

Vaisala Precision Lightning Warning System (PLWS)

Hillsborough County Aviation Authority acted on behalf of the Tampa Airport Managers Association (TAMA) to contract with Global Atmospheric (now having been acquired and known as **Vaisala, Inc.**) for installation of the Precision Lightning Warning System (PLWS) in June, 1996 for a sum of \$176,537.37. We have recurring monthly payments to Vaisala for the full maintenance responsibility of the installed equipment for \$2,045.10 and satellite operational data services for \$332.92. The attached handout diagrams the components which make up this system with Remote Alarm Display Systems (RADS) installed typically in the Operations Offices of the participating airlines. The system operates from three sources of data: national satellite lightning strike data and two electronic field mill sensors, which measure voltage potential. The advantage of the Vaisala system is the ability to predict when a lightning strike may occur, with multiple sensor sources, vice others, which only alarm after the fact.

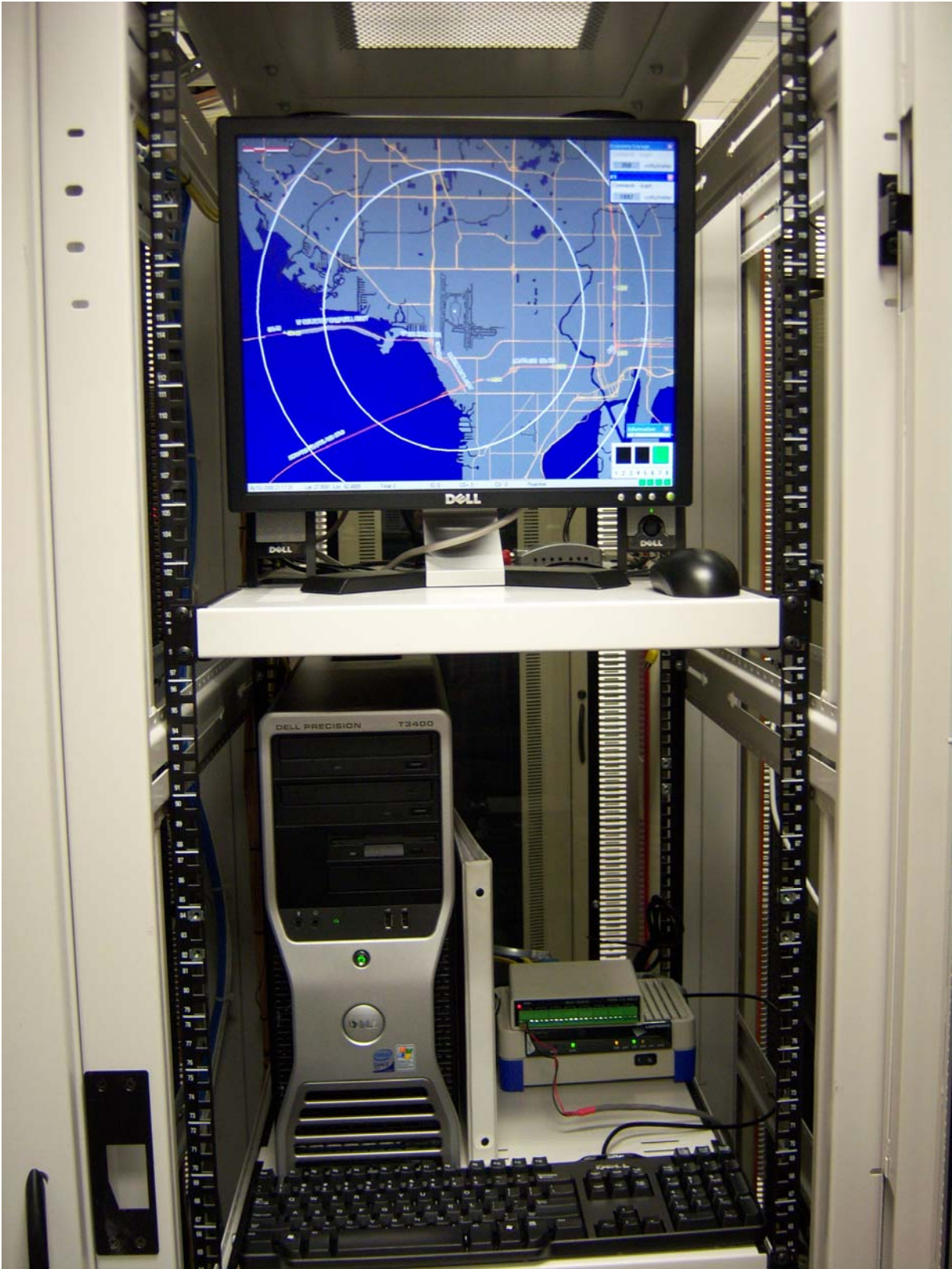
The TAMA group later requested additional equipment be installed to assist in notifying their personnel of imminent lightning danger when their Operations or Maintenance offices were not actively manned. In June, 2002, the Authority contracted with Vaisala and ARINC, their technical marketing contractor, for \$82,940 to install Remote Enunciators (RE) consisting of audible horns and beacons typically located on the ramp exteriors of the Airsides. The operation of these RE units is also described on the attached handout. The design and manufacture of the RE units was subcontracted to **PI Engineering**.

Upon completion of the Consolidated ARFF (Airport Fire Station), the RE units were relocated from the former East and West ARFF buildings to new locations on the roofs of the Police Canine Facility on the north side of the airport and the Economy Garage Admin Building on the south side of the airport. These sites were chosen for their strategic system locations and their access to the Authority's local area network (LAN) to support the transition from radio modem transmission of the EFM signals to LAN-based transmission.

On April 15, 2008 the PLWS system was upgraded to Vaisala's latest-generation TWX300 for \$21,275. This new system provides several enhancements over the previous PLWS:

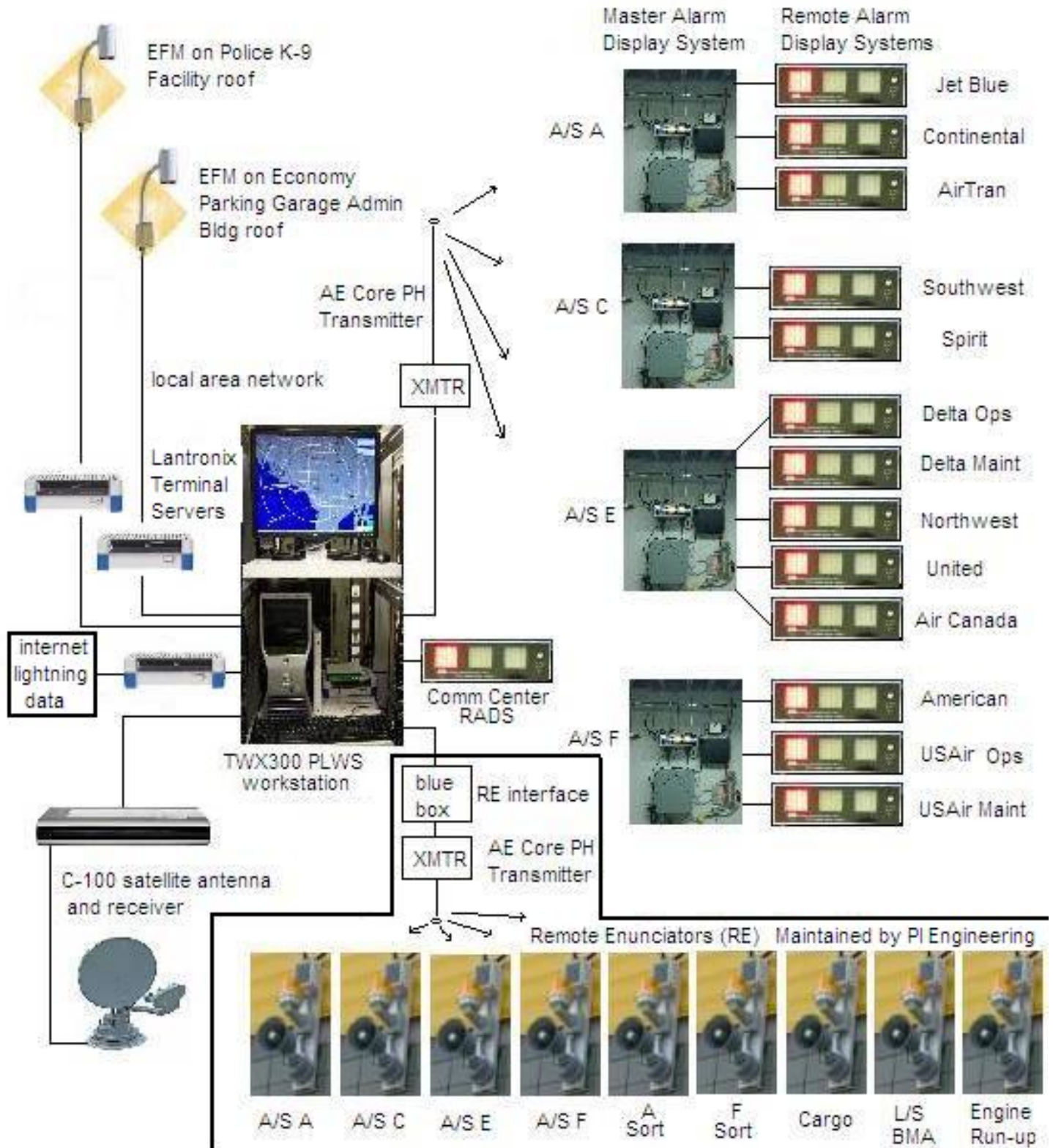
- Lightning strike data is now received primarily by Internet with the former satellite receiver as backup. This is a significant improvement, as the satellite data was sometimes degraded or temporarily lost in severe weather when it was most needed.
- The two Electronic Field Mills (EFM) now transmit their voltage potential data to the computer located in the Communications Center via Local Area Network (LAN) cabling vice the former radio modems. This again provides a more reliable means to receive this data.
- The TWX300 is a windows-based program vice the DOS program of the old PLWS.
- The TWX300 can provide direct graphical printouts of strike data and locations for a desired timeframe. In the past, these reports had to be requested from Vaisala.

PLWS Computer located in the Communications Center Equipment Rack

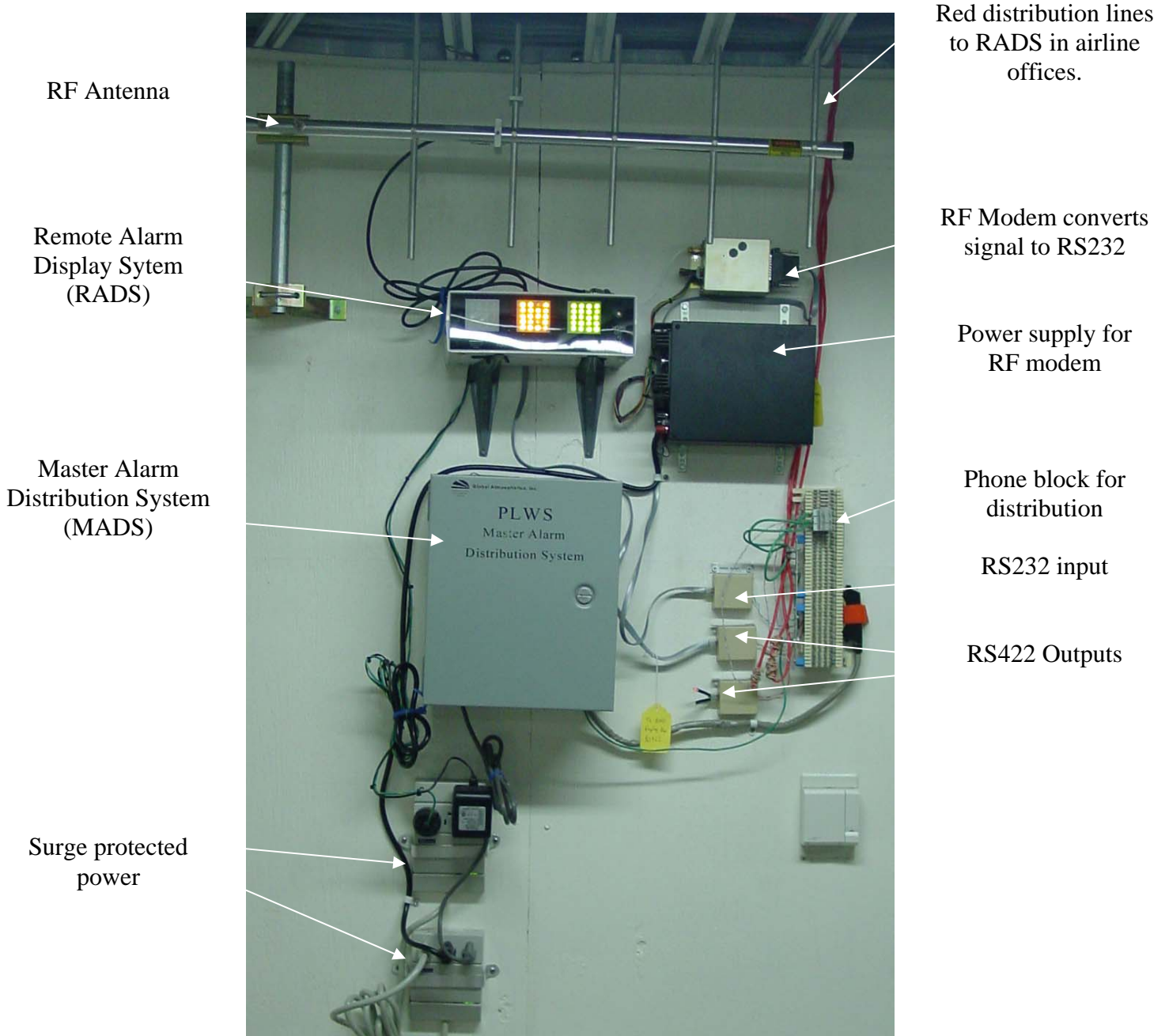


Precision Lightning Warning System (PLWS) Diagram

The TWX300 PLWS compares data from three sources: electronic field mill sensors measuring electrical potential at the Police K-9 Facility, Economy Garage Admin Bldg and lightning data feed service from Vaisala via the internet with satellite backup.







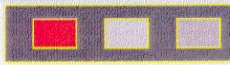


Precision Lightning Warning System (PLWS)
 Master Alarm Distribution System (MADS)
 Installation at Airside "E" (typical)



Sequence of operation: Equipment is mounted on bulkhead of Main Comm. Room. RF antenna receives the PLWS signal from the CY Core penthouse transmitter. Signal is converted by RF Modem to RS232 input to phone block and Master Alarm Distribution System (MADS). Data is processed and sent to RADS in various airline spaces via CAT5 cabling.

A red RADS condition is generated when a lightning flash has occurred within 3.1 miles or when a lightning flash has occurred within 4.8 miles and the two field mill alarm thresholds are met. After a 5-minute delay, the system will improve to the lesser appropriate threat level. For example, if the two field mills still are above the threshold, but there has been no lightning activity within 18 miles for 5 minutes, the system would improve to yellow. However, if the two field mills still are above the threshold and there has been lightning activity greater than 4.8 miles away, but less than 18 miles, the system will improve only to red and yellow.

**PLWS REMOTE ALARM DISPLAY SYSTEM OPERATING PROFILE
TAMPA INTERNATIONAL AIRPORT**

RADS LIGHT CONDITION	CAUSES OF LIGHT CONDITIONS	ANTICIPATED EFFECTS
 GREEN	Field Mill readings do not exceed alarm thresholds. No cloud-to-ground lightning has been detected within 18 miles.	No activity is indicated.
 GREEN & YELLOW	One EFM has reached an alarm threshold, or Lightning has occurred within 18 miles.	Conditions favor development of thunderstorms, or One or more storms are nearby and are either active or undergoing development.
 YELLOW	Two field mills have reached alarm threshold, or Lightning flash within 18 miles and one field mill has attained threshold, or Lightning flash within 4.8 miles.	Activity is close to the field.
 RED & YELLOW	Two field mills have reached alarm threshold, and lightning has occurred within 18 miles of the field, or Lightning flash within 4.8 miles and one field mill has reached alarm threshold.	Activity is close enough that a red light can be anticipated, or If red status was previously displayed, then the storm is beginning to display less influence on the local area.
 RED	Lightning flash has occurred within 3.1 miles, or Lightning flash has occurred within 4.8 miles of the airport and two field mills have reached alarm threshold.	Lightning detected in the local area.
THE FOLLOWING INDICATE SYSTEM TROUBLE		
 LIGHT(S) FLASHING	RADS has failed to receive a message from the PLWS Alarm System during the last 30 seconds. Failure may be due to loss of power, phone line, radio modem system, PLWS workstation	Disregard system status messages until lights stabilize. Perform RADS Troubleshooting Guide Actions if return to normal function does not occur within one minute.
 RED & GREEN	System is re-synching after initiating a reset command, or The entire system has been reset by the PLWS workstation.	Disregard system until normal light sequence returns. Perform RADS Troubleshooting Guide actions if return to normal function does not occur within one minute.

PLWS Remote Enunciators

In addition to the PLWS RADS in participating airline spaces, ramp-mounted Remote Enunciators (RE) provide flashing beacon and horn alarms at Air Cargo, Airsides A, C, E, F, A Bag Sort, F Bag Sort and the Landside Terminal Bag Makeup Area.



Exterior Remote Enunciator unit

Each RE unit has a receiver box with antenna, horn, and beacon. When a “red” RADS danger condition exists, the yellow RE beacon will begin flashing and the horn will emit 5 to 6 blasts. The yellow beacon will continue to flash as long as the “red” RADS danger condition exists. When the danger has passed, the PLWS system will improve to any lesser indicated threat level, after a 5-minute delay. The beacon will then stop flashing and a 14-second siren will sound the “all clear”. If alarm parameters are again reached, the system will alarm again.

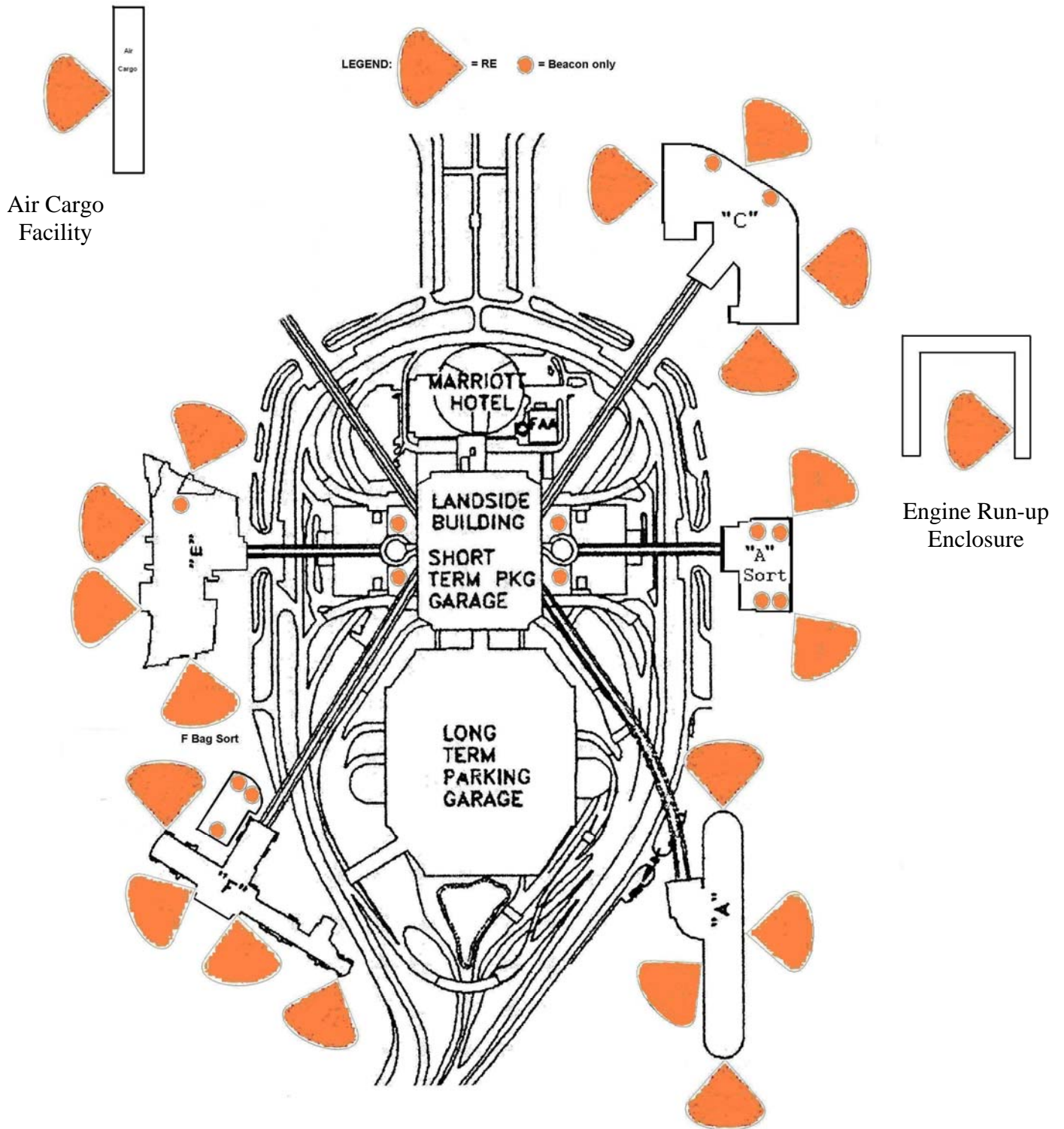


Interior Bag Makeup Area RE

The Bag Makeup and Sort Areas for Airsides A, C, E and F have yellow beacons installed above the tug exists, but no horns. The yellow beacon flashes the same as the RE unit at the Airsides.

Conveyor construction in the Landside Terminal Bag Makeup Area has degraded the signal activating these units and will be inoperable until completion of work in progress to modify the system from a RF radio signal to cable.

Remote Enunciator (RE) and External Beacon installations



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More information about the TWX300 PLWS can be found at <http://www.vaisala.com> and also at www.lightningstorm.com.