

**Training Pilots Prior to Simultaneous Instrument Landing
System (ILS) Precision Runway Monitor (PRM) Approaches to
Closely-Spaced Parallel Runways**

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

FOREWORD

The Precision Runway Monitor (PRM) system consists of high-speed update and high-resolution radar hardware, software, and video monitors. This significantly improves the air traffic controller's ability to monitor aircraft on final approach and enhances the overall safety of flight operations.

These safety enhancements have immediately been offset by a reduction of minimum separation between aircraft on approach. Aircraft are proposed to be allowed on parallel approaches with runway centerlines as close as 3000 ft without the lateral, in-trail or stagger separation previously required. The stated intent is to bring instrument meteorological conditions arrival rates closer to arrival rates during visual meteorological conditions. If certain events occur, a breakout maneuver must be successfully accomplished within seconds to meet minimum aircraft separation requirements.

The following documents the SAE Human Behavioral Engineering Technology (HBET/G-10) Realistic Training Subcommittee's efforts to safely integrate high update radar into the national airspace system. To accomplish this goal, a Precision Runway Monitor (PRM) regimen is provided which begins with authorizing documents such as operation specifications issued by the Federal Aviation Administrator. The regimen also includes an awareness video and handout, a means for measuring understanding of the knowledge essential to conducting safe and efficient PRM approaches, a train-to-proficiency simulator module, and a checklist to determine whether or not the flight may safely include a PRM approach and what preflight actions are required if PRM unable. All operators at PRM airports are invited to use this information as a standardized reference.

The material in this document is a result of the SAE HBET/G-10 Realistic Training Subcommittee review of current operator training programs and analysis, and the requirements and recommendations of regulators, air traffic controllers, airport facility managers, manufacturers, and pilot associations. To maintain standardization and currency, user input is encouraged. Direct information and comments to the SAE G-10 Realistic Training Subcommittee Chairman, 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA.

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FOREWORD (Continued)

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1. SCOPE:

This SAE Aerospace Recommended Practice (ARP) provides guidance to prepare pilots to participate in simultaneous instrument landing system (ILS) precision runway monitor (PRM) approaches to closely-spaced parallel runways.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE Aerospace Technical Report Style Manual (September 1997)

2.1.2 U.S. Government Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

FAA Aeronautical Information Manual, Section 5-4-12 to 14, and Pilot/Controller Glossary

FAA Order 8400.10 Flight Standards Handbook Bulletin for Air Transportation (HBAT) 97-05 titled "Operations Specifications paragraph C052/A002 (revised), Operating Instruction, and Training Program Approval for Simultaneous Close Parallel ILS Approach and Landing (ILS PRM)" 4-29-97

FAA Form 8400-8 Operations Specifications (issued for individual air carriers)

FAA Order 7110.65 Air Traffic Control, Section 5-9-8 Simultaneous Independent Dual ILS/MLS Approaches-High Update Radar

Federal Aviation Regulations, Part 1

2.1.3 Jeppesen Publications: Available from Jeppesen, 55 Inverness Drive, Englewood, CO 80112-5498.

Attention all users page 11-0 (issued for the airport conducting ILS PRM approaches)

Approach chart (issued for each runway to which ILS PRM approaches will be conducted)

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2.1.4 Aircraft Manufacturer Operating Bulletin for Each Aircraft Type and Each Operator:

Northwest Airlines A-320 Operating Bulletin 97-1 Simultaneous Close Parallel ILS (ILS PRM) Approaches At MSP, April 25, 1997

Northwest Airlines Flight Operations General Bulletin 98-101, November 13, 1998

2.1.5 Video Tape: Available from System Resources Corporation, 3rd Floor, 5218 Atlantic Avenue, Mays Landing, NJ 08330; 609-625-5669; Fax 609-625-5497.

"ILS PRM Approaches Information For Pilots" 16:00 7/24/97 DUB MST 586.01

2.1.6 Evaluations: Available from the National Technical Information Service, Springfield, VA 22161.

Airbus 320 Performance During ATC-Directed Breakouts on Final Approach, K.M.Hollister, A.S. Rhoades, A.T. Lind, 20 November 1998, Lincoln Laboratory, Massachusetts Institute of Technology, Project Report ATC-265

Evaluation of Dual Simultaneous Instrument Landing System Approaches to Runways Spaced 3000 Feet Apart with One Localizer Offset Using a Precision Runway Monitor System, R.E. Ozmore (ACT-510) and S.L. Morrow (SRC), September 1996, DOT/FAA/CT-96/2

2.1.7 Evaluations: Available from authors.

A320 and B747-400 Breakout Performance Studies, 7 September 1995, MIT Lincoln Laboratory, FAA Aviation Standards (AFS-421)

Evaluation of Triple Simultaneous Instrument Landing System Approaches to Runways Spaced 4000 Feet and 5300 Feet Apart Using a Precision Runway Monitor System, R.E. Ozmore (ACT-510) and S.L. Morrow (SRC), August 1997

Demonstration Report: Raleigh-Durham Precision Runway Monitor Program, MSI Services, Inc, 600 Maryland Avenue, S.W., Washington, D.C. 20024, undated

An Analysis of Traffic Alert and Collision Avoidance System (TCAS) Advisories during Simultaneous Instrument Approaches, Toma and Massimini, MITRE Center for Advanced Aviation System Development, McLean, Virginia, September 1993, Contract DTFA01-93-C-00001, Project 173EA, Sponsored by the Federal Aviation Administration

An Extension of the Analysis of Traffic Alert and Collision Avoidance System (TCAS) Advisories During Simultaneous Instrument Approaches to Closely Spaced Parallel Runways, Folmar, Szebrat and Toma, MITRE, McLean, Virginia, July 1994, Contract DTFA01-93-C-00001, Project 173EA, Sponsored by the Federal Aviation Administration, CAASD

2.2 Glossary:

BREAKOUT: A technique to direct aircraft out of the approach stream. In the context of close parallel operations, a breakout is used to direct threatened aircraft away from a deviating aircraft.

CLOSE PARALLELS: Two parallel runways whose extended centerlines are separated by at least 3400 ft but less than 4300 ft, having a Precision Runway Monitoring (PRM) system that permits simultaneous independent ILS approaches.

FINAL MONITOR CONTROLLER: Air Traffic Control Specialist assigned to radar monitor the flight path of aircraft during simultaneous parallel and simultaneous close parallel ILS approach operations. Each runway is assigned a final monitor controller during simultaneous parallel and simultaneous close parallel ILS approaches. Final monitor controllers shall utilize the Precision Runway Monitor (PRM) system during simultaneous close parallel ILS approaches.

ILS CATEGORY I: An ILS approach which provides for approach to a height above touchdown of not less than 200 ft and with runway visual range of not less than 1800 ft.

IMMEDIATELY: Used by ATC when such action compliance is required to avoid an imminent situation.

INSTRUMENT LANDING SYSTEM: A precision instrument approach system which normally consists of the following electronic components and visual aids - localizer, glideslope, outer marker, middle marker, and approach lights.

MINIMUM VECTORING ALTITUDE: The lowest MSL altitude at which an IFR aircraft will be vectored by a radar controller, except as otherwise authorized for radar approaches, departures, and missed approaches. The altitude meets IFR obstacle clearance criteria. It may be lower than the published MEA along an airway or J-route segment. It may be utilized for radar vectoring only upon the controller's determination that an adequate radar return is being received from the aircraft being controlled.

NO TRANSGRESSION ZONE: A 2000 ft wide zone located equidistant between parallel runway final approach courses in which flight is not allowed.

NOTICE TO AIRMEN: A notice containing information (not known sufficiently in advance to publish by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations.

PARALLEL ILS APPROACHES: Approaches to parallel runways by IFR aircraft which, when established inbound toward the airport on the adjacent final approach courses, are radar separated by at least 2 miles.

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2.2 (Continued):

SIMULTANEOUS ILS APPROACHES: An approach system permitting simultaneous ILS/MLS approaches to airports having parallel runways separated by at least 4300 ft between centerlines. Integral parts of a total system are ILS/MLS, radar, communications, ATC procedures, and appropriate airborne equipment.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM II: An airborne system that utilizes interrogation of and replies from airborne radar beacon transponders and provides traffic advisories and resolution advisories in the vertical plane (called ACAS internationally for TCAS II version 7).

TRANSPONDER: The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS) which automatically receives radio signals from interrogators on the ground, and selectively replies with a specific reply pulse or pulse group only to those interrogations being received on the mode to which it is set to respond.

2.3 Abbreviations:

AGL	Altitude expressed in feet measured from ground level
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
FAA	Federal Aviation Administration
ILS	Instrument Landing System
MEL	Minimum Equipment List
MSL	Altitude expressed in feet measured from mean sea level
MVA	Minimum Vectoring Altitude
NOTAM	Notice to Airmen
NTZ	No Transgression Zone
PF	Pilot-Flying
PNF	Pilot-Not Flying
PRM	Precision Runway Monitor
RA/TA	Resolution Advisory/Traffic Advisory
TCAS	Traffic Alert and Collision Avoidance System; TCAS II is presumed

3. GENERAL:

- 3.1 The guidance in this document is primarily aimed at trainers of pilots expecting to land at airports authorized to conduct closely spaced ILS PRM approaches. It can also be used by the pilots themselves to ensure they are in fact qualified and adequately prepared to participate in such operations prior to departing, and if not qualified/prepared, to be aware of the need for an additional 30 min of fuel, and the requirement to notify ATC of "PRM unable" status.

3.2 The guidance consists of a training matrix of statements and decision gates (Figure 1). Each item in the figure is supported by a list of factors which are relevant to the task (Appendix A). This process can be summarized as follows:

- a. Identify regulatory requirements
- b. Complete awareness training
- c. Complete check for understanding
- d. Experience simulation
- e. Match fuel and communication to participating status

The process will repeat both for each recurrent training and for different crew pairings.

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SAE SUBCOMMITTEE G-10G, REALISTIC TRAINING OF
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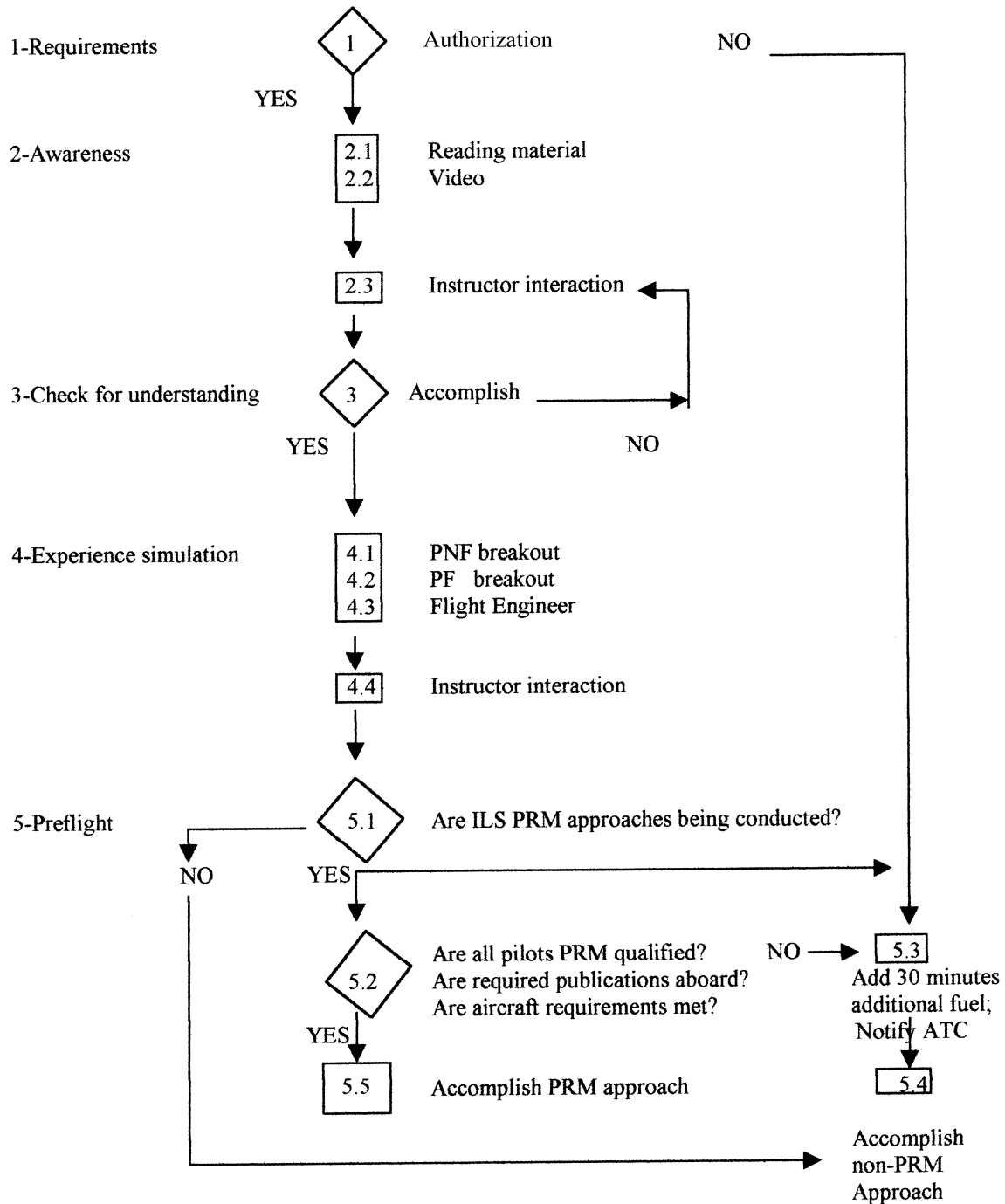


FIGURE 1 - ILS PRM Training Matrix