

**ROS  
HPS-1000/Q  
DROPLIGHT SYSTEM**

**OPERATING AND MAINTENANCE MANUAL**

SERIAL NUMBER: \_\_\_\_\_

SALES ORDER: \_\_\_\_\_



5618 Copley Drive  
San Diego, CA 92111-7902  
TEL: 858-565-8500  
FAX: 858-565-8808  
[www.rosys.com](http://www.rosys.com)

# TABLE OF CONTENTS

WARRANTY .....	III
CUSTOMER SERVICE .....	IV
GENERAL DESCRIPTION .....	1
DESIGN FEATURES .....	2
SPECIFICATIONS .....	3
<i>HPS-1000/Q DROPLIGHT</i> .....	3
<i>HPS-1000 IN-AIR BALLAST POWER SUPPLY</i> .....	3
<i>CABLE MANAGEMENT SYSTEM</i> .....	3
INSTALLATION AND OPERATION.....	4
<i>OPERATIONAL CHECK</i> .....	4
<i>INSTALLATION</i> .....	4
MAINTENANCE.....	5
CAUTION.....	6
APPENDIX.....	7

## WARRANTY

Remote Ocean Systems, Inc. (hereinafter called "**ROS**") warrants its products as stated below subject to the conditions specified.

**ROS** warrants its products, when operated under normal conditions, to be free from defects in material or workmanship for a period of one year from the date of purchase provided that inspection by **ROS** discloses that such defects developed under normal and proper use. **ROS** products repaired or replaced pursuant to this warranty shall be warranted for the unexpired portion of the warranty applying to the original product. The liability of **ROS** under this warranty shall exist subject to the following conditions:

- (a) **ROS** is properly notified of such defects by Purchaser, and the defective product is returned to **ROS**, transportation charges paid by Purchaser.
- (b) **ROS** shall be released from all obligations under its warranty in the event repairs or modifications are made by persons not authorized by **ROS**.
- (c) Representative and warranties made by any person, including distributors and representatives of **ROS**, which are inconsistent or in conflict with the terms of this warranty, shall not be binding upon **ROS** unless reduced to writing and approved by an officer of **ROS**. **ROS** shall in no event be liable for other direct, special, incidental, consequential, indirect or penal charges.
- (d) This warranty shall be governed by the laws of the State of California.

In the event the defect is determined to be within the terms of this warranty, then **ROS** agrees to repair and/or replace (at **ROS**'s discretion) the product or defective portion at no charge to the Purchaser. This warranty does not apply to expendable items or to normal wear and tear and is conditional upon performance of normal preventative maintenance procedures.

Our commitment to quality and customer service directs us to constantly strive to improve our products. The materials and specifications presented in our manuals and data sheets are correct and accurate to the best of our knowledge, and are presented in good faith. However, the information is not guaranteed and is subject to change without notice.

### **LIMITATION OF REMEDIES**

Purchaser assumes all risk and liability for results obtained in any installation, operation, or use of the product. Purchaser's sole remedy for any breach of warranty by vendor shall be limited to the "express remedies" set forth above. Otherwise, in no event shall vendor, its agents, or employees be liable to the original purchaser or any third party for any consequential or incidental damages or expenses of any nature arising directly out of or in connection with the use of vendor products. Even if vendor has been advised of the possibility of such damages or expenses. In any event, unless otherwise contrary to state law, vendor liability under this limited warranty shall not exceed the purchase price of the product.

## **CUSTOMER SERVICE**

ROS, Inc uses a worldwide network of stocking distributors and representatives who are familiar with our products and are able to provide assistance during installation and/or operation of these products.

If you have any questions or problems with this product that are not covered by this manual or instruction, please contact our agent in your area, or contact us directly by phone, fax, or e-mail.

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E-mail: [support@rosys.com](mailto:support@rosys.com)

## GENERAL DESCRIPTION

The HPS-1000 Droplight System was designed specifically for use in nuclear reactor vessels and spent fuel storage pools. The light head uses a high-pressure sodium discharge light. Because of the very high efficiency, the 1000-watt HPS lamp produces the equivalent light of seven 1000-watt incandescent lights and will last ten times as long as an incandescent light used under the same conditions.

In addition to the high efficiency and long lifetime, the construction of the HPS bulb is extremely rugged with no filaments to break, the actual service lifetime under adverse handling conditions will far exceed that of standard incandescent droplights.

The HPS-1000 Droplight System includes the droplight, with detachable power cable, and a regulating ballast power supply. The 1000-watt HPS bulb in the droplight is permanently bonded to an electropolished stainless steel base. A flexible insulating compound provides shock mounting, and eliminates the need for bulb sockets, o-rings, gaskets, or lip seals which could leak and cause premature failure. An outer quartz envelope surrounds the sodium arc tube. For added protection, an electropolished stainless steel screen completely encloses the bulb.

The configuration of the droplight allows it to be easily lowered through small openings (light diameter is 3.5 inches), and recovered without snagging problems. The detachable power cable is constructed of flexible IEEE-383 rated polyurethane, which contains no halogens and is easy to wipe down to minimize contamination. The HPS 1000 Droplight is also available with two different reflectors. The standard reflector directs the light downward. The optional side looking reflector directs the light to the side and has a weighted base to stand self supported in the flow holes of the lower core support plate. Either reflector can be quickly and easily installed or removed for use in confined areas.

The in-air ballast power supply for the droplight is contained in a lightweight aluminum air-cooled housing, and includes an on-off power switch and a cooling fan. The input power cord has a smooth IEEE-383 polyurethane jacket for easy decontamination and long life. The power supply is 12 x 12 x 6 inches and weight is 36 pounds.

In the standard configuration, a handle is supplied for ease of transport. In an optional configuration, the ballast power supply is mounted on high-density polyethylene along with a cable management system. In the cable management system, power is passed through slip rings in the system reel and the droplight cable is wound onto the reel. The HPS-1000 Droplight can then be connected to the cable connector and lowered without tangles. In both configurations the HPS-1000 Droplight System is coupled to the light head by a Kellums grip attached to the cable for secure deployment and retrieval and also provides strain from the connector interface.

## DESIGN FEATURES

The primary design features of the HPS-1000 Droplight System are as follows:

1. Exceptionally long life (10 times longer than an incandescent bulb).
2. Very high efficiency (140,000 lumens for 1000 watt light).
3. Direct plug in replacement of existing fixtures.
4. Secure lamp retention with mating cable protecting connector interface.
5. Smooth electropolished stainless steel finish for minimum corrosion, maximum service life, and easy decontamination.
6. Ballasts designed for maximum life.
7. Stainless steel screen protects HPS bulb and retains fragments if bulb is accidentally broken.
8. Stainless steel light base permanently bonded to bulb and connector. No gaskets, lip seals, or sockets to fail.
9. Wet Mateable lamp and ballast connectors.
10. Quick and easy bulb and module replacements.
11. Smooth, rugged radiation tolerant polyurethane cable for easy decontamination and long life. Easy replacement if damaged.
12. Optional cable management system allows easy handling and operation from low dose area.

## **SPECIFICATIONS**

### ***HPS-1000/Q DROPLIGHT***

POWER:	1000 Watts
OPERATION DEPTH:	100 Feet
LAMP TYPE:	High Pressure Sodium Discharge
LAMP OUTPUT:	140,000 Lumens (Initial Output)
LAMP LIFETIME:	10 time longer than an incandescent bulb
DIAMETER:	3.5 Inches
LENGTH:	17 Inches including connector
WEIGHT IN AIR:	5.25 Pounds
WEIGHT IN WATER:	0.25 Pounds
HOUSING MATERIAL:	Electropolished 304 stainless steel
PROTECTIVE COVER:	Electropolished stainless steel screen
CONNECTOR:	Underwater mateable BH3MP
REFLECTORS (OPTIONAL)	Standard or lower core plate flow hole side looking

### ***HPS-1000 IN-AIR BALLAST POWER SUPPLY***

POWER RATING:	1000 Watts
VOLTAGE INPUT:	120 VAC, 60 Hz
OVERALL SIZE:	12 x 12 x 6 inches
WEIGHT:	36 Pounds
ENCLOSURE:	Brushed Aluminum
POWER SWITCH:	Power Switch Push button (Lighted)
CABLE GLANDS:	Weather proof nylon 66
POWER CORD:	IEEE-383 rated polyurethane jacketed
LIGHT CABLE:	IEEE-383 rated polyurethane jacketed
LAMP CONNECTOR:	IL3FS
POWER CONNECTOR:	Nylon 66 120VAC straight plug
MOUNTING:	
Option #1	High-density polyurethane platform (When used with cable management system)

### ***CABLE MANAGEMENT SYSTEM***

REEL SIZE:	14 x 18 x 20 Inches
PLATFORM SIZE:	36 x 20 x 1 Inches
SLIP RINGS:	3 Conductor
PLATFORM MATERIAL:	High density polyurethane

## INSTALLATION AND OPERATION

The HPS 1000 Droplight System is a sturdy assembly designed to withstand the harsh demands of underwater operation. However, a few precautions are recommended in order to prevent damage and assure trouble-free operation during the life of the equipment.

**NOTE:** All ROS, Inc. products are thoroughly tested and inspected prior to shipment. However, damage may occur during transit. After unpacking the equipment, carefully inspect it for any sign of damage. If damage is detected a claim should be submitted to the freight carrier, with a copy to ROS, Inc.

After the initial inspection, connect and operate the equipment as instructed in the following section. If the equipment fails to operate, please contact the Customer Service Manager at ROS, Inc.

### ***OPERATIONAL CHECK***

After unpacking, an operational check should be made prior to use of the HPS-1000. Plug in 120 VAC power for a brief period of time (less than one minute) to verify the light will operate.

### **CAUTION**

**THE LAMP IS DESIGNED FOR IN WATER USE ONLY. DO NOT BURN IN AIR FOR MORE THAN 5 MINUTES.**

### ***INSTALLATION***

The HPS-1000 Droplight can be mounted and operated in any position underwater. For most fuel pool and reactor vessel applications, it is simply lowered by the interconnecting cable to the desired position.

In the optional cable management system the ballast power supply and cable reel are mounted to a high-density polyethylene platform. The HPS-1000 Droplight is simply reeled in or out to the desired location.

Either configuration allows for use of the standard reflector or lower core plate flow hole side looking reflector.



## MAINTENANCE

The HPS-1000 Droplight system was designed to provide a long lifetime of service with very little maintenance. Maintenance is generally limited to cleaning and replacement of bulb assemblies.

Ballasts are generally good for 5-7 years. After this period, the capacitor may change value due to heat and age or the striker may give out. If the striker gives out, the lamp will not strike. If the capacitor changes value, the ballast will deliver improper power that will cause the lamp to run hot or run cold. The result is a considerable reduction in lamp life. Ballasts older than 7 years old should be replaced or rebuilt to ensure optimum performance.

The design of the bulb assembly compliments this long lifetime. The bulb is potted into a stainless base with a flexible insulating compound. This eliminates all o-rings, which could leak, or bulb sockets which could corrode and fail. When the bulb requires replacement, the entire bulb and stainless steel base are replaced as a unit. The protective stainless steel screen can be re-used on the replacement lamp assembly.

To replace the lamp assembly:

1. Turn off the HPS-1000 Droplight Ballast and unplug the power cord from the source.
2. Retrieve the HPS-1000 Droplight assembly.
3. Unlock Kellums grip from the lamp assembly.
4. Unscrew the connector locking sleeve and unplug the connector.
5. Unscrew the protective stainless steel screen and remove.
6. Screw new lamp into screen.
7. Plug in the connector and screw on locking sleeve.
8. Hook Kellums grip onto lamp base.

## **CAUTION**

**LAMP AND STAINLESS STEEL SCREEN MAY BE VERY HOT AFTER PROLONGED OPERATION. EITHER WAIT FOR SCREEN AND BULB TO COOL OR USE PROTECTIVE GLOVES TO CHANGE LAMP ASSEMBLY. USE OF AN INCORRECT POWER SOURCE MAY CAUSE PERMANENT DAMAGE TO THE BALLAST POWER SUPPLY.**

**DO NOT PLUG OR UNPLUG INTERCONNECT CABLES WITH THE POWER ON. THIS CAN SEVERELY DAMAGE THE INTERCONNECT CABLES.**

## **WARNING**

**DO NOT CONNECT A MULTIMETER TO THE OUTPUT OF THE LAMP CONNECTOR. THE VOLTAGE IS VERY HIGH (5000-7500 VOLTS) AND WILL DESTROY ANY VOM. ONLY TRAINED PERSONEL WITH THE CORRECT EQUIPMENT SHOULD ATTEMPT OUTPUT MEASUREMENTS.**

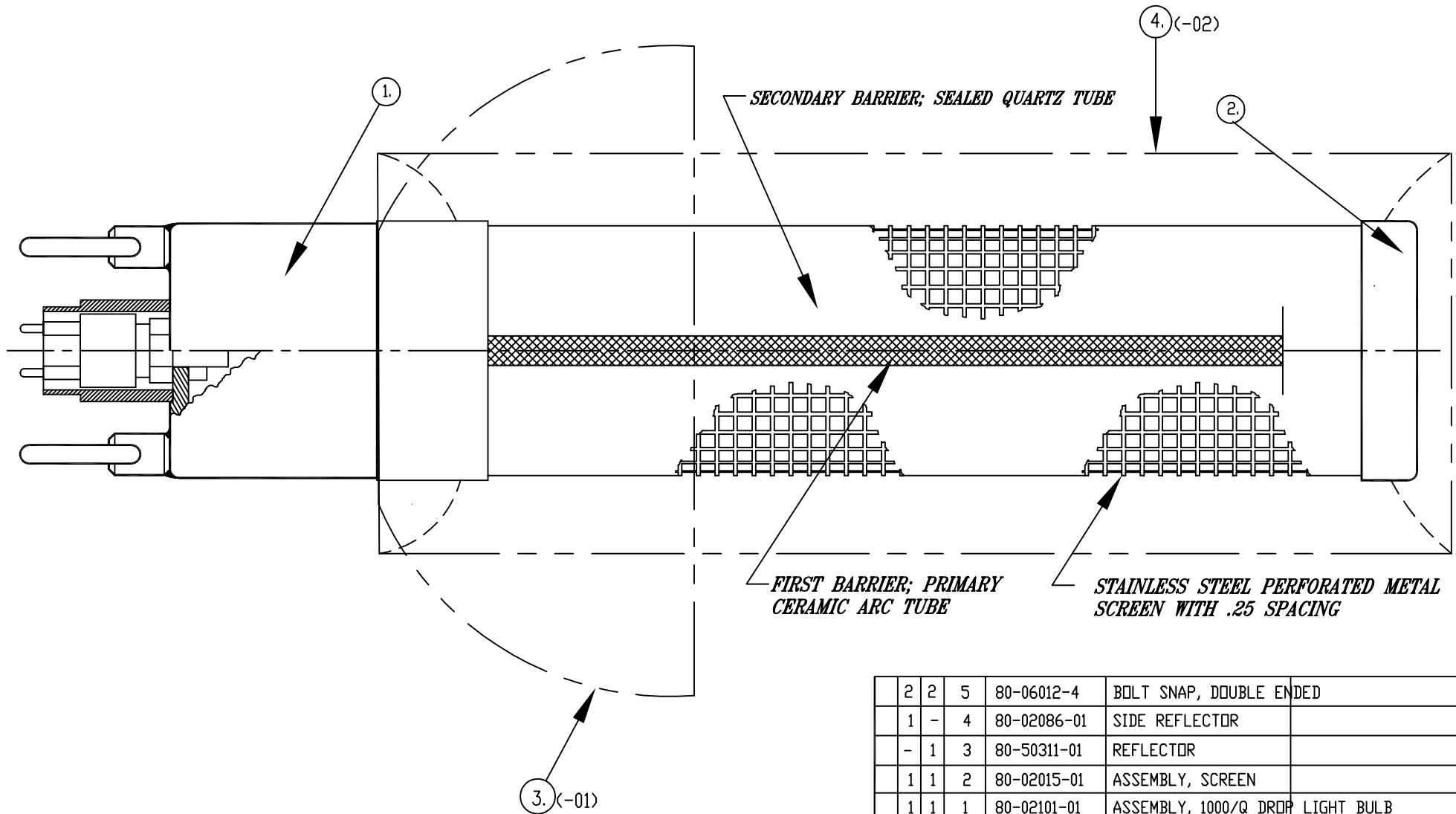
## APPENDIX

### Droplight HPS-1000 Drawings

80-02100	HPS-1000/Q Droplight Assembly
80-50114	Cable Management System, DLBA-1000
80-02109	Ballast Assy, In-Air Ballast, 115VAC, 60Hz, HPS-1000
80-02007	Wiring Diagram, In-Air Ballast, 115VAC, 60Hz, HPS-1000

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REV	DESCRIPTION	DATE
A	SEE ECD NUMBER 286 SS	10/26/00
B	CHANGED PART # OF ITEM 2, IS: '80-02015-01', WAS: '80-02023-01' PER ECR NO. 639	6/14/02 SM
C	SEE ECD NUMBER 1296 NBB	27OCT08

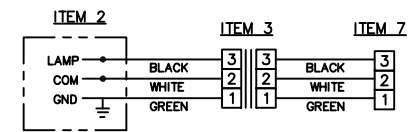
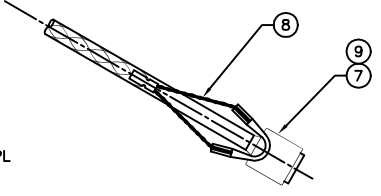
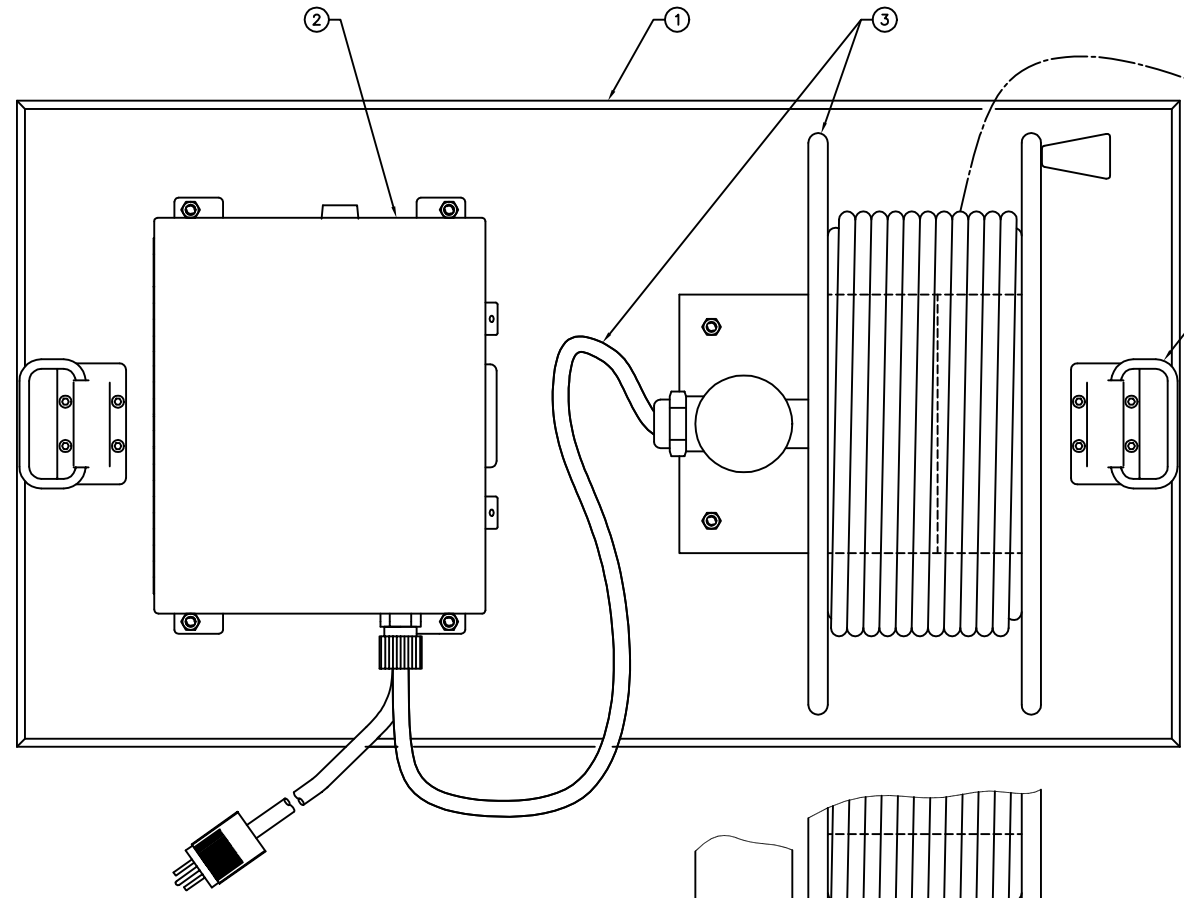


2	2	5	80-06012-4	BOLT SNAP, DOUBLE ENDED	
1	-	4	80-02086-01	SIDE REFLECTOR	
-	1	3	80-50311-01	REFLECTOR	
1	1	2	80-02015-01	ASSEMBLY, SCREEN	
1	1	1	80-02101-01	ASSEMBLY, 1000/Q DROP	LIGHT BULB
-03	-02	-01	ITEM	PART OR	NOMENCLATURE OR
QTY/ASSY	NO.	IDENTIFYING NO.	DESCRIPTION	MATERIAL SPECIFICATION	

NEXT ASSEMBLY: END ITEM					
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES					
TOLERANCES .X = +/- .030 .XX = +/- .010 XXX = +/- .005 ANGULAR +/- 30°		SURFACE TEXTURE: N/A ✓			
PREPARED	<i>RoToCo</i>	02/25/97	<b>TOP ASSEMBLY</b> <b>HPS-1000/Q DROPLIGHT</b>		
CHECKED	<i>R.Hoffman</i>	11/09/00			
QA	<i>O.Correa</i>	11/27/00			
RELEASED BY	<i>S.Myers</i>				
SIZE	CAGE CODE	DWG NO.	REV LTR		
	C	2T637	80-02100	C	
SCALE	FULL	WEIGHT	SHEET		1 OF 1

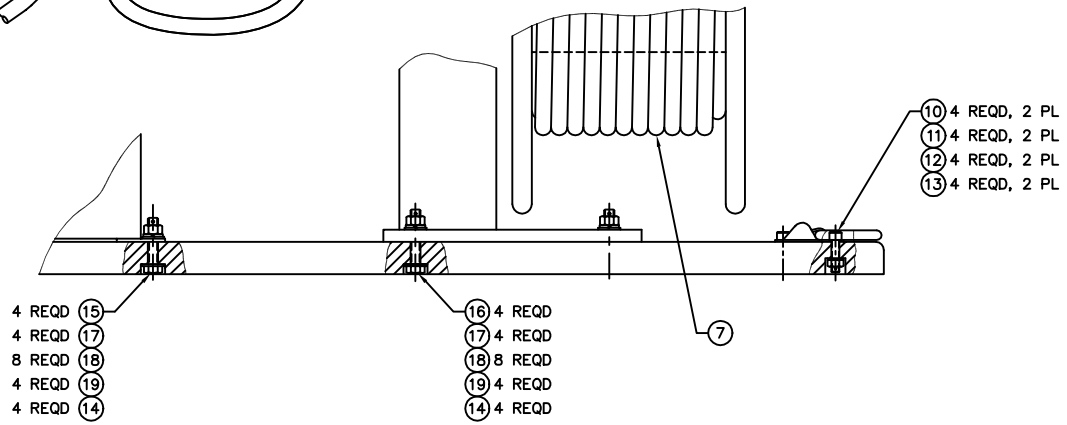
1. DOUBLE ENDED BOLT SNAPS (ITEM 5) ARE TO BE INCLUDED AS PART OF THE LIGHT KIT.  
 NOTES (UNLESS OTHERWISE SPECIFIED)

REV	DESCRIPTION	DATE
A	ITEM 4 WAS 80-02520-4	10-9-97
B	UPDATED & DWG # WAS SK-07012-07-28-99	
C	SEE ECO NO. 442	0105-24-01



WIRING DIAGRAM

	3	20		CRIMP LUG	
	8	19		LOCK WASHER, NOM Ø.312	
	16	18		FLAT WASHER, NOM Ø.312	
	8	17		HEX NUT, .312-18	
	4	16	89-90007-02	HEX HD CAP SCR	AID
	4	15	89-90007-01	HEX HD CAP SCR	AID
	8	14		COTTER PIN, Ø.09 X .5 LG	
	8	13		COTTER PIN, Ø.06 X 1.0 LG	
	8	12		FLAT WASHER, NOM Ø.250	
	8	11		HEX NUT, .250-20	
	8	10	52-41129-01	SOC HD CAP SCR	AID
	1	9	60-08091-01	LOCKING SLEEVE	
	1	8	80-80016-4	KELLUMS GRIP	
	1	7	CA-8-03-100	CABLE ASSY	
	1	6			
	1	5			
	2	4	80-50116-01	HANDLE	
	1	3	80-50037-01	CABLE REEL	
	1	2	80-02109-03	BALLAST ASSY	
	1	1	80-50115-02	BASE PLATE	



- 4 REQD (15)
- 4 REQD (17)
- 8 REQD (18)
- 4 REQD (19)
- 4 REQD (14)
- 16 4 REQD
- 17 4 REQD
- 18 8 REQD
- 19 4 REQD
- 14 4 REQD

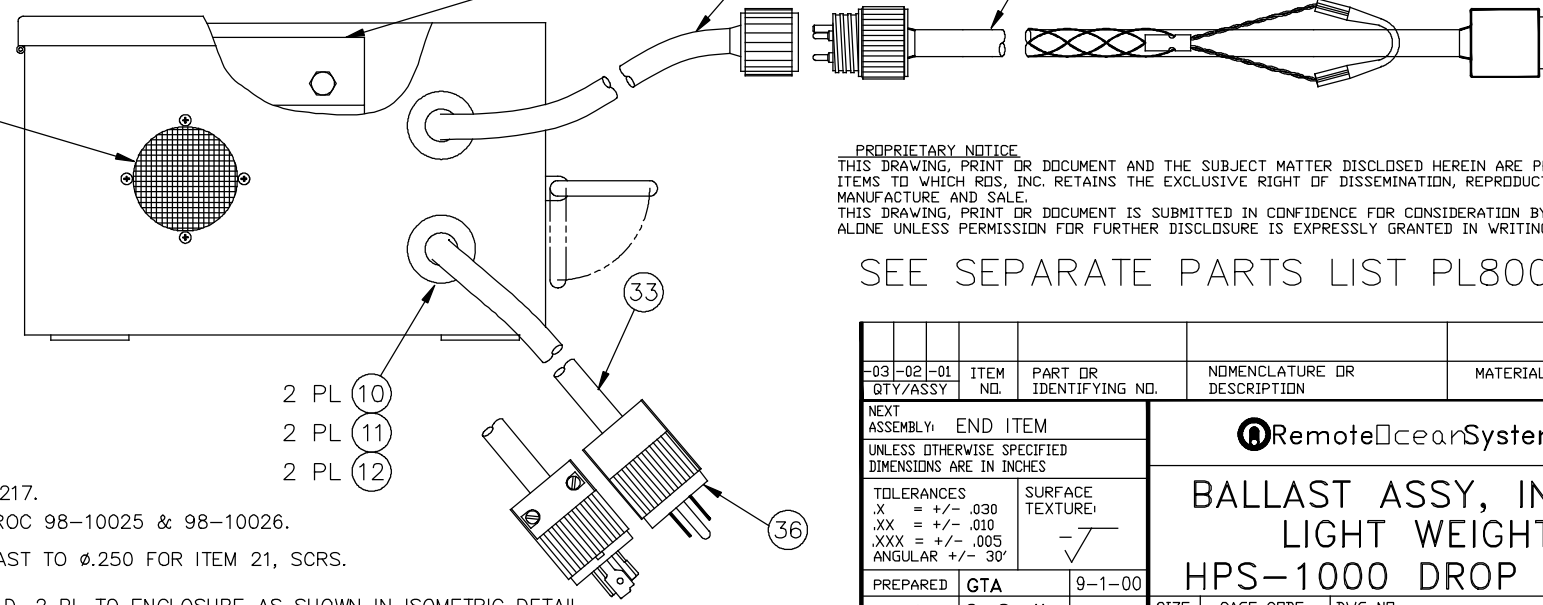
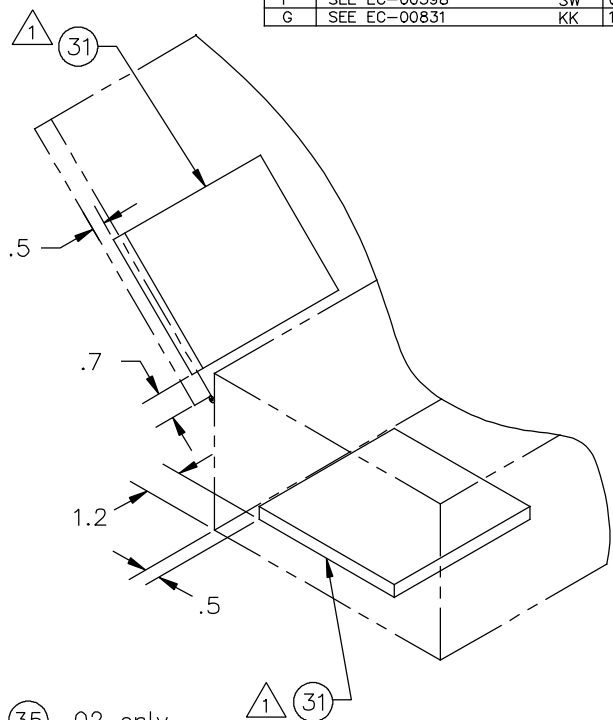
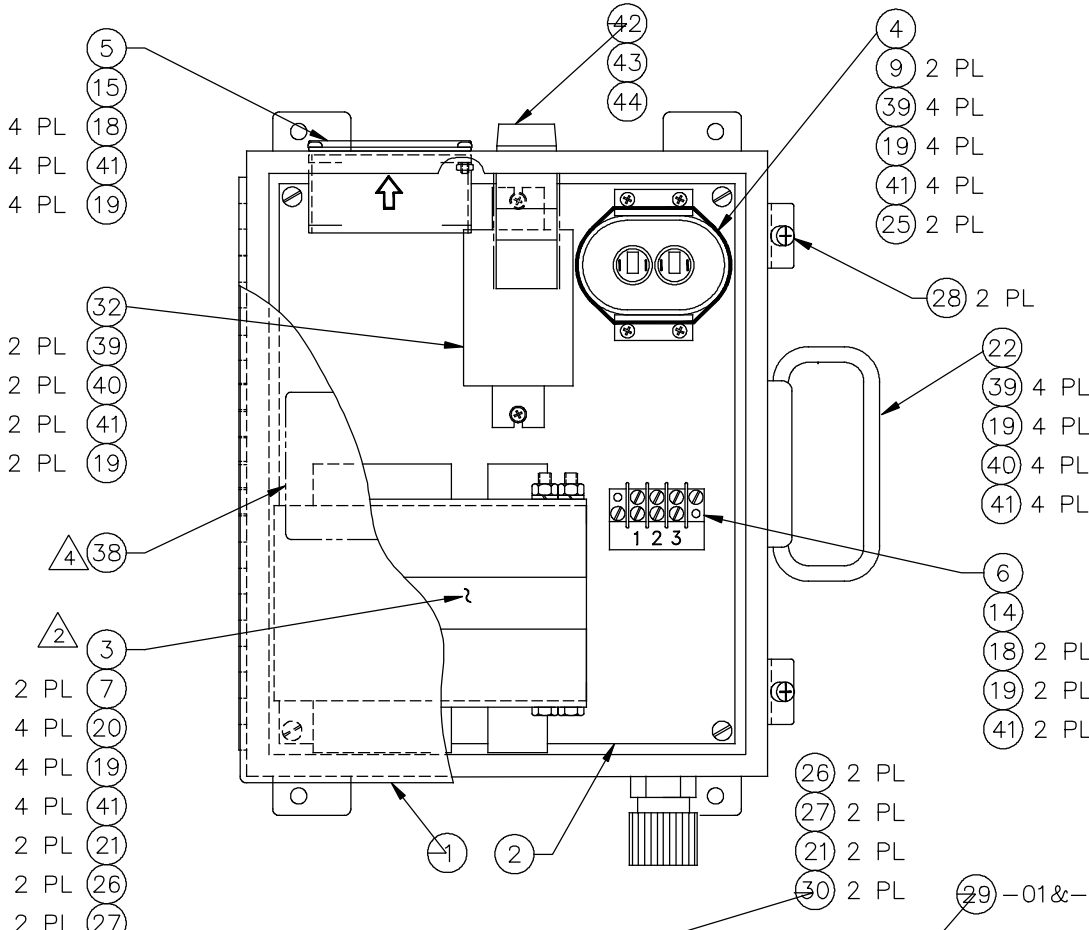
NOTES (UNLESS OTHERWISE SPECIFIED)

NEXT ASSEMBLY: -  
 UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES  
 TOLERANCES SURFACE TEXTURE:  
 .X = +/- .030  
 .XX = +/- .010  
 .XXX = +/- .005  
 ANGULAR +/- .30°  
 PREPARED: GTA 9-29-97  
 CHECKED: DA  
 RELEASED BY:

**RemoteClearSystems**  
**CABLE MANAGEMENT SYSTEM**  
**DLBA-1000**

SIZE: D	CAGE CODE: 27637	DWG NO: 80-50114	REV LTR: C
SCALE: 1/2	WEIGHT:	SHEET 1 OF 1	

REV	DESCRIPTION	DATE
A	SEE ECO NO. 383	gta 3-19-01
B	SEE ECO NO. 404	gta 4-9-01
C	SEE ECO NO. 441	gta 5-24-01
D	ADDED -04 CONFIG.	gta 8-11-04
E	REF. ECR 816	RJL 021705
F	SEE EC-00398	SW 08DEC09
G	SEE EC-00831	KK 19JUL11



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SEE SEPARATE PARTS LIST PL8002109

- 4 LABEL PER ROS PROC, 98-10217.
  - 3. ASSY TO CONFORM TO ROS PROC 98-10025 & 98-10026.
  - 2 OPEN HOLES IN ITEM 3, BALLAST TO  $\phi$ .250 FOR ITEM 21, SCRS.
  - 1 ATTACH ITEM 31, SUPPORT PAD, 2 PL TO ENCLOSURE AS SHOWN IN ISOMETRIC DETAIL, ONE PAD ON THE INSIDE BOTTOM AND ONE ON THE INSIDE OF THE LID.
- NOTES (UNLESS OTHERWISE SPECIFIED)

QTY/ASSY	ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
03-02-01				
NEXT ASSEMBLY: END ITEM				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES				
TOLERANCES		SURFACE TEXTURE:		
X = +/- .030		-√		
XX = +/- .010				
XXX = +/- .005				
ANGULAR +/- 30'				
PREPARED	GTA	9-1-00		
CHECKED	S. Scott	9-1-00	SIZE	CAGE CODE
QA	O. Correa	9-6-00	C	2T637
RELEASED BY B. Hulburd		DWG NO.		REV LTR
		80-02109		G
SCALE 1/2		WEIGHT 37.5 lbs		SHEET 1 OF 1

PARTS LIST				Remote Ocean Systems		CAGE CODE 2T637	PL 8002109	REV G
QUANTITY REQD				TITLE BALLAST ASSY, IN-AIR - LT WT - HPS-1000 DL			SHT 1 OF 2	DATE 9-1-00
-04	-03	-02	-01	ITEM NO.	PART NO.	DESCRIPTION	REMARKS	
			X		80-02109-01	BALLAST ASSY, 100' CABLE W/STR PLUG		
		X			80-02109-02	BALLAST ASSY, 125' CABLE W/STR PLUG		
	X				80-02109-03	BALLAST ASSY, W/O OUTPUT CABLES		
	1	1	1	1	80-02114-02	ENCLOSURE - AID		
	1	1	1	2	80-02113-01	PANEL - AID		
	1	1	1	3	80-02148-4	BALLAST	BALLAST 71A8793-500	
	1	1	1	4	80-02004-4	CAPACTOR, 22.5uF		
	1	1	1	5	80-50020-4	FAN	115VAC	
	1	1	1	6	80-80060-4	TERMINAL BLOCK		
	2	2	2	7	80-50035-01	BRACKET, BALLAST		
				8				
	2	2	2	9	80-50033-01	BRACKET, CAPACITOR		
	2	2	2	10	60-03274-4	STRAIN RELIEF 0.39-0.56 IN DIA		
	2	2	2	11	80-50038-4	SEAL RING		
	2	2	2	12	80-80051-4	NUT, LOCKING		
	1	1	1	13	80-50044-01	SCREEN, AIR COOLING		
	1	1	1	14	80-80058-4	MARKER STRIP		
	1	1	1	15	80-50039-4	GUARD, FAN		
	4	4	4	16		PAN HD SCR, #4-40 X .38 LG	SST	
	4	4	4	17		HEX NUT, #4-40	SST	
	6	6	6	18		PAN HD SCR, #6-32 X .50 LG	SST	
	20	20	20	19		HEX NUT, #6-32	SST	
	4	4	4	20		FLAT HD SCR, #6-32 X .375 LG	SST	
	4	4	4	21		HEX HD SCR, .250-20 X 4.50 LG	SST	

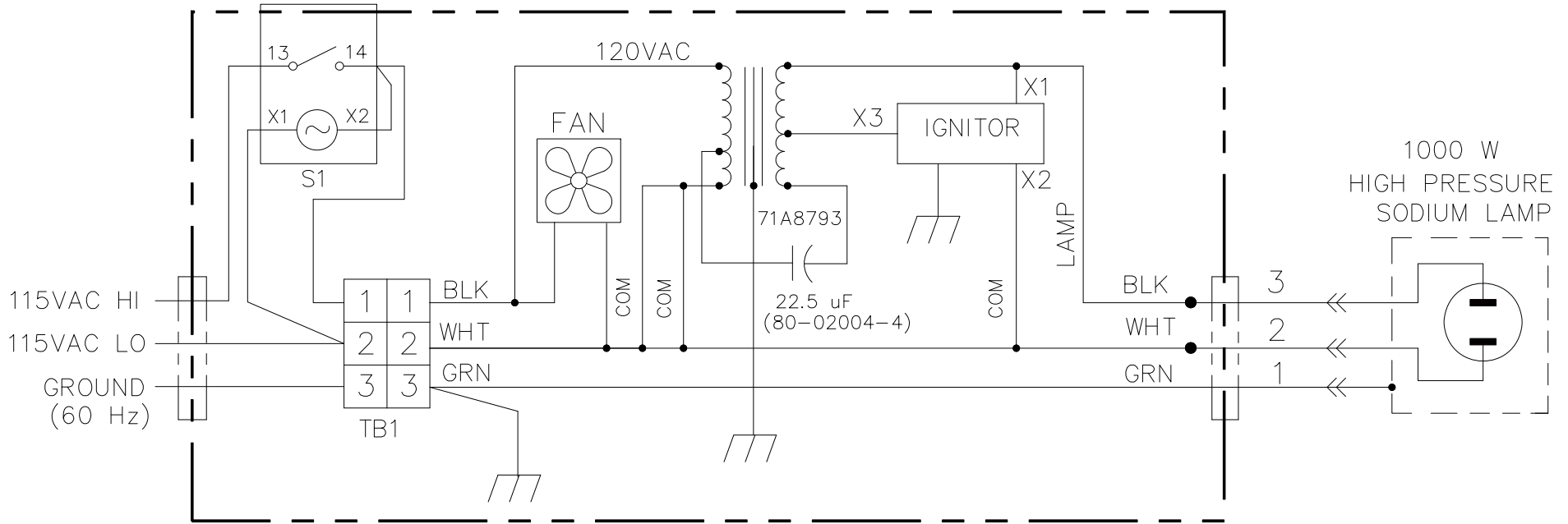
PARTS LIST				Remote Ocean Systems		CAGE CODE 2T637	PL 8002109	REV G
QUANTITY REQD				TITLE BALLAST ASSY, IN-AIR - LT WT - HPS-1000 DL			SHT 2 OF 2	DATE 9-1-00
-04	-03	-02	-01	ITEM NO.	PART NO.	DESCRIPTION	REMARKS	
	1	1	1	22	80-50009-4	HANDLE		
	4	4	4	23		FLAT WASHER, NOM #4	SST	
	4	4	4	24		LOCK WASHER, NOM #4	SST	
	2	2	2	25		CABLE TIE 14.5 LG	'TYGON' T30L-9	
	4	4	4	26		HEX NUT, .250-20UNC	SST	
	4	4	4	27		LOCK WASHER, NOM .25	SST	
	2	2	2	28		COTTER PIN, $\phi$ .06 X 1.0	SST	
		1	1	29	CA-8-03-3	CABLE ASSY		
	2	2	2	30	80-02115-01	SUPPORT ANGLE		
	2	2	2	31	80-02116-01	SUPPORT PAD		
	1	1	1	32	80-02081-4	IGNITOR		
10 ft	10 ft	10 ft		33	30-12170-01	CABLE CA-1217		
			1	34	CA-23-01-100	CABLE ASSY		
		1		35	CA-23-01-125	CABLE ASSY		
	1	1	1	36	60-03260-4	PLUG, STR PRONG, MALE		
REF	REF	REF		37	80-02007	WIRING DIAGRAM		
	1	1	1	38		ID LABEL		
	10	10	10	39		PAN HD SCR, #6-32 X .38 LG	SST	
	6	6	6	40		FLAT WASHER, NOM #6	SST	
	20	20	20	41		LOCK WASHER, NOM #6	SST	
	1	1	1	42	80-80027-4	SWITCH, PUSHBUTTON		
	1	1	1	43	80-80026-4	CONTACT BLOCK		
	1	1	1	44	80-80028-4	BULB, SWITCH	110VAC	
REF	REF	REF		45	80-50079	TEST PROCEDURE		
				46				
				47				



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REV	DESCRIPTION	DATE
A	SEE ECO NO. 397 gta	4-2-01
B	SEE ECO NO. 403 gta	4-9-01
C	SEE EC-00398 SW	14DEC09



QTY/ASSY	ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
-03	-02	-01		
NEXT ASSEMBLY: 80-02109				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES				
TOLERANCES		SURFACE TEXTURE:		
.X = +/- .030		-		✓
.XX = +/- .010				
.XXX = +/- .005				
ANGULAR +/- 30'				
PREPARED	<b>GTA</b>	3-29-01		
CHECKED	<b>R.Hoffman</b>	4-05-01	SIZE	REV LTR
QA	<b>R.Longabaugh</b>	4-05-01	<b>B</b>	<b>C</b>
RELEASED BY	<b>S.Myers</b>		CAGE CODE	DWG NO.
			<b>2T637</b>	<b>80-02007</b>
SCALE 1/1			WEIGHT	SHEET 1 OF 1

NOTES (UNLESS OTHERWISE SPECIFIED)