



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

OPNAVINST 9094.1B
N86

01 August 1996

OPNAV INSTRUCTION 9094.1B

From: Chief of Naval Operations

Subj: FULL POWER AND ECONOMY TRIAL REQUIREMENTS FOR NON-NUCLEAR SURFACE SHIP CLASSES

Ref: (a) FXP-4 Mobility (MOB) Exercises (NOTAL)
(b) NAVSEA S9086-C4-STM-000/CH-094 R1 Trials
(c) NAVSEA SL101-AA-GYD-010 Energy Conservation

Encl: (1) Composite Listing of Non-Nuclear Active Fleet Surface Ships, Full Power and Economy Trial Requirements
(2) Sea Water Injection Temperature Correction Tables
(3) Time-Out-of-Dock and Ship Age Correction Tables
(4) Fuel Temperature Correction Table
(5) Sample Full Power Trial Computations

1. Purpose

a. To provide full power and economy trial requirements for non-nuclear surface ship classes for trials conducted for any reason other than contract trials and to delineate reporting procedures for updating trial requirements.

b. To update enclosure (1) by adding new ship classes, deleting obsolete classes and revising, where required, existing ship class requirements.

2. Cancellation OPNAV Instruction 9094.1A.

3. Applicability This instruction applies to all non-nuclear surface ship power and economy trials conducted for any reason other than contract trials.

4. Discussion Reference (a) provides general guidelines for conducting engineering trial. Enclosure (1) tabulates full power and economy trial requirements based on calculations, design requirements, and actual standardization trial results. The full power trial requirement for all non-nuclear surface ships is based on developing 95 percent of the design rated full power shaft horsepower (SHP).



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a. Full power trial measurement for those ships without torsionmeters installed is based on propeller RPM related to 95 percent of design full power. Enclosures (1) through (4) provide the requirements and allowances for various other factors such as displacement, ship's age, seawater injection temperature, time-out-of-dock, and fuel temperature, which further correct the actual propeller RPM required to demonstrate full power.

b. Full power trial measurement for those ships provided with installed torsionmeters is based on a direct reading of the SHP (95 percent of design full power).

c. Enclosure (5) provides sample computations for establishing full power requirements for various ship classes.

5. Policy

a. Full power trials shall be conducted for a minimum duration of 1 hour and at a minimum depth of water as prescribed by reference (b). As directed by the observing senior engineer, extended full power demonstration may be necessitated because of observed dynamic changes in plant performance/stability. All full power trials shall be conducted with a 75 percent minimum liquid load (including bulk cargo tanks) at the commencement of the trial. Fleet/Type commanders shall determine when full power and economy trials are to be conducted and they shall ensure machinery alignments during these trials are in accordance with design heat balance diagrams, propulsion operating guides, and reference (c).

b. Economy trials shall be conducted as specified by fleet/type commanders and they shall ensure machinery alignments during economy trials conform to propulsion operating guides and reference (c).

c. Full power and economy trials may be conducted in conjunction with engineering trials conducted for competitive exercises, and Board of Inspection and Survey Underway Material Inspections. Full power and economy trials shall not be conducted in conjunction with Builders and Acceptance Trials governed by contract specifications. The requirements and factors delineated in enclosures (1) through (4) are applicable to full power and economy trials.

6. Responsibilities

a. Fleet commanders and type commanders shall direct engineering trial requirements using enclosures (1) through (5) and reference (a) as the basis. All recommended corrections and changes will be provided to Commander Naval Sea Systems Command (COMNAVSEASYSOM) code SEA 03X.

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b. COMNAVSEASYSKOM (SEA 03X) will review all engineering trials and issue message changes to this instruction, based on calculations, design requirements, and review of engineering trials conducted, with the concurrence of Chief of Naval Operations (N86). A formal change to this instruction will be issued annually to incorporate all message changes.

7. Action

a. Reports of all satisfactory and unsatisfactory engineering trials shall be provided to COMNAVSEASYSKOM (SEA 03X). The report of an unsatisfactory trial is particularly important because it can be used to provide information on design or material problems that preclude a successful trial.

8. Reports and Forms

a. Reports shall be completed using the applicable OPNAV 9094 series forms. Completed reports are assigned report control symbol OPNAV 9094-1 and are approved for three years from the date of this instruction.

b. The following forms are available through normal Navy supply channels (Ser NAVSUP P-2002):

OPNAV 9094/1A (5/79)	Engineering Trial Report Letter S/N 0107-LF-090-9405
OPNAV 9094/1B (5/79)	Engineering Trial Report - Trial Data (Steam Turbine Driven Ships with Oil Fired Boilers)
	Sheet 1 S/N 0107-LF-090-9410
	Sheet 2A S/N 0107-LF-090-9415
	Sheet 2B S/N 0107-LF-090-9420
	Sheet 3 S/N 0107-LF-090-9425
OPNAV 9094/1C (5/79)	Engineering Trial Report - Trial Data (Diesel Driven Ships)
	Sheet 1 S/N 0107-LF-090-9430
	Sheet 2 S/N 0107-LF-090-9435

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OPNAV 9094/1D (5/79) Engineering Trial Report - Trial Data
(Gas Turbine Driven Ships)

Sheet 1 S/N 0107-LF-090-9440

Sheet 2 S/N 0107-LF-090-9445



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**COMPOSITE LISTING OF NON-NUCLEAR
ACTIVE FLEET SURFACE SHIPS,
FULL POWER
AND
ECONOMY TRIAL
REQUIREMENTS**

Enclosure (1)

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AD 37 AND 41 CLASSES

Applicable to the following ships:

AD 37, 38, 41, 43 and 44

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	20,000
Design RPM	150

Propellers

No. Installed	1
Type	Fixed Pitch
Diameter	18'
Pitch	16'-10" at 0.7 Radius
No. of Blades	6

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
16,000	18'-11"	148.0	1802	1840
17,000	19'-10"	147.5		
18,000	20'-8"	147.0		
19,000	21'-6"	146.0		
20,000	22'-5"	145.5		
21,000	23'-4"	145.0		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	68	466	476
15	100	869	888

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AE 26 CLASS

Applicable to the following ships:

AE 27, 28, 29, 33, 34 and 35

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	22,000
Design RPM	115

Propellers

No. Installed	1
Type	Fixed Pitch
Diameter	20'
Pitch	22.16' at 0.7 Radius
No. of Blades	6

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
14,000	21'	113.0	1837	1876
15,000	22'-1 1/2"	113.0		
16,000	23'-3"	112.5		
17,000	24'-4"	112.5		
18,000	25'-5 1/2"	112.5		
19,000	26'-6 1/2"	112.0		
20,000	27'-8 1/2"	112.0		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
15	74	815	832
18	90	1096	1119

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AGF 3 CLASS

Applicable to the following ship:

AGF 3

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	24,000
Design RPM	235

Propellers

No. Installed	2
Type	Fixed Pitch
Diameter	12'-6"
Pitch	11'-10 5/8" at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (based on 95% of design SHP
and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller		Fuel
		RPM	SF-76	(gal/hr) JP-5
8,000	13'-8"	231	2075	2121
9,000	15'-1"	229		
10,000	16'-3"	228		
11,000	17'-5"	227		
12,000	18'-7"	225		
13,000	19'-9"	224		
14,000	21'-1"	223		
15,000	22'-2"	222		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	100	510	524
15	151	882	904

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AGF 11 CLASS

Applicable to the following ship:

AGF 11

Main Propulsion Machinery

Steam Turbine Double Reduction Gear
Design SHP 24,000
Design RPM 235

Propellers

No. Installed 2
Type Fixed Pitch
Diameter 12.5'
Pitch 11.8' at 0.7 Radius
No. of Blades 5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
13,500	18'- 4"	221.5	2224	2270
14,000	18'-10"	221.0		
14,500	19'- 4"	220.5		
15,000	19'-11"	220.0		
15,500	20'- 5"	219.5		
16,000	20'-11"	219.0		
16,500	21'- 5"	218.5		
17,000	21'-11"	218.0		

Injection Temperature Correction Table

Injection Temperature °F Correction Factor

75 and below	1.000
80	0.998
85	0.996

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	110	584	596
15	164	1046	1068

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AO(J) 177 CLASS

Applicable to the following ships:

AO 177, 178, 179, 180 and 186

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	24,000
Design RPM	100

Propellers:

No. Installed	1
Type	Fixed Pitch
Diameter	21'
Pitch	25' 9-1/2" at 0.7 Radius
No. of blades	5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller		Fuel
		RPM	SF-76	(gal/hr) JP-5
22,000	20' 0"	101.0	1838	1876
24,000	22' 8-3/4"	101.0		
26,000	24' 4-1/2"	100.5		
28,000	26' 0"	100.5		
30,000	27' 8-3/8"	100.0		
32,000	29' 3-5/8"	100.0		
34,000	30' 9-5/8"	99.5		
36,000	32' 5"	99.0		
38,000	33' 11-3/8"	98.5		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

1 Boiler Operations

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	48	550	596
15	70	924	943

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AO 177(J) CLASS (Cont'd)

2 Boiler Operations

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
15	70	966	986
20	93	1706	1740

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AOE 1 CLASS

Applicable to the following ships:

AOE 1, 2, 3, and 4

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	100,000
Design RPM	140

Propellers

No. Installed	2
Type	Fixed Pitch
Diameter	23'
Pitch	23.328' at 0.7 Radius
No. of Blades	6

Full Power Trial Requirements (based on 95% of design SHP
and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
34,000	27'	142.0	8578	8756
36,000	28' 4-1/4"	141.5		
38,000	29' 7-3/4"	141.0		
40,000	31'	140.5		
42,000	32' 3"	140.0		
44,000	33' 6"	139.5		
46,000	34' 8-1/2"	139.0		
48,000	35' 10-1/2"	138.5		
50,000	37'	138.0		
52,000	38'	137.5		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
15	72	1853	1892
20	96	3071	3135

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AOE 6 CLASS

Applicable to the following ships:

AOE 6 and 7

Main Propulsion Machinery

Gas Turbine	Double Reduction Reverse Gear
Gas Turbine Engines	Four G.E. LM2500
Design BHP & RPM	26,250 @3600 RPM
Design SHP	100,000
Design RPM	140

Propellers

No. Installed	2
Type	Fixed Pitch
Diameter	23'
Pitch	24.43'at 0.7 Radius
No. of blades	6

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (47,500 SHP/shaft))

CAUTION

**Ensure the torque split between engines
on a shaft does not exceed 6,000 ft-lbs**

Notes: No allowances need to be made for varying displacement, hull fouling, etc.

Fuel (gal/hr)	
SF-76	JP-5
6038	6162

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AOE 6 CLASS (Cont'd)

Economy Trial Requirements

Speed (knots)	RPM	Split Plant Mode Fuel (gal/hr)		Full Power Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
15	68	1448	1478	1856	1894
20	91	2264	2310	2754	2810

Speed (knots)	RPM	Trail Shaft Mode Fuel (gal/hr)	
		SF-76	JP-5
15	83	1305	1332

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AOE 10 CLASS

Applicable to the following ship:

AOE 10

Main Propulsion Machinery

Gas Turbine	Double Reduction Reverse Gear
Gas Turbine Engines	Four G.E. LM2500
Design BHP & RPM	26,250 HP @3600 RPM
Design SHP	100,000
Design RPM	140

Propellers

No. Installed	2
Type	Fixed Pitch
Diameter	23'
Pitch	24.43' at 0.7 Radius
No. of blades	6

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (47,500 SHP/shaft))

CAUTION

ENSURE the torque split between engines on a shaft does not exceed 6,000 ft-lbs

Note: No allowances need to be made for varying displacement, hull fouling, etc.

	Fuel
	(gal/hr)
SF-76	JP-5

*

*

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

AOE 10 CLASS (Cont'd)

Economy Trial Requirements:

Speed (knots)	RPM	Split Plant Mode (gal/hr)			Full Power Mode (gal/hr)
		SF-76	JP-5	SF-76	JP-5
15	*	*	*	*	*
20	*	*	*	*	*

Speed (knots)	RPM	Trail Shaft Mode Fuel (gal/hr)	
		SF-76	JP-5
15	*	*	*

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

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AOR 1 CLASS

Applicable to the following ships:

AOR 6 and 7

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	32,000
Design RPM	105

Propellers

No. Installed	2
Type	Fixed Pitch
Diameter	20.5'
Pitch	23.78' at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
28,000	26'	103	2273	2321
30,000	27'-6 1/2"	103		
32,000	29'-1"	102		
34,000	29'-7 1/4"	102		
36,000	32'-1 1/4"	102		
38,000	33'-7 1/4"	101		
40,000	35'-1 1/4"	101		
42,000	36'-6"	101		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	47	602	615
15	70	1053	1075

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ARS 50 CLASS

Applicable to the following ships:

ARS 50, 51, 52 and 53

Main Propulsion Machinery

Deisel	Single Reduction Gear
Diesel Engines	Four Caterpillar D399
Design BHP & RPM	1100 @ 1225 RPM
Design SHP	4200
Design RPM	150

Propellers

No. Installed	2
Type	Controllable Pitch, inside a kort nozzle.
Diameter	10.5' at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (1,995 SHP/shaft))

The following engine parameters should not be exceeded when attempting to reach full power:

BHP/Engine:	1100
Engine RPM:	1225
Exh Gas Temp (Stack):	900°F
Jacket Water Temp:	205°F
Lube Oil Temp:	220°F

Note: 1. It may be necessary to use pitch trim to obtain full power.

2. No allowances are made for varying displacement, hull fouling, etc.

Fuel	
(gal/hr)	
SF-76	JP-5
278	290

Economy Trial Requirements

Speed	RPM	Fuel	
(knots)		(gal/hr)	
		SF-76	JP-5
*	*	*	*

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

Enclosure (1)

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AS 31 CLASS

Applicable to the following ship:

AS 32

Main Propulsion Machinery

Diesel	Electric (AC)
Diesel Engines	Six Fairbanks Morse 38TD-8 1/8
Design BHP & RPM	2655 @ 850 RPM
Design SHP	15,000
Design RPM	157

Propeller

No. Installed	1
Type	Fixed Pitch
Diameter	18'
Pitch	14.72' at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements

1. Primary method: Attain 157 SRPM (no corrections for displacement, time-out-of-dock, age of ship, fuel temp, or seawater injection temp). If unable to attain at least 149 SRPM, use alternate method below.

2. Alternate method: If unable to attain 149 SRPM, attainment of total engine torque of 93,680 ft-lbs (+0/-3000) is required for satisfactory demonstration of full power.

CAUTION: Because of design limitations, do not exceed 157 SRPM or 98,610 ft-lbs total engine torque.

Note: Individual engine torque is calculated as follows:

Engine HP = 1.34 x Generator KW output

Engine Torque [ft-lbs] = $\frac{5252 \times \text{Engine HP}}{\text{Engine RPM}}$

Total Engine Torque is the sum of the torque supplied by all six on line engines.

No additional allowances are authorized for displacement, time-out-of-dock or age of ship because of propeller under pitch.

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AS 31 CLASS (Cont'd)

Maximum cylinder exhaust temperature shall not exceed 1100 °F. 1000 °F (normal at full load)

Fuel (gal/hr)	
SF-76	JP-5
1083	1105

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)
*	*	*

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

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AS 33 CLASS

Applicable to the following ship:

AS 33

Main Propulsion Machinery

Steam Turbine Double Reduction Gear, Fixed Pitch
Design SHP 20,000
Design RPM 150

Propellers

No. Installed 1
Type Fixed Pitch
Diameter 18'
Pitch 16'-10" at 0.7 Radius
No. of Blades 6

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
16,000	18'-11"	148.0	1843	1882
17,000	19'-10"	147.5		
18,000	20'-8"	147.0		
19,000	21'-6"	146.0		
20,000	22'-5"	145.5		
21,000	23'-4"	145.0		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	68	587	600
15	100	1015	1037

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AS 36 AND 39 CLASSES

Applicable to the following ships:

AS 36, 37, 39, 40 and 41

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	20,000
Design RPM	150

Propellers

No. Installed	1
Type	Fixed Pitch
Diameter	18'
Pitch	16'-10" at 0.7 Radius
No. of Blades	6

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
16,000	18'-11"	148.0	1843	1882
17,000	19'-10"	147.5		
18,000	20'-8"	147.0		
19,000	21'-6"	146.0		
20,000	22'-5"	145.5		
21,000	23'-4"	145.0		
22,000	24'-3"	144.0		
23,000	25'-1"	143.5		
24,000	25'-11"	143.0		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	68	587	600
15	100	1015	1037

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ATS 1 CLASS

Applicable to the following ships:

ATS 1, 2 and 3

Main Propulsion Machinery

Diesel	Single Reduction Gear
Diesel Engine	Four Caterpillar Engines
Design BHP & RPM	1700 @ 1650 RPM
Design RPM	150
Design SHP	6600

Propellers

No. Installed	2
Type	Controllable Pitch, Escher Wyss
Diameter	11' 9"
Pitch	9.01' at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (3,135 SHP/shaft))

The following engine parameters should not be exceeded when attempting to reach full power:

BHP/Engine	Fuel Rack Setting	Exhaust Gas Temp. (Individual Cylinder)	Air Manifold Pressure
1700 at 1650 RPM	6.2 mm	1108 °F	20 psig at Full Load

Fuel (gal/hr)	
SF-76	JP-5
380	487

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)
*	*	SF-76 JP-5
		* *

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

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CG 47 CLASS

Applicable to the following ships:

CG 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72 and 73

Main Propulsion Machinery

Gas Turbine	Double Reduction Gear
Gas Turbine Engines	Four G.E. LM 2500 GT
Design BHP & RPM	21,500 @ 3600 RPM
Design SHP	80,000
Design RPM	168

Propellers

No. Installed	2
Type	Controllable Pitch
Diameter	17'
Pitch	26'2" at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (38,000 SHP/shaft))

CAUTION

**Ensure the torque split between engines
on a shaft does not exceed 6,000 ft-lbs**

Notes:

- (1) No allowances need to be made for varying displacement, hull fouling, etc.
(2) All bleed air is to be secured during this trial.

	Fuel
	(gal/hr)
SF-76	JP-5
5250	5355

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CG 47 CLASS (Cont'd)

Economy Trial Requirements

Notes:

- (1) CG 47 through CG 68 and CG 71 - For steady state single engine operation (trail shaft (15 knots) and split plant (22 knots), the main propulsion shaft torque shall be limited to a maximum value of 550,000 FT-LBS.
- (2) CG 69,70,72 and CG 73 - For steady state single engine operation (trail shaft only), the main propulsion shaft torque shall be limited to a maximum value of 550,000 FT-LBS.
- (3) All bleed air is to be secured during this trial.

SPEED (knots)	RPM	Split Plant Mode Fuel (gal/hr)		Full Power Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
15	79	1356	1383	1706	1740
20	104	1966	2005	2376	2425
25	131	2766	2821	3226	3291

SPEED (knots)	RPM	Trail Shaft Mode Fuel (gal/hr)	
		SF-76	JP-5
15	*	*	*

* Data will be furnished on the next issue

CV 60 CLASS

Applicable to the following ship:

CV 62

Main Propulsion Machinery

Steam Turbine Double Reduction Gear
Design SHP 280,000
Design RPM 170

Propellers

No. Installed 4
Type Fixed Pitch
Diameter 21'
Pitch 24.9' at 0.7 Radius
No. of Blades 5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM		Fuel (gal/hr)	
		Inboard	Outboard	SF-76	JP-5
70,000	32'- 6"	160	162	22,578	23,047
72,000	33'- 3"	160	162		
74,000	34'- 0"	160	162		
76,000	34'- 10"	159	161		
78,000	35'- 7"	159	161		
80,000	36'- 4"	158	160		
82,000	37'- 1"	158	160		
84,000	37'- 11"	157	160		

Use Group 3 Injection Temperature Correction Table.

In addition to the above correction, a reduction in RPM is made to allow for hull fouling. For the first 20 months since last hull cleaning and painting, reduce the RPM by 3/4 of a revolution per month; for each additional month, reduce the RPM by 1/4 of a revolution per month.

(TIME-OUT-OF DOCK ALLOWANCE FACTOR of Enclosure 4 does not apply)
Economy Trial Requirements (4 Boilers)

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
15	68	3,262	3,330
20	92	5,235	5,343
25	116	9,040	9,227

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CV 63 CLASS

Applicable to the following ships:

CV 63 and 64

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	280,000
Design RPM	170

Propellers

No. Installed	4
Type	Fixed Pitch
Diameter	21'
Pitch	24.9' at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM		Fuel (gal/hr)	
		Inboard	Outboard	SF-76	JP-5
70,000	32'- 3"	160	162	22,648	23,118
72,000	33'- 1"	160	162		
74,000	33'- 10"	160	162		
76,000	34'- 8"	159	161		
78,000	35'- 6"	159	161		
80,000	36'- 3"	158	160		
82,000	37'- 1"	158	160		
84,000	37'- 10"	157	160		

Use Group 3 Injection Temperature Correction Table

In addition to the above correction, a reduction in RPM is made to allow for hull fouling. For the first 20 months since last hull cleaning and painting, reduce the RPM by 3/4 of a revolution per month; for each additional month, reduce the RPM by 1/4 of a revolution per month.

(TIME-OUT-OF DOCK ALLOWANCE FACTOR of Enclosure 4 does not apply)
Economy Trial Requirements (4 Boilers)

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
15	68	3,108	3,173
20	92	5,099	5,205
25	116	9,240	9,432

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CV 66 CLASS

Applicable to the following ship:

CV 66

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	280,000
Design RPM	170

Propellers

No.	Installed 4
Type	Fixed Pitch
Diameter	21'
Pitch	24.1' at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM		Fuel (gal/hr)	
		Inboard	Outboard	SF-76	JP-5
70,000	32'- 3"	172	174	22,133	23,593
72,000	33'- 0"	171	173		
74,000	33'- 10"	171	173		
76,000	34'- 7"	170	172		
78,000	35'- 4"	170	172		
80,000	36'- 2"	169	171		
82,000	36'- 11"	169	171		
84,000	37'- 8"	168	170		

Use Group 3 Injection Temperature Correction Table

In addition to the above correction, a reduction in RPM is made to allow for hull fouling. For the first 20 months since last hull cleaning and painting, reduce the RPM by 3/4 of a revolution per month; for each additional month, reduce the RPM by 1/4 of a revolution per month.

(TIME-OUT-OF DOCK ALLOWANCE FACTOR of Enclosure 4 does not apply)
Economy Trial Requirements (4 Boilers)

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
15	70	2,955	3,016
20	92	5,242	5,351
25	116	9,203	9,394

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CV 67 CLASS

Applicable to the following ship:

CV 67

Main Propulsion Machinery

Steam Turbine Double Reduction Gear
Design SHP 280,000
Design RPM 170

Propellers

No. Installed 4
Type Fixed Pitch
Diameter 21'
Pitch 24.1' at 0.7 Radius
No. of Blades 5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM		Fuel (gal/hr)	
		Inboard	Outboard	SF-76	JP-5
70,000	31'- 5"	169	175	22,160	22,620
72,000	32'- 3"	168	174		
74,000	33'- 0"	168	174		
76,000	33'- 10"	167	173		
78,000	34'- 7"	167	173		
80,000	35'- 4"	166	172		
82,000	36'- 2"	166	172		
84,000	36'- 11"	165	171		

Use Group 3 Injection Temperature Correction Table

In addition to the above correction, a reduction in RPM is made to allow for hull fouling. For the first 20 months since last hull cleaning and painting, reduce the RPM by 3/4 per month; for each additional month, reduce the RPM by 1/4 per month.

(TIME-OUT-OF DOCK ALLOWANCE FACTOR of Enclosure 4 does not apply)
Economy Trial Requirements (4 Boilers)

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
15	73	3,593	3,668
20	95	5,398	5,510
25	120	9,292	9,485

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DD 963 CLASS

Applicable to the following ships:

DD 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992 and 997.

Main Propulsion Machinery

Gas Turbine	Double Reduction Gear
Gas Turbine Engines	Four G.E. LM 2500 GT
Design BHP	21,500 @ 3600 RPM
Design SHP	80,000
Design RPM	168

Propellers

No. Installed	2
Type	Controllable Pitch
Diameter	17'
Pitch	26'2" at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (38,000 SHP/shaft))

CAUTION

**Ensure the torque split between engines
on a shaft does not exceed 6,000 ft-lbs**

Notes:

- (1) Recommend Full Power Mode to achieve speed in excess of 22 knots
- (2) No allowances need to be made for varying displacement, hull fouling, etc.
- (3) All bleed air is to be secured during this trial.

Fuel	
(gal/hr)	
SF-76	JP-5
5200	5304

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DD 963 CLASS (Cont'd)

Economy Trial Requirements

Notes:

(1) For steady state single engine operation (split plant and trail shaft operations), the main propulsion shaft torque shall be limited to a maximum value of 550,000 FT-LBS.

(2) All bleed air is to be secured during this trial.

Speed (knots)	RPM	Split Plant Mode Fuel (gal/hr)		Full Power Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
15	72	1,150	1,173	1,520	1,550
20	97	1,670	1,704	2,070	2,111
25	122	2,430	2,479	2,880	2,977

Speed (Knots)	RPM	Trail Shaft Mode Fuel (gal/hr)	
		SF-76	JP-5
15	*	*	*

* Data will be furnished on the next issue

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DDG 51 CLASS

Applicable to the following ships:

DDG 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77 and 78

Main Propulsion Machinery

Gas Turbine	Double reduction Gear
Gas Turbine Engines	Four G.E. LM 2500 GT
Design BHP	26,500 @ 3600 RPM
Design SHP	100,000
Design RPM	168

Propellers

No. Installed	2
Type	Controllable Pitch
Diameter	17'
Pitch	29'2" at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (47,500/shaft))

CAUTION

**Ensure the torque split between engines
on a shaft does not exceed 6,000 ft-lbs**

Notes:

- (1) No allowances need to be made for varying displacement, hull fouling, etc.
(2) All bleed air is to be secured during this trial.

Fuel (gal/hr)	
SF-76	JP-5
5982	6100

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DDG 51 CLASS (Cont'd)

Economy Trial Requirements

Notes:

(1) All bleed air is to be secured during this trial.

Speed (knots)	RPM	Split Plant Mode Fuel (gal/hr)		Full Power Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
15	66	1128	1150	1522	1552
20	88	1580	1611	1947	1986
25	114	2430	2479	2787	2843

Speed (knots)	RPM	Trail Shaft Mode Fuel (gal/hr)	
		SF-76	JP-5
15		*	*

* Data will be furnished on the next issue

DDG 993 CLASS

Applicable to the following ships:

DDG 993, 994, 995 and 996

Main Propulsion Machinery

Gas Turbine	Double Reduction Gear
Gas Turbine Engines	Four G.E. LM 2500 GT
Design SHP	80,000
Design RPM	168
Design BHP	21,500 @ 3600 RPM

Propellers

No. Installed	2
Type	Controllable Pitch
Diameter	17'
Pitch	26'2" at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (38,000 SHP/Shaft))

CAUTION

**Ensure the torque split between engines
on a shaft does not exceed 6,000 ft-lbs**

Notes:

- (1) Recommend Full Power Mode to achieve speed in excess of 22 knots
- (2) No allowances need to be made for varying displacement, hull fouling, etc.
- (3) All bleed air is to be secured during this trial.

Fuel	
(gal/hr)	
SF-76	JP-5
5280	5386

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DDG 993 Class (Cont'd)

Economy Trial Requirements

Notes:

(1) For steady state single engine operation (split plant and trail shaft operations), the main propulsion shaft torque shall be limited to a maximum value of 550,000 FT-LBS.

(2) All bleed air is to be secured during this trial.

Speed (knots)	RPM	Split Plant Mode Fuel (gal/hr)		Full Power Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
15	72	1216	1240	1536	1567
20	98	1836	1873	2196	2240
25	125	2686	2740	3116	3178

Speed (knots)	RPM	Trail Shaft Mode Fuel (gal/hr)	
		SF-76	JP-5
15	*	*	*

* Data will be furnished on the next issue

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FFG 7 CLASS

Applicable to the following ships:

FFG 7, 8, 9, 11, 12, 13, 14, 15, 19, 20, 21, 22, 23, 24, 25,
26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42,
43, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59,
60, and 61

Main Propulsion Machinery

Gas Turbine	Double Reduction Gear
Gas Turbine Engines	Two G.E. LM 2500 GT
Design BHP	20,500 @ 3600 RPM
Design SHP	40,000
Design RPM	180

Propellers

No. Installed	1
Type	Controllable Pitch
Diameter	16.5'
Pitch	23.5' at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (based on 95% of design SHP and
trials data)

CAUTION

**Ensure the torque split between engines
on a shaft does not exceed 6,000 ft-lbs**

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
3,400	14'-4"	180	2560	2614
3,600	14'-10"	180		
3,800	15'-4"	179		
4,000	15'-7"	178		
4,100	16'-1"	177		
4,200	16'-4"	176		

Notes:

- (1) All bleed air to be secured during this trial.
- (2) Use Time-out-of-Dock Allowance Factors only.
- (3) Minimum pitch required during F.P. run is 23.5'.

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FFG 7 CLASS (Cont'd)

Economy Trial Requirements:

Speed (knots)	RPM	Single Engine Mode Fuel (gal/hr)			Two Engine Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5	
15	84	620	632	810	826	
20	114	940	959	1160	1183	
25	144	--	--	1730	1765	

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LCC 19 CLASS

Applicable to the following ships:

LCC 19 and 20

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	20,000
Design RPM	115

Propellers

No. Installed	1
Type	Fixed Pitch
Diameter	20'
Pitch	24.82' at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
15,000	22'-1 1/4"	113.5	1927	1967
16,000	23'-2 1/2"	113.0		
17,000	24'-2 1/4"	112.0		
18,000	25'-4 1/4"	111.5		
19,000	26'-5"	110.5		
20,000	27'-5"	109.7		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	51	757	773
15	74	990	1011
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LHA 1 CLASS

Applicable to the following ships:

LHA 1, 2, 3, 4 and 5

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	70,000
Design RPM	180

Propellers

No. Installed	2
Type	Fixed Pitch
Diameter	16'-6"
Pitch	18.6' at 0.7 Radius
No. of Blades	6

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
32,800	22'-8 3/4"	178.0	6550	6681
33,900	23'-2"	177.5		
35,000	24'-10 3/4"	177.0		
36,100	24'-3 3/4"	176.5		
37,200	24'-11"	176.0		
38,300	25'-6"	175.5		
39,400	26'-2"	175.0		
40,500	26'-9"	174.5		
41,600	27'-3 3/4"	174.0		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Single Boiler Cross Connected Fuel (gal/hr)		Two Boilers Split Plant Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
15	100	2112	2155	2222	2268
20	136	3575	3648	3630	3704

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LHD 1 CLASS

Applicable to the following ships:

LHD 1, 2, 3 and 4

Main Propulsion Machinery

Steam Turbine Double Reduction Gear
 Design SHP 70,000
 Design RPM 180

Propellers

No installed 2
 Type Fixed Pitch
 Diameter 16'-6"
 Pitch 18'-6" at 0.7 Radius
 No. of Blades 6

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
35,000	23'-8 3/4"	177.5	6250	6380
36,000	24'-3"	177.5		
37,000	24'-9"	177.0		
38,000	25'-3 1/4"	177.0		
39,000	25'-9 1/4"	176.5		
40,000	26'-3 1/2"	176.0		
41,000	26'-9 1/2"	176.0		
42,000	27'-3 1/2"	175.5		
43,000	27'-9 1/2"	175.5		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Single Boiler Cross Connected Fuel (gal/hr)		Two Boilers Split Plant Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
15	103	2126	2170	2258	2305
20	138	3465	3537	3444	3515

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LPD 4 CLASS

Applicable to the following ships:

LPD 4, 5, 6, 7, 8, 9, 10, 12, 13, 14 and 15

Main Propulsion Machinery

Steam Turbine Double Reduction Gear
Design SHP 24,000
Design RPM 235

Propellers:

No. Installed 2
Type Fixed Pitch
Diameter 12.5'
Pitch 11.8' at 0.7 Radius
No. of Blades 5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM*	Fuel (gal/hr)	
			SF-76	JP-5
13,500	18'- 4"	221.5	2224	2270
14,000	19'-10"	221.0		
14,500	19'- 4"	220.5		
15,000	19'-11"	220.0		
15,500	20'- 5"	219.5		
16,000	20'-11"	219.0		
16,500	21'- 5"	218.5		
17,000	21'-11"	218.0		

* Restricted to 210 RPM prior to completion of SHIPALT LPD-301D

Injection Temperature Correction Table

Injection Temperature °F Correction Factor

75 and below 1.000
80 0.998
85 0.996

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LPD 4 CLASS (Cont'd)

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	110	584	596
15	164	1046	1068

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LPH 2 CLASS

Applicable to the following ships:

LPH 9 and 11

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	22,000
Design RPM	115

Propellers

No. Installed	1
Type	Fixed Pitch
Diameter	21'
Pitch	22' 6" at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
11,000	17'-9"	116	1774	1811
12,000	19'	116		
13,000	20'-4"	115		
14,000	21'-6"	115		
15,000	22'-9"	114		
16,000	23'-11"	114		
17,000	25'-1"	113		
18,000	26'-2"	113		
19,000	27'-4"	112		
20,000	28'-6"	111.5		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	48	520	531
15	70	719	734
20	95	1237	1263

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LSD 36 CLASS

Applicable to the following ships:

LSD 36, 37, 38, 39 and 40

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	24,000
Design RPM	235

Propellers

No. Installed	2
Type	Fixed Pitch
Diameter	12.5'
Pitch	11.9' at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
10,000	12'- 7-1/4"	229	2425	2475
11,000	15'- 9-1/2"	228		
12,000	16'- 10-3/4"	227		
13,000	18'	226		
14,000	19'- 1-1/4"	225		
15,000	20'- 1-1/4"	224		

Use Group 3 Injection Temperature Correction Table

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	100	561	573
15	151	1038	1059
20	208	2023	2065

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LSD 41 CLASS

Applicable to the following ships:

LSD 41, 42, 43, 44, 45, 46, 47, and 48

Main Propulsion Machinery

Diesel	Double Reduction Gear
Diesel Engines	Four Colt-Pielstick 16PC 2.5V
Design BHP	8,500 @520 RPM
Design SHP	33,000
Design RPM	165

Propellers

No. Installed	2
Type	Controllable Pitch
Diameter	13.5'
Pitch	20'5" at 0.7 Radius
No. of Blades	5

Full Power Trial Requirements (determined from torsionmeter readings and propulsion machinery control system capability (14,000 SHP/shaft))

The following diesel engine parameters should not be exceeded when attempting to reach full power:

Engine RPM	Exhaust Gas Temp (Combined)	Jacket Water Temp	Inlet Lube Oil Temp
520	1050 °F	185 °F	140 °F

No allowances are made for varying displacement, hull fouling, etc.

Fuel (gal/hr)	
SF-76	JP-5
1780	1860

Split Plant Trial Requirements (determined from torsionmeter reading equivalent to 95% of design SHP in this mode(6,000 SHP))

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LSD 41 CLASS (Cont'd)

Economy Trial Requirements

Notes:

(1) For steady state single engine operation (split plant operations), the main propulsion shaft torque shall be limited to a maximum 95% of single engine torque.

Speed (knots)	RPM	Single engine Split Plant Mode Fuel (gal/hr)		Two Engines Full Power Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
10	*	*	*	--	--
15	*	*	*	*	*
20	*	--	--	*	*

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

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LSD 49 CLASS

Applicable to the following ships:

LSD 49, 50, and 51

Main Propulsion Machinery

Deisel Double Reduction Gear
Deisel Engines Four Colt-Pielstick 16PC 2.5V
Design BHP 8,500 @520 RPM
Design SHP 33,000
Design RPM 165

Propellers

No. Installed 2
Type Controllable Pitch
Diameter 13.5'
Pitch 20'5" at 0.7 Radius
No. of Blades 5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (15,675 SHP/haft))

The following diesel engine parameters should not be exceeded when attempting to reach full power:

Engine RPM	Exhaust Gas Temp (Combined)	Jacket Water Temp	Inlet Lube Oil Temp
520	1050 °F	185 °F	140 °F

No allowances are made for varying displacement, hull fouling, etc.

Fuel
(gal/hr)
SF-76 JP-5

* *

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

Split Plant Trial Requirements (determined from torsionmeters reading equivalent to 95% of design SHP (6,000 SHP))

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LSD 49 CLASS (Cont'd)

Economy Trial Requirements

Notes:

(1) For steady state single engine operation (split plant and trail shaft operations), the main propulsion shaft torque shall be limited to a minimum 95% of single engine torque.

Speed (knots)	RPM	Single engine Split Plant Mode Fuel (gal/hr)		Two Engines Full Power Mode Fuel (gal/hr)	
		SF-76	JP-5	SF-76	JP-5
10	*	*	*	--	--
15	*	*	*	*	*
20	*	--	--	*	*

* Data not listed will be provided as Change Notices when existing data has been reviewed and incorporated.

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LST 1182 CLASS

Applicable to the following ships:

LST 1189, and 1194

Main Propulsion Machinery

Diesel Engines	Six ALCO 16-251C
Design BHP	2750 BHP at 1,000 ERPM
Designed SHP	8,000
Designed SRPM	228

Reduction Gear:	
Manufacturer	General Electric
Type	Single Red. Double Helical
Gear Ratio	4.3934:1

Propellers

No. Installed	2
Type	Controllable Pitch
Diameter	11.5'
Pitch (design)	12.33' at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements (based on diesel engine capability and trial data)

The following engine parameters should not be exceeded when attempting to reach full power:

BHP/ Engine	Engine RPM	Fuel Pump Rack Setting	Exhaust Temp	Turbo Intake Man. (17 psig min)
2750	1000	* 29.75 ± 1/4mm ** 29 +0 - 1/4mm	1050°F (Max)	* 18-22 psig ** 28-28 psig

Note:

- *- ALCO Turbocharger Part No. 22600181 installed
- ** - ALCO Turbocharger Part No. 22602149 installed

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LST 1182 CLASS (Cont'd)

Fouling: To allow for hull fouling and engine degradation, the minimum propeller pitch at full power shaft speed is as follows:

- | | | |
|----|--|-------|
| 1. | Up to 6 months out of dock: | 12.2' |
| 2. | Between 6 months and 12 months out of dock: | 11.9' |
| 3. | Between 12 months and 18 months out of dock: | 11.6' |
| 4. | Over 18 months out of dock: | 10.9' |

Note: Time out of dock shall be interpreted to mean the time from the last docking where the hull has been cleaned and recoated or from the last full (complete) waterborne hull cleaning. The propeller pitches prescribed are considered valid only for operation at full load design displacement plus or minus 200 tons.

Fuel (gal/hr)	
SF-76	JP-5
1043	1065

Displacement: Based on LST 1183 special performance trials, the impact on ships speed (and thus pitch) due to displacement change is that a 10 percent decrease/increase in displacement would result in a 4 percent increase/decrease in ship speed (and thus pitch) at constant power output.

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MCM 1 CLASS (Waukesha Engine)

Applicable to the following ships:

MCM 1 and 2

Main Propulsion Machinery

Diesel Single Reduction Gear
 Diesel Engines Four Waukesha Diesel Engines (Model L1616
 DSIN)
 Design BHP 600 @ 2,000 ERPM
 Design SHP 2350
 Design SRPM 180

Propellers

No. Installed 2
 Type Controllable Pitch
 Diameter 7'0"
 Pitch (design) 12.46' at 0.70 Radius
 No. of Blades 5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (1,116 SHP/shaft))

The following engine parameters should not be exceeded when attempting to reach full power:

BHP/ Engine	Engine RPM	Intake Manifold Pressure	Lube Oil Sump Temp	Jacket Water Temp	Exh Gas Pre Turbo Temp
600	2000	65" Hg absolute	225°F	185°F	910°F

	Fuel (gal/hr)
SF-76	JP-5
157	161

NOTES:

1. Use pitch trim to obtain full power as necessary.
2. No allowances are made for varying displacement, or liquid load.
3. Assumes the 24 hour Average Electric Load is 294 KW.

MCM 1 CLASS (IF Engine)

Applicable to the following ships:

MCM 3 through 14

Main Propulsion Machinery

Diesel	Single Reduction Gear
Dieasel Engines	Four Isotta Fraschini (Model ID 36 SS6 V-AM)
Design BHP	600 @1800 ERPM
Design SHP	2300
Design SRPM	176

Propellers:

No. Installed	2
Type	Controllable Pitch
Diameter	7'0"
Design Pitch	12.46' at 0.70 Radius
No. of Blades	5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (1,092 SHP/shaft))

The following engine parameters should not be exceeded when attempting to reach full power:

BHP/ Engine	Engine RPM	Intake Manifold Pressure	Lube Oil Sump Temp Temp	Jacket Water Temp	Exh Gas pre-Turbo Temp
600	1800	46" Hg absolute	220°F	195°F	1112°F
	Fuel (gal/hr)				
	SF-76	JP-5			
	165	169			

NOTES:

1. Use pitch trim to obtain full power as necessary.
2. No allowances are made for varying displacement, or liquid load.
3. Assumes the 24 hour Average Electric Load is 294 KW.

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MCS 12 CLASS

Applicable to the following ships:

MCS 12

Main Propulsion Machinery

Steam Turbine	Double Reduction Gear
Design SHP	22,000
Design RPM	115

Propellers

No. Installed	1
Type	Fixed Pitch
Diameter	21'
Pitch	22' 6" at 0.7 Radius
No. of Blades	4

Full Power Trial Requirements (based on 95% of design SHP and trial data)

Displacement (tons)	Mean Draft	Full Power Propeller RPM	Fuel (gal/hr)	
			SF-76	JP-5
11,000	17'-9"	116	1774	1811
12,000	19'	116		
13,000	20'-4"	115		
14,000	21'-6"	115		
15,000	22'-9"	114		
16,000	23'-11"	114		
17,000	25'-1"	113		
18,000	26'-2"	113		
19,000	27'-4"	112		
20,000	28'-6"	111.5		

Use Group 3 Injection Temperature Correction Table.

Economy Trial Requirements

Speed (knots)	RPM	Fuel (gal/hr)	
		SF-76	JP-5
10	48	520	531
15	70	719	734
20	95	1237	1263

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MHC 51 CLASS

Applicable to the following ships:

MHC 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, and 62

Main Propulsion Machinery

Two Isotta Fraschini Engines, 8 cylinder, Model ID36 SS8V- AM
 Design BHP 800 @1800 RPM (at engine flywheel)
 Design SHP 1382 @ 87 PRPM (663 SRPM)

Two Integrated Fluid Variator and Gearbox (IFVG)
 Fluid Coupling 3% slip during normal transit mode
 Variable slip in minehunting mode
 Gear Ratio 2.63:1

Propellers:

No. Installed 2
 Type Voith Schneider 21 GS, cyclodial propeller
 Diameter 2100 mm (propeller blade orbit)
 Design Pitch Not Applicable
 No. of Blades 5
 Blade Length 1600 mm
 Worm Gear Ratio 7.625:1 (propeller input shaft RPM/propeller output RPM)

Full Power Trial Requirements

Design full power is defined as 741 SHP per shaft at 663 SRPM (87 PRPM) measured at the misalignment coupling. Successful demonstration of full power is a minimum average of 703 SHP at 663 SRPM for each shaft. Full power is measured by the ship's torsionmeters. Propeller pitch may need to be adjusted to obtain acceptable performance. In attempting to reach full power, propulsion equipment must not exceed allowable operational limits as defined by equipment technical manuals and incorporated in the control system's alarms. No allowances are made for varying hull displacements or propeller/hull fouling.

*Fuel (gal/hr)	
SF-76	JP-5
103	105

* Assumes a 24 hour average electric load of 193 kW with one SSDG on line and propulsion train developing 703 SHP.

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PC 1 CLASS

Applicable to the following ships:

PC 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10

Main Propulsion Machinery

Diesel	Reduction Gears Four Reintjes Model WVS 2232, Reduction Ratio 2.025 :1
Diesel Engine	Four 16 cylinder Paxman, Valenta, Diesel Engines, 4 Shafts
Design BHP	3350 @ 1500 RPM
Design SRPM	740
Design SHP	13,000

Propellers:

No. Installed	4
Type	Fixed Pitch
Diameter	50"
No. of Blades	5

Full Power Trial Requirements (determined from torsionmeter readings equivalent to 95% of design SHP (3,088 SHP/shaft))

Fuel (gal/hr)	
SF-76	JP-5
695	708

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**SEAWATER
INJECTION TEMPERATURE
CORRECTION TABLES**

Enclosure (2)

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SEAWATER INJECTION CORRECTION TABLE

The full power propeller RPM for steam-driven vessels is to be corrected for seawater injection temperature by the following factors. Use the factor corresponding to the closest injection temperature. Do not interpolate.

Group 1	NOT USED	
Group 2	Injection Temperature, °F	Correction Factor
	50	1.0068
	55	1.0051
	60	1.0029
	65	1.0000
	70	0.9956
	75	0.9877
	80	0.9802
	85	0.9728
	90	0.9655
Group 3	Injection Temperature, °F	Correction Factor
	50	1.0194
	55	1.0178
	60	1.0154
	65	1.0123
	70	1.0072
	75	1.0000
	80	0.9925
	85	0.9854
	90	0.9784
Group 4	Injection Temperature, °F	Correction Factor
	50	1.0271
	55	1.0253
	60	1.0231
	65	1.0202
	70	1.0157
	75	1.0091
	80	1.0000
	85	0.9924
	90	0.9858
Group 5	Injection Temperature, °F	Correction Factor
	75 and below	1.0000
	80	0.9925
	85	0.9854
	90	0.9784

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**TIME-OUT-OF-DOCK AND SHIP AGE
CORRECTION TABLES**

Enclosure (3)

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TIME-OUT-OF-DOCK ALLOWANCE FACTOR

Time-out-of-dock is defined as the time from the last docking where the hull has been cleaned and recoated or from the last full (complete) waterborne hull cleaning. When ablative paint is used for recoating, the self polishing paint factor shall be used.

Months Since Bottom Cleaned and Coated	Correction Factor for RPM	Self Polishing Paint Correction Factor for RPM
0-3	1.000	1.000
4-6	0.990	0.994
7-12	0.980	0.988
13-18	0.970	0.982
19-24	0.960	0.975
over 24	0.950	0.969

AGE ALLOWANCE FACTOR

Age is defined as the time span since the ship was originally commissioned.

Age of Ship (Years)	Corrector Factor for RPM
0 to 20	1.000
21	0.998
22	0.996
23	0.994
24	0.992
25	0.990
26	0.988
27	0.986
28	0.984
29	0.982
30 & older	0.980

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**FUEL TEMPERATURE
CORRECTION TABLE**

Enclosure (4)

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Correction Factor To Be Applied to Reduce Full Power RPM
For Fuel Temperature Above 60 °F

STEAM PROPULSION SHIPS ONLY

Temperature Factor °F	RPM Reduction When Burning SF-76/JP-5
Up to 60	None
61 - 70	0.998
71 - 80	0.995
81 - 90	0.992
91 - 100	0.989
101 - 110	0.986
111 - 120	0.983
121 - 125	0.981

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**SAMPLE
FULL POWER TRIAL
COMPUTATIONS**

Enclosure (5)

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SAMPLE FULL POWER TRIAL COMPUTATIONS

	Full Power Trial Requirement (Without Corrections)	Correction Factor
1. Ship: LHD 1		
Displacement: 38,000 tons 177 RPM		
Injection Temp: 72 °F		1.0072
Time-Out-of-Dock: 142 Days (Ablative Paint)		0.994
Age: 3 Years		1.000
Fuel Temp: 85 °F		0.992
Full Power Trial Requirement		
	= 177 x 1.0072 x 0.994 x 1.000 x 0.992	
	= 175.7	
	= 176 RPM	
2. Ship: FFG 7		
Displacement: 3,800 tons 180 RPM		
Injection Temp: N/A		
Time-Out-of-Dock: 954 Days (32 months)		0.950
Age: N/A		
Fuel Temp: N/A		
Full Power Trial Requirement		
	= 180 x 0.9500	
	= 171	
3. Ship: DDG 51		
Displacement: 8,000		
Injection Temp: N/A		
Time-Out-of-Dock: N/A		
Age: N/A		
Fuel Temp: N/A		
Full Power Trial Requirement		
	= 47,500 SHP/shaft (Determined from Torsionmeter)	
4. Ship: CV 64 160 RPM (Outboard)		
Displacement: 80,000 tons 158 RPM (Inboard)		
Injection Temp: 80 °F		0.9925
Time-Out-of-Dock: 850 Days (28 months)		*
Age: 30 Years		0.980
Fuel Temp: 93 °F		0.989

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SAMPLE FULL POWER TRIAL COMPUTATIONS (Cont'd)

* Enclosure (3) does not apply. Enclosure (1) applies as follows: To allow for fouling, reduce the RPM by 17 (15 for the first 20 months and 2 for the remaining 8 months).

Full Power Trial Requirement

$$\begin{aligned}\text{Inboard} &= 158 \times 0.9925 \times 0.980 \times 0.989 - 17 \\ &= 134.98 \\ &= 135 \text{ RPM}\end{aligned}$$

$$\begin{aligned}\text{Outboard} &= 160 \times 0.9925 \times 0.980 \times 0.989 - 17 \\ &= 136.91 \\ &= 137 \text{ RPM}\end{aligned}$$

NOTE: Always round RPM off to the nearest whole number.