



**Federal Aviation
Administration**

Final Approach Runway Occupancy Signal (FAROS) Operational Evaluation

By: Jaime Figueroa, ATO-P

Date: January 26, 2006



Background

- **NTSB safety recommendation A-00-66:**
 - “Require, at all airports with scheduled passenger service, a ground movement safety systemprovide a direct warning capability to flight crews.”
- **2002 – 2004 FAA Runway Safety Blueprint**
 - “...develop and evaluate a visual signal that provides direct warning to flight crews on final approach when the runway is occupied;”
- **FY2006 ATO Operations Planning Business Plan**
 - “Continue development of surface technologies and operational solutions.....”

FAROS Overview

- **Direct notification to pilots on approach that a runway is occupied – Advisory only.**
 - Potentially unsafe to land
 - Pilot should increase vigilance
- **Suggested by the Air Safety Foundation**
- **Advantages**
 - Direct and immediate notification to pilot
 - Existing controller procedures unchanged
 - No aircraft equipage required



FAROS Overview (cont'd)

- **Proof of concept demo at LGB: September 2002**
- **MITRE/CAASD Simulation Study: November 2003**
- **Long Beach comm workload analysis: July 2004**
- **Shadow Operations tests: October 2005**
- **Operational evaluation at LGB: March 2006**



Operational Evaluation Objectives

- **Evaluate the FAROS concept at LGB in an operational environment**
 - Objective data collection with instrumentation
 - Subjective data collection with surveys
 - Evaluate system technical performance

FAROS Concept of Operation

- **FAROS monitors zones to determine if an aircraft or ground vehicle is on the runway**
- **At LGB**
 - Three zones on Runway 30 were defined - considered to be the most likely locations for a runway incursion
 - Flashing PAPI signaling method
- **Baseline**
 - PAPI flashes when a zone is occupied
- **Enhanced**
 - PAPI flashes if a zone is occupied and an aircraft is on approach within a specified time to touchdown
 - Concept still being developed



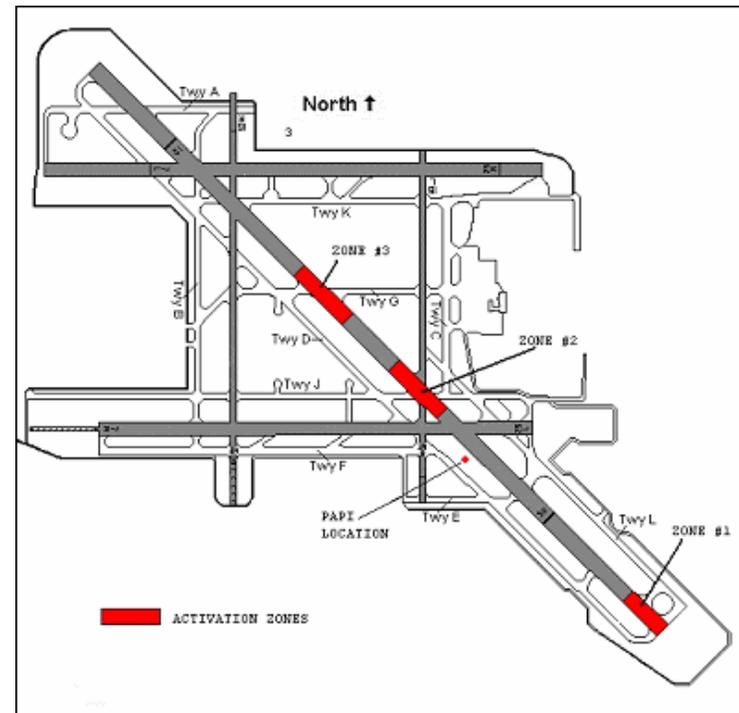
Monitored Zones

- **FAROS monitors three zones on Runway 30 to determine occupancy**

Zone 1: Standard RWY 30 full-length departure position

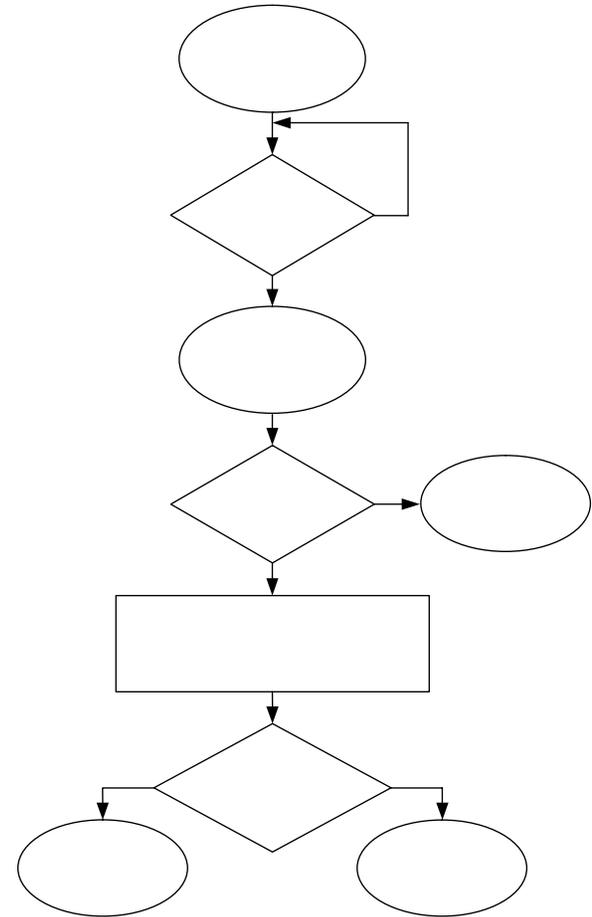
Zone 2: Common intersection departure position at RWY 30 and TWY J

Zone 3: Intersection of RWW 30 and TWY G



Procedures

- **Controller procedures are unchanged**
- **Pilots, observing Flashing PAPI at or below 500' AGL, are to contact the tower to resolve any potential conflict**
- **Pilot responsibility for land/go-around decision unchanged**
- **Lack of Flashing PAPI does not indicate a clear runway**



OpEval Phase 1 – Shadow Ops / Flight Check

- **System verification**
- **FAROS equipment operating in normal mode**
- **Flashing function inoperative - pilots will not see the PAPI flash**
- **Controllers not affected**
- **Data gathering and system monitoring**
- **Evaluation of system technical performance**
- **Flight check under controlled conditions**

OpEval Phases 2 & 3 – Baseline/eFAROS

- **Pilots exposed to the Flashing PAPI**
- **Pilots and controllers to coordinate in resolving any potential conflicts**
- **Amount of pilot/controller communications about the Flashing PAPI is an evaluation item**
- **Pilots requested to complete surveys to gather their evaluation of the system**
- **Anyone encouraged to complete survey**

Pilot Familiarization

- **Direct contact**
 - Airlines and air carriers
 - FSDOs and FBOs
 - Brochures mailed to area pilots
 - Brochures and posters at surrounding airports
 - Approach plate binder data sheet
 - Presentations at local pilot meetings

- **General coverage**
 - FAA Public Affairs
 - FAA web sites
 - Magazine articles