Argos Ingegneria S.p.A.

April 2009


Argos
ingegneria

RUNWAY SAFETY AREA

MONITORING SYSTEM

Pat. n° RM2002A000408, 31/07/2002

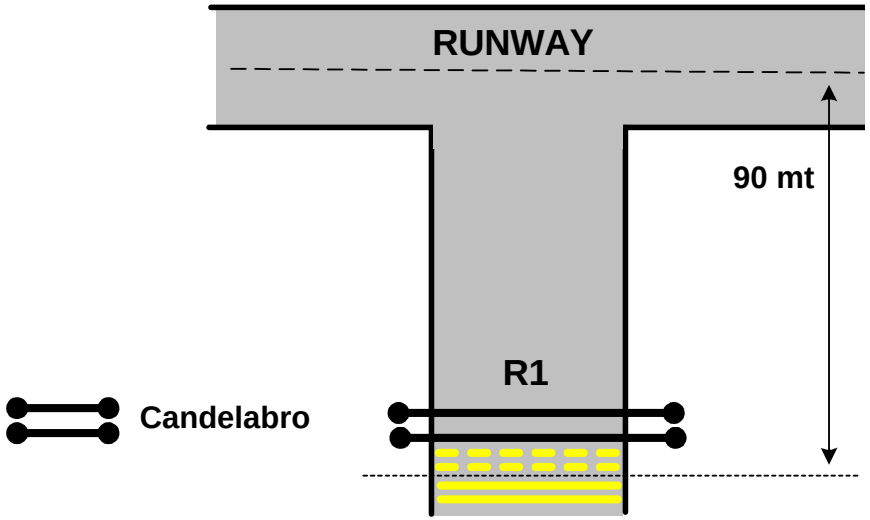
Functionality (I)

RSAMS[(1)] monitors the target movements (aircrafts and vehicles) on the RWY/TWY intersections in order to:

- ✈ detect Runway Incursions (i.e. unauthorized runway entries);
- ✈ detect manoeuvre errors (i.e. unauthorized exits from RWY).

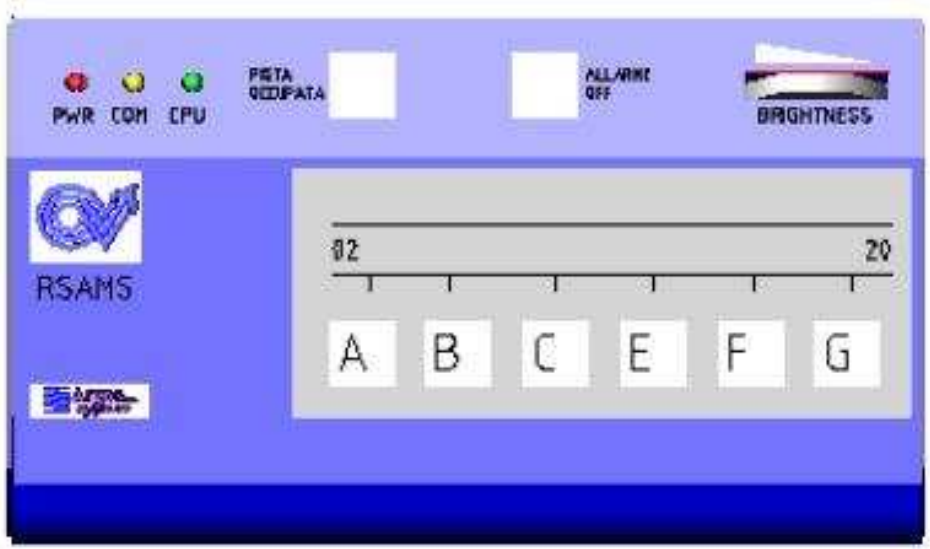
Each violation is notified to the Ground Controller through an acoustic alarm and appropriate visual signs.

The detection component of the system consists of two couples of microwave sensors (two TX and two RX) installed beyond the taxiway border, close to the CAT I holding position. The two TX on one side and the two RX on the other are mounted on a structure called “Candelabro”.



Functionality (II)

In order to reduce the Ground Controller workload, RSAMS is provided with a transportable keyboard, called "***Telecomando RSAMS***", composed by functional buttons, each associated to a specific protected intersection.



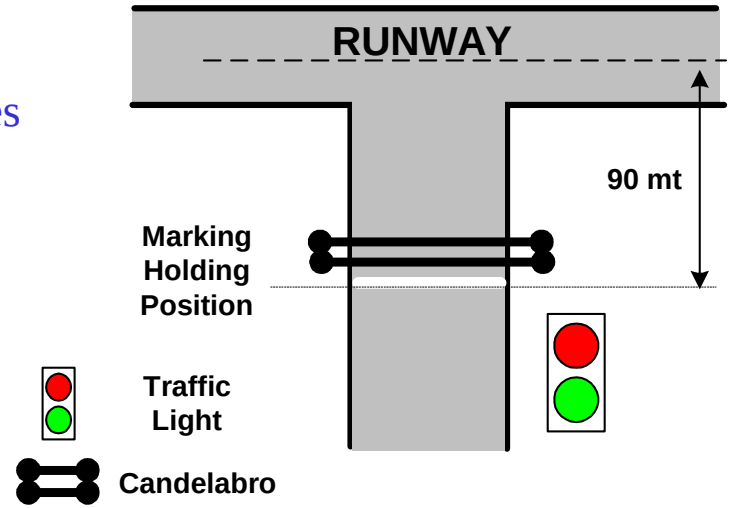
Traffic light

The system can be equipped with traffic lights that signal to drivers the clearance into the Runway:

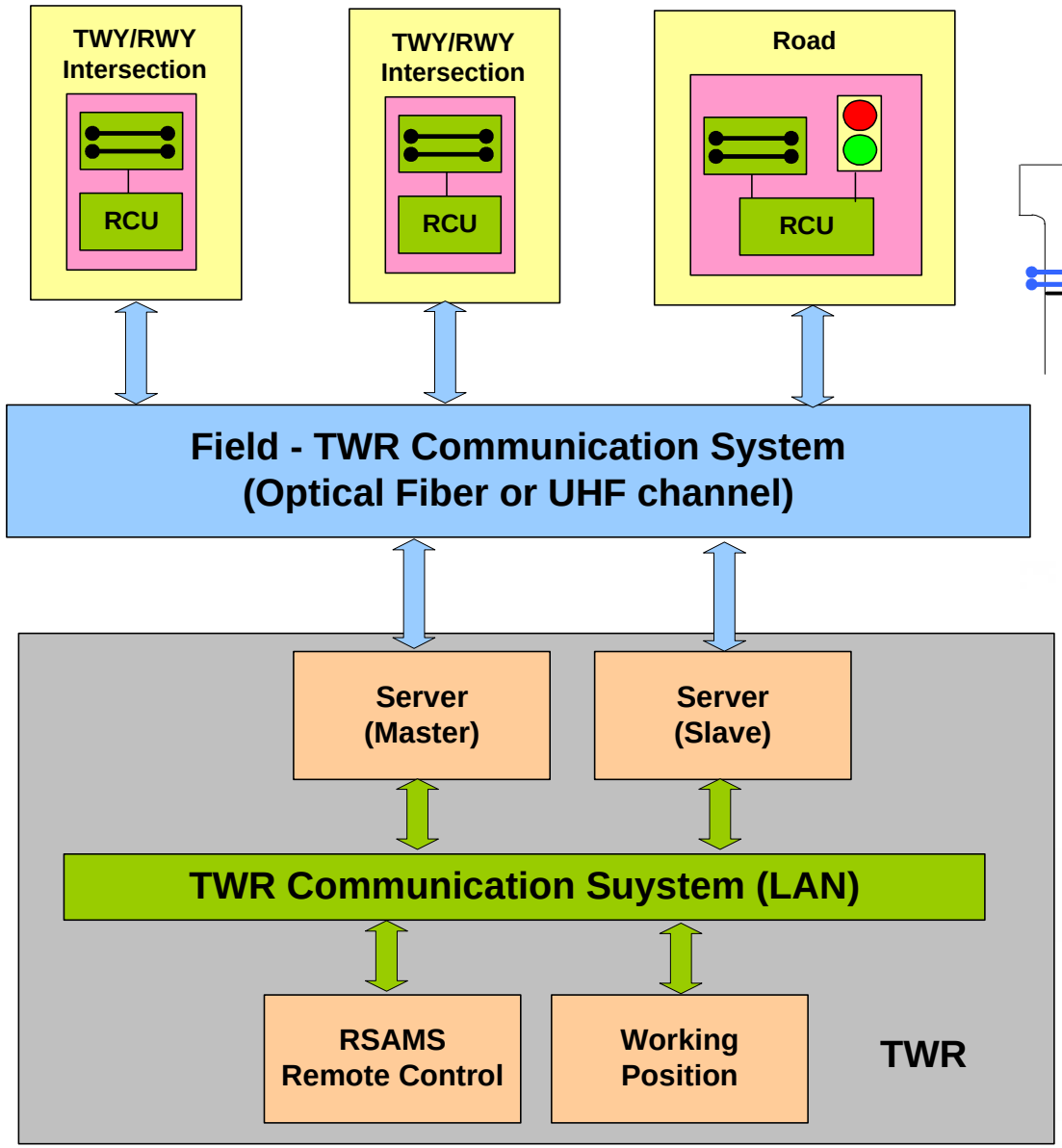
- ✈ Red light, when vehicle is not allowed to enter the Runway;
- ✈ Green light, when vehicle is cleared to enter the Runway.

When the Ground Controller sends the clearance command, the system switches off the red light and turns-on the green light.

When the vehicle crosses the 'candelabro' line, the system resets and automatically switches on the red light and turns off the green light.

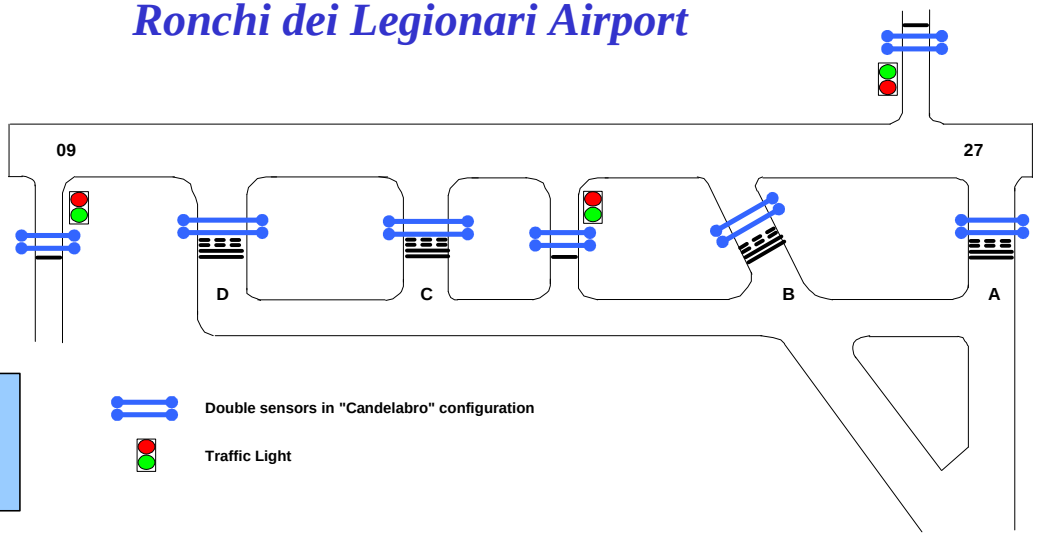


Architecture and configuration

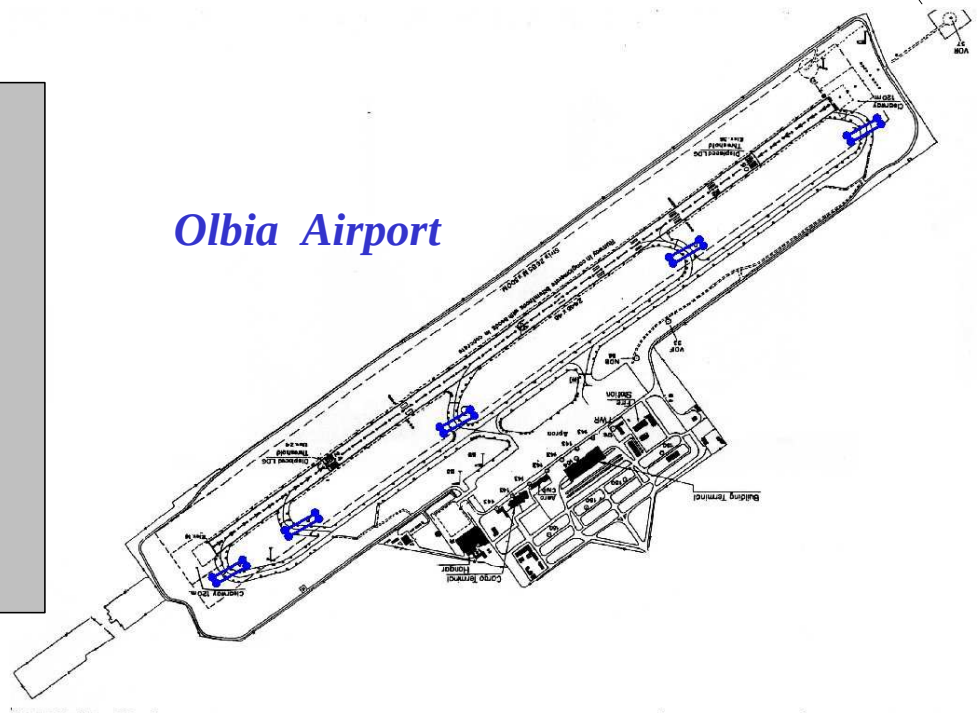


Block diagram

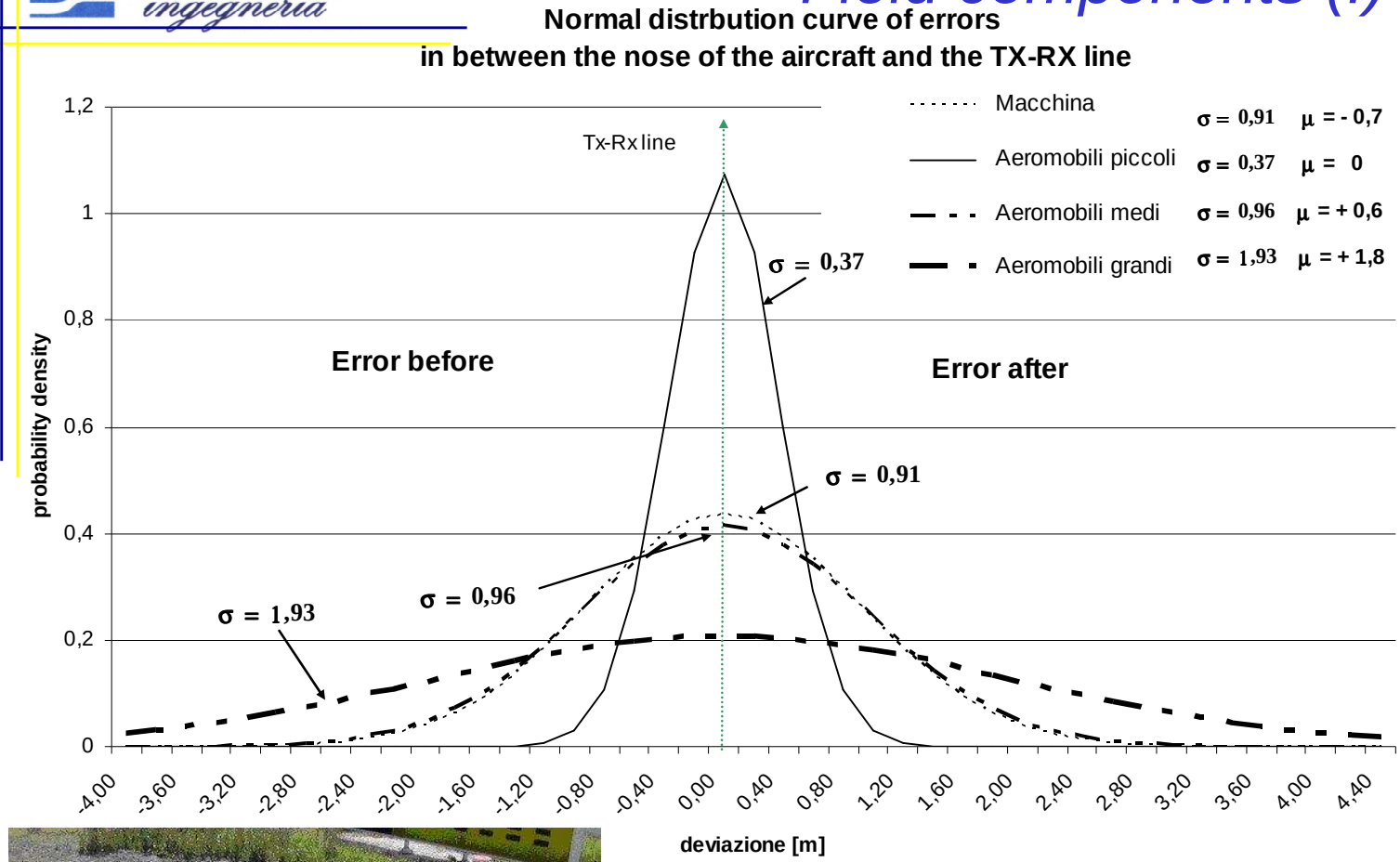
Ronchi dei Legionari Airport



Olbia Airport

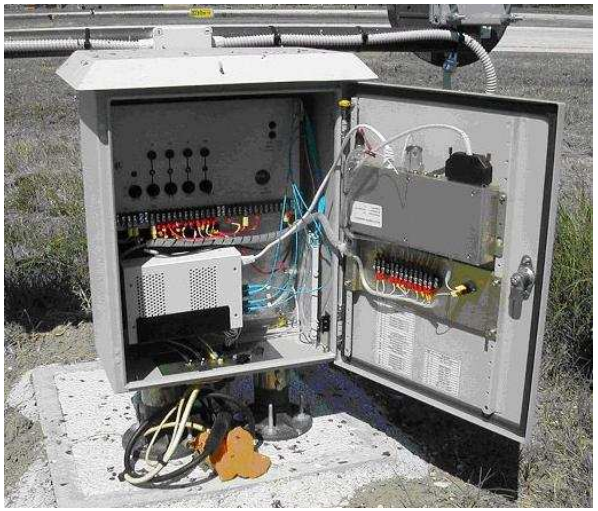


Field components (I)



Candelabro

Cabinet master



Field components (II)

Detection system

Microwave sensors, composed of one TX and one RX, mounted in couples, can detect the presence of the target as well as its crossing direction; each couple is installed on a metal structure called “candelabro”.

Master cabinet

Installed close to the Runway Incursion RX candelabro. It contains:

- Remote Control Unit, dedicated to the RX data processing;
- FO or UHF channel for data interface;
- Power supply/charger module used to power the devices through the RSAMS dedicated circuit or AGL power line;
- Back-up battery in case of absent of primary power

Slave cabinet

Installed close to the Runway Incursion TX candelabro. It contains:

- Power supply/charger module used to power the devices through the RSAMS dedicated circuit or AGL power line;
- Back-up battery in case of absent of primary power

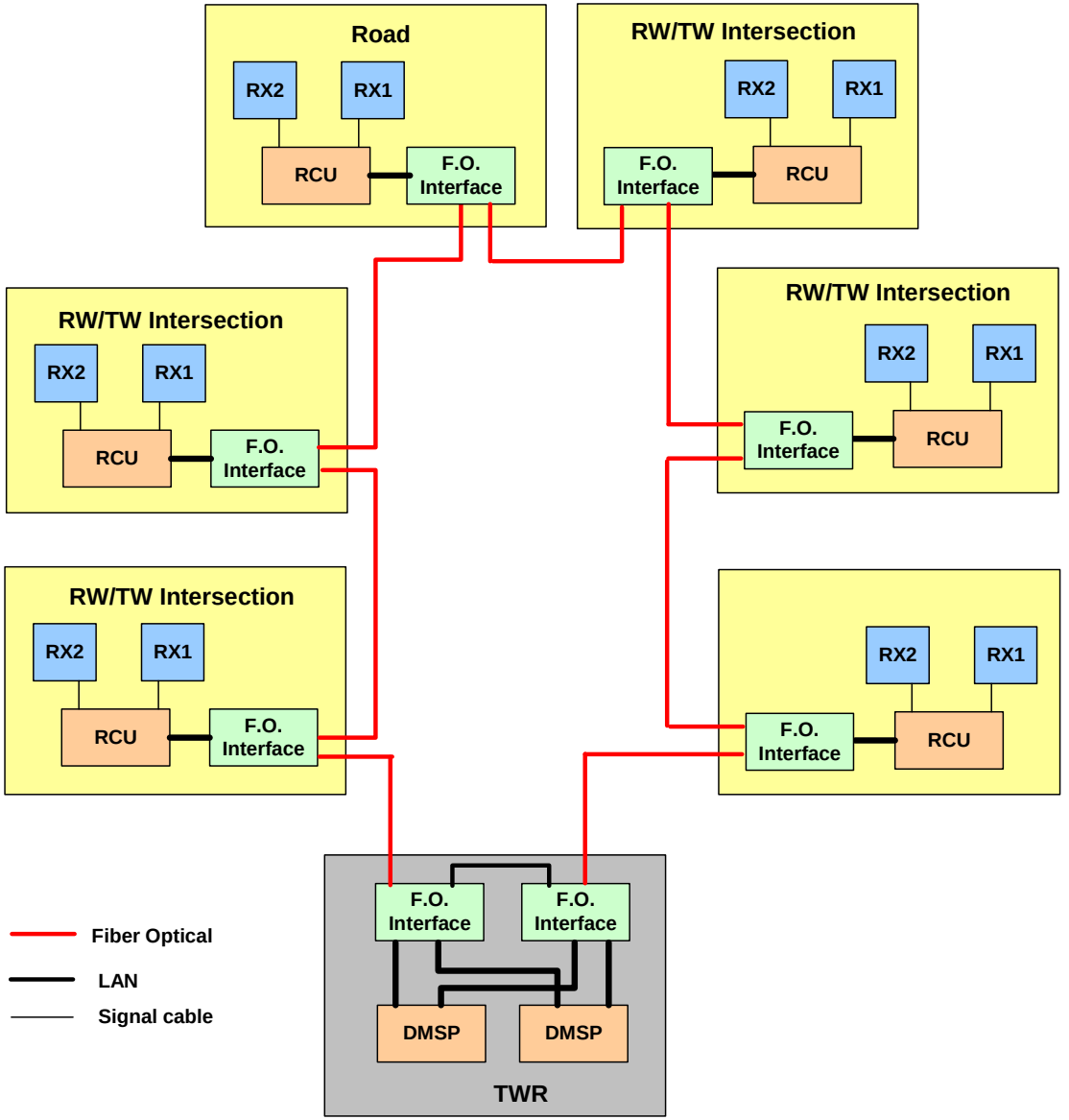
Field communication system - TWR

Fiber Optical connection:

- Installation of a fibre optics ring with 4 mono-mode fibres terminating on the RSAMS rack.
- Use of FO interface module on site, inside the Master Cabinet, and in TWR, inside RSAMS rack.
- STP protocol implementation to reconfigure automatically the interface modules in case of network interruption.

UHF connection:

- On field, installation in Master cabinet of UHF Tx/Rx module inside RCU.
- On TWR, UHF Tx/Rx module in 19” case to interface LAN protocol.
- TDMA access technique with slots assigned statically to RCU.



Data processing section

Distributed Microwave Sensor Processor (DMSP)

The System server, in redundant configuration, works in Linux OS and hosts the following SW modules:

- DMST (Distributed Microwave Sensor Tracker) that according to the information sent by "candelabri" and the Ground Controller settings, has to manage the operative configuration of the intersections and detect the unauthorized entries/exits.

Event	INCURSION CONFIGURATION			
	IN	IN/OUT	OUT	CLOSED
Entry into the runway crossing the Runway Incursion candelabro line without authorization	Runway Incursion	Runway Incursion	Runway Incursion	Runway Incursion
Entry into the runway crossing the Runway Incursion candelabro line with authorization	OK	OK	-	-
Exit from runway crossing the Runway Incursion candelabro	Manouvre Error	OK	OK	Manouvre Error

- LOG that records the events detected by the system in order to make them available for any later check

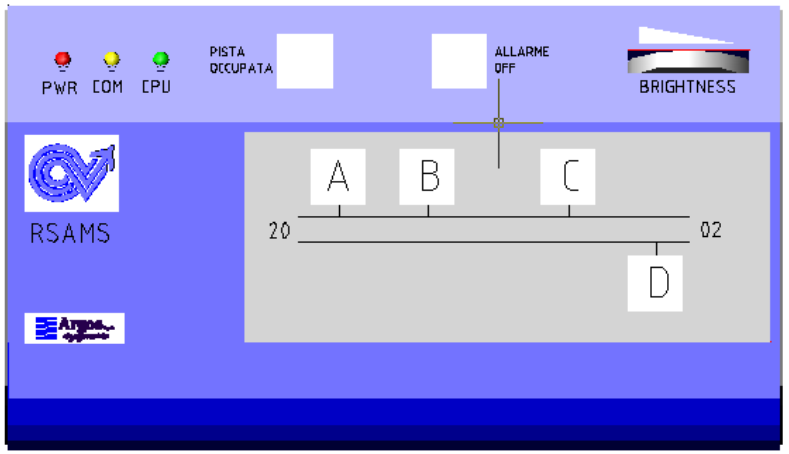
- SYNCRO that guarantees, through a GPS system and an NPT server, the clock alignment among the system server and HMI units.

Display section

TWR operative room

- RSAMS work station
  - displays the RSAMS operative information
  - Allows the Ground Controller to send RSAMS commands (clearance/engagement of the Runway, selection of the airport configuration, etc); some commands are subject to password

- RSAMS remote control
  - Allows/denies entry into the runway
  - Shows a Runway incursion event
  - Sets the engaged/cleared runway
  - Resets the acoustic alarm



Equipment room

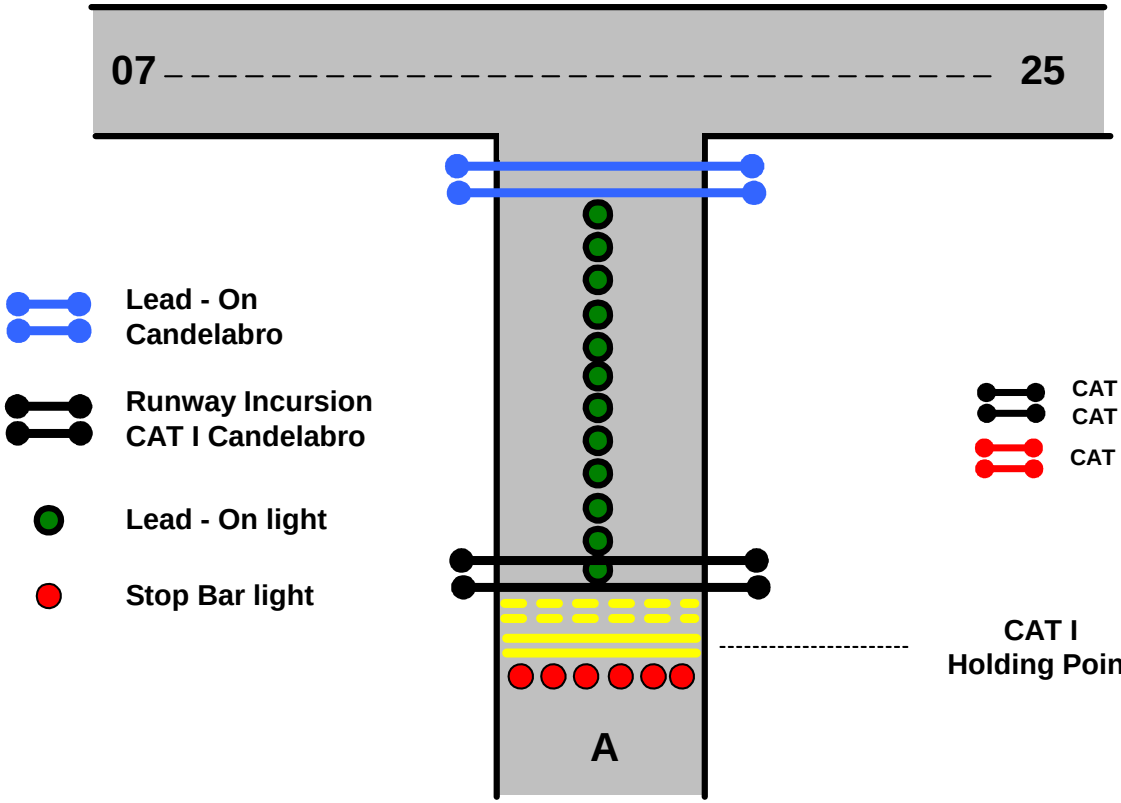
- Displays the same information of the operative room; all the commands are subject to password

Vault

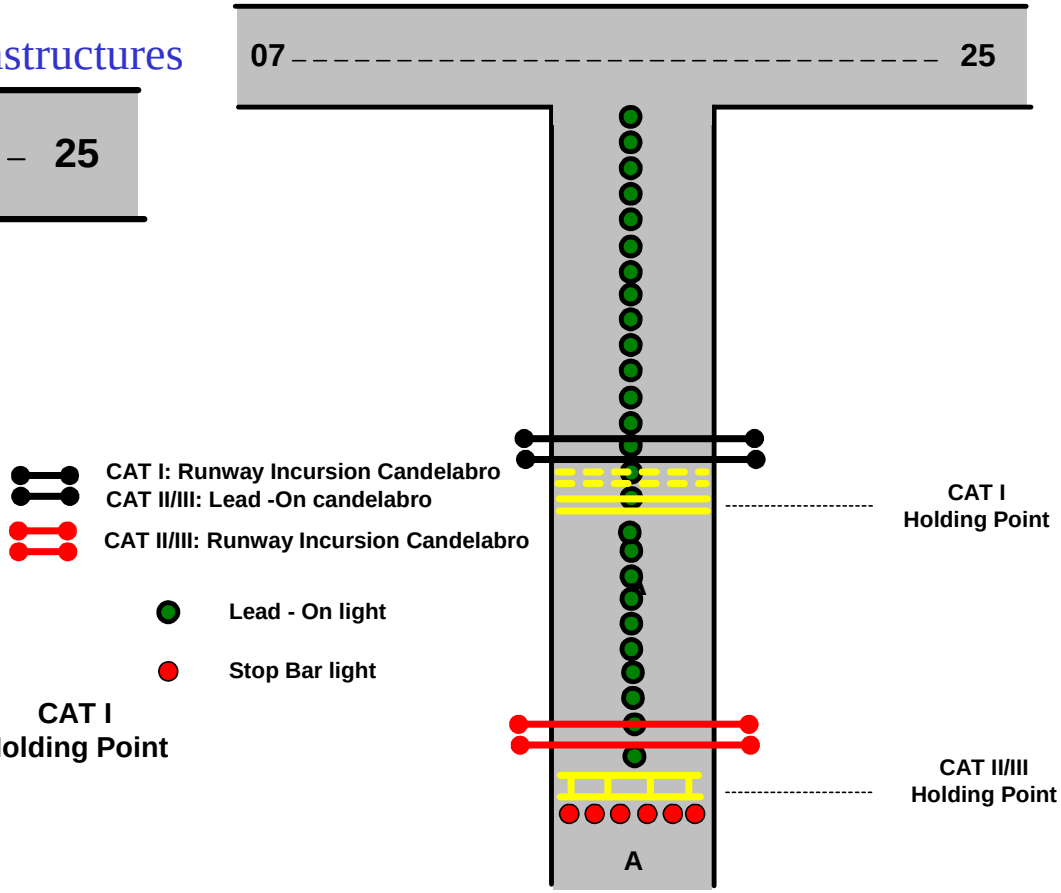
- Displays the information on RSAMS systems diagnostics

RSAMS integration with stop bar systems (I)

- ***Purpose***
  - Gather on the same position the Ground Controller information
  - Give the clearance into the runway from a single workstation, with the stop bar switching off and consequent switching on of the lead on lights
  - Standardize the field sensors and the communications between field and tower
  - Reuse the pre-existing and available infrastructures



CAT I

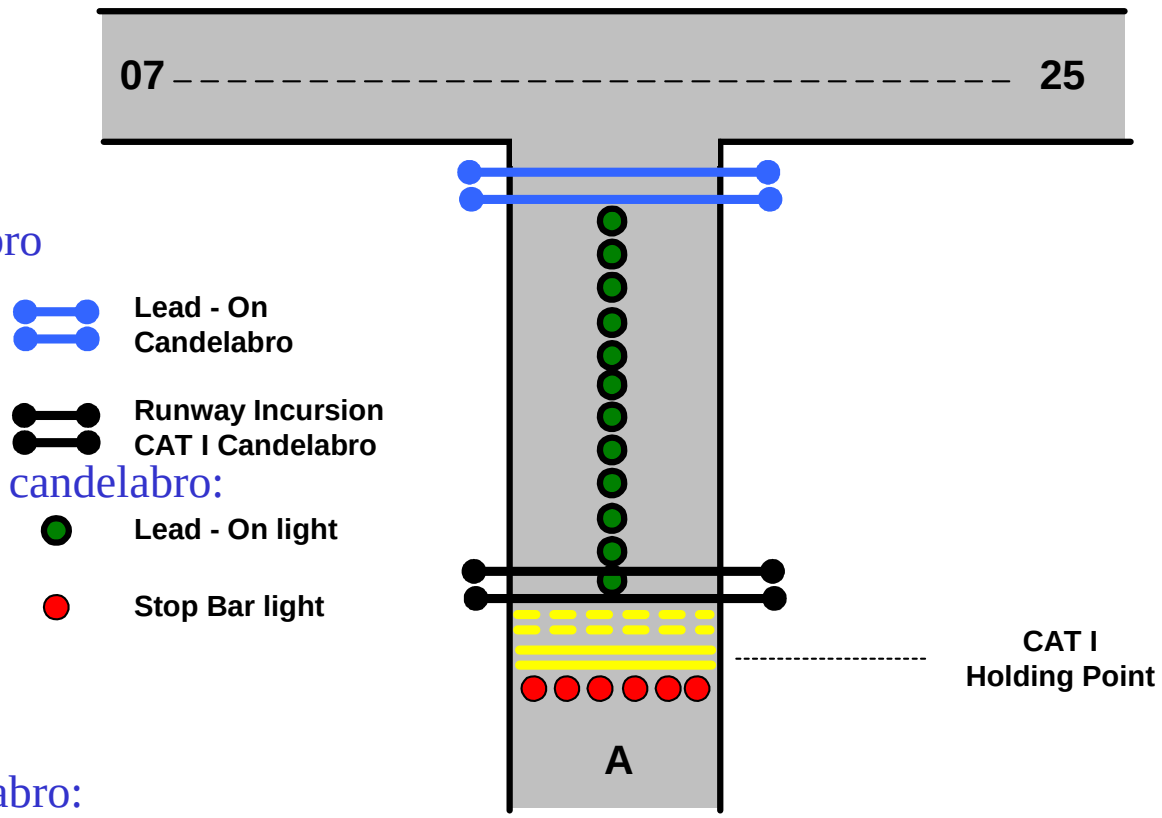


CAT I and CAT II/III

RSAMS integration with stop bar system (II)

The Stop Bar system is in charge of switching on and off the stop bars and lead on lights, according to the information sent by “candelabri”

- No target is allowed to enter the runway:
  1. Armed Runway Incursion candelabro
  2. Switched on Stop bar
  3. Switched off Lead-On
- Target authorized:
  1. Disarmed Runway Incursion candelabro
  2. Switched off Stop bar
  3. Switched on Lead-On
- Detection of the target by Runway Incursion candelabro:
  1. Armed Runway Incursion candelabro
  2. Switched on Stop bar
  3. Still switched on Lead-On
- Target presence detected by Lead-on candelabro:
  1. Armed Runway Incursion candelabro
  2. Switched on Stop bar
  3. Switched off Lead-On



RSAMS integration with stop bar system(III)

Field

TWR Field Communication

Data Processing

Display