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Part No: 9304PTD5

XR Series

500 WATT MARINE SEARCHLIGHT

Model 9304

Operator's/Maintenance Manual

(Covers Standard 110 VAC and Optional 220 VAC Power Supplies)

Manufactured By

PERKO, INC

Miami, FL

PERKO®

OPERATOR'S MANUAL

WITH

MAINTENANCE SUPPLEMENT

FOR

MODEL 9304

XR Series 500 WATT MARINE SEARCHLIGHT
(Covers Standard 110 VAC and Optional 220 VAC Power Supplies)

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500 WATT MARINE SEARCHLIGHT

CHAPTER I

1-1 GENERAL. This manual contains descriptive theory, installation procedures and maintenance instructions for the XR Series 500 Watt Marine Searchlight, Model 9304, which will hereinafter be referred to as the 500 Watt Searchlight (figure 1-1).

NOTE

All service and/or installation work on Xenon Searchlights should be preformed by a Qualified Marine Electrician!!

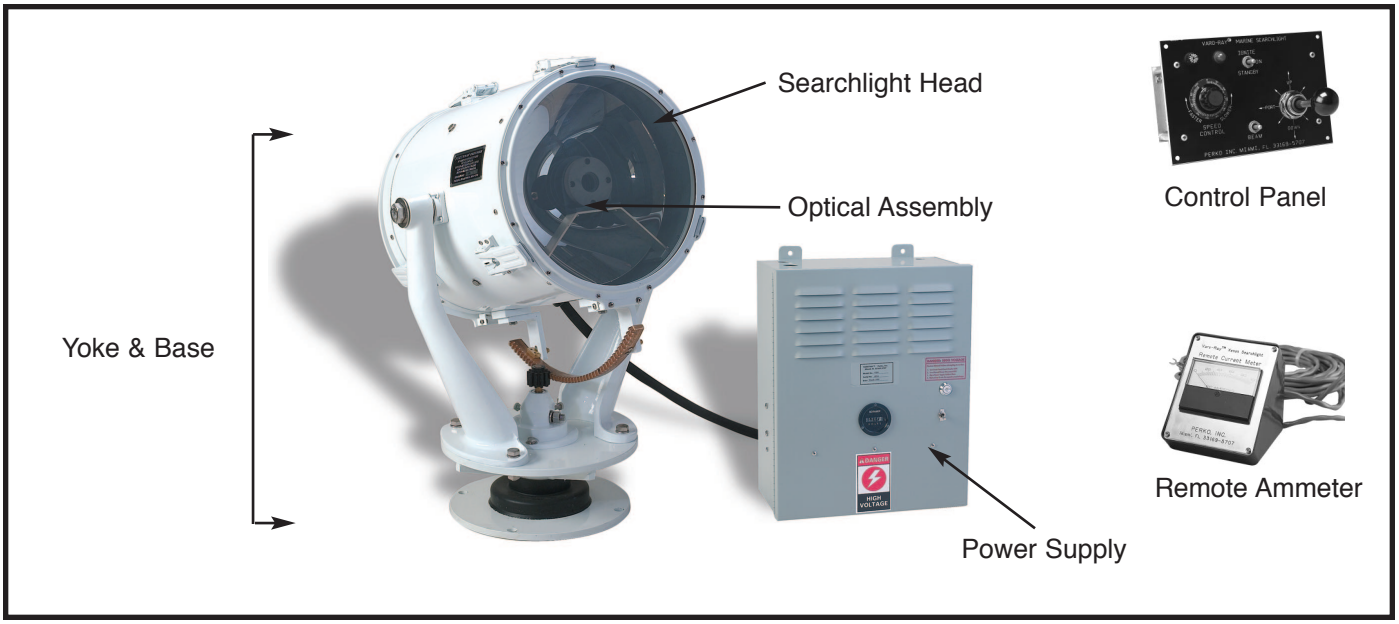
1-2 DESCRIPTION. The 500 Watt searchlight is comprised of a head assembly, a yoke and base assembly, a Power Supply unit, a remote control panel, a remote ammeter, and either manual or electric directional controls.

The head assembly housing, the yoke arms and the base are made of aluminum. All components of the searchlight which are exposed to the weather are painted with epoxy paint. White is the standard color.

The head assembly is supported at its approximate center of gravity by two stainless steel shoulder bolts extending through holes with bushings in the yoke arms. These bolts engage threaded holes in bosses on each side of the housing.

The yoke arms are attached to the yoke support plate. The yoke support plate rotates around the spindle of the base plate on two tapered bearings. A sliding stop plate, located around the base of the rotating cover allows approximately 380 degrees of azimuth rotation of the searchlight (approximately 190 degrees either side of dead ahead). The stop is necessary to prevent the electrical cable in the bottom of the head assembly housing from being severely stressed by wrapping around the yoke. The yoke support plate is retained on the base by a nut at the top of the spindle. A rubber boot is provided around the base of the yoke support plate for weather protection. The base is fastened to the ship's structure with four bolts through four holes provided in the base plate.

The major components of the 500 Watt Searchlight are described individually as follows:



a. Head Assembly. The head assembly is comprised of the head, to which is fastened the front window assembly, rear cover and the rack assembly.

The front window assembly contains a tempered clear glass sealed into a machined aluminum frame with a rubber gasket. The window assembly is joined to the housing with a floating hinge along the lower edge of the housing. When closed, the window assembly and a gasket is held tight against the front flange face of the housing by three over-center clamps. A moisture proof and air tight seal is effected by the clamps.

The rear cover is attached to the housing in the same manner as the front window assembly. A gasket seal also is provided in the rear cover.

The electrical cable passes through a water tight feed-thru in the searchlight housing wall.

The gasket in the front window assembly and the rear cover, together with the watertight feed-thru for the electrical cable, provide an effective moisture proof, air tight seal so that the entire housing, when closed, is protected against the intrusion of water and air.

The support assembly is fastened to the housing with four radial bolts extending inward through the housing wall and engaging threaded holes in the mounting plate. The support assembly contains the reflector, blower motor, the lamp and the necessary high voltage electrical components to initiate lamp ignition.

The gear rack assembly attaches to two angle brackets which in turn are fastened to two mounting bosses attached to the bottom of the searchlight housing. This mounting arrangement provides for sufficient positive adjustment of the gear rack so that it can be properly aligned and meshed with the mounting spur gear which gives the head vertical movement.

b. Yoke and Base Assembly. The yoke and base assembly is comprised of two yoke arms bolted to a yoke support plate and a base plate having a central spindle. The yoke support plate rotates on two tapered roller bearings mounted on the base plate spindle. These bearings require lubrication. A different bearing housing
is centrally positioned on top of the rotating cover and fastened by two machine bolts. The mechanical directional controls fit into this housing such that the outer tube (azimuth directional control) is clamped to this housing by a special clamp.

The inner rod (elevation directional control) extends through this housing such that the end of the rod extends approximately one inch above the center of the gear rack on the bottom of the searchlight housing. An oil seal located in the bearing housing surrounds the inner rod as it passes through the bearing housing to prevent water from leaking into the pilot house. A pinion gear fastened to the end of the inner rod meshes with the gear rack to provide vertical motion of the searchlight head (See Mechanical Directional Controls).

c. Power Supply.

WARNING

The following equipment contains voltages and current which are hazardous to human life. Extreme caution must be exercised when performing tests required while power is on.

The XR Series Power Supply, PERKO # 9511-000-110 operates on 120 VAC, 60 Hz. (Standard)
The XR Series Power Supply, PERKO # 9511-000-220 operates on 220VAC, Single Phase 60 Hz. (Optional)

The Power Supply will accommodate input voltage variations from approximately 115 to 130 VAC or 215 to 250 VAC respectively from the ship's power generators.

CAUTION

XR Series power supplies are factory wired for a specific input voltage. Do not connect the ship's power to the Power Supply until a qualified technician determines that the ship's voltage to be connected to the Power Supply is the same as that for which the Power Supply can accommodate. It may be necessary to reposition transformer jumpers at the time of installation to match the Power Supply with the ship's voltage.

The function of the Power Supply is to convert the ship's alternating current to direct current required by the xenon lamp for proper operation. The lamp requires approximately 20 volts at approximately 20 to 25 amperes DC. The Power Supply also provides power to the high voltage and boost circuits necessary to ignite the xenon lamp and to sustain its operation.

The Power Supply is a 20 VDC, 25 amp Power Supply operated on appropriate ship's power. The Power Supply is mounted in a cabinet suitable for bulkhead mounting and with ample access space for cable connections. The standard (110 VAC) and optional (220 VAC) power supplies cannot be field adjusted to subsitute for each other and must be operated at their intended ship's supply voltage. Depending on settings (transformer taps) the 110VAC supply draws approximately 8 amps and the 220VAC supply draws approximately 4 amps.

d. Controls. There are two control systems which perform different functions. The electrical control system controls the power to the searchlight while the mechanical directional control system controls the azimuth (horizontal) and elevation (vertical) movement of the searchlight head. These systems are described as follows:

(1) Electrical Controls. Remote Control Panel STANDBY/ON/IGNITE Switch (Figure 2-1) - the "STANDBY" position removes power from the lamp circuit. This is essentially an "OFF" position. The "ON" position energizes the ignition circuit and automatically starts the lamp operation. In addition, the "ON" position maintains power to the lamp so that operation is sustained. If this position fails to start the lamp, position the switch to the "IGNITE" position until the lamp is observed to be operating and then release pressure on the spring-loaded switch. The remote ammeter will also indicate the lamp is operating by showing 20 - 25 amperes of current flow. To turn the lamp "OFF", position switch into the "STANDBY" position.

NOTE

Should the lamp fail to ignite in the "ON" (or "IGNITE" positions after approximately ten seconds) or should it fail to sustain operation after initial ignition, the lamp may be faulty.

Beam Focus Switch - This switch applies power to an electric motor which drives the focus mechanism. Holding the BEAM switch engaged continuously will cycle the focus mechanism continuously from the compact mode to the spread mode. The BEAM switch should be held in position until the desired beam pattern is obtained. Small adjustments may be obtained by momentarily engaging the beam focus switch.

NOTE

The beam pattern size may be changed (within limits) independent of the focus mechanism by making an adjustment within the searchlight head. This adjustment should be made ONLY by qualified and trained service personnel. Refer to paragraph 3-3.

A green power indicator light is provided on the control panel to indicate that power is applied to the electrical system.

A remote ammeter is provided with the Power Supply. This instrument should be located in the pilot house at a convenient location so that the pilot on watch can monitor the current being supplied to the lamp. A current indication which falls within the 20 to 25 ampere range is satisfactory. Should the current indication fall outside this range.

(2) Mechanical Controls. The mechanical controls provide the azimuth (horizontal) and elevation (vertical) movement to the searchlight head. These controls are comprised of a handle assembly located in the pilot house, a hollow tube and solid shaft, both of which extend from the handle assembly upward through the pilot house ceiling to the base of the searchlight. The hollow tube is clamped to a bearing housing fastened to the rotating yoke and base assembly. The lower end of this tube is clamped to the handle assembly. Moving the handle in a horizontal plane moves the searchlight head horizontally. The solid shaft is located inside the hollow tube. The lower end of this shaft is fastened to a miter gear such that when the control handle is twisted, the solid shaft rotates within the tube. The upper end of the solid shaft extends through the bearing housing previously mentioned and to a point approximately one inch above the gear rack fastened to the bottom of the searchlight head housing. A fiber or nylon spur gear is fastened to the upper end of the solid shaft, and this gear engages the gear rack. Twisting the control handle provides rotary motion to the spur gear which causes the gear rack to move, thus imparting vertical rotational movement to the searchlight head.

A ceiling mount is provided to cover the rough opening made in the ceiling to allow the shaft and tube to pass through. This mount has a friction screw clamp to prevent the light from swinging freely in azimuth or to lock it in a desired position.

This mechanical directional control assembly (known also optional as a lever gear control) is supported from the rotating yoke and base assembly. Provision is made to allow additional support by the installation of a solid rod and base plate extending from the bottom of the handle assembly to the pilot house control console.

CHAPTER II

INSTALLATION

2-1 GENERAL. The following paragraphs contain instructions for unpacking, installing and performing post installation inspection and checkout of the 500 Watt Searchlight.

2-2 UNPACKING. The searchlight components are packaged according to best commercial practice. Care should be exercised when unpacking to prevent damage to any of the searchlight components. Packages should be examined prior to opening for evidence of possible damage in shipment. Any shipping damage should be reported to the freight carrier or its representative. Immediately upon unpacking, check the contents of the shipping containers against the packing list. Make sure components are not discarded with the packing material. Report any shortages directly to PERKO, Inc.

WARNING

A spare xenon lamp may be shipped with a searchlight. It is not necessary to open this lamp package. Xenon lamps contain xenon gas under pressure in a quartz tube and, if mishandled, may explode.

WARNING

The searchlight head and the Power Supply should each be handled by two or more persons because of the weight and/or bulk of these two components.

2-3 INSTALLATION.

a. Preliminary

Remove the Yoke and Base and Mechanical Control components from their shipping containers and inspect for damage. If undamaged, place the Yoke and Base, Mechanical Control elevation rod, and Mechanical Control azimuth tube near the customer-provided (1/2" X 21" dia.) support plate with mounting studs. Place the remaining Mechanical Control components near the operator's station.

b. Mechanical Installation

WARNING

DO NOT FASTEN the Yoke and Base to the Support Plate until an adequate layer of moisture sealant has been applied between the base plate and support plate.

(1). At the support plate (ON the Roof), place the Yoke and Base on the support plate, aligning the four holes in the searchlight base with the studs in the mounting plate such that the Yoke rotates from forward to aft in either port or starboard directions approximately 190 degrees. The rotational stop should be felt with the Yoke pointed in the 190 degree aft position. Remove the Yoke and Base from the support plate and apply an adequate layer of moisture sealant. Replace the Yoke and Base on the support plate and fasten it using four customer-provided nuts with locking washers (or bolts).

(2). Remove the shaft housing from the Yoke and Base by removing the 5/16" mounting bolts.

(3). Align, insert and lower the azimuth tube through the 1.5" diameter hole taking care that it does not fall through the ceiling above the operator's station.

(4). Support the azimuth tube to prevent it from falling, while placing the shaft housing over the end of the azimuth tube, and fasten the housing to the tube using the shaft housing clamps provided (see Detail, Drawing 9304-1).

(5). Gently lower the azimuth tube through the roof until it is supported on the Yoke and Base by the shaft housing. Re-install the two 5/16" bolts and fasten the shaft housing to the Yoke and Base.

(6). At the operator's station, determine the desired height for the Mechanical Control. Determine how long the azimuth tube should be and cut to desired length using a metal hacksaw. Deburr the cut end of the azimuth tube using a file or coarse emery cloth and slide the ceiling mount over the tube and upward toward the ceiling. Temporarily tighten the friction clamp knob (if installed).

(7). At the Yoke and Base, lightly lubricate the elevation rod with 30W non-detergent oil, align and insert the end of the elevation rod with the cross-drilled hole into the shaft housing, and carefully feed the rod through the oil seal and azimuth tube down through the roof.

(8). At the operator's station, position the elevation rod into the shaft seat of the Mechanical Control handle assembly and install the roll pin (1/8” X 5/8") provided. "Squeeze" force rather than "hammer" force is preferable (see Detail, Drawing 9304-1).

(9). Gently push the pinned elevation rod and Mechanical Control handle assembly upward until the azimuth tube seat properly engages the azimuth tube. Clamp the Mechanical Control handle assembly to the azimuth tube (see Detail, Drawing 9304-1).

(10). At the Yoke and Base, use a hacksaw and cut off the protruding elevation rod leaving approximately 3.0" of elevation rod exposed above the top of the shaft housing. Deburr this cut.

(11). Install the spur gear provided on the elevation rod with the gear hub down. DO NOT install the roll pin at this time.

(12). At the operator's station, TEST and verify that the Yoke and Base rotates smoothly when the Mechanical Control handle assembly is rotated and that the spur gear/elevation rod rotates freely when the Mechanical Control handle assembly grip is twisted.

Remove the Searchlight Head components from their shipping containers and inspect for damage. If undamaged, place these components near the installed Yoke and Base.

(13). At the Yoke and Base, install the bushings provided into the trunnion holes of the arms of the Yoke and Base. Place the shoulder bolts (3/4-10 X 2.5") into the bushings in preparation for engaging the Searchlight Head bosses (see Detail, Drawing 9304-1).

(14). Lift the Searchlight Head into position between the arms of the Yoke and Base (window facing forward), install the optional washers if desired between the Searchlight Head bosses and the arms of the Yoke and Base, and engage/tighten the mounting bolts such that the Searchlight Head swings smoothly in the trunnions.

(15). Tilt the Searchlight Head (window up) and install the rack support and rack assembly to the bottom of the Searchlight Head as shown in Drawing 9304-1. Tighten (finger-tight) rack mounting hardware to allow for final positioning when the rack engages the spur gear.

(16). Tilt the Searchlight Head to engage the spur gear with the rack assembly and adjust the rack support and spur gear height until the spur gear teeth mesh smoothly and fully with the rack assembly teeth for all rack positions. Tighten the rack support mounting hardware.

(17). Hold the spur gear at the correct height, drill a 1/8" hole in the elevation rod using the cross-drilled spur gear hub hole as a pilot, and insert the roll pin (1/8” X 1") provided. "Squeeze" force rather than "hammer" force is preferable when installing the pin (see Detail, Drawing 9304-1).

(18). Readjust the position of the rack assembly so that the Searchlight Head elevation is smoothly and positively controlled (no binding with minimum backlash) by twisting the Mechanical Control handle assembly grip.

(19). Manually position the Yoke and Base and Searchlight Head until the glass window faces forward.

(20). At the operator's station, loosen the bolts clamping the Manual Control handle assembly to the azimuth tube and rotate the Manual Control handle to the desired neutral or forward position. Tighten the clamping bolts onto the azimuth tube (see Detail, Drawing 9304-1).

(21). TEST the operation of the Manual Control and readjust rack assembly/handle assembly as required.

(22). Position the ceiling mount against the ceiling and fasten in place.

(23). If a console mount is desired, it should be installed as shown in Drawing 9304-1.

Mechanical Installation is COMPLETE. If the above procedures are not satisfactorily completed, phone Technical Support, PERKO, INC.

c. Power Supply and General Electrical Installation.

WARNING

The Power Supply and optical assembly contain very high voltage and current which are hazardous to human life. Extreme caution must be exercised when servicing the XR Series 500 watt marine searchlight. Prior to performing any service on this part, turn circuit breaker off. Open access door and wait a minimum of 30 seconds before attempting service.

WARNING

The Power Supply unit is heavy and should be handled and installed by two or more persons.

(1) The Power Supply for the XR Series Model 9304 500 Watt xenon searchlight is supplied in a NEMA electrical enclosure measuring 20-1/4 inches high by 16-1/4 inches wide by 9-1/4 inches deep. Three inches minimum should be allowed around the two ends and the back for adequate ventilation. 30 inches should be allowed in front of the Power Supply to allow service personnel adequate access to the interior components and necessary service.

(2) The Power Supply should be mounted in a location protected from weather, approximately 24 to 36 inches above the floor. In any event, it should be mounted no nearer than 6 inches to the floor. The Power Supply should be attached to its mounting surface with four 3/8 inch bolts through the four corner holes provided in the Power Supply cabinet.

(3) Figure 2-1 shows the 115 VAC Power Supply connection requirements. Install a disconnect near the Power Supply to disconnect the ship’s power from the searchlight Power Supply. This is a safety requirement since power to the Power Supply is not disconnected when the Power Supply door is opened. Prepare and install a 3 conductor power cable from the customer supplied disconnect to the Power Supply (hot to Terminal 1 of TB3. neutral to Terminal 2 of TB3, and ground to the enclosure”.

(4) In the pilot house, determine the desired location for the remote ammeter and the electrical control panel.

(5) Cut a 2 inch by 3 inch opening in the pilot house console for the electrical remote control panel. A minimum of 3 inches clearance is needed behind the console opening.

(6) Using the remote control panel face plate as a template, drill four mounting holes, one in each corner.

(7) Insert the remote control panel assembly into the console opening and secure it in place with four screws through the face plate.

(8) The procedure for installing the remote ammeter is the same as the procedure for installing the control panel, or it may remain in the bakelite case and placed on the console in an appropriate position.

NOTE

The remote ammeter is provided with a 30 ft. calibrated cable. Do not change the length of this cable. Excess length should be coiled and stored under the console or near the Power Supply.

(9) On top of the pilot house, install a weatherproof junction box (customer furnished) immediately aft of the center of the searchlight base. With the searchlight components in place, the searchlight is now ready for final interconnecting wiring as shown in Figure 2-1.

(10). Prepare and install a cable assembly from the Power Supply terminal block TB1 to the waterproof junction box consisting of 2 conductors of No. 8 AWG and 7 conductors of No. 16 AWG (50 ft. maximum Length).

(11). Prepare and install a cable assembly from the Power Supply terminal block TB2 to the pigtail leads attached to the control panel, consisting of 6 conductors of No. 16 AWG.

2-4 POST-INSTALLATION AND CHECKOUT. After the equipment is installed and all electrical interconnections are made, perform the following inspection and checkout procedures:

(1) Check for loose parts, connections and misplaced tools.

(2) Check for proper routing and interconnection of cables.

(3) Check that all equipment is properly secured and adjusted.

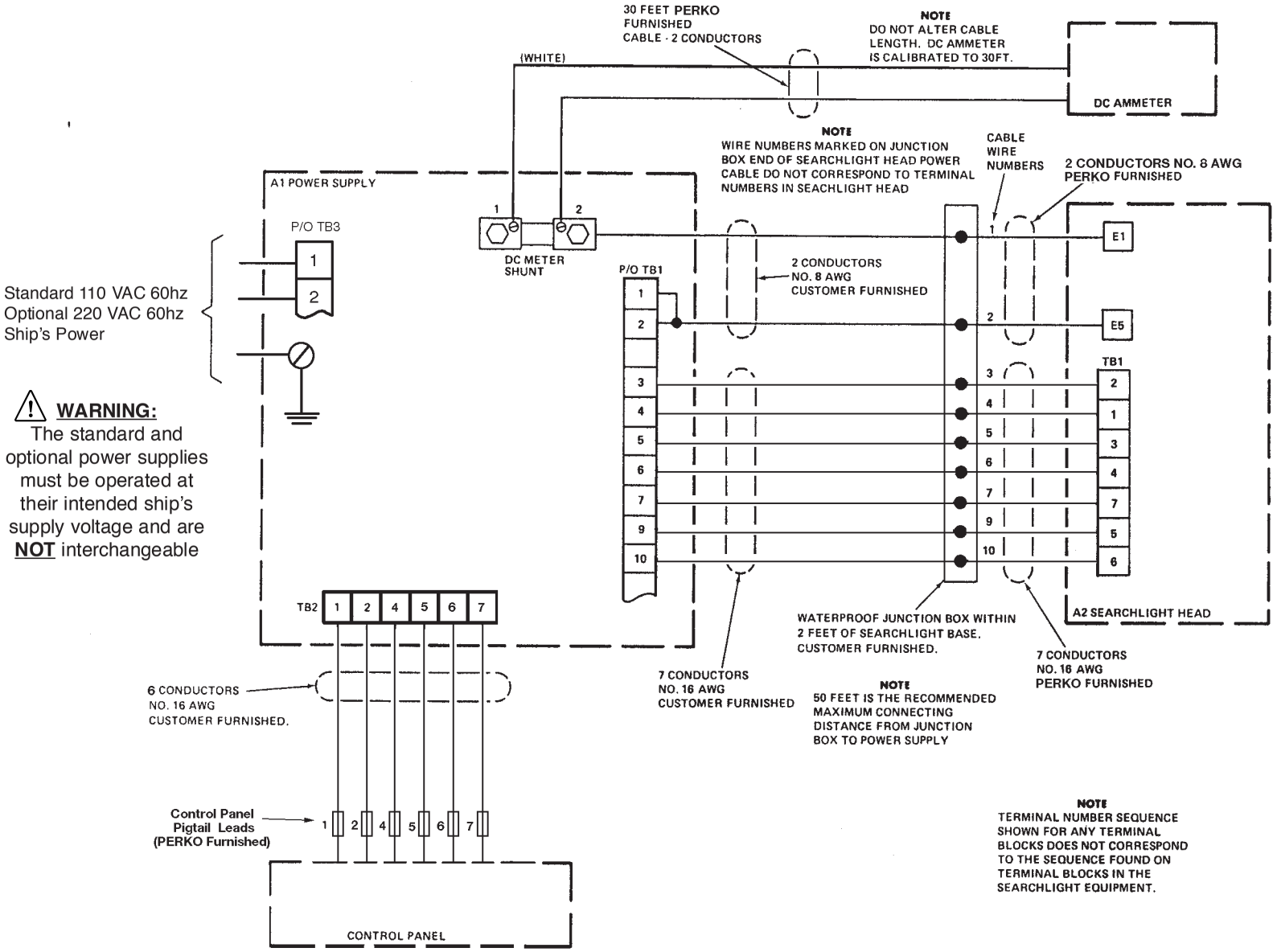


Figure 2-1 500 Watt Marine Searchlight Interconnection Diagram

CHAPTER III

INSTALLATION AND OPERATIONAL CHECKOUT

NOTE

The following checkout procedures are to be performed by competent technicians.

3-1 PRE-OPERATIONAL CHECKS. Prior to applying power to the searchlight, all cabling should be rechecked for proper connections. Ship's power should be off. The Power Supply circuit breaker should be in the OFF position and the remote control panel STANDBY/ON/IGNITE switch A3S1 should be in the STANDBY position.

3-2 LAMP IGNITION. Place the 500 Watt searchlight in operation by performing the following steps:

(1) Connect the ship's power to the searchlight Power Supply by closing the disconnect located near the Power Supply.

(2) Position Power Supply single-phase circuit breaker A1CB1 to ON.

(3) Position remote control panel STANDBY/ON/IGNITE switch A3S1 to ON or IGNITE.

NOTE

As the xenon lamp accrues hours, it may take longer to ignite in the ON or IGNITE position. Momentarily move remote control panel STANDBY/ON/IGNITE switch A3S1 to the IGNITE position and when the lamp ignites, release switch A3S1 immediately.

(4) Position remote control panel STANDBY/ON/IGNITE switch A3S1 to ON or IGNITE position. If lamp does not ignite after several attempts.

(5) Check remote ammeter A4 near remote control panel A3 when xenon lamp ignites. The initial current indication should rise to 20 - 25 amperes and remain relatively steady.

CAUTION

Wait 15 minutes before positioning circuit breaker and ship's power to OFF. Position remote control panel STANDBY/ON/IGNITE switch to STANDBY and allow blower fans to cool searchlight.

(6) If current in remote ammeter is above 25 amperes:

(a) Position ship's power to OFF and Power Supply circuit breaker to OFF.

3-3 MANUAL-BEAM FOCUS ADJUSTMENT. Beam limits can be set for a desired pattern by performing the following steps:

(1) Open searchlight head rear cover.

(2) Remove screw and lock washer from spherical link.

(3) Ignite the searchlight and direct the beam toward a relatively flat, vertical surface approximately 100 feet away.

(4) Swing spherical link downward away from the motion transfer arm. Physically move the motion transfer arm to obtain the desired beam pattern. Adjust the position of the spherical link until the retaining screw passes through the link and into the motion transfer arm without changing the position of the motion transfer arm.

NOTE

Several trial adjustments of the spherical link may be necessary to obtain the desired narrow-to-wide beam spread pattern.

CHAPTER IV

OPERATING PROCEDURES

4-1 GENERAL. The following procedures provide the necessary information for lamp ignition, operation and turn-off of the 500 Watt Searchlight.

4-2 LAMP IGNITION. Perform the following procedure in the sequence written:

(1) Close the disconnect switch located near the ship's Power Supply to apply power to the searchlight Power Supply.

(2) Place the Power Supply circuit breaker switch A1CB1 to ON position.

NOTE

As the lamp accrues hours, it may take a few seconds longer to start in the ON or IGNITE position. The IGNITE position on the remote control panel STANDBY/ON/IGNITE switch A3S1 can be held for longer periods of time. However, once the lamp ignites, release the switch immediately.

(3) Position remote control panel STANDBY/ON/IGNITE switch A3S1 to ON. The xenon lamp should light within one to two seconds. If lamp does not ignite in ON position, set remote control panel STANDBY/ON/IGNITE switch A3S1 to IGNITE position. Release switch A3S1 when lamp lights and switch will return to ON position. If lamp does not light in IGNITE position, try again. If lamp does not ignite after several attempts, refer to service technician.

(4) Check remote ammeter A4 when xenon lamp ignites A2DS1. The initial current indication may surge above 25 amperes, but after 5 minutes it should stabilize to 20-25 amperes range.

4-3 MAIN OPERATION.

(1) Position BEAM switch A3S2 up or down to adjust beam width. Release BEAM switch when desired beam width is obtained.

NOTE

The BEAM switch A3S2 adjusts the lamp focus. If the BEAM switch is held up or down, beam width will cycle from narrow to wide and wide to narrow.

(2) Rotate the lever gear control handle in a horizontal plane around the center shaft to rotate the searchlight in azimuth.

(3) To change searchlight head elevation, twist lever gear handle in a CW or CCW direction.

4-4 TURN-OFF. Turn-off is accomplished by setting the remote control panel STANDBY/ON/IGNITE switch A3S1 to the STANDBY position. The blower fans will continue to operate to prevent overheating of the blower fan motor and xenon lamp. Wait at least 15 minutes before positioning circuit breaker A1CB1 or ship's power to OFF.

CHAPTER V

OPERATOR MAINTENANCE

5-1 GENERAL. This chapter contains preventive maintenance instructions essential for maintaining the components of the searchlight. The instructions include inspection, cleaning and lubrication; operational testing of controls and 500 Watt xenon lamp and removal/replacement.

WARNING

High voltages exist in the searchlight electronics. Allow searchlight to cool off 15 minutes before positioning Power Supply circuit breaker A1CB1 or ship's power to OFF.

WARNING

The xenon gas in lamp is under pressure. It is recommended that a face mask and gloves be worn when handling a lamp. Do not touch glass area of lamp. Finger acid or dirt may cause lamp to break when ignited.

5-2 INSPECTION. Periodic inspections of certain critical points of the 500 Watt Searchlight are necessary to detect potential trouble before a malfunction occurs.

(1) Visual Inspection. At designated intervals, check for corrosion on electrical contacts, missing or broken parts and other evidence of damage.

(2) Mechanical Inspection. Check for proper installation and tightness of head and yoke assemblies.

(3) Electrical Inspection. Check power cables and wiring for cracks, breaks and loose connections. Inspect switches to ensure proper operation.

5-3 CLEANING. Using non-abrasive liquid window cleaner, clean window and dry with lint-free cloth. If reflector needs cleaning, remove xenon lamp and wipe reflector with lint-free cloth dampened with liquid window cleaner (See Para. 5-6 for lamp removal procedures).

5-4 LUBRICATION.

(1) Lubricate the following areas with non-detergent oil every three months: Around the elevation rod oil seal in the bearing housing.

(2) Once every six months (three months in salt water environment).

(a) Apply a heavy coating of marine grade bearing grease to the searchlight head pivot bolts. Bolts should be removed to accomplish this.

(b) Also, remove the yoke from the base and apply a heavy coating of marine bearing grease to the tapered roller bearings, bearing housings, surrounding internal areas, under the lip of the rubber "BOOT" sliding seal and to the sliding stop.

5-5 TESTING. Perform the following operations:

(1) Ignite xenon lamp and check that ignition occurs within 5 seconds. (See Chapter IV for operating procedures). If lamp fails to ignite within 1-3 seconds, refer to troubleshooting procedures, Chapter VI.
(2) Adjust beam width (Chapter III) and perform check operation (Chapter IV).
(3) Check lever gear directional control to determine that the searchlight responds with proper movement.

5-6 XENON LAMP REMOVAL. Perform the following steps in the following sequence:

(a) Position STANDBY/ON/IGNITE switch A3S1 to STANDBY.

(b) Allow searchlight to cool approximately 15 minutes until cooling fans stop running.

(c) Position searchlight Power Supply circuit breaker A1CB1 to OFF and disconnect ship's power.

(d) Open searchlight window by unclamping three clamps and lowering window.

WARNING

Avoid unnecessary torque on xenon lamp by using two wrenches, one to engage the flats on the anode to prevent the lamp from turning and the other to remove the terminal hold-down nut. Excessive torque on lamp could cause it to break.

(e) Remove hold-down nut from stud on front of lamp using two wrenches.

(f) Remove wire lead from stud.

(g) Loosen screws on lamp plate and remove lamp plate from support assembly.

(h) Carefully pull lamp plate from lamp.

(i) Insert empty lamp extractor through opening in bipod assembly and slide inward until it engages bayonet base of lamp in lamp holder slots.

(j) Remove the lamp from the extractor and wrap old lamp in its plastic wrapper. Tie lamp at both ends, wrap in foam rubber and store in its original shipping carton for future disposition.

5-7 XENON LAMP INSTALLATION. Perform the following steps in the following sequence:

(a) Remove new lamp from corrugated box. The lamp is packed in clear plastic with ties at both ends, then wrapped in foam packing material.

(b) Place lamp wrapped in foam on flat, stable surface.

CAUTION

Do not touch glass area of lamp. Finger acid or dirt may cause lamp to break when ignited.

(c) Remove foam material.

(d) Untie and remove plastic wrap.

(e) Insert lamp into extractor.

(f) Insert extractor into opening in lamp support and slide forward until lamp cathode stud terminal engages threaded hole in rear lamp retainer.

(g) Screw lamp in by turning extractor in CW direction until lamp seats firmly.

(h) Remove the extractor.

(i) Reinstall lamp plate.

(j) Replace wire lead on anode end of lamp and tighten, again using two wrenches.

(k) Close and clamp searchlight window.

(l) Perform operational test on lamp. Refer to Paragraph 5-5 for test procedures.

CHAPTER VI

MAINTENANCE

6-1. GENERAL. This chapter contains general maintenance procedures at the system level for the XR Series 500 Watt Marine Searchlight.

NOTE

All service and/or installation work on Xenon Searchlights should be preformed by a Qualified Marine Electrician!!

6-2. DETAILED FUNCTIONAL DESCRIPTION Using 110 VAC Power Supply. This functional analysis is provided to aid the technician in troubleshooting the XR Series 500 Watt Marine Searchlight. The searchlight is comprised of a Power Supply assembly A1, searchlight head assembly A2, remote control panel A3, and remote current meter A4. Refer to Figure 9304 5-B for searchlight schematic diagram.

The searchlight operates from a 115 VAC, 60 Hz power source which is applied through a 20 ampere circuit breaker A1CB1 to transformer A1T1. Transformer A1T1 secondaries are tapped for 24, 80 and 120 VAC.

Transformer A1T1 provides 80 VAC to full wave rectifier A1CR1. The full wave rectifier rectifies the 80 VAC and initially charges filter capacitor A1C1 to a level dependent upon load. Under minimum load (main contactor A1K1 de-energized or xenon lamp A20S1 not conducting), the main DC operating voltage will charge capacitor A1C1 to approximately 80 VDC; under maximum load (main contactor A1K1 energized and xenon lamp A2DS1 conducting), the main DC operating voltage will charge capacitor A1C1 to approximately 20 VDC. Transformer A1T1 provides 24 VAC to full wave rectifier A1A2CR1 which is rectified to provide relay control power. The 24 VDC is also used for control of beam width.

Transformer A1T1 provides 115 V to chopper assembly A1XA1 which is used to produce the 30 KV pulse ignite voltage for the xenon lamp A2DS1.

When main contactor A1K1 is energized, approximately 80 VDC is applied between the anode and cathode of xenon lamp A2DS1. The 80 VDC is also used to energize AC ignite relay A1K2, through the voltage regulator network consisting of dropping resistor A1A2R1 and 50V regulating zener diode A1A2CR2 in parallel with isolating diode A1A2 CR1 and capacitor A1A2C1. The voltage regulator network along with the DC resistance of the ignite relay A1K2 and capacitor A1A2C1 form an auto start-up circuit to ignite the xenon lamp automatically when remote control panel STANDBY/ON/IGNITE switch A3S1 is positioned to on. The auto start-up circuit functions when ignite relay A1K2 is energized and capacitor AlA2C2 begins to charge. Capacitor A1A2C2 after approximately 40 ms or 1RC time constant causes the voltage across ignite relay A1K2 to drop below 20 VDC, de-energizing the relay. Capacitor A1A2C2 will stay charged as long as the main contactor A1K1 is energized and will discharge through resistor A1A2R5 when the main contactor A1K1 is de-energized.

The searchlight is controlled from the remote control panel (A3) which consists of STANDBY/ON/IGNITE switch A3S1, POWER ON lamp A3DS2 and VARIABLE BEAM WIDTH control switch A3S2. The STANDBY/ON/IGNITE switch is a two position STANDBY/ON switch with a momentary IGNITE position. With STANDBY/ON/IGNITE switch A3S1 in STANDBY, POWER ON lamp A3DS1 is off and main contactor relay A1K1 and elapsed time meter/blower fan relay A1K3 are maintained de-energized by removal of ground return through switch A3S1. With main contactor relay A1K1 de-energized, main DC operating and ionization power is removed from the anode of xenon lamp A2DS1. During STANDBY, capacitor A1C1 is charged to 80 VDC by the 80 VDC supply and 115 VAC is provided for operation of blower fans A1B1 and

A2B2 through contacts 1 and 4 of de-energized relay A1K4. Relay A1K4 is maintained de-energized through time out timer A1TMR for approximately 18 minutes to apply 115 VAC to operate the blower for cooling. If the searchlight remains in STANDBY for longer than 18 minutes, relay A1K4 will energize and blower power will be cut off.

When remote control panel STANDBY/ON/IGNITE switch A3S1 is positioned to ON main contactor relay A1K1 energizes. With A1K1 energized, 80 VDC is initially applied to the anode of xenon lamp A2DS1 on the searchlight head assembly. The 80 VDC is also applied through resistor A1A2R1, diodes A1A2CR1 and A1A5CR2 and capacitor A1A2C1. Diode A1A2CR2 is a 50V zener diode which will hold the voltage to igniter relay A1K2 at 50V. Igniter relay A1K2 energizes and remains energized for approximately 40 ms or 1RC time constant of capacitance of A1A2C1 and the DC resistance of igniter relay A1K2. During this period 115 V is applied to chopper assembly A1A1 which produces pulses that are applied to the primary winding of high voltage transformer A2T2. The secondary winding of high voltage transformer A2T2, in conjunction with capacitor A2C1 and spark gap A2A2, then produces 6KV pulses which are applied to step up transformer A2T1 resulting in approximately 30KV pulses. The 30KV pulses are then applied to the cathode of xenon lamp A2DS1. The 30KV pulses arc across the lamp to the anode allowing the 80 VDC from capacitor A1C1 to discharge through the lamp and ionize the xenon gas. The anode return for the 30KV pulses is via capacitor A2C4. As soon as the xenon lamp is conducting, the 20 VDC operating voltage then provides current for xenon lamp A2DS1 operation through shunt resistor A1R1. Capacitor A2C3, and A1C2 are rf decoupling capacitors, while diodes A1CR3 through A1CR2 are spike suppressors.

Momentarily holding the STANDBY/ON/IGNITE switch in IGNITE will apply +24 VDC to ignite relay A1K2 terminal 1 forcing it to energize. Energizing the relay will again apply 115 V to the chopper assembly as in the ON position. The IGNITE position is provided as a manual means of igniting the lamp especially during very cold weather or where normal lamp aging requires additional ignite pulses.

Once the xenon gas is ionized by the high voltage (30KV) pulse the xenon lamp will conduct at the main DC operating (20 VDC) levels. The xenon lamp will continue to conduct as long as the main DC operating voltage is applied to the anode.

The searchlight beam width is controlled via the remote control panel VARIABLE BEAM WIDTH switch A3S2 which provides 24 VDC and ground return to focus motor A2A1. With +24 VDC and ground return, the focus motor moves the focusing mechanism attached to the xenon lamp in or out. Setting VARIABLE BEAM WIDTH switch A3S2 to the up position provides +24 VDC to terminal 3 and ground return to terminal 1 of DC focus motor A2A1 driving the focusing mechanism in one direction. Setting VARIABLE BEAM WIDTH switch A3S2 to the down position reverses +24 VDC and ground return to the terminals 1 and 3 of focus motor A2A1 thereby reversing the direction of focus motor and the focusing mechanisms.

6-3. DETAILED FUNCTIONAL DESCRIPTION Using 220 VAC Power Supply. This functional analysis is provided to aid the technician in troubleshooting the XR Series 500 Watt Marine Searchlight. The searchlight is comprised of a Power Supply assembly A1, searchlight head assembly A2, remote control panel A3, and remote current meter A4. Refer to Figure 9304 7-B for searchlight schematic diagram.

The searchlight operates from a 220 VAC, 60 Hz power source which is applied through a 15 ampere circuit breaker A1CB1 to transformer A1T1. Transformer A1T1 secondaries are tapped for 24 and 80 VAC.

Transformer A1T1 provides 80 VAC to full wave rectifier A1CR1. The full wave rectifier rectifies the 80 VAC and initially charges filter capacitor A1C1 to a level dependent upon load. Under minimum load (main contactor A1K1 de-energized or xenon lamp A20S1 not conducting), the main DC operating voltage will charge capacitor A1C1 to approximately 80 VDC; under maximum load (main contactor A1K1 energized and xenon lamp A2DS1 conducting), the main DC operating voltage will charge capacitor A1C1 to approximately 20 VDC. Transformer A1T1 provides 24 VAC to full wave rectifier A1A2CR1 which is rectified to provide relay control power. The 24 VDC is also used for control of beam width.

Transformer A1T1 provides 115 V to chopper assembly A1XA1 which is used to produce the 30 KV pulse ignite voltage for the xenon lamp A2DS1.

When main contactor A1K1 is energized, approximately 80 VDC is applied between the anode and cathode of xenon lamp A2DS1. The 80 VDC is also used to energize AC ignite relay A1K2, through the voltage regulator network consisting of dropping resistor A1A2R1 and 50V regulating zener diode A1A2CR2 in parallel with isolating diode A1A2 CR1 and capacitor A1A2C1. The voltage regulator network along with the DC resistance of the ignite relay A1K2 and capacitor A1A2C1 form an auto start-up circuit to ignite the xenon lamp automatically when remote control panel STANDBY/ON/IGNITE switch A3S1 is positioned to on. The auto start-up circuit functions when ignite relay A1K2 is energized and capacitor AIA2C2 begins to charge. Capacitor A1A2C2 after approximately 40 ms or 1RC time constant causes the voltage across ignite relay A1K2 to drop below 20 VDC, de-energizing the relay. Capacitor A1A2C2 will stay charged as long as the main contactor A1K1 is energized and will discharge through resistor A1A2R5 when the main contactor A1K1 is de-energized.

The searchlight is controlled from the remote control panel (A3) which consists of STANDBY/ON/IGNITE switch A3S1, POWER ON lamp A3DS2 and VARIABLE BEAM WIDTH control switch A3S2. The STANDBY/ON/IGNITE switch is a two position STANDBY/ON switch with a momentary IGNITE position. With STANDBY/ON/IGNITE switch A3S1 in STANDBY, POWER ON lamp A3DS1 is off and main contactor relay A1K1 and elapsed time meter/blower fan relay A1K3 are maintained de-energized by removal of ground return through switch A3S1. With main contactor relay A1K1 de-energized, main DC operating and ionization power is removed from the anode of xenon lamp A2DS1. During STANDBY, capacitor A1C1 is charged to 80 VDC by the 80 VDC supply and 115 VAC is provided from A1T2 for operation of blower fans A1B1 and A2B2 through contacts 1 and 4 of de-energized relay A1K4. Relay A1K4 is maintained de-energized through time out timer A1TMR for approximately 18 minutes to apply 115 V to operate the blower for cooling. If the searchlight remains in STANDBY for longer than 18 minutes, relay A1K4 will energize and blower power will be cut off.

When remote control panel STANDBY/ON/IGNITE switch A3S1 is positioned to ON main contactor relay A1K1 energizes. With A1K1 energized, 80 VDC is initially applied to the anode of xenon lamp A2DS1 on the searchlight head assembly. The 80 VDC is also applied through resistor A1A2R1, diodes A1A2CR1 and A1A5CR2 and capacitor A1A2C1. Diode A1A2CR2 is a 50V zener diode which will hold the voltage to igniter relay A1K2 at 50V. Igniter relay A1K2 energizes and remains energized for approximately 40 ms or 1RC time constant of capacitance of A1A2C1 and the DC resistance of igniter relay A1K2. During this period 115 V is applied to chopper assembly A1A1 which produces pulses that are applied to the primary winding of high voltage transformer A2T2. The secondary winding of high voltage transformer A2T2, in conjunction with capacitor A2C1 and spark gap A2A2, then produces 6KV pulses which are applied to step up transformer A2T1 resulting in approximately 30KV pulses. The 30KV pulses are then applied to the cathode of xenon lamp A2DS1. The 30KV pulses arc across the lamp to the anode allowing the 80 VDC from capacitor A1C1 to discharge through the lamp and ionize the xenon gas. The anode return for the 30KV pulses is via capacitor A2C4. As soon as the xenon lamp is conducting, the 20 VDC operating voltage then provides current for xenon lamp A2DS1 operation through shunt resistor A1R1. Capacitor A2C3, and A1C2 are rf decoupling capacitors, while diodes A1CR3 through A1CR2 are spike suppressors.

Momentarily holding the STANDBY/ON/IGNITE switch in IGNITE will apply +24 VDC to ignite relay A1K2 terminal 1 forcing it to energize. Energizing the relay will again apply 115 V to the chopper assembly as in the ON position. The IGNITE position is provided as a manual means of igniting the lamp especially during very cold weather or where normal lamp aging requires additional ignite pulses.

Once the xenon gas is ionized by the high voltage (30KV) pulse the xenon lamp will conduct at the main DC operating (20 VDC) levels. The xenon lamp will continue to conduct as long as the main DC operating voltage is applied to the anode.

The searchlight beam width is controlled via the remote control panel VARIABLE BEAM WIDTH switch A3S2 which provides 24 VDC and ground return to focus motor A2A1. With +24 VDC and ground return, the focus motor moves the focusing mechanism attached to the xenon lamp in or out. Setting VARIABLE BEAM WIDTH switch A3S2 to the up position provides +24 VDC to terminal 3 and ground return to terminal 1 of DC focus motor A2A1 driving the focusing mechanism in one direction. Setting VARIABLE BEAM WIDTH switch A3S2 to the down position reverses +24 VDC and ground return to the terminals 1 and 3 of focus motor A2A1 thereby reversing the direction of focus motor and the focusing mechanisms.

TABLE 6-1 PARTS LIST

Description	PERKO Part Number	S&T Part Number
SEARCHLIGHT HEAD	**9504-000**	**----------**
Front Glass (Replacement)	9504-001	103D474P2
Gear Rack Assembly (Heated)	9574-000	----------
Replacement Rack Heater Element	9571-003	111A810
Removable Optical Assembly	9524-000	----------
Focus Motor Only-(For Lights 2021+)	9521-188	407A6020-3
Focus Motor-(Old Disc, superseded by 9521-190)	----------	407A6020-3
Focus Motor & Bracket Assy (For Lights prior to 2021)	9521-190	407A6020-3
Reflector Assembly	9504-002	110D513G1
Spark Gap Assembly	9521-003	104C792
T1 (Injection Transformer)	9521-017	101C121ST
T2 (Pulse Transformer)	9521-009	102D870
Xenon Lamp	9565-000	----------
Tubular Heater	9574-001	111A808P2
Catch, Modified	9501-006	----------
YOKE and BASE	**9508-000**	110D500
Spur Gear (delrin)	9506-003	103C596P1
Optional Spur Gear (bronze)	9501-002	103C596P2
Support Arm	9504-036	----------
Seal	9506-001	103A509
Bushing	9506-024	MS17795-72
Shaft Housing	9506-034	110D507
Retainer Nut	9506-005	110A492
Lock Washer	9506-006	110A493
Upper Tapered Bearing	9506-009	110A495P2
Upper Bearing Cup	9506-011	110A496P2
Yoke Mount	9506-035	112D636
Rubber Boot	9506-012	110C505
Sliding Stop Ring	9506-036	110D506
Lower Bearing Cup	9506-010	110A496P1
Lower Tapered Bearing	9506-008	110A495P1
Base Plate (without Heater)	9506-037	110D503
Optional Base Plate (Heater)	9571-007	110D503G2
Optional Washer (3/4” Flat)	----------	MS16212-16
Bushing (modified)	9501-008	103B497
Shoulder Bolt (no Heater) 3/4”-10 x 2-1/2”	9506 046	MS35307-489
Optional Shoulder Bolt (Heater)	9571-005	111B758
Optional Cartridge Heater	9571-003	111A810
CONTROL PANEL	**9510-010**	**103D030**
Indicator Lamp Assembly		N/A
Lamp Holder	9510-021	103A595P1
Replacement Lamp	9510-018	MS25237-327
Replacement Lens	9510-014	118216-1
Ignite Switch	9510-005	103C119P1
BEAM Switch	9510-006	103C119P2
Lamp Changing Tool	**9582-001**	**B137**

Description	PERKO Part Number	S&T Part Number
MECHANICAL CONTROL	**9530-000**	**103D552**
Azimuth Tube	9530-002	9530-002
Ceiling Mount	9530-005	9530-005
Elevation Rod	9530-001	9530-001
Handle Assembly	9530-003	9530-003
Optional Support Base	9530-009	9530-009
Optional Support Rod	9530-012	9530-012
Roll Pin (1/8 X 5/8")	0855 02B	MS16562-223
Roll Pin (1/8 X 1")	9551 09A	MS16562-226
Spur Gear (delrin)	9506-003	103C596P1
Optional Spur Gear (bronze)	9501-002	103C596P2
Power Supply	**9511-000**	**110D110**
Chopper Assembly	9510-020	104C787G2
Rectifier Diode 1N2133	9510-015	S41-801-011
Rectifier Diode 1N2133R	9510-030	S41-801-111
Printed Circuit Board Assembly	9511-002	108B642G2
Filter Capacitor	9510-039	105A988P98
Isolation Capacitor	9510-007	CMR07F203J0DL
20A Circuit Breaker (115 VAC Power Supply Only)	9511-014	105B990P4
15A Circuit Breaker (220 VAC Power Supply Only)	9511-001	N/A
Transorb	9510-019	105C298
Cooling Fan	9510-011	110C119FAN
Fil.Cooling Fan Filter	9510-032	104A861P3
MAIN Contactor	9510-002	110A604
Ignite Relay	9510-026	105B053P2
Control Relay	9510-037	103A387P2
FAN Relay	9510-037	103A387P2
Elapsed Time Meter	9510-003	103A351
Shunt Resistor	9510-033	104A636
Power Transformer (115 VAC Power Supply Only)	9511-013	108D743G2
Power Transformer (220 VAC Power Supply Only)	9511-021	N/A
Aux Transformer (220 VAC Power Supply Only)	9511-022	N/A
Terminal Board 10 Term	9510-034	T30-003-010
Terminal Board 7 Term	9551-038	T30-003007
Timer Assembly	9510-012	109B589
REMOTE AMMETER	**9510-009**	**104C402G1**
Optional Front Plate with Digital Meter Contacts	special order	special order
Replacement Analog Meter	9510-024	104B649P1
Analog/Digital Mode Switch	special order	special order

CHAPTER VII

XR Series Warranty Policy and Instructions for using Xenon Lamps

WARNING !

Xenon lamps are filled with Xenon gas under high pressure. They may explode, in either the hot or cold state, especially if dropped or mishandled. Always wear protective safety equipment (a protective face mask with neck guard, chest protector, heavy clothing and leather gloves) when handling a lamp.

1. Likelihood of lamp explosion increases with lamp age and darkening. Lamps should not be operated beyond 125% of warranty life or if they have darkened considerably.

2. The protective cover must be left on the lamp during handling and installation.

3. Avoid looking directly at an operating lamp. This may damage your eyes. There should be no direct exposure to the eyes or skin from an operating lamp.

4. The Perko XR Series Xenon lamp warranty is void unless the lamp is operated according to the recommendations in this information package.

WARRANTY POLICY

1. Lamp damage or failure caused by mishandling and/or incorrect operation is not covered by warranty as determined by Perko, Inc.

2. Warranty is valid only for lamps operated under normal conditions following operating instructions published by Perko, Inc., specifically including:
   A. provisions for proper cooling of the lamp which provide that the base (connector) temperature does not exceed 230 degrees C.
   B. a periodic lamp maintenance program which provides for cleaning of the lamp to remove dust, oil and dirt accumulations and inspection of all electrical connections.
   C. lamp operation within the recommended current ranges described in the chart below.

3. All claims are subject to test and verification by Perko, Inc. Warranty forms are packed with each lamp and include "Purchase Notification" and "Warranty Registration" forms. The 18 month "Purchase Notification" form must be submitted within 30 days of initial receipt of the lamp. The "Warranty Registration" form must be submitted within 10 days of installation of the lamp. Both forms can be found in the shipping container with the lamp.

4. In the event of premature lamp failure, a "Lamp Failure Report" form (included

with the lamp) must be submitted within 20 days of the lamp failure along with the failed lamp packaged in its original shipping container. Call Perko at 1-(305)-621-7525 to obtain an RGA number. Then ship failed lamps to Perko prepaid.

5. Any credit due as a result of warranty evaluation of returned lamps will be issued only to the original authorized Perko purchasing dealer/distributor of the lamp.

6. This warranty is limited to the lamp only. Any further claim for indemnification is excluded.

7. Perko will provide a lamp purchase credit for any xenon lamp which fails prematurely due to any defect in material or workmanship provided that it has been operated on proper auxiliary equipment at no higher than the “Recommended Operation” level (shown below) and has not been physically or electrically misused or misapplied. The lamp purchase credit shall be based on accumulated hours of operation.

Figure Number	Rated Wattage	Recommended Operation	Current Range
95630000	300	15A @20V	12A to 16A
95650000	500	30A @15V	20A to 30A
95680000	800	37A @19V	30A to 45A
95600100	1,000	50A @20V	30A to 55A
95660160	1,600	65A @24V	50A to 70A

7-2

INSTRUCTIONS FOR INSTALLING XENON LAMPS

INSTALLATION OF LAMPS

Disconnect the main connector from the AC Power Supply and assure that all breakers are off before opening the searchlight housing (front glass).

INSTRUCTIONS FOR USING XENON LAMPS

The contact surface of all electrical connections must be free of foreign bodies, corrosion and scorch marks to insure good conductivity. Check regularly to assure that all clamps and cables are firmly in place, and especially after fitting the lamp.

The lamp supports must not transfer any mechanical stress to the lamp, either during installation or during operation (due to thermal expansion).

Insert lamp (with protective cover still in place) into the lamp supporting fixtures

inside the searchlight housing. When inserting and connecting the lamp, care must be taken to prevent any twisting or bending forces from being transferred to the lamp body. Insure proper current connections and polarity. Incorrect polarity will immediately damage the lamp. Remove the protective cover and tighten the lamp using a lamp extractor tool (Perko Figure # 9582 000).

WARNING!
Before taking the protective cover off the lamp, put on a protective mask, chest protector and leather gloves.

If the quartz body of the lamp is accidentally touched, clean it with alcohol and distilled water. Wear appropriate safety equipment when doing this job. Do not use cleaning rags (or material that can leave a residue). To avoid damage to the quartz envelope, clean with a lint free cloth or a soft paper product.

OPERATION OF LAMPS

Before initial operation, polarity of the electrical connections should be checked to avoid reversed polarity. Reversed polarity can destroy the negative electrode in seconds making the lamp unusable.

Lamps operate best at their rated current. Over the life of the lamp, current may be increased to its maximum value to compensate for loss of light, however, initial operation must begin at the rated current to avoid excessive arc instability (commonly referred to as flicker). The output of the lamp can be reduced by operating the lamp at its minimum current. NEVER EXCEED THE MAXIMUM CURRENT VALUES STATED IN THE TABLE.

INSTRUCTIONS FOR USING XENON LAMPS

The lamp housing must be closed during ignition and lamp operation.

WARNING!
Never look directly at an operating lamp. This may damage your eyes. Always use appropriate eye protection. Avoid direct exposure of the beam on your skin. Burns can result.

The base temperature of the lamp should never exceed 230 degrees C. Forced air flow should never be directed at the lamp. When operating lamps with forced cooling, care should be taken to assure that the velocity of the cooling air stream is correct. Convection cooling air velocity at the lamp equator should be 10 ft./sec. Fan cooling air speed should range from 16 to 32 ft. / sec. and should continue for at least 5 minutes

after the lamp has been shut off. Discolorations on the base shells indicate inadequate cooling.

For safety reasons, XR Series Xenon Lamps should be replaced once they reach the end of their warranty life period and not later than 125% of this period. After this time there is increased risk of the lamp exploding.

REMOVAL AND DISPOSAL OF LAMPS

Disconnect the AC power source and shut off main breaker. Do not open the lamp enclosure for at least 15 minutes after system has been shut down.

Follow all safety precautions described under "Installation of Lamps".

Use the lamp extractor tool to loosen the lamp.

Immediately fit the protective cover around the cooled off lamp and finish with removal of the lamp.

Due to high internal cold pressure (8 to 20 bar) and risk of lamp explosion which could result in quartz glass projectiles, end of service lamps should be contained in their provided safety cover and original packaging / shipping container and ultimately degassed before release for disposal. Pressurized lamps must not be disposed of as they can present a serious threat to others.

PERKO®

XR SERIES SEARCHLIGHT

ONE YEAR LIMITED WARRANTY

PERKO, INC. (PERKO) warrants to the original commercial-purchaser that PERKO'S commercial products will be free from defective materials or workmanship, and that the PERKOPLATE/PERKO•KOTE Finish will remain corrosion-free under normal use and service, for a period of one (1) year from the original purchase date.

ALL IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY, ARE ALSO LIMITED IN DURATION TO THE ONE YEAR PERIOD FROM THE ORIGINAL PURCHASE DATE.

PERKO SHALL NOT BE LIABLE FOR LOSS OF USE OF ANY OF ITS COMMERCIAL PRODUCTS, NOR FOR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSES, OR DAMAGES INCURRED BY THE ORIGINAL COMMERCIAL-PURCHASER OR BY ANY OTHER PERSON.

SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY OR MAY NOT APPLY TO YOU. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY OR MAY NOT APPLY TO YOU.

This warranty is void if the commercial product warranted has been damaged by accident or unreasonable use, neglect, improper service or other cause not arising out of defects in material or workmanship. Excluded from this warranty are Xenon Light bulbs which are warranted separately. See prorated warranty statement.

During the warranty period, your PERKO product will either be repaired or it will be replaced with a like product (at PERKO's option) without charge to the original commercial-purchaser, when returned prepaid and insured, with proof-of-purchase date to PERKO at the address shown below. In the event of replacement, the replacement product will continue the warranty of the original product, or ninety (90) days, whichever is longer.

PERKO does not authorize any person or company to create for it any other obligation or liability in connection with any of its products.

Serial Number_____

Date of Purchase_____

(Retain with Proof-of-Purchase Documentation)

PERKO, Inc. • 16490 N.W. 13th Avenue • Miami, FL 33169-5707

Limited Eighteen (18) Month Warranty

XR Series Figure # 9565000
500 Watt Xenon Lamp for Marine Searchlights

PERKO, INC. warrants to the first retail purchaser that this XR Series 500 watt Xenon Lamp will be free from defects in material or workmanship under normal use and service for (18) months from the date of purchase from an authorized distributor of products manufactured or sold by PERKO, INC. to be compatible with the XR Series 500 watt Xenon Searchlights. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, accident, misuse, abuse, neglect, improper maintenance or installation in an incompatible searchlight, or damage caused by acts of God. This warranty gives you specific legal rights. You may also have other rights which vary from state to state. Cracked or broken lamps, no matter what the cause, are not covered under this warranty. However, cracked or broken lamps may be returned to PERKO, INC. for other considerations. PERKO, INC. at its sole discretion, may examine the lamp, or portions thereof, and determine whether any settlement may be appropriate.

Warranty consideration will be rendered upon timely receipt of the following documentation (all documentation must be filled out completely):

1. Purchase Notification - completed (including date of original purchase) by an authorized distributor of products manufactured or sold by PERKO, INC. and received by PERKO, INC. within thirty (30) days. A purchase receipt, invoice or other documentation that specifies lamp in question will be considered.
2. Warranty Registration Form - received by Perko, Inc within ten (10) days of the date of installation. A copy of the Warranty Registration Form is attached.
3. Lamp Failure Report - received by Perko, Inc within twenty (20) days of the date on which the lamp was removed from the searchlight. A copy of the Lamp Failure Report is attached.

PERKO, INC acknowledges the following obligations under this warranty within the 18 months of XR Series Xenon lamp purchase:

1. Free replacement at no charge to the first retail purchaser of any unbroken defective XR Series Xenon Lamp that fails during the first one hundred (100) hours of operation. .
2. Pro-rata replaccement to the first retail purchaser, of any unbroken defective XR Series Xenon Lamp that fails during the first one thousand (1000) hours of operation.

PERKO, INC. reserves the right, at its sole discretion, to replace a defective lamp with a new lamp in lieu of issuing credit.

If a problem develops with a XR Series 500 watt Xenon Lamp during the warranty period, call (305) 621-7525 to obtain an **RGA Number.** Then return the lamp for evaluation, postage, freight, or shipment prepaid, along with a completed lamp failure report to:

PERKO, INC.
16490 N. W. 13th Ave.
Miami, FL 33169-5707

All lamps returned for warranty or other consideration which are found to be not defective will be returned, postage, freight, or shipment collect. All lamps for which warranty or other settlement considerations are granted become the property of PERKO, INC.

PERKO RGA Number_____ **Serial Number of Xenon Lamp**_____

LAMP FAILURE REPORT

XR Series Figure # 9565000
500 Watt Xenon Lamp for Marine Searchlights

This document, when properly completed by the first retail purchaser or his agent of the XR Series 500 watt Xenon lamp and returned to Perko, Inc., will satisfy the lamp failure report requirement in the limited eighteen (18) month warranty for XR Series 500 watt Xenon lamps for marine searchlights.

Date lamp removed from marine searchlight: _____

Hour meter reading at removal:_____

Searchlight Brand:_____Model Number: _____

Serial Number: _____

Name of Motor Vessel: _____

Company primarily responsible for searchlight service: _____

Description of failure:_____

_____

_____

_____

Printed name and signature of remover of lamp: _____

_____

This form must be completed and returned by the person removing the lamp from a marine searchlight within twenty (20) days from the date on which the lamp was removed. Mail or fax to:

PERKO, INC
16490 N. W. 13th Ave.
Miami, FL 33169-5707
Fax:1-(305)-620-9978
Phone: 1-(305)-621-7525

Serial Number of Xenon Lamp_____

WARRANTY REGISTRATION

XR Series Figure # 9565000
500 Watt Xenon Lamp for Marine Searchlights

This document, when properly completed by the first installer of the XR Series 500 watt Xenon lamp, will satisfy the warranty registration form requirement in the limited eighteen (18) month warranty for XR Series 500 watt Xenon lamps for marine searchlights.

Date lamp installed in marine searchlight:_____

Hour meter reading at installation: _____

Searchlight Brand: _____Model Number:_____

Serial Number: _____

Name of Motor Vessel: _____

Company primarily responsible for searchlight service: _____

Printed name and signature of installer of lamp: _____

_____

This form must be completed and returned by the person installing the lamp in a marine searchlight within ten (10) days from the date on which the lamp was first installed. Mail or fax to:

PERKO, INC
16490 N. W. 13th Ave.
Miami, FL 33169-5707
Fax 1-(305)-620-9978
Phone 1-(305)-621-7525

Serial Number of Xenon Lamp_____

PURCHASE NOTIFICATION

XR Series Figure # 9565000
500 Watt Xenon Lamp for Marine Searchlights

This document, when properly completed by an authorized distributor / dealer for products manufactured by Perko, Inc., will satisfy the proof of date of original purchase requirement in the limited eighteen (18) month warranty for XR Series 500 watt Xenon lamps for marine searchlights.

Purchase Price: _____

Date of First Retail purchase: _____

First retail Purchaser (Name): _____

Authorized Distributor / Dealer: _____

Intended User (motor vessel name/other): _____

Printed name & signature of Distributor / Dealer: _____

_____

Date Completed: _____

This form must be completed and returned by an authorized distributor for products manufactured by Perko within thirty (30) days of the first retail purchase. Mail or fax to:

PERKO, INC
16490 N. W. 13th Ave.
Miami, FL 33169-5707
Fax: 1-(305)-620-9978
Phone: 1-(305)-621-7525

APPENDIX B

PERKO®

Optional Heater Package
for
500 Watt
XR Series
Marine Searchlights

Installation Guide

Heater Connections

1). All heater elements are designed to operate on 120 V.A.C.

2). Switch and supply leads must be sized to accommodate a 10 amp load.

3). As shown in the appropriate schematic in Figure 2, all heater elements are connected in parallel.

4). When installing the interconnecting supply wiring to the trunnion bolts and the rack, be sure to allow enough slack for both azimuth and elevation movements of the searchlight head to its limits.

5). Connections made to the heater elements at the searchlight (outside the waterproof junction box) must be suitably protected from weather and sea conditions.

6). An appropriate indicator light or switch is recommended to alert the operator that the heaters are energized. Mount the caution plate near the switch or indicator light.

7). To prevent over-heating the searchlight, operate heaters only when ambient temperature is below freezing.

PERKO®

FIGURE 1
LOCATION OF HEATER ELEMENTS FOR XR SERIES MARINE SEARCHLIGHTS

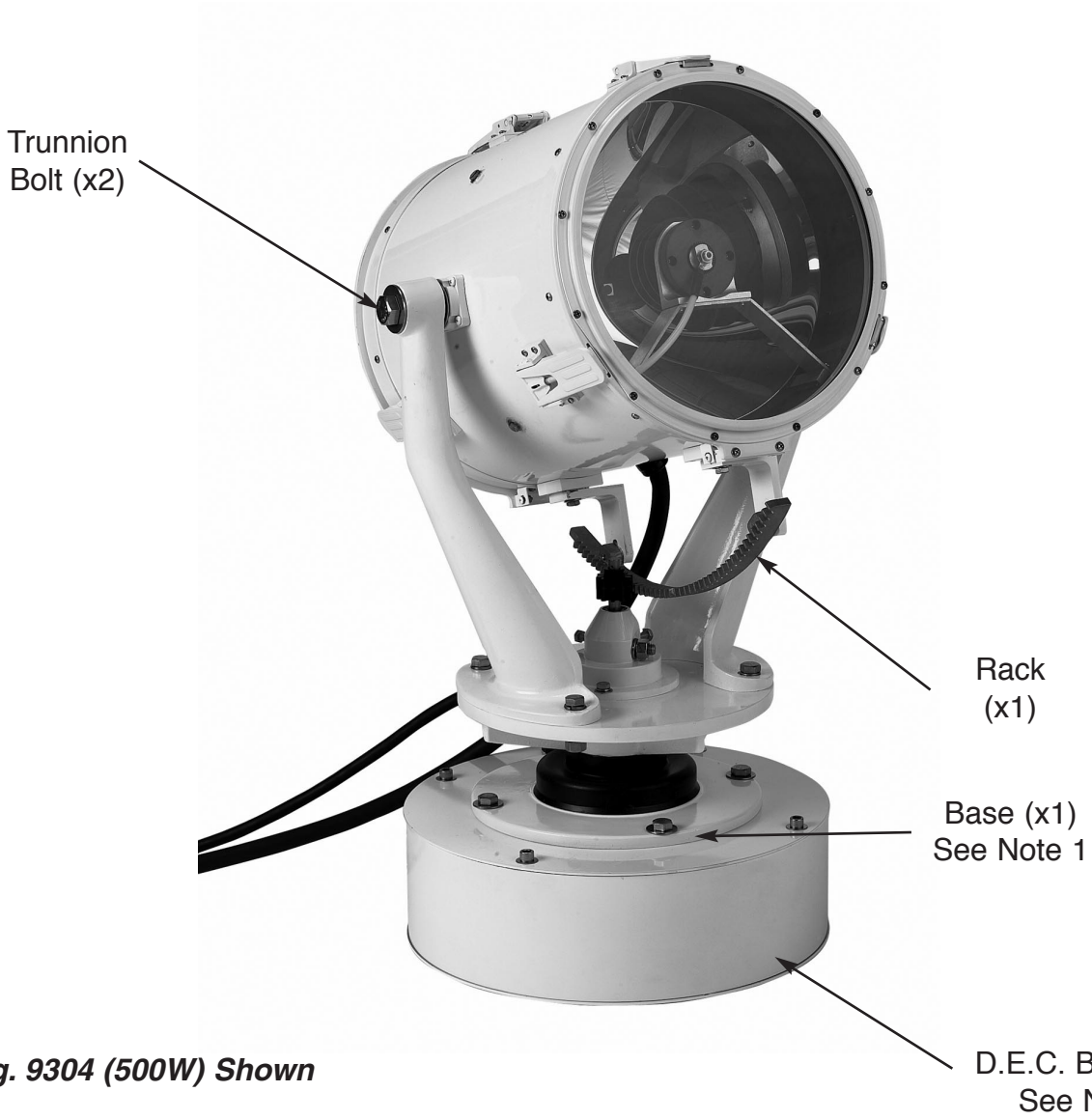
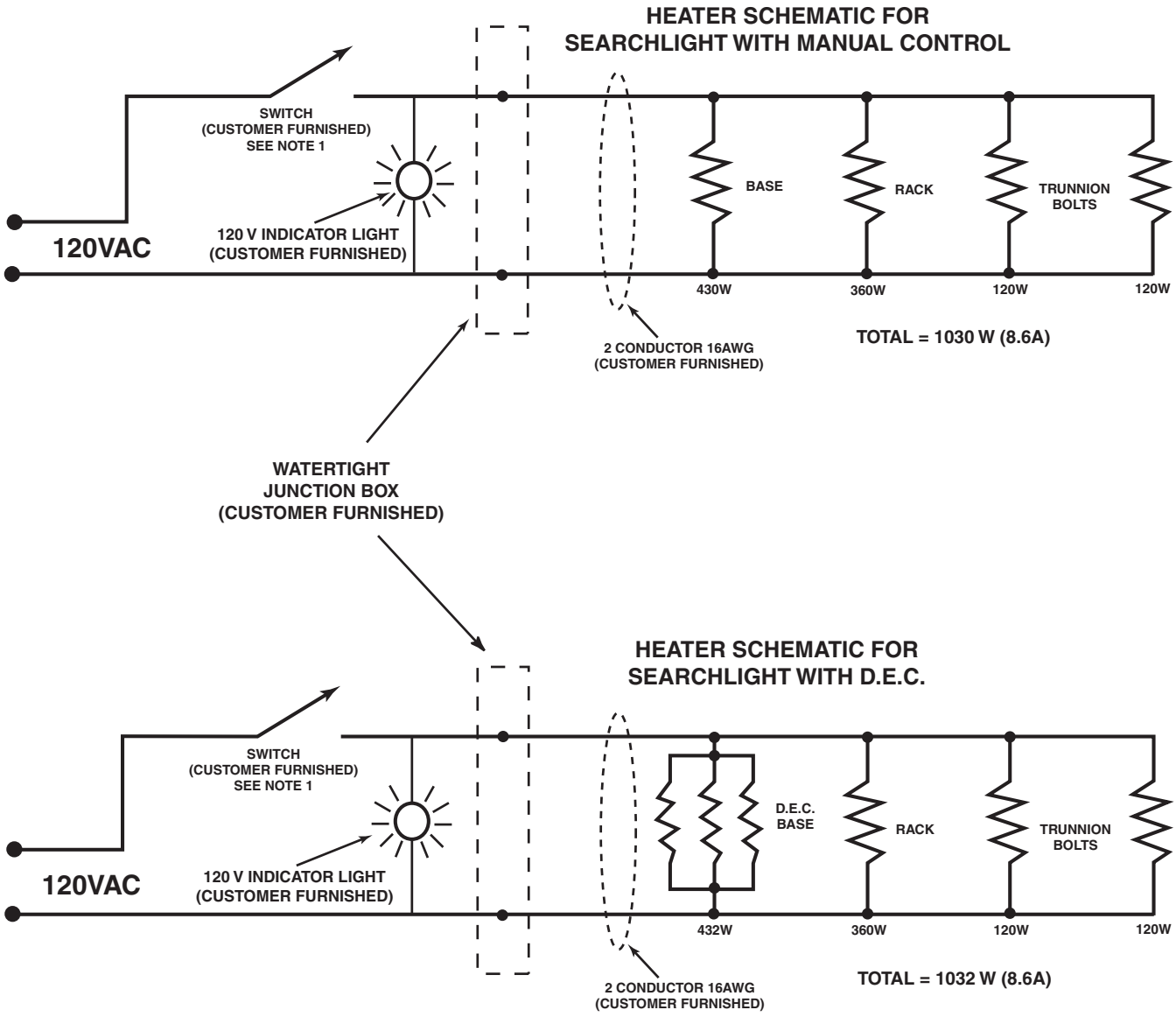


Fig. 9304 (500W) Shown

NOTES:

1. Base Heater is Only Supplied with Manual Control.

2. D.E.C. Heaters are Only Supplied with D.E.C. Base.



NOTES:

1. Attach PERKO Supplied caution plate prominently adjacent to switch.

2. Determine supply wire gauge (AWG) based on load and length to watertight junction box.

Figure 2:
Heater Package Schematics
for 500 Watt XR Series Searchlights