



Recent Evolution of Air Carrier Pilot Training

AABI Luncheon

Atlanta, GA

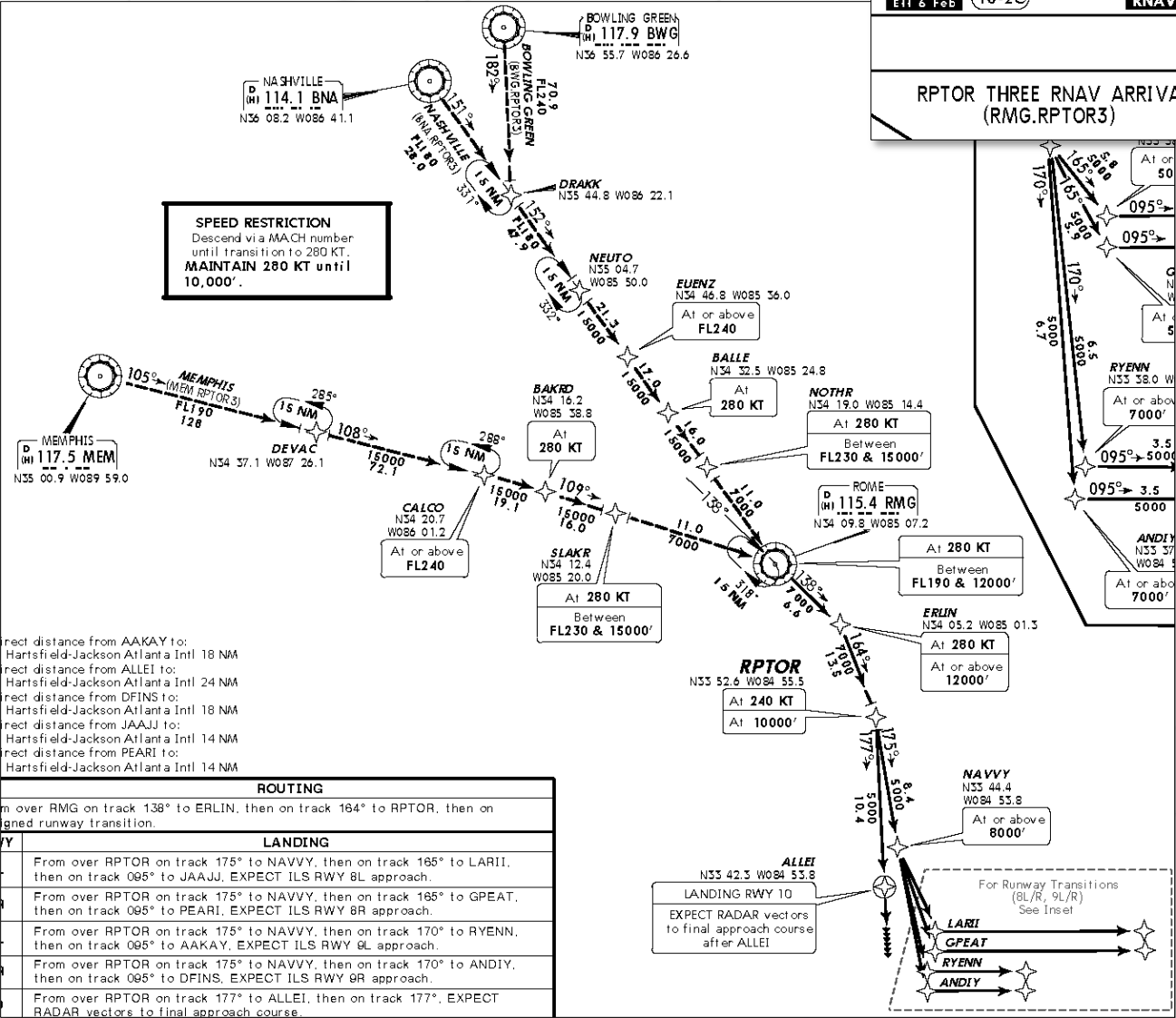
Feb 25, 2016

Why Evolve?

- Capacity pressure at our nation's airports
- Changes to the National Airspace System
- Performance-based Navigation
- Adaptation of autoflight systems & procedures
- Impact on Flight Path Management
- Autoflight/Manual flight balance
- Operational evidence
- The way forward

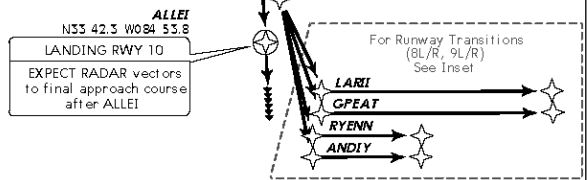
Demand Increasing for Air Travel

- According to IATA;
 - Industry revenue has doubled over the past decade
 - will double over the next 20 years
- FAA's NextGen;
 - "...satellite-based and digital technologies and new procedures that combine to make air travel more convenient, predictable and environmentally friendly."



Direct distance from AAKAY to:
 Hartsfield-Jackson Atlanta Intl 18 NM
 Direct distance from ALLEI to:
 Hartsfield-Jackson Atlanta Intl 24 NM
 Direct distance from DFINS to:
 Hartsfield-Jackson Atlanta Intl 18 NM
 Direct distance from JAAJJ to:
 Hartsfield-Jackson Atlanta Intl 14 NM
 Direct distance from PEARL to:
 Hartsfield-Jackson Atlanta Intl 14 NM

ROUTING	
From	over RMG on track 138° to ERLIN, then on track 164° to RPTOR, then on track 175° to NAVVY, then on track 165° to LARI, then on track 095° to JAAJJ, EXPECT ILS RWY 8L approach.
LANDING	
From	over RPTOR on track 175° to NAVVY, then on track 165° to GPEAT, then on track 095° to PEARL, EXPECT ILS RWY 8R approach.
From	over RPTOR on track 175° to NAVVY, then on track 170° to RYENN, then on track 095° to AAKAY, EXPECT ILS RWY 9L approach.
From	over RPTOR on track 175° to NAVVY, then on track 170° to ANDIY, then on track 095° to DFINS, EXPECT ILS RWY 9R approach.
From	over RPTOR on track 177° to ALLEI, then on track 177°, EXPECT RADAR vectors to final approach course.



KATL/ATL
HARTSFIELD-
JACKSON ATLANTA INTL



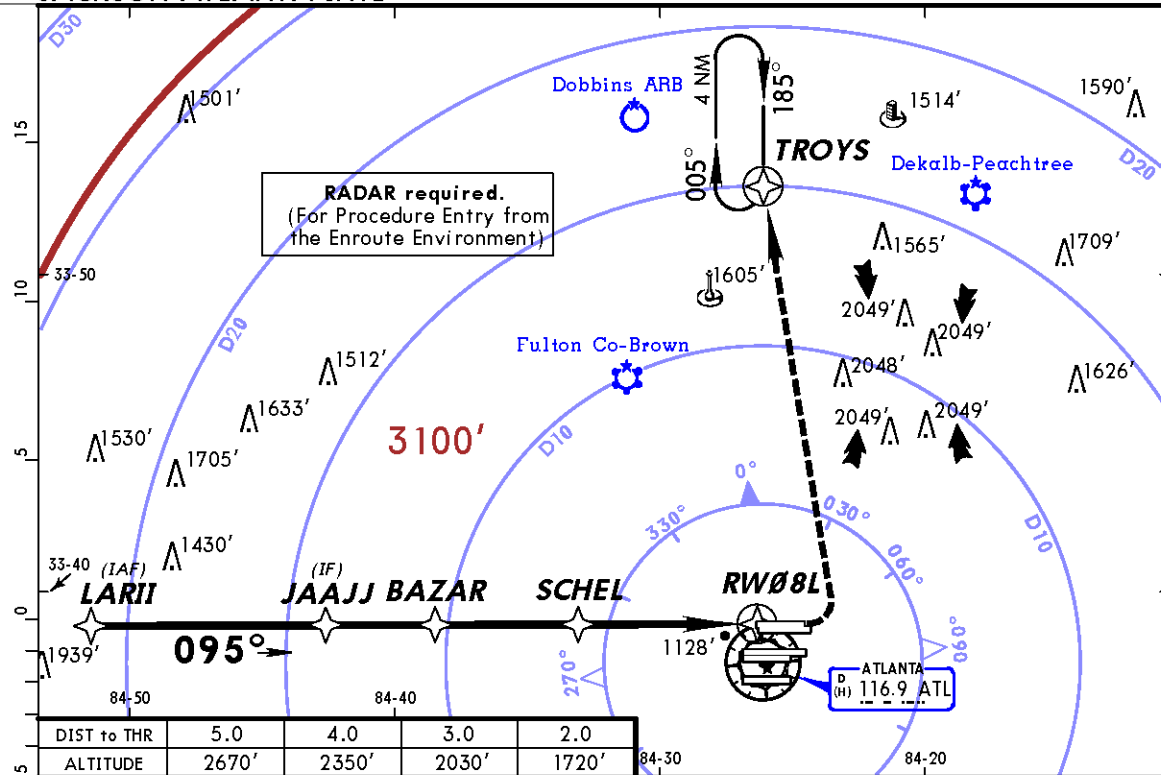
JEPPESSEN

12 SEP 14

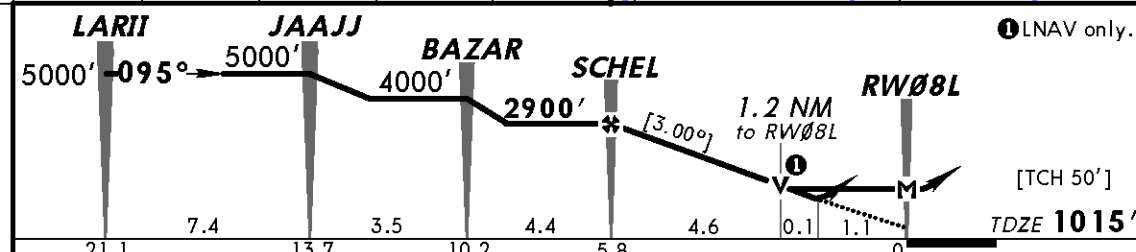
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Eff 18 Sep

ATLANTA, GA
RNAV (GPS) Y Rwy 8L



DIST to THR	5.0	4.0	3.0	2.0	
ALTITUDE	2670'	2350'	2030'	1720'	84-30

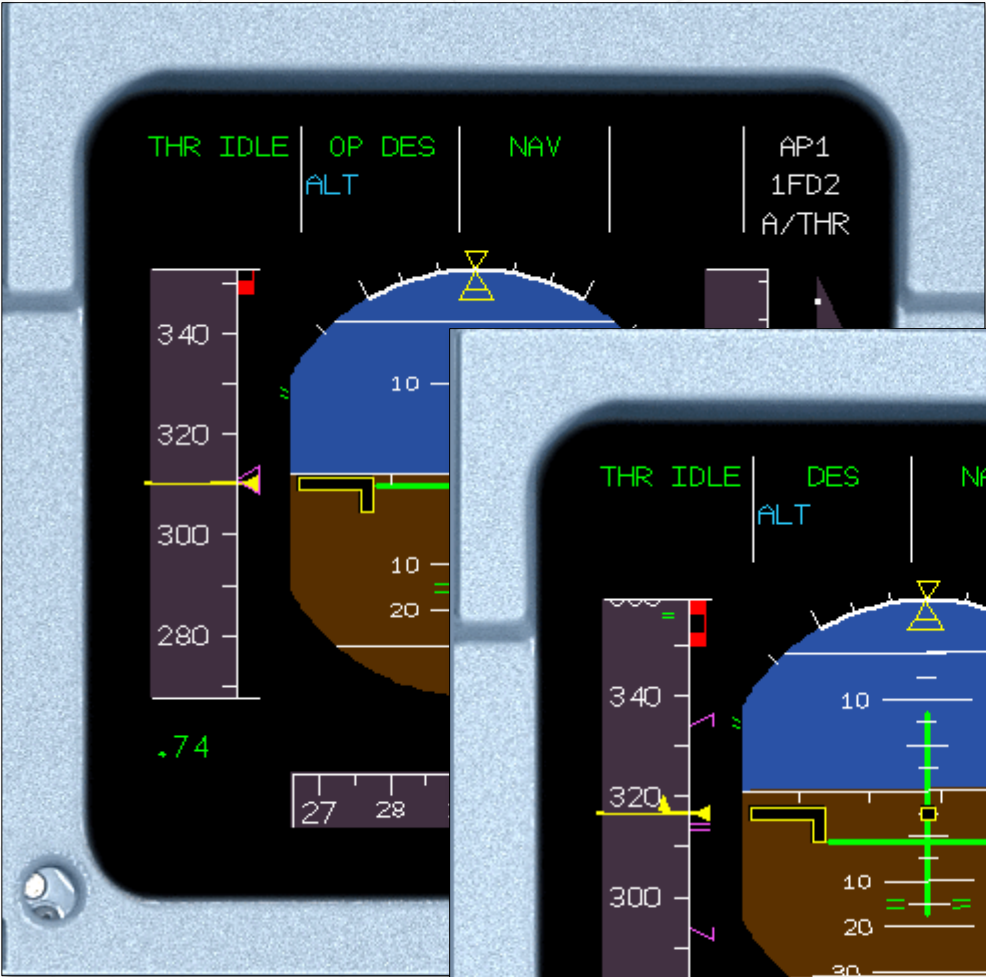


Gnd speed-Kts	120	140	160	180				
Descent Angle	[3.00°]	637	743	849	955			
MAP at RW08L								



NextGen effect on Pilot Tasks

- Requires increased understanding of flight guidance modes and submodes
 - Lateral (LNAV, Managed Nav, Heading)
 - Vertical (VNAV, Managed Des, FLCH, Open Des, Vert Speed, FPA)
 - Speed, spacing and ATC factors





ACT	RTE	LEGS	1 / 2
097°		57 NM	
LARII		210/	5000A
092°		7.4 NM	
JAAJJ		210/	5000A
093°		3.4 NM	
BAZAR		210/	4000A
093°		4.4 NM	
SCHEL		177/	2900A
093°		5.7 NM	GP 3.00°
RW08L		151/	1074
RNP / ACTUAL - - - - -			
2.00 / 0.02 NM		RTE DATA >	

BRT

Pilot Tasks (continued)

- Interpret indications to detect departures from the desired path
- Anticipate when certain ATC instructions will require or cause a change in modes
- Be able to move between modes as the situation requires

Shift to automation

- Pilot training programs are emphasizing new skill requirements
 - More exercises involving flight guidance and autoflight manipulation
- Less manual flight practice in the sim, on the line, and as required by company policy
 - Delta no longer evaluates hand-flown non-ILS approaches or CAT II landings. They're all done using the autopilot

The SA challenge of automation

- Manual
 - Pilot Input to a/c
 - Instant a/c response
- Autoflight
 - Pilot Input to automation
 - Automation input to a/c
 - Instant or delayed a/c response

Manual flight skills – still required

- Recent accidents
 - Jan 2015, Air Asia Flight 8501, A320, Rudder travel limiter
 - Jun 2009, Air France 447, A330, pitot tube icing
 - Feb 2009, Colgan Air Flight 3407, stick shaker
 - Feb 2009, Turkish Flight 1951, radio altimeter fault

Manual Flight Skills

- Easy to regain and maintain
 - Provide ample time for simulator practice
 - Visual approaches, missed approach (normal and E/O), TCAS avoidance, PRM breakouts, stall prevention/recovery, windshear recovery, normal instrument departures and arrivals, airspeed indicator failures.
 - Encourage practicing hand flying during line operations under appropriate conditions

Upset Recovery and Full Stall training

- FAA full stall training requirements
 - Pilots need solid aerodynamics bedrock
 - Angle of Attack, V-G Diagrams, Lift Curve, Drag Curve, Stall recovery
- Upset recovery
 - Skillful, timely pilot intervention needed
 - Overcome startle factor, know what control inputs and responses are required
- Ever stall in a skid? ([Video](#))

The way forward

- Air Carrier pilots require:
 - Knowledge of aerodynamics to understand AOA, stalls and upset recoveries and V-G diagrams
 - Practical experience in stalls and upsets beginning in early pilot training
 - Increased familiarity with flight guidance and autopilot systems
 - Opportunities to practice and maintain both autoflight and manual skills