

# APPROACH LIGHTING

## SAGA

### System for Approach Azimuth Guidance



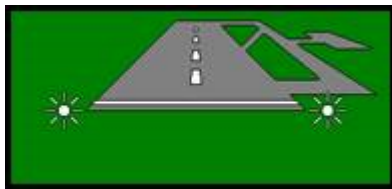
#### Compliance with standards

**ICAO:** Annex 14, Volume II, Paragraph 5.3.4

**STAC:** French

#### Uses

The SAGA (System of Azimuth Guidance for Approach) provides a combined signal of approach azimuth guidance and threshold identification.



#### Features & Benefits

- Safe operation as the SAGA system is automatically stopped when at least one of its light units is out of service. A signal is available for monitoring of this default status in the control room.
- Easy maintenance through easy access to the lamp and all terminals. No special tools are required.
- The remote control of three brilliancy levels is possible for a better visual comfort for the pilot (no dazzling).
- Efficiency as coupled with a PAPI, the SAGA system supplies the pilot with the security and the comfort of an Optical ILS.
- In order to maintain operation even in very cold and/or wet areas, the light units of SAGA are equipped with heating resistors.
- Additions of red filters (option) provide to the SAGA system with the option of emitting red Flashes corresponding to fly exclusion zone due to obstacles.

#### Specification

- The System of Azimuth Guidance for Approach will comply with ICAO recommendations Annex 14, Volume I paragraph 5.3.4 and French STAC.
- It will comprise of two flashing units (Master and Slave) located symmetrically on both sides of the runway, or TLOF for heliport, threshold.
- Depending of his position on the approach axis, the pilot will receive visual information of two flashes supplied by the two flashing units of the SAGA.
- If the pilot is on the axis +/- 0.45°, the two flashes are simultaneous.
- If the pilot is not on the axis within an angle comprise between -30 and +30°, the two flashes will be see delayed of a time between 60 and 330 ms (the further the aircraft is from the axis, the greater the delay). The delay between the two flashes produces a sequence effect which shows the direction of the axis.
- The SAGA system will be powered in 230 Vac 50/60 Hz. It will be equipped with 12 Vac 100 W pre-focused reflector lamps.
- It will be remotely controlled in 48Vdc.
- Monitoring will be possible through 2 dedicated dry contacts.
- The SAGA system will be available with heating resistors for cold and/or wet areas.
- The system will be automatically put out of service if at least one of its two flashing units becomes defective.
- The Body, Cap and Support of the flashing unit will be in aluminum alloy, phosphated and painted in aviation yellow. All fixings and fastenings will be stainless steel. The Power Supply Box will be made of reinforced polyester and will be IP 65 rated.
- The legs of the flashing units will be frangible.

#### Packaging

Complete SAGA System	
Volume:	0.062 m
Dimensions:	320 x 320 x 610 mm
Weight:	50 kg

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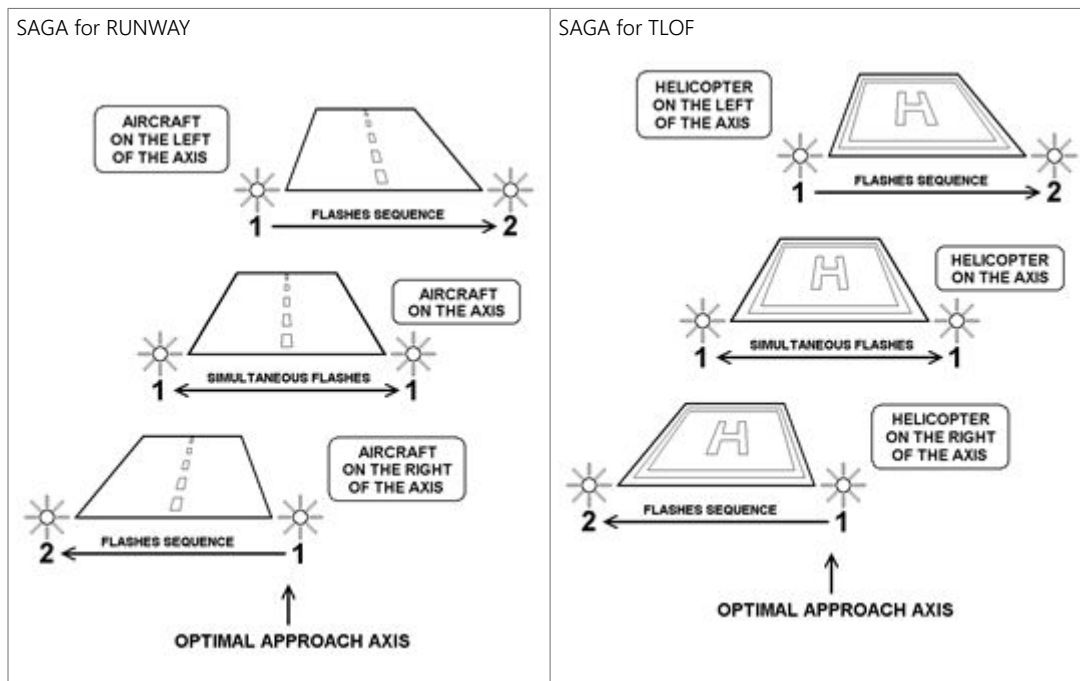
## SAGA

### Operation principle

The SAGA system includes two light units (one Master and one Slave) placed symmetrically on both sides of the Runway, or TLOF, threshold supplying unidirectional rotating beams which give a flashing effect.

The pilot receives, each second illumination of two flashes provided in sequence by the two light units.

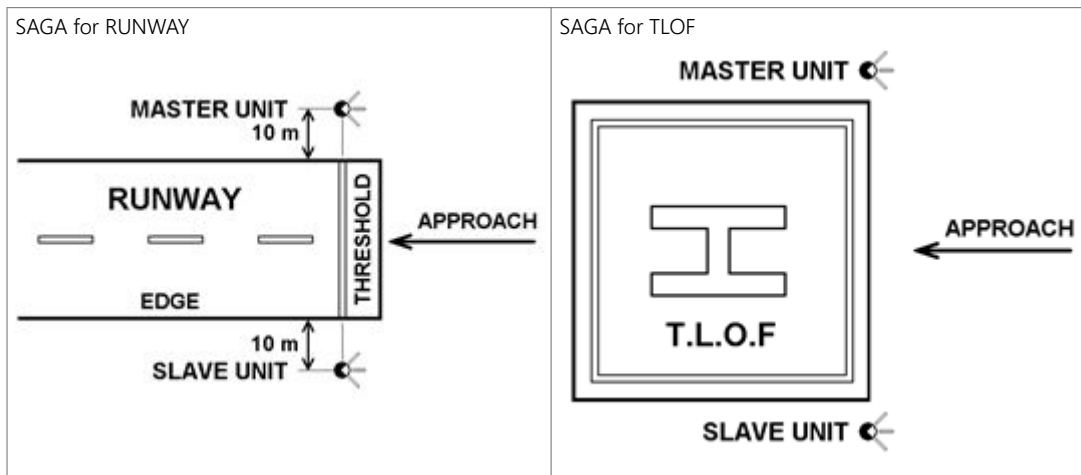
- When the aircraft flies inside a 9° width angular sector, centered on the approach axis, the pilot sees the two lights flashing simultaneously.
- When the aircraft flies inside a 30° width angular sector, centered on the approach axis and outside the previous one, the pilot sees the two lights flashing with a variable delay (60 to 330 ms) according to the position of the aircraft in the sector. The further the aircraft is from the axis, the greater the delay. The delay between the two flashes produces a sequence effect which shows the direction of the axis.
- The visual signal is not visible when the aircraft flies outside the 30° angular sector.



### Location on the field

The two light units of a SAGA system must be installed at 10 metres from the runway Edge symmetrically on both sides of the Runway threshold. For TLOF the two units must be installed as close as possible to the threshold edges.

The Master unit must be installed on the right of the Threshold and the Slave unit on the left.



Technical Characteristics

Component	Description
Lamp:	One 12 Vac 100 W pre-focused halogen reflector lamp.
Power supply:	From 220 Vac to 240 Vdc 50/60 Hz.
Electrical consumption:	Less than 250 W for the SAGA system and 240 W maximum for the heating resistors.
Visual range:	10 nautical miles in standard visibility conditions
Operation angular sector:	15 degrees on both side of the approach axis.
Axis accuracy:	+/- 0.45 degree in azimuth.
Delay between flashes:	From 60 to 300 ms.
“Flashes” frequency:	1 Hz.
Finish:	Body, Cap and Support are in aluminium alloy, phosphated and painted in aviation yellow. All fixings and fastenings are stainless steel. The IP 65 – 20 Joules Power Supply Box is made of reinforced polyester
Working temperature:	From -40°C to +50°C.
Remote CMS:	Remote control from 48 Vdc. Monitoring feed back signal using two dry contacts (Contact capacity = 250 V / 1A maximum).

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## SAGA

### Design

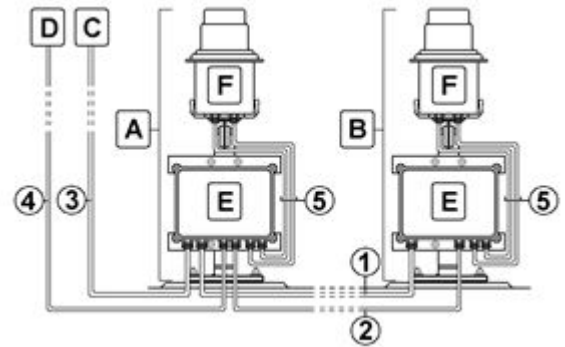
Components	HBA
<ol style="list-style-type: none"> <li>1. SAGA optical head</li> <li>2. SAGA power supply box</li> <li>3. Frangible leg</li> <li>4. Power supply box fixation bars (x 2)</li> <li>5. Power supply box fixing screws (x 4)</li> <li>6. Clamps for leg fixation (x2) with nuts and washers (2 sets by clamp)</li> <li>7. M18 –400mm Sealing rods (x 4) with nuts and washers for fixation of the leg (supplied with the leg)</li> </ol>	

### Mechanical installation and dimensions

Description	HBA
<p><b>Mechanical installation</b></p> <p>Mechanical fixing of the SAGA light unit can be done in two ways:</p> <ol style="list-style-type: none"> <li>1. On a hard surface (such as a concrete platform) using four sealing rods sealed in the concrete. The four sealing rods must be installed in square (sides = 200 mm).</li> <li>2. On a surface which is not hard (such as earth) by using the four sealing rods delivered with the system. In this case, fixing is made on a concrete block (recommended standard sizes 400 x 400 x 700 mm). The rods (M18 –400mm) must be sealed in the block making a 200 mm side square (the holes in the base plate have diameters of 22 mm).</li> </ol> <p><b>Note:</b> Adjustment of the optical head azimuth angle and to the horizontal is made using an aiming tool.</p> <p>The two SAGA units are delivered assembled and wired (connections power supply box / optical head).</p> <p><b>Dimensions</b></p> <p>Total height: 870 mm</p> <p>Optical head height: 370 mm, diameter = 264 mm</p> <p>Power supply box: 306 x 270 x 200 mm</p> <p>Frangible leg height: 500 mm, base plate = 250 x 250 mm</p>	

### Electrical Cabling

The SAGA System is comprised of two light units, one Master (A) and one Slave (B) linked together by electrical wiring. The figure below shows all the electrical connections of a complete SAGA system, connections between lights units + connection with the main supply distribution panel (C) + connection with control and monitoring desk (D) + connection between power supply box (E) and optical head (F).



### Power Supply

All power supply cables of the SAGA system must have four wires: Ground + Neutral + P1 (SAGA) + P2 (Heating Resistors). The overall diameter of all the power supply cables of the system must be between 12.5 mm and 18 mm.

Wiring between Master and Slave light units (1):

- 4 x 4 mm<sup>2</sup> LV Cable HO7RNF type.

Wiring between Master light units and main supply distribution panel (3):

- 4 x 4 mm<sup>2</sup> LV Cable HO7RNF type for distance less than 1000 m.
- 4 x 6 mm<sup>2</sup> LV Cable HO7RNF type for distance greater than 1000 m.

**Note:** Switching of power supplies for SAGA and heating resistors must be separated on the main supply distribution panel.

Control cable between Master and Slave lights units (2):

This cable must have 7 individual screened pairs (minimum wires section = 0.22 mm<sup>2</sup>). The 7 pairs are used as follows:

- 2 pairs for brilliancy level control.
- 3 pairs for synchronisation between light units.
- 2 pairs for feedback signals.

The overall diameter of this control cable must be between 7.5 mm and 13 mm.

Control cable between Master unit and control and monitoring desk (4):

This cable is a shielded cable and must have 4 pairs (minimum wires section = 1.5 mm<sup>2</sup>). The 4 pairs are used as follows:

- 2 pairs for brilliancy level control.
- 1 pair for Master default feedback signal.
- 1 pair for Slave default feedback signal.

The overall diameter of all this control cable must be between 7.5 mm and 13 mm.

Cables between the power supply box and the optical head (5):

These two cables are delivered pre-wired with the system (one set of two cables with a light unit).

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### Order codes

SAGA systems are delivered in a single packing box.

**Note:** Power supply and control cables are not supplied.

The packing box contains:

- One tool for alignment and horizontal adjustment
- One complete Master unit, already mounted and wired
- One complete Slave unit, already mounted and wired

One complete Master unit includes:

- One Master power supply box
- One optical head
- One support with:
  - One frangible leg
  - Two power supply box fixation bars
  - Two complete clamps for leg fixation
  - Four M18 –400mm sealing rods

One complete Slave unit includes:

- One Slave power supply box
- One optical head
- One support with:
  - One frangible leg
  - Two power supply box fixation bars
  - Two complete clamps for leg fixation
  - Four M18 –400mm sealing rods

**Note:** All descriptions and characteristics in this publication present only general particulars and shall not form part of any contract. The right is reserved to change them without prior notification.