Operators Manual

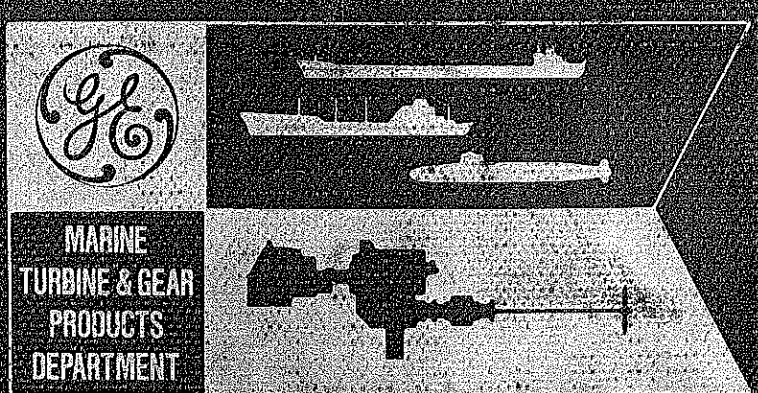
PROPULSION TURBINES AND GEARS

[redacted] ENG

#18

SUN SHIPBUILDING AND DRY DOCK COMPANY

GEK-42462

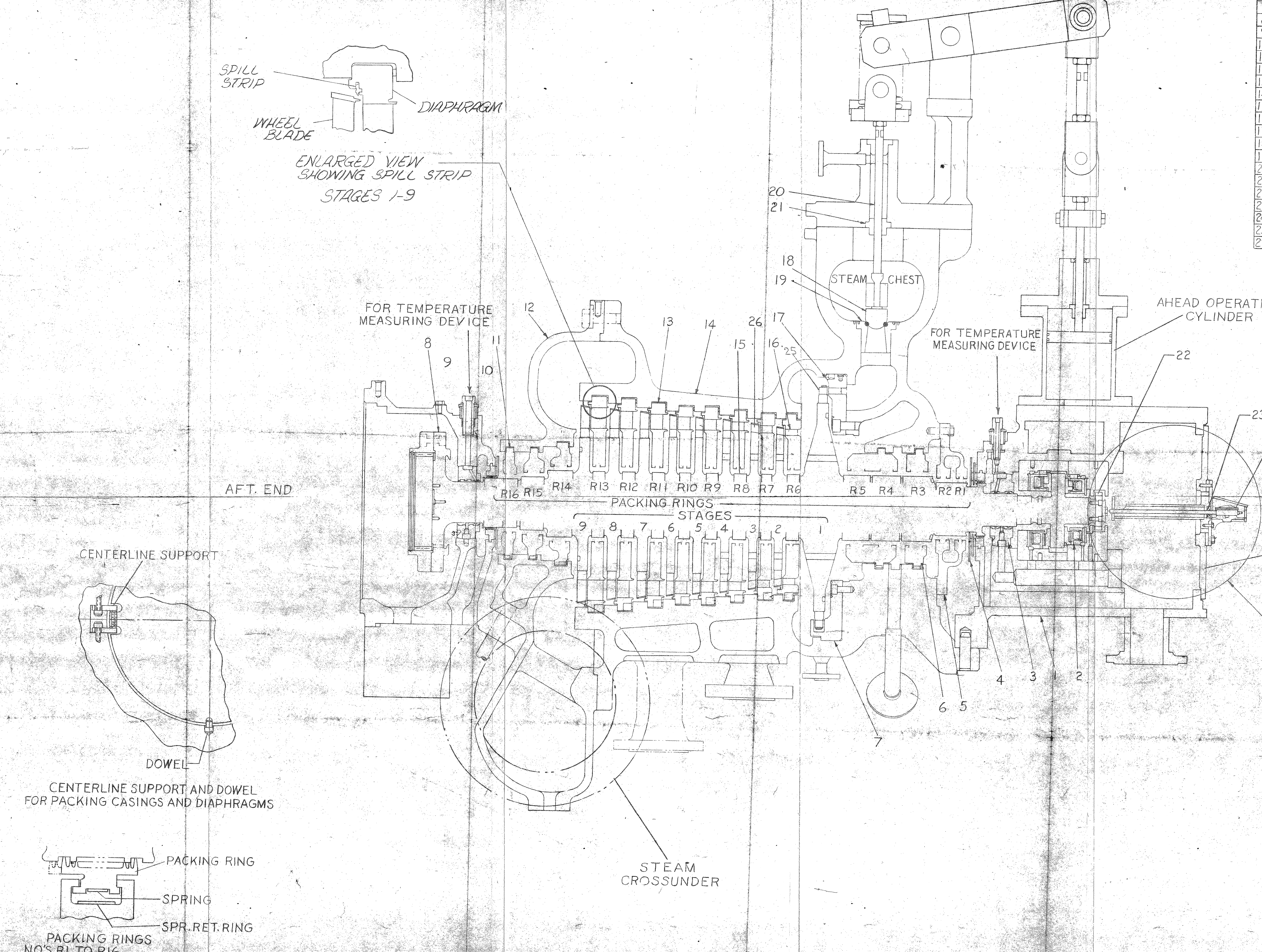


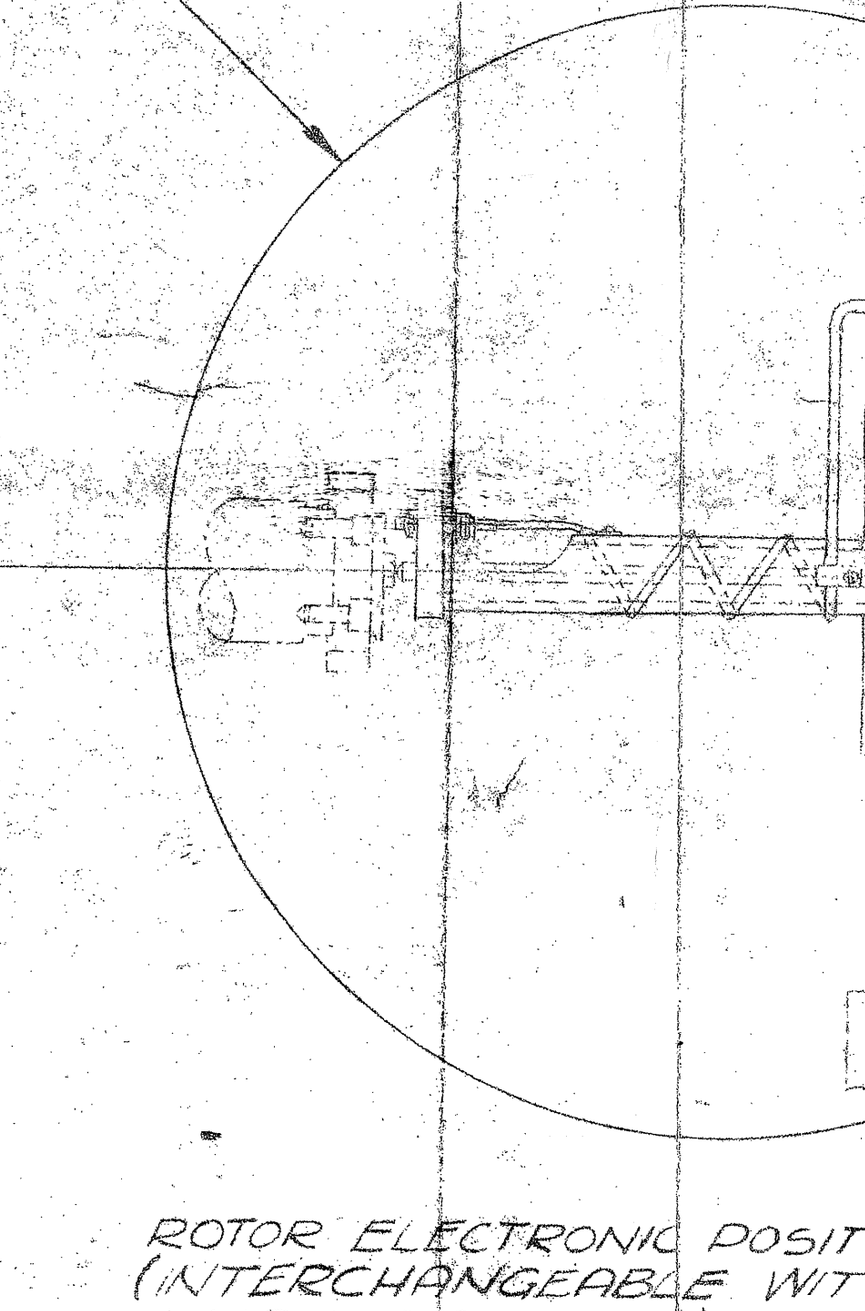
GENERAL ELECTRIC®

PC. NO.	NAME	MATERIAL	G.E. SPEC.	NEAREST EQUIV. SPEC.
1	BEARING BRACKET - FWD.	CARBON STEEL	B4A8A	ASTM-A284
2	THRUST BEARING			PIVOTED SEGMENTAL
3	JOURNAL BEARING - FWD.	CAST STEEL TIN BASE BAB.	B2MIC B21A1	ASTM-216-GR.-WCB ASTM-B23-ALLOY 3
4	OIL DEFLECTOR - FWD.	CAST AL.	B12G32A	ALLOY 750
5	PACKING BOX - FWD.	NOD. IRON	B50AM403A	ASTM-A395
6	PACKING CASINGS - FWD.	CR. MO. STL.	B50AM448A	ASTM-A387- -GR.C
7	STEAM SHIELD	MO. STL. (½ MO.	B50AM449A	ASTM-A204-GR.B
8	ROTOR	STL. FORGING	B50AM259C	ASTM-A293- -CL.6
9	JOURNAL BEARING - AFT.	CAST STEEL TIN BASE BAB.	B2MIC B21A1	ASTM-216-GR.-WCB ASTM-B23-ALLOY 3
10	OIL DEFLECTOR - AFT.	CAST. AL.	B12G32A	ALLOY 750
11	PACKING CASINGS - AFT.	CARBON STL.	B4A8A	ASTM A284
12	LOW PRESSURE HEAD - AFT.	NOD IRON	B50AM403A	ASTM A395
13	NOZZLE DIAPHRAGMS	SEE	TABULATION	BELOW
14	HIGH PRESSURE HEAD	1¼ CR. - ½ MO.	B50AM393A	ASTM-A356-GR.6
15	PACKING RINGS	SEE	TABULATION	BELOW
16	NOZZLE BLADES FOR DIAPHRAGMS	SEE	TABULATION	BELOW
17	NOZZLE PLATE, 1ST. STAGE	CR. MO. STL.	B50AM448A	ASTM-A387- GR.C
18	AHEAD CONTROL VALVE	1 CHROME 1 MOLY STL. STELLITED	B50AM450A	———
19	VALVE SEATS	1 CHROME 1 MOLY STL. STELLITED	B50AM450A	———
20	LIFT RODS	NITRIDED NITRALLOY	B5E1A	ASTM-A355-CL.A
21	LIFT ROD BUSHINGS	NITRIDED NITRALLOY	B5E1A	ASTM-A355-CL.A
22	OVERSPEED PUMP IMPELLER			
23	OIL SEAL			
24	ROTOR POSITION INDICATOR			
25	BUCKETS, STAGES 1 & 2	MOD. 12 CHROME	B50AM217B	———
26	BUCKETS, STAGES 3 TO 9 INCL.	12% CR. STN. STL. BAR	B50AM265A	———

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

PC. NO.	NAME	MATERIAL	G.E. SPEC.	NEAREST EQUIP. SPEC.
13	NOZ. PL. & DIAPH. STGS. 2 TO 5	CR. MO. STL.	B50AM448A	ASTM-A387- -GR.C
13	DIAPH. STG. 6	MO. STL.	B50AM449A	ASTM-A204-GR.B
13	DIAPH. STGS. 7 TO 9	CARBON STL.	B4A8A	ASTM-A284
15	PKG. RG. NO'S. R1, R2 & R9 TO R16	CAST BRONZE	B11G21A	LEADED NICKEL BRONZE
15	PKG. RG. NO'S R3 TO R8	DUCTILE NI RESIST	B50AM392B	ASTM-A439- -TYPE D-2C
16	NOZ. PL.	COR. RES. STL.	B50AM217	AISI-403
16	STG'S 2 TO 9	COR. RES. STL.	B7B19	AISI-TYPE 405





ROTOR ELECTRONIC POSITION DETECTOR (INTERCHANGEABLE WITH PT 24 ABOVE WHEN REQUIRED)

HULL 666

T. 10/30

(28)

(224)

GEK 5381 T.2

PS # 666-890-1 P.O.# J-37086-2

SUN SHIPBUILDING & DD CO.

SIGNATURES		
DRA [redacted]		5-21-71
CHECKED		
IS [redacted]		5-24-71
ENGRG.		
MFG.		
MAT'LS.		

MATERIAL GOVT. OR COML.

G.E.

GENERAL (GE) ELECTRIC
M.T.&G. DEPT. LOC. LYNN, MASS.

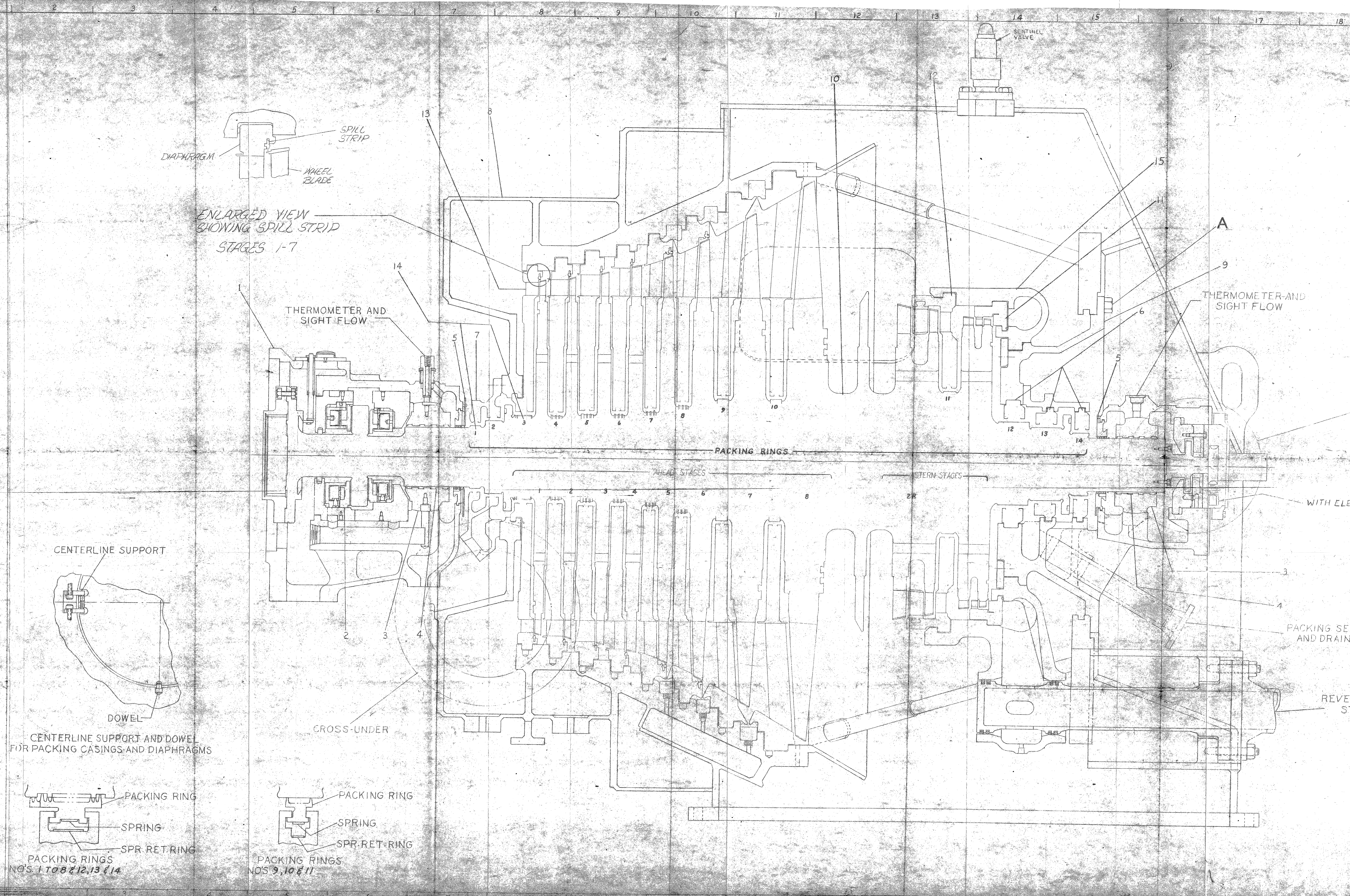
TITLE
CROSS SECTION ASSEMBLY H.P. UNIT

CONTRACT NO

CODE IDENT. NO	SIZE	DWG. NO.	REV.
01289	E	7547E18	

SCALE | WT. CALC. ACTUAL | SHEET OF

PRINTS TO: D, B, 116A, 167, 8IN, 170



PC. NO.	NAME	MATERIAL	G.E. SPEC.	NEAREST EQUIV. SPEC.
1	BEARING BRACKET	DUCTILE IRON CASTINGS	B50AM403A	ASTM-A395
2	THRUST BEARING	———	———	PIVOTED SEGMENTAL
3	LINING (FWD & AFT.)	STEEL PLATE	B4A8A	ASTM-A284
4	BABBIT (FOR PC 3	TIN BASE BABBIT	B21A1	ASTM-B23-ALLOY 3
5	OIL DEFLECTOR (FWD. & AFT.	CAST ALUMINUM	B12G32A	ALLOY 750
6	PACKING CASINGS (FWD.)	STEEL PLATE	B4A8A	ASTM-A284
	INNER, INTER. & OUTER	———	———	———
7	PACKING BOX	DUCTILE IRON CASTINGS	B50AM403A	ASTM-A395
8	EXHAUST CASING	STEEL PLATE	B4A8A	ASTM-A284
9	BRG. BRKT. & REV. HEAD	DUCTILE IRON CASTINGS	B50AM403A	ASTM-A395
10	ROTOR	NICKLE MOLY. VAN.	B50AM258C	ASTM-A293 CL 4
11	NOZ. PLATE & INTER. ASM.	STEEL PLATE	B4A8A	ASTM-A284
	& NOZ. DIAPH. STGS. 2 TO 8	———	———	———
12	NOZ. DIAPH. R2-1	CARBON MOLY. ALLOY STEEL PL.	B50AM449A	ASTM A204 GR. B
13	NOZ. BLADES (STGS. 1 T8 &	COR.-RES. STEEL	B7B19	AISI-TYPE 405
	R-1 & R-2	———	———	———
14	PACKING RINGS #1 TO 14	CAST BRONZE	B11G21A	LEADED NICKLE BRONZE
15	STEAM RING (FWD.)	STEEL CASTING	B50AM333A	ASTM-A217-CL. WC6

REVISIONS

SYM.	ZONE	DESCRIPTION	DATE	APPROVED
A		1 PCS-3,6,8,11 MAT'L WAS B4A8H	[illegible]	[illegible]
B		1 PCS-3,6,8,11 ASTM A284 WAS ADDED 2 PC 10 ASTM A293 CL 4 WAS ADDED 3 PC 12, ASTM A204 GR B WAS ADDED	[illegible]	[illegible]
C	C-5	1 ADDED ENLARGED VIEW OF SPILL STRIP	[illegible]	[illegible]
D	J-9 J-10	1 ADDED ORFICES & DAMS 70MT0239	[illegible]	[illegible]
E		1 [illegible]	[illegible]	[illegible]
F	C-11	1 DELETED SPILL STRIP STG 7 2 REVISED EXHAUST CASING	[illegible]	[illegible]
J	A-14	1 ADD SENTINEL VALVE	[illegible]	[illegible]

#219

HULL 666

(23)

T: 10/30

SUN SHIP & D.D. CO. HULL 666

RS# 666 890-1 PO# J-37086-2

GENERAL ELECTRIC
M.S.T.G.F.G. DEPT. LOC. LYNN, MASS.

SIGNATURES
DRAWN
CHECKED
ISSUED
ENGRG.
MFG.
MAT'LS

MATERIAL GOVT. OR COML.
G.E.

TITLE
CROSS SECTION ASSEMBLY
L.P. UNIT

CONTRACT NO.
CODE IDENT NO. 01289 | SIZE E | DWG NO. | REV. J
SCALE | SHEET OF

MAIN ENGINE EXPECTED OPERATING PERFORMANCE

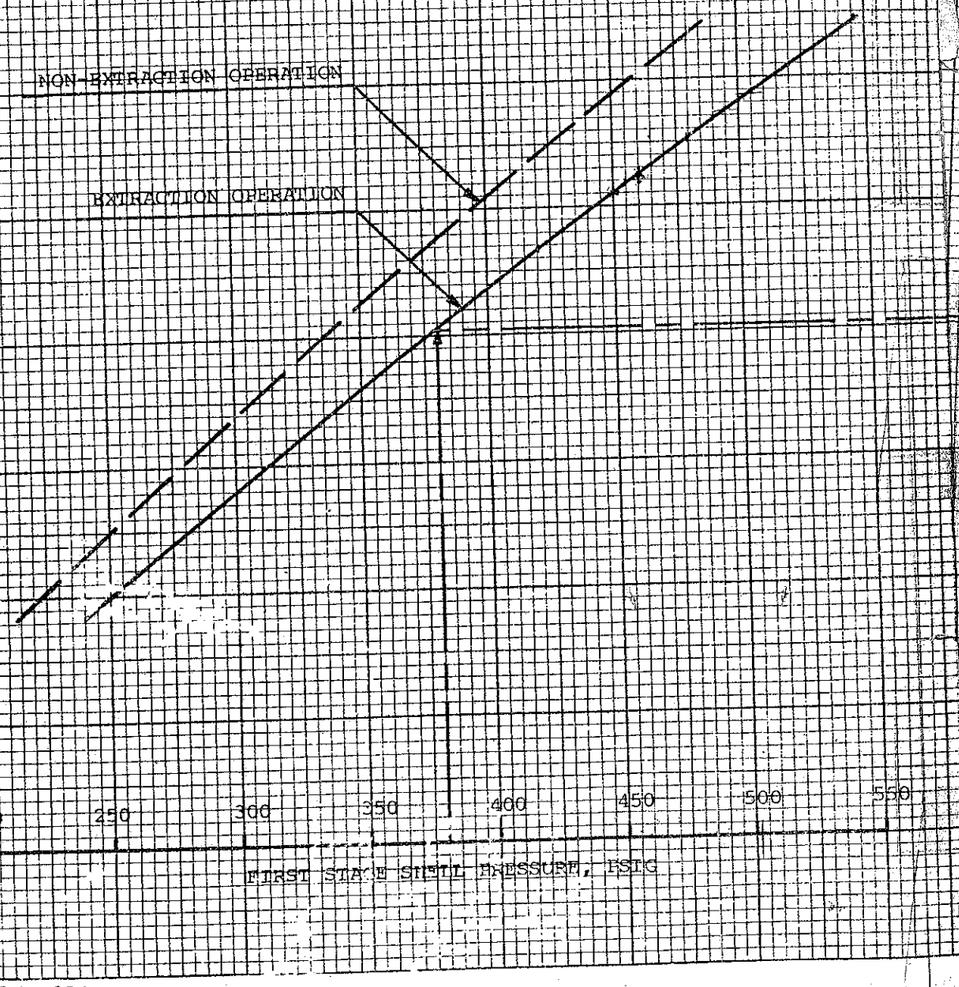
GUN/TT'S No. 1

30000 SHP - 128 RPM

645.3 PSIG - 905°F - 1.5 IN. HG. A.

Approximate Max. Extractions at Max. Power

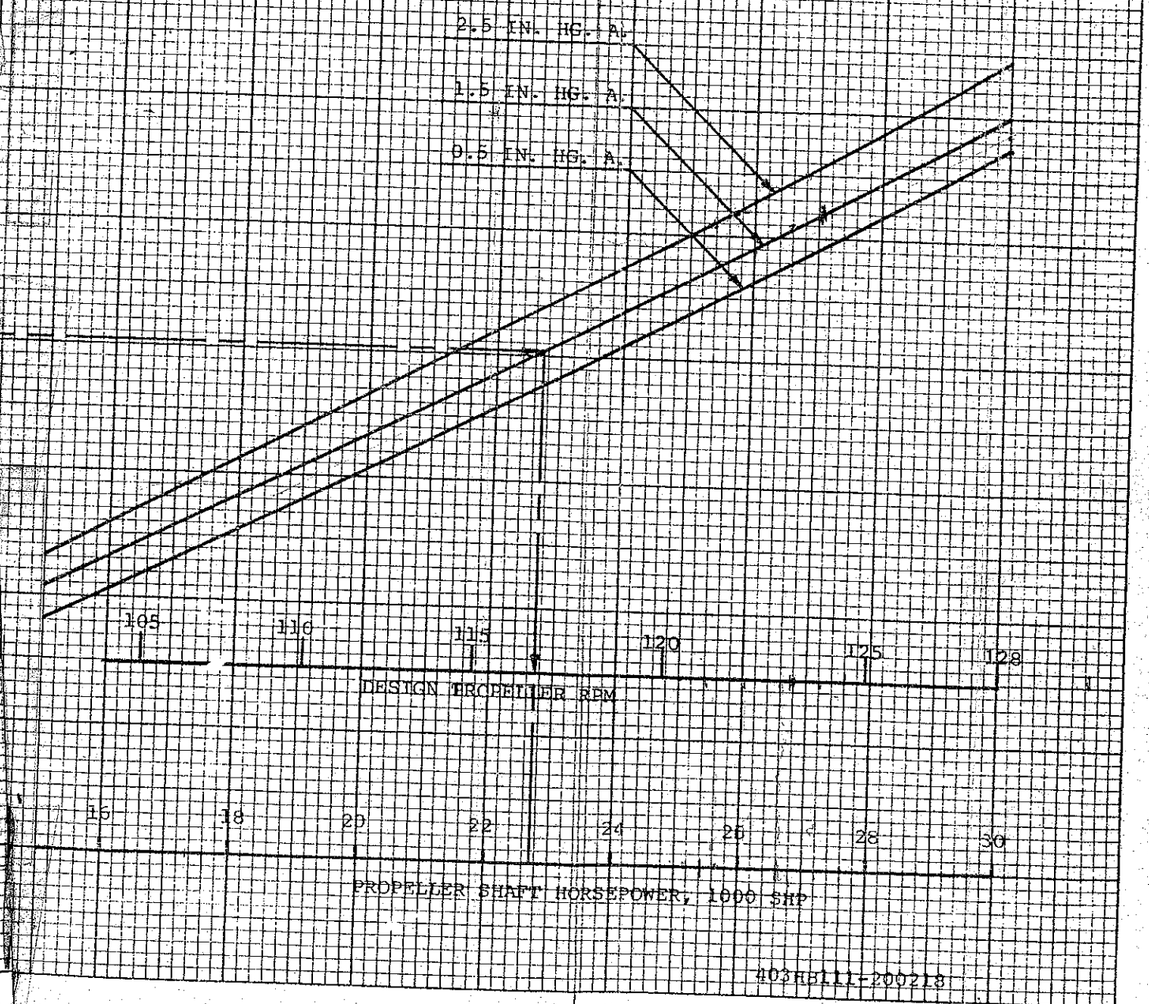
First Extraction (HP)	7000 LB/HR
Second Extraction (CO)	18900 LB/HR
Third Extraction (LP)	16100 LB/HR



Gear tooth load factors are based on 234.4 SHP per prop. RPM. To maintain proper gear tooth life, the loading should not be exceeded.

NOTES:

1. Extraction flows are approximately proportional to SHP output.
2. Change in input due to 25°F change in initial superheat and/or 5% change in throttle pressure is negligible.



403RB111-200218

717/15

7-17-75-167T
REV 8-26-75-167T

GEK-42462

PROPULSION TURBINES AND GEARS

SUN SHIPBUILDING AND DRY DOCK COMPANY

SUN P.O.	SUN HULL
J-37086-2	666
J-43282-2	670

MARINE TURBINE & GEAR PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY
LYNN, MASS.

GENERAL ELECTRIC

CONTENTS

CONTENTS (CONT'D)

5385 TC 2

TURBINE SERIAL NUMBERS

H.P. TURBINE	L.P. TURBINE
200324	200325
200414	200415

42462 SN

DRAWINGS

T-1 Outline
T-2 Assembly of High-Pressure Turbines
T-3 Assembly of Low-Pressure Turbines
T-4 Clearance Diagram, High-Pressure Turbine
T-5 Clearance Diagram, Low-Pressure Turbine
T-6 Thrust Bearing, High-Pressure Turbine
T-7 Thrust Bearing, Low-Pressure Turbine
T-8 Lube and Control Oil Diagram
T-9 Seal and Drain Diagram
T-10 Steam Seal Regulator
T-11 Mechanism for Steam Control Vavles
T-12 Control Setting Diagram
T-13 Ahead Steam Control Valves
T-14 Astern Steam Control Valves
T-15 Lifting Arrangement, High-Pressure Turbine
T-16 Lifting Arrangement, Low-Pressure Turbine
T-17 Bolt and Stud Tightening Chart
T-18 Rebabbitting drawing H.P. Turbine Fwd.
T-19 Rebabbitting drawing H.P. Turbine Aft
T-20 Rebabbitting drawing L.P. Turbine Fwd.
T-21 Rebabbitting drawing L.P. Turbine Aft.

GENERAL DESCRIPTION

The Outline drawing shows the arrangement of the main propulsion machinery.

The propulsion turbines consist of a high-pressure turbine and a low-pressure turbine located side by side and connected by a steam crossunder pipe. The rotors of the turbines are connected to the pinions of the double-reduction gear, which reduces the speeds of the turbines to the propeller shaft speed.

The Outline drawing shows the seating plan for the turbines as well as the pipe connections to external sources.

If either the high-pressure turbine or the low-pressure turbine becomes inoperative for any reason, the crossunder piping between the turbines can be rearranged to permit emergency operation on one turbine.

The turbines are equipped with speed-limiting devices which hold the turbine speed at a governing point if overspeed should occur. See the Control Setting Diagram, and the description of the Overspeed Governor System.

A low bearing-oil-pressure switch is installed in the oil feed line to the bearings. This switch senses a pressure drop in the bearing feed line and actuates to close the steam control valves when the pressure drops to a value where the bearings would not be protected. See the Lube and Control Oil Diagram.

An exhaust sentinel valve is located on top of the exhaust casing of the low-pressure turbine. This valve gives an audible alarm when the exhaust pressure becomes too high. This is not a relief valve.

In case of failure of the control oil system the ahead and astern valves may be operated manually in order to control the movement of the ship. See Section 3, OPERATION.

HIGH-PRESSURE AND LOW-PRESSURE TURBINES

HIGH-PRESSURE TURBINE

The high-pressure turbine casing consists of two halves, upper and lower, and has a metal-to-metal steam joint the entire length of the horizontal centerline (see drawing, Assembly of High-pressure Turbine). The upper halves of both the forward and aft bearing brackets can be removed for access to the journal bearings and thrust bearing. The upper halves of both the forward and aft packing boxes can also be removed to inspect the outer rings of packing, and also to provide access to the balance grooves in the shoulders of the rotor. Openings are provided in the lower-half casing for the extraction of steam.

The steam chest, which contains the ahead steam control valves, is integral with the upper half of the casing. The chest has flanged openings at each end; one opening is the steam inlet from the strainer, while the other opening allows steam flow to the astern valve. See the Outline drawing for these connections.

LOW-PRESSURE TURBINE

The low-pressure turbine, like the high-pressure turbine, has a metal-to-metal steam joint the entire length of the horizontal centerline (See drawing, Assembly of Low-Pressure Turbine). The forward and aft bearing brackets, as well as the forward and aft packing boxes also have metal-to-metal horizontal joints.

The ahead steam inlet is located in the lower half, aft end, of the turbine casing. This inlet is connected to the exhaust of the high-pressure turbine by the crossover pipe. See the Outline drawing for the arrangement of this piping.

The astern steam inlet, allows steam to flow to the steam ring of the reversing element. The exhaust connection from the turbine is bolted to the main condenser.

Astern Steam Ring

The steam ring for the astern element is an inner casing located in the forward end of the low-pressure turbine. The steam ring consists of an upper-half and lower-half casting with an annular chamber through which the steam flows to both the upper and lower halves of the astern nozzle plate. The steam ring is bolted together at its horizontal joint, and is centerline supported in the turbine casing.