Session XI. Regulation, Certification and System Standards

Results of In-service Evaluation of Wind Shear Systems

Todd Murr, Northwest Airlines

RESULTS OF IN-SERVICE EVALUATION OF WINDSHEAR SYSTEMS

Todd E. Murr
Northwest Airlines

Fourth Combined Manufacturers' and Technologists'
Airborne Windshear Review Meeting
Williamsburg, VA

April 14-16, 1992

INTRODUCTION

- Objective of the evaluation
- Preliminary results
- Conclusions

OBJECTIVE

Collect data in the operational environment to determine the capability of windshear systems and their effectiveness.

COMPONENTS OF THE OBJECTIVE

- Collect operational data
- Determine system capability
- Evaluate system effectiveness

DATA COLLECTION

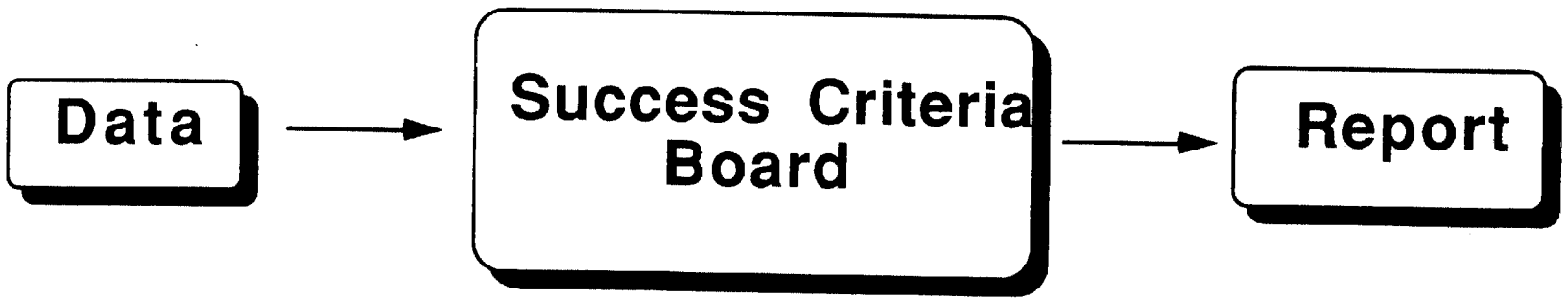
- Aircraft state parameters
- System parameters
- Weather Information
- All phases of flight
- Collection focused on windshears

SYSTEM CAPABILITY

- Will NOT intentionally fly into a windshear
- Work with NASA and FAA to determine system capability criteria
- Must rely on outside sources for "proof of concept"

SYSTEM EFFECTIVENESS

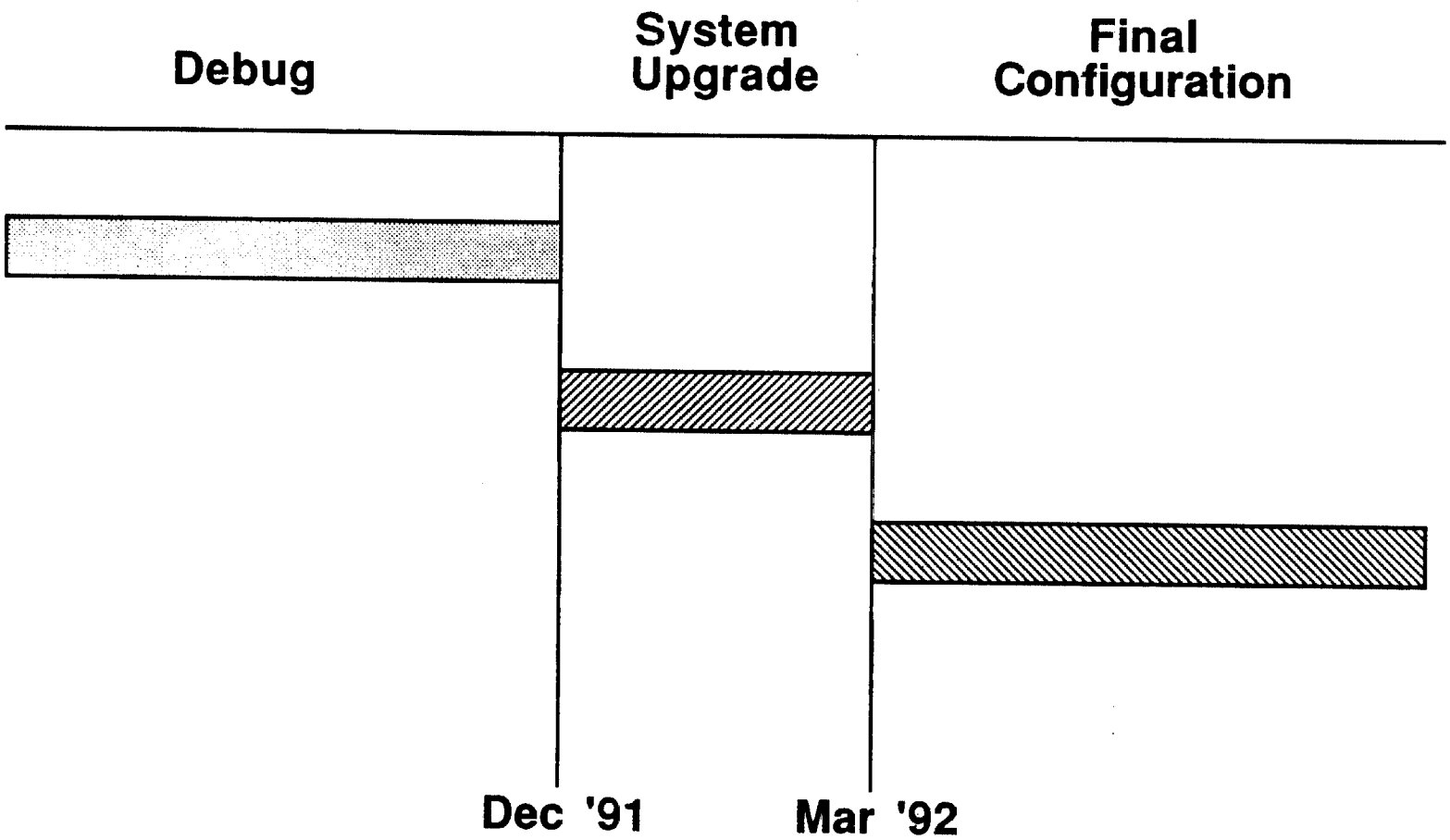
- "ready for service"
- Data reviewed and published on a monthly basis



PROGRAM DESCRIPTION

- Two windshear systems
  - TPS AWAS III (Predictive)
  - Honeywell WSC (Reactive)
- Installed on three DC-9-30
- Data collected on revenue flights

PROGRAM TIMELINE



RESULTS OF DEBUG

- Defined "Normal" operations
- Interfacing with analog aircraft
  - Power supply
  - Sensor signals
- Better understanding how the systems operate

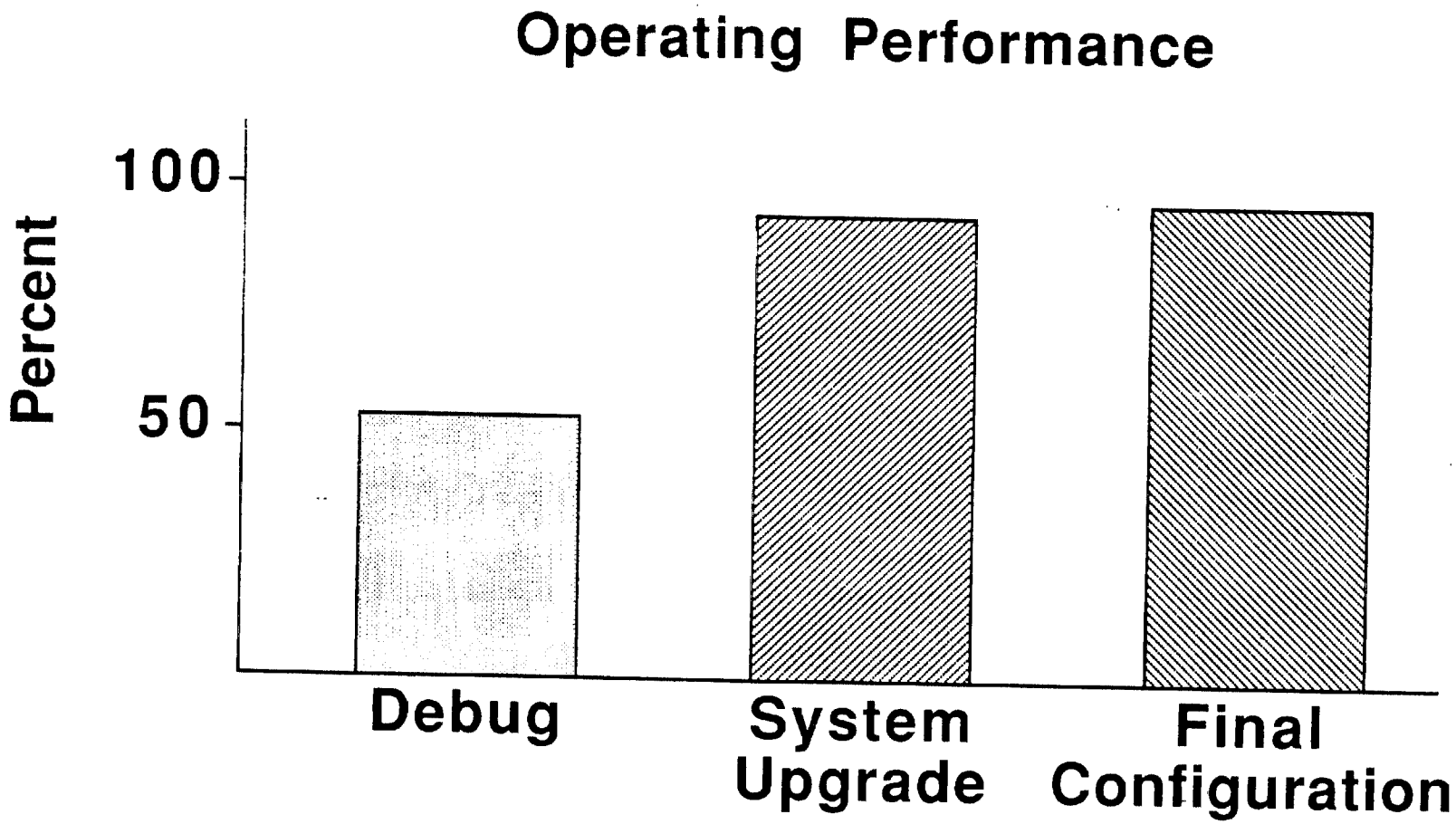
RESULTS OF SYSTEM UPGRADE

- Both systems operated at least 95% of the time
- AWAS III required a software upgrade
- Most aircraft induced nuisances and failures were eliminated

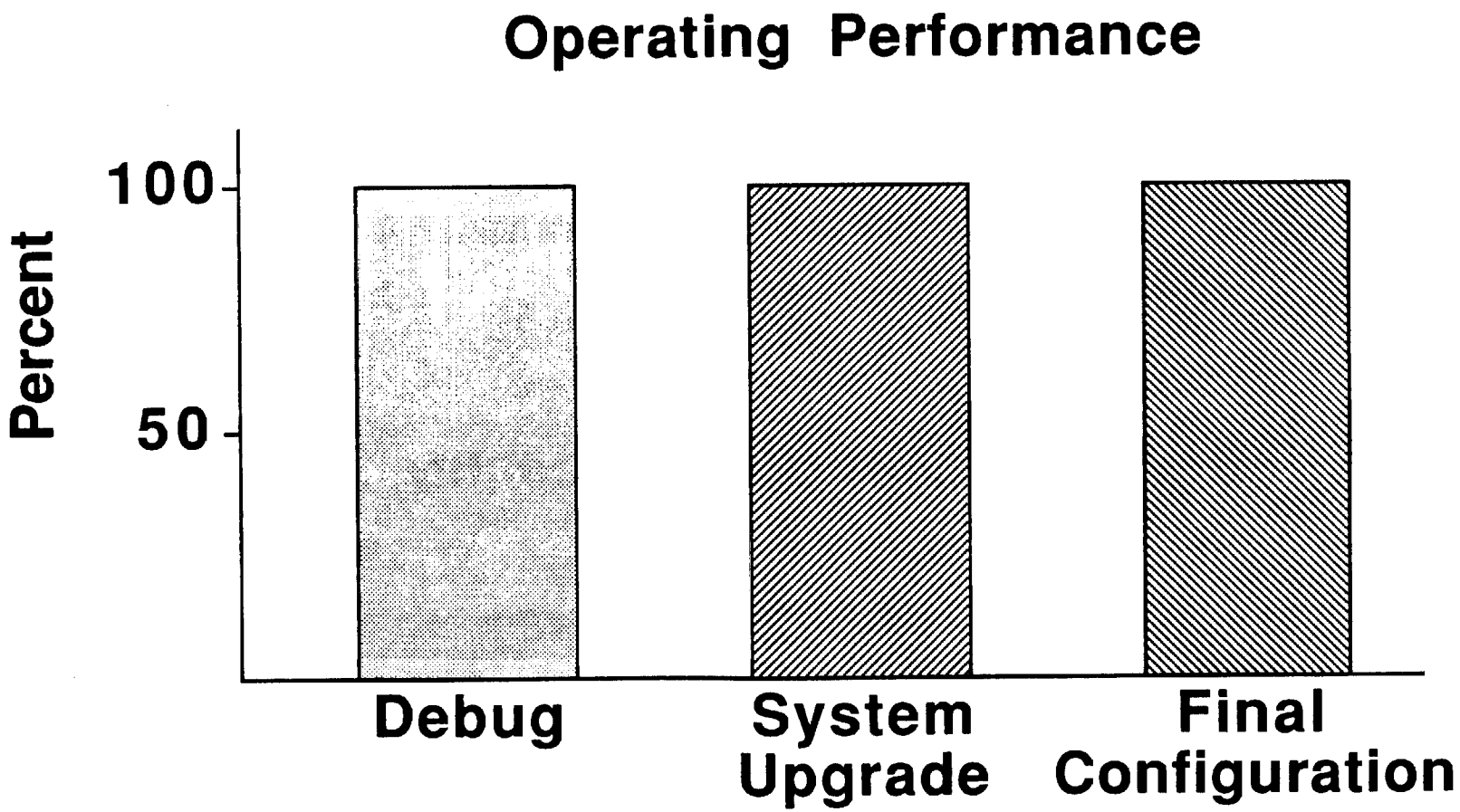
RESULTS OF FINAL CONFIGURATION

- Evaluation started in March
- Completion in June '92
- Both Systems Operating favorable

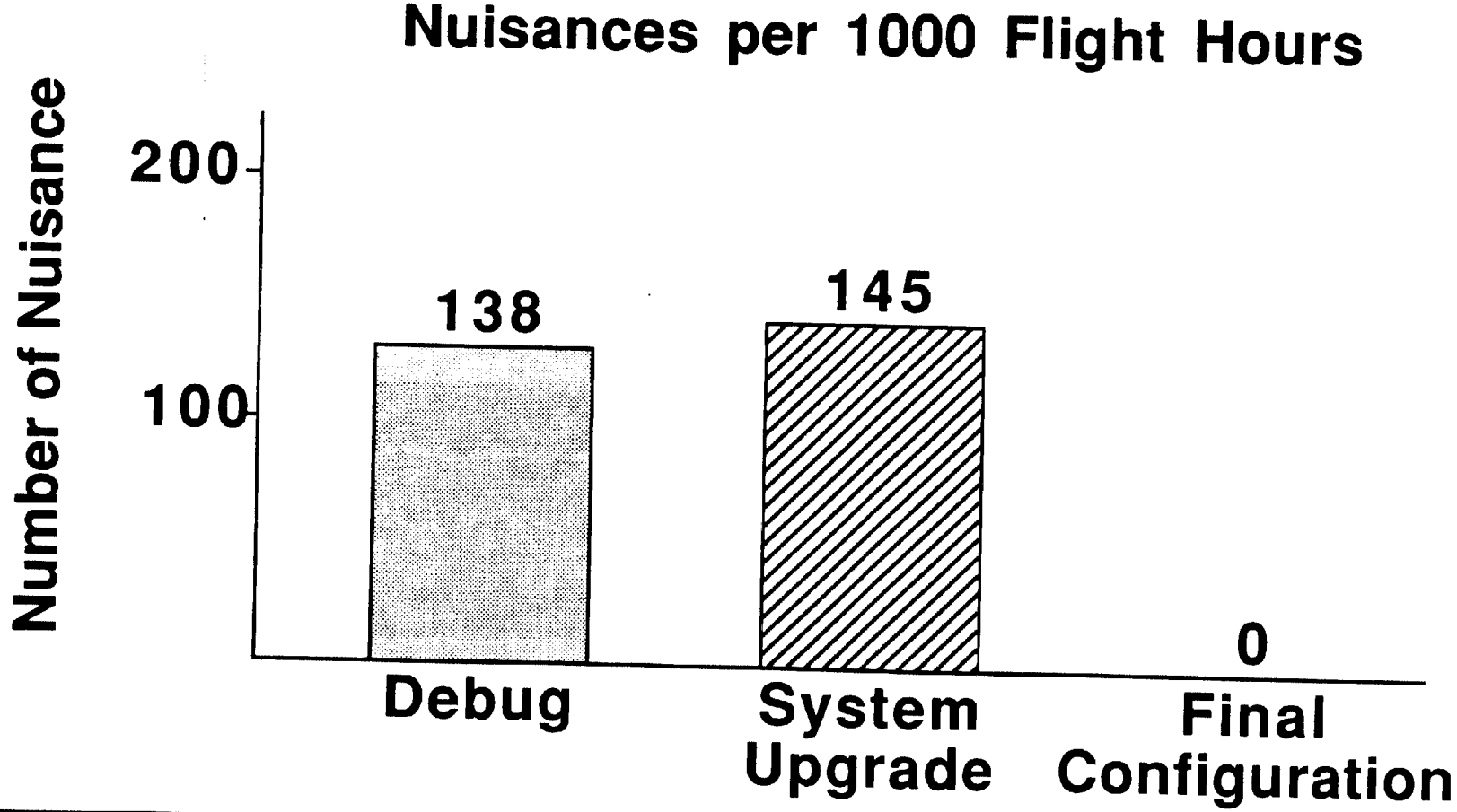
AWAS III PERFORMANCE



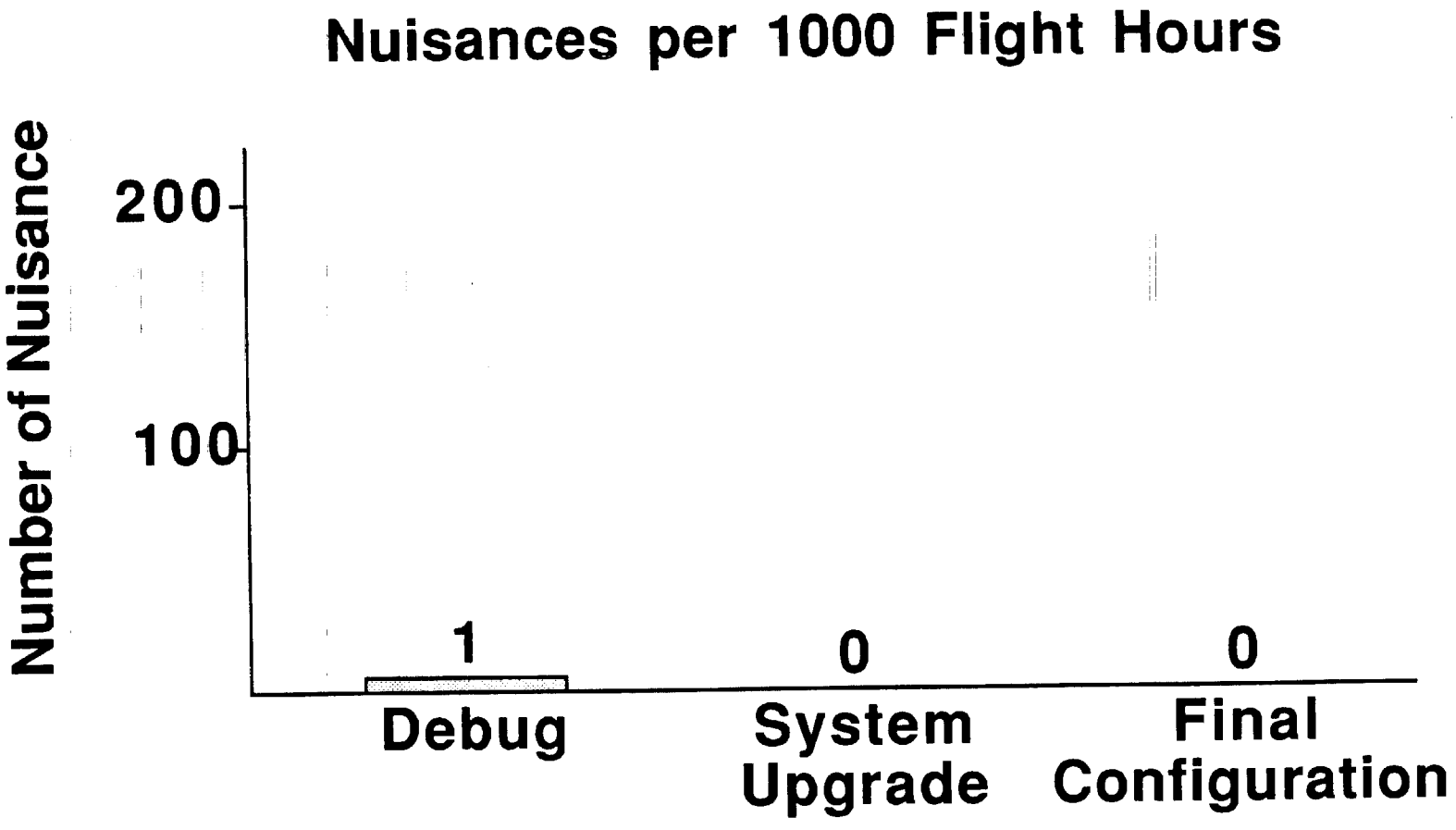
WSC PERFORMANCE



AWAS III NUISANCE RATE



WSC NUISANCE RATE



CONCLUSION

- WSC performance is exceptional
- AWAS III performance has improved
- Northwest is addressing issues raised by predictive systems
- Knowledge gained will be used to determine best solution

Results of In-service Evaluation of Wind Shear Systems

Questions and Answers

Q: Larry Gordan (MITRE) - Could you just take a minute and talk about some of the issues that predictor systems raise to pilots from your point of view?

A: Todd Murr (Northwest Airlines) - A lot of the concern that Northwest is having deals with pilot confidence and nuisance rate. If you detect an event thirty seconds ahead, by the time they penetrate this event there may not be an event or they will be at a lot higher altitude so they won't be getting the outflow. Also, if you are familiar with Northwest we are doing a lot of the curve path approaches. If you have a system that constantly looks three nautical miles out in front of you as you are doing a curve path approach, this might raise some interesting issues that we haven't addressed yet or we don't know how to address.

Q: Jim Evans (MIT) - When you talk about the performance being exceptional. How many wind shears do you reckon the systems have detected?

A: Todd Murr (Northwest Airlines) - I would say that we haven't seen any wind shears at all. We do not expect to see any wind shears and hope not to in this evaluation program.