

AIRBORNE DATABASES FOR FLIGHT INSPECTION



The Number "3"

JEPPESSEN TOULOUSE, FRANCE

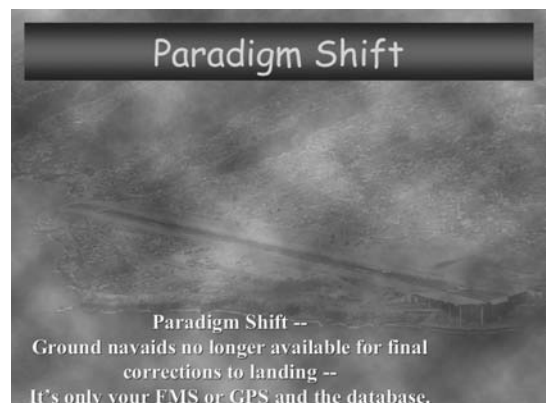
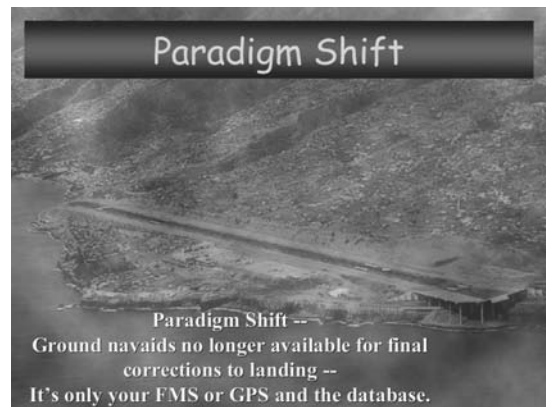
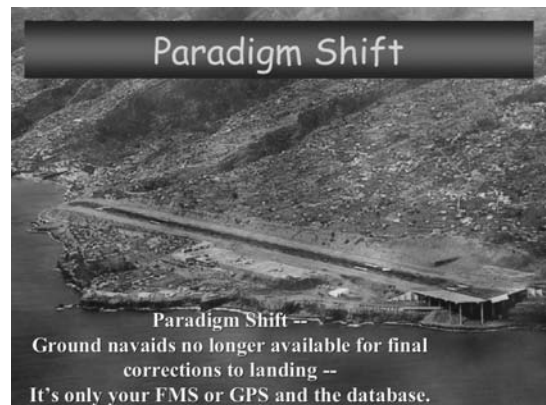
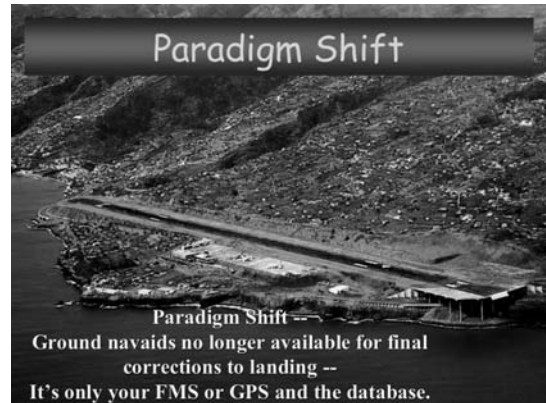
(11-3A) Eff 13 Apr **ILS DME Rwy 32L**

Sector	BLAGNAC Tower	Ground	
2.3	118.1	121.9	
ILS	Apt Elev 499'		3000'

GLS Rwy xx
 GBAS - Ground Based Augmentation System
 LAAS - Local Area Augmentation System
 GLS - GPS (or GBAS or GNSS) Landing System

RNAV (GNSS) Rwy xx
 RNAV (GNSS) Rwy xx - TSO-C129
 SBAS - Space Based Augmentation System
 EGNOS - European Global Navigation Overlay System
 WAAS - Wide Area Augmentation System
 MSAS - Japan's Multi-functional Satellite-Based Augmentation System
 GRAS - Russia's GNSS Regional Augmentation System
 GRAS - Australia's Ground-based Regional Augmentation System

RAIM - Receiver Autonomous Integrity Monitoring



Paradigm Shift

Paradigm Shift --
Ground nav aids no longer available for final corrections to landing --
It's only your FMS or GPS and the database.

Each dot is a fix on the ground

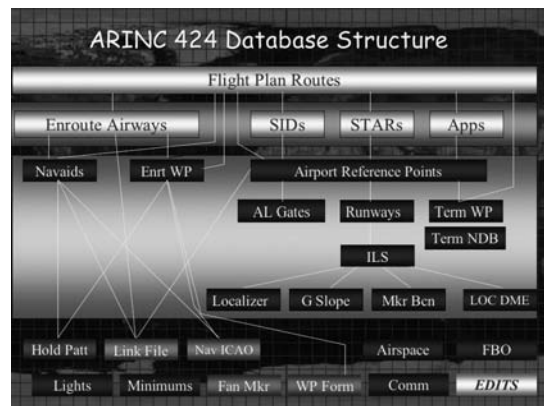
- Navaid
- Waypoint
- Intersection
- Turning Point
- Runway Threshold

Each connecting line is a route

- SID
- Airway
- STAR
- Approach

Database Navigation Not New

- Began December 1971
- First Commercial Flight June 1973
- DC-10 Collins AINS-70
- ARMA - 1973
- Vandling - 1974
- Garrett - 1974
- Sperry - 1975



Where Information Comes From

- Over 220 Countries & Territories -
188 ICAO States
Aeronautical Information Publication (AIP)

Superior Databases begin with Superior Procedure Design

PANS OPS Criteria

Required Obstruction Clearance
Initial Approach Segment
Final Approach Segment
Missed Approach Point

ARINC 424 Worldwide Standard

- September 1973 - First ARINC 424 Meeting
- July 1975 - First Gray Cover published
- July 1976 - ARINC 424-1
- ARINC 424-3 - First "Air Mass" Application
- ARINC 424-4 - Added Simulator Capability
- ARINC 424-5 - Added Computer Flight Planning
- ARINC 424-16 - Added FAS Data Block Record 2002
- ARINC 424-17 - Adopted April 30, 2004
- ARINC 424-18 - Adopted October 2005

NavData for Airborne Databases

ICAO Procedure Title Standard before Nov 25, 2004

- Procedure title should be named according to the navaid(s) to be used.
- Causes many, many variations from State to State
- Causes pilots to hear different clearances from State to State
- Causes different expectations for equipment requirements

ICAO Procedure Title Standard Effective 25 November 2004

- Title of approach procedure will be the same as the last navaid which provides final approach navigation guidance.
- Equipment requirements will be specified on approach procedure
- Different transitions will be labeled on approach procedure chart (but only when impossible to place different transitions on same chart)

Titles today for GNSS Procedures

- RNAV (GNSS) Rwy XX is ICAO standard
- RNAV (GPS) Rwy XX is German, US, and other's standard
- GPS Rwy XX is old standard in US and is still on some older procedures
- GPS XX is the display in TSO-C129 avionics
- RNAV XX is what is displayed in FMS systems

RNAV (GPS) Approach Duplication

KBWI/BWI WASHINGTON INTL		JEPPESEN 21 NOV 03 (12-4)		BALTIMORE, MD RNAV (GPS) Y Rwy 15R	
LOC	115.1	127.8	119.7	119.4	121.9
Final Appch Crs					
Minimum Alt					
LNAV/VNAV DA(H)					
App Elev			146'		
MISSED APCH: Climb to 900' then climbing RIGHT turn to 2500' direct DATED and hold.					
AIT Set: INCHES Trans level: FL 180 Trans alt: 18000'					
1. RADAR required. 2. GPS or RNP-0.3 required. 3. DME/DME RNP-0.3 not authorized.					
MSA RW 15R					

Conventional Approach Duplication

MYGF/FPO GRAND BAHAMA INTL		JEPPESEN 26 SEP 03 (11-1)		FREEPORT, BAHAMAS ILS Y Rwy 06	
LOC	119.27	126.5	118.5	121.7	
Final Appch Crs					
Minimum Alt					
LNAV/VNAV DA(H)					
App Elev			7'		
MISSED APCH: Climb to 2000' then RIGHT turn via 215° heading and ZFP VOR R-147 to D12.0 ZFP VOR and hold.					
AIT Set: IN (MB on req) Trans level: FL 180 Trans alt: 18000'					
1. When local altimeter setting not received procedure not authorized.					
MSA ZFP VOR					

New Approach Procedure Titles

KIAH/IAH GEORGE BUSH INTERCONTINENTAL/HOUSTON		JEPPESEN 24 OCT 03 (71-1)		HOUSTON, TEXAS ILS or LOC Rwy 8L	
LOC	124.05	120.05	125.35	127.3	118.57
Final Appch Crs					
Minimum Alt					
LNAV/VNAV DA(H)					
App Elev			97'		
MISSED APCH: Climb to 600' then climbing LEFT turn to 3000' outbound via IAH VOR R-019 to CLEEP INT and hold.					
AIT Set: INCHES Trans level: FL 180 Trans alt: 18000'					
1. RADAR required. 2. Simultaneous approach authorized with Rwy 8R and 9.					
MSA IAH VOR					

JEPPESEN NavData

Postponement of Approach Multiple Indicator Implementation

December 28, 2003

Notice: The implementation of the approach multiple indicator (AMI) will be postponed until a later date. This notice is being published to inform you of this change. The implementation of the AMI will be postponed until a later date. This notice is being published to inform you of this change.

Duplicate Approach Procedure Names

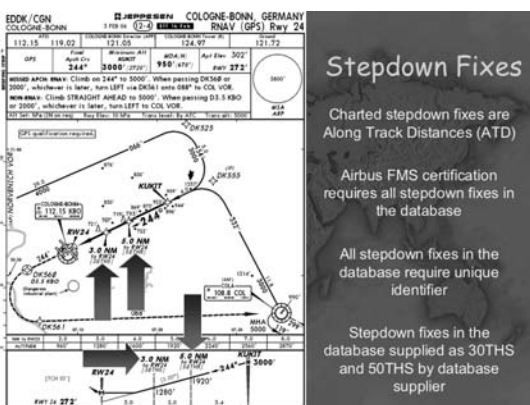
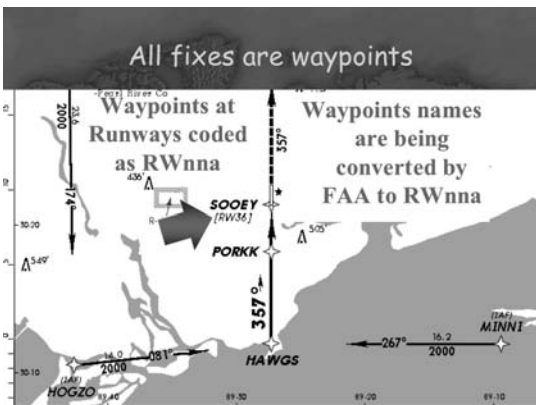
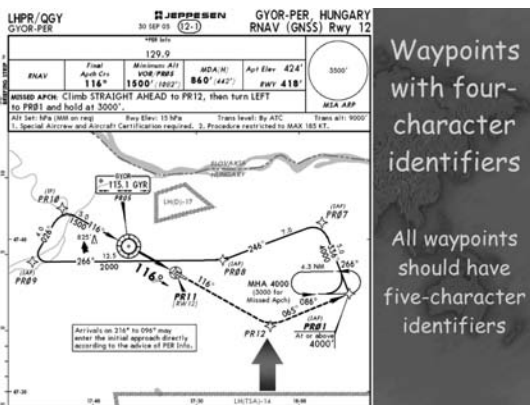
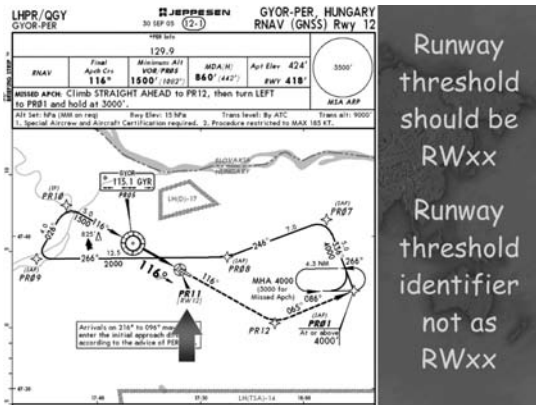
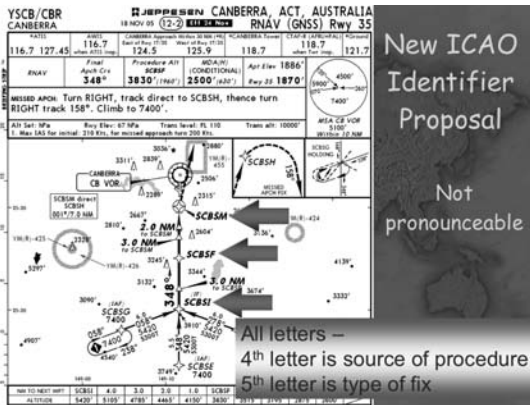
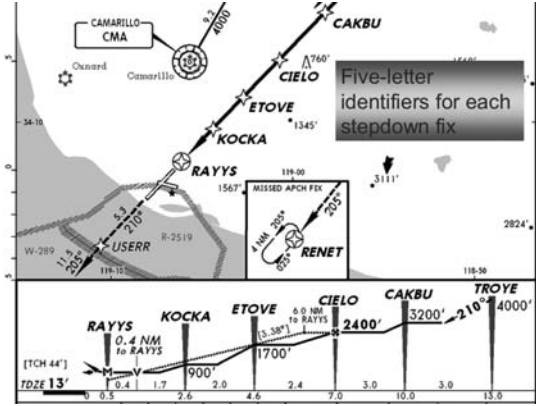
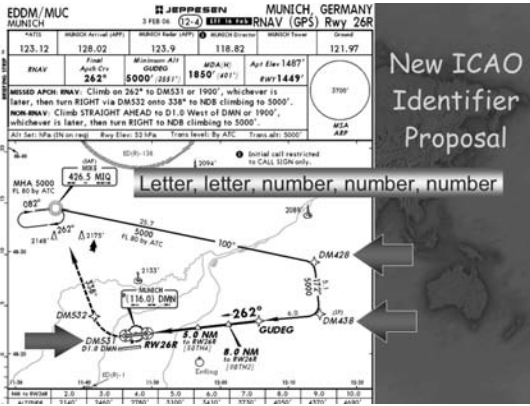
Using the same approach title currently from a multiple set, or creating a single approach that will be implemented for multiple sets of operations. This implementation will allow additional time to evaluate options that will better support current aviation activities.

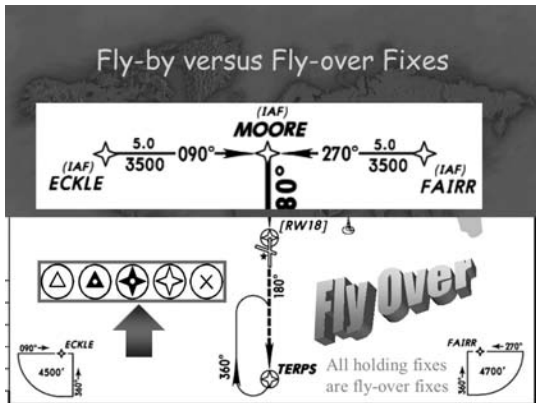
A new implementation date will be set after further options can be discussed in industry forums such as the Air Transport Association (ATA) PMS/OPS Task Force meeting on February 1-5, 2004 in Atlanta. Industry requests to postpone a new implementation date will be the top priority.

If you have questions about this Notice please contact Jeppesen NavData Technical Support at 1-800-541-3524 x444, e-mail: support@jeppesen.com or fax: (916) 352-5527.

Multiple Approach Codes

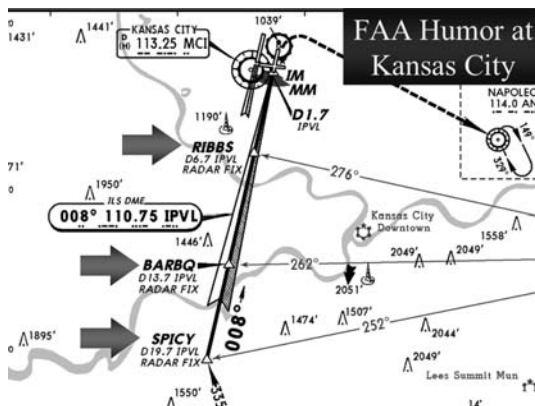
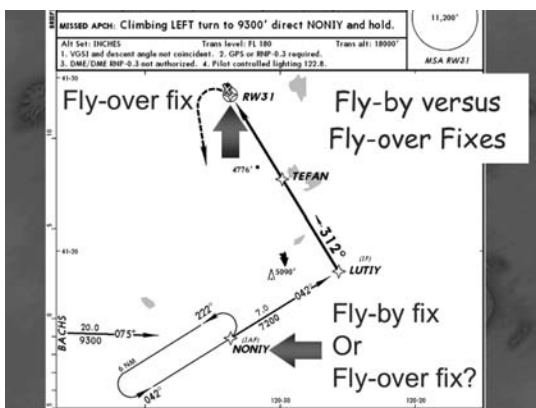
- Many avionics cannot accept two approach procedures to the same runway with the same identifier
- Situation exists with both RNAV and conventional procedures
- FAA and ICAO solution is to place unique letter after navaid type beginning with "Z" and proceeding backwards through the alphabet





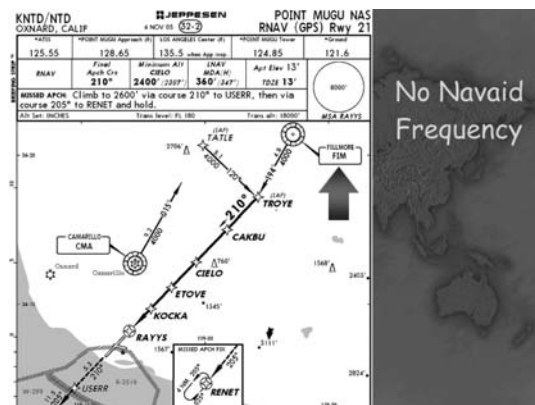
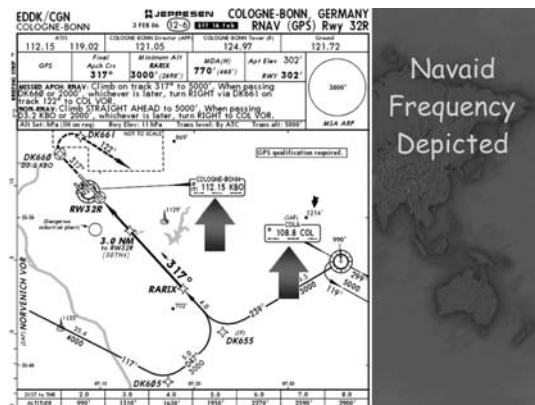
Total RNAV (GPS) & GPS Approaches

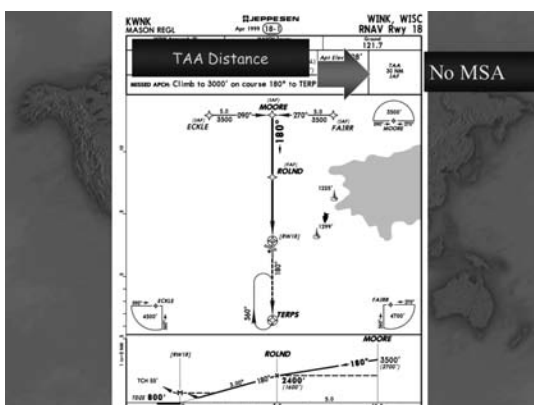
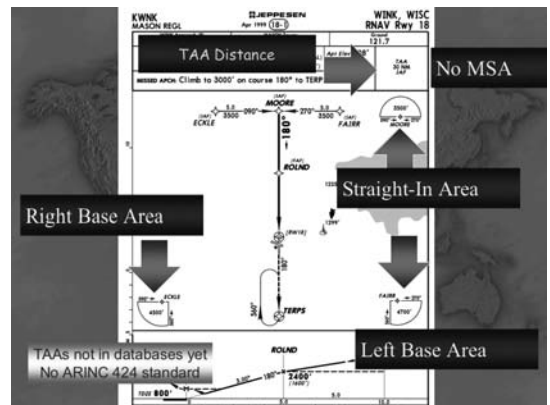
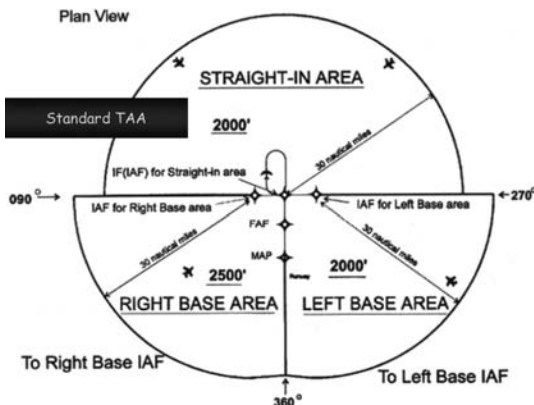
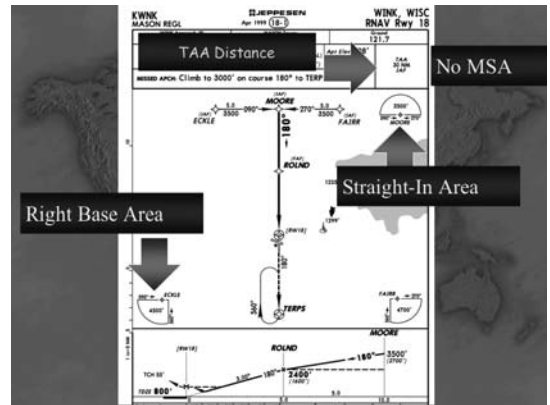
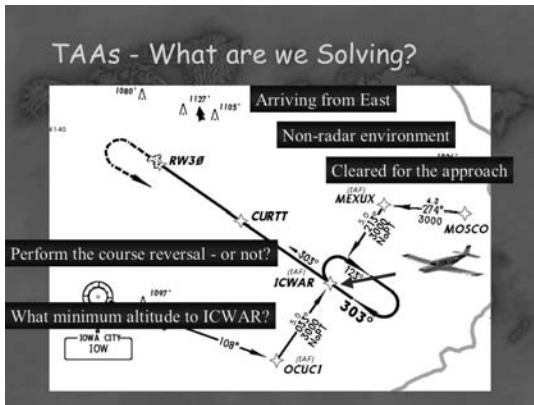
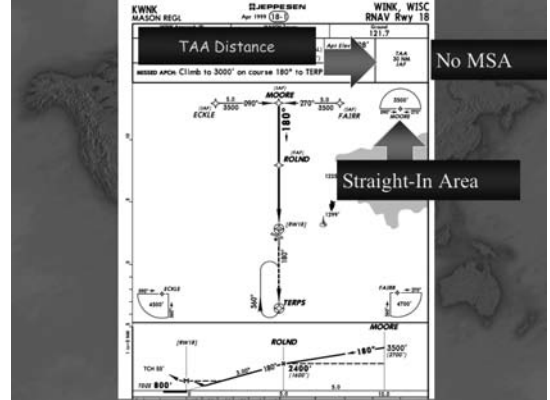
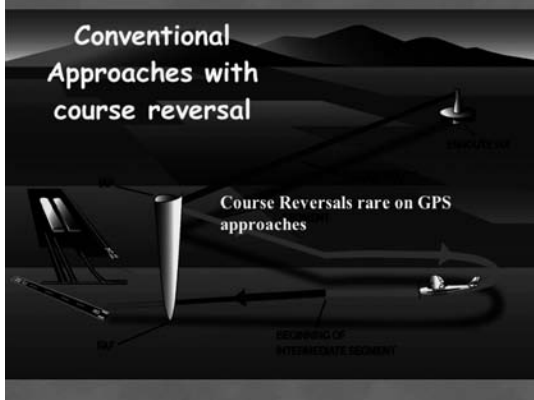
- Worldwide - 4073 (41 circling)
- Africa - 6
- Canada - 622 (8 circling)
- Eastern Europe - 8
- Europe - 34
- Latin America - 15
- Middle East - 17
- Pacific - 112 (14 circling)
- South America - 34
- South Pacific (Mostly Australia) - 700
- United States - 2525 (19 circling)
- Total any type GPS worldwide 6193 of 38910



ARINC 424 Naming Conventions

- Rule #1 - Use official waypoint name from official sources
- Will have fix at all turning points
- Use forming navaid plus distance (DEN45)
- Use D, radial, distance in letters (D263J)
- Function of fix and runway number
- CFxx, FFxx, RWxx, Mxxx, IFxx





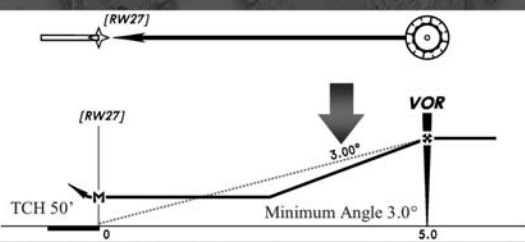
Vertical NAV Database Rules

- Rule Number 1: Use the vertical angle supplied by the State
- Rule Number 2: If the State does not supply a vertical angle, then create a vertical angle using the ARINC 424 rules

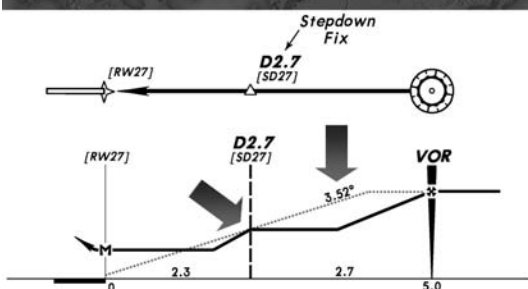
Vertical NAV Database Rules

Will have waypoint at landing threshold point (LTP) +50 feet
 Will have VNAV angle extended from LTP+50' back to FAF
 Single VNAV angle to clear stepdown fixes
 VNAV angle not below VASI/PAPI but not greater than 3.77°
 VNAV to LTP+50' - still pilot responsibility for VMC below MDA

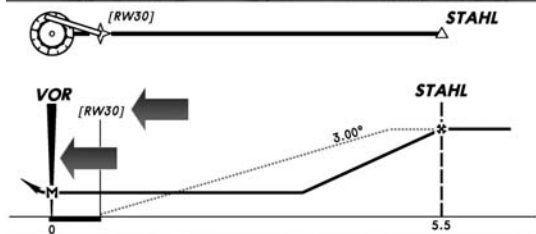
Normal Descent Standard Database Coding



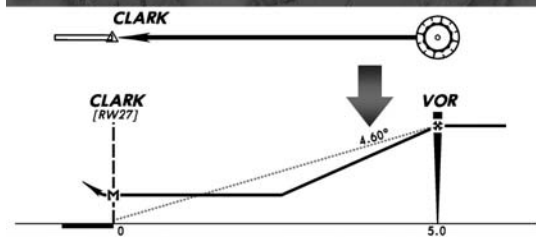
VNAV Angle over Stepdown Fixes



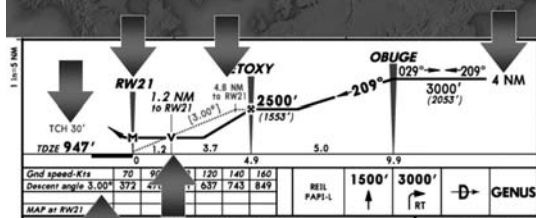
VNAV to LTP before MAP



VNAV to Circling Only Minimums



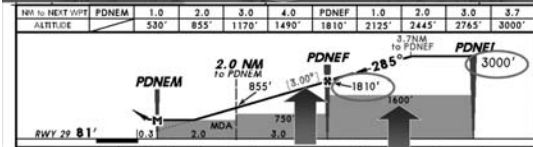
Descent Angle on RNAV (GPS) Approach



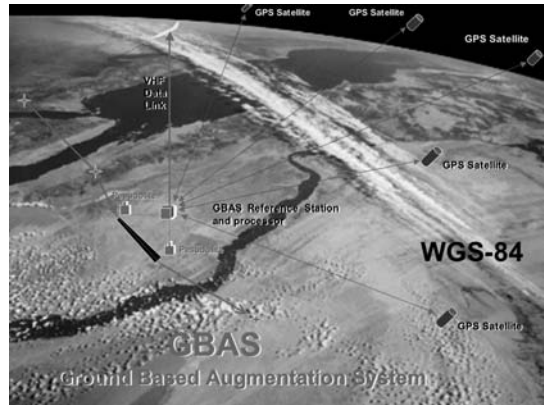
Descent Angle on RNAV (GPS) Approach



New Non-Precision Final Approach

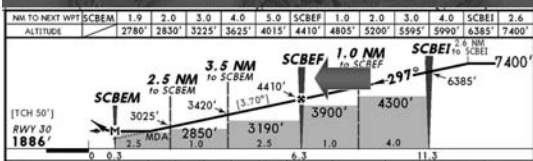


Darwin, Australia GPS Rwy 29

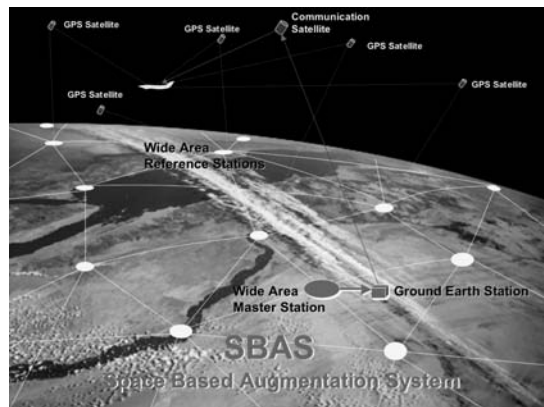


Canberra, Australia

→ RNAV (GNSS) Rwy 30



→ At SCBEF, what altitude in database?
→ 4,410 feet or 3,900 feet?



APV and Non-Precision RNAV Landing Minimums

- APV - LNAV/VNAV DA(H)
- Categories A, B, C, and D
- Based on 1.3 times V_{SO} or V_{REF}
- Components out minimums on chart

	STRAIGHT-IN LANDING RWY 1SR				LNAV		CIRCLE-TO-LAND	
	LNAV/VNAV DA(H) 540' (400')		MDA(H) 800' (660')		RAIL	ALS	RAIL	ALS
A	RAIL out	ALS out	RVR 24 or 1/2	RVR 40 or 3/4	RVR 40 or 3/4	RVR 50 or 1	800' (654') - 1 1/4	120
B	RVR 40 or 3/4	RVR 50 or 1	RVR 60 or 1/4	1 3/4	140	800' (654') - 1 1/4	140	165
C	RVR 50 or 1	RVR 60 or 1/4	1 1/2	2	165	800' (654') - 2		
D								

Space Based Augmentation System (SBAS)

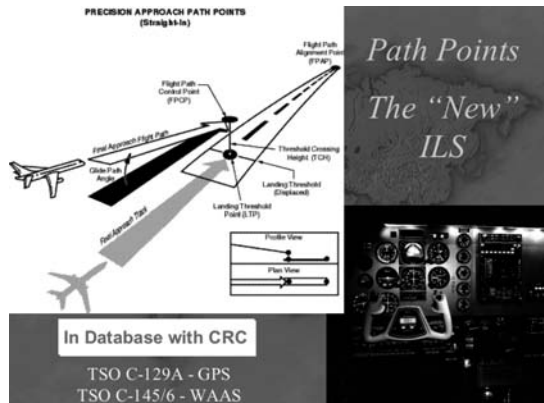
Plans for Implementation

Also applicable to:
European Global Navigation Overlay System (EGNOS),
Local Area Augmentation System (LAAS),
Wide Area Augmentation System (WAAS),
Ground Based Augmentation System (GBAS),
Japan's Multi-function Transport Satellite System (MSAS), and
Australia's Ground-based Regional Augmentation System (GRAS)



→ Doesn't meet straight-in landing minimums criteria
→ Straight-in landing still authorized (if aligned)

	Non-Precision Circle-to-Land		CIRCLE-TO-LAND Rwy 18 Not Authorized at Night	
	RAIL	ALS	RAIL	ALS
A	840' (571') - 1			
B	840' (571') - 1 1/2			
C				
D				

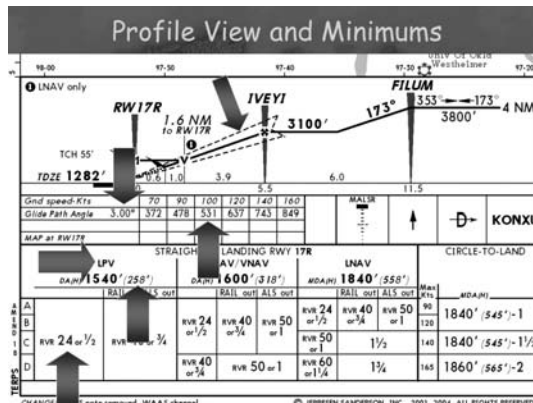


Path Points
The "New" ILS

In Database with CRC
TSO C-129A - GPS
TSO C-145/6 - WAAS

Path Point Record FAS Data Block

Data Field	Field Size	Data Type
Operation Type	2 Characters	Unsigned Integer
SBAS Service Provider Identifier	2 Characters	Unsigned Integer
Airborne Identifier	4 Characters	Alphanumeric
Runway Identifier	5 Characters	Alphanumeric
Approach Performance Designator	1 Character	Alpha
Route Indicator	1 Character	Alpha
Reference Path Data Selector	2 Characters	Unsigned Integer
Reference Path Identifier	4 Characters	Alphanumeric
LTP Latitude	11 Characters	Alphanumeric
LTP Longitude	12 Characters	Alphanumeric
LTP Ellipsoidal Height	6 Characters	Signed Integer
FPAP Latitude	11 Characters	Alphanumeric
FPAP Longitude	12 Characters	Alphanumeric
Threshold Crossing Height	7 Characters	Alphanumeric
Glide Path Angle	4 Characters	Unsigned Integer
Course Width at Threshold	5 Characters	Unsigned Integer
Length Other	4 Characters	Unsigned Integer

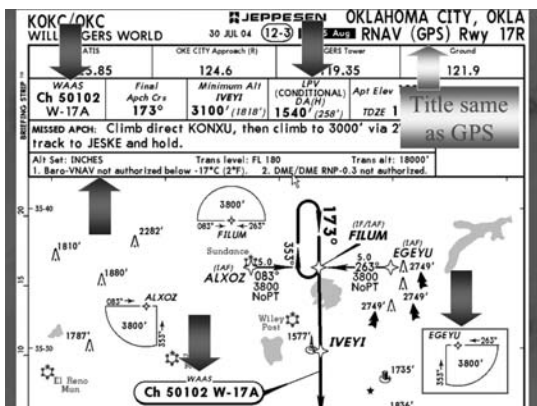
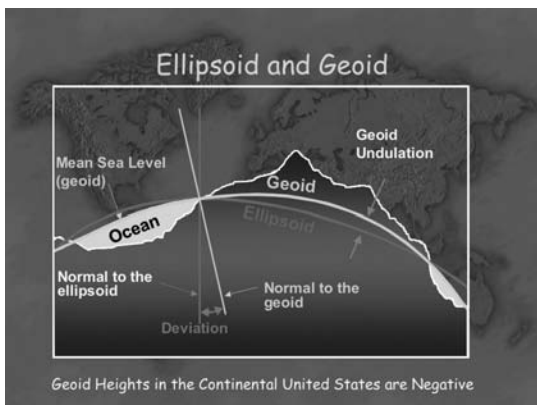
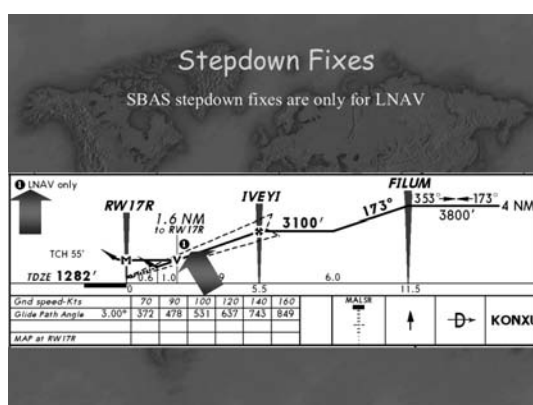


Shapes of the Earth

Mathematical simplified representation : a sphere

A complex reality : the geoid

"Best" mathematical representation : an ellipsoid



Precision GPS Approaches

- Precision approaches
- Non-precision approaches
- Non-precision approaches with vertical (APV)