PERKO®

Shaping the Wave of Excellence®

XR Series

For Commercial Marine Applications

Model 9854

1600 Watt Marine Xenon Searchlight

Operator's Manual

MANUFACTURER OF MARINE LIGHTS, HARDWARE AND ACCESSORIES.

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

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XR Series Searchlight, Model 9854 (1600 Watts)
from

PERKO®

OPERATOR'S MANUAL with MAINTENANCE SUPPLEMENT

(Serial Number 1000 or higher with Mechanical Controls)

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TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION....5
- 1.1 General....5
- 1.2 Description....5

2.0 INSTALLATION....7
- 2.1 General....7
- 2.2 Unpacking....7
- 2.3 Preparation....9
- 2.4 Installation Procedures....11
  - 2.4.1 Mechanical Installation....11
  - 2.4.2 Electrical Installation....14
  - 2.4.3 Optional Lamp Emulator Installation....15
- 2.5 Inspections and Test Procedures....16
  - 2.5.1 Testing with the Optional Lamp Emulator....16
  - 2.5.2 Xenon Lamp Installation/Testing....16

3.0 OPERATING INSTRUCTIONS....19
- 3.1 General....19
- 3.2 Placing the Searchlight on STANDBY....19
- 3.3 Turning the Searchlight ON from STANDBY....20
- 3.4 Controlling the Searchlight BEAM....21
- 3.5 Returning the Searchlight to STANDBY....21
- 3.6 Turning the Searchlight OFF....22

4.0 OPERATOR MAINTENANCE....23
- 4.1 General....23
- 4.2 Inspecting the Searchlight....23
- 4.3 Cleaning the Searchlight....24
- 4.4 Lubricating the Searchlight....25
- 4.5 Replacing the Xenon Lamp....25

5.0 TECHNICAL INFORMATION....28
- 5.1 General....28
- 5.2 Recommended Spares, Tools, and Supplies....28
- 5.3 Functional Description....28
- 5.4 Field Repair....35
- 5.5 Tapping Instructions....36

APPENDIX “A”

Field Replacement Units....37

Figure CM - 073-RFOA: XR Series Searchlight Lamp Installation....40-41

XR Series Warranty Policy and Instructions for Use of Xenon Lamps....42

XR Series 18 Month Warranty....46

Lamp Failure Report....47

Warranty Registration Form....48

Purchase Notification Form....49

APPENDIX “B”

Optional Heater Package Installation Guide....50-53

DRAWINGS....54-61

LIST OF TABLES

TABLE	Title	PAGE
1	XR Series Searchlight Shipping Checklist	8
2	Operator Maintenance Schedule	23
3	Recommended Spares, Tools and Supplies	28
4	T1, T2, T3 Power Transformer Taps for 220v 3Ø	36
5	T1, T2, T3 Power Transformer Taps for 440v 3Ø	36
6	T4 Isolation Transformer Taps for 220v or 440v	36
7	Field-replaceable Units	37

LIST OF DRAWINGS

Drawing	Title	Pages
CM-073-RFOA	Reference XR Series Searchlight Xenon Lamp Installation	40-41
9854-1	Searchlight Head, Yoke and Base, and Mechanical Control Outline Drawings	54
9854-2	Power Supply, Remote Ammeter, and Control Panel Outline Drawings	55
9854-3	Electrical Interconnection Drawings	56
9854-4	Xenon Lamp/Emulator Installation Drawings	57
9854-5	Functional Diagram/Schematics	58
9854-6	Searchlight Head, Exploded Views	59
9854-7	Yoke and Base, Exploded Views	60
9854-8	Power Supply, Exploded Views	61

1.0 INTRODUCTION

1.1 General

This manual contains descriptions, photographs, drawings, tables, installation procedures and maintenance instructions for the XR Series Searchlight, Model 9854 (1.6kW), (beginning with serial number 1000) to be installed with a Mechanical Azimuth/Elevation Control.

!!!!!!!!!! WARNING !!!!!!!!!!

XR Series Searchlights are hazardous to operate and service. Searchlights produce very intense light beams which are significant EYE HAZARDS when operating. The Power Supply is a significant electrical SHOCK HAZARD even when the Control Panel switch is placed in the STANDBY position. The searchlight lamp operates at extremely high temperatures/internal pressures and is a significant BURN HAZARD, and the lamp may EXPLODE even when not in operation.

Risks associated with servicing the **XR Series Searchlight** have been reduced by the introduction of the XENON LAMP EMULATOR. This device permits operators to perform functional tests on their XR Series Searchlights with minimum risk of lamp explosions, electrical shocks and burns, or being blinded by the beam.

1.2 Description

The XR Series Searchlight with mechanical control of beam direction (azimuth and elevation) is comprised of six major assemblies (see Drawings 9854-1 and 9854-2):

			S&T Part No.	PERKO Part #
1.	Searchlight Head	(SH)	P/N 104D800	9501-000
2.	Yoke and Base	(YB)	P/N 112D635	9506-000
3.	Mechanical Control	(MC)	P/N 103D552	9530-000
4.	Power Supply (220VAC)	(PS)	P/N 108D832	9512-000
5.	Power Supply (440VAC)	(PS)	----------	9514-000
6.	Remote Ammeter	(RA)	P/N 104C402G1	9510-009
7.	Control Panel	(CP)	P/N 103D030	9510-010

The Searchlight Head (see Drawing 9854-1) is composed of a cylindrical housing, a hinged and clamped front-window assembly, a control rack assembly (optionally heated), and a removable optical assembly. The housing is a machined aluminum casting with unique external (top and rear) and internal (rear) cooling fins and threaded machined bosses (each side) for mounting to the Yoke and Base. The front window is a tempered clear glass sealed in a metal frame which is hinged (bottom) and clamped (top and sides) closed. The control rack assembly is attached (bottom) and connects to the Mechanical Control (beam azimuth and

elevation) shafts. The removable internal optical assembly consists of mechanical, optical, and electrical components which produce and focus the searchlight beam. When the front window is closed and latched, the housing is sealed, protecting the optical assembly from dirt and moisture.

The Searchlight Head is mounted between the arms of the Yoke and Base (see Drawing 9854-1) using stainless steel shoulder bolts (optionally heated) engaging threaded holes in machined bosses on each side of the housing. These arms are attached to a yoke support plate which rotates on tapered bearings protected by a rubber boot. This support plate is attached to a sealed shaft housing clamped to the azimuth control tubular shaft of the Mechanical Control. The yoke support plate may only rotate approximately 190 degrees either side of forward (380 degrees of azimuthal rotation) to prevent stressing electrical power cables. The top of the Mechanical Control elevation control rod is connected to a spur gear which engages the teeth on the rack assembly attached to the bottom of the Searchlight Head housing. Elevation of the searchlight beam is restricted to approximately 30 degrees above and below the horizon. The base plate (optionally heated) of the Yoke and Base is attached to the customer provided support plate (on the roof above the operator's station) using four bolts or studs with nuts through holes provided (4 holes, 5/8" dia., on an 11.0" bolt circle, spaced 90 degrees apart, oriented forward, aft, port and starboard). This base plate also supports the mating tapered bearings and holes through which the control shafts from the Mechanical Control pass.

The Mechanical Control (see Drawing 9854-1) consists of a control handle assembly, two control shafts (an inner elevation control rod enclosed within an outer azimuth control tube) and the spur gear. The two control shafts are cut to desired length and mounted through the roof above the operator's station. The inner rod (elevation control shaft) passes through the shaft housing on the yoke support plate and the spur gear is attached to this shaft engaging the curved rack on the bottom of the Searchlight Head. The outer tubular shaft is clamped by the shaft housing which in turn is attached to the yoke support plate. The control handle assembly is clamped to the azimuth control tube and pinned to the elevation control rod. Rotating the entire control handle assembly about the control shaft axis results in azimuthal rotation of the Searchlight Head. Twisting the control handle grip about its own axis results in elevating the searchlight beam. Optional support for the Mechanical Control is provided by a support shaft and base.

The Power Supply (see Drawing 9854-2) consists of a louvered cabinet containing the electrical and electronic components which operate the searchlight. This cabinet is designed for wall mounting with a hinged door giving maximum access to the electrical components and circuits for maintenance. The Power Supply uses forced-air ventilation for cooling and is not sealed against dirt or moisture.

The Power Supply should be positioned conveniently with access to ship's power (three-phase, 220 VAC or 440 VAC, 1,750 Watts) and protection from oil, water, or other contamination. Door clearance of 30" is required in front and left of the Power Supply. The wiring from ship's power to the Power Supply and from the Power Supply to the Searchlight Head must be armored and selected in compliance with all appropriate electrical and environmental codes.

The Remote Ammeter (see Drawing 9854-2) measures and indicates the searchlight lamp current during operation using an analog meter. A switch and two digital volt meter-compatible connections may be special ordered. The Remote Ammeter should be mounted within easy viewing distance of the operator's station.

The Control Panel (see Drawing 9854-2) contains STANDBY/ON/IGNITE and BEAM focus switches with a green indicator lamp which is lit when the searchlight power is switched from STANDBY to ON/IGNITE (if the Searchlight Head front window is CLOSED). This panel should be mounted within easy reach of the operator's station.

All external surfaces of the Searchlight Head, Yoke and Base are anodized aluminum with multiple coats of marine-compatible paint (standard color is white). All other external and internal surfaces for the major assemblies are protected against corrosion by chemical finishes, platings or coatings.

2.0 INSTALLATION

2.1 General

The XR Series Searchlight installation has four separate phases: unpacking, preparation, installation, and testing. Each phase should be completed with appropriate inspections before beginning the next phase.

2.2 Unpacking

The searchlight components are packaged consistent with best commercial practice. Care should be exercised when unpacking to prevent damage to any of the searchlight equipment. Packages should be examined prior to opening for evidence of possible damage in shipment. Any external damage to shipping containers should be documented and reported immediately to the freight carrier or its representative. When unpacking, check the contents of the shipping container against the appropriate packing list and the following shipping checklist and report any shortages directly to PERKO, Inc.

!!!!!!!!!! WARNING !!!!!!!!!!

The Searchlight Head and the Power Supply should be handled by two or more people because of their weight and bulk.

Table 1 - XR Series Searchlight Shipping Checklist
(SEE Drawing 9854-1)
Package 1 of 3 is a CRATE containing:

	(Qty)	S&T Part Nos.	PERKO Part #
Searchlight Head S/N_____		**104D800**	**9501-000**
Assembly Complete: Casting with Optical Assembly and Power Cable.			
Injection Transformer S/N _____		101D121ST	9521-017
Excitation Transformer S/N _____		102D870	9521-009
Washer, Lock, 3/8"	(2)	MS35338-46	----------
Screw, 3/8-16 X 5/8" (hex-head)	(2)	MS35307-357	----------
Rack Support	(1)	102D380	9501-039
Rack Assembly (no heater)	(1)	104D485	9521-023
Optional Heated Rack Assembly	(1)	103D598P2	9571-000
Optional Rack Tubular Heater	(1)	111A808P2	9571-002
Xenon Optional Lamp Emulator (special order)	(1)	ST1000XLE	9582-004
1600 W Xenon Lamp S/N _____	(1)	ST1600	9566-000
1000 W Xenon Lamp S/N _____	(1)	ST1000	9560-000
800 W Xenon Lamp S/N _____	(1)	ST800	9568-000
Front Brass Lamp Adapter	(1)	B078	9521-020
Reflector Wrench	(1)	B123	9582-003
Lamp Changing Tool	(1)	B137	9582-001
Yoke and Base S/N_____		**112D635**	**9506-000**
Assembly Complete: Arms, Support, Bearings, Seals, Rubber Boot, and Base Plate.	( )		
Optional Washer, Flat, 3/4"	(2)	MS16212-16	9121-00A1
Bushing, Modified	(2)	103B496	9506-032
Bolt (no heater) 3/4-10 X 2.5"	(2)	MS35307-489	----------
Optional Heated Bolt	(2)	111B758	9571-005
Optional Bolt Cartridge Heater	(2)	111A810	9571-003
Optional Base Plate Tubular Heater	(1)	115A410	9571-001
Mechanical Control		**103D552**	**9530-000**
Handle Assembly Complete with Knob	(1)	103D552-LGH	9530-003
Optional Base, Support	(1)	110B553	9530-009
Ceiling Mount	(1)	110C301	9530-005
Spur Gear	(1)	103C596	9530-010
Roll Pin, 1/8 X 5/8"	(2)	MS16562-223	----------
Roll Pin, 1/8 X 1.0"	(2)	MS16562-226	----------

Package 2 of 3 is a TUBE containing:

Optional Shaft, Support	(1)	103B569	9530-012
Rod, Elevation	(1)	103B936*72	9530-001
Tube, Azimuth	(1)	103B937*72	9530-002

Table 1 - XR Series Searchlight Shipping Checklist (Continued, See Drawing 9854-2)

Package 3 of 3 is a CRATE containing:

		(Qty)	S&T Part No.	PERKO Part #
Power Supply S/N_____				
Assembly Complete: wired for nominal	( )220 VAC	(1)	**108D832**	**9512-000**
	( )440 VAC.	(1)	------	9514-000
Power Transformers S/N_____,_____,_____			108D857P1	9510-013
Accessory Transformer S/N_____			104A210P3	
Remote Ammeter S/N_____		**(1)**	**04C402G1**	**9510-009**
Assembly Complete: 0-100 Amp meter, case and cable				
DVM Optional DVM Connections		(1)	104C402G1	9510-036
Control Panel S/N_____			**103D030**	**9510-010**
Assembly Complete: plate, switches and indicator lamp		(1)		

2.3 PREPARATION

Determine the desired location for the operator's station (the location for the Mechanical Control, Remote Ammeter and Control Panel, see Drawings 9854-1 and 9854-2). If a heater package is to be installed on the Yoke and Base, a heater ON/OFF switch, circuit breaker and interconnecting wiring must be provided (see Drawing 9854-3).

!!!!!!!!!! WARNING !!!!!!!!!!

With Mechanical Controls, the Searchlight Head, Yoke and Base MUST be installed directly above the operator's station.

Determine the desired location for the Power Supply and select a suitable bulkhead with the following characteristics:

a) capable of supporting the Power Supply (minimum 300 pounds) when wall-mounted with 5/8" hardware
b) convenient access to both ship's power (3-phase, 220 VAC/20 Amps or 440 VAC/10 Amps) and the Searchlight Head (recommended cable length less than 50 ft.)
c) sufficient door clearance (approx. 30" to the front and left) for inspection and maintenance
d) sufficient space above for input and output cabling and below for air flow (minimum 12").

Perform the following procedure in preparation for installing the XR Series Searchlight:

1. Directly above the operator's station, drill a hole (1.5" dia.) through the ceiling (see Drawing 9854-1).

2. Install a suitable flat metal plate (minimum 0.5" thick and 21" dia.) with a center hole (1.5" dia.) and four mounting studs or bolts/nuts arranged on an 11" bolt circle (90 degrees apart, oriented forward, aft, port and starboard). The 1.5" dia. hole in this plate and the bolt circle must be aligned with the hole drilled in step 1 above.

Note: For the following items #3 thru #7, refer to the Interconnection Diagram drawing 9854-3.

3. Install a waterproof junction box approximately 2 ft. aft from the 1.5" hole.

4. Supply, prepare and route shielded 2-conductor (#4 AWG minimum labeled #1, 2) and shielded 6-conductor (#16 AWG minimum labeled #3, 8, 9, 10, 11, 12) armored cables (in compliance with appropriate marine code) from the waterproof junction box to the location selected for the Power Supply (maximum recommended cable length of 50 ft.). Label, but DO NOT CONNECT the wires.

5. Supply, prepare and route shielded 7-conductor (#16 AWG minimum labeled 1-7) armored cable (in compliance with appropriate marine code) from the location selected for the Control Panel and that selected for the Power Supply. Label, but DO NOT CONNECT the wires.

6. Supply, prepare and route shielded 3-conductor (#12 AWG minimum for L1, L2, L3) armored cable (in compliance with appropriate marine code) among the locations selected for the Power Supply, a 3-phase manual power disconnect (20 Amp minimum), and ship's power. Label, but DO NOT CONNECT the wires.

7. If Searchlight Head and Yoke and Base are equipped with heaters, supply, prepare and route shielded 2-conductor (#16 AWG minimum, H1, H2) armored cable (in compliance with appropriate marine code) among a waterproof junction box, heater switch, circuit breaker, and ship's power (120 VAC, 15 Amp). Label, but DO NOT CONNECT the wires.

8. Drill four holes (9/16" clearance) suitable for mounting the Power Supply to the selected bulkhead (see Drawing 9854-2 for relative locations and dimensions). Supply and install a 3-phase manual power disconnect (20 Amp minimum) near the desired Power Supply location (recommend 6" to the right of the Power Supply cabinet door handle).

Preparation is Complete. If the above procedures are not completed satisfactorily, phone Technical Support, PERKO, INC.

2.4 Installation Procedures

Mechanical and electrical installation of the XR Series Searchlight is best accomplished by at least two people due to the weight and bulk of the various assemblies.
Electrical installation of the XR Series Searchlight requires detailed knowledge of marine electrical codes and is best accomplished by marine electricians.

!!!!!!!!!! WARNING !!!!!!!!!!

The XR Series Searchlight Power Supply produces high voltages and currents. Before opening access door, DEACTIVATE Line Power using Manual DISCONNECT, TURN front panel circuit breaker OFF, and WAIT for at least 1 minute. The Power Supply is heavy and should be handled and installed by two or more persons.

Electrical installation is accomplished by properly terminating and connecting the wiring provided with the appropriate terminals in the Power Supply.

2.4.1 Mechanical Installation Procedure

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.

!!!!!!!!!! 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 9854-1).

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 9854-1).

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 9854-1).

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 9854-1).

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 9854-1. 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 9854-1).

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 9854-1).

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 9854- 1.

Remove the Power Supply from its shipping container. Remove the Remote Ammeter and Control Panel from the Power Supply cabinet and inspect for damage. If undamaged, place

the Power Supply near the bulkhead selected for mounting, and place the Remote Ammeter and Control Panel near the operator's station.

24. Mount the Power Supply to the desired bulkhead using 1/2" hardware and the external brackets provided.

25. At the operator's station, mount the Remote Ammeter at the desired location. Route the cable provided from the Remote Ammeter to the Power Supply. Label, BUT DO NOT CONNECT the wires.

!!!!!!!!!! WARNING !!!!!!!!!!

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.

26. At the operator's station console, cut a 2" x 3" opening. A minimum 3" depth is required behind the console opening.

27. Using the Control Panel face plate as a template, drill four mounting holes, one in each corner.

28. CONNECT the 7-conductor pigtail cable from the Control Panel to the cable to the Power Supply. Mount the Control Panel. DO NOT CONNECT the cable at the Power Supply end.

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

2.4.2 Electrical Installation Procedure

Electrical installation of the XR Series Searchlight requires detailed knowledge of marine electrical codes and is best accomplished by marine electricians.

!!!!!!!!!! WARNING !!!!!!!!!!

The XR Series Searchlight Power Supply produces high voltages and currents. Before opening access door, DEACTIVATE Line Power using Manual DISCONNECT, TURN front panel circuit breaker OFF, and WAIT for at least 1 minute. The Power Supply is heavy and should be handled by two or more persons.

1. At the POWER SUPPLY, VERIFY that the Manual Line Power Disconnect is functional. Label, terminate, and connect the “User Supplied” Line Power Leads (L3, L2, L1) to the appropriate Power Supply terminals (TB1-1, 2, 3). GROUND the Power Supply chassis.

2. VERIFY continuity, label, terminate, and connect the 7-conductor (#16 AWG) cable from the Control Panel to the appropriate Power Supply terminals (Wire Numbers 1-7 to TB2-3, 4, 5, 6, 7, 8, 9 as shown).

3. VERIFY continuity, label, terminate, and connect the cable from the Remote Ammeter to the DC Meter Shunt (white to R1-1).

4. VERIFY continuity, label, terminate, and connect the 2-conductor (#4 AWG) cable from the waterproof junction box on top of the pilot house (A,B) to the Power Supply terminals (R1-2 and E2).

5. VERIFY continuity, label, terminate, and connect the 6-conductor (#16 AWG) cable from the waterproof junction box on top of the pilot house to the appropriate Power Supply terminals (TB3-1,6,7, 8,9,10).

6. At the Searchlight Head, VERIFY, label, and connect the 2-conductor (#4 AWG) cable from the waterproof junction box (1,2 or A,B) to the appropriate pigtail cable leads (1,2 or A,B) from the Searchlight Head.

7. VERIFY, label, and connect the 6-conductor (#16 AWG) cable from the waterproof junction box (3, 8-12 or C, H, I, J, K, L) to the appropriate pigtail cable leads (3, 8-12 or C, H, I, J, K, L).

8. If heaters are attached to the Yoke and Base, route the 2-conductor (#16 AWG) cable from ship's power (110 VAC/15 Amps) to the heater elements as shown in Drawing 9854-3. Label and connect the wires.

9. REVIEW and VERIFY interconnections between Power Supply, Control Panel, Remote Ammeter, Heater Coils (if installed) and Line Power at the manual disconnect.

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

2.4.3 Special Order Optional Lamp Emulator Installation Procedure

Risks associated with servicing the XR Series Searchlight have been reduced by the introduction of the OPTIONAL XENON LAMP EMULATOR. This device permits operators to perform functional tests on their XR Series Searchlights without the risks of lamp explosions or being blinded by the beam.

For installation instructions,refer to the instructions supplied with the optional lamp emulator kit

2.5 Inspections and Test Procedures

After the XR Series Searchlight has been installed using the procedures in **Section 2.4 INSTALLATION**, PERFORM the following inspections and test procedures. IF AT ANY TIME, PERFORMANCE IS NOT AS DESCRIBED, the problem must be corrected, before continuing, by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0. Technical Support is available by telephone from PERKO, INC.

2.5.1 Testing with the Optional Lamp Emulator

For testing instructions,refer to the instructions supplied with the optional lamp emulator kit

2.5.2 Xenon Lamp Installation/Testing

The Xenon Lamp used in the XR Series Searchlight is a high-pressure, compact arc lamp specifically designed and manufactured for PERKO, Inc. **This lamp will EXPLODE if mishandled. EYE protection is required** when handling the lamp outside of the Searchlight or whenever the front window of the Searchlight Head is open. This lamp operates at extremely high temperatures and the glass body of the lamp should never be touched. The lamp, when shipped, is wrapped with a heavy plastic shield and tied at both ends. Skin oils damage the oxide-free quartz glass body of the lamp and care should be used to ensure that ungloved hands NEVER touch the glass. The Xenon Lamp Installation Procedure is shown photographically in Lamp Installation Sequence Pg 40-41 and Drawing 9854-4 illustrates the lamp installation procedure.

!!!!!!!!!! WARNING !!!!!!!!!!

PERKO, INC. strongly recommends that Xenon Lamp installation operations be performed only by specially trained and experienced personnel. Detailed instructions are included here for completeness.

Locate and place the Lamp Changing Tool (special 9/64" extended hex-driver) and the unopened Model ST 1600 Xenon Lamp shipping container near the Searchlight Head.

!!!!!!!!!! WARNING !!!!!!!!!!

EYE protection is required for lamp installation. VERIFY that ship's power is switched OFF at Manual Disconnect, Power Supply front panel circuit breaker is switched OFF, and Control Panel switch is switched STANDBY.≈

1. ASSEMBLE all necessary tools, supplies and SAFETY EQUIPMENT (see Frame 1 ofLamp Installation Sequence Pg 40).

2. At the Searchlight Head, OPEN the Searchlight Head front window to gain access to the optical assembly (see Frame 2 of Lamp Installation Sequence Pg 40).

3. LOOSEN (turn counter-clockwise) and REMOVE the two front lamp clamp screws and the top portion of the Front Lamp Clamp (see Front Lamp Clamp Detail, Drawing 9854-4 and Frame 3 ofLamp Installation Sequence Pg 40).

4. REMOVE the Xenon Optional Lamp Emulator (if installed) or old xenon lamp (if installed) and STORE safely. REMOVE new xenon lamp from its shipping container but DO NOT REMOVE the plastic wrap.

5. ATTACH the proper brass lamp adapters. (Warning: orientation is VERY IMPORTANT. See Lamp Adapter Detail, Drawing 9854-4.)

6. GRASP the lamp by the anode endcap (metal) and WITHOUT TOUCHING THE GLASS, INSERT and SCREW lamp into the Rear Lamp Mount until seated (see Frame 4 ofLamp Installation Sequence Pg 40).

7. TIGHTEN the Rear Lamp Clamping Screw using the extended hex-driver (turn clockwise, torque of 10 inch-pounds, DO NOT OVER-TORQUE! see Frame 5 of Lamp Installation Sequence Pg 41)

8. ENGAGE the front lamp clamp (reinstall the top portion of the clamp and the clamping screws, see Frame 6 of Lamp Installation Sequence Pg 41).

9. TIGHTEN the two front lamp clamp screws (turn clockwise, torque of 10 inch-pounds, DO NOT OVER-TORQUE! SEE Frame 6 of Lamp Installation Sequence Pg 41).

10. REMOVE and STORE the flexible shield from the lamp (see Frames 7 and 8 ofLamp Installation Sequence Pg 41).

11. CLOSE the Searchlight Head front window and ENGAGE the front window clamps (top and sides). SEE Frame 8 of Lamp Installation Sequence Pg 41.

12. COMPLETE the Warranty Registration Form and return it as directed.

13. **Xenon Lamp Installation COMPLETE (see Frame 8 of CM-073-RFOA XR Series Searchlight Lamp Installation, Pages 40-41).** If the above procedure is not satisfactorily completed, phone Technical Support, PERKO, INC.

14. At the Power Supply, CONNECT ship's power to the Searchlight by closing the manual disconnect located near the Power Supply.

15. SWITCH the Power Supply front panel circuit breaker PS-CB1 (OFF/ON) to ON.

16. VERIFY that Power Supply cooling fans are running by listening and/or monitoring air flow (place hands outside and below Power Supply cabinet) and that there are no unusual burning odors present.

17. AT the operator's station, SWITCH Control Panel CP-S1 switch (STANDBY/ON/IGNITE) ON.

18. CHECK Remote Ammeter for initial current indication. The initial current indication should rise to 38-60 amperes and remain relatively steady. If zero current is indicated, lamp did not ignite.

..... NOTE .....

The xenon lamp may not ignite when the Control Panel switch CP-S1 is switched from STANDBY to ON. If the xenon lamp does not ignite (zero current indicated on the Remote Ammeter), MOMENTARILY switch to IGNITE on the Control Panel switch CP-S1 while monitoring the Remote Ammeter for non-zero lamp current. When the lamp ignites, release the IGNITE switch.

19. **IF the xenon lamp DOES NOT IGNITE, lamp and/or START circuitry is faulty** and must be corrected by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0.

20. **IF xenon lamp current is above 65 amperes or below 42 amperes, then the MAIN Power Transformers in the Power Supply should be re-tapped** by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0.

********** CAUTION **********

Whenever the xenon lamp has been lit, wait 15 minutes before switching front panel circuit breaker on Power Supply to OFF and/or disconnecting ship's power. Position Control Panel STANDBY/ON/IGNITE switch to STANDBY and allow fans to cool the searchlight.

21. FOCUS/DEFOCUS the searchlight beam by momentarily positioning the Control Panel BEAM switch, CP-S2, UP or DOWN. VERIFY that the focus of the searchlight beam changes when the BEAM switch is positioned UP or DOWN.

22. AFTER operating the searchlight for 10 minutes, SWITCH the Control Panel CP-S1 switch to STANDBY and WAIT 15 minutes for the Searchlight Head and Power Supply to properly cool.

23. VERIFY that no unusual burning odors emanate from the Searchlight Head, waterproof junction box, Power Supply and/or Manual Power Disconnect.

Xenon Lamp Installation/Testing COMPLETE. IF Searchlight does not perform properly, the problem must be corrected by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0.

3.0 OPERATING INSTRUCTIONS

3.1 General

The following instructions provide the necessary information for operating the XR Series Searchlight.

!!!!!!!!!! WARNING !!!!!!!!!!

XR Series Searchlights produce very intense light beams which are significant eye hazards when operating.

..... NOTE .....

The useful life of the xenon lamp in the XR Series Searchlight depends on three separate factors: number and duration of ignite/start cycles, and total time of operation. The XR Series Searchlight should not be repeatedly cycled ON and OFF. Maximum xenon lamp life is obtained by minimizing the use of the manual IGNITE switch, operating the searchlight at least 30 minutes when turned ON and allowing the xenon lamp to cool (searchlight STANDBY) for at least 15 minutes before turning the searchlight back ON.

3.2 Placing the Searchlight on STANDBY

1. At the operator's station, POSITION Control Panel STANDBY/ON/IGNITE switch to STANDBY.

2. At the searchlight Power Supply, CONNECT ship's power to searchlight Power Supply by closing Manual Power Disconnect.

3. SWITCH the Power Supply front panel circuit breaker ON and VERIFY that cooling fans in Power Supply are operating.

!!!!!!!!!! WARNING !!!!!!!!!!

IF the XR Series Searchlight does not perform as described, the problem must be corrected by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and Functional Description in Section 5.0.

3.3 TURNING the Searchlight ON from STANDBY

!!!!!!!!!! WARNING !!!!!!!!!!

XR Series Searchlights produce very intense light beams which are significant eye hazards when operating.

1. At the operator's station, POSITION Control Panel STANDBY/ON/IGNITE switch to ON. The xenon lamp should ignite within 30-50 milliseconds (non-zero current indicated on Remote Ammeter).

..... NOTE .....

As the xenon lamp ages, it may not auto-start/ignite or it may require a few seconds longer to ignite/start in the IGNITE switch position. The IGNITE position on the Control Panel switch CP-S1 can be held for longer periods of time. However, misuse of the IGNITE switch position will DESTROY components in the Searchlight Head and Power Supply assemblies.

2. VERIFY that lamp current indicated on the Remote Ammeter is 42-65 amperes.

!!!!!!!!!! WARNING !!!!!!!!!!

IF the XR Series Searchlight does not perform as described, the problem must be corrected by experienced marine electricians/searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0.

3.4 Controlling the Searchlight BEAM

!!!!!!!!!! WARNING !!!!!!!!!!

XR Series Searchlights produce very intense light beams which are significant eye hazards when operating.

1. ADJUST searchlight beam to desired azimuth by pushing the Mechanical Control handle toward port or starboard. A friction lock is installed either on the ceiling mount or on the Mechanical Control.

2. ADJUST searchlight beam to desired elevation by twisting the Mechanical Control handle. A friction lock is controlled by the knurled portion of the Mechanical Control handle.

3. ADJUST searchlight beam to desired diameter by moving Control Panel BEAM switch UP or DOWN. This switch controls the position of the xenon lamp with respect to the focal point of the searchlight's reflector. If the BEAM switch is held up or down, beam diameter will cycle continuously from minimum to maximum.

..... NOTE .....

Mechanical adjustments for the searchlight's reflector and the HaloGuard optimize the BEAM profile at any specific beam diameter. These Mechanical Adjustments should be performed only by experienced Searchlight Technicians.

!!!!!!!!!! WARNING !!!!!!!!!!

IF the XR Series Searchlight does not perform as described, the problem must be corrected by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0.

3.5 RETURNING the Searchlight to STANDBY

1. At the operator's station, SWITCH the Control Panel STANDBY/ON/IGNITE switch to STANDBY.

..... NOTE .....

The Searchlight Head fan will continue to cool the xenon lamp for approximately 15 minutes after the searchlight is switched from ON to STANDBY. It is important not to switch the searchlight OFF (at the Power Supply) from STANDBY during this 15 minute period.

2. VERIFY that lamp current indicated on the Remote Ammeter is zero (0) amperes.

!!!!!!!!!! WARNING !!!!!!!!!!

IF the XR Series Searchlight does not perform as described, the problem must be corrected by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0 below.

3.6 Turning the Searchlight OFF

..... NOTE .....

The Searchlight Head fan will continue to cool the xenon lamp for approximately 15 minutes after the searchlight is switched from ON to STANDBY. It is important not to switch the searchlight OFF (at the Power Supply) from STANDBY during this 15 minute period.

1. At the operator's station, VERIFY Control Panel STANDBY/ON/IGNITE switch is set to STANDBY.

2. At the Power Supply, SWITCH the Power Supply front panel circuit breaker OFF.

3. DISCONNECT ship's power to searchlight Power Supply by opening Manual Power Disconnect.

!!!!!!!!!! WARNING !!!!!!!!!!

IF the XR Series Searchlight does not perform as described, the problem must be corrected by experienced marine electricians or searchlight technicians using the Recommended Spares, Tools, and Supplies and the Functional Description in Section 5.0.

4.0 OPERATOR MAINTENANCE

4.1 General

This chapter contains preventive maintenance instructions for the XR Series Searchlight which can be effectively performed with minimum training (see Table 2). These instructions include procedures for recommended inspections, cleaning, lubrication, replacing the xenon lamp and testing the searchlight without a xenon lamp installed.

Table 2 - Operator Maintenance Schedule

Item	Interval	Date	Date	Date
INSPECT				
Visual	3 month	_____	_____	_____
Mechanical	6 month	_____	_____	_____
Electrical	12 month	_____	_____	_____
CLEAN				
Searchlight Head	3 month	_____	_____	_____
Power Supply	6 month	_____	_____	_____
LUBRICATE				
Bearings	24 month	_____	_____	_____
Bushings	24 month	_____	_____	_____
Control Rods	24 month	_____	_____	_____
LAMP REPLACEMENT	as req.	_____	_____	_____
Starting meter reading				
Ending meter reading		_____	_____	_____
Lamp Life (RMS-IMS)				

4.2 Inspecting the Searchlight

Periodic inspections of certain elements of the XR Series Searchlight are necessary to detect potential problems before a malfunction occurs (see Table 2).

1. Visual Inspections: Every three (3) months in service, check the exterior surfaces of the Searchlight Head, Yoke and Base assemblies for corrosion, missing or broken parts and any other evidence of damage.

2. Mechanical Inspections: Every six (6) months in service, check for proper installation, smoothness in operation and tightness of fittings on Searchlight Head, Yoke and Base, and Mechanical Control assemblies.

3. Electrical Inspections: Every twelve (12) months in service, check power cables, electrical contacts and wiring for cracks, breaks and loose connections. Inspect switches to ensure proper operation.

4.3 Cleaning the Searchlight

Every three (3) months in service (more often if indicated):

1. WASH all external surfaces of the Searchlight Head, Yoke and Base, Mechanical Control, Remote Ammeter and Control Panel using warm water containing a mild detergent.

!!!!!!!!!! WARNING !!!!!!!!!!

The xenon lamp contains a pressurized gas and it will EXPLODE if mishandled. EYE PROTECTION is REQUIRED and a face shield and gloves are recommended when the front glass window of the Searchlight Head is open.

2. CLEAN inside and outside surfaces of front glass window on Searchlight Head using non-abrasive liquid window cleaner and lint-free cloth.

!!!!!!!!!! WARNING !!!!!!!!!!

The Searchlight reflector is a precision optical element and coatings will be damaged or destroyed if improper cleaning procedures are used.

3. IF ABSOLUTELY NECESSARY, the searchlight reflector and xenon lamp can be cleaned by GENTLY wiping or dusting the surfaces with a lint-free cloth moistened with alcohol.

Every six (6) months in service (more often if indicated):

!!!!!!!!!! WARNING !!!!!!!!!!

The searchlight Power Supply contains HIGH VOLTAGES and CURRENTS. Wait at least 2 minutes after disconnecting ship's power and opening cabinet door before attempting service.

1. DISCONNECT the ship's power by opening the Manual Power Disconnect. WAIT AT LEAST 2 MINUTES after opening the power supply cabinet door and vacuum/dust all electronic components using a vacuum cleaner or lint free cloth.

2. REMOVE and WASH the Power Supply fan filters.

4.4 Lubricating the Searchlight

Every twenty four (24) months in service (more often if indicated):

1. GREASE the tapered bearings in the Yoke and Base using marine-type bearing grease (see Drawing 9854-7).

2. OIL the bushings in the Yoke and Base arms using 30W non-detergent oil (see Drawing 9854-7).

3. Lightly OIL the Mechanical Control elevation rod and azimuth tube using 30W non-detergent oil (see Drawing 9854-1).

4.5 Replacing the Xenon Lamp (SEE CM-073-RFOA XR Series Searchlight Lamp Installation, Pages 40-41))

!!!!!!!!!! WARNING !!!!!!!!!!

PERKO, INC. strongly recommends that xenon lamp changing operations be performed only by specially trained and experienced personnel. Detailed instructions are included here for completeness.

Locate and place all necessary equipment and supplies, i.e. SAFETY EQUIPMENT, the Lamp Changing Tool (special 9/64" extended hex-driver), the old xenon lamp shipping container, plastic wrapper, Warranty Failure Report, and the new unopened Model ST 1600 Xenon Lamp shipping container near the Searchlight Head.

!!!!!!!!!! WARNING !!!!!!!!!!

EYE protection is required for lamp installation. VERIFY that ship's power is switched OFF at Manual Disconnect, Power Supply front panel circuit breaker is switched OFF, and Control Panel switch is switched STANDBY.

1. WITH EYE PROTECTION, FACE SHIELD, APRON, and GLOVES PROPERLY WORN, OPEN the Searchlight Head front window to gain access to the optical assembly (see Frame 8 of CM-073-RFOA XR Series Searchlight Lamp Installation, Pages 40-41).

2. INSTALL flexible shield around lamp (see Frame 7 of CM-073-RFOA).

3. WHEN flexible shield is properly installed around lamp, APRON and GLOVES may be removed, BUT EYE PROTECTION should always be worn whenever the Xenon Lamp is handled or the Searchlight front window is OPEN.

4. LOOSEN (turn counter-clockwise) and REMOVE the two front lamp clamp screws and the top portion of the front lamp clamp. (See Frame 6 of CM-073-RFOA and Front Lamp Clamp Detail, Drawing 9854-4 Page 54).

5. ENGAGE Rear Lamp Clamping Screw with extended hex-driver and LOOSEN the rear lamp clamping screw (See Frame 5 of CM-073-RFOA and Rear Lamp Clamp Detail, Drawing 9854-4 Page 54).

6. GRASP the old xenon lamp by the anode endcap (outside metal end) and WITHOUT TOUCHING THE GLASS, screw the lamp GENTLY out of the optical assembly. It may be necessary to further loosen the rear lamp clamp.

8. COMPLETE the Warranty Failure Report for the old xenon lamp if you wish to return it for warranty consideration.

9. EXECUTE "Section 2.5.1 Testing with the Optional Lamp Emulator" and continue ONLY IF the operation of the Searchlight is verified by the Test Procedures.

10. EXECUTE "Section 2.5.2 Xenon Lamp Installation/ Testing" and restore it to operational use ONLY IF the operation is verified by the Test Procedures.

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5.0 TECHNICAL INFORMATION

5.1 General

This chapter contains a detailed functional description with drawing references to the exploded views in Drawing 9854-5 through Drawing 9854-8 for the XR Series Searchlight.

..... NOTE .....

REPAIR procedures based on this chapter should only be performed by experienced Depot-Repair technicians or factory-trained technicians.

5.2 Recommended Spares, Tools and Supplies

TABLE 3 - Recommended Spares, Tools, and Supplies

Qty	Item		S&T Part No.	PERKO Part #
1	**Recommended Spares Kit: XR Series Searchlight Model 9854 including:**	**P/N**	**9854RSKit**	**9582-005**
a.	one(1) Solar 1600 Xenon Lamp	P/N	ST1600	9566-000
b.	one(1) Injection Transformer SH-T1	P/N	101D121ST	9521-017
c.	one(1) Pulse Transformer SH-T2	P/N	102D870	9521-009
d.	one(1) Spark gap Assembly, SH-SGA	P/N	104C792G1	9521-003
e.	one(1) Optical Assembly fan SH-FAN	P/N	B108	9521-008
f.	one(1) Power Supply fan PS-FAN	P/N	110C119P1	9510-011
g.	three(3) Diodes, Rectifier PS-CR1	P/N	S41-801-011	9510-015
h.	three(3) Diodes, Rectifier PS-CR2	P/N	S41-801-111	9510-030
i.	one(1) Filter Capacitor PS-C1	P/N	105A988P98	9510-039
j.	one(1) Relay, Ignition PS-K2	P/N	105B053P2	9510-026
k.	one(1) Circuit Board Assembly PS-A5	P/N	108B642G1	9510-025
l.	one(1) Spur Gear	P/N	103C596P1	9506-003
m.	one(1) Oil Seal, Shaft Housing	P/N	103A509P1	9506-001
n.	one(1) Reflector Adjusting Tool	P/N	B123	9582-003
o.	one(1) Lamp Changing Tool (9/64" extended hex-driver)	P/N	B137	9582-001
p.	one(1) Xenon Optional Lamp Emulator (1.6kw)	P/N	ST1600XLE	9582-004

5.3 Functional Description

This functional description is provided to aid the experienced technician in understanding the operation of the XR Series Searchlight. The searchlight is comprised of: Power Supply (PS), Searchlight Head (SH), Yoke and Base (YB), Mechanical Control (MC), Control Panel (CP),

and Remote Ammeter (RA). The Functional Diagram/Schematics are shown in Drawing 9854-5 and specific components are identified by zones in Drawing 9854-5.

The XR Series Searchlight requires 3-phase, AC (60 Hz), manually disconnectable electrical power (200-260 VAC, 20 Amps or 400-520 VAC, 10 Amps) which is connected to PS-TB1/1 (L3), PS-TB1/2 (L2), and PS-TB1/3 (L1) as shown at zone dA in Drawing 9854-5. These electrical feeds are connected to the circuit breaker PS-CB1 (20 A if 220 VAC or 10 A if 440 VAC) mounted on the Power Supply cabinet door (see Drawing 9854-3, front view). The poles of the circuit breaker (zone dB) are connected to PS-TB1/1, 2, 3, 4, 5, 7 providing electrical feeds to the primaries of the MAIN Power Transformers PS-T1, PS-T2 and PS-T3 (dC-dD) when the circuit breaker PS-CB1 is switched ON.

!!!!!!!!!! WARNING !!!!!!!!!!

The XR Series Searchlight Power Supply contains HIGH VOLTAGE when energized and large polarized storage capacitors which may EXPLODE if improperly discharged, even WHEN the Power Supply is NOT ENERGIZED. HIGH VOLTAGE may be LETHAL when mishandled and the storage capacitors are significant EYE HAZARDS. PERKO, INC. strongly recommends that electrical service be performed only by appropriately trained and experienced personnel. These instructions are intended for use by experienced personnel ONLY.

The MAIN Power Transformers are wired in a delta-delta configuration (cC-dD) with the primaries tapped to produce the desired xenon lamp current. Typically, these transformers are tapped as shown in the Detail in Drawing 9854-5, zone fA. **TO REDUCE LAMP CURRENT, increase the number of "primary turns" used. TO INCREASE LAMP CURRENT, reduce the number of "primary turns" used. For Example MINIMUM LAMP CURRENT for 440VAC is tapped Input terminals 1 and 17 with jumper from 7 to 11. MAXIMUM LAMP CURRENT for 440VAC is tapped Input terminals 3 and 14 with jumper from 4 to 13.**

The MAIN Power Transformer secondaries are connected to points E1 on the rectifier/heat sink assemblies PS-A2, PS-A3 and PS-A4 (dE). The commoned cathodes of CR1s (dE) on PS-A2, PS-A3 and PS-A4 are wired to the plus(+) terminal on filter capacitor PS-C1 (dG). The commoned anodes of CR2s (cE) on PS-A2, PS-A3 and PS-A4 are wired to the minus(-) terminal on filter capacitor PS-C1 (cE-cJ, MAIN DC Return). This combination of MAIN power transformer secondaries, rectifier/heat sink assemblies and filter capacitor provide the DC run power for the Xenon Lamp (approximately 20 Volts @ 40 Amps).

The DC run power is connected to the xenon lamp (dJ) as follows: the plus(+) terminal of filter capacitor PS-C1 (dF) is connected to the anode of the xenon lamp through the MAIN contactor PS-K1 (dG, closed when energized), through the metering shunt PS-R1 (dH), through the #4 AWG cable/ waterproof junction box (dI,JB-A), and through the Searchlight Head pigtail (dJ,SH-A). The negative (-) terminal of the filter capacitor PS-C1 (dF) is connected to the cathode of the xenon lamp (dJ) through the wiring point PS-E2, the #4 AWG cable/waterproof

junction box (JB-B), the Searchlight Head pigtail SH-B, and through the secondary of the injection transformer SH-T1 (cJ).

Unregulated DC relay power is produced on circuit board PS-A5 (eD). The MAIN power transformer secondary leads PS-T3/18,19 (dC, nominal 24 VAC) are connected to the AC input terminals of bridge rectifier PS-A5/CR5 (eC). The DC relay voltage is referenced to the same DC Return (eD, Relay DC Return, PS-A5/GND) as the DC run voltage (cH, MAIN DC Return,PS-E2) by connecting the negative DC terminal of rectifier PS-A5/CR5 (eD) to the negative DC terminal of filter capacitor PS-C1 (dF). The DC relay power is filtered by storage capacitor PS-A5/C3 (eD). Current limited output PS-A5/E5 (eD) is connected to Main contactor coil PS-K1/X1 (eG), control relay coil PS-K3/2 (bG), PS-TB2/5 (fE), indicator lamp CP-DS1 (fF), STANDBY/ON/IGNITE switch CP-S1/5 (fF) and BEAM switch CP-S2/3 (fD).

Auxiliary 115 VAC power for Power Supply cooling fans PS-FAN (bF), Searchlight Head cooling fan SH-FAN (bJ) and xenon lamp ignition circuitry (PS-CR3, PS-A1, SH-T2, SH-SG, SH-T1) are provided by ISOLATION transformer PS-T4 (cC). The primaries of the ISOLATION transformer are connected to the L1 and L2 legs of the 3-phase ship's power (cB) and tapped to provide approximately 115 VAC. The ISOLATION transformer is initially tapped as shown in the Detail on Drawing 9854-5 (bA).

The Remote Ammeter (dH) measures and displays the operating current for the xenon lamp by sensing the difference of potential (voltage) produced across the metering shunt PS-Shunt (eH).

The Control Panel BEAM switch CP-S2 (fD) provides DC relay power to the focus motor (fJ) in the Searchlight Head. A DC voltage of one polarity is provided to the focus motor when the Control Panel BEAM switch CP-S2 is momentarily switched UP and DC voltage of the opposite polarity is provided to the focus motor when the Control Panel switch CP-S2 is momentarily switched DOWN. The polarity of DC voltage supplied to the focus motor determines the motor's direction of rotation.
The position of the reflector at minimum beam diameter is mechanically adjustable for optimum beam profile. Access to the two orthogonal reflector drives are obtained by removing the appropriate access plugs (see Drawing 9854-6). Reflector adjustments must be made using the Reflector Adjusting Tool while the searchlight beam is visible.

The "HALO" which is characteristic of all searchlights equipped with parabolic reflectors is controlled by an optional Halo Guard located at the center of the reflector. This HaloGuard controls the amount of light reflected from the center of the reflector during operation. For any given beam diameter, e.g. best focus on distant object, the HaloGuard may be adjusted (moved in/out) to remove unwanted light in the searchlight beam. The HaloGuard may only be moved when the searchlight is OFF and COOL.

!!!!!!!!!! WARNING !!!!!!!!!!

DO NOT ATTEMPT to ADJUST the Optional HaloGuard when the searchlight is ON or within 15 minutes after the searchlight has been switched off. Operating temperatures of the lamp and reflector can cause serious burns and touching the lamp at any time may cause an explosion. EYE PROTECTION REQUIRED whenever the front window of the searchlight is opened.

The following initial conditions are assumed:

Manual Power Disconnect switched **DISCONNECT**
Power Supply cabinet door **Closed**
Power Supply circuit breaker PS-CB1 switched **OFF**
Control Panel STANDBY/ON/IGNITE switch on **STANDBY**
Control Panel BEAM switch in **neutral** (center) position
Searchlight Head front window **Closed.**

!!!!!!!!!! WARNING !!!!!!!!!!

The XR Series Searchlight Power Supply contains HIGH VOLTAGE even when the MAIN Circuit Breaker is switched OFF. The Filter Capacitor is a large polarized storage capacitor which may be CHARGED, even WHEN the Power Supply is NOT ENERGIZED.

IF the Power Supply cabinet door is opened when the circuit breaker PS-CB1 is switched OFF, the filter capacitor PS-C1 (dF) will be slowly discharged by resistor PS-R3 (bF) through the cabinet door switch contacts.

The interlock/relay/switch contact configurations shown in Drawing 9854-5 assume the above initial conditions. **The XR Series Searchlight has been switched OFF.**

When the following Actions are taken by the Operator of a XR Series Searchlight the associated Events occur:

Action: CONNECT Ship's Power using Manual Disconnect
Events: L1, L2 and L3 (cA) are supplied to PS-TB1/1,2,3.

IF the Power Supply cabinet door is opened when the circuit breaker PS-CB1 is switched OFF, the filter capacitor PS-C1 (dF) will be slowly discharged by resistor PS-R3 (bF) through the cabinet door switch contacts.

Action: SWITCH Power Supply circuit breaker PS-CB1 ON

Events: L1, L2 and L3 are connected to PS-TB1/4, 5, 6, 7, 8 (cB) which provides electrical power to MAIN power transformer primaries (cC) and ISOLATION transformer primary (cC).

MAIN power transformer run power secondaries (cD) and rectifier/heat sink assemblies (cE) begin to charge the filter capacitor PS-C1 (dF) to approximately 80 VDC (maximum output of the MAIN power transformer secondaries).

MAIN power transformer relay power secondary PS- T3/18,19 (dC) and rectifier PS-A5/CR5 (eC) charge the capacitor PS-A5/C3 (eD) to approximately 40 VDC. The current limited output PS-A5/E5 (eD) provides approximately 24 VDC to the Control Panel indicator lamp CP-DS1 (fF), Main contactor relay PS-K1 (dG), ignite relay PS-K2 (eF) and control relay PS-K3 (bG) but they remain de-energized (i.e. NO DC return). Timer module (bG) begins cycle (initially OFF switching to ON after 15 minutes) leaving fan relay PS-K4 de-energized.

ISOLATION transformer secondary PS-T4/11 provides AC power to fans (bF,bJ) and ignition circuitry. The AC fan circuit is completed (connected to PS- T4/12, bD) by the PS-K4/1,4 contacts (aF,NC) resulting in turning fans PS-FANS (bF) and SH-FAN (bJ) ON but the ignition circuits PS-A1/SH-T2 are not directly energized (NO AC Common). However, when the Power Supply cabinet door is closed, on positive half-cycles small currents (limited by PS- R2,eG and PS-R3,cF) flow from PS-T4/11 (bD) through rectifier PS-CR3/AC (eG) to PS-CR3/+ through PS-R2 (eG) slowly charging filter capacitor PS-C1 (dF) to approximately 160 VDC through PS-R3 (bF) through the cabinet door switch (bF) through the diode PS-A5/CR3 (bE) to PS-T4/12 (bD).

AFTER approximately 15 minutes, fan relay PS-K4 (bF) is energized by the timer module resulting in turning all fans OFF.

Action: SWITCH Control Panel STANDBY/ON/IGNITE switch ON

Events: ON switch contacts CP-S1/1,2 (gF) provide a DC Return through the Searchlight Head front window interlock switch (bJ) for: the Control Panel indicator lamp CP-DS1 (fF) turning it ON, the Main contactor relay PS-K1/X2 (dH) closing its A1/A2 contacts, the control relay PS-K3/7 (bG) closing contacts PS-K3/1,3 turning ON the elapsed time meter PS-M1 (bC) and opening contacts PS-K3/5,8 (bG) which disables the timer PS-TMR, de-energizing the fan relay PS-K4 (bF), resulting in all FANS turning ON.

Activating the main contactor relay PS-K1 connects the anode of the xenon lamp to DC run power and begins an auto-start sequence of operations: Initial DC run voltage (160 VDC) is applied to PS- A5/E1 (cG). Capacitor PS-A5/C1 (initially discharged,dF) begins to charge at a rate determined primarily by resistor PS-A5/R1 (cG). Zener diode PS-A5/CR2 (dF) limits the maximum voltage at PS-A5/E2 (dG) to about 50 VDC. Capacitor PS-A5/C2 (initially discharged, eD) also begins to charge but at a slower rate than PS-A5/C1 (dF) due to the coil resistance of ignite relay PS-K2/1,8 (eF). These resistor/capacitor/coil components, acting in concert, momentarily energize the ignite relay PS-K2 (eF, approximately 75 milliseconds) when the Main contactor relay PS-K1 (eH) first closes.

> Note: the voltage applied to the coil of the ignite relay PS-K2/1,2 is the difference between the voltage on capacitor PS-A5/C1 and the voltage on capacitor PS-A5/C2 and cannot exceed 50 VDC.

Ignite relay PS-K2, when energized, provides an AC Common for the ignition circuitry thereby energizing it. ISOLATION transformer output PS-T4/11 (bD) is connected to rectifier terminal PS-CR3/4 (fG), TB3-6 (fI), JB-H (fI), SH-TB/2 (fJ) and the primary of transformer SH-T2/1 (fJ). When ignite relay PS-K2 closes: the rectifier terminal PS-CR3/AC (eG) and the Chopper terminal PS-A1/5 (eH) are connected directly to the ISOLATION transformer output PS-T4/12 (cD), the rectified 115 VAC (PS-CR3/+, eG) keeps the filter capacitor PS-C1 (dF) charged to approximately 165 VDC until lamp ignition. On each negative half-cycle of the AC power from PS-T4 (cC), the Chopper PS-A1 (eH) does not conduct. On each positive half-cycle of the AC power from PS-T4 the Chopper PS-A1 initially is non-conducting but turns ON (fires) when the voltage across the Chopper PS-A1 exceeds 100 VDC. This results in an approximate square-wave current flowing through the primary of transformer SH-T2 (5 millisec. ON, 12 millisec. OFF, eJ). This primary current wave-form in transformer SH-T2 produces an intermittent, 2-5 kHz, 6-9 kV oscillation (ringing produced by RLC-Spark Gap load) in the secondary of transformer SH-T1. When the spark gap fires (in bursts of 6-12 pulses/half-cycle), the primary of the injection transformer SH-T1 (cJ) is excited with 6-9 kV pulses.

The spacing between the electrodes on the Spark Gap Assembly is adjustable when the optical assembly is removed from the Searchlight Head. This gap should be to 0.050" +/- 0.10".

These pulses produce 30-40 kV ignition pulses in the secondary of transformer SH-T1 (dJ) which is connected to the cathode of the xenon lamp (dJ). Several of these pulses will result in dielectric breakdown of the xenon gas within the lamp resulting in the evolution of a stable arc between the lamp electrodes fueled by the DC run power (i.e. 20 VDC @ 40 Amps).

If the xenon lamp ignites, the energy stored on the filter capacitor PS-C1, associated with the DC start voltage (initially 165 VDC and limited by PS-R2) will be more rapidly consumed than PS-CR3/PS-R2 can replace it. Thus, the voltage across the filter capacitor during xenon lamp ignition will decrease as the lamp current increases, stabilizing at the ballasted operating current provided by the DC run circuit (nominally 40 Amps @ 20 VDC). As the voltage across the filter capacitor decreases, the voltage applied to the ignite relay RC network at PS-A5/E1 will decrease below that necessary to keep the ignite relay energized. Thus, the ignite relay is automatically de-energized when the xenon lamp ignites.

Action: **SWITCH Control Panel STANDBY/ON/IGNITE switch to IGNITE**

Events: IGNITE switch contacts CP-S1/1,2 (gF) provide a DC Return through the Searchlight Head front window interlock switch (bJ) as described above for the ON position. The principal difference in operation when using the IGNITE switch is to over-ride the auto-start sequence in that IGNITE switch contacts CP-S1/4,5 (fF) close and prevent the voltage on capacitor PS-A5/C2 from exceeding that of the nominal DC relay voltage (about 24 VDC) by connecting PS-A5/E5 (eD) to PS-A5/E3. This connection continuously energizes ignite relay PS-K2 (eF) as long as the IGNITE switch is held in the IGNITE position and the xenon lamp does not ignite.

!!!!!!!!!! WARNING !!!!!!!!!!

EXCESSIVE USE of the IGNITE switch will damage the XR Series Searchlight, extensively. PERKO, INC. strongly recommends ignition problems be corrected before extensive use of the IGNITE switch is required.

Action **SWITCH Control Panel BEAM switch UP or DOWN**

Events: BEAM switch contacts CP-S2 (gF) provide DC relay power to the focus motor (gJ) in the Searchlight Head. The focus motor drives mechanical linkages which control the position of the xenon lamp with respect to the focal point of the searchlight reflector thereby controlling the searchlight beam diameter. Moving the Control Panel BEAM switch UP provides +24 VDC to the focus motor causing the motor to rotate clockwise. Moving the Control Panel BEAM switch DOWN provides -24 VDC to the focus motor causing the motor to rotate counter- clockwise.

The mechanical linkage for the focus motor drives the xenon lamp in and out (between its extremes of position) for both Control Panel BEAM switch positions, UP or DOWN.

5.4 Field Repair

Field repair of the XR Series Searchlights is best accomplished by factory-trained searchlight technicians or experienced marine engineers (mechanical faults) and marine electricians (electrical faults) using recommended field replacement units (see Table 4). Substitutions of non-authorized equivalents by repair personnel could adversely effect the performance of the searchlight and may produce LIFE-THREATENING HAZARDS. When a Field-replaceable Unit is not shown in exploded views (see Drawings 9854-6/8) it either requires selected values of components determined during assembly or specialized tooling for electrical/ mechanical/optical alignment.

The detection of electrical and electronic faults in the XR Series Searchlight is best accomplished by experienced marine electricians or searchlight technicians using the Xenon Optional Lamp Emulator listed in Recommended Spares, Tools and Supplies. This Xenon Optional Lamp Emulator is mechanically and electrically equivalent to the xenon lamp but will not produce high intensity light or explode when mishandled or when major faults exist in the searchlight. The Optional Lamp Emulator is installed in the Searchlight Head in place of the xenon lamp as described in Section 2.5.1. Prior to any attempted electrical and electronic service of the searchlight, the general Description in Section 1.2, the electrical installation procedures in Section 2.4.2, the inspections and test procedures in Section 2.5 and the Functional Description in Section 5.3 should be reviewed and a detailed visual inspection of all searchlight assemblies should be made, giving particular attention to loose connections, burned or deteriorating components and other obvious defects. An exploded view of the Power Supply is shown in Drawing 9854-8 together with a listing of Field-replaceable Units by reference designators used in Drawing 9854-5 and the appropriate PERKO, Inc. part number (also see Table 4).

The detection of mechanical faults in the XR Series Searchlight is best accomplished by marine engineers using the Exploded Views of the major assemblies (see Drawings 9854-6/8) and the listing of Field-replaceable Units in Table 4. Prior to any attempted service of the mechanical components of the searchlight, the general description in Section 1.2 and the mechanical installation procedures in Section 2.4.1 should be reviewed and a detailed visual inspection made, giving particular attention to loose hardware and wear (normal or abnormal).

Technical Support is available from PERKO, Inc. during Regular Business hours (8:30 a.m. to 4:00 p.m., Eastern Time, Monday-Friday excluding holidays).

5.5 TAPPING INSTRUCTIONS

Use the following tables for jumper and tap position adjustments to T1, T2, T3 (Main Power Transformers) and T4 (Isolation Transformer). For 220v input, use Table 4 and the lower half of Table 6. For 440v input, use Table 5 and the upper half of Table 6.

Table 4

Transformers T1, T2, T3 (Parallel Primaries for 220V 3Ø input)					
Input Voltage	% of Nominal Input Voltage	Input Terminals	Jumper Terminals	Approx. DC Current Output	
	117	1 & 17	1 to 11 7 to 17		Move Taps in this Direction to accommodate higher input voltages and/or to **lower the lamp current.**
	113	1 & 16	1 to 11 6 to 16		
	109	1 & 15	1 to 11 5 to 15		
	106	1 & 14	1 to 11 4 to 14		
230	105	2 & 17	2 to 12 7 to 17	42A	
220	100	2 & 16	2 to 12 6 to 16	43A	
208	95	2 & 15	2 to 12 5 to 15	43A	
200	91	2 & 14	2 to 12 4 to 14	44A	
	90	3 & 17	3 to 13 7 to 17		
	87	3 & 16	3 to 13 6 to 16		
	83	3 & 15	3 to 13 5 to 15		
	79	3 & 14	3 to 13 4 to 14		Move Taps in this Direction to accommodate lower input voltages and/or to **raise the lamp current.**

Table 5

Transformers T1, T2, T3 (Series Primaries for 440V 3Ø input)					
Input Voltage	% of Nominal Input Voltage	Input Terminals	Jumper Terminals	Approx. DC Current Output	
	117	1 & 17	7 to 11		Move Taps in this Direction to accommodate higher input voltages and/or to **lower the lamp current.**
	113	1 & 16	6 to 11		
	109	1 & 15	5 to 11		
	106	1 & 14	4 to 11		
460	104	2 & 17	7 to 12	42A	
440	100	2 & 16	6 to 12	43A	
420	96	2 & 15	5 to 12	43A	
400	92	2 & 14	4 to 12	44A	
	91	3 & 17	7 to 13		
	87	3 & 16	6 to 13		
	83	3 & 15	5 to 13		
	79	3 & 14	4 to 13		Move Taps in this Direction to accommodate lower input voltages and/or to **raise the lamp current.**

Important: Jumpers to all three transformers (T1, T2, T3) must be identical. Do not install any jumpers other than the combinations shown above, otherwise non-parallel primary windings will cause transformer overheating and failure.

Note: The % of Nominal Input Voltage column is only a guide for the initial tapping of the transformers. Supplying the desired lamp current is the actual criteria to be used to determine the final selection of the taps.

Table 6

Transformer T4 (Parallel or Series Primaries for 220V 3Ø or 440V 3Ø input)			
Input Voltage	Input Terminals	Jumper Terminals	
			Move Taps in this Direction to accommodate higher input voltages.
520	1 & 10	5 to 6	
480	1 & 9	4 to 6	
440	1 & 8	3 to 6	
416	1 & 7	2 to 6	
260	1 & 5	1 to 6 5 to 10	
240	1 & 4	1 to 6 4 to 9	
220	1 & 3	1 to 6 3 to 8	
208	1 & 2	1 to 6 2 to 7	
			Move Taps in this Direction to accommodate lower input voltages.

Important: Do not install any jumpers other than the combinations shown above, otherwise non-parallel primary windings will cause transformer overheating and failure.

APPENDIX A

TABLE 7 - Field-replaceable Units

Ref	Item		S&T Part No.	PERKO Part #
Tools	**Optional Lamp Emulator (Drawing 9854-4)**		**ST 1000XLE**	**9582-004**
	Reflector Tool (Drw.9854-4)		**B123(LCT)**	**9582-003**
	Lamp Changing Tool		**B137**	**9582-001**
CP	**CONTROL PANEL (see Drawing 9854-2)**		**103D030**	**9510-010**
DS1	Indicator Lamp Assembly		N/A	
	Lamp Holder		103A595P1	9510-021
	Replacement Lamp		MS25237-327	9510-018
	Replacement Lens		118216-1	9510-014
S1	Ignite Switch		103C119P1	9510-005
S2	BEAM Switch		103C119P2	9510-006
MC	**MECHANICAL CONTROL (see Drawing 9854-1)**		**N/A**	
	Azimuth Tube		103B937*72	9530-002
	Ceiling Mount		110C301	9530-005
	Elevation Rod		103B936*72	9530-001
	Handle Assembly		103D552-LGH	9530-003
	Optional Support Base		110B553	9530-009
	Optional Support Rod		103B569*72	9530-012
	Roll Pin (1/8 X 5/8")		MS16562-223	----------
	Roll Pin (1/8 X 1")		MS16562-226	----------
	Spur Gear (delrin)		103C596P1	9506-003
	Optional Spur Gear (bronze)		103C596P2	9501-002
PS	**POWER SUPPLY (see Drawing 9854-8)**	**220 VAC**	**108D832**	**9512-000**
	POWER SUPPLY	**440 VAC**	**----------**	**9514-000**
A1	Chopper Assembly		104C787G2	9510-020
A2,A3,A4	Heat Sink Assembly		104C857	9510-022
CR1	Rectifier Diode 1N2133		S41-801-011	9510-015
CR2	Rectifier Diode 1N2133R		S41-801-111	9510-030
A5	Printed Circuit Board Assembly		108B642G1	9510-025
C1	Filter Capacitor		105A988P98	9510-039
C2	Isolation Capacitor		CMR07F203J0DL	9510-007
CB1	MAIN Circuit Breaker (220VAC/20A)		103A349P5	9512-001
	MAIN Circuit Breaker (440VAC/10A)		103A349P2	9514-001
CR3	Rectifier Bridge		325-0023-019	9510-029
CR4	Transorb		105C298	9510-019
CR5	Transorb		105C298	9510-019
CR6	Transorb		105C298	9510-019
FAN	Cooling Fan		110C119FAN	9510-011
	Fil.Cooling Fan Filter		104A861P3	9510-032
K1	MAIN Contactor		110A604	9510-002
K2	Ignite Relay		105B053P2	9510-026
K3	Control Relay		103A387P2	9510-037
K4	FAN Relay		103A387P2	9510-037
M1	Elapsed Time Meter		103A351	9510-003
R1	Shunt Resistor		104A636	9510-033
R2	Resistor		323-0010-018	9510-028
R3	Resistor		R36-604-439	9510-027
S1	Door Interlock Switch		M8805-1-020	9510-016

TABLE 7 - Field-replaceable Units (Continued)

Ref	Item	S&T Part No.	PERKO Part #
PS	**POWER SUPPLY (see Drawing 9854-8) 220 VAC**	**108D832**	**9512-000**
	POWER SUPPLY 440 VAC	**----------**	**9514-000**
T1,T2,T3	MAIN Power Transformer	108D857	9510-013
T4	ISOLATION Transformer	104A210P3	9510-001
TB1,TB2,TB3	Terminal Board	T30-003-010	9510-034
TB4	Terminal Board	T30-004-005	9510-035
TMR	Timer Assembly	109B589	9510-012
RA	**REMOTE AMMETER (see Drawing 9854-2)**	**104C402G1**	**9510-009**
DCC	Optional Front Plate with Digital Meter Contacts	special order	special order
M1	Replacement Analog Meter	104B649P1	9510-024
S1	Analog/Digital Mode Switch	special order	special order
SH	**SEARCHLIGHT HEAD (see Drawing 9854-6)**	**104D800**	**9501-000**
	Front Glass (Replacement)	103D474P1	9501-005
	Gear Rack Assembly (without Heater)	104D485G1	9501-033
	Gear Rack Assembly (Heated)	104D485G3	9571-006
	Replacement Rack Heater Element	111A808	9571-002
	Rack Support	102D380	9501-380
	Removable Optical Assembly	1020988	9521-000
	FAN (with Capacitor)	B108	9521-008
	Focus Motor	SCD646988-5*	9521-013
	Interlock Switch	103A345P1	9521-015
	Reflector	B133	9521-005
	Shock Mounts	4C953	9521-066
	Spark Gap Assembly	104C792	9521-003
	T1 (Injection Transformer)	101C121ST	9521-017
	T2 (Pulse Transformer)	102D870	9521-009
	Xenon Lamp	ST1600	9566-000
YB	**YOKE and BASE (see Drawing 9854-7)**	**112D635**	9506-000
	Spur Gear (delrin)	103C596P1	9506-003
	Optional Spur Gear (bronze)	103C596P2	9501-002
	Support Arm	103D494	9506-033
	Seal	103A509	9506-001
	Bushing	MS17795-72	9506-024
	Shaft Housing	110D507	9506-034
	Retainer Nut	110A492	9506-005
	Lock Washer	110A493	9506-006
	Upper Tapered Bearing	110A495P2	9506-009
	Upper Bearing Cup	110A496P2	9506-011
	Yoke Mount	112D636	9506-035
	Rubber Boot	110C505	9506-012
	Sliding Stop Ring	110D506	9506-036
	Lower Bearing Cup	110A496P1	9506-010
	Lower Tapered Bearing	110A495P1	9506-008
	Base Plate (without Heater)	110D503	9506-037
	Optional Base Plate (Heater)	110D503G2	9571-007

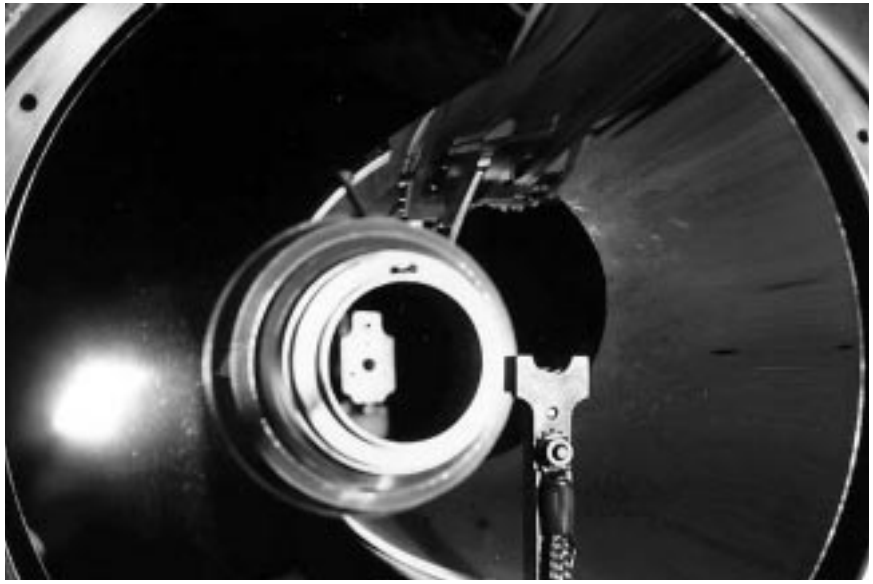
TABLE 7 - Field-replaceable Units (Continued)

Ref	Item	S&T Part No.	PERKO Part #
YB	**YOKE and BASE (Continued,see Drawing 9854-7)**	**112D635**	**9506-000**
	Optional Tubular Heater	115A410	9571-001
	Optional Washer	MS16212-16	----------
	Bushing (modified)	103B497	9501-008
	Shoulder Bolt (no Heater)	MS35307-489	----------
	Optional Shoulder Bolt (Heater)	111B758	9571-005
	Optional Cartridge Heater	111A810	9571-003

CM-073-RFOA
XR Series Searchlight Lamp Installation

1. Assemble all Necessary Equipment

2. Optical Assembly Prior to Lamp Installation



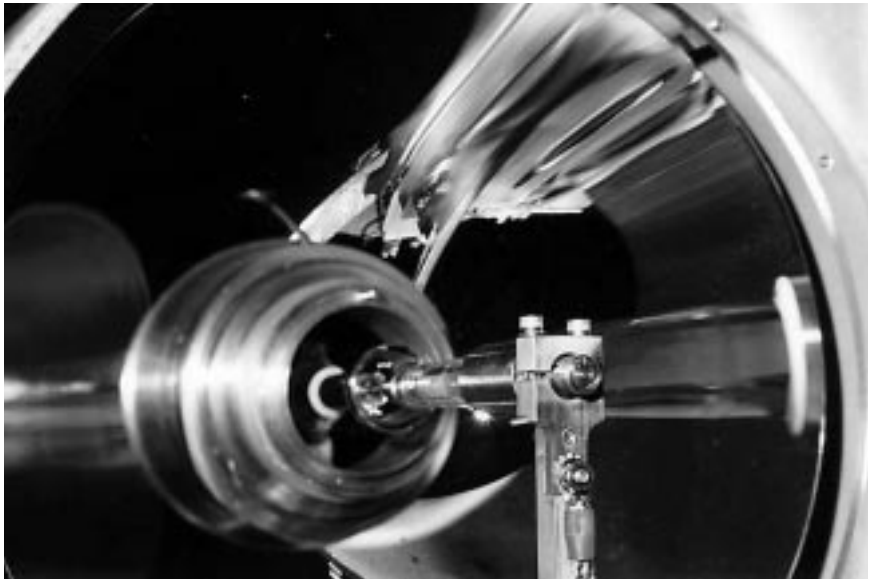
3. Remove Upper Portion of Front Lamp Clamp

4. Insert Screw and Lamp onto Rear Lamp Mount until Seated.

5. Using extended Hex-Driver, Tighten Rear Lamp Clamp.

6. Reinstall Top Portion of Front Lamp Clamp.

7. Carefully Remove Flexible Shield from Lamp.



8. Lamp Properly Installed.

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
9563 000	300	15A @20V	12A to 16A
9565 000	500	30A @15V	20A to 30A
9568 000	800	37A @19V	30A to 45A
9560 000	1,000	50A @20V	30A to 55A
9566 000	1,600	65A @24V	50A to 70A

INSTRUCTIONS FOR USING XENON LAMPS

INSTALLATION OF LAMPS

Disconnect the mains 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 an 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 Part # 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®

Limited Eighteen (18) Month Warranty

XR Series Part # 9566-000
1600 Watt Xenon Lamp for Marine Searchlights

PERKO, INC warrants to the first retail purchaser that this XR Series 1600 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 1600 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:

1. Replacement of any unbroken defective XR Series 1600 watt Xenon Lamp that fails during the first one hundred (100) hours of operation at no charge to the first retail purchaser.
2. Pro-rata credit, using the following formula: credit = .65 X (1000 - operated hours) /1000 X list price to the first retail purchaser, for any unbroken defective XR Series 1600 watt 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 1600 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®

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

LAMP FAILURE REPORT

XR Series Part# 9566-000
1600 Watt Xenon Lamp for Marine Searchlights

This document, when properly completed by the first retail purchaser or his agent of the XR Series 1600 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 1600 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

PERKO®

Serial Number of Xenon Lamp_____

WARRANTY REGISTRATION

XR Series Part # 9566-000
1600 Watt Xenon Lamp for Marine Searchlights

This document, when properly completed by the first installer of the XR Series 1600 watt Xenon lamp, will satisfy the warranty registration form requirement in the limited eighteen (18) month warranty for XR Series 1600 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:

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Miami, FL 33169-5707
Fax 1-(305)-620-9978
Phone 1-(305)-621-7525

PERKO®

Serial Number of Xenon Lamp_____

PURCHASE NOTIFICATION

XR Series Part # 9566-000
1600 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 1600 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:

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APPENDIX B

PERKO®

Optional Heater Package
for
1600 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.

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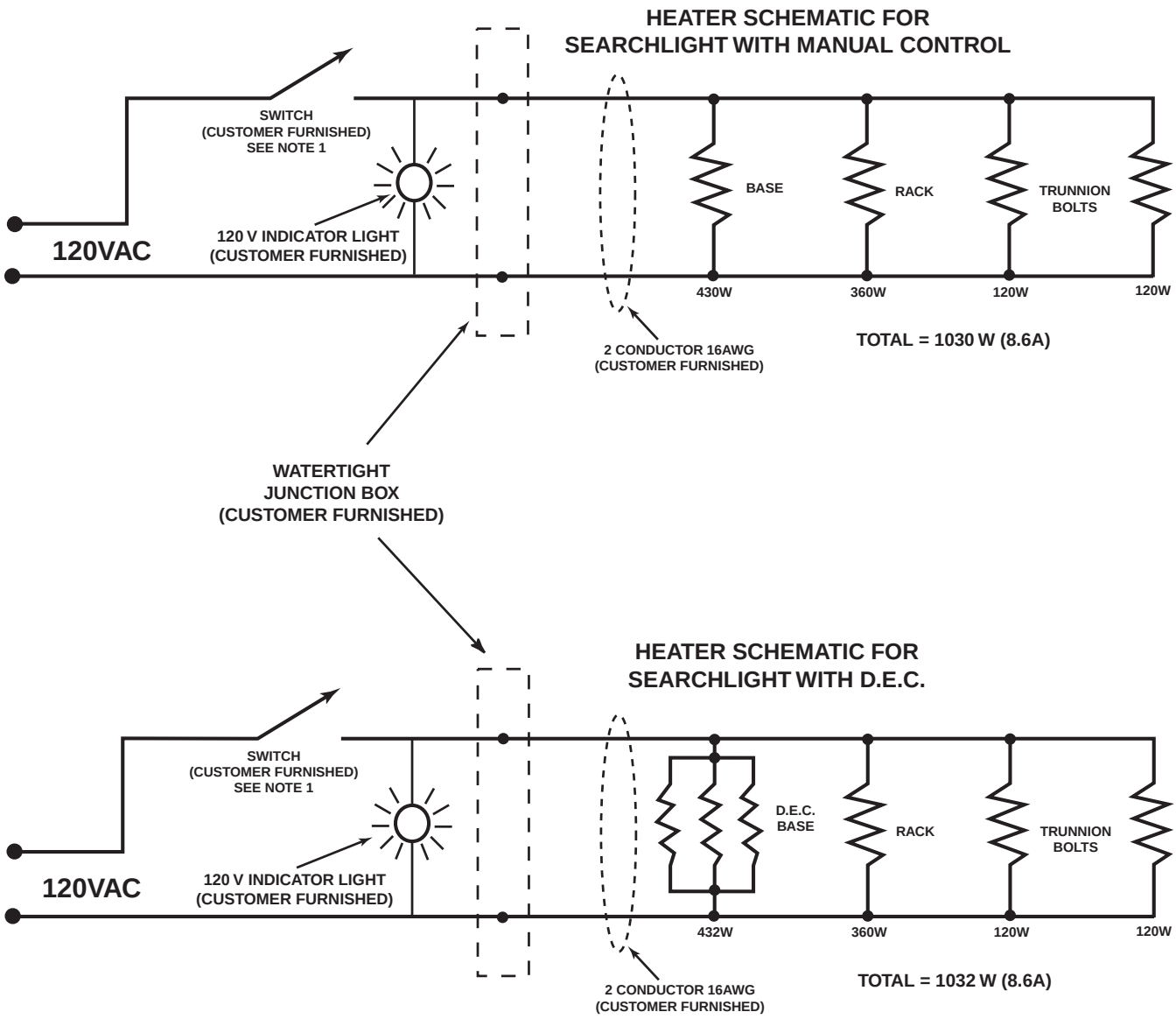
FIGURE 1
LOCATION OF HEATER ELEMENTS FOR XR SERIES MARINE SEARCHLIGHTS

Fig. 9854 (1600W) Shown

NOTES:

1. Base Heater is Only Supplied with Manual Control.

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



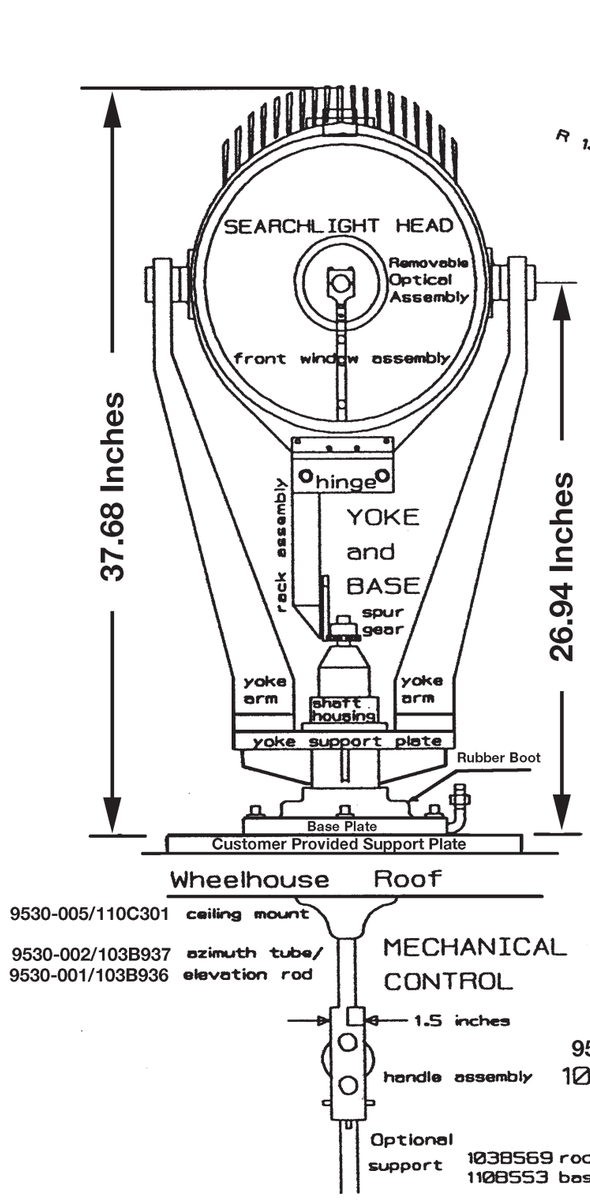
NOTES:

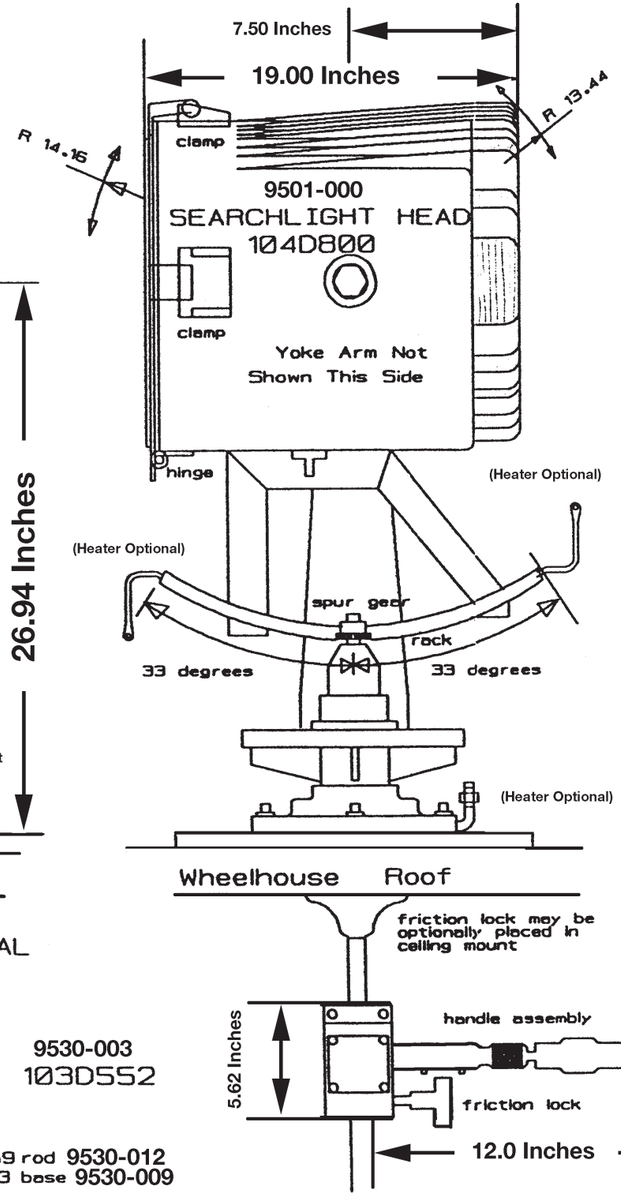
1. Attach PERKO Supplied caution plate prominently adjacent to switch.

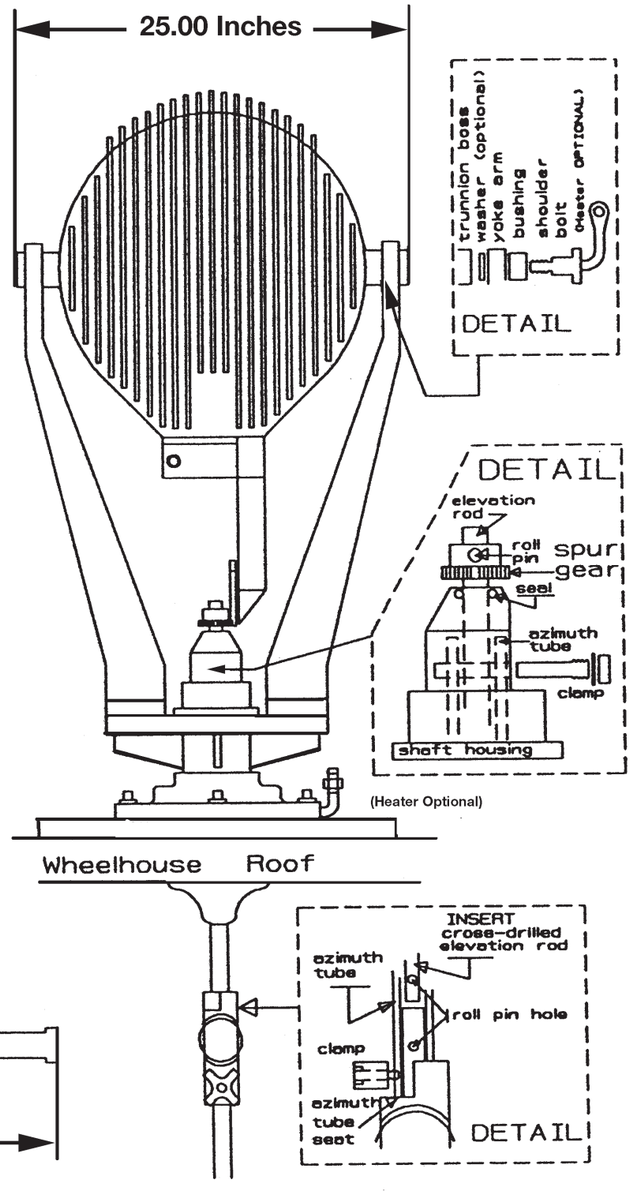
2. Determine supply wire gauge (AWG) based on load and length to watertight junction box.

Figure 2:
Heater Package Schematics
for 1600 Watt XR Series Searchlights

XR Series 1600 Watt Marine Searchlight as shown: APPROX. 150 Lbs. Installed







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Scale: XX :XX

Date: 07/08/99

Drawing Number

9854-1-B

Drawing Name:

XR Series 1600 Watt Marine Searchlight

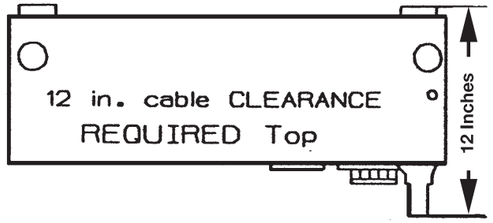
Searchlight Outline Drawing

Sheet 1 of 1

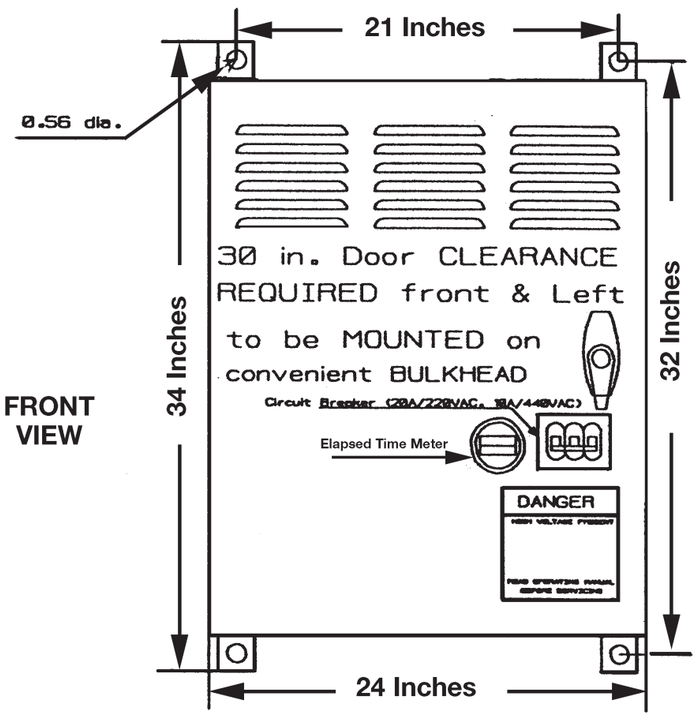
Power Supply : Approx. 275 Lbs.

108D832 - 9512-000 (220 VAC)
9514-000 (440 VAC)

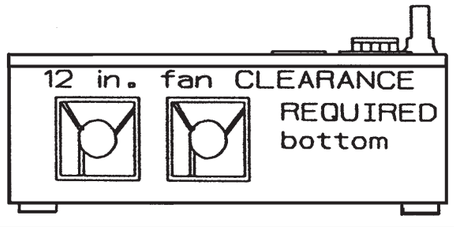
TOP VIEW



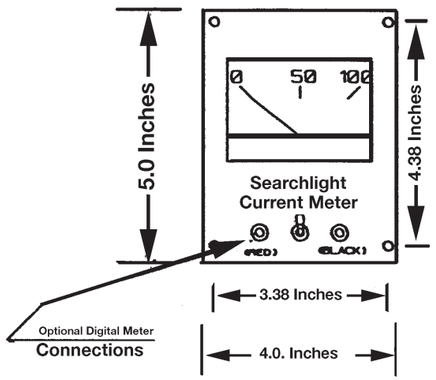
FRONT VIEW



BOTTOM VIEW

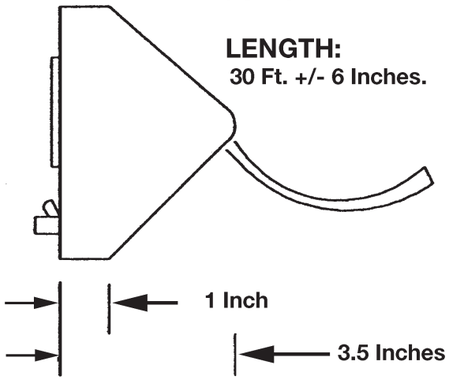


To Be Mounted Near Pilot Station



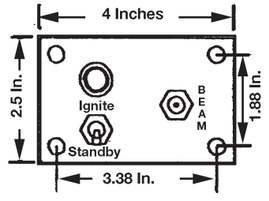
WARNING !!!
Cable Provided MUST NOT BE CUT or EXTENDED

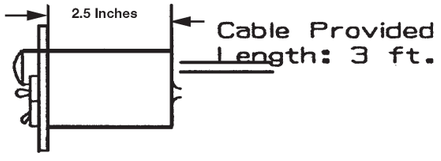
LENGTH:
30 Ft. +/- 6 Inches.



Remote Ammeter 9510-009/104C402G1

Replacement Ammeter 9510-024/104B649P1





To Be Mounted On Pilot Console

CONTROL PANEL → 9510-010/103D030

IGNITE Switch →	9510-005/103C119P1
BEAM Switch →	9510-006/103C119P2
Lamp Holder →	9510-021/103A595P1
Replacement Lamp →	9510-018/MS25237-327
Replacement Lens →	9510-014/118216-1

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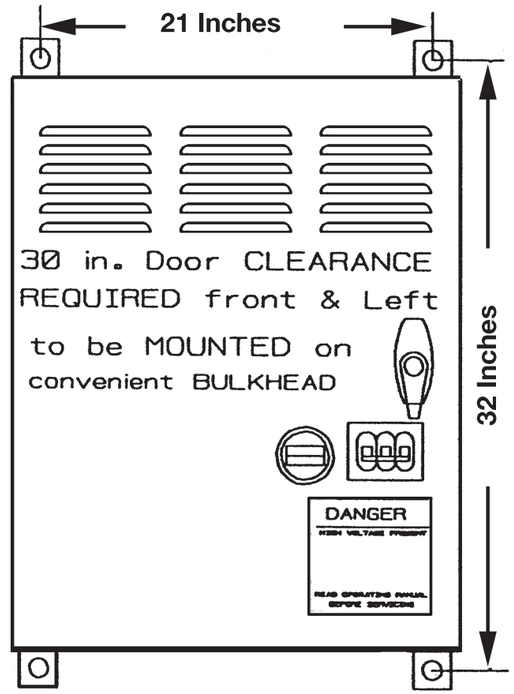
Drawing Name:

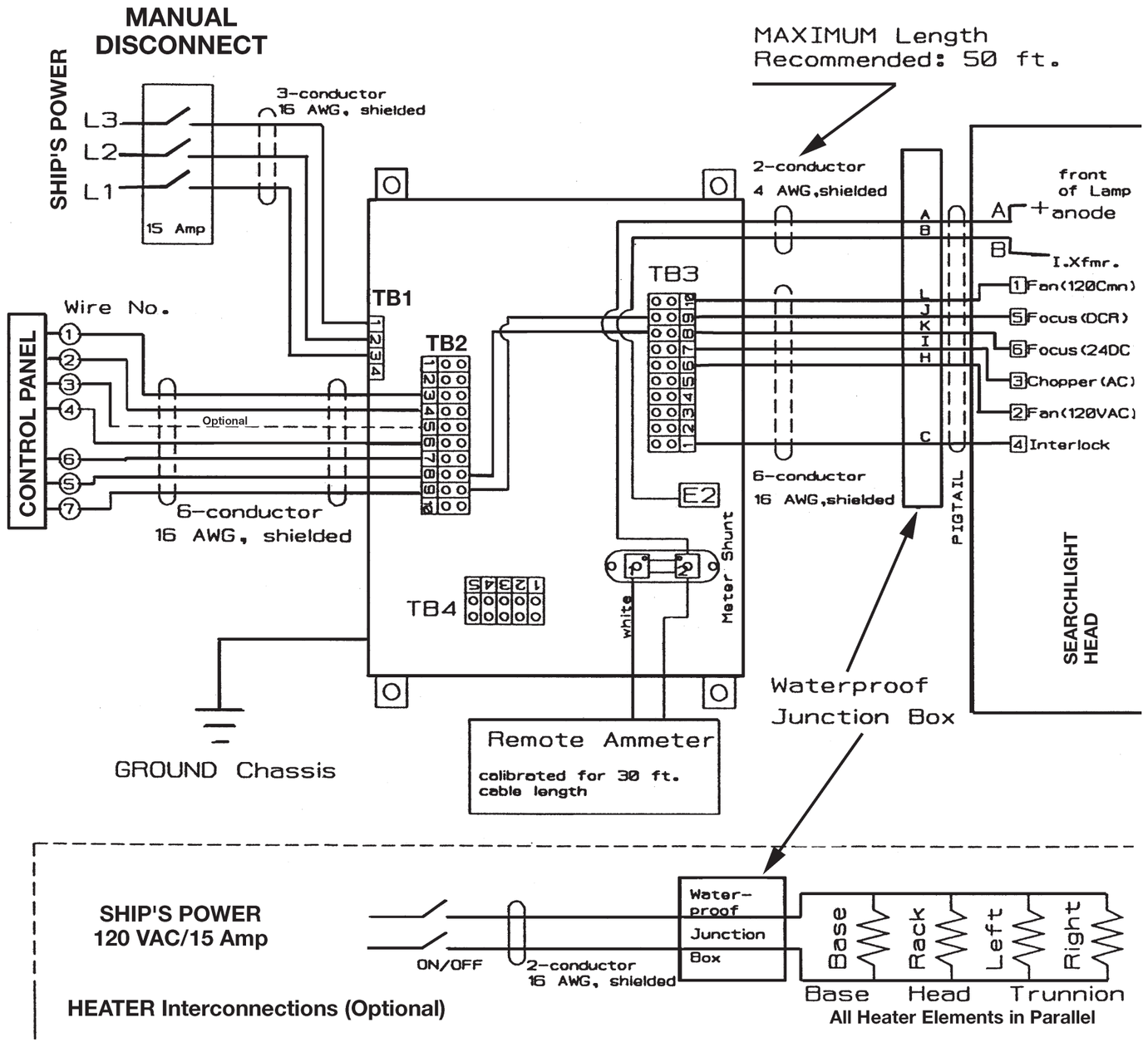
XR Series 1600 Watt Marine Searchlight

Power Supply Outline Drawing

Sheet 1 of 1



POWER SUPPLY
Front
View



HEATER Interconnections (Optional)

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Drawing Number
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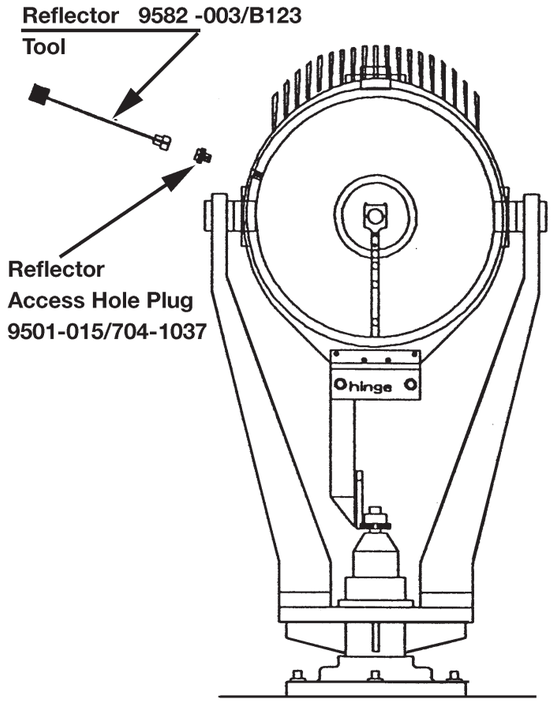
Drawing Name:

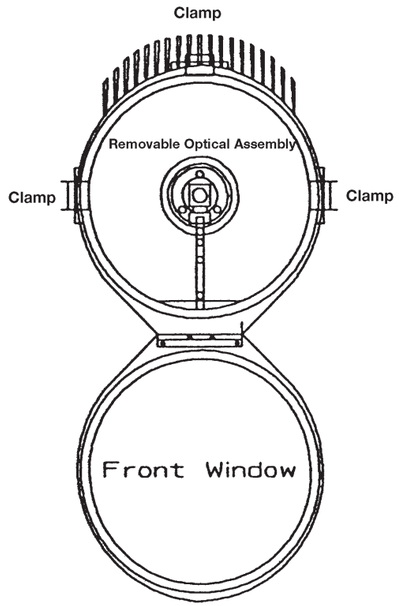
XR Series 1600 Watt Marine Searchlight

Interconnection Diagram

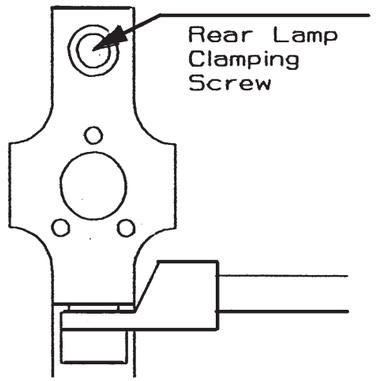
Sheet 1 of 1



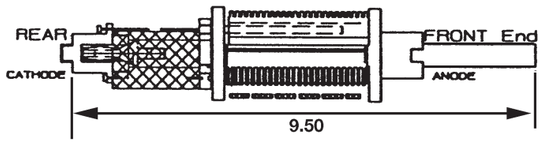
WARNING !!! With XENON Lamps
EYE PROTECTION IS REQUIRED
Face Shield/Gloves Recommended



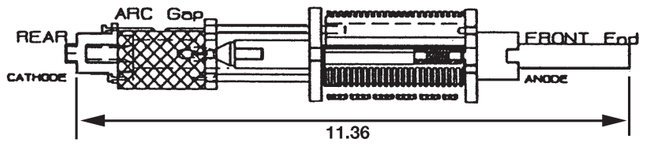
REAR Lamp Clap Detail



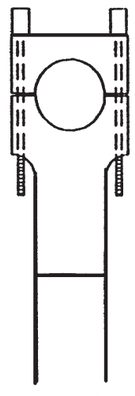
RUN Configuration



START Configuration

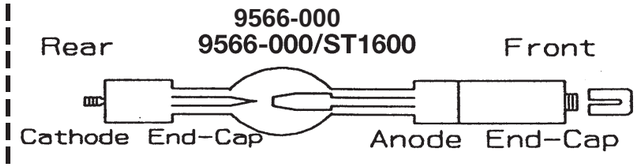


XENON Lamp Emulator DETAIL



Front Lamp Clamp Detail

WARNING !!! For XENON LAMP
EYE PROTECTION IS REQUIRED
Face Shield/Gloves Recommended



XENON Lamp Detail

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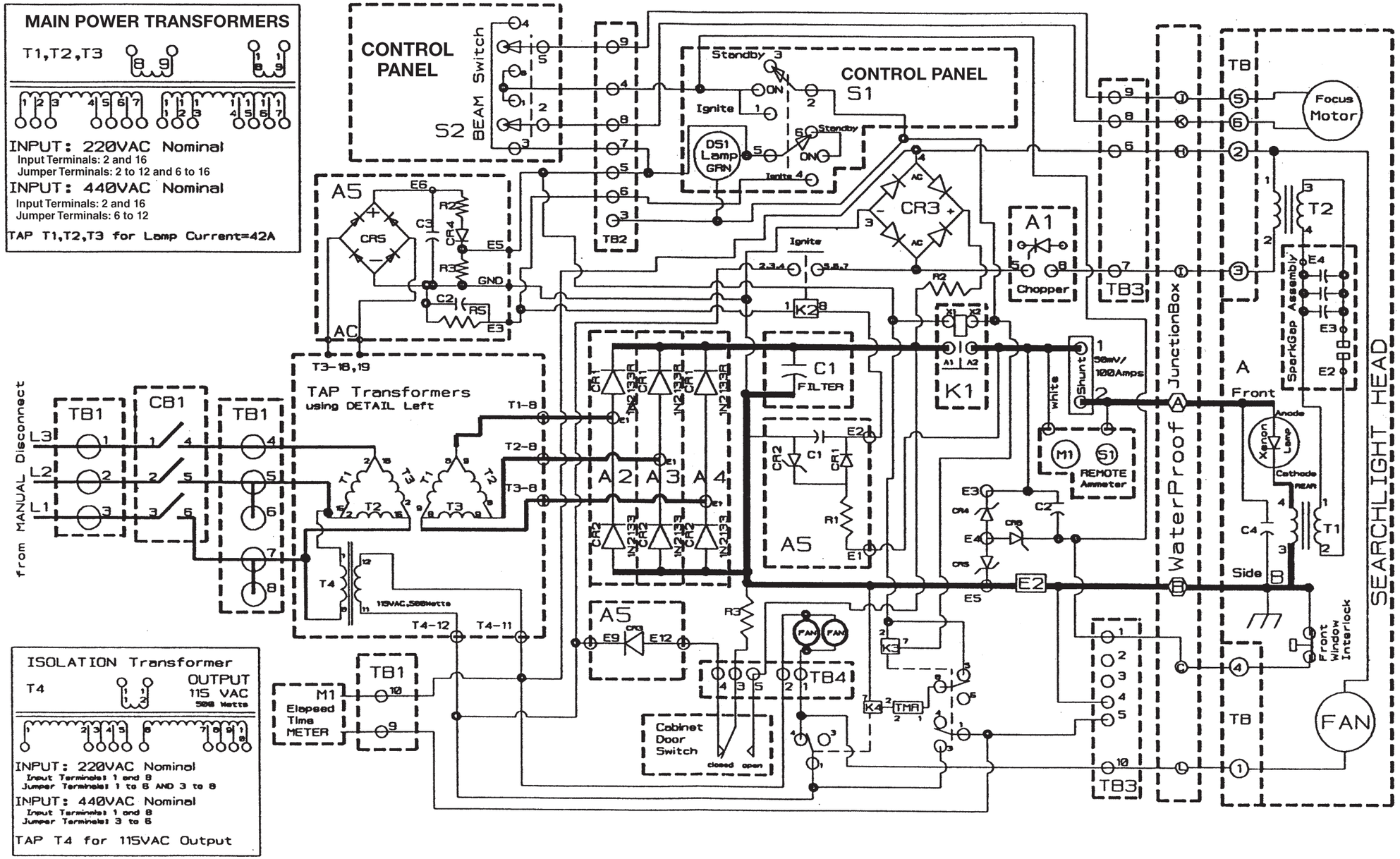
XR Series 1600 Watt Marine Searchlight
Xenon Lamp/Emulator Installation
Sheet 1 of 1



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Scale: XX :XX

Date: 02/16/00

Drawing Number

9854-5-B

Drawing Name:

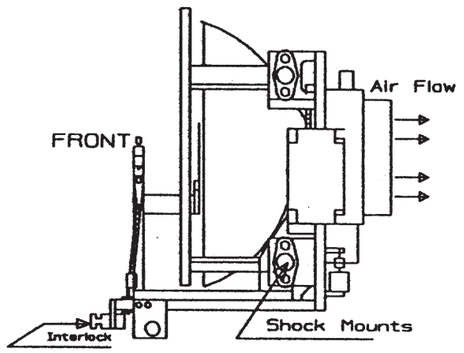
XR Series 1600 Watt Marine Searchlight

Functional Diagram/Schematics

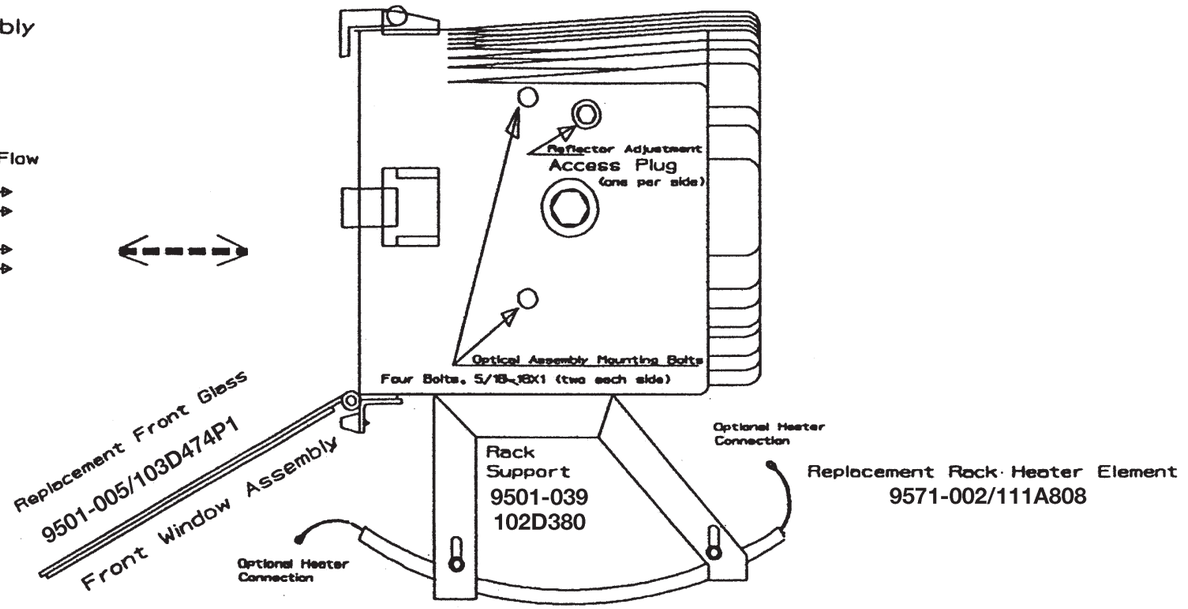
Sheet 1 of 1

SEARCHLIGHT HEAD : 9501-000/104D800 (Approx. 90 lbs.)

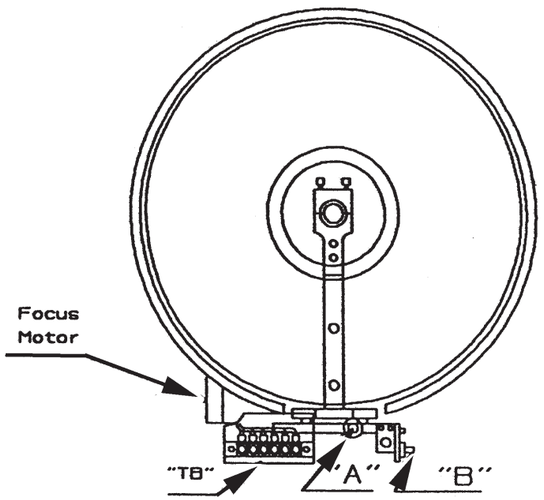
Removable Optical Assembly

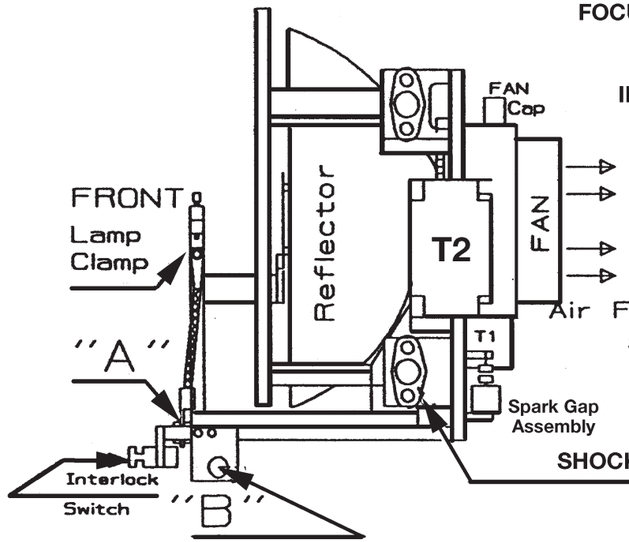


9521-000/STRF 1000



Gear Rack Assembly 9521-023/104D485G1 or 9571-000/104D485G3 (Heated)





FOCUS MOTOR 9521-013/SCD646988-5*

REFLECTOR 9521-071/B133

INTERLOCK 9521-015/103A345P1

FAN 9521-008/B108

T2 9521-009/102D870 (Pulse Transformer)

T1 9521-017/101C121ST (Injection Transformer)

SGA 9521-003/104C792 (Spark Gap Assembly)

SHOCK MOUNTS 9521-066/4C953

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Drawing Number
9854-6-B

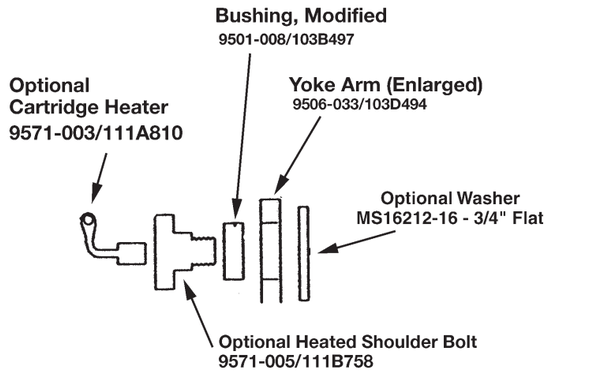
Drawing Name:

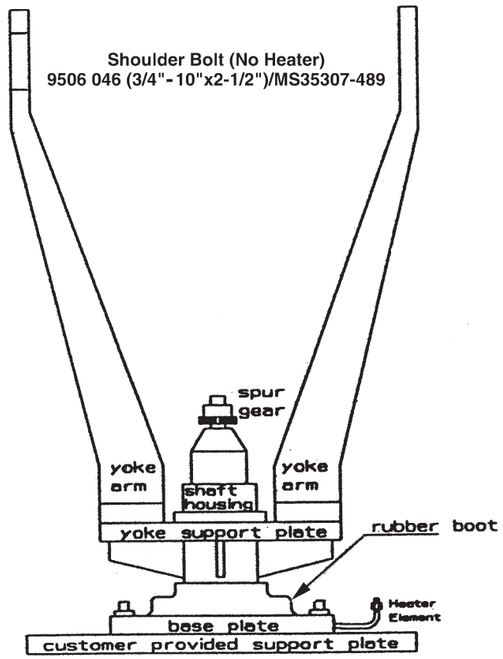
XR Series 1600 Watt Marine Searchlight

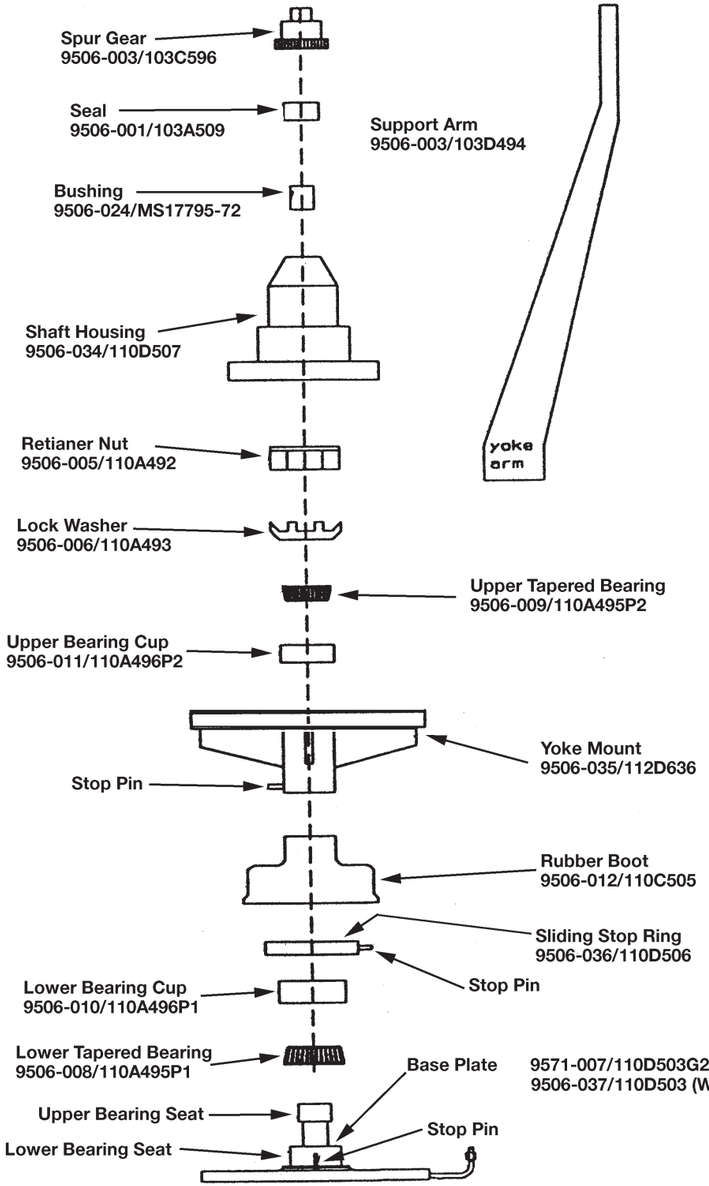
Searchlight Head, Exploded Views

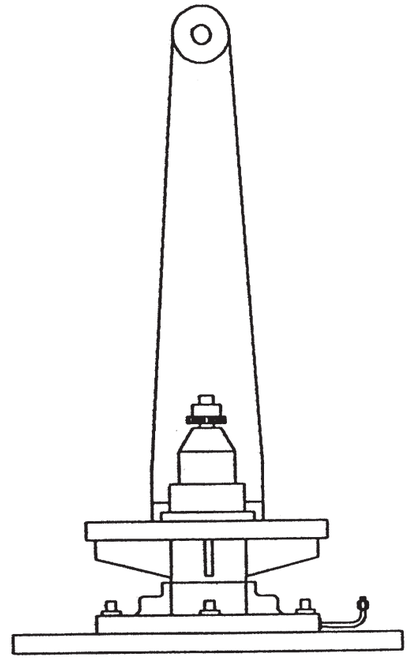
Sheet 1 of 1

Yoke and Base: 9506-000/112D635 (Approx. 60 Lbs.)









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Date: 06/24/02
Drawing Number
9854-7-C

Drawing Name:

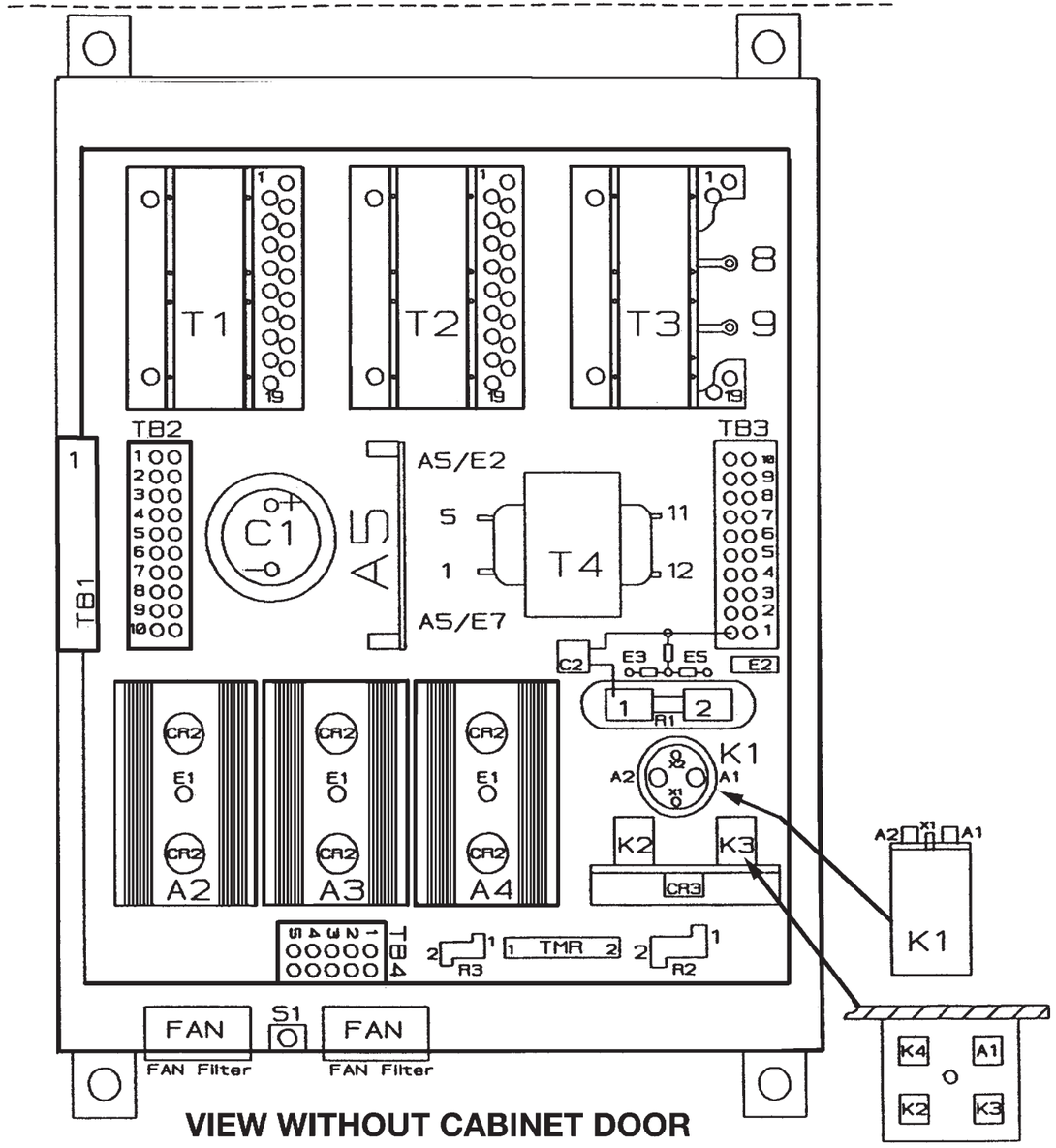
XR Series 1600 Watt Marine Searchlight

Exploded Views, Yoke and Base

Sheet 1 of 1

Power Supply: (Approx. 275 Lbs.)

9512-000 (220 VAC) 108D832
9514-000 (440 VAC)



VIEW WITHOUT CABINET DOOR

	PERKO Part No.	S&T Part No.	Description
A1:	9510-020	104C787G2	Chopper Assembly
A2:	9510-022	104C857	Heat Sink Assembly
A3:	9510-022	104C857	Heat Sink Assembly
A4:	9510-022	104C857	Heat Sink Assembly
A5:	9510-025	108B642G1	Printed Circuit Board
C1:	9510-039	105A988P98	Main Filter Capacitor
C2:	9510-077	CMR07F203J0DL	Isolation Capacitor
CB1:	9514-001 9512-001	103A349P2(10A) P5(20A)	MAIN Circuit Board (on Door)
CR3:	9510-029	325-0023-019	Rectifier Bridge
CR4:	9510-019	105C298	Transorb (Spike Suppressor)
CR5:	9510-019	105C298	Transorb (Spike Suppressor)
CR6:	9510-019	105C298	Transorb (Spike Suppressor)
	9510-011	110C119	Fans
	9510-032	104A861P3	Fan Filters
K1:	9510-002	110A604	MAIN Contactor
K2:	9510-026	105B053P2	Ignite Relay
K3:	9510-037	103A387P2	Control Relay
K4:	9510-037	103A387P2	Fan Relay
M1:	9510-003	103A351	Elapsed Time Meter (on Door)
R1:	9510-033	104A636	Shunt
R2:	9510-028	323-0010-018	
R3:	9510-027	R36-604-439	
S1:	9510-016	M8805-01-020	Cabinet Door Interlock
T1:	9510-013	108D857	MAIN Power Transformer
T2:	9510-013	108D857	MAIN Power Transformer
T3:	9510-013	108D857	MAIN Power Transformer
T4:	9510-001	104A210P3	ISOLATION Transformer
TB1:	9510-034	T30-003-010	Terminal Board (10 Position)
TB2:	9510-034	T30-003-010	Terminal Board (10 Position)
TB3:	9510-034	T30-003-010	Terminal Board (10 Position)
TB4:	9510-035	T30-004-005	Terminal Board (5 Position)
TMR:	9510-012	109B589	Timer Assembly

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Drawing Name:

XR Series 1600 Watt Marine Searchlight

Power Supply, Exploded Views

Sheet 1 of 1