

APPENDIX B

MONTHLY PREVENTIVE MAINTENANCE SCHEDULE

AND ELECTRICAL CHECK-OFF LISTS

The formats shown in this appendix are primarily guides and must be revised for each type ship and particular design of equipment, ship schedule and operating condition.

The department head will use the sample lists as guides in implementing a preventive maintenance program schedule to be accomplished by ship's force. Such a program is necessary and it's effectiveness will be reflected in operating costs.

MONTHLY MAINTENANCE SCHEDULE: JANUARY THRU MAY

JANUARY

Nos. 1 & 2 Main Condensers  
 No. 1 Fire & Sanitary Pump  
 No. 2 Aux. Circ. Pump  
 Nos. 1 & 2 Bilge & Ballast Pumps  
 No. 2 Comb. Control Compressor  
 Nos. 1 & 3 Main Feed Pumps  
 No. 2 L.O. Purifier  
 No. 1 L.P. Evap Tube Nest Drain Pump  
 No. 3 Aux. Cond. Pump  
 No. 1 Atmos. Drain Pump  
 Nos. 1 & 3 F.O. Service Pumps  
 Nos. 1 & 3 L.O. Service Pumps  
 No. 1 Reefer Compressor  
 Nos. 1-2-3 & 4 Boiler Water & F'sides  
 Nos. 1 & 2 E.R., 1 $\frac{1}{4}$ " 150# Rod. Statn  
 Nos. 2 & 4 Forced Draft Blwrs (Fans  
 & Motors)  
 Crew Dishwashing Machine  
 Pneumatic Bilge Suction Valves (Fwd  
 Fr. 98)

FEBRUARY

Nos. 1 & 2 Main Lube Oil Coolers  
 No. 1 Aux. Gen. Air & L.O. Coolers  
 No. 3 Aux. Circ. Pump  
 Submersible Bilge Pump  
 No. 1 Priming Pump  
 Port Steering Gear  
 No. 2 L.P. Evap. Tube Nest Drain Pump  
 No. 4 Aux. Cond. Pump  
 No. 2 Atmos. Drain Pump  
 No. 1 Main Cond. Pump  
 No. 2 Reefer Comp.  
 No. 1 Main Feed Pump Turbine  
 Nos. 1 & 2 E.R., 10# Stations  
 Nos. 1 & 3 E.R., 2", 150# Red. Statn

MARCH

Nos. 1 & 2 Mn Mtr Air Coolers  
 No. 2 Aux. Gen. Air & L.O. Coolers  
 No. 4 Aux. Circ. Pump  
 No. 1 Bilge Pump  
 No. 2 Priming Pump  
 No. 1 Main Circ. Pump  
 No. 2 F.O. Transfer Pump  
 Nos. 1 & 2 Diesel Oil Trsf Pumps  
 No. 3 Reefer Compressor  
 Nos. 1 & 2 Main Thrust Bearings,  
 Sumps & Coolers  
 Aux. Diesel Generator  
 No. 1 Laundry Press  
 Nos. 1 & 2 Main Engine Thrust  
 Nos. 1 & 2 Boat Winches

APRIL

Nos. 2 & 4 Aux. Condensers  
 No. 3 Aux. Gen. Air & L.O. Coolers  
 No. 2 Fire & Sanitary Pump  
 No. 1 L.P. Evap Circ Pump  
 No. 1 Brine Pump  
 No. 3 Priming Pump  
 No. 2 Main Circ. Pump  
 No. 2 Mn Mtr Cooling Water Pump  
 No. 1 L.P. Evap. Cond. Pump  
 No. 3 F.W. Pump  
 No. 2 Evap. F.W. Dist. Pump  
 Main L.O. Coolers  
 No. 4 Reefer Compressor  
 No. 3 Main Feed Pump Turbine  
 Air Eject. Reducing Stations  
 No. 2 Laundry Press  
 Nos. 1 & 3 Aux. Gen. Thrust & Brgs  
 Nos. 3 & 4 Boat Winches  
 P & S Shaft Alley Pneumatic Valves

MAY

Nos. 1 & 3 Aux. Condensers  
 No. 4 Aux. Gen. Air & L.O.  
 Coolers  
 No. 3 Fire & Sanitary Pump  
 No. 2 L.P. Evap. Circ. Pump  
 No. 2 Brine Pump  
 No. 1 Main Motor Cooling Water  
 Pump  
 Ballast Stripping Pump  
 No. 2 L.P. Evap. Cond. Pump  
 No. 1 Ice Water Circ. Pump  
 1st Stage Air Eject Nozzles &  
 Valves  
 Nos. 1 & 3 Boiler Air Heaters  
 & Econ.  
 Line Bearings & Sumps  
 No. 5 Reefer Compressor  
 No. 1 Laundry Extractor  
 Nos. 1 & 2 E.R., 85# Stations  
 Nos. 2 & 4 Aux. Gen. Thrust &  
 Bearings  
 Nos. 5 & 6 Boat Winches  
 Nos. 1 & 2 Cargo Winches  
 Butcher Shop Drain Pump &  
 Sump Tanks  
 No. 5 Hold Pneumatic Valves

MONTHLY MAINTENANCE SCHEDULE: JUNE THRU NOVEMBER

B-3

JUNE

Nos. 1 & 2 Main Gen. Air Coolers  
 No. 4 Fire & Sanitary Pump  
 No. 1 Aux. Circ. Pump  
 Reefer Circ. Pump  
 No. 2 L.P. Evap. Feed Pump  
 Oil & Water Separator Sump Pump  
 No. 1 L.O. Purifier  
 No. 2 Ice Water Circ. Pump  
 Main Air Compressor  
 2d Stage Air Eject Nozzles & Valves  
 Main Gen. Air Coolers  
 Main Motor Bearings & Sumps  
 No. 6 Reefer Compressor  
 No. 2 Main Feed Pump Turbine  
 Nos. 2 & 4 Boilers Air Heaters & Econ.  
 No. 2 Comb. Control Board  
 Main Engine Thrust  
 Nos. 7 & 8 Boat Winches  
 Nos. 3 & 4 Cargo Winches  
 Eductor Chain Locker  
 P & S Pneumatic Valves

JULY

Nos. 1 & 2 Main Condensers  
 No. 1 Fire & Sanitary Pump  
 No. 2 Aux. Circ. Pump  
 Nos. 1 & 2 Bilge & Ballast Pumps  
 No. 4 Priming Pump  
 No. 2 Hot Water Circ. Pump  
 No. 3 L.O. Purifier  
 Johnston Heating System Compressor  
 No. 4 F.W. Pump  
 No. 3 Main Cond. Pump  
 No. 1 E.R. Fuel Oil Heaters  
 No. 4 Main Feed Pump Turbine  
 Nos. 1 & 2 E.R., 1½" 150# Red Statn  
 Nos. 9 & 10 Boat Winches  
 Nos. 5 & 6 Cargo Winches  
 Fire Main Loop Valves  
 Nos. 1 & 2, Trp Dishwashing Machines

AUGUST

Nos. 1 & 2 Main Lube Oil Coolers  
 No. 1 Aux. Gen. Air & L.O. Coolers  
 No. 3 Aux. Circ. Pump  
 No. 1 L.P. Evap. Feed Pump  
 No. 1 Hot Water Circ. Pump  
 No. 1 Boiler Feed Transfer Pump  
 No. 2 L.P. Evap Air Eject Condenser  
 No. 1 Fresh Water Pump  
 No. 2 E.R. Fuel Oil Heaters  
 Galley Day Box Compressor  
 Nos. 1 & 2 E.R. 10# Reducing Statn  
 Nos. 1 & 2 E.R., 2", 150# Red Statn  
 Nos. 11 & 12 Boat Winches  
 Nos. 7 & 8 Cargo Winches  
 Pneumatic Bilge Suction Valves (Aft Frame 166)

SEPTEMBER

Nos. 2 & 4 Aux. Condensers  
 No. 2 Aux. Gen. Air & L.O. Coolers  
 Nos. 1 & 2 Main Motor Air Coolers  
 No. 4 Aux. Circ. Pump  
 Nos. 1 & 2 Main Thrust Bearings, Sumps & Coolers  
 Nos. 2 & 4 Main Feed Pumps  
 Passenger Elevator  
 Butcher Shop Equipment  
 No. 2 Fresh Water Pump  
 Nos. 2 & 4 Fuel Oil Service Pumps  
 Nos. 2 & 4 Lube Oil Service Pumps  
 Nos. 1-2-3 & 4 Boiler Water & Firesides  
 Aux. Diesel Generator  
 Freight Elevator & Dumbwaiters  
 Main Engine Thrust  
 Nos. 1 & 3 Forced Draft Blowers (Motors & Fans)  
 Nos. 9 & 10 Cargo Winches  
 Main Pantry Dishwashing Machine

OCTOBER

Nos. 1 & 3 Aux. Condensers  
 No. 3 Aux. Gen. Air & L.O. Coolers  
 No. 2 Fire & Sanitary Pump  
 No. 1 L.P. Evap Circ. Pump  
 No. 1 Brine Pump  
 No. 2 Main Motor Cooling Wtr Pump  
 No. 1 Main Eng Sump & L.O. Gravity Tanks (Batch L.O.)  
 Bake Shop Equipment  
 Main Galley Equipment  
 No. 2 Main Cond. Pump  
 Ice Water Compressor  
 Air Ejector Reducing Station  
 Settlers & Deep Tank Pneumatic F.O. Valves  
 Nos. 1 & 3 Aux. Gen Thrust Brgs  
 Nos. 11 & 12 Cargo Winches

NOVEMBER

No. 2 Main Eng Sump Gravity Tanks (Batch L.O.)  
 No. 4 Aux. Gen. Air & L.O. Coolers  
 No. 3 Fire & Sanitary Pump  
 No. 2 L.P. Evap Circ Pump  
 No. 2 Brine Pump  
 No. 1 Main Mtr Cooling Wtr Pump  
 Stbd Steering Gear  
 No. 2 Boiler Feed Transfer Pump  
 No. 1 Aux. Cond. Pump  
 No. 1 F.O. Transfer Pump  
 Nos. 1 & 3 Boiler Air Heaters & Economizers  
 Line Bearings & Sumps  
 Laundry Flat Work Ironer  
 Nos. 2 & 4 Aux. Gen. Thrust & Bearings  
 Nos. 13 & 14 Cargo Winches  
 Butcher Shop Drain Pump & Sump Tanks

MONTHLY MAINTENANCE SCHEDULE: DECEMBER

DECEMBER

Nos. 1 & 2 Main Gen. Air Coolers  
No. 4 Fire & Sanitary Pump  
No. 1 Aux. Circ. Pump  
Reefer Circ. Pump  
No. 1 Comb. Control Compressor  
No. 1 L.P. Evap. Air Eject. Condenser  
No. 2 Aux. Cond. Pump  
Troop Galley Equipment  
Nos. 2 & 4 Boiler Air Heaters &  
Economizers  
No. 4 Main Cond. Pump  
Main Motor Bearings & Sumps  
Laundry Washing Machine  
100# Laundry Steam Reducing  
Station  
No. 1 Comb. Control Board  
Main Engine Thrust

2 October 1964

SAMPLE ELECTRICAL MAINTENANCE CHECK-OFF LISTANNUALLYUSCG 111.05-10(D) - Test Each Thermostat Kidde Fire Alarm System1 2 3 4 5 6 7 8 9 10 11 12SEMI-ANNUALLYMSTSPACINST 4700.3B - Megger Readings on all Motors1 2 3 4 5 6 7 8 9 10 11 12USCG 78.17-45 (c) & (d) - Ship's Service Battery Performance Tests1 2 3 4 5 6 7 8 9 10 11 12QUARTERLYUSCG 78.17-10 (b) - Open & Inspect all Electrical Lifeboat Equipment1 2 3 4 5 6 7 8 9 10 11 12CO<sub>2</sub> Pressure Alarm Devices Tests1 2 3 4 5 6 7 8 9 10 11 12MSTSPAC INST 4700.3B - All Storage Batteries & Equalizing Charge1 2 3 4 5 6 7 8 9 10 11 12Open, Clean and Check Gyro MG Set1 2 3 4 5 6 7 8 9 10 11 12MONTHLYFry Kettles - Test & Calibrate Thermostats1 2 3 4 5 6 7 8 9 10 11 12USCG 78.17-45 (b) & (d) - Emergency Generator Test - 2 Hours Loaded1 2 3 4 5 6 7 8 9 10 11 12MSTSPAC INST 4700.3B - Megger & Record Ship's Service Aux. Gen. & Emerg. Gen.1 2 3 4 5 6 7 8 9 10 11 12Test Emergency Steering Engine Order Telegraph1 2 3 4 5 6 7 8 9 10 11 12Test Ground Connections, all Portable Electric Tools1 2 3 4 5 6 7 8 9 10 11 12Test Power Failure Alarms, Wheelhouse1 2 3 4 5 6 7 8 9 10 11 12Test Run Emergency Forced Blower1 2 3 4 5 6 7 8 9 10 11 12RED LINE UNDER NUMBER OF MONTH DENOTES WHEN DUERED "X" OVER NUMBER DENOTES WHEN COMPLETED

APPENDIX C

BUNKERING OCEAN VESSELS

Excerpts appearing on the following pages are taken from a paper delivered by ADMIRAL F. D. Higbee, U. S. Coast Guard, Retired, Port Warden, City of Los Angeles. While the preparation and procedure for bunkering ocean vessels pertain to commercial practices, it is recommended that the contents be carefully studied looking toward the establishment of an efficient bunkering system utilizing the team concept and check-off list in each MSTS Ship. Oil spills can involve costly clean up losses as well as a danger to life and property. A coordinated procedure will decrease the frequency and severity of oil spills.

EXCERPTS ON THE PREPARATION AND PROCEDURE FOR BUNKERING OCEAN VESSELS

Bunkering an ocean vessel is a task too important for delegating exclusively to the ship's engineers. It needs the coordinated attention (under direction of the Master) of other personnel. There is a part in it for the Mate on watch, the carpenter, electrician, operator of the oil barge, the licensed engineers, the wipers or oilers, and the gangway or other watchmen.

Some of those concerned need not be on duty during actual time of the bunkering. Their participation may be only during preparation.

The needs of ships for bunkering details are obviously variable and so must their plans vary. Those having most frequent and most severe spills are those that have no coordinated plan whatever. They occur in ships of companies that take for granted that the Chief Engineer will bunker the ship, night or day, with whoever is kept on board for the machinery division watch. They occur in ships where the Master does not participate in a plan for safe bunkering. He may even consider the task as none of his responsibility whatever.

The worst spills are the undetected ones during the night. Oil is overflowing for appreciable intervals without knowledge of those responsible.

The bunkering operations of all ships have been observed with interest by the Port Warden's force. Records are maintained of all known spills and comments recorded as to causes when ascertained.

By written general orders from the home office, every Master is required to organize a bunkering procedure and get a detail trained in the practice of it.

There will be exacting compliance with a check-off list used for the purpose.

Team work does it.

It begins with participation of the Master. The detail includes surveillance by the Mate of the watch for operations visible on deck and overside. The carpenter plugs and effectively cements scuppers. The electrician rigs the sound-power extension telephone to afford communication from on deck near hose coupling to the machinery departments several decks below. The man on deck is at the shut-off valve by the hose coupling. He keeps on his head-set phones as does the licensed engineer below deck who is watching the pneumaticator and other gauges. A five-man team, sometimes a good four-man team, is usually competent to bunker most any ship without mishap provided EFFICIENT DIRECT COMMUNICATION IS MAINTAINED.

If a night job, the electrician rigs cargo cluster lights to illuminate the water line, especially below overboard discharges. The gangway watchman is alerted to patrol alongside ship's entire length and with flashlight to seek indication of oil from drains above or below water line. He is provided with a police whistle and instructed to use it upon observing the first trickle. The Second Engineer is in the machinery compartment watching the pneumatic legs, static legs, pressure gauges and receiving reports from subordinates by means of ship's communication system and the deck man with the headset sound-power phone. The Second Engineer is assisted below decks by another licensed engineer. Two or more oilers or wipers are employed at outage soundings and miscellaneous chores.

The barge operator has been definitely told the rate of flow desired. The gauges are watched. When the pressure is exceeded or the flow accelerated, the ship will caution the barge and it may shut down against it. A ship can shut down against a barge or shore station having centrifugal pumps and a by-pass without rupturing a good hose. When 85 percent filled, the ship signals the barge man for a full stop. A slow down is less effective and insufficient. A full stop, if only for five minutes, assures that communication is being maintained with the barge and ship and it alerts the entire team to top-off time vigilance. That pause sometimes enables an air pocket to escape or subside. A big bubble that might have caused an overflow before the tank had filled with fuel may thus be eliminated. Then, after the short pause, the barge is asked to resume loading at a slower rate while the tanks are topped off. This is all accomplished by a small but well-organized team.

Communication is of the utmost importance. The phones must be tested as O.K. before fuel starts aboard.

When the barge man disappears beyond conversational distance, the ship shuts down until he resumes station as he should. He is best situated to detect the start of an overflow through a vent on his side of the vessel. He will need to be told to watch for them and sound his horn if it happens. It takes no more than one shut-down to convince a barge man that he is dealing with a customer who is going to exact proficient, alert service from him, the way they want it.

Our records reveal that negligent lack of vigilance originates many spills, lack of communication between barge, machinery space watches, and men on deck is another common cause.

Lack of bunkering team is most common cause of all.

Barge men are sometimes in haste to get back for a load scheduled for another vessel, and for other reasons.



The company cited herein has that haste hazard solved by its shut-down orders when rate of flow ordered is exceeded. The barge men get no penalty for a spill because it cannot be proven that the oil overflowed from his vessel. It spilled from the ship. He is snugly aware of that evasion.

All men of the bunkering team have police whistles as a precaution against failure of telephones and for other reasons. Just enough men in a bunkering team with good communication do better than a needless number without it. No member of the team detailed for duty on deck is required to go below decks and no one assigned to a below decks station is required or expected to leave there for a duty on deck.

The navigating bridge is sometimes a communication station because from either wing of the bridge an observer can see overside full length of ship and from the pilot house there are phones, speaking tubes, engine room telegraphs, and general alarms with communication generally throughout the ship. The vessel is provided with those facilities and most large ships have extension cord telephones for other places. Failure to employ those facilities and failure to make best use of men in the watch aboard is a costly negligence.

The steamship company cited herein as successful in oil spill abatement has one veteran skipper who well explained the system thus:

"When our ships burned coal, bunkering was a job for all hands. Now we take fuel through a hose, but it still requires some duties that are not done by the men who stoke the furnaces. In my ship the Chief Engineer knows more about bunkering than I do. But I am the boss and the overall responsibility is mine. I know the Chief needs the support of myself and the help of a few men not of the Engineer Department. So long as I am Master he is going to get that essential assistance. They are building bigger ships now but I have yet to sail in one big enough for more than one boss."

Other plans than these used effectively by the one line may be even better, but no plan at all and any plan not participated in by the Master has not been observed to be effective.

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