HARMONY LA300
Service Technical Section
W764332-307

STERIS®

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HARMONY LA300
Service Technical Section
Theory of Operation

The Harmony LA300 Exam Surgical Lighting System is offered to complement other existing Harmony systems such as Harmony EMS and Harmony LA/LL Lights. In order to avoid confusion between products, it will be necessary to utilize the full product name when communicating. The LA300 exam light is intended to be a high quality exam light, to complement the Exam 10 product line (not replace it).

The Harmony LA300 suspension system is available in several configurations;

1. **Surgical/OR setting (LA08)**. The lighting system can be installed as part of a traditional Harmony LA suspension system. All that is required is an available, open suspension arm on the main LA spindle assembly. The LA300 light can be added at a later date, but first an existing light head and spring arm would need to be removed and the 300 spring arm and light head substituted in its place, or if the spindle has a spacer installed, then an Add on arm kit (1893219D) can be ordered to install ANY style of LA spring arm. (A sales kit is available that includes a LA300 spring arm and a light head.

2. **Ceiling Mount (LA30)** The ceiling mount option contains a suspension system unique to the LA300. It is manufactured by Ondal Corporation and contains all metric components. The system consists of a horizontal tube, vertical tube, spring arm, DC power supply and light head. The mounting bolt pattern is retro-fixable to Exam 10 locations. Maximum ceiling height is 10' and minimum is 7' 10". The light weighs 100 pounds plus moment force (see equipment drawing).The ceiling flange will be secured to the customer's structure via four 1/4" bolts or all thread.

3. **Wall Mount (LA31)** The wall mount option contains a wall bracket and power supply cover, a horizontal arm, a spring arm, and a light head. The DC power supply is located on the wall, beneath a plastic cover. The light weighs 55 pounds plus moment force (see equipment drawing).

4. **Mobile Stand (LA32)** The mobile option contains a base with power supply, a vertical support tube, a spring arm and Light head. Power cord is 20 feet long, weight is approximately 76 pounds.

5. **Controls:** The control system characteristics are as follows;

   5.1. Controls -There is no wall control for any of the suspension options, however this light head and spring arm can be added to a traditional LA suspension system, within an OR room. This option is very uncommon, but if present, would utilize the standard Harmony LA wall control family. There is a bezel/switch assembly located on the light head for

the surgeon intensity control. This bezel switch sends a signal to the light head circuit board, which turns on DC power to the lamp.

5.2. Power Supply - All units are equipped with a 24VDC power supply located under the canopy for the ceiling and wall mount versions. It is located in the base of the Mobile Stand. The power supply is 24 VDC, maximum 200 Watt output. Black wire output is DC ground and White wire output is +24VDC. The power supply is designed to "fold back" its output to a low voltage level in the event that a short circuit exists across its output.

5.3. **Light Head Control Board -** The circuit board within the LA 300 Light head controls the power of the lamp output similar to the power control circuits on LA500/700. The intensity of the lamp is controlled by changing the duty cycle of the voltage going to the lamp as follows;

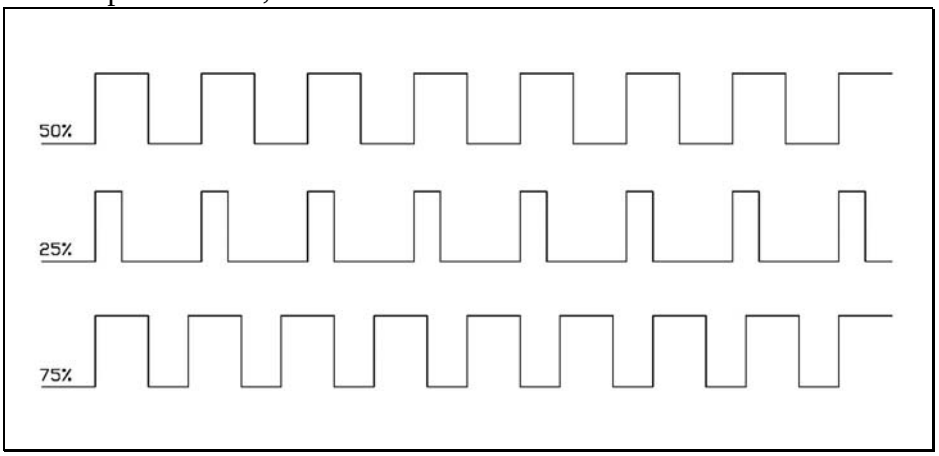

Figure 1-HARMONY LA LIGHT DUTY CYCLE

5.4. **Lamp Power Explanation** – The power being supplied to the lamp is not a straight DC voltage. The voltage is a 22-24 volt square wave signal. The frequency is a constant 20 Khz. The duty cycle is varied to change the intensity of the lamp. There are seven intensity settings in the control system. The control automatically updates the duty cycle to maintain a consistent current flow at the lamp. 24Vdc is supplied to the lighthead control board at all times, even when the lamp is off. This is allows the lighthead to start up when commanded ON from the membrane switch on the lighthead.

5.5. **Lamp Startup Explanation -** The lamp goes through a setup procedure as follows:

5.5.1. The control software starts out by applying a small 35% duty cycle voltage to the lamp.

5.5.2. The current detection hardware on the control board looks for a steady current (after the initial in rush current has level out) for at least 0.1 seconds. This total time is a lamp warm up time and is typically 1.14 seconds.

5.5.3. The duty cycle is increased until it reaches the target lamp intensity last requested by user.

5.5.4. If the lamp current has not stabilized even after two seconds during the warm up period, the controller will shut down the lamp and report a "lamp start error" to the display.

5.6. **Light Head -** The light head is offered in one size, the Harmony LA 300. The reflector is approximately 9 ½" in diameter. There is no redundant lamp change system in this light head. The lamps are **not** interchangeable between other LA or LL or Exam 10 lights due to the size and wattage. The Lamp intensity is regulated by changing the duty cycle of the voltage from the light head board. This is similar to the Harmony LA System where the duty cycle is used to change lamp intensity. The light head is assembled with all English/USA standard fasteners and contains the following major components;

5.6.1. Lamp Change Base, 146667-059. This component holds the single 100 watt, 22 volt lamp in a fixed location for optimum focal pattern size and intensity.

5.6.2. Coated Reflector Assembly, 146667-010. This component is roughly 9.45 inches in diameter and four inches deep. Contains special coatings necessary to maintain a color temperature of 4400 K and a color rendering index (CRI) of 94.

5.6.3. Lamp, 093926-113. This lamp has general specifications of 24 volt, 100 watt, 250 hour life typical at 100 watt (maximum) intensity.

5.6.4. PC board Assembly, 136820-064. This lamp head controller board controls several functions within the light head. The main function is intensity control. Any number of seven intensities can be chosen by the doctor/surgeon via the push buttons located on the light head or the wall control (as outlined above in controls). A secondary function is communication with the wall control when used in conjunction with a Harmony LA wall control system.

Intensity	Relative Illuminance (%)	Socket Power (W)
7	100	100
6	90	94
5	80	88
4	70	82
3	60	76
2	50	70
1	40	63

Note: *The same lamp is used for the primary and backup sockets for the large and medium lightheads*

Figure 2 -HAMONY LA300 LIGHTHEAD

5.7 SERIAL NUMBER EXPLANATION

Two serial number formats exist for the Harmony LA light system; a STERIS Montgomery format and an Ondal serial number format. The following list explains the formats. When ordering service parts or requesting technical support, have the applicable serial number available for the item being worked on (spring arm, ceiling plate, control, etc.).

Lighthead – STERIS Montgomery format beginning with 04.

Wall Control System – STERIS Montgomery format beginning with 04. Example:

Plant	Day of Year	Year	Unit that Day
04	326	02	049

The Spring Arm and Mounting S/N formats, follows:

1101 – Ceiling plate
1102 – Central axis or spindle
1103 – Spring arm for large & medium lighthead
1104 – Spring arm for monitors
1105 – Auxiliary spindle
1106 – Spring arm w/extension arm for small lighthead
1107 – ceiling mount small lighthead
1108 – wall mount small lighthead
1109 – mobile stand samll lighthead

Product Catagory	Month	Year	5-Digit Counting Number
1102	11	4	03392

LA300 Troubleshooting

Light Will Not Turn On

1. Verify Integrity of lamp. Measure continuity of lamp with volt ohm meter. Make sure lamp filament is not shorted/ rewelded. This condition can cause a light head circuit board failure.
2. Verify connections to Lamp change module are not loose (Banana Jacks and wire connections to and from the lamp change module).
3. On mobile stand units, verify the integrity of the 110 volt power cord and connections.
4. Verify that 24 VDC is always present to the light head. The DC power supply is always on, whether the light head is turned on or not. Remove cover at yoke/light head interface to verify voltage at that location. Verify DC voltage is present from the spring arm under two conditions:
    A. With Light head connected.
    B. With light head disconnected. If DC voltage is not present, investigate cause at the power supply.
5. Cycle the main 110 volt AC power on and off. Re-verify DC voltage output.
6. If AC voltage is present at the line filter output, and 24 VDC is not present at the power supply, replace 24VDC power supply.
7. Verify commutator within extension arm is not shorted to ground, or open circuit.
8. Verify connections to touch pad on light head are ok. Remove switch bezel on light head by removing four screws under bezel (touch pad). Make sure switches are connected and neither short nor open circuited.
9. If all the above voltages check out and touch pad switches are ok, then replace the light head circuit board.

Light Head Intensity is not adjustable

1. Verify connections to touch pad bezel are connected (see above).
2. Verify DC voltage checks as outlined above. Investigate cause.
3. Replace Light head circuit board if voltages are correct and bezel touch pads are ok.
4. Replace light head circuit board.

Mobile Floor stand tipping

Mobile floor stand tipping may be caused by the location of the locking casters (if present).

1. Verify the there are two swivel locking casters and 2 swivel casters.
2. If locking casters are present, they should be located on the power supply side of the base. The installation instructions, at one time, stated to install them opposite the power supply.

Suspension System Drifts

See Installation Instructions 129382-529, Adjustments, Pages 3-16, 3-17, 3-18, 3-19.

Removal/Replacement

1. **Light Head Installation/ Deinstallation:**

See Installation Instructions 129382-529, Installation, Pages 3-1 thru 3-3
Note: For removal of light head, reverse order of the procedure.

2. Removal of Light Head back cover

Removal of the light head cover is necessary in the event that the internal circuit board needs to be replaced.

2.1. Raise the light head to its uppermost position before any components are removed from it. This will assure the light head does not raise up uncontrollably when components are removed from it.

2.2. Loosen, but do not remove, the eight allen head screws that secure the light head back cover to the base. Continue to loosen each screw the same amount, but not removing any one screw. These screws have a captive washer on the back side of them that can be lost, if the screw is removed from the cover.

2.3. Once all screws are loosened, gently remove the back cover.

2.4. The circuit board can be removed and replaced by removing the wiring plugs attached to the board, and then removing the four screws that secure the board to the light head. Note: Special attention must be paid to the orientation of the three conductor ribbon cable (J3). The ribbon cable must be put back in the exact same orientation, else the touch pad buttons will work opposite of the designation (the + button will lower the intensity of the light, and the – button will raise the intensity of the light).

LA300 Field Test Procedure

General Check

1. Inspect wire connections to insure that lamp socket and terminal block connections are secure.
2. Visually inspect routing of wires through yoke pivot interface and ensure they are properly positioned. Improper assembly could pinch and damage the wires.
3. Inspect general appearance, such as condition of molded surfaces, fit of light head bezel switch, etc.
4. Inspect all labels for correct location and defects (eg bubbles, illegibility, peeling edges, etc).
5. Inspect Hood Latch operation, verify proper fit of hood, and observe hood function.
6. Ensure proper fit and alignment of lamp holder assembly within the light head.

Optical Testing

Caution: Do Not Handle Lamps with bare hands, oils and contaminants can cause shattering of the glass envelope.

Caution: Lamps used for testing must be handled with care, Glass envelope and ceramic base get extremely hot and can cause burns.

1. Optical Tests shall be conducted with the digital display light meter, STERIS part number 764330-525.
2. Set the light meter 1 meter (39 inches) below the lens, and set the light head to maximum intensity.

3. Surgical Light out put and specifications should be as outlined below;

Harmony LA Optical Performance

Important: Values are typical for the small pattern size at highest intensity setting (unless otherwise noted) at 39 3/8" (1m) from the lighthead. Definitions and measurements are in accordance with IEC 60601-2-41.

	Harmony LA 300
Central Illuminance (range for intensity settings 1-7)	23,500 – 59,000 lux (2,180 – 5,500 fc)
Pattern Size	
D_{10}	200 mm (8")
D_{50}	100 mm (4")
Depth of Illumination	> 1520 mm (> 60")
Peak Total Irradiance	<250 W/m²
Color Temperature	4,400 K
Color Rendering Index (CRI)	94
Shadow Control	
Single Mask:	0%
Double Mask:	66%
Cavity:	100%
Single mask w/ cavity:	0%
Double mask w/ cavity:	68%
Average Lamp Life at mid-range intensity	1,000 hrs

4. Switch Bezel Function test
    - Turn off light by pressing and holding the "-"button on the bezel.
    - Verify Light will turn on by pressing the "+" button, then off by pressing the "-"button.
    - Repeat on/off test for each pair of +/- switches on the bezel. NOTE: If a button is held longer than 2 seconds, the light will automatically turn off.
    - Visually verify on/off luminance changes.

Voltage Checks

1. Voltage measured at the yoke/light head connection interface should be 23.5 to 24.5 volts DC with the light head turned on. No adjustment is possible. The White wire is +24VDC and the black wire is 24 VDC ground.

Suspension System Checks

1. Verify arm system does not drift. The light head should stay in any position that it is placed in. If it does not, then refer to spring arm tension and brake screw adjustments (Troubleshooting section)
2. Verify the ceiling plate is level within 0.3 degrees (if ceiling mount). Verify Horizontal arm is level within 0.3 degrees (if wall mount unit).
3. On ceiling mount units, verify the four set screws are tight, where the vertical tube slides into the ceiling plate.

STERIS LA 300 PM Schedule

Note: Do not touch lamp glass with bare fingers. Skin oils and grease are detrimental to lamp life.

Service to be performed Semi-annually		
1.0	Preparation of P.M. (all inspections)	
	1.1	Meet with equipment operators
	1.2	Check overall lighting system for appearance, visual damage, missing parts
	1.3	Follow appropriate safety precautions
2.0	Requirements for Inspection (Light head #1)	
	2.1	Verify light functions without flickering through all ranges of motion.
	2.2	Verify proper intensity
3.0	Equipment Checkout (all inspections) (Light head #1)	
	3.1	Check for proper installation. For ceiling mount units, remove canopy and check for tightness of mounting screws and that vertical tube and plate and secure. For wall mounted units, check for tightness of bracket mounting bolts and that extension arm is securely attached if equipped. For floor stand units, check secure-ment of vertical tube and base. For all units, very proper installation of arm and light head assembly onto mount. Verify that all screws are tight
	3.2	Check for drift of light head within yoke and of yoke on suspension arm. Check for ease of movement. Make brake/tension adjustments as needed
	3.3	Verify the use of STERIS bulbs
	3.4	Verify light has proper labels
	3.5	Reinstall covers and clean area
4.0	Meet with Customer	