

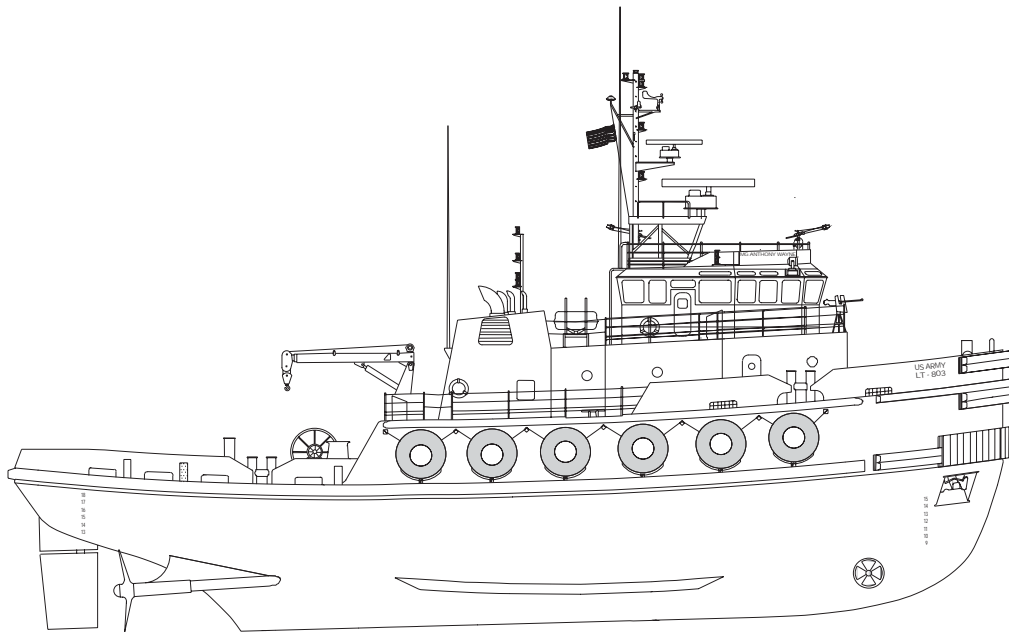
# TM 55-1925-273-24&P-2

This manual supersedes TM 55-1925-207-24&P-2, dated 16 August 1991

---

## TECHNICAL MANUAL

### UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR INLAND AND COASTAL LARGE TUG (LT) NSN 1925-01-509-7013 (EIC XAG)



DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

---

**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**30 NOVEMBER 2005**



**WARNING SUMMARY**

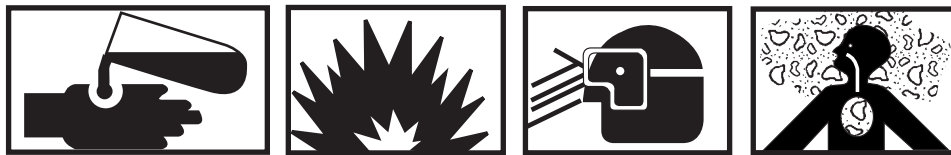
**FIRST AID**

Although the 128' Large Tug is normally assigned a medic, first aid is still an important skill for all crewmembers. The ability to promptly administer first aid to another crewmember could mean the difference between life and death for that crewmember. First aid procedures for soldiers are contained in FM 4-25.11.

**WARNING SUMMARY CONTENT**

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this vessel and its equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and of hazardous materials used within the technical manual.

**BATTERIES**



Batteries are filled with a sulfuric acid based electrolyte. This electrolyte is extremely corrosive to human tissue and to many other materials. Chemical protective gloves, goggles, faceshield, and an apron must be worn at all times when batteries are being serviced. If electrolyte comes in contact with clothing or other material, wash the affected area with large volumes of fresh water. If electrolyte comes in contact with the skin, flush the area with large volumes of water. If the electrolyte comes in contact with the eyes, flush them with large volumes of water. Continue flushing the affected area until medical assistance arrives. Failure to comply can result in death or serious injury.

Batteries produce hydrogen gas. This gas is explosive. Keep the work area free of sparks, open flame, and excessive heat. Take care to prevent conductive metal tools from arcing between the positive and negative terminals. Failure to comply with these precautions can result in death or serious injury.

**CHLORINE AND BROMINE STORAGE AND HANDLING**



Chlorine and the Water Demineralizer Cartridge (NSN 4610-01-022-9970) which contains the chemical Bromine may not be stored together. Both chemicals, Chlorine and Bromine, must follow the Federal HAZCOM standard (29 CFR 1910.1200) along with the Material Safety Data Sheet (MSDS) for each chemical. Failure to comply could result in injury or death.

**CONFINED SPACE ENTRY**

Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502. Entry into an uninspected confined space may result in death or serious injury to personnel.

**DIESEL FUEL**



Fuel vapors are explosive. Fuel is flammable. Before fueling the tanks or transferring fuel, ensure that firefighting equipment is immediately available for use in case of fire emergency. Do not smoke or allow smoking, or any other open flame in the vicinity of the fueling operation. Wipe clean any fuel spillage and dispose of spilled fuel in accordance with the appropriate local regulations. A fueling watch supervisor shall be stationed to ensure compliance with fueling safety procedures. Failure to comply can result in death or serious injury.

Avoid prolonged exposure of the skin to diesel fuel. Chemical protective gloves and goggles must be worn whenever handling diesel fuel or parts which are saturated with diesel fuel. Failure to comply can result in death or serious injury.

**ELECTRICAL**



Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.

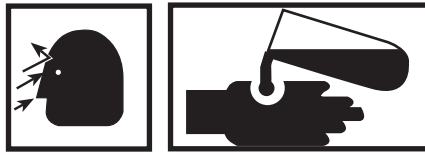
Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.

**GALLEY NOISE HAZARD**



All crewmembers working in the galley area must wear Army Hearing Protection Devices (HPDs) and ensure that the galley doors remain closed. Failure to comply could result in injury.

**GAYLORD VENTILATION AND FIRE SUPPRESSION SYSTEM**



In the event that the Gaylord Ventilation and Fire Suppression system is activated and exposure to the fire suppressant occurs, all personnel exposed should immediately wash out the eyes and shower to remove residual material. Failure to comply could result in injury or death.

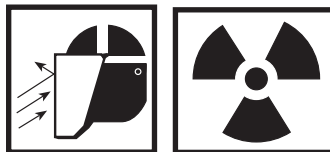
**HOT WORK, WELDING, AND GRINDING**



Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel. These hot particles can also ignite fires in the work area and in adjacent spaces. During and after removal, the work area will be very hot. Wear protective goggles, gloves, and/or apron at all times during cutting and grinding operations. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel.

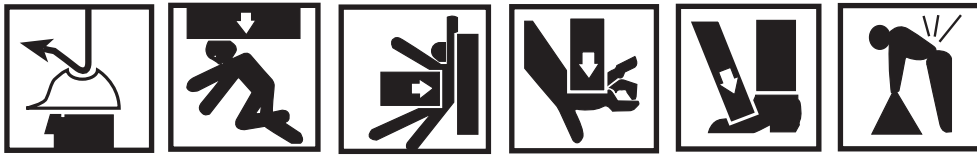
Grinding, needling, and chipping operations produce high velocity flying debris which can become lodged in the skin or in the eyes. Grinding, needling, and chipping in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing grinding, needling and chipping operations. Failure to comply can result in death or serious injury to personnel.

Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.



Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc welding operations without using appropriate eye and skin protection. Failure to comply can result in death or serious injury.

**LIFTING OPERATIONS AND HEAVY LOADS**



All personnel in the vicinity of lifting operations should wear appropriate safety equipment including gloves, hard hat, and safety shoes. Death or serious injury can result from failure to heed this warning.

Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.

Heavy loads can crush. Use a minimum of two crewmembers to lift and hold heavy loads. Do not allow any body parts to come under the load or between the load and a stationary object. Failure to comply can result in serious injury or death.

**LOCKING HARDWARE**

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

**MACHINE GUN NOISE HAZARD**



During M2 caliber 0.50 weapons firing, all personnel standing outside on deck must wear Army Hearing Protection Devices (HPDs). Failure to comply with this warning could result in serious injury.

**OILS AND CLEANING SOLVENT**



Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in death or serious injury.

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.

**PRESSURIZED LINES**

Hydraulic hoses and lines may be under pressure. Relieve pressure by operating the appropriate control valve, if possible. Loosen fittings on hose lines slowly. Allow oil to run around threads of fitting, releasing pressure before disconnecting fitting. Releasing pressurized oil suddenly may cause death or severe personal injury.

**RADIATION, RADIO ANTENNAS**



Inspecting antennas with the INSA, radars, transceivers and receiver-transmitters turned on presents a radiation hazard. Ensure all transceivers and receiver-transmitters are turned off prior to inspecting antennas. Ensure that the appropriate circuit breaker has been secured, locked out, and tagged out (see WP 0008) in accordance with FM 55-502. Failure to comply could result in injury or death.

**ROTATING EQUIPMENT**



Use extreme caution when working around rotating components. Do not allow hands or tools to come in contact with the rotating components. Do not wear loose clothing, jewelry, or anything else which might become entangled in the rotating components. Failure to comply can result in death or serious injury.

**SAFETY HARNESS**

Ensure that a safety harness is worn when inspecting antennas. Failure to comply could result in injury or death.

**SEWAGE**



Sewage is a common mode of transmission for parasitic organisms that may have the capability of causing communicable diseases. Chemical protective gloves and a protective apron should be worn to help prevent contact with sewage. After coming in contact with sewage or contaminated equipment, be sure to clean yourself with a disinfectant soap. Avoid sewage contact with skin abrasions, punctures, cuts, and other open wounds. Wipe up and clean any spills and/or contaminated equipment using a disinfectant soap. Failure to comply can result in death or serious illness.

SEWAGE (CONTINUED)



Toxic and flammable vapors are generated in the sewage system. Provide ventilation from outside source. Avoid open flames and prolonged breathing of fumes. Failure to comply can result in death or serious injury.

Toxic and flammable vapors are generated in the sewage system. Provide ventilation from an outside source. Avoid open flames and prolonged breathing of fumes. Failure to comply can result in death or serious injury.

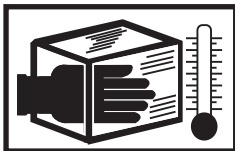
EXPLANATION OF SAFETY WARNING ICONS



**BIOLOGICAL** - abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.



**CHEMICAL** - drops of liquid on hand show that the material will cause burns or irritation to human skin or tissue.



**CRYOGENIC** - hand in block of ice shows that the material is extremely cold and can injure human skin or tissue.



**EAR PROTECTION** - headphones over ears show that noise level will harm ears.



**ELECTRICAL** - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.



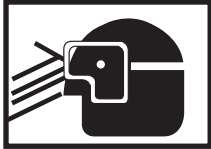
**ELECTRICAL** - electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.



EXPLANATION OF SAFETY WARNING ICONS (CONTINUED)



**EXPLOSION** - rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition, or high pressure.



**EYE PROTECTION** - person with goggles shows that the material will injure the eyes.



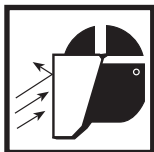
**FALLING PARTS** - arrow bouncing off human shoulder and head shows that falling parts present a danger to life or limb.



**FIRE** - flame shows that a material may ignite and cause burns.



**FLYING PARTICLES** - arrows bouncing off face show that particles flying through the air will harm face.



**FLYING PARTICLES** - arrows bouncing off face with face shield show that particles flying through the air will harm face.



**HEAVY OBJECT** - human figure stooping over heavy object shows physical injury potential from improper lifting technique.



**HEAVY PARTS** - hand with heavy object on top shows that heavy parts can crush and harm.



**HEAVY PARTS** - foot with heavy object on top shows that heavy parts can crush and harm.

EXPLANATION OF SAFETY WARNING ICONS (CONTINUED)



**HEAVY PARTS** - heavy object on human figure shows that heavy parts present a danger to life or limb.



**HEAVY PARTS** - heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.



**HELMET PROTECTION** - arrow bouncing off head with helmet shows that falling parts present a danger.



**HOT AREA** - hand over object radiating heat shows that part is hot and can burn.



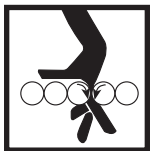
**LASER LIGHT** - laser light hazard symbol indicates extreme danger for eyes from laser beams and reflections.



**MOVING PARTS** - human figure with an arm caught between gears shows that the moving parts of the equipment present a danger to life or limb.



**MOVING PARTS** - hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.



**MOVING PARTS** - hand with fingers caught between rollers shows that the moving parts of the equipment present a danger to life or limb.



**POISON** - skull and crossbones show that a material is poisonous or is a danger to life.

EXPLANATION OF SAFETY WARNING ICONS (CONTINUED)



**RADIATION** - three circular wedges show that the material emits radioactive energy and can injure human tissue.



**RADIO TRANSMISSION WARNING** - Radiating lines from a radio antenna indicate the danger of radiation and electric shock hazards are present.



**SHARP OBJECT** - pointed object in hand shows that a sharp object presents a danger to limb.



**SHARP OBJECT** - pointed object in hand shows that a sharp object presents a danger to limb.



**SHARP OBJECT** - pointed object in foot shows that a sharp object presents a danger to limb.



**SLICK FLOOR** - wavy line on floor with legs prone shows that slick floor presents a danger for falling.



**VAPOR** - human figure in a cloud shows that material vapors present a danger to life or health.



LIST OF EFFECTIVE PAGES/WORK PACKAGES

Date of original issue for this manual is:

Original 30 NOVEMBER 2005

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 76 AND TOTAL NUMBER OF WORK PACKAGES IS 308 CONSISTING OF THE FOLLOWING:**

Page/WP No.	* Change No.	Page/WP No.	* Change No.
Front Cover.....	0	WP 0037 00 (8 pgs).....	0
a-i.....	0	WP 0038 00 (6 pgs).....	0
j blank.....	0	WP 0039 00 (6 pgs).....	0
A-D.....	0	WP 0040 00 (24 pgs).....	0
i - x.....	0	WP 0041 00 (2 pgs).....	0
Chp 1 title page.....	0	Chp 2 title page.....	0
WP 0001 00 (6 pgs).....	0	WP 0042 00 (6 pgs).....	0
WP 0002 00 (2 pgs).....	0	WP 0043 00 (4 pgs).....	0
WP 0003 00 (4 pgs).....	0	WP 0044 00 (4 pgs).....	0
WP 0004 00 (4 pgs).....	0	WP 0045 00 (4 pgs).....	0
WP 0005 00 (4 pgs).....	0	WP 0046 00 (4 pgs).....	0
WP 0006 00 (6 pgs).....	0	WP 0047 00 (4 pgs).....	0
WP 0007 00 (14 pgs).....	0	WP 0048 00 (4 pgs).....	0
WP 0008 00 (14 pgs).....	0	WP 0049 00 (4 pgs).....	0
WP 0009 00 (6 pgs).....	0	WP 0050 00 (4 pgs).....	0
WP 0010 00 (16 pgs).....	0	WP 0051 00 (4 pgs).....	0
WP 0011 00 (8 pgs).....	0	WP 0052 00 (4 pgs).....	0
WP 0012 00 (6 pgs).....	0	WP 0053 00 (4 pgs).....	0
WP 0013 00 (10 pgs).....	0	WP 0054 00 (4 pgs).....	0
WP 0014 00 (2 pgs).....	0	WP 0055 00 (4 pgs).....	0
WP 0015 00 (4 pgs).....	0	WP 0056 00 (8 pgs).....	0
WP 0016 00 (2 pgs).....	0	WP 0057 00 (6 pgs).....	0
WP 0017 00 (2 pgs).....	0	WP 0058 00 (26 pgs).....	0
WP 0018 00 (8 pgs).....	0	WP 0059 00 (12 pgs).....	0
WP 0019 00 (6 pgs).....	0	WP 0060 00 (2 pgs).....	0
WP 0020 00 (4 pgs).....	0	WP 0061 00 (4 pgs).....	0
WP 0021 00 (4 pgs).....	0	WP 0062 00 (2 pgs).....	0
WP 0022 00 (2 pgs).....	0	WP 0063 00 (4 pgs).....	0
WP 0023 00 (4 pgs).....	0	WP 0064 00 (6 pgs).....	0
WP 0024 00 (4 pgs).....	0	WP 0065 00 (12 pgs).....	0
WP 0025 00 (4 pgs).....	0	WP 0066 00 (2 pgs).....	0
WP 0026 00 (8 pgs).....	0	WP 0067 00 (4 pgs).....	0
WP 0027 00 (4 pgs).....	0	WP 0068 00 (6 pgs).....	0
WP 0028 00 (6 pgs).....	0	WP 0069 00 (8 pgs).....	0
WP 0029 00 (10 pgs).....	0	WP 0070 00 (4 pgs).....	0
WP 0030 00 (6 pgs).....	0	WP 0071 00 (4 pgs).....	0
WP 0031 00 (2 pgs).....	0	WP 0072 00 (6 pgs).....	0
WP 0032 00 (10 pgs).....	0	WP 0073 00 (4 pgs).....	0
WP 0033 00 (10 pgs).....	0	WP 0074 00 (4 pgs).....	0
WP 0034 00 (2 pgs).....	0	WP 0075 00 (4 pgs).....	0
WP 0035 00 (8 pgs).....	0	WP 0076 00 (6 pgs).....	0
WP 0036 00 (4 pgs).....	0	WP 0077 00 (4 pgs).....	0

\* Zero in this column indicates an original page or work package

**TM 55-1925-273-24&P-2**

LIST OF EFFECTIVE PAGES/WORK PACKAGES (continued)

Page/WP No.	* Change No.	Page/WP No.	* Change No.
WP 0078 00 (4 pgs) .....	0	WP 0127 00 (2 pgs) .....	0
Chp 3 title page .....	0	WP 0128 00 (4 pgs) .....	0
WP 0079 00 (2 pgs) .....	0	WP 0129 00 (4 pgs) .....	0
WP 0080 00 (4 pgs) .....	0	WP 0130 00 (4 pgs) .....	0
WP 0081 00 (44 pgs) .....	0	WP 0131 00 (6 pgs) .....	0
WP 0082 00 (12 pgs) .....	0	WP 0132 00 (4 pgs) .....	0
WP 0083 00 (10 pgs) .....	0	WP 0133 00 (8 pgs) .....	0
WP 0084 00 (14 pgs) .....	0	WP 0134 00 (4 pgs) .....	0
Chp 4 title page .....	0	WP 0135 00 (4 pgs) .....	0
WP 0085 00 (2 pgs) .....	0	WP 0136 00 (4 pgs) .....	0
WP 0086 00 (2 pgs) .....	0	WP 0137 00 (2 pgs) .....	0
WP 0087 00 (2 pgs) .....	0	WP 0138 00 (2 pgs) .....	0
WP 0088 00 (2 pgs) .....	0	WP 0139 00 (2 pgs) .....	0
WP 0089 00 (2 pgs) .....	0	WP 0140 00 (2 pgs) .....	0
WP 0090 00 (4 pgs) .....	0	WP 0141 00 (4 pgs) .....	0
WP 0091 00 (2 pgs) .....	0	WP 0142 00 (14 pgs) .....	0
WP 0092 00 (2 pgs) .....	0	WP 0143 00 (6 pgs) .....	0
WP 0093 00 (4 pgs) .....	0	WP 0144 00 (6 pgs) .....	0
WP 0094 00 (18 pgs) .....	0	WP 0145 00 (4 pgs) .....	0
WP 0095 00 (4 pgs) .....	0	WP 0146 00 (4 pgs) .....	0
WP 0096 00 (4 pgs) .....	0	WP 0147 00 (4 pgs) .....	0
WP 0097 00 (6 pgs) .....	0	WP 0148 00 (4 pgs) .....	0
WP 0098 00 (4 pgs) .....	0	WP 0149 00 (4 pgs) .....	0
WP 0099 00 (14 pgs) .....	0	WP 0150 00 (4 pgs) .....	0
WP 0100 00 (6 pgs) .....	0	WP 0151 00 (2 pgs) .....	0
WP 0101 00 (6 pgs) .....	0	WP 0152 00 (2 pgs) .....	0
WP 0102 00 (6 pgs) .....	0	WP 0153 00 (6 pgs) .....	0
WP 0103 00 (6 pgs) .....	0	WP 0154 00 (4 pgs) .....	0
WP 0104 00 (4 pgs) .....	0	WP 0155 00 (6 pgs) .....	0
WP 0105 00 (4 pgs) .....	0	WP 0156 00 (4 pgs) .....	0
WP 0106 00 (10 pgs) .....	0	WP 0157 00 (2 pgs) .....	0
WP 0107 00 (4 pgs) .....	0	WP 0158 00 (10 pgs) .....	0
WP 0108 00 (4 pgs) .....	0	WP 0159 00 (4 pgs) .....	0
WP 0109 00 (4 pgs) .....	0	WP 0160 00 (4 pgs) .....	0
WP 0110 00 (4 pgs) .....	0	WP 0161 00 (2 pgs) .....	0
WP 0111 00 (14 pgs) .....	0	WP 0162 00 (4 pgs) .....	0
WP 0112 00 (12 pgs) .....	0	WP 0163 00 (2 pgs) .....	0
WP 0113 00 (4 pgs) .....	0	WP 0164 00 (6 pgs) .....	0
WP 0114 00 (2 pgs) .....	0	WP 0165 00 (4 pgs) .....	0
WP 0115 00 (2 pgs) .....	0	WP 0166 00 (6 pgs) .....	0
WP 0116 00 (2 pgs) .....	0	WP 0167 00 (6 pgs) .....	0
WP 0117 00 (2 pgs) .....	0	WP 0168 00 (6 pgs) .....	0
WP 0118 00 (2 pgs) .....	0	WP 0169 00 (4 pgs) .....	0
WP 0119 00 (2 pgs) .....	0	WP 0170 00 (4 pgs) .....	0
WP 0120 00 (2 pgs) .....	0	WP 0171 00 (6 pgs) .....	0
WP 0121 00 (4 pgs) .....	0	WP 0172 00 (6 pgs) .....	0
WP 0122 00 (6 pgs) .....	0	WP 0173 00 (2 pgs) .....	0
WP 0123 00 (4 pgs) .....	0	WP 0174 00 (2 pgs) .....	0
WP 0124 00 (6 pgs) .....	0	WP 0175 00 (2 pgs) .....	0
WP 0125 00 (6 pgs) .....	0	WP 0176 00 (4 pgs) .....	0
WP 0126 00 (4 pgs) .....	0	WP 0177 00 (2 pgs) .....	0

\* Zero in this column indicates an original page or work package

LIST OF EFFECTIVE PAGES/WORK PACKAGES (continued)

Page/WP No.	* Change No.	Page/WP No.	* Change No.
WP 0178 00 (4 pgs) .....	0	WP 0218 00 (2 pgs) .....	0
WP 0179 00 (2 pgs) .....	0	WP 0219 00 (6 pgs) .....	0
WP 0180 00 (6 pgs) .....	0	WP 0220 00 (4 pgs) .....	0
WP 0181 00 (4 pgs) .....	0	WP 0221 00 (4 pgs) .....	0
WP 0182 00 (2 pgs) .....	0	WP 0222 00 (4 pgs) .....	0
WP 0183 00 (2 pgs) .....	0	WP 0223 00 (4 pgs) .....	0
WP 0184 00 (8 pgs) .....	0	WP 0224 00 (4 pgs) .....	0
WP 0185 00 (4 pgs) .....	0	WP 0225 00 (4 pgs) .....	0
WP 0186 00 (2 pgs) .....	0	WP 0226 00 (4 pgs) .....	0
WP 0187 00 (2 pgs) .....	0	WP 0227 00 (4 pgs) .....	0
WP 0188 00 (6 pgs) .....	0	WP 0228 00 (4 pgs) .....	0
WP 0189 00 (2 pgs) .....	0	WP 0229 00 (4 pgs) .....	0
WP 0190 00 (4 pgs) .....	0	WP 0230 00 (4 pgs) .....	0
WP 0191 00 (4 pgs) .....	0	WP 0231 00 (4 pgs) .....	0
WP 0192 00 (2 pgs) .....	0	WP 0232 00 (2 pgs) .....	0
WP 0193 00 (4 pgs) .....	0	WP 0233 00 (4 pgs) .....	0
Electronic DA Form 2028 .....	0	WP 0234 00 (14 pgs) .....	0
DA 2028 .....	0	WP 0235 00 (8 pgs) .....	0
Authentication Page .....	0	WP 0236 00 (14 pgs) .....	0
Rear Cover .....	0	WP 0237 00 (4 pgs) .....	0
Volume 2		WP 0238 00 (6 pgs) .....	0
Front Cover .....	0	WP 0239 00 (2 pgs) .....	0
a-i .....	0	WP 0240 00 (4 pgs) .....	0
j blank .....	0	WP 0241 00 (14 pgs) .....	0
A-D .....	0	WP 0242 00 (2 pgs) .....	0
i - vi .....	0	WP 0243 00 (10 pgs) .....	0
Chp 5 title page .....	0	WP 0244 00 (4 pgs) .....	0
WP 0194 00 (2 pgs) .....	0	WP 0245 00 (4 pgs) .....	0
WP 0195 00 (2 pgs) .....	0	WP 0246 00 (4 pgs) .....	0
WP 0196 00 (2 pgs) .....	0	WP 0247 00 (4 pgs) .....	0
WP 0197 00 (2 pgs) .....	0	WP 0248 00 (4 pgs) .....	0
WP 0198 00 (6 pgs) .....	0	WP 0249 00 (2 pgs) .....	0
WP 0199 00 (4 pgs) .....	0	WP 0250 00 (6 pgs) .....	0
WP 0200 00 (6 pgs) .....	0	WP 0251 00 (8 pgs) .....	0
WP 0201 00 (12 pgs) .....	0	WP 0252 00 (2 pgs) .....	0
WP 0202 00 (4 pgs) .....	0	WP 0253 00 (4 pgs) .....	0
WP 0203 00 (4 pgs) .....	0	WP 0254 00 (2 pgs) .....	0
WP 0204 00 (4 pgs) .....	0	WP 0255 00 (10 pgs) .....	0
WP 0205 00 (4 pgs) .....	0	WP 0256 00 (6 pgs) .....	0
WP 0206 00 (4 pgs) .....	0	WP 0257 00 (6 pgs) .....	0
WP 0207 00 (6 pgs) .....	0	WP 0258 00 (6 pgs) .....	0
WP 0208 00 (2 pgs) .....	0	WP 0259 00 (4 pgs) .....	0
WP 0209 00 (4 pgs) .....	0	WP 0260 00 (2 pgs) .....	0
WP 0210 00 (8 pgs) .....	0	WP 0261 00 (4 pgs) .....	0
WP 0211 00 (2 pgs) .....	0	WP 0262 00 (4 pgs) .....	0
WP 0212 00 (10 pgs) .....	0	WP 0263 00 (4 pgs) .....	0
WP 0213 00 (4 pgs) .....	0	WP 0264 00 (2 pgs) .....	0
WP 0214 00 (2 pgs) .....	0	WP 0265 00 (2 pgs) .....	0
WP 0215 00 (2 pgs) .....	0	WP 0266 00 (4 pgs) .....	0
WP 0216 00 (4 pgs) .....	0	WP 0267 00 (4 pgs) .....	0
WP 0217 00 (4 pgs) .....	0	WP 0268 00 (4 pgs) .....	0

\* Zero in this column indicates an original page or work package

TM 55-1925-273-24&P-2

LIST OF EFFECTIVE PAGES/WORK PACKAGES (continued)

Page/WP No.	* Change No.	Page/WP No.	* Change No.
WP 0269 00 (4 pgs) .....	0	WP 0301 00 (42 pgs) .....	0
WP 0270 00 (4 pgs) .....	0	WP 0302 00 (40 pgs) .....	0
WP 0271 00 (2 pgs) .....	0	WP 0303 00 (22 pgs) .....	0
WP 0272 00 (2 pgs) .....	0	WP 0304 00 (30 pgs) .....	0
WP 0273 00 (6 pgs) .....	0	WP 0305 00 (24 pgs) .....	0
WP 0274 00 (4 pgs) .....	0	WP 0306 00 (34 pgs) .....	0
WP 0275 00 (8 pgs) .....	0	WP 0307 00 (12 pgs) .....	0
WP 0276 00 (4 pgs) .....	0	WP 0308 00 (4 pgs) .....	0
WP 0277 00 (4 pgs) .....	0	Glossary-1-Glossary-4 .....	0
WP 0278 00 (4 pgs) .....	0	Index 1-Index-60 .....	0
WP 0279 00 (4 pgs) .....	0	FO-TOC (2 pgs) .....	0
Chp 6 title page .....	0	FO-1 (2 pgs) .....	0
WP 0280 00 (4 pgs) .....	0	FO-2 (1 pgs) .....	0
WP 0281 00 (4 pgs) .....	0	FO-3 (1 pgs) .....	0
WP 0282 00 (4 pgs) .....	0	FO-4 (1 pgs) .....	0
WP 0283 00 (10 pgs) .....	0	FO-5 (5 pgs) .....	0
WP 0284 00 (6 pgs) .....	0	FO-6 (12 pgs) .....	0
WP 0285 00 (4 pgs) .....	0	FO-7 (8 pgs) .....	0
WP 0286 00 (10 pgs) .....	0	FO-8 (10 pgs) .....	0
WP 0287 00 (6 pgs) .....	0	FO-9 (8 pgs) .....	0
WP 0288 00 (2 pgs) .....	0	FO-10 (30 pgs) .....	0
WP 0289 00 (4 pgs) .....	0	FO-11 (10 pgs) .....	0
WP 0290 00 (2 pgs) .....	0	FO-12 (16 pgs) .....	0
WP 0291 00 (4 pgs) .....	0	FO-13 (5 pgs) .....	0
WP 0292 00 (6 pgs) .....	0	FO-14 (5 pgs) .....	0
Chp 7 title page .....	0	FO-15 (3 pgs) .....	0
WP 0293 00 (4 pgs) .....	0	FO-16 (3 pgs) .....	0
WP 0294 00 (4 pgs) .....	0	FO-17 (7 pgs) .....	0
WP 0295 00 (22 pgs) .....	0	FO-18 (6 pgs) .....	0
WP 0296 00 (56 pgs) .....	0	Electronic DA Form 2028 .....	0
WP 0297 00 (36 pgs) .....	0	DA 2028 .....	0
WP 0298 00 (64 pgs) .....	0	Authentication Page .....	0
WP 0299 00 (14 pgs) .....	0	Rear Cover .....	0
WP 0300 00 (26 pgs) .....	0		

\* Zero in this column indicates an original page or work package



HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 30 NOVEMBER 2005

TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL  
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

FOR

INLAND AND COASTAL LARGE TUG (LT)  
NSN 1925-01-509-7013 (EIC XAG)

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications) through the Internet on the Army Electronic Product Support (AEPS) Web site. The Internet address is <https://aeeps.ria.army.mil>. The DA Form 2028 is located under the Public Applications section on the AEPS public home page. Fill out the form and click on SUBMIT. Using this form on the AEPS site will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or e-mail your letter or DA Form 2028 directly to: AMSTA-LC-LPIT / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

DISTRIBUTION STATEMENT A: Approved for public release, distribution is unlimited.

TABLE OF CONTENTS

	<u>WP Sequence No.</u>
WARNING SUMMARY	
HOW TO USE THIS MANUAL	
CHAPTER 1 - GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION .....	Volume 1
CHAPTER 2 - TROUBLESHOOTING PROCEDURES .....	Volume 1
CHAPTER 3- SERVICE UPON RECEIPT AND PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) .....	Volume 1
CHAPTER 4 - UNIT MAINTENANCE INSTRUCTIONS .....	Volume 1

VOLUME 2

WARNING SUMMARY	
HOW TO USE THIS MANUAL	
CHAPTER 5 - DIRECT SUPPORT MAINTENANCE INSTRUCTIONS Voids and Compartments, Repair .....	0194 00

This manual supersedes TM 55-1925-207-24&P-2, dated 16 August 1991

TABLE OF CONTENTS (continued)

WP Sequence No.

Mast, Repair .....	0195 00
Windows, Repair .....	0196 00
Hydraulic Watertight Doors, Repair .....	0197 00
Hydraulic Watertight Doors, Cylinder Assembly; Replace .....	0198 00
Hydraulic Watertight Doors, Cylinder Assembly; Repair .....	0199 00
Hydraulic Watertight Doors, Control Valve Assembly; Replace .....	0200 00
Hydraulic Watertight Doors, Control Valve Assembly; Repair .....	0201 00
Hydraulic Watertight Doors, Hand Pumps, Local/Remote; Replace .....	0202 00
Hydraulic Watertight Doors, Hand Pumps, Local/Remote; Repair .....	0203 00
Watertight Doors, Repair .....	0204 00
Watertight Hatches, Repair .....	0205 00
Watertight Scuttles, Repair .....	0206 00
Watertight Manholes, Repair .....	0207 00
Rotary Clearview Screens, Replace .....	0208 00
Rotary Clearview Screens, Repair .....	0209 00
Pilothouse, Replace .....	0210 00
Pilothouse, Repair .....	0211 00
Main Engine Prelubrication Oil Pump, Repair .....	0212 00
Reduction Gear Cooling Pump, Repair .....	0213 00
Keel Coolers, Inspect .....	0214 00
Propeller, Inspect .....	0215 00
Electrical Power System, Test .....	0216 00
Electrical Power System, Adjust .....	0217 00
Electrical Power System, Repair .....	0218 00
Main Switchboard, Repair .....	0219 00
Emergency Switchboard, Repair (Bus Tie Circuit Breaker Replacement) .....	0220 00
Emergency Switchboard, Repair (EDG Circuit Breaker Replacement) .....	0221 00
Engine Room Emergency Load Center Distribution Panel, Replace .....	0222 00
Power Distribution Panel, Replace .....	0223 00
Motor Controller; Reduction Gear Cooling Pump, Sewage Discharge Pump 1 & 2, Lube Oil Transfer Pump, Potable Water Pump 1 & 2, Galley Supply Fan, Galley Exhaust Fan, Sanitary Space Exhaust Fan, Crew Mess Fan Coil Unit, 01, 02, 03 Levels Fan Coil Unit, Air Compressor 1 & 2, Fuel Oil Transfer Pump, AFFF Pump; Replace .....	0224 00
Motor Controller, Lube Oil Priming Pump 1 and Lube Oil Priming Pump 2; Replace .....	0225 00
Motor Controller; AMS 1 & 2 Supply Fan, Boatswain's Store Room Supply Fan, Arms Locker Exhaust Fan, Engine Room Supply Fan 1 & 2, Engine Room Exhaust Fan 1 & 2; Replace .....	0226 00
Motor Controller; Bilge & Ballast Pump 1 & 2, Fire & General Service Pump #1 & #2; Replace .....	0227 00
Motor Controller, Hot Potable Water Recirculating Pump; Replace .....	0228 00
Motor Controller, Weld Hood Exhaust Fan; Replace .....	0229 00
Battery Charger, Power Supply System; Replace .....	0230 00
Battery Charger, Power Supply System; Repair .....	0231 00
Illumination and Navigation Signals, Test .....	0232 00
Illumination and Navigation Signals, Replace .....	0233 00
Illumination and Navigation Signals, Repair .....	0234 00
Searchlights, Replace .....	0235 00
Searchlights, Repair .....	0236 00
Navigation Lighting Panel, Replace .....	0237 00
Navigation Lighting Panel, Repair .....	0238 00
Interior Communication, Repair .....	0239 00
Sound Powered Telephones, Replace .....	0240 00

TABLE OF CONTENTS (continued)

**WP Sequence No.**

Sound Powered Telephones, Repair .....	0241 00
Intercommunication System, Replace .....	0242 00
Intercommunication System, Repair .....	0243 00
Engine Order Telegraph, Replace .....	0244 00
Engine Order Telegraph, Repair .....	0245 00
Battery Charger, General Alarm System; Replace .....	0246 00
Battery Charger, General Alarm System; Repair .....	0247 00
Tank Level Indicators, Inspect .....	0248 00
Tank Level Indicators, Calibrate .....	0249 00
Tank Level Indicators, Replace .....	0250 00
Tank Level Indicators, Repair .....	0251 00
Tank Level Indicators, Fluid Detection Devices; Inspect .....	0252 00
Tank Level Indicators, Fluid Detection Devices; Replace .....	0253 00
Tank Level Indicators, Transmitters; Inspect .....	0254 00
Tank Level Indicators, Transmitters; Replace .....	0255 00
Tank Level Indicators, Cable Assemblies; Inspect .....	0256 00
Tank Level Indicators, Cable Assemblies; Replace .....	0257 00
Day Tank High Level Alarms, Alarm Panel; Replace, Repair .....	0258 00
Day Tank High Level Alarms, Level Sensor; Replace .....	0259 00
Sewage Discharge Pump, Repair .....	0260 00
Sewage Discharge Pump, Pump End; Replace .....	0261 00
Sewage Discharge Pump, Pump End; Repair .....	0262 00
Sewage Discharge Pump, Electric Motor; Repair .....	0263 00
Ballast Pump, Repair .....	0264 00
Ballast Pump, Pump End; Repair .....	0265 00
Ballast Pump, Electric Motor; Repair .....	0266 00
Potable Water Pump, Repair .....	0267 00
Potable Water Pump, Pump End; Repair .....	0268 00
Hydropneumatic Tank, Replace .....	0269 00
Hot Water Heater, Replace .....	0270 00
Hot Water Heater, Repair .....	0271 00
Fire and General Service Pump, Alignment .....	0272 00
Fire and General Service Pump, Repair .....	0273 00
Fire and General Service Pump, Pump End; Replace .....	0274 00
Fire and General Service Pump, Pump End; Repair .....	0275 00
Fire and General Service Pump, Electric Motor; Replace .....	0276 00
Fire and General Service Pump, Electric Motor; Repair .....	0277 00
Arc Welding Machine, Repair .....	0278 00
Ammunition Locker, Repair .....	0279 00
 CHAPTER 6 - GENERAL SUPPORT MAINTENANCE INSTRUCTIONS	
Reduction Gear Cooling Pump, Repair .....	0280 00
Propulsion Engine Exhaust System, Repair .....	0281 00
Sewage Discharge Pump, Repair .....	0282 00
Sewage Discharge Pump, Pump End, Repair .....	0283 00
Sewage Discharge Pump, Electric Motor; Repair .....	0284 00
Ballast Pump, Repair .....	0285 00
Ballast Pump, Pump End; Repair .....	0286 00
Ballast Pump, Electric Motor; Repair .....	0287 00
Potable Water Pump, Repair .....	0288 00
Potable Water Pump, Pump End; Repair .....	0289 00
Fire and General Service Pump, Repair .....	0290 00

TABLE OF CONTENTS (continued)

WP Sequence No.

Fire and General Service Pump, Pump End; Repair .....	0291 00
Fire and General Service Pump, Electric Motor; Repair .....	0292 00

CHAPTER 7- SUPPORTING INFORMATION

References .....	0293 00
Maintenance Allocation Chart (MAC) Introduction .....	0294 00
Maintenance Allocation Chart .....	0295 00
Repair Parts and Special Tools List; Hull Structure .....	0296 00
Repair Parts and Special Tools List; Propulsion System .....	0297 00
Repair Parts and Special Tools List; Electrical Distribution Systems .....	0298 00
Repair Parts and Special Tools List; Lighting .....	0299 00
Repair Parts and Special Tools List; Motor Controllers .....	0300 00
Repair Parts and Special Tools List; Batteries, Battery Chargers, Searchlights, and Navigation Lighting .....	0301 00
Repair Parts and Special Tools List; Interior Communication, Engine Order Telegraph, General Alarm, Entertainment System, and Signal Horn .....	0302 00
Repair Parts and Special Tools List; Tank Level Indicators .....	0303 00
Repair Parts and Special Tools List; Sewage, Oily Bilge, and Ballast Systems .....	0304 00
Repair Parts and Special Tools List; Potable Water and Fire and General Service Systems ...	0305 00
Repair Parts and Special Tools List; Damage Control Equipment, Workshop Equipment, and Armament Installation .....	0306 00
Expendable and Durable Items List .....	0307 00
Torque Table .....	0308 00

GLOSSARY

INDEX

FOLDOUT PAGES

Fuel System Schematic .....	FO-1
General Service Pump Suction Piping Modifications .....	FO-2
Air Compressor Pipework .....	FO-3
ROWPU Installation .....	FO-4
ROWPU System Wiring Diagram .....	FO-5
Machinery Remote Control System .....	FO-6
Battery Power Supply System .....	FO-7
One Line Electrical Diagram .....	FO-8
Power System .....	FO-9
Electrical Plant Elementary Wiring Diagram .....	FO-10
Lighting and Small Power Distribution Diagram .....	FO-11
Machinery Equipment Wiring .....	FO-12
Sound Powered Telephone System .....	FO-13
General Alarm System .....	FO-14
Arms Storage Alarm System .....	FO-15
Public Announcing System .....	FO-16
HVAC Electrical System .....	FO-17
Fire Detection and Alarm System .....	FO-18

## HOW TO USE THIS MANUAL

### USING THIS MANUAL

When using this manual, read and understand the entire maintenance action before performing the task. Also, read and understand all warnings, cautions, and notes as well as general safety precautions that apply to the task to be performed. The warning summary will inform personnel of hazards associated with the equipment to be worked on. However, the summary is not all inclusive and personnel should be aware at all times of hazardous conditions that may arise.

### ACCESSING INFORMATION

Information is accessed by referring to the table of contents, located in the front of this manual, or by looking in the alphabetical index, located in the back of this manual.

To locate information using the table of contents, first scan the chapter titles to determine the general area in which your information will be contained. After locating the proper chapter, look beneath the chapter title to find the desired informational or procedural work package title. To the right of the work package title is a work package sequence number. This work package sequence number will direct you to the proper work package. Work packages are arranged in numerical order in this manual.

To locate information using the alphabetical index, look down the subject column on the left side of the page until you find the desired subject. To the right of the subject is the work package sequence number and page number. Go to the indicated work package and indicated page number to find the desired information.

### INITIAL SETUP

Initial setup requirements are located directly above many of the procedures in this manual. The information is given to ensure all materials, expendables, tools and any other equipment necessary are readily available for use. The initial setup will be accomplished prior to starting the actual steps of each maintenance procedure. There are five basic headings listed under the initial setup:

**Tools and Special Tools:** This section lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from table 2 of the Maintenance Allocation Chart (MAC).

**Materials/Parts:** This section lists all of the materials and parts required to perform the task. If the material or part is needed each time to work package is used, then it is listed here. If the part is optional, replaced on a conditional basis, or is only needed for certain specific procedures within the work package it is not listed.

**Personnel Required:** This section lists all personnel necessary to perform the task. When a specific MOS or other personnel qualification is required, this MOS or additional requirement is also indicated.

**Equipment Condition:** This section notes the conditions that must exist before starting the task. The equipment condition will also include any prerequisite maintenance tasks to be performed with reference to the work package number or to the TM number that contains the required maintenance task.

**References:** This section lists any other publications necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within this manual. A listing of reference materials is contained in the Supporting Information chapter at the rear of this manual.

### ILLUSTRATIONS

Various visual methods are used to locate and repair components. Locator illustrations in Controls and Indicator tables, Preventive Maintenance Checks and Services (PMCS) tables, exploded views, and cut-away diagrams make the information in the manual easier to understand and follow.

## **LOCATING MAJOR COMPONENTS**

This work package gives a brief description of the major components, and provides illustrations showing the location of the components. Knowing the major components of the system is the first step to understanding system operation and maintenance.

## **THEORY OF OPERATION**

This work package contains the theory of operation for the system. Theory of operation is provided to familiarize the user system operating principles. Once the operating principles are understood, the user is better equipped to operate, troubleshoot, and maintain the system.

## **TROUBLESHOOTING PROCEDURES**

A troubleshooting index work package is contained in this manual to permit easy location of troubleshooting procedures. Full directions for using the troubleshooting index and the accompanying troubleshooting procedures are contained in the troubleshooting index work packages. The troubleshooting procedure work package(s) immediately follow the troubleshooting index.

## **MAINTENANCE PROCEDURES**

To locate a maintenance procedure, consult the table of contents or the alphabetical index. Each level of maintenance (operator, unit, direct support, and general support) has a chapter dedicated to maintenance procedures for the appropriate level of maintenance. Each maintenance work package contains complete maintenance procedures, starting with initial setup and continuing through follow on service as appropriate. Always ensure that all of the initial setup is complete before beginning a maintenance procedure and always ensure that all warnings, cautions, and notes are heeded.

## **MAINTENANCE ALLOCATION CHART**

The MAC lists all of the authorized maintenance for the system assigns that maintenance to the appropriate maintenance level (operator, unit, direct support, general support). Use of the MAC is explained fully in the Maintenance Allocation Chart Introduction work package.

## **REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)**

The RPSTL lists all of the repair parts authorized for the system. Illustrations are provided to assist in locating the desired repair parts. Full instructions for use of the RPSTL are contained in the Repair Parts and Special Tools List Introduction work package. Always follow the directions contained in this work package when using the RPSTL.

## **ALPHABETICAL INDEX**

The Alphabetical Index, located in the back of this manual, contains an alphabetical list of all sections of this manual. For example, Location and Description of Major Components is found in section L. The work package sequence number is found on the right side of the title where the Location and Description of Major Components is located. Turn to the work package indicated to find the description and location of each component.

## **Chapter 5**

# **Direct Support Maintenance Instructions for Inland and Coastal Large Tug (LT)**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
VOIDS AND COMPARTMENTS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1,  
Table 2, WP 0295 00)  
Tool Kit, Welder's (Item 3, Table 2,  
WP 0295 00)

**References:**

FM 55-502  
Organizational Confined Space Entry SOP  
TB 43-0144  
TB 55-1900-204-24  
WP 0295 00

**Personnel Required:**

One Certified Welder (trained in confined  
space entry)  
One Entry Supervisor/Attendant  
Fire Watch as Required (FM 55-502)

**Equipment Condition:**

Vessel certified safe for HOT WORK (FM 55-502).  
VOIDS prepared for confined space entry (Organizational  
Confined Space Entry SOP and FM 55-502).

---

**REPAIR****WARNING**

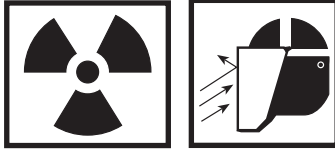
**Entry into an uninspected confined space may result in death or serious injury to personnel. Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502.**

1. Remove all water and contamination from the void(s) to locate the damage. If the damage is below the waterline, the vessel may have to be beached or drydocked before performing repairs.

**WARNING**

**Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel. These hot particles can also ignite fires in the work area and in adjacent spaces. During and after removal, the work area will be very hot. Wear protective goggles, gloves, and/or aprons at all times during cutting and grinding operations. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and serious damage to the vessel.**

2. Prepare the area for repair by removing paint, rust, and contamination. Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected in accordance with TB 55-1900-204-24.

**WARNING**

**Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc-welding operations without using appropriate eye and skin protection.**

3. Repair the damage by welding and/or patching the area. Replace damaged areas as necessary. The nature of the repair will necessarily depend upon the nature of the damage.
4. Chip and grind the welds as required.
5. Prime and paint the repaired area in accordance with TB 43-0144. If the voids are damaged due to heavy rust, the entire void should be sandblasted to bare metal, primed, and painted in accordance with TB 43-0144.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MAST, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)

**References:**

FM 55-502  
TB 43-0144  
WP 0295 00

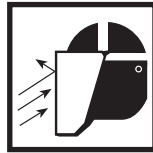
**Personnel Required:**

One Watercraft Operator, 88K  
Fire Watch as Required (FM 55-502)

---

**NOTE**

Repair the masts by cleaning and painting as necessary. If any structural damage or defect is detected, notify the maintenance supervisor.

**WARNING**

**Grinding, needling, and chipping operations produce high velocity flying debris, which can become lodged in the skin or in the eyes. Grinding, needling, and chipping in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing grinding, needling, and chipping operations. Failure to comply can result in serious injury or death to personnel.**

1. Prepare the area for repair by removing paint, rust, and contamination. This may be accomplished using a chipping hammer, wire brush, grinder, or needle gun depending upon the size of the affected area.
2. Prime and paint the repaired area (TB 43-0144).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
WINDOWS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**Materials/Parts:**

Rubber Strip (Item 4, Figure 2, WP 0296 00)

**References:**

WP 0295 00

WP 0296 00

**NOTE**

This work package details repair of the portholes found throughout the vessel's berthing areas. Replacement of pilothouse windows is accomplished at depot level.

**COVER AND GLASS FRAME REPLACEMENT****REMOVAL**

1. Loosen four bell nuts (figure 1, item 1) and undog the cover (figure 1, item 2).
2. Remove and discard the two cotter pins (figure 1, item 3) from the hinge pin (figure 1, item 4).

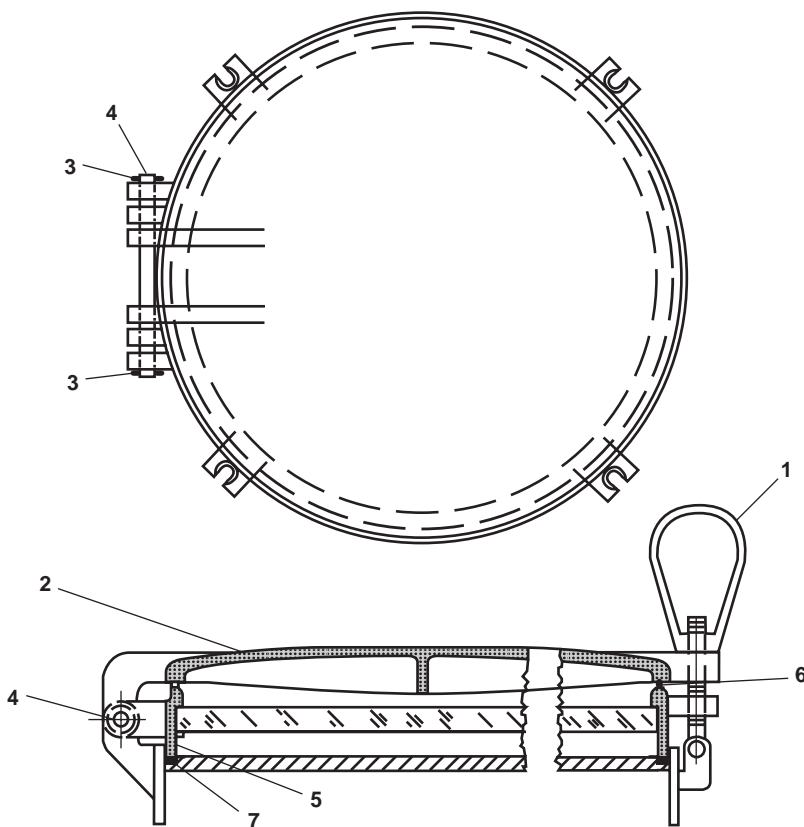


Figure 1. Window Cover and Glass Frame

 **CAUTION**

Hold the cover and glass frame securely when the hinge pins are driven out. Both assemblies will come loose when the hinge pin is removed. Cover or glass breakage could result if the components are permitted to fall freely.

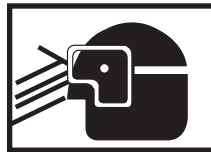
3. Have one crewmember hold the cover (figure 1, item 2) and glass frame (figure 1, item 5) while the other crewmember removes the hinge pin (figure 1, item 4).
4. Set aside the cover (figure 1, item 2) and glass frame (figure 1, item 5) if they will be installed later.

**INSTALLATION**

1. Have one crewmember hold the cover (figure 1, item 2) and glass frame (figure 1, item 5) in position while the other crewmember installs the hinge pin (figure 1, item 4) to hold them in place.
2. Install two new cotter pins (figure 1, item 3) in the hinge pin (figure 1, item 4) to secure it in place.

**RUBBER STRIP GASKET REPLACEMENT****REMOVAL**

1. Remove the cover and glass frame as described in the preceding procedure in this work package.
2. Remove the rubber strip (figure 1, item 6) from the cover (figure 1, item 2) or from the frame (figure 1, item 7) as required.

**WARNING**

**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply can result in serious injury to personnel.**

3. Use a wire brush to thoroughly clean all of the old gasket material from the gasket channel. Clean the gasket channel to bare metal.

**INSTALLATION**

1. Position the rubber strip (figure 1, item 6) in the channel of the cover (figure 1, item 2) and/or the frame (figure 1, item 7) ensuring that the rubber strip is pressed firmly into place throughout the entire channel.
2. Clean the sealing edge of the glass frame (figure 1, item 5).
3. Apply a chalk line completely around both sealing edges of the glass frame (figure 1, item 5).
4. Close and dog the porthole.
5. Open the porthole and inspect the rubber strip. If the porthole is watertight, the gaskets will show an unbroken chalk line.
6. If the line is broken, notify the maintenance supervisor.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDRAULIC WATERTIGHT DOORS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Torch Outfit, Cutting and Welding (Item 2, Table 2, WP 0295 00)  
Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
Gloves, Leather (Item 37, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)

**Personnel Required (continued):**

Fire Watch as required (FM 55-502) (If welding will be performed)

**References:**

FM 55-502  
TB 43-0144  
TB 55-1900-204-24  
WP 0295 00

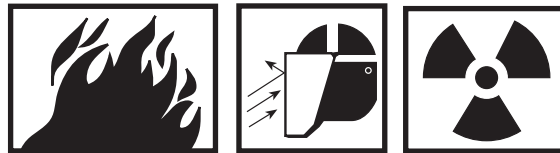
**Personnel Required:**

Two Watercraft Engineers, 88L

**Equipment Conditions:**

Vessel certified safe for HOTWORK (FM 55-502) (if welding will be performed)

---

**REPAIR****WARNING**

Grinding or cutting operations produce hot, flying particles. These particles can cause serious injury to personnel or ignite fires in the work area. Wear protective goggles, gloves, and/or aprons at all times. A fire watch must be posted whenever grinding or cutting operations are taking place. Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc welding operations without appropriate eye and skin protection. Failure to comply can result in damage to the vessel and serious injury or death to personnel.

**⚠ CAUTION**

Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected (TB 55-1900-204-24).

**NOTE**

Inspect the door structure and sealing edges for corrosion and other damage that would prevent a proper seal.

1. If welding repairs are required, perform such repairs using the applicable design drawings and acceptable welding practices. All watercraft welding and repair must be accomplished as detailed in TB 55-1900-204-24.
2. After the area has cooled, paint the affected area (TB 43-0144), taking care not to paint any threads.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDRAULIC WATERTIGHT DOORS, CYLINDER ASSEMBLY; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 029500)  
Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
Suitable Drain Pan

**Personnel Required:**

Three Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Hydraulic Fluid, Fire Resistant (Item 89, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)

**Equipment Conditions:**

Remote hand pump and local hand pumps locked out and tagged out (FM 55-502).

---

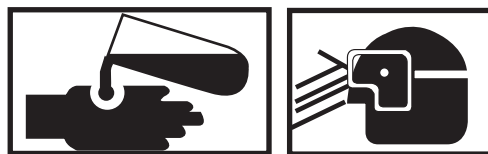
**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**HYDRAULIC CYLINDER REPLACEMENT****REMOVAL**

1. CLOSE the remote valves (figure 1, items 1 and 2).

**WARNING**



**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in illness, serious injury, or death.**

2. Position a suitable drain pan beneath the hydraulic cylinder (figure 2, item 1) that is to be removed.

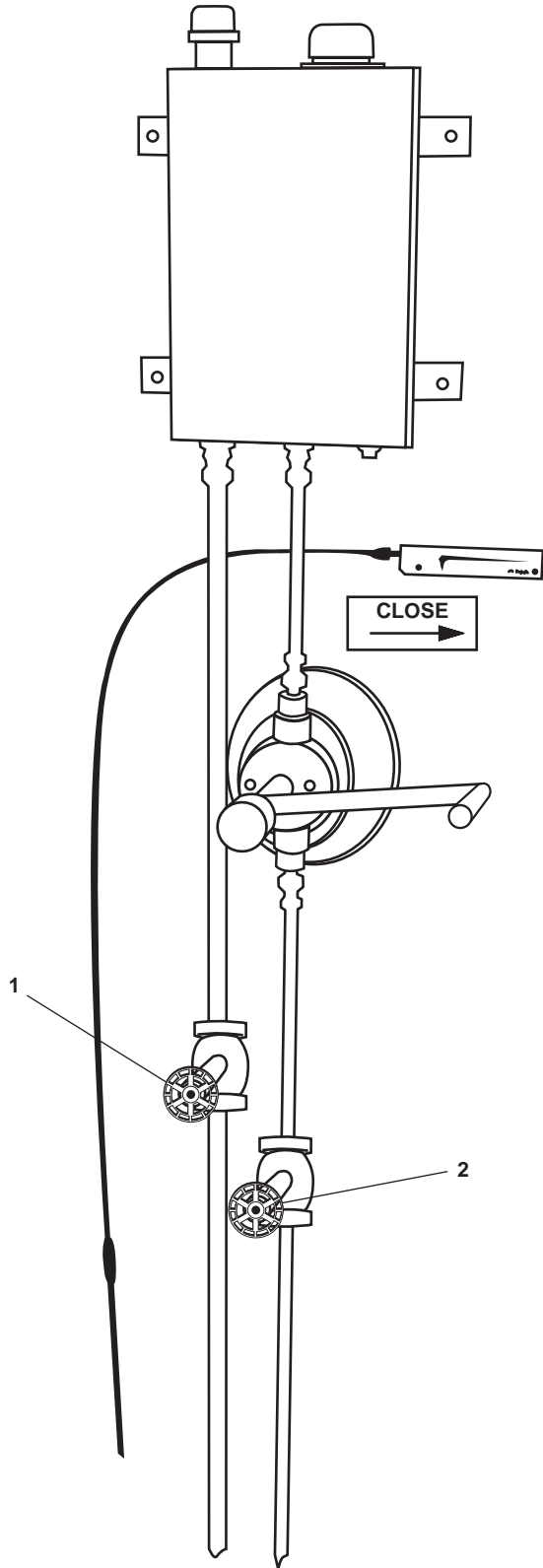


Figure 1. Valve Assembly

**WARNING**

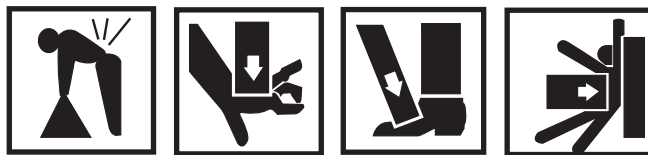
**Hydraulic hoses and lines may be under pressure. Relieve pressure by operating the appropriate control valve if possible. Loosen fitting on hose lines slowly. Allow oil to run around threads of the fitting, releasing pressure before disconnecting. Releasing pressurized oil suddenly may cause serious injury or death.**

3. Loosen, but do not remove, the hydraulic lines (figure 2, item 2) on each end of the hydraulic cylinder (figure 2, item 1) to release pressure from the system.
4. After all the pressure has been relieved, remove the hydraulic lines (figure 2, item 2) at the hydraulic cylinder (figure 2, item 1).
5. Cover the hydraulic lines (figure 2, item 2) with clean wiping rags to prevent contamination.

**WARNING**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow comply can result in serious injury or death.**

6. Use wiping rags and dry cleaning solvent to clean up all hydraulic fluid immediately to prevent unsafe working conditions.
7. Remove the rod nut (figure 2, item 3), and remove the hydraulic cylinder (figure 2, item 1) from the door.

**WARNING**

**Heavy loads can crush. Use a minimum of two crewmembers to lift and hold heavy loads. Do not allow any body parts to come under the load or between the load and a stationary object. Failure to comply can result in serious injury or death.**

8. Using two crewmembers, hold the hydraulic cylinder (figure 2, item 1) while the a third crewmember removes the cotter pins (figure 2, item 4) and anchor pin (figure 2, item 5). Discard the cotter pins.
9. Remove the hydraulic cylinder (figure 2, item 1) from the cylinder mounting bracket (figure 2, item 6).

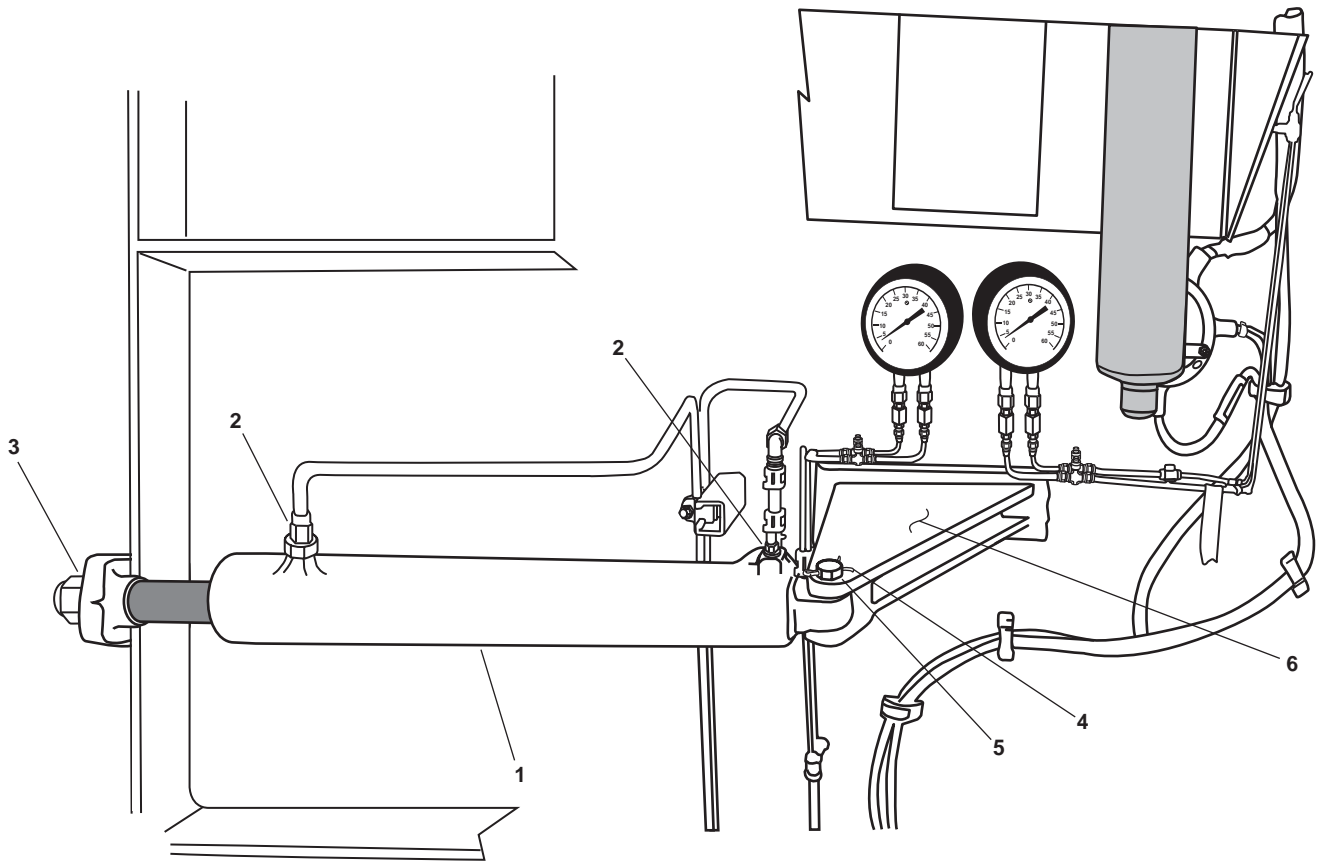
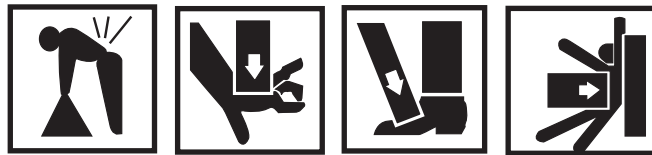


Figure 2. Hydraulic Cylinder

## INSTALLATION

### WARNING



**Heavy loads can crush. Use a minimum of two crewmembers to lift and hold heavy loads. Do not allow any body parts to come under the load or between the load and a stationary object. Failure to comply can result in serious injury or death.**

1. Using two crewmembers, position the hydraulic cylinder (figure 2, item 1) in the cylinder mounting bracket (figure 2, item 6) and secure it in place with the anchor pin (figure 2, item 5).
2. Install new cotter pins (figure 2, item 4) to secure the anchor pin in place.

3. Connect the hydraulic cylinder (figure 2, item 1) to the door, and install the rod nut (figure 2, item 3).
4. Connect the hydraulic lines (figure 2, item 2).
5. OPEN the remote valves (figure 1, items 1 and 2).
6. Fill the reservoir with clean hydraulic fluid to the proper level as indicated on the sight glass.
7. Remove the lockouts and tagouts (FM 55-502).

**WARNING**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow comply can result in serious injury or death.**

8. Cycle the door fully OPEN and fully CLOSED (TM 55-1925-273-10) four to five times to test the door and to release trapped air. Check for leaks and replenish the hydraulic oil as necessary.
9. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDRAULIC WATERTIGHT DOORS, CYLINDER ASSEMBLY; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Hydraulic Fluid, Fire Resistant (Table 89, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Bitan Cups (Item 4, Figure 3, WP 0296 00)  
Preformed Packing (Item 7, Figure 3, WP 0296 00)  
Seal, Plain (Item 9, Figure 3, WP 0296 00)

**Materials/Parts (continued):**

O-Ring (Item 5, Figure 3, WP 0296 00)  
Spacer, Sleeve (Item 6, Figure 3, WP 0296 00)  
Ring, Retaining (Item 8, Figure 3, WP 0296 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

TB 43-0218  
WP 0198 00  
WP 0295 00  
WP 0296 00  
WP 0307 00

**Equipment Condition:**

Hydraulic cylinder removed (WP 0198 00).

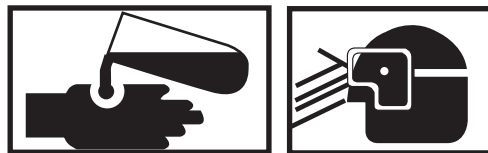
---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**DISASSEMBLY**

1. Remove the snap ring (figure 1, item 1) that holds the rod (figure 1, item 2) in the cylinder (figure 1, item 3). Discard the snap ring.

**WARNING**

**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in illness, serious injury or death.**

2. Position the rod end of the cylinder (figure 1, item 3) over a suitable drain pan to catch any hydraulic fluid lost during removal of the rod (figure 1, item 2).

3. Using two crewmembers, pull the rod (figure 1, item 2) out of the cylinder (figure 1, item 3). One crewmember must hold the cylinder while the other removes the rod.
4. Remove the nut (figure 2, item 1) from the rod (figure 2, item 2).
5. Remove the piston (figure 2, item 3) from the rod (figure 2, item 2).
6. Remove and discard the bitan cups (figure 2, item 4), O-rings (figure 2, items 5, 6, and 7), preformed packing (figure 2, item 8), plain seal (figure 2, item 9), and sleeve spacer (figure 2, item 10) from the piston (figure 2, item 3) and the rod (figure 2, item 2).

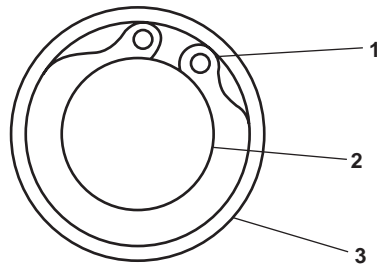


Figure 1. End View Of Cylinder

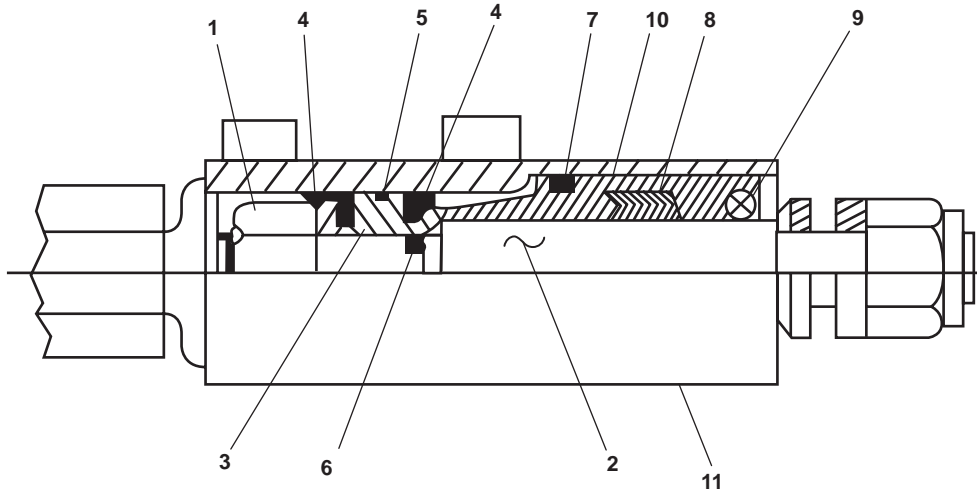
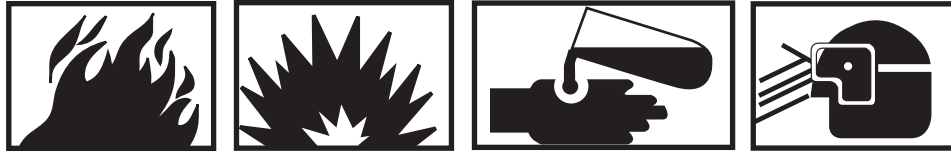


Figure 2. Cylinder Assembly



## CLEANING AND INSPECTION

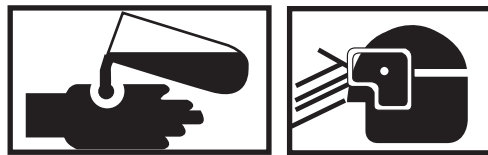
**WARNING**

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in serious injury or death.

Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in illness, serious injury or death.

1. Clean all metal parts with cleaning solvent and dry with clean wiping rags.
2. Inspect the cylinder rod for corrosion, pitting, deep scratches, or other damage that would harm the plain seal and preformed packing. If damage is found, the entire cylinder assembly must be replaced.
3. Use a light to examine the interior of the cylinder for corrosion, pitting, deep scratches, or other damage that would harm the plain seal and preformed packing. If damage is found, replace the entire cylinder assembly.
4. Inspect the piston and sleeve spacer for corrosion, pitting, deep scratches, or other damage that would harm the O-rings. If damage is found, replace the piston or sleeve spacer.

## ASSEMBLY

**WARNING**

Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in illness, serious injury or death.

1. Install a new O-ring (figure 2, item 7) preformed packing (figure 2, item 8), and plain seal (figure 2, item 9) in the sleeve spacer (figure 2, item 10).
2. Apply a liberal coating of clean hydraulic fluid to the preformed packing (figure 2, item 8), O-ring (figure 2, item 7), and plain seal (figure 2, item 9).

- 
3. Slide the sleeve spacer (figure 2, item 10) on the rod (figure 2, item 2), taking care not to damage the plain seal (figure 2, item 9).
  4. Install a new O-ring (figure 2, item 6) on the rod (figure 2, item 2) and apply a liberal coating of hydraulic fluid to the O-ring.
  5. Install a new O-ring (figure 2, item 5) and bitan cups (figure 2, item 4) on the piston (figure 2, item 3).
  6. Apply a liberal coating of clean hydraulic fluid to the O-ring (figure 2, item 5) and bitan cups (figure 2, item 4).
  7. Slide the piston (figure 2, item 3) onto the rod (figure 1, item 2) and secure it with the nut (figure 2, item 1).
  8. Carefully slide the rod (figure 2, item 2), piston (figure 2, item 3), and spacer assembly (figure 2, item 8) into the cylinder (figure 2, item 11), ensuring that the components previously installed are not twisted or damaged.
  9. Install a new snap ring (figure 1, item 1) to secure the rod (figure 1, item 2) into the cylinder (figure 1, item 3).
  10. Perform the Hydraulic Watertight Doors, Cylinder Assembly; Replace Installation procedure (WP 0198 00).

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDRAULIC WATERTIGHT DOORS, CONTROL VALVE ASSEMBLY; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Gauge, Pressure Dial Indicating (Item 18, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
 Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
 Suitable Drian Pan

**Materials/Parts:**

Hydraulic Fluid, Fire Resistant (Item 89, Table 1, WP 0307 00)  
 Tag, Danger (Item 174, Table 1, WP 0307 00)

**Materials/Parts (continued):**

Control Valve Assembly (Item 10, Figure 3, WP 0296 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
 WP 0295 00  
 WP 0296 00  
 WP 0307 00

**REMOVAL**
**WARNING**

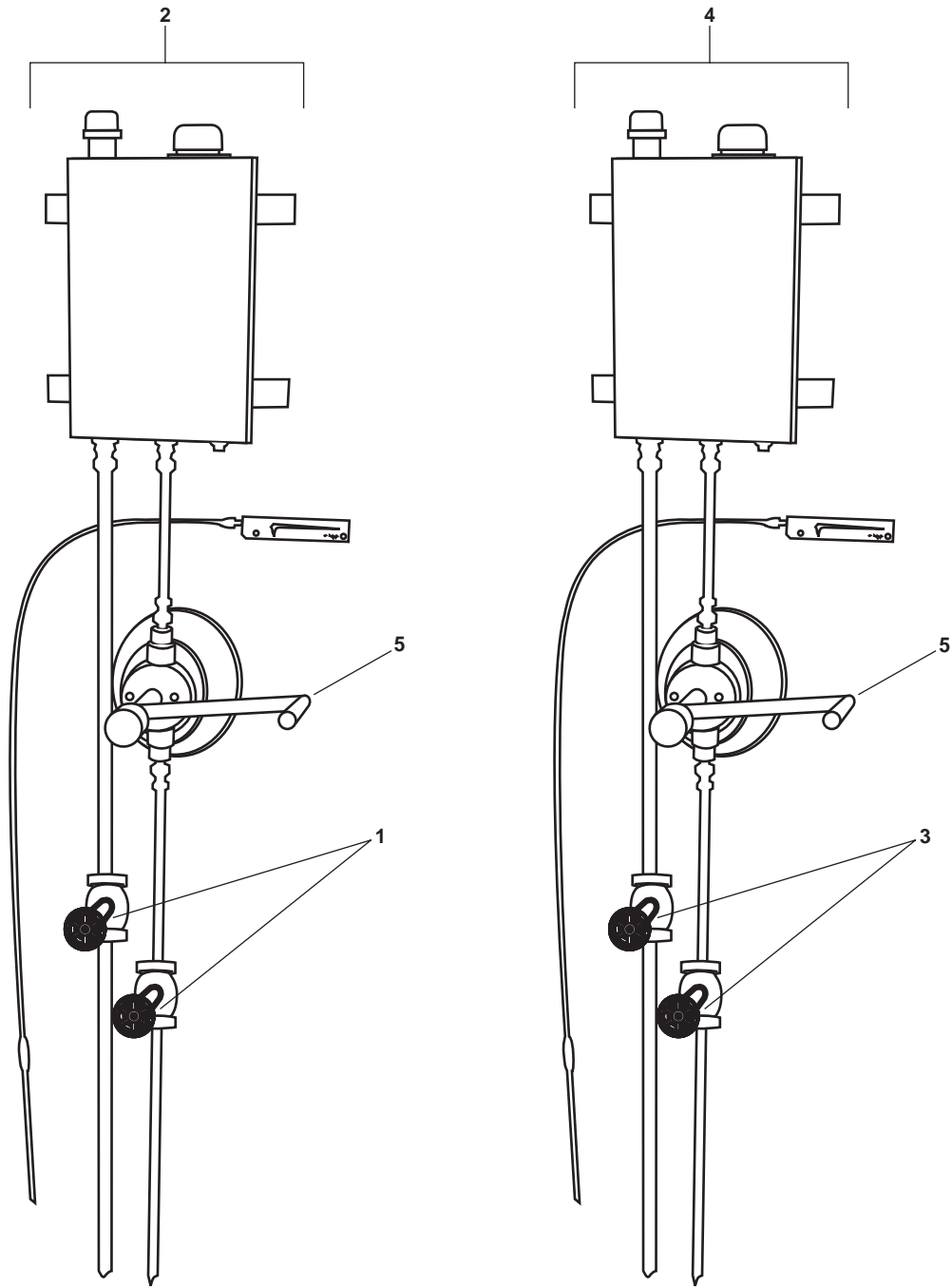
**Hydraulic hoses and lines may be under pressure. Relieve pressure by operating the appropriate control valve, if possible. Loosen fittings on hose lines slowly. Allow oil to run around threads of fitting, releasing pressure before disconnecting fitting. Releasing pressurized oil suddenly may cause severe personal injury.**

1. For AMS 1 control valve assembly replacement, CLOSE the cutoff valves (figure 1, item 1) at the AMS 1 hydraulic watertight door main deck passageway remote station (figure 1, item 2). Lock out and tag out (FM 55-502).
2. For AMS 2 control valve assembly replacement, CLOSE the cutoff valves (figure 1, item 3) at the AMS 2 hydraulic watertight door vestibule remote station (figure 1, item 4). Lock out and tag out (FM 55-502).
3. Place a suitable drain pan beneath the work area.


**CAUTION**

Always use two wrenches when loosening hydraulic lines. Failure to use two wrenches can result in damage to the hydraulic lines or fittings. Always use the two wrench method.

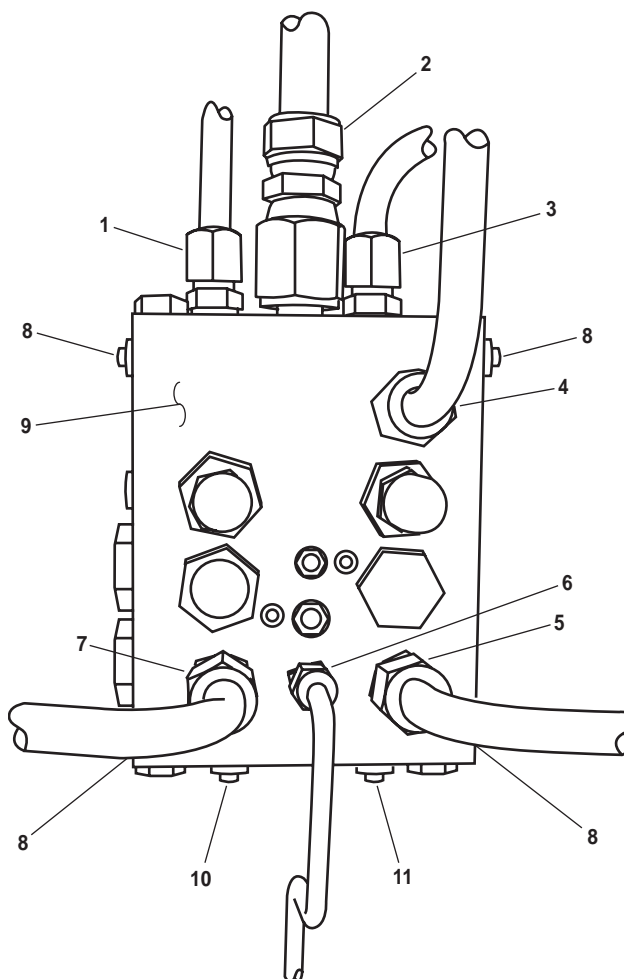
4. Label and remove the hydraulic lines (figure 2, items 1, 2, 3, 4, 5, 6, and 7).
5. Allow any hydraulic fluid to drain into the suitable drain pan.
6. Remove the four screws (figure 2, item 8) that secure the control valve assembly (figure 2, item 9) to its mounting bracket.
7. Remove the control valve assembly (figure 2, item 9) from its mounting bracket.



AMS 1 Hydraulic Watertight Door Remote,  
Main Deck Passageway

AMS 2 Hydraulic Watertight Door Reservoir,  
Vestibule

Figure 1. AMS 1 and AMS 2 Control Valve Assemblies



**Figure 2. Control Valve Assembly**

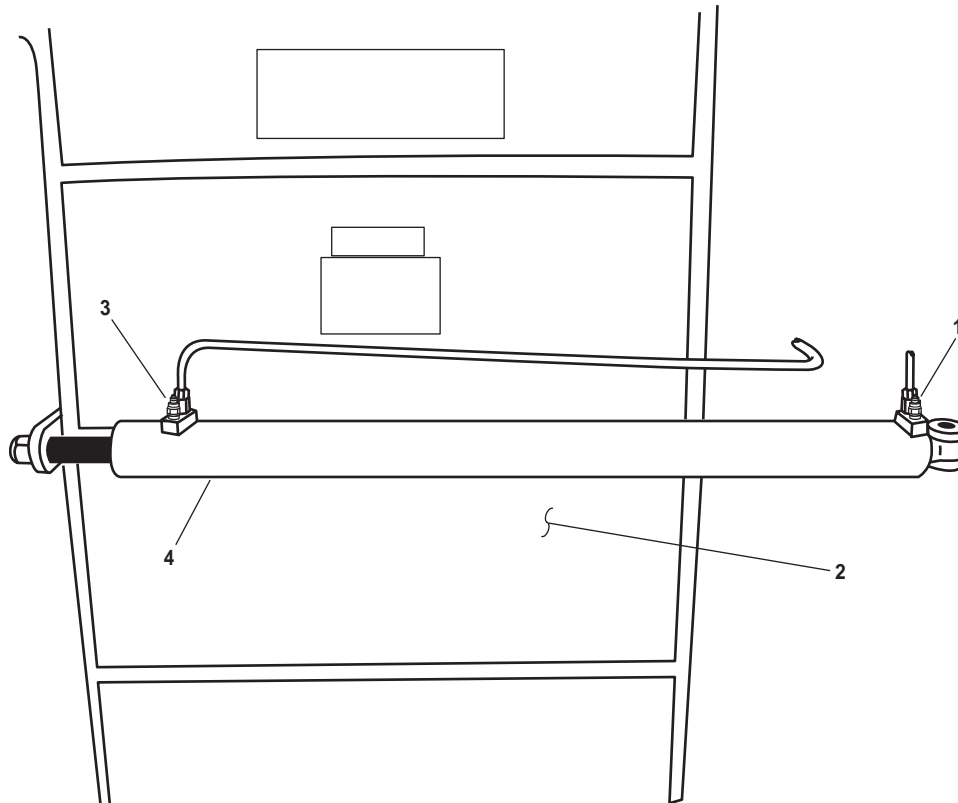
## INSTALLATION

1. Position the control valve assembly (figure 2, item 9) in its mounting bracket and secure it with the four screws (figure 2, item 8).

## ⚠ CAUTION

Always use two wrenches when tightening hydraulic lines. Failure to use two wrenches can result in damage to the hydraulic lines or fittings. Always use the two wrench method.

2. Connect the hydraulic lines (figure 2, items 1, 2, 3, 4, 5, 6, and 7) to the control valve assembly (figure 2, item 9) using the labels from step 4 of Removal as a guide. Remove the labels.
3. Remove the lockouts and tagouts (FM 55-502).
4. Remove the pipe plug (figure 2, item 10) from the control valve assembly (figure 2, item 9).
5. OPEN the cutoff valves (figure 1, items 1 and 3) for the appropriate remote location, and install the pipe plug (figure 2, item 10) when hydraulic fluid is vented from the pipe plug opening.
6. OPEN the vent (figure 3, item 1) on the mounting end of the cylinder.



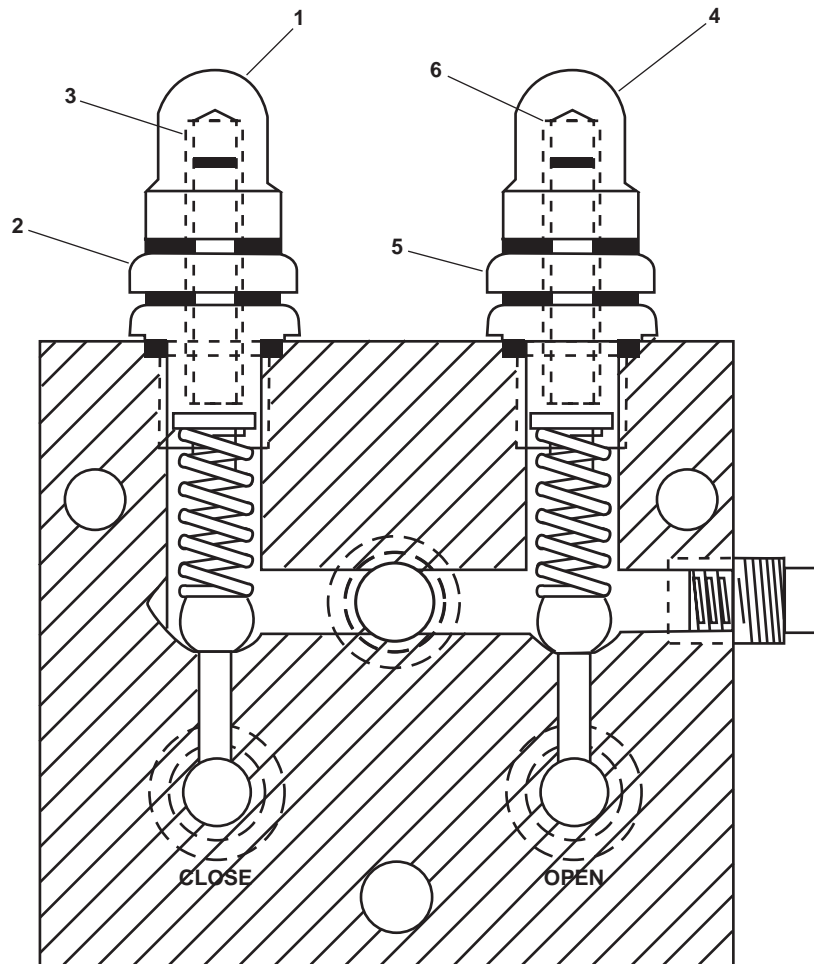
**Figure 3. Hydraulic Cylinder Vent**

7. Rotate the remote hand pump (figure 1, item 5) in the CLOSE direction until hydraulic fluid flows freely from the vent (figure 3, item 1).
8. CLOSE the vent (figure 3, item 1) and continue to rotate the remote hand pump (figure 1, item 5) clockwise until the watertight door (figure 3, item 2) closes.
9. OPEN the vent (figure 3, item 3) at the rod end of the cylinder (figure 3, item 4).
10. Operate the local hand pump in the OPEN direction until hydraulic fluid flows freely from the vent (figure 3, item 3).
11. CLOSE the vent (figure 3, item 3) and continue to rotate the local hand pump until the watertight door (figure 3, item 2) is OPEN.
12. Operate the watertight door through four to five complete OPEN/CLOSE cycles to bleed any remaining air from the system.
13. Remove the pipe plug (figure 2, item 10) from the OPEN part of the control valve assembly (figure 2, item 9). Install a pressure gauge in this opening.
14. Remove the pipe plug (figure 2, item 11) from the CLOSE part of the control valve assembly (figure 2, item 9). Install a pressure gauge in this opening.
15. Turn the local hand pump until the door is fully CLOSED and the cylinder is deadheaded.

## NOTE

Turn the crank handle against a deadheaded cylinder only while taking gauge readings. Do not continue cranking the door after the gauge reading has been observed.

16. Observe the reading on the pressure gauge in the CLOSE piping (figure 2, item 11) . The proper CLOSE relief pressure setting is 800 PSI (55 bar).
17. If the CLOSE relief pressure is not wet at 800 PSI (55 bar), perform steps 18-23. If the CLOSE relief pressure is set at 800 PSI (55 bar), proceed to step 24.
18. Remove the cap nut (figure 4, item 1) from the CLOSE relief valve cartridge.



**Figure 4. Control Valve Assembly Pressure Setting**

19. Loosen the jam nut (figure 4, item 2) on the CLOSE relief valve cartridge.
20. If the CLOSE relief pressure is too high, turn the CLOSE adjusting screw (figure 4, item 3) counterclockwise until the proper relief pressure is attained. If the CLOSE relief pressure is too low, turn the adjusting screw clockwise until the proper relief pressure is attained.
21. Hold the CLOSE adjusting screw (figure 4, item 3) stationary and tighten the jam nut (figure 4, item 2).

22. Check the CLOSE relief pressure. If the proper relief pressure is noted, proceed to step 23. If an incorrect CLOSE relief pressure is noted, repeat steps 19-22.
23. Install the cap nut (figure 4, item 1) on the CLOSE relief valve cartridge.
24. Turn the local hand pump until the door is fully OPEN and the cylinder is deadheaded.

**NOTE**

Turn the crank handle against a deadheaded cylinder only while taking gauge readings. Do not continue cranking the door after the gauge reading has been observed.

25. Observe the reading on the pressure gauge in the OPEN piping. The proper OPEN relief pressure setting is 800 PSI (55 bar).
26. If the OPEN relief pressure is not set at 800 PSI (55 bar), perform steps 27-32. If the OPEN relief pressure is set at 800 PSI (55 bar), proceed to step 33.
27. Remove the cap nut (figure 4, item 4) from the OPEN relief valve cartridge.
28. Loosen the jam nut (figure 4, item 5) on the OPEN relief valve cartridge.
29. If the OPEN relief pressure is too high, turn the OPEN adjusting screw (figure 4, item 6) counterclockwise until the proper relief pressure is attained. If the OPEN relief pressure is too low, turn the adjusting screw clockwise until the proper relief pressure is attained.
30. Hold the OPEN adjusting screw (figure 4, item 6) stationary and tighten the jam nut (figure 4, item 5).
31. Check the CLOSE relief pressure. If the proper relief pressure is noted, continue with the procedure. If an incorrect OPEN relief pressure is noted, repeat steps 28-31.
32. Install the cap nut (figure 4, item 1) on the OPEN relief valve cartridge.
33. Remove the pressure gauges and install the pipe plugs (figure 3, items 10 and 11) .
34. Return the hydraulic watertight door to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDRAULIC WATERTIGHT DOORS, CONTROL VALVE ASSEMBLY; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Chemical, and Oil Protective (Item 36, Table 2, WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Cloth, Abrasive (Crocus Cloth) (Item 39, Table 1, WP 0307 00)  
Hydraulic Fluid, Fire Resistant (Item 89, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)  
O-Ring (Item 11, Figure 3, WP 0296 00)  
O-Ring (Item 12, Figure 3, WP 0296 00)  
O-Ring (Item 13, Figure 3, WP 0296 00)  
Spring, Helical (Item 14, Figure 3, WP 0296 00)

**Materials/Parts (continued):**

Ball, Check (Item 15, Figure 3, WP 0296 00)  
Packing, W/Retainer (Item 17, Figure 3, WP 0296 00)  
O-Ring (Item 22, Figure 3, WP 0296 00)  
O-Ring (Item 25, Figure 3, WP 0296 00)  
Ball, Valve, Ported (Item 26, Figure 3, WP 0296 00)  
Spring, Helical (Item 27, Figure 3, WP 0296 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

WP 0200 00  
WP 0295 00  
WP 0296 00  
WP 0307 00

**Equipment Condition:**

Control valve assembly removed (WP 0200 00).

---

**CONTROL VALVE ASSEMBLY****DISASSEMBLY**

1. Match mark the control valve assembly (figure 1, item 1) top section (figure 1, item 2), middle section (figure 1, item 3), and bottom section (figure 1, item 4) to ensure that the control valve assembly is reassembled in the correct order and in the proper orientation.

 **CAUTION**

Always use two wrenches when loosening hydraulic lines. Failure to use two wrenches can result in damage to the hydraulic lines or fittings. Always use the two wrench method.

2. Using two wrenches, remove the three nuts (figure 1, item 5) from the top section (figure 1, item 2) of the control valve assembly (figure 1, item 1) and the three nuts (figure 1, item 6) from the bottom section (figure 1, item 4) of the control assembly.

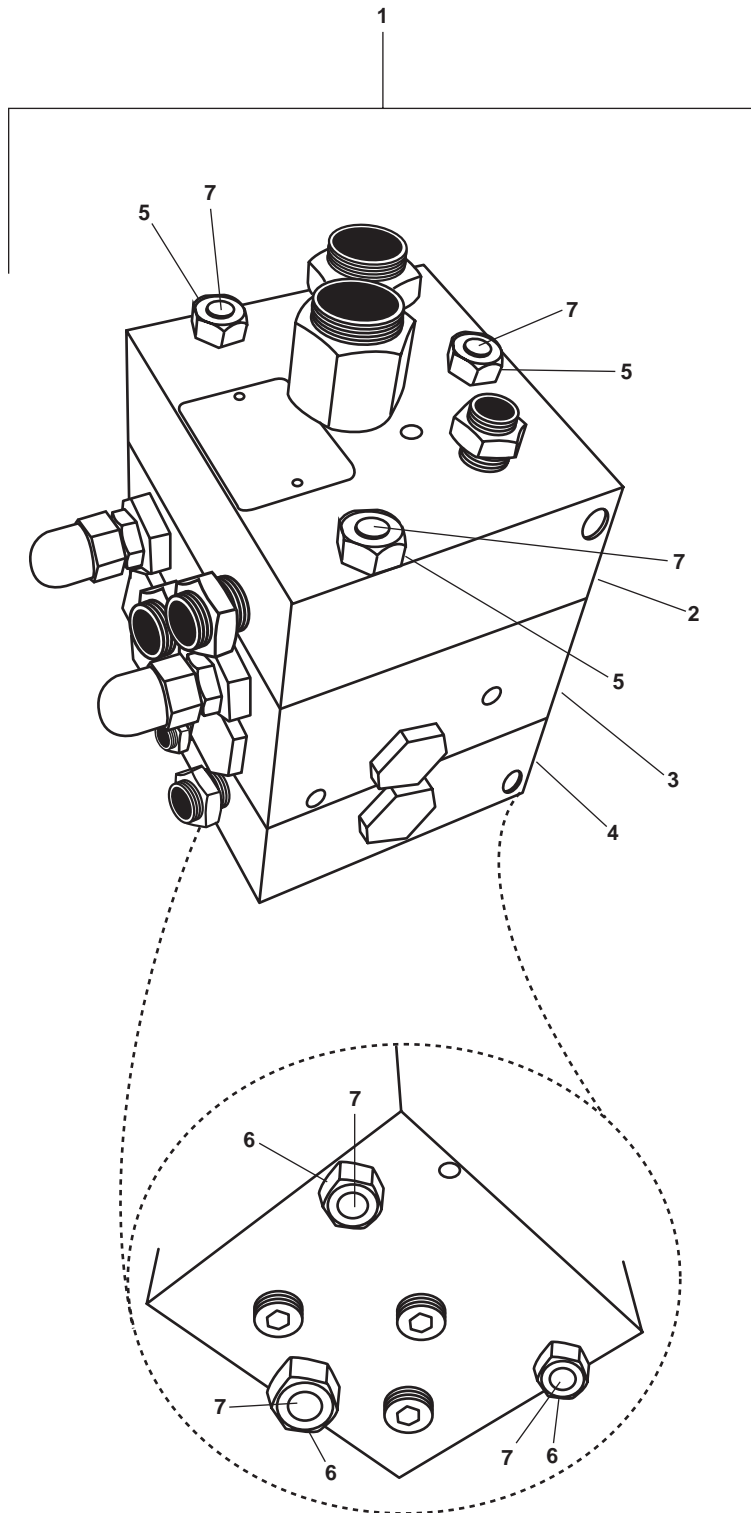
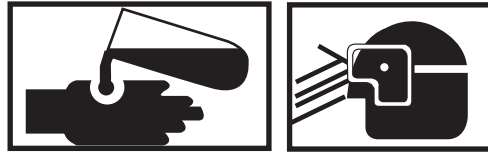


Figure 1. Remote Valve Assembly

**WARNING**

**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

3. Position the control valve assembly (figure 1, item 1) over a suitable drain pan and remove the three bolts (figure 1, item 7) from the control valve assembly. Allow any hydraulic fluid to drain into the suitable drain pan.
4. Separate the control valve assembly (figure 1, item 1) into its sections.

**INSPECTION**

1. Inspect all sealing surfaces for damage. Minor damage may be repaired using an abrasive cloth. Major damage requires replacement of the component.
2. Inspect all springs for breakage or distortion. Replace the entire valve section if broken or distorted springs are discovered.
3. Inspect all balls for corrosion, pitting, or other obvious damage. Replace the entire valve assembly if corrosion, pitting, or other obvious damage is discovered.

**ASSEMBLY**

1. Assemble the bottom section (figure 1, item 4), the middle section (figure 1, item 3), and the top section (figure 1, item 2) of the control valve assembly (figure 1, item 1) using the match marks from step 1 of Removal as a guide.
2. Install the three bolts (figure 1, item 7) in the control valve assembly (figure 1, item 1).
3. Install the three nuts (figure 1, item 6) on the three bolts (figure 1, item 7) on the bottom section (figure 1, item 4) of the control valve assembly (figure 1, item 1). Do not tighten at this time.
4. Install the three nuts (figure 1, item 5) on the three bolts (figure 1, item 7) on the top section (figure 1, item 2) of the control valve assembly (figure 1, item 1). Do not tighten at this time.

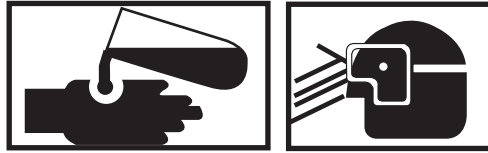
**⚠ CAUTION**

Always use two wrenches when tightening hydraulic lines. Failure to use two wrenches can result in damage to the hydraulic lines or fittings. Always use the two wrench method.

5. Using two wrenches, tighten the three nuts (figure 1, item 5) on the top section (figure 1, item 2) and the three nuts (figure 1, item 6) on the bottom section (figure 1, item 4) of the control valve assembly (figure 1, item 1).

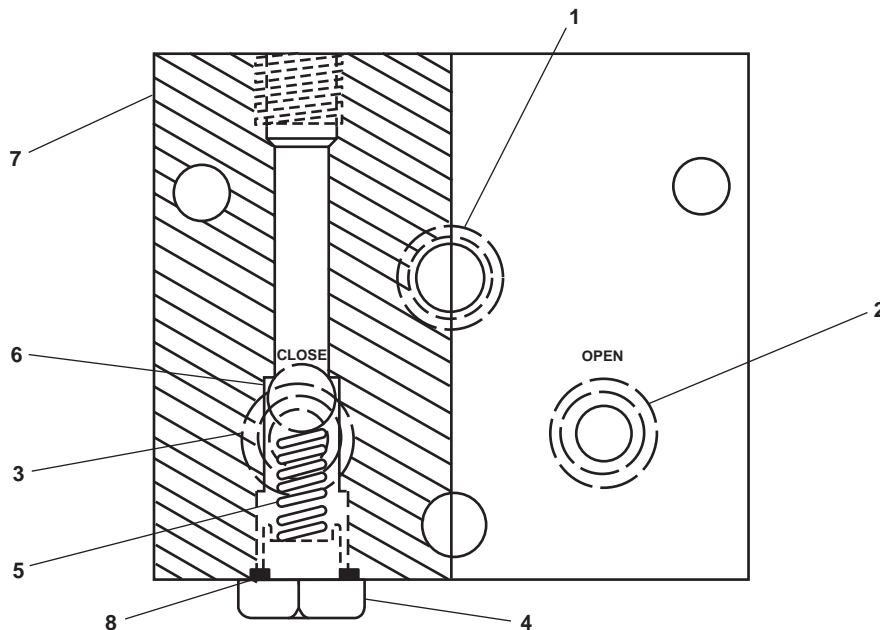
## SINGLE CHECK VALVE

## DISASSEMBLY

**WARNING**

**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

1. Perform the Control Valve Disassembly procedure in this work package.
2. Remove and discard the O-rings (figure 2, items 1, 2, and 3).
3. Remove the plug (figure 2, item 4), spring (figure 2, item 5), and check ball (figure 2, item 6) from the single check valve (figure 2 item 7).
4. Remove and discard the O-ring (figure 2, item 8) from the single check valve (figure 2, item 7).



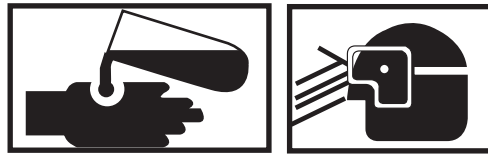
**Figure 2. Single Check Valve**

## INSPECTION

1. Inspect all sealing surfaces for damage. Minor damage may be repaired using an abrasive cloth. Major damage requires replacement of the component.
2. Inspect all springs for breakage or distortion. Replace the entire valve section if broken or distorted springs are discovered.
3. Inspect all balls for corrosion, pitting, or other obvious damage. Replace the entire valve assembly if corrosion, pitting, or other obvious damage is discovered.

## ASSEMBLY

### WARNING



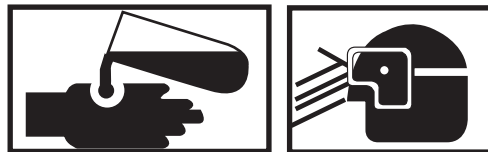
**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

1. Seat the ball (figure 2, item 6) and spring (figure 2, item 5) in the single check valve (figure 2, item 7).
2. Lubricate a new O-ring (figure 2, item 8) with hydraulic fluid and install it in the single check valve (figure 2, item 7).
3. Install the plug (figure 2, item 4) in the single check valve (figure 2, item 7).
4. Lubricate the new O-rings (figure 2, items 1, 2, and 3) with hydraulic fluid and install them in the single check valve (figure 2, item 7).
5. Perform the Control Valve Assembly procedure in this work package.

## SAFETY RELIEF VALVE

### DISASSEMBLY

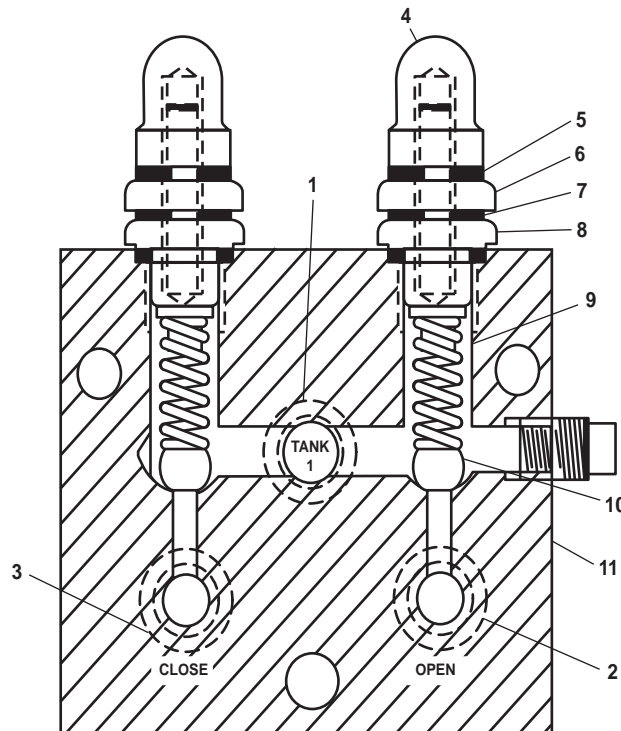
### WARNING



**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

1. Perform the Control Valve Disassembly procedure in this work package.

2. Remove and discard the O-rings (figure 3, items 1, 2, and 3).
3. Remove the cap nut (figure 3, item 4) and the packing with retainer (figure 3, item 5). Discard the packing with retainer.
4. Remove the jam nut (figure 3, item 6) and set aside. Remove and discard the packing with retainer (figure 3, item 7).
5. Remove the plug (figure 3, item 8), spring (figure 3, item 9), and ball (figure 3, item 10) from the safety relief valve (figure 3, item 11) and set aside.
6. Perform steps 3-5 for the remaining side.



**Figure 3. Dual Relief Valve**

### INSPECTION

1. Inspect all sealing surfaces for damage. Minor damage may be repaired using an abrasive cloth. Major damage requires replacement of the component.
2. Inspect all springs for breakage or distortion. Replace the entire valve section if broken or distorted springs are discovered.
3. Inspect all balls for corrosion, pitting, or other obvious damage. Replace the entire valve assembly if corrosion, pitting, or other obvious damage is discovered.

### ASSEMBLY

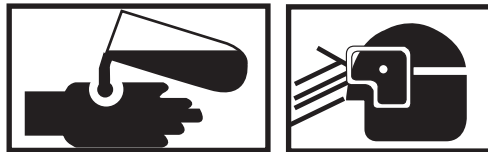
1. Seat the ball (figure 3, item 10) and spring (figure 3, item 9) in the safety relief valve (figure 3, item 11).
2. Install the plug (figure 3, item 8) in the safety relief valve (figure 3, item 11).

3. Install new packing with retainer (figure 3, item 7) and install the jam nut (figure 3, item 6).
4. Install new packing with retainer (figure 3, item 5) and install the cap nut (figure 3, item 4).

**WARNING**

**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

5. Lubricate the new O-rings (figure 3, items 1, 2, and 3) with hydraulic fluid and install them in the safety relief valve (figure 3, item 11).
6. Perform the Control Valve Assembly procedure in this work package.

**CHECK VALVE****DISASSEMBLY****WARNING**

**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

1. Perform the Control Valve Disassembly procedure in this work package.
2. Remove and discard the O-rings (figure 4, items 1, 2, and 3).
3. Remove the plug (figure 4, item 4), spring (figure 4, item 5), and ball (figure 4, item 6) from the check valve (figure 4, item 7) and set aside.
4. Remove and discard the O-ring (figure 4, item 8) from the check valve (figure 4, item 7).
5. Perform steps 3 and 4 for the remaining assemblies.

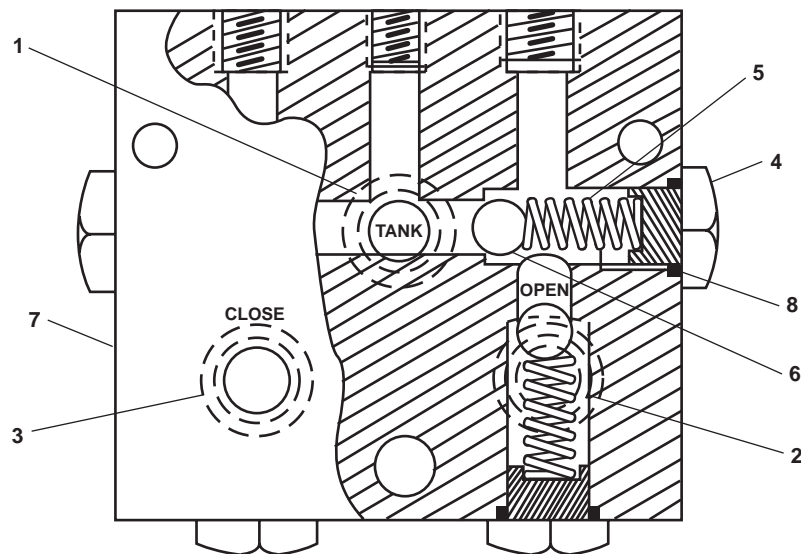


Figure 4. Quad Check Valve

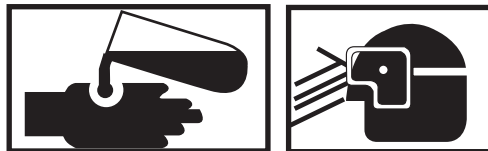
#### INSPECTION

1. Inspect all sealing surfaces for damage. Minor damage may be repaired using an abrasive cloth. Major damage requires replacement of the component.
2. Inspect all springs for breakage or distortion. Replace the entire valve section if broken or distorted springs are discovered.
3. Inspect all balls for corrosion, pitting, or other obvious damage. Replace the entire valve assembly if corrosion, pitting, or other obvious damage is discovered.

#### ASSEMBLY

1. Seat the ball (figure 4, item 6) and spring (figure 4, item 5) in the check valve (figure 4, item 7).

#### WARNING



**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

2. Lubricate a new O-ring (figure 4, item 8) with hydraulic fluid and install it in the check valve (figure 4, item 7).
3. Install the plug (figure 4, item 4) in the check valve (figure 4, item 7).
4. Perform steps 1 through 3 for the remaining assemblies.

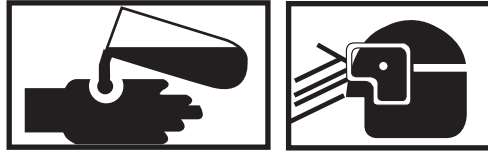


5. Lubricate the new O-rings (figure 4, item 1, 2, and 3) with hydraulic fluid and install them on the check valve (figure 4, item 7).
6. Perform the Control Valve Assembly procedure in this work package.

## SHUTTLE VALVE

### DISASSEMBLY

#### WARNING



**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

1. Perform the Control Valve Disassembly procedure in this work package.
2. Remove and discard the O-ring (figure 5, items 1, 2, and 3).

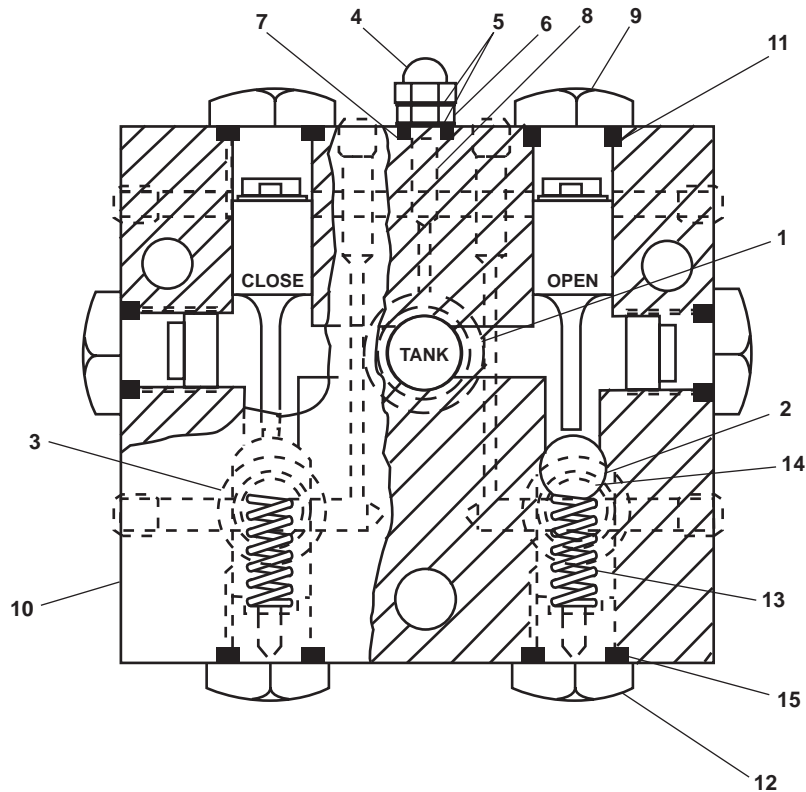


Figure 5. Shuttle Valve

3. Remove the cap nut (figure 5, item 4) and O-ring (figure 5, item 5). Discard the O-ring.
4. Remove the jam nut (figure 5, item 6) and set aside. Remove and discard the O-ring (figure 5, item 5).
5. Remove and discard the O-ring (figure 5, item 7) from the needle valve (figure 5, item 8).
6. Remove the plug (figure 5, item 9) from the shuttle valve (figure 5, item 10) and set aside. Remove and discard the O-ring (figure 5, item 11).
7. Remove the plug (figure 5, item 12), spring (figure 5, item 13), and ball (figure 5, item 14) from the shuttle valve (figure 5, item 10).
8. Remove and discard the O-ring (figure 5, item 15).
9. Perform steps 6 and 7 for the remaining assemblies.

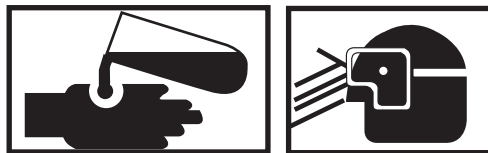
### INSPECTION

1. Inspect all sealing surfaces for damage. Minor damage may be repaired using an abrasive cloth. Major damage requires replacement of the component.
2. Inspect all springs for breakage or distortion. Replace the entire valve section if broken or distorted springs are discovered.
3. Inspect all balls for corrosion, pitting, or other obvious damage. Replace the entire valve assembly if corrosion, pitting, or other obvious damage is discovered.

### ASSEMBLY

1. Seat the ball (figure 5, item 14) and spring (figure 5, item 13) in the shuttle valve (figure 5, item 10).

#### WARNING



**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness, serious injury, or death.**

2. Lubricate the O-ring (figure 5, item 15) with hydraulic fluid and install it on the plug (figure 5, item 12)
3. Install the plug (figure 5, item 12) in the shuttle valve (figure 5, item 10).
4. Lubricate the O-ring (figure 5, item 11) with hydraulic fluid and install it on the plug (figure 5, item 9).
5. Install the plug (figure 5, item 9) in the shuttle valve (figure 5, item 10).
6. Lubricate the O-ring (figure 5, item 7) with hydraulic fluid and install it on the needle valve (figure 5, item 8).
7. Install a new O-ring (figure 5, item 5) and the jam nut (figure 5, item 6) on the shuttle valve (figure 5, item 10).

8. Install a new O-ring (figure 5, item 5) and the cap nut (figure 5, item 4) on the shuttle valve (figure 5, item 10).
9. Lubricate the O-rings (figure 5, items 1, 2, and 3) with hydraulic fluid and install them on the shuttle valve (figure 5, item 10).
10. Perform the Control Valve Assembly procedure in this work package.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDRAULIC WATERTIGHT DOORS, HAND PUMPS, LOCAL/REMOTE; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
Suitable Drain Pan

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Hydraulic Fluid, Fire Resistant (Item 89, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 030700)

**Equipment Conditions:**

Applicable hydraulic door secured and local and remote hand pumps locked out and tagged out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

1. Place the suitable drain pan beneath the work area.
2. CLOSE the remote valves (figure 1, items 1 and 2).

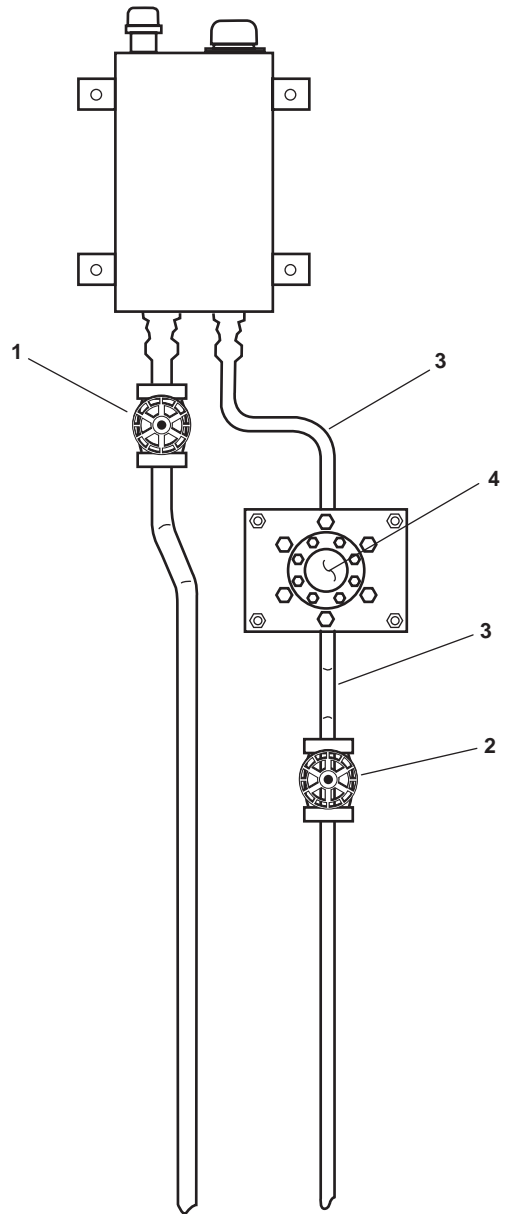
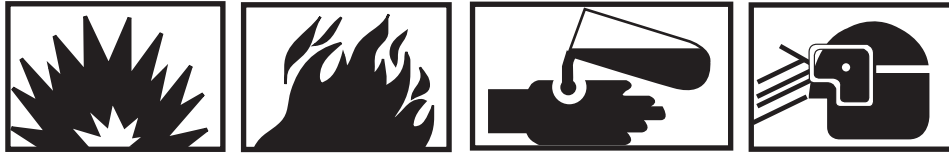


Figure 1. Hydraulic Watertight Door System

**WARNING**

Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in illness, serious injury, or death.

Hydraulic hoses and lines may be under pressure. Relieve pressure by operating the appropriate control valve if possible. Loosen fittings on hose lines slowly. Allow oil to run around threads of the fitting, releasing pressure before disconnecting. Releasing pressurized oil suddenly may cause serious injury or death.

**CAUTION**

Always use two wrenches when loosening hydraulic lines. Failure to use two wrenches can result in damage to the hydraulic lines or fittings. Always use the two wrench method.

3. Label and remove the hydraulic lines (figure 1, item 3) from the pump (figure 1, item 4).
4. Remove the two taper pins (figure 2, item 1) from the hand crank (figure 2, item 2). Remove the hand crank. For the local pump, remove both hand cranks.
5. Remove the six bolts (figure 2, item 3) and lockwashers (figure 2, item 4) from the pump (figure 2, item 5). Discard the lockwashers.

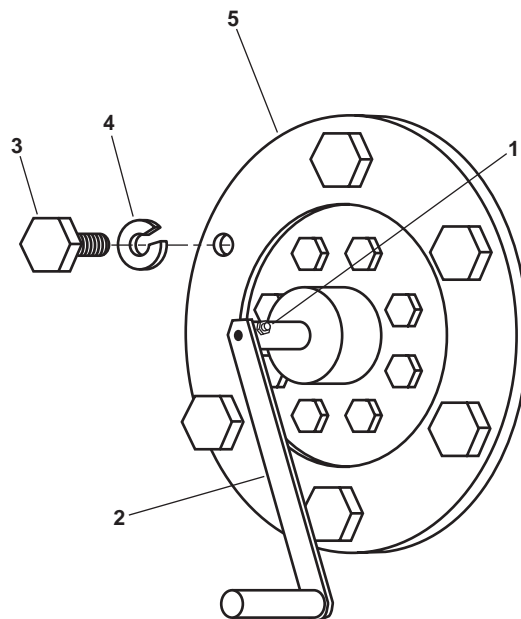


Figure 2. Hand Pump

---

**INSTALLATION**

1. Install the pump (figure 2, item 5) and secure it with six new lockwashers (figure 2, item 4) and six bolts (figure 2, item 3).
2. Install the hand crank (figure 2, item 2) and secure it with the two taper pins (figure 2, item 1). For the local pump, install both hand cranks.

** CAUTION**

Always use two wrenches when loosening hydraulic lines. Failure to use two wrenches can result in damage to the hydraulic lines or fittings. Always use the two wrench method.

3. Install the hydraulic lines (figure 1, item 3) on the pump (figure 1, item 4) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Remove the lockouts and tagouts (FM 55-502).
5. OPEN the remote valves (figure 1, items 1 and 2).
6. Using the hand pump, operate the door through three to four complete OPEN/CLOSE cycles (TM 55-1925-273-10) to ensure that all air is removed from the system.
7. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDRAULIC WATERTIGHT DOORS, HAND PUMPS, LOCAL/REMOTE; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Gasket, End Cap (Item 35, Figure 3, WP 0296 00)  
Packing, Preformed (Item 36, Figure 3, WP 0296 00)  
Seal, Plain, Encased (Item 34, Figure 3, WP 0296 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**Reference:**

TB 43-0218  
WP 0202 00  
WP 0295 00  
WP 0296 00  
WP 0307 00

**Equipment Conditions:**

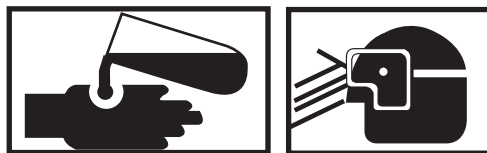
Hand pump removed (WP 0202 00).

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

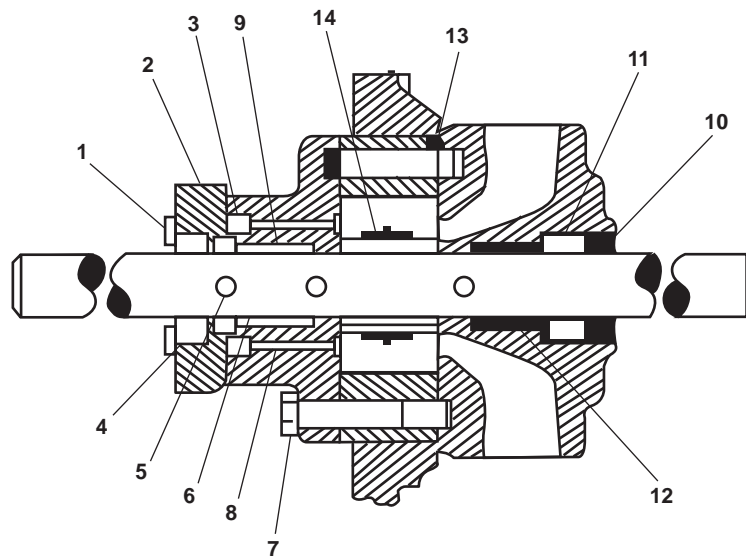
**LOCAL PUMP****DISASSEMBLY**

**WARNING**



**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in illness, serious injury, or death.**

1. Remove the screws (figure 1, item 1) holding the end cap (figure 1, item 2) to the pump.
2. Remove the plain encased seal (figure 1, item 3) from the end cap (figure 1, item 2). Discard the plain encased seal.
3. Remove the rear shaft seal (figure 1, item 4), collar retaining pin (figure 1, item 5) and the collar (figure 1, item 6).



**Figure 1. Local Hand Pump**

4. Remove the screws (figure 1, item 7) that hold the pump head to the body.
5. Remove the snap ring (figure 1, item 8) and the rear bearing (figure 1, item 9). Discard the snap ring and the rear bearing.
6. Remove and discard the preformed packing (figure 1, item 10).
7. Remove the snap ring (figure 1, item 11) and the front bearing (figure 1, item 12). Discard the snap ring and the front bearing.
8. Remove the end cap gasket (figure 1, item 13) and rotor (figure 1, item 14). Discard the end cap gasket.

#### CLEANING AND INSPECTION

#### WARNING



**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of a spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

1. Clean all metal parts with dry cleaning solvent and dry with clean wiping rags.
2. Inspect the bearings for corrosion, pitting, deep scratches, or other damage that would harm the seals and packing. If damage is found, the entire pump assembly must be replaced.

#### ASSEMBLY

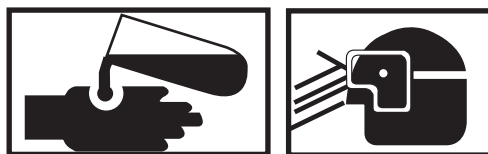
1. Install the rotor (figure 1, item 14) and a new end cap gasket (figure 1, item 13).

2. Install the front bearing (figure 1, item 12) and a new snap ring (figure 1, item 11).
3. Install new preformed packing (figure 1, item 10).
4. Install the rear bearing (figure 1, item 9) and a new snap ring (figure 1, item 8).
5. Assemble the pump head to the pump body and secure it with the screws (figure 1, item 7).
6. Install the collar (figure 1, item 6), collar-retaining pin (figure 1, item 5), and rear shaft seal (figure 1, item 4).
7. Install a new plain encased seal (figure 1, item 3) and the end cap (figure 1, item 2). Secure the pump with the screws (figure 1, item 1).

## REMOTE PUMP

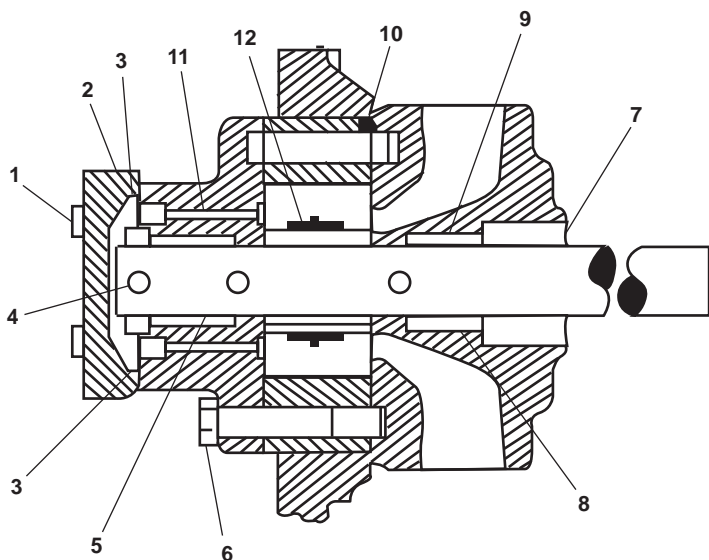
### DISASSEMBLY

#### WARNING



**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in illness, serious injury, or death.**

1. Remove the screws (figure 2, item 1) that hold the end cap (figure 2, item 2) to the pump.



**Figure 2. Remote Hand Pump**

2. Remove and discard the end cap gasket (figure 2, item 3).
3. Remove the collar-retaining pin (figure 2, item 4) and the collar (figure 2, item 5). Discard the collar-retaining pin.
4. Remove the screws (figure 2, item 6) that hold the pump head to the body.
5. Remove and discard the preformed packing (figure 2, item 7) from the shaft end of the pump.
6. Remove the snap ring (figure 2, item 8) and the front shaft bearing (figure 2, item 9). Discard the snap ring.
7. Remove and discard the preformed packing (figure 2, item 10), the rear bearing (figure 2, item 11), and rotor (figure 2, item 12).

## CLEANING AND INSPECTION

### WARNING



**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of a spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

1. Clean all metal parts with dry cleaning solvent and dry with clean wiping rags.
2. Inspect the bearings for corrosion, pitting, deep scratches, or other damage that would harm the seals and packing. If damage is found, the entire pump assembly must be replaced.

## ASSEMBLY

1. Install the rotor (figure 2, item 12), rear bearing (figure 2, item 11), and preformed packing (figure 2, item 10).
2. Install the front shaft bearing (figure 2, item 9) and a new snap ring (figure 2, item 8).
3. Install a new preformed packing (figure 2, item 7).
4. Assemble the pump head to the body and secure with screws (figure 2, item 6).
5. Install the collar (figure 2, item 5) and secure it with a new collar-retaining pin (figure 2, item 4).
6. Install the new end cap gasket (figure 2, item 3) and end cap (figure 2, item 2). Secure the pump with screws (figure 2, item 1).

## END OF WORK PACKAGE

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
WATERTIGHT DOORS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Torch Outfit, Cutting and Welding (Item 2, Table 2, WP 0295 00)  
Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
Tool Kit, Carpenter's (Item 9, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)

**Materials/Parts:**

Rubber Cement (Item 151, Table 1, WP 0295 00)  
Gasket (Item 9, Figure 4, WP 0296 00)

**Personnel Required:**

Two Watercraft Engineers, 88L (One of these must be trained in confined space entry if void entry is required)

**Personnel Required (continued):**

Fire watch as required (FM 55-502) (if welding will be performed)  
One Entry Supervisor Attendant (If void entry is required)

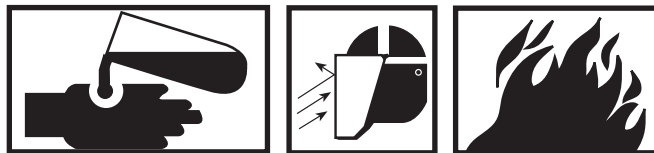
**References:**

FM 55-502  
Organizational Confined Space Entry SOP (if void entry is required)  
TB 55-1900-204-24  
TB 43-0144  
WP 0295 00  
WP 0296 00

**Equipment Conditions:**

Vessel certified safe for HOT WORK (FM 55-502) (if welding will be performed)  
Voids must be prepared for confined space entry (if void entry is required)

---

**GASKET SEALING AREA REPAIR****WARNING**

**Wire brushing operations can produce high velocity flying debris which can become lodged in the skin or in the eyes. Wire brushing in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing wire brushing operations. Failure to comply can result in death or serious injury to personnel.**

1. Use a scraper to remove the gasket (figure 1, item 1).
2. Use a wire brush to clean the gasket channel thoroughly. All of the old gasket and adhesive must be removed and the channel cleaned to the bare metal.

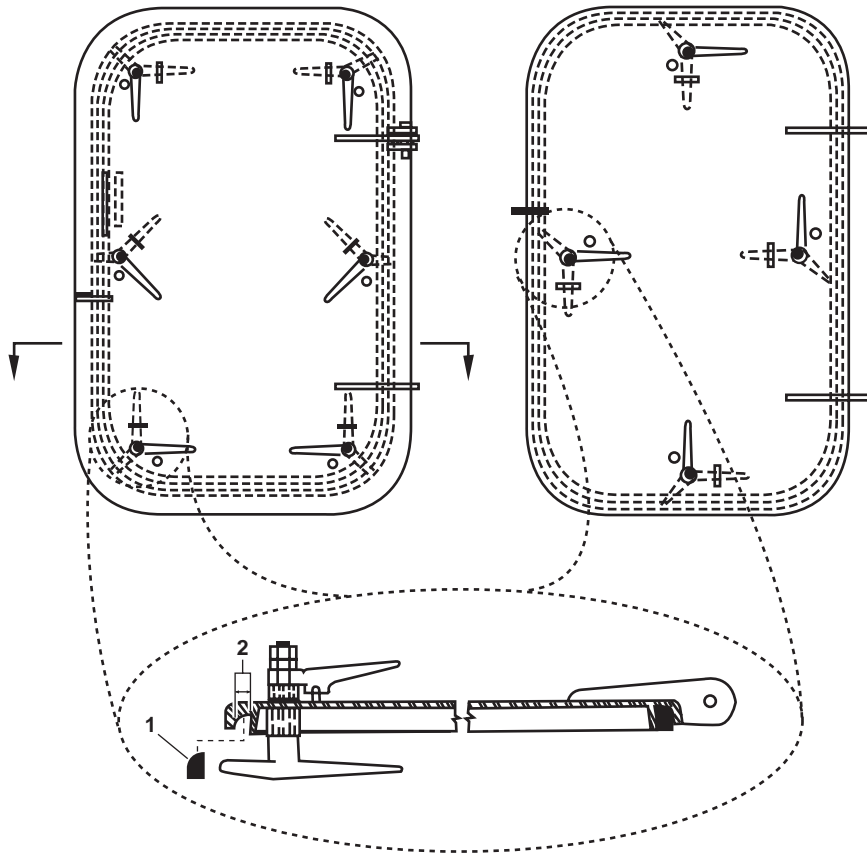
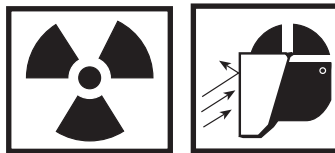


Figure 1. Watertight Door (Typical)

**WARNING**



Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc-welding operations without appropriate eye and skin protection. Failure to comply can result in serious injury or death.

**⚠ CAUTION**

Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected as detailed in TB 55-1900-204-24.

3. If welding repairs are required, perform such repairs as detailed in the applicable design drawings and acceptable welding practices. All watercraft welding and repair must be accomplished as detailed in TB 55-1900-204-24.

4. If a confined space must be entered in order to perform work or to post a fire watch, prepare the space for confined space entry and secure a Confined Space Entry Permit in accordance with the Organizational Confined Space Entry SOP and FM 55-502.
5. After the area has cooled, paint the affected area (TB 43-0144), taking care not to paint any threads.

### **GASKET REPLACEMENT**

1. On a flat surface, lay out clean, dry boards or other material to protect the deck. Roll out the new gasket material.

#### **NOTE**

The gasket will shrink over time. If the gasket is cut too short, it will eventually leave a gap at the joint and destroy the watertight integrity of the door. Allow one extra inch for every 3 feet (91.4 cm) of channel.

2. Measure the gasket channel and cut the new gasket.

#### **NOTE**

A 45° joint should be used at corners in closures with square corners. Elsewhere, square butt joints are preferable. Joints should not be located in the radius portions of closures. The number of gasket joints should be kept to a minimum (no more than four). Very short strips (less than 2 feet) (61 cm) should not be used.

3. Install the gasket (figure 1, item 1) in the door using rubber cement.
4. Clean the knife-edge of the closure frame.
5. Apply a chalk line completely around the knife-edge of the doorframe.

#### **NOTE**

When setting up dogs on watertight doors, the dog on the opposite side of the hinges should be set up first with sufficient pressure to hold the door. Two dogs should then be set up snugly on the hinge side. All the dogs then should be set up evenly to ensure a good bearing all around.

6. Close and dog the door.
7. Open the door and inspect the gasket. If the door is watertight, the gasket will show an unbroken chalk line.
8. If the line is broken, notify the maintenance supervisor.
9. Operate the door and check for smooth and positive dogging action.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
WATERTIGHT HATCHES, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Torch Outfit, Cutting and Welding (Item 2, Table 2, WP 0295 00)  
 Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
 Tool Kit, Carpenter's (Item 9, Table 2, WP 0295 00)  
 Faceshield, Industrial (Item 38, Table 2, WP 0295 00)

**References:**

FM 55-502  
 TB 43-0144  
 TB 55-1900-204-24  
 WP 0295 00  
 WP 0296 00  
 WP 0307 00  
 (Organizational Confined Space Entry SOP)

**Materials/Parts:**

Rubber Cement (Item 151, Table 1, WP 0307 00)  
 Gasket (Item 9, Figure 4, WP 0296 00)

**Equipment Conditions:**

Vessel certified safe for HOTWORK (FM 55-502) (if welding will be performed).

Voids must be prepared for confined space entry with Confined Space Entry Permit secured (Organizational Confined Space Entry SOP and FM 55-502) (if void entry is required).

**Personnel Required:**

Two Watercraft Engineers, 88L (One of these must be trained in confined space entry if void entry is required)  
 One Entry Supervisor/Attendant (if void entry is required)

---

**HATCH SEALING AREA REPAIR**

1. Minor repairs to the gasket sealing edge (figure 1, item 1) may be made by welding.

**WARNING**



**Grinding and cutting operations produce hot, flying particles. These particles can cause serious injury to personnel or ignite fires in the work area. Wear protective goggles, gloves, and/or aprons at all times. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and damage to the vessel.**

2. Use a grinder to clean the work area to the bare metal.

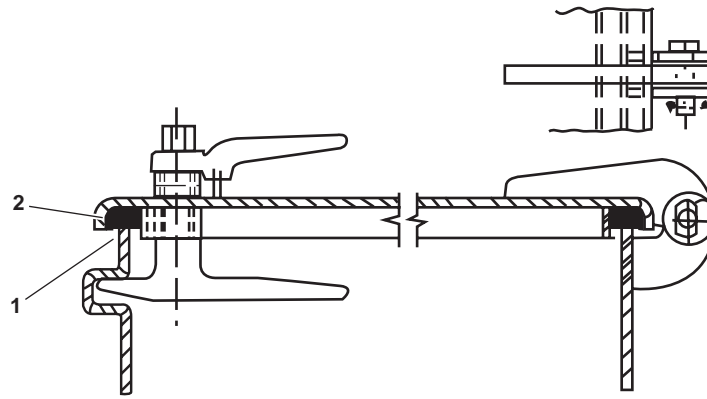
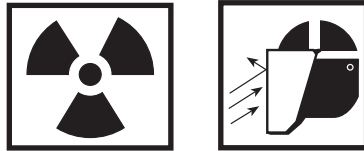


Figure 1. Watertight Hatch

**WARNING**



**Unexpected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc-welding operations without appropriate eye and skin protection. Failure to comply can result in death or serious injury.**

**⚠ CAUTION**

Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected (TB 55-1900-204-24).

3. Use the welder to build up the damaged area to a level higher than the desired contour.

**WARNING**



**Grinding and cutting operations produce hot, flying particles. These particles can cause serious injury to personnel or ignite fires in the work area. Wear protective goggles, gloves, and/or aprons at all times. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and damage to the vessel.**

4. Use a grinder to return the gasket sealing edge (figure 1, item 1) to the proper contour.
5. After the work area is cooled, test the seal of the gasket as detailed in the Gasket Replacement procedure in this work package.

---

**GASKET REPLACEMENT**

1. On a flat surface, lay out clean, dry boards or other material to protect the deck. Roll out the new gasket material.

**NOTE**

The gasket will shrink over time. If the gasket is cut too short, it will eventually leave a gap at the joint and destroy the watertight integrity of the door. Allow one extra inch for every 3 feet (91.4 cm) of channel.

2. Measure the gasket channel and cut the new gasket.

**NOTE**

A 45° joint should be used at corners in closures with square corners. Elsewhere, square butt joints are preferable. Joints should not be located in the radius portions of closures. The number of gasket joints should be kept to a minimum (no more than 4). Very short strips (less than 2 feet (61 cm)) should not be used.

3. Install the gasket (figure 1, item 2) on the door using rubber cement.
4. Clean the knife edge of the closure frame.
5. Apply a chalk line completely around the knife edge of the doorframe.

**NOTE**

When setting up dogs on watertight doors, the dog on the opposite side of the hinges should be set up first with sufficient pressure to hold the door. Two dogs should then be set up snugly on the hinge side. All the dogs then should be set up evenly to ensure a good bearing all around.

6. Close and dog the door.
7. Open the door and inspect the gasket. If the door is watertight, the gasket will show an unbroken chalk line.
8. If the line is broken, notify the maintenance supervisor.
9. Operate the door and check for smooth and positive dogging action.
10. Touch up any damaged paint (TB 43-0144).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
WATERTIGHT SCUTTLES, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Torch Outfit, Cutting and Welding (Item 2, Table 2, WP 0295 00)  
 Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
 Tool Kit, Carpenter's (Item 9, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 1, WP 0295 00)  
 Gloves, Leather (Item 37, Table 1, WP 0295 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

TB 43-0144  
 TB 55-1900-204-24  
 WP 0092 00 (volume 1)  
 WP 0295 00  
 WP 0296 00  
 WP 0307 00

**Materials/Parts:**

Rubber Cement (Item 151, Table 1, WP 0307 00)  
 Gasket (Item 5, Figure 6, WP 0296 00)

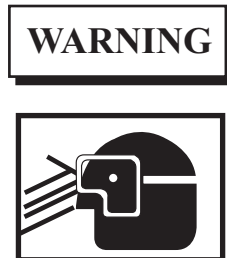
**Equipment Conditions:**

Dogging hardware removed (WP 0092 00, volume 1).  
 Vessel certified safe for HOT WORK (FM 55-502).

---

**DISASSEMBLY**

1. Remove the dog stud (figure 1, item 1).
2. Remove the delrin bushings (figure 1, item 2) and preformed packing (figure 1, item 3).
3. Use a scraper to remove the gasket (figure 1, item 4).



**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.**

4. Use a wire brush to clean the gasket channel thoroughly. All of the old gasket and adhesive must be removed and the channel cleaned to the bare metal.

**INSPECTION**

1. Inspect the gasket sealing edge (figure 1, item 5) for damage or deformity. Repair minor deformities as described in the repair paragraph. Refer major deformities to the maintenance supervisor.
2. Inspect the bushing (figure 1, item 2) and seals (figure 1, item 6) for wear or damage. Replace any worn or damaged components.
3. Inspect the dog stud for wear or damage, taking special care to inspect the bushing and seal surfaces of the stud. Replace the stud if wear or damage is noted.

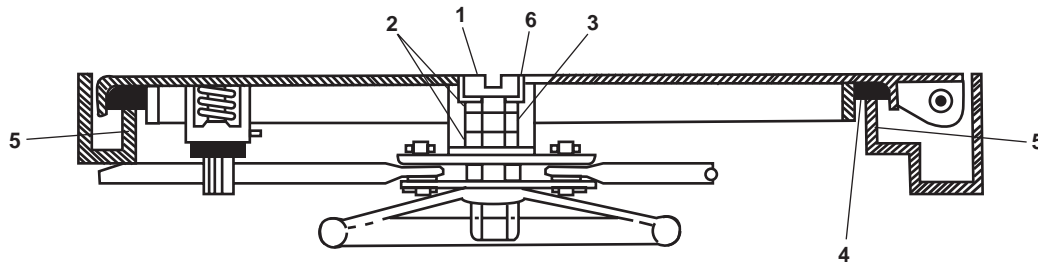


Figure 1. Watertight Scuttle

## REPAIR

Minor repairs to the gasket sealing edge (figure 1, item 5) may be made by welding.

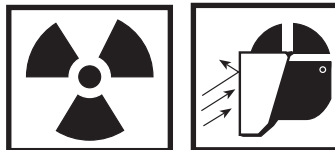
### WARNING



Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel or ignite fires in the work area. Wear protective goggles, gloves, and/or aprons at all times. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and damage to the vessel.

1. Use a grinder to clean the work area to the bare metal.

### WARNING



Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc-welding operations without appropriate eye and skin protection.

### ⚠ CAUTION

Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected as outlined in TB 55-1900-204-24.

2. Use the welder to build up the damaged area to a level higher than the desired contour.

**WARNING**

Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel or ignite fires in the work area. Wear protective goggles, gloves, and/or aprons at all times. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and damage to the vessel.

3. Use a grinder to return the gasket sealing edge to the proper contour.
4. After the area has cooled, paint the affected area (TB 43-0144).

**ASSEMBLY**

1. Measure the required length around the scuttle for the gasket.

**NOTE**

The gasket will shrink over time. If the gasket is cut too short, it will eventually leave a gap at the joint and destroy the watertight integrity of the scuttle.

2. Add one additional inch and cut the gasket.
3. Install the gasket (figure 1, item 4) on the scuttle using rubber cement. Ensure that it is seated well in the gasket channel.
4. Assemble dogging hardware (WP 0092 00, volume 1).
5. Clean the knife-edge of the closure frame.
6. Apply a chalk line completely around the knife-edge of the scuttle.
7. Close and dog the scuttle.
8. Open the scuttle and examine the gasket.
9. If the scuttle is watertight, the gasket will show an unbroken chalk line.
10. If the line is broken, notify the maintenance supervisor.
11. Operate the scuttle and check for smooth and positive dogging action.
12. Touch up any damaged paint (TB 43-0144).

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
WATERTIGHT MANHOLES, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Torch Outfit, Cutting and Welding (Item 2, Table 2, WP 0295 00)  
 Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
 Tool Kit, Carpenter's (Item 9, Table 2, WP 0295 00)  
 Threading Set, Screw (Item 31, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 1, WP 0295 00)  
 Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 1, WP 0295 00)  
 Faceshield, Industrial (Item 38, Table 2, WP 0295 00)

**Materials/Parts:**

Gasket (Item 1, Figure 7, WP 0296 00)  
 Screw Cap (Item 2, Figure 7, WP 0296 00)

**Personnel Required:**

Two Watercraft Engineers, 88L (One of these must be trained in confined space entry)

**References:**

FM 55-502  
 TB 43-0144  
 TB 55-1900-204-24  
 WP 0093 00  
 WP 0295 00  
 WP 0296 00  
 Organizational Confined Space Entry SOP

**Equipment Conditions:**

Manhole removed (WP 0093 00).  
 Vessel certified safe for HOTWORK (FM 55-502) (if welding will be performed).  
 Fire watch as required (FM 55-502).  
 Voids must be prepared for confined space entry with confined space entry permit secured (FM 55-502 and the Organizational Confined Space Entry SOP).

---

**MANHOLE****GASKET SEALING AREA REPAIR**

1. Minor repairs to the gasket sealing edge (figures 1 and 2, item 1) may be made by welding.



Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel. These hot particles can also ignite fires in the work area and in adjacent spaces. During and after removal, the work area will be very hot. Wear protective goggles, gloves, and/or aprons must be worn at all times during cutting and grinding operations. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and serious damage to the vessel.

2. Use a grinder to clean the work area to the bare metal.

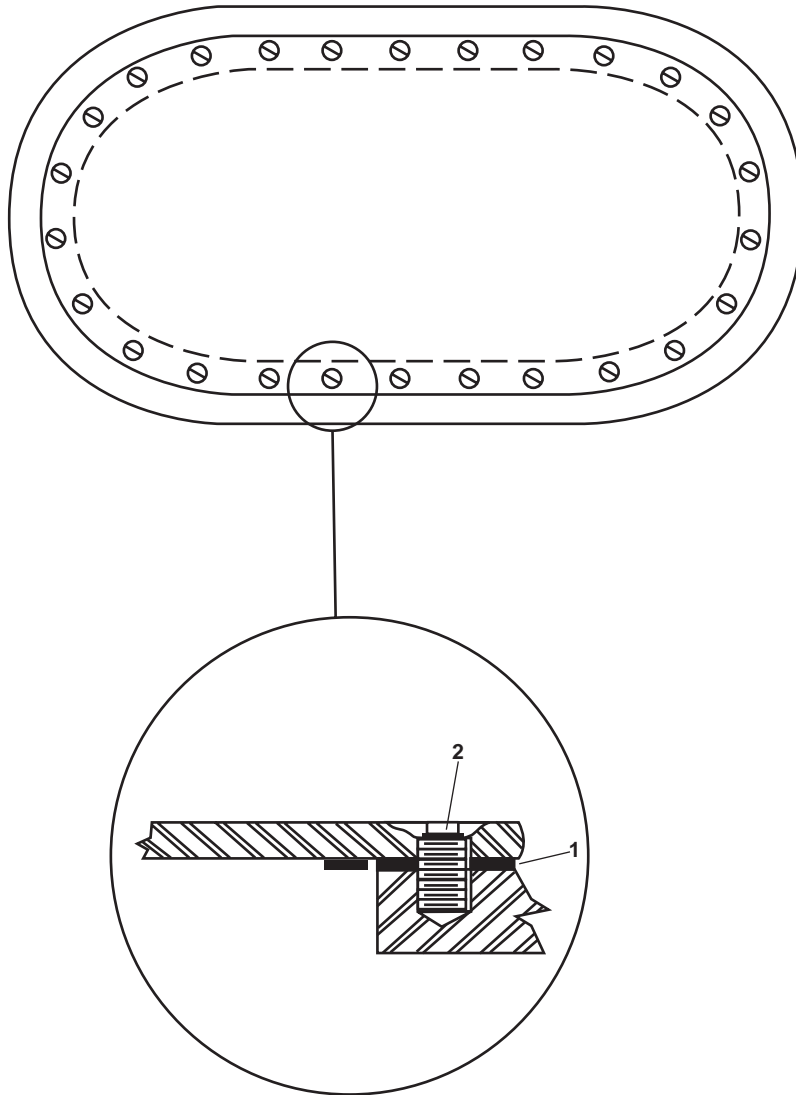
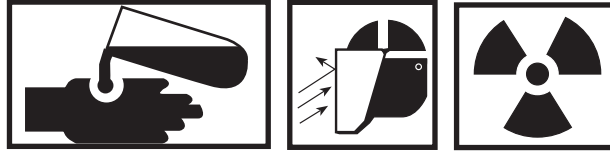


Figure 1. Raised Manhole Cover (Typical)

**WARNING**

**Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc welding operations without appropriate eye and skin protection.**

**⚠ CAUTION**

Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected as outlined in TB 55-1900-204-24.

3. Use the welder to build up the damaged area to a level higher than the desired contour.
4. Use a grinder to return the gasket sealing edge (figures 1 and 2, item 1) to the proper contour.
5. Repeat steps 2-4 until a satisfactory sealing edge is obtained.
6. When the repair is cool, touch up paint (TB 43-0144).
7. When the paint is dry, return the equipment to the desired readiness condition.

**STUD REPLACEMENT (RAISED MANHOLE)**

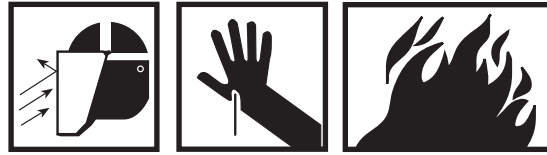
1. If welding repairs are required, perform such repairs as detailed in the applicable design drawings and acceptable welding practices. All watercraft welding and repair must be accomplished as outlined in TB 55-1900-204-24.

**WARNING**

**Entry into an uninspected confined space may result in death or serious injury to personnel. Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502.**

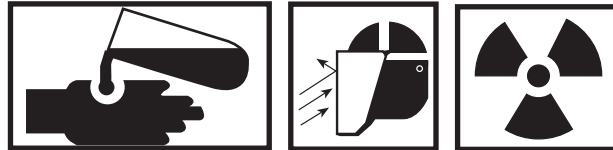
**Special precautions must be taken if cutting or welding operations will take place inside tanks or confined spaces. All confined space protocols and regulations must be strictly adhered to. Ventilation and/or respiratory protection must also be provided to control exposure to welding fumes. Failure to comply can result in serious injury to personnel.**

2. If a confined space must be entered in order to perform work or to post a fire watch, prepare the space for confined space entry and secure a Confined Space Entry Permit (Organizational Confined Space Entry SOP and FM 55-502).

**WARNING**

Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel. These hot particles can also ignite fires in the work area and in adjacent spaces. During and after removal, the work area will be very hot. Wear protective goggles, gloves, and/or aprons must be worn at all times during cutting and grinding operations. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and serious damage to the vessel.

3. Using a cutting torch, remove the old stud (figure 2, item 2).
4. Use a grinder to thoroughly clean the work area.
5. Position the new stud (figure 2, item 2) in place.
6. Thread several nuts (figure 2, item 3) onto the stud (figure 2, item 2) to protect the threads.

**WARNING**

Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc-welding operations without appropriate eye and skin protection.

7. Weld the stud (figure 2, item 2) securely in place.
8. After the area has cooled, apply paint (TB 43-0144), but do not paint the threads.
9. When the paint is dry, return the equipment to the desired readiness condition.

**THREAD REPAIR (FLUSH MANHOLE)**

1. If welding repairs are required, perform such repairs as detailed in the applicable design drawings and acceptable welding practices. All watercraft welding and repair must be accomplished as outlined in TB 55-1900-204-24.
2. Select the correct size tap, and run the tap through the damaged threads.
3. Install a bolt (figure 2, item 2) into the hole, and attempt to tighten it.
4. If the fastener holds securely, remove the fastener and proceed to step 6 of this procedure.

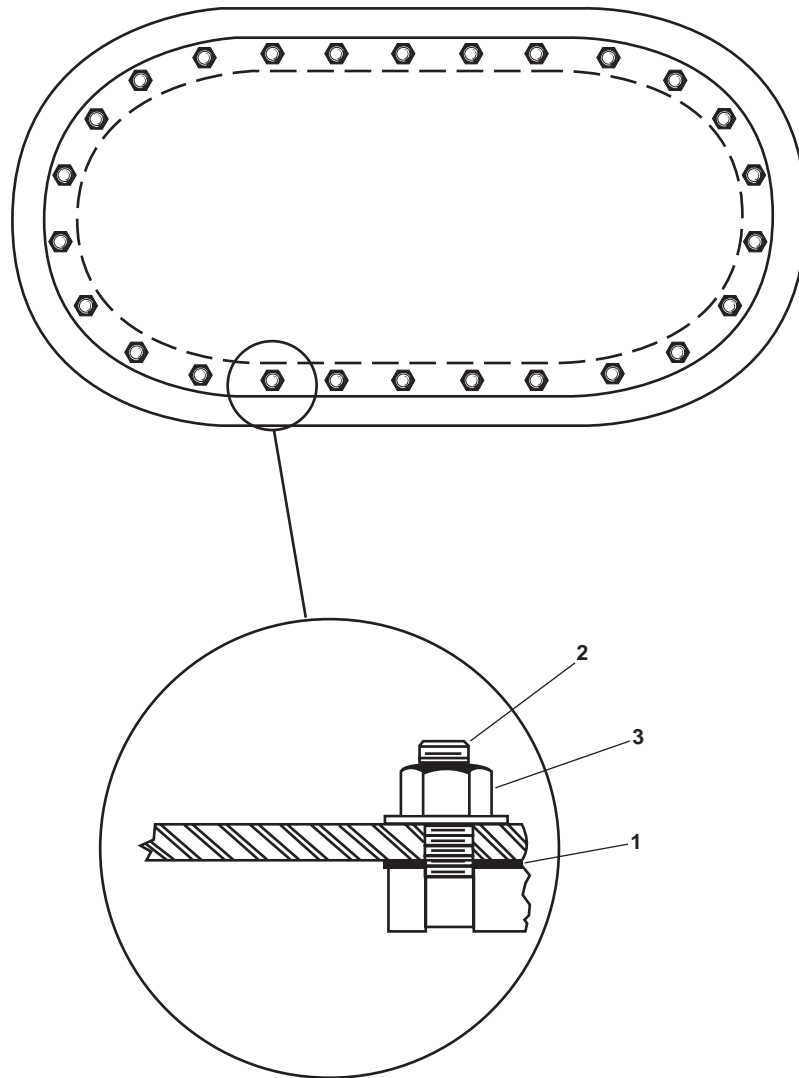
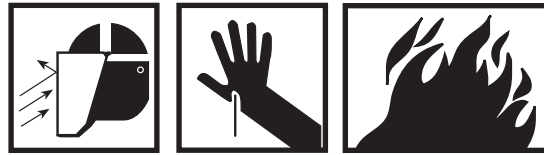


Figure 2. Flush Manhole (Typical)

5. If the threads are stripped, complete the following:

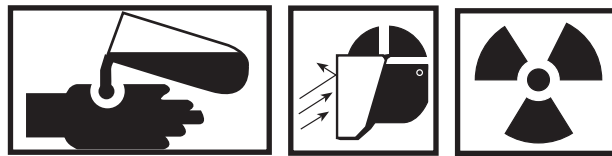
**WARNING**



Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel. These hot particles can also ignite fires in the work area and in adjacent spaces. During and after removal, the work area will be very hot. Wear protective goggles, gloves, and/or aprons must be worn at all times during cutting and grinding operations. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and serious damage to the vessel.

- a. Use a grinder, needle gun, and wire brush to clean the damaged area to the bare metal.

**WARNING**



Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc welding operations without appropriate eye and skin protection.

**⚠ CAUTION**

Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected (TB 55-1900-204-24).

- b. Use the arc welder to build up the damaged area to a level higher than the desired contour.
- c. Use a grinder to smooth the damaged area and return the surfaces to normal.
- d. Repeat steps a-c until a satisfactory surface is obtained.
- e. Drill and tap the hole for the hatch fastener.
- f. Allow the repair area to cool.
6. Apply paint (TB 43-0144).
7. When the paint is dry, return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ROTARY CLEARVIEW SCREENS, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)

**Materials/Parts:**

Rag, Wiping, (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)  
Gasket (Item 3, Figure 8, WP 0296 00)  
Rotary Clearview Screen (Item 1, Figure 8,  
WP 0296 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

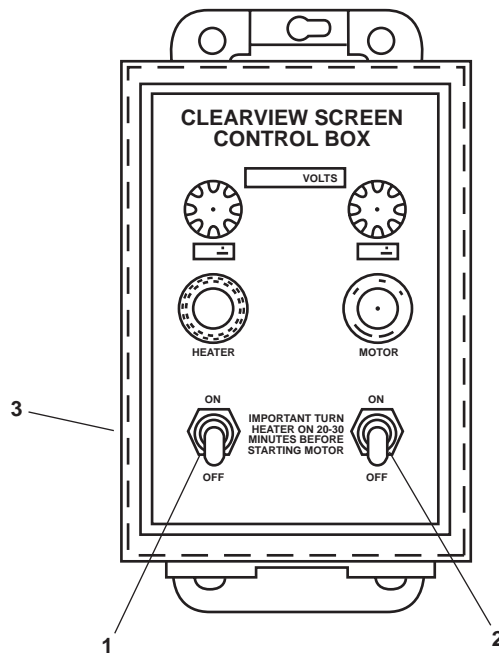
FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0296 00  
WP 0307 00

**Equipment Conditions:**

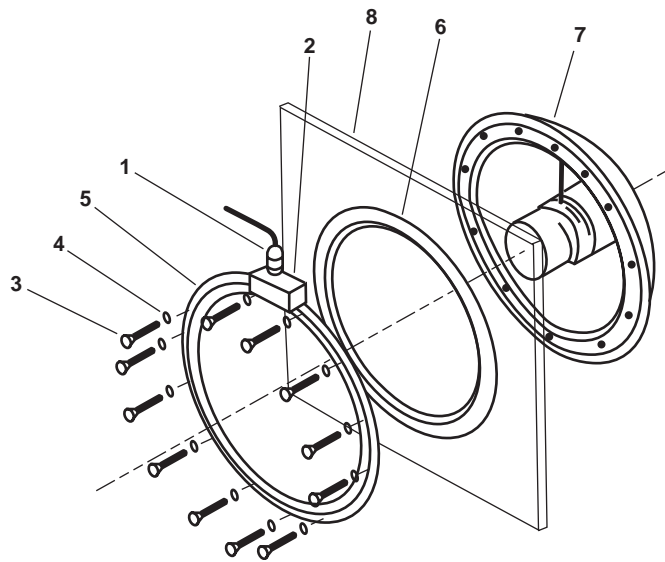
At 120V exterior emergency lighting panel No. 2, set the  
ROTARY CLEARVIEW WIPER AND HEATER.  
circuit breaker to OFF. Lock out and tag out (FM 55-  
502)

**REMOVAL**

1. Set the HEATER switch (figure 1, item 1) and the MOTOR switch (figure 1, item 2) on the clearview screen control box (figure 1, item 3) to OFF.
2. Remove the connector (figure 2, item 1) from the junction box (figure 2, item 2).



**Figure 1. Clearview Screen Control Box**



**Figure 2. Clearview Screen**

**⚠ CAUTION**

A minimum of two personnel are needed when removing the clearview screen from the window. The second person is needed outside to prevent the rotary assembly from falling during disassembly. Failure to comply with this caution can cause damage to the rotary assembly.

3. Remove the twelve screws (figure 2, item 3) and twelve washers (figure 2, item 4) and remove the retaining ring (figure 2, item 5), the gasket (figure 2, item 6), and the rotary assembly (figure 2, item 7) from the window (figure 2, item 8). Discard the gasket.

**INSTALLATION**

1. Thoroughly clean the window (figure 2, item 8) with clean wiping rags and clean water and verify that there are no cracks or damage.
2. Install a new gasket (figure 2, item 6), the rotary assembly (figure 2, item 7), and the retaining ring (figure 2, item 5) and secure them with the twelve screws (figure 2, item 3) and twelve washers (figure 2, item 4).
3. Install the connector (figure 2, item 1) on the junction box (figure 2, item 2).
4. Remove the lockouts and tagouts (FM 55-502).
5. Set the circuit breaker to ON.
6. Operate the clearview screen under usual conditions (TM 55-1925-273-10).
7. Verify that the window spins and heats properly.
8. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ROTARY CLEARVIEW SCREENS, REPAIR**

**INITIAL SETUP:**

**Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
Multimeter, AN/PSM-45 (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0296 00  
WP 0307 00

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)

**Equipment Conditions:**

Set to OFF the ROTARY CLEARVIEW WIPER AND HEATER circuit breaker at 120V exterior emergency lighting panel No. 2. Lock out and tag out (FM 55-502).

**Personnel Required:**

Two Watercraft Engineers, 88L

**CONTROL BOX LAMP REPLACEMENT**

**REMOVAL**

1. Remove the protective lens cover (figure 1, item 1).
2. Remove the lamp (figure 1, item 2).

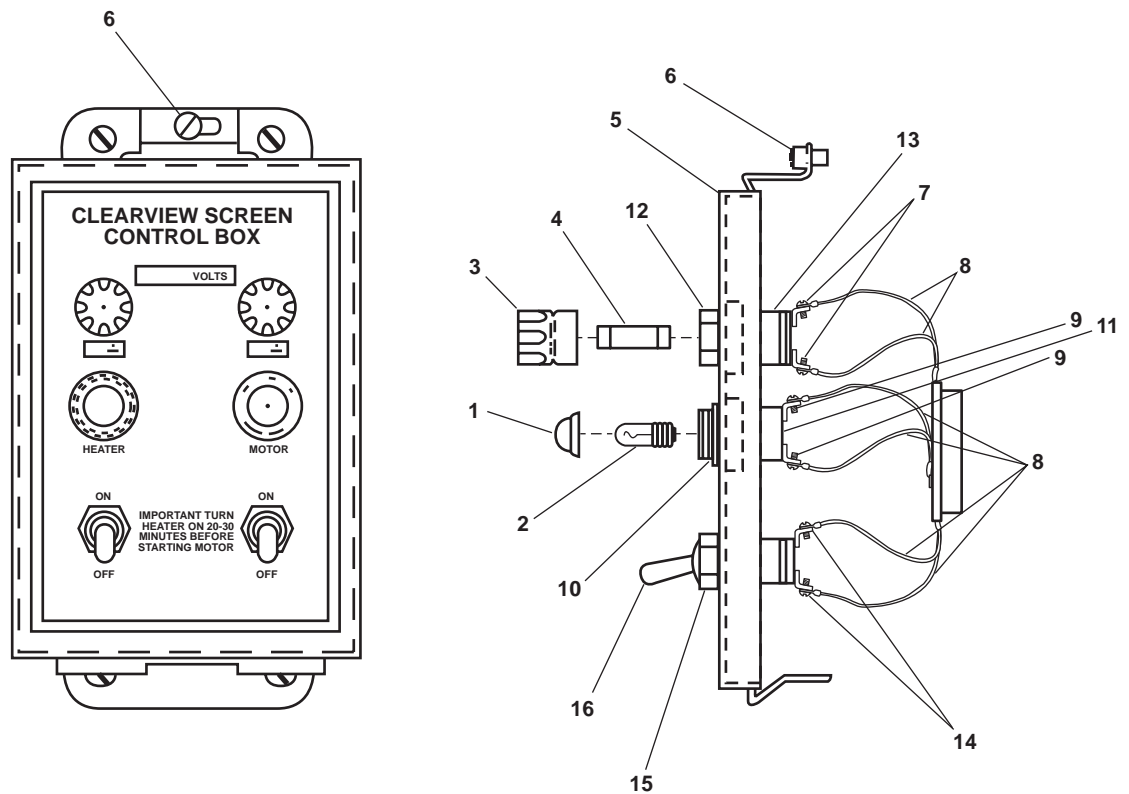


Figure 1. Clearview Screen Control Box

---

**INSTALLATION**

1. Install the lamp (figure 1, item 2).
2. Install the protective lens cover (figure 1, item 1) finger tight.
3. Perform the Follow-On Service at the end of this work package.

**CONTROL BOX FUSE REPLACEMENT****REMOVAL**

1. Remove the fuse holder (figure 1, item 3).
2. Remove the fuse (figure 1, item 4) from the fuse holder (figure 1, item 3).

**INSTALLATION**

1. Install the fuse (figure 1, item 4) in the fuse holder (figure 1, item 3).
2. Install the fuse holder (figure 1, item 3) with the installed fuse (figure 1, item 4) in the control box (figure 1, item 5).
3. Perform the Follow-On Service at the end of this work package.

**LAMP HOUSING ASSEMBLY REPLACEMENT****REMOVAL**

1. Perform the Control Box Lamp Replacement Removal procedure in this work package.
2. Loosen the captive screw (figure 1, item 6), and open the control box (figure 1, item 5).



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for the presence of voltage at the fuse holder assembly terminals (figure 1, item 7). If voltage is present, verify that the correct circuit breaker is set to OFF, locked out, and tagged out (55-502). If no voltage is present, proceed with the procedure.
4. Label and remove the wiring (figure 1, item 8) from the lamp assembly terminals (figure 1, item 9).
5. Remove the retaining nut (figure 1, item 10) and remove the lamp housing assembly (figure 1, item 11) from the control box (figure 1, item 5).

## INSTALLATION

1. Install the lamp housing assembly (figure 1, item 11) in the control box (figure 1, item 5) and secure it with the retaining nut (figure 1, item 10).
2. Install the wiring to the lamp assembly terminals (figure 1, item 9). using the labels from step 4 of Removal as a guide. Remove the labels.
3. Close the control box (figure 1, item 5) and secure it with the captive screw (figure 1, item 6).
4. Perform the Control Box Lamp Replacement Installation procedure in this work package.
5. Perform the Follow-On Service at the end of this work package.

## FUSE HOLDER ASSEMBLY REPLACEMENT

1. Perform the Control Box Fuse Replacement Removal procedure in this work package.
2. Loosen the captive screw (figure 1, item 6) and open the control box (figure 1, item 5).



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for the presence of voltage at the fuse holder assembly terminals (figure 1, item 7). If voltage is present, verify that the correct circuit breaker is set to OFF, locked out, and tagged out (55-502). If no voltage is present, proceed with the procedure.
4. Label and remove the wiring (figure 1, item 8) from the fuse holder assembly terminals (figure 1, item 7).
5. Remove the retaining nut (figure 1, item 12) and the fuse holder assembly (figure 1, item 13) from the control box (figure 1, item 5).

## INSTALLATION

1. Install the fuse holder assembly (figure 1, item 13) in the control panel (figure 1, item 5) and secure it with the retaining nut (figure 1, item 12).
2. Install the wiring (figure 1, item 8) to the fuse holder assembly terminals (figure 1, item 7) using the labels from Removal step 4 of removal as a guide. Remove the labels.
3. Close the control panel (figure 1, item 5) and secure it with the captive screw (figure 1, item 6).
4. Perform the Control Box Fuse Replacement Installation procedure in this work package.
5. Perform the Follow-On Service procedure at the end of this work package.

## TOGGLE SWITCH REPLACEMENT

### REMOVAL

1. Loosen the captive screw (figure 1, item 6), and open the control box (figure 1, item 5).



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for the presence of voltage at the fuse holder assembly terminals (figure 1, item 7). If voltage is present, verify that the correct circuit breaker is set to OFF, locked out, and tagged out (55-502). If no voltage is present, proceed with the procedure.
3. Label and remove the wiring (figure 1, item 8) from the toggle switch terminals (figure 1, item 14).
4. Remove the retaining nut (figure 1, item 15) and remove the toggle switch (figure 1, item 16) from the control box (figure 1, item 5).

### INSTALLATION

1. Install the toggle switch (figure 1, item 16) in the control box (figure 1, item 5), and secure it with the retaining nut (figure 1, item 15)
2. Install the wiring (figure 1, item 8) to the toggle switch terminals (figure 1, item 14) using the labels from step 3 of Removal as a guide. Remove the labels.
3. Close the control panel (figure 1, item 5) and secure it with the captive screw (figure 1, item 6).
4. Perform the Follow-On Service procedure at the end of this work package.

### FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).
2. Set the circuit breaker to ON.
3. Operate the clearview screen under usual conditions (TM 55-1925-273-10).
4. Verify that the window spins and heats properly.
5. Return the equipment to the desired readiness condition.

### END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
PILOTHOUSE, REPLACE**

**INITIAL SETUP:**

**Tools and Special Tools:**

- Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)
- Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)
- Multimeter (Item 16, Table 2, WP 0295 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

- FM 55-502
- TB 43-0218
- WP 0295 00
- WP 0307 00

**Materials/Parts:**

- Tag, Danger (Item 174, Table 1, WP 0307 00)

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REPLACE WINDSHIELD WIPER BELT**

**REMOVAL**

1. Determine which windshield wiper belt will be replaced. At 120V exterior emergency lighting panel No. 2, set to OFF, lock out, and tag out (FM 55-502) the corresponding circuit breaker shown in table 1.
2. Remove the four screws (figure 1, item 1) from the cover (figure 1, item 2) of the windshield wiper motor junction box (figure 1, item 3).
3. Remove the cover (figure 1, item 2) from the windshield wiper motor junction box (figure 1, item 3).

**Table 1. Windshield Wipers and Motors**

Windshield Wiper to Repair	Circuit Breaker to Lock Out and Tag Out
Forward Port and Starboard	WINDSCREEN WIPERS. (PORT & STBD FWD).
Forward Starboard and Port	WINDSCREEN WIPERS. (STARBOARD& PORT FWD).

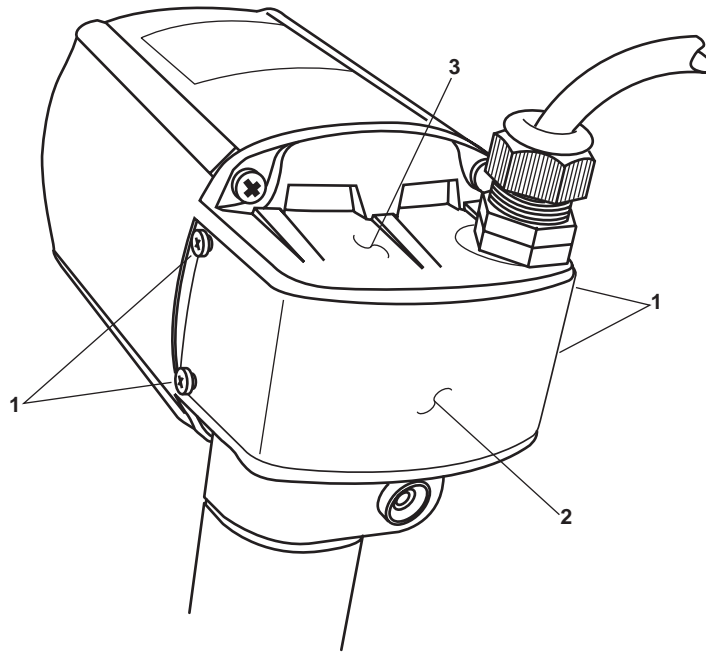


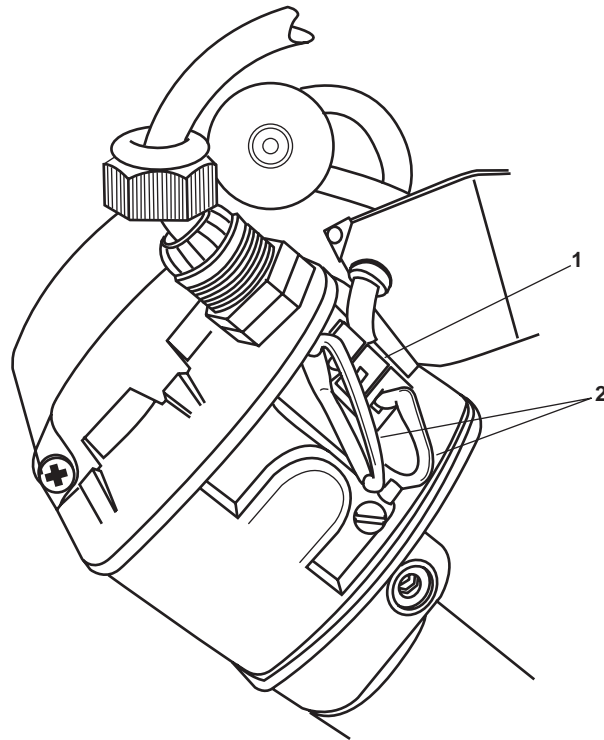
Figure 1. Windshield Wiper Motor

**WARNING**



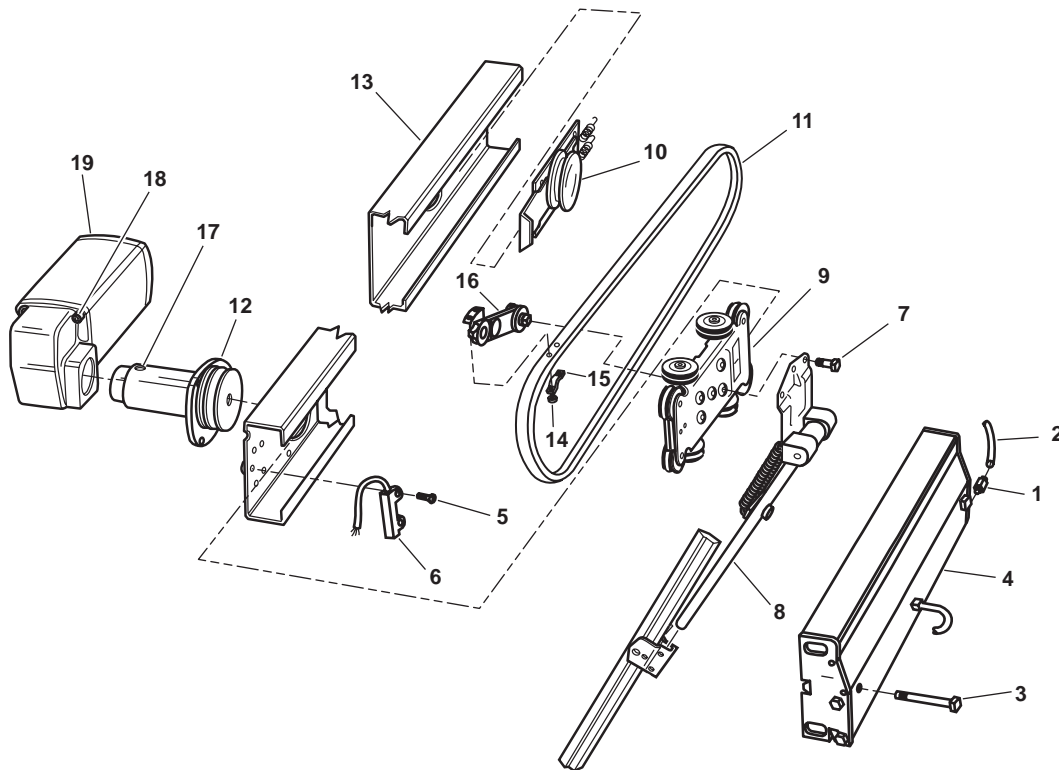
**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Using a multimeter, check for voltage at the windshield wiper motor terminals (figure 2, item 1). If voltage is present, ensure that the correct circuit breakers have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
5. Loosen and remove the nut (figure 3, item 1) from the water line (figure 3, item 2).
6. Remove the two bolts (figure 3, item 3) from the cover (figure 3, item 4) and remove the cover (figure 3, item 4).
7. Remove the two screws (figure 3, item 5) from the park switch (figure 3, item 6) and remove the park switch.
8. Remove the three screws (figure 3, item 7) that secure the windshield wiper blade assembly (figure 3, item 8) to the carriage plate assembly (figure 3, item 9) and remove the windshield wiper blade assembly.



**Figure 2. Windshield Wiper Motor Junction Box**

9. Slide the carriage plate assembly (figure 3, item 9) toward the idler tension pulley (figure 3, item 10) and remove the belt (figure 3, item 11) from the drive shaft pulley assembly (figure 3, item 12).
10. Remove the carriage plate assembly (figure 3, item 9) from the windshield wiper housing (figure 3, item 13).
11. Remove the two nuts (figure 3, item 14) securing the clamp (figure 3, item 15) and remove the clamp from the idler pulley assembly (figure 3, item 16).
12. Remove the belt (figure 3, item 11) from idler pulley assembly (figure 3, item 16).



**Figure 3. Windshield Wiper Components (Exploded View)**

## INSTALLATION

1. Install the belt (figure 3, item 11) on the idler pulley assembly (figure 3, item 16).
2. Install the clamp (figure 3, item 15) and the two nuts (figure 3, item 14) securing the clamp. Tighten the two nuts securely.
3. Install the carriage plate assembly (figure 3, item 9) in the windshield wiper housing (figure 3, item 13).
4. Slide the carriage plate assembly (figure 3, item 9) toward the idler tension pulley (figure 3, item 10) and install the belt (figure 3, item 11) on the drive shaft pulley assembly (figure 3, item 12).
5. Install the windshield wiper blade assembly (figure 3, item 8) on the carriage plate assembly (figure 3, item 9). Install the three screws (figure 3, item 7) securing the windshield wiper blade assembly. Tighten the three screws securely.
6. Install the park switch (figure 3, item 6) into the windshield wiper housing (figure 3, item 13) and secure it with the two screws (figure 3, item 5). Tighten the two screws securely.
7. Install the cover (figure 3, item 4) on the windshield wiper housing (figure 3, item 13) and secure it with the two bolts (figure 3, item 3). Tighten the two bolts securely.
8. Connect the nut (figure 3, item 1) to the water line (figure 3, item 2) and tighten the nut securely.
9. Install the cover (figure 1, item 2) on the windshield wiper motor junction box (figure 1, item 3) and secure it with the four screws (figure 1, item 1).
10. Perform the Follow-On Service procedure at the end of this work package.



---

**REPLACE WINDSHIELD WIPER ASSEMBLY (MOTOR)****REMOVAL**

1. Determine which windshield wiper assembly motor will be replaced. At the 120V exterior emergency lighting panel No. 2, set to OFF, lock out, and tag out (FM 55-502) the corresponding circuit breaker shown in table 1.
2. Remove the four screws (figure 1, item 1) from the cover (figure 1, item 2) of the windshield wiper motor junction box (figure 1, item 3).



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the windshield wiper motor terminals (figure 2, item 1). If any voltage is present, ensure that the correct circuit breakers have been secured, locked out, and tagged out. If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 2, item 2) from the windshield wiper motor junction box (figure 1, item 3).
5. Loosen the set screw (figure 3, item 17) on the drive shaft pulley assembly (figure 3, item 12).
6. Remove the four screws (figure 3, item 18) that secure the windshield wiper motor (figure 3, item 19) and remove the windshield wiper motor.

**INSTALLATION**

1. Install the new windshield wiper motor (figure 3, item 19) and secure it with the four screws (figure 3, item 18).
2. Tighten the set screw (figure 3, item 17) on the drive shaft pulley assembly (figure 3, item 12).
3. Connect the wiring (figure 2, item 2) in the windshield wiper motor junction box (figure 1, item 3) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Install the cover (figure 1, item 2) on the windshield wiper motor junction box (figure 1, item 3) and secure it with the four screws (figure 1, item 1).
5. Perform the Follow-On Service procedure at the end of this work package.

## REPLACE HEATER SWITCHES

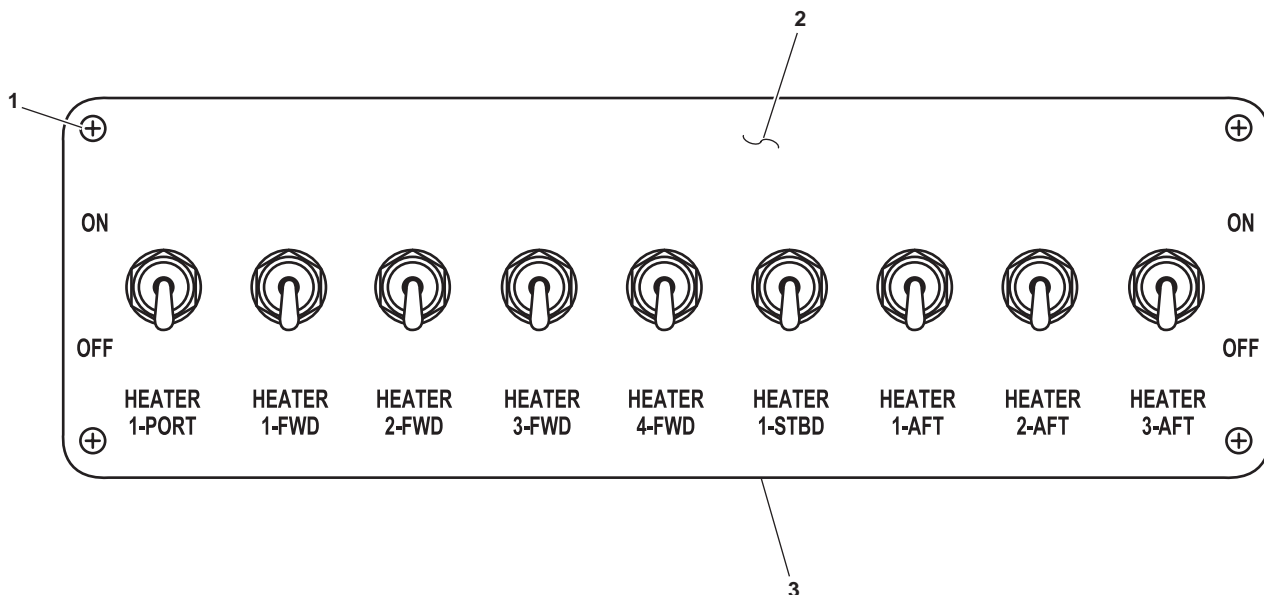
### REMOVAL

1. Determine which heater switch will be replaced. At the 120V pilothouse emergency distribution panel No. 2, set to OFF, lock out, and tag out (FM 55-502) the corresponding circuit breaker shown in table 2.
2. Remove the four screws (figure 4, item 1) from the front panel (figure 4, item 2) of the heater switch bank (figure 4, item 3).



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

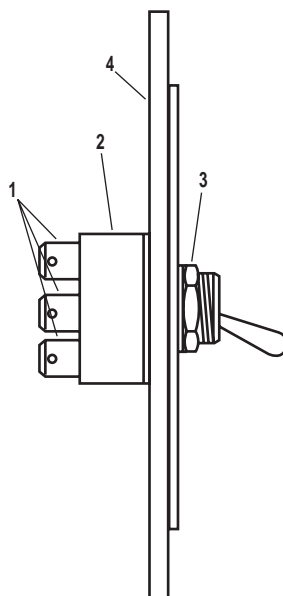
3. Remove the front panel (figure 4, item 2), and use a multimeter to check for voltage on the switch contacts (figure 5, item 1) inside the heater switch bank (figure 4, item 3). If any voltage is present, ensure that the correct circuit breakers have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring from the switch (figure 5, item 2).
5. Remove the retaining nut (figure 5, item 3) securing the switch (figure 5, item 2) to the front panel (figure 5, item 4).
6. Remove the switch (figure 5, item 2) from the front panel (figure 5, item 4).



**Figure 4. Heater Switch Bank**

**Table 2. Heater Switch Circuit Breakers**

Heater Switch to Repair	Circuit Breaker to Lock Out and Tag Out
HEATER 1-PORT	WINDSCREEN ELEMENTS. (FWD).
HEATER 2-PORT	WINDSCREEN ELEMENTS. (FWD).
HEATER 2-FWD	WINDSCREEN ELEMENTS. (FWD).
HEATER 3-FWD	WINDSCREEN ELEMENTS. (FWD).
HEATER 4-FWD	WINDSCREEN ELEMENTS. (FWD).
HEATER 1-STBD	WINDSCREEN ELEMENTS. (AFT).
HEATER 1-AFT	WINDSCREEN ELEMENTS. (AFT).
HEATER 2-AFT	WINDSCREEN ELEMENTS. (AFT).
HEATER 3-AFT	WINDSCREEN ELEMENTS. (AFT).



**Figure 5. Heater Switch**

**INSTALLATION**

1. Install the new switch (figure 5, item 2) in the front panel (figure 5, item 4), and secure it with the retaining nut (figure 5, item 3).
2. Connect the wiring to the switch contacts (figure 5, item 1) using the labels from step 4 of Removal as a guide. Remove the labels.
3. Install the front panel (figure 4, item 2), and secure it with the four screws (figure 4, item 1).
4. Perform the Follow-On Service procedure at the end of this work package.

**FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).
2. Set the applicable circuit breaker at the 120V pilothouse emergency distribution panel or the exterior emergency lighting panel No. 2 to ON. Refer to table 1 or 2.
3. Operate the windshield wipers and verify proper operation of the repaired unit.
4. Operate the heater switch and verify the proper operation of the repaired unit.
5. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
PILOTHOUSE, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Drill, Electric, Portable, 1/2" (Item 32, Table 2, WP 0295 00)  
 Drill Set, Twist Set (Item 33, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 2, WP 0295 00)  
 Riveter, Blind, Hand (Item 20, Table 2, WP 0295 00)

**Materials/Parts:**

Latch, Toggle (Item 18, Figure 9, WP 0296 00)

**Personnel Required:**

2 Watercraft Engineers, 88L

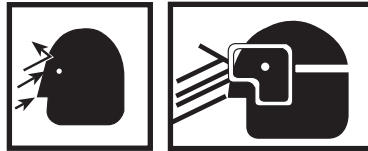
**References:**

WP 0295 00  
 WP 0296 00

---

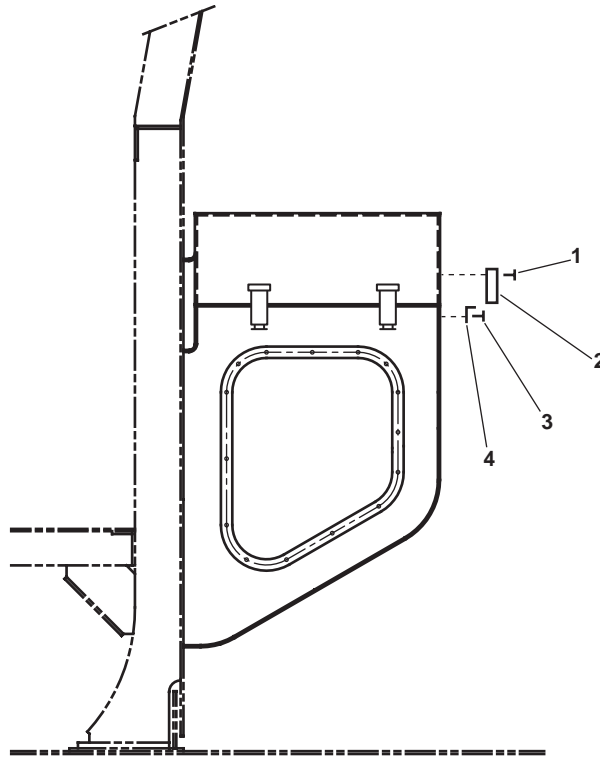
**TOGGLE LATCH REPLACEMENT****REMOVAL**

**WARNING**



**Drilling operations produce high velocity flying debris which can become lodged in the skin or in the eyes. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing grinding, needling and chipping operations. Failure to comply can result in death or serious injury to personnel.**

1. Drill out the two rivets (figure 1, item 1) securing the top half of the toggle latch (figure 1, item 2). Remove the top half of the toggle latch.
2. Drill out the two rivets (figure 2, item 3) securing the bottom half of the toggle latch (figure 1, item 4). Remove the bottom half of the toggle latch.



**Figure 1. Toggle Latch Replacement**

#### **INSTALLATION**

1. Position the bottom half of the toggle latch (figure 1, item 4) over the existing rivet holes and secure it with two rivets (figure 1, item 3).
2. Position the top half of the toggle latch (figure 1, item 2) over the existing rivet holes and secure it with two rivets (figure 1, item 1).

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MAIN ENGINE PRELUBRICATION OIL PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Torque Wrench (Item 4, Table 2, WP 0295 00)  
 Tool, Locknut (Item 17, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
 Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
 Suitable Drain Pan

**Materials/Parts:**

Dry Cleaning Solvent (Item 59, Table 1, WP 0307 00)  
 Isopropyl Alcohol (Item 92, Table 1, WP 0307 00)  
 Lubrication Oil, Engine (Item 99, Table 1, WP 0307 00)  
 Tape, Antiseizing (Item 174, Table 1, WP 0307 00)  
 Rag, Wiping (Item 139, Table 1, WP 0307 00)  
 Grease, General Purpose (Item 75, Table 1, WP 0307 00)  
 Bearing, Ball, Annular (Item 7, Figure 10, WP 0297 00)  
 Gasket (Item 12, Figure 10, WP 0297 00)

**Materials/Parts (continued):**

Lockwasher, Bearing (Item 6, Figure 10, WP 0297 00)  
 O-Ring (Item 9, Figure 10, WP 0297 00)  
 Packing, Preformed (Item 14, Figure 10, WP 0297 00)  
 Packing, Preformed (Item 15, Figure 10, WP 0297 00)  
 Seal (Item 4, Figure 10, WP 0297 00)  
 Seal, Mechanical (Qty 2) (Item 11, Figure 10, WP 0297 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

TB 43-0218  
 TM 55-1925-273-10  
 WP 0095 00 (volume 1)  
 WP 0096 00 (volume 1)  
 WP 0295 00  
 WP 0297 00  
 WP 0307 00

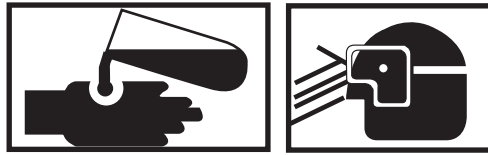
**Equipment Conditions:**

Main engine prelubrication pump removed (WP 0095 00, volume 1)

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**DISASSEMBLY****WARNING**

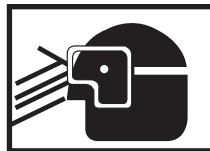
**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.**

1. Using dry cleaning solvent, clean exterior surfaces of the main engine prelubrication pump and inspect for nicks or burrs.

**NOTE**

Disassemble the main engine prelubrication pump only to the level necessary to correct the obvious problem.

2. Loosen the locknut (figure 1, item 1) and remove the adjusting screw (figure 1, item 2) from the jam nut (figure 1, item 3).

**WARNING**

**The cover is under spring pressure. Use eye protection and necessary precautions to avoid personal injury.**

3. Remove the jam nut (figure 1, item 3) and O-ring (figure 1, item 4). Discard the O-ring.



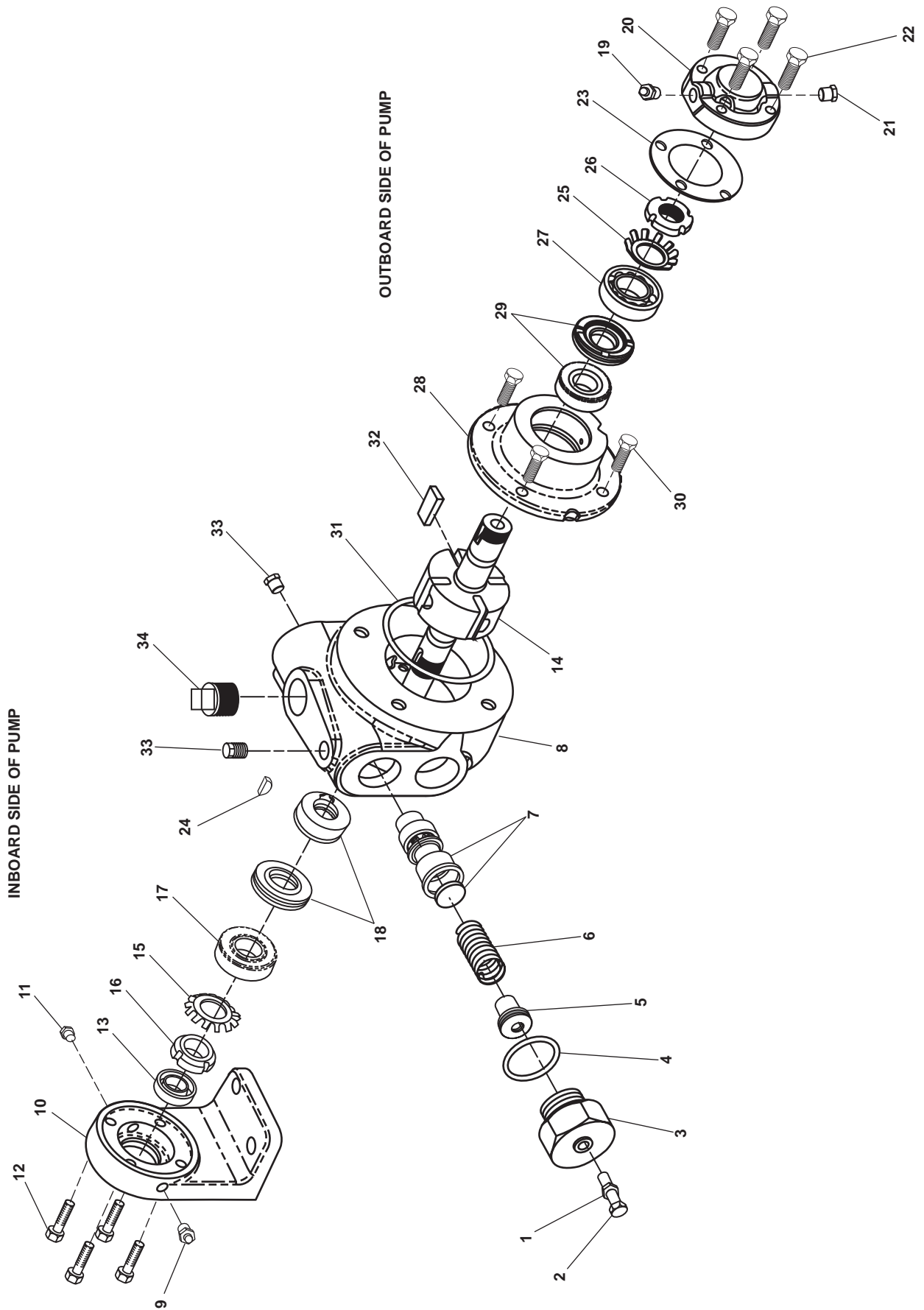
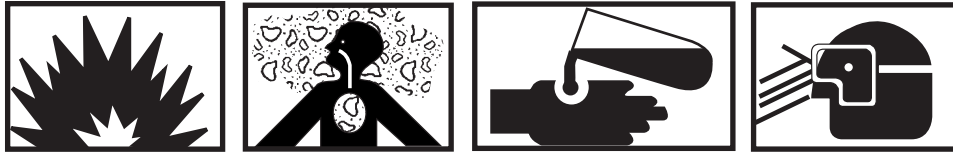


Figure 1. Main Engine Prelubrication Pump (Exploded View)

**WARNING**

**Diesel fuel is flammable and diesel fuel vapors can be explosive. Make sure all work is performed in a well ventilated area. Keep sparks, open flame, and excessive heat away from the work area. Failure to comply with this precaution can result in death or serious injury.**

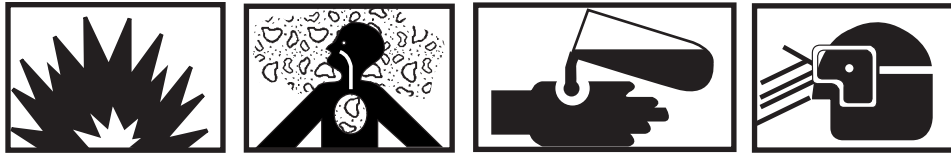
**Avoid prolonged exposure of the skin to diesel fuel. Protective nitrile gloves and chemical protective goggles must be worn whenever handling diesel fuel or parts, which are saturated with diesel fuel. Failure to comply with this precaution can result in serious injury.**

4. Remove the spring guide (figure 1, item 5) and spring (figure 1, item 6).
5. Remove the disc and valve (figure 1, item 7) from the pump body (figure 1, item 8) cavity.
6. Remove the grease fitting (figure 1, item 9) from the mounting bracket (figure 1, item 10).
7. Remove the grease fitting relief (figure 1, item 11) from the mounting bracket (figure 1, item 10).
8. Remove the four cap screws (figure 1, item 12) from the mounting bracket (figure 1, item 10).
9. Remove the mounting bracket (figure 1, item 10) and the grease seal (figure 1, item 13) from the rotor and shaft assembly (figure 1, item 14). Discard the grease seal.
10. Remove the lockwasher (figure 1, item 14) and bearing locknut (figure 1, item 15) from the rotor and shaft assembly (figure 1, item 14). Discard the lockwasher.
11. Remove the bearing (figure 1, item 17) from the pump body (figure 1, item 8).
12. Remove the mechanical seal (figure 1, item 18) from the rotor and shaft assembly (figure 1, item 14). Discard the mechanical seal.
13. Remove the grease fitting (figure 1, item 19) from the bearing cover (figure 1, item 20).
14. Remove the grease fitting relief (figure 1, item 21) from the bearing cover (figure 1, item 20).
15. Remove the four cap screws (figure 1, item 22) from the bearing cover (figure 1, item 20) and remove the bearing cover and the gasket (figure 1, item 23) from the rotor and shaft assembly (figure 1, item 14).
16. Remove the shaft key (figure 1, item 24) from the rotor and shaft assembly (figure 1, item 14).
17. Remove the lockwasher (figure 1, item 25). Using a locknut tool, remove the bearing locknut (figure 1, item 26) from the rotor and shaft assembly (figure 1, item 14). Discard the lockwasher.
18. Remove the bearing (figure 1, item 27) from the head (figure 1, item 28).
19. Remove the mechanical seal (figure 1, item 29) from the head (figure 1, item 28). Discard the mechanical seal.

20. Remove the four cap screws (figure 1, item 30) from the head (figure 1, item 28) and carefully slide the head off the rotor and shaft assembly (figure 1, item 14).
21. Remove the O-ring (figure 1, item 31) from the head (figure 1, item 28). Discard the O-ring.
22. Gently remove the rotor and shaft assembly (figure 1, item 14) from the pump body (figure 1, item 8), with one hand cupped underneath the assembly to keep the vanes (figure 1, item 32) from falling out.
23. Remove the four vanes (figure 1 item, 32) from the rotor and shaft assembly (figure 1, item 14).
24. Remove the two 1/4 inch gauge plugs (figure 1, item 33) from the pump body (figure 1, item 8).
25. Remove the 3/4 inch gauge plug (figure 1, item 34) from the pump body (figure 1, item 8).

## CLEANING AND INSPECTION

### WARNING



**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

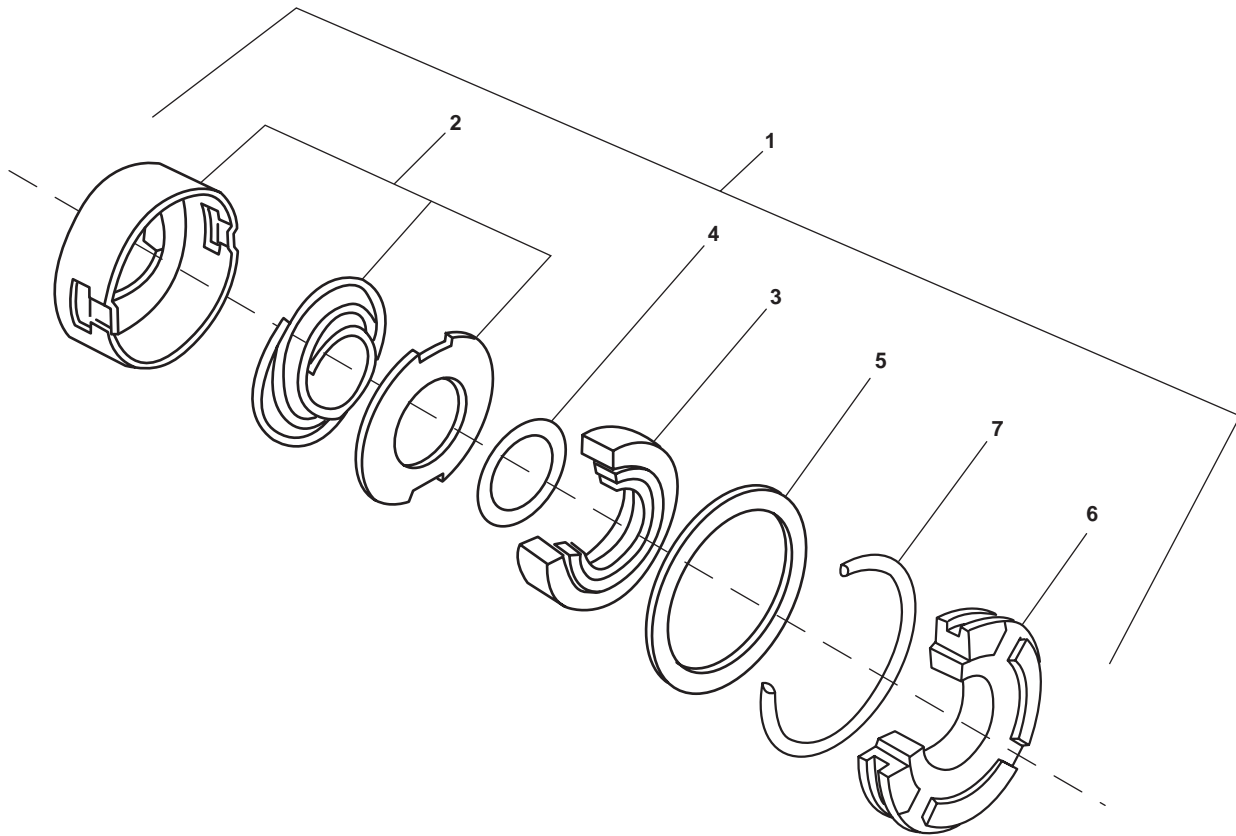
Using cleaning solvent, clean all the removed parts. Check for any burrs on the rotor and shaft assembly (figure 1, item 32) the pump body (figure 1, item 8), and all other removed parts. Inspect all component parts for unusual wear or damage.

## ASSEMBLY

### NOTE

Reassemble the INBOARD side of the pump first. Position the pump cylinder with the INTAKE port and relief valve to the right.

1. Apply a small amount of engine lubrication oil in the mechanical seal (figure 2, item 1) and bearing recess of the pump body (figure 1, item 8) before installing the mechanical seal.
2. Insert the seal jacket assembly (figure 2, item 2) into the seal recess of the pump body (figure 1, item 8) with the drive tangs of the jacket facing inward.
3. With the polished face facing outward, align the notches of the rotating seal face (figure 2, item 3) with the jacket assembly (figure 2, item 2), and install the rotating seal face and rotating O-ring (figure 2, item 4) into the jacket assembly.
4. Thoroughly clean the rotating seal face (figure 2, item 2) with clean wiping rags and isopropyl alcohol.
5. Install the seal backup ring (figure 2, item 5) into the seal recess of the pump body (figure 1, item 8).
6. Thoroughly clean the polished face of the stationary seat (figure 2, item 6) with a clean wiping rag and alcohol.
7. Align the stationary seat (figure 2, item 6) and the O-ring (figure 2, item 7) and insert it into the seal recess with the polished face inward to mate with the rotating seal face (figure 2, item 3).



**Figure 2. Mechanical Seal**

8. Hand pack the bearing (figure 1, item 17) with general purpose grease.

**NOTE**

The balls in the bearing should face outward, with the grease shield inward. The bearing must be fully and squarely seated against the mechanical seal during installation.

9. Install the bearing (figure 1, item 17) into the pump body (figure 1, item 8) recessed cavity.

**NOTE**

Use care when handling the rotor and shaft assembly and installing the vanes.

10. Install the rotor and shaft assembly (figure 1, item 14) into the pump body (figure 1, item 8) and through the mechanical seal (figure 2, item 1).
11. Rotate the rotor and shaft assembly (figure 1, item 14) to engage the drive tangs of the mechanical seal (figure 1, item 18) into the rotor and shaft assembly.
12. Apply 2 to 3 drops of engine lubrication oil on the vanes (figure 1, item 32) and insert the vanes into the slots on the rotor and shaft assembly (figure 1, item 14)..
13. Install the shaft key (figure 1, item 24) in the rotor and shaft assembly (figure 1, item 14).

 **CAUTION**

It is important that the bearing locknuts and bearing lockwashers are installed and adjusted properly. Over tightening locknuts can cause bearing failure or a broken lockwasher tang. Loose locknuts will allow the rotor on the shaft and rotor assembly to slip gradually.

**NOTE**

Ensure that the inner tang of the bearing lockwasher is located in the slot in the shaft and rotor assembly threads. Bend the bearing lockwasher slightly, if necessary.

14. Install a new lockwasher (figure 1, item 15) with the tangs outward. Install the locknut (figure 1, item 16) with the tapered end facing inward.
15. Using a lockout tool, tighten the locknut (figure 1, item 16) to pull the rotor and shaft assembly's (figure 1, item 14) rotor flat against the back wall of the pump body (figure 1, item 8).
16. Repeat steps 1 - 9 to install the mechanical seal (figure 1, item 29) into the head (figure 1, item 28).
17. Apply a small amount of engine lubrication oil to the head (figure 1, item 28) O-ring groove on the inside face of the head.
18. Install a new O-ring (figure 1, item 31) into the groove.

**NOTE**

Use care not to damage the mechanical seal when installing the head onto the cylinder.

19. Apply a small amount of engine lubrication oil on the exposed end of the rotor and shaft assembly (figure 1, item 14) and install the head over the rotor shaft assembly and against the head (figure 1, item 28).
20. Rotate the head (figure 1, item 28) to engage the drive tangs of the mechanical seal (figure 1, item 29) jacket assembly (figure 2, item 2) with slots in the rotor of the rotor and shaft assembly (figure 1, item 14).
21. Install the four cap screws (figure 1, item 22) hand tight at this time.

 **CAUTION**

It is important that the bearing locknuts and bearing lockwashers are installed and adjusted properly. Overtightening locknuts can cause bearing failure or a broken lockwasher tang. Loose locknuts will allow the rotor on the shaft and rotor assembly to shift causing premature wear.

**NOTE**

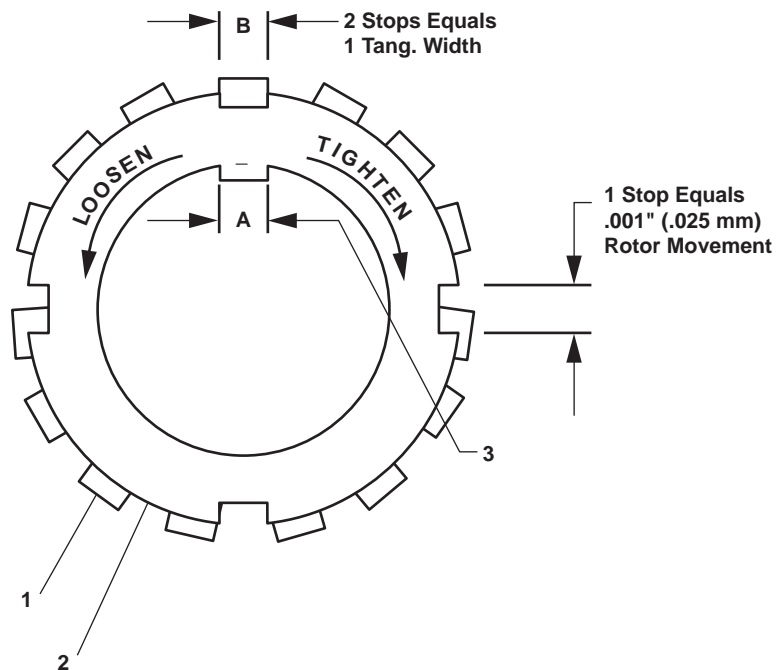
Ensure that the inner tang "A" of the bearing lockwasher is located in the slot in the shaft and rotor assembly threads, bending the bearing lockwasher slightly, if necessary.

22. Install a new lockwasher (figure 1, item 25) with the tangs outward. Install the locknut (figure 1, item 26) with the tapered end facing inward.
23. Using a lockout tool, tighten the locknut (figure 1, item 26) to pull the head (figure 1, item 28) up against the pump body (figure 1, item 8).

## ⚠ CAUTION

Do not over tighten, bend, or shear the lockwasher inner tang. Equipment damage could occur if the lockwasher is damaged.

24. Using the pump's coupling half, hold the rotor shaft assembly's end and tighten the outboard locknut with a lockout tool to pull the head (figure 1, item 28) against the pump body (figure 1, item 8).
25. Tighten both bearing locknuts (figure 1, items 16 and 26) to ensure that the bearings (figure 1, items 17 and 27) are bottomed in the head (figure 1, items 28) and the pump's body (figure 1, item 8) recess.
26. Loosen both bearing locknuts (figure 1, items 16 and 26) one complete turn.
27. Tighten bearing locknut (figure 1, item 16) until a slight shaft and rotor assembly (figure 1, item 14) drag is felt when turning the shaft by hand.
28. Back off the bearing locknut (figure 1, item 16) the width of one lockwasher tang "B" (figure 3). Secure the bearing locknut by bending the closest aligned bearing lockwasher tang into the slot in the bearing locknut. The pump should turn freely when rotated by hand.
29. Tighten the bearing locknut (figure 1, item 26) by hand until it is snug against the bearing (figure 1, item 27).
30. Using a lockout tool, tighten the bearing locknut (figure 1, item 26) the width of one lockwasher tang "B" (figure 3).
31. Tighten bearing locknut (figure 1, item 26) just past the desired tang, then back off the locknut to align the tang with the locknut slot as shown in figure 3.
32. Secure the bearing locknut (figure 1, item 26) by bending the aligned bearing lockwasher (figure 1, item 25) tang into the slot in the bearing locknut. The assembly should continue to turn freely when rotated by hand.



**Figure 3. Locknut Adjustment**

33. Check adjustment by grasping the bearing locknut (figure 1, item 26) and the bearing lockwasher (figure 1, item 25) with fingers and rotate back and forth. If this cannot be accomplished, one or both bearing locknuts (figure 1, item 16 or 26) are too tight. Alternately loosen bearing locknuts one stop at a time until the pump shaft rotates freely by hand.
34. Grease the outside diameter of the grease seal (figure 1, item 13) and install it on the mounting bracket (figure 1 item 10) with the lip of the grease seal inward (towards the pump).
35. Install a new bearing cover gasket (figure 1, item 31) into the head (figure 1, item 28) recess.

#### NOTE

The bearing cover must be installed with the grease fitting facing up.

36. Install the bearing cover (figure 1, item 20) on the head (figure 1, item 28) and secure it with the four cap screws (figure 1, item 22) securing the bearing cover (figure 1, item 20). Torque the cap screws 15 ft-lb (20 Nm).
37. Install the grease fitting (figure 1, item 19) into the bearing cover (figure 1, item 20).
38. Install the grease fitting relief (figure 1, item 21) into the bearing cover (figure 1, item 20).
39. Install the grease fitting (figure 1, item 9) into the mounting bracket (figure 1, item 10).
40. Install the grease fitting relief (figure 1, item 11) into the mounting bracket (figure 1, item 10).
41. Apply general purpose grease to the outer diameter of a new grease seal and install the new grease seal into the mounting bracket (figure 1, item 10) with the lip facing inward.
42. Install the mounting bracket (figure 1, item 10) onto the pump body (figure 1, item 8) and secure it with the four cap screws (figure, 1 item 12).
43. Install the valve and disc (figure 1, item 7) the spring (figure 1, item 6), and the spring guide (figure 1, item 5) in the pump body (figure 1, item 8).
44. Install the 3/4 gauge plug (figure 1, item 34)
45. Install the two 1/4 inch gauge plugs (figure 1, item 34).
46. Install a new O-ring (figure 1, item 4) on the jam nut (figure 1, item 33).
47. Install the jam nut (figure 1, item 3) into the pump body (figure 1, item 8).
48. Install the adjusting screw (figure 1, item 2) and locknut (figure 1, item 1) in the jam nut (figure 1, item 3).
49. Install the pump and the electric motor (WP 0095 00, volume 1 and WP 0096 00, volume 1).
50. Operate the prelube pump under usual conditions (TM 55-1925-273-10) to ensure proper operation. Priming should occur within one minute.
51. Observe that prelube oil discharge from the engine bearings is within expected parameters (TM 55-1925-273-10).
52. If the discharge pressure is not acceptable, adjust the pressure by:
  - a. Loosening the locknut (figure 1, item 1).
  - b. Adjusting the adjusting screw (figure 1, item 2).

- c. With the pump running, turn the adjusting screw (figure 1, item 2) clockwise (increases pressure) or counter-clockwise (decreases pressure) until the desired discharge pressure is attained.
  - d. Tightening the locknut (figure 1, item 1).
53. Return the equipment to the desired readiness condition (TM 55-1925-273-10).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
REDUCTION GEAR COOLING PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
FM 55-509-1  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the FRESH WATER PUMP No. 1, (REDUCTION GEAR). or the FRESH WATER PUMP No. 2, (REDUCTION GEAR) circuit breaker at 440 power panel No. 1. Lock out and tag out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**WIRING REPAIR**

Proper repair of wiring consists of replacement of the damaged wiring. When electrical casualty requires expedient repairs, repair may be made by splicing. Splicing is authorized for repair of damaged cables if the remainder of the cable is in good mechanical and electrical condition. The cable must be replaced in its entirety at the most opportune time. For proper splicing methods, refer to FM 55-509-1.

**DISASSEMBLY**

1. Remove the two screws (figure 1, item 1), and remove the cover (figure 1, item 2) from the junction box (figure 1, item 3).

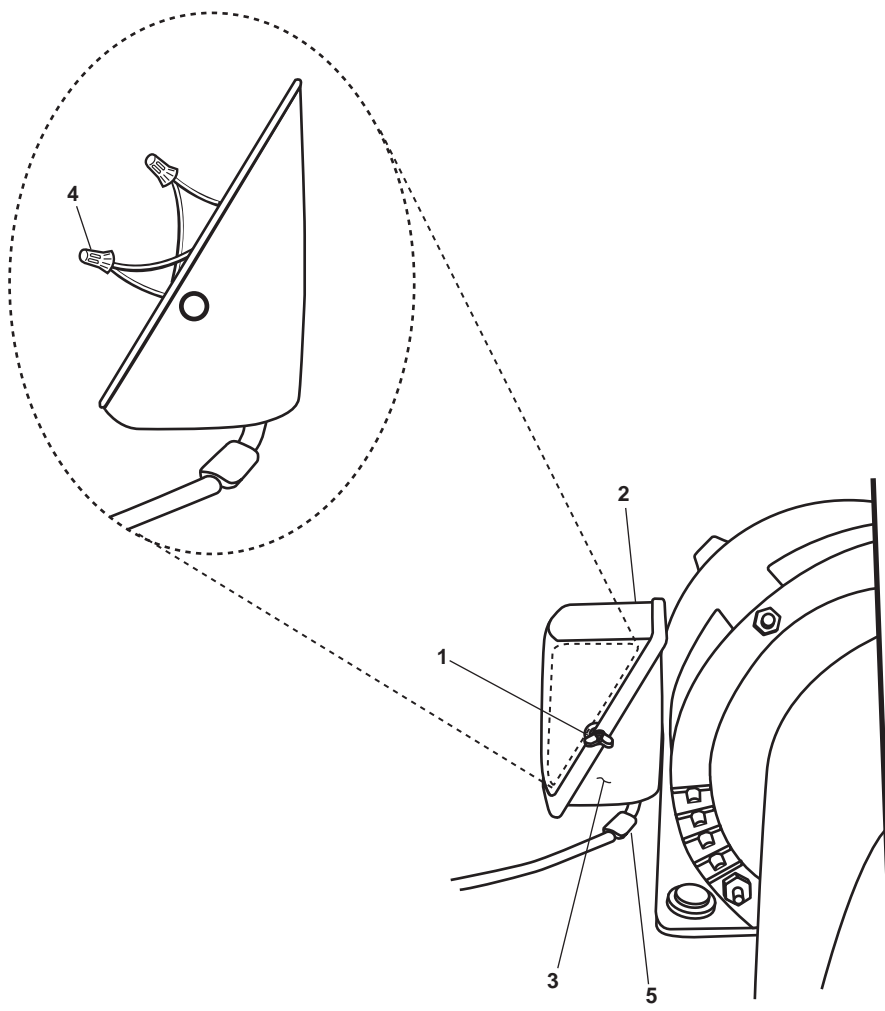
**WARNING**



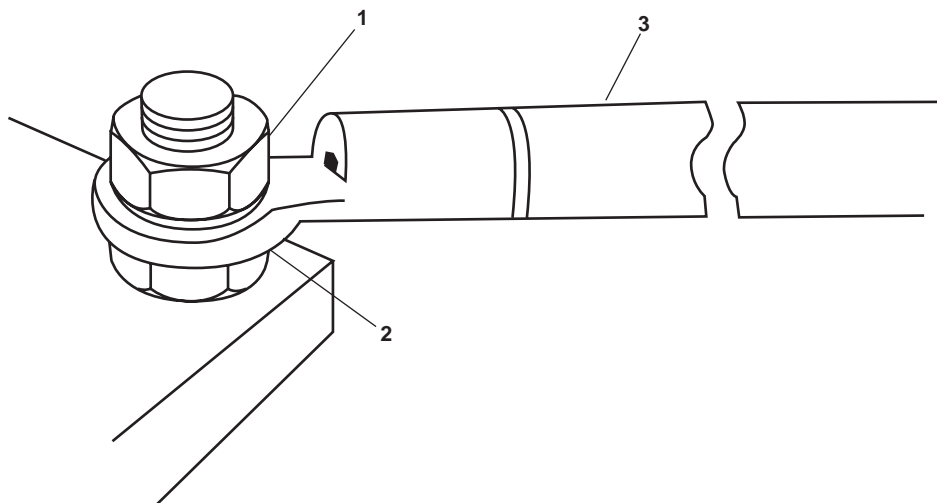
**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury.**

2. Use a multimeter to check for voltage at the wire terminals (figure 1, item 4). If voltage is present, verify that the correct circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.

3. Remove any covers or interference that restrict access to the wire being removed.
4. Label all wiring to be removed, and make a sketch of the work area to permit proper assembly.
5. Remove the nuts (figure 2, item 1) that secure the wire terminals (figure 2, item 2) in the motor controller, and remove the wire nuts from the wire terminals (figure 1, item 4) in the junction box (figure 1, item 3).
6. Remove the wiring (figure 1, item 5) from the junction box (figure 1, item 3).
7. Follow the wiring (figure 1, item 5) to the opposite end, freeing it from the vessel structure as required.
8. Remove the wiring (figure 2, item 3) from the wire terminals (figure 2, item 2).
9. Perform steps 1-8 for any other wire that may require removal.



**Figure 1. Typical Junction Box**



**Figure 2. Typical Wire Terminal**

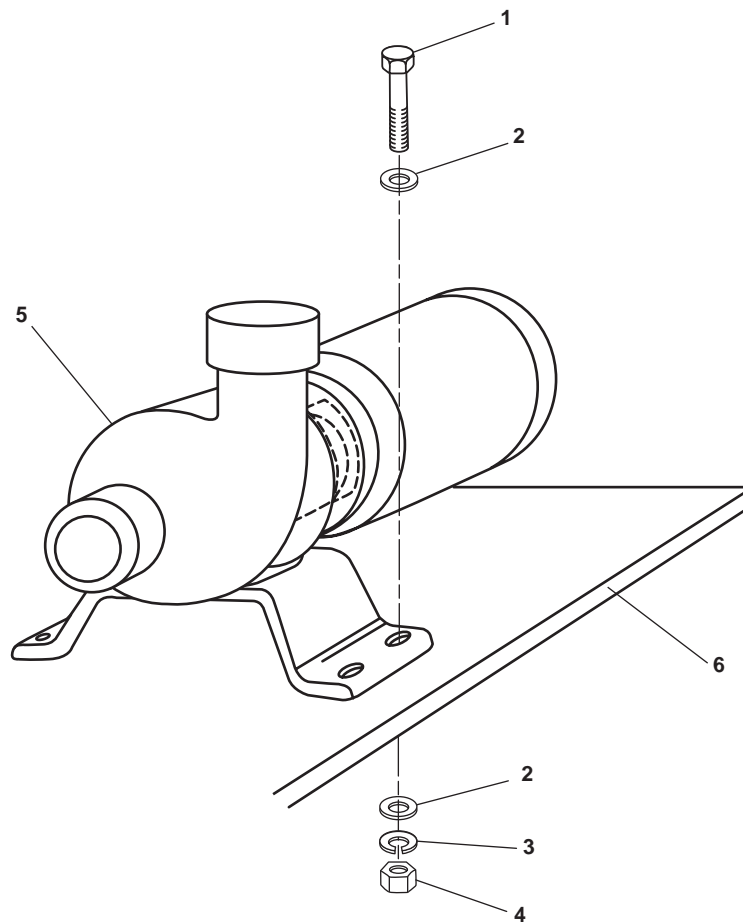
#### **ASSEMBLY**

1. Determine the wires to be connected by referring to the sketches and labels from step 4 of Disassembly as a guide.
2. Route the new wires (figure 1, item 5) from the junction box (figure 1, item 3) along the same path as the old wires to the motor controller and secure it to wire terminals (figure 2, item 2) with the nuts (figure 2, item 1).
3. Connect the wiring (figure 1, item 5) in the junction box (figure 1, item 3).
4. Remove any remaining labels.
5. Install any covering or interference removed during the Removal procedure.
6. Install the cover (figure 1, item 2) on the junction box (figure 1, item 3), and secure it with the two screws (figure 1, item 1).
7. Perform the Follow-On Service procedure at the end of this work package.

#### **FASTENER REPLACEMENT**

#### **REMOVAL**

Remove the four bolts (figure 3, item 1), eight flat washers (figure 3, item 2), four lockwashers (figure 3, item 3) and four nuts (figure 3, item 4) that secure the pump (figure 3, item 5) to the foundation (figure 3, item 6). Discard the lockwashers.



**Figure 3. Reduction Gear Cooling Pump Mounting Hardware**

### INSTALLATION

1. Install the pump (figure 3, item 5), and secure it to the foundation (figure 3, item 6) with the four bolts (figure 3, item 1), four new lockwashers (figure 3, item 2), eight flat washers, (figure 3, item 3) and four nuts (figure 3, item 4).
2. Perform the Follow-On Service at the end of this work package.

### FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts.
2. Set the circuit breaker to ON.
3. Operate the reduction gear cooling pump under usual conditions (TM 55-1925-273-10), and check for vibration and abnormal noise.
4. Return the equipment to the desired readiness condition.

### END OF WORK PACKAGE

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
KEEL COOLERS, INSPECT**

---

**INITIAL SETUP:****Materials/Parts:**

Tag, Danger (Item 174, Table 2, WP 0295 00)

**Personnel Required:**

Two Watercraft Engineers, 88L  
Qualified Divers and Attendants (FM 20-11)

**References:**

FM 20-11  
FM 55-502  
TM 55-1925-273-10  
WP 0307 00

**Equipment Conditions:**

Vessel is moored and on shore power  
(TM 55-1925-273-10).  
Set the anchor windlass brakes  
(TM 55-1925-273-10).  
Pelican hooks securing the anchor chains.  
At the emergency switchboard, set the STEERING  
GEAR PUMP #1 circuit breaker to OFF; set  
the FIRE PUMP #1 circuit breaker to OFF;  
set the BILGE PUMP #1 circuit breaker to  
OFF; set the CENT HYD SYS circuit breaker  
to OFF. Lock out and tag out (FM 55-502).

**Equipment Conditions (continued):**

At the main switchboard, set the BILGE PUMP NO. 2  
circuit breaker to OFF; set the FIRE PUMP NO. 2  
circuit breaker to OFF; set the STEERING GEAR  
PUMP #2 circuit breaker to OFF. Lock out and tag out  
(FM 55-502).  
At 440V power panel No. 1, set the SEWAGE  
DISCHARGE PUMP No. 1 circuit breaker to OFF; set  
the SEWAGE DISCHARGE PUMP No. 2 circuit  
breaker to OFF; set the MSD DISCHARGE PUMP  
AND BLOWER circuit breaker to OFF. Lock out and  
tag out (FM 55-502).  
At 120V distribution panel No. 4, set the OILY WATER  
SEPARATOR circuit breaker to OFF. Lock out and  
tag out (FM 55-502).  
At 120V pilothouse emergency distribution panel, set the  
SPEED LOG 85 ELECTRONICS UNIT circuit breaker  
to OFF; set the SONAR DIGITAL AN/SQN. (ECHO  
SOUNDER DISPLAY) circuit breaker to OFF. Lock  
out and tag out (FM 55-502).  
At the SSDG 1 engine control panel push IN the emergency  
stop pushbutton. Lock out and tag out (FM 55-502).  
CLOSE valves CA-5 STG AIR TO BOW THRUSTER  
ENG; CA-6 STG AIR TO PMP DR ENG; CA-7 STG  
AIR TO DSL ENG; CA-8 STG AIR TO ME #2; CA-  
9 STG AIR TO ME #1; CA-22 SEACHEST BLWT.;  
and CA-23 SEACHEST BLWT. Lock out and tag out  
(FM 55-502).

**NOTE**

Inspection of the keel cooler exterior components must be performed by a team of qualified divers. Inspection of the keel cooler components inside the vessel is detailed in WP 0098 00 (volume 1).

**INSPECTION****WARNING**

**Do not pump from or discharge to the sea while diving operations are in progress. Do not rotate screws, cycle rudders, or perform any other operation that might injure the diver. Do not operate the fathometer or any other underwater electrical devices. Failure to comply with this warning may result in death or serious injury to the divers.**

1. Inspect all six keel coolers for signs of external damage or leakage. Report any damage to the maintenance supervisor.

2. Inspect all six keel coolers for security of mounting. Report any loose mounting to the maintenance supervisor.
3. Inspect all six keel coolers for contamination by sand, mud, paint, or marine growth. If contamination is found, report the contamination to the maintenance supervisor who will determine the most effective cleaning method.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
PROPELLER, INSPECT**

---

**INITIAL SETUP:****Materials/Parts:**

Tag, Danger (Item 174, Table 2, WP 0295 00)

**Personnel Required:**

Two Watercraft Engineers, 88L  
Qualified Divers and Attendants (FM 20-11)

**References:**

FM 20-11  
FM 55-502  
TM 55-1925-273-10  
WP 0307 00

**Equipment Conditions:**

Vessel is moored and on shore power  
(TM 55-1925-273-10).  
Set the anchor windlass brakes  
(TM 55-1925-273-10).  
Pelican hooks securing the anchor chains.  
At the emergency switchboard, set the STEERING GEAR PUMP #1 circuit breaker to OFF; set the FIRE PUMP #1 circuit breaker to OFF; set the BILGE PUMP #1 circuit breaker to OFF; set the CENT HYD SYS circuit breaker to OFF. Lock out and tag out (FM 55-502).

**Equipment Conditions (continued):**

At the main switchboard, set the BILGE PUMP NO. 2 circuit breaker to OFF; set the FIRE PUMP NO. 2 circuit breaker to OFF; set the STEERING GEAR PUMP #2 circuit breaker to OFF. Lock out and tag out (FM 55-502).  
At 440V power panel No. 1, set the SEWAGE DISCHARGE PUMP No. 1 circuit breaker to OFF; set the SEWAGE DISCHARGE PUMP No. 2 circuit breaker to OFF; set the MSD DISCHARGE PUMP AND BLOWER circuit breaker to OFF. Lock out and tag out (FM 55-502).  
At 120V distribution panel No. 4, set the OILY WATER SEPARATOR circuit breaker to OFF. Lock out and tag out (FM 55-502).  
At 120V pilothouse emergency distribution panel, set the SPEED LOG 85 ELECTRONICS UNIT circuit breaker to OFF; set the SONAR DIGITAL AN/SQN. (ECHO SOUNDER DISPLAY) circuit breaker to OFF. Lock out and tag out (FM 55-502).  
At the SSDG 1 engine control panel push IN the emergency stop pushbutton. Lock out and tag out (FM 55-502).  
CLOSE valves CA-5 STG AIR TO BOW THRUSTER ENG; CA-6 STG AIR TO PMP DR ENG; CA-7 STG AIR TO DSL ENG; CA-8 STG AIR TO ME #2; CA-9 STG AIR TO ME #1; CA-22 SEACHEST BLWT.; and CA-23 SEACHEST BLWT. Lock out and tag out (FM 55-502).

**NOTE**

Inspection of the propellers and the bow thruster must be performed by a team of qualified divers.

**INSPECTION****WARNING**

**Do not pump from or discharge to the sea while diving operations are in progress. Do not rotate screws, cycle rudders, or perform any other operation that might injure the diver. Do not operate the fathometer or any other underwater electrical devices. Failure to comply with this warning may result in death or serious injury to the divers.**

1. Inspect the propellers and the bow thruster for signs of obvious damage such as dings, nicks, deformation, or entangled materials. Report any damage to the maintenance supervisor.

2. Inspect the propellers and the bow thruster for security of mounting. Report any loose mounting to the maintenance supervisor.
3. Inspect the propellers and the bow thruster for contamination by marine growth. If contamination is found, report the contamination to the maintenance supervisor who will determine the most effective cleaning method.

**END OF WORK PACKAGE**



**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ELECTRICAL POWER SYSTEM, TEST**

**INITIAL SETUP:**

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

TM 55-1925-273-10

**NOTE**

The interlock system incorporated into the switchboards is designed to prevent damage by allowing power from only one source to be supplied to the electrical circuits at the same time. Perform this procedure to test that the interlocks in the electrical power distribution system are working properly.

**TEST NORMAL POWER INTERLOCKS**

1. Ensure that the following conditions exist prior to the testing of the electrical power interlock system:
  - a. The main switchboard is powered by SSDG 1, SSDG 2, or shore power (TM 55-1925-273-10).
  - b. Set the BUS TIE CKT. BKR. (figure 1, item 1) on the lower center panel of the main switchboard to OFF.
  - c. Set the BUS TIE BKR FEEDBACK switch (figure 2, item 1) on the top panel of the emergency switchboard to NORMAL.
2. Test that the following interlock conditions operate as listed in table 1.
3. If any of the interlocks fail to operate correctly, notify the maintenance supervisor.

**Table 1. Normal Power Interlocks**

<b>Circuit Breaker CLOSED</b>	<b>Cannot Close</b>
GEN. 1 CKT BKR (figure 1, item 2)	SHORE POWER Circuit Breaker (figure 1, item 3)
GEN. 2 CKT BKR (figure 1, item 4)	SHORE POWER Circuit Breaker (figure 1, item 3)
SHORE POWER Circuit Breaker (figure 1, item 3)	GEN. 1 CKT BKR (figure 1, item 2)
SHORE POWER Circuit Breaker (figure 1, item 3)	GEN. 2 CKT BKR (figure 1, item 4)
BUS TIE CKT. BKR. (figure 1, item 1)	EMG GENERATOR CIRCUIT BREAKER (figure 2, item 2)
EMG. GEN. SWBD BUS TIE #1 (figure 1, item 5)	EMG. GEN. SWBD BUS TIE #2 (figure 1, item 6)
EMG. GEN. SWBD BUS TIE #2 (figure 1, item 6)	EMG. GEN. SWBD BUS TIE #1 (figure 1, item 5)

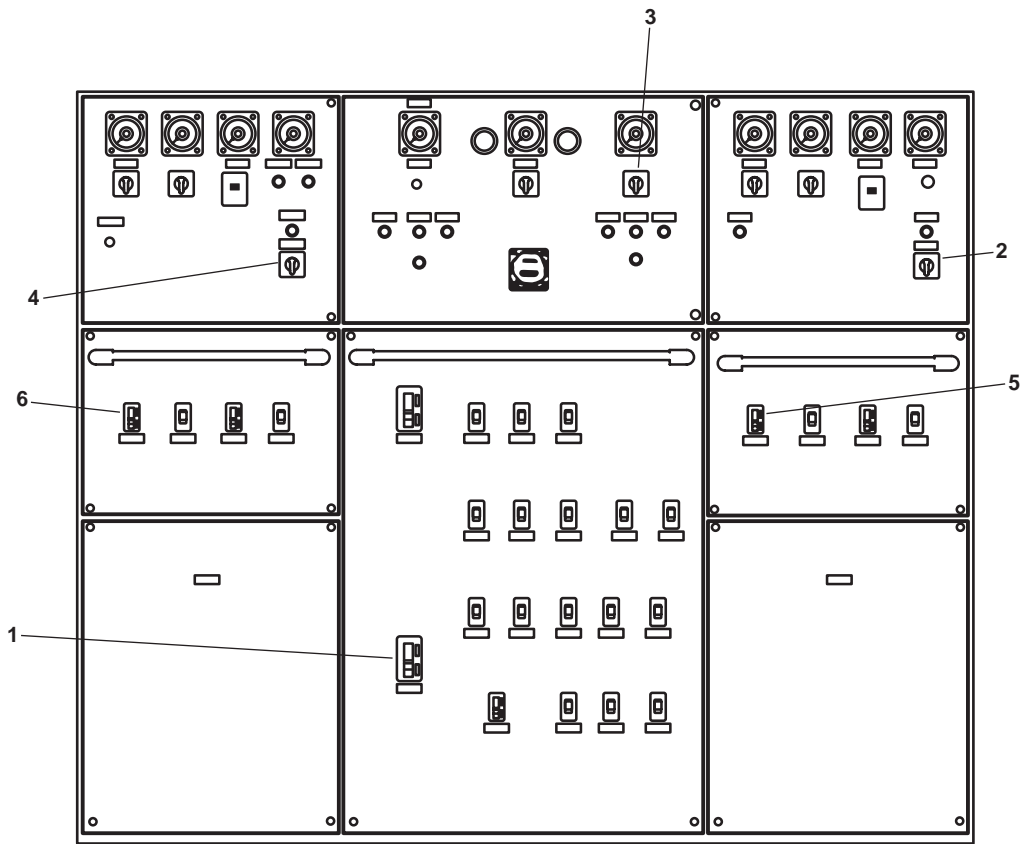


Figure 1. Main Switchboard

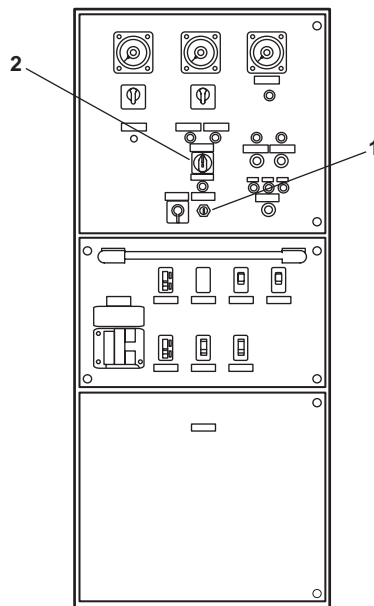


Figure 2. Emergency Switchboard

**TEST EMERGENCY DIESEL GENERATOR (EDG) POWER INTERLOCKS (NO FEEDBACK)**

1. Ensure that the following circuit breaker/switches are set as indicated prior to the testing of the electrical power interlock system:
  - a. EDG is running (TM 55-1925-273-10).
  - b. BUS TIE BKR FEEDBACK switch (figure 2, item 1) on the top panel of the emergency switchboard to NORMAL.
2. Test that the following interlock condition operates as listed in table 2.
3. If any of the interlocks fail to operate correctly, notify the maintenance supervisor.

**Table 2. EDG Power Interlocks (No Feedback)**

Circuit Breaker CLOSED	Cannot Close
EMG GENERATOR CIRCUIT BREAKER (figure 2, item 2)	BUS TIE CKT. BKR. (figure 1, item 1)

**TEST EDG POWER INTERLOCKS (WITH FEEDBACK)**

1. Ensure that the following circuit breaker/switches are set as indicated prior to the testing of the electrical power interlock system:
  - a. EDG is running (TM 55-1925-273-10).
  - b. Set the BUS TIE BKR FEEDBACK switch (figure 2, item 1) switch on the top panel of the emergency switchboard to FEEDBACK.
2. Test that the following interlock conditions operate as listed in table 3.
3. If any of the interlocks fail to operate correctly, notify the maintenance supervisor.

**Table 3. EDG Power, Interlocks (with Feedback)**

Circuit Breaker CLOSED	Cannot Close
EMG GENERATOR CIRCUIT BREAKER (figure 2, item 2) & BUS TIE CKT. BKR. (figure 1, item 1)	GEN. 1 CKT BKR (figure 1, item 2)
EMG GENERATOR CIRCUIT BREAKER (figure 2, item 2) & BUS TIE CKT. BKR. (figure 1, item 1)	GEN. 2 CKT BKR (figure 1, item 4)
EMG GENERATOR CIRCUIT BREAKER (figure 2, item 2) & BUS TIE CKT. BKR. (figure 1, item 1)	SHORE POWER Circuit Breaker (figure 1, item 3)

**END OF WORK PACKAGE**



**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ELECTRICAL POWER SYSTEM, ADJUST**

**INITIAL SETUP:**

**Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)

**References:**

WP 0111 00 (volume 1)  
WP 0113 00 (volume 1)  
WP 0221 00  
WP 0295 00

**Personnel Required:**

Two Watercraft Engineers, 88L

**EDG CIRCUIT BREAKER ADJUSTMENT**

1. Refer to WP 0221 00 for removal and installation procedures for the emergency diesel generator (EDG) circuit breaker (figure 1, item 1).

**WARNING**



**Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.**

2. After installation, refer to table 1 for voltage adjustments and trip settings.

**Table 1. EDG Circuit Breaker Setting Information**

Manufacturer/Type	Adjustments/Settings
SQUARE D Type MP0841	Trip settings: 1R on Long Time 1M on Inst Time

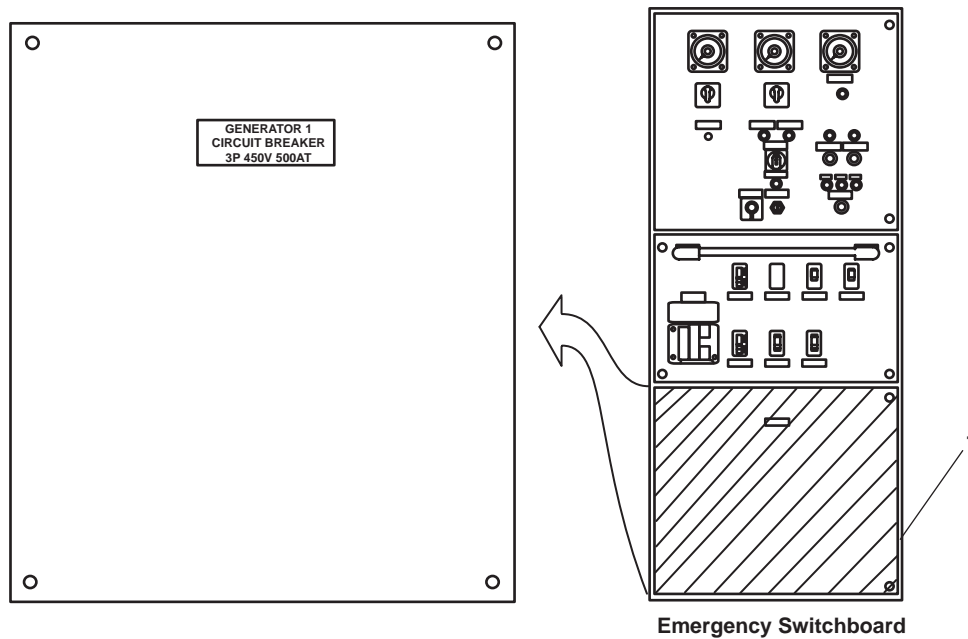


Figure 1. EDG Circuit Breaker Location

**SSDG 1/SSDG 2 CIRCUIT BREAKER ADJUSTMENT**

1. Refer to WP 0221 00 for removal and installation procedures for the ship service diesel generator 1 (SSDG 1) circuit breaker (figure 2, item 1) and/or SSDG 2 circuit breaker (figure 2, item 2).

**WARNING**



**Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.**

2. After installation, refer to table 2 for voltage adjustments and trip settings.

**Table 2. SSDG 1 and SSDG 2 Circuit Breaker Setting Information**

Manufacturer/Type	Adjustment/Settings
MASTERPACT Type MP08 N1 CURRENT .4 - 1: Set on .63	Trip Settings: SHORT TIME P/U 2 - 10: Set on 6 SHORT TIME DELAY 0 - .3: Set on .1

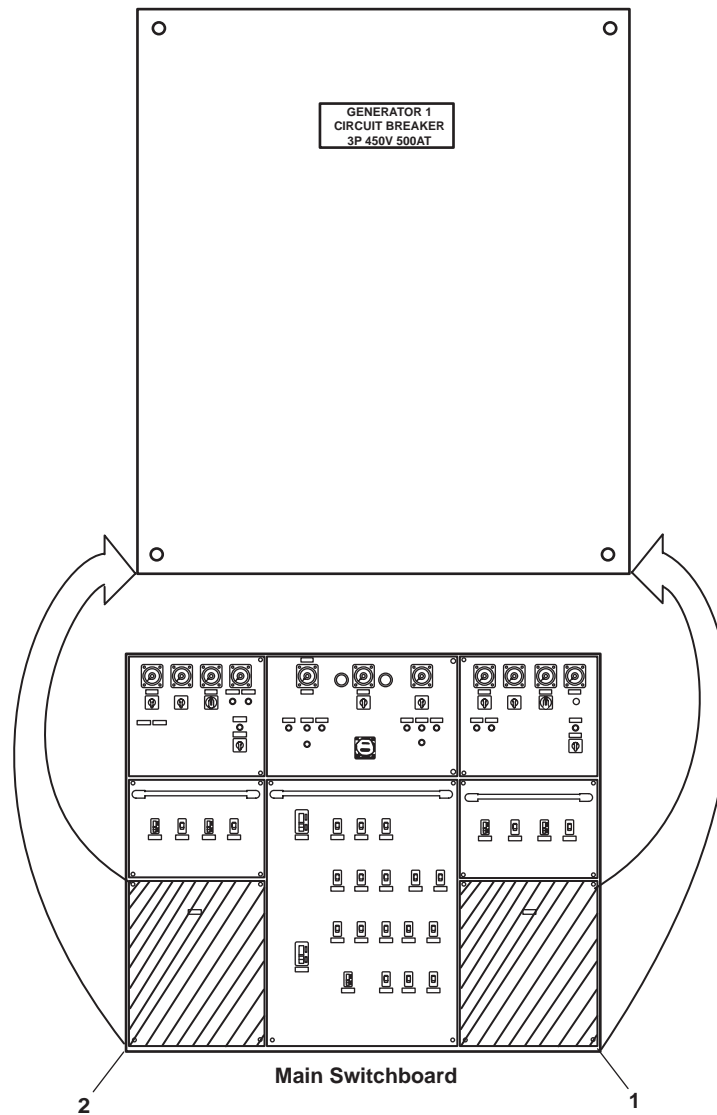


Figure 2. SSDG 1 and SSDG 2 Circuit Breaker Location

### SHORE POWER CIRCUIT BREAKER ADJUSTMENT

1. Refer to WP0111 00 (volume 1) for removal and installation procedures for the shore power circuit breaker located on the main switchboard (figure 3, item 1).

### WARNING

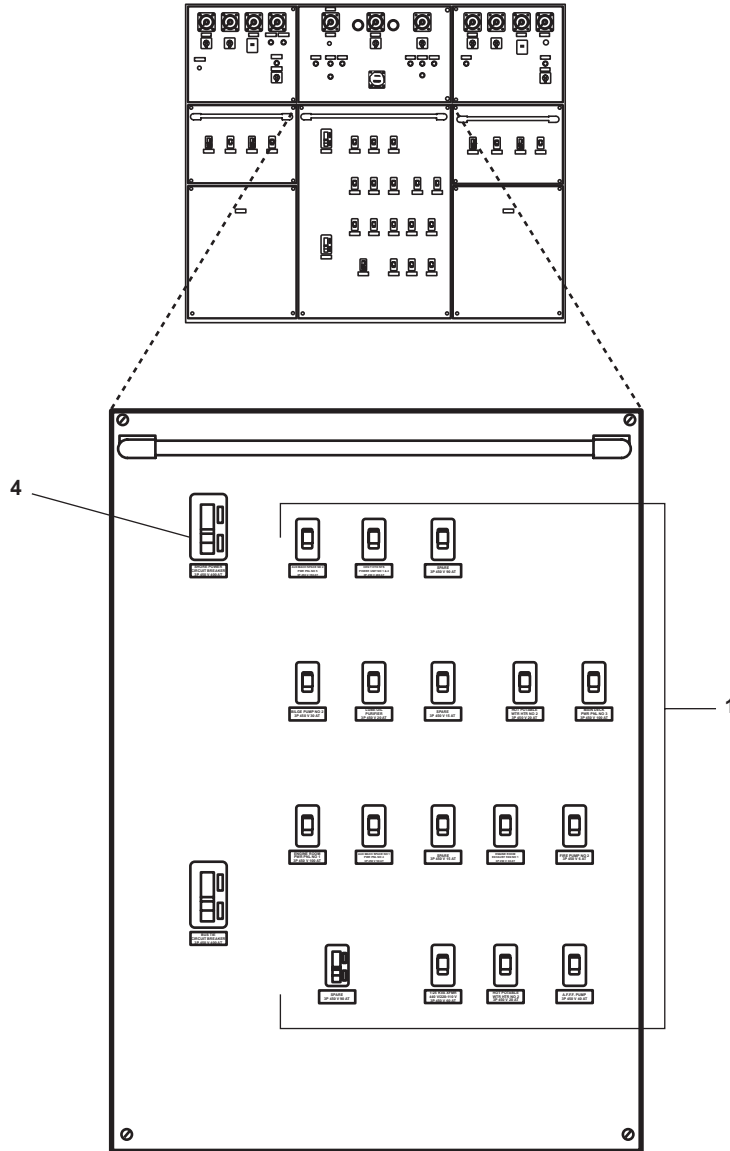


Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.

2. After installation of the applicable circuit breaker, refer to table 3 for voltage adjustments and trip settings.

**Table 3. Shore Power Circuit Breaker Setting Information**

Manufacturer/Type	Adjustment/Settings
MERLIN GERLIN Type CJ400N INST 400A	Trip Settings: MAGNETIC 2.5 - 10: Set on 10



**Figure 3. Shore Power Circuit Breaker Location**

END OF WORK PACKAGE



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ELECTRICAL POWER SYSTEM, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Tool Kit, Electrician's (Item 11, Table 2, WP0295 00)  
 Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
 FM 55-509-1  
 TM 55-1925-273-10  
 WP 0295 00  
 WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**Equipment Conditions:**

CLOSE valves FO-21, F.O. SPLY TO S.S.D.G. No.1;  
 FO-22, F.O. SPLY TO S.S.D.G. No.2 and FO-32,  
 F.O. SPLY TO ENG. Lock out and tag out  
 (FM 55-502).  
 Set to OFF the SHORE PWR. RCPT. circuit breaker  
 on the main switchboard. Lock out and tag out  
 (FM 55-502).  
 External lighting source provided for the work area.

**WIRING REPAIR**

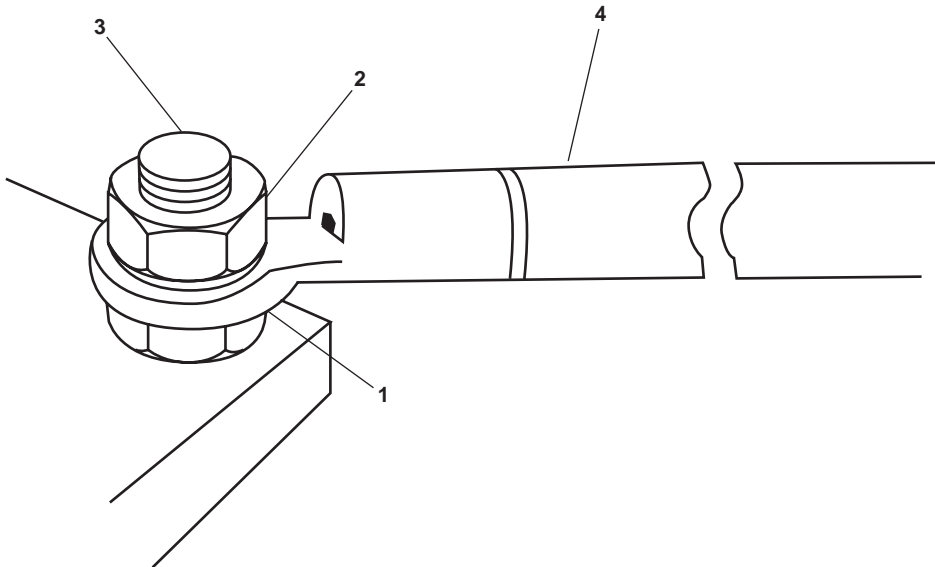
Proper repair of wiring consists of replacement of the damaged wiring. When electrical casualty requires expedient repairs, repair may be made by splicing. Splicing is authorized for repair of damaged cables if the remainder of the cable is in good mechanical and electrical condition. The cable must be replaced in its entirety at the most opportune time. For proper splicing methods, refer to FM 55-509-1.

**DISASSEMBLY****WARNING**

**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

1. Use a multimeter to check for voltage at the wire terminals (figure 1, item 1). If voltage is present, verify that the correct circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
2. Remove any covers or interference that restrict access to the wire being removed.
3. Label all wiring to be removed, and make a sketch of the work area to permit proper assembly.
4. Remove the nuts (figure 1, item 2) that secure the wire terminals (figure 1, item 1) to the post (figure 1, item 3).
5. Remove the wire (figure 1, item 4) from the applicable enclosure.

6. Follow the wire (figure 1, item 4) to the opposite end, freeing it from the vessel structure as required.
7. Repeat steps 2-5 to remove the wires from the opposite end.
8. Perform steps 1-7 for any other wires in the electrical system that may require removal.



**Figure 1. Typical Wire Terminal**

#### **ASSEMBLY**

1. Determine the wires to be connected by referring to the sketch and labels from step 3 of Disassembly as guides.
2. Route the new wire (figure 1, item 4) along the same path as the old wire, and secure it to the post (figure 1, item 3) with the nut (figure 1, item 2).
3. Perform steps 1-2 for any remaining wires.
4. Remove any remaining labels.
5. Install any covering or interference removed during the Disassembly procedure.
6. Remove the lockouts and tagouts (FM 55-502).
7. Operate the power generation equipment under usual conditions (TM 55-1925-273-10), and check for proper circuit operation in the area of the wiring repair.
8. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MAIN SWITCHBOARD, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers 88L

**References:**

FM 55 502  
TM 55-1925-273-10

**References (continued):**

WP 0295 00  
WP 0307 00

**Equipment Conditions:**

CLOSE valves FO-21, F.O. SPLY TO S.S.D.G. NO. 1;  
FO-22, F.O. SPLY TO S.S.D.G. NO.2; and FO-32,  
F.O. SPLY TO ENG. Lock out and tag out  
(FM 55-502).

Set to OFF the SHORE PWR. RCPT. circuit breaker  
on the main switchboard. Lock out and tag out  
(FM 55-502).

External lighting for the work area.

---

**MAIN SWITCHBOARD ACCESS PANEL****DISASSEMBLY**

1. Loosen the captive screws (figure 1, item 1) on the desired panel (figure 1, items 2, 3, 4, 5, 6, 7, and 8).
2. Remove/OPEN the desired panel (figure 1, items 2, 3, 4, 5, 6, 7, and 8) from/on the main switchboard (figure 1, item 9).

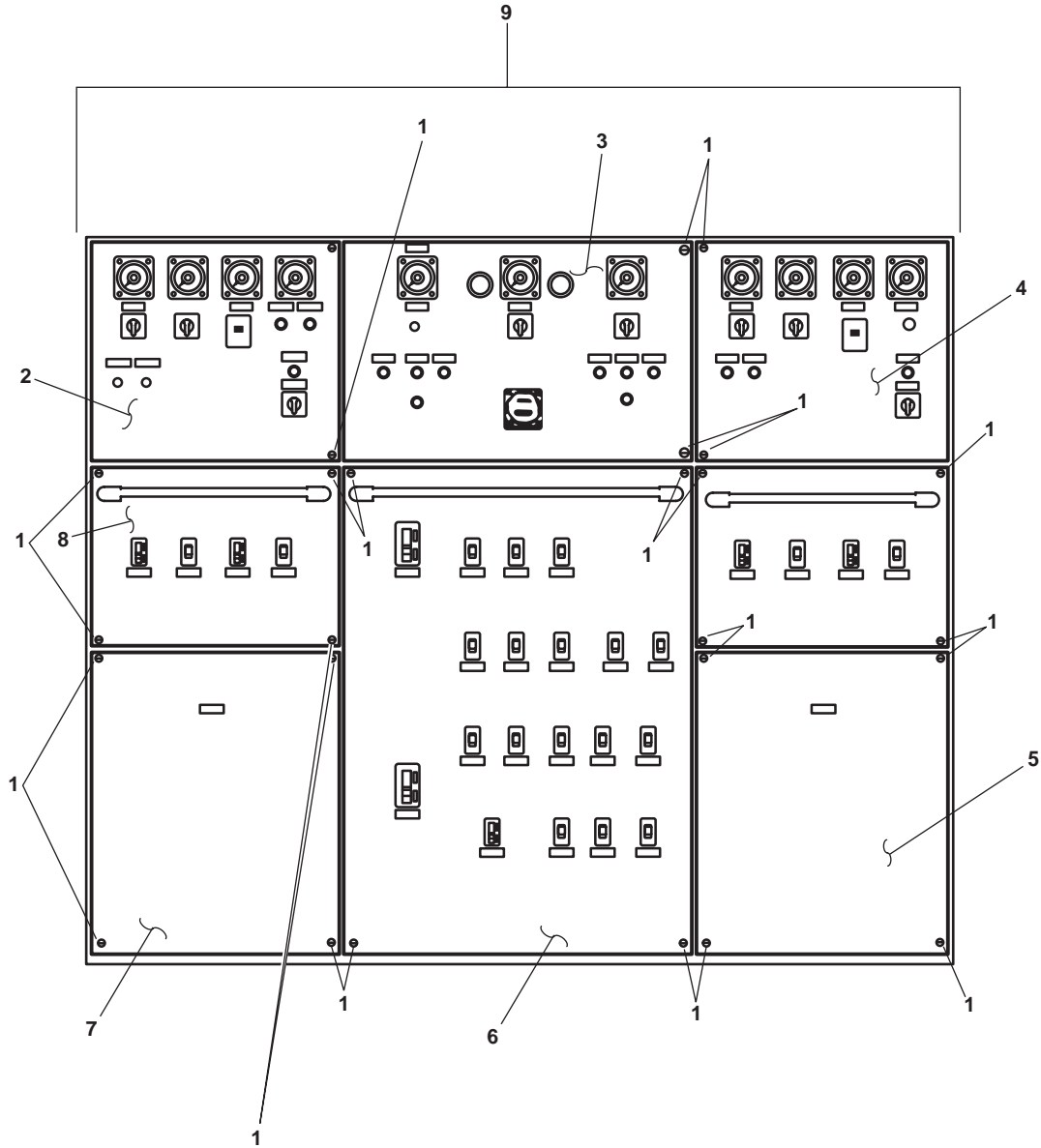


Figure 1. Main Switchboard

---

**ASSEMBLY**

1. Install/CLOSE the desired panel (figure 1, items 2, 3, 4, 5, 6, 7, and 8) on the main switchboard (figure 1, item 9).
2. Tighten the captive screws (figure 1, item 1) on the desired panel (figure 1, items 2, 3, 4, 5, 6, 7, and 8).
3. Perform the Follow-On Service procedure at the end of this work package.

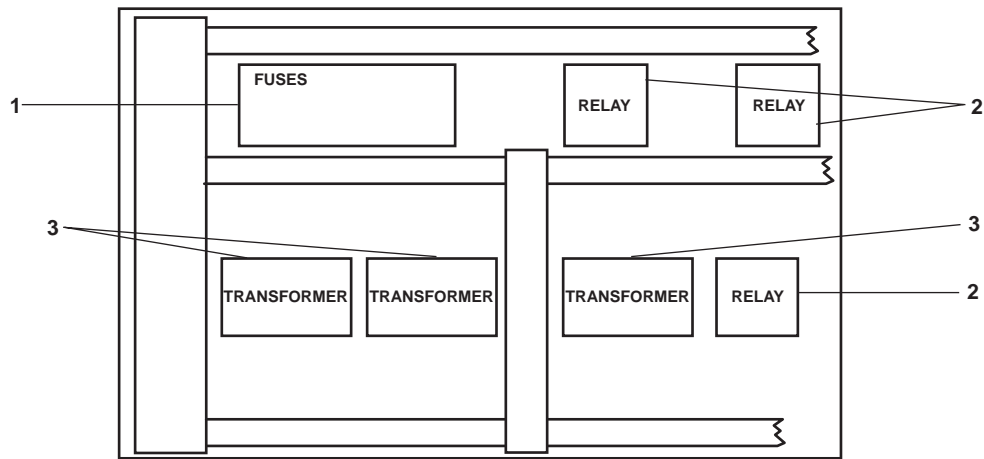
**FUSE REPLACEMENT****REMOVAL**

1. Perform the Main Switchboard Access Panel Disassembly procedure in this work package.

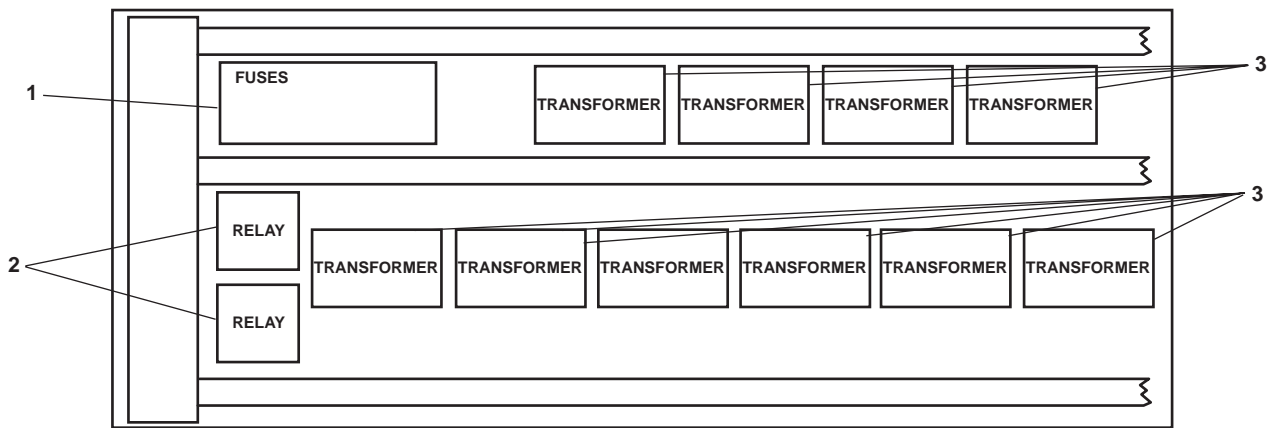
**WARNING**

**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

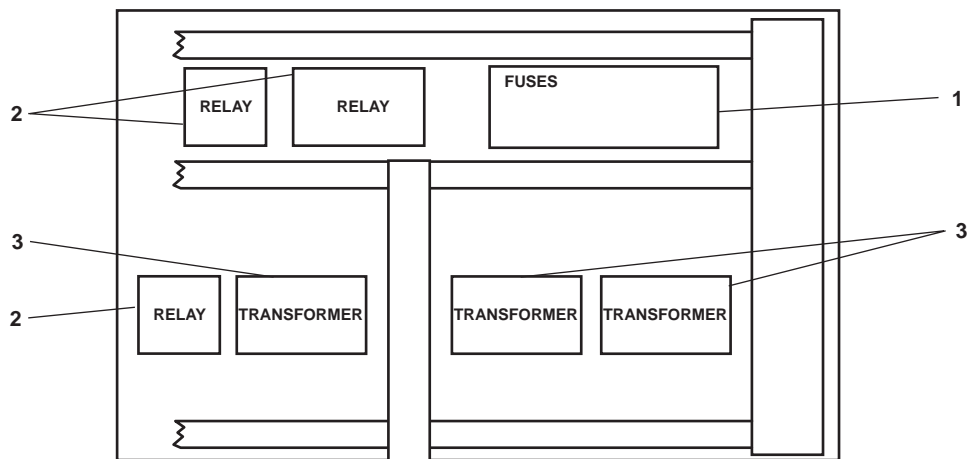
2. Use a multimeter to check for voltage at the fuse(s) (figure 2, item 1) to be replaced. If voltage is present, ensure that the appropriate fuel oil valves have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.
3. Using a fuse puller, remove the applicable fuse(s) (figure 2, item 1) from the fuse holder(s).



GENERATOR 2 SECTION BACK PANEL LAYOUT



SYNCHRONIZING SECTION BACK PANEL LAYOUT



GENERATOR 1 SECTION BACK PANEL LAYOUT

Figure 2. Main Switchboard Back Panel Layout

## INSTALLATION

1. Using a fuse puller, install the applicable fuse(s) (figure 2, item 1) in the fuse holder(s).
2. Perform the Main Switchboard Access Panel Assembly procedure in this work package.

## RELAY REPLACEMENT

### REMOVAL

1. Perform the Main Switchboard Access Panel Disassembly procedure in this work package.

### WARNING



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the relay(s) (figure 2, item 2) to be replaced. If voltage is present, ensure that the proper fuel oil valves have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.
3. Label and disconnect the wiring attached to the applicable relay (figure 2, item 2).
4. Remove the relay from the relay from the main switchboard (figure 1, item 9).

## INSTALLATION

1. Install the applicable relay(s) (figure 2, item 2) in the main switchboard (figure 1, item 9).
2. Connect the wiring to the relay (figure 2, item 2) using the labels from step 3 of Removal as a guide. Remove the labels.
3. Perform the Main Switchboard Access Panel Assembly procedure in this work package.

## TRANSFORMER REPLACEMENT

### REMOVAL

1. Perform the Main Switchboard Access Panel Disassembly procedure in this work package.

**WARNING**

**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the transformer(s) (figure 2, item 3) to be replaced. If voltage is present, ensure that the proper fuel oil valves have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.
3. Label and disconnect the wiring to the applicable transformer (figure 2, item 3).
4. Remove the associated mounting hardware from the transformer (figure 2, item 3).
5. Remove the transformer (figure 2, item 3) from the main switchboard (figure 1, item 9).

**INSTALLATION**

1. Install the applicable transformer(s) (figure 2, item 3) in the main switchboard (figure 1, item 9) and secure it with the associated mounting hardware.
2. Connect the wiring to the transformer (figure 2, item 3) using the labels from step 3 of Removal as a guide. Remove the labels.
3. Close and secure the main switchboard door panels.

**FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).
2. Perform Preparation for Use Operation Under Usual Conditions (TM 55-1925-273-10).
3. Perform Power Generation Operation Under Usual Conditions (TM 55-1925-273-10) and check for proper operation.
4. Return the main switchboard to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
EMERGENCY SWITCHBOARD, REPAIR (BUS TIE CIRCUIT BREAKER REPLACEMENT)**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
 Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
 TM 55-1925-273-10  
 WP 0295 00  
 WP 0298 00  
 WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
 Circuit Breaker (Item 22, Figure 20, WP 0298 00)

**Equipment Conditions:**

CLOSE valves FO-21, F.O. SPLY TO S.S.D.G. NO. 1; FO-22, F.O. SPLY TO S.S.D.G. NO.2; and FO-32, F.O. SPLY TO ENG. Lock out and tag out (FM 55-502).  
 SHORE PWR. RCPT. secured, locked out, and tagged out (FM 55-502).  
 External lighting for the work area.

**Personnel Required:**

Two Watercraft Engineers, 88L

**REMOVAL**

**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

1. Loosen the four captive screws (figure 1, item 1) and remove the door panel (figure 1, item 2) from the emergency switchboard (figure 1, item 3).
2. Use a multimeter to check for voltage at the bus tie circuit breaker assembly (figure 2, item 1). If voltage is present, ensure that the proper fuel oil valves have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Remove the three bolts (figure 3, item 1), the six flat washers (figure 3, item 2) and the three nuts (figure 3, item 3) from the bus terminals (figure 3, item 4).
4. Label and remove the wiring (figure 3, item 5) from the bus terminals (figure 3, item 4).
5. Remove the five bolts (figure 3, item 6), the 10 flat washers (figure 3, item 7), and the five nuts (figure 3, item 8) from the bus bar (figure 3, item 9).
6. Remove the two bolts (figure 2, item 2), the four flat washers (figure 2, item 3), and the two nuts (figure 2, item 4) from the bus tie circuit breaker assembly (figure 2, item 1).
7. Remove the bus tie circuit breaker assembly (figure 2, item 1) from the emergency switchboard (figure 1, item 3).

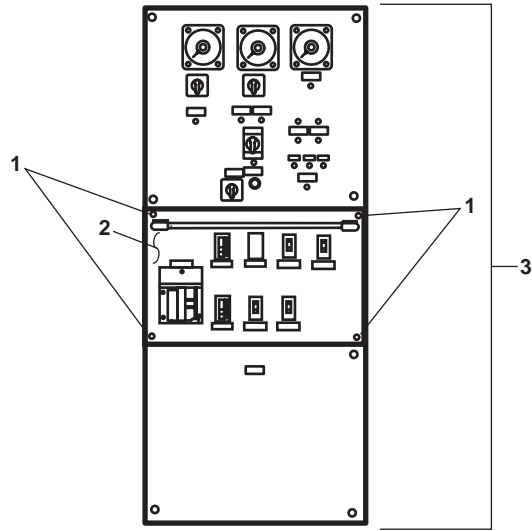


Figure 1. Emergency Switchboard

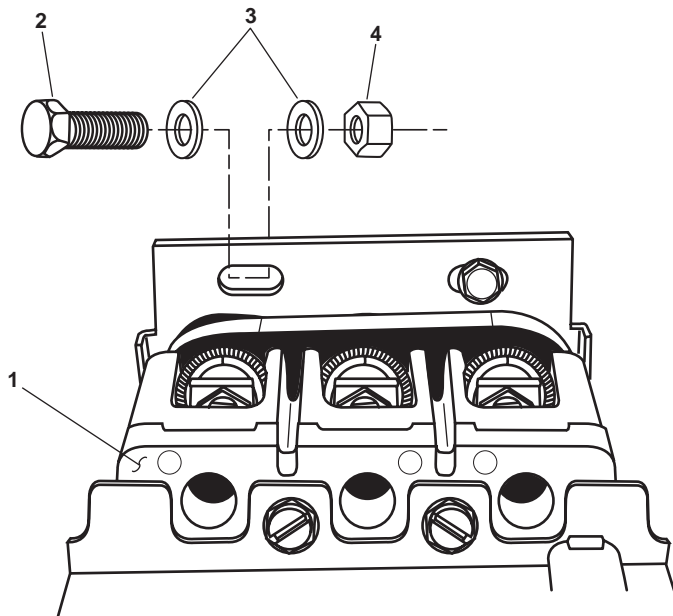


Figure 2. Bus Tie Circuit Breaker

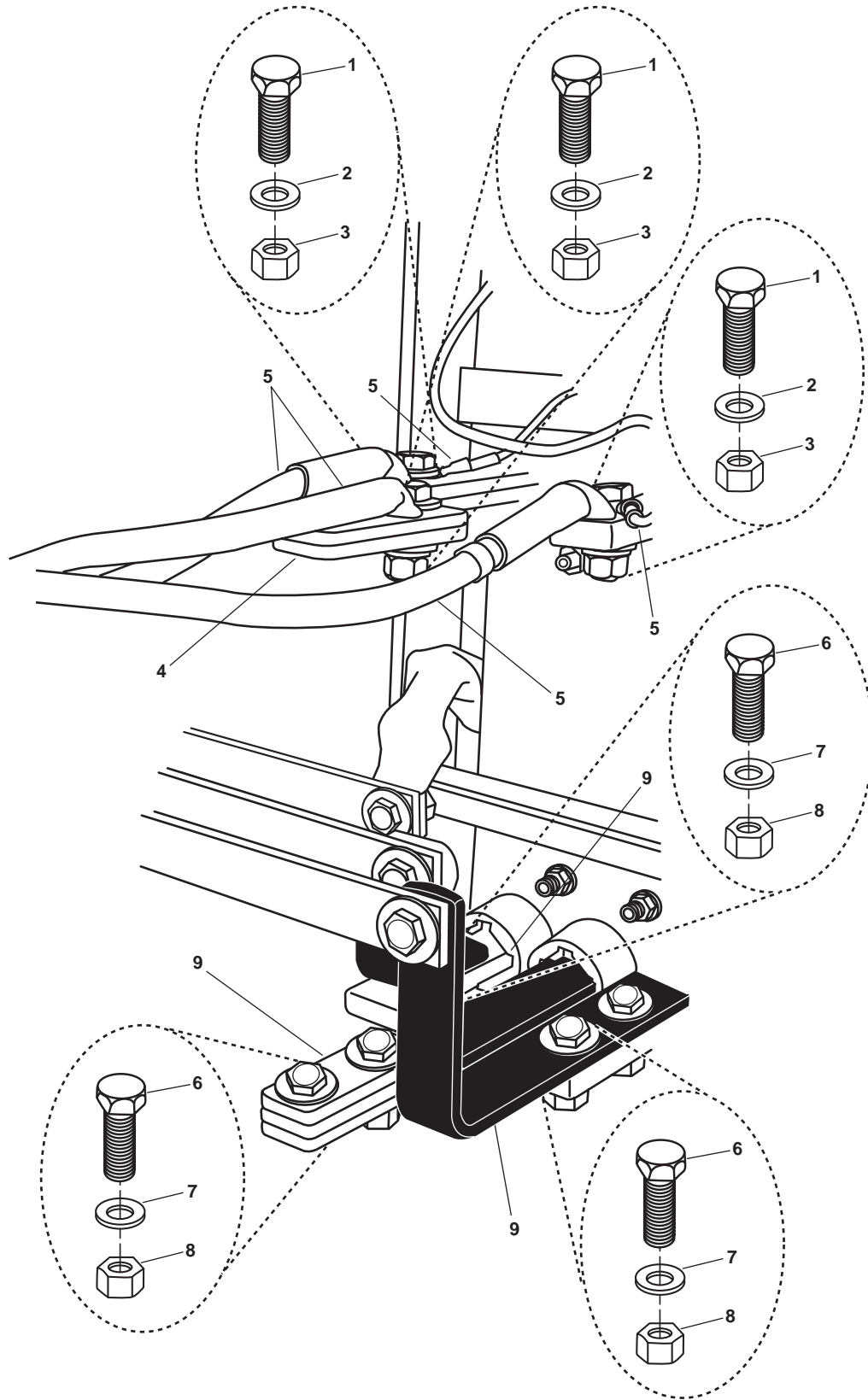


Figure 3. Bus Tie Circuit Breaker Bus Bar and Wire Connections

---

**INSTALLATION**

1. Install the bus tie circuit breaker assembly (figure 2, item 1) in the emergency switchboard (figure 1, item 3).
2. Install the two bolts (figure 2, item 2), the four flat washers (figure 2, item 3), and the two nuts (figure 2, item 4) in the bus tie circuit breaker assembly (figure 2, item 1).
3. Install the five bolts (figure 3, item 6), the 10 flat washers (figure 3, item 7), and the five nuts (figure 3, item 8) in the bus bar (figure 3, item 9).
4. Connect the wiring (figure 3, item 5) to the bus terminals (figure 3, item 4) using the labels from step 4 of Removal as a guide and secure it with the three bolts (figure 3, item 1), the six flat washers (figure 3, item 2) and three nuts (figure 3, item 3). Remove the labels.
5. Install the door panel (figure 1, item 2) on the emergency switchboard (figure 1, item 3).
6. Tighten the four captive screws (figure 1, item 1) on the door panel (figure 1, item 2).
7. Remove the lockouts and tagouts (FM 55-502).
8. Perform Preparation for Use, Operation Under Usual Conditions (TM 55-1925-273-10).
9. Perform Power Generation, Operation Under Usual Conditions (TM 55-1925-273-10) and check for proper operation of the bus tie circuit breaker assembly.
10. Return the emergency switchboard to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
EMERGENCY SWITCHBOARD, REPAIR (EDG CIRCUIT BREAKER REPLACEMENT)**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
 Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55 502  
 TM 55-1925-273-10  
 WP 0295 00  
 WP 0298 00  
 WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
 Circuit Breaker (Item X, Figure 20, WP 0298 00)

**Equipment Conditions:**

CLOSE valves FO-21, F.O. SPLY TO S.S.D.G. NO. 1; FO-22, F.O. SPLY TO S.S.D.G. NO. 2; FO-32, F.O. SPLY TO ENG. Lock out and tag out (FM 55-502).  
 Set to OFF the SHORE PWR. RCPT. circuit breaker on the main switchboard. Lock out and tag out (FM 55-502).  
 External lighting for the work area.

**Personnel Required:**

Two Watercraft Engineers, 88L

**NOTE**

The procedure for replacement of the ships service diesel generator (SSDG) 1 and SSDG 2 circuit breaker is the same as this procedure. The only difference is that the SSDG 1 and SSDG 2 circuit breakers are located in the main switchboard.

**REMOVAL**

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

1. Loosen the captive screws (figure 1, item 1) on the door panel (figure 1, item 2).
2. Remove the door panel (figure 1, item 2) from the emergency switchboard (figure 1, item 3).
3. Press the OFF switch (figure 2, item 1) on the circuit breaker face.
4. Remove the crank (figure 2, item 2) from the storage slot (figure 2, item 3).
5. Insert the crank (figure 2, item 2) into the cranking slot (figure 2, item 4).
6. Turn the crank (figure 2, item 2) until the dial (figure 2, item 5) indicates DISCONNECTED. Remove the crank from the slot (figure 2, item 4).

NOTE

The circuit breaker is track mounted.

7. Grasp the latches (figure 2, item 6) firmly and pull the circuit breaker (figure 2, item 7) forward until the tracks are fully extended.

**WARNING**



**Two personnel are required to lift the circuit breaker from the emergency switchboard. Personnel should wear hard hats, safety shoes, and heavy gloves when lifting the circuit breaker. Failure to follow these instructions can result in death or serious injury.**

8. Remove the circuit breaker (figure 2, item 7) by lifting the circuit breaker straight up from the tracks.

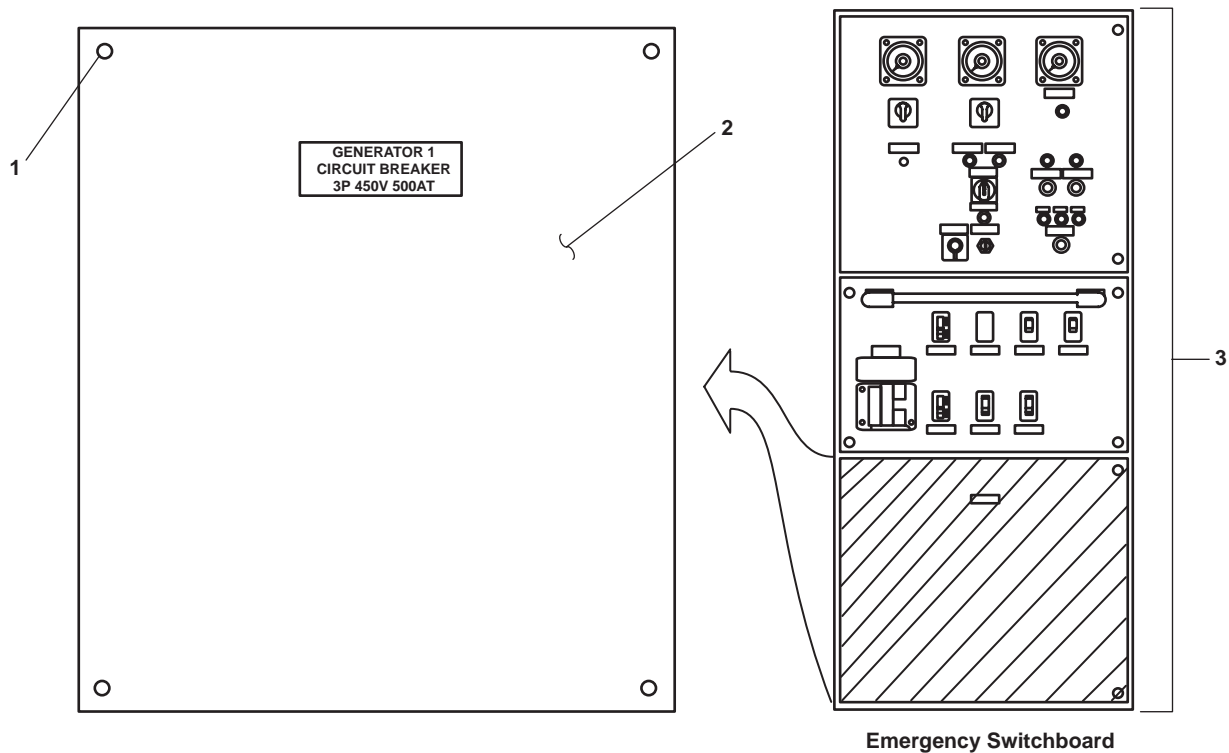


Figure 1. SSDG 1, SSDG 2, and EDG Circuit Breaker Front Panel (Typical)

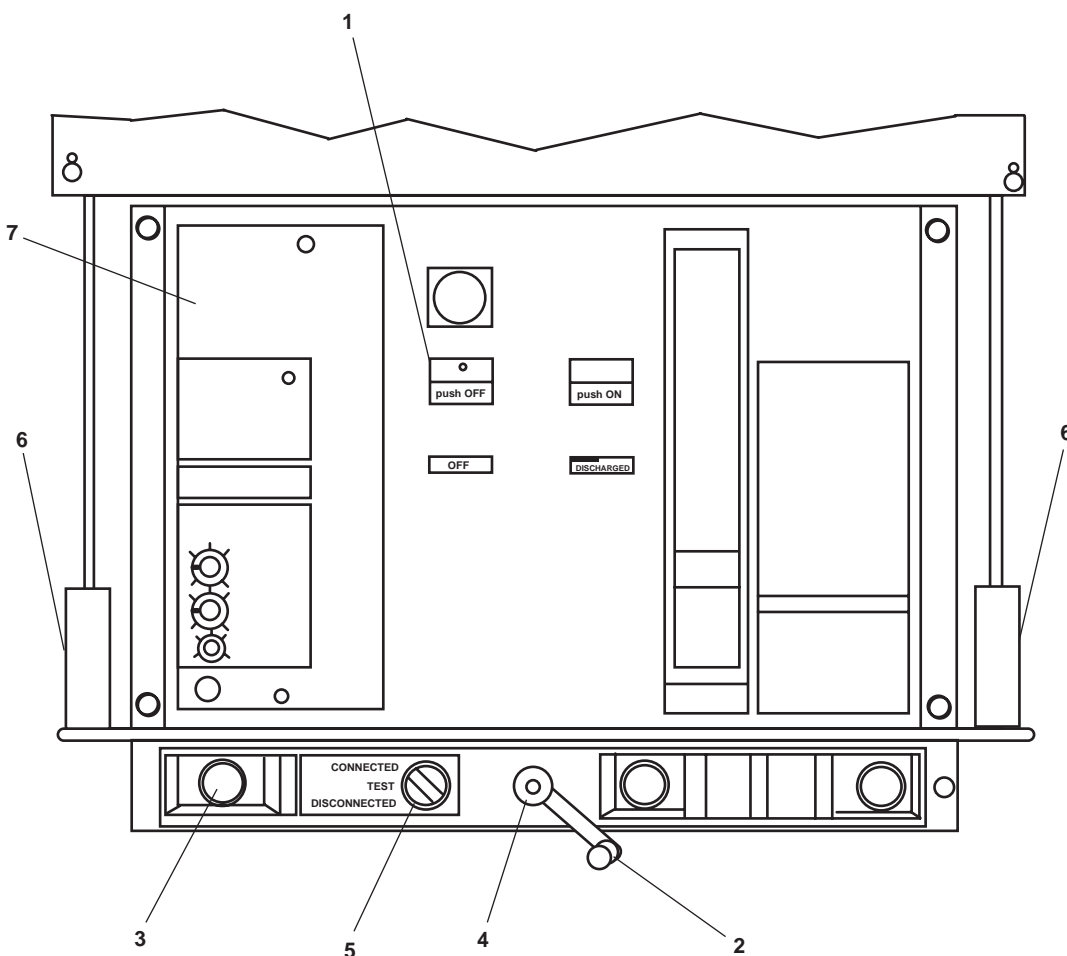


Figure 2. EDG Circuit Breaker

INSTALLATION

**WARNING**



**Two personnel are required to lift the circuit breaker from the emergency switchboard. Personnel should wear hard hats, safety shoes, and heavy gloves when lifting the circuit breaker. Failure to follow these instructions can result in death or serious injury.**

1. Position the circuit breaker (figure 2, item 7) on the tracks.
2. Grasp the latches (figure 2, item 6) and manually push the tracks in until they reach the track stop position.
3. Insert the crank (figure 2, item 2) into the cranking slot (figure 2, item 4).

- 
4. Turn the crank (figure 2, item 2) until the circuit breaker (figure 2, item 7) is completely seated and the dial (figure 2, item 5) indicates CONNECTED.
  5. Continue turning the crank (figure 2, item 2) until two clicking sounds are heard, indicating the circuit breaker (figure 2, item 6) is locked in the connected position.
  6. Remove the crank (figure 2, item 2) and stow in the storage slot (figure 2, item 3).
  7. Install the door panel (figure 1, item 2).
  8. Secure the door panel (figure 1, item 2) by tightening the captive screws (figure 1, item 1).
  9. Remove the lockouts and tagouts (FM 55-502).
  10. Perform Preparation for Use, Operation Under Usual Conditions (TM 55-1925-273-10).
  11. Perform Power Generation, Operation Under Usual Conditions (TM 55-1925-273-10) and check for proper operation of the emergency switchboard.
  12. Return the emergency switchboard to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ENGINE ROOM EMERGENCY LOAD CENTER DISTRIBUTION PANEL, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Power Panel (Item 1, Figure 23, WP 0298 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0113 00 (volume 1)  
WP 0295 00  
WP 0298 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the 1-25KVA XFMR 440V/220-110V 3P  
450V 60AT circuit breaker on the main switch-  
board. Lock out and tag out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

1. Press the key latch (figure 1, item 1) and open the door (figure 1, item 2).

**WARNING**



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

**▲ CAUTION**

Exercise care when removing the face panel and door to prevent damage of the ground detection cable. Failure to comply with this caution will cause damage to equipment.

2. Loosen the six captive screws (figure 1, item 3) on the face panel (figure 1, item 4) and remove it.
3. Remove the four screws (figure 1, item 5) from the inner panel (figure 1, item 6). Remove the inner panel.

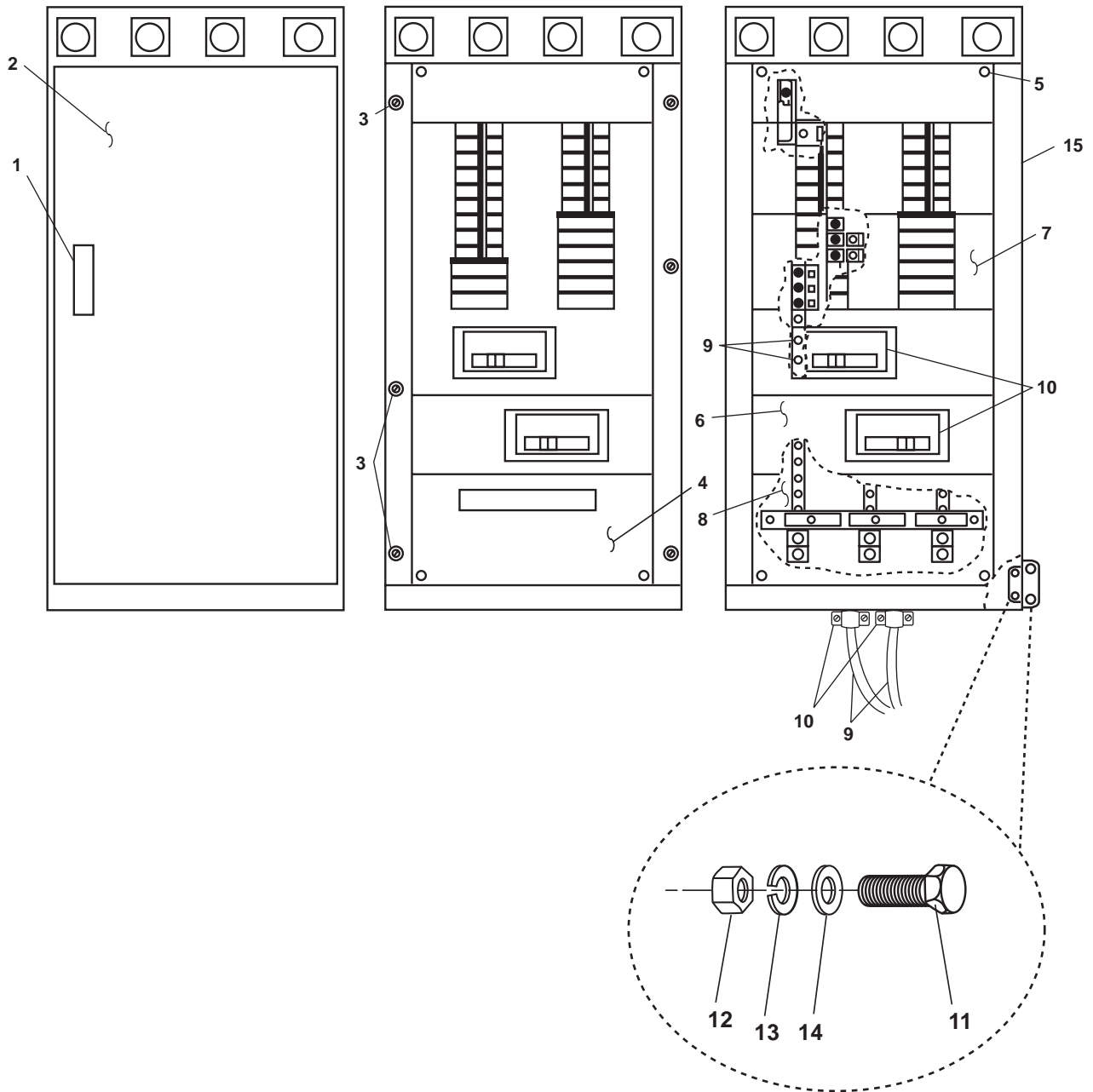


Figure 1. Load Center Distribution Panel Replacement

**WARNING**

**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Use a multimeter to check for voltage at the circuit breaker(s) (figure 1, item 7) and the bus bar(s) (figure 1, item 8). If voltage is present, ensure that the proper circuit breakers have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
5. Label and remove the wiring (figure 1, item 9) from the circuit breakers (figure 1, item 7) and the bus bars (figure 1, item 8). Loosen the strain relief clamps (figure 1, item 10).
6. Remove the circuit breakers (figure 1, item 7) (WP 0113 00, volume 1).
7. Remove the four bolts (figure 1, item 11), four hex nuts (figure 1, item 12), four lockwashers (figure 1, item 13), and four flat washers (figure 1, item 14). Discard the lockwashers.
8. Remove the load center distribution panel (figure 1, item 2) from the bulkhead.

**INSTALLATION**

1. Install the load center distribution panel (figure 1, item 15) on the bulkhead and secure it with the four bolts (figure 1, item 11), four hex nuts (figure 1, item 12), four new lockwashers (figure 1, item 13), and four flat washers (figure 1, item 14).
2. Install the circuit breakers (figure 1, item 7) (WP 0113 00, volume 1).
3. Route the wiring (figure 1, item 9) into the load center distribution panel and secure it in place with the strain relief clamps (figure 1, item 10).
4. Connect the wiring (figure 1, item 9) to the bus bars (figure 1, item 8) and the circuit breakers (figure 1, item 7) using the labels from step 5 of Removal as a guide. Remove the labels.
5. Install the inner panel (figure 1, item 6) on the load center distribution panel (figure 1, item 15) and secure it with the four screws (figure 1, item 5).
6. Install the face panel (figure 1, item 4) and the door (figure 1, item 2) on the load center distribution panel and secure them with the six captive screws (figure 1, item 3).
7. Remove the lockouts and tagouts (FM 55-502).
8. Set to ON the 1-25KVA XFMR 440/220-110V 3P 450V 60 AT circuit breaker (figure 2, item 1) on the main switchboard (figure 2, item 2).
9. Set to ON all the circuit breakers (figure 1, item 7). Close the door (figure 1, item 2) and secure it using the key latch (figure 1, item 1).

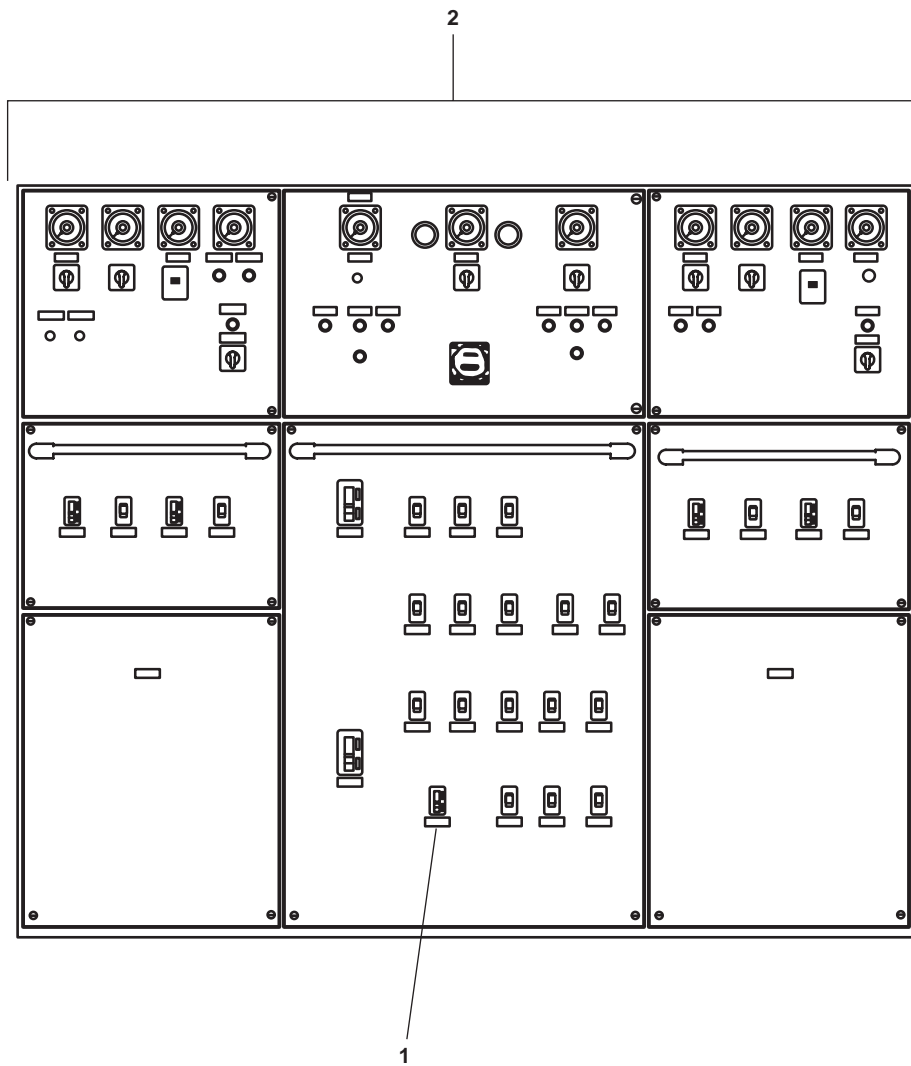


Figure 2. Main Switchboard

10. Operate the equipment supplied by the load center distribution panel and ensure the equipment operates normally.
11. Return the load center distribution panel to the desired readiness condition.

END OF WORK PACKAGE

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
POWER DISTRIBUTION PANEL, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Power Panel (Item 1, Figures 24, 25, 26, 27 and 28,  
WP 0298 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
WP 0114 00 (volume 1)  
WP 0295 00  
WP 0298 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the appropriate power panel circuit breaker  
on the main switchboard. Lock out and tag out  
(FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

**WARNING**



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

**⚠ CAUTION**

Exercise care when removing the face panel and door to prevent damage of the ground detection cable. Failure to comply with this caution may result in damage to the power panel.

**NOTE**

The power distribution panel replacement procedure is for all power distribution panels.

1. Press the key latch (figure 1, item 1) and open the door (figure 1, item 2).
2. Loosen the six captive screws (figure 1, item 3) and remove the face panel (figure 1, item 4).

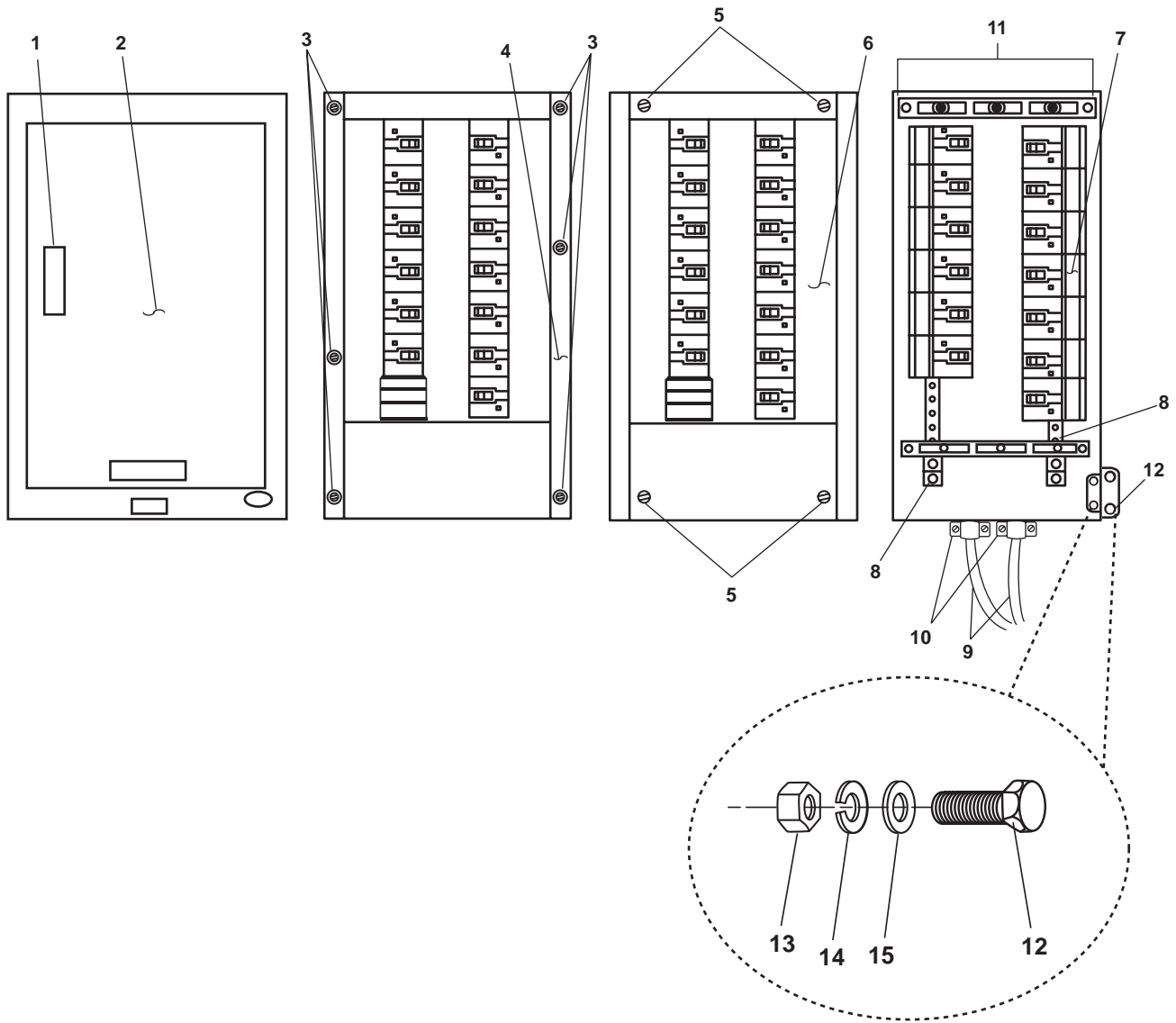


Figure 1. Power Distribution Panel Replacement (Typical)

3. Remove the four screws (figure 1, item 5) from the inner panel (figure 1, item 6). Remove the inner panel.

**WARNING**

**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Use a multimeter to check for voltage at the circuit breaker(s) (figure 1, item 7) and the bus bar(s) (figure 1, item 8). If voltage is present, ensure that the appropriate circuit breakers have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.
5. Label and remove the electrical wiring (figure 1, item 9) to the circuit breakers (figure 1, item 7) and the bus bars (figure 1, item 8).
6. Loosen the strain relief clamps (figure 1, item 10) and remove the wiring (figure 1, item 9) from the power distribution panel (figure 1, item 11).
7. Remove the circuit breakers (figure 1, item 7) (WP 0114 00, volume 1).
8. Remove the four bolts (figure 1, item 12), the four hex nuts (figure 1, item 13), the four lockwashers (figure 1, item 14), and the four flat washers (figure 1, item 15) that secure the power distribution panel to the bulkhead. Discard the lockwashers.
9. Remove the power distribution panel (figure 1, item 11) from the bulkhead.

**INSTALLATION**

1. Install the power distribution panel (figure 1, item 11) on the bulkhead and secure it with the four bolts (figure 1, item 12), four hex nuts (figure 1, item 13), four new lockwashers (figure 1, item 14), and four flat washers (figure 1, item 15).
2. Install the circuit breakers (figure 1, item 7) (WP 0114 00, volume 1).
3. Route the wiring (figure 1, item 9) into the power distribution panel (figure 1, item 11) and secure it in place with the strain relief clamps (figure 1, item 10).
4. Connect the wiring (figure 1, item 9) to the bus bars (figure 1, item 8) and the circuit breakers (figure 1, item 7) using the labels from step 5 of Removal as a guide. Remove the labels.
5. Install the inner panel (figure 1, item 6) on the power distribution panel (figure 1, item 11) and secure it with the four screws (figure 1, item 5).
6. Install the face panel (figure 1, item 4) and the door (figure 1, item 2) on the power distribution panel (figure 1, item 11), and secure them with the six captive screws (figure 1, item 3).
7. Remove the lockouts and tagouts (FM 55-502).
8. Set to ON the appropriate power panel circuit breaker on the main switchboard.

9. Set to ON all circuit breakers (figure 1, item 7) in the power distribution panel (figure 1, item 11). Close the door (figure 1, item 2) and secure the door with the key latch (figure 1, item 1).
10. Operate the equipment protected by each circuit breaker to ensure that the circuit breaker is functioning properly.
11. Return the power distribution panel to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MOTOR CONTROLLER; REDUCTION GEAR COOLING PUMP, SEWAGE DISCHARGE PUMP 1 & 2,  
LUBE OIL TRANSFER PUMP, POTABLE WATER PUMP 1 & 2, GALLEY SUPPLY FAN, GALLEY  
EXHAUST FAN, SANITARY SPACE EXHAUST FAN, CREW MESS FAN COIL UNIT, 01, 02, 03 LEVELS  
FAN COIL UNIT, AIR COMPRESSOR 1 & 2, FUEL OIL TRANSFER PUMP, AFFP PUMP; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Condition:**

Set to OFF the applicable motor controller circuit breaker. Lock out and tag out (FM 55-502).

**WARNING**

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

**REMOVAL****NOTE**

The switch handle must be OFF to open the door.

1. Set to OFF the switch handle (figure 1, item 1).
2. Loosen the motor controller door screw (figure 1, item 2).
3. Turn the handle (figure 1, item 3) to open the door (figure 1, item 4).

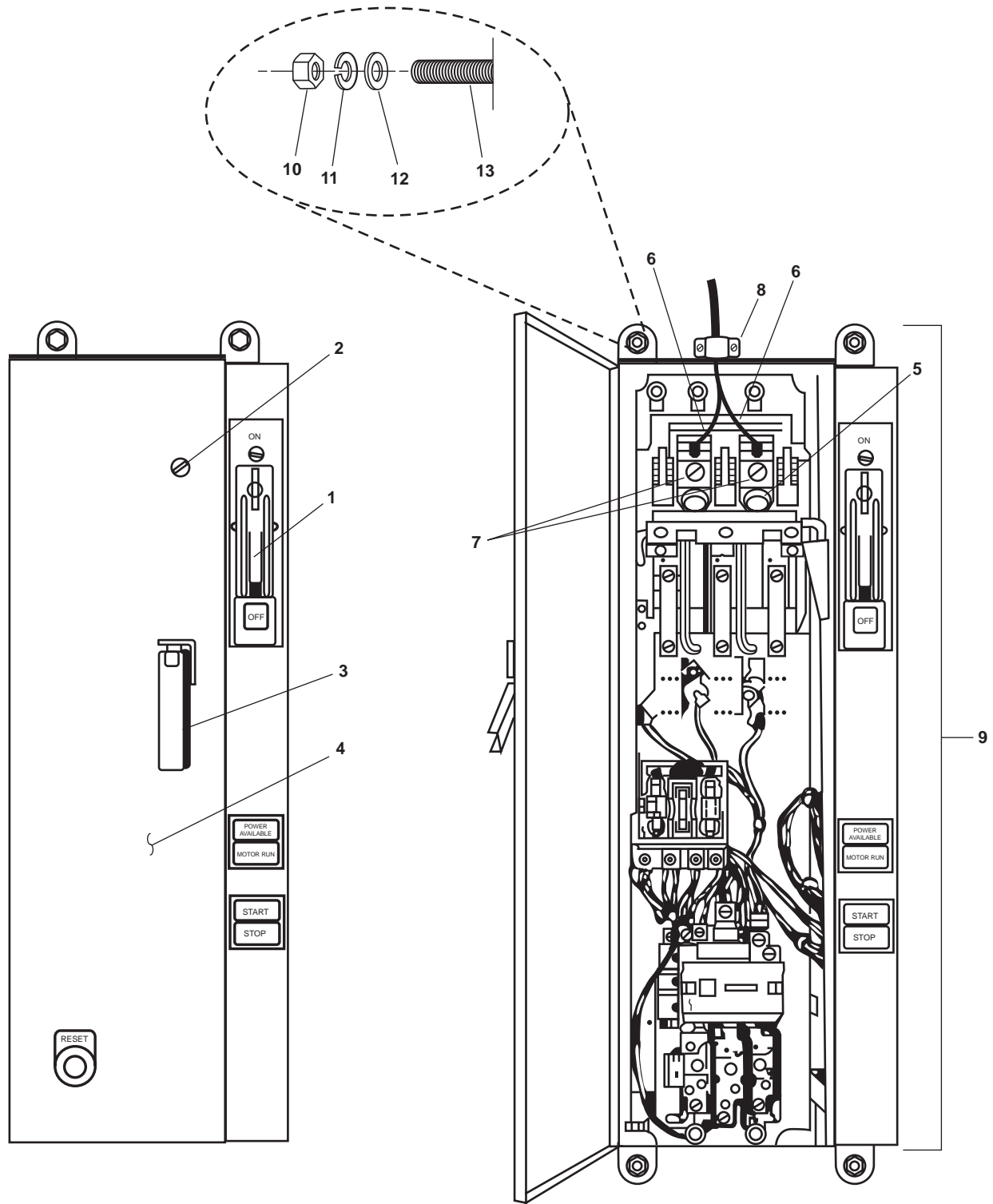


Figure 1. Motor Controller Type 1 (Typical)

**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Use a multimeter to check for available voltage at the motor controller terminals (figure 1, item 5). If voltage is present, ensure that the appropriate circuit breakers have been secured, locked out, and tagged out. If no voltage is present, continue with this procedure.
5. Label and remove the wiring (figure 1, item 6) by loosening the screws (figure 1, item 7) located on the terminals (figure 1, item 5). Loosen the strain relief clamps (figure 1, item 8) and pull the wiring (figure 1, item 6) from the motor controller (figure 1, item 9).
6. Remove the four nuts (figure 1, item 10), lockwashers (figure 1, item 11), and the four flat washers (figure 1, item 12) from the studs (figure 1, item 13). Discard the lockwashers (figure 1, item 11).
7. Remove the motor controller (figure 1, item 9) from the studs (figure 1, item 13).

**INSTALLATION**

1. Install the motor controller (figure 1, item 9) on the studs (figure 1, item 13).
2. Install the four nuts (figure 1, item 10), four new lockwashers (figure 1, item 11), and the four flat washers (figure 1, item 12) on the studs (figure 1, item 13).
3. Route the wiring (figure 1, item 6) into the motor controller (figure 1, item 9) and secure it in place with the strain relief clamps (figure 1, item 8).
4. Connect the wiring (figure 1, item 6) to the motor controller (figure 1, item 9) by tightening the screws located on the terminals (figure 1, item 5) using the labels from step 5 of Removal as a guide. Remove the labels.
5. Close and secure the door (figure 1, item 4) by turning the handle (figure 1, item 3).
6. Tighten the door by turning the motor controller door screw (figure 1, item 2).
7. Set to ON the switch handle (figure 1, item 1).
8. Remove lockouts and tagouts (FM 55-502).
9. Set to ON the applicable circuit breaker.
10. Perform Operation Under Usual Conditions (TM 55-1925-273-10) for the applicable system and check for proper operation.
11. Return the motor controller to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MOTOR CONTROLLER, LUBE OIL PRIMING PUMP 1 AND LUBE OIL PRIMING PUMP 2; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Motor Controller (Item 1, Figures 50 and 51,  
WP 0300 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0300 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the MAIN ENGINE LUBE OIL PRIMING PUMP No. 1 circuit breaker, or the MAIN ENGINE LUBE OIL PRIMING PUMP No. 2. circuit breaker at 440V power panel No. 1. Lock out and tag out (FM 55-502).

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

1. Remove the screw (figure 1, item 1) and then remove the front cover (figure 1, item 2) from the motor controller (figure 1, item 3).

**WARNING**



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the motor controller terminals (figure 2, item 1). If voltage is present, ensure that the appropriate circuit breakers have been secured, locked out, and tagged out. If no voltage is present, continue with this procedure.
3. Label and remove the wiring (figure 2, item 2) by loosening the screws located on the terminals (figure 2, item 1).

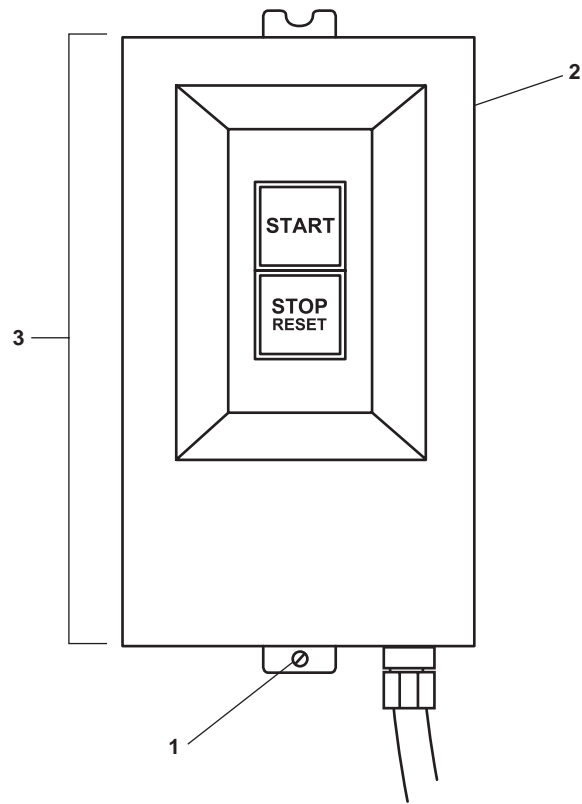


Figure 1. Motor Controller Type 6 (Typical)

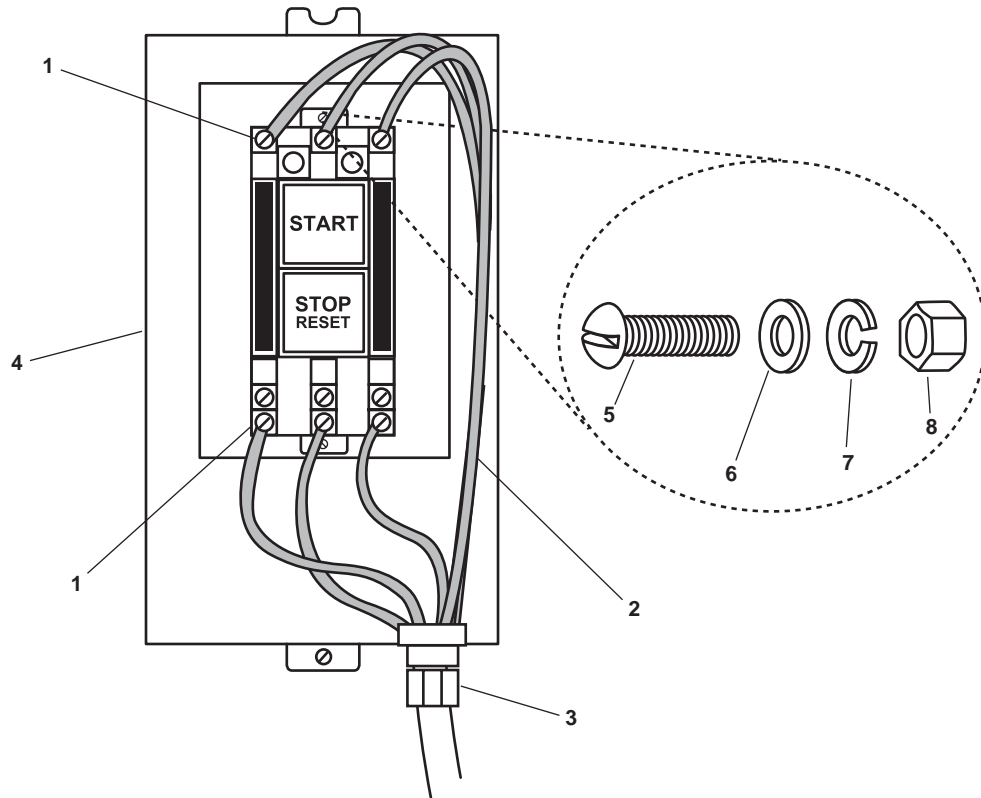


Figure 2. Motor Controller Type 6 - Cover Removed

4. Remove the electrical connector (figure 2, item 3) from the motor controller (figure 2, item 4) and remove the wiring (figure 2, item 2).
5. Remove the two screws (figure 2, item 5), two flat washers (figure 2, item 6), two lockwashers (figure 2, item 7) and two nuts (figure 2, item 8) that secure the motor controller (figure 2, item 4) to its foundation. Discard the lockwashers.
6. Remove the motor controller (figure 2, item 4) from its foundation.

#### **INSTALLATION**

1. Install the motor controller (figure 2, item 4) on its foundation and secure it with the two screws (figure 2, item 5), two flat washers (figure 2, item 6), two new lockwashers (figure 2, item 7), and two nuts (figure 2, item 8).
2. Install the wiring (figure 2, item 2) in the motor controller (figure 2, item 4) and install the electrical connector (figure 2, item 3).
3. Connect the wiring (figure 2, item 2) to the terminal screws (figure 2, item 1) using the labels from step 3 of Removal as a guide. Remove the labels.
4. Install the front cover (figure 1, item 2) on the motor controller (figure 1, item 3) and secure it with the screw (figure 1, item 1).
5. Remove the lockouts and tagouts (FM 55-502).
6. Operate the lube oil priming pump while operating main propulsion system Under Usual Conditions (TM 55-1925-273-10) and check for proper operation.
7. Return the lube oil priming pump motor controller to the desired readiness condition.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MOTOR CONTROLLER; AMS 1 & 2 SUPPLY FAN, BOATSWAIN'S STORE ROOM SUPPLY FAN, ARMS  
LOCKER EXHAUST FAN, ENGINE ROOM SUPPLY FAN 1 & 2, ENGINE ROOM EXHAUST FAN 1 & 2;  
REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the applicable motor controller circuit breaker.  
Lock out and tag out (FM 55-502).

---

<b>WARNING</b>
----------------

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL****NOTE**

The switch handle must be OFF to open the door.

1. Set to OFF the switch handle (figure 1, item 1).
2. Loosen the motor controller door screw (figure 1, item 2) and turn the handle (figure 1, item 3) to open the door (figure 1, item 4).

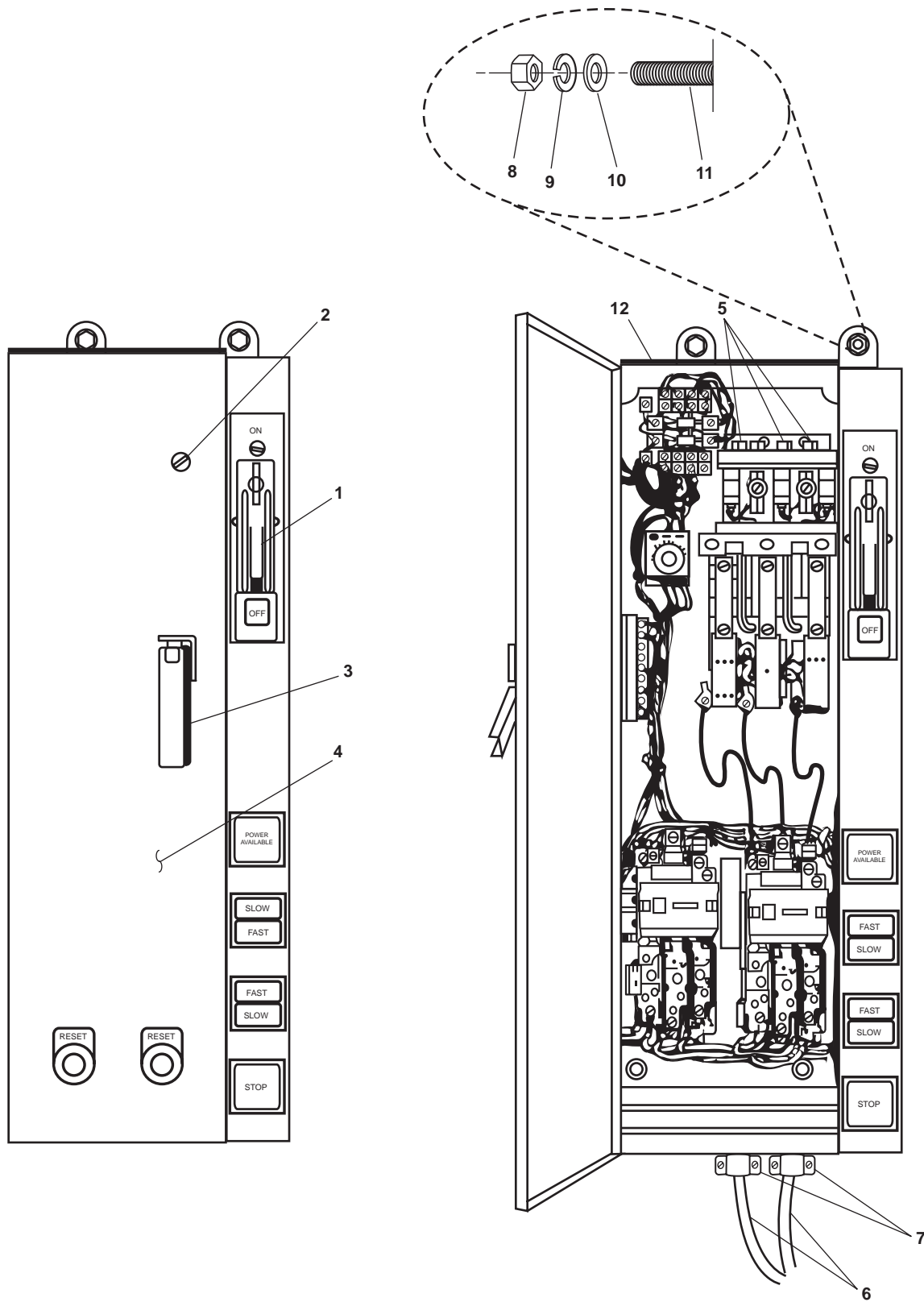


Figure 1. Type 2 Motor Controller

**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the motor controller terminals (figure 1, item 5). If voltage is present, ensure that the correct circuit breakers are secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 1, item 6) from the motor controller terminals (figure 1, item 5).
5. Loosen the strain relief clamps (figure 1, item 7), and remove the wiring (figure 1, item 6) from the motor controller.
6. Remove the four nuts (figure 1, item 8), the four lockwashers (figure 1, item 9), and four flat washers (figure 1, item 10) from the studs (figure 1, item 11). Discard the lockwashers.
7. Remove the motor controller (figure 1, item 12) from the studs (figure 1, item 11).

**INSTALLATION**

1. Position the motor controller (figure 1, item 12) on the studs (figure 1, item 11), and secure it with the four nuts (figure 1, item 8), four new lockwashers (figure 1, item 9), and four flat washers (figure 1, item 10).
2. Route the wiring (figure 1, item 6) through the strain relief clamps (figure 1, item 7) and into the motor controller (figure 1, item 12).
3. Connect the wiring (figure 1, item 6) to the terminals (figure 1, item 5) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Tighten the strain relief clamps (figure 1, item 7).
5. Close the door (figure 1, item 4), and secure it by turning the handle (figure 1, item 3) and tightening the motor controller door screw (figure 1, item 2).
6. Remove the lockouts and tagouts (FM 55-502).
7. Set to ON the applicable circuit breaker.
8. Set to ON the switch handle (figure 1, item 1).
9. Operate the applicable system Under Usual Conditions (TM 55-1925-273-10) and check for proper operation.
10. Return the system to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MOTOR CONTROLLER; BILGE & BALLAST PUMP 1 & 2, FIRE & GENERAL SERVICE PUMP #1 & #2;  
REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the applicable motor controller circuit breaker.  
Lock out and tag out (FM 55-502).

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL****NOTE**

The switch handle must be OFF to open the door.

1. Set to OFF the switch handle (figure 1, item 1).
2. Loosen the motor controller door screw (figure 1, item 2) and turn the handle (figure 1, item 3) to open the door (figure 1, item 4).

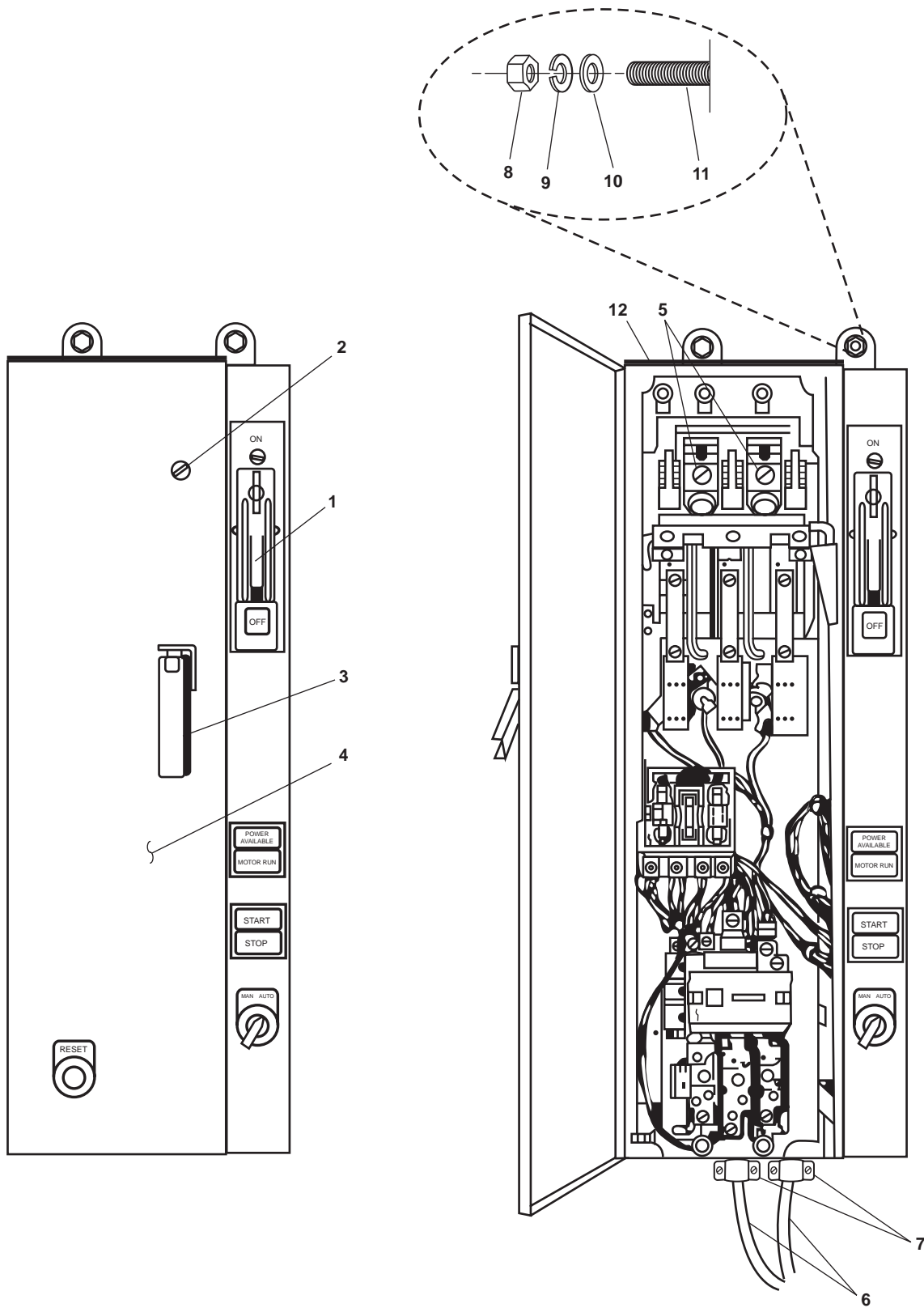


Figure 1. Type 3 Motor Controller

**WARNING**

**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in damaged equipment and serious injury or death.**

3. Use a multimeter to check for voltage at the motor controller terminals (figure 1, item 5). If voltage is present, ensure that the correct circuit breakers are secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 1, item 6) from the motor controller terminals (figure 1, item 5).
5. Loosen the strain relief clamps (figure 1, item 7), and remove the wiring (figure 1, item 6).
6. Remove the four nuts (figure 1, item 8), the four lockwashers (figure 1, item 9), and the four flat washers (figure 1, item 10) from the studs (figure 1, item 11). Discard the lockwashers.
7. Remove the motor controller (figure 1, item 12) from the studs (figure 1, item 11).

**INSTALLATION**

1. Position the motor controller (figure 1, item 12) on the studs (figure 1, item 11), and secure it with the four bolts (figure 1, item 8), four nuts (figure 1, item 8), four new lockwashers (figure 1, item 9), and four flat washers (figure 1, item 10).
2. Route the wiring (figure 1, item 6) through the strain relief clamps and into the motor controller (figure 1, item 12).
3. Connect the wiring (figure 1, item 6) to the terminals (figure 1, item 5) using the labels from step 4 of Removal as a guide.
4. Tighten the strain relief clamps (figure 1, item 7).
5. Close the door (figure 1, item 4) and secure it by turning the handle (figure 1, item 3) and tightening the motor controller door screw (figure 1, item 2).
6. Remove the lockouts and tagouts (FM 55-502).
7. Set to ON the applicable circuit breaker.
8. Set to ON the switch handle (figure 1, item 1).
9. Operate the applicable system Under Usual Conditions (TM 55-1925-273-10) and check for proper operation.
10. Return the system to the desired readiness condition.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MOTOR CONTROLLER, HOT POTABLE WATER RECIRCULATING PUMP; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the HOT POTABLE WATER RECIRCULATING PUMP. circuit breaker at 440V power panel No. 4. Lock out and tag out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

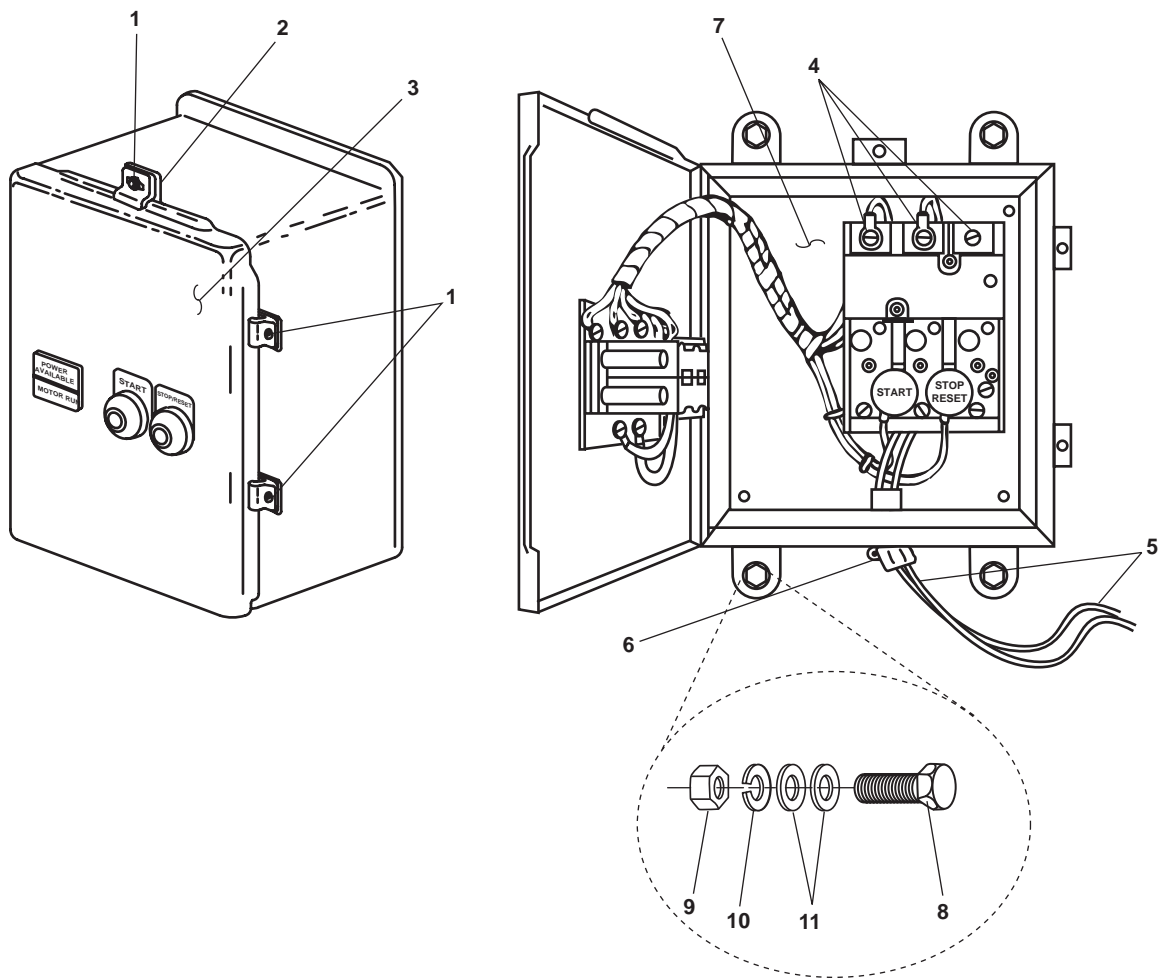
1. Loosen the four screws (figure 1, item 1) until the clamps (figure 1, item 2) clear the lip of the door (figure 1, item 3).
2. Open the door (figure 1, item 3).

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the motor controller terminals (figure 1, item 4). If voltage is present, ensure that the correct circuit breakers are secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 1, item 6) from the motor controller terminals (figure 1, item 5).
5. Loosen the strain relief clamps (figure 1, item 6) and remove the wiring (figure 1, item 5) from the motor controller (figure 1, item 7).



**Figure 1. Type 4 Motor Controller**

6. Remove the four bolts (figure 1, item 8), the four nuts (figure 1, item 9), the four lockwashers (figure 1, item 10), and the eight flat washers (figure 1, item 11). Discard the lockwashers.
7. Remove the motor controller (figure 1, item 7) from its foundation.

#### **INSTALLATION**

1. Position the motor controller (figure 1, item 7) on its foundation, and secure it with the four bolts (figure 1, item 8), four nuts (figure 1, item 9), four new lockwashers (figure 1, item 10), and eight flat washers (figure 1, item 11).
2. Route the wiring (figure 1, item 5) through the strain relief clamps (figure 1, item 6) into the motor controller (figure 1, item 7).
3. Connect the wiring (figure 1, item 5) to the terminals (figure 1, item 4) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Tighten the strain relief clamps (figure 1, item 6).

5. Close the door (figure 1, item 3), and secure it with the four clamps (figure 1, item 2) and four screws (figure 1, item 1).
6. Remove the lockouts and tagouts (FM 55-502).
7. Operate the potable water system under usual conditions (TM 55-1925-273-10) and check for proper operation.
8. Return the potable water system to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MOTOR CONTROLLER, WELD HOOD EXHAUST FAN; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
 Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
 TB 43-0218  
 TM 55-1925-273-10  
 WP 0295 00  
 WP 0300 00  
 WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
 Motor Controller (Item 1, Figure 59, WP 0300 00)

**Equipment Conditions:**

Set to OFF the WORKSHOP EXHAUST FAN E02-16-1 circuit breaker at 120V distribution panel No. 4. Lock out and tag out (FM 55-502).

**Personnel Required:**

Two Watercraft Engineers, 88L

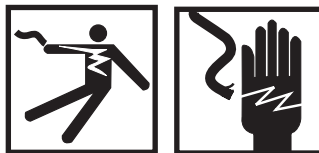
**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

1. Loosen the four screws (figure 1, item 1) until the clamps (figure 1, item 2) clear the lip of the door (figure 1, item 3).
2. OPEN the motor controller door (figure 1, item 3).

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the motor controller terminals (figure 2, item 1). If voltage is present, ensure that the proper circuit breakers have been secured, locked out, and tagged out (FM 55 502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 2, item 2) from the terminal screws (figure 2, item 1).
5. Loosen the strain relief clamps (figure 2, item 3) and remove the wiring (figure 2, item 2) from the motor controller (figure 2, item 4).

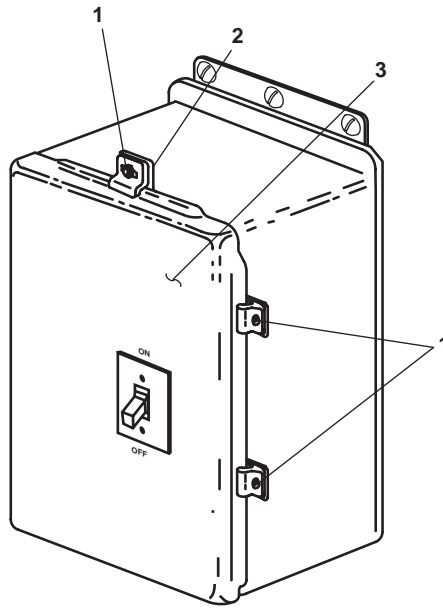


Figure 1. Motor Controller Type 5 (Typical)

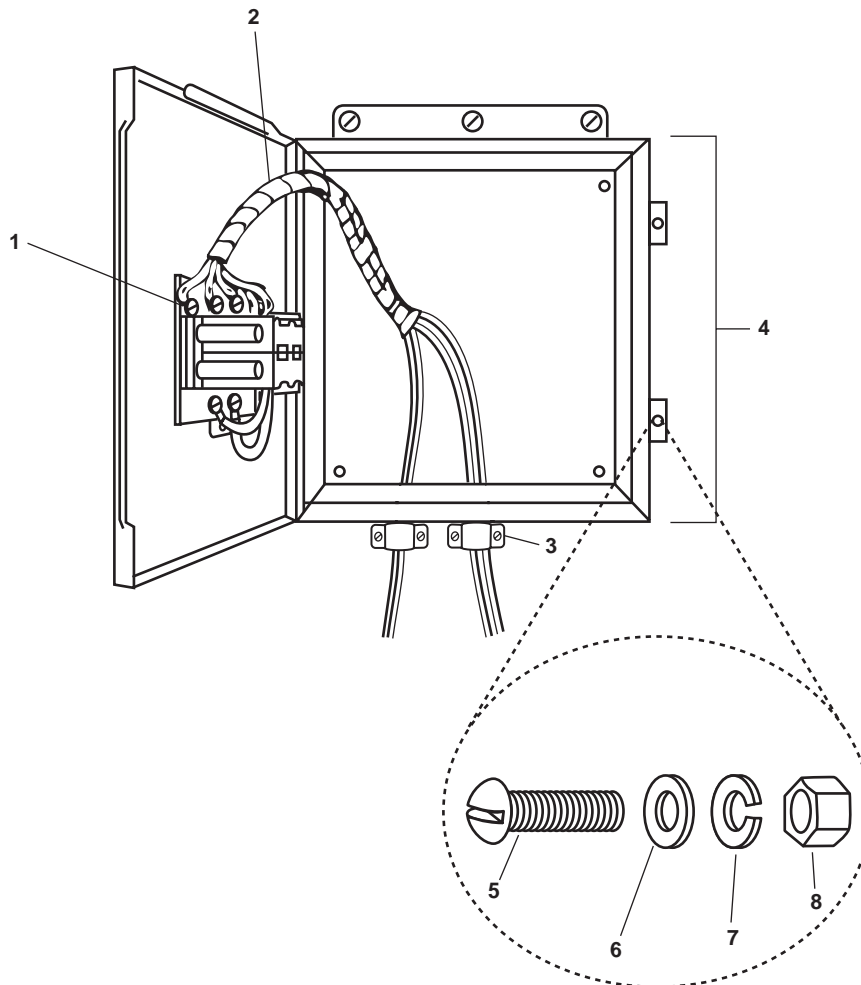


Figure 2. Interior of Motor Controller Type 5

6. Remove the four bolts (figure 2, item 5), four flat washers (figure 2, item 6), four lockwashers (figure 2, item 7), and four nuts (figure 2, item 8) from the motor controller (figure 2, item 4). Discard the lockwashers.
7. Remove the motor controller (figure 2, item 4) from its foundation.

## INSTALLATION

1. Position the motor controller (figure 2, item 4) on its foundation.
2. Secure the motor controller (figure 2, item 4) with the four bolts (figure 2, item 5), four flat washers (figure 2, item 6), four new lockwashers (figure 2, item 7), and four nuts (figure 2, item 8).
3. Route the wiring (figure 2, item 2) into the motor controller (figure 2, item 4) and secure it in place with the strain relief clamps (figure 2, item 3).
4. Connect the wiring (figure 2, item 2) to the motor controller (figure 2, item 4) using the labels from step 4 of Removal as a guide. Tighten the terminal screws (figure 2, item 1) and remove the labels.
5. CLOSE the door (figure 1, item 3).
6. Rotate the clamp (figure 1, item 2) until it is over the lip of the door (figure 1, item 3).
7. Tighten the door screws (figure 1, item 1).
8. Remove the lockouts and tagouts (FM 55-502).
9. Operate the Heating, Ventilation, Air condition, and Refrigeration (HVACR) systems under usual conditions (TM 55-1925-273-10) and check for proper operation of the workshop exhaust fan.
10. Return the workshop motor controller to the desired readiness condition.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BATTERY CHARGER, POWER SUPPLY SYSTEM; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Battery Charger (Item 2, Figure 60, WP 0301 00)

**Personnel Required:**

Three Watercraft Engineers, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0301 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the applicable battery charger circuit breaker.  
Lock out and tag out (FM 55-502).  
Remove the positive and negative battery cables from the  
applicable battery bank. Lock out and tag out (FM  
55-502).

---

**REMOVAL**

1. Remove the screw (figure 1, item 1) from the battery charger door (figure 1, item 2).
2. OPEN the battery charger door (figure 1, item 2).

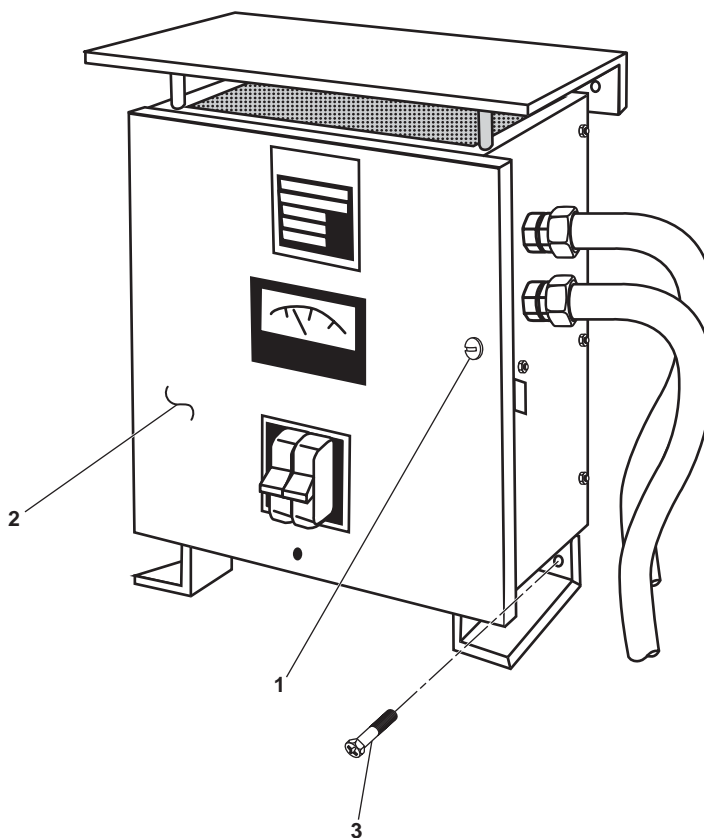
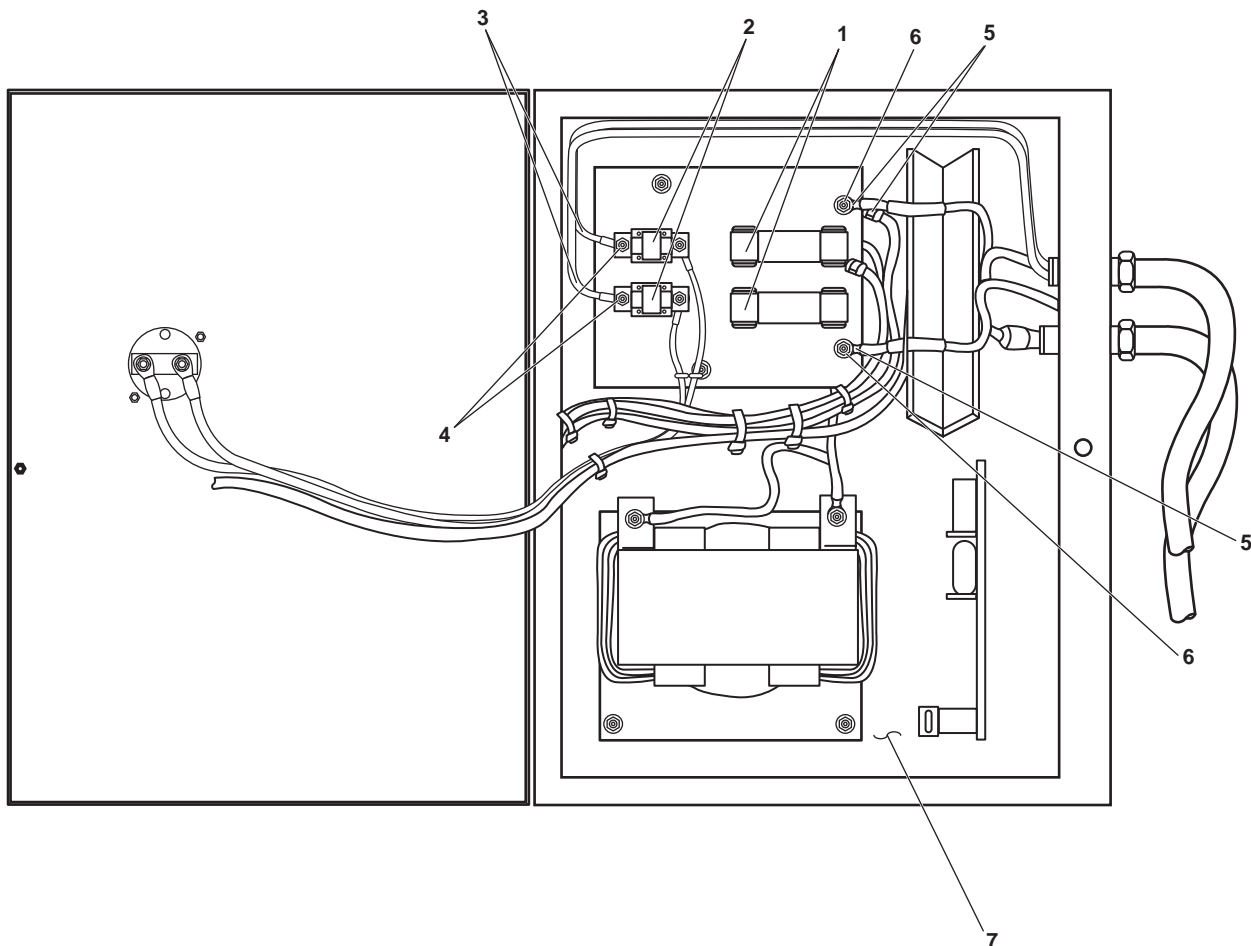


Figure 1. Battery Charger

**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for available ac voltage at the fuse(s) (figure 2, item 1). If ac voltage is present, ensure that the proper circuit breaker(s) have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Use a multimeter to check for dc voltage at the dc fuse(s) (figure 2, item 2). If dc voltage is present, ensure that the positive and negative battery cables are removed from the applicable battery bank and are locked out and tagged out (FM 55-502). If no dc voltage is present, continue with the procedure.
5. Label and remove the wiring (figure 2, item 3) from the dc fuse terminals (figure 2, item 4).



**Figure 2. Battery Charger Internal Components**

6. Label and remove the wiring (figure 2, item 5) from the ac terminals (figure 2, item 6).
7. Remove the wiring (figure 2, items 3 and 5) from the battery charger (figure 2, item 7).

**WARNING**



**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

8. While two crewmembers hold the battery charger (figure 2, item 7), have a third crewmember remove the two bolts (figure 1, item 3) that secure the battery charger to the bulkhead.
9. Remove the battery charger (figure 2, item 7) from the bulkhead.

### INSTALLATION

**WARNING**



**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

1. Using two crewmembers, position the battery charger (figure 2, item 7) on the bulkhead while a third crewmember installs the two bolts (figure 1, item 3) that secure the battery charger to the bulkhead.
2. Install the wiring (figure 2, items 3 and 5) in the battery charger (figure 2, item 7).
3. Connect the wiring (figure 2, item 5) to the ac terminals (figure 2, item 6) using the labels from step 6 of Removal as a guide. Remove the labels.
4. Connect the wiring (figure 2, item 3) to the dc fuse terminals (figure 2, item 4) using the labels from step 5 of Removal as a guide. Remove the labels.
5. CLOSE the battery charger door (figure 1, item 2) and secure it with the screw (figure 1, item 1).
6. Remove the lockouts and tagouts (FM 55-502) from the battery cables.
7. Connect the battery cables to the battery bank (TM 55-1925-273-10).
8. Remove the remaining lockouts and tagouts (FM 55-502).
9. Set the applicable circuit breaker to ON and check the battery charger for proper operation.
10. Return the battery charger to the desired readiness condition.

### END OF WORK PACKAGE



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BATTERY CHARGER, POWER SUPPLY SYSTEM; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Ammeter (Item 2, Figure 61, WP 0301 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0301 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the applicable battery charger circuit breaker.  
Lock out and tag out (FM 55-502).  
Remove the positive and negative battery cables from the  
applicable battery bank. Lock out and tag out (FM  
55-502).

---

**DISASSEMBLY**

1. Remove the screw (figure 1, item 1) from the battery charger door (figure 1, item 2).
2. OPEN the battery charger door (figure 1, item 2).

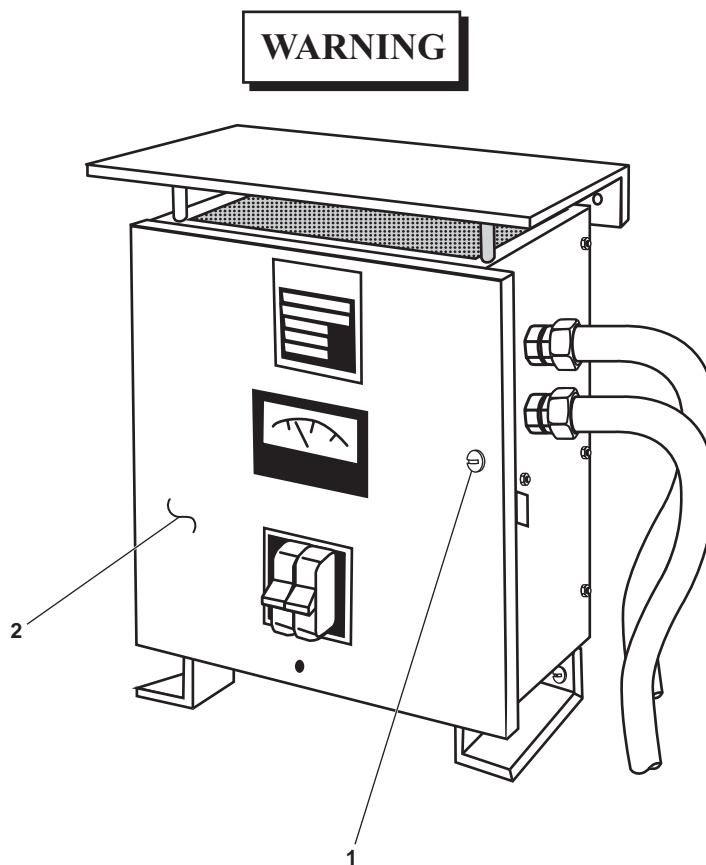
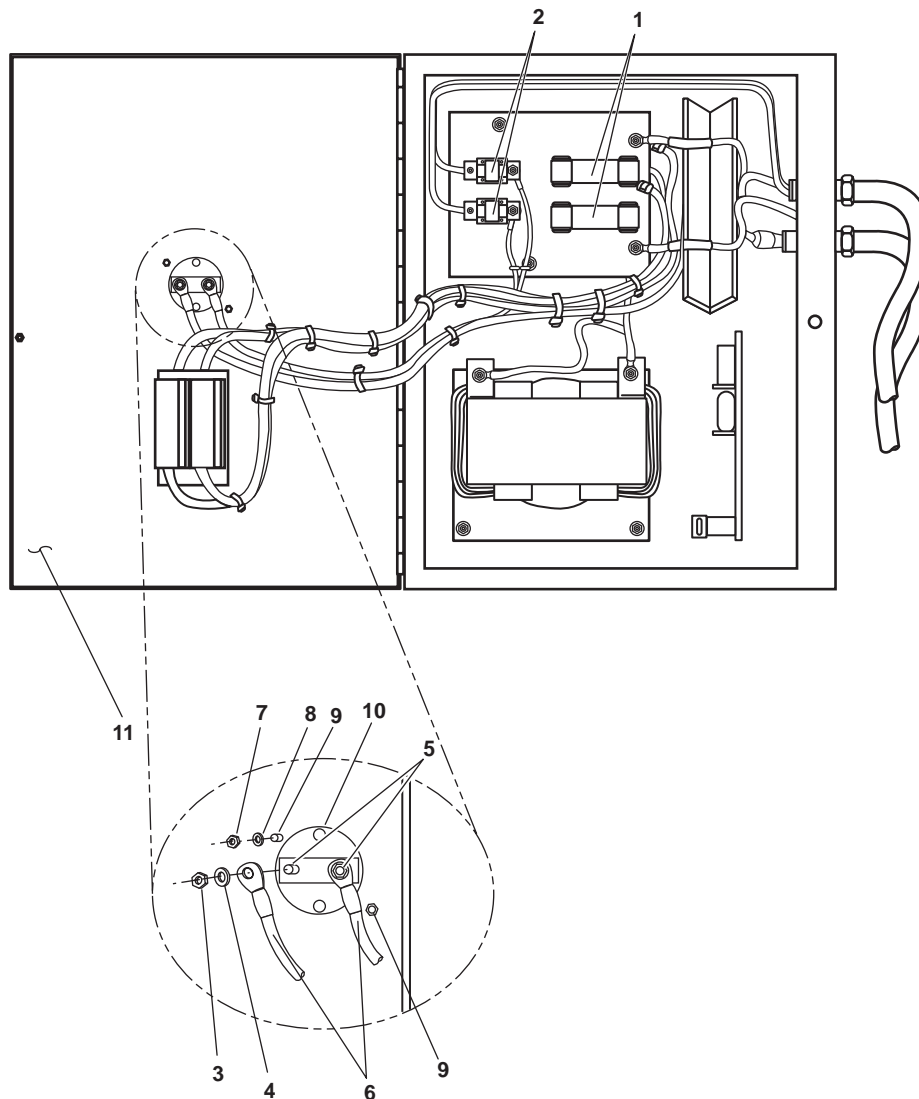


Figure 1. Battery Charger



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for ac voltage at the fuse(s) (figure 2, item 1). If ac voltage is present, ensure that the proper circuit breaker(s) have been set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Use a multimeter to check for voltage at the dc fuse(s) (figure 2, item 2). If dc voltage is present, ensure that the positive and negative battery cables are removed from the applicable battery bank and are locked out and tagged out (FM 55-502). If no dc voltage is present, continue with the procedure.



**Figure 2. Battery Charger Internal Components**

5. Remove the two nuts (figure 2, item 3) and two flat washers (figure 2, item 4) from the ammeter terminals (figure 2, item 5).
6. Label and remove the wiring (figure 2, item 6) from the ammeter terminals (figure 2, item 5).
7. Remove the two nuts (figure 2, item 7) and two flat washers (figure 2, item 8) from the ammeter mounting studs (figure 2, item 9).
8. Remove the ammeter (figure 2, item 10) from the battery charger door (figure 2, item 11).

#### **ASSEMBLY**

1. Install the ammeter (figure 2, item 10) in the battery charger door (figure 2, item 11).
2. Install the two nuts (figure 2, item 7) and two flat washers (figure 2, item 8) on the ammeter mounting studs (figure 2, item 9).
3. Connect the wiring (figure 2, item 6) to the ammeter terminals (figure 2, item 5) using the labels from step 6 of Removal as a guide. Remove the labels.
4. Install the two nuts (figure 2, item 3) and two flat washers (figure 2, item 4) on the ammeter terminals (figure 2, item 5).
5. CLOSE the battery charger door (figure 1, item 2).
6. Install the screw (figure 1, item 1) in the battery charger door (figure 1, item 2).
7. Remove the lockouts and tagouts (FM 55-502) from the battery cables.
8. Connect the battery cables to the battery bank (TM 55-1925-273-10).
9. Remove the remaining lockouts and tagouts (FM 55-502).
10. Set the applicable circuit breaker to ON and check the battery charger for proper operation.
11. Return the battery charger to the desired readiness condition.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ILLUMINATION AND NAVIGATION SIGNALS, TEST**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1,  
Table 2, WP 0295 00)

**Personnel Required:**

One Watercraft Engineer, 88L

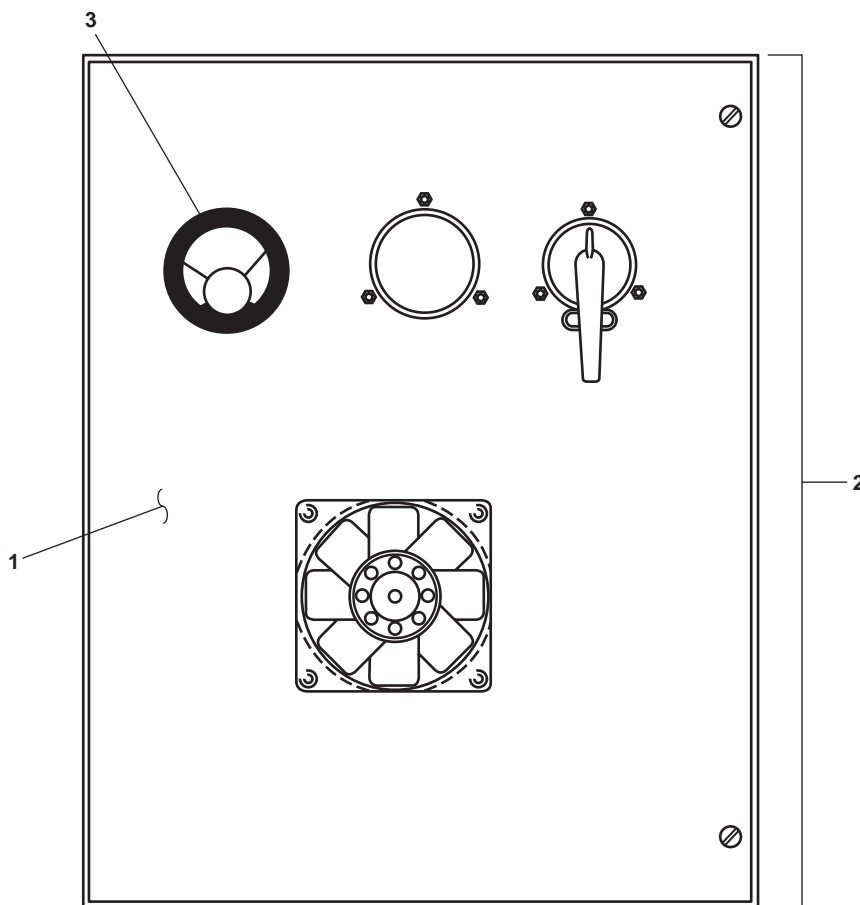
**References:**

WP 0295 00

---

**SEARCHLIGHT POWER SUPPLY, TEST**

1. On the front door (figure 1, item 1) of the power supply (figure 1, item 2), read the lamp current displayed on the ammeter (figure 1, item 3). The current should read approximately 30 amperes.
2. If the lamp current is low, turn the lamp and the disconnect switch to OFF. Move the transformer primary connection (figure 2, item 1) to a higher number.
3. If the lamp current is high, turn the lamp and the disconnect switch to OFF. Move the transformer primary connection (figure 2, item 1) to a lower number.



**Figure 1. Exterior Searchlight Power Supply**

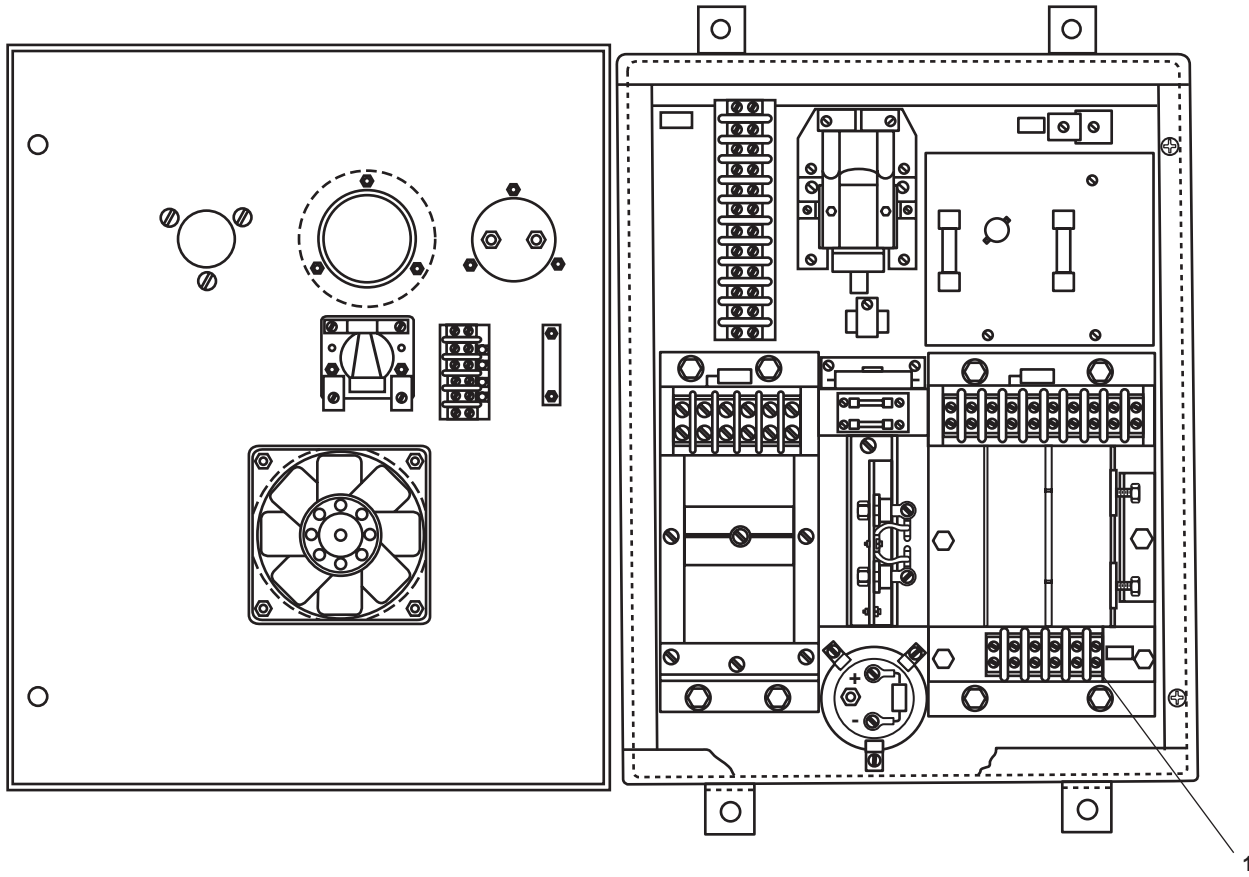


Figure 2. Interior Searchlight Power Supply

END OF WORK PACKAGE

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ILLUMINATION AND NAVIGATION SIGNALS, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Power Supply (Item 156, Figure 62, WP 0301 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
WP 0232 00  
WP 0295 00  
WP 0301 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the PORT SEARCHLIGHT POWER SUPPLY or the STARBOARD SEARCHLIGHT POWER SUPPLY circuit breaker on the 120V pilothouse emergency distribution panel. Lock out and tag out (FM 55-502).

---

**SEARCHLIGHT POWER SUPPLY REPLACEMENT****REMOVAL**

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal blocks (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 2, item 2) from terminal block 1 (figure 2, item 3).
5. Remove the wiring (figure 2, item 2) from the power supply (figure 1, item 3).
6. Remove the two nuts (figure 2, item 4) and the two flat washers (figure 2, item 5) from the two studs (figure 2, item 6).
7. Remove the power supply (figure 2, item 7) from the two studs (figure 2, item 6).

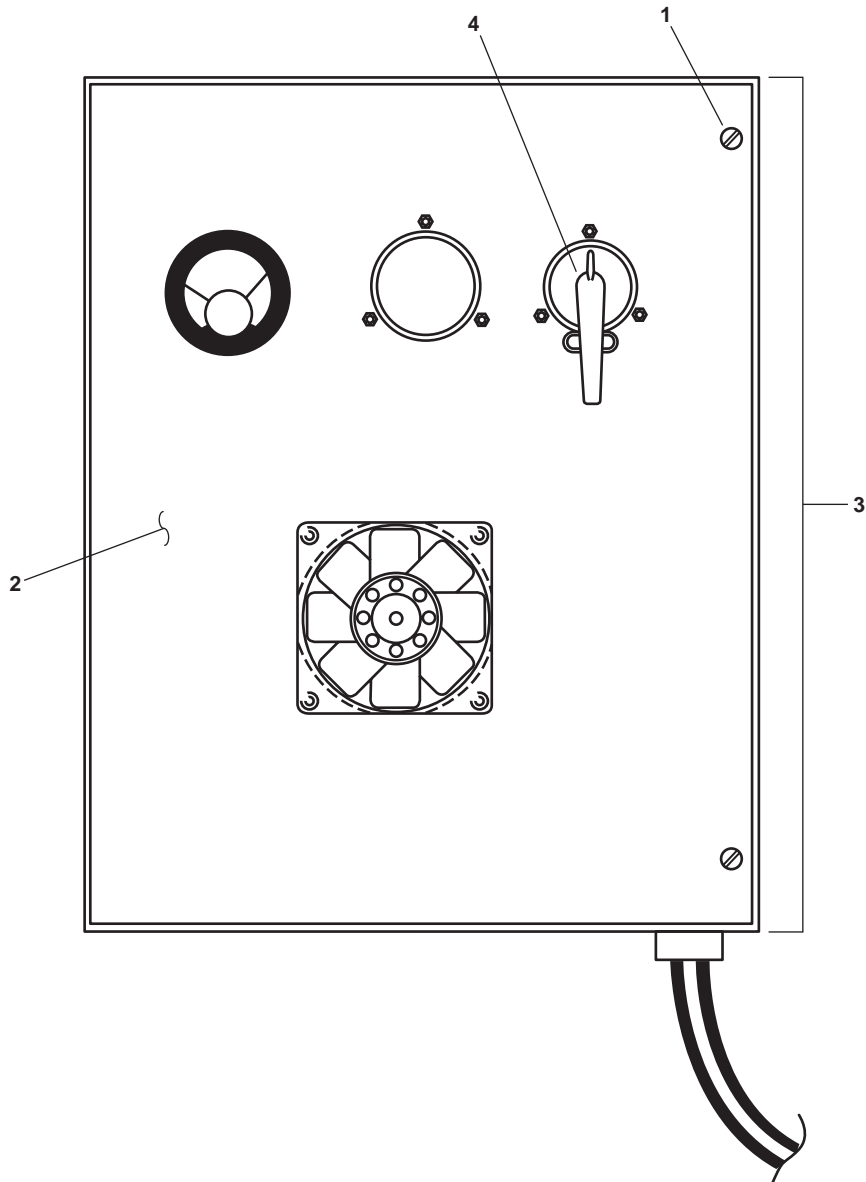


Figure 1. Searchlight Power Supply (External)

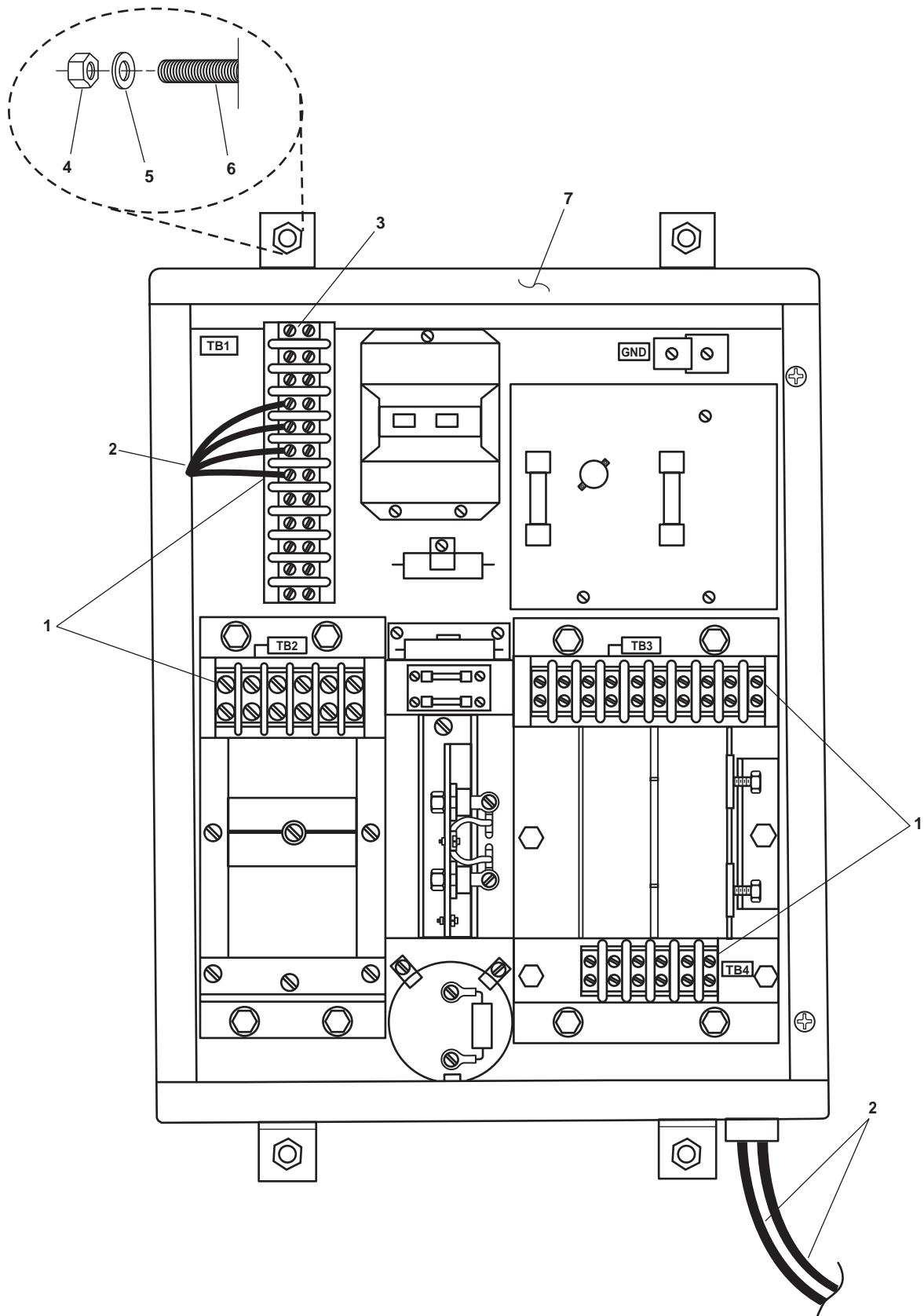


Figure 2. Searchlight Power Supply (Internal)

---

**INSTALLATION**

1. Position the power supply (figure 2, item 7) on the two studs (figure 2, item 6) and secure it with the two nuts (figure 2, item 4) and the two flat washers (figure 2, item 5).
2. Install the wiring (figure 2, item 2) in the power supply (figure 1, item 3).
3. Connect the wiring (figure 2, item 2) to terminal block 1 (figure 2, item 3) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Close the door (figure 1, item 2) to the power supply (figure 1, item 3) and secure it with the two captive screws (figure 1, item 1).
5. Remove the lockouts and tagouts (FM 55-502).
6. Set to ON the PORT SEARCHLIGHT POWER SUPPLY or the STARBOARD SEARCHLIGHT POWER SUPPLY circuit breaker on the 120V pilothouse emergency distribution panel.
7. Perform the Illumination And Navigation Signals Test procedure (WP 0232 00) and check for proper operation of the searchlight power supply.
8. Return the searchlight power supply to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ILLUMINATION AND NAVIGATION SIGNALS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
WP 0232 00  
WP 0295 00  
WP 0307 00

**Equipment Condition:**

Set to OFF the PORT SEARCH LIGHT POWER SUPPLY or the STARBOARD SEARCHLIGHT POWER SUPPLY circuit breaker on the 120V pilothouse emergency distribution panel. Lock out and tag out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**SEARCHLIGHT POWER SUPPLY****ELAPSED TIME INDICATOR REPLACEMENT****REMOVAL**

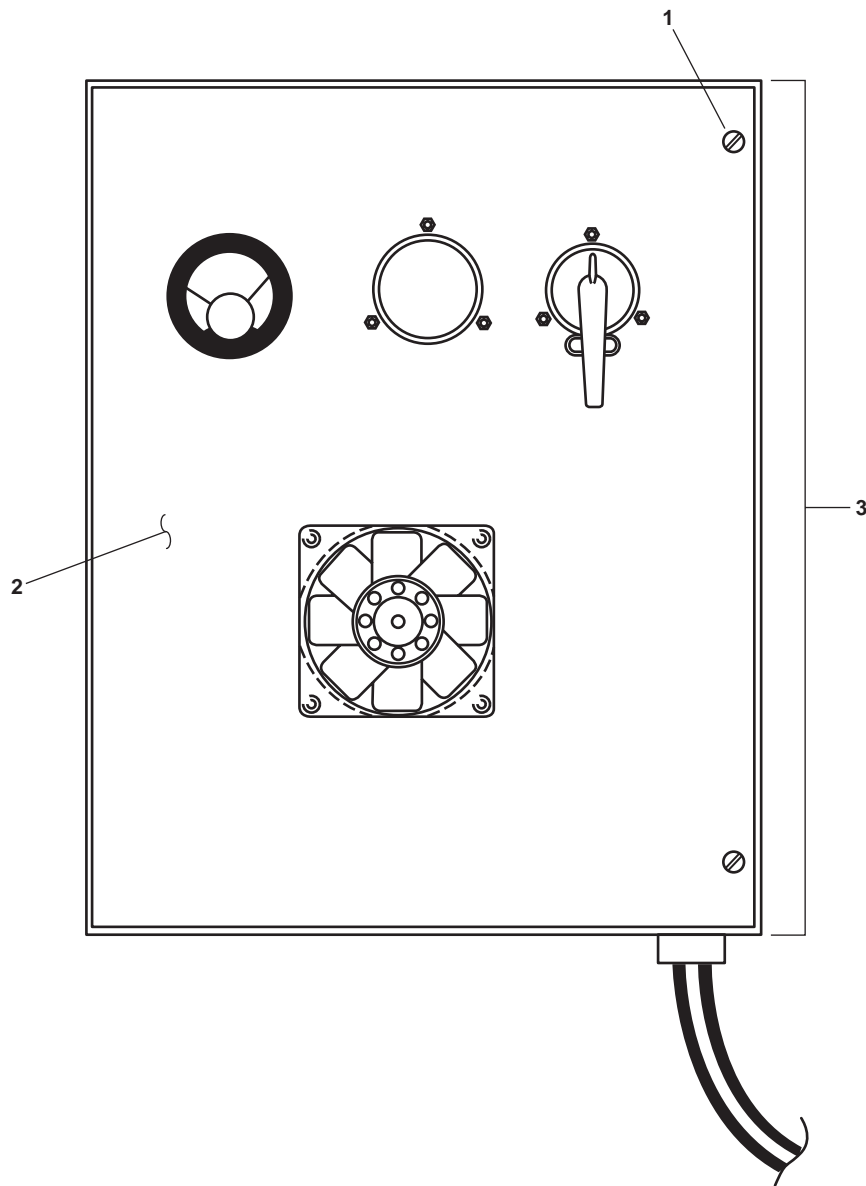
1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal blocks (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.



**Figure 1. Searchlight Power Supply**

4. Label and remove the wiring of the elapsed time indicator (figure 2, item 2) from terminal block 5 (figure 2, item 3).
5. Remove the three screws (figure 2, item 4), the three lockwashers (figure 2, item 5), and the three nuts (figure 2, item 6) from the elapsed time indicator (figure 2, item 2). Discard the lockwashers.
6. Remove the elapsed time indicator (figure 2, item 2) from the door (figure 1, item 2) of the power supply (figure 1, item 3).



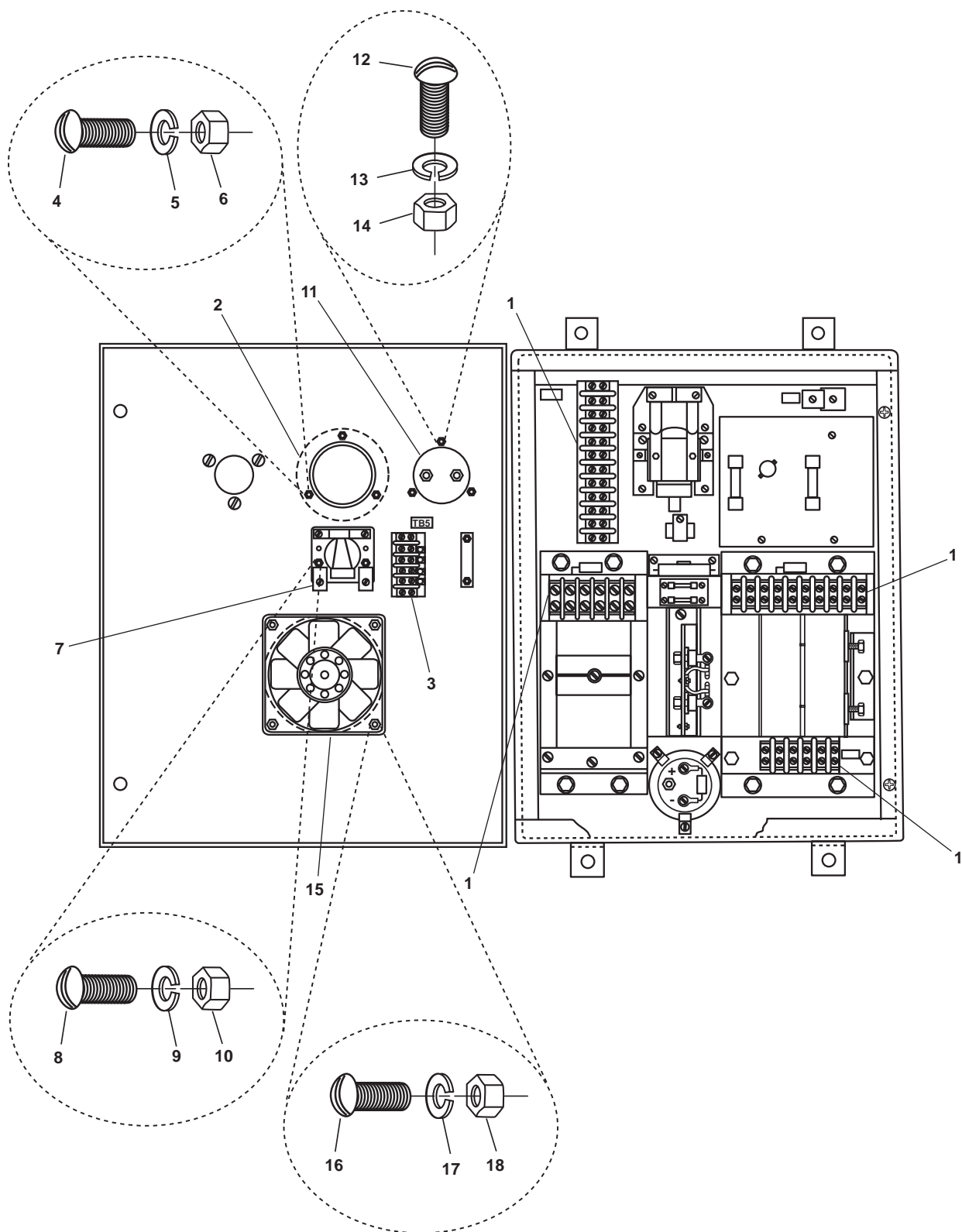


Figure 2. Searchlight Power Supply Internal Door Components

## INSTALLATION

1. Install the elapsed time indicator (figure 2, item 2) in the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. Install the three screws (figure 2, item 4), three new lockwashers (figure 2, item 5), and the three nuts (figure 2, item 6) in the elapsed time indicator (figure 2, item 2).
3. Connect the wiring of the elapsed time indicator (figure 2, item 2) to terminal block 5 (figure 2, item 3) using the labels from step 4 of Removal as a guide. Remove the labels.
4. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
5. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
6. Perform the Follow-On Service procedure at the end of this work package.

## R2 RELAY REPLACEMENT

### REMOVAL

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal blocks (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring of the R2 relay (figure 2, item 7) from terminal block 5 (figure 2, item 3).
5. Remove the two screws (figure 2, item 8), two lockwashers (figure 2, item 9), and two nuts (figure 2, item 10) from the R2 relay (figure 2, item 7). Discard the lockwashers.
6. Remove the R2 relay (figure 2, item 7) from the door (figure 1, item 2) of the power supply (figure 1, item 3).

### INSTALLATION

1. Install the R2 relay (figure 2, item 7) in the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. Install the two screws (figure 2, item 8), two new lockwashers (figure 2, item 9), and two nuts (figure 2, item 10) in the R2 relay (figure 2, item 7).

3. Connect the wiring of the R2 relay (figure 2, item 7) to terminal block 5 (figure 2, item 3) using the labels from step 4 of Removal as a guide. Remove the labels.
4. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
5. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
6. Perform the Follow-On Service procedure at the end of this work package.

## AMMETER REPLACEMENT

### REMOVAL

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal blocks (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring from the ammeter (figure 2, item 11).
5. Remove the three screws (figure 2, item 12), three lockwashers (figure 2, item 13), and three nuts (figure 2, item 14) from the ammeter (figure 2, item 11). Discard the lockwashers.
6. Remove the ammeter (figure 2, item 11) from the door (figure 1, item 2) of the power supply (figure 1, item 3).

### INSTALLATION

1. Install the ammeter (figure 2, item 11) in the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. Install the three screws (figure 2, item 12), three new lockwashers (figure 2, item 13), and three nuts (figure 2, item 14) in the ammeter (figure 2, item 11).
3. Connect the wiring to the ammeter (figure 2, item 11) using the labels from step 4 of Removal as a guide. Remove the labels.
4. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
5. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
6. Perform the Follow-On Service procedure at the end of this work package.

## FAN REPLACEMENT

### REMOVAL

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal blocks (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring of the fan (figure 2, item 15) from terminal block 5 (figure 2, item 3).
5. Remove the four screws (figure 2, item 16), four lockwashers (figure 2, item 17), and four nuts (figure 2, item 18) from the fan (figure 2, item 15). Discard the lockwashers.
6. Remove the fan (figure 2, item 15) from the door (figure 1, item 2) of the power supply (figure 1, item 3).

### INSTALLATION

1. Install the fan (figure 2, item 15) in the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. Install the four screws (figure 2, item 16), four new lockwashers (figure 2, item 17), and four nuts (figure 2, item 18) in the fan (figure 2, item 15).
3. Connect the wiring of the fan (figure 2, item 15) to terminal block 5 (figure 2, item 3) using the labels from step 4 of Removal as a guide. Remove the labels.
4. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
5. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
6. Perform the Follow-On Service procedure at the end of this work package.

---

**RESISTOR ASSEMBLY REPLACEMENT****REMOVAL**

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block 1 (figure 3, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Remove the two screws (figure 3, item 2) from the resistor assembly (figure 3, item 3).
5. Remove the resistor assembly (figure 3, item 3) from the capacitor (figure 3, item 4).

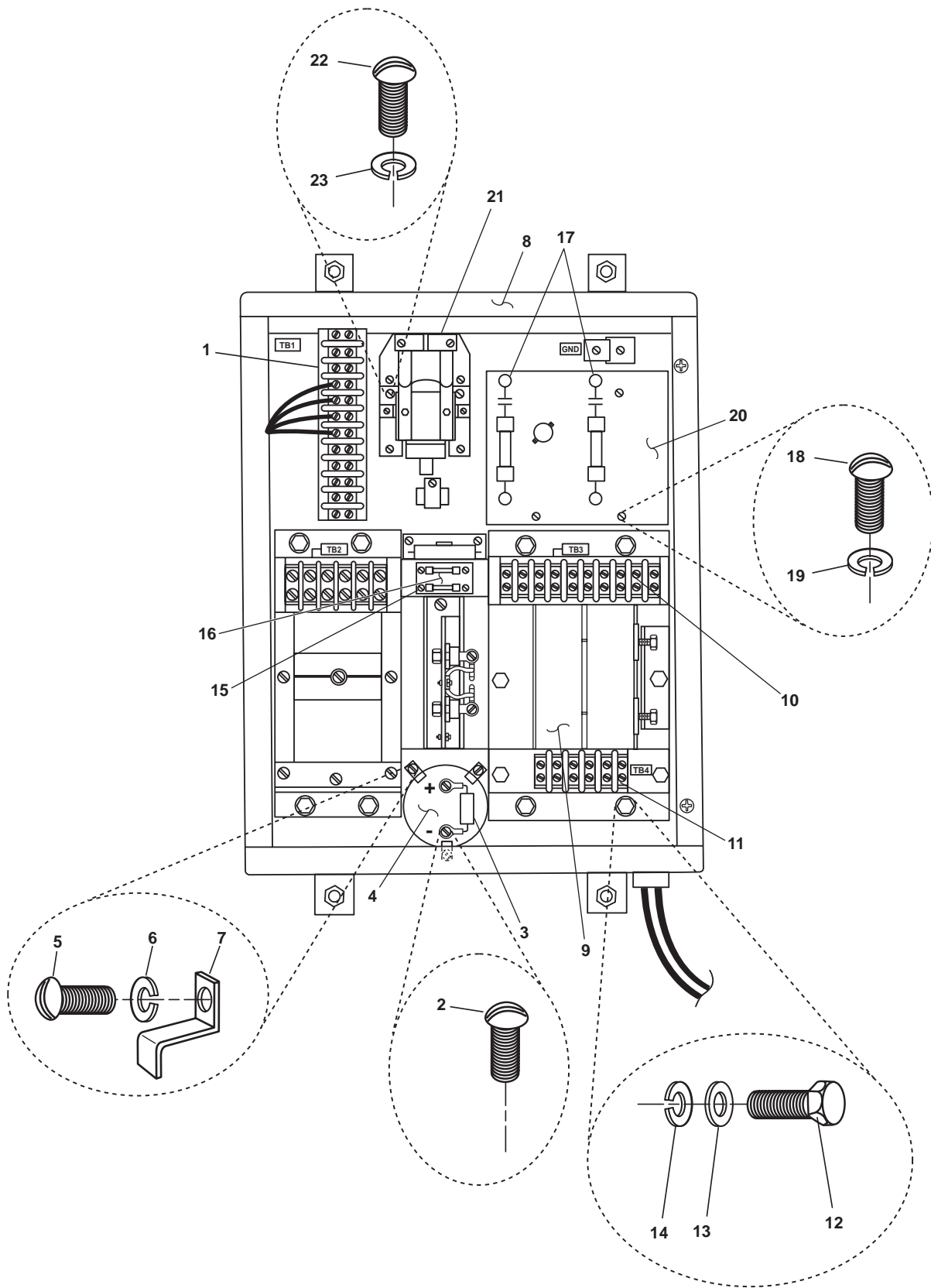


Figure 3. Searchlight Power Supply Internal Components

**INSTALLATION**

1. Install the resistor assembly (figure 3, item 3) on the capacitor (figure 3, item 4).
2. Install the two screws (figure 3, item 2) in the resistor assembly (figure 3, item 3).
3. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
4. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
5. Perform the Follow-On Service procedure at the end of this work package.

**CAPACITOR REPLACEMENT****REMOVAL**

1. Perform the Resistor Assembly Removal procedure in this work package.
2. Label and remove the wiring from the capacitor (figure 3, item 4).
3. Remove the three screws (figure 3, item 5), three lockwashers (figure 3, item 6) and three clamps (figure 3, item 7) from the capacitor (figure 3, item 4). Discard the lockwashers.
4. Remove the capacitor (figure 3, item 4) from the power supply (figure 3, item 8).

**INSTALLATION**

1. Install the capacitor (figure 3, item 4) in the power supply (figure 3, item 8).
2. Install the three clamps (figure 3, item 7), three new lockwashers (figure 3, item 6), and three screws (figure 3, item 5) on the capacitor (figure 3, item 4).
3. Connect the wiring to the capacitor (figure 3, item 4) using the labels from step 2 of Removal as a guide. Remove the labels.
4. Perform the Resistor Assembly Installation procedure in this work package.

**TRANSFORMER ASSEMBLY REPLACEMENT****REMOVAL**

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).

**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at terminal block 1 (figure 3, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring of the transformer assembly (figure 3, item 9) from terminal block 3 (figure 3, item 10) and terminal block 4 (figure 3, item 11).
5. Remove the four cap screws (figure 3, item 12), four flat washers (figure 3, item 13), and four lockwashers (figure 3, item 14) from the transformer assembly (figure 3, item 9). Discard the lockwashers.
6. Remove the transformer assembly (figure 3, item 9) from the power supply (figure 3, item 8).

**INSTALLATION**

1. Install the transformer assembly (figure 3, item 9) in the power supply (figure 3, item 8).
2. Install the four cap screws (figure 3, item 12), four flat washers (figure 3, item 13), and four new lockwashers (figure 3, item 14) in the transformer assembly (figure 3, item 9).
3. Connect the wiring of the transformer assembly (figure 3, item 9) to terminal block 3 (figure 3, item 10) and terminal block 4 (figure 3, item 11) using the labels from step 4 of Removal as a guide. Remove the labels.
4. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
5. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
6. Perform the Follow-On Service procedure at the end of this work package.

**FUSE REPLACEMENT****REMOVAL**

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).



**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at terminal block 1 (figure 3, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Using a fuse puller, remove the fuse (figure 3, item 15) from the fuse block (figure 3, item 16).

**INSTALLATION**

1. Using a fuse puller, install the fuse (figure 3, item 15) in the fuse block (figure 3, item 16).
2. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
3. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
4. Perform the Follow-On Service procedure at the end of this work package.

**FUSIBLE SWITCH REPLACEMENT****REMOVAL**

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).

**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at terminal block 1 (figure 3, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.

4. Label and remove the wiring from the fuse kit (figure 3, item 17).
5. Remove the three screws (figure 3, item 18) and three lockwashers (figure 1, item 19) from the fusible disconnect switch (figure 3, item 20). Discard the lockwashers.
6. Remove the fuse kit (figure 3, item 17) from the fusible disconnect switch (figure 3, item 20).
7. Remove the fusible disconnect switch (figure 3, item 20) from the power supply (figure 3, item 8).

## INSTALLATION

1. Install the fuse kit (figure 3, item 17) on the fusible disconnect switch (figure 3, item 20).
2. Install the fusible disconnect switch (figure 3, item 20) in the power supply (figure 3, item 8).
3. Install the three screws (figure 3, item 18) and three new lockwashers (figure 1, item 19) in the fusible disconnect switch (figure 3, item 20).
4. Connect the wiring to the fuse kit (figure 3, item 17) using the labels from step 4 of Removal as a guide. Remove the labels.
5. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
6. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
7. Perform the Follow-On Service procedure at the end of this work package.

## R1 RELAY REPLACEMENT

### REMOVAL

1. Loosen the two captive screws (figure 1, item 1) on the door (figure 1, item 2) of the power supply (figure 1, item 3).
2. OPEN the door (figure 1, item 2) of the power supply (figure 1, item 3).



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at terminal block 1 (figure 3, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring from the R1 relay (figure 3, item 21).

5. Remove the two screws (figure 3, item 22) and two lockwashers (figure 3, item 23) from the R1 relay (figure 3, item 21). Discard the lockwashers.
6. Remove the R1 relay (figure 3, item 21) from the power supply (figure 3, item 8).

### **INSTALLATION**

1. Install the R1 relay (figure 3, item 21) in the power supply (figure 3, item 8).
2. Install the two screws (figure 3, item 22) and two new lockwashers (figure 3, item 23) in the R1 relay (figure 3, item 21).
3. Connect the wiring to the R1 relay (figure 3, item 21) using the labels from step 4 of Removal as a guide. Remove the labels.
4. CLOSE the door (figure 1, item 2) on the power supply (figure 1, item 3).
5. Tighten the two captive screws (figure 1, item 1) in the door (figure 1, item 2).
6. Perform the Follow-On Service procedure at the end of this work package.

### **FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).
2. Set to ON the PORT SEARCHLIGHT POWER SUPPLY or the STARBOARD SEARCHLIGHT POWER SUPPLY circuit breaker on the 120V pilothouse emergency distribution panel.
3. Perform the Illumination And Navigation Signals Test procedure (WP 0232 00) and check for proper operation of the searchlight power supply.
4. Return the searchlight power supply to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEARCHLIGHTS, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Gasket (Item 72, Figure 62, WP 0301 00)  
Lockwasher (Item 25, Figure 62, WP 0301 00)  
Lockwasher (Item 74, Figure 62, WP 0301 00)  
Lockwasher (Item 80, Figure 62, WP 0301 00)  
Lockwasher (Item 131, Figure 62, WP 0301 00)  
Lockwasher (Item 134, Figure 62, WP 0301 00)  
Searchlight (Item 1, Figure 62, WP 0307 00)

**References:**

FM 55-502  
TB 43-0218  
WP 0133 00 (volume 1)  
WP 0295 00  
WP 0301 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the PORT SEARCH LIGHT POWER SUPPLY circuit breaker or the STARBOARD SEARCH LIGHT POWER SUPPLY circuit breaker on the 120V pilothouse emergency distribution panel. Lock out and tag out (FM 55-502).

**Personnel Required:**

Three Watercraft Engineers, 88L

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**DRUM ASSEMBLY REPLACEMENT****REMOVAL**

1. Remove the eight screws (figure 1, item 1) and eight lockwashers (figure 1, item 2) from the rear cover (figure 1, item 3) of the drum assembly (figure 1, item 4). Discard the lockwashers.
2. Remove the rear cover (figure 1, item 3) from the drum assembly (figure 1, item 4).

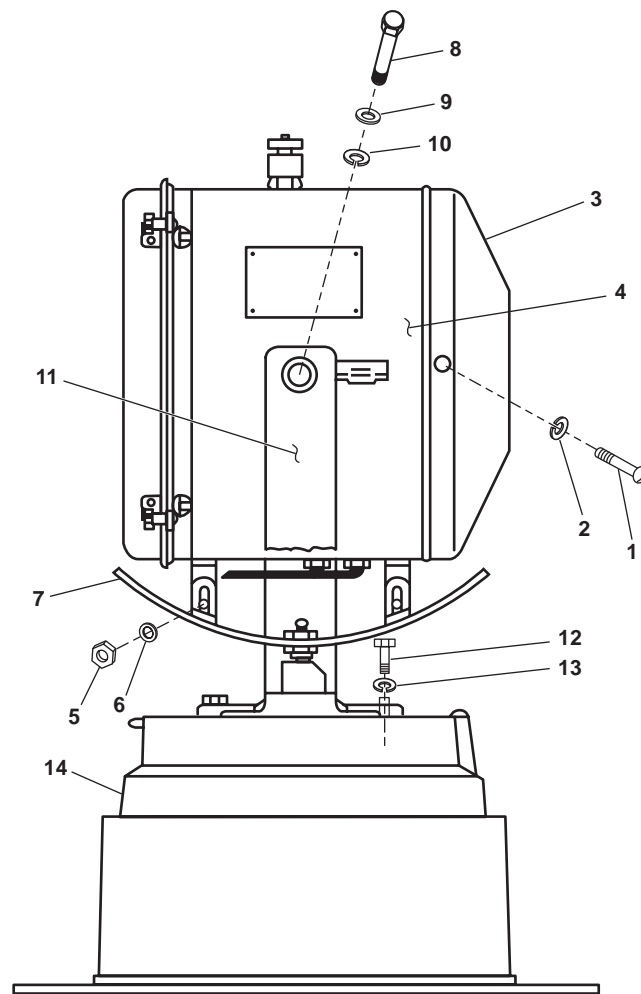


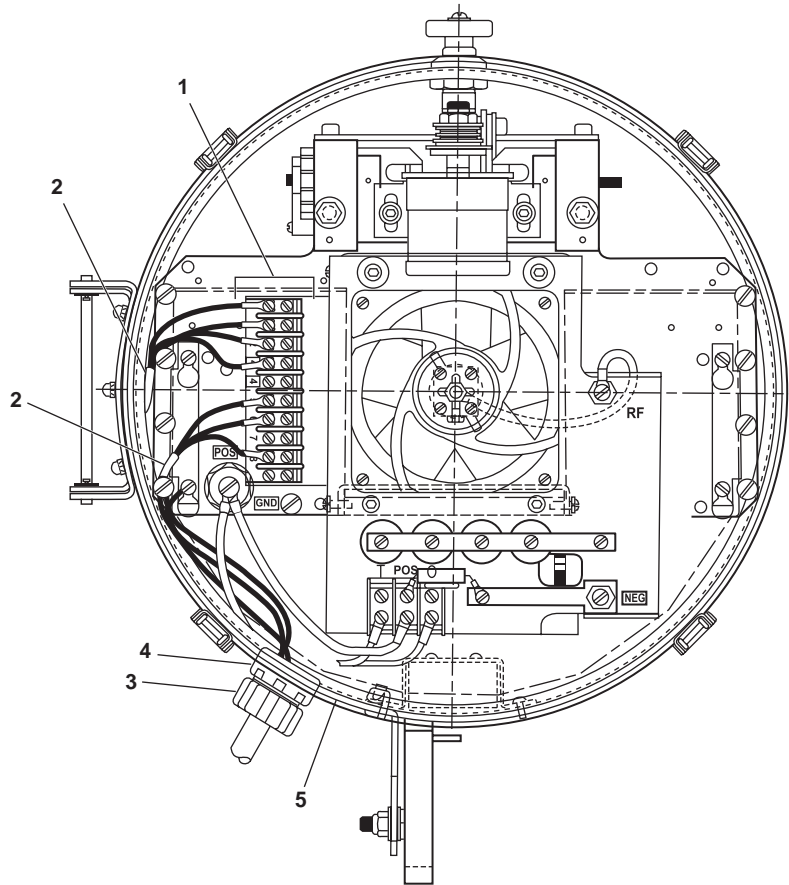
Figure 1. 500 Watt Xenon Searchlight

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 2, item 2) from the terminal block (figure 2, item 1).



**Figure 2. 500 Watt Xenon Searchlight Rear Cover Removed**

5. Loosen the stuffing tube (figure 2, item 3) and packing assembly (figure 2, item 4).
6. Remove the wiring (figure 2, item 2) from the drum assembly (figure 2, item 5).
7. Remove the two nuts (figure 1, item 5) and four flat washers (figure 1, item 6) from the rack bracket (figure 1, item 7).

**⚠ CAUTION**

Two crewmembers are required to maintain positive control of the drum assembly during removal from the arm assembly. Failure to comply with this caution will result in damage to the drum assembly.

8. Remove the two bolts (figure 1, item 8), two flat washers (figure 1, item 9), and two lockwashers (figure 1, item 10) from the arm assembly (figure 1, item 11). Discard the lockwashers.
9. Remove the drum assembly (figure 1, item 4) from the arm assembly (figure 1, item 11).

---

**INSTALLATION** **CAUTION**

Two crewmembers are required to maintain positive control of the drum assembly during removal from the arm assembly. Failure to comply with this caution will result in damage to the drum assembly.

1. Install the drum assembly (figure 1, item 4) on the arm assembly (figure 1, item 11).
2. Install the two bolts (figure 1, item 8), two flat washers (figure 1, item 9), and two new lockwashers (figure 1, item 10) in the arm assembly (figure 1, item 11).
3. Install the two nuts (figure 1, item 5) and four flat washers (figure 1, item 6) in the rack bracket (figure 1, item 7).
4. Install the wiring (figure 2, item 2) in the drum assembly (figure 2, item 5).
5. Tighten the stuffing tube (figure 2, item 3) and packing assembly (figure 2, item 4).
6. Connect the wiring (figure 2, item 2) to the terminal block (figure 2, item 1).
7. Install the rear cover (figure 1, item 3) on the drum assembly (figure 1, item 4).
8. Install the eight screws (figure 1, item 1) and eight new lockwashers (figure 1, item 2) in the rear cover (figure 1, item 3) of the drum assembly (figure 1, item 4).
9. Remove the lockouts and tagouts (FM 55-502).
10. Lubricate the searchlight, align the searchlight, and verify the spark gap adjustment (WP 0131 00, volume 1).
11. Return the searchlight to the desired readiness condition.

**ARM ASSEMBLY REPLACEMENT****REMOVAL**

1. Perform the Drum Assembly Removal procedure in this work package.
2. Remove the three bolts (figure 1, item 12) and three lockwashers (figure 1, item 13) from the arm assembly (figure 1, item 11). Discard the lockwashers.
3. Remove the arm assembly (figure 1, item 11) from the base assembly (figure 1, item 14).

**INSTALLATION**

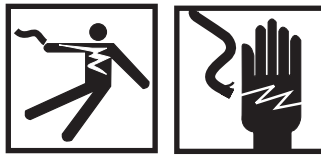
1. Install the arm assembly (figure 1, item 11) on the base assembly (figure 1, item 14).
2. Install the three bolts (figure 1, item 12) and three new lockwashers (figure 1, item 13) in the arm assembly (figure 1, item 11).
3. Perform the Drum Assembly Installation procedure in this work package.



---

**BASE ASSEMBLY REPLACEMENT****REMOVAL**

1. Perform the Arm Assembly Removal procedure in this work package.
2. Remove the eight screws (figure 3, item 1) and eight lockwashers (figure 3, item 2) from the upper base assembly (figure 3, item 3). Discard the lockwashers.
3. Remove the upper base assembly (figure 3, item 3) from the lower base assembly (figure 3, item 4).
4. Remove the gasket (figure 3, item 5) from the lower base assembly (figure 3, item 4). Discard the gasket.

**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

5. Use a multimeter to check for voltage at the terminal block (figure 3, item 6). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
6. Label and remove the wiring (figure 3, item 7) from the terminal block (figure 3, item 6).
7. Loosen the stuffing tube (figure 3, item 8) and packing assembly (figure 3, item 9).
8. Remove the wiring (figure 3, item 7) from the lower base assembly (figure 3, item 4).
9. Remove the three nuts (figure 3, item 10) and three lockwashers (figure 3, item 11) from the studs (figure 3, item 12). Discard the lockwashers.

**⚠ CAUTION**

Two crewmembers are required to maintain positive control of the drum assembly during removal from the arm assembly. Failure to comply with this caution will result in damage to the drum assembly.

10. Remove the lower base assembly (figure 3, item 4) from its foundation.

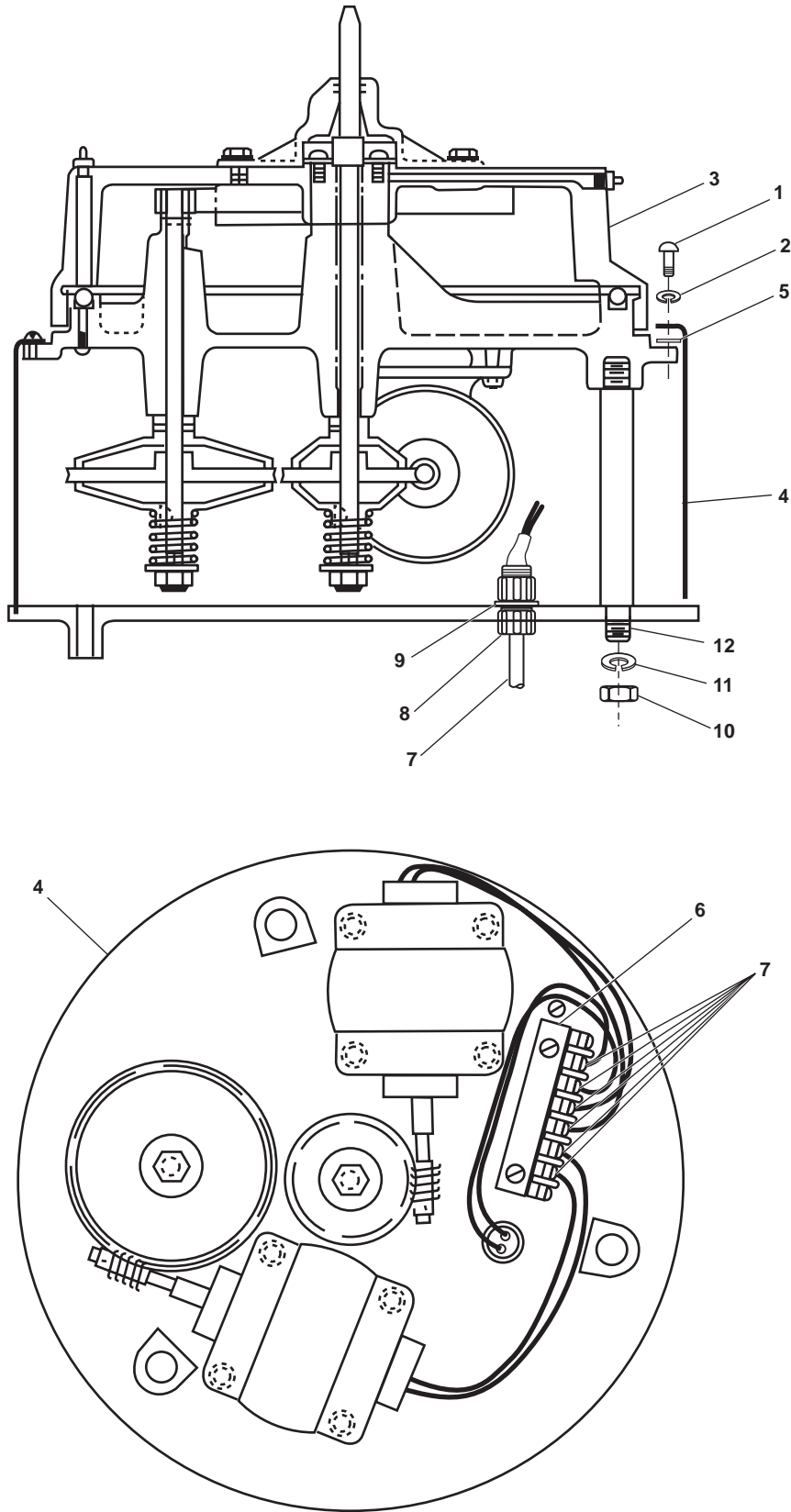


Figure 3. Searchlight Base Assembly

---

**INSTALLATION** **CAUTION**

Two crewmembers are required to maintain positive control of the drum assembly during removal from the arm assembly. Failure to comply with this caution will result in damage to the drum assembly.

1. Install the lower base assembly (figure 3, item 4) on its foundation.
2. Install the three nuts (figure 3, item 10) and three new lockwashers (figure 3, item 11) on the studs (figure 3, item 12).
3. Install the wiring (figure 3, item 7) in the lower base assembly (figure 3, item 4).
4. Tighten the stuffing tube (figure 3, item 8) and packing assembly (figure 3, item 9).
5. Connect the wiring (figure 3, item 7) to the terminal block (figure 3, item 6) using the labels from step 6 of Removal as a guide. Remove the labels.
6. Install a new gasket (figure 3, item 5) on the lower base assembly (figure 3, item 4).
7. Install the upper base assembly (figure 3, item 3) on the lower base assembly (figure 3, item 4).
8. Install the eight screws (figure 3, item 1) and eight new lockwashers (figure 3, item 2) in the upper base assembly (figure 3, item 3).
9. Perform the Arm Assembly Installation procedure in this work package.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEARCHLIGHTS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)  
Suitable Spring Scale

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
WP 0133 00 (volume 1)  
WP 0232 00  
WP 0235 00  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the PORT SEARCH LIGHT POWER SUPPLY. circuit breaker or the STARBOARD SEARCH LIGHT POWER SUPPLY. circuit breaker on the 120V pilothouse emergency distribution panel. Lock out and tag out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**LAMP STARTER ASSEMBLY REPLACEMENT****REMOVAL**

1. Remove the eight screws (figure 1, item 1) and eight lockwashers (figure 1, item 2) from the rear cover (figure 1, item 3) of the drum assembly (figure 1, item 4). Discard the lockwashers.
2. Remove the rear cover (figure 1, item 3) from the drum assembly (figure 1, item 4).
3. Loosen the four screws (figure 2, item 1) on the safety cover (figure 2, item 2).
4. Remove the safety cover (figure 2, item 2) from the drum assembly (figure 2, item 3).

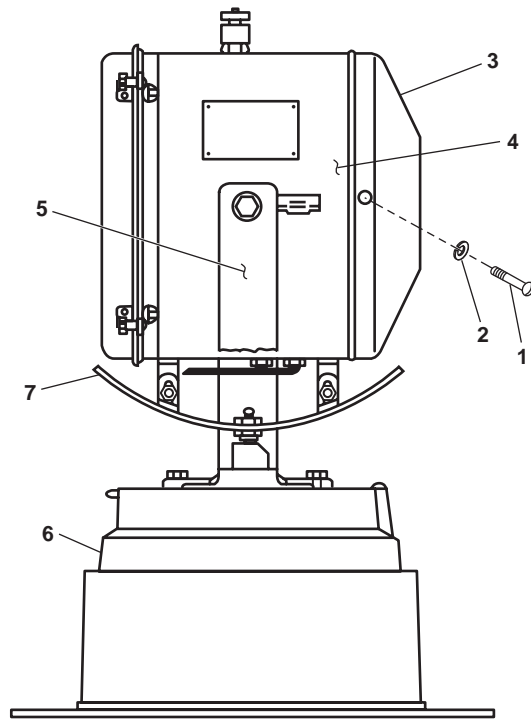


Figure 1. 500 Watt Xenon Searchlight

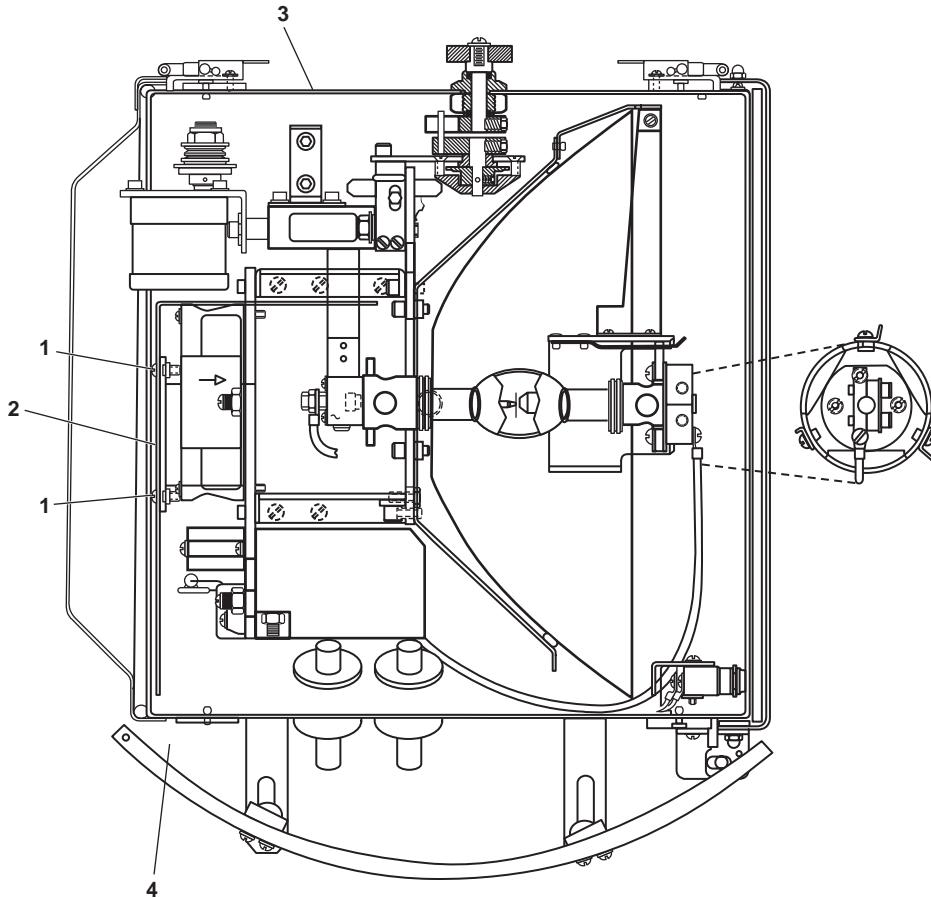
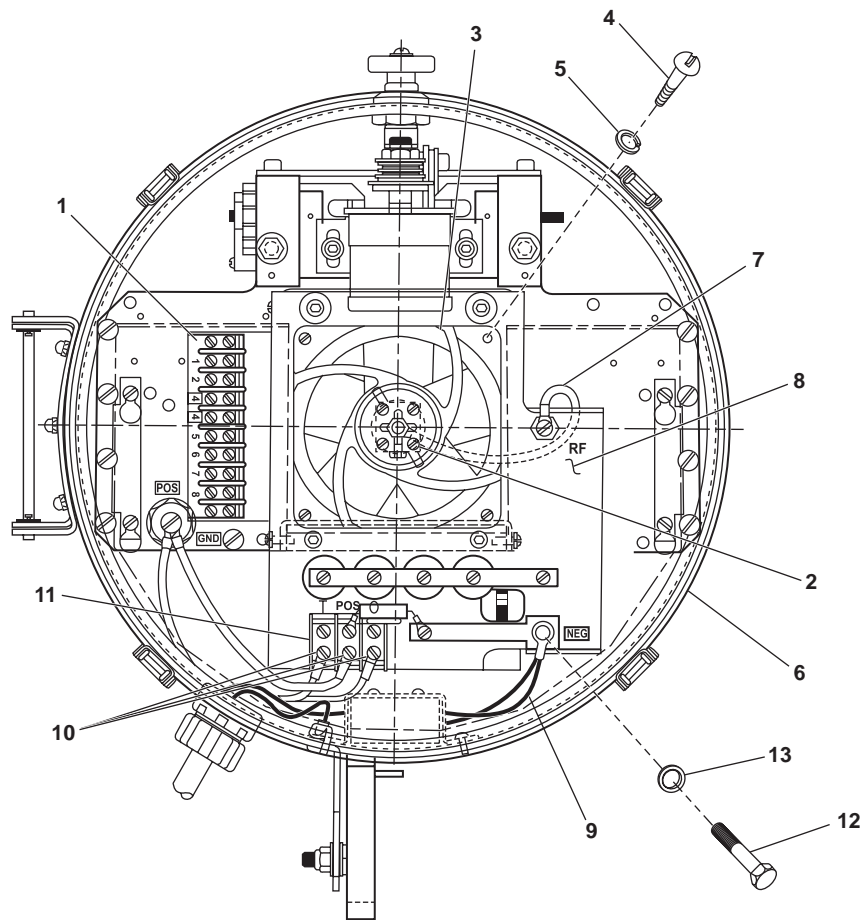


Figure 2. Searchlight Side View

**WARNING**

**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

5. Use a multimeter to check for voltage at the terminal block (figure 3, item 1). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
6. Label and remove the plug and cord assembly (figure 3, item 2) from the fan (figure 3, item 3).
7. Remove the four screws (figure 3, item 4) and four lockwashers (figure 3, item 5) from the fan (figure 3, item 3). Discard the lockwashers.
8. Remove the fan (figure 3, item 3) from the drum assembly (figure 3, item 6).



**Figure 3. 500 Watt Xenon Searchlight Rear Cover Removed**

9. Label and remove the lamp wire (figure 3, item 7) from the starter assembly (figure 3, item 8).
10. Label and remove the negative wire (figure 3, item 9) from the starter assembly (figure 3, item 8).
11. Label and remove the wiring (figure 3, items 10) from the terminal block (figure 3, item 11) on the starter assembly (figure 3, item 8).
12. Remove the four self-locking screws (figure 3, item 12) and four flat washers (figure 3, item 13). Discard the self-locking screws.
13. Remove the starter assembly (figure 3, item 8) from the drum assembly (figure 3, item 6).

## **INSTALLATION**

1. Install the starter assembly (figure 3, item 8) in the drum assembly (figure 3, item 6).
2. Install four new self-locking screws (figure 3, item 12) and four flat washers (figure 3, item 13).
3. Connect the wiring (figure 3, items 10) to the terminal block (figure 3, item 11) on the starter assembly (figure 3, item 8) using the labels from step 11 of Removal as a guide. Remove the labels.
4. Connect the negative wire (figure 3, item 9) to the starter assembly (figure 3, item 8) using the labels from step 10 of Removal as a guide. Remove the labels.
5. Connect the lamp wire (figure 3, item 7) to the starter assembly (figure 3, item 8) using the labels from step 9 of Removal as a guide. Remove the labels.
6. Install the fan (figure 3, item 3) in the drum assembly (figure 3, item 6).
7. Install the four screws (figure 3, item 4) and four new lockwashers (figure 3, item 5) in the fan (figure 3, item 3).
8. Connect the plug and cord assembly (figure 3, item 2) to the fan (figure 3, item 3) using the labels from step 6 of Removal as a guide. Remove the labels.
9. Install the safety cover (figure 2, item 2) in the drum assembly (figure 2, item 3).
10. Tighten the four screws (figure 2, item 1) on the safety cover (figure 2, item 2).
11. Install the rear cover (figure 1, item 3) on the drum assembly (figure 1, item 4).
12. Install the eight screws (figure 1, item 1) and eight lockwashers (figure 1, item 2) in the rear cover (figure 1, item 3) of the drum assembly (figure 1, item 4).
13. Perform the Follow-On Service procedure at the end of this work package.

## **MOTOR (UP AND DOWN/LEFT AND RIGHT) REPLACEMENT**

### **REMOVAL**

1. Remove the drum assembly (figure 1, item 4) from the arm assembly (figure 1, item 5) (WP 0235 00).
2. Remove the arm assembly (figure 1, item 5) from the upper base assembly (figure 1, item 6) (WP 0235 00).
3. Remove the eight screws (figure 4, item 1) and eight lockwashers (figure 4, item 2) from the upper base assembly (figure 4, item 3).
4. Remove the upper base assembly (figure 4, item 3) from the lower base assembly (figure 4, item 4).



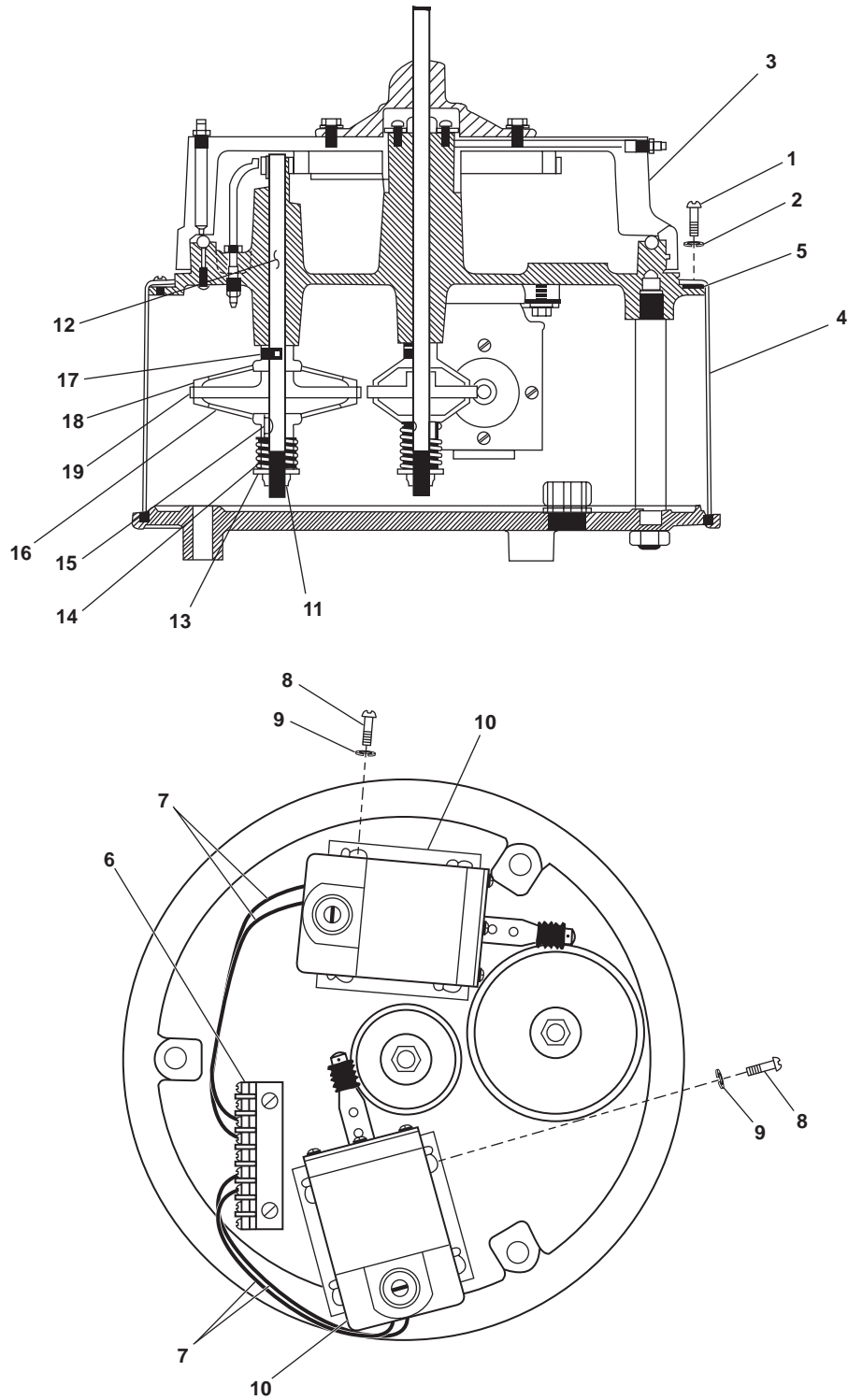


Figure 4. Searchlight Base Assembly

5. Remove the gasket (figure 4, item 5) from the lower base assembly (figure 4, item 4). Discard the gasket.

**WARNING**

**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

6. Use a multimeter to check for voltage at the terminal block (figure 4, item 6). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
7. Label and remove the motor (up and down/left and right) wiring (figure 4, item 7) from the terminal block (figure 4, item 6).
8. Remove the four screws (figure 4, item 8) and four lockwashers (figure 4, item 9) from the motor (up and down/left and right) (figure 4, item 10). Discard the lockwashers.
9. Remove the motor (up and down/left and right) (figure 4, item 10) from the lower base assembly (figure 4, item 4).

**INSTALLATION**

1. Install the motor (up and down/left and right) (figure 4, item 10) in the lower base assembly (figure 4, item 4).
2. Install the four screws (figure 4, item 8) and four new lockwashers (figure 4, item 9) in the motor (up and down/left and right) (figure 4, item 10).
3. Connect motor (up and down/left and right) wiring (figure 4, item 7) to the terminal block (figure 4, item 6) using the labels from step 7 of Removal as a guide. Remove the labels.
4. Install a new gasket (figure 4, item 5) on the lower base assembly (figure 4, item 4).
5. Install the upper base assembly (figure 4, item 3) on the lower base assembly (figure 4, item 4).
6. Install the eight screws (figure 4, item 1) and eight new lockwashers (figure 4, item 2) in the upper base assembly (figure 4, item 3).
7. Install the arm assembly (figure 1, item 5) on the upper base assembly (figure 1, item 6) (WP 0235 00).
8. Install the drum assembly (figure 1, item 4) on the arm assembly (figure 1, item 5) (WP 0235 00).
9. Attach a spring scale to the arm assembly (figure 1, item 5) if the right and left motor and/or clutch were replaced. Attach the spring scale to the elevation rack (figure 1, item 7) if the up and down motor and/or clutch were replaced.
10. Pull on the spring and measure the resistance required to move the searchlight.
  - a. A force of 20 to 25 lbs. (9.1 to 11.3 kg) is required for the up and down clutch.
  - b. A force of 15 to 20 lbs. (6.8 to 9.1 kg) is required for the right and left clutch.

11. If the force required to slip the clutch is not within the required range, perform steps 1-5 of Removal and adjust the nut (figure 4, item 11). Tighten the nut to increase the force required; loosen the nut to decrease the force required.
12. Perform steps 4-11 of Installation until the force required to move the searchlight is within the tolerances outlined in step 10 of Installation.
13. Perform the Follow-On Service procedure at the end of this work package.

## **CLUTCH (UP AND DOWN/LEFT AND RIGHT) REPLACEMENT**

### **REMOVAL**

1. Perform the Motor (Up and Down/Left and Right) Removal procedure in this work package.
2. Remove the self-locking nut (figure 4, item 11) from the shaft (figure 4, item 12). Discard the self-locking nut.
3. Remove the flat washer (figure 4, item 13) and spring (figure 4, item 14) from the shaft (figure 4, item 12).
4. Remove the woodruff key (figure 4, item 15) from the shaft (figure 4, item 12).
5. Remove the lower clutch plate (figure 4, item 16) from the shaft (figure 4, item 12).
6. Remove the setscrew (figure 4, item 17) from the upper clutch plate (figure 4, item 18).
7. Remove the upper clutch plate (figure 4, item 18) and worm gear (figure 4, item 19) from the shaft (figure 4, item 12).

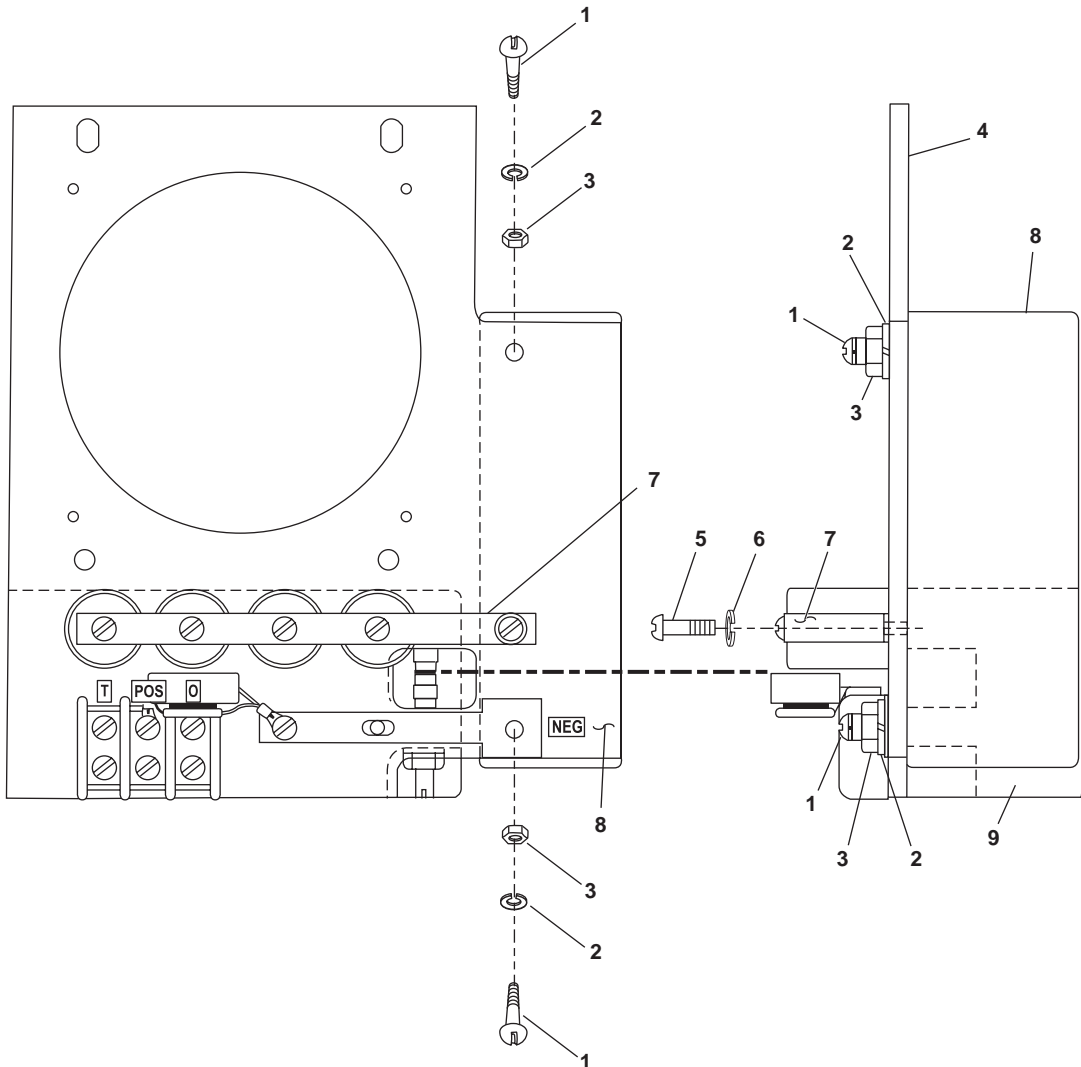
### **INSTALLATION**

1. Install the upper clutch plate (figure 4, item 18) and worm gear (figure 4, item 19) on the shaft (figure 4, item 12).
2. Install the setscrew (figure 4, item 17) in the upper clutch plate (figure 4, item 18).
3. Install the lower clutch plate (figure 4, item 16) on the shaft (figure 4, item 12).
4. Install the woodruff key (figure 4, item 15) in the shaft (figure 4, item 12).
5. Install the flat washer (figure 4, item 13) and spring (figure 4, item 14) on the shaft (figure 4, item 12).
6. Install a new self-locking nut (figure 4, item 11) on the shaft (figure 4, item 12).
7. Perform the Motor (Up and Down/Left and Right) Installation procedure in this work package.

## **TRANSFORMER REPLACEMENT**

### **REMOVAL**

1. Perform the Lamp Starter Assembly Removal procedure in this work package.
2. Remove the two screws (figure 5, item 1), two lockwashers (figure 5, item 2), and two nuts (figure 5, item 3) from the lamp starter assembly (figure 5, item 4). Discard the lockwashers.
3. Remove the screw (figure 5, item 5) and lockwasher (figure 5, item 6) from the connector (figure 5, item 7). Discard the lockwasher.
4. Remove the RF transformer (figure 5, item 8) and the high voltage transformer (figure 5, item 9) from the lamp starter assembly (figure 5, item 4).



**Figure 5. Searchlight Lamp Starter Assembly Removed**

## INSTALLATION

1. Install the RF transformer (figure 5, item 8) and the high voltage transformer (figure 5, item 9) in the lamp starter assembly (figure 5, item 4).
2. Install the screw (figure 5, item 5) and new lockwasher (figure 5, item 6) in the connector (figure 5, item 7).
3. Install the two screws (figure 5, item 1), two lockwashers (figure 5, item 2), and two nuts (figure 5, item 3) in the lamp starter assembly (figure 5, item 4).
4. Perform the Lamp Starter Assembly Installation procedure in this work package.

**JOYSTICK CONTROLLER REPLACEMENT**

**REMOVAL**

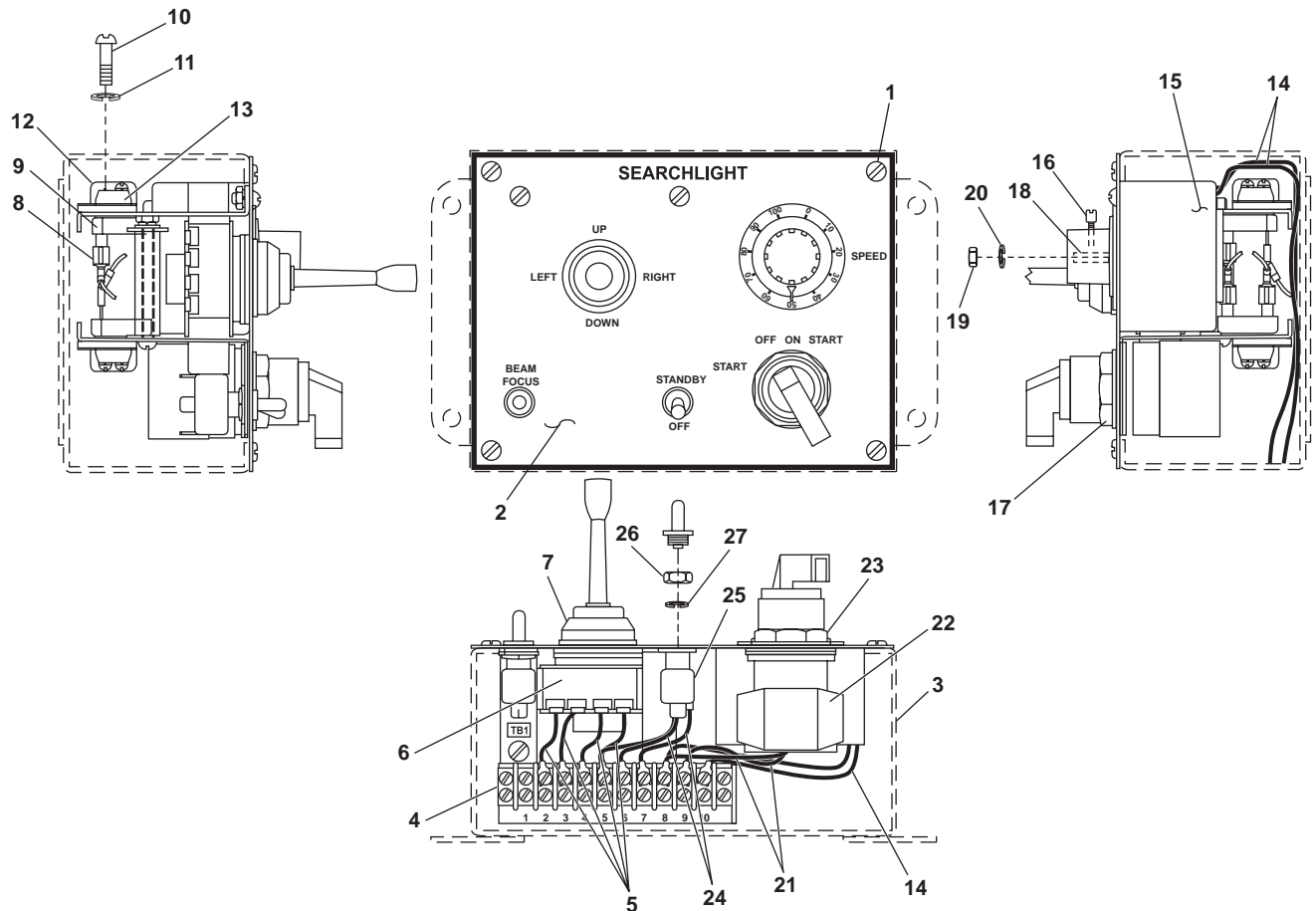
1. Remove the four screws (figure 6, item 1) from the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
2. Remove the cover plate (figure 6, item 2) from the control station (figure 6, item 3).

**WARNING**



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block (figure 6, item 4). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.



**Figure 6. Searchlight Control Station**

4. Label and remove the wiring (figure 6, item 5) of the joystick controller (figure 6, item 6) from the terminal block (figure 6, item 4).
5. Remove the nut (figure 6, item 7) from the joystick (figure 6, item 6).
6. Remove the joystick controller (figure 6, item 6) from the cover plate (figure 6, item 2).

## INSTALLATION

1. Install the joystick controller (figure 6, item 6) in the cover plate (figure 6, item 2).
2. Install the nut (figure 6, item 7) on the joystick controller (figure 6, item 6).
3. Connect the wiring (figure 6, item 5) of the joystick controller (figure 6, item 6) to the terminal block (figure 6, item 4) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Install the cover plate (figure 6, item 2) on the control station (figure 6, item 3).
5. Install the four screws (figure 6, item 1) in the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
6. Perform the Follow-On Service procedure at the end of this work package.

## RECTIFIER DIODE IN SEARCHLIGHT CONTROL PANEL REPLACEMENT

### REMOVAL

1. Remove the four screws (figure 6, item 1) from the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
2. Remove the cover plate (figure 6, item 2) from the control station (figure 6, item 3).

### WARNING



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block (figure 6, item 4). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 6, item 8) from the rectifier diode (figure 6, item 9).
5. Remove the two screws (figure 6, item 10) and two lockwashers (figure 6, item 11) from the terminal block (figure 6, item 12). Discard the lockwashers.
6. Remove the terminal block (figure 6, item 12), spacer (figure 6, item 13), and rectifier diode (figure 6, item 9) from the control station (figure 6, item 3).

## INSTALLATION

1. Install the terminal block (figure 6, item 12), spacer (figure 6, item 13), and rectifier diode (figure 6, item 9) in the control station (figure 6, item 3).
2. Install the two screws (figure 6, item 10) and two new lockwashers (figure 6, item 11) in the terminal block (figure 6, item 12).
3. Connect the wiring (figure 6, item 8) to the rectifier diode (figure 6, item 9) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Install the cover plate (figure 6, item 2) on the control station (figure 6, item 3).
5. Install the four screws (figure 6, item 1) in the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
6. Perform the Follow-On Service procedure at the end of this work package.

## CONTROL PANEL ADJUSTABLE TRANSFORMER REPLACEMENT

### REMOVAL

1. Remove the four screws (figure 6, item 1) from the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
2. Remove the cover plate (figure 6, item 2) from the control station (figure 6, item 3).



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block (figure 6, item 4). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 6, item 14) from the transformer (figure 6, item 15).
5. Remove the setscrew (figure 6, item 16) from the knob (figure 6, item 17).
6. Remove the knob (figure 6, item 17) from the shaft (figure 6, item 18).
7. Remove the nut (figure 6, item 19) and lockwasher (figure 6, item 20) from the shaft (figure 6, item 18). Discard the lockwasher.
8. Remove the transformer (figure 6, item 15) from the cover plate (figure 6, item 2).

### INSTALLATION

1. Install the transformer (figure 6, item 15) in the cover plate (figure 6, item 2).
2. Install the nut (figure 6, item 19) and new lockwasher (figure 6, item 20) on the shaft (figure 6, item 18).

3. Install the knob (figure 6, item 17) on the shaft (figure 6, item 18).
4. Install the setscrew (figure 6, item 16) in the knob (figure 6, item 17).
5. Connect the wiring (figure 6, item 14) to the transformer (figure 6, item 15) using the labels from step 4 of Removal as a guide. Remove the labels.
6. Install the cover plate (figure 6, item 2) on the control station (figure 6, item 3).
7. Install the four screws (figure 6, item 1) in the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
8. Perform the Follow-On Service procedure at the end of this work package.

## CONTROL PANEL SELECTOR SWITCH REPLACEMENT

### REMOVAL

1. Remove the four screws (figure 6, item 1) from the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
2. Remove the cover plate (figure 6, item 2) from the control station (figure 6, item 3).



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block (figure 6, item 4). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 6, item 21) from the selector switch (figure 6, item 22).
5. Remove the nut (figure 6, item 23) from the selector switch (figure 6, item 22).
6. Remove the selector switch (figure 6, item 22) from the cover plate (figure 6, item 2).

### INSTALLATION

1. Install the selector switch (figure 6, item 22) in the cover plate (figure 6, item 2).
2. Install the nut (figure 6, item 23) on the selector switch (figure 6, item 22).
3. Connect the wiring (figure 6, item 21) to the selector switch (figure 6, item 22) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Install the cover plate (figure 6, item 2) on the control station (figure 6, item 3).
5. Install the four screws (figure 6, item 1) in the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
6. Perform the Follow-On Service procedure at the end of this work package.



---

## CONTROL PANEL TOGGLE SWITCH REPLACEMENT

### REMOVAL

1. Remove the four screws (figure 6, item 1) from the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
2. Remove the cover plate (figure 6, item 2) from the control station (figure 6, item 3).



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block (figure 6, item 4). If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 6, item 24) from the toggle switch (figure 6, item 25).
5. Remove the nut (figure 6, item 26) and lockwasher (figure 6, item 27) from the toggle switch (figure 6, item 25). Discard the lockwasher.
6. Remove the toggle switch (figure 6, item 25) from the cover plate (figure 6, item 2).

### INSTALLATION

1. Install the toggle switch (figure 6, item 25) in the cover plate (figure 6, item 2).
2. Install the nut (figure 6, item 26) and new lockwasher (figure 6, item 27) on the toggle switch (figure 6, item 25).
3. Connect the wiring (figure 6, item 24) to the toggle switch (figure 6, item 25) using the labels from step 4 of Removal as a guide. Remove the labels.
4. Install the cover plate (figure 6, item 2) on the control station (figure 6, item 3).
5. Install the four screws (figure 6, item 1) in the cover plate (figure 6, item 2) of the control station (figure 6, item 3).
6. Perform the Follow-On Service procedure at the end of this work package.

### FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).
2. Lubricate the searchlight, align the searchlight, and verify the spark gap adjustment (WP 0133 00, volume 1).
3. Perform the Illumination And Navigation Signals Test procedure (WP 0232 00).
4. Return the searchlight to the desired readiness condition.

### END OF WORK PACKAGE



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
NAVIGATION LIGHTING PANEL, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Light Panel, Navigation (Item 1, Figure 66,  
WP 0301 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
WP 0295 00  
WP 0301 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the NAVIGATION LIGHTING PANEL circuit breaker on the 120V emergency load center distribution panel. Lock out and tag out (FM 55-502).

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

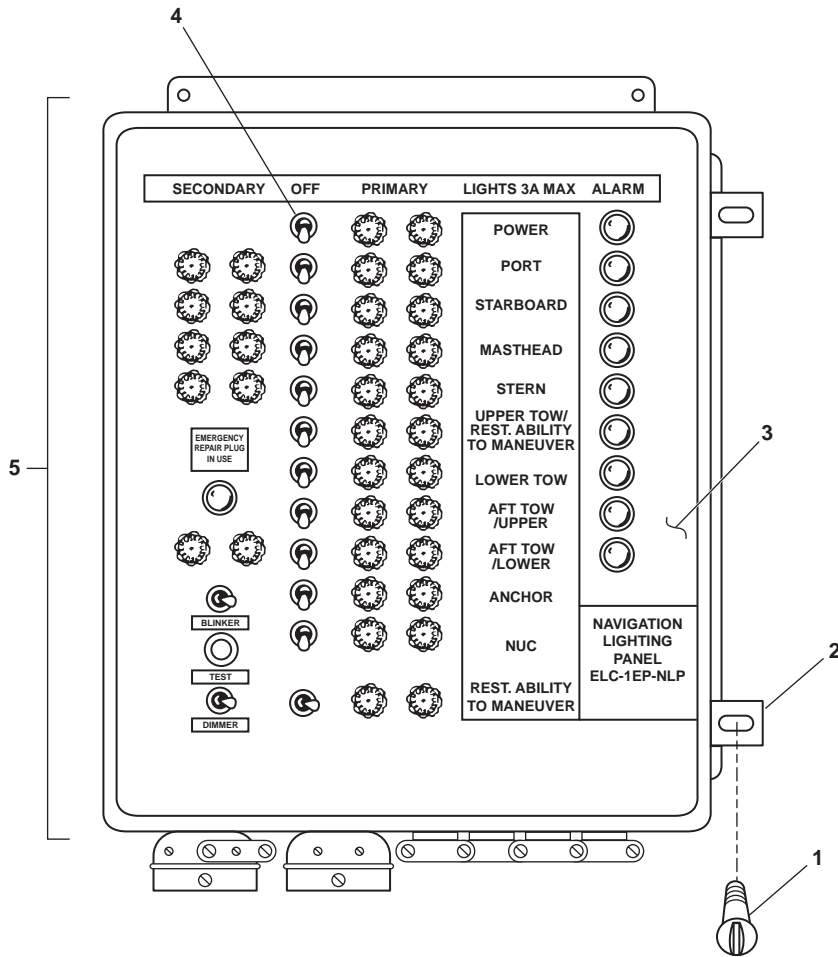
1. Loosen the two captive screws (figure 1, item 1) securing the clamps (figure 1, item 2) on the navigation lighting panel door (figure 1, item 3).
2. Rotate the clamps (figure 1, item 2) off the lip of the navigation lighting panel door (figure 1, item 3) and OPEN the door.

**WARNING**



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at terminal block 1 (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.



**Figure 1. Navigation Lighting Panel**

4. Label and remove the wiring (figure 2, item 2) from the input side of terminal block 1 (figure 2, item 1).
5. Loosen the two screws (figure 2, item 3) on the strain relief clamps (figure 2, item 4) and remove the wiring (figure 2, item 2) from the navigation lighting panel (figure 2, item 5).
6. Remove the four bolts (figure 2, item 6), four flat washers (figure 2, item 7), four lockwashers (figure 2, item 8), and four nuts (figure 2, item 9) from the navigation lighting panel (figure 2, item 5). Discard the lockwashers.
7. Remove the navigation lighting panel (figure 2, item 5) from the bulkhead.

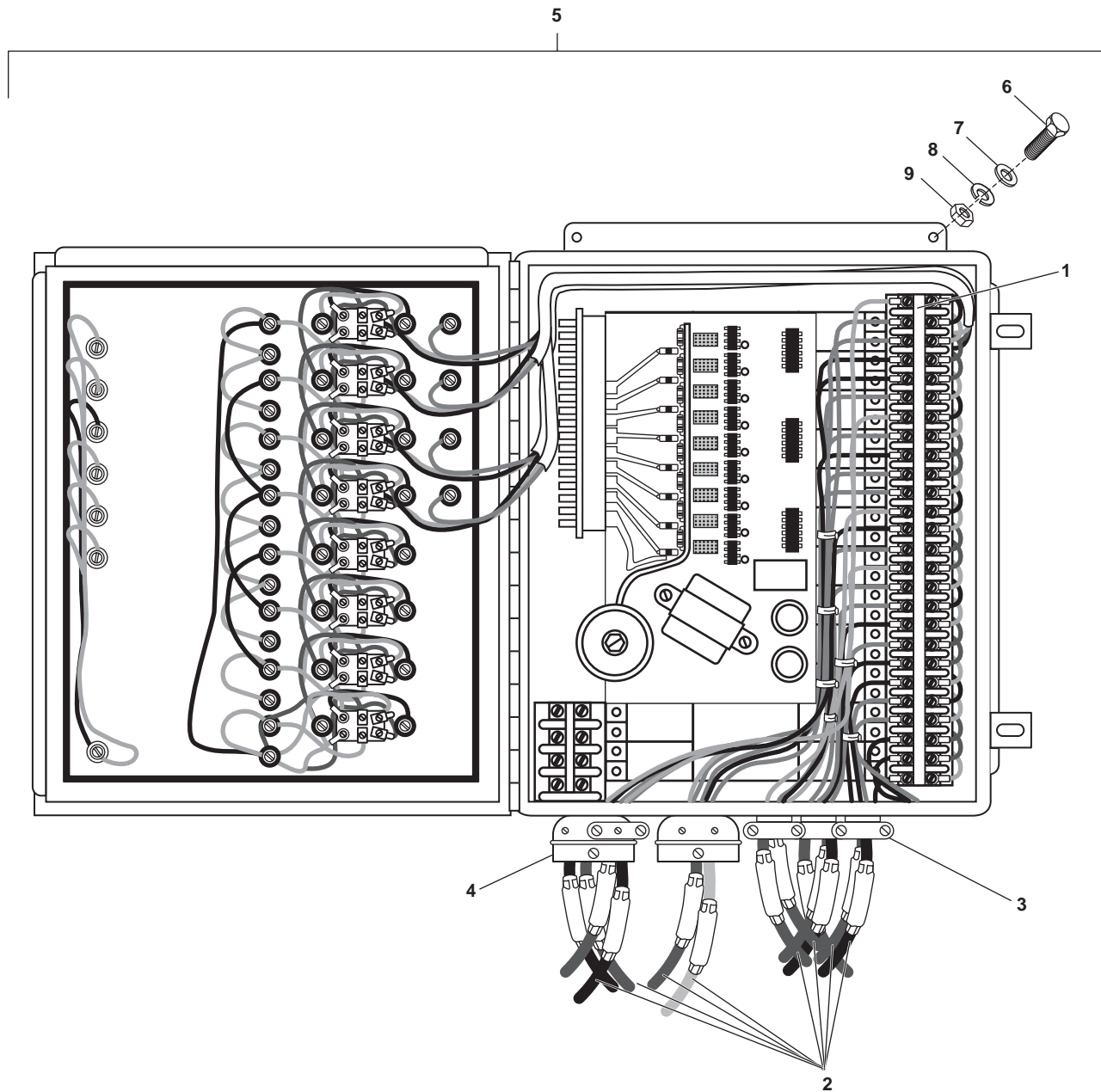


Figure 2. Internal Components of the Navigation Lighting Panel

**INSTALLATION**

1. Install the navigation lighting panel (figure 2, item 5) on the bulkhead and secure it with the four bolts (figure 2, item 6), four flat washers (figure 2, item 7), four new lockwashers (figure 2, item 8), and four nuts (figure 2, item 9).
2. Install the wiring (figure 2, item 2) through the strain relief clamps (figure 2, item 4) and in the navigation lighting panel (figure 2, item 5).

- 
3. Connect the wiring (figure 2, item 2) to the input side of terminal block 1 (figure 2, item 1) using the labels from step 4 of Removal as a guide. Remove the labels.
  4. Tighten the two screws (figure 2, item 3) on the strain relief clamps (figure 2, item 4). CLOSE the navigation lighting panel door (figure 1, item 3).
  5. Install the clamps (figure 1, item 2) over the lip of the navigation lighting panel door (figure 1, item 3) and secure them with the two captive screws (figure 1, item 1).
  6. Remove the lockouts and tagouts (FM 55-502).
  7. Set to ON the NAVIGATION LIGHTING PANEL circuit breaker on the 120V emergency load center distribution panel.
  8. Set to ON all ON/OFF toggle switches (figure 1, item 4) on the navigation lighting panel (figure 1, item 5) and verify that all navigation lights illuminate.
  9. Return the navigation lighting panel to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
NAVIGATION LIGHTING PANEL, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
TB 43-0218  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Equipment Conditions:**

Set to OFF the NAVIGATION LIGHTING PANEL. circuit breaker on the 120V emergency load center distribution panel. Lock out and tag out (FM 55-502).

**Personnel Required:**

Two Watercraft Engineers, 88L

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**LAMP ASSEMBLY REPLACEMENT****REMOVAL**

1. Loosen the two captive screws (figure 1, item 1) securing the clamps (figure 1, item 2) on the navigation lighting panel door (figure 1, item 3).
2. Rotate the clamps (figure 1, item 2) off the lip of the navigation lighting panel door (figure 1, item 3) and OPEN the door.

**WARNING**



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block 1 (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 2, item 2) from the lamp assembly (figure 2, item 3).

5. Remove the nut (figure 1, item 4) from the lens (figure 1, item 5).
6. Remove the lens (figure 1, item 5) from the lamp assembly (figure 2, item 3).
7. Remove the nut (figure 2, item 4) from the lamp assembly (figure 2, item 3).
8. Remove the lamp assembly (figure 2, item 3) from the navigation lighting panel door (figure 2, item 5).

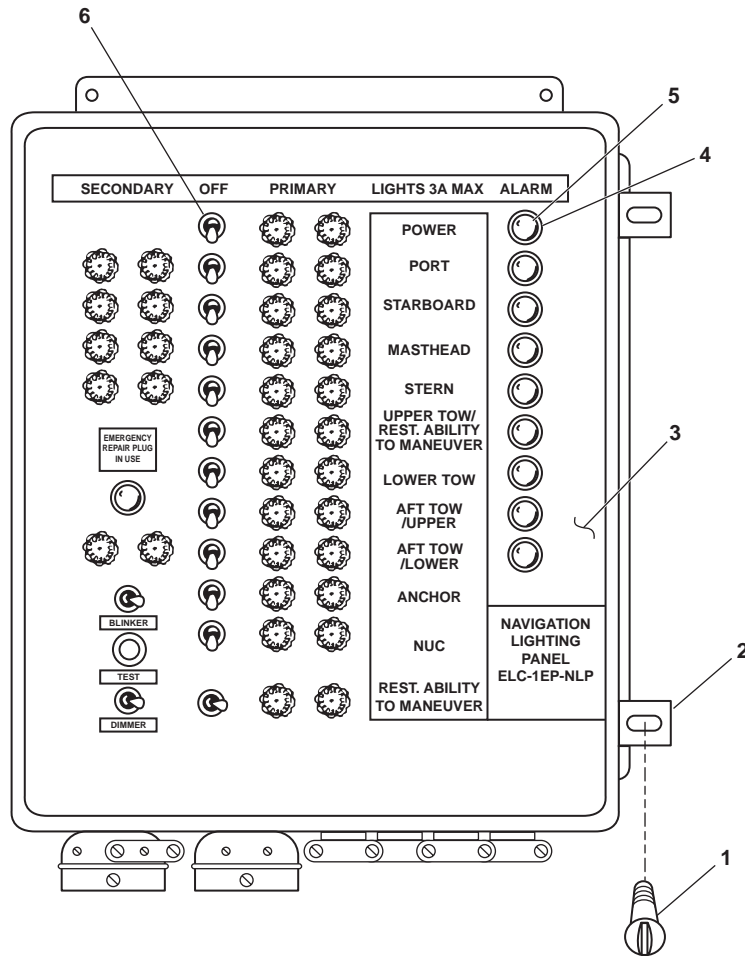


Figure 1. Navigation Lighting Panel



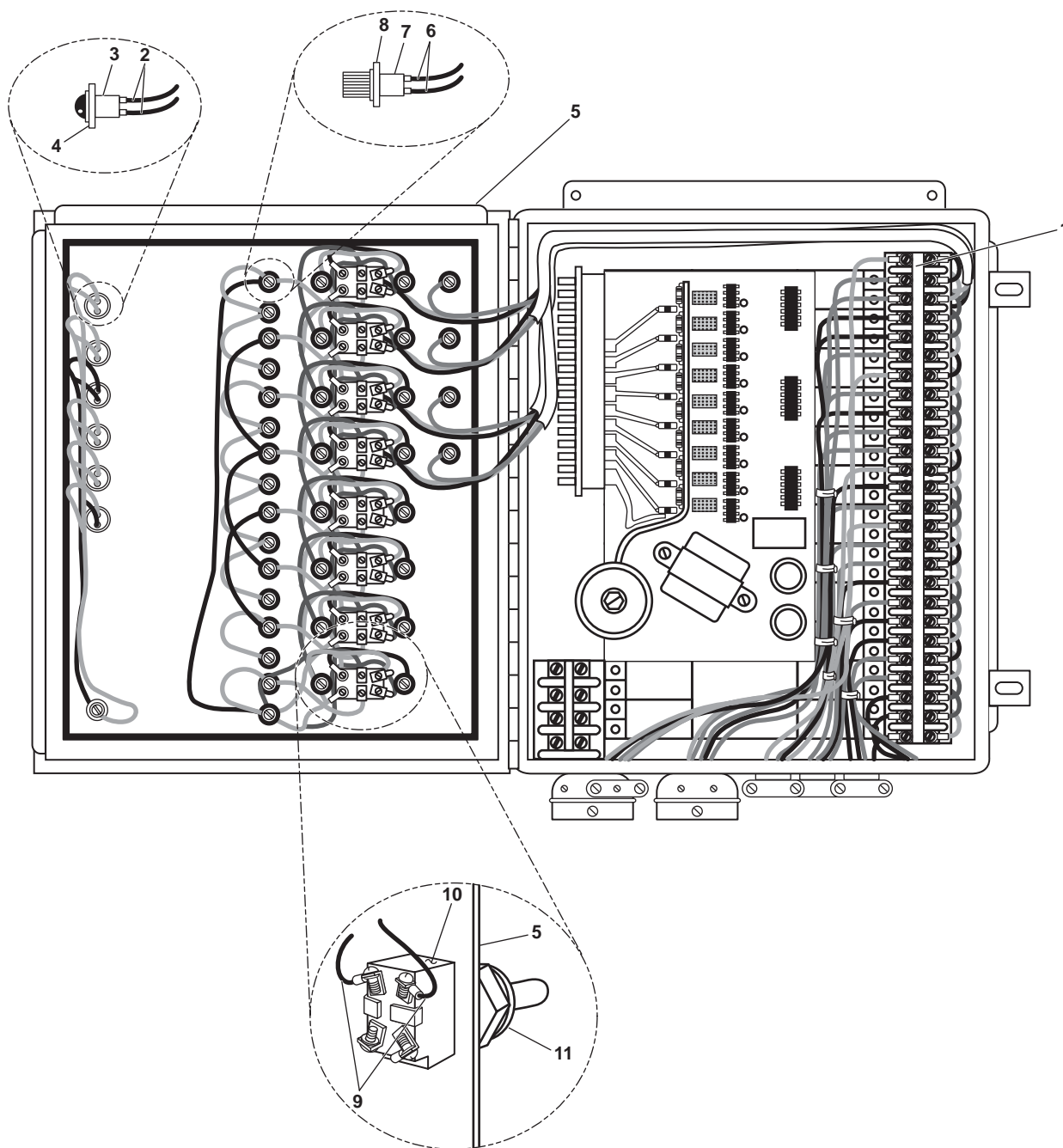


Figure 2. Navigation Lighting Panel (Open)

**INSTALLATION**

1. Install the lamp assembly (figure 2, item 3) in the navigation lighting panel door (figure 2, item 5)
2. Install the nut (figure 2, item 4) on the lamp assembly (figure 2, item 3).
3. Install the lens (figure 1, item 5) on the lamp assembly (figure 2, item 3).
4. Install the nut (figure 1, item 4) on the lens (figure 1, item 5).

5. Connect the wiring (figure 2, item 2) to the lamp assembly (figure 2, item 3) using the labels from step 4 of Removal as a guide. Remove the labels.
6. CLOSE the navigation lighting panel door (figure 1, item 3).
7. Install the clamps (figure 1, item 2) on the lip of the navigation lighting panel door (figure 1, item 3) and tighten the two captive screws (figure 1, item 1).
8. Perform the Follow-On Service procedure at the end of this work package.

## FUSE ASSEMBLY REPLACEMENT

### REMOVAL

1. Loosen the two captive screws (figure 1, item 1) securing the clamps (figure 1, item 2) on the navigation lighting panel door (figure 1, item 3).
2. Rotate the clamps (figure 1, item 2) off the lip of the navigation lighting panel door (figure 1, item 3) and OPEN the door.



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block 1 (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 2, item 6) from the fuse assembly (figure 2, item 7).
5. Remove the nut (figure 2, item 8) from the fuse assembly (figure 2, item 7).
6. Remove the fuse assembly (figure 2, item 7) from the navigation lighting panel door (figure 2, item 5).

### INSTALLATION

1. Install the fuse assembly (figure 2, item 7) in the navigation lighting panel door (figure 2, item 5) and secure it with the nut (figure 2, item 8).
2. Connect the wiring (figure 2, item 6) to the fuse assembly (figure 2, item 7) using the labels from step 4 of Removal as a guide. Remove the labels.
3. CLOSE the navigation lighting panel door (figure 1, item 3).
4. Install the clamps (figure 1, item 2) on the lip of the navigation lighting panel door (figure 1, item 3) and tighten the two captive screws (figure 1, item 1).
5. Perform the Follow-On Service procedure at the end of this work package.

---

## TOGGLE SWITCH ASSEMBLY REPLACEMENT

### REMOVAL

1. Loosen the two captive screws (figure 1, item 1) securing the clamps (figure 1, item 2) on the navigation lighting panel door (figure 1, item 3).
2. Rotate the clamps (figure 1, item 2) off the lip of the navigation lighting panel door (figure 1, item 3) and OPEN the door.



**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the terminal block 1 (figure 2, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 2, item 9) from the toggle switch assembly (figure 2, item 10).
5. Remove the nut (figure 2, item 11) from the navigation lighting panel door (figure 2, item 5).
6. Remove the toggle switch assembly (figure 2, item 10) from the navigation lighting panel door (figure 2, item 5).

### INSTALLATION

1. Install the toggle switch assembly (figure 2, item 10) in the navigation lighting panel door (figure 2, item 5) and secure it with the nut (figure 2, item 11).
2. Connect the wiring (figure 2, item 9) to the toggle switch assembly (figure 2, item 10) using the labels from step 4 of Removal as a guide. Remove the labels.
3. CLOSE the navigation lighting panel door (figure 1, item 3).
4. Install the clamps (figure 1, item 2) on the lip of the navigation lighting panel door (figure 1, item 3) and tighten the two captive screws (figure 1, item 1).
5. Perform the Follow-On Service procedure at the end of this work package.

**FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).
2. Set to ON the NAVIGATION LIGHTING PANEL. circuit breaker on the 120V emergency load center distribution panel.
3. Set to ON all ON/OFF toggle switches (figure 1, item 6) on the navigation lighting panel door (figure 1, item 3) and verify that all navigation lights illuminate.
4. Return the navigation lighting panel to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
INTERIOR COMMUNICATIONS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0302 00  
WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Attenuator (Volume Control Box) (Item 4, Figure 67,  
WP 0302)

**Equipment Conditions:**

Set to OFF the P.A. SYSTEM circuit breaker at the 120V  
elect distribution panel. Lock out and tag out (FM  
55-502).

**Personnel Required:**

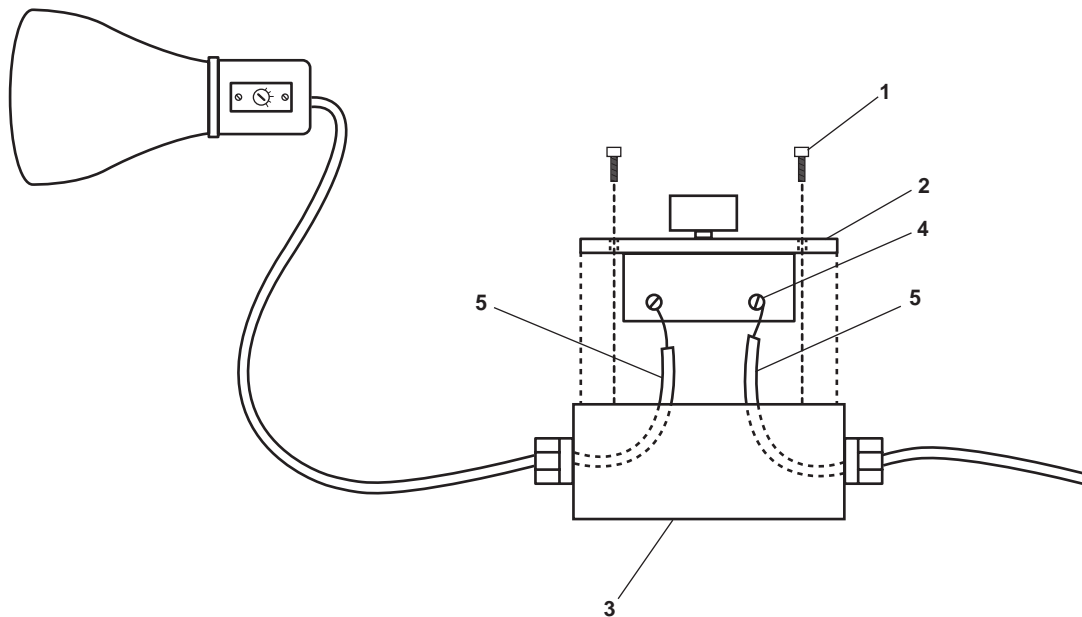
Two Watercraft Engineers, 88L

---

**INTERIOR COMMUNICATIONS SYSTEM, VOLUME CONTROL BOX REPLACEMENT**

**REMOVAL**

1. Remove the two screws (figure 1, item 1) from the volume control box face plate (figure 1, item 2).



**Figure 1. Volume Control Box**

**WARNING**

**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement with the circuit energized may result in serious injury or death.**

2. Remove the volume control box face plate (figure 1, item 2) from the volume control box (figure 1, item 3).
3. Use a multimeter to check for voltage at the wiring terminals (figure 1, item 4). If voltage is present, ensure that the appropriate circuit breakers have been set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label and remove the wiring (figure 1, item 5) from the volume control box face plate (figure 1, item 2).

**INSTALLATION**

1. Connect electrical wiring (figure 1, item 5) to the volume control box face plate (figure 1, item 2) using the labels from step 4 of Removal as a guide. Remove the labels.
2. Install the volume control box face plate (figure 1, item 2) on the volume control box (figure 1, item 3) and secure it with the two screws (figure 1, item 1).
3. Remove the lockouts and tagouts (FM 55-502).
4. Operate the intercommunication and sound powered telephone systems under usual conditions (TM 55-1925-273-10) and check for proper operation of the public address system.
5. Return the interior communications system to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SOUND POWERED TELEPHONES, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)

**References:**

WP 0295 00

**Personnel Required:**

One Watercraft Engineer, 88L

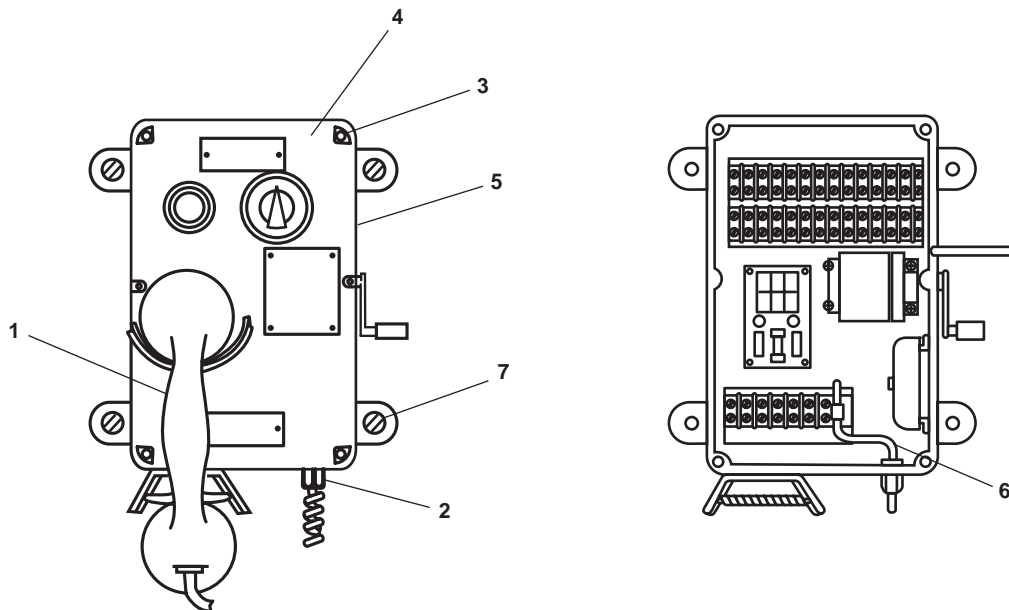
---

**HANDSET REPLACEMENT****NOTE**

The sound powered telephone system consists of similar sound powered telephones that contain identical handsets and headset-chestsets. The following procedures describe removal and installation procedures for both types of sound powered telephones.

**REMOVAL**

1. Remove the handset (figure 1, item 1) and disconnect the telephone cord nut (figure 1, item 2).
2. Remove the four screws (figure 1, item 3) from the front panel (figure 1, item 4) of the telephone assembly (figure 1, item 5).
3. Remove the front panel (figure 1, item 4) from the telephone assembly (figure 1, item 5).
4. Label and remove the wiring (figure 1, item 6) from the telephone assembly (figure 1, item 5).



**Figure 1. Sound Powered Telephone – Handset (Typical)**

5. Remove the four screws (figure 1, item 7) that secure the telephone assembly (figure 1, item 5) to the bulkhead.
6. Remove the telephone assembly (figure 1, item 5) from the bulkhead.

### **INSTALLATION**

1. Position the telephone assembly (figure 1, item 5) on the bulkhead.
2. Secure the telephone assembly (figure 1, item 5) to the bulkhead with the four screws (figure 1, item 7).
3. Remove the four screws (figure 1, item 3) and the front panel (figure 1, item 4) from the telephone assembly (figure 1, item 5).
4. Connect the wiring (figure 1, item 6) using the labels from step 4 of Removal as a guide. Remove the labels.
5. Install the front panel (figure 1, item 4) on the telephone assembly (figure 1, item 5) and secure it with the four screws (figure 1, item 3).
6. Connect the telephone cord by securing with the telephone cord nut (figure 1, item 2).
7. Replace the handset (figure 1, item 1).
8. Perform the Follow-On Service procedure at the end of this work package.

### **HEADSET - CHESTSET REPLACEMENT**

#### **REMOVAL**

1. Remove the headset-chestset (figure 2, item 1) by disconnecting the plug (figure 2, item 2) from the receptacle (figure 2, item 3) on the jack box (figure 2, item 4).
2. Check the receptacle (figure 2, item 3) for moisture. If moisture is present, allow it to air dry.



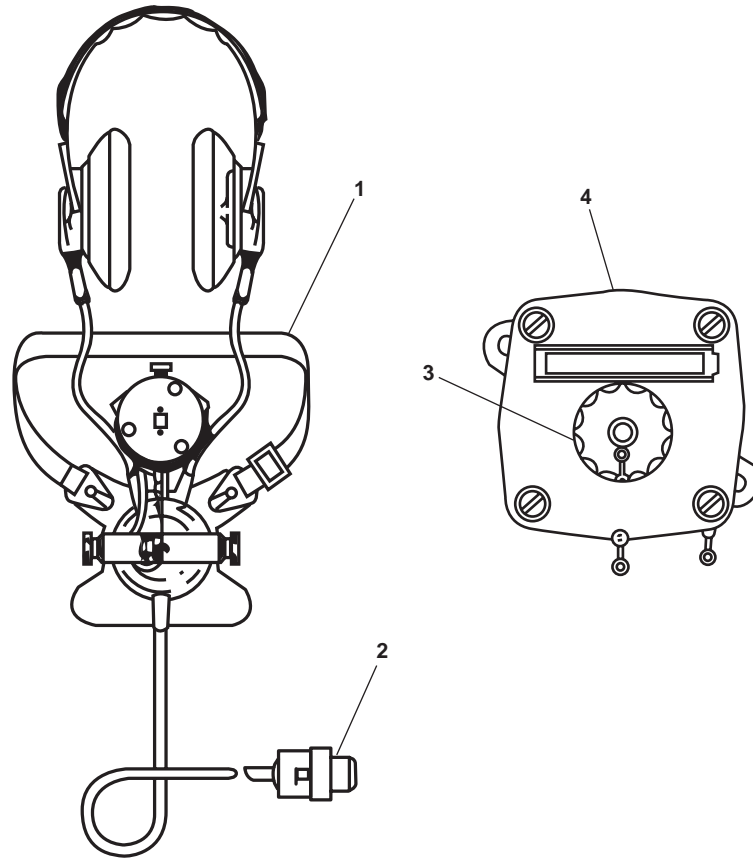


Figure 2. Sound Powered Telephone – Headset-Chestset (Typical)

### INSTALLATION

1. Connect the new headset-chestset assembly (figure 2, item 1) to the jack box (figure 2, item 4) by pushing the plug (figure 2, item 2) into the receptacle (figure 2, item 3).
2. Perform the Follow-On Service procedure at the end of this work package.

### FOLLOW-ON SERVICE

1. Ensure that the sound powered telephone system operates properly by allowing other sound powered stations to transmit and receive voice communications to and from the replaced station.
2. Return the equipment to the desired readiness condition.

### END OF WORK PACKAGE



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SOUND POWERED TELEPHONES, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
FM 55-509-1  
TM 55-1925-273-10  
WP 0240 00  
WP 0295 00  
WP 0307 00

**Materials/Parts**

Rubber Cement (Item 151, Table 1, WP 0307 00)

**Equipment Conditions:**

Sound powered telephone removed (WP 0240 00).

**Personnel Required:**

One Watercraft Engineer, 88L

---

**NOTE**

This work package contains the repair procedures for the MWT-246J, SW-23J, SWLR-243J, and the SW-243J sound powered telephones.

**MWT-246J GASKET REPLACEMENT****REMOVAL**

1. Loosen the T-handle (figure 1, item 1) and OPEN the cover (figure 1, item 2) of the handset box (figure 1, item 3).
2. Remove the gasket (figure 1, item 4) from the telephone handset box (figure 1, item 3).

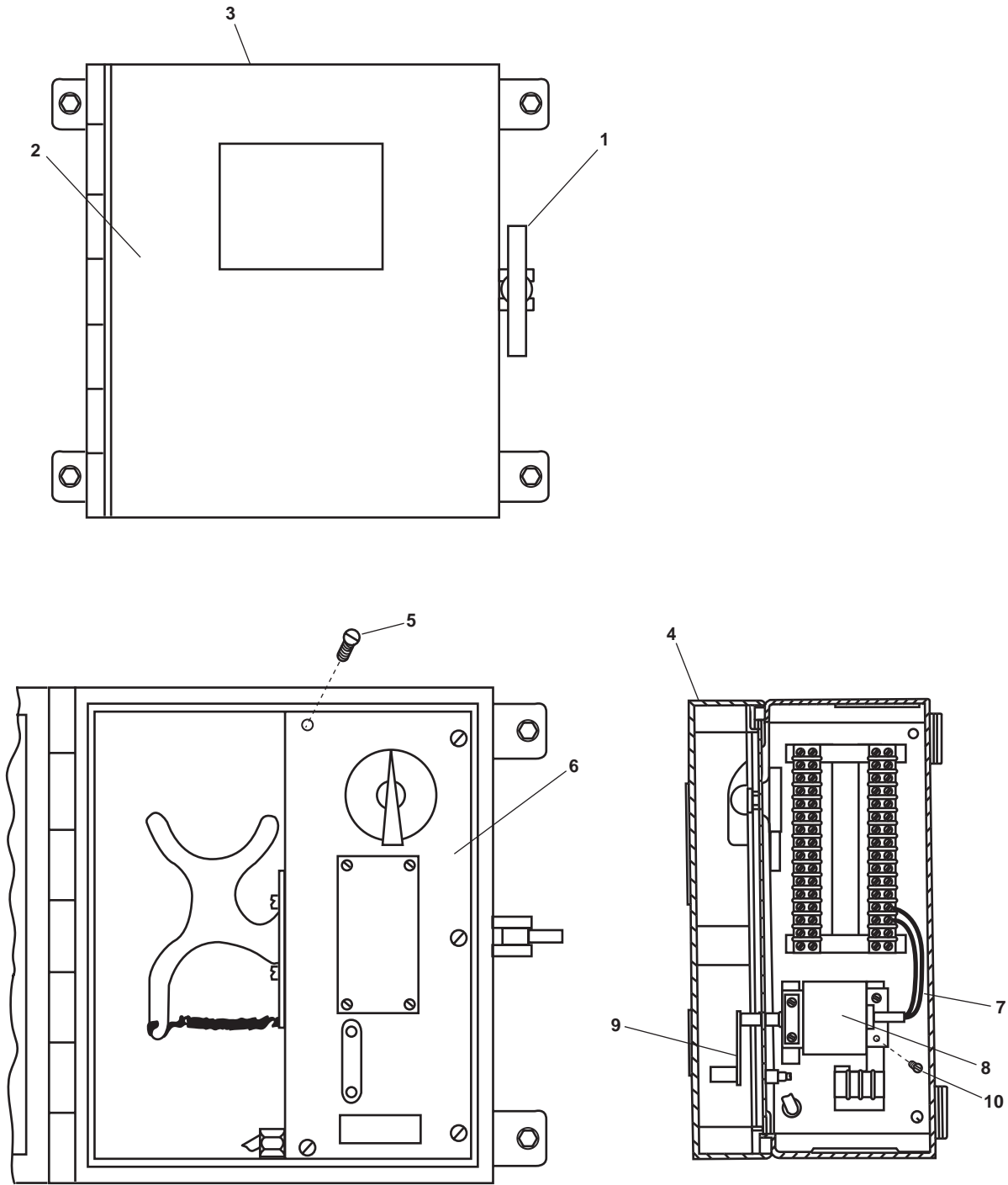


Figure 1. Sound Powered Telephone MWT-246J

---

**INSTALLATION**

1. Install the gasket (figure 1, item 4) in the telephone handset box (figure 1, item 3) and secure it with rubber cement.
2. CLOSE the cover (figure 1, item 2) of the handset box (figure 1, item 3) and tighten the T-handle (figure 1, item 1).

**MWT-246J HAND RINGING GENERATOR REPLACEMENT****REMOVAL**

1. Loosen the T-handle (figure 1, item 1) and OPEN the cover (figure 1, item 2) of the handset box (figure 1, item 3).
2. Remove the five screws (figure 1, item 5) from the mounting plate (figure 1, item 6).
3. Remove the mounting plate (figure 1, item 6) from the handset box (figure 1, item 3).
4. Label and remove the wiring (figure 1, item 7) from the hand ringing generator (figure 1, item 8).
5. Remove the manual control handle (figure 1, item 9) from the hand ringing generator (figure 1, item 8) by turning it counterclockwise.
6. Remove the four screws (figure 1, item 10) from the hand ringing generator (figure 1, item 8).
7. Remove the hand ringing generator (figure 1, item 8) from the handset box (figure 1, item 3).

**INSTALLATION**

1. Install the hand ringing generator (figure 1, item 8) in the handset box (figure 1, item 3).
2. Install the four screws (figure 1, item 10) in the hand ringing generator (figure 1, item 8).
3. Install the manual control handle (figure 1, item 9) on the hand ringing generator (figure 1, item 8).
4. Connect the wiring (figure 1, item 7) to the hand ringing generator (figure 1, item 8) using the labels from step 4 of Removal as a guide. Remove the labels.
5. Install the mounting plate (figure 1, item 6) on the handset box (figure 1, item 3).
6. Install the five screws (figure 1, item 5) in the mounting plate (figure 1, item 6).
7. CLOSE the cover (figure 1, item 2) of the handset box (figure 1, item 3) and tighten the T-handle (figure 1, item 1).

**MWT-246J MANUAL CONTROL HANDLE REPLACEMENT****REMOVAL**

1. Loosen the T-handle (figure 1, item 1) and OPEN the cover (figure 1, item 2) of the handset box (figure 1, item 3).
2. Remove the manual control handle (figure 1, item 9) from the hand ringing generator (figure 1, item 8) by turning it counterclockwise.

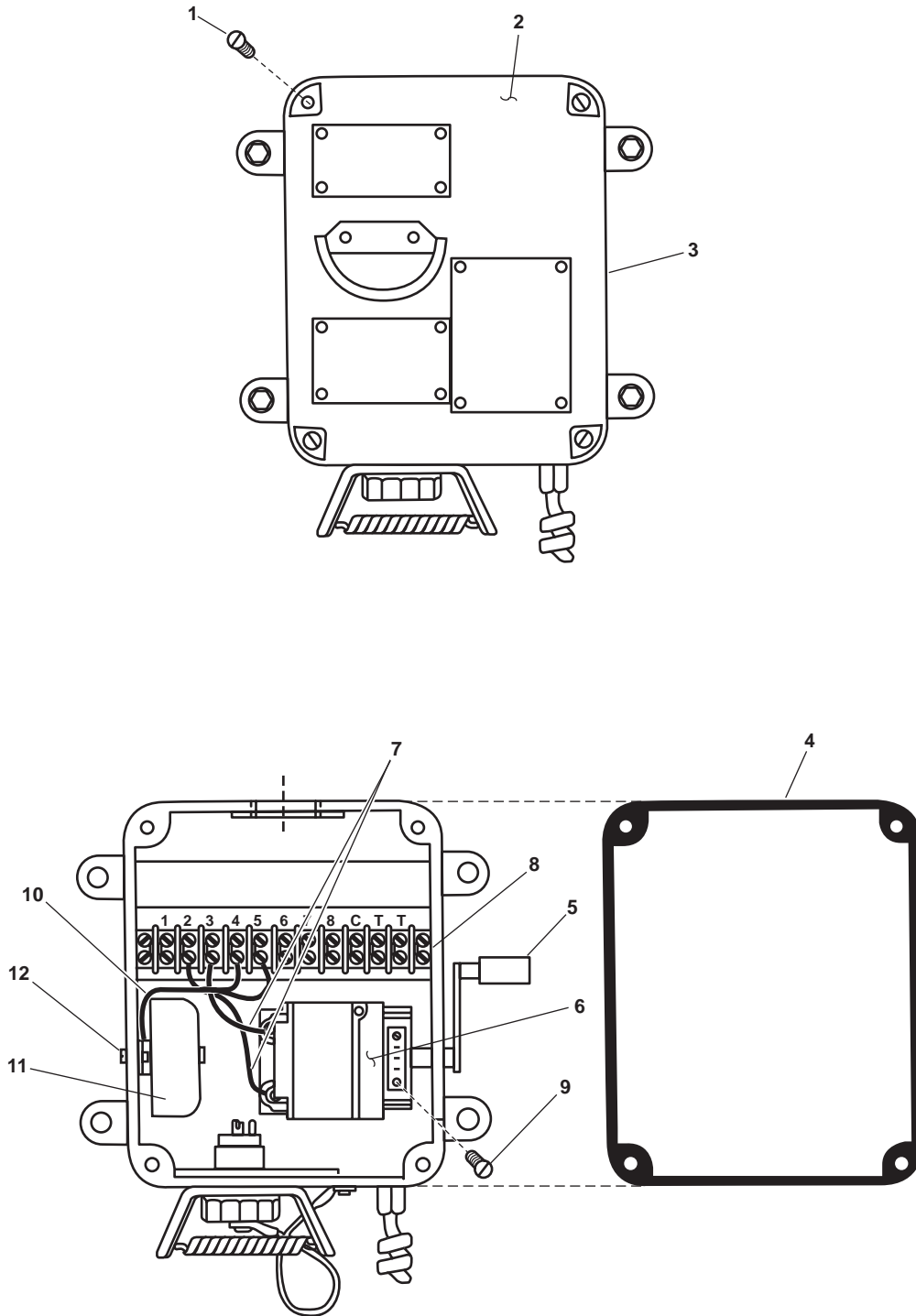
**INSTALLATION**

1. Install the manual control handle (figure 1, item 9) on the hand ringing generator (figure 1, item 8).
2. CLOSE the cover (figure 1, item 2) of the handset box (figure 1, item 3) and tighten the T-handle (figure 1, item 1).

**SW-23J GASKET REPLACEMENT**

**REMOVAL**

1. Remove the four screws (figure 2, item 1) from the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).



**Figure 2. Sound Powered Telephone SW-23J**

2. Remove the cover (figure 2, item 2) from the SW-23J telephone junction box (figure 2, item 3).
3. Remove the gasket (figure 2, item 4) from the SW-23J telephone junction box (figure 2, item 3).

### **INSTALLATION**

1. Install the gasket (figure 2, item 4) on the SW-23J telephone junction box (figure 2, item 3).
2. Install the cover (figure 2, item 2) on the SW-23J telephone junction box (figure 2, item 3).
3. Install the four screws (figure 2, item 1) in the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).

### **SW-23J HAND RINGING GENERATOR REPLACEMENT**

#### **REMOVAL**

1. Remove the four screws (figure 2, item 1) from the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).
2. Remove the cover (figure 2, item 2) from the SW-23J telephone junction box (figure 2, item 3).
3. Remove the manual control handle (figure 2, item 5) from the hand ringing generator (figure 2, item 6) by turning it counterclockwise.
4. Label and remove the wiring (figure 2, item 7) of the hand ringing generator (figure 2, item 6) from the terminal board (figure 2, item 8).
5. Remove the two screws (figure 2, item 9) from the hand ringing generator (figure 2, item 6).
6. Remove the hand ringing generator (figure 2, item 6) from the SW-23J junction box (figure 2, item 3).

#### **INSTALLATION**

1. Install the hand ringing generator (figure 2, item 6) in the SW-23J junction box (figure 2, item 3).
2. Install the two screws (figure 2, item 9) in the hand ringing generator (figure 2, item 6).
3. Install the manual control handle (figure 2, item 5) on the hand ringing generator (figure 2, item 6).
4. Connect the wiring (figure 2, item 7) of the hand ringing generator (figure 2, item 6) to the terminal board (figure 2, item 8) using the labels from step 4 of Removal as a guide. Remove the labels.
5. Install the cover (figure 2, item 2) on the SW-23J telephone junction box (figure 2, item 3).
6. Install the four screws (figure 2, item 1) in the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).

### **SW-23J MANUAL CONTROL HANDLE REPLACEMENT**

#### **REMOVAL**

1. Remove the four screws (figure 2, item 1) from the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).
2. Remove the cover (figure 2, item 2) from the SW-23J telephone junction box (figure 2, item 3).

3. Remove the manual control handle (figure 2, item 5) from the hand ringing generator (figure 2, item 6) by turning it counterclockwise.

## **INSTALLATION**

1. Install the manual control handle (figure 2, item 5) on the hand ringing generator (figure 2, item 6).
2. Install the cover (figure 2, item 2) on the SW-23J telephone junction box (figure 2, item 3).
3. Install the four screws (figure 2, item 1) in the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).

## **SW-23J ELECTRIC BELL REPLACEMENT**

### **REMOVAL**

1. Remove the four screws (figure 2, item 1) from the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).
2. Remove the cover (figure 2, item 2) from the SW-23J telephone junction box (figure 2, item 3).
3. Label and remove the wiring (figure 2, item 10) of the electric bell (figure 2, item 11) from the terminal board (figure 2, item 8).
4. Remove the screw (figure 2, item 12) that secures the electric bell (figure 2, item 11) to the SW-23J telephone junction box (figure 2, item 3).
5. Remove the electric bell (figure 2, item 11) from the SW-23J telephone junction box (figure 2, item 3).

### **INSTALLATION**

1. Install the electric bell (figure 2, item 11) in the SW-23J telephone junction box (figure 2, item 3).
2. Install the screw (figure 2, item 12) that secures the electric bell (figure 2, item 11) in the SW-23J telephone junction box (figure 2, item 3).
3. Connect the wiring (figure 2, item 10) of the electric bell (figure 2, item 11) to the terminal board (figure 2, item 8) using the labels from step 3 of Removal as a guide. Remove the labels.
4. Install the cover (figure 2, item 2) on the SW-23J telephone junction box (figure 2, item 3).
5. Install the four screws (figure 2, item 1) in the cover (figure 2, item 2) of the SW-23J telephone junction box (figure 2, item 3).

## **SWLR-243J GASKET REPLACEMENT**

### **REMOVAL**

1. Remove the four screws (figure 3, item 1) from the SWLR-243J telephone cover (figure 3, item 2).
2. Remove the SWLR-243J telephone cover (figure 3, item 2) from the SWLR-243J telephone junction box (figure 3, item 3).
3. Remove the gasket (figure 3, item 4) from the SWLR-243J telephone junction box (figure 3, item 3).



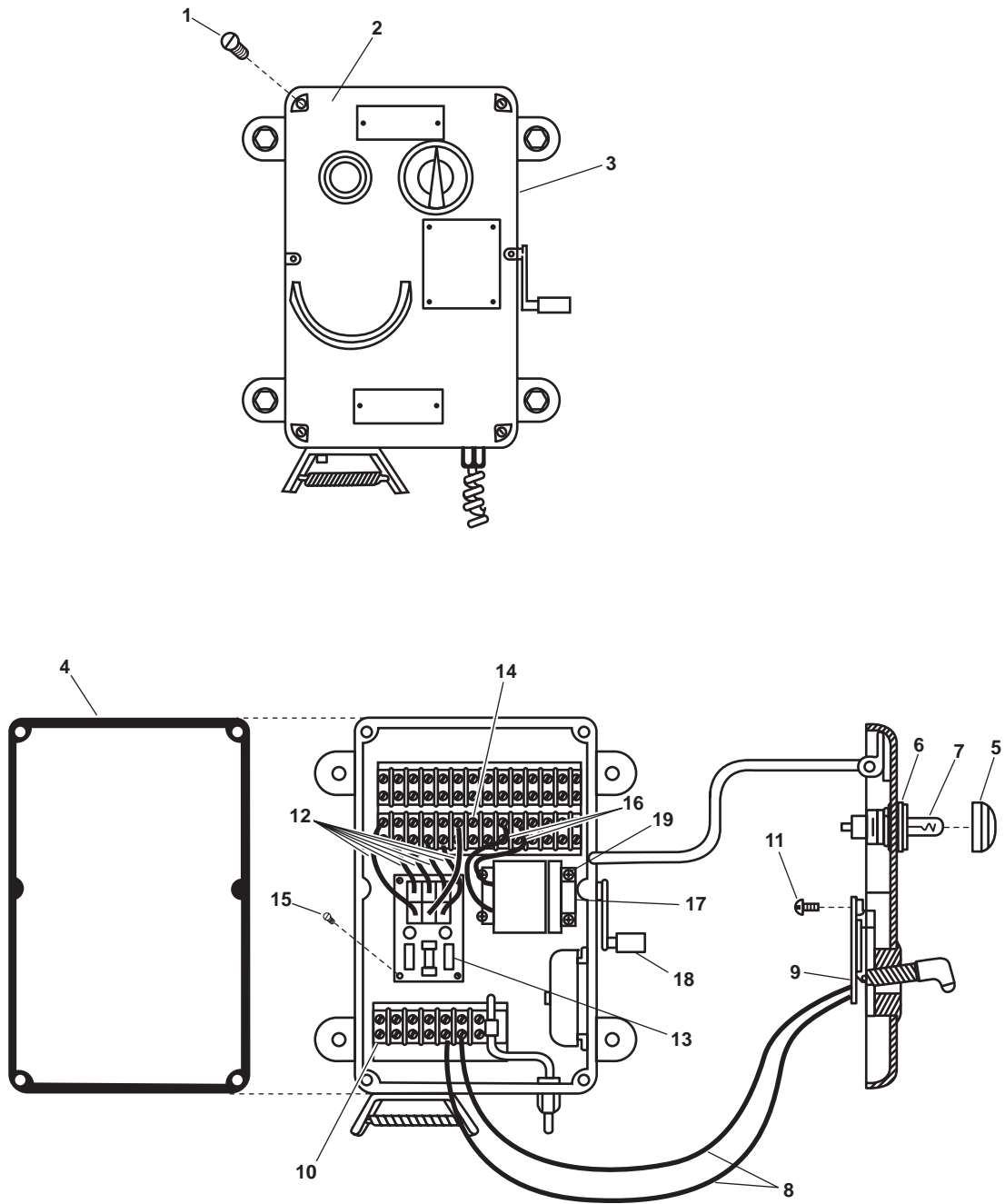


Figure 3. Sound Powered Telephone SWLR-243J

---

**INSTALLATION**

1. Install the gasket (figure 3, item 4) on the SWLR-243J telephone junction box (figure 3, item 3).
2. Install the SWLR-243J telephone cover (figure 3, item 2) on the SWLR-243J telephone junction box (figure 3, item 3).
3. Install the four screws (figure 3, item 1) in the SWLR-243J telephone cover (figure 3, item 2).

**SWLR-243J LIGHT ASSEMBLY LAMP REPLACEMENT****REMOVAL**

1. Remove the lens (figure 3, item 5) from the SWLR-243J light assembly (figure 3, item 6).
2. Remove the lamp (figure 3, item 7) from the SWLR-243J light assembly (figure 3, item 6).

**INSTALLATION**

1. Install the lamp (figure 3, item 7) in the SWLR-243J light assembly (figure 3, item 6).
2. Install the lens (figure 3, item 5) on the SWLR-243J light assembly (figure 3, item 6).

**SWLR-243J HOOK SWITCH REPLACEMENT****REMOVAL**

1. Remove the four screws (figure 3, item 1) from the SWLR-243J telephone cover (figure 3, item 2).
2. Remove the SWLR-243J telephone cover (figure 3, item 2) from the SWLR-243J telephone junction box (figure 3, item 3).
3. Label and remove the wiring (figure 3, item 8) of the hook switch (figure 3, item 9) from the terminal board (figure 3, item 10).
4. Remove the two screws (figure 3, item 11) from the hook switch (figure 3, item 9).
5. Remove the hook switch (figure 3, item 9) from the SWLR-243J telephone cover (figure 3, item 2).

**INSTALLATION**

1. Install the hook switch (figure 3, item 9) on the SWLR-243J telephone cover (figure 3, item 2).
2. Install the two screws (figure 3, item 11) in the hook switch (figure 3, item 9).
3. Connect the wiring (figure 3, item 8) of the hook switch (figure 3, item 9) to the terminal board (figure 3, item 10) using the labels from step 3 of Removal as a guide. Remove the labels.
4. Install the SWLR-243J telephone cover (figure 3, item 2) on the SWLR-243J telephone junction box (figure 3, item 3).
5. Install the four screws (figure 3, item 1) in the SWLR-243J telephone cover (figure 3, item 2).

**SWLR-243J RELAY REPLACEMENT****REMOVAL**

1. Remove the four screws (figure 3, item 1) from the SWLR-243J telephone cover (figure 3, item 2).
2. Remove the SWLR-243J telephone cover (figure 3, item 2) from the SWLR-243J telephone junction box (figure 3, item 3).

3. Label and remove the wiring (figure 3, item 12) of the relay (figure 3, item 13) from the terminal board (figure 3, item 14).
4. Remove the four screws (figure 3, item 15) from the relay (figure 3, item 13).
5. Remove the relay (figure 3, item 13) from the SWLR-243J telephone junction box (figure 3, item 3).

### **INSTALLATION**

1. Install the relay (figure 3, item 13) in the SWLR-243J telephone junction box (figure 3, item 3).
2. Install the four screws (figure 3, item 15) in the relay (figure 3, item 13).
3. Connect the wiring (figure 3, item 12) of the relay (figure 3, item 13) to the terminal board (figure 3, item 14).
4. Install the SWLR-243J telephone cover (figure 3, item 2) on the SWLR-243J telephone junction box (figure 3, item 3).
5. Install the four screws (figure 3, item 1) in the SWLR-243J telephone cover (figure 3, item 2).

### **SWLR-243J HAND RINGING GENERATOR REPLACEMENT**

#### **REMOVAL**

1. Remove the four screws (figure 3, item 1) from the SWLR-243J telephone cover (figure 3, item 2).
2. Remove the SWLR-243J telephone cover (figure 3, item 2) from the SWLR-243J telephone junction box (figure 3, item 3).
3. Label and remove the wiring (figure 3, item 16) of the hand ringing generator (figure 3, item 17) from the terminal board (figure 3, item 14).
4. Remove the manual control handle (figure 3, item 18) from the hand ringing generator (figure 3, item 17) by turning it counterclockwise.
5. Remove the four screws (figure 3, item 19) from the hand ringing generator (figure 3, item 17).
6. Remove the hand ringing generator (figure 3, item 17) from the SWLR-243J telephone junction box (figure 3, item 3).

#### **INSTALLATION**

1. Install the hand ringing generator (figure 3, item 17) in the SWLR-243J telephone junction box (figure 3, item 3).
2. Install the four screws (figure 3, item 19) in the hand ringing generator (figure 3, item 17).
3. Install the manual control handle (figure 3, item 18) on the hand ringing generator (figure 3, item 17).
4. Connect the wiring (figure 3, item 16) of the hand ringing generator (figure 3, item 17) to the terminal board (figure 3, item 14) using the labels from step 3 of Removal as a guide. Remove the labels.
5. Install the SWLR-243J telephone cover (figure 3, item 2) on the SWLR-243J telephone junction box (figure 3, item 3).
6. Install the four screws (figure 3, item 1) in the SWLR-243J telephone cover (figure 3, item 2).

### **SWLR-243J MANUAL CONTROL HANDLE REPLACEMENT**

#### **REMOVAL**

1. Remove the four screws (figure 3, item 1) from the SWLR-243J telephone cover (figure 3, item 2).

2. Remove the SWLR-243J telephone cover (figure 3, item 2) from the SWLR-243J telephone junction box (figure 3, item 3).
3. Remove the manual control handle (figure 3, item 18) from the hand ringing generator (figure 3, item 17) by turning it counterclockwise.

### INSTALLATION

1. Install the manual control handle (figure 3, item 18) on the hand ringing generator (figure 3, item 17).
2. Install the SWLR-243J telephone cover (figure 3, item 2) on the SWLR-243J telephone junction box (figure 3, item 3).
3. Install the four screws (figure 3, item 1) in the SWLR-243J telephone cover (figure 3, item 2).

### SW-243J GASKET REPLACEMENT

#### REMOVAL

1. Remove the four screws (figure 4, item 1) of the SW-243J telephone cover (figure 4, item 2) from the SW-243J telephone junction box (figure 4, item 3).
2. Remove the SW-243J telephone cover (figure 4, item 2) from the SW-243J telephone junction box (figure 4, item 3).
3. Remove the gasket (figure 4, item 4) from the SW-243J telephone junction box (figure 4, item 3).

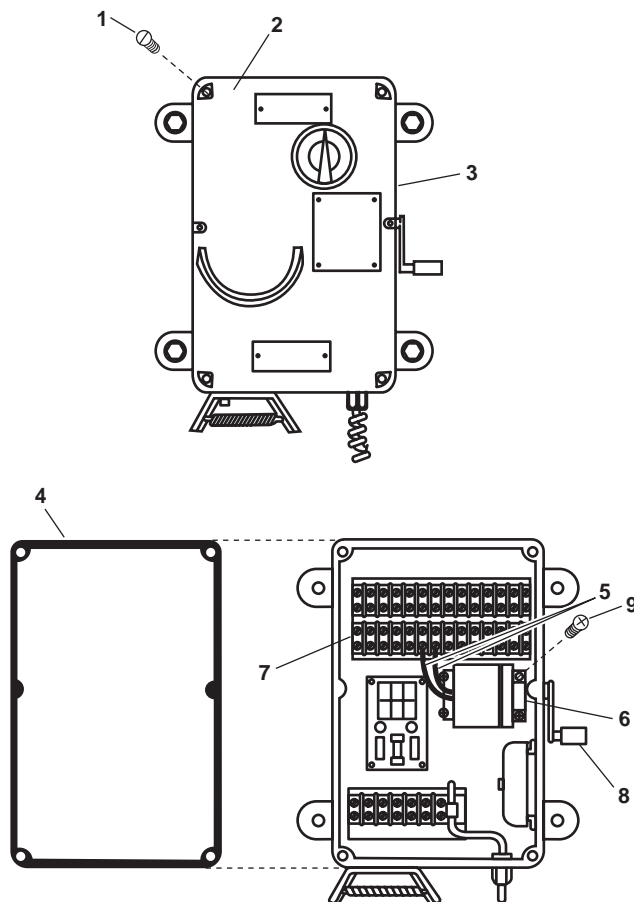


Figure 4. Sound Powered Telephone SW-243J

---

**INSTALLATION**

1. Install the gasket (figure 4, item 4) on the SW-243J telephone junction box (figure 4, item 3).
2. Install the SW-243J telephone cover (figure 4, item 2) on the SW-243J telephone junction box (figure 4, item 3).
3. Install the four screws (figure 4, item 1) of the SW-243J telephone cover (figure 4, item 2) in the SW-243J telephone junction box (figure 4, item 3).

**SW-243J HAND RINGING GENERATOR REPLACEMENT****REMOVAL**

1. Remove the four screws (figure 4, item 1) of the SW-243J telephone cover (figure 4, item 2) from the SW-243J telephone junction box (figure 4, item 3).
2. Remove the SW-243J telephone cover (figure 4, item 2) from the SW-243J telephone junction box (figure 4, item 3).
3. Label and remove the wiring (figure 4, item 5) of the hand ringing generator (figure 4, item 6) from the terminal board (figure 4, item 7).
4. Remove the manual control handle (figure 4, item 8) from the hand ringing generator (figure 4, item 6) by turning it counterclockwise.
5. Remove the four screws (figure 4, item 9) from the hand ringing generator (figure 4, item 6).
6. Remove the hand ringing generator (figure 4, item 6) from the SW-243J telephone junction box (figure 4, item 3).

**INSTALLATION**

1. Install the hand ringing generator (figure 4, item 6) in the SW-243J telephone junction box (figure 4, item 3).
2. Install the four screws (figure 4, item 9) in the hand ringing generator (figure 4, item 6).
3. Install the manual control handle (figure 4, item 8) on the hand ringing generator (figure 4, item 6).
4. Connect the wiring (figure 4, item 5) of the hand ringing generator (figure 4, item 6) to the terminal board (figure 4, item 7).
5. Install the SW-243J telephone cover (figure 4, item 2) on the SW-243J telephone junction box (figure 4, item 3).
6. Install the four screws (figure 4, item 1) of the SW-243J telephone cover (figure 4, item 2) in the SW-243J telephone junction box (figure 4, item 3).

**SW-243J MANUAL CONTROL HANDLE REPLACEMENT****REMOVAL**

1. Remove the four screws (figure 4, item 1) of the SW-243J telephone cover (figure 4, item 2) from the SW-243J telephone junction box (figure 4, item 3).
2. Remove the SW-243J telephone cover (figure 4, item 2) from the SW-243J telephone junction box (figure 4, item 3).
3. Remove the manual control handle (figure 4, item 8) from the hand ringing generator (figure 4, item 6) by turning it counterclockwise.

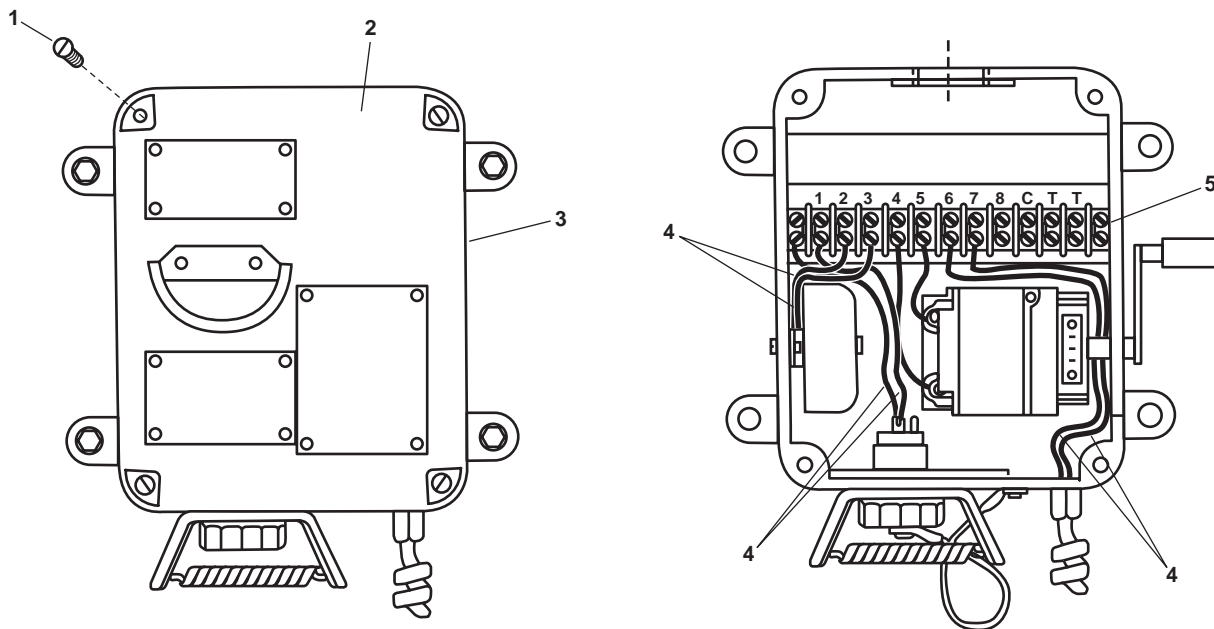
**INSTALLATION**

1. Install the manual control handle (figure 4, item 8) on the hand ringing generator (figure 4, item 6).
2. Install the SW-243J telephone cover (figure 4, item 2) on the SW-243J telephone junction box (figure 4, item 3).
3. Install the four screws (figure 4, item 1) of the SW-243J telephone cover (figure 4, item 2) in the SW-243J telephone junction box (figure 4, item 3).

**ELECTRICAL WIRING REPLACEMENT (TYPICAL)****REMOVAL****NOTE**

Proper repair of the electrical wiring consists of replacement of the damaged wiring. When an electrical casualty requires expedient repairs, repair may be made by splicing. Splicing is authorized for repair of damaged cables if the remainder of the cable is in good mechanical and electrical condition. The cable must be replaced in its entirety at the most opportune time. Proper splicing methods should be performed as detailed in FM 55-509-1.

1. Remove the four screws (figure 5, item 1) from the telephone cover (figure 5, item 2) of the telephone junction box (figure 5, item 3).



**Figure 5. Sound Powered Telephone Wiring Replacement (Typical)**

2. Remove the telephone cover (figure 5, item 2) from the telephone junction box (figure 5, item 3).
3. Label and remove the wiring (figure 5, item 4) from the terminal board (figure 5, item 5).
4. Follow the wiring (figure 5, item 4) to its opposite end and remove it from its equipment.

**INSTALLATION**

1. Install new wiring (figure 5, item 4) or splice the existing wiring (FM 55-509-1) and connect it to the equipment.
2. Route the new electrical wiring assembly along the same path as the old electrical wiring assembly, securing it in the same manner as the old wiring assembly.
3. Connect the wiring (figure 5, item 4) to the terminal board (figure 5, item 5) using the labels from step 3 of Removal as a guide. Remove the labels.
4. Install the telephone cover (figure 5, item 2) on the telephone junction box (figure 5, item 3).
5. Install the four screws (figure 5, item 1) in the telephone cover (figure 5, item 2) of the telephone junction box (figure 5, item 3).

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
INTERCOMMUNICATION SYSTEM, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Intercommunication Station (Item 1, Figure 69,  
WP 0302 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0302 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the INTERCOM SYSTEM. circuit breaker  
on the 120V pilothouse emergency distribution panel.  
Lock out and tag out (FM 55-502).

---

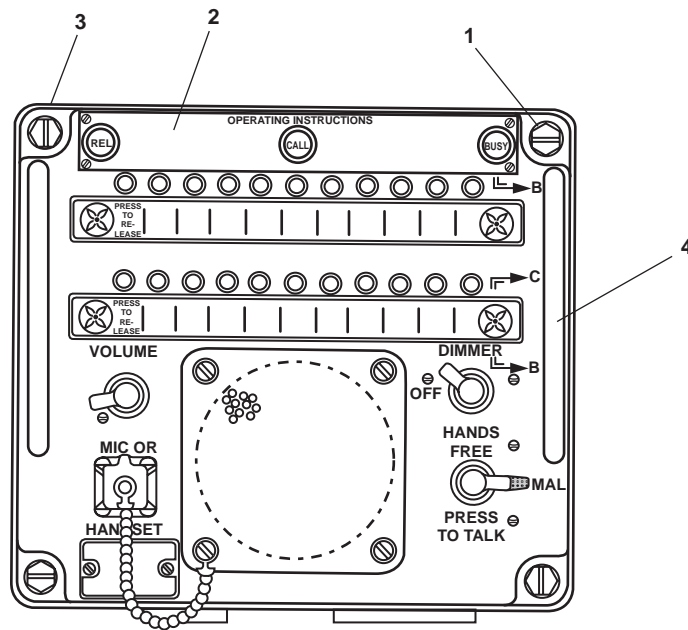
**REMOVAL**

**Repair or replace components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

**NOTE**

The intercommunication system consists of a 20-station system that is a party-line type voice communication system. The following describes the removal and installation instructions for a typical intercommunication unit.

1. Remove the four screws (figure 1, item 1) that attach the intercommunication station (figure 1, item 2) to the housing (figure 1, item 3).
2. Grasp the two handles (figure 1, item 4) and pull straight out until the intercommunication station (figure 1, item 2) is removed from the housing (figure 1, item 3).



**Figure 1. Intercommunication Station (Typical)**

## INSTALLATION

1. Install the intercommunication station (figure 1, item 2) in the housing (figure 1, item 3) using the two handles (figure 1, item 4).
2. Secure the intercommunication station (figure 1, item 2) to the housing (figure 1, item 3) with the four screws (figure 1, item 1).
3. Remove the lockouts and tagouts (FM 55-502).
4. Operate the intercommunication system under usual conditions (TM 55-1925-273-10).
5. Return the intercommunication station to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
INTERCOMMUNICATION SYSTEM, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0242 00  
WP 0295 00

**Personnel Required:**

One Watercraft Engineer, 88L

**Equipment Conditions:**

Intercommunication station removed (WP 0242 00).

---

**WARNING**

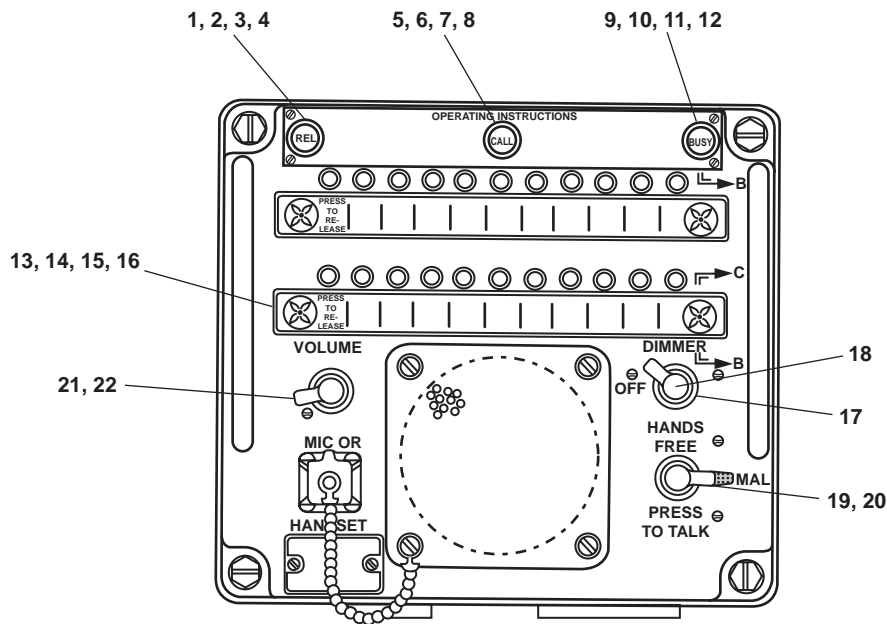
**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**INDICATOR REPLACEMENT****NOTE**

The intercommunication system consists of a 20-station system that is a party-line type voice communication system. The following describes the repair procedures for a typical intercommunication unit that has been removed from the system (WP 0242 00). The repair procedures consist of component removal and installation instructions.

**REMOVAL**

1. Remove the REL (release) indicator (figure 1, item 1) the incandescent lamp (figure 1, item 2), and the lamp lens gasket (figure 1, item 3) from the lamp holder (figure 1, item 4).
2. Remove the CALL indicator (figure 1, item 5) the incandescent lamp (figure 1, item 6), and the lamp lens gasket (figure 1, item 7) from the lamp holder (figure 1, item 8).
3. Remove the BUSY indicator (figure 1, item 9), the incandescent lamp (figure 1, item 10), and the lamp lens gasket (figure 1, item 11) from the lamp holder (figure 1, item 12).
4. Remove the edge light lens (figure 1, item 13), the incandescent lamp (figure 1, item 14), and the edge light lamp gasket (figure 1, item 15) from the lamp holder (figure 1, item 16).



**Figure 1. Intercommunication Station (Front View)**

## INSTALLATION

1. Install the edge light lamp gasket (figure 1, item 15) over the lamp holder (figure 1, item 16), and install the incandescent lamp (figure 1, item 14) and the edge light lens (figure 1, item 13).
2. Install the lamp lens gasket (figure 1, item 11) over the lamp holder (figure 1, item 12), and install the incandescent lamp (figure 1, item 10) and the BUSY indicator (figure 1, item 9).
3. Install the lamp lens gasket (figure 1, item 7) over the lamp holder (figure 1, item 8), and install the incandescent lamp (figure 1, item 6) and the CALL indicator (figure 1, item 5).
4. Install the lamp lens gasket (figure 1, item 3) over the lamp holder (figure 1, item 4), and install the incandescent lamp (figure 1, item 2) and the REL (release) indicator (figure 1, item 1).
5. Perform the Follow-On Service procedure at the end of this work package.

## FRONT PANEL SWITCH-HARDWARE REPLACEMENT

### REMOVAL

1. Remove the setscrew (figure 1, item 17) and the DIMMER switch knob (figure 1, item 18).
2. Remove the setscrew (figure 1, item 19) and the HANDS FREE/NORMAL/PRESS TO TALK switch knob (figure 1, item 20).
3. Remove the setscrew (figure 1, item 21) and the VOLUME switch knob (figure 1, item 22).

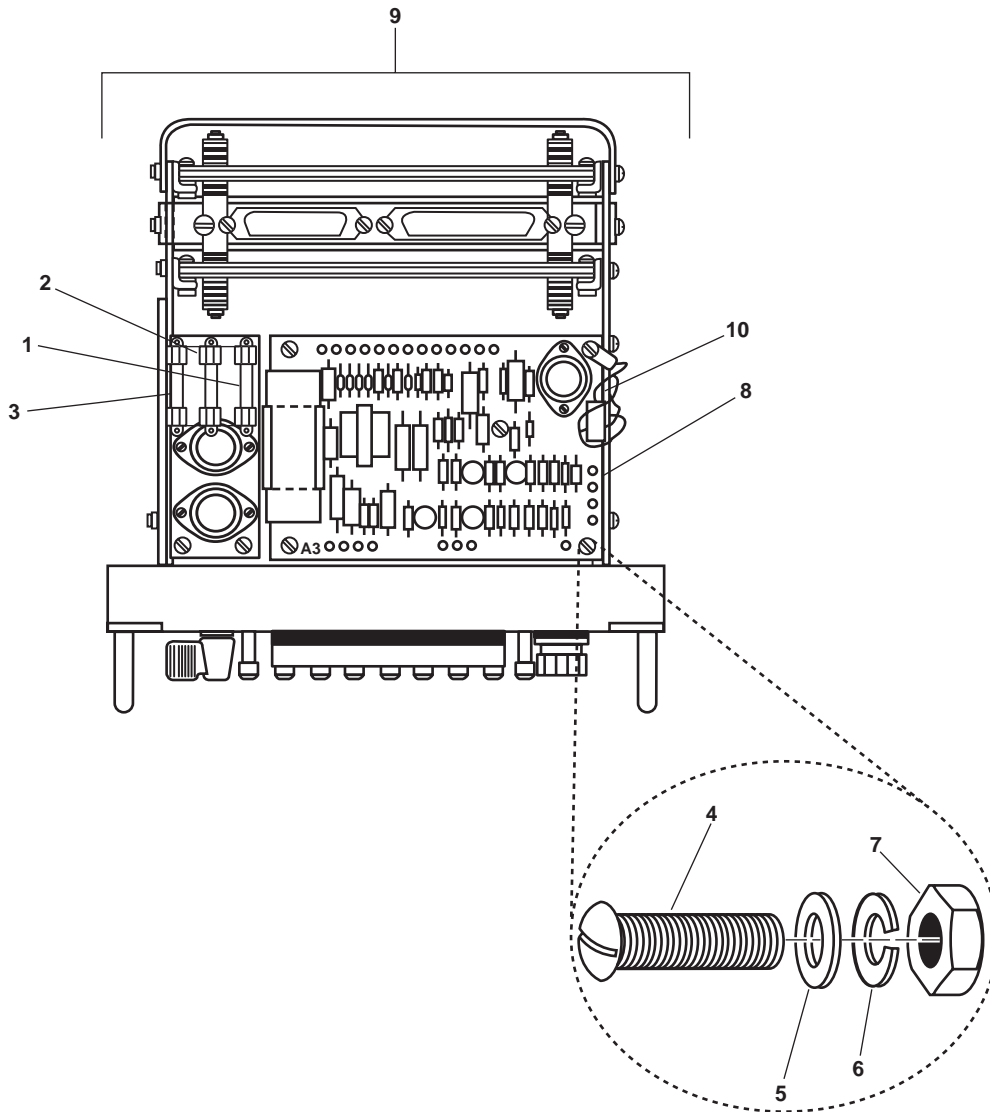
**INSTALLATION**

1. Install the VOLUME switch knob (figure 1, item 22) and secure with the setscrew (figure 1, item 21).
2. Install the HANDS FREE/NORMAL/PRESS TO TALK switch knob (figure 1, item 20) and secure with the setscrew (figure 1, item 19).
3. Install the DIMMER switch knob (figure 1, item 18) and secure with the setscrew (figure 1, item 17).
4. Perform the Follow-On Service procedure at the end of this work package.

**FUSE REPLACEMENT**

**REMOVAL**

1. Remove the time lag fuse (figure 2, item 1) from the fuse holder (figure 2, item 2) using a fuse puller.
2. Remove the normal fuse (figure 2, item 3) from the fuse holder (figure 2, item 2) using a fuse puller.



**Figure 2. Intercommunication Station (Rear View)**

---

**INSTALLATION** **CAUTION**

Ensure that the fuses being installed are the same voltage and amperage rating as the ones removed. Damage to the equipment could occur if incorrect fuses are installed.

1. Install the time lag fuse (figure 2, item 1) in the fuse holder (figure 2, item 2) using a fuse puller.
2. Install the normal fuse (figure 2, item 3) in the fuse holder (figure 2, item 2) using a fuse puller.
3. Perform the Follow-On Service procedure at the end of this work package.

**AMPLIFIER & POWER SUPPLY BOARD CIRCUIT CARD ASSEMBLY REPLACEMENT****REMOVAL**

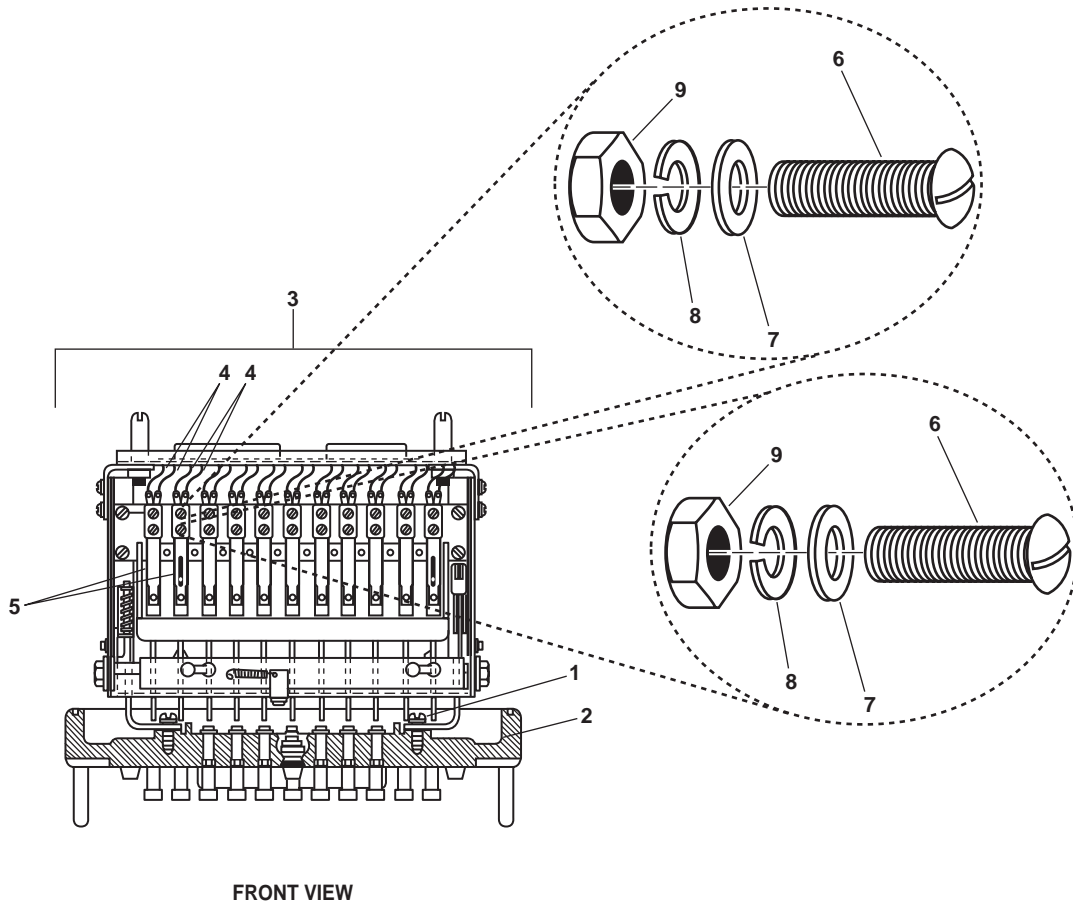
1. Remove the four screws (figure 2, item 4), four flat washers (figure 2, item 5), four lockwashers (figure 2, item 6), and four nuts (figure 2, item 7) from the amplifier and power circuit card assembly (figure 2, item 8) in the intercommunication station (figure 2, item 9). Discard the lockwashers.
2. Label and remove the wiring (figure 2, item 10) from the amplifier and power supply board circuit card assembly (figure 2, item 8).
3. Remove the amplifier and power supply board circuit card assembly (figure 2, item 8).

**INSTALLATION**

1. Install the amplifier and power supply board circuit card assembly (figure 2, item 8) in the intercommunication station (figure 2, item 9).
2. Connect the wiring (figure 2, item 10) to the amplifier and power supply board circuit card assembly (figure 2, item 8) using the labels from step 2 of Removal as a guide. Remove the labels.
3. Secure the amplifier and power supply board circuit card assembly (figure 2, item 8) with the four screws (figure 2, item 4), four flat washers (figure 2, item 5), four new lockwashers (figure 2, item 6), and four nuts (figure 2, item 7).
4. Perform the Follow-On Service procedure at the end of this work package.

**STATION SELECTOR ASSEMBLY REPLACEMENT****REMOVAL**

1. Remove the two screws (figure 3, item 1) from the faceplate (figure 3, item 2) of the intercommunication station (figure 3, item 3).
2. OPEN the faceplate (figure 3, item 2).
3. Label and remove the wiring (figure 3, item 4) from the station selector assembly (figure 3, item 5).
4. Remove the two screws (figure 3, item 6), two flat washers (figure 3, item 7), two lockwashers (figure 3, item 8), and two nuts (figure 3, item 9) from the station selector assembly (figure 3, item 5). Discard the lockwashers.



**Figure 3. Intercommunication Station (Front View)**

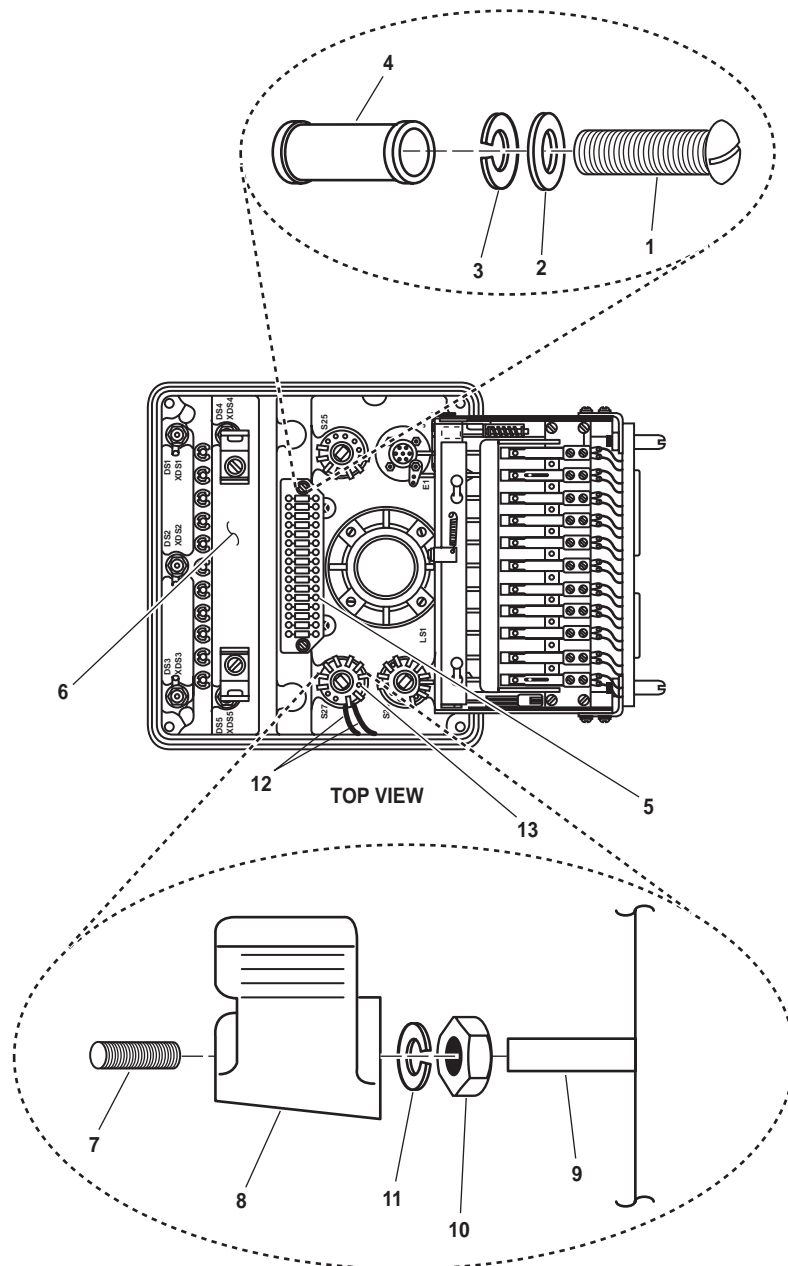
## INSTALLATION

1. Install the station selector assembly (figure 3, item 5) in the intercommunication station.
2. Install the two screws (figure 3, item 6), two flat washers (figure 3, item 7), two new lockwashers (figure 3, item 8), and two nuts (figure 3, item 9) on the station selector assembly (figure 3, item 5).
3. Connect the wiring (figure 3, item 4) to the station selector assembly (figure 3, item 5) using the labels from step 3 of Removal as a guide. Remove the labels.
4. CLOSE the faceplate (figure 3, item 2).
5. Install the two screws (figure 3, item 1) in the faceplate (figure 3, item 2) of the intercommunication station (figure 3, item 3).
6. Perform the Follow-On Service procedure at the end of this work package.

**RESISTOR BOARD CIRCUIT CARD ASSEMBLY REPLACEMENT**

**REMOVAL**

1. Remove the two screws (figure 3, item 1) from the faceplate (figure 3, item 2) of the intercommunication station (figure 3, item 3).
2. OPEN the faceplate (figure 3, item 2).
3. Remove the two screws (figure 4, item 1), two flat washers (figure 4, item 2), two lockwashers (figure 4, item 3), and two spacers (figure 4, item 4) from the resistor board circuit card assembly (figure 4, item 5). Discard the lockwashers.
4. Remove the resistor board circuit card assembly (figure 4, item 5) from the inside of the faceplate (figure 4, item 6).



**Figure 4. Intercommunication Station (Top View Inside of Faceplate)**



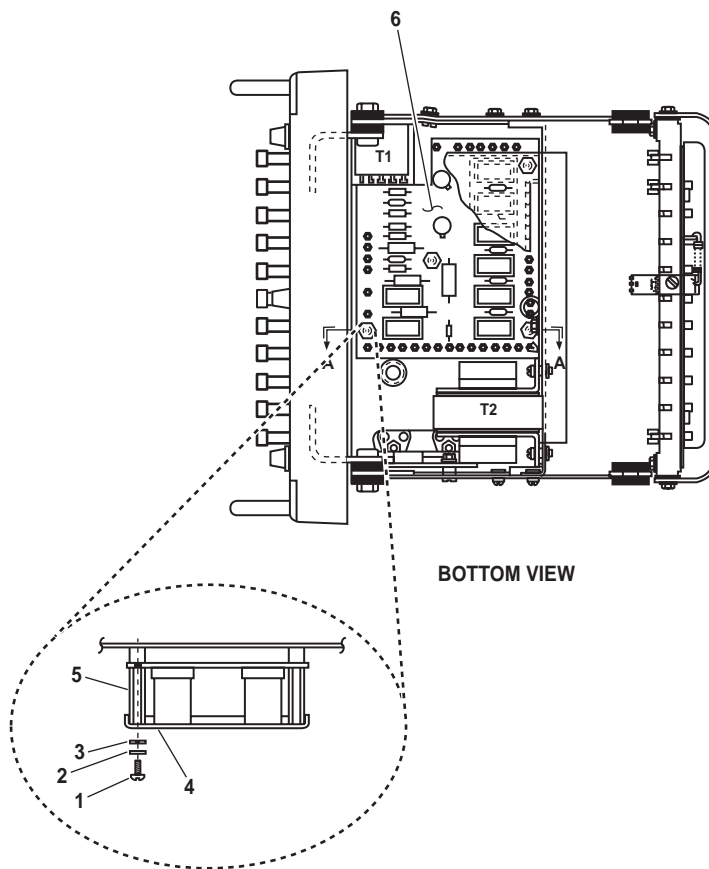
**INSTALLATION**

1. Install the resistor board circuit card assembly (figure 4, item 5) in the inside of the faceplate (figure 4, item 6).
2. Install the two screws (figure 4, item 1), two flat washers (figure 4, item 2), two new lockwashers (figure 4, item 3), and two spacers (figure 4, item 4) in the resistor board circuit card assembly (figure 4, item 5).
3. CLOSE the faceplate (figure 3, item 2).
4. Install the two screws (figure 3, item 1) in the faceplate (figure 3, item 2) of the intercommunication station (figure 3, item 3).
5. Perform the Follow-On Service procedure at the end of this work package.

**RELAY BOARD CIRCUIT CARD ASSEMBLY REPLACEMENT**

**REMOVAL**

1. Remove the three screws (figure 5, item 1), three flat washers (figure 5, item 2), three lockwashers (figure 5, item 3), retainer (figure 5, item 4), and three spacers (figure 5, item 5) from the relay board circuit card assembly (figure 5, item 6). Discard the lockwashers.
2. Remove the relay board circuit card assembly (figure 5, item 6) from the bottom of the intercommunication station (figure 5, item 7).



**Figure 5. Intercommunication Station (Bottom View)**

---

**INSTALLATION**

1. Install the relay board circuit card assembly (figure 5, item 6) in the intercommunication station (figure 5, item 7).
2. Install the three screws (figure 5, item 1), three flat washers (figure 5, item 2), three new lockwashers (figure 5, item 3), retainer (figure 5, item 4), and three spacers (figure 5, item 5) in the relay board circuit card assembly (figure 5, item 6).
3. Perform the Follow-On Service procedure at the end of this work package.

**SWITCH REPLACEMENT****REMOVAL**

1. Remove the setscrew (figure 4, item 7) from the knob (figure 4, item 8).
2. Remove the knob (figure 4, item 8) from the switch shaft (figure 4, item 9).
3. Remove the nut (figure 4, item 10) and lockwasher (figure 4, item 11) from the switch shaft (figure 4, item 9). Discard the lockwasher.
4. Remove the two screws (figure 3, item 1) from the faceplate (figure 3, item 2) of the intercommunication station (figure 3, item 3).
5. OPEN the faceplate (figure 3, item 2).
6. Label and remove the wiring (figure 4, item 12) from the switch (figure 4, item 13).
7. Remove the switch (figure 4, item 13) from the rear of the faceplate (figure 4, item 6).

**INSTALLATION**

1. Install the switch (figure 4, item 13) in the rear of the faceplate (figure 4, item 6).
2. Connect the wiring (figure 4, item 12) to the switch (figure 4, item 13) using the labels from step 6 of Removal as a guide. Remove the labels.
3. CLOSE the faceplate (figure 3, item 2).
4. Install the two screws (figure 3, item 1) in the faceplate (figure 3, item 2) of the intercommunication station (figure 3, item 3).
5. Install the nut (figure 4, item 10) and new lockwasher (figure 4, item 11) on the switch shaft (figure 4, item 9).
6. Install the knob (figure 4, item 8) on the switch shaft (figure 4, item 9).
7. Install the setscrew (figure 4, item 7) in the knob (figure 4, item 8).
8. Perform the Follow-On Service procedure at the end of this work package.

**FOLLOW-ON SERVICE**

1. Install the intercommunication station (WP 0242 00).
2. Operate the intercommunication system under usual conditions and check for proper operation (TM 55-1925-273-10).
3. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ENGINE ORDER TELEGRAPH, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 1, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
FM 55-509-1  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the E.O.T. SYSTEM. circuit breaker at the 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL****NOTE**

This procedure is applicable to both the EOS and pilothouse Engine Order Telegraph (EOT) units.

1. Remove the four screws (figure 1, item 1), four flat washers (figure 1, item 2), four lockwashers (figure 1, item 3), and four nuts (figure 1, item 4), and remove the Engine Order Telegraph (EOT) panel (figure 1, item 5) from the console. Discard the lockwashers.

**WARNING**



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the terminal board (figure 1, item 6). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.
3. Label and remove the wires from the terminal board (figure 1, item 6).

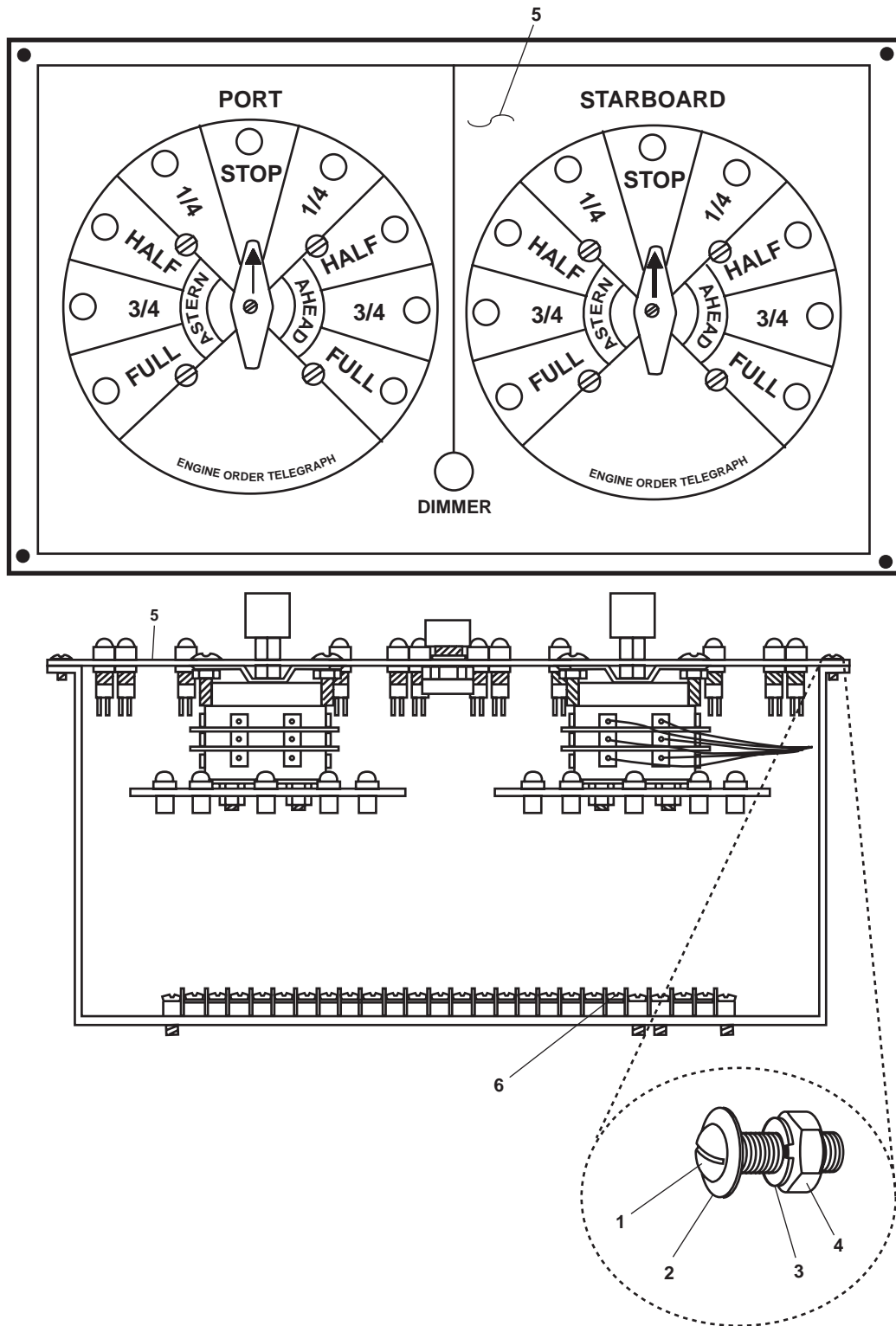


Figure 1. EOT Panel Removed

**INSTALLATION**

1. Install the wires on the terminal board (figure 1, item 6) using the labels from step 3 of Removal as a guide. Discard the labels.
2. Install the EOT panel (figure 1, item 5) in the console. Secure it with the four screws (figure 1, item 1), four flat washers (figure 1, item 2), four new lockwashers (figure 1, item 3), and four nuts (figure 1, item 4).
3. Remove the lockouts and tagouts (FM 55-502).
4. Set the circuit breaker to ON.
5. Test operate the EOT (TM 55-1925-273-10).
6. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ENGINE ORDER TELEGRAPH, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)

**Materials/Parts:**

Switch, Rotary (Item 2, Figure 71,  
WP 0302 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0244 00  
WP 0295 00  
WP 0302 00

**Equipment Conditions:**

Engine Order Telegraph (EOT) panel removed (WP 0244 00).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**NOTE**

This procedure is applicable to both the EOS and pilothouse Engine Order Telegraph (EOT) units.

**ROTARY SWITCH REPLACEMENT****REMOVAL**

1. Remove the screw (figure 1, item 1) and the switch knob (figure 1, item 2) from the EOT panel (figure 1, item 3).
2. Label and disconnect the electrical wiring (figure 1, item 4) from the applicable rotary switch (figure 1, item 5) to be replaced.
3. Tilt the panel (figure 1, item 3) up and remove the four mounting screws (figure 1, item 6), four flat washers (figure 1, item 7), four lockwashers (figure 1, item 8), and four nuts (figure 1, item 9). Discard the lockwashers.
4. Remove the applicable rotary switch (figure 1, item 5) from the panel (figure 1, item 3).

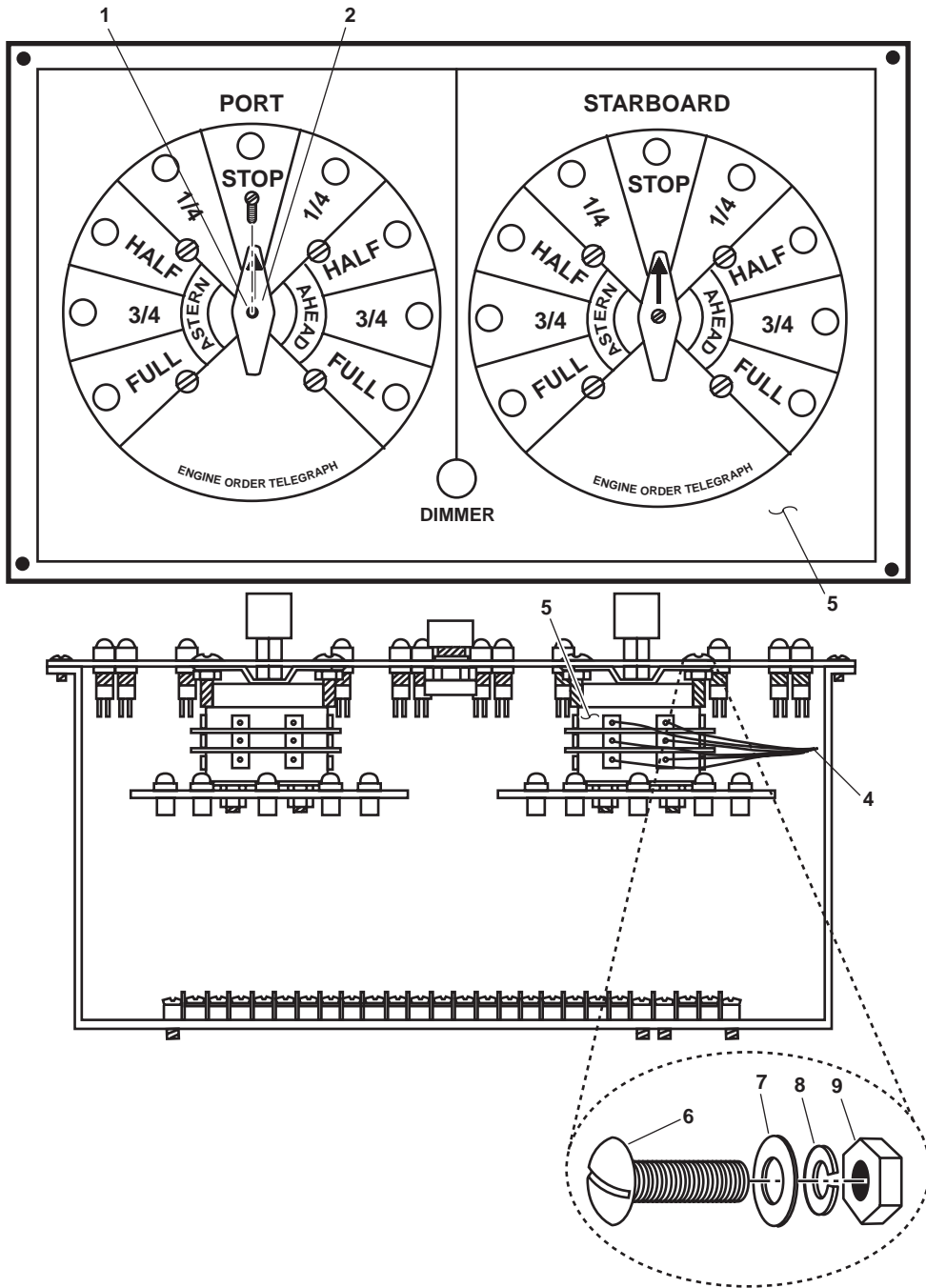


Figure 1. Engine Order Telegraph (EOT) Panel Repair (Typical)

**INSTALLATION**

1. Tilt the panel (figure 1, item 3) up and install the applicable rotary switch (figure 1, item 5) using the four mounting screws (figure 1, item 6), four flat washers (figure 1, item 7), four new lockwashers (figure 1, item 8), and four nuts (figure 1, item 9). Tighten the four mounting screws (figure 1, item 6).
2. Connect the electrical wiring (figure 1, item 4) to the rotary switch (figure 1, item 5).
3. Position the switch knob (figure 1, item 2) on the shaft of the rotary switch and secure with the screw (figure 1, item 1).
4. Install the EOT panel (WP 0244 00).
5. Operate the EOT (TM 55-1925-273-10) and ensure that the panel operates properly.

**END OF PROCEDURE**



**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BATTERY CHARGER, GENERAL ALARM SYSTEM; REPLACE**

**INITIAL SETUP:**

**Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 173, Table 1, WP 0307 00)

**Equipment Conditions:**

Negative battery cable for the applicable battery disconnected and insulated from the negative battery terminal (FM 55-502).

**Personnel Required:**

Three Watercraft Engineers, 88L

**REMOVAL**

1. Set to OFF the specific breaker for the applicable battery charger as detailed in table 1. Lock out and tag out (FM 55-502).

**Table 1. Battery Charger Lock Out and Tag Out Guide**

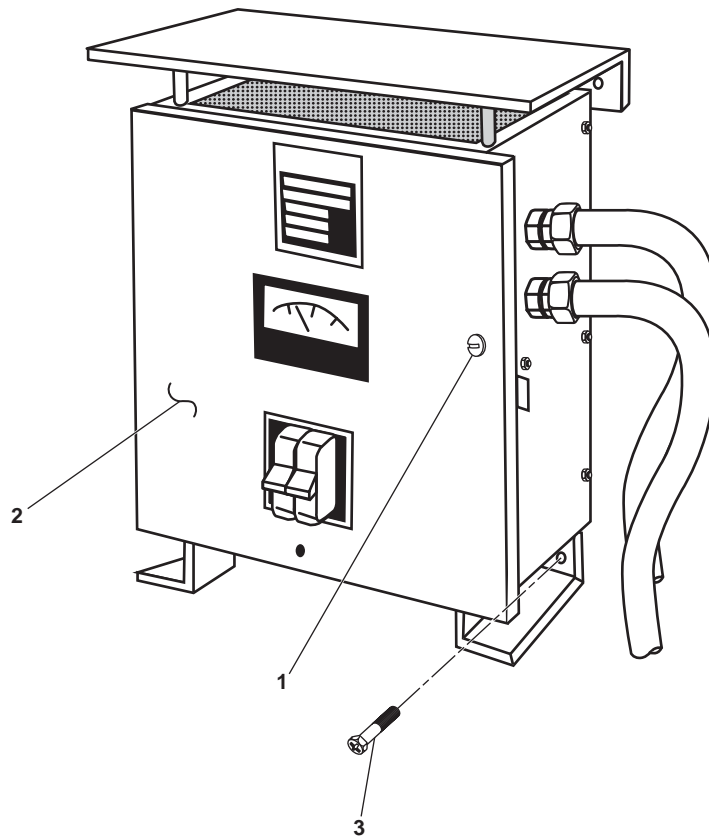
Battery Charger	Specific Breaker	Distribution Panel
ROWPU	ROWPU BATTERY CHARGER.	120V Distribution Panel No. 4
EDG	EMERGENCY DIESEL GENERATOR SET BATTERY CHARGER.	120V Emergency Load Center Distribution Panel
SSDG No. 1	SSDG No. 1. BATTERY CHARGER.	120V Emergency Distribution Panel No. 1
GMDSS	GMDSS BATTERY CHARGER.	120V Elex Distribution Panel

2. OPEN the battery charger door (figure 1, item 2).



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

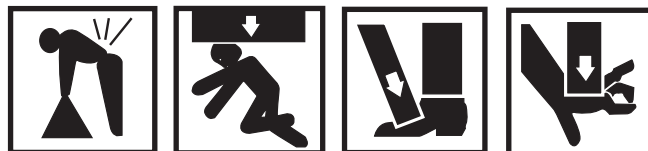
3. Use a multimeter to check for available ac voltage at the fuse(s) (figure 2, item 1). If ac voltage is present, ensure that the proper circuit breaker(s) have been secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.



**Figure 1. Battery Charger**

4. Use a multimeter to check for dc voltage at the dc fuse(s) (figure 2, item 2). If dc voltage is present, ensure that the positive and negative battery cables are removed from the applicable battery bank and are locked out and tagged out (FM 55-502). If no dc voltage is present, continue with the procedure.
5. Label and remove the wiring (figure 2, item 3) from the dc fuse terminals (figure 2, item 4).
6. Label and remove the wiring (figure 2, item 5) from the ac terminals (figure 2, item 6).
7. Remove the wiring (figure 2, items 3 and 5) from the battery charger (figure 2, item 7).

**WARNING**



**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

8. While two crewmembers hold the battery charger (figure 2, item 7), have a third crewmember remove the two bolts (figure 1, item 3) that secure the battery charger to the bulkhead.
9. Remove the battery charger (figure 2, item 7) from the bulkhead.

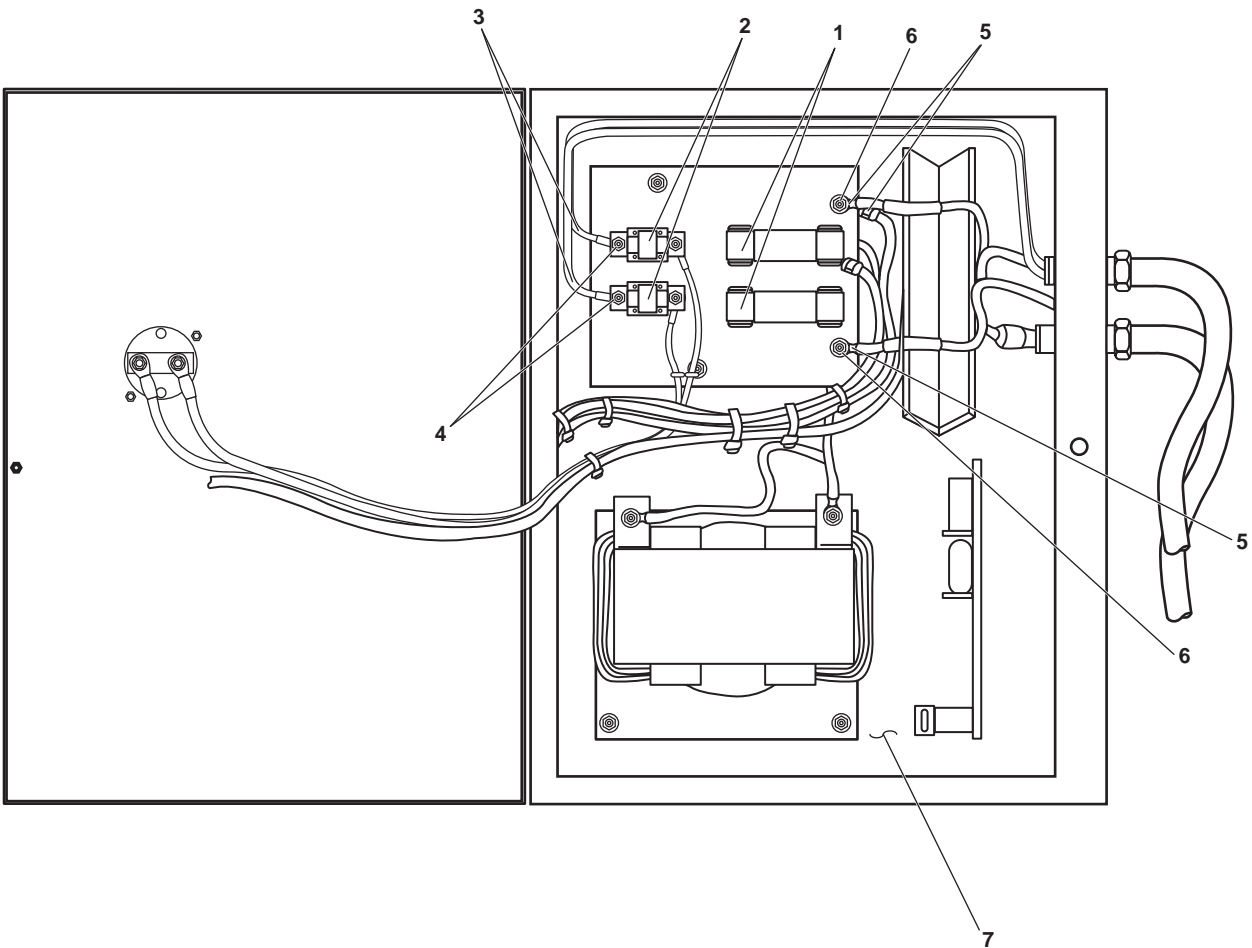
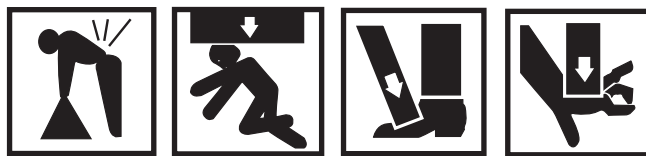


Figure 2. Battery Charger Internal Components

## INSTALLATION

### WARNING



**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

1. Using two crewmembers, position the battery charger (figure 2, item 7) on the bulkhead while a third crewmember installs the two bolts (figure 1, item 3) that secure the battery charger to the bulkhead.
2. Install the wiring (figure 2, items 3 and 5) in the battery charger (figure 2, item 7).
3. Connect the wiring (figure 2, item 5) to the ac terminals (figure 2, item 6) using the labels from step 6 of Removal as a guide. Remove the labels.
4. Connect the wiring (figure 2, item 3) to the dc fuse terminals (figure 2, item 4) using the labels from step 5 of Removal as a guide. Remove the labels.

5. CLOSE the battery charger door (figure 1, item 2) and secure it with the screw (figure 1, item 1).
6. Remove the lockouts and tagouts (FM 55-502) from the battery cables.
7. Connect the battery cables to the battery bank (TM 55-1925-273-10).
8. Remove the remaining lockouts and tagouts (FM 55-502).
9. Set the applicable circuit breaker to ON and check the battery charger for proper operation.
10. Return the battery charger to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BATTERY CHARGER, GENERAL ALARM SYSTEM; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF, lock out, and tag out (FM 55-502) the circuit breaker for the affected battery charger.  
Disconnect, lock out, and tag out (FM 55-502) the negative battery cable for the affected battery bank.

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**FUSE REPLACEMENT****REMOVAL**

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

**Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.**

1. Open the front panel of the battery charger by loosening the captive screw (figure 1, item 1).
2. Use a multimeter to ensure that no voltage is available to the input (figure 2, item 1) and output (figure 2, item 2) fuses. If voltage is noted, ensure that the power supply is locked out and tagged out (FM 55-502). If no voltage is noted, continue with the procedure.
3. Remove the failed fuse (figure 2, item 1 or 2) by pulling it straight out from its holder.

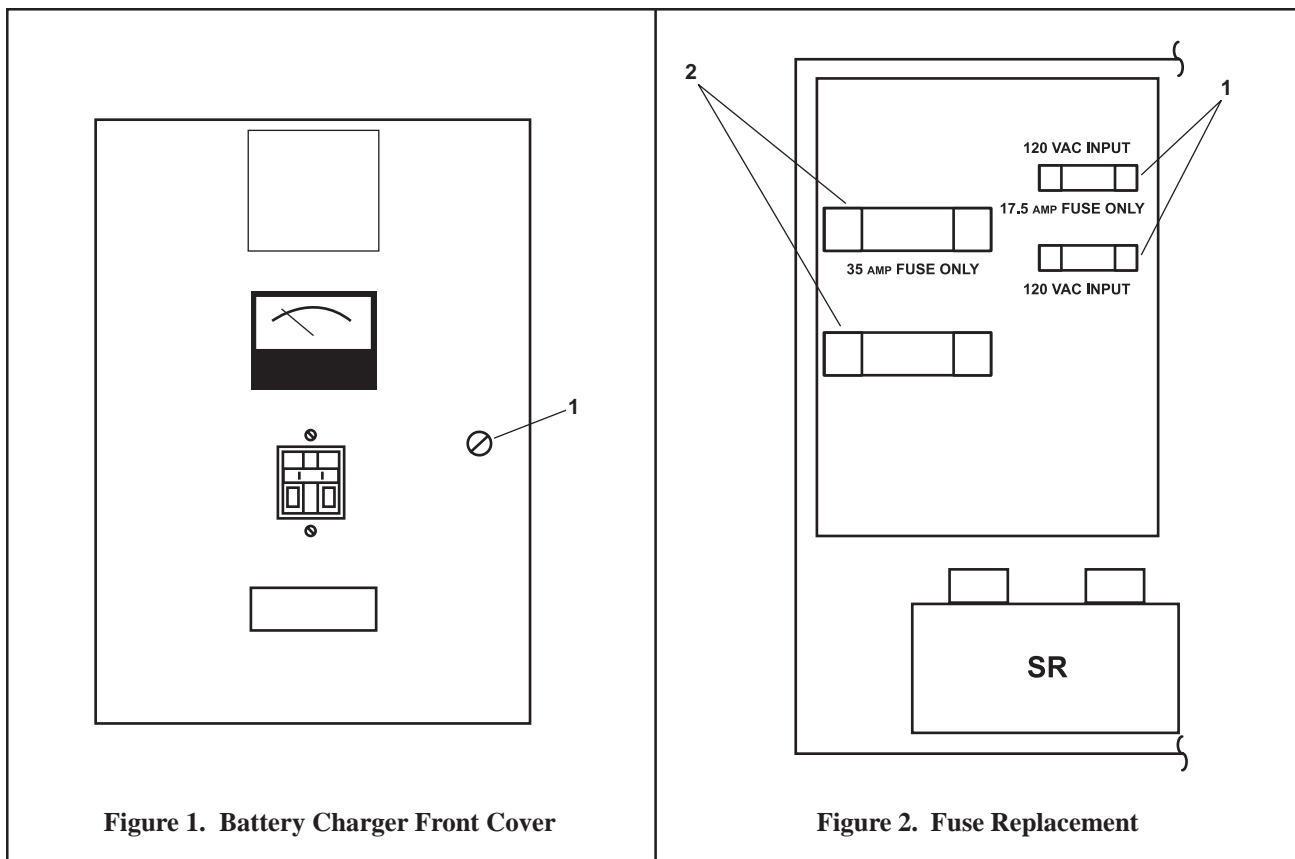


Figure 1. Battery Charger Front Cover

Figure 2. Fuse Replacement

## INSTALLATION

1. Install the new fuse (figure 2, item 1 or 2) by pushing it into its holder.
2. Close the front panel and secure it with the captive screw (figure 1, item 1).
3. Perform the Follow-On Service procedure at the end of this work package.

## AMMETER REPLACEMENT

## REMOVAL

### WARNING

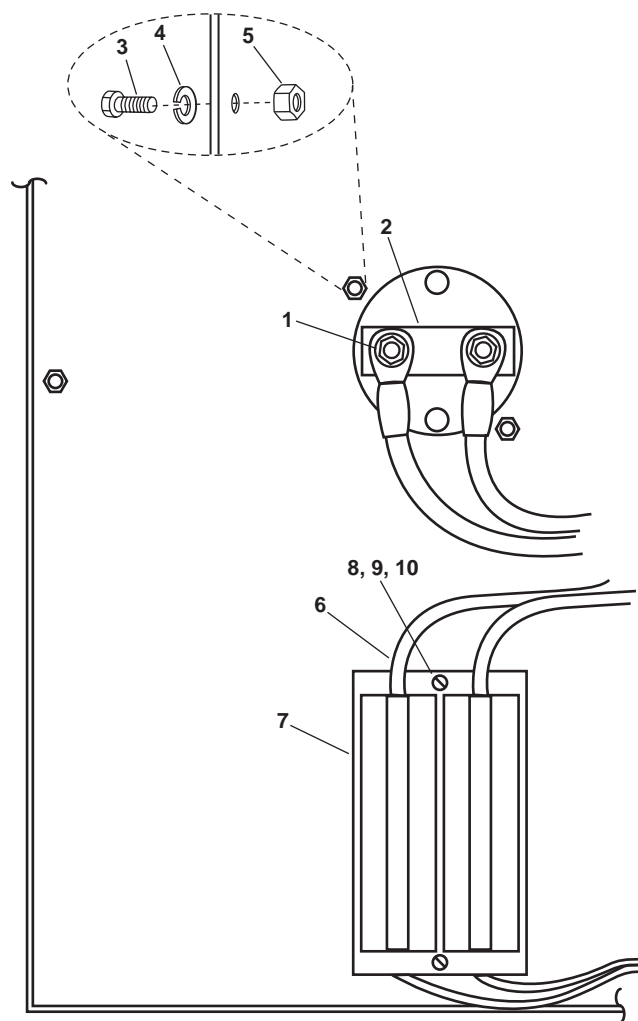


Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.

Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.

1. Open the front panel of the battery charger by loosening the screw (figure 1, item 1).

2. Use a multimeter to ensure that no voltage is available to the ammeter's wiring (figure 3, item 1). If voltage is noted, ensure that the power supply is locked out and tagged out (FM 55-502). If no voltage is noted, continue with the procedure.
3. Label and disconnect the electrical leads (figure 3, item 1) from the ammeter (figure 3, item 2).
4. Remove the two machine screws (figure 3, item 3), lockwashers (figure 3, item 4), and nuts (figure 3, item 5). Discard the lockwashers.
5. Remove the ammeter (figure 3, item 2) from the front cover.



**Figure 3. Ammeter and Circuit Breaker Replacement**

## INSTALLATION

1. Position the ammeter (figure 3, item 2) in the cover and secure it with the two screws (figure 3, item 3), new lockwashers (figure 3, item 4), and nuts (figure 3, item 5).
2. Connect the electrical leads (figure 3, item 1) to the ammeter (figure 3, item 2) and remove the labels.
3. Close the front panel and secure with the screw (figure 1, item 1).
4. Perform the Follow-On Service procedure at the end of this work package.

---

## CIRCUIT BREAKER REPLACEMENT

### REMOVAL



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

1. Open the front panel of the battery charger by loosening the captive screw (figure 1, item 1).
2. Use a multimeter to ensure that no voltage is available to the circuit breaker (figure 3, item 7). If voltage is noted, ensure that the power supply is locked out and tagged out (FM 55-502). If no voltage is noted, continue with the procedure.
3. Label and disconnect the electrical leads (figure 3, item 6) to the circuit breaker (figure 3, item 7).
4. Remove the two machine screws (figure 3, item 8), nuts (figure 3, item 9), and lockwashers (figure 3, item 10). Discard the lockwashers.
5. Remove the circuit breaker (figure 3, item 7) from the front cover.

### INSTALLATION

1. Position the circuit breaker (figure 3, item 7) in the cover and secure it with the two screws (figure 3, item 8), nuts (figure 3, item 9), and new lockwashers (figure 3, item 10).
2. Connect the electrical leads (figure 3, item 6) to the circuit breaker (figure 3, item 7) and remove the labels.
3. Close the front panel and secure it with the captive screw (figure 1, item 1).
4. Perform the Follow-On Service procedure at the end of this work package.

### FOLLOW-ON SERVICE

1. Connect the negative cable on the battery bank.
2. Remove the lockouts and tagouts (FM 55-502).
3. Set the battery charger circuit breaker to ON.
4. Verify that the battery charger functions correctly.
5. Return the equipment to the desired readiness condition.

### END OF WORK PACKAGE

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, INSPECT**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)

**References:**

TM 55-1925-273-10  
WP 0295 00

**Personnel Required:**

Two Watercraft Engineers, 88L

**Equipment Conditions:**

TLI system operating under usual conditions (TM 55-  
1925-273-10).

---

**WARNING**

**Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.**

1. Place the POWER ON/OFF switch (figures 1 and 2, item 1) on the TLI control panel in the EOS to OFF.
2. Verify that the fluid meters on the control panel (figures 1 and 2, item 2) and at the remote indicator panel (figure 3, item 1) deflects to zero.

**WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Loosen the captive screws (figure 1 or 2, item 3), and OPEN the front panel of TLI control panel that contains the faulty indication.
4. Place the POWER ON/OFF switch (figures 1 and 2, item 1) on the control panel to ON. Verify that the POWER lamp (figures 1 and 2, item 4) illuminates.
5. Locate, press, and hold the CALIBRATE pushbutton switch (figure 4, item 1) on the suspect control module in the TLI control panel.

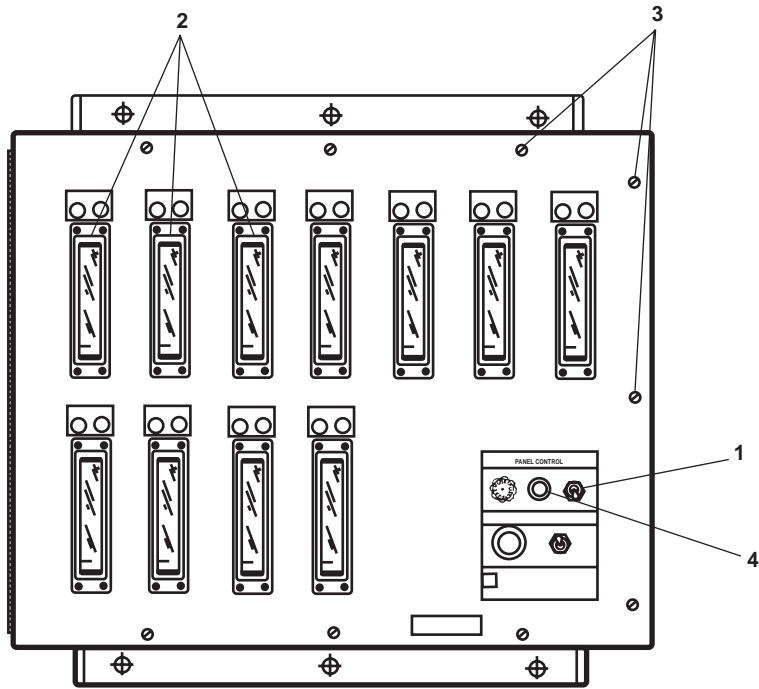


Figure 1. 11 Channel TLI Control Panel

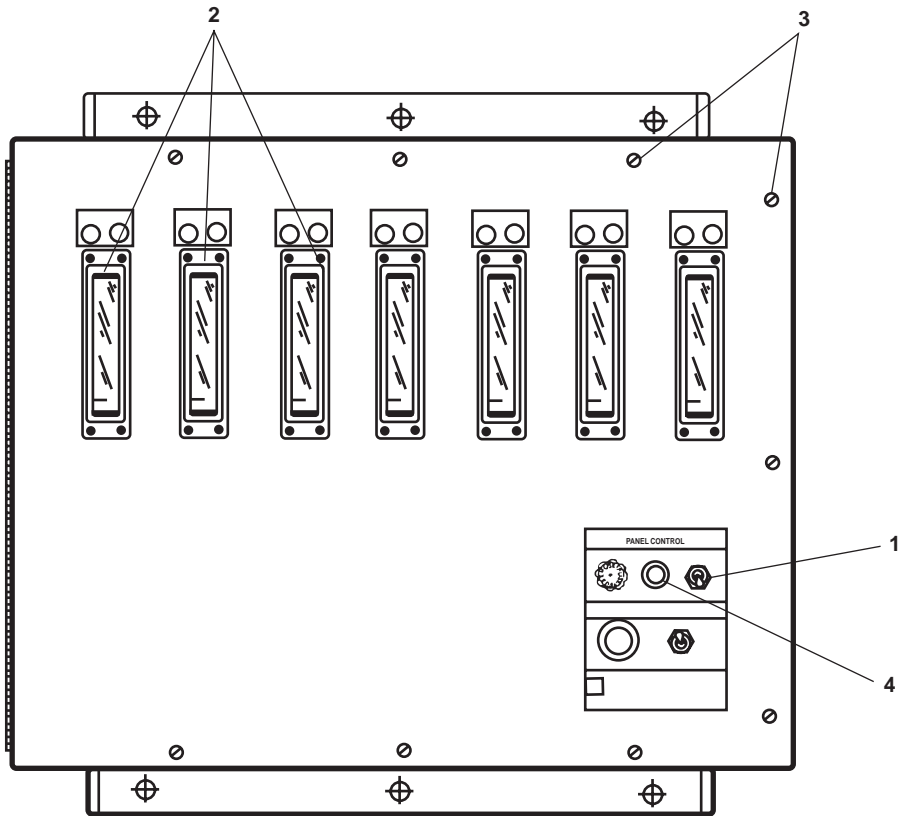


Figure 2. 7 Channel TLI Control Panel

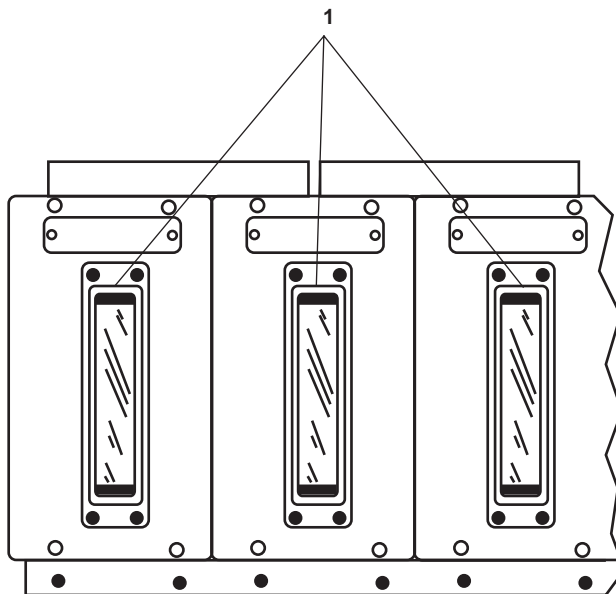


Figure 3. TLI Remote Indicator

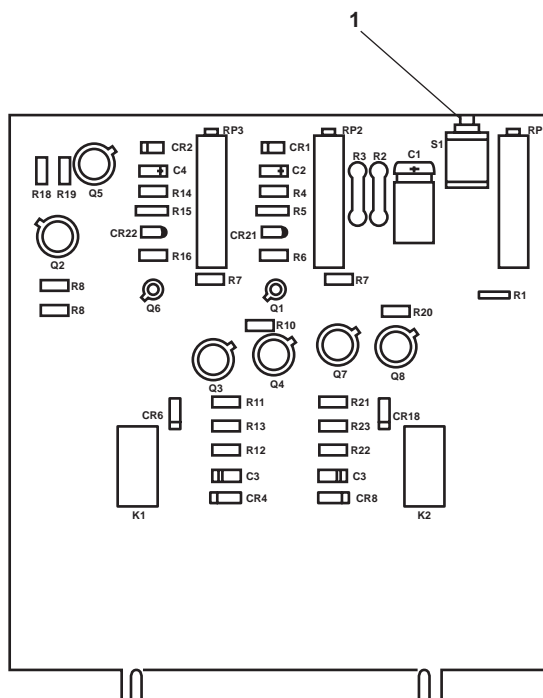


Figure 4. Control Module Circuit Card

6. While the CALIBRATE pushbutton switch (figure 4, item 1) is pressed, verify that the selected control panel fluid level meter (figures 1 & 2, item 2) and the associated remote indicator panel fluid level meter (figure 3, item 1) deflects to the full-scale position.
7. If the fluid meters do not fully deflect, notify the maintenance supervisor.
8. Release the selected CALIBRATE pushbutton switch (figure 4, item 1).
9. At the TLI control panels, place the POWER ON/OFF switch (figures 1 and 2, item 1) to OFF.
10. CLOSE and secure the TLI control panel front covers (figure 1 or 2, item 3).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, CALIBRATE**

---

**INITIAL SETUP:****References:**

WP 0255 00

**Equipment Conditions:**

TLI Transmitters Removed (WP 0255 00)

---

**CALIBRATION**

TLI transmitters may not be field repaired or calibrated. Return the TLI transmitter to the Original Equipment Manufacturer (OEM) for repair, calibration, or adjustment. Contact Gems Sensors Inc., One Cowles Road, Plainville, CT 06062-1198 to make arrangements for returning the TLI transmitter(s).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM55-502  
TM 55-1925-273-10  
WP 0156 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the TLI SYSTEM. circuit breaker at 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).

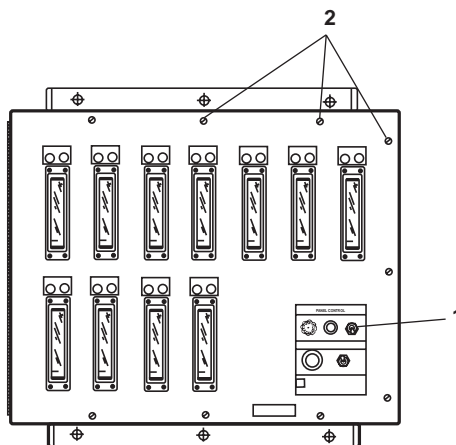
---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**CONTROL MODULE REPLACEMENT****REMOVAL**

1. Set to OFF the POWER ON/OFF switch (figure 1, item 1) on the Tank Level Indicator (TLI) control panel in the EOS.
2. Loosen the captive screws (figure 1, item 2) and open the front panel.



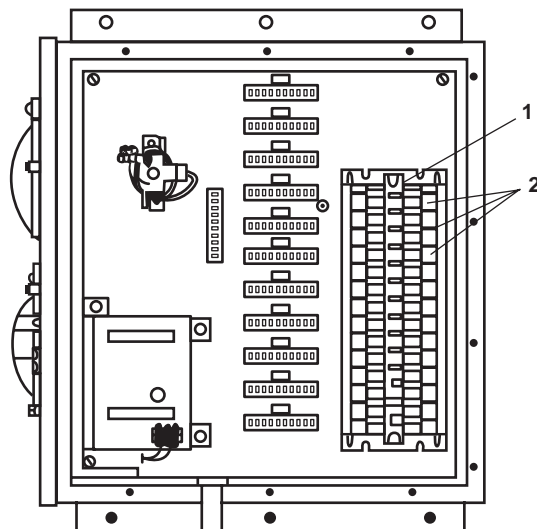
**Figure 1. TLI Control Panel and Components**

## WARNING



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the POWER ON/OFF switch (figure 1, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Loosen the two retaining screws that secure the retaining bar (figure 2, item 1).
5. Remove the retaining bar (figure 2, item 1).
6. Remove the control module (figure 2, item 2) from the card rack.



**Figure 2. Receiver Panel Interior**

### INSTALLATION

1. Install the control module (figure 2, item 2) in the appropriate slot of the card rack, pushing straight inward until the card is firmly seated.
2. Install the retaining bar (figure 2, item 1) and secure it with the retaining screws (figure 1, item 2).
3. Perform the Follow-On Service procedure at the end of this work package.

## PANEL METER REPLACEMENT

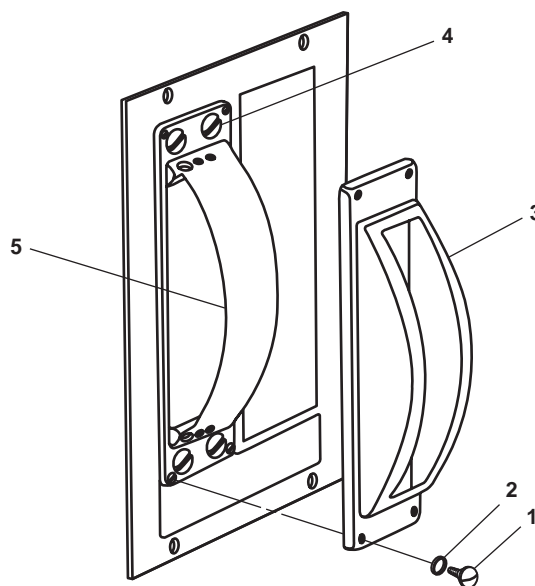
### REMOVAL

1. Set to OFF the POWER ON/OFF switch (figure 1, item 1) on the TLI control panel in the EOS.
2. Loosen the captive screws (figure 1, item 2) and open the front panel.



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the POWER ON/OFF switch (figure 1, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. CLOSE the TLI control panel door and tighten the captive screws (figure 1, item 2).
5. Remove the four screws (figure 3, item 1) and four lockwashers (figure 3, item 2). Discard the lockwashers.
6. Remove the face frame (figure 3, item 3).
7. Remove the four screws (figure 3, item 5) from the panel meter (figure 3, item 4).
8. Remove the panel meter (figure 3, item 4) from its mount and disconnect the cable from the faulty panel meter.



**Figure 3. Panel Meter**

## INSTALLATION

1. Connect the panel meter cable and insert the panel meter (figure 3, item 4) in the the control panel.
2. Install the four screws (figure 3, item 5) in the panel meter (figure 3, item 4).
3. Install the face frame (figure 3, item 3) over the panel meter (figure 3, item 4), securing it with the four screws (figure 3, item 1) and four new lockwashers (figure 3, item 2).
4. Set to ON the POWER ON/OFF switch (figure 1, item 1) at the TLI control panel in the EOS.
5. Perform the Follow-On Service procedure at the end of this work package.

## ALARM HORN REPLACEMENT

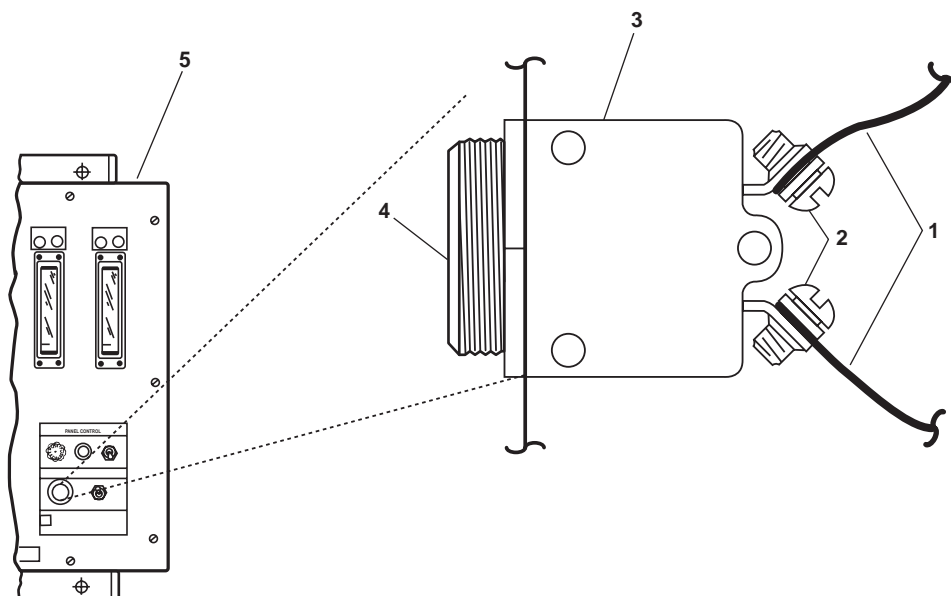
### REMOVAL

1. Loosen the captive screws (figure 1, item 2) and open the front panel.



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Use a multimeter to check for voltage at the POWER ON/OFF switch (figure 1, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Label and remove the wiring (figure 4, item 1) from the terminals (figure 4, item 2) of the alarm horn assembly (figure 4, item 3).
4. Loosen the retaining nut (figure 4, item 4) and remove the alarm horn assembly (figure 4, item 3) from the alarm panel (figure 4, item 5).



**Figure 4. Alarm Horn Assembly**

## INSTALLATION

1. Install the alarm horn assembly (figure 4, item 3) in the alarm panel (figure 4, item 5) and secure it with the retaining nut (figure 4, item 4).
2. Connect the wires (figure 4, item 1) to the terminals (figure 4, item 2) of the alarm horn assembly (figure 4, item 3) using the labels from step 3 of Removal as a guide. Remove the labels.
3. Close the front panel and tighten the captive screws (figure 1, item 2).
4. Perform the Follow-On Service procedure at the end of this work package.

## FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).
2. Operate the TLI SYSTEM under usual conditions (TM 55-1925-273-10).
3. Perform the Tank Level Indicator Calibrate procedure (WP 0156 00, volume 1) for the replaced equipment.
4. Return the equipment to the desired readiness condition.

## END OF WORK PACKAGE





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)  
Soldering Iron, Electric (Item 21, Table 2  
WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

WP 0250 00  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Flux Soldering (Item 64, Table 1, WP 0307 00)  
Rosin Core Solder (Item 166, Table 1, 0307 00)

**Equipment Condition:**

Defective control module removed (WP 0250 00)  
and placed on a non-conductive work surface.

---

**CAPACITOR REPLACEMENT**

**WARNING**



**Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.**

1. Label the correct location of the leads to be disconnected from the faulty capacitor on the control module. Pay special attention to the polarity and arrangement of the capacitor's leads.
2. Clip the leads of the capacitor as close to the Printed Circuit (PC) board as possible, and remove it from the control module.
3. Heat and tin the tip of the soldering iron.
4. Turn the control module over on the work surface, and locate the clipped leads from the faulty capacitor.

 **CAUTION**

Place the heated tip of the soldering iron in contact with the control module board just long enough to melt and remove the old solder and leads from the faulty component. Applying unnecessary heat to the control module and its components can cause damage.

5. Use the soldering iron to melt the solder around the clipped leads, and remove the solder with a desoldering tool. Remove the clipped capacitor leads with long-nosed pliers or tweezers.

6. Shape the leads of the replacement capacitor to fit in the mounting holes or posts on the control module.

#### NOTE

When replacing capacitors, observe the polarity of the capacitor being replaced and position the replacement accordingly.

7. Insert the leads of the new component into the mounting holes from the front side of the board to the back, and shape the leads so that they lie flat on the conducting surfaces on the back side of the control module.

#### WARNING



**Do not use soldering flux in unventilated spaces. Failure to follow these precautions can cause illness, serious injury, or death.**

8. Apply a small amount of soldering flux to the component leads and the control module holes using a flux brush.

#### ⚠ CAUTION

Place the heated tip of the soldering iron in contact with the control module and component just long enough for the solder to flow into the mounting holes. Applying unnecessary heat to the control module and its components can cause damage.

#### NOTE

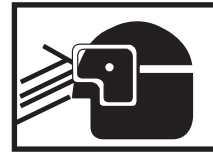
If space permits, hold the leads with long-nosed pliers between the component and the soldering point on the control module to allow the pliers to act as a heat sink.

9. Apply a small amount of solder to the tinned tip of the soldering iron, and apply the tip of the tinned soldering iron to the capacitor leads long enough for solder to flow into the mounting holes.

#### NOTE

The solder is sufficiently cooled (solid) when the color changes from opaque to shiny, and the texture remains smooth.

10. Allow the solder joint to cool, then inspect the new connection.

**WARNING**

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

Do not allow cleaning solvents or polyurethane resin to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear protective gloves and goggles when handling cleaning solvents and resins. Failure to follow these precautions can result in illness, serious injury or death.

11. Clean the new solder connections with dry cleaning solvent, allow to dry, and brush polyurethane resin over the newly exposed connections on the back of the control module.
12. Perform control module replacement (WP 0250 00).

**RESISTOR REPLACEMENT**

1. Label the correct location of the leads to be disconnected from the faulty resistor on the control module.
2. Clip the leads of the resistor as close to the pc board as possible, and remove it from the control module.
3. Heat and tin the tip of the soldering iron.
4. Turn the control module over on the work surface, and locate the clipped leads from the faulty resistor.

**⚠ CAUTION**

Place the heated tip of the soldering iron in contact with the control module board just long enough to melt and remove the old solder and leads from the faulty component. Applying unnecessary heat to the control module and its components can cause damage.

5. Use the soldering iron to melt the solder holding the clipped leads in place, and remove the molten solder with a desoldering tool. Remove the clipped component leads with long-nosed pliers or tweezers.
6. Shape the leads of the replacement resistor to fit in the mounting holes or posts on the control module.
7. Insert the leads of the new resistor into the mounting holes from the front side of the board to the back, and shape the leads to lay flat on the conducting surfaces on the back side of the control module.

**WARNING**

**Do not use soldering flux in unventilated spaces. Failure to follow these precautions can cause illness, serious injury, or death.**

8. Apply a small amount of soldering flux to the component leads and the control module mounting holes using a flux brush.

**CAUTION**

Place the heated tip of the soldering iron in contact with the control module and component just long enough for the solder to flow into the mounting holes. Applying unnecessary heat to the control module and its components can cause damage.

**NOTE**

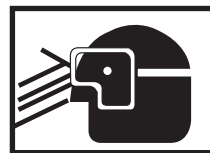
If space permits, hold the leads with long-nosed pliers between the component and the soldering point on the control module to allow the pliers to act as a heat sink.

9. Apply a small amount of solder to the tinned tip of the soldering iron, and apply the tip of the tinned soldering iron to the resistor leads long enough for solder to flow into the mounting holes.

**NOTE**

The solder is sufficiently cooled (solid) when the color changes from opaque to shiny, and the texture remains smooth.

10. Allow the solder joint to cool, then inspect the new connection.

**WARNING**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

**Do not allow cleaning solvents or polyurethane resin to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear protective gloves and goggles when handling cleaning solvents and resins. Failure to follow these precautions can result in illness, serious injury or death.**

11. Clean the new solder connections with cleaning solvent, allow to dry, and brush polyurethane resin over the newly exposed connections on back of the control module.

12. Perform control module replacement (WP 0250 00).

### DIODE REPLACEMENT

1. Label the correct location of the leads to be disconnected from the faulty diode on the control module. Pay special attention to the polarity and arrangement of the diode and how it is placed on the board.
2. Clip the leads of the diode as close to the pc board as possible, and remove it from the control module.
3. Heat and tin the tip of the soldering iron.
4. Turn the control module over on the work surface, and locate the clipped leads from the bad diode.

### CAUTION

Place the heated tip of the soldering iron in contact with the control module board just long enough to melt and remove the old solder and leads from the faulty component. Applying unnecessary heat to the control module and its components can cause damage.

5. Use the soldering iron to melt the solder around the clipped leads, and remove the solder with a desoldering tool. Remove the clipped leads left from the diode with long-nosed pliers or tweezers.
6. Shape the leads of the replacement diode to fit in the mounting holes or posts on the control module.

### NOTE

When replacing diodes, observe the polarity of the diode being replaced and position the replacement accordingly.

7. Insert the leads of the new diode into the mounting holes from the front side of the board to the back, and shape the leads so that they lie flat on the conducting surfaces on the back of the control module.

### WARNING



**Do not use soldering flux in unventilated spaces. Failure to follow these precautions can cause illness, serious injury, or death.**

8. Apply a small amount of soldering flux to the leads of the diode and to the control module holes with a flux brush.

## ⚠ CAUTION

Place the heated tip of the soldering iron in contact with the control module and diode just long enough for the solder to flow into the mounting holes. Applying unnecessary heat to the control module and its components can cause damage.

### NOTE

If space permits, hold the leads with long-nosed pliers between the diode and the soldering point on the control module to allow the pliers to act as a heat sink. Do not remove the pliers until the solder joint has cooled.

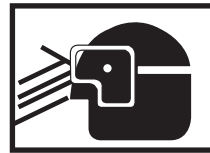
- Apply a small amount of solder to the tinned tip of the soldering iron, and apply the tip of the tinned soldering iron to the diode leads long enough for solder to flow from the tip of the soldering iron into the mounting holes.

### NOTE

The solder is sufficiently cooled (solid) when the color changes from opaque to shiny, and the texture remains smooth.

- Allow the solder joint to cool, then inspect the new connection.

## WARNING



**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

**Do not allow cleaning solvents or polyurethane resin to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear protective gloves and goggles when handling cleaning solvents and resins. Failure to follow these precautions can result in illness, serious injury or death.**

- Clean the new solder connections with cleaning solvent, allow to dry, and brush polyurethane resin over the newly exposed connections on the control module.
- Perform control module replacement (WP 0250 00).

### TRANSISTOR REPLACEMENT

- Label the correct location of the leads to be disconnected from the faulty transistor. Pay special attention to the placement of the base, emitter, and collector arrangement of the transistor and how it is placed on the board.
- Clip the leads of the transistor as close to the pc board as possible, and remove it from the control module.

- Heat and tin the tip of the soldering iron.
- Turn the control module over on the work surface, and locate the clipped leads from the faulty transistor.

### CAUTION

Place the heated tip of the soldering iron in contact with the control module board just long enough to melt and remove the old solder and leads from the faulty component. Applying unnecessary heat to the control module and its components can cause damage.

- Use the soldering iron to melt the solder around the clipped leads, and remove the solder with a desoldering tool. Remove the clipped leads left from the transistor with long-nosed pliers or tweezers.
- Shape the leads of the replacement transistor to fit in the mounting holes or posts on the control module.

### NOTE

When replacing a transistor, observe the location of the multiple leads of the transistor. The flat or indented part of the transistor correlates to the base of the component. Replacement transistors meeting required specification may not look identical to the part they are replacing. Position the replacement on the board accordingly.

- Insert the leads of the new transistor into the mounting holes from the front side of the board to the back, and shape the leads so that they lie flat on the conducting surfaces on the back of the control module.

### WARNING



**Do not use soldering flux in unventilated spaces. Failure to follow these precautions can cause illness, serious injury, or death.**

- Apply a small amount of soldering flux to the leads of the transistor and to the control module holes with a flux brush.

### CAUTION

Place the heated tip of the soldering iron in contact with the control module and diode just long enough for the solder to flow into the mounting holes. Applying unnecessary heat to the control module and its components can cause damage.

### NOTE

If space permits, place long-nosed pliers in contact with the leads between the transistor and the soldering point on the control module to allow the pliers to act as a heat sink. Do not remove the pliers until the solder joint has cooled.

- Apply a small amount of solder to the tinned tip of the soldering iron, and apply the tip of the tinned soldering iron to the transistor leads long enough for solder to flow from the tip of the soldering iron into the mounting holes.

## NOTE

The solder is sufficiently cooled (solid) when the color changes from opaque to shiny, and the texture remains smooth.

10. Allow the solder joint to cool, then inspect the new connection.



**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

**Do not allow cleaning solvents or polyurethane resin to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear protective gloves and goggles when handling cleaning solvents and resins. Failure to follow these precautions can result in illness, serious injury or death.**

11. Clean the new solder connections with cleaning solvent, allow to dry, and brush polyurethane resin over the newly exposed connections on the control module.
12. Perform control module replacement (WP 0250 00).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, FLUID DETECTION DEVICES; INSPECT**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2  
WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Leather (Item 37, Table 2, WP 0295 00)

**References:**

FM 55-502  
WP 0093 00 (volume 1)  
WP 0295 00  
WP 0307 00  
Organizational Confined Space Entry SOP

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L (One of these  
must be trained in confined space entry)  
One Entry Supervisor/Attendant

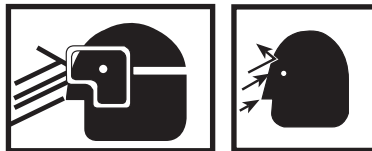
**Equipment Conditions:**

Set to OFF the TLI SYSTEM circuit breaker in 120V  
emergency distribution panel No. 1. Lock out and  
tag out (FM 55-502).  
Manhole cover removed (WP 0093 00, volume 1).  
Tanks prepared for confined space entry with Con-  
fined Space Entry Permit secured (Organizational  
Confined Space Entry SOP and FM 55-502).

**INSPECT TRANSMITTER MOUNTING BRACKETS****WARNING**

**Entry into an uninspected confined space may result in death or serious injury to personnel. Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502.**

1. Enter the tank and locate the transmitter mounting brackets.

**WARNING**

**Wire brushing operations can produce high velocity flying debris which can become lodged in the skin or in the eyes. Wire brushing in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing wire brushing operations. Failure to comply can result in death or serious injury to personnel.**

2. If necessary, use a wire brush to scrape away any foreign matter from the mounting bracket welds (figure 1, item 1).
3. Verify that no corrosion or damage is present on the mounting brackets (figure 1, item 2).

4. Check for loose or missing attaching hardware (figure 1, item 3) on mounting brackets, and replace and tighten any missing hardware as necessary.
5. Look for cracks, breaks, physical damage or other noticeable defects.
6. Ensure that the mounting brackets are holding the transmitter(s) (figure 1, item 4) firmly in place.
7. Exit the tank and install the manhole cover (WP 0093 00, volume 1).
8. Remove the lockouts and tagouts (FM 55-502) and return equipment to the desired readiness condition.

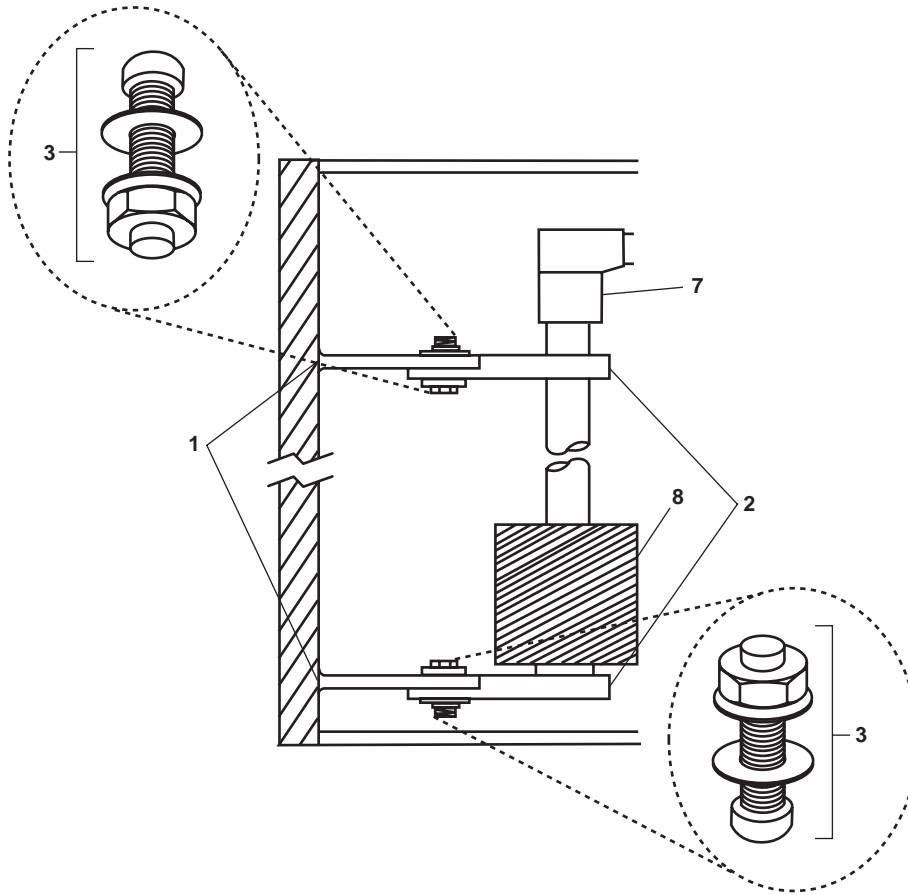


Figure 1. TLI Transmitter Mounting Brackets

END OF WORK PACKAGE

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, FLUID DETECTION DEVICES; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Torch Outfit, Cutting and Welding (Item 2, Table 2, WP 0295 00)  
 Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 2, WP 0295 00)  
 Sander, Disc, Angle (Item 40, Table 2, WP 0295 00)

**References:**

FM 55-502  
 Organizational Confined Space Entry SOP  
 TB 43-0218  
 TB 43-0144  
 TB 55-1900-204-24  
 TM 55-1925-273-10  
 WP 0093 00 (volume 1)  
 WP 0295 00  
 WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Equipment Conditions:**

Set to OFF the TLI SYSTEM. circuit breaker at 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).  
 Manhole cover removed (WP 0093 00, volume 1).  
 Tanks certified safe for hotwork (FM 55-502).  
 Tanks prepared for confined space entry with Confined Space Entry Permit secured in accordance with Organizational Confined Space Entry SOP and FM 55-502.

**Personnel Required:**

Two Watercraft Engineers, 88L  
 One must be trained in confined space entry  
 One Entry Supervisor/Attendant  
 Fire Watch as Required (FM 55-502)

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**TRANSMITTER MOUNTING BRACKETS REPLACEMENT**

**WARNING**

**Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502. Entry into an unprepared confined space may result in death or serious injury to personnel.**

1. Enter the tank and locate the faulty Tank Level Indicator (TLI ) transmitter mounting brackets (figure 1, item 1).

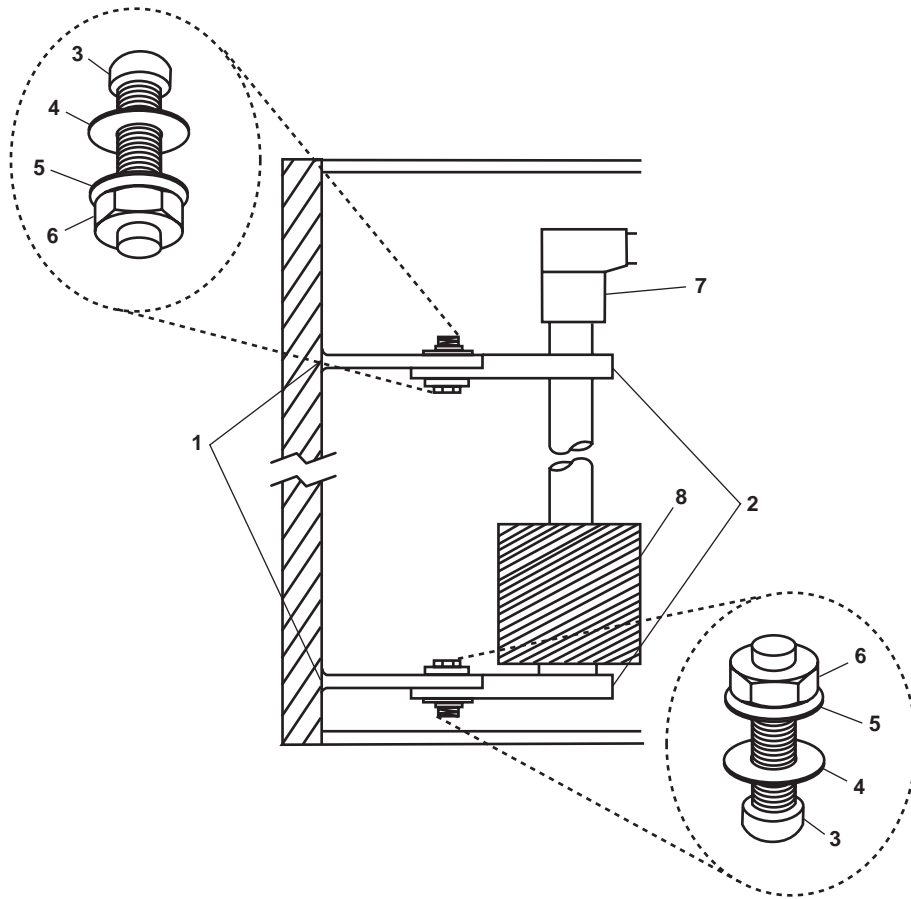
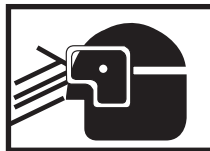


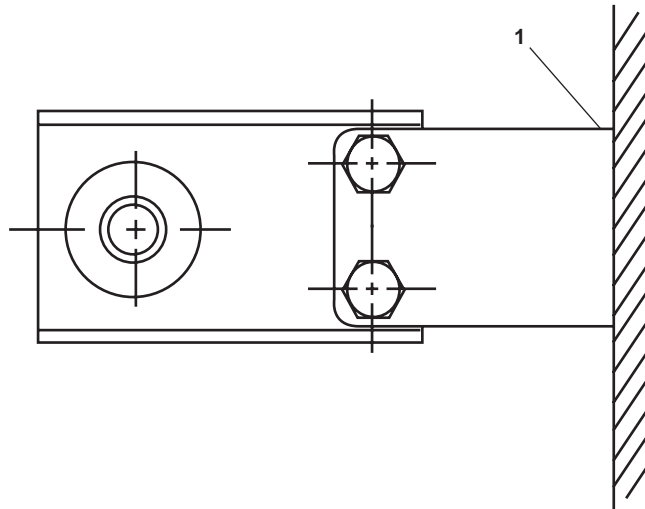
Figure 1. TLI Transmitter Mounting Brackets and Transmitter

**WARNING**



**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury or death.**

2. Use a wire brush to scrape away any foreign matter from the mounting bracket welds (figure 2, item 1), the mounting bracket assembly (figure 1, item 2), bolts (figure 1, item 3), flat washers (figure 1, item 4), lockwashers (figure 1, item 5), and locknuts (figure 1, item 6).



**Figure 2. TLI Transmitter Mounting Bracket Top View**

**⚠ CAUTION**

Care must be taken when removing TLI transmitters from their mounts. Excessive shock and vibration can damage components.

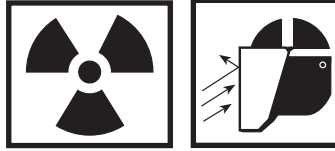
3. Remove the upper and lower bolts (figure 1, item 3), flat washers (figure 1, item 4), lockwashers (figure 1, item 5) and locknuts (figure 1, item 6). Discard the lockwashers and locknuts.
4. Inspect the bolts (figure 1, item 3) and flat washers (figure 1, item 4) for wear and/or damage. Replace the bolts and flat washers if they are worn and/or damaged.
5. Place a protective cover over the TLI transmitter (figure 1, item 7) to prevent damage from flying debris.

**WARNING**



**Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel or ignite fires in the work area. Wear protective goggles, gloves, and/or aprons at all times. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and damage to the vessel.**

6. Use a grinder (sander) to clean the work area around the faulty mounting bracket (figure 1 and 2, item 1) to the bare metal.

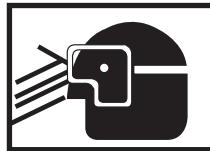
**WARNING**

**Unprotected exposure to arc welding rays can cause serious eye damage and radiation burns to the skin. Never perform arc-welding operations without appropriate eye and skin protection. Failure to comply can result in death or serious injury.**

**⚠ CAUTION**

Improper connection of ground leads can cause serious electrolytic and electronic damage to the vessel and its components. Always ensure that ground leads are connected (TB 55-1900-204-24).

7. Post fire watches as necessary on both sides of the bulkhead where hotwork is to take place.
8. Weld the mounting bracket to the bulkhead in accordance with the applicable construction drawings and welding practices detailed in TB 55-1900-204-24.

**WARNING**

**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.**

9. Use a wire brush to prepare the work area for painting.
10. After the area has cooled, paint and preserve the affected area (TB 43-0144).
11. Install the TLI transmitter (figure 1, item 7) to the mounting brackets (figure 1, item 1) and secure it with the bolts (figure 1, item 3), flat washers (figure 1, item 4), new lockwashers (figure 1, item 5), and new locknuts (figure 1, item 6).
12. Ensure that all cables inside the tank are secured and that they will not interfere with the travel of the TLI transmitter float (figure 1, item 8) when the vessel pitches up and down or side to side.
13. Ensure that all cable connections to components are secured.
14. Remove all tools and debris from the interior of the tank. Exit the tank and install the manhole cover (WP 0093 00, volume 1).
15. Remove the lockouts and tagouts (FM 55-502).
16. Operate the TLI system under usual conditions (TM 55-1925-273-10), ensuring proper operation of the system.
17. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, TRANSMITTERS; INSPECT**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L  
(One must be trained in confined space entry)  
One Entry Supervisor/Attendant

**References:**

FM 55-502  
Organizational Confined Space Entry SOP

**References (continued):**

TM 55-1925-273-10  
WP 0093 00 (volume 1)  
WP 0295 00  
WP 0307 00

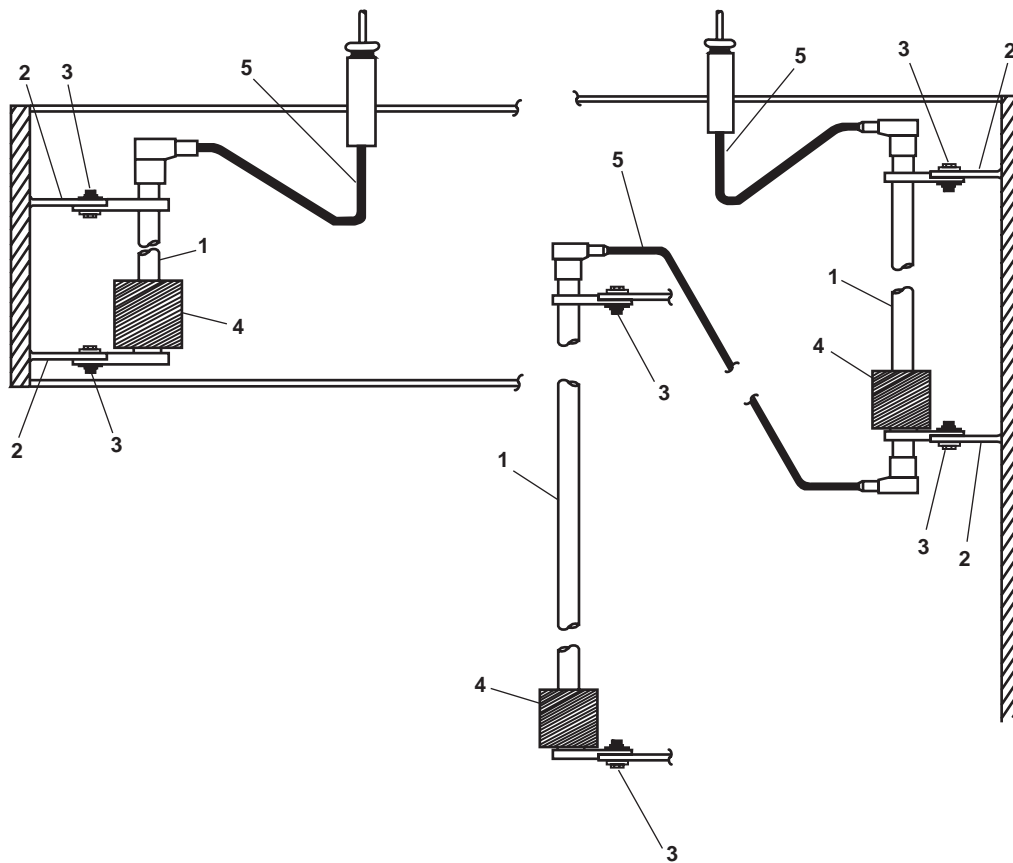
**Equipment Conditions:**

Set to OFF the TLI SYSTEM. circuit breaker at 120V  
emergency distribution panel No. 1. Lock out and  
tag out (FM 55-502).  
Manhole cover removed (WP 0093 00, volume 1).  
Tank prepared for confined space entry with Confined  
Space Entry Permit secured in accordance with Or-  
ganizational Confined Space Entry SOP and FM 55-  
502.

**INSPECT TLI TRANSMITTER****WARNING**

**Entry into an unprepared confined space may result in death or serious injury to personnel. Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502. Failure to comply can result in serious injury or death.**

1. Enter the tank and locate the Tank Level Indicator (TLI) transmitter (figure 1, item 1).
2. Inspect the mounting brackets (figure 1, item 2) for adequate welds and proper preservation.
3. Examine the attaching hardware (figure 1, item 3) for stripped screw threads, worn slots, and loss. Verify that there are no loose or missing bolts, flat washers, lockwashers, and locknuts on the mounting brackets. Replace or tighten hardware as necessary.
4. Check the vertical alignment of the TLI transmitter (figure 1, item 1) in the mounting brackets in accordance with the applicable drawings.
5. Ensure that the TLI transmitter (figure 1, item 1) is secured firmly in place.
6. Examine the TLI transmitter (figure 1, item 1) for dents, cracks, or other physical damage.
7. Use a dry, clean wiping rag to wipe any sludge and dirt off the stem of the transmitter (figure 1, item 1) that may interfere with the travel of the float (figure 1, item 4).



**Figure 1. TLI Indicator Transmitter**

8. Check that the cables (figure 1, item 5) are properly secured and that there are no nicks or wear in the skin of the cables from the TLI transmitters to the stuffing tube penetrator. Replace worn or damaged cables as necessary.
9. Examine the cables (figure 1, item 5) for evidence of aging, burning, worn insulation, corrosion, or other signs of wear or damage. Replace worn or damaged cables as necessary.
10. Ensure that the cable (figure 1, item 5) has some slack but does not interfere with the movement of the float (figure 1, item 4).
11. Slide the float (figure 1, item 4) up and down the stem of the transmitter (figure 1, item 1). Ensure the float (figure 1, item 4) slides freely up and down the entire length of the stem.
12. Remove all tools and debris from the interior of the tank.
13. Exit the tank and install the manhole cover (WP 0093 00, volume 1).
14. Remove the lockouts the tagouts (FM 55-502).
15. Perform the Operation Under Usual Conditions: Tank Level Indicator System Shutdown procedure (TM 55-1925-273-10).
16. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, TRANSMITTERS; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
 Tool Kit, Electrician's (Item 11, Table 2,  
 WP 0295 00)  
 Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
 Tag, Danger (Item 174, Table 1, WP 0307 00)  
 Tape, Insulation, Electrical (Item 178, Table 1,  
 WP 0307 00)  
 Twine, Fibrous (Item 194, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L  
 (One must be trained in confined space entry)  
 One Confined Space Entry Supervisor/Attendant

**References:**

FM 55-502  
 Organizational Confined Space Entry SOP

**References (continued):**

TB 43-0218  
 TM 55-1925-273-10  
 WP 0093 00 (volume 1)  
 WP 0252 00  
 WP 0253 00  
 WP 0254 00  
 WP 0256 00  
 WP 0257 00  
 WP 0295 00  
 WP 0307 00

**Equipment Conditions:**

Set to OFF the TLI SYSTEM. circuit breaker at 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).  
 Manhole cover removed (WP 0093 00, volume 1).  
 Tank prepared for confined space entry with Confined Space Entry Permit secured in accordance with Organizational Confined Space Entry SOP and FM 55-502.

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**TANK LEVEL INDICATOR (TLI) TRANSMITTER****REMOVAL****NOTE**

The TLI Transmitter procedure does not apply to the sewage collection tank TLI transmitter. For replacement of the sewage collection tank TLI transmitter, refer to the Sewage Collection Tank TLI Transmitter procedure in this work package.

1. Locate the connection box that connects the faulty TLI transmitter to the TLI system.
2. Remove the screws (figure 1, item 1) that secure the connection box cover (figure 1, item 2).
3. Remove the connection box cover (figure 1, item 2).

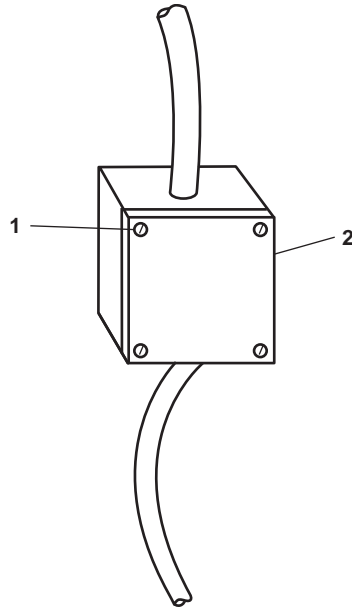


Figure 1. Connection Box (Typical)

**WARNING**



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Use a multimeter to check for voltage at the connection box leads. If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
5. Determine which terminals connect the TLI transmitter cable assembly to the connection box and which terminals connect the connection box to the TLI receivers. Label the correct location of all cable terminals in the connection box (figure 1, item 2).

**NOTE**

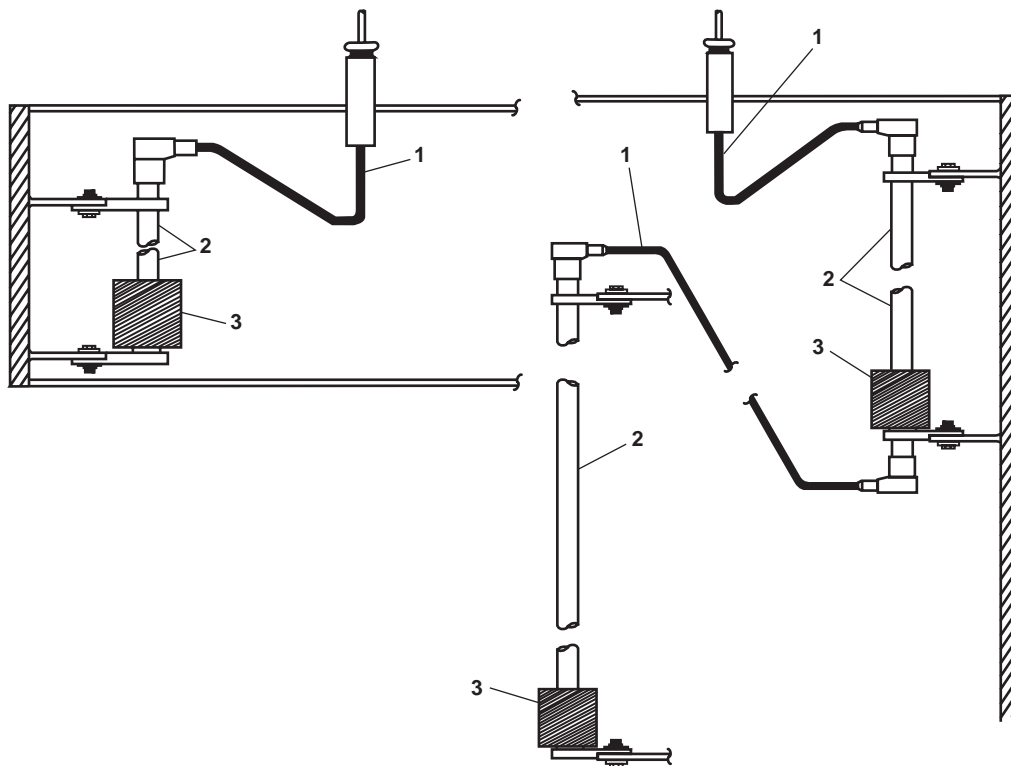
Only the TLI transmitter cable assembly wires should be connected to terminals in the connection box.

6. Disconnect the TLI system cable wires that connect the connection box to the TLI receivers. Use electrical insulation tape to insulate the TLI system cable wires. Take care not to damage any fasteners that may have to be reused.

## WARNING

**Entry into an unprepared confined space may result in death or serious injury to personnel. Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502. Failure to comply can result in serious injury or death.**

7. Enter the tank.
8. Locate the cable assembly (figure 2, item 1) tank entry point, and follow the cable back to the transmitter (figure 2, item 2).



**Figure 2. TLI Transmitter Configuration and Components**

9. Locate the cable assembly adapter (figure 3, item 1) and remove the setscrew (figure 3, item 2).
10. Remove the cable assembly adapter (figure 3, item 1) from the TLI transmitter connector (figure 3, item 3).
11. If the TLI transmitter is a dual mount, repeat steps 9 and 10 until all cable assemblies are removed from the TLI transmitters.

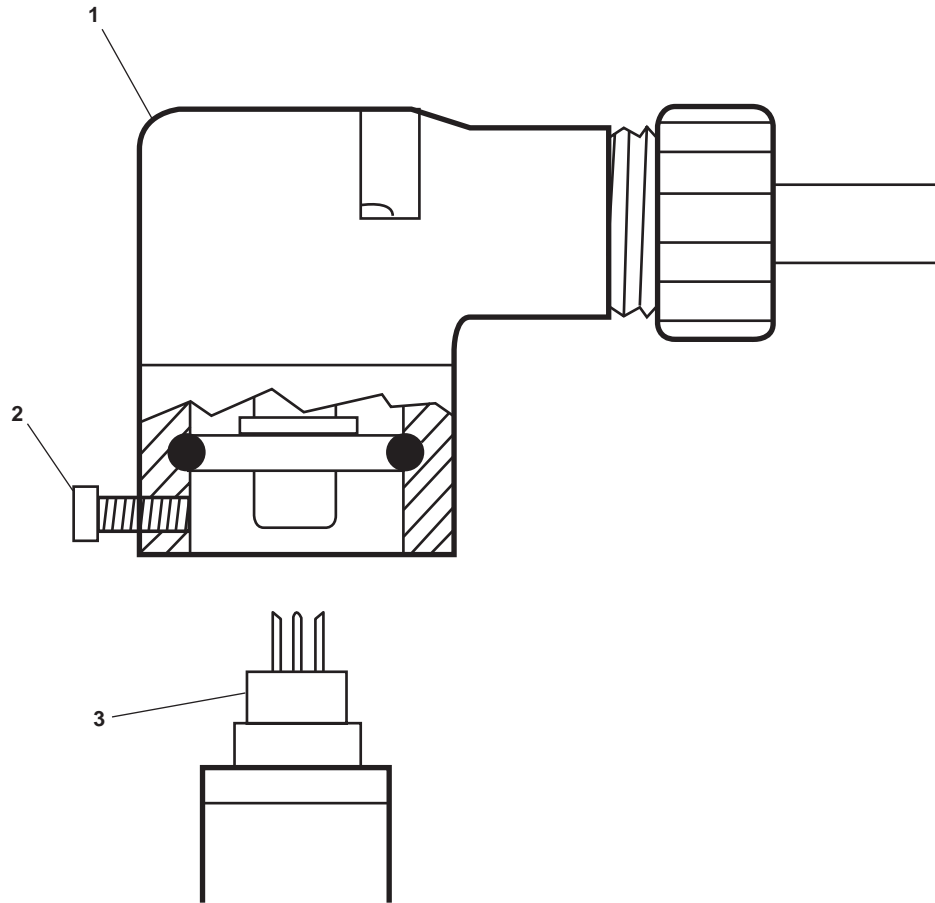
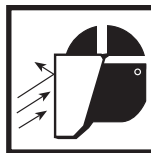


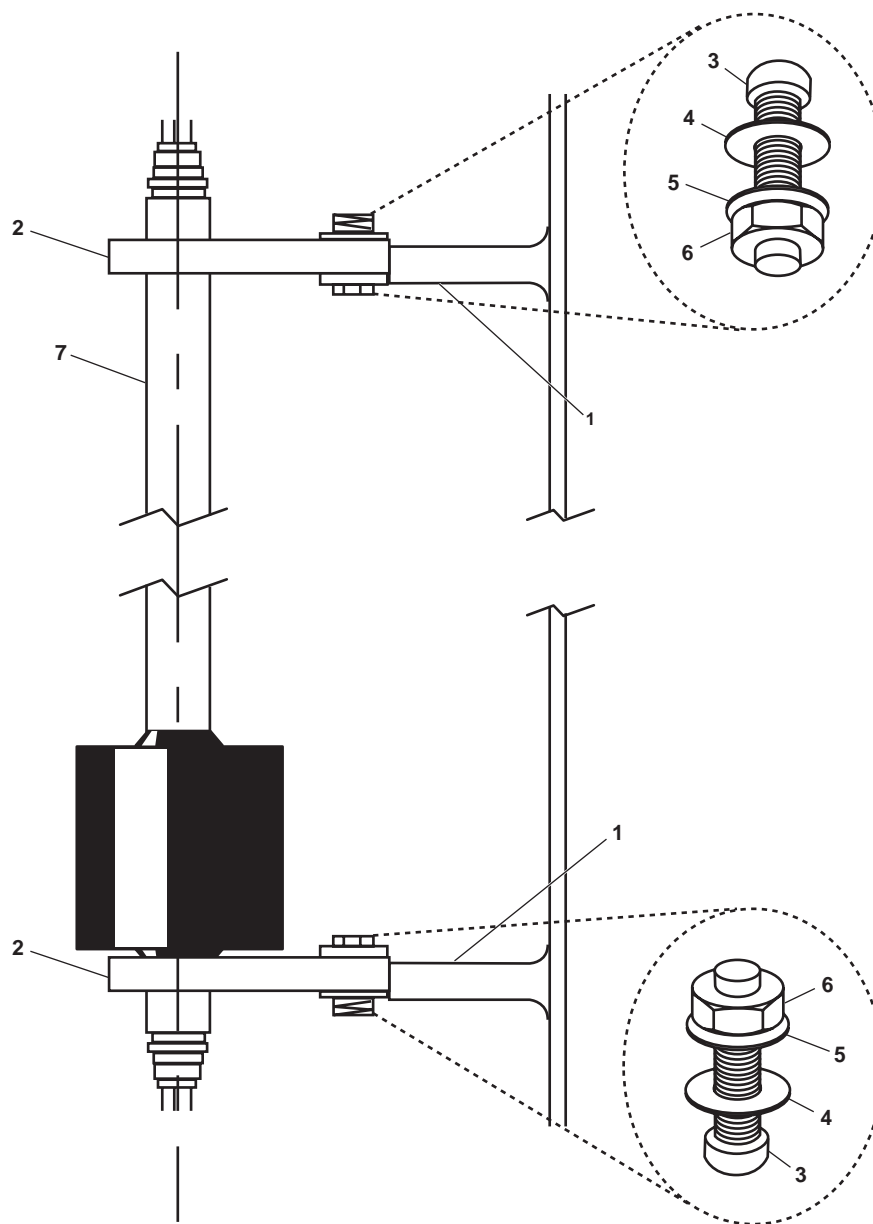
Figure 3. TLI Transmitter (Typical)

**WARNING**



**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury or death.**

12. Use a wire brush to scrape away any foreign matter from the mounting brackets (figure 4, item 1), the mounting bracket assemblies (figure 4, item 2), mounting bolts (figure 4, item 3), flat washers (figure 4, item 4), lockwashers (figure 4, item 5) and locknuts (figure 4, item 6). Discard the lockwashers and locknuts.



**Figure 4. TLI Transmitter Mounts (Typical)**

**⚠ CAUTION**

Use care when removing TLI transmitters from their mounts. Excessive shock and vibration can damage its components.

13. Remove the bolts (figure 4, item 3), flat washers (figure 4, item 4), lockwashers (figure 4, item 5), and locknuts (figure 4, item 6). Discard the lockwashers and locknuts.
14. Inspect the mounting bolts (figure 4, item 3) and flat washers (figure 4, item 4). Replace the bolts and/or flat washers if they are worn and damaged.
15. Remove the faulty TLI transmitter module (figure 4, item 7) from the mounting bracket assemblies (figure 4, item 2).

---

**INSTALLATION**

1. Inspect the mounting brackets (figure 4, item 1) (WP 0252 00).
2. Install the TLI transmitter (figure 4, item 7) in the mounting bracket assemblies (figure 4, item 2).
3. Install the mounting bracket assemblies (figure 4, item 2) to the mounting brackets (figure 4, item 1) with the bolts (figure 4, item 3), flat washers (figure 3, item 4), new lockwashers (figure 3, item 5), and new locknuts (figure 4, item 6).
4. Check the vertical alignment of the TLI transmitter (figure 4, item 7).
5. Inspect the installation (WP 0252 00, WP 0253 00, and WP 0254 00).
6. Install the TLI transmitter cable assemblies (WP 0257 00).
7. Ensure that all cable assemblies (figure 2, item 1) are secured in place and will not interfere with the travel of the float (figure 2, item 3) when the vessel pitches up and down or side to side.
8. Ensure that all cable connections to components are properly secured.
9. Slide the float (figure 2, item 3) up and down the stem (figure 2, item 2) of the TLI transmitter (figure 4, item 7). Ensure that each float slides freely up and down the entire length of the stem with no interference.
10. Connect the cable assembly wires to the terminals in the connection box using the labels from step 5 of Removal as a guide. Remove the labels.
11. Inspect the TLI transmitter cable assemblies (WP 0256 00).
12. Install the connection box cover (figure 1, item 2).
13. Verify that all tools and debris are removed from the tank.
14. Exit the tank and install the manhole cover (WP 0093 00, volume 1).
15. Remove the lockouts and tagouts (FM 55-502).
16. Operate the TLI system under usual conditions (TM 55-1925-273-10).
17. Return the equipment to the desired readiness condition.

## SEWAGE COLLECTION TANK TLI TRANSMITTER

## REMOVAL

**WARNING**

Sewage is a common mode of transmission for parasitic organisms that may have the capability of causing communicable diseases. Chemical protective gloves and a protective apron should be worn to help prevent contact with sewage. After coming in contact with sewage or contaminated equipment, be sure to clean yourself with a disinfectant soap. Avoid sewage contact with skin abrasions, punctures, cuts, and other open wounds. Wipe up and clean any spills and/or contaminated equipment using a disinfectant soap. Failure to comply can result illness, serious injury or death.

**NOTE**

The sewage collection tank must be as empty as possible to minimize the possibility of spillage and contamination.

1. Locate the connection box that connects the faulty TLI transmitter to the TLI system.
2. Remove the screws (figure 1, item 1) that secure the connection box cover (figure 1, item 2).
3. Remove the connection box cover (figure 1, item 2).

**WARNING**

**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Use a multimeter to check for voltage at the connection box leads. If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
5. Determine which terminals connect the TLI transmitter cable assembly to the connection box and which terminals connect the connection box to the TLI receivers. Label the correct location of all cable terminals in the connection box.

**NOTE**

Only the TLI transmitter cable assembly wires should be connected to the terminals in the connection box.

6. Disconnect the TLI system cable wires that connect the connection box to the TLI receivers. Use electrical insulation tape to insulate the TLI system cable wires.

7. At the tank top, remove the junction box cover (figure 5, item 1).
8. Label the correct location of all terminals (figure 5, item 2) in the junction box, and label the terminals on the replacement TLI transmitter.
9. Disconnect the terminals (figure 5, item 2) that connect the TLI transmitter to the junction box (figure 5, item 1). Prepare the wires for removal by bundling the TLI transmitter wires (figure 5, item 3) together and tying about a twenty-four inch (60 cm) length of fibrous twine to the end of the wire bundle.

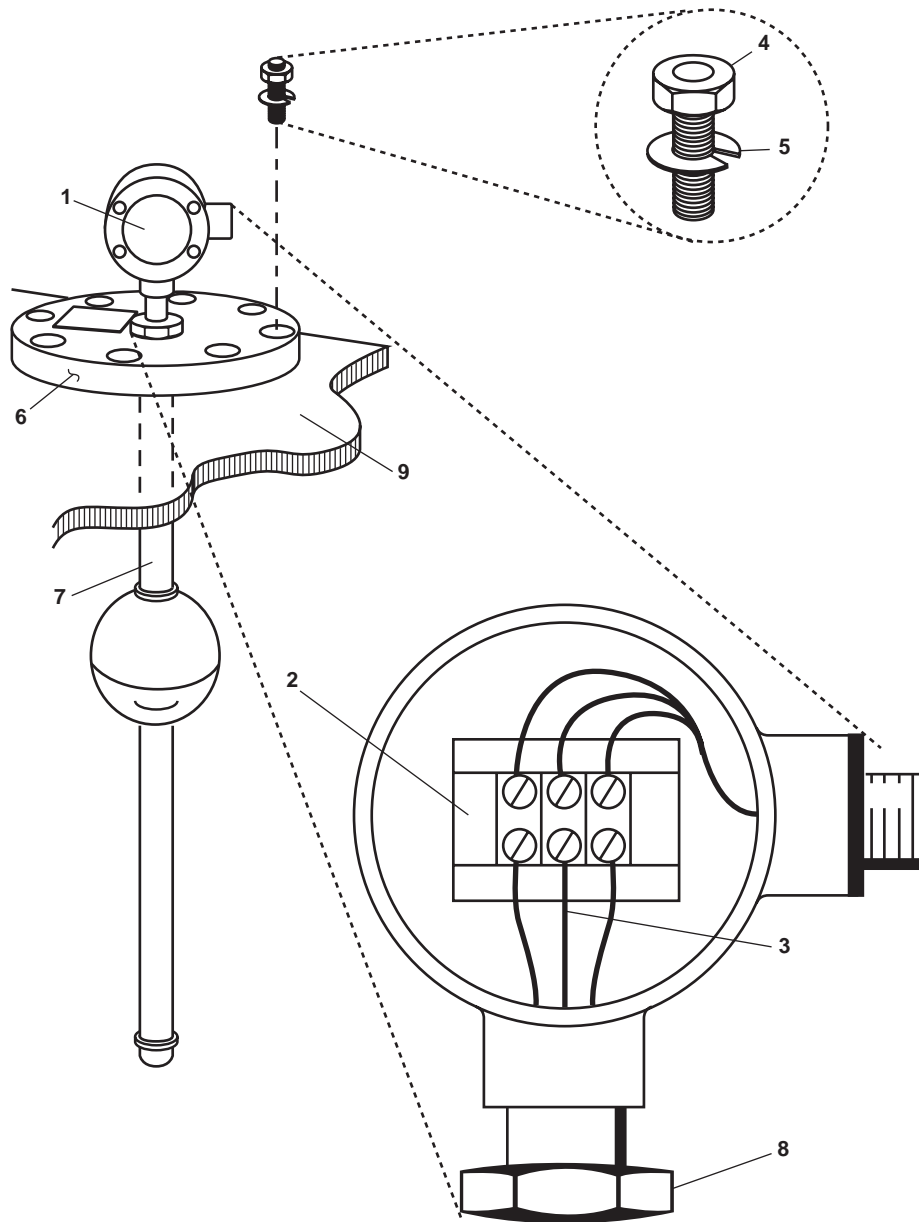


Figure 5. Junction Box and Flange Mounted Transmitter (Typical)



 **CAUTION**

Care must be taken when removing the flange mounted TLI transmitter. Use a minimum of two crewmembers to remove the flange mounted TLI transmitter. Failure to comply can result in damage to the equipment and cabling.

10. Remove the bolts (figure 5, item 4) and lockwashers (figure 5, item 5). Remove the flange (figure 5, item 6) from the top of the tank. Take care not to strike the TLI transmitter (figure 5, item 7) against any solid surfaces. Discard the lockwashers.

**NOTE**

It may be necessary to rotate the TLI transmitter counterclockwise while holding the junction box steady in order to separate the junction box from the TLI transmitter.

11. Remove the TLI transmitter (figure 5, item 7) from the flange (figure 5, item 6) by holding the TLI transmitter shaft securely and rotating the retaining nut (figure 5, item 8) counterclockwise.

**NOTE**

Slowly separate the TLI transmitter from the flange and guide the wires as necessary to prevent damage. Allow the fibrous twine to pull through so that it can be used to guide the wires to the replacement TLI transmitter through the flange and into the junction box.

12. When the retaining nut (figure 5, item 8) is free from the threads, gently pull the TLI transmitter (figure 5, item 7) away from the flange (figure 5, item 6) until both units are separated.

**INSTALLATION**

1. Remove the fibrous twine from the TLI transmitter wires (figure 5, item 3). Tie the fibrous twine securely around the wires of the replacement TLI transmitter.
2. Pull the fibrous twine from the dry side of the flange (figure 5, item 6), and guide the wires for the replacement TLI transmitter (figure 5, item 7) into place at the junction box terminals (figure 5, item 2).
3. Push the threaded end of the TLI transmitter stem (figure 5, item 7) into position through the bottom of the flange (figure 5, item 6) and into contact with the retaining nut (figure 5, item 8).

 **CAUTION**

Do not secure the TLI transmitter with the retaining nut until the junction box is properly installed on the stem or damage to the equipment will result.

4. Rotate the retaining nut (figure 5, item 8) clockwise over the threaded end of the TLI transmitter (figure 5, item 7) and tighten several turns.
5. Position the junction box (figure 5, item 1) over the threaded end of the TLI transmitter (figure 5, item 7) while continuing to pull the wires (figure 5, item 3) into place with the fibrous twine.
6. When the junction box (figure 5, item 1) is in place and the wires (figure 5, item 3) are completely through the flange and free of interference, secure the junction box (figure 5, item 1) to the TLI transmitter (figure 5, item 7) by holding the junction box in place and rotating the TLI transmitter clockwise. Rotate until hand tight plus 1/8 of a turn. Do not over tighten.
7. Hold the TLI transmitter (figure 5, item 7) securely in place and tighten the retaining nut (figure 5, item 8).

- 
8. Install the TLI transmitter in the tank. Install the flange (figure 5, item 6) to the top of the tank (figure 5, item 9) with the bolts (figure 5, item 4) and new lockwashers figure 5, item 5). Take care not to strike the TLI transmitter (figure 5, item 7) against any solid surfaces, or to stress the cable connections at the junction box (figure 5, item 1).
  9. Remove the fibrous twine from the TLI transmitter wires (figure 5, item 3).
  10. Connect the TLI transmitter wires (figure 5, item 3) to the junction box terminals (figure 5, item 2) using the label from step 9 of Removal as a guide. Remove the labels.
  11. Install the junction box cover.
  12. Inspect the TLI transmitter cable assemblies (WP 0256 00).
  13. Install the connection box cover.
  14. Remove the lockouts and tagouts (FM 55-502).
  15. Operate the sewage collection tank TLI system under usual conditions (TM 55-1925-273-10).
  16. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, CABLE ASSEMBLIES; INSPECT**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L  
One must be trained in confined space entry  
One Confined Space Entry Supervisor/Attendant

**References:**

FM 55-502  
Organizational Confined Space Entry SOP

**References (continued):**

TM 55-1925-273-10  
WP 0093 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the TLI SYSTEM. circuit breaker at 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).  
Manhole cover removed (WP 0093 00, volume 1).  
Tank prepared for confined space entry with Confined Space Entry Permit secured in accordance with Organizational Confined Space Entry SOP and FM 55-502.

**INSPECT DRY SIDE CABLE ASSEMBLY**

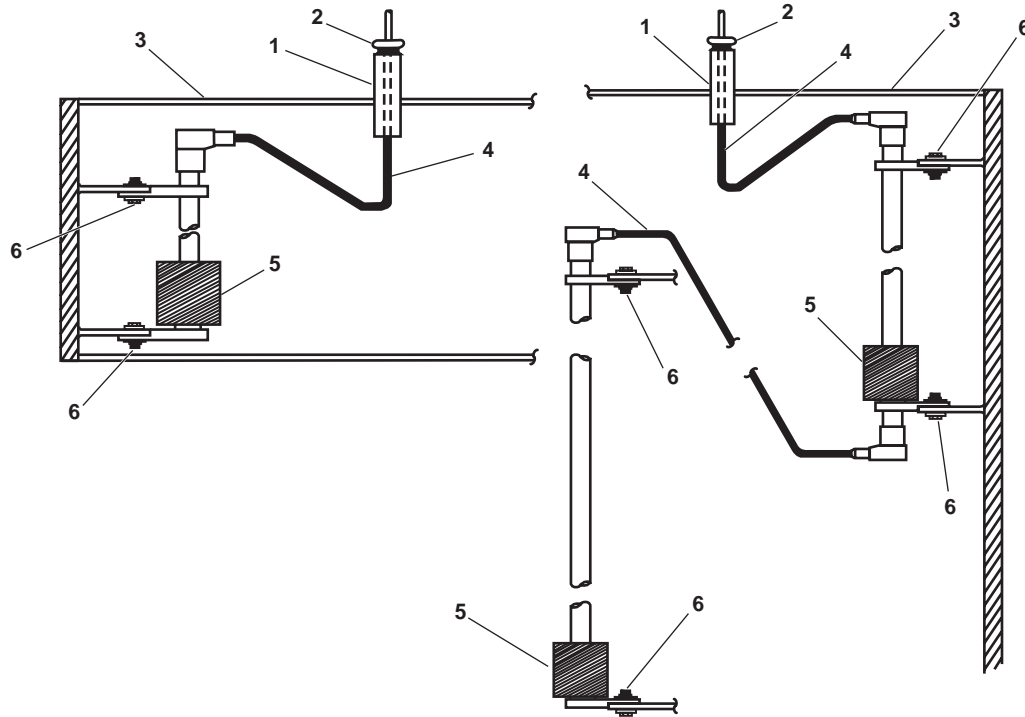
**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

1. Locate the connection box for the applicable Tank Level Indicator (TLI) transmitter cable. Ensure that the connection box is serviceable and undamaged.

**NOTE**

The sewage holding tank uses a 5 inch (13 cm) flange mount with a junction box to connect the TLI transmitter to the system. For this installation, the junction box and flange are dry side components.

2. At the tank that contains the cable assembly being inspected, locate the cable penetration stuffing tube (or junction box) (figure 1, item 1).
3. Inspect the cable (figure 1, item 2) from the cable penetration stuffing tube (figure 1, item 1) (or junction box) to the connection junction box. Examine the cable for evidence of aging, burning, worn insulation, corrosion, or other signs of wear or damage.
4. At the tank top, inspect the cable penetrator retaining lug (figure 1, item 3) for damage and wear.



**Figure 1. TLI Transmitter Configurations and Components**

5. Ensure that the penetrator lug (figure 1, item 3) is secured, and check that there is no evidence of tank leakage where the cable enters the tank.
6. Inspect the exterior of the tank penetration stuffing tube (figure 1, item 1) (or flange) for cracks, deterioration, and wear. Check for evidence of tank leakage around the area where the stuffing tube (or flange) contacts the top of the tank (figure 1, item 3).
7. Check for any unnecessary cable slack, and ensure that the cable is properly secured from the cable penetrator stuffing tube (or junction box) to the connection box.

#### **INSPECT WET SIDE CABLE**

### **WARNING**

**Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502. Entry into an unprepared confined space may result in death or serious injury to personnel.**

#### **NOTE**

There is no wet side cable assembly for the sewage holding tank junction box. Continue to the Test TLI Transmitter And Cable Assembly Continuity paragraph for junction box-installed TLI transmitters.

1. Enter the tank and locate the TLI transmitter cable entry point.

2. Use dry, clean wiping rags to wipe any sludge and dirt from the cable (figure 1, item 2). Clean the cable so that the full length can be inspected from the penetrator to the TLI transmitter and between TLI transmitters if the tank uses a dual TLI transmitter system.
3. Examine the cable(s) (figure 1, item 2) for evidence of burning, worn insulation, corrosion, or other signs of wear or damage.
4. Inspect the area of the cable penetration stuffing tube (figure 1, item 1) for damage and wear.
5. Ensure that the cable (figure 1, item 2) is tight in the cable stuffing tube (figure 1, item 1) and that there is no evidence of leakage from outside the tank through the cable penetration tube.
6. Inspect the interior tank side of the cable penetration stuffing tube (figure 1, item 1) for cracks, deterioration, and wear. Check for evidence of contamination entering the tank from the area of the stuffing tube.
7. Check that all cables (figure 1, item 2) inside the tank (figure 1, item 4) are secured in place and that they will not interfere with the travel of the TLI transmitter float(s) (figure 1, item 5) when the vessel pitches up and down or side to side.
8. Ensure that all cable assembly connections to components are properly secured.
9. Tighten any loose nuts and bolts (figure 1, item 6) as necessary.

#### TEST TLI TRANSMITTER AND CABLE ASSEMBLY CONTINUITY

1. Locate the connection box that connects the TLI transmitter to the TLI system.
2. Remove the screws (figure 2, item 1) securing the connection box cover (figure 2, item 2).
3. Remove the connection box cover (figure 2, item 2), taking care not to damage any water protecting seals or gaskets.



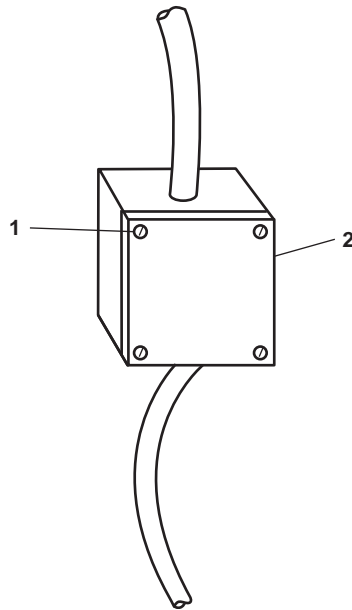
**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Use a multimeter to check for voltage at the connection box leads. If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
5. Determine which terminals connect the TLI transmitter cable assembly to the connection box. Label the correct location of all cable terminals to be disconnected.

#### NOTE

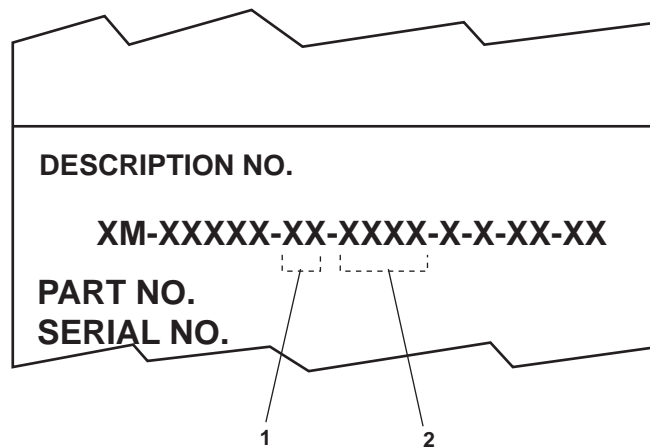
Only the TLI transmitter cable assembly wires should be connected to terminals in the connection box.

6. Disconnect and insulate TLI system cable wires from the connection box terminals. Take care not to damage any fasteners or water protective seals that may have to be reused. Replace any parts that damaged.



**Figure 2. Connection Box**

7. Take continuity readings at the terminal points and verify that no connections are grounded.
8. Determine the correct resistance reading by referring to the tag attached to the TLI transmitter tag (fastened to the TLI transmitter) and multiplying "WHOLE INCHES OF INDICATOR" (figure 3, item 1) by "OHMS OF RESISTANCE PER INCH OF INDIC. X 100" (figure 3, item 2). The correct calculated value should be between 1000 and 2500 ohms.
9. Measure TLI transmitter and cable assembly resistance at the connection box by taking a resistance reading across the red and black wires. The resistance reading should be within 10% of the value calculated in step 8.
10. Measure resistance in Ohms between the black wire and the white wire in the connection box. The measured resistance value should be 330 ohms  $\pm$  10% with all floats at the bottom rest position on the TLI transmitter.



**Figure 3. TLI Transmitter Tag**

11. Continue measuring resistance in Ohms between the black and white wires and slowly raise the float(s) on the TLI transmitter(s) in the same order filling the tank would. The total measured resistance should increase from approximately 330 Ohms (when the float(s) are completely lowered), to the calculated value from step 8 plus 330 Ohms (with the float(s) completely raised). All resistance values should be within 10% of calculated values.
12. Remove all tools and debris from the interior of the tank.
13. Exit the tank and install the manhole cover (WP 0093 00, volume 1).

#### **CONNECT AND TEST TLI TRANSMITTER**

1. Connect the TLI transmitter cable assembly wires to the terminals in the connection box using the labels from step 5 of the Test TLI Transmitter and Cable Assembly Continuity procedure as a guide.
2. Install the connection box cover (figure 2, item 2).
3. Remove the lockouts and tagouts (FM 55-502).
4. Operate the TLI system under usual conditions (TM 55-1925-273-10), verifying proper operation of the system.
5. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TANK LEVEL INDICATORS, CABLE ASSEMBLIES; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Silicone Compound (Item 157, Table 1, Table 1,  
WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)  
Twine, Fibrous (Item 194, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L  
One must be trained in confined space entry  
One Entry Supervisor/Attendant

**References:**

FM 55-502  
Organizational Confined Space Entry SOP  
TM 55-1925-273-10  
WP 0093 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the TLI SYSTEM. circuit breaker at 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).

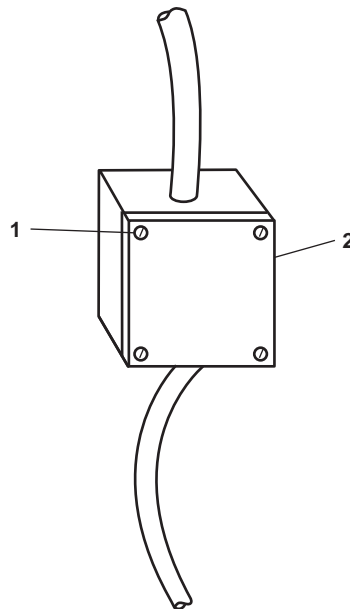
Manhole cover removed (WP 0093 00, volume 1).

Tank prepared for confined space entry with Confined Space Entry Permit secured in accordance with Organizational Confined Space Entry SOP and FM 55-502.

---

**REMOVAL**

1. Locate the connection box that connects the faulty Tank Level Indicator (TLI) transmitter to the TLI system.
2. Remove the screws (figure 1, item 1) that secure the connection box cover (figure 1, item 2).
3. Remove the connection box cover (figure 1, item 2).



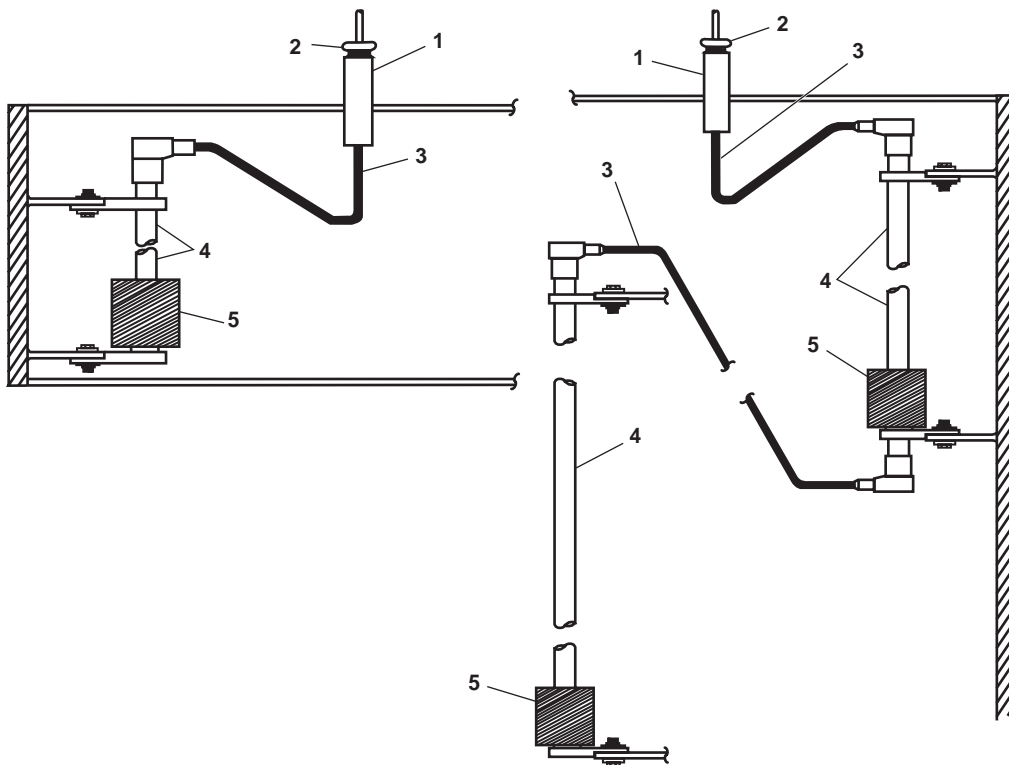
**Figure 1. Connection Box (Typical)**

## WARNING



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

4. Use a multimeter to check for voltage at the connection box leads. If voltage is present, ensure that the proper circuit breaker is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
5. Determine which terminals connect the TLI transmitter cable assembly to the connection box. Label the correct location of all cable terminals to be disconnected. Label the new TLI transmitter cable assembly wiring.
6. Disconnect the wires for the faulty TLI transmitter cable assembly from the connection box terminals. Remove the cable assembly from the connection box.
7. At the tank that contains the faulty TLI transmitter, locate the tank penetration cable stuffing tube (figure 2, item 1) that is associated with the faulty TLI transmitter.
8. Locate and loosen the cable penetrator retaining lug (figure 2, item 2) on top of the cable stuffing tube (figure 2, item 1). Allow the lug to slide up the cable approximately 12 inches (30 cm).



**Figure 2. TLI Transmitter Configuration and Components (Typical)**

**WARNING**

Only properly trained personnel may enter confined spaces, or act as entry supervisors and/or attendants for those working in confined spaces. Before entering into a confined space, the space must be cleared for entry and a Confined Space Entry Permit must be secured. All entry into confined spaces must be in accordance with the Organizational Confined Space Entry Standard Operating Procedure and FM 55-502. Entry into an unprepared confined space may result in death or serious injury.

9. Enter the tank.
10. Locate the cable assembly (figure 2, item 3) tank entry point and follow the cable back to the transmitter (figure 2, item 4).
11. Locate the cable assembly adapter (figure 3, item 1). Remove the setscrew (figure 3, item 2) that locks the cable assembly adapter to the TLI transmitter connector (figure 3, item 3).
12. Carefully remove the cable assembly adapter (figure 3, item 1) from the TLI transmitter.
13. Cover the exposed connections of the TLI transmitter (figure 3, item 3) with a clean wiping rag. Secure the clean wiping rag to the transmitter with fibrous twine to prevent damage and/or contamination.

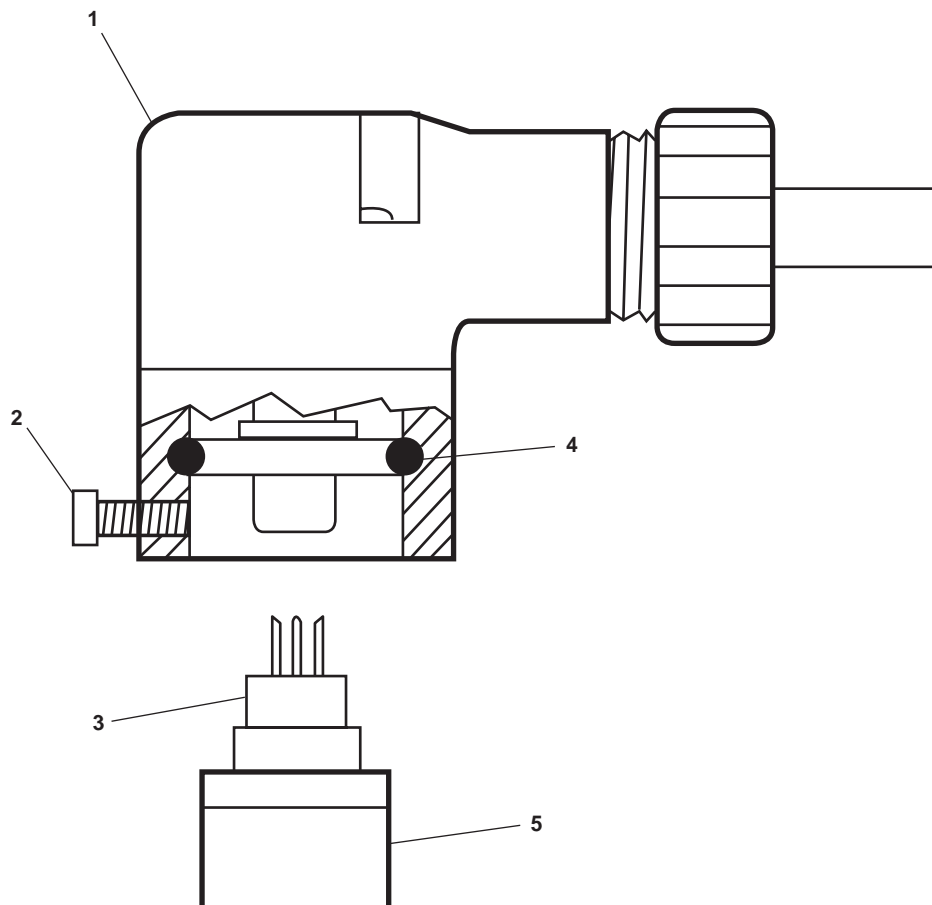


Figure 3. Cable Assembly Adapter and TLI Transmitter Connector (Typical)

14. Direct the crewmember outside the tank to slowly push the faulty TLI transmitter cable assembly (figure 2, item 3) into the stuffing tube while the crewmember in the tank slowly pulls on the fibrous twine. Adjust the position of the cable penetrator retaining lug nut (figure 2, item 2) as necessary to prevent interference during removal of the cable assembly.
15. Guide the faulty TLI transmitter cable down through the stuffing tube until approximately 12 inches (30 cm) remains on the outside of the tank.
16. Remove the cable penetrator retaining lug nut (figure 2, item 2) from the cable assembly. Inspect the nut for damage and wear. Replace the nut if it is damaged and/or worn.
17. Loop and tie a four-foot (1.2 m) length of fibrous twine to the end of the cable assembly protruding outside the tank.

#### NOTE

The purpose of the fibrous twine on the cable is to assist in guiding the replacement cable assembly from inside the tank through the stuffing tube to the outside of the tank.

18. Continue installing the TLI transmitter cable assembly down through the stuffing tube (figure 2, item 1) and into the tank.

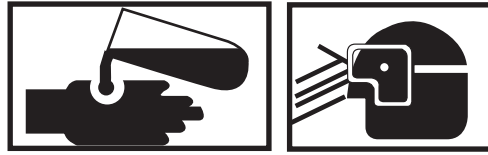
#### NOTE

Take care not to pull the fibrous twine completely through the stuffing tube into the tank. Enough fibrous twine must be left outside the tank to adequately guide the replacement cable assembly through the stuffing tube.

19. When the cable assembly (figure 2, item 3) is completely inside the tank, remove the fibrous twine. Remove any items that secure the cable assembly in place in the tank.
20. Remove the faulty cable assembly (figure 2, item 3) from the tank.
21. Repeat steps 12-14 on any remaining TLI transmitter cable assemblies (figure 2, item 3). Remove any items that secure them in place, and remove them from the tank.

#### INSTALLATION

1. From inside the tank, tie the fibrous twine hanging from the stuffing tube to the connection box end of the replacement TLI transmitter cable assembly (figure 2, item 3).
2. Direct the crewmember outside the tank to slowly pull on the fibrous twine, while the crewmember inside the tank guides the cable assembly (figure 2, item 3) towards the stuffing tube (figure 2, item 1).
3. Work together to pull and push the cable assembly through the stuffing tube (figure 2, item 1) until approximately 12 inches (30 cm) of cable from the replacement cable assembly remains outside the stuffing tube.
4. Remove the fibrous twine from the end of the cable assembly (figure 2, item 3).
5. Place the cable penetrator retaining lug nut (figure 2, item 2) over the new cable assembly. Ensure that the lug nut (figure 2, item 2) is properly positioned so that it can be installed in the stuffing tube (figure 2, item 1).
6. Slowly and carefully push (from inside the tank) and pull (from outside the tank) the new cable through the stuffing tube (figure 2, item 1) until all unnecessary slack from the cable assembly (figure 2, item 3) is removed from the tank and there is enough cable to reach the connection box. Ensure that the retaining lug nut (figure 2, item 2) remains in close proximity to the stuffing tube.
7. Remove the clean wiping rag and fibrous twine covering the connections (figure 3, item 3) of the TLI transmitter.

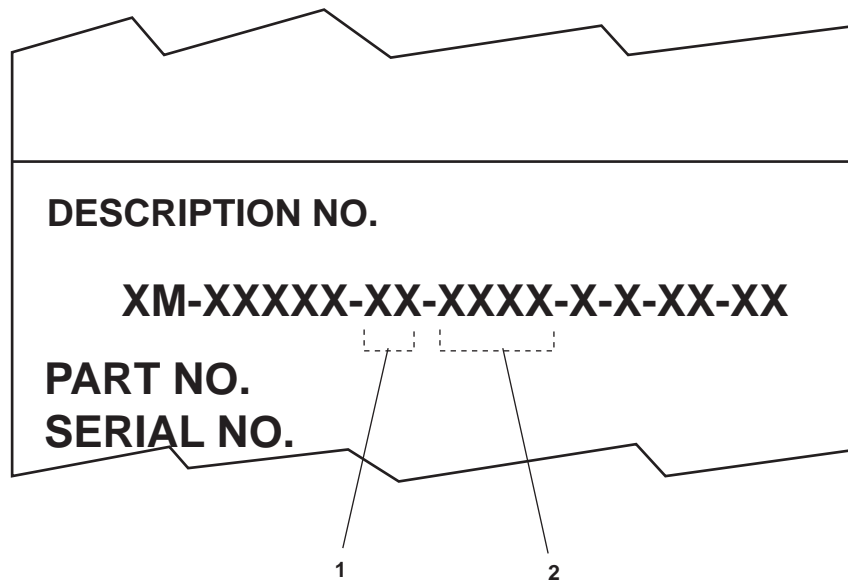
**WARNING**

**Do not allow silicone compound to come in contact with the skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling silicone compound. Failure to comply can result in illness or serious injury.**

**⚠ CAUTION**

Do not place silicone compound directly on the electrical connections. Damage to the equipment can occur.

8. Ensure that the O-ring (figure 3, item 4) is in place in the cable adapter (figure 3, item 1), then lubricate the O-ring with a small amount of silicone compound.
9. Line up and press the adapter (figure 3, item 1) over the transmitter connector (figure 3, item 3) stem until it completely covers the black line unit on the TLI transmitter stem (figure 3, item 5).
10. Holding the adapter in place, secure the adapter (figure 3, item 1) with the setscrew (figure 3, item 2) to the TLI transmitter connector stem (figure 3, item 5).
11. If the TLI transmitter is a dual mount, repeat steps 7-10 until all cable assemblies are installed.
12. Ensure that all connecting cables (figure 3, item 3) are secured in place and will not interfere with the travel of the float (figure 2, item 5) when the vessel pitches up and down or side to side.
13. Slide the float (figure 2, item 5) up and down the stem (figure 2, item 4) of the transmitter. Ensure that each float slides freely up and down the entire length of the stem with no interference.
14. Position the cable penetrator retaining lug (figure 2, item 2) as necessary to align it with the top of the stuffing tube (figure 2, item 1). Install the cable penetrator retaining lug by rotating it clockwise.
15. Cut to length, clean, and prepare the cable for installation in the connection box.
16. Take continuity readings from the terminal points of the cable assembly to ground and verify that no connections are grounded.
17. Determine the correct resistance reading by referring to the tag attached to the TLI transmitter and multiplying "WHOLE INCHES OF INDICATOR" (figure 4, item 1) by "OHMS OF RESISTANCE PER INCH OF INDIC. X 100" (figure 4, item 2). The correct calculated value should be between 1000 and 2500 ohms.
18. Measure TLI transmitter and cable assembly resistance by taking a resistance reading across the red and black wires. The resistance reading should be within 10% of the value calculated in step 17.
19. Measure resistance between the black wire and the white wire in the connection box. The measured resistance value should be 330 ohms  $\pm$  10% with all floats at the bottom rest position on the TLI transmitter.



**Figure 4. TLI Transmitter Tag**

20. Continue measuring resistance between the black and white wires and slowly raise the float on the TLI transmitter in the same order filling the tank would. The total measured resistance should increase from approximately 330 (when the float are completely lowered), to the calculated value from step 18 plus 330 ohms (with the float(s) completely raised). All resistance values should be within 10% of calculated values.
21. Remove all tools and debris from the interior of the tank.
22. Exit the tank and install the manhole cover (WP 0093 00, volume 1).
23. Connect the cable assembly wires to the terminals in the connection box using the labels from step 5 of Removal as a guide. Remove the labels.
24. Install the connection box cover.
25. Remove the lockouts and tagouts (FM 55-502).
26. Operate the TLI system under usual conditions (TM 55-1925-273-10).
27. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
DAY TANK HIGH LEVEL ALARMS, ALARM PANEL; REPLACE, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Equipment Conditions:**

Set to OFF the FUEL OIL DAY TANKS (P&S) HIGH LEVEL ALARM circuit breaker at the machinery DC distribution control panel. Lock out and tag out (FM 55-502).

**Personnel Required:**

Two Watercraft Engineers, 88L

**TEST SWITCH REPLACEMENT****REMOVAL**

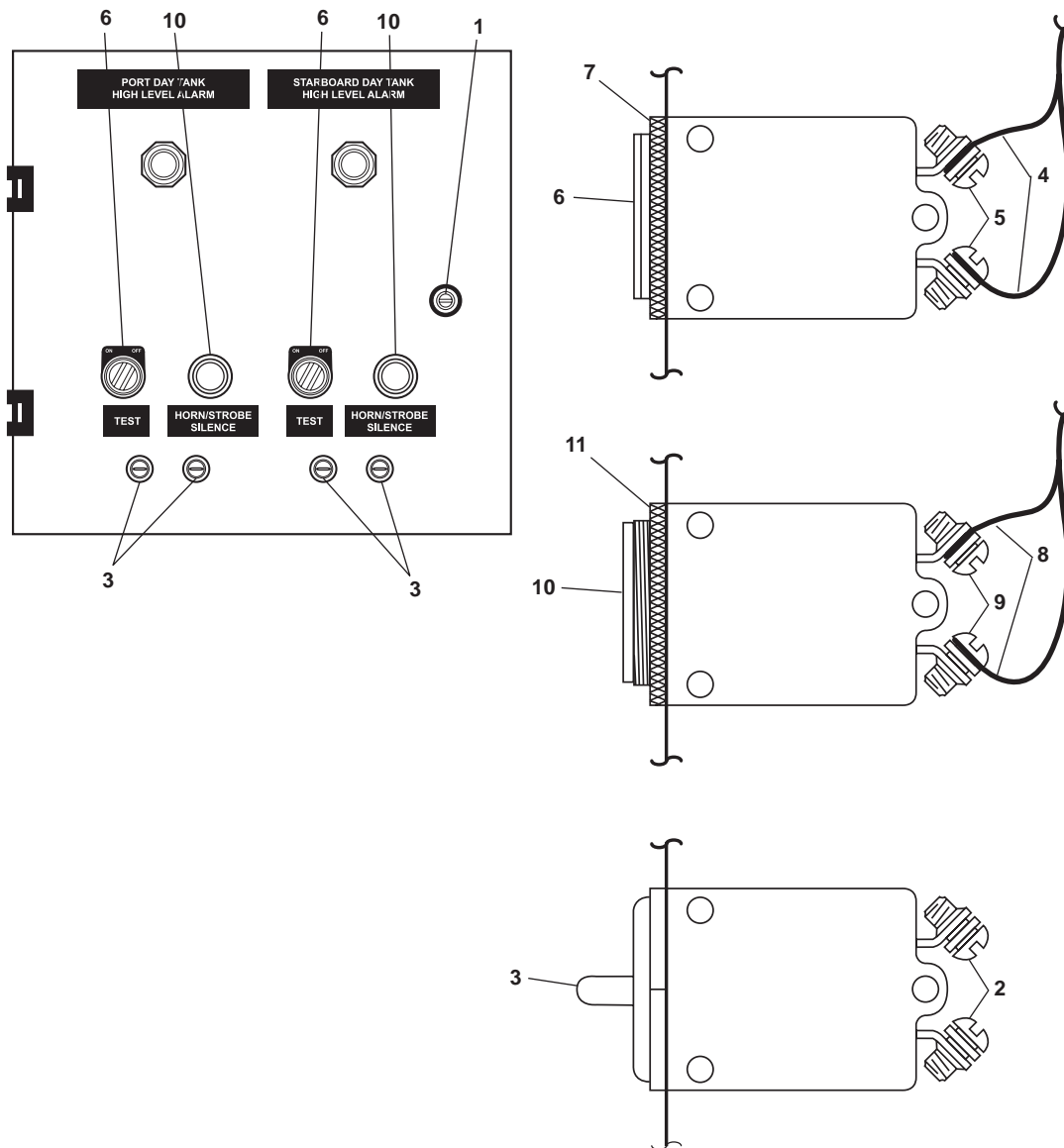
1. Loosen the captive screw (figure 1, item 1) and open the front panel.

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the terminals (figure 1, item 2) of the fuse holders (figure 1, item 3). If voltage is present, ensure that the correct circuit breaker is set to OFF, locked out, and tagged out (FM 55-502.) If no voltage is present, continue with the procedure.
3. Label the and remove the wires (figure 1, item 4) from the terminals (figure 1, item 5) of the switch assembly (figure 1, item 6).
4. Remove the knurled retaining nut (figure 1, item 7) and remove the switch assembly (figure 1, item 6) from the alarm panel.



**Figure 1. Day Tank High Level Alarm Panel Components**

**INSTALLATION**

1. Install the switch assembly (figure 1, item 6) and secure it with the knurled retaining nut (figure 1, item 7).
2. Install the wires (figure 1, item 4) to the terminals (figure 1, item 5) of the switch (figure 1, item 3) using the labels from step 3 of Removal as a guide. Remove the labels.
3. Close the front panel and secure it with the captive screw (figure 1, item 1).
4. Perform the Follow-On Service procedure at the end of this work package.



## RELAY REPLACEMENT

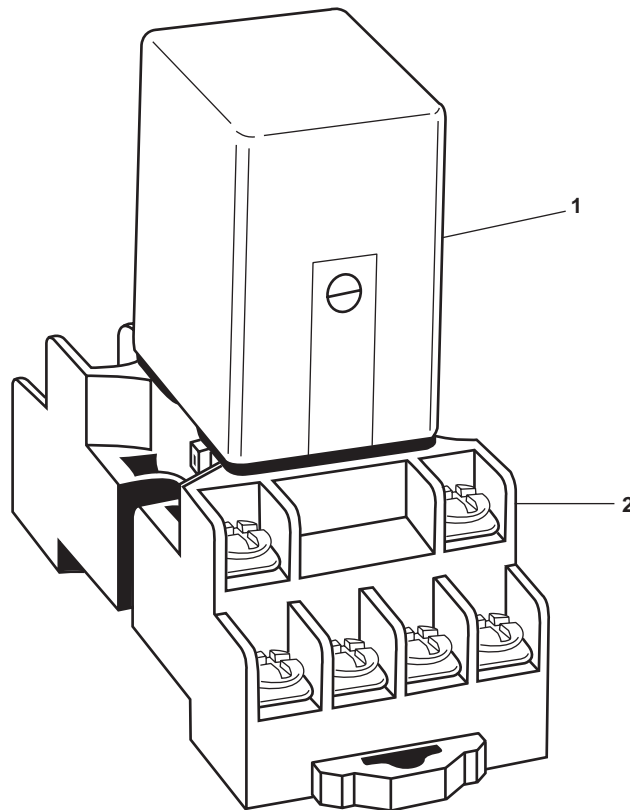
### REMOVAL

1. Loosen the captive screw (figure 1, item 1) and open the front panel.



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the terminals (figure 1, item 2) of the fuse holders (figure 1, item 3). If voltage is present, ensure that the correct circuit breaker is set to OFF, locked out, and tagged out (FM 55-502.) If no voltage is present, continue with the procedure.
3. Remove the relay (figure 2, item 1) from the socket (figure 2, item 2).



**Figure 2. Relay Assembly**

## INSTALLATION

1. Install the relay (figure 2, item 1) by lining up the pins and gently pushing it into the socket (figure 2, item 2) until it snaps into place.
2. Close the front panel and secure it with the captive screw (figure 1, item 1).
3. Perform the Follow-On Service procedure at the end of this work package.

## HORN/STROBE SILENCE (PUSHBUTTON) SWITCH REPLACEMENT

### REMOVAL

1. Loosen the captive screw (figure 1, item 1) and open the front panel.



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the terminals (figure 1, item 2) of the fuse holders (figure 1, item 3). If voltage is present, ensure that the correct circuit breaker is set to OFF, locked out, and tagged out (FM 55-502.) If no voltage is present, continue with the procedure.
3. Label the and remove the wires (figure 1, item 8) from the terminals (figure 1, item 9) of the pushbutton switch assembly (figure 1, item 10).
4. Remove the knurled retaining nut (figure 1, item 11) and remove the pushbutton switch assembly (figure 1, item 10) from the alarm panel.

### INSTALLATION

1. Install the pushbutton switch assembly (figure 1, item 10) and secure it with the knurled retaining nut (figure 1, item 11).
2. Install the wires (figure 1, item 8) to the terminals (figure 1, item 9) of the pushbutton switch assembly (figure 1, item 10) using the labels from step 3 of Removal as a guide. Remove the labels.
3. Close the front panel and secure it with the captive screw (figure 1, item 1).
4. Perform the Follow-On Service procedure at the end of this work package.

## HORN/STROBE ASSEMBLY REPLACEMENT

### REMOVAL

1. Remove the two screws (figure 3, item 1) that secure the horn/strobe (figure 3, item 2) to the mounting plate (figure 3, item 3).

**WARNING**



**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the terminal board (figure 3, item 4). If voltage is present, ensure that the correct circuit breaker is set to OFF, locked out, and tagged out (FM 55-502.) If no voltage is present, continue with the procedure.
3. Label and disconnect the wires from the terminal board (figure 3, item 4).
4. Remove the two screws (figure 3, item 5) that secure the mounting plate (figure 3, item 3) to the junction box (figure 3, item 6).

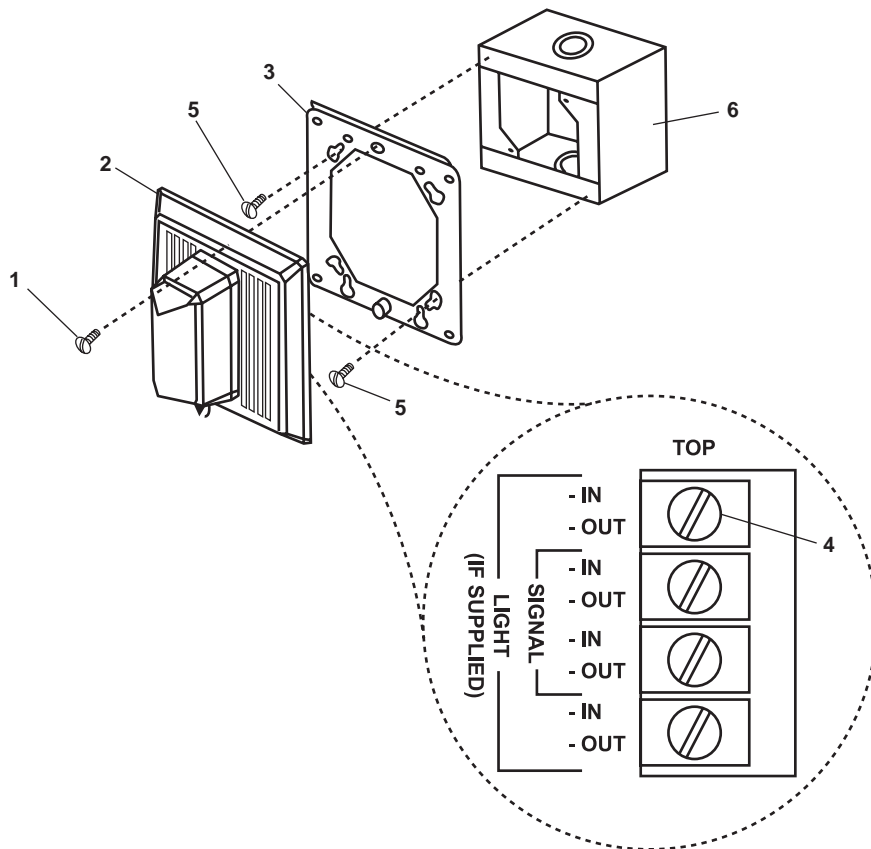


Figure 3. Horn/Strobe Assembly

---

**INSTALLATION**

1. Install the mounting plate (figure 3, item 3) on the junction box (figure 3, item 6) and secure it with the two screws (figure 3, item 5).
2. Connect the wires to the terminal board (figure 3, item 4) using the labels from step 3 of Removal as a guide. Discard the labels.
3. Install the horn/strobe (figure 3, item 2) on the mounting plate (figure 3, item 3) and secure it with the two screws (figure 3, item 1).
4. Perform the Follow-On Service procedure at the end of this work package.

**FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).
2. Operate the day tank high level alarm under usual conditions (TM 55-1925-273-10).
3. Cycle the TEST switch (figure 1, item 3) from OFF to ON and back to OFF to test the alarm circuit function.
4. Press and release the HORN/STROBE SILENCE switch (figure 1, item 4) to silence the alarm.
5. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
DAY TANK HIGH LEVEL ALARMS, LEVEL SENSOR; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
 Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
 Tape, Antiseizing (Item 175, Table 1, WP 0307 00)  
 Day Tank High Level Alarm Sensor (Item 14, Figure 80, WP 0303 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
 WP 0295 00  
 WP 0303 00  
 WP 0307 00

**Equipment Conditions:**

Set to OFF the FUEL OIL DAY TANKS (P&S) HIGH LEVEL ALARM circuit breaker at the 24V machinery DC distribution control panel. Lock out and tag out (FM 55-502).  
 Set to OFF the FUEL OIL XFER PUMP circuit breaker on the emergency switchboard. Lock out and tag out (FM 55-502).  
 Set to OFF the FUEL OIL TRANSFER PUMP No. 2 circuit breaker at 440V power panel No. 1. Lock out and tag out (FM 55-502).  
 Day tank no more than half full.

---

**DAY TANK HIGH LEVEL ALARM SENSOR REPLACEMENT**
**REMOVAL**

1. Remove the cover from the junction box (figure 1, item 1).



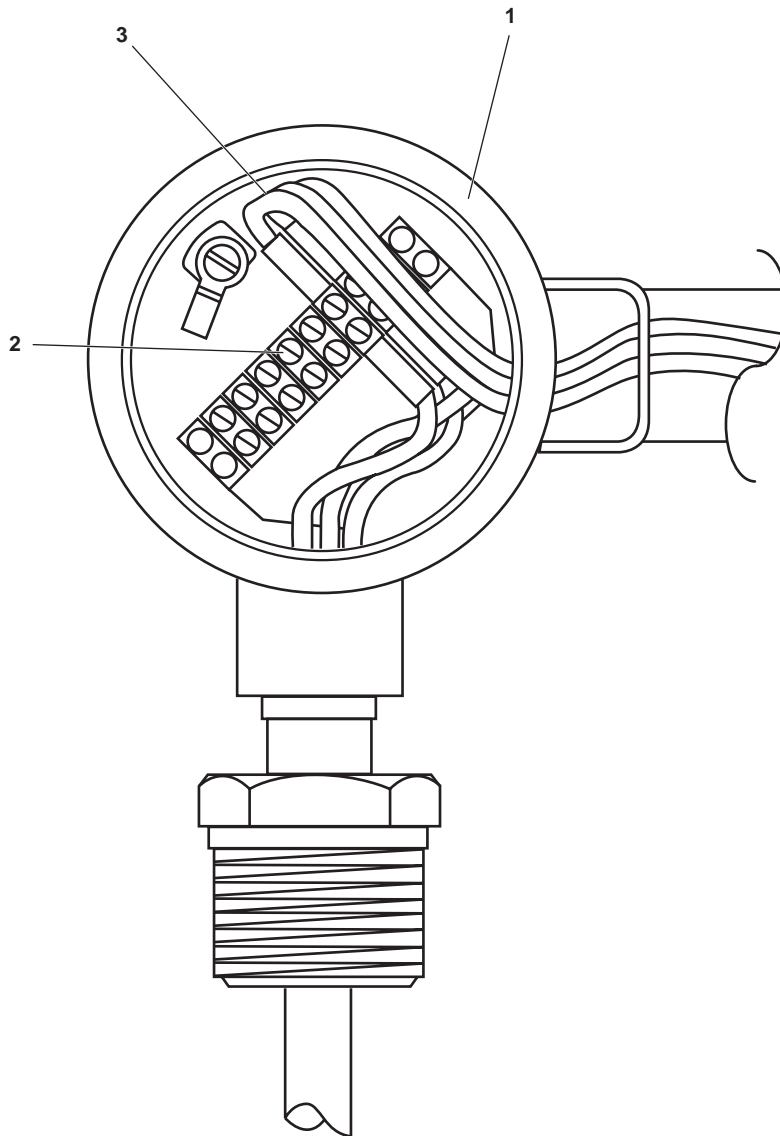
**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the terminal board (figure 1, item 2) inside the junction box (figure 1, item 1). If voltage is present, ensure that the proper circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Label and remove the output wires (figure 1, item 3) that connect the junction box (figure 1, item 1) to the alarm panel.

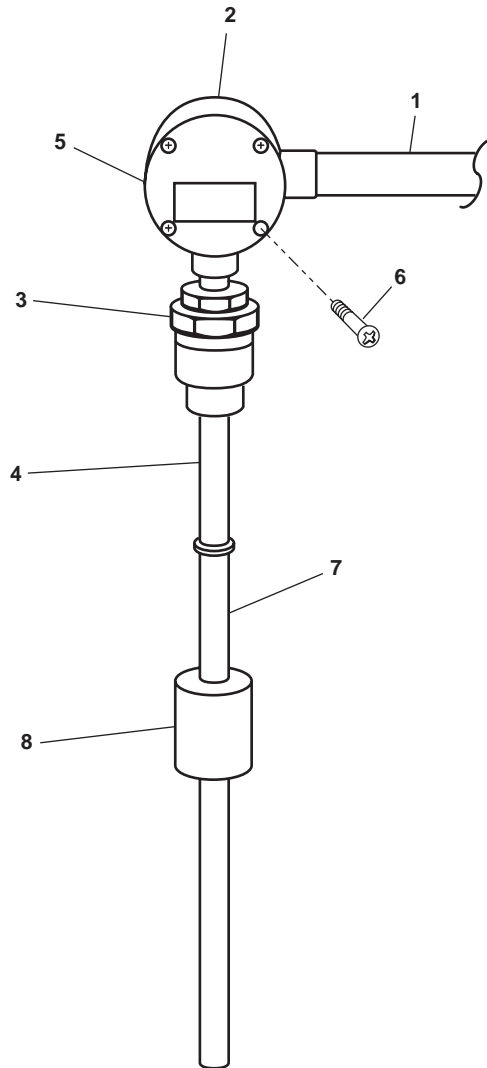
**CAUTION**

Care must be taken when removing the top mounted sensor to prevent damage to equipment and cabling.

4. Remove the alarm panel cable conduit (figure 2, item 1) from the sensor assembly (figure 2, item 2).
5. Loosen the 1-5/16" hex fitting (figure 2, item 3), and remove the sensor assembly (figure 2, item 4) from the top of the tank.
6. Remove the junction box (figure 2, item 2) from the sensor assembly (figure 2, item 4).



**Figure 1. Junction Box with Cover Removed**



**Figure 2. Day Tank High Level Alarm Sensor Assembly**

## INSTALLATION

1. Apply antiseizing tape to the male threads of the conduit (figure 2, item 1).
2. Run the wires from the conduit (figure 2, item 1) into the junction box (figure 2, item 2).
3. Install the junction box (figure 2, item 2) on the conduit (figure 2, item 1) hand tight plus 1/8 of a turn. Do not overtighten.
4. Install the wires (figure 1, item 3) in the junction box (figure 1, item 1) using the labels from step 3 of Removal as a guide. Remove the labels.
5. Install the junction box cover (figure 2, item 5), and secure it with the four screws (figure 2, item 6).

---

**NOTE**

Do not secure the sensor in the tank fitting until it has been tested.

6. Place the sensor stem (figure 2, item 7) into the tank fitting.
7. Remove the lockouts and tagouts (FM 55-502) and set the circuit breakers to ON.
8. Test the operation of the day tank high level alarm by lifting the sensor unit out of the tank fitting and sliding the float (figure 2, item 8) slowly up and down the sensor stem (figure 2, item 7). Verify that the day tank high level alarm sounds when the float is placed at approximately the 95% full position.
9. Apply antiseizing tape to the 1-5/16" HEX fitting (figure 2, item 3).
10. Install the sensor assembly (figure 2, item 4) in the tank, and secure it with the 1-5/16" HEX fitting (figure 2, item 3). Tighten hand tight plus 1/8 of a turn. Do not overtighten.
11. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEWAGE DISCHARGE PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 1,  
WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0162 00 (volume 1)  
WP 0295 00  
WP 0307 00

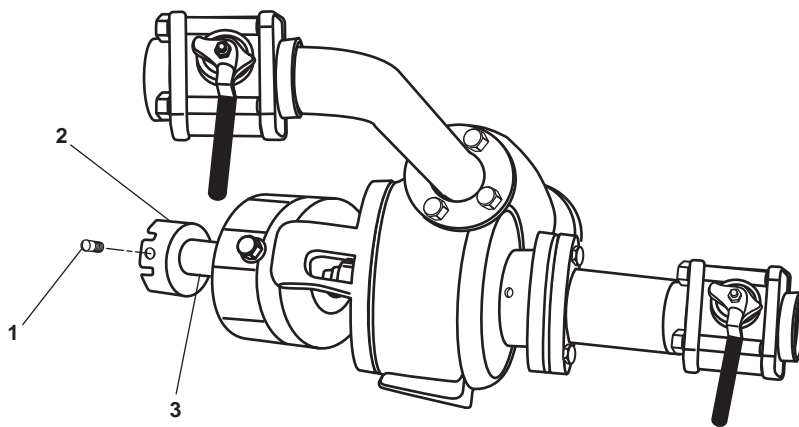
**Equipment Conditions:**

Sewage discharge pump electric motor removed  
(WP 0162 00, volume 1).

---

**COUPLING REPLACEMENT****REMOVAL**

1. Loosen the set screw (figure 1, item 1) from the coupling (figure 1, item 2).
2. Remove the coupling (figure 1, item 2) from the pump shaft (figure 1, item 3).



**Figure 1. Sewage Discharge Pump**

**INSTALLATION**

1. Install the coupling (figure 1, item 2) on the pump shaft (figure 1, item 3), and secure it with the set screw (figure 1, item 1).
2. Perform the Electric Motor Replacement Installation procedure (WP 0162 00, volume 1).
3. Operate the sewage discharge pump under usual conditions (TM 55-502-1925-273-10).
4. Check the for sewage discharge pump for proper operation and any signs of leakage.
5. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEWAGE DISCHARGE PUMP, PUMP END; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Chain Hoist (Item 7, Table 2, WP 0295 00)  
Sling, Endless (Item 10, Table 2, WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0162 00 (volume 1)  
WP 0295 00  
WP 0304 00  
WP 0307 00

**Equipment Conditions:**

Electric motor removed (WP 0162 00, volume 1).  
CLOSE all valves for affected pump. Lock out and tag out (FM 55-502).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

1. Place a suitable drain pan under the sewage discharge pump.

**WARNING**

**Sewage lines may be under pressure. Loosen fittings on hose line slowly. Allow fluid to run around threads of fitting, releasing pressure before disconnecting fitting. Releasing pressurized fluid suddenly may cause severe personal injury.**

2. Slowly OPEN the pressure gauge fitting (figure 1, item 1) to relieve pressure from the sewage discharge pump (figure 1, item 2).
3. After all pressure has been released, remove the bolts (figure 1, item 3) and the nuts (figure 1, item 4) securing the sewage discharge pump (figure 1, item 2) to the vessel's discharge piping.
4. Remove the bolts (figure 1, item 5) and the nuts (figure 1, item 6) securing the sewage discharge pump's inlet (figure 1, item 2) to the vessel's inlet piping.
5. Remove the gaskets (figure 1, items 7 and 8) from the sewage discharge pump (figure 1, item 2). Discard the gaskets.
6. Remove the nuts (figure 2, item 1), the lockwashers (figure 2, item 2), the flat washers (figure 2, item 3) and the bolt (figure 2, item 4) securing the sewage discharge pump (figure 2, item 5) to the foundation. Discard the lockwashers.

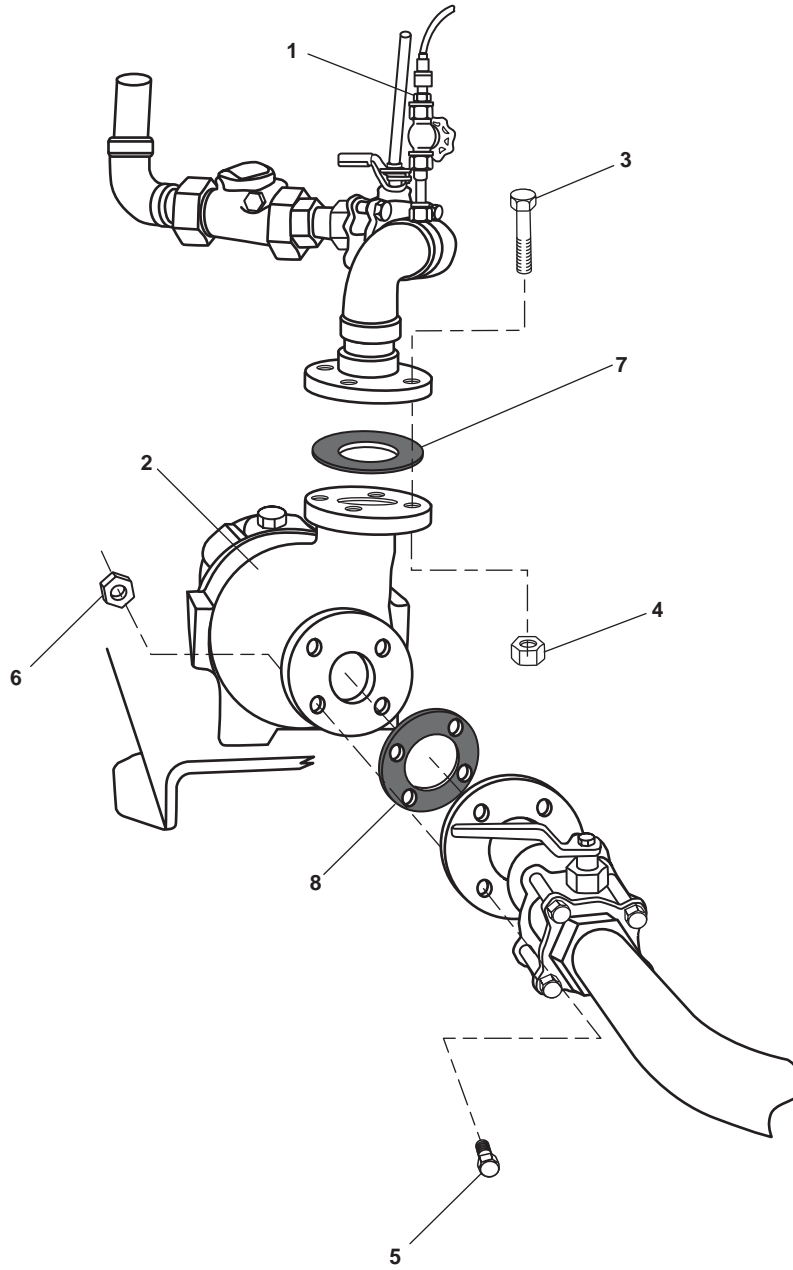


Figure 1. Sewage Discharge Pump

**WARNING**

All personnel in the vicinity of the lifting operations should wear appropriate safety equipment including gloves, hardhat, and safety shoes. Death or serious injury can result from failure to heed this warning.

7. Using the endless sling and chain hoist, carefully remove the sewage discharge pump (figure 2, item 5) from the foundation and move the sewage discharge pump to a workbench.
8. Plug or tape over the exposed piping connections and the pressure differential connection on the vessel's piping to prevent contamination of the system.

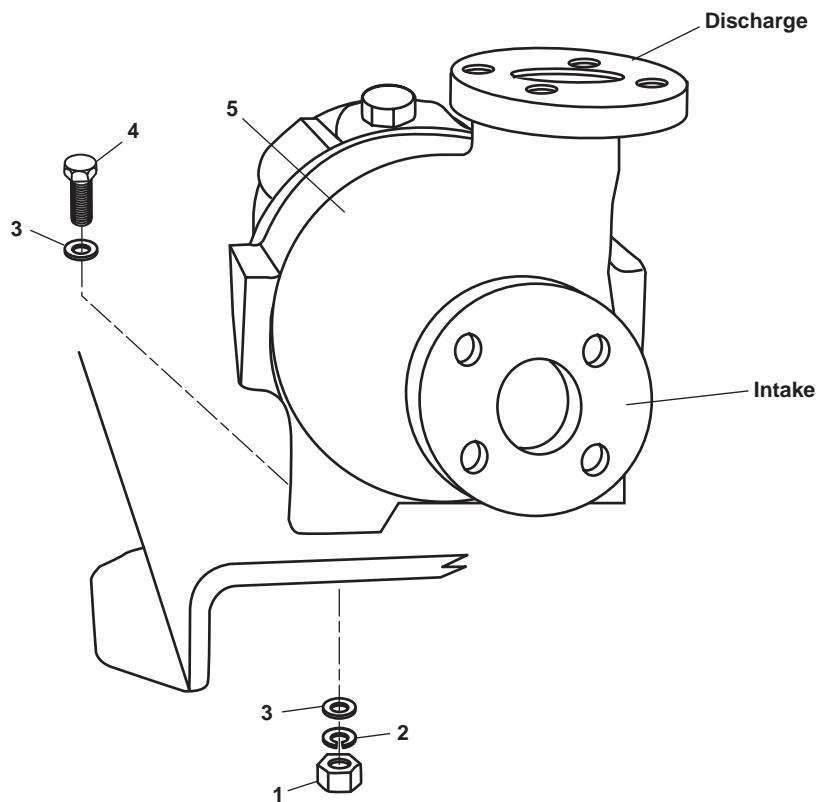


Figure 2. Sewage Discharge Pump Removal

---

**INSTALLATION**

1. Using the endless sling and chain hoist, carefully lower the sewage discharge pump (figure 2, item 5) onto the foundation and into place.
2. Install the bolts (figure 2, item 4), flat washer (figure 2, item 3), new lockwashers (figure 2, item 2) and nut (figure 2, item 1) securing the sewage discharge pump (figure 2, item 5) to the foundation. Do not tighten bolts at this time.
3. Install the bolts (figure 1, item 5), a new gasket (figure 1, item 8), and the nuts (figure 1, item 6) in the vessel's piping. Do not tighten the bolts at this time.
4. Install the bolts (figure 1, item 3), a new gasket (figure 1, item 7), and the nuts (figure 1, item 4) securing the pump to the vessel's piping.
5. Tighten the bolts (figure 1, items 3 and 5) securing the sewage discharge pump to the vessel's piping.
6. Tighten the bolts (figure 2, item 4) securing the sewage discharge pump (figure 2, item 5) to the foundation.
7. Install the electric motor (WP 0162 00, volume 1).
8. Operate the sewage discharge pump (TM 55-1925-273-10) checking for leaks and proper operation.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEWAGE DISCHARGE PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Suitable Drain Pan

**References:**

FM 55-502  
WP 0162 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1,  
WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)

**Equipment Conditions:**

Electric motor removed (WP 0162 00, volume 1).  
CLOSE all valves for affected pump. Lock out and tag  
out (FM 55-502).

**Personnel Required:**

One Watercraft Engineer, 88L

---

**GASKET REPLACEMENT****REMOVAL**

<b>WARNING</b>
----------------

**Sewage lines may be under pressure. Loosen fittings on hose line slowly. Allow fluid to run around threads of fitting, releasing pressure before disconnecting fitting. Releasing pressurized fluid suddenly may cause severe personal injury.**

1. Remove the nuts (figure 1, item 1) and the bolts (figure 1, item 2) that secure the intake flange (figure 1, item 3) and allow any fluid to drain into the suitable drain pan.
2. Remove the intake gasket (figure 1, item 4).
3. Remove the nuts (figure 1, item 5) and the bolts (figure 1, item 6) that secure the discharge flange (figure 1, item 7).
4. Remove and discard the gasket (figure 1, item 8).
5. Plug or tape over the exposed flanges and any openings on the standing piping to prevent contamination of the system.

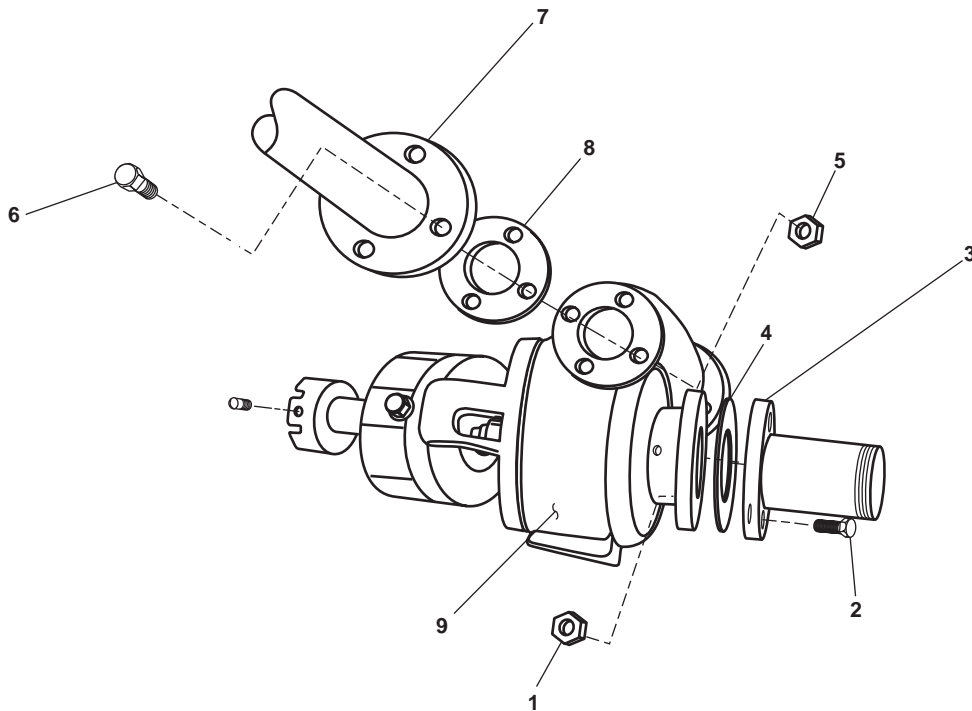
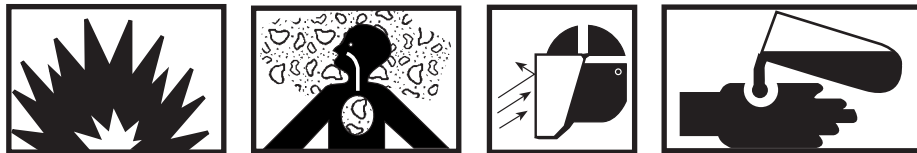


Figure 1. Sewage Discharge Pump

## INSTALLATION

### WARNING



Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

Wire brushing operations can produce high velocity flying debris which can become lodged in the skin or in the eyes. Wire brushing in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing wire brushing operations. Failure to comply can result in death or serious injury to personnel.

1. Clean the sealing surfaces of the flanges using dry cleaning solvent and a wire brush.
2. Install the intake flange (figure 1, item 3) and a new gasket (figure 1, item 4) on the sewage discharge pump (figure 1, item 9) and secure it with the nuts (figure 1, item 1) and bolts (figure 1, item 2).



3. Install the discharge flange (figure 1, item 7) and a new gasket (figure 1, item 8) on the sewage discharge pump (figure 1, item 9) and secure it with the nuts (figure 1, item 5) and bolts (figure 1, item 6).
4. Perform the Sewage Discharge Pump Electric Motor Replacement Installation procedure (WP 0162 00, volume 1).
5. Operate the sewage discharge pump under usual conditions (TM 55-1925-273-10), checking for leaks and proper operation. Continue to monitor the system occasionally while the system pressurizes fully. If leakage is detected, secure the system and stop the leakage.
6. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEWAGE DISCHARGE PUMP, ELECTRIC MOTOR; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 1, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
FM 55-509-1  
TM 55-1925-273-10  
WP 0162 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the SEWAGE DISCHARGE PUMP No. 1 circuit breaker or the SEWAGE DISCHARGE PUMP No 2. circuit breaker at 440V power panel No. 1. Lock out and tag out (FM 55-502).

---

**WIRING REPAIR**

Proper repair of 24 Volt wiring consists of replacement of the damaged wiring. When electrical casualty requires expedient repairs, repair may be made by splicing. Splicing is authorized for repair of damaged cables if the remainder of the cable is in good mechanical and electrical condition. The cable must be replaced in its entirety at the most opportune time. For proper splicing methods, refer to FM 55-509-1.

**DISASSEMBLY**

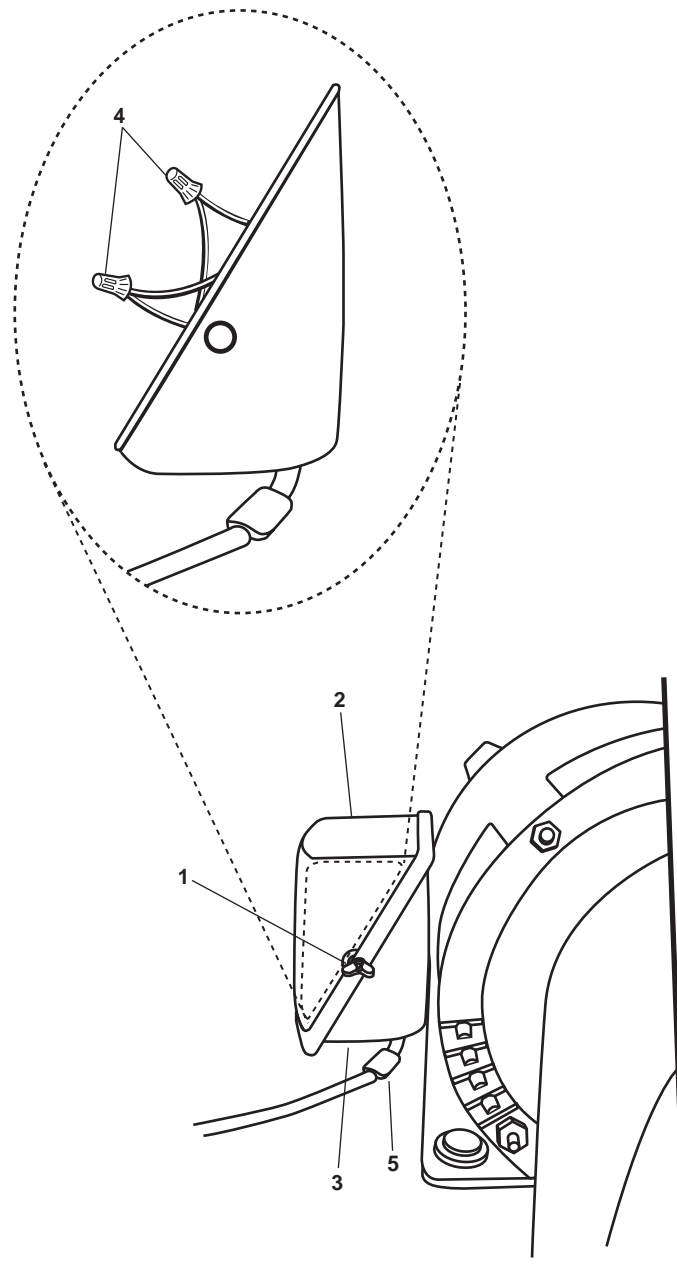
1. Remove the two screws (figure 1, item 1), and remove the cover (figure 1, item 2) from the junction box (figure 1, item 3).

**WARNING**



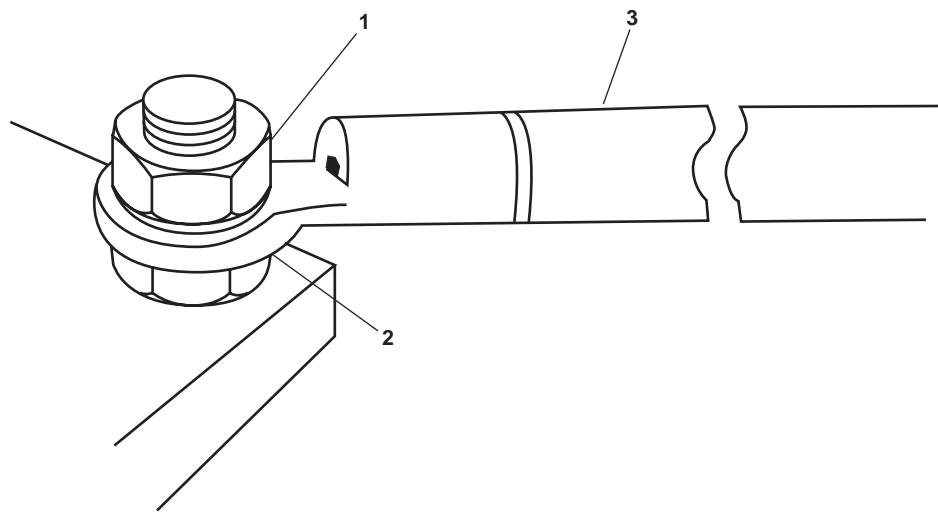
**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the wire terminals (figure 1, item 4). If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Remove any covers or interference that restrict access to the wire being removed.
4. Label all wiring to be removed, and make a sketch of the work area to permit proper assembly.
5. Remove the nuts (figure 2, item 1) that secure the wire terminals (figure 2, item 2) in the motor controller, and remove the wire nuts from the wire terminals (figure 1, item 4) in the junction box (figure 1, item 3).



**Figure 1. Typical Junction Box**

6. Remove the wiring (figure 1, item 5) from the junction box (figure 1, item 3).
7. Follow the wiring (figure 1, item 5) to the opposite end, freeing it from the vessel structure as required.
8. Remove the wiring (figure 2, item 3) from the wire terminals (figure 2, item 2) at the opposite end.
9. Perform steps 2-8 for any wire that may require removal.



**Figure 2. Typical Wire Terminal**

### **ASSEMBLY**

1. Determine the wires to be connected by referring to the sketch and labels from step 4 of Disassembly as guides.
2. Route the new wiring (figure 1, item 5) from the junction box (figure 1, item 3) along the same path as the old wires to the motor controller and secure it to wire terminals (figure 2, item 2) in the same manner as the old wiring assembly.
3. Install the wiring (figure 1, item 5) in the junction box (figure 1, item 3).
4. Remove any remaining labels.
5. Install any covering or interference removed during the Removal procedure.
6. Install the cover (figure 1, item 2) on the junction box (figure 1, item 3) and secure it with the two screws (figure 1, item 1).
7. Remove the lockouts and tagouts (FM 55-502).
8. Set the circuit breaker to ON.
9. Operate the sewage discharge pump under usual conditions (TM 55-1925-273-10).
10. Check the for sewage discharge pump for proper operation and any signs of leakage.
11. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BALLAST PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0171 00 (volume 1)  
WP 0295 00  
WP 0307 00

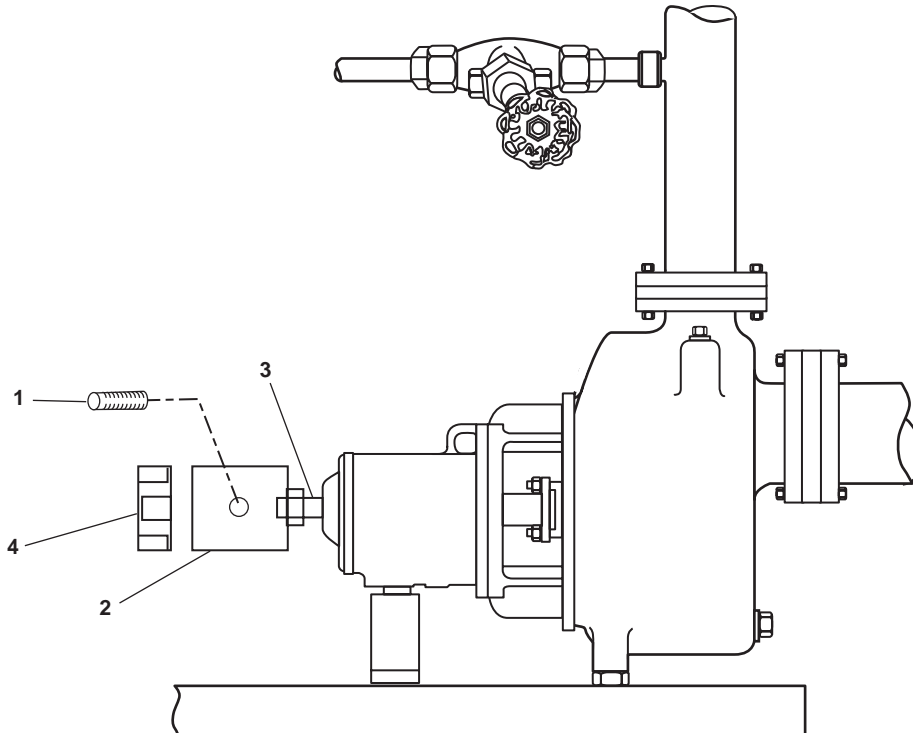
**Equipment Conditions:**

Electric motor removed (WP 0171 00, volume 1).  
CLOSE all valves for the affected pump. Lock out and  
tag out (FM 55-502).

---

**BALLAST PUMP COUPLING REPLACEMENT****REMOVAL**

1. Remove the flange screw (figure 1, item 1) from the coupling (figure 1, item 2).
2. Slide the coupling (figure 1, item 2) from the ballast pump shaft (figure 1, item 3) with the spider (figure 1, item 4).



**Figure 1. Ballast Pump**

**INSPECTION**

1. Inspect the coupling (figure 1, item 2) for corrosion, deformation, and obvious damage. Replace the coupling if it is corroded, deformed, and/or damaged.
2. Inspect the spider (figure 1, item 4) for damage, deformity, or deterioration. Replace the spider if it is corroded, deformed, and/or deteriorated.

**INSTALLATION**

1. Install the coupling (figure 1, item 2) on the ballast pump shaft (figure 1, item 3).
2. Install the coupling (figure 1, item 2) and secure it with the flange screw (figure 1, item 1).
3. Install the spider (figure 1, item 4) in the coupling (figure 1, item 2).
4. Install the electric motor (WP 0171 00, volume 1).
5. Operate the ballast pump under usual conditions (TM 55-1925-273-10), checking for leaks and proper operation.
6. Continue to monitor the system occasionally while the system pressurizes fully. If leakage is detected, secure the system and stop the leakage.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BALLAST PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0171 00 (volume 1)  
WP 0295 00  
WP 0307 00

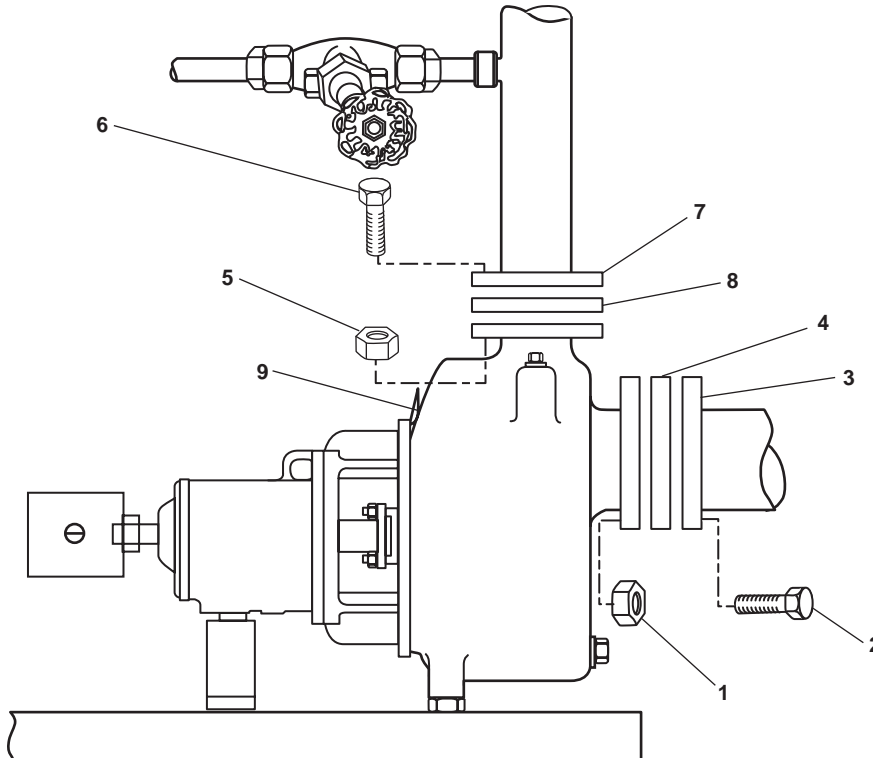
**Equipment Conditions:**

Electric motor removed (WP 0171 00, volume 1).  
CLOSE all valves for the affected pump. Lock out and  
tag out (FM 55-502).

---

**GASKET REPLACEMENT****REMOVAL**

1. Remove the nuts (figure 1, item 1) and the bolts (figure 1, item 2) that secure the intake flange (figure 1, item 3).
2. Remove and discard the gasket (figure 1, item 4).

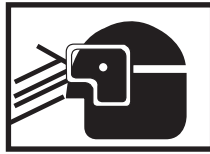


**Figure 1. Ballast Pump**

3. Remove the nuts (figure 1, item 5) and the bolts (figure 1, item 6) that secure the discharge flange (figure 1, item 7).
4. Remove and discard the gasket (figure 1, item 8).

## INSTALLATION

### WARNING



**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury or death.**

1. Clean the sealing surfaces of the intake flanges (figure 1, item 3) and discharge flanges (figure 1, item 7) using a wire brush.
2. Install a new gasket (figure 1, item 4) and the intake flange (figure 1, item 3) on the ballast pump (figure 1, item 9).
3. Install the nuts (figure 1, item 1) and bolts (figure 1, item 2) to secure the intake flange (figure 1, item 3). Tighten the nuts and bolts.
4. Install a new gasket (figure 1, item 8) and the discharge flange (figure 1, item 7) on the ballast pump (figure 1, item 9).
5. Install the nuts (figure 1, item 5) and bolts (figure 1, item 6) to secure the flange (figure 1, item 7). Tighten the nuts and bolts.
6. Install the electric motor (WP 0171 00, volume 1).
7. Operate the ballast pump under usual conditions (TM 55-1925-273-10), checking for leaks and proper operation.
8. Continue to monitor the system occasionally while the system pressurizes fully. If leakage is detected, secure the system and stop the leakage.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BALLAST PUMP, ELECTRIC MOTOR; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2 WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
FM 55-509-1  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the BILGE PUMP #1 circuit breaker on the emergency switchboard or the BILGE PUMP NO. 2 circuit breaker on the main switchboard. Lock out and tag out (FM 55-502).

---

**NOTE**

Proper repair of the electrical wiring consists of replacement of the damaged wiring. When electrical casualty requires expedient repairs, repairs may be made splicing. Splicing is authorized for repair of damaged cable, however the damaged cable must be replaced in its entirety at the most opportune time. Proper splicing methods should be performed in accordance with FM 55-509-1.

**REMOVAL****NOTE**

Electrical junction boxes may vary in size, shape, and mounting position of the box on the motor frame. Electrical junction box covers may vary in number and placement of screws holding the cover in place.

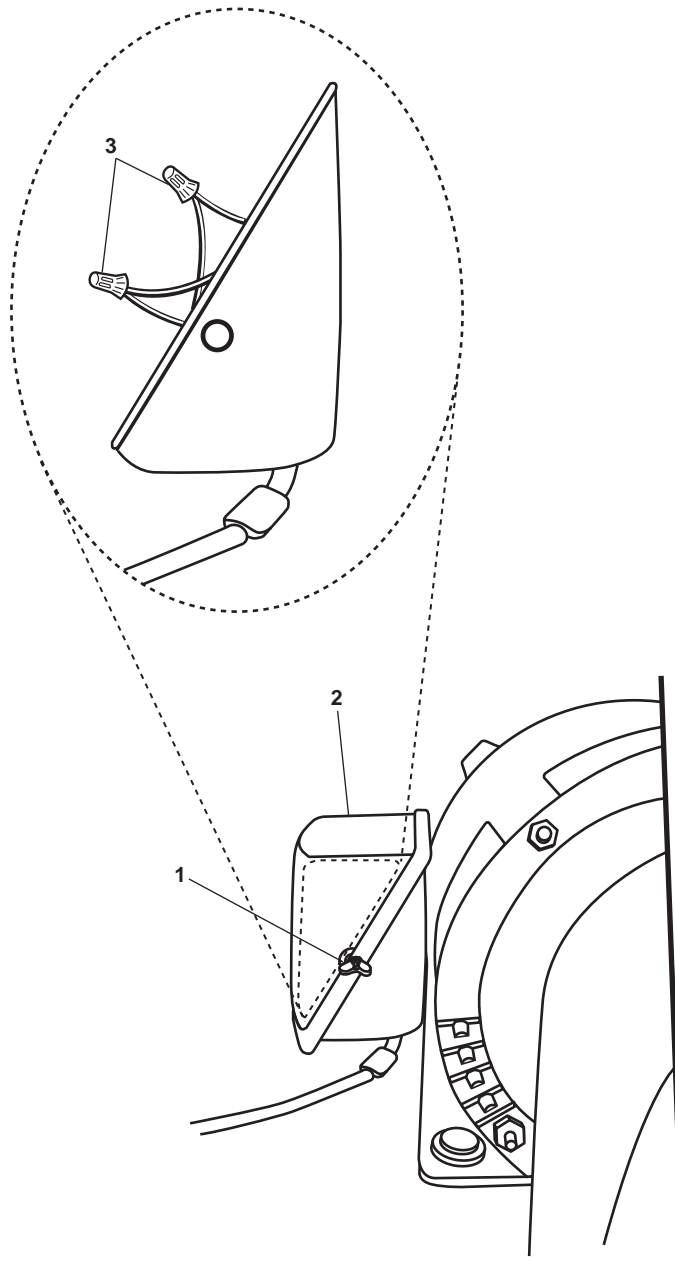
1. Remove the screws (figure 1, item 1) holding the ballast pump's electrical junction box cover (top) (figure 1, item 2).
2. Remove the junction box cover (top) (figure 1, item 2).

**WARNING**

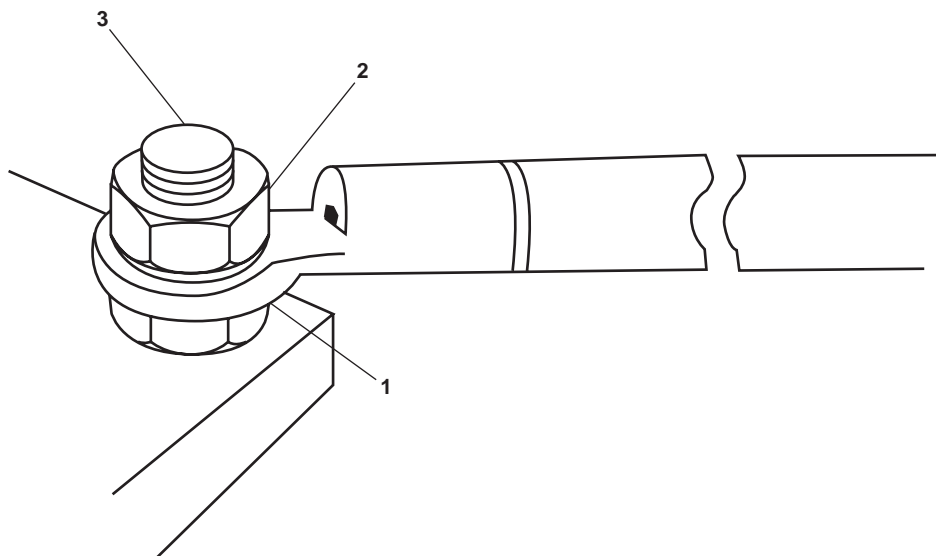
**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

3. Using a multimeter, check for voltage at the wiring terminals. If voltage is present, ensure that the proper motor controller is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label the electrical wiring near the terminal(s) (figure 1), or make a sketch of the work area to permit proper assembly.

5. At the ballast pump motor controller panel, label the electrical wiring near the terminal(s) (figure 2, item 1), or make a sketch of the work area to permit proper assembly.
6. Remove the nuts (figure 2, item 2) that secure the terminals (figure 2, item 1) to the studs (figure 2, item 3) and remove the terminals from the studs.
7. Follow the wiring to the ballast pump motor and free it from the vessel's structure as required.
8. Remove the wire nuts (figure 1, item 3), unwind the wire, and remove the affected wire.



**Figure 1. Electrical Junction Box (Typical)**



**Figure 2. Electrical Wiring to The Controller Terminal (Typical)**

## INSTALLATION

1. Determine which terminal(s) connect to the appropriate stud(s) by referring to the label and/or sketch made in step 4 of Removal as a guide. Remove the labels.
2. Connect the terminals (figure 2, item 1) to the studs (figure 2, item 3) by securing the nuts (figure 2, item 2).
3. Route the new electrical wiring assembly along the same path as the old electrical wiring assembly, securing it to the vessel's structure in the same manner as the old wiring assembly and into the electrical motor's junction box. Refer to figure 1.
4. Connect the new electrical wiring with new wire nuts (figure 1, item 3) and remove the labels.
5. Install the electrical junction box cover (top) (figure 1, item 2) with the screws (figure 1, item 1). Tighten the screws (figure 1, item 1).
6. Remove the lockout and tagouts (FM 55-502).
7. Operate the ballast pump under usual conditions (TM 55-1925-273-10) to check for proper pump operation.
8. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
POTABLE WATER PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
FM 55-509-1  
TM 55-1925-273-10  
WP 0176 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the POTABLE WATER PUMP No. 1 circuit breaker or the POTABLE WATER PUMP No. 2 circuit breaker at 440V power panel No. 5. Lock out and tag out (FM 55-502).

---

**ELECTRICAL WIRING REPAIR**
**NOTE**

Proper repair of the electrical wiring consists of replacement of the damaged wiring. When electrical casualty requires expedient repairs, repairs may be made by splicing. Splicing is authorized for repair of damaged cable, however the damaged cable must be replaced in its entirety at the most opportune time. Proper splicing methods should be performed (FM 55-509-1).

**REMOVAL****WARNING**

**Replace or repair components only after the affected circuit has been secure, locked out and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

**NOTE**

Electrical junction boxes may vary in size, shape, and mounting position of the box on the motor frame. Electrical junction box covers may vary in number and placement of screws holding the cover in place.

1. Remove the two screws (figure 1, item 1) holding the potable water pump's electrical junction box cover (top) (figure 1, item 2).
2. Remove the junction box cover (top) (figure 1, item 2).

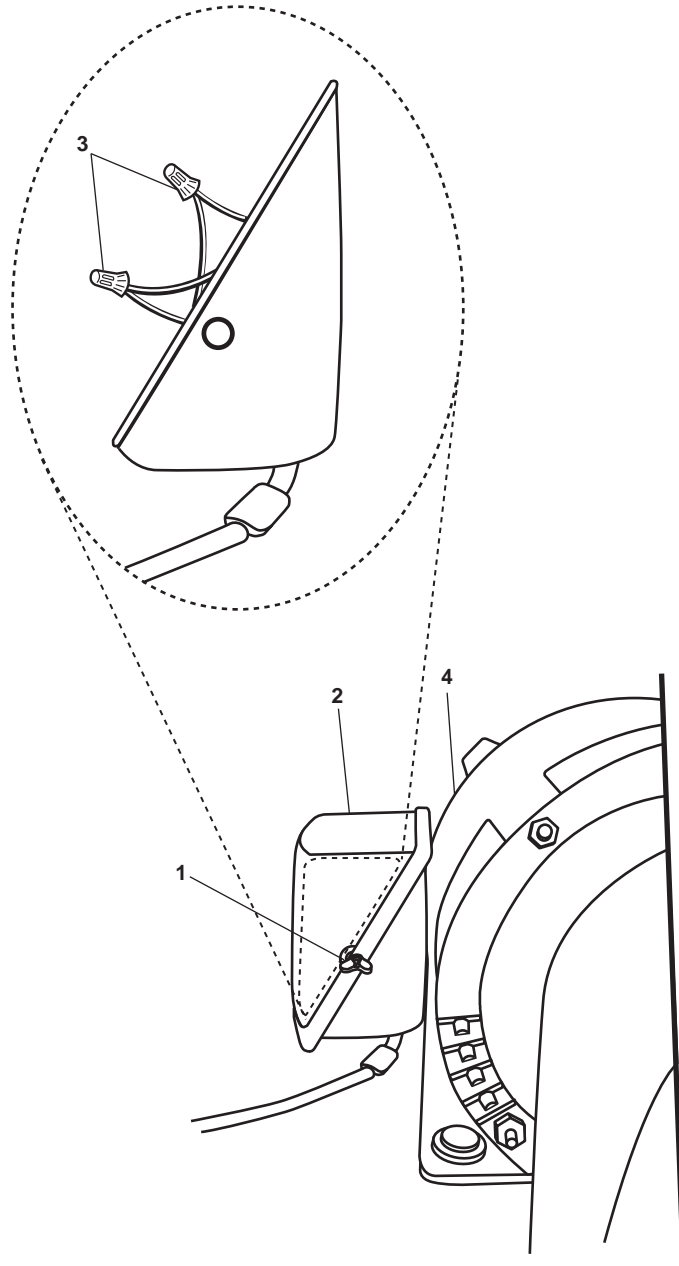
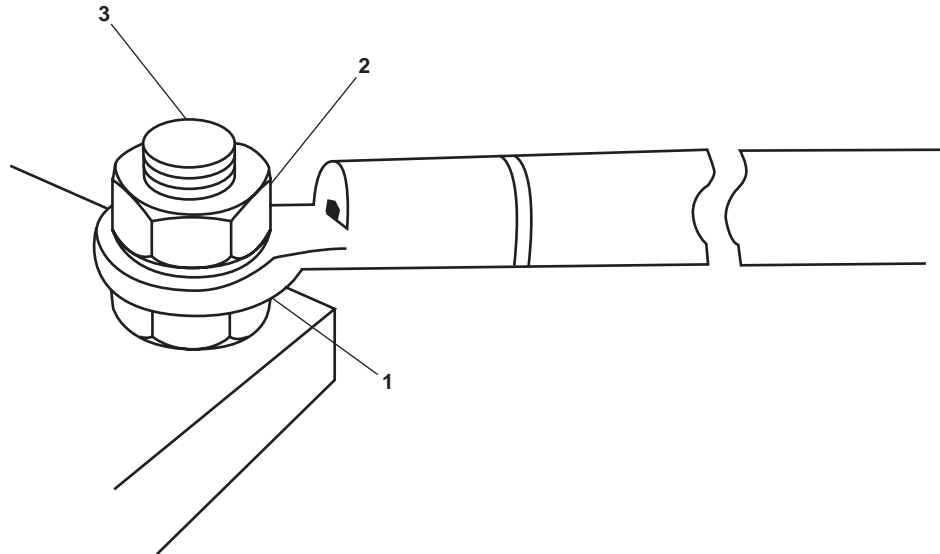


Figure 1. Electrical Junction Box (Typical)



3. Using a multimeter, check for voltage at the wiring terminals. If voltage is present, ensure that the proper motor controller is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
4. Label the electrical wiring near the terminal(s) (refer to figure 1), or make a sketch of the work area to permit proper reassembly.
5. At the potable water pump motor controller panel, label the electrical wiring near the terminal(s) (figure 2, item 1), or make a sketch of the work area to permit proper assembly.



**Figure 2. Electrical Wiring To The Controller Terminal (Typical)**

6. Remove the nuts (figure 2, item 2) that secure the terminals (figure 2, item 1) to the studs (figure 2, item 3) and remove the terminals from the studs.
7. Follow the wiring to the potable water pump's motor, freeing it from the vessel's structure as required.
8. Remove the wire nuts (figure 1, item 3), unwind the wire, and remove the affected wire.

### **INSTALLATION**

1. Determine which terminal(s) connect to the appropriate stud(s) by referring to the label and/or sketch.
2. Connect the terminals (figure 2, item 1) to the studs (figure 2, item 3) with the nuts (figure 2, item 2).
3. Route the new electrical wiring assembly to the motor following the same path as the old electrical wiring assembly. Secure the wiring to the vessel's structure in the same manner as the old wiring assembly.
4. Connect the new electrical wiring with the wire nuts (figure 1 item 3) and remove the labels.
5. Install the electrical junction box cover (top) (figure 1, item 2) with the two screws (figure 1, item 1). Tighten the screws (figure 1, item 1).
6. Perform the Follow-On Service procedure at the end of this work package.

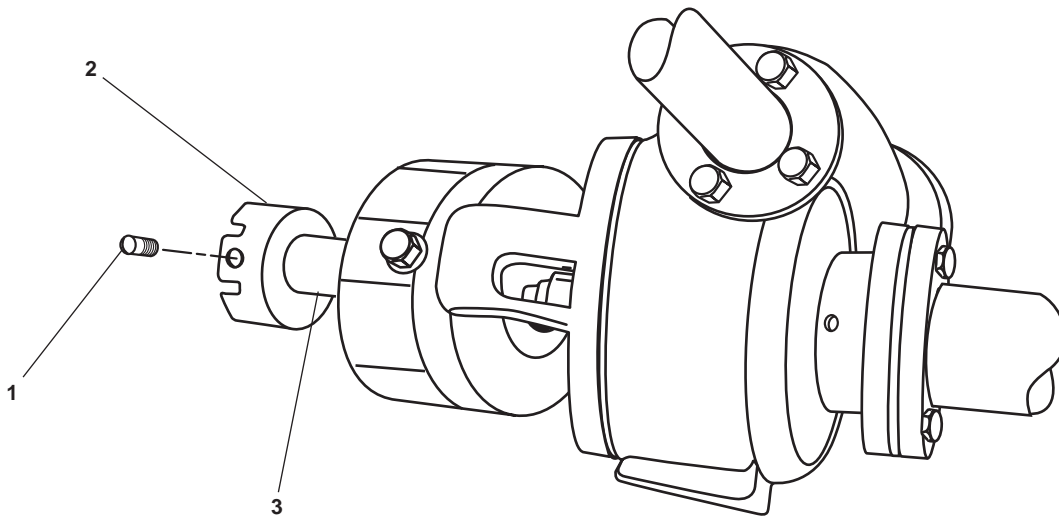
---

**REPLACE POTABLE WATER PUMP COUPLING****REMOVAL**

1. Remove the electric motor (WP 0176 00, volume 1).
2. Remove the flange screw (figure 3, item 1) from the coupling (figure 3, item 2).
3. Slide the coupling (figure 3, item 2) from the potable water pump shaft (figure 3, item 3).

**INSPECTION**

Inspect the potable water pump coupling (figure 3, item 2) for corrosion, deformation, and obvious damage.



**Figure 3. Potable Water Pump**

**INSTALLATION**

1. Slide the new coupling (figure 3, item 2) onto the potable water pump shaft (figure 3, item 3).
2. Install the flange screw (figure 3, item 1) into the coupling (figure 3, item 2), and tighten.
3. Install the electric motor (WP 0176 00, volume 1).

**FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).
2. Operate the potable water pump under usual conditions (TM 55-1925-273-10) and check for proper operation.
3. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
POTABLE WATER PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protection (Item 36, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Grease, General Purpose (Item 75, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Gasket, (Item 6, Figure 88, WP 0305 00)  
Packing (Item 8, Figure 88, WP 0305 00)  
Ring, Wearing (Item 3, Figure 88, WP 0305 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0175 00 (volume 1)  
WP 0295 00  
WP 0305 00  
WP 0307 00

**Equipment Conditions:**

Potable water pump removed (WP 0175 00, volume 1).

---

**DISASSEMBLY****NOTE**

Disassemble the potable water pump only as far as required to perform the maintenance work needed.

1. Drain the potable water pump. Flush with clean water if necessary.

**WARNING**

**Dry cleaning solvent is flammable, keep away from open flame and other ignition sources. Avoid prolonged skin contact. Wear protective equipment for eyes and skin.**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

2. Using dry cleaning solvent, clean exterior surfaces of the unit. Inspect all component parts for unusual wear or damage, and replace as required.
3. Remove the drain plug (figure 1, item 1) from the volute (figure 1, item 2).

4. Remove the cap screws (figure 1, item 3) securing the backplate (figure 1, item 4) to the volute (figure 1, item 2). Separate the volute from the backplate.
5. Remove the casing gasket (figure 1, item 5) from the volute (figure 1, item 2). Discard the gasket.
6. Remove the front plate wear ring (figure 1, item 6) from the volute (figure 1, item 2). Discard the front plate wear ring.
7. Remove the impeller screw (figure 1, item 7) and the impeller washer (figure 1, item 8).
8. Remove the impeller (figure 1, item 9) from the shaft (figure 1, item 10). Remove the key (figure 1, item 11) from the impeller.
9. Remove the cap screws (figure 1, item 12) securing the backplate (figure 1, item 4) to the bracket (figure 1, item 13). Separate the backplate from the bracket.
10. Remove the backplate gasket (figure 1, item 14) from the backplate (figure 1, item 4). Discard the backplate gasket.
11. Remove the rear case wear ring (figure 1, item 15) from the backplate (figure 1, item 4). Discard the rear case wear ring.
12. Remove the snap ring (figure 1, item 16) from the shaft (figure 1, item 10).

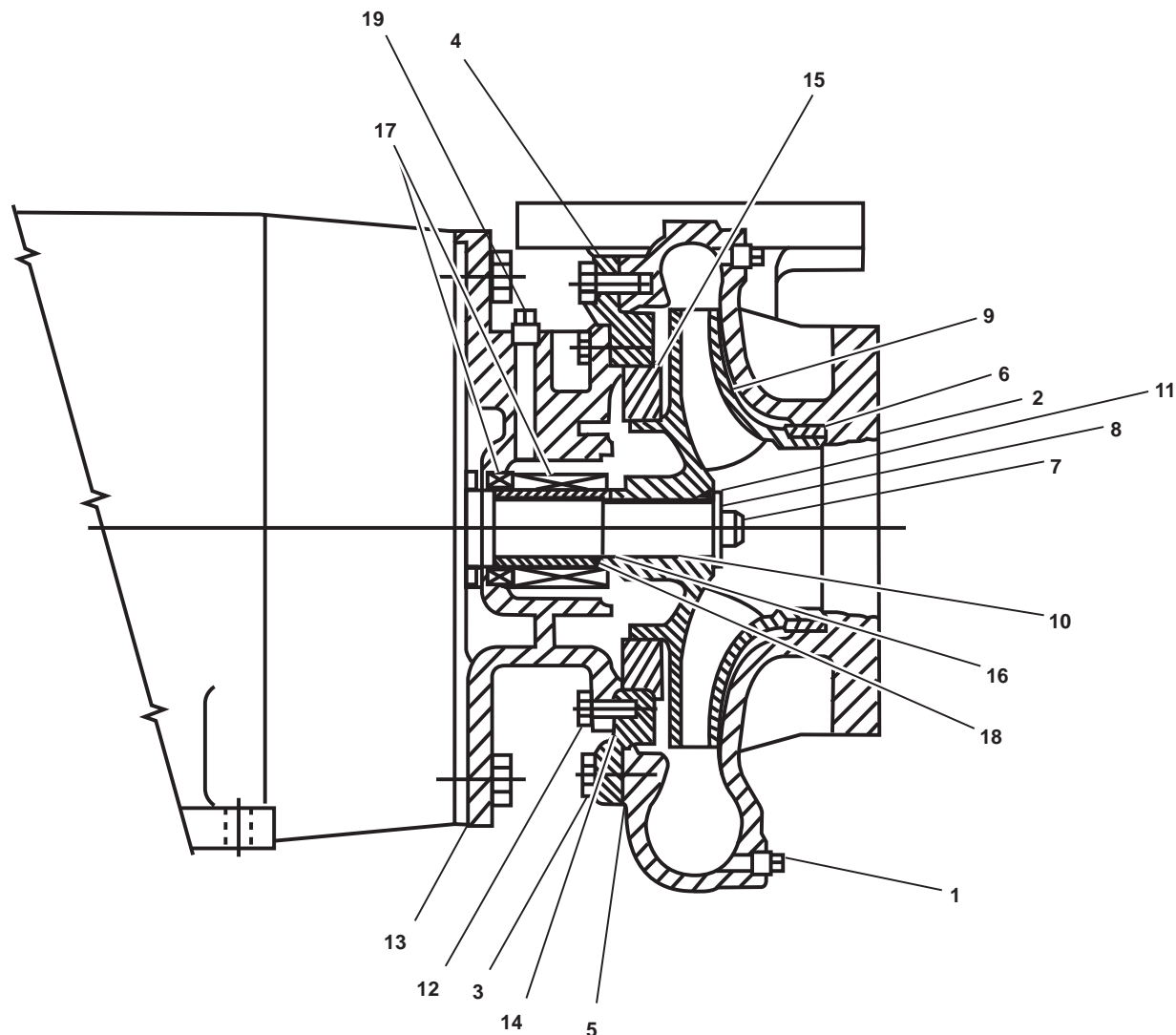


Figure 1. Potable Water Pump Disassembly

13. Remove the mechanical seal (figure 1, item 17) from shaft (figure 1, item 10).
14. Remove the sleeve (figure 1, item 18) from the shaft (figure 1, item 10).

#### NOTE

Do not remove the bracket or slinger from the motor.

15. Remove the stuffing box plug (figure 1, item 19) from the bracket (figure 1, item 13).

#### ASSEMBLY

#### WARNING



**Dry cleaning solvent is flammable, keep away from open flame and other ignition sources. Avoid prolonged skin contact. Wear protective equipment for eyes and skin.**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

1. Using dry cleaning solvent, clean the disassembled parts of the unit before assembly.
2. Install the stuffing box plug (figure 1, item 19) in the bracket (figure 1, item 13).
3. Install the shaft sleeve (figure 1, item 18) over the shaft (figure 1, item 10).
4. Install the new mechanical seal (figure 1, item 17) on the shaft (figure 1, item 10).
5. Install the snap ring (figure 1, item 16) on the shaft (figure 1, item 10).
6. Install the new rear case wear ring (figure 1, item 15) on the backplate (figure 1, item 4).
7. Install the new backplate gasket (figure 1, item 14) on the backplate (figure 1, item 4).
8. Install the backplate (figure 1, item 4) on the bracket (figure 1, item 13). Install the cap screws (figure 1, item 12) into the backplate. Tighten the cap screws.
9. Install the key (figure 1, item 12) into the impeller (figure 1, item 9). Install the impeller (figure 1, item 9) on the shaft (figure 1, item 10).
10. Install the impeller washer (figure 1, item 8) and the impeller screw (figure 1, item 7) to secure the impeller. Tighten the impeller screw.
11. Install the new front plate wear ring (figure 1, item 6) on the volute (figure 1, item 2).
12. Install the new casing gasket (figure 1, item 5) on the volute (figure 1, item 2). Lower the volute over the backplate (figure 1, item 4).

13. Install the cap screws (figure 1, item 3) securing the volute (figure 1, item 2) to the bracket (figure 1, item 2). Tighten the cap screws.
14. Install the drain plugs (figure 1, item 1) in the volute (figure 1, item 2). Tighten the drain plugs.
15. Install the potable water pump (WP 0175 00, volume 1).
16. Remove the lockouts and tagouts (FM 55-502).
17. Operate the potable water pump under usual conditions (TM 55-1925-273-10) and check for leakage and proper operation.
18. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HYDROPNEUMATIC TANK, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 0000)  
Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)  
Tape, Antiseizing (Item 175, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
MIL-STD-769  
S9086-VH-STM-010/CH-635  
WP 0177 00 (volume 1)  
WP 0178 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the HOT POTABLE WTR HTR NO. 1 and HOT POTABLE WTR HTR NO. 2 circuit breakers at the main switchboard. Lock out and tag out (FM 55-502).  
Set to OFF the POTABLE WATER PUMP No. 1 and POTABLE WATER PUMP No. 2 circuit breakers at 440V power panel No. 5. Lock out and tag out (FM 55-502).  
Set to OFF the HOT POTABLE WATER RECIRCULATING PUMP. circuit breaker at 440V power panel No. 4. Lock out and tag out (FM 55-502).  
CLOSE valves PW-78, C.O.V. HYDR. PNEU TK. OUTLET.; PW-76, C.O.V. POT. WTR. PMP. No. 1 DISCH.; and PW-77, C.O.V. POT. WTR. PMP. No. 2 DISCH.. Lock out and tag out (FM 55-502).  
Hydropneumatic tank pressure relieved (WP 0177 00, volume 1).  
Both pressure switches removed (WP 0178 00, volume 1).  
Pressure gauge and sight glass removed (WP 0177 00, volume 1).

**REMOVAL**
**WARNING**

**Potable hoses and lines may be under pressure. Loosen fittings on hoses and lines slowly. Allow the fluid to run around the threads of the fitting or flange, releasing the pressure before disconnecting the fitting or flange. Releasing pressurized fluid suddenly may cause severe personal injury or death.**

1. Remove the four bolts (figure 1, item 1) and the four nuts (figure 1, item 2) securing the vessel piping flange (figure 1, item 3) to the hydropneumatic tank flange (figure 1, item 5).
2. Remove and discard the gasket (figure 1, item 6).
3. Remove the air charge valve (figure 1, item 7) from the piping (figure 1, item 8).
4. Remove the eight bolts (figure 1, item 9) and eight washers (figure 1, item 10) securing the hydropneumatic tank (figure 1, item 4) to its foundation.
5. Plug or cap all open piping.

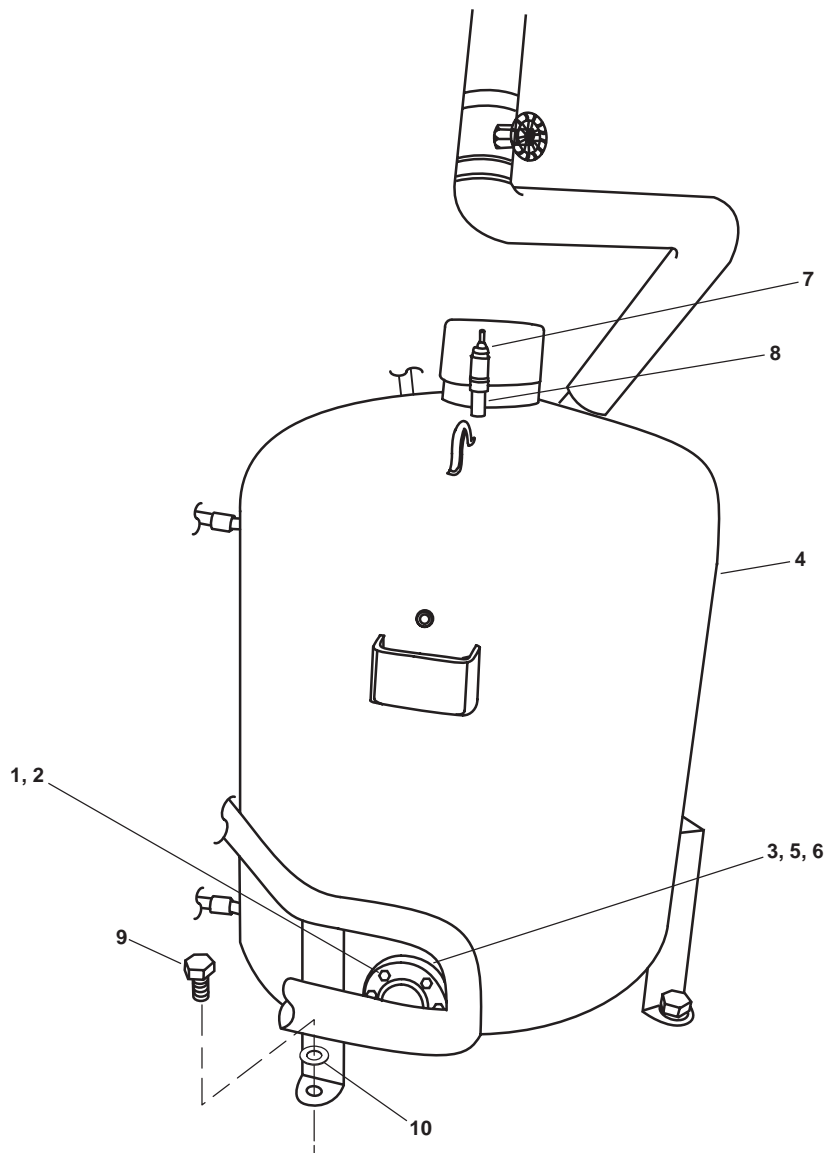
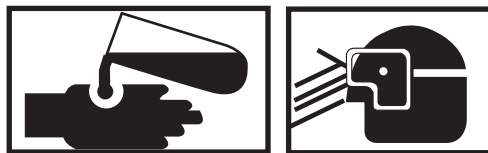


Figure 1. Hydropneumatic Tank

**WARNING**



**Insulation is a skin and eye irritant. Do not allow insulation to come in contact with unprotected skin or eyes. Wear goggles to protect the eyes. Wear loose-fitting, long-sleeved, and long-legged clothing and gloves to protect the skin. Failure to comply can result in serious eye and skin irritation.**

6. Remove all insulation from the hydropneumatic tank (figure 1, item 4). Discard the insulation.
7. Remove the hydropneumatic tank (figure 1, item 4).



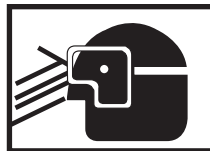
## INSTALLATION

**WARNING**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury or death.**

1. Using a wire brush and dry cleaning solvent, clean the piping flange of the vessel piping (figure 1, item 3).
2. Install the hydropneumatic tank (figure 1, item 4) on its foundation.
3. Secure the hydropneumatic tank (figure 1, item 4) to its foundation with the eight bolts (figure 1, item 9) and the eight washers (figure 1, item 10).
4. Install a new gasket (figure 1, items 6) between the vessel flange (figure 1, item 3) and the hydropneumatic tank flange (figure 1, item 5).
5. Secure the vessel flange (figure 1, item 3) and the hydropneumatic tank flange (figure 1, item 5) with the four bolts (figure 1, item 1) and the four nuts (figure 1, item 2).

**WARNING**

**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury or death.**

6. Clean the female pipe threads of the air charge valve (figure 1, item 7) and the male pipe threads of the piping (figure 1, item 8) using a wire brush.
7. Apply antiseizing tape to the male threads of the piping (figure 1, item 8).
8. Install the air charge valve (figure 1, item 9) on the pipe (figure 1, item 8).
9. Install the pressure switches (WP 0178 00, volume 1).

10. Install the pressure gauge and the site glass (WP 0177 00, volume 1).
11. Refer to MIL-STD-769 and S9086-VH-STM-010/CH-635 for insulation replacement.
12. Remove the lockouts and tagouts (FM 55-502).
13. Pressurize the hydropneumatic tank (WP 0178 00, volume 1).
14. Observe the hydropneumatic tank and its connections, ensuring proper operation and checking for leakage.
15. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HOT WATER HEATER, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 2,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)  
Suitable Drain Hose  
Suitable Drain Pan

**Reference:**

FM 55-502  
TB 43-0218  
WP 0183 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)  
Tape, Antiseizing (Item 175, WP 0307 00)

**Equipment Conditions:**

Hot water heater prepared for replacement (WP 0183 00,  
volume 1).

**Personnel Required:**

Two Watercraft Engineers, 88L

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**REMOVAL**

1. OPEN the access door (figure 1, item 1).

**WARNING**



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Using a multimeter, check for voltage at the wiring leads. If voltage is present, ensure that the proper controller is secured, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Label and disconnect the electrical wiring (figure 1, item 2).
4. Attach a hose to the drain faucet (figure 1, item 3).
5. Lift the manual relief lever on the relief valve (figure 1, item 4) to let air into the unit.

6. OPEN the drain faucet (figure 1, item 3) and allow the water to drain into the suitable drain pan.
7. Remove the vent drain (figure 1, item 5) from the relief valve (figure 1, item 4).

**⚠ CAUTION**

Never attempt to disconnect or connect union connections with only one wrench. Damage to the vessel piping or to the component piping could occur. Always use two wrenches.

8. Remove the outlet union (figure 1, item 6) using the two wrench method.

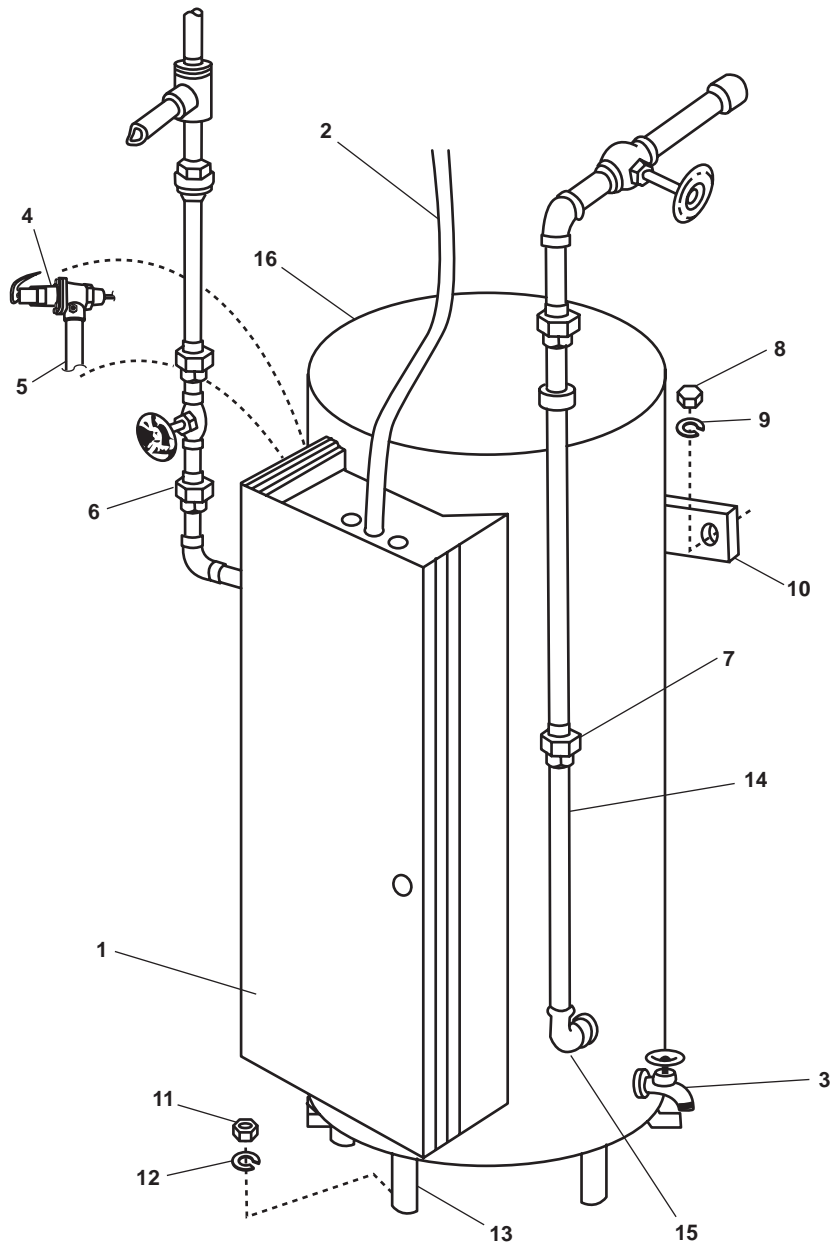
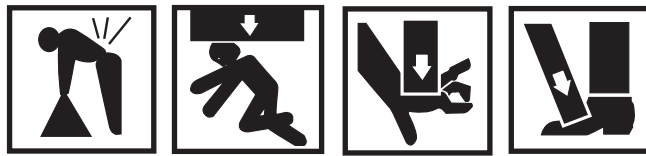


Figure 1. Typical Water Heater Replacement

9. Remove the inlet union (figure 1, item 7) using the two wrench method.
10. Remove the four retaining nuts (figure 1, item 8) and four lockwashers (figure 1, item 9) from the bulkhead brackets (figure 1, item 10). Discard the lockwashers.
11. Remove the retaining nuts (figure 1, item 11) and the lockwashers (figure 1, item 12) from the angle brackets (figure 1, item 13). Discard the lockwashers.
12. Remove the attached piping (figure 1, item 14) from the inlet union (figure 1, item 7). Retain the attached piping for the new hot water heater.
13. Remove the elbow (figure 1, item 15). Retain the elbow for the new hot water heater.

**WARNING**

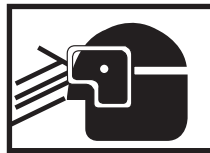


**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

14. Using two crewmembers, remove the hot water heater (figure 1, item 16) from its foundation.

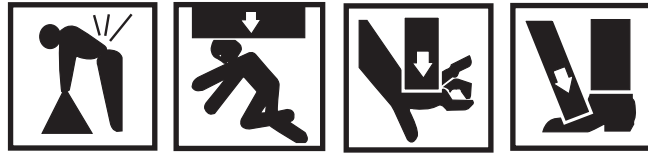
#### INSTALLATION

**WARNING**



**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury or death.**

1. Clean the male threads of the inlet pipe and the outlet pipe using a wire brush. Apply antiseizing tape to the male threads of the inlet pipe and the outlet pipe.
2. Install the elbow (figure 1, item 15) and attached piping (figure 1, item 14) on the new hot water heater (figure 1, item 16).

**WARNING**

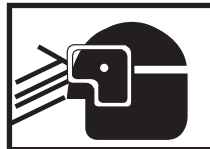
**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

3. Using two crewmembers, install the hot water heater (figure 1, item 16) on the angle brackets (figure 1, item 13). Secure the water heater to the angle brackets with the four retaining nuts (figure 1, item 11) and four new lockwashers (figure 1, item 12).
4. Secure the upper portion of the hot water heater (figure 1, item 16) to the bulkhead brackets (figure 1, item 10) with the four retaining nuts (figure 1, item 8) and four new lockwashers (figure 1, item 9).

**⚠ CAUTION**

Never attempt to disconnect or connect union connections with only one wrench. Damage to the vessel piping or to the component piping could occur. Always use two wrenches.

5. Connect the unions (figure 1, items 6 and 7) to the piping. Minor reorientation of the elbow (figure 1, item 15) may be necessary to properly align the unions. Tighten the unions (figure 1, items 6 and 7) using the two wrench method.

**WARNING**

**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.**

6. Clean the male threads of the vent drain (figure 1, item 5) using a wire brush. Apply antiseizing tape to the male threads of the vent drain.
7. Install the vent drain (figure 1, item 5) into the relief valve (figure 1, item 4).
8. Connect the electrical wiring (figure 1, item 3) to the hot water heater (figure 1, item 16) using the labels from step 3 of Removal as a guide. Remove the labels.
9. CLOSE the access door (figure 1, item 1).
10. CLOSE the drain faucet (figure 1, item 3).
11. Notify unit maintenance to complete the installation of the hot water heater (WP 0183 00, volume 1).

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
HOT WATER HEATER, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Torch Outfit, Cutting and Welding (Item 2, Table 2,  
WP 0295 00)  
Tool Kit, Welder's (Item 3, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Leather (Item 37, Table 2, WP 0295 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

FM 55-502  
S9074-AR-GIB-010/278  
WP 0182 00 (volume 1)

**References (continued):**

WP 0183 00 (volume 1)  
WP 0184 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Applicable hot water heater prepared for removal  
(WP 0183 00, volume 1).  
Applicable hot water heater drained (WP 0184 00,  
volume 1).

---

**WELDED PIPING REPLACEMENT****REMOVAL**

1. Prepare the work area in accordance with S9074-AR-GIB-010/278.

**NOTE**

The appropriate procedure is determined by the material contained in the replacement piping or component. Refer to S9074-AR-GIB-010/278 for the appropriate procedure.

2. Verify that the water heater is drained below the level where the hot work is to be accomplished.
3. Cut off the affected piping or component.

**INSTALLATION**

1. Install the new pipe or component and weld or braze the joint as appropriate.
2. Perform the Hot Water Heater Replace Installation procedure (WP 0183 00, volume 1).
3. Perform the Hot Water Heater Adjust Adjustment procedure (WP 0182 00, volume 1).
4. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, ALIGNMENT**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the FIRE PUMP #1 circuit breaker at the emergency switchboard or the FIRE PUMP NO. 2 circuit breaker at the main switchboard. Lock out and tag out (FM 55-502).

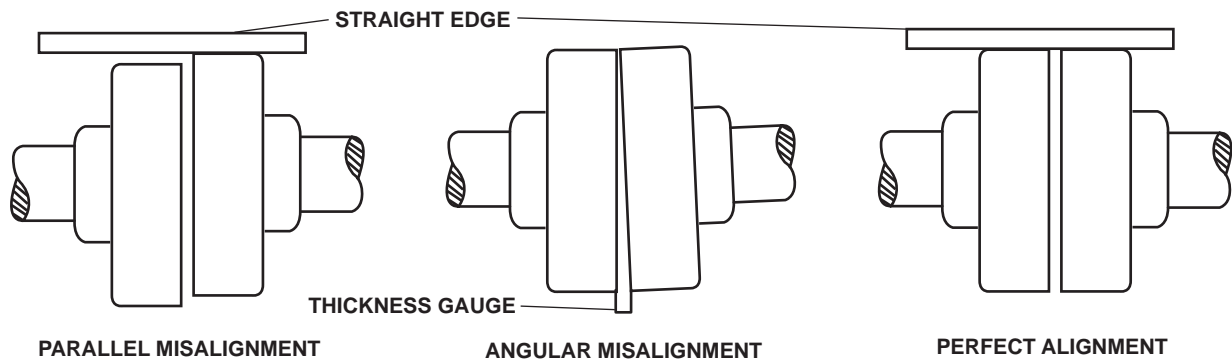
---

**VERIFY ALIGNMENT**

**⚠ CAUTION**

Keep the flexible coupling faces separated so that they do not make contact with each other when the motor shaft is forced to the limit of the bearing clearance toward the pump. Failure to comply with this caution can result in damage to the pump and motor.

1. Check the parallel alignment using a straight edge held against the edges of the coupling halves at any four places 90° apart around the coupling. The straight edge should be parallel to the pump and the electric motor halves at all times.
2. Check the angular alignment around the coupling by inserting a feeler gauge at any four places 90° apart around the coupling as shown in figure 1.
3. If the coupling is out of alignment, loosen the bolts securing the electric motor to the pump and check for foreign objects or dirt trapped between the electric motor and pump mounting surfaces. If no foreign objects or dirt are found, move the electric motor to achieve the desired alignment.



**Figure 1. Coupling Alignment**

---

**NOTE**

Any adjustment to correct one direction of alignment may affect the other direction. Therefore it is necessary to recheck both the angular and the parallel alignment after each adjustment.

4. Check the parallel and angular alignment to ensure that the coupling has been correctly aligned.
5. Remove the lockouts and tagouts (FM 55-502).
6. Set the applicable circuit breaker to ON.

**WARNING**

**Use extreme caution when working around the rotating pump shaft. Do not allow hands or tools to come in contact with the shaft. Do not wear loose clothing, jewelry, or anything else, which might become entangled in the shaft. Failure to comply can result in death or serious injury.**

7. Operate the fire and general service pump (TM 55-1925-273-10), checking for any unusual noise or vibration.
8. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**

---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 1,  
WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protective (Item 36, Table 1,  
WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)  
Tape, Antiseizing (Item 175, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
FM 55-509-1  
TM 55-1925-273-10

**References (continued):**

WP 0272 00  
WP 0276 00  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the FIRE PUMP #1 circuit breaker at the emergency switchboard. Lock out and tag out (FM 55-502).  
Set to OFF the FIRE PUMP NO. 2 circuit breaker at the main switchboard. Lock out and tag out (FM 55-502).  
CLOSE valves FM-6, FIRE/G.S. PMP No.1 SUCT; FM-7, FIRE/G.S. PMP No. 2 SUCT; FM-14, FIRE/G.S. PMP. No.2 DISCH. TO FM; FM-15, FIRE/G.S. PMP. No.2 DISCH. TO GS; FM-16, FIRE/G.S. PMP No.1 DISCH TO FM; FM-17, FIRE/G.S. PMP No.1 DISCH TO GS. Lock out and tag out (FM 55-502).

**WIRING REPAIR**

Proper repair of 24 Volt wiring consists of replacement of the damaged wiring. When electrical casualty requires expedient repairs, repair may be made by splicing. Splicing is authorized for repair of damaged cables if the remainder of the cable is in good mechanical and electrical condition. The cable must be replaced in its entirety at the most opportune time. For proper splicing methods, refer to FM 55-509-1.

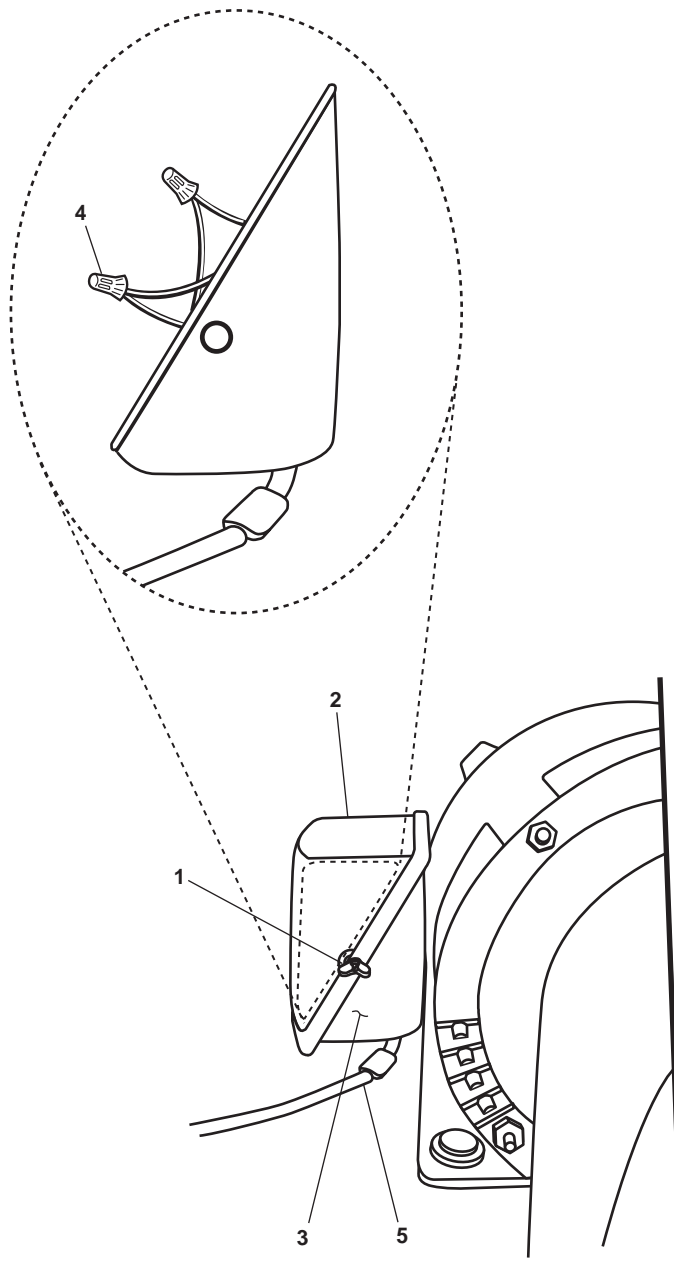
**DISASSEMBLY**

1. Remove the two screws (figure 1, item 1), and remove the cover (figure 1, item 2) from the junction box (figure 1, item 3).



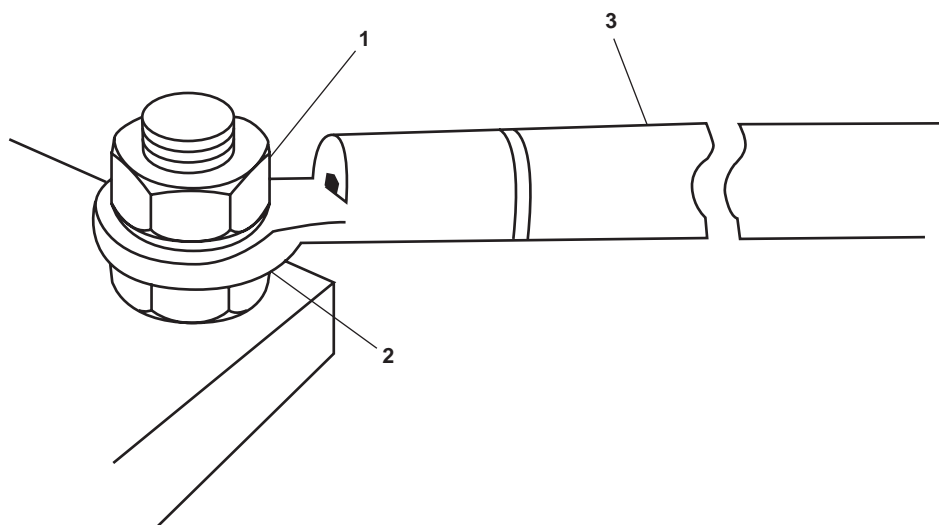
**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the wire terminals (figure 1, item 4). If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.



**Figure 1. Typical Junction Box**

3. Remove any covers or interference that restrict access to the wire being removed.
4. Label all wiring to be removed, and make a sketch of the work area to permit proper assembly.
5. Remove the nuts (figure 2, item 1) that secure the wire terminals (figure 2, item 2) in the motor controller, and remove the wire nuts from the wire terminals (figure 1, item 4) in the junction box (figure 1, item 3).
6. Remove the wiring (figure 1, item 5) from the junction box (figure 1, item 3).
7. Follow the wiring (figure 1, item 5) to the opposite end, freeing it from the vessel structure as required.
8. Remove the wiring (figure 2, item 3) from the wire terminals (figure 2, item 2) at the opposite end.
9. Perform steps 1-6 for any other wire that may require removal.



**Figure 2. Typical Wire Terminal**

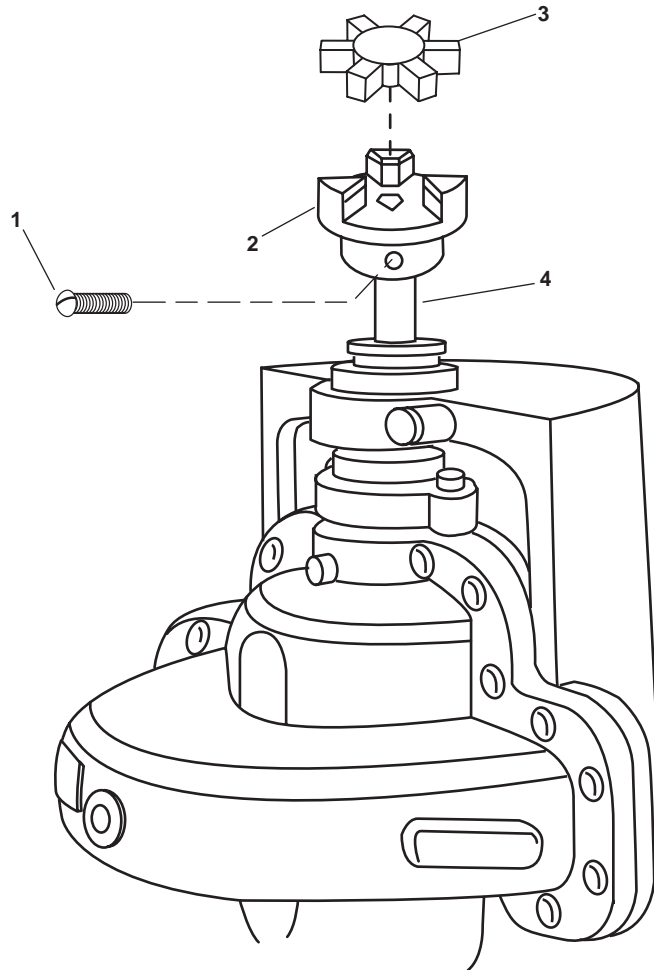
### **ASSEMBLY**

1. Determine the wires to be connected by referring to the sketches and labels from Disassembly step 4.
2. Route the new wires (figure 1, item 5) from the junction box (figure 1, item 3) along the same path as the old wires to the motor controller and secure it to wire terminals (figure 2, item 2) with the nuts (figure 2, item 1).
3. Connect the wiring (figure 1, item 5) in the junction box (figure 1, item 3).
4. Remove any remaining labels.
5. Install any covering or interference removed during the Removal procedure.
6. Install the cover (figure 1, item 2) on the junction box (figure 1, item 3), and secure it with the two screws (figure 1, item 1).
7. Perform the Follow-On Service procedure at the end of this work package.

### **COUPLING REPLACEMENT**

#### **REMOVAL**

1. Remove the fire and general service pump electric motor (WP 0276 00).
2. Loosen the set screw (figure 3, item 1) from the coupling (figure 3, item 2).
3. Remove the coupling (figure 3, item 2) and the coupling spider (figure 3, item 3) from the pump shaft (figure 3, item 4).



**Figure 3. Fire and General Service Pump**

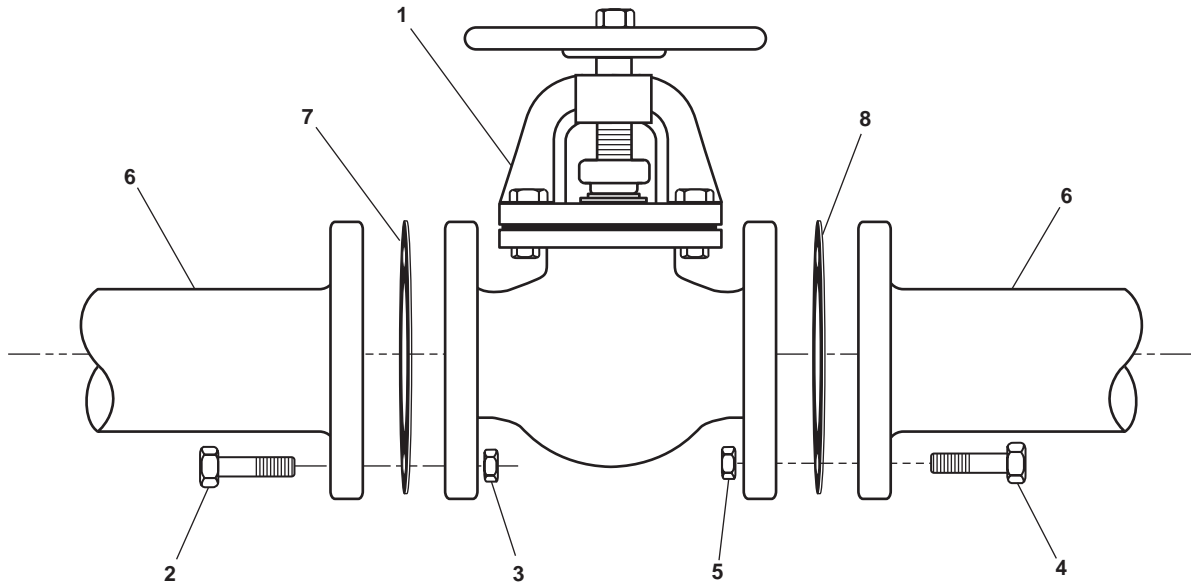
### INSTALLATION

1. Install the coupling (figure 3, item 2) and coupling spider (figure 3, item 3) on the pump shaft (figure 3, item 4), and secure them with the set screw (figure 3, item 1).
2. Install the electric motor (WP 0276 00).
3. Perform the Fire and General Service Pump Alignment procedure (WP 272 00).
4. Perform the Follow-On Service at the end of this work package.

### FLANGED GLOBE VALVE REPLACEMENT

#### REMOVAL

1. Partially OPEN the valve (figure 4, item 1) to equalize the internal pressure before removing any bolts.
2. Place a suitable drain pan under the valve (figure 4, item 1).



**Figure 4. Flanged Globe Valve**

3. Slowly loosen the bolts (figure 4, item 2) and nuts (figure 4, item 3) on the inlet side of the valve (figure 4, item 1), and allow and pressure to vent and any liquid to drain into the drain pan.
4. Remove the bolts (figure 4, item 2) and nuts (figure 4, item 3) from the inlet side of the valve (figure 4, item 1).
5. Remove the bolts (figure 4, item 4) and nuts (figure 4, item 5) from the outlet side of the valve (figure 4, item 1).
6. Remove the valve (figure 4, item 1) from the vessel piping (figure 4, item 6).
7. Remove and discard the gaskets (figure 4, items 7 and 8).

## INSTALLATION

### WARNING

**Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury or death.**

1. Clean the flanges of valve (figure 4, item 1) and vessel piping (figure 4, item 6) using a wire brush, clean wiping rags, and water.
2. Install the valve (figure 4, item 1) and two new gaskets (figure 4, items 7 and 8) to the vessel piping, and secure it with the bolts (figure 4, items 2 and 4) and the nuts (figure 4, items 3 and 5).
3. Perform the Follow-On Service procedure at the end of this work package.

**FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).
2. Set the circuit breakers to ON.
3. Operate the fire and general service system under usual conditions (TM 55-1925-273-10).
4. Check the for proper operation of the system, and check connections for leakage.
5. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, PUMP END, REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Chain Hoist, Hand Operated (Item 7, Table 2, WP 0295 00)  
Sling, Endless (Item 10, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Leather (Item 37, Table 2, WP 0295 00)  
Helmet, Safety (Item 28, Table 2, WP 0295 00)  
Suitable Drain Pan

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

TB 43-0218  
TM 55-1925-273-10  
WP 0276 00  
WP 0295 00  
WP 0305 00  
WP 0307 00

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)

**Equipment Conditions:**

Fire and general service pump electric motor removed (WP 0276 00).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**PUMP REPLACEMENT****REMOVAL**

1. Place a suitable drain pan under the pump.

**WARNING**

**The fire and service general pump may be under pressure. Loosen the plugs on the case slowly. Allow the water to run around threads of fitting, releasing pressure before removing the plug. Releasing pressurized water suddenly may cause severe personal injury or death.**

2. Slowly remove the drain plugs (figure 1, items 1, 2, and 3) and allow any pressure to vent and any water to drain into the suitable drain pan.
3. Remove the eight nuts (figure 1, item 4) and eight bolts (figure 1, item 5) from the suction pipe connection.
4. Remove the eight nuts (figure 1, item 6) and bolts (figure 1, item 7) from the discharge pipe connection.
5. Remove and discard the gaskets (figure 1, items 8 and 9).

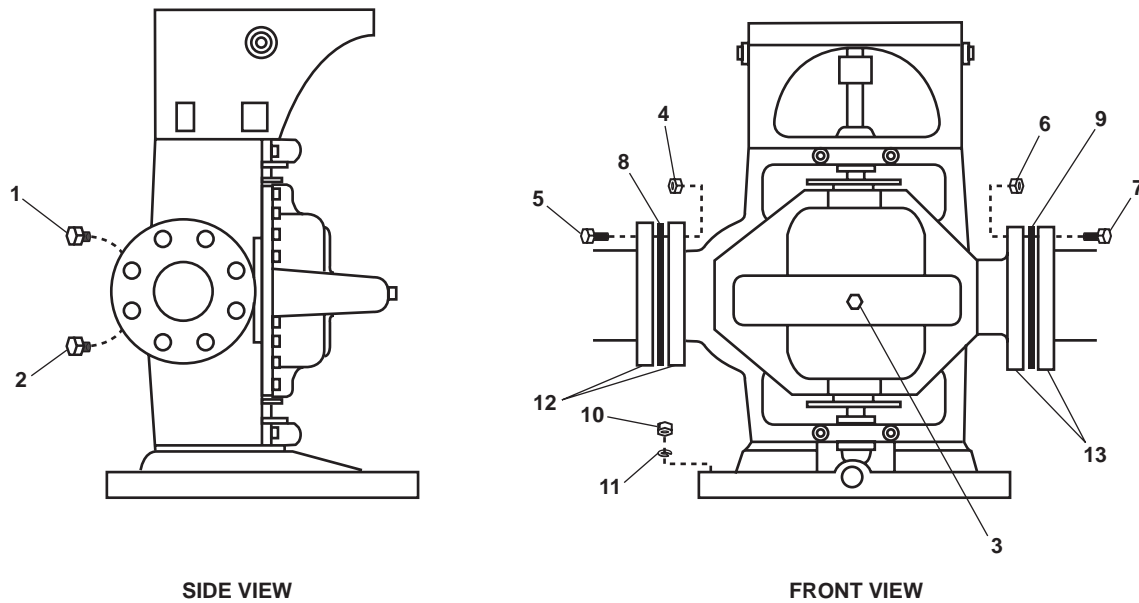
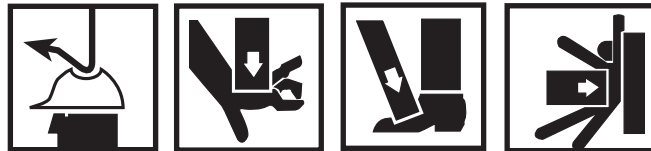


Figure 1. Fire And General Service Pump

### WARNING

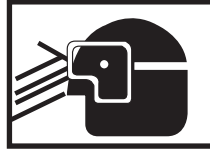


All personnel in the vicinity of lifting operations should wear appropriate safety equipment including gloves, hardhat, and safety shoes. Death or serious injury can result from failure to heed this warning.

Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.

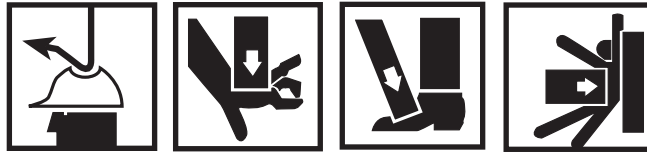
6. Attach the chain hoist to the pump and remove the slack from the chain.
7. Remove the eight nuts (figure 1, item 10) and eight lockwashers (figure 1, item 11) that secure the pump the foundation. Discard the lockwashers.
8. Remove the pump from the foundation.

## INSTALLATION

**WARNING**

**Wire brushing operations produce high velocity flying debris which can become lodged in the skin or in the eyes. Wire brushing in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing grinding, needling and chipping operations. Failure to comply can result in death or serious injury to personnel.**

1. Clean the suction flanges (figure 1, item 12) and the discharge flanges (figure 1, item 13) with a wire brush, clean water, and wiping rags.

**WARNING**

**All personnel in the vicinity of lifting operations should wear appropriate safety equipment including gloves, hardhat, and safety shoes. Death or serious injury can result from failure to heed this warning.**

**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

2. Install the pump on the foundation using the chain hoist, and secure it with the eight nuts (figure 1, item 10) and eight new lockwashers (figure 1, item 11).
3. Remove the chain hoist.
4. Install a new gasket (figure 1, item 8) between the suction flanges (figure 1, item 12), and secure the suction flanges with the eight nuts (figure 1, item 4) and eight bolts (figure 1, item 5).
5. Install a new gasket (figure 1, item 9) between the discharge flanges (figure 1, item 13), and secure the discharge flanges with the eight nuts (figure 1, item 6) and eight bolts (figure 1, item 7).
6. Install the drain plugs (figure 1, items 1, 2, and 3).
7. Install the fire and general service pump electric motor (WP 0276 00).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Press, Arbor (Item 8, Table 2, WP 0295 00)  
 Puller, Mechanical, Gear and Bearing (Item 27, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
 Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 2, WP 0295 00)

**Materials/Parts:**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
 Sealing Compound (Item, 155, Table 1 WP 0307 00)  
 Tag, Danger (Item 174, Table 1, WP 0307 00)  
 Bearing, Ball, Annular (Item 4, Figure 93, WP 0305 00)  
 Bearing, Ball, Annular (Item 12, Figure 93, WP 0605 00)  
 Gasket (Item 2, Figure 93, WP 0305 00)  
 Gasket (Item 14, Figure 93, WP 0305 00)  
 Gasket (Item 15, Figure 93, WP 0305 00)  
 O-Ring (Item 6, Figure 93, WP 0305 00)  
 O-Ring (Item 7, Figure 93, WP 0305 00)  
 Ring, Retaining (Item 13, Figure 93, WP 0305 00)

**Materials/Parts (continued):**

Ring, Wearing (Item 7, Figure 93, WP 0305 00)  
 Ring, Impeller (Item 10, Figure 93, WP 0305 00)  
 Seal (Item 3, Figure 93, WP 0305 00)  
 Seal, Oil (Item 5, Figure 93, WP 0305 00)  
 Seal, Oil (Item 11, Figure 93, WP 0305 00)  
 Seal, Plain (Item 16, Figure 93, WP 0305 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
 TB 43-0218  
 TC 9-524  
 TM 55-1925-273-10  
 WP 0274 00  
 WP 0295 00  
 WP 0305 00  
 WP 0307 00

**Equipment Conditions:**

Fire and general service pump removed (WP 0274 00).

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**PUMP REPAIR****DISASSEMBLY**

1. Remove the bolts (figure 1, item 1) that secure the base (figure 1, item 2) to the pump body (figure 1, item 3).
2. Remove the bolts (figure 1, item 4) that secure the alignment bracket (figure 1, item 5) to the pump body (figure 1, item 3).
3. Remove the cap screws (figure 1, item 6), and remove the casing (figure 1, item 7) from the pump body (figure 1, item 3).
4. Remove and discard the gasket (figure 1, item 8).
5. Remove the two cap screws (figure 1, item 9), and remove the outboard bearing caps (figure 1, item 10) and pin (figure 1, item 11).

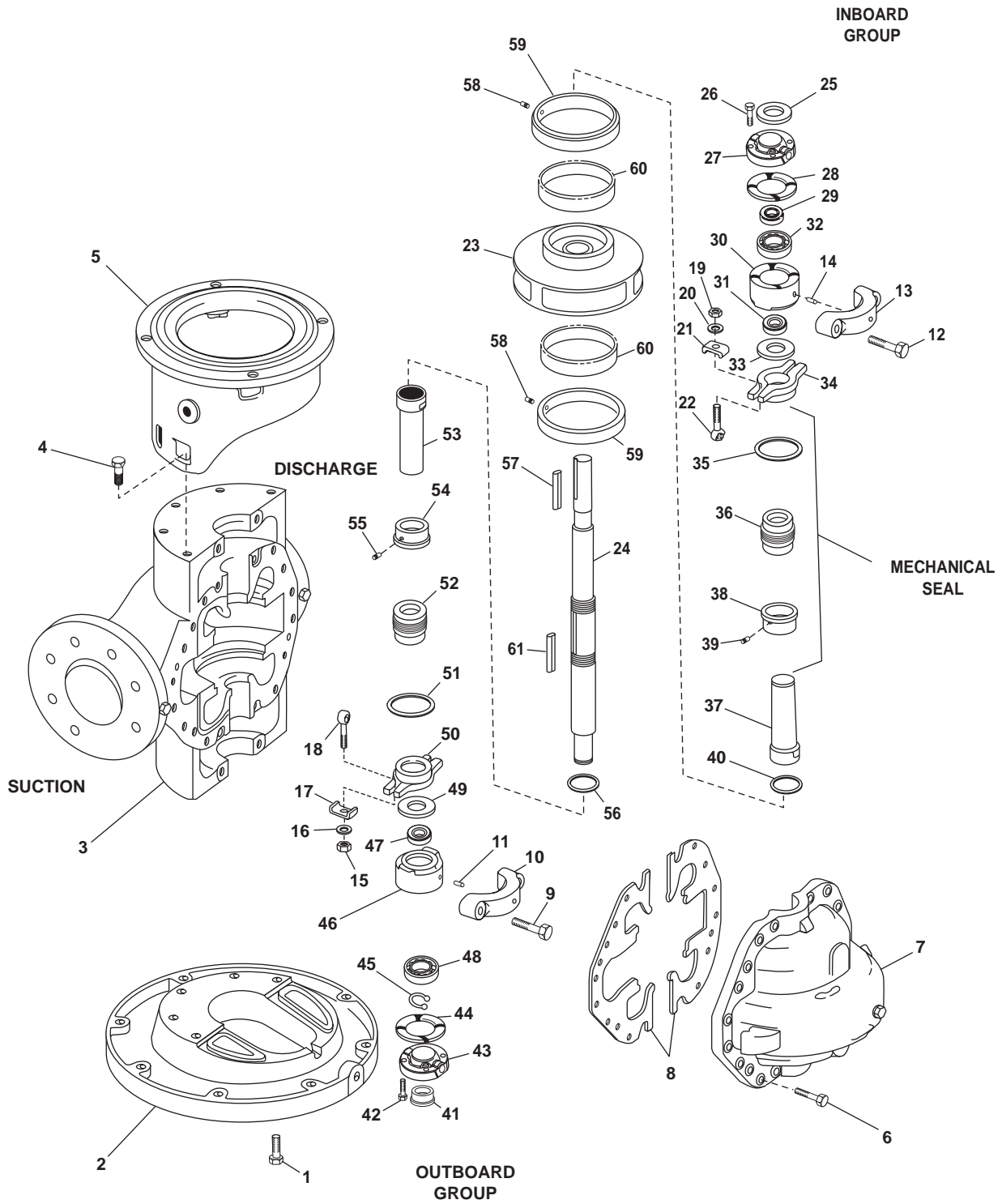


Figure 1. Fire and General Service Pump

6. Remove the two cap screws (figure 1, item 12), and remove the inboard bearing cap (figure 1, item 13) and pin (figure 1, item 14).
7. Remove the nut (figure 1, item 15), washer (figure 1, item 16) and gland clamp (figure 1, item 17). Remove the swing bolt (figure 1, item 18) from the outboard group.
8. Remove the nut (figure 1, item 19), washer (figure 1, item 20), and gland clamp (figure 1, item 21), and remove the swing bolt (figure 1, item 22) from the inboard group.

 **CAUTION**

Use care when moving the impeller and shaft assembly. The ceramic seats can be cracked from sliding down the shaft. To prevent the ceramic seats from being damaged, wrap the mechanical seals in a cloth to secure them.

9. Remove the impeller (figure 1, item 23) and shaft (figure 1, item 24) from the pump body (figure 1, item 3).
10. Remove the upper slinger (figure 1, item 25) from the end of the shaft (figure 1, item 24).
11. Remove the cap screws (figure 1, item 26), and remove the inboard cartridge cap (figure 1, item 27) from the shaft (figure 1, item 24).
12. Remove and discard the gasket (figure 1, item 28)
13. Remove and discard the grease seal (figure 1, item 29).
14. Using a mechanical gear and bearing puller, remove the inboard group bearing cartridge (figure 1, item 30), the grease seal (figure 1, item 31), and the bearing (figure 1, item 32) from the shaft (figure 1, item 24). Discard the grease seal.
15. Remove the slinger (figure 1, item 33) from the shaft (figure 1, item 24).
16. Remove the upper gland (figure 1, item 34) from the shaft (figure 1, item 24).
17. Remove and discard the O-ring (figure 1, item 35).

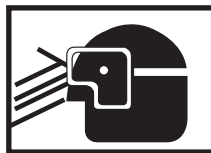
 **CAUTION**

Use care in removing the seal assembly to prevent marring or damaging the mating surfaces.

18. Remove the upper mechanical seal (figure 1, item 36) from the shaft (figure 1, item 24).
19. Mark the position of the upper sleeve (figure 1, item 37) on the shaft (figure 1, item 24) to ensure correct orientation of the upper seal collar (figure 1, item 38) during pump assembly.
20. Loosen the set screw (figure 1, item 39), and remove the upper seal collar (figure 1, item 38) and the upper sleeve (figure 1, item 37) from the shaft (figure 1, item 24).
21. Remove and discard the O-ring (figure 1, item 40).
22. Remove the lower race (figure 1, item 41) from the shaft (figure 1, item 24).
23. Remove the cap screw (figure 1, item 42), and remove the cartridge cap (figure 1, item 43) and the gasket (figure 1, item 44) from the shaft (figure 1, item 24).

24. Remove the retainer clip (figure 1, item 45). Using a mechanical gear and bearing puller, remove the outboard group bearing cartridge (figure 1, item 46), the grease seal (figure 1, item 47), and the bearing (figure 1, item 48) from the shaft (figure 1, item 24). Discard the retainer clip and the grease seal.
25. Remove the lower slinger (figure 1, item 49) from the shaft (figure 1, item 24).
26. Remove the lower gland (figure 1, item 50) from the shaft (figure 1, item 24).
27. Remove the O-ring (figure 1, item 51) from the lower gland (figure 1, item 50). Discard the O-ring.
28. Remove the lower mechanical seal (figure 1, item 52) from the shaft (figure 1, item 24).
29. Mark the position of the lower sleeve (figure 1, item 53) on the shaft (figure 1, item 24) to ensure correct orientation of the lower seal collar (figure 1, item 54) during pump assembly.
30. Loosen the set screw (figure 1, item 55), and remove the lower seal collar (figure 1, item 54) and the lower sleeve (figure 1, item 53) from the shaft (figure 1, item 24).
31. Remove and discard the O-ring (figure 1, item 56).
32. Remove the upper key (figure 1, item 57) from the shaft (figure 1, item 24).
33. Remove the two pins (figure 1, item 58) and the outer races (figure 1, item 59) from the impeller (figure 1, item 23).
34. Inspect the wear rings (figure 1, item 60) for damage and wear. If the outside diameter of the wear rings does not match the inside diameter of the outer races, the wear rings must be replaced.
35. When replacing the wear rings, if the seating surface area on the impeller (figure 1, item 23) is damaged, build up the damaged area and machine using standard shop practices (TC 9-524). Verify that the outside diameter of the seating area corresponds to the inside diameter of the new wear rings (figure 1, item 60).
36. Remove and discard the lower key (figure 1, item 61) from the shaft (figure 1, item 24).

## ASSEMBLY

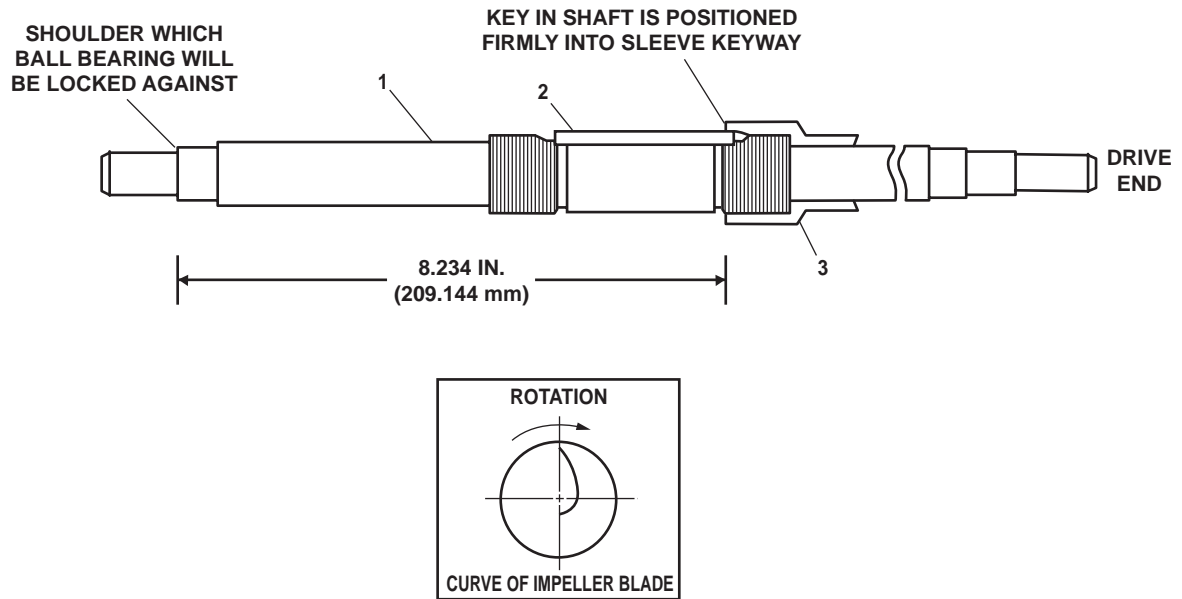


**Wire brushing operations produce high velocity flying debris which can become lodged in the skin or in the eyes. Wire brushing in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing grinding, needling and chipping operations. Failure to comply can result in death or serious injury to personnel.**

1. Clean the mating surfaces of the casing (figure 1, item 7) and the pump body (figure 1, item 3) with a wire brush, clean water, and wiping rags.
2. Apply sealing compound on the inner diameter of the impeller wear rings (figure 1, item 60). Press fit the new wear rings to the seating surfaces of the impeller (figure 1, item 23).



3. Install the outer races (figure 1, item 59) on the wear ring (figure 1, item 60) seating surfaces of the impeller (figure 1, item 23). Secure the races with the two pins (figure 1, item 58).
4. Apply sealing compound to the recess in the shaft (figure 2, item 1), and install the lower key (figure 2, item 2) on the shaft.
5. Apply sealing compound to the recess in the shaft (figure 2, item 1), and install the upper key (figure 2, item 3) on the drive end of the shaft.



**Figure 2. Shaft Key Installation for Rotation**

6. Install a new O-ring (figure 1, item 56) on the lower part of the shaft (figure 1, item 24).
7. Install the lower sleeve (figure 1, item 53) on the shaft (figure 1, item 24) using the marks from step 29 of Disassembly as a guide to ensure correct orientation.
8. Install the lower seal collar (figure 1, item 54) on the shaft (figure 1, item 24) using the marks from step 29 of Disassembly as a guide to ensure correct orientation. Secure it with the set screw (figure 1, item 55).
9. Install the lower mechanical seal (figure 1, item 52) on the shaft (figure 1, item 24).
10. Install a new O-ring (figure 1, item 51) on the lower gland (figure 1, item 50). Install the lower gland on the shaft (figure 1, item 24).
11. Install the lower slinger (figure 1, item 49) on the shaft (figure 1, item 24).
12. Install the bearing (figure 1, item 48), the outboard group bearing cartridge (figure 1, item 46) and a new grease seal (figure 1, item 47) on the shaft (figure 1, item 24). Secure them with a new retainer clip (figure 1, item 45).
13. Install the cartridge cap (figure 1, item 43) and a new gasket (figure 1, item 44) on the shaft (figure 1, item 24). Secure them with the cap screw (figure 1, item 42).
14. Install the lower race (figure 1, item 41) on the shaft (figure 1, item 24).

15. Install a new O-ring (figure 1, item 40) on the upper part of the shaft (figure 1, item 24).
16. Install the upper sleeve (figure 1, item 37) on the shaft (figure 1, item 24) using the marks from step 19 of Disassembly as a guide to ensure correct orientation.
17. Install the upper seal collar (figure 1, item 38) on the shaft (figure 1, item 24) using the marks from step 19 of Disassembly as a guide to ensure correct orientation. Secure it with the set screw (figure 1, item 39).

 **CAUTION**

Use care when installing the seal assembly to prevent marring or damaging the mating surfaces.

18. Install a new O-ring (figure 1, item 35) on the upper mechanical seal (figure 1, item 36). Install the mechanical seal on the shaft (figure 1, item 24).
19. Install the upper gland (figure 1, item 34) on the shaft (figure 1, item 24).
20. Install the slinger (figure 1, item 33) on the shaft the shaft (figure 1, item 24).
21. Install the bearing (figure 1, item 32), a new grease seal (figure 1, item 31), and the inboard group bearing cartridge (figure 1, item 30) on the shaft (figure 1, item 24).
22. Install a new grease seal (figure 1, item 29), and a new gasket (figure 1, item 28) on the shaft (figure 1, item 24)
23. Install the inboard cartridge cap (figure 1, item 27) on the shaft (figure 1, item 24), and secure it with the cap screws (figure 1, item 26).
24. Install the upper slinger (figure 1, item 25) on the shaft (figure 1, item 24).

 **CAUTION**

Use care when moving the impeller and shaft assembly. The ceramic seats can be cracked from sliding down the shaft. To prevent the ceramic seats from being damaged, wrap the mechanical seals in a cloth to secure them.

25. Install the impeller (figure 1, item 23) and the shaft (figure 1, item 24) into the pump body (figure 1, item 3).
26. Install the inboard group swing bolt (figure 1, item 22). Secure it with the nut (figure 1, item 19), washer (figure 1, item 20), and gland clamp (figure 1, item 21).
27. Install the outboard group swing bolt (figure 1, item 18). Secure it with the nut (figure 1, item 15), washer (figure 1, item 16) and gland clamp (figure 1, item 17).
28. Install the inboard bearing caps (figure 1, item 13). Secure them with the pin (figure 1, item 14) and the two cap screws (figure 1, item 12).
29. Install the outboard bearing caps (figure 1, item 10). Secure them with the pin (figure 1, item 11) and the two cap screws (figure 1, item 9).
30. Install a new gasket (figure 1, item 8) on the casing mating surface of the pump body (figure 1, item 3).
31. Install the casing (figure 1, item 7) on the pump body (figure 1, item 3). Secure it with the cap screws (figure 1, item 6).
32. Install the base (figure 1, item 2) on the pump body (figure 1, item 3). Secure it with the bolts (figure 1, item 1).

33. Install the alignment bracket (figure 1, item 5) on the pump body (figure 1, item 3). Secure it with the bolts (figure 1, item 4).
34. Install the fire and general service pump (WP 0274 00).

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, ELECTRIC MOTOR; REPLACE**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Chain Hoist, Hand Operated (Item 7, Table 2, WP 0295 00)  
Sling, Endless (Item 10, Table 2, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**References:**

FM 55-502  
TM 55-1925-273-10  
WP 0187 00 (volume 1)  
WP 0272 00  
WP 0295 00  
WP 0305 00

**Materials:**

Electric Motor (Item 18, Figure 93, WP 0305 00)

**Equipment Conditions:**

Electric motor prepared for removal (WP 0187 00, volume 1).

**Personnel Required:**

Two Watercraft Engineers, 88L

---

**ELECTRIC MOTOR REPLACEMENT****REMOVAL****NOTE**

Electrical junction boxes may vary in size, shape, and mounting position of the box on the motor frame. Electrical junction box covers may vary in number and placement of screws holding the cover in place.

1. Remove the two screws (figure 1, item 1), and remove the cover (figure 1, item 2) from the junction box (figure 1, item 3).



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the wire terminals (figure 1, item 4). If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Label and remove the wiring (figure 1, item 5) from the junction box (figure 1, item 3).
4. Attach the chain hoist to the eye pads (figure 2, item 1) on the motor (figure 2, item 2), and take a slight strain to remove the slack from the chain.
5. Remove the four bolts (figure 2, item 3) and the four flat washers (figure 2, item 4) from the motor (figure 2, item 2).

**WARNING**

All personnel in the vicinity of lifting operations should wear appropriate safety equipment including gloves, hardhat, and safety shoes. Death or serious injury can result from failure to heed this warning.

Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.

6. Slowly lift the motor (figure 2, item 2) off the foundation (figure 2, item 5) using the chain hoist. Lower it to the deck.

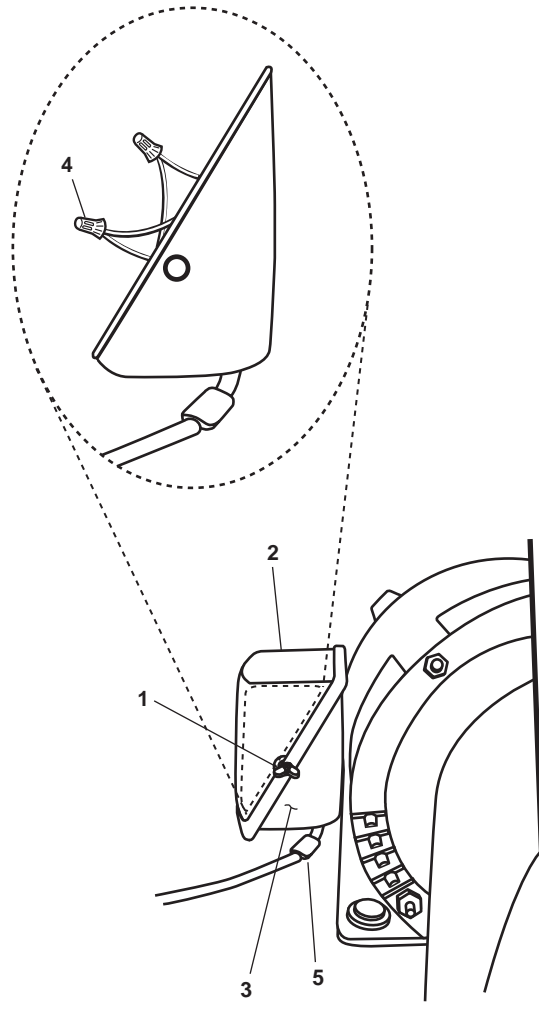


Figure 1. Typical Junction Box

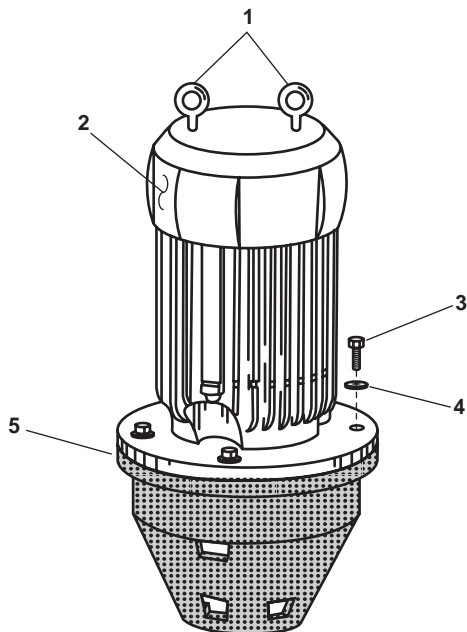


Figure 2. Fire and General Service Pump Motor

## INSTALLATION

### WARNING



**All personnel in the vicinity of lifting operations should wear appropriate safety equipment including gloves, hardhat, and safety shoes. Death or serious injury can result from failure to heed this warning.**

**Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.**

1. Attach the chain hoist to the eye pads (figure 2, item 1) on the motor (figure 2, item 2) and take a slight strain to remove the slack from the chain.
2. Slowly lift the motor (figure 2, item 2) and position it on the foundation (figure 2, item 5).
3. Verify that the mounting holes on the motor (figure 2, item 2) are aligned with the holes on the foundation (figure 2, item 5).
4. Install the motor (figure 2, item 2) on the foundation, and secure it with the four bolts (figure 2, item 3) and the four flat washers (figure 2, item 4).

5. Remove the chain hoist from the motor (figure 2, item 2).
6. Perform the Fire and General Service Pump Alignment procedure (WP 272 00).
7. Remove the lockouts and tagouts (FM 55-502).
8. Set the circuit breakers to ON.
9. Operate the fire and general service system under usual conditions (TM 55-1925-273-10).
10. Verify proper operation of the system, checking the connections for leakage.
11. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, ELECTRIC MOTOR; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, Electrician's (Item 11, Table 1, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)

**Materials/Parts:**

Tag, Danger (Item 174, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
FM 55-509-1  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Set to OFF the FIRE PUMP #1 circuit breaker at the emergency switchboard. Lock out and tag out (FM 55-502).

Set to OFF the FIRE PUMP NO. 2 circuit breaker at the main switchboard. Lock out and tag out (FM 55-502).

---

**WIRING REPAIR**

Proper repair of wiring consists of replacement of the damaged wiring. When electrical casualty requires expedient repairs, repair may be made by splicing. Splicing is authorized for repair of damaged cables if the remainder of the cable is in good mechanical and electrical condition. The cable must be replaced in its entirety at the most opportune time. For proper splicing methods, refer to FM 55-509-1.

**DISASSEMBLY**

1. Remove the two screws (figure 1, item 1), and remove the cover (figure 1, item 2) from the junction box (figure 1, item 3).



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the wire terminals (figure 1, item 4). If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Remove any covers or interference that restrict access to the wire being removed.
4. Label all wiring to be removed, and make a sketch of the work area to permit proper assembly.
5. Remove the nuts (figure 2, item 1) that secure the wire terminals (figure 2, item 2) in the motor controller, and remove the wire nuts from the wire terminals (figure 1, item 4) in the junction box (figure 1, item 3).

6. Remove the wiring (figure 1, item 5) from the junction box (figure 1, item 3).
7. Follow the wiring (figure 1, item 5) to the opposite end, freeing it from the vessel's structure as required.
8. Remove the wiring (figure 2, item 3) from the wire terminals (figure 2, item 2) at the opposite end.
9. Perform steps 1-6 for any other wire that may require removal or repair.

#### ASSEMBLY

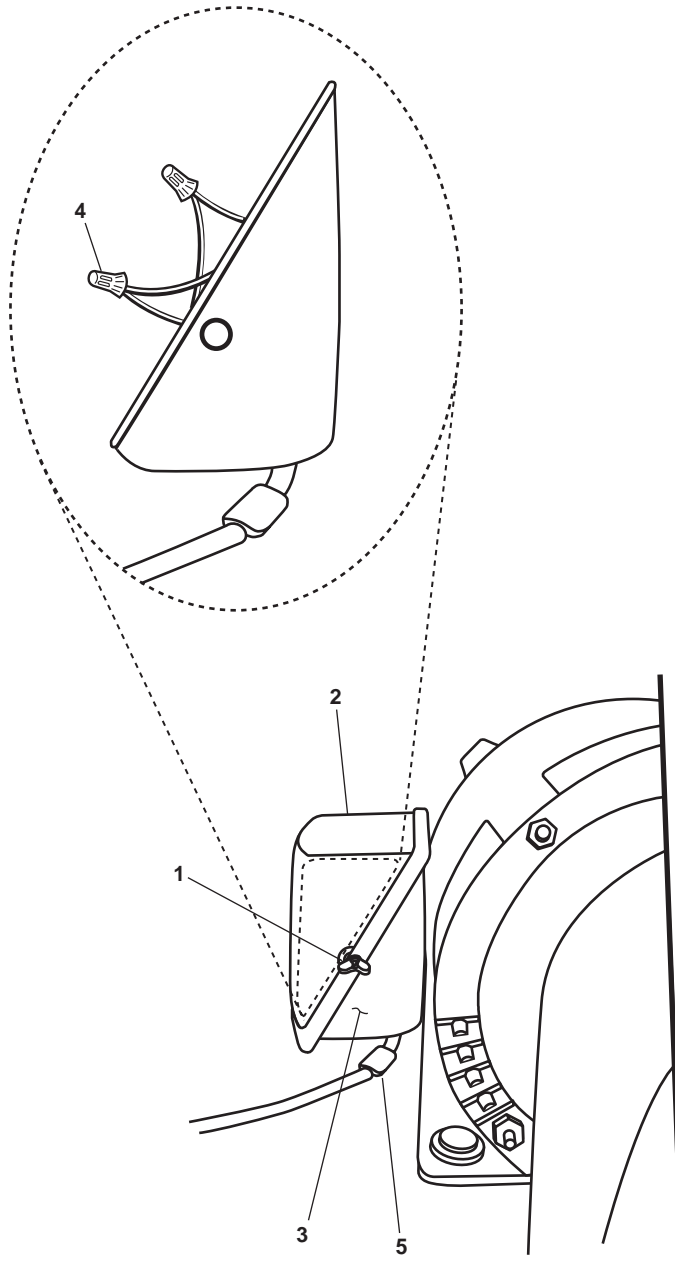
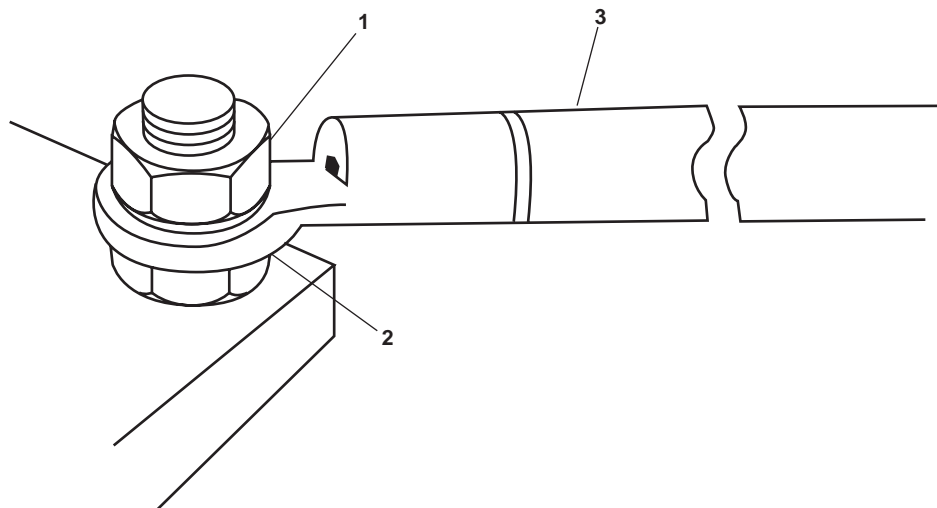


Figure 1. Typical Junction Box



**Figure 2. Typical Wire Terminal**

1. Determine the wires to be connected by referring to the sketches and labels from step 4 of Disassembly as guides.
2. Route the new wires (figure 1, item 5) from the junction box (figure 1, item 3) along the same path as the old wires to the motor controller and secure it to wire terminals (figure 2, item 2) with the nut (figure 2, item 1).
3. Connect the wiring (figure 1, item 5) in the junction box (figure 1, item 3).
4. Remove any remaining labels.
5. Install any covering or interference removed during the Removal procedure.
6. Install the cover (figure 1, item 2) on the junction box (figure 1, item 3), and secure it with the two screws (figure 1, item 1).
7. Remove the lockouts and tagouts (FM 55-502).
8. Set the circuit breakers to ON.
9. Operate the fire and general service system under usual conditions (TM 55-1925-273-10).
10. Check for proper operation of the system, and check connections for leakage.
11. Return the equipment to the desired readiness condition.

**END OF WORK PACKAGE**



---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ARC WELDING MACHINE, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Tool Kit, Electrician's (Item 11, Table 2, WP 0295 00)  
 Multimeter (Item 16, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)

**References:**

FM 55-502  
 TM 55-1925-273-10  
 WP 0295 00

**Equipment Conditions:**

Set to OFF the WELDING MACHINE. circuit breaker at 440V power panel No. 5. Lock out and tag out (FM 55-502).

**Personnel Required:**

Two Watercraft Engineers, 88L

---

**SPARK GAP ADJUSTMENT AND INSPECTION****DISASSEMBLY**

1. Remove the 24 screws (figure 1, item 1) securing the cover (figure 1, item 2) to the arc welder, and remove the cover.

**WARNING**



**Replace or repair components only after the affected circuit has been secured, locked out, and tagged out (FM 55-502). Performing replacement or repair with the circuit energized may result in serious injury or death.**

2. Use a multimeter to check for voltage at the fuse housing (figure 1, item 3), and inline fuse (figure 1, item 4). If voltage is present, ensure that the correct circuit breaker is set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.
3. Press the spring-loaded door latch (figure 1, item 5) and OPEN the front access door (figure 1, item 6).
4. Loosen the screw (figure 1, item 7) on each spark gap assembly.
5. Insert a 0.008 inch (0.0203 mm) feeler gauge between each spark gap contact point (figure 1, item 8). The feeler gauge should be held firmly in place by the contact points.
6. Push or pull the pressure point (figure 1, item 9) of the loosened contact point (figure 1, item 8) to correct the gap to 0.008 inch (0.0203 mm).
7. Tighten the screw (figure 1, item 7).
8. Remove the feeler gauge.

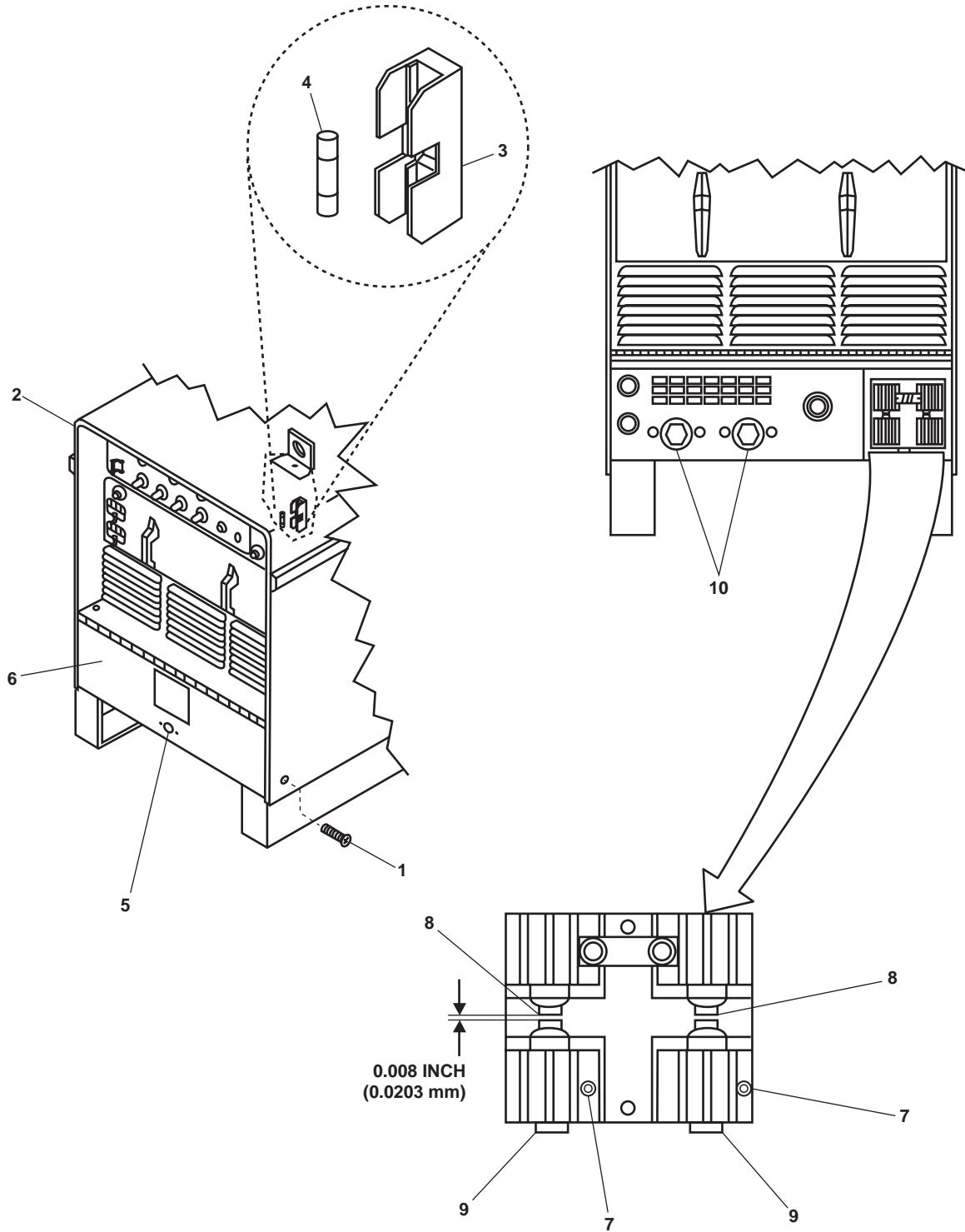
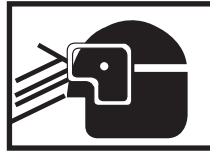


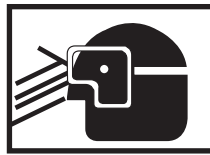
Figure 1. Arc Welder

## ASSEMBLY

**WARNING**

**Goggles should always be worn when working with compressed air. Failure to wear goggles when working with compressed air can result in serious injury or death.**

1. Blow all loose dust and debris from the arc-welding machine using compressed air.

**WARNING**

**Wire brushing operations produce high velocity flying debris which can become lodged in the skin or in the eyes. Grinding, needling, and chipping in confined spaces can result in debris flying in unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing wire brushing operations. Failure to comply can result in death or serious injury to personnel.**

2. Clean the weld terminals (figure 1, item 10) using a wire brush. If necessary, tighten the loose weld terminals.
3. Visually inspect all cables and connections for damaged insulation, cuts, broken wires, and fraying.
4. Install the cover (figure 1, item 2), and secure it with the 24 screws (figure 1, item 1).
5. CLOSE the front access door (figure 1, item 6).
6. Remove the lockouts and tagouts (FM 55-502).
7. Set the circuit breaker to ON.
8. Operate the arc welder under normal conditions (TM 55-1925-273-10).
9. Check for normal operation of the arc welder.
10. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE





---

**DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
AMMUNITION LOCKER, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**Materials/Parts:**

Isopropyl Alcohol, Technical (Item 91, Table 1,  
WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Rubber Cement (Item 151, Table 1, WP 0307 00)  
Silicone Compound (Item 158, Table 1 WP 0307 00)

**References:**

WP 0295 00  
WP 0307 00

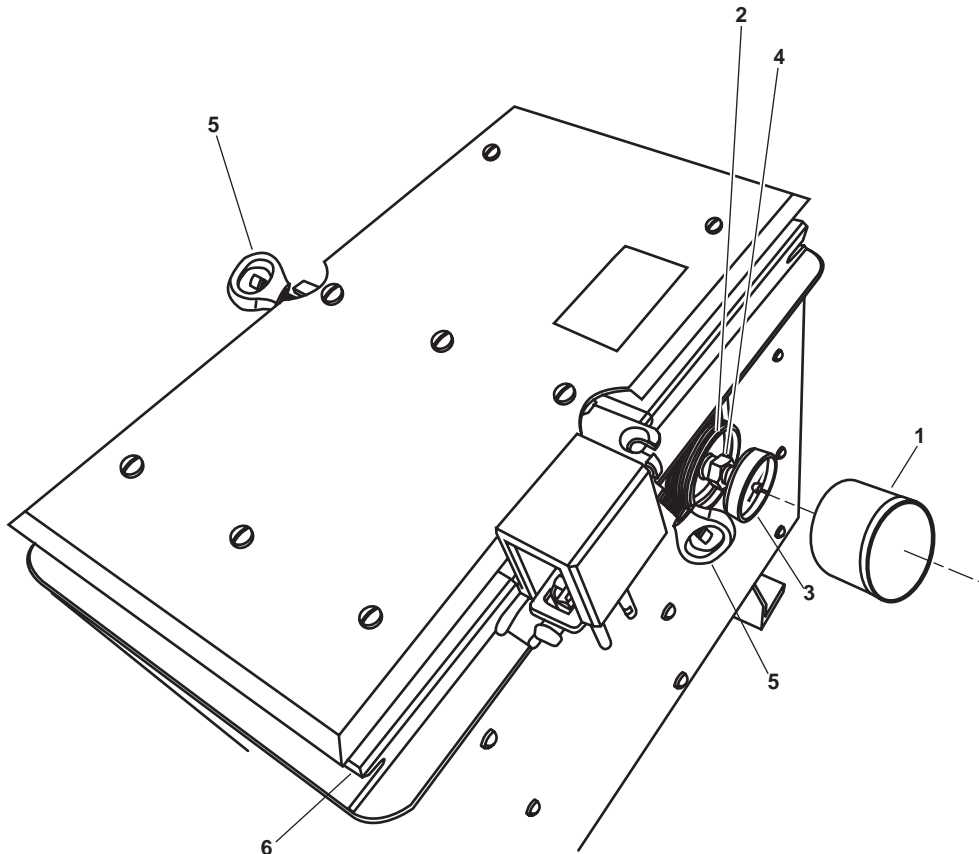
**Equipment Conditions:**

Ammunition locker empty with the high security lock  
removed.

---

**THERMOMETER REPLACEMENT****REMOVAL**

1. Remove the cover (figure 1, item 1) from the thermometer housing (figure 1, item 2).
2. Remove the thermometer (figure 1, item 3) from the thermometer housing (figure 1, item 2).



**Figure 1. Ammunition Locker Thermometer**

## INSTALLATION

1. Adjust the jam nut (figure 1, item 4) on the thermometer (figure 1, item 3) as necessary to prevent the cover (figure 1, item 1) from damaging the thermostat when it is installed in the thermometer housing (figure 1, item 2).
2. Install the thermometer (figure 1, item 3) into the thermometer housing (figure 1, item 2).
3. Install the cover (figure 1, item 1) on the thermometer housing (figure 1, item 2).

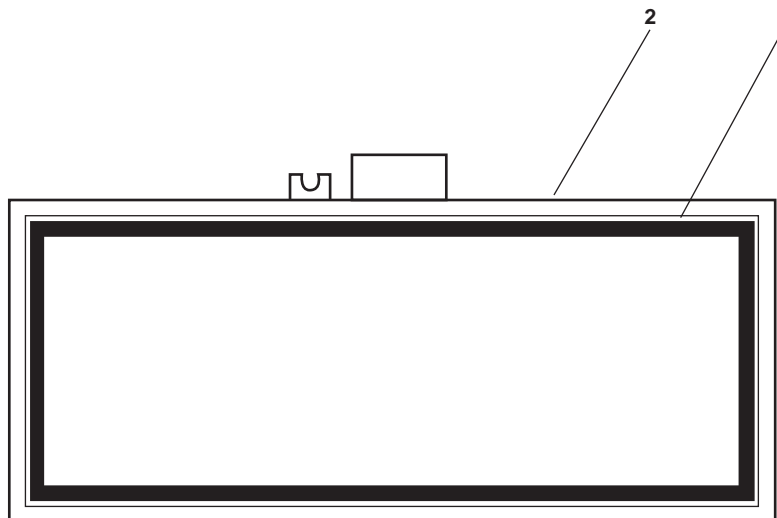
## GASKET REPLACEMENT

### REMOVAL



**Wire brushing operations produce high velocity flying debris which can become lodged in the skin or in the eyes. Wire brushing in confined spaces can result in debris flying from unexpected directions. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing grinding, needling and chipping operations. Failure to comply can result in death or serious injury to personnel.**

1. Loosen the dogs (figure 1, item 5) and open the lid (figure 1, item 6).
2. Remove the gasket (figure 2, item 1) from the lid (figure 2, item 2).



**Figure 2. Ammunition Locker Gasket**

**INSTALLATION**

1. Fabricate a new gasket (figure 2, item 1) using the old gasket as a template. Discard the old gasket.
2. Clean the gasket area of the lid (figure 2, item 2) with isopropyl alcohol and a clean wiping rag.
3. Apply a light coat of rubber cement in the retainer gasket track of the lid (figure 2, item 2).
4. Install the new gasket (figure 2, item 1) and allow the rubber cement to cure for four hours.
5. Apply a thin coat of silicone compound to the exposed area of the gasket (figure 2, item 1).
6. Close the lid (figure 1, item 6) and secure it with the dogs (figure 1, item 5).
7. Return the ammunition locker to the desired readiness condition.

**END OF WORK PACKAGE**



## **Chapter 6**

# **General Support Maintenance Instructions for Inland and Coastal Large Tug (LT)**



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
REDUCTION GEAR COOLING PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protection (Item 36, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Grease, General Purpose (Item 75, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Gasket, (Item 5, Figure 11, WP 0297 00)  
Seal, Assembly, Shaft (Item 3, Figure 11, WP 0297 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

FM 55-502  
TB 43-0218  
TM 55-1925-273-10  
WP 0097 00 (volume 1)  
WP 0295 00  
WP 0297 00  
WP 0307 00

**Equipment Conditions:**

Reduction gear cooling pump removed (WP 0097 00, volume 1).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**DISASSEMBLY****NOTE**

Disassemble the reduction gear cooling pump only as far as required to perform the maintenance work needed.

**WARNING**



**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

1. Drain the reduction gear cooling pump. Flush with clean water if necessary.

- Using dry cleaning solvent, clean exterior surfaces of the unit. Inspect all component parts for unusual wear or damage, and replace as required.

**WARNING**



Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

- Remove the drain plugs (figure 1, item 1) from the volute (figure 1, item 2).

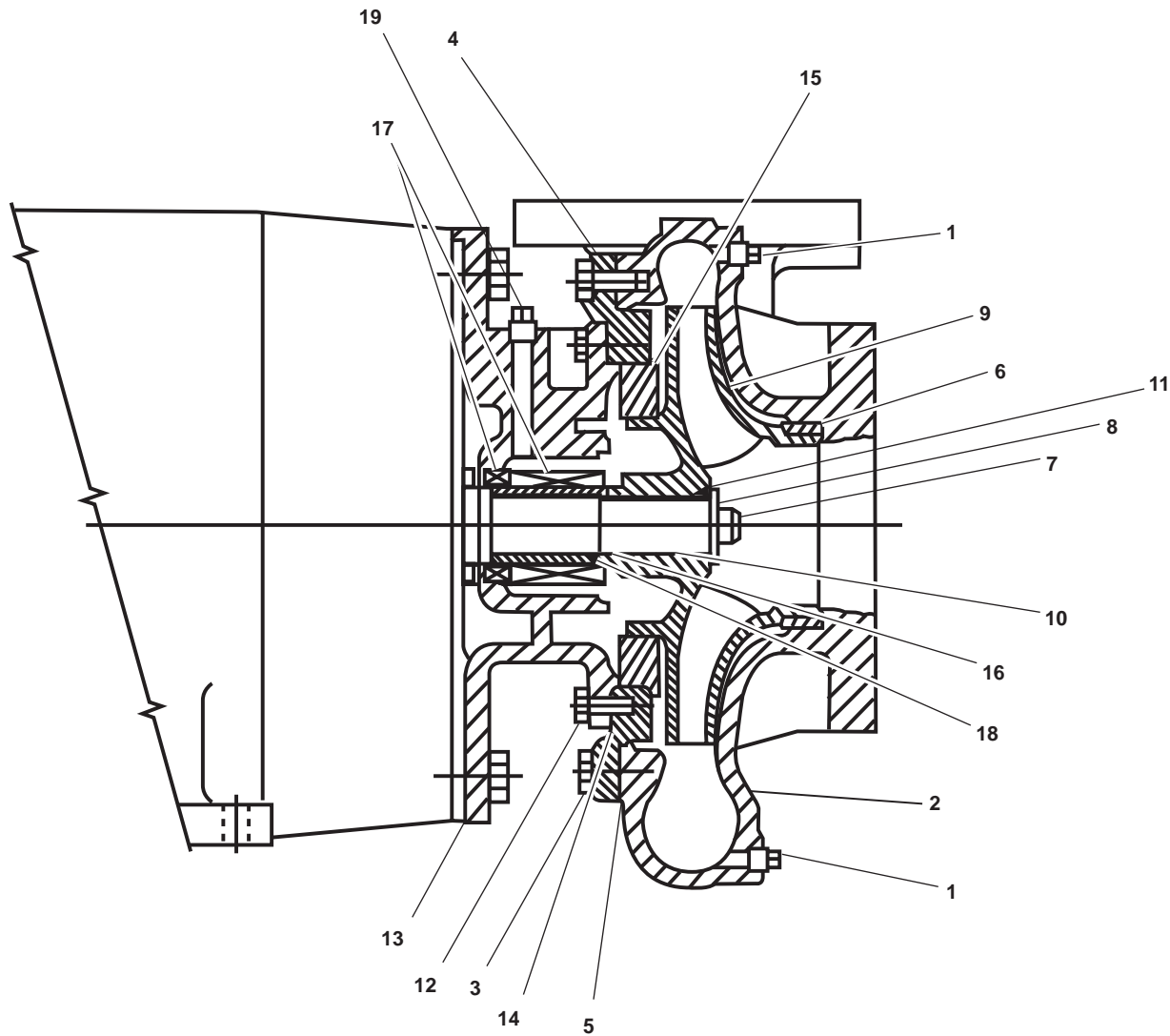


Figure 1. Reduction Gear Cooling Pump



4. Remove the cap screws (figure 1, item 3) securing the backplate (figure 1, item 4) to the volute (figure 1, item 2). Separate the volute from the backplate.
5. Remove the gasket (figure 1, item 5) from the volute (figure 1, item 2). Discard the gasket.
6. Remove the front plate wear ring (figure 1, item 6) from the volute (figure 1, item 2). Discard the front plate wear ring.
7. Remove the impeller screw (figure 1, item 7) and the impeller washer (figure 1, item 8).
8. Remove the impeller (figure 1, item 9) from the shaft (figure 1, item 10). Remove the key (figure 1, item 11) from the impeller.
9. Remove the cap screws (figure 1, item 12) securing the backplate (figure 1, item 4) to the bracket (figure 1, item 13). Separate the backplate from the bracket.
10. Remove the gasket (figure 1, item 14) from the backplate (figure 1, item 4). Discard the gasket.
11. Remove the rear case wear ring (figure 1, item 15) from the backplate (figure 1, item 4). Discard the rear case wear ring.
12. Remove the snap ring (figure 1, item 16) from the shaft (figure 1, item 10). Discard the snap ring.
13. Remove the shaft seal assembly (figure 1, item 17) from shaft (figure 1, item 10). Discard the shaft seal assembly.
14. Remove the sleeve (figure 1, item 18) from the shaft (figure 1, item 10).
15. Remove the stuffing box plug (figure 1, item 19) from the bracket (figure 1, item 13).

## ASSEMBLY

### WARNING



**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

1. Using dry cleaning solvent, clean the disassembled parts of the unit before assembly.
2. Install the stuffing box plug (figure 1, item 19) in the bracket (figure 1, item 13).
3. Install the shaft sleeve (figure 1, item 18) over the shaft (figure 1, item 10).
4. Install the new shaft seal assembly (figure 1, item 17) on the shaft (figure 1, item 10).
5. Install a new snap ring (figure 1, item 16) on the shaft (figure 1, item 10).
6. Install the new rear case wear ring (figure 1, item 15) on the backplate (figure 1, item 4).

7. Install the new gasket (figure 1, item 14) on the backplate (figure 1, item 4).
8. Install the backplate (figure 1, item 4) on the bracket (figure 1, item 13). Install the cap screws (figure 1, item 12) in the backplate. Tighten the cap screws.
9. Install the key (figure 1, item 11) in the impeller (figure 1, item 9). Install the impeller (figure 1, item 9) on the shaft (figure 1, item 10).
10. Install the impeller washer (figure 1, item 8) and the impeller screw (figure 1, item 7) to secure the impeller. Tighten the impeller screw.
11. Install the new front plate wear ring (figure 1, item 6) on the volute (figure 1, item 2).
12. Install the new gasket (figure 1, item 5) on the volute (figure 1, item 2). Lower the volute over the backplate (figure 1, item 4).
13. Install the cap screws (figure 1, item 3) securing the volute (figure 1, item 13) to the bracket (figure 1, item 2). Tighten the cap screws.
14. Install the drain plugs (figure 1, item 1) in the volute (figure 1, item 2). Tighten the drain plugs.
15. Install the reduction gear cooling pump (WP 0097 00, volume 1).
16. Remove the lockouts and tagouts (FM 55-502).
17. Place the reduction gear cooling pump online (TM 55-1925-273-10) and check for leakage and proper operation.

**END OF WORK PACKAGE**

---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ENGINE EXHAUST SYSTEM, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Goggles Industrial (Item 35, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protection (Item 36, Table 2, WP 0307 00)  
Gloves, Leather (Item 37, Table 2, WP 0307 00)  
Faceshield, Industrial (Item 38, Table 1, WP 0295 00)  
Suitable Drain Pan

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Tag, Danger (Item 174, Table 1, WP 0307 00)  
Tape, Antiseizing (Item 175, Table 1, WP 0307 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

FM 55-502  
MIL-STD-769  
S9086-VH-STM-010/CH-635  
TM 55-1925-273-10  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

For starboard main engine, CLOSE valve CA-9, STG AIR TO ME #1. Lock out and tag out (FM 55-502).  
For port engine, CLOSE valve CA-8, STG AIR TO ME #2. Lock out and tag out (FM 55-502).

---

**AIR BOX DRAIN VALVE REPLACEMENT****REMOVAL**

1. Place a suitable drain pan under the air box drain valve (figure 1, item 1).
2. Remove the lower drain pipe (figure 1, item 2) from the air box drain valve (figure 1, item 1).
3. Remove the air box drain valve (figure 1, item 1) from the upper drain pipe (figure 1, item 3).

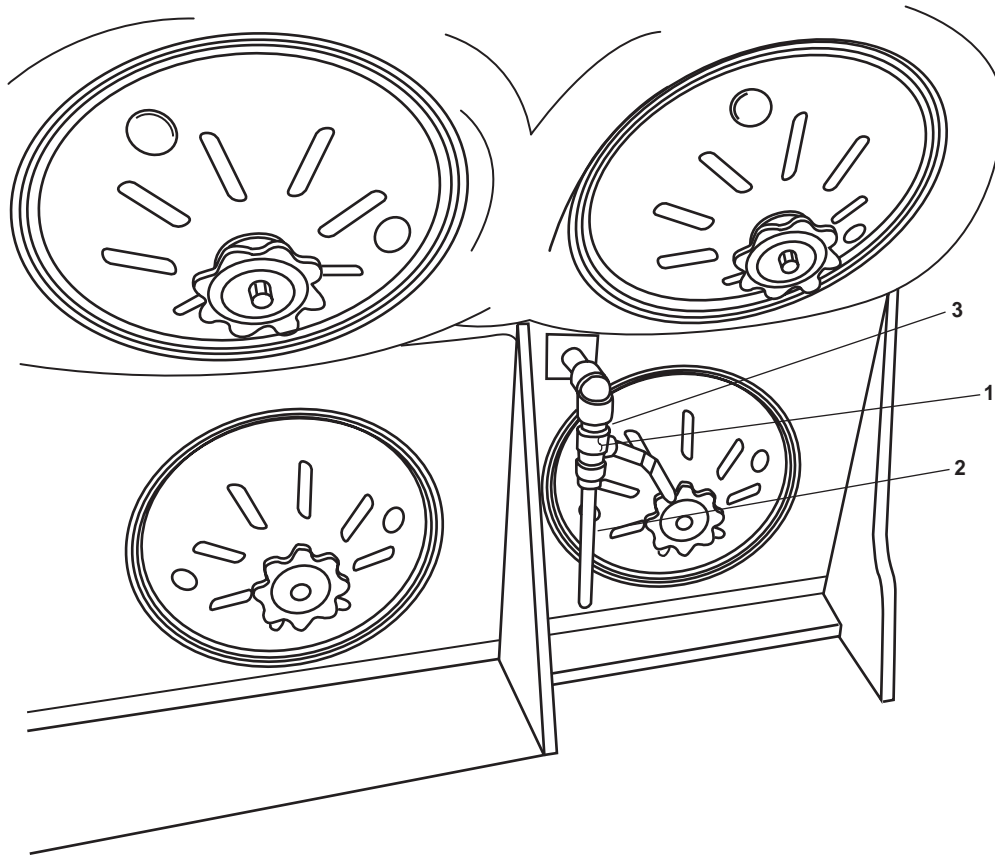


Figure 1. Air Box Drain Valve (Typical)

## INSTALLATION

### WARNING



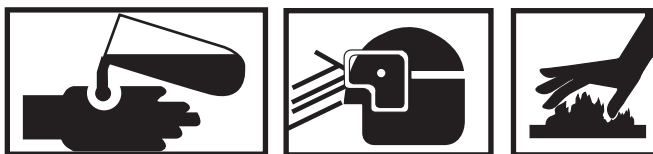
**Wire brushing operations produce high velocity flying debris, which can become lodged in the skin or in the eyes. Wear protective eyewear, gloves, and long sleeves when performing wire brushing operations. Failure to comply can result in serious injury or death to personnel.**

1. Using a wire brush, clean the remnants of antiseizing tape from the male thread connections of both the upper drain pipe (figure 1, item 3) and the lower drain pipe (figure 1, item 2).

**WARNING**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

2. Apply antiseizing tape to the male pipe threads of the upper drain pipe (figure 1, item 3).
3. Install the air box drain valve (figure 1, item 1) onto the upper drain pipe (figure 1, item 3).
4. Apply antiseizing tape to the male pipe threads of the lower drain pipe (figure 1, item 2).
5. Install the lower drain pipe (figure 1, item 2) into the air box drain valve (figure 1, item 1).
6. Perform the Follow-On Service procedure at the end of this work package.

**INSULATION REPLACEMENT****WARNING**

**Loose-fitting, long-sleeved, and long-legged clothing is recommended to prevent irritation. Gloves are also recommended. Skin irritation cannot occur if there is no contact with the skin. Failure to comply can result in death or serious injury.**

**Always wear heavy leather gloves when handling hot engine components. Handling hot engine components with bare hands or skin may result in severe burns. Failure to comply can result in death or serious injury.**

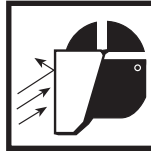
**NOTE**

1. Refer to MIL-STD-769 and S9086-VH-STM-010/CH-635 for repair and replacement of insulation. All insulation replacement must be conducted in accordance with these publications.
2. Perform the Follow-On Service procedure at the end of this work package.

---

**FOLLOW-ON SERVICE**

1. Remove the lockouts and tagouts (FM 55-502).

**WARNING**

**Use protective goggles, faceshield, and necessary precautions to avoid personal injury. Ensure that the valve is in the open position before applying any fluid pressure. Sudden pressurization may rupture the new valve. Failure to comply can result in death or serious injury.**

2. Operate the affected main engine (TM 55-1925-273-10).
3. Cycle air box drain valve (figure 1, item 1) from CLOSED to OPEN several times while observing connections for leakage. Ensure that the air box drains when the valve is OPEN. There shall be no leakage when the air box drain valve is CLOSED.

**END OF WORK PACKAGE**

---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEWAGE DISCHARGE PUMP, REPAIR**

---

**Initial Setup:****Tools and Special Tools:**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0295 00)  
 Threading Set, Screw (Item 31, Table 2, WP 0295 00)  
 Drill, Electric, Portable, 1/2" (Item 32, Table 2, WP 0295 00)  
 Drill Set, Twist (Item 33, Table 2, WP 0295 00)  
 Drill Set, 1/2" - 1" (Item 34, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 2, WP 0295 00)

**Personnel Required:**

One Machinist, 44E

**References:**

WP 0283 00  
 WP 0295 00

**Equipment Conditions:**

Sewage discharge pump disassembled (WP 0283 00)

---

**MACHINING REPAIRS**

Due to replacement part availability, expediency of repair, and other factors, it may sometimes be necessary to repair existing pump components rather than replacing them. For example, a pump shaft may be worn in the seal area, but otherwise serviceable. If a new pump shaft is unavailable, or if the unit must be returned to service with minimal down time, it may be possible to build up and re-machine the worn shaft area. The same holds true for volutes, housings, and impeller wear ring seats.

Always confer with the work center supervisor before performing machining repairs to determine the proper course of action and to determine the feasibility of the repair. No matter what form of machining repairs will be accomplished, ensure that the repairs conform to standard machine shop practices and procedures and all applicable regulations.

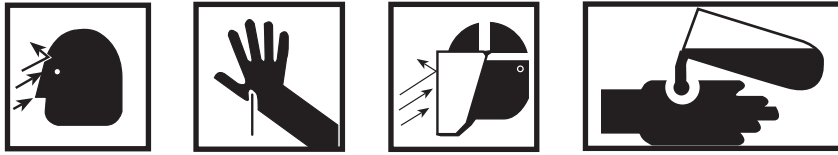
**THREAD REPAIR**

Damaged female threads may be replaced by installing thread inserts. The procedure below describes this process.

**NOTE**

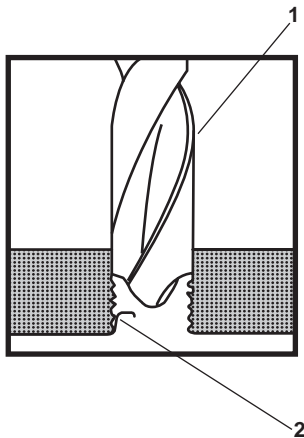
The size of the holes drilled and tapped will vary depending upon the size of the insert used.

1. Select the proper size thread insert. The proper size thread insert should have the same size female threads as the fastener that will thread into it.
2. Measure the external thread size and pitch of the thread insert selected in step 1 above.
3. Select the tap that corresponds to the external thread size and pitch of the insert selected in step 1 above. Also select the proper size drill bit (figure 1, item 1) for use with the tap.

**WARNING**

**Drilling operations produce high velocity flying debris, which can become lodged in the skin or in the eyes. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing drilling operations. Failure to comply can result in serious injury to personnel.**

4. Drill out the damaged threads (figure 1, item 2) using the drill bit (figure 1, item 1) selected in step 3 above. Chamfer the hole with a standard countersink (82° to 100°).
5. Tap new threads in the hole using the tap (figure 2, item 1) selected in step 3 above.
6. Thread the insert (figure 3, item 1) into the new threads until the top of the insert is slightly below the surface.
7. Drive down the keys (figure 3, item 2; figure 4, item 1) using the insert's installation tool (figure 4, item 2) or a round, flat driver. The keys should be flush with the surface (figure 4, item 3).
8. Thread a fastener of the desired thread size and pitch into the insert to ensure that the insert is installed properly.



**Figure 1. Removing Old Threads**



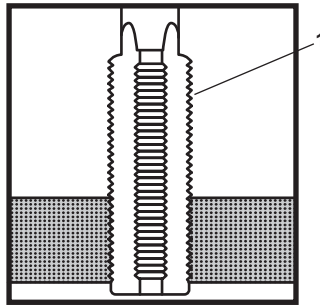


Figure 2. Tapping New Threads

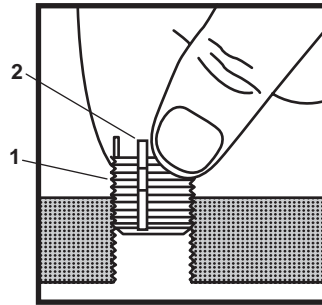


Figure 3. Installing the Insert

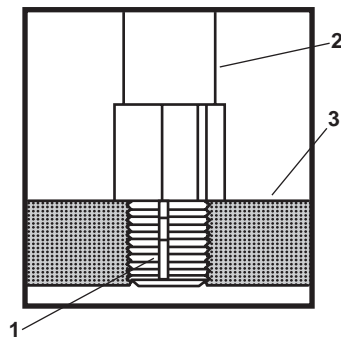


Figure 4. Drive Down the Keys

END OF WORK PACKAGE



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEWAGE DISCHARGE PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Torque Wrench (0-250 FT-LB) (Item 4, Table 2, WP 0295 00)  
 Press, Arbor (Item 8, Table 2, WP 0295 00)  
 Durco Tool Kit (Item 15, Table 2, WP 0295 00)  
 Gloves, Chemical and Oil Protection (Item 36, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 2, WP 0295 00)  
 Faceshield, Industrial (Item 38, Table 2, WP 0295 00)  
 Suitable Drain Pan

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
 Layout Dye (Item 92, Table 1, WP 0307 00)  
 Lubricating Oil, Engine (Item 104, Table 1, WP 0307 00)  
 Sealing Compound (Item 153, Table 1, WP 0307 00)  
 Bearing, Inboard (Item 5, Figure 82, WP 0304 00)

**Materials/Parts (continued):**

Bearing, Outboard (Item 4, Figure 82, WP 0304 00)  
 Gasket, Casing Cover (Item 8, Figure 82, WP 0304 00)  
 Gasket, Impeller (Item 7, Figure 82, WP 0304 00)  
 Seal, Oil, Inboard (Item 6, Figure 82, WP 0304 00)  
 Seal, Oil, Outboard (Item 9, Figure 82, WP 0304 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**Reference:**

TB 43-0218  
 WP 0261 00  
 WP 0295 00  
 WP 0307 00

**Equipment Conditions:**

Pump end removed (WP 0261 00)

**DISASSEMBLY**

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

1. Place a suitable drain pan under the pump's drain plug (figure 1, item 1). Remove the drain plug and drain all oil from the pump.
2. Remove the vent plug (figure 1, item 2) from the bearing housing (figure 1, item 3).
3. Remove the eight casing nuts (figure 1, item 4) securing the bearing housing adapter (figure 1, item 5) to the pump casing (figure 1, item 6).
4. Separate the bearing housing adapter (figure 1, item 5) from the pump casing (figure 1, item 6) and remove the rear cover gasket (figure 1, item 7). Discard the rear cover gasket.
5. Install the impeller wrench onto the shaft (figure 1, item 8) and the key (figure 1, item 9).

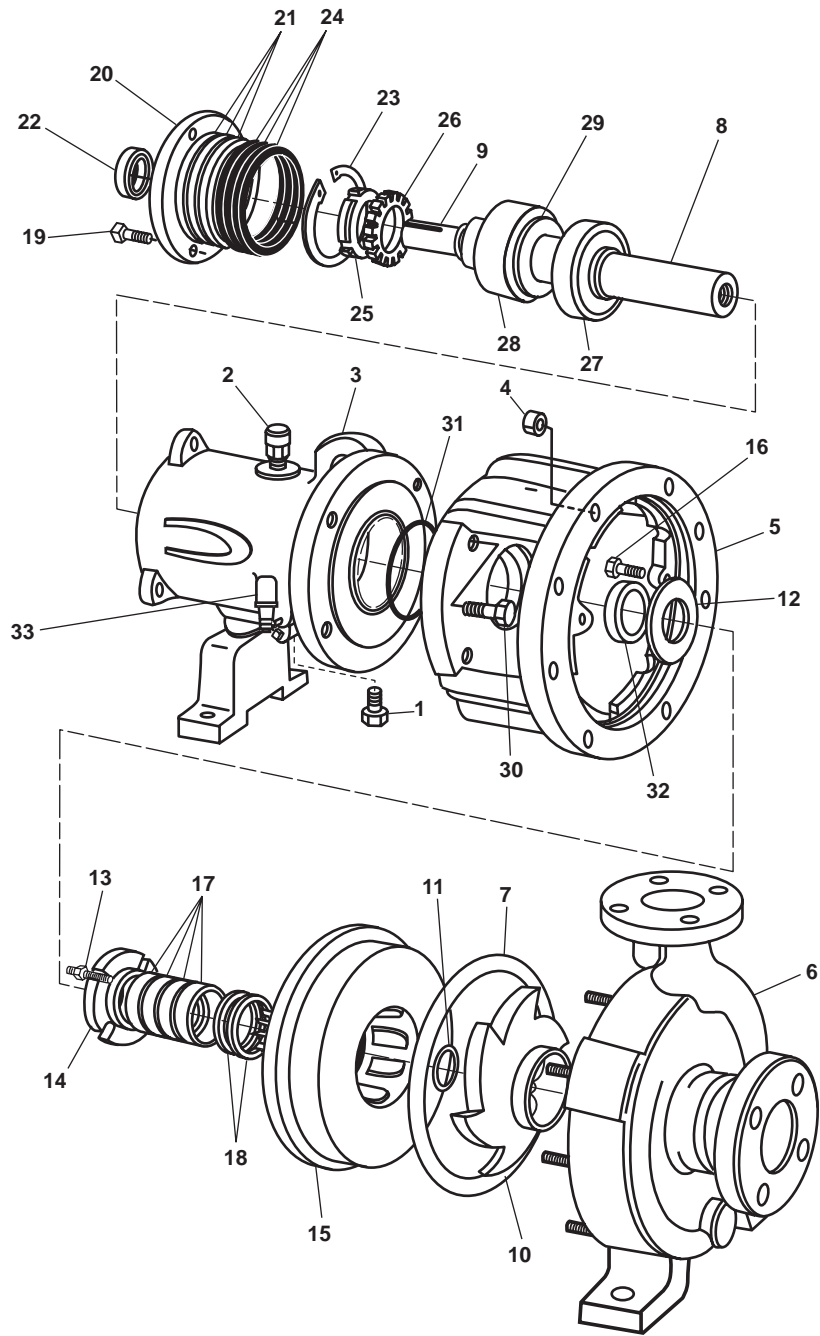


Figure 1. Sewage Discharge Pump Assembly

**WARNING**

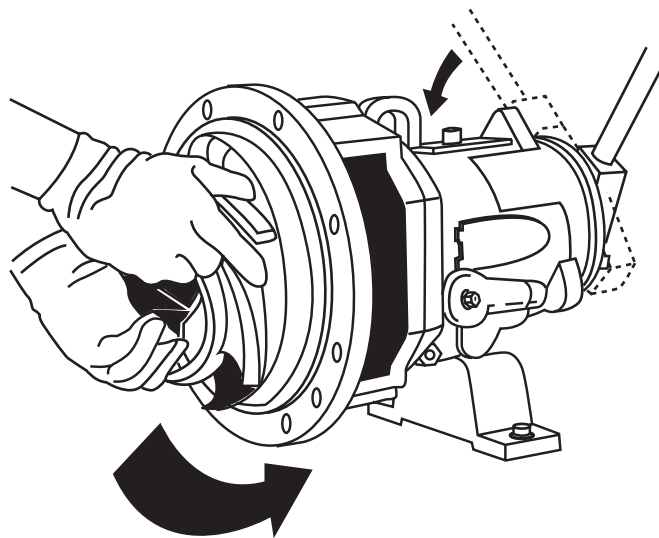
**The impeller could have sharp edges, wear leather gloves to protect hands when removing the impeller. Personal injury or death could result.**

**Do not apply heat to the impeller to loosen it from the shaft. Liquid inside the impeller might cause an explosion causing injury or death.**

**NOTE**

It may take several attempts using this method before the impeller is loosened.

6. Turn the impeller (figure 1, item 10) in the clockwise direction and move the impeller wrench in the 11:00 o'clock position. Quickly spin the impeller in the counterclockwise position causing the impeller wrench to impact the hard surface of the workbench. Refer to figure 2.
7. Unscrew the impeller (figure 1, item 10) and remove it from the shaft (figure 1, item 8).
8. Remove the impeller gasket (figure 1, item 11) from the shaft (figure 1, item 8). Discard the impeller gasket.
9. Remove the inboard deflector (figure 1, item 12) from the bearing housing adapter (figure 1, item 5).
10. Remove the four nuts (figure 1, item 13) securing the gland (figure 1, item 14). Slide the gland away from the rear cover plate (figure 1, item 15).
11. Install the brass shaft guide onto the shaft (figure 1, item 8).
12. Remove the two cap screws (figure 1, item 16) securing the rear cover plate (figure 1, item 15) to the bearing housing adapter (figure 1, item 5).



**Figure 2. Impeller Removal.**

13. Slowly separate the rear cover plate (figure 1, item 15) from the bearing housing adapter (figure 1, item 5) and slide the rear cover plate off the shaft (figure 1, item 8).
14. Remove the packing set (figure 1, item 17) from the rear cover plate (figure 1, item 15). Discard the packing set.

#### NOTE

Do not discard the lantern rings.

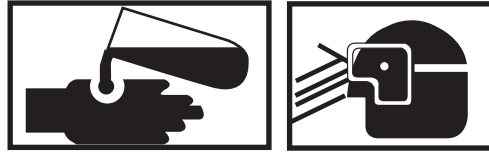
15. Remove the two lantern rings (figure 1, item 18) from the rear cover plate (figure 1, item 15).
16. Remove the brass shaft guide from the shaft (figure 1, item 8).
17. Loosen the three bolts (figure 1, item 19) securing the bearing carrier (figure 1, item 20). Remove the bearing carrier.
18. Remove the bearing carrier gaskets (figure 1, item 21) from the bearing carrier (figure 1, item 20). Discard the gaskets.
19. Remove the outboard oil seal (figure 1, item 22) from the bearing carrier (figure 1, item 20). Discard the outboard oil seal.
20. Remove the bearing snap ring (figure 1, item 23) using snap pliers. Discard the snap ring.
21. Remove and retain the shims (figure 1, item 24) from the bearing housing (figure 1, item 3).
22. Remove the bearing lock nut (figure 1, item 25) and the bearing lockwasher (figure 1, item 26). Discard the bearing lock washer.
23. Remove the shaft (figure 1, item 8) from the bearing housing (figure 1, item 3).

#### CAUTION

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

24. Remove the inboard bearing (figure 1, item 27), the outboard bearing (figure 1, item 28), and the slinger (figure 1, item 29) from the shaft (figure 1, item 8), using an arbor press.
25. Remove the four cap screws (figure 1, item 30) securing the bearing housing (figure 1, item 3) to the bearing housing adapter (figure 1, item 5). Separate the bearing housing and the bearing housing adapter.
26. Remove the O-ring (figure 1, item 31) from the bearing housing (figure 1, item 3). Discard the O-ring.
27. Remove the inboard oil seal (figure 1, item 32) from the inner race of the bearing housing adapter (figure 1, item 5). Discard the inboard oil seal.
28. Remove the Trico oil gauge (figure 1, item 33) from the bearing housing (figure 1, item 3).

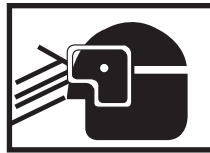
## CLEAN AND INSPECT

**WARNING**

**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in death or serious injury.**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

1. Using cleaning solvent, clean all the metal parts.
2. Check for any binding, scoring, or galling, or rough rotation on the inboard bearings (figure 1, items 27) and the outboard bearings (figure 1, item 28). Inspect all component parts for unusual wear or damage, and replace as required.

**WARNING**

**Do not exceed 25 lb/in<sup>2</sup> (1,7 bar) nozzle pressure when using compressed air to dry parts. Wear goggles for eye protection. Do not direct air stream toward self or other personnel. Failure to comply can result in injury or death.**

**⚠ CAUTION**

Do not permit the ball bearings to free spin in the bearing race as the bearing is being subjected to the compressed air. Bearing failure will result.

3. Direct a stream of compressed air at the bearings (figure 1, items 27 and 28) to blow out any debris.

**ASSEMBLY**

1. Install a new inboard oil seal (figure 1, item 32) into the inner race of the bearing housing adapter (figure 1, item 5).
2. Install a new O-ring (figure 1, item 31) into the bearing housing (figure 1, item 3).
3. Connect the bearing housing (figure 1, item 3) and the bearing housing adapter (figure 1, item 5). Install the four cap screws (figure 1, item 30) securing the bearing housing to the bearing housing adapter.

4. Put layout dye onto shaft (figure 1, item 8) then scribe a line in the layout dye for the location of new inboard bearing (figure 1, item 27). Refer to figure 3.
5. Install a new slinger (figure 1, item 29) using an arbor press.

**⚠ CAUTION**

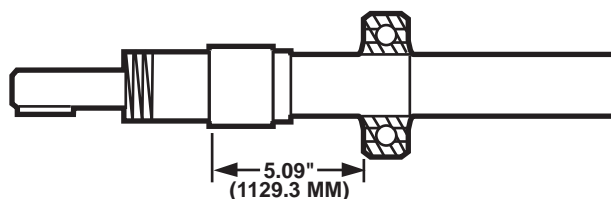
Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

6. Press the new inboard bearing (figure 1, item 27) onto the shaft (figure 1, item 8) using an arbor press, aligning the edge of the inner race of the new inboard bearing with the scribed line.

**⚠ CAUTION**

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

7. Press the new outboard bearing (figure 1, item 28) onto the shaft (figure 1, item 8) up to the shoulder of the shaft using an arbor press. Refer to figure 3.
8. Install a new bearing lockwasher (figure 1, item 26) and the bearing lock nut (figure 1, item 25). Tighten the bearing lock nut and engage the lock washers tangs into the locknut's slots.
9. Apply a coat of lubricating oil on the shaft (figure 1, item 8), the inboard bearing (figure 1, item 27) and the outboard bearings (figure 1, item 28), the inside of the bearing housing (figure 1, item 3) and slide the shaft (figure 1, item 8) into the rear of the bearing housing.
10. Install three new set bolts (figure 1, item 21) into the bearing carrier (figure 1, item 20). Tighten the set bolts.
11. Install the brass shaft guide onto the shaft (figure 1, item 8).
12. Install the new inboard deflector (figure 1, item 12).
13. Install the impeller gasket (figure 1, item 11) onto the shaft (figure 1, item 8).
14. Install the gland (figure 1, item 14) onto the shaft (figure 1, item 8).
15. Slide the rear cover plate (figure 1, item 15) over the brass shaft guide and onto the shaft (figure 1, item 8) up to the bearing housing adapter (figure 1, item 5).
16. Install the two cap screws (figure 1, item 16) securing the rear cover plate (figure 1, item 15) to the bearing housing adapter (figure 1, item 5). Tighten the two cap screws to the torque of 40 lb-ft (54 N-m).



**Figure 3. Bearing Positioning**



**WARNING**

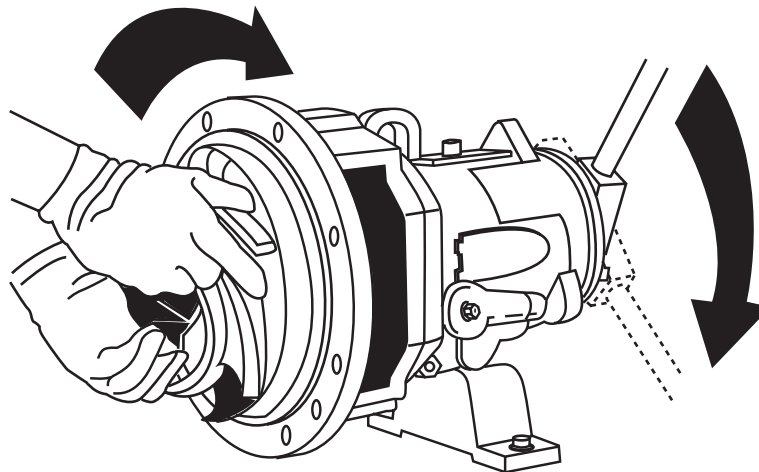
**The impeller could have sharp edges, wear leather gloves to protect hands when removing the impeller. Personal injury or death could result.**

17. Screw the impeller (figure 1, item 10) onto the shaft (figure 1, item 8) until it is firmly against the shaft's shoulder.

**CAUTION**

Do not attempt to tighten the impeller on the shaft by hitting the impeller with a hammer or any other object or by inserting a pry bar between the impeller vanes. Serious damage to the impeller may result from such actions.

18. Install the impeller wrench over the shaft (figure 1, item 8) and the key (figure 1, item 9).
19. Grab the impeller (figure 1, item 10) in both hands, with the impeller wrench handle to the left, spin the impeller forcefully in a clockwise direction to impact the impeller wrench handle on the work surface to the right.
20. Determine the proper clearance using the table 1.
21. Measure the clearance between the impeller (figure 1, item 10) and the rear cover plate (figure 1, item 15) and record the distance.
22. Subtract the desired clearance from the recorded measurement. Select shims (figure 1, item 24) to equal the sum of the subtracted measurement.



**Figure 4. Tightening The Impeller**

**Table 1. Impeller Clearance Settings**

Temperature – °F (°C)	Clearance to casing – in (mm)
200 (93)	0.018 ± 0.003 (0.46 ± 0.08)
200 to 250 (93 to 121)	0.021 (0.53)
251 to 300 (122 to 149)	0.024 (0.61)
301 to 350 (150 to 176)	0.027 (0.69)
351 to 400 (177 to 204)	0.030 (0.76)
401 to 450 (205 to 232)	0.033 (0.84)
450 (232)	0.036 (0.91)

23. Remove the three set bolts (figure 1, item 21) securing the bearing carrier (figure 1, item 20). Remove the bearing carrier .

**NOTE**

Install the thinnest shims first.

24. Install the shims (figure 1, item 24) between the new bearing snap ring (figure 1, item 23) and the bearing housing (figure 1, item 3). Install the new bearing snap ring.
25. Install the outboard oil seal (figure 1, item 22) into the bearing carrier (figure 1, item 20).
26. Install the three set bolts (figure 1, item 19) into the bearing carrier (figure 1, item 20). Tighten the set bolts.
27. Recheck the clearance between the impeller (figure 1, item 10) and the rear cover plate (figure 1, item 15).
28. Measure the thickness of the new bearing snap ring (figure 1, item 23) and the shims (figure 1, item 24). The bearing carrier gaskets (figure 1, item 21) should equal 1 1/2 times the new snap ring and the shim stack.
29. Apply sealing compound between each new bearing carrier gasket (figure 1, item 22).
30. Place the new bearing carrier gaskets (figure 1, item 21) stack inside the bearing carrier (figure 1, item 20).
31. Install the bearing carrier (figure 1, item 20) onto the bearing housing (figure 1, item 3). Tighten the three set bolts (figure 1, item 21) 30 lb-ft (41 N·m).
32. Install the two lantern rings into the rear cover plate (figure 1, item 15). Push the two lantern rings snug down into the rear cover plate using the gland (figure 1, item 14).
33. Install the new packing set (figure 1, item 17) into the rear cover plate. Push the new packing set snug down into the rear cover plate using the gland (figure 1, item 14).
34. Install the gland (figure 1, item 14) into the rear cover plate (figure 1, item 15).
35. Install the four nuts (figure 1, item 13) securing the gland (figure 1, item 14). Tighten the four nuts to 5 lb-ft (6.8 N·m).
36. Install the rear cover gasket (figure 1, item 7) onto the outer race of the rear cover plate (figure 1, item 15).
37. Place the bearing housing adapter (figure 1, item 5) and the pump casing (figure 1, item 6) together.

**NOTE**

The casing nuts are non-lubricated.

38. Install the eight casing nuts (figure 1, item 4) securing the bearing housing adapter (figure 1, item 5) to the pump casing (figure 1, item 6). Tighten the eight casing nuts to a torque of 15 lb-ft (20 N·m).
39. Install the vent plug (figure 1, item 2) into the bearing housing (figure 1, item 3).
40. Install the Trico oil gauge (figure 1, item 33) into the bearing housing (figure 1, item 3).
41. Install the drain plug (figure 1, item 1) into the bearing housing. Tighten the drain plug.

 **CAUTION**

Do not place the pump online before filling the bearing house adapter with oil. Damage to the pump will occur.

42. Fill the bearing housing adapter (figure 1, item 3) to the center of the oil sight glass with lubrication oil.

**END OF WORK PACKAGE**



**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
SEWAGE DISCHARGE PUMP, ELECTRIC MOTOR; REPAIR**

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Lubricating Gun, Hand (Item 25, Table 2, WP 0295 00)  
Puller, Mechanical; Gear and Bearing (Item 27, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Grease, Ball and Roller Bearing (Item 71, Table 1, WP 0307 00)

**Materials/Parts (continued):**

Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Sealing Compound, Loctite 242 (Item 155, Table 1, WP 0307 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

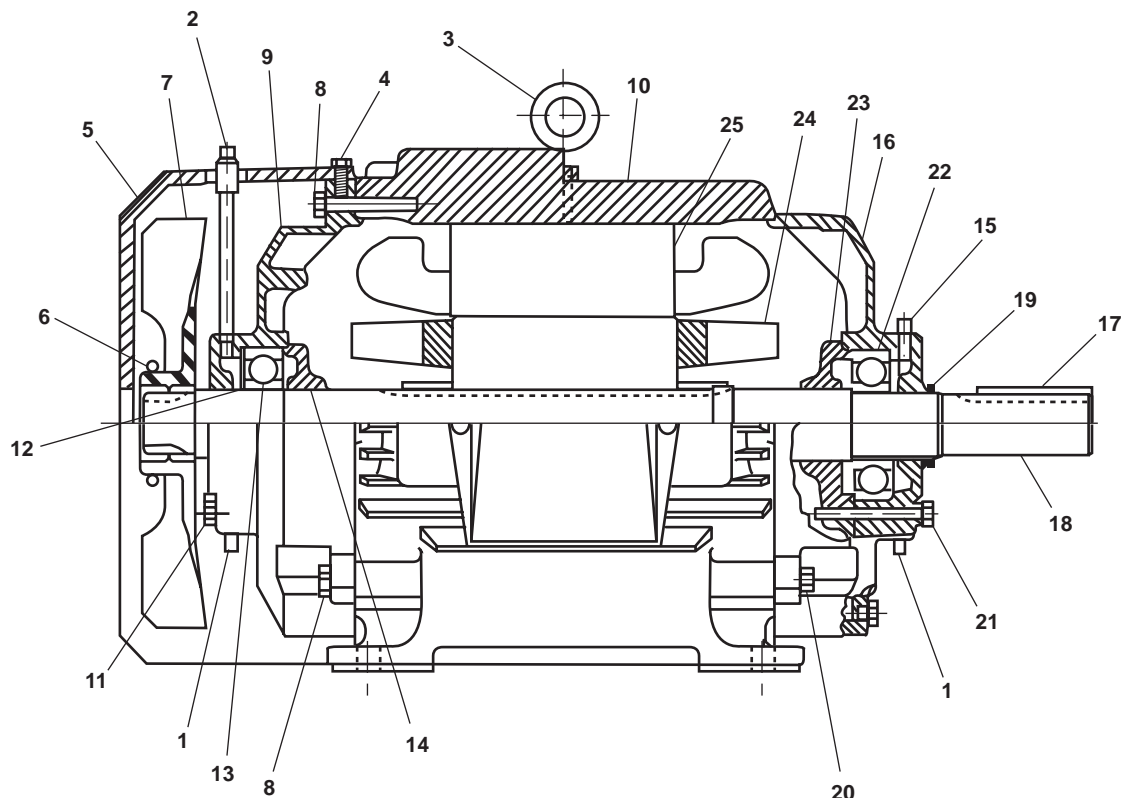
FM 55-502  
WP 0162 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

Electric motor removed (WP 0162 00, volume 1).

**DISASSEMBLY**

1. Remove the two grease drains (figure 1, item 1). Remove the grease fitting (figure 1, item 2).
2. Remove the eye bolt (figure 1, item 3).



**Figure 1. Sewage Discharge Pump Electric Motor**

3. Remove the two fan cover bolts (figure 1, item 4). Remove the fan cover guard (figure 1, item 5).
4. Remove the fan clamp (figure 1, item 6) from the cooling fan (figure 1, item 7). Remove the cooling fan.
5. Remove the four bolts (figure 1, item 8) from the front end bracket (figure 1, item 9). Separate the front end bracket from the frame (figure 1, item 10).
6. Remove the two bolts (figure 1, item 11) from the front end bracket (figure 1, item 9).
7. Separate the front end bracket (figure 1, item 9) from the frame (figure 1, item 10).

 **CAUTION**

Use care to keep pressure around the bearing's outer race equal. Damage to the bearing can result.

8. Remove the wave washer (figure 1, item 12) from the front end bracket (figure 1, item 9). Remove the bearing (figure 1, item 13) using a bearing puller.
9. Remove the front end inner cap (figure 1, item 14).
10. Remove the back end grease fitting (figure 1, item 15) from the back end bracket (figure 1, item 16).
11. Remove the key (figure 1, item 17) from the shaft (figure 1, item 18) keyway.
12. Remove the slinger (figure 1, item 19) from the shaft (figure 1, item 18).
13. Remove the four bolts (figure 1, item 20) securing the back end bracket (figure 1, item 16). Separate the back end bracket from the frame (figure 1, item 10).
14. Remove the two bolts (figure 1, item 21) from the back end bracket (figure 1, item 16).

 **CAUTION**

Use care to keep pressure around the bearing's outer race equal. Damage to the bearing can result.

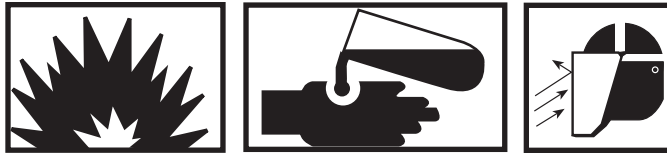
15. Remove the back end bearing (figure 1, item 22) using a bearing puller.
16. Remove the back end inner cap (figure 1, item 23) from the shaft (figure 1, item 18).

**NOTE**

Do not remove the stator from the frame.

17. Remove the shaft (figure 1, item 18) and the rotor (figure 1, item 24) from the frame (figure 1, item 10).

## CLEANING AND INSPECTION

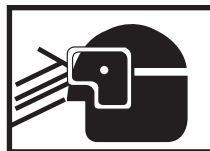
**WARNING**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

**⚠ CAUTION**

Do not allow the dry cleaning solvent to come in contact with the stator. Dry cleaning solvent may cause the stator to corrode.

1. Using cleaning solvent, clean the outside of the fan cover (figure 1, item 5), frame (figure 1, item 10), front end bracket (figure 1, item 9), back end bracket (figure 1, item 16) and bearings (figure 1, items 13 and 22).
2. Check for any binding, scoring, or burrs on the bearings (figure 1, items 13 and 22) and all other removed parts. Inspect all component parts for unusual wear or damage and replace as required.
3. Check the rotor (figure 1, item 24) and stator (figure 1, item 25) for obvious damage.

**WARNING**

**Do not exceed 25 PSI (1.7 bar) nozzle pressure when using compressed air to dry parts. Wear goggles for eye protection. Do not direct air stream toward self or other personnel. Failure to comply can result in death or serious injury.**

**⚠ CAUTION**

Do not permit the ball bearings to free spin in the bearing race as the bearing is being subjected to the compressed air. Bearing failure will result.

4. Direct a stream of compressed air at the bearings (figure 1, items 13 and 22) to blow out any debris.

**ASSEMBLY**

1. Install the shaft (figure 1, item 18), and the rotor (figure 1, item 24) in the frame (figure 1, item 10).
2. Install the back end inner cap (figure 1, item 23) on the shaft (figure 1, item 18).

**WARNING**

**Always wear gloves when handling hot bearings. Handling hot bearings with bare hands or skin may result in severe burns. Failure to comply can result in death or serious injury.**

**CAUTION**

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

3. Heat the back end bearing (figure 1, item 22) to 250 °F (121 °C) in an oven to expand the inner race. Install the back end bearing onto the shaft (figure 1, item 18).
4. Install the two bolts (figure 1, item 21) securing the back end inner cap (figure 1, item 23).
5. Place the back end bracket (figure 1, item 16) on the frame (figure 1, item 10). Install the four bolts (figure 1, item 20) securing the back end bracket. Tighten the bolts.
6. Install the front end inner cap (figure 1, item 14) on the shaft (figure 1, item 18).

**WARNING**

**Always wear gloves when handling hot bearings. Handling hot bearings with bare hands or skin may result in severe burns. Failure to comply can result in death or serious injury.**

7. Heat the front end bearing (figure 1, item 13) to 250 °F (121 °C) in an oven to expand the inner race. Install the front end bearing onto the shaft (figure 1, item 18).
8. Install the two bolts (figure 1, item 11) securing the front inner cap (figure 1, item 14). Install the wave washer (figure 1, item 12) into the front end bracket (figure 1, item 9).
9. Place the front end bracket (figure 1, item 9) on the frame (figure 1, item 10).
10. Install the four bolts (figure 1, item 8) securing the front end bracket (figure 1, item 9) to the frame 10.



11. Install the slinger (figure 1, item 19) on the shaft (figure 1, item 18).
12. Install the key (figure 1, item 17) in the shaft (figure 1, item 18) keyway.
13. Install the cooling fan (figure 1, item 7) on the shaft (figure 1, item 18). Install the fan clamp (figure 1, item 6) securing the cooling fan.
14. Install the fan cover guard (figure 1, item 5). Install the two fan cover bolts (figure 1, item 4). Tighten the fan cover bolts.
15. Install two grease drains (figure 1, item 1). Do not tighten the grease drains at this time.
16. Install the grease fitting (figure 1, item 2) in the front end bracket (figure 1, item 9). Tighten the grease drain and grease fitting.
17. Install the grease fitting (figure 1, item 15) in the back end bracket. Tighten the grease fitting.
18. Install the eye bolt (figure 1, item 3) in the frame (figure 1, item 10). Tighten the eye bolt.

 **CAUTION**

Do not apply grease through the front end or the back end grease fittings with the grease drains closed.

19. Add 5-6 strokes of grease to the grease fittings (figure 1, items 2 and 15) using a hand lubricating gun. Wipe any excess grease from the grease fills using a wiping rag.
20. Apply locktite thread sealant to the threads of the two grease drains (figure 1, item 1). Close and tighten the grease drains.

**END OF WORK PACKAGE**



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BALLAST PUMP, REPAIR**

---

**Initial Setup:****Tools and Special Tools:**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0295 00)  
 Threading Set, Screw (Item 31, Table 2, WP 0295 00)  
 Drill, Electric, Portable, 1/2" (Item 32, Table 2, WP 0295 00)  
 Drill Set, Twist (Item 33, Table 2, WP 0295 00)  
 Drill Set, 1/2" - 1" (Item 34, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 2, WP 0295 00)

**Personnel Required:**

One Machinist, 44E

**References:**

WP 0286 00  
 WP 0295 00

**Equipment Conditions:**

Ballast pump disassembled (WP 0286 00)

---

**MACHINING REPAIRS**

Due to replacement part availability, expediency of repair, and other factors, it may sometimes be necessary to repair existing pump components rather than replacing them. For example, a pump shaft may be worn in the seal area, but otherwise serviceable. If a new pump shaft is unavailable, or if the unit must be returned to service with minimal down time, it may be possible to build up and re-machine the worn shaft area. The same holds true for volutes, housings, and impeller wear ring seats.

Always confer with the work center supervisor before performing machining repairs to determine the proper course of action and to determine the feasibility of the repair. No matter what form of machining repairs will be accomplished, ensure that the repairs conform to standard machine shop practices and procedures and all applicable regulations.

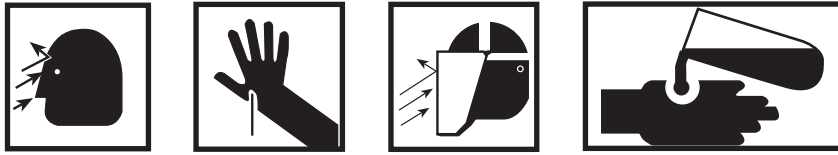
**THREAD REPAIR**

Damaged female threads may be replaced by installing thread inserts. The procedure below describes this process.

**NOTE**

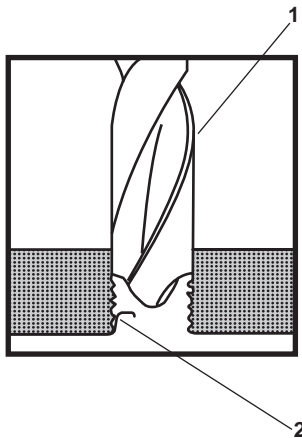
The size of the holes drilled and tapped will vary depending upon the size of the insert used.

1. Select the proper size thread insert. The proper size thread insert should have the same size female threads as the fastener that will thread into it.
2. Measure the external thread size and pitch of the thread insert selected in step 1 above.
3. Select the tap that corresponds to the external thread size and pitch of the insert selected in step 1 above. Also select the proper size drill bit (figure 1, item 1) for use with the tap.

**WARNING**

**Drilling operations produce high velocity flying debris, which can become lodged in the skin or in the eyes. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing drilling operations. Failure to comply can result in serious injury to personnel.**

4. Drill out the damaged threads (figure 1, item 2) using the drill bit (figure 1, item 1) selected in step 3 above. Chamfer the hole with a standard countersink (82° to 100°).
5. Tap new threads in the hole using the tap (figure 2, item 1) selected in step 3 above.
6. Thread the insert (figure 3, item 1) into the new threads until the top of the insert is slightly below the surface.
7. Drive down the keys (figure 3, item 2; figure 4, item 1) using the insert's installation tool (figure 4, item 2) or a round, flat driver. The keys should be flush with the surface (figure 4, item 3).
8. Thread a fastener of the desired thread size and pitch into the insert to ensure that the insert is installed properly.



**Figure 1. Removing Old Threads**

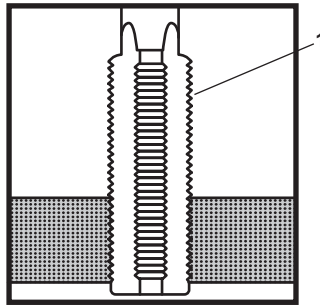


Figure 2. Tapping New Threads

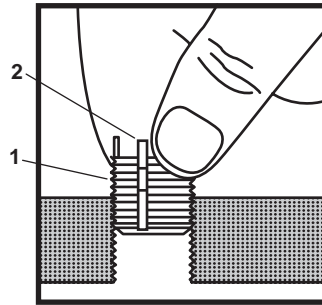


Figure 3. Installing the Insert

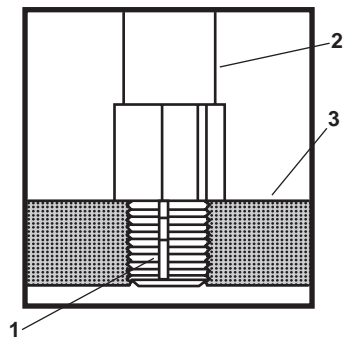


Figure 4. Drive Down the Keys

END OF WORK PACKAGE



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BALLAST PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Torque Wrench (0-250 FT-LB) (Item 4, Table 2, WP 0295 00)  
 Press, Arbor (Item 8, Table 2, WP 0295 00)  
 Durco Tool Kit (Item 15, Table 2, WP 0295 00)  
 Gloves, Chemical and Oil Protection (Item 36, Table 2, WP 0295 00)  
 Gloves, Leather (Item 37, Table 2, WP 0295 00)  
 Faceshield, Industrial (Item 38, Table 2, WP 0295 00)  
 Suitable Drain Pan

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
 Layout Dye (Item 92, Table 1, WP 0307 00)  
 Lubricating Oil, Engine (Item 104, Table 1, WP 0307 00)  
 Sealing Compound (Item 153, Table 1, WP 0307 00)  
 Bearing, Ball, Inboard (Item 8, Figure 86, WP 0304)

**Materials/Parts (continued):**

Bearing, Ball, Outboard (Item 6, Figure 86, WP 0304)  
 Gasket, Impeller (Item 10, Figure 86, WP 0304)  
 Gasket, Rear Cover (Item 13, Figure 86, WP 0304)  
 Packing, Preformed (Item 12, Figure 86, WP 0304)  
 Seal, Oil, Inboard (Item 9, Figure 86, WP 0304)  
 Seal, Oil, Outboard (Item 15, Figure 86, WP 0304)  
 Slinger, Oil (Item 14, Figure 86, WP 0304)

**Personnel Required:**

Two Watercraft Engineers, 88L

**Reference:**

TB 43-0218  
 WP 0170 00 (volume 1)  
 WP 0295 00  
 WP 0307 00

**Equipment Conditions:**

Pump end removed (WP 0170 00, volume 1)

---

**DISASSEMBLY**

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

1. Place a suitable drain pan under the pump's drain plug (figure 1, item 1). Remove the drain plug and drain all oil from the pump.
2. Remove the vent plug (figure 1, item 2) from the bearing housing (figure 1, item 3).
3. Remove the eight casing nuts (figure 1, item 4) securing the bearing housing adapter (figure 1, item 5) to the pump casing (figure 1, item 6).
4. Separate the bearing housing adapter (figure 1, item 5) from the pump casing (figure 1, item 6) and remove the rear cover gasket (figure 1, item 7). Discard the rear cover gasket.
5. Install the impeller wrench onto the shaft (figure 1, item 8) and the key (figure 1, item 9).

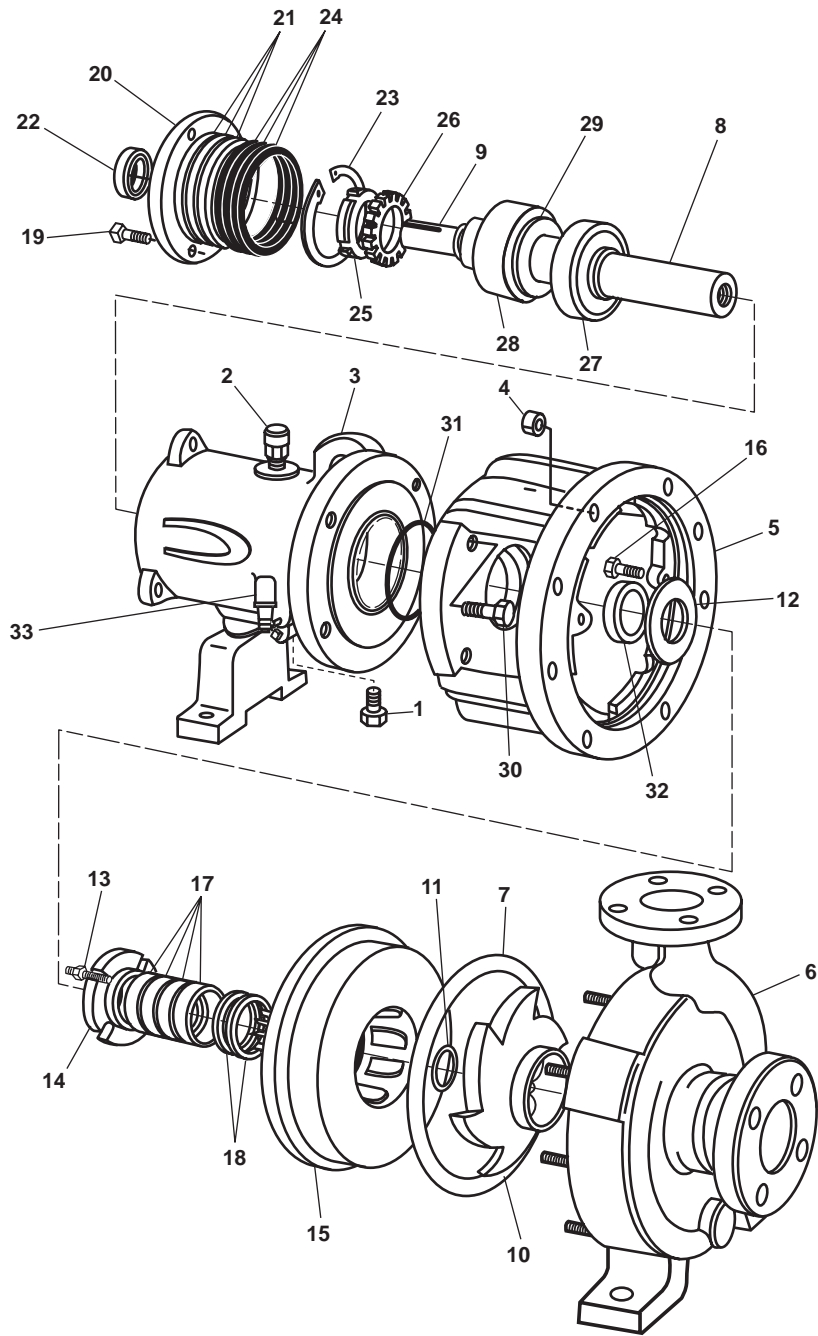


Figure 1. Ballast Pump Repair



**WARNING**

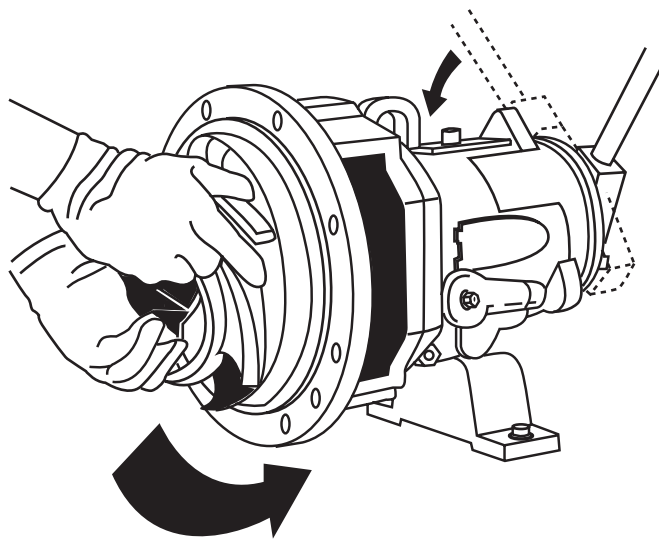
**The impeller could have sharp edges, wear leather gloves to protect hands when removing the impeller. Personal injury or death could result.**

**Do not apply heat to the impeller to loosen it from the shaft. Liquid inside the impeller might cause an explosion causing injury or death.**

**NOTE**

It may take several attempts using this method before the impeller is loosened.

6. Turn the impeller (figure 1, item 10) in the clockwise direction and move the impeller wrench in the 11:00 o'clock position. Quickly spin the impeller in the counterclockwise position causing the impeller wrench to impact the hard surface of the workbench. Refer to figure 2.
7. Unscrew the impeller (figure 1, item 10) and remove it from the shaft (figure 1, item 8).
8. Remove the impeller gasket (figure 1, item 11) from the shaft (figure 1, item 8). Discard the impeller gasket.
9. Remove the inboard deflector (figure 1, item 12) from the bearing housing adapter (figure 1, item 5).
10. Remove the four nuts (figure 1, item 13) securing the gland (figure 1, item 14). Slide the gland away from the rear cover plate (figure 1, item 15).
11. Install the brass shaft guide onto the shaft (figure 1, item 8).



**Figure 2. Impeller Removal.**

12. Remove the two cap screws (figure 1, item 16) securing the rear cover plate (figure 1, item 15) to the bearing housing adapter (figure 1, item 5).
13. Slowly separate the rear cover plate (figure 1, item 15) from the bearing housing adapter (figure 1, item 5) and slide the rear cover plate off the shaft (figure 1, item 8).
14. Remove the packing set (figure 1, item 17) from the rear cover plate (figure 1, item 15). Discard the packing set.

#### NOTE

Do not discard the lantern rings.

15. Remove the two lantern rings (figure 1, item 18) from the rear cover plate (figure 1, item 15).
16. Remove the brass shaft guide from the shaft (figure 1, item 8).
17. Loosen the three bolts (figure 1, item 19) securing the bearing carrier (figure 1, item 20). Remove the bearing carrier.
18. Remove the bearing carrier gaskets (figure 1, item 21) from the bearing carrier (figure 1, item 20). Discard the gaskets.
19. Remove the outboard oil seal (figure 1, item 22) from the bearing carrier (figure 1, item 20). Discard the outboard oil seal.
20. Remove the bearing snap ring (figure 1, item 23) using snap pliers. Discard the snap ring.
21. Remove and retain the shims (figure 1, item 24) from the bearing housing (figure 1, item 3).
22. Remove the bearing lock nut (figure 1, item 25) and the bearing lockwasher (figure 1, item 26). Discard the bearing lock washer.
23. Remove the shaft (figure 1, item 8) from the bearing housing (figure 1, item 3).

#### CAUTION

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

24. Remove the inboard bearing (figure 1, item 27), the outboard bearing (figure 1, item 28), and the slinger (figure 1, item 29) from the shaft (figure 1, item 8), using an arbor press.
25. Remove the four cap screws (figure 1, item 30) securing the bearing housing (figure 1, item 3) to the bearing housing adapter (figure 1, item 5). Separate the bearing housing and the bearing housing adapter.
26. Remove the O-ring (figure 1, item 31) from the bearing housing (figure 1, item 3). Discard the O-ring.
27. Remove the inboard oil seal (figure 1, item 32) from the inner race of the bearing housing adapter (figure 1, item 5). Discard the inboard oil seal.
28. Remove the Trico oil gauge (figure 1, item 33) from the bearing housing (figure 1, item 3).

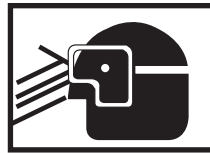
## CLEAN AND INSPECT

**WARNING**

**Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to comply can result in death or serious injury.**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to comply can result in death or serious injury.**

1. Using cleaning solvent, clean all the metal parts.
2. Check for any binding, scoring, or galling, or rough rotation on the inboard bearings (figure 1, items 27) and the outboard bearings (figure 1, item 28). Inspect all component parts for unusual wear or damage, and replace as required.

**WARNING**

**Do not exceed 25 lb/in<sup>2</sup> (1,7 bar) nozzle pressure when using compressed air to dry parts. Wear goggles for eye protection. Do not direct air stream toward self or other personnel. Failure to comply can result in injury or death.**

**⚠ CAUTION**

Do not permit the ball bearings to free spin in the bearing race as the bearing is being subjected to the compressed air. Bearing failure will result.

3. Direct a stream of compressed air at the bearings (figure 1, items 27 and 28) to blow out any debris.

**ASSEMBLY**

1. Install a new inboard oil seal (figure 1, item 32) into the inner race of the bearing housing adapter (figure 1, item 5).
2. Install a new O-ring (figure 1, item 31) into the bearing housing (figure 1, item 3).
3. Connect the bearing housing (figure 1, item 3) and the bearing housing adapter (figure 1, item 5). Install the four cap screws (figure 1, item 30) securing the bearing housing to the bearing housing adapter.

4. Put layout dye onto shaft (figure 1, item 8) then scribe a line in the layout dye for the location of new inboard bearing (figure 1, item 27). Refer to figure 3.
5. Install a new slinger (figure 1, item 29) using an arbor press.

**⚠ CAUTION**

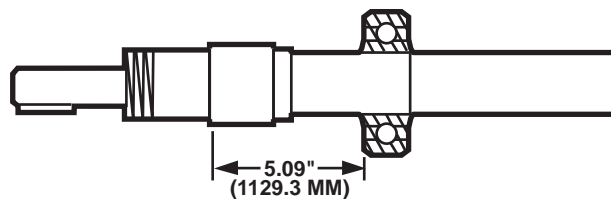
Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

6. Press the new inboard bearing (figure 1, item 27) onto the shaft (figure 1, item 8) using an arbor press, aligning the edge of the inner race of the new inboard bearing with the scribed line.

**⚠ CAUTION**

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

7. Press the new outboard bearing (figure 1, item 28) onto the shaft (figure 1, item 8) up to the shoulder of the shaft using an arbor press. Refer to figure 3.
8. Install a new bearing lockwasher (figure 1, item 26) and the bearing lock nut (figure 1, item 25). Tighten the bearing lock nut and engage the lock washers tangs into the locknut's slots.
9. Apply a coat of lubricating oil on the shaft (figure 1, item 8), the inboard bearing (figure 1, item 27) and the outboard bearings (figure 1, item 28), the inside of the bearing housing (figure 1, item 3) and slide the shaft (figure 1, item 8) into the rear of the bearing housing.
10. Install three new set bolts (figure 1, item 21) into the bearing carrier (figure 1, item 20). Tighten the set bolts.
11. Install the brass shaft guide onto the shaft (figure 1, item 8).
12. Install the new inboard deflector (figure 1, item 12).
13. Install the impeller gasket (figure 1, item 11) onto the shaft (figure 1, item 8).
14. Install the gland (figure 1, item 14) onto the shaft (figure 1, item 8).
15. Slide the rear cover plate (figure 1, item 15) over the brass shaft guide and onto the shaft (figure 1, item 8) up to the bearing housing adapter (figure 1, item 5).
16. Install the two cap screws (figure 1, item 16) securing the rear cover plate (figure 1, item 15) to the bearing housing adapter (figure 1, item 5). Tighten the two cap screws to the torque of 40 lb-ft (54 N-m).



**Figure 3. Bearing Positioning**

**WARNING**

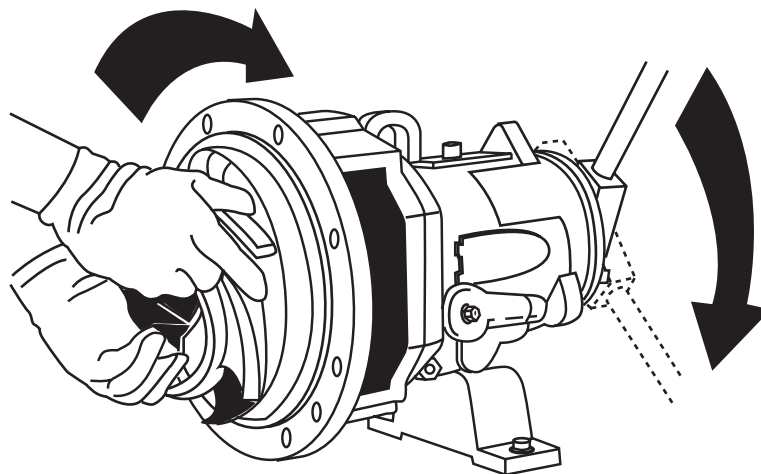
**The impeller could have sharp edges, wear leather gloves to protect hands when removing the impeller. Personal injury or death could result.**

17. Screw the impeller (figure 1, item 10) onto the shaft (figure 1, item 8) until it is firmly against the shaft's shoulder.

**⚠ CAUTION**

Do not attempt to tighten the impeller on the shaft by hitting the impeller with a hammer or any other object or by inserting a pry bar between the impeller vanes. Serious damage to the impeller may result from such actions.

18. Install the impeller wrench over the shaft (figure 1, item 8) and the key (figure 1, item 9).
19. Grab the impeller (figure 1, item 10) in both hands, with the impeller wrench handle to the left, spin the impeller forcefully in a clockwise direction to impact the impeller wrench handle on the work surface to the right.
20. Determine the proper clearance using the table 1.
21. Measure the clearance between the impeller (figure 1, item 10) and the rear cover plate (figure 1, item 15) and record the distance.
22. Subtract the desired clearance from the recorded measurement. Select shims (figure 1, item 24) to equal the sum of the subtracted measurement.
23. Remove the three set bolts (figure 1, item 21) securing the bearing carrier (figure 1, item 20). Remove the bearing carrier .



**Figure 4. Tightening The Impeller**

**Table 1. Impeller Clearance Settings**

Temperature – °F (°C)	Clearance to casing – in (mm)
200 (93)	0.018 ± 0.003 (0.46 ± 0.08)
200 to 250 (93 to 121)	0.021 (0.53)
251 to 300 (122 to 149)	0.024 (0.61)
301 to 350 (150 to 176)	0.027 (0.69)
351 to 400 (177 to 204)	0.030 (0.76)
401 to 450 (205 to 232)	0.033 (0.84)
450 (232)	0.036 (0.91)

**NOTE**

Install the thinnest shims first.

24. Install the shims (figure 1, item 24) between the new bearing snap ring (figure 1, item 23) and the bearing housing (figure 1, item 3). Install the new bearing snap ring.
25. Install the outboard oil seal (figure 1, item 22) into the bearing carrier (figure 1, item 20).
26. Install the three set bolts (figure 1, item 19) into the bearing carrier (figure 1, item 20). Tighten the set bolts.
27. Recheck the clearance between the impeller (figure 1, item 10) and the rear cover plate (figure 1, item 15).
28. Measure the thickness of the new bearing snap ring (figure 1, item 23) and the shims (figure 1, item 24). The bearing carrier gaskets (figure 1, item 21) should equal 1 1/2 times the new snap ring and the shim stack.
29. Apply sealing compound between each new bearing carrier gasket (figure 1, item 22).
30. Place the new bearing carrier gaskets (figure 1, item 21) stack inside the bearing carrier (figure 1, item 20).
31. Install the bearing carrier (figure 1, item 20) onto the bearing housing (figure 1, item 3). Tighten the three set bolts (figure 1, item 21) 30 lb-ft (41 N·m).
32. Install the two lantern rings into the rear cover plate (figure 1, item 15). Push the two lantern rings snug down into the rear cover plate using the gland (figure 1, item 14).
33. Install the new packing set (figure 1, item 17) into the rear cover plate. Push the new packing set snug down into the rear cover plate using the gland (figure 1, item 14).
34. Install the gland (figure 1, item 14) into the rear cover plate (figure 1, item 15).
35. Install the four nuts (figure 1, item 13) securing the gland (figure 1, item 14). Tighten the four nuts to 5 lb-ft (6.8 N·m).
36. Install the rear cover gasket (figure 1, item 7) onto the outer race of the rear cover plate (figure 1, item 15).
37. Place the bearing housing adapter (figure 1, item 5) and the pump casing (figure 1, item 6) together.

**NOTE**

The casing nuts are non-lubricated.

38. Install the eight casing nuts (figure 1, item 4) securing the bearing housing adapter (figure 1, item 5) to the pump casing (figure 1, item 6). Tighten the eight casing nuts to a torque of 15 lb-ft (20 N·m).

39. Install the vent plug (figure 1, item 2) into the bearing housing (figure 1, item 3).
40. Install the Trico oil gauge (figure 1, item 33) into the bearing housing (figure 1, item 3).
41. Install the drain plug (figure 1, item 1) into the bearing housing. Tighten the drain plug.

 **CAUTION**

Do not place the pump online before filling the bearing house adapter with oil. Damage to the pump will occur.

42. Fill the bearing housing adapter (figure 1, item 3) to the center of the oil sight glass with lubrication oil.

**END OF WORK PACKAGE**





**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
BALLAST PUMP, ELECTRIC MOTOR; REPAIR**

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Lubricating Gun, Hand (Item 25, Table 2, WP 0295 00)  
Puller, Mechanical; Gear and Bearing (Item 27, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protection (Item 36, Table 2, WP 0295 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

FM 55-502  
WP 0171 00 (volume 1)  
WP 0295 00  
WP 0307 00

**Equipment Conditions:**

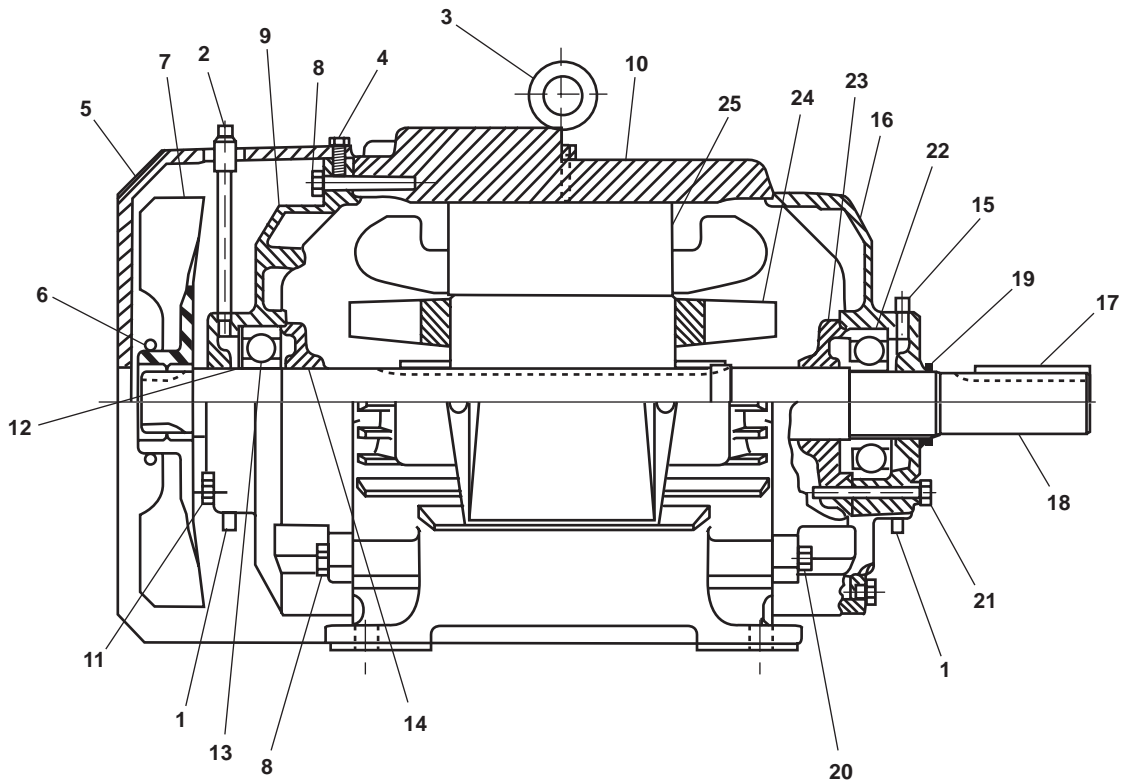
Electric motor removed (WP 0171 00, volume 1)

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Grease, Ball and Roller Bearing (Item 71, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307 00)  
Sealing Compound, Loctite 242 (Item 155, Table 1, WP 0307 00)

**DISASSEMBLY**

1. Remove the two grease drains (figure 1, item 1). Remove the grease fitting (figure 1, item 2).



**Figure 1. Typical Ballast Pump Electric Motor (Typical)**

2. Remove the eye bolt (figure 1, item 3).
3. Remove the two fan cover bolts (figure 1, item 4). Remove the fan cover guard (figure 1, item 5).
4. Remove the fan clamp (figure 1, item 6) from the cooling fan (figure 1, item 7). Remove the cooling fan.
5. Remove the four bolts (figure 1, item 8) from the front end bracket (figure 1, item 9).
6. Remove the two bolts (figure 1, item 11) from the front end bracket (figure 1, item 9).
7. Separate the front end bracket (figure 1, item 9) from the frame (figure 1, item 10).

 **CAUTION**

Use care to keep pressure around the bearing's outer race equal. Damage to the bearing can result.

8. Remove the wave washer (figure 1, item 12) from the front end bracket (figure 1, item 9). Remove the bearing (figure 1, item 13) using a bearing puller.
9. Remove the front end inner cap (figure 1, item 14).
10. Remove the back end grease fitting (figure 1, item 15) from the back end bracket (figure 1, item 16).
11. Remove the key (figure 1, item 17) from the shaft (figure 1, item 18) keyway.
12. Remove the slinger (figure 1, item 19) from the shaft (figure 1, item 18).
13. Remove the four bolts (figure 1, item 20) securing the back end bracket (figure 1, item 16). Separate the back end bracket from the frame (figure 1, item 10).
14. Remove the two bolts (figure 1, item 21) from the back end bracket (figure 1, item 16).

 **CAUTION**

Use care to keep pressure around the bearing's outer race equal. Damage to the bearing can result.

15. Remove the back end bearing (figure 1, item 22) using a bearing puller.
16. Remove the back end inner cap (figure 1, item 23) from the shaft (figure 1, item 18).

**NOTE**

Do not remove the stator from the frame.

17. Remove the rotor (figure 1, item 24) from the frame (figure 1, item 10) and stator (figure 1, item 25).

---

**CLEANING AND INSPECTION****WARNING**

**Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

**⚠ CAUTION**

Do not allow the dry cleaning solvent to come in contact with the stator (figure 1, item 25). Dry cleaning solvent may cause the stator to corrode.

1. Using cleaning solvent, clean the outside of the fan cover (figure 1, item 5), frame (figure 1, item 10), front end bracket (figure 1, item 9), back end bracket (figure 1, item 16) and bearings (figure 1, items 13 and 22).
2. Check for any binding, scoring, or burrs on the bearings (figure 1, items 13 and 22) and all other removed parts. Inspect all component parts for unusual wear or damage, and replace as required.
3. Check the rotor (figure 1, item 24) and stator (figure 1, item 25) for obvious damage.

**⚠ CAUTION**

Do not permit the ball bearings to free spin in the bearing race as the bearing is being subjected to the compressed air. Bearing failure will result.

4. Direct a stream of compressed air at the bearings (figure 1, items 13 and 22) to blow out any debris.

**ASSEMBLY**

1. Install the rotor (figure 1, item 24) in the frame (figure 1, item 10) and stator (figure 1, item 25).
2. Install the back end inner cap (figure 1, item 23) on the shaft (figure 1, item 18).

**WARNING**

**Always wear gloves when handling hot bearings. Handling hot bearings with bare hands or skin may result in severe burns or death.**

**⚠ CAUTION**

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

3. Heat the back end bearing (figure 1, item 22) to 250 °F (121 °C) in an oven to expand the inner race. Install the back end bearing on the shaft (figure 1, item 18).
4. Install the two bolts (figure 1, item 21) securing the back end inner cap (figure 1, item 23).
5. Place the back end bracket (figure 1, item 16) on the frame (figure 1, item 10). Install the four bolts (figure 1, item 20) securing the back end bracket. Tighten the bolts.
6. Install the front end inner cap (figure 1, item 14) on the shaft (figure 1, item 18).
7. Heat the front end bearing (figure 1, item 13) to 250 °F (121 °C) in an oven to expand the inner race. Install the front end bearing on the shaft (figure 1, item 18).
8. Install the two bolts (figure 1, item 11) securing the front inner cap (figure 1, item 14). Install the wave washer (figure 1, item 12) in the front end bracket (figure 1, item 9).
9. Place the front end bracket (figure 1, item 9) on the frame (figure 1, item 10).
10. Install the four bolts (figure 1, item 8) securing the front end bracket (figure 1, item 9) to the frame 10.
11. Install the slinger (figure 1, item 19) on the shaft (figure 1, item 18).
12. Install the key (figure 1, item 17) in the shaft (figure 1, item 18) keyway.
13. Install the cooling fan (figure 1, item 7) on the shaft (figure 1, item 18). Install the fan clamp (figure 1, item 6) securing the cooling fan.
14. Install the fan cover guard (figure 1, item 5). Install the two fan cover bolts (figure 1, item 4). Tighten the fan cover bolts.
15. Install the grease fitting (figure 1, item 2) in the front end bracket (figure 1, item 9).
16. Install the grease fitting (figure 1, item 15) in the back end bracket.
17. Install the eye bolt (figure 1, item 3) in the frame (figure 1, item 10).

 **CAUTION**

Do not apply grease through the front end or the back end grease fittings with the grease drains closed.

18. Add 5-6 strokes of grease to grease fittings (figure 1, items 2 and 15) using a lubricating hand gun. Wipe any excess grease from the grease fills using a wipe rag.
19. Apply locktite thread sealant to the threads of the two grease drains (figure 1, item 1). Install and tighten the grease drains.

**END OF WORK PACKAGE**



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
POTABLE WATER PUMP; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2,  
WP 0295 00)  
Arbor Press (Item 8, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)  
Suitably Sized Lathe

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

TC 9-524  
WP 0175 00 (volume 1)  
WP 0268 00  
WP 0295 00

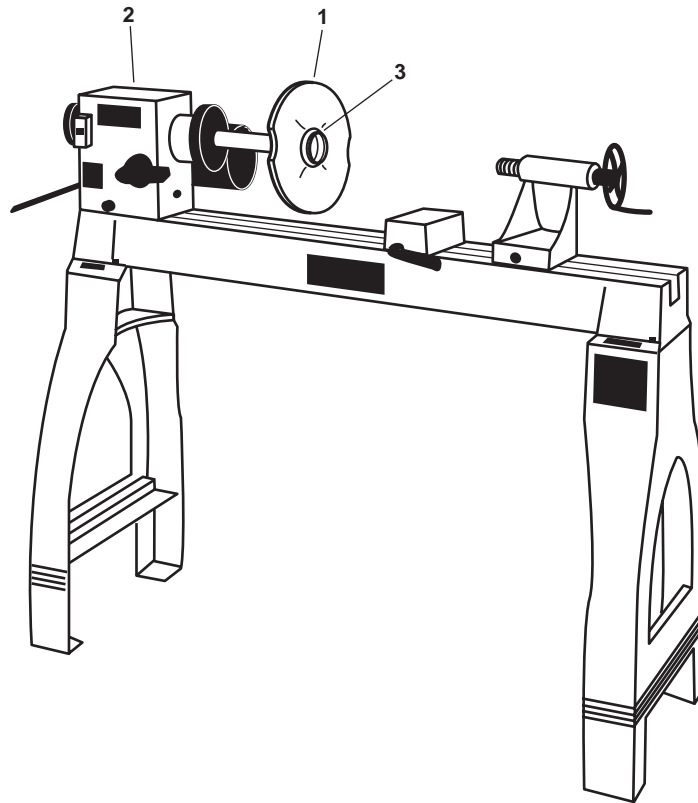
**Equipment Conditions:**

Potable water pump removed (WP 0175 00, volume 1).  
The impeller removed (WP 0268 00).

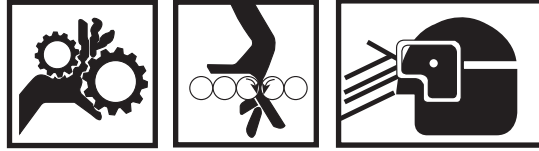
---

**MACHINING**

1. Chuck the impeller (figure 1, item 1) in a suitably sized lathe (figure 1, item 2).



**Figure 1. Typical Impeller Machining**

**WARNING**

Use extreme caution when working around rotating impeller and shaft. Do not wear loose clothing, jewelry, or anything else which might become entangled in the shaft or parts of the lathe that spin. Wear protective eyewear. Failure to follow these precautions can result in death or serious injury.

**▲ CAUTION**

Take care not to remove any material from the impeller itself during the machining operation.

- Machine away the wear ring (figure 1, item 3) until its thickness is approximately 0.030 in (0.762 mm).
- With the impeller (figure 1, item 1) still chucked in the lathe (figure 1, item 2), use a cape chisel to gently cut one side of the impeller wear ring (figure 1, item 3), taking care not to gouge the impeller in the process.
- Remove the wear ring (figure 1, item 3) from the impeller (figure 1, item 1).
- Carefully inspect the seat area for the wear ring (figure 1, item 3). If the area is damaged, build up the damaged area and remachine using standard shop practices in accordance with TC 9-524. Use the new wear ring to gauge the outside diameter (OD) of the impeller (figure 1, item 1). The wear ring should be a light press fit (0.003 to 0.005 inch (0.0762 to 0.1270 mm) interference).
- Once the wear ring(s) (figure 1, item 3) is removed, remove the impeller (figure 1, item 1) from the lathe (figure 1, item 2).
- Install new wear rings (figure 1, item 3) onto the impeller (figure 1, item 1) using an arbor press and install the impeller into the pump (WP 0268 00).

END OF WORK PACKAGE



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
POTABLE WATER PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanics (Item 1,  
Table 2, WP 0295 00)  
Threading Set, Screw (Item 31, Table 2,  
WP 0295 00)  
Drill, Electric, Portable, 1/2' (Item 32, Table 2,  
WP 0295 00)  
Drill Set, 1/16" - 1/2" (Item 33, Table 2,  
WP 0295 00)  
Drill Set, 1/2" - 1" (Item 34, Table 2, WP 0295 00)  
Goggles, Industrial (Item 35, WP 0306 00)  
Gloves, Leather (Item 37, WP 0306 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

WP 0267 00  
WP 0295 00  
WP 0306 00

**Equipment Conditions:**

Potable water pump disassembled (WP 0267 00).

---

**MACHINING REPAIRS**

Due to replacement part availability, expediency of repair, and other factors, it may sometimes be necessary to repair existing pump components rather than replacing them. For example, a pump shaft may be worn in the seal area, but otherwise serviceable. If a new pump shaft is unavailable, or if the unit must be returned to service with minimal down time, it may be possible to build up and remachine the worn shaft area. The same holds true for volutes, housings, and impeller wear ring seats.

Always confer with the work center supervisor before performing machining repairs to determine the proper course of action and to determine the feasibility of the repair. No matter what form of machining repairs will be accomplished, ensure that the repairs conform to standard machine shop practices and procedures and all applicable regulations.

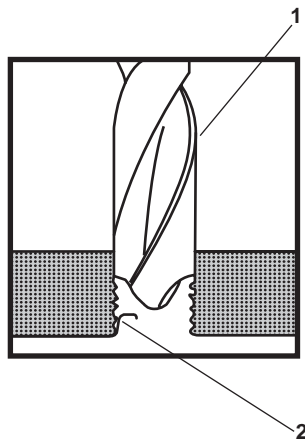
**THREAD REPAIR**

Damaged female threads may be replaced by installing thread inserts. The procedure below describes this process.

**NOTE**

The size of the holes drilled and tapped will vary depending upon the size of the insert used.

1. Select the proper size thread insert. The proper size thread insert should have the same size female threads as the fastener that will thread into it.
2. Measure the external thread size and pitch of the thread insert selected in step 1 above.
3. Select the tap that corresponds to the external thread size and pitch of the insert selected in step 1 above. Also select the proper size drill bit (figure 1, item 1) for use with the tap.



**Figure 1. Removing Old Threads**

**WARNING**



**Drilling operations produce high velocity flying debris, which can become lodged in the skin or in the eyes. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing drilling operations. Failure to comply can result in serious injury to personnel.**

4. Drill out the damaged threads (figure 1, item 2) using the drill bit (figure 1, item 1) selected in step 3 above. Chamfer the hole with a standard countersink (82° to 100°).
5. Tap new threads in the hole using the tap (figure 2, item 1) selected in step 3.
6. Thread the insert (figure 3, item 1) into the new threads until the top of the insert is slightly below the surface.
7. Drive down the keys (figure 3, item 2; figure 4, item 1) using the insert's installation tool (figure 4, item 2) or a round, flat driver. The keys should be flush with the surface (figure 4, item 3).
8. Thread a fastener of the desired thread size and pitch into the insert to ensure that the insert is installed properly.

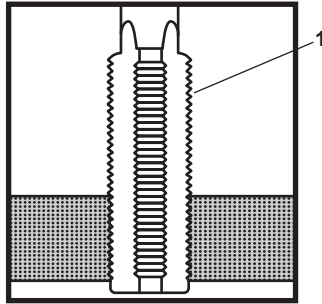


Figure 2. Tapping New Threads

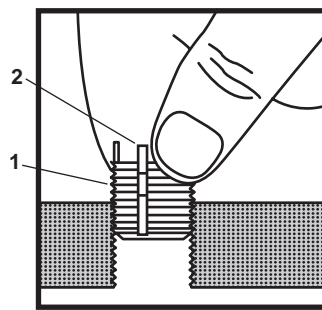


Figure 3. Installing the Insert

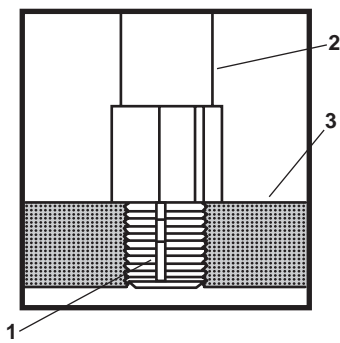


Figure 4. Drive Down the Keys

END OF WORK PACKAGE



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Arbor Press (Item 8, Table 2, WP 0295 00)  
Goggles, Vented (Item 35, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)  
Suitably Sized Lathe

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

TC 9-524  
WP 0274 00  
WP 0275 00  
WP 0295 00  
WP 0306 00

**Materials/Parts:**

Wear Ring (Item 10, Table 2, WP 0306 00)

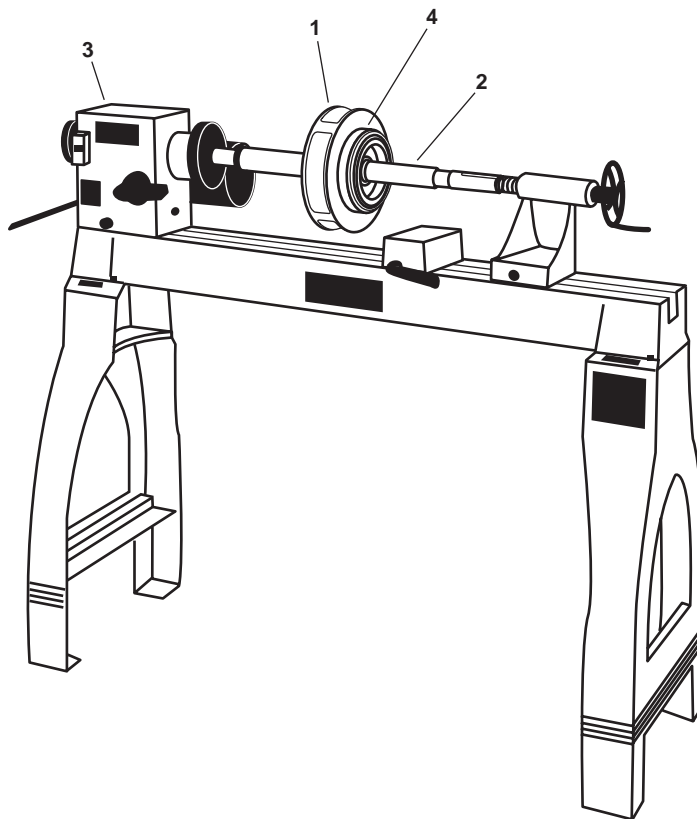
**Equipment Conditions:**

Fire and general service pump removed (WP 0274 00)  
Impeller removed (WP 0275 00).

---

**MACHINING**

1. Chuck the impeller (figure 1, item 1) and shaft (figure 1, item 2) in a suitably sized lathe (figure 1, item 3).



**Figure 1. Impeller Machining**

**WARNING**

Use extreme caution when working around rotating impeller and shaft. Do not wear loose clothing, jewelry, or anything else which might become entangled in the shaft or parts of the lathe that spin. Wear protective eyewear. Failure to follow these precautions can result in death or serious injury.

**⚠ CAUTION**

Take care not to remove any material from the impeller itself during the machining operation.

2. Machine away the wear ring (figure 1, item 4) until its thickness is approximately 0.030 in (0.762 mm).
3. With the impeller (figure 1, item 1) still chucked in the lathe (figure 1, item 3), use a cape chisel to gently cut one side of the impeller wear ring (figure 1, item 4), taking care not to gouge the impeller in the process.
4. Remove the wear ring (figure 1, item 4) from the impeller (figure 1, item 1).
5. Repeat steps 1 through 4 above for the wear ring (figure 1, item 4) on the opposite side of the impeller if necessary.
6. Carefully inspect the seat area for the wear ring (figure 1, item 3). If the area is damaged, build up the damaged area and remachine using standard shop practices in accordance with TC 9-524. Use the new wear ring to gauge the outside diameter (OD) of the impeller (figure 1, item 1). The wear ring should be a light press fit (0.003 to 0.005 inch (0.0762 to 0.1270 mm) interference).
7. Once the wear ring(s) (figure 1, item 3) is removed, remove the impeller (figure 1, item 1) and shaft (figure 1, item 2) assembly from the lathe.
8. Install new wear rings (figure 1, item 3) onto the impeller (figure 1, item 1) and install the impeller into the pump (WP 0292 00).

**END OF WORK PACKAGE**

---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, PUMP END; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
 Threading Kit, Screw (Item 31, Table 2, WP 0295 00)  
 Drill, Electric, Portable, 1/2' (Item 32, Table 2, WP 0295 00)  
 Drill Set, 1/16" - 1/2" (Item 33, Table 2, WP 0295 00)  
 Drill Set, 1/2" - 1" (Item 34, Table 2, WP 0295 00)  
 Goggles, Industrial (Item 35, WP 0295 00)  
 Gloves, Leather (Item 37, WP 0295 00)

**Personnel Required:**

One Watercraft Engineer, 88L

**References:**

WP 0275 00  
 WP 0295 00

**Equipment Conditions:**

Fire and general service pump disassembled (WP 0275 00).

---

**MACHINING REPAIRS**

Due to replacement part availability, expediency of repair, and other factors, it may sometimes be necessary to repair existing pump components rather than replacing them. For example, a pump shaft may be worn in the seal area, but otherwise serviceable. If a new pump shaft is unavailable, or if the unit must be returned to service with minimal down time, it may be possible to build up and re-machine the worn shaft area. The same holds true for volutes, housings, and impeller wear ring seats.

Always confer with the work center supervisor before performing machining repairs to determine the proper course of action and to determine the feasibility of the repair. No matter what form of machining repairs will be accomplished, ensure that the repairs conform to standard machine shop practices and procedures and all applicable regulations.

**THREAD REPAIR**

Damaged female threads may be replaced by installing thread inserts. The procedure below describes this process.

**NOTE**

The size of the holes drilled and tapped will vary depending upon the size of the insert used.

1. Select the proper size thread insert. The proper size thread insert should have the same size female threads as the fastener that will thread into it.
2. Measure the external thread size and pitch of the thread insert selected in step 1 above.
3. Select the tap that corresponds to the external thread size and pitch of the insert selected in step 1 above. Also select the proper size drill bit (figure 1, item 1) for use with the tap.

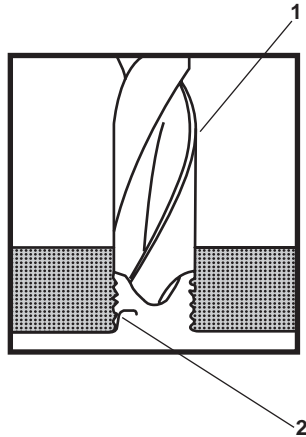


Figure 1. Removing Old Threads



**Drilling operations produce high velocity flying debris, which can become lodged in the skin or in the eyes. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing drilling operations. Failure to comply can result in serious injury or death.**

4. Drill out the damaged threads (figure 1, item 2) using the drill bit (figure 1, item 1) selected in step 3 above. Chamfer the hole with a standard countersink (82° to 100°).
5. Tap new threads in the hole using the tap (figure 2, item 1) selected in step 3 above.
6. Thread the insert (figure 3, item 1) into the new threads until the top of the insert is slightly below the surface.
7. Drive down the keys (figure 3, item 2; figure 4, item 1) using the insert's installation tool (figure 4, item 2) or a round, flat driver. The keys should be flush with the surface (figure 4, item 3).
8. Thread a fastener of the desired thread size and pitch into the insert to ensure that the insert is installed properly.



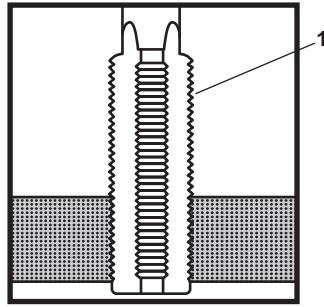


Figure 2. Tapping New Threads

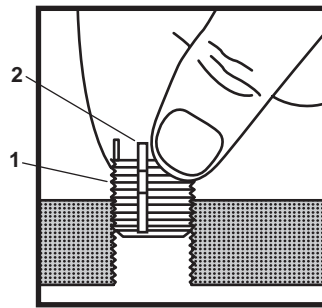


Figure 3. Installing the Insert

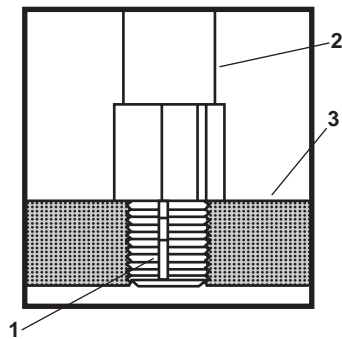


Figure 4. Drive Down the Keys

END OF WORK PACKAGE



---

**GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
FIRE AND GENERAL SERVICE PUMP, ELECTRIC MOTOR; REPAIR**

---

**INITIAL SETUP:****Tools and Special Tools:**

Tool Kit, General Mechanic's (Item 1, Table 2, WP 0295 00)  
Chain Hoist, Hand Operated (Item 7, Table 2, WP 0295 00)  
Multimeter (Item 16, Table 2, WP 0295 00)  
Lubricating Gun, Hand (Item 25, Table 2, WP 0295 00)  
Gloves, Chemical and Oil Protective (Item 36, Table 2, WP 0295 00)  
Faceshield, Industrial (Item 38, Table 2, WP 0295 00)

**Materials/Parts:**

Dry Cleaning Solvent (Item 57, Table 1, WP 0307 00)  
Grease, General Purpose (Item 75, Table 1, WP 0307 00)  
Rag, Wiping (Item 139, Table 1, WP 0307)  
Sealing Compound, Loctite 242 (Item 155, Table 1, WP 0307 00)

**Materials/Parts (continued):**

Bearing, Ball (Item 19, Figure 93, WP 0305 00)  
Bearing, Ball (Item 20, Figure 93, WP 0305 00)

**Personnel Required:**

Two Watercraft Engineers, 88L

**References:**

TB 43-0218  
TM 55-1925-273-10  
WP 0276 00  
WP 0295 00  
WP 0305 00  
WP 0307 00  
WP 0308 00

**Equipment Conditions:**

Electric motor removed (WP 0276 00).

---

**WARNING**

**Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.**

**DISASSEMBLY**

1. OPEN the grease drains (figure 1, items 1 and 2) and drain the grease from the unit.
2. Remove the grease drains (figure 1, items 1 and 2). Remove the grease fitting (figure 1, item 3).
3. Remove the eye pads (figure 1, item 4).
4. Remove the canopy (figure 1, item 5) from the fan cover guard (figure 1, item 6).
5. Remove the nuts (figure 1, item 7) and washers (figure 1, item 8) from the fan cover guard (figure 1, item 6).
6. Remove the lock screw (figure 1, item 9) from the pump head shaft nut (figure 1, item 10). Remove the pump head shaft nut from the pump head shaft (figure 1, item 11). Discard the lock screw.
7. Remove the bolt and associated hardware (figure 1, item 12) from the bolted coupling (figure 1, item 13).
8. Remove the bolted coupling (figure 1, item 13) and gib key (figure 1, item 14).
9. Remove the lock nut (figure 1, item 15) and lockwasher (figure 1, item 16) from the pump head shaft (figure 1, item 11).

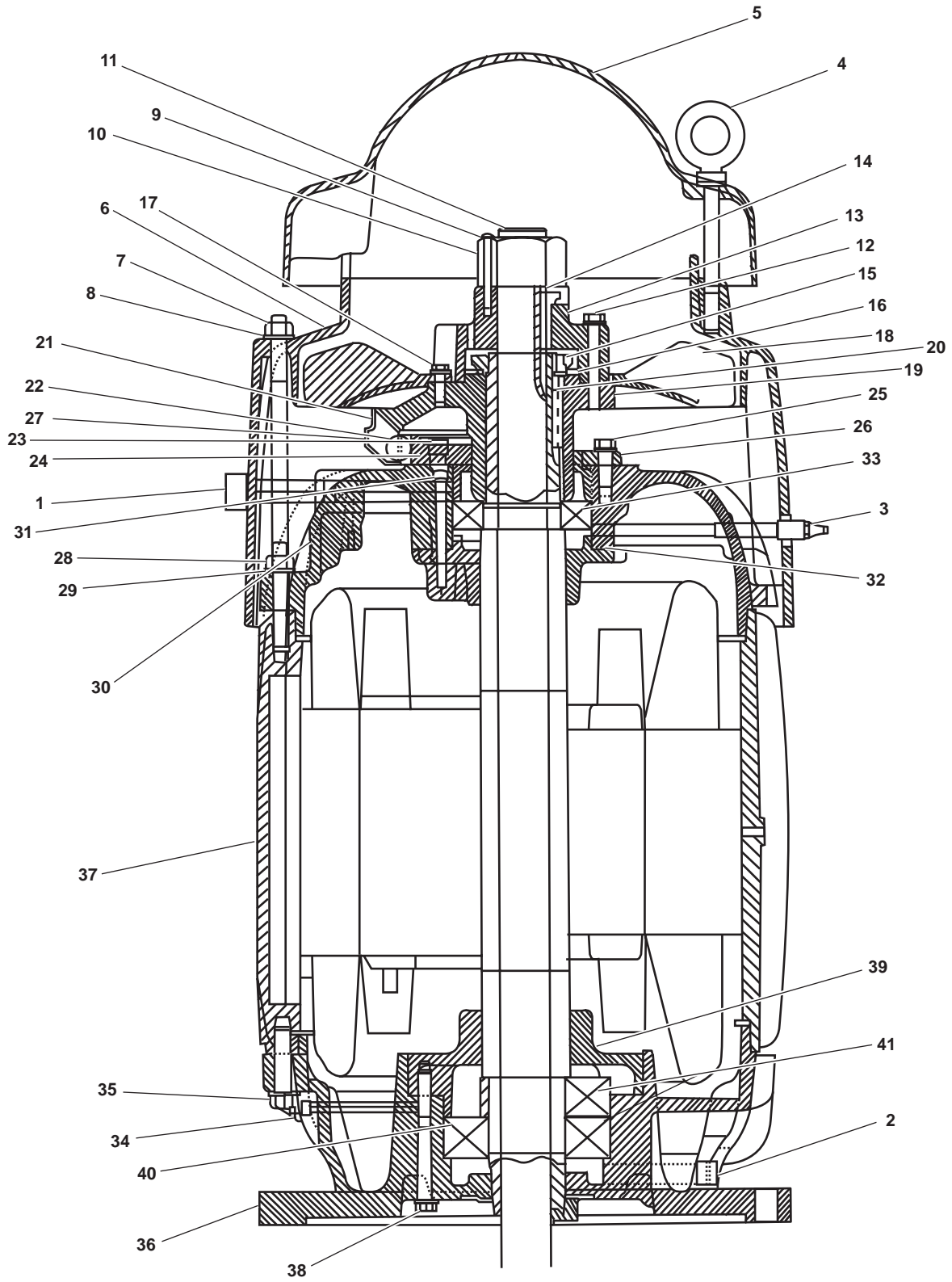


Figure 1. Fire and General Service Pump Electric Motor (Typical)

Discard the lock nut and lockwasher.

10. Remove the bolts and associated hardware (figure 1, item 17) securing the fan (figure 1, item 18) to the coupling adaptor (figure 1, item 19).
11. Remove the coupling adaptor (figure 1, item 19) and the key (figure 1, item 20) from the pump head shaft (figure 1, item 11).
12. Remove the ball retaining ring (figure 1, item 21) securing the ratchet ball (figure 1, item 22). Remove the ratchet ball.
13. Remove the bolts (figure 1, item 23) securing the stationary ratchet (figure 1, item 24). Remove the stationary ratchet.
14. Remove the bolts (figure 1, item 25) securing the bearing cap (figure 1, item 26) and remove the bearing cap. Remove the rotating ratchet (figure 1, item 27).
15. Remove the bolts (figure 1, item 28) and washer (figure 1, item 29) securing the upper bracket (figure 1, item 30). Remove the upper bracket.
16. Remove the bolts (figure 1, item 31) securing the bearing cap (figure 1, item 32) to the upper bracket (figure 1, item 30). Separate the bearing cap from the upper bracket.
17. Separate the upthrust and guide bearing (figure 1, item 33) from the upper bracket (figure 1, item 30).
18. Remove the grease fitting (figure 1, item 34).
19. Remove the bolts (figure 1, item 35) from the lower bracket (figure 1, item 36). Separate the lower bracket from the stator and rotor housing (figure 1, item 37).
20. Remove the bolts (figure 1, item 38) securing the bearing cap (figure 1, item 39) to the lower bracket (figure 1, item 36). Separate the bearing cap from the lower bracket.
21. Remove the single bearing (figure 1, item 40) from the lower bracket (figure 1, item 36).
22. Remove the tandem thrust bearings (figure 1, item 41) from the lower bracket (figure 1, item 36).

## CLEANING AND INSPECTION

### WARNING



**Dry cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.**

1. Clean all of the removed parts with dry cleaning solvent and clean wiping rags.
2. Check for any binding, scoring, or burrs on the bearings (figure 1, items 33, 40, and 41) and all other removed parts. Inspect all component parts for unusual wear or damage. Replace worn or damaged parts.

 **CAUTION**

Do not exceed 25 PSI (1.7 bar) nozzle pressure when using compressed air to dry parts. Wear goggles for eye protection. Do not direct air stream toward self or other personnel.

Do not permit the ball bearings to free spin in the bearing race as the bearing is being subjected to the compressed air. Bearing failure will result.

3. Direct a stream of compressed air at the bearings (figure 1, items 33, 40, and 41) to remove any debris.

**ASSEMBLY****NOTE**

Refer to WP 0308 00 for torque specifications of all torque call outs.

1. Install the tandem thrust bearings (figure 1, item 41) into the lower bracket (figure 1, item 36).
2. Install the new single bearing (figure 1, item 40) into the lower bracket (figure 1, item 36).
3. Install the bearing cap (figure 1, item 39) onto the lower bracket (figure 1, item 36). Install the bolts (figure 1, item 38) securing the bearing cap to the lower bracket.
4. Install the lower bracket onto the stator and rotor housing (figure 1, item 37). Install the bolts (figure 1, item 35) into the lower bracket (figure 1, item 36).
5. Install the grease fitting (figure 1, item 34) into the lower bracket (figure 1, item 36).
6. Install the new upthrust and guide bearing (figure 1, item 33) into the upper bracket (figure 1, item 30).
7. Install the bearing cap (figure 1, item 32) onto the upper bracket (figure 1, item 30). Install the bolts (figure 1, item 31) securing the bearing cap to the upper bracket.
8. Install the upper bracket (figure 1, item 30) onto the stator and housing rotor (figure 1, item 37). Install the bolts (figure 1, item 28) and washer (figure 1, item 29) securing the upper bracket.
9. Install the rotating ratchet (figure 1, item 27). Install the bearing cap (figure 1, item 26).
10. Install the bolts securing the bearing cap (figure 1, item 25).
11. Install the stationary ratchet (figure 1, item 24) and install the bolts (figure 1, item 23) securing the stationary ratchet.
12. Install the ratchet ball (figure 1, item 22). Install the ball retaining ring (figure 1, item 21) to secure the ratchet ball.
13. Install the coupling adaptor (figure 1, item 19) and the key (figure 1, item 20) into the pump head shaft (figure 1, item 11).
14. Install a new lockwasher (figure 1, item 16) and a new lock nut (figure 1, item 15) onto the pump head shaft (figure 1, item 11).
15. Install the fan (figure 1, item 18) onto the pump head shaft (figure 1, item 11). Install the bolts and associated hardware (figure 1, item 17) securing the fan to the coupling adaptor (figure 1, item 19).
16. Install the bolted coupling (figure 1, item 13) and gib key (figure 1, item 14).
17. Install the bolt and associated hardware (figure 1, item 12) into the bolted coupling (figure 1, item 13).

 **CAUTION**

Failure to observe applicable torques may cause extensive damage to the electric motor.

18. Install the pump head shaft nut (figure 1, item 10) onto the pump head shaft (figure 1, item 11). Tighten the pump head shaft nut to the applicable torque (WP 0308 00) and align the pin hole with the lock screw (figure 1, item 9) hole in bolted coupling (figure 1, item 13).
19. Install a new locking screw (figure 1, item 9) into the pump head shaft nut (figure 1, item 10) and the bolted coupling (figure 1, item 13).
20. Install nuts (figure 1, item 7) and washers (figure 1, item 8) securing the fan cover guard (figure 1, item 6).
21. Install the canopy (figure 1, item 5) onto the fan cover guard (figure 1, item 6).
22. Install the eye pads (figure 1, item 4).
23. Install the grease fitting (figure 1, item 3).
24. Install the upper grease drain (figure 1, item 1). Do not tighten the grease drain at this time.
25. Install the lower grease drain (figure 1, item 2). Do not tighten the grease drain at this time.

 **CAUTION**

Do not apply grease into the upper or the lower grease fittings while the upper or the lower grease drains CLOSED.

26. Add 0.4 ounce (12 cc) of new general purpose grease into the upper grease fill (figure 1, item 3) using a lubricating gun. Wipe any excess grease from the grease fills using a wiping rag.
27. Add 0.6 ounce (18 cc) of new general purpose grease into the lower grease fill (figure 1, item 34) using a lubricating gun. Wipe any excess grease from the grease fills using a wiping rag.
28. Apply Loctite thread sealant to the threads of the upper grease drains (figure 1, item 1). Torque the upper grease drains to 20 lb-ft (27 Nm).
29. Apply Loctite thread sealant to the threads of the lower grease drain (figure 1, item 2). Torque the lower grease drain to 20 lb-ft (27 Nm).

**END OF WORK PACKAGE**





**Chapter 7**

**Supporting Information**  
**for**  
**Inland and Coastal Large Tug (LT)**



---

**UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
REFERENCES**

---

This work package lists all field manuals, forms, technical manuals, and miscellaneous publications referenced in this manual.

**ARMY REGULATIONS**

AR 70-71 U.S. Army Regulation (NBC Contamination)  
AR 750-1 Army Materiel Maintenance Policy

**FIELD MANUALS**

FM 4-25.11 First Aid  
FM 55-502 Watercraft Safety  
FM 55-509-ITM Introduction to Marine Electricity

**TECHNICAL MANUALS**

TM 38-470 Storage and Maintenance of Army Prepositioned Stock Materiel  
TM 55-1925-208-24 Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual for Main Propulsion Engine Inland And Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-208-24P Unit, Intermediate Direct Support and Intermediate General Support Maintenance Repair Parts And Special Tools List for Main Propulsion Engine Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-209-24-1 Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual for Ship's Service Generator Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-209-24-2 Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual for Ship's Service Generator Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-209-24P Unit, Intermediate Direct Support and Intermediate General Support Repair Parts and Special Tools List for Ship's Service Generator Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-210-24 Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual for Emergency Generator Set Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-210-24P Unit, Intermediate Direct Support and Intermediate General Support Maintenance Repair Parts and Special Tools List for Emergency Generator Set Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-211-24 Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual for Pump Drive Engine Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-211-24P Unit, Intermediate Direct Support and Intermediate General Support Maintenance Repair Parts and Special Tools List For Pump Drive Engine Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-212-24&P Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Bow Thruster Engine Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-213-24&P Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Lube Oil Purification System Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)  
TM 55-1925-214-24&P Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Bow Thruster Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)

TM 55-1925-215-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Steering Gear System Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-222-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Propulsion Controls Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-223-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Main Reduction Gear Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-224-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Environmental Control Sub-system Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-225-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Engine Room Monitoring System Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-226-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Commissary Equipment Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-228-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Propulsion Shaft Couplings, Brakes, and Seals Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-231-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Refrigeration Machinery Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-233-24&P	Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Laundry Equipment Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-273-24&P-1	Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-273-24&P-2	
TM 55-1925-273-SDC	Damage Control Manual for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-282-14&P	Operator, Unit, Direct Support, and General Support Maintenance Manual, Including Repair Parts and Special Tools List for Reverse Osmosis Water Purification Unit Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-283-12&P	Operator and Unit Maintenance Manual, Including Repair Parts and Special Tools List for Fuel Filter/Water Separator (Fuel Transfer System) Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-284-14&P	Operator, Unit, Direct Support, and General Support Maintenance Manual, including Repair Parts and Special Tools List for Marine Sanitation System Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-285-13&P	Operator, Unit, and Direct Support Maintenance Manual, including Repair Parts and Special Tools List for Oil Water Separator Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-286-13&P	Operator, Unit, and Direct Support Maintenance Manual, including Repair Parts and Special Tools List for Air Compressor for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-292-14&P	Operator, Unit, Direct Support, and General Support Maintenance Manual, including Repair Parts and Special Tools List for Fire Fighting, Fire Alarm, and Fire Suppression Systems for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1925-294-14&P	Operator, Unit, Direct Support, and General Support Maintenance Manual, including Repair Parts and Special Tools List for Deck Machinery and Hydraulic System for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
TM 55-1945-224-14&P	Operator, Unit, Direct Support, and General Support Maintenance Manual, (Including Repair Parts and Special Tools List) for Boat, Inflatable, Rigid Hull(Zodiac) Model M-B-10005 H472 © September 1993, Zodiac of North America, Inc. NSN 1940-01-505-1621

---

TM 55-1945-221-14&P	Operator, Unit, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Outboard Motor (Johnson-OMC) Model #70 © 2000 Outboard Motor Corporation NSN 2805-01-505-1613
TM 55-5825-311-10	Operator's Manual for Large Tug C4ISR Suite
TM 55-5830-283-10	Operator's Manual for U.S. Army Watercraft Global Maritime Distress and Safety System (GMDSS)
TM 750-244-6	Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use

**TECHNICAL BULLETINS**

TB 43-0218	Inspection, Use and Tightening of Metal Fasteners Used on Tank-Automotive Equipment
TB 55-1900-232-10	U.S. Army Towing Manual
TB 740-97-4	Preservation of Vessels for Storage

**FORMS AND PAMPHLETS**

DA Form 2028	Recommended Changes to Equipment Technical Publications
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2407	Maintenance Request
DA Form 2408-9	Equipment Control Record
DA Form 4640	Harbor Boat Deck Department Log for Class A&B Vessels
DA Form 4993	Harbor Boat Engine Department Log for Class A and C-1 Vessels
DA PAM 738-750	Functional Users Manual for The Army Maintenance Management System (TAMMS)
SF 368	Product Quality Deficiency Report
STP 21-1-SMCT	U.S. Army Training Manual - (MOPP IV Clothing)

**HANDBOOKS AND STANDARDS**

MIL-HDBK-113	Guide for the Selection of Lubricants, Functional Fluids, Preservatives, and Specialty Products for Use in Ground Equipment Systems
MIL-HDBK-275	Guide for the Selection of Lubricant Fluids and Compounds for Use in Flight Vehicles and Components

**END OF WORK PACKAGE**



---

**UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION**

---

### **THE ARMY MAINTENANCE SYSTEM MAC**

This introduction provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Unit — includes two subcolumns, C (operator/crew) and O (unit) maintenance.

Direct Support — includes an F subcolumn.

General Support — includes an H subcolumn.

Depot — includes a D subcolumn.

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

### **MAINTENANCE FUNCTIONS**

Maintenance functions are limited to and defined as follows:

1. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
2. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. **Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms.
4. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.
6. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

7. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
8. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
9. **Repair.** The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

#### NOTE

The following definitions are applicable to the "repair" maintenance function:

**Services.** Inspect, test, service, adjust, align, calibrate, and/or replace.

**Fault location/troubleshooting.** The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

**Disassembly/assembly.** The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

**Actions.** Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

10. **Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
11. **Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

#### EXPLANATION OF COLUMNS IN THE MAC

**Column (1) Group Number.** Column (1) lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

**Column (2) Component/Assembly.** Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

**Column (3) Maintenance Function.** Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above.)

**Column (4) Maintenance Level.** Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to per-



---

form the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

- C Operator or crew maintenance
- O Unit maintenance
- F Direct support maintenance
- L Specialized repair activity (SRA)
- H General support maintenance
- D Depot maintenance

#### NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

#### EXPLANATION OF COLUMNS IN THE TOOLS AND TEST EQUIPMENT REQUIREMENTS

Column (1) Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) Nomenclature. Name or identification of the tool or test equipment.

Column (4) National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) Tool Number. The manufacturer's part number, model number, or type number.

#### EXPLANATION OF COLUMNS IN THE REMARKS

Column (1) Remarks Code. The code recorded in column (6) of the MAC.

Column (2) Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

**END OF WORK PACKAGE**



**UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
MAINTENANCE ALLOCATION CHART**

**Table 1. MAC for Inland and Coastal Large Tug**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
01	LARGE TUG, 128 FOOT  HULL STRUCTURE								
0101	Hull, Bitts, Chocks, & Tiedowns	Inspect Service Replace Repair	1.5 8.0				-- --	1  A B B	
0102	Voids And Compartments	Inspect Service Repair	8.0	30.0	20.0		--	22 1,3,37,38 1,3 C B	
0103	Mast	Inspect Service Replace Repair	1.5	8.0	20.0		--	1,3,37,38  1,3 A B	
0104	Doors, Hatches, Scuttles, and Windows	Inspect Service Replace Repair	0.3	1.0	4.0		--	1  B	
010401	Hydraulic Watertight Doors	Inspect Adjust Service Replace Repair	0.3	4.0	1.0		--	1  B D	
01040101	Hydraulic Cylinder Assembly	Inspect Replace Repair	0.3		4.0 4.0			1,2,3,35, 36,38  1,35,36 1,35,36	

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
01040102	Control Valve Assembly	Inspect	0.3						
		Replace			4.0			1,18,35, 36	
01040103	Hand Pumps, Local/Remote	Repair			4.0			1, 35,36	
		Inspect	0.3						
		Service	0.5						
010402	Watertight Doors	Replace			4.0			1,35,36	
		Repair			4.0			1,35,36	
		Inspect	0.3						
010403	Watertight Hatches	Service	1.0					25	
		Replace		1.0	24.0		--	1,2,3,9,38	B
		Repair							
010404	Watertight Scuttles	Inspect	0.3						
		Service	1.0					25	
		Replace		1.0	24.0		--	1,2,3,25,38	B
010405	Watertight Manholes	Repair							
		Inspect	0.3						
		Replace		1.0	24.0		--	1,2,3,9,35, 37	B
010406	Rotary Clear-View Screen	Repair							
		Replace			16.0			1	
		Inspect	0.3			8.0		11,16	
0105	Pilothouse	Repair		16.0	8.0			1,11,16	
		Replace			16.0			1,16,32,33, 35,37	
02	PROPULSION SYSTEM								
0201	Main Propulsion Engine	Repair							E

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
020101	Prelubrication Oil Pump	Inspect Repair	0.6		3.0			1,4,17,35, 36	
02010101	Pump End	Inspect Replace	0.6	3.0				1	
02010102	Electric Motor	Inspect Replace	0.2	2.0				1,16	
0202	Main Reduction Gear	Repair							F
020201	Reduction Gear Cooling Pump	Inspect Replace Repair	0.6	3.0	3.0	6.0		1,16 1,16	
0203	Propulsion Controls	Repair							G
0204	Engine Cooling System	Repair							H
020401	Keel Coolers	Inspect Repair		0.5	24.0			22,37	B
0205	Propulsion Shaft Couplings, Brakes, And Seals	Repair							B, I
0206	Propeller	Inspect Replace Repair		0.5	24.0			22,37	B B
0207	Engine Exhaust System	Inspect Replace Repair	1.0				12.0	-- -- 1,35-38	B B,J
0208	Lube Oil System								
020801	Piping	Inspect Replace Repair	2.0		5.0			-- --	B B

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD		SUSTAINMENT				
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
020802	Valves	Inspect Replace Repair	0.1	0.5 1.0				1,35,36 1	
020803	Lube Oil Purification System	Repair							K
020804	Lube Oil Transfer Pump	Inspect Service Replace Repair	0.6 0.3	3.0 2.0				1 1,16 1,4,17,25 35,36	
0209	Fuel System								
020901	Piping	Inspect Replace Repair	2.0				-- --		B B
020902	Valves	Inspect Replace Repair	0.1	2.0 1.0				1,36,38 1,36,38	
020903	Pump, Fuel Oil Transfer								
02090301	Pump	Inspect Service Replace Repair	0.6 0.3	2.0 2.0				135,36 1,4,17,35, 36	
02090302	Electric Motor	Inspect Replace	0.2	2.0				1,16	
020904	Fuel Oil Filter/ Water Separator (Engines)	Inspect Service Replace Repair	0.5	2.0 2.0			--	1,35,36 1,35,36	B
020905	Fuel Filter/ Water Separator (Fuel Transfer System)	Repair							L

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
03	ELECTRICAL SYSTEMS								
0301	Generator Set, Ships Service	Repair						M	
0302	Generator Set, Emergency	Repair						N	
0303	Electrical Power System	Inspect Test Adjust Replace Repair	2.0 1.0		2.0 1.0		-- 11	1,11,16	
030301	Switchboard, Main	Inspect Test Replace Repair	0.5 0.2				--	1,11,16	B P
030302	Switchboard, Emergency	Inspect Test Replace Repair	0.5 0.2				--	1,11,16	P
030303	Center, Load Engine Room Emergency	Inspect Replace	0.2		1.5 8.0			1,11,16	
03030301	Load Center Distribution Panel	Inspect Replace	0.2		1.5 8.0			1,11,16	
03030302	120V Emergency Load Center Distribution Panel	Inspect Replace	0.2		1.5 8.0			1,11,16	
030304	Panel, Power Distribution, Including Emergency	Inspect Replace	0.2		1.5 8.0			1,11,16	
03030401	220/110V Distribution Panel	Inspect Replace	0.2		1.5 8.0			1,11,16	
03030402	440V Power Panel No. 1	Inspect Replace	0.2		1.5 8.0			1,11,16	

**Table 1. MAC for Inland and Coastal Large Tug (continued)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
03030403	440V Power Panel No. 2	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030404	440V Power Panel No. 3	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030405	440V Power Panel No. 4	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030406	440V Power Panel No. 5	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030407	120V Distribution Panel No 1	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030408	120V Distribution Panel No 2	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030409	120V Distribution Panel No 3	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030410	120V Distribution Panel No 4	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030411	120V Emergency Distribution Panel No. 1	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030412	120V Main Deck, 01&02 Emergency Lighting Panel No.1	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030413	120V Exterior Emergency Lighting Panel No.2	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030414	120V Elex Distribution Panel	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030415	120V Pilot House Emergency Distribution Panel	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030416	01 & 02 Level Reheater 120V Fuse Box No. 1	Inspect Replace	0.2	1.5	8.0			1,11,16	



Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
03030417	Convection Heater 120V Fuse Box No. 2	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030418	Deck Reheater 120V Fuse Box No. 3	Inspect Replace	0.2	1.5	8.0			1,11,16	
03030419	220V Air Conditioning Distribution Panel	Inspect Replace	0.2	1.5	8.0			1,11,16	
0304	Lighting Fixture, Junction Box (Typical)	Inspect Repair		1.2 1.0				1,11	
0305	Lighting Fixture, Bracket (Typical)	Inspect Repair		1.2 1.0				1,11	
0306	Fluorescent Fixture, Recessed	Inspect Repair	0.5	1.2 1.0				11	
0307	Fluorescent Light, Surface Mount	Inspect Repair	0.5	1.2 1.0				11	
0308	Lighting Fixture, Watertight Incandescent Explosion Proof (Typical)	Inspect Repair		1.2 1.0				11	
0309	Floodlights	Inspect Replace Repair		2.0 1.5 0.5				11,16 11,16	
0310	Controllers, Motor	Inspect Replace Repair		0.5 3.0	8.0			11,16 11,16	Q Q

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
031001	Motor Controller: Cooling Pump, Reduction Gear 1 & 2; Pump, Sewage Discharge 1 & 2; Pump, Lube Oil Transfer; Pump, Potable Water 1 & 2; Fan, Galley Supply; Fan, Galley Exhaust; Fan, Sanitary Space Exhaust; Coil Unit, Crew Mess; Coil Unit, 01, 02, 03 Levels; Compressor, Air 1 & 2; Pump, Fuel Oil Transfer	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		1.0				11,16	
031002	Motor Controller: Pump AFFF	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		1.0				11,16	
031003	Motor Controller: Pump Lube Oil Priming 1	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		1.0				11,16	
031004	Motor Controller: Pump Lube Oil Priming 2	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		1.0				11,16	
031005	Motor Controller: Fan, Supply, AMS 1 & 2; Fan, Boat- swain's Store Room Supply; Fan, Arms Locker Exhaust	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		2.0				11,16	
031006	Motor Controller: Fan Engine Room Supply 1 & 2	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		1.0				11,16	
031007	Motor Controller: Fan Engine Room Exhaust 1 & 2	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		2.0				11,16	

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
031008	Motor Controller: Pump, Bilge & Ballast 1 & 2	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		2.0				11,16	
031009	Motor Controller: Pump, Fire & General Service, Emergency # 1	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		2.0				11,16	
031010	Motor Controller: Pump, Fire & General Service, Emergency # 2	Inspect		0.2					
		Replace			8.0			11,16	
		Repair		2.0				11,16	
031011	Motor Controller: Pump, Hot Potable Water, Recirculating	Inspect		0.2					
		Replace			4.0			11,16	
		Repair		1.0				11,16	
031012	Motor Controller: Fan Weld Hood Exhaust	Inspect		0.2					
		Replace			4.0			11,16	
		Repair		1.0				11,16	
0311	Battery Power Supply System	Inspect	1.0						
		Test		3.0				11,14,35, 36,38,39	
		Service		8.0				11,35,36, 38,39	
		Replace		8.0				11,35,36, 38,39	
031101	Charger, Battery	Repair		4.0				11,35,36, 38,39	
		Inspect	0.2						
		Replace			4.0			1,16	
0312	Illumination And Navigation Signals	Repair		1.0				1,16	
		Inspect	4.0						
		Test			1.5			1	
		Replace			8.0			11,16	
		Repair			10.0			11,16	

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS	
			FIELD		SUSTAINMENT					
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT			
			C	O	F	H	D			
031201	Searchlights	Inspect	1.0							
		Test	0.5							
		Service		0.5				1,11,35,37		
		Replace			6.0			11,16	R-U	
		Repair		6.0	16.0			1,11,12,16 35,37	R-U	
031202	Lights, Navigation (Running Lights)	Replace		1.0				11,16		
		Repair		1.0				11		
03120201	Lights, Navigation (Running Lights) Single	Replace		1.0				11,16		
		Repair		1.0				11		
03120202	Lights, Navigation (Running Lights) Double	Replace		1.0				11,16		
		Repair		1.0				11		
031203	Light, Yardarm Blinker And Key	Replace		4.0				11,16		
		Repair		4.0				11		
031204	Panel, Navigation Lighting	Inspect	0.5							
		Replace		1.0	8.0			11,16		
		Repair		1.0	8.0			11,16		
031205	Magnetic Compass	Repair							AQ	
04	COMMAND AND SURVEILLANCE									
0401	Interior Communications	Inspect	3.0							
		Test		2.0						
		Service	1.0							
		Replace		3.0				1,11		
		Repair		3.0	4.0			1,11,16		
040101	Telephones, Sound Powered	Inspect	6.0							
		Test		6.0						
		Replace			8.0			11		
		Repair			8.0			1,11,16		

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD		SUSTAINMENT				
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
040102	System, Intercommunication Public Announcing System	Inspect Replace Repair	1.0			4.0 4.0		11 1,11	
0402	Alarm System, Arms Storage And Radio Room	Test Repair	1.0	1.0				11,16	V
0403	Engine Order Telegraph (EOT)	Test Replace Repair	0.3			4.0 4.0		1,16 11	
0404	Alarm System, General	Inspect Replace Repair	1.0	2.0 2.0				11,16 11,16	
040401	Beacon, Rotating	Replace Repair		0.5 1.0				11,16 11,16	
040402	Charger, Battery	Inspect Replace Repair	0.2			1.0 1.0		1,16 1,11,16	
040403	Bank, Battery	Inspect Service  Replace  Repair	1.0	4.0 4.0 4.0				11,35,36, 38,39 1135,36, 38,39 11,35,36, 39	
0405	System, Entertainment	Replace Repair		1.0 1.0				11 11	
0406	Integrated Bridge System	Repair							W
0407	Communications Systems	Repair							W
0408	Global Maritime Distress and Safety System (GMDSS)	Repair							X

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD		SUSTAINMENT				
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
0409	Signal Horn	Inspect Replace	0.2	1.0				1,16	
05	AUXILIARY SYSTEMS								
0501	Engine Room Monitoring System	Repair							Y
0502	Tank Level Indicators	Inspect Test Adjust Calibrate Replace Repair	1.0	1.0 1.0 1.0 1.0 1.0	1.0 1.0 1.0 3.0		--	1 11 11 11 11,16 11,16,21	Z Z B Z Z
050201	Fluid Level Detection Devices	Inspect Replace			1.0 1.0			1 1,2,3,35, 37,40	Z Z
05020101	Transmitters	Inspect Replace			1.0 12.0			1 3,11,16	Z Z
05020102	Cable Assemblies	Inspect Replace			1.0 4.0			11,16 3,11,16	Z Z
050202	Day Tank High Level Alarm								
05020201	Alarm Panel	Replace Repair		2.0	2.0 2.0			11,16 1,11,16	
05020202	Level Sensor	Replace			8.0			1,11,16	
0503	Sewage Collection, Holding, and Transfer (CHT) System								
050301	Piping	Inspect Replace Repair	2.0				-- --		B B

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
050302	Valves	Inspect	0.5						
		Replace		1.0				1,35,36	
		Repair		2.0				1,35,36	
050303	Sewage Discharge Pump	Inspect	1.0						
		Service	1.0						
		Repair		1.0	3.0	6.0		1,31-35,37	
05030301	Pump End	Inspect	0.5						
		Replace			6.0			1,7,10	
		Repair			3.0	6.0		1,4,8,15, 36-38	
05030302	Electric Motor	Inspect	0.5						
		Replace		6.0				1,16	
		Repair			3.0	6.0		1,16,25, 27,36,38	
050304	Marine Sanitation System	Repair						AA	
0504	Work Boat	Repair						AB	
0505	Environmental Control System	Repair						AC	
0506	Oily Bilge System								
050601	Piping	Inspect	2.0						
		Service		1.0					
		Replace					--		
		Repair					--	B B	
050602	Valves	Inspect	0.5						
		Replace		1.0				1,35,36	
050603	Oily Bilge Pump	Inspect	0.6						
		Replace		2.0				1	
		Repair		3.0				1,23,24	
050604	Oily Waste Drain and Stowage Tank	Inspect	1.0						

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
050605	Oily Water Separator	Repair							AD
0507	Ballast System								
050701	Piping	Inspect Replace Repair	2.0					-- --	B B
050702	Valves	Inspect Replace Repair	0.5	1.0 2.0				1,35,36 1	
050703	Ballast Pump	Inspect Service Repair	1.0 1.0	1.0	3.0	6.0		1,16, 31-35,37	
05070301	Pump End	Inspect Service Replace Repair	0.5 0.5	18.0	3.0	6.0		1,7,10 1,4,8,15, 16,36-38	
05070302	Electric Motor	Inspect Replace Repair	0.5	8.0	3.0	6.0		1,5,7,16 1,16,25, 27,36	
0508	Steering Gear System	Repair							AE
0509	Bow Thruster Reduction Gear	Repair							AF
0510	Bow Thruster	Repair							AG
0511	Rudder	Replace Repair						-- --	B B
0512	Deck Machinery and Hydraulic System	Repair							AH
0513	Compressed Air System	Repair							AI



Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
0514	Refrigeration Machinery	Repair							AJ
0515	Fire Fighting System	Repair							AK
051501	Pump Drive Engine	Repair							AL
0516	Potable Water System								
051601	Piping	Inspect Replace Repair	2.0					-- --	B B
051602	Valves	Inspect Replace Repair	0.5	1.0 2.0				1,35,36 1	
051603	Potable Water Pump	Inspect Service Repair	0.6 0.6	2.0	3.0	6.0		1 1,8,11,16, 35,38	
05160301	Pump End	Inspect Replace Repair	0.3	3.0	3.0	6.0		1 1, 31-38	
05160302	Electric Motor	Inspect Replace	0.2	2.0				1,11,16	
051604	Water Purification Unit, Reverse Osmosis	Repair							AM
051605	Tank, Hydropneumatic	Inspect Replace	0.5	8.0	24.0			1,36,38	
05160501	Switch, Pressure	Inspect Replace	0.5	1.0				1,16	

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
051606	Proportioning Bromide Feeder System	Inspect	0.5						
		Test		0.5				30	
		Service		1.0					
		Replace		1.0				1,16	
		Repair		2.0				1,16,21	
051607	Heater, Hot Water	Inspect	0.5						
		Adjust		0.5				1	
		Replace		1.0	8.0			11,16	
		Repair		1.0	3.0			2,3,11,16	
051608	Hot Potable Water Recirculation Pump	Inspect	0.6						
		Replace		3.0				1,16	
0517	Fire and General Service Pump	Inspect	0.8						
		Alignment			3.0			1	
		Service Repair	0.8		3.0	6.0		1,8,16,35, 36,38	
051701	Pump End	Inspect	0.4						
		Service	0.4						
		Replace		3.0	3.0			1,10,28, 35,37	
051702	Electric Motor	Repair			6.0	12.0		1,8,27, 31-37	
		Inspect	0.5						
		Replace		3.0	3.0			1,7,10,16	
		Repair		1.0	3.0	6.0		1,7,16,25, 36,38	
		Service		0.5			1,4,25		
06	OUTFIT AND FURNISHINGS								
0601	Laundry Equipment	Repair						AN	
0602	Commissary Equipment	Repair						AO	

Table 1. MAC for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIP	(6) REMARKS	
			FIELD		SUSTAINMENT				
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT			DEPOT
			C	O	F	H			D
0603	Damage Control Equipment								
060301	Pump, Engine Driven Centrifugal (P100)	Repair				--	B, AP		
060302	Pumps, Portable, Electric	Inspect Repair	0.1	0.5			1		
060303	Fan, Vaneaxial (Water Driven Blower)	Repair				--	B		
0604	Work Shop Equipment								
060401	Press, Drill	Inspect Replace Service	0.2	2.0 0.5			1,16 1,16		
060402	Grinder, Bench	Inspect Replace Service	0.2 0.2	0.5 0.2			1,16 1,16		
060403	Machine, Arc Welding	Inspect Replace Repair	0.5	1.0	1.0		1,5,7,16 1,11,16,35		
07	ARMAMENT INSTALLATION								
0701	Ammunition Locker	Inspect Repair	0.5		2.0		1		
0702	Gun Mounts	Inspect Service	0.5	1.0			1		

Table 2. Tools and Test Equipment for Inland and Coastal Large Tug

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	C	Tool Kit, General Mechanic's	5180-00-629-9783	SC5180-90-CL-N55 (50980)
2	O	Torch Outfit, Cutting and Welding	3433-00-357-8116	SC3433-90-CL-N03 (50980)
3	C	Tool Kit, Welder's	5180-00-754-0661	SC 5180-90-N39 (81996)
4	C	Wrench, Torque 0-250 FT-LB	5120-00-640-6365	B107.14M (05047)
5	C	Sling, Endless 1" x 6'	3940-01-183-9412	3375957 (15434)
6	O	Extractor, Stuffing	5120-00-223-9556	GGG-E-950 (81348)
7	O	Hoist, Chain, Hand Operated, 3/4 Ton	3950-00-965-0096	MILH904 (81349)
8	F	Press, Arbor	3444-00-223-8359	02001 (15746)
9	O	Tool Kit, Carpenter's	5180-00-293-2875	SC5180-90-CL-N08 (50980)
10	O	Sling, Endless	3940-01-187-5870	3375958 (15434)
11	C	Tool Kit, Electrician's	5180-00-313-3045	SC5180-90-CL-N35 (50980)
12	F	Wrench, Lamp	5120-01-162-2912	9871 (10741)
13	O	Ammeter	6625-01-354-7300	DSA-2003 (58935)
14	O	Tester, Battery Electrolyte	6630-00-171-5126	6630-00-171-5126 (93489)
15	F	Tool Kit, Durco		78880689 (18930)
16	C	Multimeter, AN/PSM-45A	6625-01-265-6000	27 W/ACCE (89536)
17	O	Tool, Locknut		903090 (07524)
18	F	Gage, Pressure, Dial Indicating	6685-01-351-6868	G2515L (26952)
19	F	Bushing, Pipe	4730-01-235-5782	209P-12-4 (93061)
20	F	Riveter, Blind, Hand	3456-01-289-4310	HP-2 (10054)
21	F	Soldering Iron, Electric	3439-01-443-3704	SL325 (78976)
22	C	Flashlight, Watertight	6230-00-264-8261	MX-991/U (1CSX9)

Table 2. Tools and Test Equipment for Inland and Coastal Large Tug (continued)

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
23	F	Tool Kit, Master Mechanic's	5180-00-399-5273	SC5180-90-CL-N05 (55719)
24	O	Wrench, Torque, 0-600 IN-LB	5120-00-288-8865	B107.14M TY1CLBST3 (05047)
25	C	Lubricating Gun, Hand	4930-00-223-3389	7584 (0FKM1)
26	H	Hammer, Hand, Copper Soft Head	5120-00-224-4121	B751W (42380)
27	H	Puller, Mechanical, Gear and Bearing	5120-00-215-1880	1005 (45225)
28	F	Helmet, Safety, Construction, White	8415-00-935-3139	ISEA/ANSI Z89.1 (80204)
29	O	Wrench, Spanner	5120-00-293-0406	M7426529REV3PT1 (08452)
30	O	Test Kit, Sanitizer		ICQ-260 (93255)
31	H	Threading Set, Screw	5180-00-422-4975	GGG-T-330 (81348)
32	H	Drill, Electric, Portable 1/2	5130-00-293-1849	PD5130-00-293-1849 (80244)
33	H	Drill Set, Twist Set	5133-00-293-0983	DB129B (55719)
34	H	Drill Set, 1/2 IN to 1 IN	5133-00-293-1161	B94.11M (05047)
35	O	Goggles, Industrial	4240-00-190-6432	A-A-1110 (58536)
36	O	Gloves, Chemical and Oil Protective	8415-01-013-7384	MIL-G-87066 (81349)
37	O	Gloves, Leather	8415-01-394-0215	MTDC-918 SZ-L (80244)
38	F	Faceshield, Industrial	4240-00-542-2048	ANSI Z87.1 (80204)
39	O	Apron, Utility	8415-00-082-6108	A-A-55063 (58536)
40	F	Sander, Disk, Pneumatic	5130-00-340-0719	21 HR-550 (13797)

**Table 3. Remarks for Inland and Coastal Large Tug**

REFERENCE CODE	REMARKS
A	Service includes removing paint and rust, cleaning gaskets (on hatches) and painting. Dogs and hinges on hatches are to be freed, and cleaned of paint.
B	Depot Level Maintenance will be accomplished through the use of commercial activities on an as needed basis, or through the On-Conditional-Cyclic-Maintenance (OCCM) Program in accordance with AR 750-1, Para 5-13.
C	Tank/compartment is to be free of explosive/combustible fumes/liquids prior to any spark causing hot work.
D	Unit level tasks are for repairing oil leaks only.
E	Refer to TM 55-1925-208-24 for repair of the Main Propulsion Engines.
F	Refer to TM 55-1925-223-24&P for repair of the Main Reduction Gear.
G	Refer to TM 55-1925-222-24&P for repair of the Propulsion Controls.
H	Repair of Engine Cooling System Components is covered in the Main Propulsion Engine manual TM 55-1925-208-24.
I	Refer to TM 55-1925-228-24&P for repair of the Propulsion Shaft Couplings, Brakes, and Seals.
J	Repair of exhaust system below depot level is limited to replacement of insulation and limited welding. Exhaust components integral to the engine are covered in the Main Propulsion Engine Manual, Reference Code E.
K	Refer to TM 55-1925-213-24&P for repair of the Lubrication Oil Purification System.
L	Refer to TM 55-1925-283-12&P for repair of the Fuel Filter/Water Separator (Fuel Transfer System)
M	Refer to TM 55-1925-209-24 for repair of the Generator Set, Ship's Service.
N	Refer to TM 55-1925-210-24 for repair of the Generator Set, Emergency.
P	Repair of Voltmeter, Ammeter, Frequency Meter, Wattmeter, Phase Rotation Meter, and Synchroscope is by replacement of individual components only.
Q	Selection of overload relay coils, whenever possible, should be made from actual motor current as shown on the motor nameplate or as obtained from the motor manufacturer.
R	Test for system operation in both automatic and manual functions.
S	High pressure exists inside lamp when hot, and could explode. Protect eyes and body when lamp is lit.
T	Components of this group/system will be ordered, replaced and maintained individually.
U	CAUTION: Ensure polarity of power connection is correct or damage to equipment could result
V	Use Multimeter for continuity check.

**Table 3. Remarks for Inland and Coastal Large Tug (continued)**

REFERENCE CODE	REMARKS
W	Refer to TM 55-5825-311-10 for repair of the Integrated Bridge System (IBS) and the Command, Control, Communications, Computers and Intelligence - Surveillance and Reconnaissance (C4ISR) Systems.
X	Refer to TM 55-5830-283-10 for repair of the Global Maritime Distress and Safety System (GMDSS).
Y	Refer to TM 55-1925-225-24&P for repair of the Engine Room Monitoring System.
Z	Tanks must be prepared for confined space entry with Confined Space Entry Permit secured, IAW Organizational Confined Space Entry SOP and FM 55-502.
AA	Refer to TM 55-1925-284-14&P for repair of the Marine Sanitation System.
AB	Refer to TM 55-1945-224-14&P and TM 55-1945-221-14&P for repair of the Work Boat.
AC	Refer to TM 55-1925-224-24&P for repair of the Environmental Control Device.
AD	Refer to TM 55-1925-285-13&P for repair of the Oil Water Separator.
AE	Refer to TM 55-1925-215-24&P for repair of the Steering Gear System.
AF	Refer to TM 55-1925-214-24&P for repair of the Reversing Marine Gear, Bow Thruster.
AG	Refer to TM 55-1925-214-24&P for repair of the Bow Thruster Assembly and to TM 55-1925-212-24&P for repair of the Bow Thruster Engine.
AH	Refer to TM 55-1925-294-14&P for repair of the Deck Machinery and Hydraulic System.
AI	Refer to TM 55-1925-286-13&P for repair of the Air Compressor.
AJ	Refer to TM 55-1925-231-24&P for repair of the Refrigeration Machinery.
AK	Refer to TM 55-1925-292-14&P for repair of the Fire Fighting, Fire Alarm, and Fire Suppression Systems.
AL	Refer to TM 55-1925-211-24 for repair of the Engine Set, Pump Drive.
AM	Refer to TM 55-1925-282-14&P for repair of the Reverse Osmosis Water Purification Unit.
AN	Refer to TM 55-1925-233-24&P for repair of the Laundry Equipment.
AO	Refer to TM 55-1925-226-24&P for repair of the Commissary System.
AP	For Repair of P-100 Portable Pump refer to NAVSEA Technical Manual S6226-NM-MMC-010/15852, Revision B.
AQ	Refer to TM 55-1915-213-24&P for repair of the Magnetic Compass.

**END OF WORK PACKAGE**





**UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
REPAIR PARTS AND SPECIAL TOOLS LIST**

**INTRODUCTION**

**SCOPE**

This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of operator, unit, direct support, and general support maintenance of the Inland and Coastal Large Tug (LT). It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

**GENERAL**

In addition to the Introduction work package, this RPSTL is divided into the following work packages.

1. **Repair Parts List Work Packages.** Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts are listed with the component they mount on. Bulk materials are listed by item name in FIG. BULK at the end of the work packages. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.
2. **Special Tools List Work Packages.** Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.
3. **Cross-Reference Indexes Work Packages.** There are two crossreference indexes work packages in this RPSTL: the National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. The National Stock Number Index work package refers you to the figure and item number. The Part Number Index work package refers you to the figure and item number.

**EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES**

ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

SMR CODE (Column (2)). The SMR code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout:

<u>Source Code</u>	<u>Maintenance Code</u>		<u>Recoverability Code</u>
<u>XX</u>	<u>XX</u>		<u>X</u>
1st two positions: How to get an item.	3rd position: Who can install, replace, or use the item.	4th position: Who can do complete repair* on the item.	5th position: Who determines disposition action on unserviceable items.

\*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

Source Code. The source code tells you how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

<u>Source Code</u>	<u>Application/Explanation</u>
PA	Stock items; use the applicable NSN to requisition/request items with these source codes.
PB	They are authorized to the level indicated by the code entered in the 3rd position of the SMR code.
PC	
PD	
PE	
PF	
PG	
	<b>NOTE</b>
	Items coded PC are subject to deterioration.
KD	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
KF	
KB	
MO-Made at unit/AVUM level	Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the P/N in the DESCRIPTION AND
MF-Made at DS/AVIM level	USABLE ON CODE (UOC) column and listed in the bulk material group work package
MH-Made at GS level	of the RPSTL. If the item is authorized to you by the 3rd position code of the SMR code,
ML-Made at SRA	but the source code indicates it is made at higher level, order the item from the higher
MD-Made at depot	level of maintenance.
AO-Assembled by unit/AVUM level	Items with these codes are not to be requested/requisitioned individually. The parts that
AF-Assembled by DS/AVIM level	make up the assembled item must be requisitioned or fabricated and assembled at the
AH-Assembled by GS level	level of maintenance indicated by the source code. If the 3rd position of the SMR code
AL-Assembled by SRA	authorizes you to replace the item, but the source code indicates the item is assembled at
AD-Assembled by depot	a higher level, order the item from the higher level of maintenance.
XA	Do not requisition an "XA" coded item. Order the next higher assembly.(Refer to NOTE below.)
	If an item is not available from salvage, order it using the CAGEC and P/N.
XB	
XC	Installation drawings, diagrams, instruction sheets, field service drawings; identified by manufacturer's P/N.
XD	Item is not stocked. Order an XD-coded item through normal supply channels using the CAGEC and P/N given, if no NSN is available.

**NOTE**

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes except for those items source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

<u>Maintenance Code</u>	<u>Application/Explanation</u>
C -	Crew or operator maintenance done within unit/AVUM maintenance.
O -	Unit level/AVUM maintenance can remove, replace, and use the item.
F -	Direct support/AVIM maintenance can remove, replace, and use the item.
H -	General support maintenance can remove, replace, and use the item.
L -	Specialized repair activity can remove, replace, and use the item.
D -	Depot can remove, replace, and use the item.

Fourth Position. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

#### NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

<u>Maintenance Code</u>	<u>Application/Explanation</u>
O -	Unit/AVUM is the lowest level that can do complete repair of the item.
F -	Direct support/AVIM is the lowest level that can do complete repair of the item.
H -	General support is the lowest level that can do complete repair of the item.
L -	Specialized repair activity (enter specialized repair activity designator) is the lowest level that can do complete repair of the item.
D -	Depot is the lowest level that can do complete repair of the item.
Z -	Nonrepairable. No repair is authorized.
B -	No repair is authorized. No parts or special tools are authorized for maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is shown in the fifth position of the SMR code as follows:

<u>Recoverability Code</u>	<u>Application/Explanation</u>
Z -	Nonrepairable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
O -	Reparable item. When uneconomically repairable, condemn and dispose of the item at the unit level.

Recoverability Code	Application/Explanation
F -	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support level.
H -	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D -	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level.
L -	Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A -	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

NSN (Column (3)). The NSN for the item is listed in this column.

CAGEC (Column (4)). The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

PART NUMBER (Column (5)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

**NOTE**

When you use an NSN to requisition an item, the item you receive may have a different P/N from the number listed.

DESCRIPTION AND USABLE ON CODE (UOC) (Column (6)). This column includes the following information:

1. The federal item name, and when required, a minimum description to identify the item.
2. P/Ns of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.
3. Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.
4. The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

QTY (Column (7)). The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application.

**EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGES FORMAT AND COLUMNS**

1. National Stock Number (NSN) Index Work Package.

STOCK NUMBER Column. This column lists the NSN in National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

(e.g.,  $\frac{\text{NSN}}{5385-01-574-1476}$ )  
 $\frac{\text{NSN}}{\text{NIIN}}$

When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

**FIG. Column.** This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.

**ITEM Column.** The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

2. **Part Number (P/N) Index Work Package.** P/Ns in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

**PART NUMBER Column.** Indicates the P/N assigned to the item.

**FIG. Column.** This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.

**ITEM Column.** The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

**Fabrication Instructions.** Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk material are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source coded to be manufactured or fabricated are found in the applicable procedure.

**Index Numbers.** Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the NSN / P/N index work packages and the bulk material list in the repair parts list work package.

## **HOW TO LOCATE REPAIR PARTS**

1. **When NSNs or P/Ns Are Not Known.**

First. Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

Second. Find the figure covering the functional group or the subfunctional group to which the item belongs.

Third. Identify the item on the figure and note the number(s).

Fourth. Look in the repair parts list work packages for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

2. **When NSN Is Known.**

First. If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

3. **When P/N Is Known.**

First. If you have the P/N and not the NSN, look in the PART NUMBER column of the P/N index work package. Identify the figure and item number.

Second. Look up the item on the figure in the applicable repair parts list work package.

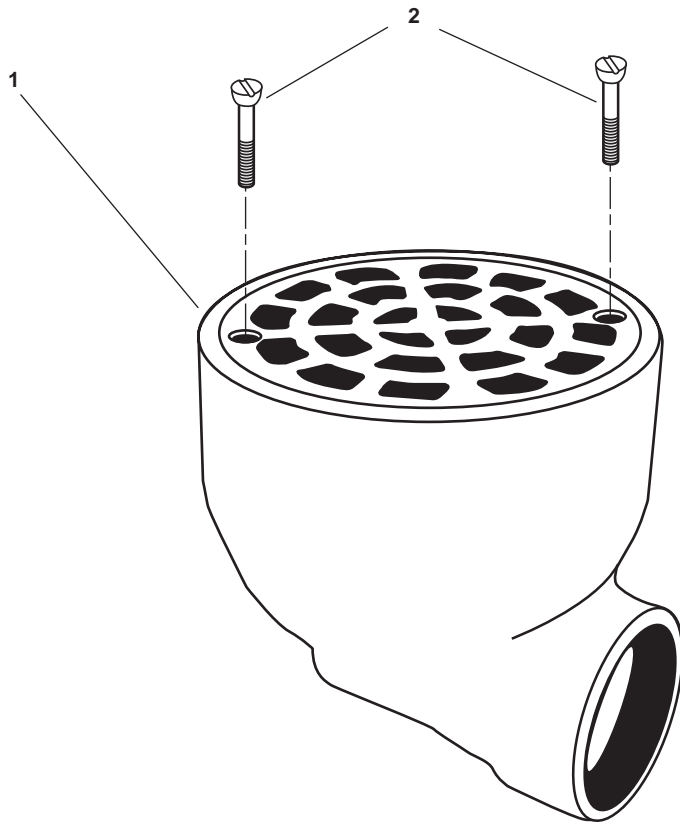


Figure 1. Hull, Bitts, Chocks, and Tiedowns

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0101	
					FIG 1 HULL, BITTS, CHOCKS, & TIEDOWNS	
1	PAOZZ	4730-01-529-0050	79128	234-1.5BF-WB	STRAINER,DECK DRAIN .....	1
2	PAOZZ	5305-01-529-0085	39428	90585A358	SCREW,SOCKET HEAD .....	3
					<b>END OF FIGURE</b>	

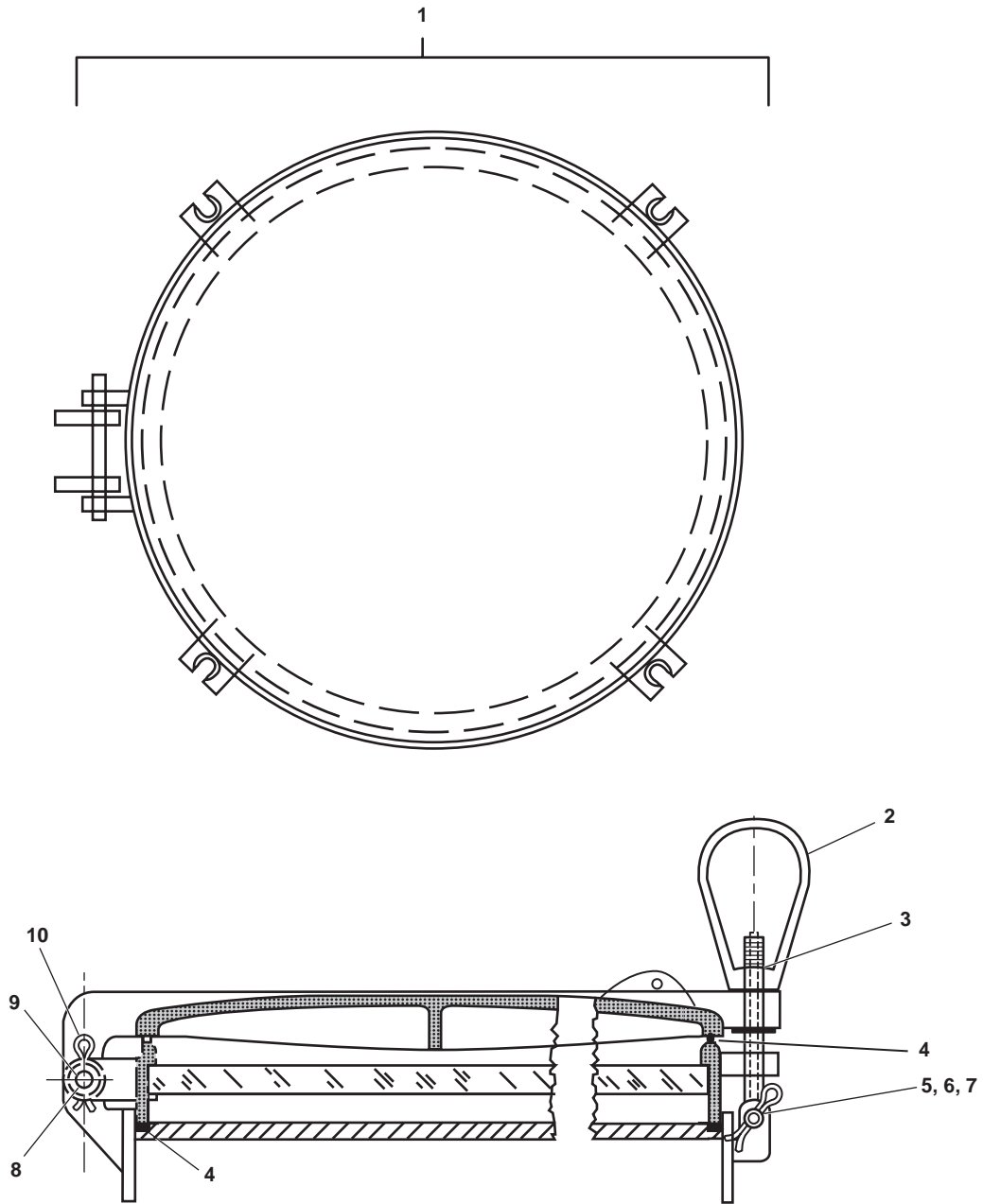


Figure 2. Portlight



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0104	
					FIG 2 PORTLIGHT	
1	PFOFF	2040-01-391-1975	21204	CC7135-16-BCUSS	PORTLIGHT .....	10
2	XDOZZ		21204	CC-7159-5B	.DOG,LOCKING .....	4
3	MOOZZ		21204	920SS-8 IN.	.ROD (MAKE FROM PN 920SS) .....	1
4	MFFZZ		81349	MILR900-28 IN.	.RUBBER STRIP (MAKE FROM PN MILR900) .....	1
5	PFOZZ	5310-00-167-0804	88044	AN960C616	.WASHER,FLAT .....	16
6	PFOZZ	5315-00-234-1856	80205	MS24665-155	.PIN,COTTER .....	8
7	PFOZZ	5305-00-145-0948	96906	MS35266-32	.SCREW,MACHINE .....	16
8	XDOZZ		21204	907SS	.ROD .....	V
9	PFOZZ	5310-00-167-0806	80205	NAS1149C0863R	.WASHER,FLAT .....	4
10	PFOZZ	5315-00-236-8359	80205	MS24665-370	.PIN,COTTER .....	2
					<b>END OF FIGURE</b>	

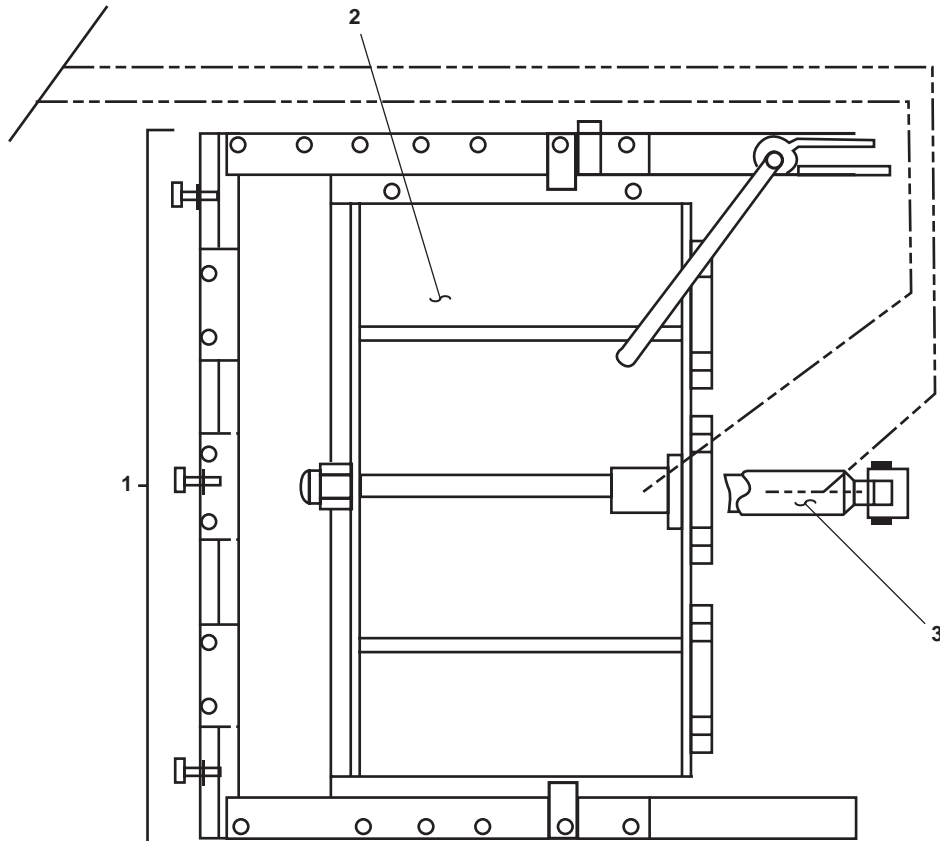


Figure 3. Hydraulic Watertight Doors (Sheet 1 of 9)

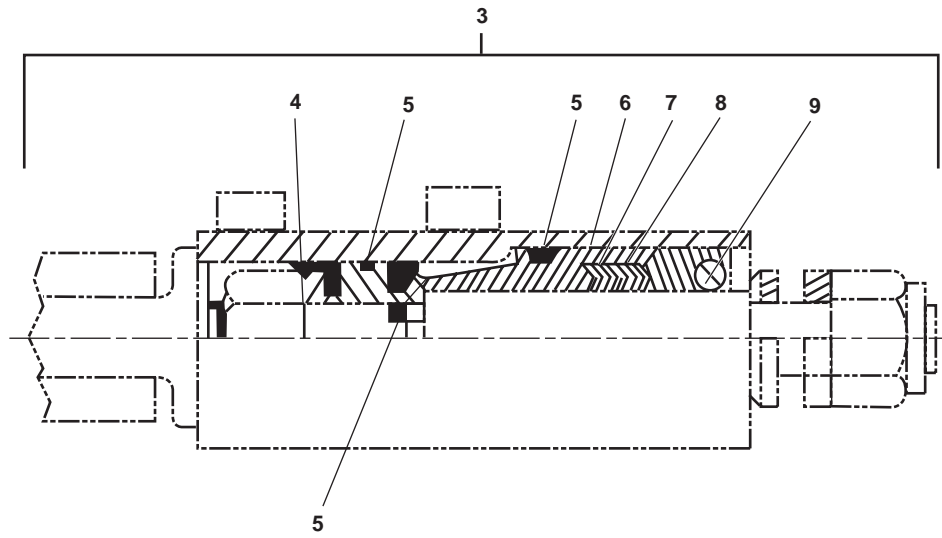


Figure 3. Hydraulic Watertight Doors (Sheet 2 of 9)

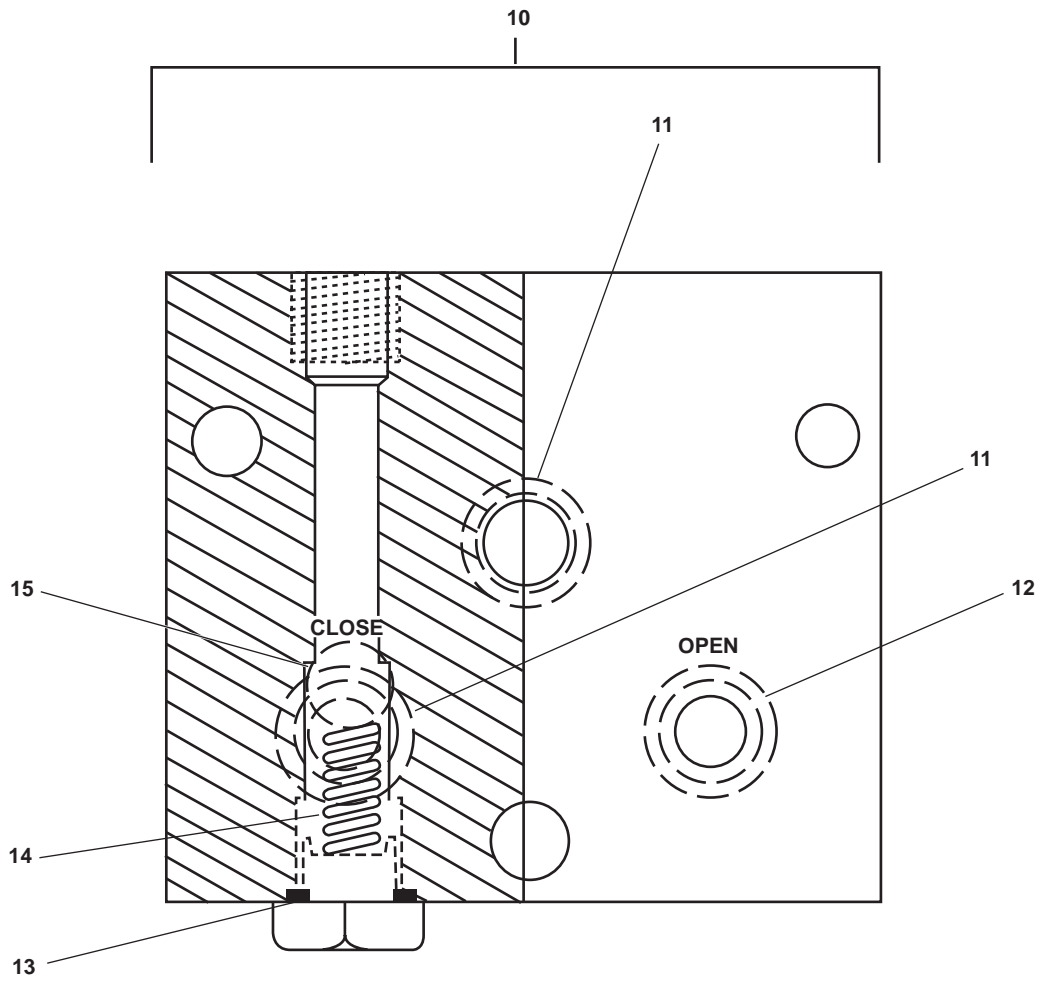


Figure 3. Hydraulic Watertight Doors (Sheet 3 of 9)

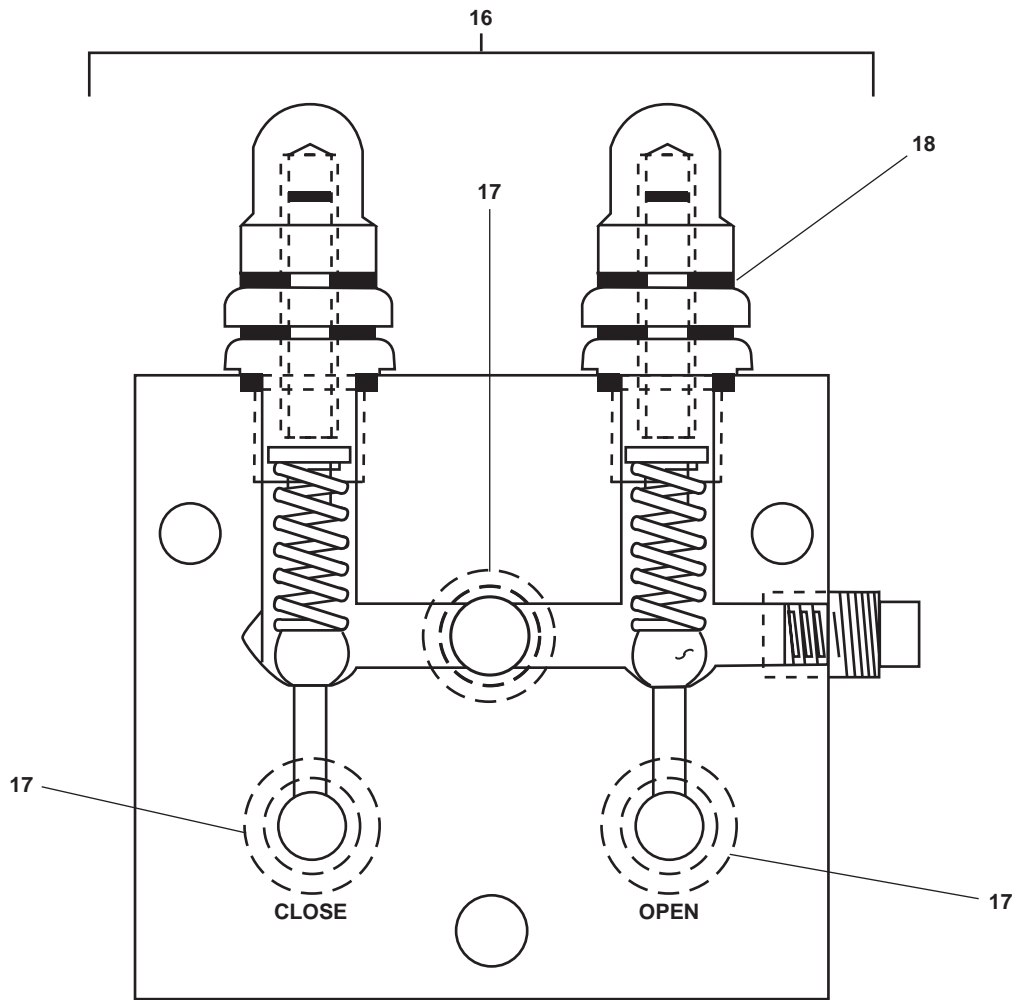


Figure 3. Hydraulic Watertight Doors (Sheet 4 of 9)

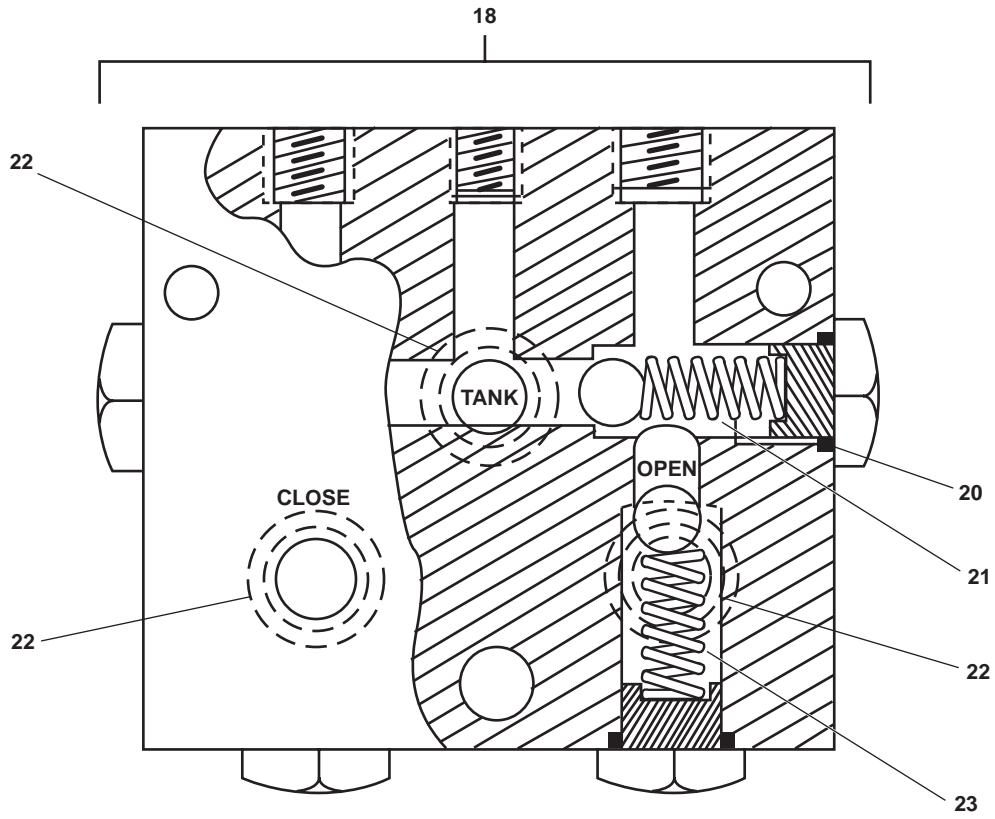


Figure 3. Hydraulic Watertight Doors (Sheet 5 of 9)

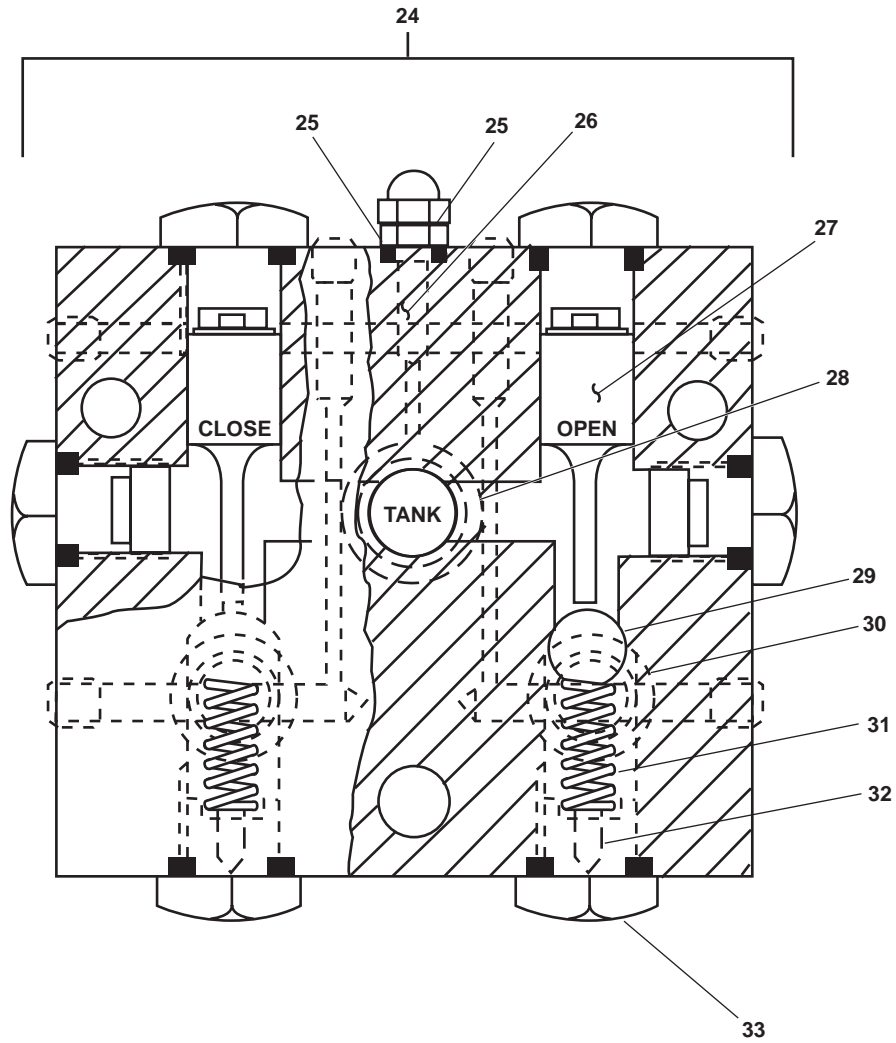


Figure 3. Hydraulic Watertight Doors (Sheet 6 of 9)

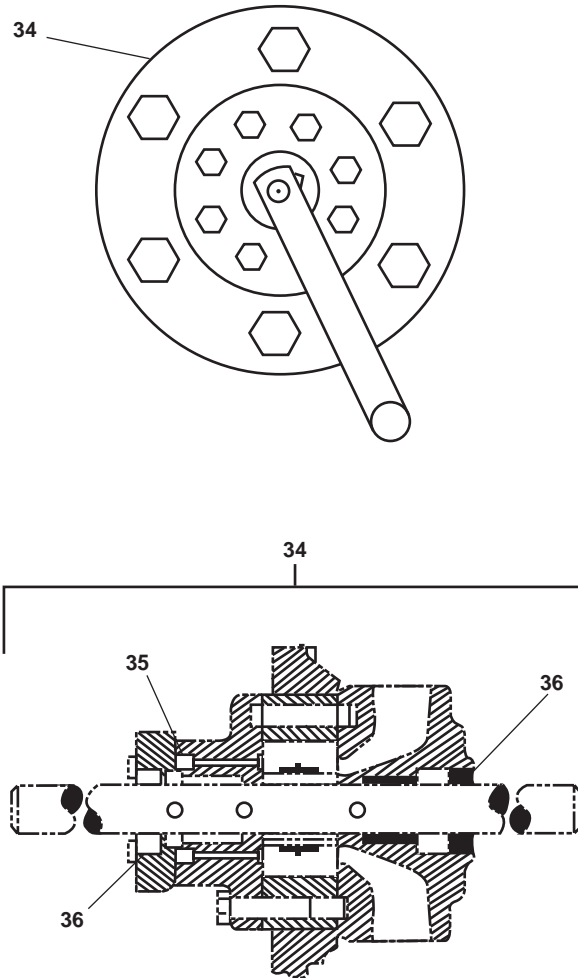


Figure 3. Hydraulic Watertight Doors (Sheet 7 of 9)



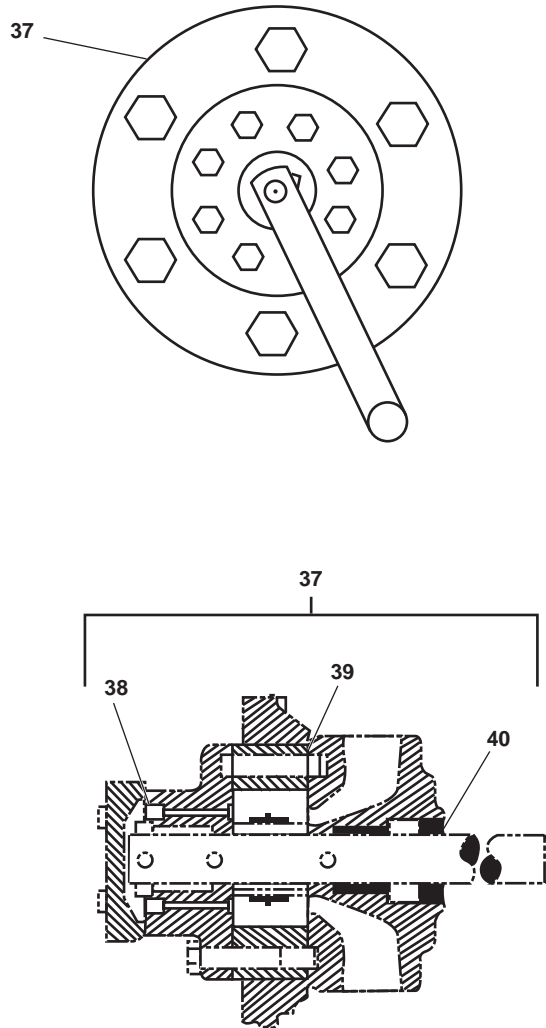


Figure 3. Hydraulic Watertight Doors (Sheet 8 of 9)

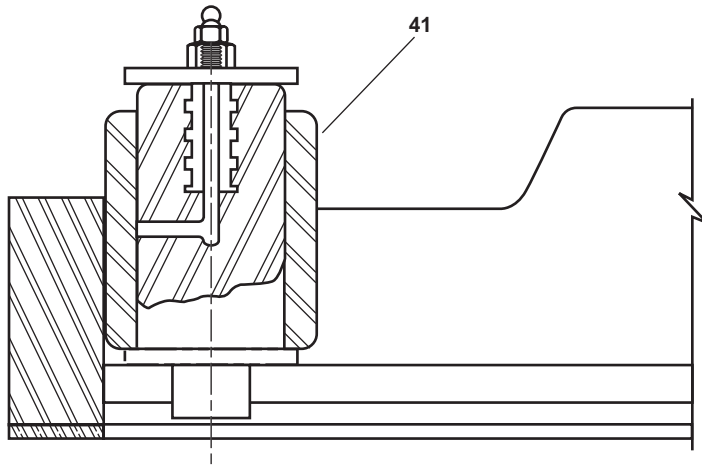


Figure 3. Hydraulic Watertight Doors (Sheet 9 of 9)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 010401	
					FIG 3 HYDRAULIC WATERTIGHT DOORS	
1	XDOFF		63705	D-WK-492-A8	DOOR, HYDRAULIC, WT DOOR, WATERTIGHT, SLIDING, HYDRAULIC, 40"X66" .....	1
2	PFZZ	2040-01-257-7664	63705	D-WK-492-A7	.DOOR, HYDRAULIC, WT DOOR, WATERTIGHT, SLIDING, HYDRAULIC, 40"X66" .....	2
3	PFZZ	3040-01-364-5402	63705	B-WK-406-C-1-B	.CYLINDER ASSEMBLY .....	1
4	PAFZZ	2030-00-968-9617	63705	CWK592-32AITEM5	.CUP, BITAN .....	2
5	PAFZZ	5331-00-811-6503	81343	MS29561-212	.O-RING .....	1
6	PFZZ	5365-01-348-3375	63705	4-7	.SPACER, SLEEVE .....	4
7	PAFZZ	5330-00-833-3498	63705	CWK653-9PC8	.PACKING, PREFORMED .....	3
8	PAFZZ	5325-00-804-2775	96906	MS16625-1287	.RING, RETAINING .....	1
9	PAFZZ	5330-00-599-5011	73680	63X760	.SEAL, PLAIN ENCASED .....	1
10	PFZZ	4820-01-115-5202	63705	D-WK-492-A6-9	.VALVE ASSEMBLY, MANI CONTROL VALVE ASSEMBLY, QUADRUPLE CHECK .....	4
11	PAFZZ	5331-00-618-0801	81343	MS28775-114	.O-RING .....	4
12	PAFZZ	5331-00-579-7916	81343	MS28775-115	.O-RING .....	4
13	PAFZZ	5331-00-618-0801	81343	MS28775-114	.O-RING .....	1
14	PAFZZ	5360-01-390-8409	63705	D-WK-492-A6-12-3	.SPRING, HELICAL, COMP .....	1
15	PFZZ	4820-01-436-4212	63705	D-WK-492-A6-PC12 -2	.BALL, CHECK .....	1
16	PAFFF	4820-01-298-5240	63705	D-WK-492-A6 PC11	.VALVE, SAFETY, RELIEF .....	1
17	PAFZZ	5331-00-618-0801	81343	MS28775-114	.O-RING .....	4
18	PAFZZ	5330-00-603-0195	83259	600-001-10	.PACKING W/ RETAINER .....	2
19	PFZZ	4820-01-298-5231	63705	D-WK-492-A6-PC12	.VALVE, CHECK .....	1
20	PAFZZ	5331-00-579-7916	81343	MS28775-115	.O-RING .....	4
21	PAFZZ	5360-01-390-8404	63705	D-WK-492-A6-9-3	.SPRING, HELICAL, COMP .....	2
22	PAFZZ	5331-00-618-0801	81343	MS28775-114	.O-RING .....	4
23	PAFZZ	5360-01-390-8403	63705	D-WK-492-A6-9-5	.SPRING, HELICAL, COMP .....	2
24	PFZZ	4820-01-298-5257	63705	D-WK-492-A6 PC10	.VALVE, SHUTTLE .....	1
25	PAFZZ	5331-00-579-3158	07060	2-008N300-9	.O-RING .....	2
26	PFZZ	4820-01-392-0369	63705	D-WK-492-A6-10-5	.VALVE, GLOBE .....	1
27	PFZZ	4820-01-391-7839	63705	D-WK-492-A6-10-6	.PISTON, VALVE .....	2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
28	PAFZZ	5331-00-618-0801	81343	MS28775-114	..O-RING .....	2
29	PFFZZ	4820-01-436-4217	63705	D-WK-492-A6-10-9	..BALL,VALVE,PORTED .....	2
30	PAFZZ	5331-00-618-0801	81343	MS28775-114	..O-RING .....	4
31	PAFZZ	5360-01-390-7080	63705	NO. 2 WK	..SPRING,HELICAL,COMP .....	2
32	PFFZZ	5315-01-436-7650	63705	D-WK-492-A6 PC10-11	..PIN,SPRING .....	2
33	PFFZZ	5365-01-436-2557	63705	D-WK-492-A6 PC10-2	..PLUG,MACHINE THREAD .....	6
34	PFFFF	4320-01-269-9562	63705	C-WK-437-37	..PUMP,ROTARY,LOCAL .....	1
35	PAFZZ	5330-00-540-2508	63705	20-22031-2	..GASKET,END CAP .....	2
36	PAFZZ	5330-01-164-7353	07334	2-28	..PACKING,PREFORMED .....	2
37	PFFFF	4320-01-269-9563	63705	C-WK-437-38	..PUMP,ROTARY,REMOTE .....	1
38	PAFZZ	5330-00-286-6816	63705	60250	..SEAL,PLAIN ENCASED .....	3
39	PAFZZ	5330-00-540-2508	63705	20-22031-2	..GASKET,END CAP .....	2
40	PAFZZ	5330-01-164-7353	07334	2-28	..PACKING,PREFORMED .....	2
41	PFOZZ	2040-01-453-7457	63705	A-WK-329-D15	..ROLLER,DOOR .....	4

END OF FIGURE



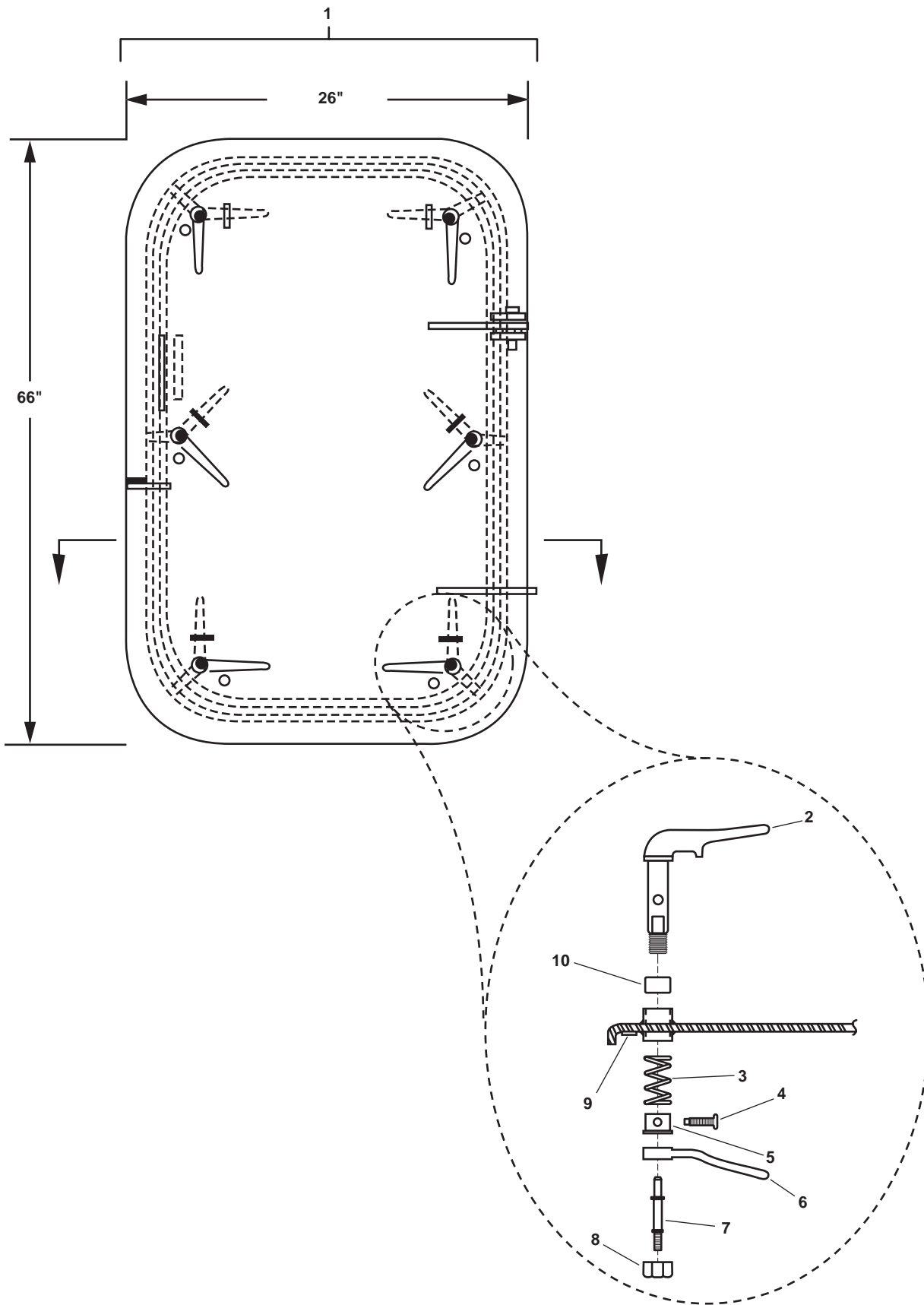


Figure 4. Watreight Doors (Sheet 1 of 9)

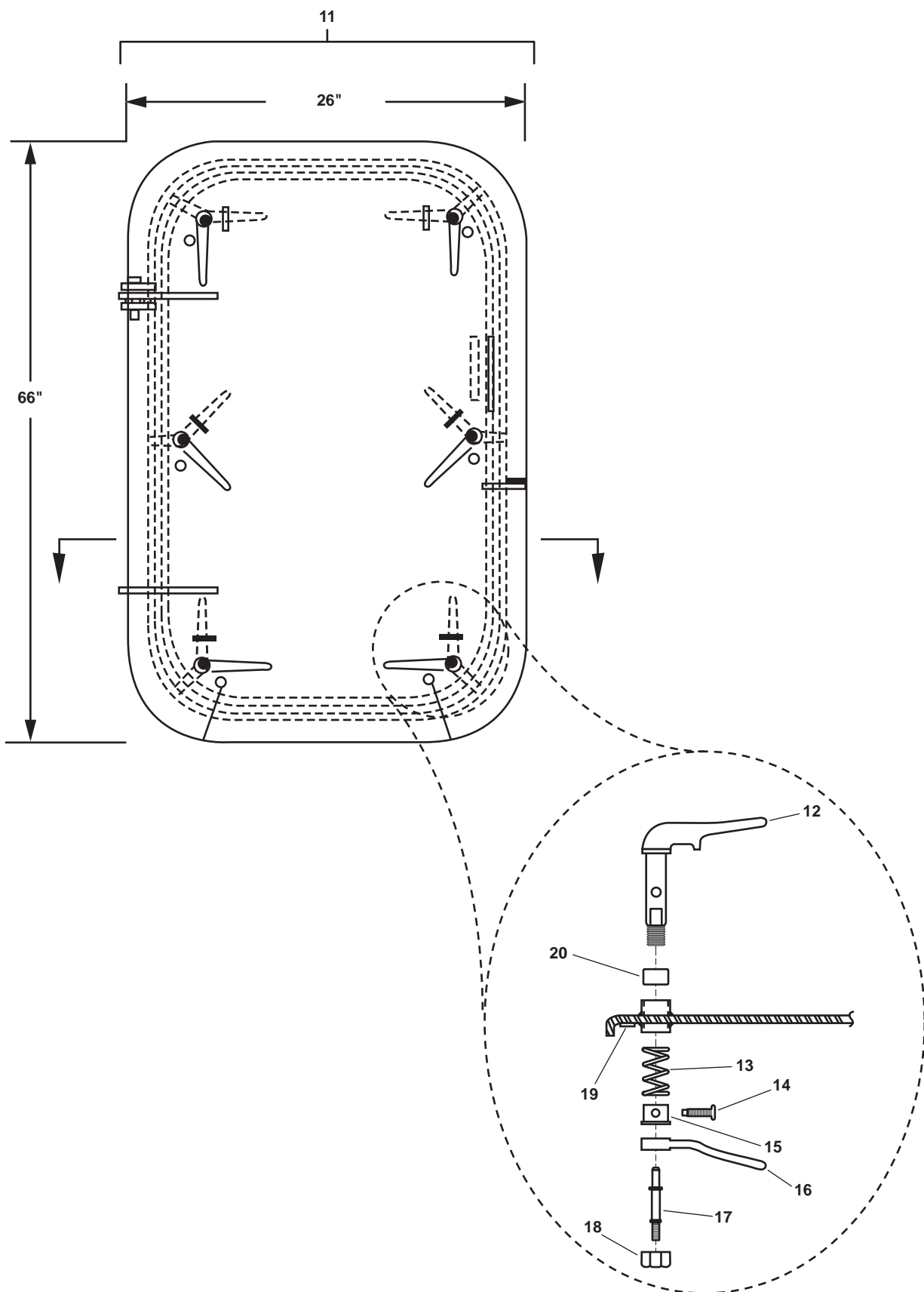


Figure 4. Watertight Doors (Sheet 2 of 9)

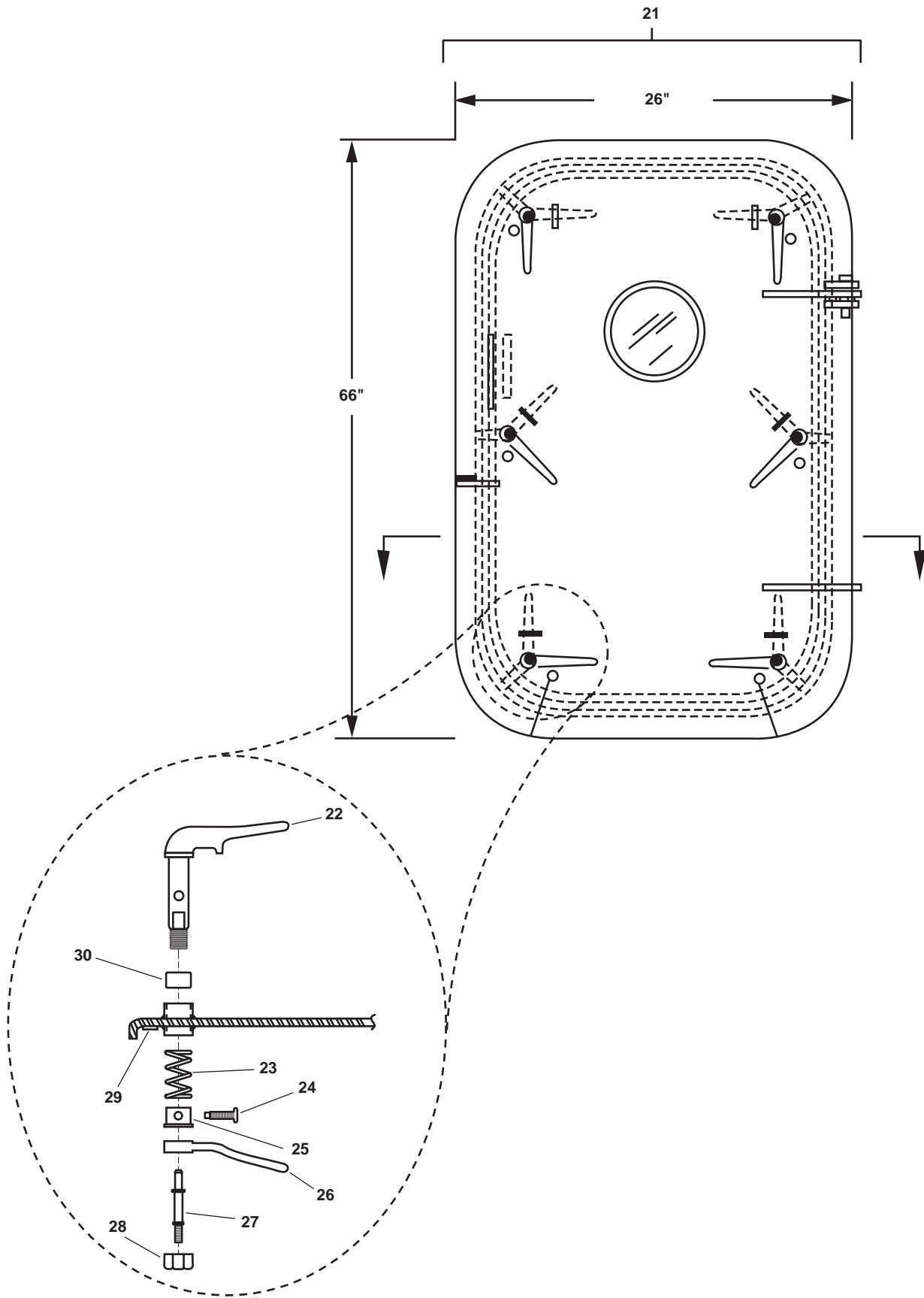


Figure 4. Watreight Doors (Sheet 3 of 9)



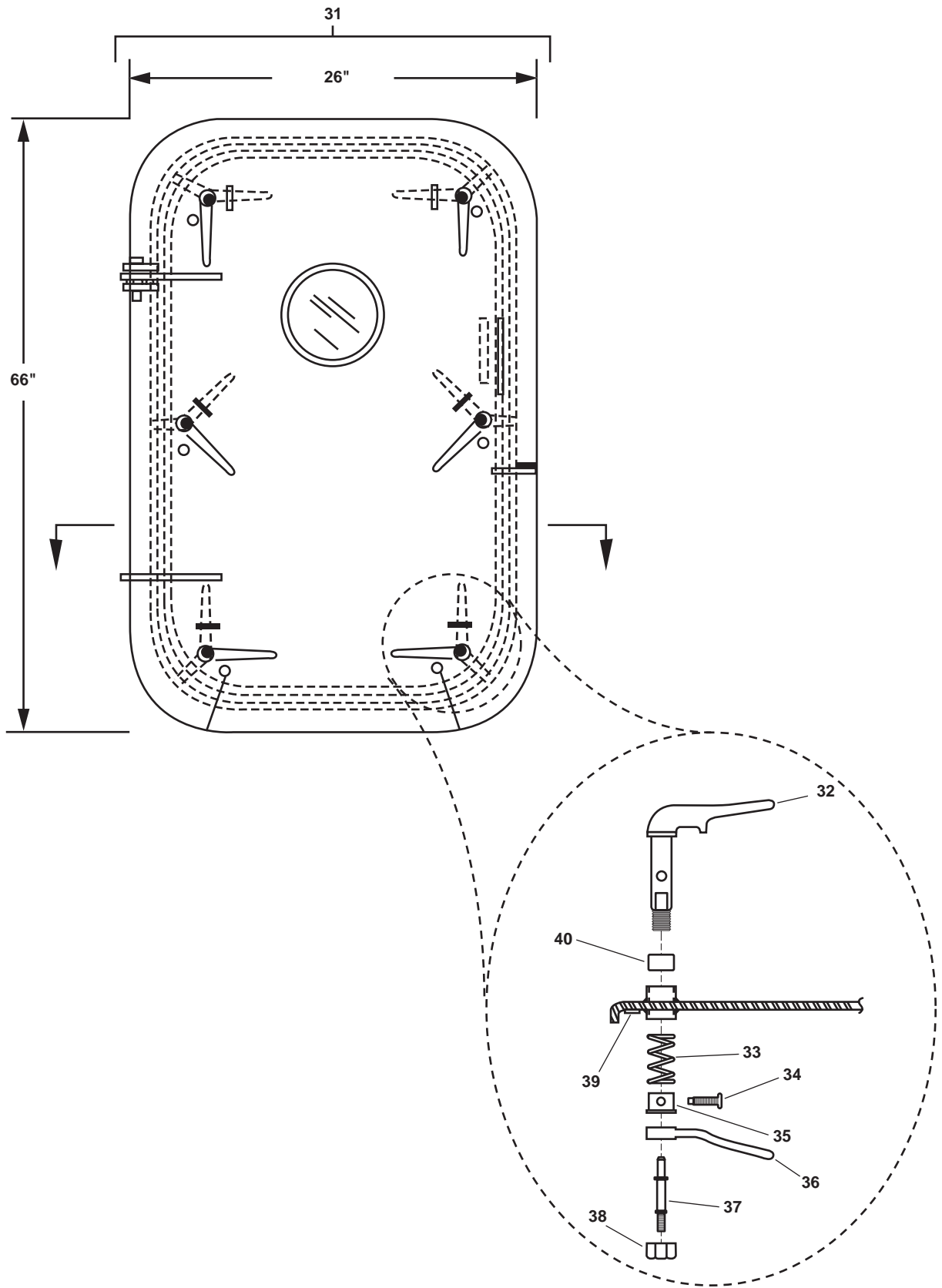


Figure 4. Watertight Doors (Sheet 4 of 9)

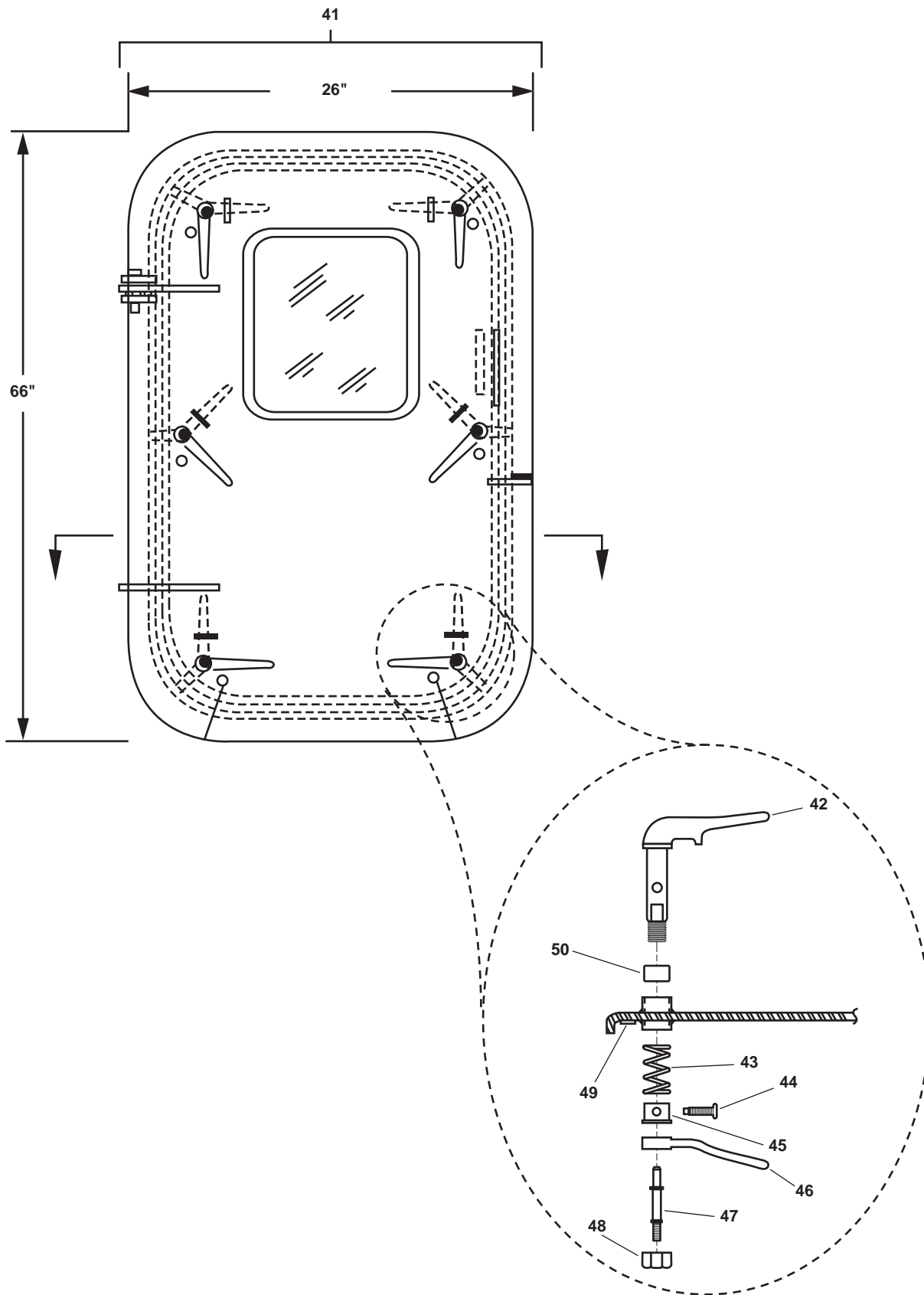


Figure 4. Watertight Doors (Sheet 5 of 9)

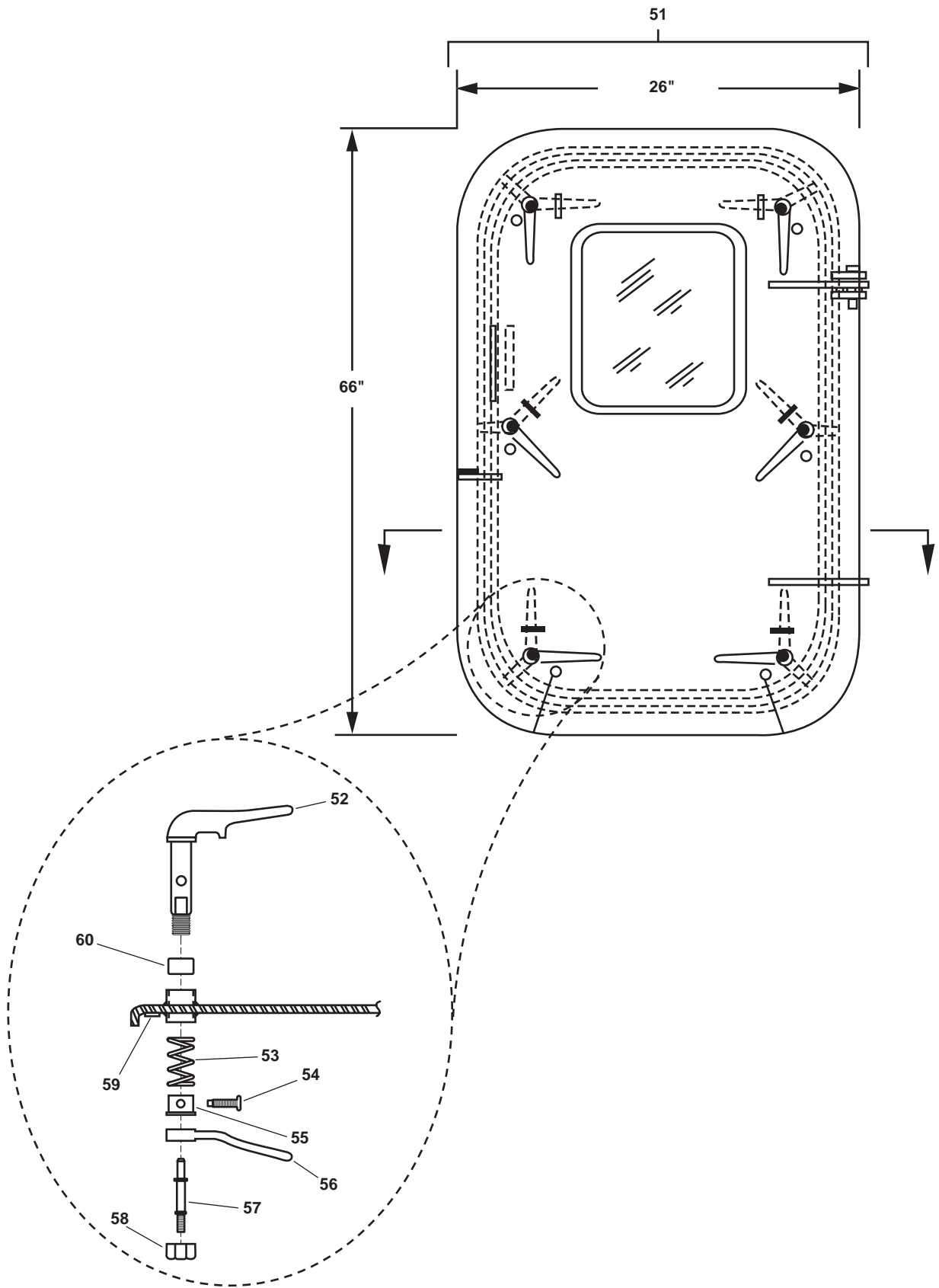


Figure 4. Watertight Doors (Sheet 6 of 9)

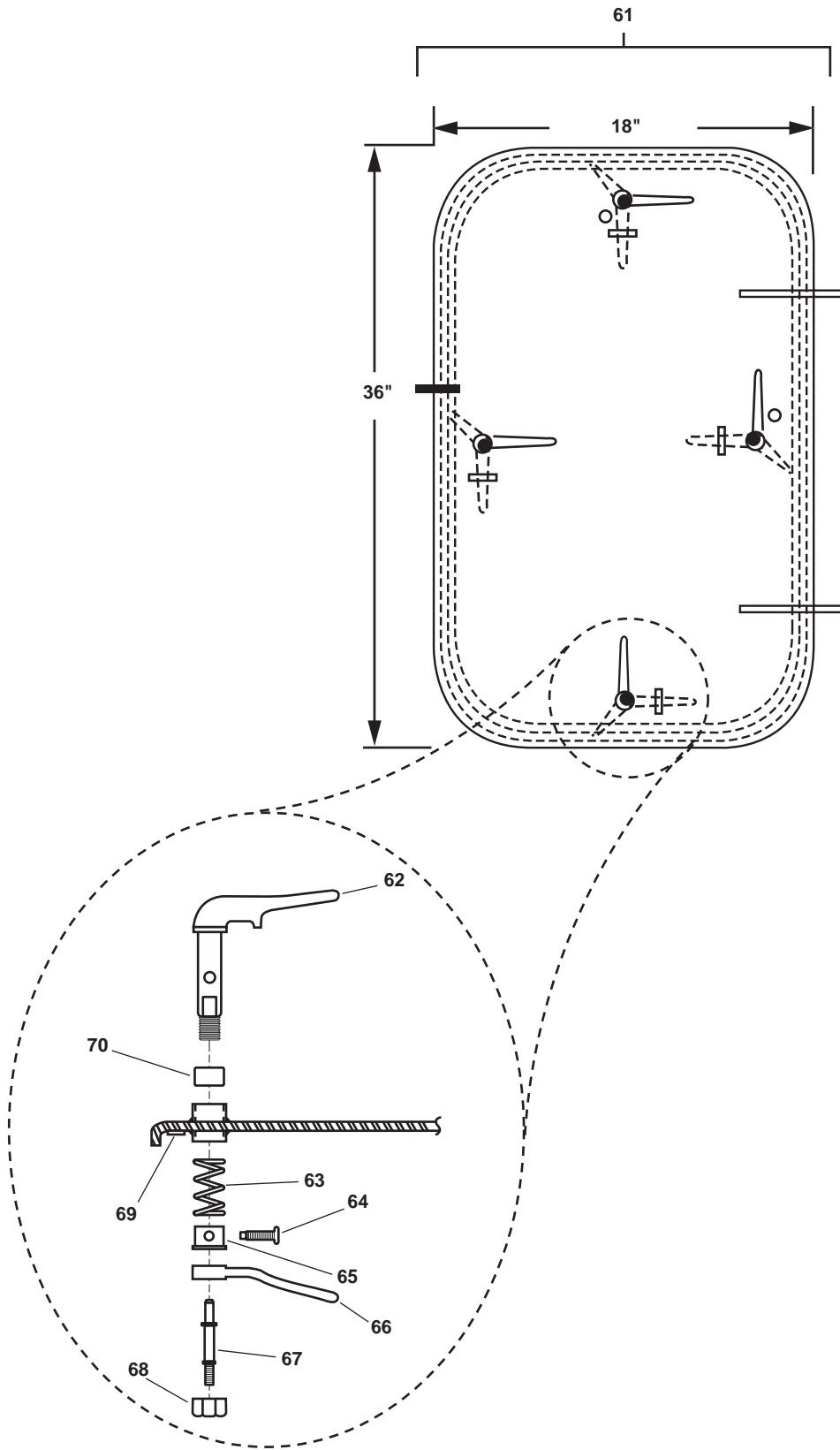


Figure 4. Watertight Doors (Sheet 7 of 9)

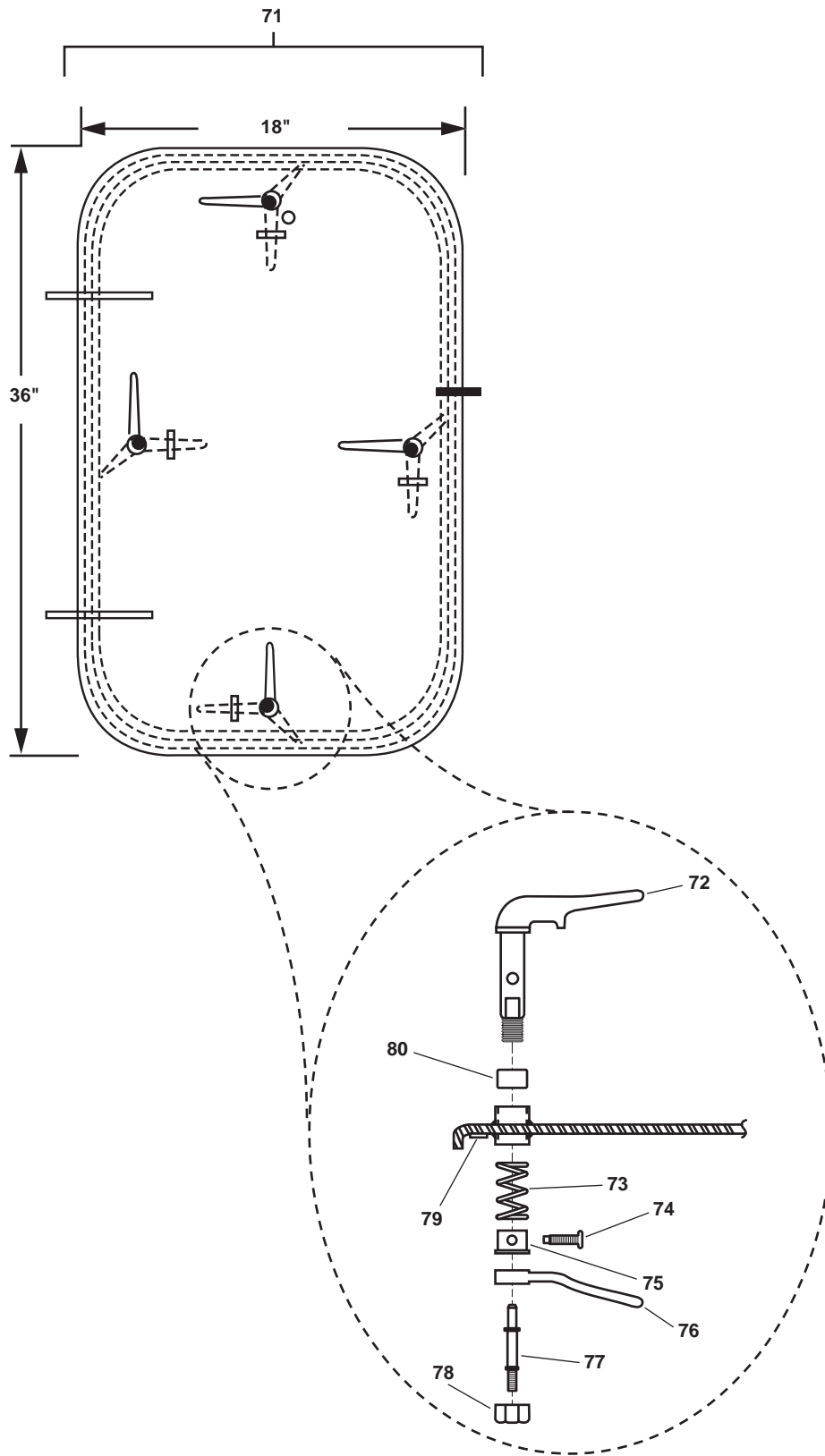


Figure 4. Watertight Doors (Sheet 8 of 9)

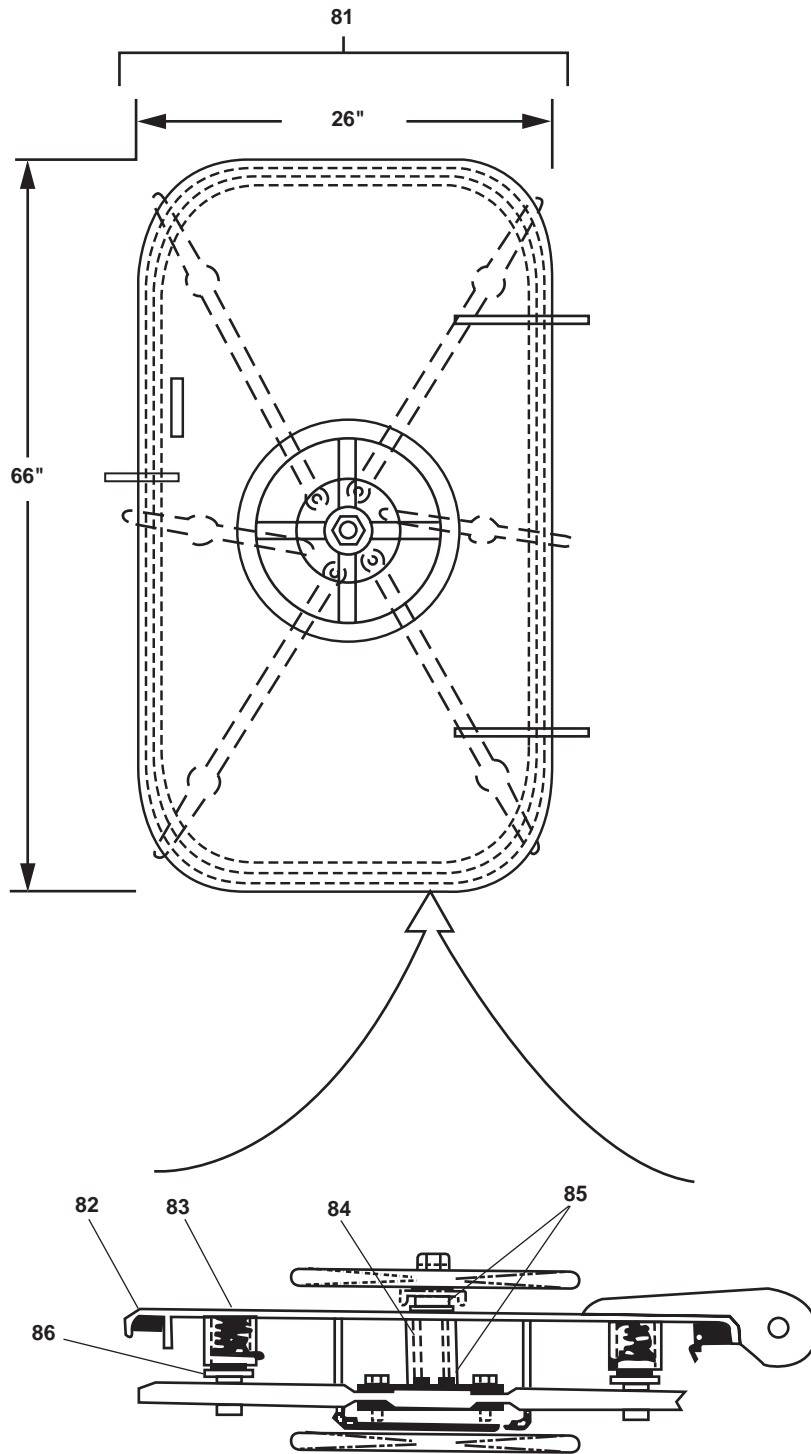


Figure 4. Watertight Doors (Sheet 9 of 9)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 010402	
					FIG. 4 WATERTIGHT DOORS	
1	XDOOO		81100	21-167002	DOOR,WATER TIGHT,LH WTD 6-DOG 26X66 LH .....	2
2	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	6
3	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	6
4	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	6
5	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	6
6	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	6
7	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	6
8	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	6
9	PAOZZ	5330-01-342-2552	81100	102-7	.GASKET .....	1
10	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	6
11	XDOOO		81100	21-167007	DOOR,WATER TIGHT,RH WTD 6-DOG 26X66 RH .....	2
12	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	6
13	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	6
14	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	6
15	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	6
16	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	6
17	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	6
18	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	6
19	PAFZZ	5330-01-342-2552	81100	102-7	.GASKET .....	1
20	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	6
21	XDOOO		81100	21-167005	DOOR,WATER TIGHT,LH WTD 6-DOG 26X66 LH, 3/4" PORT .....	3
22	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	6
23	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	6
24	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	6
25	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	6
26	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	6
27	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	6
28	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	6
29	PAOZZ	5330-01-342-2552	81100	102-7	.GASKET .....	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
30	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	6
31	XDOOO		81100	21-167004	DOOR,WATER TIGHT,RH WTD 6-DOG 26X66 RH, 3/4" PORT .....	2
32	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	6
33	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	6
34	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	6
35	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	6
36	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	1
37	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	6
38	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	6
39	PAOZZ	5330-01-342-2552	81100	102-7	.GASKET .....	1
40	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	6
41	XDOOO		81100	21-167008	DOOR,WATER TIGHT,RH WTD 6-DOG 26X66 RH,15 X 24 LT .....	1
42	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	6
43	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	6
44	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	6
45	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	6
46	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	1
47	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	6
48	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	6
49	PAOZZ	5330-01-342-2552	81100	102-7	.GASKET .....	1
50	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	6
51	XCOOO		19207	12492710	DOOR,WATER TIGHT,LH PILOTHOUSE WATERTIGHT DOOR .....	1
52	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	6
53	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	6
54	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	6
55	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	6
56	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	1
57	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	6
58	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	6
59	PAOZZ	5330-01-342-2551	81100	101-7	.GASKET .....	1
60	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	6



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
61	XDOOO		81100	21-167015	DOOR,WATER TIGHT,LH WTD 4-DOG 18X36 LH .....	2
62	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	4
63	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	4
64	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	4
65	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	4
66	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	1
67	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	4
68	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	4
69	PAOZZ	5330-01-342-2551	81100	101-7	.GASKET .....	1
70	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	3
71	XDOOO		81100	21-167016	DOOR,WATER TIGHT,RH WTD 4-DOG 18X36 RH .....	2
72	PAOZZ	2040-00-770-8387	53711	6397262	.DOG,DOOR,MARINE .....	4
73	PAOZZ	5360-00-690-5395	80064	805-1400067PC13	.SPRING,HELICAL,COMP .....	4
74	PAOZZ	5315-00-841-1390	80064	805-1400054PC6	.PIN,SHOULDER,HEADED .....	4
75	PAOZZ	3120-01-104-1108	80064	805-1400067 PIECE 4	.BEARING,SLEEVE .....	4
76	PAOZZ	5340-00-735-4565	80064	805-1400067PC2	.HANDLE,DOOR .....	4
77	PAOZZ	5305-01-104-1052	80064	803-1400067 PIECE 6	.SETSCREW .....	4
78	PAOZZ	5310-00-891-3461	96906	MS35691-67	.NUT,PLAIN,HEXAGON .....	4
79	PAOZZ	5330-01-342-2551	81100	101-7	.GASKET .....	1
80	PAOZZ	3120-00-999-3106	80064	803-1400067 PIECE 3	.BUSHING,SLEEVE .....	4
81	XDOOO		81100	21-167003	DOOR,WATER TIGHT,LH WTD QUICK- ACTING, 26X66,LH .....	1
82	PAFZZ	5330-01-342-2539	81100	104-7	.O-RING .....	1
83	PAOZZ	5360-01-348-3306	81100	104-27	.SPRING,HELICAL,COMP .....	2
84	PAOZZ	5331-01-342-2552	81100	102-7	.GASKET .....	1
85	PAOZZ	3120-01-348-3366	81100	104-21	.BUSHING,SLEEVE .....	2
86	PAOZZ	3120-01-348-3367	81100	104-28	.BUSHING,SLEEVE .....	2

END OF FIGURE



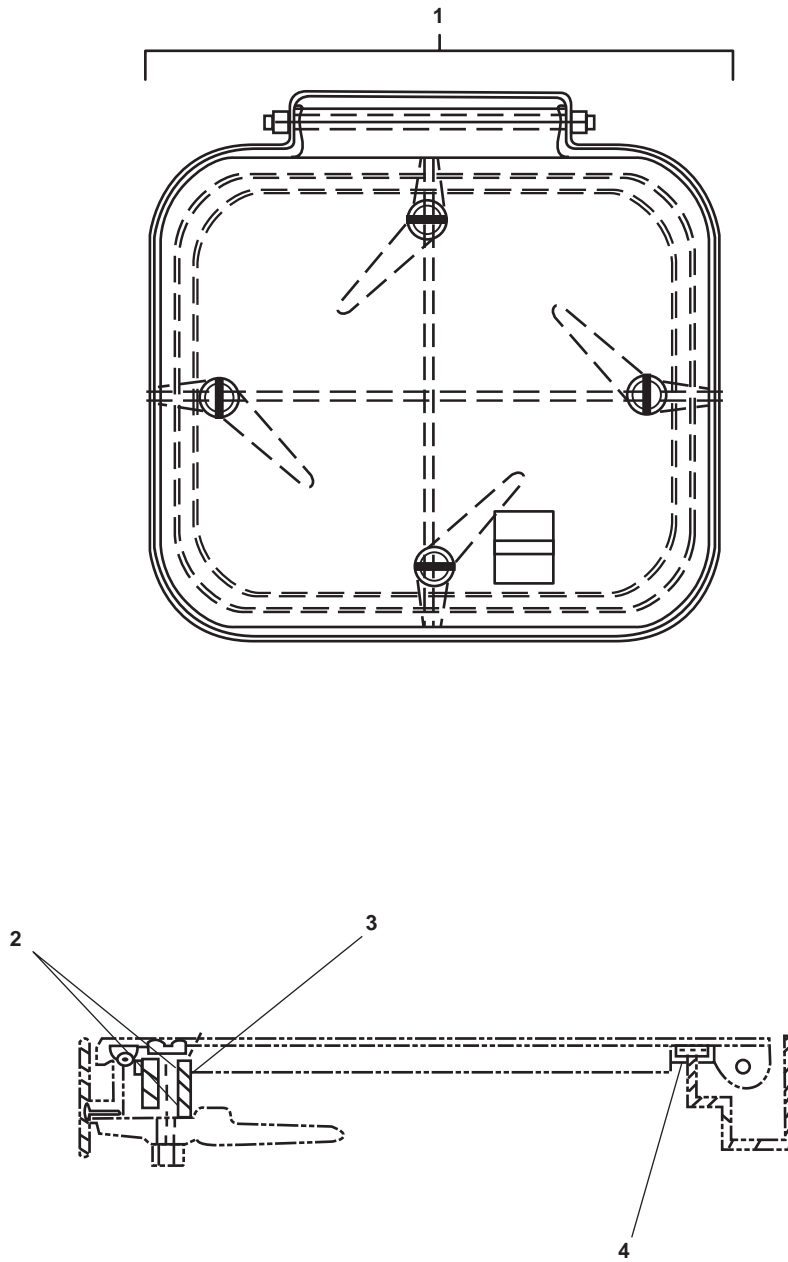


Figure 5. Watertight Hatches (Sheet 1 of 4)

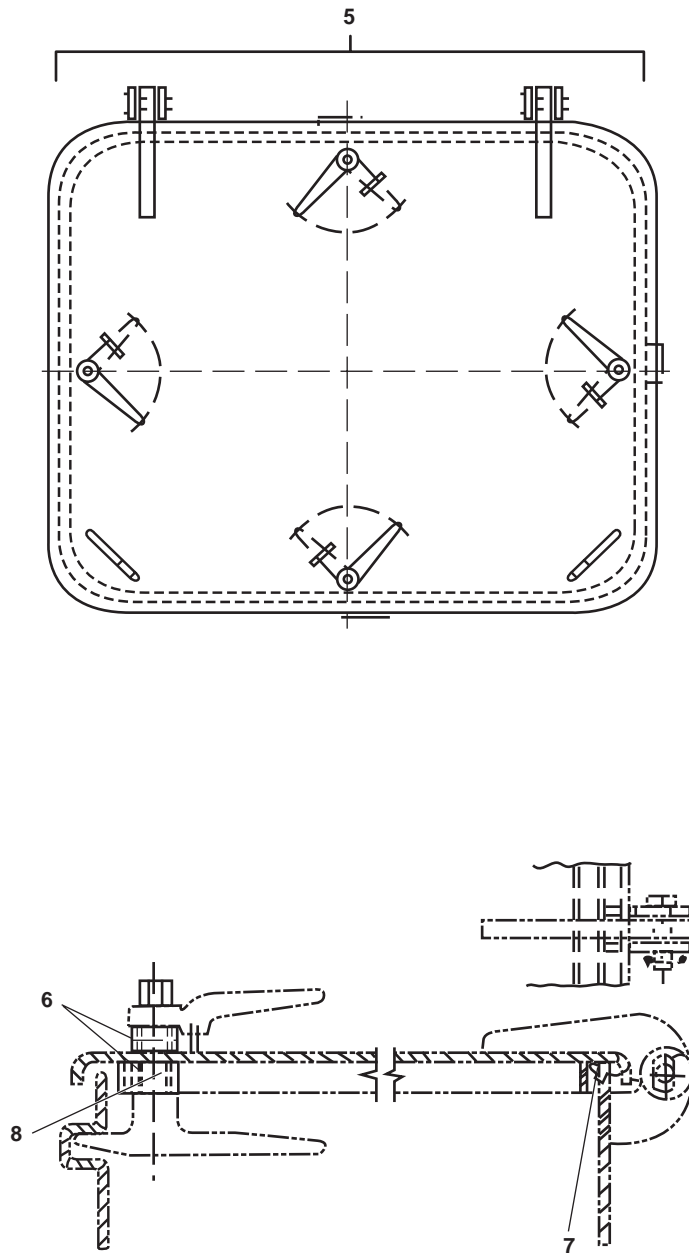


Figure 5. Watertight Hatches (Sheet 2 of 4)

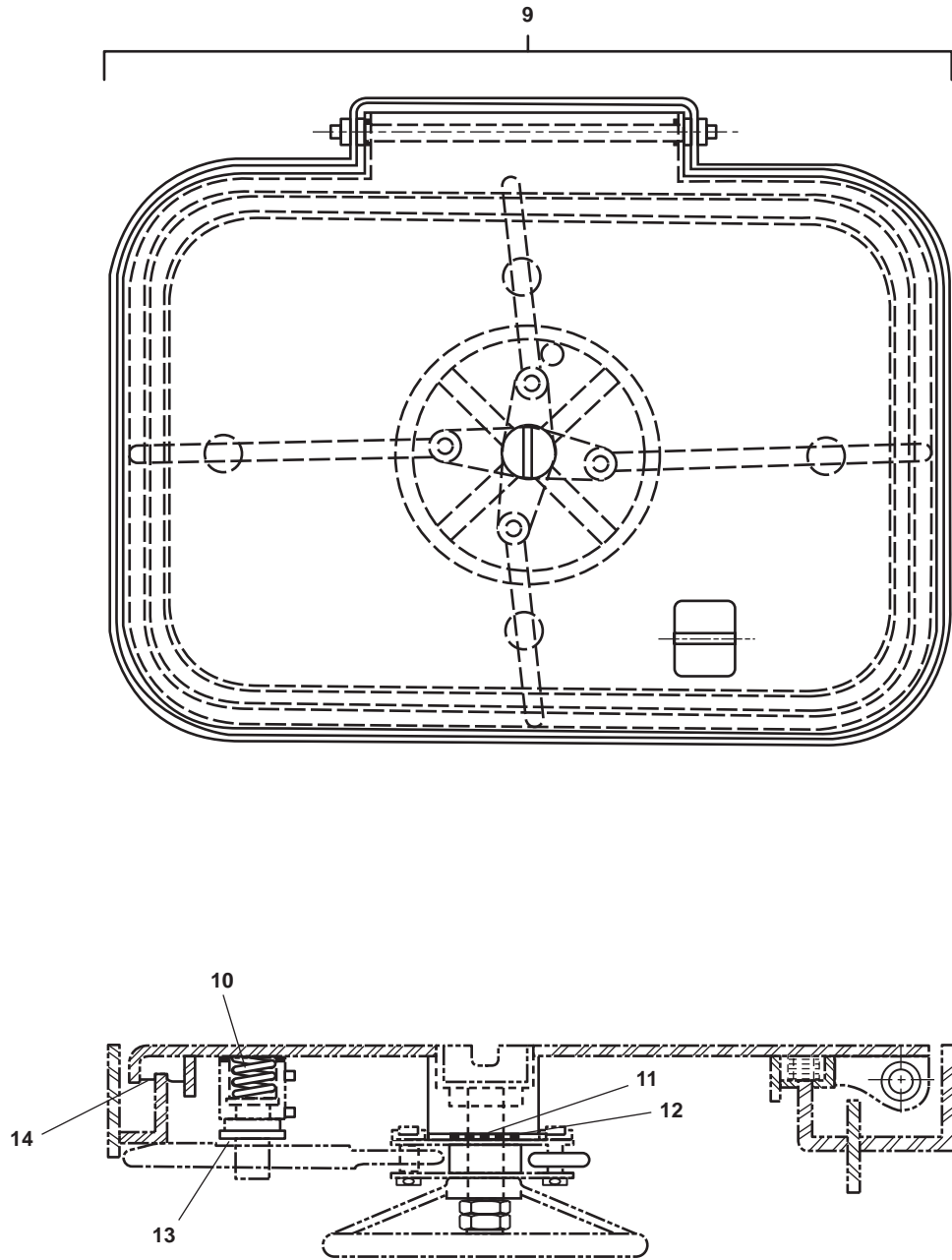


Figure 5. Watertight Hatches (Sheet 3 of 4)

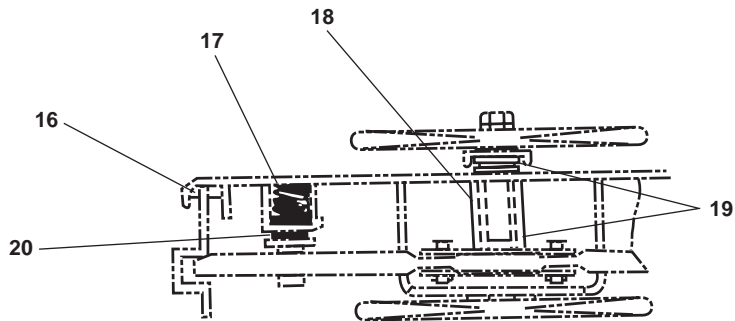
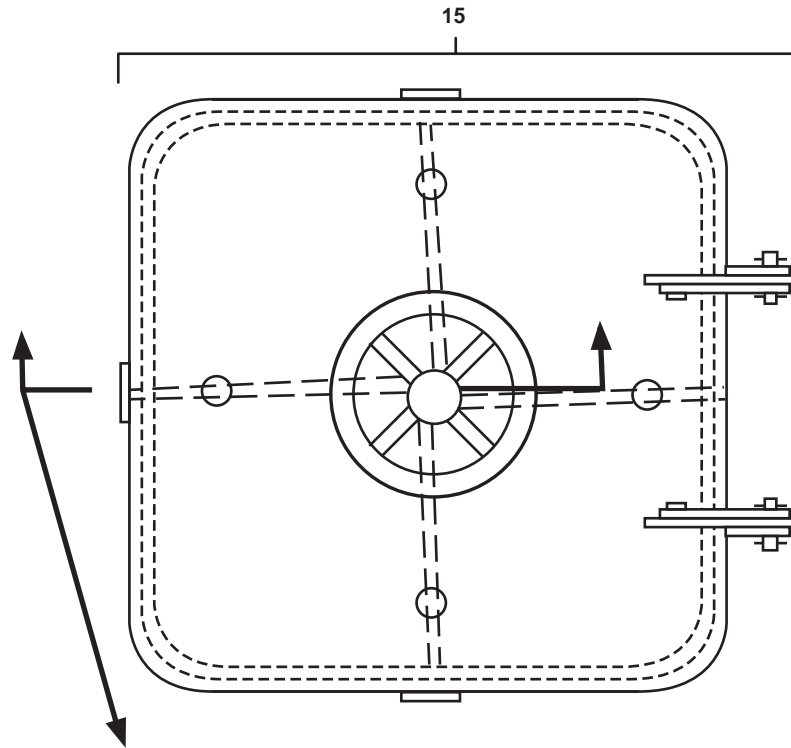


Figure 5. Watertight Hatches (Sheet 4 of 4)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 010403	
					FIG. 5 WATERTIGHT HATCHES	
1	XDOFF		81100	21-167014	HATCH,FWT HATCH,FWT,36X36 .....	2
2	PAOZZ	5331-01-342-2543	81100	201-19	.O-RING .....	1
3	PAOZZ	3120-01-348-4874	81100	201-18	.BUSHING,SLEEVE .....	2
4	PAFZZ	5330-01-348-8344	81100	201-8	.GASKET .....	1
5	XDOFF		81100	21-167013	HATCH,RSDWT HATCH,RSDWT,36X36 .....	2
6	PAOZZ	3120-01-348-4874	81100	201-18	.BUSHING,SLEEVE .....	2
7	PAFZZ	5330-01-348-8344	81100	201-8	.GASKET .....	1
8	PAOZZ	5331-01-342-2543	81100	201-19	.O-RING .....	1
9	XDOFF		81100	21-167010	HATCH,FQAWT HATCH,FQAWT,24X24 .....	1
10	PAOZZ	5360-01-348-8322	81100	202-17	.SPRING,HELICAL.COMP .....	1
11	PAOZZ	5331-01-342-2544	81100	202-13	.O-RING .....	1
12	PAOZZ	3120-01-348-3368	81100	202-21	.BUSHING,SLEEVE .....	2
13	PAOZZ	3120-01-349-9441	81100	202-16	.BUSHING,SLEEVE .....	2
14	PAFZZ	5330-01-342-2553	81100	202-7	.GASKET .....	1
15	XDOFF		81100	21-167011	HATCH,RQAWT HATCH,RQAWT,24X24 .....	3
16	PAFZZ	5330-01-342-2553	81100	202-7	.GASKET .....	1
17	PAOZZ	5360-01-348-8322	81100	202-17	.SPRING,HELICAL.COMP .....	1
18	PAOZZ	3120-01-348-3368	81100	202-21	.BUSHING,SLEEVE .....	2
19	PAOZZ	5331-01-342-2544	81100	202-13	.O-RING .....	1
20	PAOZZ	3120-01-349-9441	81100	202-16	.BUSHING,SLEEVE .....	2
					<b>END OF FIGURE</b>	

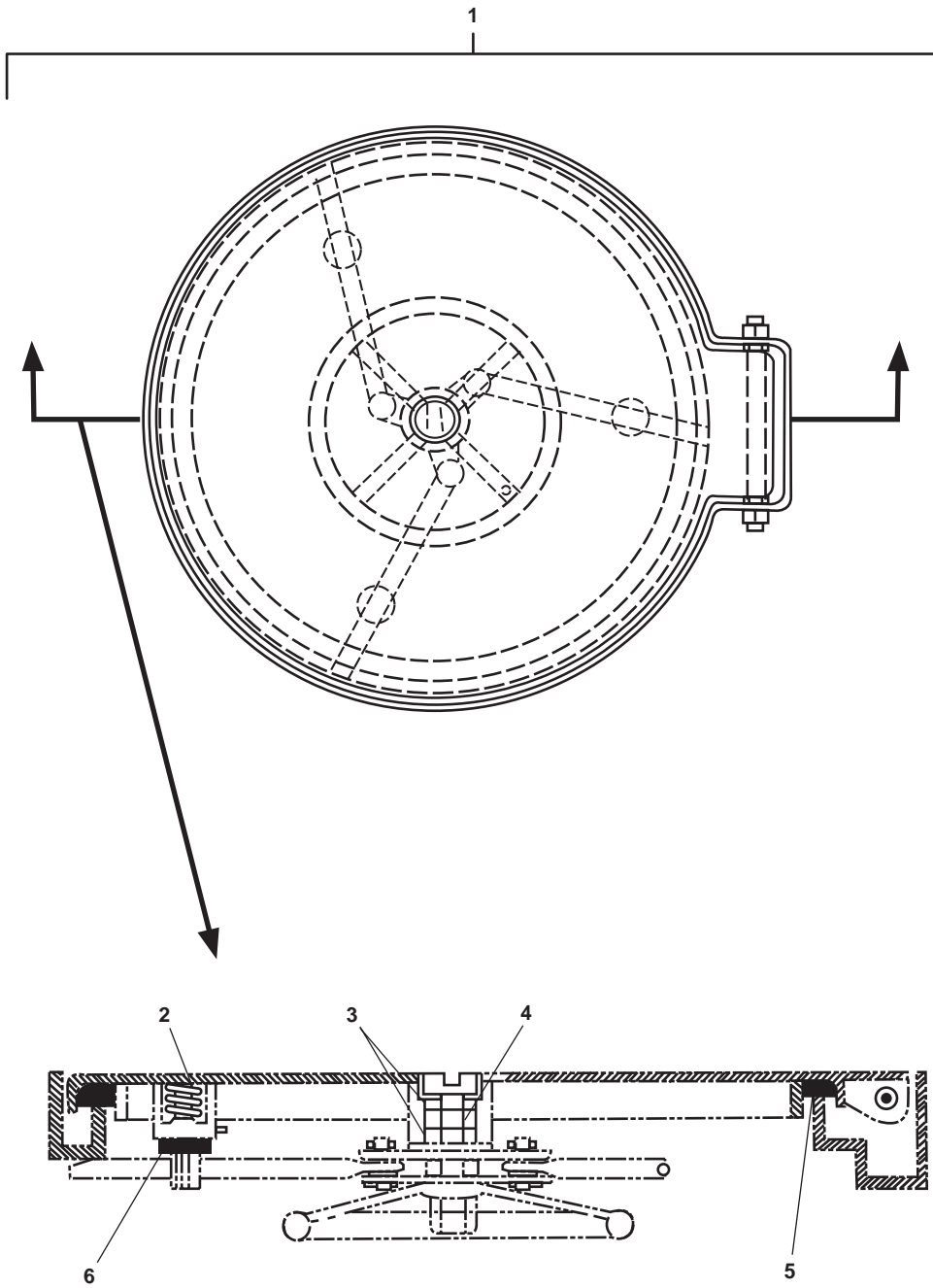


Figure 6. Watertight Scuttles



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 010404	
					FIG. 6 WATERTIGHT SCUTTLES	
1	XDOFF		81100	21-167001	SCUTTLE,FQAWT .....	2
2	PAOZZ	5360-01-348-8325	81100	401-25	.SPRING,HELICAL,COMP .....	1
3	PAOZZ	5360-01-348-8324	81100	401-26	.SPRING,HELICAL,COMP .....	1
4	PAOZZ	5331-01-342-2547	81100	401-18	.O-RING .....	1
5	PAFZZ	5330-01-348-6932	81100	401-9	.GASKET .....	1
6	PAOZZ	3120-01-348-6966	81100	401-17	.BUSHING,SLEEVE .....	1
					<b>END OF FIGURE</b>	

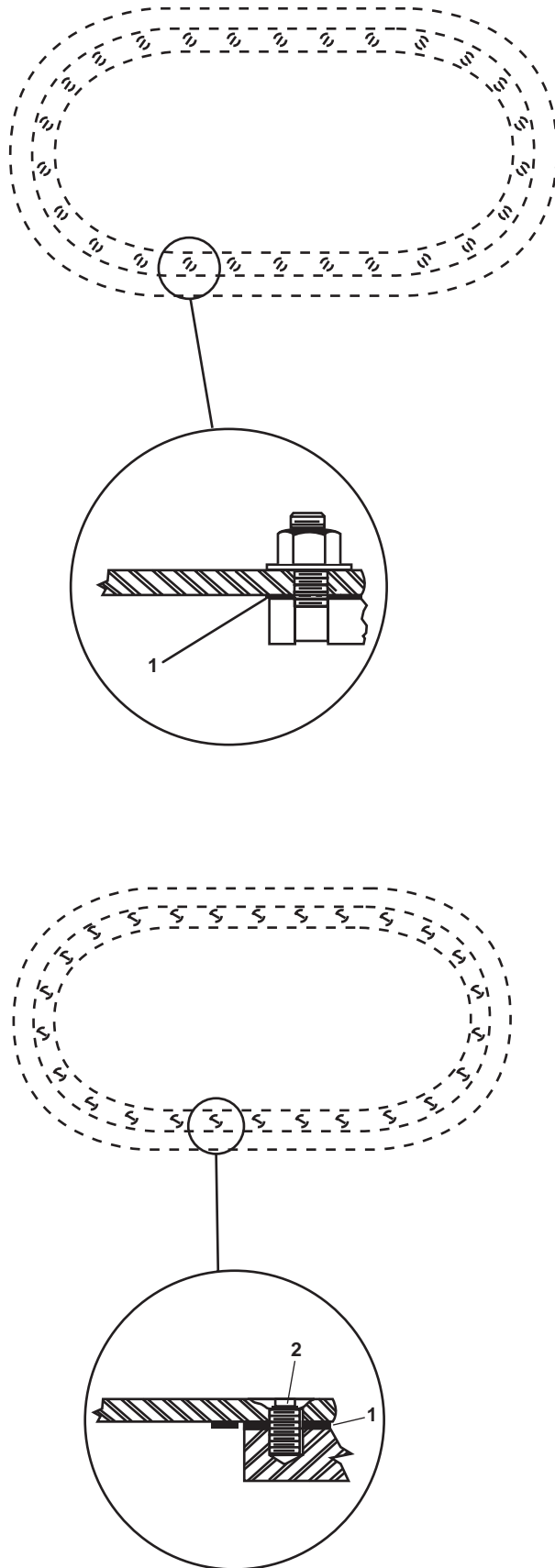


Figure 7. Watertight Manholes

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 010405	
					FIG 7 WATERTIGHT MANHOLES	
1	MOOZZ		81349	MIL-G-1149-OVAL CUT TO FIT	GASKET,MANHOLE (MAKE FROM PN MIL-G-1149) .....	1
2	PFOZZ	5305-00-827-7834	96906	MS35307408	SCREW,CAP,HEXAGON H .....	V
					<b>END OF FIGURE</b>	



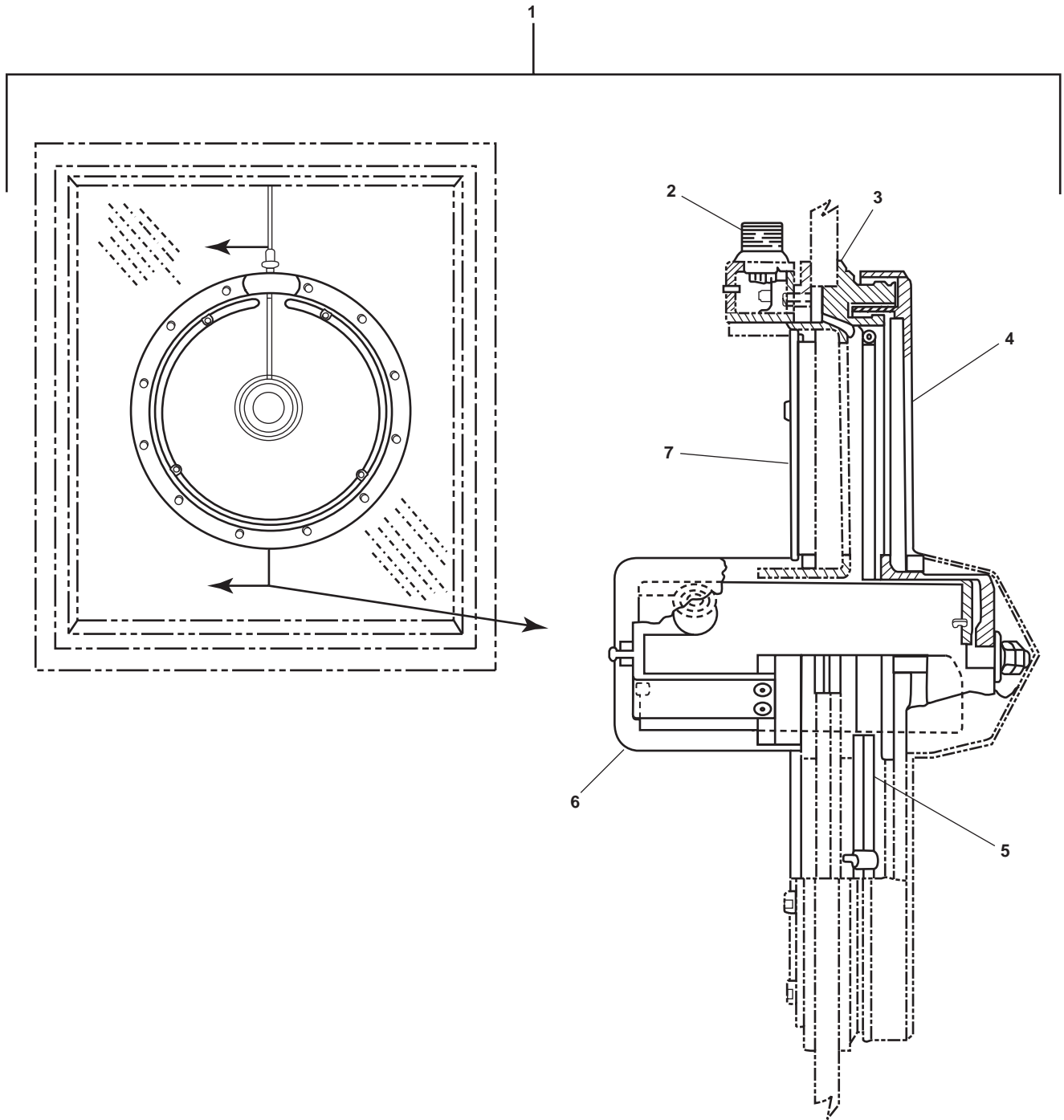


Figure 8. Rotary Clearview Screen (Sheet 1 of 2)

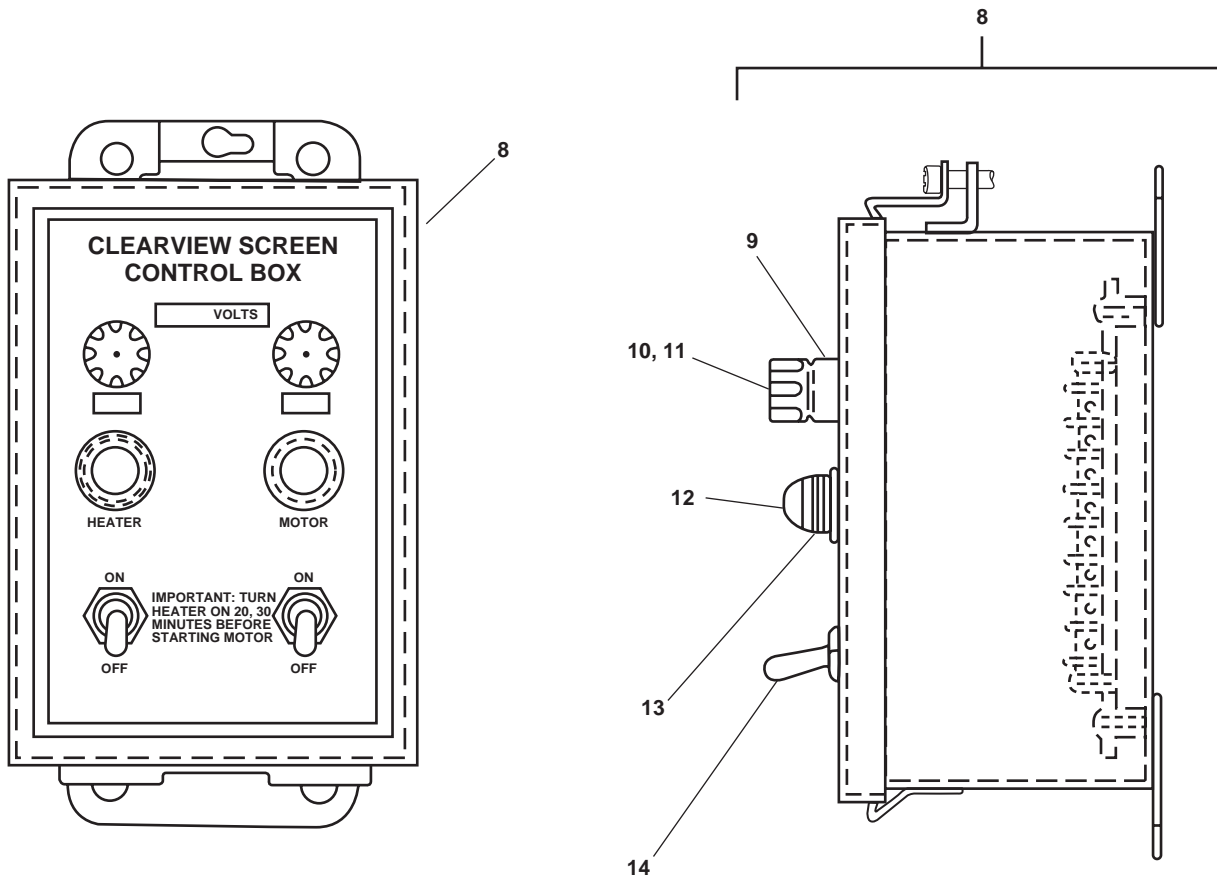


Figure 8. Rotary Clearview Screen (Sheet 2 of 2)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 010406	
					FIG 8 ROTARY CLEARVIEW SCREEN	
1	XDFFF	2040-01-283-7367	21204	CC-6020	WINDOW,NONICING CLEARVIEW WINDOW .....	3
2	XDFZZ	5935-01-118-9183	81349	MIL-C-5015	.CONNECTOR,RECEPTACL .....	1
3	XDFZZ	5330-01-207-1541	21204	CC-6004 PIECE 20	.GASKET .....	1
4	XDFZZ	2040-01-207-7296	21204	CC-6028	.SPINNING GLASS ASSY .....	1
5	XDFZZ	4540-01-178-8367	21204	CC6001	.HEATING ELEMENT,ELE .....	1
6	XDFZZ	6105-01-161-6390	21204	CC6020-11	.MOTOR,DIRECT CURREN .....	1
7	XDFZZ	9340-01-287-1380	21204	CC-137-1	.WINDOW,OBSERVATION .....	1
8	XDFFF	6110-01-164-3686	21204	CC6005	CONTROL BOX,CLEARVI CONTROL BOX, CLEAR VIEW WINDOW .....	3
9	XDFZZ	5920-00-138-1799	75915	342014A	.FUSEHOLDER,EXTRACTO .....	1
10	PAFZZ	5920-00-280-4960	81349	F02A250V2A	.FUSE,CARTRIDGE,2A .....	1
11	PAFZZ	5920-00-010-6652	81349	F02A250V3A	.FUSE,CARTRIDGE .....	1
12	XDFFF	6210-00-602-5825	83330	81-0408-0131-341	.LIGHT,INDICATOR .....	2
13	PAFZZ	6240-00-223-9100	85604	153-0024	.LAMP,GLOW .....	1
14	XDFZZ	5930-00-617-9935	81349	ST52K	.SWITCH,TOGGLE .....	2
					<b>END OF FIGURE</b>	

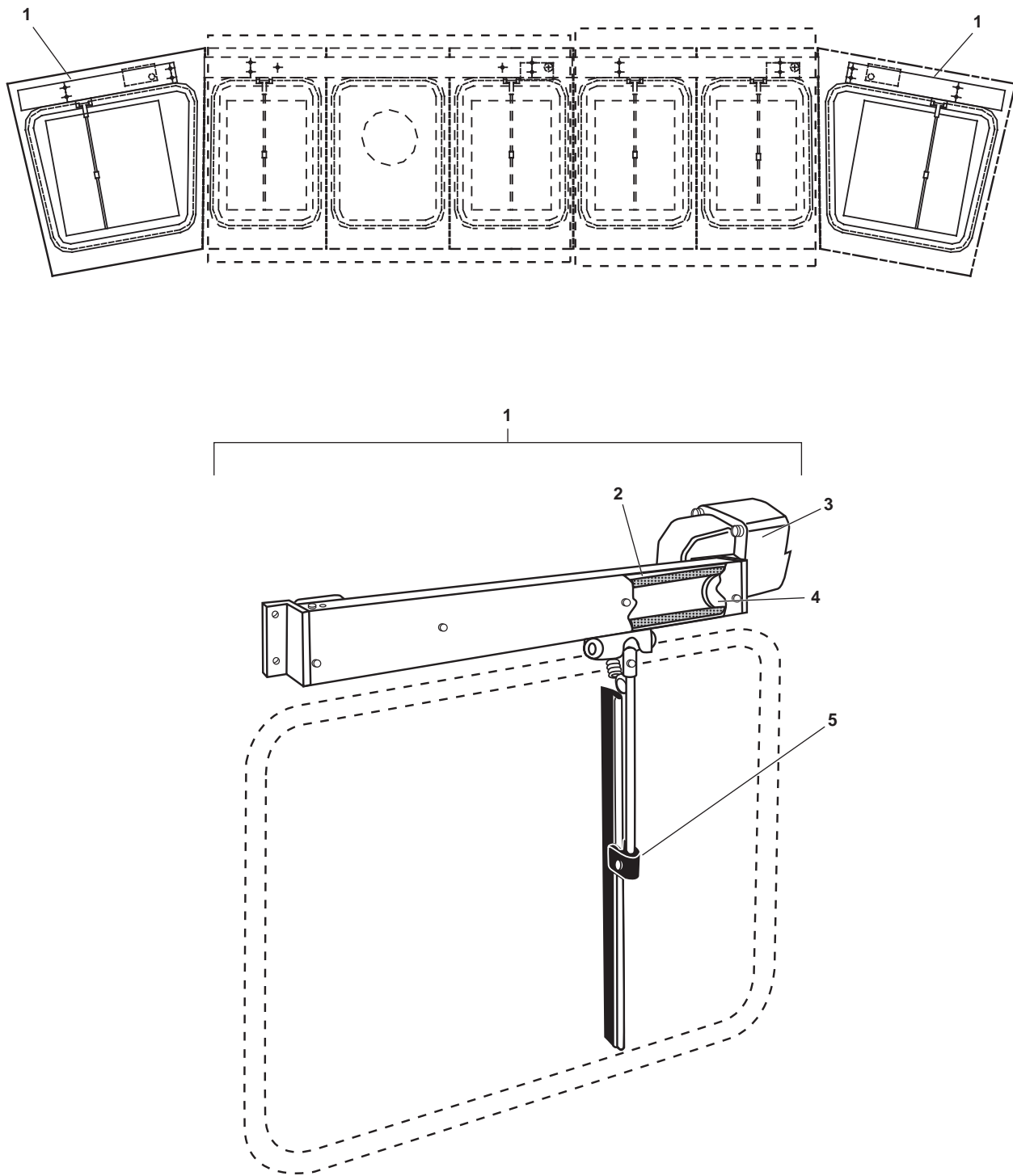


Figure 9. Pilothouse (Sheet 1 of 7)



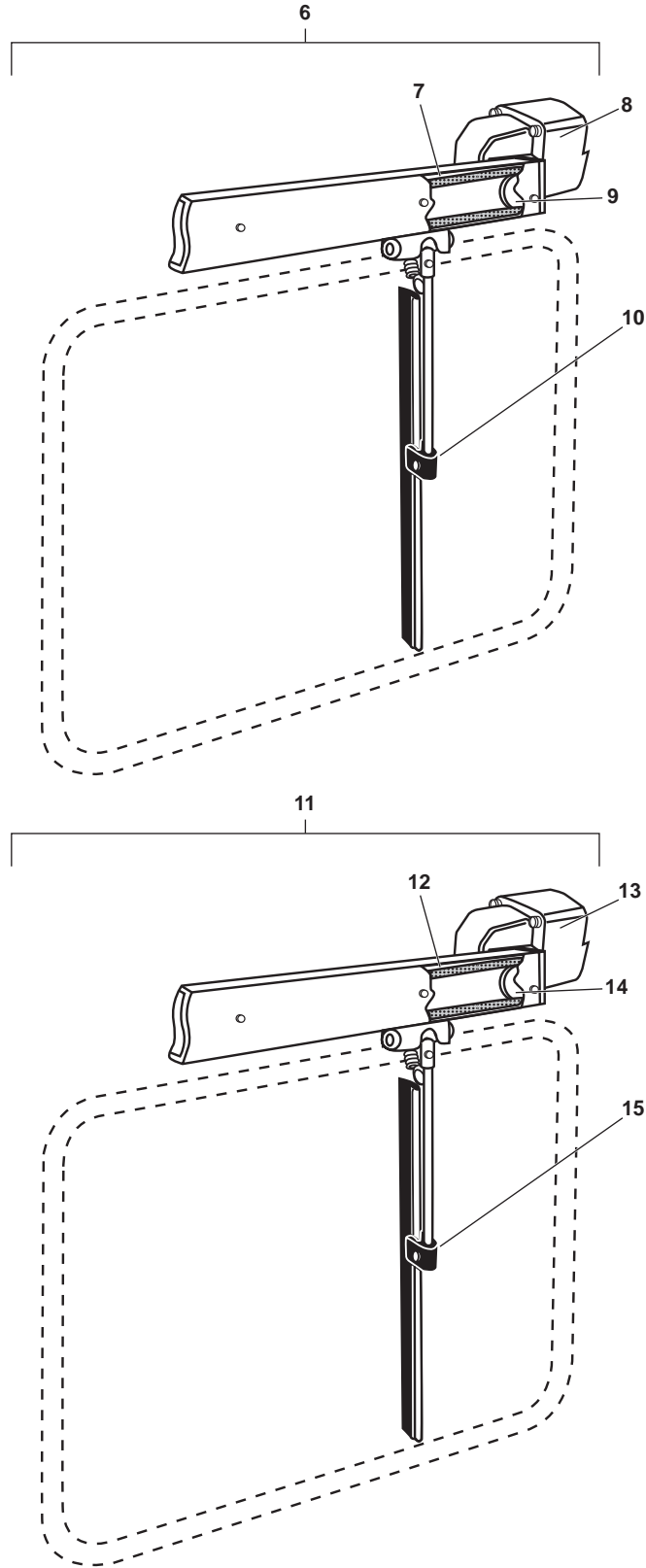


Figure 9. Pilothouse (Sheet 2 of 7)

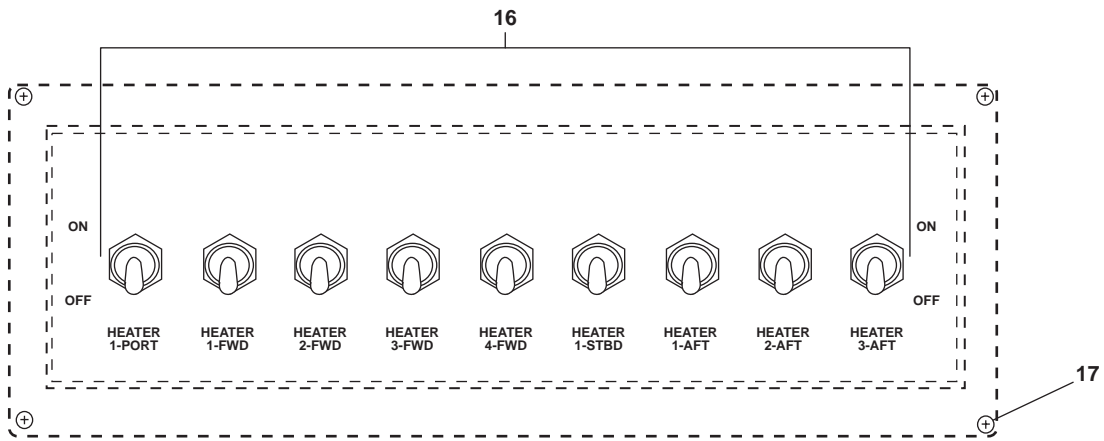


Figure 9. Pilothouse (Sheet 3 of 7)

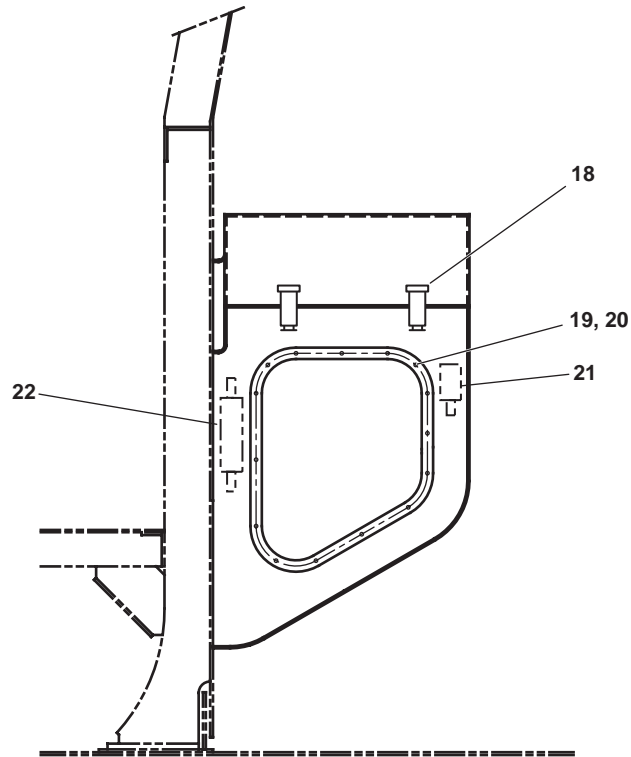


Figure 9. Pilothouse (Sheet 4 of 7)

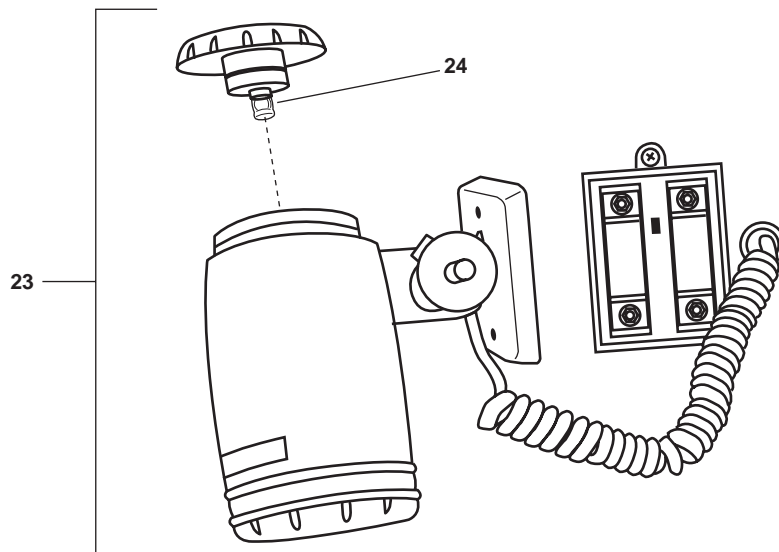


Figure 9. Pilothouse (Sheet 5 of 7)

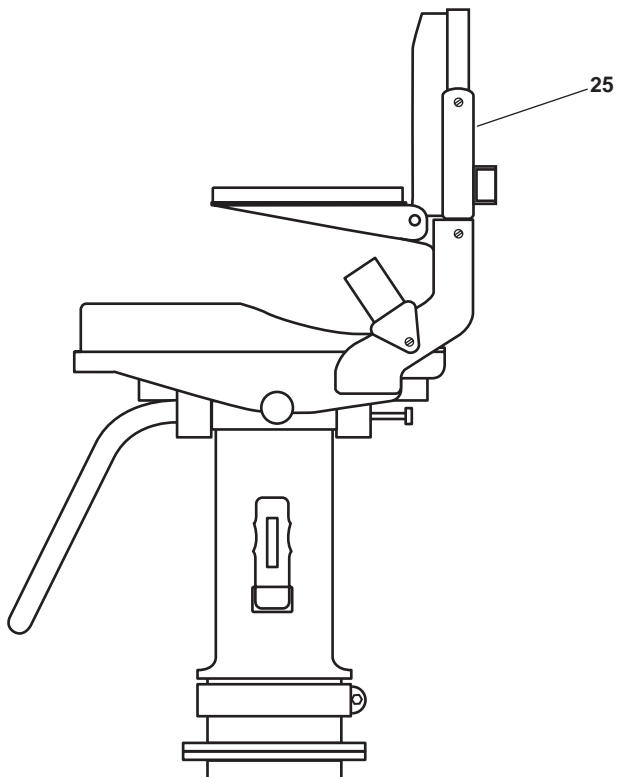


Figure 9. Pilothouse (Sheet 6 of 7)

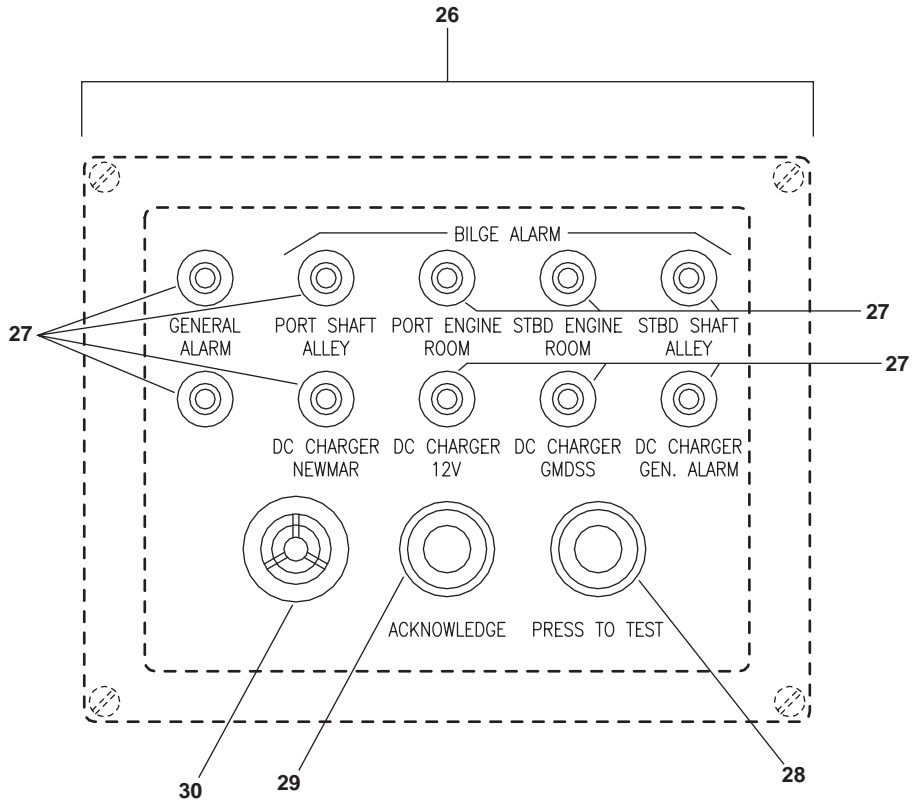


Figure 9. Pilothouse (Sheet 7 of 7)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0105	
					FIG 9 PILOTHOUSE	
1	XDFFF		K5163	Q00686-02R1	WIPER,WINDSHIELD WINDSHIELD WIPER, SINGLE WIPER .....	2
2	PAFZZ	3030-99-372-4337	K5163	1279-106-42	.V-BELT .....	1
3	XDFZZ		K5163	1490-000-GA56-L	.MOTOR,AC .....	1
4	XDFZZ		K5163	1588-117	.ROLLER,GUIDE .....	1
5	PAOZZ	2090-99-572-6196	K5163	1279-233-700	.BLADE ASSEMBLY,WIPE .....	1
6	XDFFF		K5163	Q00686-03R3	WIPER,WINDSHIELD WINDSHIELD WIPER, TWIN WIPER, STBD SIDE .....	1
7	PAFZZ	3030-99-372-4337	K5163	1279-106-42	.V-BELT .....	1
8	XDFZZ		K5163	1490-000-GA56-L	.MOTOR,AC .....	1
9	XDFZZ		K5163	1588-117	.ROLLER,GUIDE .....	2
10	PAOZZ	2090-99-572-6196	K5163	1279-233-700	.BLADE ASSEMBLY,WIPE .....	2
11	XDFFF	K5163		Q00686-01R4	WIPER,WINDSHIELD WINDSHIELD WIPER, TWIN WIPER, PORT SIDE .....	1
12	PAFZZ	3030-99-372-4337	K5163	1279-106-42	.V-BELT .....	1
13	XDFZZ		K5163	1490-000-GA56-L	.MOTOR,AC .....	1
14	XDFZZ		K5163	1588-117	.ROLLER,GUIDE .....	2
15	PAOZZ	2090-99-572-6196	K5163	1279-233-700	.BLADE ASSEMBLY,WIPE .....	1
16	XDFZZ		K9745	C-1700-R-0-M1080	SWITCH,TOGGLE .....	9
17	PAFZZ	5305-01-528-8440	39428	90184A105	SCREW,SHEET METAL .....	4
18	PAFZZ	5340-01-528-9615	3L478	TL110A	LATCH,TOGGLE .....	6
19	PAFZZ		39428	91781A540	SCREW,MACHINE .....	15
20	PFFZZ	5325-01-030-6854	96906	MS122121	INSERT,SCREW THREAD .....	15
21	XDFZZ		63325	1E1B9	THERMOSTAT .....	1
22	XDOZZ		63325	OS1510-350A	HEATER,STRIP,120V .....	1
23	XDOZZ		U7832	678 SERIES	FIXTURE,LIGHT .....	1
24	XDOZZ		U7832	678-114-22	.LED .....	1
25	PFOZZ	2090-00-814-1101	80064	804-1749059	TYPE I CLASS I STYLE A CHAIR,PEDESTAL, SHIP .....	1
26	XDOFF		19207	12492678	PANEL,ALARM,PILOTHO .....	1
27	PAOZZ		U3054	651-105-22	.LED,RED .....	10
28	PAOZZ	5930-01-528-9397	1BU99	XB4BA21	.PUSHBUTTON .....	1
29	PAOZZ	5930-01-528-9395	1BU99	XB4BA51	.PUSHBUTTON .....	1
30	PAOZZ	6350-01-251-2607	90201	SC628MN	.BUZZER .....	1
					END OF FIGURE	





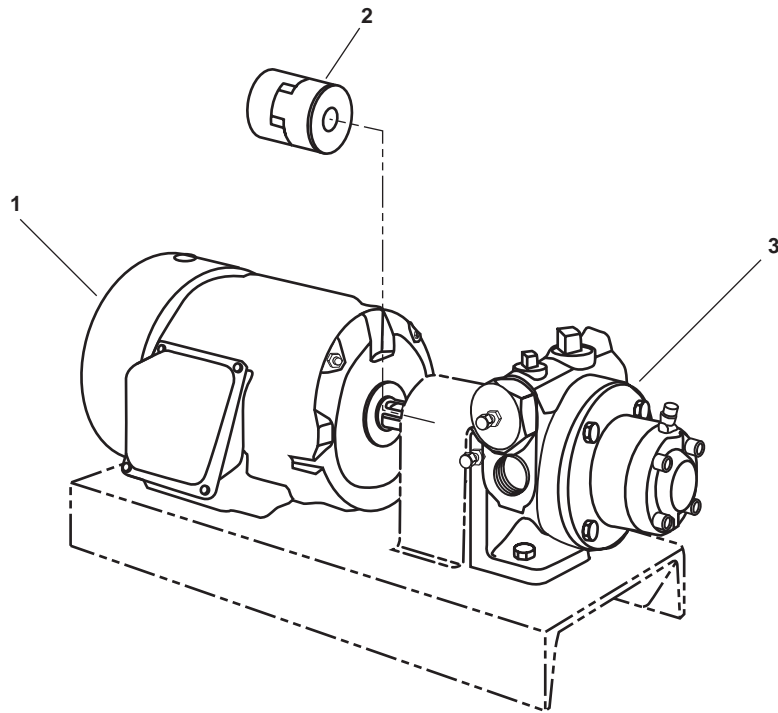


Figure 10. Prelubrication Oil Pump (Sheet 1 of 2)

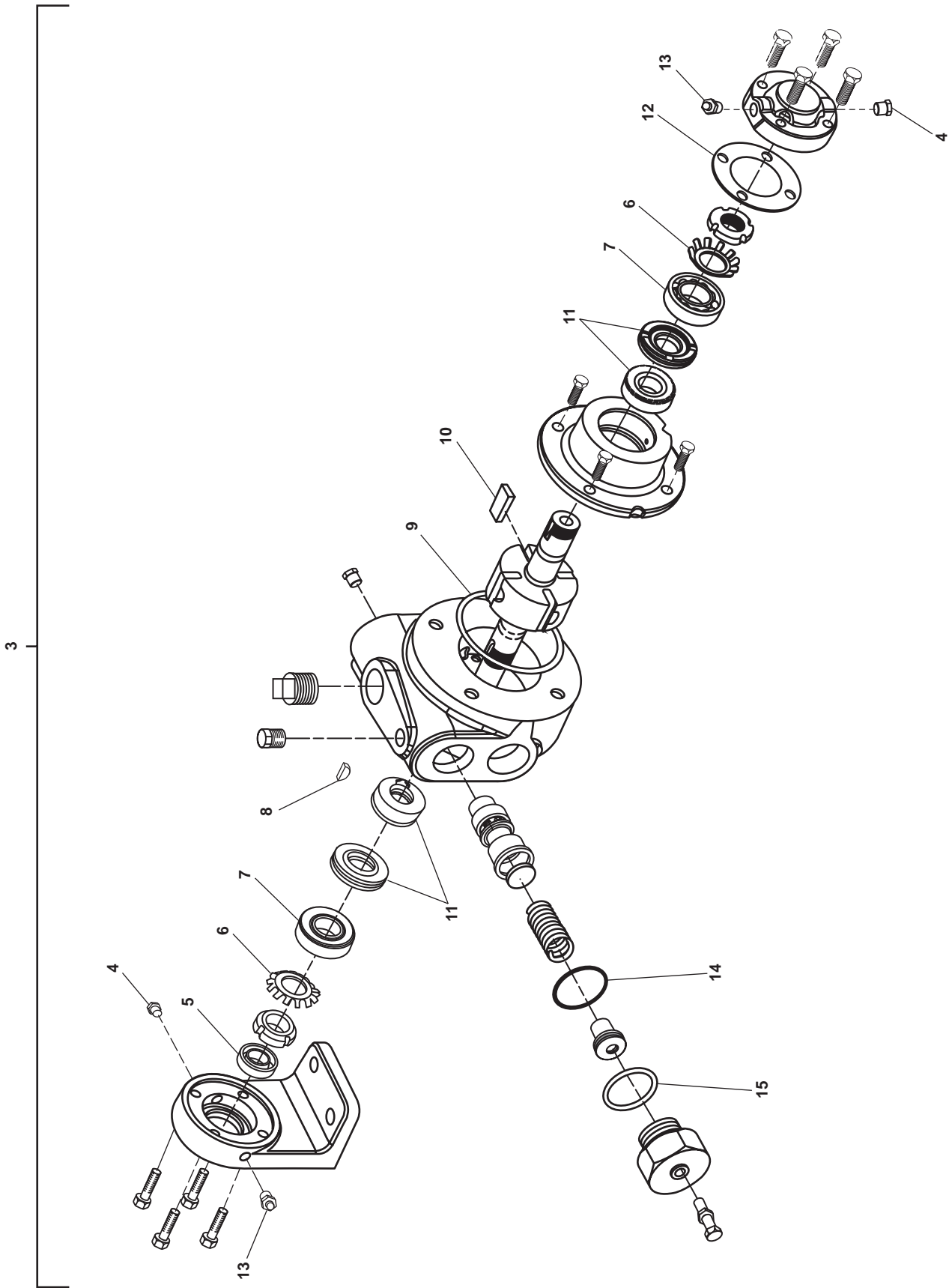


Figure 10. Prelubrication Oil Pump (Sheet 2 of 2)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 020101	
					FIG. 10 PRELUBRICATION OIL PUMP	
1	PAOZZ	6105-01-317-0837	50380	P14H3239M	MOTOR,ALTERNATING C .....	2
2	PAOZZ	3010-00-888-9213	75665	L150	COUPLING,SHAFT,FLEX .....	2
3	PFOFF	4320-01-356-8527	07524	XSB1	PUMP UNIT,ROTARY PRE-LUBRICATION OIL PUMP .....	2
4	PAFZZ	4930-00-672-3513	07524	701992	.RELIEF .....	2
5	PAFZZ	5330-00-178-8574	07524	331934	.SEAL .....	1
6	XDFZZ		07524	903532	.LOCKWASHER,BEARING .....	2
7	PAFZZ	3110-01-144-1557	07524	903405	.BEARING,BALL,ANNULA .....	2
8	PAFZZ	5315-01-308-3859	07524	909126	.KEY,WOODRUFF .....	1
9	PAFZZ	5331-00-178-8605	07524	711941	.O-RING .....	1
10	XDFZZ		07524	092913	.VANE,PUMP,ROTARY .....	6
11	XDFZZ		07524	332921	.SEAL,MECHANICAL .....	1
12	PAFZZ	5330-00-460-4688	07524	383075	.GASKET .....	1
13	PAFZZ	4730-00-203-6406	75755	JD7759	.FITTING,LUBRICATION .....	2
14	PAFZZ	5330-00-178-8602	07524	711940	.PACKING,PREFORMED .....	1
15	PAFZZ	5330-00-178-8601	07524	701965	.PACKING,PREFORMED .....	1
					<b>END OF FIGURE</b>	

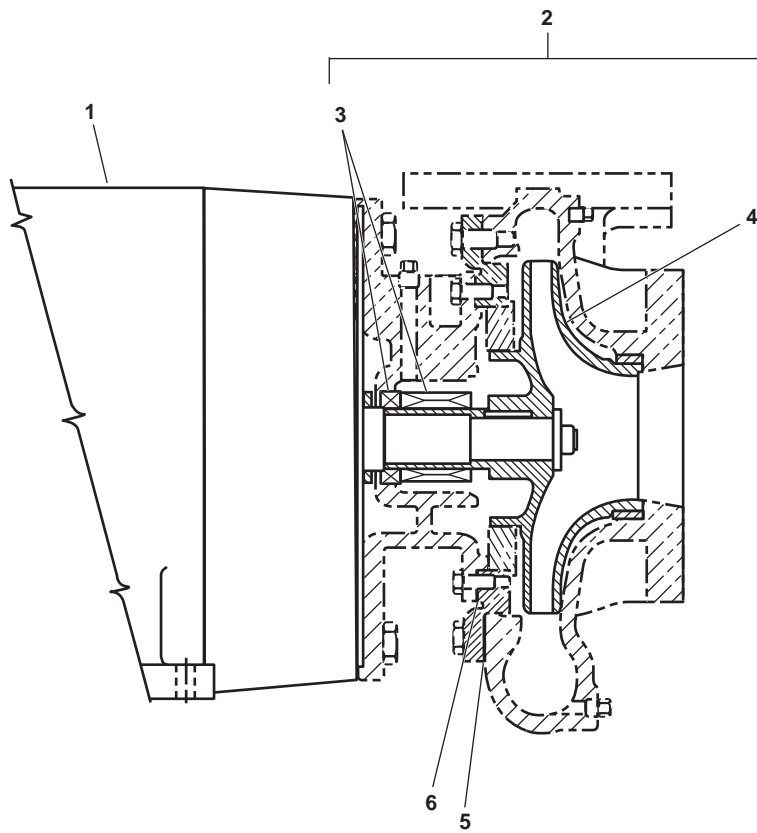
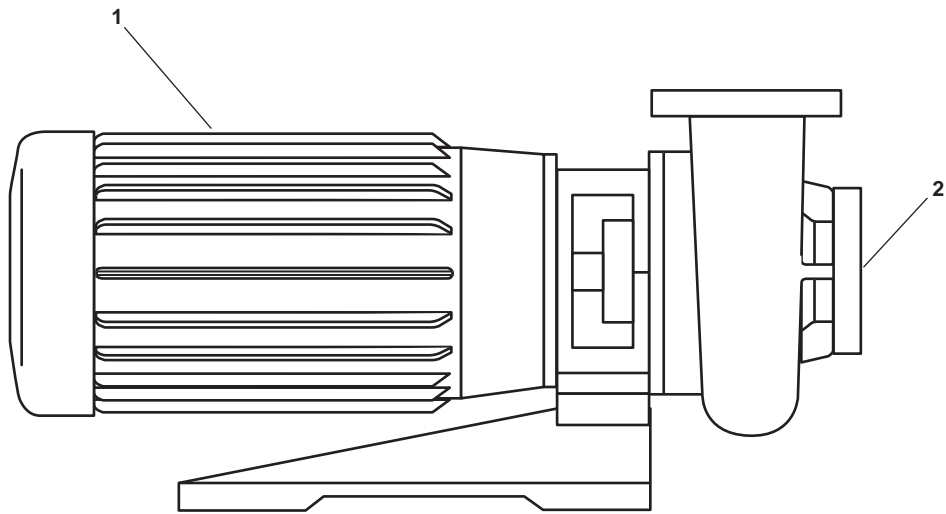


Figure 11. Reduction Gear Cooling Pump

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 020201	
					FIG.11 REDUCTION GEAR COOLING PUMP	
1	PFOZZ	6105-01-348-5895	05472	JM3550	MOTOR,ALTERNATING C.....	1
2	XDOHH		45396	LC-1250-5	PUMP REDUCTION GEAR COOLING PUMP .....	2
3	PAHZZ	4320-01-324-5798	45396	14009931	.SEAL ASSEMBLY,SHAFT PART OF KIT P/N K100-X .....	1
4	PFHZZ	4320-01-130-7044	45396	03217203B	.IMPELLAR .....	1
5	PAHZZ	5330-01-040-3920	45396	11005688X006	.GASKET PART OF KIT P/N K100-X .....	1
6	PAHZZ	4320-01-069-3375	45396	13008680B	.SLINGER PART OF KIT P/N K100-X .....	1
KIT	PAHZZ	5330-01-289-4995	45396	K100-X	PARTS KIT,SEAL REPL .....	1
					GASKET .....	( 1 ) 11 - 5
					SEAL ASSEMBLY,SHAFT .....	( 1 ) 11 - 3
					SLINGER .....	( 1 ) 11 - 6
					<b>END OF FIGURE</b>	

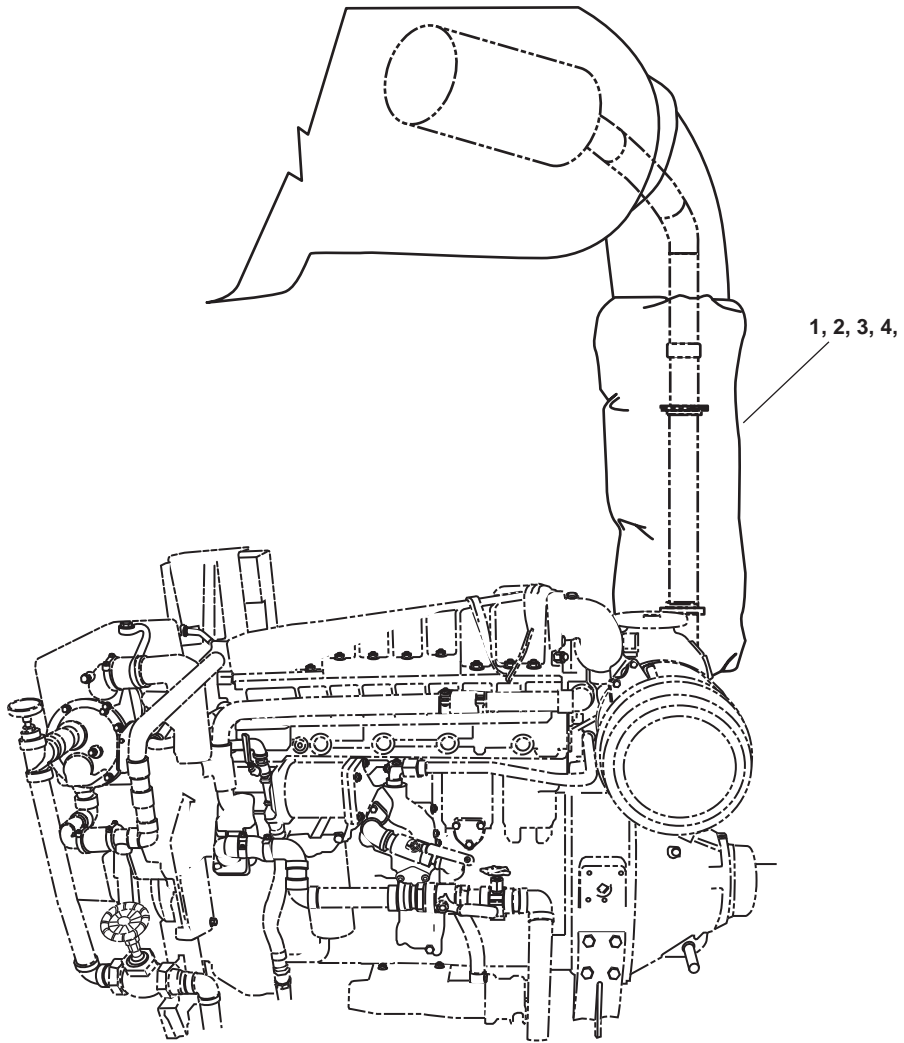


Figure 12. Engine Exhaust System (Sheet 1 of 3)

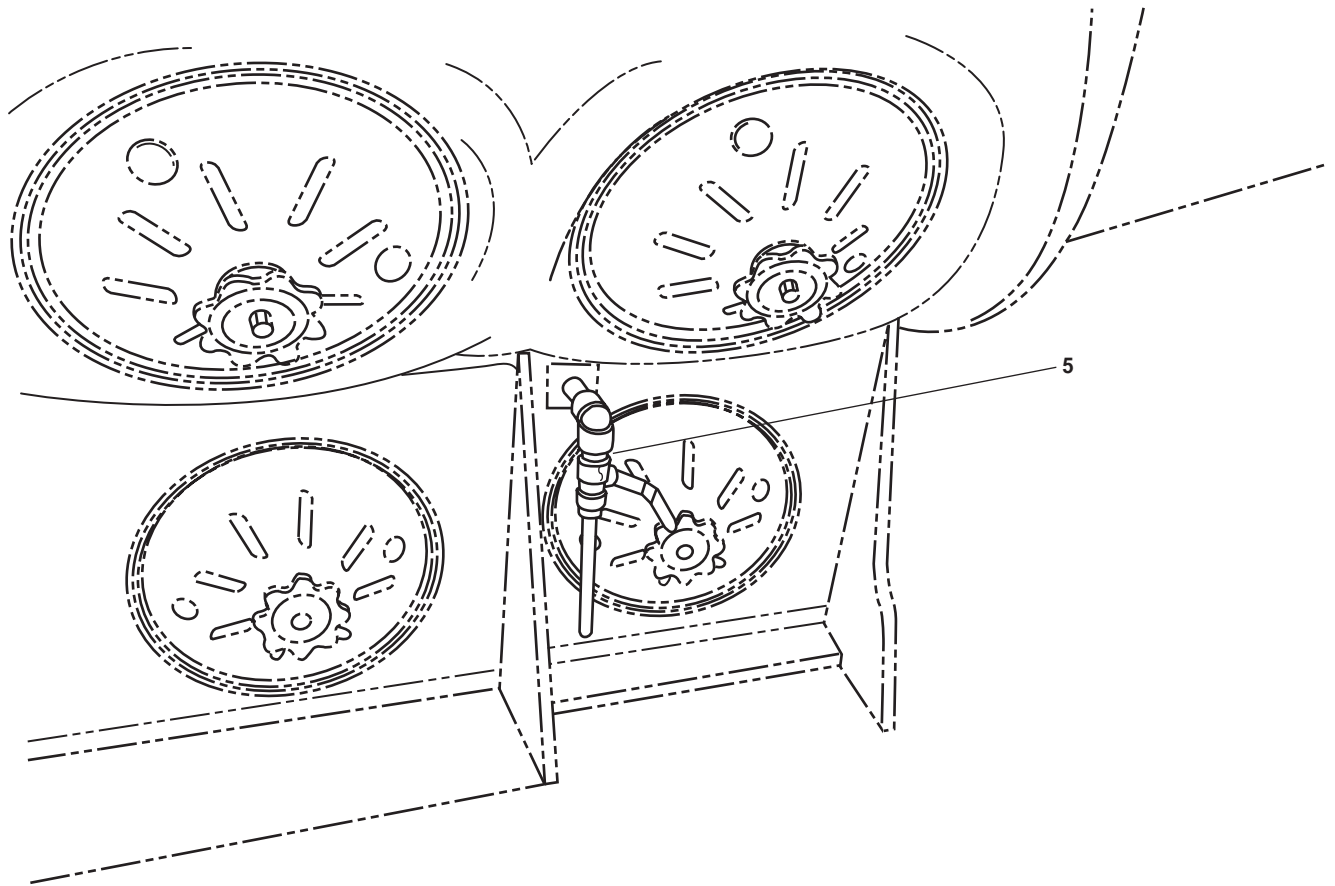


Figure 12. Engine Exhaust System (Sheet 2 of 3)

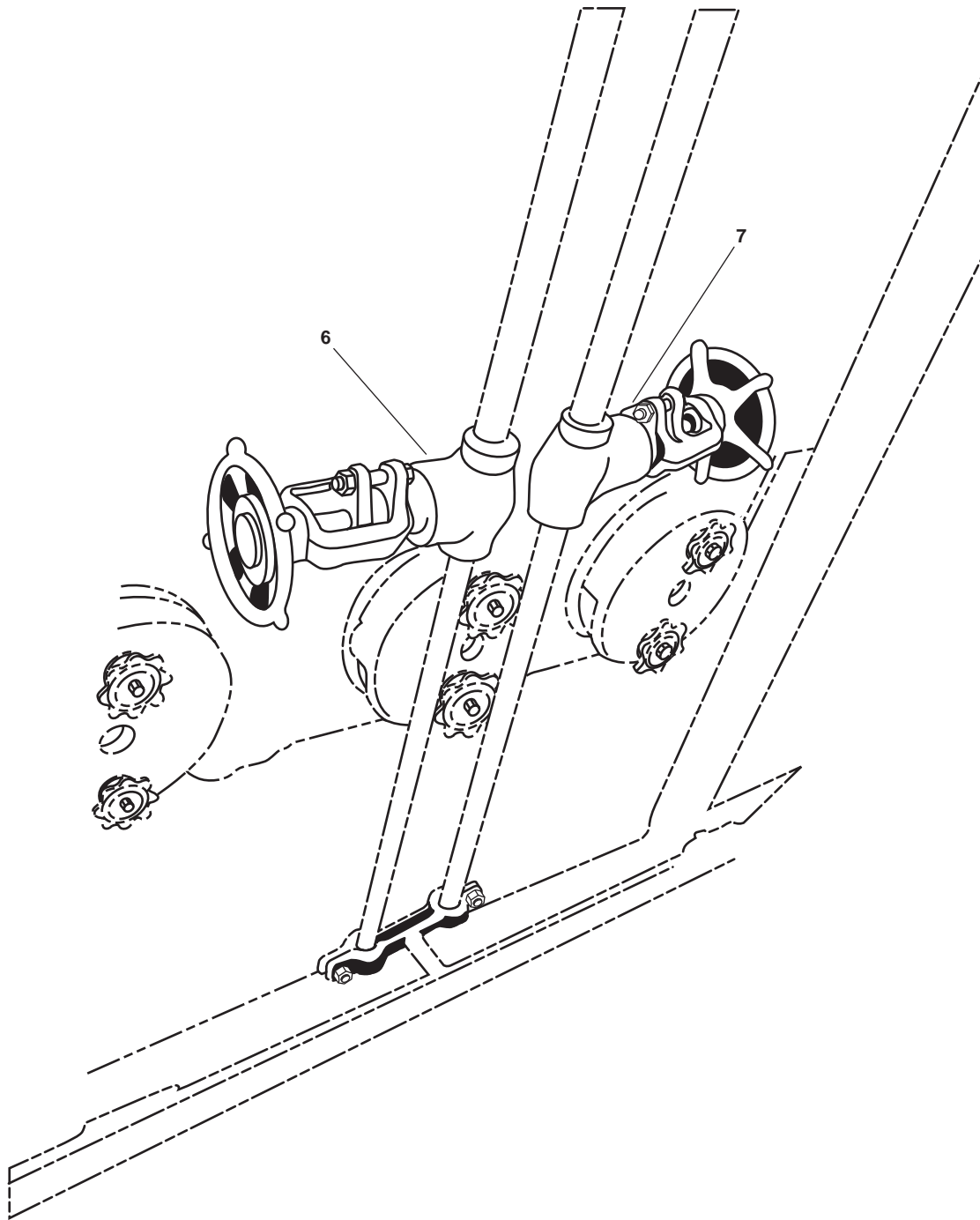
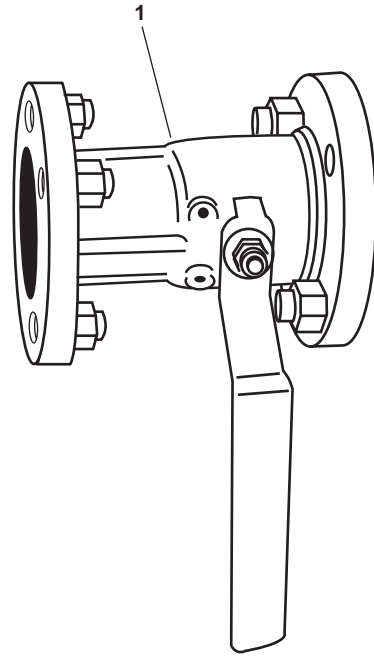


Figure 12. Engine Exhaust System (Sheet 3 of 3)

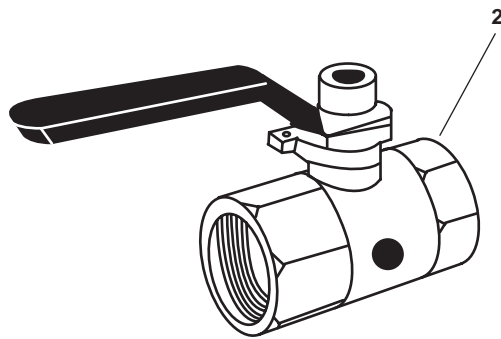


(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0207	
					FIG. 12 ENGINE EXHAUST SYSTEM	
1	XDHZZ		0JN76	20" X 2" CAL SIL PC	INSULATION,THERMAL .....	V
2	XDHZZ		0JN76	8" X 2" CAL SIL PC	INSULATION,THERMAL .....	V
3	XDHZZ		0JN76	6" X 2" CAL SIL PC	INSULATION,THERMAL .....	V
4	XDHZZ		0JN76	4" X 2" CAL SIL PC	INSULATION,THERMAL .....	V
5	XDHZZ	4820-01-428-1805	72219	73-103-01 1/2IN	VALVE, BALL .....	4
6	XDHZZ		3J605	36502	VALVE, BALL .....	4
7	XDHZZ	4820-01-349-4765	63220	SW66703-1/2IN.	VALVE, GATE .....	7
					<b>END OF FIGURE</b>	





1" Flanged Ball Valve



1" Threaded Ball Valve

Figure 13. Lube Oil System (Sheet 1 of 6)

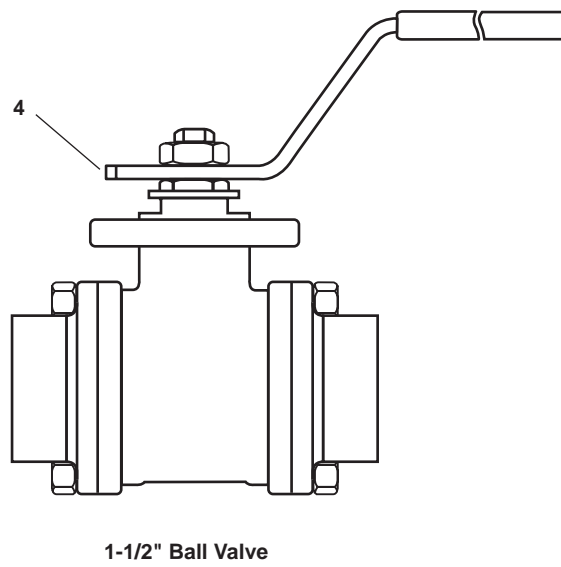
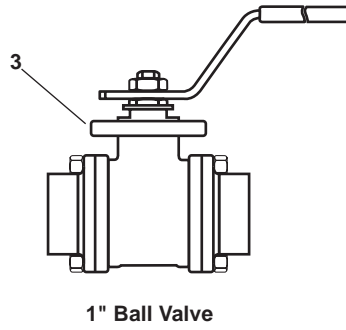


Figure 13. Lube Oil System (Sheet 2 of 6)

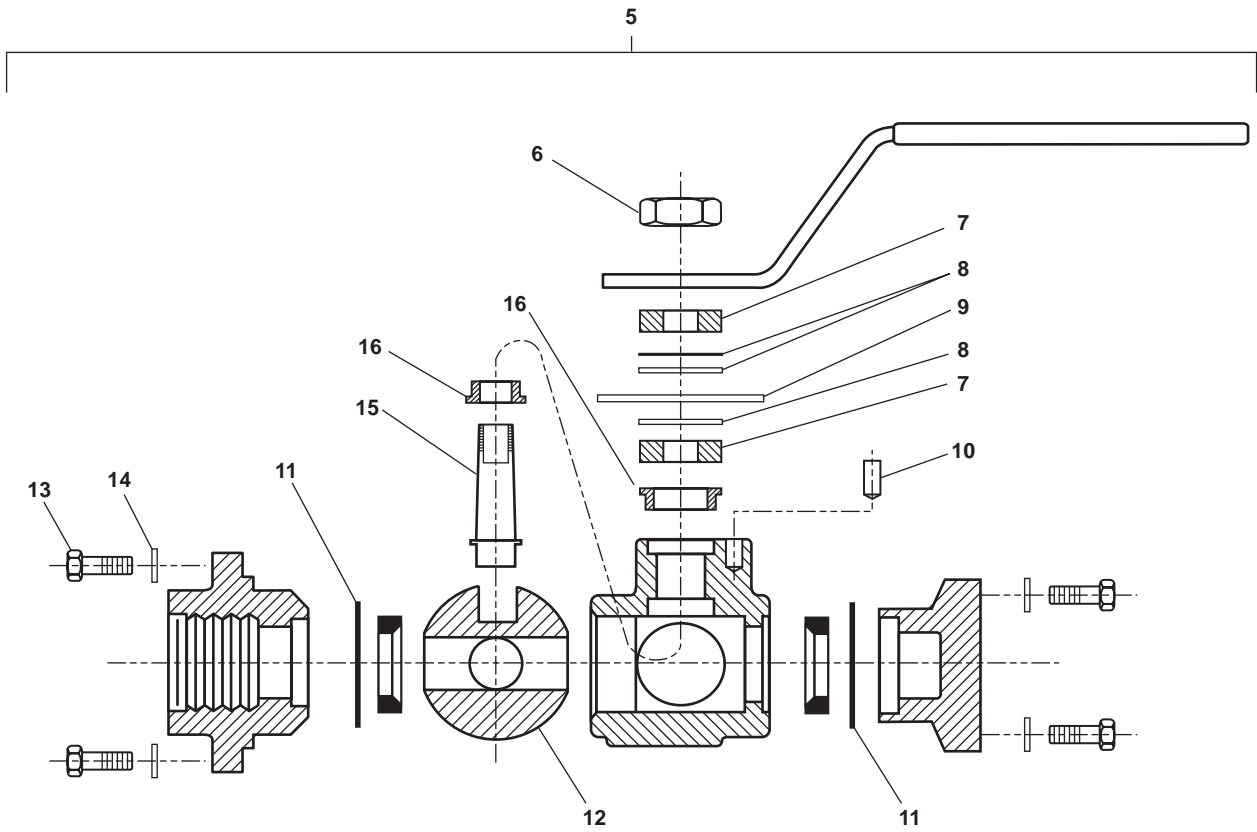
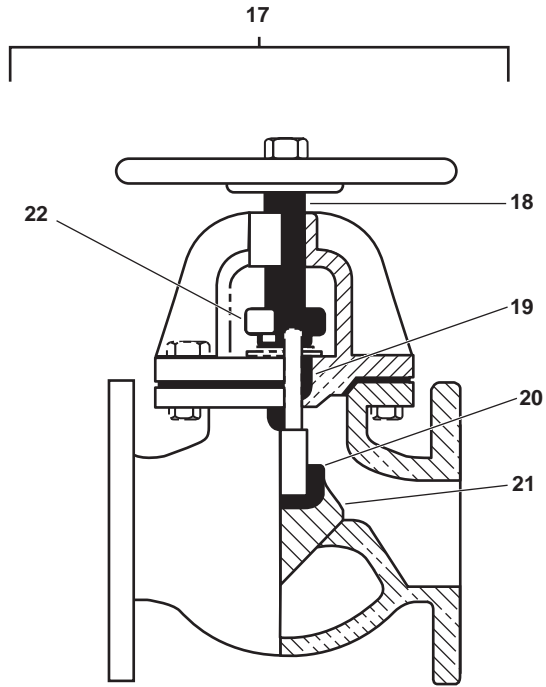
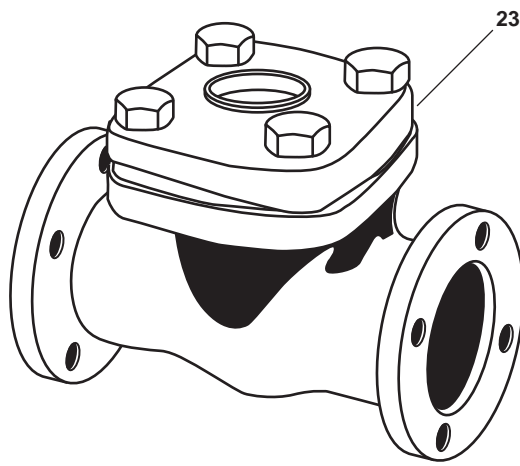


Figure 13. Lube Oil System (Sheet 3 of 6)



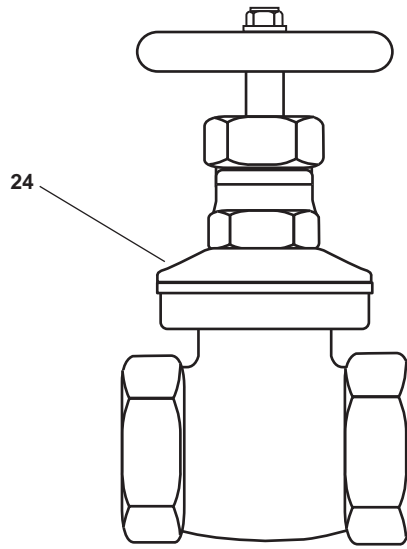
1-1/2" Globe Valve, Flange

Figure 13. Lube Oil System (Sheet 4 of 6)

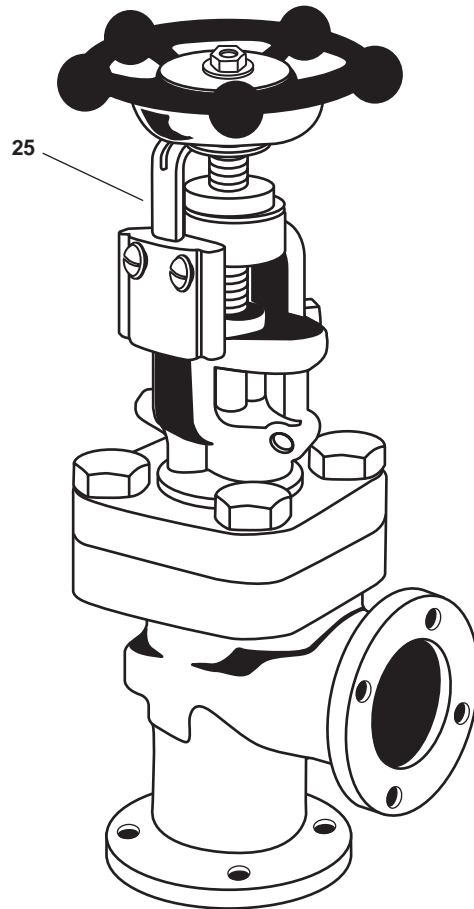


1" Check Valve, Flange

Figure 13. Lube Oil System (Sheet 5 of 6)



1/2" Gate Valve, Threaded



Angle Hose Valve

Figure 13. Lube Oil System (Sheet 6 of 6)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0208	
					FIG.13 LUBE OIL SYSTEM	
1	XDOZZ		76364	401002	VALVE,BALL REPLACED APOLLO #88-105-01 .....	4
2	PFOZZ	4820-01-369-8992	57661	7310501	VALVE,BALL .....	6
3	PFOZZ	4820-01-348-6218	57661	83-207-01	VALVE,BALL .....	1
4	PFOZZ	4820-01-348-6217	57661	83-205-01	VALVE,BALL .....	8
5	PFOOO	4820-01-508-3518	92021	MPE-E4L-A01A03	VALVE,BALL,3-WAY .....	1
6	XDOZZ	5306-00-637-9675	10001	12Z24PC421	.BOLT,MACHINE .....	16
7	PFOZZ	5306-00-817-4989	96906	MS35307-333	.BOLT,MACHINE .....	16
8	PAOZZ	5331-01-194-8963	02697	2-140V709-90	.O-RING .....	2
9	PFOZZ	4820-01-508-3506	92021	MPH-E102T	.BALL,VALVE,PORTED .....	1
10	PFOZZ	4820-01-425-7645	92021	SPK-H104D	.DISK,VALVE .....	1
11	PFOZZ	5310-01-420-2107	92021	SPB-31-SB(1)2/B7 ITEM 17	.WASHER,LOCK .....	16
12	PFOZZ	5310-01-500-4866	92021	HWLKFKXN	.NUT,SELF-LOCKING,HE .....	2
13	PFOZZ	5310-01-385-7819	92021	SPK-H110	.WASHER,SPRING TENS .....	7
14	PFOZZ	4820-01-508-3526	92021	MPHLE405E	.STEM,FLUID VALVE .....	1
15	PAOZZ	5331-01-105-9154	92021	M83248/2-129	.O-RING .....	4
16	PFOZZ	4820-01-480-7601	92021	SPK-H106	.GUIDE,VALVE STEM .....	2
17	PFOOO	4820-01-173-1269	63220	473 1-1/2IN F-46661	VALVE,GLOBE .....	3
18	PFOZZ	4820-01-270-4370	40439	20066 E-47324	.STEM,FLUID VALVE .....	1
19	PAOZZ	5331-01-275-3178	0SYN4	1625G	.O-RING .....	1
20	PAOZZ	5330-00-759-0550	63220	31107	.GASKET,SPIRAL WOUND .....	1
21	PFOZZ	4820-01-148-5051	63220	16963	.DISK,VALVE .....	1
22	PFOZZ	5330-01-206-7368	63220	11971	.RETAINER,PACKING .....	1
23	PFOZZ	4820-01-137-5849	63220	573 1IN	VALVE,CHECK .....	1
24	PFOZZ	4820-01-280-3919	63220	12111-0.5IN	VALVE,GATE .....	1
25	XDOZZ		0WLX8	412471.300	VALVE,ANGLE, HOSE 1-1/2" BRONZE, NAVY HOSE ANGLE VALVE .....	1
					<b>END OF FIGURE</b>	



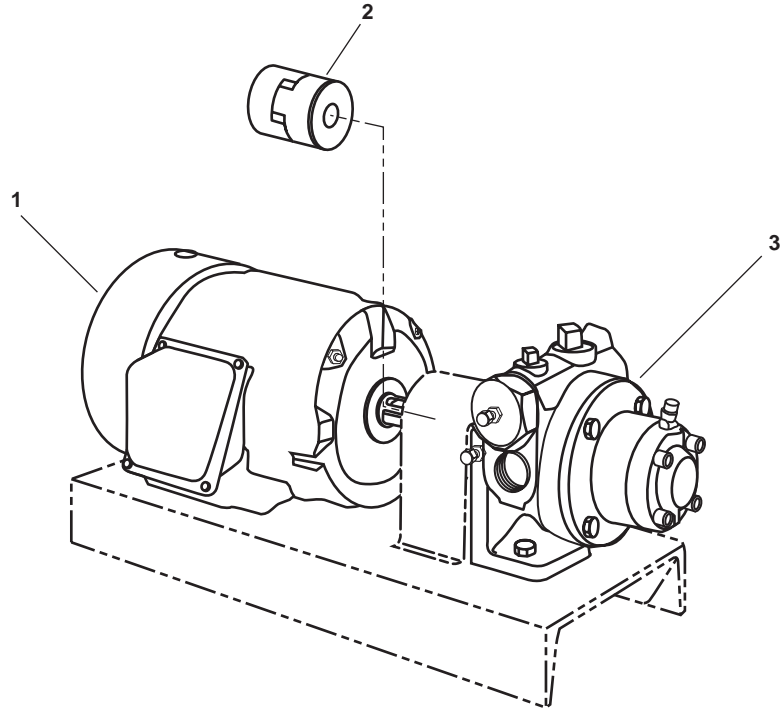


Figure 14. Lube Oil Transfer Pump (Sheet 1 of 2)

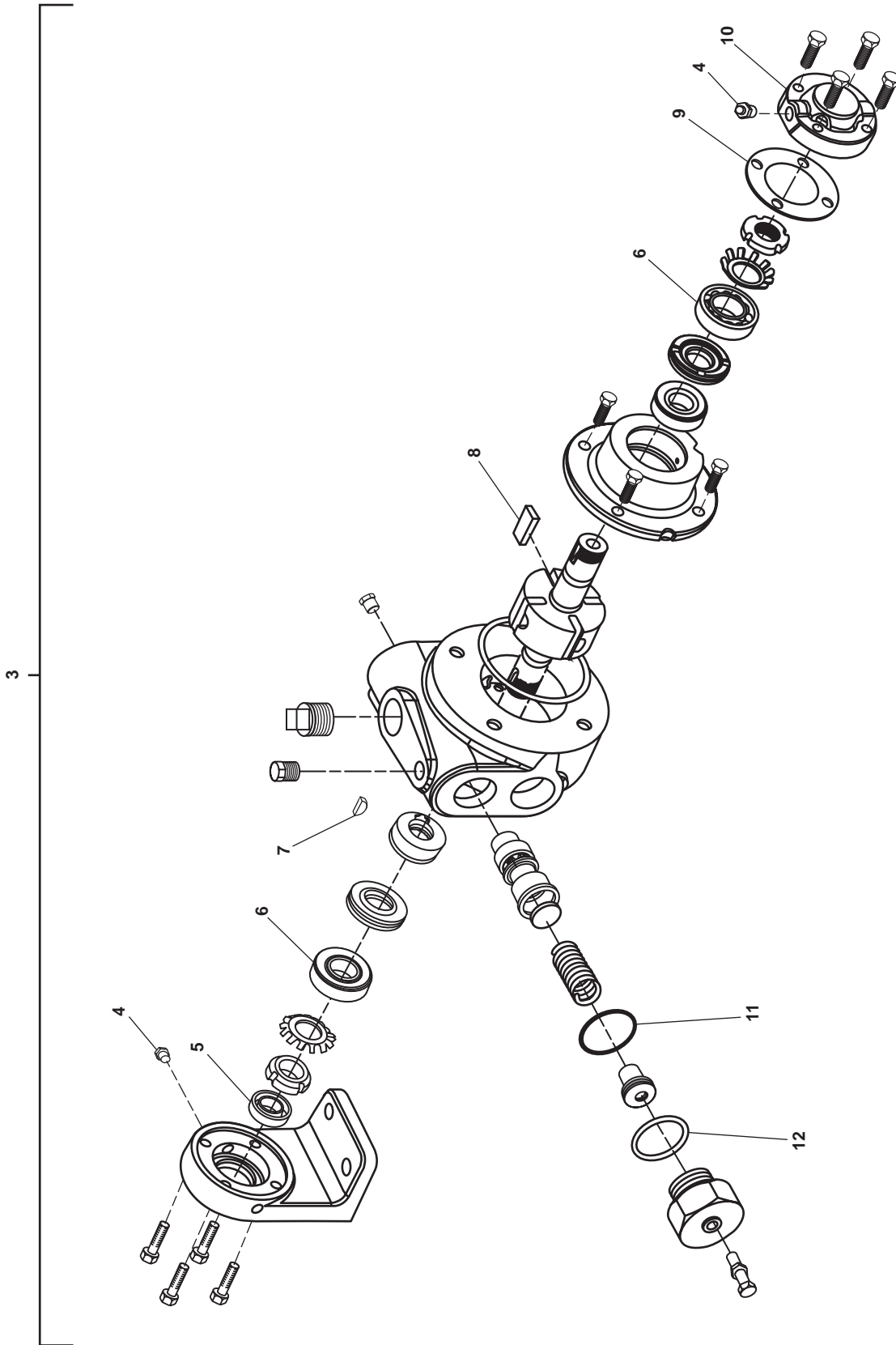


Figure 14. Lube Oil Transfer Pump (Sheet 2 of 2)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 020804	
					FIG. 14 LUBE OIL TRANSFER PUMP	
1	PAOZZ	6105-01-317-0837	50380	P14H3239M	MOTOR,ALTERNATING C.....	2
2	PAOZZ	3010-00-888-9213	75665	L150	COUPLING,SHAFT,FLEX.....	2
3	PFOOO	4320-01-356-8527	07524	XSB1	PUMP UNIT,ROTARY LUBE OIL TRANSFER PUMP.....	2
4	PAOZZ	4730-00-203-6406	75755	JD7759	.FITTING,LUBRICATION.....	1
5	PAOZZ	5330-00-178-8574	07524	331934	.SEAL.....	1
6	PAOZZ	3110-01-144-1557	07524	903405	.BEARING,BALL,ANNULA.....	2
7	PAOZZ	5315-01-308-3859	07524	909126	.KEY,WOODRUFF.....	1
8	XDOZZ		07524	092913	.VANE,PUMP,ROTARY.....	6
9	PAOZZ	5330-00-460-4688	07524	383075	.GASKET.....	1
10	XDOZZ		07524	043071	.COVER,BEARING.....	1
11	PAOZZ	5330-00-178-8602	07524	711940	.PACKING,PREFORMED.....	1
12	PAOZZ	5330-00-178-8601	07524	701965	.PACKING,PREFORMED.....	1
					<b>END OF FIGURE</b>	



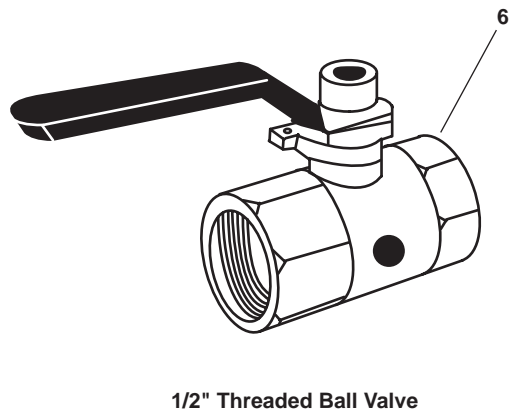
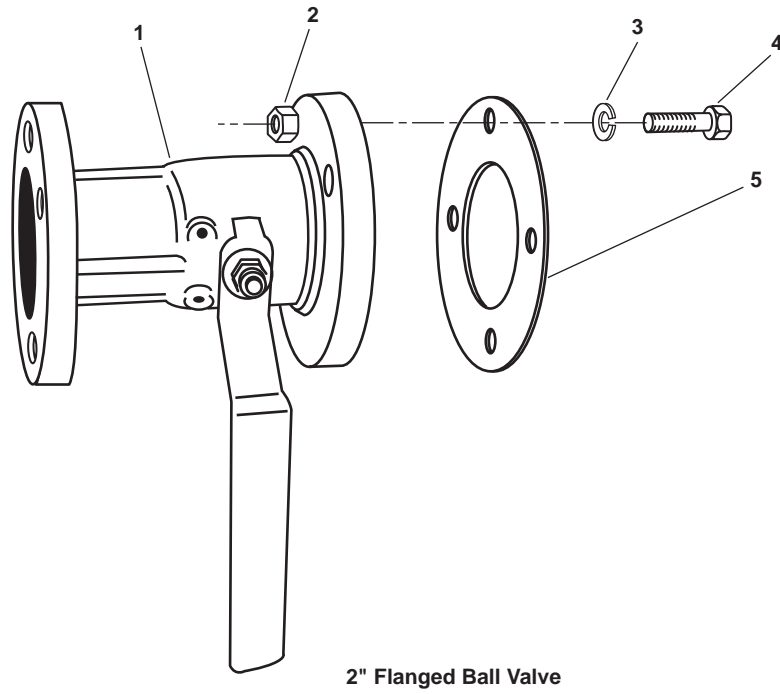
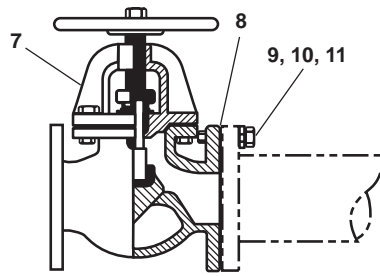
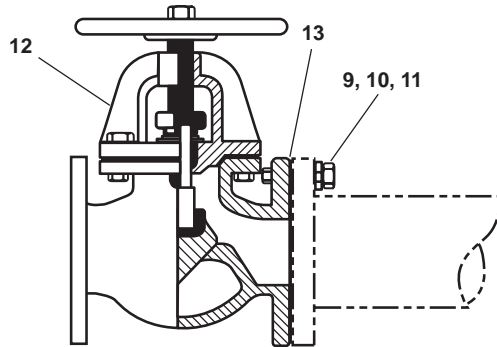


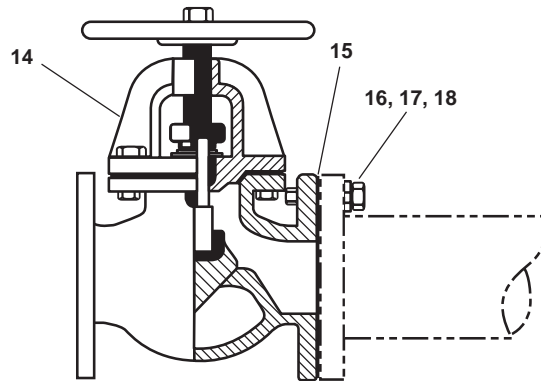
Figure 15. Fuel System Piping and Valves (Sheet 1 of 6)



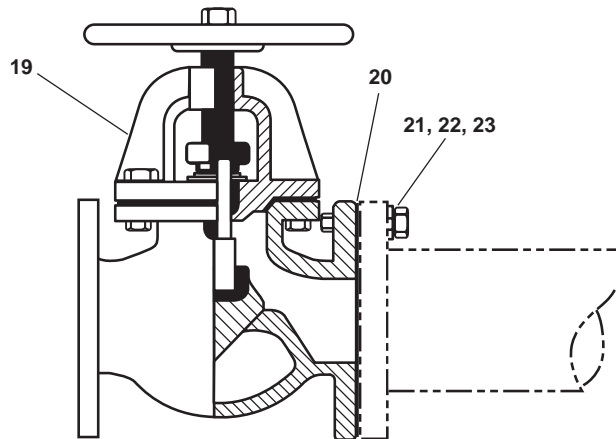
1/2" Globe Valve, Flange



3/4" Globe Valve, Flange



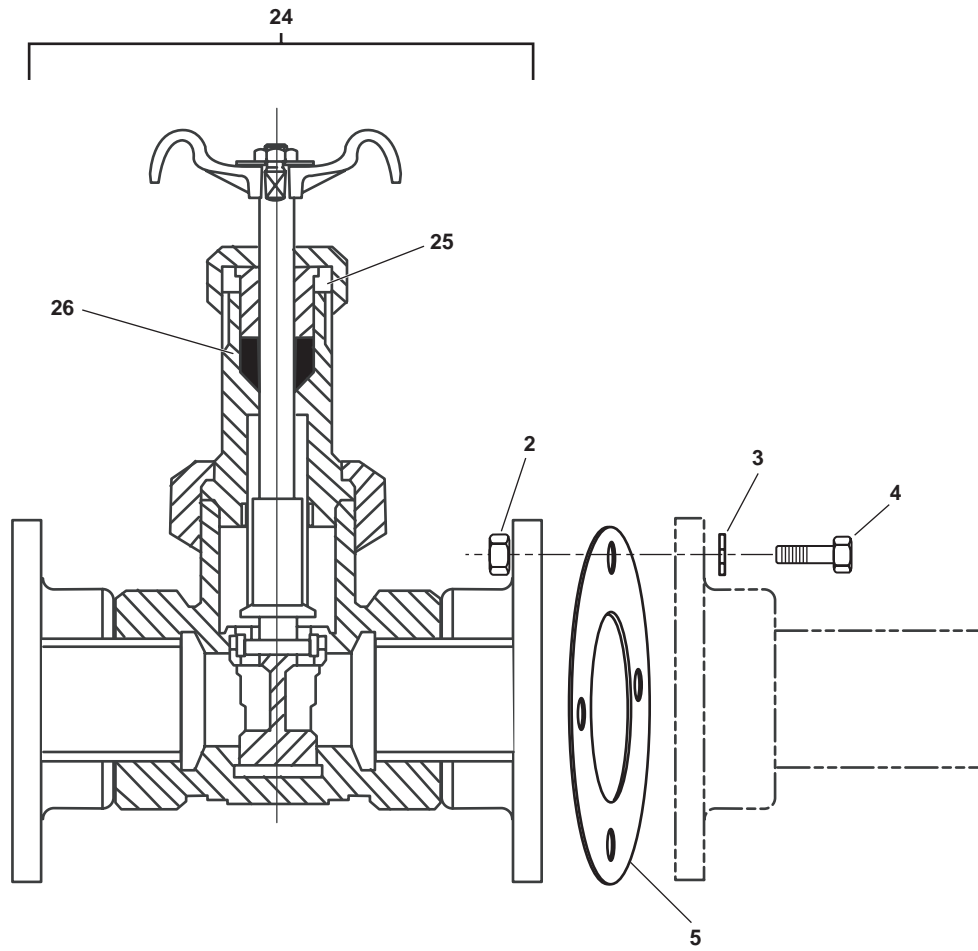
1" Globe Valve, Flange



1-1/2" Globe Valve, Flange

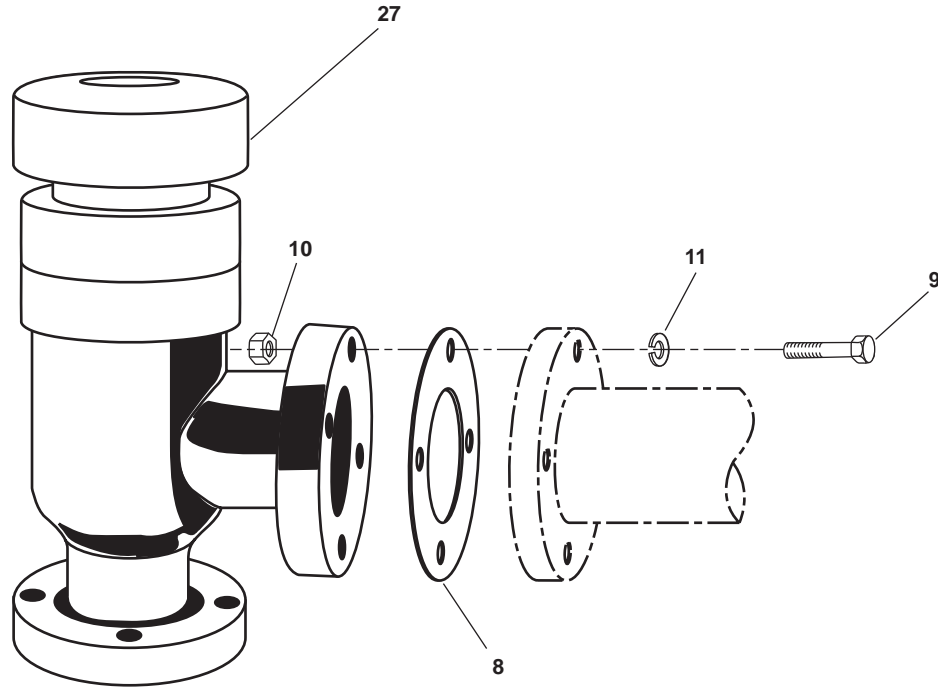
Figure 15. Fuel System Piping and Valves (Sheet 2 of 6)



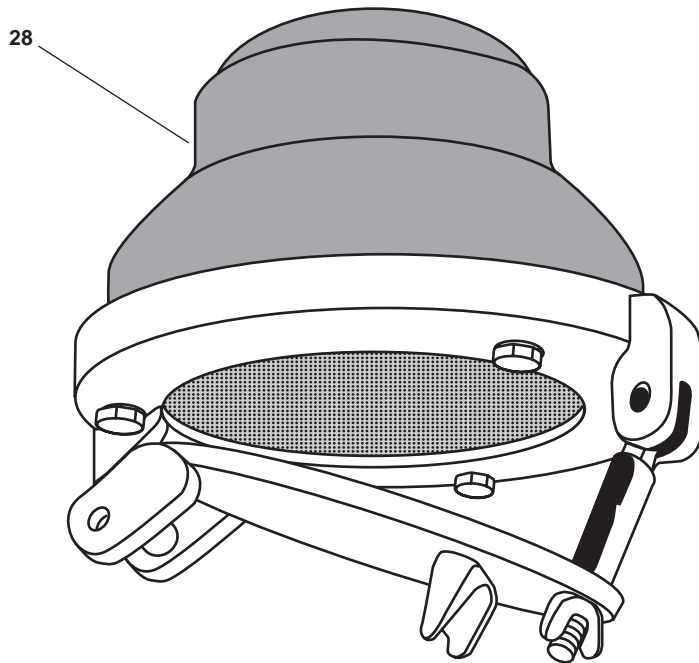


2" Gate Valve, Flange

Figure 15. Fuel System Piping and Valves (Sheet 3 of 6)

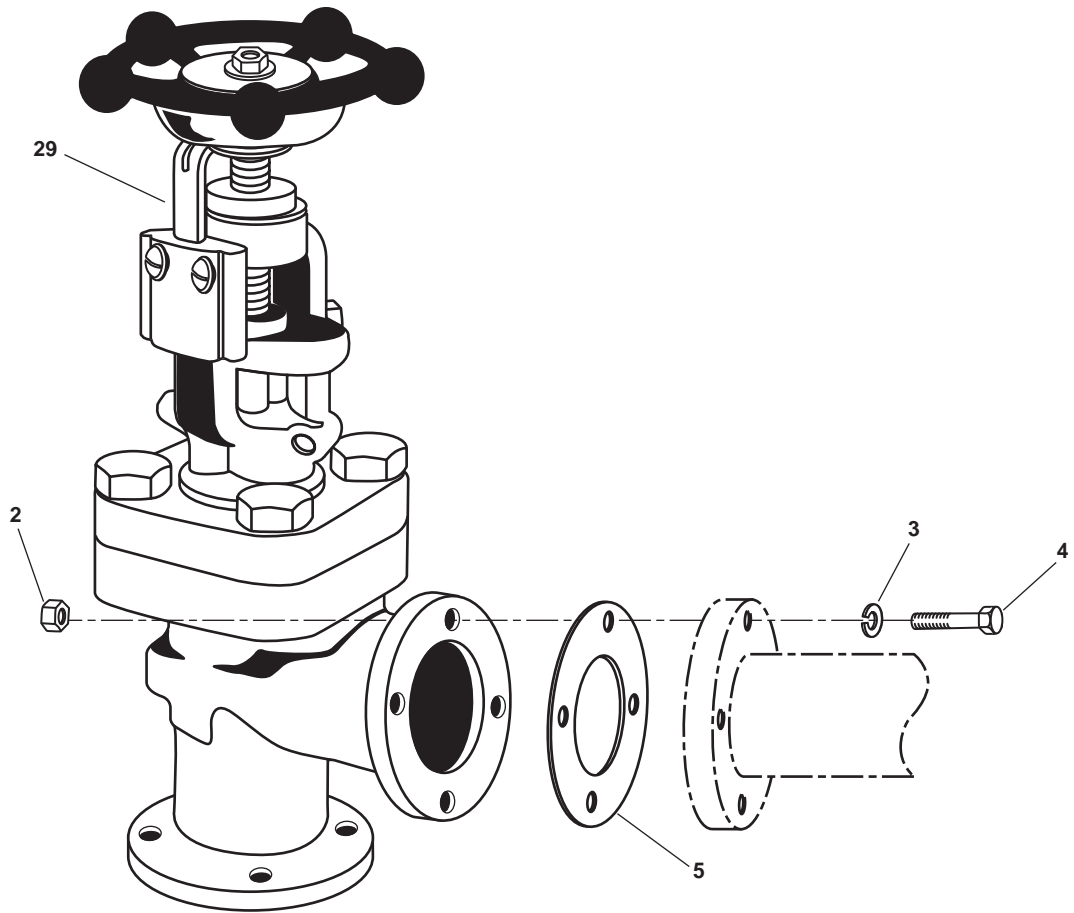


Safety Relief Valve



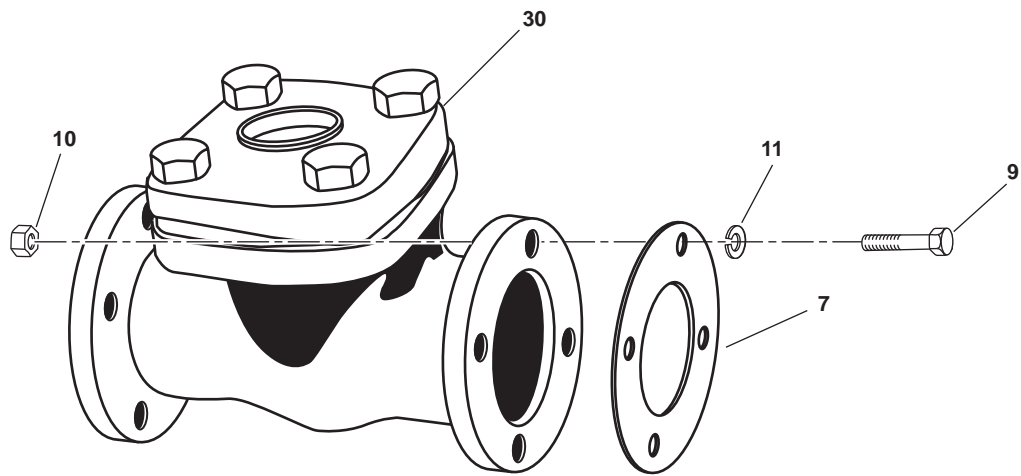
Vent Valve

Figure 15. Fuel System Piping and Valves (Sheet 4 of 6)



2" Angle Valve

Figure 15. Fuel System Piping and Valves (Sheet 5 of 6)



1/2" Check Valve, Flange

Figure 15. Fuel System Piping and Valves (Sheet 6 of 6)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0209	
					FIG.15 FUEL SYSTEM	
1	PFOZZ	4820-01-348-6215	57661	88-108-01	VALVE,BALL .....	4
2	PAOZZ		39428	94819A049	NUT,PLAIN HEX .....	8
3	PAOZZ	5310-01-528-7188	39428	92147A031	WASHER,LOCKING .....	8
4	PAOZZ		39428	92186A634	SCREW,HEX HEAD .....	8
5	PAOZZ	5330-01-529-2544	0B6K6	760125-020	GASKET .....	16
6	XDOZZ		57661	83-503-01	VALVE,BALL .....	1
7	PFOZZ	4820-01-349-7743	63220	473 1/2 IN.	VALVE,GLOBE .....	2
8	PAOZZ	5330-01-529-2540	0B6K6	760125-005	GASKET .....	8
9	PAOZZ		39428	93190A714	SCREW,HEX HEAD .....	32
10	PAOZZ		39428	94819A055	NUT,PLAIN HEX .....	32
11	PFOZZ	5310-00-933-8778	81337	5-13-2512P31	WASHER,LOCK .....	32
12	XDOZZ		57661	F180TF-3/4	VALVE,GLOBE .....	2
13	PAOZZ		0B6K6	3/4 IN. BUNA-N FLANGE GASKET	GASKET .....	8
14	XDOZZ		57661	F180TF-1	VALVE,GLOBE .....	2
15	PAOZZ	5330-01-529-2532	0B6K6	760125-010	GASKET,FLANGE .....	6
16	PAOZZ		39428	92186A804	SCREW,HEX HEAD .....	20
17	PAOZZ		39428	94819A058	NUT,PLAIN HEX .....	20
18	PAOZZ	5310-01-389-7640	96906	MS35338-145	WASHER,LOCK .....	20
19	XDOZZ		57661	F180TF-1 1/2	VALVE,GLOBE .....	2
20	PAOZZ	5330-01-376-2946	73124	SY1060142 NON-ASBESTOS	GASKET .....	1
21	PAOZZ		39428	94819A055	NUT,PLAIN HEX .....	16
22	PAOZZ	5310-00-933-8778	81337	5-13-2512P31	WASHER,LOCK .....	16
23	PAOZZ	5305-01-466-4853	39428	92186A721	SCREW,HEX HEAD .....	16
24	PFOOO	4820-01-135-7468	63220	353MM 2IN	VALVE,GATE .....	1
25	PAOZZ	5330-00-932-4792	63220	31105	.GASKET .....	1
26	PAOZZ	5330-00-599-9544	81349	MILP17303	.PACKING MATERIAL .....	1
27	PFOZZ	4820-01-350-7384	01343	L14	VALVE,SAFETY RELIEF .....	2
28	PFOZZ	4820-01-359-4845	79128	1660T	VALVE,VENT .....	1
29	PFOZZ	4820-01-349-7219	30263	B-142-0300	VALVE,ANGLE .....	1
30	PFOZZ	4820-01-283-7152	63220	573 1/2IN	VALVE,CHECK .....	7
					<b>END OF FIGURE</b>	



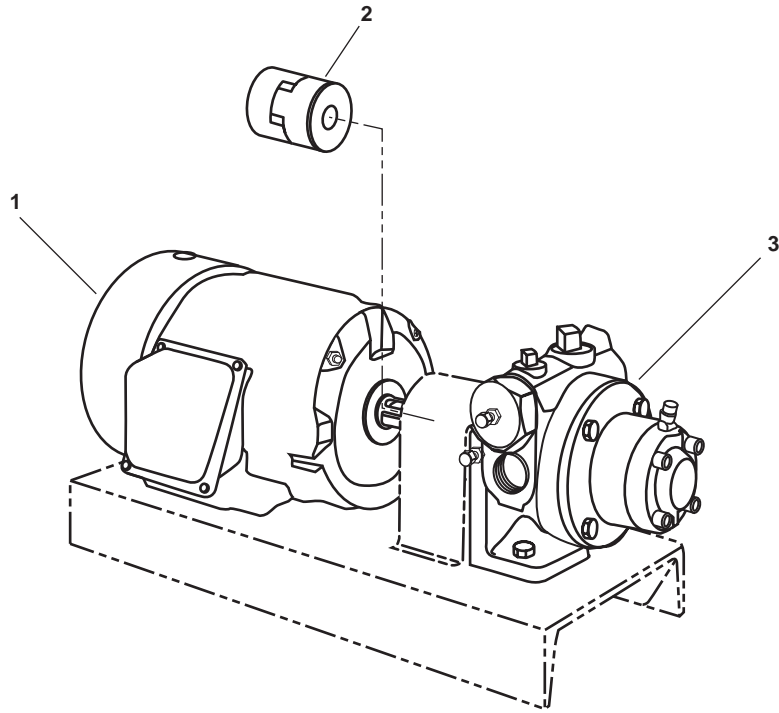


Figure 16. Fuel Oil Transfer Pump (Sheet 1 of 2)

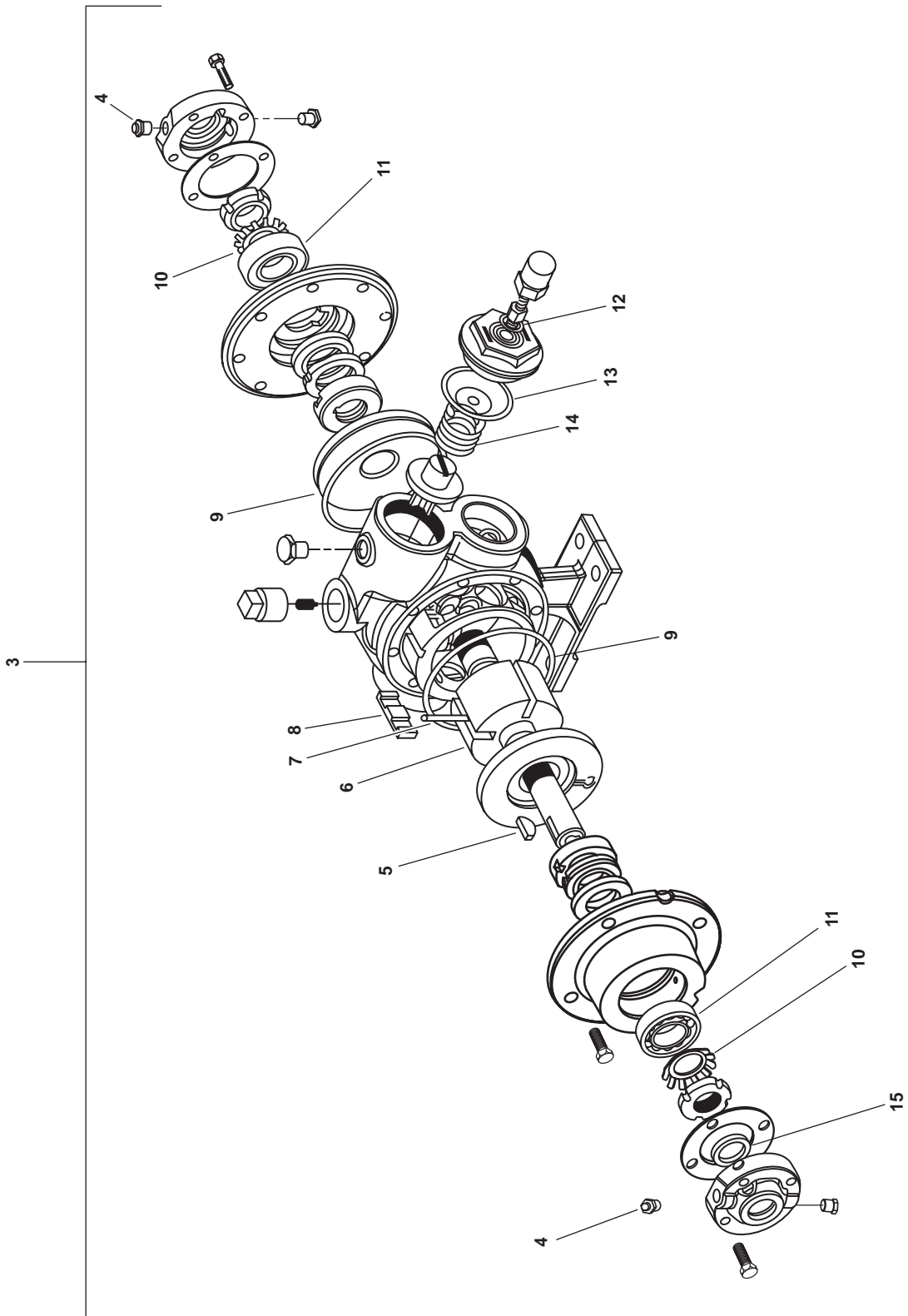


Figure 16. Fuel Oil Transfer Pump (Sheet 2 of 2)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 020903	
					FIG. 16 PUMP, FUEL OIL TRANSFER	
1	XDOZZ		S5281	00218ES3EF56C	MOTOR,ALTERNATING C .....	1
2	PAOZZ	3010-00-888-9213	75665	L150	COUPLING,SHAFT,FLEX .....	1
3	XDOOO		07524	XLF1.5B	PUMP FUEL OIL TRANSFER PUMP .....	2
4	XDOZZ	4930-00-672-3509	07524	317815	.FITTING,GREASE .....	2
5	KFOZZ		07524	909125	.KEY,SHAFT PART OF KIT P/N 898970 .....	1
6	KFOZZ		07524	263076	.ROTOR & SHAFT ASSEM PART OF KIT P/N 899070 .....	1
7	KFOZZ		07524	123401	.ROD,PUSH PART OF KIT P/N 898970 .....	2
8	KFOZZ		07524	093088	.VANE PART OF KIT P/N 898970 .....	4
9	KFOZZ		07524	701991	.O-RING PART OF KIT P/N 898970 .....	2
10	KFOZZ		07524	903533	.LOCKWASHER PART OF KIT P/N 898970 .....	2
11	KFOZZ		07524	903114	.BEARINGBALL PART OF KIT P/N 898970 .....	2
12	KFOZZ		07524	701908	.O-RING PART OF KIT P/N 898970 .....	1
13	KFOZZ		07524	701970	.O-RING PART OF KIT P/N 898970 .....	1
14	PAOZZ	5360-00-224-0468	07524	471420	.SPRING,HELICAL,COM .....	1
15	KFOZZ		07524	331927	.SEAL,GREASE PART OF KIT P/N 898970 .....	1
KIT	PAOZZ	4320-01-529-2371	07524	898970	.KIT,MAINTENANCE .....	1
					BEARING,BALL .....	( 2 ) 16 - 11
					KEY,SHAFT .....	( 1 ) 16 - 5
					LOCKWASHER .....	( 2 ) 16 - 10
					O-RING .....	( 1 ) 16 - 13
					O-RING .....	( 2 ) 16 - 9
					O-RING .....	( 1 ) 16 - 12
					ROD,PUSH .....	( 2 ) 16 - 7
					SEAL,GREASE .....	( 1 ) 16 - 15
					VANE .....	( 4 ) 16 - 8
KIT	PAOZZ	4320-01-529-2372	07524	899070	.KIT,REBUILD .....	1
					ROTOR & SHAFT ASSEM .....	( 1 ) 16 - 6
					<b>END OF FIGURE</b>	

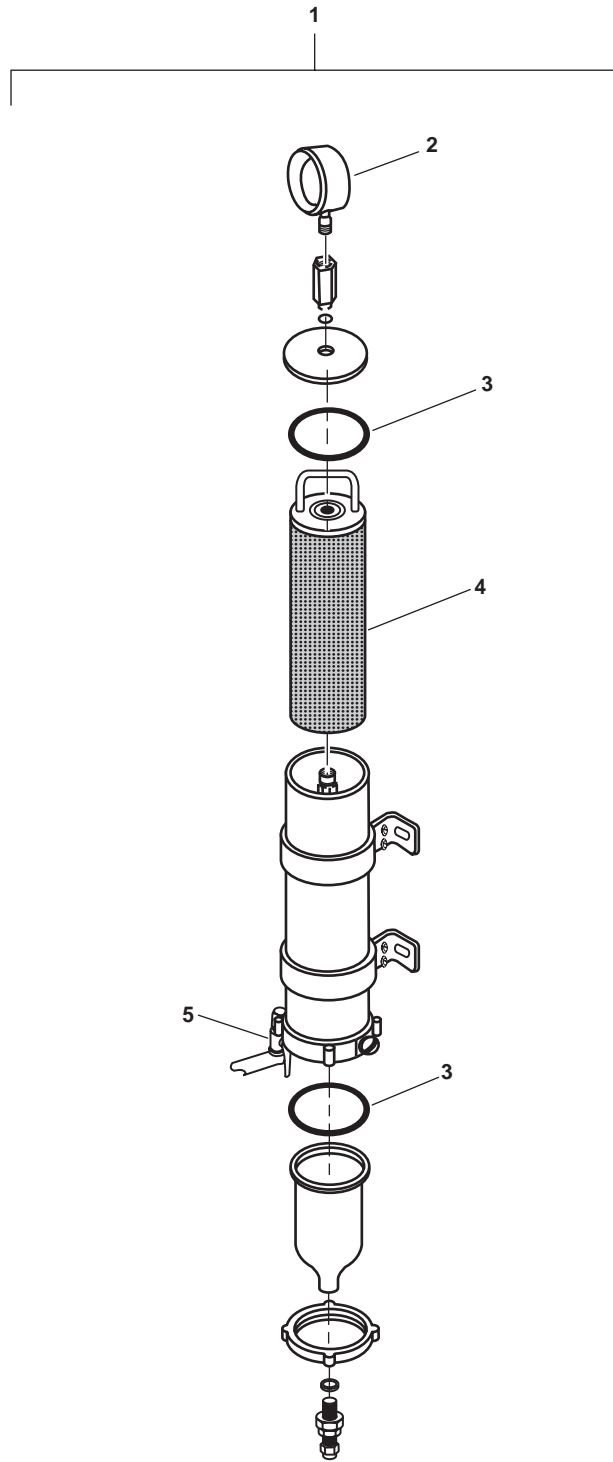


Figure 17. Fuel Oil/Water Separator (Engines)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 020904	
					FIG.17 FUEL OIL/WATER SEPARATOR (ENGINES)	
1	PFOOO	4330-01-051-9419	55752	1000FG30	FILTER-SEPARATOR,LI .....	16
2	PAOZZ	6685-01-468-5394	55752	11-1676	.GAGE,VACUUM,INDICAT .....	1
3	PAOZZ	5330-01-046-1990	55752	11007	.GASKET,BOWL .....	2
4	PAOZZ	4330-01-364-0184	55752	2020TM	.FILTER ELEMENT,FLUI .....	1
5	XDOZZ		55752	RK 11073	.VALVE,BALL .....	32
					<b>END OF FIGURE</b>	





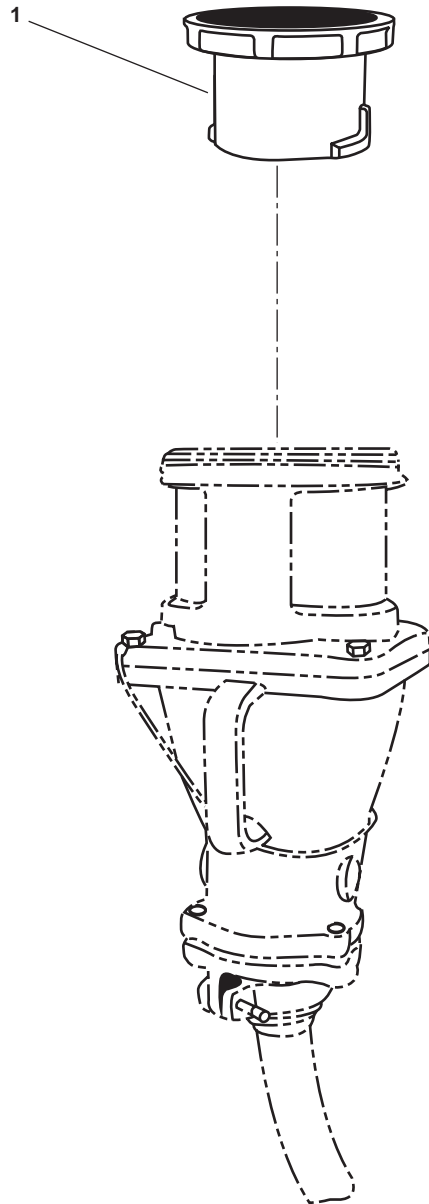
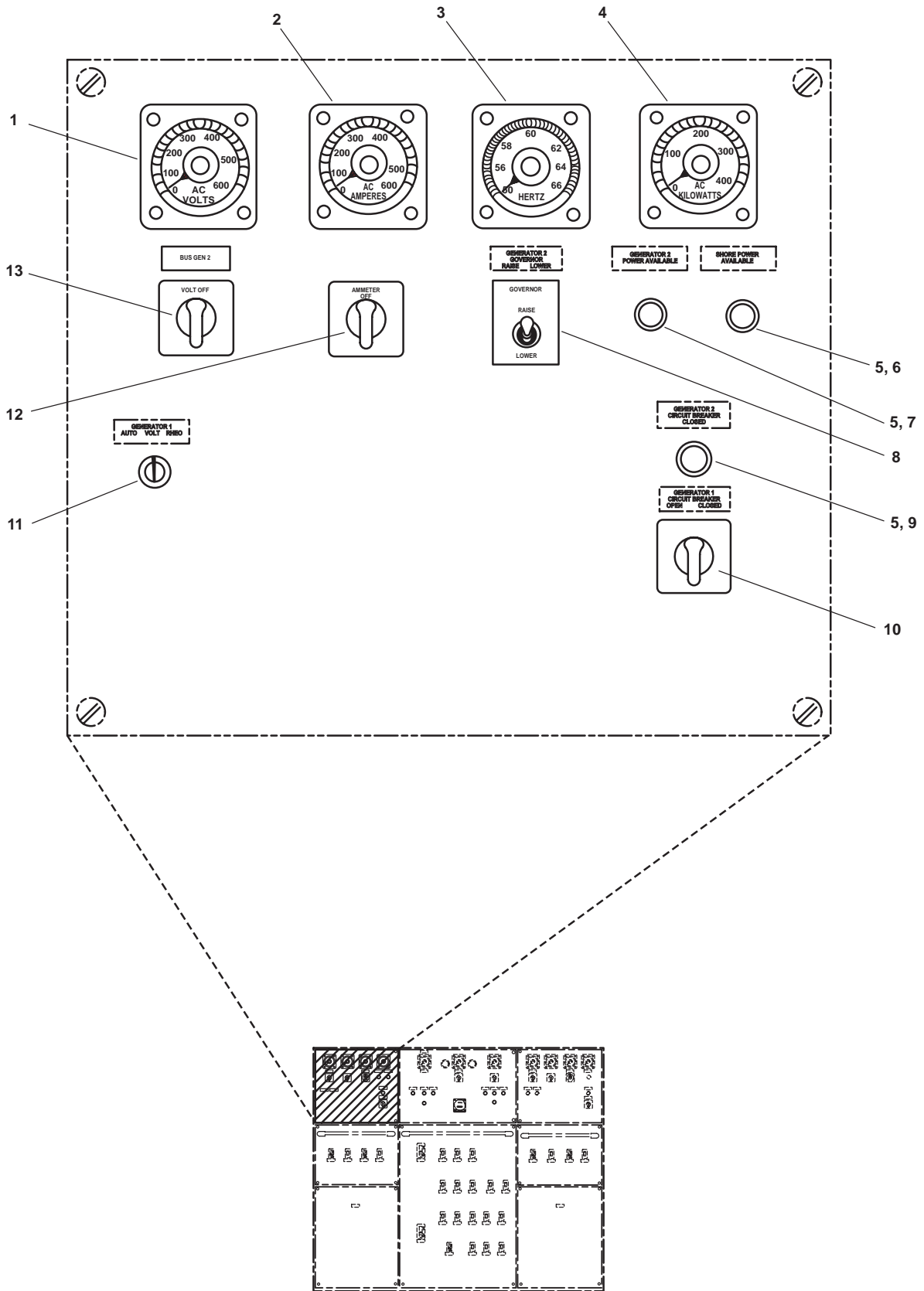


Figure 18. Electrical Power System

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
1	XDOZZ		59730	DS4404MRABO	GROUP 0303 FIG 18 ELECTRICAL POWER SYSTEM CONNECTOR,RECEPTACL ..... 1 END OF FIGURE	

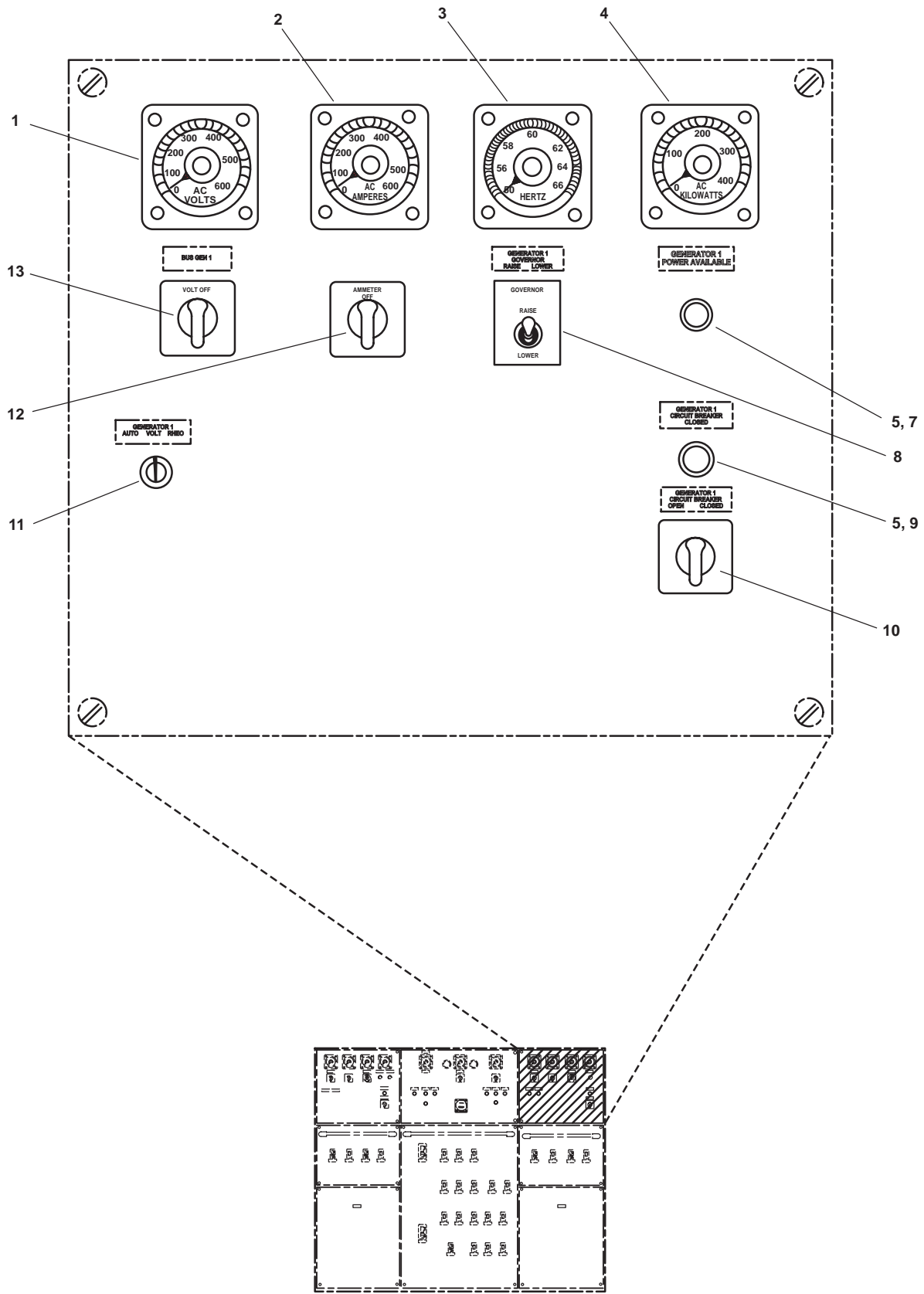






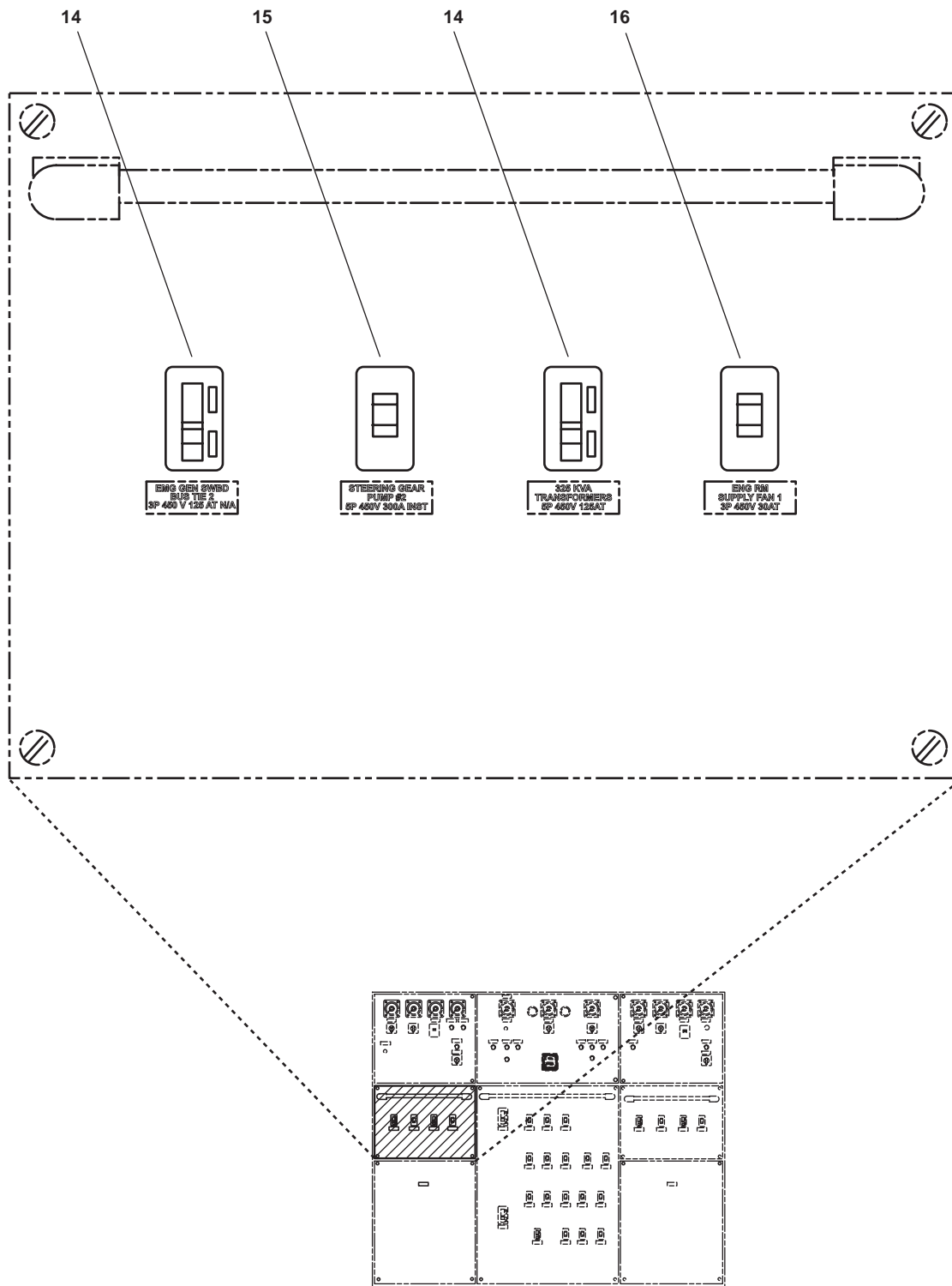
Main Switchboard Top Left Panel

Figure 19. Main Switchboard (Sheet 1 of 8)



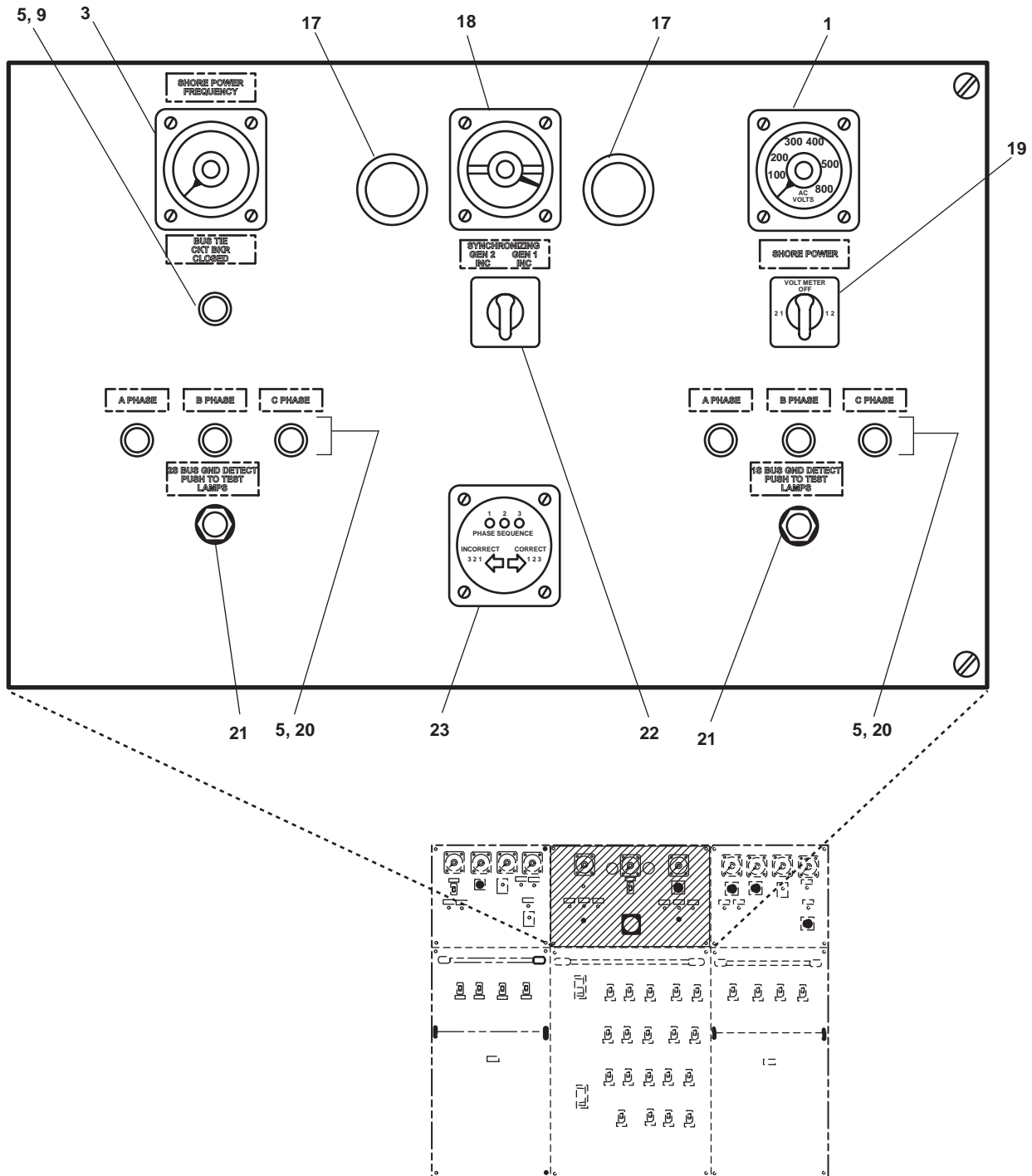
Main Switchboard Top Right Panel

Figure 19. Main Switchboard (Sheet 2 of 8)



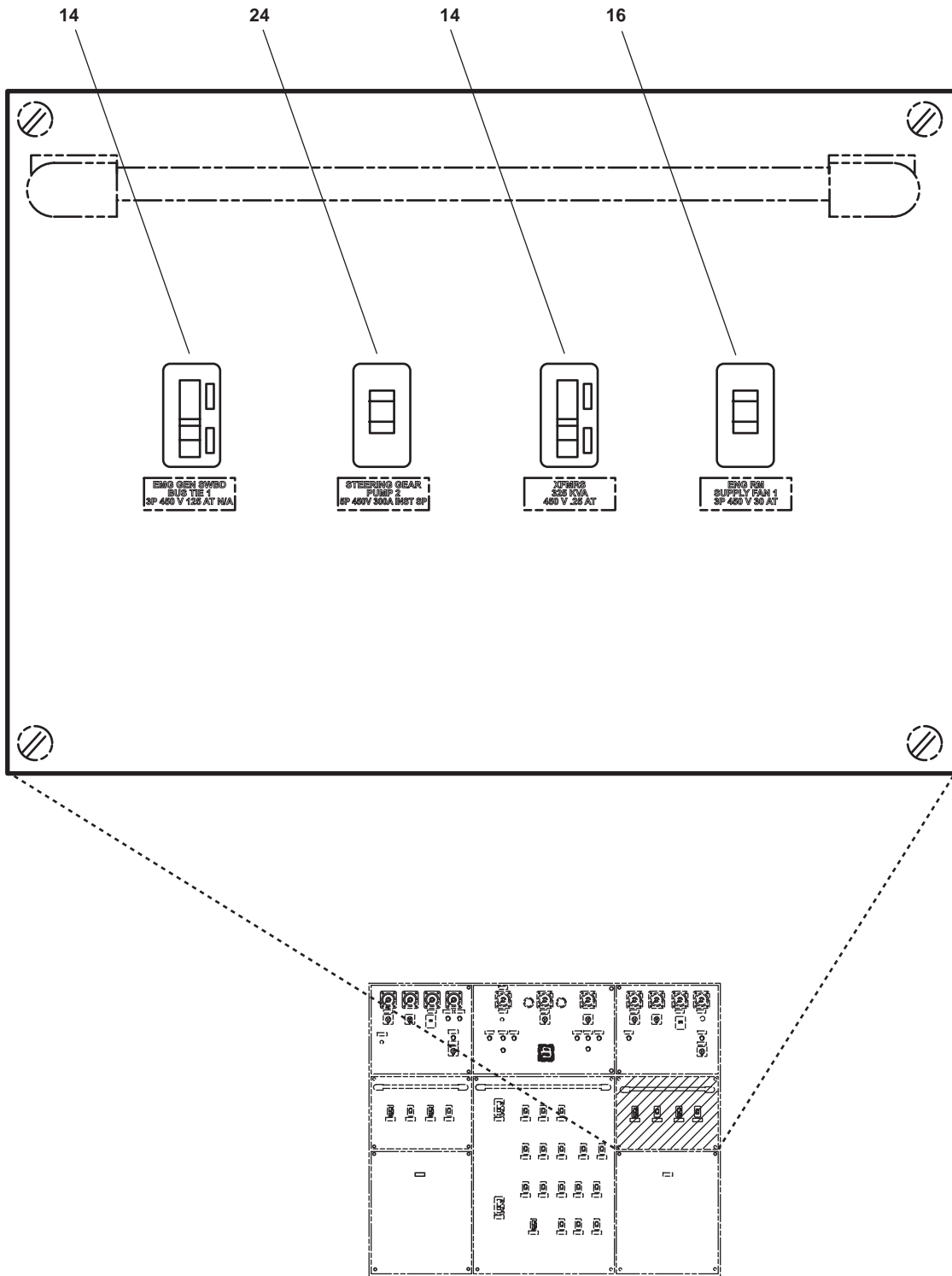
Main Switchboard Middle Left Panel

Figure 19. Main Switchboard (Sheet 3 of 8)



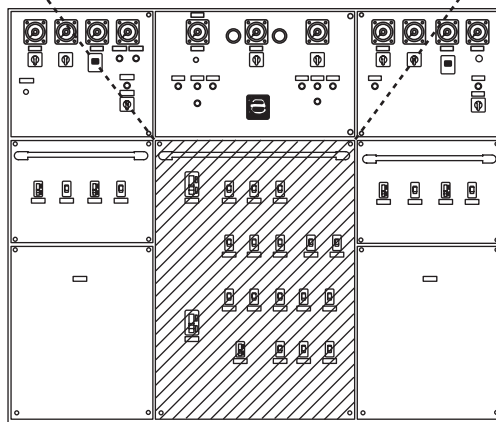
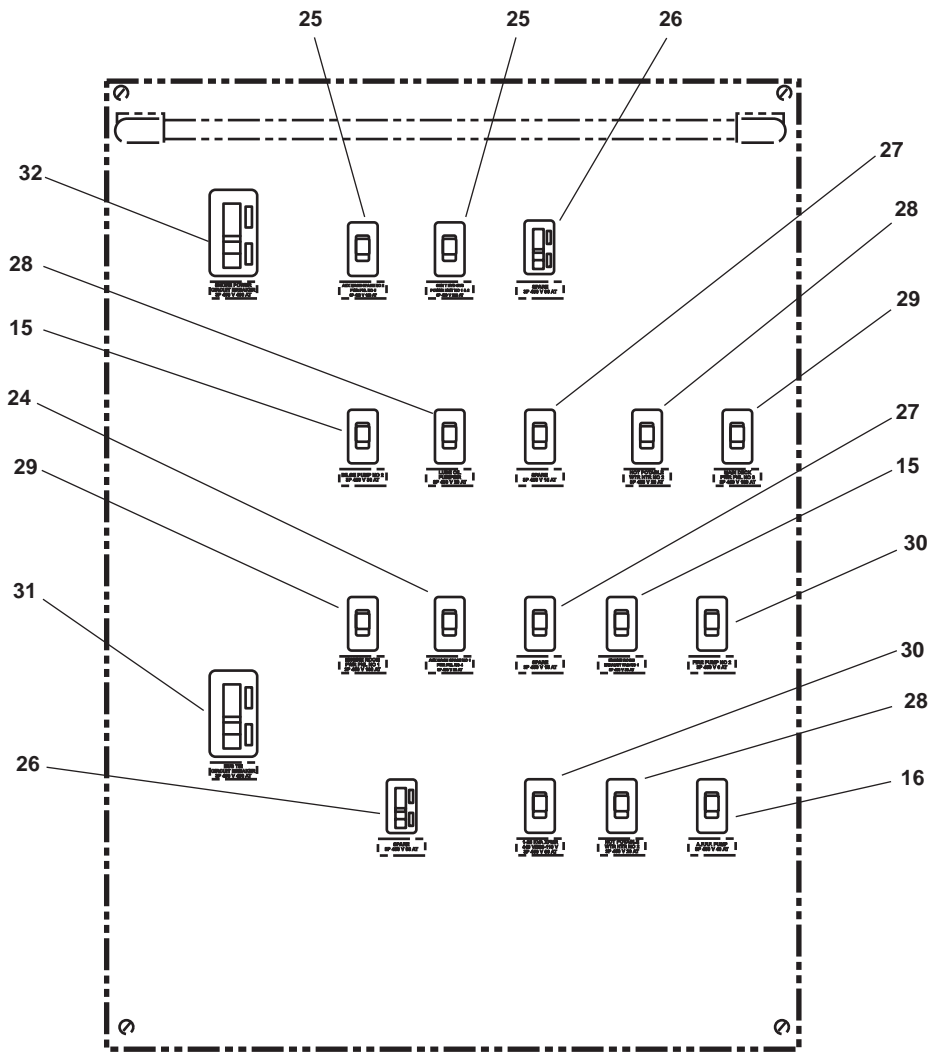
Main Switchboard Top Center Panel

Figure 19. Main Switchboard (Sheet 4 of 8)



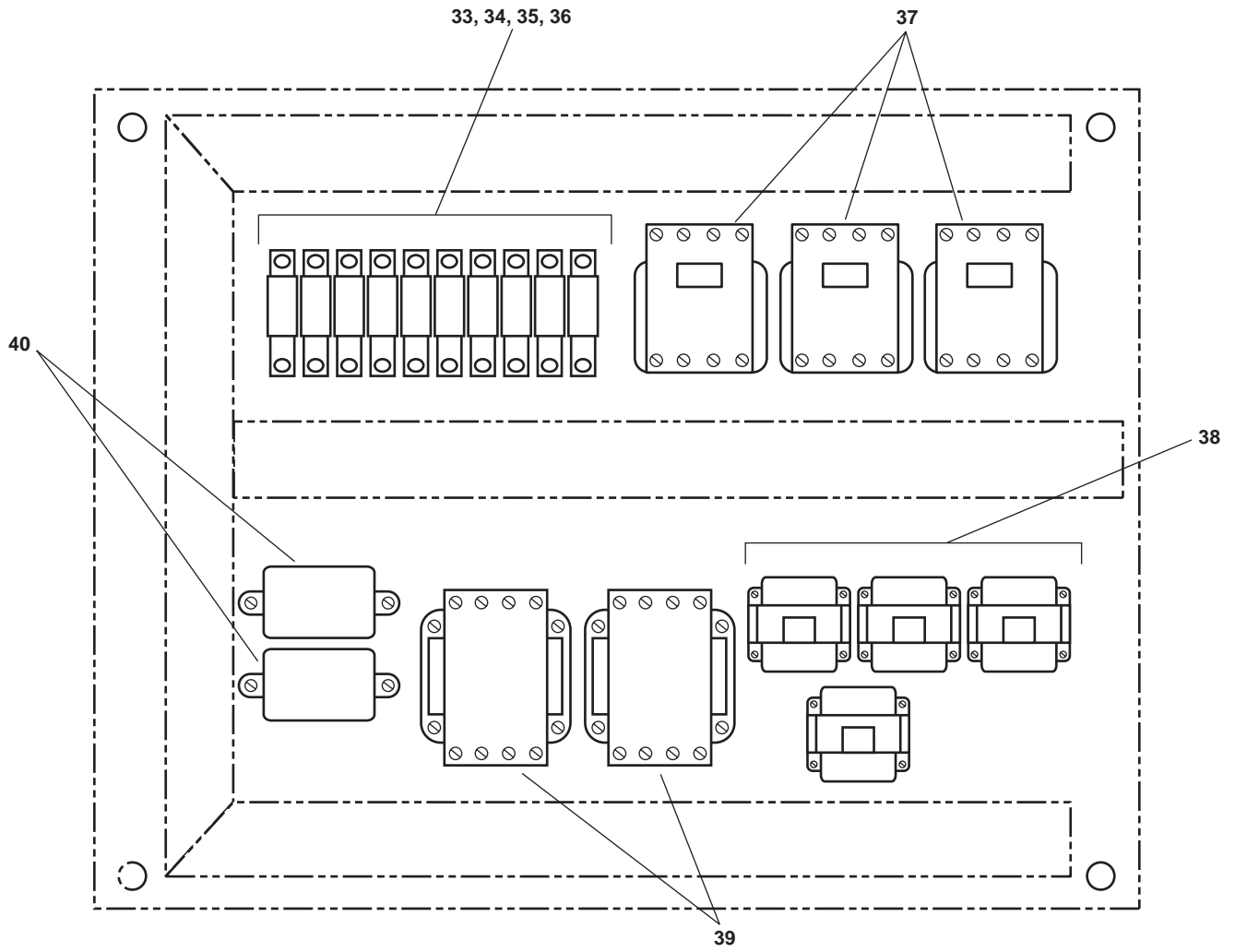
Main Switchboard Middle Right Panel

Figure 19. Main Switchboard (Sheet 5 of 8)



Main Switchboard Middle Bottom Panel

Figure 19. Main Switchboard (Sheet 6 of 8)



Main Switchboard Synchronizing Section  
Backpanel Layout

Figure 19. Main Switchboard (Sheet 7 of 8)

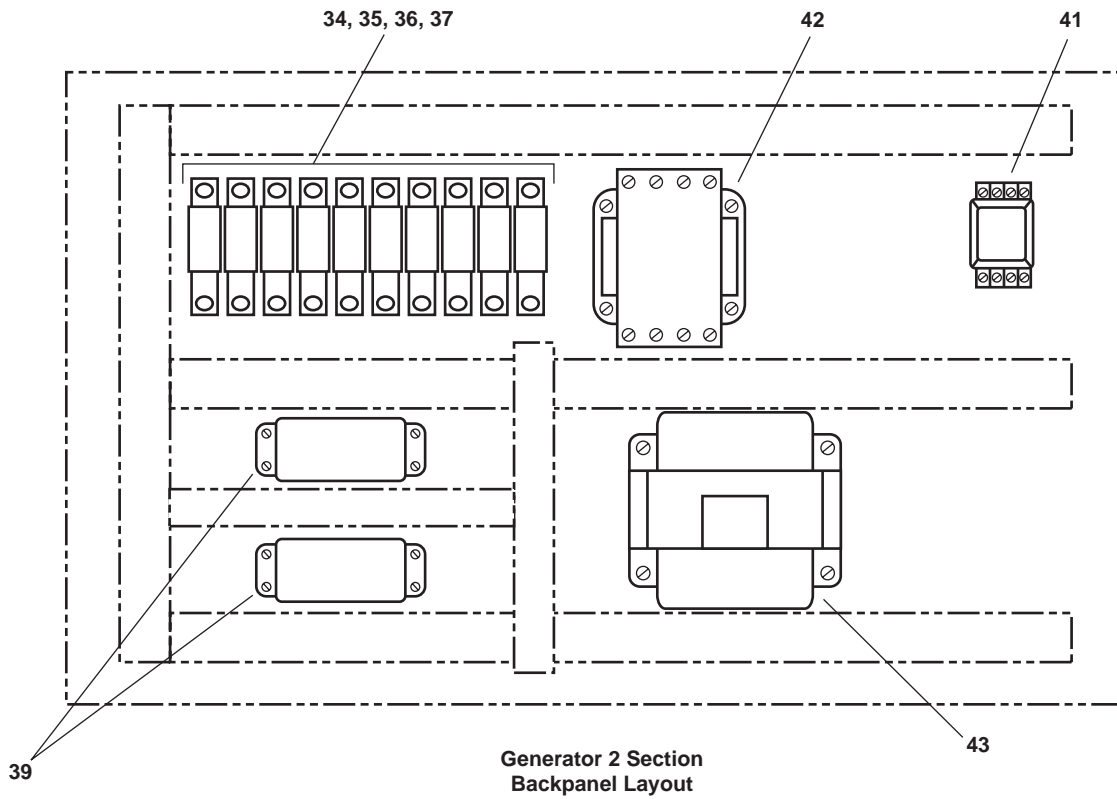
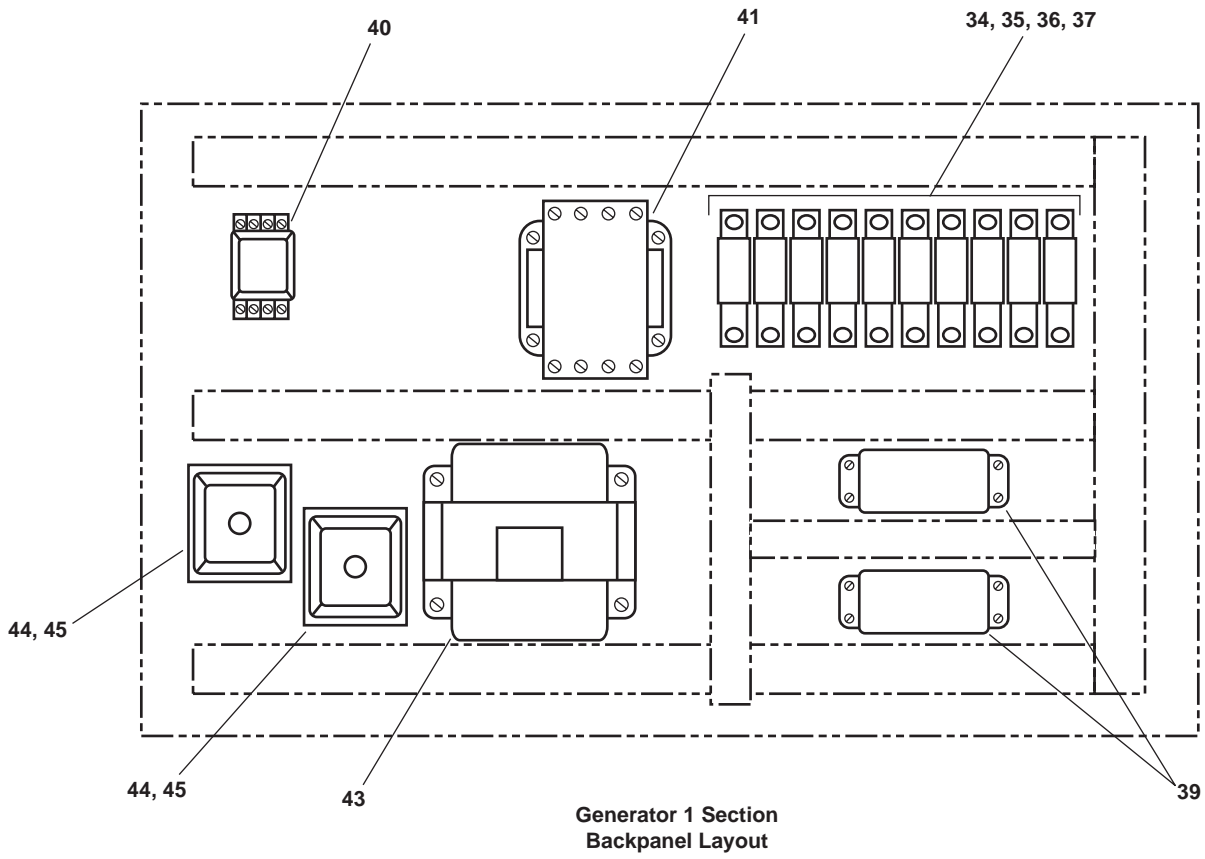


Figure 19. Main Switchboard (Sheet 8 of 8)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 030301	
					FIG 19 SWITCHBOARD, MAIN	
1	PAOZZ	6625-01-529-0654	53498	077-08VA-SJSJ-C6	VOLTMETER .....	3
2	PAOZZ	6625-01-140-6422	53498	077-08AA-LSSJ	AMMETER .....	2
3	PFOZZ	6625-00-556-4936	60336	103372ANAN	METER,ELECTRICAL FR .....	3
4	PAOZZ	6625-01-330-5506	53498	077-218A-QQXA-C6 CT800 :5PT480:120	WATTMETER .....	2
5	PFOZZ	6250-01-333-1092	83330	31-0901-01-102	LAMPHOLDER .....	12
6	PAOZZ	6210-01-039-0625	83330	31-0113-300	LENS,LIGHT .....	1
7	PFOZZ	6210-01-332-1713	83330	32-0135-300	LENS,LIGHT .....	1
8	PAOZZ	5930-00-636-3020	55588	7564K6	SWITCH,TOGGLE .....	2
9	XDOZZ		83330	32-0114-300	LENS,LIGHT .....	3
10	PFOZZ	5930-01-347-9135	63225	S7021385	SWITCH,ROTARY .....	2
11	PFOZZ	6110-01-355-4535	11083	7C2700	CONTROLLER,MOTOR .....	2
12	PFOZZ	5930-01-330-3506	63225	S7021205	SWITCH,ROTARY .....	2
13	PAOZZ	5930-01-330-8569	63225	S7021200	SWITCH,ROTARY .....	2
14	XDOZZ		0K3M2	37005-125	CIRCUIT BREAKER .....	4
15	XDOZZ		0K3M2	38013-030	CIRCUIT BREAKER .....	3
16	XDOZZ		0K3M2	38013-040	CIRCUIT BREAKER .....	3
17	PAOZZ	6210-00-160-0340	75346	S14	LIGHT,INDICATOR .....	2
18	PAOZZ	6625-01-207-5026	53498	077-146A-PRAE	INDICATOR,SYNCHRONI .....	1
19	PAOZZ	5930-01-330-3507	63225	S7021449	SWITCH,ROTARY .....	1
20	PFOZZ	6210-01-332-1714	83330	32-0137-300	LENS,LIGHT .....	6
21	PAOZZ	5930-01-352-3438	66842	3SB03-PFB01	SWITCH,PUSH .....	2
22	PFOZZ	5930-01-330-3201	63225	S7021204	SWITCH,ROTARY .....	1
23	PAOZZ	6625-01-456-4397	53498	077-12PA-P2C6	METER,SPECIAL SCALE .....	1
24	PFOZZ	5925-01-354-9718	0K3M2	41761-C125HMA40A	CIRCUIT BREAKER .....	2
25	XDOZZ		0K3M2	37006-200	CIRCUIT BREAKER .....	2
26	PAOZZ	5925-01-355-5348	0K3M2	37026-090	CIRCUIT BREAKER .....	2
27	XDOZZ		0K3M2	38013-015	CIRCUIT BREAKER .....	2
28	XDOZZ		0K3M2	38013-020	CIRCUIT BREAKER .....	3
29	XDOZZ		0K3M2	38013-100	CIRCUIT BREAKER .....	2
30	XDOZZ		0K3M2	38013-060	CIRCUIT BREAKER .....	2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
31	XDOZZ		0K3M2	35011 TYPE CK800NA	SWITCH .....	1
32	XDOZZ		0K3M2	36028 TYPE CJ 400 N	CIRCUIT BREAKER .....	1
33	PAFZZ	5920-01-330-5223	26794	M633-66	FUSEHOLDER BLOCK .....	7
34	PAFZZ	5920-01-330-5224	26794	M632-66	FUSEHOLDER BLOCK .....	4
35	PAFZZ	5920-01-276-2046	26794	M631-66	FUSEHOLDER,EXTRACTO .....	5
36	PAFZZ	5920-00-813-2714	71400	BBS3	FUSE,CARTRIDGE .....	32
37	PFFZZ	5950-01-160-4775	53711	324-6258908 ITEM 11	TRANSFORMER,POWER .....	7
38	PAFZZ	5950-01-231-2448	30552	9T58B46G08	TRANSFORMER,POWER .....	6
39	PAFZZ	5945-01-456-8564	53498	256-PLDU-PQBX-C6	RELAY,ELECTROMAGNET .....	2
40	PAFZZ		53498	252-PVAU	RELAY,ELECTROMAGNET .....	2
41	PAFZZ	5945-01-458-9504	53498	256-PATU-LSBX-SE -C6-EA	RELAY,ELECTROMAGNET .....	2
42	PAFZZ	5920-00-866-2570	71400	BBS10	FUSE,CARTRIDGE .....	2
43	PAFZZ	5950-01-150-6453	03512	9T58B50	TRANSFORMER,POWER .....	2
44	PAFZZ	5935-01-140-8059	77342	27E122	SOCKET,PLUG-IN ELEC .....	1
45	PFFZZ	5945-01-301-4095	77342	KRPA11AG-120	RELAY,ELECTROMAGNET .....	1
<b>END OF FIGURE</b>						



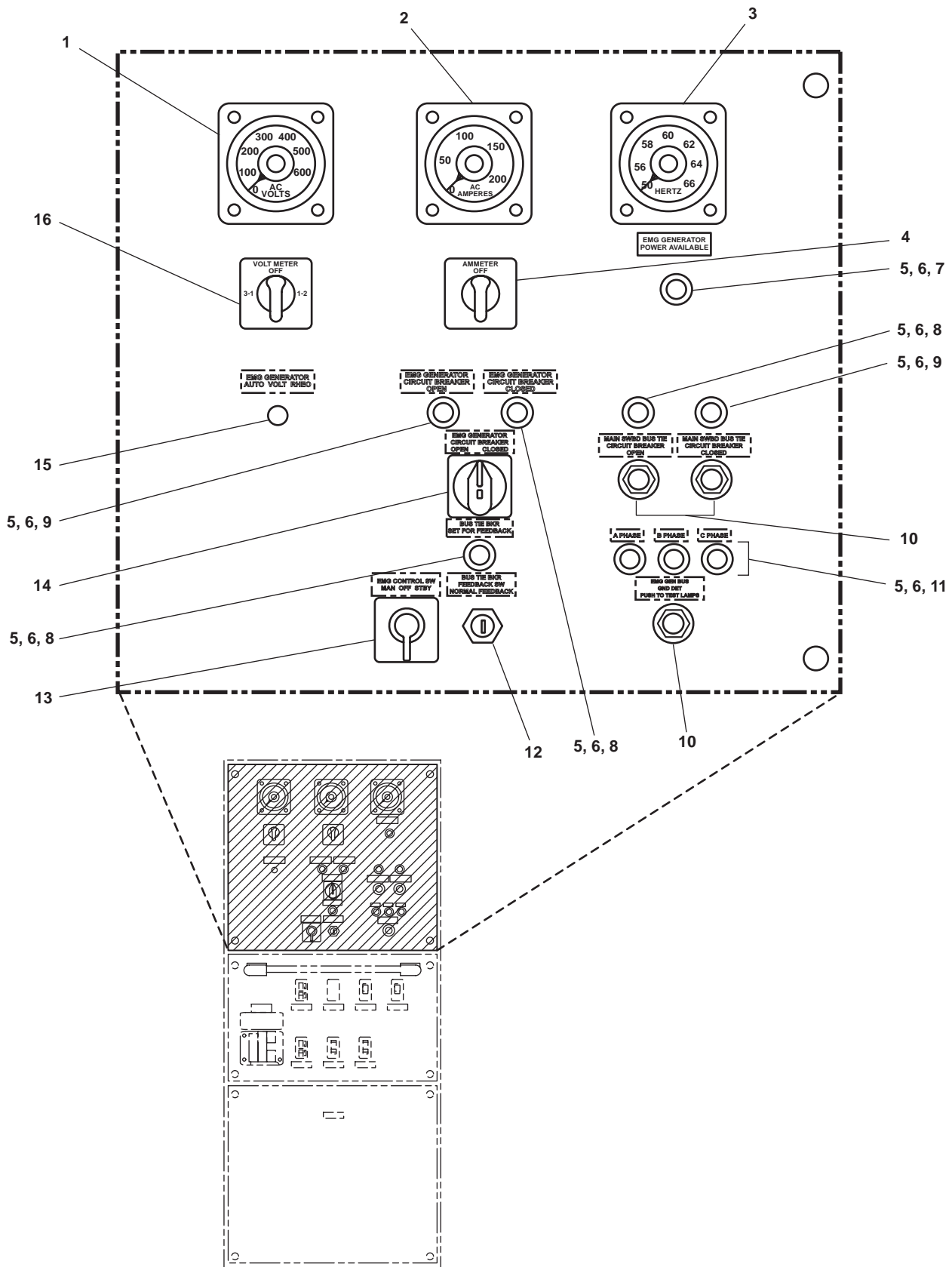
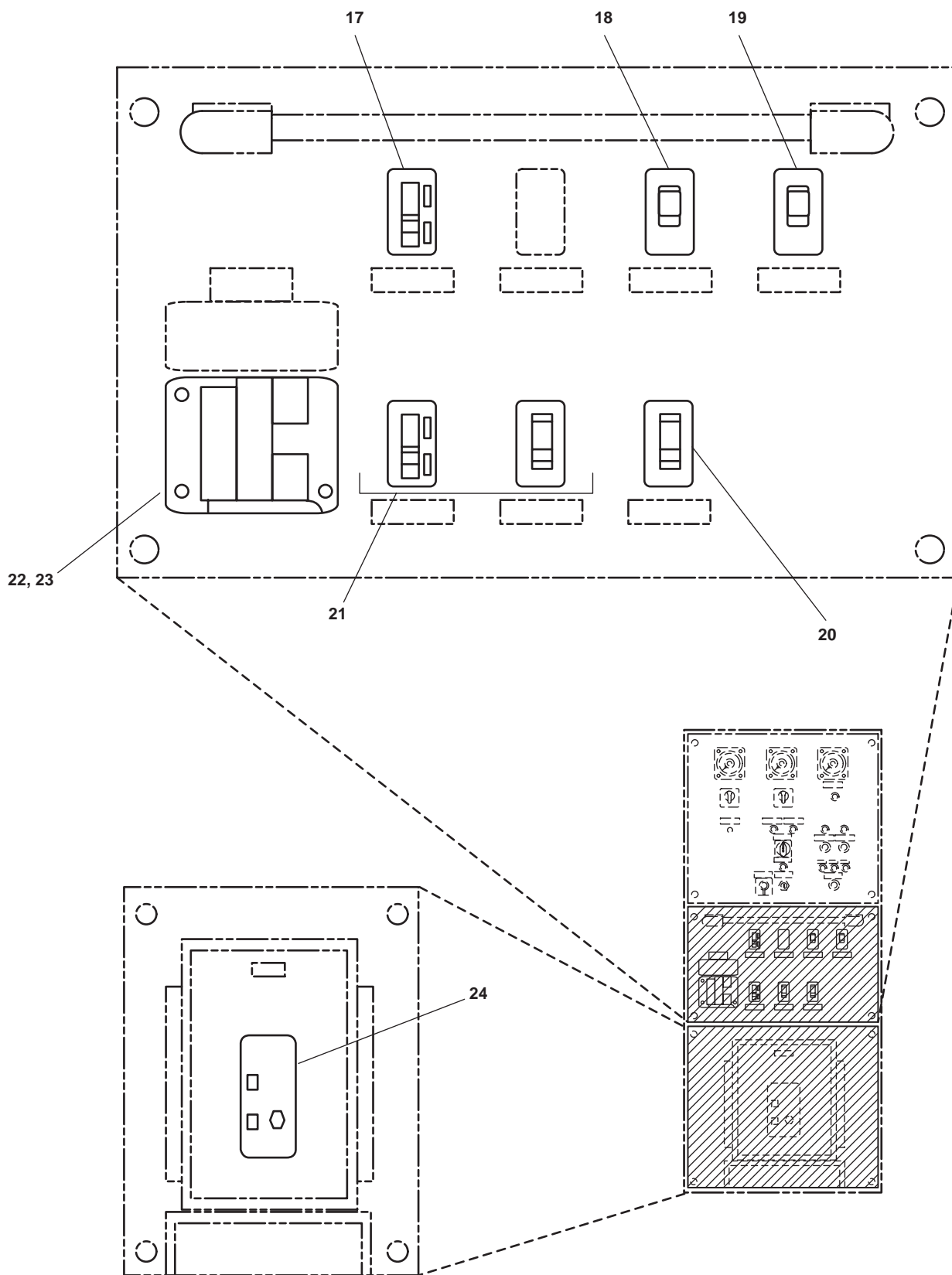
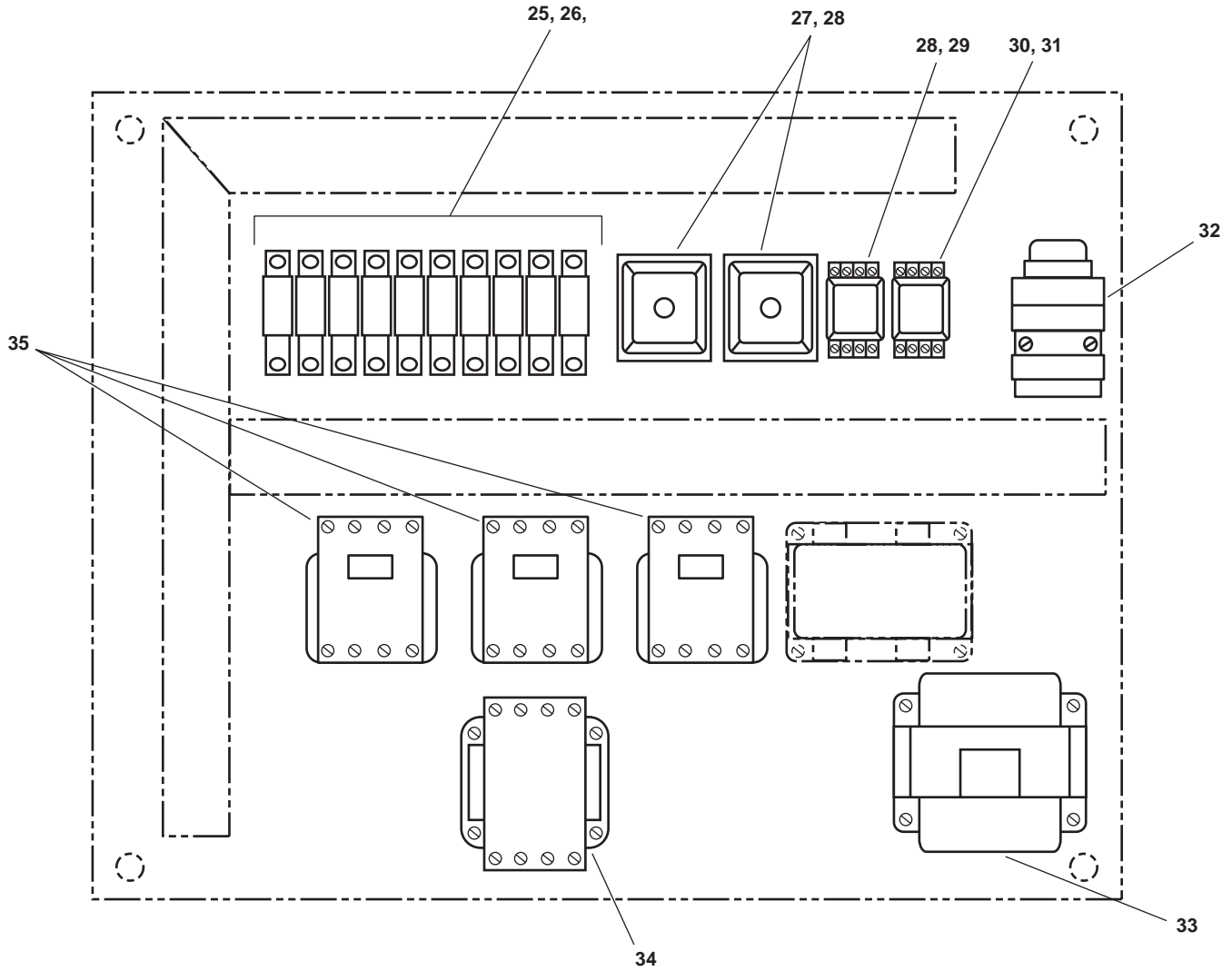


Figure 20. Emergency Switchboard (Sheet 1 of 3)



Emergency Switchboard Middle and Bottom Panel

Figure 20. Emergency Switchboard (Sheet 2 of 3)



Emergency Switchboard Backpanel Layout

Figure 20. Emergency Switchboard (Sheet 3 of 3)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 030302	
					FIG. 20 SWITCHBOARD, EMERGENCY	
1	PFOZZ	6625-01-096-9993	53498	077-08VA-PZSJ	VOLTMETER .....	1
2	PFOZZ	6625-01-207-5024	53498	077-05FA-LSRL-C6	AMMETER .....	1
3	PFOZZ	6625-00-556-4936	60336	103372ANAN	METER,ELECTRICAL FR .....	1
4	PFOZZ	5930-01-330-3506	63225	S7021205	SWITCH,ROTARY .....	1
5	PFOZZ	6250-01-333-1092	83330	31-0901-01-102	LAMPHOLDER .....	9
6	PAOZZ	6240-00-143-3049	62607	6S6-120V	LAMP .....	9
7	PFOZZ	6210-01-332-1713	83330	32-0135-300	LENS,LIGHT .....	1
8	PFOZZ	6210-01-157-9049	83330	25F1576	LENS,LIGHT,RED .....	3
9	PFOZZ	6210-01-016-8691	83330	31-0112-300	LENS,LIGHT,GREEN .....	2
10	PFOZZ	5930-01-348-7893	60969	CR104PBG91U1	SWITCH,PUSH .....	3
11	PFOZZ	6210-01-332-1714	83330	32-0137-300	LENS,LIGHT .....	3
12	PFOZZ	5930-01-348-8589	60969	CR104PSK21A92L	SWITCH,LOCK .....	1
13	PFOZZ	5930-01-330-3201	63225	S7021204	SWITCH,ROTARY .....	1
14	PFOZZ	5930-01-347-9135	63225	S7021385	SWITCH,ROTARY .....	1
15	PFOZZ	6110-01-355-4535	11083	7C2700	CONTROLLER,MOTOR .....	1
16	PAOZZ	5930-01-330-3507	63225	S7021449	SWITCH,ROTARY .....	1
17	PFOZZ	5025-01-368-2498	0K3M2	41761 C125H	CIRCUIT BREAKER .....	1
18	PFOZZ	5925-01-354-6090	0K3M2	38113-060	CIRCUIT BREAKER .....	1
19	PFOZZ	5925-01-354-6091	56365	38113-050	CIRCUIT BREAKER .....	1
20	PFOZZ	5925-01-354-6088	0K3M2	38113-015	CIRCUIT BREAKER .....	1
21	PFOZZ	5925-01-354-6089	0K3M2	38113-030	CIRCUIT BREAKER .....	2
22	XDFZZ		2A142	EOP3T07	OPERATOR,ELECTRICAL .....	1
23	XDFZZ		27192	KW3400F	CIRCUIT BREAKER .....	1
24	XDFZZ		0K3M2	MP08 N1	CIRCUIT BREAKER .....	1
25	PAOZZ		71400	AGC6	FUSE,CARTRIDGE .....	8
26	PAOZZ	5920-00-579-8434	71400	BBS15	FUSE,CARTRIDGE .....	2
27	PFOZZ	5945-01-173-8303	89020	SSC12ABA	RELAY,ELECTROMAGNET .....	2
28	PAOZZ	5935-01-140-8059	77342	27E122	SOCKET,PLUG-IN ELEC .....	3
29	PFOZZ	5945-01-301-4095	77342	KRPA11AG-120	RELAY,ELECTROMAGNET .....	1
30	PFOZZ	5935-01-052-9171	77342	27E123	SOCKET,PLUG-IN ELEC .....	3

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
31	PFOZZ	5945-00-839-7511	96214	533045-30	RELAY,ELECTROMAGNET .....	1
32	PFOZZ	5945-00-208-4696	89020	7022AD	RELAY,ELECTROMAGNET .....	1
33	PFOZZ	5950-01-130-8585	60969	9T58B0051	TRANSFORMER,POWER .....	1
34	XDOZZ		2A142	UVH3LP08K	TRANSFORMER,POWER .....	1
35	PFOZZ	5950-01-160-4775	53711	324-6258908 ITEM 11	TRANSFORMER,POWER .....	3
<b>END OF FIGURE</b>						





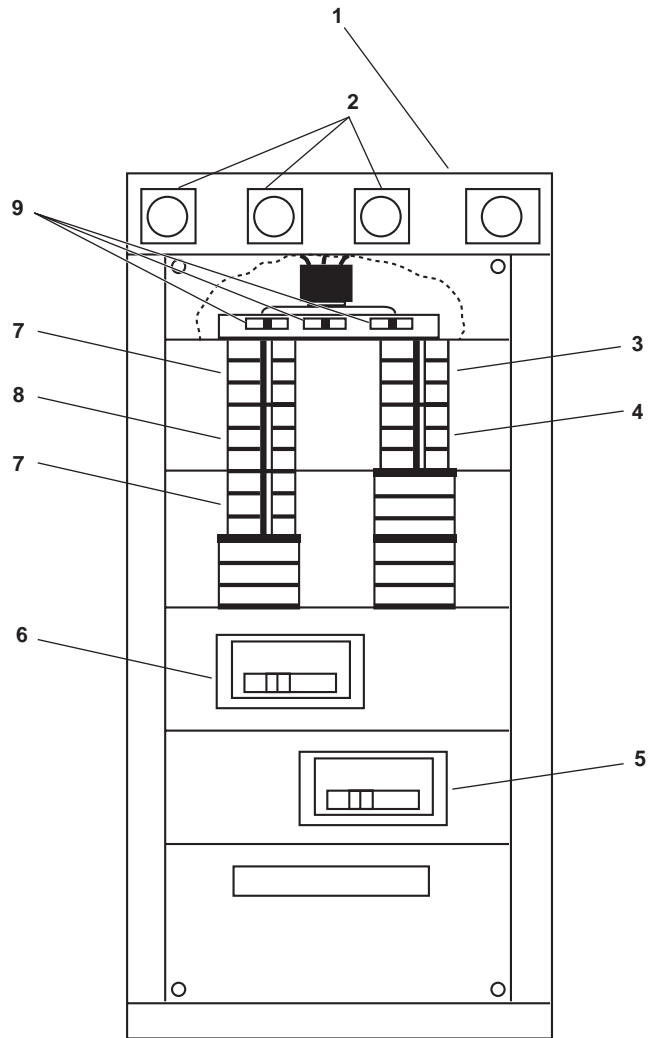


Figure 21. Engine Room Load Center

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030301	
					FIG 21 CENTER, LOAD, ENGINE ROOM	
1	XDFZZ		0E0J2	88029-1	LOAD CENTER,ENG RM .....	1
2	PAOZZ	6240-00-143-3049	62607	6S6-120V	LAMP .....	3
3	PFOZZ	5925-01-349-3080	66842	BQ3M030	CIRCUIT BREAKER .....	1
4	PFOZZ	5925-00-486-9111	30086	BQ3-M050	CIRCUIT BREAKER .....	1
5	PFOZZ	5925-01-349-4210	66842	QJ23M125	CIRCUIT BREAKER .....	1
6	PFOZZ	5925-01-348-7822	66842	QJ23M150	CIRCUIT BREAKER .....	1
7	PFOZZ	5925-00-486-9107	0E3Z7	BQ2M015	CIRCUIT BREAKER .....	2
8	PFOZZ	5925-01-348-7821	66842	BQ3M090	CIRCUIT BREAKER .....	1
9	PAOZZ	5920-00-813-2714	71400	BBS3	FUSE,CARTRIDGE .....	3
					<b>END OF FIGURE</b>	

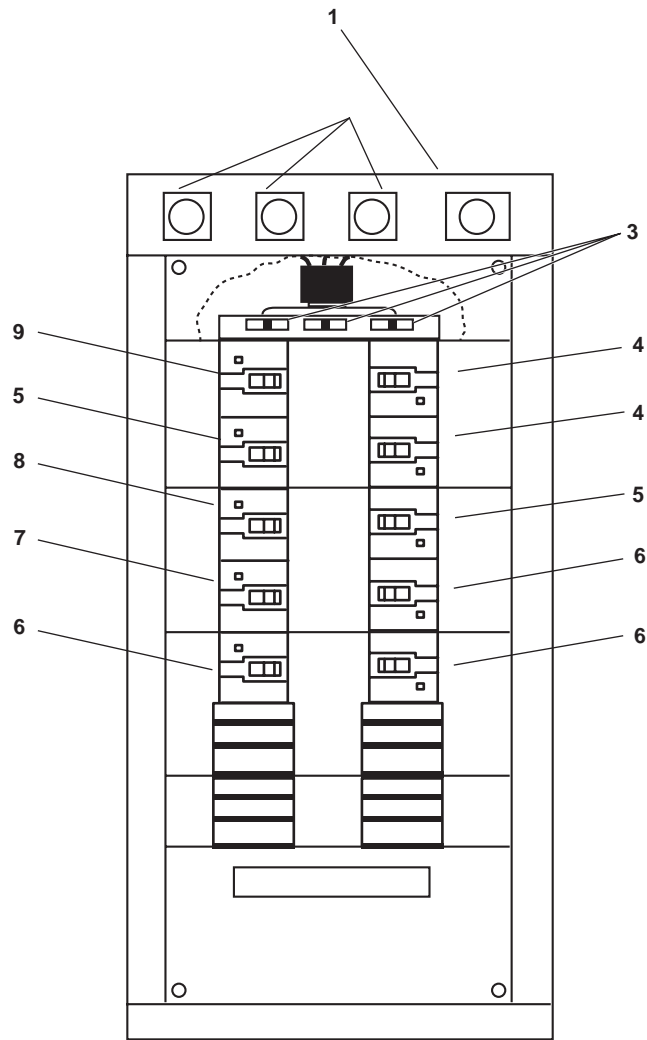


Figure 22. Emergency Load Center

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030302	
					FIG 22 CENTER, LOAD, EMERGENCY	
1	XDFZZ		0E0J2	88029-2	LOAD CENTER,EMER RM .....	1
2	PAOZZ	6240-00-143-3049	62607	6S6-120V	LAMP .....	3
3	PAOZZ	5920-00-813-2714	71400	BBS3	FUSE,CARTRIDGE .....	3
4	PFOZZ	5925-01-348-5778	66842	BQ3M025	CIRCUIT BREAKER .....	2
5	PFOZZ	5925-01-348-5780	66842	BQ3M070	CIRCUIT BREAKER .....	2
6	PFOZZ	5925-00-484-3138	30086	BQ3M015	CIRCUIT BREAKER .....	3
7	PFOZZ	5925-01-348-5777	66842	BQ3M020	CIRCUIT BREAKER .....	1
8	PFOZZ	5925-00-486-9107	0E3Z7	BQ2M015	CIRCUIT BREAKER .....	1
9	PFOZZ	5925-01-348-5779	66842	BQ3M040	CIRCUIT BREAKER .....	1
					<b>END OF FIGURE</b>	

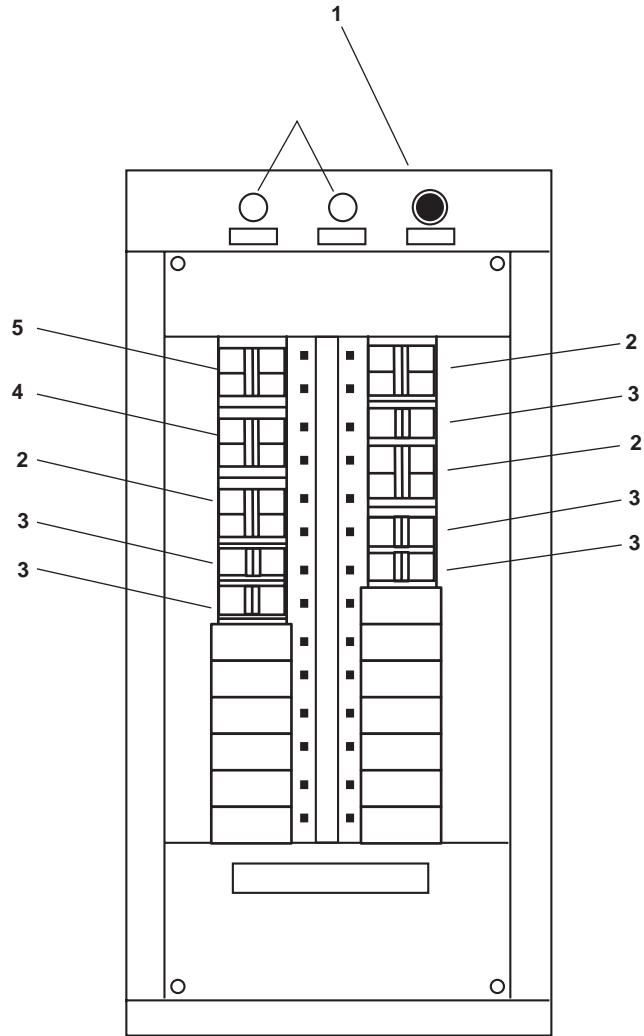


Figure 23. 220/110V Distribution Panel

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030401	
					FIG. 23 220/110V DISTRIBUTION PANEL	
1	XDFZZ		0E0J2	88029	DIST PANEL,220/110V .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	3
3	PAOZZ	5925-01-440-5400	66842	B115	CIRCUIT BREAKER .....	5
4	PAOZZ	5925-01-387-6469	66842	B225	CIRCUIT BREAKER .....	1
5	PAOZZ	5925-01-387-6606	66842	B230	CIRCUIT BREAKER .....	1
6	PAOZZ	6240-00-143-3049	62607	6S6-120V	LAMP .....	2
					<b>END OF FIGURE</b>	

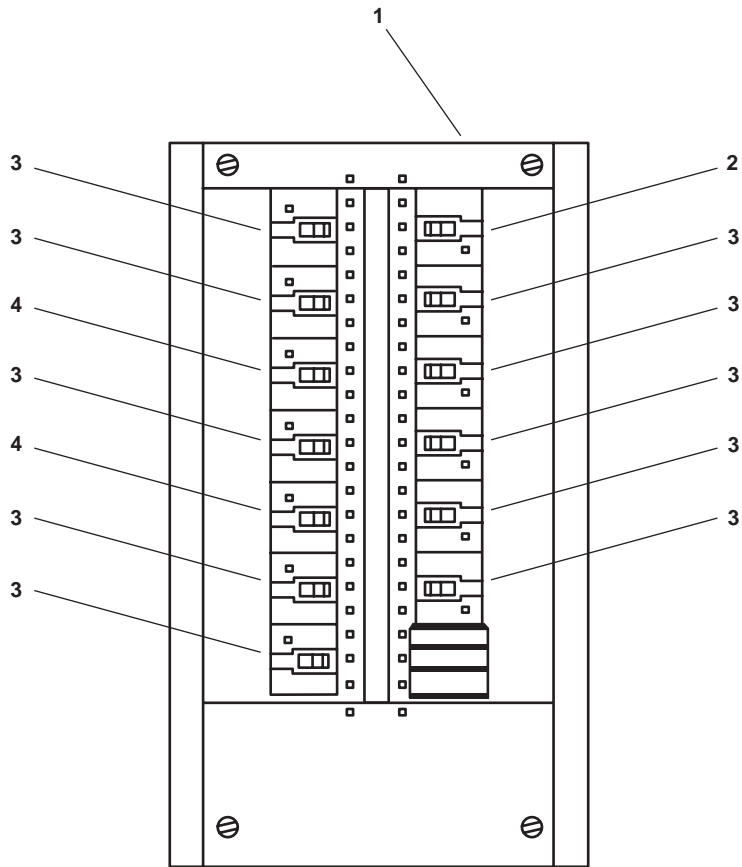


Figure 24. 440V Power Panel No. 1



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030402	
					FIG 24 440V POWER PANEL No. 1	
1	XDFZZ		0E0J2	88029-3	POWER PANEL,PP1 .....	1
2	PFOZZ	5925-01-349-3081	66842	ED43B020	CIRCUIT BREAKER .....	1
3	PAOZZ	5925-01-346-7541	66842	ED43B015	CIRCUIT BREAKER .....	10
4	PFOZZ	5925-01-349-3080	66842	BQ3M030	CIRCUIT BREAKER .....	2
					<b>END OF FIGURE</b>	

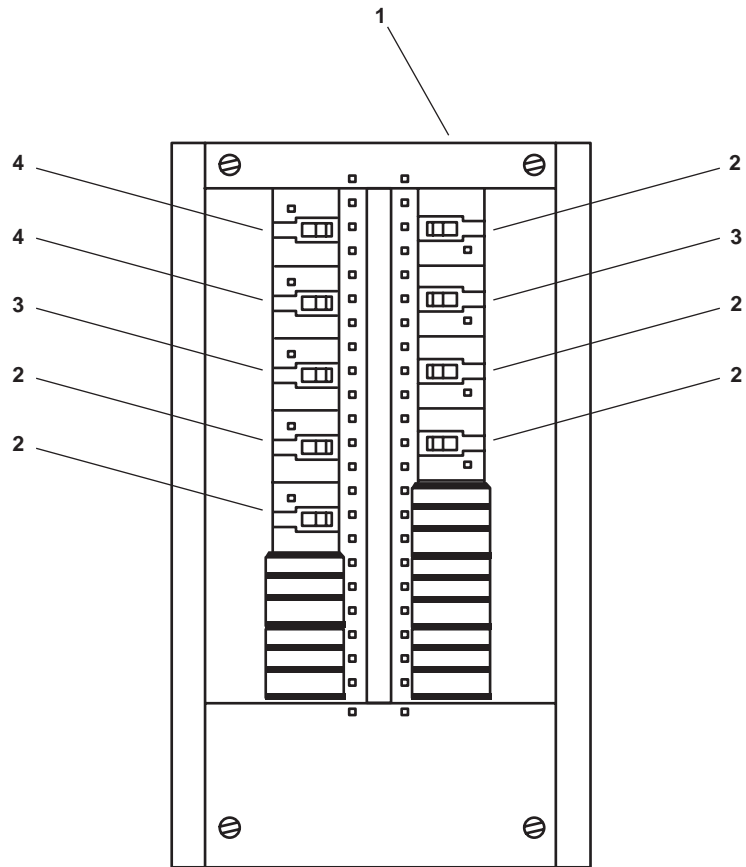


Figure 25. 440V Power Panel No. 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030403	
					FIG. 25 440V POWER PANEL No. 2	
1	XDFZZ		0E0J2	88029-4	POWER PANEL,PP2 .....	1
2	PAOZZ	5925-01-346-7541	66842	ED43B015	CIRCUIT BREAKER .....	5
3	PFOZZ	5925-01-349-3081	66842	ED43B020	CIRCUIT BREAKER .....	2
4	PFOZZ	5925-01-346-6171	66842	ED43B025	CIRCUIT BREAKER .....	2
					<b>END OF FIGURE</b>	

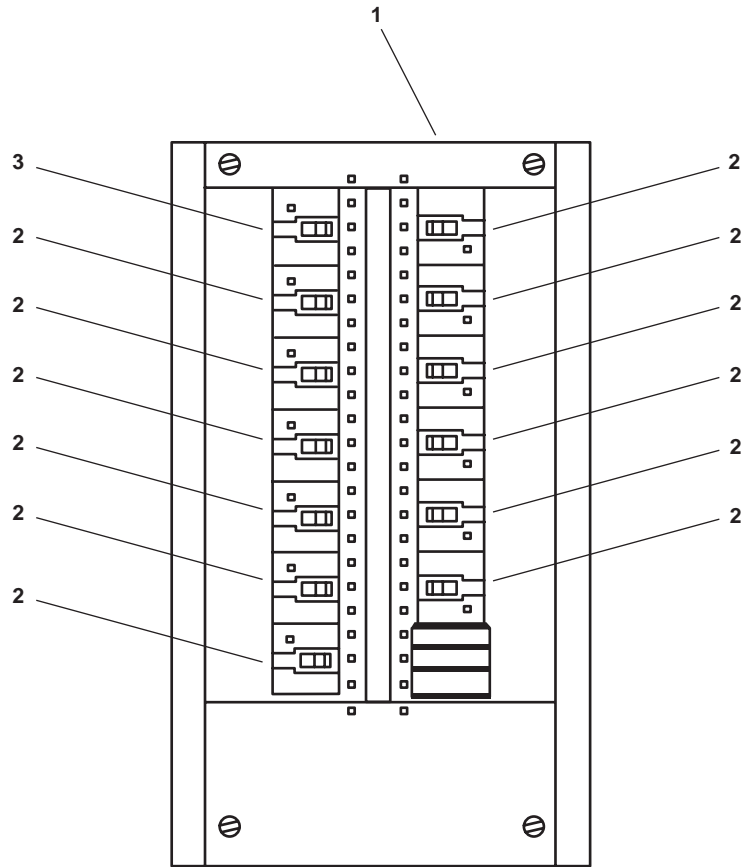


Figure 26. 440V Power Panel No. 3

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030404	
					FIG. 26 440V POWER PANEL No. 3	
1	XDFFF		0E0J2	88029-5	POWER PANEL,PP3 .....	1
2	PAOZZ	5925-01-346-7541	66842	ED43B015	.CIRCUIT BREAKER .....	12
3	XDOZZ	5925-01-346-6171	66842	ED43B025	.CIRCUIT BREAKER .....	1
					<b>END OF FIGURE</b>	

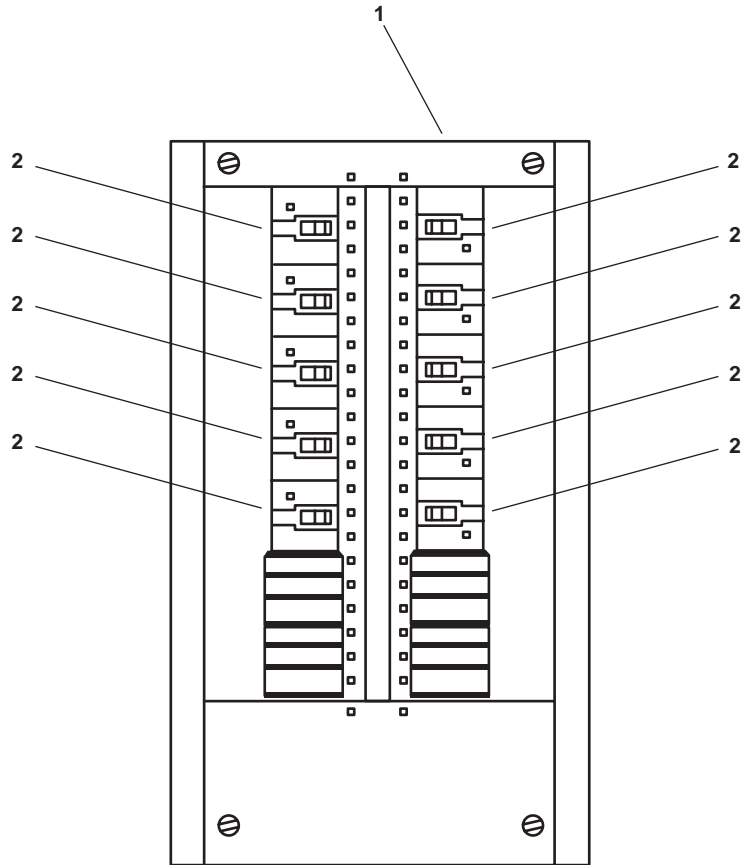


Figure 27. 440V Power Panel No. 4

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030405	
					FIG 27 440V POWER PANEL No. 4	
1	XDFZZ		0E0J2	88029-6	POWER PANEL,PP4 .....	1
2	PAOZZ	5925-01-346-7541	66842	ED43B015	CIRCUIT BREAKER .....	10
					<b>END OF FIGURE</b>	

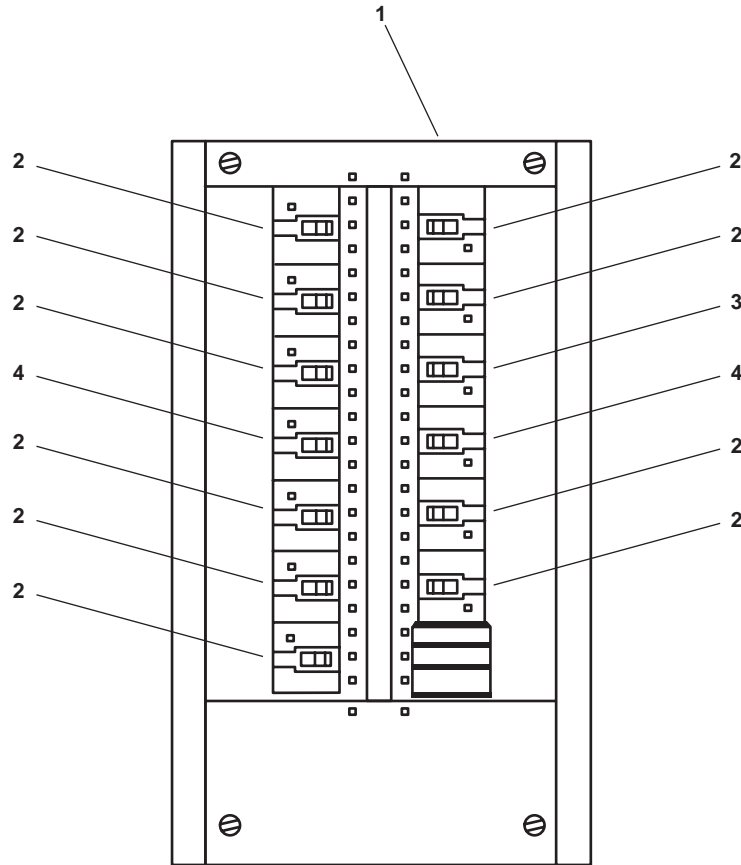


Figure 28. 440V Power Panel No. 5



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030406	
					FIG 28 440V POWER PANEL No. 5	
1	XDFZZ		0E0J2	88029-7	POWER PANEL,PP5 .....	1
2	PAOZZ	5925-01-346-7541	66842	ED43B015	CIRCUIT BREAKER .....	10
3	PAOZZ	5925-01-436-7421	66842	ED43B060	CIRCUIT BREAKER .....	1
4	PAOZZ	5925-01-346-7533	66842	ED43B040	CIRCUIT BREAKER .....	2
					<b>END OF FIGURE</b>	

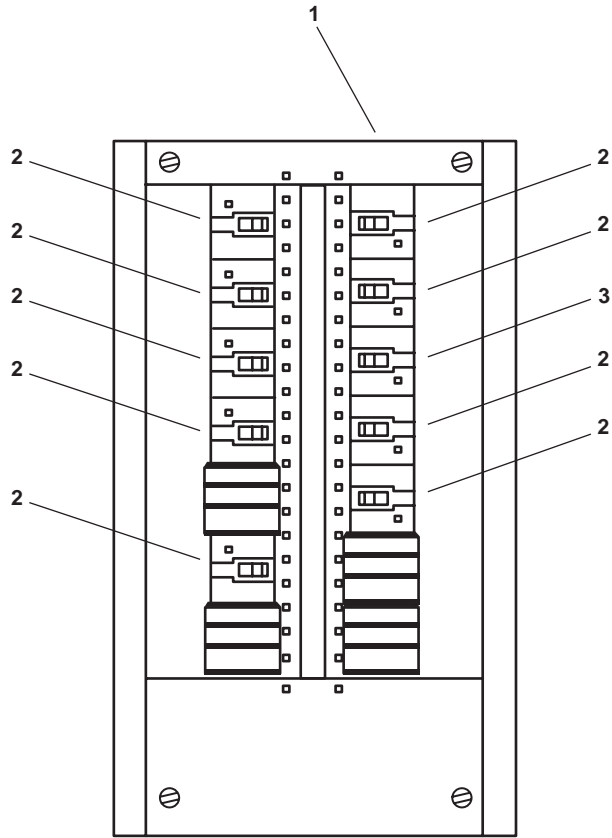


Figure 29. 120V Distribution Panel No. 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030407	
					FIG. 29 120V DISTRIBUTION PANEL No. 1	
1	XDFZZ		0E0J2	88029-8	DIST PANEL,DP1 .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	9
3	PAOZZ	5925-01-387-6606	66842	B230	CIRCUIT BREAKER .....	1
					<b>END OF FIGURE</b>	

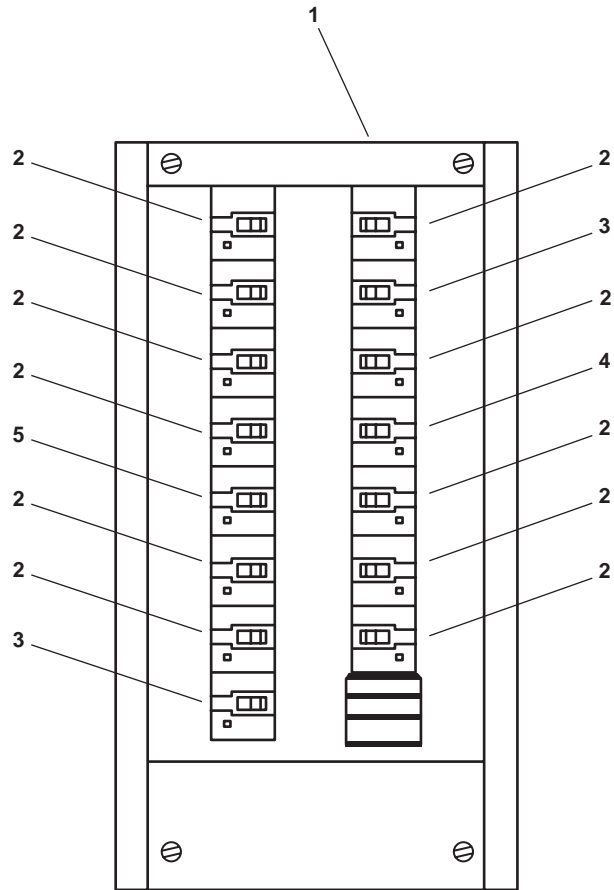


Figure 30. 120V Distribution Panel No. 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030408	
					FIG 30 120V DISTRIBUTION PANEL No. 2	
1	XDFZZ		0E0J2	88029-9	DIST PANEL,DP2 .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	11
3	PFOZZ	5925-01-387-6629	66842	B220	CIRCUIT BREAKER .....	2
4	PFOZZ	5925-01-464-5338	66842	B350	CIRCUIT BREAKER .....	1
5	PFOZZ	5925-01-464-5332	66842	B340	CIRCUIT BREAKER .....	1
					<b>END OF FIGURE</b>	

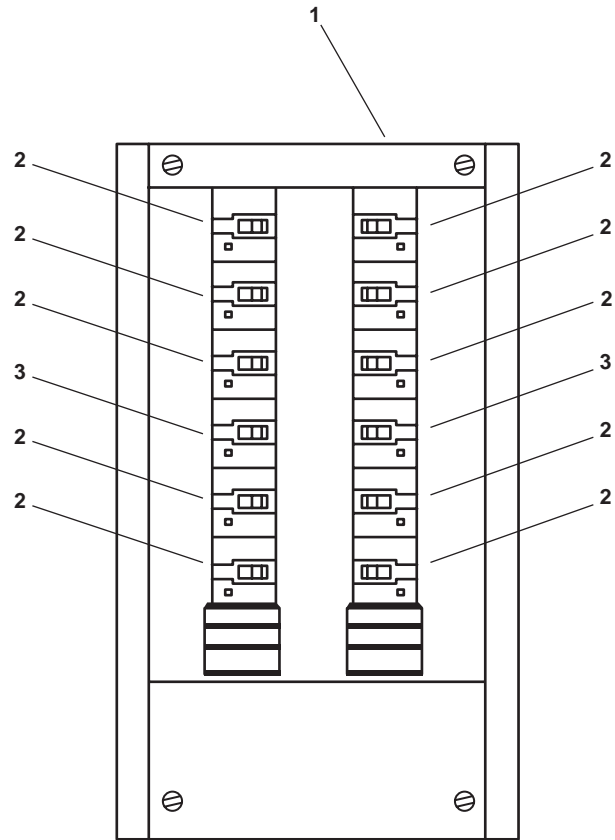


Figure 31. 120V Distribution Panel No. 3

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030409	
					FIG. 31 120V DISTRIBUTION PANEL No. 3	
1	XDFZZ		0E0J2	88029-10	DIST PANEL,DP3 .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	10
3	PFOZZ	5925-01-464-5338	66842	B350	CIRCUIT BREAKER .....	2
					<b>END OF FIGURE</b>	

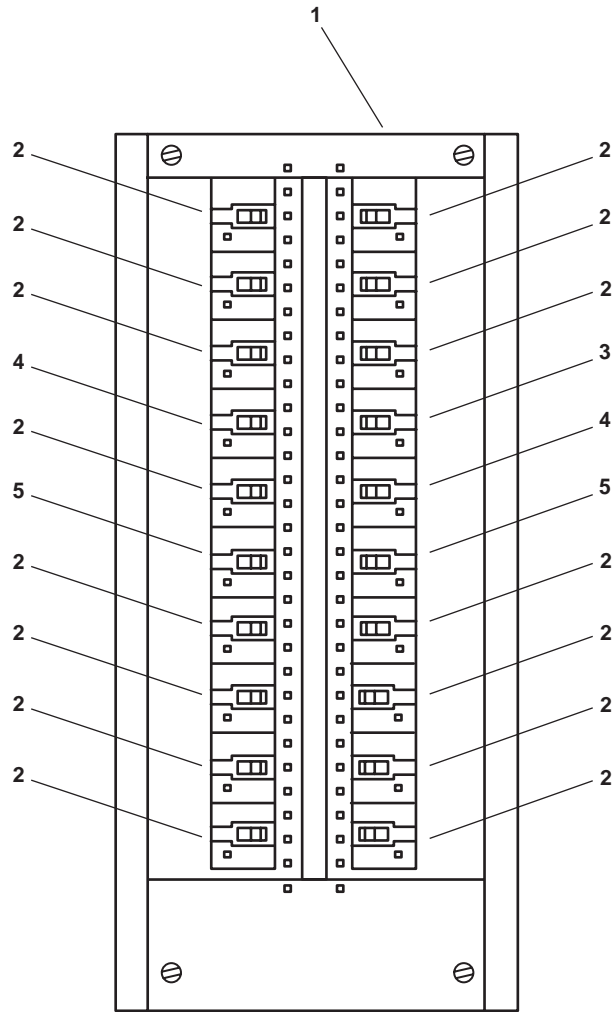


Figure 32. 120V Distribution Panel No. 4



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030410	
					FIG. 32 120V DISTRIBUTION PANEL No. 4	
1	XDFZZ		0E0J2	88029-11	DIST PANEL,DP4 .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	15
3	PFOZZ	5925-01-387-6629	66842	B220	CIRCUIT BREAKER .....	1
4	PAOZZ	5925-01-387-6606	66842	B230	CIRCUIT BREAKER .....	2
5	PAOZZ	5925-01-387-6469	66842	B225	CIRCUIT BREAKER .....	2
					<b>END OF FIGURE</b>	

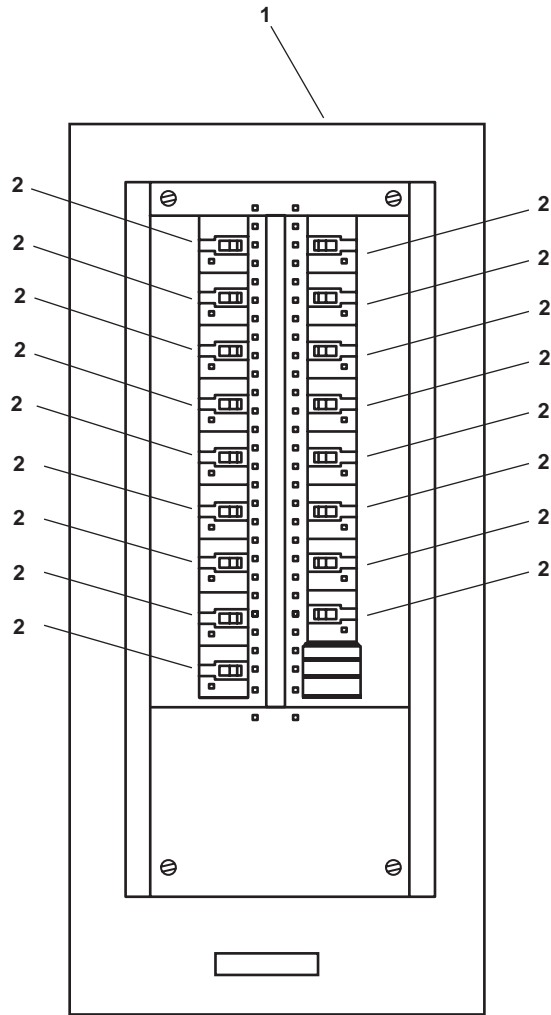


Figure 33. 120V Emergency Distribution Panel No. 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0303041	
					FIG. 33 120V EMERGENCY DISTRIBUTION PANEL No. 1	
1	XDFZZ		0E0J2	88029-12	EMER DIST PANEL,EDP .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	17
					<b>END OF FIGURE</b>	

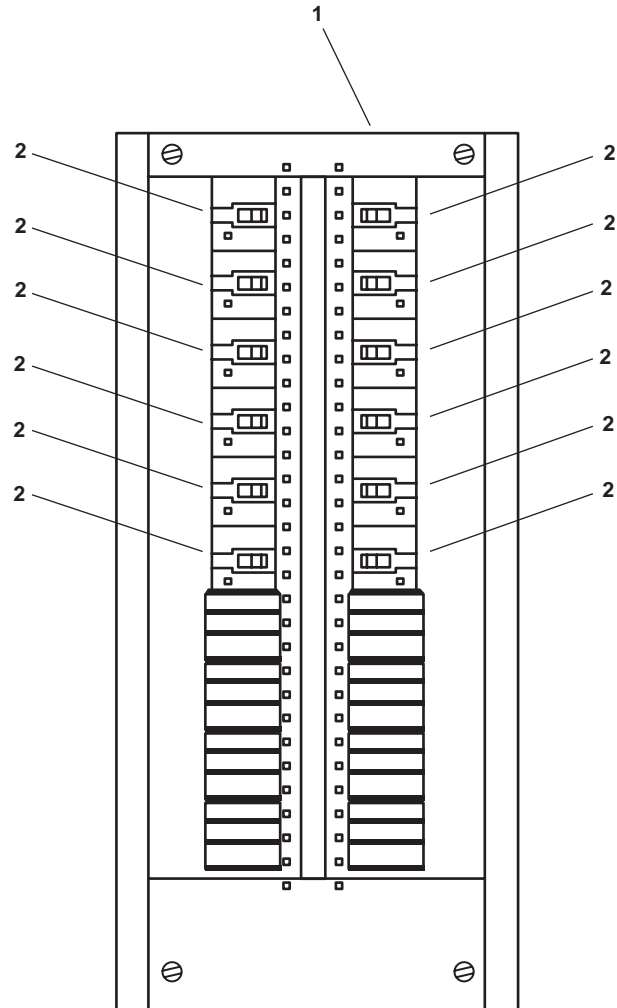


Figure 34. 120V Main Deck, 01 & 02 Emergency Lighting Panel No. 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030412	
					FIG 34 120V MAIN DECK, 01 & 02 EMERGENCY LIGHTING PANEL No. 1	
1	XDFZZ		0E0J2	88029-13	EMER LIGHTING PANEL EMERGENCY LIGHTING PANEL, EL1 .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	12
					<b>END OF FIGURE</b>	

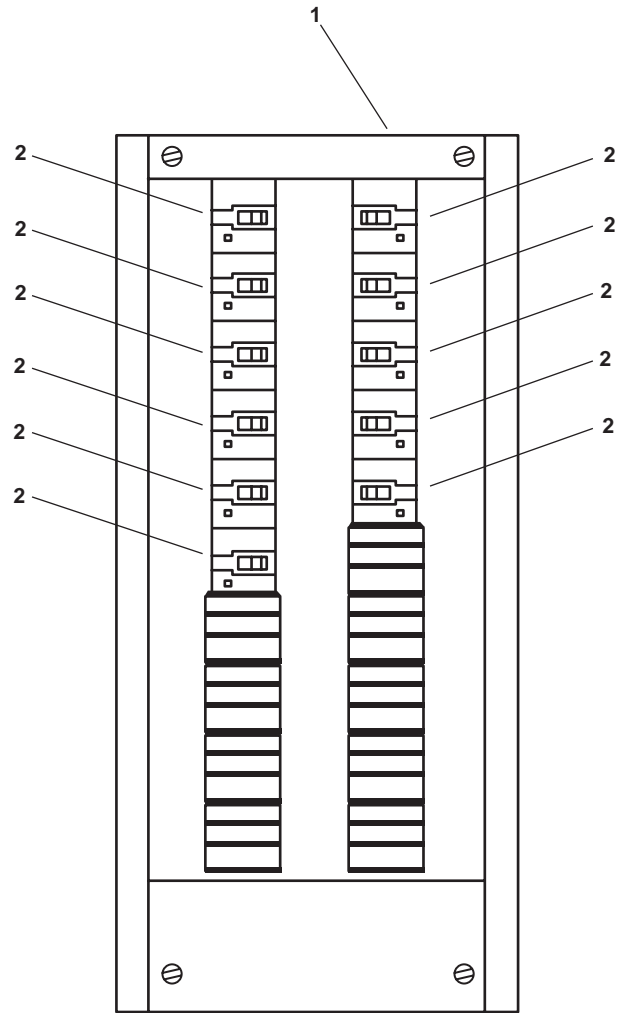


Figure 35. 120V Exterior Emergency Lighting Panel No. 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030413	
					FIG. 35 120V EXTERIOR EMERGENCY LIGHTING PANEL No. 2	
1	XDFZZ		0E0J2	88029-14	EMER LIGHTING PANEL EMERGENCY LIGHTING PANEL, EL2 .....	1
2	PAOZZ	5925-01-387-6592	66842	B215	CIRCUIT BREAKER .....	11
					<b>END OF FIGURE</b>	

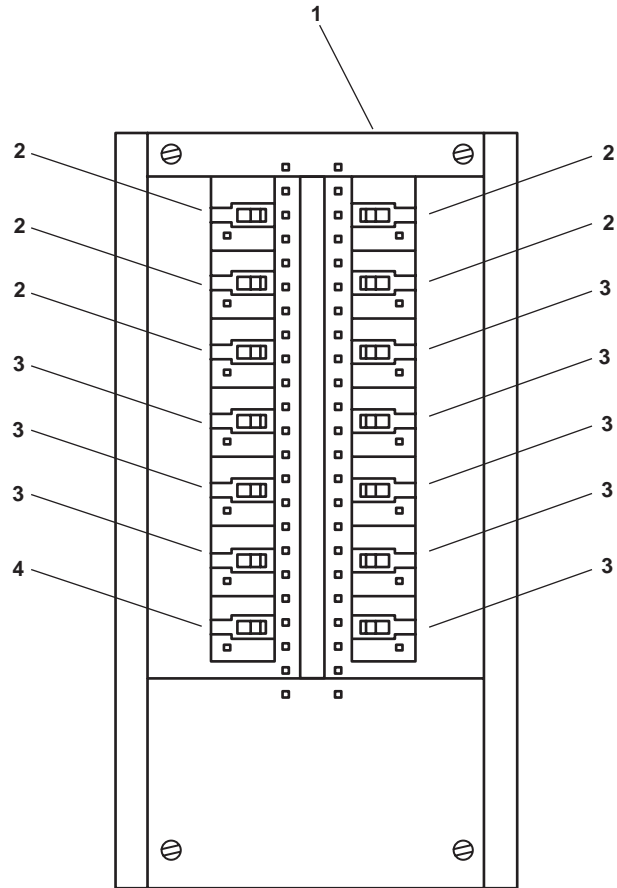


Figure 36. 120V Electronics Distribution Panel



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030414	
					FIG 36 120V ELECTRONICS DISTRIBUTION PANEL	
1	XDFZZ		0E0J2	88029-15	ELECTRONIC DISTRIBU ELECTRONIC DISTRIBUTION PANEL .....	1
2	PAOZZ	5925-00-497-5365	66842	BQ2B020	CIRCUIT BREAKER .....	5
3	PAOZZ	5925-00-421-0752	66842	BQ2B015	CIRCUIT BREAKER .....	8
4	PAOZZ	5925-00-497-5366	66842	BQ2B030	CIRCUIT BREAKER .....	1
					<b>END OF FIGURE</b>	

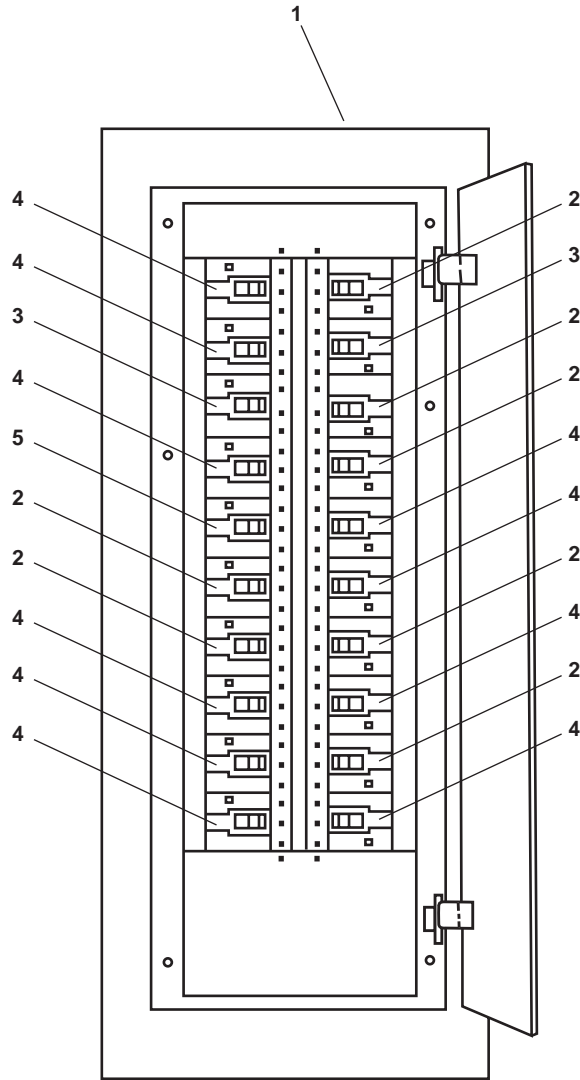


Figure 37. 120V Pilothouse Emergency Distribution Panel

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030415	
					FIG. 37 120V PILOTHOUSE EMERGENCY DISTRIBUTION PANEL	
1	XDFZZ		0E0J2	88029-16	PILOT HOUSE DISTRIB PILOT HOUSE DISTRIBUTION PANEL .....	1
2	PAOZZ	5925-00-497-5365	66842	BQ2B020	CIRCUIT BREAKER .....	7
3	PAOZZ	5925-00-497-5366	66842	BQ2B030	CIRCUIT BREAKER .....	2
4	PAOZZ	5925-00-421-0753	80020	417715-4	CIRCUIT BREAKER .....	10
5	PAOZZ	5925-00-421-0754	30086	BQ2B040	CIRCUIT BREAKER .....	1
					<b>END OF FIGURE</b>	

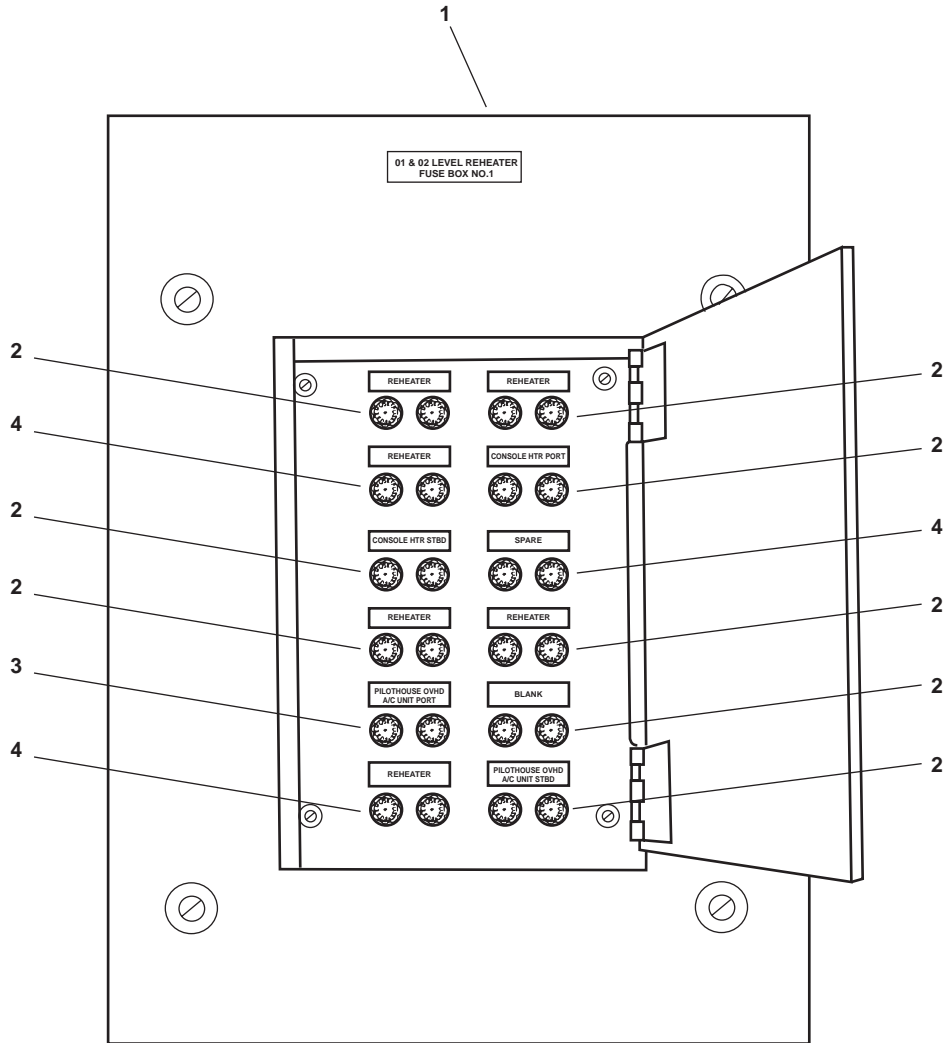


Figure 38. 01 & 02 Level Reheater 120V Fuse Box No. 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030416	
					FIG. 38 01 & 02 LEVEL REHEATER 120V FUSE BOX No. 1	
1	XDFZZ		0E0J2	88030-1	FUSE BOX,01&02 LEVE FUSE BOX, 01 & 02 LEVEL REHEATERS .....	1
2	PAOZZ	5920-01-477-9261	71400	ABC-10	FUSE,CARTRIDGE .....	16
3	PAOZZ	5920-00-177-2269	71400	ABC25	FUSE,CARTRIDGE .....	2
4	PAOZZ	5920-01-048-0548	71400	AGC20	FUSE,CARTRIDGE .....	4
					<b>END OF FIGURE</b>	

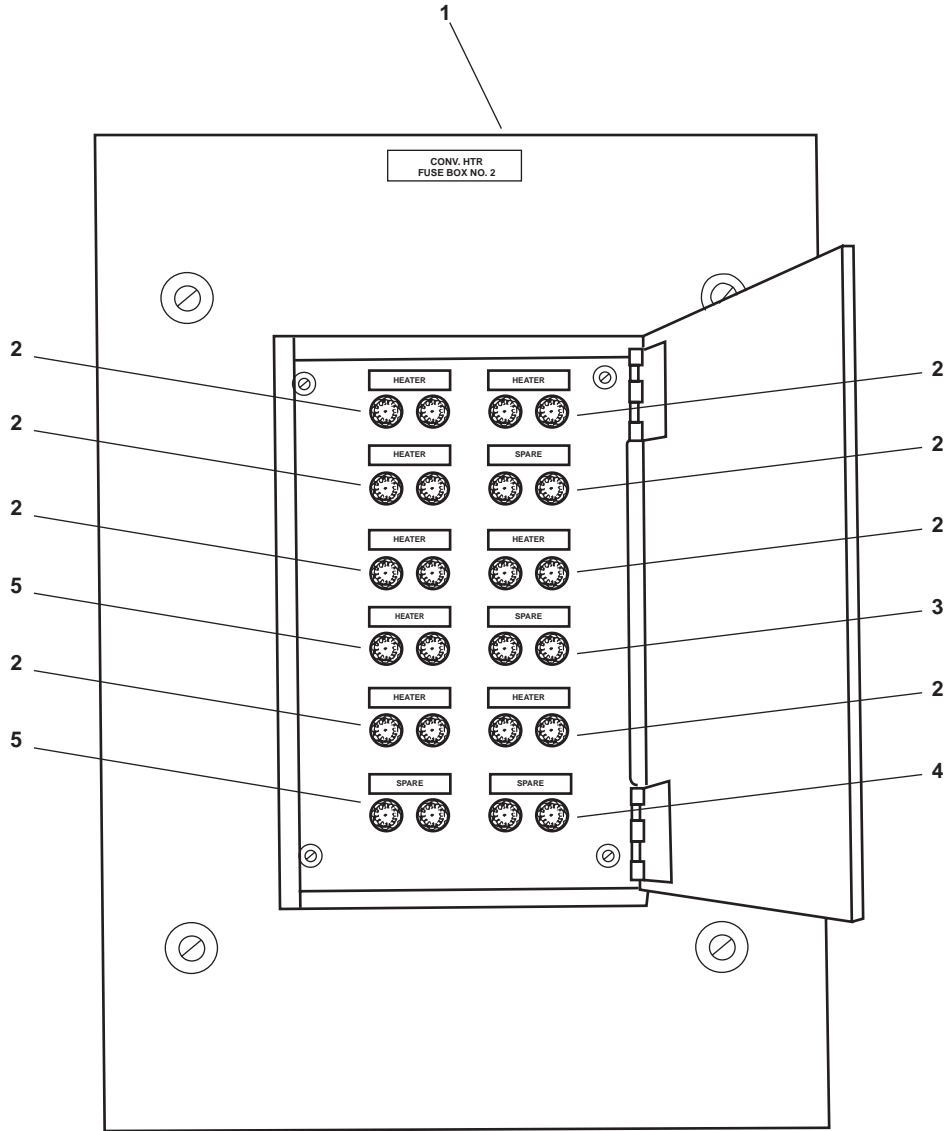


Figure 39. Convective Heater 120V Fuse Box No. 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030417	
					FIG 39 CONVECTOR HEATER 120V FUSE BOX No. 2	
1	XDFZZ		0E0J2	88030-2	FUSE BOX,CONVECTION .....	1
2	PAOZZ	5920-01-477-9261	71400	ABC-10	FUSE,CARTRIDGE .....	16
3	PAOZZ	5920-01-048-0548	71400	AGC20	FUSE,CARTRIDGE .....	2
4	PAOZZ	5920-00-177-2269	71400	ABC25	FUSE,CARTRIDGE .....	2
5	PAOZZ	5920-00-065-1735	71400	KTK15	FUSE,CARTRIDGE .....	4
					<b>END OF FIGURE</b>	

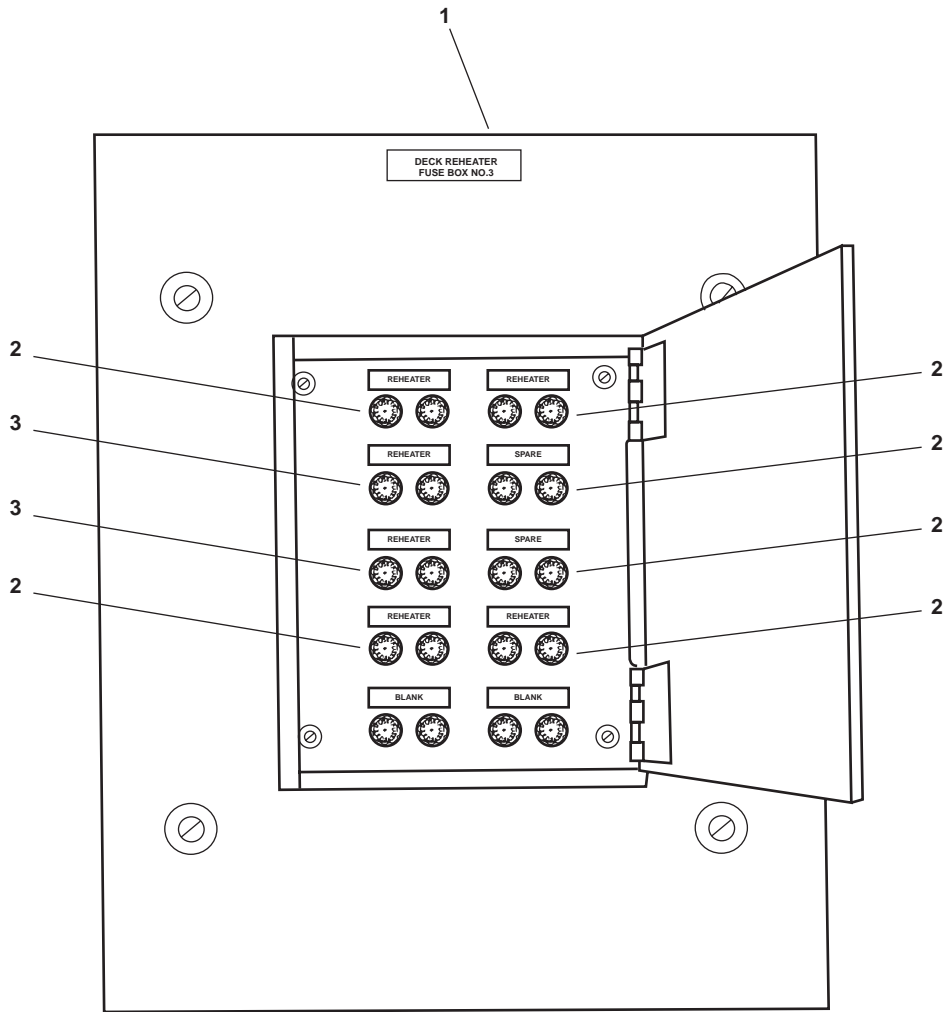


Figure 40. Deck Reheater 120V Fuse Box No. 3



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030418	
					FIG. 40 DECK REHEATER 120V FUSE BOX No. 3	
1	XDFZZ		0E0J2	88030-3	FUSE BOX,MAIN DECK .....	1
2	PAOZZ	5920-01-477-9261	71400	ABC-10	FUSE,CARTRIDGE .....	12
3	PAOZZ	5920-00-177-2269	75915	314-025	FUSE,CARTRIDGE .....	4
					<b>END OF FIGURE</b>	

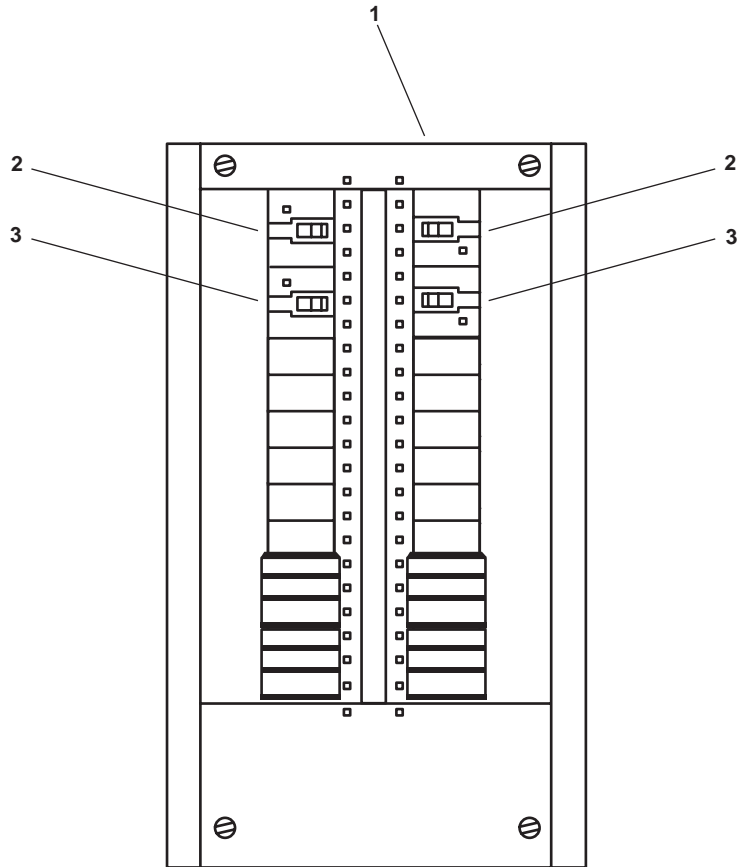


Figure 41. 220V Air Conditioning Distribution Panel

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03030419	
					FIG. 41 220V AIR CONDITIONING DISTRIBUTION PANEL	
1	XDFZZ		2B109	PRL1A	PANEL,POWER DISTRIB .....	1
2	PAOZZ	5925-01-414-8843	89946	BAB2030H	CIRCUIT BREAKER .....	2
3	PAOZZ	5925-01-051-3265	11660	BAB2020H	CIRCUIT BREAKER .....	2





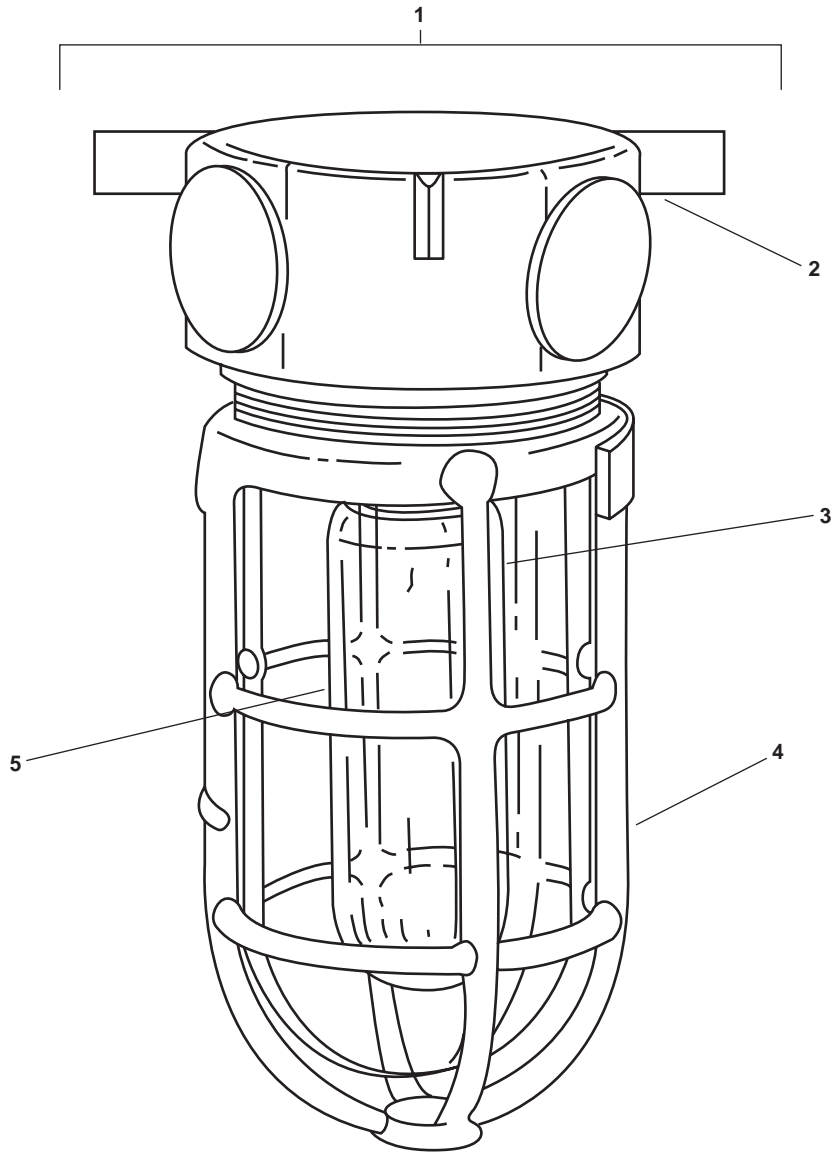


Figure 42. Junction Box Lighting Fixture (Typical)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0304	
					FIG. 42 LIGHTING FIXTURE, JUNCTION BOX (TYPICAL)	
1	XDOOO		56501	VA150K-GCN-C2U	FIXTURE,LIGHT,JUNCT .....	19
2	XDOZZ		56501	VA150K-C2U	.MOUNT,LIGHT FIXTURE .....	1
3	PAOZZ	6210-01-351-1156	56501	GG15C	.GLOBE,ELECTRIC LIGH .....	1
4	XDOZZ		56501	GN	.GUARD .....	1
5	PAOZZ	6240-01-383-7551	08108	150A-120V	.LAMP,INCANDESCENT .....	1
					<b>END OF FIGURE</b>	

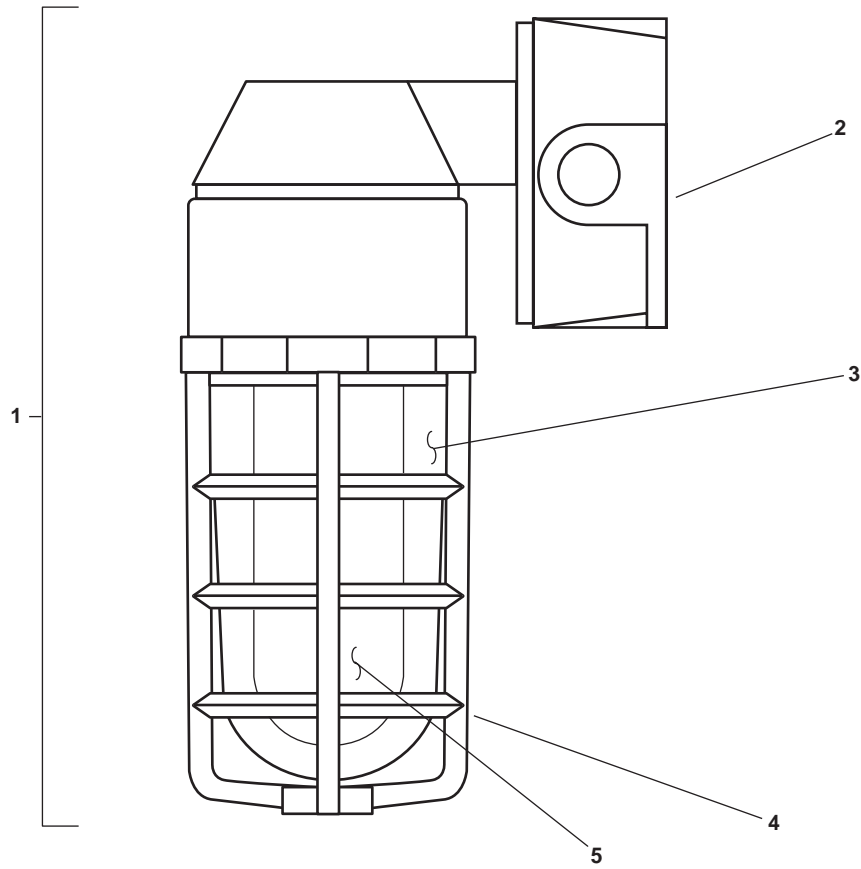


Figure 43. Bracket Lighting Fixture (Typical)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0305	
					FIG. 43 LIGHTING FIXTURE, BRACKET (TYPICAL)	
1	XDOOO		56501	VA150K-GCN-W2U	FIXTURE,LIGHT,BRACK .....	19
2	XDOZZ		56501	VA150K-W2U	.MOUNT,LIGHT FIXTURE .....	1
3	PAOZZ	6210-01-351-1156	56501	GG15C	.GLOBE,ELECTRIC LIGH .....	1
4	XDOZZ		56501	GN	.GUARD .....	1
5	PAOZZ	6240-01-383-7551	08108	150A-120V	.LAMP,INCANDESCENT .....	1
					<b>END OF FIGURE</b>	

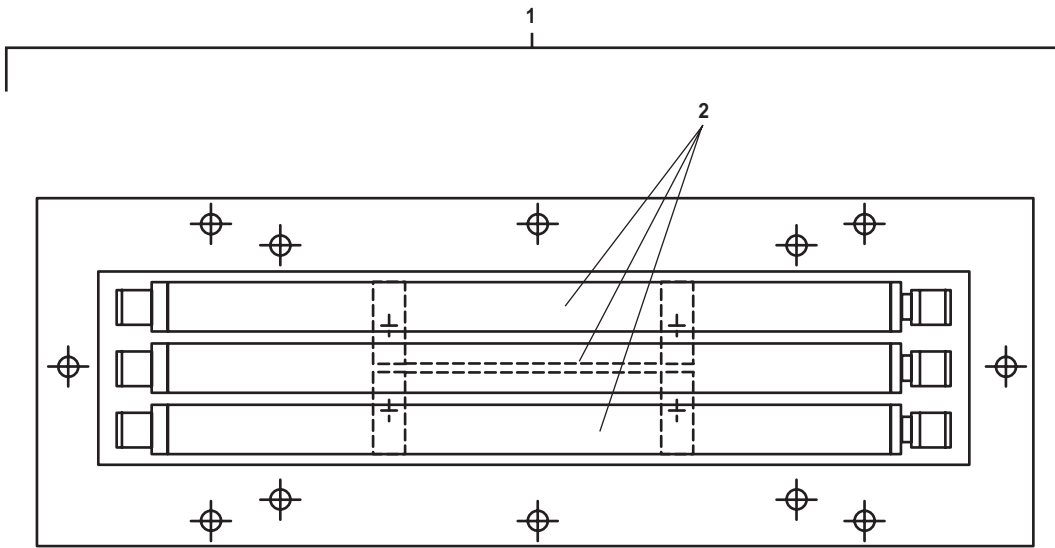
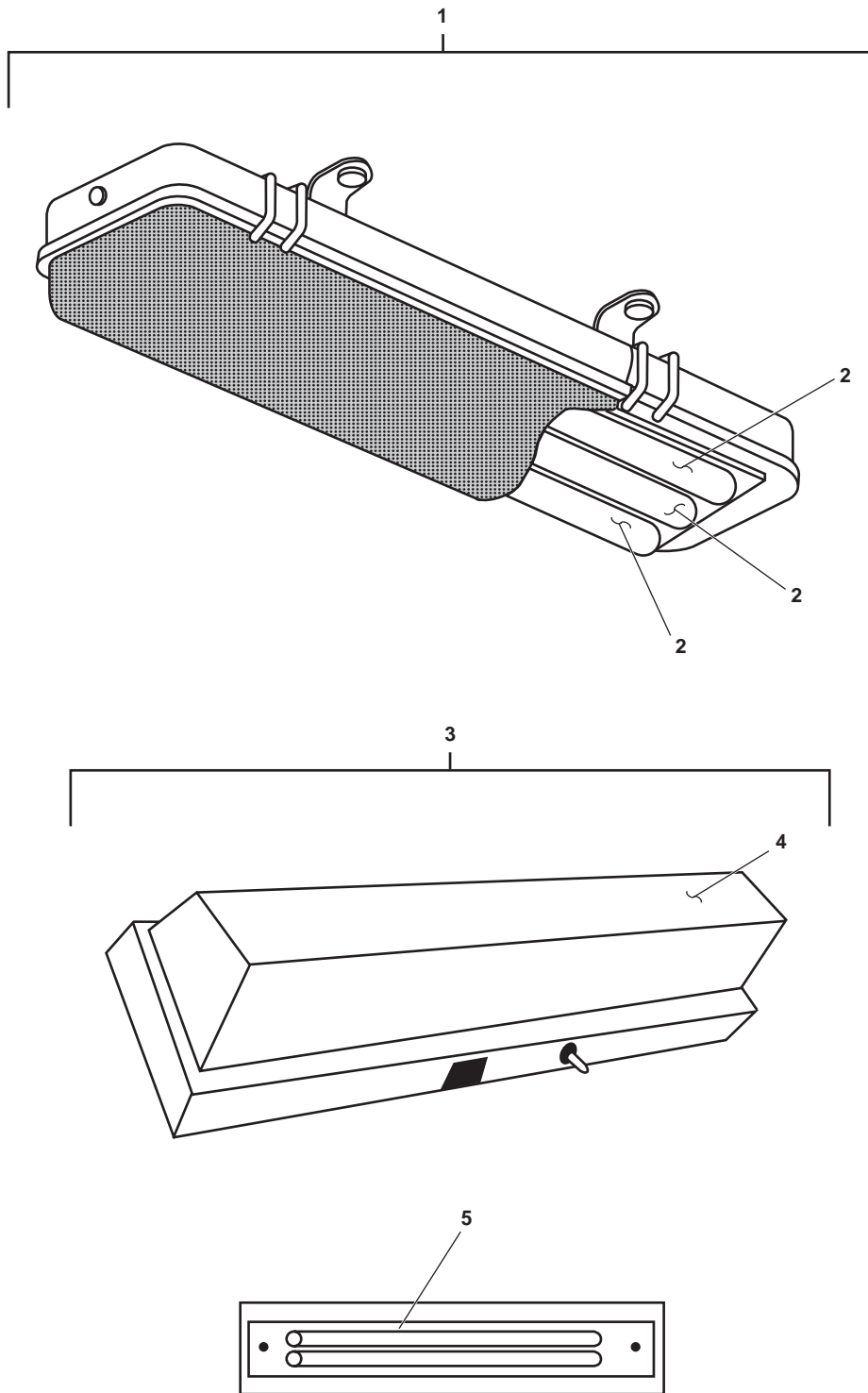


Figure 44. Recessed Fluorescent Fixture

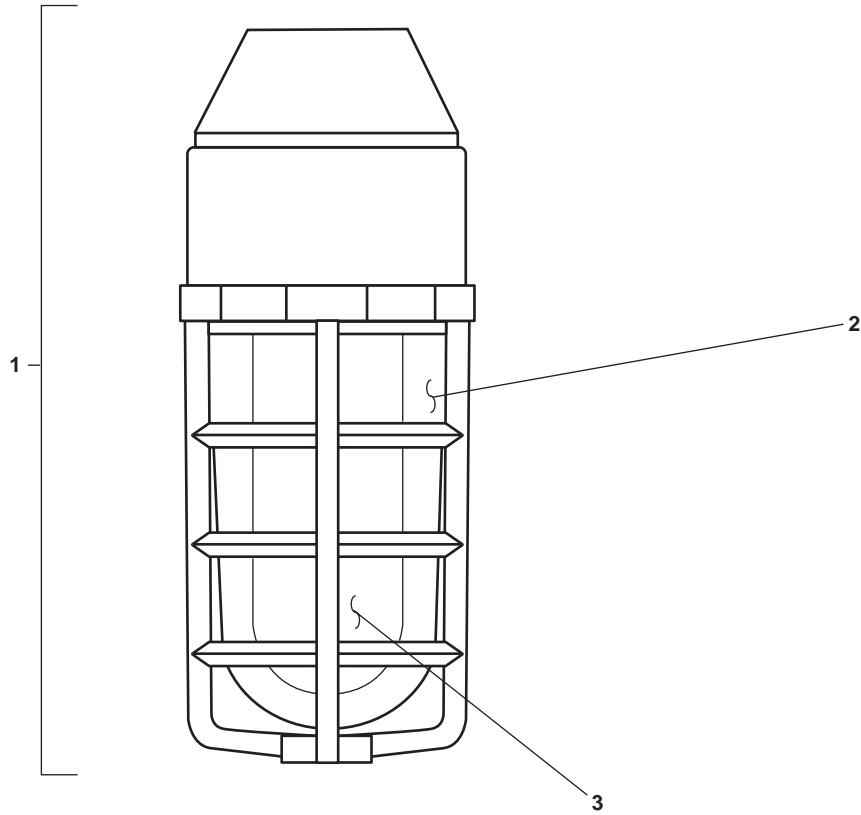
(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0306	
					FIG 44 FLUORESCENT FIXTURE, RECESSED	
1	XDOZZ		81493	LFR320AW	FIXTURE,LIGHT,FLUOR .....	51
2	PAOZZ	6240-01-313-6861	51454	F20T12-24/SPECTR UMLITE- P/HD22M	LAMP,FLUORESCENT .....	3
<b>END OF FIGURE</b>						



Fluorescent Light, Surface Mount (2 Types)

Figure 45. Surface Mount Fluorescent Light

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0307	
					FIG 45 FLUORESCENT LIGHT, SURFACE MOUNT	
1	XDOOO		81493	LFS320A	FIXTURE,LIGHT,FLUOR .....	43
2	PAOZZ	6240-01-313-6861	51454	F20T12-24/SPECTR UMLITE- P/HD22M	LAMP,FLUORESCENT .....	3
3	PFOZZ	6210-01-196-2098	95405	F215	FIXTURE,LIGHTING .....	10
4	PFOZZ	6210-01-352-1551	95405	FX2092	DIFFUSER .....	1
5	PAOZZ	6240-00-152-2982	08805	F15T8/CW	LAMP,FLOURESCENT .....	2
					<b>END OF FIGURE</b>	



**Figure 46. Watertight Incandescent Explosion Proof Lighting Fixture (Typical)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0308	
					FIG 46 LIGHTING FIXTURE, WATERTIGHT INCANDESCENT EXPLOSION PROOF (TYPICAL)	
1	XDOZZ		95405	EPC30A	FIXTURE,LIGHTING .....	1
2	PAOZZ	6210-01-352-1665	95405	INX9005A	GLOBE,ELECTRIC LIGH .....	1
3	PAOZZ	6240-01-316-4651	95405	INX3528	LAMP,INCANDESCENT .....	1
					<b>END OF FIGURE</b>	

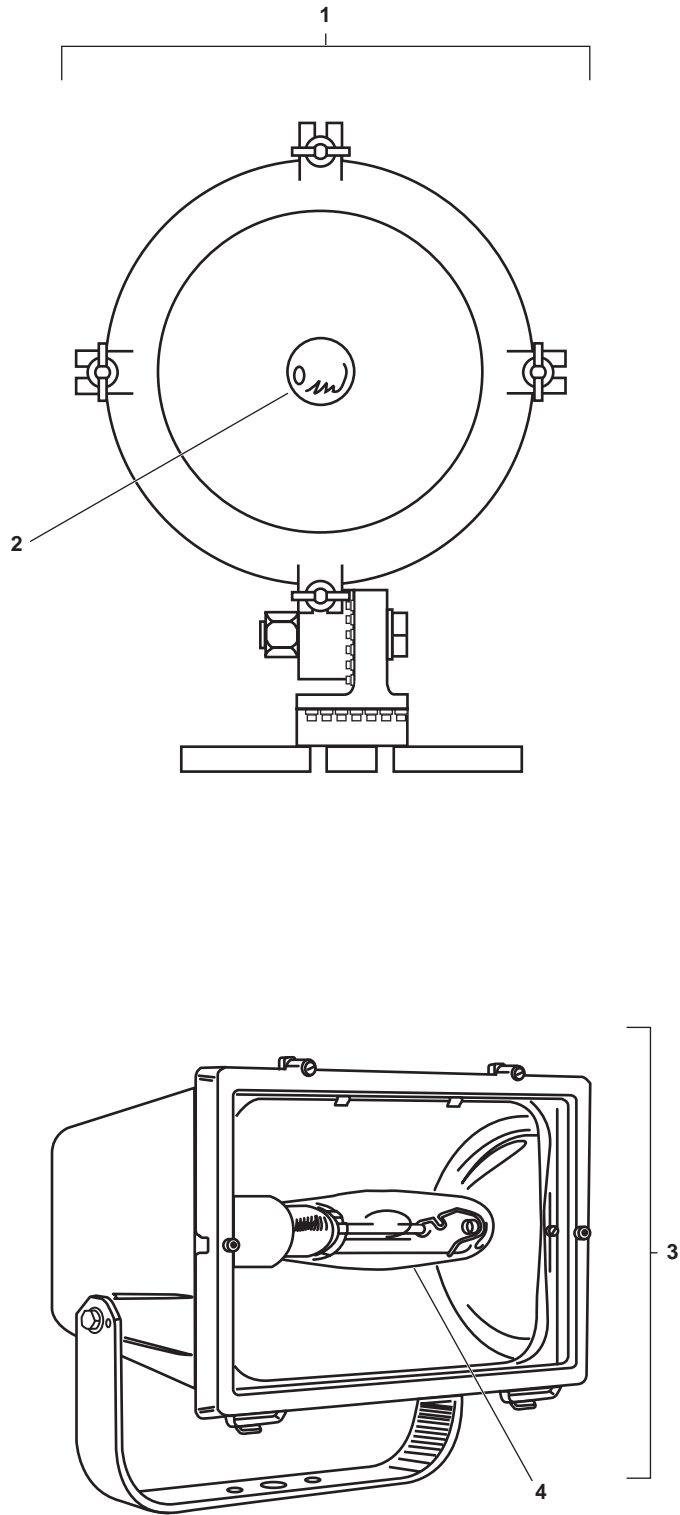


Figure 47. Floodlights

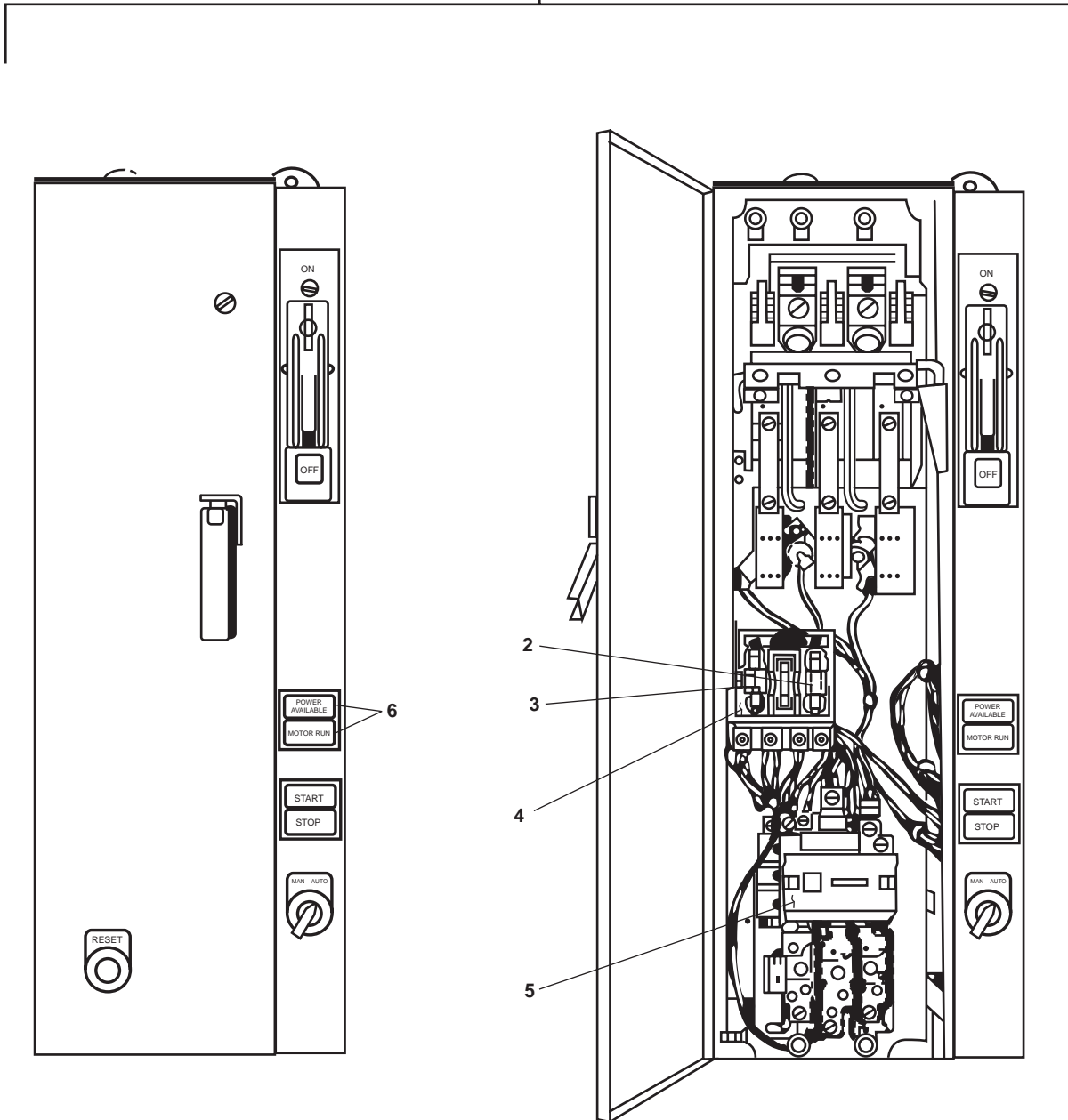


(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0309	
					FIG 47 FLOODLIGHTS	
1	PFOZZ	6220-01-353-3198	95405	740SM	FLOODLIGHT,ELECTRIC .....	3
2	PAOZZ	6240-00-950-3859	62607	200PAR46/3MFL	LAMP,INCANDESCENT .....	1
3	XDOZZ		02580	P54H17MOA17X6DB	FLOODLIGHT,ELECTRIC .....	3
4	PAOZZ	6240-01-353-3220	95405	INX3551	LAMP,METAL HALIDE .....	1
					<b>END OF FIGURE</b>	





1



**Figure 48. Motor Controller:**  
**Reduction Gear 1 & 2 Cooling Pump; Sewage Discharge Pump 1 & 2; Lube Oil Transfer Pump;**  
**Potable Water Pump 1 & 2; Galley Exhaust Fan; Sanitary Space Exhaust Fan; Crew Mess Fan Coil Unit; 01, 02, 03**  
**Levels Fan Coil Unit; Air Compressor 1 & 2; Fuel Oil Transfer Pump**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031001	
					FIG. 48 MOTOR CONTROLLER: COOLING PUMP, REDUCTION GEAR 1 & 2; PUMP, SEWAGE DISCHARGE 1 & 2; PUMP, LUBE OIL TRANSFER; PUMP, POTABLE WATER 1 & 2; FAN, GALLEY SUPPLY; FAN, GALLEY EXHAUST; FAN, SANITARY SPACE EXHAUST; COIL UNIT, CREW MESS; COIL UNIT, 01, 02, 03 LEVELS; COMPRESSOR, AIR 1 & 2; PUMP, FUEL OIL TRANSFER	
1	PFFZZ	6110-01-313-7144	27192	A30BDA0G60	CONTROLLER,MOTOR .....	1
2	PAOZZ	5920-01-343-0293	75915	KLDR 6/10	FUSE,CARTRIDGE .....	2
3	PAOZZ	5920-01-381-8290	71400	MSL-6/10	FUSE,CARTRIDGE .....	1
4	PAOZZ	5950-01-341-9573	27192	C340AG	TRANSFORMER,POWER .....	1
5	PAOZZ	6110-00-635-1357	6X441	AN16EN0AC	STARTER,MOTOR .....	1
6	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP,INCANDESCENT .....	2
					<b>END OF FIGURE</b>	

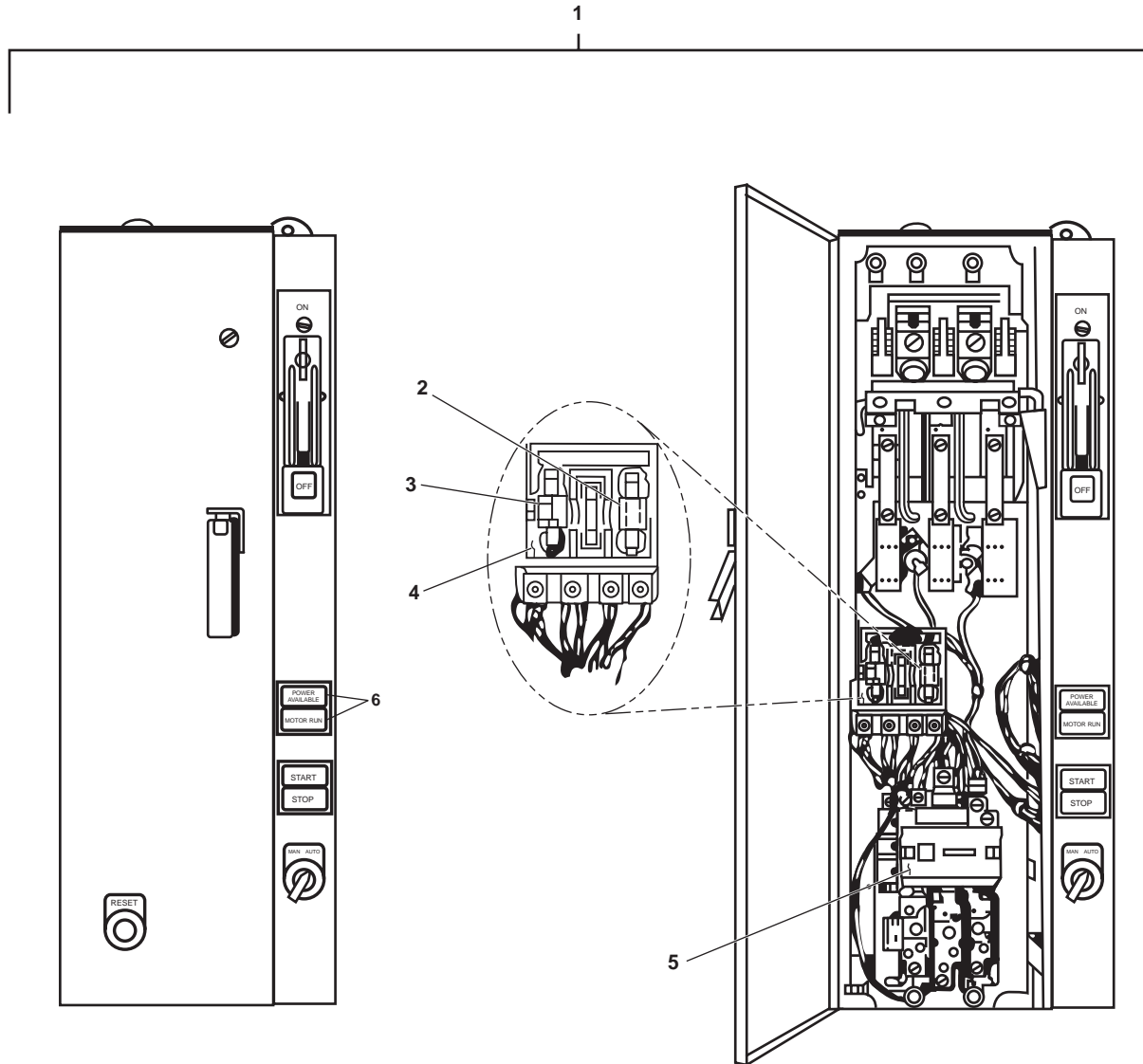


Figure 49. AFFF Pump Motor Controller

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031002	
					FIG. 49 MOTOR CONTROLLER, PUMP, AFFF	
1	XDFZZ		27192	A30DDA0G60	CONTROLLER,MOTOR .....	1
2	PAOZZ	5920-01-343-0293	75915	KLDR 6/10	FUSE,CARTRIDGE .....	2
3	PAOZZ	5920-01-381-8290	71400	MSL-6/10	FUSE,CARTRIDGE .....	1
4	PAOZZ	5950-01-341-9573	27192	C340AG	TRANSFORMER,POWER .....	1
5	PFOZZ	6110-00-425-8787	27192	A10DN0AB	STARTER,MOTOR .....	1
6	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP,INCANDESCENT .....	1
					<b>END OF FIGURE</b>	

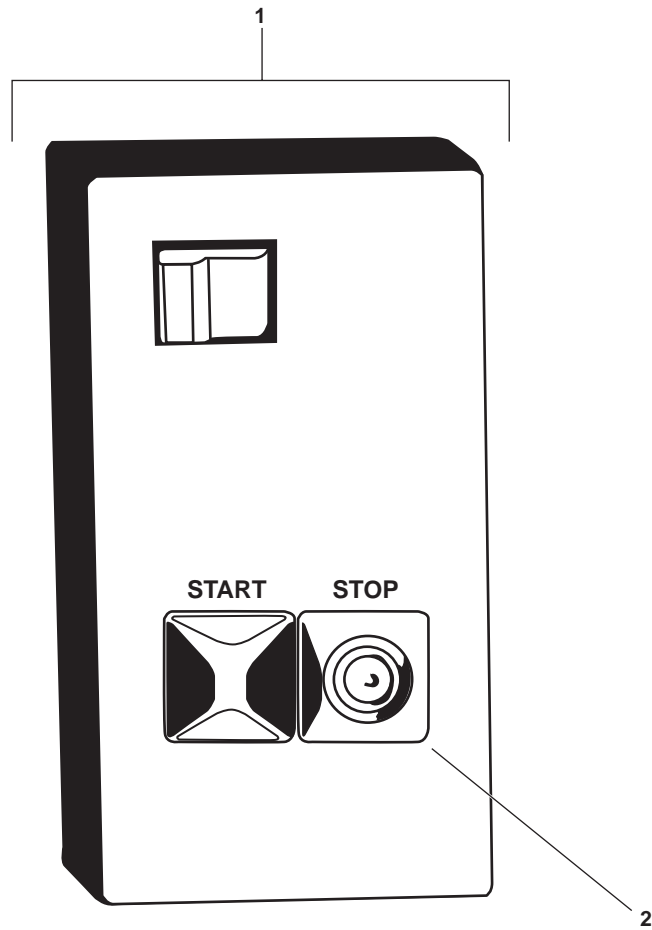


Figure 50. Lube Oil Priming Pump 1 Motor Controller



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031003	
					FIG 50 MOTOR CONTROLLER, PUMP, LUBE OIL PRIMING 1	
1	XDFZZ		27192	9115H171K	CONTROLLER,MOTOR STBD PRELUBE PUMP MOTOR CONTROLLER .....	1
2	PFOZZ	5945-00-937-0768	15605	6-200	CONTACT SET,RELAY .....	1
					<b>END OF FIGURE</b>	

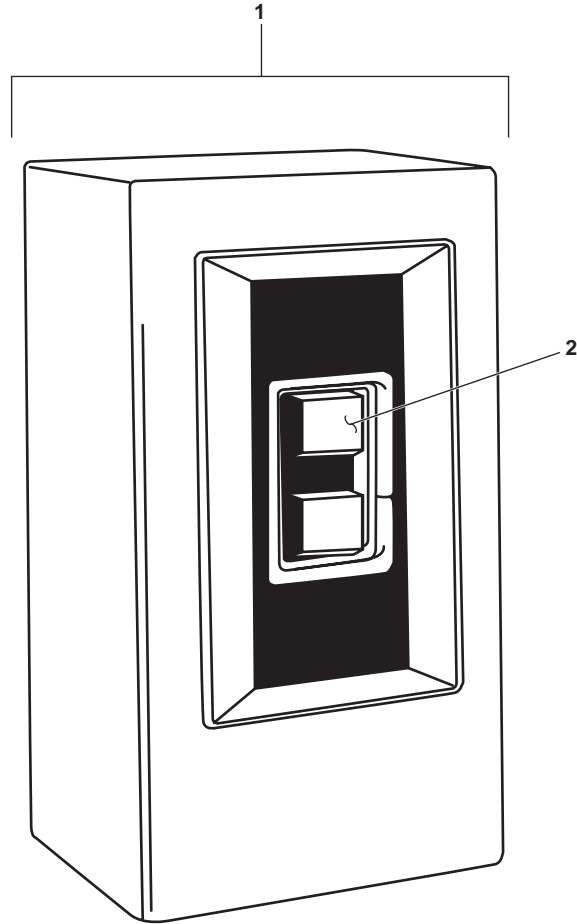
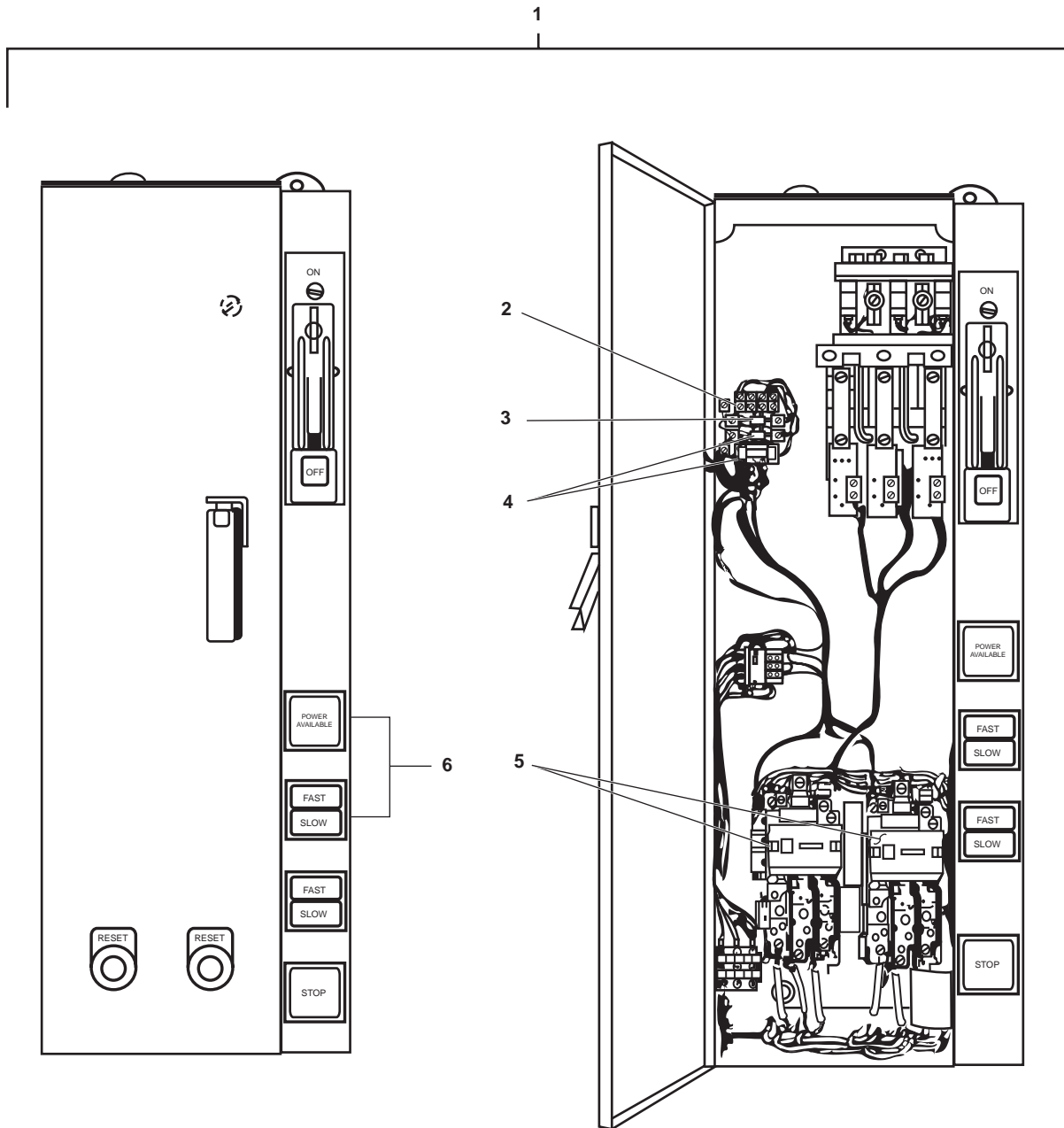


Figure 51. Lube Oil Priming Pump 2 Motor Controller

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031004	
					FIG 51 MOTOR CONTROLLER, PUMP, LUBE OIL PRIMING 2	
1	XDFZZ		08242	609-AJW	CONTROLLER,MOTOR PORT PRELUBE PUMP MOTOR CONTROLLER .....	1
2	XDFZZ		08242	609-AOW	PUSH BUTTOM,SWITCH .....	1
					<b>END OF FIGURE</b>	



**Figure 52. Motor Controller:**  
AMS 1 and AMS 2 Supply Fan; Boatswain's Store Room Supply Fan; Arms Locker Exhaust Fan

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031005	
					FIG. 52 MOTOR CONTROLLER: FAN, SUPPLY, AMS 1 & AMS 2, FAN; BOATSWAIN'S STORE ROOM SUPPLY; FAN, ARMS LOCKER EXHAUST	
1	XDFZZ		27192	A710BQ7	CONTROLLER,MOTOR MOTOR CONTROLLER FOR FANS .....	1
2	PFOZZ	5950-01-348-7053	30882	V100BTZ13RB	TRANSFORMER,POWER .....	1
3	PAOZZ	5920-00-577-4716	71400	FNQ1	FUSE,CARTRIDGE .....	2
4	PAOZZ	5920-01-343-0294	71400	FNQ-R-5	FUSE,CARTRIDGE .....	1
5	PFOZZ	6110-01-349-8681	27192	A700BN0218A	STARTER,MOTOR .....	2
6	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP,INCANDESCENT .....	3
					<b>END OF WORK PACKAGE</b>	

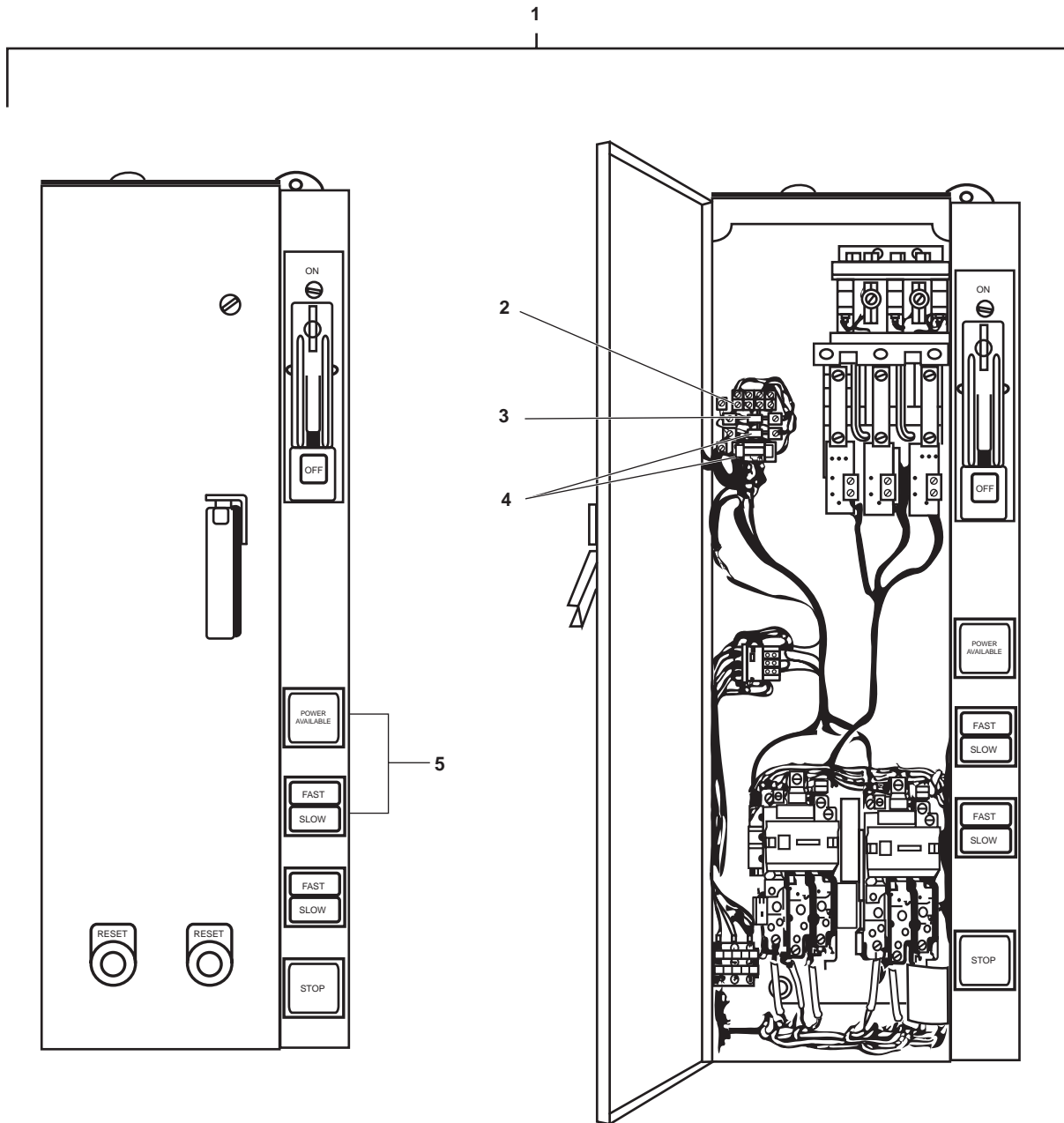


Figure 53. Engine Room Supply Fan 1 & 2 Motor Controller

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031006	
					FIG. 53 MOTOR CONTROLLER: FAN ENGINE ROOM SUPPLY 1 & 2	
1	XDFZZ		27192	A710DQ7	CONTROLLER,MOTOR ENG RM SUPPLY FAN 1 & 2 .....	1
2	PFOZZ	5950-01-348-7053	30882	V100BTZ13RB	TRANSFORMER,POWER .....	1
3	PAOZZ	5920-00-577-4716	71400	FNQ1	FUSE,CARTRIDGE .....	1
4	PAOZZ	5920-01-343-0294	71400	FNQ-R-5	FUSE,CARTRIDGE .....	2
5	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP,INCANDESCENT .....	3
					<b>END OF FIGURE</b>	

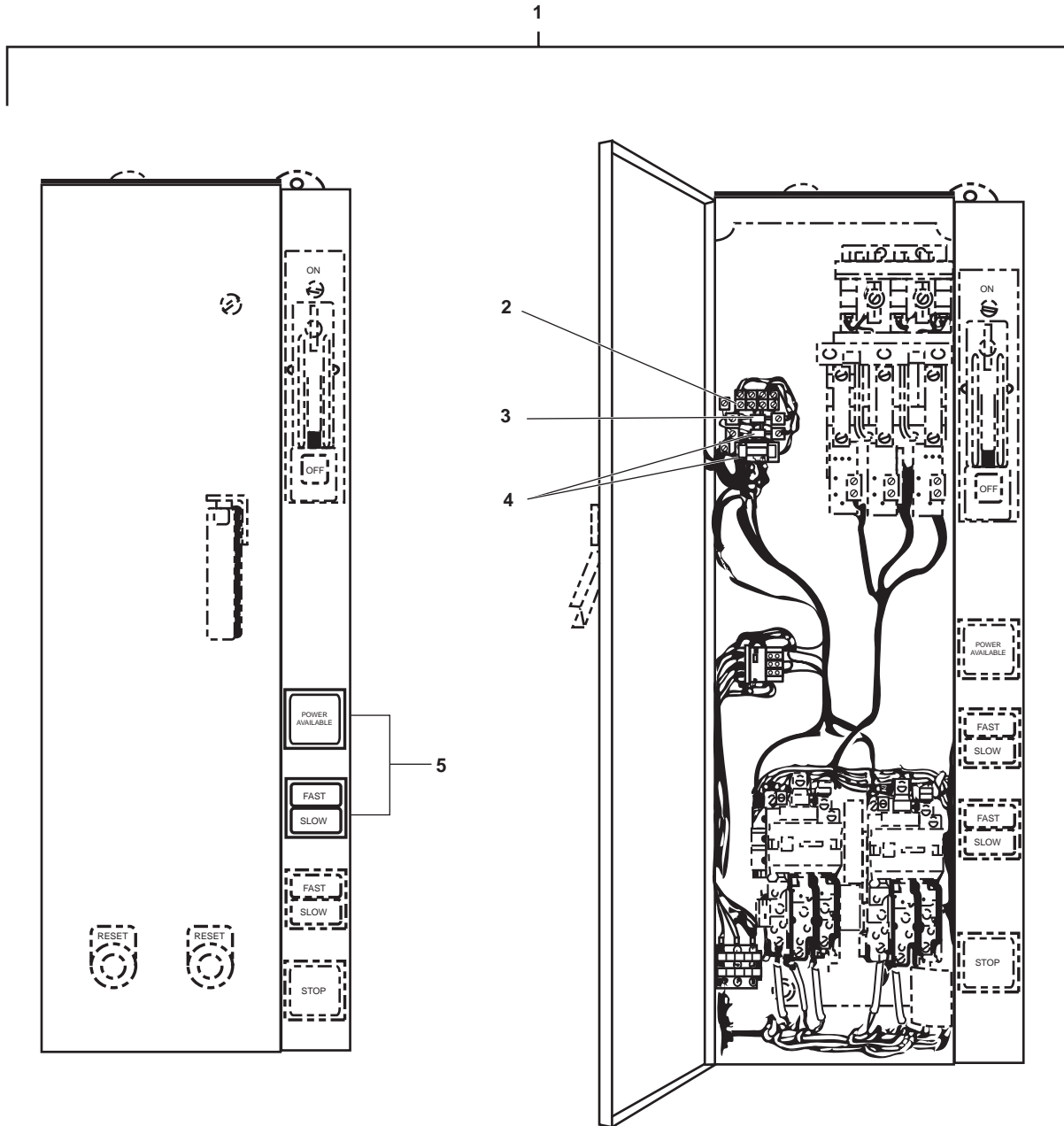


Figure 54. Engine Room Supply Fan 1 & 2 Motor Controller



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031007	
					FIG. 54 MOTOR CONTROLLER: FAN ENGINE ROOM SUPPLY 1 & 2	
1	XDFZZ		27192	A710DQ7	CONTROLLER,MOTOR ENG RM SUPPLY FAN 1 & 2 .....	1
2	PFOZZ	5950-01-348-7053	30882	V100BTZ13RB	.TRANSFORMER,POWER .....	1
3	PAOZZ	5920-00-577-4716	71400	FNQ1	.FUSE,CARTRIDGE .....	1
4	PAOZZ	5920-01-343-0294	71400	FNQ-R-5	.FUSE,CARTRIDGE .....	2
5	PAOZZ	6240-00-902-4660	71744	120PSB	.LAMP,INCANDESCENT .....	3
					<b>END OF FIGURE</b>	

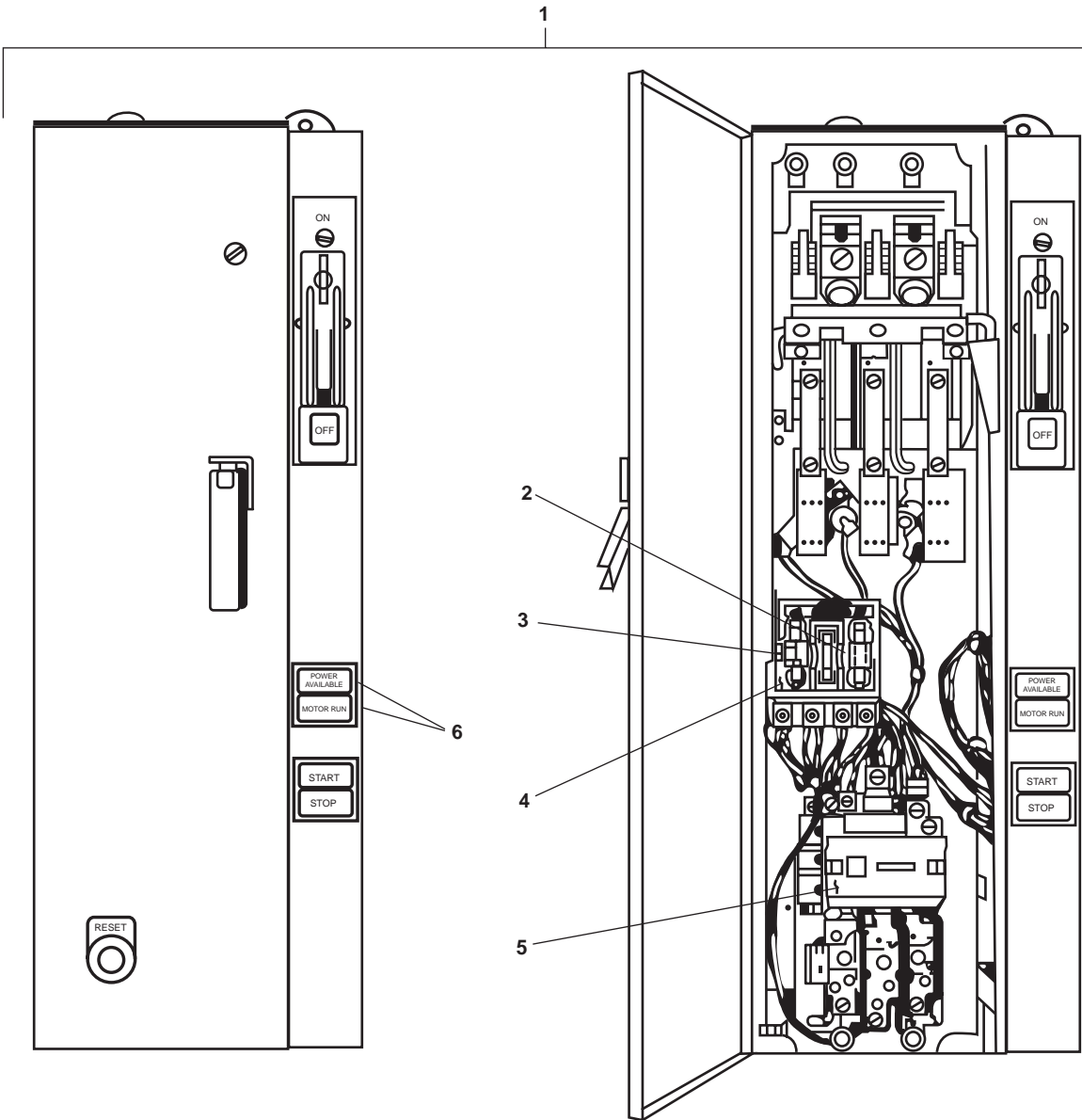


Figure 55. Bilge & Ballast Pump 1 & 2 Motor Controller

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031008	
					FIG 55 MOTOR CONTROLLER: PUMP, BILGE & BALLAST 1 & 2	
1	XDFZZ	6110-01-313-7051	27192	A30CDA0G60	CONTROLLER,MOTOR BILGE & BALLAST PUMP MOTOR CONTROLLER .....	1
2	PAOZZ	5920-01-343-0293	75915	KLDR 6/10	FUSE,CARTRIDGE .....	2
3	PAOZZ	5920-01-381-8290	71400	MSL-6/10	FUSE,CARTRIDGE .....	1
4	PAOZZ	5950-01-341-9573	27192	C340AG	TRANSFORMER,POWER .....	1
5	PAOZZ	6110-00-635-1357	6X441	AN16EN0AC	STARTER,MOTOR .....	1
6	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP,INCANDESCENT .....	3
					<b>END OF FIGURE</b>	

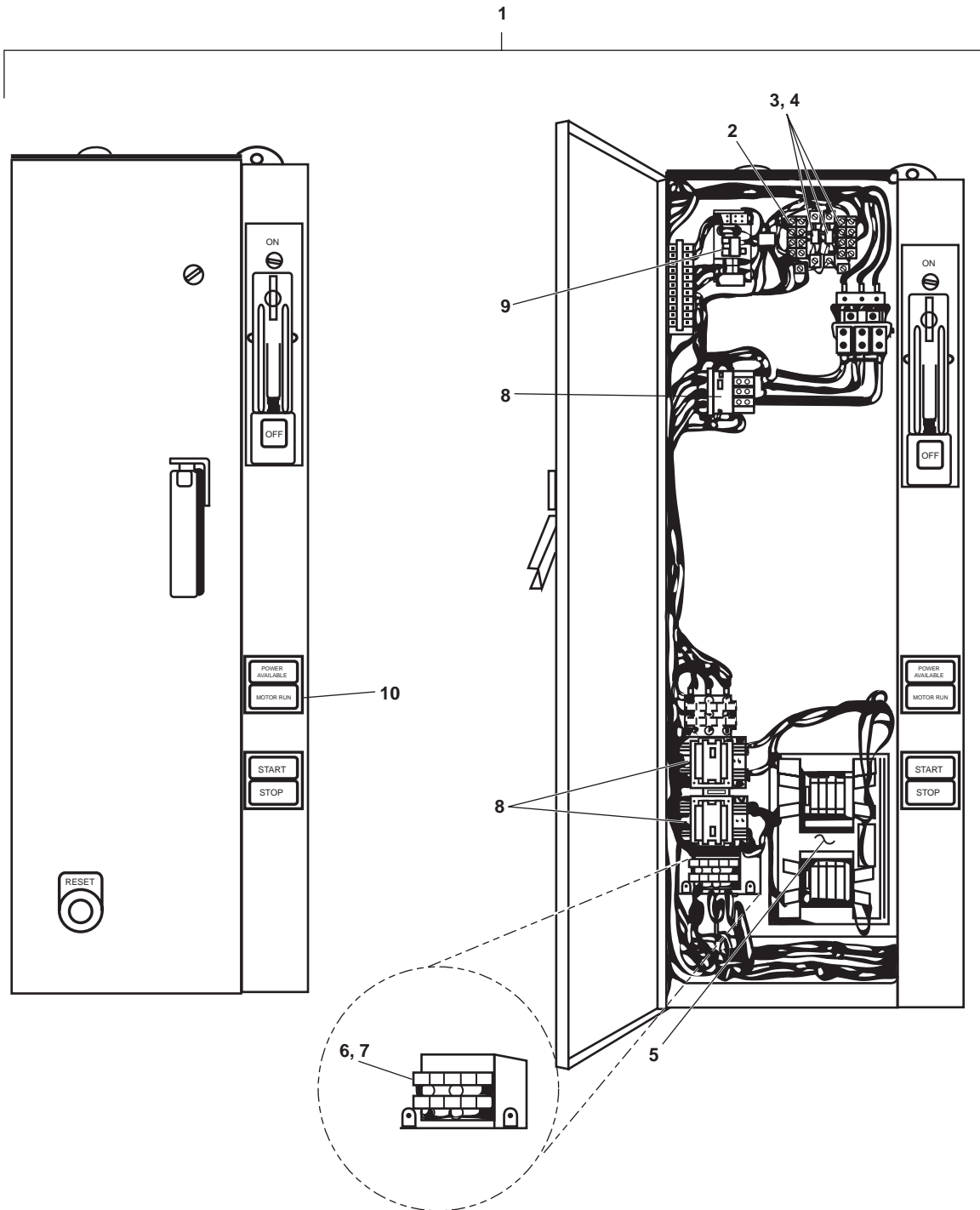


Figure 56. Fire & General Service Pump Emergency #1 Motor Controller

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031009	
					FIG. 56 MOTOR CONTROLLER, PUMP, FIRE & GENERAL SERVICE, EMERGENCY #1	
1	XDFZZ	27192		A410ED021C60B	CONTROLLER,MOTOR FIRE & GEN SERVICE PUMP #1 .....	1
2	PFOZZ	5950-01-348-7054	30882	V150BTZ13RB	TRANSFORMER,POWER .....	1
3	PAOZZ	5920-01-256-5830	71400	FNQ1-1/2	FUSE,CARTRIDGE .....	1
4	PAOZZ	5920-01-334-7385	71400	FNQ-R1/2	FUSE,CARTRIDGE .....	2
5	PFOZZ	5950-01-349-2942	27192	42-1679-5	TRANSFORMER,POWER .....	2
6	PFOZZ	5945-01-142-6969	34010	22935742	RELAY,ELECTROMAGNET .....	3
7	PFOZZ	5945-01-348-5028	27192	10-51672	RELAY,ELECTROMAGNET .....	1
8	PFOZZ	6110-01-203-2811	15605	C10EN2EB	CONTACTOR,MAGNETIC .....	3
9	PFOZZ	5945-01-203-2813	27192	C300EN3	RELAY,THERMAL .....	1
10	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP,INCANDESCENT .....	2
					<b>END OF FIGURE</b>	

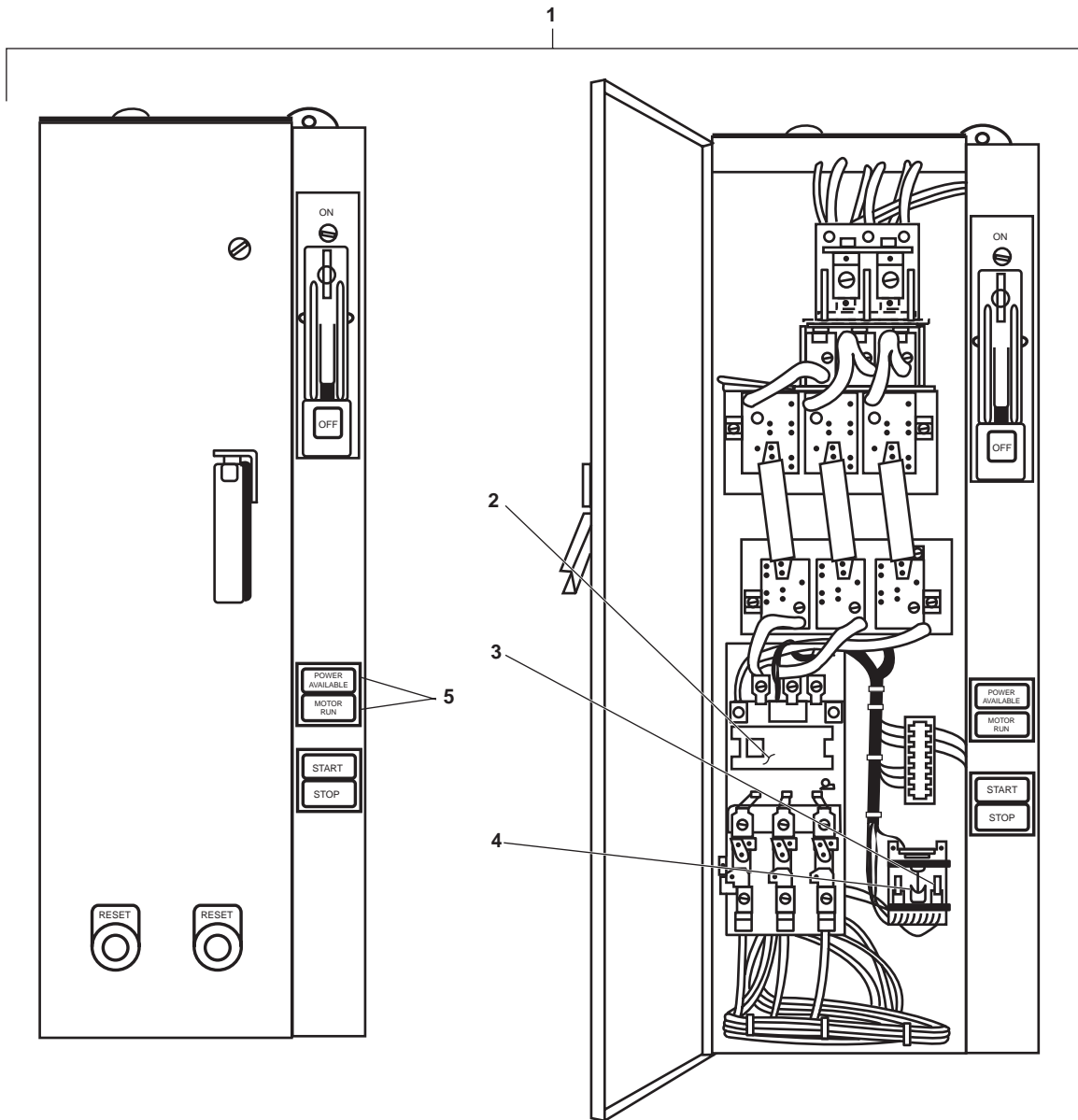


Figure 57. Fire and General Service Pump Emergency #2 Motor Controller

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031010	
					FIG. 57 MOTOR CONTROLLER, PUMP, FIRE & GENERAL SERVICE, EMERGENCY #2	
1	XDFZZ		27192	A30EDA0G60	CONTROLLER,MOTOR FIRE & GEN SERVICE PUMP #2 .....	1
2	PAOZZ	6110-01-110-1336	27192	A10EN0A	STARTER,MOTOR .....	1
3	PAOZZ	5920-01-423-7416	0EUT9	FNQ-R-2.5	FUSE,CARTRIDGE .....	2
4	PAOZZ	5920-01-050-6558	71400	FNQ12	FUSE,CARTRIDGE .....	1
5	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP,INCANDESCENT .....	2
					<b>END OF FIGURE</b>	

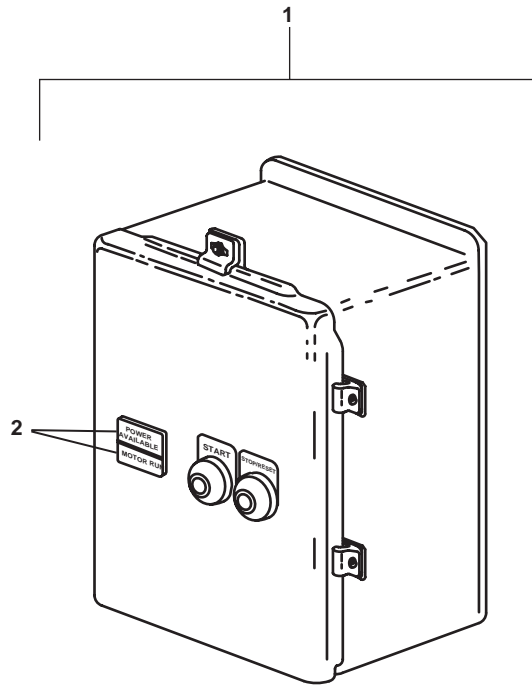


Figure 58. Hot Potable Water Recirculating Pump Motor Controller



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031011	
					FIG 58 MOTOR CONTROLLER, PUMP, HOT POTABLE WATER RECIRCULATING	
1	XDOZZ		27192	9115H167	CONTROLLER,MOTOR HOT POTABLE ..... WATER RECIRC PUMP .....	1
2	PAOZZ	6240-00-902-4660	71744	120PSB	.LAMP,INCANDESCENT .....	2
					<b>END OF FIGURE</b>	

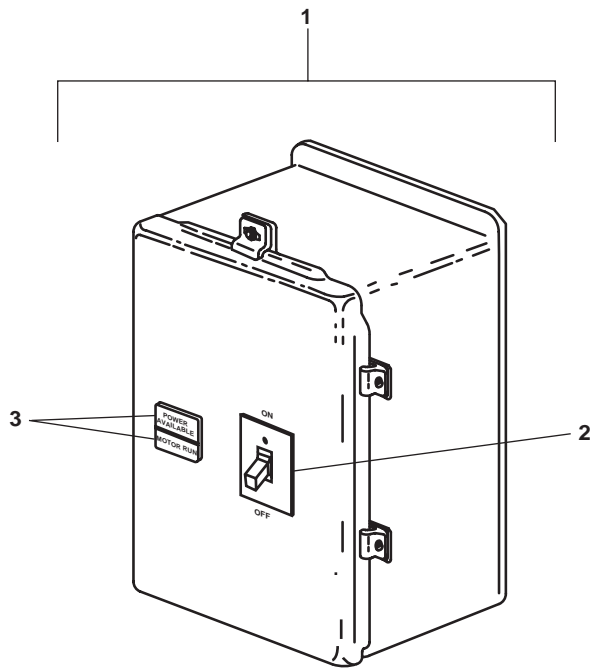


Figure 59. Weld Hood Exhaust Fan Motor Controller

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031012	
					FIG. 59 MOTOR CONTROLLER, FAN, WELD HOOD EXHAUST	
1	XDFZZ		27192		MOTOR CONTROLLER, WELD HOOD EXH. CONTROLLER, MOTOR WELD HOOD EXHAUST .....	1
2	PFOZZ	6110-00-916-4625	15605	D82-2084-6	STARTER, MOTOR .....	1
3	PAOZZ	6240-00-902-4660	71744	120PSB	LAMP, INCANDESCENT .....	2
<b>END OF FIGURE</b>						





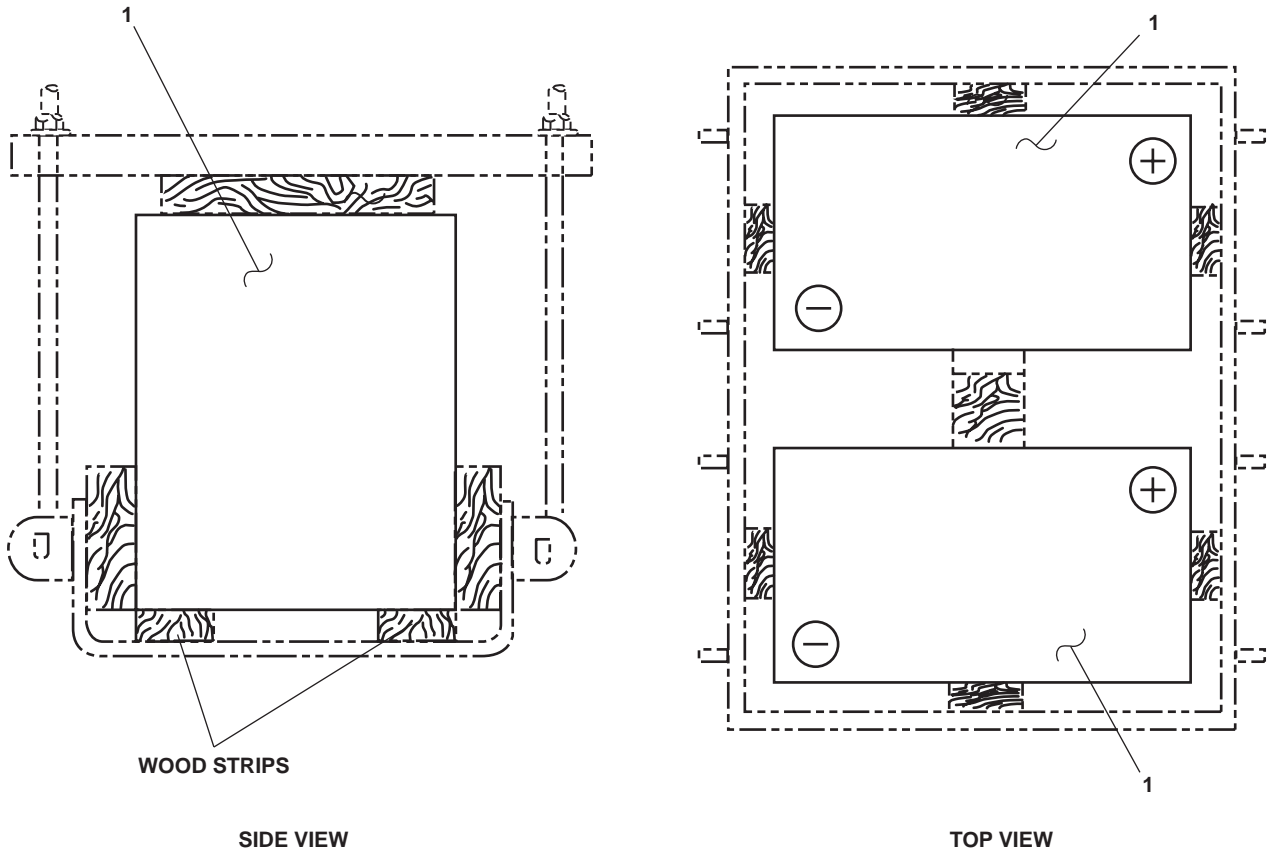
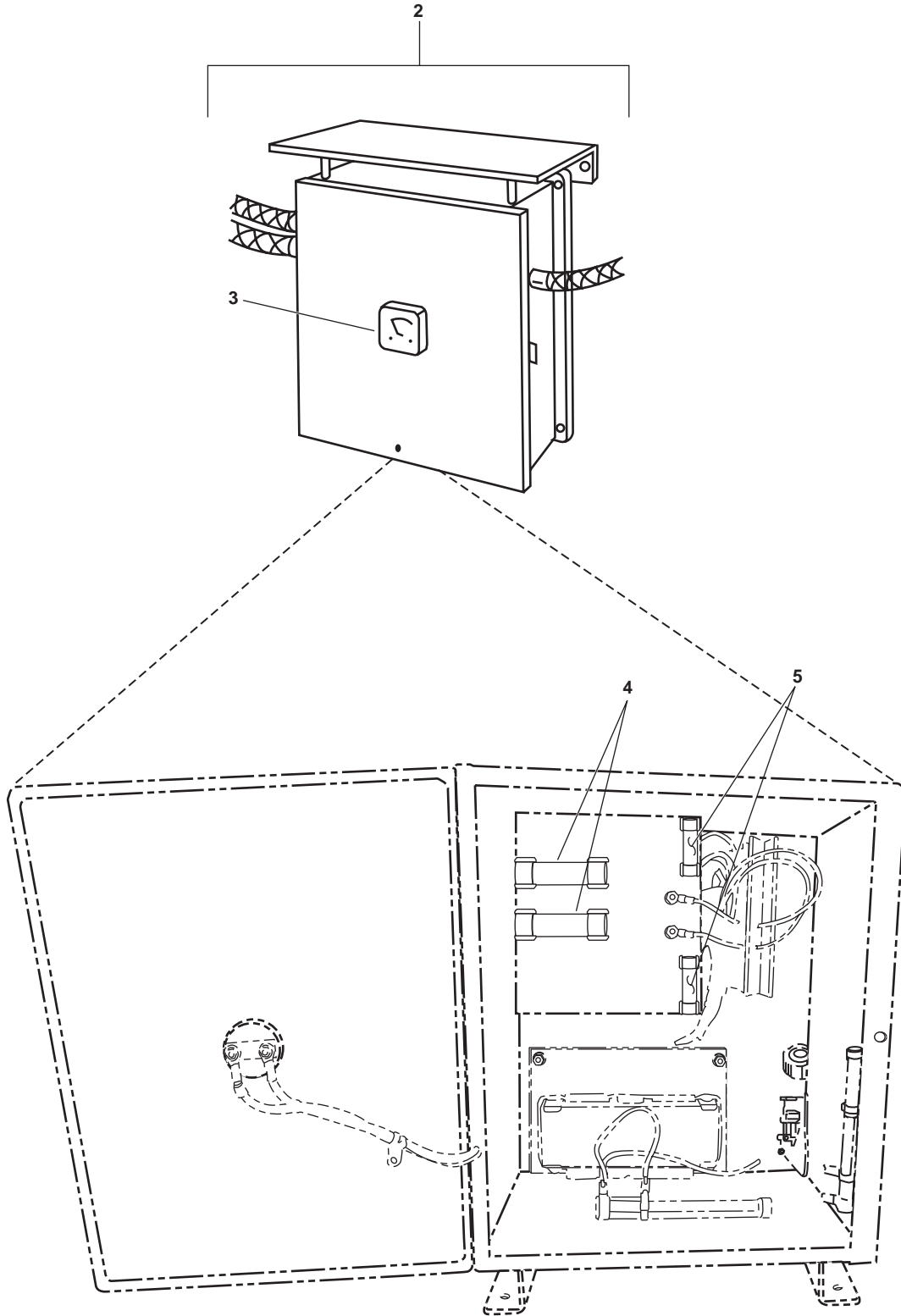


Figure 60. Battery Power Supply System (Sheet 1 of 3)



LaMarche 20 Amp Battery Charger

Figure 60. Battery Power Supply System (Sheet 2 of 3)

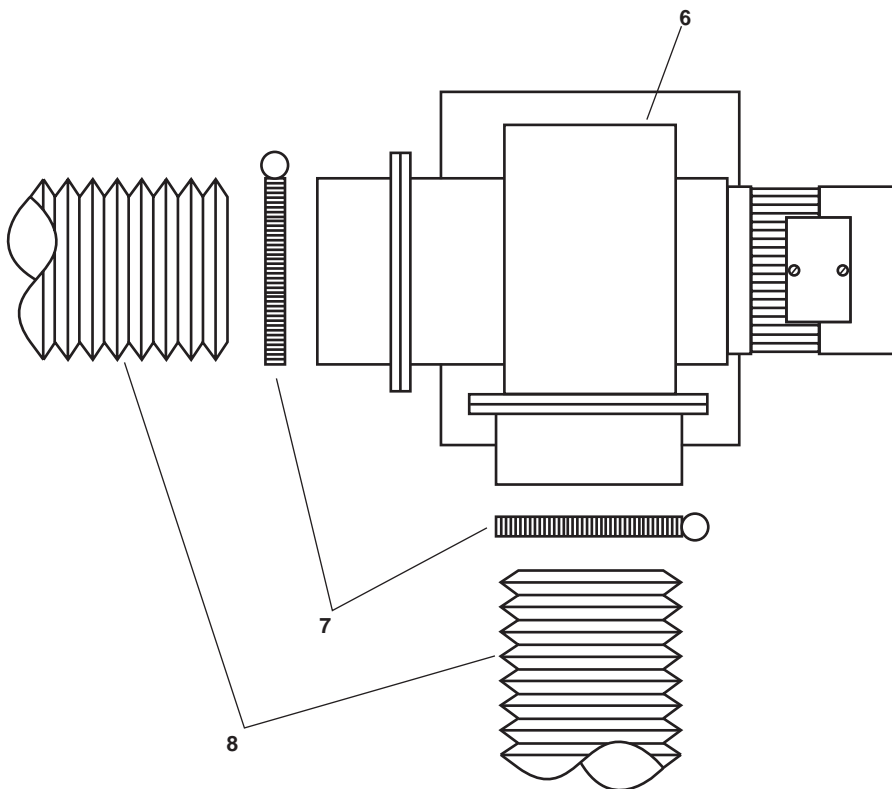
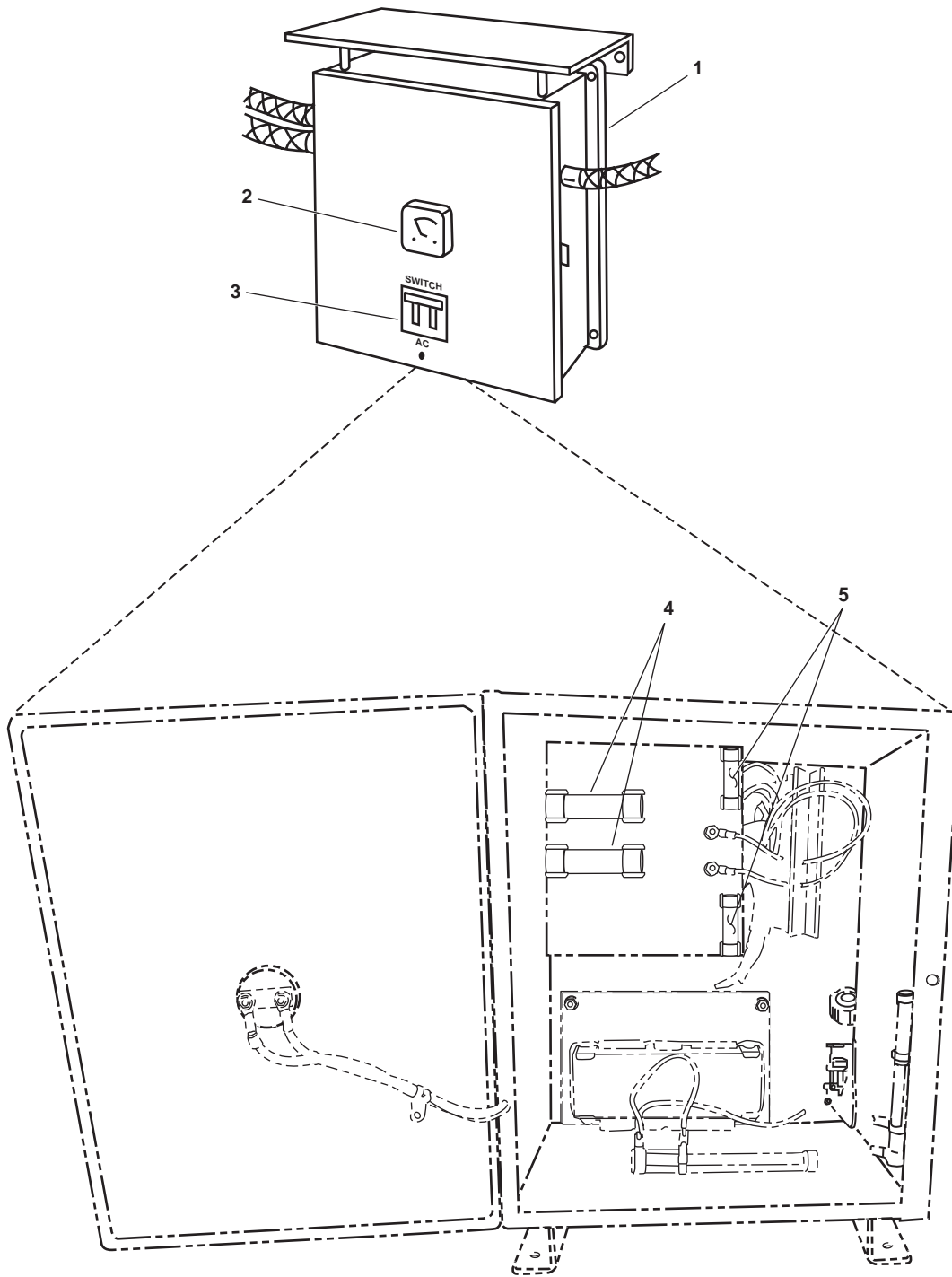


Figure 60. Battery Power Supply System (Sheet 3 of 3)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0311	
					FIG. 60 BATTERY POWER SUPPLY SYSTEM	
1	PAOZZ	6140-01-360-6487	78657	T-12-120	BATTERY,STORAGE .....	10
2	PFOOO	6130-01-350-2121	92731	A41-20-24V-A1	CHARGER,BATTERY .....	2
3	PFOZZ	6625-00-443-5705	60741	49-6881	.VOLTMETER .....	1
4	PAOZZ	5920-00-252-2022	81349	F16A250V35A	.FUSE,CARTRIDGE .....	2
5	PAOZZ	5920-00-890-4548	92731	P8-C1-B18	.FUSE,CARTRIDGE .....	2
6	XDOZZ		U6322	40 BTFL56-2	FAN,CENTRIFUGAL .....	1
7	PAOZZ	4730-01-531-7177	39428	5011T25	CLAMP,HOSE .....	2
8	XDOZZ		39428	5501K31	HOSE .....	25
					<b>END OF FIGURE</b>	



LaMarche 40 Amp Battery Charger

Figure 61. Battery Charger (Sheet 1 of 3)

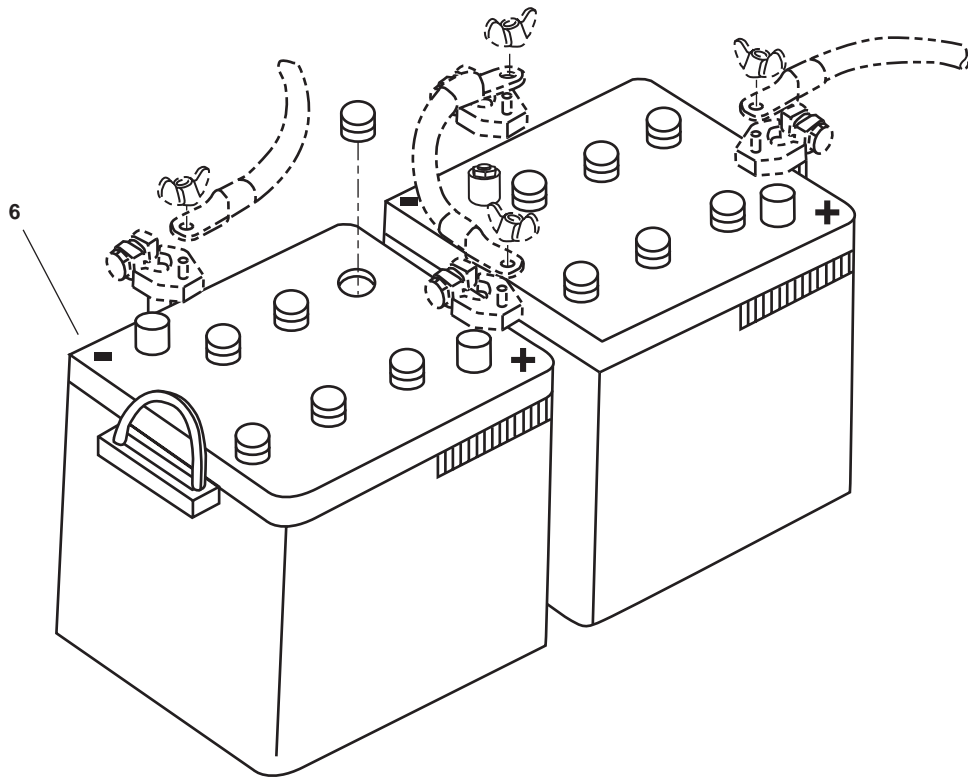


Figure 61. Battery Charger (Sheet 2 of 3)

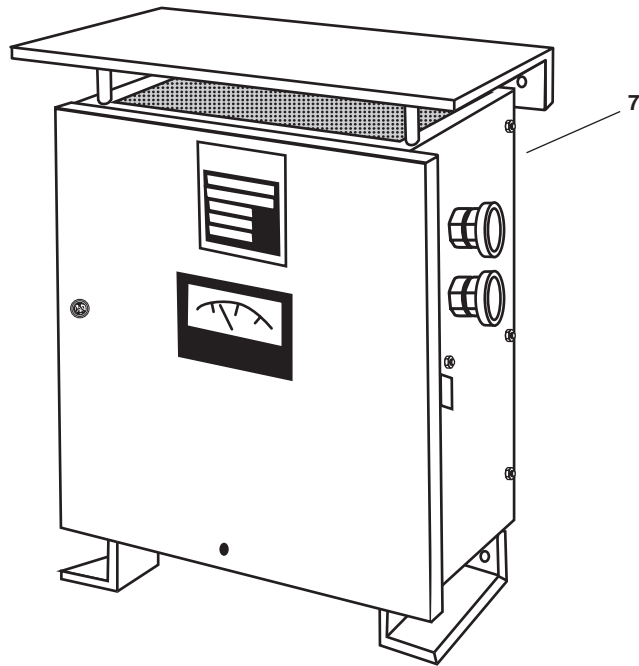


Figure 61. Battery Charger (Sheet 3 of 3)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031101	
					FIG 61 CHARGER, BATTERY	
1	PFOFF	6130-01-098-6871	92731	A41-40-24V-A1	CHARGER,BATTERY .....	1
2	PFOZZ	6625-00-975-2802	13499	458-0699-000	.AMMETER .....	1
3	PFOZZ	5925-00-828-1512	89946	QC2040	.CIRCUIT BREAKER .....	1
4	PAOZZ	5920-00-252-2022	81349	F16A250V35A	.FUSE,CARTRIDGE .....	2
5	PAOZZ	5920-00-646-4621	81349	F63C500V70A	.FUSE,CARTRIDGE .....	2
6	PAOZZ	6140-01-446-9498	19207	6TMF/TYPEI	BATTERY,STORAGE .....	2
7	XDOZZ		92731	A40-20-12V-A1-6L	CHARGER,BATTERY .....	1
					<b>END OF FIGURE</b>	



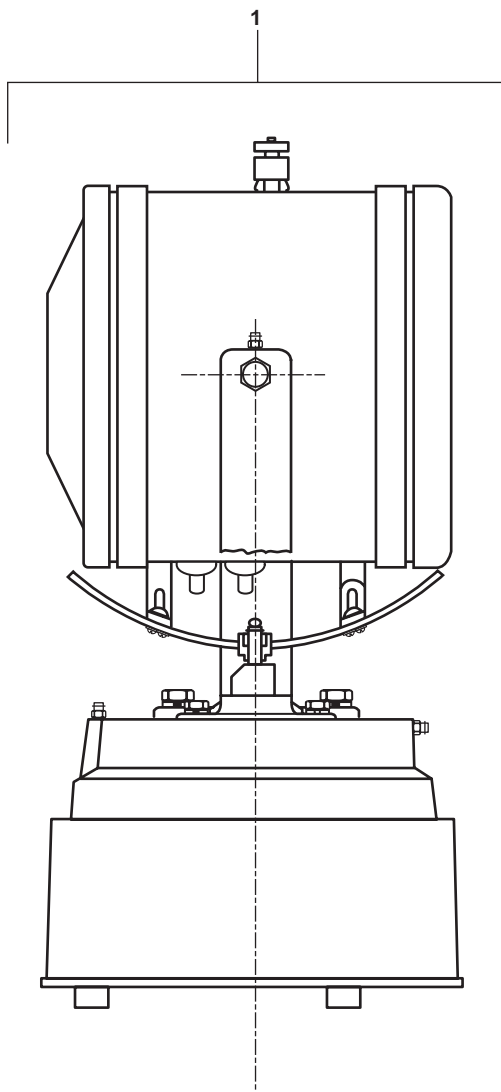


Figure 62. Searchlights (Sheet 1 of 10)

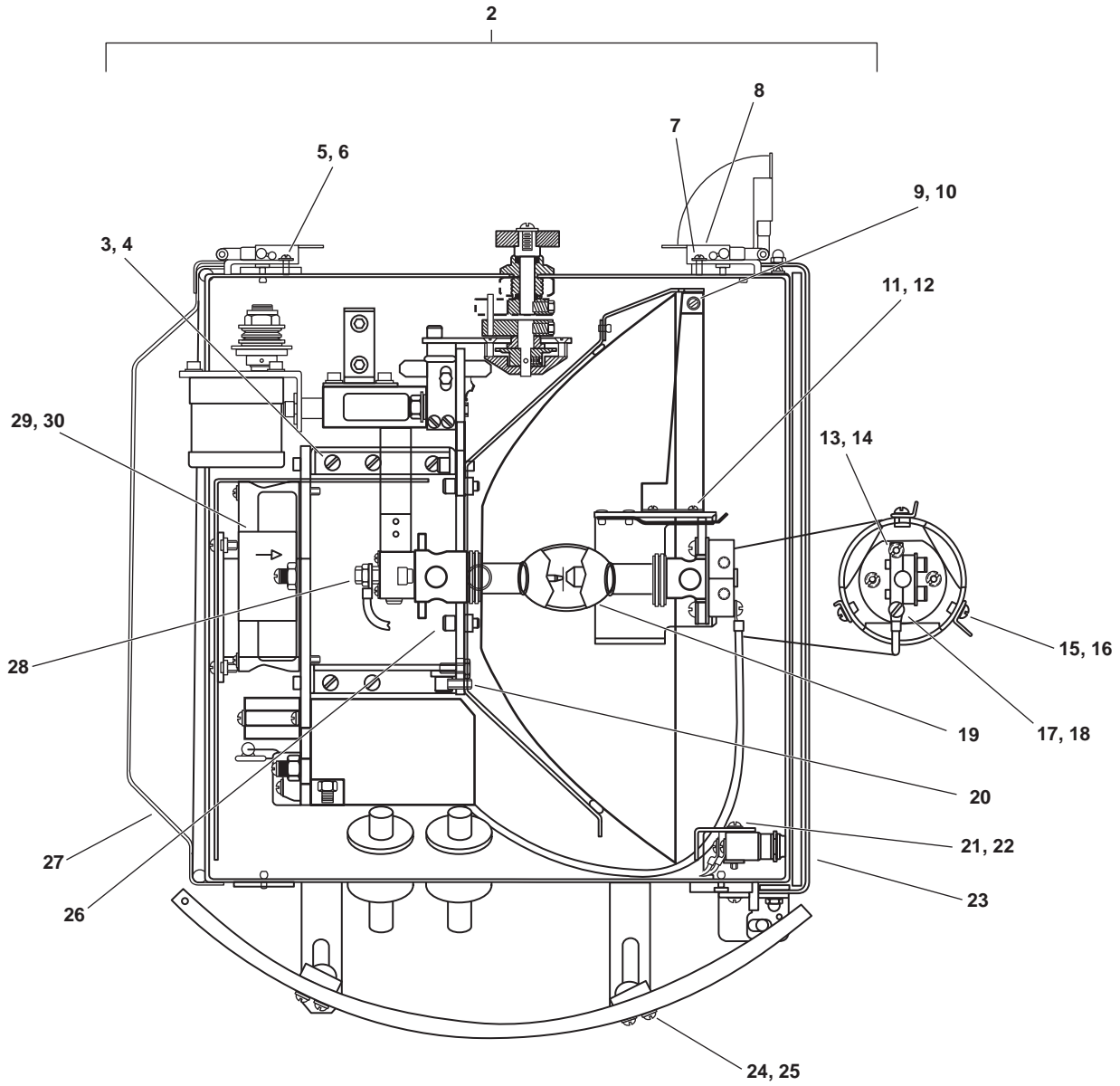


Figure 62. Searchlights (Sheet 2 of 10)



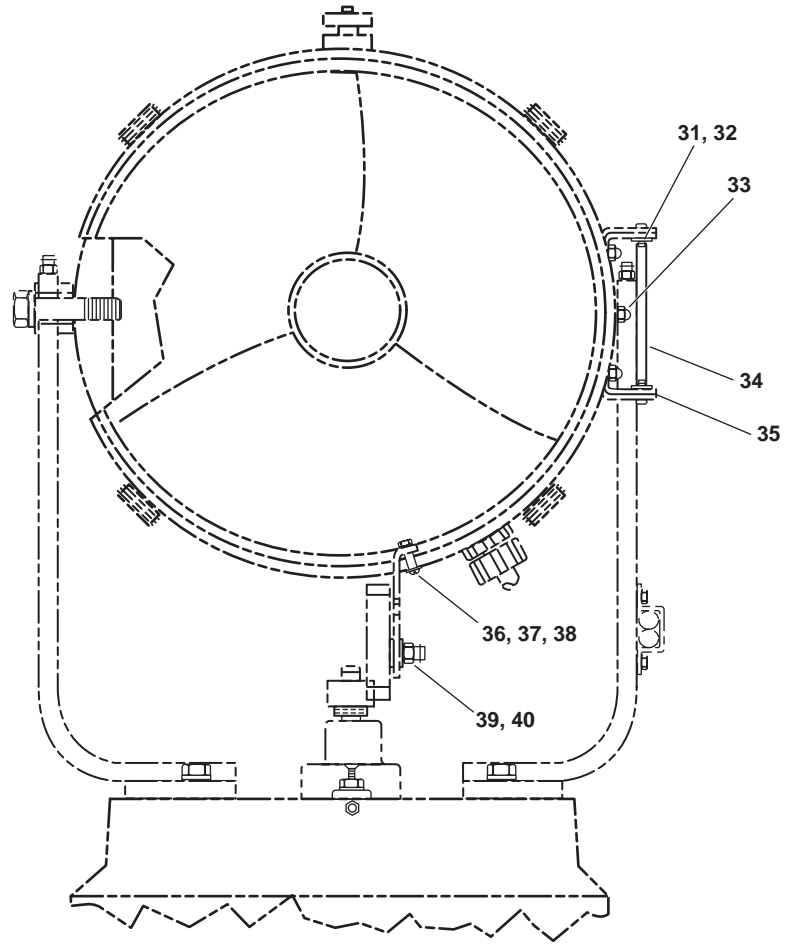


Figure 62. Searchlights (Sheet 3 of 10)

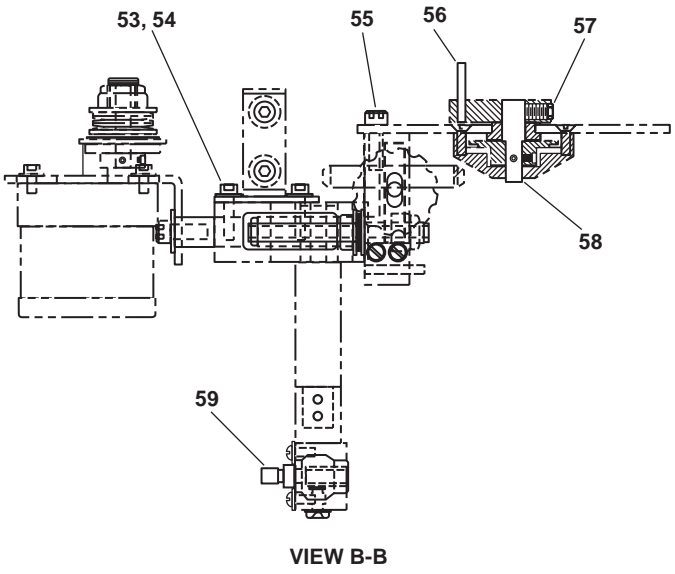
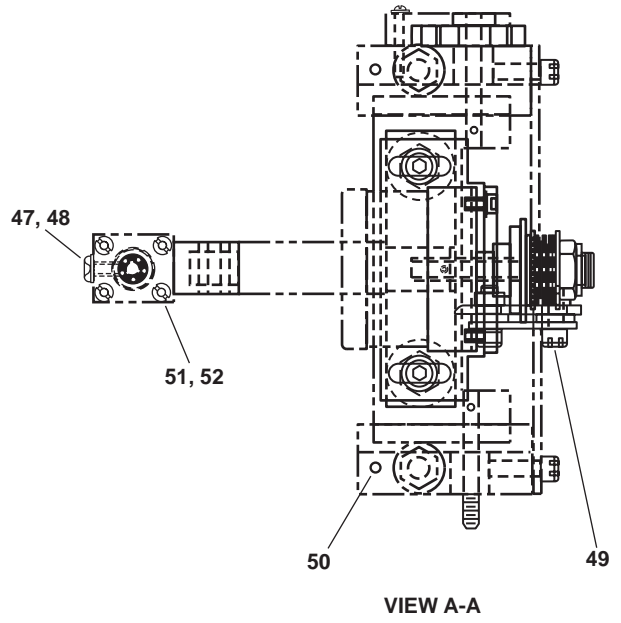
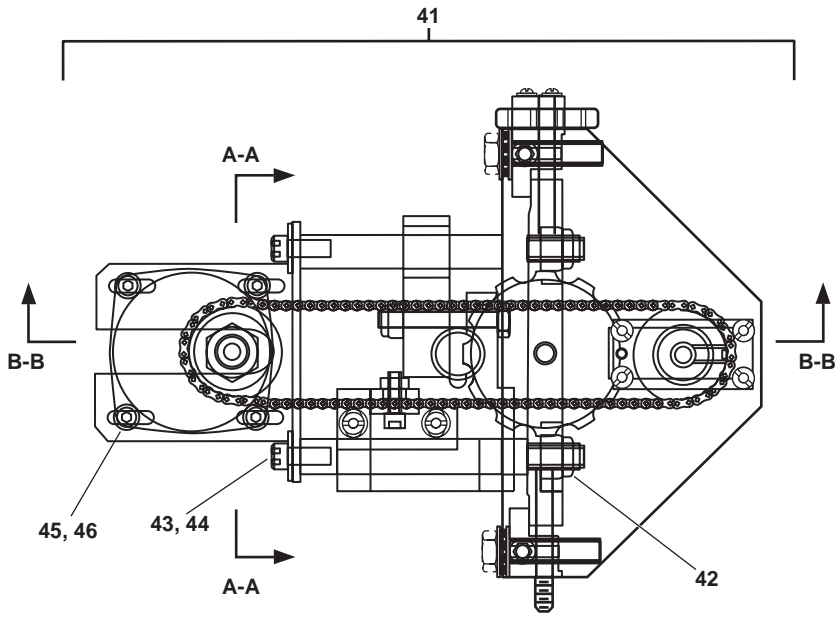
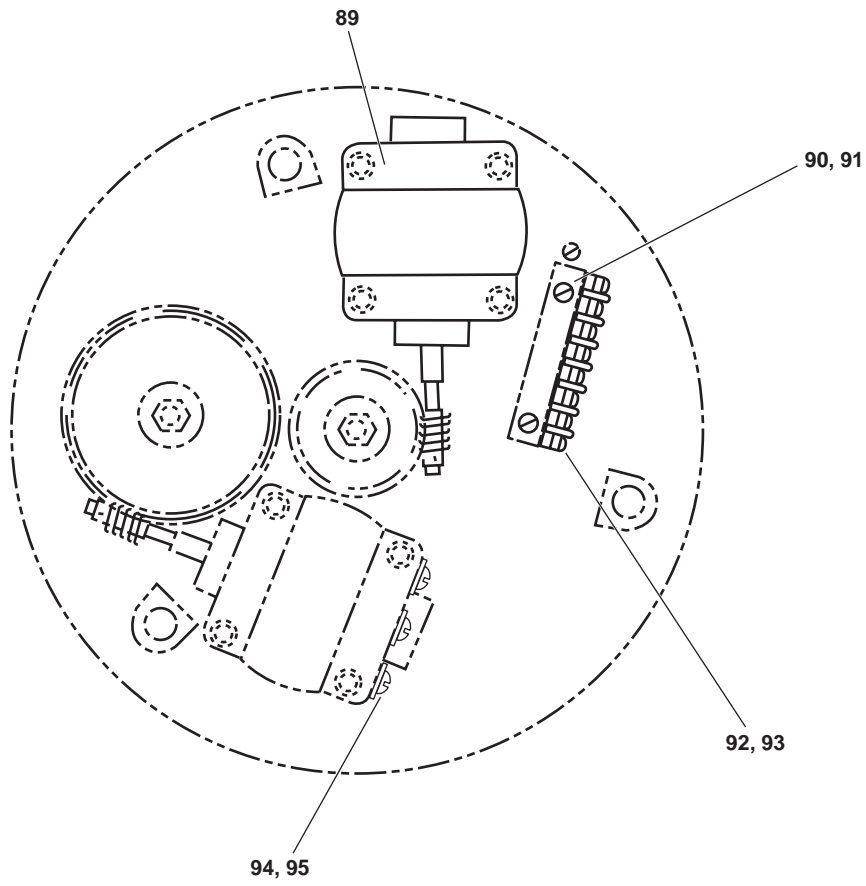
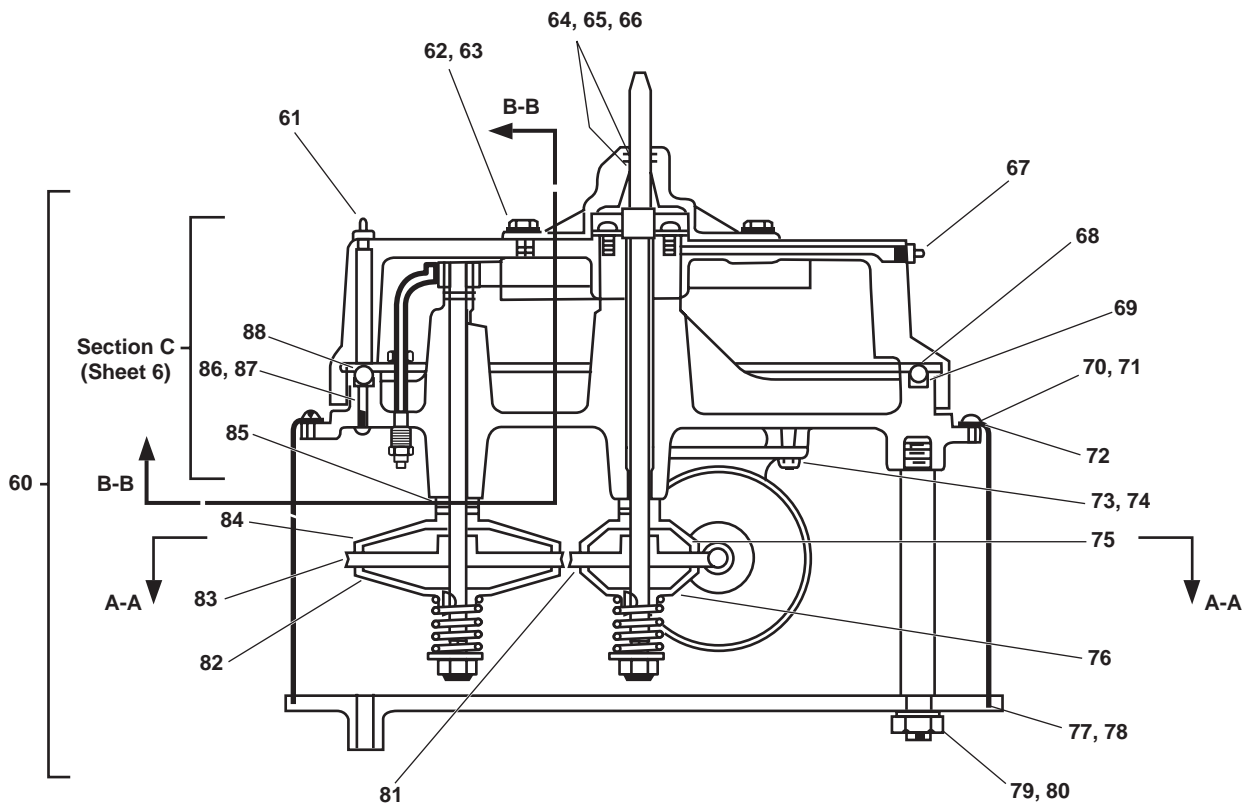
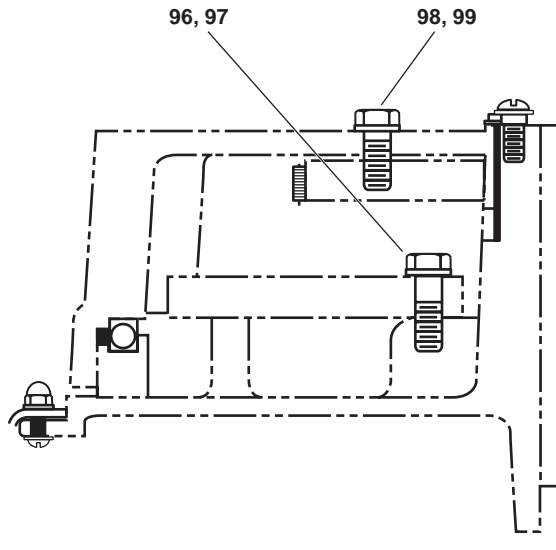


Figure 62. Searchlights (Sheet 4 of 10)

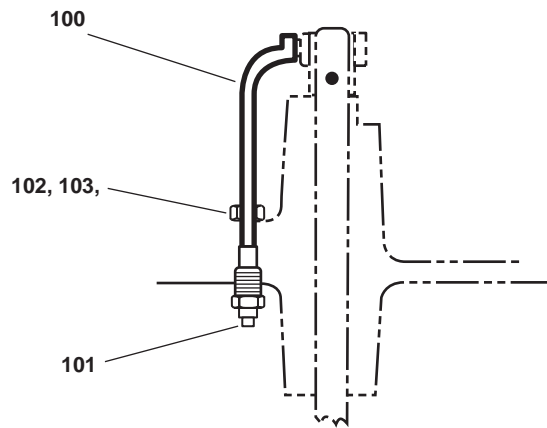


VIEW A-A

Figure 62. Searchlights (Sheet 5 of 10)



**VIEW B-B**  
(Continued From Sheet 5)



**SECTION C**  
(Continued From Sheet 5)

**Figure 62. Searchlights (Sheet 6 of 10)**

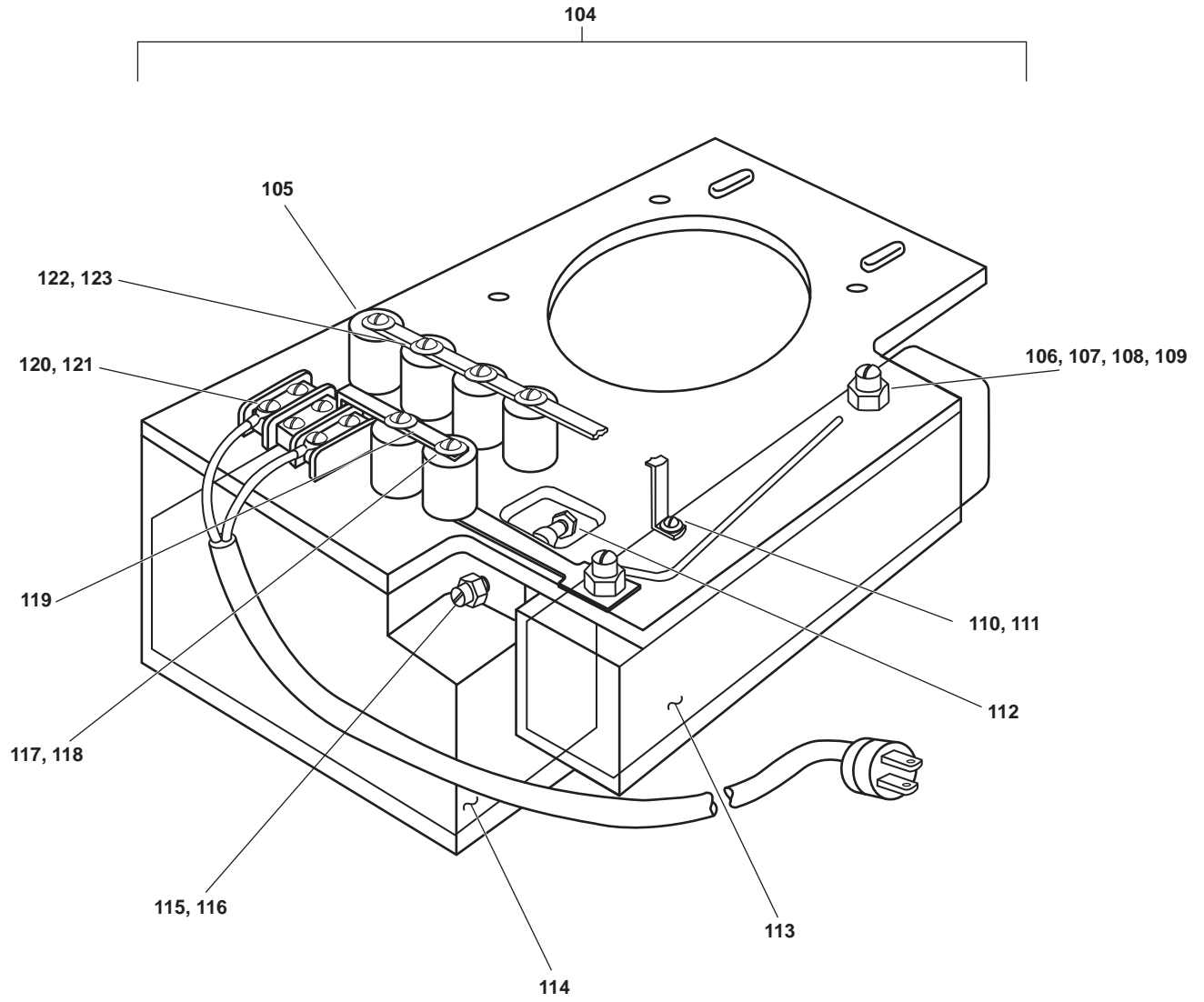


Figure 62. Searchlights (Sheet 7 of 10)

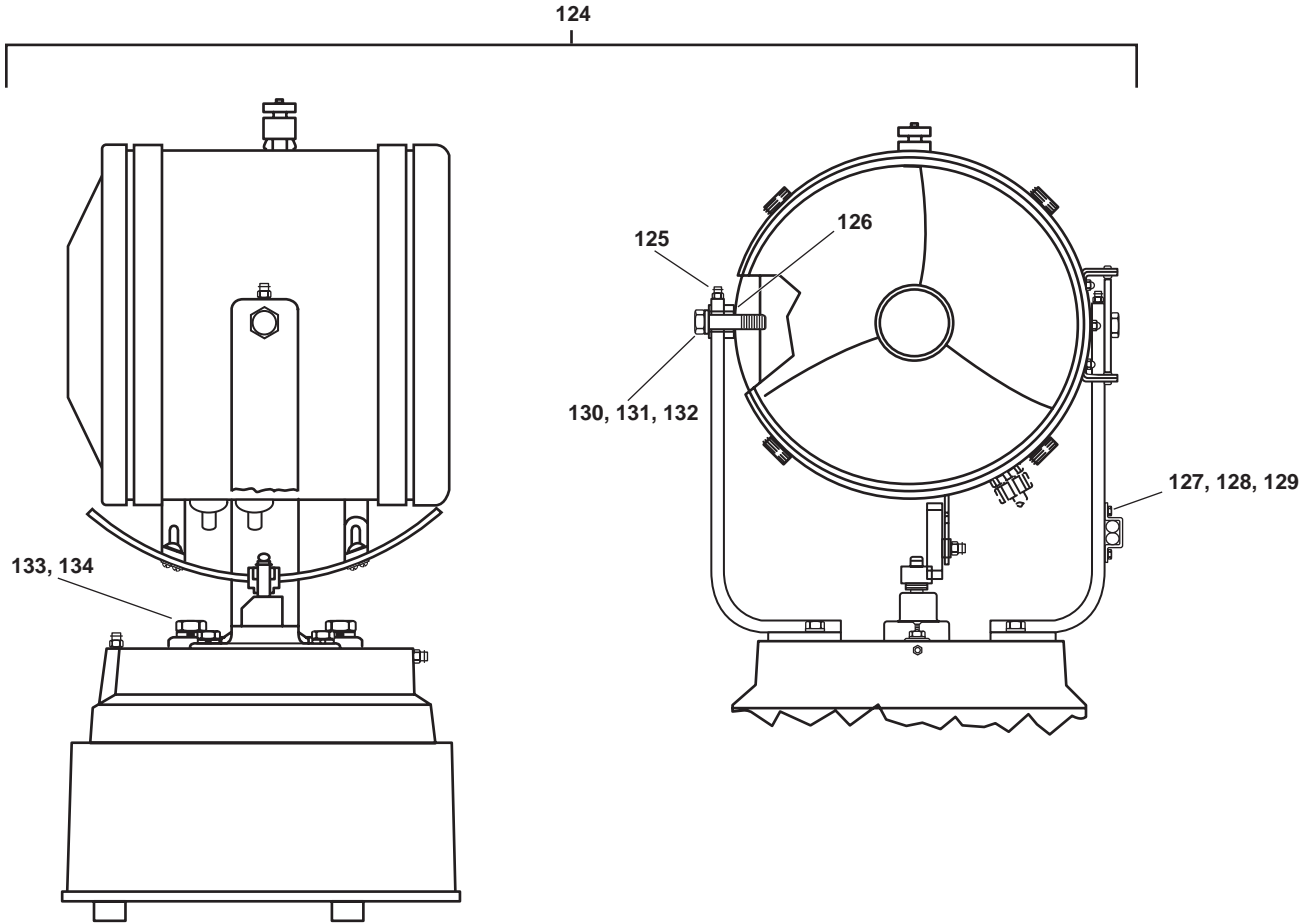


Figure 62. Searchlights (Sheet 8 of 10)

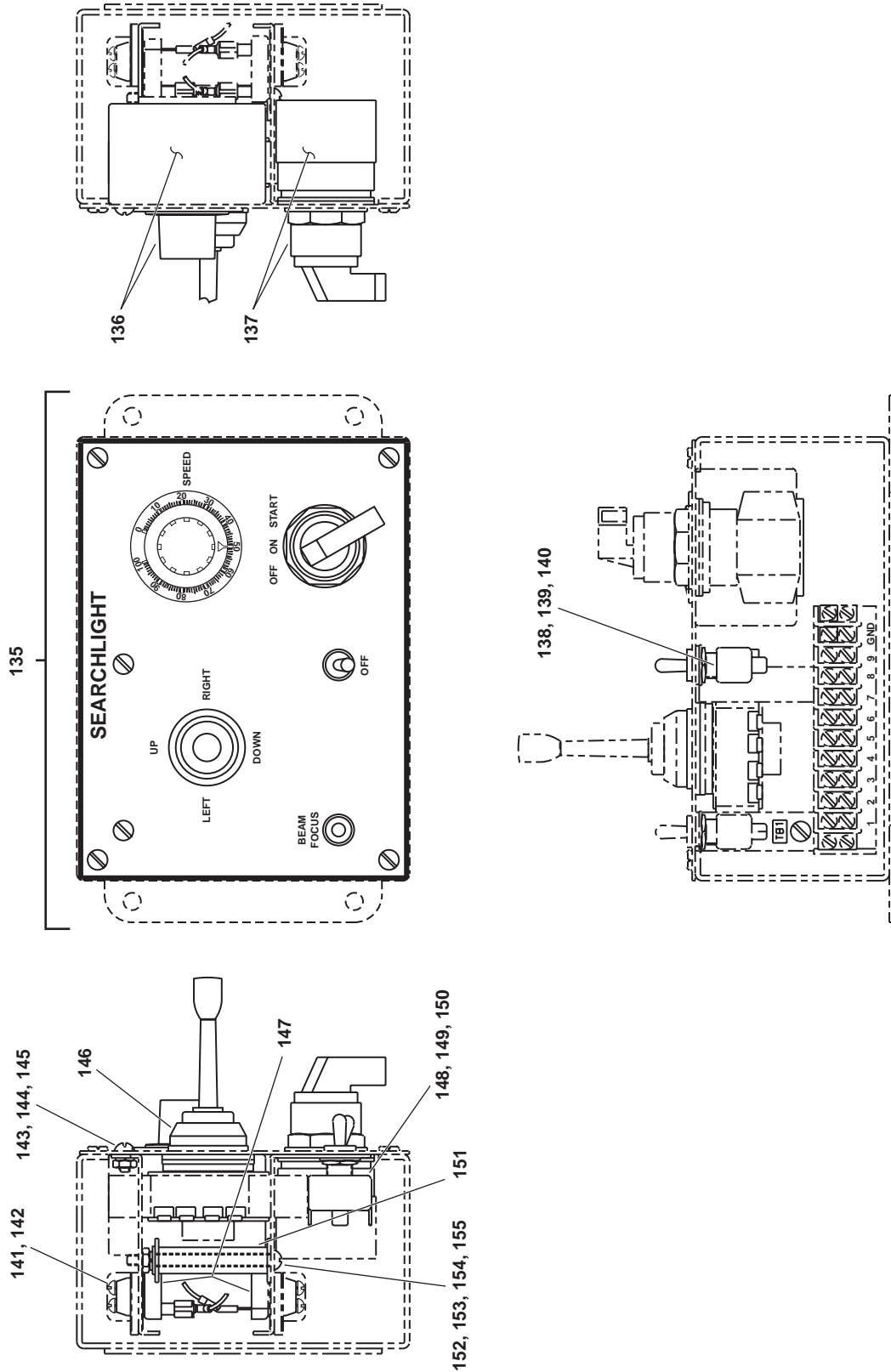


Figure 62. Searchlights (Sheet 9 of 10)

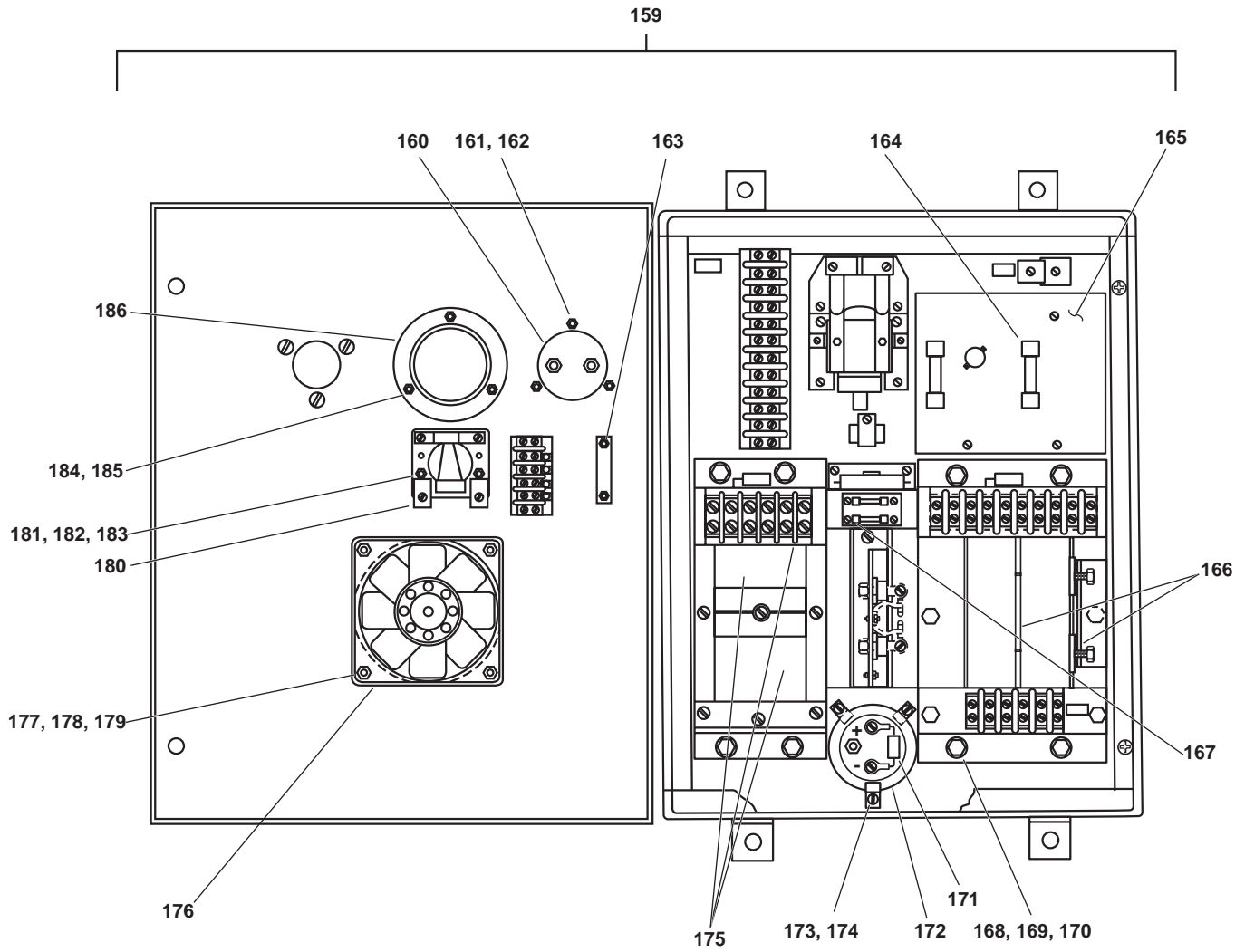


Figure 62. Searchlights (Sheet 10 of 10)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031201	
					FIG. 62 SEARCHLIGHTS	
1	PFOFF	6230-01-270-3725	10741	X9398-RF	SEARCHLIGHT .....	2
2	XAOFF		10741	11570	..DRUM ASSEMBLY .....	1
3	XDFZZ		39428	91792A159	..SCREW,MACHINE .....	4
4	XDFZZ		39428	91475A020	..WASHER,LOCK .....	4
5	XDFZZ		39428	91792A144	..SCREW,MACHINE .....	3
6	XDFZZ		39428	91475A020	..WASHER,LOCK .....	3
7	XDFZZ		39428	91792A145	..SCREW,MACHINE .....	8
8	PAFZZ	5340-01-374-5437	10741	8318A	..CATCH,CLAMPING .....	8
9	XDFZZ		39428	91475A020	..WASHER,LOCK .....	6
10	XDFZZ		39428	91792A192	..SCREW,MACHINE .....	2
11	XDFZZ		39428	91792A144	..SCREW,MACHINE .....	6
12	XDFZZ		39428	91475A020	..WASHER,LOCK .....	6
13	XDFZZ		39428	91792A242	..SCREW,MACHINE .....	2
14	XDFZZ		39428	91475A027	..WASHER,LOCK .....	2
15	XDFZZ		39428	91792A144	..SCREW,MACHINE .....	6
16	XDFZZ		39428	91475A025	..WASHER,LOCK .....	2
17	XDFZZ		39428	91792A240	..SCREW,MACHINE .....	1
18	XDFZZ		39428	91475A027	..WASHER,LOCK .....	1
19	PAOZZ	6240-01-162-4086	33030	XM1000-9HS	..LAMP,XENON .....	1
20	XDFZZ		39428	91792A242	..SCREW,MACHINE .....	10
21	XDFZZ		39428	91792A153	..SCREW,MACHINE .....	1
22	XDFZZ		39428	91475A020	..WASHER,LOCK .....	6
23	XDFZZ		10741	11622X	..DOOR ASSEMBLY .....	1
24	XDFZZ		39428	91792A192	..SCREW,MACHINE .....	2
25	XDFZZ		39428	91475A025	..WASHER,LOCK .....	2
26	XDFZZ		39428	92240A539	..SCREW,CAP .....	4
27	XDFZZ		10741	11623X	..COVER ASSEMBLY,REAR .....	1
28	XDFZZ		39428	91240A029	..NUT,HEX .....	1
29	XDFZZ		10741	10447	..FAN,AXIAL .....	1
30	XDFZZ		10741	10448A	..PLUG & CORD ASSEMBL .....	1
31	XDFZZ		0KEV6	98401A409	..PIN,COTTER .....	2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
32	XDFZZ		39428	91475A029	..WASHER,LOCK .....	4
33	XDFZZ		39428	91792A145	..SCREW,MACHINE .....	3
34	XDFZZ		10741	9333	..PIN,HINGE .....	1
35	XDFZZ		39428	98017A655	..WASHER,FLAT .....	2
36	XDFZZ		39428	91792A537	..SCREW,MACHINE .....	4
37	XDFZZ		39428	91240A029	..NUT,HEX .....	4
38	XDFZZ		39428	98017A655	..WASHER,FLAT .....	4
39	XDFZZ		39428	90101A237	..NUT,LOCKING .....	2
40	XDFZZ		39428	98017A689	..WASHER,FLAT .....	4
41	XCOFF		10741	12475X	..FOCUS ASSEMBLY .....	1
42	XDFZZ		39428	90101A243	..NUT,LOCK .....	2
43	XDFZZ		39428	93705A538	..SCREW,CAP .....	2
44	XDFZZ		39428	90945A760	..WASHER,FLAT .....	2
45	XDFZZ		39428	92196A191	..SCREW,CAP .....	4
46	XDFZZ		39428	91475A025	..WASHER,LOCK .....	4
47	XDFZZ		39428	91792A240	..SCREW,MACHINE .....	1
48	XDFZZ		39428	91475A027	..WASHER,LOCK .....	1
49	XDFZZ		39428	93705A538	..SCREW,CAP .....	2
50	XDFZZ		10741	4565-86	..PIN,SPRING .....	2
51	XDFZZ		39428	91792A146	..SCREW,MACHINE .....	4
52	XDFZZ		39428	91475A020	..WASHER,LOCK .....	4
53	XDFZZ		39428	92196A245	..SCREW,CAP .....	2
54	XDFZZ		39428	91475A027	..WASHER,LOCK .....	2
55	XDFZZ		39428	93705A538	..SCREW,CAP .....	2
56	XDFZZ		10741	4565-86	..PIN,SPRING .....	1
57	XDFZZ		39428	94495A245	..SCREW,SET .....	1
58	PFFZZ	3120-00-809-2533	96881	4L4FK	..BEARING,SLEEVE .....	1
59	XDFZZ		10741	12279	..LAMP,SOCKET .....	1
60	PFFFF	6210-01-269-8372	10741	PL7052	..FIXTURE,SEARCHLIGHT BASE ASSEMBLY .....	1
61	PAFZZ	4730-00-972-5789	81343	AS15721-1	..FITTING,LUBRICATION .....	1
62	XDFZZ		39428	91475A031	..WASHER,LOCK .....	2
63	XDFZZ		39428	91783A535	..SCREW,MACHINE .....	2

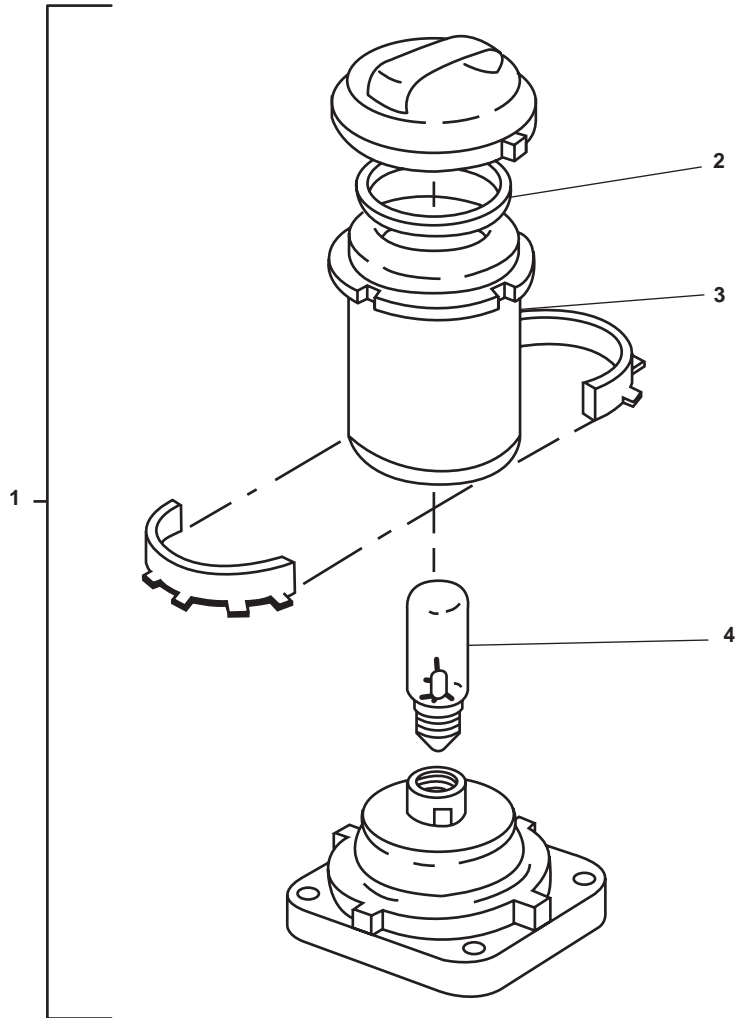
(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
64	XDFZZ		39428	91783A539	..SCREW,MACHINE .....	3
65	XDFZZ		39428	91475A029	..WASHER,LOCK .....	3
66	PAFZZ	5331-01-152-0088	10741	2285K	..O-RING .....	2
67	PAFZZ	4730-00-972-5789	81343	AS15721-1	..FITTING,LUBRICATION .....	1
68	PFFZZ	3120-01-194-0765	10741	8436	..BEARING,WASHER,THRU .....	1
69	PFFZZ	3120-01-194-0764	10741	8437	..BEARING,WASHER,THRU .....	1
70	XDFZZ		39428	91783A242	..SCREW,MACHINE .....	8
71	XDFZZ		39428	91475A027	..WASHER,LOCK .....	8
72	PAFZZ	5330-01-161-9852	10741	8460	..GASKET .....	1
73	XDFZZ		39428	92240A537	..SCREW,CAP .....	8
74	XDFZZ		39428	91475A029	..WASHER,LOCK .....	8
75	PFFZZ	3010-01-190-9808	10741	8457	..CLUTCH,PLATE,SEARCH .....	1
76	PFFZZ	3010-01-189-0220	10741	8456	..CLUTCH,PLATE,SEARCH .....	1
77	PAFZZ	5330-01-161-9860	10741	8464	..RUBBER STRIP .....	V
78	PAFZZ	5330-01-194-0475	10741	4165	..GASKET .....	V
79	XDFZZ		39428	91847A540	..NUT,PLAIN,HEXAGON .....	3
80	XDFZZ		39428	91475A035	..WASHER,LOCK .....	3
81	PFFZZ	3020-01-192-4649	10741	G90	..GEAR,WORM .....	1
82	PFFZZ	3010-01-189-0219	10741	G91	..CLUTCH,PLATE,SEARCH .....	1
83	PFFZZ	3020-01-192-4648	10741	G93	..GEAR,WORM .....	1
84	PFFZZ	3010-01-189-4240	10741	8543	..CLUTCH,PLATE,SEARCH .....	1
85	PFFZZ	3120-00-455-9984	10741	8L12FK	..BEARING,SLEEVE .....	3
86	XDFZZ		39428	91783A242	..SCREW,MACHINE .....	1
87	XDFZZ		39428	91475A027	..WASHER,LOCK .....	1
88	PFFZZ	3110-01-194-8872	10741	EF128	..BEARING,BALL,ANNULA .030 ASSEMBLY .....	110
89	PFFZZ	6105-01-452-4236	10741	K2315-A	..MOTOR,DIRECT CURREN .....	2
90	XDFZZ		39428	91783A535	..SCREW,MACHINE .....	1
91	XDFZZ		39428	91475A029	..WASHER,LOCK .....	1
92	XDFZZ		39428	91783A196	..SCREW,MACHINE .....	4
93	XDFZZ		39428	91475A025	..WASHER,LOCK .....	4
94	XDFZZ		39428	91475A027	..WASHER,LOCK .....	8
95	XDFZZ		39428	91783A827	..SCREW,MACHINE .....	8

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
96	XDFZZ		39428	92240A626	..SCREW,CAP .....	1
97	XDFZZ		39428	91475A031	..WASHER,LOCK .....	4
98	XDFZZ		39428	92240A624	..SCREW,CAP .....	1
99	XDFZZ		39428	91475A031	..WASHER,LOCK .....	2
100	XDFZZ		10741	8450	..TUBE,GREASE .....	1
101	PAFZZ	4730-00-972-5789	81343	AS15721-1	..FITTING,LUBRICATION .....	1
102	XDFZZ		39428	91475A029	..WASHER,LOCK .....	2
103	XDFZZ		39428	91240A029	..NUT,HEX .....	1
104	XDOFF		10741	7252	..STARTER ASSEMBLY .....	1
105	PAFZZ	5910-01-268-4015	10741	2896	..CAPACITOR .....	4
106	XDFZZ		39428	91847A431	..NUT,HEX .....	2
107	XDFZZ		39428	91475A031	..WASHER,LOCK .....	2
108	XDFZZ		39428	91783A240	..SCREW,MACHINE .....	2
109	XDFZZ		39428	91475A027	..WASHER,LOCK .....	2
110	XDFZZ		39428	91783A194	..SCREW,MACHINE .....	1
111	XDFZZ		39428	91475A025	..WASHER,LOCK .....	1
112	PAFZZ	5999-01-189-5244	10741	3246	..CONTACT,ELECTRICAL .....	1
113	PAFZZ	5950-01-268-5246	10741	9339X	..TRANSFORMER,RADIO F .....	1
114	PAFZZ	5950-01-268-5245	10741	4407X	..TRANSFORMER,POWER .....	1
115	XDFZZ		39428	91841A215	..NUT,HEX .....	1
116	XDFZZ		39428	91475A029	..WASHER,LOCK .....	1
117	XDFZZ		39428	91783A194	..SCREW,MACHINE .....	1
118	XDFZZ		39428	91475A025	..WASHER,LOCK .....	1
119	XDFZZ		10741	7691X	..CAPACITOR .....	1
120	XDFZZ		39428	91783A198	..SCREW,MACHINE .....	2
121	XDFZZ		39428	91475A025	..WASHER,LOCK .....	2
122	XDFZZ		39428	91783A190	..SCREW,MACHINE .....	4
123	XDFZZ		39428	91475A025	..WASHER,LOCK .....	4
124	XDOFF		0KV41	7980	..CONTROL,DISTANT ELE .....	1
125	PAFZZ	4730-00-972-5789	81343	AS15721-1	..FITTING,LUBRICATION .....	2
126	XDFZZ		39428	92240A774	..SCREW,CAP .....	2
127	XDFZZ		39428	91792A240	..SCREW,MACHINE .....	2
128	XDFZZ		39428	91475A027	..WASHER,LOCK .....	2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
129	XDFZZ		39428	98370A011	..WASHER,FLAT .....	2
130	XDFZZ		39428	91475A035	..WASHER,LOCK .....	2
131	XDFZZ		39428	98017A215	..WASHER,FLAT .....	2
132	PPFZZ	3110-01-269-0565	10741	4670	..BEARING,ANNULAR .....	1
133	XDFZZ		39428	92240A714	..SCREW,CAP .....	4
134	XDFZZ		39428	91475A033	..WASHER,LOCK .....	4
135	XDOFF		10741	7563	..CONTROL STATION .....	1
136	XDFZZ		10741	5349	..TRANSFORMER,VARIABL .....	1
137	PPFZZ	5930-01-188-8843	10741	9855	..SWITCH,ROTARY .....	1
138	PPFZZ	5930-01-348-4172	10741	8621	..SWITCH,TOGGLE .....	1
139	XDFZZ		10741	9813	..WASHER,LOCK .....	1
140	XDFZZ		10741	9798	..RING,LOCKING .....	1
141	XDFZZ		39428	91783A150	..SCREW,MACHINE .....	8
142	XDFZZ		39428	91475A020	..WASHER,LOCK .....	8
143	XDFZZ		39428	91783A240	..SCREW,MACHINE .....	2
144	XDFZZ		39428	91475A027	..WASHER,LOCK .....	2
145	XDFZZ		39428	91240A011	..NUT,HEX .....	2
146	PPFZZ	5930-01-144-1442	10741	8808	..SWITCH,LEVER .....	1
147	PPFZZ	6130-01-167-1503	10741	8542X	..RECTIFIER,METALLIC .....	2
148	PPFZZ	5930-01-348-4171	10741	9796	..SWITCH,TOGGLE .....	1
149	XDFZZ		10741	9813	..WASHER,LOCK .....	1
150	XDFZZ		10741	9798	..RING,LOCKING .....	1
151	PPFZZ	5905-01-311-6931	10741	C1235P	..RESISTOR,FIXED,WIRE .....	1
152	XDFZZ		39428	91240A011	..NUT,HEX .....	1
153	XDFZZ		39428	91475A027	..WASHER,LOCK .....	1
154	XDFZZ		39428	98370A011	..WASHER,FLAT .....	1
155	XDFZZ		39428	91783A256	..SCREW,MACHINE .....	1
156	PFOFF	6130-01-264-6979	10741	4198PS	..POWER SUPPLY .....	1
157	PPFZZ	6625-01-268-4047	10741	9591	..AMMETER .....	3
158	XDFZZ		39428	90945A710	..WASHER,FLAT .....	3
159	XDFZZ		39428	91475A018	..WASHER,LOCK .....	3
160	XDFZZ		39428	91783A196	..SCREW,MACHINE .....	2
161	PPFZZ	5920-01-272-6191	10741	6292	..FUSEHOLDER,BLOCK .....	1

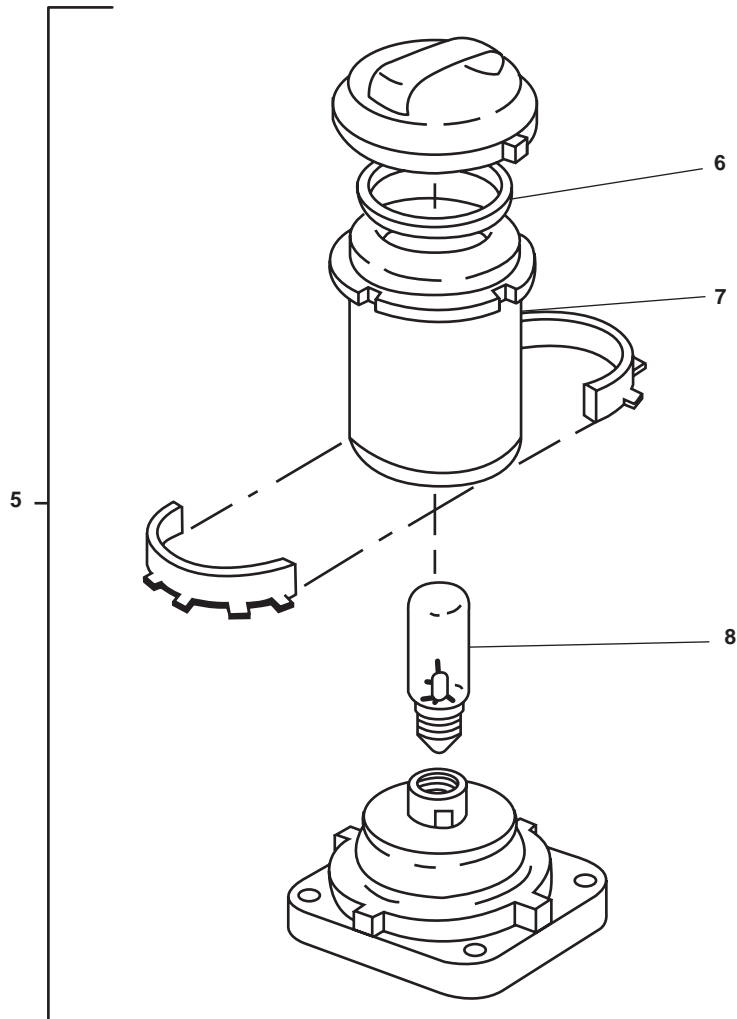
(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
162	PPFZZ	5930-01-210-4061	10741	6291	..SWITCH SUBASSEMBLY .....	1
163	PPFZZ	5950-01-271-8155	10741	4395X	..TRANSFORMER,POWER .....	1
164	PAFZZ	5920-00-142-7376	71400	MDL5	..FUSE CARTRIDGE .....	2
165	XDFZZ		39428	92240A537	..SCREW,CAP .....	4
166	XDFZZ		39428	91475A029	..WASHER,LOCK .....	4
167	XDFZZ		39428	90945A760	..WASHER,FLAT .....	4
168	PPFZZ	5905-01-188-2358	10741	9723X	..RESISTOR,FIXED,WIRE .....	1
169	PPFZZ	5910-01-107-3565	37942	CGS153U100X4C	..CAPACITOR,FIXED,ELE .....	1
170	XDFZZ		39428	91783A240	..SCREW,MACHINE .....	3
171	XDFZZ		39428	91475A027	..WASHER,LOCK .....	3
172	PPFZZ	5950-01-271-8131	10741	4394X	..REACTOR .....	1
173	PPFFF	4140-01-268-9129	10741	4434X	..FAN,CIRCULATING .....	1
174	XDFZZ		39428	91783A150	..SCREW,MACHINE .....	4
175	XDFZZ		39428	91475A020	..WASHER,LOCK .....	4
176	XDFZZ		39428	90730A007	..NUT,HEX .....	4
177	PFOFF	5945-00-851-8922	10741	24212	..RELAY,ELECTROMAGNET .....	1
178	XDFZZ		39428	91783A197	..SCREW,MACHINE .....	2
179	XDFZZ		39428	91475A025	..WASHER,LOCK .....	2
180	XDFZZ		39428	90730A010	..NUT,HEX .....	2
181	XDFZZ		39428	91783A146	..SCREW,MACHINE .....	3
182	XDFZZ		39428	91475A020	..WASHER,LOCK .....	3
183	PPFZZ	6645-01-099-6887	82227	K42202-P4	..METER,TIME TOTALIZI .....	3

END OF FIGURE



Single Navigation Light, Yellow

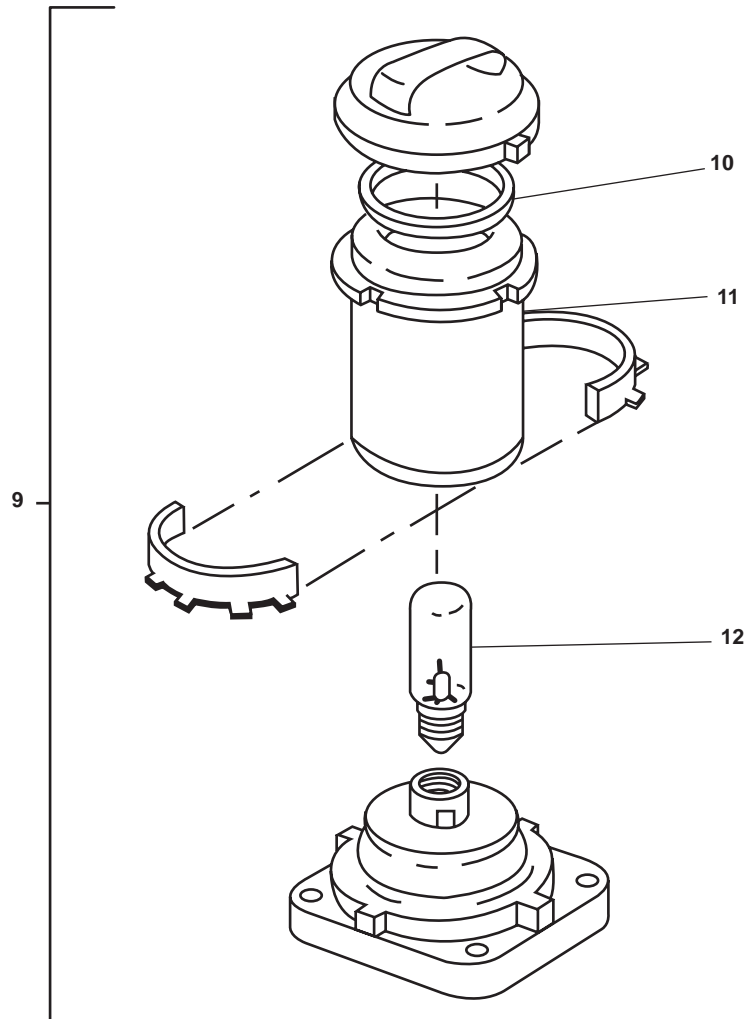
Figure 63. Marine Navigation (Running) Lights, Single (Sheet 1 of 4)



Single Navigation Light, White

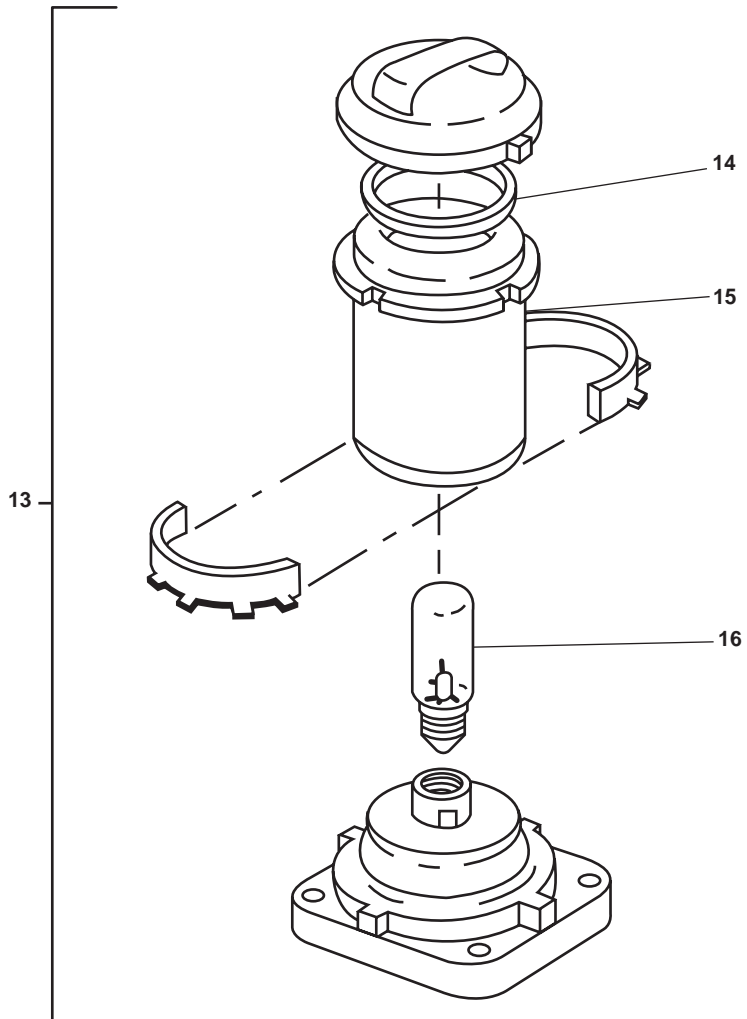
Figure 63. Marine Navigation (Running) Lights, Single (Sheet 2 of 2)





Single Navigation Light, White

Figure 63. Marine Navigation (Running) Lights, Single (Sheet 3 of 4)

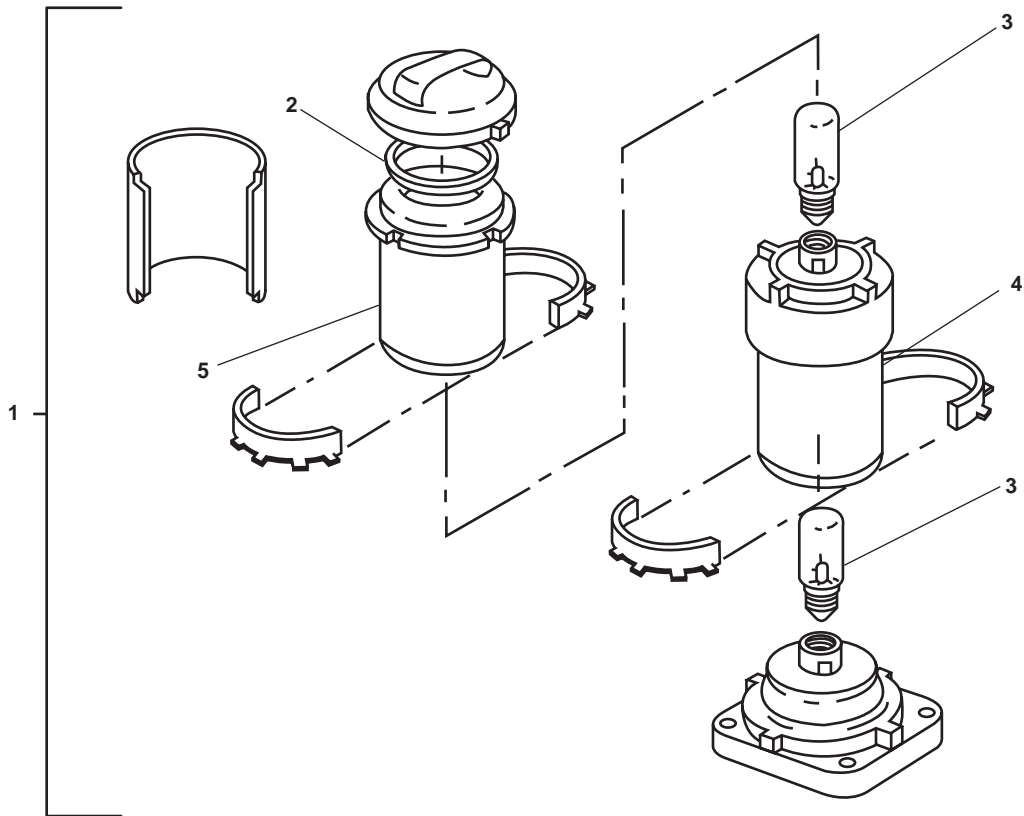


Single Navigation Light, Red

Figure 63. Marine Navigation (Running) Lights, Single (Sheet 4 of 4)

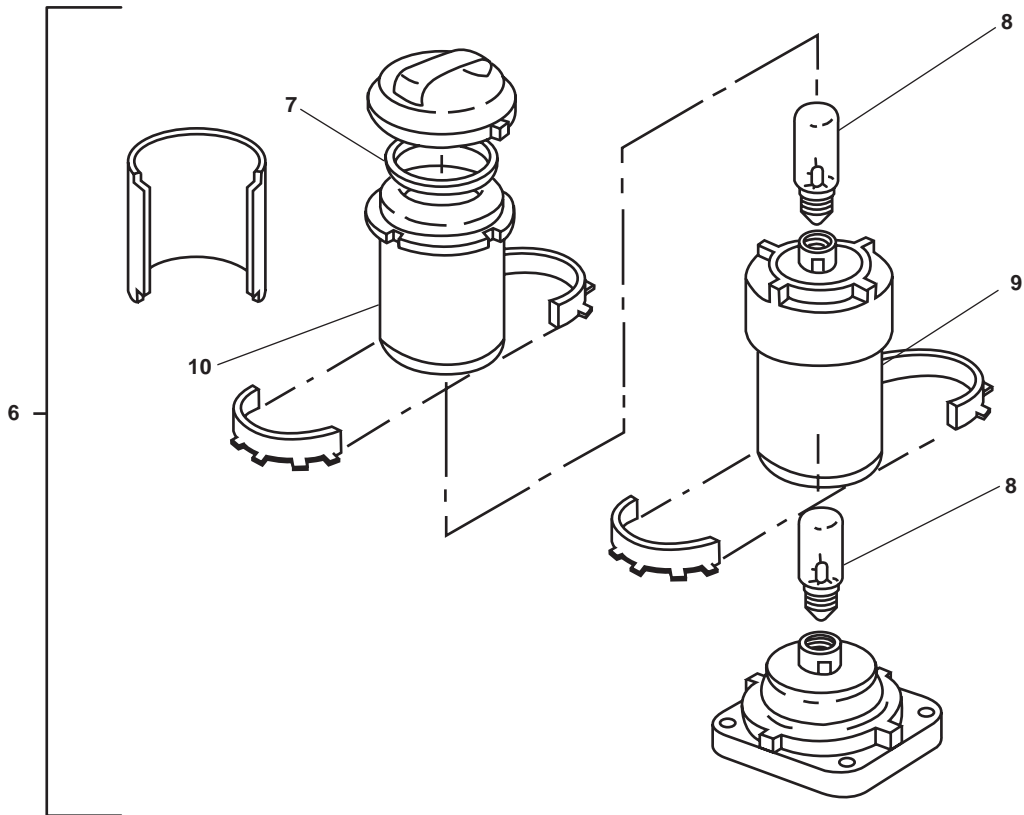
(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03120201	
					FIG. 63 LIGHTS, NAVIGATION, MARINE (RUNNING) SINGLE	
1	PAOOO	6220-01-353-9025	61204	3072499	LIGHT,NAVIGATIONAL TOWING LIGHT, YELLOW .....	1
2	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	1
3	PAOZZ	6210-01-351-3711	61204	83072006	.LENS,LIGHT,YELLOW .....	1
4	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	1
5	PAOOO	6220-01-315-4474	61204	3070009	LIGHT,NAVIGATIONAL ANCHOR LIGHT .....	1
6	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	1
7	PAOZZ	6220-01-186-9750	61204	83070-017	.LENS,LIGHT,WHITE .....	1
8	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	1
9	PAOOO	6220-01-189-1372	61204	33071-009	LIGHT,NAVIGATIONAL NOT UNDER COMMAND LIGHT, WHITE, 360 DEGREE .....	2
10	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	1
11	PAOZZ	6220-01-186-9750	61204	83070-017	.LENS,LIGHT,WHITE .....	1
12	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	1
13	PAOOO	6220-01-315-4475	61204	3070209	LIGHT,NAVIGATIONAL NOT UNDER COMMAND LIGHT, RED, 360 DEGREE .....	4
14	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	1
15	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	1
16	PAOZZ	6220-01-188-6961	61204	83070-019	.LENS,LIGHT,RED .....	1
					<b>END OF FIGURE</b>	





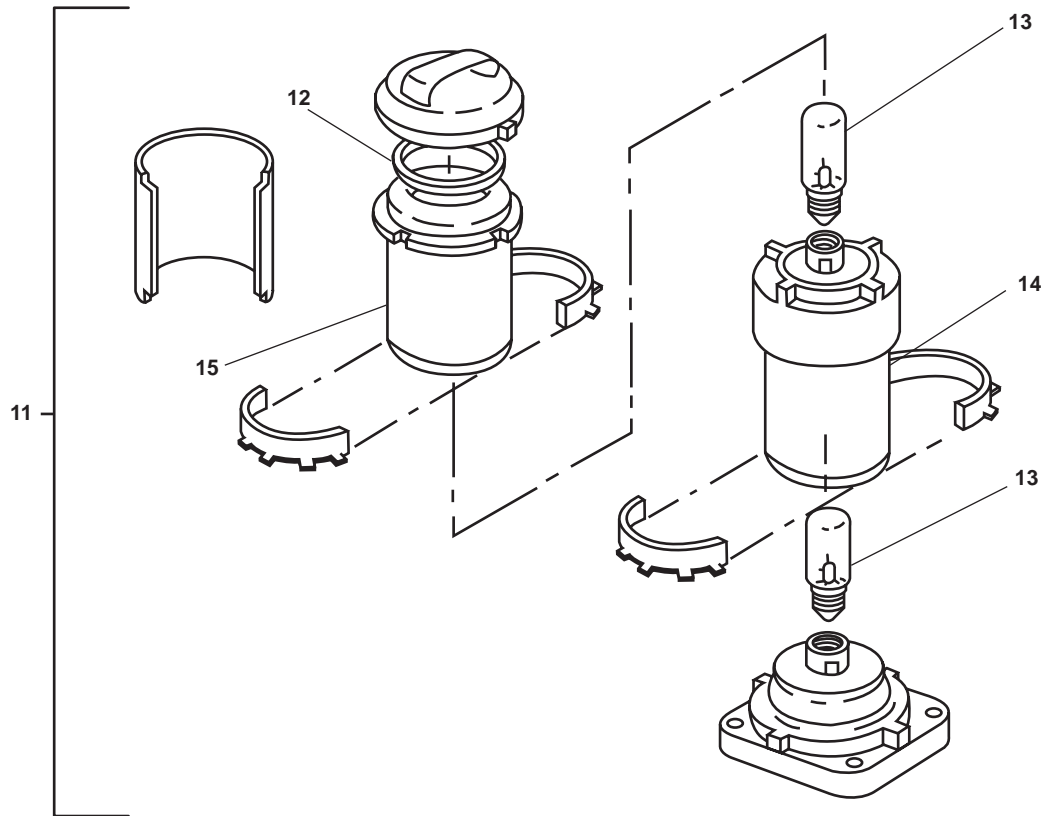
Double Navigation Light, Green

Figure 64. Marine Navigation (Running) Lights, Double (Sheet 1 of 4)



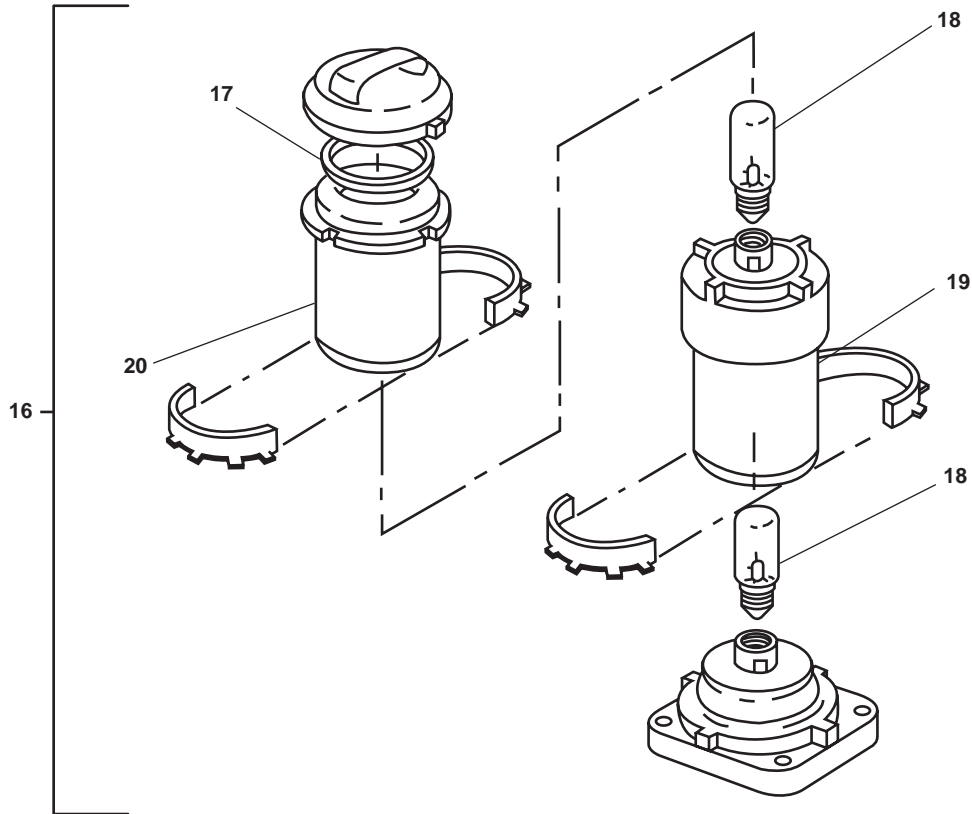
Double Navigation Light, White

Figure 64. Marine Navigation (Running) Lights, Double (Sheet 2 of 4)



Double Navigation Light, Red

Figure 64. Marine Navigation (Running) Lights, Double (Sheet 3 of 4)



Double Navigation Light, White (No Shield)

Figure 64. Marine Navigation (Running) Lights, Double (Sheet 4 of 4)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 03120202	
					FIG 64 LIGHTS, NAVIGATION, MARINE (RUNNING) DOUBLE	
1	PAOOO	6220-01-192-6308	61204	33079-109	LIGHT,NAVIGATION STBD SIDE LIGHT .....	1
2	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	2
3	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	2
4	PAOZZ	6220-01-190-5340	61204	83070018	.LENS,LIGHT,GREEN .....	1
5	PAOZZ	6220-01-189-0150	61204	83075-014	.LENS,LIGHT,GREEN .....	1
6	PAOOO	6220-01-316-9343	61204	3581009	LIGHT,NAVIGATIONAL LIGHT, MASTHEAD .....	1
7	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	2
8	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	2
9	PAOZZ	6220-01-186-9750	61204	83070-017	.LENS,LIGHT,WHITE .....	1
10	PAOZZ	6220-01-196-5189	61204	83075-013	.LENS,LIGHT,WHITE .....	1
11	PAOOO	6220-01-192-4861	61204	71300-4	LIGHT,NAVIGATIONAL PORT SIDE LIGHT .....	1
12	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	2
13	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	2
14	PAOZZ	6220-01-192-0403	61204	83075015	.LENS,LIGHT,RED .....	1
15	PAOZZ	6220-01-188-6961	61204	83070-019	.LENS,LIGHT,RED .....	1
16	PAOOO	6220-01-198-5616	61204	71500-1	LIGHT,NAVIGATION STERN LIGHT .....	1
17	PAOZZ	5330-01-313-4965	61204	95800146	.GASKET .....	2
18	PAOZZ	6240-01-315-3879	61204	90172-4	.LAMP,INCANDESCENT .....	2
19	PAOZZ	6220-01-196-5189	61204	83075-013	.LENS,LIGHT,WHITE .....	1
20	PAOZZ	6220-01-186-9750	61204	83070-017	.LENS,LIGHT,WHITE .....	1
					<b>END OF FIGURE</b>	

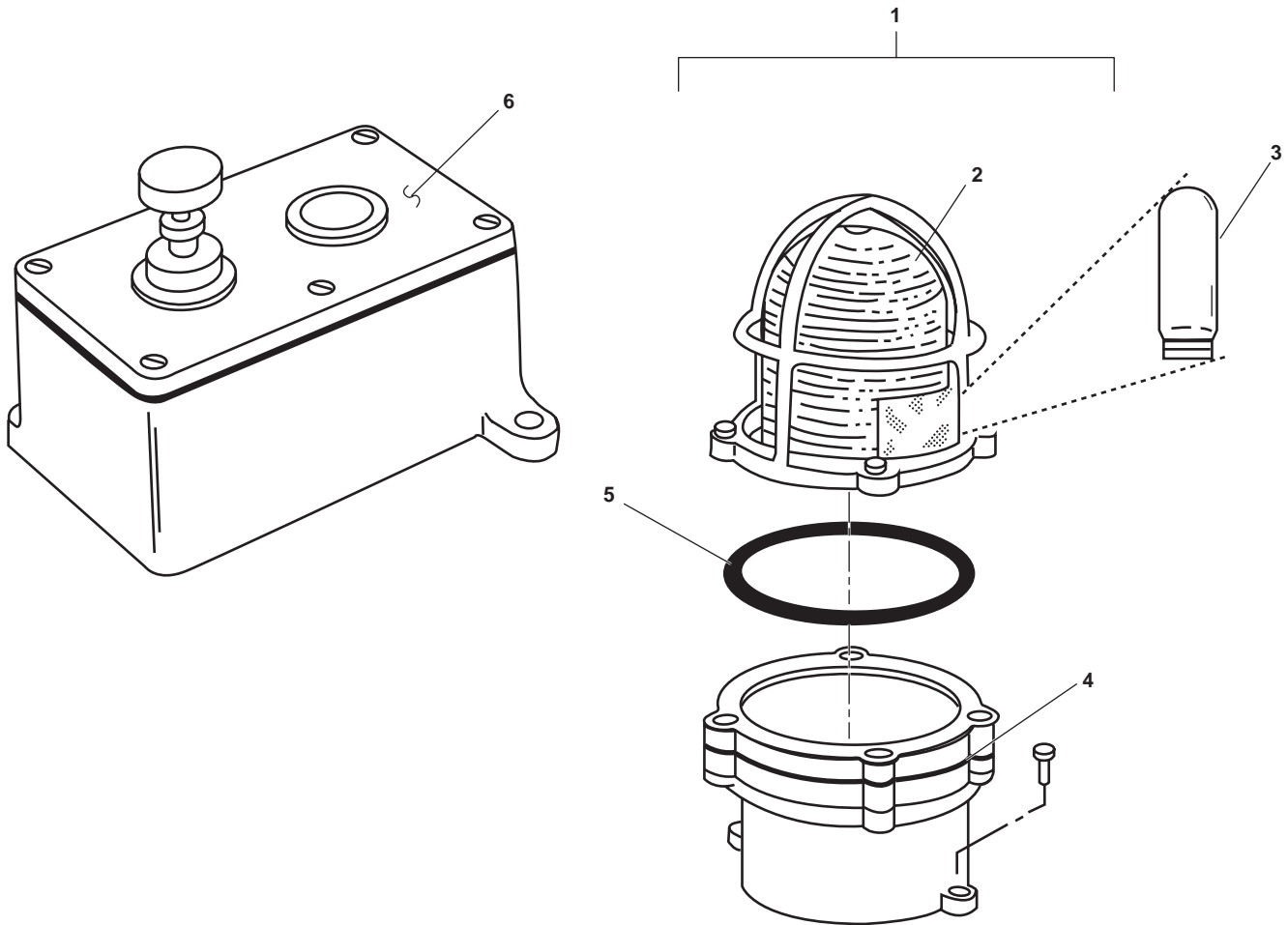


Figure 65. Yardarm Blinker Light and Key

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031203	
					FIG. 65 LIGHT, YARDARM BLINKER AND KEY	
1	PAOOO	6210-01-352-2899	95405	1159ACLRD2	FIXTURE,LIGHTING BLINKER LIGHT, TELEGRAPH .....	2
2	PAOZZ	6210-01-352-1548	95405	INX2058C	.LENS,LIGHT .....	1
3	PAOZZ	6240-01-316-4651	95405	INX3528	.LAMP,INCANDESCENT .....	1
4	PAOZZ	5330-01-350-0488	95405	GKT1048	.GASKET .....	1
5	PAOZZ	5330-01-350-0487	95405	GKT1008	.GASKET .....	1
6	PAOZZ	5805-01-196-4754	95405	810	KEY,TELEGRAPH .....	1
					<b>END OF FIGURE</b>	

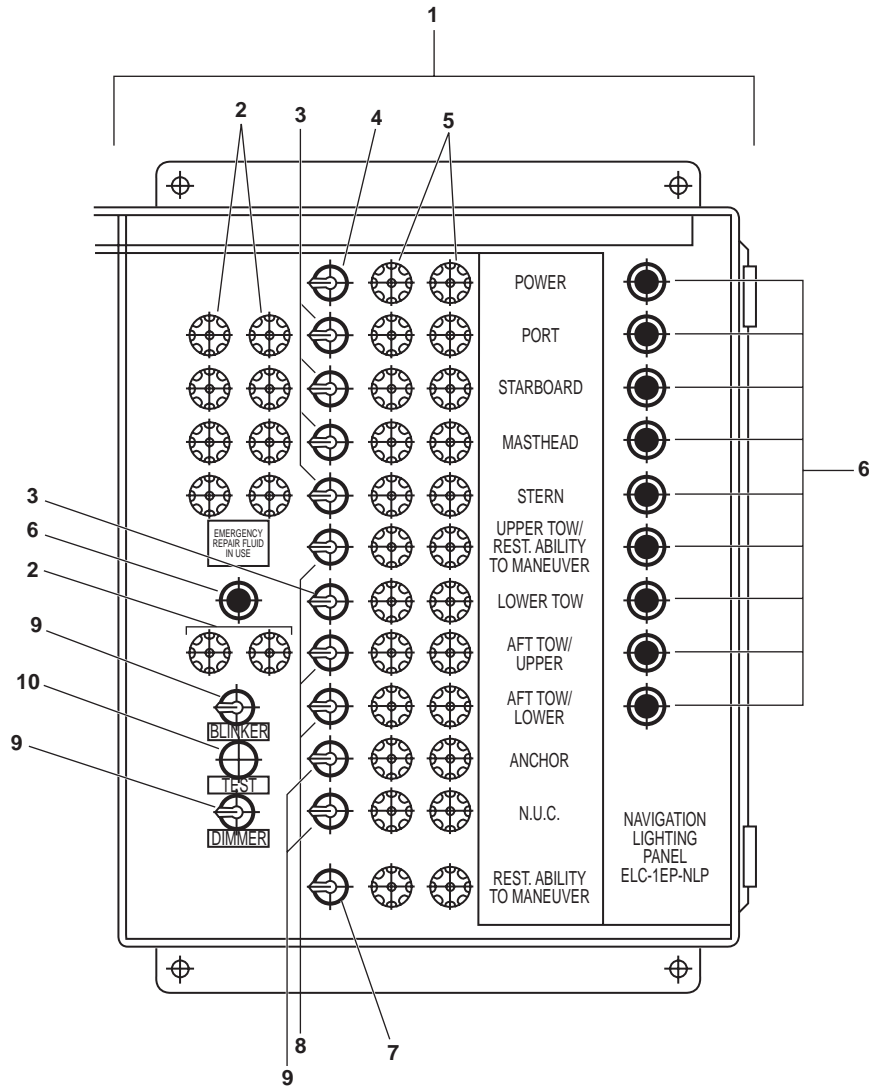


Figure 66. Navigation Lighting Panel

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 031204	
					FIG. 66 PANEL, NAVIGATION LIGHTING	
1	XDFFF		0L201	NLFM4D3S25W120UG	LIGHT PANEL, NAVIGAT NLFM4D3S3NUG120 ABK-ABS IS REPLACEMENT P/N .....	1
2	PAOZZ	5920-00-010-6652	81349	F02A250V3A	.FUSE,CARTRIDGE .....	32
3	PAFZZ	5930-00-964-0671	82634	91-0003	.SWITCH, TOGGLE .....	5
4	PAFZZ	5930-01-317-1878	82634	0121-0018	.SWITCH, TOGGLE .....	1
5	PAOZZ	5920-00-011-7142	81349	F02A125V10A	.FUSE,CARTRIDGE,10A .....	2
6	PAOZZ	6240-01-345-3264	63006	67G	.LAMP,INCANDESCENT .....	10
7	PAOZZ	5930-00-583-8494	04009	82601	.SWITCH, TOGGLE .....	1
8	PAFZZ	5930-00-702-6428	82634	90-0002	.SWITCH, TOGGLE .....	4
9	PAFZZ	5930-01-264-2883	82634	0121-0017	.SWITCH, TOGGLE .....	4
10	XDFZZ		44254	275-671	.SWITCH,PUSH .....	1
<b>END OF FIGURE</b>						



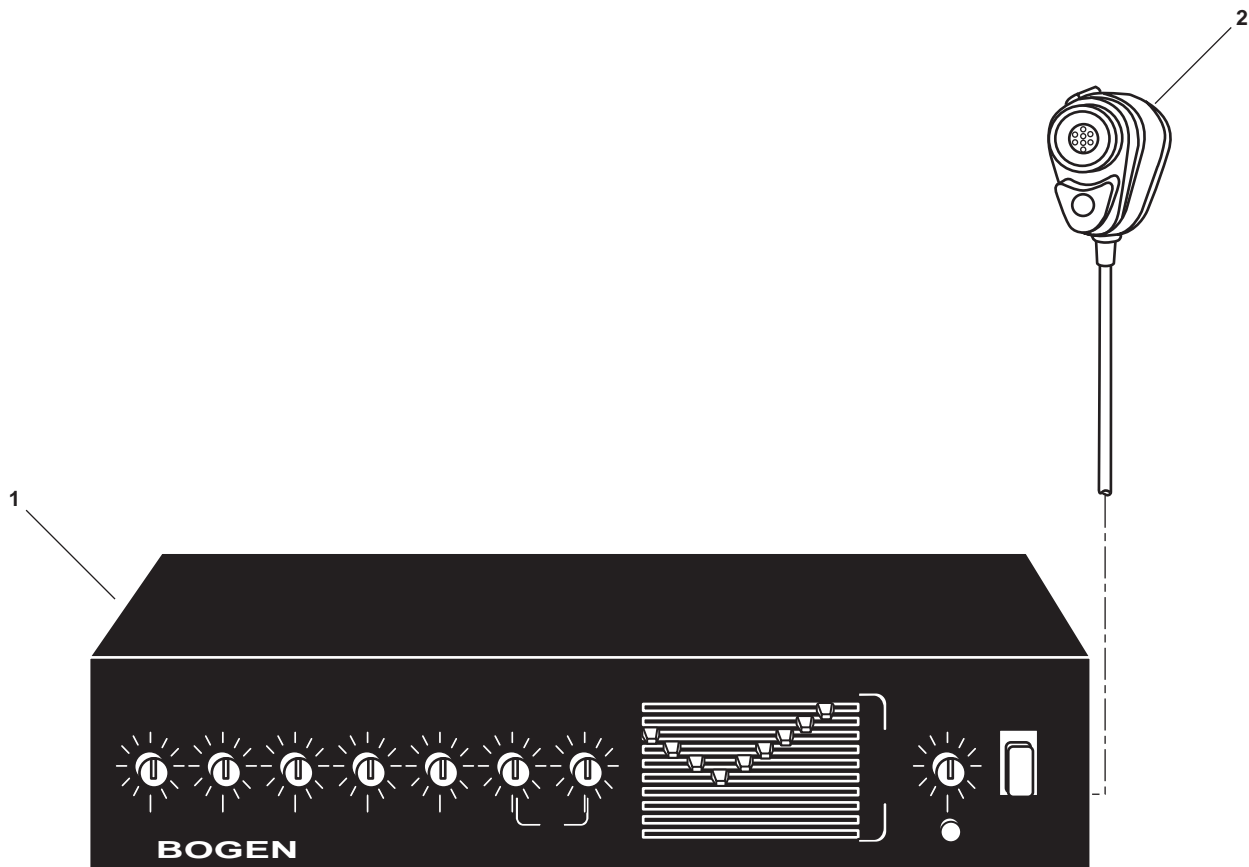


Figure 67. Interior Communications Public Announcing System (Sheet 1 of 2)

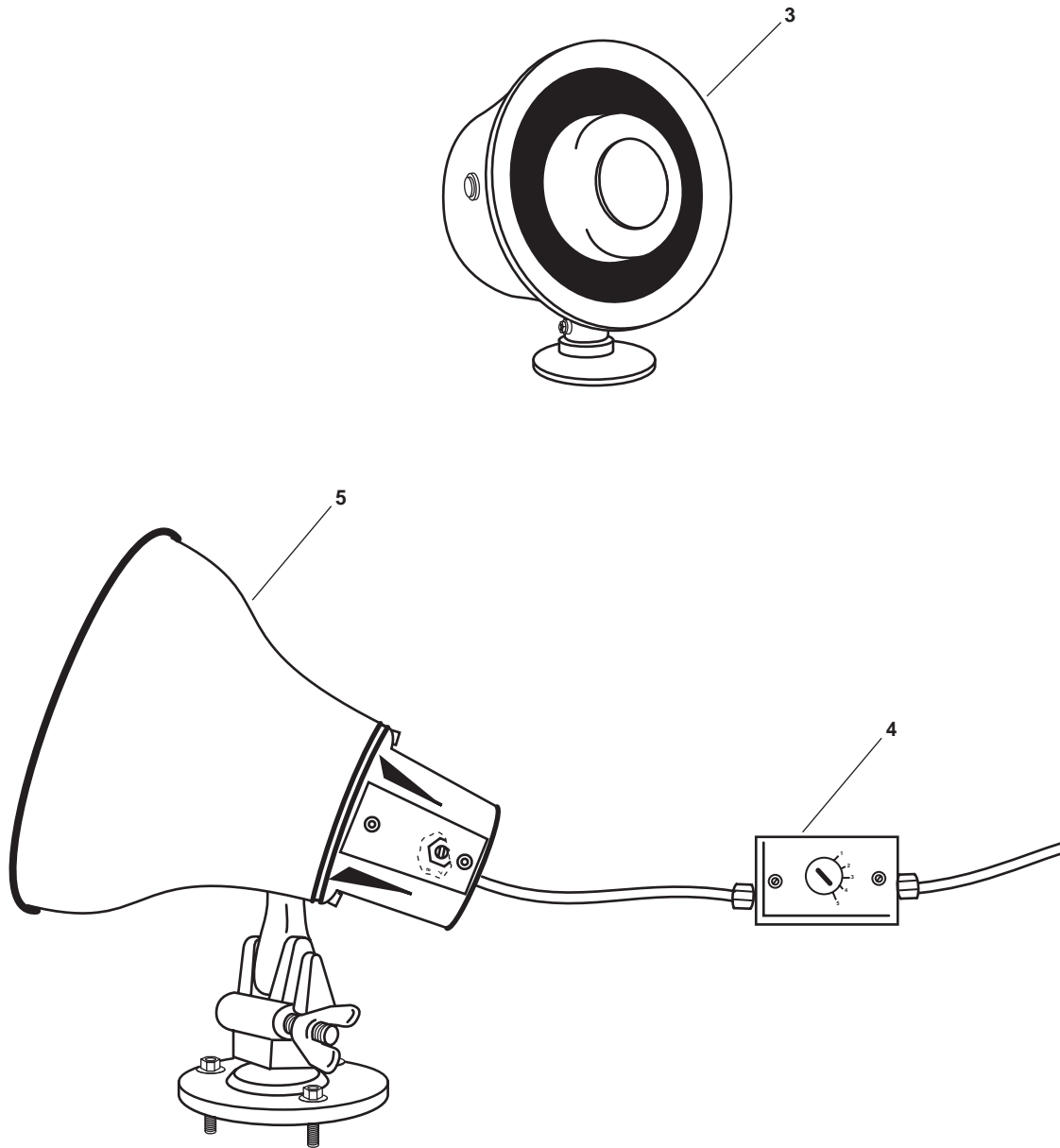


Figure 67. Interior Communications Public Announcing System (Sheet 2 of 2)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0401	
					FIG. 67 INTERIOR COMMUNICATIONS PUBLIC ANNOUNCING SYSTEM	
1	PFOZZ	5895-01-356-2994	07843	CT100C	AMPLIFIER,AUDIO FRE .....	1
2	PFOZZ	5965-00-906-1442	57230	SP-HG-003-001	MICROPHONE,MAGNETIC .....	1
3	PFOZZ	5965-01-354-2028	07843	SPT-15A	HORN,LOADSPEAKER .....	3
4	XDFZZ		70661	AT10	ATTENUATOR .....	7
5	PFOZZ	5965-01-336-9732	04655	12-1408724	LOADSPEAKER,PERMANE .....	7
					<b>END OF FIGURE</b>	

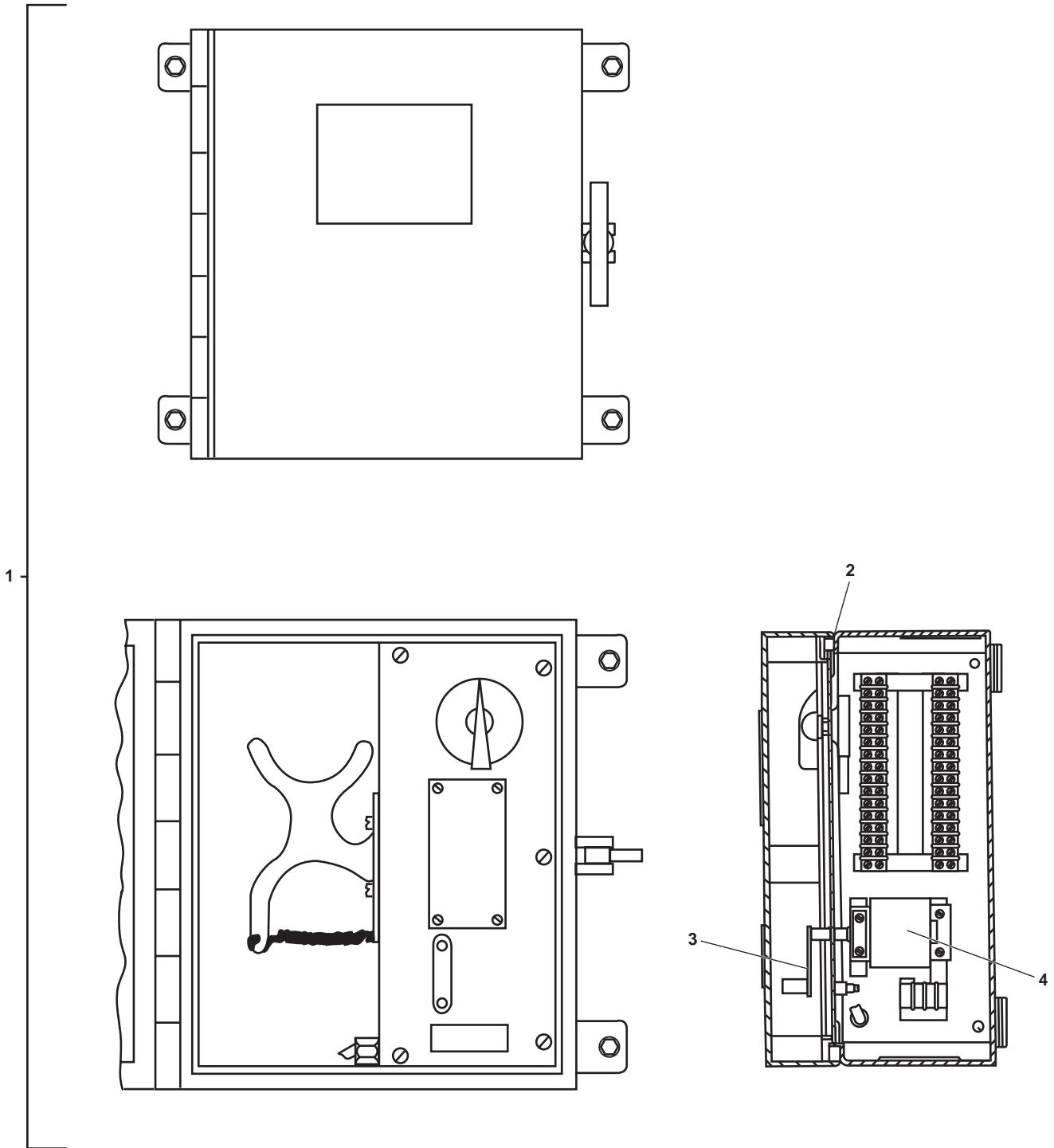


Figure 68. Sound Powered Telephones (Sheet 1 of 5)

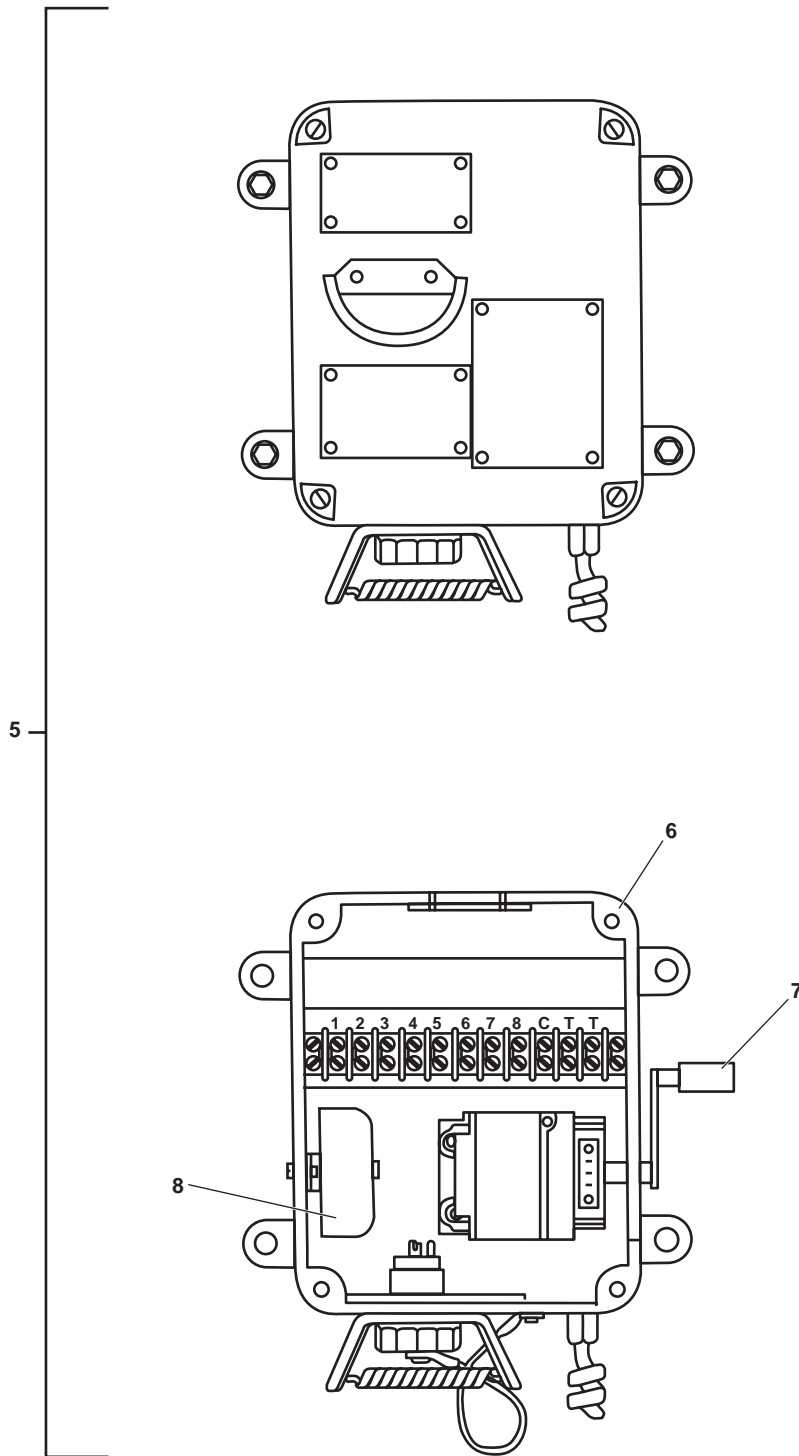


Figure 68. Sound Powered Telephones (Sheet 2 of 5)

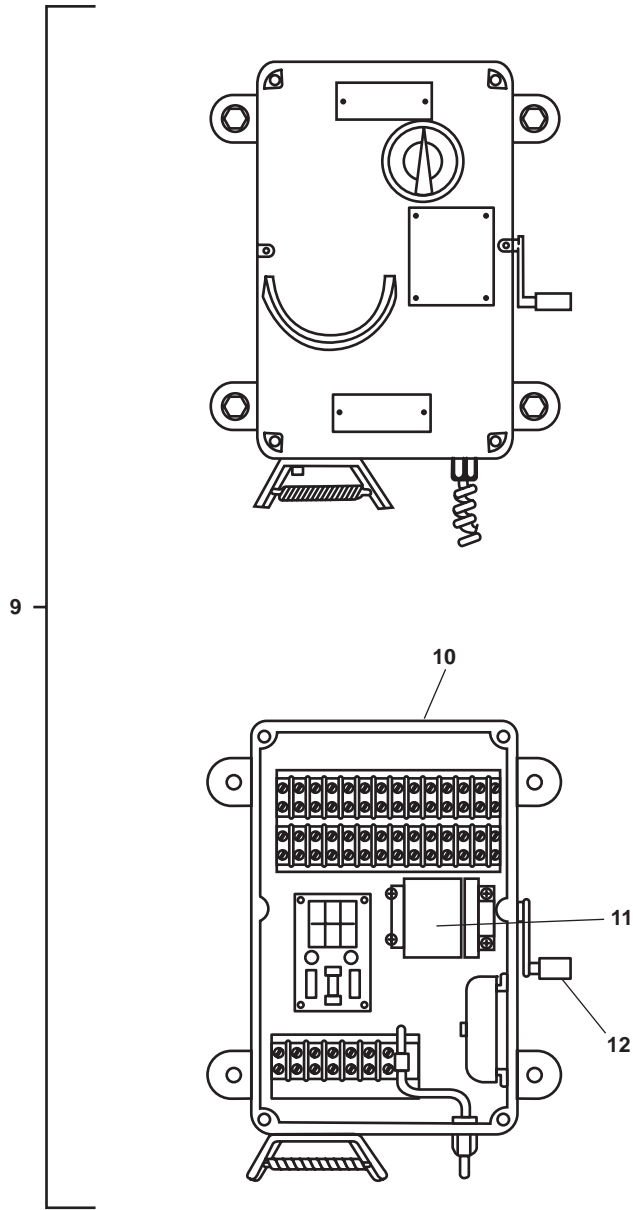


Figure 68. Sound Powered Telephones (Sheet 3 of 5)

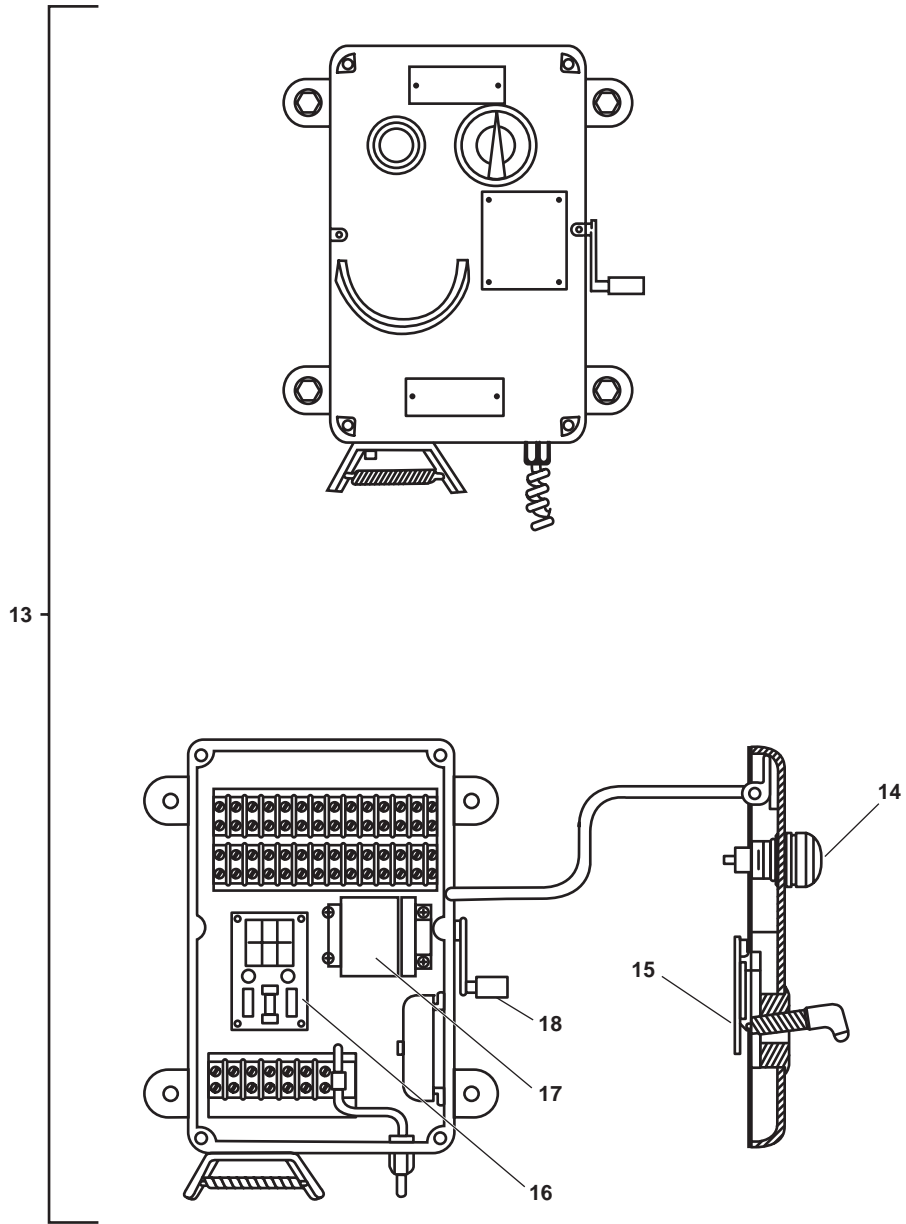


Figure 68. Sound Powered Telephones (Sheet 4 of 5)

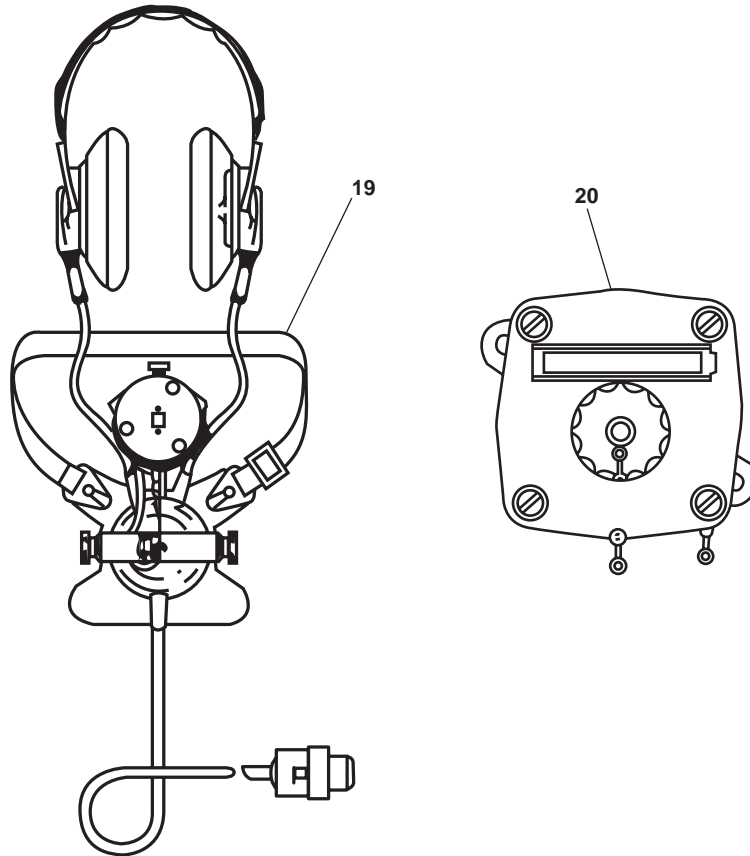


Figure 68. Sound Powered Telephones (Sheet 5 of 5)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 040101	
					FIG. 68 TELEPHONES, SOUND POWERED	
1	PAFFF	5805-01-356-7279	73274	MWT-246J	TELEPHONE SET,SP .....	8
2	PAFZZ	5330-01-308-0109	73274	19D	.GASKET .....	1
3	PFFZZ	5340-01-373-2985	73274	CAT. NO. 24-P	.HANDLE,CRANK .....	1
4	PFFZZ	5805-01-281-7002	73274	22	.GENERATOR,RINGING,H .....	1
5	PFFFF	5805-01-357-1246	73274	SW-23J	TELEPHONE SET,SP .....	1
6	PAFZZ	5330-01-274-7136	73274	50-19A	.GASKET .....	1
7	PFFZZ	5342-01-272-9841	73274	24	.HANDLE .....	1
8	PFFZZ	6350-01-280-4696	73274	26	.BELL,ELECTRICAL .....	1
9	PFFFF	5805-01-356-7281	73274	SW243J	TELEPHONE SET,SP .....	11
10	PAFZZ	5330-01-304-9505	73274	CAT. NO. 50-19B	.GASKET .....	1
11	PFFZZ	5805-01-281-7002	73274	22	.GENERATOR,RINGING,H .....	1
12	PFFZZ	5342-01-272-9841	73274	24	.HANDLE .....	1
13	PFFFF	5805-01-356-7280	73274	SWLR-243J	TELEPHONE SET,SP .....	1
14	PFFZZ	6210-01-316-4579	73274	41	.LIGHT,INDICATOR .....	1
15	PFFZZ	5930-01-286-9665	73274	85-01 ALT 2/ITEM 10	.SWITCH,HOOK .....	1
16	PFFZZ	5945-01-270-6105	73274	32A	.RELAY,ELECTROMAGNET .....	1
17	PFFZZ	5805-01-281-7002	73274	22	.GENERATOR,RINGING,H .....	1
18	PFFZZ	5342-01-272-9841	73274	24	.HANDLE .....	1
19	PFFZZ	5965-00-900-6401	81349	H-200/U	HEADSET-CHEST SET .....	17
20	PFFZZ	5935-01-267-8099	80064	G-15A	JACK BOX .....	5
					<b>END OF FIGURE</b>	

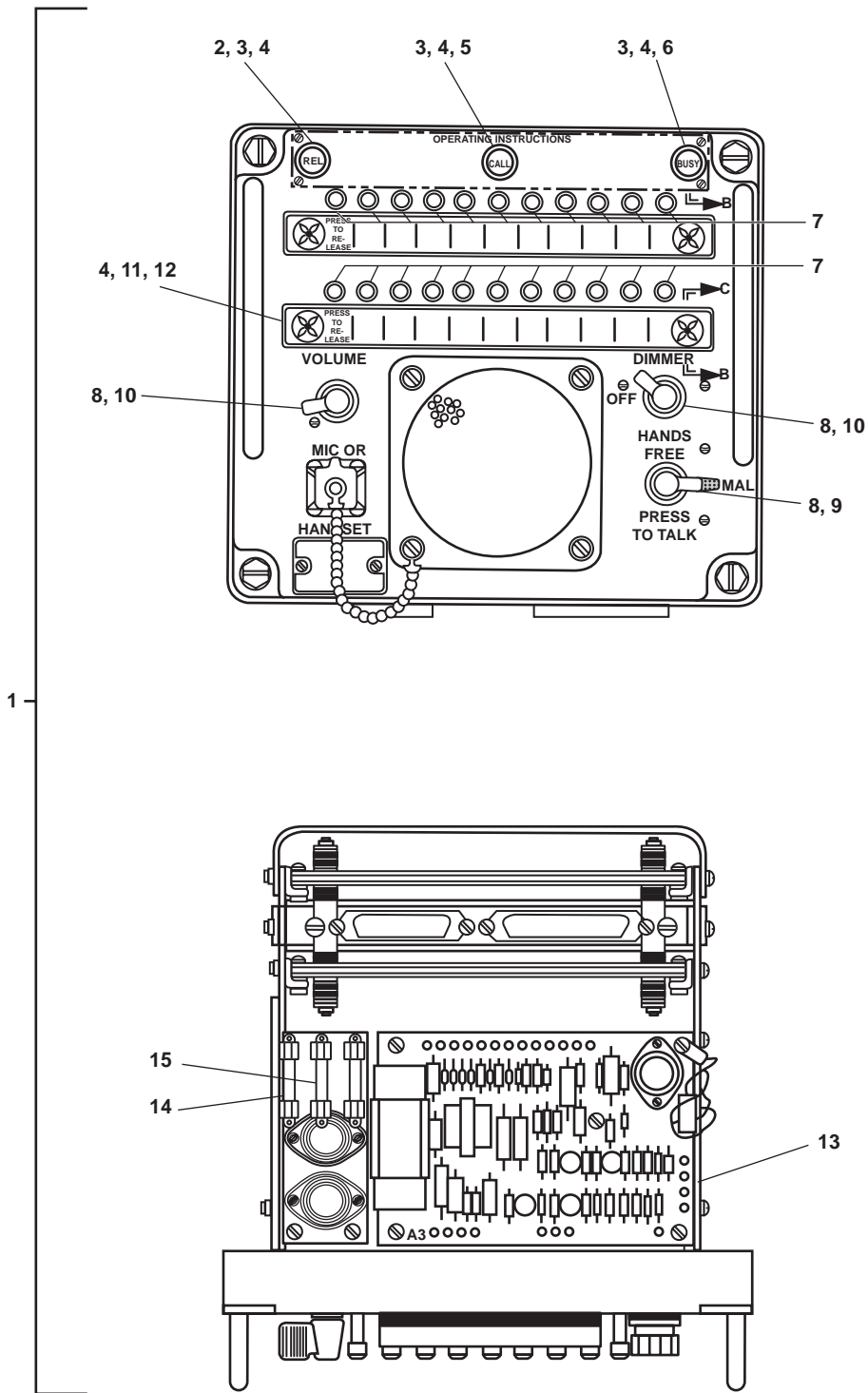


Figure 69. Intercommunication System (Sheet 1 of 3)



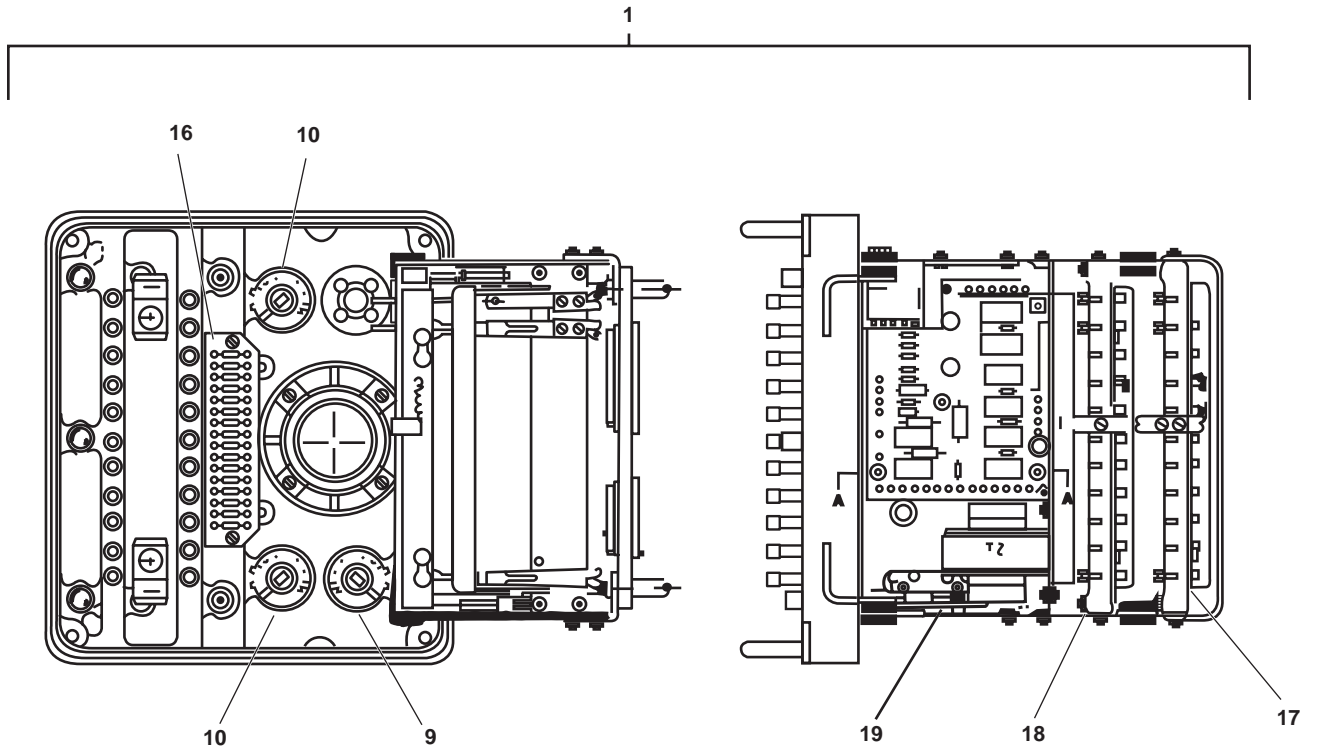


Figure 69. Intercommunication System (Sheet 2 of 3)

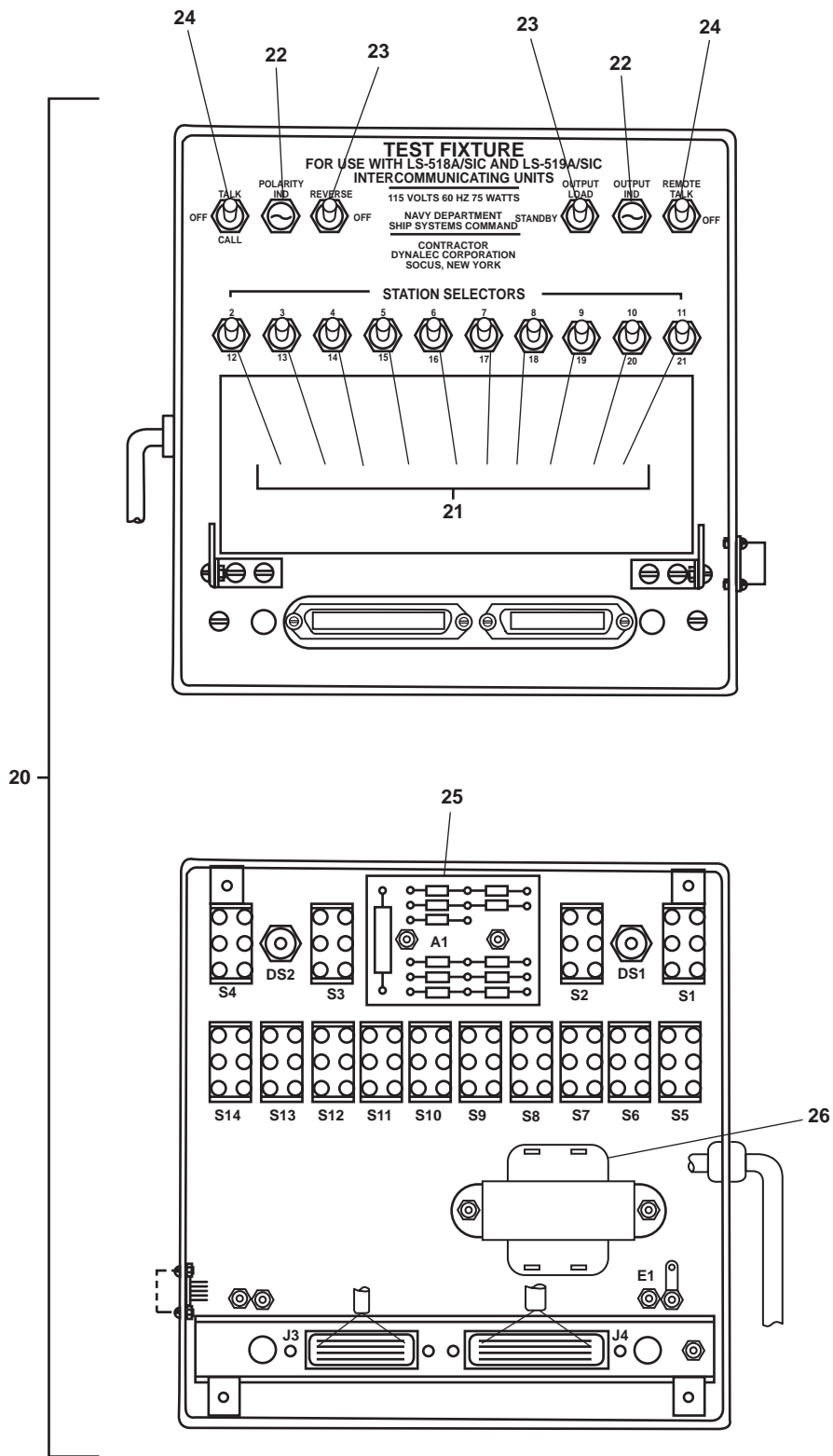


Figure 69. Intercommunication System (Sheet 3 of 3)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 040102	
					FIG 69 SYSTEM, INTERCOMMUNICATION	
1	PFFFF	5830-01-118-1287	12763	61690-000-2	INTERCOMM STATION LS-519A/SIC INTER-COMMUNICATION STATION .....	12
2	PFFZZ	6210-01-155-9403	12763	14101-014	.LENS,LIGHT .....	1
3	PAFZZ	5330-01-056-5061	12763	61691-071	.GASKET .....	3
4	PAFZZ	6420-00-851-4352	18876	10051850	.LAMP,INCANDESCENT .....	7
5	PFFZZ	6210-01-155-5947	12763	14101-015	.LENS,LIGHT .....	1
6	PFFZZ	6210-01-155-5948	12763	14101-016	.LENS,LIGHT .....	1
7	PFFZZ	5930-01-057-8272	12763	61690-102	.SWITCH,PUSH .....	22
8	PAFZZ	5330-01-126-4564	12763	61691-068	.GASKET .....	3
9	PFFZZ	5930-01-058-0867	12763	61690-101	.SWITCH,ROTARY .....	1
10	PFFZZ	5930-01-058-0866	12763	61690-103	.SWITCH,ROTARY .....	2
11	PFFZZ	6210-01-172-8364	12763	14101-017	.LENS,LIGHT .....	4
12	PAFZZ	5330-01-125-6277	12763	61690-076	.GASKET .....	4
13	PFFZZ	5998-01-140-9311	12763	61690-099	.CIRCUIT CARD ASSEMB .....	1
14	PAFZZ	5920-00-280-5038	81349	F03B250V1/2AS	.FUSE,CARTRIDGE .....	3
15	PAFZZ	5920-00-280-3537	81349	F03A250V1AS	.FUSE,CARTRIDGE .....	1
16	PFFZZ	5998-01-162-7255	12763	61690-092	.CIRCUIT CARD,ASSEMB .....	1
17	PFFZZ	5930-01-356-4010	12763	61690-119	.SWITCH,ROTARY .....	1
18	PAFZZ	5930-01-356-4009	12763	61690-161	.SWITCH,ROTARY .....	1
19	PFFZZ	5940-01-154-5353	12763	61690-081	.TERMINAL BOARD .....	1
20	PFFFF	6625-01-126-4886	12763	61690-090	TEST FIXTURE .....	3
21	PFFZZ	5930-00-615-7882	96906	MS35059-27	.SWITCH,TOGGLE .....	10
22	PAFZZ	6240-00-892-4420	62607	C7A	.LAMP,GLOW .....	2
23	PFFZZ	5930-00-615-7897	96906	MS35059-31	.SWITCH,TOGGLE .....	2
24	PFFZZ	5930-00-615-9376	96906	MS35059-21	.SWITCH,TOGGLE .....	2
25	PFFZZ	5998-01-356-8058	12763	61690-086	.CIRCUIT CARD ASSEMB .....	1
26	PFFZZ	5950-01-357-0929	12763	61690-104	.TRANSFORMER,POWER .....	1
					<b>END OF FIGURE</b>	



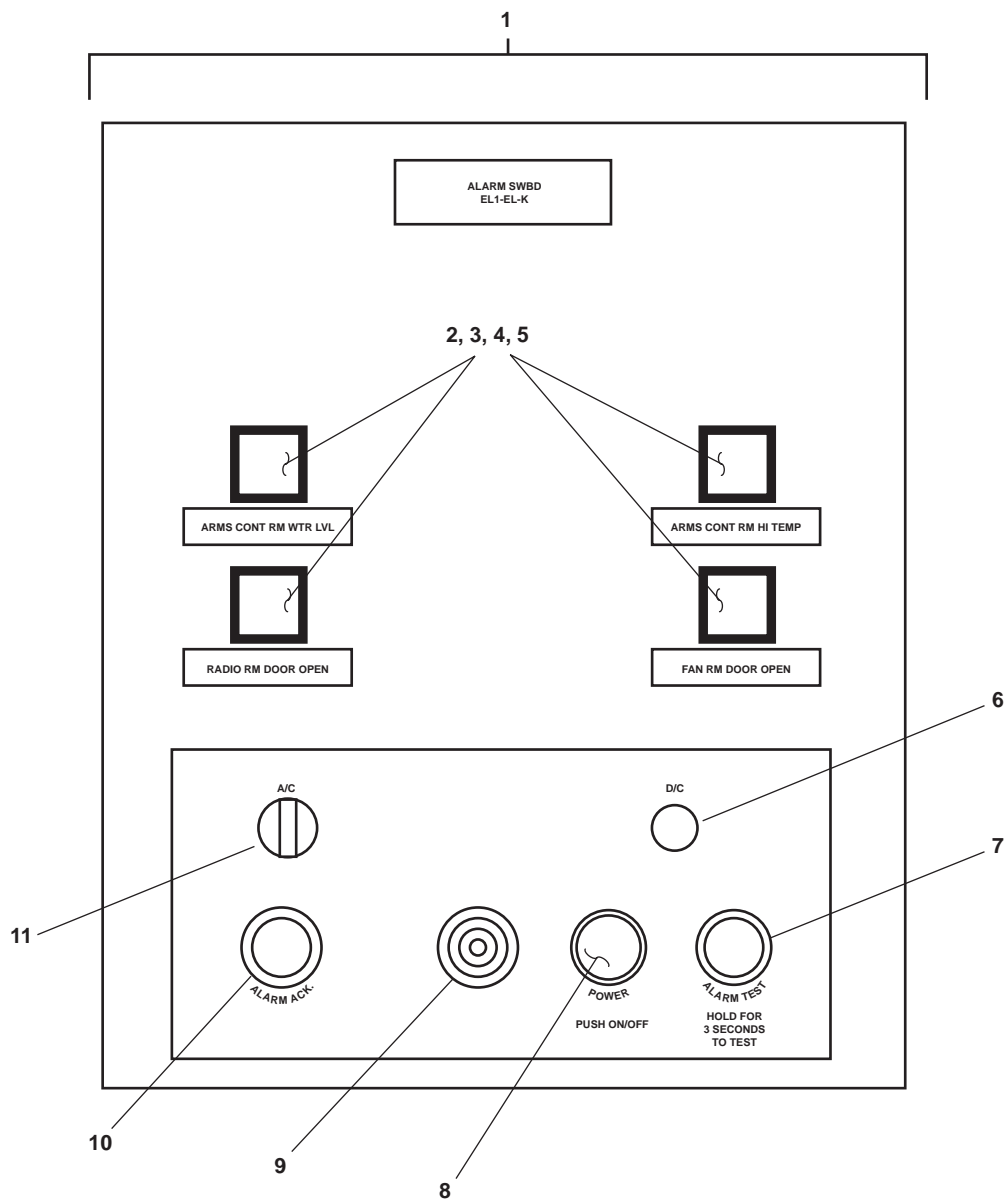
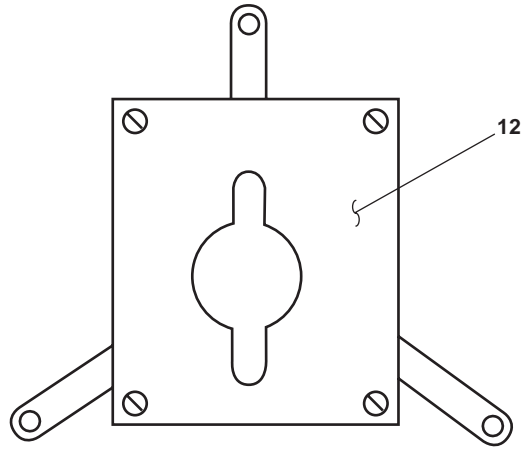
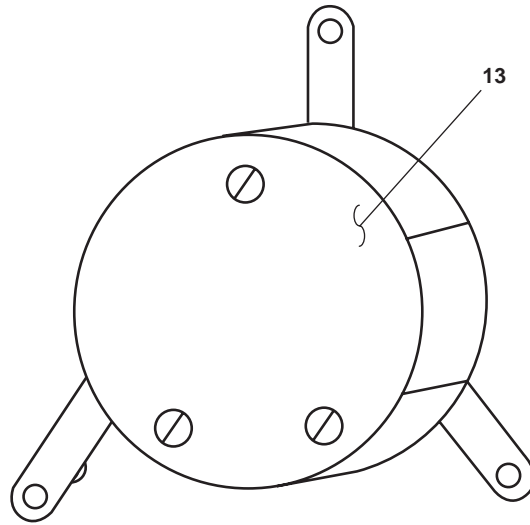


Figure 70. Arms Storage and Radio Room Alarm System (Sheet 1 of 4)

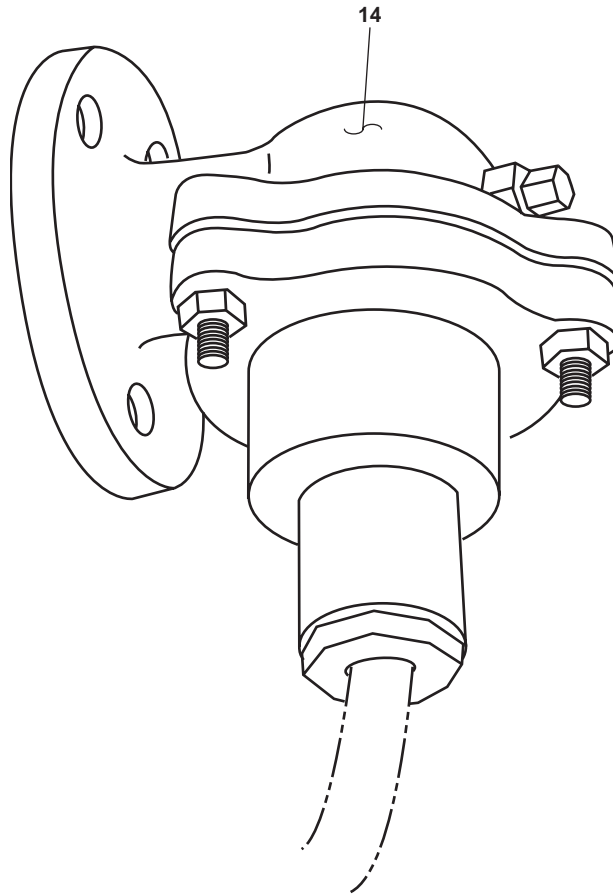


Rotary Snap Switch Assembly, Main Deck Fan Room and Radio Room



Door Alarm Switch Assembly, Radio Room

Figure 70. Arms Storage and Radio Room Alarm System (Sheet 2 of 4)



Magazine Sprinkler Water Switch Assembly

Figure 70. Arms Storage and Radio Room Alarm System (Sheet 3 of 4)

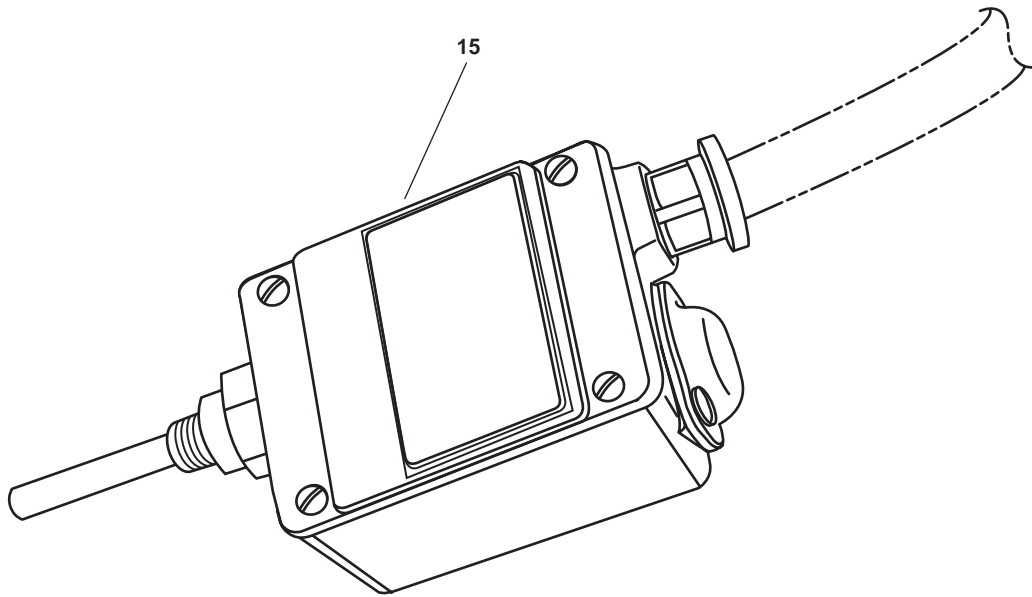


Figure 70. Arms Storage and Radio Room Alarm System (Sheet 4 of 4)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0402	
					FIG. 70 ALARM SYSTEM, ARMS STORAGE AND RADIO ROOM	
1	PFOOO	6320-01-443-4972	63544	9999-41100	PANEL,ALARM,SHIPBD .....	1
2	PAOZZ	6210-01-271-6226	63544	2450-00001	.LIGHT,INDICATOR .....	4
3	PAOZZ	6210-01-324-9962	63544	2450-00063R	.LENS,LIGHT .....	4
4	PAOZZ	6240-01-443-7154	63544	41100 ITEM 25	.LAMP,INCANDESCENT .....	4
5	PAOZZ	6250-01-443-7162	63544	41100 ITEM 27	.LAMPHOLDER .....	4
6	PAOZZ	5920-00-010-6652	81349	F02A250V3A	.FUSE,CARTRIDGE .....	1
7	PAOZZ	5930-01-444-5813	63544	DWG NO. 41100 ITEM 6	.SWITCH,PUSH .....	1
8	PAOZZ	5930-01-321-7115	63544	5100-00029G	.PUSH BUTTON .....	1
9	PAOZZ	5999-01-271-6213	63544	1300-00012	.SONALERT .....	1
10	PAOZZ	5930-01-321-7114	63544	5100-00029R	.PUSH BUTTON .....	1
11	PAOZZ	5920-01-444-5814	63544	DWG NO. 41100 ITEM 10	.FUSE,CARTRIDGE .....	1
12	PAOZZ	5930-01-279-6819	81349	1SR2C4A-2	SWITCH,ROTARY .....	1
13	PAOZZ	5930-00-259-8890	80064	9000S6202-74052	SWITCH,ROTARY DOOR ALARM SWITCH, FAN ROOM .....	1
14	PAOZZ	5930-00-033-6729	81349	IC/W	WATER SWITCH .....	1
15	PAOZZ	5930-00-270-4984	89326	ML1HH203	SWITCH,THERMOSTATIC .....	1
					<b>END OF FIGURE</b>	



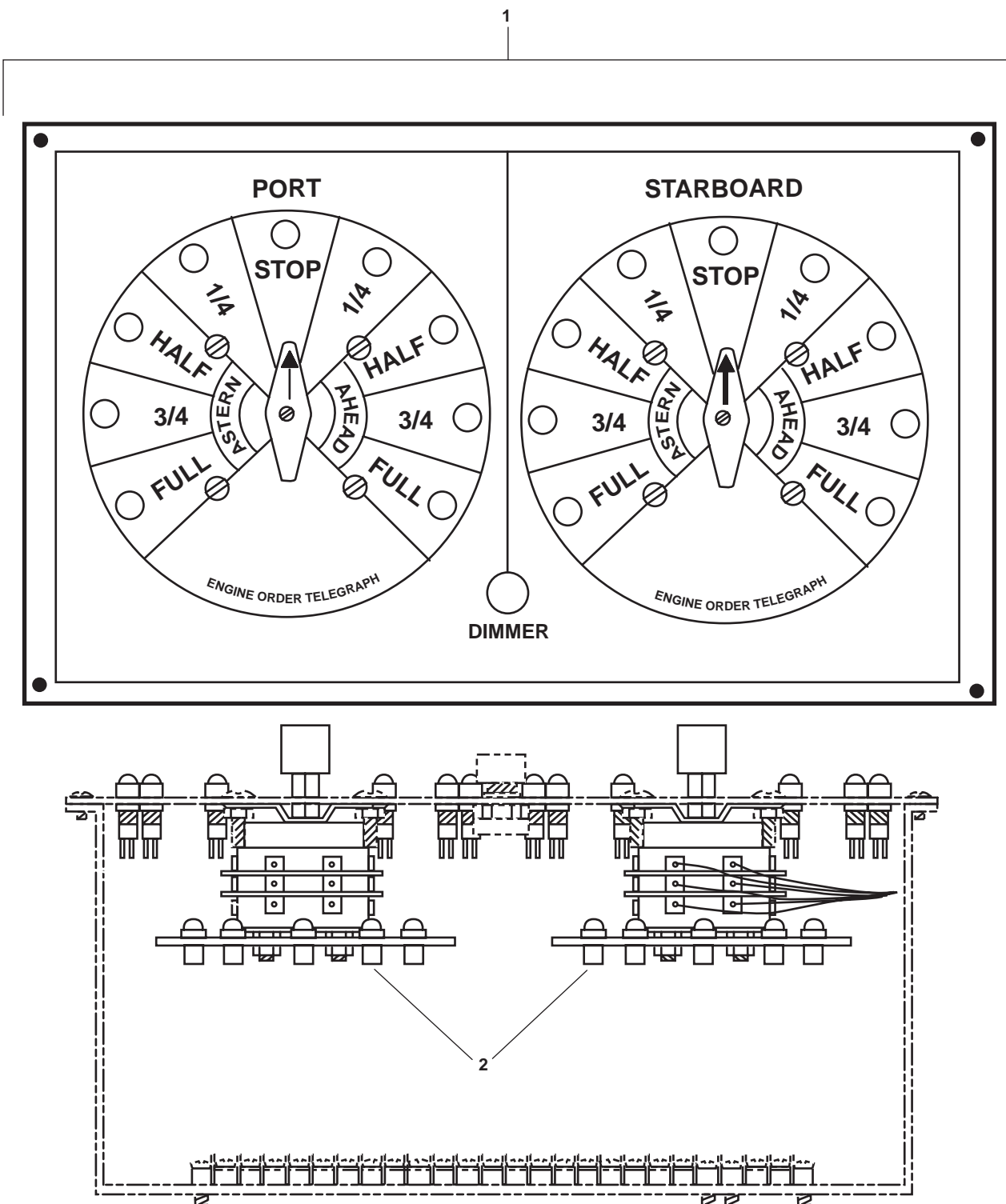


Figure 71. Engine Order Telegraph (Sheet 1 of 2)

3

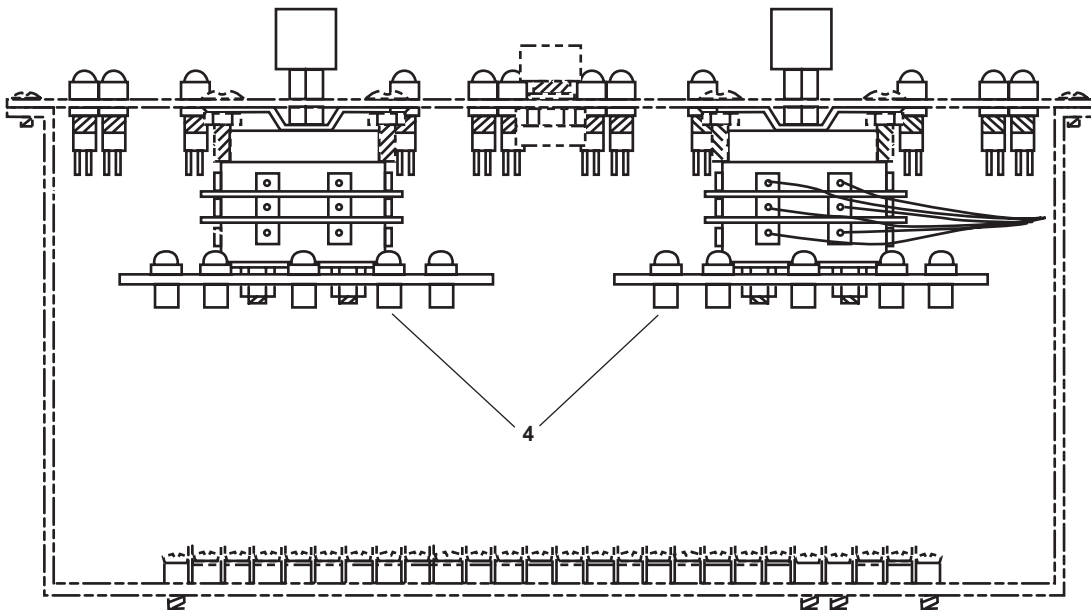
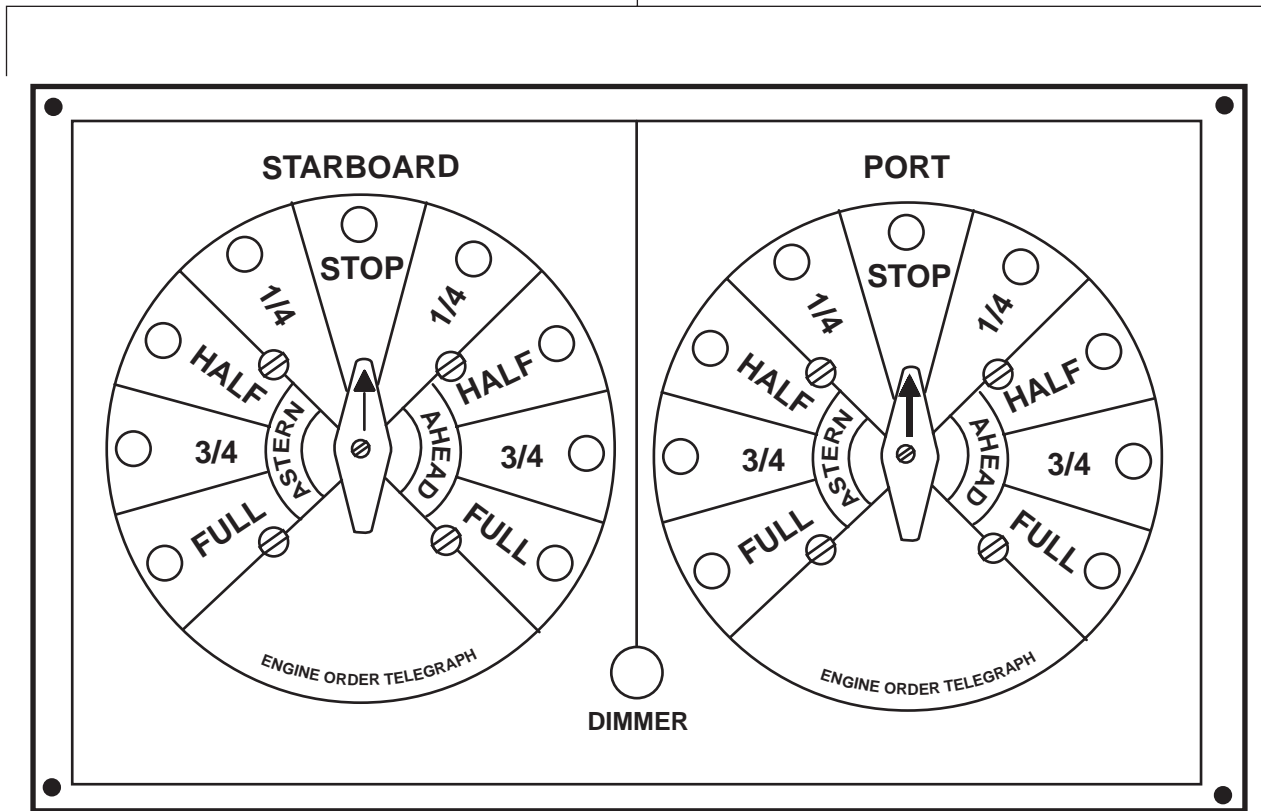


Figure 71. Engine Order Telegraph (Sheet 2 of 2)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0403	
					FIG 71 ENGINE ORDER TELEGRAPH (EOT)	
1	PFFZZ	5895-01-357-0835	0F6M5	301874-2	PANEL,INDICATOR .....	1
2	PFFZZ	5930-01-395-2509	0F6M5	301874-3	.SWITCH,ROTARY .....	2
3	PFFZZ	5895-01-357-0834	0F6M5	301873-2	PANEL,INDICATOR .....	1
4	PFFZZ	5930-01-395-2509	0F6M5	301874-3	.SWITCH,ROTARY .....	2
					<b>END OF FIGURE</b>	

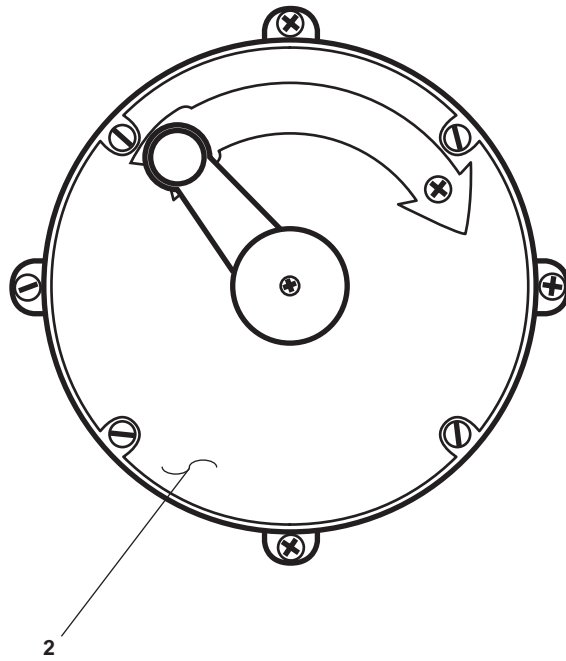
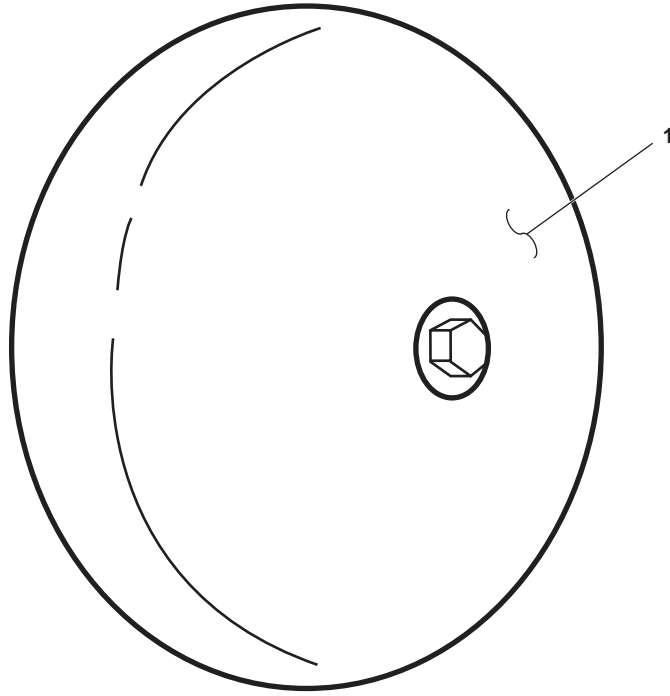


Figure 72. General Alarm System

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0404	
					FIG. 72 ALARM SYSTEM, GENERAL	
1	PAOZZ	6350-01-438-7198	73274	96UD8S-024	BELL,ELECTRICAL .....	12
2	PAOZZ	5930-01-315-8942	73274	6916	SWITCH,ROTARY .....	2
					<b>END OF FIGURE</b>	

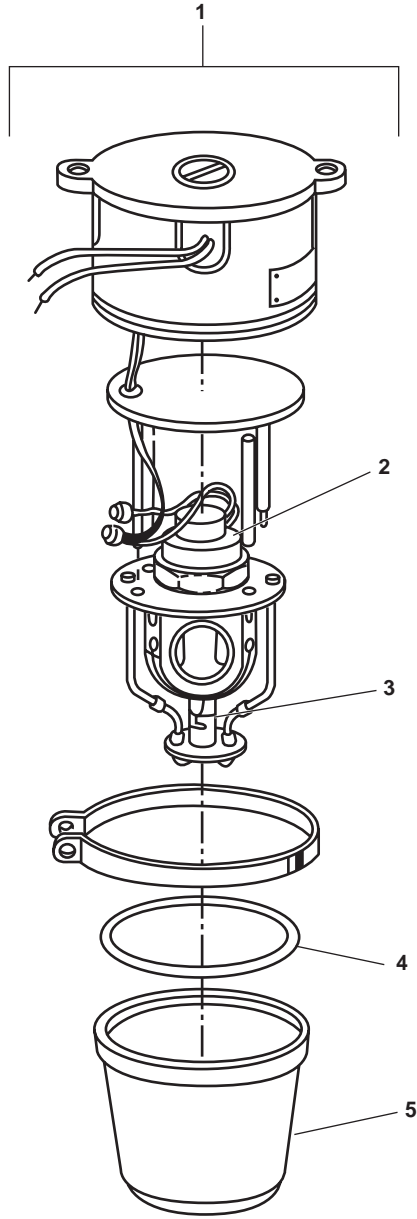
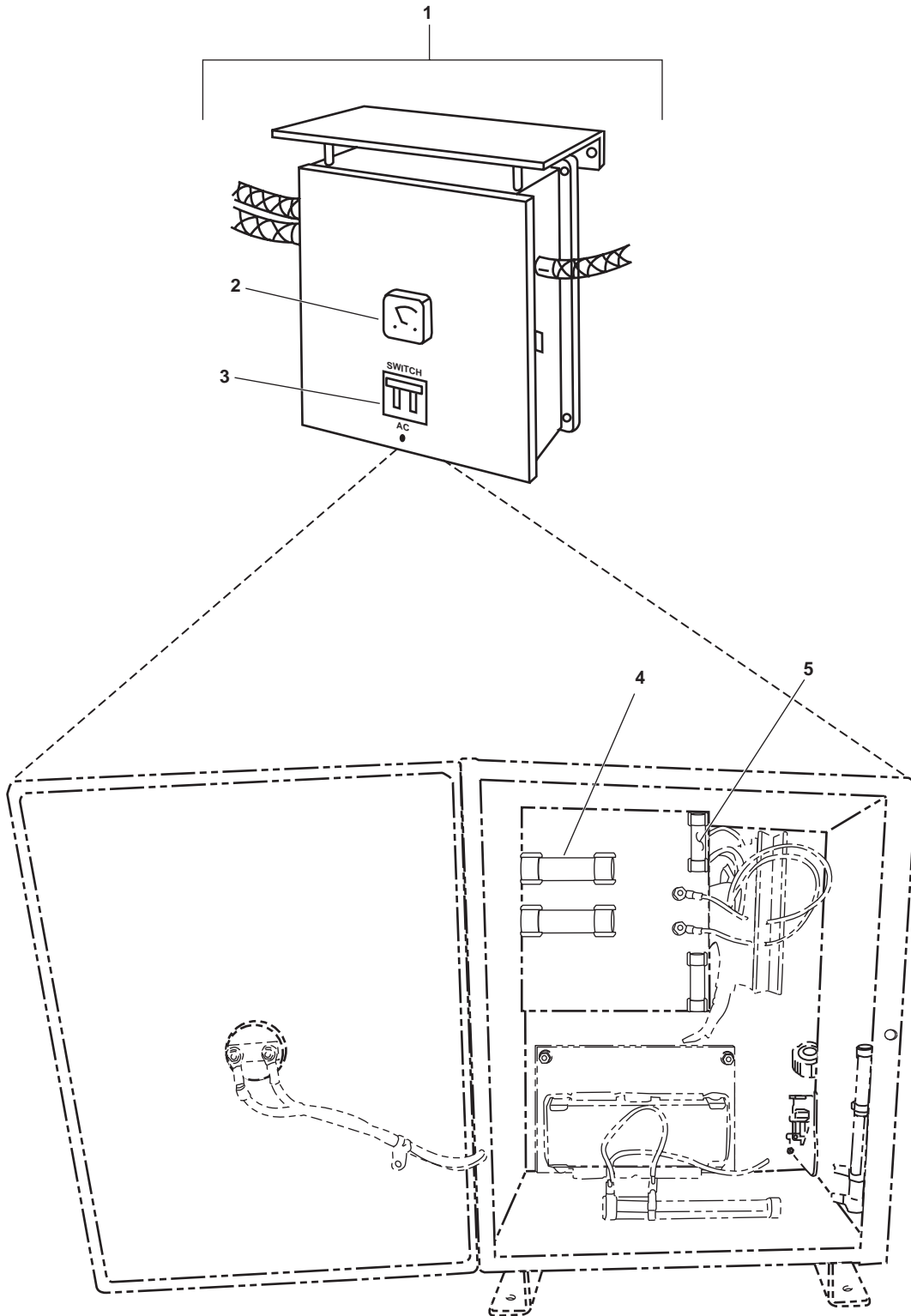


Figure 73. Rotating Beacon



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 040401	
					FIG. 73 BEACON, ROTATING	
1	PFOOO	6210-01-245-8723	73274	RB-WT	LIGHT,BEACON .....	3
2	PFOZZ	6105-01-142-3764	73274	6151	.MOTOR,DIRECT CURREN .....	1
3	PAOZZ	6240-00-155-7923	62607	312	.LAMP,INCANDESCENT .....	1
4	PAOZZ	5330-01-115-9499	73274	6230	.GASKET .....	1
5	PFOZZ	6220-01-142-8449	73274	6221	.LENS,LIGHT .....	1
					<b>END OF FIGURE</b>	



LaMarche 30 Amp Battery Charger

Figure 74. Battery Charger

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 040402	
					FIG 74 CHARGER, BATTERY	
1	PFOOO	6130-01-350-2120	92731	A41-30-24V-A1	CHARGER,BATTERY .....	1
2	PAOZZ	6625-01-129-0015	92731	P1DA-E50-A1S	.AMMETER .....	1
3	PFOZZ	5920-01-081-0012	92731	S2C-47A-A14	.ARRESTER,ELECTRICAL .....	1
4	PAOZZ	5920-01-458-9148	81349	F15BR250V30A	.FUSE,CARTRIDGE .....	2
5	PAOZZ	5920-01-149-9738	92731	P8-C2-B50	.FUSE,CARTRIDGE .....	2
					<b>END OF FIGURE</b>	

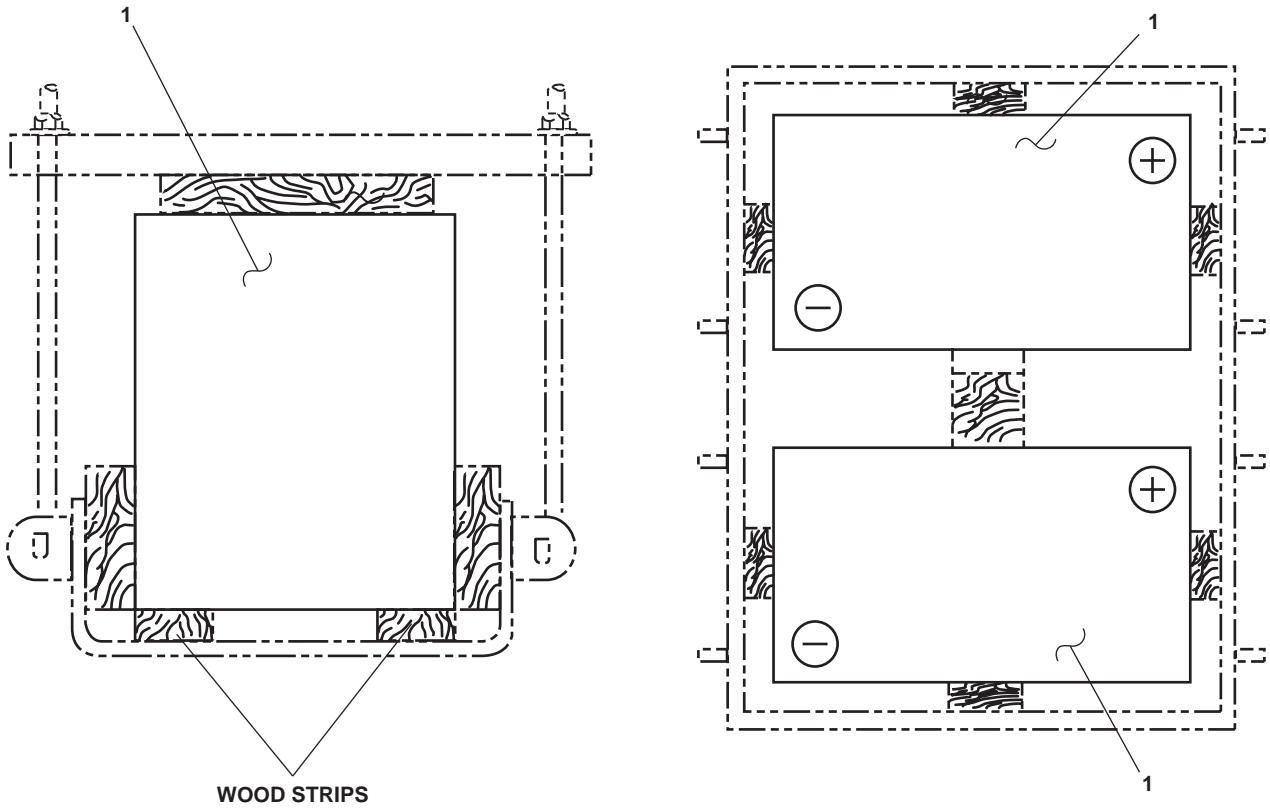


Figure 75. Battery Bank

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
1	PAOZZ	6140-01-446-9498	19207	6TMF/TYPEI	GROUP 040403 FIG. 75 BANK, BATTERY BATTERY,STORAGE ..... 2 END OF FIGURE	

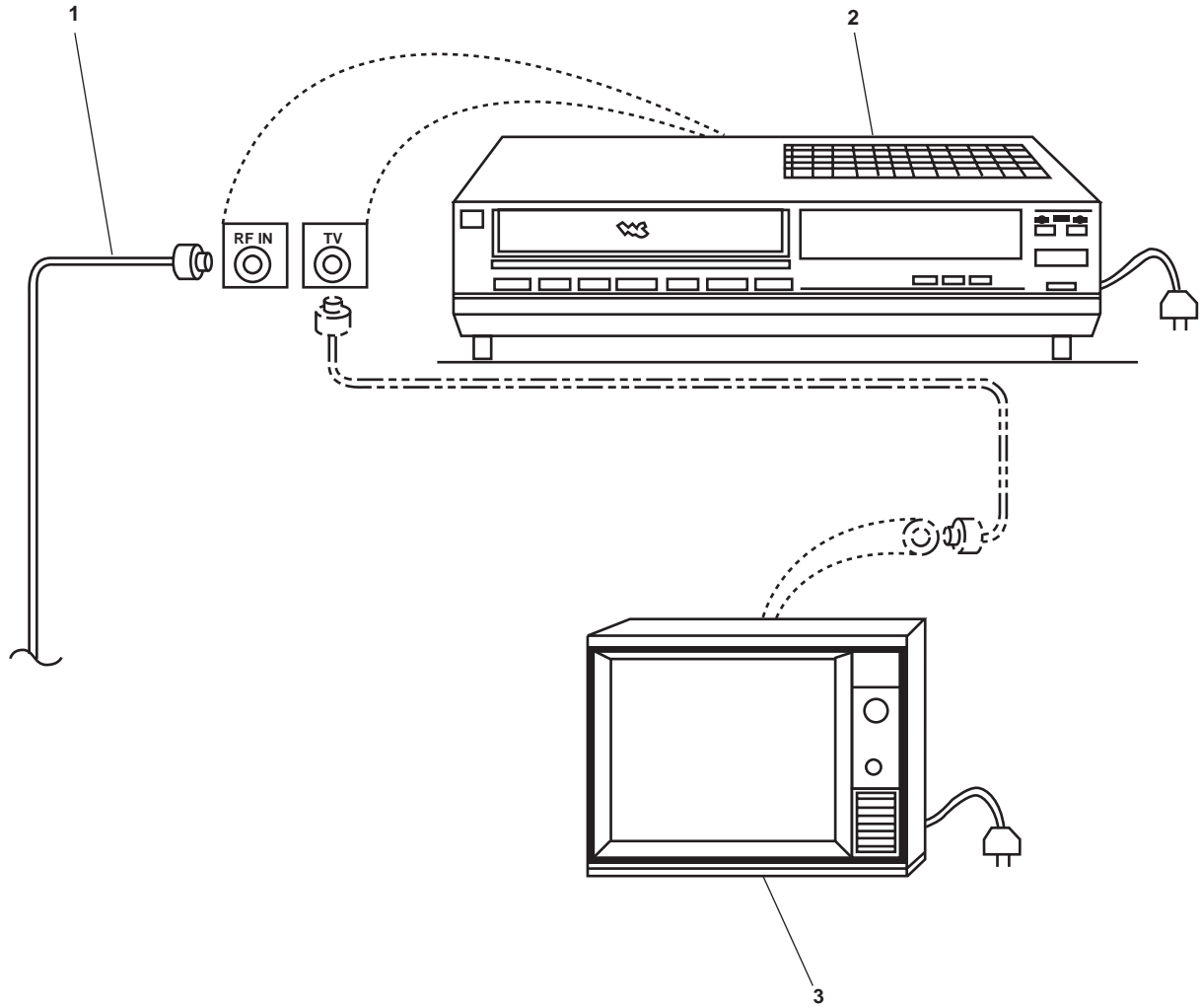


Figure 76. Entertainment System

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0405	
					FIG 76 SYSTEM, ENTERTAINMENT	
1	PFOZZ	6145-01-383-2464	81349	M17/184-00001	CABLE,RADIO FREQUEN COAXIAL CABLE, RG-59 LOW SMOKE .....	V
2	XDOZZ		0BDN7	VCA960U	VCR,4-HEAD,HIFI .....	1
3	XDOZZ		0BDN7	20R-S100	TELEVISION,COLOR,20.....	1
					<b>END OF FIGURE</b>	





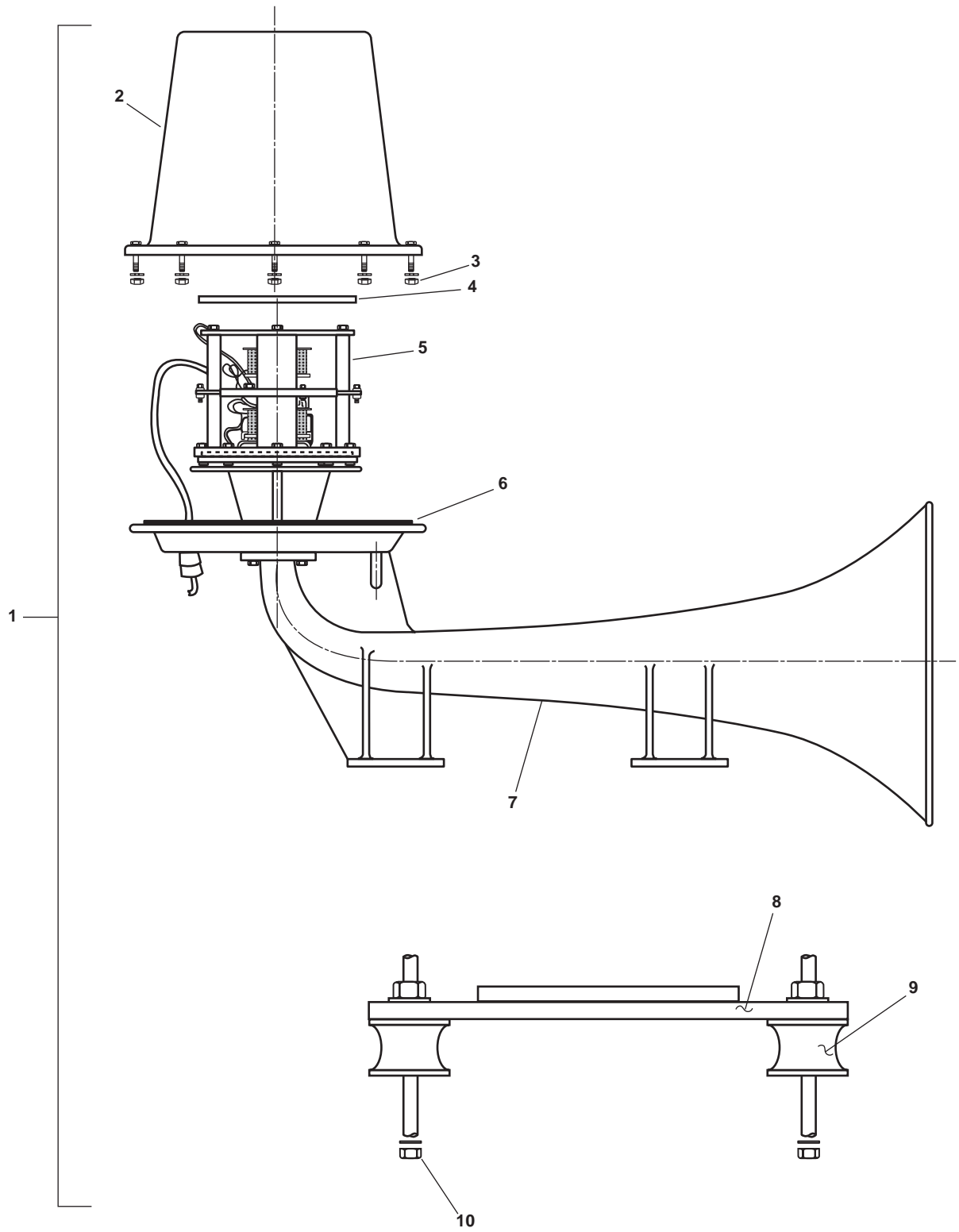


Figure 77. Signal Horn (Sheet 1 of 4)

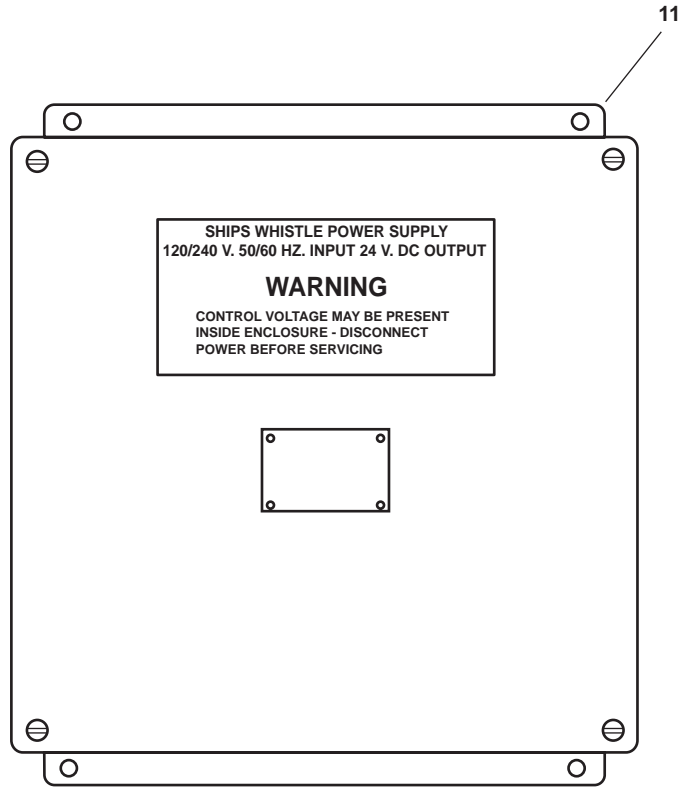


Figure 77. Signal Horn (Sheet 2 of 4)

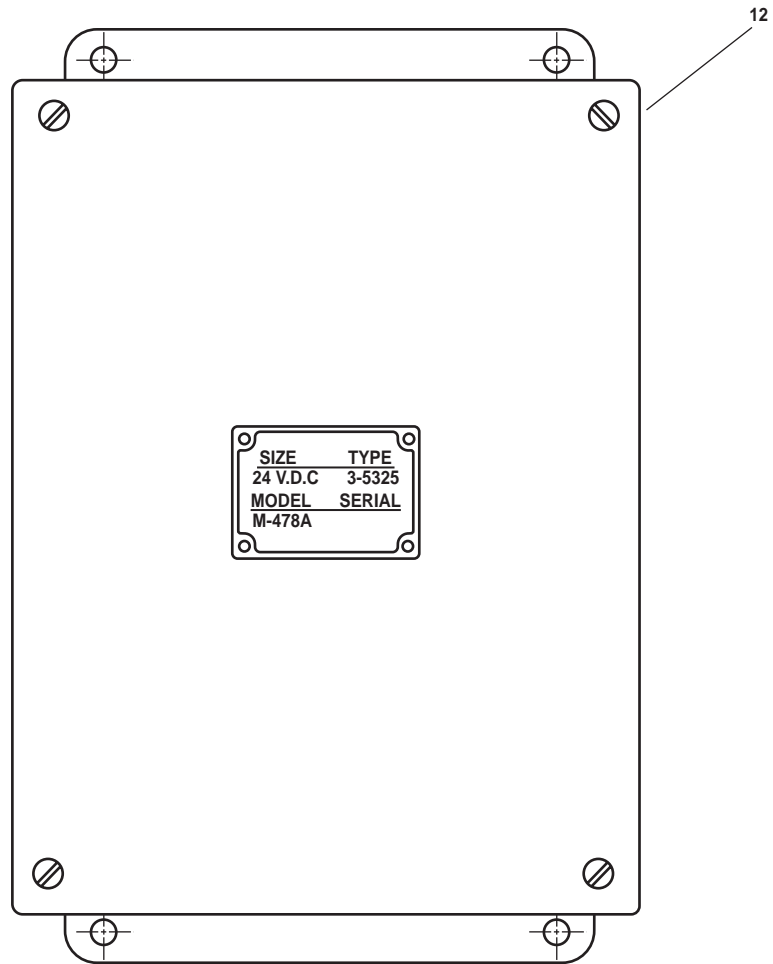


Figure 77. Signal Horn (Sheet 3 of 4)

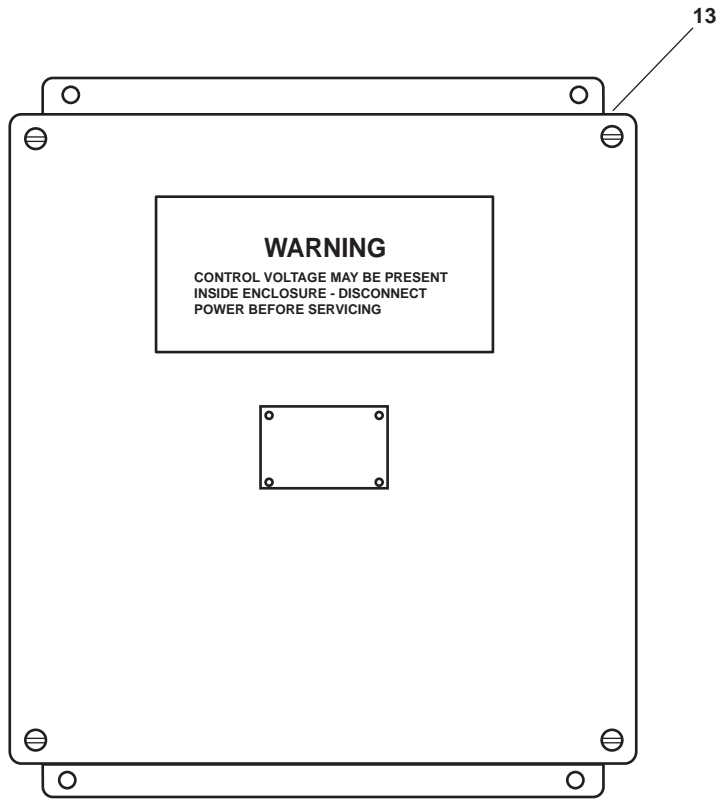
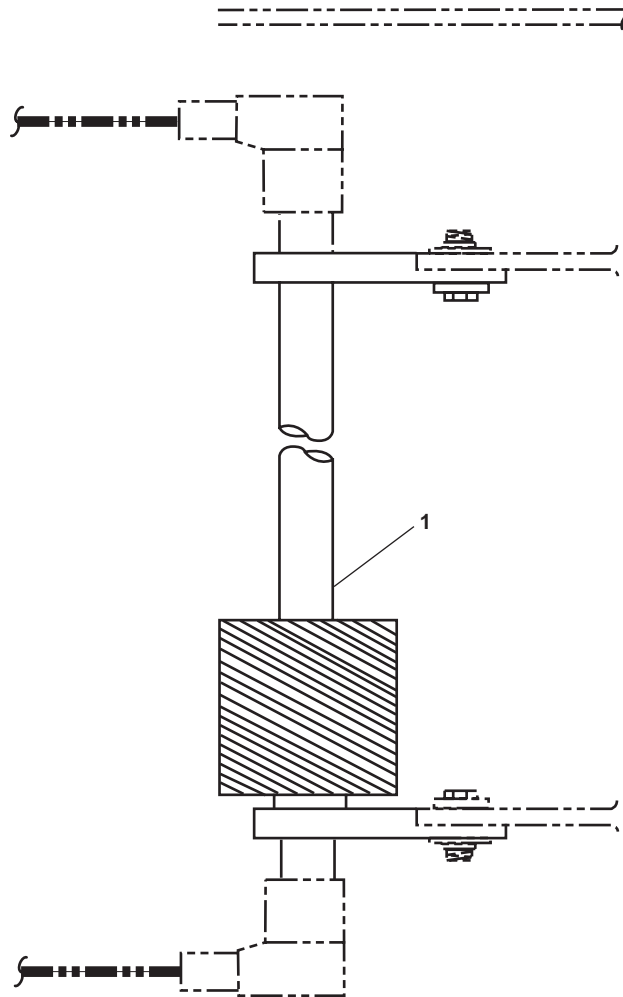


Figure 77. Signal Horn (Sheet 4 of 4)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0409	
					FIG 77 SIGNAL HORN	
1	PFOOO	2040-01-275-3686	75214	KB-20	HORN,ELECTRICAL .....	1
2	PAOZZ	5342-01-293-7833	75214	P33-2	.HOUSING,SPECIAL .....	1
3	PAOZZ	5310-01-523-9885	3A054	90715A135	.NUT,LOCK .....	8
4	PAOZZ	6350-01-295-9866	75214	P28-24	.DIAPHRAM,HORN .....	1
5	PDOZZ	5999-01-276-4721	75214	PT120-1	.DIAPHRAM,HEATER AN .....	1
6	PAOZZ	5331-01-276-4678	75214	PT121-1	.O-RING .....	1
7	PDOZZ	2040-01-295-8283	75214	PT1-5	.PROJECTOR,HORN,ELEC .....	1
8	PAOZZ	2040-01-302-1028	75214	P504-1	.BAR,ELECTRICAL .....	1
9	PAOZZ	5342-01-293-7898	75214	PT32-4	.MOUNT,RESILIENT .....	4
10	PAOZZ	5310-01-504-5702	39428	90715A125	NUT,SELF-LOCKING,HE .....	8
11	PDOZZ	6130-01-290-0498	75214	M-477	POWER SUPPLY .....	1
12	PDOZZ	5955-01-311-6188	75214	M-478	OSCILLATOR,NONCRYST .....	1
13	PDOZZ	6645-01-112-9392	75214	M411-AS3	TIMER,SEQUENTIAL TIMER, FOG SIGNAL .....	1
					<b>END OF FIGURE</b>	



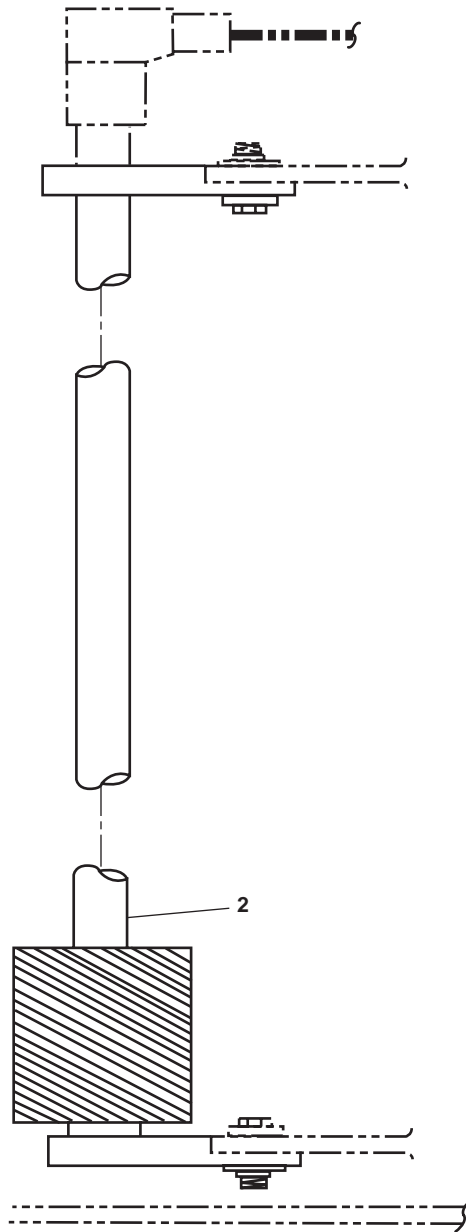




F. O. Tank 1 Transmitter Port/Stbd

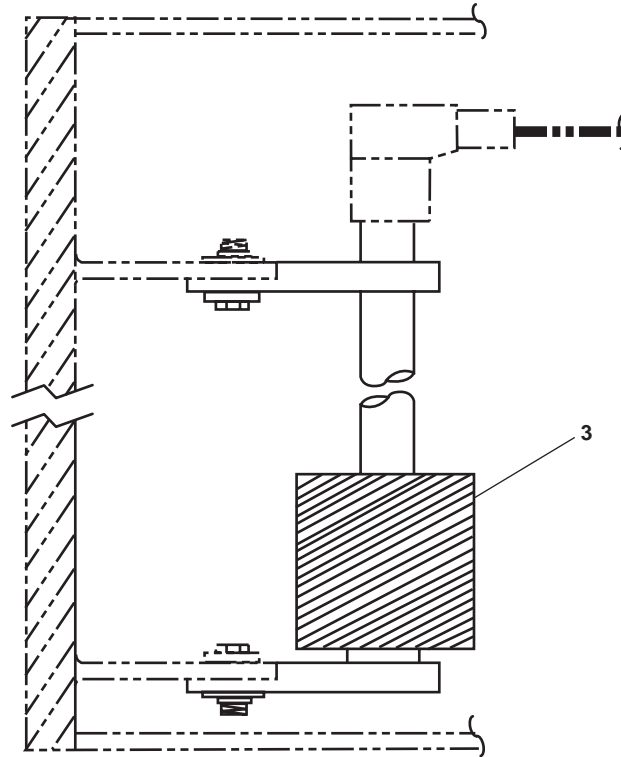
Figure 78. Tank Level Indicators (Sheet 1 of 13)





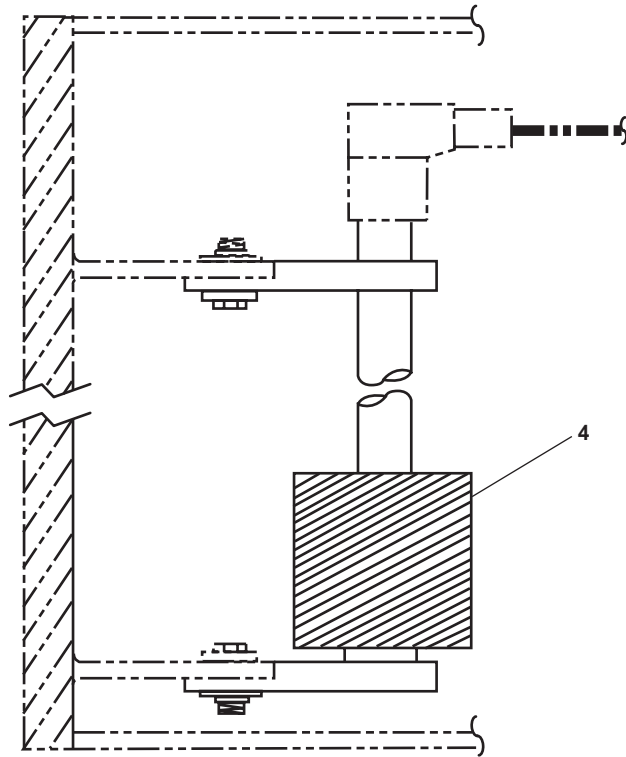
F. O. Tank 2 Transmitter Port/Stbd

Figure 78. Tank Level Indicators (Sheet 2 of 13)



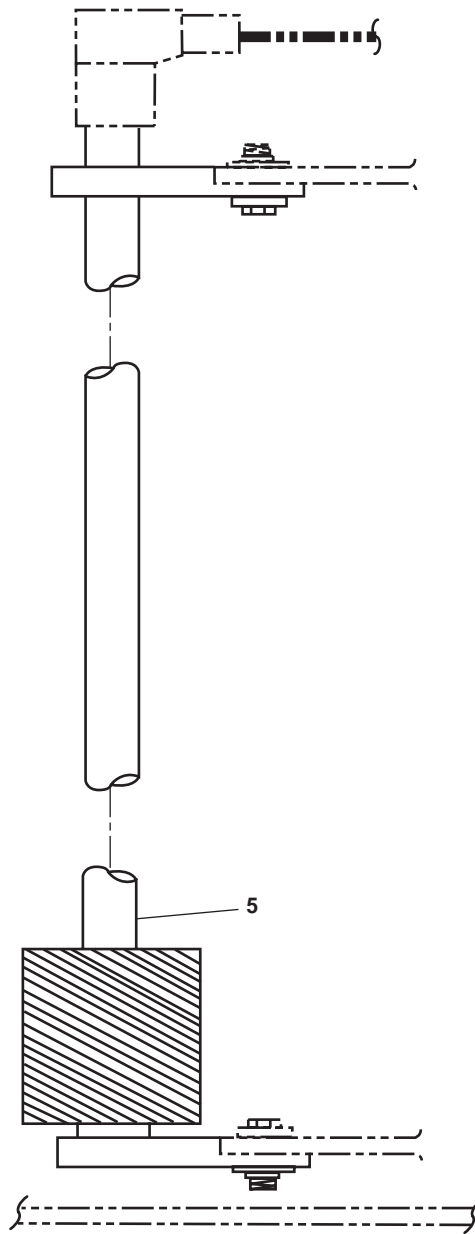
F. O. Tank 2 Centerline Transmitter

Figure 78. Tank Level Indicators (Sheet 3 of 13)



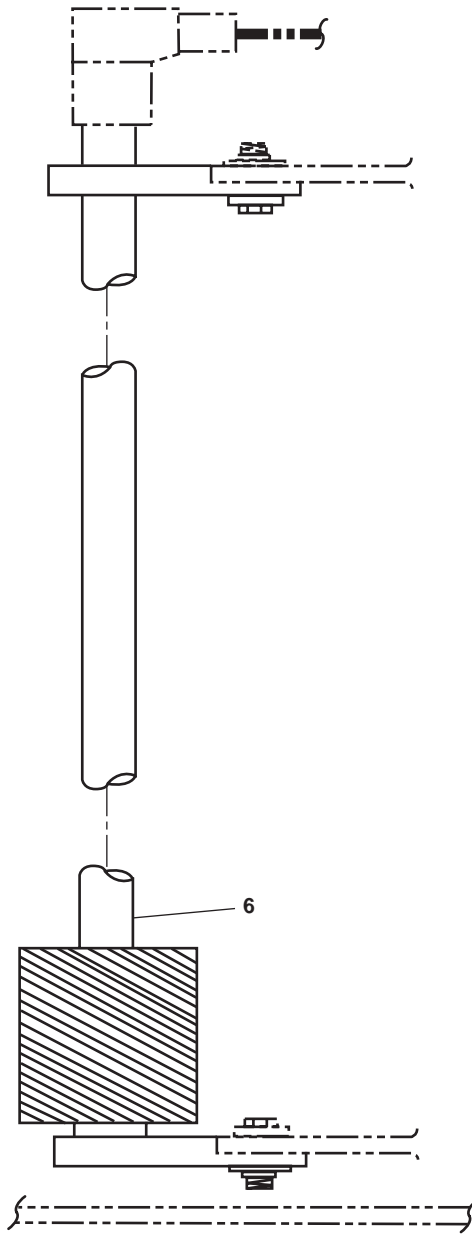
F. O. Tank 3 Centerline Transmitter

Figure 78. Tank Level Indicators (Sheet 4 of 13)



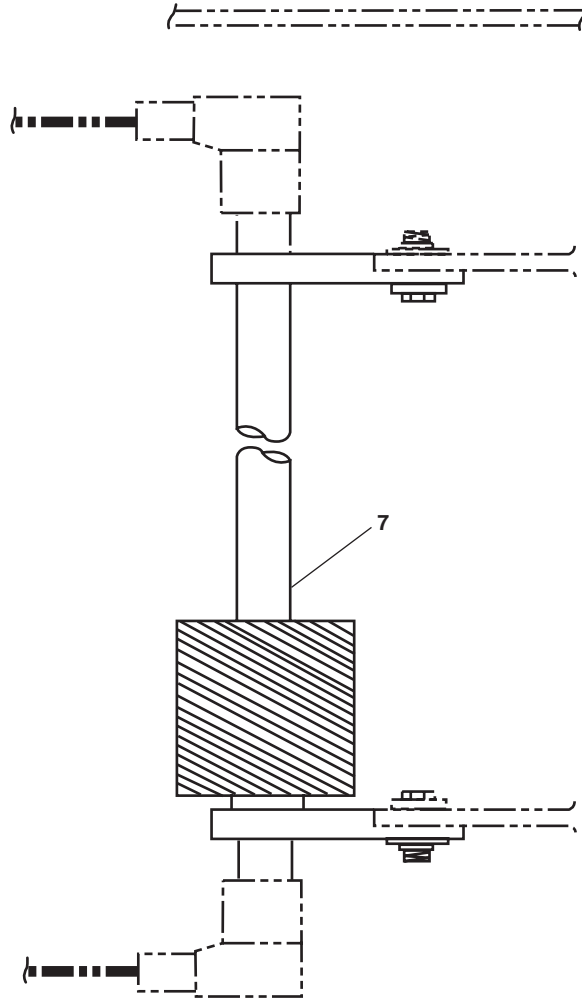
F. O. Tank 4 Port/Stbd Transmitter

Figure 78. Tank Level Indicators (Sheet 5 of 13)



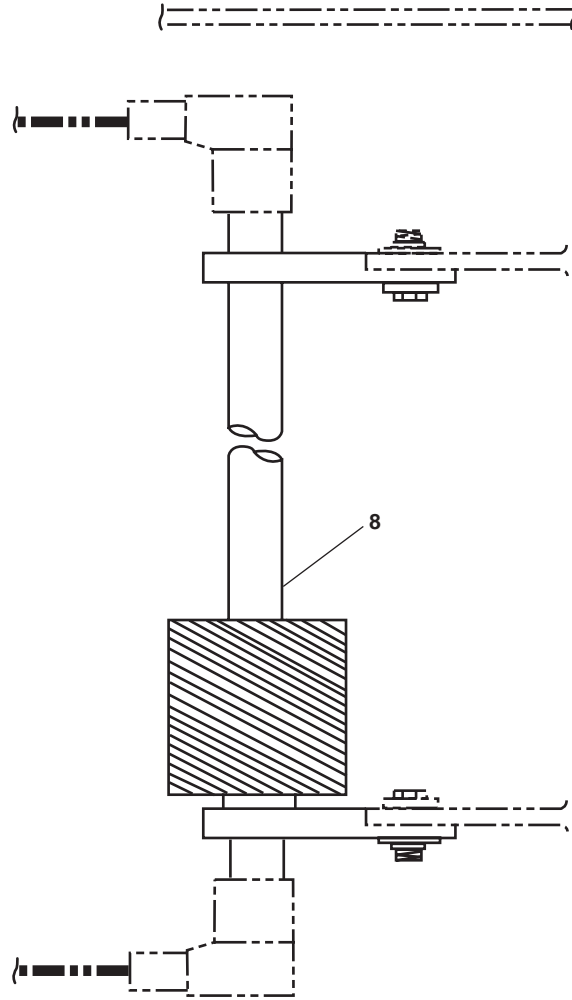
F. O. Day Tank Port/Stbd Transmitter

Figure 78. Tank Level Indicators (Sheet 6 of 13)



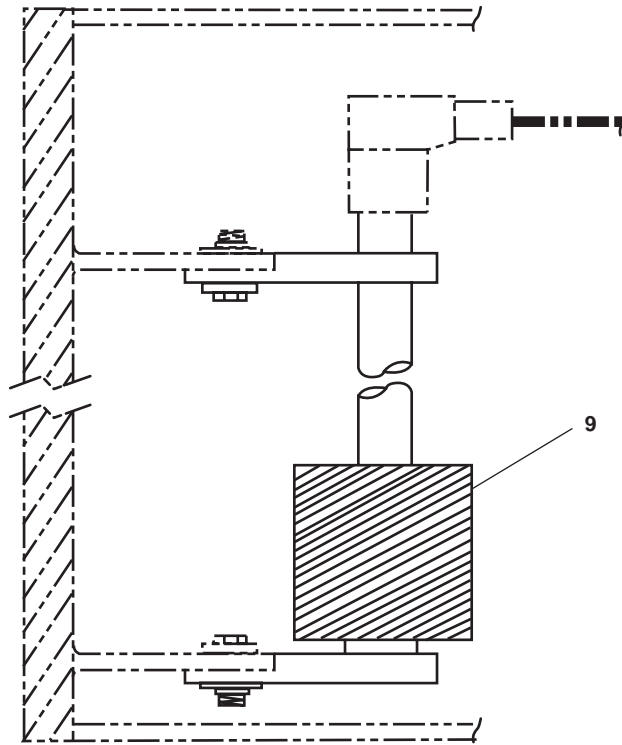
L. O. Storage Tank Transmitter

Figure 78. Tank Level Indicators (Sheet 7 of 13)



Oily Waste Tank Transmitter

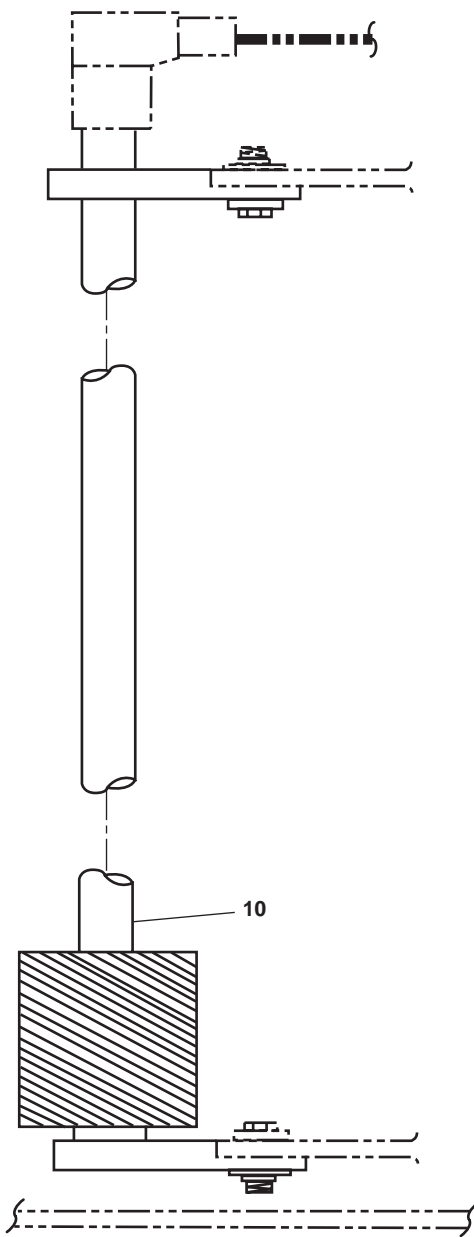
Figure 78. Tank Level Indicators (Sheet 8 of 13)



Fore Peak Ballast Tank Transmitter

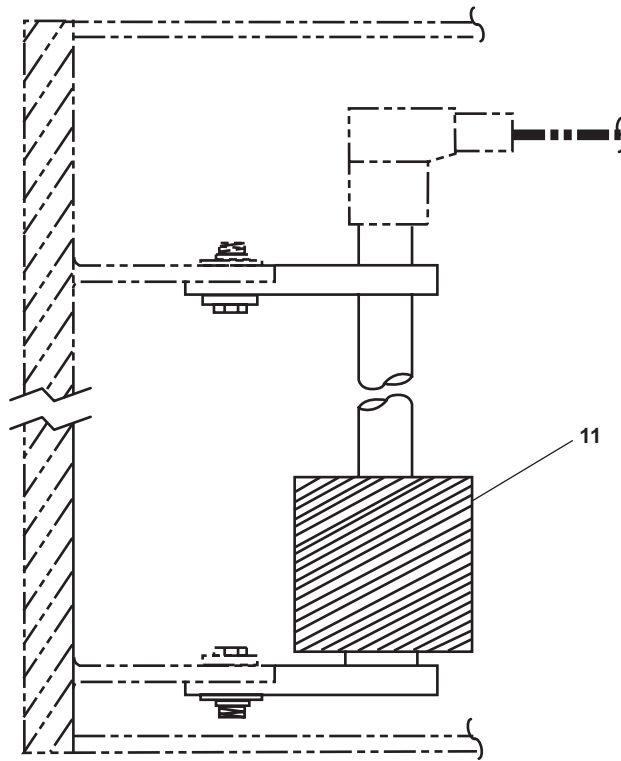
Figure 78. Tank Level Indicators (Sheet 9 of 13)





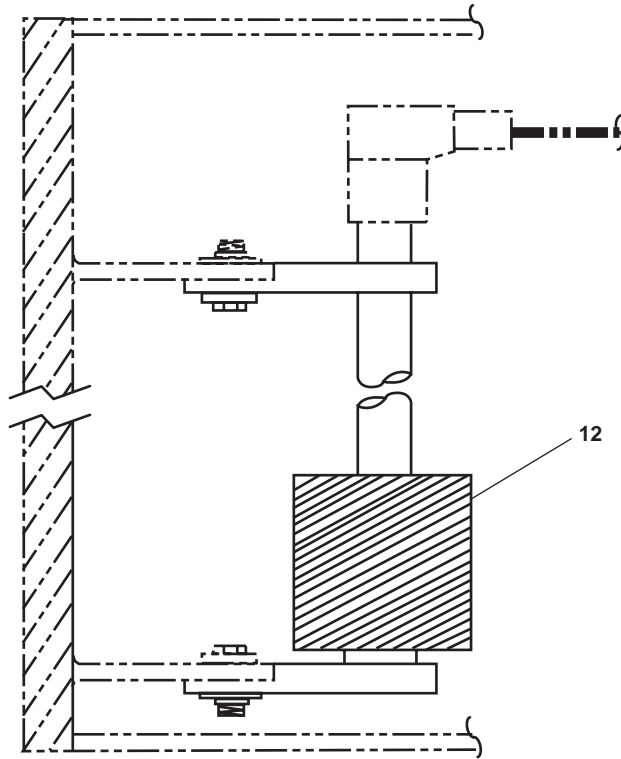
Aft Ballast Tank Port/Stbd Transmitter

Figure 78. Tank Level Indicators (Sheet 10 of 13)



Potable Water Tank Transmitter

Figure 78. Tank Level Indicators (Sheet 11 of 13)



Sewage Holding Tank Transmitter

Figure 78. Tank Level Indicators (Sheet 12 of 13)

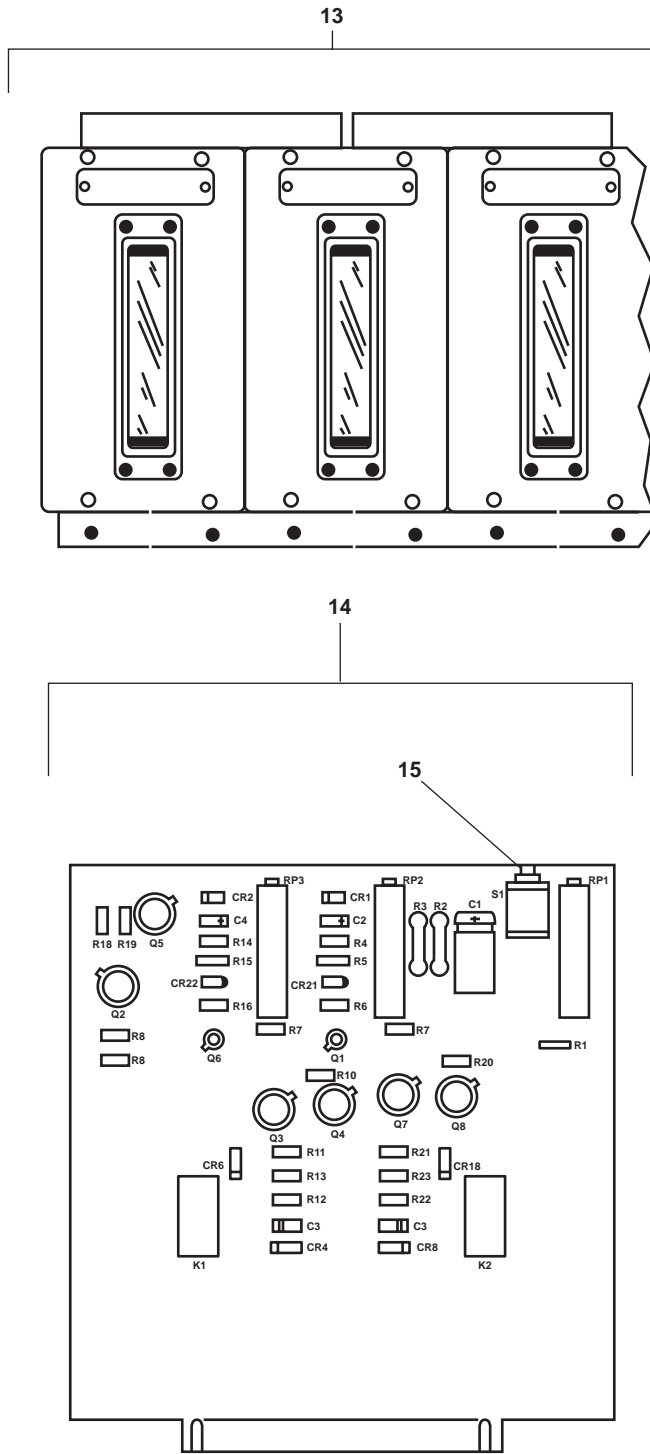
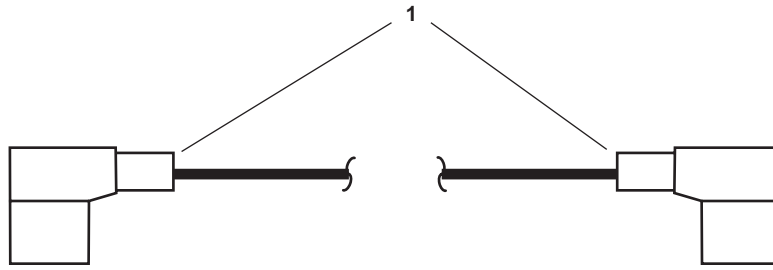
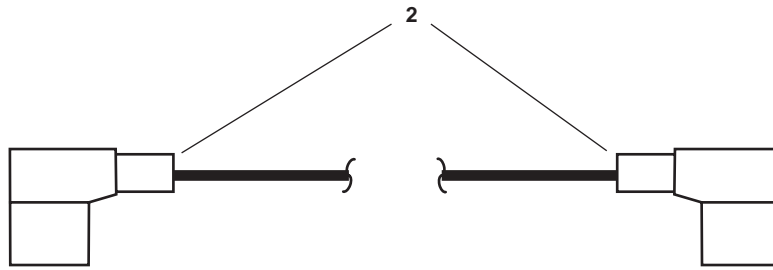


Figure 78. Tank Level Indicators (Sheet 13 of 13)

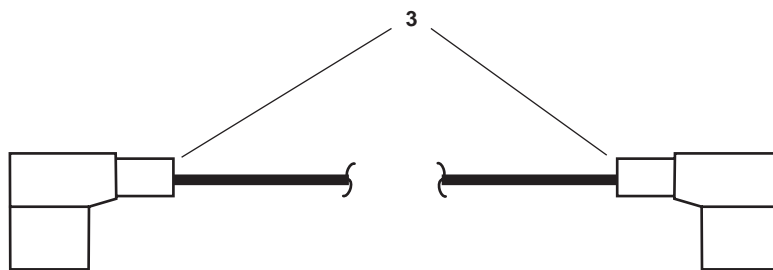
(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0502	
					FIG 78 TANK LEVEL INDICATORS	
1	PAFZZ	6680-01-222-2004	04034	XM-36465-32-1500 -O-L	TRANSMITTER,LIQUID .....	2
2	PAFZZ	6680-01-352-1645	04034	XM-36460-31-4300 -O-L	TRANSMITTER,LIQUID .....	2
3	PAFZZ	6680-01-316-2654	04034	39698	TRANSMITTER,LIQUID .....	1
4	XDFZZ		04034	XM-36460-102-150 0-O-L	TRANSMITTER,LIQUID .....	1
5	PAFZZ	6680-01-262-8965	04034	XM-36460-127-100 0-O-L	TRANSMITTER,LIQUID .....	2
6	XDFZZ		04034	XM-36460-141-100 0-O-L	TRANSMITTER,LIQUID .....	2
7	PAFZZ	6680-01-352-0399	04034	XM-36465-63-1000 -O-L	TRANSMITTER,LIQUID .....	2
8	PAFZZ	6680-01-352-1644	04034	52459	TRANSMITTER,LIQUID .....	2
9	PAFZZ	6680-01-352-0400	04034	XM-36460-183-100 0-W-L	TRANSMITTER,LIQUID .....	1
10	PAFZZ	6680-01-220-2273	04034	XM-36460-49-1500 -W-L	TRANSMITTER,LIQUID .....	4
11	PAFZZ	6680-01-081-7799	04034	39927	TRANSMITTER,LIQUID .....	4
12	XDFZZ		04034	XM-36490-41	TRANSMITTER,LIQUID .....	1
13	XDFFF	6680-01-225-9961	04034	38350	INDICATOR,LIQUID QT MASTER TANK ... LEVEL INDICATOR, 11 METER .....	1
14	XDFHH	6680-01-093-1196	04034	RE-31370	.RECEIVER,SLAVE,LIQU .....	18
15	PAFZZ	5998-01-058-1918	04034	38100	..CIRCUIT CARD ASSEMB .....	11
					<b>END OF FIGURE</b>	



10 Ft. (3.0 Meter) Cable Assembly



5 Ft. (1.5 Meter) Cable Assembly



30 Ft. (9.1 Meter) Cable Assembly

Figure 79. Cable Assemblies

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 05020102	
					FIG 79 CABLE ASSEMBLIES	
1	PAFZZ	6150-01-197-8484	04034	36885-10-LP	CABLE ASSEMBLY,POWE .....	1
2	PAFZZ	6150-01-105-9187	04034	36885-5LP	CABLE ASSEMBLY,POWE .....	2
3	XDFZZ		04034	36880-30-LP	CABLE ASSEMBLY .....	10
					<b>END OF FIGURE</b>	

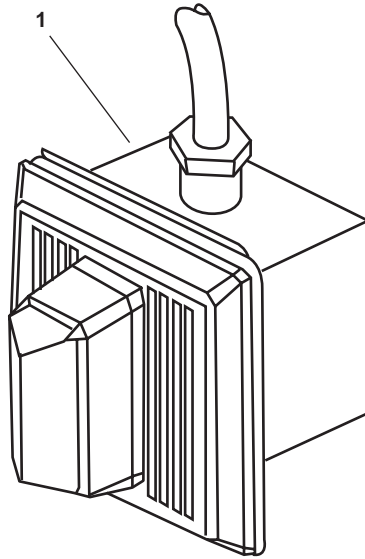


Figure 80. Day Tank High Level Alarm (Sheet 1 of 3)



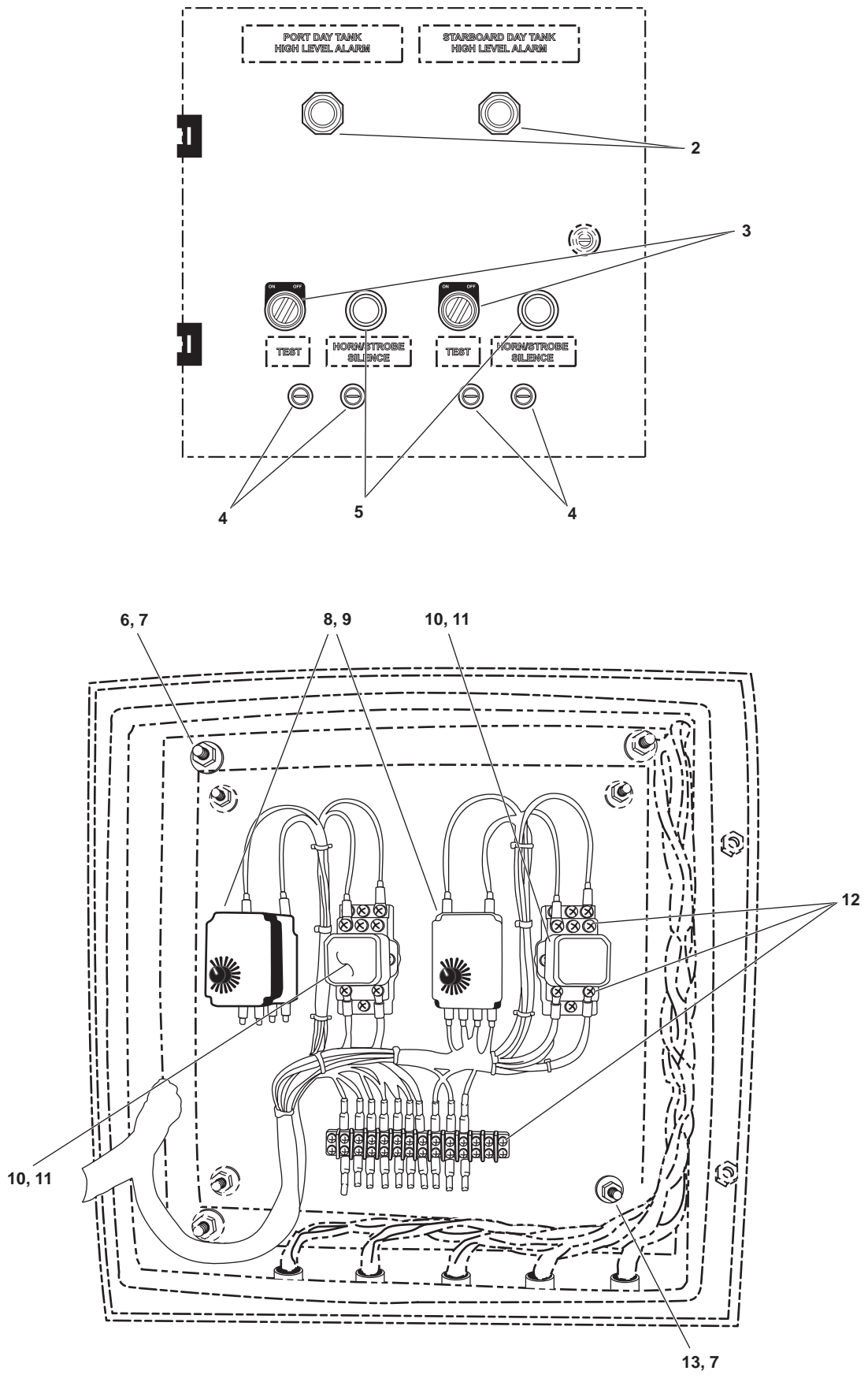


Figure 80. Day Tank High Level Alarm (Sheet 2 of 3)

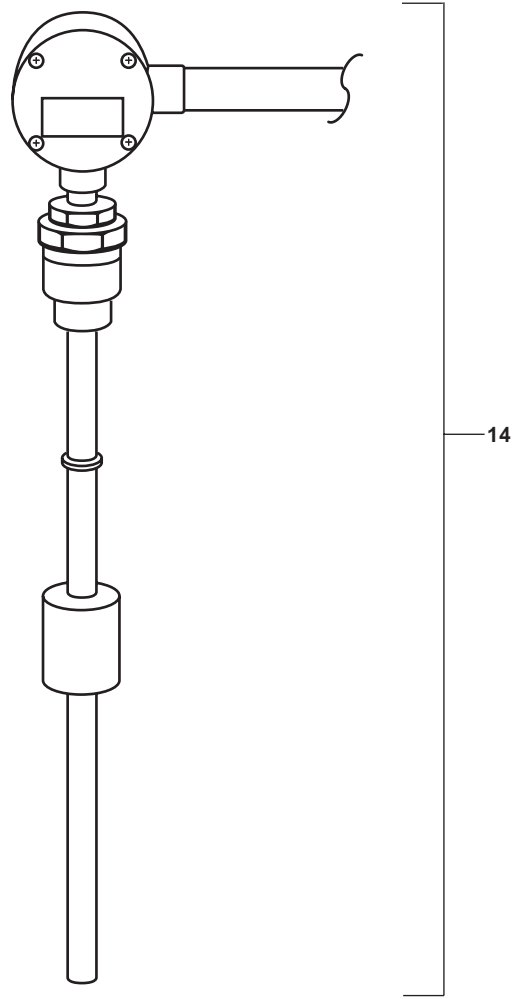
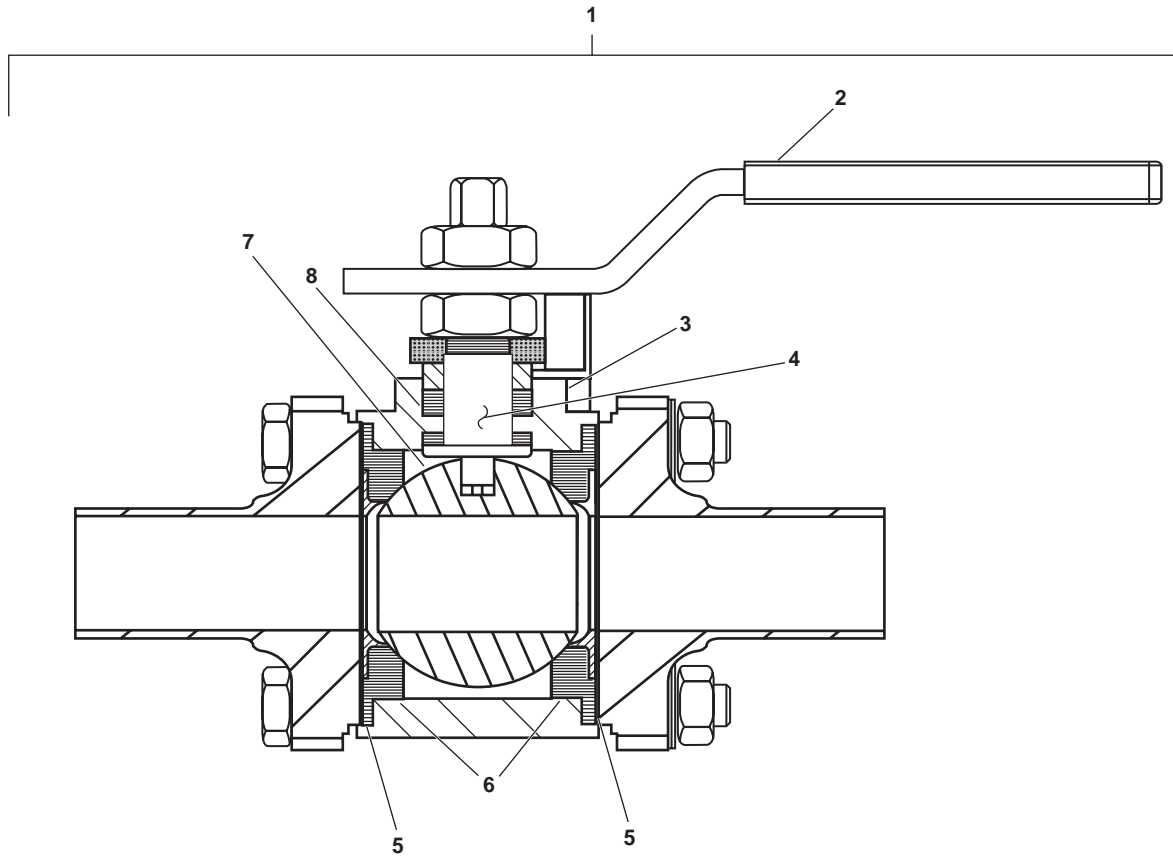


Figure 80. Day Tank High Level Alarm (Sheet 3 of 3)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 050202	
					FIG 80 DAY TANK HIGH LEVEL ALARM	
1	PAOZZ		KC5W5	867-STR-A-AQ	HORN/STROBE LIGHT .....	2
2	XDOZZ		56365	9001KP35R31	LIGHT,PILOT .....	2
3	XDOZZ		56365	9001K12J35CH7	SWITCH,ROTARY .....	2
4	PAOZZ	5920-00-757-9140	71400	AGC5A	FUSE,CARTRIDGE .....	4
5	XDOZZ		56365	9001KR1RH13	SWITCH,PUSH BUTTON .....	2
6	PAOZZ		39428	94819A049	NUT,PLAIN HEX .....	4
7	PAOZZ	5310-01-389-7640	96906	MS35338-145	WASHER,LOCK .....	20
8	XDOZZ		56365	9050JCK18V14	RELAY,TIMING .....	2
9	XDOZZ		56365	9050NR51	SOCKET,PLUG-IN,ELEC .....	2
10	XDOZZ		56365	8501KXD12M1V53	RELAY,ELECTROMAGNET .....	2
11	PFOZZ	5935-01-362-6592	56365	8501NR82	SOCKET,PLUG-IN,ELEC .....	2
12	PAOZZ	5310-00-933-8778	81337	5-13-2512P31	WASHER,LOCK .....	48
13	PFOZZ	5305-01-509-0161	39428	93190A624	SCREW,CAP .....	48
14	XDOZZ		04034	TEMPPART15372	SWITCH,LIQUID LEVEL LS-700EP LIQUID LEVEL SWITCH .....	2
					<b>END OF FIGURE</b>	

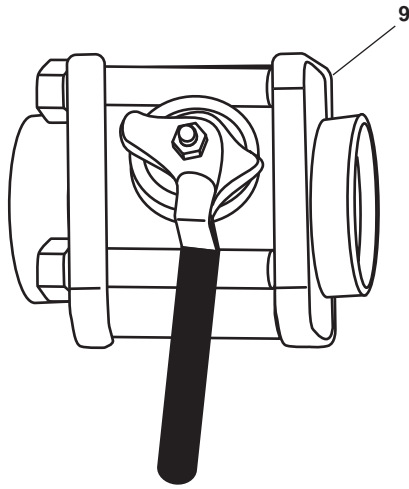




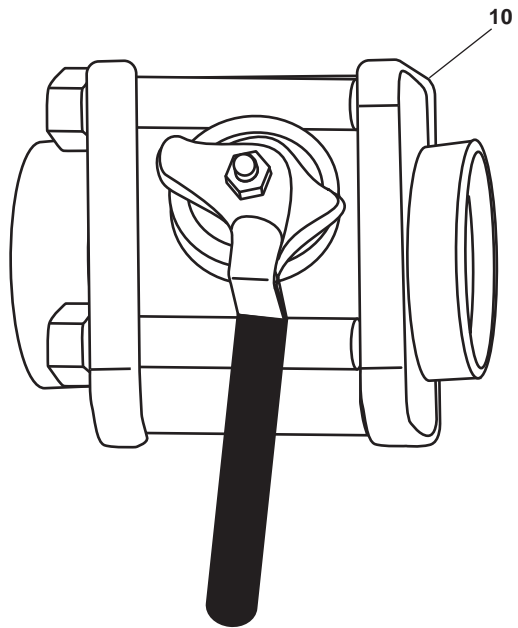


1/2" Ball Valve, Socket Weld

Figure 81. Valves (Sheet 1 of 3)



1-1/2" Ball Valve



2" Ball Valve

Figure 81. Valves (Sheet 2 of 3)

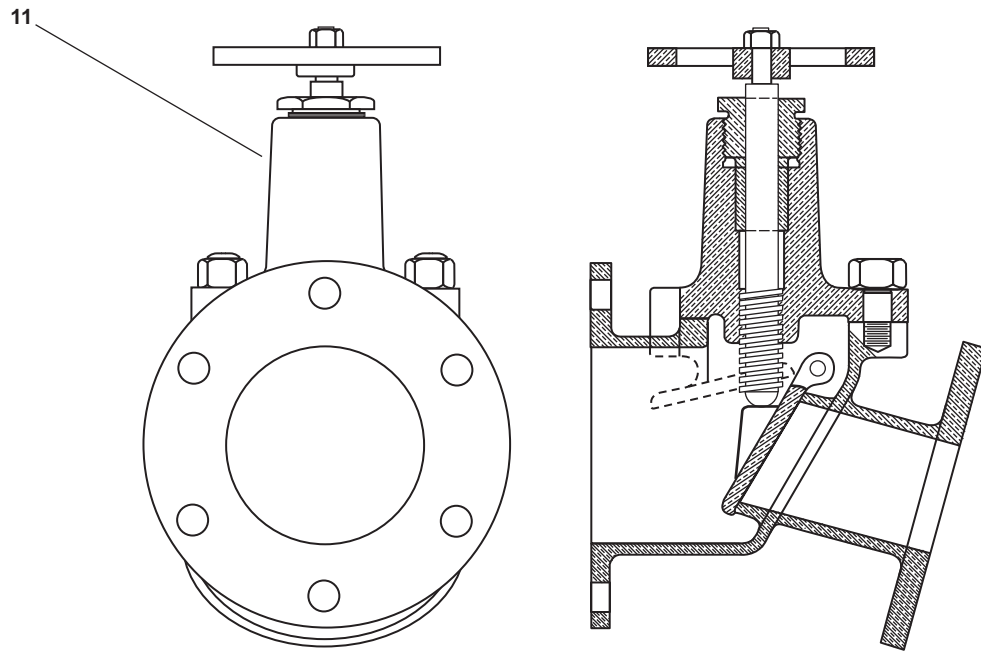


Figure 81. Valves (Sheet 3 of 3)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 050302	
					FIG 81 VALVES	
1	PFOOO	4820-01-344-3933	92021	SPB-20-F152-4IN	VALVE,BALL,4" .....	3
2	PFOZZ	4820-01-165-6009	92021	SP-19-4D	.HANDLE,VALVE .....	1
3	PFOZZ	5330-01-168-9166	92021	SPK19-6A	.RETAINER,PACKING .....	1
4	PFOZZ	4820-01-056-3488	92021	SP19-5A	.STEM,FLUID VALVE .....	1
5	PAOZZ	5330-01-023-1878	92021	SP-20-13	.GASKET .....	2
6	PAOZZ	4820-01-022-0543	92021	SP-20-8B	.SEAT,VALVE .....	3
7	PFOZZ	4820-01-301-9129	92021	SP-20-2	BALL,VALVE,PORTED .....	1
8	PAOZZ	5330-01-021-0830	92021	SP-19-9A	.PACKING .....	1
9	XDOZZ		14448	8901-1-1/2	VALVE,BALL,1-1/2" .....	1
10	XDOZZ		14448	8614-2	VALVE,BALL,2" .....	8
11	PFOZZ	4820-01-100-9103	80064	810-1385707 4IN	VALVE,SCUPPER,GAG .....	1
					<b>END OF FIGURE</b>	

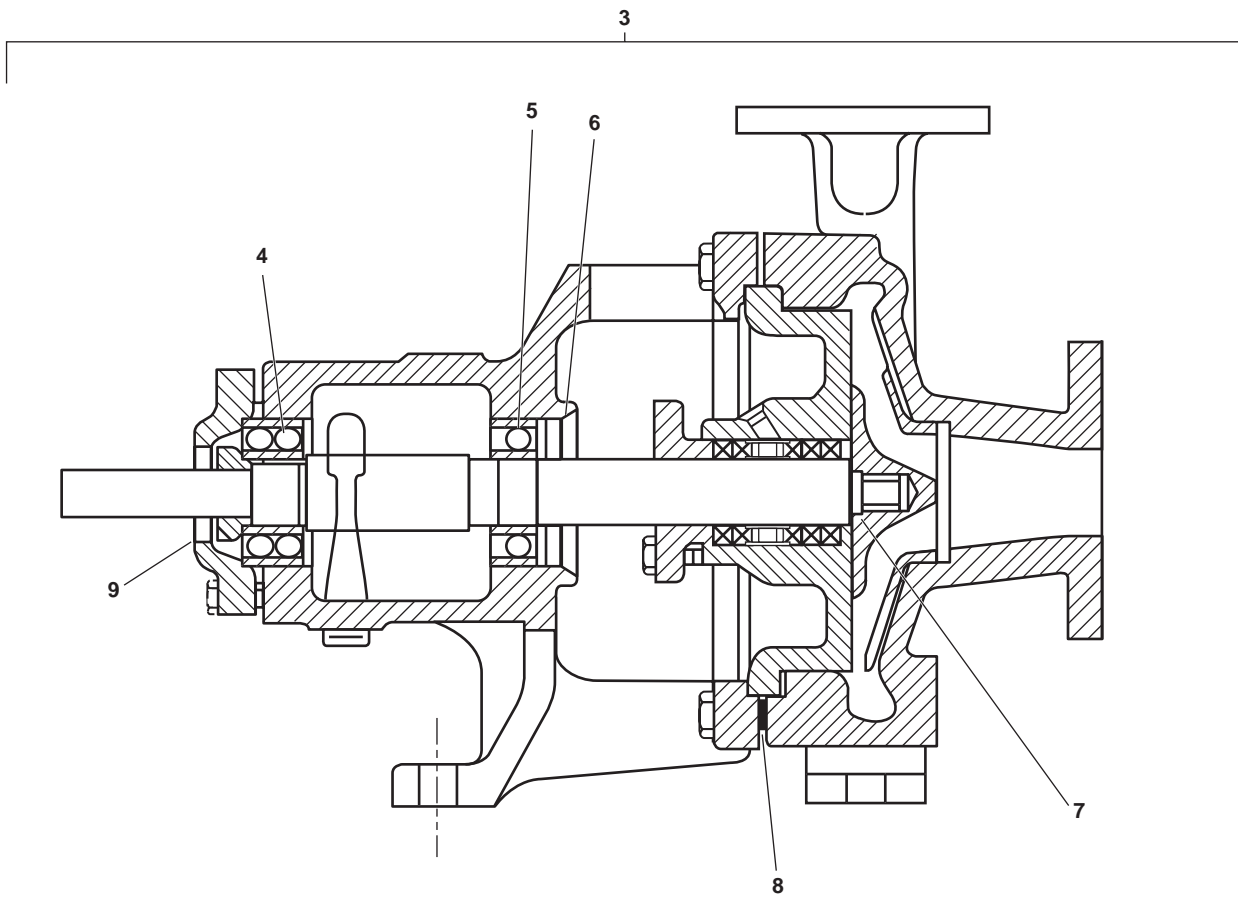
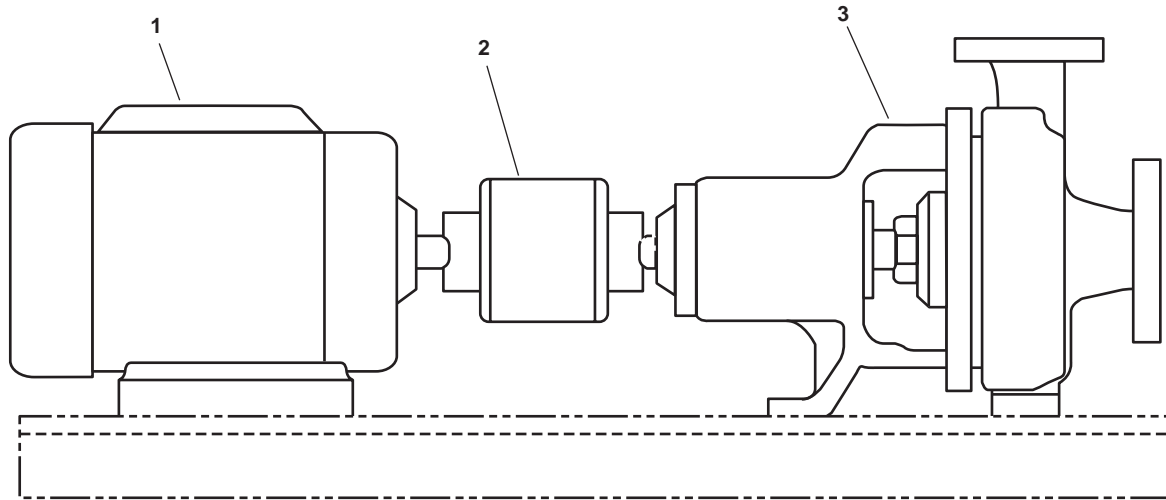


Figure 82. Sewage Discharge Pump

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 050303	
					FIG 82 SEWAGE DISCHARGE PUMP	
1	XDOZZ		50380	P18G391	MOTOR,ALTERNATING C.....	1
2	PAFZZ	3010-00-888-9213	75665	L150	COUPLING,SHAFT,FLEX .....	1
3	PPFHH	4630-01-480-6914	07CU5	33985	PUMPING UNIT,SEWAGE SEWAGE DISCHARGE PUMP .....	2
4	XDHZZ		07CU5	79012001	.BEARING,OUTBOARD .....	1
5	XDHZZ		07CU5	78923927	.BEARING,INBOARD .....	1
6	XDHZZ		07CU5	79016077	.SEAL,OIL,INBOARD .....	1
7	XDHZZ		07CU5	78932597	.GASKET,IMPELLER GRO .....	1
8	XDHZZ		07CU5	78925005	.GASKET,CASING COVER .....	1
9	XDHZZ		07CU5	78997103	.SEAL,OIL,OUTBOARD .....	1
					<b>END OF FIGURE</b>	



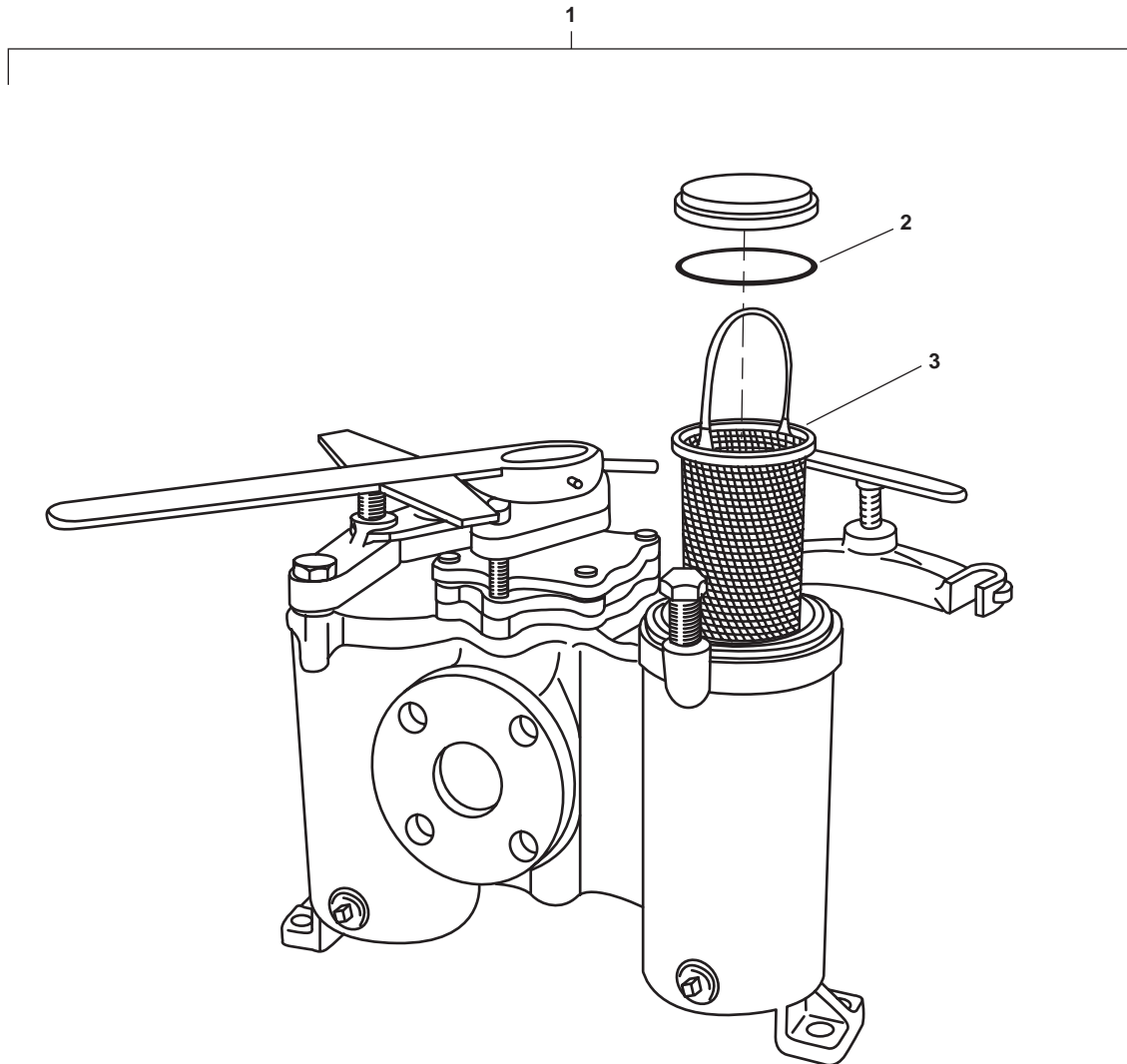
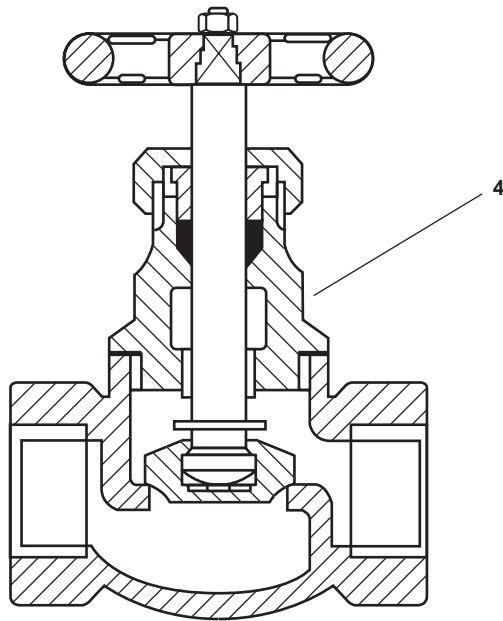
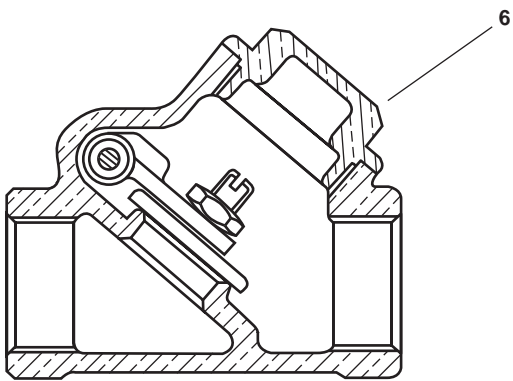


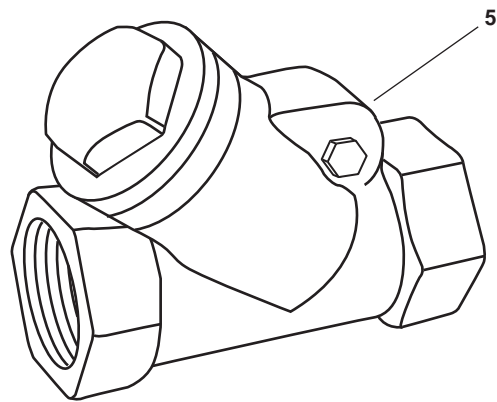
Figure 83. Oily Bilge System Valves (Sheet 1 of 4)



1-1/2" Globe Stop Check Valve

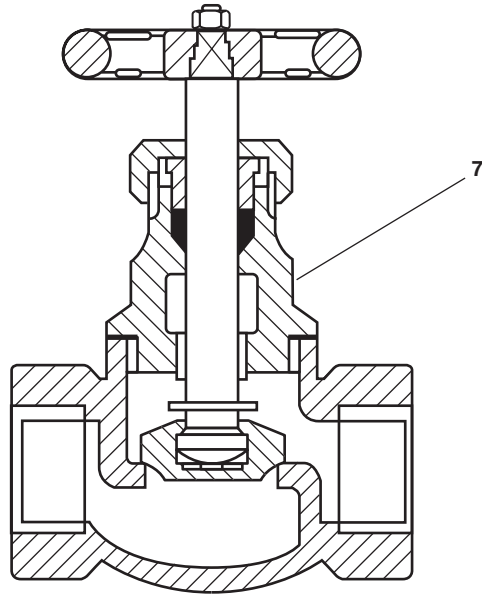


1-1/2" Swing Check Valve

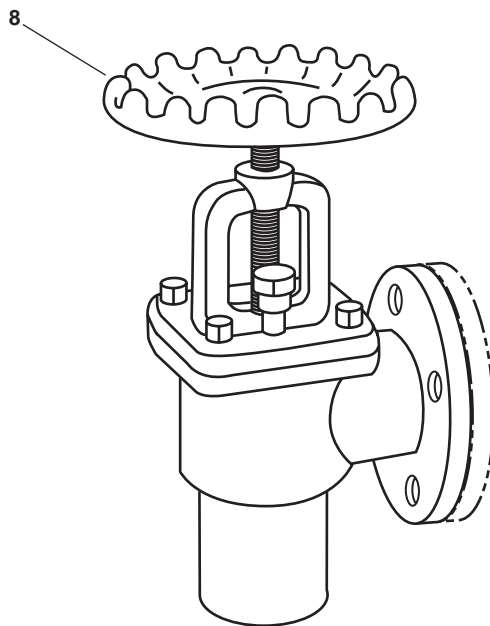


1" Swing Check Valve

Figure 83. Oily Bilge System Valves (Sheet 2 of 4)

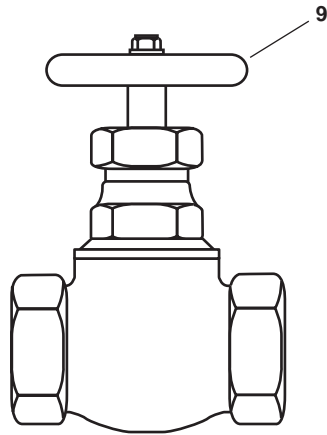


1-1/2" Globe Valve,

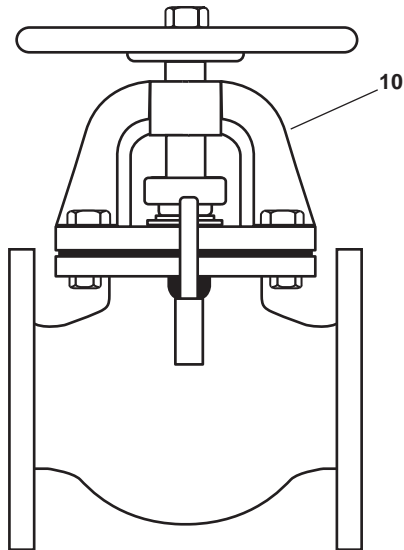


1-1/2" Angle Globe Valve, Flanged

Figure 83. Oily Bilge System Valves (Sheet 3 of 4)



1/4" Globe Valve



1-1/2" Globe Stop Check Valve

Figure 83. Oily Bilge System Valves (Sheet 4 of 4)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 050602	
					FIG 83 VALVES, OILY BILGE SYSTEM	
1	PFOZZ		73124	53BTX 1-1/2" NPT	STRAINER,SEDIMENT 1-1/2" NPT, BRONZE BODY DUPLEX STRAINER .....	1
2	PAOZZ	5330-01-183-6647	73124	ST262Z5B	GASKET .....	2
3	PFOZZ	4730-01-342-8532	73124	ST262SJXX	STRAINER ELEMENT .....	2
4	PFOZZ	4820-01-293-5064	76364	1605-030E-1.5IN	VALVE,GLOBE .....	10
5	PFOZZ	4820-01-274-5860	76364	5299-001-1	VALVE,CHECK .....	1
6	PFOZZ	4820-01-299-0407	76364	5399-003R112	VALVE,CHECK .....	1
7	PFOZZ	4820-01-292-9599	76364	1600-035 1.50IN	VALVE,GLOBE .....	5
8	PFOZZ	4820-01-173-1161	80064	803-1385711-AWAF	VALVE,ANGLE .....	1
9	PFOZZ	4820-01-359-4834	76364	1600-001 1/4 IN.	VALVE,GLOBE .....	3
10	PAOZZ	4820-00-184-9186	53711	803-4384536-72A	VALVE,GLOBE .....	4
					<b>END OF FIGURE</b>	

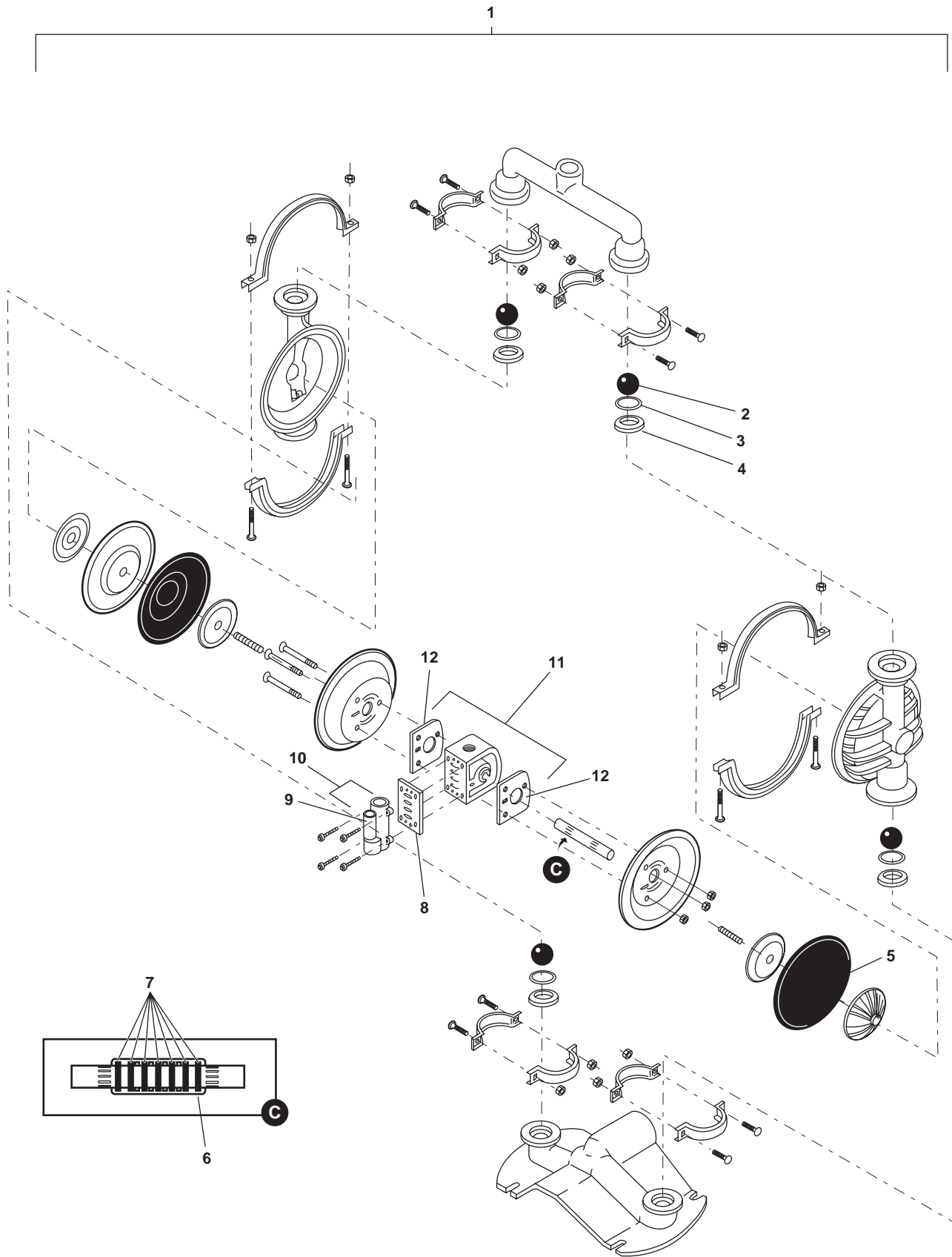


Figure 84. Oily Bilge Pump

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 050603	
					FIG. 84 OILY BILGE PUMP	
1	PFOOO	4320-01-280-8964	52837	M4	PUMP,RECIPRICATING .....	1
2	PFOZZ	4820-01-200-0739	52837	PU71	.BALL,VALVE .....	4
3	PAOZZ	5331-01-471-5900	52837	04120055	.O-RING .....	4
4	PFOZZ	4820-01-121-7918	52837	04-1121-03	.SEAT,VALVE .....	4
5	PFOZZ	4820-01-114-8195	52837	04-1010-51	.DIAPHRAM,VALVE,FLAT .....	2
6	PFOZZ	3040-01-186-6024	52837	04-3800-09	.SHAFT,SHOULDERED .....	1
7	PAOZZ	5331-01-211-1336	52837	20JH	.O-RING .....	7
8	PAOZZ	5330-01-140-8814	52837	50B	.GASKET .....	1
9	PAOZZ	4320-01-199-8038	52837	60E	.FILTER ELEMENT,FLUI .....	1
10	PFOZZ	4820-01-115-4427	52837	60	.VALVE ASSY,AIR .....	1
11	PFOZZ	4320-01-246-2899	52837	04-2000-07	.BODY AND PISTON ASS .....	1
12	PAOZZ	5330-01-126-5156	52837	04-3520-52	.GASKET .....	2
					<b>END OF FIGURE</b>	



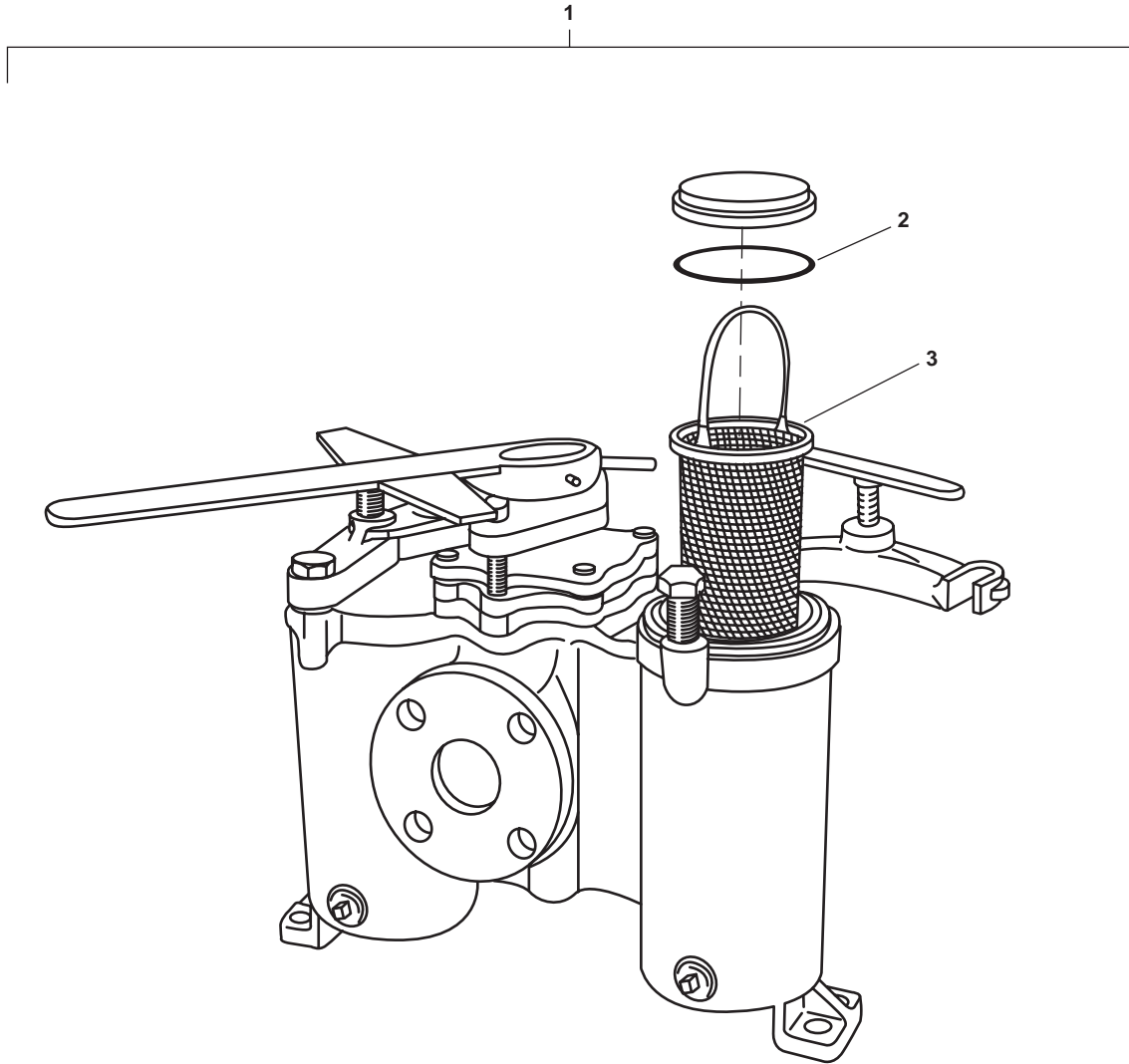


Figure 85. Ballast System Valves (Sheet 1 of 8)

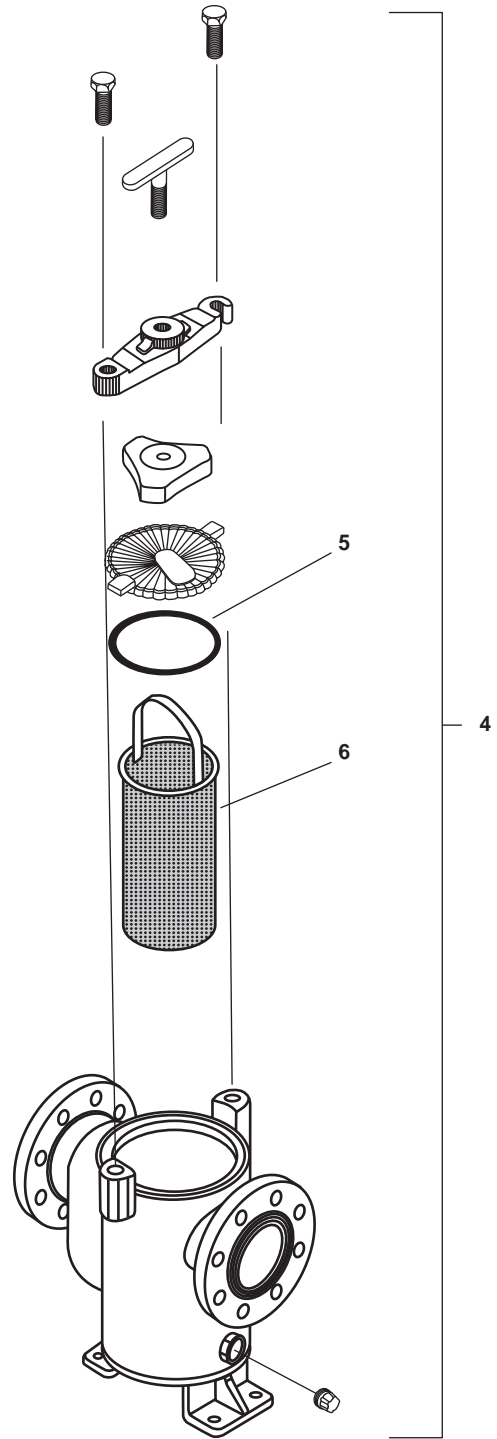
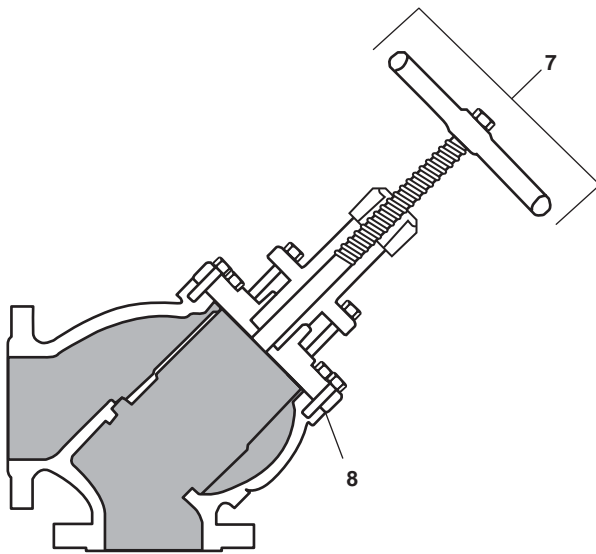
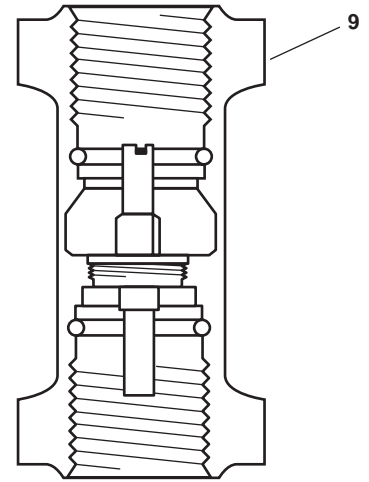


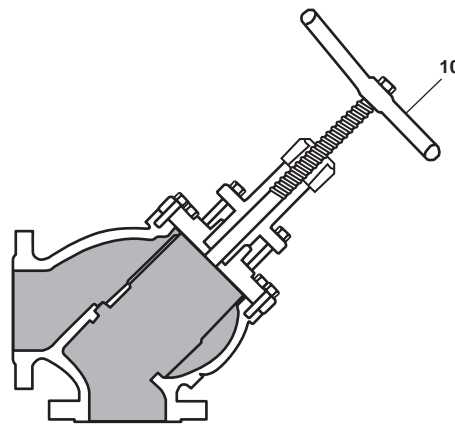
Figure 85. Ballast System Valves (Sheet 2 of 8)



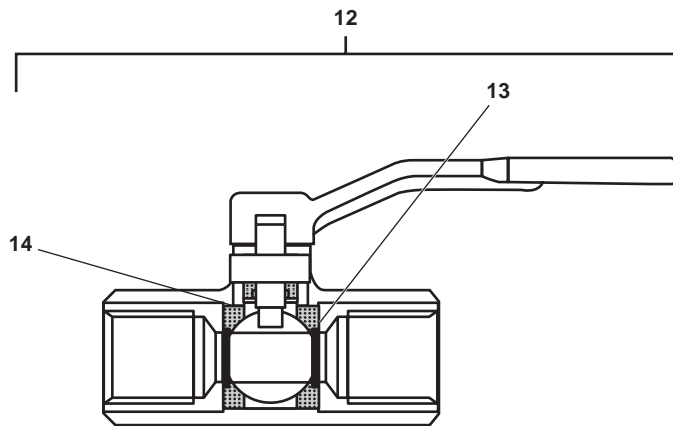
1/2" Globe Stop Check Valve



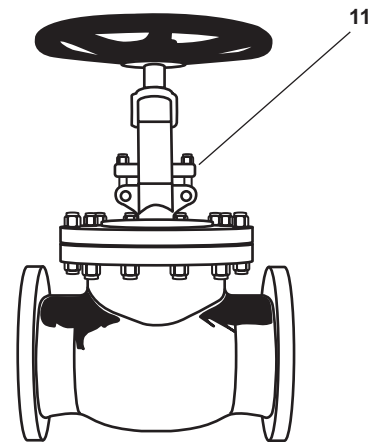
3" Vertical Lift Check Valve



2-1/2" Globe Stop Check Valve

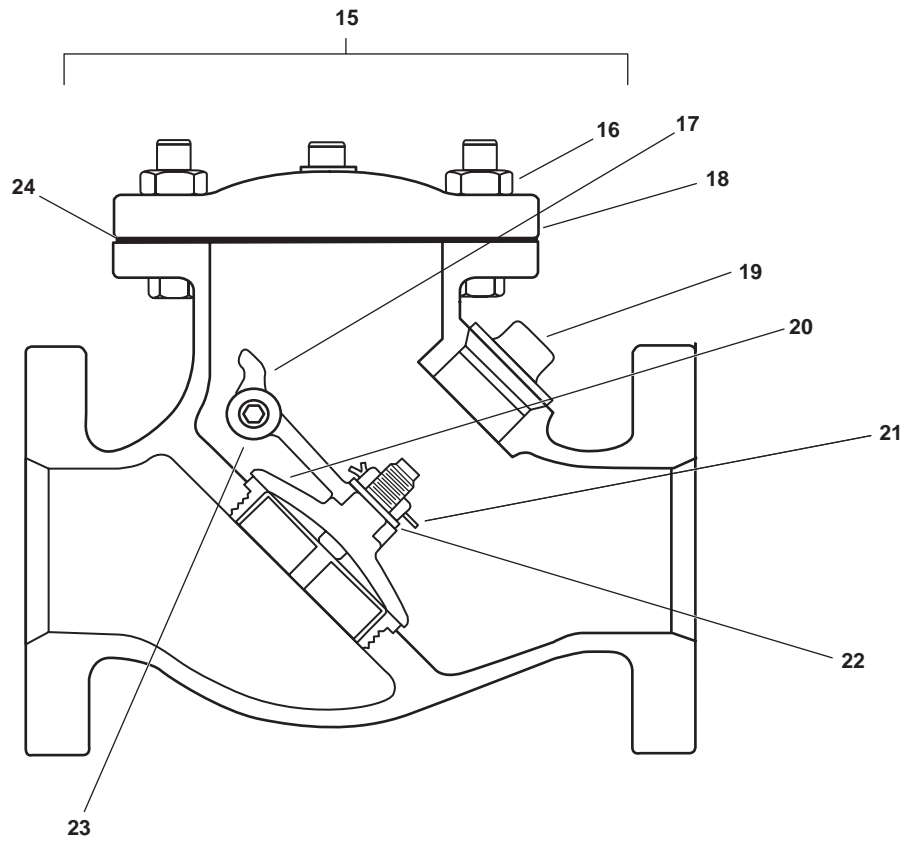


1-1/2" Ball Valve



3" Gate Valve

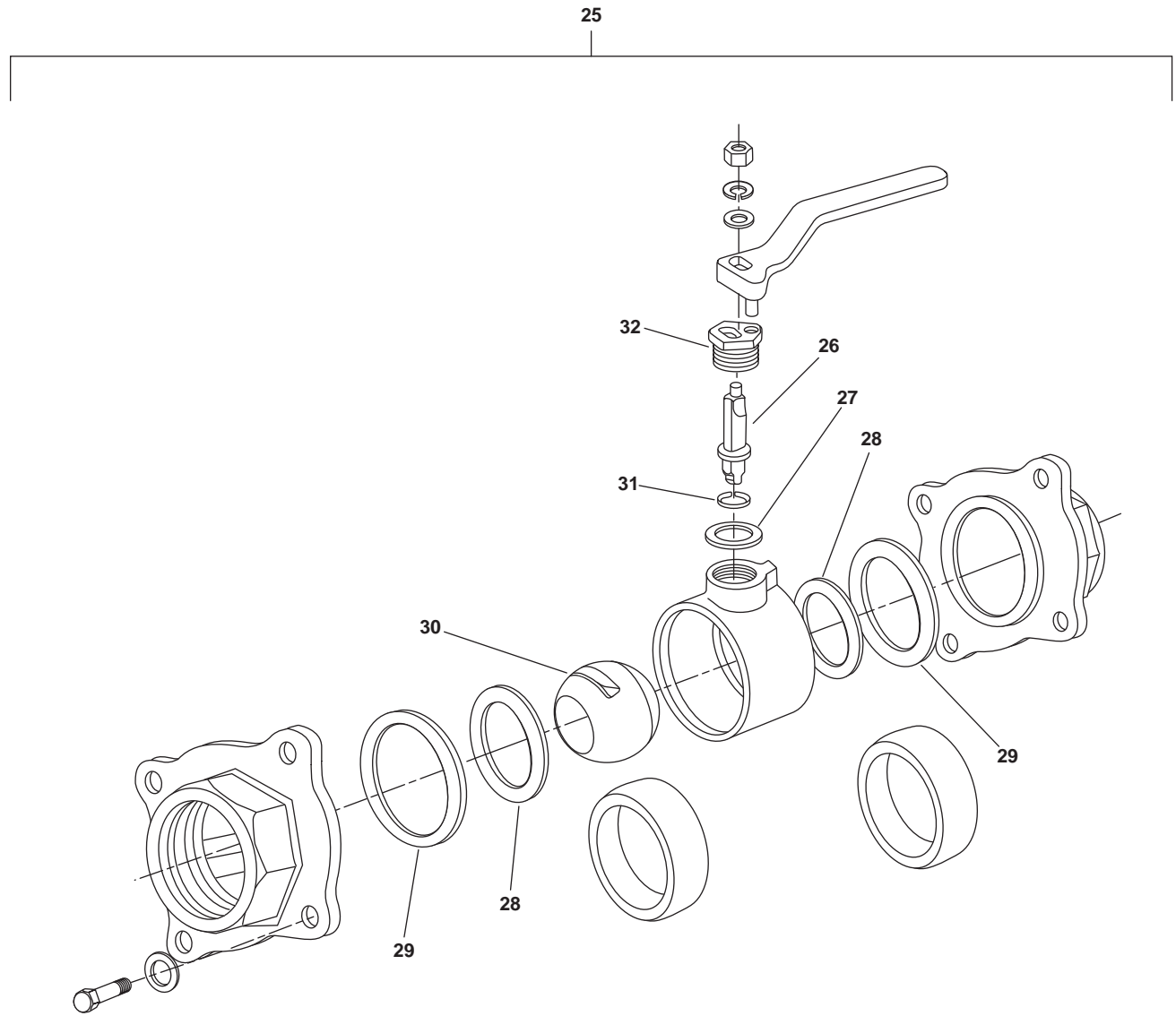
Figure 85. Ballast System Valves (Sheet 3 of 8)



3" Flanged Check Valve

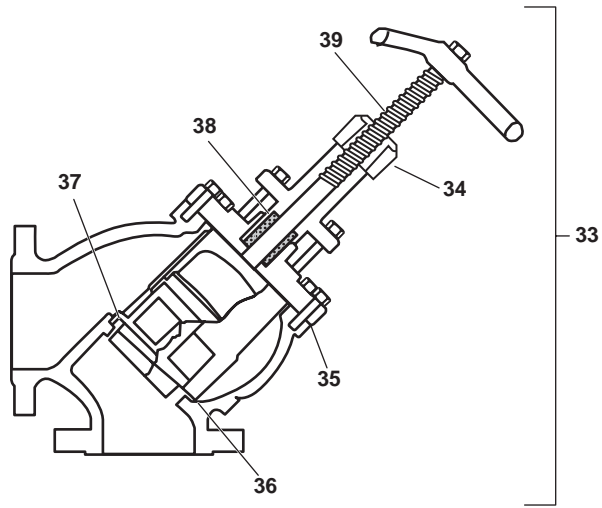
Figure 85. Ballast System Valves (Sheet 4 of 8)



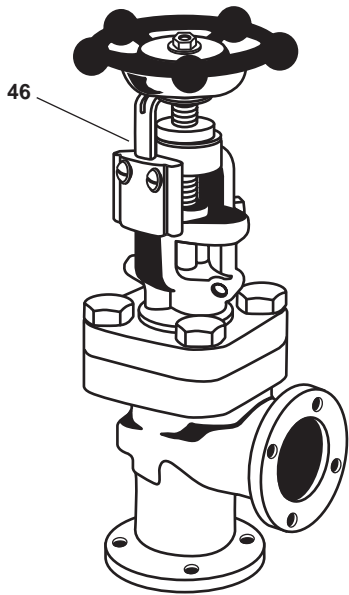


3" Threaded Ball Valve

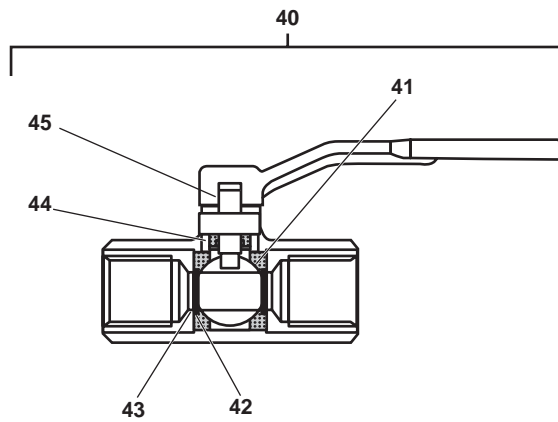
Figure 85. Ballast System Valves (Sheet 5 of 8)



3" Stop Check Valve

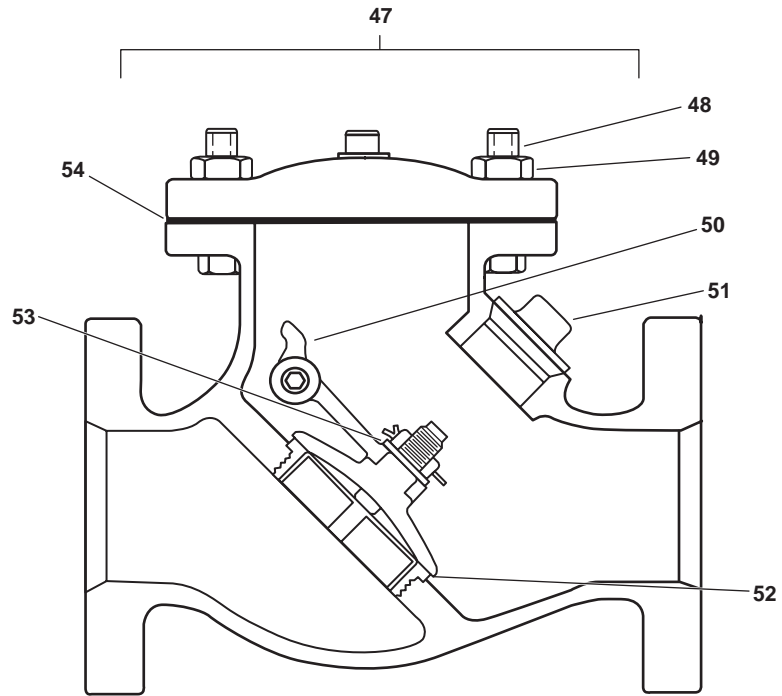


3" Angle Globe Stop Check Valve



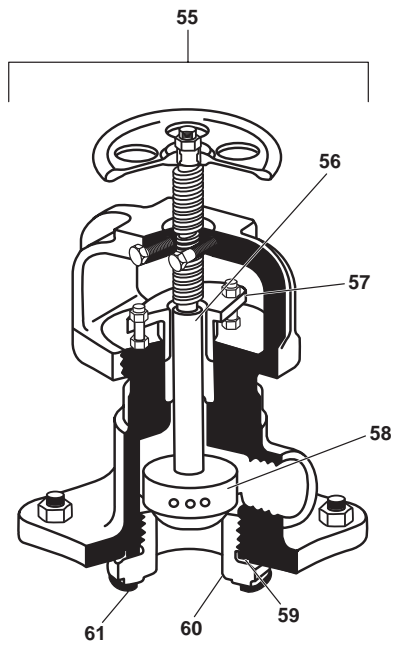
3" Ball Valve

Figure 85. Ballast System Valves (Sheet 6 of 8)

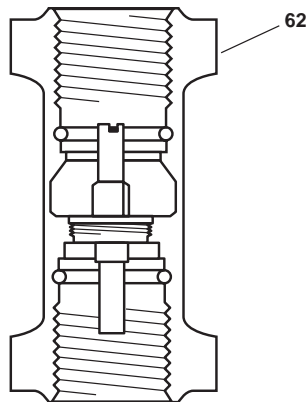


1-1/2" Flanged Check Valve

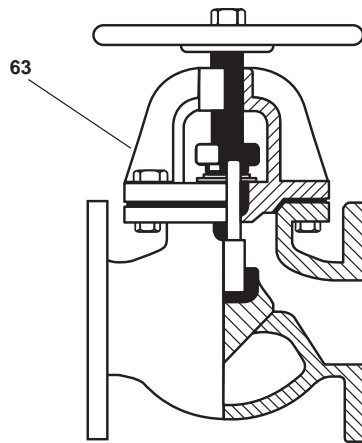
Figure 85. Ballast System Valves (Sheet 7 of 8)



3" Angle Globe Stop Check Valve



1-1/2" Vertical Lift Check Valve



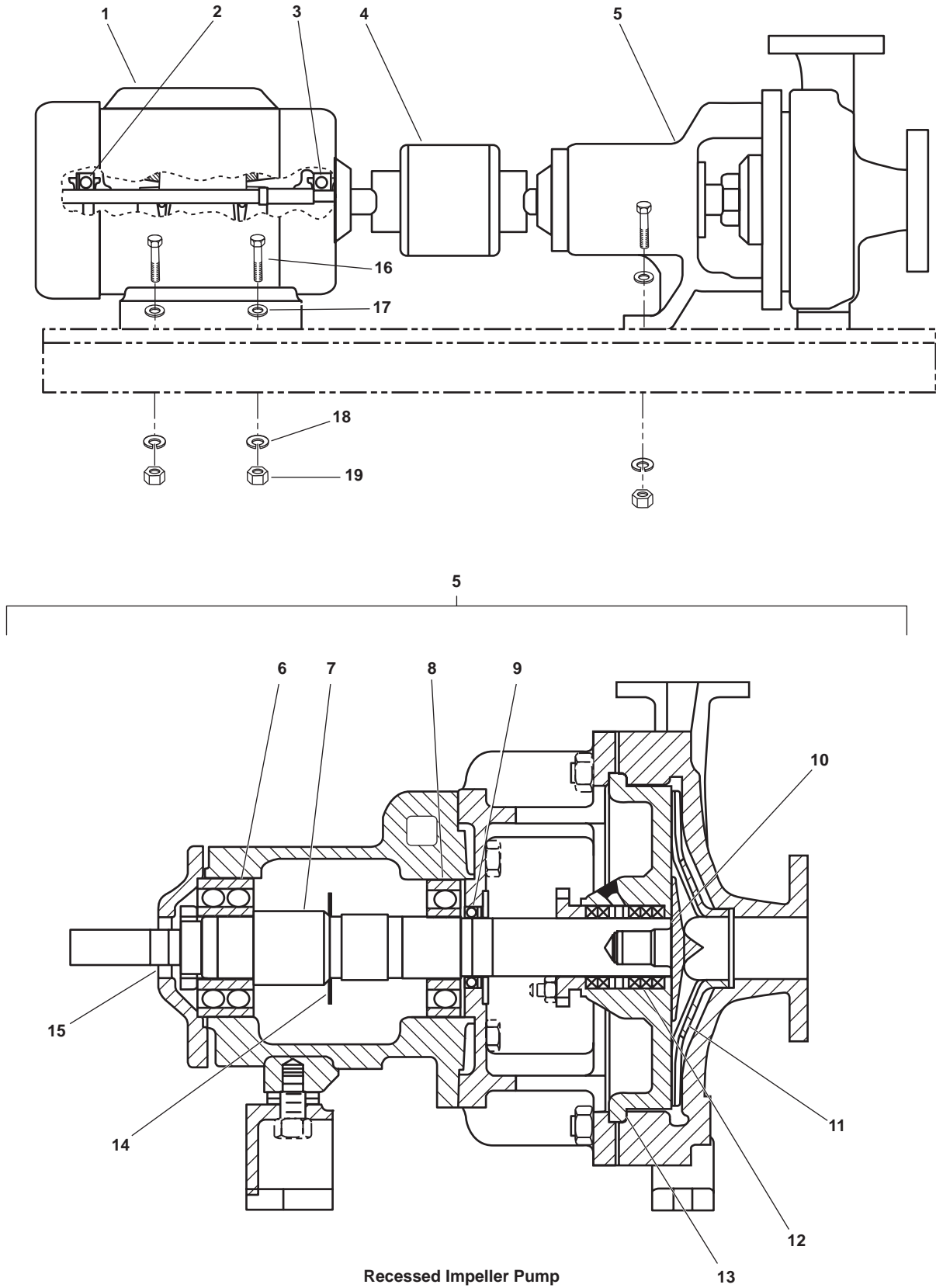
1/2" Globe Valve, Flange

Figure 85. Ballast System Valves (Sheet 8 of 8)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 050702	
					FIG 85 VALVES, BALLAST SYSTEM	
1	PFOZZ	4730-01-180-8541	73124	ST051030BFM005	STRAINER,SEDIMENT .....	1
2	PAOZZ	5330-01-234-2607	73124	ST00285	PACKING,PREFORMED .....	1
3	PFOZZ	4730-01-278-7542	73124	ST510SFXX	STRAINER,ELEMENT .....	1
4	PFOZZ	4730-01-217-0189	73124	72F-B3IN BRZ FLG.109	STRAINER,SEDIMENT .....	1
				PERF SS		
5	PAOZZ	5331-01-220-7565	73124	72F-B3INPIECE 8	O-RING .....	1
6	PFOZZ	4730-01-217-0190	73124	ST268SFXX	STRAINER ELEMENT,SE .....	1
7	PFOZZ	4820-00-138-3870	76364	1063NSC-500	VALVE,STOP CHECK .....	2
8	PAOZZ	5330-01-392-2760	81349	M24696/1-010	.GASKET .....	1
9	XDOZZ		03533	29	VALVE,CHECK,VERTICA .....	5
10	PFOZZ	4810-01-260-6973	30263	B-1221-A 2.50IN	VALVE,STOP-CHECK .....	4
11	PFOZZ	4820-01-349-7471	63220	353 3 IN.	VALVE,GATE .....	1
12	PFOZZ	4820-01-199-7887	92021	SPB-G1S-A	VALVE,BALL .....	1
13	PAOZZ	5331-01-263-1080	30263	B-122-0250 PIECE 15	.O-RING .....	1
14	PAOZZ	5330-01-263-1089	30263	B-122-0250 PIECE 5	.GASKET .....	1
15	PFOZZ	4820-01-433-2665	76364	1291-N-3IN	VALVE,CHECK .....	2
16	PFOZZ	5310-01-452-5768	76364	31134-K-380	.NUT,PLAIN .....	2
17	PFOZZ	4820-01-279-3067	76364	4405-M-160	.HINGE,SWING CHECK .....	1
18	PFOZZ	4820-01-420-1123	76364	40270-L-160	.CAP,VALVE .....	1
19	PFOZZ	4730-01-419-4779	76364	42112-K-380	.PLUG,TUBE,FITTING .....	1
20	PFOZZ	4820-01-386-4539	76364	3871-L-160	.DISK,VALVE .....	1
21	PFOZZ	5315-01-419-2962	76364	7959-E-381	.PIN,COTTER .....	1
22	PFOZZ	5310-01-419-3876	76364	38205-L-387	.WASHER,FLAT .....	1
23	PFOZZ	5315-01-419-2961	76364	5931-L-380	.PIN,STRAIGHT,HEADLE .....	1
24	PAOZZ	5330-01-419-3877	76364	66131-M-710	.GASKET .....	1
25	PFOOO	4820-01-112-3152	92021	SP-B-19-SB-2	VALVE,BALL .....	1
26	PFOZZ	4820-01-056-3488	92021	SP19-5A	.STEM,FLUID VALVE .....	1
27	PAOZZ	5330-01-048-3912	92021	SP-19-9	.PACKING,PREFORMED .....	1
28	PFOZZ	4820-01-047-5366	92021	SP-19-8B	.SEAT,VALVE .....	1
29	PAOZZ	5330-01-021-0875	92021	SP-19-13	.PACKING,PREFORMED .....	2
30	PFOZZ	4820-01-207-3761	92021	SPB-K002	.BALL,VALVE,PORTED .....	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
31	PFOZZ	5330-01-052-2236	92021	SPK-19-6	.RETAINER,PACKING .....	1
32	PFOZZ	5330-01-052-2237	92021	SPK-19-10	.RETAINER,PACKING .....	1
33	PFOOO	4810-01-442-0846	30263	MB252251E-0300	VALVE,STOP-CHECK .....	3
34	PFOZZ	4810-01-442-1046	30263	MB252251E-0300-1 0	.GLAND,PACKING,VALVE .....	1
35	PAOZZ	5330-01-442-1706	30263	MB252251E-0300-5	.GASKET .....	1
36	PFOZZ	4810-01-442-0847	30263	MB252251E-0300-6	.SEAT,VALVE .....	1
37	PFOZZ	4810-01-442-0852	30263	MB252251E-0300-7	.DISK,VALVE .....	1
38	PFOZZ	4810-01-442-1058	30263	MB252251E-0300-1 8	.INDICATOR,VALVE OPE .....	1
39	PFOZZ	4810-01-442-0857	30263	MB252251E-0300-9	.STEM,FLUID,VALVE .....	1
40	PFOOO	4820-01-271-1903	92021	SPB-39-F152	VALVE,BALL .....	1
41	PFOZZ	4820-01-207-3761	92021	SPB-K002	.BALL,VALVE,PORTED .....	1
42	PAOZZ	5330-01-021-0875	92021	SP-19-13	.PACKING,PREFORMED .....	1
43	PFOZZ	4820-01-047-5366	92021	SP-19-8B	.SEAT,VALVE .....	1
44	PAOZZ	5330-01-021-0830	92021	SP-19-9A	.PACKING .....	1
45	PFOZZ	4820-01-211-5397	92021	SPH-19-5A	.STEM,FLUID,VALVE .....	1
46	PFOZZ	4820-01-458-7276	76364	161A-036 J14	VALVE,GLOBE .....	6
47	PFOOO	4820-01-503-7541	80064	803-1385637 REV J MODIFIED	VALVE,CHECK .....	1
48	PFOZZ	5306-01-387-9294	80064	803-1385637-02-1 3	.BOLT,MACHINE .....	4
49	PFOZZ	5310-01-382-2587	80064	803-1385637 PIECE 14-2 1/2IN	.NUT,PLAIN,HEXAGON .....	4
50	PFOZZ	5342-01-127-8224	80064	803-1385637-02-0 3	.HINGE,VALVE .....	1
51	PFOZZ	4820-01-120-4094	80064	803-1385637-02-0 6	.PLUG,HINGE PIN .....	1
52	PFOZZ	4820-01-092-1800	80064	803-1385637-02X- 08	.SEAT,VALVE .....	1
53	PFOZZ	5310-01-392-9426	80064	803-1385637-02X- 19	.WASHER,FLAT .....	1
54	PAOZZ	5330-01-503-7540	76364	66174-W987	.GASKET .....	1
55	XDOOO	4820-01-270-4252	61661	71F-D17-SC-3IN	VALVE,ANGLE .....	6
56	PFOZZ	4820-01-270-6478	61661	PS-7103D7S0-7	.STEM,FLUID,VALVE .....	1
57	PFOZZ	5330-01-272-2610	61661	7103D7S0-13	.RETAINER,PACKING .....	1
58	PFOZZ	4820-01-270-4205	61661	7103D7S0-3	.DISK,VALVE .....	1
59	PAOZZ	5331-01-274-9735	61661	PS-1103D700 ITEM 13	.O-RING .....	1
60	PFOZZ	4820-01-270-2376	61661	7103D7S0-4	.SEAT,VALVE .....	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
61	PAOZZ	5330-01-272-7468	61661	PS-1103D7S0 ITEM 8	.GASKET .....	1
62	XDOZZ		37239	418	VALVE,CHECK,VERTICA .....	1
63	PAOZZ	4820-01-192-2897	76364	162A-002H 1/2IN	VALVE,GLOBE .....	1
<b>END OF FIGURE</b>						



Recessed Impeller Pump

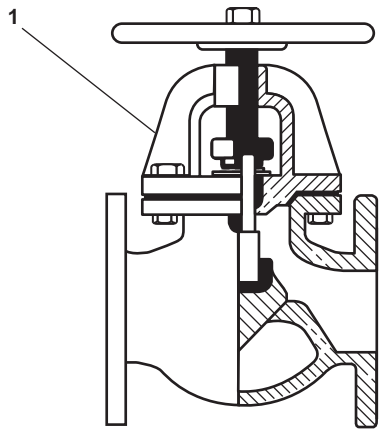
Figure 86. Ballast Pump



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 050703	
					FIG 86 PUMP, BALLAST	
1	XDFZZ		50380	P21G391	MOTOR,ALTERNATING C .....	2
2	PFOZZ	3110-00-554-3425	58536	AA59584-106JACT	.BEARING,BALL,ANNULA .....	1
3	PFOZZ	3110-01-246-0827	03950	111X03502X0020	.BEARING,BALL,ANNULA .....	1
4	PAFZZ	3010-00-888-9213	75665	L150	COUPLING,SHAFT,FLEX .....	1
5	XDOHH		07CU5	2X1-1/2-10A6-1/2	PUMP,RECESSED IMPEL .....	2
6	XDFZZ		07CU5	2K121-SR	.BEARING,BALL,OUTBD .....	1
7	XDFZZ		07CU5	2U105-2205	.SHAFT .....	1
8	XDFZZ		07CU5	2Z120-SR	.BEARING,BALL,INBOAR .....	1
9	XDFZZ		07CU5	2Z118-TSSR	.SEAL,OIL,INBOARD .....	1
10	XDFZZ		07CU5	2Z104-TFR	.GASKET,IMPELLER .....	1
11	XDFZZ		07CU5	AH103RV-CD4M	.IMPELLER .....	1
12	XDFZZ		07CU5	2Z113-TFGP	.PACKING,PREFORMED .....	2
13	XDFZZ		07CU5	AH107-TFE	.GASKET,REAR COVER .....	1
14	XDFZZ		07CU5	2Y122-SR	.SLINGER,OIL .....	1
15	XDFZZ	5330-01-340-5558	07CU5	2Z129	.SEAL,OIL,OUTBD .....	1
16	PAOZZ	5305-01-422-8601	96906	MS35307-472S316	SCREW,CAP,HEXAGON H .....	8
17	PAOZZ	5310-01-387-0525	80205	MS15795-820CRES3 16	WASHER,FLAT .....	16
18	PAOZZ	5310-01-389-7640	96906	MS35338-145	WASHER,LOCK .....	8
19	PAOZZ	5310-00-764-6609	96906	MS51971-7	NUT,PLAIN,HEXAGON .....	8
<b>END OF FIGURE</b>						



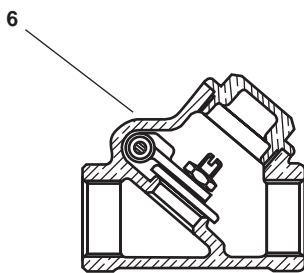




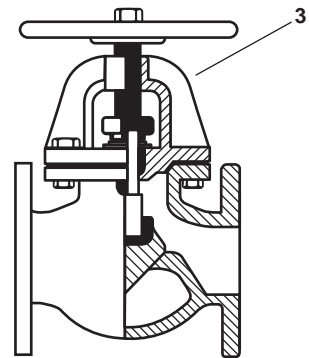
1-1/4" Globe Stop Check Valve



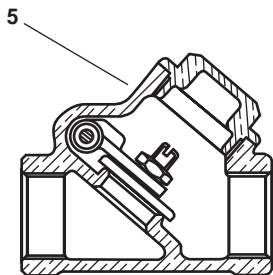
1-1/2" Globe Hose Angle Valve



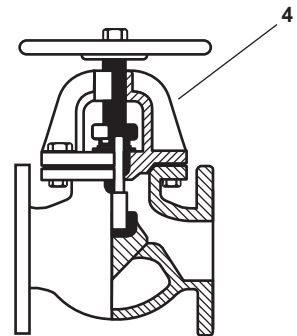
3/8" Swing Check Valve



3/4" Globe Stop Check Valve

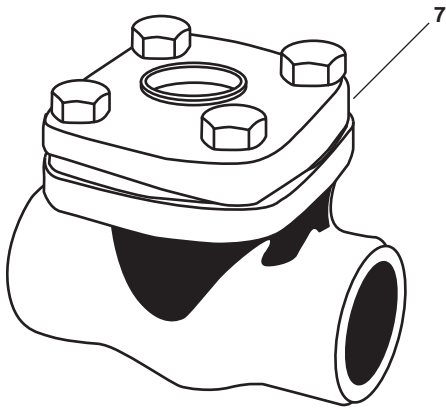


1/2" Swing Check Valve

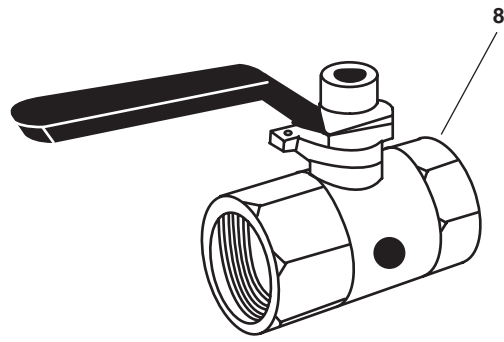


1/2" Globe Stop Check Valve

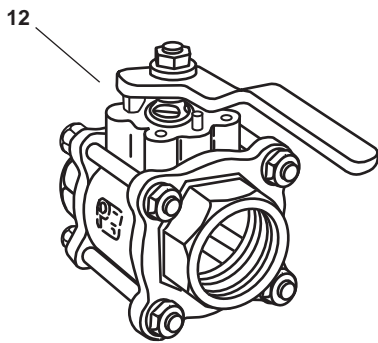
Figure 87. Potable Water System (Sheet 1 of 3)



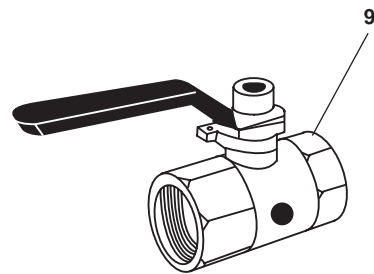
1-1/2" Swing Check Valve



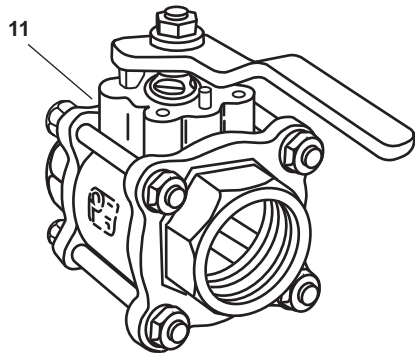
1/2" Threaded Ball Valve



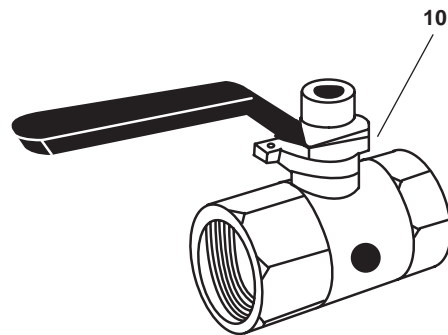
3/4" Threaded Ball Valve



1/2" Threaded Ball Valve

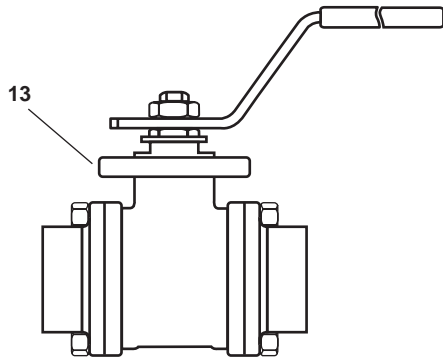


1" Threaded Ball Valve

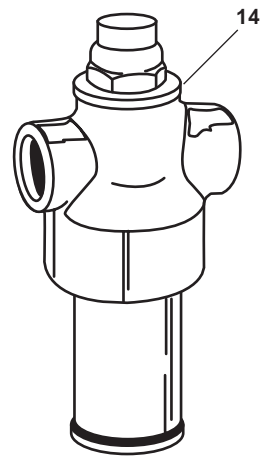


1-1/4" Threaded Ball Valve

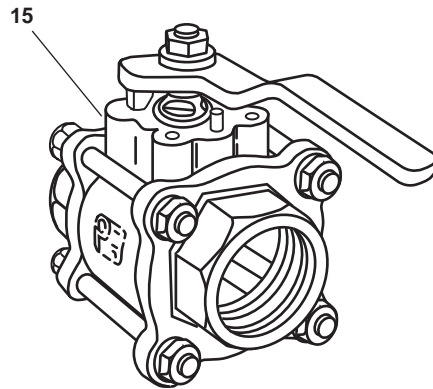
Figure 87. Potable Water System (Sheet 2 of 3)



1-1/2" Threaded Ball Valve



3/8" Pressure Reducing Valve



1/4" Ball Valve

Figure 87. Potable Water System (Sheet 3 of 3)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0516	
					FIG 87 POTABLE WATER SYSTEM	
1	XDOZZ		0WLX8	112301.100	VALVE,GLOBE .....	5
2	XDOZZ		0WLX8	055401.300.MT	VALVE,ANGLE,HOSE .....	1
3	XDOZZ		0WLX8	112301.150	VALVE,GLOBE .....	2
4	XDOZZ		0WLX8	112301.250	VALVE,GLOBE .....	5
5	XDOZZ		0WLX8	112501-100	VALVE,SWING CHECK .....	5
6	XDOZZ		0WLX8	112501.060	VALVE,SWING CHECK .....	1
7	XDOZZ		0WLX8	112501.300	VALVE,SWING CHECK .....	1
8	XDOZZ		0WLX8	375202.040	VALVE,BALL .....	3
9	XDOZZ		0WLX8	375202.100	VALVE,BALL .....	35
10	XDOZZ		0WLX8	375202.150	VALVE,BALL .....	1
11	XDOZZ		0WLX8	375202.200	VALVE,BALL .....	10
12	XDOZZ		0WLX8	375202.250	VALVE,BALL .....	1
13	XDOZZ		0WLX8	375202.300	VALVE,BALL .....	8
14	XDOZZ		79227	26AB	VALVE,PRESSURE REDU .....	1
15	PFOZZ	4820-01-417-8493	92021	SPB-DIS-A-L	VALVE,BALL .....	1
					<b>END OF FIGURE</b>	

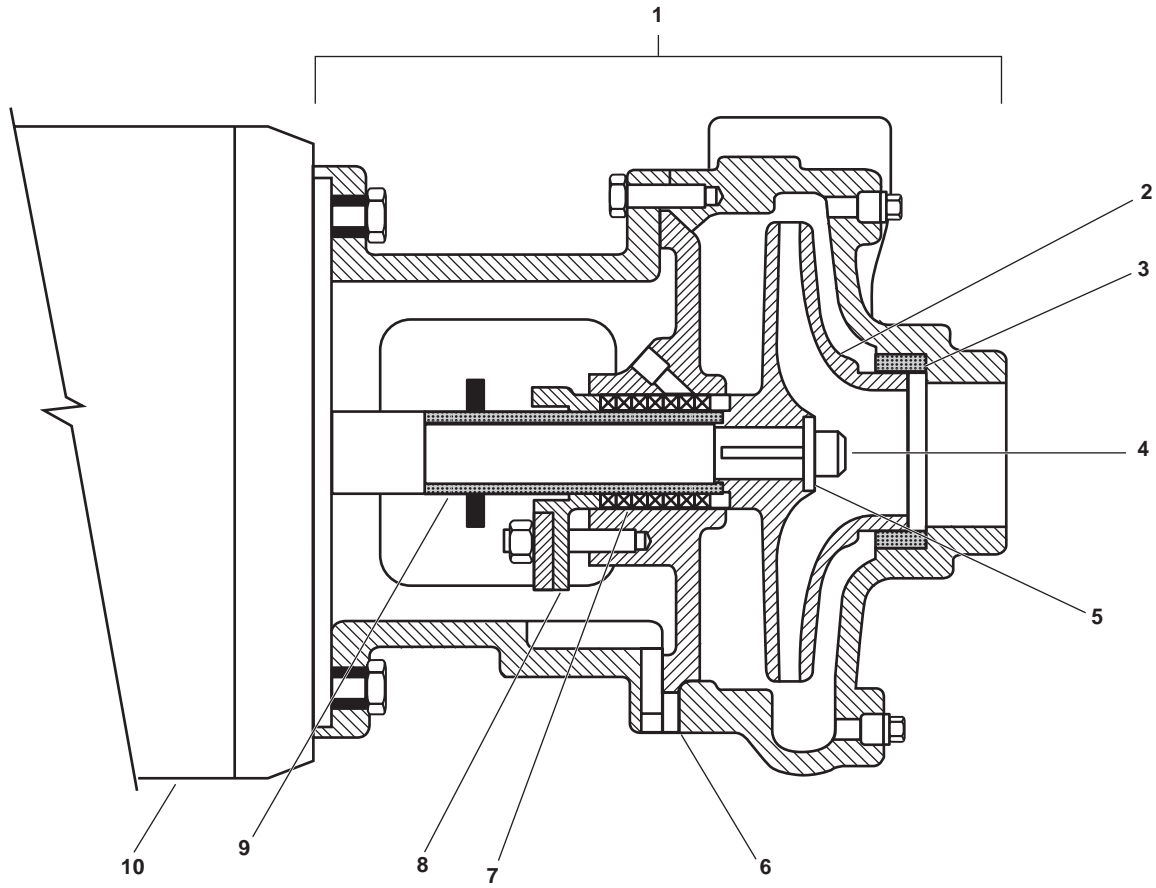


Figure 88. Potable Water Pump



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 051603	
					FIG 88 POTABLE WATER PUMP	
1	XDOFF		45396	10-10707-150062- 2621	PUMP UNIT,CENTRIFUG POTABLE WATER PUMP .....	2
2	PAFZZ	4320-01-195-6993	45396	03012358B	.IMPELLER,PUMP,CENTR .....	1
3	PAFZZ	4320-00-001-3480	45396	04006197B	.RING,WEARING .....	1
4	PAFZZ	5305-00-057-3969	45396	08023447H303	.SCREW,CAP .....	1
5	PAFZZ	5310-00-397-5320	45396	10006510B	.WASHER .....	1
6	PAFZZ	5330-01-082-0755	55985	17032665G4	.GASKET .....	1
7	PAFZZ	5330-00-406-5214	45396	13031761	.PACKING,PREFORMED .....	1
8	PAFZZ	5330-01-069-9250	45396	61025033L	.RETAINER,PACKING .....	1
9	PAFZZ	4320-00-487-9320	45396	05008976B	.SLEEVE,SHAFT,PUMP .....	1
10	PAOZZ		05472	JMM3559T	MOTOR,ALTERNATING C.....	1
<b>END OF FIGURE</b>						

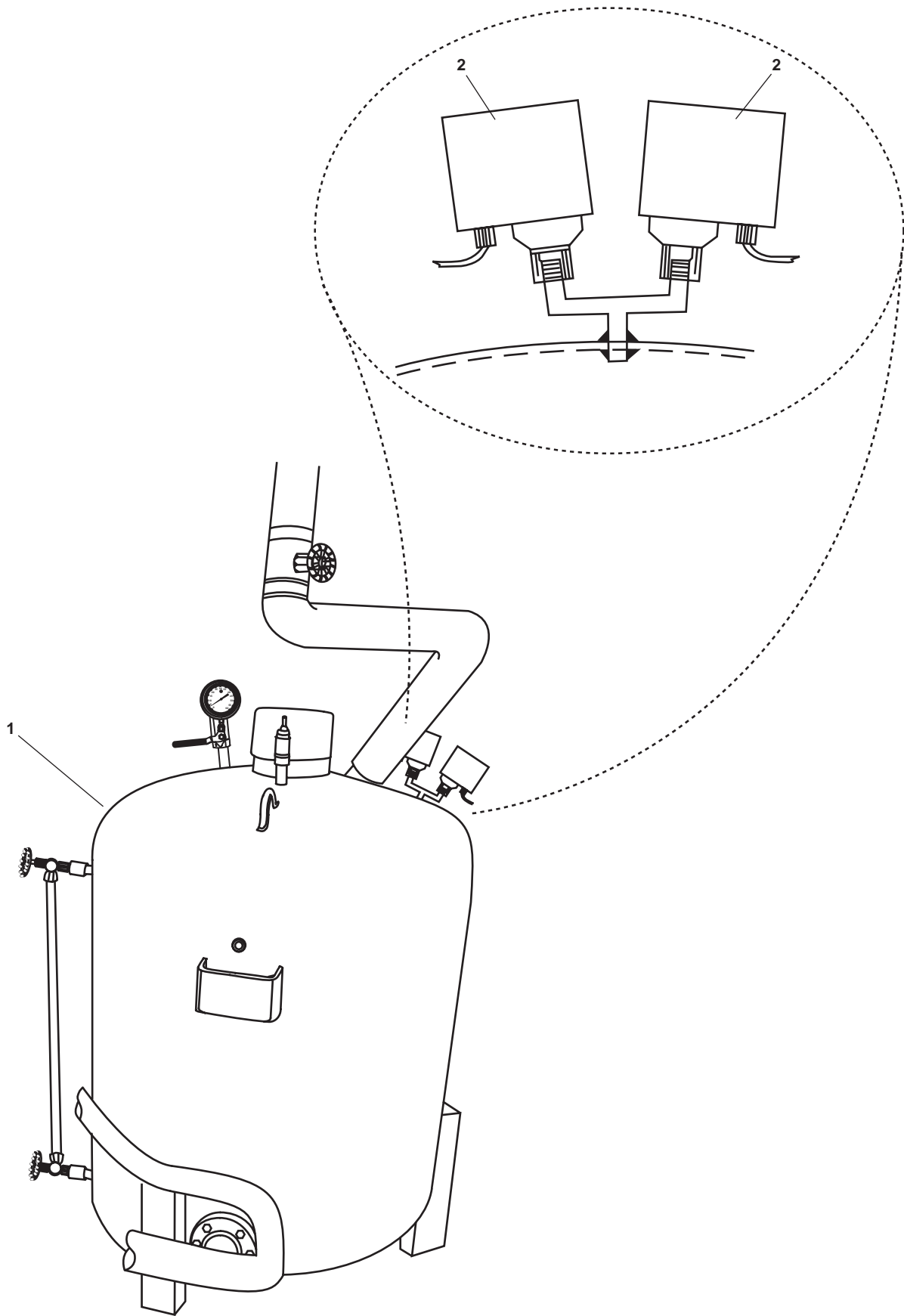
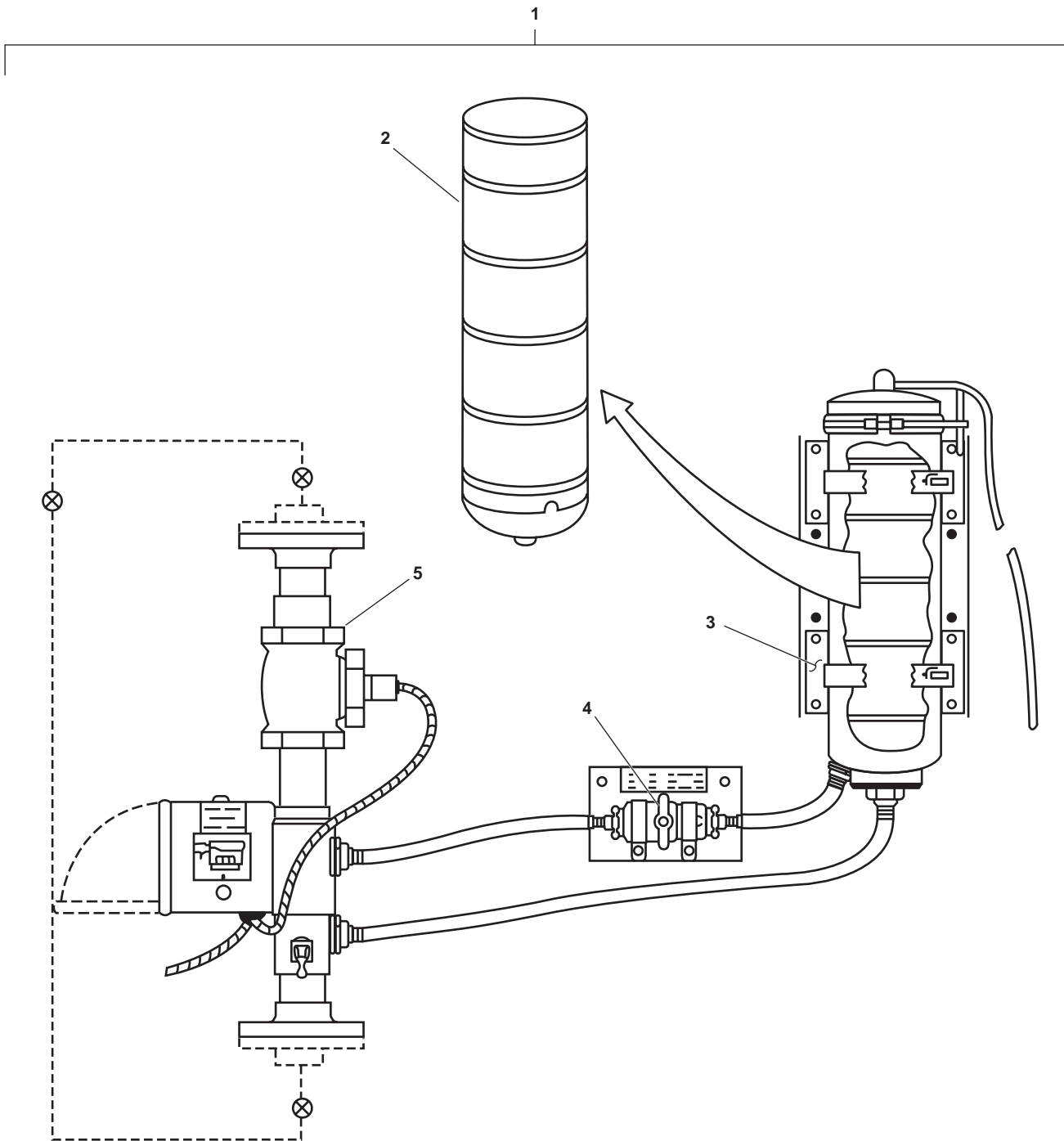


Figure 89. Hydroneumatic Tank

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 051605	
					FIG 89 TANK, HYDRONEUMATIC	
1	PDFZZ		09647	538-A-7926	TANK, HYDROPNEUMATIC .....	1
2	PAOZZ	5930-01-350-9415	09647	732-A-7774 ITEM 2	SWITCH, PRESSURE .....	2
					<b>END OF FIGURE</b>	



Bromine Feeder Assembly

Figure 90. Proportioning Bromide Feeder System (Sheet 1 of 3)

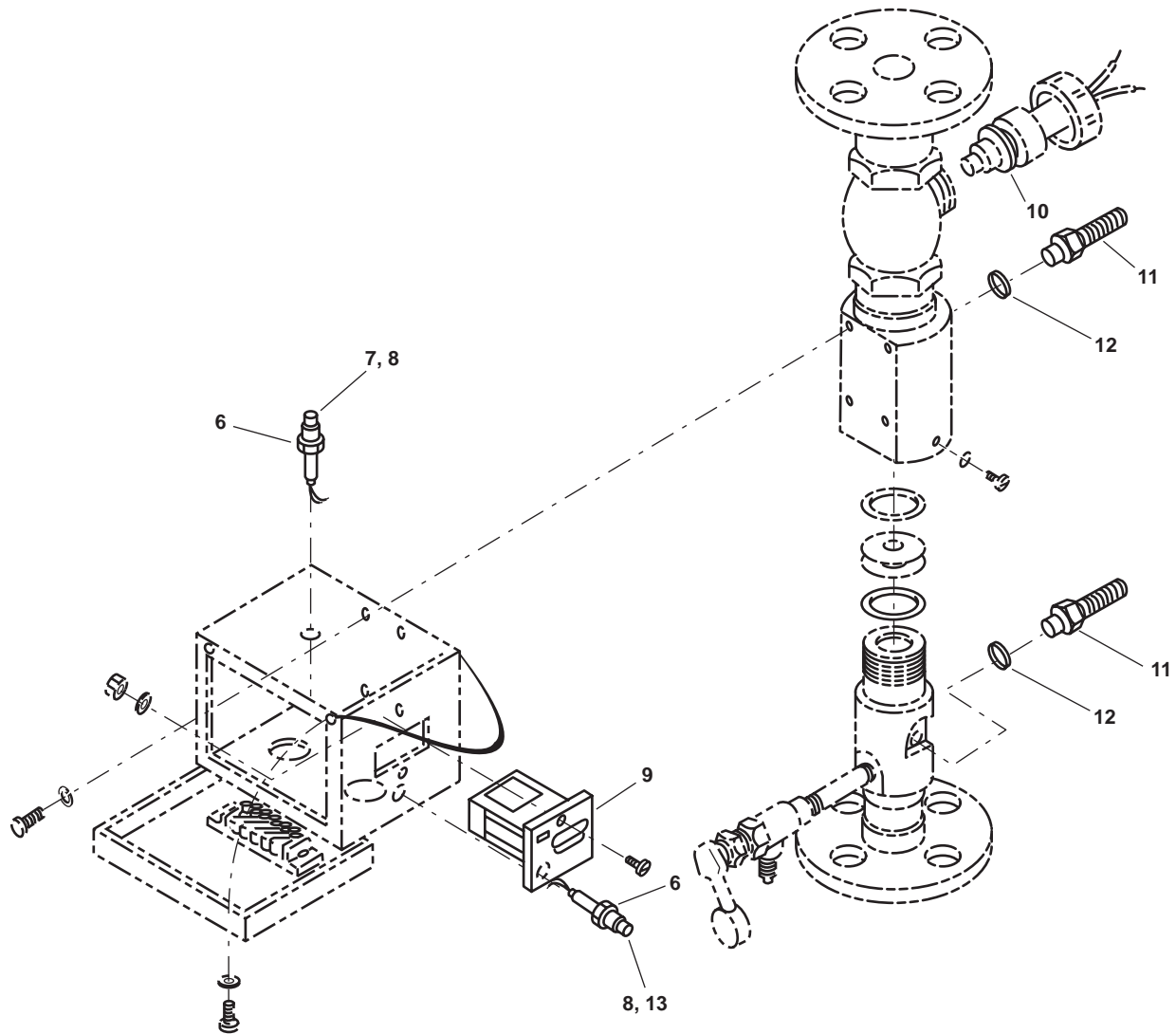


Figure 90. Proportioning Bromide Feeder System (Sheet 2 of 3)

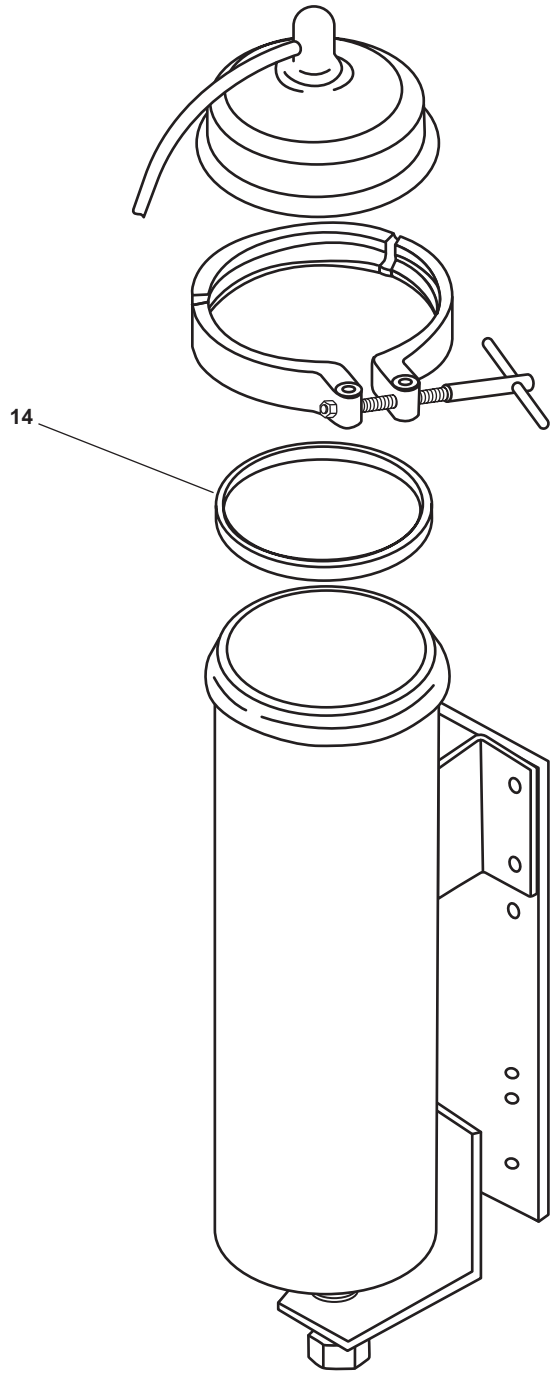


Figure 90. Proportioning Bromide Feeder System (Sheet 3 of 3)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 051606	
					FIG 90 PROPORTIONING BROMIDE FEEDER SYSTEM	
1	PDOOO	4230-01-354-5426	08576	9065-04	PROPORTIONER,FOAM .....	1
2	PAOZZ	4610-01-022-9970	08576	9540-01	.CARTRIDGE,WATER,DEM CARTRIDGE, WATER,DEMINERALIZER, ION EXCHANGE .....	1
3	PDOZZ	4610-01-177-2413	08576	4656-00	.FEEDER ASSEMBLY CARTRIDGE, WATER,DEMINERALIZER,ION EXCHANGE .....	1
4	PDOZZ	4820-01-296-5700	08576	3035-13	.VALVE,BALL .....	1
5	PAOZZ	4230-01-354-5427	08576	3037-41	.PROPORTIONER,FOAM L BYPASS CONNECTION ASSEMBLY .....	1
6	PAOZZ	6210-01-206-6443	95405	FPS320	.FIXTURE,LIGHTING .....	1
7	PAOZZ	6210-01-234-0167	58854	30147	.LENS,LIGHT .....	1
8	PAOZZ	6240-00-014-2306	58536	AA52463-A03	.LAMP,INCANDESCENT .....	1
9	PAOZZ	6645-01-162-8023	08576	3007-10	.METER,TIME TOTALIZI .....	1
10	PAOZZ	5331-00-007-6143	81343	MS29513-023	.O-RING .....	1
11	PAOZZ	4730-01-162-6353	08576	4807-00	.ADAPTER,STRAIGHT,HO .....	2
12	PAOZZ	5330-01-385-6370	81349	M83248/1-017	.PACKING,PREFORMED .....	2
13	PAOZZ	6210-00-935-6980	88204	NAED 320990	.LENS,LIGHT .....	1
14	PAOZZ	5330-01-480-0664	08576	0344-00	.GASKET .....	1
					<b>END OF FIGURE</b>	

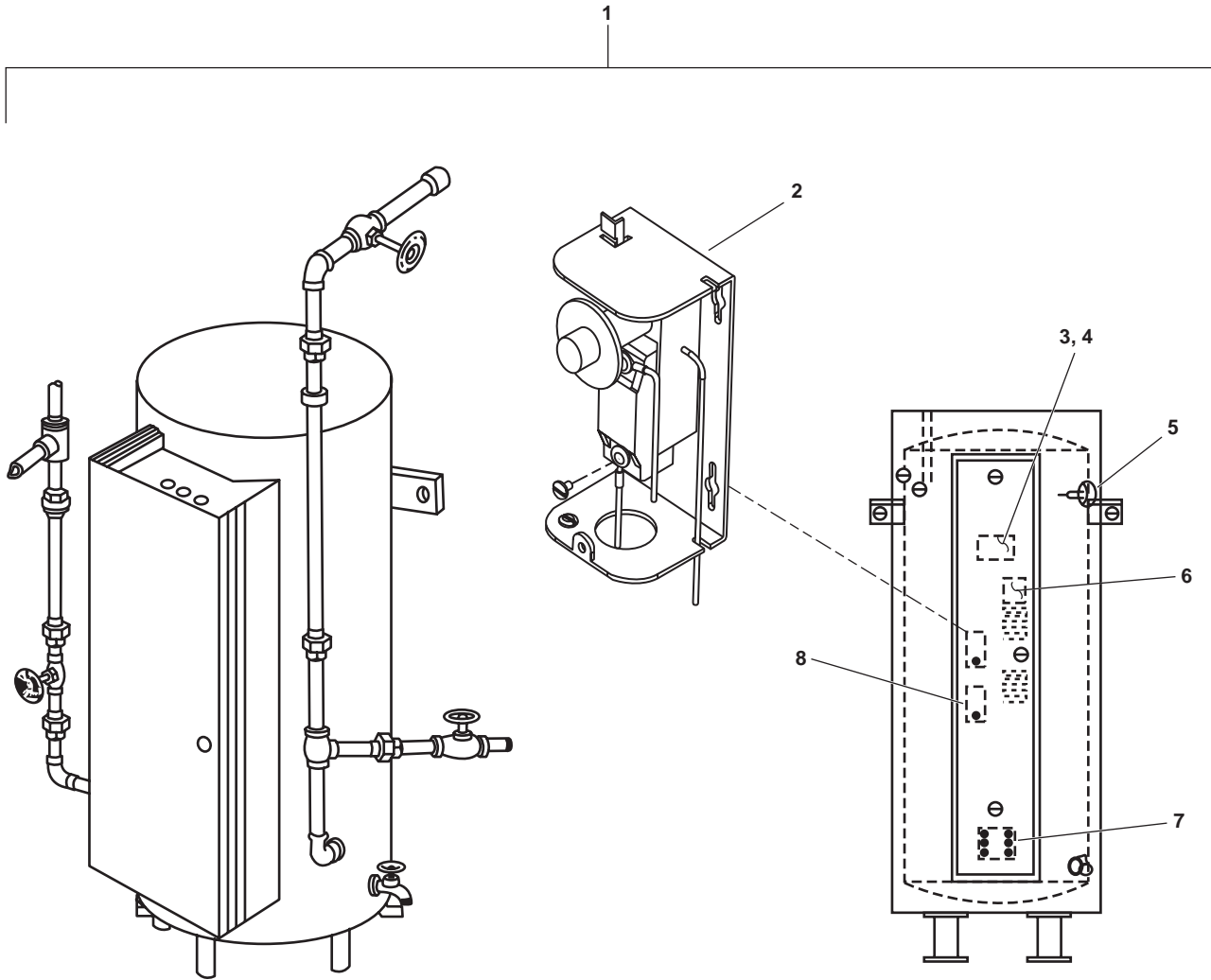
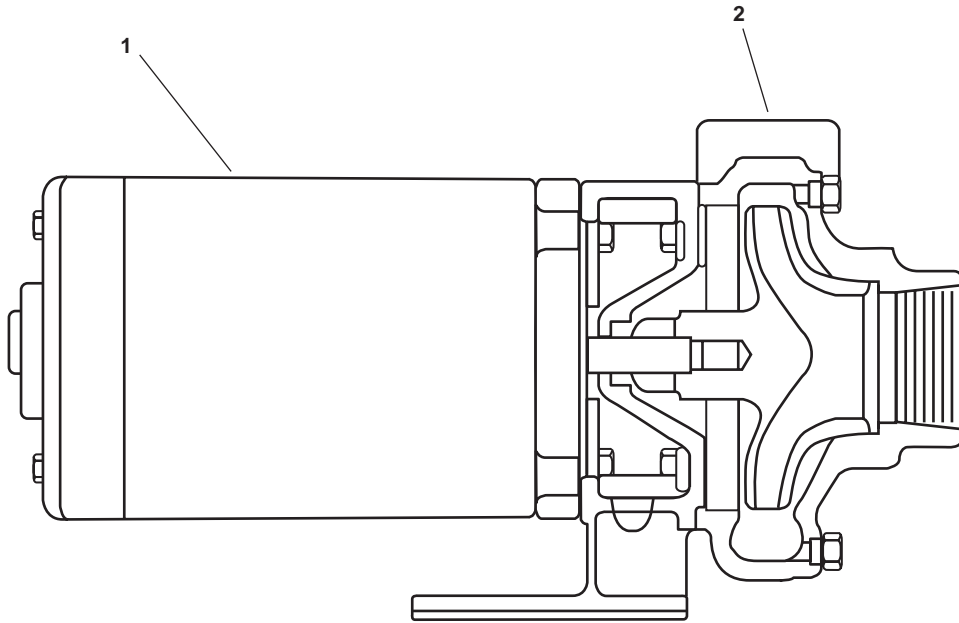


Figure 91. Hot Water Heater



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 051607	
					FIG 91 HEATER, HOT WATER	
1	PFOOO	4520-01-351-0220	19857	SE80-0-10SLT4	HEATER,WATER,ELECTR.....	2
2	PFOZZ	5930-00-448-6489	92578	A19ADB1	.SWITCH,THERMOSTAT.....	2
3	PFOZZ	6110-01-353-5812	19857	2200EB230AA-80	.CONTACTOR,MAGNETIC.....	2
4	PAOZZ	5920-01-167-9026	19857	FNW-15	.FUSE,CARTRIDGE,15A.....	3
5	XDOZZ		19857	30E160R090	.THERMOMETER,0-250F.....	1
6	PAOZZ	5920-01-483-2282	19857	TRM-3	.FUSE,CARTRIDGE,3A.....	3
7	PFOZZ	4540-01-324-0988	19857	6-38683N	.HEATING ELEMENT,IMM.....	1
8	PFOZZ	5930-01-248-9322	92578	73-8052 PIECE 3	.SWITCH,THERMOSTAT.....	1
					<b>END OF FIGURE</b>	



**Figure 92. Hot Potable Water Recirculation Pump**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 051608	
					FIG 92 HOT POTABLE WATER RECIRCULATION PUMP	
1	XDOZZ		05472	JM3463	MOTOR,ALTERNATING C.....	1
2	XDOFF		80887	10-12501-100061- 2381T	PUMP,CENTRIFUGAL HOT WATER RECIRC PUMP .....	2
					<b>END OF FIGURE</b>	



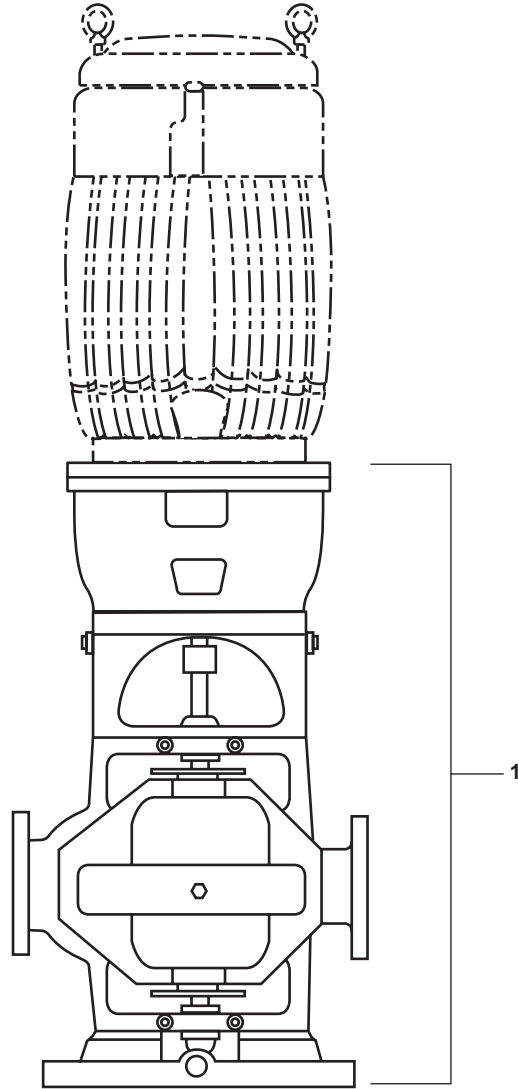


Figure 93. Fire and General Service Pump (Sheet 1 of 4)

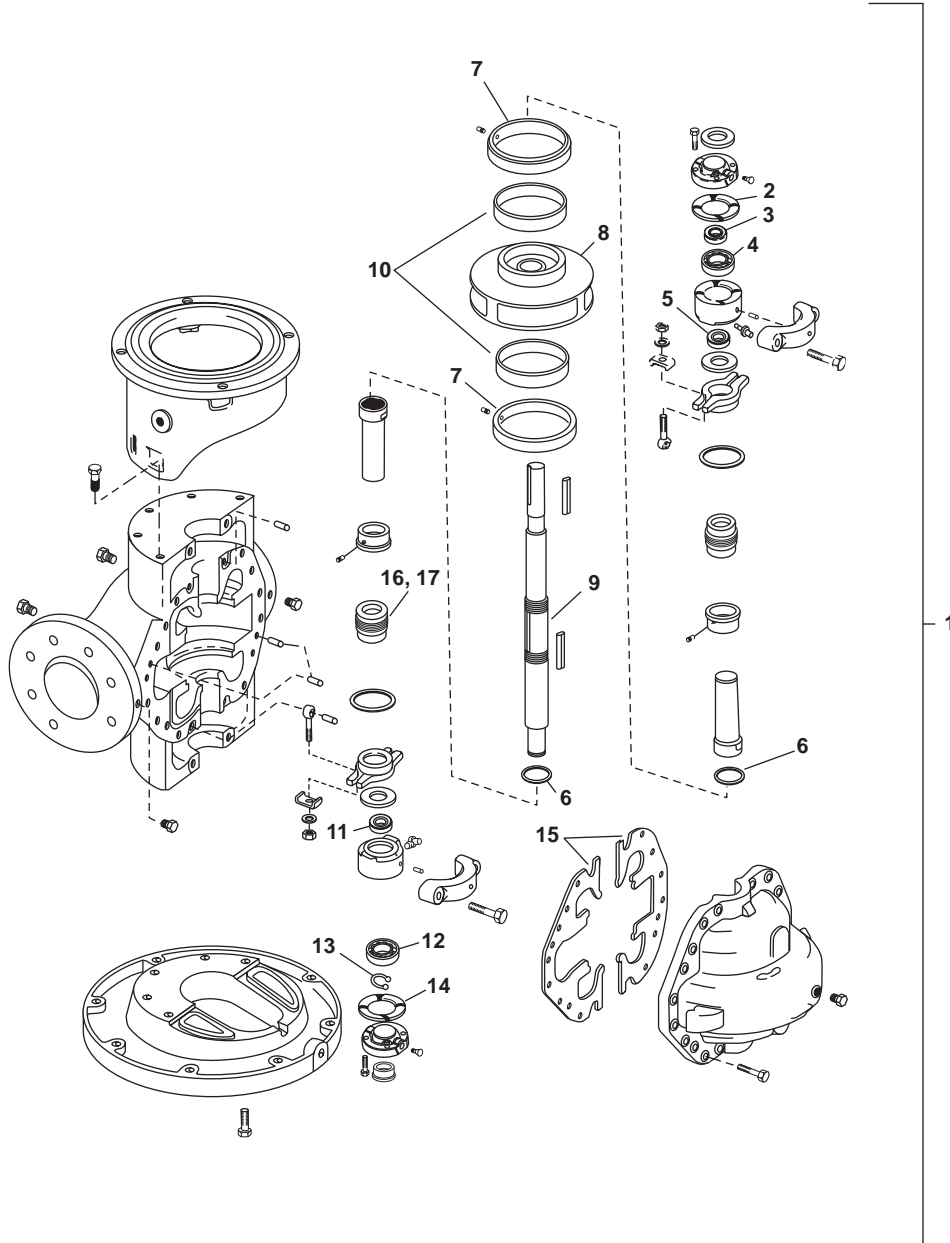


Figure 93. Fire and General Service Pump (Sheet 2 of 4)

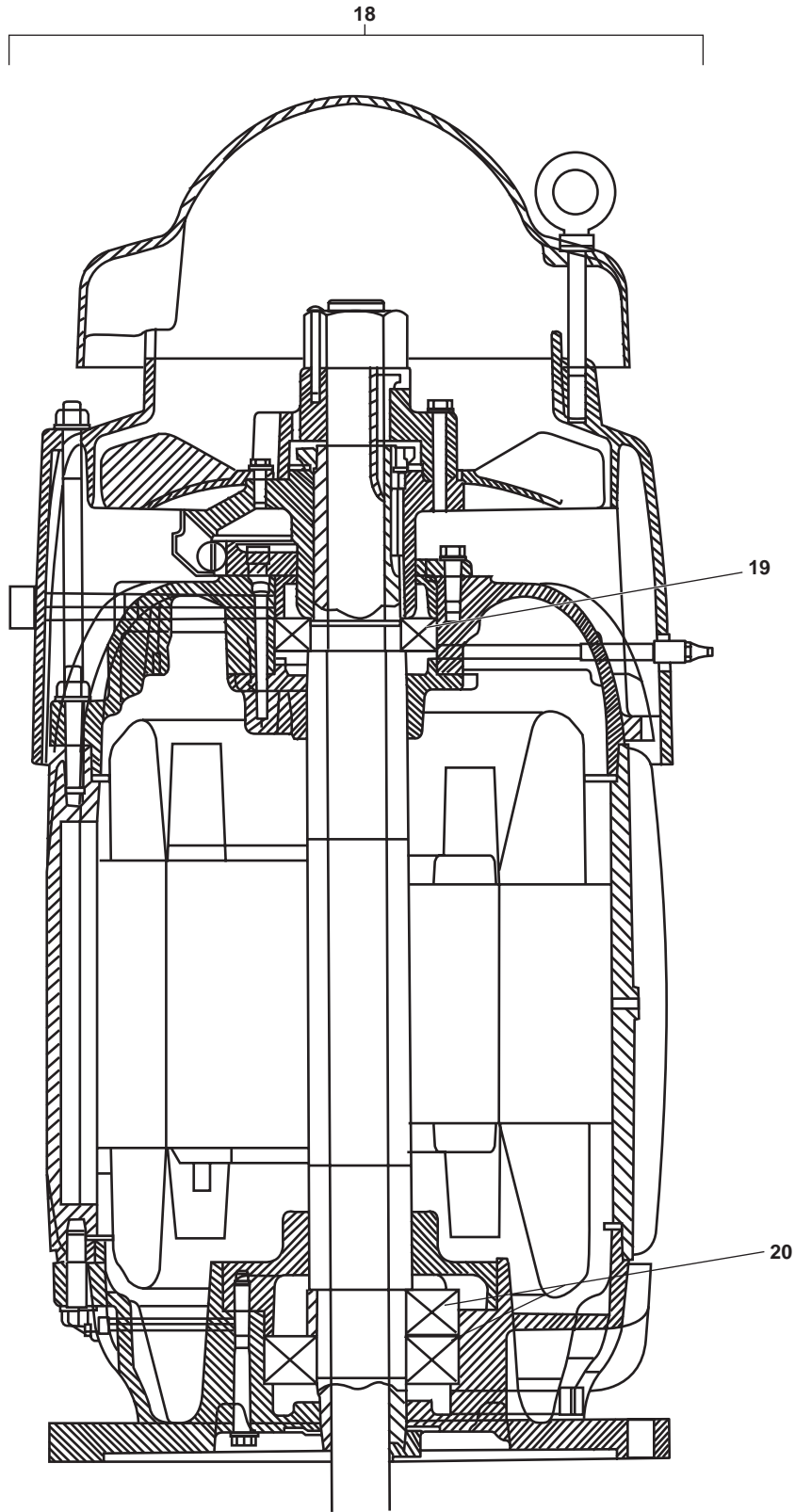
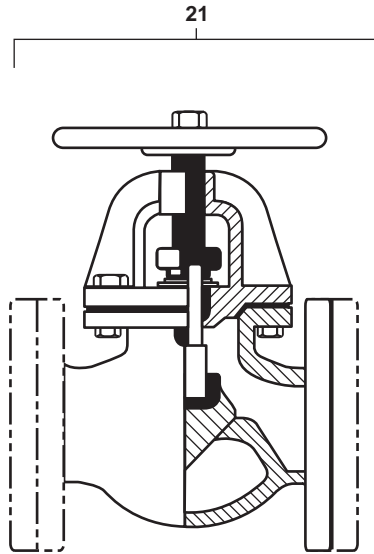


Figure 93. Fire and General Service Pump (Sheet 3 of 4)



1-1/2" Globe Valve, Flanged

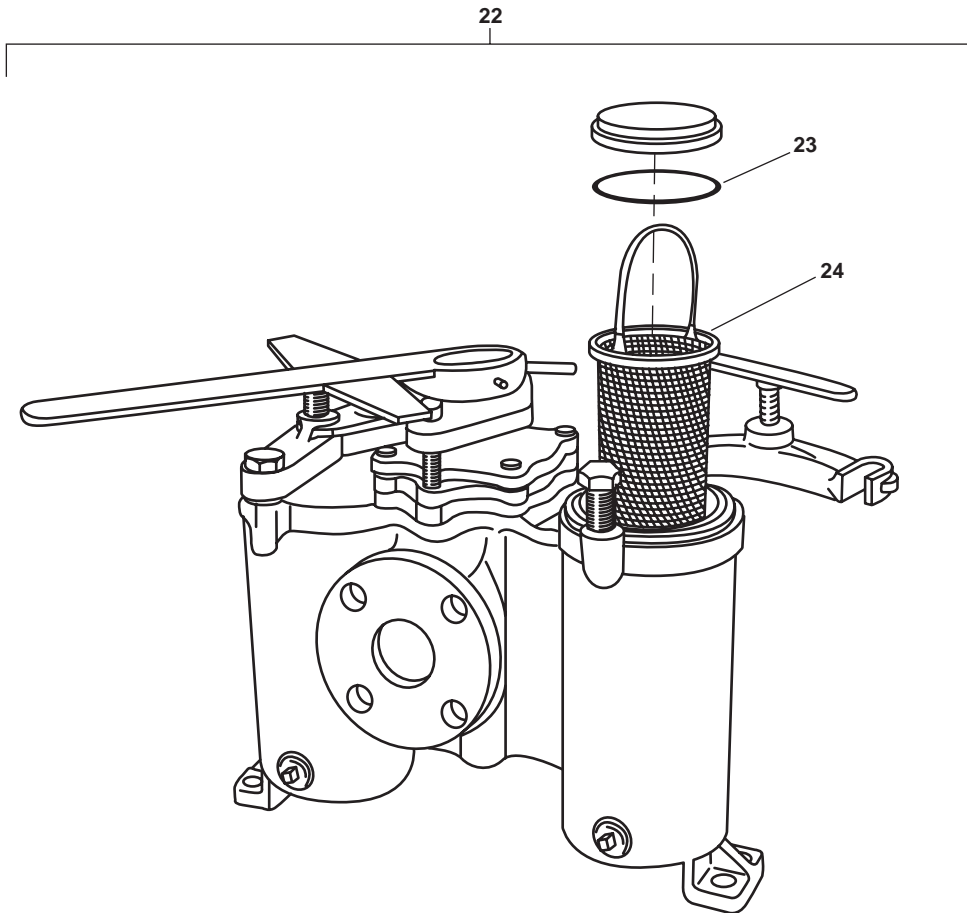


Figure 93. Fire and General Service Pump (Sheet 4 of 4)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0517	
					FIG 93 FIRE AND GENERAL SERVICE PUMP	
1	XDFFF		04579	413AB 2X2.5X9	PUMP,CENTRIFUGAL FIRE AND GENERAL SERVICE PUMP .....	2
2	PAFZZ	5330-00-146-2735	04579	3641308614	.GASKET .....	1
3	PAFZZ	5330-01-339-8819	04579	7126321653	.SEAL,PLAIN,ENCASED .....	1
4	PAFZZ	3110-01-339-9525	04579	0681905647	.BEARING,BALL,ANNULA .....	1
5	PAFZZ	5330-00-146-7307	04579	7126322653	.SEAL,OIL .....	1
6	PAFZZ	5331-00-606-8994	04579	3630417457	.O-RING .....	2
7	PAFZZ	4320-00-147-1718	04579	6761744208	.RING,WEARING .....	2
8	XDFZZ		04579	4432104225	.IMPELLER,PUMP,CENTR .....	1
9	PFZZ	4320-01-346-1818	04579	7280945104	.SHAFT,TRANSMISSION .....	1
10	XDFZZ		04579	6762043208	.RING,IMPELLER .....	2
11	PAFZZ	5330-00-146-7307	04579	7126322653	.SEAL,OIL .....	1
12	PAFZZ	3110-00-156-4673	52676	5303RH	.BEARING,BALL,ANNULA .....	1
13	PAFZZ	5325-01-346-0356	04579	676-0440-088	.RING,RETAINING .....	1
14	PAFZZ	5330-00-146-2735	04579	3641308614	.GASKET .....	1
15	PAFZZ	5330-00-146-2814	04579	364-1262-598	.GASKET .....	1
16	PAFZZ	5330-00-239-4802	04579	7120907764	.SEAL,PLAIN .....	2
17	PAFZZ		04579	3640328457	.O-RING .....	1
18	XDFHH		92940	672348/W07W14503 32R-2	MOTOR,ALTERNATING C .....	1
19	PAHZZ	3110-00-554-3078	92940	6210ZJ	.BEARING,BALL,ANNULA BEARING, BALL,ANNULAR,UPPER END .....	1
20	PAFZZ	3110-00-752-7775	92940	6311ZC3	.BEARING,BALL,ANNULA BEARING, BALL,ANNULAR,LOWER END .....	1
21	PFOZZ	4820-01-400-2076	76364	1306-007-300	VALVE,GATE .....	3
22	XDOOO		76372	MODEL 53 BTX 3 IN.	STRAINER,SEDIMENT .....	2
23	XDOZZ		76372	2375011993	.O-RING .....	2
24	XDOZZ		76372	MODEL 53 BTX BASKET - 3 IN.	.ELEMENT,STRAINER .....	2
					<b>END OF FIGURE</b>	





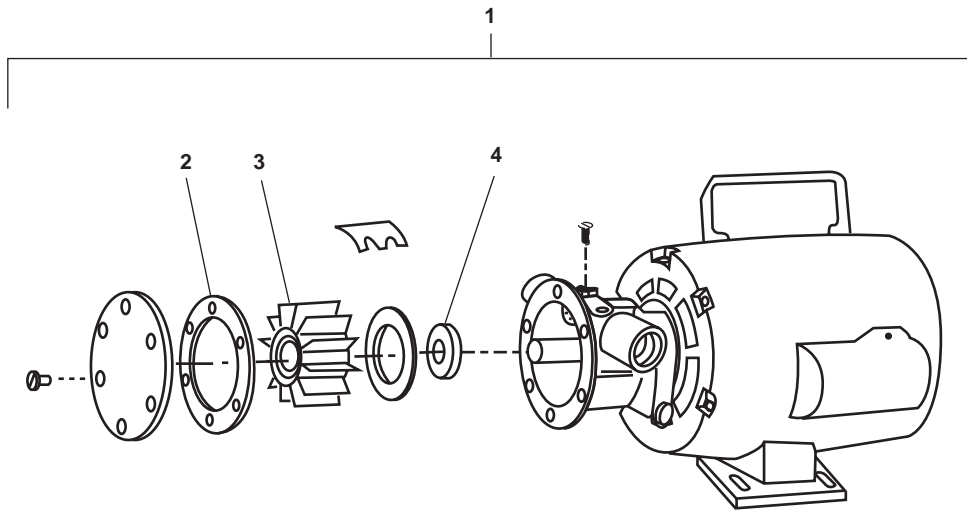


Figure 94. Damage Control Equipment (1 of 3)

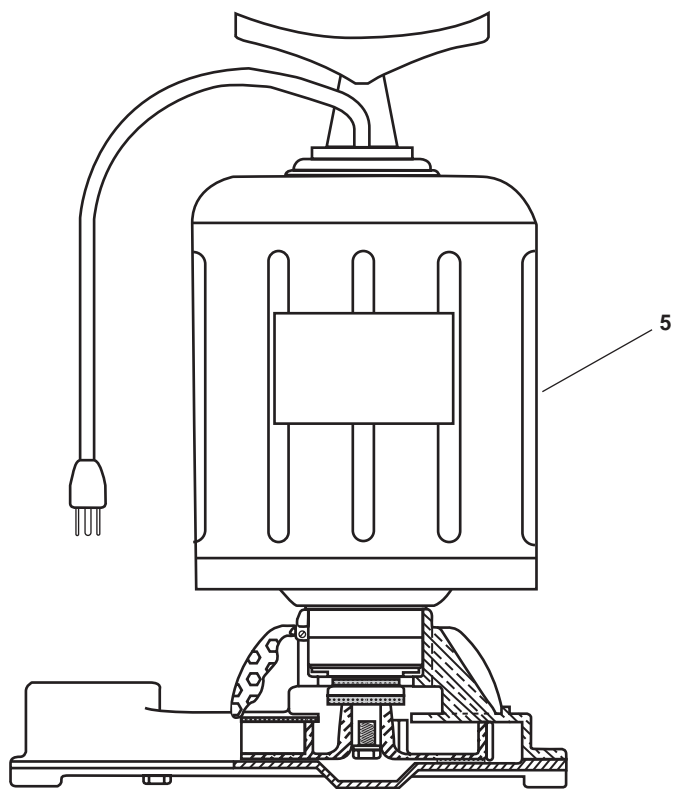


Figure 94. Damage Control Equipment (2 of 3)

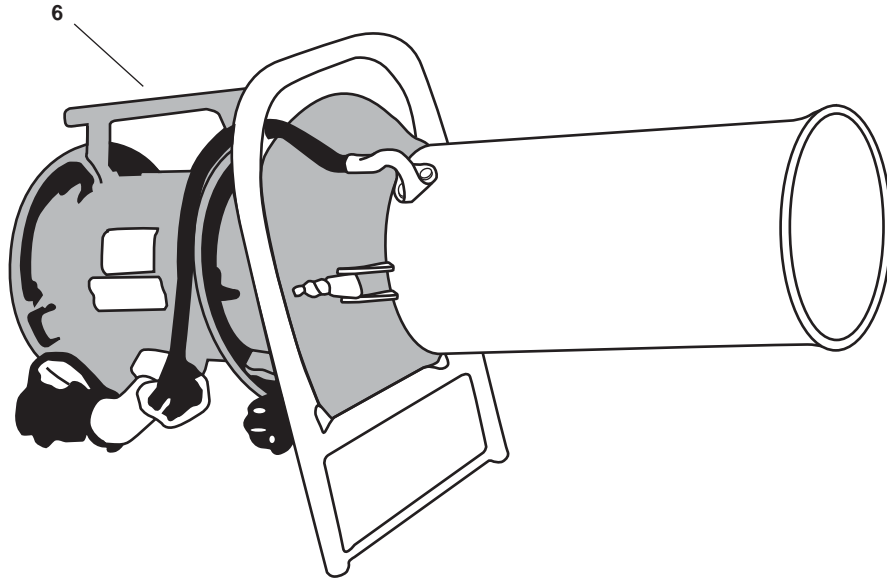


Figure 94. Damage Control Equipment (3 of 3)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0603	
					FIG 94 DAMAGE CONTROL EQUIPMENT	
1	PAOOO	4320-00-986-7312	31425	11810-0003	PUMP UNIT,CENTRIFUG PUMP UNIT,POR- TABLE, NON-SUBMERSIBLE .....	1
2	PAOZZ	5330-00-364-9458	31425	11816-0000	.GASKET .....	1
3	PFOZZ	4320-00-948-6725	31425	5929-0003	.IMPELLER,PUMP,CENTR .....	1
4	PAOZZ	5330-00-948-6724	31425	92700-0420	.SEAL,PLAIN EMCASED .....	1
5	PAOZZ	4320-00-437-0046	91972	MODEL B	PUMP UNIT,CENTRIFUG .....	2
6	PAOZZ	4140-01-333-2224	52081	2000 MODEL WF-20	FAN,VANEAXIAL BLOWER, WATER DRIVEN .....	1
					<b>END OF FIGURE</b>	





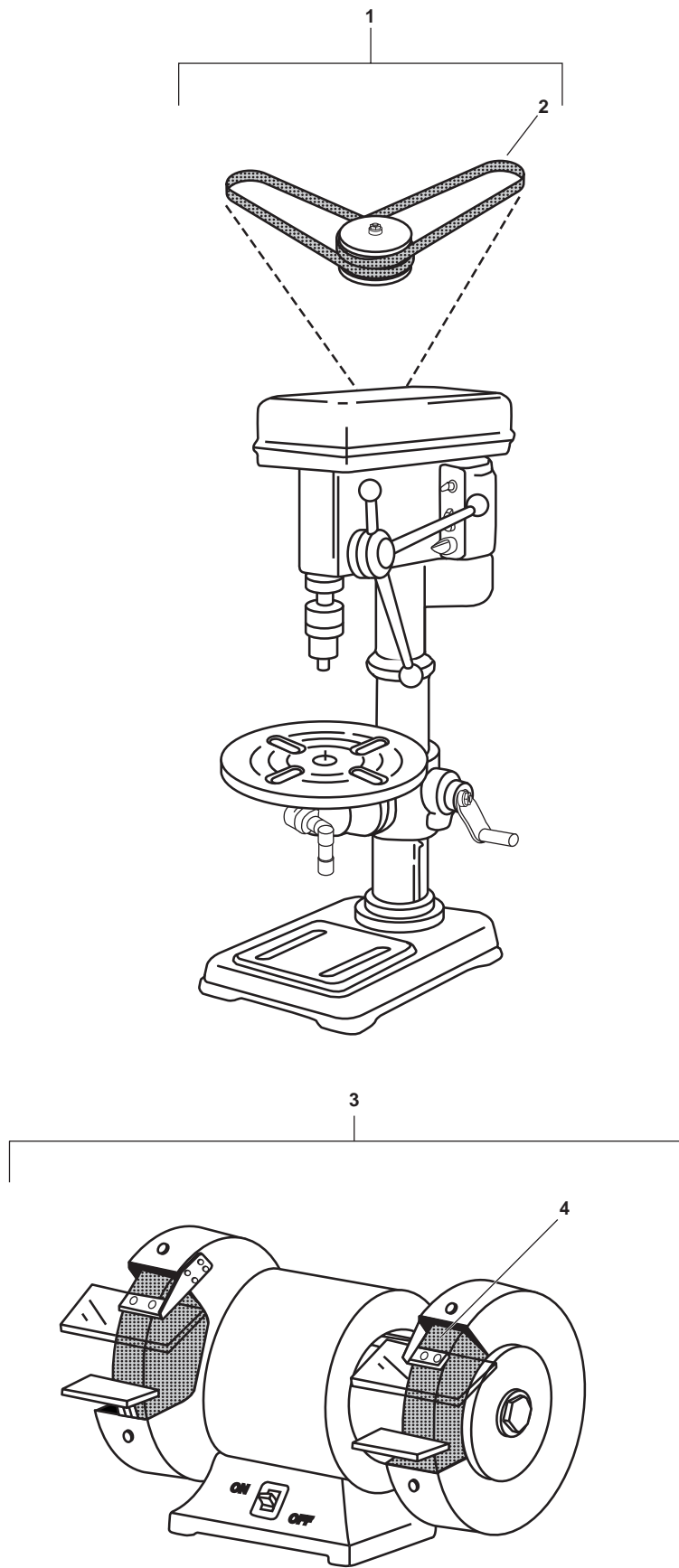


Figure 95. Workshop Equipment (1 of 2)

5

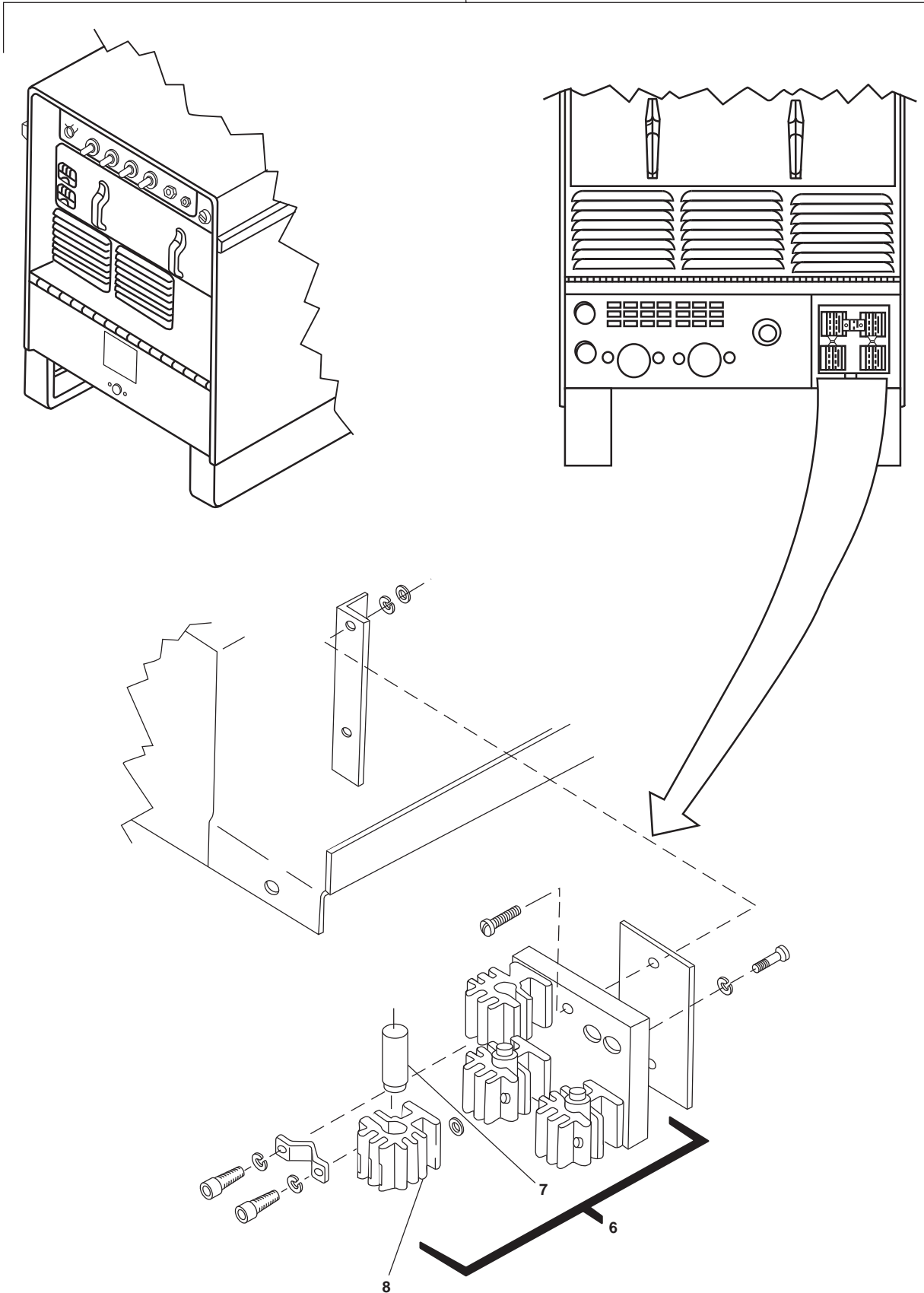


Figure 95. Workshop Equipment (2 of 2)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0604	
					FIG 95 WORKSHOP EQUIPMENT	
1	PFOZZ	3413-01-312-2376	85002	OR-1758	DRILLING MACHINE,UP .....	1
2	XDOZZ		60985	OR-1758-099	.BELT,V .....	2
3	PAOZZ	3415-01-382-0745	95952	E-97	GRINDING MACHINE,UT .....	1
4	PFOZZ	5345-00-181-7008	80204	ANSI B74.18	.DISK,ABRASIVE .....	2
5	PFOFF	3431-01-357-9949	40608	SYNCRWAVE 351 P/N 03219	WELDING MACHINE,ARC .....	1
6	PPFZZ	3432-00-787-8194	40608	020-623	.SPARK GAP SUBASSEMB .....	1
7	PPFZZ	5999-00-229-2757	40608	A-020603	..CONTACT,ELECTRICAL .....	1
8	PPFZZ	3431-01-204-7073	40608	020-622	..HOLDER,POINT .....	1
					<b>END OF FIGURE</b>	

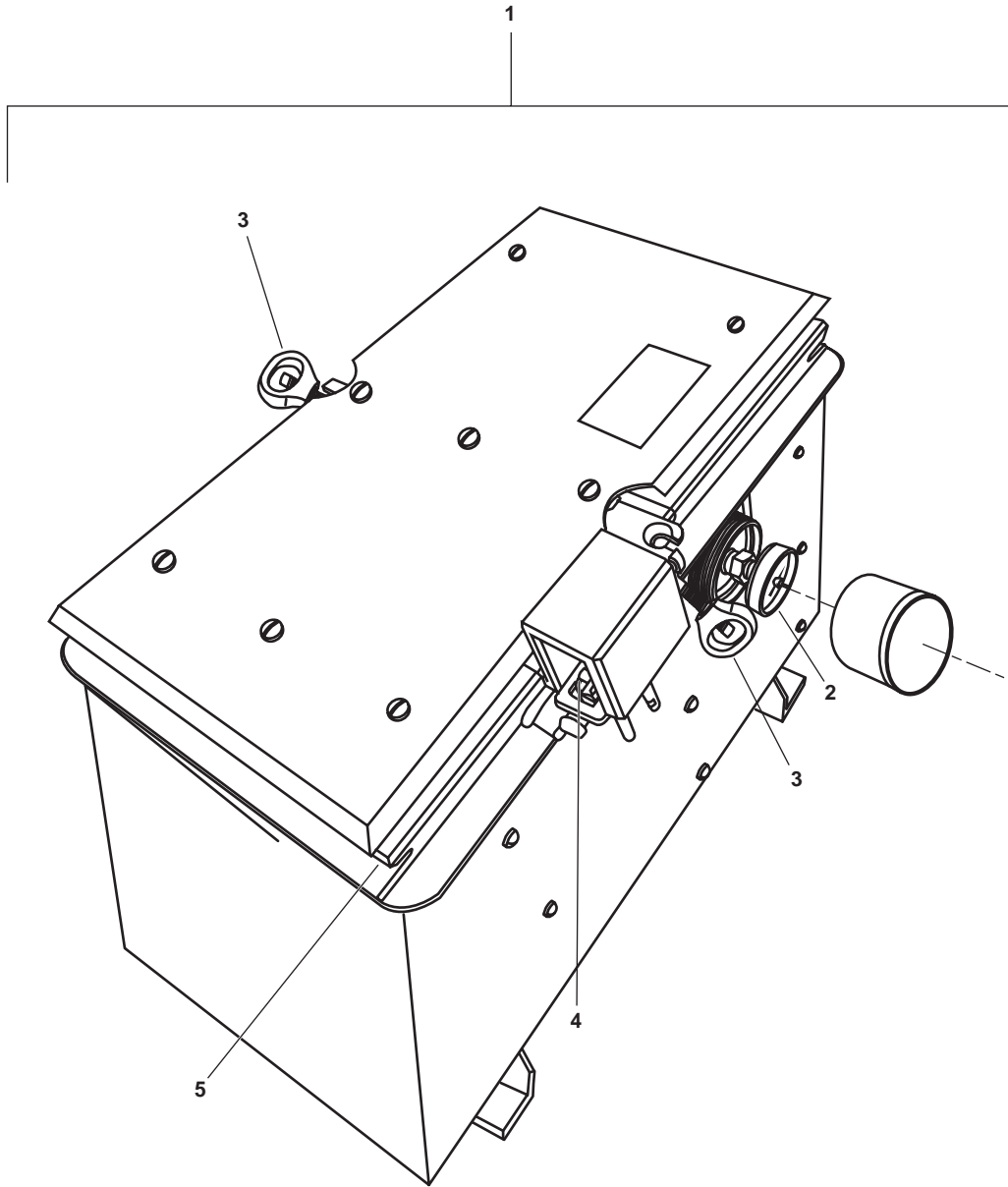


Figure 96. Ammunition Locker

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0701	
					FIG. 96 AMMUNITION LOCKER	
1	XDOFF		53711	804-5184210	LOCKER,AMMUNITION LOCKER, 50 CALIBER AMMUNITION .....	1
2	PFOZZ	6685-00-042-3218	76526	4250MS4AX	.THERMOMETER,SELF-IN .....	1
3	XDFZZ		3D527	804-5184210 PC 30	.DOG BOLT ASSEMBLY .....	4
4	PFOZZ	5340-01-217-5068	81349	MIL-P-43607F	.PADLOCK .....	1
5	XDFZZ		3D527	804-5184210 PC 16	.GASKET .....	1
					<b>END OF FIGURE</b>	

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 9501	
					FIG 97 BULK	
1	PAOZZ		21204	920SS	ROD ..... V	
2	PAFZZ	5330-00-290-5863	81349	MILR900	RUBBER STRIP ..... V	
3	PAOZZ	5330-01-037-6369	81349	MIL-G-1149	RUBBER SHEET,SOLID ..... V	
					END OF FIGURE	

Table 1. National Stock Number Index

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
4320-00-001-3480	88	3	5330-00-239-4802	93	16
5331-00-007-6143	90	10	5920-00-252-2022	60	4
5920-00-010-6652	8	11		61	4
	66	2	5930-00-259-8890	70	13
	70	6	5930-00-270-4984	70	15
5920-00-011-7142	66	5	5920-00-280-3537	69	15
6240-00-014-2306	90	8	5920-00-280-4960	8	10
5930-00-033-6729	70	14	5920-00-280-5038	69	14
6685-00-042-3218	96	2	5330-00-286-6816	3	38
5305-00-057-3969	88	4	5330-00-290-5863	97	2
5920-00-065-1735	39	5	5330-00-364-9458	94	2
5920-00-138-1799	8	9	5310-00-397-5320	88	5
4820-00-138-3870	85	7	5330-00-406-5214	88	7
5920-00-142-7376	62	164	5925-00-421-0752	36	3
6240-00-143-3049	20	6	5925-00-421-0753	37	4
	21	2	5925-00-421-0754	37	5
	22	2	6110-00-425-8787	49	5
	23	6	4320-00-437-0046	94	5
5305-00-145-0948	2	7	6625-00-443-5705	60	3
5330-00-146-2735	93	2	5930-00-448-6489	91	2
	93	14	3120-00-455-9984	62	85
5330-00-146-2814	93	15	5330-00-460-4688	10	12
5330-00-146-7307	93	5		14	9
	93	11	5925-00-484-3138	22	6
4320-00-147-1718	93	7	5925-00-486-9107	21	7
6240-00-152-2982	45	5		22	8
6240-00-155-7923	73	3	5925-00-486-9111	21	4
3110-00-156-4673	93	12	4320-00-487-9320	88	9
6210-00-160-0340	19	17	5925-00-497-5365	36	2
5310-00-167-0804	2	5		37	2
5310-00-167-0806	2	9	5925-00-497-5366	36	4
5920-00-177-2269	38	3		37	3
	39	4	5330-00-540-2508	3	35
	40	3		3	39
5330-00-178-8574	10	5	3110-00-554-3078	93	19
	14	5	3110-00-554-3425	86	2
5330-00-178-8601	10	15	6625-00-556-4936	19	3
	14	12		20	3
5330-00-178-8602	10	14	5920-00-577-4716	52	3
	14	11		53	3
5331-00-178-8605	10	9		54	3
5345-00-181-7008	95	4	5331-00-579-3158	3	25
4820-00-184-9186	83	10	5331-00-579-7916	3	12
4730-00-203-6406	10	13		3	20
	14	4	5920-00-579-8434	20	26
5945-00-208-4696	20	32	5930-00-583-8494	66	7
6240-00-223-9100	8	13	5330-00-599-5011	3	9
5360-00-224-0468	16	14	5330-00-599-9544	15	26
5999-00-229-2757	95	7	6210-00-602-5825	8	12
5315-00-234-1856	2	6	5330-00-603-0195	3	18
5315-00-236-8359	2	10	5331-00-606-8994	93	6

Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
5930-00-615-7882	69	21	5920-00-813-2714	19	36
5930-00-615-7897	69	23		21	9
5930-00-615-9376	69	24		22	3
5930-00-617-9935	8	14	2090-00-814-1101	9	25
5331-00-618-0801	3	11	5306-00-817-4989	13	7
	3	13	5305-00-827-7834	7	2
	3	17	5925-00-828-1512	61	3
	3	22	5330-00-833-3498	3	7
	3	28	5945-00-839-7511	20	31
	3	30	5315-00-841-1390	4	4
6110-00-635-1357	48	5		4	14
	55	5		4	24
5930-00-636-3020	19	8		4	34
5306-00-637-9675	13	6		4	44
5920-00-646-4621	61	5		4	54
4930-00-672-3509	16	4		4	64
4930-00-672-3513	10	4		4	74
5360-00-690-5395	2	23	6420-00-851-4352	69	4
	4	3	5945-00-851-8922	62	177
	4	13	5920-00-866-2570	19	42
	4	33	3010-00-888-9213	10	2
	4	43		14	2
	4	53		16	2
	4	63		82	2
	4	73		86	4
5930-00-702-6428	66	8	5920-00-890-4548	60	5
5340-00-735-4565	4	6	5310-00-891-3461	4	8
	4	16		4	18
	4	26		4	28
	4	36		4	38
	4	46		4	48
	4	56		4	58
	4	66		4	68
	4	76		4	78
3110-00-752-7775	93	20	6240-00-892-4420	69	22
5920-00-757-9140	80	4	5965-00-900-6401	68	19
5330-00-759-0550	13	20	6240-00-902-4660	48	6
5310-00-764-6609	86	19		49	6
2040-00-770-8387	4	2		52	6
	4	12		53	5
	4	22		54	5
	4	32		55	6
	4	42		56	10
	4	52		57	5
	4	62		58	2
	4	72		59	3
3432-00-787-8194	95	6	5965-00-906-1442	67	2
5325-00-804-2775	3	8	6110-00-916-4625	59	2
3120-00-809-2533	62	58	5330-00-932-4792	15	25
5331-00-811-6503	3	5			



Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
5310-00-933-8778	15	11	5930-01-057-8272	69	7
	15	22	5930-01-058-0866	69	10
	80	12	5930-01-058-0867	69	9
6210-00-935-6980	90	13	5998-01-058-1918	78	15
5945-00-937-0768	50	2	4320-01-069-3375	11	6
5330-00-948-6724	94	4	5330-01-069-9250	88	8
4320-00-948-6725	94	3	5920-01-081-0012	74	3
6240-00-950-3859	47	2	6680-01-081-7799	78	11
5930-00-964-0671	66	3	5330-01-082-0755	88	6
2030-00-968-9617	3	4	4820-01-092-1800	85	52
4730-00-972-5789	62	61	6680-01-093-1196	78	14
	62	67	6625-01-096-9993	20	1
	62	101	6130-01-098-6871	61	1
	62	125	6645-01-099-6887	62	183
6625-00-975-2802	61	2	4820-01-100-9103	81	11
4320-00-986-7312	94	1	5305-01-104-1052	4	7
3120-00-999-3106	4	10		4	17
	4	20		4	27
	4	30		4	37
	4	40		4	47
	4	50		4	57
	4	60		4	67
	4	70		4	77
	4	80	3120-01-104-1108	4	5
6210-01-016-8691	20	9		4	15
5330-01-021-0830	81	8		4	25
	85	44		4	35
5330-01-021-0875	85	29		4	45
	85	42		4	55
4820-01-022-0543	81	6		4	65
4610-01-022-9970	90	2		4	75
5330-01-023-1878	81	5	5331-01-105-9154	13	15
5325-01-030-6854	9	20	6150-01-105-9187	79	2
5330-01-037-6369	97	3	5910-01-107-3565	62	169
6210-01-039-0625	19	6	6110-01-110-1336	57	2
5330-01-040-3920	11	5	4820-01-112-3152	85	25
5330-01-046-1990	17	3	6645-01-112-9392	77	13
4820-01-047-5366	85	28	4820-01-114-8195	84	5
	85	43	4820-01-115-4427	84	10
5920-01-048-0548	38	4	4820-01-115-5202	3	10
	39	3	5330-01-115-9499	73	4
5330-01-048-3912	85	27	5830-01-118-1287	69	1
5920-01-050-6558	57	4	5935-01-118-9183	8	2
5925-01-051-3265	41	3	4820-01-120-4094	85	51
4330-01-051-9419	17	1	4820-01-121-7918	84	4
5330-01-052-2236	85	31	5330-01-125-6277	69	12
5330-01-052-2237	85	32	5330-01-126-4564	69	8
5935-01-052-9171	20	30	6625-01-126-4886	69	20
4820-01-056-3488	81	4	5330-01-126-5156	84	12
	85	26	5342-01-127-8224	85	50
5330-01-056-5061	69	3	6625-01-129-0015	74	2

Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
4320-01-130-7044	11	4	6220-01-186-9750	63	7
5950-01-130-8585	20	33		63	11
4820-01-135-7468	15	24		64	9
4820-01-137-5849	13	23		64	20
6625-01-140-6422	19	2	5905-01-188-2358	62	168
5935-01-140-8059	19	44	6220-01-188-6961	63	16
	20	28		64	15
5330-01-140-8814	84	8	5930-01-188-8843	62	137
5998-01-140-9311	69	13	6220-01-189-0150	64	5
6105-01-142-3764	73	2	3010-01-189-0219	62	82
5945-01-142-6969	56	6	3010-01-189-0220	62	76
6220-01-142-8449	73	5	6220-01-189-1372	63	9
5930-01-144-1442	62	146	3010-01-189-4240	62	84
3110-01-144-1557	10	7	5999-01-189-5244	62	112
	14	6	6220-01-190-5340	64	4
4820-01-148-5051	13	21	3010-01-190-9808	62	75
5920-01-149-9738	74	5	6220-01-192-0403	64	14
5950-01-150-6453	19	43	4820-01-192-2897	85	63
5331-01-152-0088	62	66	3020-01-192-4648	62	83
5940-01-154-5353	69	19	3020-01-192-4649	62	81
6210-01-155-5947	69	5	6220-01-192-4861	64	11
6210-01-155-5948	69	6	6220-01-192-6308	64	1
6210-01-155-9403	69	2	5330-01-194-0475	62	78
6210-01-157-9049	20	8	3120-01-194-0764	62	69
5950-01-160-4775	19	37	3120-01-194-0765	62	68
	20	35	3110-01-194-8872	62	88
6105-01-161-6390	8	6	5331-01-194-8963	13	8
5330-01-161-9852	62	72	4320-01-195-6993	88	2
5330-01-161-9860	62	77	6210-01-196-2098	45	3
6240-01-162-4086	62	19	5805-01-196-4754	65	6
4730-01-162-6353	90	11	6220-01-196-5189	64	10
5998-01-162-7255	69	16		64	19
6645-01-162-8023	90	9	6150-01-197-8484	79	1
6110-01-164-3686	8	8	6220-01-198-5616	64	16
5330-01-164-7353	3	36	4820-01-199-7887	85	12
	3	40	4320-01-199-8038	84	9
4820-01-165-6009	81	2	4820-01-200-0739	84	2
6130-01-167-1503	62	147	6110-01-203-2811	56	8
5920-01-167-9026	91	4	5945-01-203-2813	56	9
5330-01-168-9166	81	3	3431-01-204-7073	95	8
6210-01-172-8364	69	11	6210-01-206-6443	90	6
4820-01-173-1161	83	8	5330-01-206-7368	13	22
4820-01-173-1269	13	17	5330-01-207-1541	8	3
5945-01-173-8303	20	27	4820-01-207-3761	85	30
4610-01-177-2413	90	3		85	41
4540-01-178-8367	8	5	6625-01-207-5024	20	2
4730-01-180-8541	85	1	6625-01-207-5026	19	18
5330-01-183-6647	83	2	2040-01-207-7296	8	4
3040-01-186-6024	84	6	5930-01-210-4061	62	162

Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
5331-01-211-1336	84	7	5330-01-272-7468	85	61
4820-01-211-5397	85	45	5342-01-272-9841	68	7
4730-01-217-0189	85	4		68	12
4730-01-217-0190	85	6		68	18
5340-01-217-5068	96	4	4820-01-274-5860	83	5
6680-01-220-2273	78	10	5330-01-274-7136	68	6
5331-01-220-7565	85	5	5331-01-274-9735	85	59
6680-01-222-2004	78	1	5331-01-275-3178	13	19
6680-01-225-9961	78	13	2040-01-275-3686	77	1
5950-01-231-2448	19	38	5920-01-276-2046	19	35
6210-01-234-0167	90	7	5331-01-276-4678	77	6
5330-01-234-2607	85	2	5999-01-276-4721	77	5
6210-01-245-8723	73	1	4730-01-278-7542	83	3
3110-01-246-0827	86	3	4820-01-279-3067	85	17
4320-01-246-2899	84	11	5930-01-279-6819	70	12
5930-01-248-9322	91	8	4820-01-280-3919	13	24
6350-01-251-2607	9	30	6350-01-280-4696	68	8
5920-01-256-5830	56	3	4320-01-280-8964	84	1
2040-01-257-7664	3	2	5805-01-281-7002	68	4
4810-01-260-6973	85	10		68	11
6680-01-262-8965	78	5		68	17
5331-01-263-1080	85	13	4820-01-283-7152	15	30
5330-01-263-1089	85	14	2040-01-283-7367	8	1
5930-01-264-2883	66	9	5930-01-286-9665	68	15
6130-01-264-6979	62	156	9340-01-287-1380	8	7
5935-01-267-8099	68	20	5330-01-289-4995	11	KIT
5910-01-268-4015	62	105	6130-01-290-0498	77	11
6625-01-268-4047	62	157	4820-01-292-9599	83	7
5950-01-268-5245	62	114	4820-01-293-5064	83	4
5950-01-268-5246	62	113	5342-01-293-7833	77	2
4140-01-268-9129	62	173	5342-01-293-7898	77	9
3110-01-269-0565	62	132	2040-01-295-8283	77	7
6210-01-269-8372	62	60	6350-01-295-9866	77	4
4320-01-269-9562	3	34	4820-01-296-5700	90	4
4320-01-269-9563	3	37	4820-01-298-5231	3	19
4820-01-270-2376	85	60	4820-01-298-5240	3	16
6230-01-270-3725	62	1	4820-01-298-5257	3	24
4820-01-270-4205	85	58	4820-01-299-0407	83	6
4820-01-270-4252	85	55	5945-01-301-4095	19	45
4820-01-270-4370	13	18		20	29
5945-01-270-6105	68	16	4820-01-301-9129	81	7
4820-01-270-6478	85	56	2040-01-302-1028	77	8
4820-01-271-1903	85	40	5330-01-304-9505	68	10
5999-01-271-6213	70	9	5330-01-308-0109	68	2
6210-01-271-6226	70	2	5315-01-308-3859	10	8
5950-01-271-8131	62	172		14	7
5950-01-271-8155	62	163	5955-01-311-6188	77	12
5330-01-272-2610	85	57	5905-01-311-6931	62	151
5920-01-272-6191	62	161	3413-01-312-2376	95	1

Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
5330-01-313-4965	63	2	6250-01-333-1092	19	5
	63	6		20	5
	63	10	4140-01-333-2224	94	6
	63	14	5920-01-334-7385	56	4
	64	2	5965-01-336-9732	67	5
	64	7	5330-01-339-8819	93	3
	64	12	3110-01-339-9525	93	4
	64	17	5330-01-340-5558	86	15
6240-01-313-6861	44	2	5950-01-341-9573	48	4
	45	2		49	4
6110-01-313-7051	55	1		55	4
6110-01-313-7144	48	1	5331-01-342-2539	4	84
6240-01-315-3879	63	4	5331-01-342-2543	5	2
	63	8		5	8
	63	12	5331-01-342-2544	5	11
	63	15		5	19
	64	3	5331-01-342-2547	6	4
	64	8	5330-01-342-2551	4	59
	64	13		4	69
	64	18		4	79
6220-01-315-4474	63	5	5330-01-342-2552	4	9
6220-01-315-4475	63	13		4	19
5930-01-315-8942	72	2		4	29
6680-01-316-2654	78	3		4	39
6210-01-316-4579	68	14		4	49
6240-01-316-4651	46	3		4	82
	65	3	5330-01-342-2553	5	14
6220-01-316-9343	64	6		5	16
6105-01-317-0837	10	1	4730-01-342-8532	83	3
	14	1	5920-01-343-0293	48	2
6110-01-317-0972	54	1		49	2
5930-01-317-1878	66	4		55	2
5930-01-321-7114	70	10	5920-01-343-0294	52	4
5930-01-321-7115	70	8		53	4
4540-01-324-0988	91	7		54	4
4320-01-324-5798	11	3	4820-01-344-3933	81	1
6210-01-324-9962	70	3	6240-01-345-3264	66	6
5930-01-330-3201	19	22	5325-01-346-0356	93	13
	20	13	4320-01-346-1818	93	9
5930-01-330-3506	19	12	5925-01-346-6171	25	4
	20	4		26	3
5930-01-330-3507	19	19	5925-01-346-7533	28	4
	20	16	5925-01-346-7541	24	3
5920-01-330-5223	19	33		25	2
5920-01-330-5224	19	34		26	2
6625-01-330-5506	19	4		27	2
5930-01-330-8569	19	13		28	2
6210-01-332-1713	19	7	5930-01-347-9135	19	10
	20	7		20	14
6210-01-332-1714	19	20	5360-01-348-3306	4	83
	20	11	3120-01-348-3366	4	85

Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
3120-01-348-3367	4	86	5930-01-350-9415	89	2
3120-01-348-3368	5	12	4520-01-351-0220	91	1
	5	18	6210-01-351-1156	42	3
5365-01-348-3375	3	6		43	3
5930-01-348-4171	62	148	6210-01-351-3711	63	3
5930-01-348-4172	62	138	6680-01-352-0399	78	7
3120-01-348-4874	5	3	6680-01-352-0400	78	9
	5	6	6210-01-352-1548	65	2
5945-01-348-5028	56	7	6210-01-352-1551	45	4
5925-01-348-5777	22	7	6680-01-352-1644	78	8
5925-01-348-5778	22	4	6680-01-352-1645	78	2
5925-01-348-5779	22	9	6210-01-352-1665	46	2
5925-01-348-5780	22	5	6210-01-352-2899	65	1
6105-01-348-5895	11	1	5930-01-352-3438	19	21
4820-01-348-6215	15	1	6220-01-353-3198	47	1
4820-01-348-6217	13	4	6240-01-353-3220	47	4
4820-01-348-6218	13	3	6110-01-353-5812	91	3
5330-01-348-6932	6	5	6220-01-353-9025	63	1
3120-01-348-6966	6	6	5965-01-354-2028	67	3
5950-01-348-7053	52	2	4230-01-354-5426	90	1
	53	2	4230-01-354-5427	90	5
	54	2	5925-01-354-6088	20	20
5950-01-348-7054	56	2	5925-01-354-6089	20	21
5925-01-348-7821	21	8	5925-01-354-6090	20	18
5925-01-348-7822	21	6	5925-01-354-6091	20	19
5930-01-348-7893	20	10	5925-01-354-9718	19	24
5360-01-348-8322	5	10	6110-01-355-4535	19	11
	5	17		20	15
5360-01-348-8324	6	3	5925-01-355-5348	19	26
5360-01-348-8325	6	2	5895-01-356-2994	67	1
5330-01-348-8344	5	4	5930-01-356-4009	69	18
	5	7	5930-01-356-4010	69	17
5930-01-348-8589	20	12	5805-01-356-7279	68	1
5950-01-349-2942	56	5	5805-01-356-7280	68	13
5925-01-349-3080	21	3	5805-01-356-7281	68	9
	24	4	5998-01-356-8058	69	25
5925-01-349-3081	24	2	4320-01-356-8527	10	3
	25	3		14	3
5925-01-349-4210	21	5	5895-01-357-0834	71	3
4820-01-349-4765	12	7	5895-01-357-0835	71	1
4820-01-349-7219	15	29	5950-01-357-0929	69	26
4820-01-349-7471	85	11	5805-01-357-1246	68	5
4820-01-349-7743	15	7	3431-01-357-9949	95	5
6110-01-349-8681	52	5	4820-01-359-4834	83	9
3120-01-349-9441	5	13	4820-01-359-4845	15	28
	5	20	6140-01-360-6487	60	1
5330-01-350-0487	65	5	5935-01-362-6592	80	11
5330-01-350-0488	65	4	4330-01-364-0184	17	4
6130-01-350-2120	74	1	3040-01-364-5402	3	3
6130-01-350-2121	60	2	5025-01-368-2498	20	17
4820-01-350-7384	15	27	4820-01-369-8992	13	2

Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
5340-01-373-2985	68	3	5330-01-419-3877	85	24
5340-01-374-5437	62	8	4730-01-419-4779	85	19
5330-01-376-2946	15	20	4820-01-420-1123	85	18
5920-01-381-8290	48	3	5310-01-420-2107	13	11
	49	3	5305-01-422-8601	86	16
	55	3	5920-01-423-7416	57	3
3415-01-382-0745	95	3	4820-01-425-7645	13	10
5310-01-382-2587	85	49	4820-01-428-1805	12	5
6145-01-383-2464	76	1	4820-01-433-2665	85	15
6240-01-383-7551	42	5	5365-01-436-2557	3	33
	43	5	4820-01-436-4212	3	15
5330-01-385-6370	90	12	4820-01-436-4217	3	29
5310-01-385-7819	13	13	5925-01-436-7421	28	3
4820-01-386-4539	85	20	5315-01-436-7650	3	32
5310-01-387-0525	86	17	6350-01-438-7198	72	1
5925-01-387-6469	23	4	5925-01-440-5400	23	3
	32	5	4810-01-442-0846	85	33
5925-01-387-6592	23	2	4810-01-442-0847	85	36
	29	2	4810-01-442-0852	85	37
	30	2	4810-01-442-0857	85	39
	31	2	4810-01-442-1046	85	34
	32	2	4810-01-442-1058	85	38
	33	2	5330-01-442-1706	85	35
	34	2	6320-01-443-4972	70	1
	35	2	6240-01-443-7154	70	4
5925-01-387-6606	23	5	6250-01-443-7162	70	5
	29	3	5930-01-444-5813	70	7
	32	4	5920-01-444-5814	70	11
5925-01-387-6629	30	3	6140-01-446-9498	61	6
	32	3		75	1
5306-01-387-9294	85	48	6105-01-452-4236	62	89
5310-01-389-7640	15	18	5310-01-452-5768	85	16
	80	7	2040-01-453-7457	3	41
	86	18	6625-01-456-4397	19	23
5360-01-390-7080	3	31	5945-01-456-8564	19	39
5360-01-390-8403	3	23	4820-01-458-7276	85	46
5360-01-390-8404	3	21	5920-01-458-9148	74	4
5360-01-390-8409	3	14	5945-01-458-9504	19	41
2040-01-391-1975	2	1	5925-01-464-5332	30	5
4820-01-391-7839	3	27	5925-01-464-5338	30	4
4820-01-392-0369	3	26		31	3
5330-01-392-2760	85	8	5305-01-466-4853	15	23
5310-01-392-9426	85	53	6685-01-468-5394	17	2
5930-01-395-2509	71	2	5331-01-471-5900	84	3
	71	4	5920-01-477-9261	38	2
4820-01-400-2076	93	21		39	2
5925-01-414-8843	41	2		40	2
4820-01-417-8493	87	15	5330-01-480-0664	90	14
5315-01-419-2961	85	23	4630-01-480-6914	82	3
5315-01-419-2962	85	21	4820-01-480-7601	13	16
5310-01-419-3876	85	22	5920-01-483-2282	91	6

Table 1. National Stock Number Index (continued)

STOCK NUMBER	FIG	ITEM	STOCK NUMBER	FIG	ITEM
5310-01-500-4866	13	12	5305-01-529-0085	1	2
5330-01-503-7540	85	54	6625-01-529-0654	19	1
4820-01-503-7541	85	47	4320-01-529-2371	16	KIT
5310-01-504-5702	77	10	4320-01-529-2372	16	KIT
4820-01-508-3506	13	9	5330-01-529-2532	15	15
4820-01-508-3518	13	5	5330-01-529-2540	15	8
4820-01-508-3526	13	14	5330-01-529-2544	15	5
5305-01-509-0161	80	13	4730-01-531-7177	60	7
5310-01-523-9885	77	3	3030-99-372-4337	9	2
5310-01-528-7188	15	3		9	7
5305-01-528-8440	9	17		9	12
5930-01-528-9395	9	29	2090-99-572-6196	9	5
5930-01-528-9397	9	28		9	10
5340-01-528-9615	9	18		9	15
4730-01-529-0050	1	1	6210-99-911-2172	9	27

Table 1. Part Number Index

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
00218ES3EF56C	16	1	10447	62	29
0121-0017	66	9	10448A	62	30
0121-0018	66	4	1063NSC-500	85	7
020-622	95	8	11-1676	17	2
020-623	95	6	11005688X006	11	5
03012358B	88	2	11007	17	3
03217203B	11	4	111X03502X0020	86	3
0344-00	90	14	112301.100	87	1
04-1010-51	84	5	112301.150	87	3
04-1121-03	84	4	112301.250	87	4
04-2000-07	84	11	112501-100	87	5
04-3520-52	84	12	112501.060	87	6
04-3800-09	84	6	112501.300	87	7
04006197B	88	3	11570	62	2
04120055	84	3	1159ACLRD2	65	1
043071	14	10	11622X	62	23
05008976B	88	9	11623X	62	27
055401.300.MT	87	2	11810-0003	94	1
0681905647	93	4	11816-0000	94	2
077-05FA-LSRL-C6	20	2	11971	13	22
077-08AA-LSSJ	19	2	12-1408724	67	5
077-08VA-PZSJ	20	1	120PSB	48	6
077-08VA-SJSJ-C6	19	1		49	6
077-12PA-P2C6	19	23		52	6
077-146A-PRAE	19	18		53	5
077-218A-QQXA-C6CT800:5PT480:120	19	4		54	5
08023447H303	88	4		55	6
092913	10	10		56	10
	14	8		57	5
093088	16	8		58	2
10-10707-150062-2621	88	1		59	3
10-12501-100061-2381T	92	2	12111-0.5IN	13	24
10-51672	56	7	12279	62	59
10006510B	88	5	123401	16	7
1000FG30	17	1	12475X	62	41
10051850	69	4	12492678	9	26
101-7	4	59	12492710	4	51
	4	69	1279-106-42	9	2
	4	79		9	7
102-7	4	9		9	12
	4	19	1279-233-700	9	5
	4	29		9	10
	4	39		9	15
	4	49	1291-N-3IN	85	15
	4	82	12Z24PC421	13	6
103372ANAN	19	3	1300-00012	70	9
	20	3	13008680B	11	6
104-21	4	85	13031761	88	7
104-27	4	83	1306-007-300	93	21
104-28	4	86	14009931	11	3
104-7	4	84	14101-014	69	2



Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
14101-015	69	5	20JH	84	7
14101-016	69	6	20RV79	76	3
14101-017	69	11	21-167001	6	1
1490-000-GA56-L	9	3	21-167002	4	1
	9	8	21-167003	4	81
	9	13	21-167004	4	31
150A-120V	42	5	21-167005	4	21
	43	5	21-167007	4	11
153-0024	8	13	21-167008	4	41
1588-117	9	4	21-167010	5	9
	9	9	21-167011	5	15
	9	14	21-167013	5	5
1600-001 1/4IN.	83	9	21-167014	5	1
1600-035 1.50IN	83	7	21-167015	4	61
1605-030E-1.5IN	83	4	21-167016	4	71
161A-036J14	85	46	22	68	4
1625G	13	19		68	11
162A-002H 1/2IN	85	63		68	17
1660T	15	28	2200EB230AA-80	91	3
16963	13	21	2285K	62	66
17032665G4	88	6	22935742	56	6
19D	68	2	234-1.5BF-WB	1	1
1E1B9	9	21	2375011993	93	23
1SR2C4A-2	70	12	24	68	7
2-008N300-9	3	25		68	12
2-140V709-90	13	8		68	18
2-28	3	36	24212	62	177
	3	40	2450-00001	70	2
20" X 2" CAL SIL PC	12	1	2450-00063R	70	3
20-22031-2	3	35	252-PVAU	19	40
	3	39	256-PATU-LSBX-SE-C6-EA	19	41
2000 MODEL WF-20	94	6	256-PLDU-PQBX-C6	19	39
20066E-47324	13	18	25F1576	20	8
200PAR46/3MFL	47	2	26	68	8
201-18	5	3	263076	16	6
	5	6	26AB	87	14
201-19	5	2	275-671	66	10
	5	8	27E122	19	44
201-8	5	4		20	28
	5	7	27E123	20	30
202-13	5	11	2896	62	105
	5	19	29	85	9
202-16	5	13	2K121-SR	86	6
	5	20	2U105-2205	86	7
202-17	5	10	2X1-1/2-10A6-1/2	86	5
	5	17	2Y122-SR	86	14
202-21	5	12	2Z104-TFR	86	10
	5	18	2Z113-TFGP	86	12
202-7	5	14	2Z118-TSSR	86	9
	5	16	2Z120-SR	86	8
2020TM	17	4	2Z129	86	15

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
3/4 IN. BUNA-N FLANGE GASKET		15 13	36880-30-LP	79	3
3007-10	90	9	36885-10-LP	79	1
30147	90	7	36885-5LP	79	2
301873-2	71	3	37005-125	19	14
301874-2	71	1	37006-200	19	25
301874-3	71	2	37026-090	19	26
	71	4	375202.040	87	8
3035-13	90	4	375202.100	87	9
3037-41	90	5	375202.150	87	10
3070009	63	5	375202.200	87	11
3070209	63	13	375202.250	87	12
3072499	63	1	375202.300	87	13
30E160R090	91	5	38013-015	19	27
31-0112-300	20	9	38013-020	19	28
31-0113-300	19	6	38013-030	19	15
31-0901-01-102	19	5	38013-040	19	16
	20	5	38013-060	19	30
31105	15	25	38013-100	19	29
31107	13	20	38100	78	15
31134-K-380	85	16	38113-015	20	20
312	73	3	38113-030	20	21
314-025	40	3	38113-050	20	19
317815	16	4	38113-060	20	18
32-0114-300	19	9	38205-L-387	85	22
32-0135-300	19	7	383075	10	12
	20	7		14	9
32-0137-300	19	20	38350	78	13
	20	11	3871-L-160	85	20
324-6258908 ITEM 11	19	37	39698	78	3
	20	35	39927	78	11
3246	62	112	3SB03-PFB01	19	21
32A	68	16	4" X 2" CAL SIL PC	12	4
33071-009	63	9	4-7	3	6
33079-109	64	1	40 BTFL56-2	60	6
331927	16	15	401-17	6	6
331934	10	5	401-18	6	4
	14	5	401-25	6	2
332921	10	11	401-26	6	3
33985	82	3	401-9	6	5
342014A	8	9	401002	13	1
35011 TYPE CK800NA	19	31	40270-L-160	85	18
353 3 IN.	85	11	41	68	14
353MM 2IN	15	24	41100 ITEM 25	70	4
3581009	64	6	41100 ITEM 27	70	5
36028 TYPE CJ 400 N	19	32	412471.300	13	25
3630417457	93	6	413AB 2X2.5X9	93	1
364-1262-598	93	15	4165	62	78
3640328457	93	17	41761 C125H	20	17
3641308614	93	2	41761-C125HMA40A	19	24
	93	14	417715-4	37	4
36502	12	6	418	85	62

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
4198PS	62	156	60E	84	9
42-1679-5	56	5	61025033L	88	8
42112-K-380	85	19	6151	73	2
4250MS4AX	96	2	61690-000-2	69	1
4394X	62	172	61690-076	69	12
4395X	62	163	61690-081	69	19
4405-M-160	85	17	61690-086	69	25
4407X	62	114	61690-090	69	20
4432104225	93	8	61690-092	69	16
4434X	62	173	61690-099	69	13
4565-86	62	50	61690-101	69	9
	62	56	61690-102	69	7
458-0699-000	61	2	61690-103	69	10
4656-00	90	3	61690-104	69	26
4670	62	132	61690-119	69	17
471420	16	14	61690-161	69	18
473 1-1/2IN F-46661	13	17	61691-068	69	8
473 1/2 IN.	15	7	61691-071	69	3
4807-00	90	11	6210ZJ	93	19
49-6881	60	3	6221	73	5
4L4FK	62	58	6230	73	4
5-13-2512P31	15	11	6291	62	162
	15	22	6292	62	161
	80	12	6311ZC3	93	20
50-19A	68	6	6397262	4	2
5011T25	60	7		4	12
50B	84	8		4	22
5100-00029G	70	8		4	32
5100-00029R	70	10		4	42
52459	78	8		4	52
5299-001-1	83	5		4	62
5303RH	93	12		4	72
533045-30	20	31	63X760	3	9
5349	62	136	651-105-22	9	27
538-A-7926	89	1	66131-M-710	85	24
5399-003R112	83	6	66174-W987	85	54
53BTX 1-1/2" NPT	83	1	672348/W07W1450332R-2	93	18
5501K31	60	8	676-0440-088	93	13
573 1/2IN	15	30	6761744208	93	7
573 1IN	13	23	6762043208	93	10
5929-0003	94	3	678SERIES	9	23
5931-L-380	85	23	678-114-22	9	24
6" X 2" CAL SIL PC	12	3	67G	66	6
6-200	50	2	6916	72	2
6-38683N	91	7	6S6-120V	20	6
60	84	10		21	2
600-001-10	3	18		22	2
60250	3	38		23	6
609-AJW	51	1	6TMF/TYPEI	61	6
609-AOW	51	2		75	1

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
701908	16	12	803-1385637-02-13	85	48
701965	10	15	803-1385637-02X-08	85	52
	14	12	803-1385637-02X-19	85	53
701970	16	13	803-1385711-AWAF	83	8
701991	16	9	803-1400067 PIECE 3	4	10
701992	10	4		4	20
7022AD	20	32		4	30
7103D7S0-13	85	57		4	40
7103D7S0-3	85	58		4	50
7103D7S0-4	85	60		4	60
711940	10	14		4	70
	14	11		4	80
711941	10	9	803-1400067 PIECE 6	4	7
7120907764	93	16		4	17
7126321653	93	3		4	27
7126322653	93	5		4	37
	93	11		4	47
71300-4	64	11		4	57
71500-1	64	16		4	67
71F-D17-SC-3IN	85	55		4	77
7252	62	104	803-4384536-72A	83	10
7280945104	93	9	804-1749059 TYPE I CLASS 1 STYLE A		9
72F-B3IN BRZ.FLG.109PERF SS	85	4	804-5184210	96	1
72F-B3INPIECE 8	85	5	804-5184210 PC 16	96	5
73-103-01 1/2IN	12	5	804-5184210 PC 30	96	3
73-8052 PIECE 3	91	8	805-1400054PC6	4	4
7310501	13	2		4	14
732-A-7774 ITEM 2	89	2		4	24
740SM	47	1		4	34
7563	62	135		4	44
7564K6	19	8		4	54
760125-005	15	8		4	64
760125-010	15	15		4	74
760125-020	15	5	805-1400067 PIECE 4	4	5
7691X	62	119		4	15
78923927	82	5		4	25
78925005	82	8		4	35
78932597	82	7		4	45
78997103	82	9		4	55
79012001	82	4		4	65
79016077	82	6		4	75
7959-E-381	85	21	805-1400067PC13	2	23
7980	62	124		4	3
7C2700	19	11		4	13
	20	15		4	33
8" X 2" CAL SIL PC	12	2		4	43
803-1385637 PIECE 14-2 1/2IN	85	49		4	53
803-1385637 REV J MODIFIED	85	47		4	63
803-1385637-02-03	85	50		4	73
803-1385637-02-06	85	51			

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
805-1400067PC2	4	6	88029-15	36	1
	4	16	88029-16	37	1
	4	26	88029-2	22	1
	4	36	88029-3	24	1
	4	46	88029-4	25	1
	4	56	88029-5	26	1
	4	66	88029-6	27	1
	4	76	88029-7	28	1
81-0408-0131-341	8	12	88029-8	29	1
810	65	6	88029-9	30	1
810-13857074IN	81	11	88030-1	38	1
82601	66	7	88030-2	39	1
83-205-01	13	4	88030-3	40	1
83-207-01	13	3	8808	62	146
83-503-01	15	6	8901-1-1/2	81	9
83070-017	63	7	898970	16	KIT
	63	11	899070	16	KIT
	64	9	8L12FK	62	85
	64	20	90-0002	66	8
83070-019	63	16	9000S6202-74052	70	13
	64	15	9001K12J35CH7	80	3
83070018	64	4	9001KP35R31	80	2
83072006	63	3	9001KR1RH13	80	5
83075-013	64	10	90101A237	62	39
	64	19	90101A243	62	42
83075-014	64	5	90172-4	63	4
83075015	64	14		63	8
8318A	62	8		63	12
8436	62	68		63	15
8437	62	69		64	3
8450	62	100		64	8
8456	62	76		64	13
8457	62	75		64	18
8460	62	72	90184A105	9	17
8464	62	77	903114	16	11
85-01 ALT 2/ITEM 10	68	15	903405	10	7
8501KXD12M1V53	80	10		14	6
8501NR82	80	11	903532	10	6
8542X	62	147	903533	16	10
8543	62	84	9050JCK18V14	80	8
8614-2	81	10	9050NR51	80	9
8621	62	138	90585A358	1	2
867-STR-A-AQ	80	1	9065-04	90	1
88-108-01	15	1	90715A125	77	10
88029	23	1	90715A135	77	3
88029-1	21	1	90730A007	62	176
88029-10	31	1	90730A010	62	180
88029-11	32	1	907SS	2	8
88029-12	33	1	909125	16	5
88029-13	34	1	909126	10	8
88029-14	35	1		14	7

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
90945A710	62	158	91475A031	62	62
90945A760	62	44		62	97
	62	167		62	99
91-0003	66	3		62	107
9115H167	58	1	91475A033	62	134
9115H171K	50	1	91475A035	62	80
91240A011	62	145		62	130
	62	152	91781A540	9	19
91240A029	62	28	91783A146	62	181
	62	37	91783A150	62	141
	62	103		62	174
91475A018	62	159	91783A190	62	122
91475A020	62	4	91783A194	62	110
	62	6		62	117
	62	9	91783A196	62	92
	62	12		62	160
	62	22	91783A197	62	178
	62	52	91783A198	62	120
	62	142	91783A240	62	108
	62	175		62	143
	62	182		62	170
91475A025	62	16	91783A242	62	70
	62	25		62	86
	62	46	91783A256	62	155
	62	93	91783A535	62	63
	62	111		62	90
	62	118	91783A539	62	64
	62	121	91783A827	62	95
	62	123	91792A144	62	5
	62	179		62	11
91475A027	62	14		62	15
	62	18	91792A145	62	7
	62	48		62	33
	62	54	91792A146	62	51
	62	71	91792A153	62	21
	62	87	91792A159	62	3
	62	94	91792A192	62	10
	62	109		62	24
	62	128	91792A240	62	17
	62	144		62	47
	62	153		62	127
	62	171	91792A242	62	13
91475A029	62	32		62	20
	62	65	91792A537	62	36
	62	74	91841A215	62	115
	62	91	91847A431	62	106
	62	102	91847A540	62	79
	62	116	920SS	97	1
	62	166	920SS-8 IN.	2	3

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
92147A031	15	3	9855	62	137
92186A634	15	4	9999-41100	70	1
92186A721	15	23	9T58B0051	20	33
92186A804	15	16	9T58B46G08	19	38
92196A191	62	45	9T58B50	19	43
92196A245	62	53	A-020603	95	7
92240A537	62	73	A-WK-329-D15	3	41
	62	165	A10DN0AB	49	5
92240A539	62	26	A10EN0A	57	2
92240A624	62	98	A19ADB1	91	2
92240A626	62	96	A30BDA0G60	48	1
92240A714	62	133	A30CDA0G60	55	1
92240A774	62	126	A30DDA0G60	49	1
92700-0420	94	4	A30EDA0G60	57	1
93190A624	80	13	A40-20-12V-A1-6L	61	7
93190A714	15	9	A41-20-24V-A1	60	2
9333	62	34	A41-30-24V-A1	74	1
9339X	62	113	A41-40-24V-A1	61	1
93705A538	62	43	A410ED021C60B	56	1
	62	49	A700BN0218A	52	5
	62	55	A710BQ7	52	1
94495A245	62	57	A710CQ7	54	1
94819A049	15	2	A710DQ7	53	1
	80	6	AA52463-A03	90	8
94819A055	15	10	AA59584-106JACT	86	2
	15	21	ABC-10	38	2
94819A058	15	17		39	2
9540-01	90	2		40	2
95800146	63	2	ABC25	38	3
	63	6		39	4
	63	10	AGC20	38	4
	63	14		39	3
	64	2	AGC5A	80	4
	64	7	AGC6	20	25
	64	12	AH103RV-CD4M	86	11
	64	17	AH107-TFE	86	13
9591	62	157	AN16EN0AC	48	5
96UD8S-024	72	1		55	5
9723X	62	168	AN960C616	2	5
9796	62	148	ANSIB74.18	95	4
9798	62	140	AS15721-1	62	61
	62	150		62	67
98017A215	62	131		62	101
98017A655	62	35		62	125
	62	38	AT10	67	4
98017A689	62	40	B-122-0250 PIECE 15	85	13
9813	62	139	B-122-0250 PIECE 5	85	14
	62	149	B-1221-A 2.50IN	85	10
98370A011	62	129	B-142-0300	15	29
	62	154	B-WK-406-C-1-B	3	3
98401A409	62	31	B115	23	3

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
B215	23	2	C7A	69	22
	29	2	CAT. NO. 24-P	68	3
	30	2	CAT. NO. 50-19B	68	10
	31	2	CC-137-1	8	7
	32	2	CC-6004 PIECE 20	8	3
	33	2	CC-6020	8	1
	34	2	CC-6028	8	4
	35	2	CC-7159-5B	2	2
B220	30	3	CC6001	8	5
	32	3	CC6005	8	8
B225	23	4	CC6020-11	8	6
	32	5	CC7135-16-BCUSS	2	1
B230	23	5	CGS153U100X4C	62	169
	29	3	CR104PBG91U1	20	10
	32	4	CR104PSK21A92L	20	12
B340	30	5	CT100C	67	1
B350	30	4	CWK592-32AITEM5	3	4
	31	3	CWK653-9PC8	3	7
BAB2020H	41	3	D-WK-492-A6 PC10	3	24
BAB2030H	41	2	D-WK-492-A6 PC10-11	3	32
BBS10	19	42	D-WK-492-A6 PC10-2	3	33
BBS15	20	26	D-WK-492-A6 PC11	3	16
BBS3	19	36	D-WK-492-A6-10-5	3	26
	21	9	D-WK-492-A6-10-6	3	27
	22	3	D-WK-492-A6-10-9	3	29
BQ2B015	36	3	D-WK-492-A6-12-3	3	14
BQ2B020	36	2	D-WK-492-A6-9	3	10
	37	2	D-WK-492-A6-9-3	3	21
BQ2B030	36	4	D-WK-492-A6-9-5	3	23
	37	3	D-WK-492-A6-PC12	3	19
BQ2B040	37	5	D-WK-492-A6-PC12-2	3	15
BQ2M015	21	7	D-WK-492-A7	3	2
	22	8	D-WK-492-A8	3	1
BQ3-M050	21	4	D82-2084-6	59	2
BQ3M015	22	6	DS4404MRABO	18	1
BQ3M020	22	7	DWG NO. 41100 ITEM 10	70	11
BQ3M025	22	4	DWG NO. 41100 ITEM 6	70	7
BQ3M030	21	3	E-97	95	3
	24	4	ED43B015	24	3
BQ3M040	22	9		25	2
BQ3M070	22	5		26	2
BQ3M090	21	8		27	2
C-1700-R-0-M1080	9	16		28	2
C-WK-437-37	3	34	ED43B020	24	2
C-WK-437-38	3	37		25	3
C10EN2EB	56	8	ED43B025	25	4
C1235P	62	151		26	3
C300EN3	56	9	ED43B040	28	4
C340AG	48	4	ED43B060	28	3
	49	4	EF128	62	88
	55	4	EOP3T07	20	22



Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
EPC30A	46	1	JD7759	10	13
F02A125V10A	66	5		14	4
F02A250V2A	8	10	JM3463	92	1
F02A250V3A	8	11	JM3550	11	1
	66	2	JMM3559T	88	10
	70	6	K100-X	11	KIT
F03A250V1AS	69	15	K2315-A	62	89
F03B250V1/2AS	69	14	K42202-P4	62	183
F15BR250V30A	74	4	KB-20	77	1
F15T8/CW	45	5	KLDR 6/10	48	2
F16A250V35A	60	4		49	2
	61	4		55	2
F180TF-1	15	14	KRPA11AG-120	19	45
F180TF-1 1/2	15	19		20	29
F180TF-3/4	15	12	KTK15	39	5
F20T12-24/SPECTRUMLITE-P/HD22M	44	2	KW3400F	20	23
	45	2	L14	15	27
F215	45	3	L150	10	2
F63C500V70A	61	5		14	2
FNQ-R-2.5	57	3		16	2
FNQ-R-5	52	4		82	2
	53	4		86	4
	54	4	LC-1250-5	11	2
FNQ-R1/2	56	4	LFR320AW	44	1
FNQ1	52	3	LFS320A	45	1
	53	3	M-477	77	11
	54	3	M-478	77	12
FNQ1-1/2	56	3	M17/184-00001	76	1
FNQ12	57	4	M24696/1-010	85	8
FNW-15	91	4	M4	84	1
FPS320	90	6	M411-AS3	77	13
FX2092	45	4	M631-66	19	35
G-15A	68	20	M632-66	19	34
G90	62	81	M633-66	19	33
G91	62	82	M83248/1-017	90	12
G93	62	83	M83248/2-129	13	15
GG15C	42	3	MB252251E-0300	85	33
	43	3	MB252251E-0300-10	85	34
GKT1008	65	5	MB252251E-0300-18	85	38
GKT1048	65	4	MB252251E-0300-5	85	35
GN	42	4	MB252251E-0300-6	85	36
	43	4	MB252251E-0300-7	85	37
H-200/U	68	19	MB252251E-0300-9	85	39
HWLKFKXN	13	12	MDL5	62	164
IC/W	70	14	MIL-C-5015	8	2
INX2058C	65	2	MIL-G-1149	97	3
INX3528	46	3	MIL-G-1149-OVALCUTTOFIT	7	1
	65	3	MIL-P-43607F	96	4
INX3551	47	4	MILP17303	15	26
INX9005A	46	2	MILR900	97	2

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
MILR900-28 IN.	2	4	OR-1758	95	1
ML1HH203	70	15	OR-1758-099	95	2
MODEL 53 BTX 3 IN.	93	22	OS1510-350A	9	22
MODEL 53 BTX BASKET - 3 IN.	93	24	P14H3239M	10	1
MODEL B	94	5		14	1
MOTOR CONTROLLER, WELD HOOD EXH.	59	1	P18G391	82	1
MP08 N1	20	24	P1DA-E50-A1S	74	2
MPE-E4L-A01A03	13	5	P21G391	86	1
MPH-E102T	13	9	P28-24	77	4
MPHLE405E	13	14	P33-2	77	2
MS122121	9	20	P504-1	77	8
MS15795-820CRES316	86	17	P54H17MOA17X6DB	47	3
MS16625-1287	3	8	P8-C1-B18	60	5
MS24665-155	2	6	P8-C2-B50	74	5
MS24665-370	2	10	PL7052	62	60
MS28775-114	3	11	PRL1A	41	1
	3	13	PS-1103D700 ITEM 13	85	59
	3	17	PS-1103D7S0 ITEM 8	85	61
	3	22	PS-7103D7S0-7	85	56
	3	28	PT1-5	77	7
	3	30	PT120-1	77	5
MS28775-115	3	12	PT121-1	77	6
	3	20	PT32-4	77	9
MS29513-023	90	10	PU71	84	2
MS29561-212	3	5	Q00686-01R4	9	11
MS35059-21	69	24	Q00686-02R1	9	1
MS35059-27	69	21	Q00686-03R3	9	6
MS35059-31	69	23	QC2040	61	3
MS35266-32	2	7	QJ23M125	21	5
MS35307-333	13	7	QJ23M150	21	6
MS35307-472S316	86	16	RB-WT	73	1
MS35307408	7	2	RE-31370	78	14
MS35338-145	15	18	RK 11073	17	5
	80	7	S14	19	17
	86	18	S2C-47A-A14	74	3
MS35691-67	4	8	S7021200	19	13
	4	18	S7021204	19	22
	4	28		20	13
	4	38	S7021205	19	12
	4	48		20	4
	4	58	S7021385	19	10
	4	68		20	14
	4	78	S7021449	19	19
MS51971-7	86	19		20	16
MSL-6/10	48	3	SC628MN	9	30
	49	3	SE80-0-10SLT4	91	1
	55	3	SP-19-13	85	29
MWT-246J	68	1		85	42
NAED 320990	90	13	SP-19-4D	81	2
NAS1149C0863R	2	9	SP-19-8B	85	28
NLFM4D3S25W120UG	66	1		85	43
NO. 2 WK	3	31			

Table 1. Part Number Index (continued)

PARTNUMBER	FIG	ITEM	PARTNUMBER	FIG	ITEM
SP-19-9	85	27	SW66703-1/2IN.	12	7
SP-19-9A	81	8	SWLR-243J	68	13
	85	44	SY1060142 NON-ASBESTOS	15	20
SP-20-13	81	5	SYNCRWAVE 351 P/N 903219	95	5
SP-20-2	81	7	T-12-120	60	1
SP-20-8B	81	6	TEMPPART15372	80	14
SP-B-19-SB-2	85	25	TL110A	9	18
SP-HG-003-001	67	2	TRM-3	91	6
SP19-5A	81	4	UVH3LP08K	20	34
	85	26	V100BTZ13RB	52	2
SPB-20-F152-4IN	81	1		53	2
SPB-31-SB(1)2/B7 ITEM 17	13	11		54	2
SPB-39-F152	85	40	V150BTZ13RB	56	2
SPB-D1S-A-L	87	15	VA150K-C2U	42	2
SPB-G1S-A	85	12	VA150K-GCN-C2U	42	1
SPB-K002	85	30	VA150K-GCN-W2U	43	1
	85	41	VA150K-W2U	43	2
SPH-19-5A	85	45	VC-A105U	76	2
SPK-19-10	85	32	X9398-RF	62	1
SPK-19-6	85	31	XB4BA21	9	28
SPK-H104D	13	10	XB4BA51	9	29
SPK-H106	13	16	XLF1.5B	16	3
SPK-H110	13	13	XM-36460-102-1500-O-L	78	4
SPK19-6A	81	3	XM-36460-127-1000-O-L	78	5
SPT-15A	67	3	XM-36460-141-1000-O-L	78	6
SSC12ABA	20	27	XM-36460-183-1000-W-L	78	9
ST00285	85	2	XM-36460-31-4300-O-L	78	2
ST051030BFM005	85	1	XM-36460-49-1500-W-L	78	10
ST262SJXX	83	3	XM-36465-32-1500-O-L	78	1
ST262Z5B	83	2	XM-36465-63-1000-O-L	78	7
ST268SFXX	85	6	XM-36490-41	78	12
ST510SFXX	83	3	XM1000-9HS	62	19
ST52K	8	14	XSB1	10	3
SW-23J	68	5		14	3
SW243J	68	9			

END OF WORK PACKAGE



---

**UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
EXPENDABLE AND DURABLE ITEMS LIST**

---

**INTRODUCTION****SCOPE**

This work package lists expendable and durable items that you will need to operate and maintain the Inland and Coastal Large Tug (LT). This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

**EXPLANATION OF COLUMNS IN THE EXPENDABLE/DURABLE ITEMS LIST**

Column (1) Item Number. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., "Use brake fluid (item 5, WP 0098 00).").

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (include as applicable: C = Operator/Crew, O = Unit, F = Direct Support, H = General Support, D = Depot).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item, which you can use to requisition it.

Column (4) Item Name, Description, Commercial and Government Entity Code (CAGEC), and Part Number (P/N). This column provides the other information you need to identify the item.

Column (5) Unit of Issue (U/I). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (3).

Table 1. Expendable and Durable Items List

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
1	O	6830-00-264-6751	ACETYLENE, TECHNICAL (81348) BB-A-106-B	CY
2	O	1365-01-359-7102	AEROSOL SMOKE, 2.5 OZ AEROSOL CAN (61908) 25S, ES400	EA
3	O	6850-01-441-3218	ANTIFREEZE (58536) A-A-52624	GL
4	C	8105-01-183-9764	BAG, PLASTIC (58536) 8105-01-183-9764	BX
5	C	8105-00-655-8285	BAG, PLASTIC, DISPOSABLE LINER POLY (58536) 8105-00-655-8285	BX
6	C	8105-01-183-9769	BAG, PLASTIC, DISPOSABLE LINER POLY (58536) 8105-01-183-9769	BX
7	C	8105-01-070-0721	BAG, POLY, SIZED TO FIT TRASH COMPACTOR (53820) 1600 POLY BAG	EA
8	C	7520-00-935-7135	BALLPOINT PEN, BLACK INK, FINE POINT (83421) 7520-00-935-7135	DZ
9	O	7520-00-281-5911	BASKET, WASTE PAPER, ROUND, GRAY, METAL (88001) C1060C	EA
10	O	6135-00-835-7210	BATTERY, NONRECHARGEABLE, SIZE D, ALKALINE (83740) E95	PG
11	O	6140-00-195-5339	BATTERY, STORAGE, 12 VOLT (1SWJ4) 6V155	EA
12	O	5110-00-277-4590	BLADES, HAND, HACKSAW, HIGH-SPEED STEEL, 12 IN LONG, 18 TEETH PER INCH, TYPE 1, CLASS 2, GRADE A, BD-10-EA (05047) B94.52M	EA
13	O	5110-00-277-4591	BLADES, HAND, HACKSAW, HIGH-SPEED STEEL, 12 IN LONG, 24 TEETH PER INCH, BD-10-EA (05047) B94.52M	EA
14	C	7920-00-267-2967	BROOM, PUSH, RATTAN, (NO HANDLE) (83421) 7920-00-267-2967	EA
15	C	7920-00-291-8305	BROOM, UPRIGHT, CORN, HANDLE NOT DETACHABLE (83421) 7920-00-291-8305	EA
16	C	7920-00-240-6358	BRUSH, DUSTING, BAKERY, TYPE 1, CLASS 2 (80244) 7920-00-240-6358	EA
17	C	7920-00-165-7277	BRUSH, DUSTING, BEN, LACQUERED BLOCK HANDLE (45092) 378	EA
18	C	7920-00-240-6357	BRUSH, DUSTING, BENCH (18702) 705-9	EA
19	C	8020-00-559-0438	BRUSH, PAINT, 1 IN (58536) A-A-3193	EA
20	C	8020-00-559-0389	BRUSH, PAINT, 2 IN (58536) A-A-3193	EA
21	C	8020-00-178-8305	BRUSH, PAINT, 4 IN (58536) A-A-3192	EA

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
22	C	8020-00-597-4770	BRUSH, PAINT, MEDIUM GRADE, NYLON BRISTLE (58536) A-A-3192	EA
23	C	7920-00-772-5800	BRUSH, SANITARY, TYPE I CLASS 2 DUTY A (83421) 7920-00-772-5800	EA
24	C	7920-00-240-7171	BRUSH, SCRUB, DECK, NO HANDLE (80244) 7920-00-240-7171	EA
25	C	7920-00-240-7174	BRUSH, SCRUB, FLOOR, HAND, 1-3/4" X 6" (80244) 7920-00-240-7174	EA
26	C	7520-00-223-8000	BRUSH, STENCIL, 3/4 IN X 1 IN (45606) 70107	EA
27	O	7920-00-291-5815	BRUSH, WIRE, CURVED HANDLE (83421) 7920-00-291-5815	EA
28	O	5130-00-293-0263	BRUSH, WIRE, ROTARY WHEEL, 1/2 IN ARBOR (17699) 5130-00-293-0263	EA
29	O	7920-00-246-8501	BRUSH, WIRE, SCRATCH, 7 1/2 IN X 2 1/4 IN (83421) 7920-00-246-8501	EA
30	O	7240-00-160-0441	CAN, ASH, AND GARBAGE, W/O COVER 24 (0T115) 90124HDC	EA
31	O	7240-00-160-0440	CAN, GARBAGE, W/O COVER, 32 GL (0T115) 90146HDC	EA
32	C	8415-00-121-5830	CAP, FOOD HANDLERS, WHITE DISPOSABLE (3F842) C100	BX
33	O	8415-00-634-2410	CAP, FOOD HANDLER'S, WHITE (80244) 8415-00-634-2410	BX
34	C	9150-01-193-6376	CLEANER, LUBRICATION PRESERVATIVE (MACH GUN MT) (65983) CLP-9ME	EA
35	O	6850-01-493-8360	CLEANING COMPOUND, ACID, PIPELINE (1BZ02) B645800002	EA
36	O	6850-01-493-8354	CLEANING COMPOUND, ALKALI, FERROUS SURFACE (1BZ02) B645800001	EA
37	C	6850-00-285-8011	CLEANING COMPOUND, SOLVENT (58536) AA59601-2G	DR
38	C	7520-00-240-5503	CLIPBOARD, FILE, 9 X 17" (83421) 7520-00-240-5503	EA
39	F	5350-00-221-0872	CLOTH, ABRASIVE (CROCUS CLOTH) (76381) 051144-02435	PG
40	O	8030-00-251-3980	COMPOUND, ANTISEIZE (26916) 034-000750	LB
41	C	8030-00-231-2345	COMPOUND, CORROSION PREVENTIVE (19203) 945011	GL
42	C	8020-00-664-3657	CONDITIONER, PAINT BRUSH (00343) PROTEXEMBRUSHCONDITIONER	EA
43	C	4020-00-240-2164	CORD, COTTON, 1/4 IN 200 FT COIL (81349) MILL1145	CL
44	C	4020-00-240-2160	CORD, COTTON, 5/16 IN 1200 FT COIL (81348) TC571	CL

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
45	O	7240-00-161-1147	COVER, ASH AND GARBAGE CAN, 24 GL (0T115) 90124HDL	EA
46	O	7240-00-161-1143	COVER, ASH AND GARBAGE CAN, 32 GL (0T115) 90146HDL	EA
47	O	7290-00-130-3271	COVER, IRONING BOARD, 16 X 54" HEAT RESISTANT (83421) 7290-00-130-3271	EA
48	C	7930-00-926-5280	DETERGENT, GENERAL PURPOSE (80244) 7930-00-926-5280	BX
49	C	7930-00-985-6911	DETERGENT, GENERAL PURPOSE (83421) 7930-00-985-6911	CN
50	C	7930-00-880-4454	DISHWASHING COMPOUND, HAND, LIQUID, 1 GAL (83421) 7930-00-880-4454	BX
51	C	7930-00-985-6905	DISHWASHING COMPOUND, MACHINE, 25 LB DRUM (80244) 7930-00-985-6905	EA
52	C	6840-00-810-6396	DISINFECTANT, FOOD SERVICE POWDER, TWELVE 4.77 OZ POUCHES PER BOX (81349) MIL-D-11309	BX
53	C	5345-00-881-8377	DISK, ABRASIVE, NO 36 GRIT SIZE, CLOSED COAT (80204) ANSI B74.18	BX
54	C	5345-00-881-8378	DISK, ABRASIVE, NO. 24 GRIT SIZE, CLOSED COAT (80204) ANSI B74.18	EA
55	C	5345-00-881-8375	DISK, ABRASIVE, NO. 60 GRIT SIZE, CLOSED COAT, 1/2 IN ARBOR (80204) ANSI B74.18	EA
56	O	6810-01-070-1784	DISTILLED WATER, TECHNICAL (53390) 6170-18-7	BT
57	C	6850-00-281-1985	DRY CLEANING SOLVENT (02978) PS661	GL
58	O	3439-00-262-2670	ELECTRODE, WELDING, 6010, 1 X 14 (31505) AWSA5.1-78 E6010 0.125	CO
59	O	3439-00-262-2652	ELECTRODE, WELDING, 6011, 3/32 X 12 (31505) AWSA5.1-69 E6011 0.093	LB
60	O	3439-00-853-2719	ELECTRODE, WELDING, 7018, 3/16 X 14, CN = 50 LBS (31505) AWSA5.5-81	CN
61	O	7310-00-512-1076	FILTER, COFFEE MAKER (25628) 20115.0000	MX
62	C	7930-01-184-3905	FINISH, FLOOR, NONBUFFING (80244) 7930-01-184-3905	GL
63	O	3439-01-236-9572	FLUX, SOLDERING (27911) 40026	CN
64	O	3439-00-255-4571	FLUX, SOLDERING (58536) A-A-51145	CN



Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
65	O	3439-00-255-4580	FLUX, WELDING (94030) 1	LB
66	C	4210-01-056-8343	FOAM, LIQUID, AFFF, 5 GAL (81349) MIL-F-24385	CN
67	C	7930-00-664-6910	GLASS CLEANER, TYPE 1, CLASS 1 (83421) 7930-00-664-6910	BX
68	O	9150-00-944-8953	GREASE, AIRCRAFT (54527) AEROSHELLGREASE22	CN
69	O	9150-01-197-7689	GREASE, AUTO AND ARTILLERY, 6 1/2 LBS, SYMBOL GAA (81349) M-10924-D	CN
70	O	9450-00-526-4205	GREASE, BALL AND ROLLER BEARING (81349) MIL-G-187-09	CN
71	O	9150-01-117-2928	GREASE, BALL AND ROLLER BEARING, 5 LB (81349) DOD-G-24508	CN
72	O	9150-00-663-9795	GREASE, BALL AND ROLLER BEARING, 6.5 LBS CAN (81349) MIL-G-18709	CN
73	O	9150-01-095-5512	GREASE, BALL AND ROLLER, CN (73219) L0189.001	CN
74	C	9150-01-209-6868	GREASE, FOOD PROCESSING EQUIPMENT (81349) DOD-G-24650	LB
75	O	9150-00-180-6381	GREASE, GENERAL PURPOSE (81349) MIL-PRF-24139	CN
76	O	9150-00-235-5555	GREASE, GENERAL PURPOSE, CN, 6.5 LBS GGP (07950) ROYCO 49	CN
77	O	9150-00-180-6382	GREASE, MBG, CN, 6-1/2 LB (81349) MIL-PRF-24139	CN
78	O	9150-01-525-1498	GREASE, POLYUREA, ELECTRIC MOTOR (29700) MOBIL POLYREX 14-EM OZ	CN
79	C	9150-00-530-6814	GREASE, WIRE ROPE-EXPOSED GEAR, 35 LB CAN (81349) MIL-PRF-18458	CN
80	C	4020-00-240-2161	HALYARD, COTTON BRAIDED, 2400 FT ROLL, 1/4 IN DI (81349) MILH226	RL
81	C	7920-00-267-1218	HANDLE, MOP, WOOD, 54" LG (83421) 7920-00-267-1218	EA
82	C	7920-00-141-5452	HANDLE, WOOD, FOR USE WITH RATTAN PUSHBROOM (83421) 7920-00-141-5452	EA
83	O		HARDENER, CEILCOAT (16605) FLAKETAR 661	GL
84	C	7230-00-252-3394	HOOK, SHOWER CURTAIN SUSPENSION, 100 PER BOX (26821) L946	BX
85	O		HOSE, BRAIDED, CLEAR, 1/2" (30 FEET) (05MH3) KURI13130C1/2	FT

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
86	O		HOSE, BRAIDED, CLEAR, 3/4 (20 FEET) (05MH3) KURI3130D3/4	FT
87	O		HOSE, HP, -6 (25 FEET) (05MH3) STO6-6 DAYCO	FT
88	C	9150-00-985-7234	HYDRAULIC FLUID, CN, 5 GAL (81349) MIL-PRF-17672	CN
89	C	9150-00-111-6256	HYDRAULIC FLUID, FIRE RESISTANT (81349) MIL-PRF-46170	GL
90	C	9150-00-985-7233	HYDRAULIC FLUID, PETROLEUM BASE, 55 GAL (58563) IMPERIAL 2075	DR
91	C	6810-00-983-8551	ISOPROPYL ALCOHOL, TECHNICAL (81348) TT-I-735	QT
92	O	6850-01-015-0834	LAYOUT DYE (59581) 837745-16358	CN
93	O	8010-00-239-5737	LEAD, WHITE, PIGMENT, PAINT PRODUCTS, PASTE IN OIL, 5 LB (81348) TT-W-215	CN
94	C	9150-01-469-7264	LUBRICANT, SILICONE (75906) W46040-111	TU
95	O	9150-00-186-6681	LUBRICATING OIL (81349) M2104-1-30W	QT
96	O	9150-01-158-2881	LUBRICATING OIL, AIR COMPRESSOR (96004) GST OIL 100	CN
97	C	9150-00-135-2634	LUBRICATING OIL, ENGINE (77988) MOBILGARD 450	DR
98	C	9150-00-186-6699	LUBRICATING OIL, ENGINE (81349) MIL-L-46152	QT
99	C	9150-01-178-4726	LUBRICATING OIL, ENGINE (81349) MIL-PRF-2104	QT
100	C	9150-01-413-6892	LUBRICATING OIL, ENGINE, 10W-30 (81343) J2362	CO
101	C	9150-01-230-9749	LUBRICATING OIL, ENGINE, 10W-30, CN, 5 GAL (81343) 10W-30	CN
102	C	9150-00-186-6668	LUBRICATING OIL, ENGINE, CN, 5 GAL, OE/HDO-10 (81349) M2104-3-10W	CN
103	C	9150-00-188-9858	LUBRICATING OIL, ENGINE, CN, 5 GAL, OE/HDO-30 (81349) M2104-3-30W	CN
104	C	9150-00-188-9862	LUBRICATING OIL, ENGINE, OE/HDO-40; DR, 55 GAL (81349) 9150-00-188-9862	DR
105	F	9150-01-398-7341	LUBRICATING OIL, EXPOSED GEAR (27843) PRE-LUBE 19	CN
106	C	9150-01-035-5393	LUBRICATING OIL, GEAR, CN, 5 GAL, GO-80/90 (81343) J2360	CN

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
107	C	9150-00-027-3098	LUBRICATING OIL, GENERAL PURPOSE (77988) DTE HEAVY MEDIUM	QT
108	C	9150-00-458-0075	LUBRICATING OIL, GENERAL PURPOSE, 16 OZ CN (81349) MIL-PRF-32033	CN
109	O	9150-00-598-2911	LUBRICATING OIL, REFRIGERANT COMPRESSOR, RCO-4 (81348) VV-L-825	QT
110	C	7510-00-266-6712	MASKING TAPE, PRESSURE SENSITIVE ADHESIVE, 1" (19203) 8783476	RO
111	C	7510-00-266-6710	MASKING TAPE, PRESSURE SENSITIVE ADHESIVE, 2" (52170) 232 2IN.	RO
112	C	7510-00-266-6707	MASKING TAPE, PRESSURE SENSITIVE ADHESIVE, 3" (52170) 232 3 IN.	RO
113	O		MEDIA GARNET, 8-12 (1BZ02) 4643070155	BG
114	O	6850-01-493-8355	METAL CLEANER AND RUST REMOVER (1BZ02) B645800004	EA
115	C	7920-00-141-5550	MOPHEAD, WET (83421) 7920-00-141-5550	EA
116	C	5315-00-753-3885	NAIL, COMMON, 16 D, PG, 5 LB (81346) ASTM-F1667 NL CM S-11 B	PG
117	C	5315-00-753-3882	NAIL, COMMON, 5 LB (81346) ASTM-F1667 NL CM S-0-7B	PG
118	C	8540-00-285-7001	NAPKIN, TABLE, PAPER (58536) A-A-2838	BX
119	C	9150-01-237-7467	OIL, FOOD PROCESSING EQUIPMENT (81349) DOD-L-24651	GL
120	C	6830-01-049-5263	OXYGEN, TECHNICAL (81348) BB-O-925	CY
121	C	7290-00-633-9124	PAD, IRONING BOARD, 16" X 54" X 3/8" THICK (58536) A-A-297	EA
122	C	7920-00-823-9818	PAD, METAL POLISH (NEVER DULL), CN, 2LB (58536) A-A-59299	CN
123	C	7920-00-045-2940	PAD, SCOURING (27293) 7447	BX
124	C	6665-00-050-8529	PAPER, CHEMICAL AGENT DETECTOR (81361) D5-67-266	BK
125	C	7530-00-145-0414	PAPER, TABULATING MACHINE, COMPUTER PRINTER (56897) 143-20	BX
126	C	8540-00-530-3770	PAPER, TOILET, 96 ROLLS PER BOX (90274) 100	BK
127	C	6850-00-001-4194	PASTE, WATER INDICATING (65093) SAR-GEL	PG

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
128	C	7510-00-281-5234	PENCIL, WRITING #2 (83421) 7510-00-281-5234	DZ
129	C	9150-00-250-0933	PETROLATUM, TECHNICAL (81348) VV-P-236	CN
130	C		PIN, COTTER, PRONG, 1/2 IN X 6 IN, PLAIN STEEL FINISH (FITS BRIDLE AND RIDER SOCKET PIN) (39428) 98311A656	EA
131	C		PIN, COTTER, PRONG, 1/4 IN X 4 IN, PLAIN STEEL FINISH (FITS PLATE SHACKLE BOLT) (39428) 98311A558	EA
132	C		PIN, COTTER, PRONG, 3/16 IN X 3 IN, PLAIN STEEL FINISH (FITS RETRIEVING WIRE SOCKET PIN) (39426) 98315A520	EA
133	C	6515-00-137-6345	PLUG, EAR, HEARING PROTECTION, UNIVERSAL SIZE, VINYL FOAM, DISPOSABLE, 400 PER BOX (89875) 4-375	BX
134	C	7930-00-266-7136	POLISH, METAL (6X798) POLISH, METAL	EA
135	C	7930-00-205-0442	POWDER, SCOURING, 14 OZ CN (58536) A-A-47	CN
136	O		PRIMER, CEILCOAT (16605) FLAKETAR 675	GL
137	C	6830-00-584-3041	PROPANE, 14 OZ DISPOSABLE CYLINDER (6N430) 2140	EA
138	O	9150-01-493-8350	PUMP OIL, HP, 2.5 GAL. (1BZ02) B647800002	EA
139	C	7920-00-205-1711	RAG, WIPING, 50LB BALE (80244) 7920-00-205-1711	BE
140	O	2040-00-288-2866	RATGUARD, SHIP (81349) MILG2767	EA
141	O	6830-01-457-7848	REFRIGERANT GAS MIXTURE (58536) A-A-58060-R404AW15.4	EA
142	C	7930-00-045-6923	REMOVER, FLOOR, POLISH (80244) 7930-00-045-6923	GL
143	C	4240-00-629-8199	RESPIRATOR, AIR FILTERING, 20 PER BOX (D2607) GT-9999-3005-7	BX
144	O	3439-00-246-0564	ROD, WELDING, 1/16 X 36 (31505) AWSA5.2-80 RG60 0.062	LB
145	O	3439-00-246-0566	ROD, WELDING, 1/8 X 36 (31505) AWSA5.2-80 RG60 0.125	LB
146	O	3439-00-268-9668	ROD, WELDING, 1/8 X 36 (81348) RBCUZN-A 0.062	LB
147	O	3439-00-247-2978	ROD, WELDING, 1/8 X 36 (81348) RCUZN-A 0.125	LB
148	O	3439-00-518-1914	ROD, WELDING, 1/8" X 36" (31505) AWSA5.27-69 RCUZNC	CO

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
149	O	3439-00-246-0565	ROD, WELDING, 3/32 X 36 (31505) AWSA5.2-80 RG60 0.093	LB
150	O	3439-00-262-7565	ROD, WELDING, 3/32 X 36, CO, 10LB (31505) AWSA5.27-85 CL RBCUZN-A 0.094	CO
151	O	4940-00-873-1730	RUBBER CEMENT (16720) V750-1	CN
152	O		SAND, MEDIA, 100 LB. (1BZ02) 4643020255	BG
153	C	8030-01-299-1762	SEALING COMPOUND (0A083) 77BR	TU
154	O	8030-00-616-7694	SEALING COMPOUND, ANTI-SEIZE (95534) X-PANDO PIPE JOINT COMPOUND	CN
155	O	8030-01-025-1692	SEALING COMPOUND, LOCTITE 242 (81349) MIL-S-46163	BT
156	C	8135-00-838-0122	SHEET, PLASTIC FOOD WRAP, ROLLED, 15" WIDTH, CLASS 7, RO-5000 FT (81348) L-P-370	RO
157	O	6850-00-880-7616	SILICONE COMPOUND (81343) AS8660 8OZTU	TU
158	O	6850-00-177-5094	SILICONE COMPOUND, 2 OZ PER TUBE (71984) DC4-20Z	TU
159	C	7930-00-579-8532	SOAP, LAUNDRY, 100 LB DRUM (81348) P-S-1792	DR
160	C	8520-00-129-0803	SOAP, TOILET, HAND, 4 OZ CAKE (80244) 8520-00-129-0803	BX
161	O	6810-00-264-6618	SODIUM BICARBONATE, TECHNICAL (58536) AA374-2	LB
162	O	6810-00-598-7316	SODIUM HYPOCHLORITE SOLUTION (1H4F2) PART NO. A-A-1427B	BX
163	O	3439-00-003-8601	SOLDER, LEAD ALLOY, ACID CORE (81346) SN10WRP20.028 1LB	SL
164	O	3439-00-188-6988	SOLDER, LEAD ALLOY, ROSIN CORE (81346) SN40WRAP3 0.090 1LB	SL
165	O	3439-00-163-4347	SOLDER, LEAD-TIN ALLOY, ACID CORE (81346) SN50BS 1LB	BR
166	O	3439-01-150-1051	SOLDER, ROSIN CORE (17794) 1243-0001	LB
167	O	3439-00-596-1718	SOLDER, SILVER (80009) 006-0664-00	EA
168	O		SOLVENT, CLEANING (16605) CEILCOTE T-410	GL
169	O	6850-01-023-5004	SOLVENT, ROSIN FLUX, 16 OZ. CAN (09800) 2009	CN
170	C	7510-00-272-9410	STAPLES, PAPER FASTENING, OFFICE TYPE, HEAVY DUTY, 1/2" X 1/2", 5000 UNIT BOX (02809) S.F.-13 1/2	BX
171	O	6850-01-493-8356	STORAGE, CHEMICAL (1BZ02) B645800003	EA

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
172	O	5975-01-034-5871	STRAP, TIEDOWN, ELECTRICAL COMPONENTS (96906) MS3367-7-0	HD
173	O		TAG, CAUTION (USED FOR LOCKOUT/TAGOUT) (3HPE6) 0116-LF-114-0100	BX
174	O		TAG, DANGER (USED FOR LOCKOUT/TAGOUT) (3HPE6) 0116-LF-115-4300	BX
175	O	8030-00-889-3535	TAPE, ANTISEIZING, 1/2 IN X 260 IN (96214) 417043-2	EA
176	C	5640-00-409-4265	TAPE, DUCT, RO, 180 FT (45255) DUCTTAPEALUMINUM	RO
177	C	5970-00-185-8531	TAPE, ELECTRICAL INSULATION, 81 1/2 FT PER RO (81165) 1045	RO
178	C	5970-00-012-1276	TAPE, INSULATION, ELECTRICAL (75037) 88	RO
179	C	9390-01-462-6814	TAPE, LUMINOUS, 1 IN X 50 YDS (76381) 3MN131PL	RO
180	C	9390-01-078-8660	TAPE, REFLECTIVE (94960) 3150-3X50 YD	RL
181	O	6830-01-390-9622	TETRAFLUOROETHANE, TECHNICAL (R134A) (2S827) 7798-3130	CY
182	C	8135-00-846-8409	TIE STRIP, BAG, 250 PER BD (58536) A-A-2105	BD
183	C	7920-00-823-9773	TOWELS, PAPER MACHINERY, TYPE 6 (83421) 7920-00-823-9773	MX
184	C	8450-00-291-0392	TOWELS, PAPER, BX=2400 (58536) A-A-696	BX
185	O	4720-01-528-6803	TUBE, POLYE, BLACK, .040, 1/4" (5 FEET) (05MH3) PH EB 43	FT
186	O	4720-01-528-6747	TUBE, POLYE, BLACK, .062, 1/2" (5 FEET) (05MH3) PH EB 86	FT
187	O	4720-01-528-6754	TUBE, POLYE, BLACK, .062, 3/8" (5 FEET) (05MH3) PH EB 64	FT
188	O	4720-01-528-6731	TUBING, 316 SS, .049, 1/2" (10 FEET) (05MH3) 1/2049316SMLS	FT
189	O	4720-01-528-6805	TUBING, 316 SS, .049, 3/8" (10 FEET) (05MH3) 3/8049316SMLS	FT
190	O	4710-00-277-4026	TUBING, COPPER, 1/2 IN (81349) MIL-T-24107	FT
191	O	4710-00-277-4029	TUBING, COPPER, 1/4 IN (81349) MIL-T-24107	FT
192	O	4710-00-277-4027	TUBING, COPPER, 3/8 IN (81346) ASTMB68B75375ODX032INWLTHK	FT
193	O	4710-00-277-4030	TUBING, COPPER, 5/16 IN (81349) MIL-T-24107	FT
194	C	4020-00-241-8886	TWINE, FIBROUS, 5 PLY BALL (81348) T-T-891	EA

Table 1. Expendable and Durable Items List (continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
195	C		WIRE, SAFETY LOCK, STAINLESS STEEL, .020 DIA, MIL-W-6715 (39428) 8860K61	EA

END OF WORK PACKAGE





---

**UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
TORQUE TABLE**

---

## GENERAL

This section provides general torque limits for screws used on the Large Tug (LT). Special torque limits are indicated in the maintenance procedures for applicable components. The general torque limits given in this section shall be used when specific torque limits are not indicated in the maintenance procedure. These general torque limits cannot be applied to screws that retain rubber components. The rubber components will be damaged before the torque limit is reached. If a special torque limit is not given in the maintenance instructions, tighten the screw or nut until it touches the metal surface, then tighten it one more turn.

## TORQUE LIMITS

Table 1 lists dry torque limits. Dry torque limits are used on screws that do not have lubricants applied to the threads. Table 2 lists wet torque limits. Wet torque limits are used on screws that have high-pressure lubricants applied to the threads. Table 3 lists torque limits for metric fasteners.

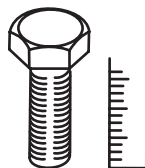
## HOW TO USE TORQUE TABLE

1. Measure the diameter of the screw you are installing (figure 1).



**Figure 1. Screw Diameter**

2. Count the number of threads per inch (figure 2) or use a thread pitch gauge to determine the thread pitch.

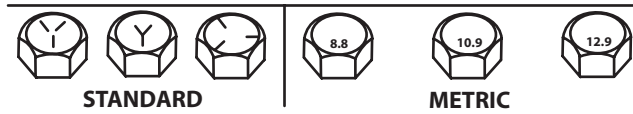


**Figure 2. Screw Threads**

3. Under the heading **SIZE**, look down the left hand column until you find the diameter of the screw you are installing (there will usually be two lines beginning with the same size).
4. In the second column under **SIZE**, find the number of threads per inch that matches the number of threads you counted in step 2. (Not required for metric screws).

**CAPSCREW HEAD MARKINGS**

Manufacturer's marks Metric screws are of three may vary. These are all grades: 8.8, 10.9, and 12.9. SAE Grade 5 (3-line). Grades & Manufacturer's marks appear on the screw head (figure 3).



**Figure 3. Manufacturer's Marks**

- To find the grade screw you are installing, match the markings on the head to the correct picture of CAPSCREW HEAD MARKINGS on the torque table.
- Look down the column under the picture you found in step 5 until you find the torque limit (1b/ft or Nm) for the diameter and threads per inch of the screw you are installing.

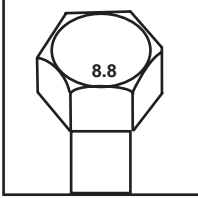
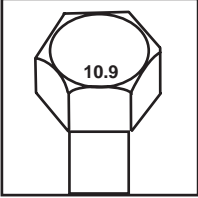
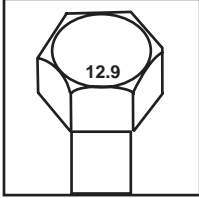
**Table 1. Torque Limits For Dry Fasteners**

CAPSCREW HEAD MARKINGS			SAE GRADE NO.2		SAE GRADE NO.5		SAE GRADE NO. 6 OR 7		SAE GRADE NO.8	
Dia. Inches	Threads Per Inch	Millimeters	Pound Feet	Newton Meters	Pound Feet	Newton Meters	Pound Feet	Newton Meters	Pound Feet	Newton Meters
1/4	20	6.35	5	7	8	11	10	14	12	16
1/4	28	6.35	6	9	10	14	12	16	14	19
5/16	18	7.94	11	15	17	23	21	28	25	34
5/16	24	7.94	12	16	19	26	24	33	25	34
3/8	16	9.63	20	27	30	41	40	54	45	61
3/8	24	9.53	23	31	35	47	45	61	50	68
7/16	14	11.11	30	41	50	68	60	81	70	95
7/16	20		35	47	55	75	70	95	80	108
1/2	13	12.70	50	68	75	102	95	129	110	149
1/2	20		55	75	90	122	100	136	120	163
9/16	12	14.29	65	88	110	149	135	183	150	203
9/16	18		75	102	120	163	150	203	170	231
5/8	11	15.88	90	122	150	203	190	258	220	298
5/8	18		100	136	180	244	210	285	240	325
3/4	10	19.05	160	217	260	353	320	434	380	515
3/4	16		180	244	300	407	360	488	420	597
7/8	9	22.23	140	190	400	542	520	705	600	814
7/8	14		155	210	440	597	580	786	660	895
1	8	25.40	220	298	580	786	800	1085	900	1220
1	12		240	325	640	868	860	1166	1000	1356
1-1/8	7	25.58	300	407	800	1085	1120	1519	1280	1736
1-1/8	12		340	461	880	1193	1260	1709	1440	953
1-1/4	7	31.75	420	570	1120	1519	1580	2142	1820	2468
1-1/4	12		460	624	1240	1681	1760	2387	2000	2712
1-3/8	6	34.93	560	759	1460	1980	2080	2820	2380	3227
1-3/8	12		640	868	1680	2278	2380	3227	2720	3688
1-1/2	6	38.10	740	1003	1940	2631	2780	3700	3160	4285
1-1/2	12		840	1139	2200	2983	3100	4204	3560	4827

Table 2. Torque Limits For Wet Fasteners

SIZE			TORQUE							
			SAE GRADE NO.2		SAE GRADE NO.5		SAE GRADE NO. 6 OR 7		SAE GRADE NO.8	
Dia. Inches	Threads Per Inch	Millimeters	Pound Feet	Newton Meters	Pound Feet	Newton Meters	Pound Feet	Newton Meters	Pound Feet	Newton Meters
1/4	20	6.35	4	6	6	8	8	11	9	12
1/4	28	6.35	5	7	7	9	9	12	10	14
5/16	18	7.94	8	11	3	18	16	22	18	24
6/16	24	7.94	9	12	14	19	18	24	20	27
3/8	16	9.53	15	20	23	31	30	41	35	47
3/8	24	9.53	17	23	25	34	30	41	35	47
7/16	14	11.11	24	33	35	47	45	61	55	75
7/16	20		25	34	40	54	50	68	60	81
1/2	13	12.70	35	47	55	75	70	95	80	108
1/2	20		40	54	65	88	80	108	90	122
9/16	12	14.29	50	68	80	108	100	136	110	149
9/16	18		55	75	90	122	110	149	130	176
5/8	11	15.88	70	95	110	149	140	190	170	231
5/8	18		80	108	130	176	160	217	180	244
3/4	10	19.05	120	163	200	271	240	325	280	380
3/4	16		140	190	220	298	280	380	320	434
7/8	9	22.23	110	149	300	407	400	542	460	624
7/8	14		120	163	320	434	440	597	500	678
1	8	25.40	160	217	440	597	600	814	680	922
1	12		170	231	480	651	660	895	740	1003
1-1/8	7	25.58	220	298	600	814	840	1139	960	1302
1-1/8	12		260	353	660	895	940	1275	1080	1464
1-1/4	7	31.75	320	434	840	1139	1100	1492	1360	1844
1-1/4	12		360	488	920	1248	1320	1790	1500	2034
1-3/8	6	34.93	420	570	1100	1492	1560	2115	1780	2414
1-3/8	12		460	624	1260	1709	1780	2414	2040	2766
1-1/2	6	38.10	560	760	1460	1980	2080	2820	2360	3200
1-1/2	12		620	841	1640	2224	2320	3146	2660	3607

Table 3. Torque Limits For Metric Fasteners

CAPSCREW HEAD MARKINGS							
		METRIC GRADE 8.8		METRIC GRADE 10.9		METRIC GRADE 12.9	
SIZE							
DIA INCHES	MILLIMETERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS
.157	4	2	3	3	4	4	5
.197	5	4	5	6	8	7	9
.237	6	7	9	10	14	11	15
.276	7	11	15	16	22	20	27
.315	8	18	24	25	34	29	39
.394	10	32	43	47	64	68	79
.473	12	68	79	83	113	100	136
.630	16	144	195	196	266	235	319
.709	18	190	258	269	366	323	438
.788	20	260	353	366	496	440	597
.867	22	368	499	520	705	678	919
.946	24	470	637	664	900	794	1077
1.064	27	707	959	996	1351	1235	1675
1.182	30	967	1311	1357	1840	1630	2210

END OF WORK PACKAGE

---

**UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
GLOSSARY**

---

Aft or after	At, near, or toward the stern.
Aids to navigation	Charted marks (such as buoys, beacons, lights, and electronic devices) to assist navigators.
Amidships	Usually in the line of the keel, but sometimes halfway between bow and stern; often contracted to “midships.”
Astern	Behind the vessel; in the direction of the stern.
Athwartships	At right angles to the fore-and-aft line of a vessel; across the vessel in a direction at right angles to the keel.
Beam	The maximum width of a vessel, also called breadth.
Berth	A place for securing a vessel, either in the stream or alongside a wharf or other vessel.
Bilge	The lowest interior position of a ship; the water that accumulates in the bilge is called bilge water.
Bilge pump	A pump used aboard vessels to remove accumulations of water in the bilge.
Bitter end	Last end of a rope or inboard end of an anchor cable secured to a bitt.
Bitts	Pair of heavy posts, set vertically in a deck or on a pier, to which mooring or towing lines are fastened.
Boat hook	A wooden staff with a metal hook and prod at one end used for fending off or holding on when coming alongside a vessel or a wharf. It is also used for picking up small objects from the water.
Bow	The forward part of a vessel.
Bowline	A line leading from the bow of a vessel.
Bulkhead	Partition dividing the interior of a vessel into various compartments.
Chafe	To wear down by rubbing the surface of a line against a solid object.
Chafing gear	A guard of canvas, rope, or similar material placed around spars, lines, or rigging to prevent wear.
Chocks	Round or oval holes in a vessel’s bulwark, sometimes fitted with rollers, through which hawsers and ropes are passed; also blocks of wood for supporting boats, weights, and so on.
Cleat	Wood or metal fitting that has two projecting horns to which a line is secured.

## TM 55-1925-273-24&P-2

Coaming	Sidewall of a hatch projecting above the deck around the perimeter of the hatch to prevent water from going below.
Coxswain	The enlisted person in charge of a small craft.
Dogs	Small, bent metal fittings used to secure watertight doors, hatch covers, manhole covers, and so on to close and fasten as tight as possible.
Draft	The depth of water which a vessel requires to float freely; the depth of a vessel from the waterline to the keel; also a sling load of cargo.
Engine room	Compartment containing the propulsion machinery of a vessel.
Faking down	To lay down rope in long or circular turns (coils) so that each turn of rope overlaps the next one underneath in such a way that the rope is clear for running.
Fenders	A device of canvas, wood, or rope used over the side to take the shock of contact between vessel and wharf or other vessel when alongside.
Fore	Parts of a vessel at or adjacent to the bow; also parts between the mid-ship section and stern.
Fore and aft	Lengthwise of a ship.
Gunwale	The uppermost continuous strake in a vessel's side; the upper edge of a vessel's hull.
Hard over	Turning the wheel as far as possible in a given direction.
Hatch	Opening in a deck giving access to cargo holds.
Helm	The machine by which a vessel is steered.
Hold	Space between the lowermost deck and the bottom of a vessel that is used for the stowage of ballast, cargo, and stores.
Hull	Framework of a vessel, including all decks, but exclusive of masts, yards, riggings, and all outfit or equipment.
Inboard	Toward the centerline of a vessel; also the side next to a wharf or another vessel.
Knot	A unit of speed equal to 1 nautical mile per hour
Lanyard	Rope used to make anything fast, especially a short piece reeved through deadeyes, connecting shrouds, stays, and so on, to side of vessel.
Lazarette	A compartment used for storage purposes in the stern of a vessel.
Left-hand propeller	When viewed from astern the propeller that turns counterclockwise while driving the boat ahead.

## TM 55-1925-273-24&P-2

Life lines	Lines stretched fore and aft along the decks to give the crew safety against being washed overboard.
Life jacket	An apparatus of buoyant material, designed to keep a person afloat.
Life raft	Raft kept buoyant by cylindrical air chambers, designed to keep survivors of a disaster afloat for rescue.
Life ring	Floating ring covered with canvas that is designed to support a person in water.
Main deck	First complete deck running the full length of a vessel.
Maneuver	To make a series of changes in direction and position for a specific purpose.
Moored	Lying with both anchors down; tied to a pier or anchor buoy; also to secure a vessel other than by anchoring with a single anchor.
Mooring lines	Cables or ropes used to tie up a vessel.
Outboard	Toward the side of a vessel in relation to the centerline or outside the vessel entirely; also, the side away from a wharf or vessel alongside.
PFD	Personal Floatation Device: An apparatus of buoyant material, designed to keep a person afloat.
Pier	A wharf which projects into a harbor, with water and accommodations for berthing vessels on two or more sides of it.
Port side	The left side of a vessel looking forward, indicated by a red running light when underway at night; an opening in a vessel's side; a harbor for cargo operations.
Potable water	Drinkable water, meeting standards set by the U.S. Public Health Service.
Quarter	General area from the middle of a vessel to the extreme stern; also to proceed with the quarter to the wind or sea; to bring the sea or wind \ first on one quarter and then on the other.
Right-hand propeller	When viewed from astern, the propeller that turns clockwise while driving the boat ahead.
Rudder	Flat structure hung vertically on the sternpost, just aft of the screw, and used to steer a vessel by offering resistance to the water when turned to an angle with the centerline.
Rudder amidships	The position of the rudder when it parallels the keel line of the vessel.
Running lights	All lights required to be shown during peacetime by a vessel that is under way.
Scope	Length of anchor chain or cable to which a vessel is riding.
Seacock	Valve connecting with the outside raw water in the lower part of vessel which can be used to flood various parts.

Sheave	A grooved wheel or pulley inside a block over which a line runs.
Spring line	A mooring line leading at an angle of about 45 degrees from the fore and aft line of a vessel to a wharf or another vessel.
Starboard side	Right side of a vessel looking forward; indicated by a green running light when underway at night.
Stern	The after end (rear) of a vessel.
Stern line	A line leading from the stern of a vessel.
Stow	To put away, to lock up for safekeeping in a proper place.
Topside	Above decks, such as on the weather deck or bridge.
Towing bitts	Vertical posts on a vessel to which towing or mooring lines are secured.
Trim	Difference in draft at the bow and stern of a vessel; manner in which a vessel floats on the water, whether on an even keel or down by the head or stern; shipshape. To adjust a vessel's position in the water by arranging ballast, cargo, and so on. To arrange for sailing; to assume, or cause a vessel to assume, a certain position, or trim, in the water.
Turnbuckle	Link threaded on both ends of a short bar that is used to pull objects together.
Underway	A vessel is said to be underway when she is not anchored, moored, aground, or beached.
Wharf	Projecting platform of timber, stone, or other material which extends into water deep enough for vessels to be accommodated alongside for loading or unloading.
Wheel	The instrument attached to the rudder by which a vessel is steered.
Winch	A piece of machinery, which operates a shaft, fitted with a drum or drums upon which lines or cables are wound to hoist or haul an object.

**END OF WORK PACKAGE**



**UNIT, GENERAL SUPPORT, AND DIRECT SUPPORT MAINTENANCE  
INLAND AND COASTAL LARGE TUG (LT)  
ALPHABETICAL INDEX**

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
01 & 02 Level Reheater 120V Fuse Box No. 1 Repair Parts and Special Tools List .....	0298 00-56
01 Level	
Exterior, Location and Description of Major Components .....	0004 00-1
Interior, Location and Description of Major Components .....	0008 00-1
PMCS .....	0083 00-1
01, 02, 03 Level	
Exhaust Cooling Fan Coil Unit Motor Controller Replace .....	0224 00-1
Fan Coil Unit Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace	
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
02 Level and Above PMCS .....	0084 00-1
02 Level Exterior Location and Description of Major Components .....	0005 00-1
120V Distribution Panel No. 1, Repair Parts and Special Tools List .....	0298 00-36
120V Distribution Panel No. 2, Repair Parts and Special Tools List .....	0298 00-40
120V Distribution Panel No. 3, Repair Parts and Special Tools List .....	0298 00-42
120V Distribution Panel No. 4, Repair Parts and Special Tools List .....	0298 00-44
120V Electronics Distribution Panel, Repair Parts and Special Tools List .....	0298 00-52
120V Emergency Distribution Panel No. 1, Repair Parts and Special Tools List .....	0298 00-46
120V Exterior Emergency Lighting Panel No. 2, Repair Parts and Special Tools List .....	0298 00-50
120V Main Deck, 01 & 02 Emergency Lighting Panel No. 1, Repair Parts and Special Tools List .....	0298 00-48
120V Pilothouse Emergency Distribution Panel, Repair Parts and Special Tools List .....	0298 00-54
220/110V Distribution Panel, Repair Parts and Special Tools List .....	0298 00-26
220V Air Conditioning Distribution Panel, Repair Parts and Special Tools List .....	0298 00-62
440V Power Panel No. 1, Repair Parts and Special Tools List .....	0298 00-28
440V Power Panel No. 2, Repair Parts and Special Tools List .....	0298 00-30
440V Power Panel No. 3, Repair Parts and Special Tools List .....	0298 00-32
440V Power Panel No. 4, Repair Parts and Special Tools List .....	0298 00-34
440V Power Panel No. 5, Repair Parts and Special Tools List .....	0298 00-36

**A**

Abbreviations .....	0001 00-2
AC Fuse, Replace, Battery Charger	
General Alarm .....	0147 00-2
Power Supply System .....	0132 00-2
Acronyms .....	0001 00-2
Adapter Proportioning Bromide Feeder System Replace .....	0180 00-4
Adjust	
EDG Circuit Breaker .....	0217 00-1
Electrical Power System .....	0217 00-1
	0217 00-2
	0217 00-3
Hot Water Heater .....	0182 00-1
Hydraulic Watertight Door .....	0088 00-1
Shore Power Circuit Breaker .....	0217 00-3

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Adjust (continued):	
Spark Gap	
Searchlight .....	0133 00-7
Welder .....	0278 00-1
SSDG 1/SSDG 2 Circuit Breaker .....	0217 00-2
Tank Level Indicator .....	0155 00-1
Adjustable Transformer Searchlight Replace .....	0236 00-11
AFFF Pump	
Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-4
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Theory of Operation .....	0032 00-6
Air Box Drain Valve, Replace .....	0281 00-1
Air Compressor	
Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Theory of Operation .....	0027 00-3
Air Conditioning Condenser Units, Theory of Operation .....	0038 00-1
Air Intake System, Main Propulsion Engine, Theory of Operation .....	0018 00-2
Air Starting System, Main Propulsion Engine, Theory of Operation .....	0018 00-3
Alarm	
Arms Storage	
Repair .....	0142 00-1
Replace	
Alarm Panel Arms Locker .....	0142 00-12
Bulb .....	0142 00-1
Bulb (Round Lens) .....	0142 00-3
Buzzer .....	0142 00-5
Door Alarm Switch Arms Locker .....	0142 00-11
Fuse .....	0142 00-3
Fuse Holder .....	0142 00-5
Lamp (Square Lens) .....	0142 00-3
Rotary Switch Arms Locker .....	0142 00-10
Thermostat Arms Locker .....	0142 00-7
Water Switch Arms Locker .....	0142 00-9
Troubleshooting .....	0069 00-1
Day Tank High Level	
Panel	
Horn/Strobe Assembly Replace .....	0258 00-4
Horn/Strobe Silence Switch Replace .....	0258 00-4
Relay Replace .....	0258 00-3
Repair .....	0258 00-1
Replace .....	0258 00-1
Test Switch Replace .....	0258 00-1
Troubleshooting .....	0057 00-1
General, Troubleshooting .....	0072 00-1

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
Alarm (continued):	
Horn, Tank Level Indicator, Replace .....	0250 00-5
Panel, Arms Locker	
Radio Room Alarm, Replace .....	0142 00-12
Replace, Arms Storage Alarm .....	0142 00-12
Pilothouse	
Replace	
Buzzer .....	0094 00-16
LED .....	0094 00-12
Pushbutton .....	0094 00-15
Radio Room	
Repair .....	0142 00-1
Replace	
Alarm Panel Arms Locker .....	0142 00-12
Bulb .....	0142 00-1
Bulb (Round Lens) .....	0142 00-3
Buzzer .....	0142 00-5
Door Alarm Switch Arms Locker .....	0142 00-11
Fuse .....	0142 00-3
Fuse Holder .....	0142 00-5
Lamp (Square Lens) .....	0142 00-3
Rotary Switch Arms Locker .....	0142 00-10
Troubleshooting .....	0069 00-1
System	
Arms Storage and Radio Room, Troubleshooting .....	0069 00-1
Theory of Operation .....	0037 00-1
Align	
Fire and General Service Pump .....	0272 00-1
Searchlight .....	0133 00-5
Ammeter	
Battery Charger Power Supply System Replace .....	0247 00-2
Searchlight Power Supply Replace .....	0234 00-5
Ammunition Locker	
Gasket, Replace .....	0279 00-2
Repair .....	0279 00-1
Repair Parts and Special Tools List .....	0306 00-10
Thermometer, Replace .....	0279 00-1
Amplifier & Power Supply Board Circuit Card Intercommunication System Replace .....	0243 00-4
Amplifier Public Address System Replace .....	0140 00-1
AMS 1	
Location and Description of Major Components .....	0012 00-1
	0012 00-2
Supply Fan Motor Controller	
Repair .....	0124 00-1
Repair Parts and Special Tools List .....	0300 00-10
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
AMS 2	
Location and Description of Major Components .....	0013 00-5
Supply Fan Motor Controller	
Repair 0124 00-1	
Repair Parts and Special Tools List .....	0300 00-10

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
AMS 2 (continued):	
Supply Fan Motor Controller (continued):	
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Anchor Windlass, Theory of Operation .....	0040 00-12
Arc Welder	
Repair .....	0278 00-1
Troubleshooting .....	0078 00-1
Arms Locker	
Exhaust Fan Motor Controller	
Repair .....	0124 00-1
Repair Parts and Special Tools List .....	0300 00-10
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Location and Description of Major Components .....	0010 00-8
Arms Storage Alarm	
Repair .....	0142 00-1
Replace	
Alarm Panel Arms Locker .....	0142 00-12
Bulb .....	0142 00-1
Bulb (Round Lens) .....	0142 00-3
Buzzer .....	0142 00-5
Door Alarm Switch Arms Locker .....	0142 00-11
Fuse .....	0142 00-3
Fuse Holder .....	0142 00-5
Lamp (Square Lens) .....	0142 00-3
Rotary Switch Arms Locker .....	0142 00-10
Thermostat, Arms Locker .....	0142 00-7
Water Switch Arms Locker .....	0142 00-9
Arms Storage and Radio Room Alarm System, Repair Parts and Special Tools List .....	0302 00-15

**B**

Ballast Pump	
Coupling, Replace .....	0264 00-1
Electric Motor	
Repair .....	0266 00-1
Replace .....	0287 00-1
Replace .....	0171 00-1
Pump End	
Repair .....	0265 00-1
Replace .....	0286 00-1
Replace .....	0170 00-1
Repair .....	0169 00-1
Replace .....	0264 00-1
Replace .....	0285 00-1
Repair Parts and Special Tools List .....	0304 00-28

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
Ballast System Valve	
Repair .....	0168 00-1
Repair Parts and Special Tools List .....	0304 00-17
Replace .....	0167 00-1
Base Assembly, Searchlight, Replace .....	0235 00-5
Battery Bank, Repair Parts and Special Tools List .....	0302 00-30
Battery Box, Exhaust Fan, Replace .....	0131 00-4
Battery Charger	
General Alarm	
Repair .....	0147 00-1
Wiring .....	0147 00-1
Replace	
Fuse AC .....	0147 00-2
Fuse DC .....	0147 00-4
Power Supply System	
Repair .....	0132 00-1
	0231 00-1
	0247 00-1
Wiring .....	0132 00-1
Replace .....	0230 00-1
	0246 00-1
Ammeter .....	0247 00-2
Circuit Breaker .....	0247 00-4
Fuse .....	0247 00-1
AC .....	0132 00-2
DC .....	0132 00-4
Repair Parts and Special Tools List .....	0301 00-6
	0302 00-28
Troubleshooting .....	0066 00-1
Battery	
General Alarm	
Repair .....	0150 00-1
Replace .....	0149 00-1
Service .....	0148 00-1
Power Supply	
Repair .....	0131 00-1
Replace .....	0130 00-1
Service .....	0129 00-1
Repair Parts and Special Tools List .....	0301 00-2
Test .....	0128 00-1
Beacon, Rotating	
Repair .....	0146 00-1
Replace .....	0145 00-1
Dome .....	0146 00-1
Lamp .....	0146 00-3
Bell ,General Alarm, Replace .....	0143 00-1
Below Main Deck Aft of Engine Room, Location and Description of Major Components .....	0013 00-1
Below Main Deck Level PMCS .....	0081 00-1
Belt, Windshield Wiper, Replace .....	0210 00-1
Bench Grinder	
Replace .....	0191 00-1
Service .....	0191 00-3
Troubleshooting .....	0077 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Bilge and Ballast Pump	
Motor Controller	
Repair .....	0125 00-1
Repair Parts and Special Tools List .....	0300 00-16
Replace .....	0227 00-1
Fuse .....	0125 00-3
Lamp .....	0125 00-1
Motor Starter .....	0125 00-3
Transformer .....	0125 00-4
Troubleshooting .....	0050 00-1
Bilge and Ballast Systems, Theory of Operation .....	0030 00-1
Blade, Windshield Wiper, Replace .....	0094 00-1
Boatswain's Store	
Location and Description of Major Components .....	0010 00-9
Boatswain's Store Room Supply Fan Motor Controller	
Repair .....	0124 00-1
Repair Parts and Special Tools List .....	0300 00-10
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Bow Thruster	
Compartment, Location and Description of Major Components .....	0012 00-1
System, Theory of Operation .....	0012 00-5
System, Theory of Operation .....	0022 00-1
Bracket Lighting Fixture	
Repair .....	0116 00-1
Repair Parts and Special Tools List .....	0299 00-4
Replace Lamp .....	0116 00-1
Brominator	
Assembly, Replace .....	0180 00-3
Dual Feed Valve Assembly, Replace .....	0180 00-5
Replace .....	0180 00-1
Service .....	0180 00-1
Test .....	0179 00-1
Bromine Feeder	
Assembly, Replace .....	0180 00-5
Cartridge, Replace .....	0180 00-1
Bulb	
Day Tank High Level Alarm Replace .....	0158 00-6
Navigation Lighting Panel Replace .....	0139 00-1
Radio Room Alarm Replace .....	0142 00-1
Replace Arms Storage Alarm .....	0142 00-1
(Round Lens) Radio Room Alarm Replace .....	0142 00-3
Tank Level Indicator Replace .....	0157 00-1
Bus Tie Circuit Breaker, Replace .....	0220 00-1
Buzzer	
Radio Room Alarm Replace .....	0142 00-5
Replace, Arms Storage Alarm .....	0142 00-5

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
<b>C</b>	
Cable Assembly	
Repair Parts and Special Tools List .....	0303 00-16
Tank Level Indicator	
Dry Side, Inspect .....	0256 00-1
Inspect .....	0256 00-1
Replace .....	0257 00-1
Wet Side, Inspect .....	0256 00-2
Cable Connector, Shore Power, Replace .....	0110 00-3
Calibrate, Tank Level Indicator .....	0156 00-1
	0249 00-1
Capabilities, Equipment .....	0002 00-1
Capacities, Tank .....	0015 00-1
Capacitor	
Searchlight Power Supply, Replace .....	0234 00-9
Tank Level Indicator, Replace .....	0251 00-1
Capstan, Theory of Operation .....	0040 00-10
Captain's Stateroom, Location and Description of Major Components .....	0008 00-7
Cartridge, Bromine Feeder Replace .....	0180 00-1
Cathodic Protection System ,Theory of Operation .....	0041 00-1
Central Hydraulic Power Unit	
Electrical Operation Theory of Operation .....	0040 00-4
Hydraulic Operation Theory of Operation .....	0040 00-4
Hydraulic Pumps Theory of Operation .....	0040 00-1
Motor Controller Theory of Operation .....	0040 00-2
Reservoir Theory of Operation .....	0040 00-2
Return Filter Theory of Operation .....	0040 00-2
Safety Monitoring and Shutoff Devices Theory of Operation .....	0040 00-2
Suction Filter Theory of Operation .....	0040 00-2
System	
Pressure Gauge Theory of Operation .....	0040 00-2
Relief Valve Theory of Operation .....	0040 00-2
theory of Operation .....	0040 00-1
Characteristics, Equipment .....	0002 00-1
Check Valve, Hydraulic Watertight Door, Repair .....	0201 00-7
Chief Engineer's Stateroom, Location and Description of Major Components .....	0008 00-6
Circuit Breaker	
Battery Charger, Power Supply System, Replace .....	0247 00-4
Bus Tie, Replace .....	0220 00-1
EDG	
Adjust .....	0217 00-1
Replace .....	0221 00-1
Emergency Switchboard, Replace .....	0112 00-7
Engine Room Emergency Load Center, Replace .....	0113 00-2
Main Switchboard, Replace .....	0111 00-14
	0111 00-6
Power Distribution Panel, Replace .....	0114 00-1
Shore Power, Adjust .....	0217 00-3
SSDG 1/SSDG 2, Adjust .....	0217 00-2
Clearview Screen	
Control Box	
Fuse, Replace .....	0209 00-2
Fuse Holder, Replace .....	0209 00-3
Lamp Housing, Replace .....	0209 00-2

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Clearview Screen (continued):	
Control Box (continued):	
Lamp, Replace .....	0209 00-1
Toggle Switch, Replace .....	0209 00-4
Repair .....	0209 00-1
Replace .....	0208 00-1
Control Box Fuse .....	0209 00-2
Control Box Fuse Holder .....	0209 00-3
Control Box Lamp .....	0209 00-1
Control Box Lamp Housing .....	0209 00-2
Control Box Toggle Switch .....	0209 00-4
Troubleshooting .....	0075 00-13
Clutch, Searchlight, Replace .....	0236 00-7
Compressed Air System, Theory of Operation .....	0027 00-1
Console Light, Pilothouse, Troubleshooting .....	0070 00-1
Contactors	
Assembly, Motor Controller, Lube Oil Priming Pump, Replace .....	0123 00-1
Magnetic, Hot Water Heater, Replace .....	0184 00-5
Switch, General Alarm, Replace .....	0143 00-4
Control Air System, Theory of Operation .....	0028 00-1
Control Module, Tank Level Indicator Replace .....	0250 00-1
Control Valve Assembly, Hydraulic Watertight Door	
Repair .....	0201 00-1
Replace .....	0200 00-1
Convection Heater, Theory of Operation .....	0038 00-1
Convactor Heater 120V Fuse Box No. 2, Repair Parts and Special Tools List .....	0298 00-58
Cooling System, Main Propulsion Engine, Theory of Operation .....	0018 00-7
Corrosion Prevention and Control .....	0001 00-1
Coupling	
Ballast Pump, Replace .....	0264 00-1
Fire and General Service Pump, Replace .....	0273 00-3
Potable Water Pump, Replace .....	0267 00-4
Sewage Discharge Pump, Replace .....	0260 00-1
Cover, Window, Replace .....	0196 00-1
CPC .....	0001 00-1
Crane, Theory of Operation .....	0040 00-16
Crew Mess Fan Coil Unit Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace 0224 00-1	
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Crew's Stateroom 1, Location and Description of Major Components .....	0009 00-4
Crew's Stateroom 2, Location and Description of Major Components .....	0009 00-5
Crew's Stateroom 3, Location and Description of Major Components .....	0009 00-3
Crew's Stateroom 4, Location and Description of Major Components .....	0009 00-6
Cylinder Assembly, Hydraulic Watertight Door	
Repair .....	0199 00-1
Replace .....	0198 00-1



<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
<b>D</b>	
Damage Control	
Equipment, Repair Parts and Special Tools List .....	0306 00-2
Locker, Location and Description of Major Components .....	0010 00-6
Data, Equipment .....	0017 00-1
Day Tank High Level Alarm	
Level Sensor, Replace .....	0259 00-1
Panel	
Horn/Strobe	
Assembly, Replace .....	0258 00-4
Silence Switch, Replace .....	0258 00-4
Relay, Replace .....	0258 00-3
Repair .....	0258 00-1
Replace .....	0258 00-1
Test Switch .....	0258 00-1
Repair Parts and Special Tools List .....	0303 00-18
Replace	
Bulb .....	0158 00-6
Fuse .....	0158 00-7
Fuse Holder .....	0158 00-8
Lamp Assembly .....	0158 00-7
Troubleshooting .....	0057 00-1
DC Fuse, Replace	
Battery Charger, General Alarm .....	0147 00-4
Battery Charger, Power Supply System .....	0132 00-4
Deck Drain, Service .....	0085 00-1
Deck Machinery, Theory of Operation .....	0040 00-1
Deck Reheater 120V Fuse Box No. 3, Repair Parts and Special Tools List .....	0298 00-60
Destruction of Army Materiel to Prevent Enemy Use .....	0001 00-1
Diesel Engine-Driven Firefighting Pump, Theory of Operation .....	0032 00-6
Differences Between Models .....	0016 00-1
Diode, Tank Level Indicator, Replace .....	0251 00-5
Distribution Panel	
Power	
Replace .....	0223 00-1
Circuit Breaker .....	0114 00-1
Circuit Breaker .....	0114 00-1
Troubleshooting .....	0060 00-1
Dome, Rotating Beacon, Replace .....	0146 00-1
Door Alarm	
Switch	
Arms Locker, Replace .....	0142 00-11
Radio Room, Replace .....	0142 00-11
System, Theory of Operation .....	0037 00-5
Drain, Deck, Service .....	0085 00-1
Drill Press	
Replace .....	0190 00-1
Service .....	0190 00-2
Troubleshooting .....	0076 00-1
Drum Assembly, Searchlight, Replace .....	0235 00-1
Dual Feed Valve Assembly, Brominator, Replace .....	0180 00-5
Duct Heaters, Theory of Operation .....	0038 00-1
Duplex Strainer, Oily Bilge System, Service .....	0163 00-1

Subject

WP Sequence No. -Page No.

E

EDG	
Circuit Breaker	
Adjust .....	0217 00-1
Replace .....	0221 00-1
Power Interlocks, Test	
With Feedback Test .....	0216 00-3
Without Feedback .....	0216 00-3
EIR .....	0001 00-1
Elapsed Time Indicator, Searchlight Power Supply, Replace .....	0234 00-1
Electric Motor	
Ballast Pump	
Repair .....	0266 00-1
	0287 00-1
Replace .....	0171 00-1
Fire and General Service Pump	
Repair .....	0187 00-1
	0277 00-1
	0292 00-1
Replace .....	0187 00-1
	0276 00-1
Service .....	0188 00-1
Fuel Oil Transfer Pump, Replace .....	0107 00-1
Potable Water Pump, Replace .....	0176 00-1
Prelubrication Pump, Replace .....	0096 00-1
Sewage Discharge Pump	
Repair .....	0263 00-1
	0284 00-1
Replace .....	0162 00-1
Electrical Power System	
Adjust .....	0217 00-1
Repair .....	0110 00-1
	0218 00-1
Repair Parts and Special Tools List .....	0298 00-2
Test .....	0216 00-1
Electrical System	
Alternating Current System ,Theory of Operation .....	0035 00-1
Battery Banks, Theory of Operation .....	0035 00-7
Battery Chargers, Theory of Operation .....	0035 00-4
Direct Current System Theory of Operation .....	0035 00-4
Distribution Panels	
Alternating Current, Theory of Operation .....	0035 00-4
Direct Current, Theory of Operation .....	0035 00-7
Emergency Switchboard, Theory of Operation .....	0035 00-1
General, Theory of Operation .....	0035 00-1
Main Switchboard, Theory of Operation .....	0035 00-1
Motor Controllers, Theory of Operation .....	0035 00-4
Storage Batteries, Theory of Operation .....	0035 00-4
Theory of Operation .....	0035 00-1
Transformers, Theory of Operation .....	0035 00-4
Emergency Diesel Generator (EDG), Theory of Operation .....	0034 00-2
Emergency Diesel Generator Room, Location and Description of Major Components .....	0008 00-12
Emergency Load Center, Repair Parts and Special Tools List .....	0298 00-24

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
Emergency Switchboard	
Repair .....	0112 00-1
	0220 00-1
	0221 00-1
Repair Parts and Special Tools List .....	0298 00-15
Replace Circuit	
Breaker .....	0112 00-7
Fuse .....	0112 00-8
Lamp .....	0112 00-1
Meter .....	0112 00-4
Pushbutton .....	0112 00-3
Relay .....	0112 00-10
Switch .....	0112 00-3
	0112 00-7
Transformer .....	0112 00-10
Troubleshooting .....	0059 00-1
Engine Control Panel, Theory of Operation .....	0018 00-1
Engine Cooling System	
Components, Theory of Operation .....	0019 00-1
Heat Exchanger, Theory of Operation .....	0019 00-4
Keel Cooler, Theory of Operation .....	0019 00-2
Radiator, Theory of Operation .....	0019 00-3
Theory of Operation .....	0019 00-1
Engine Exhaust System	
Main Propulsion, Engine Theory of Operation .....	0018 00-3
Repair .....	0281 00-1
Repair Parts and Special Tools List .....	0297 00-6
Engine Order Telegraph	
Repair .....	0245 00-1
Repair Parts and Special Tools List .....	0302 00-21
Replace .....	0244 00-1
Rotary Switch .....	0245 00-1
Theory of Operation .....	0036 00-4
Troubleshooting .....	0071 00-1
Engine Room	
Location and Description of Major Components .....	0011 00-1
Port Side Location and Description of Major Components .....	0011 00-1
Starboard Side Location and Description of Major Components .....	0011 00-6
Engine Room Emergency Load Center	
Circuit Breaker, Replace .....	0113 00-2
Distribution Panel, Replace .....	0222 00-1
Fuse, Replace .....	0113 00-2
Replace 0113 00-1	
Engine Room Exhaust Fan Motor Controller	
Repair .....	0124 00-1
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Repair Parts and Special Tools List .....	0298 00-23
Engine Room Supply Fan Motor Controller	
Repair .....	0124 00-1
Repair Parts and Special Tools List .....	0300 00-12
	0300 00-14

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Engine Room Supply Fan Motor Controller (continued):	
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Engine Room Water Washdown System (ERWWS), Theory of Operation .....	0032 00-8
Entertainment System	
Repair .....	0152 00-1
Repair Parts and Special Tools List .....	0302 00-32
Replace .....	0151 00-1
EOS	
Air Conditioner, Theory of Operation .....	0038 00-1
Location and Description of Major Components .....	0011 00-4
Equipment Characteristics, Capabilities, and Features .....	0002 00-1
Equipment Data .....	0017 00-1
Exhaust System, Engine, Repair .....	0281 00-1
Expendable and Durable Items List .....	0307 00-1

**F**

Fan	
AMS 1 Supply, Motor Controller	
Repair .....	0124 00-1
Replace	
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
AMS 2 Supply, Motor Controller	
Repair .....	0124 00-1
Replace	
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Arms Locker Exhaust, Motor Controller	
Repair .....	0124 00-1
Replace	
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Battery Box Exhaust, Replace .....	0131 00-4
Boatswain's Store Room Supply, Motor Controller	
Repair .....	0124 00-1
Replace	
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Engine Room Exhaust, Motor Controller	
Repair .....	0124 00-1

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
Fan (continued):	
Engine Room Exhaust, Motor Controller (continued):	
Replace	
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Engine Room Supply, Motor Controller	
Repair .....	0124 00-1
Replace	
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Galley Exhaust, Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Galley Supply, Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Sanitary Space Exhaust, Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Searchlight Power Supply, Replace .....	0234 00-6
Weld Hood Exhaust, Motor Controller	
Repair .....	0127 00-1
Replace, Motor Starter .....	0127 00-1
Fan Coil Unit	
01, 02, 03 Level, Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Crew Mess, Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Theory of Operation .....	0038 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Fan Room	
01 Level (Aft), Location and Description of Major Components .....	0008 00-3
Main Deck, Location and Description of Major Components .....	0010 00-2
Features, Equipment .....	0002 00-1
Fire & General Service Pump, Motor Controller	
Repair .....	0125 00-1
Replace .....	0227 00-1
Fuse .....	0125 00-3
Lamp .....	0125 00-1
Motor Starter .....	0125 00-3
Transformer .....	0125 00-4
Fire Alarm System, Theory of Operation .....	0037 00-1
Fire and General Service Pump 1, Motor Controller, Repair Parts and Special Tools List .....	0300 00-18
Fire and General Service Pump 2, Motor Controller, Repair Parts and Special Tools List .....	0300 00-20
Fire and General Service Pump	
Align .....	0272 00-1
Coupling, Replace .....	0273 00-3
Electric Motor	
Repair .....	0187 00-1
	0277 00-1
	0292 00-1
Replace .....	0187 00-1
	0276 00-1
Service .....	0188 00-1
Pump End	
Repair .....	0275 00-1
	0291 00-1
Replace .....	0186 00-1
	0274 00-1
Repair .....	0273 00-1
	0290 00-1
Repair Parts and Special Tools List .....	0305 00-19
Troubleshooting .....	0053 00-1
Fire Main, Theory of Operation .....	0032 00-1
Fire Monitors, Theory of Operation .....	0032 00-1
Fire Stations, Theory of Operation .....	0032 00-2
Fire Suppression Systems	
Arms Locker Drenching, Theory of Operation .....	0033 00-9
Engine Room Water Washdown System (ERWSS), Theory of Operation .....	0033 00-6
Extinguishing Agents, Theory of Operation .....	0033 00-9
FM-200	
Alarm System, Theory of Operation .....	0033 00-4
Theory of Operation .....	0033 00-1
Galley, Theory of Operation .....	0033 00-8
Theory of Operation .....	0033 00-1
Floodlight	
Repair .....	0121 00-1
Repair Parts and Special Tools List .....	0299 00-12
Replace .....	0120 00-1
Lamp .....	0121 00-1
Lens .....	0121 00-1
Troubleshooting .....	0062 00-1
Flow Sensor, Proportioning Bromide Feeder System, Replace .....	0180 00-3

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Fluid Detection Device, Tank Level Indicator	
Inspect .....	0252 00-1
Replace .....	0253 00-1
Fluorescent Lighting Fixture	
Recessed	
Repair .....	0117 00-1
Replace Lamp .....	0117 00-1
Surface Mount	
Repair .....	0118 00-1
Replace Lamp .....	0118 00-1
FM-200 Fire Suppression Alarm System, Theory of Operation .....	0037 00-6
Forms, Maintenance .....	0001 00-1
Forward Fan Room, Location and Description of Major Components .....	0008 00-5
Fuel Oil Filter/Water Separator	
Repair .....	0109 00-1
Service .....	0108 00-1
Troubleshooting .....	0055 00-1
Fuel Oil	
System	
Valve	
Repair .....	0104 00-1
Replace .....	0103 00-1
Transfer Pump	
Electric Motor	
Replace .....	0107 00-1
Repair .....	0122 00-1
Motor Controller	
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Repair .....	0106 00-1
Repair Parts and Special Tools List .....	0297 00-31
Replace .....	0105 00-1
Troubleshooting .....	0047 00-1
Fuel Oil/Water Separator, Repair Parts and Special Tools List .....	0297 00-34
Fuel System	
Fuel Oil Fill and Transfer System, Theory of Operation .....	0023 00-1
Main Propulsion Engine, Theory of Operation .....	0018 00-1
Piping and Valves, Repair Parts and Special Tools List .....	0297 00-23
Theory of Operation .....	0023 00-1
Fuse	
01, 02, 03 Level Fan Coil Unit Motor Controller, Replace .....	0122 00-3
AC, Replace, Battery Charger	
General Alarm .....	0147 00-2
Power Supply System .....	0132 00-2
AFFF Pump Motor Controller, Replace .....	0122 00-3
Air Compressor Motor Controller, Replace .....	0122 00-3
AMS 1 Supply Fan Motor Controller, Replace .....	0124 00-3
AMS 2 Supply Fan Motor Controller, Replace .....	0124 00-3
Arms Locker Exhaust Fan Motor Controller, Replace .....	0124 00-3
Battery Charger, Power Supply System, Replace .....	0247 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Fuse (continued):	
Bilge and Ballast Pump Motor Controller, Replace .....	0125 00-3
Boatswain's Store Room Supply Fan Motor Controller, Replace .....	0124 00-3
Crew Mess Fan Coil Unit Motor Controller, Replace .....	0122 00-3
Day Tank High Level Alarm, Replace .....	0158 00-7
DC, Replace, Battery Charger	
General Alarm .....	0147 00-4
Power Supply System .....	0132 00-4
Emergency Switchboard, Replace .....	0112 00-8
Engine Room Emergency Load Center, Replace .....	0113 00-2
Engine Room Exhaust Fan Motor Controller, Replace .....	0124 00-3
Engine Room Supply Fan Motor Controller, Replace .....	0124 00-3
Fire and General Service Pump Motor Controller, Replace .....	0125 00-3
Fuel Oil Transfer Pump Motor Controller, Replace .....	0122 00-3
Galley Exhaust Fan Motor Controller, Replace .....	0122 00-3
Galley Supply Fan Motor Controller, Replace .....	0122 00-3
Holder	
Arms Storage Alarm, Replace .....	0142 00-5
Day Tank High Level Alarm, Replace .....	0158 00-8
Radio Room Alarm, Replace .....	0142 00-5
Rotary Clearview Screen, Replace .....	0209 00-3
Tank Level Indicator, Replace .....	0158 00-5
Hot Water Heater, Replace .....	0184 00-1
Intercommunication System, Replace .....	0243 00-3
Lube Oil Transfer Pump Motor Controller, Replace .....	0122 00-3
Main Switchboard Replace .....	0219 00-3
Navigation Lighting Panel, Replace .....	0139 00-2
.....	0238 00-4
Potable Water Pump Motor Controller, Replace .....	0122 00-3
Radio Room Alarm, Replace .....	0142 00-3
Reduction Gear Cooling Pump Motor Controller, Replace .....	0122 00-3
Rotary Clearview Screen, Replace .....	0209 00-2
Sanitary Space Exhaust Fan Motor Controller, Replace .....	0122 00-3
Searchlight Power Supply, Replace .....	0234 00-10
Sewage Discharge Pump Motor Controller, Replace .....	0122 00-3
Tank Level Indicator, Replace .....	0158 00-4
Fusible Switch, Searchlight Power Supply, Replace .....	0234 00-11

**G**

Galley, Location and Description of Major Components .....	0010 00-12
Galley Exhaust Fan Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Galley Supply Fan Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4



<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Gasket	
Ammunition Locker, Replace .....	0279 00-2
Sealing Area	
Watertight Door Repair .....	0204 00-1
Watertight Manhole Repair .....	0207 00-1
Watertight Door, Replace .....	0204 00-3
Watertight Hatch, Replace .....	0205 00-3
Window, Replace .....	0196 00-2
General Alarm	
Repair .....	0144 00-1
Replace .....	0143 00-1
General Alarm Battery	
Repair .....	0150 00-1
Replace .....	0149 00-1
Service .....	0148 00-1
General Alarm Battery Charger	
Repair .....	0147 00-1
Wiring .....	0147 00-1
General Alarm System	
Bell, Replace .....	0143 00-1
Contactor Switch, Replace .....	0143 00-4
Gong, Replace .....	0144 00-1
Relay, Replace .....	0144 00-5
Repair .....	0144 00-1
Repair Parts and Special Tools List .....	0302 00-24
Replace .....	0143 00-1
Theory of Operation .....	0037 00-3
Troubleshooting .....	0072 00-1
General Information .....	0001 00-1
Glass Frame, Window, Replace .....	0196 00-1
Glossary .....	Glossary-1
Gong, General Alarm, Replace .....	0144 00-1
Governor, Theory of Operation .....	0018 00-1
Gun Mounts, Service 0193 00-1	

**H**

Handset, Sound Powered Telephone, Replace .....	0240 00-1
Hatch Sealing Area, Watertight Hatch, Repair .....	0205 00-1
Headset-Chestset, Sound Powered Telephone, Replace .....	0240 00-2
Heater, Pilothouse Wing	
Replace .....	0094 00-6
Thermostat, Replace .....	0094 00-3
Troubleshooting .....	0070 00-1
Heating Element, Hot Water Heater, Replace .....	0184 00-3
Heating, Ventilation, and Air Conditioning (HVAC) Systems, Theory of Operation .....	0038 00-1
Horn, Signal Horn, Replace .....	0153 00-1
Horn/Strobe	
Assembly, Day Tank High Level Alarm Panel, Replace .....	0258 00-4
Silence Switch, Day Tank High Level Alarm Panel, Replace .....	0258 00-4
Hot Potable Water Recirculation Pump	
Motor Controller	
Repair .....	0126 00-1
Repair Parts and Special Tools List .....	0300 00-22

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Hot Potable Water Recirculation Pump (continued):	
Motor Controller (continued):	
Replace .....	0228 00-1
Lamp .....	0126 00-1
Starter Assembly .....	0126 00-2
Repair Parts and Special Tools List .....	0305 00-16
Replace .....	0185 00-1
Troubleshooting .....	0052 00-1
Hot Water Heater	
Adjust .....	0182 00-1
Repair .....	0184 00-1
	0271 00-1
Repair Parts and Special Tools List .....	0305 00-14
Replace .....	0183 00-1
	0270 00-1
Fuse .....	0184 00-1
Heating Element .....	0184 00-3
Magnetic Contactor .....	0184 00-5
Thermometer .....	0184 00-7
Thermostat .....	0184 00-4
Troubleshooting .....	0074 00-1
How to Use This Manual .....	vi
Hull, Bitts, Chocks, and Tiedowns Repair Parts and Special Tools List .....	0296 00-6
Hydraulic Systems, Theory of Operation .....	0026 00-1
Hydraulic Watertight Door	
Adjust .....	0088 00-1
Check Valve, Repair .....	0201 00-7
Control Valve Assembly	
Repair .....	0201 00-1
Replace .....	0200 00-1
Cylinder Assembly	
Repair .....	0199 00-1
Replace .....	0198 00-1
Hand Pump	
Local, Repair .....	0203 00-1
Remote, Repair .....	0203 00-3
Replace .....	0202 00-1
Repair .....	0089 00-1
	0197 00-1
Repair Parts and Special Tools List .....	0296 00-10
Safety Relief Valve, Repair .....	0201 00-5
Shuttle Valve, Repair .....	0201 00-9
Troubleshooting .....	0043 00-1
Hydropneumatic Tank	
Pressure Switch Replace .....	0178 00-1
Repair Parts and Special Tools List .....	0305 00-8
Replace .....	0177 00-1
	0269 00-1
<b>I</b>	
Illumination and Navigation Signals	
Repair .....	0234 00-1
Replace .....	0233 00-1
Test .....	0232 00-1
Indicator, Intercommunication System, Replace .....	0243 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Inspect	
Cable Assembly	
Dry Side, Tank Level Indicator .....	0256 00-1
Tank Level Indicator .....	0256 00-1
Wet Side, Tank Level Indicator .....	0256 00-2
Fluid Detection Device, Tank Level Indicator .....	0252 00-1
Keel Cooler .....	0098 00-1
Main Propulsion Engine .....	0214 00-1
Reduction Gear .....	0098 00-1
SSDG .....	0098 00-3
Propeller .....	0098 00-2
Tank Level Indicator .....	0215 00-1
Transmitter, Tank Level Indicator .....	0248 00-1
Transmitter, Tank Level Indicator .....	0254 00-1
Intercommunication System	
Repair .....	0243 00-1
Repair Parts and Special Tools List .....	0302 00-10
Replace .....	0242 00-1
Amplifier and Power Supply Board Circuit Card .....	0243 00-4
Fuse .....	0243 00-3
Indicator .....	0243 00-1
Relay Board Circuit Card Assembly .....	0243 00-7
Resistor Board Circuit Card Assembly .....	0243 00-6
Station Selector Assembly .....	0243 00-4
Switch .....	0243 00-8
Theory of Operation .....	0036 00-1
Troubleshooting .....	0068 00-1
Interior Communication	
Public Announcing System, Repair Parts and Special Tools List .....	0302 00-1
Repair .....	0141 00-1
Repair .....	0239 00-1
Replace .....	0140 00-1
Theory of Operation .....	0036 00-1
Volume Control, Replace .....	0239 00-1
Interlocks	
EDG	
Power With Feedback, Test .....	0216 00-3
Power Without Feedback, Test .....	0216 00-3
Normal Power, Test .....	0216 00-1
<b>J</b>	
Joystick Controller, Searchlight, Replace .....	0236 00-9
Junction Box Lighting Fixture	
Repair .....	0115 00-1
Repair Parts and Special Tools List .....	0299 00-2
Replace Lamp .....	0115 00-1
<b>K</b>	
Keel Cooler	
Inspect .....	0098 00-1
Inspect .....	0214 00-1
Main Propulsion Engine, Inspect .....	0098 00-1
Reduction Gear, Inspect .....	0098 00-3
SSDG, Inspect .....	0098 00-2
Key, Yardarm Blinker, Replace .....	0136 00-2

Subject

WP Sequence No. -Page No.

L

Lamp

01, 02, 03 Level Fan Coil Unit Motor Controller, Replace .....	0122 00-1
AFFF Pump Motor Controller, Replace .....	0122 00-1
Air Compressor Motor Controller, Replace .....	0122 00-1
AMS 1 Supply Fan Motor Controller, Replace .....	0124 00-1
AMS 2 Supply Fan Motor Controller, Replace .....	0124 00-1
Arms Locker Exhaust Fan Motor Controller, Replace .....	0124 00-1
Assembly	
Day Tank High Level Alarm, Replace .....	0158 00-7
Navigation Lighting Panel, Replace .....	0238 00-1
Bilge and Ballast Pump Motor Controller, Replace .....	0125 00-1
Boatswain's Store Room Supply Fan Motor Controller, Replace .....	0124 00-1
Bracket Lighting Fixture, Replace .....	0116 00-1
Crew Mess Fan Coil Unit Motor Controller, Replace .....	0122 00-1
Emergency Switchboard, Replace .....	0112 00-1
Engine Room Exhaust Fan Motor Controller, Replace .....	0124 00-1
Engine Room Supply Fan Motor Controller, Replace .....	0124 00-1
Fire and General Service Pump Motor Controller, Replace .....	0125 00-1
Floodlight, Replace .....	0121 00-1
Fluorescent Lighting Fixture	
Recessed, Replace .....	0117 00-1
Surface Mount, Replace .....	0118 00-1
Fuel Oil Transfer Pump Motor Controller, Replace .....	0122 00-1
Galley Exhaust Fan Motor Controller, Replace .....	0122 00-1
Galley Supply Fan Motor Controller, Replace .....	0122 00-1
Hot Potable Water Recirculation Pump Motor Controller, Replace .....	0126 00-1
Housing, Rotary Clearview Screen, Replace .....	0209 00-2
Junction Box Lighting Fixture, Replace .....	0115 00-1
Lube Oil Transfer Pump Motor Controller, Replace .....	0122 00-1
Main Switchboard, Replace .....	0111 00-1
	0111 00-9
Navigation Light	
Double, Replace .....	0135 00-1
Single, Replace .....	0135 00-1
Potable Water Pump Motor Controller, Replace .....	0122 00-1
Proportioning Bromide Feeder System, Replace .....	0181 00-1
Reduction Gear Cooling Pump Motor Controller, Replace .....	0122 00-1
Rotary Clearview Screen, Replace .....	0209 00-1
Rotating Beacon, Replace .....	0146 00-3
Sanitary Space Exhaust Fan Motor Controller, Replace .....	0122 00-1
Searchlight, Replace .....	0133 00-1
Sewage Discharge Pump Motor Controller, Replace .....	0122 00-1
Square Lens	
Radio Room Alarm, Replace .....	0142 00-3
Arms Storage Alarm, Replace .....	0142 00-3
Starter Assembly, Searchlight, Replace .....	0236 00-1
Tank Level Indicator, Replace .....	0158 00-1
Watertight Incandescent Explosion Proof Lighting Fixture, Replace .....	0119 00-1
Yardarm Blinker, Replace .....	0137 00-1
Laundry Room ,Location and Description of Major Components .....	0010 00-7

Lens

Floodlight, Replace .....	0121 00-1
Navigation Light	
Double, Replace .....	0135 00-1
Single, Replace .....	0135 00-1
Yardarm Blinker, Replace .....	0137 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Level Sensor, Day Tank High Level Alarm, Replace .....	0259 00-1
Light	
Navigation	
Double, Repair .....	0135 00-1
Repair .....	0135 00-1
Replace .....	0134 00-1
Single, Repair .....	0135 00-1
	0135 00-1
Pilothouse Console	
Bulb, Replace .....	0094 00-10
Replace .....	0094 00-12
Troubleshooting .....	0070 00-1
Yardarm Blinker, Replace .....	0136 00-1
Lighting Fixture	
Bracket	
Repair .....	0116 00-1
Replace Lamp .....	0116 00-1
Fluorescent	
Recessed	
Repair .....	0117 00-1
Replace Lamp .....	0117 00-1
Surface Mount	
Repair .....	0118 00-1
Replace Lamp .....	0118 00-1
Junction Box	
Repair .....	0115 00-1
Replace Lamp .....	0115 00-1
Watertight Incandescent Explosion Proof	
Repair .....	0119 00-1
Replace Lamp .....	0119 00-1
Lighting, Interior Troubleshooting .....	0061 00-1
List of Abbreviations/Acronyms .....	0001 00-2
Location and Description of Major Components	
01 Level	
Exterior .....	0004 00-1
Interior .....	0008 00-1
02 Level Exterior .....	0005 00-1
AMS 1 .....	0012 00-1
	0012 00-2
AMS 2 .....	0013 00-5
Arms Locker .....	0010 00-8
Below Main Deck Aft of Engine Room .....	0013 00-1
Boatswain's Store .....	0010 00-9
Bow Thruster Compartment .....	0012 00-1
	0012 00-5
Captain's Stateroom .....	0008 00-7
Chief Engineer's Stateroom .....	0008 00-6
Crew's Stateroom 1 .....	0009 00-4
Crew's Stateroom 2 .....	0009 00-5
Crew's Stateroom 3 .....	0009 00-3
Crew's Stateroom 4 .....	0009 00-6
Damage Control Locker .....	0010 00-6
Emergency Diesel Generator Room .....	0008 00-12
Engine Room .....	0011 00-1
Port Side .....	0011 00-1
Starboard Side .....	0011 00-6

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Location and Description of Major Components (continued):	
EOS .....	0011 00-4
Fan Room	
01 Level (Aft) .....	0008 00-3
Forward .....	0008 00-5
Main Deck .....	0010 00-2
Galley .....	0010 00-12
Laundry Room .....	0010 00-7
Main Deck	
Exterior .....	0003 00-1
Interior	
Berthing Areas .....	0009 00-1
Non-Berthing Areas .....	0010 00-1
Passageway .....	0010 00-11
Mast, Aft .....	0006 00-3
Mess/Recreation Space .....	0010 00-4
Navigation Lights and Radars, Starboard .....	0006 00-5
NCO's Stateroom .....	0008 00-11
Officer's Stateroom 1 .....	0008 00-9
Officer's Stateroom 2 .....	0008 00-4
Pilothouse	
Interior .....	0007 00-1
Looking Aft .....	0007 00-10
Looking Forward .....	0007 00-7
	0007 00-8
Looking to Port .....	0007 00-4
Plan View .....	0007 00-1
Top and Masts .....	0006 00-1
Radio Room	
Interior	
Aft Bulkhead .....	0007 00-12
Forward Bulkhead (Radio Racks) .....	0007 00-13
Port Bulkhead .....	0007 00-11
Plan View .....	0007 00-14
Sanitary Space .....	0009 00-2
Shaft Alley	
Port .....	0014 00-2
Starboard .....	0014 00-1
Steering Gear Compartment .....	0013 00-2
Tanks .....	0015 00-1
Towing Gear Locker .....	0013 00-3
Vestibule .....	0010 00-15
Workshop .....	0013 00-8
Loudspeaker, Public Address System, Replace .....	0141 00-1
Lube Oil	
Priming Pump 1 Motor Controller, Repair Parts and Special Tools List .....	0300 00-6
Priming Pump 2 Motor Controller, Repair Parts and Special Tools List .....	0300 00-8
Priming Pump	
Motor Controller	
Contactor Assembly Replace .....	0123 00-1
Repair .....	0123 00-1
Replace .....	0225 00-1
System	
Repair Parts and Special Tools List .....	0297 00-11
Valve	
Repair .....	0100 00-1
Replace .....	0099 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Lube Oil (continued):	
Transfer Pump	
Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Repair .....	0102 00-1
Repair Parts and Special Tools List .....	0297 00-19
Replace 0101 00-1	
Troubleshooting .....	0046 00-1
Lubricating and Hydraulic Oil Fill and Transfer System, Theory of Operation .....	0024 00-1
Lubricating Oil System, Main Propulsion Engine, Theory of Operation .....	0018 00-4
<b>M</b>	
MAC .....	0295 00-1
Introduction .....	0294 00-1
Magnetic Contactor, Hot Water Heater, Replace .....	0184 00-5
Main Deck	
Exterior, Location and Description of Major Components .....	0003 00-1
Interior	
Berthing Areas, Location and Description of Major Components .....	0009 00-1
Non-Berthing Areas, Location and Description of Major Components .....	0010 00-1
Level, PMCS .....	0082 00-1
Passageway, Location and Description of Major Components .....	0010 00-11
Main Lubrication Oil System, Main Propulsion Engine, Theory of Operation .....	0018 00-5
Main Propulsion Engine	
Keel Cooler, Inspect .....	0098 00-1
Theory of Operation .....	0018 00-1
Main Switchboard	
Fuse Replace .....	0219 00-3
Relay Replace .....	0219 00-5
Repair .....	0111 00-1
Repair Parts and Special Tools List .....	0219 00-1
Replace .....	0298 00-5
Circuit Breaker .....	0111 00-14
.....	0111 00-6
Fuse .....	0219 00-3
Lamp .....	0111 00-1
.....	0111 00-9
Meter .....	0111 00-12
.....	0111 00-5
Pushbutton .....	0111 00-9
Relay .....	0219 00-5
Switch .....	0111 00-11
.....	0111 00-3
Sync Light .....	0111 00-9
Transformer .....	0219 00-5
Troubleshooting .....	0058 00-1
Maintenance	
Forms .....	0001 00-1
Records .....	0001 00-1
Reports .....	0001 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Maintenance Allocation Chart .....	0295 00-1
Introduction .....	0294 00-1
Marine Navigation (Running) Light	
Double, Repair Parts and Special Tools List .....	0301 00-33
Single, Repair Parts and Special Tools List .....	0301 00-27
Marine Sanitation Device, Theory of Operation .....	0031 00-1
Mast	
Location and Description of Major Components .....	0006 00-3
Repair .....	0195 00-1
Service .....	0086 00-1
Mess/Recreation Space, Location and Description of Major Components .....	0010 00-4
Meter	
Emergency Switchboard, Replace .....	0112 00-4
Main Switchboard, Replace .....	0111 00-12
Time Totalizing Proportioning Bromide Feeder System, Replace .....	0111 00-5
Time Totalizing Proportioning Bromide Feeder System, Replace .....	0180 00-3
Motor	
Searchlight, Replace .....	0236 00-4
Windshield Wiper, Replace .....	0210 00-5
Motor Controller	
01, 02, 03 Level Fan Coil Unit	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
AFFF Cooling Pump	
Replace .....	0224 00-1
Repair .....	0122 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Air Compressor	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
AMS 1 Supply Fan	
Repair .....	0124 00-1
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
AMS 2 Supply Fan	
Repair .....	0124 00-1
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4



<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Motor Controller (continued):	
Arms Locker Exhaust Fan	
Repair .....	0124 00-1
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Bilge and Ballast Pump	
Repair .....	0125 00-1
Replace .....	0227 00-1
Fuse .....	0125 00-3
Lamp .....	0125 00-1
Motor Starter .....	0125 00-3
Transformer .....	0125 00-4
Boatswain's Store Room Supply Fan	
Repair .....	0124 00-1
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Crew Mess Fan Coil Unit	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Engine Room Exhaust Fan	
Repair .....	0124 00-1
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Engine Room Supply Fan	
Repair .....	0124 00-1
Replace .....	0226 00-1
Fuse .....	0124 00-3
Lamp .....	0124 00-1
Motor Starter .....	0124 00-3
Transformer .....	0124 00-4
Fire & General Service Pump	
Repair .....	0125 00-1
Replace .....	0227 00-1
Fuse .....	0125 00-3
Lamp .....	0125 00-1
Motor Starter .....	0125 00-3
Transformer .....	0125 00-4
Fuel Oil Transfer Pump	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Motor Controller (continued):	
Galley Exhaust Fan	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Galley Supply Fan	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Hot Potable Water Recirculation Pump	
Repair .....	0126 00-1
Replace .....	0228 00-1
Lamp .....	0126 00-1
Starter Assembly .....	0126 00-2
Lube Oil Priming Pump	
Repair .....	0123 00-1
Replace .....	0225 00-1
Contactor Assembly .....	0123 00-1
Lube Oil Transfer Pump	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Potable Water Pump	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Reduction Gear Cooling Pump	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Sanitary Space Exhaust Fan	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Sewage Discharge Pump	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Troubleshooting .....	0065 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Motor Controller (continued):	
Weld Hood Exhaust Fan	
Repair .....	0127 00-1
Replace .....	0229 00-1
Motor Starter .....	0127 00-1
Motor Starter	
01, 02, 03 Level Fan Coil Unit Motor Controller, Replace .....	0122 00-3
AFFF Pump Motor Controller, Replace .....	0122 00-3
Air Compressor Motor Controller, Replace .....	0122 00-3
AMS 1 Supply Fan Motor Controller, Replace .....	0124 00-3
AMS 2 Supply Fan Motor Controller, Replace .....	0124 00-3
Arms Locker Exhaust Fan Motor Controller, Replace .....	0124 00-3
Bilge & Ballast Pump Motor Controller, Replace .....	0125 00-3
Boatswain's Store Room Supply Fan Motor Controller, Replace .....	0124 00-3
Crew Mess Fan Coil Unit Motor Controller, Replace .....	0122 00-3
Engine Room Exhaust Fan Motor Controller, Replace .....	0124 00-3
Engine Room Supply Fan Motor Controller, Replace .....	0124 00-3
Fire & General Service Pump Motor Controller, Replace .....	0125 00-3
Fuel Oil Transfer Pump Motor Controller, Replace .....	0122 00-3
Galley Exhaust Fan Motor Controller, Replace .....	0122 00-3
Galley Supply Fan Motor Controller, Replace .....	0122 00-3
Lube Oil Transfer Pump Motor Controller, Replace .....	0122 00-3
Potable Water Pump Motor Controller, Replace .....	0122 00-3
Reduction Gear Cooling Pump Motor Controller, Replace .....	0122 00-3
Sanitary Space Exhaust Fan Motor Controller, Replace .....	0122 00-3
Sewage Discharge Pump Motor Controller, Replace .....	0122 00-3
Weld Hood Exhaust Fan Motor Controller, Replace .....	0127 00-1
MST-246J	
Gasket, Sound Powered Telephone, Replace .....	0241 00-1
Hand Ringing Generator, Sound Powered Telephone, Replace .....	0241 00-3
Manual Control Handle, Sound Powered Telephone, Replace .....	0241 00-3
<b>N</b>	
Natural Supply and Exhaust Vents, Theory of Operation .....	0038 00-1
Navigation Light	
Double	
Replace	
Lamp .....	0135 00-1
Lens .....	0135 00-1
Repair .....	0135 00-1
Replace .....	0134 00-1
Single	
Replace	
Lamp .....	0135 00-1
Lens .....	0135 00-1
Troubleshooting .....	0063 00-1
Navigation Lighting Panel	
Bulb, Replace .....	0139 00-1
Fuse, Replace .....	0139 00-2
.....	0238 00-4
Lamp Assembly, Replace .....	0238 00-1
Repair .....	0139 00-1
.....	0238 00-1
Repair Parts and Special Tools List .....	0301 00-40
Replace .....	0138 00-1
.....	0237 00-1
Bulb .....	0139 00-1
Fuse .....	0139 00-2
Toggle Switch, Replace .....	0238 00-5

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Navigation Lights and Radars, Starboard, Location and Description of Major Components .....	0006 00-5
Navigator Seat, Replace .....	0094 00-8
NCO's Stateroom, Location and Description of Major Components .....	0008 00-11
Normal Power Interlocks, Test .....	0216 00-1
<b>O</b>	
Officer's Stateroom 1, Location and Description of Major Components .....	0008 00-9
Officer's Stateroom 2, Location and Description of Major Components .....	0008 00-4
Oil Content Monitor, Theory of Operation .....	0030 00-5
Oil Water Separator, Theory of Operation .....	0030 00-3
Oily Bilge Pump	
Repair .....	0166 00-1
Repair Parts and Special Tools List .....	0304 00-14
Replace .....	0165 00-1
Troubleshooting .....	0049 00-1
Oily Bilge System	
Piping, Service .....	0163 00-1
Valve	
Repair Parts and Special Tools List .....	0304 00-9
Replace .....	0164 00-1
Outlet Assembly, Proportioning Bromide Feeder System, Replace .....	0180 00-4
Ozone Depleting Substances .....	0001 00-1
<b>P</b>	
Panel Meter, Tank Level Indicator, Replace .....	0250 00-3
Pilothouse	
Alarm Panel	
Buzzer, Replace .....	0094 00-16
LED, Replace .....	0094 00-12
Pushbutton, Replace .....	0094 00-15
Console Light Troubleshooting .....	0070 00-1
Interior	
Location and Description of Major Components .....	0007 00-1
Looking Aft, Location and Description of Major Components .....	0007 00-10
Looking Forward, Location and Description of Major Components .....	0007 00-7
Looking to Port, Location and Description of Major Components .....	0007 00-8
Looking to Port, Location and Description of Major Components .....	0007 00-4
Plan View, Location and Description of Major Components .....	0007 00-1
Repair .....	0094 00-1
Repair Parts and Special Tools List .....	0211 00-1
Replace .....	0296 00-48
Replace .....	0210 00-1
Rooftop Air Conditioning Units, Theory of Operation .....	0038 00-2
Top and Masts, Location and Description of Major Components .....	0006 00-1
Wing Heater	
Replace .....	0094 00-6
Thermostat .....	0094 00-3
Troubleshooting .....	0070 00-1
Piping, Oily Bilge System Service .....	0163 00-1
Piston Cooling Oil System, Main Propulsion Engine, Theory of Operation .....	0018 00-6
PMCS	
01 Level .....	0083 00-1
02 Level and Above .....	0084 00-1
Below Main Deck Level .....	0081 00-1
Introduction .....	0080 00-1
Main Deck Level .....	0082 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Portable Electric Pump	
Repair .....	0189 00-1
Troubleshooting .....	0054 00-1
Portlight, Repair Parts and Special Tools List .....	0296 00-8
Potable Water	
Pump	
Coupling, Replace .....	0267 00-4
Electric Motor, Replace .....	0176 00-1
Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Pump End	
Repair .....	0268 00-1
.....	0289 00-1
Replace .....	0175 00-1
Repair .....	0174 00-1
.....	0267 00-1
.....	0288 00-1
Repair Parts and Special Tools List .....	0305 00-6
Theory of Operation .....	0029 00-3
Troubleshooting .....	0051 00-1
System	
Repair Parts and Special Tools List .....	0305 00-2
Theory of Operation .....	0029 00-1
Valve	
Repair .....	0173 00-1
Replace .....	0172 00-1
Tanks, Theory of Operation .....	0029 00-2
Power Distribution Panel	
Circuit Breaker, Replace .....	0114 00-1
Replace .....	0114 00-1
.....	0223 00-1
Power Generation System, Theory of Operation .....	0034 00-1
Power Supply	
Battery	
Repair .....	0131 00-1
Replace .....	0130 00-1
Service .....	0129 00-1
Test .....	0128 00-1
Battery Charger	
Repair .....	0132 00-1
.....	0231 00-1
.....	0247 00-1
Wiring .....	0132 00-1
Replace .....	0230 00-1
.....	0246 00-1
Searchlight	
Replace .....	0233 00-1
Test .....	0232 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Power Supply (continued):	
Signal Horn, Replace .....	0153 00-3
System	
Battery Charger	
Replace	
Ammeter .....	0247 00-2
Circuit Breaker .....	0247 00-4
Fuse .....	0247 00-1
Preheater, Theory of Operation .....	0038 00-1
Prelube System, Main Propulsion Engine, Theory of Operation .....	0018 00-7
Prelubrication Oil Pump	
Electric Motor, Replace .....	0096 00-1
Pump End, Replace .....	0095 00-1
Repair .....	0212 00-1
Repair Parts and Special Tools List .....	0297 00-1
Troubleshooting .....	0044 00-1
Preparation for Shipment .....	0001 00-1
Preparation for Storage .....	0001 00-1
Pressure Switch, Hydropneumatic Tank, Replace .....	0178 00-1
Preventive Maintenance Checks and Services (PMCS) Introduction .....	0080 00-1
Propeller	
Inspect .....	0215 00-1
Theory of Operation .....	0021 00-1
Propeller Shafts, Theory of Operation .....	0021 00-1
Proportioning Bromide Feeder System	
Repair .....	0181 00-1
Repair Parts and Special Tools List .....	0305 00-10
Replace .....	0180 00-1
Adapter .....	0180 00-4
Flow Sensor .....	0180 00-3
Lamp .....	0181 00-1
Outlet Assembly .....	0180 00-4
Time Totalizing Meter .....	0180 00-3
Service .....	0180 00-1
Test .....	0179 00-1
Propulsion Plant, Theory of Operation .....	0018 00-1
Public Address System	
Amplifier, Replace .....	0140 00-1
Loudspeaker, Replace .....	0141 00-1
Pump	
AFFF	
Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Ballast	
Coupling, Replace .....	0264 00-1
Electric Motor	
Repair .....	0266 00-1
Replace .....	0287 00-1
Replace .....	0171 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Pump (continued):	
Ballast (continued):	
Pump End	
Repair .....	0265 00-1
.....	0286 00-1
Replace .....	0170 00-1
Repair .....	0169 00-1
	0264 00-1
	0285 00-1
Bilge and Ballast	
Motor Controller	
Repair .....	0125 00-1
Replace	
Fuse .....	0125 00-3
Lamp .....	0125 00-1
Motor Starter .....	0125 00-3
Transformer .....	0125 00-4
Troubleshooting .....	0050 00-1
Fire and General Service	
Align .....	0272 00-1
Coupling Replace .....	0273 00-3
Electric Motor	
Repair .....	0187 00-1
	0277 00-1
	0292 00-1
Replace .....	0187 00-1
	0276 00-1
Service .....	0188 00-1
Motor Controller	
Repair .....	0125 00-1
Replace	
Fuse .....	0125 00-3
Lamp .....	0125 00-1
Motor Starter .....	0125 00-3
Transformer .....	0125 00-4
Pump End	
Repair .....	0275 00-1
	0291 00-1
Replace .....	0186 00-1
	0274 00-1
Repair .....	0273 00-1
	0290 00-1
Electric Motor .....	0187 00-1
Replace	
Electric Motor .....	0187 00-1
Pump End .....	0186 00-1
Service, Electric Motor .....	0188 00-1
Troubleshooting .....	0053 00-1
Fuel Oil Transfer	
Electric Motor, Replace .....	0107 00-1
Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Pump (continued):	
Fuel Oil Transfer (continued):	
Repair .....	0106 00-1
Replace .....	0105 00-1
Troubleshooting .....	0047 00-1
Hot Potable Water Recirculation	
Motor Controller	
Repair .....	0126 00-1
Replace	
Lamp .....	0126 00-1
Starter Assembly .....	0126 00-2
Replace .....	0185 00-1
Troubleshooting .....	0052 00-1
Hydraulic Watertight Door	
Local, Repair .....	0203 00-1
Remote, Repair .....	0203 00-3
Replace .....	0202 00-1
Lube Oil Priming	
Motor Controller, Repair .....	0123 00-1
Lube Oil Transfer	
Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Repair .....	0102 00-1
Replace .....	0101 00-1
Troubleshooting .....	0046 00-1
Oily Bilge	
Repair .....	0166 00-1
Replace .....	0165 00-1
Troubleshooting .....	0049 00-1
Portable Electric	
Repair .....	0189 00-1
Troubleshooting .....	0054 00-1
Potable Water	
Coupling, Replace .....	0267 00-4
Electric Motor, Replace .....	0176 00-1
Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Pump End	
Repair .....	0268 00-1
.....	0289 00-1
Replace .....	0175 00-1
Repair .....	0174 00-1
.....	0267 00-1
.....	0288 00-1
Troubleshooting .....	0051 00-1



<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Pump (continued):	
Prelubrication Oil	
Electric Motor, Replace .....	0096 00-1
Pump End, Replace .....	0095 00-1
Repair .....	0212 00-1
Troubleshooting .....	0044 00-1
Reduction Gear Cooling	
Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Repair .....	0213 00-1
	0280 00-1
Replace .....	0097 00-1
Sewage Discharge	
Coupling, Replace .....	0260 00-1
Electric Motor	
Repair .....	0263 00-1
	0284 00-1
Replace .....	0162 00-1
Motor Controller	
Repair .....	0122 00-1
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Pump End	
Repair .....	0262 00-1
	0283 00-1
Replace .....	0261 00-1
Repair .....	0161 00-1
	0260 00-1
	0282 00-1
Troubleshooting .....	0048 00-1
Pushbutton	
Emergency Switchboard, Replace .....	0112 00-3
Main Switchboard, Replace .....	0111 00-9

**Q**

Quality of Material .....	0001 00-5
---------------------------	-----------

**R**

R1 Relay, Searchlight Power Supply, Replace .....	0234 00-12
R2 Relay, Searchlight Power Supply, Replace .....	0234 00-4
Radio Room	
Interior	
Aft Bulkhead, Location and Description of Major Components .....	0007 00-12
Forward Bulkhead (Radio Racks), Location and Description of Major Components .....	0007 00-13
Port Bulkhead, Location and Description of Major Components .....	0007 00-11
Plan View, Location and Description of Major Components .....	0007 00-14
Roof Air Conditioning Units, Theory of Operation .....	0038 00-2

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Radio Room Alarm	
Repair .....	0142 00-1
Replace	
Alarm Panel Arms Locker .....	0142 00-12
Bulb .....	0142 00-1
(Round Lens) .....	0142 00-3
Buzzer .....	0142 00-5
Door Alarm Switch Arms Locker .....	0142 00-11
Fuse .....	0142 00-3
Fuse Holder .....	0142 00-5
Lamp (Square Lens) .....	0142 00-3
Rotary Switch Arms Locker .....	0142 00-10
Receptacle, Shore Power, Replace .....	0110 00-1
Recessed Fluorescent Lighting Fixture, Repair Parts and Special Tools List .....	0299 00-6
Records, Maintenance .....	0001 00-1
Rectifier Diode, Searchlight, Replace .....	0236 00-10
Reduction Gear Cooling Pump	
Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Repair .....	0213 00-1
	0280 00-1
Repair Parts and Special Tools List .....	0297 00-4
Replace .....	0097 00-1
Troubleshooting .....	0045 00-1
Reduction Gear Keel Cooler, Inspect .....	0098 00-3
References .....	0293 00-1
Refrigeration System	
Compressor, Theory of Operation .....	0039 00-4
Condenser Unit, Theory of Operation .....	0039 00-4
Control Box, Theory of Operation .....	0039 00-5
Expansion Valve, Theory of Operation .....	0039 00-4
Local Controls and Indicators, Theory of Operation .....	0039 00-5
Receiver, Theory of Operation .....	0039 00-5
Refrigerant System Operation, Theory of Operation .....	0039 00-5
Theory of Operation .....	0039 00-1
Unit Cooler, Theory of Operation .....	0039 00-4
Reheater, Theory of Operation .....	0038 00-1
Relay	
Board Circuit Card Assembly Intercommunication System, Replace .....	0243 00-7
Day Tank High Level Alarm Panel, Replace .....	0258 00-3
Emergency Switchboard, Replace .....	0112 00-10
General Alarm, Replace .....	0144 00-5
Main Switchboard, Replace .....	0219 00-5
Repair	
01, 02, 03 Level Fan Coil Unit Motor Controller .....	0122 00-1
AFFF Pump Motor Controller .....	0122 00-1
Air Compressor Motor Controller .....	0122 00-1
Alarm, Day Tank High Level Panel .....	0258 00-1
Ammunition Locker .....	0279 00-1

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
Repair (continued):	
AMS 1 Supply Fan Motor Controller .....	0124 00-1
AMS 2 Supply Fan Motor Controller .....	0124 00-1
Arc Welder .....	0278 00-1
Arms Locker Exhaust Fan Motor Controller .....	0124 00-1
Arms Storage Alarm .....	0142 00-1
Ballast Pump .....	0169 00-1
	0264 00-1
	0285 00-1
Electric Motor .....	0266 00-1
	0287 00-1
Pump End .....	0265 00-1
	0286 00-1
Battery	
General Alarm .....	0150 00-1
Power Supply .....	0131 00-1
Battery Charger	
General Alarm .....	0147 00-1
Power Supply System .....	0132 00-1
	0231 00-1
	0247 00-1
Beacon, Rotating .....	0146 00-1
Bilge and Ballast Pump Motor Controller .....	0125 00-1
Boatswain's Store Room Supply Fan Motor Controller .....	0124 00-1
Bracket Lighting Fixture .....	0116 00-1
Check Valve, Hydraulic Watertight Door .....	0201 00-7
Control Valve Assembly, Hydraulic Watertight Door .....	0201 00-1
Crew Mess Fan Coil Unit Motor Controller .....	0122 00-1
Cylinder Assembly, Hydraulic Watertight Door .....	0199 00-1
Day Tank High Level Alarm Panel .....	0258 00-1
Electric Motor, Fire and General Service Pump .....	0187 00-1
Electrical Power System .....	0110 00-1
	0218 00-1
Emergency Switchboard .....	0112 00-1
	0220 00-1
	0221 00-1
Engine Exhaust System .....	0281 00-1
Engine Order Telegraph .....	0245 00-1
Engine Room Exhaust Fan Motor Controller .....	0124 00-1
Engine Room Supply Fan Motor Controller .....	0124 00-1
Entertainment System .....	0152 00-1
Exhaust System, Engine .....	0281 00-1
Fire and General Service Pump .....	0273 00-1
	0290 00-1
Electric Motor .....	0187 00-1
	0277 00-1
	0292 00-1
Motor Controller .....	0125 00-1
Pump End .....	0275 00-1
	0291 00-1
Floodlight .....	0121 00-1
Fluorescent Lighting Fixture	
Recessed .....	0117 00-1
Surface Mount .....	0118 00-1
Fuel Oil Filter/Water Separator .....	0109 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Repair (continued):	
Fuel Oil System Valve .....	0104 00-1
Fuel Oil Transfer Pump .....	0106 00-1
Motor Controller .....	0122 00-1
Galley Exhaust Fan Motor Controller .....	0122 00-1
Galley Supply Fan Motor Controller .....	0122 00-1
Gasket Sealing Area	
Watertight Door .....	0204 00-1
Watertight Manhole .....	0207 00-1
General Alarm System .....	0144 00-1
Hatch Sealing Area, Watertight Hatch .....	0205 00-1
Hot Potable Water Recirculation Pump Motor Controller .....	0126 00-1
Hot Water Heater .....	0184 00-1
	0271 00-1
Hydraulic Watertight Door .....	0089 00-1
	0197 00-1
Check Valve .....	0201 00-7
Control Valve Assembly .....	0201 00-1
Cylinder Assembly .....	0199 00-1
Hand Pump	
Local .....	0203 00-1
Remote .....	0203 00-3
Safety Relief Valve .....	0201 00-5
Shuttle Valve .....	0201 00-9
Illumination and Navigation Signals .....	0234 00-1
Intercommunication System .....	0243 00-1
Interior Communication .....	0141 00-1
	0239 00-1
Junction Box Lighting Fixture .....	0115 00-1
Lube Oil Priming Pump Motor Controller .....	0123 00-1
Lube Oil System Valve .....	0100 00-1
Lube Oil Transfer Pump .....	0102 00-1
Motor Controller .....	0122 00-1
Main Switchboard .....	0111 00-1
	0219 00-1
Mast .....	0195 00-1
Navigation Light .....	0135 00-1
Navigation Lighting Panel .....	0139 00-1
	0238 00-1
Oily Bilge Pump .....	0166 00-1
Pilothouse .....	0094 00-1
	0211 00-1
Portable Electric Pump .....	0189 00-1
Potable Water Pump .....	0174 00-1
	0267 00-1
	0288 00-1
Motor Controller .....	0122 00-1
Pump End .....	0268 00-1
	0289 00-1
Prelubrication Oil Pump .....	0212 00-1
Proportioning Bromide Feeder System .....	0181 00-1
Pump	
Ballast .....	0169 00-1
	0264 00-1
	0285 00-1
Electric Motor .....	0266 00-1
	0287 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Repair (continued):	
Pump (continued):	
Ballast (continued):	
Pump End .....	0265 00-1
	0286 00-1
Fire and General Service .....	0273 00-1
	0290 00-1
Electric Motor .....	0187 00-1
	0277 00-1
	0292 00-1
Pump End .....	0275 00-1
	0291 00-1
Hydraulic Watertight Door	
Local .....	0203 00-1
Remote .....	0203 00-3
Portable Electric .....	0189 00-1
Potable Water .....	0174 00-1
	0267 00-1
	0288 00-1
Pump End .....	0268 00-1
	0289 00-1
Prelubrication Oil .....	0212 00-1
Reduction Gear Cooling .....	0213 00-1
	0280 00-1
Sewage Discharge .....	0260 00-1
	0282 00-1
Electric Motor .....	0263 00-1
	0284 00-1
Pump End .....	0262 00-1
	0283 00-1
Radio Room Alarm .....	0142 00-1
Reduction Gear Cooling Pump .....	0213 00-1
	0280 00-1
Motor Controller .....	0122 00-1
Rotary Clearview Screen .....	0209 00-1
Rotating Beacon .....	0146 00-1
Safety Relief Valve, Hydraulic Watertight Door .....	0201 00-5
Sanitary Space Exhaust Fan Motor Controller .....	0122 00-1
Searchlight .....	0133 00-1
	0236 00-1
Sewage Discharge Pump .....	0161 00-1
	0260 00-1
	0282 00-1
Electric Motor .....	0263 00-1
	0284 00-1
Motor Controller .....	0122 00-1
Pump End .....	0262 00-1
	0283 00-1
Shuttle Valve, Hydraulic Watertight Door .....	0201 00-9
Sound Powered Telephone .....	0241 00-1
Tank Level Indicator .....	0158 00-1
	0251 00-1
Thread Watertight Manhole .....	0207 00-4
Valve	
Ballast System .....	0168 00-1
Potable Water .....	0173 00-1
Sewage Collection, Holding, and Transfer (CHT) System .....	0160 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Repair (continued):	
Void .....	0194 00-1
Watertight Door .....	0090 00-1
	0204 00-1
Watertight Hatch .....	0091 00-1
	0205 00-1
Watertight Incandescent Explosion Proof Lighting Fixture .....	0119 00-1
Watertight Manhole .....	0093 00-1
	0207 00-1
Watertight Scuttle .....	0092 00-1
	0206 00-1
Weld Hood Exhaust Fan Motor Controller .....	0127 00-1
Welder .....	0278 00-1
Window .....	0087 00-1
	0196 00-1
Wiring, Battery Charger	
General Alarm .....	0147 00-1
Power Supply System .....	0132 00-1
Repair Parts and Special Tools List	
01 & 02 Level Reheater 120V Fuse Box No. 1 .....	0298 00-56
Parts and Special Tools List 01, 02, 03 Level Fan Coil Unit Motor Controller .....	0300 00-2
120V Distribution Panel No. 1 .....	0298 00-36
120V Distribution Panel No. 2 .....	0298 00-40
120V Distribution Panel No. 3 .....	0298 00-42
120V Distribution Panel No. 4 .....	0298 00-44
120V Electronics Distribution Panel .....	0298 00-52
120V Emergency Distribution Panel No. 1 .....	0298 00-46
120V Exterior Emergency Lighting Panel No. 2 .....	0298 00-50
120V Main Deck, 01 & 02 Emergency Lighting Panel No. 1 .....	0298 00-48
120V Pilothouse Emergency Distribution Panel .....	0298 00-54
220/110V Distribution Panel .....	0298 00-26
220V Air Conditioning Distribution Panel .....	0298 00-62
440V Power Panel No. 1 .....	0298 00-28
440V Power Panel No. 2 .....	0298 00-30
440V Power Panel No. 3 .....	0298 00-32
440V Power Panel No. 4 .....	0298 00-34
440V Power Panel No. 5 .....	0298 00-36
AFFF Pump Motor Controller .....	0300 00-4
Air Compressor Motor Controller .....	0300 00-2
Ammunition Locker .....	0306 00-10
AMS 1 Supply Fan Motor Controller .....	0300 00-10
AMS 2 Supply Fan Motor Controller .....	0300 00-10
Arms Locker Exhaust Fan Motor Controller .....	0300 00-10
Arms Storage and Radio Room Alarm System .....	0302 00-15
Ballast Pump .....	0304 00-28
Ballast System Valve .....	0304 00-17
Battery Bank .....	0302 00-30
Battery Charger .....	0301 00-6
Battery Charger .....	0302 00-28
Battery Power Supply System .....	0301 00-2
Bilge & Ballast Pump Motor Controller .....	0300 00-16
Boatswain's Store Room Supply Fan Motor Controller .....	0300 00-10
Bracket Lighting Fixture .....	0299 00-4
Cable Assembly .....	0303 00-16

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Repair Parts and Special Tools List (continued):	
Convactor Heater 120V Fuse Box No. 2 .....	0298 00-58
Crew Mess Fan Coil Unit Motor Controller .....	0300 00-2
Damage Control Equipment .....	0306 00-2
Day Tank High Level Alarm .....	0303 00-18
Deck Reheater 120V Fuse Box No. 3 .....	0298 00-60
Electrical Power System .....	0298 00-2
Emergency Load Center .....	0298 00-24
Emergency Switchboard .....	0298 00-15
Engine Exhaust System .....	0297 00-6
Engine Order Telegraph .....	0302 00-21
Engine Room Load Center .....	0298 00-23
Engine Room Supply Fan Motor Controller .....	0300 00-12
Engine Room Supply Fan Motor Controller .....	0300 00-14
Entertainment System .....	0302 00-32
Fire and General Service Pump .....	0305 00-19
Fire and General Service Pump 1 Motor Controller .....	0300 00-18
Fire and General Service Pump 2 Motor Controller .....	0300 00-20
Floodlight .....	0299 00-12
Fuel Oil Transfer Pump .....	0297 00-31
Fuel Oil Transfer Pump Motor Controller .....	0300 00-2
Fuel Oil/Water Separator .....	0297 00-34
Fuel System Piping and Valves .....	0297 00-23
Galley Exhaust Fan Motor Controller .....	0300 00-2
General Alarm System .....	0302 00-24
Hot Potable Water Recirculation Pump .....	0305 00-16
Hot Potable Water Recirculation Pump Motor Controller .....	0300 00-22
Hot Water Heater .....	0305 00-14
Hull, Bitts, Chocks, and Tiedowns .....	0296 00-6
Hydraulic Watertight Door .....	0296 00-10
Hydropneumatic Tank .....	0305 00-8
Intercommunication System .....	0302 00-10
Interior Communications Public Announcing System .....	0302 00-1
Introduction .....	0296 00-1
Junction Box Lighting Fixture .....	0299 00-2
Lube Oil Priming Pump 1 Motor Controller .....	0300 00-6
Lube Oil Priming Pump 2 Motor Controller .....	0300 00-8
Lube Oil System .....	0297 00-11
Lube Oil Transfer Pump .....	0297 00-19
Lube Oil Transfer Pump Motor Controller .....	0300 00-2
Main Switchboard .....	0298 00-5
Marine Navigation (Running) Light Double .....	0301 00-33
Marine Navigation (Running) Light Single .....	0301 00-27
Navigation Lighting Panel .....	0301 00-40
Oily Bilge Pump .....	0304 00-14
Oily Bilge System Valve .....	0304 00-9
Pilothouse .....	0296 00-48
Portlight .....	0296 00-8
Potable Water Pump .....	0305 00-6
Potable Water Pump Motor Controller .....	0300 00-2
Potable Water System .....	0305 00-2
Prelubrication Oil Pump .....	0297 00-1
Proportioning Bromide Feeder System .....	0305 00-10
Recessed Fluorescent Lighting Fixture .....	0299 00-6

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Repair Parts and Special Tools List (continued):	
Reduction Gear Cooling Pump .....	0297 00-4
Reduction Gear Cooling Pump Motor Controller .....	0300 00-2
Rotary Clearview Screen .....	0296 00-45
Rotating Beacon .....	0302 00-26
Sanitary Space Exhaust Fan Motor Controller .....	0300 00-2
Searchlight .....	0301 00-11
Sewage Discharge Pump .....	0304 00-6
Sewage Discharge Pump Motor Controller .....	0300 00-2
Signal Horn .....	0302 00-35
Sound Powered Telephone .....	0302 00-4
Surface Mount Fluorescent Light .....	0299 00-8
Tank Level Indicator .....	0303 00-2
Valve .....	0304 00-2
Watertight Door .....	0296 00-22
Watertight Hatch .....	0296 00-35
Watertight Incandescent Explosion Proof Lighting Fixture .....	0299 00-10
Watertight Manhole .....	0296 00-42
Watertight Scuttle .....	0296 00-40
Weld Hood Exhaust Fan Motor Controller .....	0300 00-24
Workshop Equipment .....	0306 00-7
Yardarm Blinker Light and Key .....	0301 00-38
Replace	
01, 02, 03 Level Exhaust Cooling Fan Coil Unit Motor Controller .....	0224 00-1
Adapter Proportioning Bromide Feeder System .....	0180 00-4
Adjustable Transformer Searchlight .....	0236 00-11
AFFF Cooling Pump Motor Controller .....	0224 00-1
Air Box Drain Valve .....	0281 00-1
Air Compressor Motor Controller .....	0224 00-1
Alarm, Day Tank High Level Panel .....	0258 00-1
Alarm Panel Arms Locker Arms Storage Alarm .....	0142 00-12
Ammeter	
Battery Charger Power Supply System .....	0247 00-2
Searchlight Power Supply .....	0234 00-5
Amplifier & Power Supply Board Circuit Card Intercommunication System .....	0243 00-4
AMS 1 Supply Fan Motor Controller .....	0226 00-1
AMS 2 Supply Fan Motor Controller .....	0226 00-1
Arms Locker Exhaust Fan Motor Controller .....	0226 00-1
Ballast Pump	
Coupling .....	0264 00-1
Electric Motor .....	0171 00-1
Pump End .....	0170 00-1
Battery Box Exhaust Fan .....	0131 00-4
Battery Charger, Power Supply System .....	0230 00-1
.....	0246 00-1
Battery	
General Alarm .....	0149 00-1
Power Supply .....	0130 00-1
Beacon, Rotating .....	0145 00-1
Bench Grinder .....	0191 00-1
Bilge and Ballast Pump Motor Controller .....	0227 00-1
Boatswain's Store Room Supply Fan Motor Controller .....	0226 00-1
Bridge Wing Toggle Latch .....	0211 00-1
Brominator	
Assembly .....	0180 00-3
Dual Feed Valve Assembly .....	0180 00-5



<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
Replace (continued):	
Bromine Feeder	
Assembly .....	0180 00-5
Cartridge .....	0180 00-1
Bulb	
Arms Storage Alarm .....	0142 00-1
Day Tank High Level Alarm .....	0158 00-6
Navigation Lighting Panel .....	0139 00-1
Radio Room Alarm .....	0142 00-1
Round Lens	
Arms Storage Alarm .....	0142 00-3
Radio Room Alarm .....	0142 00-3
Tank Level Indicator .....	0157 00-1
Bus Tie Circuit Breaker .....	0220 00-1
Buzzer	
Arms Storage Alarm .....	0142 00-5
Radio Room Alarm .....	0142 00-5
Cable Assembly, Tank Level Indicator .....	0257 00-1
Capacitor, Searchlight Power Supply .....	0234 00-9
Circuit Breaker	
Battery Charger Power Supply System .....	0247 00-4
Bus Tie .....	0220 00-1
EDG .....	0221 00-1
Emergency Switchboard .....	0112 00-7
Engine Room Emergency Load Center .....	0113 00-2
Main Switchboard .....	0111 00-6
Main Switchboard .....	0111 00-14
Power Distribution Panel .....	0114 00-1
Clutch, Searchlight .....	0236 00-7
Contacting Assembly, Motor Controller, Lube Oil Priming Pump .....	0123 00-1
Control Valve Assembly, Hydraulic Watertight Door .....	0200 00-1
Coupling	
Ballast Pump .....	0264 00-1
Fire and General Service Pump .....	0273 00-3
Potable Water Pump .....	0267 00-4
Sewage Discharge Pump .....	0260 00-1
Crew Mess Exhaust Cooling Fan Coil Unit Motor Controller .....	0224 00-1
Cylinder Assembly, Hydraulic Watertight Door .....	0198 00-1
Day Tank High Level Alarm Panel .....	0258 00-1
Dome, Rotating Beacon .....	0146 00-1
Door Alarm Switch, Arms Locker Arms Storage Alarm .....	0142 00-11
Drill Press .....	0190 00-1
EDG Circuit Breaker .....	0221 00-1
Elapsed Time Indicator Searchlight Power Supply .....	0234 00-1
Electric Motor	
Ballast Pump .....	0171 00-1
Fire and General Service Pump .....	0187 00-1
Sewage Discharge Pump .....	0162 00-1
Engine Order Telegraph .....	0244 00-1
Engine Room Emergency Load Center .....	0113 00-1
Distribution Panel .....	0222 00-1
Engine Room Exhaust Fan Motor Controller .....	0226 00-1
Engine Room Supply Fan Motor Controller .....	0226 00-1
Entertainment System .....	0151 00-1
Fan	
Battery Box Exhaust .....	0131 00-4
Searchlight Power Supply .....	0234 00-6

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Replace (continued):	
Fire and General Service Pump	
Coupling .....	0273 00-3
Electric Motor .....	0187 00-1
	0276 00-1
Motor Controller .....	0227 00-1
Pump End .....	0186 00-1
	0274 00-1
Floodlight .....	0120 00-1
Lamp .....	0121 00-1
Lens .....	0121 00-1
Flow Sensor, Proportioning Bromide Feeder System .....	0180 00-3
Fluid Detection Device, Tank Level Indicator .....	0253 00-1
Fuel Oil System, Valve .....	0103 00-1
Fuel Oil Transfer Pump .....	0105 00-1
Electric Motor .....	0107 00-1
Motor Controller .....	0224 00-1
Fuse	
AC, Battery Charger	
General Alarm .....	0147 00-2
Power Supply System .....	0132 00-2
Arms Storage Alarm .....	0142 00-3
Battery Charger Power Supply System .....	0247 00-1
Day Tank High Level Alarm .....	0158 00-7
DC, Battery Charger	
General Alarm .....	0147 00-4
Power Supply System .....	0132 00-4
Emergency Switchboard .....	0112 00-8
Engine Room Emergency Load Center .....	0113 00-2
Holder	
Arms Storage Alarm .....	0142 00-5
Day Tank High Level Alarm .....	0158 00-8
Radio Room Alarm .....	0142 00-5
Rotary Clearview Screen .....	0209 00-3
Tank Level Indicator .....	0158 00-5
Hot Water Heater .....	0184 00-3
Intercommunication System .....	0243 00-3
Main Switchboard .....	0219 00-3
Motor Controller	
01, 02, 03 Level Fan Coil Unit .....	0122 00-3
AFFF Pump .....	0122 00-3
Air Compressor .....	0122 00-3
AMS 1 Supply Fan .....	0124 00-3
AMS 2 Supply Fan .....	0124 00-3
Arms Locker Exhaust Fan .....	0124 00-3
Bilge and Ballast Pump .....	0125 00-3
Boatswain's Store Room Supply Fan .....	0124 00-3
Crew Mess Fan Coil Unit .....	0122 00-3
Engine Room Exhaust Fan .....	0124 00-3
Engine Room Supply Fan .....	0124 00-3
Fire & General Service Pump .....	0125 00-3
Fuel Oil Transfer Pump .....	0122 00-3
Galley Exhaust Fan .....	0122 00-3
Galley Supply Fan .....	0122 00-3

<u>Subject</u>	<u>WP Sequence No.-Page No.</u>
Replace (continued):	
Motor Controller (continued):	
Lube Oil Transfer Pump .....	0122 00-3
Potable Water Pump .....	0122 00-3
Reduction Gear Cooling Pump .....	0122 00-3
Sanitary Space Exhaust Fan .....	0122 00-3
Sewage Discharge Pump .....	0122 00-3
Navigation Lighting Panel .....	0139 00-2
	0238 00-4
Radio Room Alarm .....	0142 00-3
Rotary Clearview Screen .....	0209 00-2
Searchlight Power Supply .....	0234 00-10
Tank Level Indicator .....	0158 00-4
Fusible Switch, Searchlight Power Supply .....	0234 00-11
Galley Exhaust Cooling Fan Motor Controller .....	0224 00-1
Galley Supply Cooling Fan Motor Controller .....	0224 00-1
Gasket	
Ammunition Locker .....	0279 00-2
Watertight Door .....	0204 00-3
Watertight Hatch .....	0205 00-3
General Alarm System .....	0143 00-1
Bell .....	0143 00-1
Contactor Switch .....	0143 00-4
Gong .....	0144 00-1
Relay .....	0144 00-5
Handset, Sound Powered Telephone .....	0240 00-1
Headset-Chestset, Sound Powered Telephone .....	0240 00-2
Heating Element, Hot Water Heater .....	0184 00-3
Hot Potable Water Recirculation Pump .....	0185 00-1
Motor Controller .....	0228 00-1
Hot Water Heater .....	0183 00-1
	0270 00-1
Hydraulic Watertight Door	
Control Valve Assembly .....	0200 00-1
Cylinder Assembly .....	0198 00-1
Hand Pump .....	0202 00-1
Hydropneumatic Tank .....	0177 00-1
	0269 00-1
Pressure Switch .....	0178 00-1
Illumination and Navigation Signals .....	0233 00-1
Indicator, Intercommunication System .....	0243 00-1
Intercommunication System .....	0242 00-1
Interior Communication .....	0140 00-1
Volume Control .....	0239 00-1
Joystick, Controller Searchlight .....	0236 00-9
Key, Yardarm Blinker .....	0136 00-2
Lamp	
Assembly	
Day Tank High Level Alarm .....	0158 00-7
Navigation Lighting Panel .....	0238 00-1
Bracket Lighting Fixture .....	0116 00-1
Emergency Switchboard .....	0112 00-1
Fluorescent Lighting Fixture	
Recessed .....	0117 00-1
Surface Mount .....	0118 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Replace (continued):	
Lamp (continued):	
Housing Rotary Clearview Screen .....	0209 00-2
Junction Box Lighting Fixture .....	0115 00-1
Main Switchboard .....	0111 00-1
	0111 00-9
Motor Controller	
01, 02, 03 Level Fan Coil Unit .....	0122 00-1
AFFF Pump .....	0122 00-1
Air Compressor .....	0122 00-1
AMS 1 Supply Fan .....	0124 00-1
AMS 2 Supply Fan .....	0124 00-1
Arms Locker Exhaust Fan .....	0124 00-1
Bilge and Ballast Pump .....	0125 00-1
Boatswain's Store Room Supply Fan .....	0124 00-1
Crew Mess Fan Coil Unit .....	0122 00-1
Engine Room Exhaust Fan .....	0124 00-1
Engine Room Supply Fan .....	0124 00-1
Fire & General Service Pump .....	0125 00-1
Fuel Oil Transfer Pump .....	0122 00-1
Galley Exhaust Fan .....	0122 00-1
Galley Supply Fan .....	0122 00-1
Lube Oil Transfer Pump .....	0122 00-1
Potable Water Pump .....	0122 00-1
Reduction Gear Cooling Pump .....	0122 00-1
Sanitary Space Exhaust Fan .....	0122 00-1
Sewage Discharge Pump .....	0122 00-1
Navigation Light	
Double .....	0135 00-1
Single .....	0135 00-1
Proportioning Bromide Feeder System .....	0181 00-1
Rotary Clearview Screen .....	0209 00-1
Rotating Beacon .....	0146 00-3
Searchlight .....	0133 00-1
Square Lens	
Arms Storage Alarm .....	0142 00-3
Radio Room Alarm .....	0142 00-3
Starter Assembly Searchlight .....	0236 00-1
Tank Level Indicator .....	0158 00-1
Watertight Incandescent Explosion Proof Lighting Fixture .....	0119 00-1
Yardarm Blinker .....	0137 00-1
Lens	
Navigation Light	
Double .....	0135 00-1
Single .....	0135 00-1
Yardarm Blinker .....	0137 00-1
Light, Yardarm Blinker .....	0136 00-1
Lube Oil	
Priming Pump Motor Controller .....	0225 00-1
System, Valve .....	0099 00-1
Transfer Pump .....	0101 00-1
Motor Controller .....	0224 00-1
Meter	
Emergency Switchboard .....	0112 00-4
Main Switchboard .....	0111 00-5
	0111 00-12
Motor, Searchlight .....	0236 00-4

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Replace (continued):	
Motor Starter, Motor Controller	
01, 02, 03 Level Fan Coil Unit .....	0122 00-3
AFFF Pump .....	0122 00-3
Air Compressor .....	0122 00-3
AMS 1 Supply Fan .....	0124 00-3
AMS 2 Supply Fan .....	0124 00-3
Arms Locker Exhaust Fan .....	0124 00-3
Bilge and Ballast Pump .....	0125 00-3
Boatswain's Store Room Supply Fan .....	0124 00-3
Crew Mess Fan Coil Unit .....	0122 00-3
Engine Room Exhaust Fan .....	0124 00-3
Engine Room Supply Fan .....	0124 00-3
Fire & General Service Pump .....	0125 00-3
Fuel Oil Transfer Pump .....	0122 00-3
Galley Exhaust Fan .....	0122 00-3
Galley Supply Fan .....	0122 00-3
Lube Oil Transfer Pump .....	0122 00-3
Potable Water Pump .....	0122 00-3
Reduction Gear Cooling Pump .....	0122 00-3
Sanitary Space Exhaust Fan .....	0122 00-3
Sewage Discharge Pump .....	0122 00-3
Weld Hood Exhaust Fan .....	0127 00-1
MST-246J	
Gasket, Sound Powered Telephone .....	0241 00-1
Hand Ringing Generator, Sound Powered Telephone .....	0241 00-3
Manual Control Handle, Sound Powered Telephone .....	0241 00-3
Navigation Light .....	0134 00-1
Navigation Lighting Panel .....	0138 00-1
	0237 00-1
Navigator Seat .....	0094 00-8
Oily Bilge Pump .....	0165 00-1
Outlet Assembly Proportioning Bromide Feeder System .....	0180 00-4
Pilothouse .....	0210 00-1
Alarm Panel	
Buzzer .....	0094 00-16
LED .....	0094 00-12
Pushbutton .....	0094 00-15
Console Light .....	0094 00-12
Bulb .....	0094 00-10
Wing Console	
Heater .....	0094 00-6
Thermostat .....	0094 00-3
Potable Water Pump	
Coupling .....	0267 00-4
Electric Motor .....	0176 00-1
Motor Controller .....	0224 00-1
Pump End .....	0175 00-1
Power Distribution Panel .....	0114 00-1
	0223 00-1
Prelubrication Pump	
Electric Motor .....	0096 00-1
Pump End .....	0095 00-1
Proportioning Bromide Feeder System .....	0180 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Replace (continued):	
Public Address System	
Amplifier .....	0140 00-1
Loudspeaker .....	0141 00-1
Pump	
Ballast, Coupling .....	0264 00-1
Fire and General Service	
Coupling .....	0273 00-3
Electric Motor .....	0187 00-1
	0276 00-1
Pump End .....	0186 00-1
	0274 00-1
Hot Potable Water Recirculation .....	0185 00-1
Hydraulic Watertight Door .....	0202 00-1
Potable Water	
Coupling .....	0267 00-4
Electric Motor .....	0176 00-1
Pump End .....	0175 00-1
Sewage Discharge	
Coupling .....	0260 00-1
Pump End .....	0261 00-1
Pushbutton	
Emergency Switchboard .....	0112 00-3
Main Switchboard .....	0111 00-9
R1 Relay, Searchlight Power Supply .....	0234 00-12
R2 Relay, Searchlight Power Supply .....	0234 00-4
Rectifier Diode, Searchlight .....	0236 00-10
Reduction Gear Cooling Pump .....	0097 00-1
Motor Controller .....	0224 00-1
Relay	
Emergency Switchboard .....	0112 00-10
Main Switchboard .....	0219 00-5
Relay Board Circuit Card Assembly, Intercommunication System .....	0243 00-7
Resistor Assembly, Searchlight Power Supply .....	0234 00-7
Resistor Board Circuit Card Assembly, Intercommunication System .....	0243 00-6
Rotary Clearview Screen .....	0208 00-1
Rotary Switch	
Arms Locker Arms Storage Alarm .....	0142 00-10
Engine Order Telegraph .....	0245 00-1
Rotating Beacon .....	0145 00-1
Sanitary Space Exhaust Cooling Fan Motor Controller .....	0224 00-1
Searchlight .....	0235 00-1
Base Assembly .....	0235 00-5
Drum Assembly .....	0235 00-1
Power Supply .....	0233 00-1
Selector Switch, Searchlight .....	0236 00-12
Sewage Discharge Pump	
Coupling .....	0260 00-1
Motor Controller .....	0224 00-1
Pump End .....	0261 00-1
Shore Power	
Cable Connector .....	0110 00-3
Receptacle .....	0110 00-1
Signal Horn .....	0153 00-1
Horn .....	0153 00-1
Power Supply .....	0153 00-3
Timer .....	0153 00-5

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Replace (continued):	
Sound Powered Telephone .....	0240 00-1
Starter Assembly, Motor Controller, Hot Potable Water Recirculation Pump .....	0126 00-2
Station Selector Assembly, Intercommunication System .....	0243 00-4
Stud, Watertight Manhole .....	0207 00-3
SW-23J	
Electric Bell, Sound Powered Telephone .....	0241 00-6
Hand Ringing Generator, Sound Powered Telephone .....	0241 00-5
Manual Control Handle, Sound Powered Telephone .....	0241 00-5
SW-243J	
Gasket, Sound Powered Telephone .....	0241 00-10
Hand Ringing Generator, Sound Powered Telephone .....	0241 00-11
Manual Control Handle, Sound Powered Telephone .....	0241 00-11
Switch	
Emergency Switchboard .....	0112 00-3
	0112 00-7
Intercommunication System .....	0243 00-8
Main Switchboard .....	0111 00-3
	0111 00-11
Selector, Searchlight .....	0236 00-12
Tank Level Indicator Control Panel .....	0158 00-3
Toggle	
Navigation Lighting Panel .....	0238 00-5
Rotary Clearview Screen .....	0209 00-4
Searchlight .....	0236 00-13
SWLR-243J	
Gasket, Sound Powered Telephone .....	0241 00-6
Hand Ringing Generator, Sound Powered Telephone .....	0241 00-9
Hook Switch, Sound Powered Telephone .....	0241 00-8
Light Assembly, Sound Powered Telephone .....	0241 00-8
Manual Control Handle, Sound Powered Telephone .....	0241 00-9
Relay, Sound Powered Telephone .....	0241 00-8
Sync Light Main Switchboard .....	0111 00-9
Tank Hydropneumatic .....	0269 00-1
Tank Level Indicator .....	0157 00-1
	0250 00-1
Alarm Horn .....	0250 00-5
Capacitor .....	0251 00-1
Control Module .....	0250 00-1
Diode .....	0251 00-5
Panel Meter .....	0250 00-3
Resistor .....	0251 00-3
Transistor .....	0251 00-6
Thermometer, Ammunition Locker .....	0279 00-1
Thermostat, Arms Locker Arms Storage Alarm .....	0142 00-7
Time Totalizing Meter, Proportioning Bromide Feeder System .....	0180 00-3
Toggle Latch, Bridge Wing .....	0211 00-1
Toggle Switch	
Navigation Lighting Panel .....	0238 00-5
Searchlight .....	0236 00-13
Transformer	
Emergency Switchboard .....	0112 00-10
Main Switchboard .....	0219 00-5

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Replace (continued):	
Transformer (continued):	
Motor Controller	
01, 02, 03 Level Fan Coil Unit .....	0122 00-4
AFFF Pump .....	0122 00-4
Air Compressor .....	0122 00-4
AMS 1 Supply Fan .....	0124 00-4
AMS 2 Supply Fan .....	0124 00-4
Arms Locker Exhaust Fan .....	0124 00-4
Bilge and Ballast Pump .....	0125 00-4
Boatswain's Store Room Supply Fan .....	0124 00-4
Crew Mess Fan Coil Unit .....	0122 00-4
Engine Room Exhaust Fan .....	0124 00-4
Engine Room Supply Fan .....	0124 00-4
Fire & General Service Pump .....	0125 00-4
Fuel Oil Transfer Pump .....	0122 00-4
Galley Exhaust Fan .....	0122 00-4
Galley Supply Fan .....	0122 00-4
Lube Oil Transfer Pump .....	0122 00-4
Potable Water Pump .....	0122 00-4
Reduction Gear Cooling Pump .....	0122 00-4
Sanitary Space Exhaust Fan .....	0122 00-4
Sewage Discharge Pump .....	0122 00-4
Searchlight .....	0236 00-7
Power Supply .....	0234 00-9
Transmitter, Tank Level Indicator .....	0255 00-1
Sewage Collection .....	0255 00-7
Valve	
Air Box Drain .....	0281 00-1
Ballast System .....	0167 00-1
Oily Bilge System .....	0164 00-1
Potable Water .....	0172 00-1
Sewage Collection, Holding, and Transfer (CHT) System .....	0159 00-1
Volume Control Interior Communication .....	0239 00-1
Water Switch Arms Locker Arms Storage Alarm .....	0142 00-9
Weld Hood Exhaust Fan Motor Controller .....	0229 00-1
Welder .....	0192 00-1
Window	
Cover .....	0196 00-1
Gasket .....	0196 00-2
Glass Frame .....	0196 00-1
Windshield	
Heater Switch .....	0210 00-6
Wiper	
Belt .....	0210 00-1
Blade .....	0094 00-1
Motor .....	0210 00-5
Reporting Equipment Improvement Recommendations .....	0001 00-1
Reports, Maintenance .....	0001 00-1
Requirements	
Shelter .....	0079 00-1
Siting .....	0079 00-1
Resistor Assembly, Searchlight Power Supply, Replace .....	0234 00-7
Resistor Board Circuit Card Assembly, Intercommunication System Replace .....	0243 00-6



<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Resistor, Tank Level Indicator Replace .....	0251 00-3
Reverse Reduction Gear System, Theory of Operation .....	0020 00-1
Rotary Clearview Screen	
Control Box	
Fuse, Replace .....	0209 00-2
Fuse Holder, Replace .....	0209 00-3
Lamp, Replace .....	0209 00-1
Lamp Housing, Replace .....	0209 00-2
Toggle Switch, Replace .....	0209 00-4
Repair .....	0209 00-1
Repair Parts and Special Tools List .....	0296 00-45
Replace .....	0208 00-1
Control Box	
Fuse .....	0209 00-2
Fuse Holder .....	0209 00-3
Lamp .....	0209 00-1
Lamp Housing .....	0209 00-2
Toggle Switch .....	0209 00-4
Troubleshooting .....	0075 00-1
Rotary Switch	
Arms Locker Radio Room Alarm, Replace .....	0142 00-10
Engine Order Telegraph, Replace .....	0245 00-1
Rotating Beacon	
Repair .....	0146 00-1
Repair Parts and Special Tools List .....	0302 00-26
Replace .....	0145 00-1
Dome .....	0146 00-1
Lamp .....	0146 00-3
ROWPU, Theory of Operation .....	0029 00-4
RPSTL Introduction .....	0296 00-1

**S**

Safety Relief Valve Hydraulic Watertight Door Repair .....	0201 00-5
Safety, Care, and Handling .....	0001 00-5
Sanitary Space	
Exhaust Fan Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Location and Description of Major Components .....	0009 00-2
Scavenging Oil System, Main Propulsion Engine, Theory of Operation .....	0018 00-6
Scope .....	0001 00-1
Searchlight	
Adjust Spark Gap .....	0133 00-7
Adjustable Transformer, Replace .....	0236 00-11
Align .....	0133 00-5
Base Assembly, Replace .....	0235 00-5
Clutch, Replace .....	0236 00-7
Drum Assembly, Replace .....	0235 00-1
Joystick Controller, Replace .....	0236 00-9

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Searchlight (continued):	
Lamp Starter Assembly, Replace .....	0236 00-1
Motor, Replace .....	0236 00-4
Power Supply	
Ammeter Replace .....	0234 00-5
Capacitor Replace .....	0234 00-9
Elapsed Time Indicator Replace .....	0234 00-1
Fan Replace .....	0234 00-6
Fuse Replace .....	0234 00-10
Fusible Switch Replace .....	0234 00-11
R1 Relay Replace .....	0234 00-12
R2 Relay Replace .....	0234 00-4
Replace .....	0233 00-1
Resistor Assembly Replace .....	0234 00-7
Test .....	0232 00-1
Transformer Replace .....	0234 00-9
Rectifier Diode, Replace .....	0236 00-10
Repair .....	0133 00-1
	0236 00-1
Repair Parts and Special Tools List .....	0301 00-11
Replace .....	0235 00-1
Lamp .....	0133 00-1
Selector Switch, Replace .....	0236 00-12
Toggle Switch, Replace .....	0236 00-13
Transformer, Replace .....	0236 00-7
Troubleshooting .....	0064 00-1
Seat, Navigator, Replace .....	0094 00-8
Selector Switch Searchlight, Replace .....	0236 00-12
Sensor, Flow Proportioning Bromide Feeder System, Replace .....	0180 00-3
Service	
Battery General Alarm .....	0148 00-1
Battery Power Supply .....	0129 00-1
Bench Grinder .....	0191 00-3
Deck Drain .....	0085 00-1
Drill Press .....	0190 00-2
Duplex Strainer Oily Bilge System .....	0163 00-1
Electric Motor Fire and General Service Pump .....	0188 00-1
Fire and General Service Pump Electric Motor .....	0188 00-1
Fuel Oil Filter/Water Separator .....	0108 00-1
Gun Mounts .....	0193 00-1
Mast .....	0086 00-1
Oily Bilge System Piping .....	0163 00-1
Proportioning Bromide Feeder System .....	0180 00-1
Pump Fire and General Service Electric Motor .....	0188 00-1
Upon Receipt .....	0079 00-1
Void .....	0085 00-2
Sewage Collection, Holding, and Transfer (CHT) System	
Valve	
Repair .....	0160 00-1
Replace .....	0159 00-1
Sewage Discharge Pump	
Coupling, Replace .....	0260 00-1
Electric Motor	
Repair .....	0263 00-1
	0284 00-1
Replace .....	0162 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Sewage Discharge Pump (continued):	
Motor Controller	
Repair .....	0122 00-1
Repair Parts and Special Tools List .....	0300 00-2
Replace .....	0224 00-1
Fuse .....	0122 00-3
Lamp .....	0122 00-1
Motor Starter .....	0122 00-3
Transformer .....	0122 00-4
Pump End	
Repair .....	0262 00-1
	0283 00-1
Replace .....	0261 00-1
Repair .....	0161 00-1
	0260 00-1
	0282 00-1
Repair Parts and Special Tools List .....	0304 00-6
Troubleshooting .....	0048 00-1
Shaft Alley	
Port, Location and Description of Major Components .....	0014 00-2
Starboard, Location and Description of Major Components .....	0014 00-1
Shelter Requirements .....	0079 00-1
Shipment, Preparation .....	0001 00-1
Ship's Service Diesel Generator (SSDG,) Theory of Operation .....	0034 00-2
Shore Power	
Cable Connector, Replace .....	0110 00-3
Circuit Breaker, Adjust .....	0217 00-3
Receptacle, Replace .....	0110 00-1
Shuttle Valve, Hydraulic Watertight Door, Repair .....	0201 00-9
Signal Horn	
Horn, Replace .....	0153 00-1
Power Supply, Replace .....	0153 00-3
Repair Parts and Special Tools List .....	0302 00-35
Replace .....	0153 00-1
Timer, Replace .....	0153 00-5
Troubleshooting .....	0073 00-1
Siting Requirements .....	0079 00-1
Sound Powered Telephone	
Repair .....	0241 00-1
Repair Parts and Special Tools List .....	0302 00-4
Replace .....	0240 00-1
Handset .....	0240 00-1
Headset-Chestset .....	0240 00-2
MST-246J	
Gasket .....	0241 00-1
Hand Ringing Generator .....	0241 00-3
Manual Control Handle .....	0241 00-3
SW-23J	
Electric Bell .....	0241 00-6
Hand Ringing Generator .....	0241 00-5
Manual Control Handle .....	0241 00-5
SW-243J	
Gasket .....	0241 00-10
Hand Ringing Generator .....	0241 00-11
Manual Control Handle .....	0241 00-11

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Sound Powered Telephone (continued):	
Replace (continued):	
SWLR-243J	
Gasket .....	0241 00-6
Hand Ringing Generator .....	0241 00-9
Hook Switch .....	0241 00-8
Light Assembly .....	0241 00-8
Manual Control Handle .....	0241 00-9
Relay .....	0241 00-8
Theory of Operation .....	0036 00-2
Troubleshooting .....	0067 00-1
Space Heaters, Theory of Operation .....	0038 00-1
Spark Gap	
Searchlight, Adjust .....	0133 00-7
Welder, Adjust .....	0278 00-1
Sprinkler Systems	
Ammunition Storage Lockers Theory of Operation .....	0032 00-7
Arms Locker Drenching System Theory of Operation .....	0032 00-7
Theory of Operation .....	0032 00-1
SSDG 1/SSDG 2 Circuit Breaker, Adjust .....	0217 00-2
SSDG Keel Cooler, Inspect .....	0098 00-2
Starter Assembly, Hot Potable Water Recirculation Pump Motor Controller, Replace .....	0126 00-2
Station Selector Assembly, Intercommunication System, Replace .....	0243 00-4
Steering Gear Compartment, Location and Description of Major Components .....	0013 00-2
Steering System, Theory of Operation .....	0025 00-1
Storage, Preparation .....	0001 00-1
Strainer, Duplex Oily Bilge System Service .....	0163 00-1
Stud, Watertight Manhole Replace .....	0207 00-3
Surface Mount Fluorescent Light, Repair Parts and Special Tools List .....	0299 00-8
SW-23J	
Electric Bell, Sound Powered Telephone Replace .....	0241 00-6
Hand Ringing Generator, Sound Powered Telephone Replace .....	0241 00-5
Manual Control Handle, Sound Powered Telephone Replace .....	0241 00-5
SW-243J	
Gasket, Sound Powered Telephone Replace .....	0241 00-10
Hand Ringing Generator, Sound Powered Telephone Replace .....	0241 00-11
Manual Control Handle, Sound Powered Telephone Replace .....	0241 00-11
Switch	
Contactor, General Alarm Replace .....	0143 00-4
Emergency Switchboard, Replace .....	0112 00-3
Emergency Switchboard, Replace .....	0112 00-7
Intercommunication System, Replace .....	0243 00-8
Main Switchboard, Replace .....	0111 00-11
.....	0111 00-3
Pressure, Hydropneumatic Tank, Replace .....	0178 00-1
Searchlight	
Selector, Replace .....	0236 00-12
Toggle, Replace .....	0236 00-13
Tank Level Indicator Control Panel, Replace .....	0158 00-3
Toggle, Rotary Clearview Screen, Replace .....	0209 00-4
Windshield Heater, Replace .....	0210 00-6
Switchboard	
Emergency	
Repair .....	0112 00-1
.....	0220 00-1
.....	0221 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Sound Powered Telephone (continued):	
Replace	
Circuit Breaker .....	0112 00-7
Fuse .....	0112 00-8
Lamp .....	0112 00-1
Meter .....	0112 00-4
Pushbutton .....	0112 00-3
Relay .....	0112 00-10
Switch .....	0112 00-3
	0112 00-7
Transformer .....	0112 00-10
Troubleshooting .....	0059 00-1
Main	
Repair .....	0111 00-1
	0219 00-1
Replace	
Circuit Breaker .....	0111 00-6
	0111 00-14
Lamp .....	0111 00-1
	0111 00-9
Meter .....	0111 00-12
	0111 00-5
Pushbutton .....	0111 00-9
Switch .....	0111 00-11
	0111 00-3
Sync Light .....	0111 00-9
Troubleshooting .....	0058 00-1
SWLR-243J	
Gasket, Sound Powered Telephone, Replace .....	0241 00-6
Hand Ringing Generator, Sound Powered Telephone, Replace .....	0241 00-9
Hook Switch, Sound Powered Telephone, Replace .....	0241 00-8
Light Assembly, Sound Powered Telephone, Replace .....	0241 00-8
Manual Control Handle, Sound Powered Telephone, Replace .....	0241 00-9
Relay, Sound Powered Telephone, Replace .....	0241 00-8
Sync Light, Main Switchboard, Replace .....	0111 00-9

**T**

Table of Contents .....	i
Tank	
Capacities .....	0015 00-1
Hydropneumatic	
Pressure Switch, Replace .....	0178 00-1
Replace .....	0177 00-1
	0269 00-1
Tank Level Indicator	
Adjust .....	0155 00-1
Alarm Horn, Replace .....	0250 00-5
Cable Assembly	
Dry Side, Inspect .....	0256 00-1
Inspect .....	0256 00-1
Replace .....	0257 00-1
Wet Side, Inspect .....	0256 00-2
Calibrate .....	0156 00-1
	0249 00-1
Capacitor, Replace .....	0251 00-1
Control Module, Replace .....	0250 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Tank Level Indicator (continued):	
Diode, Replace .....	0251 00-5
Fluid Detection Device	
Inspect .....	0252 00-1
Replace .....	0253 00-1
Inspect .....	0248 00-1
Panel Meter, Replace .....	0250 00-3
Repair .....	0158 00-1
	0251 00-1
Repair Parts and Special Tools List .....	0303 00-2
Replace .....	0157 00-1
	0250 00-1
Bulb .....	0157 00-1
Fuse .....	0158 00-4
Fuse Holder .....	0158 00-5
Lamp .....	0158 00-1
Resistor .....	0251 00-3
Switch, Control Panel .....	0158 00-3
Transistor .....	0251 00-6
Test .....	0154 00-1
Transmitter	
Inspect .....	0254 00-1
Replace .....	0255 00-1
Sewage Collection, Replace .....	0255 00-7
Troubleshooting .....	0056 00-1
Tanks, Location and Description of Major Components .....	0015 00-1
Test	
Battery Power Supply .....	0128 00-1
Electrical Power System .....	0216 00-1
Illumination and Navigation Signals .....	0232 00-1
Interlocks	
EDG Power	
With Feedback .....	0216 00-3
Without Feedback .....	0216 00-3
Normal Power .....	0216 00-1
Proportioning Bromide Feeder System .....	0179 00-1
Searchlight Power Supply .....	0232 00-1
Switch Alarm Day Tank High Level Panel Replace .....	0258 00-1
Switch Day Tank High Level Alarm Panel Replace .....	0258 00-1
Tank Level Indicator .....	0154 00-1
Theory of Operation	
AFFF Pump .....	0032 00-6
Air Compressor .....	0027 00-3
Air Conditioning Condenser Units .....	0038 00-1
Air Intake System, Main Propulsion Engine .....	0018 00-2
Air Starting System, Main Propulsion Engine .....	0018 00-3
Alarm Systems .....	0037 00-1
Anchor Windlass .....	0040 00-12
Bilge and Ballast Systems .....	0030 00-1
Bow Thruster System .....	0022 00-1
Capstan .....	0040 00-10
Cathodic Protection System .....	0041 00-1
Central Hydraulic Power Unit .....	0040 00-1
Electrical Operation .....	0040 00-4
Hydraulic Operation .....	0040 00-4
Hydraulic Pumps .....	0040 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Theory of Operation (continued):	
Central Hydraulic Power Unit (continued):	
Motor Controller .....	0040 00-2
Reservoir .....	0040 00-2
Return Filter .....	0040 00-2
Safety Monitoring and Shutoff Devices .....	0040 00-2
Suction Filter .....	0040 00-2
System Pressure Gauge .....	0040 00-2
System Relief Valve .....	0040 00-2
Compressed Air System .....	0027 00-1
Control Air System .....	0028 00-1
Convection Heater .....	0038 00-1
Cooling System, Main Propulsion Engine .....	0018 00-7
Crane .....	0040 00-16
Deck Machinery .....	0040 00-1
Diesel Engine-Driven Firefighting Pump .....	0032 00-6
Door Alarm System .....	0037 00-5
Duct Heaters .....	0038 00-1
Electrical System .....	0035 00-1
Alternating Current System .....	0035 00-1
Battery Banks .....	0035 00-7
Battery Chargers .....	0035 00-4
Direct Current System .....	0035 00-4
Distribution Panels .....	
Alternating Current .....	0035 00-4
Direct Current .....	0035 00-7
Emergency Switchboard .....	0035 00-1
General .....	0035 00-1
Main Switchboard .....	0035 00-1
Motor Controllers .....	0035 00-4
Storage Batteries .....	0035 00-4
Transformers .....	0035 00-4
Emergency Diesel Generator (EDG) .....	0034 00-2
Engine Control Panel .....	0018 00-1
Engine Cooling Systems .....	0019 00-1
Components .....	0019 00-1
Heat Exchanger .....	0019 00-4
Keel Cooler .....	0019 00-2
Radiator .....	0019 00-3
Engine Exhaust System, Main Propulsion Engine .....	0018 00-3
Engine Order Telegraph .....	0036 00-4
Engine Room Water Washdown System (ERWWS) .....	0032 00-8
EOS Air Conditioner .....	0038 00-1
Fan Coil Units .....	0038 00-1
Fire Alarm System .....	0037 00-1
Fire Main .....	0032 00-1
Fire Monitors .....	0032 00-1
Fire Stations .....	0032 00-2
Fire Suppression Systems .....	0033 00-1
Arms Locker Drenching .....	0033 00-9
Engine Room Water Washdown System (ERWSS) .....	0033 00-6
Extinguishing Agents .....	0033 00-9
FM-200 .....	0033 00-1
Alarm System .....	0033 00-4
.....	0037 00-6
Galley .....	0033 00-8

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Theory of Operation (continued):	
Fuel System .....	0023 00-1
Fuel Oil Fill and Transfer System .....	0023 00-1
Main Propulsion Engine .....	0018 00-1
General Alarm System .....	0037 00-3
Governor .....	0018 00-1
Heating, Ventilation, and Air Conditioning (HVAC) Systems .....	0038 00-1
Hydraulic Systems .....	0026 00-1
Intercommunication System .....	0036 00-1
Internal Communications Systems .....	0036 00-1
Lubricating and Hydraulic Oil Fill and Transfer System .....	0024 00-1
Lubricating Oil System, Main Propulsion Engine .....	0018 00-4
Main Lubrication Oil System, Main Propulsion Engine .....	0018 00-5
Main Propulsion Engines .....	0018 00-1
Marine Sanitation Device .....	0031 00-1
Natural Supply and Exhaust Vents .....	0038 00-1
Oil Content Monitor .....	0030 00-5
Oil Water Separator .....	0030 00-3
Pilothouse Rooftop Air Conditioning Units .....	0038 00-2
Piston Cooling Oil System, Main Propulsion Engine .....	0018 00-6
Potable Water	
Pumps .....	0029 00-3
System .....	0029 00-1
Tanks .....	0029 00-2
Power Generation System .....	0034 00-1
Preheater .....	0038 00-1
Prelube System, Main Propulsion Engine .....	0018 00-7
Propeller Shafts .....	0021 00-1
Propellers .....	0021 00-1
Propulsion Plant .....	0018 00-1
Radio Room Rooftop Air Conditioning Units .....	0038 00-2
Refrigeration System .....	0039 00-1
Compressor .....	0039 00-4
Condenser Unit .....	0039 00-4
Control Box .....	0039 00-5
Expansion Valve .....	0039 00-4
Local Controls and Indicators .....	0039 00-5
Receiver .....	0039 00-5
Refrigerant System Operation .....	0039 00-5
Unit Cooler .....	0039 00-4
Reheater .....	0038 00-1
Reverse Reduction Gear System .....	0020 00-1
ROWPU .....	0029 00-4
Scavenging Oil System, Main Propulsion Engine .....	0018 00-6
Ship's Service Diesel Generator (SSDG) .....	0034 00-2
Sound Powered Telephone System .....	0036 00-2
Space Heaters .....	0038 00-1
Sprinkler Systems .....	0032 00-1
Ammunition Storage Lockers .....	0032 00-7
Arms Locker Drenching System .....	0032 00-7
Steering System .....	0025 00-1
Tow Pins .....	0040 00-18
Towing Machine Hydraulic System .....	0040 00-6
Gauges and Indicators .....	0040 00-9
Heat Exchanger .....	0040 00-9



<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Theory of Operation (continued):	
Towing Machine Hydraulic System (continued):	
Hydraulic Pump .....	0040 00-6
Relief Valves .....	0040 00-9
Reservoir .....	0040 00-9
Return Filter .....	0040 00-9
Suction Filter .....	0040 00-9
System Operation .....	0040 00-9
Towing Machines .....	0040 00-20
Electrical Operating Theory .....	0040 00-21
Hydraulic/Mechanical Operating Theory .....	0040 00-20
Turbocharger	
Lubrication (Soakback) System, Main Propulsion Engine .....	0018 00-6
Oil Filter, Main Propulsion Engine .....	0018 00-6
Ventilation Fans .....	0038 00-1
Washdown Countermeasure (WDCM) System .....	0032 00-7
Washdown Systems .....	0032 00-1
Thermometer	
Ammunition Locker, Replace .....	0279 00-1
Hot Water Heater, Replace .....	0184 00-7
Thermostat	
Arms Locker, Replace .....	0142 00-7
Hot Water Heater, Replace .....	0184 00-4
Thread Repair, Watertight Manhole .....	0207 00-4
Time Totalizing Meter, Proportioning Bromide Feeder System, Replace .....	0180 00-3
Timer, Signal Horn, Replace .....	0153 00-5
Toggle Latch, Bridge Wing, Replace .....	0211 00-1
Toggle Switch	
Navigation Lighting Panel, Replace .....	0238 00-5
Rotary Clearview Screen, Replace .....	0209 00-4
Searchlight, Replace .....	0236 00-13
Torque Table .....	0308 00-1
Tow Pins, Theory of Operation .....	0040 00-18
Towing Gear Locker, Location and Description of Major Components .....	0013 00-3
Towing Machine Hydraulic System	
Gauges and Indicators, Theory of Operation .....	0040 00-9
Heat Exchanger, Theory of Operation .....	0040 00-9
Hydraulic Pump, Theory of Operation .....	0040 00-6
Relief Valves, Theory of Operation .....	0040 00-9
Reservoir, Theory of Operation .....	0040 00-9
Return Filter, Theory of Operation .....	0040 00-9
Suction Filter, Theory of Operation .....	0040 00-9
Theory of Operation .....	0040 00-6
Towing Machines	
Electrical Operating Theory of Operation .....	0040 00-21
Hydraulic/Mechanical Operating Theory of Operation .....	0040 00-20
Theory of Operation .....	0040 00-20
Transformer	
01, 02, 03 Level Fan Coil Unit Motor Controller, Replace .....	0122 00-4
AFFF Pump Motor Controller, Replace .....	0122 00-4
Air Compressor Motor Controller, Replace .....	0122 00-4
AMS 1 Supply Fan Motor Controller, Replace .....	0124 00-4
AMS 2 Supply Fan Motor Controller, Replace .....	0124 00-4
Arms Locker Exhaust Fan Motor Controller, Replace .....	0124 00-4
Bilge & Ballast Pump Motor Controller, Replace .....	0125 00-4

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Transformer (continued):	
Boatswain's Store Room Supply Fan Motor Controller, Replace .....	0124 00-4
Crew Mess Fan Coil Unit Motor Controller, Replace .....	0122 00-4
Emergency Switchboard, Replace .....	0112 00-10
Engine Room Exhaust Fan Motor Controller, Replace .....	0124 00-4
Engine Room Supply Fan Motor Controller, Replace .....	0124 00-4
Fire & General Service Pump Motor Controller, Replace .....	0125 00-4
Fuel Oil Transfer Pump Motor Controller, Replace .....	0122 00-4
Galley Exhaust Fan Motor Controller, Replace .....	0122 00-4
Galley Supply Fan Motor Controller, Replace .....	0122 00-4
Lube Oil Transfer Pump Motor Controller, Replace .....	0122 00-4
Main Switchboard Replace .....	0219 00-5
Potable Water Pump Motor Controller, Replace .....	0122 00-4
Reduction Gear Cooling Pump Motor Controller, Replace .....	0122 00-4
Sanitary Space Exhaust Fan Motor Controller, Replace .....	0122 00-4
Searchlight Power Supply, Replace .....	0234 00-9
Searchlight, Replace .....	0236 00-7
Sewage Discharge Pump Motor Controller, Replace .....	0122 00-4
Transistor, Tank Level Indicator, Replace .....	0251 00-6
Transmitter, Tank Level Indicator	
Inspect .....	0254 00-1
Replace .....	0255 00-1
Sewage Collection, Replace .....	0255 00-7
Troubleshooting Index .....	0042 00-1
Troubleshooting Procedures	
Alarm System, Arms Storage and Radio Room .....	0069 00-1
Arc Welder .....	0078 00-1
Battery Charger .....	0066 00-1
Bench Grinder .....	0077 00-1
Bilge and Ballast Pump .....	0050 00-1
Day Tank High Level Alarm .....	0057 00-1
Distribution Panel .....	0060 00-1
Drill Press .....	0076 00-1
Emergency Switchboard .....	0059 00-1
Engine Order Telegraph .....	0071 00-1
Fire and General Service Pump .....	0053 00-1
Floodlights .....	0062 00-1
Fuel Oil Filter/Water Separator .....	0055 00-1
Fuel Oil Transfer Pump .....	0047 00-1
General Alarm System .....	0072 00-1
Hot Potable Water Recirculation Pump .....	0052 00-1
Hot Water Heater .....	0074 00-1
Hydraulic Watertight Door .....	0043 00-1
Intercommunication .....	0068 00-1
Lighting, Interior .....	0061 00-1
Lube Oil Transfer Pump .....	0046 00-1
Main Switchboard .....	0058 00-1
Motor Controller .....	0065 00-1
Navigation Lights .....	0063 00-1
Oily Bilge Pump .....	0049 00-1
Pilothouse Console Light .....	0070 00-1
Pilothouse Wing Heater .....	0070 00-1
Portable Electric Pump .....	0054 00-1
Potable Water Pump .....	0051 00-1
Prelubrication Oil Pump .....	0044 00-1

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Troubleshooting Procedures (continued):	
Reduction Gear Cooling Pump .....	0045 00-1
Rotary Clearview Screen .....	0075 00-1
Searchlights .....	0064 00-1
Sewage Discharge Pump .....	0048 00-1
Signal Horn .....	0073 00-1
Sound Powered Telephone .....	0067 00-1
Tank Level Indicator .....	0056 00-1
Welder .....	0078 00-1
Turbocharger	
Lubrication (Soakback) System, Main Propulsion Engine, Theory of Operation .....	0018 00-6
Oil Filter, Main Propulsion Engine, Theory of Operation .....	0018 00-6

**V**

Valve	
Air Box Drain Replace .....	0281 00-1
Ballast System	
Repair .....	0168 00-1
Replace .....	0167 00-1
Fuel Oil System	
Repair .....	0104 00-1
Replace .....	0103 00-1
Lube Oil System	
Repair .....	0100 00-1
Replace .....	0099 00-1
Oily Bilge System, Replace .....	0164 00-1
Potable Water	
Repair .....	0173 00-1
Replace .....	0172 00-1
Repair Parts and Special Tools List .....	0304 00-2
Sewage Collection, Holding, and Transfer (CHT) System	
Repair .....	0160 00-1
Replace .....	0159 00-1
Ventilation Fans, Theory of Operation .....	0038 00-1
Vestibule, Location and Description of Major Components .....	0010 00-15
Void	
Repair .....	0194 00-1
Service .....	0085 00-2
Volume Control, Interior Communication, Replace .....	0239 00-1

**W**

Warning Summary .....	a
Warranty Information .....	0001 00-2
Washdown Countermeasure (WDCM) System, Theory of Operation .....	0032 00-7
Washdown Systems, Theory of Operation .....	0032 00-1
Water Switch, Arms Locker, Replace .....	0142 00-9
Watertight Door	
Gasket	
Replace .....	0204 00-3
Sealing Area Repair .....	0204 00-1
Repair .....	0090 00-1
	0204 00-1
Repair Parts and Special Tools List .....	0296 00-22

<u>Subject</u>	<u>WP Sequence No. -Page No.</u>
Watertight Hatch	
Gasket	
Replace .....	0205 00-3
Sealing Area Repair .....	0205 00-1
Repair .....	0091 00-1
	0205 00-1
Repair Parts and Special Tools List .....	0296 00-35
Watertight Incandescent Explosion Proof Lighting Fixture	
Repair .....	0119 00-1
Repair Parts and Special Tools List .....	0299 00-10
Replace Lamp .....	0119 00-1
Watertight Manhole	
Gasket Sealing Area, Repair .....	0207 00-1
Repair .....	0093 00-1
	0207 00-1
Repair Parts and Special Tools List .....	0296 00-42
Replace, Stud .....	0207 00-3
Thread Repair .....	0207 00-4
Watertight Scuttle	
Repair .....	0092 00-1
	0206 00-1
Repair Parts and Special Tools List .....	0296 00-40
Weld Hood Exhaust Fan Motor Controller	
Repair .....	0127 00-1
Repair Parts and Special Tools List .....	0300 00-24
Replace .....	0229 00-1
Motor Starter .....	0127 00-1
Welder	
Repair .....	0278 00-1
Replace .....	0192 00-1
Spark Gap, Adjust .....	0278 00-1
Troubleshooting .....	0078 00-1
Window	
Cover, Replace .....	0196 00-1
Gasket, Replace .....	0196 00-2
Glass Frame, Replace .....	0196 00-1
Repair .....	0087 00-1
	0196 00-1
Windshield	
Heater Switch, Replace .....	0210 00-6
Wiper	
Belt, Replace .....	0210 00-1
Blade, Replace .....	0094 00-1
Motor, Replace .....	0210 00-5
Wing Heater, Pilothouse Troubleshooting .....	0070 00-1
Wiper Blade, Windshield, Replace .....	0094 00-1
Workshop Equipment, Repair Parts and Special Tools List .....	0306 00-7
Workshop, Location and Description of Major Components .....	0013 00-8

**Y**

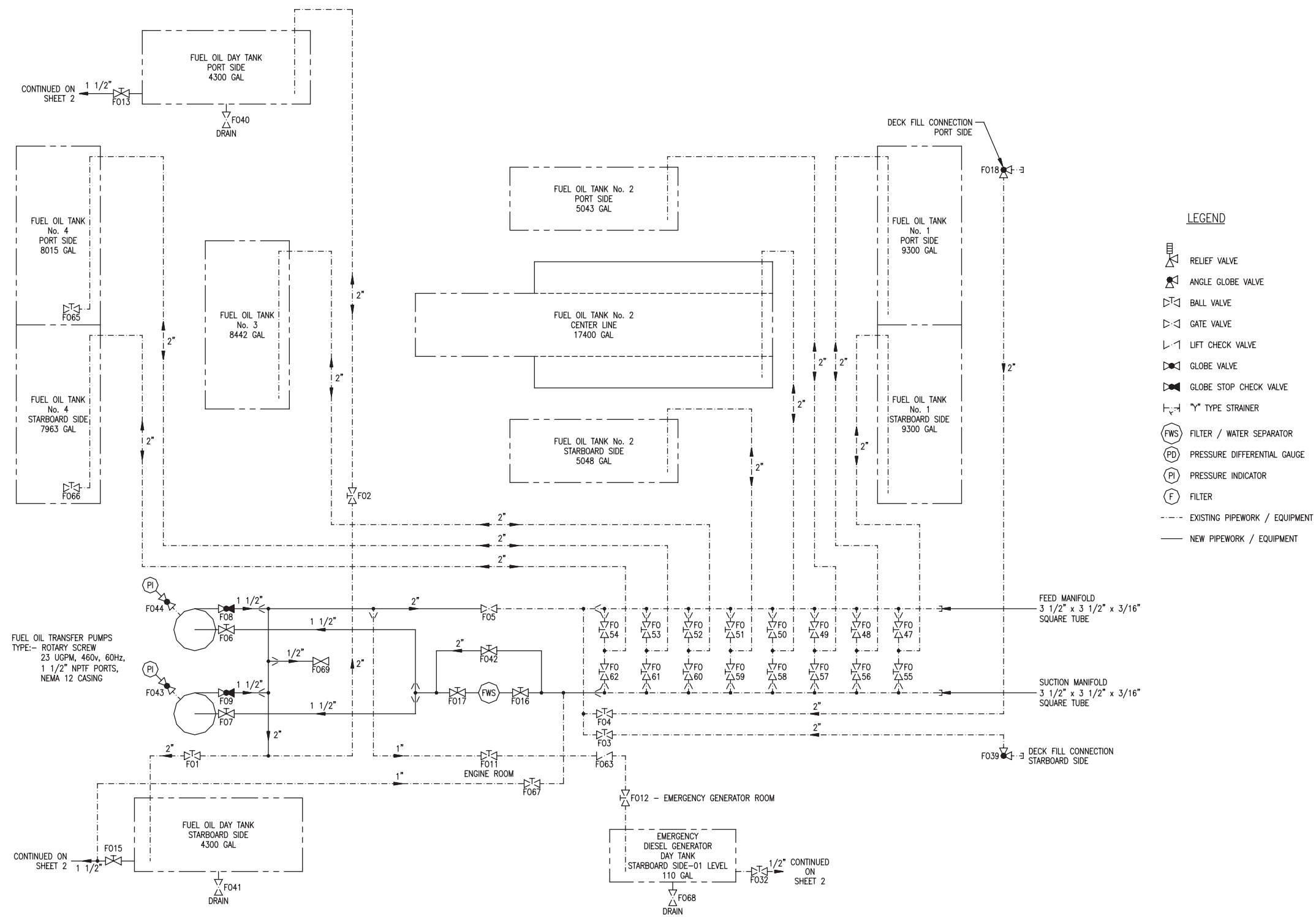
Yardarm Blinker	
Key, Replace .....	0136 00-2
Lamp, Replace .....	0137 00-1
Lens, Replace .....	0137 00-1
Light and Key, Repair Parts and Special Tools List .....	0301 00-38
Light, Replace .....	0136 00-1

TABLE OF CONTENTS

FOLDOUTS

Fuel System Schematic .....	3
General Service Pump Suction Piping Modifications .....	5
Air Compressor Pipework .....	6
ROWPU Installation .....	7
ROWPU System Wiring Diagram .....	8
Machinery Remote Control System .....	13
Battery Power Supply System.....	25
One Line Electrical Diagram .....	33
Power System.....	43
Electrical Plant Elementary Wiring Diagram .....	51
Lighting and Small Power Distribution Diagram .....	81
Machinery Equipment Wiring.....	91
Sound Powered Telephone System .....	107
General Alarm System .....	112
Arms Storage Alarm System .....	117
Public Announcing System .....	120
HVAC Electrical System.....	123
Fire Detection and Alarm System .....	130

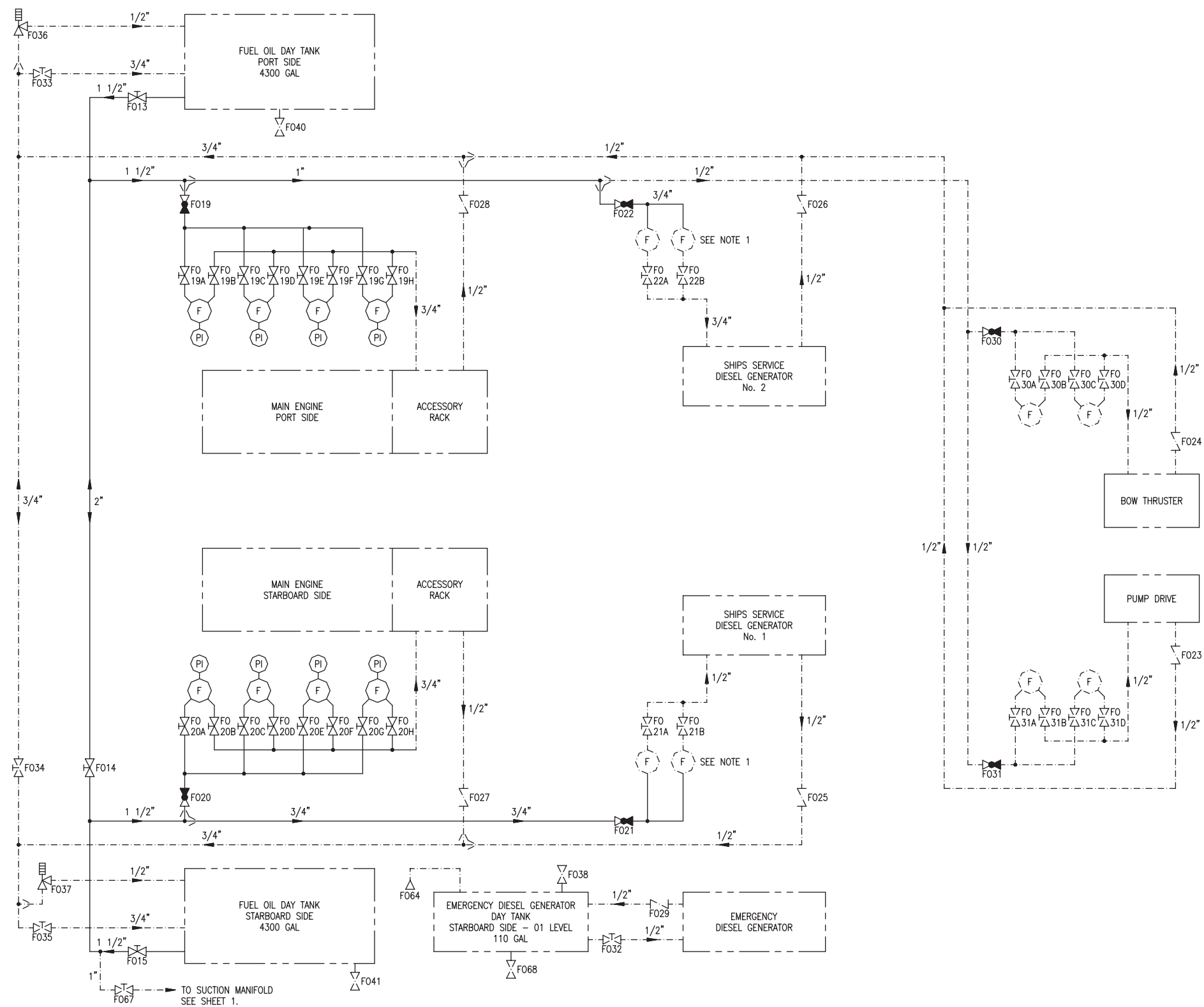




FO-1 Fuel System Schematic (Sheet 1 of 2)

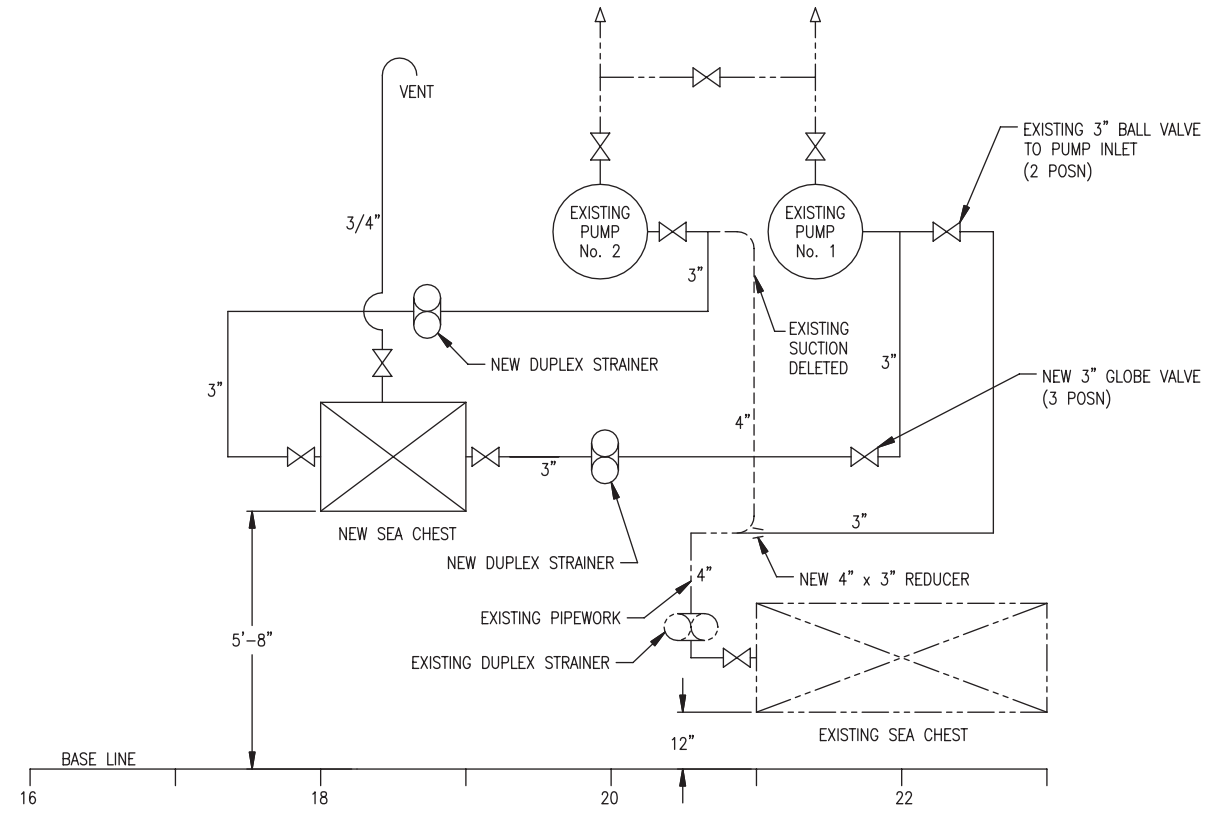






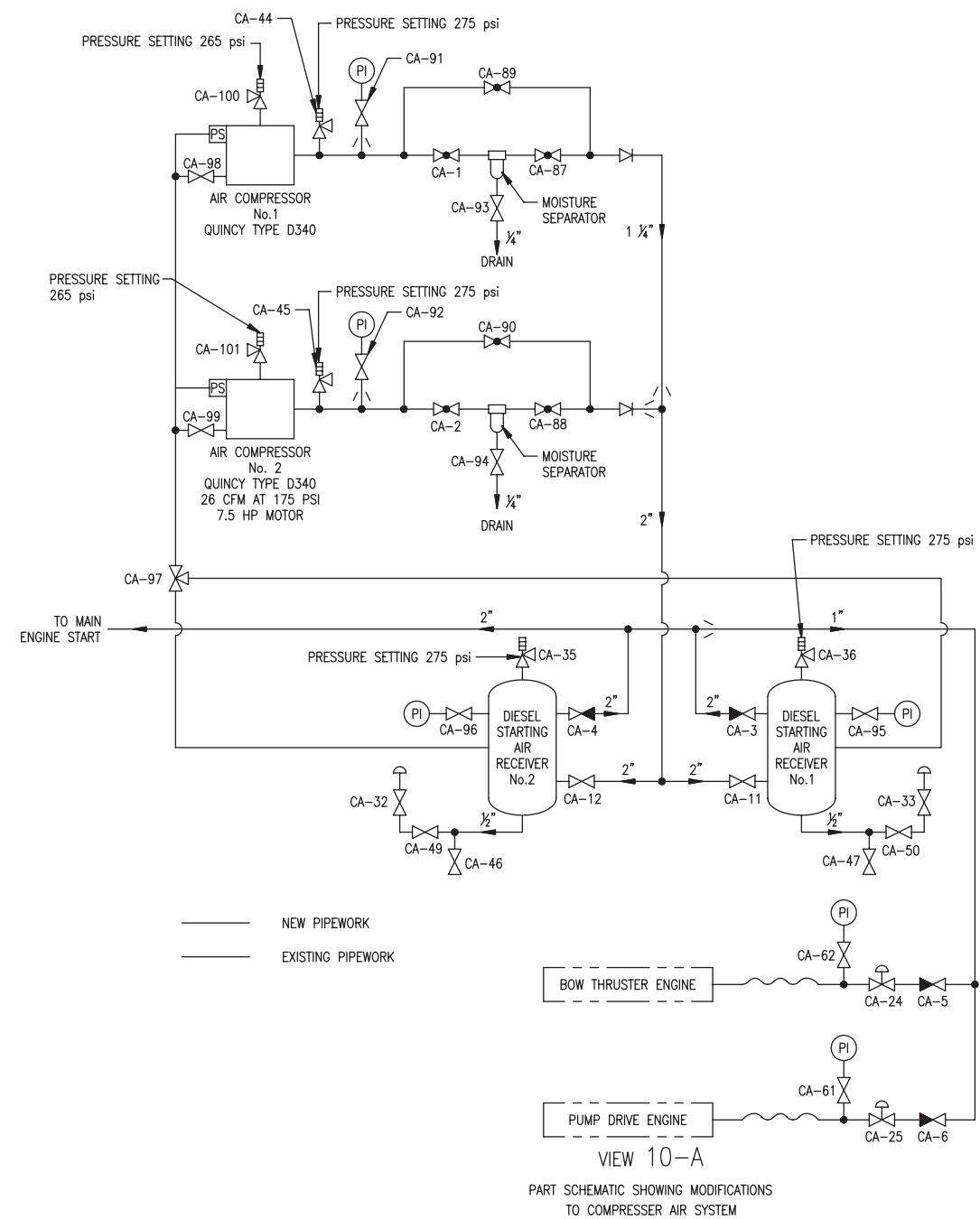
FO-1 Fuel System Schematic (Sheet 2 of 2)



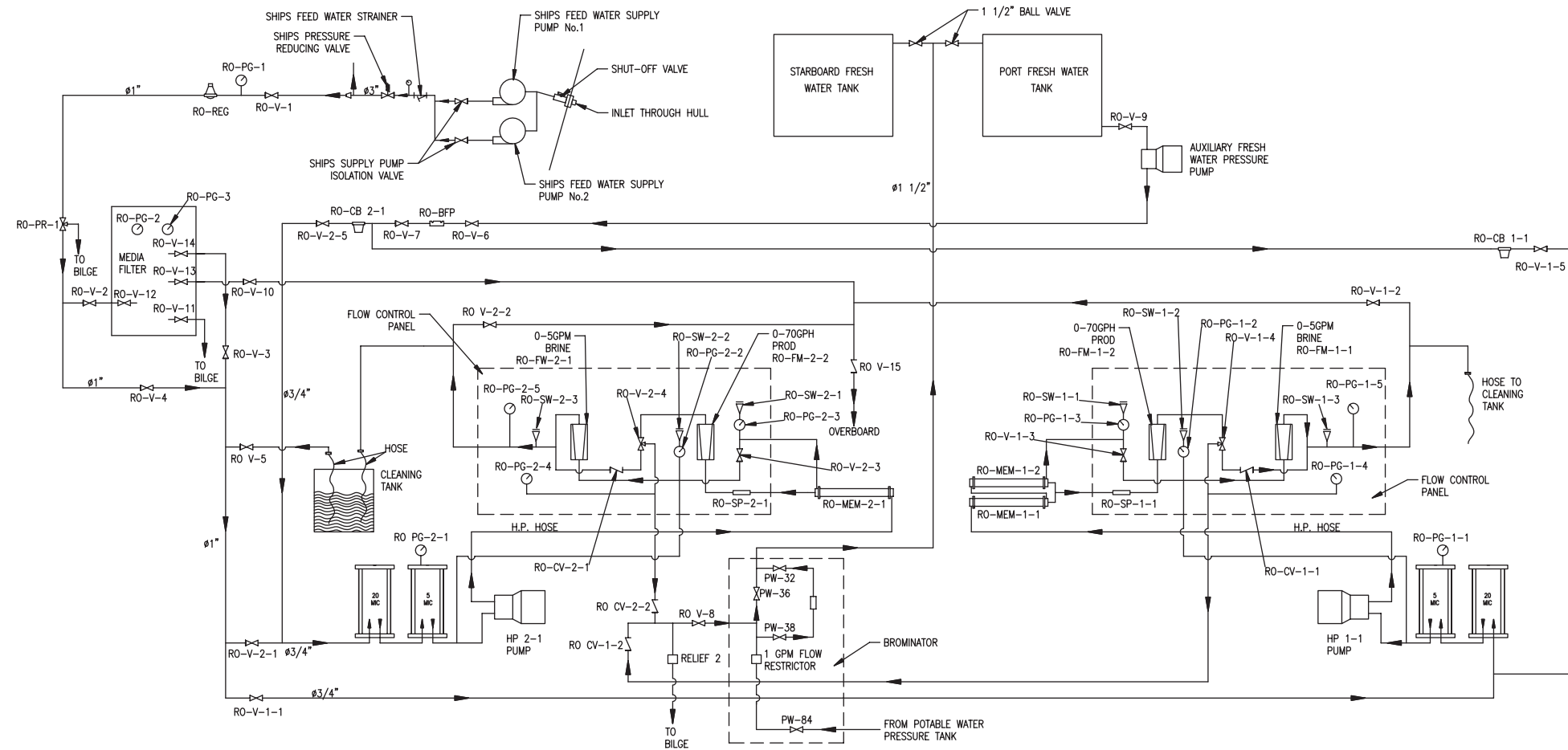


DIAGRAMMATIC 5-B  
REVISED PIPING DIAGRAMMATIC FOR GENERAL SERVICE PUMPS



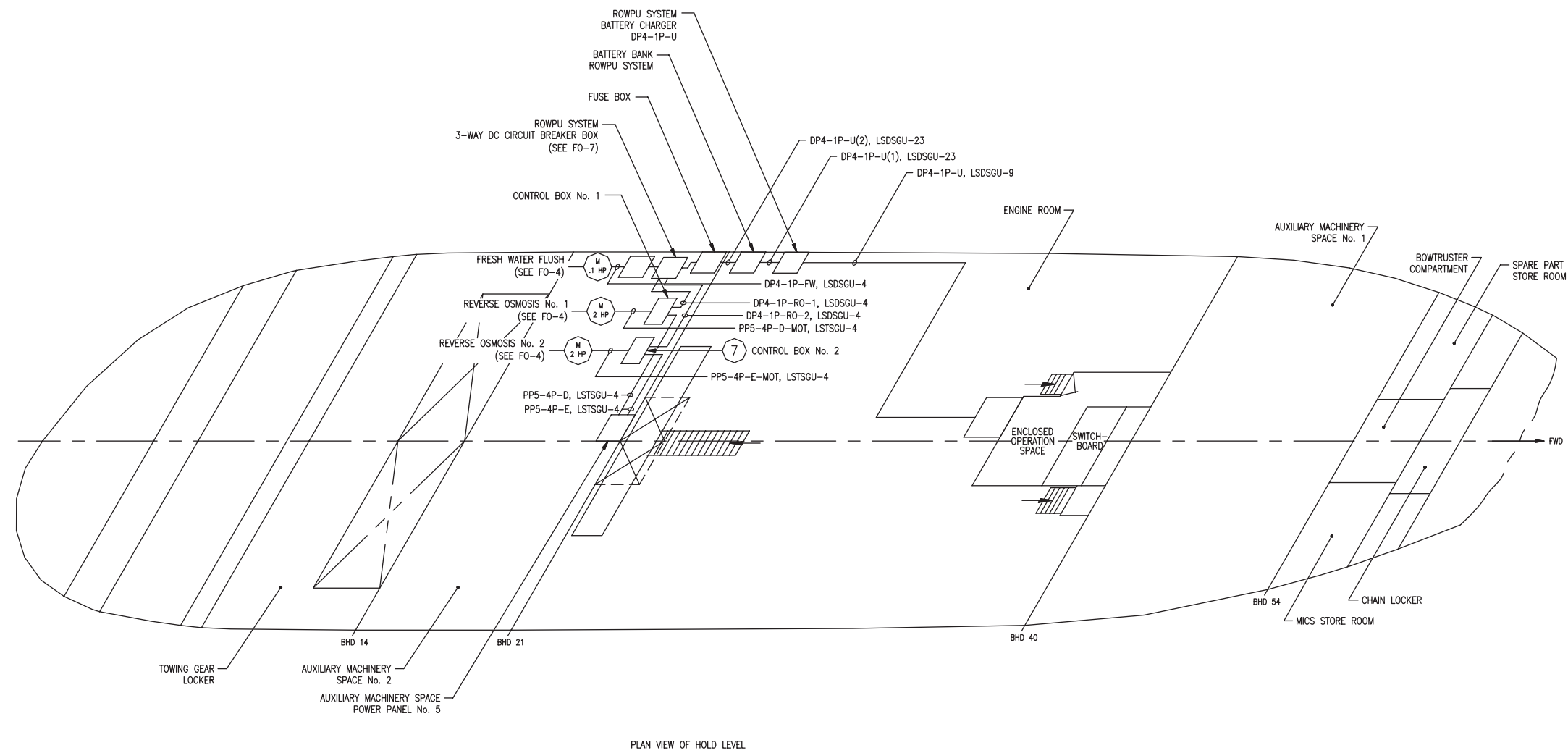




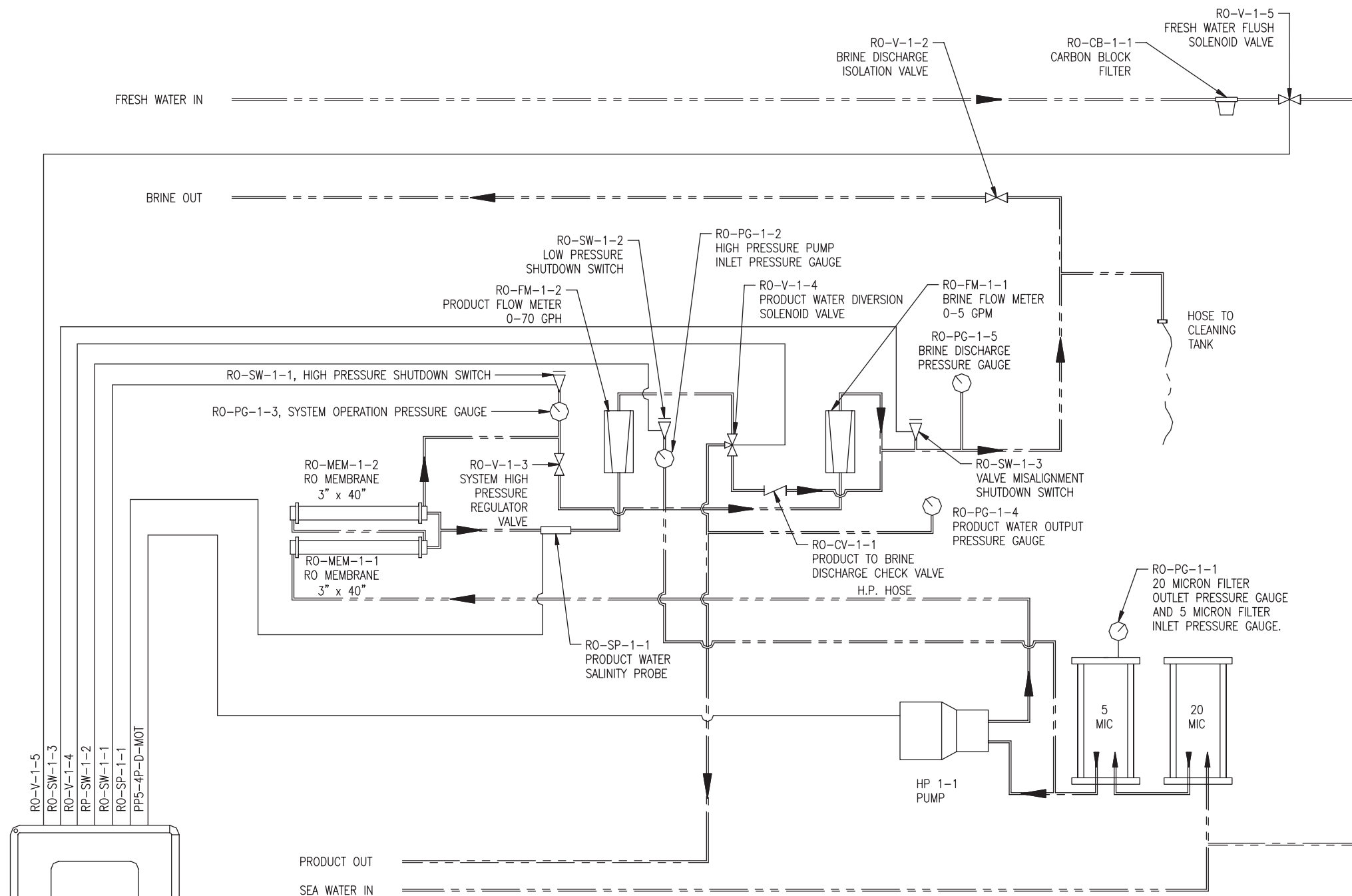






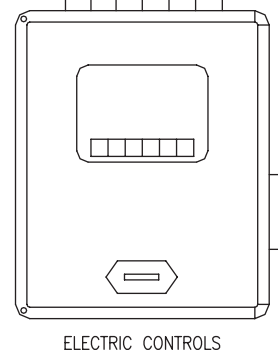






LEGEND  
 - - - - - PIPEWORK SHOWN FOR REFERENCE ONLY  
 SEE FO-4.

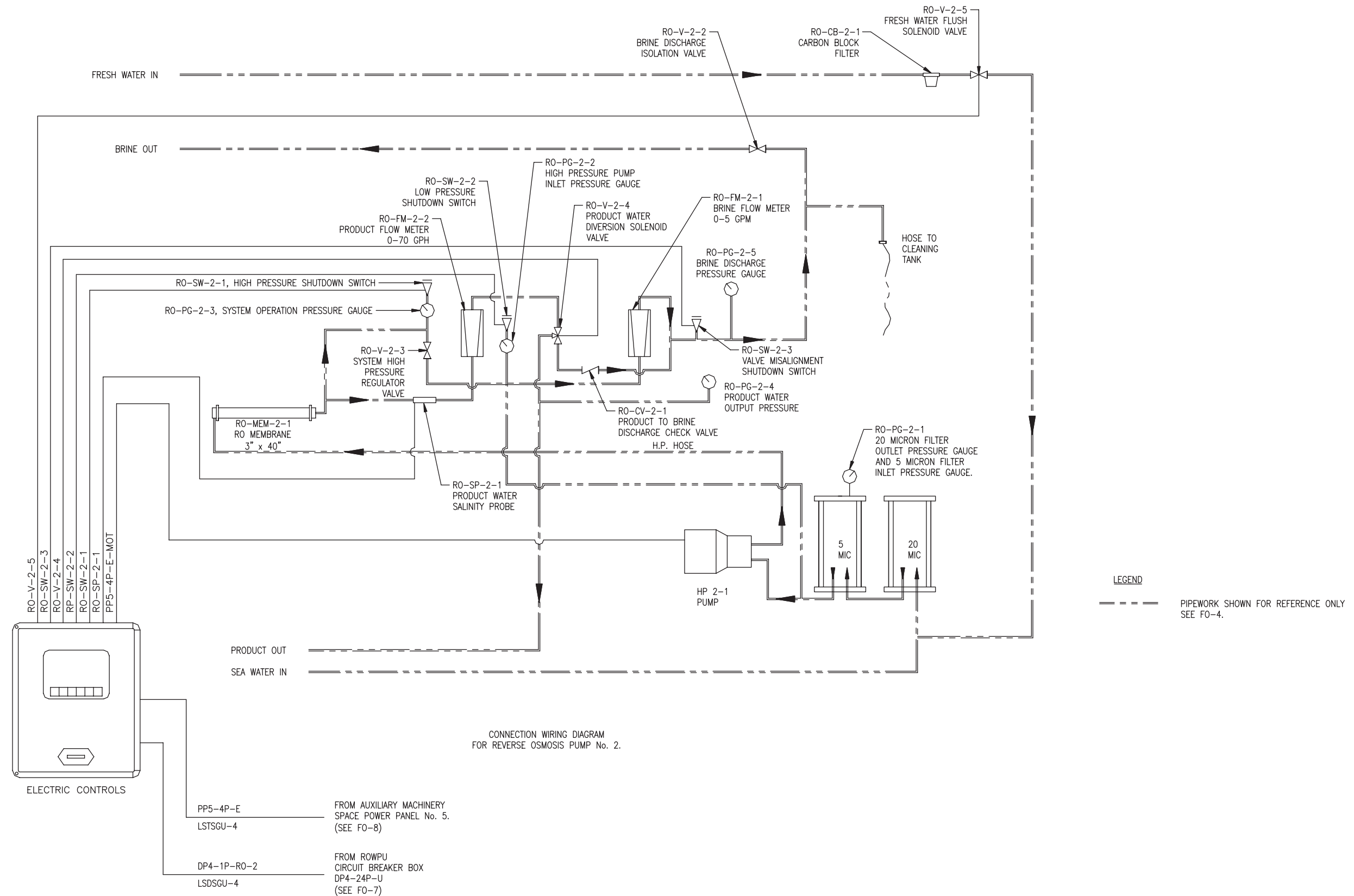
CONNECTION WIRING DIAGRAM  
 FOR REVERSE OSMOSIS PUMP No. 1.



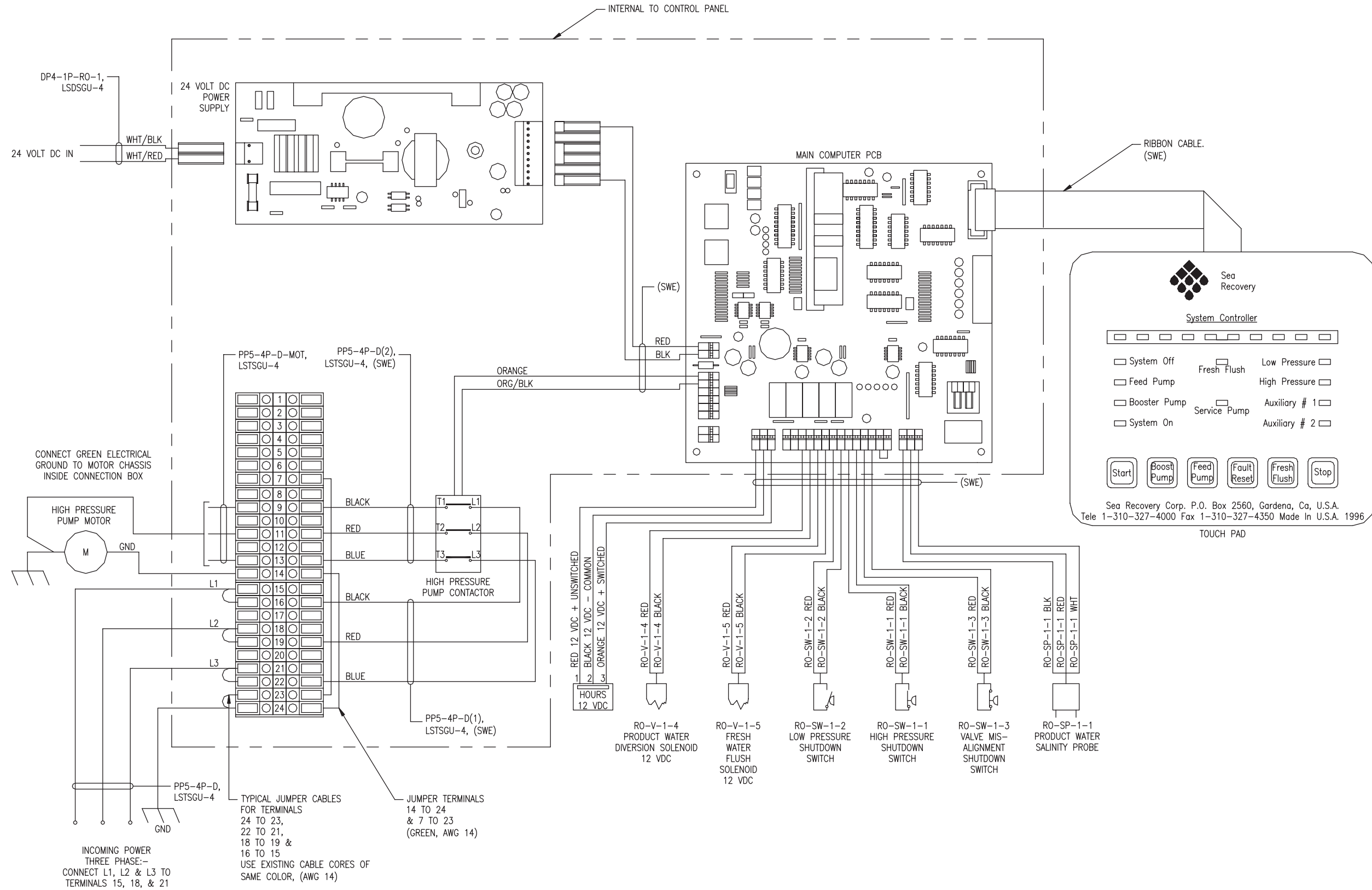
PP5-4P-D FROM AUXILIARY MACHINERY  
 SPACE POWER PANEL No. 5.  
 (SEE FO-8)

DP4-1P-RO-1 FROM ROWPU  
 CIRCUIT BREAKER BOX  
 DP4-24P-U  
 (SEE FO-7)





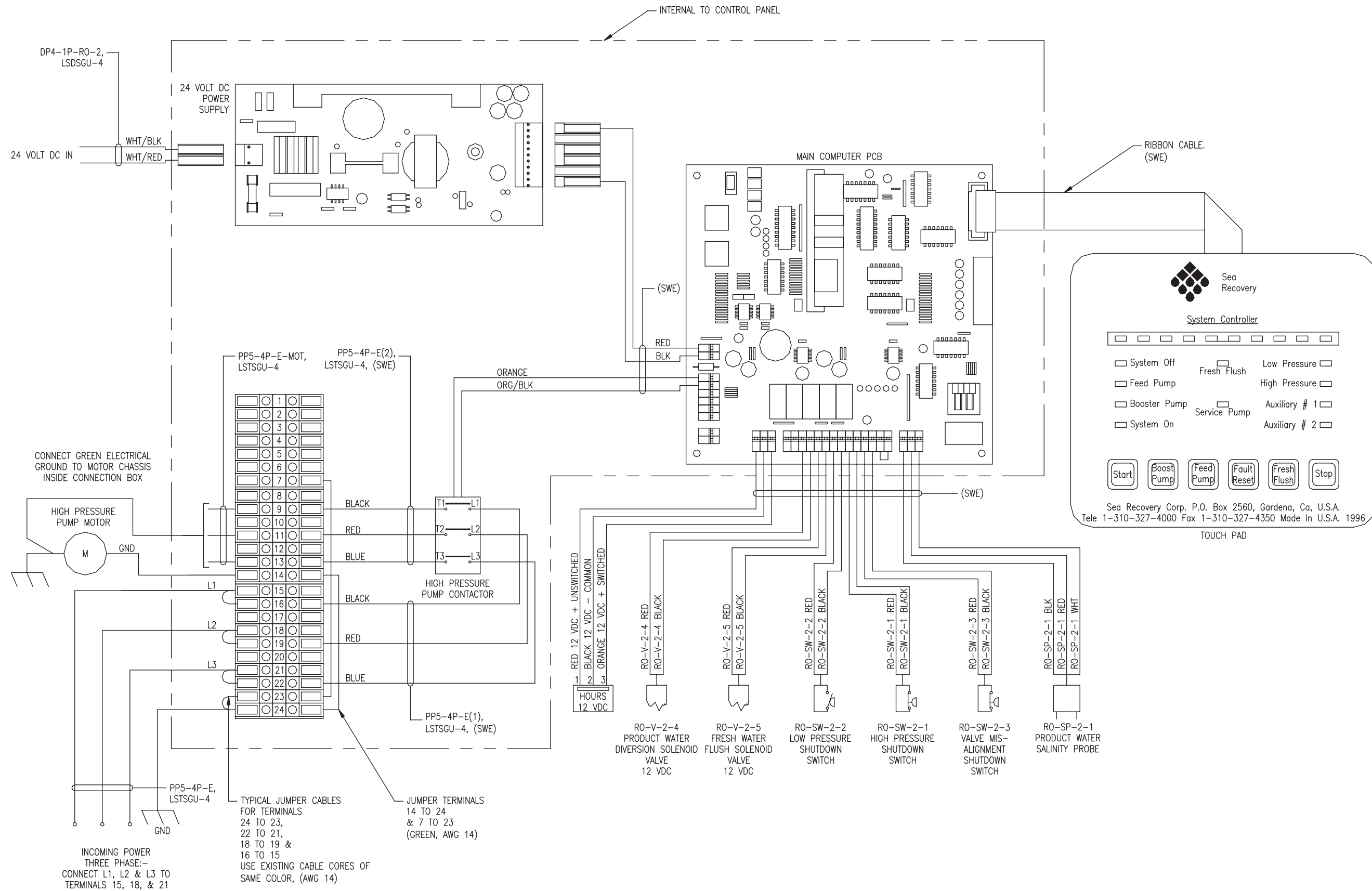




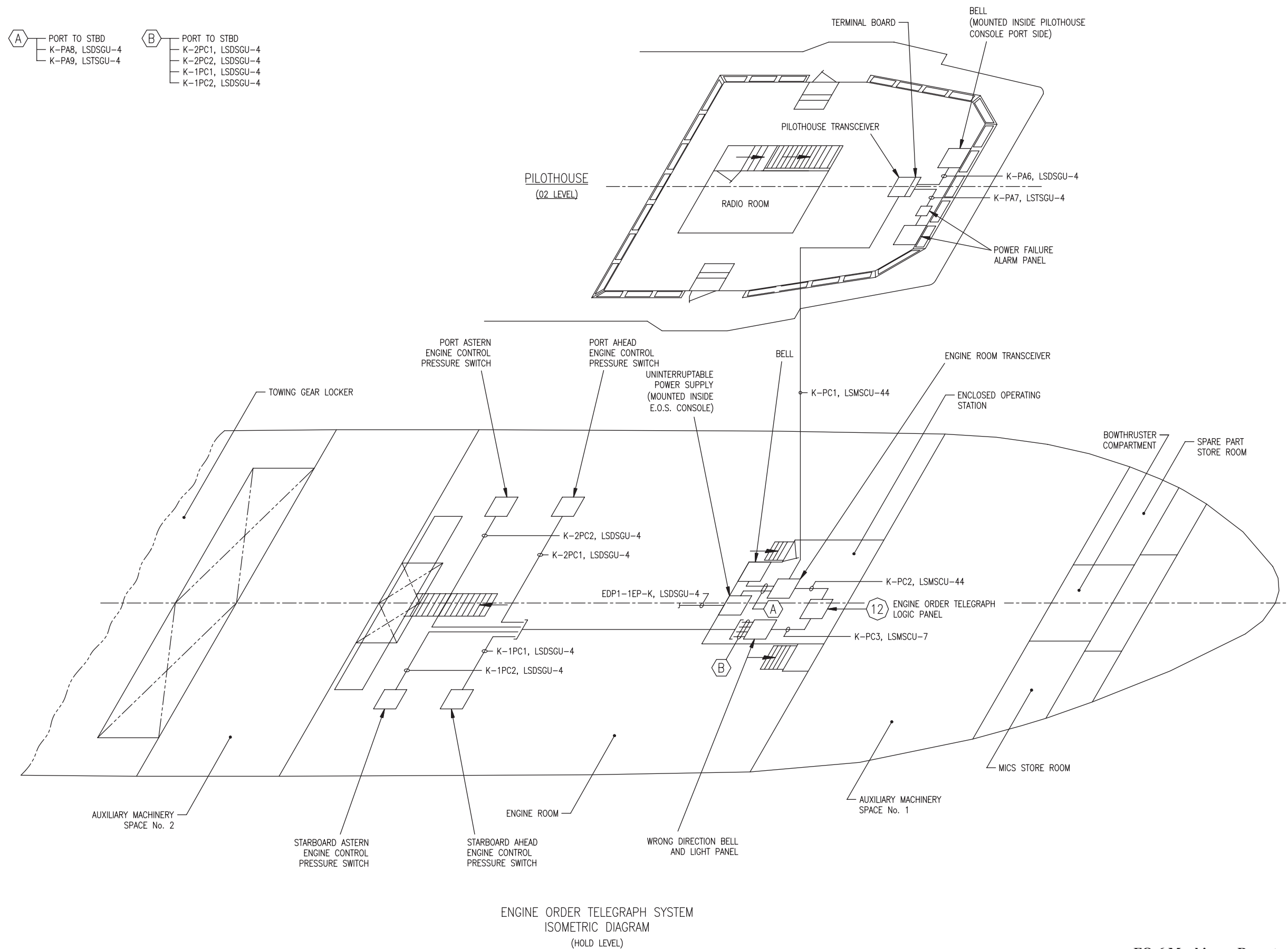
CONNECTION WIRING DIAGRAM FOR ROWPU SYSTEM. (OSMOSIS PUMP No. 1).











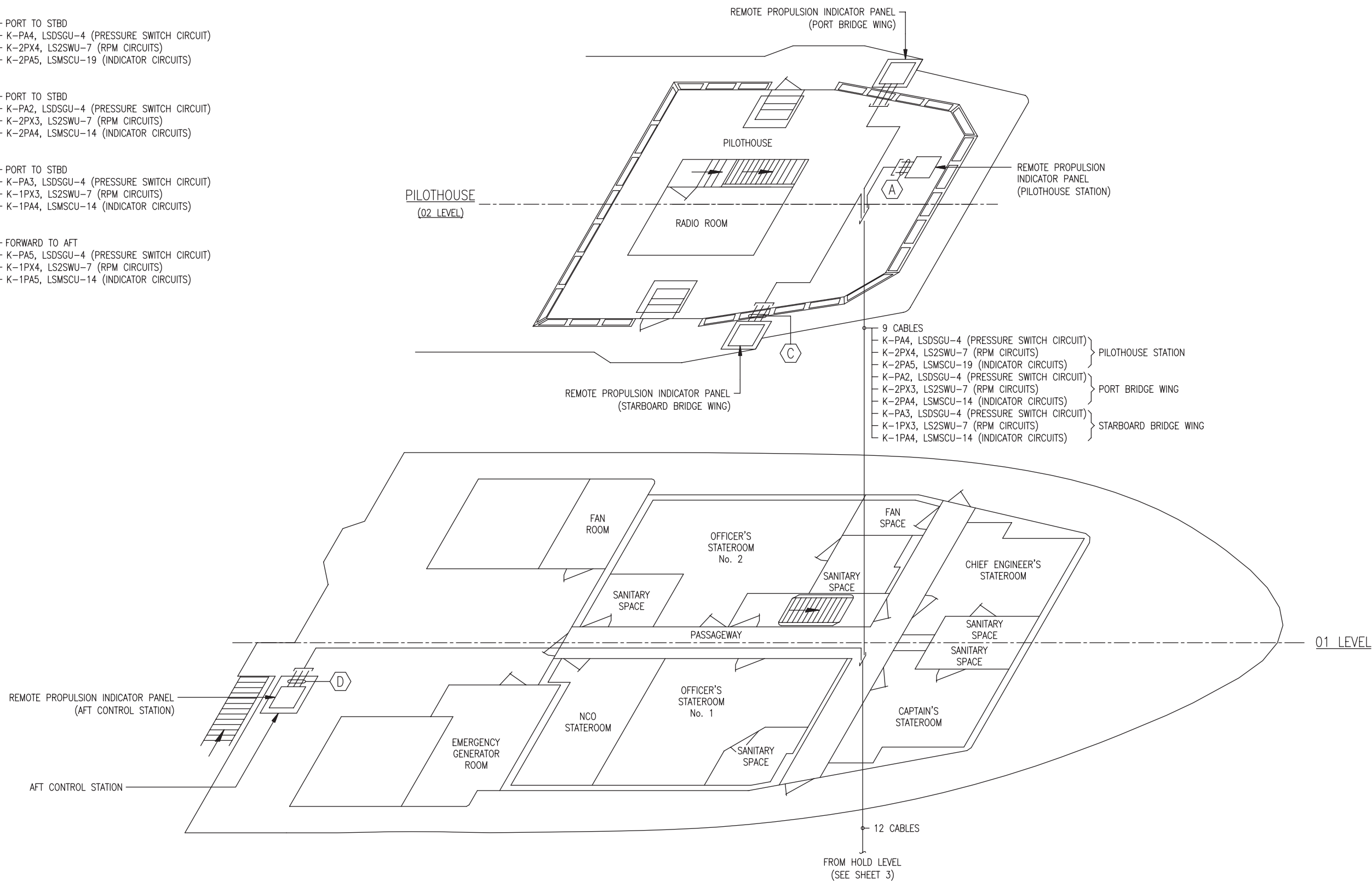


- A PORT TO STBD
  - K-PA4, LSDSGU-4 (PRESSURE SWITCH CIRCUIT)
  - K-2PX4, LS2SWU-7 (RPM CIRCUITS)
  - K-2PA5, LSMSCU-19 (INDICATOR CIRCUITS)

- B PORT TO STBD
  - K-PA2, LSDSGU-4 (PRESSURE SWITCH CIRCUIT)
  - K-2PX3, LS2SWU-7 (RPM CIRCUITS)
  - K-2PA4, LSMSCU-14 (INDICATOR CIRCUITS)

- C PORT TO STBD
  - K-PA3, LSDSGU-4 (PRESSURE SWITCH CIRCUIT)
  - K-1PX3, LS2SWU-7 (RPM CIRCUITS)
  - K-1PA4, LSMSCU-14 (INDICATOR CIRCUITS)

- D FORWARD TO AFT
  - K-PA5, LSDSGU-4 (PRESSURE SWITCH CIRCUIT)
  - K-1PX4, LS2SWU-7 (RPM CIRCUITS)
  - K-1PA5, LSMSCU-14 (INDICATOR CIRCUITS)



**CIRCUIT DESIGNATION CODE**  
 K-PA: PRESSURE SWITCH CIRCUIT (PROPULSION ALARM)  
 K-1PA: STARBOARD ALARM OR INDICATOR CIRCUIT  
 K-2PA: PORT ALARM OR INDICATOR CIRCUIT  
 K-PX: BOWTHRUSTER RPM CIRCUIT  
 K-1PX: STARBOARD RPM CIRCUIT  
 K-2PX: PORT RPM CIRCUIT

REMOTE PROPULSION INDICATOR PANEL SYSTEM  
 ISOMETRIC DIAGRAM  
 PLAN VIEW OF 01 LEVEL AND PILOTHOUSE (02 LEVEL)



A PORT TO STBD  
 K-2PA7, LSMSCU-19  
 K-2PX5, LS2SWU-7

B PORT TO STBD  
 K-2PA6, LSDSGU-4 (PORT MAIN ENGINE FAILURE)  
 K-1PA6, LSDSGU-4 (STARBOARD MAIN ENGINE FAILURE)

TO MAIN ENGINE FAILURE (SUMMARY) ALARM,  
 TERMINALS L7-25H-R7 & L9-25H-R9 (NORMAL  
 OPEN CONTACT) IN ENGINE CONTROL CABINET

C FORWARD TO AFT  
 K-2PA1, LSDSGU-4  
 K-2PA2, LSDSGU-4  
 K-2PA3, LSDSGU-4

D FORWARD TO AFT  
 K-1PA1, LSDSGU-4  
 K-1PA2, LSDSGU-4  
 K-1PA3, LSDSGU-4

TO 01 LEVEL  
 (SEE SHEET 2)

12 CABLES

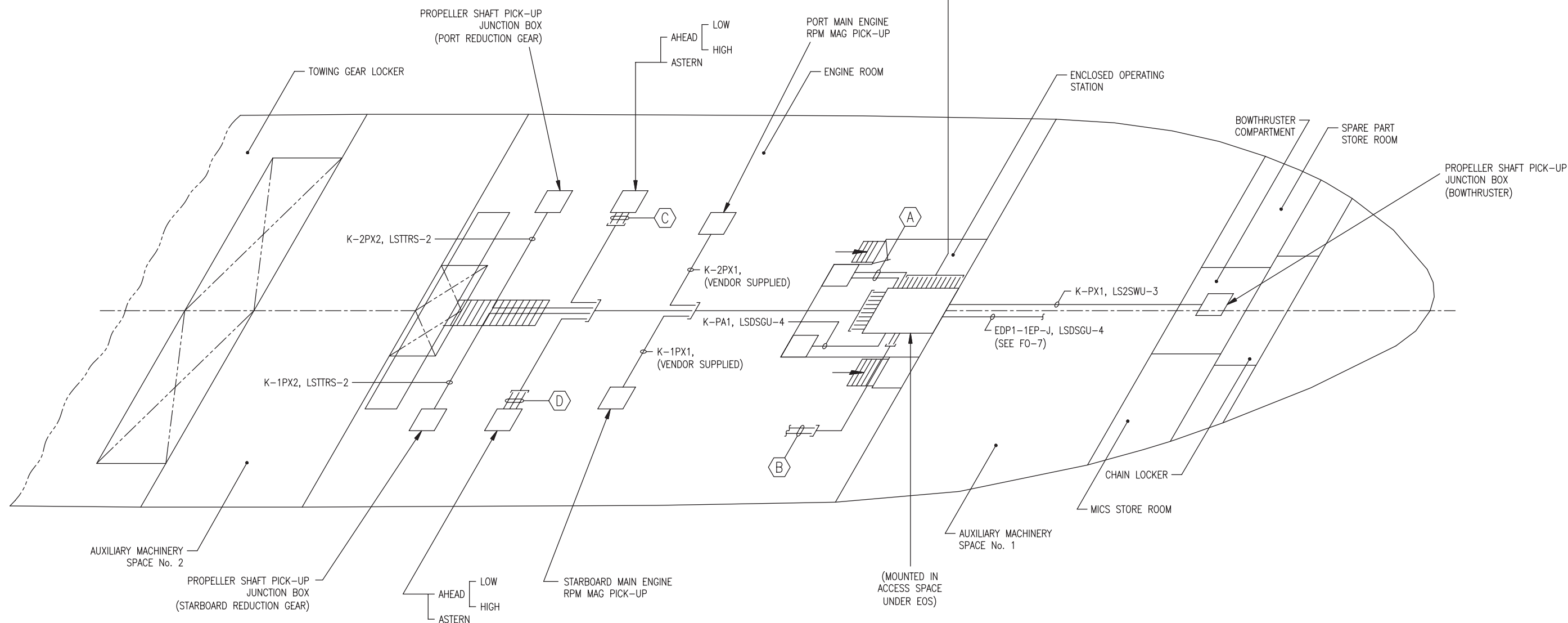
STATION IN COMMAND PRESSURE SWITCH { K-PA2, LSDSGU-4 (PORT BRIDGE WING)  
 K-PA3, LSDSGU-4 (STARBOARD BRIDGE WING)  
 K-PA4, LSDSGU-4 (PILOTHOUSE)  
 K-PA5, LSDSGU-4 (AFT CONTROL STATION)

PORT BRIDGE WING { K-2PX3, LS2SWU-7 (RPM CIRCUITS)  
 K-2PA4, LSMSCU-14 (INDICATOR CIRCUITS)

STARBOARD BRIDGE WING { K-1PX3, LS2SWU-7 (RPM CIRCUITS)  
 K-1PA4, LSMSCU-14 (INDICATOR CIRCUITS)

PILOTHOUSE STATION { K-2PX4, LS2SWU-7 (RPM CIRCUITS)  
 K-2PA5, LSMSCU-19 (INDICATOR CIRCUITS)

AFT CONTROL STATION { K-1PX4, LS2SWU-7 (RPM CIRCUITS)  
 K-1PA5, LSMSCU-14 (INDICATOR CIRCUITS)

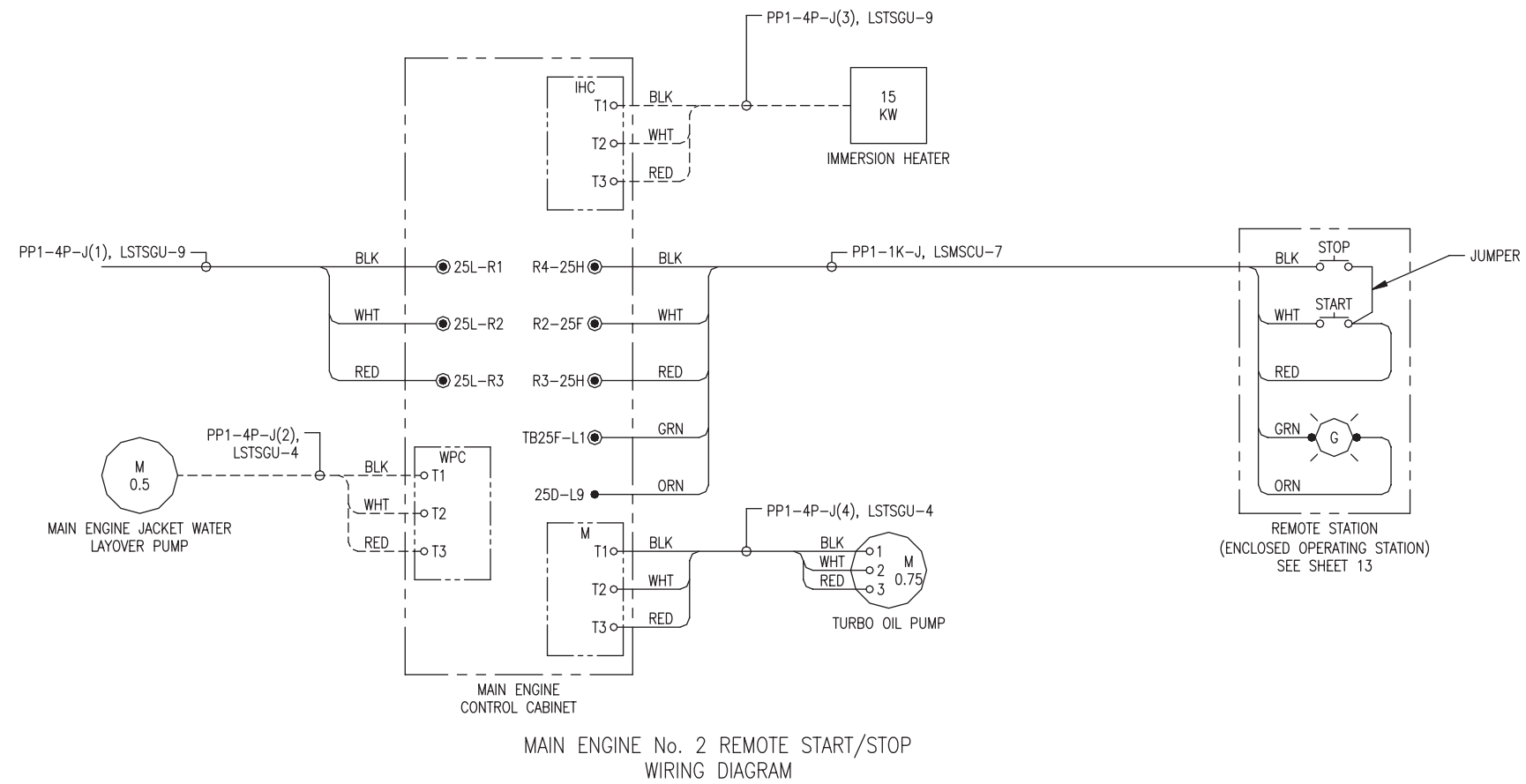
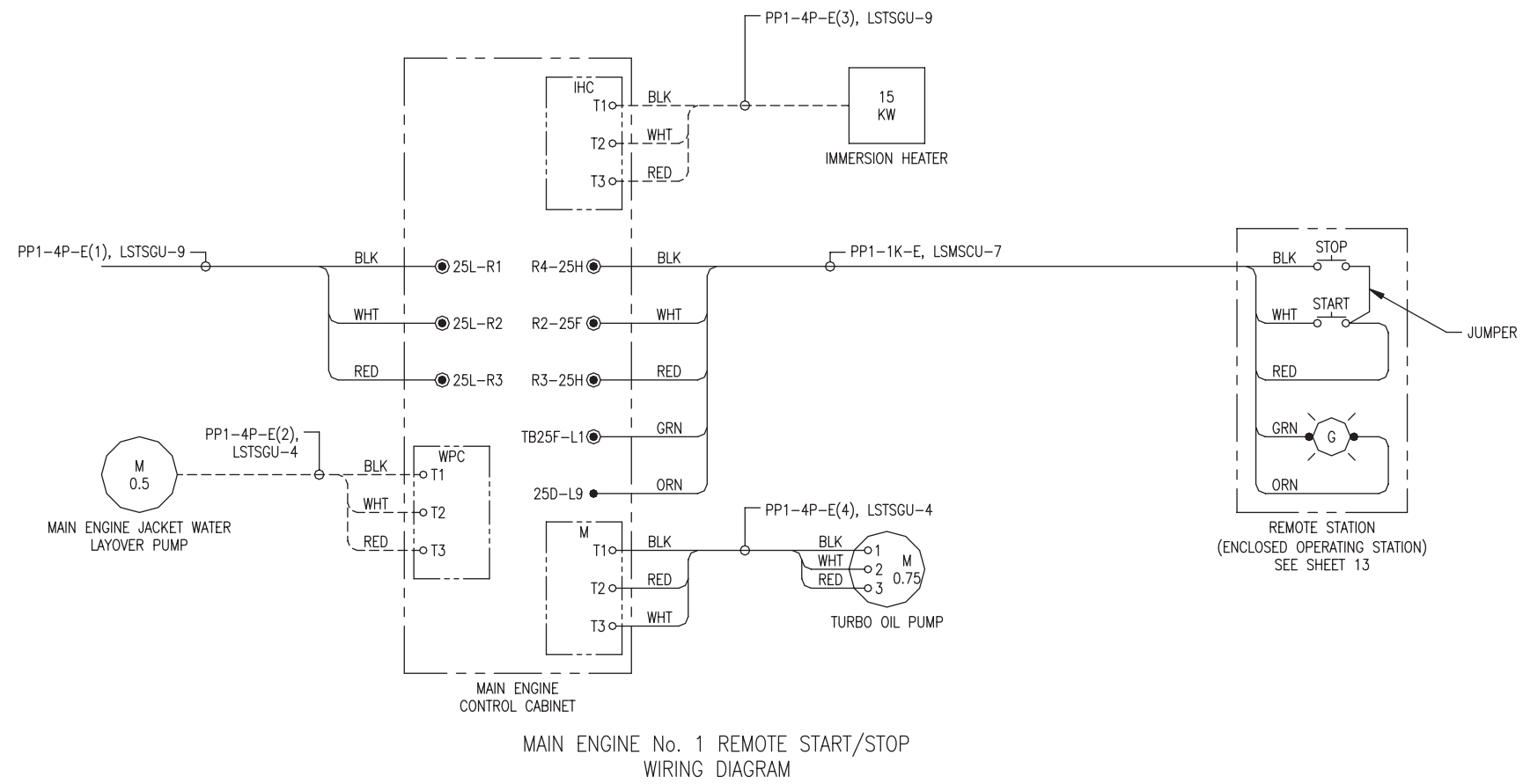


CIRCUIT DESIGNATION CODE  
 K-PA: PRESSURE SWITCH CIRCUIT (PROPULSION ALARM)  
 K-1PA: STARBOARD ALARM OR INDICATOR CIRCUIT  
 K-2PA: PORT ALARM OR INDICATOR CIRCUIT  
 K-PX: BOWTHRUSTER PROPULSION CIRCUIT  
 K-1PX: STARBOARD MISC PROPULSION CIRCUIT  
 K-2PX: PORT MISC PROPULSION CIRCUIT

REMOTE PROPULSION INDICATOR PANEL SYSTEM  
 ISOMETRIC DIAGRAM  
 PLAN VIEW OF HOLD LEVEL

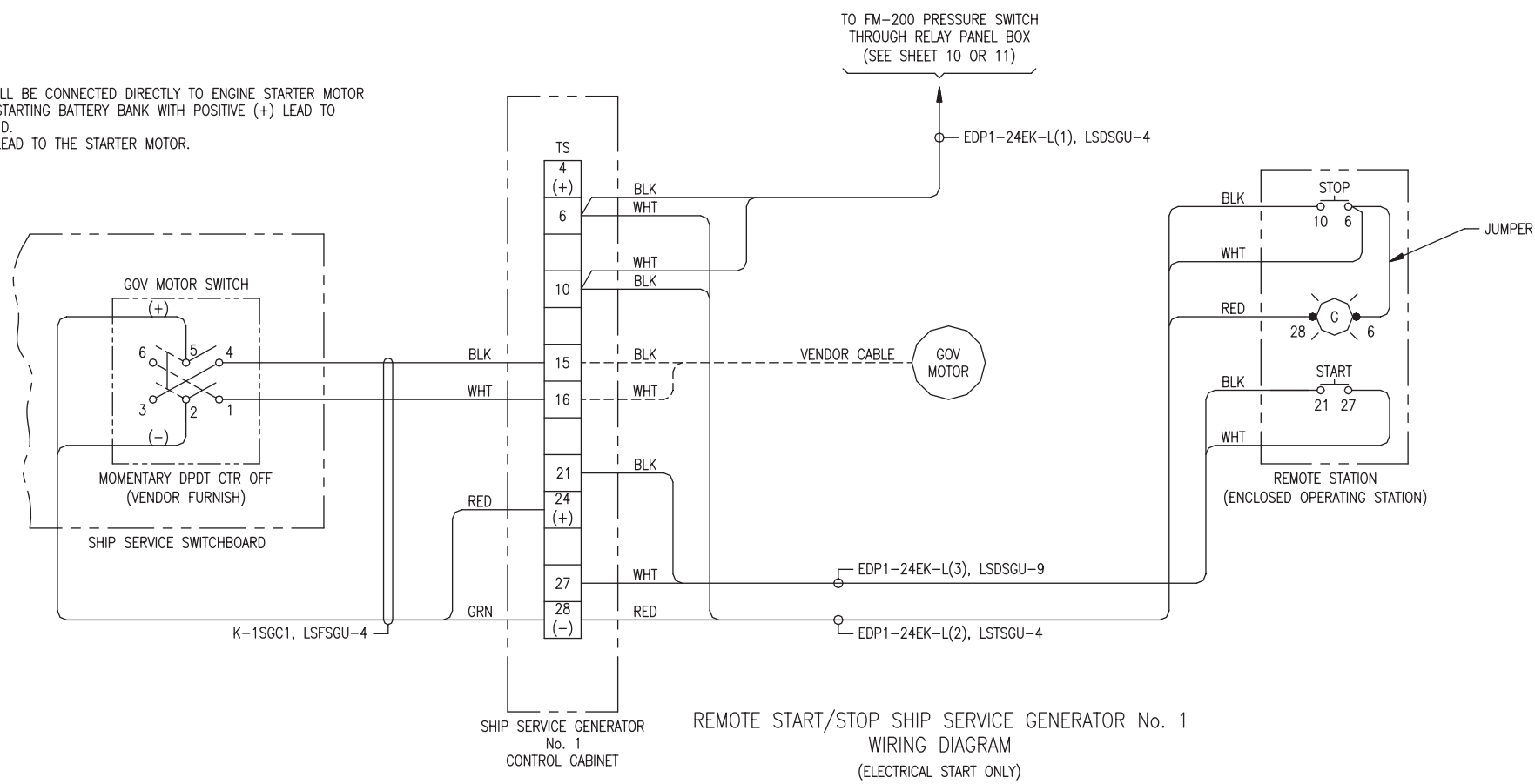




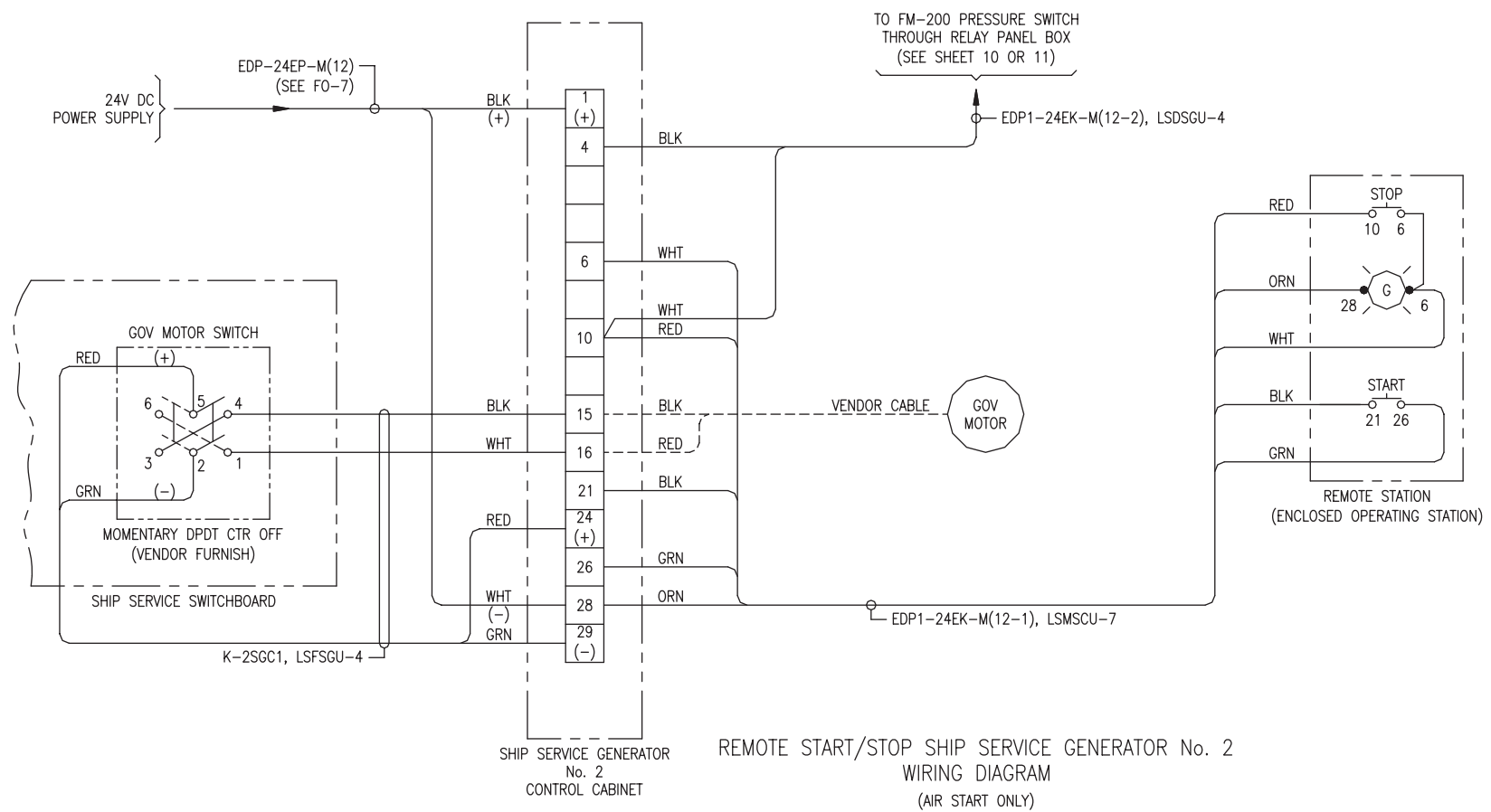




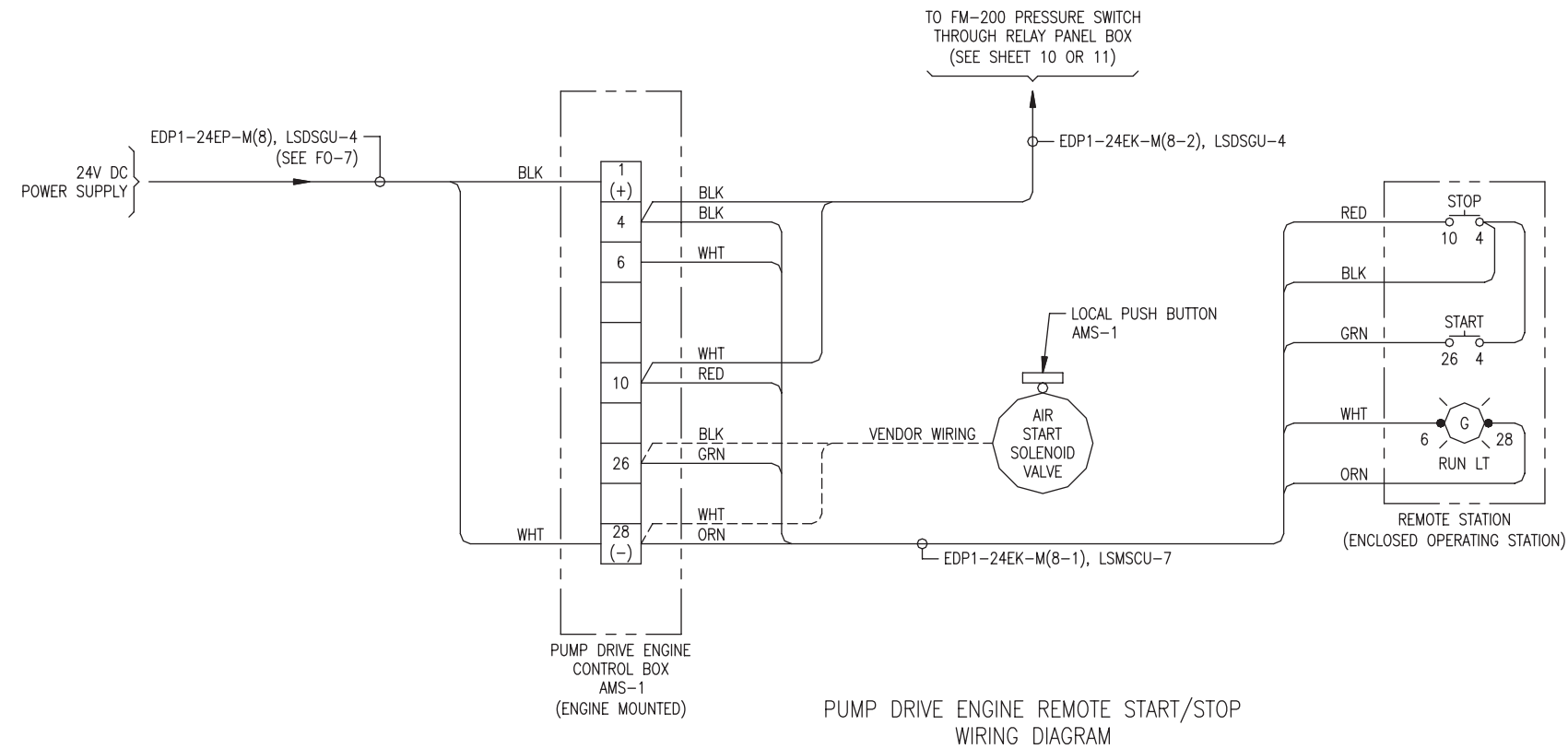
**NOTE**  
 DC POWER SHALL BE CONNECTED DIRECTLY TO ENGINE STARTER MOTOR FROM ENGINE STARTING BATTERY BANK WITH POSITIVE (+) LEAD TO PINION SOLENOID.  
 NEGATIVE (-) LEAD TO THE STARTER MOTOR.



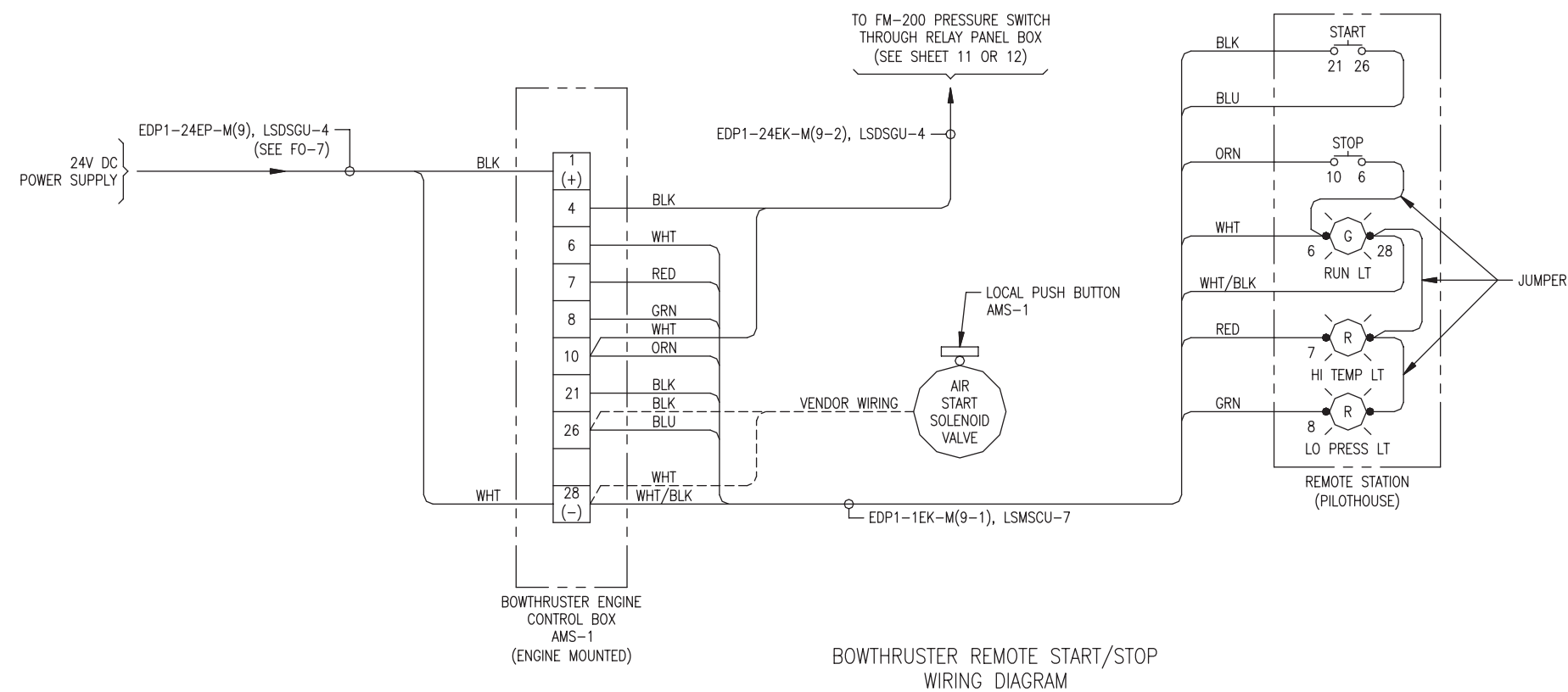
WIRE CODE ———  
 VENDOR CABLE - - - - -  
 FIELD CABLE - · - · -



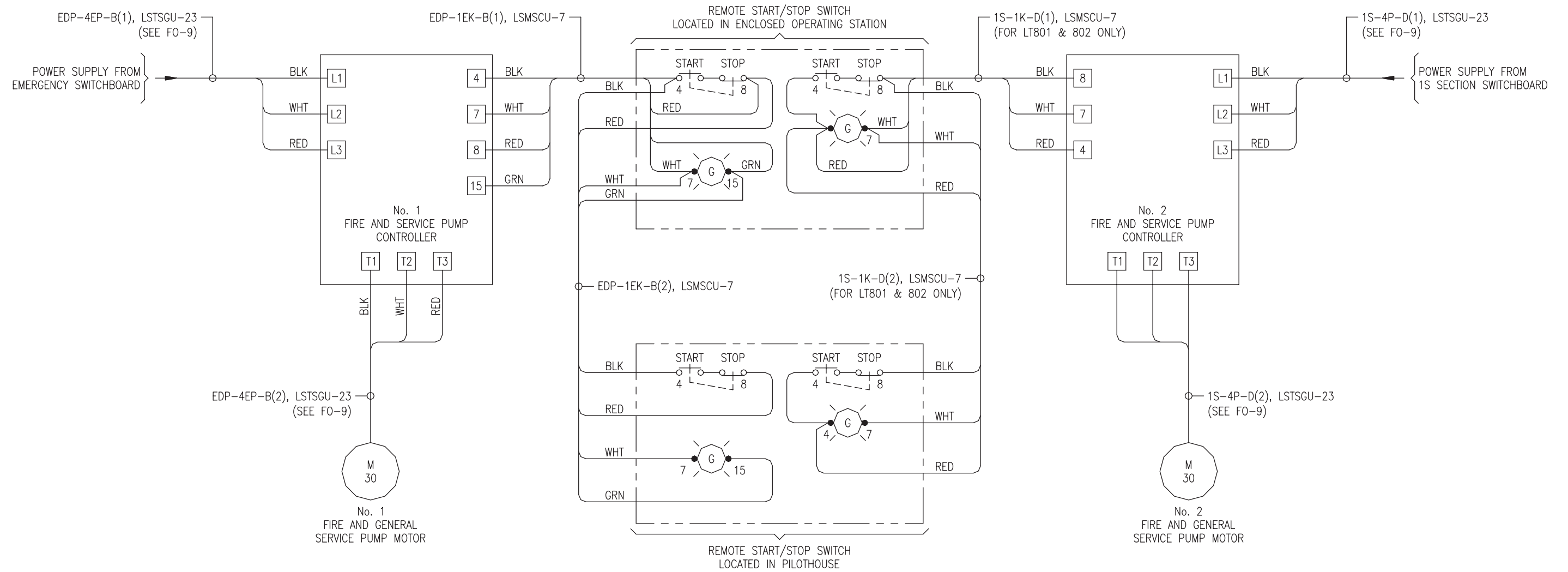




WIRE CODE  
 VENDOR CABLE - - - - -  
 FIELD CABLE \_\_\_\_\_



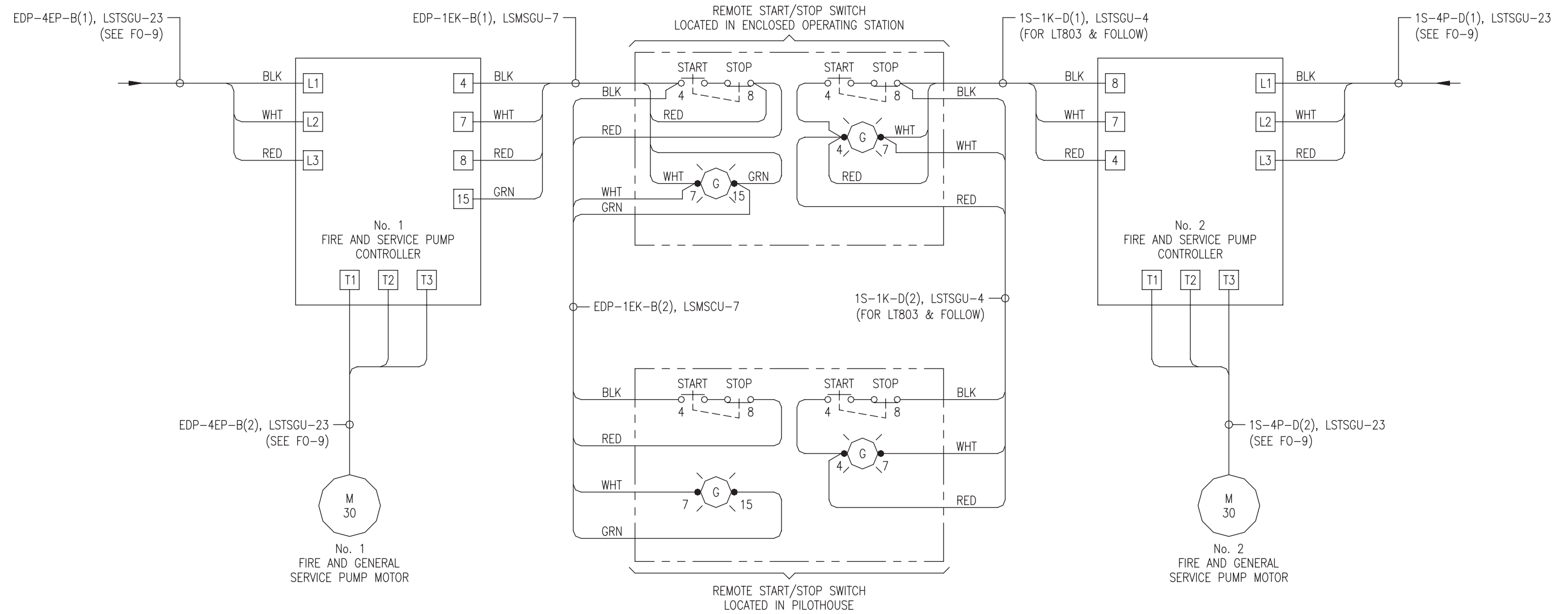




REMOTE START/STOP FIRE AND SERVICE PUMP No. 1 & No. 2  
WIRING DIAGRAM

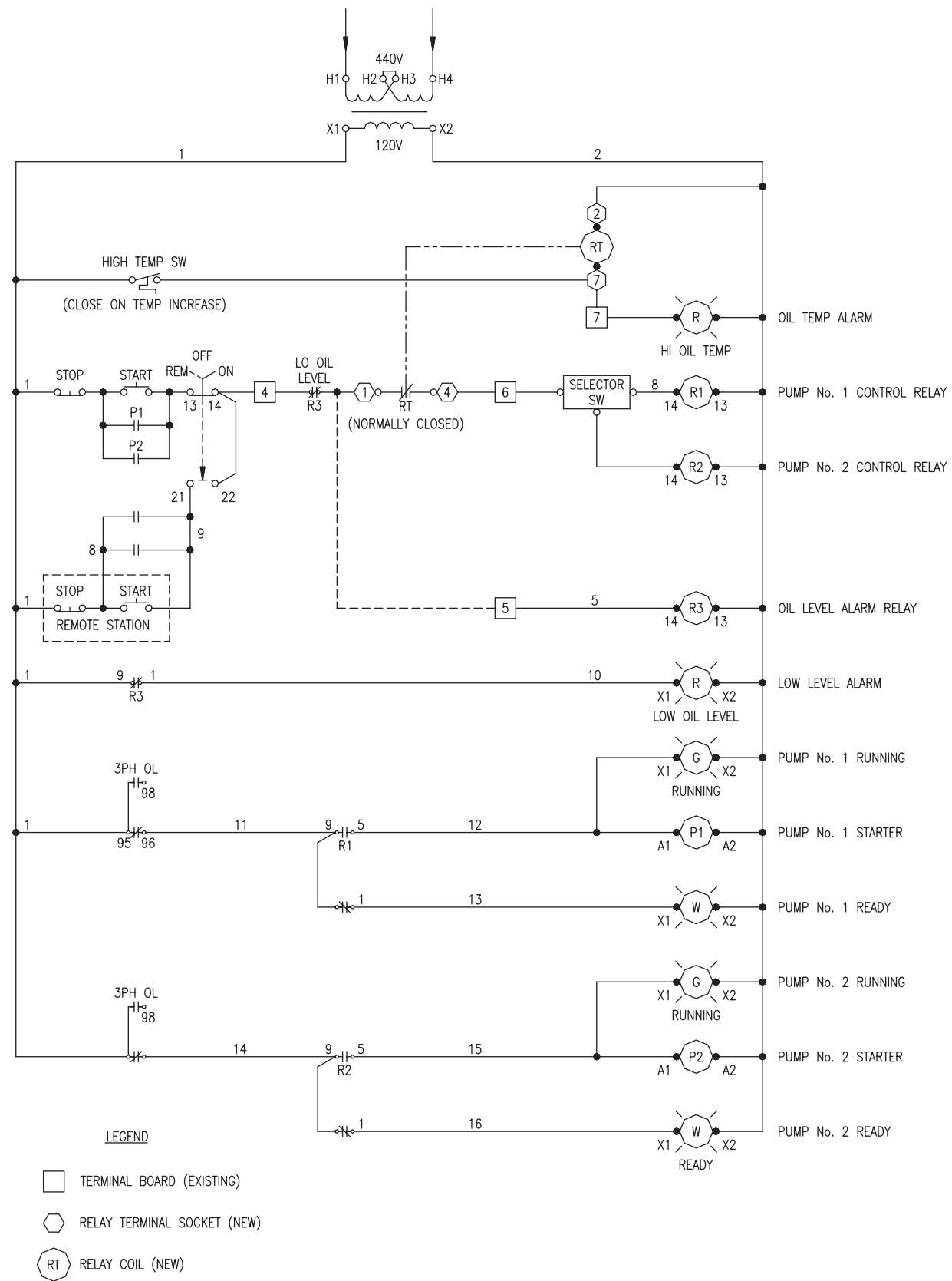




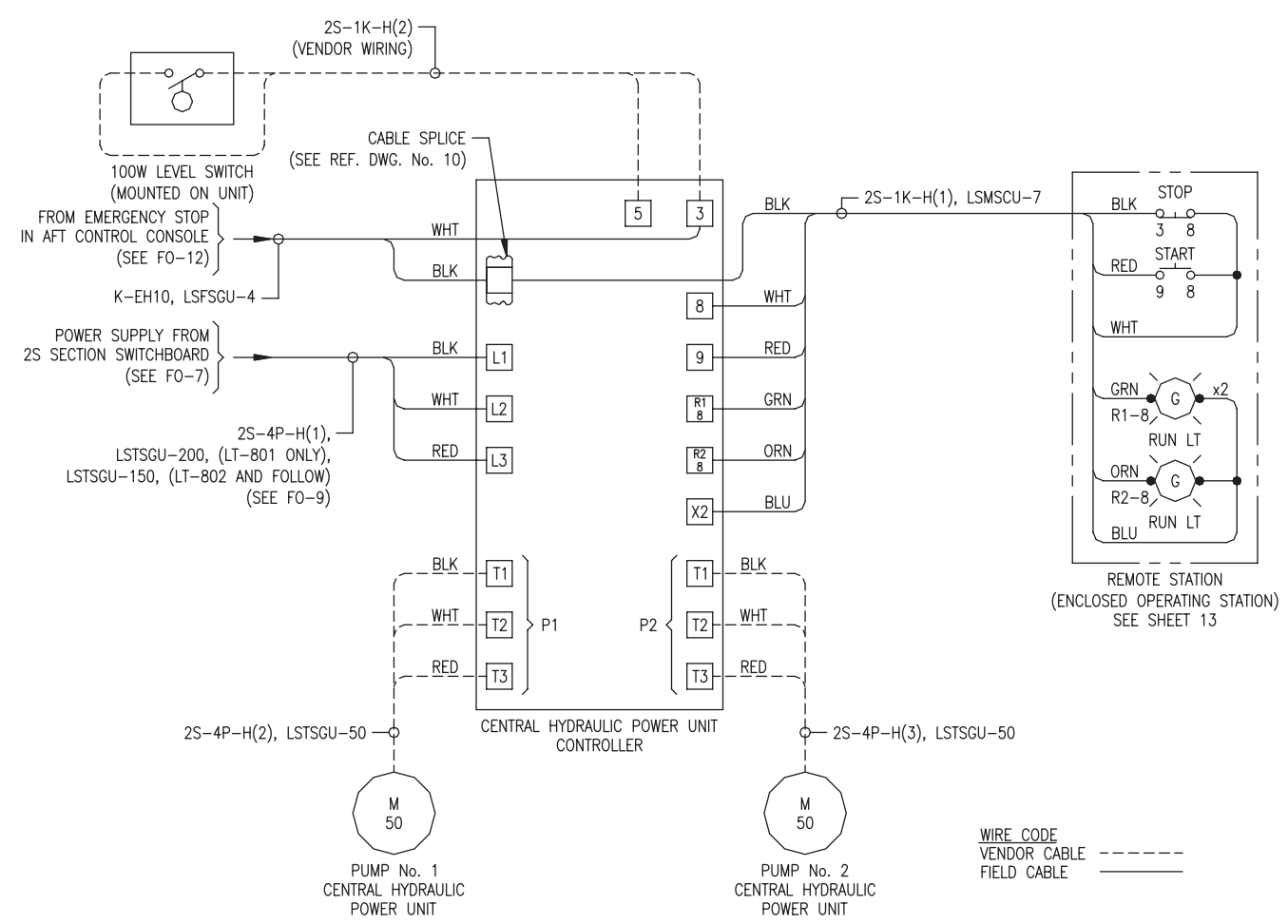


REMOTE START/STOP FIRE AND SERVICE PUMP No. 1 & No. 2  
WIRING DIAGRAM



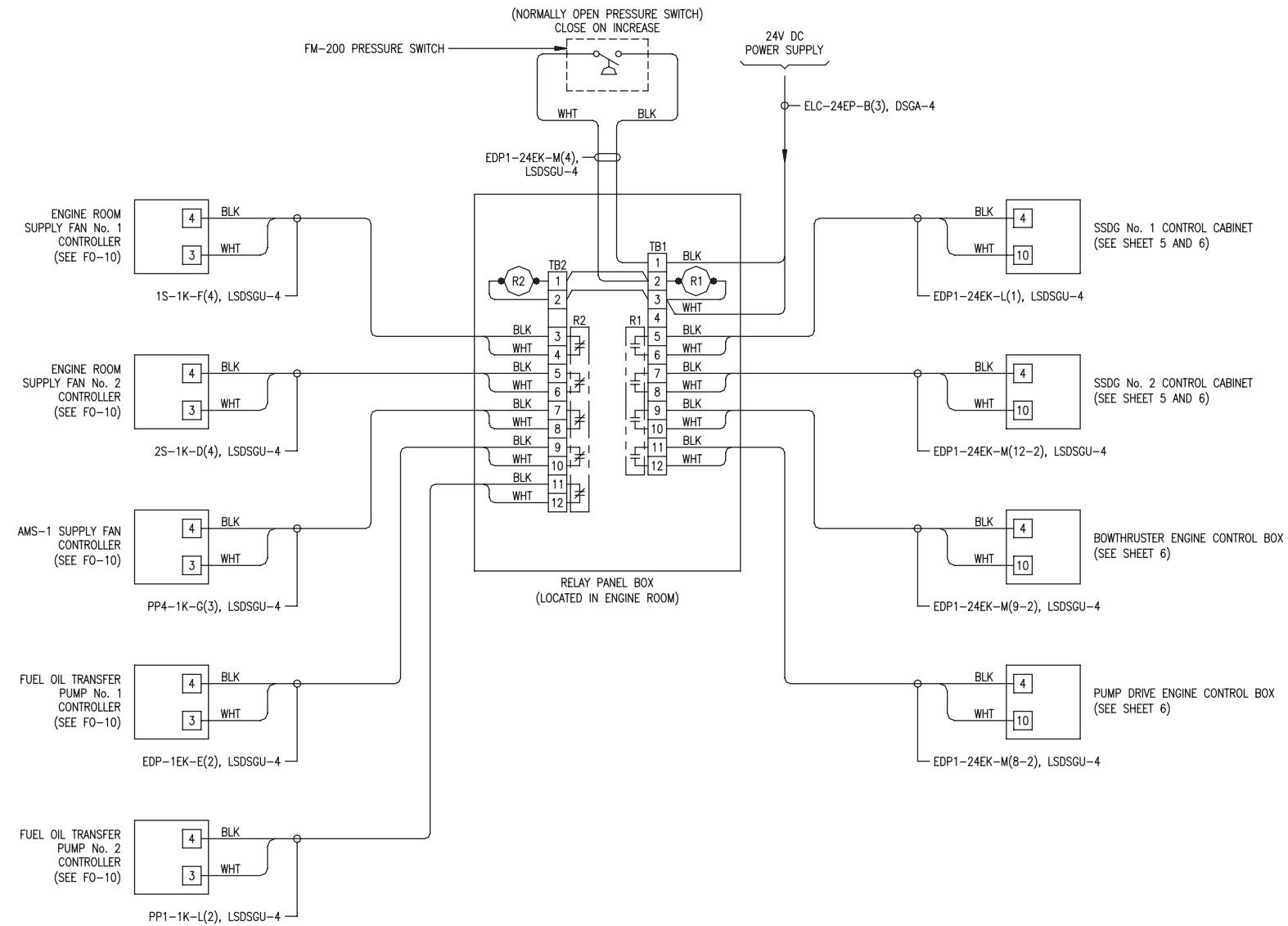


CENTRAL HYDRAULIC POWER UNIT WIRING DIAGRAM



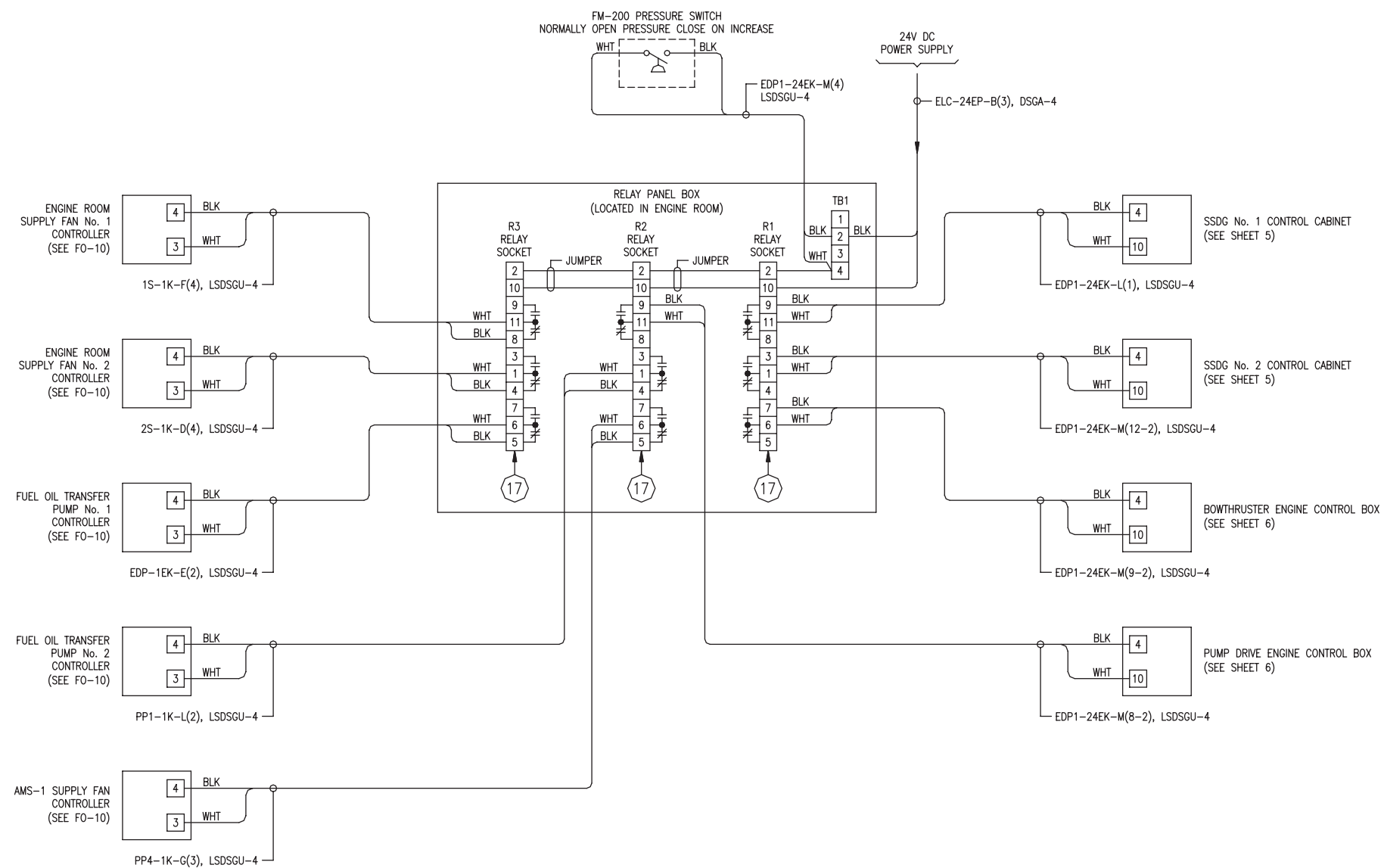
CENTRAL HYDRAULIC POWER UNIT No. 1 & No. 2 REMOTE START/STOP WIRING DIAGRAM (SEE VIEW AT LEFT FOR DETAIL)





FM-200 SYSTEM EMERGENCY SHUTDOWN  
WIRING DIAGRAM

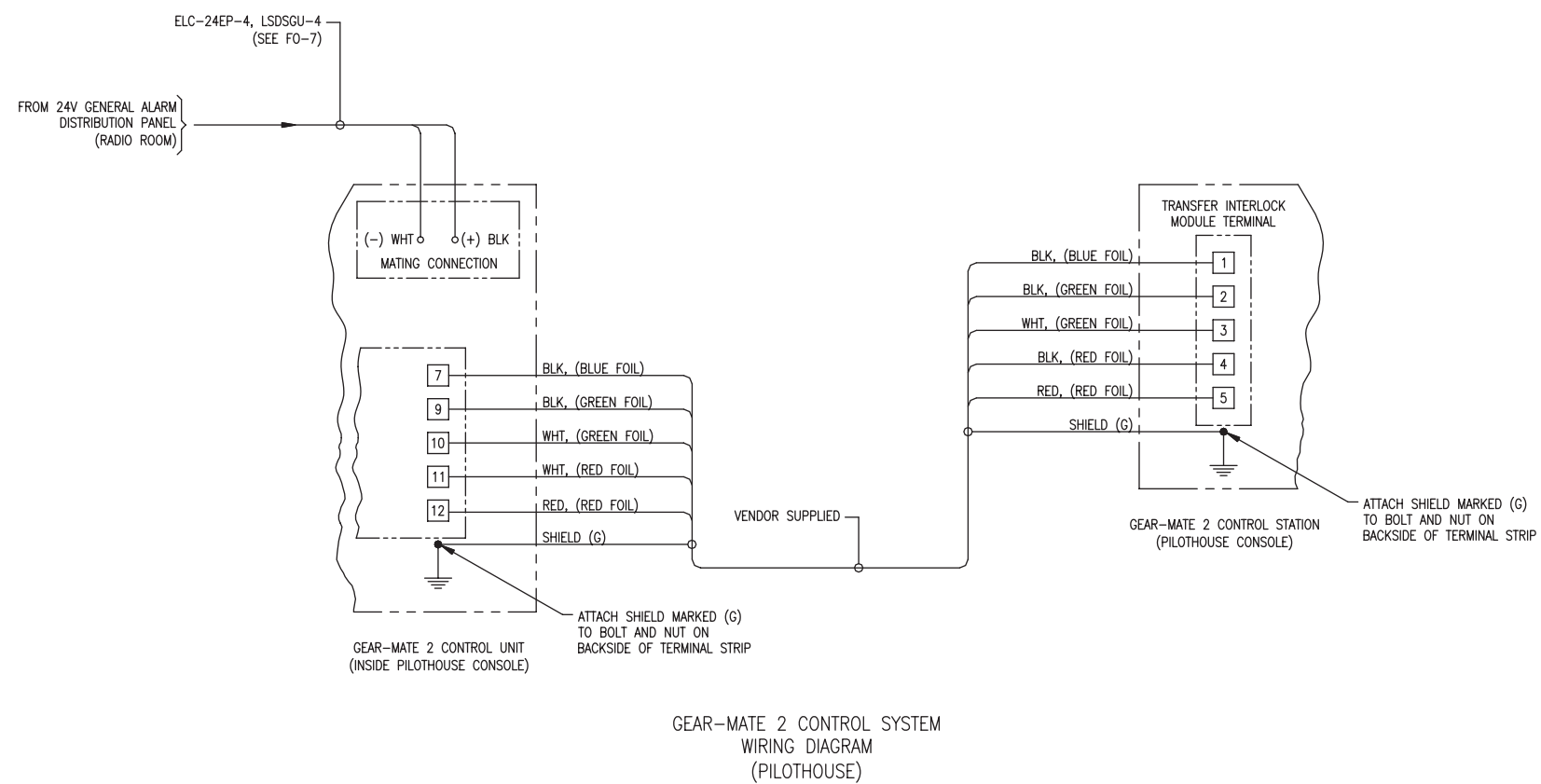




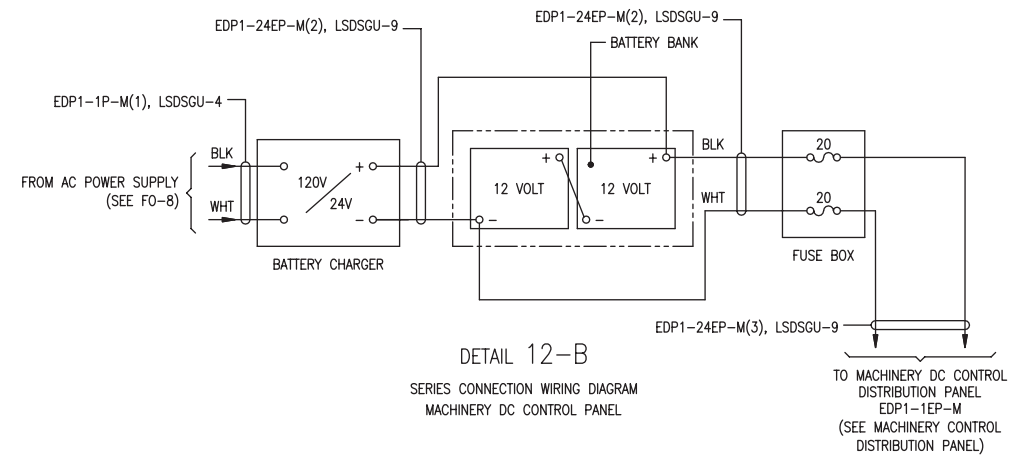
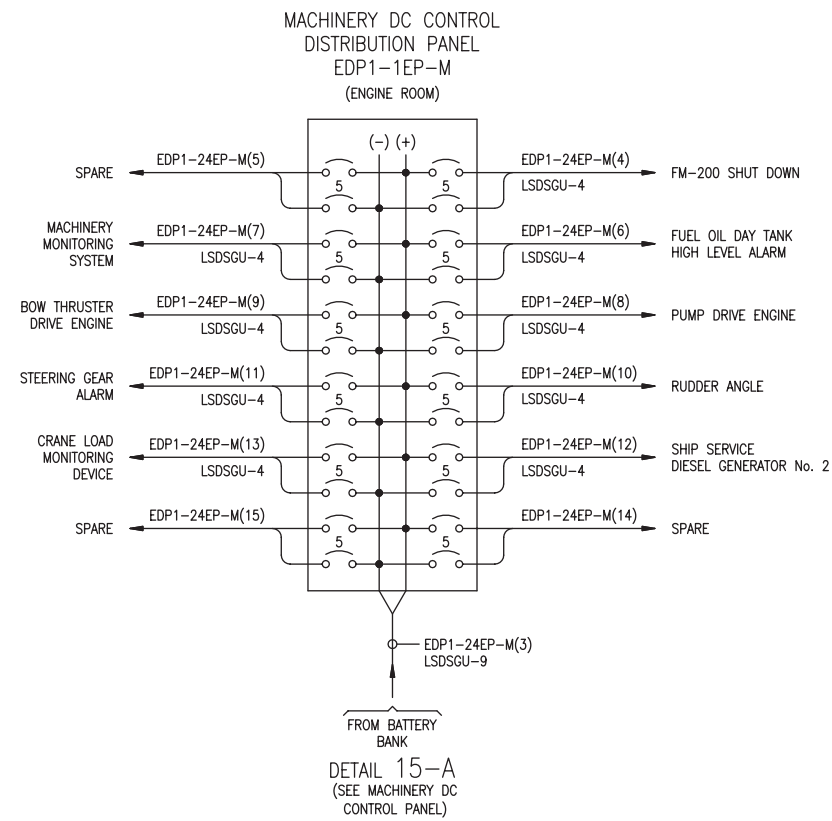
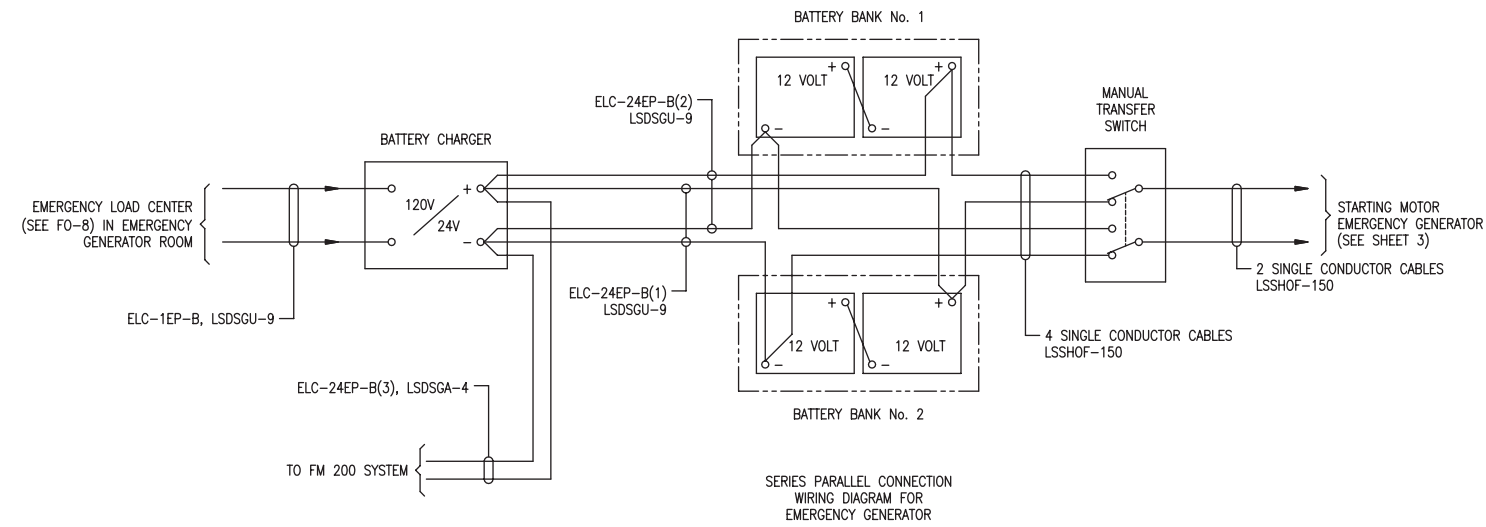
FM-200 SYSTEM EMERGENCY SHUTDOWN  
WIRING DIAGRAM



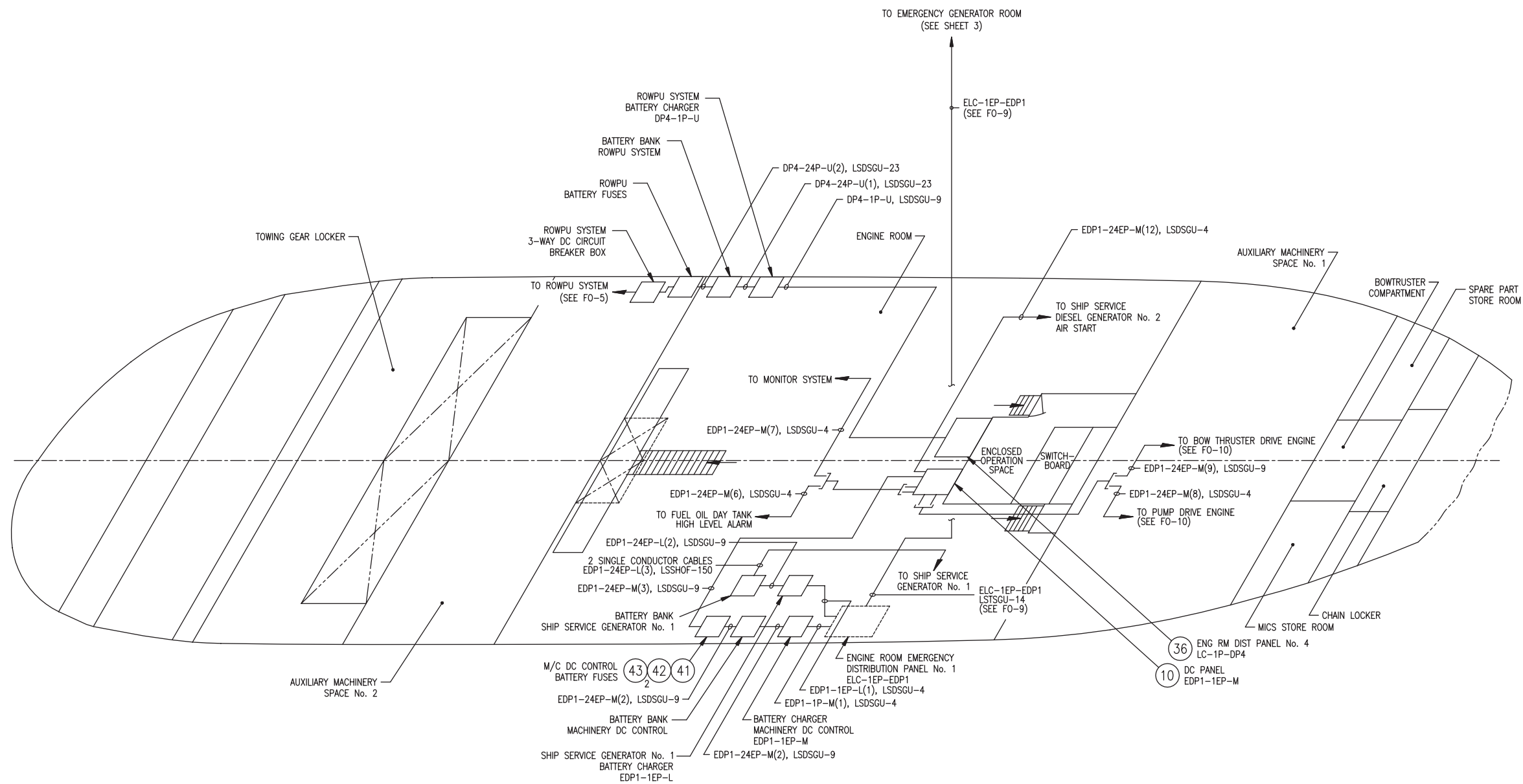






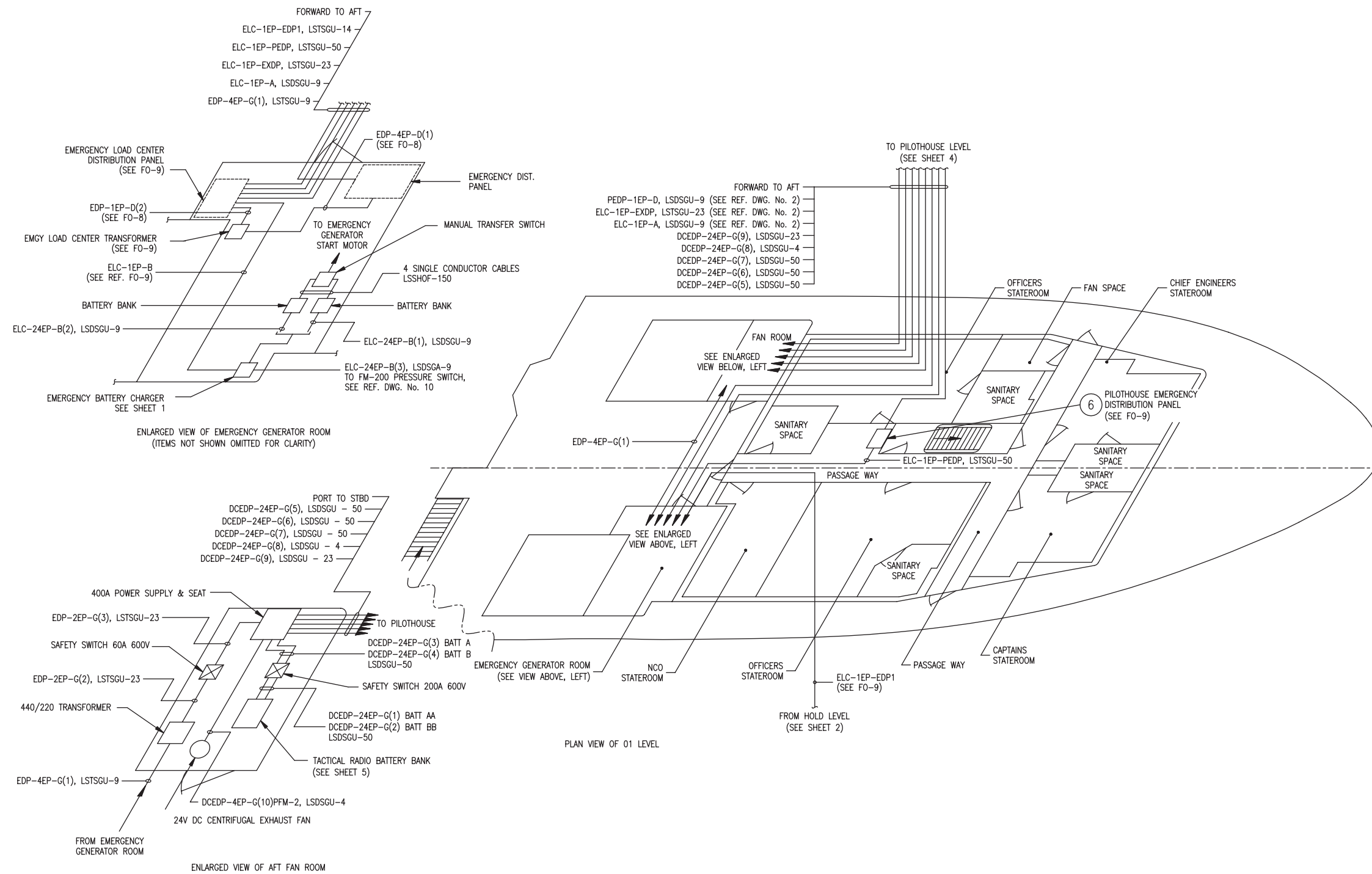






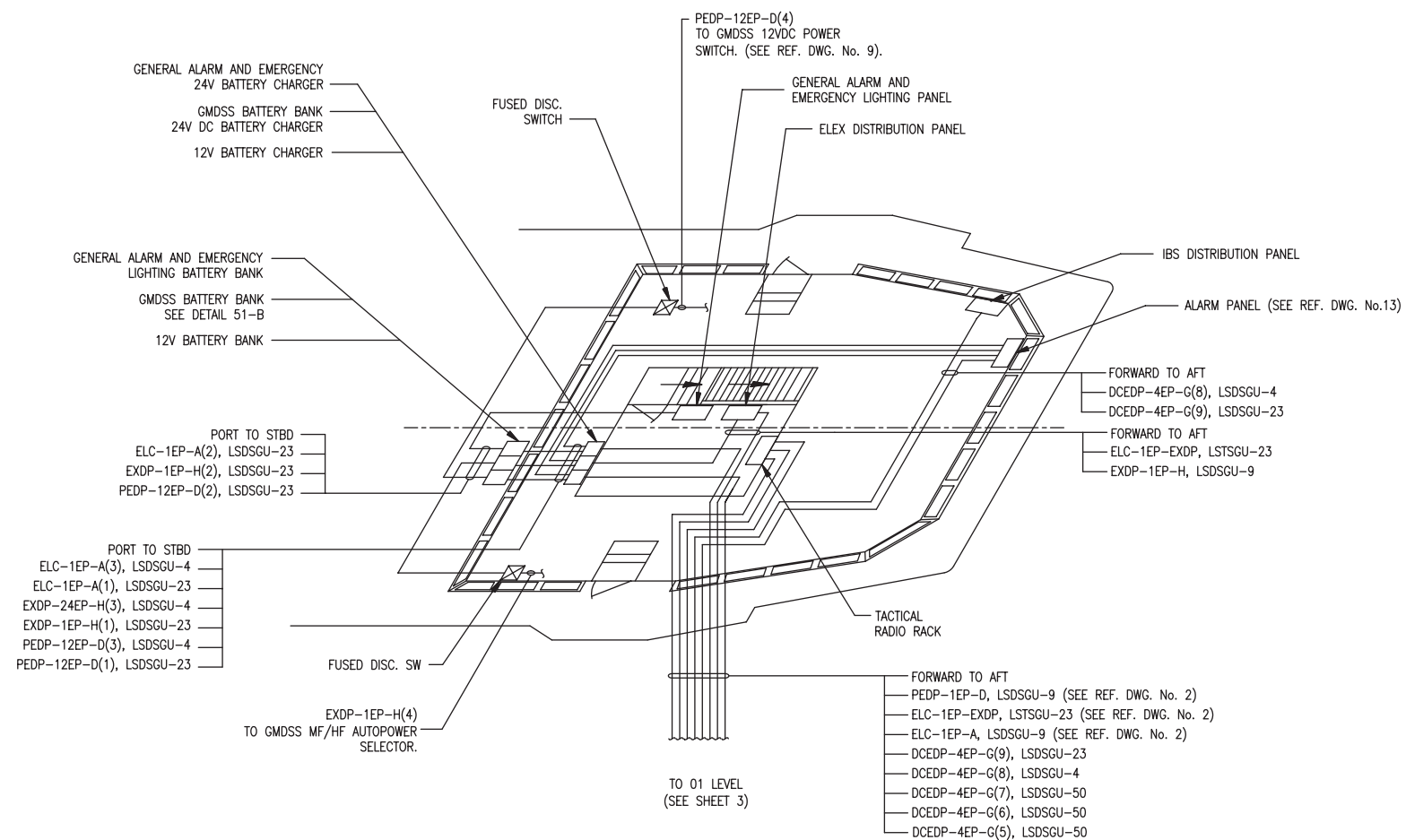
PLAN VIEW OF HOLD LEVEL







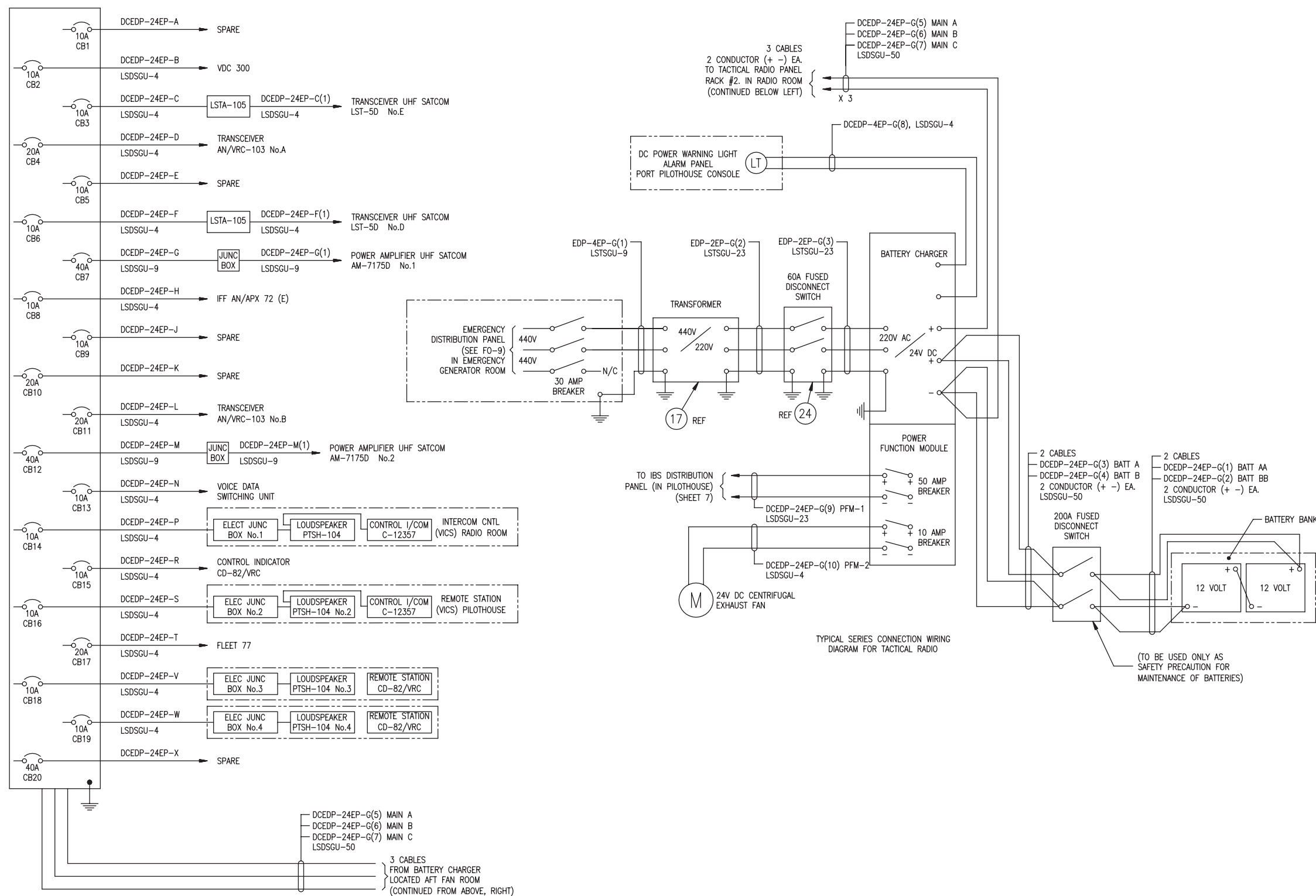




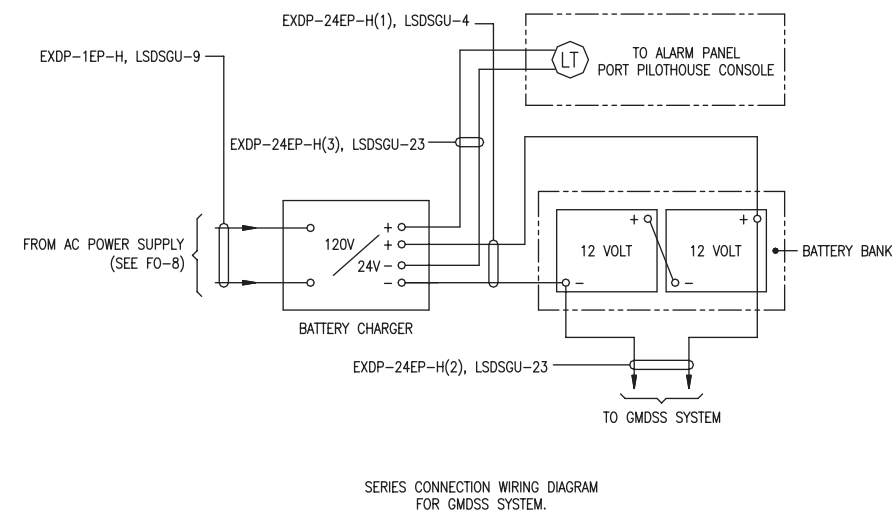
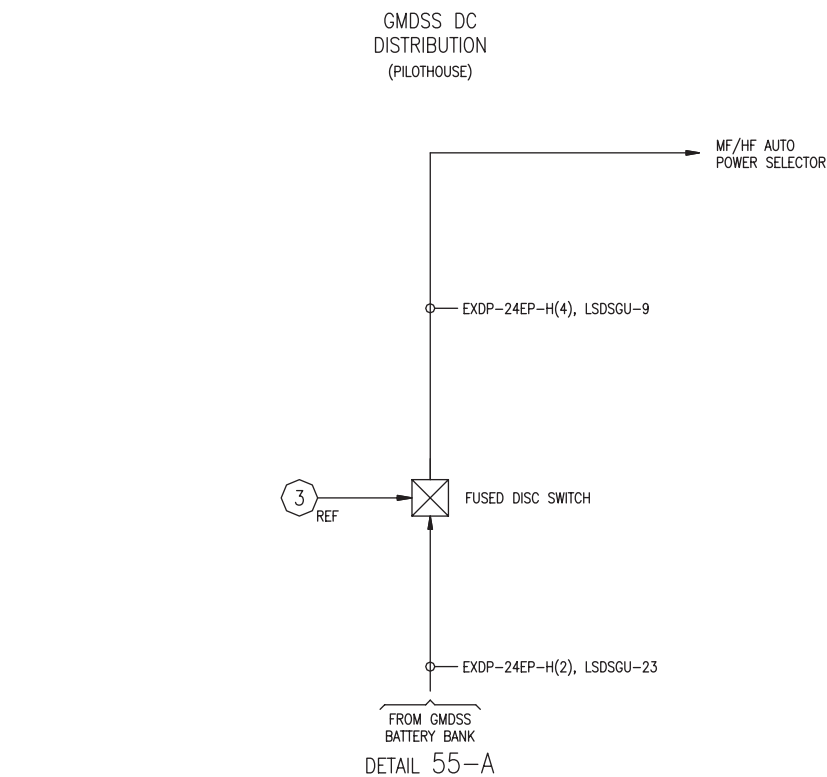
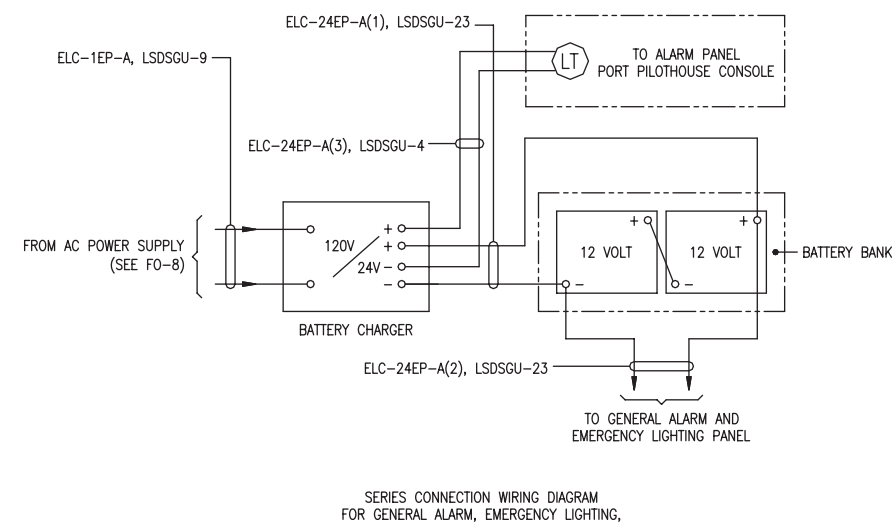
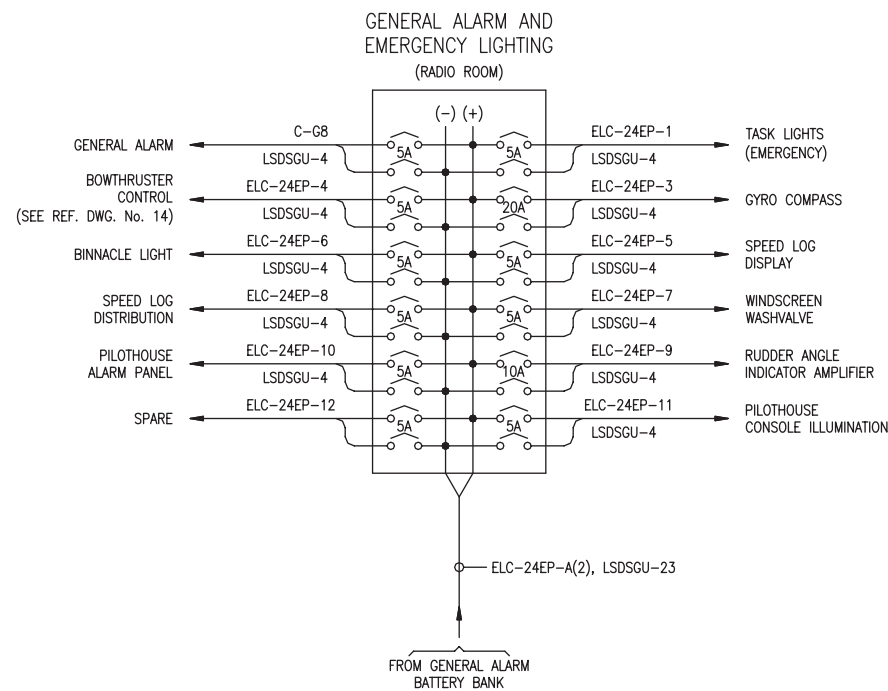
PLAN VIEW OF PILOTHOUSE LEVEL



TACTICAL RADIO RACK # 2  
(RADIO ROOM)

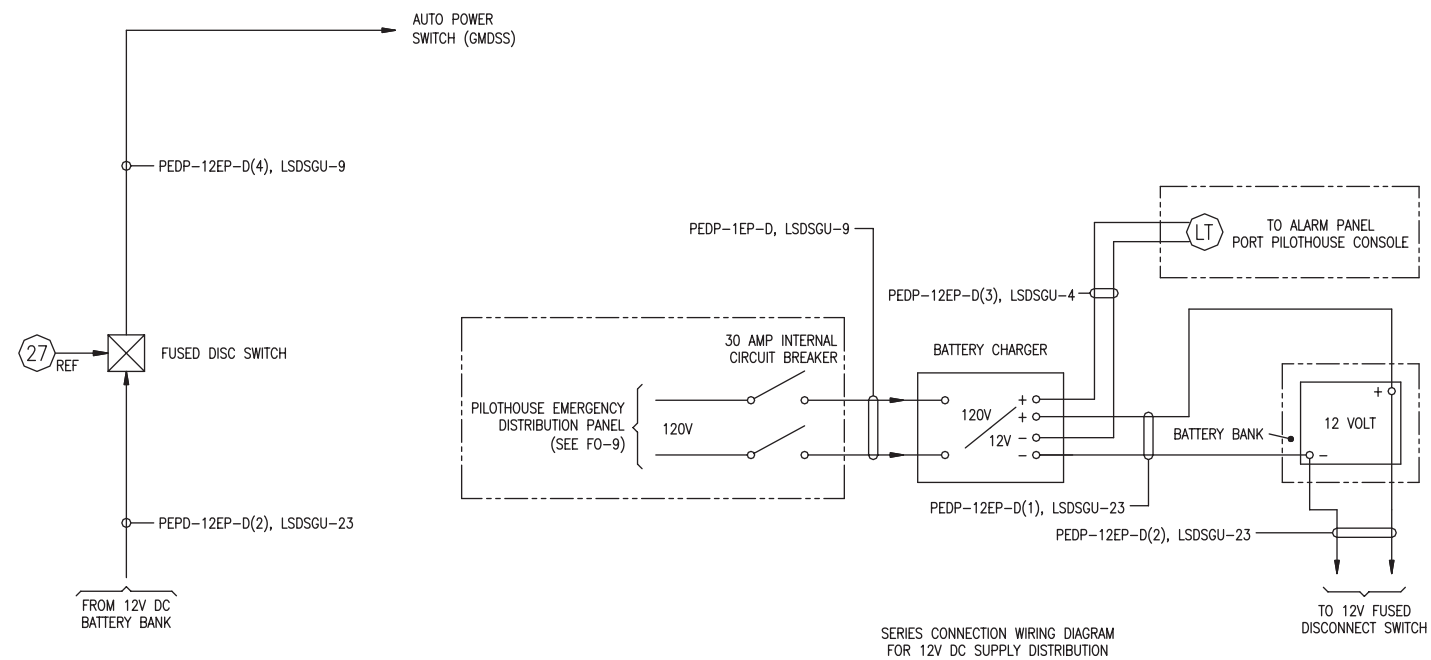




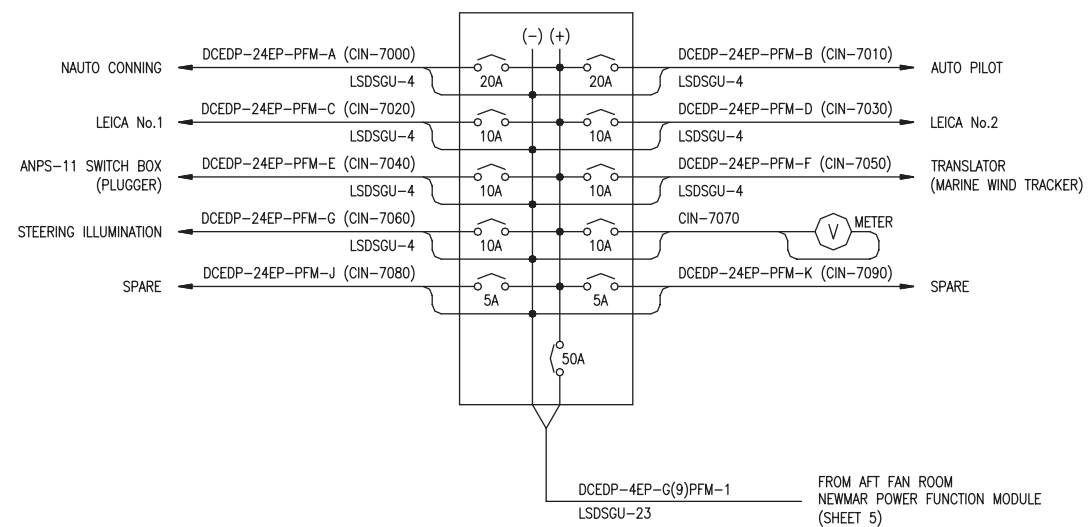




12V DC DISTRIBUTION  
(PILOTHOUSE)

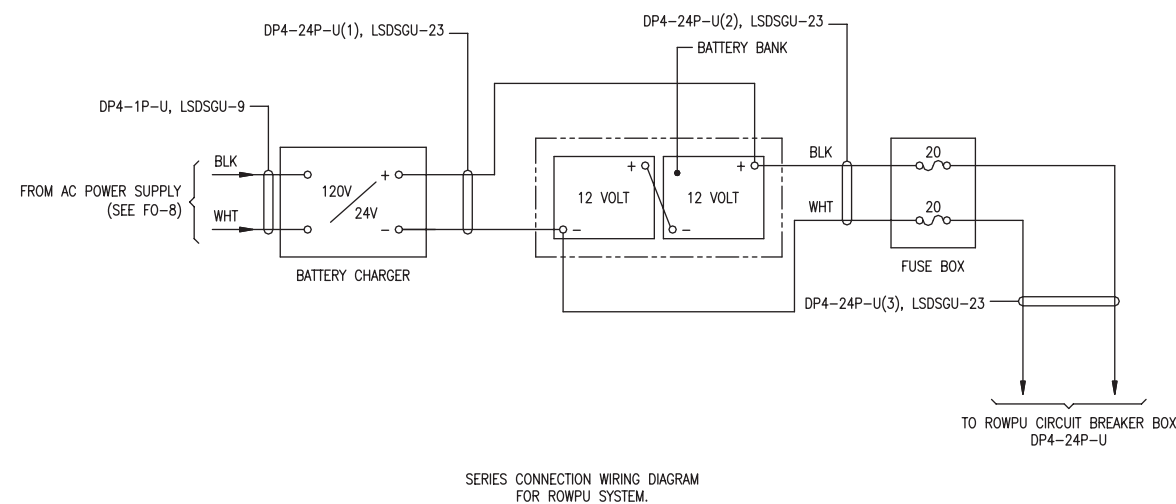
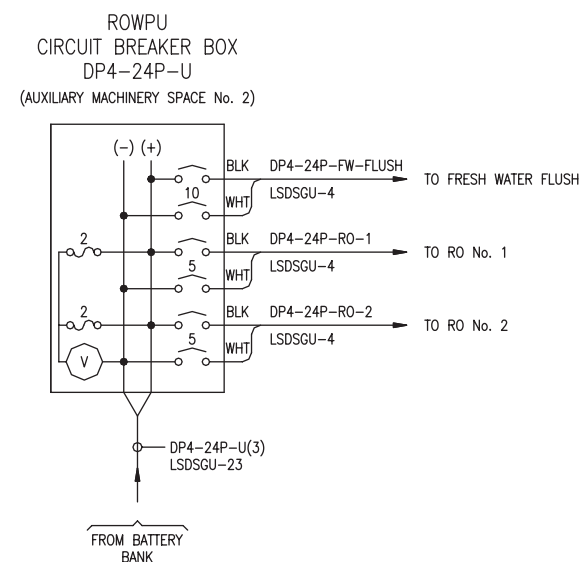


24V DC INTEGRATED BRIDGE SYSTEM (IBS)  
DISTRIBUTION PANEL  
(PILOTHOUSE)

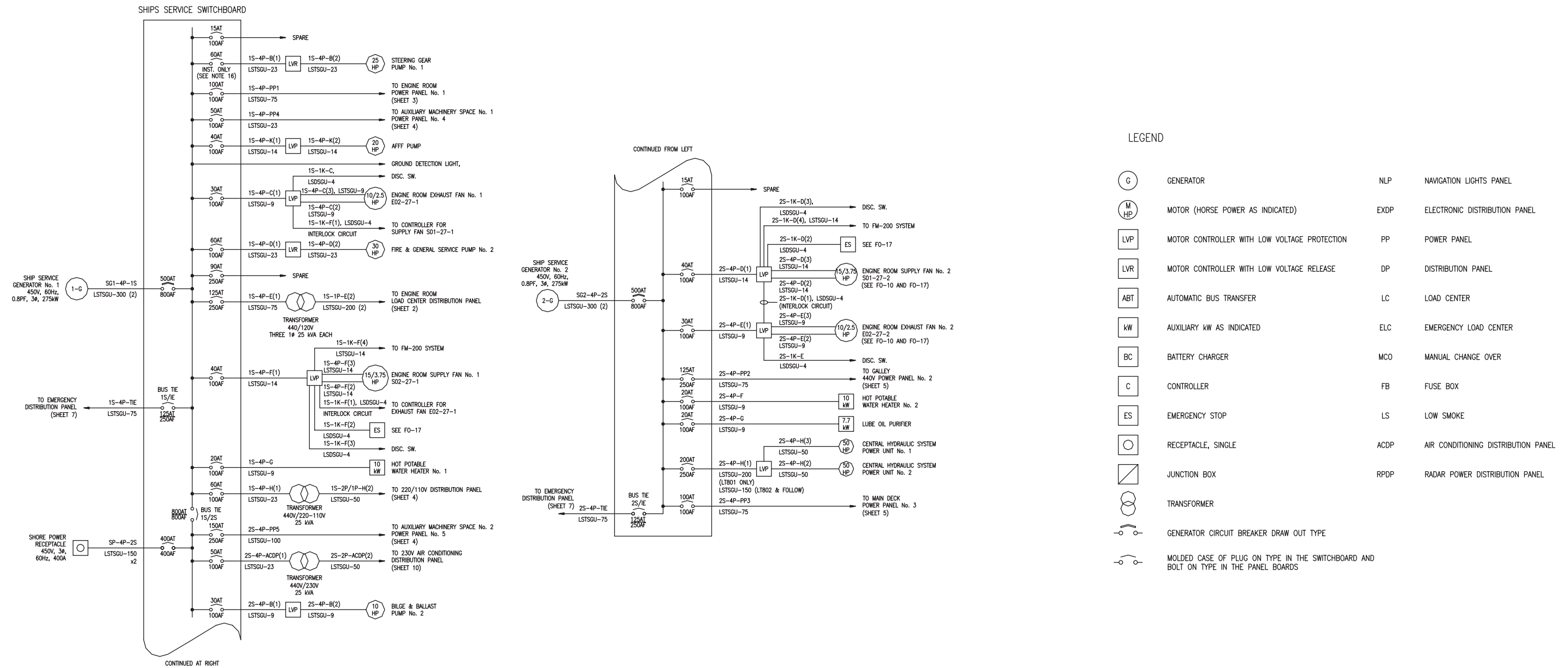






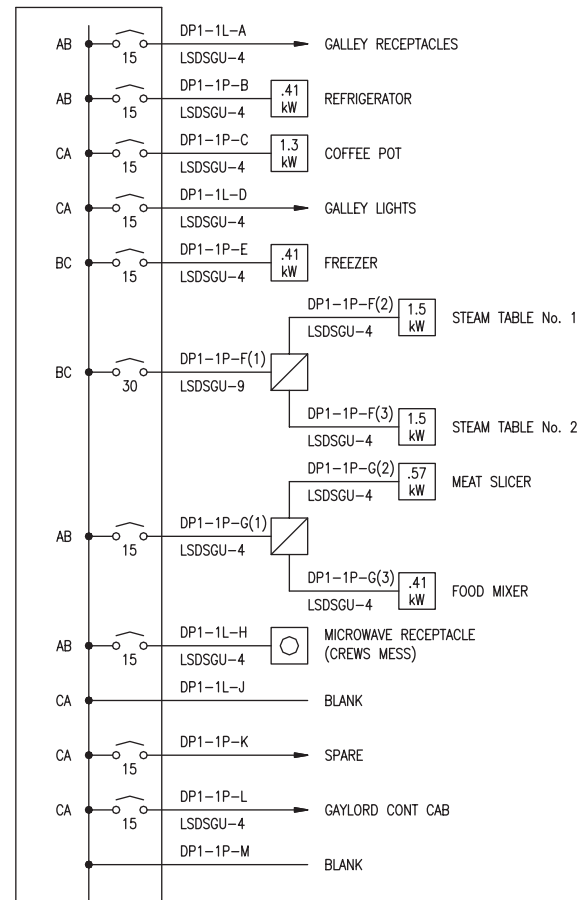




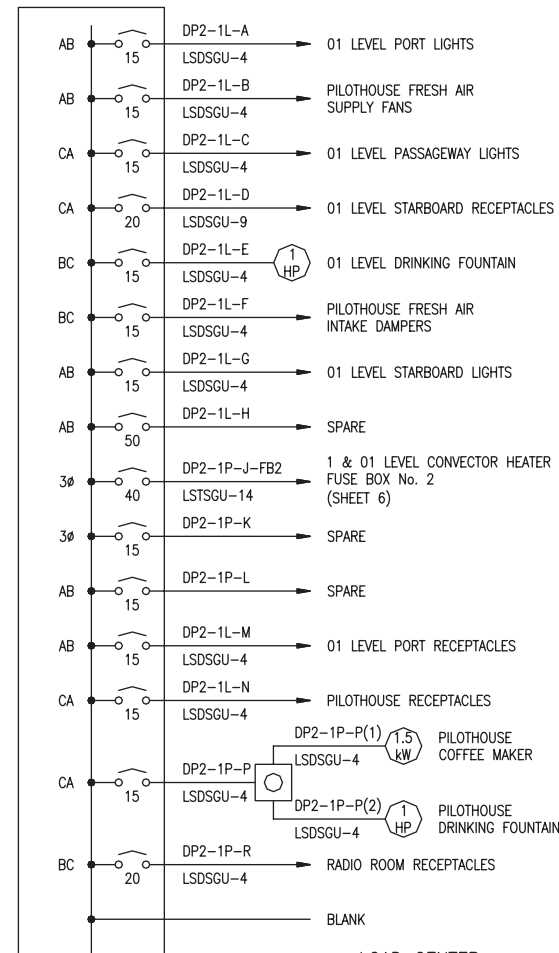




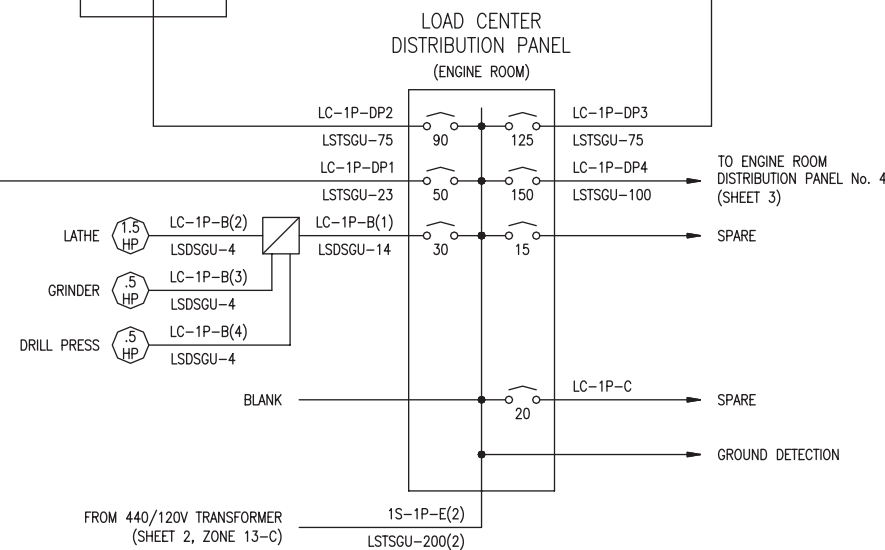
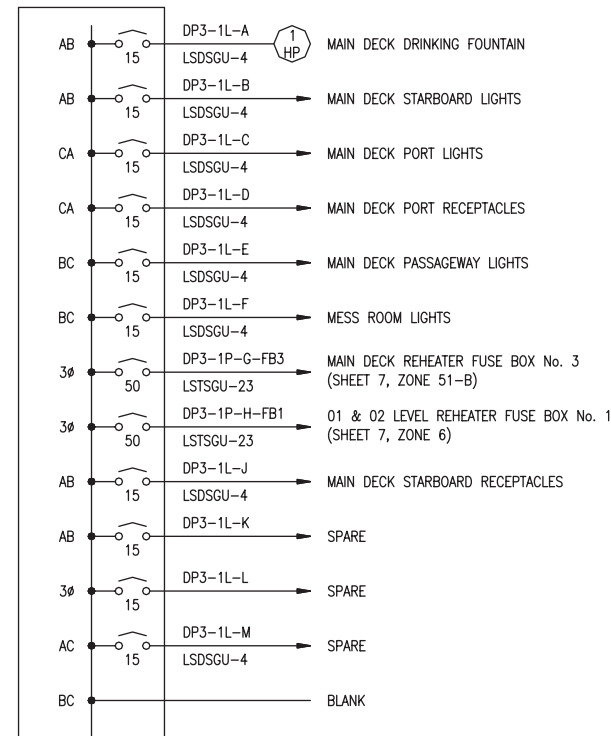
120V DISTRIBUTION PANEL No. 1  
(GALLEY)



120V DISTRIBUTION PANEL No. 2  
(01 LEVEL)

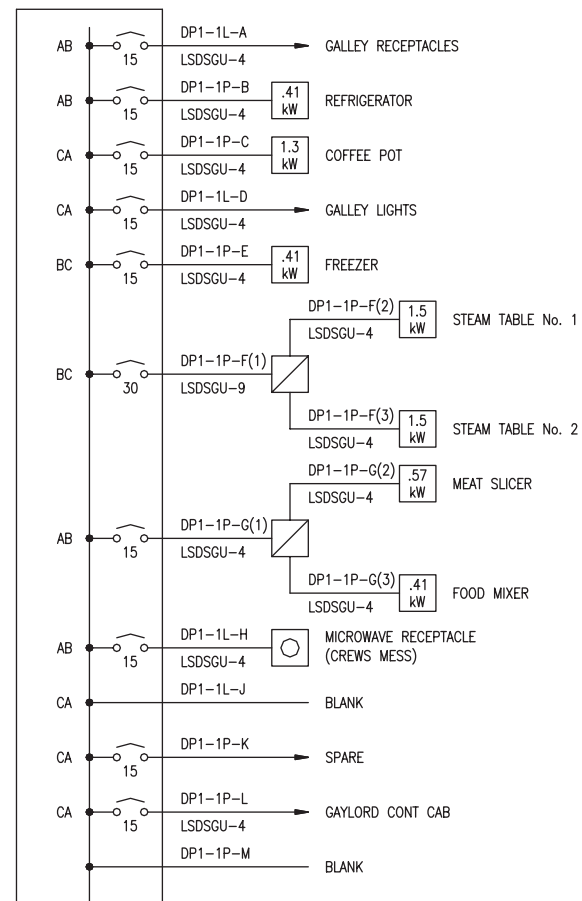


120V DISTRIBUTION PANEL No. 3  
(MAIN DECK)  
(SEE VIEW 205-A REF. DWG. No. 14)

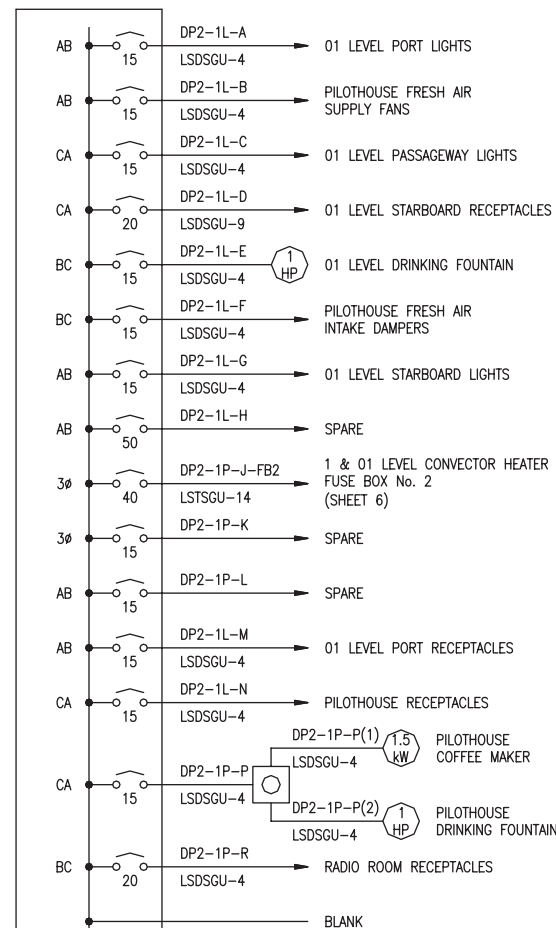




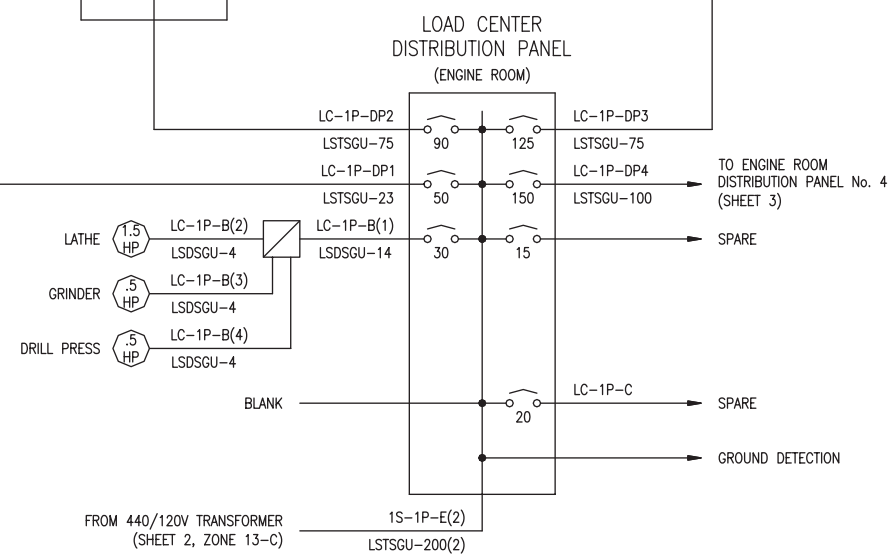
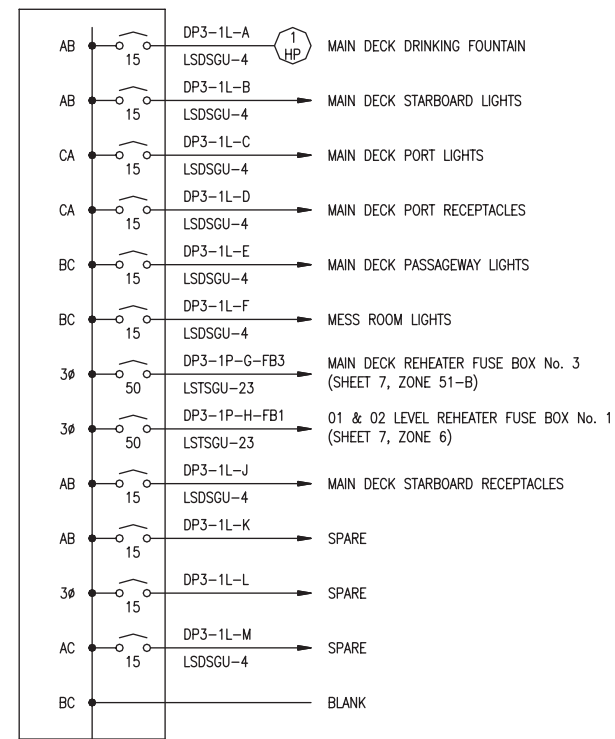
120V DISTRIBUTION PANEL No. 1  
(GALLEY)



120V DISTRIBUTION PANEL No. 2  
(01 LEVEL)



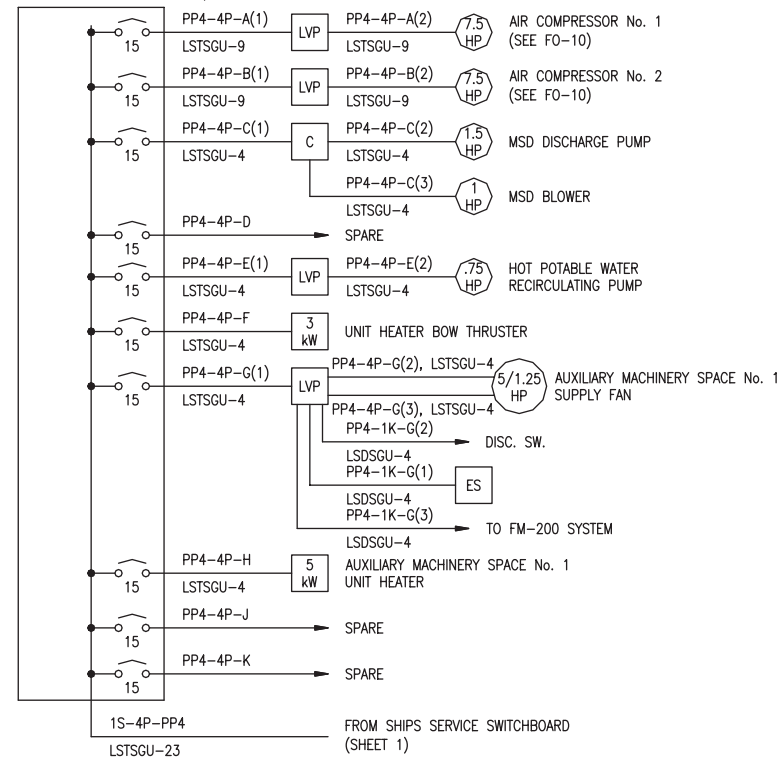
120V DISTRIBUTION PANEL No. 3  
(MAIN DECK)  
(SEE VIEW 205-A REF. DWG. No. 14)



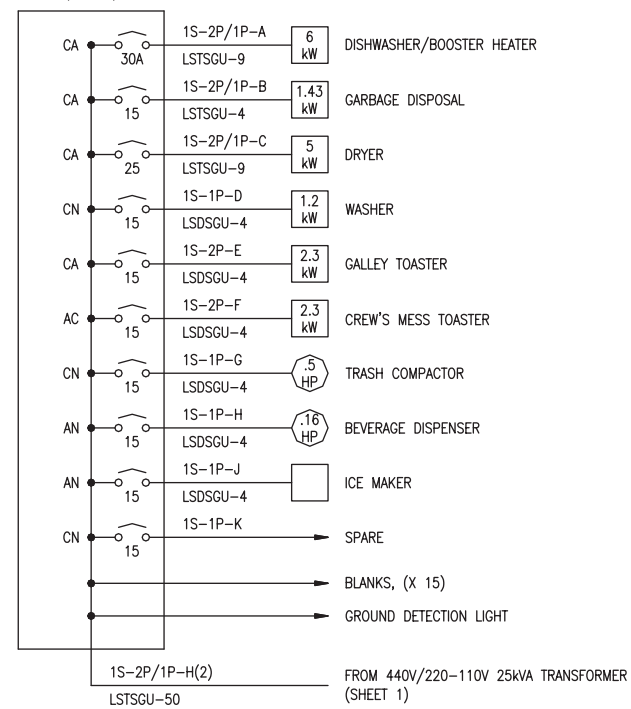




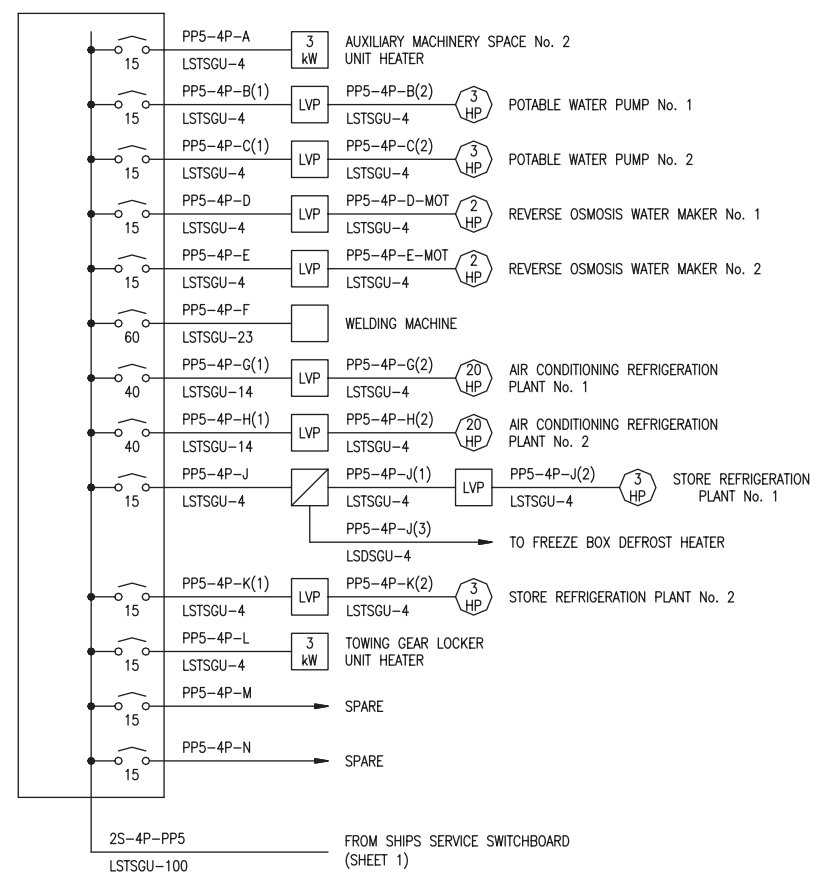
440V POWER PANEL No. 4  
(AUXILIARY MACHINERY SPACE No. 1)



220/110V DISTRIBUTION PANEL  
(GALLEY)

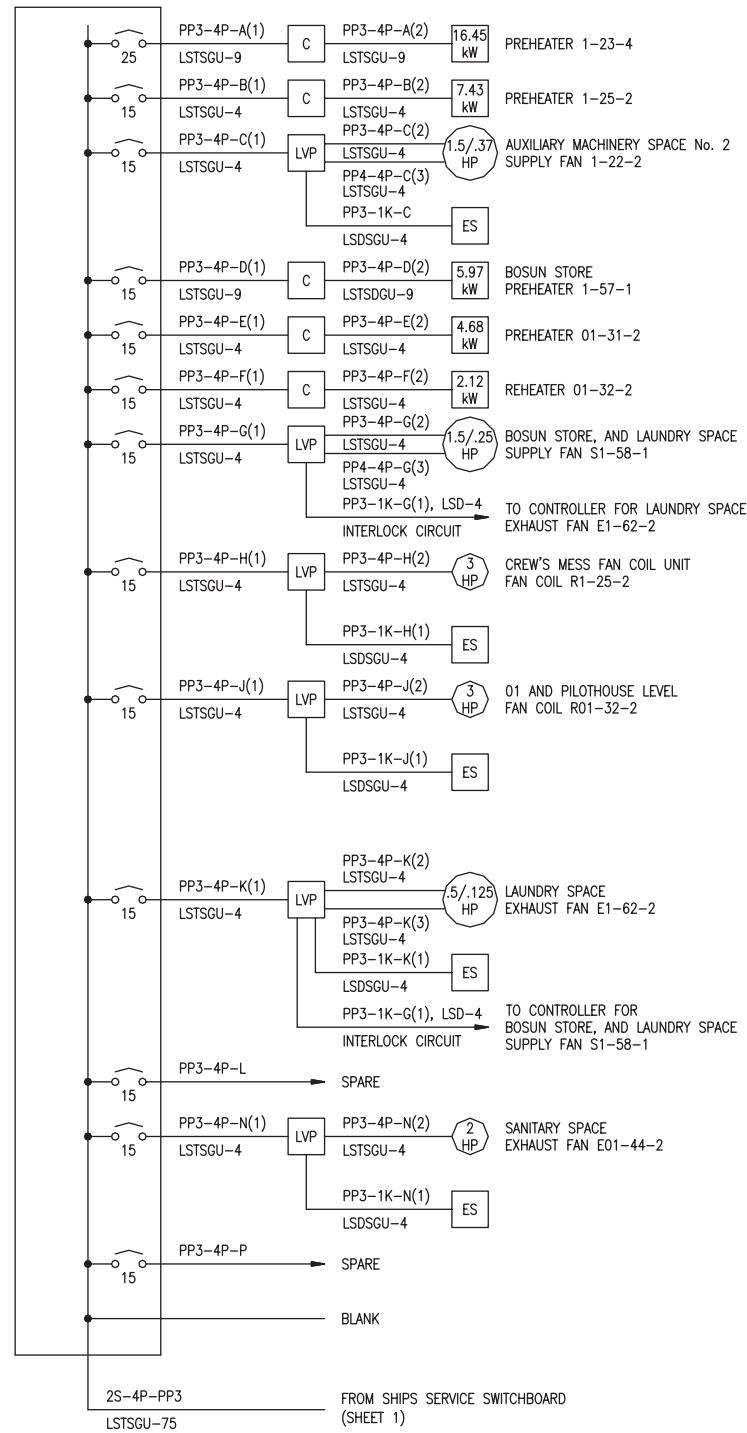


440V POWER PANEL No. 5  
(AUXILIARY MACHINERY SPACE No. 2)

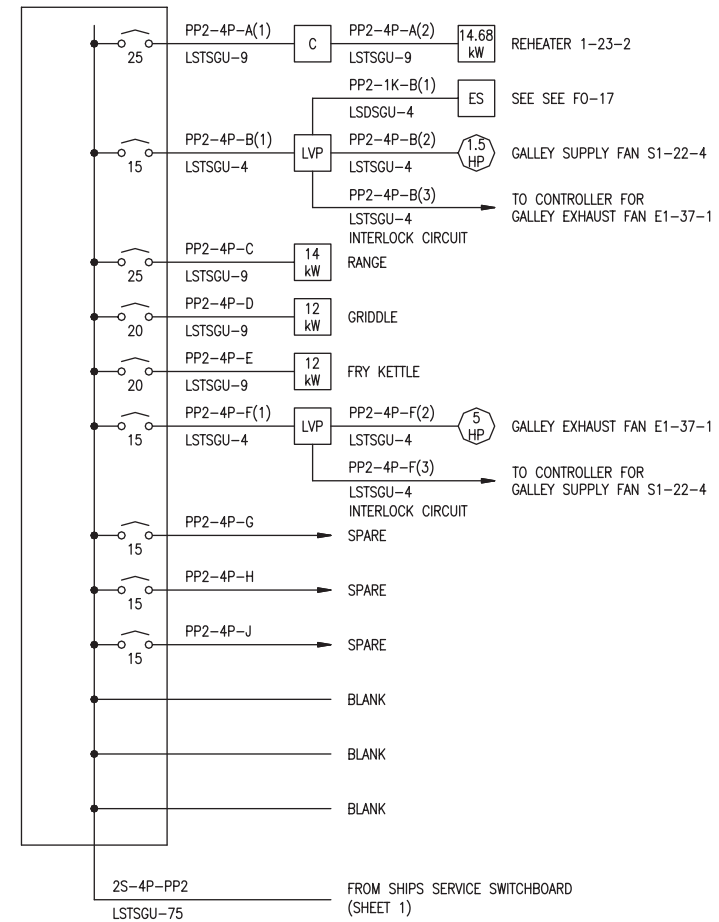




440V POWER PANEL No. 3  
(MAIN DECK)

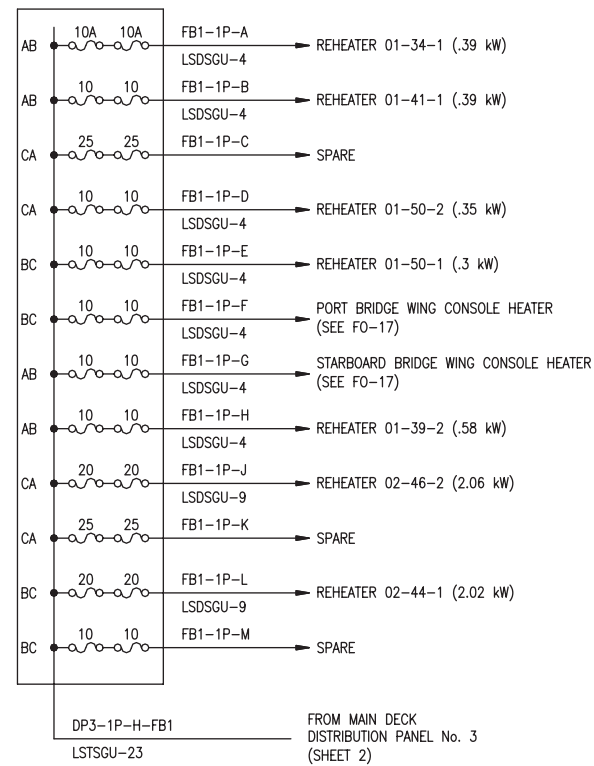


440V POWER PANEL No. 2  
(GALLEY)

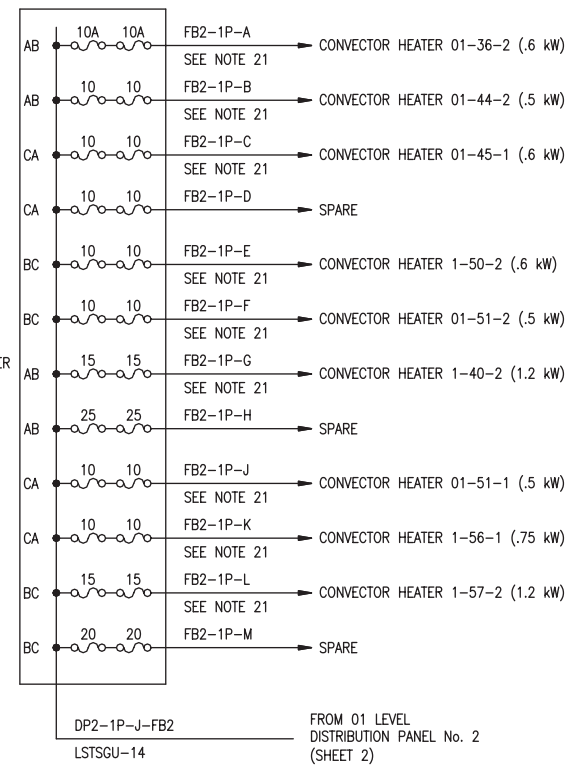




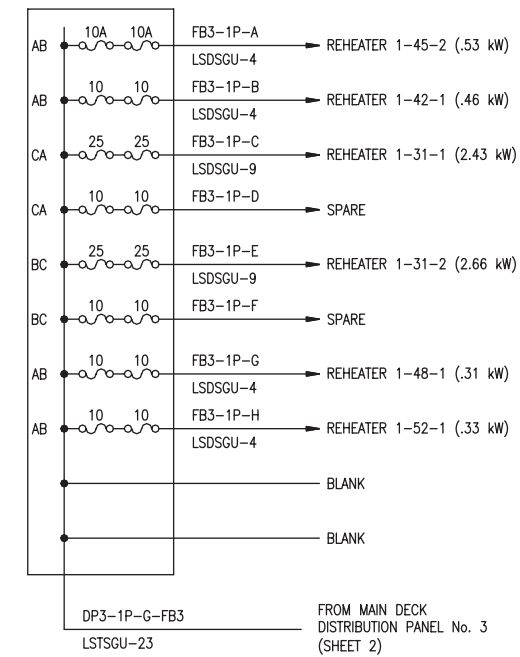
01 AND 02 LEVEL REHEATER  
120V FUSE BOX No. 1  
(01 LEVEL PORT PASSAGEWAY)



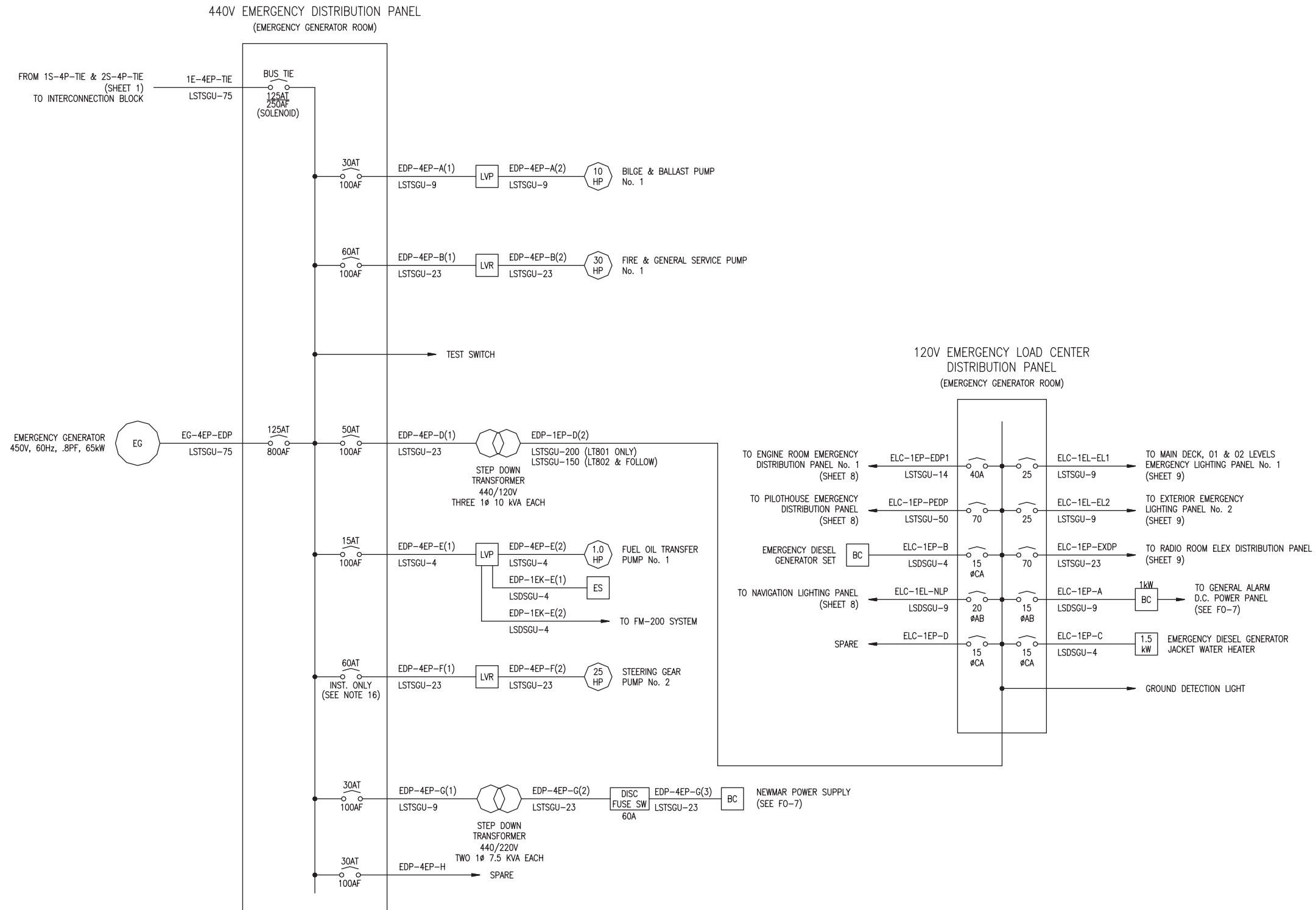
CONVECTOR HEATER  
120V FUSE BOX No. 2  
(01 LEVEL PORT PASSAGEWAY)



DECK REHEATER  
120V FUSE BOX No. 3  
(MAIN DECK PASSAGEWAY)



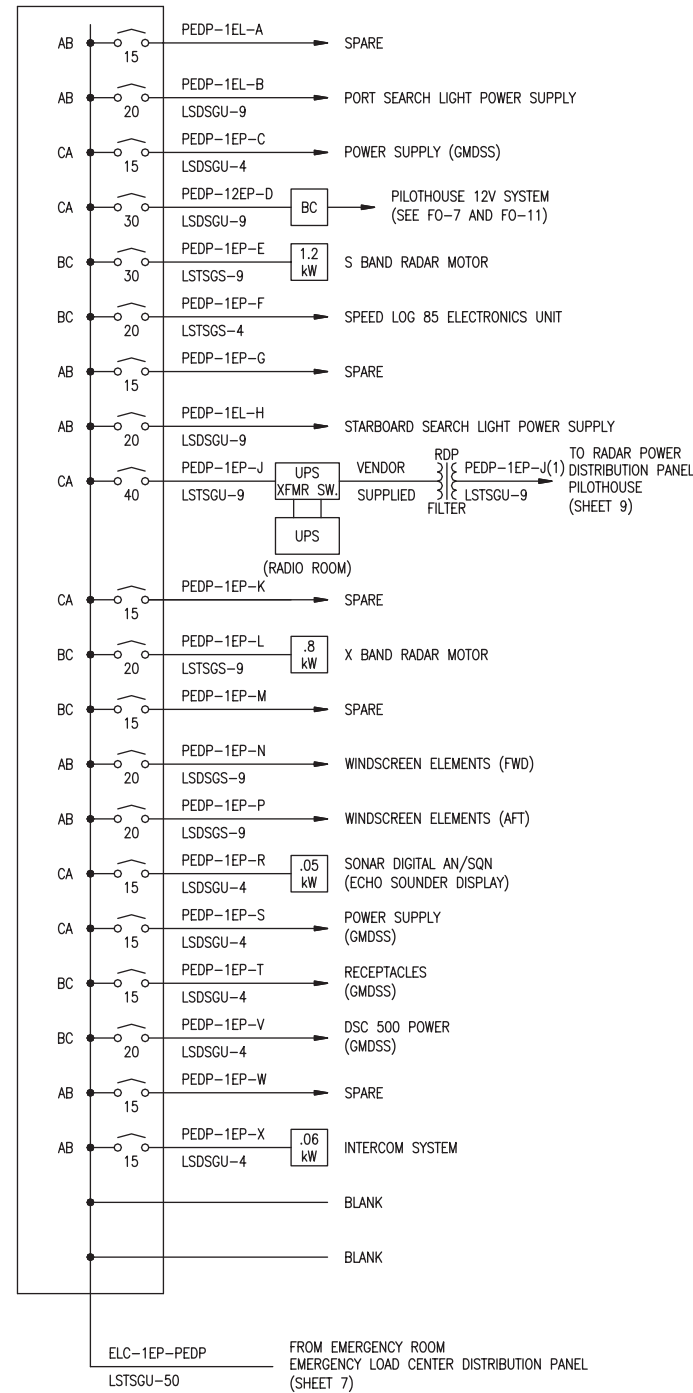




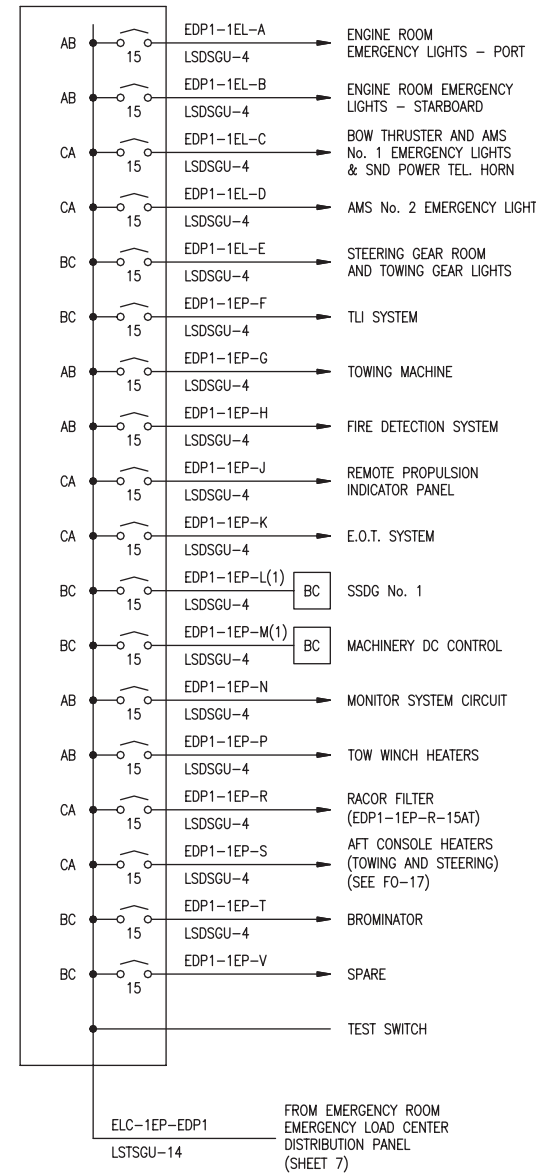




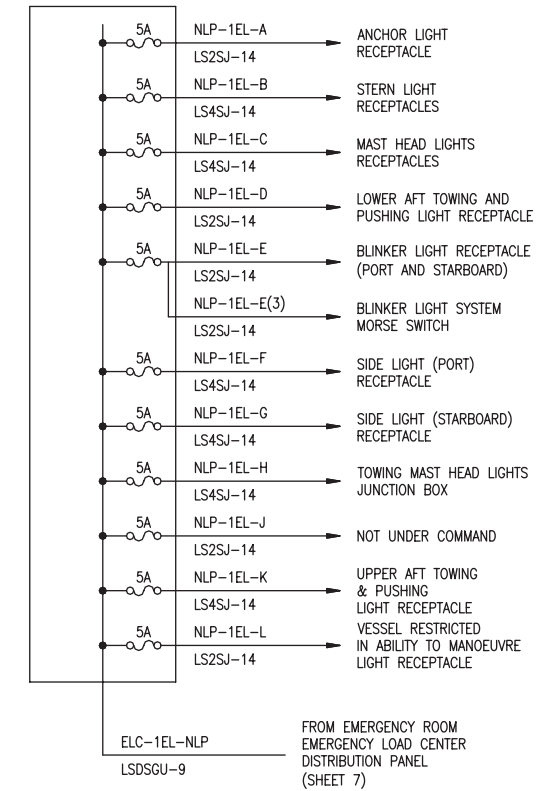
120V PILOTHOUSE EMERGENCY DISTRIBUTION PANEL  
(01 DECK AFT OF STAIRWELL)



120V EMERGENCY DISTRIBUTION PANEL No. 1  
(ENGINE ROOM)

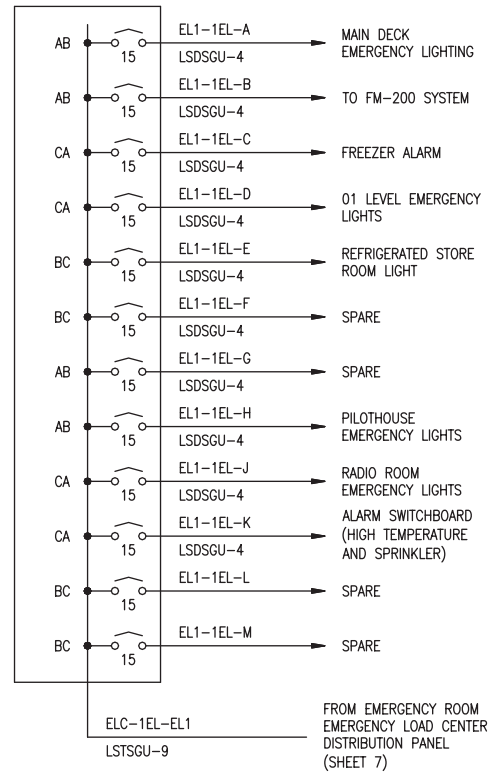


120V NAVIGATION LIGHTING PANEL  
(PILOTHOUSE)  
(SEE VIEW 165-A, DWG. REF. No. 14)

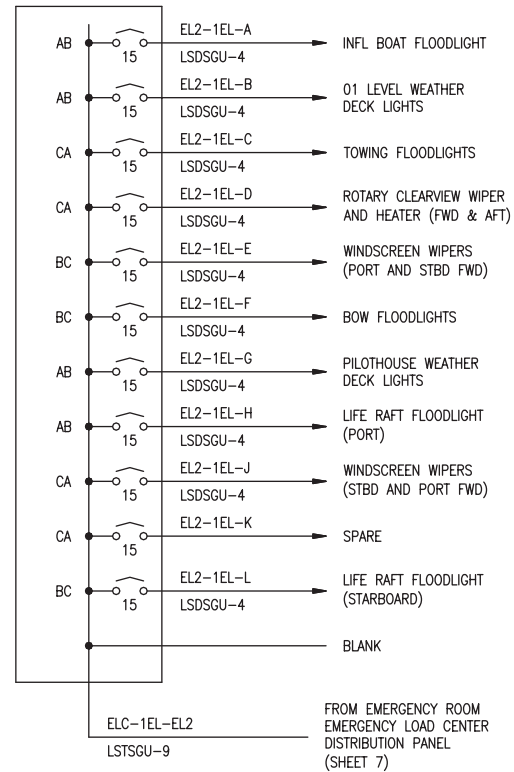




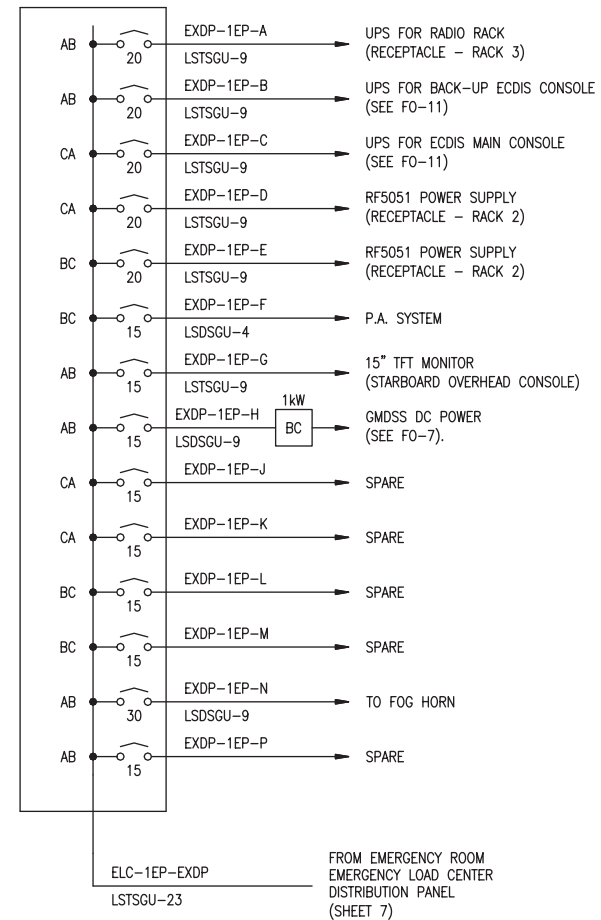
120V MAIN DECK, 01 & 02 LEVELS  
EMERGENCY LIGHTING PANEL No. 1  
(MAIN DECK AFT PASSAGEWAY)



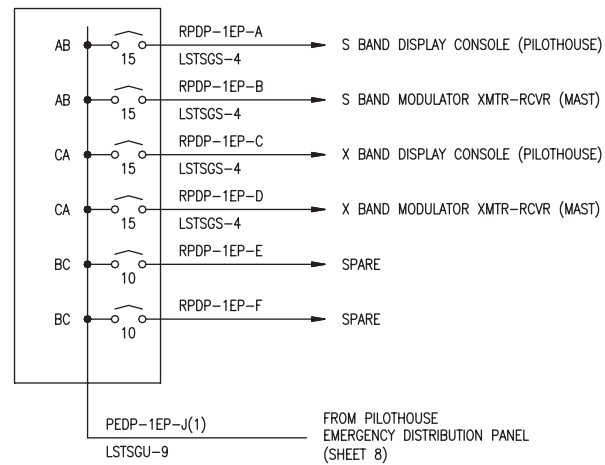
120V EXTERIOR  
EMERGENCY LIGHTING PANEL No. 2  
(01 DECK MAIN PASSAGEWAY AFT)



120V ELEX  
DISTRIBUTION PANEL  
(RADIO ROOM)

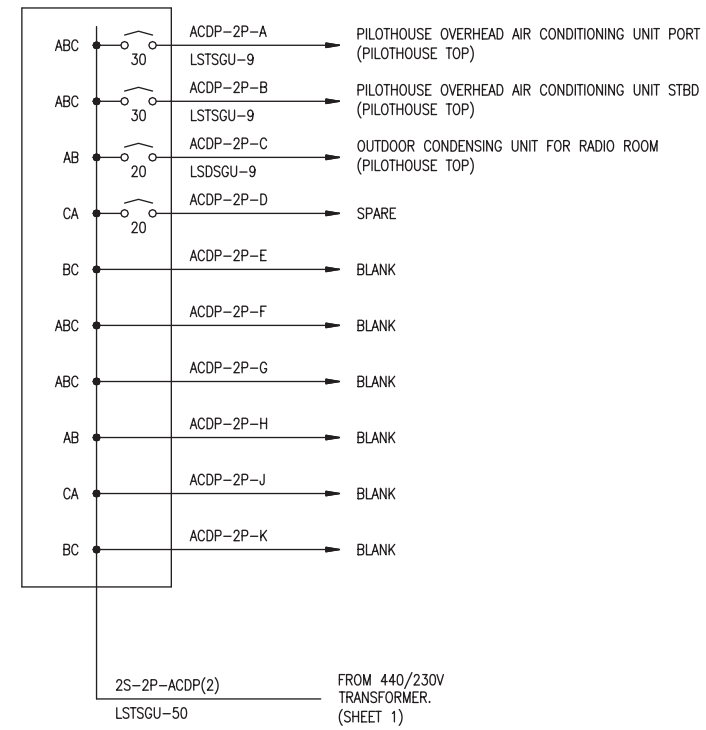


120V RADAR POWER  
DISTRIBUTION PANEL  
(PILOTHOUSE)

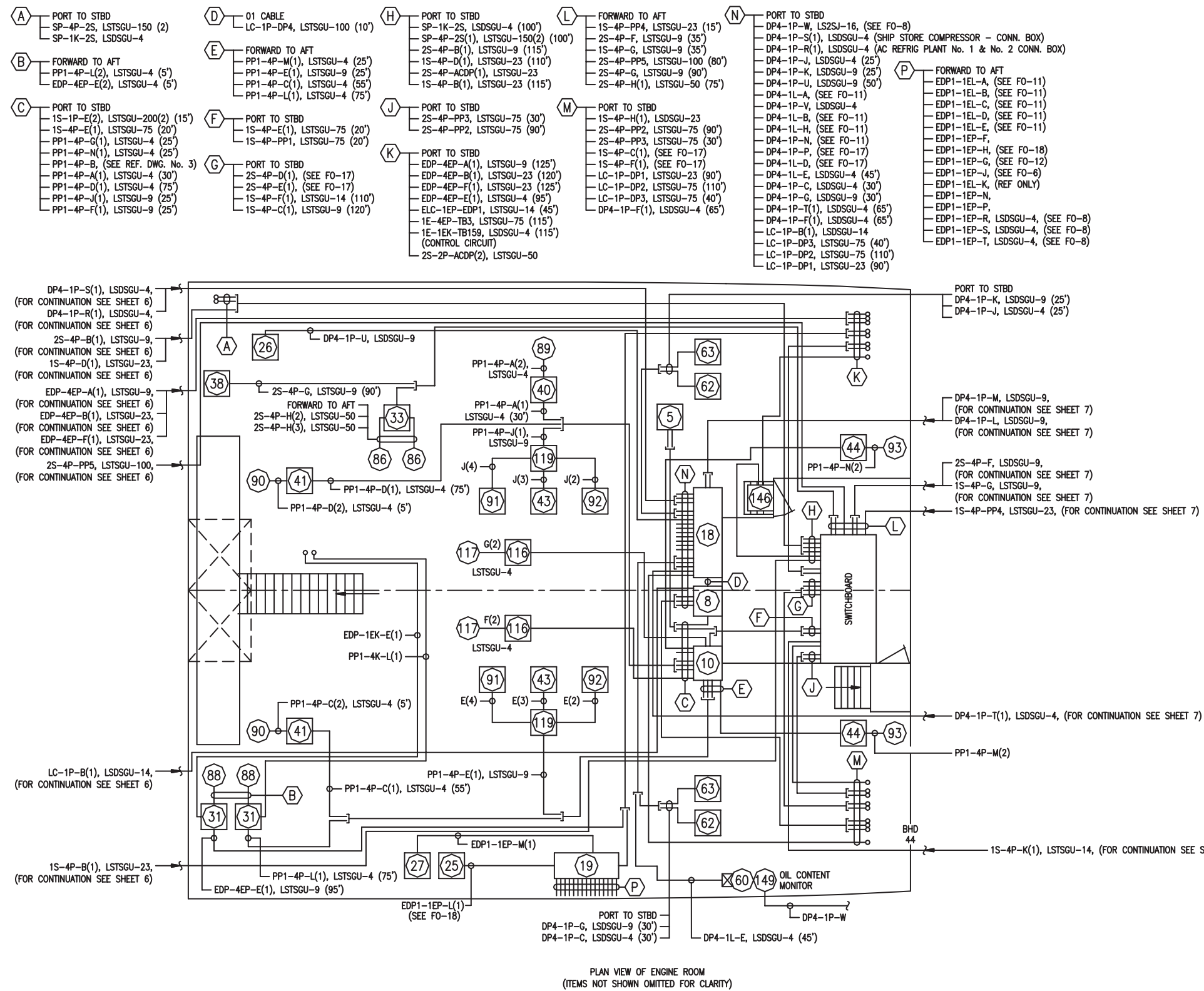




220V AIR CONDITIONING  
DISTRIBUTION PANEL  
(01 LEVEL STBD PASSAGEWAY)

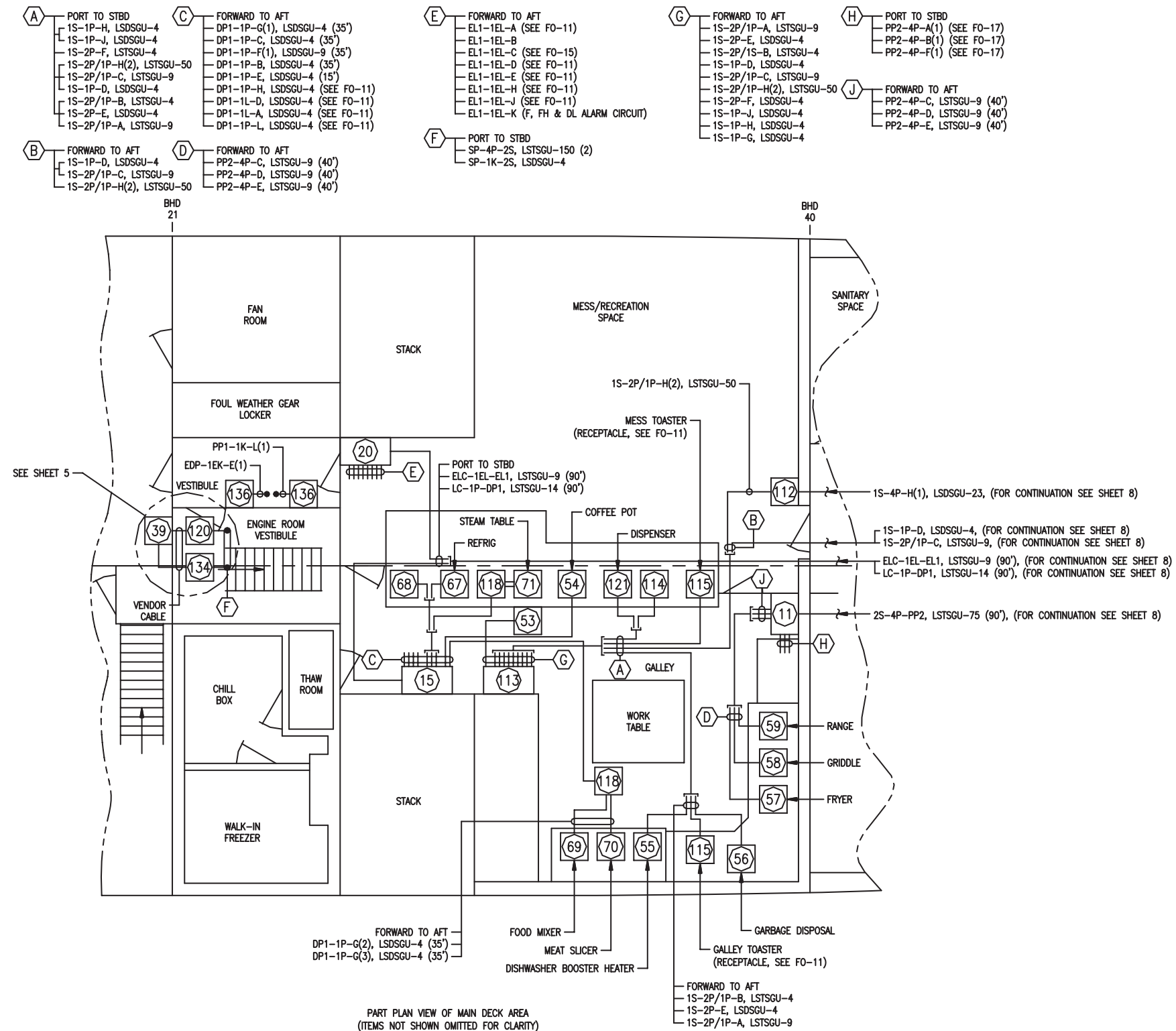






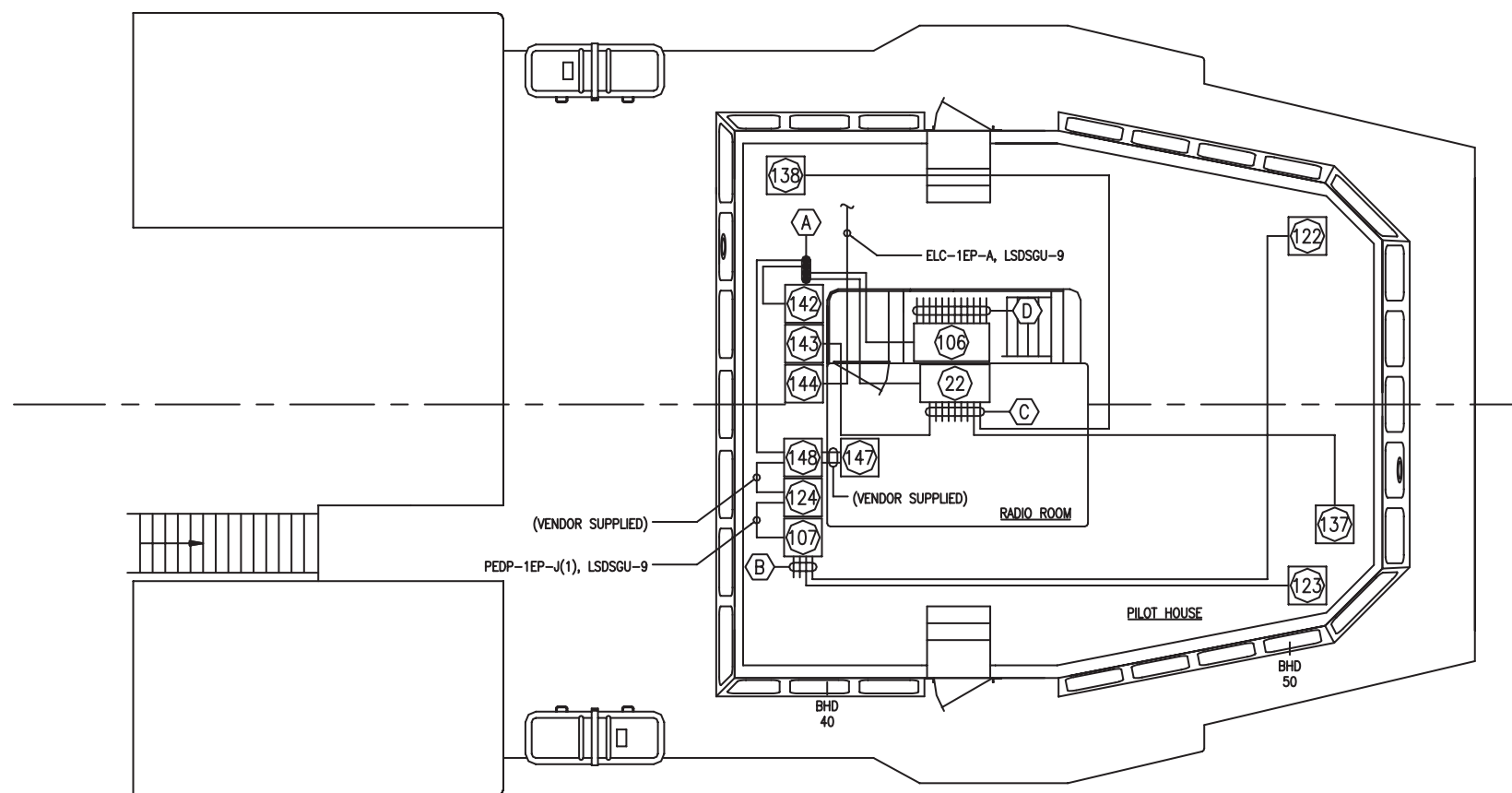








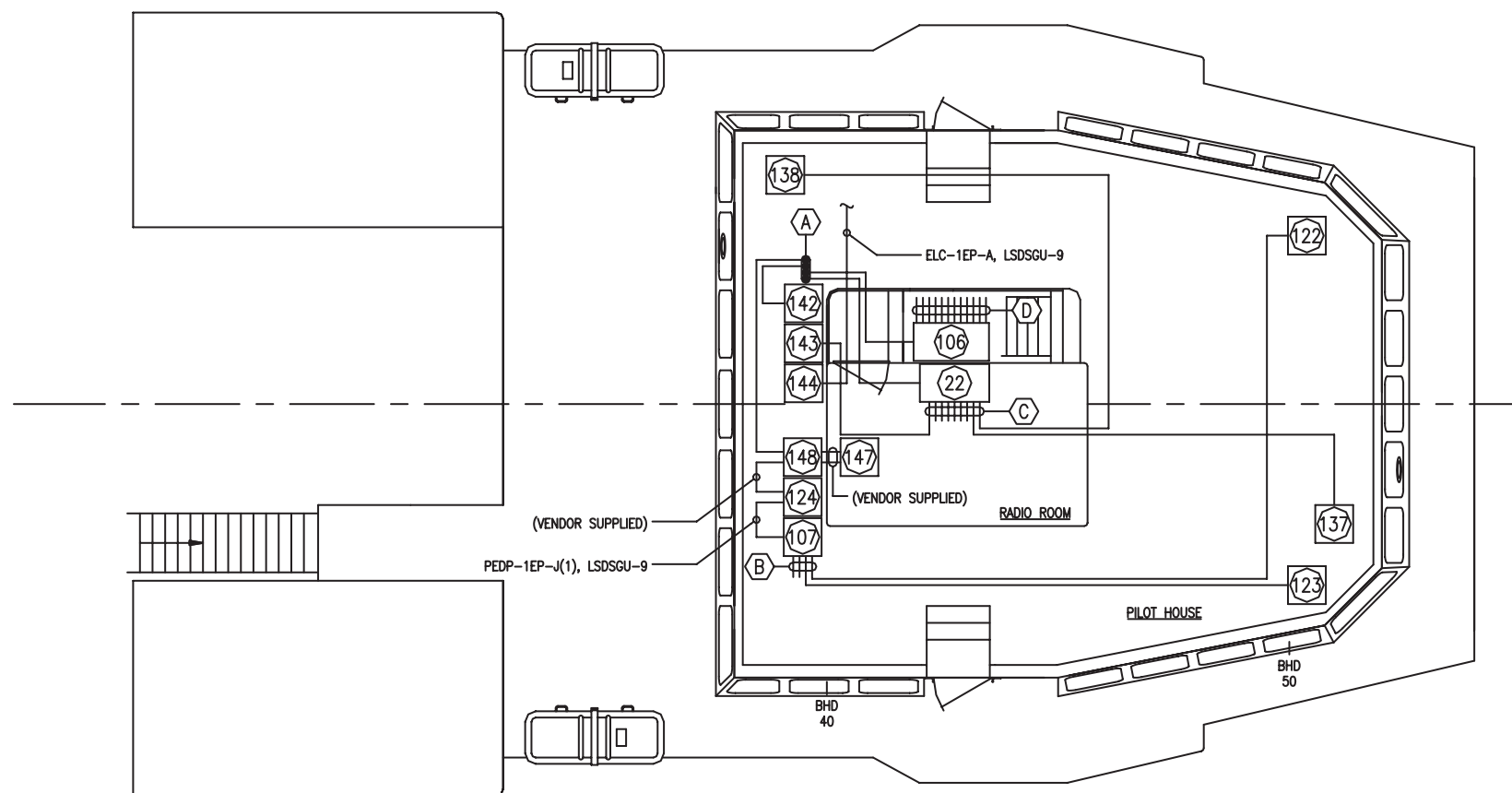
- A** PORT TO STBD
  - PEDP-1EP-J, LSDSGU-9
  - PEDP-1EP-D, LSDSGU-9
  - ELC-1EL-NLP, LSDSGU-9
  - ELC-1EP-EXDP, LSTSGU-23
- B** FORWARD TO AFT
  - RPDP-1EP-C, LSTSGS-4
  - RPDP-1EP-A, LSTSGS-4
  - RPDP-1EP-B, LSTSGS-4, (SEE FO-8)
  - RPDP-1EP-D, LSTSGS-4, (SEE FO-8)
- C** FORWARD TO AFT
  - EXDP-1EP-B, LSTSGU-9
  - EXDP-1EP-C, LSTSGU-9
  - EXDP-1EP-A, LSTSGU-9
  - EXDP-1EP-D, LSTSGU-9
  - EXDP-1EP-E, LSTSGU-9
  - EXDP-1EP-F, LSDSGU-4
  - EXDP-1EP-N, LSDSGU-9
  - EXDP-1EP-G, LSTSGU-9 (SEE FO-8)
  - EXDP-1EP-H, LSDSGU-9 (SEE FO-7)
- D** FORWARD TO AFT
  - NLP-1EL-A, LS2SJ-14
  - NLP-1EL-B, LS4SJ-14
  - NLP-1EL-C, LS4SJ-14
  - NLP-1EL-D, LS2SJ-14
  - NLP-1EL-E, LS2SJ-14
  - NLP-1EL-E(3), LS2SJ-14
  - NLP-1EL-F, LS4SJ-14
  - NLP-1EL-G, LS4SJ-14
  - NLP-1EL-H, LS4SJ-14
  - NLP-1EL-J, LS2SJ-14
  - NLP-1EL-K, LS4SJ-14
  - NLP-1EL-L, LS2SJ-14



PLAN VIEW OF PILOTHOUSE - 02 DECK LEVEL  
(ITEMS NOT SHOWN OMITTED FOR CLARITY)

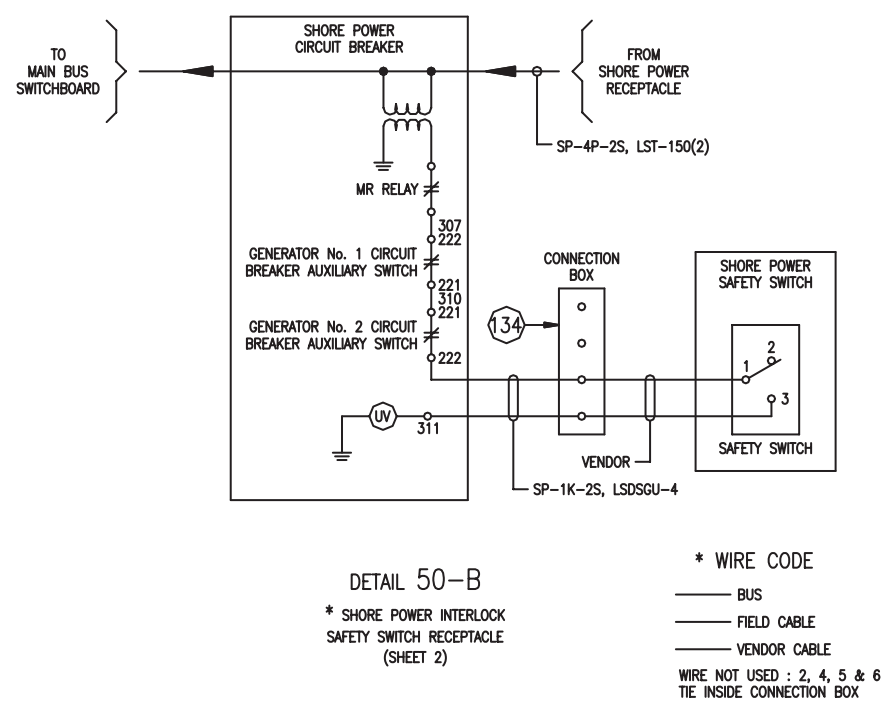


- A** PORT TO STBD
  - PEDP-1EP-J, LSDSGU-9
  - PEDP-1EP-D, LSDSGU-9
  - ELC-1EL-NLP, LSDSGU-23
  - ELC-1EP-EXDP, LSTSGU-23
- B** FORWARD TO AFT
  - RPDP-1EP-C, LSTSGS-4
  - RPDP-1EP-A, LSTSGS-4
  - RPDP-1EP-B, LSTSGS-4, (SEE FO-8)
  - RPDP-1EP-D, LSTSGS-4, (SEE FO-8)
- C** FORWARD TO AFT
  - EXDP-1EP-B, LSTSGU-9
  - EXDP-1EP-C, LSTSGU-9
  - EXDP-1EP-A, LSTSGU-9
  - EXDP-1EP-D, LSTSGU-9
  - EXDP-1EP-E, LSTSGU-9
  - EXDP-1EP-F, LSDSGU-4
  - EXDP-1EP-N, LSDSGU-9
  - EXDP-1EP-G, LSTSGU-9 (SEE FO-8)
  - EXDP-1EP-H, LSDSGU-9 (SEE FO-7)
- D** FORWARD TO AFT
  - NLP-1EL-A, LS2SJ-14
  - NLP-1EL-B, LS4SJ-14
  - NLP-1EL-C, LS4SJ-14
  - NLP-1EL-D, LS2SJ-14
  - NLP-1EL-E, LS2SJ-14
  - NLP-1EL-E(3), LS2SJ-14
  - NLP-1EL-F, LS4SJ-14
  - NLP-1EL-G, LS4SJ-14
  - NLP-1EL-H, LS4SJ-14
  - NLP-1EL-J, LS2SJ-14
  - NLP-1EL-K, LS4SJ-14
  - NLP-1EL-L, LS2SJ-14



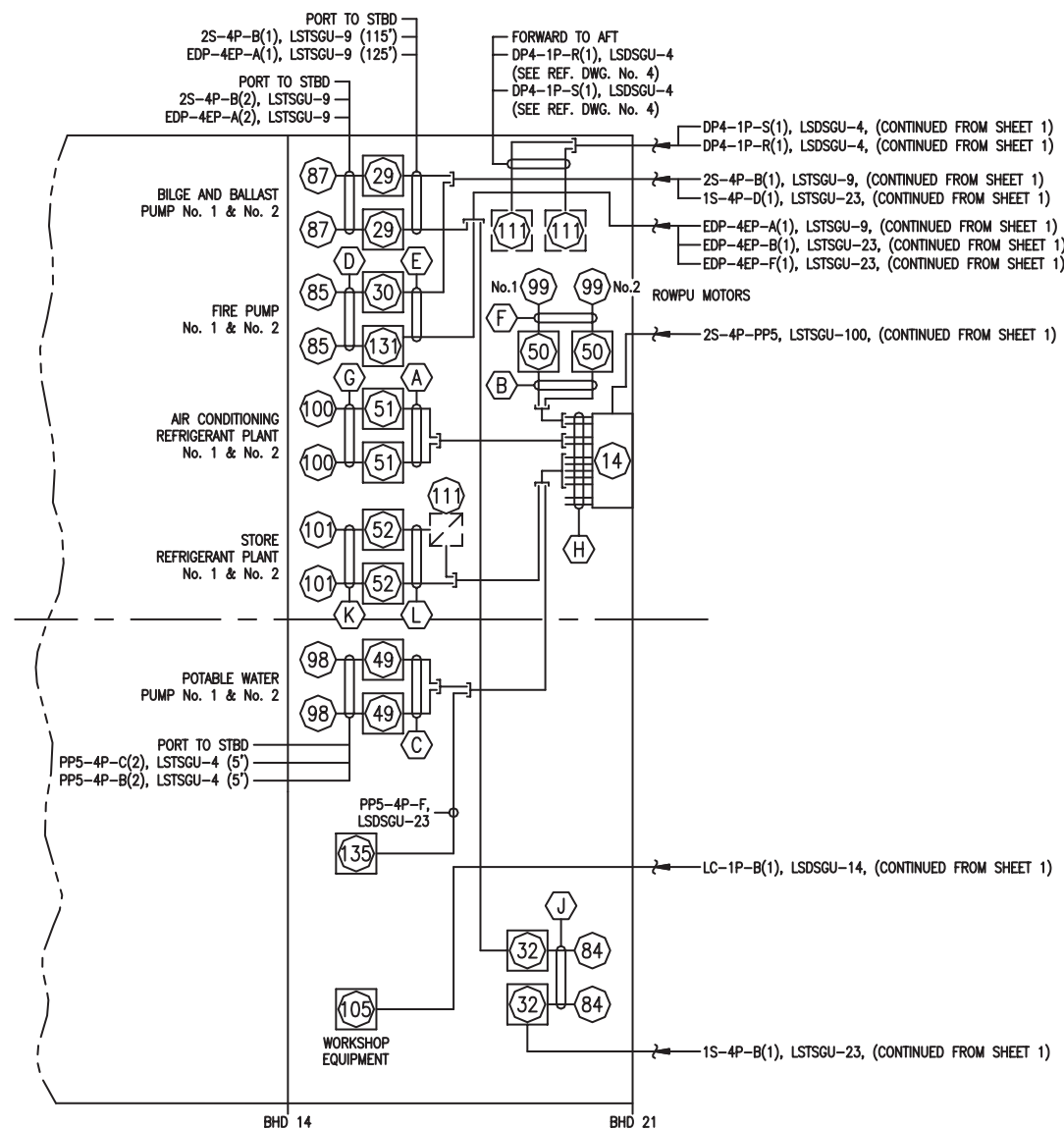
PLAN VIEW OF PILOTHOUSE - 02 DECK LEVEL  
(ITEMS NOT SHOWN OMITTED FOR CLARITY)







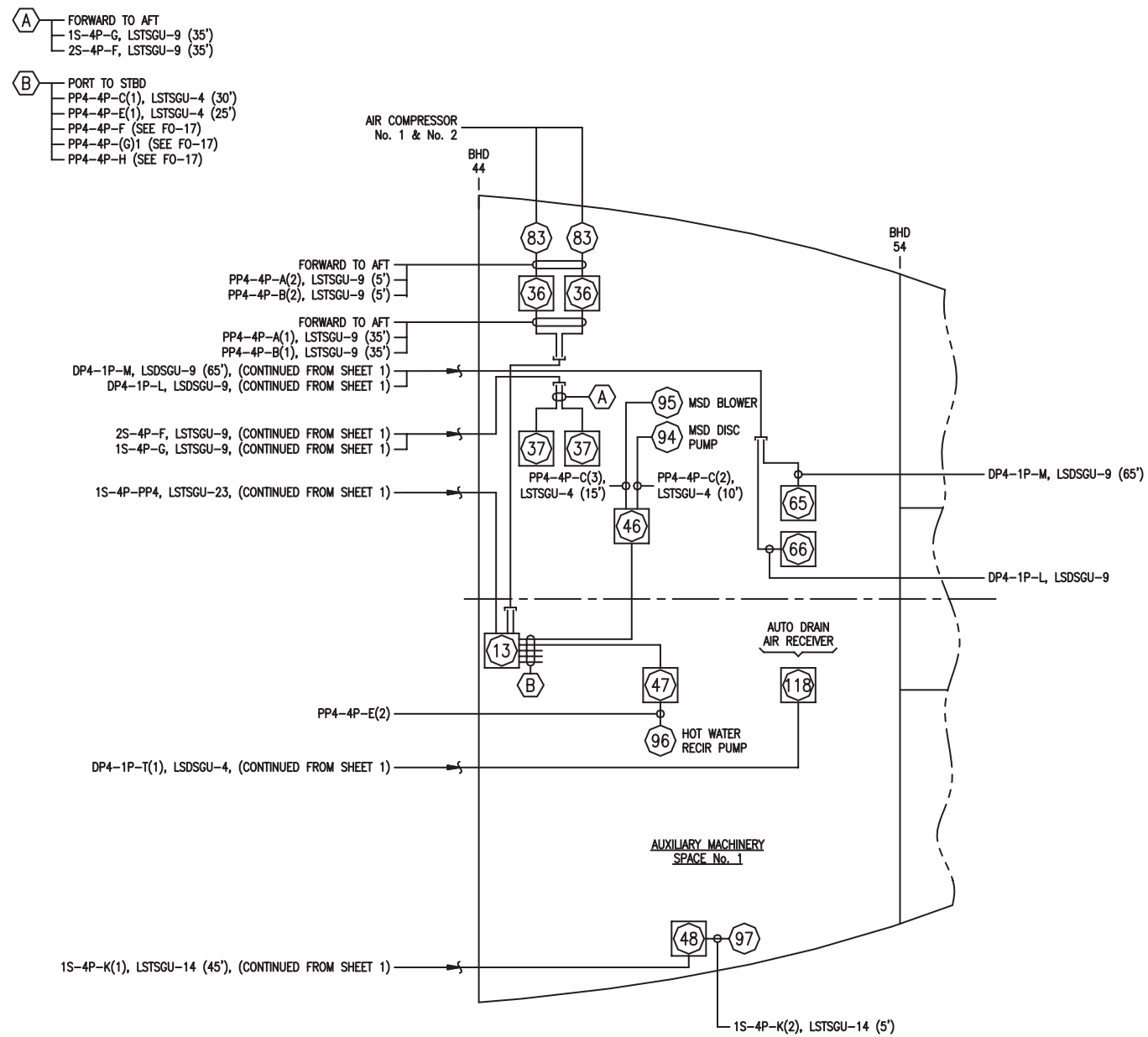




- |  |   |  |
|--|---|--|
| <p><b>A</b> FORWARD TO AFT<br/>PP5-4P-G(1), LSTSGU-14 (15')<br/>PP5-4P-H(1), LSTSGU-14 (15')</p> <p><b>B</b> FORWARD TO AFT<br/>PP5-4P-E, LSTSGU-4 (35')<br/>PP5-4P-D, LSTSGU-4 (35')</p> <p><b>C</b> PORT TO STBD<br/>PP5-4P-C(1), LSTSGU-4<br/>PP5-4P-B(1), LSTSGU-4</p> <p><b>D</b> PORT TO STBD<br/>1S-4P-D(2), LSTSGU-23 (10')<br/>EDP-4EP-B(2), LSTSGU-23 (10')</p> <p><b>E</b> PORT TO STBD<br/>1S-4P-D(1), LSTSGU-23 (110')<br/>EDP-4EP-B(1), LSTSGU-23 (120')</p> | <p><b>F</b> FORWARD TO AFT<br/>PP5-4P-E-MOT, LSTSGU-4 (5')<br/>PP5-4P-D-MOT, LSTSGU-4 (5')</p> <p><b>G</b> PORT TO STBD<br/>PP5-4P-G(2), LSTSGU-14 (10')<br/>PP5-4P-H(2), LSTSGU-14 (10')</p> <p><b>H</b> PORT TO STBD<br/>PP5-4P-D, LSTSGU-4 (35')<br/>PP5-4P-E, LSTSGU-4 (35')<br/>PP5-4P-G(1), LSTSGU-14 (15')<br/>PP5-4P-H(1), LSTSGU-14 (15')<br/>PP5-4P-J, LSTSGU-4 (25')<br/>PP5-4P-K(1), LSTSGU-4 (25')<br/>PP5-4P-C(1), LSTSGU-4 (40')<br/>PP5-4P-B(1), LSTSGU-4 (40')<br/>PP5-4P-F, LSDSGU-23 (50')<br/>PP5-4P-A (SEE FO-17)<br/>PP5-4P-L (SEE FO-17)</p> | <p><b>J</b> PORT TO STBD<br/>EDP-4EP-F(2), LSTSGU-23 (10')<br/>1S-4P-B(2), LSTSGU-23 (10')</p> <p><b>K</b> PORT TO STBD<br/>PP5-4P-J(2), LSTSGU-4 (5')<br/>PP5-4P-K(2), LSTSGU-4 (5')</p> <p><b>L</b> PORT TO STBD<br/>PP5-4P-J(1), LSTSGU-4<br/>PP5-4P-K(1), LSTSGU-4</p> |
|--|---|--|

PLAN VIEW OF AUXILIARY MACHINERY SPACE No. 2  
(ITEMS NOT SHOWN OMITTED FOR CLARITY)

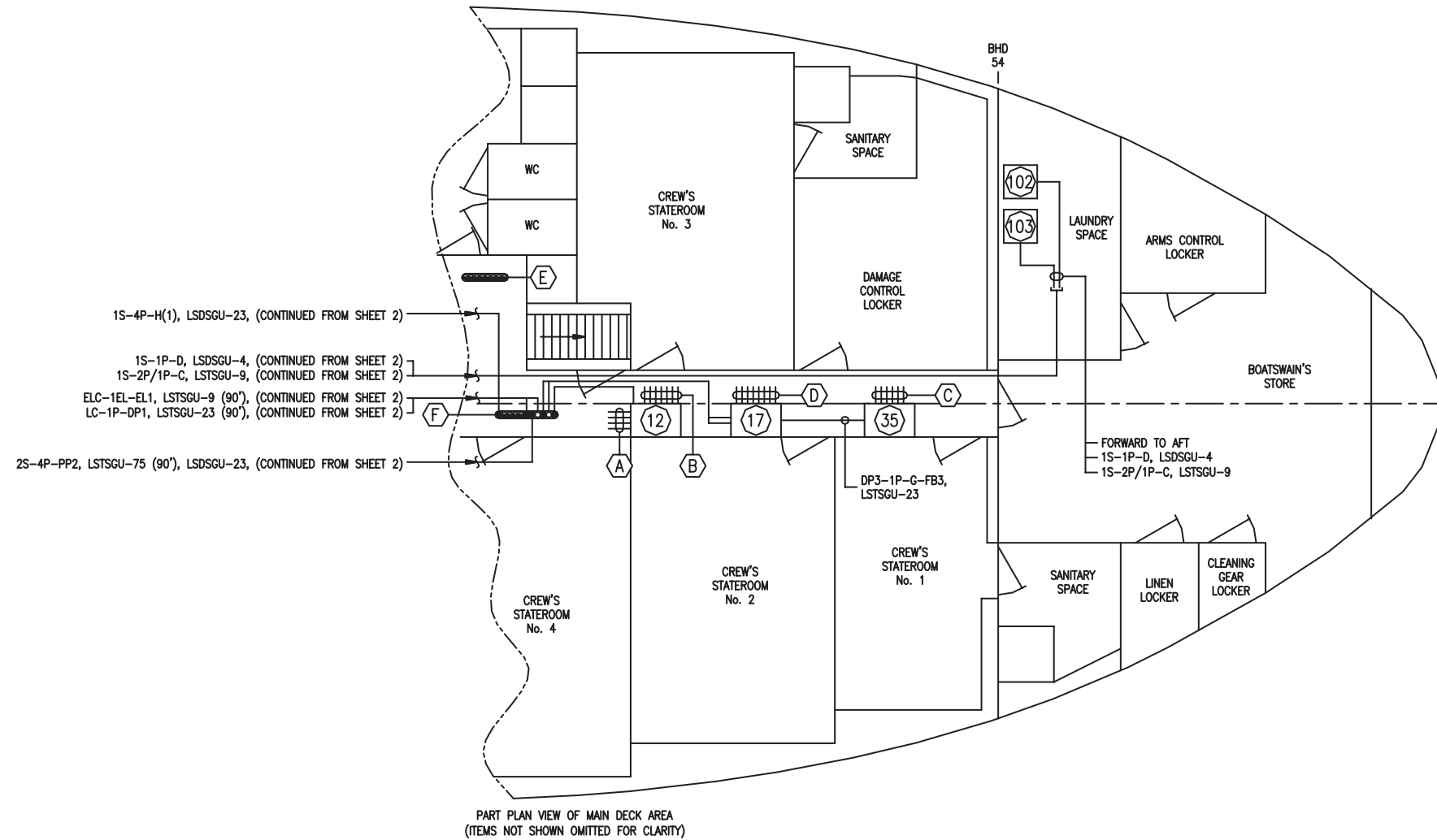




PLAN VIEW OF AUXILIARY MACHINERY SPACE No. 1  
 (ITEMS NOT SHOWN OMITTED FOR CLARITY)





























- PORT TO STBD
  - PP3-4P-E(1) (SEE FO-17)
  - PP3-4P-F(1) (SEE FO-17)
  - PP3-4P-N(1) (SEE FO-17)
  - PP3-4P-K(1) (SEE FO-17)
- FORWARD TO AFT
  - PP3-4P-A(1) (SEE FO-17)
  - PP3-4P-B(1) (SEE FO-17)
  - PP3-4P-C(1) (SEE FO-17)
  - PP3-4P-D(1) (SEE FO-17)
  - PP3-4P-G(1) (SEE FO-17)
  - PP3-4P-H(1) (SEE FO-17)
  - PP3-4P-J(1) (SEE FO-17)
- FORWARD TO AFT
  - FB3-1P-A (SEE FO-17)
  - FB3-1P-B (SEE FO-17)
  - FB3-1P-C (SEE FO-17)
  - FB3-1P-E (SEE FO-17)
  - FB3-1P-G (SEE FO-17)
  - FB3-1P-H (SEE FO-17)
- FORWARD TO AFT
  - DP3-1L-A (SEE FO-11)
  - DP3-1L-B (SEE FO-11)
  - DP3-1L-C (SEE FO-11)
  - DP3-1L-D (SEE FO-11)
  - DP3-1L-E (SEE FO-11)
  - DP3-1L-F (SEE FO-11)
  - DP3-1L-J (SEE FO-11)
  - DP3-1P-M(1) (SEE FO-17)
- FORWARD TO AFT
  - EDP-4EP-A(1), LSTSGU-9 (125')
  - EDP-4EP-B(1), LSTSGU-23 (120')
  - EDP-4EP-F(1), LSTSGU-23 (125')
  - EDP-4EP-E(1), LSTSGU-4 (95')
  - ELC-1EP-EDP1, LSTSGU-14 (45')
  - 1E-4EP-TB3, LSTSGU-75 (115')
  - 1E-1EK-TB159, LSDSGU-4 (115')
  - 2S-4P-ACDP(2), LSTSGU-50
- (LOCATED IN STAIRWAY SPACE)
  - FORWARD TO AFT
  - 2S-4P-PP3, LSTSGU-75
  - DP3-1P-H-FB1, LSTSGU-23
  - LC-1P-DP3, LSTSGU-75 (40')
  - ELC-1EL-EL1, LSTSGU-9 (90')
  - 2S-4P-PP2, LSTSGU-75 (90')
  - LC-1P-DP1, LSTSGU-23 (90')
  - LC-1P-DP2, LSTSGU-75 (110')
  - 1S-4P-C(1) (SEE FO-17)
  - 1S-4P-F(1) (SEE FO-17)
  - DP4-1P-F(1), LSDSGU-4 (65')
  - 1S-4P-H(1), LSDSGU-23



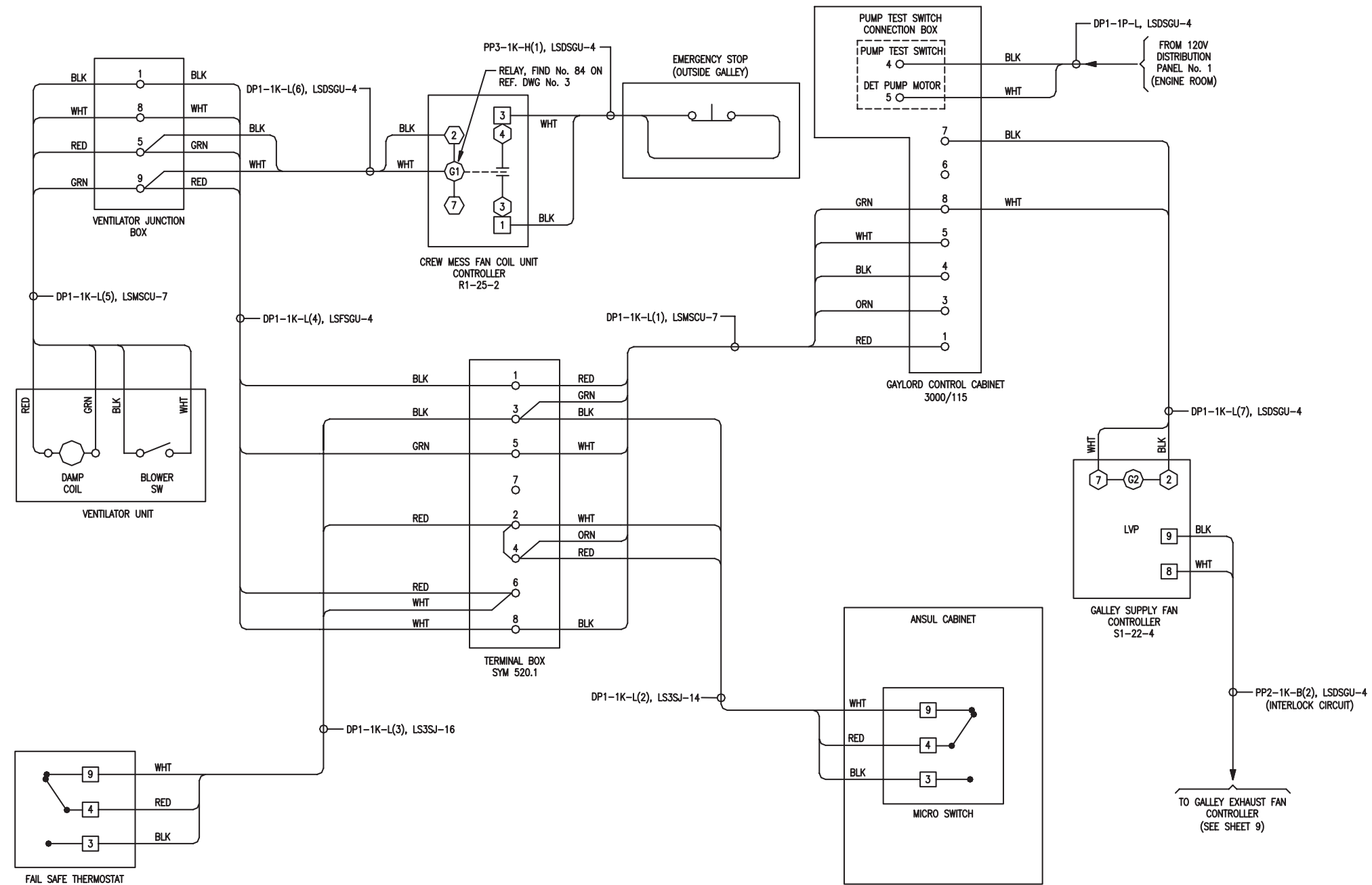


**LEGEND**

	CONTROLLER TERMINAL		RECEPTACLE
	RELAY TERMINAL		FUSE UNIT WITH RATING
	RELAY COIL		INDICATOR LAMP WITH LENS COLOR
	N/O RELAY CONTACT		AUXILIARY LOAD WITH KW RATING
	SWITCH CONTACT		PRESS TO TEST PUSHBUTTON
	DAMPER COIL		BATTERY CHARGER
	EMERGENCY STOP CONTACT		MOTOR CONTROLLER WITH LOW VOLTAGE PROTECTION
	2 SPEED MOTOR WITH HP RATINGS		CONTROLLER
	1 SPEED MOTOR WITH HP RATING		EMERGENCY STOP
	PRESSURE SWITCH		MOLDED CASE CIRCUIT BREAKER WITH RATING BOLT IN TYPE FOR PANELS
	FLOAT SWITCH (N/O)		JUNCTION BOX
	FLOAT SWITCH (N/O)		THERMOSTAT
	ALARM BELL		TRANSFORMER

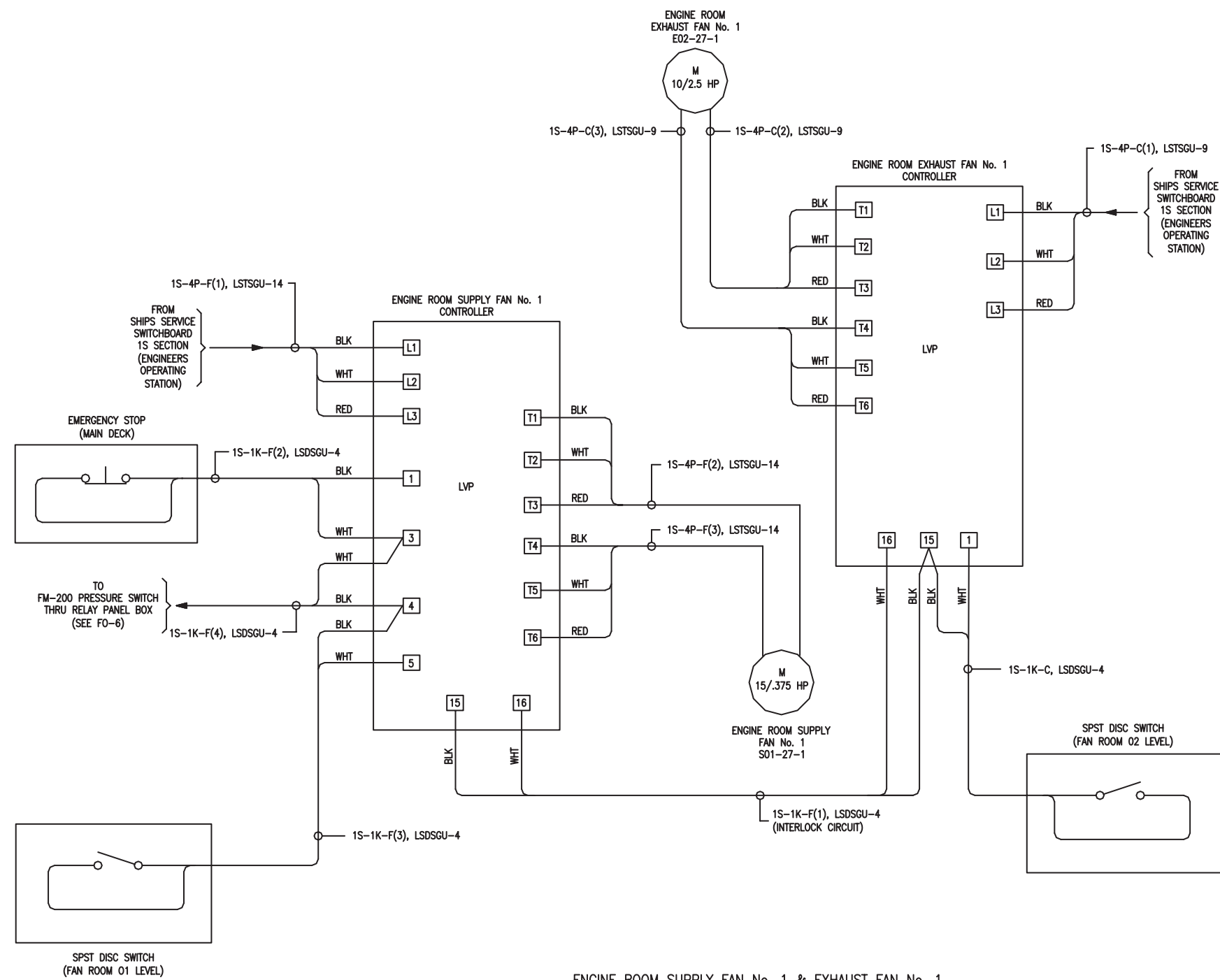






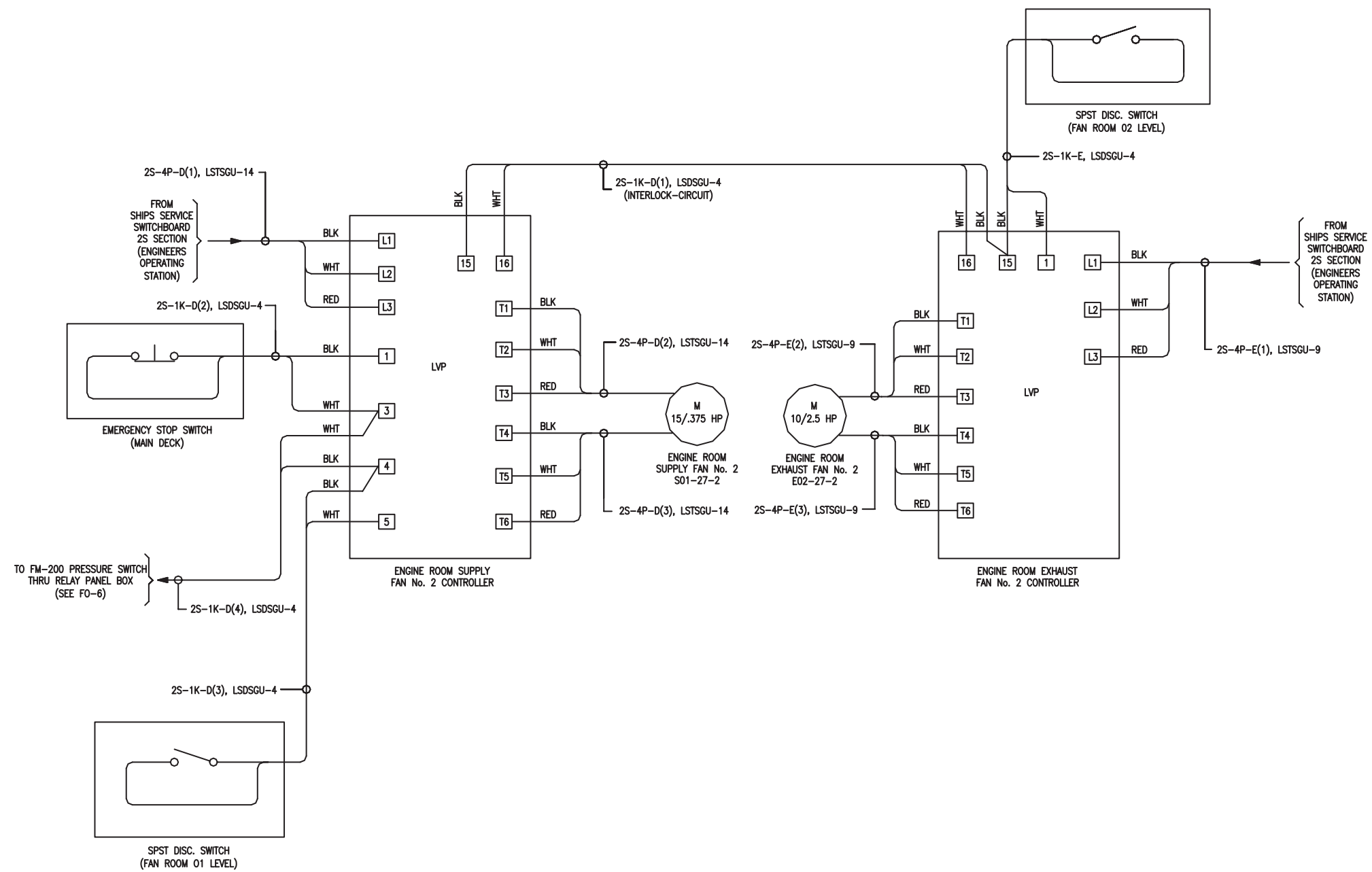
GAYLORD HOOD FAN CIRCUIT





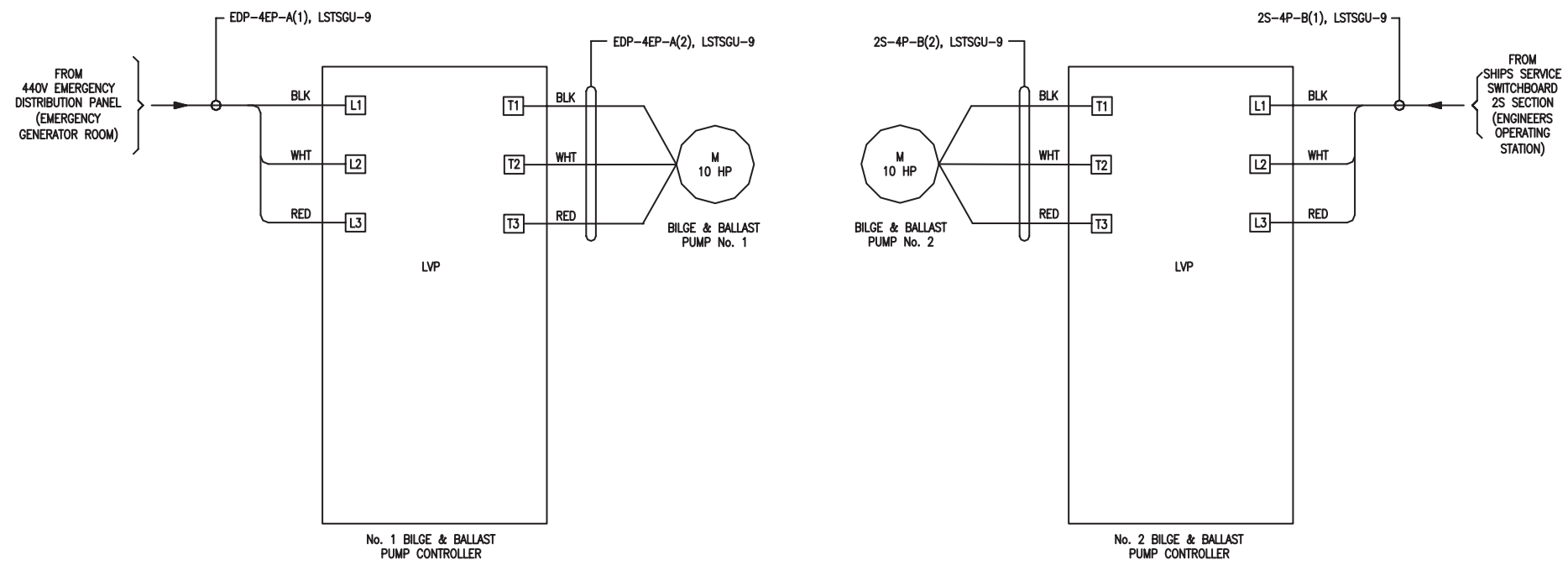
ENGINE ROOM SUPPLY FAN No. 1 & EXHAUST FAN No. 1





ENGINE ROOM SUPPLY FAN No. 2 & EXHAUST FAN No. 2

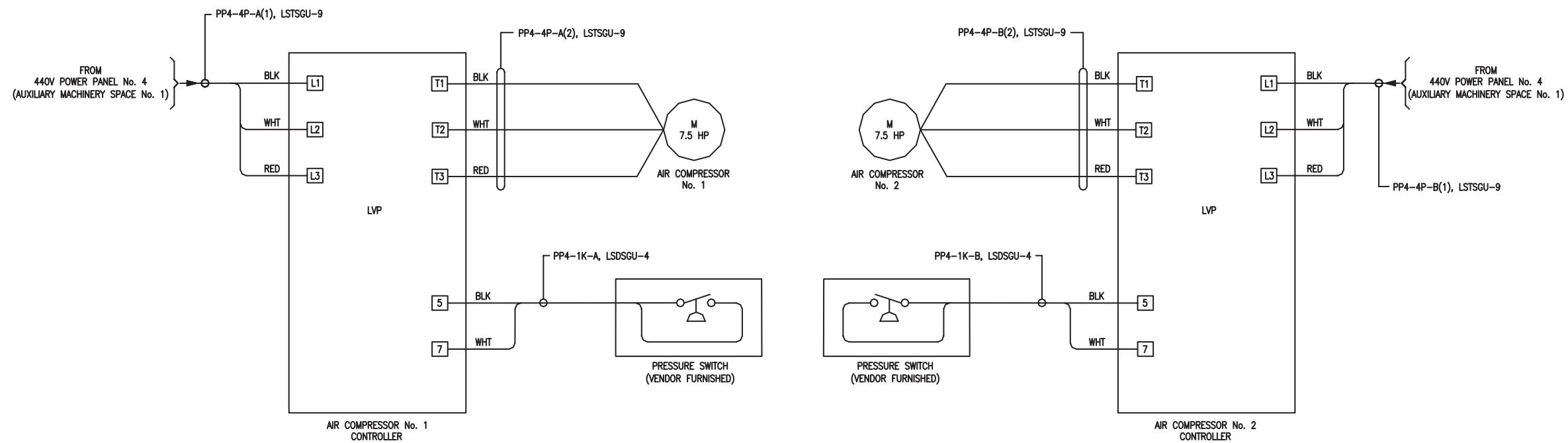




BILGE & BALLAST PUMP No. 1 & No. 2

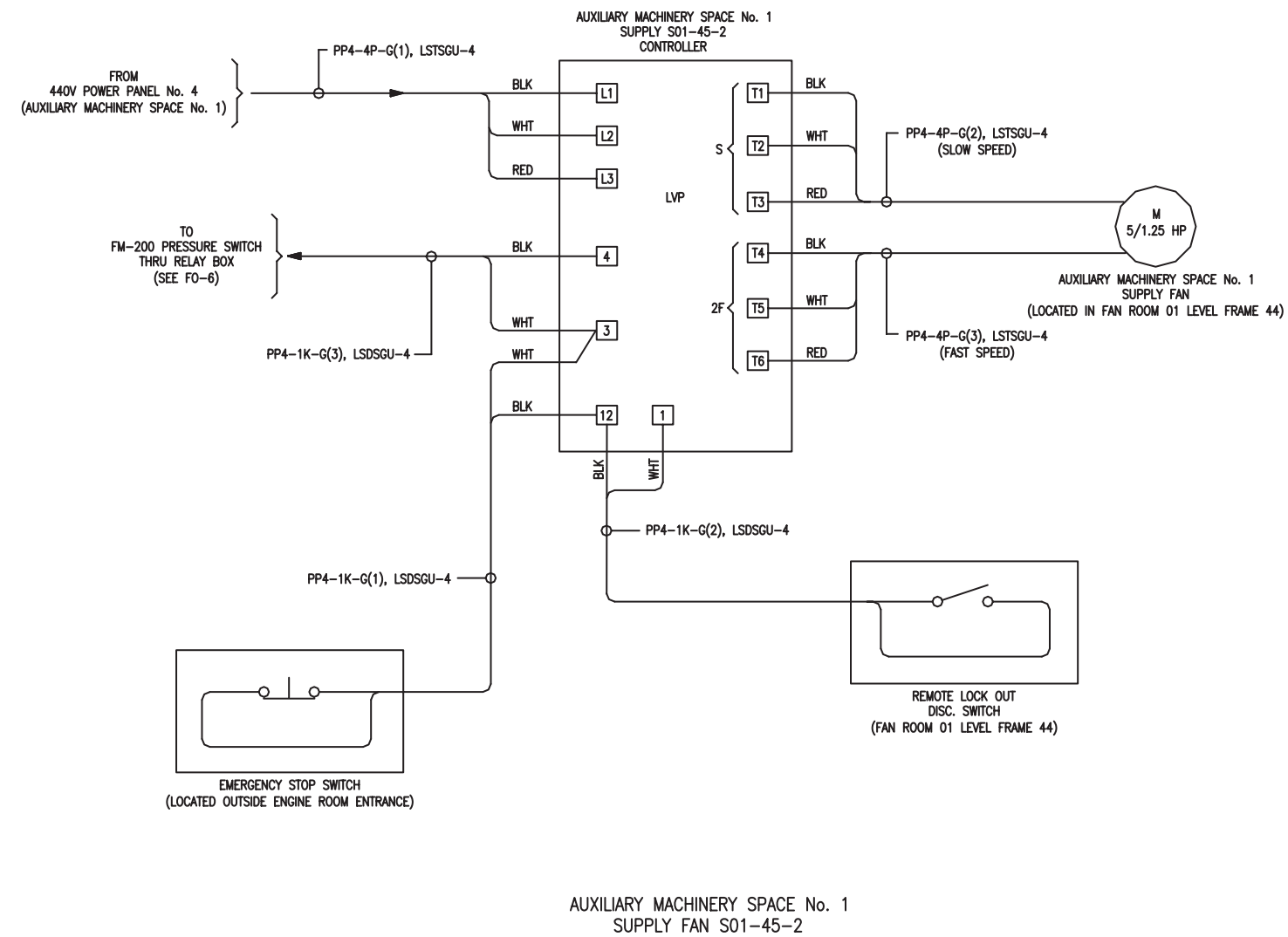




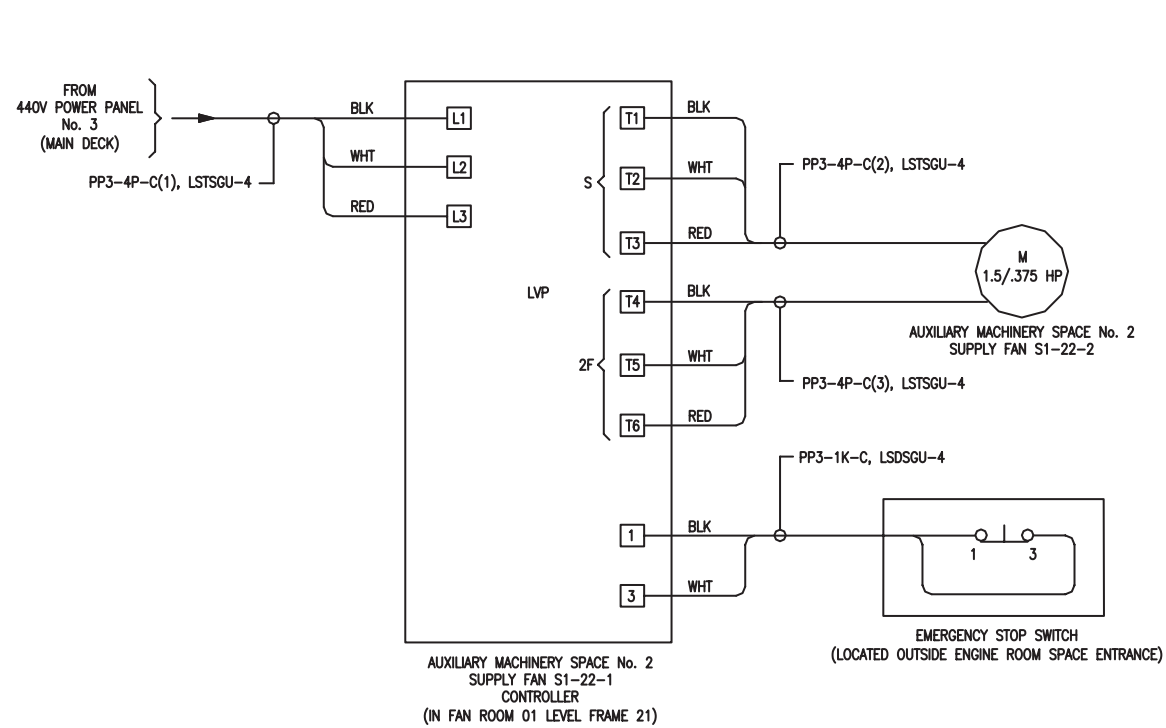


AIR COMPRESSOR No. 1 & No. 2

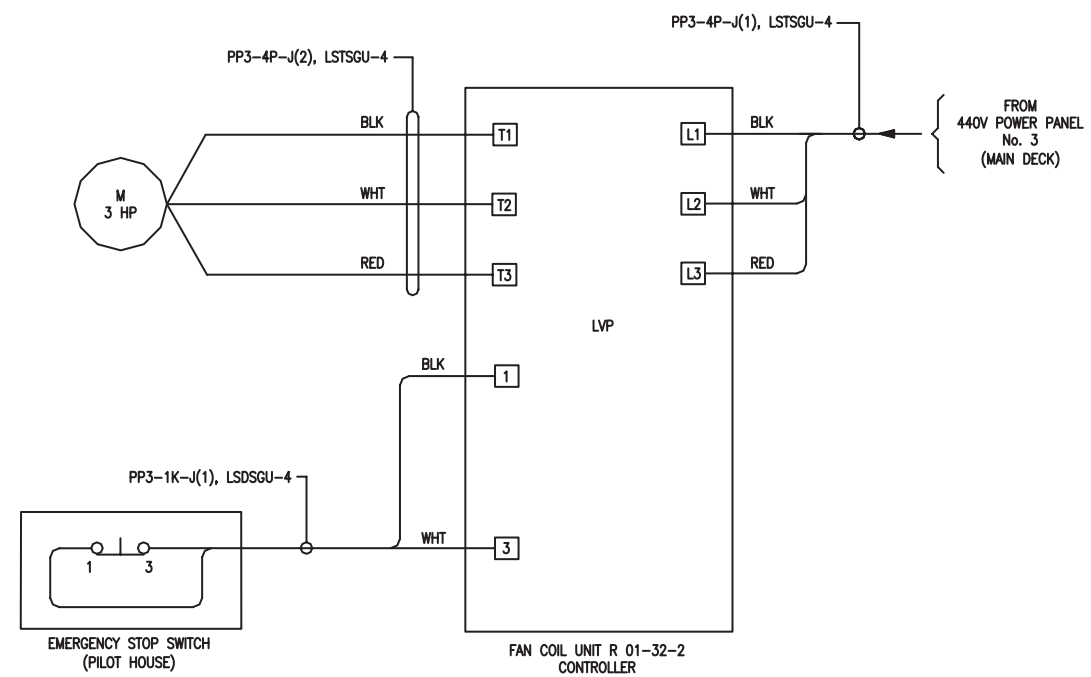




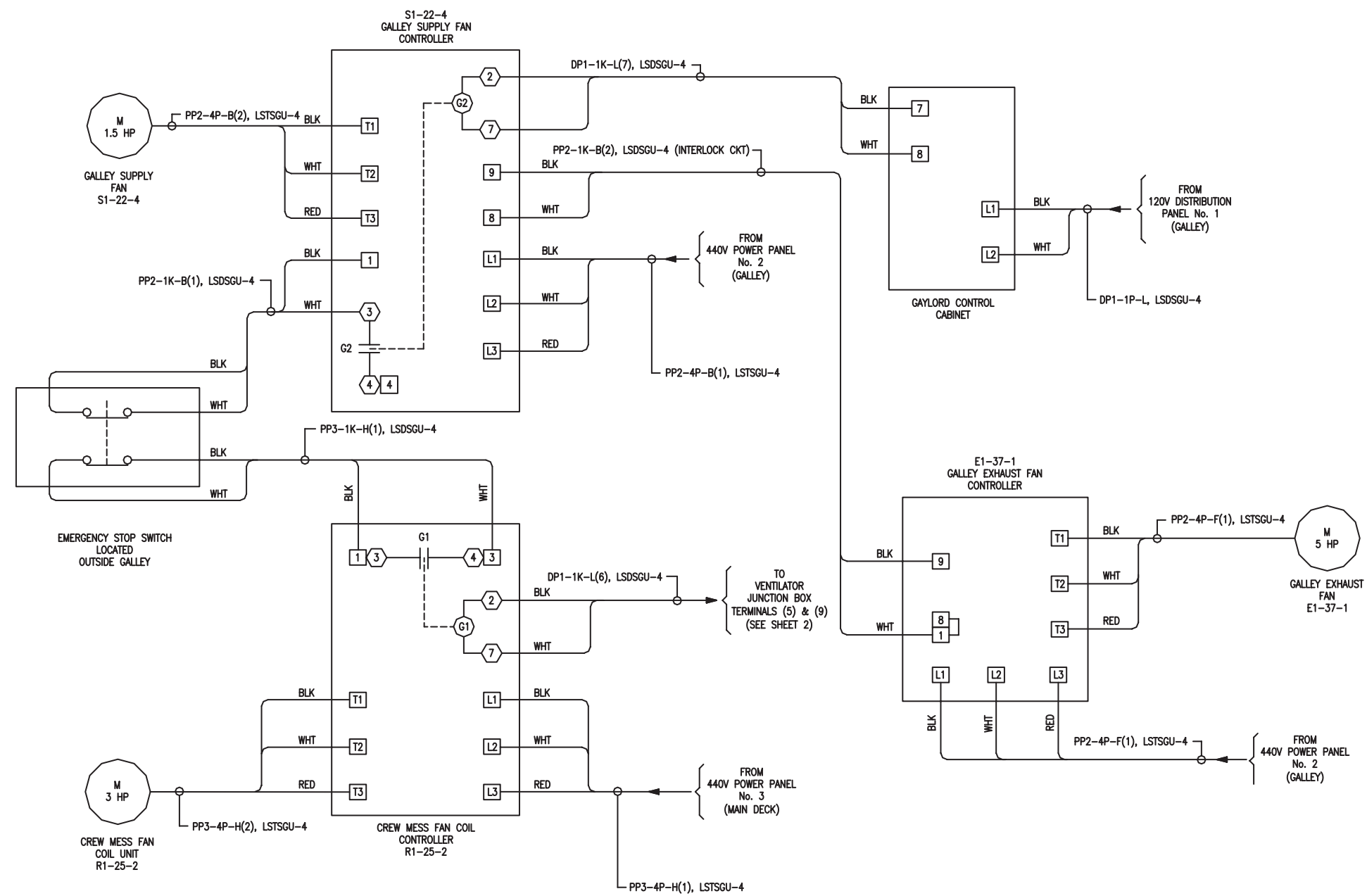




AUXILIARY MACHINERY SPACE No. 2  
SUPPLY FAN S1-22-2  
FAN COIL UNIT R01-32-2



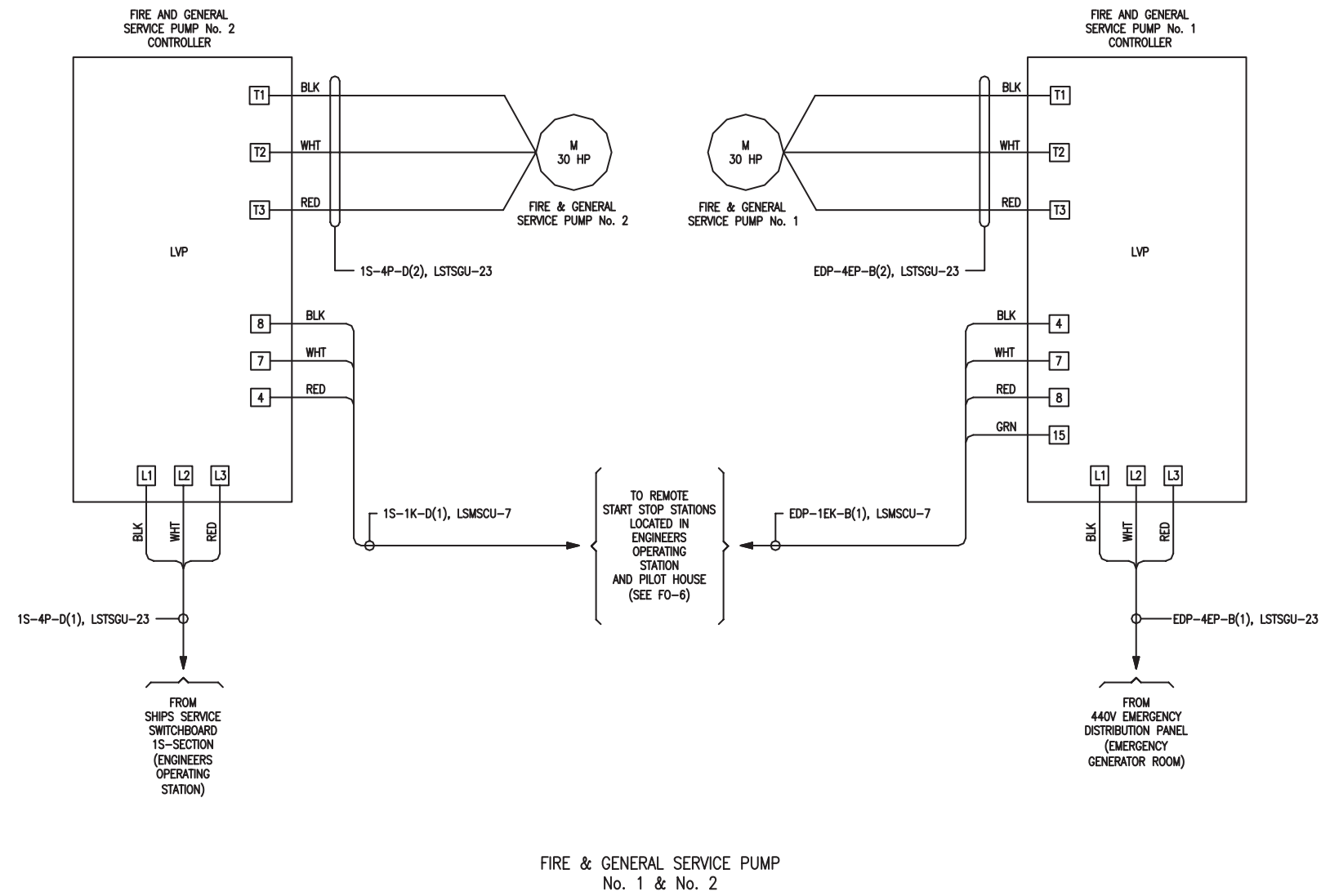




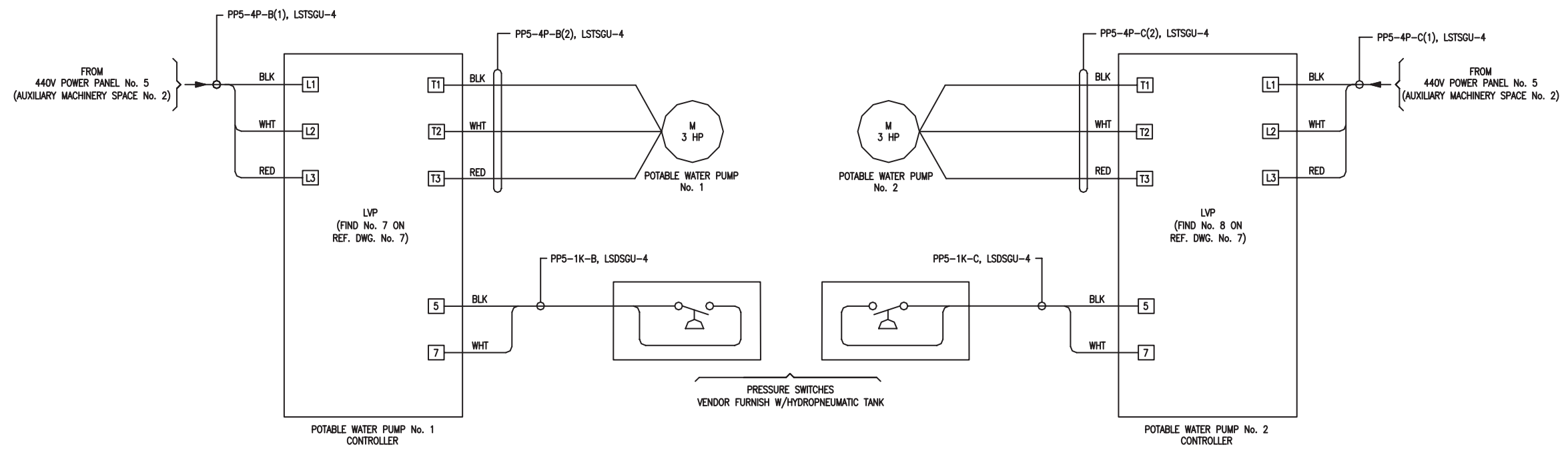
VIEW 69-A  
 GALLEY SUPPLY/EXHAUST & FAN COIL UNIT R1-25-2





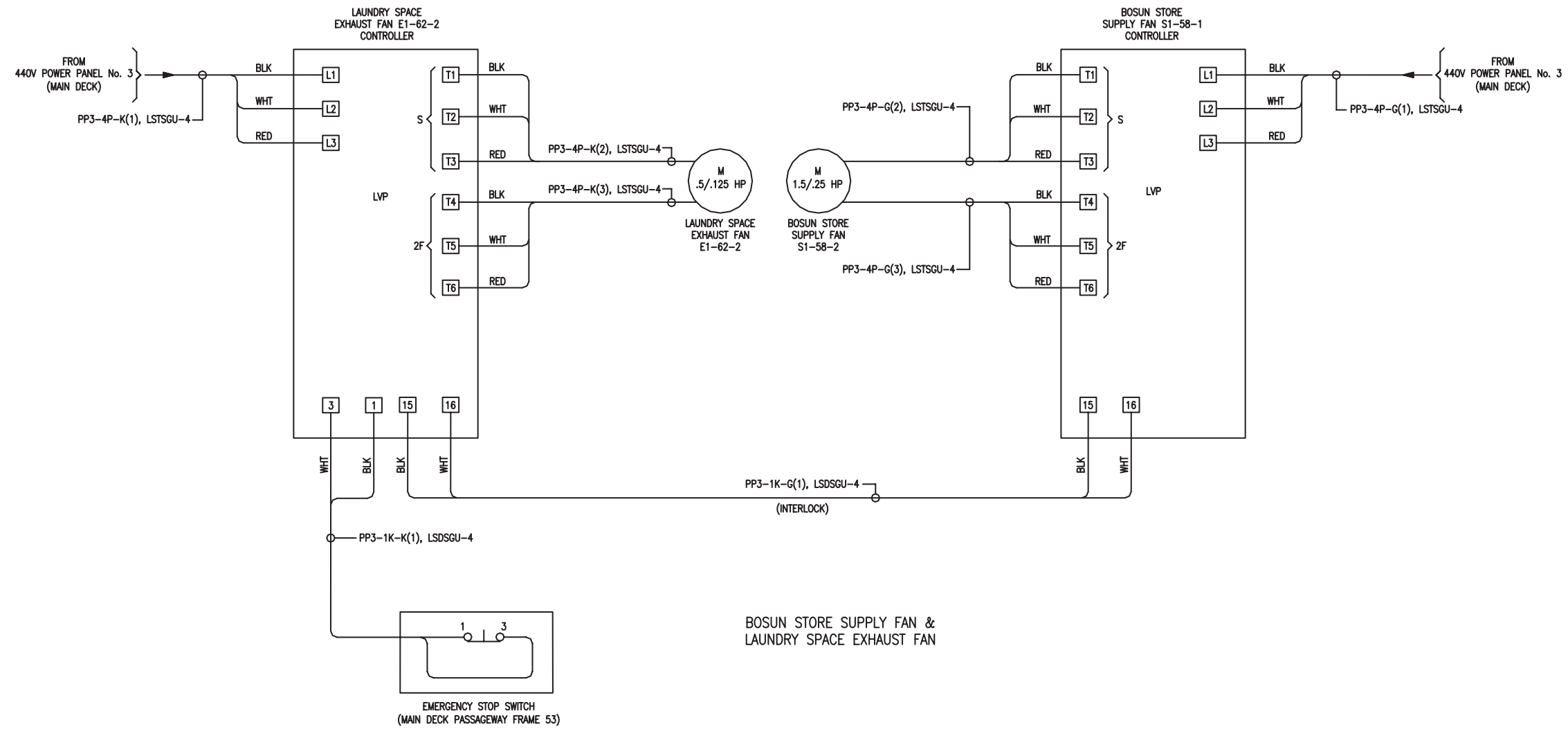




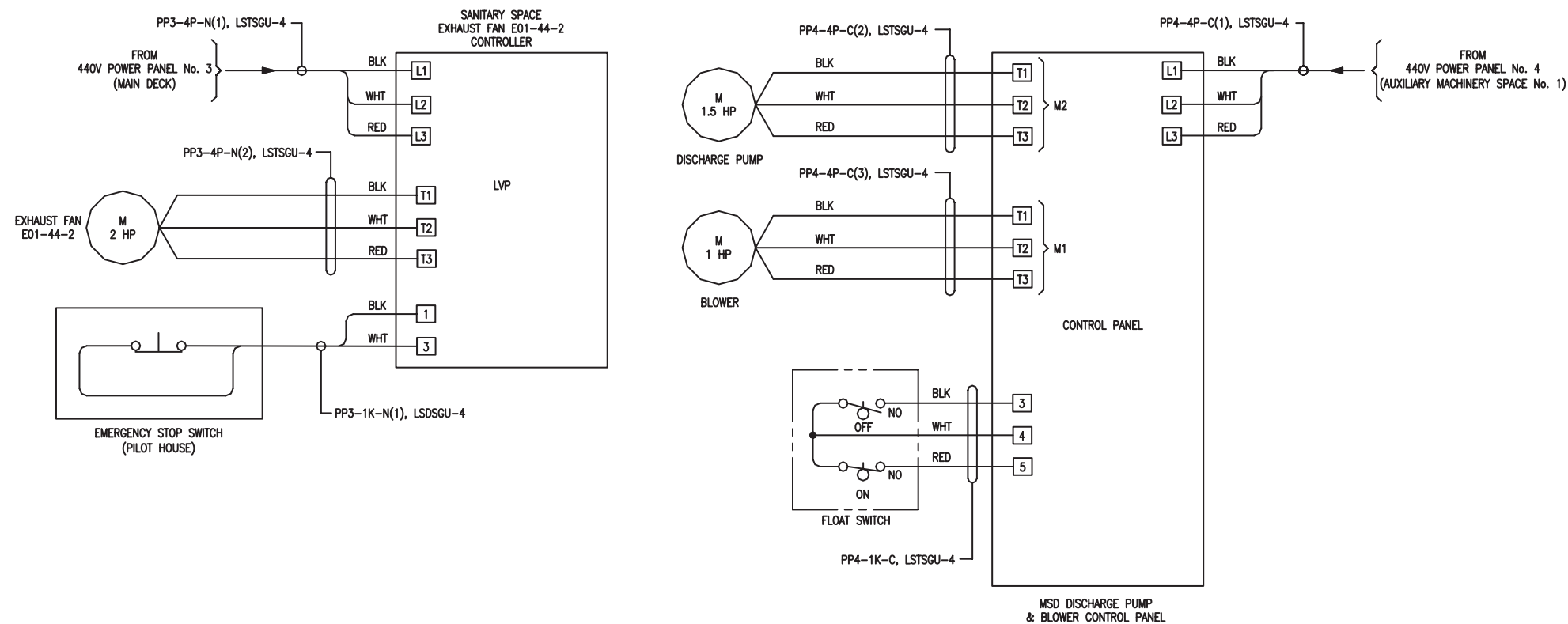


POTABLE WATER PUMP No. 1 & No. 2





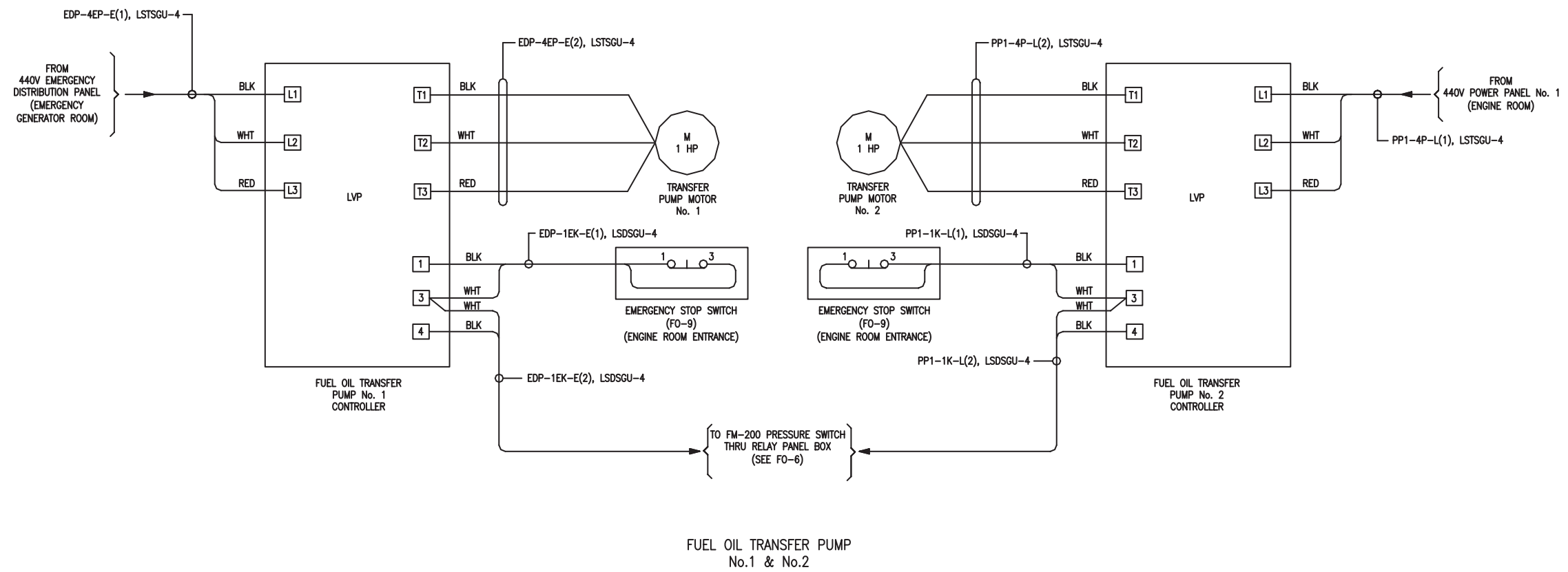




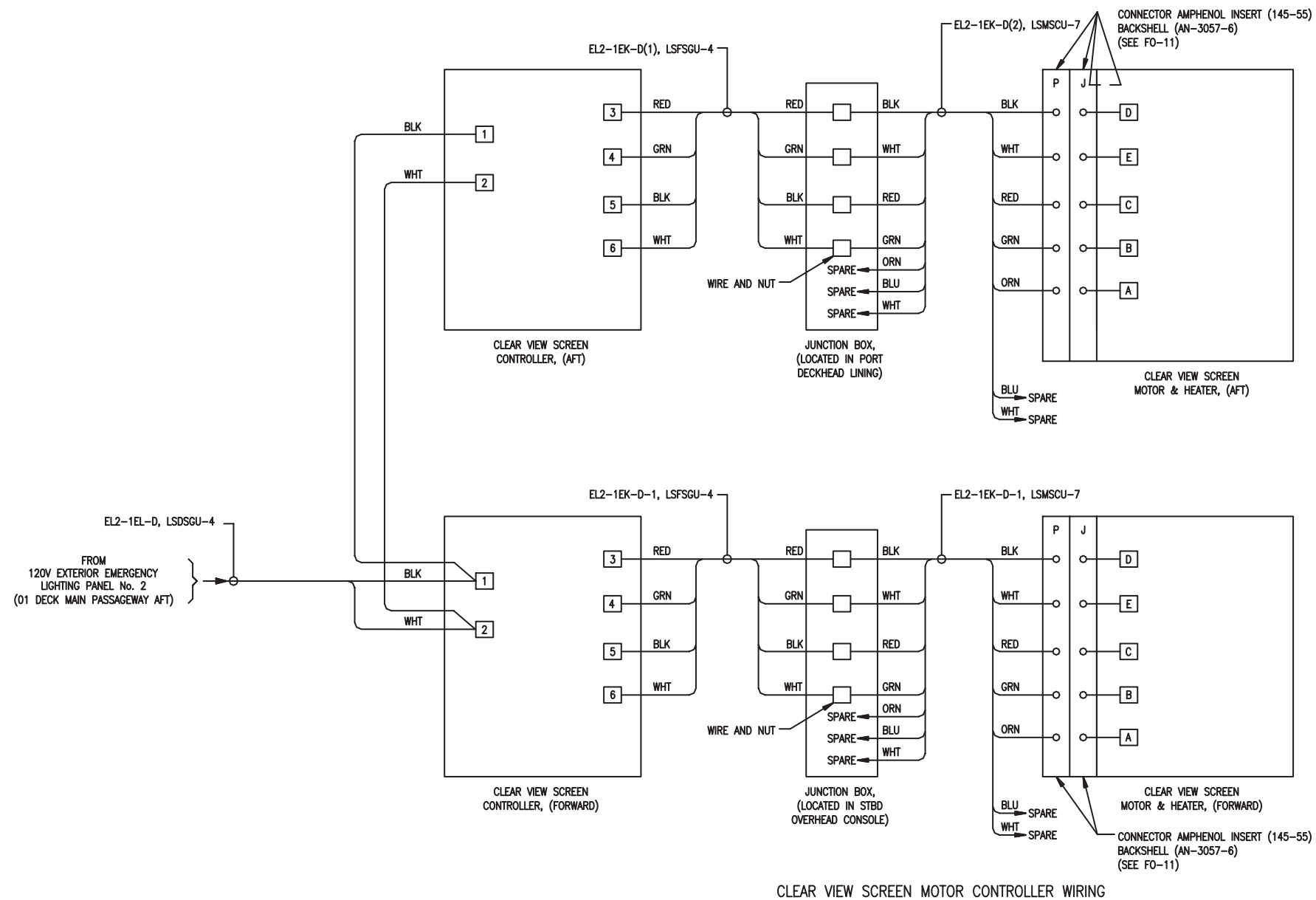
MSD SYSTEM & SANITARY EXHAUST FAN 01-44-2





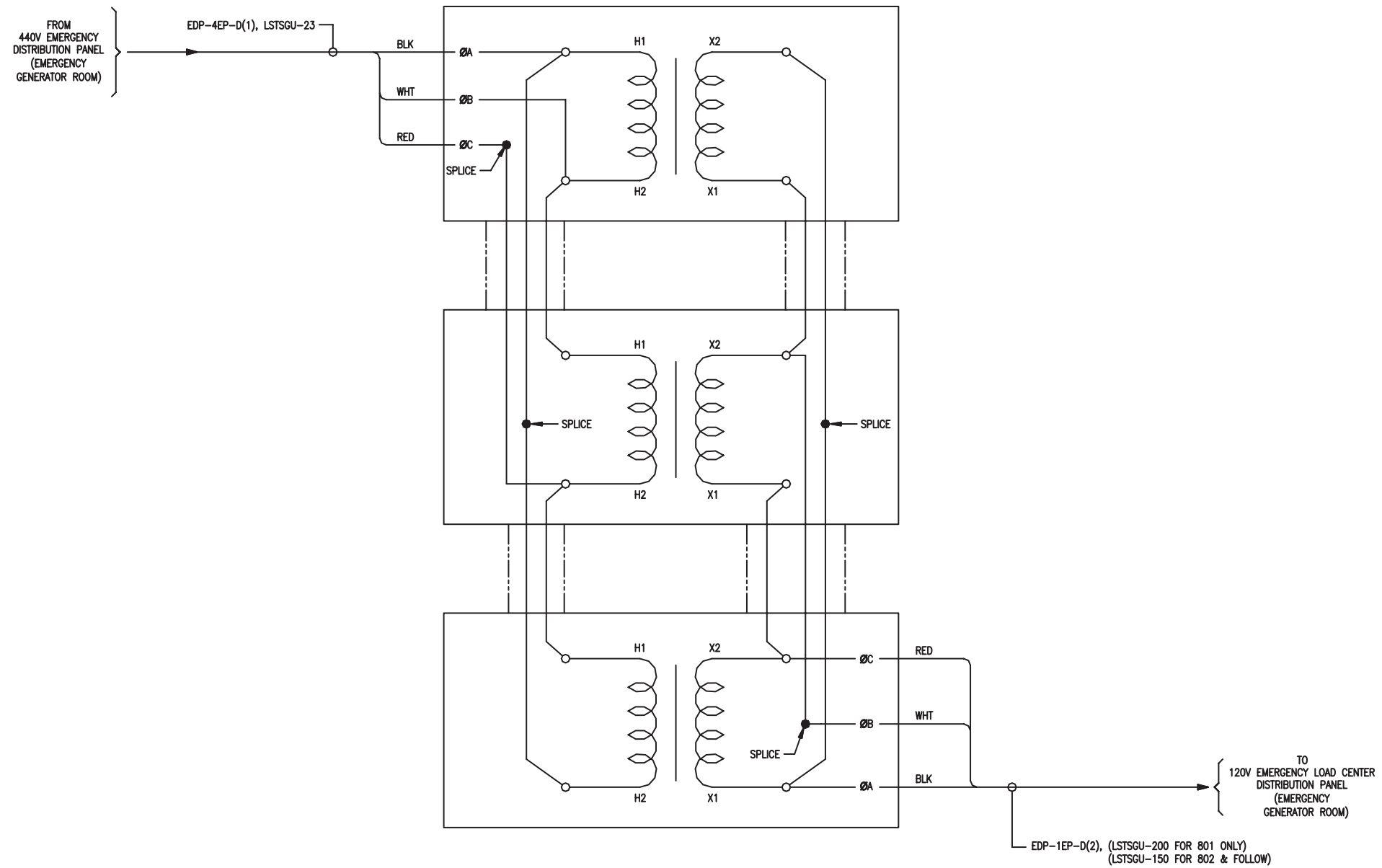






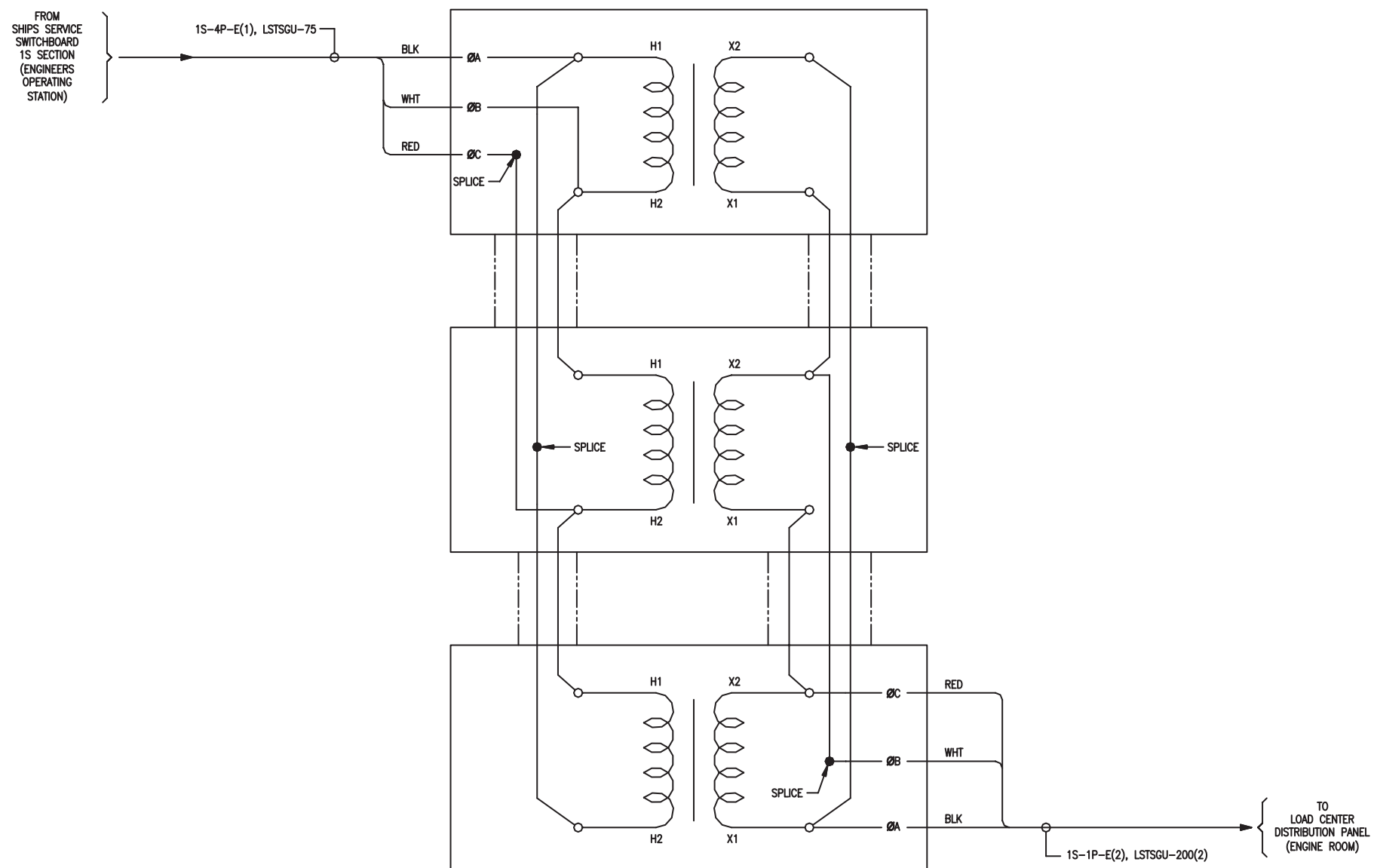
CLEAR VIEW SCREEN MOTOR CONTROLLER WIRING





THREE 10 440/120V 10KVA TRANSFORMER BANK  
WIRING DIAGRAM FOR EMERGENCY LOAD CENTER DISTRIBUTION PANEL

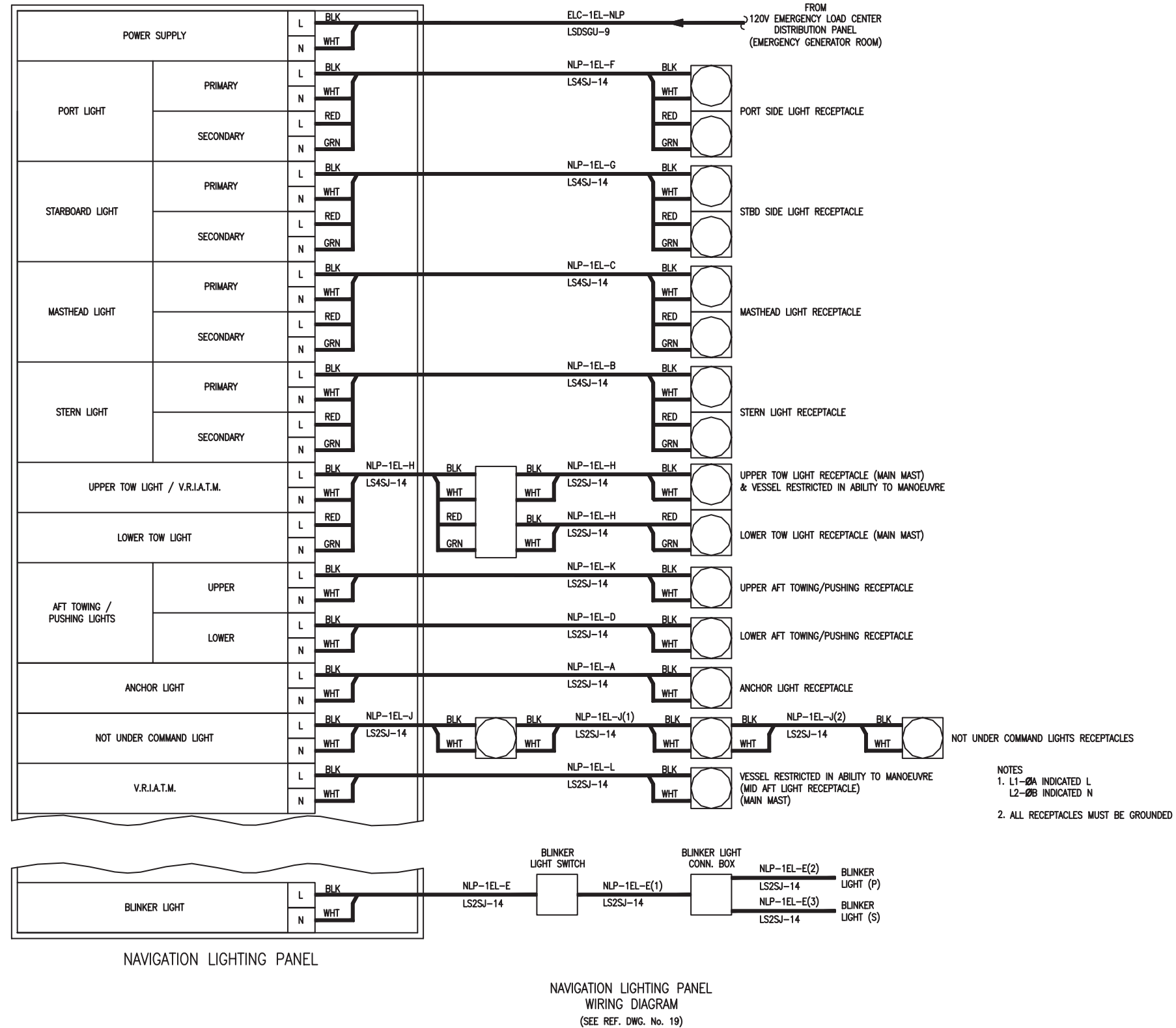




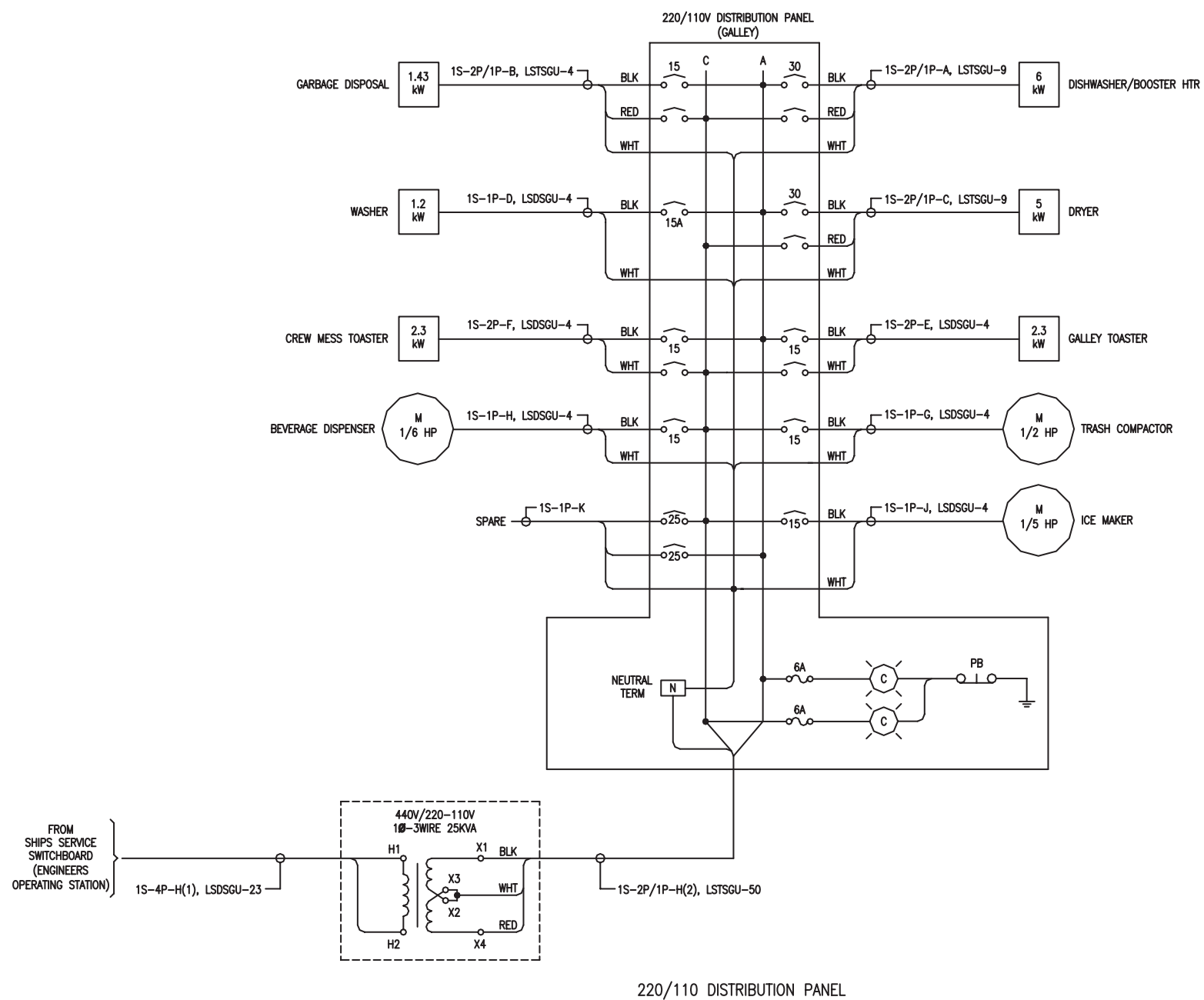
THREE 1Ø 440/120V 25KVA TRANSFORMER BANK  
WIRING DIAGRAM FOR ENGINE ROOM LOAD CENTER DISTRIBUTION PANEL



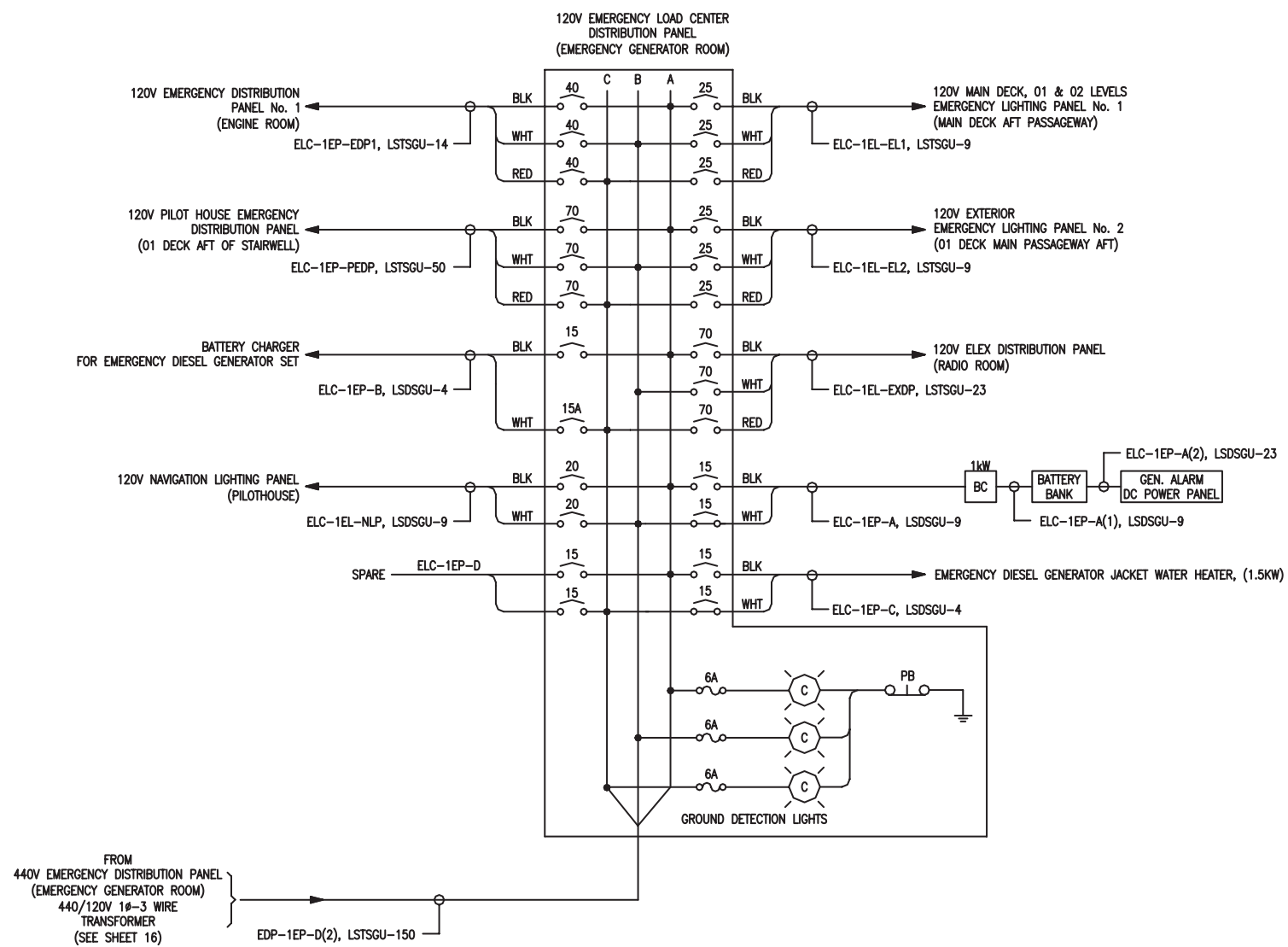






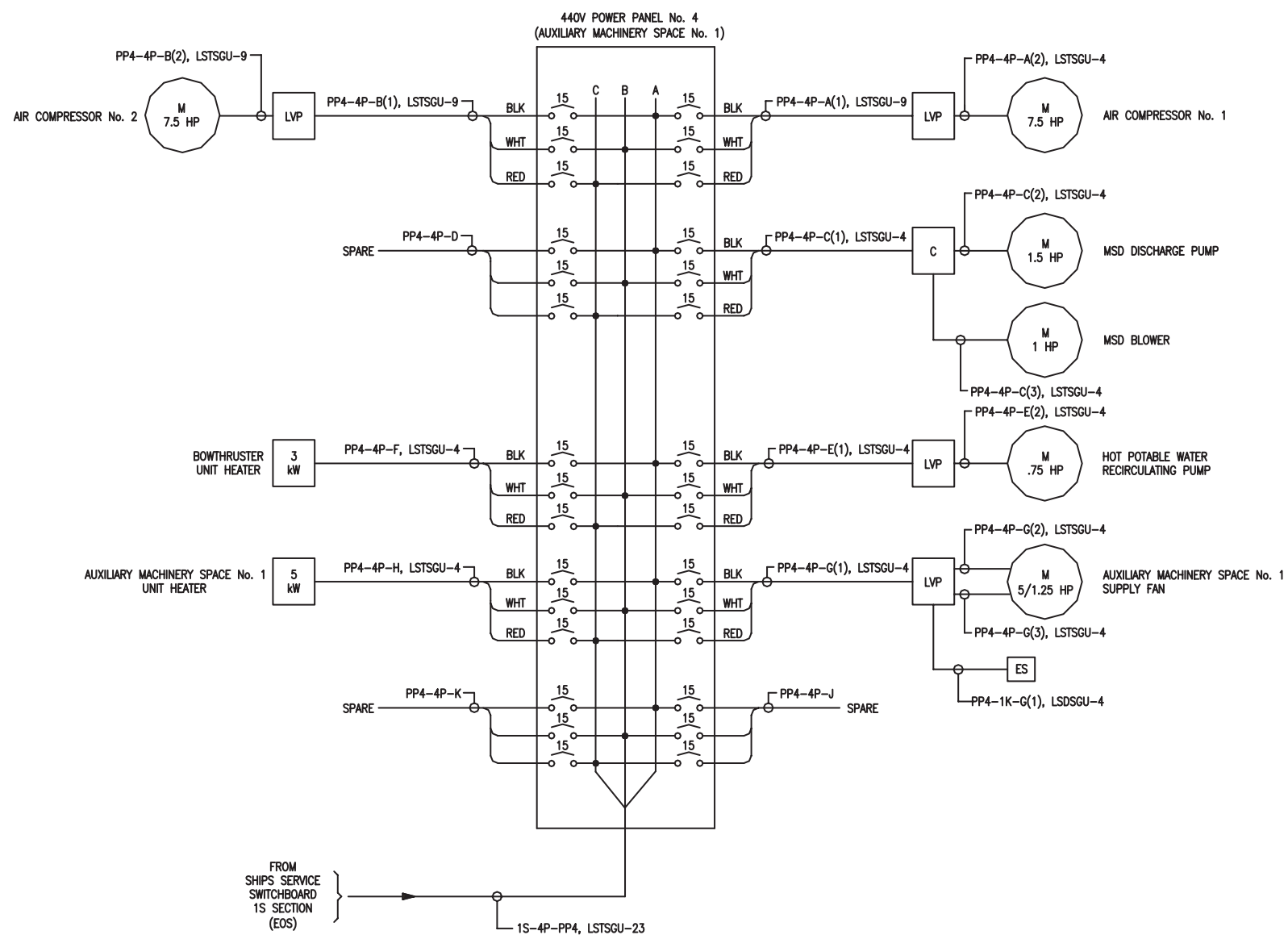






120V EMERGENCY LOAD CENTER WIRING DIAGRAM

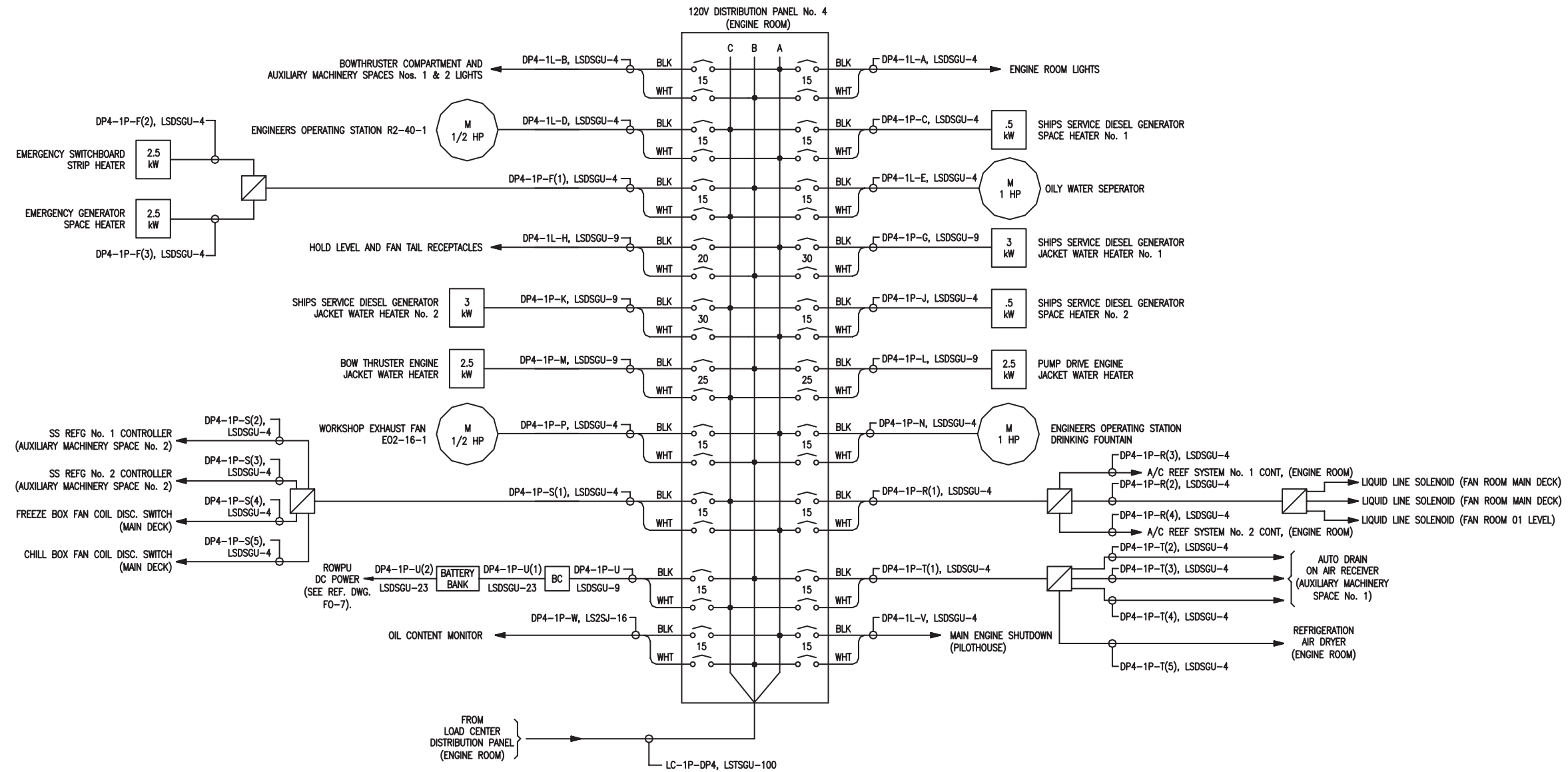




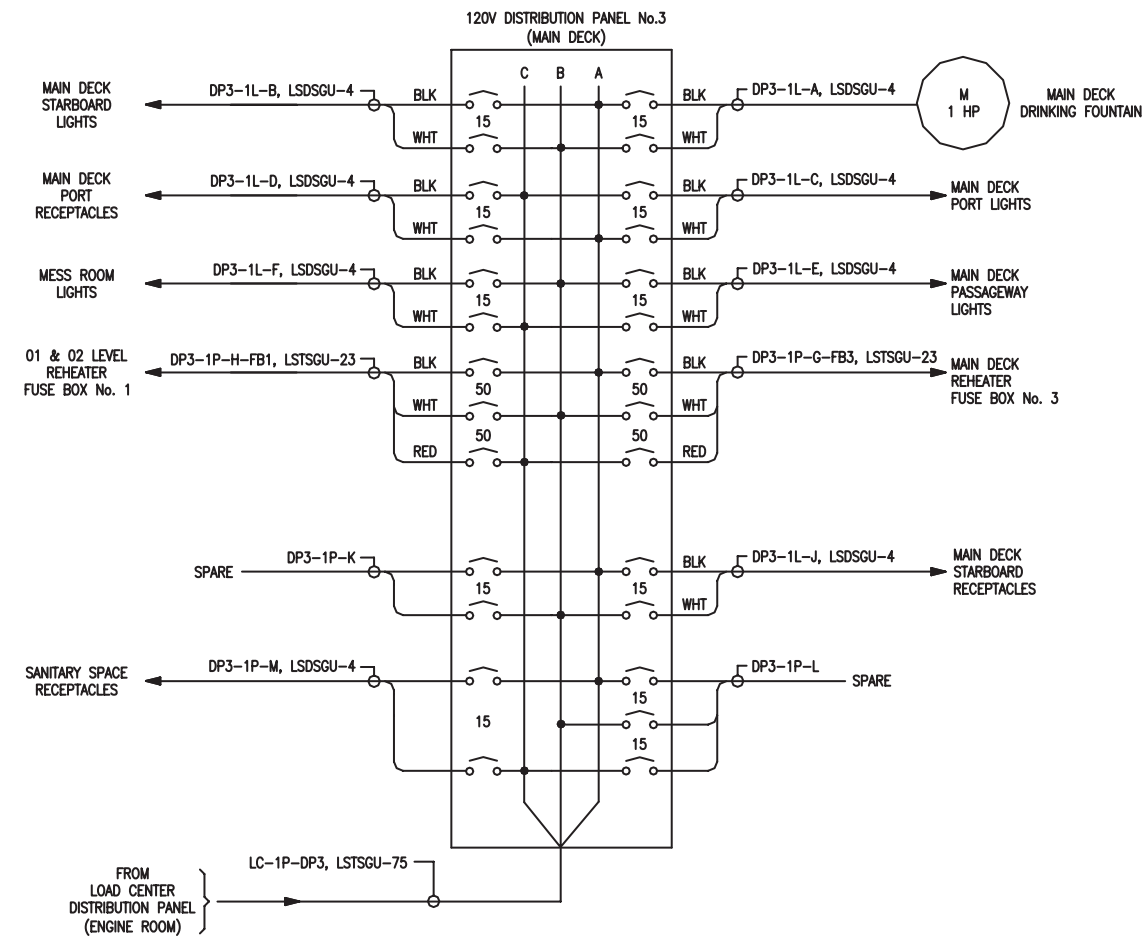
440V POWER PANEL No. 4 WIRING DIAGRAM





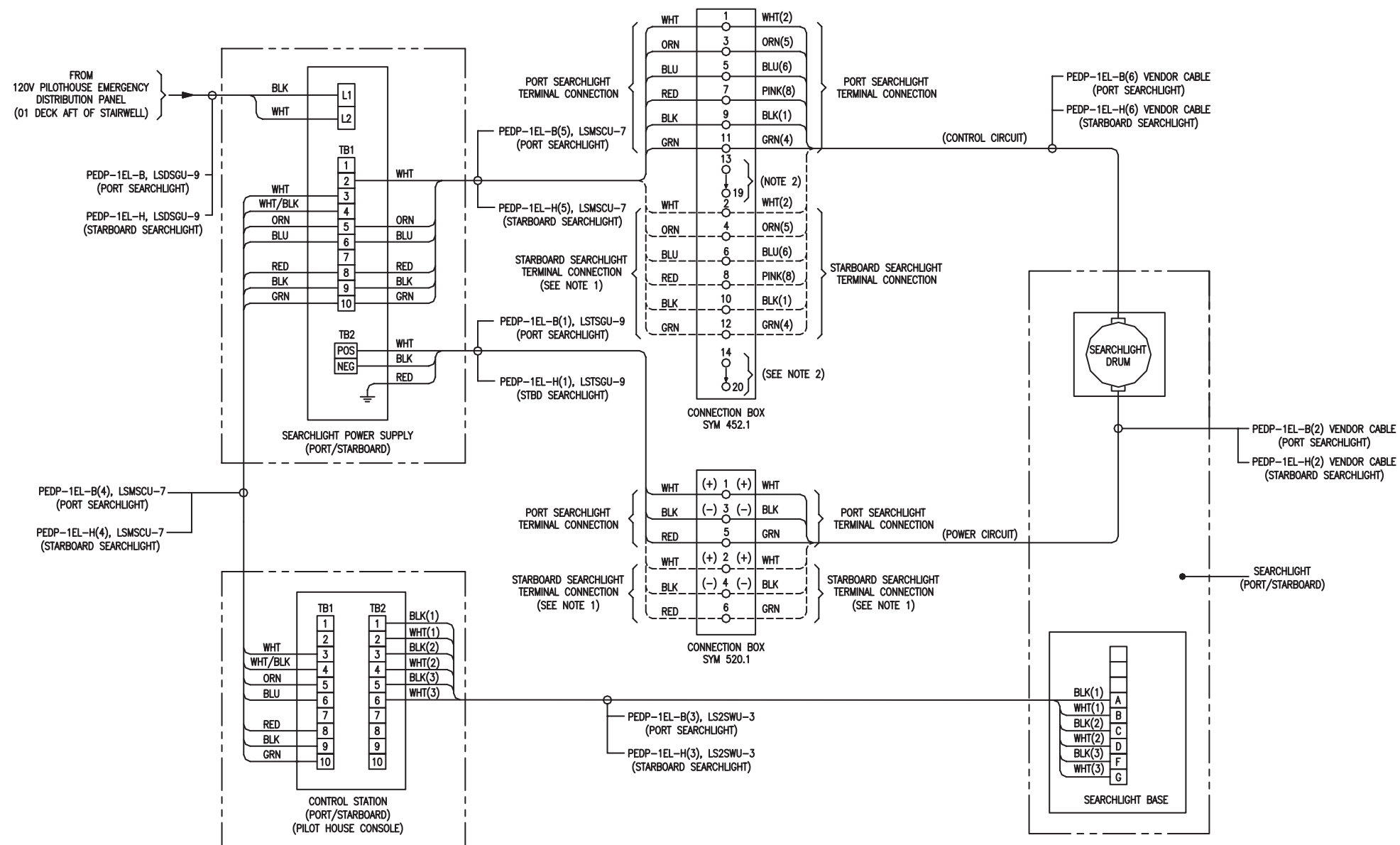






120V DISTRIBUTION PANEL No. 3 WIRING DIAGRAM

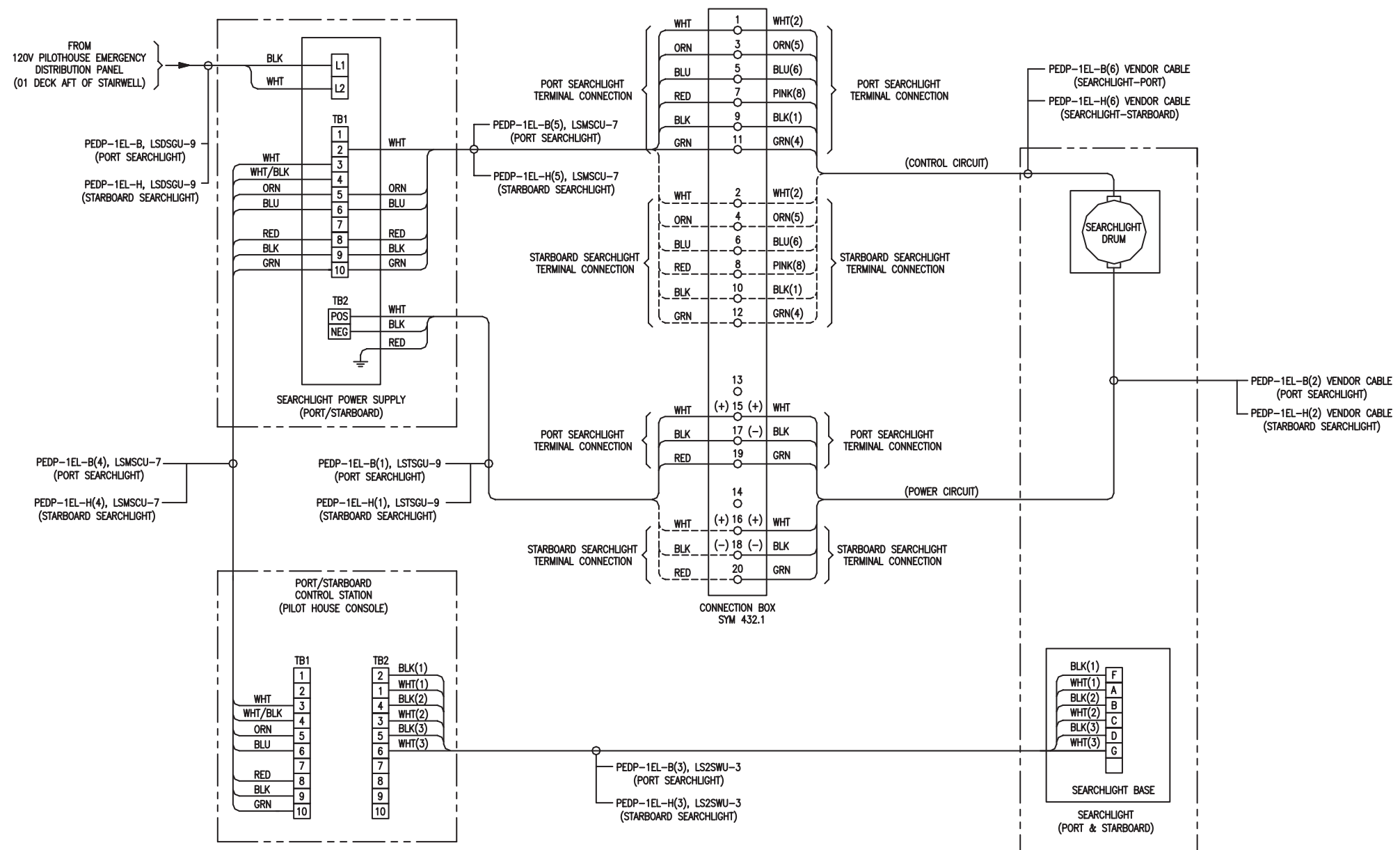




- WIRE CODE**
1. ---- STARBOARD SEARCHLIGHT TERMINAL CONNECTION FOR CONNECTION BOX SYM 432.1 & SYM 520.1
  2. FOR CONNECTION BOX SYM 432.1:  
 TB13 THRU 19 } SPARE  
 TB14 THRU 20 } SPARE

SEARCHLIGHT WIRING DIAGRAM

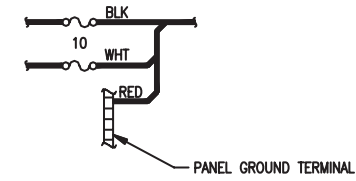




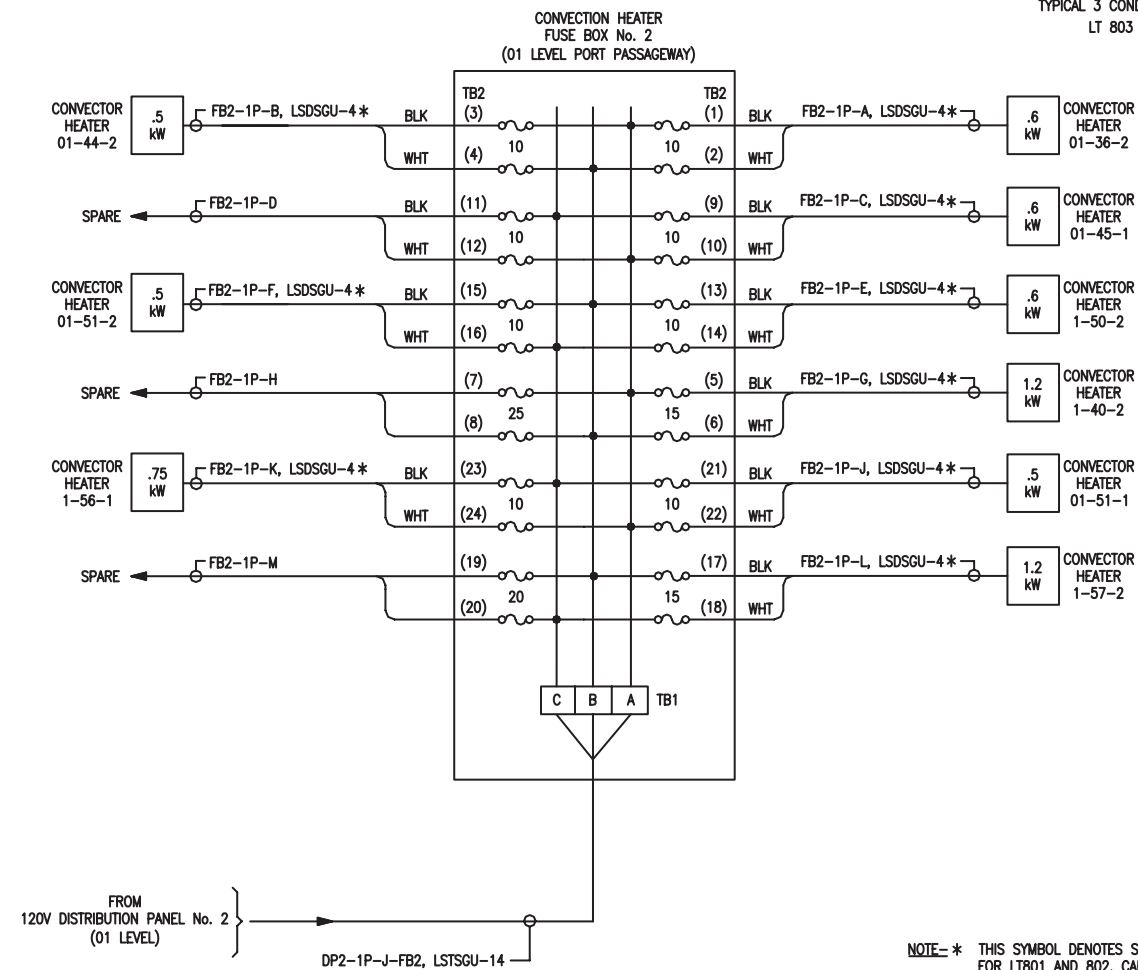
SEARCHLIGHT WIRING DIAGRAM







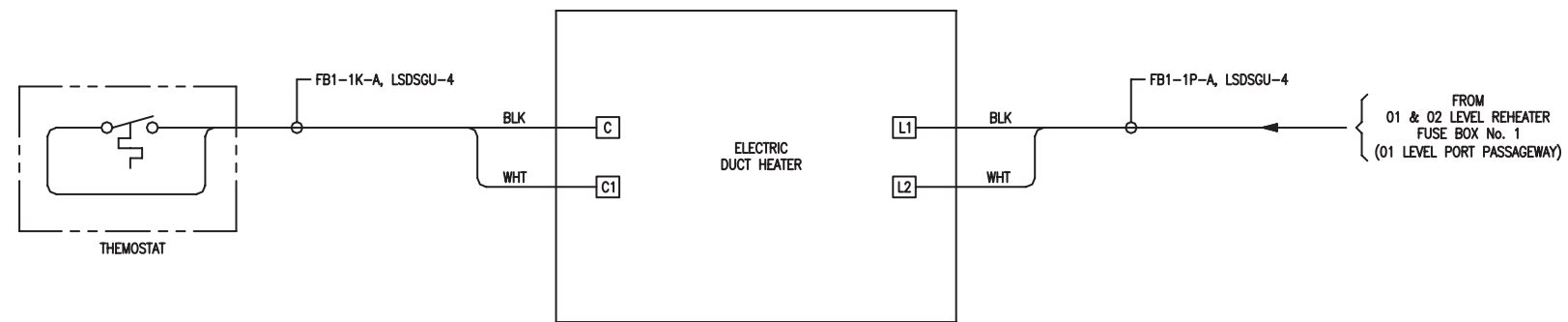
DETAIL 235-D  
TYPICAL 3 CONDUCTOR CABLE HOOK-UP  
LT 803 & FOLLOW ONLY



NOTE- \* THIS SYMBOL DENOTES SPLIT-SHIP APPLICABILITY FOR MATERIAL.  
FOR LT801 AND 802, CABLE TYPE LSTSGU-4 SHOULD BE USED FOR INSTALLATION.  
FOR LT803, CABLE TYPE LSTSGU-4 SHOULD BE USED FOR INSTALLATION.  
SEE DETAIL 235-D FOR TYPICAL THREE CONDUCTOR CONNECTIONS TO HEATER FUSE BOX.

CONVECTION HEATER FUSE BOX No. 2  
WIRING DIAGRAM

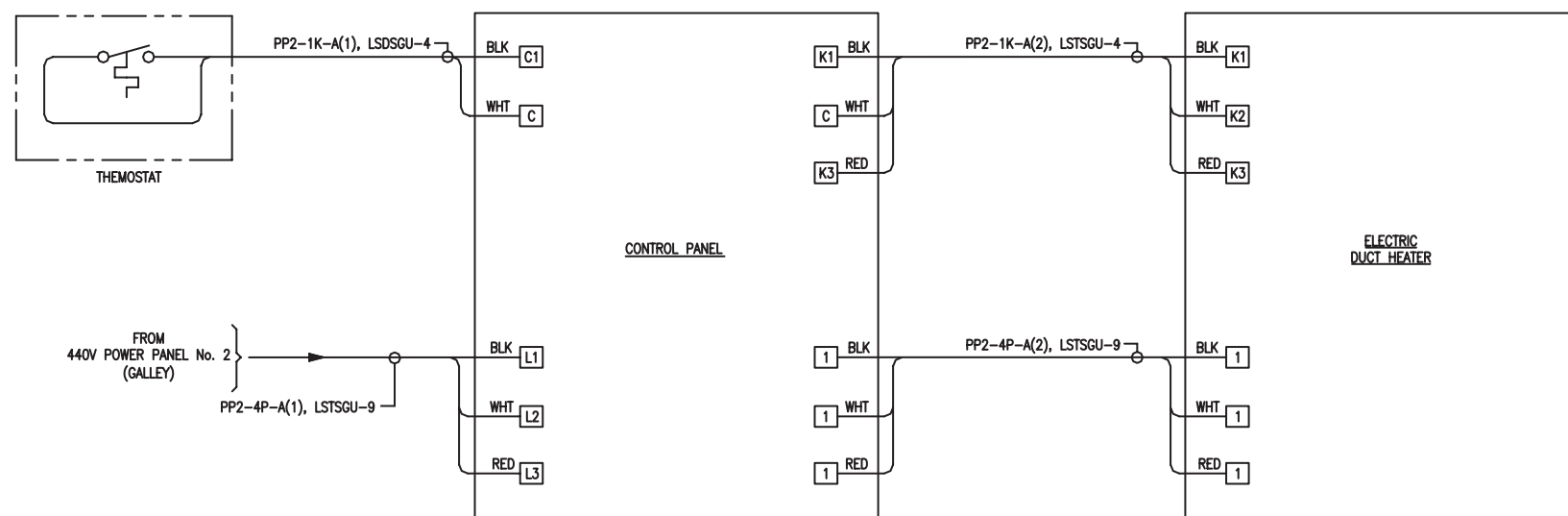




TYPICAL FOR REHEATER:  
 02-44-1 01-39-2  
 02-46-2 01-31-1  
 01-41-1 01-31-2  
 01-50-1 01-42-1  
 01-50-2 01-45-2  
 01-48-1  
 01-52-1

TYPICAL WIRING DIAGRAM FOR TERMINAL REHEATER  
 (TERMINAL REHEATER 01-34-1 SHOWN)

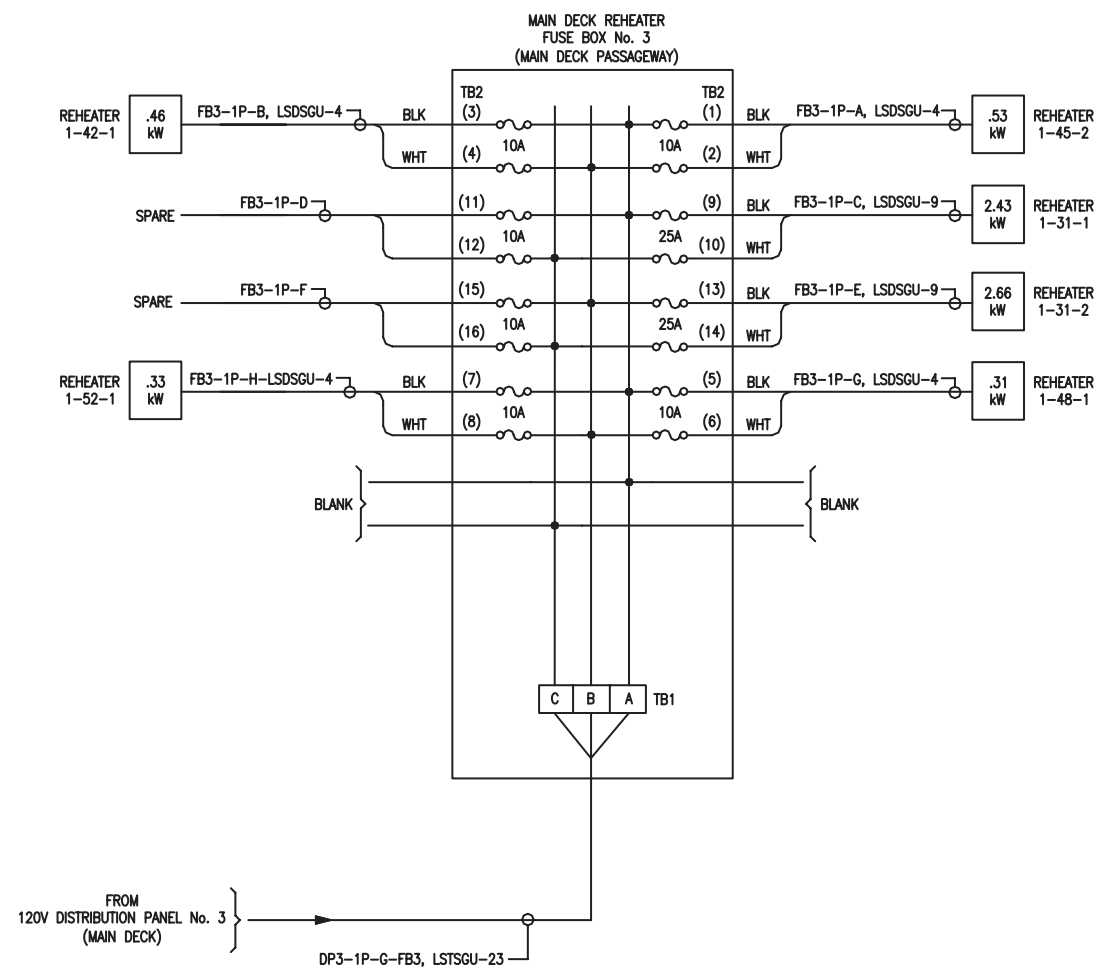




TYPICAL WIRING DIAGRAM FOR PREHEATER & REHEATER  
(REHEATER 01-23-2 SHOWN)

TYPICAL WIRING DIAGRAM FOR PREHEATER \*  
01-23-4  
01-25-2  
01-31-2  
TYPICAL WIRING DIAGRAM FOR REHEATER \*  
01-57-1  
01-32-2

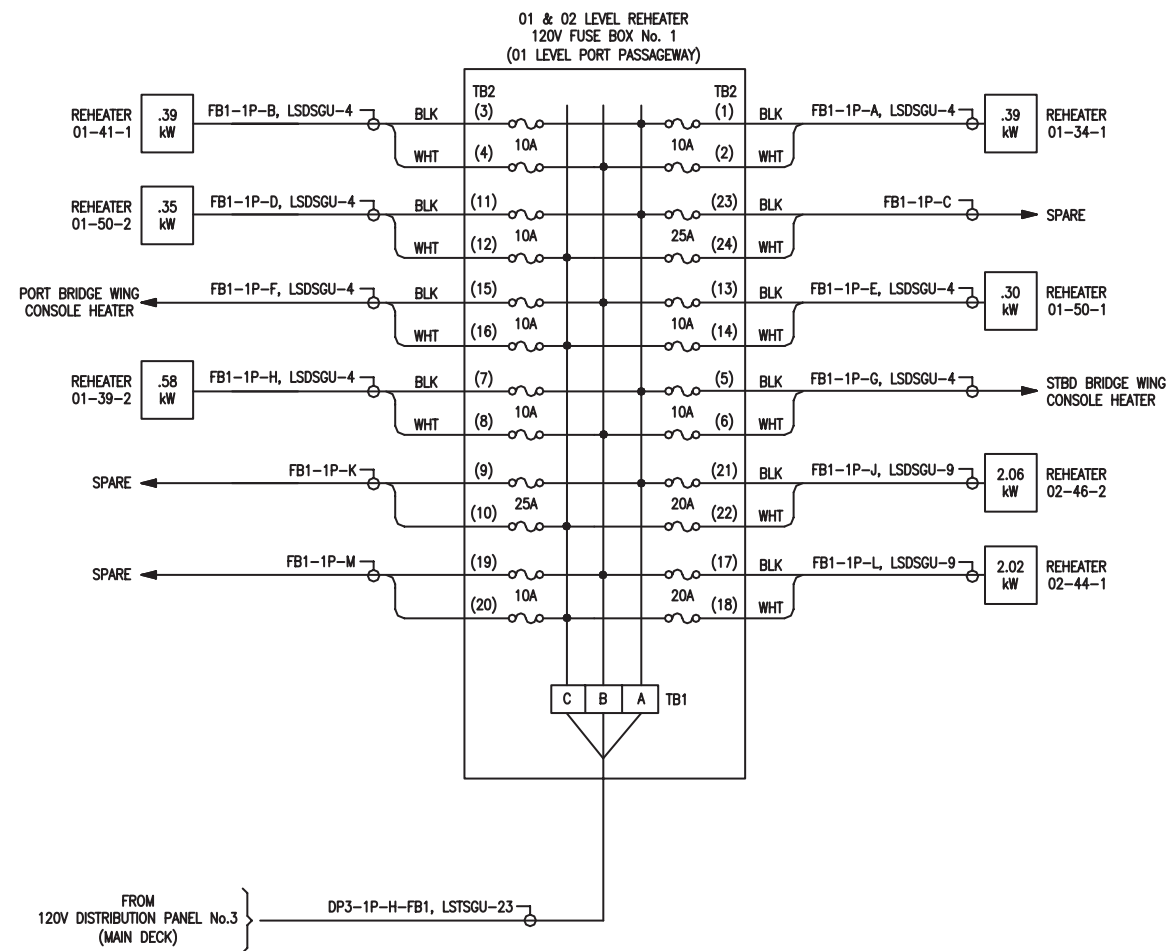




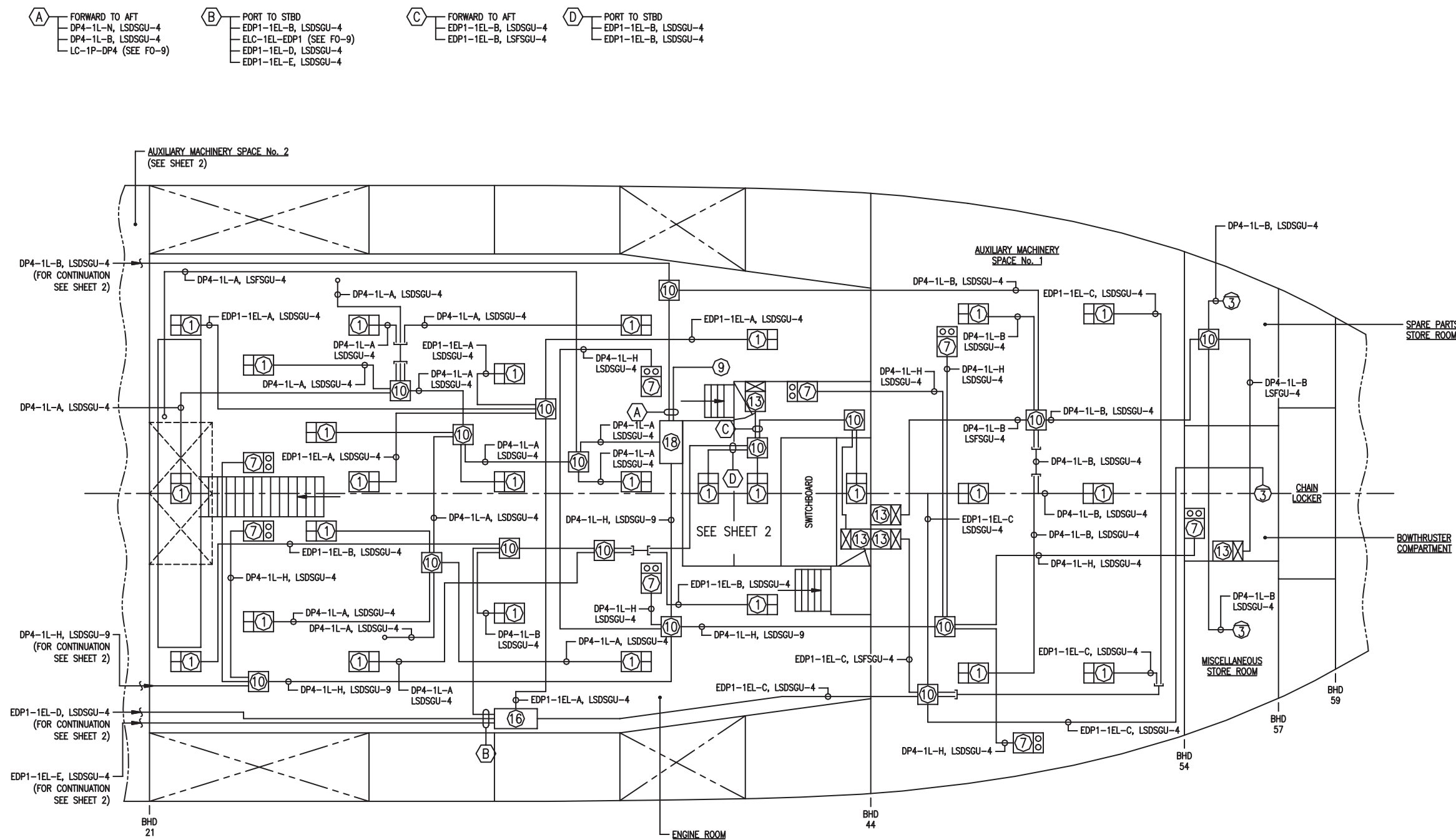
MAIN DECK REHEATER FUSE BOX No. 3





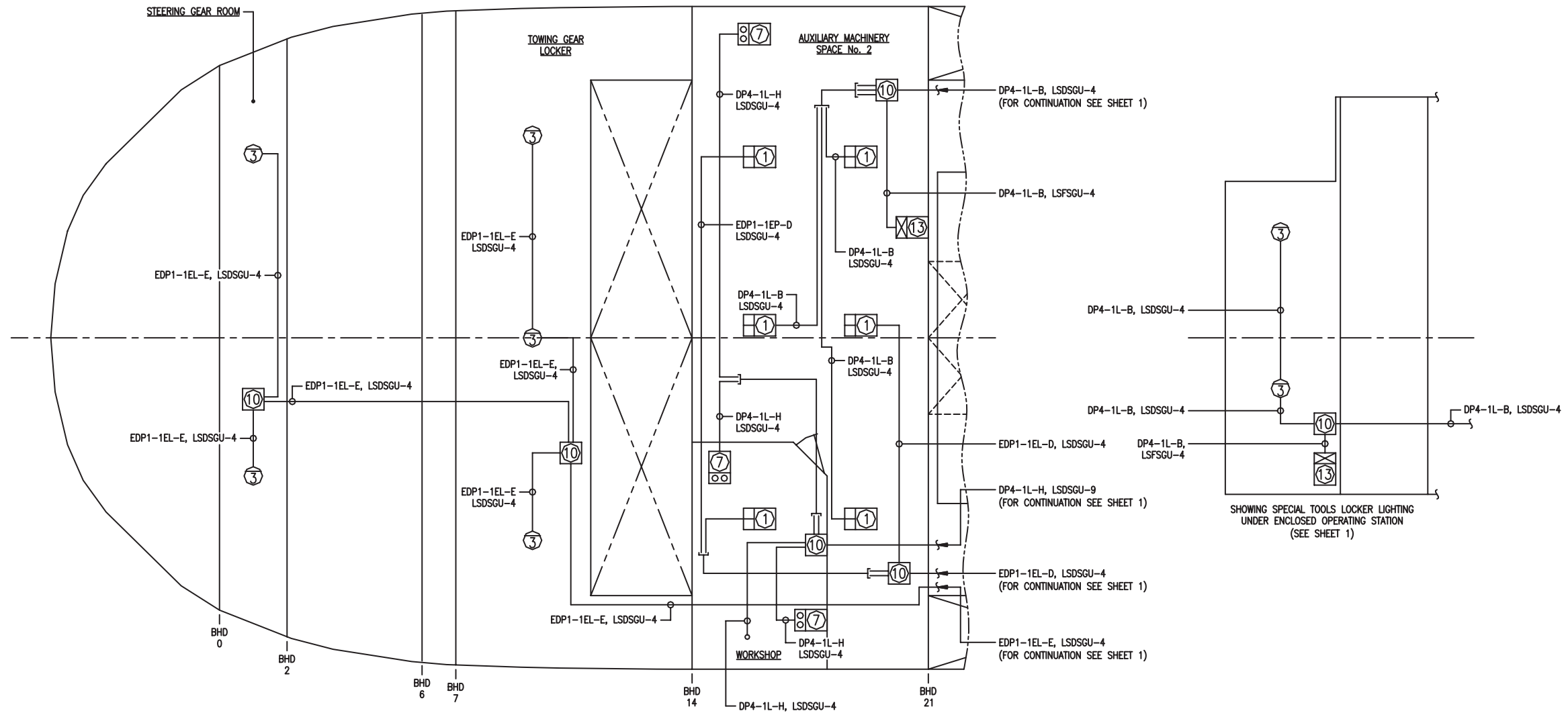






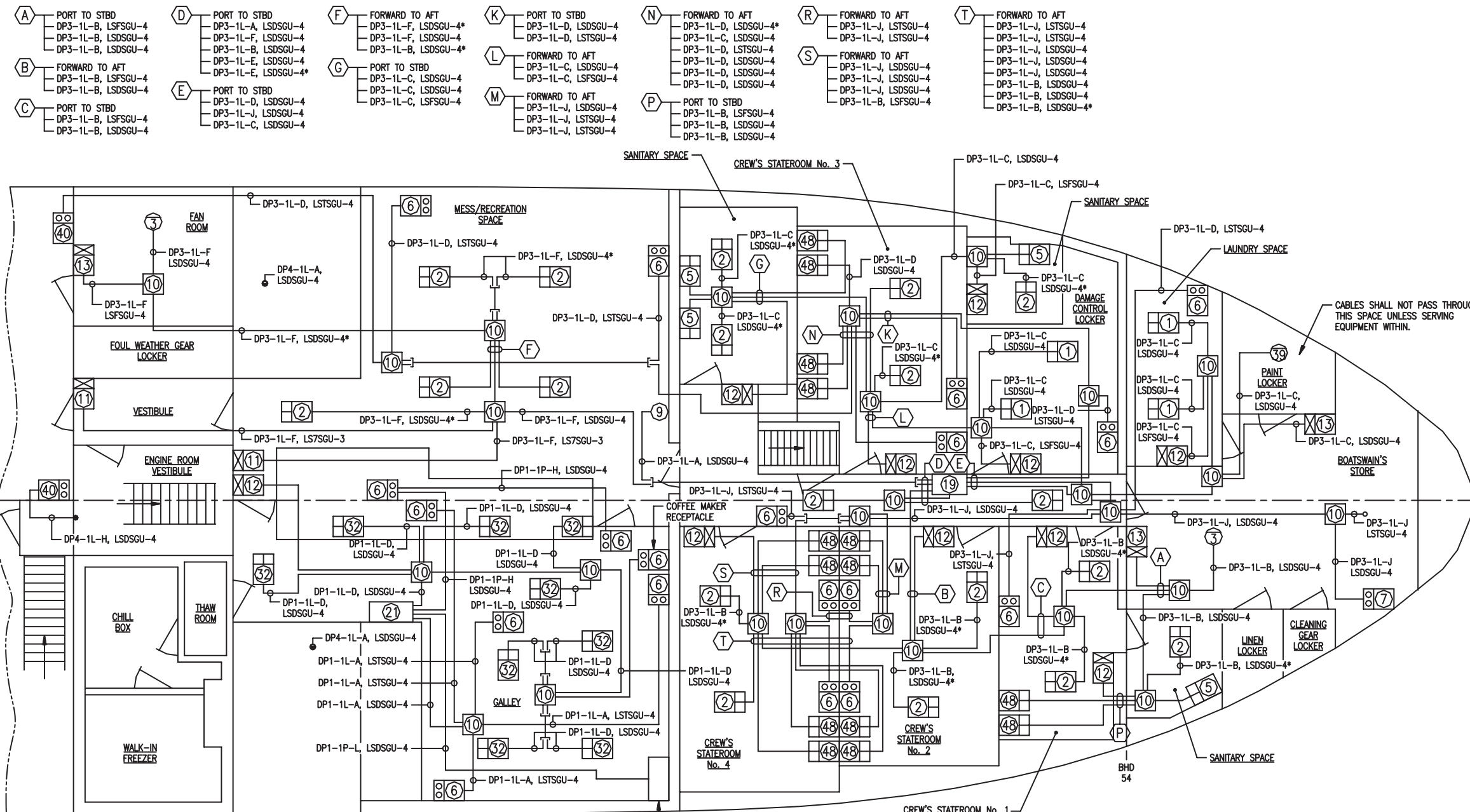
PART PLAN VIEW OF HOLD LEVEL  
SHOWING NORMAL AND EMERGENCY LIGHTING CIRCUITS





PART PLAN VIEW OF HOLD LEVEL  
SHOWING NORMAL AND EMERGENCY LIGHTING CIRCUITS





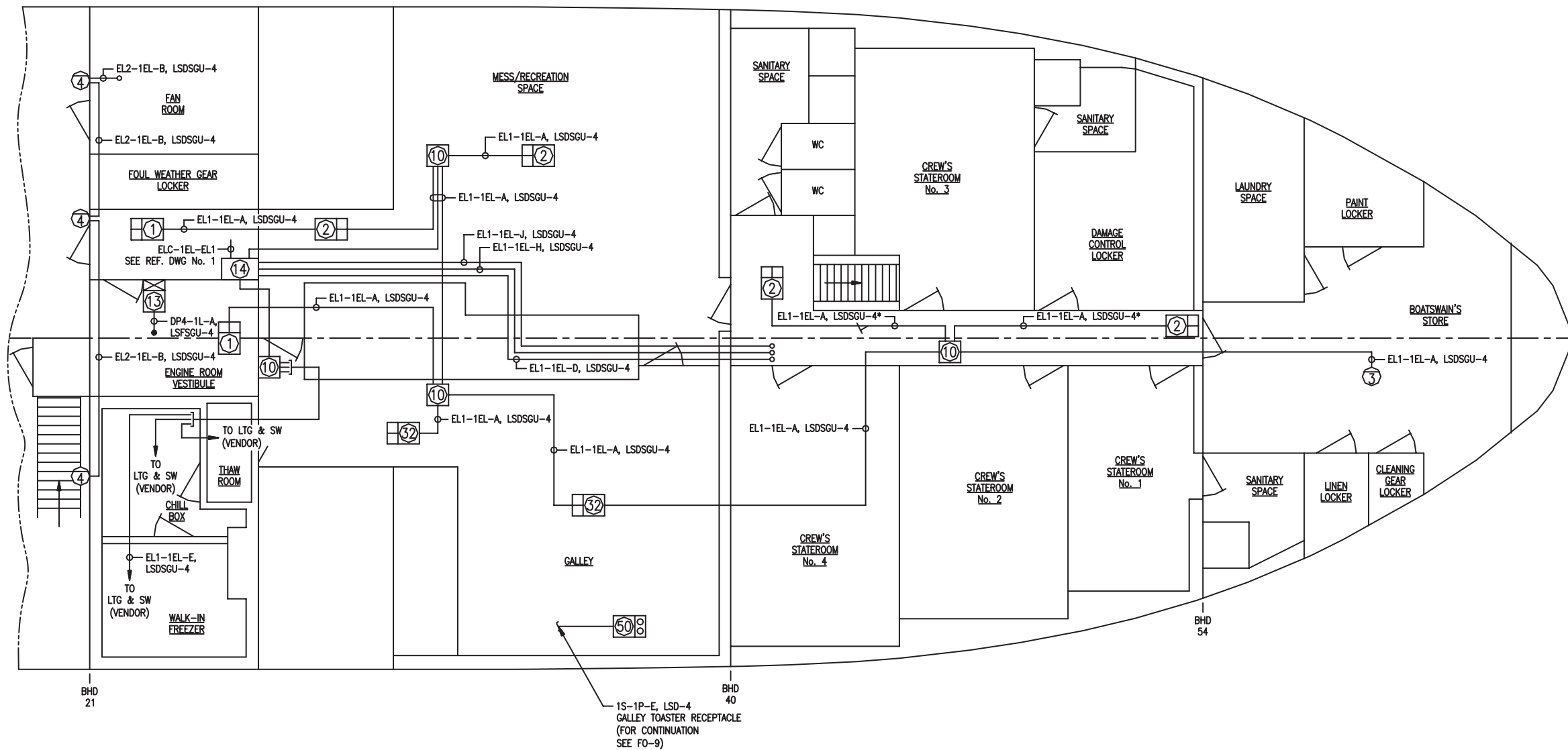
BHD 21  
 NOTE:  
 \* THIS SYMBOL DENOTES SPLIT SHIP APPLICABILITY FOR MATERIAL.  
 FOR LT801 AND 802 CABLE TYPE LSDSGU-4 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.  
 FOR LT803 AND FOLLOW CABLE TYPE LSTSGU-4 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.

PLAN VIEW OF MAIN DECK AREA  
 SHOWING NORMAL LIGHTING CIRCUITS  
 (FOR EMERGENCY LIGHTING CIRCUITS SEE SHEET 4)



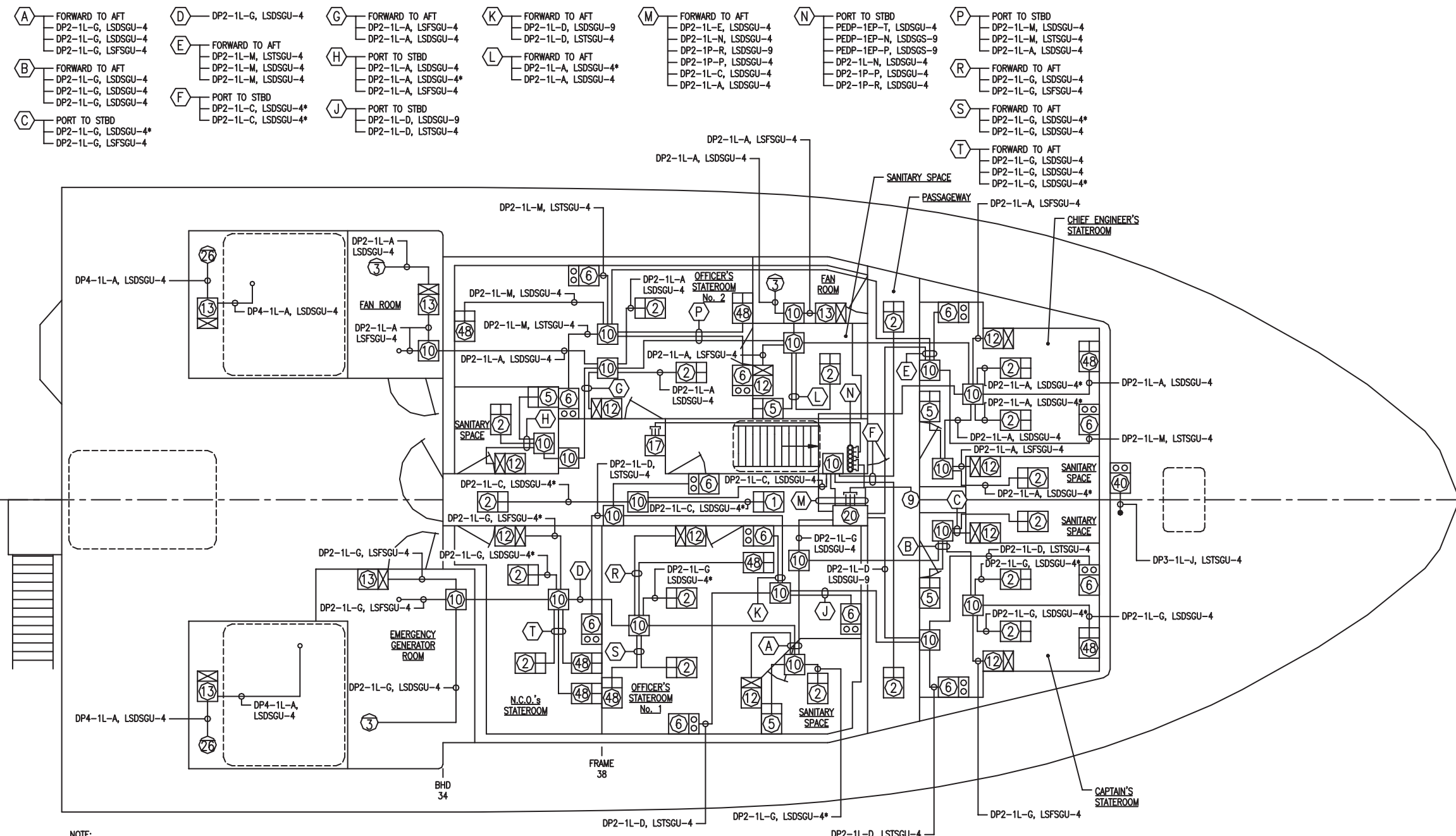


NOTE:  
 \* THIS SYMBOL DENOTES SPLIT SHIP APPLICABILITY FOR MATERIAL.  
 FOR LT801 AND 802 CABLE TYPE LSDSGU-4 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.  
 FOR LT803 AND FOLLOW CABLE TYPE LSTSGU-4 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.



PLAN VIEW OF MAIN DECK AREA  
 SHOWING EMERGENCY LIGHTING CIRCUITS  
 (FOR NORMAL LIGHTING CIRCUITS SEE SHEET 3)





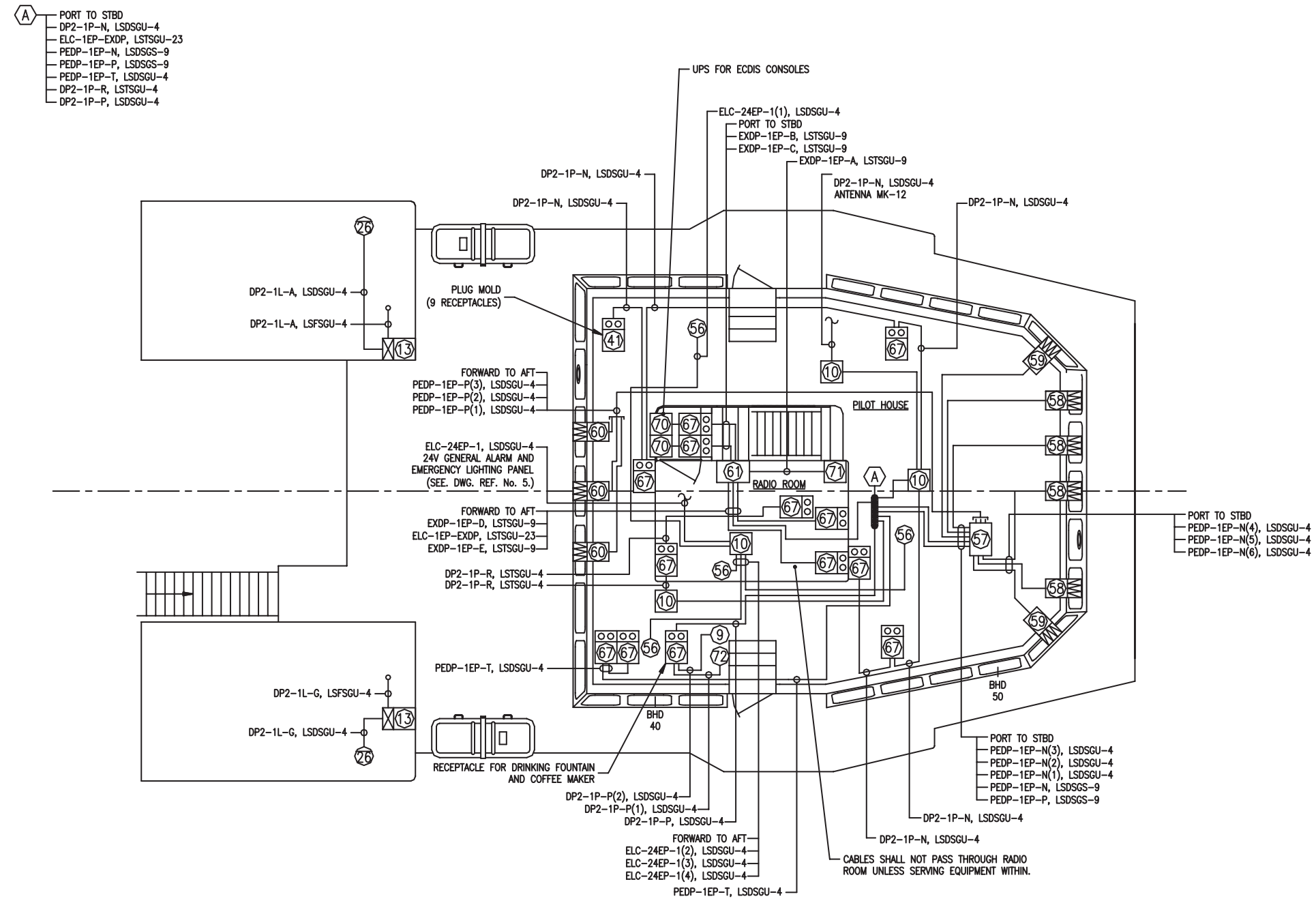
NOTE:  
 \* THIS SYMBOL DENOTES SPLIT SHIP APPLICABILITY FOR MATERIAL.  
 FOR LT801 AND 802 CABLE TYPE LSDSGU-4 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.  
 FOR LT803 AND FOLLOW CABLE TYPE LSTSGU-4 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.

PLAN VIEW OF 01 DECK LEVEL  
 SHOWING NORMAL LIGHTING CIRCUITS  
 (FOR EMERGENCY LIGHTING CIRCUITS SEE SHEET 6)







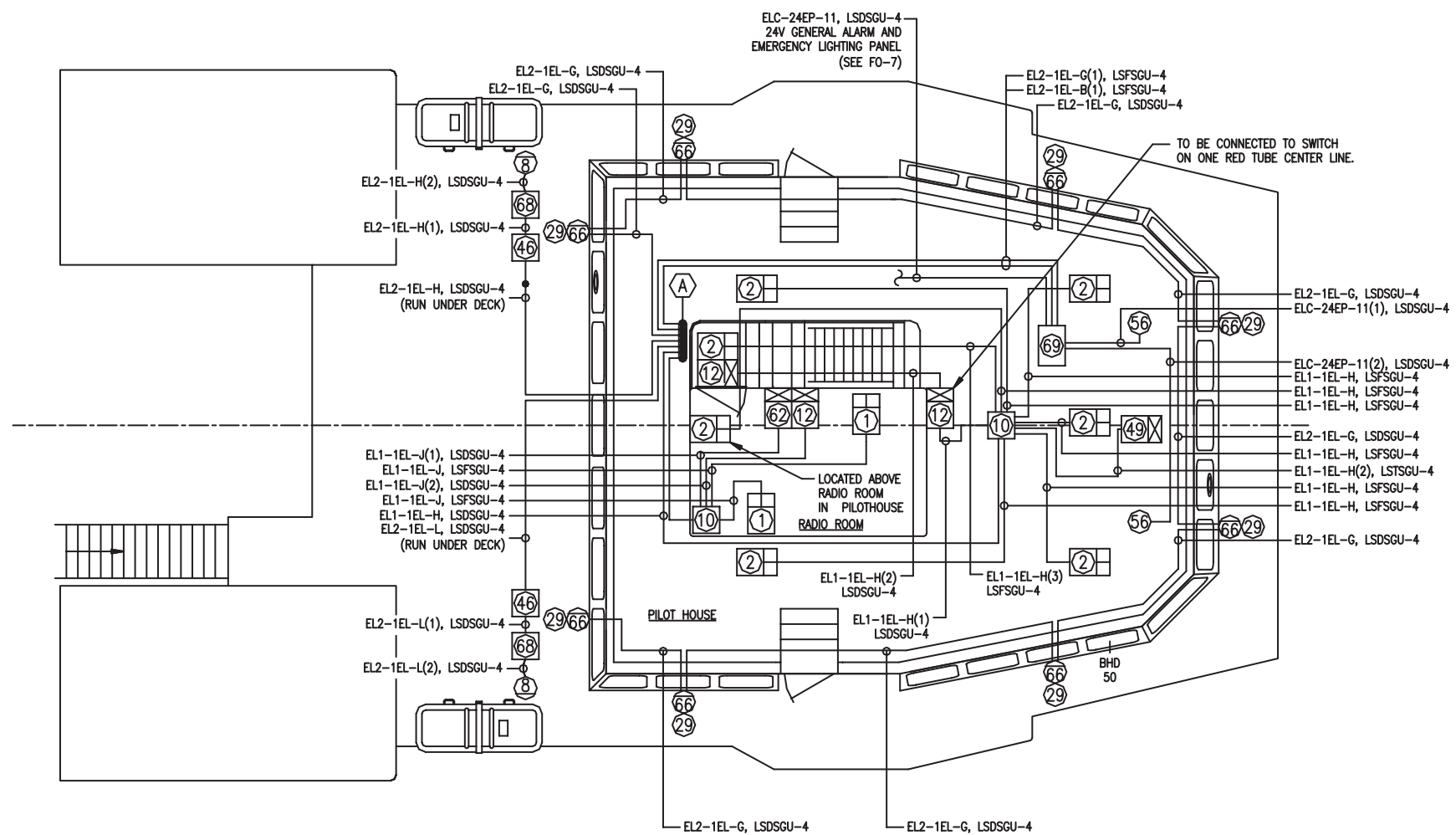


PLAN VIEW OF PILOT HOUSE LEVEL  
 SHOWING SMALL POWER, AND 24V EMERGENCY LIGHTING  
 (FOR EMERGENCY LIGHTING CIRCUITS SEE SHEET 8)





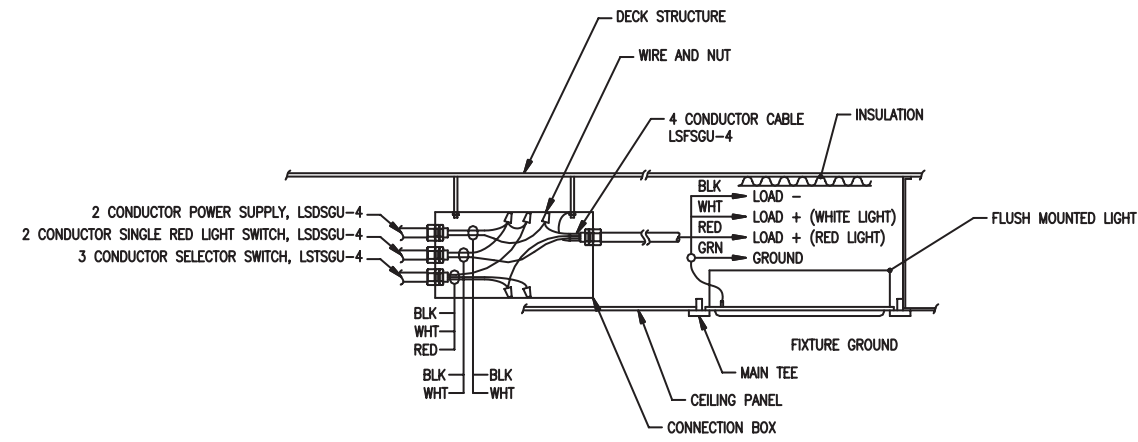
- A PORT TO STBD
- EL2-1EL-B(1), LSFSGU-4
- EL2-1EL-G(1), LSFSGU-4
- EL2-1EL-G, LSDSGU-4
- EL2-1EL-H, LSDSGU-4
- EL2-1EL-L, LSDSGU-4
- EL1-1EL-H, LSDSGU-4
- EL1-1EL-J, LSDSGU-4



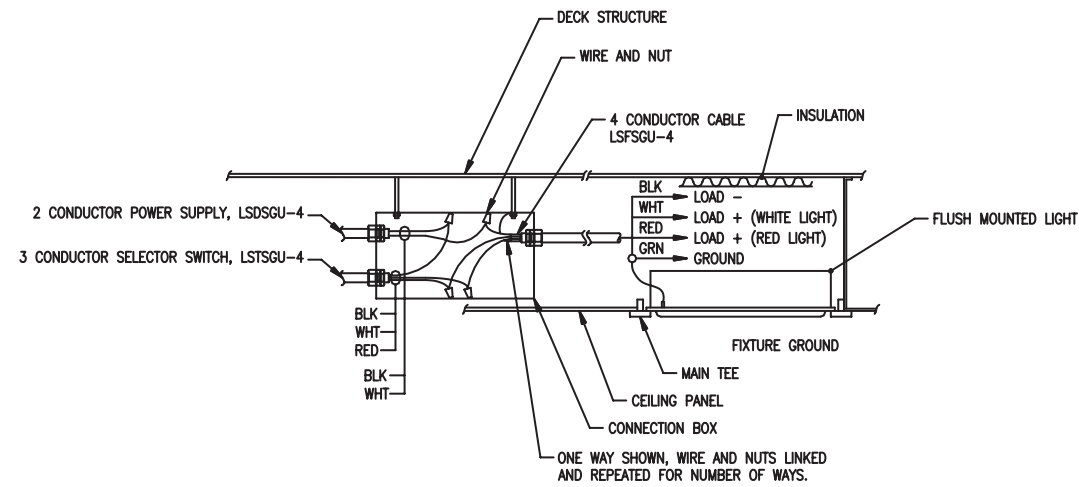
- NOTE:
1. FOR FIXTURE GROUNDING AND LIGHT CONNECTION DETAILS OF NEW RADIO ROOM OUTFIT SEE DETAIL 83-B.
  2. FOR FIXTURE GROUNDING AND LIGHT CONNECTION DETAILS OF NEW PILOTHOUSE OUTFIT SEE DETAILS 87-B AND 87-C.

PLAN VIEW OF 02 DECK LEVEL  
SHOWING EMERGENCY LIGHTING AND  
EXTERNAL LIGHTING CIRCUITS

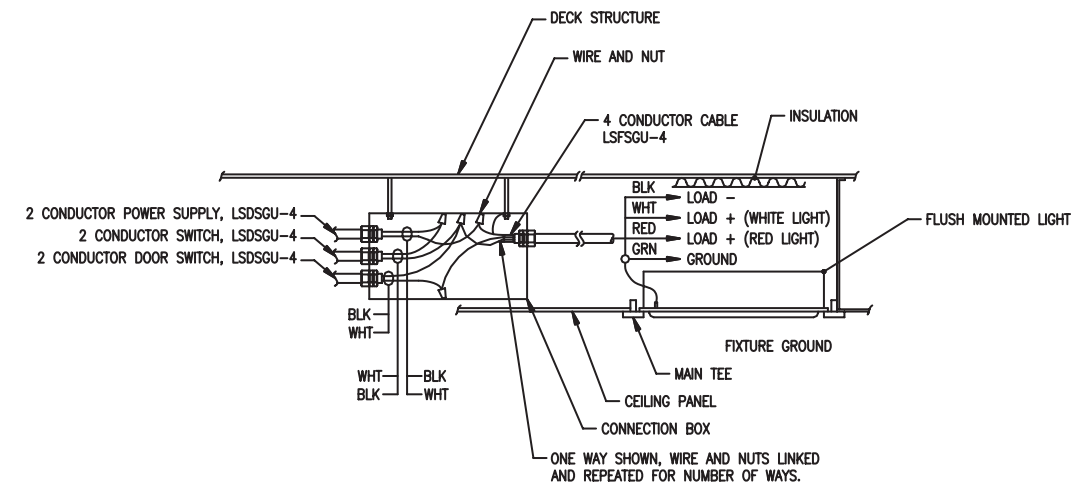




SHOWING FIXTURE GROUNDING AND CABLE CONNECTIONS  
FOR PILOTHOUSE SINGLE RED LIGHT CONNECTION  
(OPERATION OF CIRCUIT ALLOWS SELECTOR SWITCH TO OPERATE  
WHITE LIGHT ONLY, RED LIGHT TO BE OPERATED SEPARATELY BY SINGLE SWITCH)

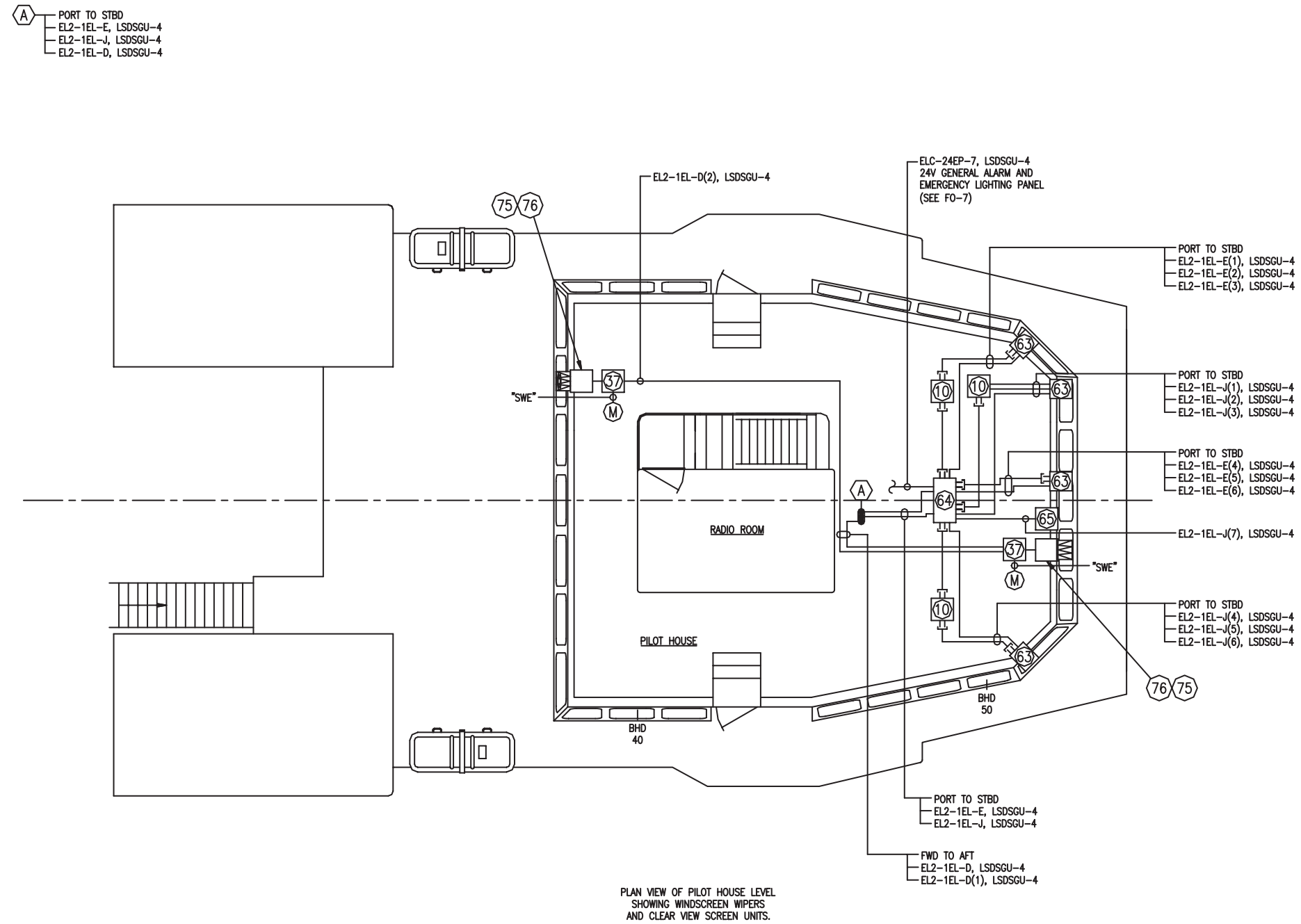


SHOWING FIXTURE GROUNDING AND CABLE CONNECTIONS  
FOR PILOTHOUSE RED AND WHITE LIGHTS  
(OPERATION OF CIRCUIT ALLOWS OFF, RED, WHITE SELECTOR SWITCH POSITIONS)

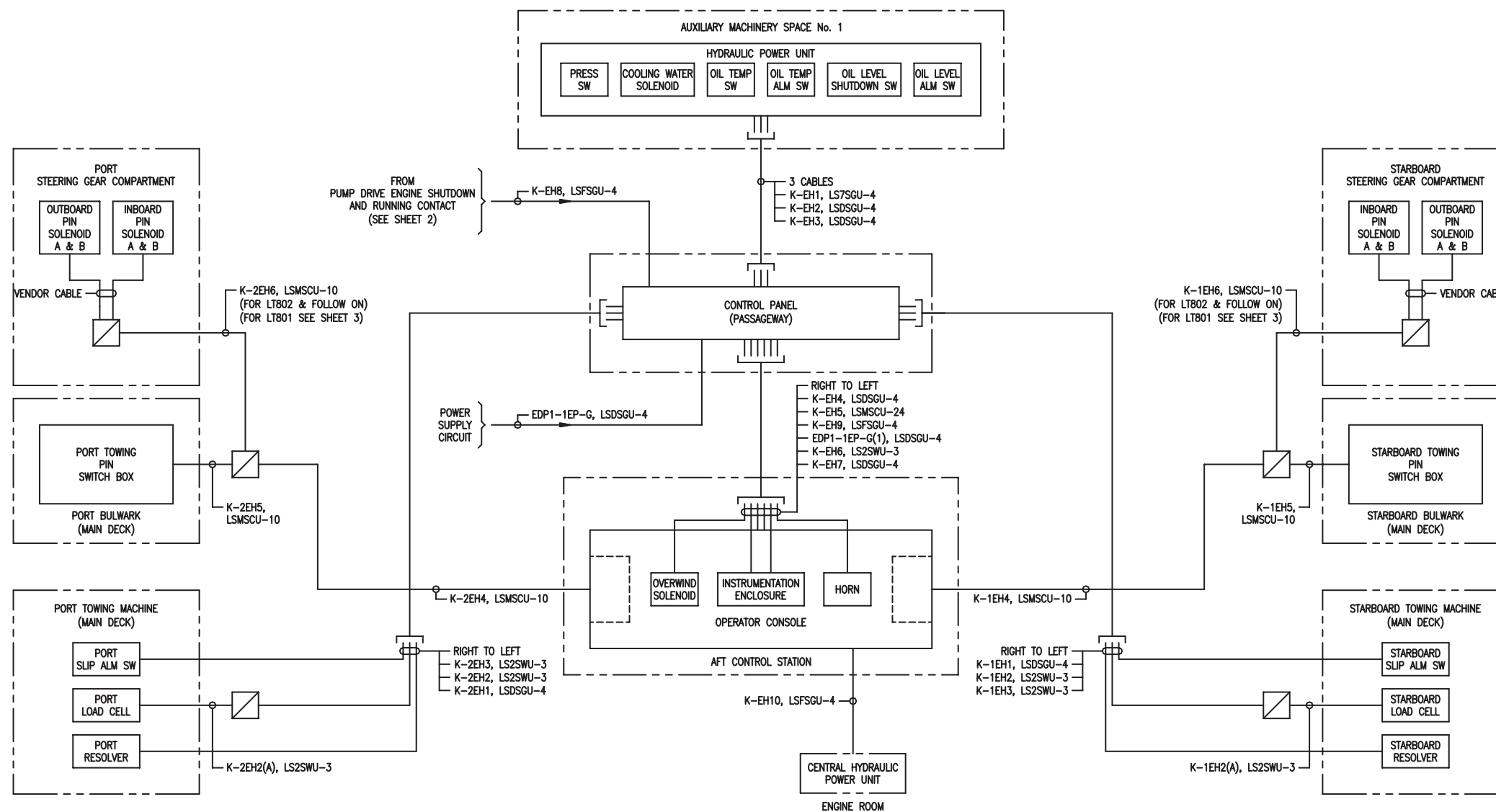


SHOWING FIXTURE GROUNDING AND CABLE CONNECTIONS  
FOR RADIO ROOM RED AND WHITE LIGHTS  
(OPERATION OF CIRCUIT ALLOWS DOOR SWITCH TO ISOLATE WHITE LIGHT IN RADIO ROOM WHEN DOOR IS OPENED.  
ON/OFF SWITCH ALLOWS OFF, RED, WHITE POSITIONS)





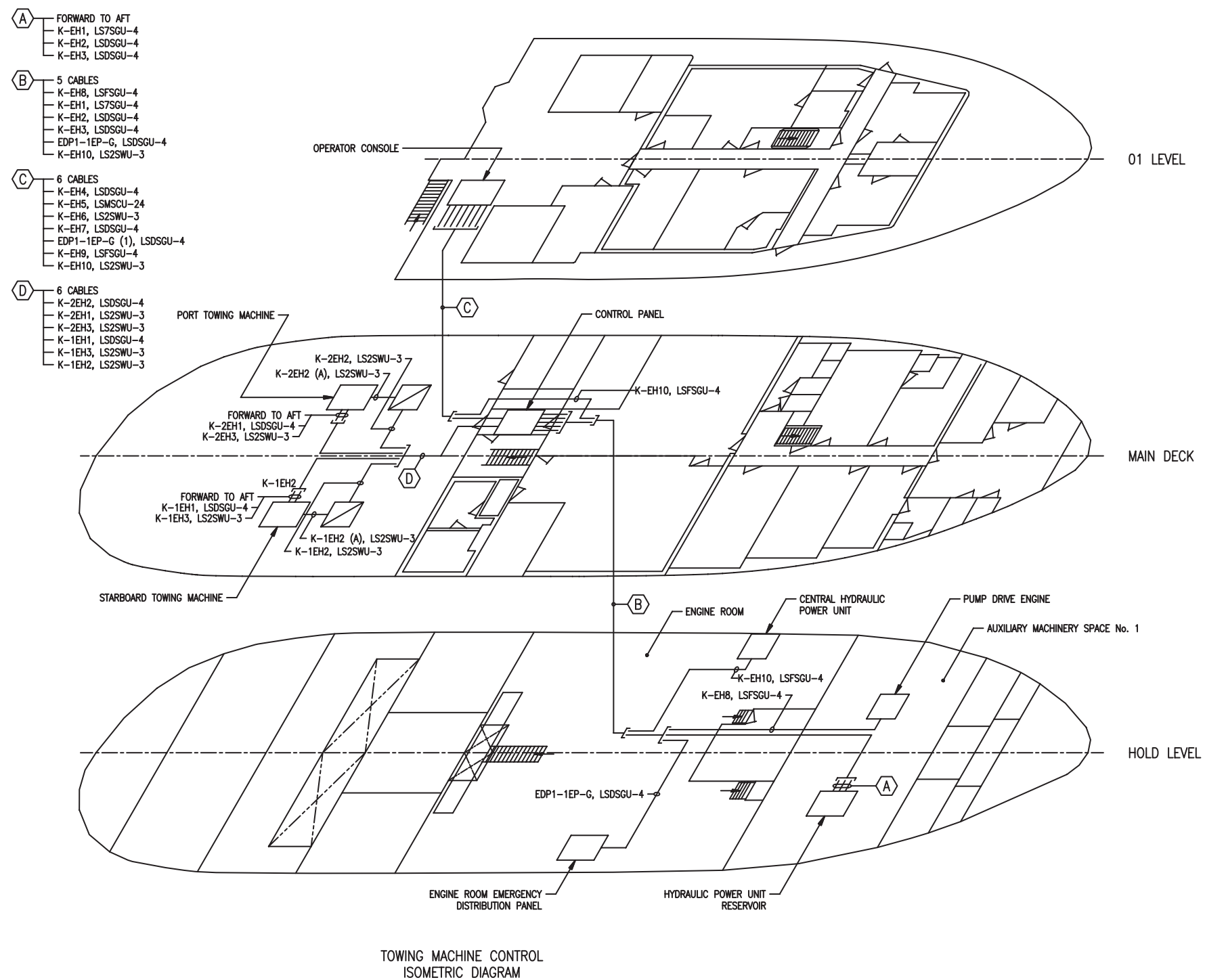




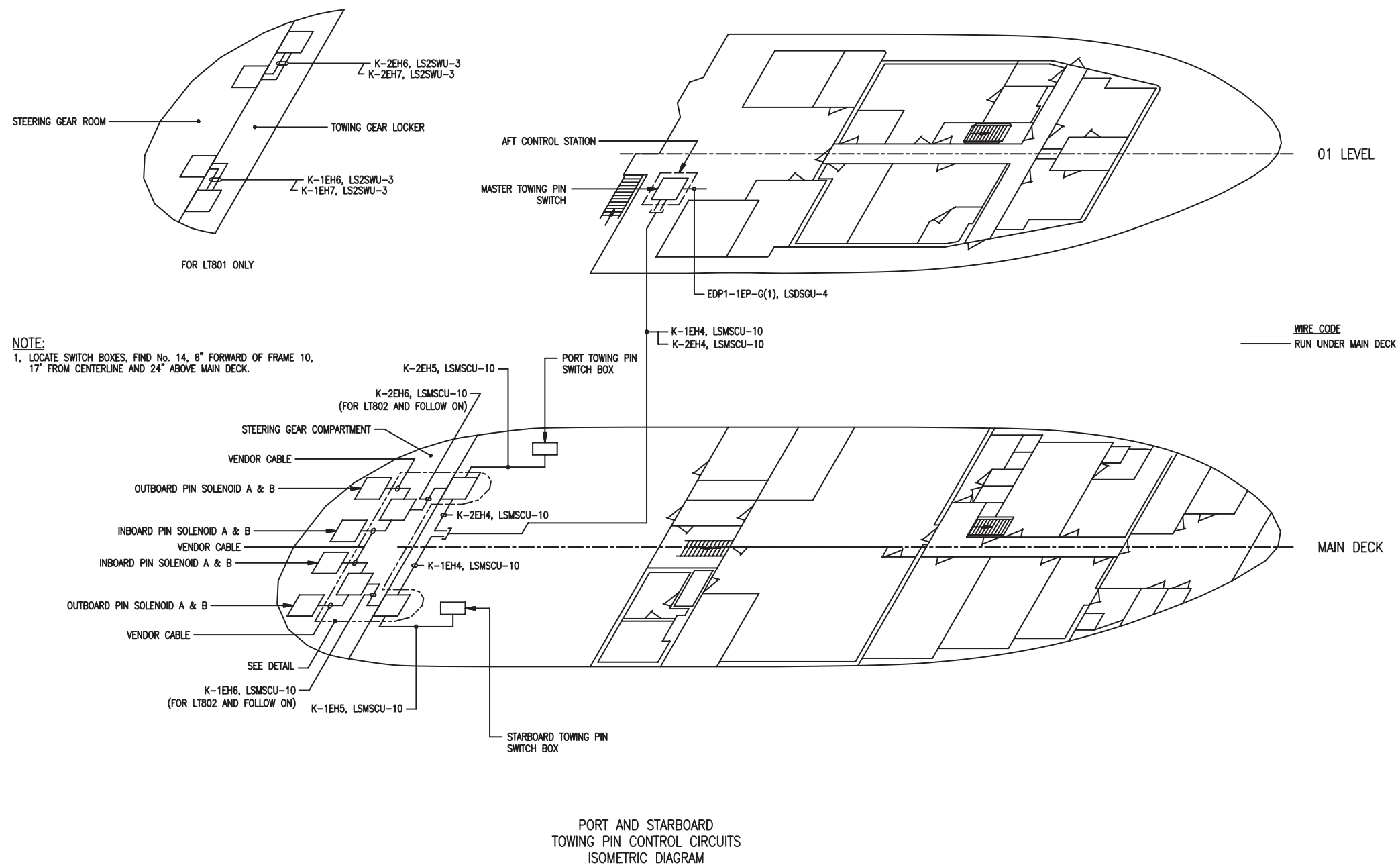
TOWING MACHINE CONTROL AND TOWING PIN CIRCUITS  
BLOCK DIAGRAM



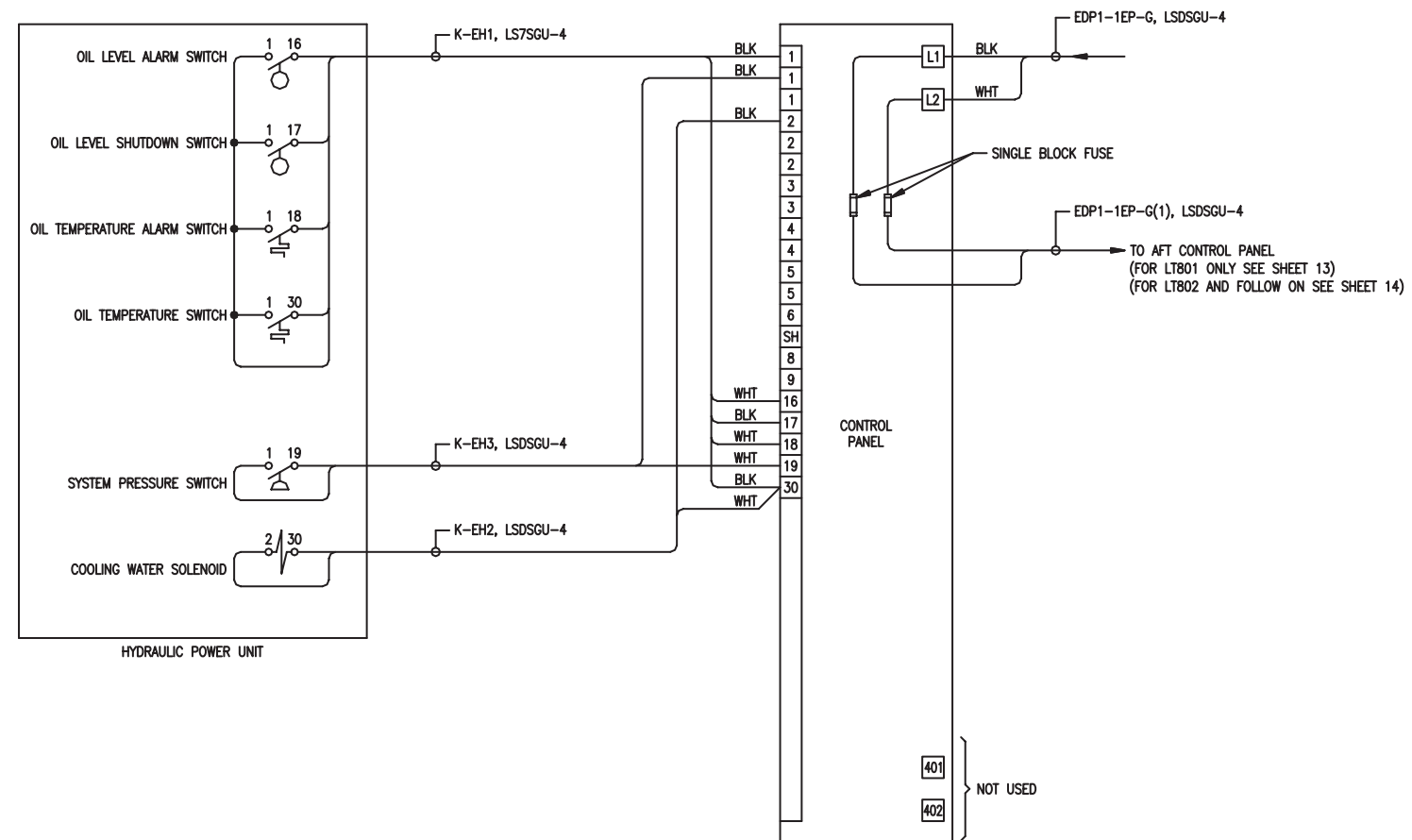






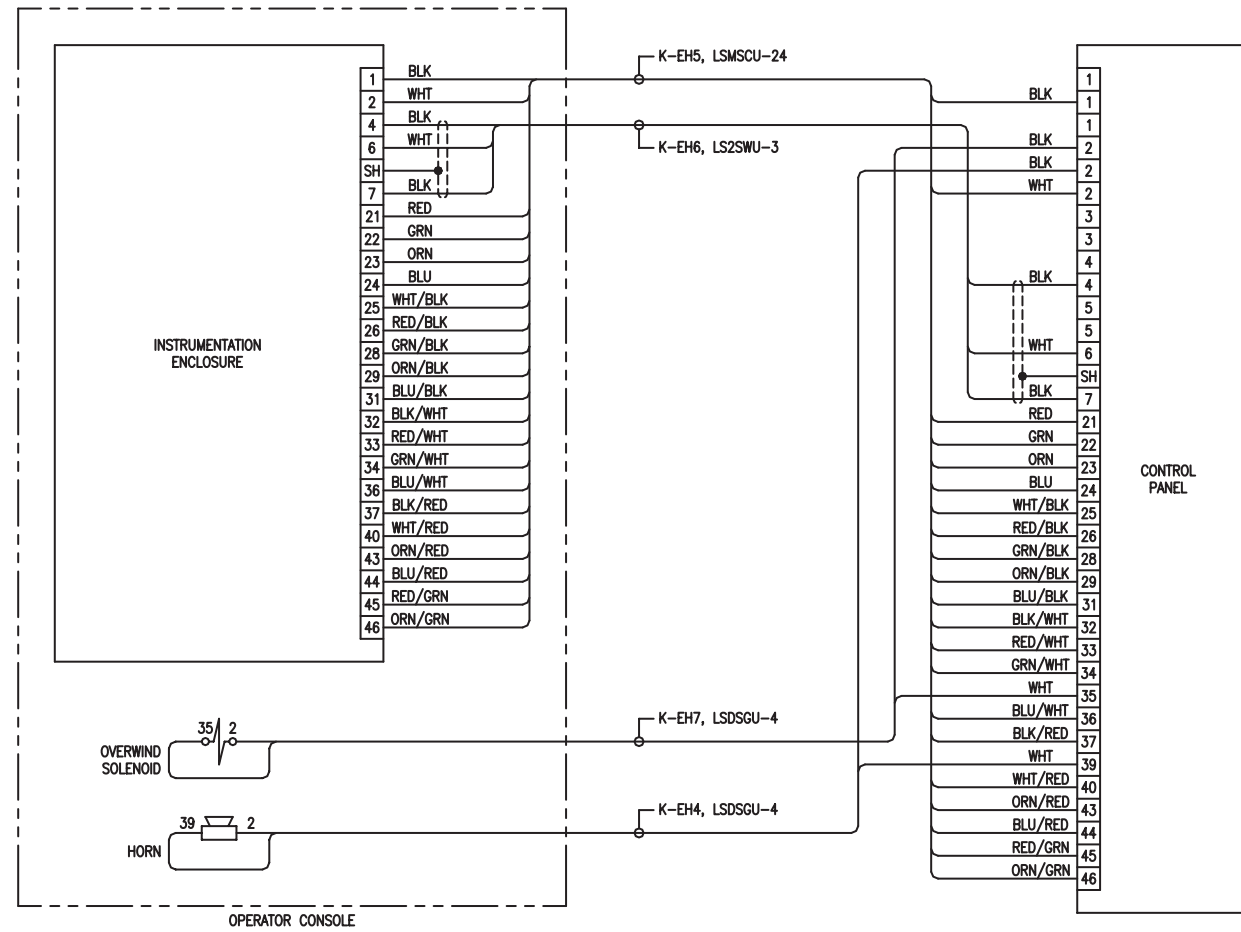






TOWING MACHINE: HYDRAULIC POWER UNIT  
WIRING DIAGRAM

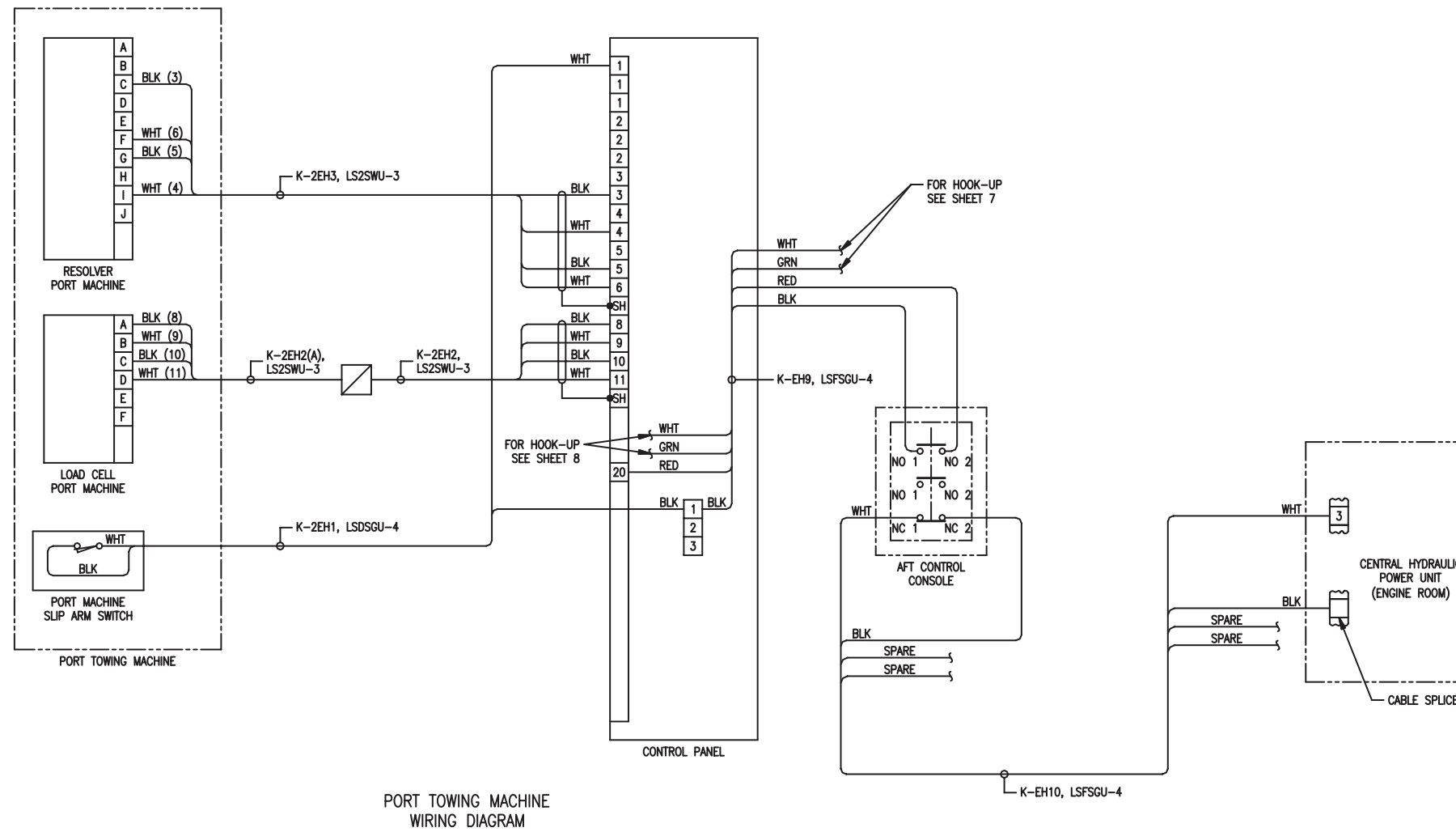




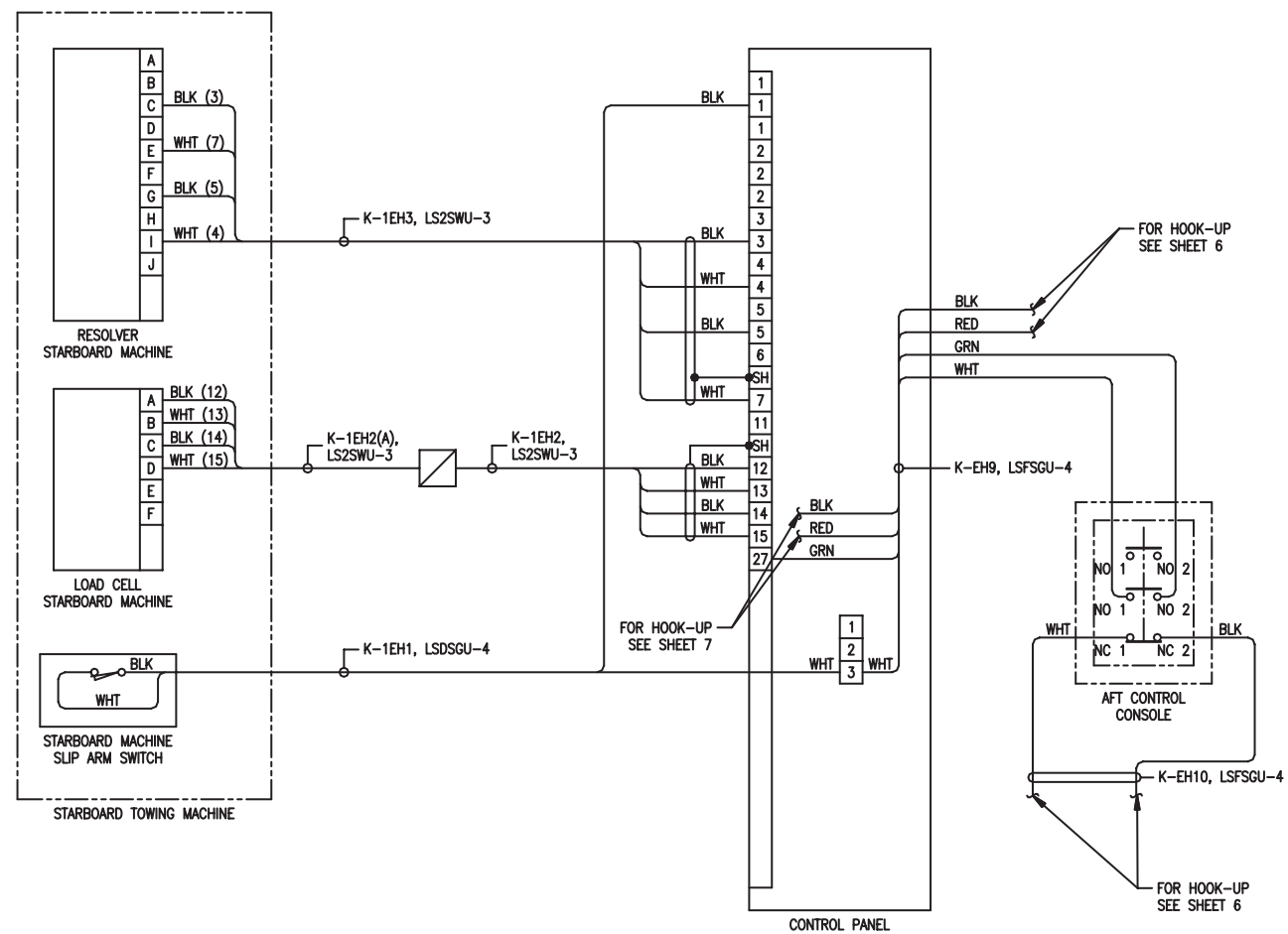
TOWING MACHINE OPERATOR CONSOLE





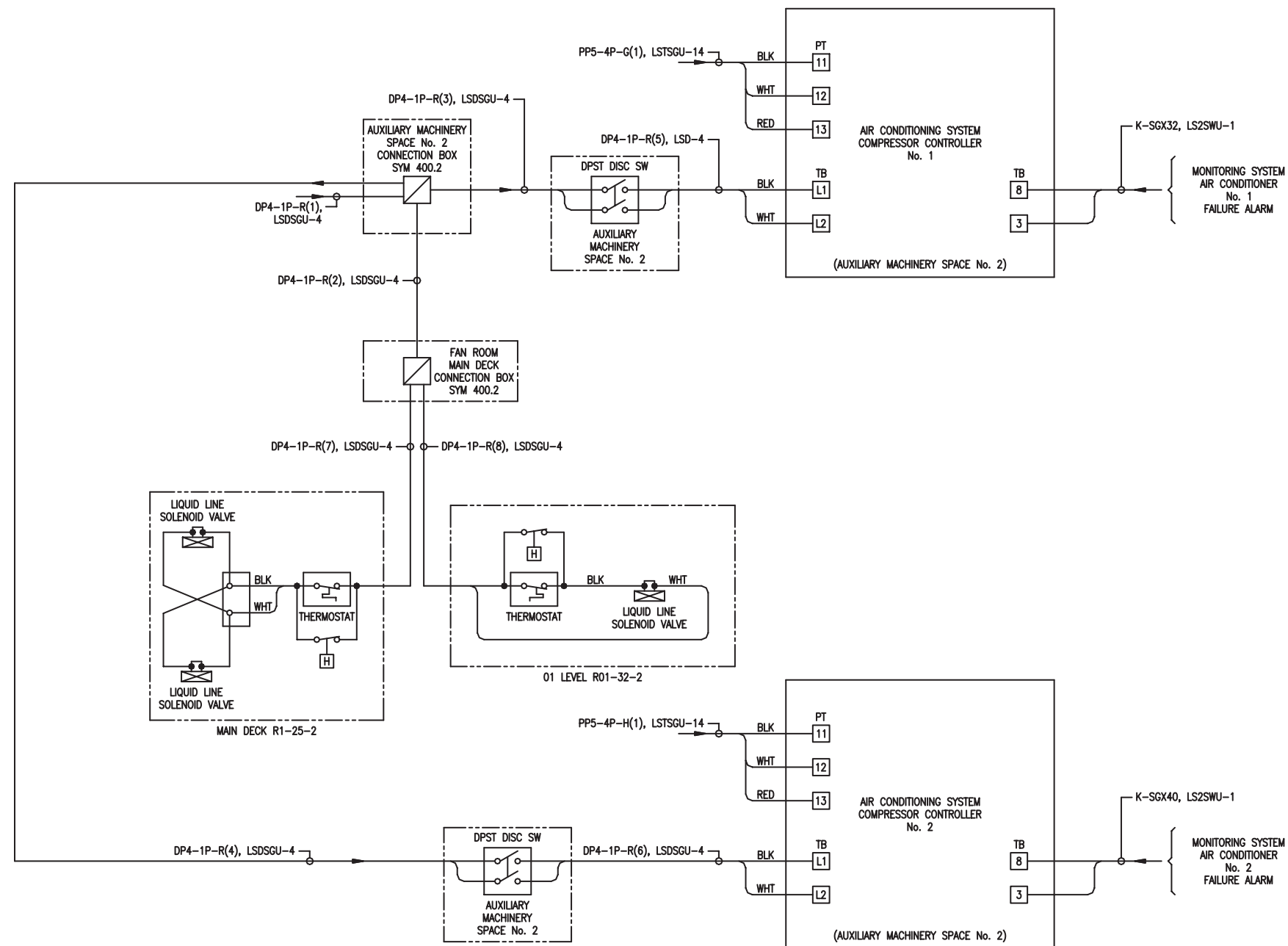






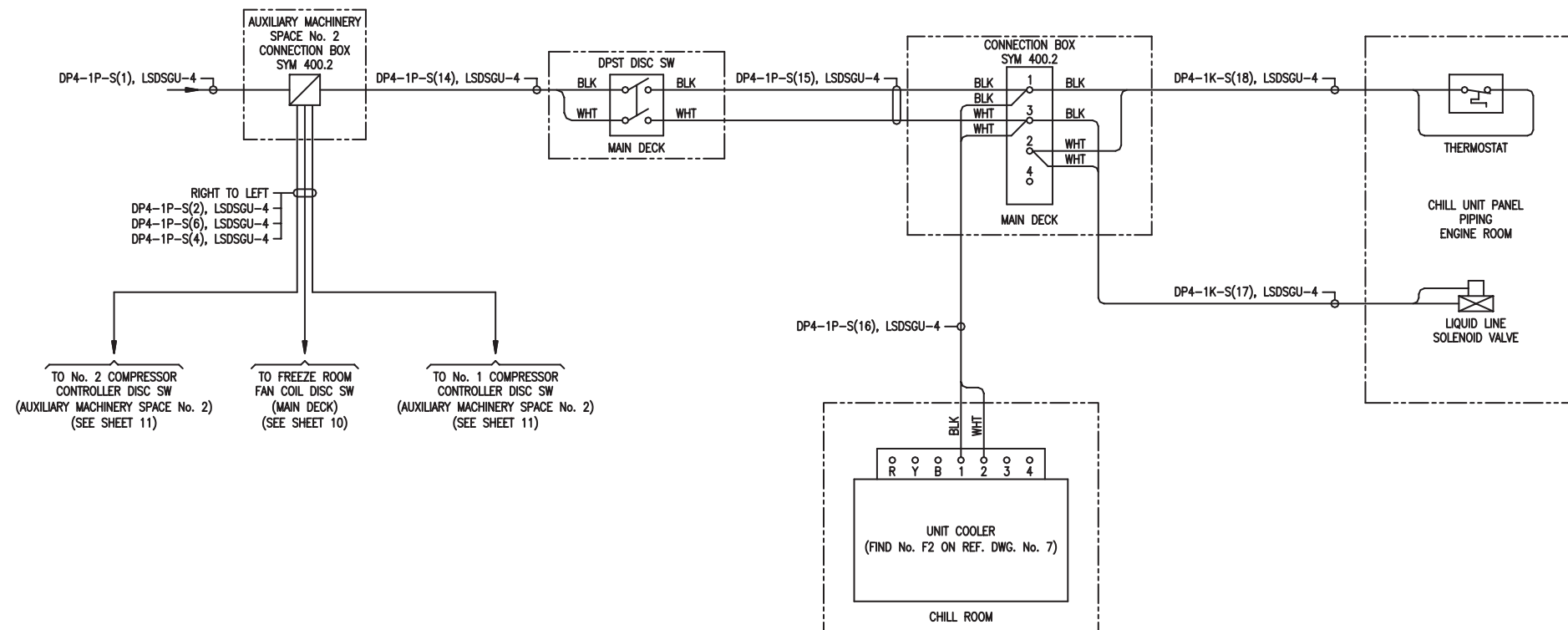
STARBOARD TOWING MACHINE  
WIRING DIAGRAM





AIR CONDITIONING SYSTEM  
 COMPRESSOR No. 1 & No. 2  
 WIRING DIAGRAM

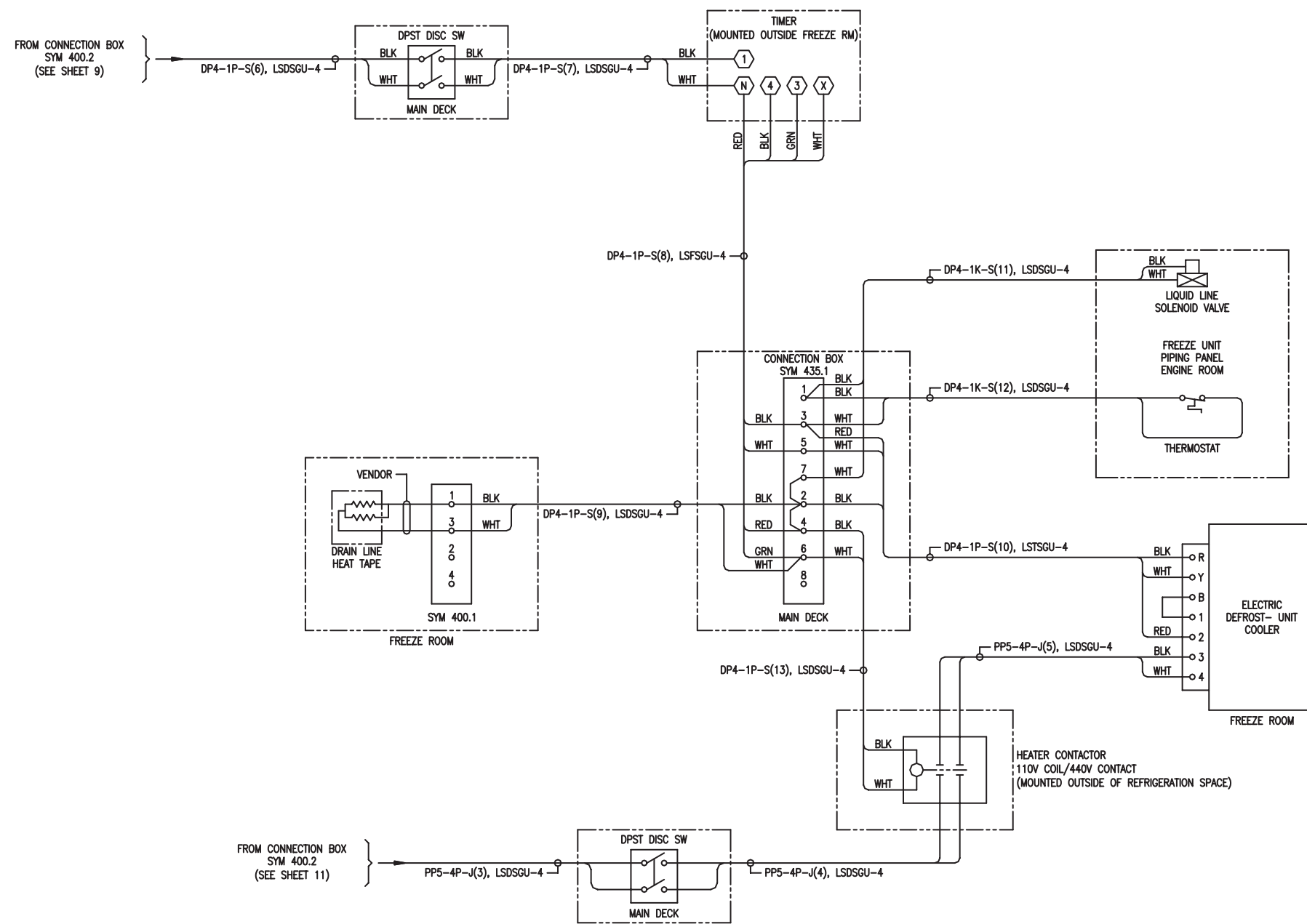




SHIP STORE REFRIGERATION CHILL UNIT  
WIRING DIAGRAM

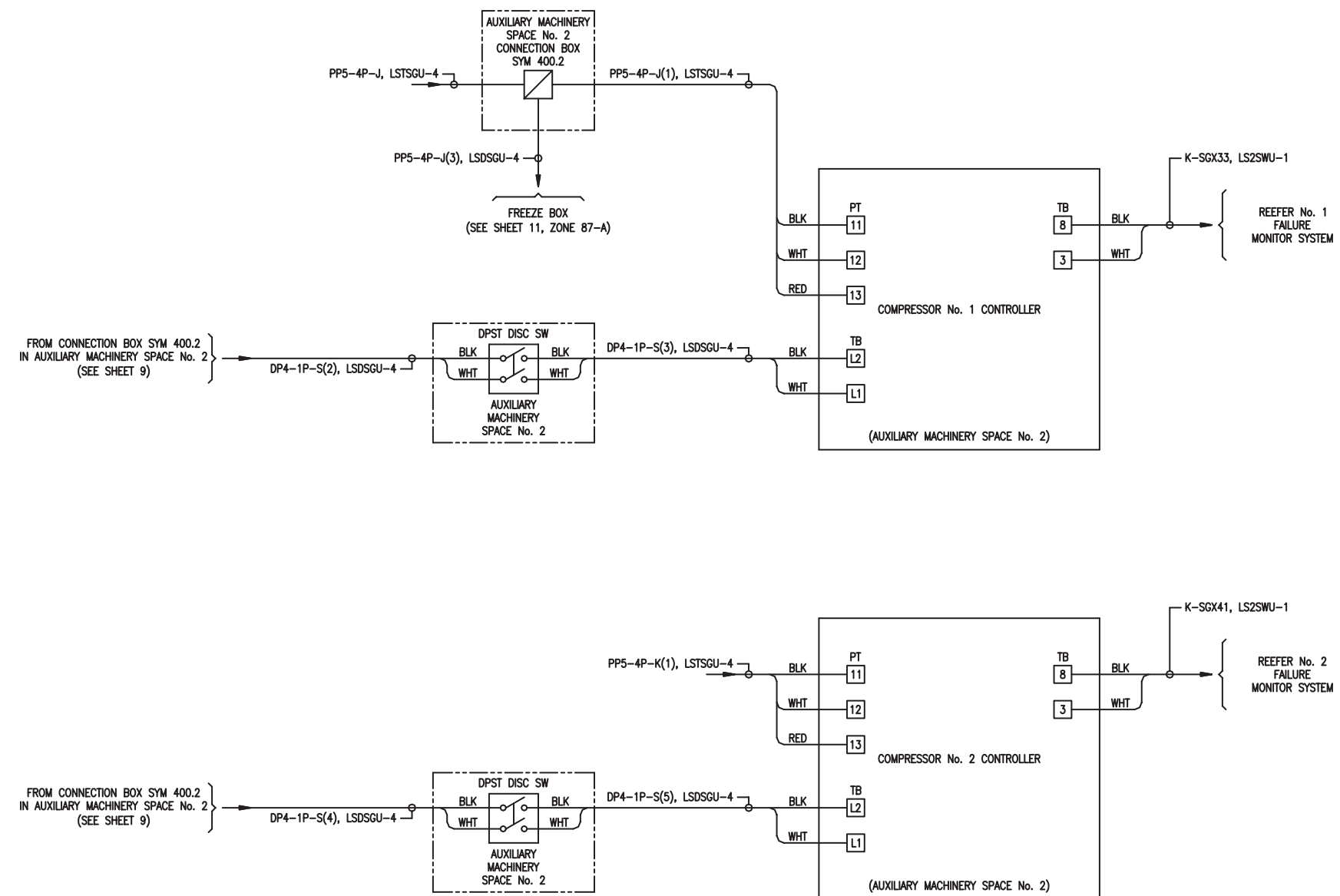






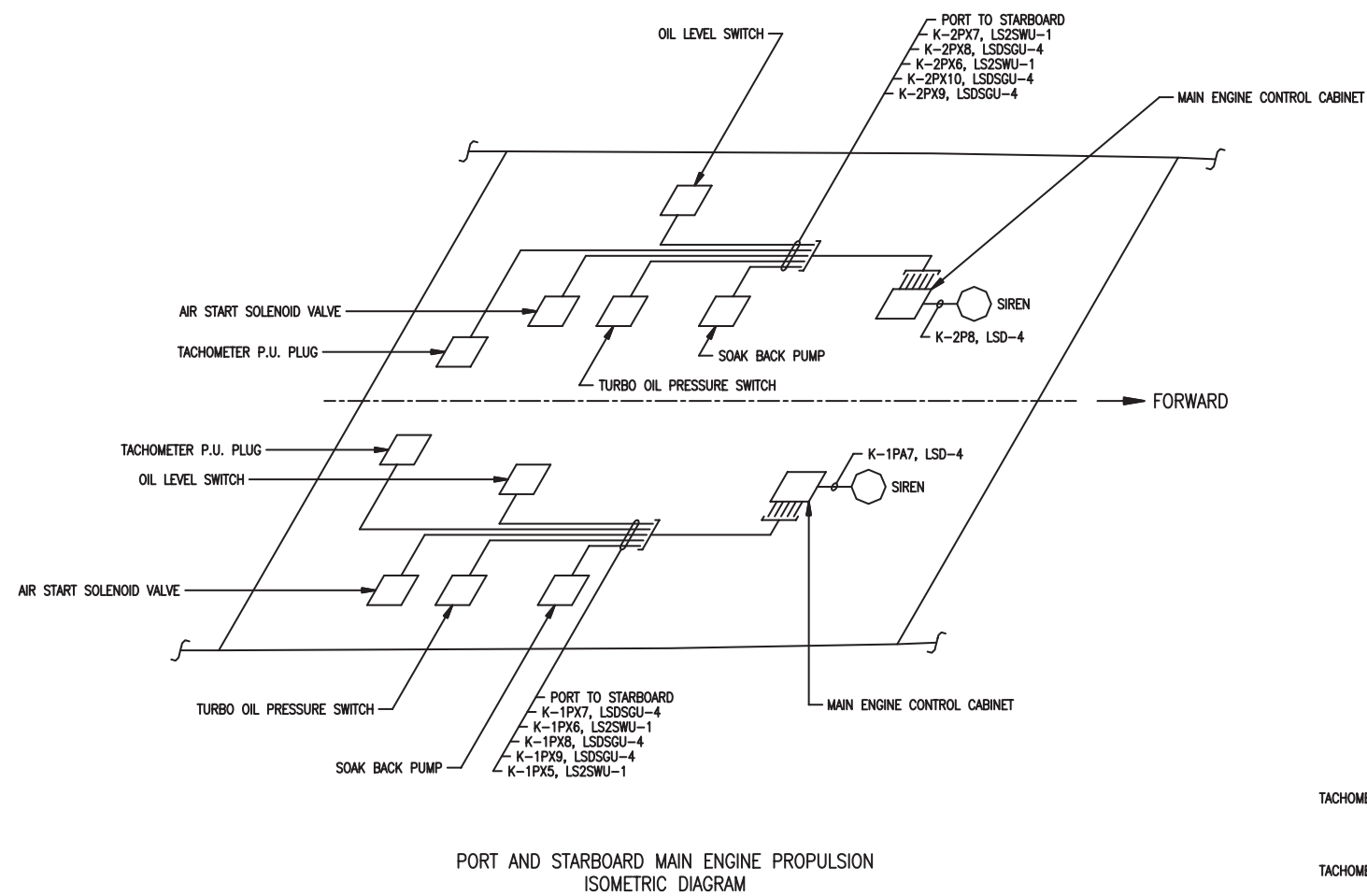
SHIP STORE REFRIGERATION FREEZE BOX  
WIRING DIAGRAM



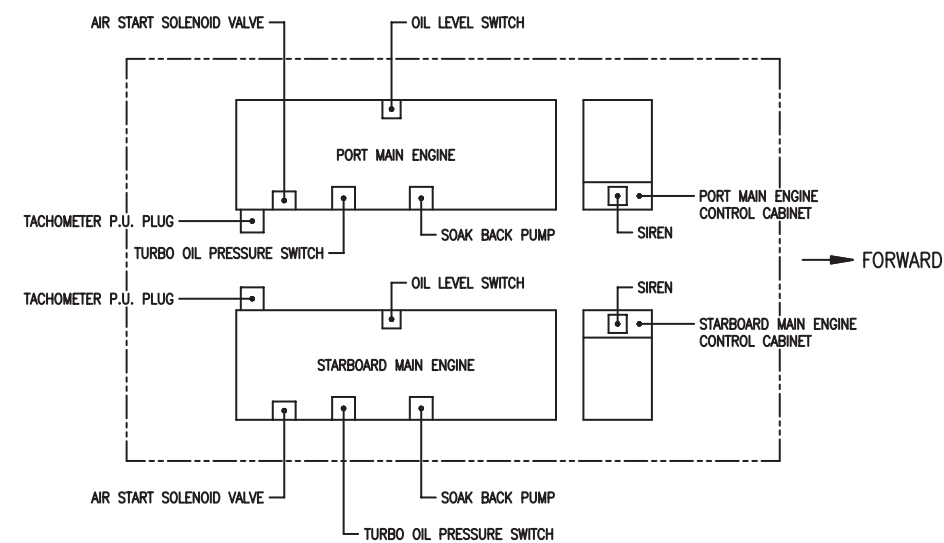


SHIP STORE REFRIGERATION  
COMPRESSOR No. 1 & No. 2  
WIRING DIAGRAM



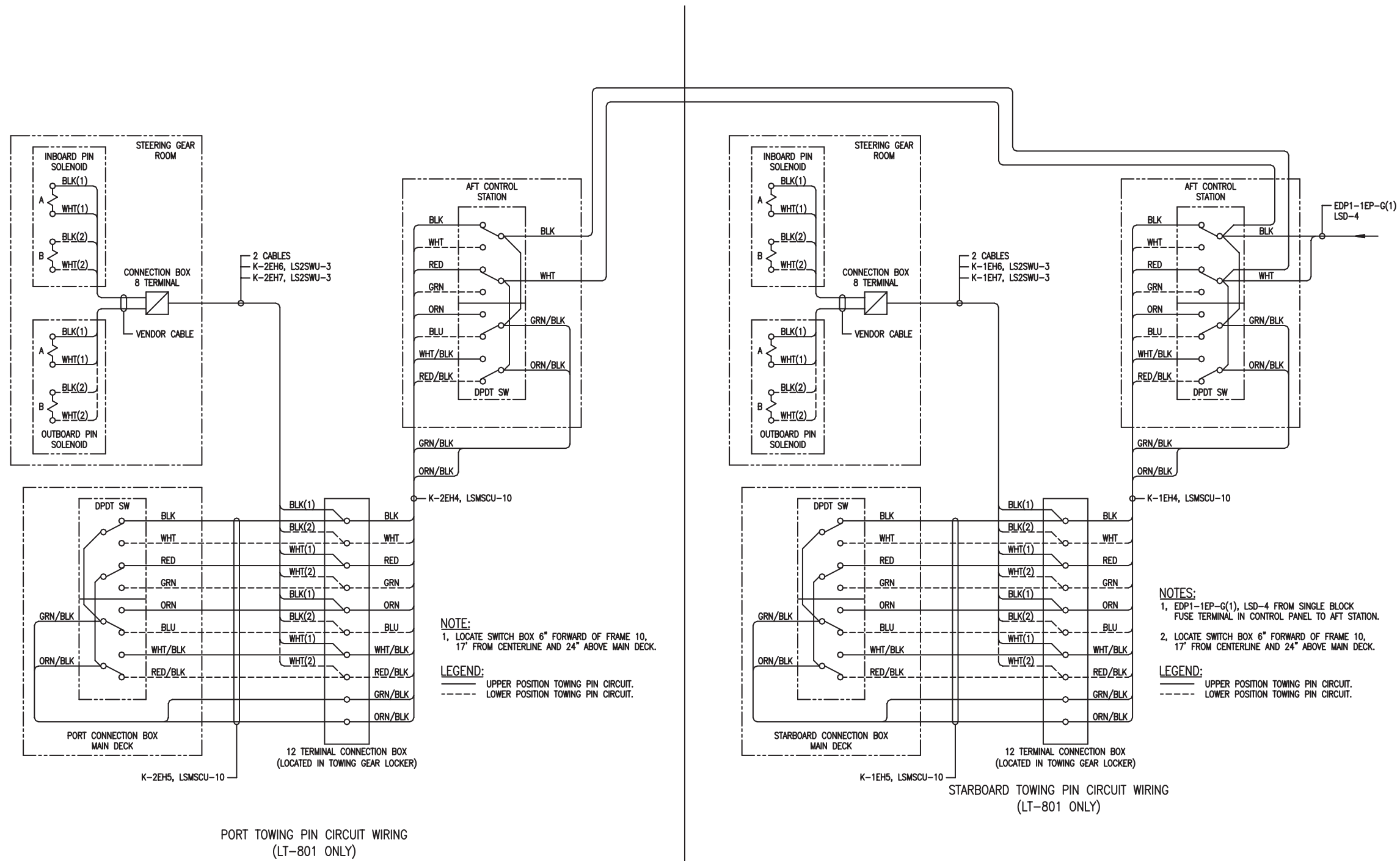


PORT AND STARBOARD MAIN ENGINE PROPULSION ISOMETRIC DIAGRAM



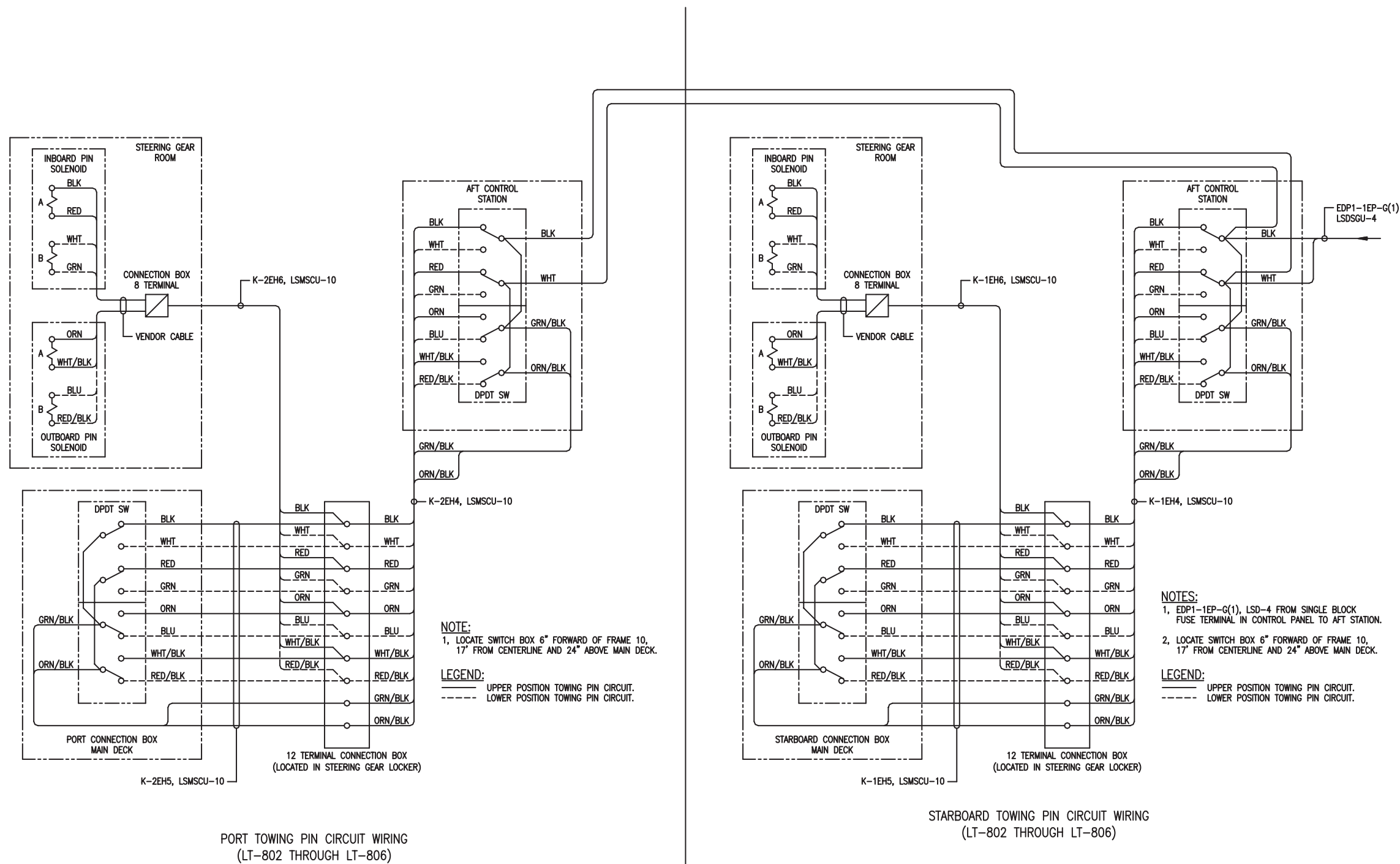
PORT AND STARBOARD MAIN ENGINE PROPULSION LAYOUT



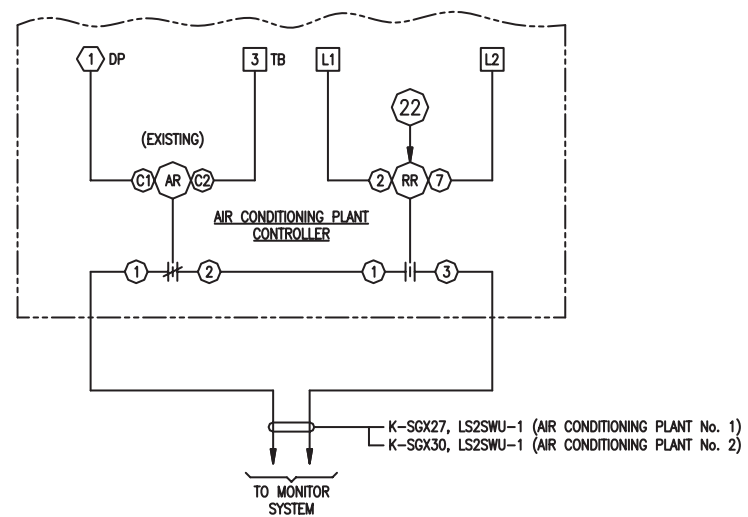






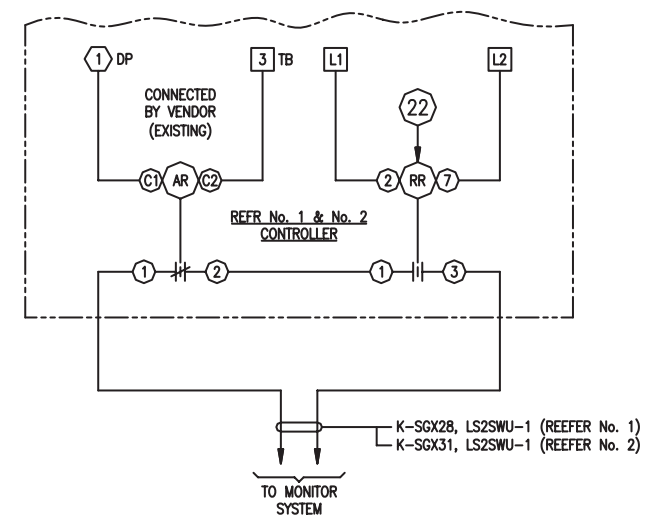






- LEGEND**
- RELAY TERMINAL
  - CONTROL TERMINAL
  - ⬡ EQUIPMENT TERMINAL

AIR CONDITIONING PLANT No. 1 & No. 2  
FAILURE ALARM CIRCUITS



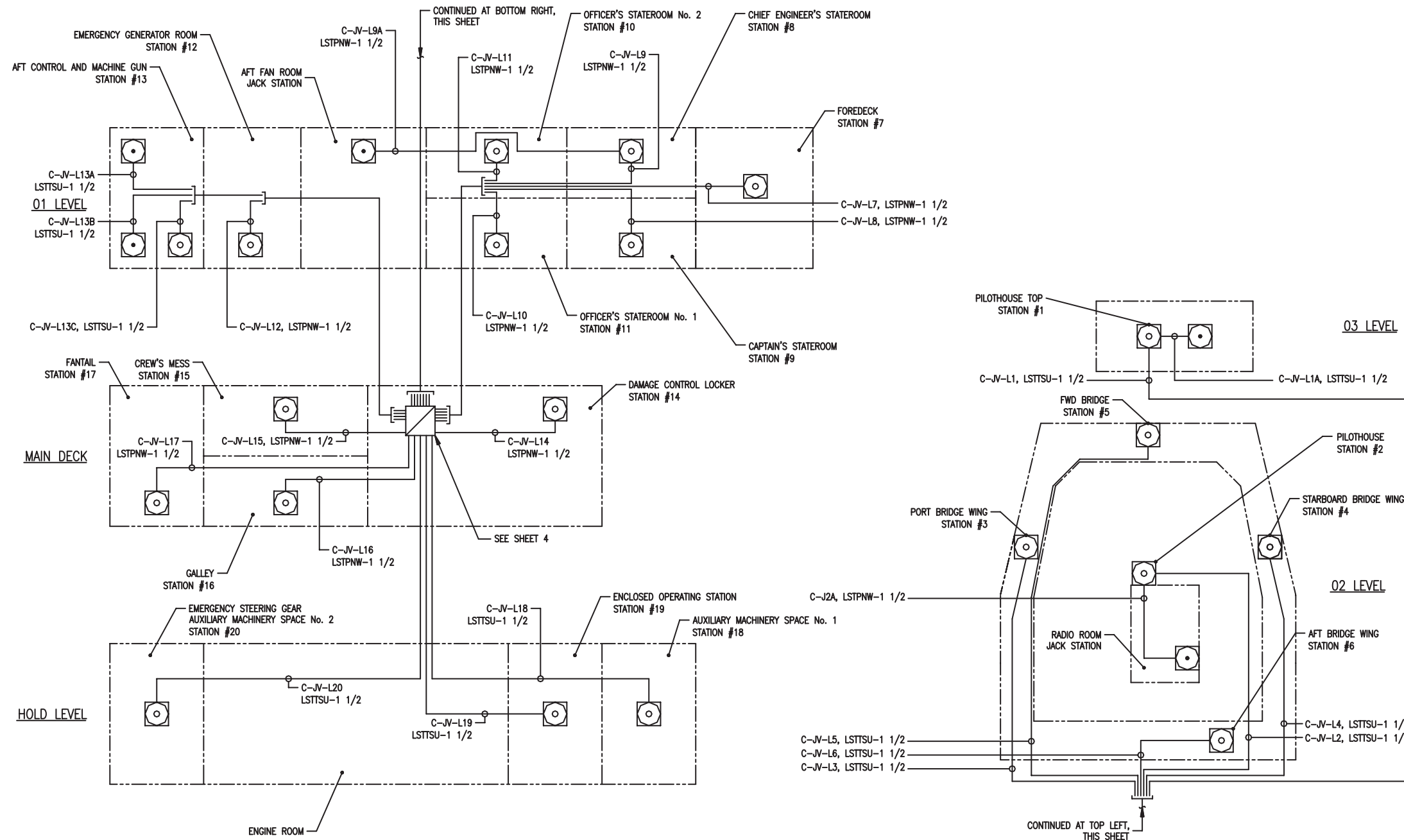
- LEGEND**
- RELAY TERMINAL
  - CONTROL TERMINAL
  - ⬡ EQUIPMENT TERMINAL

VIEW 123-B  
REFR No. 1 & No. 2 FAILURE CIRCUITS












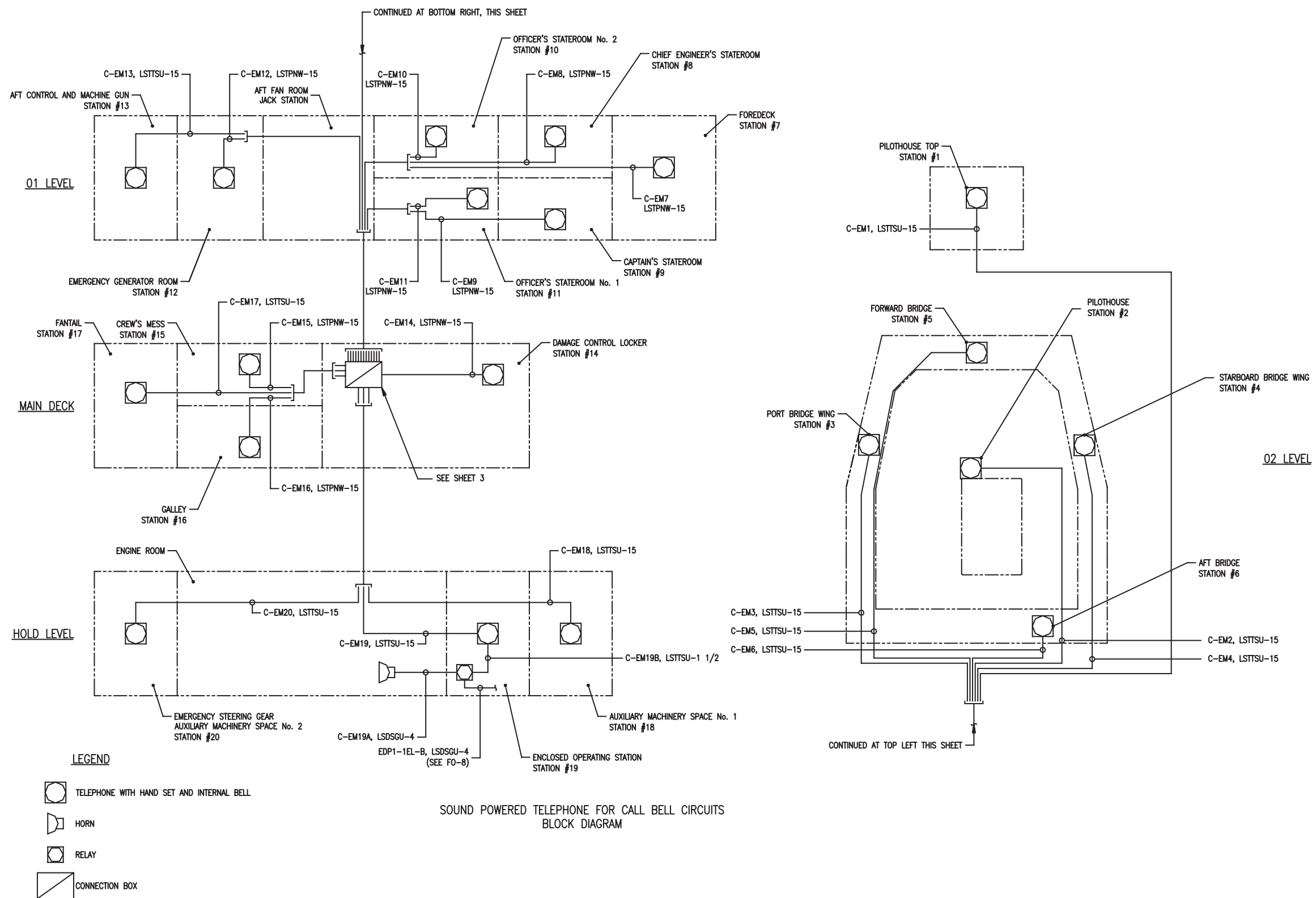
**LEGEND**

-  JACK BOX ONE GANG
-  TELEPHONE WITH A BUILT IN JACK
-  CONNECTION BOX

**SOUND POWERED TELEPHONE FOR TALKING CIRCUITS  
BLOCK DIAGRAM**



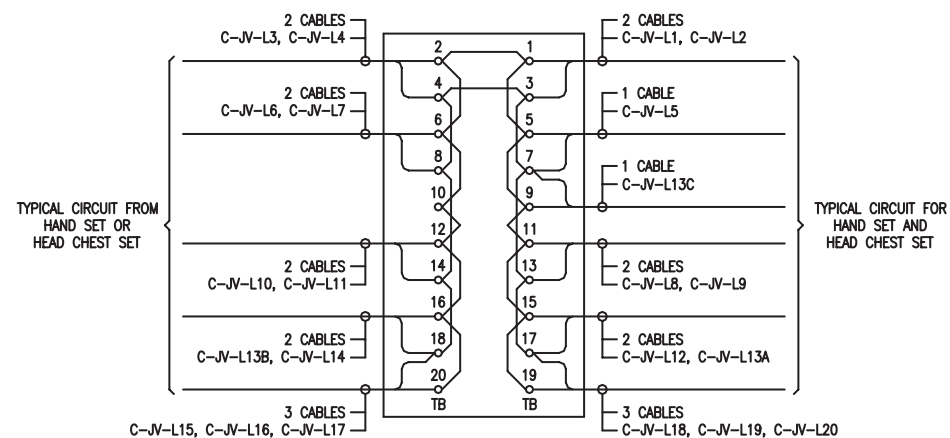












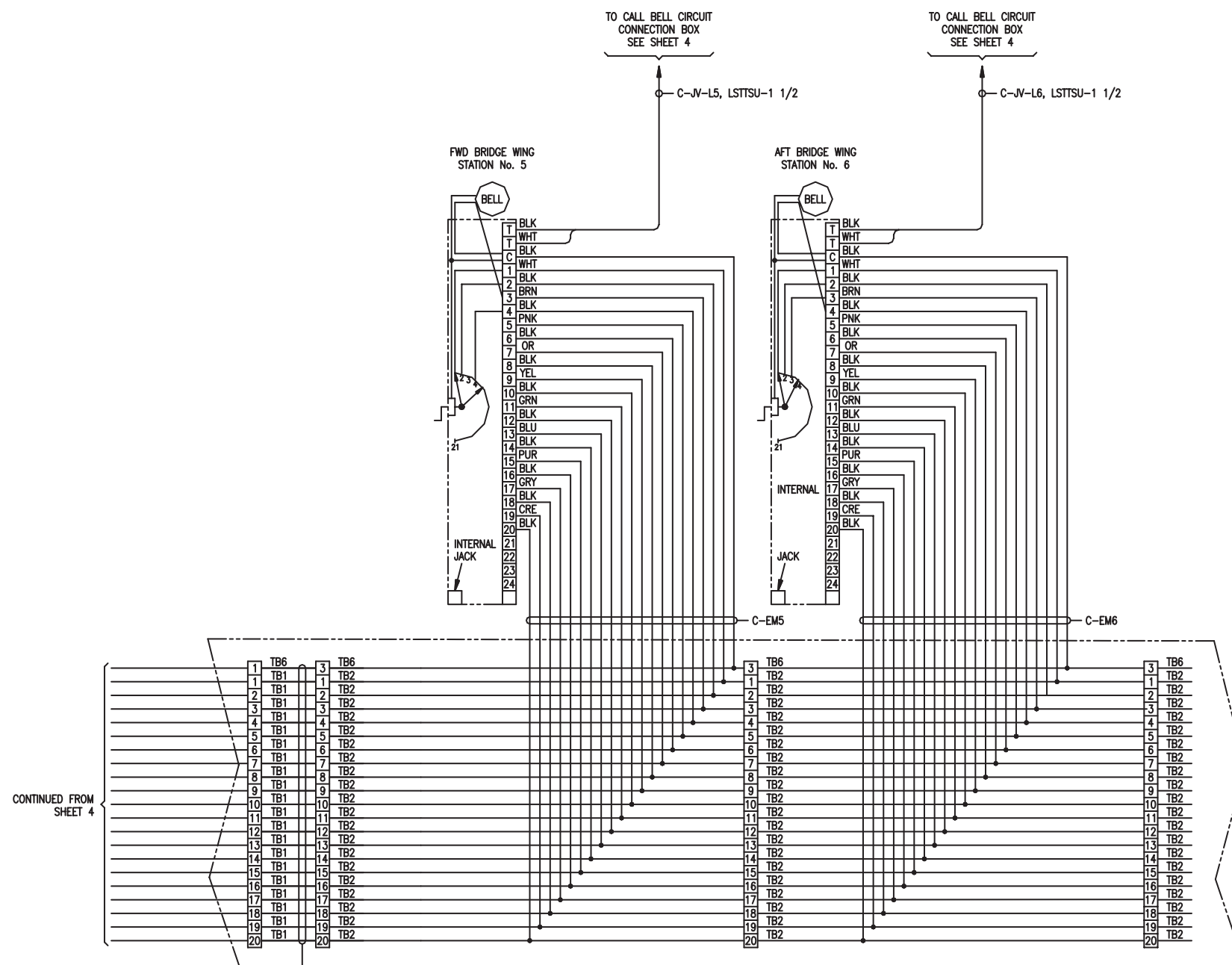
TYPICAL TALKING CIRCUIT HOOK-UP

HOOK-UP NOTES

TALKING CIRCUIT TERMINAL BOX, 20 TERMINAL  
 INSTALL JUMPER BETWEEN

TB2 AND TB1	TB1 AND TB5
TB4 AND TB3	TB5 AND TB9
TB2 AND TB6	TB9 AND TB11
TB6 AND TB10	TB11 AND TB15
TB10 AND TB12	TB15 AND TB19
TB12 AND TB16	TB3 AND TB7
TB16 AND TB20	TB7 AND TB13
TB4 AND TB8	TB13 AND TB17
TB8 AND TB14	
TB14 AND TB18	





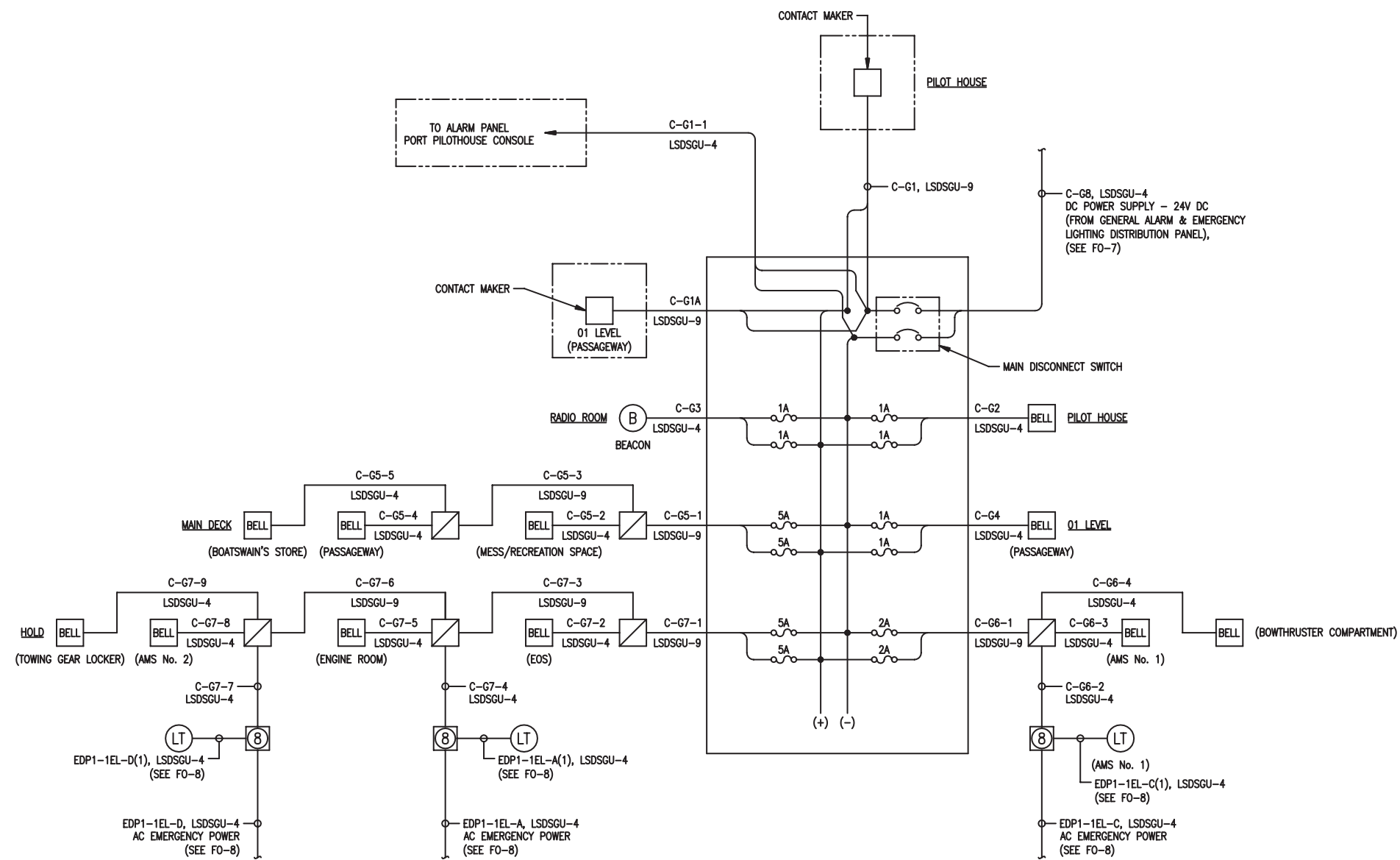
**HOOK-UP NOTES**

- CALL BELL CIRCUIT TERMINAL BOX, 120 TERMINALS
- STATION 1 THROUGH 4 CONNECTED TO TB1 AS SHOWN ABOVE COMMON TO TB6-1
- STATION 5 THROUGH 8 CONNECTED TO TB2 SIMILAR TO ABOVE COMMON TO TB6-3
- STATION 9 THROUGH 12 CONNECTED TO TB3 SIMILAR TO ABOVE COMMON TO TB6-5
- STATION 13 THROUGH 16 CONNECTED TO TB4 SIMILAR TO ABOVE COMMON TO TB6-7
- STATION 17 THROUGH 20 CONNECTED TO TB5 SIMILAR TO ABOVE COMMON TO TB6-9
- INSTALL JUMPER BETWEEN
- TB6-1 AND TB6-3
- TB6-3 AND TB6-5
- TB6-5 AND TB6-7
- TB6-7 AND TB6-9
- TB1-1 AND TB2-1
- TB2-1 AND TB3-1
- TB3-1 AND TB4-1
- TB4-1 AND TB5-1

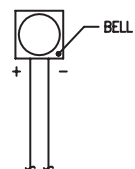
**WIRING DIAGRAM**  
(TYPICAL FOR CALL SIGNAL STATION)





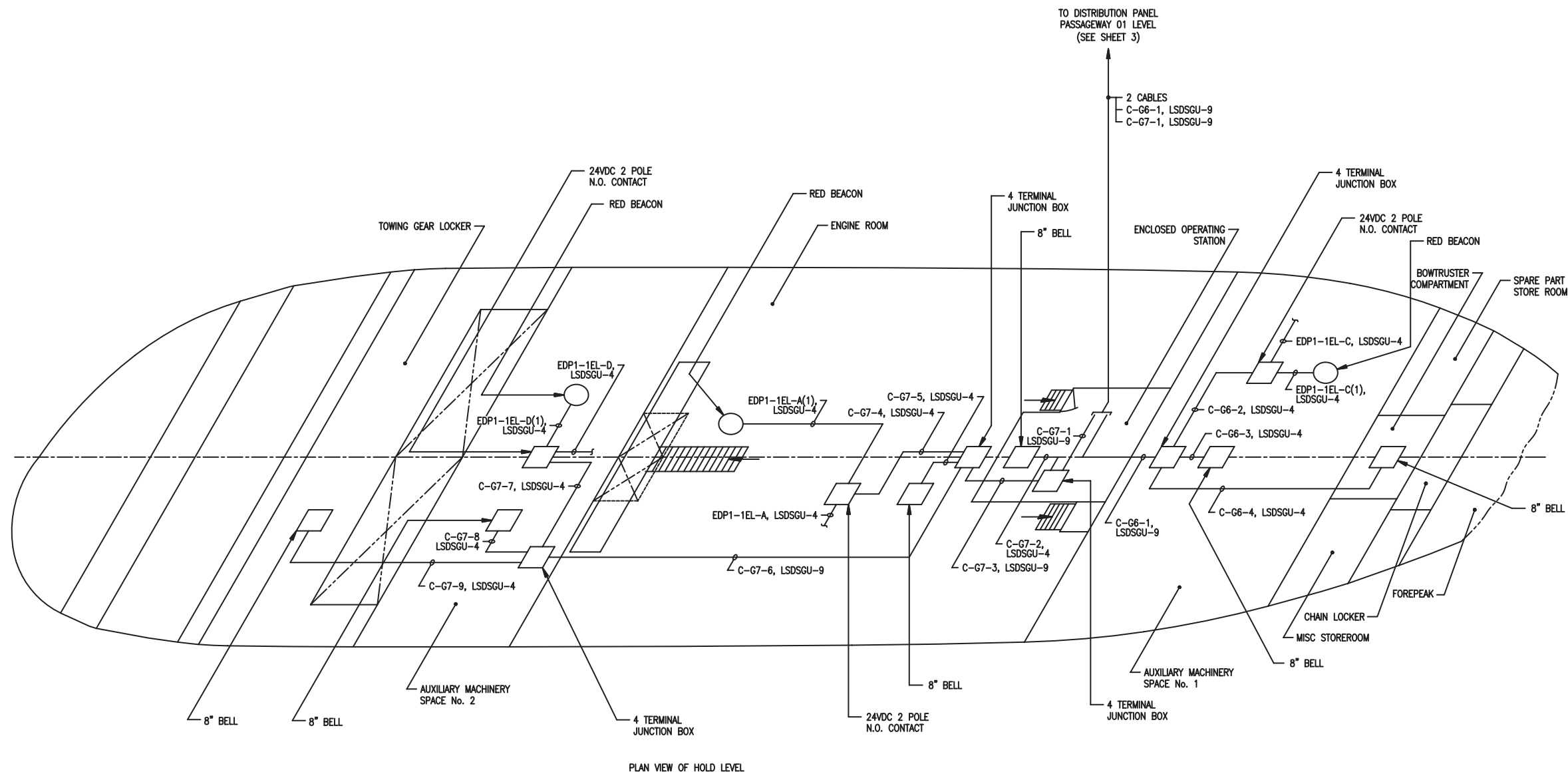


SHOWING GENERAL ALARM SYSTEM WIRING DIAGRAM FOR FEEDER DISTRIBUTION BOX (01 LEVEL PASSAGE)

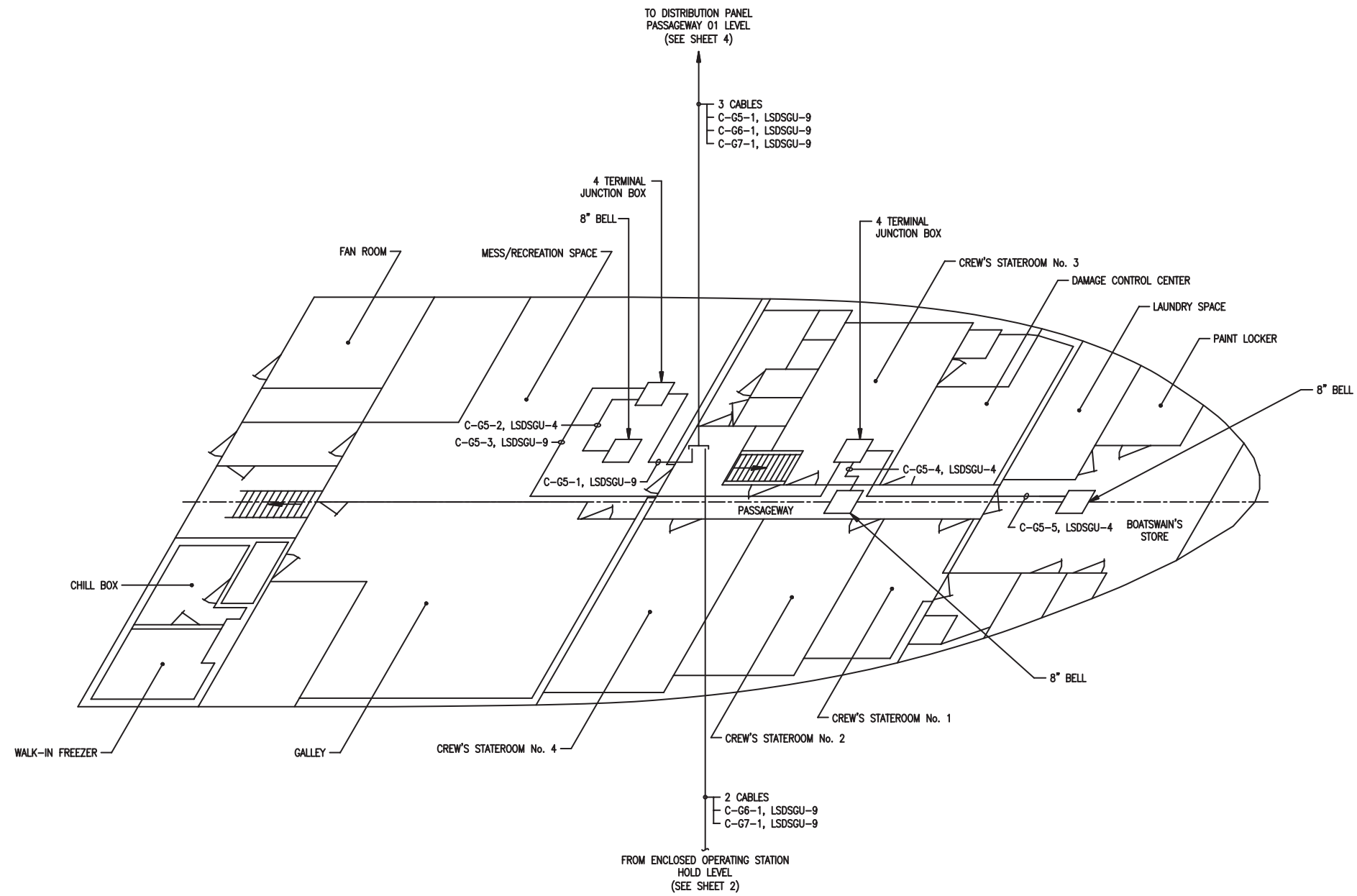


SHOWING TYPICAL CONNECTION FOR BELL



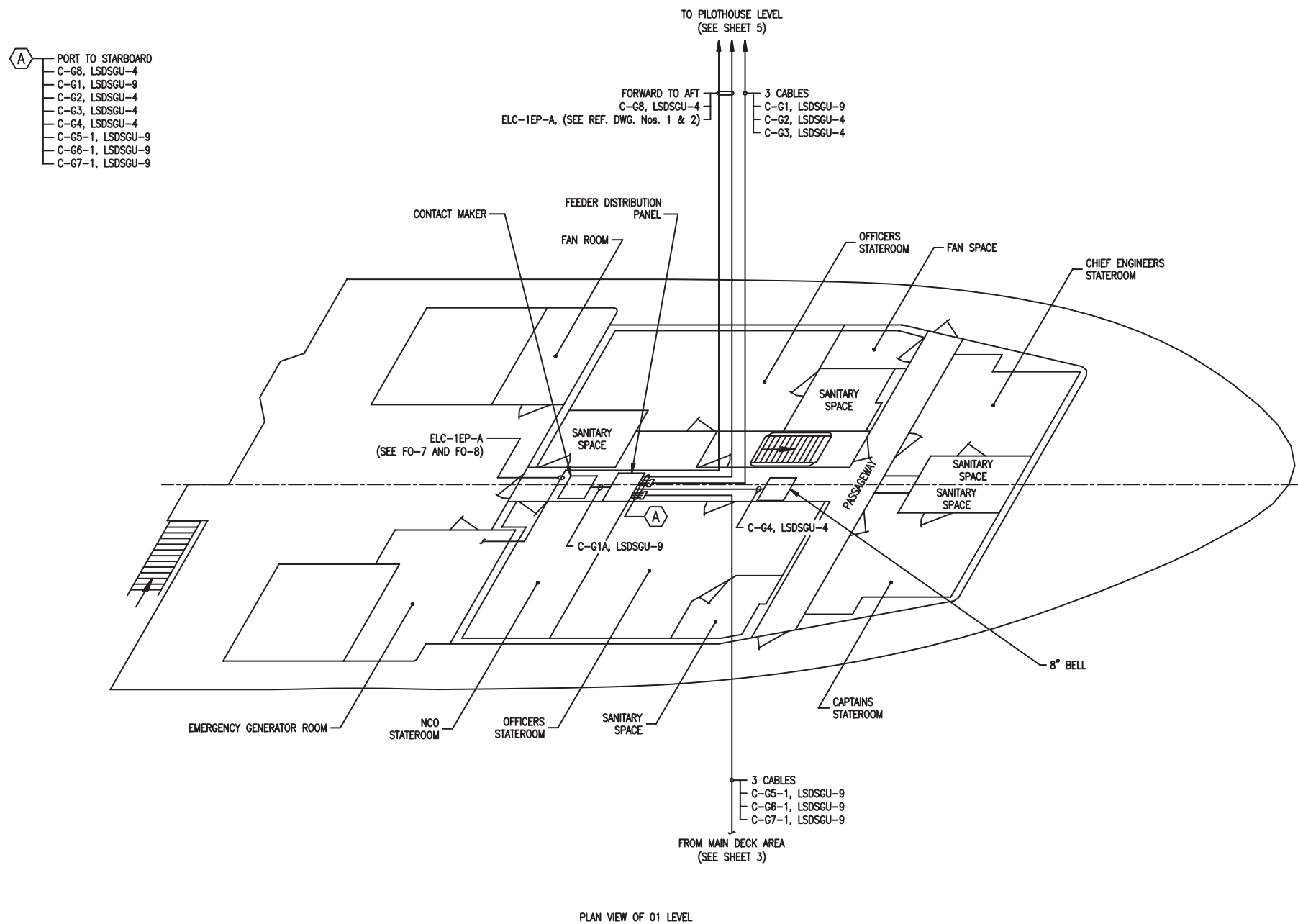






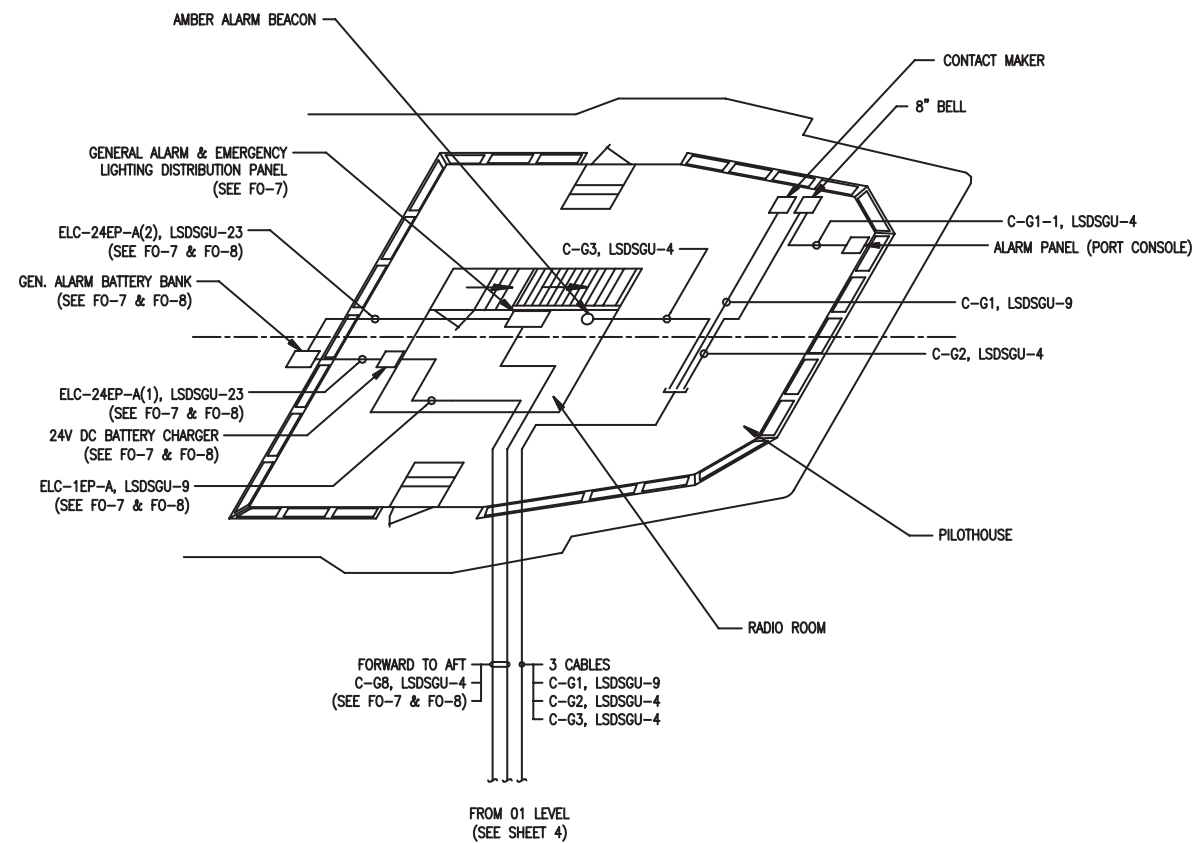
PLAN VIEW OF MAIN DECK AREA





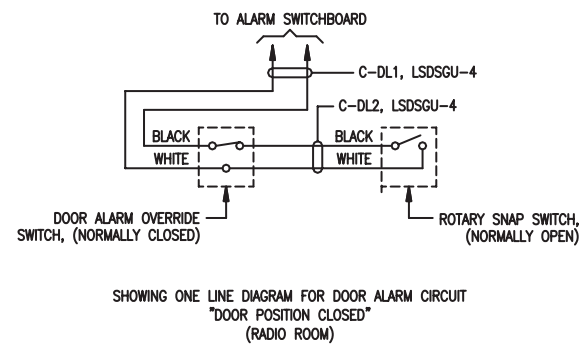
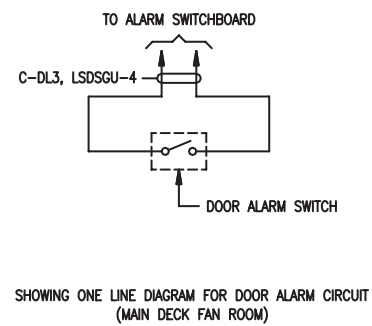
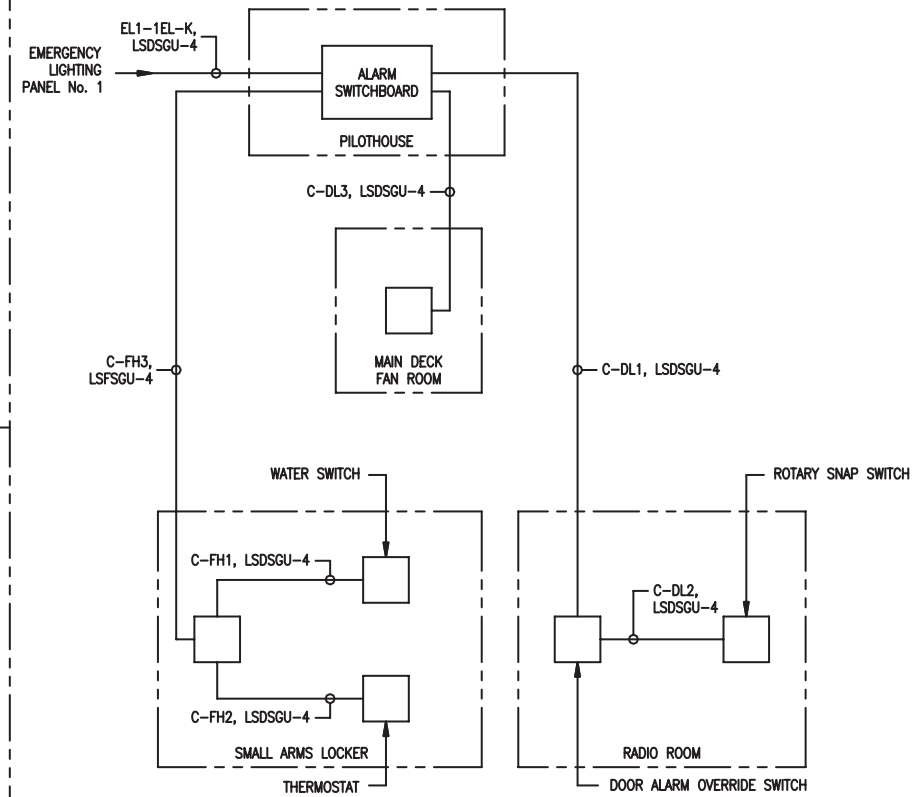
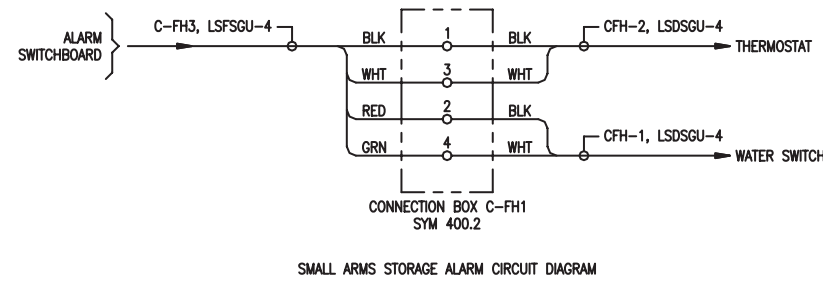
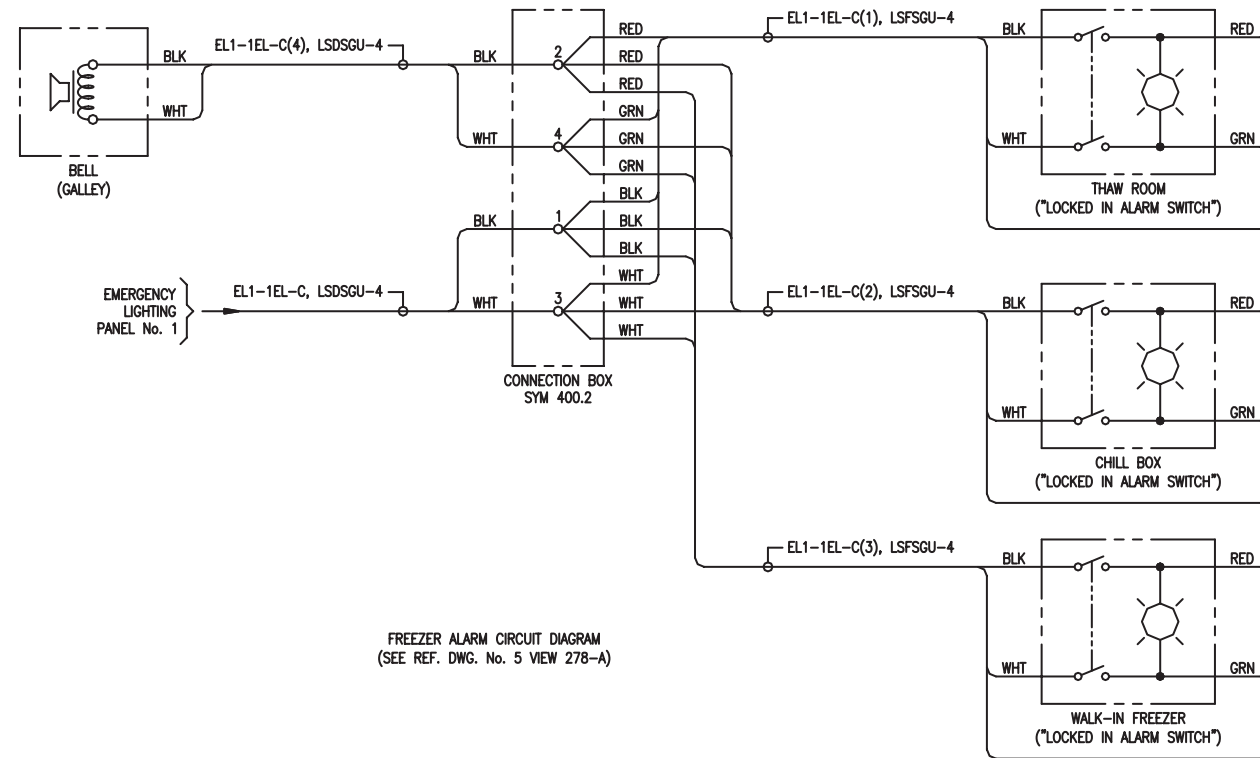






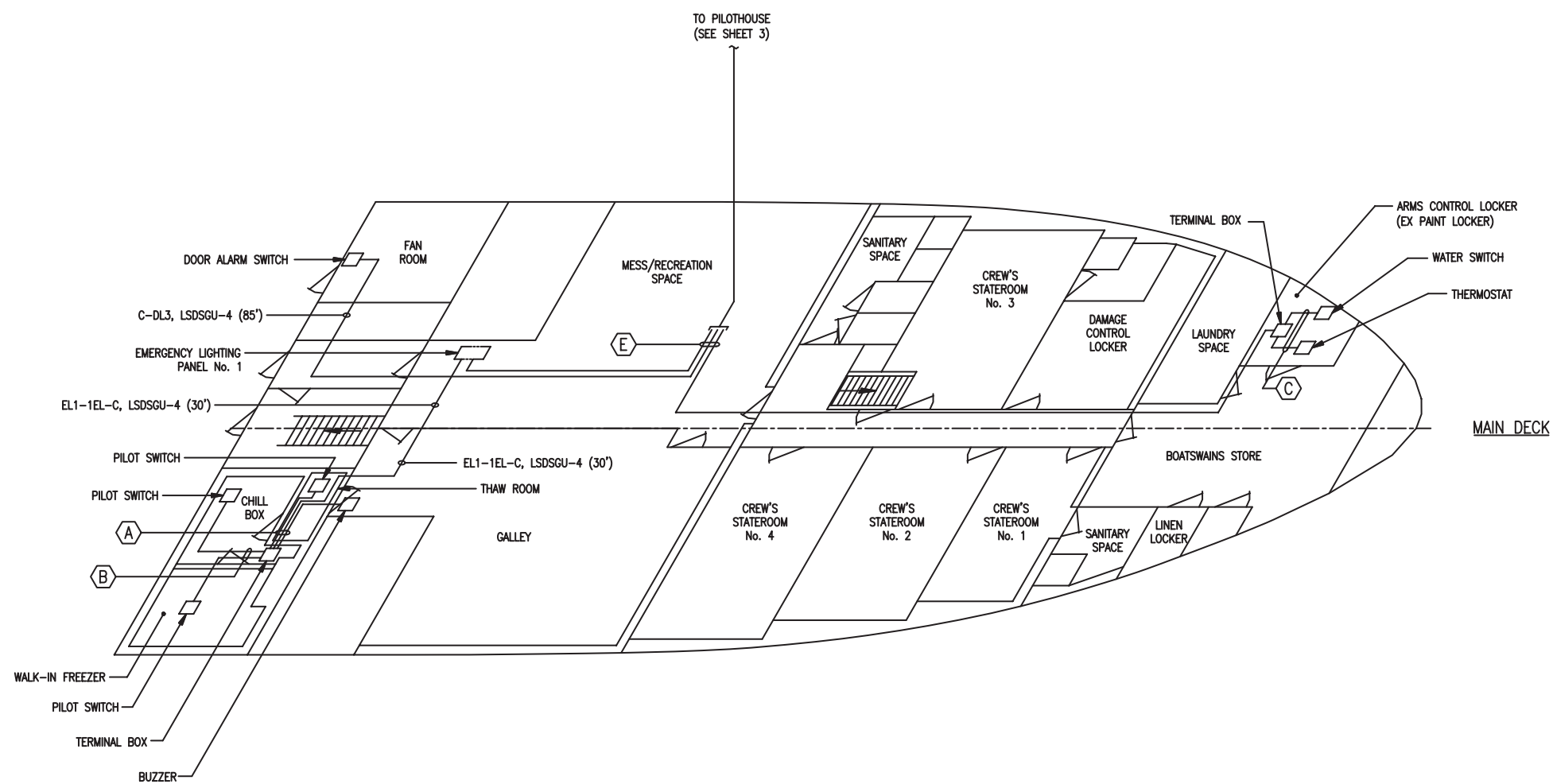
PLAN VIEW OF PILOTHOUSE LEVEL





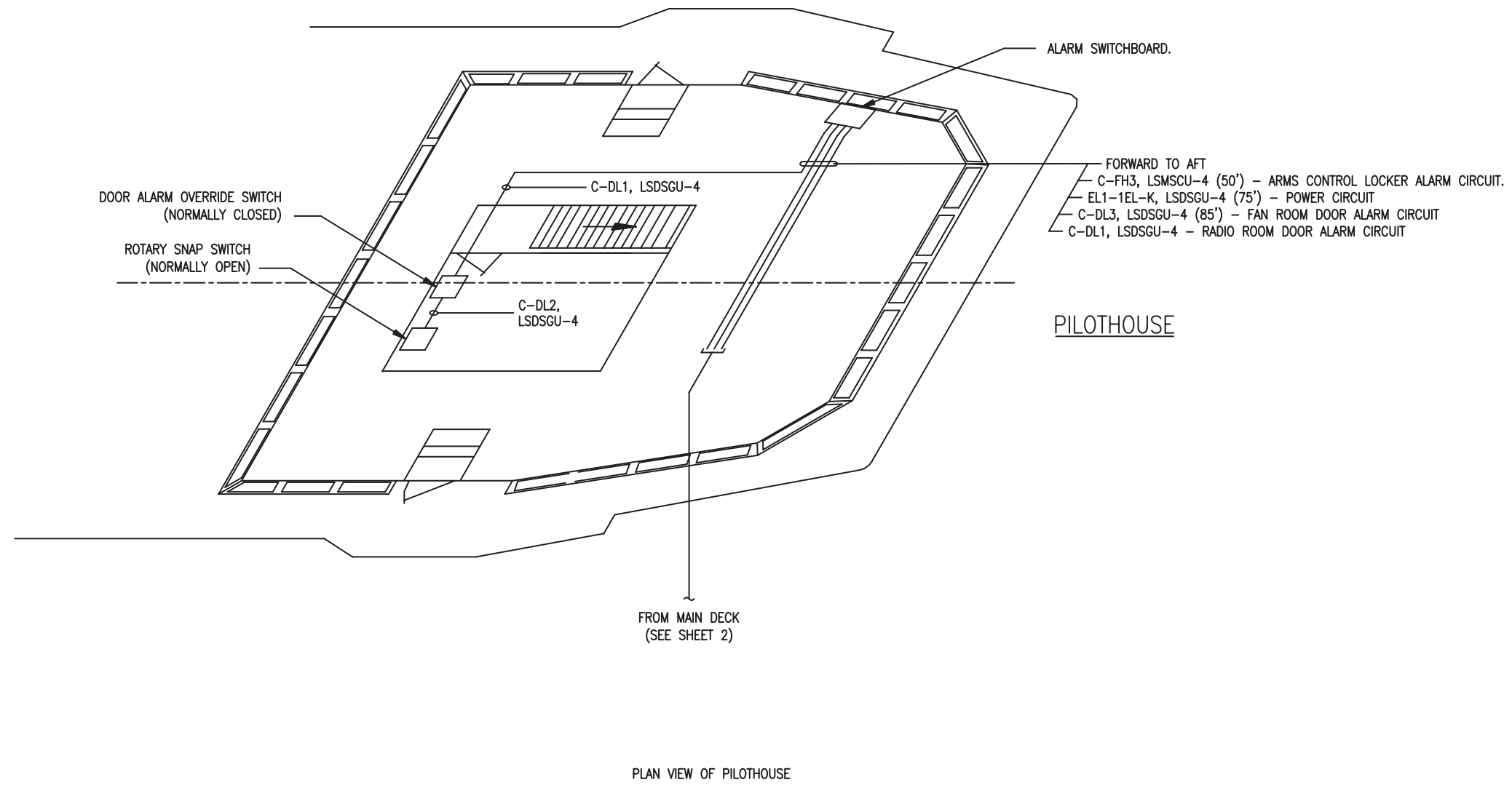


- A** FORWARD TO AFT
  - EL1-1EL-C(4), LSDSGU-4 (15') - BUZZER CIRCUIT
  - EL1-1EL-C, LSDSGU-4 (30') - POWER SUPPLY
  - EL1-1EL-C(1), LSFSGU-4 (15') - PILOT LIGHT SWITCH CIRCUIT
- B** PORT TO STBD
  - EL1-1EL-C(2), LSFSGU-4 (15') - PILOT LIGHT SWITCH CIRCUIT
  - EL1-1EL-C(3), LSFSGU-4 (15') - PILOT LIGHT SWITCH CIRCUIT
- C** PORT TO STBD
  - C-FH1, LSDSGU-4 (6')
  - C-FH2, LSDSGU-4 (6')
- E** FORWARD TO AFT
  - C-FH3, LSFSGU-4 (50') - ARMS CONTROL LOCKER ALARM CIRCUIT
  - C-DL3, LSDSGU-4 (85') - FAN ROOM DOOR ALARM CIRCUIT
  - EL1-1EL-K, LSDSGU-4 (75') - POWER CIRCUIT



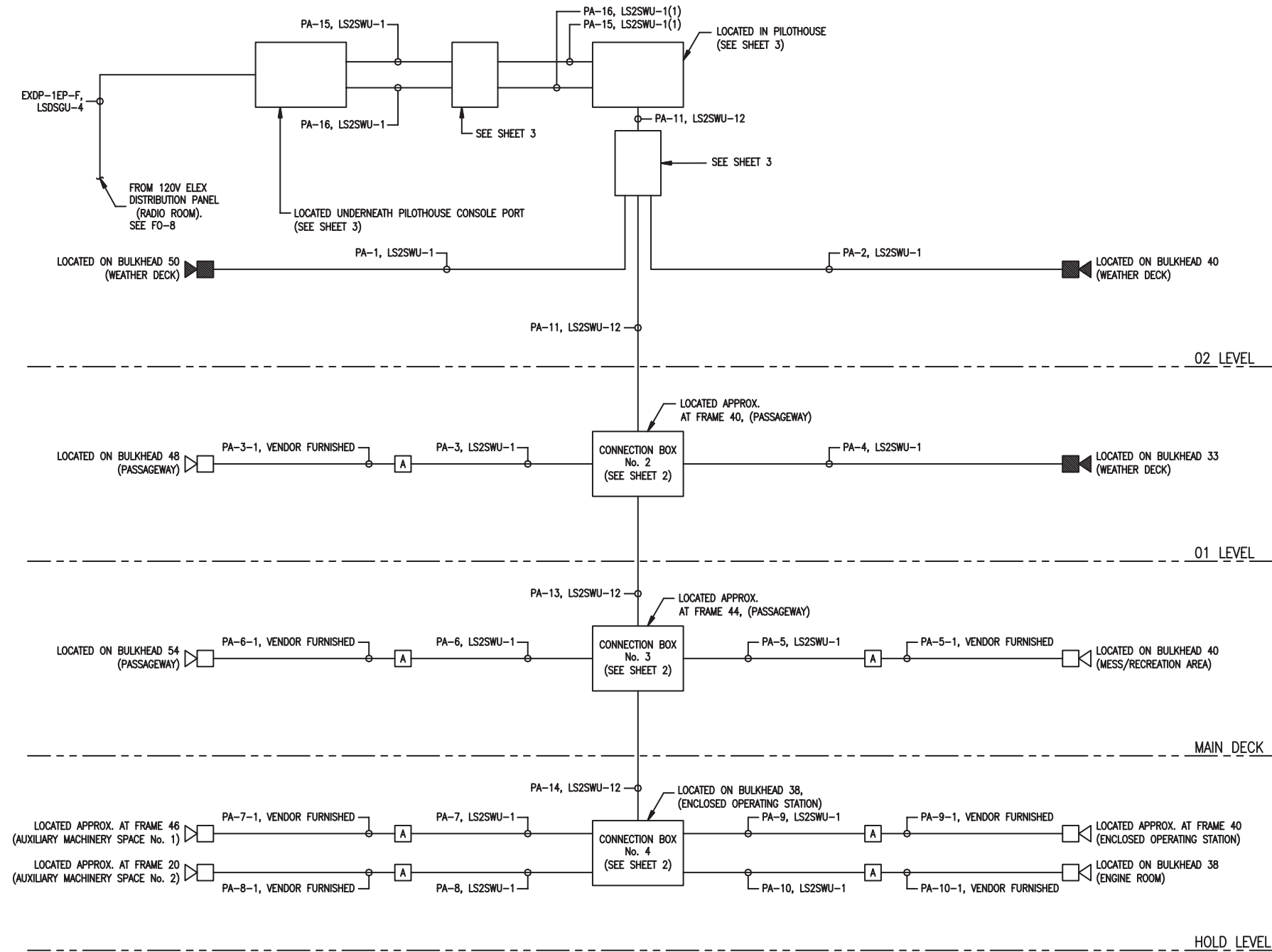
PLAN VIEW OF MAIN DECK





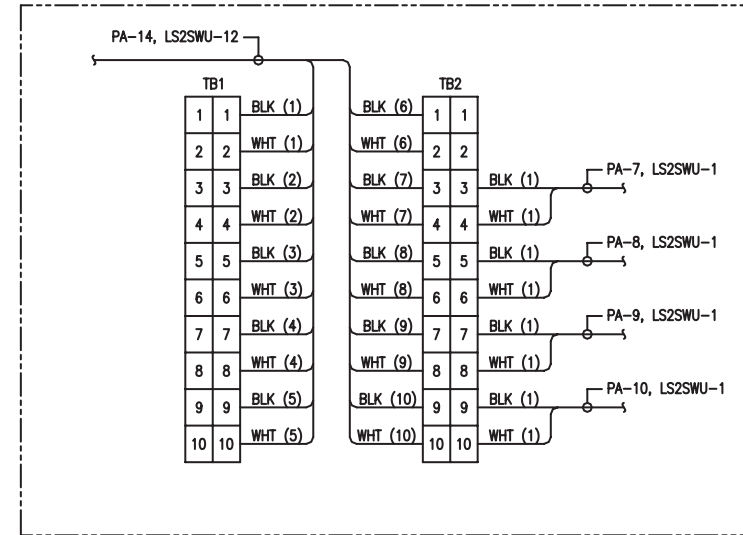




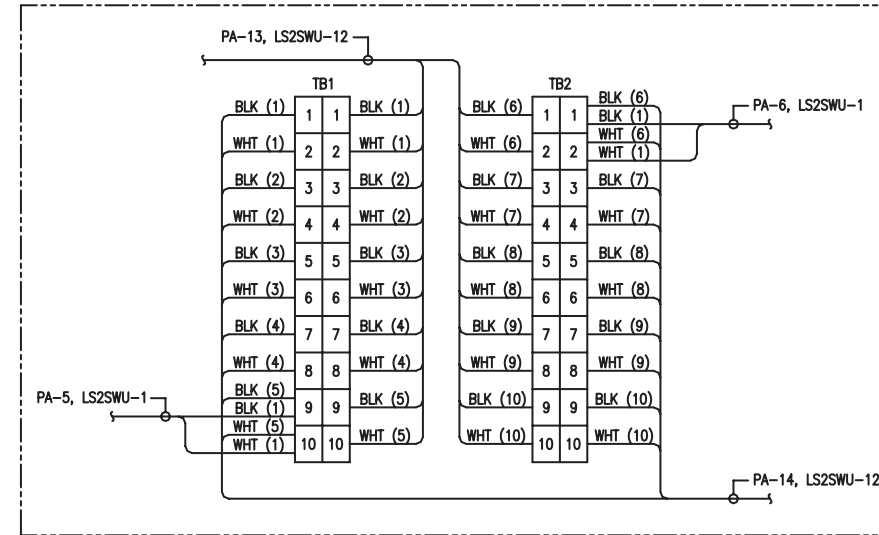


PUBLIC ANNOUNCING SYSTEM  
BLOCK DIAGRAM  
(SEE SHEET 3)

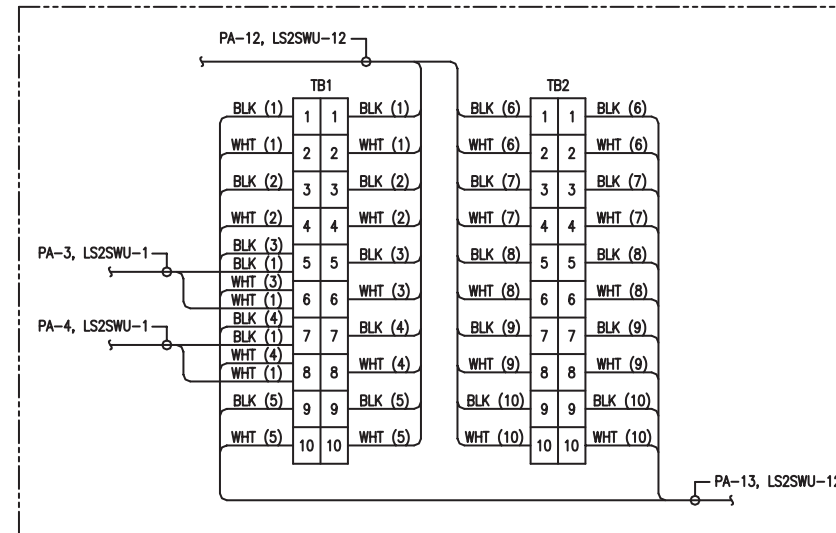




NOTE: ALL SHIELDS ARE TO BE GROUNDED INSIDE JUNCTION BOX  
 CONNECTION BOX No 4 - WIRING DIAGRAM  
 (SEE SHEET 1)

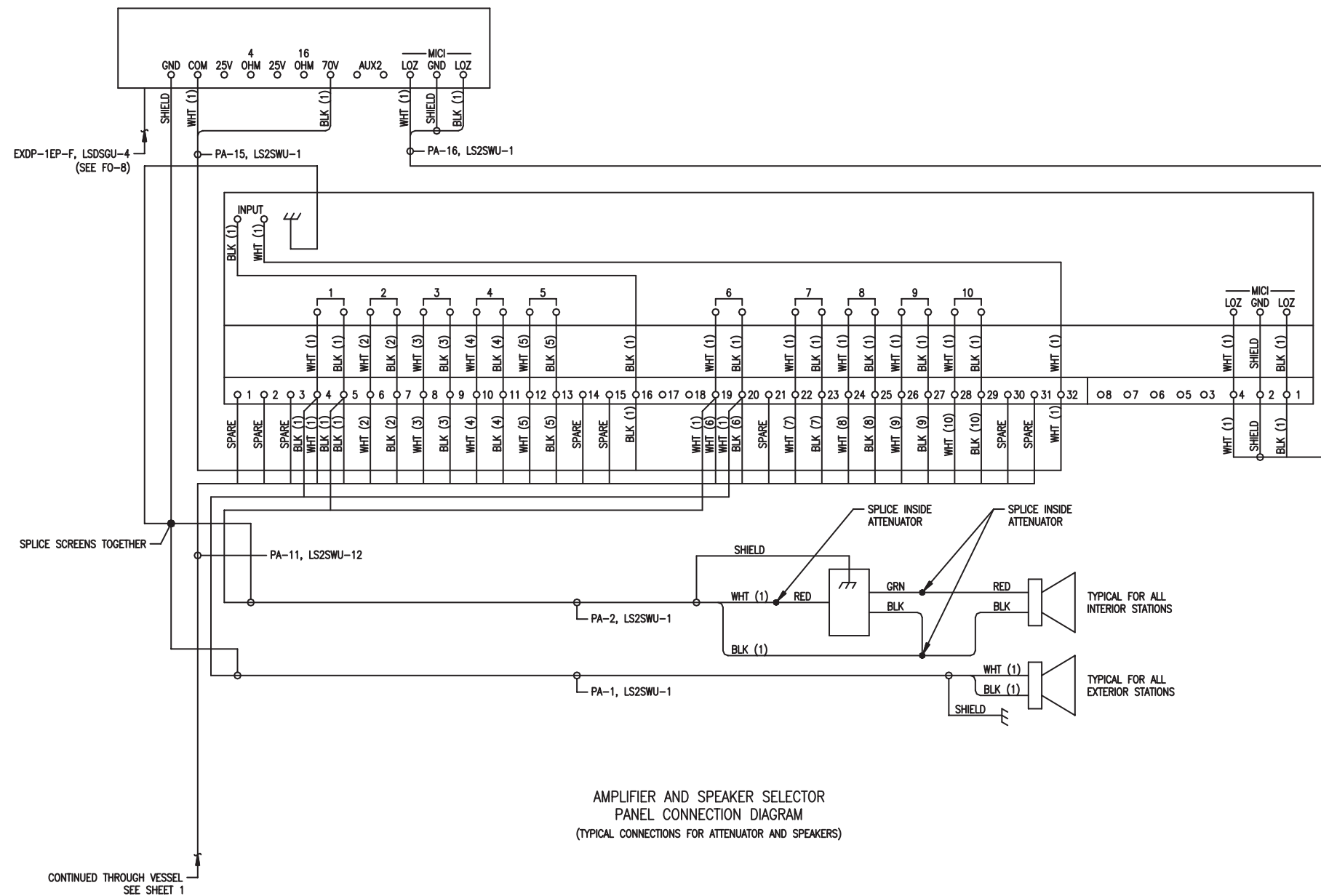


NOTE: ALL SHIELDS ARE TO BE GROUNDED INSIDE JUNCTION BOX  
 CONNECTION BOX No 3 - WIRING DIAGRAM  
 (SEE SHEET 1)

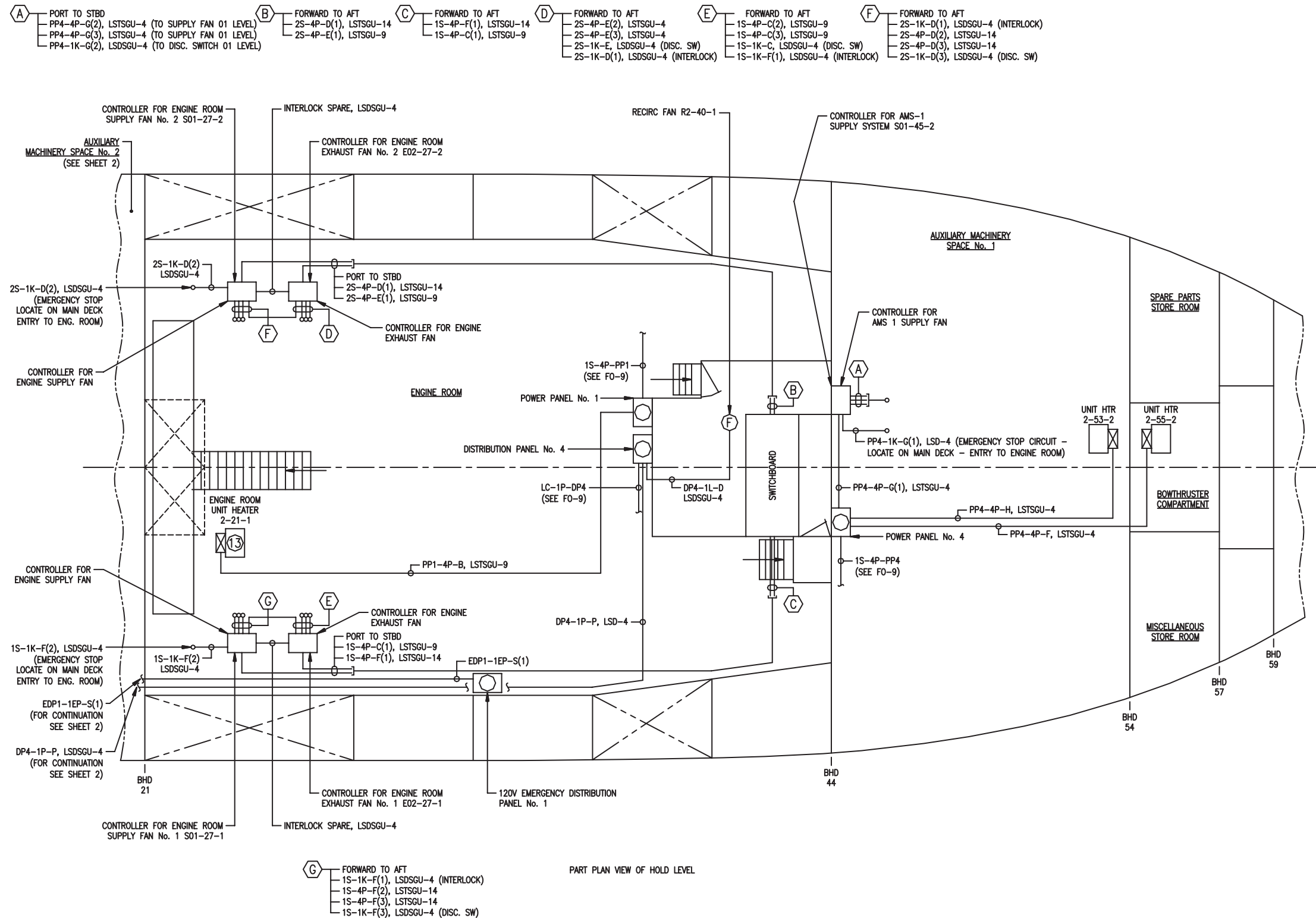


NOTE: ALL SHIELDS ARE TO BE GROUNDED INSIDE JUNCTION BOX  
 CONNECTION BOX No 2 - WIRING DIAGRAM  
 (SEE SHEET 1)



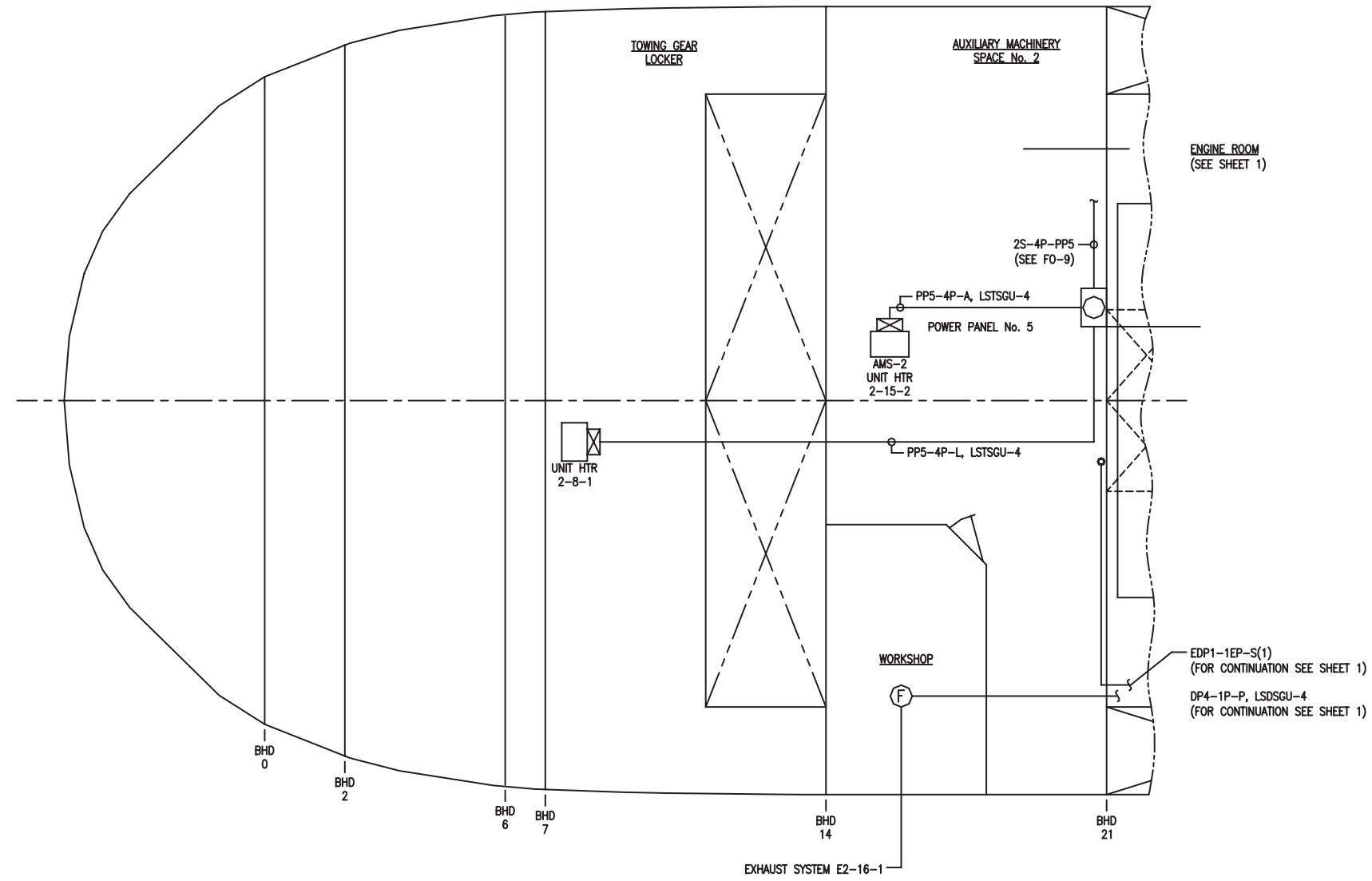






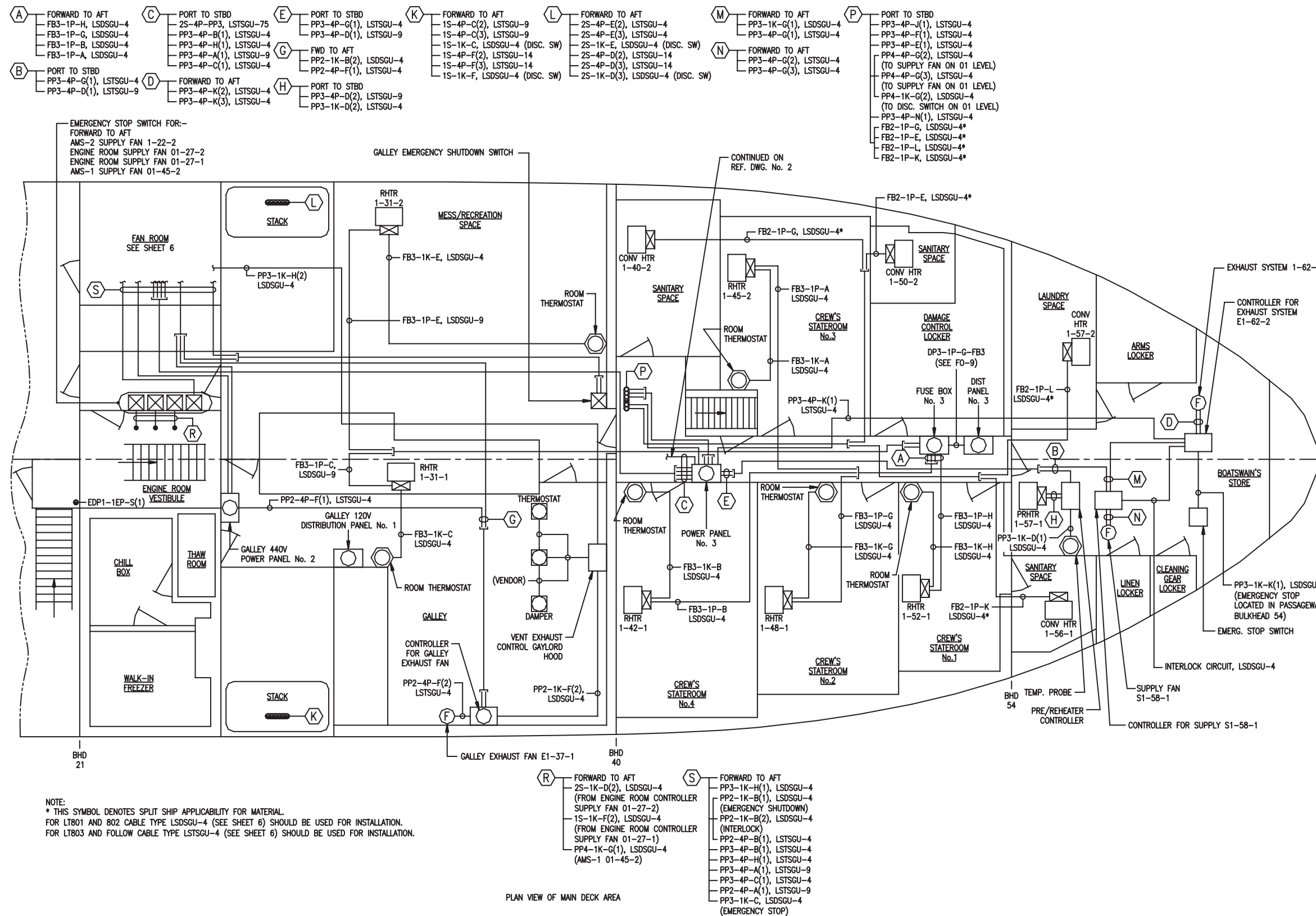




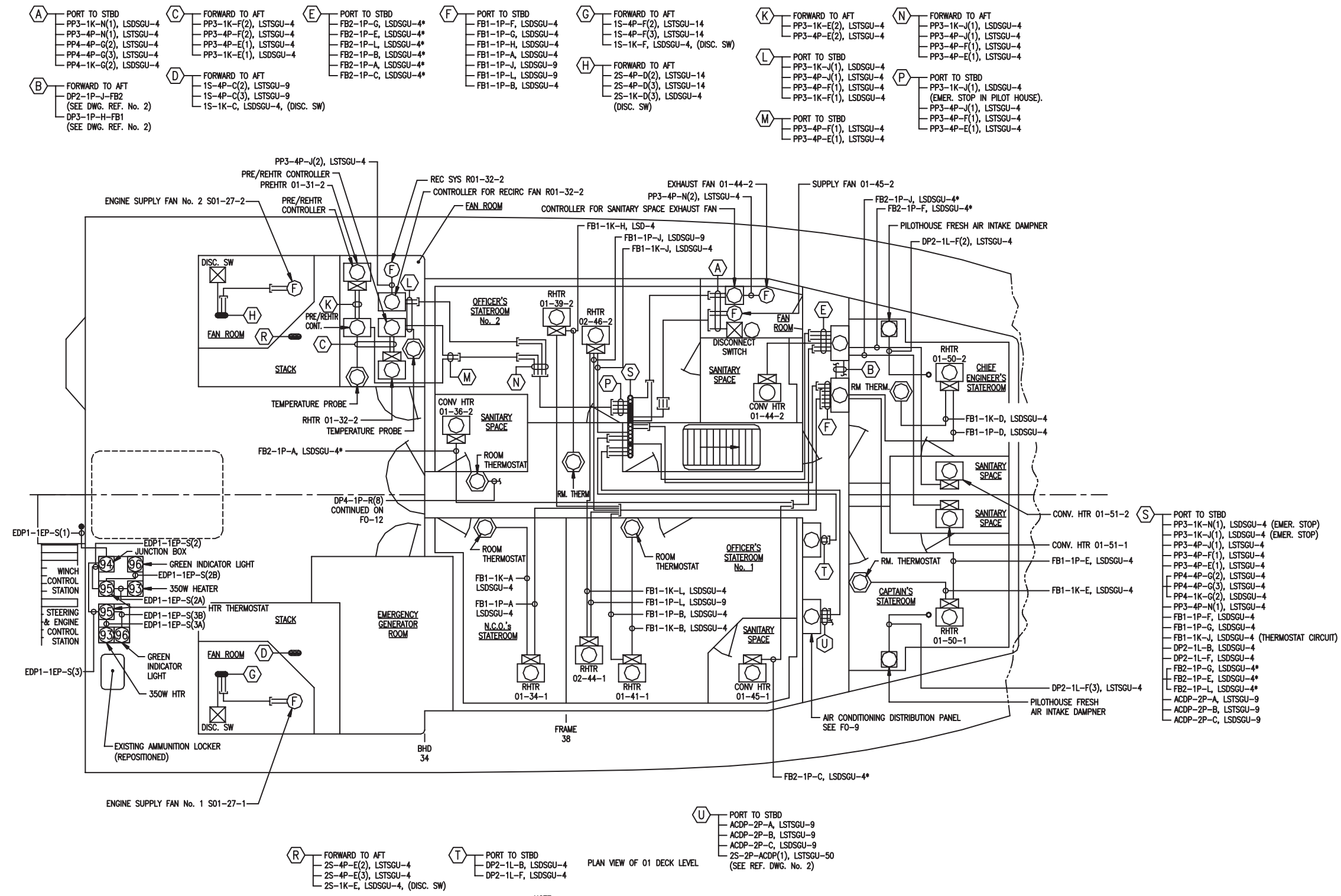


PART PLAN VIEW OF HOLD LEVEL  
SHOWING NORMAL AND EMERGENCY LIGHTING CIRCUITS





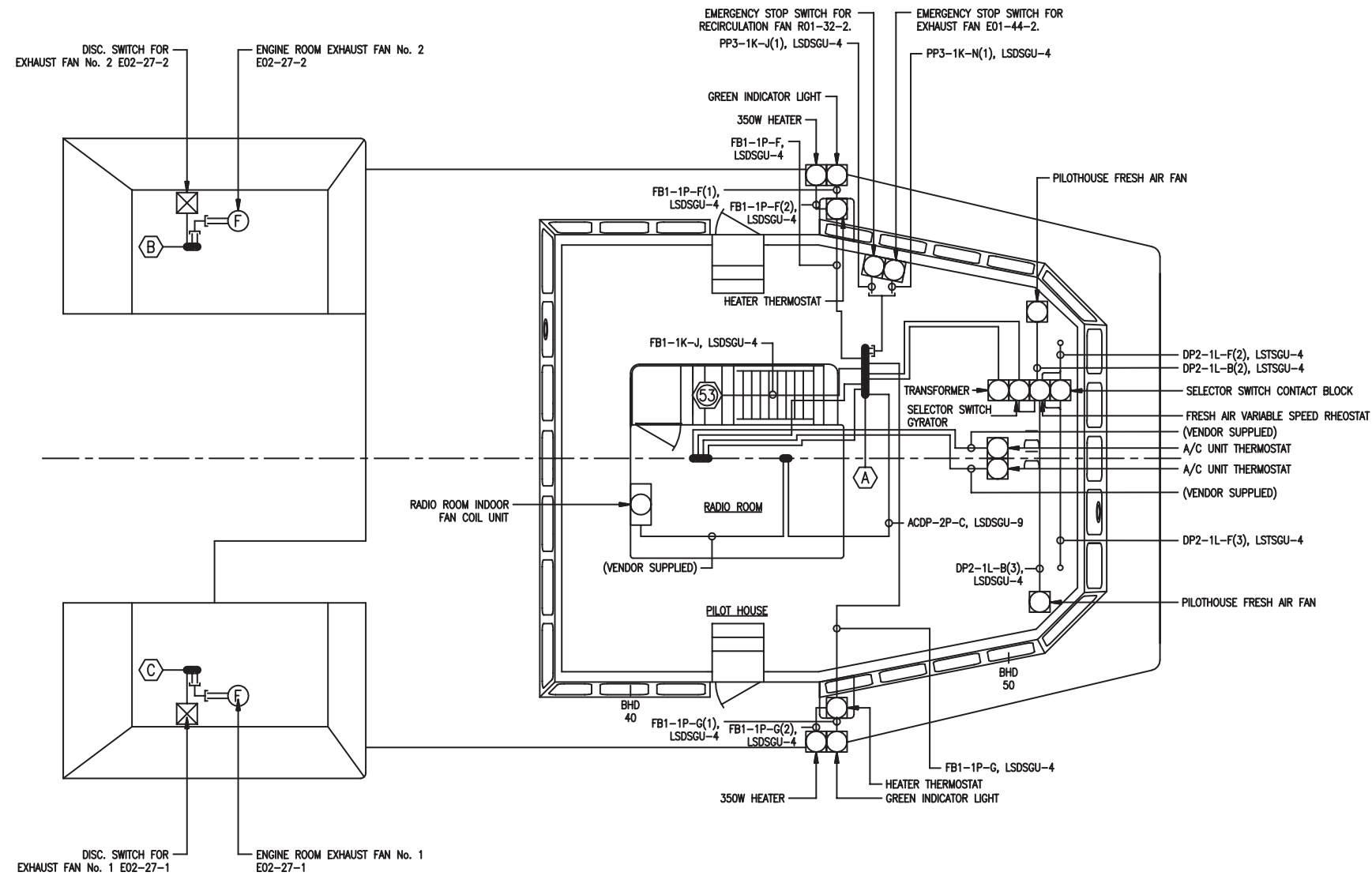




NOTE:  
 \* THIS SYMBOL DENOTES SPLIT SHIP APPLICABILITY FOR MATERIAL.  
 FOR LT801 AND 802 CABLE TYPE LSDSGU-4  
 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.  
 FOR LT803 AND FOLLOW CABLE TYPE LSTSGU-4  
 (SEE SHEET 6) SHOULD BE USED FOR INSTALLATION.



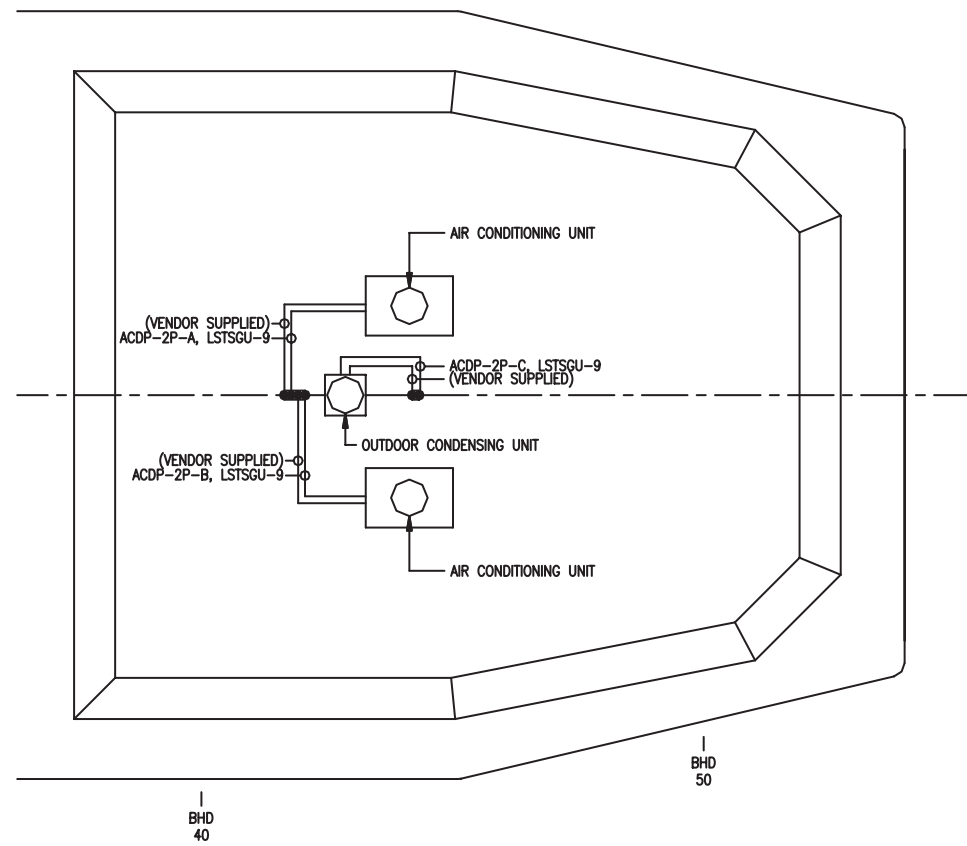
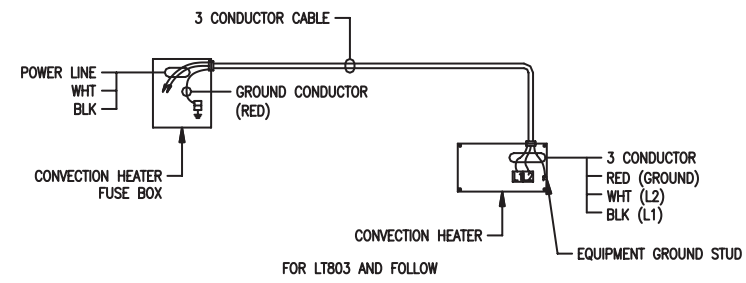
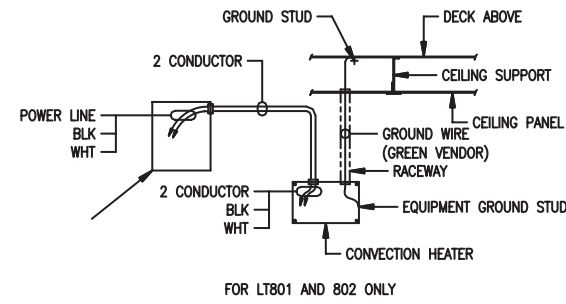
- (A)** PORT TO STBD
  - PP3-1K-N(1), LSDSGU-4 (EMER. STOP)
  - PP3-1K-J(1), LSDSGU-4 (EMER. STOP)
  - FB1-1P-F, LSDSGU-4
  - FB1-1P-G, LSDSGU-4
  - FB1-1K-J, LSDSGU-4 (THERMOSTAT CIRCUIT)
  - DP2-1L-B, LSDSGU-4
  - DP2-1L-F, LSDSGU-4
  - ACDP-2P-A, LSTSGU-9
  - ACDP-2P-B, LSTSGU-9
  - ACDP-2P-C, LSDSGU-9
- (B)** FORWARD TO AFT
  - 2S-4P-E(2), LSTSGU-4
  - 2S-4P-E(3), LSTSGU-4
  - 2S-1K-E, LSDSGU-4 (DISC. SWITCH)
- (C)** FORWARD TO AFT
  - 1S-4P-C(2), LSTSGU-9
  - 1S-4P-C(3), LSTSGU-9
  - 1S-1K-C, LSDSGU-4 (DISC. SWITCH)



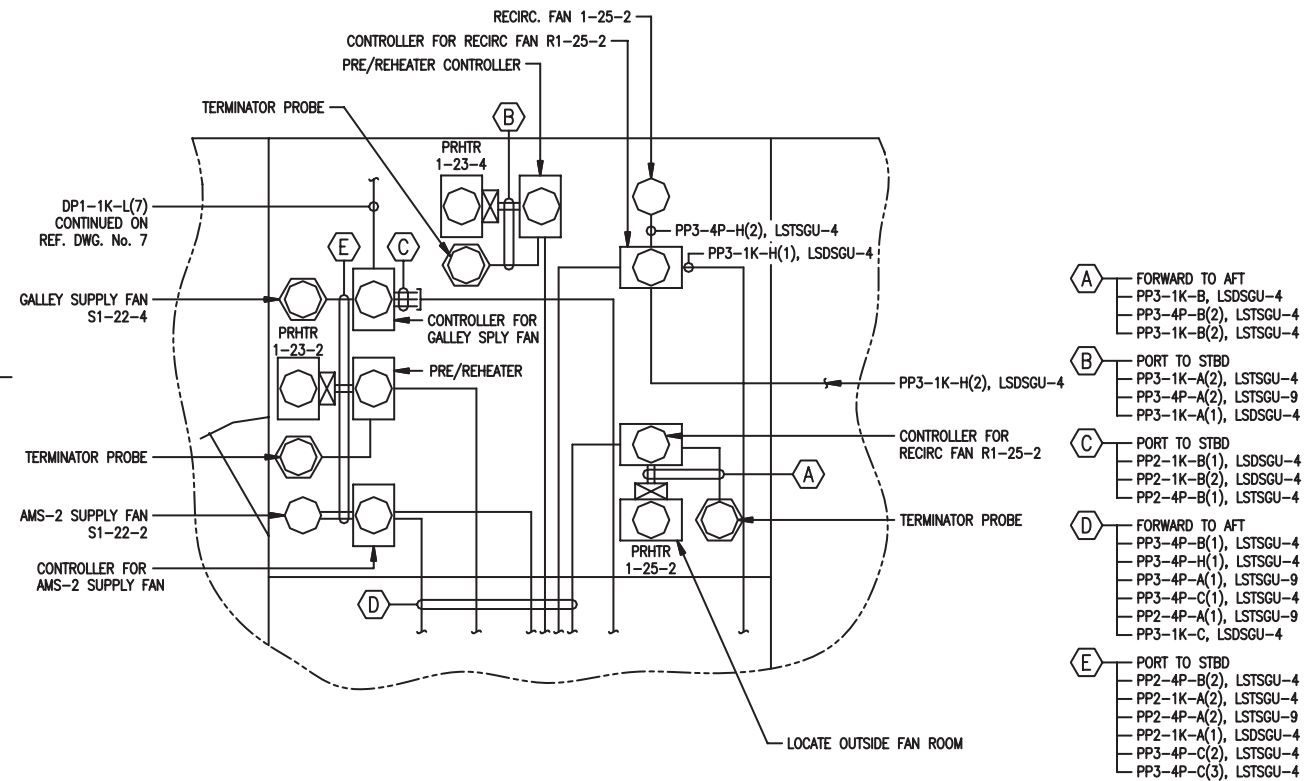
PLAN VIEW OF O2 DECK LEVEL







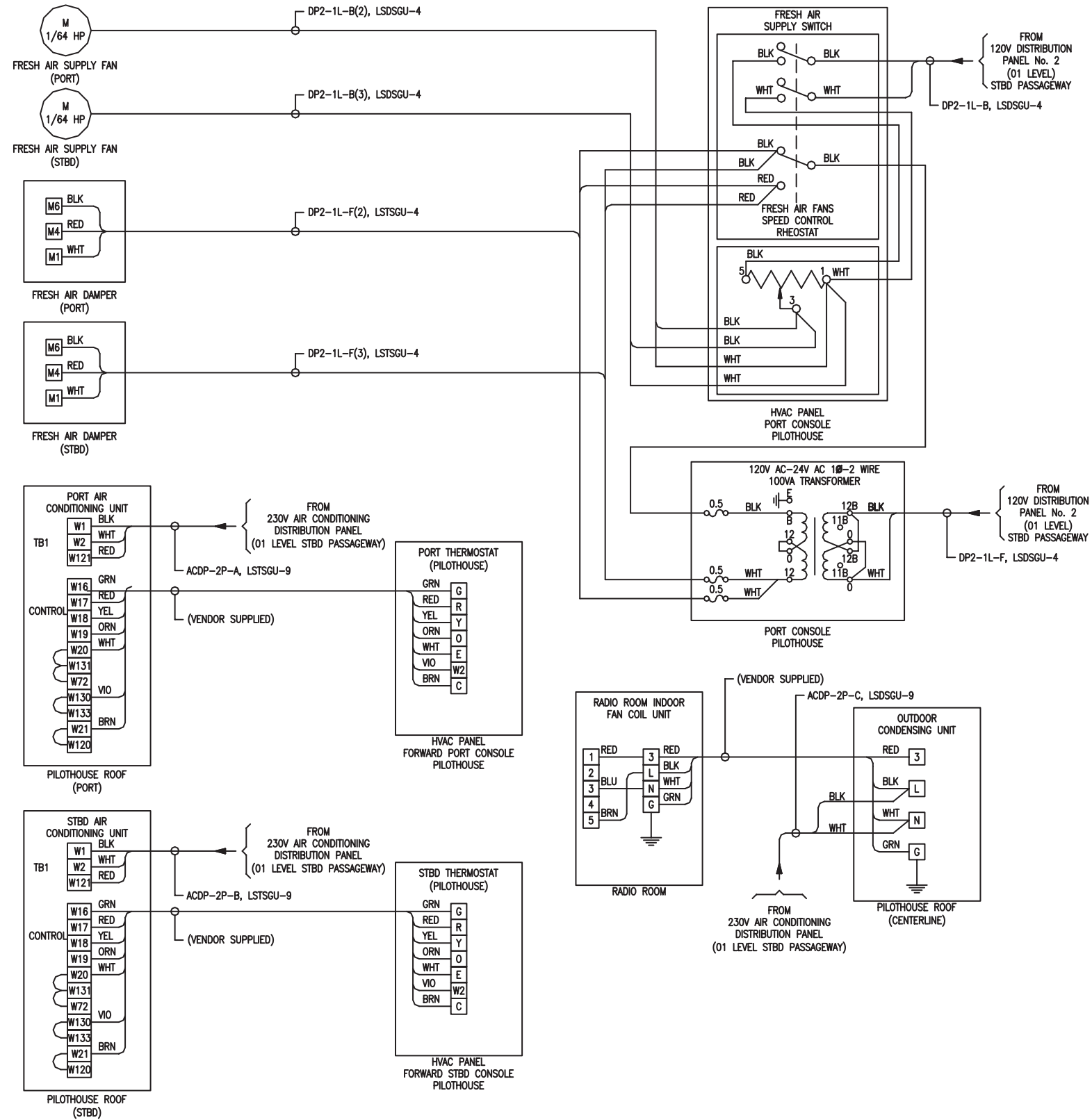
VIEW ON PILOTHOUSE ROOF  
MAST NOT SHOWN FOR CLARITY



ENLARGED VIEW OF FAN ROOM - MAIN DECK  
SEE SHEET 3

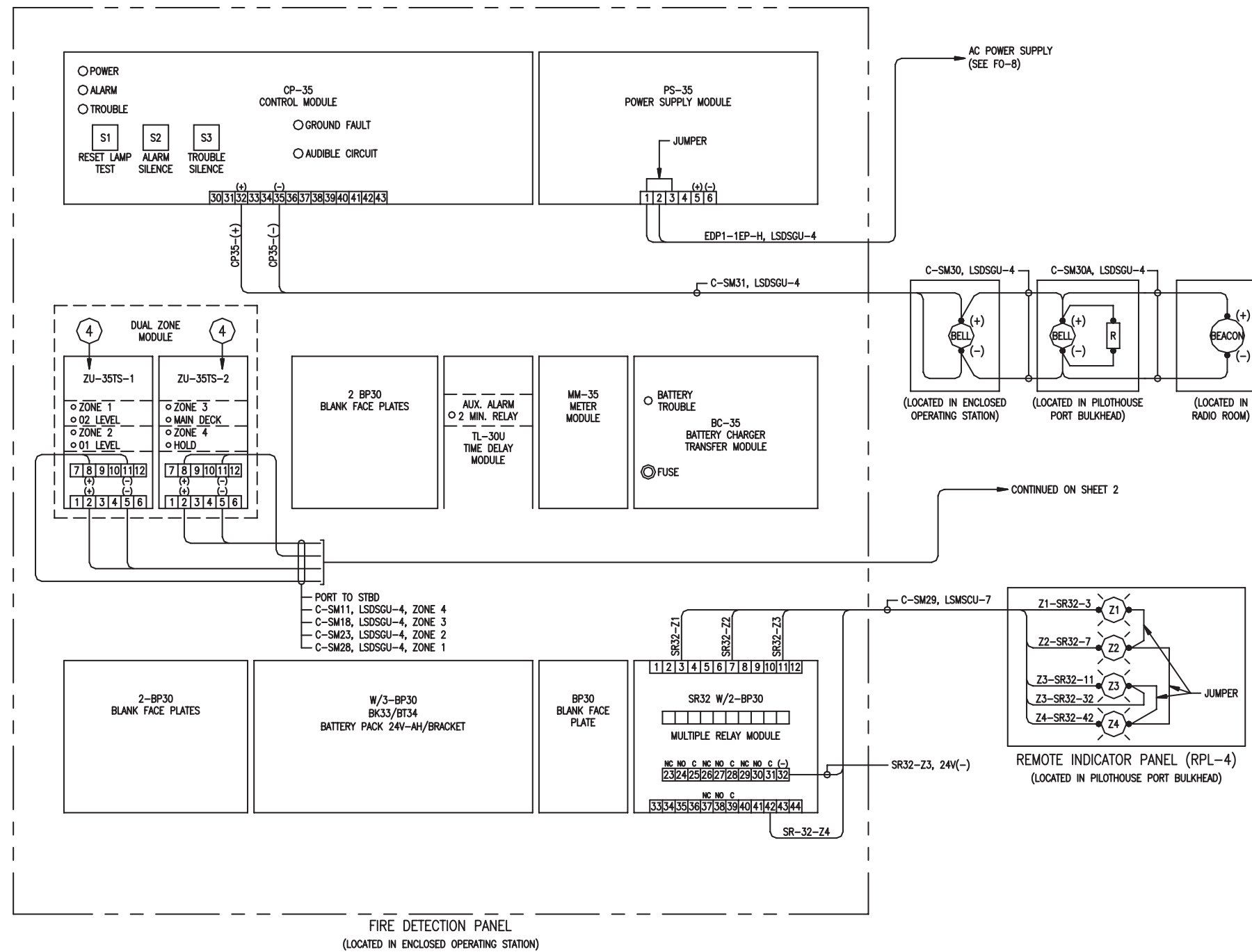
- A** FORWARD TO AFT  
PP3-1K-B, LSTSGU-4  
PP3-4P-B(2), LSTSGU-4  
PP3-1K-B(2), LSTSGU-4
- B** PORT TO STBD  
PP3-1K-A(2), LSTSGU-4  
PP3-4P-A(2), LSTSGU-9  
PP3-1K-A(1), LSTSGU-4
- C** PORT TO STBD  
PP2-1K-B(1), LSTSGU-4  
PP2-1K-B(2), LSTSGU-4  
PP2-4P-B(1), LSTSGU-4
- D** FORWARD TO AFT  
PP3-4P-B(1), LSTSGU-4  
PP3-4P-H(1), LSTSGU-4  
PP3-4P-A(1), LSTSGU-9  
PP3-4P-C(1), LSTSGU-4  
PP2-4P-A(1), LSTSGU-9  
PP3-1K-C, LSTSGU-4
- E** PORT TO STBD  
PP2-4P-B(2), LSTSGU-4  
PP2-1K-A(2), LSTSGU-4  
PP2-4P-A(2), LSTSGU-9  
PP2-1K-A(1), LSTSGU-4  
PP3-4P-C(2), LSTSGU-4  
PP3-4P-C(3), LSTSGU-4





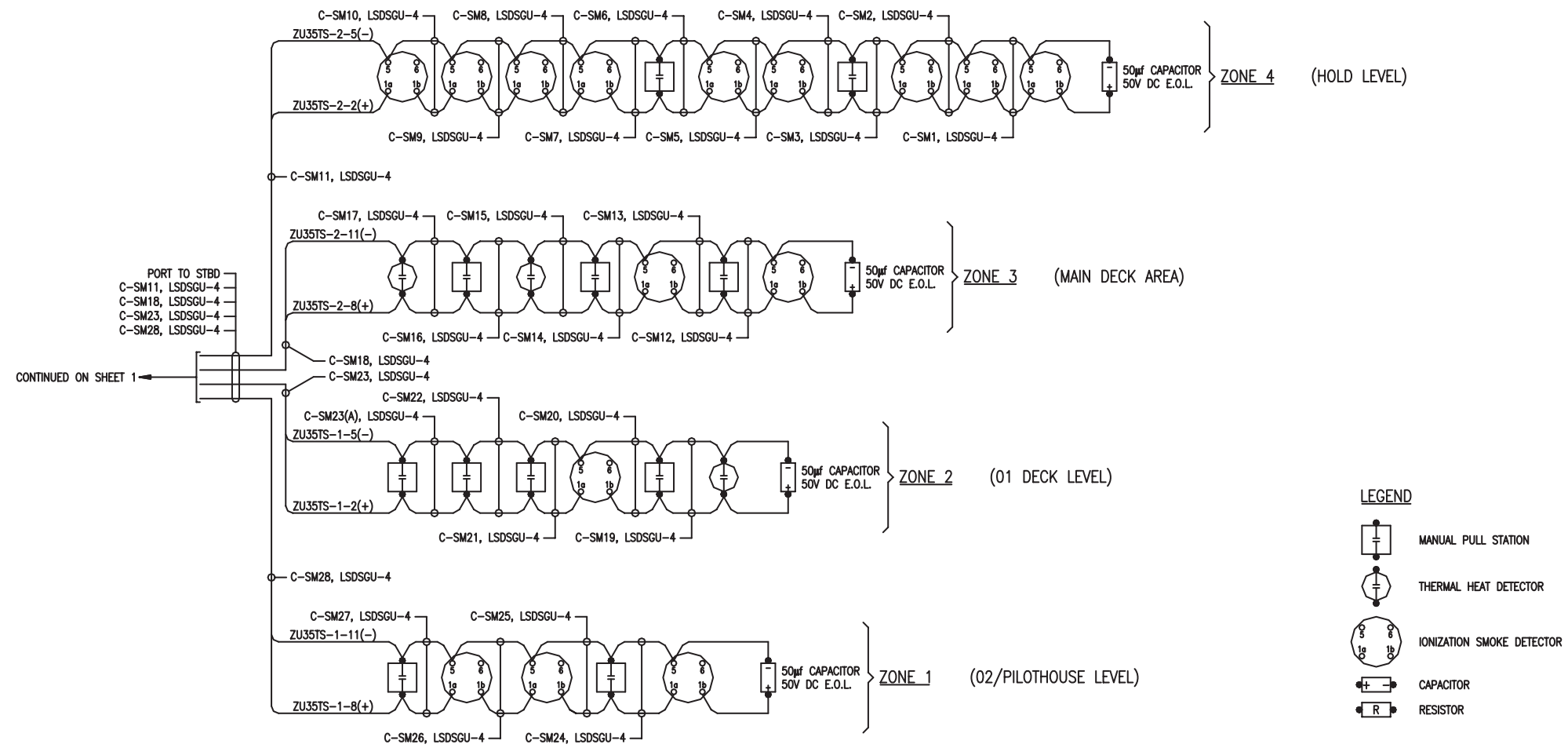
WIRING DIAGRAM FOR HVAC PANEL & PILOTHOUSE A/C UNITS





FIRE SMOKE DETECTION SYSTEM WIRING DIAGRAM

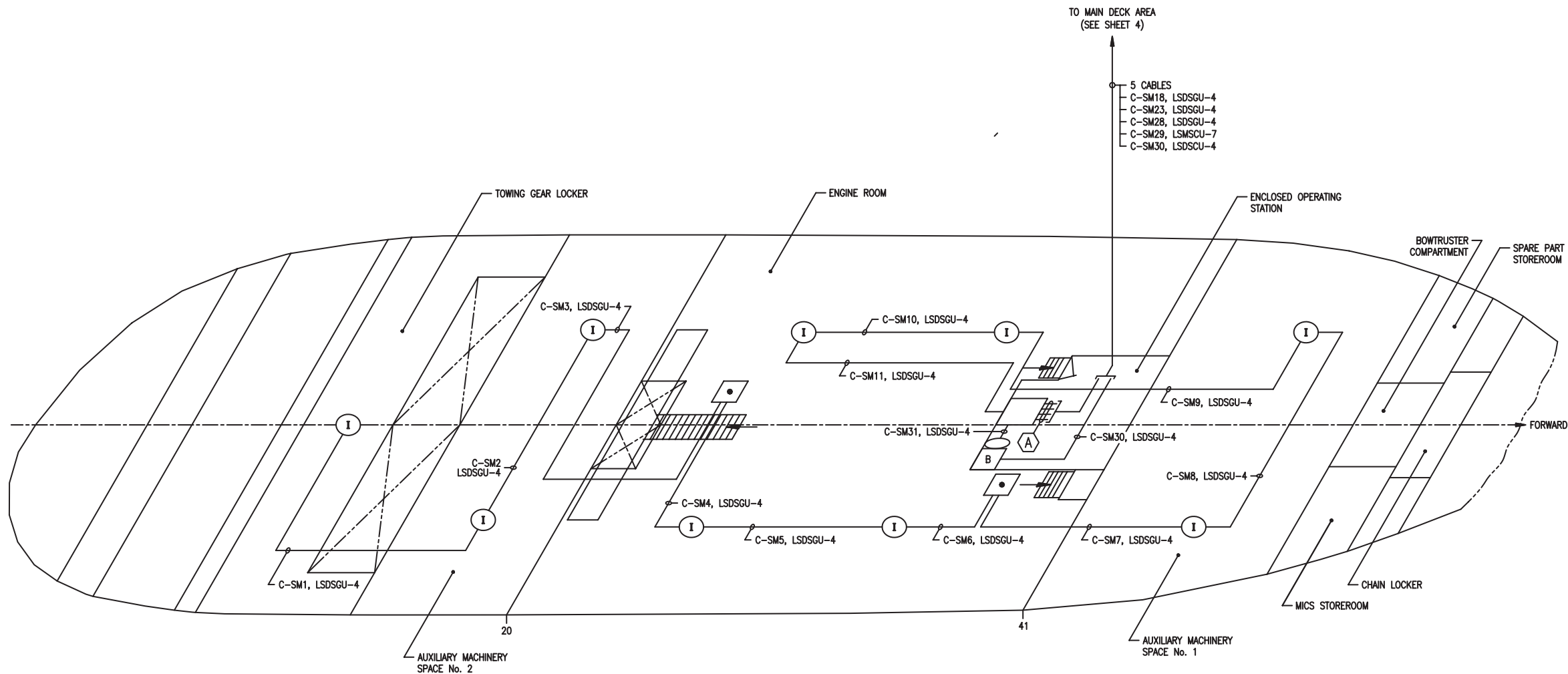








- A PORT TO STBD
- C-SM18, LSDSGU-4
- C-SM23, LSDSGU-4
- C-SM28, LSDSGU-4
- C-SM29, LSMSCU-7

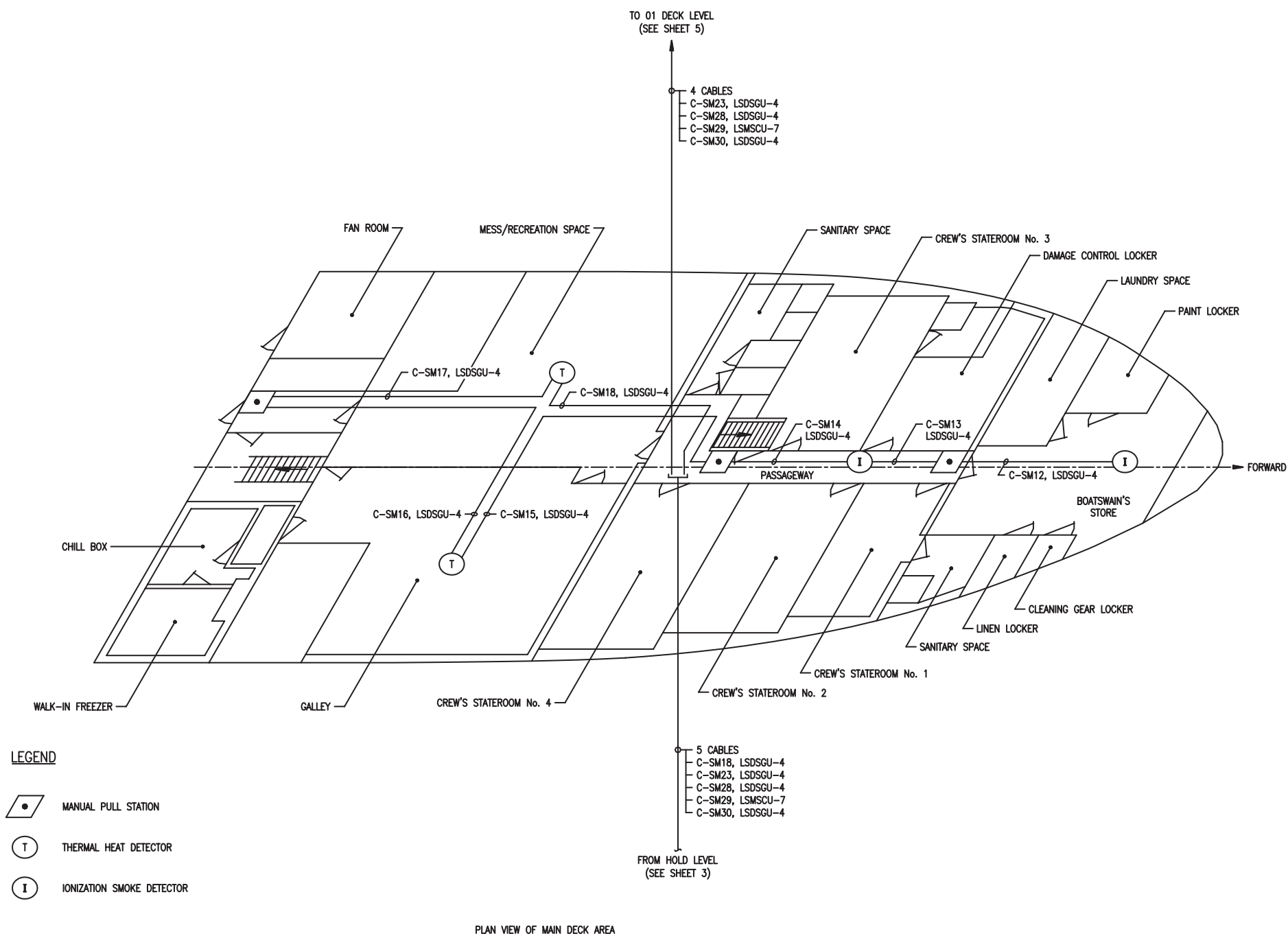


LEGEND

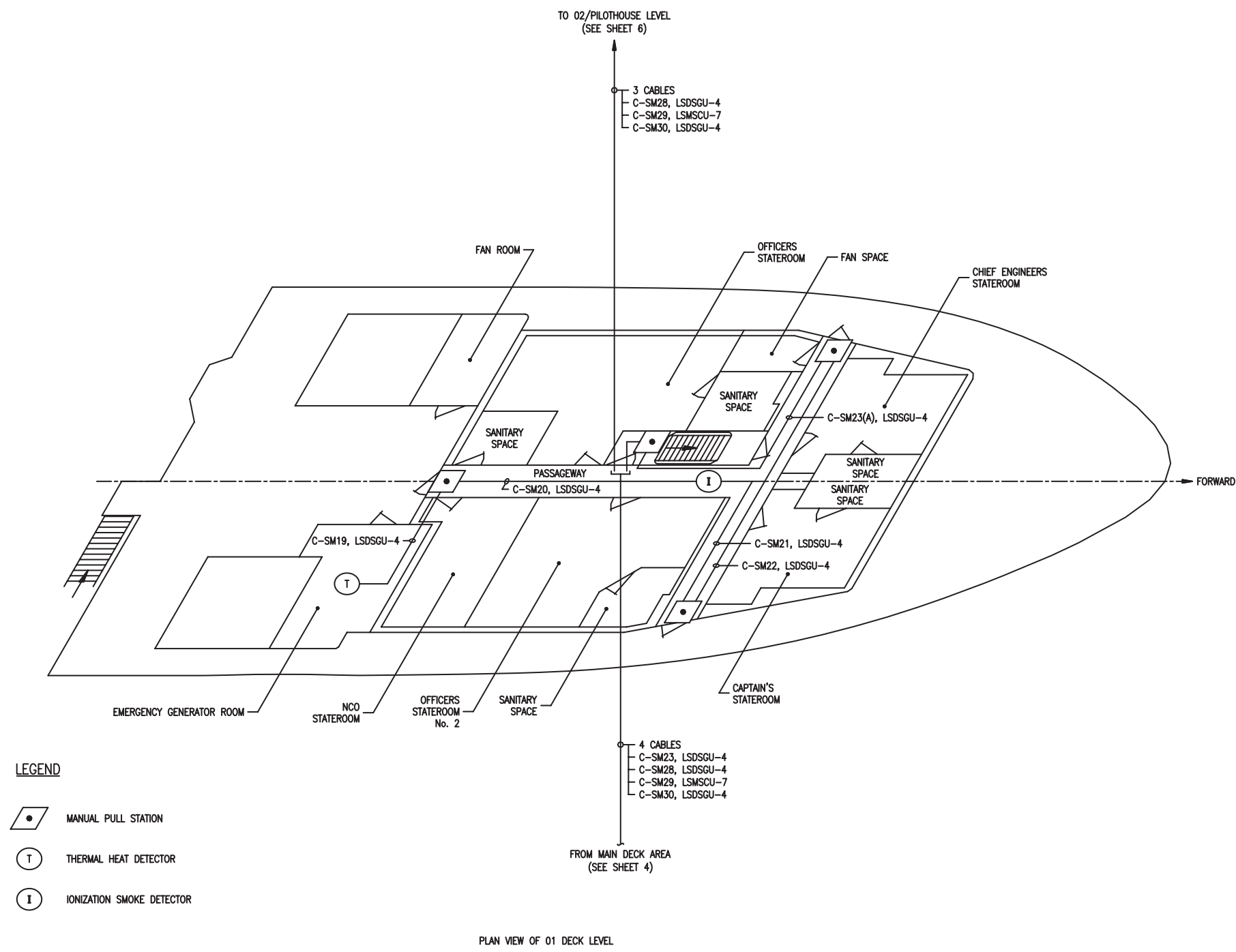
- ALARM BELL
- MANUAL PULL STATION
- IONIZATION SMOKE DETECTOR

PLAN VIEW OF HOLD LEVEL

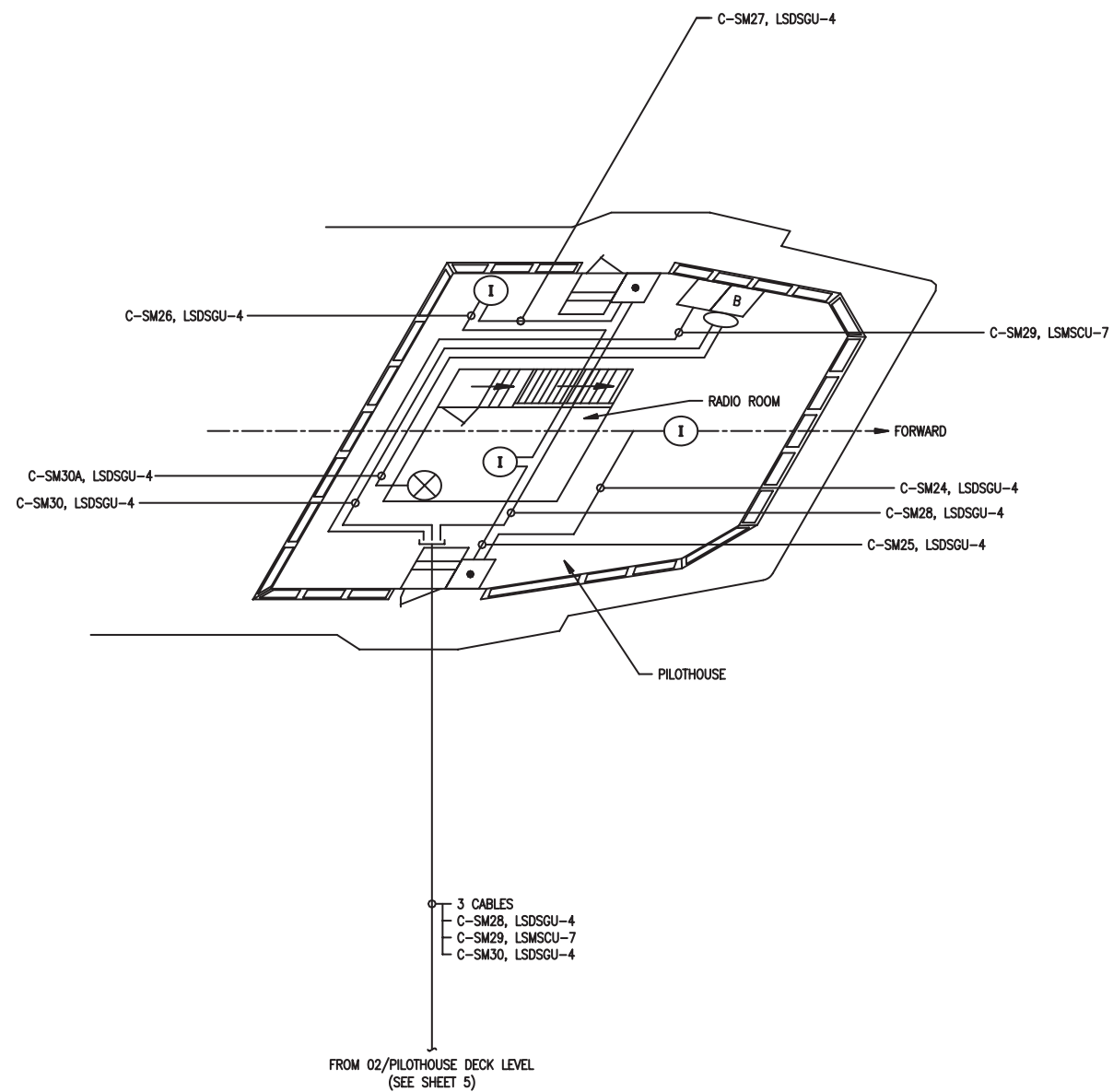
















**LEGEND**

-  ALARM BELL
-  MANUAL PULL STATION
-  IONIZATION SMOKE DETECTOR
-  FIRE ALARM BEACON


PLAN VIEW OF PILOTHOUSE/O2 LEVEL





By Order of the Secretary of the Army:

Official:

  
SANDRA R. RILEY  
*Administrative Assistant to the  
Secretary of the Army*

0529213

PETER J. SCHOOMAKER  
*General, United States Army  
Chief of Staff*

**DISTRIBUTION:** To be distributed in accordance with the initial distribution requirements for IDN: 255668, requirements for TM 55-1925-273-24&P-2.

These are the instructions for sending an electronic 2028.

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however, only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17 and 27.

**From:** "Whoever" whoever@avma27.army.mil  
**To:** whoever@avma27.army.mil  
**To:** TACOM-TECH-PUBS@ria.army.mil

Subject: DA Form 2028

1. **From:** Joe Smith
2. **Unit:** home
3. **Address:** 4300 Park
4. **City:** Hometown
5. **St:** MO
6. **Zip:** 77777
7. **Date Sent:** 19-OCT-93
8. **Pub no:** 55-1915-200-10
9. **Pub Title:** TM
10. **Publication Date:** 11-APR-88
11. **Change Number:** 12
12. **Submitter Rank:** MSG
13. **Submitter Fname:** Joe
14. **Submitter Mname:** T
15. **Submitter Lname:** Smith
16. **Submitter Phone:** 123-123-1234
17. **Problem:** 1
18. **Page:** 1
19. **Paragraph:** 3
20. **Line:** 4
21. **NSN:** 5
22. **Reference:** 6
23. **Figure:** 7
24. **Table:** 8
25. **Item:** 9
26. **Total:** 123
27. **Text:**

This is the text for the problem below line 27.

<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code)	<b>FROM:</b> (Activity and location) (Include ZIP Code)	<b>DATE:</b>
---	---	--------------

**PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION/FORM NUMBER:</b> TM X-XXXX-XXX-XXX	<b>DATE:</b> Date of the TM.	<b>TITLE:</b> Title of TM.
--	---------------------------------	-------------------------------

PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<b>SAMPLE</b>								

**PART III - REMARKS** (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

\* Reference to line numbers within the paragraph or subparagraph.

<b>TYPED NAME, GRADE OR TITLE</b> Doe, John, CPL	<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b> 755-1313	<b>SIGNATURE</b> CPL John Doe
---	---	----------------------------------

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE: Date form is filled out.
TO: (Forward to proponent of publication or form) (Include ZIP Code) Mailing address found on title block page.						FROM: (Activity and location) (Include ZIP Code) Your mailing address.	
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER: TM X-XXXX-XXX-XXX						DATE: Date of the TM.	TITLE: Title of TM.
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
	0019 00 1	3	1	1		Step No. 2 says to secure doors open with locking bar or hooks from where to what? The bars or hooks are not identified.	
	0019 00 4	4	1	1		Step No. 19 states to remove locking bars, pins or hooks from where to what? The bars, pins or hooks are not identified. Where are they stored?	
SAMPLE							
* Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE Doe, John, CPL				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 755-1313		SIGNATURE CPL John Doe	

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is OAASA						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code)						<b>FROM:</b> (Activity and location) (Include ZIP Code)	
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER TM 55-1925-273-24&P-2					DATE	TITLE Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)	
ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

<b>TO:</b> <i>(Forward direct to addressee listed in publication)</i>	<b>FROM:</b> <i>(Activity and location) (Include ZIP Code)</i>	<b>DATE</b>
---	--	-------------

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION NUMBER</b> TM 55-1925-273-24&P-2	<b>DATE</b>	<b>TITLE</b> Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
--	-------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

<b>TYPED NAME, GRADE OR TITLE</b>	<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b>	<b>SIGNATURE</b>
-----------------------------------	---	------------------

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b>						Use Part II ( <i>reverse</i> ) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
<b>TO:</b> ( <i>Forward to proponent of publication or form</i> ) ( <i>Include ZIP Code</i> )				<b>FROM:</b> ( <i>Activity and location</i> ) ( <i>Include ZIP Code</i> )			
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
<b>PUBLICATION/FORM NUMBER</b> TM 55-1925-273-24&P-2					<b>DATE</b>	<b>TITLE</b> Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)	
<b>ITEM</b>	<b>PAGE</b>	<b>PARA-</b>	<b>LINE</b>	<b>FIGURE NO.</b>	<b>TABLE</b>	<b>RECOMMENDED CHANGES AND REASON</b>	
<b>TYPED NAME, GRADE OR TITLE</b>					<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b>		<b>SIGNATURE</b>

<b>TO:</b> <i>(Forward direct to addressee listed in publication)</i>	<b>FROM:</b> <i>(Activity and location) (Include ZIP Code)</i>	<b>DATE</b>
---	--	-------------

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION NUMBER</b> TM 55-1925-273-24&P-2	<b>DATE</b>	<b>TITLE</b> Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
--	-------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
----------------------------	--	-----------



<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b>						Use Part II ( <i>reverse</i> ) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO: ( <i>Forward to proponent of publication or form</i> ) ( <i>Include ZIP Code</i> )				FROM: ( <i>Activity and location</i> ) ( <i>Include ZIP Code</i> )			
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER  TM 55-1925-273-24&P-2					DATE		TITLE Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

<b>TO:</b> <i>(Forward direct to addressee listed in publication)</i>	<b>FROM:</b> <i>(Activity and location) (Include ZIP Code)</i>	<b>DATE</b>
---	--	-------------

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION NUMBER</b> TM 55-1925-273-24&P-2	<b>DATE</b>	<b>TITLE</b> Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
--	-------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

<b>TYPED NAME, GRADE OR TITLE</b>	<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b>	<b>SIGNATURE</b>
-----------------------------------	---	------------------

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b>						Use Part II ( <i>reverse</i> ) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
<b>TO:</b> ( <i>Forward to proponent of publication or form</i> ) ( <i>Include ZIP Code</i> )				<b>FROM:</b> ( <i>Activity and location</i> ) ( <i>Include ZIP Code</i> )			
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
<b>PUBLICATION/FORM NUMBER</b> TM 55-1925-273-24&P-2					<b>DATE</b>	<b>TITLE</b> Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)	
<b>ITEM</b>	<b>PAGE</b>	<b>PARA-</b>	<b>LINE</b>	<b>FIGURE NO.</b>	<b>TABLE</b>	<b>RECOMMENDED CHANGES AND REASON</b>	
<b>TYPED NAME, GRADE OR TITLE</b>					<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b>		<b>SIGNATURE</b>

<b>TO:</b> <i>(Forward direct to addressee listed in publication)</i>	<b>FROM:</b> <i>(Activity and location) (Include ZIP Code)</i>	<b>DATE</b>
---	--	-------------

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION NUMBER</b> TM 55-1925-273-24&P-2	<b>DATE</b>	<b>TITLE</b> Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)
--	-------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
----------------------------	--	-----------

### Metric Conversion Factors

Mc x F = Cf		
Measurement to be Converted (Mc)	Factor (F)	Converted Measurement (Cf)
Meters (m)	x 39.37	= Inches (in.)
Meters (m)	x 3.281	= Feet (ft)
Meters (m)	x 1.094	= Yards (yd)
Inches (in.)	x 25.40	= Millimeters (mm)
Inches (in.)	x 2.54	= Centimeters (cm)
Inches (in.)	x 0.0254	= Meters (m)
Inches (in.)	x 25400	= Micrometers (μm)
Feet (ft)	x 0.305	= Meters (m)
Square feet (ft <sup>2</sup> )	x 0.093	= Square meters (m <sup>2</sup> )
Foot-Pounds	x 1.35582	= Newton meters (N m)
Newton meters (N m)	x 0.73756	= Foot Pounds
Yards (yd)	x 0.914	= Meters (m)
Square yards (yd <sup>2</sup> )	x 0.836	= Square meters (m <sup>2</sup> )
Square Inches (in <sup>2</sup> )	x 6.452	= Square Centimeters (cm <sup>2</sup> )
Cubic Inches (in <sup>3</sup> )	x 16.39	= Cubic Centimeters (cm <sup>3</sup> )
Cubic Centimeters (cm <sup>3</sup> )	x 0.061	= Cubic Inches (in <sup>3</sup> )
Cubic Feet (ft <sup>3</sup> )	x 0.028	= Cubic Meters (cm <sup>3</sup> )
Gallons (gal)	x 3.785	= Liters (L)
Liters (L)	x 0.2642	= Gallons (gal)
Kilometers (km)	x 0.5397	= Nautical miles (nmi)
Meters (m)	x 0.0005397	= Nautical miles (nmi)
Nautical miles (nmi)	x 1.853	= Kilometers (km)
Fluid Ounces (oz)	x 29.574	= Milliliters (mL)
Pounds (lb)	x 0.4536	= Kilograms (kg)
Kilograms (kg)	x 2.2046	= Pounds (lb)
Kilopascals (kPa)	x 0.145	= Pounds (lb) per Square Inch (psi)
Pounds per Square Inch (psi)	x 6.895	= Kilopascals (kPa)
Degrees Centigrade (°C)	(°C x 1.8) + 32	= Degrees Fahrenheit (°F)
Degrees Fahrenheit (°F)	(°F-32) ÷ 1.8	= Degrees Centigrade (°C)
Bar	x 14.5	= Pounds per Square Inch (psi)
Pounds per Square Inch (psi)	x 0.06894	= Bar
Horsepower (hp)	x 0.746	= Kilowatt (kW)
Kilowatt (kW)	x 1.341	= Horsepower (hp)

PIN: 082853-000