

**Runway Incursion
Joint Safety Implementation Team**

**Implementation Plan
For
Ground Vehicle Upgrade and Installation**

Executive Summary

DRAFT

Statement of Work

The purpose of this project is to reduce runway incursion incidents by improving ground vehicle operator situational awareness using airport moving map technology.

Federal Aviation Administration (FAA) data shows that runway incursion incidents are increasing. Runway incursion incidents are often thought of as aircraft-to-aircraft in nature, but to fully address runway incursion concerns, incursions between aircraft and ground-based vehicle traffic must also be considered. In a June 2001 report on Runway Safety, the FAA cited that 20 percent of all runway incursions reported in 2000 were attributable to vehicle or pedestrian deviations, and that the actual number of such incidents increased nearly 30% over the previous year. The runway incursion Joint Safety Analysis Team (JSAT) has determined that moving map technology is highly effective (the four moving map interventions rated in the top ten out of 146 interventions) for reducing the threat of accidents caused by runway incursions. National Aeronautics and Space Administration (NASA) and the National Transportation Safety Board (NTSB) also support the addition of this technology for the purpose of runway incursion prevention, and numerous avionics manufactures are striving to develop near-term certifiable moving map products. The FAA Safe Flight 21 Program estimated that by displaying proximate ground traffic on a moving map display, a significant number of runway incursion incidents could be eliminated [enabled by Automatic, Dependant Surveillance Broadcast (ADS-B) and Traffic Information Service Broadcast (TIS-B) technologies]. Finally, the addition of runway occupancy advisory systems and data-linked, graphical taxi clearance/limit systems will further reduce the possibility for runway incursion incidents and accidents.

Airport operator implementation of moving map technology is voluntary. Ground vehicle equipage alone will not prevent runway incursion incidents and accidents, however when considered along with cockpit moving map technology, the full picture of airport operations can be presented to all operators. Several methods of implementation are envisioned in a stepwise fashion to achieve safety and productivity enhancements from moving map technology. FAA will coordinate with airport operators, Association of American Airport Executives (AAAE) and Airports Council International (ACI) to determine which vehicles types are equipped and with what level of equipage. Two general methods for implementing moving map technology (airport maps) into vehicles are as follows:

1. Temporary installation

A portable, low-cost electronic device (e.g., laptop, palm pilot,) that has surface moving map, vehicle own-ship position (via GPS), ground traffic (via ADS-B/TIS-B), and potentially, a runway occupancy alerting system. Data-linked graphical and textual taxi clearance functionality may or may not be necessary. Antenna can be portable, magnetic-attached to the roof. Electrical power that is available from cigarette lighter receptacle/battery backup. This type of installation could be applicable to vehicles accessing the airport on a temporary basis.

2. Permanent installation

- a. Stand-alone panel mounted display.
- b. Laptop with docking station.

This installation would have a surface map with vehicle position (via GPS), ground traffic (via ADS-B/TIS-B), a runway occupancy alerting system, and graphical and textual taxi clearance functionality. This installation could be applicable to fire/rescue, airport operations vehicles, and airport security vehicles.

1/22/02

End state incorporation of the varied levels of technology into vehicles that operate at airports will be determined by the need to meet industry safety standards and the purpose of the vehicle on the airport.

The project requirements developed from the intervention strategies outlined in the Runway Incursion JSAT are as follows:

- Promote ground vehicle installation of airport surface moving map displays that depict the airport surface with vehicle own-ship GPS position, cleared taxi routes, and taxi clearance limits to specified vehicle operators on the airport. Apply data link technology to allow cockpit display to show ATC cleared routes and clearance limits. Systems should be developed for different type of equipage schemes outlined above.
- Promote installation of graphic displays with traffic information and runway occupancy advisory systems to specified vehicle operators. Systems must be developed for each different type of equipage scheme. ADS-B and TIS-B are the enabling technologies for traffic information.

The project requirements for the moving map implementation are organized in four phases. The phases in each safety enhancement are listed in a “best estimate” chronological order, however, do to varying levels of technology readiness, the phases may actually occur in a different order. Phase 1 will address development and installation of vehicle moving map (airport) displays with vehicle own-ship position, enabled by GPS. Phase 2 will add display functionality for data-linked traffic, ground and air, utilizing ADS-B and TIS-B. Phase 3 will add functionality for runway occupancy advisory systems. Phase 4 will add functionality for data-linked taxi routes and clearance limits.

Lead Organization for Overall Project Coordination (LOOPC):

ARP

Safety Enhancement 1: Vehicle Moving Map Display Installations (SE-62)

The development and installation of airport surface moving map displays in ground vehicles will improve aviation safety by reducing runway incursions through enhanced vehicle situational awareness, traffic awareness, runway occupancy alerting and graphical taxi clearances.

Accident Prevention Index:

Resource Requirements:

- Output 1 GPS capability—Available
 Display plus Link Data Display Processor (LDPU)--Available
 Cost—hardware+installation—est. \$1K to \$6K/vehicle
 FAA—1/2 FTE
 Industry and Associations—1/2 FTE
- Outputs 2-4
 FAA cost—est-1/2 FTE
 Industry—est-1/2 FTE

Completion Date: FY 2002-FY 2007

Phase 1

Output 1:

- On specified ground vehicles the FAA will encourage airport operators of Part 139 airports to install systems that have an airport surface moving map display with own position (provided by GPS). FAA will encourage Part 139 airport operators to direct equipage in ground vehicles that transit airport movement areas.

Resources: AAS (LOOC), AND, RTCA, Manufacturers, Operators, AAAE, ACI.

Timeline:

- Equipment—Available FY 2001
- Ground vehicle equipage plan— FY 2002

Actions:

- Manufacturers should provide low cost portable systems and higher cost permanently installed systems. The systems should be easy, low cost upgradeable to add follow-on functionality.
- FAA will coordinate with airport operators, Association of American Airport Executives (AAAE) and Airports Council International (ACI) to determine which vehicles types are equipped and with what level of equipage.

1/22/02

Phase 2

Output 2:

- FAA will encourage Part 139 airport operators to upgrade ground vehicle moving map displays to **add air/ground traffic functionality**. ADS-B and TIS-B are the enabling technologies.

Resources: AAS (LOOC), AND, RTCA, Manufacturers, Operators, AAAE, ACI.

Timeline: FY 2002-FY 2007

Phase 3

Output 3:

- FAA will encourage Part 139 airport operators to upgrade ground vehicle moving map displays to **add runway occupancy advisory systems to ground vehicle surface map displays**.

Resources: AAS (LOOC), AND, RTCA, Manufacturers, Operators, AAAE, ACI.

Timeline: FY 2005-FY 2008

Phase 4

Output 4:

- FAA will encourage Part 139 airport operators to upgrade ground vehicle moving map displays to **add data linked taxi clearance and clearance limit functionality to ground vehicle moving map displays**.

Resources: AAS (LOOC), AND, RTCA, Manufacturers, Operators, AAAE, ACI.

Timeline: FY 2007-FY 2010

Relationship to Current Aviation Initiatives

- Creation of Runway Safety Program Office within the FAA
- Regional Runway Safety Program Managers added to FAA Regional Offices
- Runway Safety Program Office in conjunction with Runway Incursion JSIT created Top Ten Initiatives For Reducing Runway Incursions
- Joint Industry/Government Runway Incursion Summits
- FAA published guidance material (AC, HBAT, PTS, etc.)
- Runway Incursion Actions Teams (RIAT)
- Linking of Runway Safety Program Initiatives to Runway Incursion Joint Safety Implementation Team Initiatives
- Safeflight 21 Runway Surface Roadmap
- NAS Operational Evolution Plan (OEP)
- Free Flight Phase I and II activities
- RTCA activities
- NASA Aviation Safety Programs, Runway Incursion Prevention Systems (RIPS)

Performance Goals and Indicators

- Goal: Reduction of runway incursions where a vehicle operator deviation was the causal factor.
Indicator: Reduction in the number and rate of runway incursions resulting from vehicle operator deviations as measured by the FAA Runway Safety Program office by 2007.
- Goal: All vehicles operated on Part 139 airports equipped with moving map display systems.
Indicator: Vehicle equipage will meet or exceed equipage rate established by FAA and airport operators and associations.

Programmatic Approach

Organizational Strategy

The Runway Incursion JSIT identified Jim Walton, UPS Airline, as the JSIT project lead for Runway Incursion Aircraft Equipment/Vehicle Upgrade/Installation subgroup. The project lead will coordinate implementation activities outlined

in the Implementation Plan and will provide progress reports to the Runway Incursion JSIT until receipt of CAST G Level approval. Implementation is viewed as a shared responsibility between the FAA and specific airport authorities. The FAA offices of primary responsibilities (OPR) for this plan are ARP, AAS and AND. The primary responsibility for industry is shared between regional airport authorities and airport associations.

Implementation Activities

Major activities include the establishment of standards and requirements for moving map display systems, the standards and infrastructure for the survey of airports and dissemination of airport databases. These activities will provide moving map systems in vehicles that will reduce runway incursions by improving airport surface and airport traffic situational awareness.

Key Products and Milestones

Safeflight 21 Runway Surface Roadmap	3 months
NAS Operational Evolution Plan (OEP)	In progress
FAA Runway Safety Program office campaign to encourage equipage and periodic publication of status of industry moving map equipage	36 months
Display and ADS-B Standards	
ADS-B MASPS	Complete
1090 Link MOPS	Complete
1090 Rev A Link MOPS	In Progress
UAT Link MOPS	In Progress
TIS-B MASPS	18 months
TIS-B MOPS	18 months
CDTI MOPS	12 months
Ongoing Moving Map Development	
SF 21 TESIS-Contract awarded to 4 Vendors	Complete
Contract Due Date	9 months
FAA assistance to manufacturers for Moving Map development	
Safeflight 21 Coordination with vendors and FAA Standards/Certification	In Progress
FAA (AAS) will develop appropriate installation, maintenance, operational procedures and training guidance for use in vehicles:	
FAA (ATA) will provide NOAA/NGS with prioritized survey schedule	
Initial 75 airport surveys contracted by SF 21	October 2002
Prioritization for remaining Part 139 airport surveys	12 months
NOAA/NGS will acquire/provide airport survey data for all Part 139 airports that meets the requirements of RTCA SC-193 Airports document.	In Progress
National Aeronautics Charting Organization (NACO), AVN, will apply attributes to NOAA/NGS survey data and made available to the industry in appropriate formats.	In Progress
FAA infrastructure must be established to prioritize, collect, revise, and distribute airport data for all Part 139 airports.	24 months

Risk Description

- Added cost of moving map system procurement and installation.
- Added training cost for vehicle operators.
- Resistance to voluntary compliance by some airport operators.

Risk Mitigation Plan

- Communication to airport operators of the safety and potential security benefits associated with voluntary equipage of moving map display technologies.
- Cooperation between FAA and industry organizations would preclude entering into the rule making process.

Impact on International Applications

- Opportunity to set the standard for improved situational awareness through the use of airport moving map technologies. Opportunity for an exchange of information between FAA and ICAO/JAA to educate, train, and increase the awareness of most international operators through use of moving map technologies. ICAO and JAA are represented on CAST. Both have adopted Runway Incursion prevention procedures and have similar programs.