

AMSCO Maintenance Manual



**34" POLARIS® SL
SURGICAL LIGHTING FIXTURE**

(7/88) P-764321-180

TABLE OF CONTENTS

Section	Paragraph		Page	Grid
1		GENERAL INFORMATION	1-1	A-10
	1.1	APPLICATION AND DESIGN	1-1	A-10
	1.2	SPECIAL TOOLS	1-1	A-10
	1.3	ELECTRICAL FUNCTIONAL DESCRIPTION	1-1	A-10
	1.3.1	Introduction	1-1	A-11
	1.3.2	Voltage Measurement	1-2	A-11
	1.3.3	SCR Module Theory	1-2	A-11
	1.3.4	Controller Operation Theory	1-2	A-11
2		OPERATING INSTRUCTIONS	2-1	B-6
	2.1	GENERAL	2-1	B-6
	2.2	25 AMP VARIABLE INTENSITY CONTROL	2-1	B-6
	2.3	LIGHTHEAD MOVEMENT	2-1	B-6
	2.4	CLEANING INSTRUCTIONS	2-2	B-7
	2.4.1	Cleaning Implements	2-2	B-7
	2.4.2	Areas To Be Cleaned	2-3	B-8
	2.4.3	General Cleaning Procedure	2-3	B-8
	2.4.4	Disinfecting Procedure	2-3	B-8
	2.4.5	Acrylic Lens And Sterile Handle	2-3	B-8
3		INSPECTION AND MAINTENANCE	3-1	B-10
	3.1	GENERAL	3-1	B-10
	3.2	ROUTINE INSPECTION	3-1	B-10
	3.3	PREVENTIVE MAINTENANCE	3-1	B-10
		TABLE 3-1. PREVENTIVE MAINTENANCE SCHEDULE	3-1	B-10
		TABLE 3-2. SAMPLE PREVENTIVE MAINTENANCE RECORD	3-2	B-11
	3.3.1	Inspect Lamps*, Lamp Sockets, And Lamp Holder	3-3	B-12
	3.3.2	Inspect Rotation of Lighthead Within Yoke	3-4	B-13
	3.3.3	Inspect Yoke Rotation About Suspension Arm	3-4	B-13
	3.3.4	Inspect Suspension Arm Vertical Motion	3-4	B-13
	3.3.5	Check Vertical Suspension Tube Rivets	3-5	B-14
	3.3.6	Inspect Rotation Of 48" Horizontal Support Arm And Suspension Arm	3-5	B-14
	3.3.7	Inspect Brushes	3-6	C-1
	3.3.8	Miscellaneous Checks (Lighthead And Suspension Assembly)	3-6	C-1
	3.3.9	Check Variable Intensity Control Operation	3-6	C-1
	3.3.10	Inspect Optical Performance	3-7	C-2
	3.3.11	Checking/Setting 25 Amp Variable Intensity Control Output Voltage	3-8	C-3
	3.4	TROUBLESHOOTING	3-9	C-4
		TABLE 3-3. TROUBLESHOOTING CHART	3-9	C-4
	3.5	FIELD TEST PROCEDURE	3-12	C-7
	3.5.1	General	3-12	C-7
	3.5.2	Check For Proper Mechanical Installation	3-12	C-7
	3.5.3	Positioning Force Test	3-13	C-8
	3.5.4	Check For Proper Electrical Installation, 25 Amp Variable Intensity Control	3-14	C-9
		TABLE 3-4. LINE VOLTAGE VARIATIONS AND TAP CONNECTIONS	3-15	C-10
	3.5.5	Light Optics Testing Procedure	3-16	C-11

This document is intended for the exclusive use of AMSCO and its customers. Reproduction in whole or in part is prohibited.

TABLE OF CONTENTS (Continued)

Section	Paragraph	Page	Grid
4	COMPONENT REPAIR AND REPLACEMENT	4-1	
	4.1 GENERAL	4-1	C-14
	4.2 LAMP REPLACEMENT PROCEDURE	4-1	C-14
	4.3 LAMPHOLDER, LAMP SOCKET, HEAT FILTER REPLACEMENT	4-2	C-14
	4.3.1 Removal Of Lampholder	4-2	D-1
	4.3.2 Lamp Socket Replacement	4-2	D-1
	4.3.3 Installation Of Lampholder	4-3	D-1
	4.3.4 Heat Filter Replacement	4-3	D-2
	4.4 ACRYLIC LENS REPLACEMENT	4-3	D-2
	4.4.1 Units Shipped Before 9/86	4-3	D-2
	4.4.2 Units Shipped After 9/86	4-4	D-3
	4.5 R2 REFLECTOR REPLACEMENT	4-4	D-3
	4.6 R3 REFLECTOR REPLACEMENT	4-5	D-4
	4.6.1 R3 Reflector Removal	4-5	D-4
	4.6.2 R3 Reflector Reassembly	4-5	D-4
	4.7 LIGHTHEAD REMOVAL AND REINSTALLATION	4-5	D-4
	4.7.1 Lighthouse Removal	4-6	D-5
	4.7.2 Lighthouse Reinstallation	4-6	D-5
	4.8 LIGHTHEAD BRAKE SERVICING AND ADJUSTMENT	4-7	D-6
	4.8.1 Lighthouse Brake Servicing	4-7	D-6
	4.8.2 Lighthouse Brake Adjustments	4-8	D-7
	4.9 YOKE BEARING SERVICING	4-8	D-7
	4.9.1 Yoke Bearing Removal	4-8	D-7
	4.9.2 Yoke Bearing Reinstallation	4-9	D-8
	4.9.3 Yoke Brake Adjustment	4-10	D-9
	4.10 LIGHTHEAD SUSPENSION ARM REMOVAL, REINSTALLATION AND ADJUSTMENTS	4-10	D-9
	4.10.1 Lighthouse Suspension Arm Removal	4-10	D-9
	4.10.2 Lighthouse Suspension Arm Reinstallation	4-11	D-10
	4.10.3 Lighthouse Suspension Arm Adjustments	4-12	D-11
	4.11 VERTICAL SUSPENSION TUBE REMOVAL AND REINSTALLATION	4-12	D-11
	4.11.1 Vertical Suspension Tube Removal	4-12	D-11
	4.11.2 Vertical Suspension Tube Reinstallation	4-13	D-12
	4.12 BRUSH/BRUSHHOLDER REPLACEMENT	4-14	D-13
	4.13 BRAKE ADJUSTMENT — SUPPORT ARM PIVOTS	4-15	D-14
	4.14 SPINDLE AND COLLECTOR RING REMOVAL/REINSTALLATION	4-15	D-14
	4.15 SUPPORT ARM AND COLLECTOR RING REMOVAL/REINSTALLATION	4-15	D-14
	4.16 CENTRAL MOUNT FIXTURE REMOVAL/REINSTALLATION	4-16	E-1
	4.16.1 Removal Of Central Mount Fixture	4-16	E-1
	4.16.2 Reinstallation Of Central Mount Fixture	4-16	E-1
	4.17 PATTERN SIZE ADJUSTMENT	4-18	E-3
	4.18 SCR MODULE REPLACEMENT — 25 AMP VARIABLE INTENSITY CONTROL	4-18	E-3
5	ILLUSTRATIONS AND PARTS LIST	5-1	E-6

LIST OF ILLUSTRATIONS

Figure	Title	Page	Grid
1-1	AC SINE WAVE CONDUCTION ANGLE	1-1	A-10
1-2	VARIABLE INTENSITY CONTROL WIRING DIAGRAM	1-2	A-11
1-3	VARIABLE INTENSITY CONTROL BLOCK DIAGRAM	1-4	A-13
2-1	25 AMP VARIABLE INTENSITY CONTROLLER	2-1	B-6
2-2	MOUNTING ARRANGEMENT	2-1	B-6
2-3	AREAS TO BE CLEANED	2-2	B-7
3-1	INSPECT LAMP HOLDERS AND LAMPS	3-3	B-12
3-2	ADJUSTMENT OF PIVOT	3-4	B-13
3-3	LOWER DRIVE RIVET INSPECTION	3-4	B-13
3-4	UPPER DRIVE RIVET INSPECTION	3-5	B-14
3-5	INSPECT ROTATIONS	3-5	B-14
3-6	INSPECT BRUSHES	3-6	C-1
3-7	25 AMP VARIABLE INTENSITY CONTROLLER	3-7	C-2
3-8	CHECKING/SETTING OUTPUT VOLTAGE	3-8	C-3
3-9	UPPER DRIVE RIVET INSPECTION	3-13	C-8
3-10	LOWER DRIVE RIVET INSPECTION	3-13	C-8
3-11	ATTACHING SPRING SCALE TO CENTRA ARM	3-13	C-8
3-12	LIGHTHEAD ROTATION IN YOKE	3-13	C-8
3-13	LIGHTHEAD/YOKE ROTATION ABOUT SUSPENSION ARM	3-14	C-9
3-14	SUSPENSION ARM MOTION	3-14	C-9
3-15	VOLTAGE TAP CONNECTIONS	3-14	C-9
3-16	CHECKING/SETTING OUTPUT VOLTAGE	3-15	C-10
3-17	LIGHTHEAD AND LIGHT METER POSITIONING	3-16	C-11
3-18	LIGHT OPTICS TESTING TEMPLATE	3-17	C-12
4-1	LAMP REPLACEMENT	4-1	C-14
4-2	LAMP HOLDER TERMINAL BLOCK CONNECTIONS	4-2	D-1
4-3	HEAT FILTER ASSEMBLY	4-3	D-2
4-4	ACRYLIC LENS AND TRIM RING (Units Before 9/86)	4-3	D-2
4-5	ACRYLIC LENS AND TRIM RING (Units After 9/86)	4-3	D-2
4-6	SECURING R2 REFLECTOR	4-4	D-3
4-7	PREVENTING SUSPENSION ARM FROM SPRINGING BACK	4-6	D-5
4-8	BRAKE SIDE PIVOT SHAFT ASSEMBLY	4-6	D-5
4-9	WIRE SIDE PIVOT SHAFT ASSEMBLY	4-7	D-6
4-10	LIGHTHEAD BRAKE ADJUSTMENT	4-7	D-6
4-11	BEARING PRE-LOADING TOOL (P-764325-730)	4-8	D-7
4-12	YOKE BEARING ASSEMBLY	4-9	D-8
4-13	YOKE BRAKE ADJUSTMENT	4-10	D-9
4-14	SUSPENSION ARM FORK TERMINAL BLOCK	4-10	D-9
4-15	LIFTING SUSPENSION ARM ASSEMBLY	4-11	D-10
4-16	RIVETS PROPERLY INSTALLED	4-11	D-10
4-17	LOWER DRIVE RIVET INSPECTION	4-11	D-10
4-18	SUSPENSION ARM MOTION	4-12	D-11
4-19	SCREWING/UNSCREWING VERTICAL SUSPENSION TUBE	4-12	D-11
4-20	SUSPENSION TUBE RIVETS	4-13	D-12
4-21	UPPER DRIVE RIVET INSPECTION	4-14	D-13

LIST OF ILLUSTRATIONS (Continued)

Figure	Title	Page	Grid
4-22	INSPECT BRUSHES	4-14	D-13
4-23	BRUSH HOLDERS AND CONNECTIONS	4-14	D-13
4-24	CENTRAL MOUNT CANOPY AND GASKET	4-17	E-2
4-25	CENTRAL MOUNT AND SUPPORT ARM	4-17	E-2
4-26	25 AMP VARIABLE INTENSITY CONTROLLER	4-18	E-3
4-27	SCR MODULE LOCATION	4-19	E-4
5-1	GENERAL ASSEMBLY	5-1	E-6
5-2	HORIZONTAL ARM ASSEMBLY (Part 1 of 2, Central Pivot)	5-2	E-7
5-3	HORIZONTAL ARM ASSEMBLY (Part 2 of 2, Outer Pivot)	5-4	E-9
5-4	SUSPENSION TUBE DETAIL	5-6	E-11
5-5	SUSPENSION ARM AND FORK (Part 1 of 2)	5-8	E-13
5-6	SUSPENSION ARM AND FORK (Part 2 of 2)	5-10	F-1
5-7	YOKE BEARING ASSEMBLY	5-12	F-3
5-8	LIGHTHEAD PIVOT ASSEMBLIES	5-14	F-5
5-9	LIGHTHEAD ASSEMBLY (Part 1 of 2)	5-16	F-7
5-10	LIGHTHEAD ASSEMBLY (Part 2 of 2)	5-18	F-9
5-11	R2 REFLECTOR AND ACRYLIC LENS	5-20	F-11
5-12	LIGHTHEAD HANDLE AND PIVOT BRACKETS	5-22	F-13
5-13	25 AMP VARIABLE INTENSITY CONTROL (Part 1 of 2)	5-24	G-1
5-14	25 AMP VARIABLE INTENSITY CONTROL (Part 2 of 2)	5-26	G-3
5-15	VARIABLE INTENSITY CONTROL — Recessing Kit	5-28	G-5

SUMMARY OF WARNINGS AND CAUTIONS

The following are personnel (WARNINGS) and equipment (CAUTIONS) safety precautions to be observed when operating or servicing this unit. This is a listing of all safety precautions appearing in the text. Carefully read them before proceeding to use or service the unit. Observance of these safety precautions will minimize the risk of personal injury or the possible use of improper maintenance methods which may damage the unit or render it unsafe. It is important to understand that these precautions are not exhaustive. AMSCO could not possibly know, evaluate and advise maintenance departments of all conceivable ways in which maintenance might be done or the possible hazardous consequences of each way.

The operation and maintenance procedures recommended by AMSCO are described in this manual. Only these recommended maintenance procedures should be followed.

WARNING: REPAIRS AND ADJUSTMENTS SHOULD BE PERFORMED ONLY BY EXPERIENCED PERSONS FULLY ACQUAINTED WITH THIS EQUIPMENT. USE OF INEXPERIENCED, UNQUALIFIED PERSONS TO WORK ON THE EQUIPMENT OR THE INSTALLATION OF UNAUTHORIZED PARTS COULD CAUSE PERSONAL INJURY OR RESULT IN COSTLY DAMAGE.

WARNING: NEVER OPERATE LIGHT WITHOUT HEAT FILTERS PROPERLY INSTALLED. USE OF FIXTURE WITHOUT HEAT FILTERS COULD CAUSE PERSONAL INJURY.

WARNING: BE SURE TO DISCONNECT POWER AT MAIN CIRCUIT BREAKER AND/OR VARIABLE INTENSITY CONTROL AND ALLOW FIXTURE TO COOL PRIOR TO BEGINNING ANY WORK.

WARNING: DO NOT USE THIS LIGHTHEAD IN A CLASS 1, GROUP C, HAZARDOUS LOCATION AS DEFINED BY THE NFPA FLAMMABLE ANESTHETICS CODE, AS THERE IS NO STOP TO PREVENT LOWERING BELOW 5 FOOT LEVEL.

WARNING: BE SURE THAT DRILL TEMPLATE REMAINS SEATED ON VERTICAL SUSPENSION TUBE DURING DRILLING. FAILURE TO DO SO MAY RESULT IN IMPROPER INSTALLATION.

WARNING: WHEN PERFORMING ANY PROCEDURES INVOLVING THE LIGHT, NOTE THE FOLLOWING:

- ENSURE ELECTRICAL SERVICE IS SHUT OFF AT CIRCUIT BREAKER OR FUSE BOX BEFORE BEGINNING ANY MAINTENANCE ON THIS LIGHTING FIXTURE.
- PERMIT LAMP AND LAMP HOLDER ASSEMBLY TO COOL BEFORE TOUCHING.

WARNING: THE TWO DRIVE RIVETS FURNISHED FOR SECURING THE VERTICAL SUSPENSION TUBE TO THE SUPPORT ARM AND THE FOUR DRIVE RIVETS FOR SECURING THE VERTICAL SUSPENSION TUBE TO THE SUSPENSION FORK MUST BE PROPERLY INSTALLED . . . OMISSION OR IMPROPER INSTALLATION COULD ALLOW THE LIGHTHEAD TO FALL.

WARNING: USE 12 GAUGE WIRE (MINIMUM DIAMETER) FOR CONNECTING THE 25 AMP VARIABLE INTENSITY CONTROL TO THE 34" POLARIS SL LIGHTHEAD. REFER TO EQUIPMENT DRAWING NUMBER 129357-828 FOR SINGLE LIGHTHEAD INSTALLATIONS OR 129357-829 FOR INSTALLATIONS TOGETHER WITH A 22" POLARIS LIGHTHEAD. (ABOVE DRAWING NUMBERS DO NOT APPLY TO SPECIAL ORDERS.)

WARNING: WEIGHTS MUST BE POSITIVELY ATTACHED TO PREVENT SUSPENSION ARM FROM MOVING UPWARD DURING ADJUSTMENT.

WARNING: DO NOT PERFORM THIS ADJUSTMENT UNLESS OPTICAL TESTING IS CONDUCTED IN CONJUNCTION WITH TEST PROCEDURE IN PARA. 3.5.5.

WARNING: THE FORK AT THE END OF THE LIGHTHEAD SUSPENSION ARM IS UNDER TENSION. WHEN REMOVING OR INSTALLING THE SURGICAL LIGHT ASSEMBLY, DO NOT EXTEND THE FORK; IT COULD SNAP BACK AND PINCH FINGERS OR HAND.

WARNING: THE REMOVAL AND REINSTALLATION OF A CENTRAL-MOUNT FIXTURE WILL REQUIRE A MEANS OF SUPPORTING IT WHILE THE MOUNTING HARDWARE IS BEING REMOVED AND REPLACED. FIXTURE WITH ONE ARM WEIGHS APPROXIMATELY 105 LBS; WITH TWO ARMS, APPROXIMATELY 135 LBS.

WARNING: BE SURE THAT NUTS SECURING CENTRAL-MOUNT FIXTURE TO MOUNTING PLATE ARE FULLY ENGAGED ON EXTENSION BOLTS. ALLOW AT LEAST 1/16" FROM BOTTOM OF NUT TO END OF BOLT.

WARNING: REMOVAL OF LIGHTHEAD ASSEMBLY FROM YOKE REQUIRES TWO PEOPLE. LIGHTHEAD WEIGHS APPROXIMATELY 40 POUNDS.

WARNING: DO NOT LOOSEN OR REMOVE SCREWS HOLDING REFLECTOR TO SUPPORT FRAME.

WARNING: MAKE SURE THERE IS AT LEAST 1" OF THREAD ENGAGED BETWEEN ADJUSTING NUT AND ROD AND CAP ASSEMBLY WHEN SUSPENSION ARM ADJUSTMENT IS COMPLETED.

WARNING: SUPPORT SUSPENSION ARM AND YOKE. TOTAL ASSEMBLY WEIGHS APPROXIMATELY 100 POUNDS.

WARNING: IMPROPERLY INSTALLED LIGHTHEAD SUSPENSION ARM MAY SEPARATE FROM VERTICAL SUSPENSION TUBE. ADEQUATE PRECAUTIONS MUST BE TAKEN.

WARNING: BE SURE THAT LOWER NUTS ARE FULLY ENGAGED ON EXTENSION BOLTS. ALLOW AT LEAST 1/16" FROM BOTTOM OF NUT TO END OF BOLT.

CAUTION: Before setting the circuit breaker to the ON position, be sure the rotary switch is in the OFF position.

CAUTION: Avoid rough treatment of lighthead, particularly while lamp is in use. Do not bump lighthead into walls or other equipment.

CAUTION: Take care to prevent leakage of fluids into interior of lighthead and suspension arm. Do not attempt to clean internal reflective surfaces as deterioration may result. Avoid getting cleaning solutions on electrical contacts as performance may be affected.

CAUTION: Do not touch glass portion of lamps or inner surface of lamp reflectors when relamping or in general cleaning. Skin oils are harmful to lamp life. If bulb or inner surface of its reflector is touched, wipe with alcohol and pat dry. Use clean, soft cloths only.

CAUTION: Use only recommended cleaning/germicide and/or antistatic agents on this light. Some degree of staining, pitting and/or discoloration could occur if a phenolic-, iodophor-, or glutaraldehyde-based disinfectant is used on the surfaces of this light. Also, use of alcohol or aerosol spray cleaner/disinfectants (e.g., Lysol®) containing a substantial amount of alcohol in the formula can damage the acrylic lens and the identifying decals on the lighthead.

CAUTION: 34" Polaris SL 25 Amp Variable Intensity Control output voltage must be set with a TRUE RMS AC VOLTMETER (Beckman HD130). Standard voltmeters will give erroneously high readings that can lead to reduced lamp life and potential equipment damage. If a TRUE RMS VOLTMETER is not available, contact your AMSCO service representative or local regional office.

CAUTION: Do not use AMSCO Surgical Reflector Cleaner on reflector. This cleaner is for aluminum surfaces only and will leave a non-removable film on the reflector. Do not use alcohol or phenolic-base disinfectant solutions on reflector. Permanent damage may result.

CAUTION: Do not use alcohol or abrasive compounds on acrylic lens.

CAUTION: Be careful when removing rivets from suspension tube so as not to damage wiring inside the tube.

CAUTION: Before drilling the suspension tube, be sure that cut end of tube is seated firmly against flange inside drill template.

CAUTION: When drilling suspension tube, take precautions to protect wiring. Also, be sure to remove all chips after drilling.

CAUTION: After installing new brushes, recheck the voltage at the lampholder jack (21.5 volts ± 0.1 volt) per procedure in paragraph 3.5.4 and adjust if required.

CAUTION: Do not attempt to lift the lighthead assembly by the lighthead; use yoke and suspension arm.

CAUTION: The commutators at the central hub and suspension tube pivots have different diameters. Therefore, the brushes are different because they have different radii. Do not mix brushes up.

CAUTION: Coated side of filter is to face lamp cover. Do not touch heat filter surface with fingers. Make sure all 3 teflon gaskets are installed and oriented as shown in Figure 4-3.

CAUTION: If one lamp socket is burned or corroded all eight sockets should be inspected and replaced if necessary.

CAUTION: With brush holder removed, insulator slot should be approximately 1/2" wide. If necessary, use insulator milling tool and trim insulator slot.

CAUTION: Do not use wire nuts to make wiring connections inside of yoke. Movement of lighthead may loosen wire nuts.

CAUTION: Do not install plug buttons without retaining cables.

CAUTION: Do not touch reflecting surfaces of R2 or R3 reflector. Skin oils are detrimental to reflective coating. Wear clean rubber gloves while handling.

CAUTION: Since locknut holds yoke on suspension arm, be prepared to accept weight of yoke and lighthead when this locknut is removed.

CAUTION: The following assembly and lubrication procedures must be followed precisely to assure proper lighthead operation. Deviation will result in erratic operation and possible damage to the brake system and yoke.

CAUTION: Place supports under yoke and suspension arm. Do not place supports under lighthead assembly.

CAUTION: When reinstalling bearings, make sure brake adjustment screw is backed off. Failure to do so will interfere with proper reinstallation of bearings at stud head.

CAUTION: Bearing alignment is very critical when reinstalling bearings. Make sure outer bearing races are completely seated in suspension arm before installing collar. Use of the collar to seat bearing race may cause galling on suspension arm and produce aluminum chips which will impregnate bearings.

CAUTION: Handle wiring carefully.

CAUTION: When adjusting spring-compression rods, both rods must be adjusted equal amounts and flats on rods must be maintained parallel to floor (with suspension arm parallel to floor).

CAUTION: Drill rivet heads only. Damage to wires can occur if rivets are drilled out totally.

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 1

GENERAL INFORMATION

1.1 APPLICATION AND DESIGN

This section includes product literature relating to the principal descriptive and identifying characteristics of AMSCO's Surgical Lighting Fixtures. General concepts of the equipment, its purpose, capabilities, limitations, and technical specifications are described and illustrated.

1.2 SPECIAL TOOLS

The following special tools will be required when servicing the lighthouse:

Light Meter Kit

Alvania EP-2 Grease

Spanner Wrench Assembly With Pins

Nut Removal Tool

Yoke Bearing Pre Loading Kit

Channel Lock 4"

Butt Connectors

TRUE RMS VOLTMETER — Beckman HD130

RTV 106 High Temperature Sealant

Lubriplate Mo-Lith #2 Grease

Wakefield Thermal 120-2

Molykote 321R Lubricant*

Dow Corning 340*

Strap Wrench (cloth type)

*Call AMSCO Service Company

P-764315-933

P-764315-995

P-755639-001

P-755633-001

P-764315-730

P-764316-765

P-82409-001

P-764321-205

R-5300-162

R-6400-826

R-5560-270

1.3 ELECTRICAL FUNCTIONAL DESCRIPTION

1.3.1 Introduction

The power to the Polaris SL lighthouse is controlled by increasing or decreasing the current conduction angle of each sine wave. Various conduction angles with related lamp intensities are shown in Figure 1-1.

As the controller intensity selector is changed from position 5 to position 1, the current "ON TIME" or "CONDUCTION ANGLE" is reduced. The circuit includes a current sensing transformer used with other circuitry to automatically adjust the conduction angle if one or more lamps burn out.

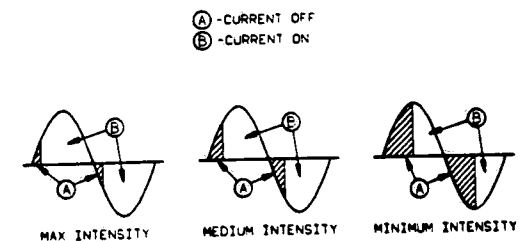


Figure 1-1. AC SINE WAVE CONDUCTION ANGLE.

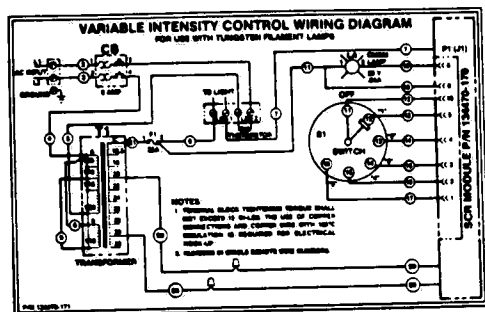


Figure 1-2. VARIABLE INTENSITY CONTROL WIRING DIAGRAM.

1.3.2 Voltage Measurement

Since the voltage waveforms used are not full sine waves, a standard **AC averaging voltmeter reading will be in error and must not be used to set lamp voltage.** The B and K meter (used until 2/85) and the Beckman HD110 (used from 2/85 to 5/86) are not authorized for use on the Polaris SL light. A **TRUE RMS VOLTMETER** (Beckman HD130) will measure the voltages accurately and, therefore, is required.

NOTE: The Beckman HD110 and HD130 have the same color case. Externally, the only difference is the model number on the front of the case. Do not mistake the HD110 for the HD130 as the **HD110 is not a true RMS voltmeter.**

1.3.3 SCR Module Theory (See Figure 1-3)

The Polaris SL Controller provides the following functions:

- Intensity selector control with five levels of lamp intensity and an ON/OFF position. Position 5 is maximum intensity.
- Three overcurrent protection devices.
 - Circuit breaker (CB) on feeder lines breaking HOT and NEUTRAL lines in the event of a major overcurrent occurrence.
 - Fuse (F1) breaks the circuit of the secondary during a major overcurrent occurrence if the circuit breaker is defective.
 - Automatic voltage reduction circuit for short-term or minor overcurrent occurrences sensed by current transformer CT1.

- Two soft-start devices:

- Electrical — Thermistor located on terminal LD-2 reduces inrush current surge at startup. The thermistor has approximately 5 ohms resistance when cold (77 F/25 C) and less than 0.5 ohm when hot (above 212 F or 100 C).
- Electronic — At startup, circuitry applies minimum voltage (90 degrees conduction angle) to the lamps for 3 seconds as determined by Sequencer #1.

- Automatic Diagnostic Check — The circuitry automatically applies maximum voltage (approximately 170° conduction angle) to the lamps for 5 seconds as determined by Sequencer #2. This sequence is intended to cause very old lamps (near burnout) to fail during preparation for surgery so that failed lamps can be changed out prior to actual surgery.

NOTE: This 5 second diagnostic sequence immediately follows the 3 second soft-start sequence.

- Remaining Lamp Protector — CT1 senses lamp burnout current characteristics and, together with other circuitry, lowers lamp voltage to remaining illuminated lamps. This feature limits lamp failure to one-at-a-time or protects against multiple lamp failure.
- Thermal Compensation — Temperature inside the controller is sensed and the lamp voltage is automatically adjusted to prevent lamp overvoltage.

NOTE: If the light has been in operation for several hours, lamp voltage may be lower than the original voltage setting. This is normal operation resulting from the temperature compensation circuit. After the controller cools, the original voltage which was set during adjustment can be verified.

1.3.4 Controller Operation Theory

In the USA, a dedicated 120 VAC (+5/-15%) service is supplied to the variable intensity controller (V1C). Through a circuit breaker and a thermistor for soft startup, this voltage is applied to the primary of the T1 power transformer. Jumper locations on the primary are dependent upon incoming **loaded** line voltage. The secondary taps S1 (common), S9 (control voltage — 20/18V) and S8 (lamp load — 30/28V) are wired per the two references.

**When incoming line exceeds 122 VAC, the 30V and 20V taps are changed to 28V and 18V respectively.*

The SCR module includes the board assembly, two SCRs and the heat sink. The 30/28V volt tap feeds the lamp load and is switched ON and OFF every half cycle by electronic control of the negative and positive SCRs. A steering network receives a trigger pulse from the opto-isolator and directs this pulse to the positive SCR, for the positive half of each line voltage cycle, and then to the negative SCR for the negative half of the line voltage cycle.

The time when the SCRs are turned OFF compared to the time the SCRs are turned ON is the result of the output of the 90 degrees conduction control and the 90-180 degrees conduction control. Outputs of these two controls are dependent on the following:

- The internal intensity adjustment potentiometer (R27) setting.
 - Selected position of the intensity selector control.
 - Line voltage.
 - Power transformer primary and secondary taps selected and connected.
 - Number of lamps illuminated (Note: Voltage to the lamps is lowered as each lamp burns out — when failed lamps are replaced the lamp voltage is automatically returned to the original setting).
- The 20V/18V* tap supplies voltage to the bridge rectifier. The full wave rectifier DC voltage output from the bridge rectifier is used:
- in the startup (soft start) sequence #1.
 - in the diagnostic sequencer #2.
 - in the 90 degrees conduction control.
 - to feed the filter and DC regulator which supplies +15 VDC for board power.
 - in the resistor network/intensity selector control (S1).

**When incoming line exceeds 122 VAC, the 30V and 20V taps are changed to 28V and 18V respectively.*

The current transformer (CT1) monitors lamp current continuously and senses any short term or long term change from normal current. Automatic adjustment to long term changes are made by the circuit, including the CT1 transformer, the A-C amplifier, the slow detector/filter, D-C amplifier and the 90-180 degrees conduction control. A change in the conduction angle makes the required compensation.

Fast changes of current are sensed by CT1 and the output fed to the fast overcurrent detector. The lamp voltage is switched to minimum (90 degrees conduction angle) for 1/2 second by the lamp burnout sequencer and then normal operation is resumed.

In summary, several key points are emphasized to obtain proper operation:

- Use a Beckman HD130 True RMS voltmeter to measure lamp voltages accurately.
- Be sure incoming voltage is connected to the proper T1 primary tap per the tap connection table provided.
- Be sure the intensity selector switch is set to position five when adjusting the lamp voltage to 21.5 ± 0.1 volt using the R27 internal potentiometer.
- Be sure 12 AWG wire has been installed between the controller and the lighting fixture. If other sizes are used it may not be possible to obtain proper lamp voltage during adjustment.
- For incoming loaded line voltage above 122 VAC, be sure the secondary taps (28V and 18V) are used. Do not use the 30V and 20V taps for this line voltage condition.



Surgical Lighting Fixture

POLARIS SL™ SURGICAL LIGHTHEAD*

TECH
DATA

*for Mounting Details refer to SD-308

DESCRIPTION

Large-diameter (34" [863 mm]) lighthead provides cool, color-corrected light, appropriate for those surgeons who require a large-diameter surgical light. The large, uniformly illuminated pattern minimizes need for repositioning lighthead during use. The lighthead passes the light-beam "around" shadow-causing interference to produce high intensity even in deep cavities.

Application

For use in major surgical suites, the unit can be suspended from central hub-mount as single lighthead or in combination with a Polaris 22"-diameter lighthead. (For sample surgical suite lighting layouts, see your AMSCO representative.)

Standards

Lighting fixture (lighthead and mount) meets the applicable requirements of the following standards and/or regulations:

NFPA's Flammable Anesthetics Code.

NFPA's National Electric Code.

Underwriters Laboratories Inc. listing.

California Seismic design compliance.

FDA Medical Device Amendments to the Food, Drug, and Cosmetics Act.

DESIGN FEATURES

Optics. Light is provided by eight 50 watt lamp sources, each with integral heat-removing dichroic-coated, glass reflectors. Heat is further reduced by dichroic-coated, color-correcting, heat-absorbing glass filters in front of each lamp. The light from the individual lamps is then reflected and blended by two reflectors, the first having a unique diffusion arrangement (pat. pend.); the second (outer) being spun aluminum with an Alzak® reflective surface. Finally, an optical diffuser further blends light output onto the surgical field, while shielding the surgical team from peripherally visible light, thus reducing glare.

Easy lamp replacement requires no special tools. Lampholders are quickly and easily reached through a hinged access cover. Each lamp has its own ejector lever for easy relamping. Multiple-lamp arrangement maintains pattern, shadow-control and depth of field, even in the event of lamp failure, allowing uninterrupted surgery. Two extra lamps are furnished with each lighthead.

*Alzak is a registered trademark of Aluminum Company of America

Because of American Sterilizer Company's continuing program of research and development, all specifications and descriptions are subject to change without notice. This catalog is intended for the exclusive use of AMSCO customers, including architects or designers. Reproduction in whole or in part by others is prohibited.

©AMSCO — 1983-1987



Typical only — some details may vary

Upper 48" horizontal support arm is included with mounting hardware (See separate literature.)

Lower horizontal suspension arm assembly supports movable yoke into which the lighthead is mounted. A counterbalanced spring assembly, fully enclosed, balances the arm and permits exact positioning.

Vertical Suspension System. Each lighthead/suspension arm assembly is suspended from a vertical, seamless, chromium-plated steel tube (cut to size by others). (See separate Tech Data for mounting.)

SELECTION CHECKED BELOW
APPLIES TO THIS EQUIPMENT

Polaris SL Variable Intensity Control

- ☐ Surface Mounting
- ☐ Recess Mounting

Item No. _____
Location(s) _____

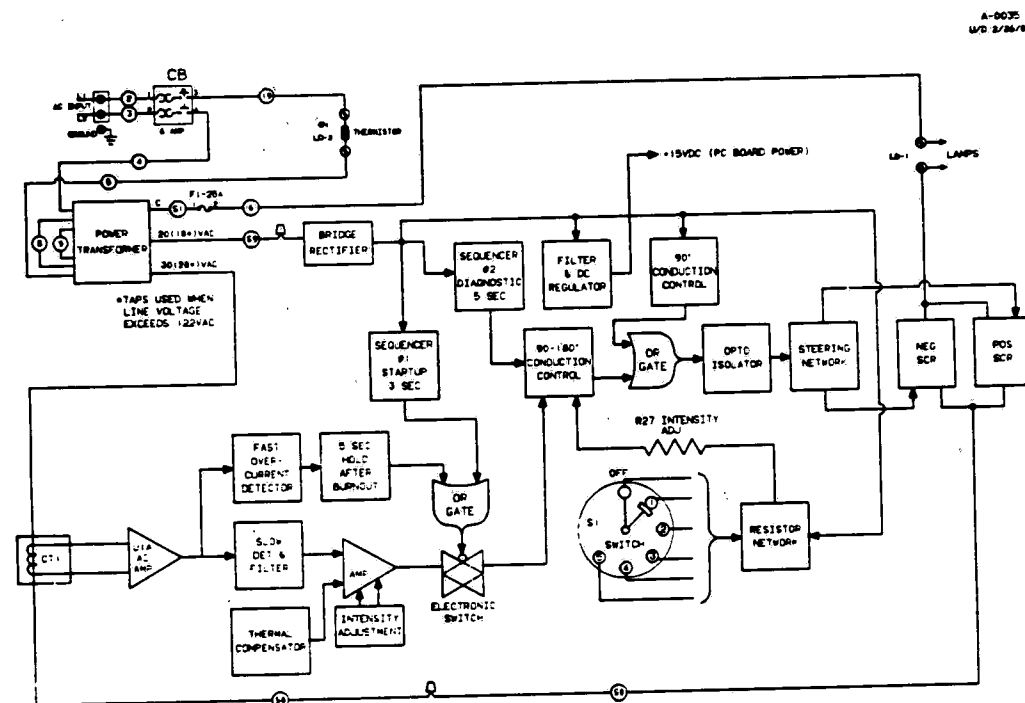


Figure 1-3. VARIABLE INTENSITY CONTROL BLOCK DIAGRAM.

Sterilizable handle is for positioning the lighthouse from within the sterile field. It is the same size as the sterile handle for the Polaris 22" lighthouse and thus is interchangeable with it. The handle also accommodates AMSCO's disposable light handle covers. Three detachable sterilizable handles are furnished with each lighthouse. (For positioning from outside the sterile field, a non-sterile handle completely surrounds the outer cover of the lighthouse.)

Epoxy Finish is electrostatically deposited, oven-cured. Resists abrasion, chemical attack, corrosion, and mechanical damage. The smooth, enclosed construction allows easy cleaning to promote an aseptic environment.

TECHNICAL DATA

Lighthouse Interface. Polaris SL (34" diameter) and Polaris (22" diameter) (see separate Tech Data, SD-307) major lighthouses function independently or together as lighting system components with coordinating color, configuration, and mounting. The outside edge of the Polaris SL lighthouse, with arm assembly fully extended, rotates about the mounting hub at 9" (2972 mm) radius; Polaris rotates at 7.4" (2235 mm) radius. When used in conjunction with Polaris 22" lighthouse, smaller lighthouse may be repositioned freely without attention to Polaris SL. The family of AMSCO lights will meet the needs of any modern surgical suite, and appropriate layouts can be designed by AMSCO Planning Services.

Articulation. Lighthouse rotation is 330° (nominal) within the yoke. Yoke rotates 330° about the suspension arm. With the lighthouse pivot 82-1/2" (2095 mm) above floor, vertical positioning distance (of the bottom rim of the lighthouse) is from 50 to 84" (1270 to 2134 mm) above finished floor. Suspension arms permit lighthouse to be positioned directly beneath mounting hub or extended out to 117" (2972 mm) from it laterally.

Lighthouse can be positioned with minimal effort. All movement, vertical and rotational, is free, quiet, and smooth, without subsequent drifting.

Internal-convection thermal control protects beam temperature and lighthouse internal temperatures. Heat energy is absorbed into filter housing and conducted away from patient and surgical team toward the ceiling through the lampholder access cover; design allows passive heat-pump principle to remove heat for away-from-horizontal lighthouse positions, as well.

Optical Performance

The **Synchrolux (SL) optical system** utilizes a patented folded optical design to optimize visibility at the surgical site. The focal plane is 40" (1016 mm) nominal below the reflector rim. Beam intensity at the focal plane is 9000 footcandles and is adjustable to adapt to tissue reflectivity and depth of incision; pattern size is 7-8" (184-203 mm) nominal measured as 20% of the maximum intensity. Depth of field is 28" (711 mm). Radiant infra-red energy in the light beam at the focal plane is less than 3.5 $\mu\text{W}/\text{cm}^2/\text{ft}$.

Color correction is for proper tissue-color perception; light beam is 4400° ($\pm 400^\circ$) Kelvin as measured on a Commission International de l'Eclairage chromaticity diagram. Light projection provides illumination of at least 60% of the unshadowed level, exceeding the 10% minimum level recommended for shadow reduction by the IES Guide, CP29, Lighting for Health Care Facilities.

Current Leakage. Neither the assembled lighting fixture nor any of its components will demonstrate current leakage of more than 25 microamperes per lighthouse (20 microamperes for the variable intensity control) when measured in accordance with Underwriters Laboratories Standard 544.

INSTALLATION

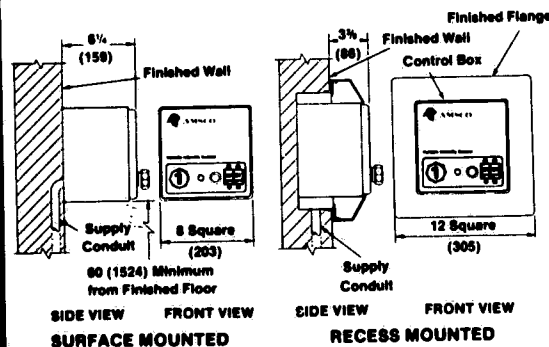
When ordered with an appropriate mounting, AMSCO furnishes all components necessary to obtain a complete working unit, ready for (but not including) installation and connection.

VARIABLE INTENSITY CONTROL

A UL-listed Variable Intensity Control is required for each lighthouse. Control changes intensity by providing five individual settings. It also acts as an ON/OFF switch. Transformer is operable at 120/240 volts, 60 Hz. Units are available for surface mounting on a finished wall or for recessing into a finished wall. An epoxy-coated housing and an aluminum front panel with an anodized natural finish enclose the transformer. Electrical connection between the Variable Intensity Control and the lighting fixture is by others.

Each lighthouse is matched to its respective controller by an easy-to-read number furnished for attachment to the knob of the controller and duplicated on the suspension fork of the lighthouse.

VARIABLE INTENSITY CONTROL



NOTES:

- One intensity control, as shown, required for each lighthouse.
- Provide 110-120 or 220-230 volt, 50/60 Hz, single-phase, 3-wire service (4 amps). The lighting fixture must be grounded.

DIMENSIONS ARE INCHES (MILLIMETERS)
— DRAWING IS NOT TO SCALE

This print is for guidance when planning space and utility services. Actual installation prints may be obtained from any AMSCO office representative.

B- 1



MOUNTING FOR SURGICAL LIGHTHEAD*

• central mount

*Refer to SD-307 and SD-392 for Surgical Lightheads

TECH DATA

DESCRIPTION

Surgical lighting fixture with central hub mount, from which one or two horizontal arms radiate. Support AMSCO Surgical Lighthead(s) (see SD-307 and/or SD-392). Also available with optional support arm for audiovisual system.

Application

Designed for installation on most surgical suite ceilings, including rooms with forced-air circulation. Accommodates one or two lighthouse assemblies.

Standards

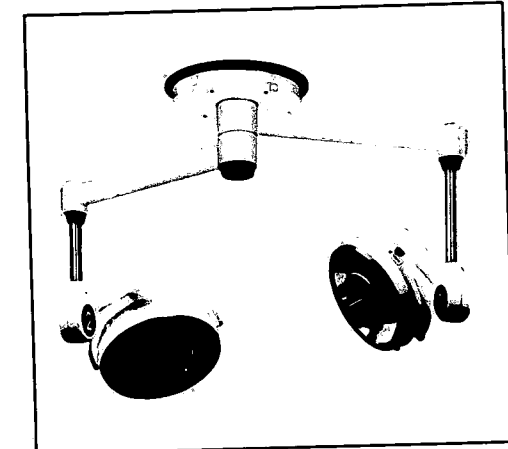
(Refer to SD-307 and/or SD-392.)

DESIGN FEATURES

Mounting Configurations. Each fixture includes a central hub and either one or two lighthouse/suspension arm assemblies. Each assembly is suspended from a horizontal arm which rotates around the central hub. Horizontal arms are either 24, 36, or 48 inches (610, 914, or 1220 mm) long. The 48-inch arm supports Polaris SL only. When single Polaris SL lighthouse is specified, a hub spacer for future arms is supplied.

Vertical Suspension System. The rotary suspension shaft of the surgical lighthouse moves on tapered roller bearings at one end of the horizontal arm. The arm, affixed to a central roller-bearing housing, is supported by a cast iron ceiling plate. The bearing housing at each end features a pivot and commutators to (1) supply electrical power to the lamp, (2) provide non-stop rotation of the lighthouse and (3) provide non-stop rotation of both the lighthouse and arm. Both pivots include an adjustable brake which prevents lighthouse from drifting.

Hardware is furnished for securing the ceiling plate to the studs of the ceiling suspension supports (extension bolts and supports are by others). An epoxy-coated, spun-aluminum canopy is also furnished to conceal the ceiling plate. . . a vinyl gasket seals the gap between the canopy and ceiling.



Typical only — some details may vary.

SELECTIONS CHECKED BELOW APPLY TO THIS EQUIPMENT

Mounting Configuration (one lighthouse per support arm)

Polarise

- ☐ One 24" Long Support Arm
- ☐ One 36" Long Support Arm
- ☐ Two 36" Long Support Arms

Polaris SL™

- ☐ One 48" Long Support Arm with Hub Spacer for Future 36" Long Support Arm for Polaris

Polaris SL/Polaris

- ☐ One 48" (for Polaris SL) and One 36" (for Polaris) Long Support Arm

Polaris with Audiovisual Support Arm

- ☐ One 36" Long Support Arm and One TV Support Arm
- ☐ Two 36" Long Support Arms and One TV Support Arm

Item No. _____
Location(s) _____

B- 2

TECHNICAL DATA

Maneuverability. When positioned at any point, the fixture moves freely, smoothly and quietly throughout its range of maneuverability, without drifting.

The horizontal support arm provides unrestricted (continuous) rotation as follows: an overall radius of 70-7/8" (1800 mm), if a 24" (610 mm) long support arm; 88" (2235 mm), if a 36" (914 mm) long arm; and 117" (2972 mm), if a 48" (1220 mm) long arm (centerline of mounting hub to outermost edge of the lighthead's reflector rim).

Current Leakage. Neither the assembled lighting fixture nor any of its components will demonstrate current leakage of more than 25 microamperes per lighthead (20 microamperes for the variable intensity control) when measured in accordance with Underwriters Laboratories Standard 544.

INSTALLATION

When ordered with appropriate lighthead(s), AMSCO furnishes all components necessary to obtain a complete working unit, ready for (but not including) installation and connection.

VARIABLE INTENSITY CONTROL

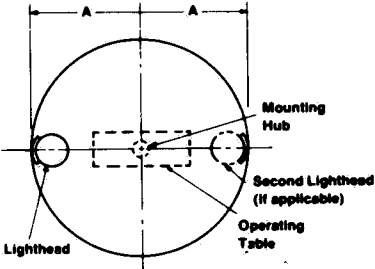
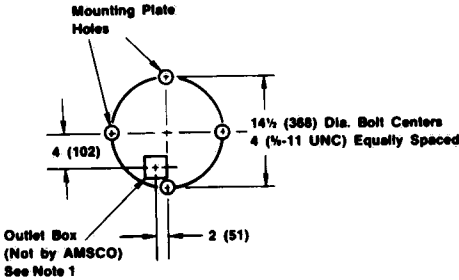
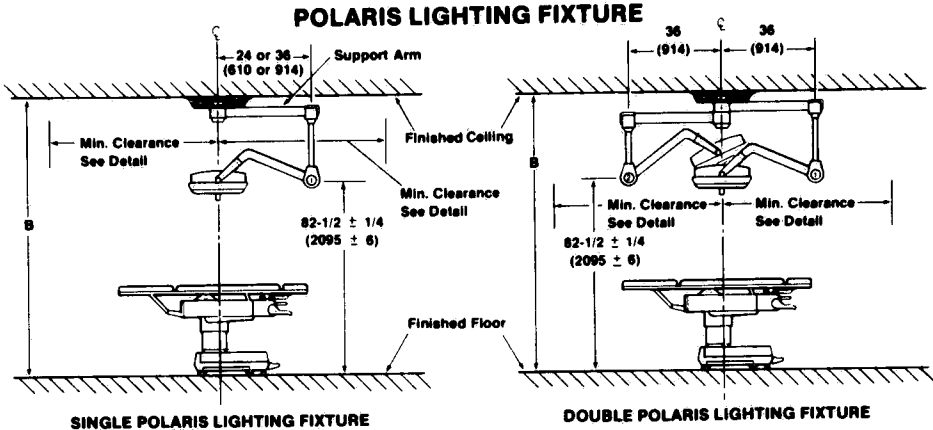
A UL-listed Variable Intensity Control is required for each lighthead (see SD-307 or SD-392).

WARRANTY

The American Sterilizer Company warrants that each fixture is carefully tested, inspected and leaves the factory in proper working condition, free of visible defects. Coverage includes one year on parts (except expendables) and 90 days on labor. AMSCO representatives can provide full details of the warranty program upon request.

OPTIONAL PREVENTIVE MAINTENANCE AGREEMENT

A coast-to-coast network of skilled and competent specialists can provide periodic PMA inspection and adjustment to assure low-cost peak performance.



DIMENSIONS ARE INCHES (MILLIMETERS) — DRAWING IS NOT TO SCALE

MOUNTING ARRANGEMENT	A MINIMUM CLEARANCE	B CEILING HEIGHT		MOUNTED* WEIGHT lb (kg)	MOMENT FORCE lb-ft (Nm)
		MIN.	MAX.		
One 24" (610 mm) Arm	6'2" (1879)	8'5-1/2" (2578)	12'0" (3657)	140 (63.5)	300 (41.5)
One 36" (914 mm) Arm	7'2" (2184)	8'5-1/2" (2578)	12'0" (3657)	140 (63.5)	350 (48.4)
Two 36" (914 mm) Arms	7'2" (2184)	8'10" (2692)	12'0" (3657)	240 (108.9)	700 (96.8)

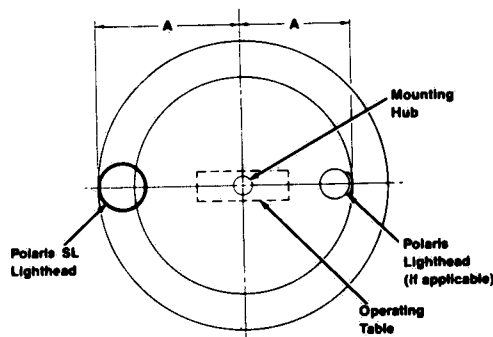
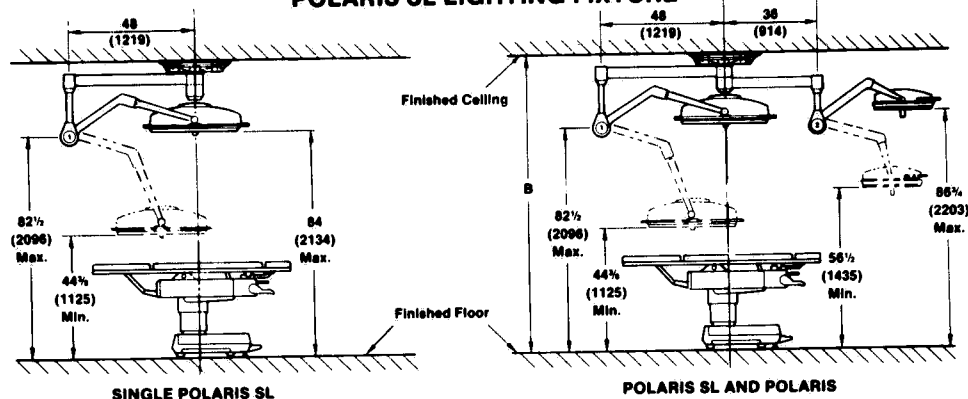
*Includes weight of lighthead(s).
Note: For maximum future flexibility, AMSCO suggests designing structural support for largest load factors.

- NOTES:
- Electrical connection between the lighting fixture and the variable intensity control is by others. Each lighthead requires a separate connection. The lighting fixture must be grounded.
 - Mounting plate must be level. Leveling nuts are furnished to compensate for ceiling irregularities.
 - Ceiling structure must adequately support lighting fixture. See weights and moments above.
 - In a flammable anesthetizing location, this fixture must be installed at least 5 feet (1525 mm) above the floor. In a nonflammable anesthetizing location, it may be installed at any feasible height above the floor.
 - 780 BTU/hr per Polaris lighthead is released into the room. 1434 BTU/hr per Polaris SL is released into the room.
 - Fixture construction permits complete non-stop rotation (360°) of both the support arm(s) and the lighthead(s).

... CHECK LOCAL CODES ...

This print is for guidance when planning space and utility services. Actual installation prints may be obtained from any AMSCO office representative.

POLARIS SL LIGHTING FIXTURE



DIMENSIONS ARE INCHES (MILLIMETERS) — DRAWING IS NOT TO SCALE

MOUNTING ARRANGEMENT	A MINIMUM CLEARANCE	B CEILING HEIGHT MIN.	B CEILING HEIGHT MAX.	MOUNTED* WEIGHT lb (kg)	MOMENT FORCE lb-ft (Nm)
One 48" (1220 mm) Arm	9'9" (2972)	9'0" (2742)	12'0" (3657)	320 (145)	1200** (165)
One 48" (1220 mm) and One 36" (914 mm) Arm	9'9" (2972)	9'0" (2742)	12'0" (3657)	420 (191)	1200 (165)

*Includes weight of lighthouse(s).

**Moment force calculated to include possible future addition of one 36" arm.

Note: For maximum future flexibility, AMSCO suggests designing structural support for largest load factors.

NOTES:

- Electrical connection between the lighting fixture and the variable intensity control is by others. Each lighthouse requires a separate connection. The lighting fixture must be grounded.
- Mounting plate must be level. Leveling nuts are furnished to compensate for ceiling irregularities.
- Ceiling structure must adequately support lighting fixture. See weights and moments above.
- In a flammable anesthetizing location, this fixture must be installed at least 5 feet (1525 mm) above the floor. In a nonflammable anesthetizing location, it may be installed at any feasible height above the floor.
- 780 BTU/hr per Polaris lighthouse is released into the room. 1434 BTU/hr per Polaris SL is released into the room.
- Fixture construction permits complete non-stop rotation (360°) of both the support arm(s) and the lighthouse(s).

... CHECK LOCAL CODES ...

This print is for guidance when planning space and utility services. Actual installation prints may be obtained from any AMSCO office representative.

B- 5

SECTION 2

OPERATING INSTRUCTIONS

WARNING DO NOT USE THIS LIGHTHEAD IN A CLASS 1, GROUP C, HAZARDOUS LOCATION AS DEFINED BY THE NFPA FLAMMABLE ANESTHETICS CODE AS THERE IS NO STOP TO PREVENT LOWERING BELOW THE FIVE-FOOT LEVEL.

WARNING NEVER OPERATE LIGHT WITHOUT THE HEAT FILTERS PROPERLY INSTALLED. USE OF FIXTURE WITHOUT HEAT FILTERS COULD CAUSE PERSONAL INJURY.

CAUTION: Before setting the circuit breaker to the ON position, be sure the rotary switch is in the OFF position.

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

To operate the Controller:

- Push ON-OFF circuit breaker to ON.
- Turn lighthouse on by rotating the rotary switch to a number, 1 through 5. The higher the number, the higher the intensity.

NOTE: For longer lamp life, use higher intensity levels only when needed.

- To turn lighthouse off, rotate rotary switch to OFF.
- Push ON-OFF circuit breaker to OFF.

2.3 LIGHTHEAD MOVEMENT (See Figure 2-2)

CAUTION: Avoid rough treatment of lighthouse at all times and, in particular, during use. Refrain from bumping lighthouse into walls or other equipment.

2.1 GENERAL

The following instructions are intended to guide the serviceman: (1) when instructing operators in techniques designed to ensure optimum equipment performance; and (2) when verifying validity of operator complaints. See Section 3, TROUBLESHOOTING, if Fixture is not operating properly. Refer to Section 1, GENERAL INFORMATION, for capabilities of the equipment.

2.2 25 AMP VARIABLE INTENSITY CONTROL (See Figure 2-1)

The 34" Polaris SL lighthouse has its own wall-mounted, 25 Amp Variable Intensity Controller. The number on the rotary switch corresponds to the number on the lighthouse suspension fork.

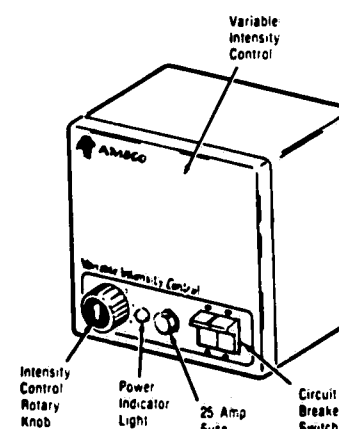


Figure 2-1. 25 AMP VARIABLE INTENSITY CONTROLLER.

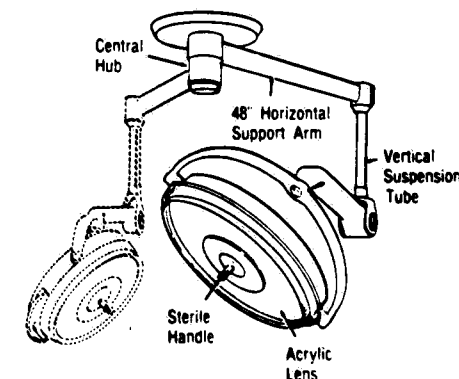


Figure 2-2. MOUNTING ARRANGEMENT.

2-1

764371-1A0

B- 6

The following movements can be made by using either the removable (sterile) handle on the lighthead or the non-sterile handle on the reflector outer cover:

Central-mount Lighthead may:

1. Rotate continuously around vertical suspension tube.
2. Rotate continuously around central hub.
3. Rotate clockwise or counterclockwise about suspension arm (within limits of the stops) approximately 328 degrees.
4. Tilt forward or backward in yoke approximately 310 degrees.
5. Move up or down by pivoting at suspension fork.

2.4 CLEANING INSTRUCTIONS

WARNING: WHEN PERFORMING ANY PROCEDURES INVOLVING THE LIGHT, NOTE THE FOLLOWING:

- ENSURE ELECTRICAL SERVICE IS SHUT OFF AT CIRCUIT BREAKER OR FUSE BOX BEFORE BEGINNING ANY MAINTENANCE ON THIS LIGHTING FIXTURE.
- PERMIT LAMP AND LAMP HOLDER ASSEMBLY TO COOL BEFORE TOUCHING.

CAUTION: Do not touch glass portion of lamps or inner surface of lamp reflectors when relamping or in general cleaning. Skin oils are harmful to lamp life. If bulb or inner surface of its reflector is touched, wipe with alcohol and pat dry. Use clean, soft cloths only.

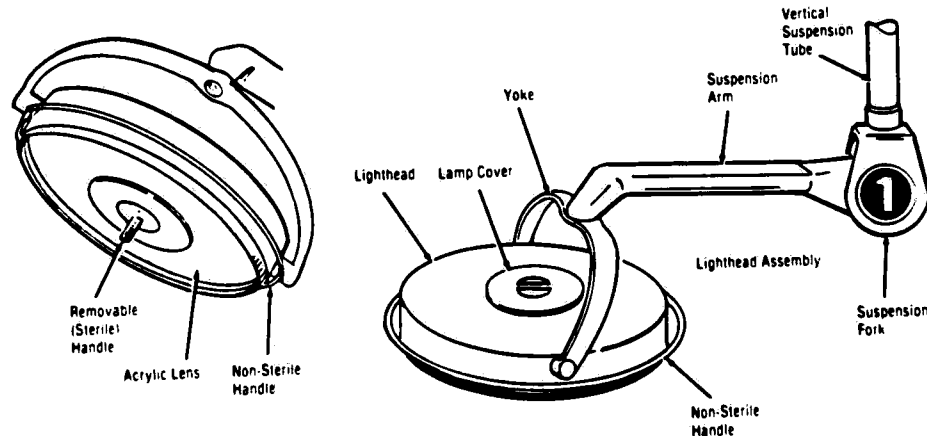


Figure 2-3. AREAS TO BE CLEANED.

2.4.1 Cleaning Implements

- Pail
- Sponge
- Cloth Wipes
- Rubber Gloves
- Mild Household Detergent (e.g., Joy®)
- Quaternary-based germicide such as Bio-Q, Sanikleen®, OR/CS Spray N'Wipe, or OR/CS Germicidal Cloths®.

CAUTION: Use only recommended cleaning/germicide and/or antistatic agents on this light. Some degree of staining, pitting and/or discoloration could occur if a phenolic-, iodophor-, or glutaraldehyde-based disinfectant is used on the surfaces of this light. Also, use of alcohol or aerosol spray cleaner/disinfectants (e.g., Lysol®) containing a substantial amount of alcohol in the formula can damage the acrylic plastic lens and the identifying decals on the lighthead.

®Joy is a registered trademark of Proctor & Gamble.

Bio-Q is a trademark of AMSCO/Medical Products Division.

OR/CS Spray N'Wipe is a trademark of AMSCO/Medical Products Division.

OR/CS Germicidal Cloths is a trademark of AMSCO/Medical Products Division.

®Sanikleen is a registered trademark of AMSCO/Medical Products Division.

Lysol is a registered trademark of Lehn & Fink, Div. of Sterling Drug, Inc.

*Contact your AMSCO/Medical Products Division representative for details.

2.4.2 Areas To Be Cleaned (See Figure 2-3)

CAUTION: Take care to prevent leakage of fluids into interior of lighthead and suspension arm. Do not attempt to clean internal reflective surfaces as deterioration may result. Avoid getting cleaning solutions on electrical contacts as performance may be affected.

The cleaning and disinfecting procedures described in Paragraphs 2.4.3 and 2.4.4 apply to each of the following areas:

1. Suspension Arm — Wipe the entire suspension arm, including the suspension fork and yoke.
2. Lamp Cover — Wipe the lamp cover on the 34" Polaris SL lighthead.
3. Lighthead — Wipe both top and side surfaces.

2.4.3 General Cleaning Procedure

1. Wear rubber gloves.
2. Use a sponge and a mild detergent and water solution to wipe listed surfaces (Paragraph 2.4.2). Wring excess solution from sponge before wiping.
3. Rinse all surfaces with a soft cloth wipe and clear water. Wring excess water from cloth before wiping.
4. Wipe all surfaces dry with a fresh cloth.

2.4.4 Disinfecting Procedure

1. Wear rubber gloves.
2. Prepare germicidal solution according to container directions. Or, use OR/CS Spray N'Wipe or OR/CS Germicidal Cloths which require no preparation.
3. Use a soft cloth, dampened with disinfectant solution or OR/CS Spray N'Wipe, or OR/CS Germicidal Cloths to wipe listed surfaces (Paragraph 2.4.2). Wring excess solution from cloth before wiping if necessary.
4. Do not rinse or dry surfaces; allow germicidal film to remain as surface air-dries.

2.4.5 Acrylic Lens and Sterile Handle (See Figure 2-3)

CAUTION: Do not use alcohol or abrasive compounds on acrylic lens.

1. Remove the sterile handle and process it with the other surgical instruments used during the surgical procedure. Do not install reprocessed sterile handle until light is to be used.
2. Clean the lens by wiping with a mild detergent and water solution (e.g. Joy®) on a soft cloth. Wring excess solution from the cloth before wiping.

NOTE: As an alternate method of infection control, use AMSCO's Disposable Sterile Handle Covers according to package directions.

®Joy is a registered trademark of Proctor & Gamble.

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 3

INSPECTION AND MAINTENANCE

3.1 GENERAL

The maintenance described in Paragraph 3.2 should be performed at intervals best determined by usage of the equipment. Other preventive maintenance inspections and recommended intervals are listed in Paragraph 3.3, Table 3-1. Should a problem occur when operating the unit, refer to Paragraph 3.4, TROUBLESHOOTING.

WARNING: WHEN PERFORMING ANY PROCEDURES INVOLVING THE LIGHT, NOTE THE FOLLOWING:

- ENSURE ELECTRICAL SERVICE IS SHUT OFF AT CIRCUIT BREAKER OR FUSE BOX BEFORE BEGINNING ANY MAINTENANCE ON THIS LIGHTING FIXTURE.
- PERMIT LAMPS AND SOCKET ASSEMBLIES TO COOL BEFORE TOUCHING.

WARNING: REPAIRS AND ADJUSTMENTS SHOULD BE PERFORMED ONLY BY EXPERIENCED PERSONS FULLY ACQUAINTED WITH THIS EQUIPMENT. USE OF INEXPERIENCED, UNQUALIFIED PERSONS TO WORK ON THE EQUIPMENT OR THE INSTALLATION OF UNAUTHORIZED PARTS COULD CAUSE PERSONAL INJURY OR RESULT IN COSTLY DAMAGE.

3.2 ROUTINE INSPECTION

1. Inspect entire installation for any signs of damage or misaligned parts.
2. Be sure ceiling fasteners are tight and that fixture is properly supported.
3. Check lighthead movement (Paragraph 2.3) using both sterile and non-sterile handles. Be sure each movement is smooth and that there is no binding or drifting.

NOTE: After lighthead is positioned so that reflector rim is either parallel or perpendicular to the floor, the lighthead should not drift.

4. Check electrical components for loose wires, improper connections and other obvious defects.

5. Be sure that all chips were removed from inside the fork after holes were drilled into the suspension tube and suspension fork during installation.

6. Be sure that all wires in the fork are dressed away from possible pinch points before side cover is installed on suspension fork.

7. Thoroughly clean the fixture (Paragraph 2.4).

3.3 PREVENTIVE MAINTENANCE

The following table summarizes recommended basic preventive maintenance procedures and typical frequency of performance. These procedures supplement an overall thorough preventive maintenance program which should be carried out on a scheduled basis by trained personnel. Table 3-2 is a sample maintenance record which we suggest the Maintenance Department keep. Such a record will prove helpful in assuring regular maintenance.

TABLE 3-1.
PREVENTIVE MAINTENANCE SCHEDULE

Procedure	Frequency*
Inspect Polaris SL Lamps**, Lamp Sockets, and Lamp Holder	Bi-monthly
Inspect Rotation of Lighthead Within the Yoke	Bi-monthly
Inspect Rotation About the Suspension Arm	Bi-monthly
Inspect Suspension Arm Vertical Motion	Bi-monthly
Check Vertical Suspension Tube Pinning	Bi-monthly
Inspect Rotation of Horizontal Support Arm(s) (Central-Mounted Lightheads)	Bi-monthly
Inspect Central Mount Brushes	Semi-Annually
Check Variable Intensity Control Operation	Bi-monthly
Inspect Optical Performance	Bi-monthly

*These procedures should be performed at regular intervals as indicated. This frequency is minimum and should be increased if usage demands.

**Check for burned out lamps WEEKLY as it is difficult to determine by illumination pattern if one of the 8 lamps is burned out.

Department _____

This form to be utilized for preventive maintenance record only and is not to be used as a guide to perform maintenance.

(Circle "X" In Column When Service Is Performed)

SERVICE PERFORMED:	1	2	3	4	5	6
1.0 PREPARATION FOR PREVENTIVE MAINTENANCE						
1.1 Discuss equipment operation with department personnel	X	X	X	X	X	X
1.2 Install test equipment	X	X	X	X	X	X
2.0 EACH LIGHTHEAD						
2.1 Inspect lamp sockets and all eight bulbs	X	X	X	X	X	X
2.2 Inspect lighthouse rotation in yoke	X	X	X	X	X	X
2.3 Inspect yoke rotation about the suspension arm	X	X	X	X	X	X
2.4 Inspect lens for proper attachment	X	X	X	X	X	X
2.5 Inspect yoke plug buttons to ensure secure attachment	X	X	X	X	X	X
3.0 EACH SUSPENSION FORK/ARM ASSEMBLY						
3.1 Inspect arm assembly for proper tension. Adjust if necessary	X	X	X	X	X	X
3.2 Make sure raise/lower forces are equal	X	X	X	X	X	X
3.3 Check yoke assembly for any oil leakage	X	X	X	X	X	X
4.0 CENTRAL HUB MOUNTED LIGHTS						
4.1 Check each horizontal arm assembly for drift. Check for being level and then adjust brake if necessary	X	X	X	X	X	X
4.2 Ensure that suspension tube is securely pinned to arm fork and rotary suspension shaft on each horizontal arm	X	X	X	X	X	X
4.3 Inspect condition of brushes. Repair if necessary			X			X
4.4 When inspecting brushes, inspect exposed wires, connections and terminals		X			X	
4.5 Ensure bottom rubber cap is secure	X	X	X	X	X	X
5.0 EACH LIGHTHEAD CONTROLLER						
5.1 Ensure that electrical service is shut off at disconnect switch or fuse box	X	X	X	X	X	X
5.2 Inspect internal components of controller	X	X	X	X	X	X
5.3 Measure lamp voltage during peak electrical demand	X			X		
6.0 FINAL TEST						
6.1 Move each light fixture through all positions	X	X	X	X	X	X
6.2 Wipe down all exterior surfaces with a clean dry cloth	X	X	X	X	X	X

TABLE 3-2. MAINTENANCE RECORD SHEET SAMPLE

WARNING WHEN PERFORMING ANY PROCEDURES INVOLVING THE LIGHT, NOTE THE FOLLOWING:

- **ENSURE ELECTRICAL SERVICE IS SHUT OFF AT CIRCUIT BREAKER OR FUSE BOX BEFORE BEGINNING ANY MAINTENANCE ON THIS LIGHTING FIXTURE.**
- **PERMIT LAMP AND LAMP HOLDER ASSEMBLY TO COOL BEFORE TOUCHING.**

3.3.1 Inspect Lamps*, Lamp Sockets, and Lamp Holder (See Figure 3-1)

1. Open hinged lamp cover located on back of lighthouse by visually locating hinge and pulling up on the cover handle in direction of hinge.

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

*Check for burned out lamps WEEKLY as it is difficult to determine by illumination pattern if one of the 8 lamps is burned out. Perform steps 1 and 2 of Paragraph 3.3.1.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

2. Check for burned-out lamps. Turn on electrical power to the lighthouse (use setting number 1 of rotary control knob) to identify burned-out lamps. Turn off power, allow lamp area to cool, and replace lamps as required. (Paragraph 4.2, Lamp Replacement Procedure).

3. Inspect lamps for damage or discoloration. Replace if necessary (Paragraph 4.2 Lamp Replacement Procedure).

4. Check lamp sockets for corroded, burned, or loose socket contacts. Replace degraded sockets.

5. Check that lamp sockets are firmly installed onto lamp pins.

6. Inspect lamp socket wires for worn insulation or loose wire connections, which indicate that lamp socket assemblies must be replaced.

7. Check that each lamp is securely seated and centered in its recess on the lamp holder plate.

CAUTION: When replacing the lamp(s) make sure the proper lamp (P-93902-608) is installed. Other lamps may look like our lamp but will not be rated at the proper voltage (22 volts). Damage to the circuit board could occur when improper lamp is installed.

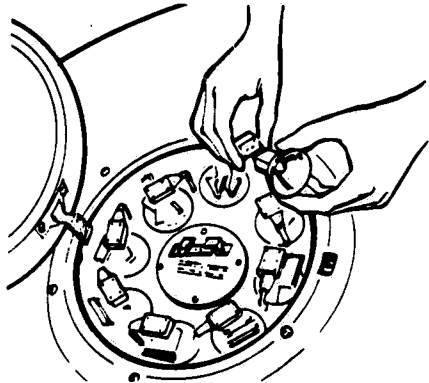


Figure 3-1. INSPECT LAMP HOLDERS AND LAMPS.

3.3.2 Inspect Rotation of Lighthead Within Yoke (See Figure 3-2)

Lighthead rotation within the yoke should be smooth and quiet, require minimal positioning force, and should not drift from the selected position.

1. Rotate lighthead through its complete range of motion, approximately 310 degrees. If rotation exceeds this limit, stops are damaged.

2. Check that the force required to rotate the lighthead is smooth and consistent throughout the range. If it is not, brake is not adjusted properly, bearings and brake system are contaminated, lack lubrication, or are damaged.

3. Check at several locations throughout the range that the lighthead remains in position without drifting. If drift occurs, brakes require adjustment or servicing. See Paragraph 4.8.

3.3.3 Inspect Yoke Rotation About Suspension Arm (See Figure 3-2)

Yoke rotation about the lower suspension arm should be smooth and quiet, require minimal positioning force, and should not drift from the selected position.

1. Rotate yoke through its complete range of motion, approximately 330 degrees. If rotation exceeds this limit, stops are damaged and must be serviced.

2. Check that the force required to rotate the yoke is smooth and consistent throughout the range. If it is not, brake is not adjusted properly, bearings are contaminated or damaged and require servicing.

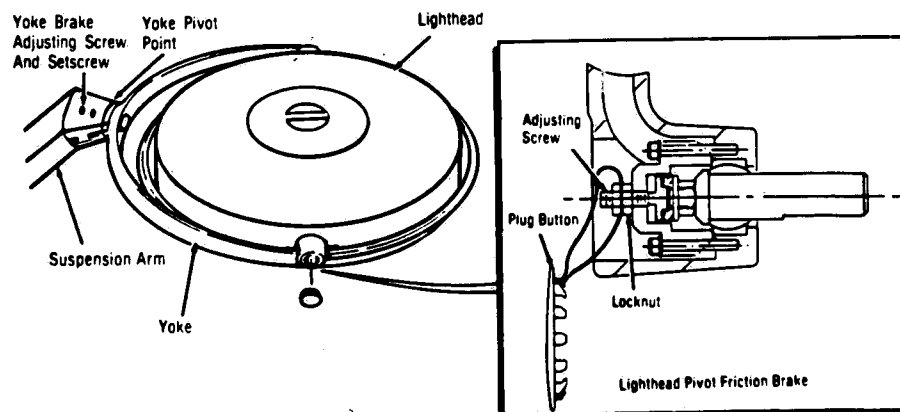


Figure 3-2. ADJUSTMENT OF PIVOT.

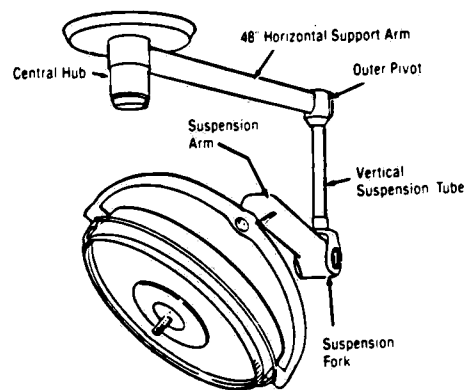


Figure 3-3. INSPECT ROTATIONS.

3. Check at several locations throughout the range that the yoke remains in position, without drift. If drift occurs, yoke brake or bearing preload must be adjusted, or bearing serviced. See Paragraph 4.9.

3.3.4 Inspect Suspension Arm Vertical Motion (See Figure 3-3)

Suspension arm up and down movement should be smooth and quiet, require minimal positioning force, and should not drift from the selected position.

1. Move suspension arm through its complete vertical range. Check that the force required is smooth and consistent throughout, and that the force required to raise the arm is substantially the same as the force to lower it. If not, the bearings may be contaminated, or the counterbalance spring system may require adjustment.

2. Check at several locations throughout the range of vertical travel that suspension arm remains where positioned, without drift. If drift occurs, counterbalance system requires adjustment. See Paragraph 4.10.3.

NOTE: The suspension arm and lighthead are factory adjusted to remain in balance as they rotate about the suspension fork.

3.3.5 Check Vertical Suspension Tube Rivets (See Figures 3-4 and 3-5)

CAUTION: Two people are required when inspecting the light arm suspension: one to support the light and arm, and one to hold the vertical suspension tube.

WARNING: THE TWO 1/4\"/>

1. Inspect lower drive rivets as follows:

a. While second person supports the light arm assembly, securely position a cloth-type strap wrench on the vertical suspension tube above the suspension fork.

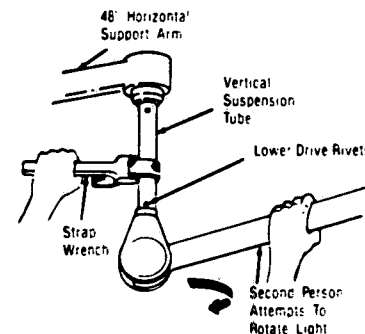


Figure 3-4. LOWER DRIVE RIVET INSPECTION.

b. Have second person attempt to rotate the light arm assembly around the vertical suspension tube.

c. If light assembly can be rotated when the suspension tube is held in place, inspect lower drive rivet installation and service if necessary. See Paragraph 4.11.

2. Inspect upper drive rivets as follows:

a. With strap wrench around the vertical suspension tube, insert a 9/16-inch Allen wrench (or 1-1/2-inch box wrench) in the hex nut of the horizontal support arm pivot, to prevent rotation. If vertical suspension tube can be rotated, inspect upper drive rivet installation and service if necessary. See Paragraph 4.11.

3. Make certain that a center pin is in place on each rivet, driven in and seated flush with rivet head.

3.3.6 Inspect Rotation of 48\"/>

Rotation of the suspension arm is created by turning the suspension tube within the outer hub of the 48\"/>

1. Rotate suspension tube at least one complete turn in both directions within the 48\"/>

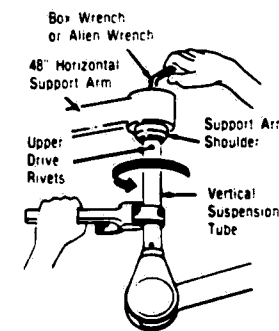


Figure 3-5. UPPER DRIVE RIVET INSPECTION.

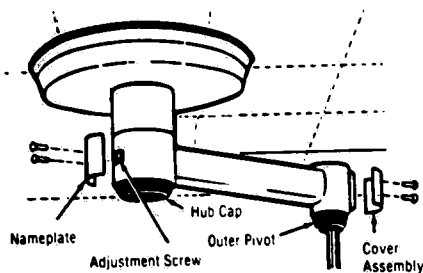


Figure 3-6. INSPECT BRUSHES.

2. Rotate 48" horizontal support arm at least one complete turn in both directions around the central hub. If rotation is not smooth and consistent, bearings or electrical-brush systems may be defective and require servicing.

3. Check at several locations along the rotational paths that 48" horizontal support and suspension arms remain where positioned, without drift. If drift occurs, a brake at the central hub or outer hub may require adjustment, or central mount may require leveling. See Paragraph 4.13.

3.3.7 Inspect Brushes (See Figure 3-6)

1. Remove nameplate and cover assembly from each end of support arm.

2. Disconnect all three wires from each brush holder assembly. Secure wires by bending sideways, so that they will not slip into hub.

3. Remove the three screws which secure brush holder.

4. Remove brush holder from arm.

5. Examine collector rings for burned spots, dirt, etc., and clean as necessary.

6. Check condition of brushes. If discolored or damaged, replace. See Paragraph 4.12.

7. Reassemble items by following above steps in reverse order. **Black** wire must be connected to top terminal on brush holder, **white** wire to bottom terminal, and **green** wire to middle terminal.

NOTE: If light flickers when central mount arm is rotated, order kit P-764315-406 (two per 48" arm). Instructions for use are contained in kit.

3.3.8 Miscellaneous Checks (Lighthouse and Suspension Assembly)

1. Check Hub Cap (Central Mount)

a. Inspect fit of hub cap to suspension arm. There should be no gaps between hub cap outer edge and surface of arm at any point of a 360 degree rotation.

b. The hub spacer should fit snug against the hub with no gaps.

c. If any gaps are detected, tighten hub cap mounting screws.

2. Inspect Fork Covers

Verify numbered plate is in place at suspension fork and that it matches the number on the corresponding 25 amp variable intensity controller. Fork covers are the access to the terminal block and keep it protected.

3. Inspect Yoke Plug Buttons

a. Make sure retainer wires are attached.

b. Spread button fingers to tighten fit into yoke.

4. Inspect Nameplate/Covers

Verify nameplate (located on central hub) and cover assembly (located on outer hub of suspension arm) are securely in place, as they are the access to electrical brushes and keep them protected.

5. Inspect Lamp Cover

Check cover (located on back of lighthouse) to be sure hinge is secure. If cover is loose or misaligned, tighten hinge screws.

3.3.9 Check Variable Intensity Control Operation (See Figure 3-7)

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

1. Check circuit breaker:

a. Keep power OFF at rotary switch. Set circuit breaker ON.

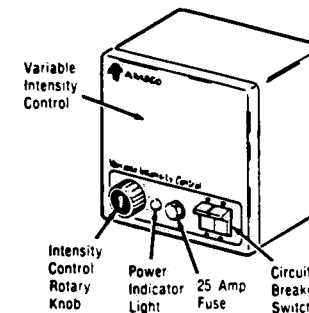


Figure 3-7. 25 AMP VARIABLE INTENSITY CONTROLLER.

b. Turn rotary switch to setting 5.

c. Wiggle circuit breaker toggle switch in its ON position.

If light flickers, circuit breaker is defective. If circuit breaker trips OFF, breaker may be defective, or other electrical faults in the system may exist.

2. Check rotary switch:

a. With power on at circuit breaker, turn rotary switch from OFF through each of the five intensity/ON positions. The higher the number, the more the intensity should increase.

b. Turn the rotary switch to the midway positions between each of the intensity settings and immediately release the knob. **DO NOT HOLD THE SWITCH BETWEEN POSITIONS.** If light goes out temporarily or switch does not snap to one of the intensity settings, switch is defective and should be replaced.

NOTE: If lighthouse will not light, ensure electrical power is on and check fuse by substituting a new tested fuse. (Fuse cannot be visually inspected.)

3.3.10 Inspect Optical Performance

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

1. Check intensity. If illumination seems too low, check for following possible problems and correct if needed:

a. Discolored lamps (refer to Paragraph 3.3.1, *Inspect Lamp, Lamp Socket, and Lamp Holder*).

b. Burned-out lamps.

c. Corroded or burned-out lamp sockets.

d. Lamp not fully seated and centered in lamp holder groove.

e. Dirty lens or reflectors (refer to Paragraph 2.4.5, *The Acrylic Lens and the Sterile Handle*).

If preceding are correct, but illumination remains low, fault lies with electrical system.

2. Check steadiness of illumination. If light flickers or intensity falters when lighthouse is repositioned, brush system or electrical connections may require servicing.

3. Check power to lighthouse. If lamp(s) are known to be good, but light does not come on, check for bad fuse, circuit breaker, or rotary switch (refer to Paragraph 3.3.9, *Check Variable Intensity Control Operation*). If okay, but lamp remains off, electrical connections may be loose or controller may be defective.

4. Check that light comes on at all five intensity settings. If light comes on at some intensity settings but not all, the rotary switch or PC board may be defective.

5. Check that light intensity increases when controller setting is increased. If it does not, controller may be improperly installed, controller may be defective, or electrical connections may be loose.

NOTE: Incorrect setting of the 25 Amp Variable Intensity Control output voltage of 21.5 volts ± 0.1 volt (measured with a TRUE RMS METER) will affect illumination level (voltage set too low) and lamp life (voltage set too high). Although this output does not normally require adjustment after installation adjust per Paragraph 3.3.11 if necessary.

3.3.11 Checking/Setting 25 Amp Variable Intensity Control Output Voltage (See Figure 3-8)

CAUTION: 34" Polaris SL 25 Amp Variable Intensity Control output voltage must be set with a TRUE RMS AC VOLTMETER (Beckman HD130). Standard voltmeters will give erroneously high readings that can lead to reduced lamp life and potential equipment damage. If a TRUE RMS VOLTMETER is not available, contact your AMSCO service representative or local regional office.

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

1. Turn on electric power at the fuse box or disconnect switch.

2. Turn on electric power at the variable intensity control (circuit breaker switch and rotary knob) and turn rotary knob to position 5 (maximum).

NOTE: Voltage setting must be performed with lighthouse at maximum intensity and with all 8 lamps functioning.

3. Using a TRUE RMS VOLTMETER measure voltage at jack provided in center of lamp holder assembly. Voltage should be 21.5 volts \pm 0.1 volt.

4. If adjustment is required:

a. Remove front panel on Variable Intensity Control.

b. Adjust voltage by turning potentiometer, located in upper right hand corner of variable intensity control box, clockwise to increase voltage or counter-clockwise to decrease voltage.

5. Gently close lamp cover, verifying that the latch engages.

6. Turn rotary knob to each numbered position ensuring power through all intensity settings.

7. Turn off power at variable intensity control (rotary knob AND circuit breaker switch) when setting is completed.

8. Replace front panel on variable intensity control.

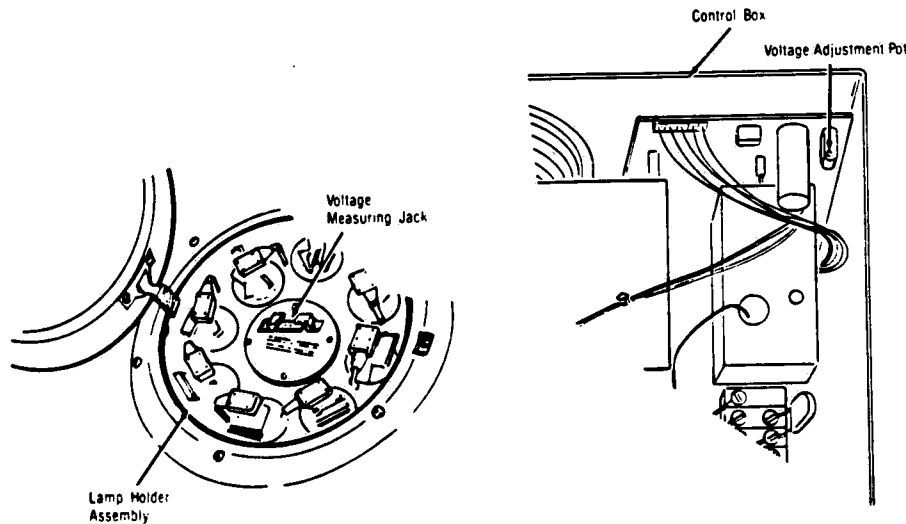


Figure 3-8. CHECKING/SETTING OUTPUT VOLTAGE.

3.4 TROUBLESHOOTING

1. Use operating instructions presented in Section 2 to verify trouble symptoms.
2. After symptom has been verified, refer to Table 3-3. From the table, select **TROUBLE** example that is most appropriate. Follow **POSSIBLE CAUSE AND/OR CORRECTION** instructions and references.
3. Use **Variable Intensity Control Block Diagram (Fig. 1-3)** as a reference for understanding operation of the fixture and in locating problems.
4. Refer to **Section 4, COMPONENT REPAIR AND REPLACEMENT** for recommended procedures when performing repairs.

TABLE 3-3. TROUBLESHOOTING CHART

TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION
1. Lamps will not come on.	<p>a. Assure that main circuit breaker, controller circuit breaker, and controller rotary switch are set at ON.</p> <p>b. Assure that controller fuse is not blown.</p> <p>c. Check lamps, replace if necessary.</p> <p>NOTE: Polaris SL utilizes eight lamps connected in parallel. If one lamp fails, the remaining will not be affected. All eight lamps would have to fail for no light to be emitted.</p> <p>d. Check for controller input power availability.</p> <p>e. Check controller thermistor for continuity when voltage is applied.</p> <p>f. Check controller transformer output for power availability.</p> <p>g. Check controller output terminals for proper voltage (approximately 21.5 volts). If no voltage is present, change SCR module.</p> <p>h. Check central mount for continuity (refer to TROUBLE - Central Mount).</p> <p>i. Check for proper electrical connections on lampholder terminal block, yoke, suspension fork, and central mount ceiling junction box.</p> <p>j. Check lampholder assembly and lamp sockets for continuity.</p> <p>k. Make sure the proper lamps are installed.</p>

TABLE 3-3. TROUBLESHOOTING CHART (Continued)

TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION
2. Lamps flicker or work intermittently.	<p>a. Check that lamps are installed into lamp sockets positively.</p> <p>b. Check lamp sockets for signs of corrosion, arcing, pitting, or cracked ceramic bases. Refer to Paragraph 4.3.2 for lamp socket replacement.</p> <p>c. Check for proper electrical connections on lampholder terminal block, yoke, suspension fork, and central mount ceiling junction box.</p> <p>d. Check central mount for continuity (refer to TROUBLE — Central Mount).</p> <p>e. Check controller for proper electrical connections of input and output leads. Check condition of fuse and fuse holder, circuit breaker, and rotary switch. (Refer to Paragraph 3.5.4.)</p> <p>f. Check SCR module and change if required. (Refer to Paragraph 4.18.)</p> <p>g. Wires in J1 connector on the circuit board are loose or not crimped properly.</p>
3. Light intensity or beam pattern is poor.	<p>a. Check for burned out lamps, for lamp discoloration and for proper lamp part numbers.</p> <p>b. Check lighthouse for proper operating voltage. (Refer to Paragraph 3.5.4.)</p> <p>c. Check for high-resistance conditions caused by corrosion, arcing, pitting, etc., on lamp pins, socket contacts, all system electrical connections, central mount brush systems, controller rotary switch.</p> <p>d. Make sure all lamps are centered and properly seated on lampholder plate.</p> <p>e. Make sure lampholder plate is properly oriented (all five attachment screws used) and plate is screwed down squarely to filter housing.</p> <p>f. Clean lens if required.</p> <p>g. Check for correct R-2 reflector adjustment. (Refer to Paragraph 3.5.5.)</p> <p>h. Check position of rotary switch.</p>

TABLE 3-3. TROUBLESHOOTING CHART (Continued)

TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION
4. Circuit breaker cannot be set to ON position.	<p>Set rotary switch to OFF position and attempt to set circuit breaker ON.</p> <ul style="list-style-type: none"> • If circuit breaker will not set, remove fuse and attempt to set. • If circuit breaker will set, check transformer for high current draw and correct. <p>Replace circuit breaker if it still cannot be set to ON position.</p>
<p>5. Central Mount</p> <p>a. Lamps will not come on, flicker, work intermittently, or intensity is low.</p> <p>b. Arm rotation requires excessive force or arm drifts.</p>	<p>a. 1. Check for proper, secure and tight electrical connections in ceiling junction box and on each lead connection to the brushholders.</p> <p>a. 2. Check brushes and slip rings for corrosion, dirt, pitting, burn marks or other signs of poor electrical contact.</p> <p>a. 3. Check brush assembly for smooth sliding in brushholder and for excessive set in compression spring. Repair or replace brushes/brushholders per Paragraph 4.12.</p> <p>b. 1. Check that installation is level. Adjust per Paragraph 4.16.2 if necessary.</p> <p>b. 2. Check brake adjustment. See Paragraph 4.13.</p>
6. Suspension Arm drifts up or down.	Adjust per Paragraph 4.10.3.
7. Yoke drifts.	Yoke brake adjustment inadequate. Adjust per Paragraph 4.9.
8. Yoke rotation tight, noisy, not smooth.	Bearings contaminated and/or bearing preload excessive. Service per Paragraph 4.9.
9. Lighthouse drifts, positioning force is uneven through travel, or positioning is not smooth or binds.	<p>a. Brake adjustments improper. Adjust per Paragraph 4.8.2.</p> <p>b. Brake lubrication improper or contaminated. Service per Paragraph 4.8.1.</p>

TABLE 3-3. TROUBLESHOOTING CHART (Continued)

TROUBLE	POSSIBLE CAUSE AND/OR CORRECTION
10. Lamp life is shorter than 150 hours.	<p>a. Ensure that proper lamp is being used.</p> <p>b. Verify proper transformer tap connections and stable facility power.</p> <p>c. With controller rotary switch set at position 5, measure voltage at lampholder jack. Reading should be 21.5 volts ± 0.1 volt. Adjust controller output per Paragraph 3.5.4.</p>
11. Center hub cap of central-mount loose or falls off.	a. Check for proper installation of mounting screws (two).
12. Cannot change intensity of lighthouse.	<p>a. Check for proper transformer tap connections on the primary side.</p> <p>b. Check that lamp voltage is properly set.</p> <p>c. Rotary switch is defective — change switch.</p> <p>d. SCR module is defective — change module.</p>

3.5 FIELD TEST PROCEDURE

3.5.1 General

34" Polaris SL systems must be tested and inspected according to this procedure on initial start-up or whenever an adjustment or repair has been made. Keep a record of the test. Each test must meet the standards of material, workmanship and performance set forth in this procedure. Refer to Component Repair and Replacement (Section 4), or Troubleshooting (Table 3-3), should problems arise or adjustments be required.

TEST EQUIPMENT

- | | |
|--|--------------|
| 1. Light meter kit | P-764315-933 |
| 2. Spring scale | P-757290-091 |
| 3. Level | P-752931-091 |
| 4. Strap wrench (if available) | |
| 5. TRUE RMS VOLTMETER
(Beckman HD130) | P-764321-205 |

3.5.2 Check For Proper Mechanical Installation

WARNING THE TWO DRIVE RIVETS FURNISHED FOR SECURING THE VERTICAL SUSPENSION TUBE TO THE SUPPORT ARM AND THE FOUR DRIVE RIVETS FOR SECURING THE VERTICAL SUSPENSION TUBE TO THE SUSPENSION FORK MUST BE PROPERLY INSTALLED. . .OMISSION OR IMPROPER INSTALLATION COULD ALLOW THE LIGHTHEAD TO FALL.

- Vertical Suspension Tube Rivets (Upper and Lower) (See Figures 3-9 and 3-10)

a. Place a cloth strap wrench (or any other device that would immobilize tube without damaging it) on vertical support tube located above suspension fork.

b. While holding tube, lift suspension arm and attempt to rotate. If arm rotates this is an indication that the four bottom rivets are not properly installed.

c. Holding vertical tube with strap wrench, attempt to rotate outer spindle (CW and CCW) using wrench on spindle nut. If spindle rotates this is an indication that the upper two rivets are not properly installed.

- Rubber Hub Cap

Make sure the hub cap mounting screws properly attach hub cap to bottom of central mount hub.

- Mount Alignment

Using a level, make sure the support arm(s) are parallel, measuring arm(s) in all four quadrants.

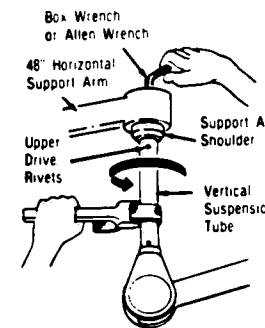


Figure 3-9. UPPER DRIVE RIVET INSPECTION.

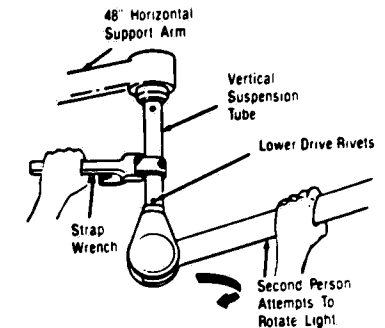


Figure 3-10. LOWER DRIVE RIVET INSPECTION.

3.5.3 Positioning Force Tests

1. Central Mount Positioning Forces

a. Attach spring scale to support arm per Figure 3-11.

b. The force necessary to start movement at the center rotation point of the support arm should be 4 to 6 lbs. Adjust brake if necessary.

c. With yoke/lighthead pivot at approximately same height as suspension fork and with lighthouse parallel to floor, attach spring scale to yoke near its attachment to the lighthouse.

d. The force necessary to start movement at the outer rotation point of the support arm should be 2 to 5 lbs. Adjust brake if necessary.

NOTE: Perform steps b-d with arms rotated at three different locations.

NOTE: After positioning forces have been checked, adjust brakes for smooth, quiet, drift-free operation.

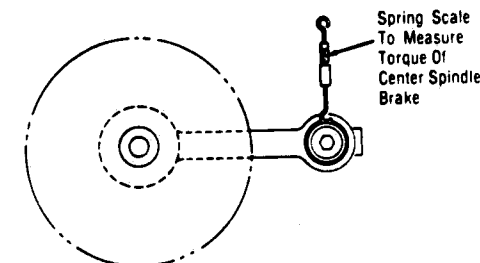


Figure 3-11. ATTACHING SPRING SCALE TO CENTRA ARM.

2. Lighthouse and Suspension Arm Positioning Forces

a. Lighthouse within the yoke

1) Position lighthouse with reflector rim parallel to floor.

2) Attach a sterile handle to lighthouse.

3) Attach the spring scale to the end of the sterile handle (use a piece of tape for attachment).

NOTE: Ensure that the spring scale is parallel to the lens and in line with the suspension arm.

4) The force necessary to rotate light (stop to stop) within the yoke should be 1 to 3 lbs. Adjust friction brake if necessary. See Figure 3-12.

5) Make sure lighthouse rotation within the yoke is $310^\circ \pm 10^\circ$.

b. Yoke about suspension arm

1) Attach spring scale to sterile handle, again.

NOTE: Ensure that the spring scale is parallel to the lens and in line with the lighthouse pivots.

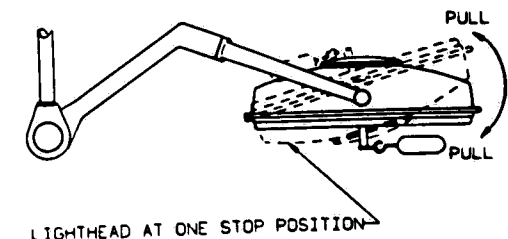


Figure 3-12. LIGHTHEAD ROTATION IN YOKE.

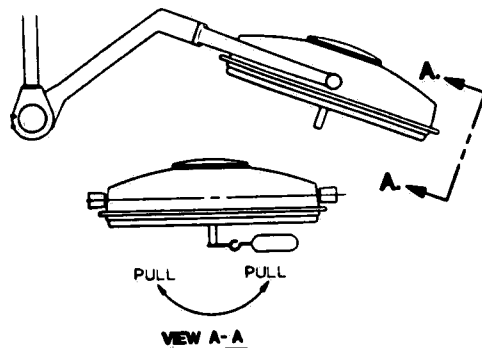


Figure 3-13. LIGHTHEAD/YOKE ROTATION ABOUT SUSPENSION ARM.

2) The force necessary to rotate the lighthead and yoke (stop to stop) about the suspension arm should be 1 to 3 lbs. See Figure 3-13.

3) Make sure yoke arm rotation is $328^\circ \pm 10^\circ$.

c. Suspension arm (raise/lower)

1) Attach spring scale to end of suspension arm.

2) The force necessary to position arm (full up and down) should be 5 to 13 lbs. Adjust if necessary. See Figure 3-14.

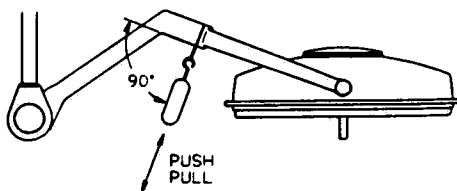


Figure 3-14. SUSPENSION ARM MOTION.

3.5.4 Check For Proper Electrical Installation, 25-Amp Variable Intensity Control (See Figures 3-15 and 3-16)

WARNING: USE 12 GAUGE WIRE (MINIMUM DIAMETER) FOR CONNECTING THE 25 AMP VARIABLE INTENSITY CONTROL TO THE 34" POLARIS SL LIGHTHEAD. REFER TO EQUIPMENT DRAWING NUMBER 129357-828 FOR SINGLE LIGHTHEAD INSTALLATIONS OR 129357-829 FOR INSTALLATIONS TOGETHER WITH A 22" POLARIS LIGHTHEAD. (ABOVE DRAWING NUMBERS DO NOT APPLY TO SPECIAL ORDERS.)

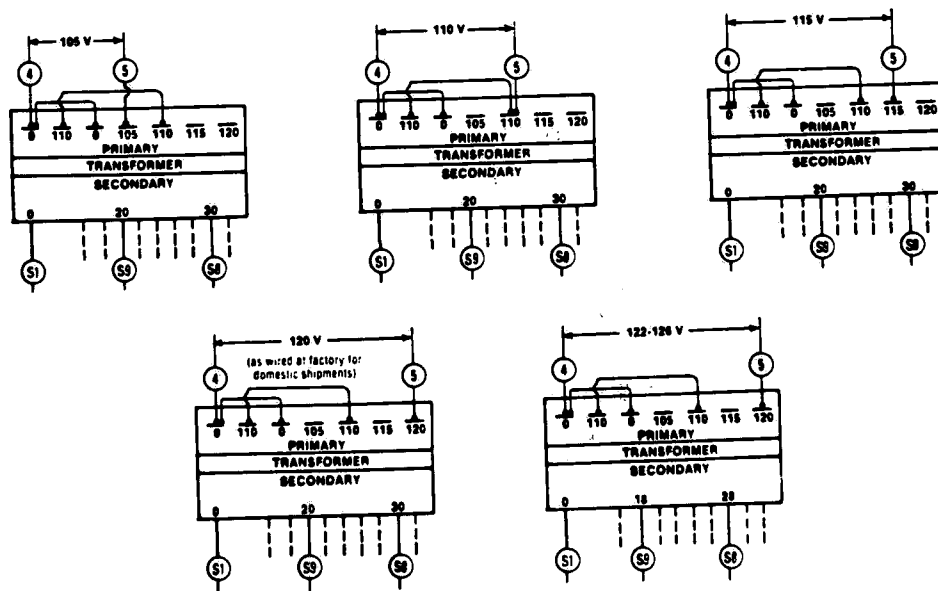


Figure 3-15. VOLTAGE TAP CONNECTIONS.

3-14
764321-180

C- 9

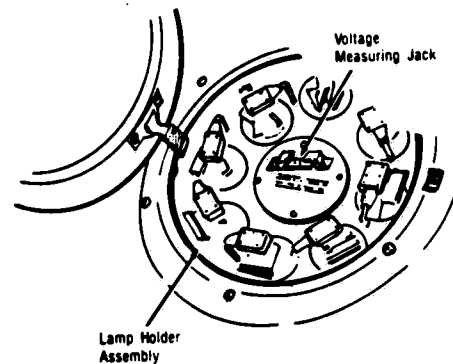


Figure 3-16. CHECKING/SETTING OUTPUT VOLTAGE.

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthead is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

Incorrect setting of the 25-Amp Variable Intensity Control output voltage of 21.5 volts ± 0.1 volt (measured with a TRUE RMS METER) will affect illumination level (voltage set too low) and lamp life (voltage set too high). Although this output does not normally require adjustment after installation, check and adjust as follows if necessary.

NOTE: Before testing electrical system, check that lamps and lamp sockets are not degraded and that lamps are properly installed in sockets. Voltage measurements should be taken during peak electrical usage periods in the facility and with lighthead at maximum intensity. Voltage setting must be performed with lighthead at maximum intensity.

1. Remove variable intensity control front cover.

2. Measure loaded input line voltage. Input voltage is measured with the variable intensity control rotary knob in the number 5 position and all 8 lamps illuminated. Refer to Figure 3-15 and Table 3-4 to make the necessary changes in the wiring. These are the recommended primary and secondary voltage tap connections when the input line voltage is as indicated.

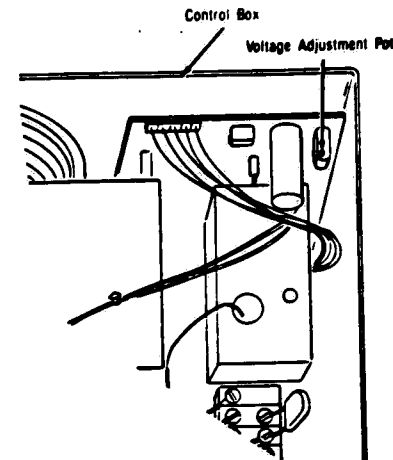


TABLE 3-4.
LINE VOLTAGE VARIATIONS AND
TAP CONNECTIONS

Line Voltage Range	Primary Tap	Secondary Tap
102.0 — 106.9	105 V	*30/20
107.0 — 111.9	110 V	*30/20
112.0 — 116.9	115 V	*30/20
117.0 — 121.9	120 V	*30/20
122.0 — 126.0	120 V	**28/18

*Wire No. S8 (from SCR module) is connected to 30 V transformer tap and wire No. S9 (from SCR module) is connected to 20 V tap.

**Connect S8 from SCR module to S4 (28 V) transformer tap and connect S9 from SCR module to S3 (18 V) transformer tap and insulate S9 (20 V) transformer tap. These taps are used if lighthead voltage cannot be lowered when the primary tap is set on 120 VAC.

CAUTION: 34" Polaris SL 25 Amp Variable Intensity Control output voltage must be set with a TRUE RMS AC VOLTMETER (Beckman HD130). Standard voltmeters will give erroneously high readings that can lead to reduced lamp life and potential equipment damage. If a TRUE RMS VOLTMETER is not available, contact your AMSCO service representative or local regional office.

3. Using a TRUE RMS VOLTMETER set voltage (measured at jack provided in center of lampholder assembly) to 21.5 volts ± 0.1 volt.

3-15
764321-180

C- 10

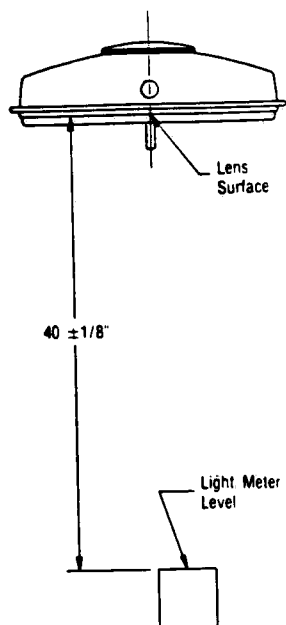


Figure 3-17. LIGHTHEAD AND LIGHT METER POSITIONING.

a. Verify that all 8 lamps are lit.

b. Adjust voltage by turning potentiometer, located in upper right hand corner of variable intensity control box, clockwise to increase voltage or counter-clockwise to decrease voltage.

4. Reinstall variable intensity control front cover.

5. Turn rotary knob to each numbered position ensuring power through all intensity settings.

IMPORTANT: Check that lamp voltage increases or decreases (measure at lampholder jack) approximately 0.3 to 1.0 volt each time the rotary switch position is changed. If voltage does not change as indicated, recheck the transformer primary tap connections. (See Table 3-4.)

If transformer must be reconnected to a tap voltage lower than the actual line voltage measured in step 1 in order to achieve 21.5 volts ± 0.1 volt output at the lampholder rack, this indicates higher than normal voltage losses in the system. Areas to check are as follows:

a. Brush condition (contact and surface condition of brushes and slip rings).

b. Excessive length of wire run between controller and central hub mount (more than 30 feet) or wire diameter smaller than specified (12 gauge minimum).

c. SCR module defective.

d. Loose or deteriorated wiring connections in controller, at brushes, or at suspension fork.

6. Turn off power at variable intensity control (rotary knob AND circuit breaker switch) when testing is completed.

7. Gently close lamp cover, verifying that the latch engages.

3.5.5 Light Optics Testing Procedure (Using Light Meter Kit, P-764315-933) (See Figures 3-17 and 3-18)

NOTE: Verify that all eight lamps are functional and are properly installed in the lampholder. Verify 21.5 volts ± 0.1 volt at lampholder jack using a TRUE RMS VOLT METER only. Verify that sockets and lamps do not have burned or corroded pin contacts and pins. Check that lighthouse optical components are relatively free of dust and other contaminants; clean if necessary. If an optical adjustment is made, it must be tested in accordance with this procedure.

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

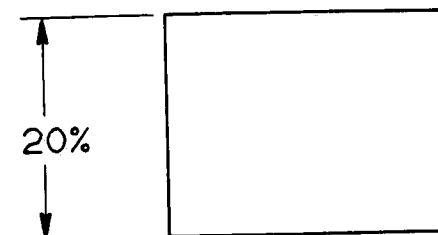
1. Energize lighthouse and set controller to high intensity, setting 5 on rotary switch. Allow system to run for at least 5 minutes.

2. Place test pattern alignment template on surgical table beneath the mechanical centerline of the lighthouse.

3. Set GE Model 214 light meter in 100% block on template.

4. Position lighthouse so that rubber trim ring is 40 inches above and parallel to the top of the light meter. See Figure 3-17.

5. Locate the peak intensity reading on light meter by positioning meter inside light pattern and then center the template under the meter. See Figure 3-18.



6. Measure and record the peak intensity. Use conversion chart furnished with light meter to determine the actual footcandle reading. Nominal intensity is 9000 footcandles. **MINIMUM ACCEPTABLE INTENSITY IS 8500 FOOTCANDLES.**

7. Verify the peak intensity is at or above 8500 footcandles.

8. Move the meter to the 20% blocks on template. Meter readings after correction of at least 20% of maximum obtained in 100% block must be found at the 20% blocks.

9. Rotate template 90 degrees and repeat the check.

10. If proper readings cannot be obtained in steps 6, 7 and 8, adjust pattern size per Paragraph 4.17. Repeat steps 5 thru 9 if any adjustments are made.

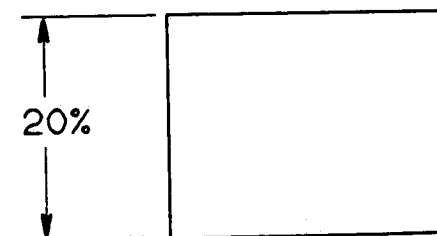
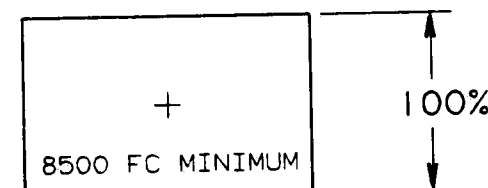


Figure 3-18. LIGHT OPTICS TESTING TEMPLATE.

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 4

COMPONENT REPAIR AND REPLACEMENT

WARNING REPAIRS AND ADJUSTMENTS SHOULD BE ATTEMPTED ONLY BY EXPERIENCED PERSONS FULLY ACQUAINTED WITH THIS EQUIPMENT. USE OF INEXPERIENCED, UNQUALIFIED PERSONS TO WORK ON THE EQUIPMENT OR THE INSTALLATION OF UNAUTHORIZED PARTS COULD CAUSE PERSONAL INJURY OR RESULT IN COSTLY DAMAGE.

WARNING WHEN PERFORMING ANY PROCEDURES INVOLVING THE LIGHT, NOTE THE FOLLOWING:

- ENSURE ELECTRICAL SERVICE IS SHUT OFF AT CIRCUIT BREAKER OR FUSE BOX BEFORE BEGINNING ANY MAINTENANCE ON THIS LIGHTING FIXTURE.
- PERMIT LAMPS AND SOCKET ASSEMBLIES TO COOL BEFORE TOUCHING.

4.1 GENERAL

This section includes instructions for the adjustment, disassembly, repair and replacement of selected components. Illustrations showing the various parts and assemblies referred to in this section are located in Section 5.

4.2 LAMP REPLACEMENT PROCEDURE (See Figure 4-1)

CAUTION: When replacing the lamp(s) make sure the proper lamp (P-93902-608) is installed. Other lamps may look like our lamp but will not be rated at the proper voltage (22 volts). Damage to the circuit board could occur when improper lamp is installed.

NOTE: Lightheades are equipped with intensity level controllers. For longer lamp life, use higher levels only when needed.

1. Open hinged lamp cover located on back of lighthead by visually locating hinge and pulling up on the cover handle in direction of hinge.

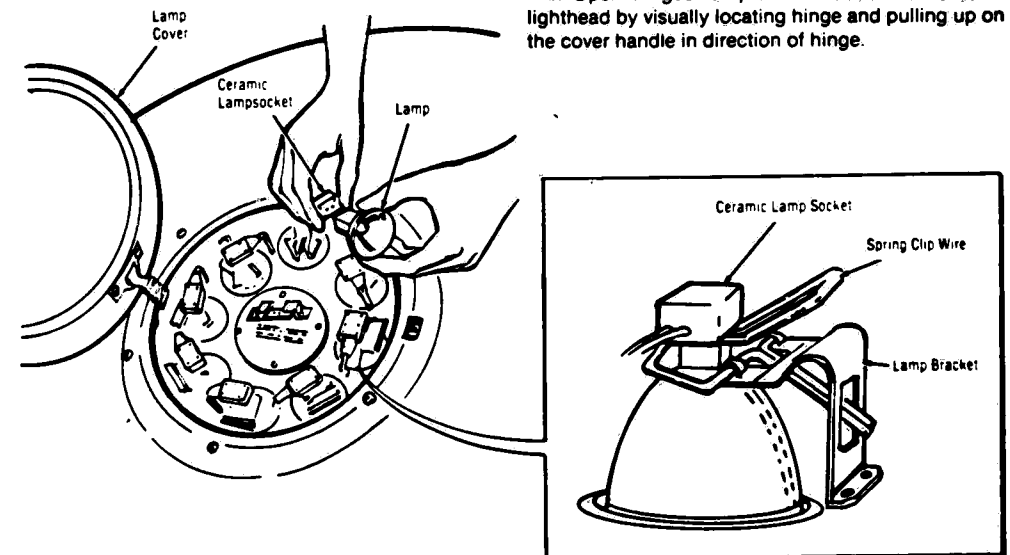


Figure 4-1. LAMP REPLACEMENT.

4-1

764321-180

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

2. Check for burned-out lamps. Turn on electrical power to the lighthouse (use setting number 1 of rotary control knob) to identify burned-out lamps. Turn off power and allow lamp area to cool. Replace lamps as required.

3. When surfaces are cool, remove burned-out lamp by slowly pushing down on the spring clip. The lamp socket will separate from the lamp and the lamp will then eject from the lamp bracket.

4. Remove used lamp.

CAUTION: Do not touch glass portion of lamps or inner surface of lamp reflectors when relamping or in general cleaning. Skin oils are harmful to lamp life. If bulb or inner surface of its reflector is touched, wipe with alcohol and pat dry. Use clean, soft cloths only.

5. Grasp new lamp by the outer rim of the reflector and insert lamp pins into ceramic socket.

6. With spring clip wire in the retracted position, slide lamp with socket into position under lamp bracket so that it is securely seated and centered in groove of the lamp holder assembly.

7. Gently close lamp holder cover, verifying that the latch engages.

NOTE: When replacing defective lamp, use lamp P-93902-608 only.

4.3 LAMPHOLDER, LAMP SOCKET, HEAT FILTER REPLACEMENT

WARNING: BE SURE TO DISCONNECT POWER AT MAIN CIRCUIT BREAKER AND/OR VARIABLE INTENSITY CONTROL AND ALLOW FIXTURE TO COOL PRIOR TO BEGINNING ANY WORK.

4.3.1 Removal of Lampholder (See Figures 5-9, 5-10)

1. Remove all lamps prior to servicing lampholder.
2. Remove five screws securing lampholder to filter housing.

3. Lift lampholder plate from its seat on the filter housing enough to access the terminal block mounted on the bottom side.

4. Disconnect the two input leads one at a time. See Figure 4-2. **Note:** Input leads have ring terminals, therefore terminal block connection screws must be temporarily removed. Replace each screw immediately to maintain proper lamp socket wiring.

5. Remove lampholder assembly from lighthouse.

4.3.2 Lamp Socket Replacement

1. Remove lampholder assembly as described in paragraph 4.3.1.

NOTE: All eight lamp sockets are connected in parallel.

CAUTION: If one lamp socket is burned or corroded, all eight sockets should be inspected and replaced if necessary.

2. Disconnect the lamp socket leads from the terminal block (one lead from each of the sockets in series). Remove the socket from the lampholder plate by pulling leads through clearance hole in plate one at a time. See Figure 4-2.

3. Route new socket leads through clearance hole in plate one at a time. Position socket and sleeving and connect ring terminals to terminal block in same location as removed from. Refer to Paragraph 4.3.3 to reinstall lampholder.

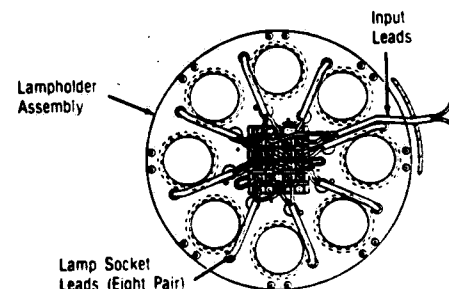


Figure 4-2. LAMP HOLDER TERMINAL BLOCK CONNECTIONS.

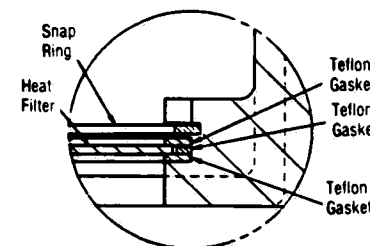


Figure 4-3. HEAT FILTER ASSEMBLY.

4.3.3 Installation of Lampholder (See Figures 5-9, 5-10)

NOTE: Screw hole pattern in lampholder plate is not symmetrical; plate will only align one way.

1. Connect the two input leads to terminal block (see Figure 4-2).

2. Position lampholder plate with the five screw clearance holes in plate aligned with the five tapped holes in filter housing.

3. Lower lampholder plate onto filter housing. As plate is lowered, position lamp socket leads such that they are routed in grooves of filter housing.

CAUTION: Do not pinch lamp socket leads between lampholder plate and filter housing.

4. After fully seating plate to filter housing, install five screws and tighten.

4.3.4 Heat Filter Replacement (See Figure 5-10)

1. Remove lampholder per Paragraph 4.3.1.

2. Using snap ring pliers, remove snap ring and then remove the top, center and bottom Teflon filter gaskets.

NOTE: Due to the large size of the snap ring, a notch filed into the inside of the tips of typical snap ring pliers will result in better holding power.

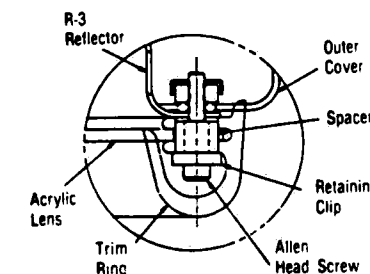


Figure 4-4. ACRYLIC LENS AND TRIM RING (Units Before 9/86).

3. Remove old filter and replace with new filter.

CAUTION: Coated side of filter is to face lamp cover. Do not touch heat filter with fingers. Make sure all three Teflon gaskets are installed and oriented as shown in Figure 4-3.

4. Reinstall top Teflon gasket. Ensure all three Teflon gaskets and filter are firmly seated together (see Figure 4-3).

NOTE: When reinstalling snap ring, installation will be easier if the rounded portion of the snap ring is facing away from the filter.

5. Using snap ring pliers reinstall snap ring. Ensure snap ring is seated in snap ring groove.

6. Reinstall lampholder per paragraph 4.3.3.

4.4 ACRYLIC LENS REPLACEMENT

NOTE: Two different methods of retention for the acrylic lens have been used on the 34" Polaris SL lighthouse. If the unit was shipped before 9/86, refer to paragraph 4.4.1. If the unit was shipped after 9/86, refer to paragraph 4.4.2.

4.4.1 Units Shipped Before 9/86 (See Figures 5-9 and 4-4)

1. Roll back edge of rubber trim ring to access Allen head screws. Remove all sixteen Allen head screws, rectangular retaining clips, spacers, and flat washers.

2. Remove trim ring from around edge of acrylic lens.

3. Remove sterile handle to access screw securing handle support to shaft and remove screw, handle support, inner cover, and acrylic lens.

NOTE: If shaft key is retained in handle support when removed, place key back into shaft keyway.

4. Remove three clips securing glare shield to acrylic lens and remove glare shield.

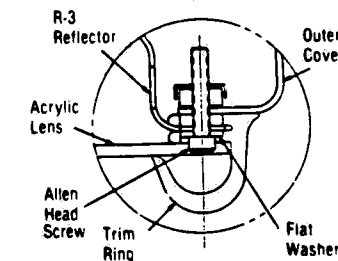


Figure 4-5. ACRYLIC LENS AND TRIM RING (Units After 9/86).

5. Using glare shield and clips removed in step 4, fasten glare shield to new acrylic lens using the three clips spaced at 120 degrees.

6. Assemble acrylic lens, inner cover, handle support to shaft by inserting screw in bottom of handle support and screwing into shaft. Do not fully tighten screw.

7. Align cutouts in edge of acrylic lens with screw holes in R3 reflector and lighthouse outer cover and fully tighten the screw in bottom of handle support into shaft.

8. Assemble trim ring around edge of acrylic lens and align cutouts in trim ring with cutouts in acrylic lens.

CAUTION: Ensure spacers are within cutouts of acrylic lens before tightening screws. Acrylic lens may crack if pinched under spacer.

9. Secure outer diameter of acrylic lens and trim ring to lighthouse by inserting the sixteen allen head screws with rectangular retaining plates, spacers, and flat washers into screw holes (where cutouts are aligned) and tighten.

10. Reattach sterile handle.

4.4.2 Units Shipped After 9/86 (See Figures 5-9 and 4-5)

1. Remove sterile handle.

2. Remove screw securing handle support to shaft and remove handle support, inner cover, and teflon washer.

NOTE: If shaft key is retained in handle support when removed, place key back into shaft keyway.

3. Roll back edge of rubber trim ring until acrylic lens can be grasped and remove lens from trim ring.

4. Remove three clips securing glare shield to acrylic lens and remove glare shield.

5. Using glare shield and clips removed in step 4, fasten glare shield to new acrylic lens using the three clips spaced at 120 degrees.

6. Align cutouts in edge of acrylic lens with allen head screws securing trim ring and R-3 reflector to lighthouse outer cover and insert acrylic lens under outer lip of trim ring.

7. Roll lip of trim ring back and over edge of acrylic lens for entire diameter while maintaining alignment of lens cutouts with the allen head screws.

8. Reassemble teflon washer, inner cover, handle support and screw to shaft and fully tighten the screw in bottom of handle support into shaft.

9. Reattach sterile handle.

4.5 R2 REFLECTOR REPLACEMENT (See Figure 5-11)

CAUTION: When performing procedures involving the reflectors, note the following:

- Do not use AMSCO Surgical Reflector Cleaner on reflector. This cleaner is for aluminum surfaces only and will leave a non-removable film on the reflector.

- Do not use alcohol nor phenolic-base disinfectant solutions on reflector. Permanent damage may result.

- Do not touch reflecting surfaces of R2 or R3 reflector. Skin oils are detrimental to reflective coating. Wear rubber gloves while handling.

1. Remove sterile handle.

2. Remove screw securing handle support to shaft and remove handle support and inner cover. A teflon washer will also be removed on units shipped after 9/86 (not included on units shipped before 9/86).

3. Remove key from shaft if it was not retained in handle support.

4. Using a pocket knife (e.g.) cut through the red RTV sealant which bridges between R2 reflector and shaft assembly.

5. Using snap ring pliers remove snap ring from shaft and carefully lower washers, wave washer, and R2 reflector from shaft.

6. Replace reflector if necessary and position lighthouse, lens facing up.

7. Orient washers, wave washer, and R2 reflector as shown in Fig. 4-6 and assemble over shaft.

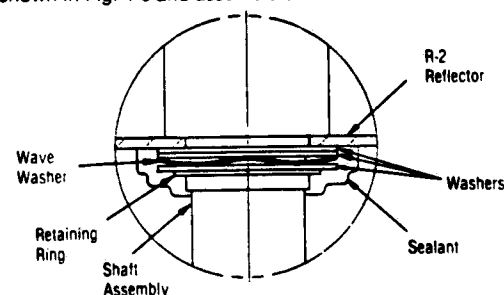


Figure 4-6. SECURING R2 REFLECTOR.

8. Using snap ring pliers assemble snap ring into groove in shaft and firmly seat in bottom of groove.

9. Adjust light pattern size and intensity per Paragraph 4.17 and verify by testing per Paragraph 3.5.5.

10. After adjustment, reseal R2 reflector to shaft assembly using RTV 106 high-temperature sealant. Do not substitute sealants.

11. Reassemble teflon washer (units shipped after 9/86), inner cover, key, and handle support to shaft by inserting the screw in bottom of handle support and tightening into shaft.

4.6 R3 REFLECTOR REPLACEMENT (See Figures 5-9, 5-10)

CAUTION: When performing procedures involving the reflectors, note the following:

- Do not use AMSCO Surgical Reflector Cleaner on reflector. This cleaner is for aluminum surfaces only and will leave a non-removable film on the reflector.

- Do not use alcohol nor phenolic-base disinfectant solutions on reflector. Permanent damage may result.

- Do not touch reflecting surfaces of R2 or R3 reflector. Skin oils are detrimental to reflective coating. Wear rubber gloves while handling.

4.6.1 R3 Reflector Removal

1. Remove acrylic lens per paragraph 4.4.1 (units shipped before 9/86) or 4.4.2 (units shipped after 9/86).

2. On units shipped after 9/86 remove trim ring by removing sixteen allen head cap screws and flat washers which secure trim ring and R3 reflector edge to lighthouse cover.

3. Remove lampholder per Paragraph 4.3.1.

4. Remove shaft assembly from filter housing by removing nut on stud of shaft.

5. Remove lampholder cover from filter housing by removing two screws which secure lampholder cover hinge. These two screws must be turned clockwise to loosen.

6. Remove six screws securing filter housing to lighthouse cover and carefully lower filter housing with R3 reflector attached.

7. Disconnect ground wire by removing ground screw and lockwasher and slide cable assembly out through sleeving in filter housing.

8. Remove six screws securing R3 reflector to filter housing and remove R3 reflector.

4.6.2 R3 Reflector Reassembly

1. Align the three notches on outer edge of R3 reflector with the hinge retaining plate of the filter housing and attach R3 reflector to filter housing using six screws removed in Step 8.

2. Insert cable assembly into sleeving in filter housing and attach ground wire using screw and lockwasher removed in Step 7.

3. Attach filter housing to lighthouse cover using the six screws removed in Step 6.

NOTE: Units shipped after 9/86 have adjustable stud inserts in the filter housing which can be adjusted to compensate for tolerance build up. Adjust as required for necessary clearance between lower edges of lighthouse cover and R3 reflector.

4. Attach lampholder cover by securing lampholder cover hinge to filter housing using two screws removed in Step 5. These two screws must be turned counter-clockwise to tighten.

5. Attach shaft assembly to filter housing by turning shaft until it touches bottom of filter housing and then tighten 1/8 to 1/4 turn more. Torque nut to 100-120 lb.in.

6. Reinstall lampholder per Paragraph 4.3.3.

7. Reinstall acrylic lens per Paragraph 4.4.1 (units shipped before 9/86) or 4.4.2 (units shipped after 9/86).

8. On units shipped after 9/86 reinstall trim ring by placing around lower edge of R3 reflector, aligning cutouts in trim ring with those in R3 reflector and lighthouse cover, and secure with the sixteen allen head screws and flat washers removed in Step 2.

9. Test light optics per Paragraph 3.5.5.

4.7 LIGHTHEAD REMOVAL AND REINSTALLATION (See Figure 5-8)

WARNING BE SURE TO DISCONNECT POWER AT MAIN CIRCUIT BREAKER AND/OR VARIABLE INTENSITY CONTROL AND ALLOW FIXTURE TO COOL PRIOR TO BEGINNING ANY WORK.

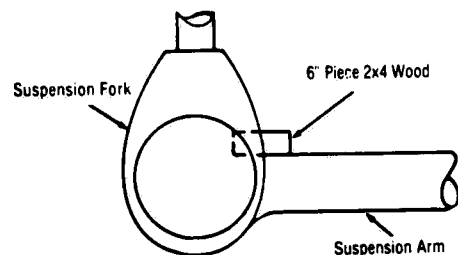


Figure 4-7. PREVENTING SUSPENSION ARM FROM SPRINGING BACK.

4.7.1 Lighthead Removal

1. Lower lighthead to a comfortable working height, then insert a 6" length of 2"x4" wood between the suspension arm and suspension fork to prevent suspension arm from springing back when lighthead is removed. (See Figure 4-7)

2. Remove plug buttons from yoke sides.

3. On wire connection side, pull wires from the yoke to expose butt connectors, then break connections as close as possible to butt connectors.

4. Roll back trim ring just below lighthead pivot points to access pivot shaft-locking screws through lens and outer cover flange. Loosen allen head screws on both sides, but do not remove.

5. On brake side, loosen both locknuts and brake adjustment screw. (See Figure 4-8)

6. Remove three allen head screws and lockwashers from adjusting plate and pull adjusting plate (with adjustment screw still attached) out of yoke.

7. Retrieve curved spring washers and half of spherical nut assembly from inside yoke.

WARNING: REMOVAL OF LIGHTHEAD ASSEMBLY FROM YOKE REQUIRES TWO PEOPLE. LIGHTHEAD WEIGHS APPROXIMATELY 40 POUNDS.

8. Remove five allen head screws and lockwashers from bearing plate on wire connection side and pull bearing plate out of yoke.

9. With lighthead properly supported, remove shaft assembly on brake side (which consists of shaft, spherical bearing, and other half of spherical nut). Lighthead is now ready to be removed.

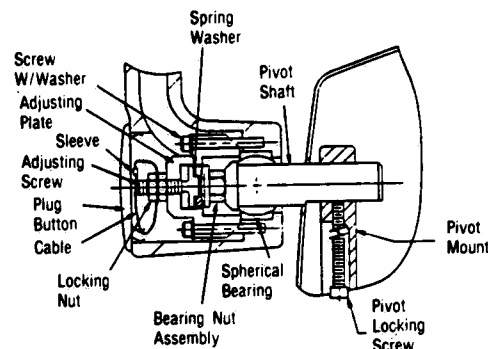


Figure 4-8. BRAKE SIDE PIVOT SHAFT ASSEMBLY.

10. With lighthead properly supported and being careful not to damage wire insulation, reach into yoke cavity (wire connection side) with pliers and pull out pivot shaft assembly (with spherical bearing).

11. Lower the lighthead out of yoke.

4.7.2 Lighthead Reinstallation

NOTE: Apply a light film of Lubriplate #2 to spherical surfaces only of bearings before reassembly.

1. Raise lighthead into yoke.

2. Insert brake-side pivot shaft into yoke and lighthead bracket, noting that flat on shaft must be down to mate with flat in lighthead bracket.

3. Insert wire-side pivot shaft through yoke and while feeding wires through the shaft, push shaft into lighthead bracket and fully into yoke, noting that flat on shaft must be down to mate with flat in lighthead bracket.

4. Place spring washer and spherical nut halves on adjustment screw which is still installed in adjusting plate.

5. Rotate lighthead so that brake side of yoke is facing downward and insert adjusting plate assembly (from Step 4).

6. Secure adjusting plate assembly to yoke with three allen head screws.

NOTE: Make sure adjustment screw is backed off sufficiently to allow adjusting plate to fully seat.

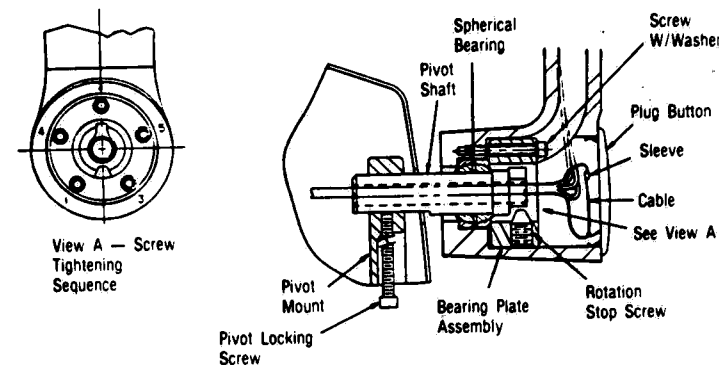


Figure 4-9. WIRE SIDE PIVOT SHAFT ASSEMBLY.

7. Route wires through center of bearing plate and secure bearing plate to yoke using five allen head screws and tighten in the sequence shown in Figure 4-9.

8. Center lighthead in yoke and tighten both pivot-shaft locking screws.

9. Reconnect wires in yoke cavity using butt connectors 82409-001. Slide at least one wire through loop in plug-button restraint cable before making connections.

CAUTION: Do not use wire nuts to make wiring connections inside of yoke. Movement of lighthead may loosen wire nuts.

10. Torque brake adjusting screw and adjust brake per Paragraph 4.8.2.

4.8 LIGHTHEAD BRAKE SERVICING AND ADJUSTMENT (See Figure 5-8)

NOTE: If lighthead rotation forces cannot be achieved in a consistent manner, or rotation is noisy or rough, the brake system may be contaminated and in need of cleaning and relubrication.

CAUTION: The following assembly and lubrication procedures must be followed precisely to assure proper lighthead operation. Deviation will result in erratic operation and possible damage to the brake system and yoke.

4.8.1 Lighthead Brake Servicing

1. Remove lighthead from yoke as described in Paragraph 4.7.1.

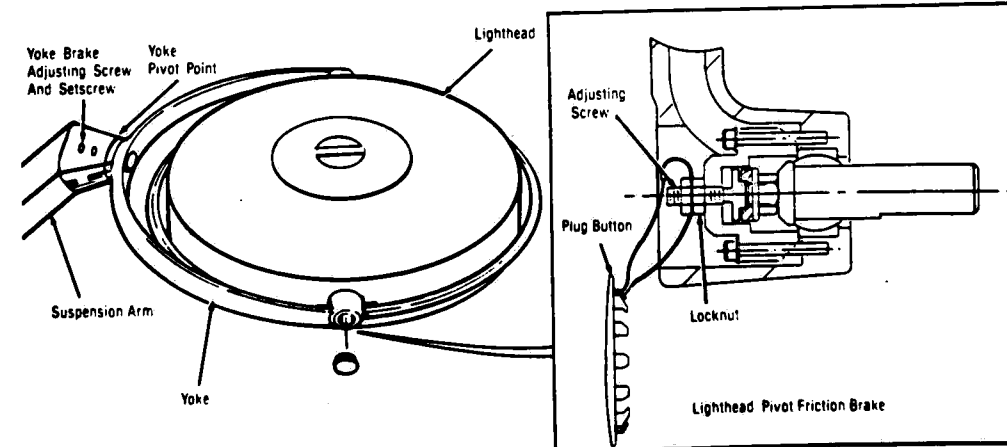


Figure 4-10. LIGHTHEAD BRAKE ADJUSTMENT.

2. Clean and degrease yoke housing and all parts which have been removed.

3. Visually inspect mating surfaces of spherical nut halves for signs of wear. Also place surfaces together and rotate them against each other to feel for roughness.

4. Rotate spherical bearing to feel for roughness.

5. If spherical nut halves or spherical bearing show signs of roughness (degradation), then they must be replaced along with the shaft.

a. Clean threads on shaft and on spherical nut halves with Loctite Primer T.

b. Apply Loctite #271 to threads and tighten nut onto shaft.

c. Press fit spherical bearing onto shaft.

6. If nut halves and bearing appear to be functional (or have been replaced), lubricate and reinstall as follows.

7. Apply a thin film of Lubriplate Mo-Lith #2 to mating bearing surfaces of spherical bearing. Lubricant must penetrate to cover entire bearing surface. Remove all grease not on spherical surface.

8. Spherical bearing surfaces of nut halves must be lubricated exactly as follows. Do not substitute lubricants, do not short-cut the time prescribed. Using Molykote 321R lubricant, shake can for at least one minute to assure lubricant is adequately suspended in transmission medium. Spray bearing surfaces with five to seven coats of lubricant. Overspray permissible. Allow to air-dry for four hours before assembly.

9. After lubricant has dried, reinstall lighthouse per Paragraph 4.7.2.

4.8.2 Lighthouse Brake Adjustments (See Figure 4-10)

1. Remove plug button on yoke end (closest to lampholder cover hinge) to expose brake assembly.

2. Loosen locking nuts and back off adjusting screw to loosen brake.

3. Hand tighten adjusting screw with a screwdriver and lock adjustment with lock nut.

4. Attach a sterile handle to lighthouse and attach spring scale to end of handle.

5. Keeping spring scale parallel to lens and in-line with suspension arm, measure the force necessary to rotate lighthouse through its travel in both directions. Force should be between 1 and 3 pounds.

6. If force is over or under the limits, loosen lock nut and retighten adjusting screw either less than or more than the initial setting in Step 3. Tighten lock nut and retest.

CAUTION: Do not install plug buttons without retaining cables.

7. Secure plug button restraint cable with second lock nut, and install plug button.

4.9 YOKE BEARING SERVICING (See Figures 5-7 and 4-12)

If a bumpy or grinding feeling is experienced when yoke is rotated it will be necessary to remove the bearing assembly. Thoroughly clean bearing assembly, repack with grease, and reinstall using the following procedure:

4.9.1 Yoke Bearing Removal

NOTE: To perform this procedure a yoke bearing pre-loading tool (P-764315-730) is required. See Figure 4-11.

1. Set circuit breaker on light control to OFF position.

2. Insert a 6 inch piece of 2" x 4" wood between the suspension arm and suspension fork to prevent suspension arm from springing back when yoke is removed. See Figure 4-7.

3. Remove plug button from right leg of yoke and plug button from center of yoke.

4. Pull wires from hole in right leg of yoke to expose the connectors then break the connection making sure that enough wire is left to make a new splice.

5. Pull wires out of yoke through center hole on yoke.

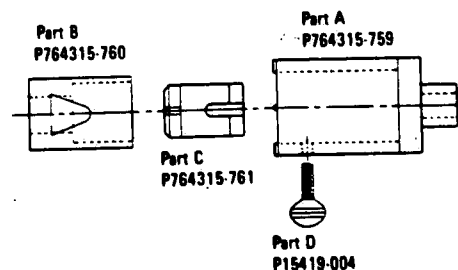


Figure 4-11. BEARING PRE-LOADING TOOL
(P-764325-730).

CAUTION: Since locknut holds yoke on suspension arm, be prepared to accept weight of yoke and lighthouse when this locknut is removed.

6. Bend back tab on lockwasher. Using special spanner wrench remove locknut from yoke stud. Slide yoke off stud on suspension arm and set aside.

NOTE: Since yoke is keyed to the stud, make sure key stays in keyway on stud when yoke is removed.

7. Remove rubber grommet located in stud.

8. Using existing key install part "B" of special tool onto stud to prevent rotation.

NOTE: Key may be shallow when installed on stud. Make sure the key engages keyway on part "B".

9. Screw part "C" of special tool onto stud until snug. Move existing wires into slot. Tighten down using 3/8" drive torque wrench (P-759729-001).

NOTE: Hold part "B" with hand when tightening part "C" as tool marks on part "B" will prevent proper mating of tools.

10. Loosen collar locking setscrew and brake setscrew.

11. Install part "A" of special tool over part "B". Align tool so tabs on tool mate with slots on collar and thumb screw lines up with bevel on outside of part "B".

12. Tighten down thumb screw to lock in part "A".

13. Loosen and remove collar.

14. Remove bearings from suspension arm.

15. Remove parts "B" and "C" of special tool from stud.

16. Remove key and spacer washer.

17. Remove all grease from existing bearing by washing in cleaning solvent. Use a degreasing solution of trichlorethene, alcohol or freon.

18. Inspect area between head of stud and upper bearing for metal shavings or foreign material.

19. Remove inner bearing race from arm and clean race.

4.9.2 Yoke Bearing Reinstallation

1. Inspect area in suspension arm where bearing seats for sand or metal filings. Wipe area clean. Remove any burrs found in bore or on collar. Use compressed air to blow clean if available. Ensure bearings are clean and dry before regreasing.

2. Regrease bearings using Alvania EP-2 grease (P-764315-995; 6 oz. jars).

CAUTION: When reinstalling bearings, make sure brake adjustment screw is backed off. Failure to do so will interfere with proper reinstallation of bearings at stud head.

3. Reinstall bearings into suspension arm and hand tighten collar.

CAUTION: Bearing alignment is very critical when reinstalling bearings. Make sure outer bearing races are completely seated in suspension arm before installing collar. Use of the collar to seat bearing race may cause galling on suspension arm and produce aluminum chips which will impregnate bearings.

4. Reinstall washer, taper side towards bearing race and woodruff key.

5. Reinstall special tool as per Steps 8-12 of Paragraph 4.9.1.

6. Torque adjustment:

a. Tighten collar.

b. Remove part "A" and install torque wrench on part "C". Rotate stud clockwise several times to seat bearings and then check stud torque. The collar should be adjusted so that 3-5 inch/pounds torque is required to rotate stud.

c. If not within the torque settings, reinstall part "A" and repeat Steps "a" and "b" until proper torque is obtained.

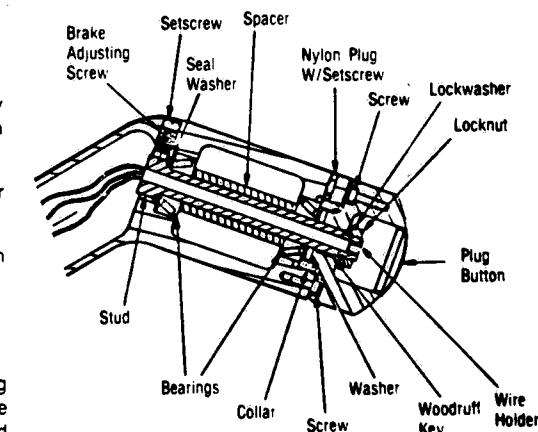


Figure 4-12. YOKE BEARING ASSEMBLY.

7. Tighten collar locking setscrew.
8. Reinstall rubber grommet.
9. Place yoke and lockwasher onto yoke stud.
10. Thread locknut onto yoke stud and tighten with spanner wrench.
11. Bend over tab on lockwasher to secure locknut in place.
12. Insert wires into yoke and reconnect.

CAUTION: Do not install plug buttons without retaining cables.

13. Reinstall yoke plug buttons.

NOTE: For prevention of rust build-up, it is recommended that a light coat of oil be maintained on the yoke bearing tool and nut removal tool.

4.9.3 Yoke Brake Adjustment (See Figure 4-13)

Measure rotation force per Paragraph 3.5.3 and adjust brake if required as follows:

1. Remove brake adjustment locking screw.
2. Adjust braking friction by turning brake adjustment screw clockwise to tighten or counterclockwise to loosen.
3. Reinstall brake adjustment locking screw and tighten.

4.10 LIGHTHEAD SUSPENSION ARM REMOVAL, REINSTALLATION AND ADJUSTMENTS (See Figures 5-4, 5-5)

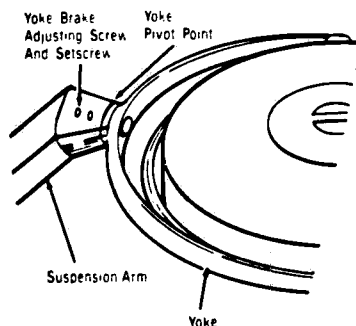


Figure 4-13. YOKE BRAKE ADJUSTMENT.

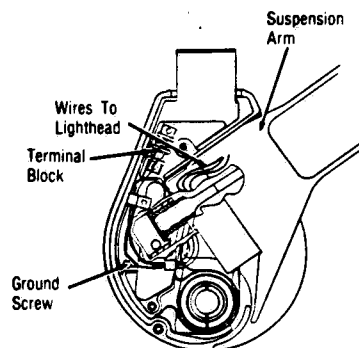


Figure 4-14. SUSPENSION ARM FORK TERMINAL BLOCK.

WARNING: BEFORE PERFORMING SUSPENSION ARM PROCEDURES, NOTE THE FOLLOWING:

- BE SURE TO DISCONNECT POWER AT MAIN BREAKER AND/OR VARIABLE INTENSITY CONTROL.
- ALLOW FIXTURE TO COOL PRIOR TO BEGINNING ANY WORK.
- ADEQUATELY SUPPORT THE LIGHTHEAD AND SUSPENSION ARM ASSEMBLY (APPROXIMATE WEIGHT 100 LBS.).
- PLACE SUPPORTS UNDER YOKE AND SUSPENSION ARM. DO NOT PLACE SUPPORTS UNDER LIGHTHEAD ASSEMBLY OR DAMAGE MAY RESULT.

4.10.1 Lighthead Suspension Arm Removal

1. Remove fork covers and disconnect wires from terminal block and ground wire from attachment to fork casting. (See Figure 4-14)

2. Raise collar to expose the four drive rivets which attach the suspension fork to the vertical suspension tube. Tape collar up and out of the way.

CAUTION: Drill rivet heads only. Damage to wires can occur if rivets are drilled out totally. Be careful when removing rivets from suspension tube so as not to damage wiring inside the tube.

NOTE: When removing the drive rivets, the center steel pins cannot be driven into the inside of the suspension fork since the inside diameter of the fork neck is too small.

3. Using a 1/4" drill bit, drill out the aluminum heads of the rivets. The steel center-pin will then protrude about 1/8".

4. Using a 1/4" punch, drive each of the rivets in just enough to clear the inside diameter of the vertical suspension tube. Do not drive them in too far.

WARNING: THE FORK AT THE END OF THE LIGHTHEAD SUSPENSION ARM IS UNDER TENSION. WHEN REMOVING OR INSTALLING THE SURGICAL LIGHT ASSEMBLY, DO NOT EXTEND THE FORK; IT COULD SNAP BACK AND PINCH FINGERS OR HAND.

5. Lower suspension arm assembly away from the suspension tube.

6. Remove the rivet bodies through the top of the fork casting neck.

4.10.2 Lighthead Suspension Arm Reinstallation

CAUTION: Do not attempt to lift the lighthead assembly by the lighthead; use yoke and suspension arm. (See Figure 4-15)

1. Remove the side covers from suspension fork.
2. Slip the collar over the lower end of the vertical suspension tube, tapered end up. Slide the collar up the tube out of the way and secure in place with tape.
3. Raise the lighthead suspension arm and guide the suspension fork onto the vertical suspension tube while feeding the supply wires through the access opening in the fork.
4. Align the holes in the vertical suspension tube and the suspension fork. Insert the 29/32" long round head drive rivets into each of the four holes. **DO NOT DRIVE RIVET CENTER PINS AT THIS TIME.**

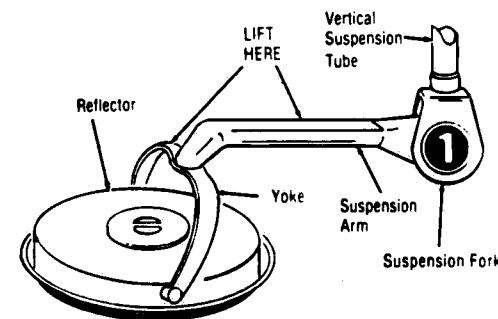


Figure 4-15. LIFTING SUSPENSION ARM ASSEMBLY.

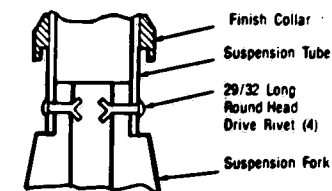


Figure 4-16. RIVETS PROPERLY INSTALLED.

5. Check that the black rubber cap is in place at the bottom of the arm support spindle and that the collar is placed on the vertical suspension tube with tapered end up.

6. Tap the rivet pins with a hammer until pins are flush with rivet heads. (See Figure 4-16)

7. Remove tape from collar and slip collar down suspension tube. Engage rivet heads in slots in collar and slide collar down over rivet heads.

8. Verify proper installation of lighthead suspension arm as follows:

NOTE: Two people are required to inspect lighthead suspension arm, one to support the light and arm and one to hold vertical suspension tube.

WARNING: IMPROPERLY INSTALLED LIGHTHEAD SUSPENSION ARM MAY SEPARATE FROM VERTICAL SUSPENSION TUBE. ADEQUATE PRECAUTIONS MUST BE TAKEN.

- a. Place a cloth-type strap wrench on vertical suspension tube above suspension fork. (See Figure 4-17)

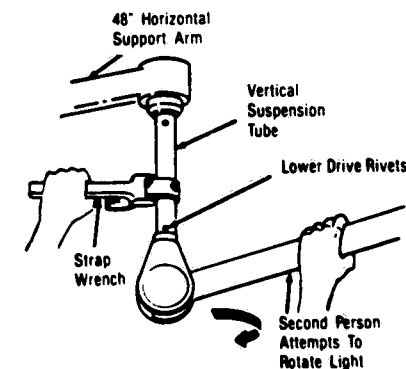


Figure 4-17. LOWER DRIVE RIVET INSPECTION.

b. While supporting lighthouse suspension arm, hold vertical suspension tube with strap wrench to prevent rotation of tube. Lift lighthouse suspension arm and attempt to rotate it around tube.

c. If lighthouse suspension arm rotates with tube held in place, lower drive rivets have not been properly installed. Remove lighthouse from vertical suspension tube and replace lower drive rivets following procedure outlined in this paragraph.

9. Adjust per Paragraph 4.10.3.

4.10.3 SUSPENSION ARM ADJUSTMENTS

1. Attach force gauge to end of suspension arm and with lighthouse parallel to floor, measure the force required to raise and lower the lighthouse at several positions throughout the range. At all positions, force should be within five to thirteen pounds. (See Figure 4-18)

CAUTION: When adjusting spring-compression rods, both rods must be adjusted equal amounts and flats on rods must be maintained parallel to floor (with suspension arm parallel to floor).

2. If adjustment is required, remove fork covers and proceed as follows:

a. Adjust spring compression by placing a 5/16" open-end wrench onto the flats of rod to prevent it from turning. Increase or decrease spring compression by turning adjustment nut with a 3/4" open-end wrench.

b. Repeat step a on the second spring assembly and check that both rods extend through their adjustment nuts equal amounts.

WARNING: MAKE SURE THERE IS AT LEAST 1" OF THREAD ENGAGED BETWEEN ADJUSTING NUT AND ROD AND CAP ASSEMBLY WHEN SUSPENSION ARM ADJUSTMENT IS COMPLETED.

c. Test as in Step 1 and repeat adjustments if required.

3. Reinstall fork covers.

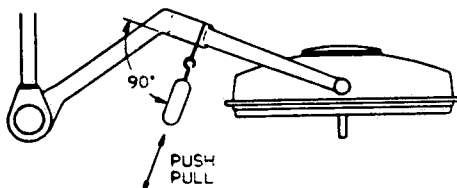


Figure 4-18. SUSPENSION ARM MOTION.

4.11 VERTICAL SUSPENSION TUBE REMOVAL AND REINSTALLATION

WARNING: BE SURE TO DISCONNECT POWER AT MAIN BREAKER AND/OR VARIABLE INTENSITY CONTROL AND ALLOW FIXTURE TO COOL PRIOR TO BEGINNING ANY WORK.

Remove suspension arm/yoke/lighthouse assembly as described in Paragraph 4.10.1 before proceeding.

4.11.1 Vertical Suspension Tube Removal

1. Remove collar from support arm at the top of the suspension tube to expose the two drive rivets.

CAUTION: Be careful when removing rivets from suspension tube so as not to damage wiring inside of tube.

2. Using a 1/4" drill bit, drill out the aluminum heads of the rivets. The steel center-pin will then protrude about 1/8".

CAUTION: Drill rivet heads only. Damage to wires can occur if rivets are drilled out totally.

3. Using a 1/4" punch drive remaining rivet body in just enough to clear the threads of the vertical suspension tube.

4. Remove rubber access cover from top of support arm and use wrench to keep shaft from turning. Unscrew the vertical suspension tube from the support arm spindle. (See Figure 4-19)

5. Remove the strain relief and remove remaining rivet bodies from spindle.

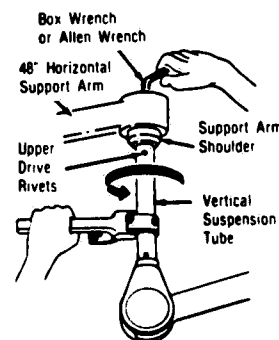


Figure 4-19. SCREWING/UNSCREWING VERTICAL SUSPENSION TUBE.

4.11.2 Vertical Suspension Tube Reinstallation

1. If a new vertical suspension tube is being used, measure and mark the tube 84-1/2" from the finished floor. (Minimum tube length is 4".) If reinstalling same vertical suspension tube, proceed to Step 10.

2. Cut tube at the point marked. File off, from the inside and outside of the tube, any burrs and sharp edges which may have resulted from the cutting.

3. Slip the drill template over the cut end of the tube until the tube bottoms-out inside. Mark the location of the top of the template on the tube.

CAUTION: Before drilling the suspension tube, be sure that cut end of suspension tube is seated firmly against flange inside the drill template.

4. Using any one of the four holes in the drill template as a guide, drill a 1/4" diameter hole in the tube. Be sure that the drill template does not slip down on the tube. Use pencil mark for reference.

5. With the aid of a helper, slip the vertical suspension tube and drill template onto the suspension fork. Align the predrilled hole in the fork casting with the hole drilled in the suspension tube and template. Insert one 29/32" long rivet through the drill template, vertical suspension tube and suspension fork. **DO NOT DRIVE THE CENTER PIN OF THE RIVET AT THIS TIME. BE SURE THAT THE DRILL TEMPLATE ALIGNS WITH THE PENCIL MARK AND THAT THE DRILL TEMPLATE IS FIRMLY SEATED ON THE SUSPENSION TUBE.**

WARNING: BE SURE THAT THE DRILL TEMPLATE REMAINS SEATED ON THE VERTICAL SUSPENSION TUBE DURING DRILLING. FAILURE TO DO SO MAY RESULT IN IMPROPER INSTALLATION.

CAUTION: When drilling tube, take precautions to protect wiring. Also, be sure to remove all chips after drilling.

6. While a helper immobilizes the suspension fork, vertical suspension tube and drill template, drill the remaining three holes through the vertical suspension tube and suspension fork. Use the holes in the drill template as guides.

7. Remove the drive rivet that is holding the drill template, vertical suspension tube and suspension fork.

8. Dismantle the three sections and discard the drill template. Do not reuse templates.

9. Measure the location of the holes in the tube. When properly drilled, the holes should be centered 1/2 ($\pm 1/32$) inch up from the cut end of the tube.

CAUTION: Handle wiring carefully.

10. Screw the suspension tube onto the support arm spindle while feeding the wires through the tube. Use a 1-1/2" box wrench or 9/16" Allen wrench to hold the support arm spindle from rotating while tightening the tube. (See Figure 4-19)

WARNING: THE TWO DRIVE RIVETS SECURING THE VERTICAL SUSPENSION TUBE TO THE SUPPORT ARM AND THE FOUR DRIVE RIVETS FOR SECURING THE VERTICAL SUSPENSION TUBE TO THE SUSPENSION FORK MUST BE PROPERLY INSTALLED... OMISSION OR IMPROPER INSTALLATION COULD ALLOW THE LIGHTHEAD TO FALL.

11. Insert a round-head drive rivet (29/32 long) into each hole drilled through the support arm spindle and the vertical suspension tube. Using a hammer, tap the protruding rivet pins until they are flush with the rivet heads as shown in the cross-sectional insert on Figure 4-20.

12. Slide the black rubber cap up the tube and snap it in place at bottom of support arm spindle.

13. Check for proper installation of upper rivets as follows:

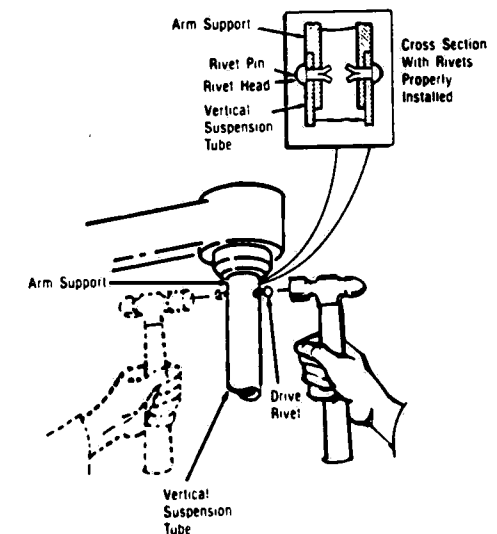


Figure 4-20. SUSPENSION TUBE RIVETS.

CAUTION: Two people are required when inspecting the light arm suspension: one to support the light and arm, and one to hold the vertical suspension tube.

a. With strap wrench around the vertical suspension tube, insert a 9/16-inch Allen wrench (or 1-1/2-inch box wrench) in the hex nut of the horizontal support arm pivot, to prevent rotation. (See Figure 4-21) If vertical suspension tube can be rotated, upper drive rivets have not been properly installed. Replace rivets following procedure in this paragraph.

b. Make certain that a center pin is in place on each rivet, driven in and seated flush with rivet head.

14. Install lighthouse suspension arm per Paragraph 4.10.2.

4.12 BRUSH/BRUSH HOLDER REPLACEMENT (See Figures 5-2, 5-3)

CAUTION: The commutators at the central hub and suspension tube pivots have different diameters. Therefore, the brushes are different because they have different radii. Do not mix brushes up.

When installing brushes, make sure the brush stamped 001 goes in the holder installed at the suspension tube pivot, and the brush stamped 002 goes in the holder installed on the central hub pivot. The ground brush located in the center position of each brush holder is the same for either pivot. The 48" support arm for the Polaris SL lighthouse has two sets of brushes at each pivot.

NOTE: In some cases, due to excess burn marks, the commutators have to be cleaned before the brushes are installed. A cleaning tool kit, part P-755715-123, is available for this purpose. Instructions for use are contained in the kit.

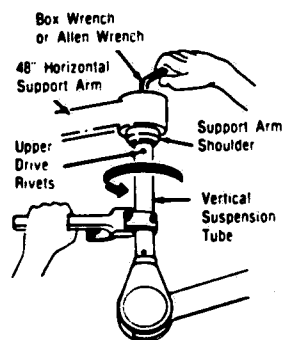


Figure 4-21. UPPER DRIVE RIVET INSPECTION.

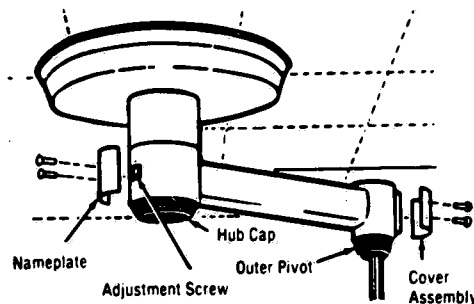


Figure 4-22. INSPECT BRUSHES.

CAUTION: After installing new brushes, recheck the voltage at the lampholder jack (21.5 volts \pm 0.1 volt) per procedure in Paragraph 3.5.4 and adjust if required.

1. Be sure power to fixture is off.
2. Remove cover assembly from each support arm pivot you are servicing. (See Figure 4-22)
3. Disconnect both sets of three wires from each brush holder assembly. Secure wires (bend sideways) so that they will not slip into hub. (See Figure 4-23)
4. Remove the three screws which secure each brush holder; remove brush holders from support arm.

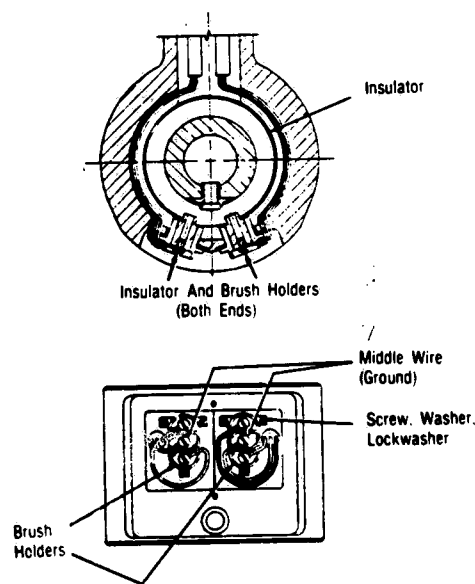


Figure 4-23. BRUSH HOLDERS AND CONNECTIONS.

CAUTION: With brush holder removed, insulator slot should be approximately 1/2" wide. If necessary, use insulator milling tool and trim insulator slot.

NOTE: When installing brush holders, make sure that insulator is positioned correctly. When properly aligned, only the tension of seating the brushes is required to install each brush holder. Any excessive pressure may indicate that the insulator is interfering with proper installation of brush holder.

5. Examine collector rings for burned spots, dirt, etc. and clean as necessary.
6. Replace brushes and brush holder (if necessary).
7. Reassemble items in reverse order. Be sure that black wire is connected to top terminal on brush holder, white wire to bottom terminal, and green wire to center terminal.

4.13 BRAKE ADJUSTMENTS — SUPPORT ARM PIVOTS

NOTE: Support Arm must be level.

1. Turn off power.
2. Remove access covers from central hub pivot and from suspension tube pivot.
3. Using a 5/16" Allen-wrench, tighten the central hub brake to prevent support arm from turning.
4. Attach spring scale to yoke at yoke/lighthouse pivot. Position yoke/lighthouse pivot at same height as suspension fork.
5. Measure the force necessary to cause lighthouse rotation around the suspension tube pivot at three separate locations. Force should be from two to four pounds. Adjust as required. Keep spring scale parallel to floor and perpendicular to suspension arm during measurement.
6. Attach spring scale to support arm at vertical suspension tube pivot.
7. Loosen central hub brake adjustment.
8. Measure the force necessary to cause the support arm to rotate around the central hub pivot at three separate locations. Keep spring scale parallel to floor and perpendicular to support arm. Force should be from four to six pounds. Adjust as required.
9. Replace access covers.

4.14 SPINDLE AND COLLECTOR RING REMOVAL/ REINSTALLATION (See Figure 5-3)

NOTE: If fixture is installed to a plastered or slab ceiling and clearance between top of support arm and ceiling is not sufficient for removing spindle assembly (approximately 8"), remove fixture from ceiling before proceeding. See Paragraph 4.16.1 for fixture removal procedure.

1. Refer to Paragraph 4.10.1 and 4.11.1 and remove lighthouse suspension arm assembly and vertical suspension tube.
2. Refer to **Brush/Brush Holder Replacement**, Paragraph 4.12 and remove brush holder assembly.
3. Remove screw(s) and spring washers from brake assembly.

4. Bend back tap on lockwasher at bottom of arm support spindle and using a spanner wrench, loosen locknut. Remove locknut, lockwasher and lower bearing from arm support spindle assembly.

5. Remove arm support spindle and brake assembly through opening in top of support arm.

NOTE: Follow Steps 6, 7, 8, and 9 only to remove collector rings from spindle.

6. Release strain relief at bottom of arm support by disassembling sealing grip.
7. Slide lower collector ring downward while carefully pulling white wire through bushing in side of spindle.
8. Slide center commutator ring down while carefully pulling green wire through bushing.
9. Carefully pull black wire out of bushing and then slide remaining collector ring off the spindle.
10. Reassemble items in reverse order. When replacing collector rings, be sure ring with black wire is placed on arm support first, then the one with green wire, and last the one with white wire. Adjust screw on brake assembly for proper friction (see **Brake Adjustment**, Paragraph 4.13).

4.15 SUPPORT ARM AND COLLECTOR RING REMOVAL/REINSTALLATION (See Figure 5-2)

NOTE: It is recommended (but not essential) that for installations with dual lighthouses, the entire fixture be lowered from ceiling before removing support arms... refer to Paragraph 4.16.

1. If fixture has not been lowered from ceiling do the following:

a. Refer to Paragraph 4.10.1 and remove lighthouse suspension arm assembly(s). (Do this even if it is not intended to remove support arms.)

b. If a dual arm assembly, equally space arms about hub to distribute load. Refer to **Brake Adjustment**, (Paragraph 4.13), and tighten adjustment screw(s) to lock arm(s) in position.

c. Remove gasket and ceiling canopy.

d. Disconnect wires to lighthouse. Be sure to tag electrical connections to facilitate reassembly.

NOTE: For a dual lighthouse assembly, black and white wires feed top 48" arm; red and red/white wires feed bottom 36" arm.

2. Refer to **Brush/Brush Holder Replacement** (Paragraph 4.12) and remove brush holder assemblies from arm(s) to be removed.

3. Remove black rubber cap from bottom of central hub.

4. Bend back tab on lockwasher at bottom of shaft and using a spanner wrench, loosen locknut.

5. With arm well supported (if fixture was not removed from ceiling), remove locknut, lockwasher, brake assembly, spacer ring and lower bearing from shaft.

NOTE: Bottom 36" arm or hub spacer will come off shaft when locknut is removed. Top 48" arm will drop approximately 1/4", but will not come off. It is recommended that the top arm be secured to the mounting fixture.

6. Carefully remove 36" arm or hub spacer from shaft.

NOTE: Proceed to Step 7 only if it is desired to remove collector rings or top 48" arm assembly from shaft.

7. Remove screws which secure bottom plate to shaft. Lower bottom plate approximately 1" and remove wire restraint.

8. Slide lower collector ring off the shaft while carefully pulling wire out of bushing.

9. Carefully pull remaining wires out of bushing and slide intermediate and upper collector ring off the shaft. Remove plastic bushing.

10. To remove the top 48" arm assembly, proceed as follows:

a. Support the arm if fixture was not removed from ceiling.

b. Remove bottom arm bearing race and shield and spacer ring.

c. Remove brake assembly adjustment screw and slide brake assembly off the shaft.

d. Carefully remove arm from shaft.

11. Reassemble items in reverse order. When replacing each set of collector rings, be sure ring with black or solid-colored wire is placed on shaft first. Adjust brake assembly screw on each arm for proper friction (see **Brake Adjustment**, Paragraph 4.13).

4.16 CENTRAL MOUNT FIXTURE REMOVAL/ REINSTALLATION (See Figure 5-2)

WARNING: REMOVAL AND REINSTALLATION WILL REQUIRE A MEANS OF SUPPORTING FIXTURE WHILE ITS MOUNTING HARDWARE IS REMOVED. FIXTURE WITH ONE ARM WEIGHS APPROXIMATELY 105 LBS; WITH TWO ARMS, APPROXIMATELY 135 LBS.

Refer to Paragraphs 4.10.1 and 4.11.1 and remove lighthouse suspension arm assembly and vertical suspension tube.

4.16.1 Removal of Central Mount Fixture (See Figures 4-24 and 4-25)

1. Remove gasket from ceiling canopy and canopy from ceiling. Disconnect leads at junction box. Tag electrical connections to facilitate reassembly.

2. If a multiple arm assembly, equally space arms about hub to distribute load. Refer to Paragraph 4.13, **Brake Adjustment** and tighten adjustment screw(s) to lock arm(s) in position.

3. Note and record proper alignment of mounting plate with ceiling extension bolts. **With fixture adequately supported**, remove its mounting hardware. Carefully lower fixture.

4.16.2 Reinstalling Central Mount Fixture (See Figures 4-24 and 4-25)

1. Raise fixture to approximately 6" from ceiling. Align holes in mounting plate with ceiling extension bolts as noted in Step 3, Paragraph 4.16.1.

2. Be sure wires protruding from shaft in center of mounting plate are fed down through triangular cutout aligned with junction box.

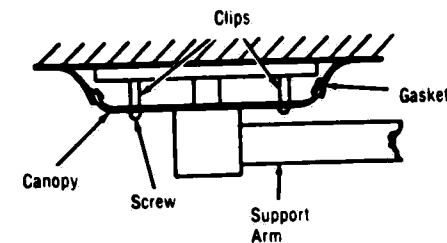


Figure 4-24. CENTRAL MOUNT CANOPY AND GASKET.

3. Raise assembly over extension bolts. Using the four flat washers, lockwashers and hex nuts secure plate... only hand-tighten nuts at this time. Pull wiring leads from junction box down through triangular cutout.

4. Using the 5/16" Allen wrench, loosen support arm brake adjustment screw(s) until arm(s) swing freely.

5. Place a spirit level on top of horizontal support arm. Using an open-end wrench, adjust hex nuts above and below mounting plate to level support arm(s) and eliminate arm drifting.

WARNING: CHECK THAT LOWER NUTS ARE FULLY ENGAGED ON EXTENSION BOLTS. ALLOW AT LEAST 1/16" FROM BOTTOM OF NUT TO END OF BOLT.

6. After leveling arm(s), rotate to alternate 90 degree positions and check for drift at each stop... readjust and tighten nuts as required.

7. Reconnect wires at junction box. Be sure they are matched correctly.

8. Tape wire nuts to wires and neatly place connections in junction box.

9. Reinstall canopy and gasket. (**NOTE:** If gasket was removed from fixture, place arms in vertical alignment and loop gasket over them, making sure slotted side will face floor when installed.)

10. Reassemble vertical suspension tube and lighthouse suspension arm assembly per Paragraphs 4.11.2 and 4.10.2.

11. Turn light(s) on and slowly rotate each assembly about both pivot points to be sure fixture is working properly and connections are secure. Adjust support arm brake assembly for proper friction (see **Brake Adjustment**, Paragraph 4.13).

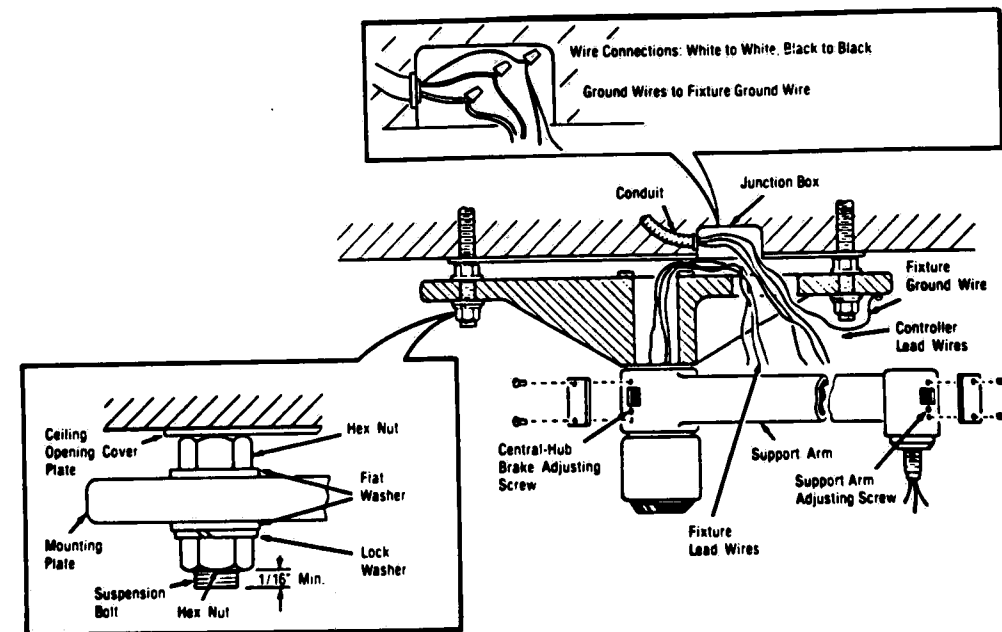


Figure 4-25. CENTRAL MOUNT AND SUPPORT ARM.

4.17 PATTERN SIZE ADJUSTMENTS (See Figure 5-11)

NOTE: Do not perform this adjustment unless optical testing has been conducted with test procedure in Paragraph 3.5.5 first.

1. Test pattern size in accordance with test procedure Paragraph 3.5.5.
2. Remove sterile handle, handle support, and inner cover.
3. Using a pocket knife (e.g.), cut through the red RTV sealant which bridges between the small reflector and shaft assembly. Once the RTV seal is cut, the R2 reflector can be rotated.
4. Rotate the R2 reflector a very small degree in one direction and note whether the pattern enlarges (peak drops, 20% block reading rises) or reduces (peak increases, 20% block reading drops).
5. Adjust the R2 reflector to give acceptable peak intensity and pattern size (refer to Paragraph 3.5.5).
6. After adjustment, reseal the R2 reflector to the shaft assembly using RTV 106 high-temperature sealant. Do not use substitute sealants.
7. Reinstall parts removed in Step 2 above.

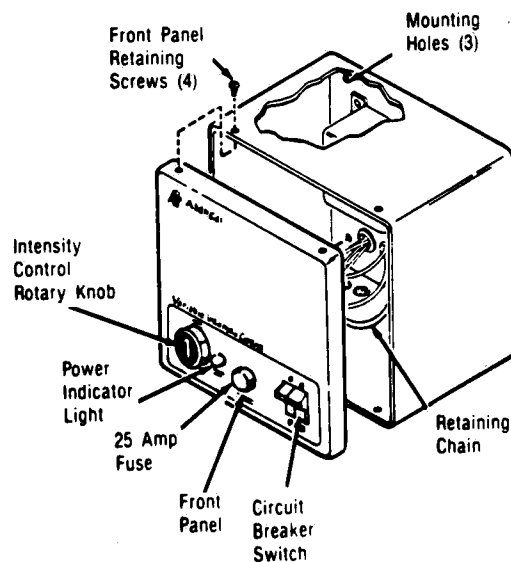


Figure 4-26. 25 AMP VARIABLE INTENSITY CONTROLLER.

4.18 SCR MODULE REPLACEMENT — 25-AMP VARIABLE INTENSITY CONTROL (See Figures 5-13, 5-14)

WARNING: SHUT OFF POWER TO 25-AMP VARIABLE INTENSITY CONTROL AT MAIN DISCONNECT BEFORE PROCEEDING.

1. Remove cover from control box by removing four screws and then allow it to hang from chain restraint. (See Figure 4-26)
2. SCR module is located in upper right corner of control box. Disconnect wires to SCR module and PC board, noting connections for reinstallation. See Figure 4-27.
3. Remove two screws securing SCR module/PC board assembly to control box and remove assembly from control box.
4. Apply a thin coating of heatsink compound (Dow Corning 340 grease) between the module and control box.
5. Mount new SCR module (with new PC board) into control box using two screws removed in Step 3 and tighten screws securely.
6. Reconnect wires to new SCR module and PC board that were disconnected in Step 2.

NOTE: When turning rotary knob from the OFF position to any intensity setting, the control will automatically perform a check sequence of three seconds below minimum intensity followed by five seconds of maximum intensity before assuming the selected intensity.

If a lamp fails when lighthouse is in use, light intensity will dim to below minimum intensity for 1/2 second (to protect remaining lamps) before returning to near previous intensity.

7. Turn on power to 25-Amp variable intensity control and check output voltage at lampholder (21.5 volts ± 0.1 volt). Adjust if required per Paragraph 3.5.4.

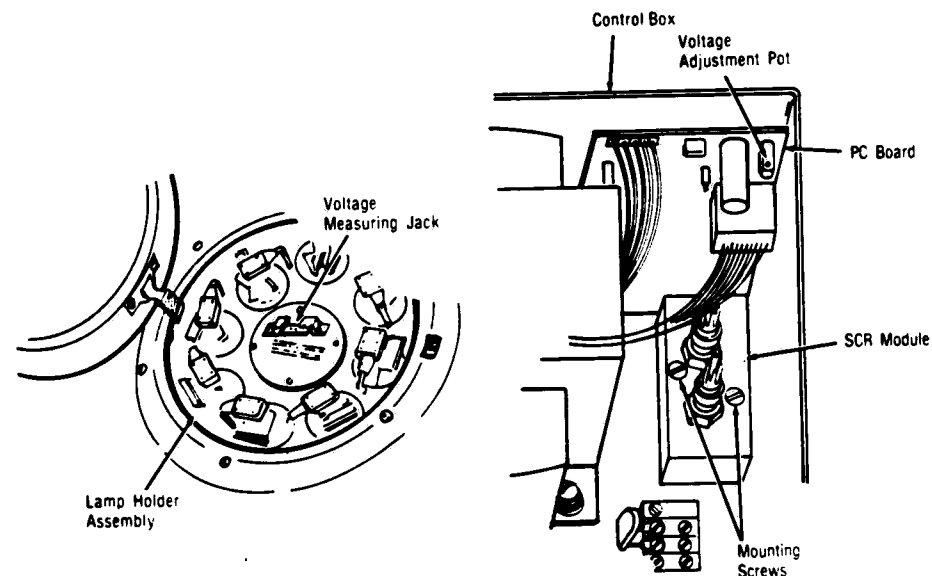


Figure 4-27. SCR MODULE LOCATION.

CAUTION: 34" Polaris SL 25-Amp Variable Intensity Control output voltage must be set with a TRUE RMS AC VOLTMETER (Beckman HD130). Standard voltmeters will give erroneously high readings that can lead to reduced lamp life and potential equipment damage. If a TRUE RMS VOLTMETER is not available, contact your AMSCO service representative or local regional office.

8. Remount cover to control box using same screws removed in Step 1.

THIS PAGE
INTENTIONALLY LEFT
BLANK

SECTION 5

ILLUSTRATIONS AND PARTS LISTS

The following pages contain an illustrated breakdown of selected assemblies. To order replacement parts, use the part numbers and descriptions provided on the subsequent parts lists. The numbers, descriptions and quantities of the parts listed are those required for a single Fixture. Each indentation in the description represents the assembly or subassembly level. The QUANTITY is specific for the given top assembly. Include on your order the model and serial numbers of the equipment. Also, where applicable, include component manufacturer and nameplate data.

HOW TO USE SECTION 5

1. Determine the function and application of the part required. Refer to Figure 5-1 and select the most appropriate title. Note the illustration reference number.
2. Turn to the illustration indicated and locate the desired part on the illustration.
3. From the illustration, obtain the index number assigned to the part desired. Refer to the accompanying description for specific information regarding the part.

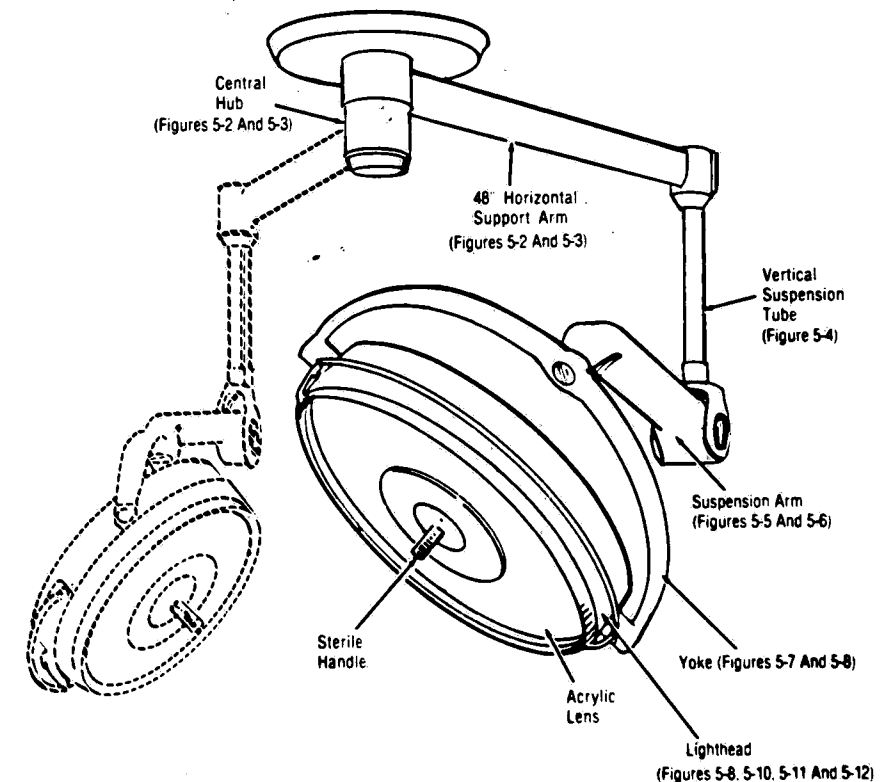


Figure 5-1. GENERAL ASSEMBLY.

5-1
764321-180

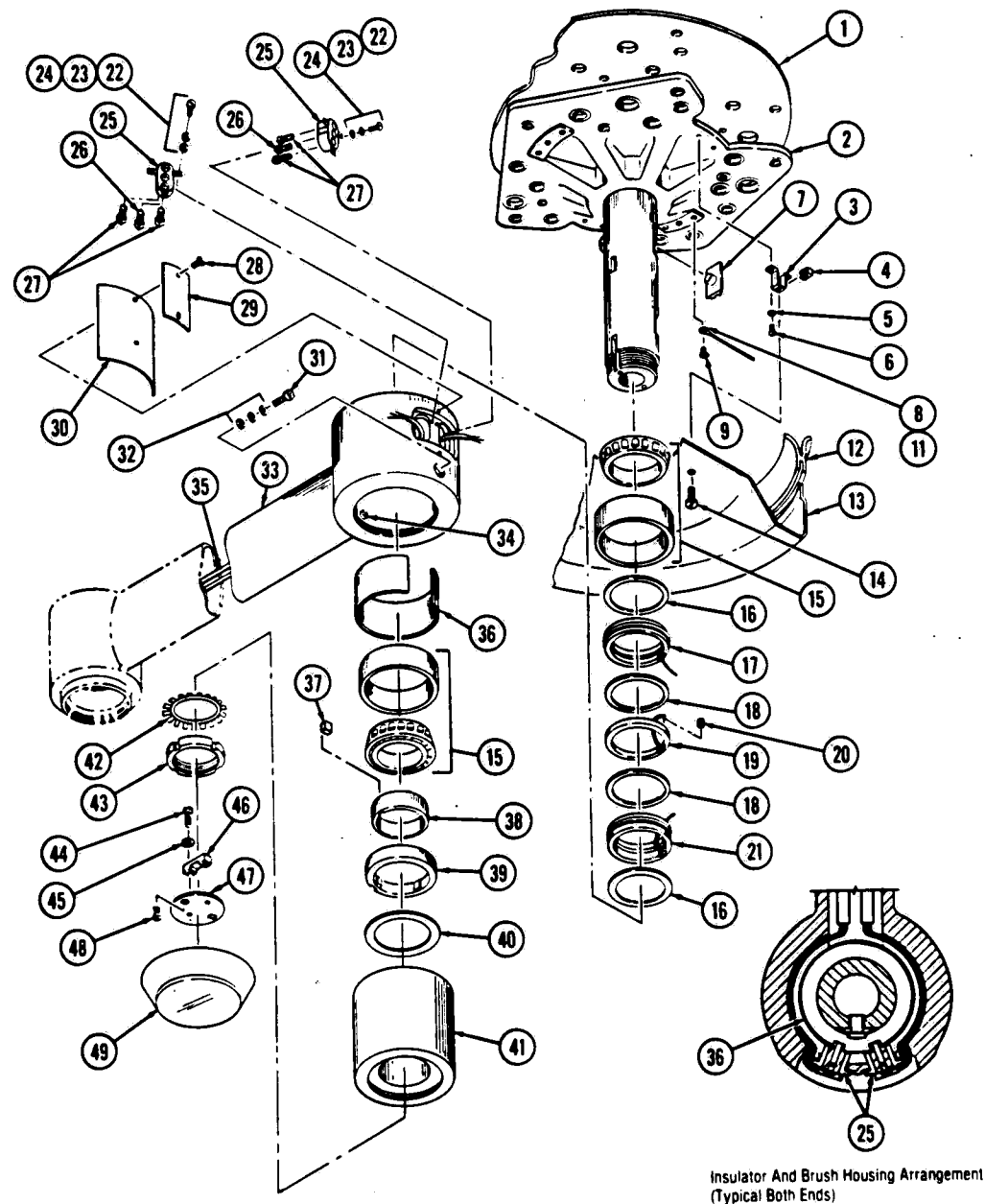


Figure 5-2. HORIZONTAL ARM ASSEMBLY (Part 1 of 2, Central Pivot).

FIG. & INDEX NO.		PART NUMBER		DESCRIPTION	UNITS PER ASSEMBLY		
5-2-	P	146645	954	HORIZONTAL ARM ASSEMBLY (Central Pivot) (Part 1 of 2).....	X		
1	P	142885	001	COVER PLATE, Ceiling.....	1		
2	P	163786	002	CEILING PLATE ASSEMBLY.....	1		
3	P	82371	001	CLIP.....	4		
4	P	48982	045	NUT, Speed, #10-32.....	4		
5	P	19675	041	LOCKWASHER, #6.....	8		
6	P	12451	041	SCREW, Round Head, #6-32 x 1/4.....	8		
7	P	150225	001	BUSHING, Insulating.....	1		
8	P	14592	091	TERMINAL.....	1		
9	P	9374	041	SCREW, Round Head, #10-32 x 3/8.....	1		
10	P	124361	013	LOCKWASHER, #10 Star.....	1		
11				WIRE, Green, 24 Lg.....	1		
12	P	93900	829	GASKET, Canopy.....	1		
13	P	93900	835	CANOPY ASSEMBLY.....	1		
14	P	25400	041	SCREW, Truss Head, #10-32 x 1/2.....	4		
15	P	82353	001	BEARING.....	2		
16	P	56164	002	WASHER, Teflon.....	2		
17	P	93902	569	RING & WIRE ASSEMBLY, Black Wire.....	1		
18	P	56163	002	SPACER, Teflon.....	2		
19	P	56157	002	RING, Commutator.....	1		
20	P	82983	001	SCREW, Set, #4-40 x 1/8, Flat Point.....	2		
21	P	93902	570	RING & WIRE ASSEMBLY, White Wire.....	1		
22	P	13334	091	SCREW, Round Head, #4-40 x 3/8.....	6		
23	P	90713	061	LOCKWASHER, #4.....	6		
24	P	26032	091	WASHER, Flat.....	6		
25	P	56159	002	BRUSH HOUSING ASSEMBLY.....	2		
26	P	82351	001	BRUSH.....	2		
27	P	150733	002	BRUSH.....	4		
28	P	17659	041	SCREW, Round Head, #4-40 x 1/4.....	2		
29	P	79987	001	NAMEPLATE, UL.....	1		
30	P	93902	565	COVER ASSEMBLY.....	1		
31	P	82367	001	SCREW, Socket Head, 3/8-24 x 1.....	1		
32	P	82365	001	WASHER, Belleville Spring.....	3		
33	P	146646	008	ARM, Horizontal, 48".....	1		
34	P	82473	001	SCREW, 3/8-24 x 3/4.....	1		
35	P	93902	566	CORD ASSEMBLY.....	2		
36	P	129357	798	INSULATOR.....	1		
37	P	82369	001	KEY.....	1		
38	P	82368	001	RING, Spacer.....	1		
39	P	56105	002	BRAKE ASSEMBLY.....	1		
40	P	82463	001	SHIELD, Bearing.....	1		
41	P	136806	124	SPACER, Hub.....	1		
42	P	82362	002	LOCKWASHER, TW113.....	1		
43	P	82361	002	NUT, Lock, TN13.....	1		
44	P	3964	041	SCREW, Round Head, #6-32 x 5/16.....	2		
45	P	5469	041	WASHER.....	2		
46	P	82380	001	RESTRAINT, Wire.....	1		
47	P	82358	001	PLATE, Bottom.....	1		
48	P	50705	041	SCREW, Flat Head, #6-32 x 5/16.....	2		
49	P	56938	090	CAP, Center Hub.....	1		

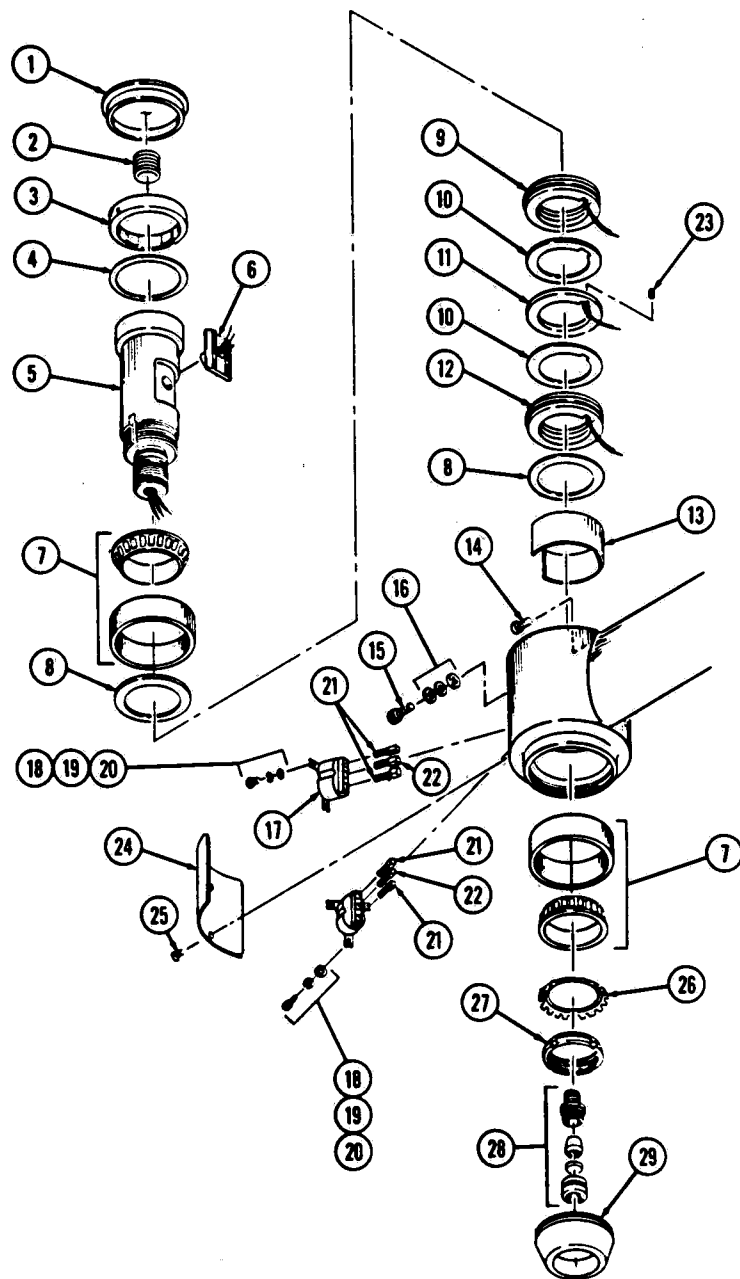


Figure 5-3. HORIZONTAL ARM ASSEMBLY (Part 2 of 2, Outer Pivot).

5-4
764321-180

E- 9

FIG. & INDEX NO.	PART NUMBER		DESCRIPTION	UNITS PER ASSEMBLY			
5-3-			HORIZONTAL ARM ASSEMBLY (Central Mount) (Part 2 of 2).....	X			
1	P	82356 001	COVER Access.....	1			
2	P	82470 001	PLUG, Pipe, 3/4 NPT.....	1			
3	P	56105 001	BRAKE ASSEMBLY.....	1			
4	P	82462 001	SHIELD, Bearing.....	1			
5	P	136806 102	ARM, Support.....	1			
6	P	150225 001	BUSHING, Insulating.....	1			
7	P	82353 001	BEARING.....	2			
8	P	56164 001	WASHER, Teflon.....	2			
9	P	93902 571	RING & WIRE ASSEMBLY, Black Wire.....	1			
10	P	56163 001	SPACER, Teflon.....	2			
11	P	56157 001	RING, Commutator.....	1			
12	P	93902 572	RING & WIRE ASSEMBLY, White Wire.....	1			
13	P	129357 797	INSULATOR.....	1			
14	P	82473 001	SCREW, 3/8-24 x 3/4.....	1			
15	P	82367 001	SCREW, Socket Head, 3/8-24 x 1.....	1			
16	P	82365 001	WASHER, Belleville Spring.....	3			
17	P	56159 002	BRUSH HOUSING ASSEMBLY.....	2			
18	P	13334 091	SCREW, Round Head, #4-40 x 3/8.....	3			
19	P	90713 061	LOCKWASHER, #4.....	3			
20	P	26032 091	WASHER, Flat.....	4			
21	P	150733 001	BRUSH.....	2			
22	P	82351 001	BRUSH.....	2			
23	P	82983 001	SCREW, Set, #4-40 x 1/8 Flat Point.....	2			
24	P	93902 564	COVER ASSEMBLY.....	1			
25	P	17659 041	SCREW, Round Head, #4-40 x 1/4.....	2			
26	P	82362 001	LOCKWASHER, TW110.....	1			
27	P	82361 001	NUT, Lock, TN10.....	1			
28	P	150226 001	GRIP, Sealing.....	1			
29	P	82357 002	CAP, Outer Hub.....	1			

5-5

764321-180

E- 10

FIG. & INDEX NO.	PART NUMBER			DESCRIPTION	UNITS PER ASSEMBLY			
5-4-				VERTICAL SUSPENSION TUBE DETAIL.....	X			
1	P	93902	552	SUSPENSION TUBE.....	1			
2	P	83632	001	DRIVE RIVET, 29/32 Long.....	6			
3	P	83634	002	COLLAR.....	1			

NOT USED

NOTE: When replacing suspension tube, refer to paragraph 4-3.

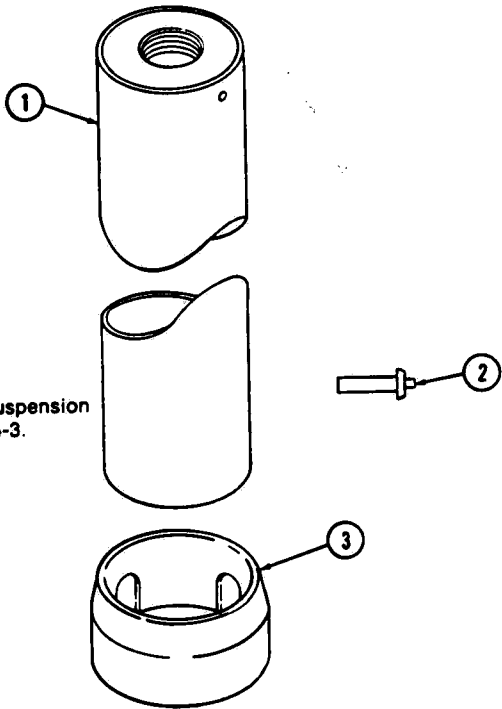


Figure 5-4. SUSPENSION TUBE DETAIL.

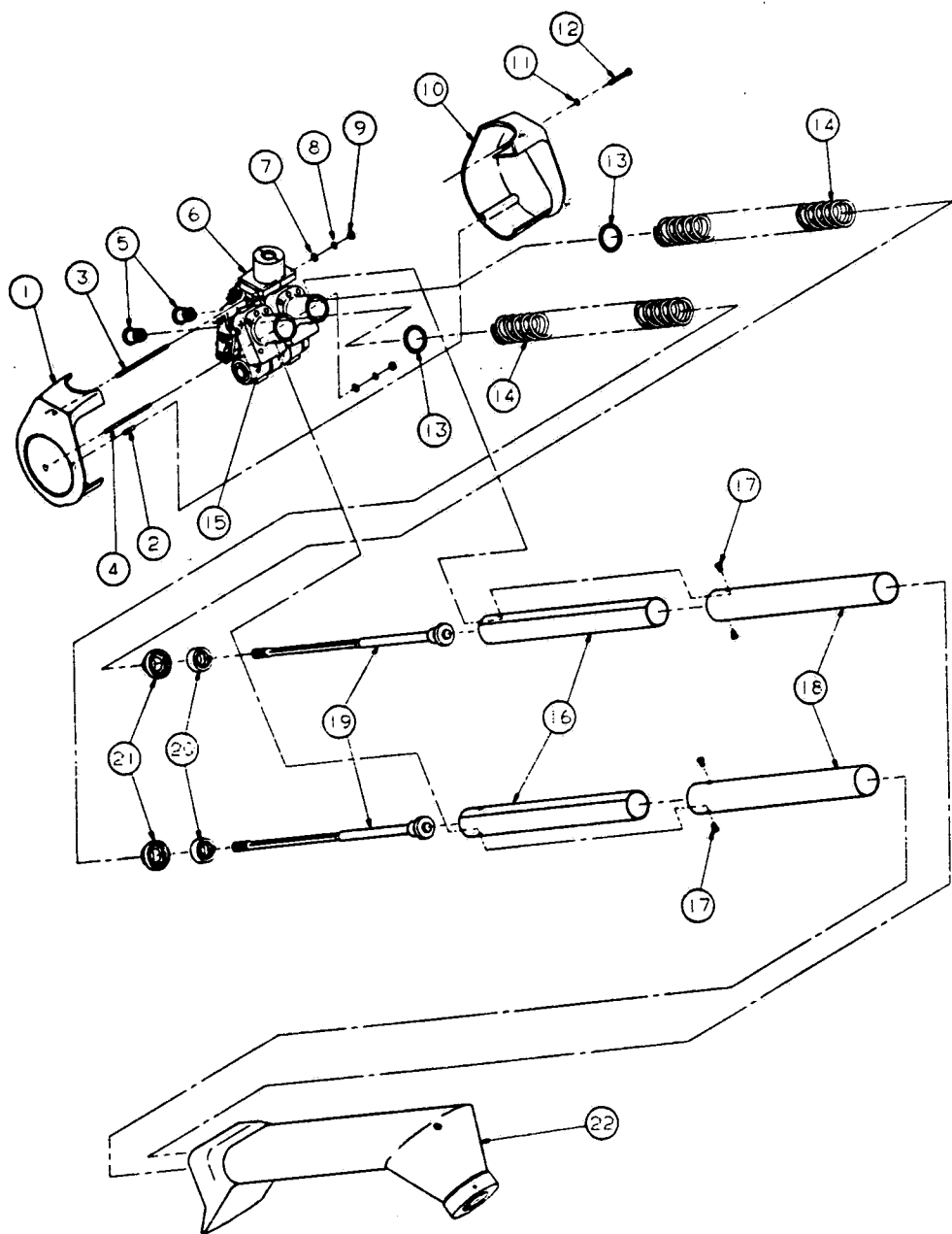


Figure 5-5. SUSPENSION ARM AND FORK (Part 1 of 2).

5-8
764321-180

E- 13

FIG. & INDEX NO.	PART NUMBER			DESCRIPTION	UNITS PER ASSEMBLY			
5-5-				SUSPENSION ARM AND FORK (Part 1 of 2).....	X			
1	P	146645	088	COVER, Fork, Left Hand.....	1			
2	P	129357	928	PIN, Groove.....	1			
3	P	129359	093	STUD, Threaded, 8-32 x 5 Long.....	1			
4	P	129359	092	STUD, Threaded, 8-32 x 4-1/2 Long.....	1			
5	P	129357	785	NUT, Adjusting.....	2			
6	P	146645	083	SUSPENSION FORK.....	1			
7	P	84114	003	WASHER, Flat, #8.....	2			
8	P	19690	061	WASHER, Lock, #8.....	2			
9	P	3038	041	NUT, Hex, 8-32.....	2			
10	P	146645	991	COVER, Fork, Right Hand.....	1			
11	P	46115	091	WASHER, Lock, #10.....	1			
12	P	90696	061	SCREW, Socket Head, 10-32 x 1-3/4 Long....	1			
13	P	40440	061	WASHER.....	2			
14	P	93900	805	SPRING, Compression.....	2			
15	P	146649	468	TUBE, Pivot.....	2			
16	P	150824	141	SLEEVE.....	2			
17	P	83370	001	SCREW, Low Head Socket, 1/4-20 x 3/8 Long.	4			
18	P	56938	094	TUBE.....	2			
19	P	93902	561	ROD AND CAP ASSEMBLY.....	2			
20	P	83160	001	BUSHING, Ball.....	2			
21	P	129356	152	ADAPTOR.....	2			
22	P	93902	607	SUSPENSION ARM.....	1			

5-9
764321-180

E- 14

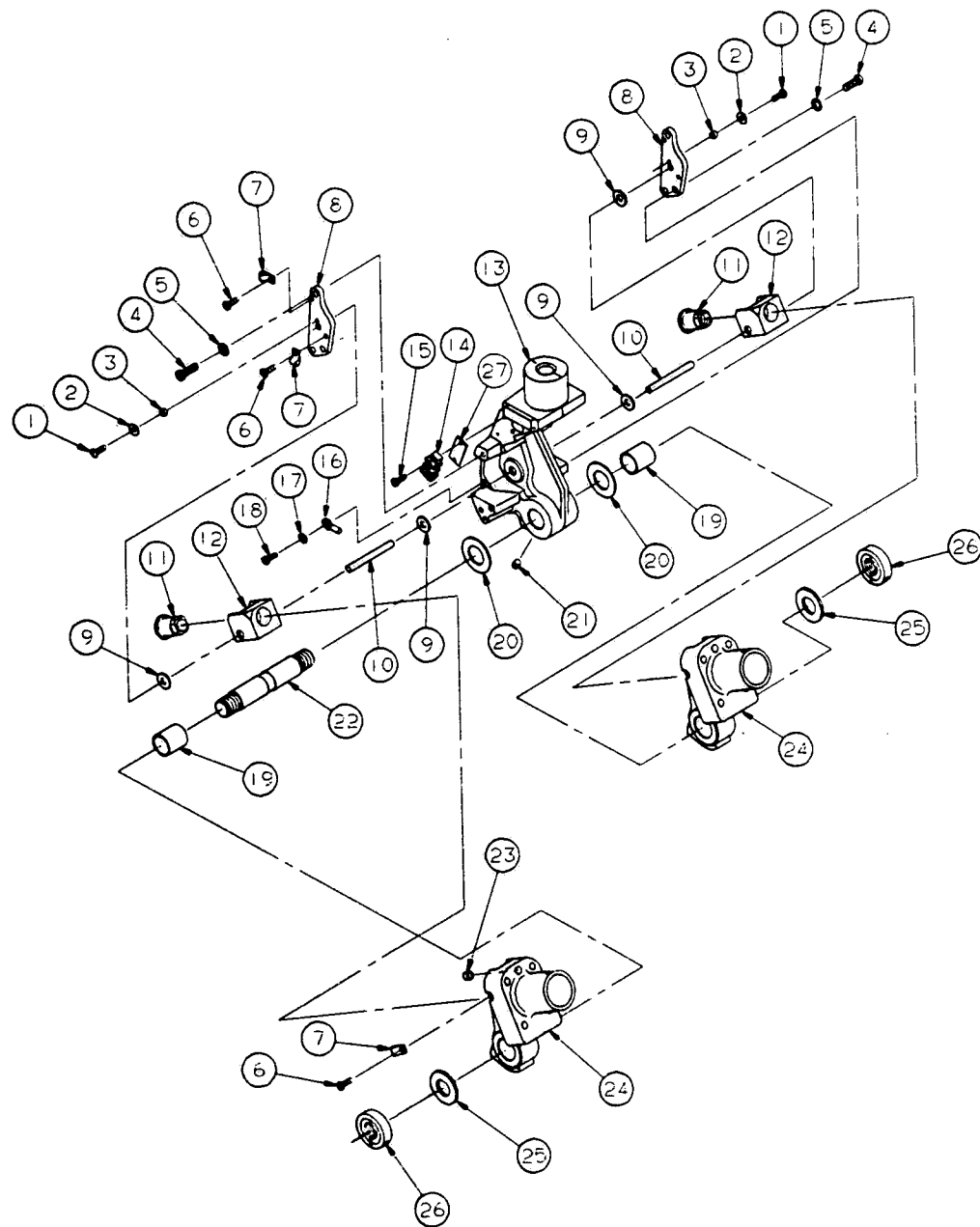


Figure 5-6. SUSPENSION ARM AND FORK (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER		DESCRIPTION	UNITS PER ASSEMBLY		
5-6-			SUSPENSION ARM AND FORK (Part 2 of 2).....	X		
1	P	118408 045	SCREW, Pan Head, 10-24 x 1/2 Long.....	2		
2	P	150824 293	WASHER, Flat.....	2		
3	P	150824 294	SPACER, Sleeve.....	2		
4	P	83637 001	SCREW, Low Head, 5/16-18 x 1 Long.....	6		
5	P	17918 091	LOCKWASHER, 5/16 Internal Tooth.....	14		
6	P	83628 001	SCREW, Button Head Socket, 6-32 x 3/8 Long.....	3		
7	P	129258 001	CLAMP, Cable.....	3		
8	P	93902 558	PLATE.....	2		
9	P	10455 091	SPACER.....	4		
10	P	129357 795	DOWEL PIN.....	2		
11	P	129357 785	NUT, Adjusting.....	2		
12	P	129357 796	PIVOT BLOCK.....	1		
13	P	146645 983	SUSPENSION FORK.....	1		
14	P	129357 833	BLOCK, Terminal, 2 Pole.....	2		
15	P	3960 041	SCREW, Round Head, 6-32 x 1/2 Long.....	1		
16	P	14592 091	TERMINAL, #10 Ring, Ground Wire.....	1		
17	P	124361 013	LOCKWASHER, Star.....	1		
18	P	82675 001	SCREW, Ground, 10-32 x 3/8 Long.....	2		
19	P	129352 619	BEARING, Bronze.....	2		
20	P	24551 091	WASHER.....	1		
21	P	15340 091	SCREW, Socket Head, Set, Cone Point.....	1		
22	P	93902 559	SCREW, Pivot.....	2		
23	P	83172 002	WIRE HOLDER.....	2		
24	P	146649 468	TUBE, Pivot.....	2		
25	P	10497 091	WASHER, Leather.....	2		
26	P	129357 808	COLLAR.....	1		
27	P	150824 314	INSULATOR, Strip.....			

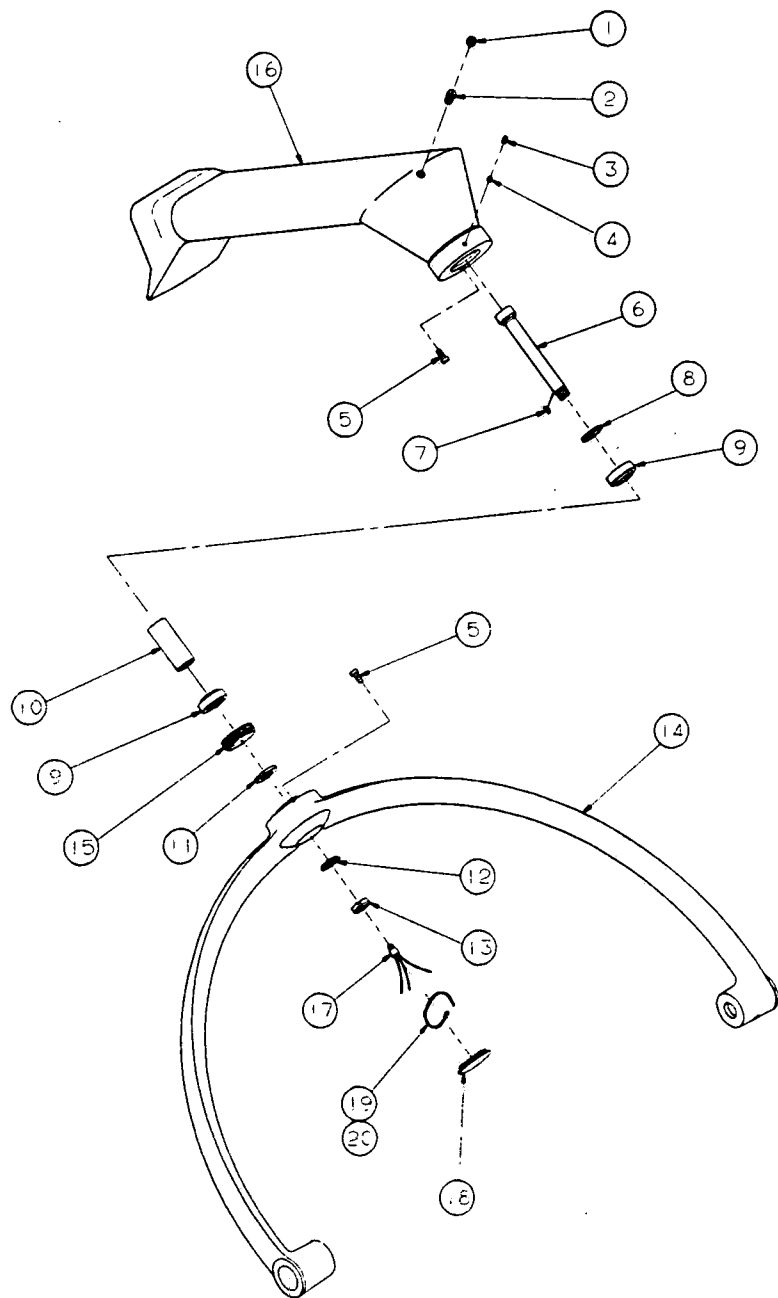


Figure 5-7. YOKE BEARING ASSEMBLY.

FIG. & INDEX NO.	PART NUMBER			DESCRIPTION	UNITS PER ASSEMBLY			
5-7-				YOKE BEARING ASSEMBLY.....	X			
1	P	129359	091	SETSCREW.....	1			
2	P	129359	087	BRAKE ADJUSTMENT SCREW ASSEMBLY.....	1			
3	P	25834	091	SETSCREW, Socket Head, 10-32 x 7/16 Long..	1			
4	P	22436	091	PLUG, Nylon.....	1			
5	P	41992	061	SCREW, Socket Head Cap, 1/4-20 x 5/8 Long.	2			
6	P	93902	557	STUD.....	1			
7	P	16416	091	KEY, Woodruff, 1/8 x 1/2.....	1			
8	P	129359	086	WASHER, Seal.....	1			
9	P	48270	091	BEARING.....	2			
10	P	129357	784	SPACER.....	1			
11	P	129356	150	WASHER.....	1			
12	P	83163	001	LOCKWASHER.....	1			
13	P	83162	001	LOCK NUT.....	1			
14	P	146645	994	YOKE.....	1			
15	P	83154	002	COLLAR.....	1			
16	P	93902	607	ARM, Suspension (See Fig. 5-5).....	1			
17	P	83172	002	WIRE HOLDER.....	2			
18	P	26577	001	PLUG BUTTON.....	1			
19	P	129352	076	SLEEVE.....	1			
20	P	129352	077	CABLE.....	1			

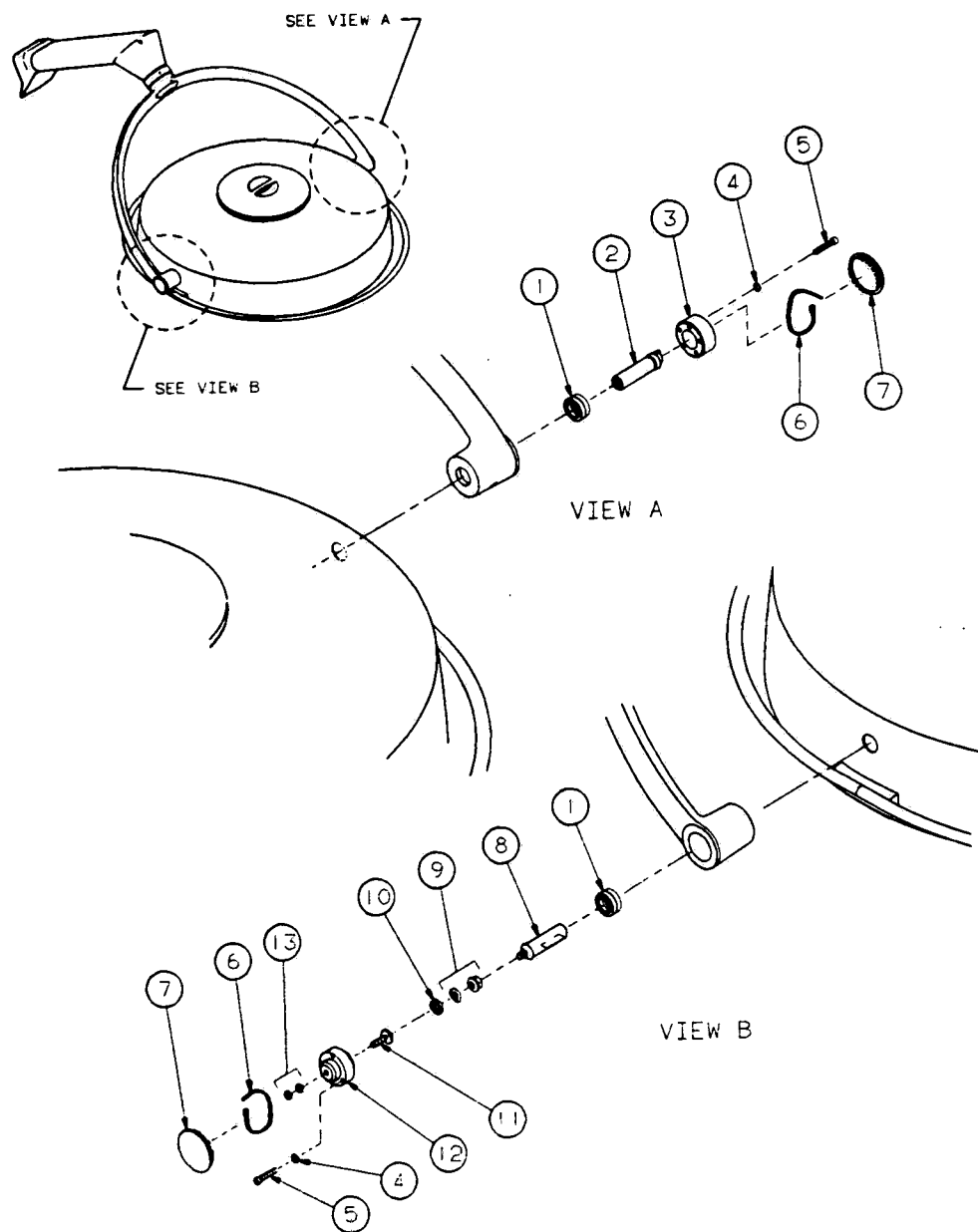


Figure 5-8. LIGHTHEAD PIVOT ASSEMBLIES.

FIG. & INDEX NO.	PART NUMBER		DESCRIPTION	UNITS PER ASSEMBLY			
5-8-			LIGHTHEAD PIVOT ASSEMBLIES.....	X			
1	P	129357 783	BEARING.....	2			
2	P	56938 186	SHAFT, Stop.....	1			
3	P	56938 187	BEARING PLATE ASSEMBLY.....	1			
4	P	19690 061	WASHER, Lock.....	8			
5	P	129359 089	SCREW, Socket Head, 8-32 x 1-1/4 Long.....	8			
6	P	129352 076	SLEEVE, w/Cable.....	2			
7	P	26577 001	PLUG BUTTON.....	2			
8	P	93902 577	SHAFT, Pivot.....	1			
9	P	129357 826	SPERICAL NUT ASSEMBLY.....	1			
10	P	129359 081	CURVED SPRING WASHER.....	1			
11	P	129357 946	ADJUSTING SCREW, 1/4-28.....	1			
12	P	129357 791	ADJUSTING PLATE.....	1			
13	P	36583 045	NUT, 1/4-28.....	2			

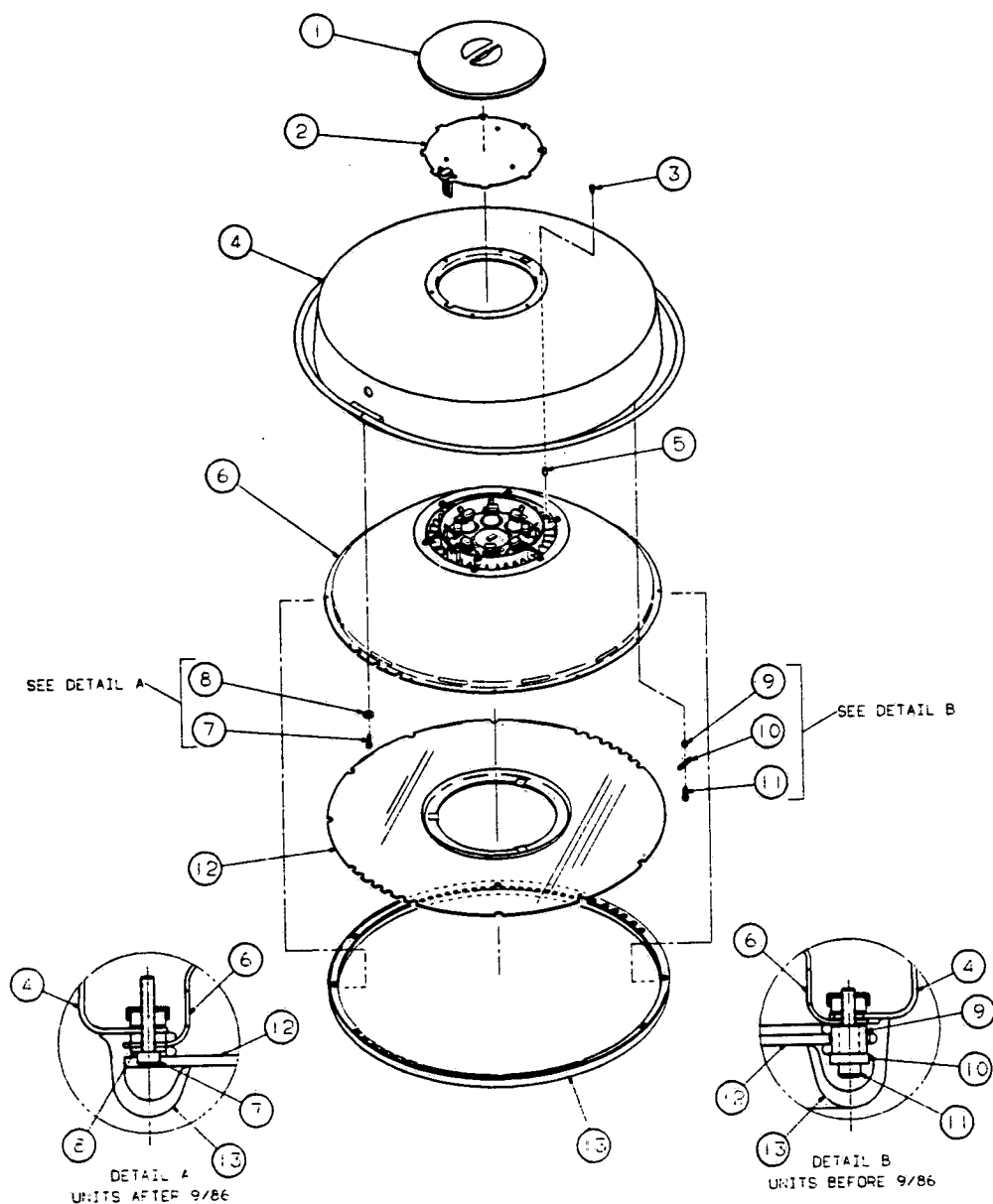


Figure 5-9. LIGHTHEAD ASSEMBLY (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER		DESCRIPTION	UNITS PER ASSEMBLY			
5-9-			LIGHTHEAD ASSEMBLY (Part 1 of 2) Units Before 9/86.....	X			
			LIGHTHEAD ASSEMBLY (Part 1 of 2) Units After 9/86.....		X		
1	P	136806 123	LAMP COVER.....	1	1		
2	P	146645 992	LAMP COVER ASSEMBLY.....	1	1		
3	P	129357 933	SCREW, Truss Head, 8-32 x 3/8 Long.....	6	6		
4	P	146645 975	OUTER COVER ASSEMBLY.....	1	1		
5	P	150824 288	STUD, Insert.....	1	6		
6	P	146645 622	REFLECTOR, R3.....	1	1		
7	P	150824 285	SCREW, Socket Head, 8-32 x 7/8 Long.....		16		
8	P	150824 286	WASHER, Flat.....	16	16		
9	P	129357 792	SPACER, Sleeve.....	16			
10	P	129357 801	WASHER, Trim Ring.....	16			
11	P	129357 932	SCREW, Socket Head, 8-32 x 1 Long.....	1	1		
12	P	136806 105	LENS, Acrylic.....	1	1		
13	P	136806 101	TRIM RING.....	1	1		

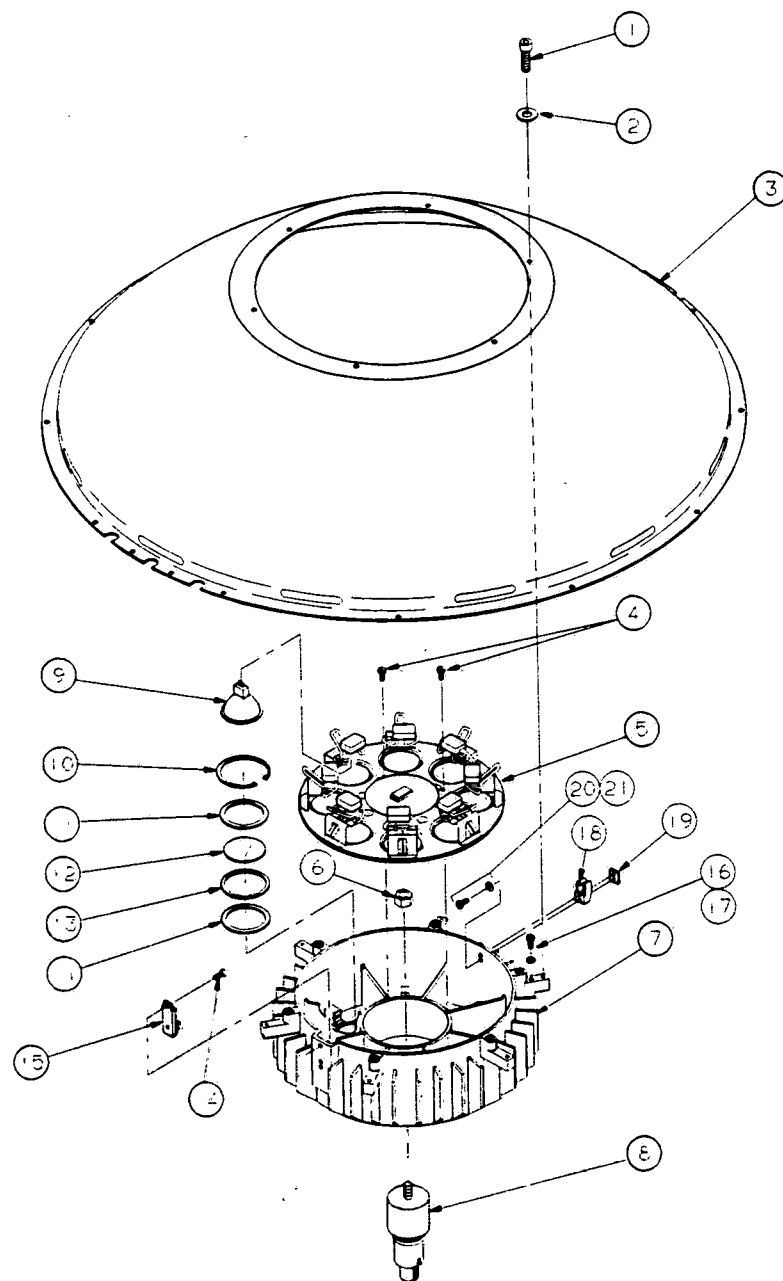


Figure 5-10. LIGHTHEAD ASSEMBLY (Part 2 of 2).

5-18

764321-18C

F- 9

FIG. & INDEX NO.	PART NUMBER			DESCRIPTION	UNITS PER ASSEMBLY			
5-10-				LIGHTHEAD ASSEMBLY (Part 2 of 2).....	X			
1	P	50527	061	SCREW, Socket Head, 8-32 x 1/2 Long.....	6			
2	P	150473	302	WASHER, Flat.....	6			
3	P	146645	622	REFLECTOR, R3.....	1			
4	P	13334	091	SCREW, 4-40 x 3/8 Long.....	5			
5	P	136806	517	LAMP HOLDER ASSEMBLY.....	1			
6	P	24496	061	NUT, 3/8 x 16.....	1			
7	P	146645	963	FILTER HOUSING.....	1			
8	P	93902	583	SHAFT ASSEMBLY.....	1			
9	P	93902	608	LAMP, 22 V, Tungsten-Halogen.....	8			
10	P	129357	807	RETAINING RING.....	8			
11	P	129357	799	GASKET, Teflon.....	16			
12	P	129359	094	HEAT FILTER.....	8			
13	P	129357	800	GASKET.....	8			
14	P	4617	041	SCREW, 8-32 x 3/8 Long.....	1			
15	P	150824	291	MOUNTING PLATE.....	1			
16	P	82675	001	SCREW, Ground.....	1			
17	P	76801	045	LOCKWASHER.....	1			
18	P	150824	289	PLATE, Backing.....	1			
19	P	150824	301	CATCH, Spring.....	1			
20	P	129356	135	SCREW, Button Head, 8-32 x 3/8 Long.....	1			
21	P	81683	002	LOCKWASHER, External Tooth.....	1			
22	P	93902	609	SOCKET, Lamp.....	8			

5-19

764321-18C

F- 10

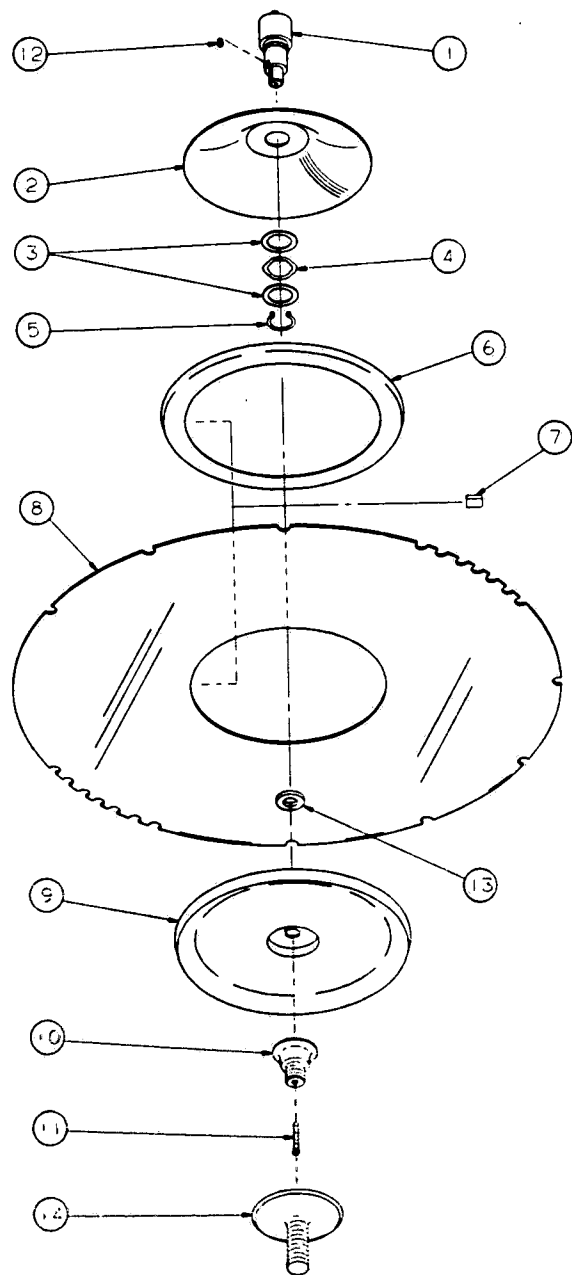


Figure 5-11. R2 REFLECTOR AND ACRYLIC LENS.

FIG. & INDEX NO.	PART NUMBER			DESCRIPTION	UNITS PER ASSEMBLY			
5-11-				R2 REFLECTOR AND ACRYLIC LENS (Units Before 9/86).....	X			
				R2 REFLECTOR AND ACRYLIC LENS (Units After 9/86).....		X		
1	P	93902	583	SHAFT ASSEMBLY.....	1	1		
2	P	136806	519	REFLECTOR, R2.....	1	1		
3	P	129357	841	WASHER, Flat.....	2	2		
4	P	129357	814	WASHER, Wave.....	1	1		
5	P	45915	045	RING, Retaining.....	1	1		
6	P	136806	120	GLARE SHIELD.....	1	1		
7	P	129357	842	CLIP, Retainer.....	3	3		
8	P	136806	105	LENS, Acrylic.....	1	1		
9	P	136806	122	COVER, Inner.....	1	1		
10	P	136229	001	SUPPORT, Handle.....	1	1		
11	P	38675	041	SCREW, Flat Head, 10-32 x 1-3/4 Long.....	1	1		
12	P	129357	818	KEY.....	1	1		
13	P	40621	091	WASHER, Flat Teflon.....	1	1		
14	P	93184	001	HANDLE, Sterile.....	1	1		

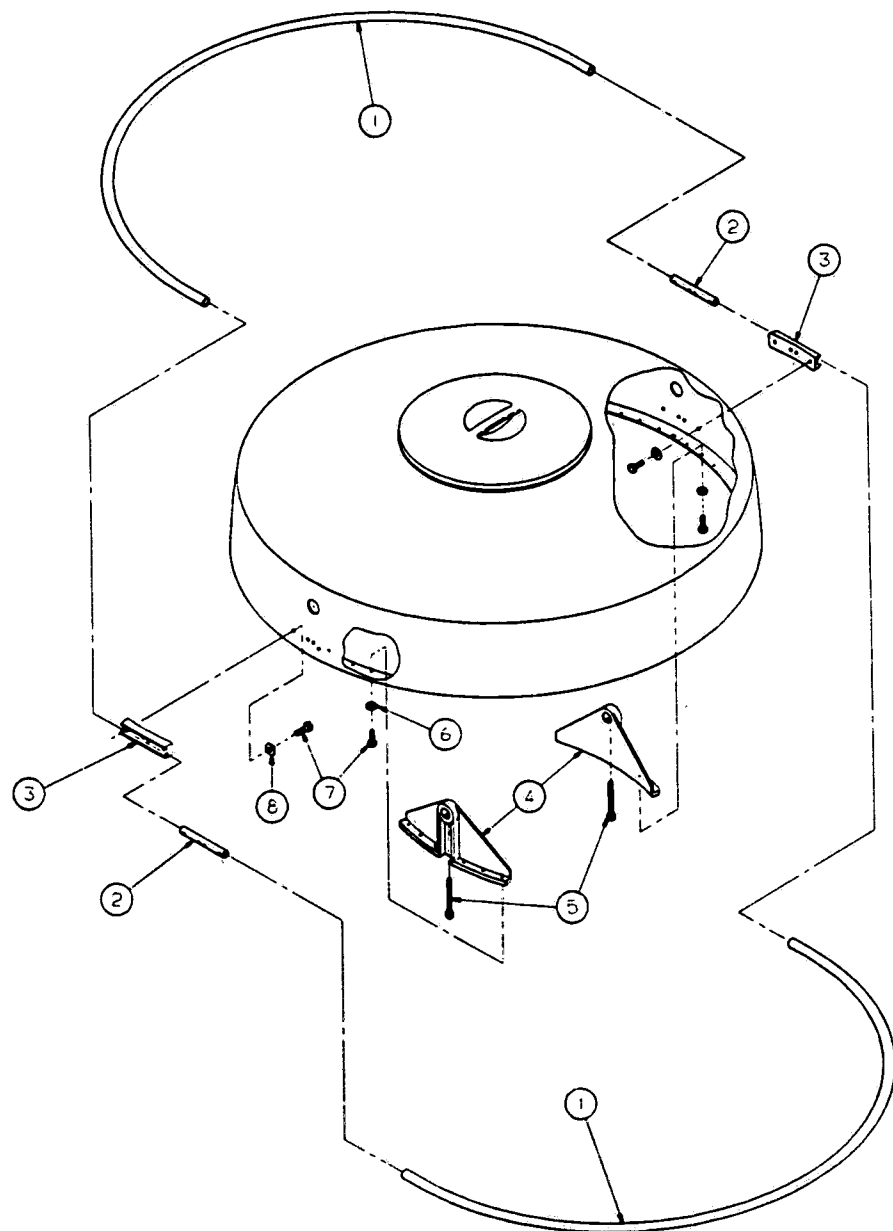


Figure 5-12. LIGHTHEAD HANDLE AND PIVOT BRACKETS.

FIG. & INDEX NO.	PART NUMBER		DESCRIPTION	UNITS PER ASSEMBLY			
5-12-			LIGHTHEAD HANDLE AND PIVOT BRACKETS.....	X			
1	P	136806	106	HANDLE, Lighthouse.....	2		
2	P	129357	789	PLUG, Insert.....	2		
3	P	93902	575	HANDLE MOUNT.....	2		
4	P	136806	103	PIVOT MOUNT.....	2		
5	P	129357	949	SCREW, Socket Head, 10-32 x 3-1/4 Long....	2		
6	P	150824	286	WASHER, Flat.....	8		
7	P	150824	285	SCREW, Socket Head, 8-32 x 7/8 Long.....	12		
8	P	5561	091	WASHER, Flat.....	4		

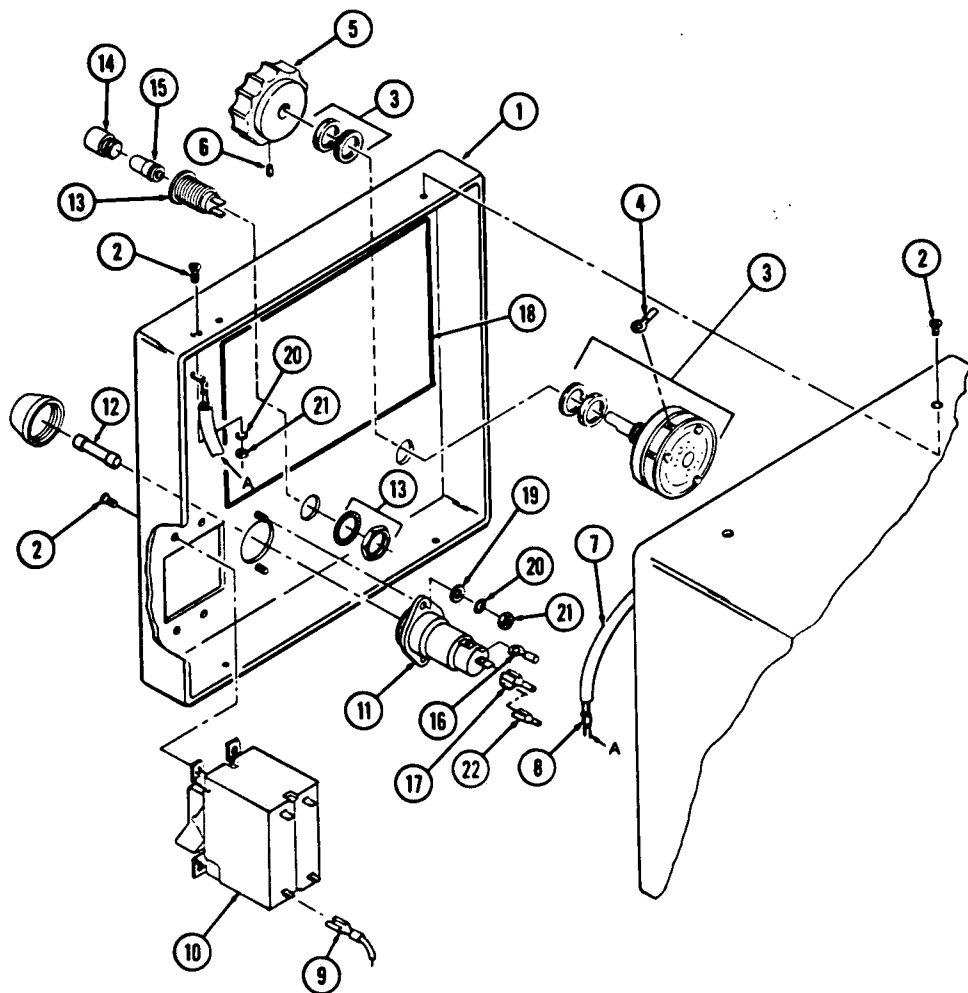


Figure 5-13. 25 AMP VARIABLE INTENSITY CONTROL (Part 1 of 2).

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
5-13-	P 146645 973	25 AMP VARIABLE INTENSITY CONTROL (Part 1 of 2).....	X
1	P 146645 985	PANEL, Control.....	1
2	P 50347 041	SCREW, Flat Head, #6-32 x 3/8.....	9
3	P 83834 001	SWITCH, Detent.....	1
4	P 129278 001	TERMINAL, Ring, #6 Stud.....	6
5	P 93349 001	KNOB, Selector.....	1
6	P 35139 061	SCREW, Set, #6-32 x 1/4.....	1
7	P 45526 091	TUBING, Chasis Cover.....	1
8	P 45527 091	CHAIN, Cover Restraint.....	1
9	P 150471 001	TERMINAL, Quick Disconnect.....	4
10	P 93234 001	BREAKER, Circuit, 6 Amp.....	1
11	P 129357 939	HOLDER, Fuse.....	1
12	P 129357 940	FUSE, 25 Amp.....	1
13	P 129357 942	LAMPHOLDER.....	1
14	P 150824 370	LENS, Green.....	1
15	P 129357 944	LAMP, 28 V, .04 Amp CM385.....	1
16	P 129278 001	TERMINAL, Ring (#6 Stud).....	1
17	P 150472 001	TERMINAL ADAPTER, Quick Disconnect.....	1
18	P 134470 171	WIRING DIAGRAM, Decal.....	1
19	P 84114 002	WASHER, Flat, #6-32.....	2
20	P 19675 041	LOCKWASHER, #6, Helical Spring.....	6
21	P 3037 041	NUT, Hex, #6-32.....	6
22	P 90695 091	TERMINAL, Quick Disconnect.....	1

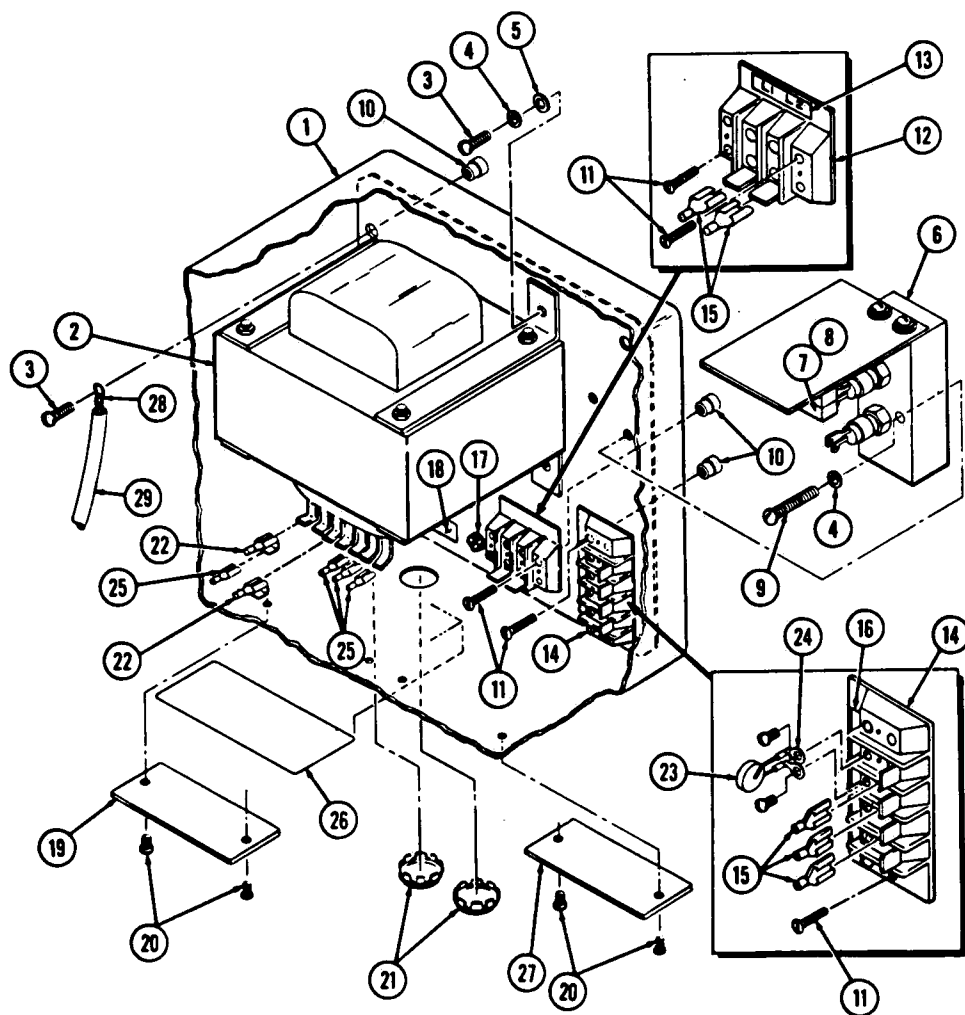


Figure 5-14. 25 AMP VARIABLE INTENSITY CONTROL (Part 2 of 2).

FIG. & INDEX NO.	PART NUMBER			DESCRIPTION	UNITS PER ASSEMBLY		
5-14-				25 AMP VARIABLE INTENSITY CONTROL (Part 2 of 2).....	X		
1	P	136806	119	BOX, Control.....	1		
2	P	93902	613	TRANSFORMER.....	1		
3	P	4682	041	SCREW, Round Head, #8-32 x 3/8.....	4		
4	P	19676	041	LOCKWASHER, #8.....	5		
5	P	5511	041	WASHER, Flat, #8.....	3		
6	P	134470	181	SCR MODULE.....	1		
7	P	129352	678	CONNECTOR, P1.....	1		
8	P	84187	002	SOCKET.....	8		
9	P	81669	009	SCREW, Round Head, #8-32 x 1-1/4.....	2		
10	P	150468	002	INSERT, #8-32.....	5		
11	P	11241	041	SCREW, Round Head, #8-32 x 5/8.....	4		
12	P	150471	001	BLOCK, Terminal, 2 Terminal.....	1		
13	P	150469	001	STRIP, Marker.....	1		
14	P	150461	002	BLOCK, Terminal, 4 Terminal.....	1		
15	P	150471	001	TERMINAL, Quick Disconnect.....	5		
16	P	150470	001	STRIP, Marker.....	1		
17	P	82675	001	SCREW, Ground, Hex Head, #10-32 UNF x 3/8.....	1		
18	P	454201	001	DECAL, Ground.....	1		
19	P	84061	001	NAMEPLATE.....	1		
20	P	47598	061	SCREW, Drive, #2 x 3/16.....	4		
21	P	24563	091	BUTTON, Plug.....	2		
22	P	150472	001	TERMINAL ADAPTER, Quick Disconnect.....	2		
23	P	150824	290	THERMISTOR, 5 Ohms, 5 Amps.....	1		
24	P	90619	091	TERMINAL, Ring, #6 Stud.....	2		
25	P	32119	091	TERMINAL, Quick Disconnect.....	4		
26	P	150824	292	PLATE, Identification.....	1		
27	P	84083	001	NAMEPLATE, UL.....	1		
28				CHAIN (See Figure 5-13).....	1		
29				TUBING (See Figure 5-13).....	1		

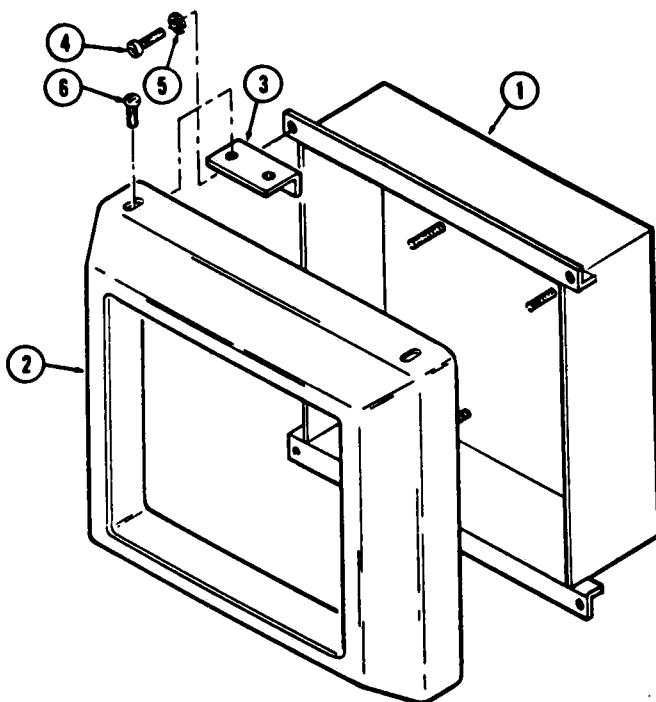


Figure 5-15. VARIABLE INTENSITY CONTROL — Recessing Kit.

FIG. & INDEX NO.	PART NUMBER			DESCRIPTION	UNITS PER ASSEMBLY			
5-15-				VARIABLE INTENSITY CONTROL - RECESSING KIT.....	X			
1	P	56346	001	ROUGH BOX ASSEMBLY.....	1			
	P	83991	002	TRIM PACKAGE - Recess Mounted Variable Intensity Control.....	1			
2	P	129356	166	• COVER.....	1			
3	P	83984	001	• ANGLE.....	4			
4	P	12538	061	• SCREW, Round Head, #10 x 32 x 1/4.....	4			
5	P	19685	061	• LOCKWASHER, #10.....	4			
6	P	42618	045	• SCREW, Button Head, #6-32 x 1/4.....	4			
7	P	3097	041	• NUT, 1/4 x 20 (Not Shown).....	3			
8	P	19678	045	• LOCKWASHER, 1/4 (Not Shown).....	3			



**AMSCO
SERVICE**

34" POLARIS SL LIGHT

P-764321-181

7/88

1 of 1

