ADB
Airfield Solutions

Instruction Manual

AM.02.515e Edition 2.1

Precision Approach Path Indicator (P.A.P.I.)

Type SPL

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Record of Changes

Revision	Description	Editor	Checked	Date
1.0	First edition	BUG	MR	
1.1	Revised installation method. Maintenance added Corrections	MR	GL, KC, VI, AHU	03/2007
1.2	Adaptation for heliport PAPI levelling	MR	LM	04/2007
2.0	Chapter 2: modifications installation in accordance to design modifications	TVA		06/2007
2.1	Rebranding	EV		12/09

Safety Instructions

Safety precautions

Operating and maintenance personnel should refer to:

- IEC 61821: Electrical installations for lighting and beaconing of aerodromes - Maintenance of aeronautical ground lighting constant current series circuits
- ICAO Aerodrome Design Manual
  Part 9: Airport Maintenance Practices
- FAA Advisory Circular AC 150/5340-26 "Maintenance of Airport Visual Aid Facilities" for instructions on safety precautions,

Personnel must always observe the safety regulations. The equipment has been designed and manufactured to allow safe and secure operation, however, the following rules must be strictly observed.

Keep away from live circuits

Operating and maintenance personnel must always observe all safety regulations.

Never install, service, replace, adjust or attempt to life equipment, i.e. equipment switched on.

Resuscitation

Operating and maintenance personnel should get acquainted with the resuscitation techniques described in the First Aid Instruction Manual as issued by the Red Cross Organisation or similar.

Use Restriction Notice and Warranty

Use restriction notice

The content of this Instruction Manual is the property of

ADB

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Warranty

If not otherwise agreed in the Purchase Contract, the following rules shall apply concerning warranty.

Any defect in design, material or workmanship, which may occur during proper and normal use over a period of one (1) year from date of installation or a maximum of 18 months from date of shipment, will be replaced by ADB free of charge, ex works. Operational failure resulting from burnt out lamps or consumables components, improper maintenance or installation, damage due to improper use of maintenance tools or equipments, vehicles, snow ploughs, aircraft arresting gear hooks or similar is not considered a result of proper use and is beyond the scope of the warranty.

Warranty does not cover natural wear and tear or damage arising after delivery owing to faulty or negligent handling, excessive strain, unsuitable materials for operation, deficient civil engineering Work, unsuitable soil conditions, and such chemical, electrochemical or electrical influences as were not assumed at the time of the Contract.

All liability for consequences of any inexpert alterations or repairs carried out by Purchaser or a third party shall be waived.

ADB. shall in no event be liable to Purchaser for any further claims, particularly claims for damages not affecting the goods themselves.

The above constitutes the limits of ADB’s liabilities in connection with the products covered by this manual.

Information about this Manual

Chapter overview

Each chapter starts with an overview of the topics of that chapter.

Using icons

Icons are used to attract the attention of the reader to specific information. The meaning of each icon is described in the table below:

Icon	Type of information	Description
	Note	A 'note' provides information that is not indispensable, but may nevertheless be valuable to the reader, such as hints and tips.
	Caution	A 'caution' is used when there is danger that the user, through incorrect manipulation, may damage equipment, get an unexpected result or has to restart (part of) a procedure.
	Warning	A 'warning' is used when there is danger of personal injury.
	Reference	A 'reference' guides the reader to other places in this manual, where he/she will find additional information on a specific topic.

Parts Identification

Parts identification symbols (e.g. A1, E4…) appearing in the text, refer to the Exploded View page 38.

Comments and Proposals

This manual has been compiled with all possible care and in view of providing a valuable and practical tool to the Airport Maintenance personnel.

We encourage customers to address us their comments and proposals for improving further the contents of this manual.

Communications should be addressed to the **Customer Service department** of ADB:

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Chapter 1: Product Information

Overview

Introduction

In this chapter you will find all the information about the supplied and not-supplied (but necessary) equipment for installation and maintenance of the ADB PAPI units SPL.

Contents

This chapter contains the following topics.

Topic	See Page
General Information	7
Equipment data	8
Operational conditions	11

General Information

PAPI

(Precision Approach Path Indicator)

The ADB “Precision Approach Path Indicator” light type SPL is a valuable visual aid developed to provide precision guidance for pilots when making an approach to land. It has minimal maintenance, low life-cycle costs and maximum reliability. It is designed to withstand high impact weather conditions while remaining serviceable.

Purpose of this manual

This manual provides general, operation, troubleshooting, maintenance and installation information.

Refer to the **Table of Contents**, page 1, to locate the information you need.

Scope of this manual

This manual covers the ADB type SPL units, designed to be in full compliance with the requirements of ICAO Annex 14, Volume I.

They also comply with FAA L-880, specification AC 150/5345-28D (tilt switch is available upon request).

Equipment data

Equipment supplied

A PAPI system consists of 4 SPL units (or 2 in case of an APAPI). The units are supplied with a fully gasketed cover, mounting legs (without optional anchors) and connection cables.

Most of the components are made of aluminium protected against corrosion, optical glassware and stainless steel.

The units are supplied precisely calibrated, with the lamps installed.

Equipment required, but not supplied

The table below lists the optional equipment, normally required for installation, but not supplied with the PAPI units.

Description	Quantity
Set of standard open ended, metric spanners for hexagon head screws.	1 set
Spirit level, Installation and levelling tool kit, including drilling jig	1 set
Checking stick.	1 set
Primary connector kit	1 per PAPI unit
Connection kit (optional) containing: - Flexible metal tubing for mechanical protection of power supply cables.	1, 2 or 3 kits per PAPI unit.
Depending on the system design: - 1, 2 or 3 conduit elbows with stoppers, or: - L-867-B base with cover	1 set per PAPI unit
RST type series transformers, depending on the SPL model: - 300W 6,6/6,6A - 200W 6,6/6,6A - 100W 6,6/6,6A	1, 2 or 3/ PAPI unit

Note: Where approach slope angles higher than normal (> 5°) are required (stolports and heliport applications), an adaptation will be required for each unit. Code number can be found in section "Tools and accessories", page 37.

Equipment data, *continued*

PAPI data

The technical characteristics of both the SPL are indicated below.

Overview

The table below lists technical data of the SPL:

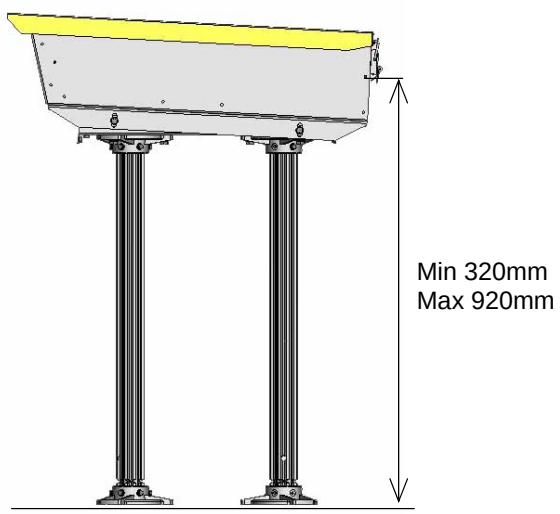
Data	Specifications
Type	**SPL**
Lamps	3 x 105W cold mirror reflector lamp per unit
Input current	6,6 A
Rated lamp life	1000 hours
Luminous intensity in red light	+/- 20 000 cd Max. 15 000Cd min over –7° to +7° horizontal angle and 0 to –4° vertical angle
Transmission factor of red sector	> 15%
Transition sector	3’ arc over the full horizontal beam spread
Temperature range for operation	- 35°C to + 55°C
Relative Humidity	0% to 100%
Wind	velocities up to 161 km per hour
Degree of Protection	IP34

Ordering codes and reference data pertinent to the equipment are listed in the tables and drawings of Chapter 5: Assemblies and Exploded Views, page 33.

Equipment data, *continued*

Beam height adjustment

When installed on breakable couplings, featuring adjustable leg length, the light beam axis of an ADB SPL can be set at any elevation, above the concrete mounting slab, between 320 mm and 920 mm. Thus any ground level difference up to 600 mm can be compensated.



Note:

In order to better match the light output of other AGL sub-systems, the PAPI units may be equipped with 48W lamps
This may be the case in medium or low intensity airport lighting systems, as well as for the use as APAPI.

Operational conditions

Introduction

The operational conditions for the PAPI /APAPI systems are explained below.

Normal operation

The PAPI system must operate continuously when the runway is in use.

When	Intensity setting
During the day:	
• When aircrafts are approaching	Use the high intensity setting (100%).
• When no aircrafts are approaching	Reduce to the normal standby setting.
At night or twilight	The system may operate continuously at 30% brightness or less.

1) Failure to adopt this practice will result in an increased consumption of lamps.
2) At brightness settings below 30%, colour discrimination becomes difficult since the white sector becomes yellowish.

Regions with heavy snowfall and frost

Units should operate continuously at normal standby brightness, even when the runway is not in use. Any snow will thus melt and drain away, and build-up of condensation on the front lenses and glass will be avoided.

To achieve this, install separate constant current regulators (CCR's) for each PAPI system (instead of a CCR + circuit selector combination) so that all the systems can be kept warm under snowstorm or moist conditions.

As an option, ADB provides PAPI units with a heating system.

When snowfall is expected to bury the units, their location should be marked with sticks or flags (approx. 2 m high), to prevent damage to the units by snow removal equipment.

Chapter 2: PAPI or APAPI location and installation

Overview

Introduction

PAPI/APAPI systems must be located according to ICAO requirements. This chapter lists the appropriate standards and explains how to install the SPL units.

Receiving, storage and unpacking

1. Upon receipt of goods at the site store, check every package for visible damage. Every damaged box should be opened and its content inspected for damage.

   If equipment is damaged, a claim form shall be filed with the carrier immediately. It may then be necessary for the carrier to inspect the equipment.

2. Store each unit preferably in its original packing in a protected area. When stored unpacked, please take care not to damage the cables and front glass.
3. Unpack the units preferably at the installation site to avoid damage during transportation and handling.

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This chapter contains the following topics.

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PAPI wiring	25
Checking cut-off angles of the light beams	26
Regular check of the elevation with the checking stick	27

Location of a PAPI / APAPI

Introduction

Guidance information as well as calculation methods may be found in the following ICAO publications:

- ANNEX 14 - Volume 1 – latest edition
- ANNEX 14 - Volume 2 – latest edition
- AERODROME DESIGN MANUAL – Part 4 – Visual Aids - latest edition
- HELIPORT MANUAL – latest edition

Prior to system installation, it is the responsibility of the Airport Authority to have all calculations checked and approved by the country's Responsible Competent Authority (e.g. the Civil Aviation Administration).

Technical Assistance

The Technical Department of ADB is at the disposal of Airport Authorities and Contractors for providing technical assistance and advice and also for calculating PAPI units locations, on basis of data provided by the Client.

Installation

Introduction

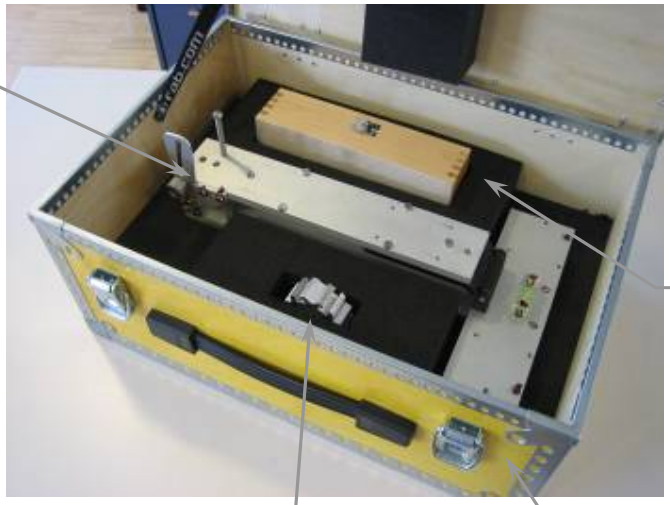
The SPL should be mounted on concrete slabs.

The concrete is cast directly into the foundation pit so that the slab rests on firm and undisturbed soil below the frost line.

A clean area must be provided in front of the PAPI, in order to avoid:
- masking the light beam by tall grass;
- mud splashes in case of rain.

Installation and levelling tool kit

The tool kit, code 1439.06.001, includes all specific material needed to install and align the SPL units.



The tool kit also includes the drilling template for the ground mounting flanges.

Installation, *continued*

Before starting

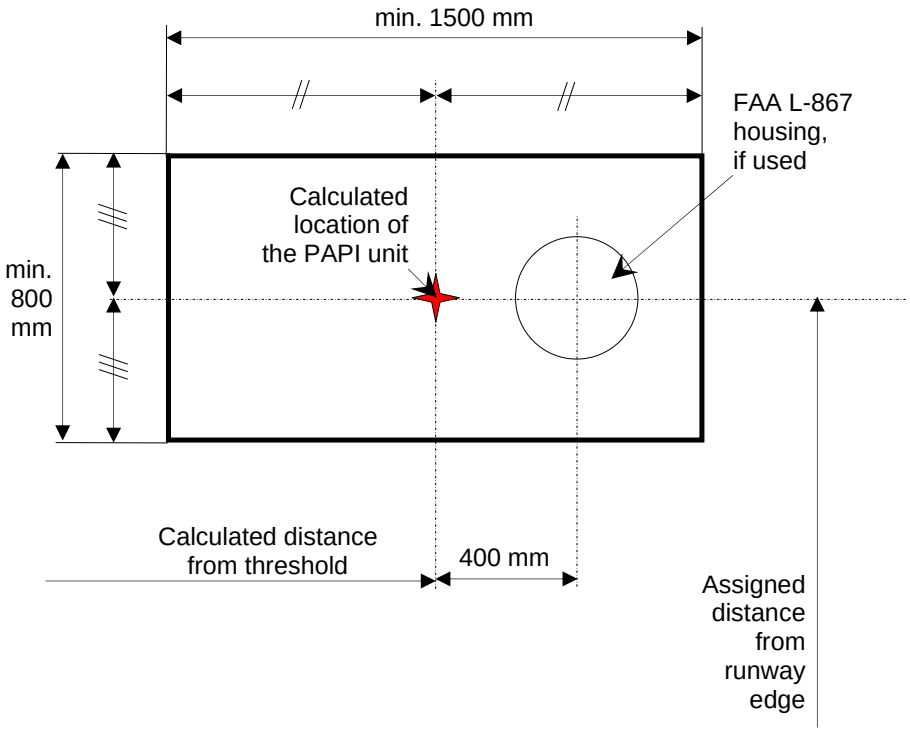
- Make sure that the exact position and height of each PAPI unit have been defined and are available
- Take care not to distort the PAPI-unit levelling plate. Besides problems appearing when levelling the units, twisting the levelling plate may lead to cracks in the lenses.
  The same applies to the PAPI box itself
- Especially, in case of installation close to the ground, make sure that all steps of the installation procedure are carried out methodically and with accuracy.

Dimensions and position of the concrete slab

Minimum acceptable dimensions for the concrete slabs are: 1500 long x 800 wide x 780 high (mm). The concrete is cast directly into the foundation pit so that the slab rests on firm and undisturbed soil below the frost line.

The above dimensions are generally acceptable but can be modified to fit, for example, soil strength characteristics, depth of the frost line or other local conditions.

Position the centre of the concrete slab at the calculated location of the PAPI unit as shown on the following sketch:

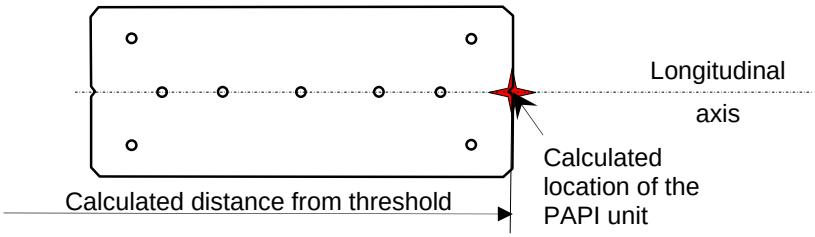


Note (1): When no L-867 transformer housing is used, the centre of the slab can be positioned 250 mm in front of the calculated location of the PAPI unit.

Installation, *continued*

Casting the concrete slab In - situ

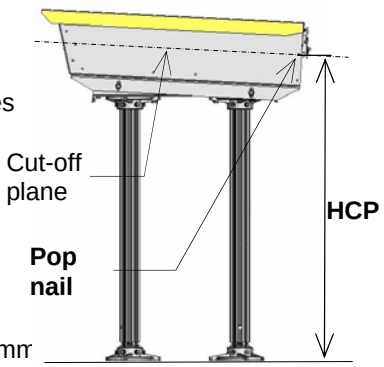
The following table instructs you on how to cast and prepare the concrete slabs.

Step	Action
1	Dig the foundation hole (see previous page for dimensions).
2	If used, position the FAA L-867 transformer housing at the rear of the PAPI unit, in accordance with manual AM.05.120. Alternatively one can also use a TC3 style conduit elbow as a cable conduit and connect it to an L867 base or another transformer housing.
3	Pour in the concrete and allow it to harden. **Make sure that the upper surface of the concrete slab is substantially flat, smooth and horizontal. Max. allowed tolerance is 10mm on the overall upper surface, limited to 1mm over the areas supporting a flange.**
4	Check the location and height of the concrete slab as build against calculations.
5	Stake out the longitudinal axis of the PAPI units parallel to the runway centreline. After the concrete has set, draw a longitudinal axis (in accordance with the axis staked out on the ground) on the upper surface of the slab. Draw a transverse axis perpendicular to the other axis, at the calculated distance from the threshold.
6	Lay the drilling jig on the slab; Position its rear edge at the calculated distance from the threshold. Align the jig along the longitudinal axis using the V-notches provided. **Tolerance on the alignment is 4mm.** 
7	Holding the jig securely in position, drill the six 10mm dia. holes to the depth required for the expansion bolts used and insert the sleeves. See the picture below: 

Installation, *continued*

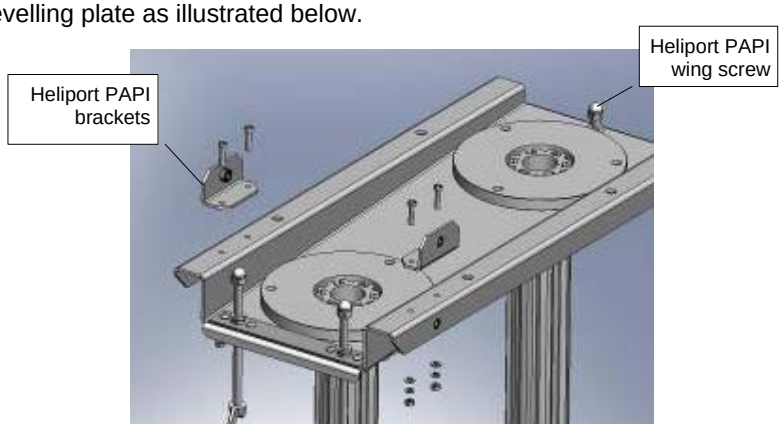
Installation of the PAPI units

The following table instructs you on how to anchor the bottom flanges (19) and to install the SPL levelling plate

Step	Action
1	The first step is to install the PAPI unit at the correct height. The cut-off plane is the plane passing through the centre of the objective lenses and the lower end of the red filters. The height of the cut off plane (**HCP**) is the vertical distance between the pop nail (indicating the location of the cut off plane) and the ground level at the location of the PAPI Out of factory, the legs have a length of. 800mm, giving a HCP of approx 920mm  In most cases, HCP is less than 920 mm and the legs must be cut to the required length **(L)** using the following formula: - **L = HCP – 123 mm** **L should never be less than 200 mm** **Tolerance on L: (+/- 10) mm** The legs are supplied with two already mounted flanges: - a ground mounting flange for fastening to the concrete slab, - a lower flange for the fastening of the levelling plate on the legs. Before cutting the legs, make sure that both flanges are lowered below the level of the portion that is cut away. Step 5 next page details the accurate adjustment of HCP
2	Position the ground mounting flanges with the oblong holes parallel to the runway centre line, and temporarily fasten each one with 3 nuts. Make sure that the flange face is in close contact with the concrete at all 3 bolts locations.  Check the verticality of the legs. **Tolerance is 5 mm/m.** If necessary, correct the defects of the slabs or use pre-manufactured shims or washers to compensate for dips. Fasten the tether, to both the ground mounting flange and the leg, on either the front or the rear leg. Lightly tighten by hand the nuts of the flange.

Installation, *continued*

Installation of the PAPI units, continued

Step	Action
3	Bring the lower flanges to about 30mm from the top of the legs, and lightly tighten the M6 screws by hand. 
4	On top of the lower flange, install successively the levelling plate and the upper flanges; lightly tighten by hand the 2x3 M10 fixing screws.  Make sure that the top of the legs are located approximately in the middle of the holes in the levelling plate and upper flanges. If needed, adjust the position of the ground mounting flanges. ⚠ Take care not to distort the levelling plate when positioning it on to the legs. Besides problems appearing when levelling the units, twisting the levelling plate may lead to cracks in the lenses. Tighten all screws and nuts of the ground mounting flanges, but neither M6 nor M10 screws at the lower and upper flanges.
4.a	**For heliport PAPIs**: Fix the additional Heliport adapter kit (brackets and wingscrew) on to the levelling plate as illustrated below. 

Installation, *continued*

Installation of the PAPI units, continued

5	Accurately adjust the height of the levelling plate by moving the lower flange. Start with the rear leg. The height of the upper face of the levelling plate to the ground is: - **L1 = HCP – 123 mm** **Tolerance on L1: (+/- 5) mm** Torque down the 6 M6 fastening screws of the lower flange to the rear leg. 
6	Set the levelling plate to approximately horizontal by adjusting the height of the lower flange at the front leg. **Tolerance is +/- 5 mm**. Torque down the 6 M6 fastening screws of the lower flange to the front leg.
7	Place a surveyor's stake at least 50 m away from the unit, towards threshold, and at the same distance from the runway edge as the axis of the PAPI.
8	Check the alignment, using the sides of the levelling plate. If necessary, adjust the unit alignment in azimuth by moving the levelling plate horizontally as required. Tighten the 2x3 M10 fixing screws between lower and upper flanges. **NOTE** It is not mandatory for the azimuth alignment to be absolutely perfect. For example, a lateral error of 0.5 m at 50 m yields an angular error of 0.5°, which would still be within acceptable tolerances.

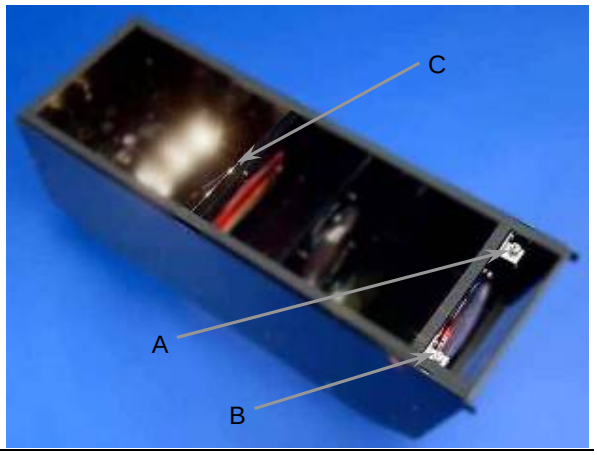
Levelling of units

Definition

The elevation **setting angle** of the PAPI units is the angle between a horizontal plane and the cut-off plane.

The **cut-off plane** is the plane passing through the centre of the objective lenses and the lower edge of the red filters; it lies parallel to the reference plane passing through the reference screws A, B, and the machined slot C.

A, B: reference screws
C: reference slot



Remark

When handling the unit, and in particular during installation and setting, rotating the reference screws A and B is prohibited.

Any accidental movement of these screws will be the cause for false information given by the PAPI system and require re-calibration in the factory by specialised personnel.

Setting angles

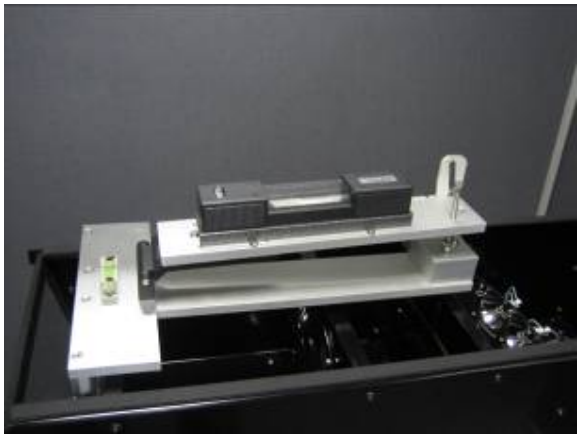
Requirements about the setting angles of PAPI and APAPI systems may be found in the following ICAO publications:

- ANNEX 14 - Volume 1 – latest edition
- ANNEX 14 - Volume 2 – latest edition
- AERODROME DESIGN MANUAL – Part 4 – Visual Aids - latest edition
- HELIPORT MANUAL – latest edition

Levelling of units, *continued*

Aiming device

This illustration shows the aiming device used for adjusting the units in elevation.



Levelling of units, *continued*

To prepare the PAPI before alignment, proceed as follows:

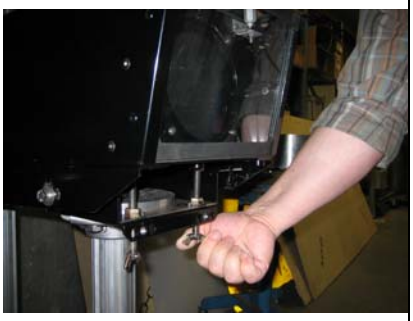
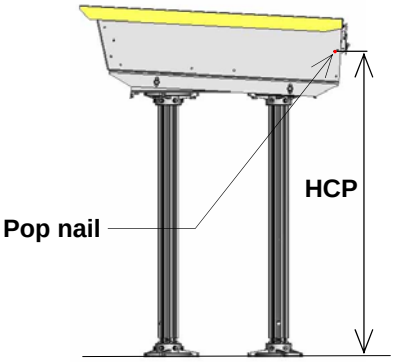
Preparation before alignment

Step	Action
1	Mount the PAPI box on the lifted supporting studs, using therefore the housings on the bottom of the PAPI box. Install the fastening screws and washers of the PAPI box to the levelling plate (2 on each side of the PAPI box), tightening them lightly by hand. 
2	Set the aiming device at the required setting angle for the unit: - First unlock the locking knob. - By using the adjustment screw and reading the angle on the Vernier scale, set the angle with an accuracy of 1' of arc - Lock the locking knob (hand tightening).  Adjustment screw Locking knob Vernier scale Install the aiming device on the reference screws A and B and machined slot C of the opened PAPI BOX.

Levelling of units, *continued*

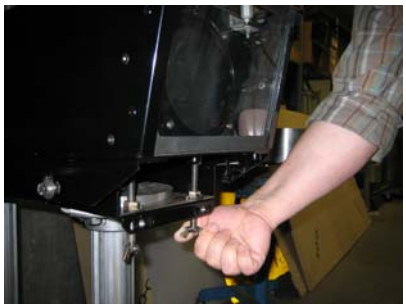
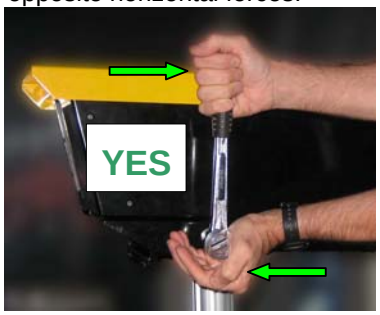
Elevation setting

To adjust the elevation of the PAPI unit, proceed as follows:

Step	Action
3	Install the adjusted aiming device on the PAPI unit, as explained above. 
4	Adjust the transverse horizontality of the PAPI box using the wingscrews on the levelling plate at the front of the PAPI, till the spirit level is indicating horizontality. Downwards movements of the box can be helped by gently pushing with the hand on the top of the box. 
5	Check **HCP** by measuring the distance from the **pop nail** to the ground. If necessary, adjust the height of the PAPI box by correcting the height of the lower flanges as explained in the section " Installation of the PAPI units" here above. Check again the transverse horizontality and adjust if necessary. 
6	Install the spirit level on the upper rod of the adjusted aiming device, to level the PAPI in the longitudinal plane. 

Levelling of units, *continued*

Elevation setting, continued

Step	Action
7	Fine tune the elevation angle of the PAPI box turning both wingscrews on the levelling plate at the front of the PAPI by the same number of turns, till the spirit level is indicating horizontality.  Downwards movements of the box can be helped by gently pushing with the hand on the top of the box. ⚠ **The accuracy of this adjustment is of utmost importance.** Allowable tolerance is +/- 1 graduation of the spirit level While adjusting the elevation angle, check that the transverse horizontality does not get out of adjustment. If it is the case, make the necessary corrections.
8	Once levelling in both directions have been set, torque down the screws on both sides of the PAPIS. Take care not to apply an excessive vertical force on the PAPI box through the spanner and the screw as it might disturb the alignment. Apply rather two opposite horizontal forces.   It is advised to do this while continuously checking the adjustment of the PAPI box, in order to detect any disturbance.
9	Check again, with the precision spirit level if the PAPI is properly adjusted and levelled (transversally, longitudinally).
10	Close the PAPI box.

Bilateral systems

⚠ In case of bilateral systems, the corresponding units at each side of the runway shall be set consecutively **without disturbing the setting of the aiming device.**

This will ensure a perfect synchronisation of the units on both sides of the runway.

PAPI wiring

Description

Different PAPI wiring methods exist.

The four units on one side of the runway are wired into a series circuit. Two independent circuits are used to feed bilateral PAPI systems. Either the two circuits are fed by separate CCR or by the same CCR through a circuit selector.

One should avoid that failure of one lamp turns off a complete PAPI box. Therefore, ADB offers several solutions, depending on the version of PAPI chosen (see Chapter "Assemblies and Exploded View"):

- SPL1S0000001 has 1 cable lead, for feeding from one 300W isolation transformer. Internally, the three lamps are wired in series, with cut-out devices on each lamp
- SPL2S0000001 has 2 cable leads, for feeding from two isolation transformer (100W and 200W). One cable lead feeds two lamps connected in series with cut-out device, the other one feeds the third lamp. This PAPI allows for easy connection to interleaved circuits.
- SPL3S0000001 has 3 cable leads, for feeding from three 100W isolation transformer. Each cable lead feeds one lamp. This PAPI allows for easy connection to interleaved circuits, without the need for cut-out device.

Note

Regions with frequent snowfalls and frost

It is recommended to operate continuously, at reduced brightness, all PAPI units, even those serving runways not currently in use. This in order to melt any falling snow immediately.

In order to achieve this, each series loop should be fed by a separate constant current regulator (CCR) rather than via a CCR + circuit selector combination.

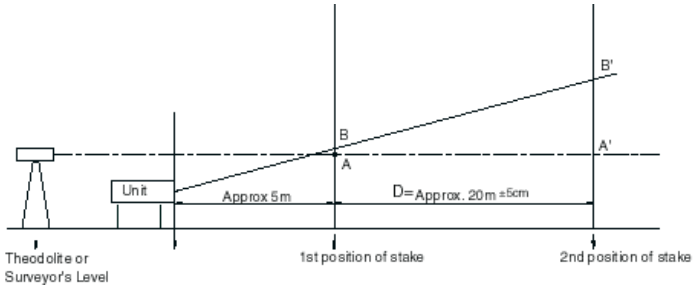
Checking cut-off angles of the light beams

Introduction

It may be requested, when the equipment is put initially into operation, and at regular intervals thereafter, that the cut-off angle of the units be checked. This measurement necessitates the use of a surveyor's level (or a theodolite) and a surveyor's stake.

Procedure

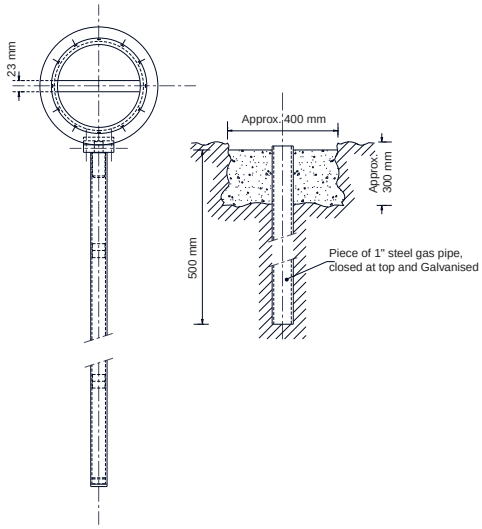
The procedure is as follows:

Step	Action
1	Position the surveying instrument 2 to 3m behind the PAPI unit.
2	An assistant approximately 5m in front of the unit holds a surveyor's stake.
3	Take reading A for the intersection of the horizontal of the surveyor's level with the stake.
4	Take reading B for the intersection of the cut-off plane of the light beam with the surveyor's stake.
5	The assistant should now move a precisely measured distance D of about 20 metre (±0.25%) down beam and take the same measurements A' and B'
6	The angle x of the beam cut-off to the horizontal is found from: $\tan x = (A'B' - AB)/D$ Where D is the horizontal distance between the two stake positions. If similar checks are to be scheduled in the future, a small concrete slab holding a galvanised pipe may be installed in front of each unit at the distances used above. 
7	According to the ICAO, prior to commissioning a PAPI or APAPI system, a visual flight check should be carried-out by the local Civil Aviation or by the Airport Authorities.

Regular check of the elevation with the checking stick

Introduction

As soon as the system is found to be operationally acceptable in all respects, permanent sighting bases should be installed in front of each light unit to allow for routine checks of the elevation setting using the checking stick.



Locating reference bases

Step	Action
1	A concrete sighting base should be located on the extended centre line of each unit.
2	When the PAPI is switched on, walk along the centreline of the unit observing it from time to time through the screen until the lower limit of the white sector is about to disappear under the first scored line.
3	At this point, dig a hole approximately 400 mm square and 300 mm deep. Drive in a 1"steel pipe vertically in the centre of the hole until its top is at ground level. Place the bottom end of the checking stick on top of the pipe and observe the light unit through the screen. Gradually drive the pipe into the hole, while frequently observing the light unit through the screen, until the light beam no longer appears completely white just below the upper line of the screen.
4	Repeat this procedure for the other units, using the same observer.
5	Pour concrete in the holes.

Observations with checking stick

Place checking stick on the concrete sighting base in front of the light unit and switch the PAPI system on. Observe the light unit through the screen. Just below the upper line of the screen, the light beam should no longer appear completely white. If this is not the case, the unit is out of alignment and requires resetting.

Distance from unit will vary according to ground elevation and unit angle setting.

Chapter 3: Maintenance

Overview

Introduction

In order to reduce maintenance to a minimum, ADB has adopted the simplest possible design and has used the best materials and protective treatments.

The light unit will give the best results only if handled with great care and well maintained throughout its lifetime.

Contents

This chapter contains the following topics.

Topic	See Page
Preventive maintenance	29
How to replace a lamp	30
How to replace a filter	31

 The front protection glass should always be present and replaced if damaged to avoid subsequent lens damage.

Lenses cannot be field replaced as they need to be factory-calibrated to guarantee the unit's performance. If a lens is broken, pleas send the unit back to ADB for lens replacement and calibration.

Preventive maintenance

Preventive maintenance tasks

In the table below you will find a checklist of preventive maintenance tasks:

Interval	Check	Action
Daily *	Check elevation angle of units (first few weeks after commissioning only, then monthly) using the checking stick (see para Regular check of the elevation with the checking stick, page 27) or the aiming device	Reset units if out of alignment as described in above installation procedure
	Check equipment for proper operation.	Repair, adjust or replace.
Weekly **	Using soft cotton cloth moistened with alcohol, clean outer surface of front protection glass.	
Monthly	Inspect housing and closure system, lamps, electrical connections, filters and protective glass for damage, breakage or warp age.	Repair or replace.
	Make sure no vegetation obscures the light beam.	Remove growth in the vicinity of equipment. Use weed killer.
	Clean interior surface of housing; remove any foreign matter. Use soft cotton cloth moistened with alcohol to clean both sides of the protective glass, colour filters and lenses.	
Twice Yearly	Make sure unit mounting is rigid.	Tighten loose nuts, screws, etc. Realign unit if hardware has loosened.
Yearly	Make flight check of system if possible.	Observe proper approach angle.

Notes: * When the light unit has stabilised, checks may be made weekly.

** More frequently during the rainy season and when there is bare soil in front of the light units

How to replace a lamp

Procedure

The following table instructs you on how to replace a lamp:

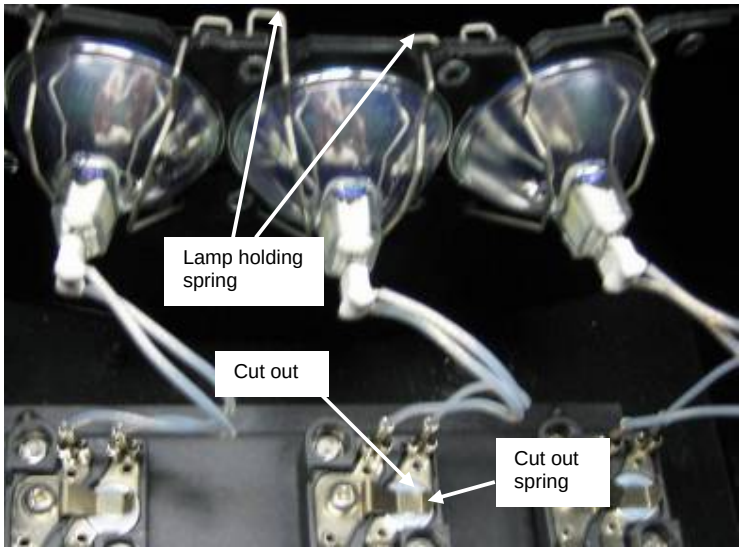
Step	Action
1	De-energize the circuit.
2	Open the PAPI unit.
3	Remove the electrical fast-on connectors from the terminal block. Check condition of the cable and fast-on connectors and replace if necessary.
4	Loosen the lamp spring.
5	Remove the lamp.
6	A new lamp can be installed by reversing this procedure.
7	Do not forget also to replace the film disk cut out when used. The latter always will go in short circuit when a lamp is defective. Not replacing the cut out will therefore result in the non functioning of the replaced lamp.

Caution: Wear cotton gloves when handling the lamps. Touching the quartz bulb with your bare fingers may seriously shorten the lamp life. If the quartz bulb has been touched, wipe it carefully with lens cleaning tissue or similar material moistened with isopropyl alcohol or methylated spirit.

It is recommended that a systematic replacement of all the lamps be made after a service period of approx. 800 hours at the 100% brightness level. An elapsed time recorder on the constant current regulator is useful to determine the time for replacement.

Illustration

The illustration below clarifies the procedure:



How to replace a filter

Procedure

The following table instructs you on how to replace a filter:

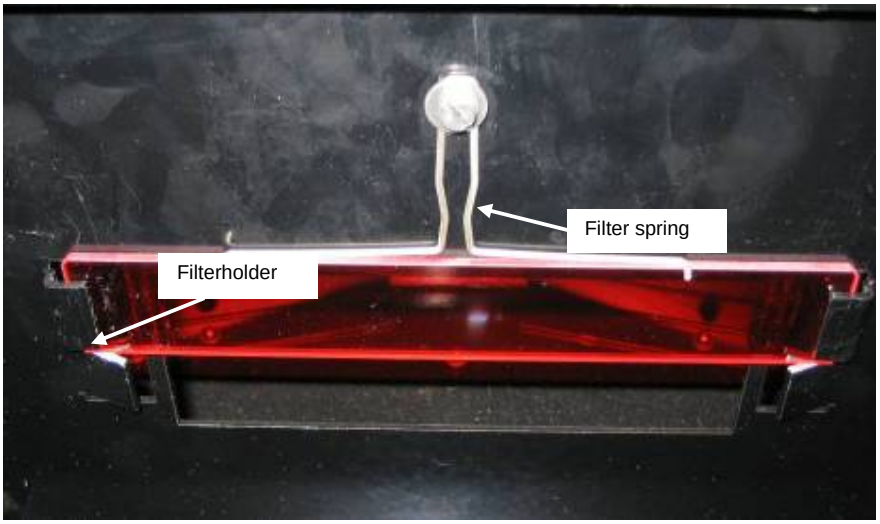
Step	Action
1	De-energize the circuit.
2	Open the light unit.
3	Lift the filter out of his holders after unscrewing the screw retaining the filter spring.
4	Remove the broken filter.
5	Place a new filter in its holder **with the side without chamfer down**.
6	Reverse this procedure.

The filters must be perfectly clean.

Use a soft cotton cloth moistened with alcohol or methylated spirit to clean filters and wear cotton gloves when handling filters

Illustration

The illustration below clarifies the procedure:



Chapter 4: Troubleshooting

Troubleshooting table

In the table below a number of problems are listed in the first column. The second column, lists the possible causes of the problem, and the third column the proposed cure.

 Before attempting to service, de-energise and lockout the circuit or the regulator so that the fixture can not be energised by remote means.

Problem	Possible cause	Solution
All lamps out	No power supply	Repair or replace loose or broken electrical connection, defective transformer. Check CCR operation.
	All lamps burned out	Replace bulbs and film disc cut out, where used . Check input current level (see below).
Light signal is dim	Dirty front glass	Clean with soft cotton cloth moistened with alcohol or methylated spirit.
	Lamp(s) not properly seated in the lamp holder	Re-position the lamp(s).
	Current level too low	Check with true RMS ammeter
	Broken lens, front glass, or filter.	Replace broken element. If a lens is broken, the unit must be sent back to the factory for recalibration.
Short lamp life	Current level too high	Check input current level at lamp and output current at CCR. Use true RMS ammeter Check isolating transformer for proper ratio.
Heater (if installed) does not operate.	Thermostat defective	Replace thermostat.
	Defective heater	Replace heater.
	Loose or broken electrical connection.	Repair or replace.

Chapter 5: Assemblies and Exploded Views

Overview

Introduction

This chapter contains an overview of the main sub-assemblies and also the exploded views of the SPL.

Contents

This chapter contains the following topics.

Topic	See Page
General information	34
PAPI Units	35
Spare Parts	36
Tools and accessories	37
Exploded view SPL	38

General information

Spare parts

In order for this vital equipment to remain permanently operational, it is recommended to keep a sufficiently large stock of spares. It will mainly consist of consumables like lamps. Other components that may need replacement, such as filters and hardware, should be stocked in smaller quantities.

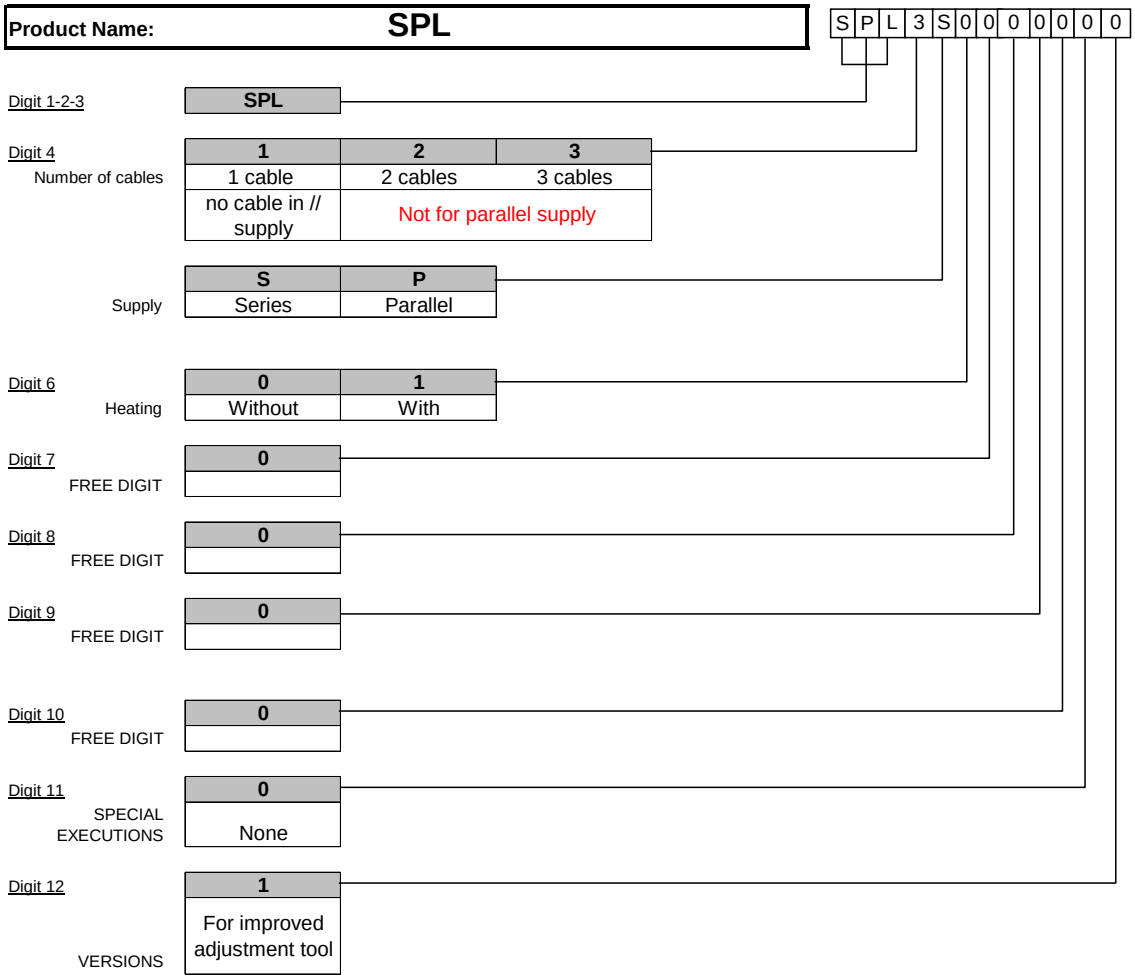
List of tables

Below is a list of the tables in this chapter:

Table	See page
Table 1: PAPI units	35
Table 2: Spare parts	36
Table 3: Tools & accessories	37

PAPI Units

Table 1: PAPI units The table below lists all types of SPL.



Spare Parts

Table 2: Spare parts

The table below lists all parts of the SPL units.

Exploded view drawing number	Description	Codenumber	Unity (sales Quantity)
1	SPL Cover assy	4072.05.160	1
2	SPL Front Glass gasket	4072.03.240	1
2&3	SPL Front Glass with gasket	4072.06.100	1
6	SPL / PPL red filter	1438.12.220	1
7	SPL Filter spring	4072.05.120	1
8	Prefocus cold mirror reflector lamps 105W - 1000Hrs	2990.40.900	1
	SPL Lamp holding spring (set of 3)	4071.82.950	3
9	F-range, TLP/SPL Terminal block with cut out spring	1411.21.000	1
	F-range, SPL Terminal block without Cut out spring	1411.21.010	1
	Lamp Cut out	1420.22.410	10
10	PPL /SPL Cover gasket (10 m)	7092.32.222	1
11	Clutch	7015.00.100	1
13	PG 13 compression gland	6126.01.230	10
14	SPL cable assy 2x2,5mm² length 2m with factory moulded on FAA L 823 style 6 connector	1458.06.120	1
16	Leveling plate	4072.15.890	1
17, 18 and 19	Mounting legs assembly	4072.08.620	1
17 / 19	Mounting flanges	4072.05.700	1

Tools and accessories

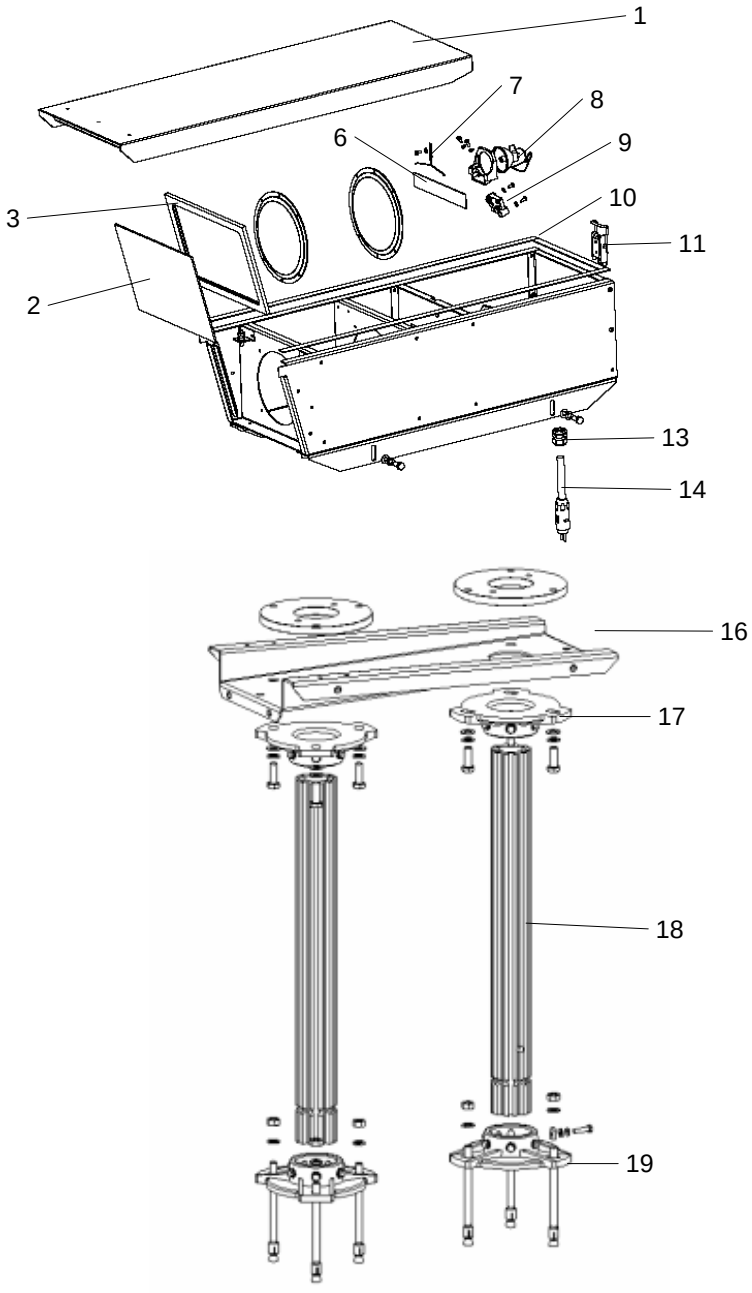
Table 3: Tools & accessories

Description	Codenumber	Unity (sales Quantity)
Installation and levelling toolbox	1439.06.001	1
Drilling template for SPL. (included in 1439.06.001)	1439.10.013	
Checking stick	1439.05.300	1
Tether (safety chain)	1424,00,020	1
Adaptation kit for helipad application	1434.31.051	1
Anchor rod for SPL	1409.20.020	6

Exploded view SPL

SPL

Below is the exploded view of the SPL PAPI unit.



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