AGLAS

SYSTEM TO CONTROL AND MONITOR INDIVIDUAL AIRFIELD LIGHTS

AGLAS remote

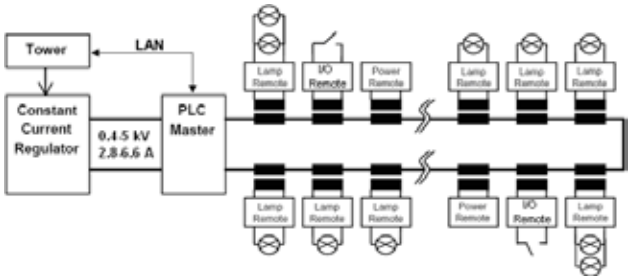
Compliance with Standards

FAA: Approved for use with SMGCS Systems. This includes both Stop Bar and Runway Guard Light control/monitoring according to AC 150/5340-28 (Current Edition); manufactured to AC 120-57 (Current Edition).
Approved for Runway Status Lights System RWSL

ICAO: Complies with CAT I/II/III ICAO lamp supervision requirements. Supports A-SMGCS for enhanced aircraft guidance in all weather conditions.
Supports safety of airport operations by integration in runway safety nets.

Introduction

The Airfield Ground Lighting Automation System AGLAS® is ADB's state-of-the art individual lamp control and monitoring system. AGLAS provides a radical leap in performance over prior airfield power line carrier systems. The system is designed to communicate on the existing airfield series circuit power line without requiring separate dedicated cabling.



AGLAS in a series lighting circuit

Uses

AGLAS provides distributed intelligence in the airfield to control and monitor a variety of airfield lighting devices. It can be used in the following applications:

- Key component of (Advanced-) Surface Movement Guidance Control Systems: (A-)SMGCS
- Stop bar control and monitoring; taxiway routing support.
- Elevated and in-pavement Runway Guard Light (RGL) control and monitoring, CAT II/III monitoring support.
- Failed-lamp detection and location identification.
- Interface with aircraft/vehicle presence sensors (option).
- Selective control and monitoring of various airfield lighting devices.

The system provides relevant information concerning the status of connected airfield lighting devices to both airport maintenance and air traffic control personnel.

Furthermore AGLAS:

- Supports the optimization of traffic volume, flexibility, maintainability and airside safety.
- Ensures reliable guidance for aircraft on the ground during CAT I, II or III conditions, increasing safety and reducing the risk of runway incursions.
- Automatically detects and reports lamp failures, decreasing downtime and maintenance costs.

AGLAS Master

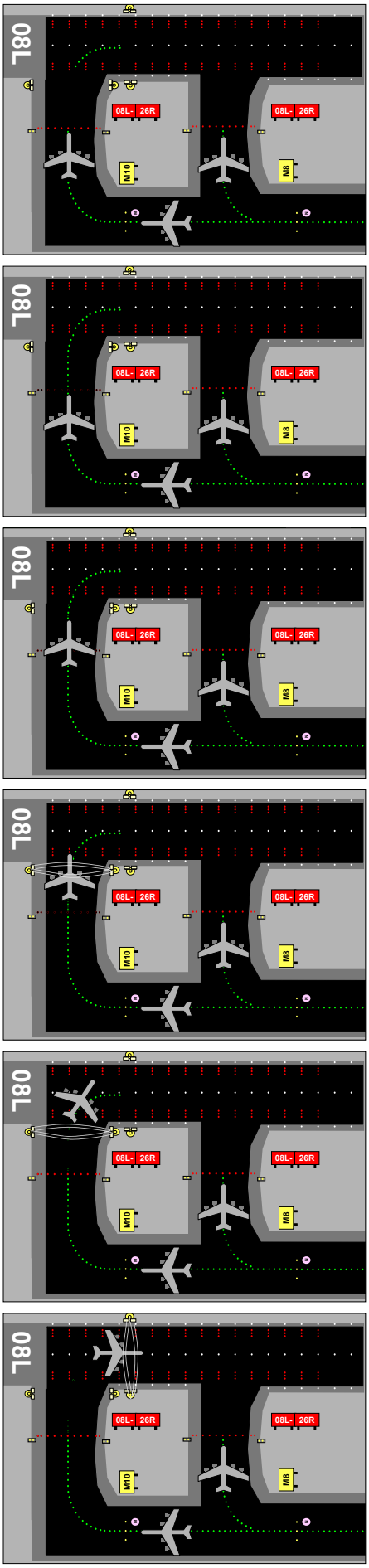
Customer Benefits

- Faster, predictable and more robust power line carrier communication method ensures highest reliability even for long airfield circuits that contain large number of lamps.
- Increased number of slots per day as a result of higher traffic throughput and better control of ground traffic movements.
- Flexible routing functionality and safe operation under all traffic and environmental conditions resulting in reduced ATC workload.
- Precise control of each segment of runways, taxiways, and stop bar lighting.
- Adjacent lamp failure reporting.
- Most economic solution for modernization projects through power line communication on existing circuits.
- Easy future upgrade of installed AGLAS systems.
- A step-by-step migration strategy can then be implemented.
- Optimized planning of runway and taxiway maintenance downtimes.
- Worldwide availability of our regional Technical Service staff for technical support and site services on short notice.

AGLAS Technology

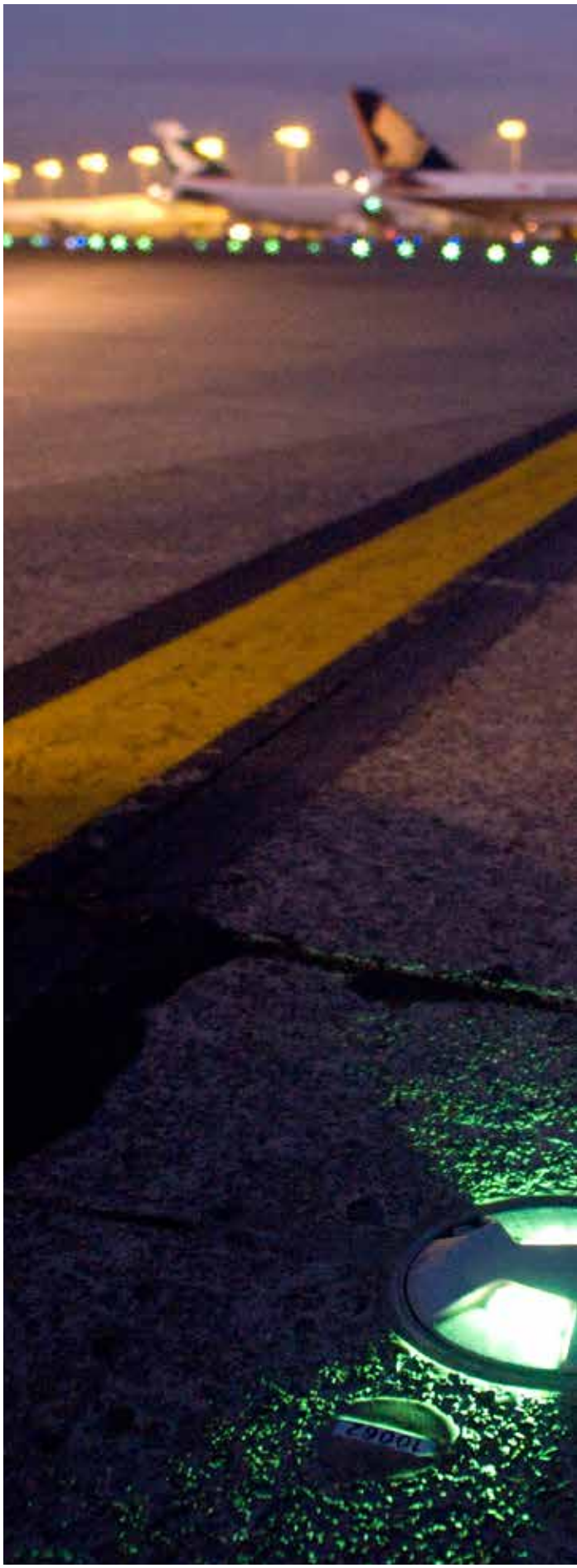
- Communicates using a radio frequency signal imposed on the high-voltage airfield series circuit cable - no separate communication cable needed.
- Communication quality is automatically optimized for each series circuit in a permanent background process.
- New communication principle together with forward error correction drastically reduces signal disturbance caused by impulse and narrow band interferences.
- Main system elements: AGLAS Master (in the substation), AGLAS Remotes (for individual control and monitoring of lights in the field). In addition, AGLAS I/O Remote for communication with local field sensors and Power Remote for sensor energy supply.

Cockpit view: visual guidance with AGLAS individual lamp control.



Features

- No separate communication cable required. RF signal on high voltage power cable for lighting control.
- Most cost-effective and proven solution for existing ground lighting systems.
- User friendly Graphical User Interface (GUI) allows easy operation and system status recognition.
- Up to 8 different frequency bands can be used in parallel, and up to 8 different timeslots which allow an increase in the number of independent communication channels up to 64. This results in greatly improved communication reliability.
- Fast and predictable switching times through the use of reliable communication methods and limited repeater levels.
- Synchronizing of control systems in different vaults by Ethernet in compliance with IEEE 1588.
- Advanced Single Frequency Network system includes an automatic network configuration function. This outstanding functionality provides for dynamic communication adaptation in all environmental conditions (such as humidity variation). The system dynamically checks repeater settings and automatically sets them, even if a Remote in the communication path has failed.
- No manual configuration is necessary to implement communication settings.
- Less crosstalk due to symmetrical design of coupling components (transmit and receive path), independent communication channels and lower transmission power compared to similar systems in the market.
- Each Remote can be a part of many different groups (blocks), allowing a group of Remotes to be controlled using only one command. This unique feature ensures fast response for complex applications.
- Can be used as a stand-alone monitoring system or integrated with an ALCS (Airfield Lighting Control System).
- Individual control of different functions in one lamp circuit. For example, a combination of Stop Bar and Lead-In Circuit.
- Optional Runway Guard Light Remotes, automatic start and net-synchronous Wig-Wag operation, independent from Master meeting FAA requirements.
- Firmware and application software can be downloaded into either the Master (substation) or Remotes (field units).
- State-of-the-art diagnostic tools provide a quick overview about communication behavior. Network management system provides detailed routing statistics to ensure reliable communication quality.
- Special heat dissipating, non metalic Remote housing ensures environmental resistance under all operating conditions.
- Communication measurements can be taken in advance within one day to analyze existing airfield infrastructure.
- Able to work with any kind of CCR and designed for 40 Ampere peak current.
- Field sensors can be integrated via I/O Remotes into the AGLAS lamp control and monitoring circuit for detection and transmission of local surveillance information via power line communication.
- For power supply of field devices such as local sensors, AGLAS Power Remotes can be integrated into the lighting circuit.



Main Characteristics and Figures

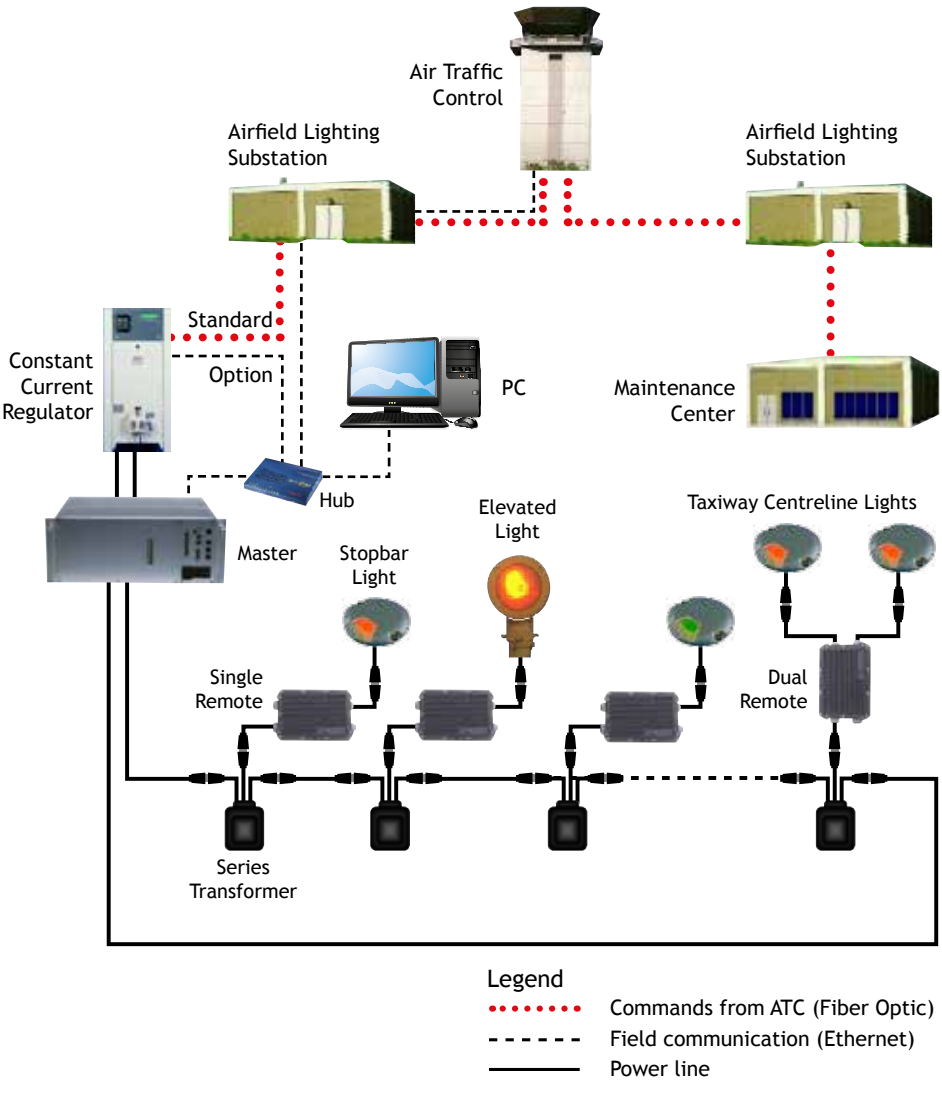
- Up to 300 Remotes per circuit, providing a potential of 600 individually addressable lights per circuit.
- Up to 15 km roundtrip circuit length.
- Real back-indication of all lights after switching block-ON-command, otherwise background polling.
- Switches up to 120 lights in 10 different groups in less than 1 second.
- Switches 5 stopbar/lead-on lights simultaneously and presents real-back indication in less than 1 second.
- Status poll provides detailed Remote and lamp parameters.

Integrated System Control

Overall system configuration and control is realized via a control process with dedicated GUI (Graphical User Interface) for configuration and maintenance. This control process ensures communication between upper control system and circuit control units (Master).

- Each circuit is equipped with a microprocessor- controlled Master for tracking, recording and data-base management of state of all Remotes in the circuit.
- The Master communicates with all the Remotes (not light fixtures) in a circuit and polls all lamps independent from the control system.

Switching and Monitoring integrated with an Airfield Lighting Control System.



Overall System Specifications

Description	Remote	Master
Operating temperature	-40 °C to +65 °C	0 °C to +55 °C
Storage temperature	-55 °C to +85 °C	-40 °C to +75 °C
Operating humidity	Max. 100 %	Max. 90 % non condensing
Series circuit operating voltage	-	Max. 5000 V AC RMS
Min. / max. Power line current	1.8 up to 6.9 A RMS	1.8 up to 6.9 A RMS
Series circuit peak voltage	-	Max. 15 kV
Maximum switching power secondary side of transformer	360 W (single Remote) Ch A + Ch B < 360 W (dual)	-
Maximum circuit load (CCR power)	-	30 kVA
Power consumption	Max. 15 W at 6.6 A	Max. 15W for power supply 115-230V Max. 65W on primary circuit at 6.6A
Enclose protection level	IP 68 / NEMA 6 P	IP 20
LAN connection to upper control system	-	IEEE 802.3 100 BaseT / IEEE1588 PTP
Net voltage of power supply	-	115 - 230 V AC ±15%, 50/60 Hz
MTBF	> 200.000h	> 200.000h
Indicative MTTR	< 30min	< 60min
Lightning protection	20kA (8/20 micro sec.)	17kA (8/20 micro sec.)
EMC (CE approved)	Compliant to the EN 61000-6-4 (EMC emission standard) Compliant to the EN 61000-6-2 and 6-5 (EMC immunity standard) Compliant to the 60950 (IT equipment standard)	
Power Up Mode	On; Off; Flashing; Maintained (last commanded state)	
Fail-Safe Mode	On; Off; Flashing, Maintained (last commanded state)	
Number of controlled and monitored lamps per unit	1 or 2	Up to 300 Remotes or 600 lights, if dual Remotes are used
Number of I/O Remotes per circuit	-	Max. 6
Transmit Frequency	8 different frequency bands between 20 kHz and 150 kHz	
Data transmission rate power line	Up to 30 kBaud (or kbit/s)	Up to 30 kBaud (or kbit/s)
Dimensions (W x H x D) / Weight	208 x 78 x 142 / 2,2 kg (single Remote) / 2,3 kg (dual)	435,8 x 177,5 x 421,5mm / 22,3 kg
Lamp failure reaction	Short is placed across isolation transformer as soon as lamp filament failure detected	-
Power Storage after Power-Off	Remote does not reset and remains in operation, if circuit power loss < 1.5 sec. Remote start up time is less than 1 sec.	-

Circuit Specifications

Cable type L-824 is recommended, for example FLYCY or equivalent. The following parameters (*) represent the specific characteristic needed in an equivalent L-824 cable. Reuse of existing installations and layout with maximum cable length or number of lights to be verified.

Cable type (specification)	L-824
Capacity of the cable	<165 nF/km *
Inductance of the cable	<0.20 mH/km *
typical impedance (125 kHz)	35 Ohm
Attenuation of the signal at 125 kHz	<5.8 dB/km *
Length of serial circuit	15 km roundtrip (9,3 miles) maximum
Insulation resistance of the series circuit against the L-824 shield or ground	50 M ohms minimum **
Secondary transformer attenuation	≤ 23 dB at 100 kHz *

* Contact ADB for support
** Technical requirement, not excluding ICAO/FAA compliance

Recommended System Specification

Overall System
The system shall be able to control and monitor individual lamps or groups of lamps and interface to local field devices such as sensors. The control system itself shall consist of three types of main components only – Remotes, Master and a supervisory computer. The first component is a decentralized lamp control field unit (Remote) capable of independently switching one or two lamps. I/O Remotes interface to field sensors. The second component is the series circuit communication interface (Master), which is installed in the substation. The Master is connected between the constant current regulator and the airfield series circuit. The last component, the supervisory computer is installed in the substation. The PC functions as a gateway between Master and ALCS (Airfield Lighting and Control System). Commands coming from the ALCS will be transferred as single or block commands (a block command addresses various Remotes with the same command) to the Master, feedback signals will be transferred to the ALCS. All configuration, commissioning and maintenance tasks will be carried out on the PC as well. A comprehensive overview about all process status as well as the possibility to carry out various commands is ensured by the GUI.

Communication
Communication to the Remote shall be accomplished using advanced RF techniques imposed on the existing high voltage airfield series circuit.
To eliminate negative impact due to crosstalk (attenuation between circuits less than 30 dB), the overall system shall provide different time synchronized communication channels.
These shall be individually programmable for each circuit. Fixed repeaters or amplifiers (which compensate for changes in temperature, moisture and aging) are not permitted. In order to eliminate loss of communication to long sections of airfield devices in case of Remote failure, Remote communication amplification on an individual airfield circuit shall be self-configuring. The failure of any Remote shall not affect the communication to the next Remotes on the circuit. Robust Forward Error Correction methods shall be used to ensure a high degree of data integrity and reliable communication performance.
It shall be possible to install and individually operate up to 300 Remotes with a maximum of 6 I/O Remotes in a circuit under specified conditions. It shall be possible to communicate on airfield circuits with a maximum roundtrip length of 15 km. Existing ICAO or IEC grounding concepts shall be implemented at the airport.

Features of the Remote
It shall be possible to independently switch and monitor up to two lamps with one Remote unit. The typical consumption of a Remote unit shall be less than 15 W. A short-term power loss of less than 1.5 seconds on the series circuit shall not lead to a reset or new start of the Remote. The Remote unit shall be ready to operate within 1 second following power-on. It shall be possible to install the Remote using standard FAA-L823 connectors without requiring further modification between isolation transformer and lamp. The Remotes input and output shall be equipped with lightning protection rated 20 kA.
A Remote shall functionally operate at turn-on even if the lamp has failed.
It shall be possible to configure the Remote to pre-defined Power Up and Fail Safe modes. In order to simplify the spare parts inventory, clearly defined preconfigured versions of Remotes shall be provided for single channel and dual channel applications. It shall be possible to set configuration parameters in the substation after the Remote has been installed in the airfield.

Features of the Master
The Master shall be able to independently execute data exchange with the connected Remotes. In order to minimize Master communication load, Remote replies shall only be transmitted to the PC if a status change occurs. The Master shall have two major functions, to transmit and receive the RF signal on the serial circuit and to filter out harmonics coming from thyristor controlled constant current regulators to smoothen the waveform.

Switching and monitoring
It shall be possible for each Remote to be part of different groups, allowing a group of Remotes to be controlled using only one command. This will enable fast lighting operation at complex intersections. It shall be possible for each channel of a two channel Remote to belong to different groups. After every group switching command, each Remote shall transmit its current state to the Master. This safeguards the accurate feedback of lamp status. The system shall not infer the status of a lamp based on the previously monitored lamp state.
Optional RGL Remotes shall be available, which start and execute net-synchronous RGL Wig-Wag function independently from the Master.
Local field devices such as sensors can be optionally integrated into each power line circuit. For local power supply to the field devices, optional Power Remotes shall be provided. Monitoring of sensor status shall be done via separate I/O Remotes using the same power line communication as the lamp Remotes.
A minimum of 6 I/O Remotes shall be allowed per circuit.

Individual visual guidance in all weather and traffic conditions.

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Product specifications may be subject to change, and specifications listed here are not binding. Confirm current specifications at time of order.