# Low-Visibility Operations/Surface Movement Guidance and Control System Chart Research

*August 1, 2013*

**This research is funded by the FAA Human Factors Division in support of the Office of Flight Standards.**

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**Research and Innovative Technology Administration**
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# Background

## Objective

- Provide data to support FAA efforts to develop recommendations and best practices for Low-Visibility Operations/Surface Movement Guidance and Control System (LVO/SMGCS) charts

## Impact

- FAA will provide results to the International Civil Aviation Organization (ICAO) LVO/SMGCS working group
- FAA will use results in developing regulatory and guidance material
- Supports NextGen Operational Improvements (OIs):
  - Low Visibility Surface Operations (107202)
  - Provide Surface Situation to Pilots, Service Providers and Vehicle Operators for Near-Zero-Visibility (102409)

# Research Team

## Project Technical Sponsor

- Bruce McGray & Terry King, Flight Standards Service Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410)

## Project Manager

- Michelle Yeh, FAA Human Factors Division (ANG-C1)

## Volpe Staff

- Stephanie Chase (project manager)
- Andrea Sparko (task manager)
- Katarina Morowsky
- Young Jin Jo

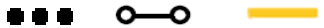
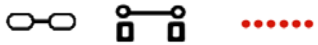
# Project Overview

- **Purpose:** Provide data to support development of best practices for LVO/SMGCS chart layout and symbology

- **Previous Research: LVO/SMGCS Chart Usability**
  - Purpose: Provide data on general usability of LVO/SMGCS charts
  - Technical Approach: Simulator studies
  - Coordination with NASA Langley Research Center

- **Current Research: LVO/SMGCS Chart Symbology**
  - Purpose: Provide data on the intuitiveness and usefulness of LVO/SMGCS chart symbology
  - Technical Approach: Online questionnaire

# Chart Symbology

| Information Type | Symbols in Use |
|---|---|
| Clearance Bar |  |
| Geographic Position Marker (GPM) |   |
| Instrument Landing System (ILS) Hold Line |  |
| Non-Movement Area |  |
| Runway Guard Light (RGL) |  |
| Stop Bar |  |
| Combination RGL and Stop Bar |  |

# Current Research: Chart Symbology

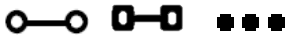
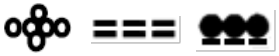
## Technical Approach: Online Questionnaire

- Task 1: Intuitiveness of symbol shapes
- Task 2: Usefulness of information types depicted on LVO/SMGCS charts

## Participants

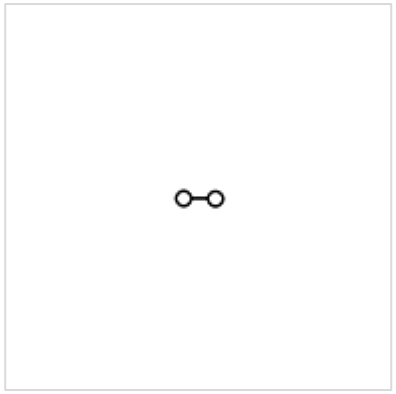
- CAT-III qualified pilot volunteers
  - ATP
  - International
  - Military
- Recruited via fliers distributed with help of FAA Project Technical Sponsor team (Bruce McGray & Philip Saenger)
- 150 pilot volunteers (as of July 15) with more anticipated
- 50 pilots will receive $50 gift card, picked via random drawing

# Task 1: Symbol Intuitiveness Overview (1/2)

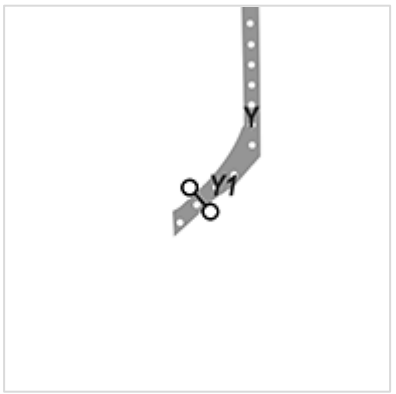
| Information Type | Symbols within Information Type | Similar Symbols from other Information Types | Foil Symbols |
|---|---|---|---|
| Clearance Bar |  |  |  |
| Geographic Position Marker (GPM) |  | |  |
| ILS Hold Line |  |  |  |
| Non-Movement Area |  |  |  |
| Runway Guard Lights (RGL) |  |  |  |
| Stop Bar |  |  |  |
| Combination RGL & Stop Bar |  |  | |

# Task 1: Symbol Intuitiveness Overview (2/2)

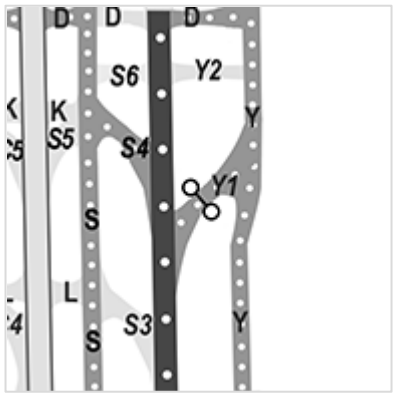
Is ⊶ a stop bar?



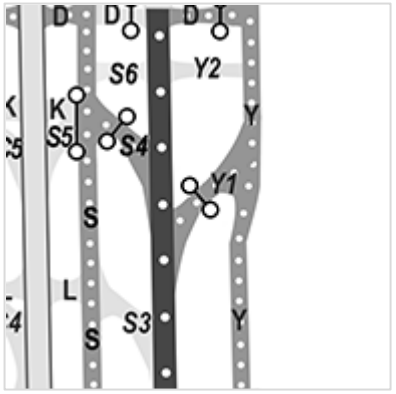
Level 1




Level 2



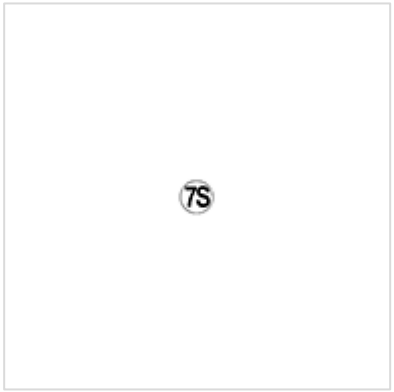

Level 3




Level 4

# Task 1: Symbol Intuitiveness Level 1

Is  a geographic position marker (GPM)?

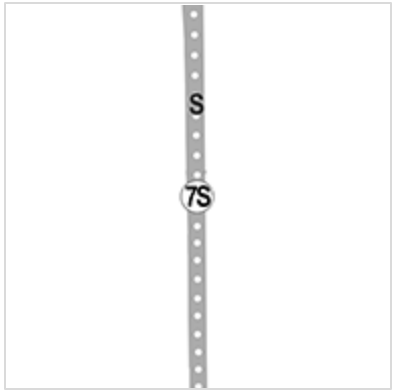


Yes

No

# Task 1: Symbol Intuitiveness Level 2

Is 7S a geographic position marker (GPM)?

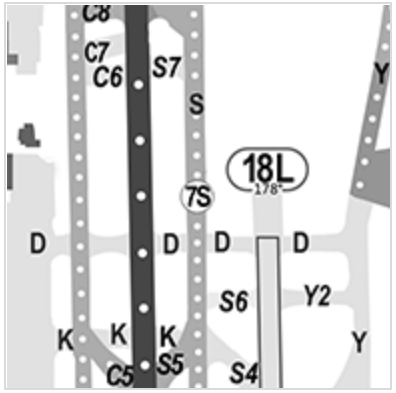



Yes

No

# Task 1: Symbol Intuitiveness Level 3

Is 7S a geographic position marker (GPM)?

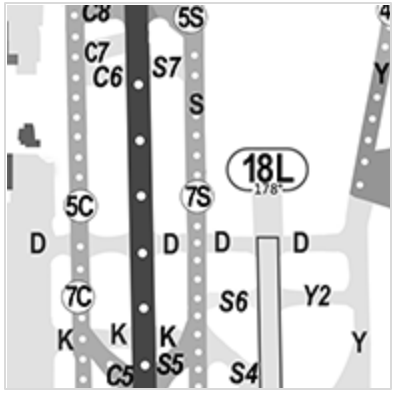



Yes

No

# Task 1: Symbol Intuitiveness Level 4

Is 7S a geographic position marker (GPM)?




Yes

No

# Task 2: Usefulness of Information Types Overview

- Pilot is shown a table of 9 selected information types with definitions
  - 7 information types from Task 1, and
  - 2 additional information types: approach hold and apron holding point

- Pilots are asked to rate the usefulness of each information type

# Task 2: Usefulness of Information Types Example

**Rate the usefulness of the following information on LVO/SMGCS charts.**

| | Very Useful | Somewhat Useful | Not Very Useful |
|---|---|---|---|
| **Geographic Position Marker (GPM):** Pavement marking used to verify aircraft position. | ○ | ○ | ○ |
| **Clearance bar:** Lights at the holding position of a taxiway/taxiway intersection. | ○ | ○ | ○ |

# Project Status

- Pilot recruitment ..... Ongoing (150 pilot volunteers as of 7/15/13)
- Data collection ..... In progress (ends Aug. 30, 2013)
- Preliminary draft report ..... Sept. 15, 2013
- Revised draft report ..... Oct. 31, 2013