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ELECTRICAL SYSTEM LOAD AND POWER ANALYSIS FOR SURFACE SHIPS

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TABLE I: Typical Operating Load Factors

310-1-a. Reference

Ship Work Breakdown Structure (SWBS) publication, NAVSEA 0900-LP-039-9010

310-1-b. Scope

This Design Data Sheet provides information for preparing an electrical system load and power analysis for conventional-powered surface ships. However, this Design Data Sheet may be used as a basis for preparing a load and power analysis for a ship powered by other means.

310-1-c. Definition of Ship Operating Conditions

- Anchor - Ship supplying all electric power while the ship is at anchor.
- Shore - Ship receiving all electric power from a shore facility or a tender.
- Cruising - Ship cruising at design cruising speed, without ship ordnance or at general quarters, but with power for test and checkout of combat systems.

Functional - Ship performing its designed function. For example, battle for destroyers and frigates, air operations for aircraft carriers, debarking operations for cargo ships, replenishment-at-sea of ships for combat support or store ships, and tending operations for tenders and repair ships.

Emergency - Ship on emergency generators, with ship service generators down. The emergency generators, as a minimum, supply loads associated with:

SURFACE COMBATANTS - Emergency ship control and selected weapons.

AIRCRAFT CARRIER - Emergency ship control and either selected weapons (Offensive) or limited air operations (Recovery and strike down of aircraft).

AMPHIBIOUS - Emergency ship control and limited unloading operations.

AUXILIARY - Emergency ship control and selected weapons.

MINE WARFARE AND PATROL CRAFT - Emergency ship control.

SERVICE CRAFT - These craft are only required to supply navigation lights and communication during emergency conditions.

310-1-d. Emergency Ship Control

Emergency ship control should include, as a minimum, the following electrical loads:

Steering gear auxiliaries
Vital propulsion auxiliaries (see Note 1)
Machinery space circle W ventilation
Emergency lighting
Emergency communications
Surface search radar
Fire pumps
Interior communications
Auxiliaries to support the emergency generator prime mover such as:

Booster pumps
Starting air pumps
Compartment ventilation motors
Fuel transfer pumps

(Note 1) Vital propulsion auxiliaries are those required for cold-starting the ship's plant and necessary for machinery protection and

shall include, as a minimum:

- Turbine generator pumps
- Emergency or standby lubricating oil service pumps
- Fuel service pumps
- Forced draft blowers (low speed)
- Motor-operated boiler stop valves
- Feed transfer pumps

310-1-e. System Analysis

The system analysis is used to determine the aggregate power requirements of all the electric power consuming devices under the various operating conditions of the ship, such as anchor, shore, cruising, functional, and emergency, or other working load conditions, with particular emphasis being placed on the minimum and maximum power requirements. The minimum power requirement is of special importance when diesel engine prime movers are used in order to avoid excessive maintenance due to the operation of the engine at light loads for long periods of time. Various operating conditions are listed. However, variations of these conditions may exist. On ships with waste heat systems, a 10 degrees F and a 90 degrees F analysis shall be prepared for all conditions of operation. Loads are listed in accordance with reference 1.

In preparing system load and power analyses, operating load factors are assigned for each individual item of equipment for each condition of operation. The multiplication of these factors by the connected load (rated kW input) for each item of equipment gives the demand load of that item for each condition of operation.

310-1-f. Operating Load Factors

Consideration shall be given to the selection of load factors because of their influence on the proper selection of generator capacity. Each equipment application shall be considered from such standpoints as its service operation in the power system and its functional operation as determined by the type of ship involved and the type of service the ship performs. Such factors are determined as a result of experience and may vary to some extent with varying conditions of service.

Table I herein lists typical operating load factors. These load factors shall be used as a guide in selecting operating load factors and should be helpful in determining a relationship between total connected load and actual operating loads under the various conditions of ship operation. The compilation of the factors listed in the Table is for guidance only and is not intended to preclude the exercise of good judgement when special circumstances modify these factors.

The operating load factors listed in the Table are used as follows:

1. The connected load (rated kW input) for each individual item of equipment is multiplied by each of the load factors (one load factor for each of the different operating conditions, such as anchor, cruising, functional and emergency). The products resulting from the multiplications are the demand loads of that particular item of equipment for the

various conditions of operation. For example, Table I shows that the load factors for a Potable Water Pump are 0.3, 0.2, 0.3, 0.3 and 0 (see entry under SWBS Group 5 - Auxiliary Systems, General) for the anchor, shore, cruising, functional, and emergency conditions, respectively. If the connected load for the pump is 19.1 kW, its demand load for each condition is: 5.7 kW for anchor condition; 3.8 kW for shore condition; 5.7 kW for cruising condition; 5.7 kW for functional condition; and 0 kW for emergency condition.

2. The total demand load for each condition of operation is found by adding the individual demand loads for the condition.

310-1-g. Selection of Operating Load Factors

In order to obtain as realistic a value for operating load factors as possible, no single method for their determination is specified. It is intended that the method of selecting operating load factors be left to the preparer of the analysis. Conditions which have a general bearing on the selection of operating load factors and typical methods which have been used in their selection are listed below:

1. Relation of the kW rating of the driving motor to actual kW consumed by the driven auxiliary.- In selecting the size of a motor necessary to drive an auxiliary at its rated output, a larger motor than actually required is normally chosen because:

a. In the design of the driven auxiliary, some margin in excess of calculated kW is allowed. Accordingly, the driving motor is not normally required to deliver its rated kW when operating the driven auxiliary at its maximum load condition.

b. The choice of available standard motor frame size may dictate selection of a larger than necessary motor.

In view of this fact, it may be assumed that an auxiliary operating at full output is not requiring the rated output of its driving motor.

2. Assignment of a factor to each individual load.- If a particular equipment operates continuously at a steady load during a given ship operational condition, the factor for that equipment may be taken as the ratio of the actual operating load to the connected load of the equipment, expressed as a decimal. If a load is intermittent, such as an air compressor motor, the factor should be selected so as to reflect:

a. The ratio of the actual load to the connected load of the equipment, and

b. The effect of intermittent duty of the equipment on the generator load. Known or anticipated ship operating procedures and practices and characteristics of operation of the equipment involved should be considered in estimating this effect.

3. Assignment of a factor to a group of loads.- A single load factor may be assigned to a group of loads under the following conditions:

a. When two or more associated power consuming devices are known to operate with some relation to each other - This method may be used where the relationship of the loads to one another is clearly established. For example, in considering the group of motors associated with the operation of a gun mount, a clearly established relationship exists between the ramming motors and the elevating motors, since the rammers operate under load only when the barrels are horizontal, while the elevating motors are idling at no load.

b. When the relationship of the loads to one another is not clearly established but is known to exist - An example of this is a group of electrical loads in a galley where the electrical equipment in operation during the preparation of a fried meal may be different from that equipment which would be in operation during the preparation of a broiled or baked meal.

c. Where there is a group of low power consuming equipment within the same space and would be assigned approximately the same load factor - An example of this is a group of electronic equipment.

4. Use of known or established load values in lieu of a factor.- For some equipment and groups of equipment, extensive investigations and tests have been conducted to determine operating load values during various ship operating conditions for use in preparing load analyses. Where such known and established operating load values are available, they should be used. The source of data, such as from cognizant system engineers should be noted in the load analysis.

5. Electric load for power conversion equipment.- A detailed analysis of electric loads that are fed through power conversion equipment should be performed. Taking into consideration the efficiency of the conversion equipment, the kW load should be listed in the power analysis in lieu of load factors.

310-1-h. Notes Applying to Typical Operating Load Factors Table (Table I)

Equipment items are categorized according to the Ship Work Breakdown Structure (SWBS) Group publication, NAVSEA 0900-LP-039-9010. Each SWBS group category is further broken down into general and specific ship type sub-categories, as required.

1. Zero Load Factors.- Zero load factors are assigned to equipment that is seldom used.

2. 0.9 Load Factors.- 0.9 load factors are used in cases where a motor operates at full load for an extended period of time during a specific ship condition.

3. Standby Units.- All standby units should be listed and assigned zero load factors except when the standby is actually kept running ~~or is a~~, in

which case a LF

based on percent of power used while idling shall be used.

4. Port Use Pumps.- Some ships are equipped with special port use pumps for operation while the ship is at anchor, permitting the larger capacity pumps to be secured. The pumps not used when the port use pumps are used should be assigned a zero load factor under anchor condition.

5. Ships Alongside.- Load analyses for tenders and repair ships should take into consideration the supply of power to ships alongside.

6. Equipment With High kW Rating.- On some ships one or more items of electric equipment are installed which draw a heavy load in comparison with the generator rating. In such instances, this equipment should not be assigned load factors by assuming inoperative other equipment not essential at the time of using these large items of equipment.

7. Loads which vary due to ambient temperatures should be identified by an "**". The load factor assigned for these loads should be for the same day (90 degrees F or 10 degrees F) and identified as such.

TABLE I

TYPICAL OPERATING LOAD FACTORS FOR SURFACE SHIPSSWBS GROUP 2 - PROPULSION PLANTGENERAL

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
Aux Sea Water Circulating Pmp	0.3	0.3	0.6	0.6	0
Blow In Door Heater, Gtrb	0	0	0.9	0.9	0
Cpch Prop Hydr Oil Htr	0.3	0.3	0.3	0.3	0
Cpch Prop Hydr Oil Pump	0	0	0.9	0.9	0
Cpch Prop Hydr Oil Pur Htr	0.1	0	0.1	0	0
Cpch Prop Hydr Oil Purifier	0.3	0	0.3	0.3	0
Elec Prpln Eqpt Space Heaters	0.9	0.9	0	0	0
Electric Propulsion Exciter	0	0	0.9	0.9	0
Emer Feed Bstr and Xfr pump	0	0	0	0	0
Fuel Service Pump	0.4	0.1	0.9	0.9	0
Inlet Louver Heater, Gtrb	0	0	0.9	0.9	0
Lighting Off FD Blower	0.1	0	0	0	0
Lube Oil Purifier	0.3	0	0.3	0.3	0
Main Circulating MO Valve	0	0	0	0	0
Main Circulating Pump	0	0	0.9	0.9	0
Main Condensate Pump	0	0	0.9	0.9	0
Main Engine Cooling Fan, Gtrb	0	0	0.9	0.9	0
Main Engine Prelube Pump	0	0	0	0	0
Main Feed Booster Pump	0.1	0	0.9	0.9	0.5
Main Turbine Gland Exhaust	0	0	0.9	0.9	0
Main Vacuum Pump	0	0	0.9	0.9	0
Main Feed Lube Pump	0.2	0	0.9	0.9	0
Module Equipment, Gtrb	0.4	0.4	0.2	0.2	0
Port FO Service Pump	0	0.1	0	0	0
Port Use FD Blower	0.2	0	0	0	0
Propulsion Control Console	0.5	0.2	0.6	0.8	0
Propulsion Motor Lube Pump	0	0	0.9	0.9	0
Propulsion Motor Vent Fan	0	0	0.9	0.9	0
Reserve Feed Transfer Pump	0.2	0.2	0.2	0	0
Sea Water Booster Pump	0	0	0.3	0.9	0
Shaft Turning Gear	0.1	0.1	0	0	0.1
Standby Rden Gear Lube Pmp	0	0	0	0	0.2
Standby Lube Service Pump	0	0	0	0	0.2

SWBS GROUP 3 - ELECTRIC PLANT

GENERAL

Elec Plant Control Console
 Emer Gen Salt Water Bstr Pmp
 Forklift Battery Charger
 Generator Space Heaters
 Gtrb Gen Enclosure Cooling Fan
 Gtrb Gen Salt Water Pump
 Lighting Machinery Spaces
 Ltg Outside Mchry Spaces
 Ship Battery Charger
 STGEN Circulating Pump
 STGEN Condensate Pump
 STGEN Start-Up Lubo Pump
 STGEN Vacuum Pump
 Uninterruptble Pwr Sply
 Battery Charger

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
Elec Plant Control Console	0.2	0.2	0.2	0.2	0.2
Emer Gen Salt Water Bstr Pmp	0	0	0	0	0.9
Forklift Battery Charger	0.2	0.2	0.3	0.3	0
Generator Space Heaters	0.9	0.9	0	0	0
Gtrb Gen Enclosure Cooling Fan	0.9	0	0.9	0.9	0
Gtrb Gen Salt Water Pump	0.9	0	0.9	0.9	0
Lighting Machinery Spaces	0.9	0.9	0.9	0.9	0.9
Ltg Outside Mchry Spaces	0.6	0.4	0.6	0.6	0.4
Ship Battery Charger	0.2	0.2	0.2	0.2	0
STGEN Circulating Pump	0.5	0	0.5	0.9	0
STGEN Condensate Pump	0.5	0	0.5	0.9	0
STGEN Start-Up Lubo Pump	0	0	0	0	0.9
STGEN Vacuum Pump	0.5	0	0.5	0.9	0
Uninterruptble Pwr Sply Battery Charger	0.2	0.2	0.2	0.3	0

AIRCRAFT CARRIERS

Aircraft & Helicopter Start
 101C M/G Set
 NTDS Computer M/G
 SS Frequency Changer
 SS 400 Hz M/G Set

Aircraft & Helicopter Start	0.1	0	0.1	0.5	0
101C M/G Set	0.2	0.2	0.5	0.7	0.5
NTDS Computer M/G	0.2	0.2	0.5	0.7	0.2
SS Frequency Changer	0.2	0.2	0.5	0.7	0.2
SS 400 Hz M/G Set	0.2	0.2	0.5	0.7	0.2

AMPHIBIOUS SHIPS

Helicopter Starting Rectifier
 SS Frequency Changer
 SS 400 Hz M/G Set

Helicopter Starting Rectifier	0	0	0.1	0.1	0.1
SS Frequency Changer	0.2	0.1	0.3	0.4	0.3
SS 400 Hz M/G Set	0.2	0.1	0.3	0.4	0.3

AUXILIARY SHIPS

Helicopter & Elex M/G Set
 Helicopter Starting Rectifier
 SS Frequency Changer
 SS 400 Hz M/G Set

Helicopter & Elex M/G Set	0.1	0.1	0.1	0.1	0.1
Helicopter Starting Rectifier	0	0	0	0	0
SS Frequency Changer	0.1	0.1	0.1	0.1	0.1
SS 400 Hz M/G Set	0.1	0.1	0.1	0.1	0.1

CRUISERS-DESTROYERS-FRIGATES

Helicopter Starting Rectifier
 SS Frequency Changer
 SS 400 Hz M/G Set

Helicopter Starting Rectifier	0	0	0	0	0
SS Frequency Changer	0.2	0.2	0.5	0.7	0.4
SS 400 Hz M/G Set	0.2	0.2	0.5	0.7	0.4

SWBS GROUP 4 -COMMAND & SURVEILLANCE

GENERAL

Bathothermograph Winch
 CIC
 Degaussing System
 ECM
 Electronic Cooling System
 Entertainment System
 IC System
 Lighting, Navigation
 Missile Fire Control
 Movie Projector
 NTDS
 Radar
 Radio and Teletype
 Searchlight
 Sonar

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
Bathothermograph Winch	0	0	0	0	0
CIC	0.2	0	0.4	0.7	0
Degaussing System	0.8	0	0.8	0.8	0
ECM	0	0	0.4	0.7	0.5
Electronic Cooling System	0.4	0.2	0.7	0.7	0.5
Entertainment System	0.1	0.1	0.3	0	0
IC System	0.2	0.2	0.4	0.7	0.4
Lighting, Navigation	0.6	0.4	0.6	0.4	0.2
Missile Fire Control	0.1	0	0.1	0.6	0
Movie Projector	0	0	0	0	0
NTDS	0.2	0	0.4	0.7	0.4
Radar	0.2	0	0.5	0.7	0.5
Radio and Teletype	0.2	0.1	0.4	0.7	0.4
Searchlight	0	0	0	0.2	0
Sonar	0	0	0.4	0.4	0

AMPHIBIOUS SHIPS

Fire Control

Fire Control	0.2	0.1	0.3	0.4	0.4
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AUXILIARY SHIPS

Fire Control

Fire Control	0	0	0	0	0.6
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CRUISERS-DESTROYERS-FRIGATES

Fire Control

Fire Control	0.2	0.1	0.4	0.7	0.4
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SWBS GROUP 5 - AUXILIARY SYSTEMS

GENERAL

A/C Chilled Water Pump
 A/C Compressor
 A/C Purge Recovery Unit
 A/C Sea Water Circulating Pmp
 Anchor Windlass
 Auxiliary Boiler
 Aux Turb Gland Exhauster
 Bilge & Fuel Tank Stripping
 Bilge Pump
 Boat Winch
 Capstan
 Cargo Refrigerator Compressor
 Cathodic Protection
 Class Circle W Ventilation
 Class Circle Z Ventilation

A/C Chilled Water Pump	0.7	0.5	0.7	0.7	0.4
A/C Compressor	0.7	0.5	0.7	0.7	0.4
A/C Purge Recovery Unit	0.3	0.3	0.3	0.3	0
A/C Sea Water Circulating Pmp	0.7	0.5	0.7	0.7	0.4
Anchor Windlass	0	0	0	0	0
Auxiliary Boiler	0.5	0	0	0	0
Aux Turb Gland Exhauster	0.5	0	0.5	0.9	0
Bilge & Fuel Tank Stripping	0.1	0.1	0.1	0	0
Bilge Pump	0.1	0.1	0.1	0.1	0
Boat Winch	0	0	0	0	0
Capstan	0	0	0	0	0
Cargo Refrigerator Compressor	0.3	0.3	0.3	0.3	0
Cathodic Protection	0.9	0.9	0.9	0	0
Class Circle W Ventilation	0.9	0.9	0.9	0.9	0.4
Class Circle Z Ventilation	0.7	0.7	0.7	0	0

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
Class W Ventilation	0.9	0.9	0.9	0.9	0.4
Class X and Y Ventilation	0.7	0.7	0.7	0	0
Class Z Ventilation	0.9	0.9	0.9	0	0
Control Air Compressor	0.2	0	0.6	0.6	0
Disinfectant Agent Pump	0.1	0.1	0.1	0.1	0
Distiller Plant	0.5	0	0.7	0.7	0
Drinking Fountain	0.4	0.4	0.4	0.4	0
Duct Htr Class Z	0.9	0.9	0.9	0	0
Duct Htr Class W	0.9	0.9	0.9	0.9	0
Duct Htr CI Circle W	0.9	0.9	0.9	0.9	0
Dumbwaiter	0.1	0.1	0.1	0	0
Fire Pump	0.2	0.2	0.2	0.4	0.4
Fuel Str, Drain and Xfer Pmp	0.3	0	0.3	0.3	0
Fuel Transfer Pump	0.1	0.1	0.1	0.1	0
Fuel Xfer Pmp Purifier	0.3	0	0.3	0	0
Fuel Tank Stripping Pump	0	0	0	0	0
Flushing System	0	0	0.1	0.1	0
Fresh Wtr Drain Cltg Tk Pump	0.3	0.1	0.6	0	0
General Service Pump	0	0	0.1	0.1	0
Gtrb Wash Down Pump	0	0	0	0	0
Gtrb Water Wash Tank Htr	0.1	0.1	0.1	0.1	0
High Pressure Air Compressor	0.1	0.1	0.1	0.1	0
Hot Water Circulating Pump	0.3	0.3	0.6	0.6	0
HP Air Compressor Air Dryer	0.1	0.1	0.1	0.1	0
LAMPS Equipment	0	0	0.1	0.5	0.5
Lubo Transfer Pump	0.1	0.1	0.1	0	0
Main Steering Gear Pump	0	0	0.3	0.3	0.3
O2 N2 Plant	0	0	0.1	0.1	0
PRAIRIE/MASKER Compressor	0	0	0.9	0.9	0
Potable Water Booster Pump	0.3	0.2	0.3	0.3	0
Potable Water Priming Pump	0	0	0	0	0
Potable Water Pump	0.3	0.2	0.3	0.3	0
Sewage Macerator	0.1	0.1	0.1	0.1	0
Sewage Pump	0	0	0.1	0.1	0
Ship Service Air Compressor	0.1	0.1	0.1	0.1	0
Soluble Fog Foam	0	0	0	0	0
Space Htr Class W	0.9	0.9	0.9	0.9	0
Space Htr Class Z	0.9	0.9	0.9	0	0
SS Air Compressor Air Dryer	0.1	0.1	0.1	0.1	0
SS Refrigerator Compressor	0.3	0.3	0.3	0.3	0
Steering Aux Heater	0.9	0.9	0	0	0
Steering Gear Control	0	0	0.5	0.5	0.5
Steering Gear Servo Pump	0	0	0.5	0.5	0.1
Standby Steering Gear Pump	0	0	0	0	0
Strg Gear Fill & Drain Pump	0	0	0	0	0
Towing Machine	0	0	0	0.3	0
Unit Coolers	0.2	0.2	0.2	0.2	0
Ventilation, No Class	0.9	0.7	0.9	0.9	0.4

AIRCRAFT CARRIERS

Acft Clg and Hydr Test Unit
 Aircraft Elevator Side Door
 Aircraft Component Elevator
 Aircraft Cooling Carts
 Aircraft Crane
 Aircraft Elevator Main Pump
 Aircraft Elevator Sump Pump
 Aircraft Positioner
 Arresting Gear System
 Aviation Gasoline Pump
 Barricade Stby Hydr Pmp Pkg
 Catapult System
 Cut Bridle Arrestor Cont Ckt
 Decanning Boom Hoise
 Elevator Platform Gate Valves
 Hangar Division Doors
 Island Elevator
 Jet Blast Deflector Hydr Pmp
 JP-5 Defueling Pump
 JP-5 Purifier
 JP-5 Service Pump
 JP-5 Transfer Pump
 JP-5 Tank Drain Str Pump
 Personnel Elevators
 Replenishment-At-Sea-System
 Stern Hoist, Flammable Liquid
 Stores Conveyor

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
0	0	0	0.5	0	
0	0	0	0.1	0	
0	0.1	0.1	0.2	0	
0	0	0	0.5	0	
0	0	0	0	0	
0	0	0.2	0.2	0	
0	0	0.1	0.1	0	
0	0	0.1	0.1	0	
0	0	0	0.2	0.2	
0	0	0	0.1	0.9	
0	0	0	0.1	0	
0	0	0	0.2	0	
0	0	0	0.2	0.2	
0.1	0.1	0.1	0	0	
0	0	0.2	0.2	0	
0	0	0	0.1	0	
0.2	0.2	0.2	0.2	0	
0	0	0	0.2	0	
0	0	0	0.2	0	
0	0	0.1	0.1	0	
0	0	0	0	0	
0.2	0.1	0.2	0.2	0	
0	0	0.2	0	0	
0.2	0.2	0	0	0	
0.1	0.1	0.1	0	0	

AMPHIBIOUS SHIPS

Aircraft Crane
 Aircraft Elevator Main Pump
 Aircraft Elevator Sump Pump
 Aircraft Engine Hoist
 Automotive Gas Defueling Pmp
 Aviation Gasoline Pumps
 Automotive Gasoline Pump
 Avionics Outlets
 Cargo Elevator
 Cargo Elev Emer Hoist
 Deck Edge Door
 Jib Crane Hoist
 JP-5 Cargo Stripping Pump
 JP-5 Defueling Pump
 JP-5 Purifier
 JP-5 Service Pump
 JP-5 Transfer Pump
 Replenishment-At-Sea-System
 Stores Conveyor
 Wire Rope Hoist

0	0	0	0	0	
0	0	0.2	0.2	0	
0	0	0.2	0.2	0	
0.2	0.2	0.2	0.2	0	
0.2	0.2	0	0	0.2	
0	0	0.2	0.2	0.2	
0.2	0.2	0	0.2	0.2	
0	0	0	0	0	
0.2	0.2	0	0.2	0.2	
0	0	0	0	0	
0	0	0.2	0.2	0	
0	0	0.2	0.2	0	
0	0	0.2	0.2	0	
0.2	0.2	0.1	0.1	0	
0	0	0.2	0	0	
0.2	0.2	0.1	0	0	
0.2	0.2	0.2	0.2	0.2	

AUXILIARY SHIPS

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
Cargo Crane	0.3	0.3	0.1	0.3	0
Cargo Crane Heater	0.2	0.2	0.2	0	0
Cargo Elevator	0.2	0.2	0	0.3	0
Cargo Elevator Door	0.1	0.1	0.1	0.1	0
Cargo Fuel Stripping Pump	0	0	0	0	0
Component Transfer Lift	0	0	0	0.2	0
Highline Winch	0	0	0	0.6	0
Helicopter Boom	0	0	0	0	0
JP-5 Priming Pump	0	0	0	0	0
JP-5 Purifier	0	0	0.1	0.3	0
JP-5 Service Pump	0	0	0.1	0.3	0
JP-5 Transfer Pump	0	0	0	0	0
Outbd and Inbd Saddle Winch	0	0	0	0.3	0
Outhaul and Inhaul Winch	0	0	0	0.3	0
Package Conveyor	0	0.7	0	0.5	0
Power Operated Hangar Door	0	0	0	0	0
Rammer Cart	0	0	0	0.2	0
Retrieving Line Winch	0	0	0	0.3	0
Retrieving Line Winch Heater	0	0	0	0	0
Sliding Block Power Unit	0	0	0	0.3	0
Snaking Winch	0	0	0	0.3	0
Span Wire Winch	0	0	0	0.6	0

CRUISERS-DESTROYERS-FRIGATES

Fan Fare Streaming Winch	0	0	0	0	0
Fast Elevator System	0.1	0.1	0.1	0	0
Helicopter Winch	0	0	0	0	0
JP-5 Purifier	0	0	0.1	0	0
JP-5 Service Pump	0	0	0.1	0	0
JP-5 Transfer Pump	0	0	0	0	0
Package Conveyor	0	0.3	0.1	0	0
Torpedo Hatch Cover	0	0	0	0	0

SWBS GROUP 6 - OUTFIT AND FURNISHINGS

GENERAL

ARC Welders AC/DC	0.1	0.1	0.1	0.1	0
Bake Oven	0.2	0.2	0.2	0	0
Bakery Chilled Water	0.3	0.2	0.3	0.1	0
Bread Slicer	0.3	0.2	0.3	0.1	0
Cash Register	0	0	0	0	0
Centrifuge	0	0	0	0	0
Coffee Maker	0.3	0.2	0.3	0.3	0
Coil Winder	0.2	0.2	0.2	0	0
Deep Fat Fryer	0.4	0.4	0.4	0	0
Dishwasher	0.3	0.2	0.3	0.2	0
Drill Press	0.1	0.1	0.1	0	0

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
Dryer	0.2	0.2	0.2	0	0
Finisher	0.2	0.2	0.2	0	0
Flatwork Ironer	0.2	0.2	0.2	0	0
Fry Kettle	0.4	0.2	0.4	0.4	0
Garbage Disposal	0.2	0.2	0.2	0	0
Garbage Grinder	0.2	0.2	0.2	0	0
Generator Test Stand	0.1	0.1	0.1	0.1	0
Griddle	0.3	0.2	0.3	0.3	0
Grinder	0.1	0.1	0.1	0	0
Hand Iron	0	0	0	0	0
Heated Glass	0	0	0	0	0
Hydraulic Test Stand	0.1	0.1	0.1	0.1	0
Ice Cream Equipment	0.3	0.2	0.3	0.2	0
Ice Maker	0.3	0.2	0.3	0.3	0
Lathe	0.2	0.2	0.2	0	0
Lube Unit	0.1	0.1	0.1	0	0
Meat Preparation Equipment	0.3	0.2	0.3	0	0
Milling Machine	0.1	0.1	0.1	0	0
Mixer	0.2	0.2	0.2	0.2	0
Oven	0.4	0.2	0.4	0.4	0
Photo Equipment	0.1	0.1	0.1	0.1	0
Planer and Joiner	0.1	0.1	0.1	0	0
Power Saw	0.1	0.1	0.1	0	0
Prerinse Booster Pump	0.3	0.2	0.3	0.2	0
Range	0.4	0.2	0.4	0.4	0
Recharge Pump	0.2	0.2	0.2	0	0
Refr/Freezer Comb	0.5	0.5	0.5	0.5	0
Refrigerator - Small	0.3	0.3	0.3	0.3	0
Sewing Machine	0.2	0.2	0.2	0	0
Shearing Machine	0.2	0.2	0.2	0	0
Shirt Folding Machine	0.2	0.2	0.2	0	0
Shop Hoist	0.1	0.1	0.1	0	0
Sterilizer - Dressing	0	0	0.1	0.7	0.1
Sterilizer - Instrument	0.1	0.1	0.1	0.7	0.1
Stitcher	0.2	0.2	0.2	0	0
Test Switchboard	0.1	0.1	0.1	0.1	0
Toaster	0.3	0.2	0.3	0	0
Trash Burner Fan	0.1	0	0.1	0	0
Ultrasonic Cleaner	0.1	0.1	0.1	0	0
Valve Replacer	0.2	0.2	0.2	0	0
Vegetable Cutter	0.2	0.1	0.2	0	0
Vegetable Peeler	0.2	0.1	0.2	0	0
Vertical Sleever	0.2	0.2	0.2	0	0
Waffle Iron	0.1	0.1	0.1	0	0
Washer Extractor	0.2	0.2	0.2	0	0
Water Heater	0.1	0.1	0.5	0.5	0.1
Window Wipers	0	0	0	0	0
X-Ray Machine	0.1	0.1	0.1	0.2	0.2

AIRCRAFT CARRIERS

	ANCHOR	SHORE	CRUISING	FUNCTIONAL	EMERGENCY
Accommodation Ladder	0	0	0	0	0
Photo Equipment	0.4	0	0.4	0.4	0

SWBS GROUP 7 - ARMAMENT

GENERAL

ASROC Launcher
ASROC Loading Crane
ASROC System Pumps
Gun Mounts
Magazine Bridge Crane
Missile Launcher
Weapons Elevator
Weapons Handling Hoist

0.1	0	0.1	0.5	0
0	0	0.5	0.5	0
0	0	0.5	0.5	0
0	0	0	0.6	0.6
0.2	0.2	0.1	0.1	0
0.2	0	0.2	0	0
0.2	0.2	0	0.7	0
0.2	0.2	0	0.7	0