AGL

Airport Lighting Computerized Remote Control and Monitoring System

Compliances:

- **ICAO**: Annex 14 - Volume I and Aerodrome Design Manual, Part 5
- **FAA**: L-890 AC150/ 5345-56A
- **NATO**: STANAG 3316

General Overview

The OCEM Computerized Remote Control and Monitoring System (**AGL**) features an advanced distributed structure which guarantees flexibility, modularity and availability.
Its design is such that no single element may affect the operation of the entire system.
AGL is based on a network ready operating system. The application database and graphic software are customized for airport needs.
The unique distribution structure of the system simplifies its installation and maintenance: each item to be controlled in the system (CCR, selector switch, parallel users, etc.) has its own interface which is connected to the communication network.
AGL includes an user-friendly data entry system specifically designed for airport lighting applications, and supports field programming and downloading techniques that simplify the system start-up and any future modifications and expansions.
AGL provides a comprehensive integrated solution for airport lighting control and monitoring system requirements, including Surface Movement Guidance and Control System (SMGCS), Runway Safety Area Management System (RSAMS), Stop-Bar Control (SBC), Single Burnt-Out Lamp Detection (SBOLD) for ALS Categorization, and Insulation Resistance Monitoring (IRM) of the series cables.
Due to its modular design and simple installation, AGL is easily scalable and configurable to military and commercial airports from the smaller regional through the large CATIII ones.

Features

- **Advanced Distributed Structure** for flexibility, modularity and availability. No single element may affect the operation of the entire system
- **Real-time Visualization** of the Airfield Lighting System status
- **Detailed and Realistic Graphic Display** for accurate and precise information to air traffic controllers and maintenance personnel
- **User-friendly HMI:** a dedicated software, specifically developped for Airfield Lighting application, simplifies the system start-up, the operability and any future modification after initial installation
- **Redundant Network** based on fiber optic cable, hardwire or wireless method as communication media
- **Simple Installation and Maintenance** due to the unique distribution structure
- **Scalability**: due to its modular design and simple installation, AGL is configurable to meet the requirements of military and commercial airports from the smaller regional through the large CATIII ones.

System Identification:

AGL - I - X - A

Basic P/N:

Compliance:
I = ICAO/STANAG
L-890 = FAA

Monitoring Options* :
A = Control Only
B = Basic Monitoring
C = Advanced Monitoring
D = Stop Bar Control
X = ICAO/STANAG System

Fail-safe Option :**
A = Preset
B = Last State

* Monitoring Options A, B, C and D are applicable to AGL FAA compliant.
** In case of ICAO/STANAG compliance, option A only.

Application

AGL, based on a modular design, represents a flexible solution for any airport to easily expand their system, to satisfy new local requirements/needs or to comply new capabilities required by the International Standards.
AGL has been designed to interface the latest technologies provided by Air Traffic Management solutions.

AGL includes the Single Lamp Control Monitoring System (SLCMS), representing a comprehensive and flexible solution for the Surface Movement Guidance and Control System (SMGCS), Runway Safety Area Management System (RSAMS), Stop-Bar Control (SBC), Single Burnt-Out Lamp Detection (SBOLD) for ALS Categorization.

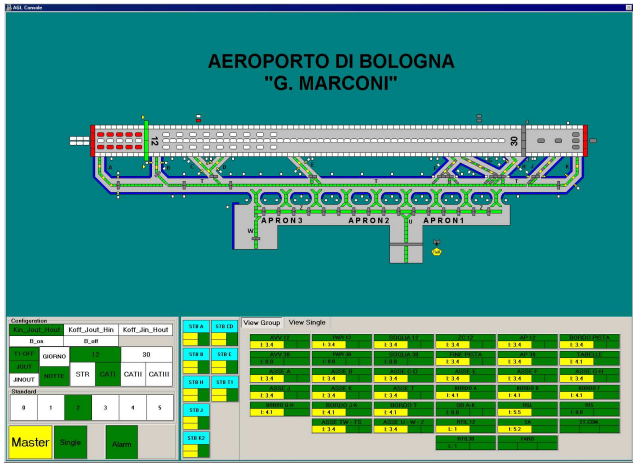
Interface System Unit (ISU)

AGL has an unique distributed structure. Each CCR and each item to be controlled is connected to an Interface System Unit (ISU). The ISU is a microprocessor based module which includes all the communication, command, monitoring, input/output, and fail-safe functions. The connection of the ISU to the communication network is via quick connectors.

When possible to simplify installation and tests, the ISUs are factory installed inside OCEM CCRs during the manufacturing phase. For existing CCRs and other devices to be controlled, such as selector switches and parallel users, ISUs will be separately installed on site.
This distributed structure not only simplifies AGL installation, but also increases significantly the reliability of the system and makes easy the maintenance.
Each ISU receives the air traffic controller commands via the communication network, executes the command and transfers back the status of the controlled device to air traffic and maintenance/operation control stations.

Software

AGL is based on a network ready operating system.
The system flexibility allows the introduction of interlocks among the control stations and operational procedures to define who can do what and how. The operating control station registers the traffic controller action as a command, and in response generates the data for transmission to the electrical vault(s) for execution. Monitoring information is sent from the vault(s) to the tower, maintenance and other control stations for displaying.
This feature allows the maintenance personnel to add CCRs and other devices to the system by simply installing an ISU for the new CCR or device to be controlled, connecting it to the local vault network, and adding its parameters to the system through a simple menu driven interface.



Control Panels and Touch Screens

AGL may accept input by conventional air traffic control tower panels or dedicated keyboards with colour LCD Monitor. The keyboards may be replaced by colour Monitor with an integrated touch screen. Single or multiple touch screens of various types and sizes are available. This includes flat screens coupled together to display a large area in sufficient detail to facilitate the use of visual aids for aircraft ground traffic control. Multiple touch screens in the control tower can be operated simultaneously or separately.
Any control station can operate independently, and a failure in any station doesn't affect the performances of the other stations or of any other device of the control system.
The design of the system is such that any operator can access any page available and can initiate commands for all the controllable devices in the system, provided that the relevant station has the clearance to access and command such items.

Network

AGL is a network based system which utilizes an airport LAN (local area network) to provide communication around the airport. The airport network can be configurated in the most convenient method for the airport such as a ring or star configuration. The network can use fiber optic cable, hardwire or wireless method as communication media. For maximum reliability two redundant airport networks may be installed.
AGL network structure makes easy the addition of new control and monitoring sites. An electrical local network based on one or two highly reliable independent communication network(s) is installed in each vault.
This network communication link is based on a dedicated 48-bit neuron chip, a sophisticated VLSI device which provides the key functions of the protocol through a combination of hardware and firmware. The protocol is designed for highly time and reliability critical applications and is used in fly-by-wire control systems for aircraft. It supports end to end acknowledgement with automatic retries. The protocol supports communications on a variety of wired and wireless media including twisted pair, power line, infrared, radio frequency, fiber optic and coaxial cable.

Single Lamp Control Monitoring System

OCEM Single Lamp Control/Monitoring System (SLCMS), developped to be interfaced and integrated to AGL, provides a comprehensive and flexible solution for the Surface Movement Guidance and Control System (SMGCS), Runway Safety Area Management System (RSAMS), Stop-Bar Control (SBC), Single Burnt-Out Lamp Detection (SBOLD) for ALS Categorization, based on minimal additions to the existing airport infrastructure.
This system provides the means to control and monitor each individual light and/or each group of lights which are connected to the series lighting circuits, as well to monitor and process the signals received from traffic sensors and detectors located on the runway(s)/taxiway(s). The installation of the SLCMS doesn't require any additional wires between the lights in the field and the electrical vault(s).

The series lighting cable is used as a signal carrier. The only installation activity required is to plug the Lamp Control/ Monitoring Units (MCCs) into the series circuit between the isolation transformer and the light (or device) to be controlled or monitored. No other elements like filters or by-passes are required.

For the communication between AGL and MCCs, a Communication Equipment (ECB) is coupled to each CCR and connected to the series lighting circuit. The MCC is a microprocessor based unit designed to control and/or monitor airport lights, signs, stop-bars, segments of lights, runway guard lights and other on-field devices. Data are transmitted to and from the MCCs via the series circuit. The MCCs may be easily programmed for the intended function by the airport personnel and an unique type of MCC is suitable for all applications.
The MCC power supply is shunted by the series circuit directly. MCC built-in programs allow to reduce the transmitted data on the series cable for maximum reliability and operability. MCCs may interface traffic sensors and detectors too and transmit the relevant data back to a central computer via the series circuit. Commonly traffic sensors used for SBC/RSAMS are connected to a dedicated fiber optic cable as communication media for immediate transmision and maximum reliability.

Insulation Resistance Monitoring System

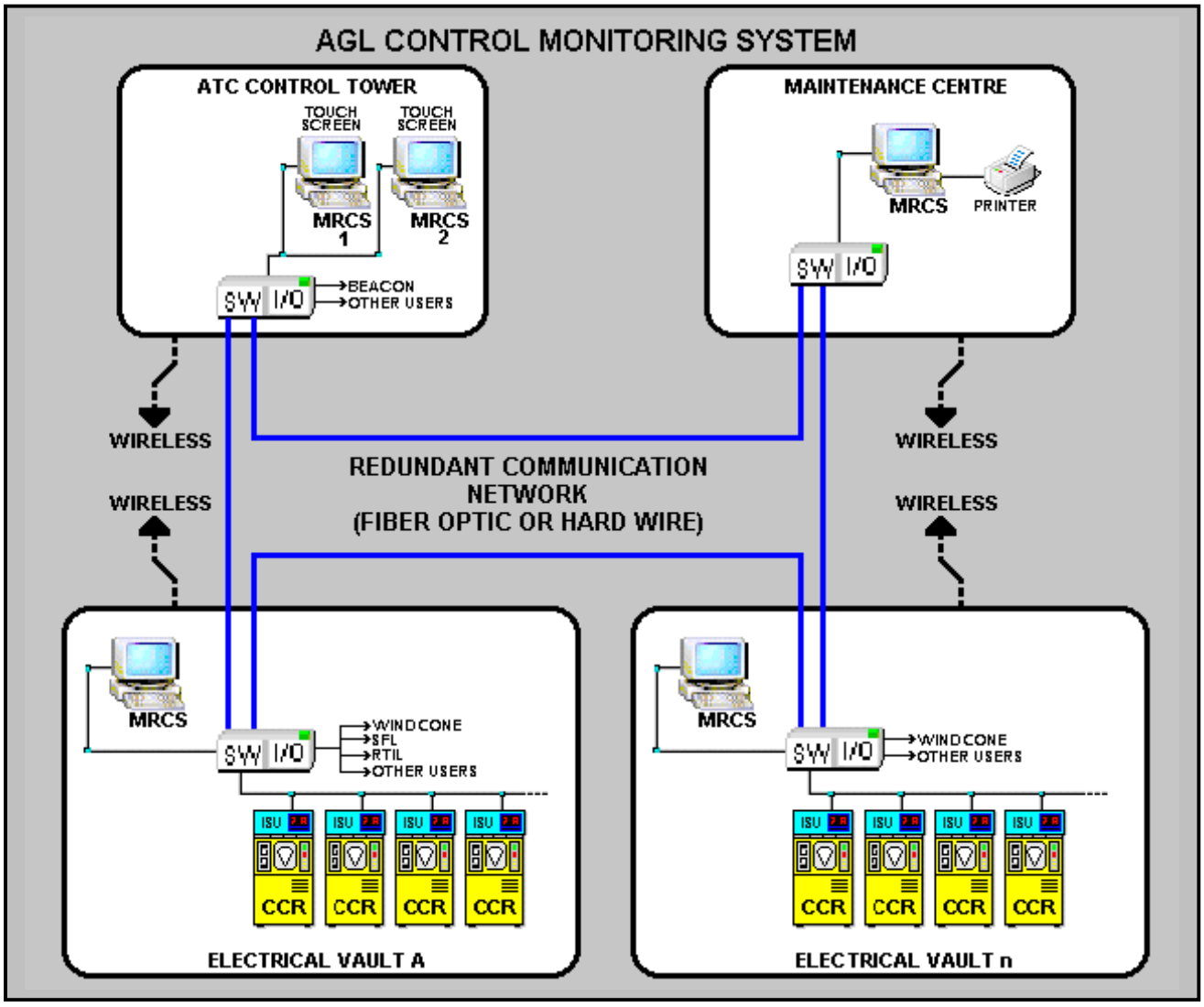
The IRM (Insulation Resistance Monitoring) unit is an automatic device that performs periodic insulation-resistance tests on an airfield lighting series circuit and displays in MΩ the cable resistance to ground. The IRM unit provides test results that can be transmitted to a dedicated PC for IRM general overview. For each monitored circuit the system informs in real time the maintenance personnel about the current reading and any warning or alarm conditions, and showes the insulation resistance trend in a graphic format, allowing preventive maintanance actions.

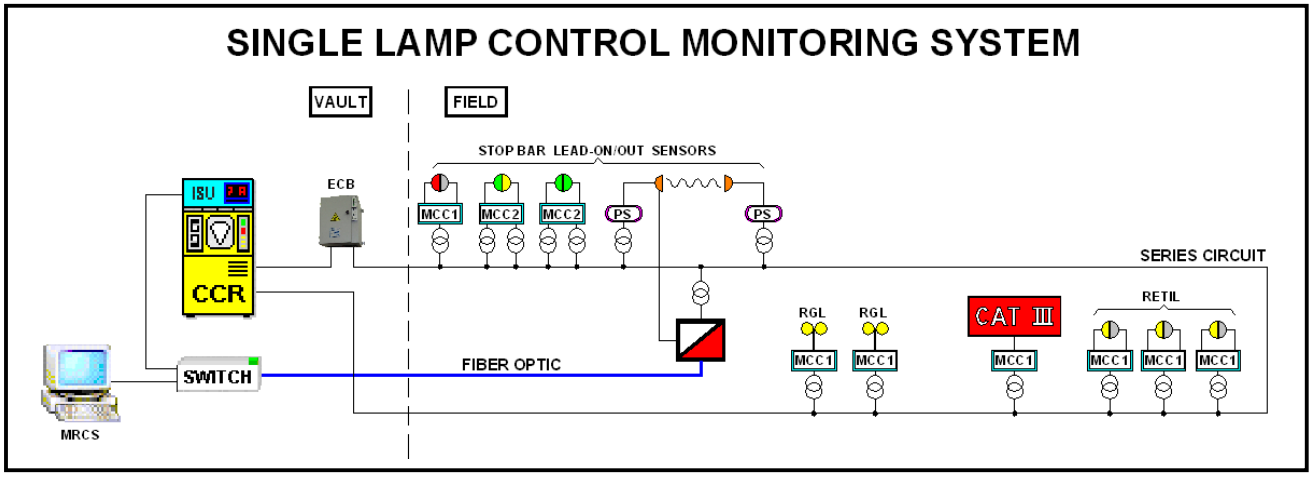
Power for the DC test voltage (max 1000VDC) is applied to the circuit when the CCR is on only. An isolation relay connects the series circuit to the measurement module during the test period. The measurement circuit converts the detected leakage current to appropriate analog input signals. A micro processes these signals and provides actual megohm value to the digital display. The test result is continuously displayed until the next test is performed. The IRM unit displays warning and alarm levels available through dry contacts too.

Maintenance Capability

The computers provide real-time and historical information of the status of the airport lighting and other controlled devices such as parallel users, generators, etc.
The computers alert the airport maintenance and operation personnel of any airport lighting malfunction at the time it occours, and provide accurate information as the time, type and nature of the problem and the system where the malfunction occoured.
All the malfunctions and the associated information are stored in the system archives, and can be printed out. The scope and the depth of information available to the operator provides a full picture of the entire airfield lighting system in real time. The system has an efficient data collection capabilities and a strong computing power.

Typical Layouts





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