# *Entegra Release 9 Self Study Material "Advanced User" Course*

14 Sep 2009

Version 1.0

# *Transition Training Block Agenda*

- Academics
  - Modification Overview
  - Architecture
  - FMS features, short cuts, power user tips
  - Map features
  - Approaches
  - Failure Modes
  - FMS400 vs 900w
  - Configurable Items

# *Module Objective*

- Assumption:
  - You are already familiar with the basic tenets of R9 and have a grasp of the *Entegra Release 9 Self Study Material "Basic User" Course*
- Objectives:
  - Provides a deeper-dive self-study version for R9. By taking this course, you should be able to have a higher level of proficiency with R9 and be capable of using some of the more advanced features and in challenging IFR conditions

*Note: This course is a copy of the slides used in live R9 transition training*

# *Modification Overview*

# *Modification Overview*

- 6-step process
  - Remove Instrument Panel, Center Console and “boxes”
  - Lay in pre-fab’d harness
  - Make all connections (maximum reuse of connectors)
  - Move/Add antennas
    - Pre-WAAS - somewhat invasive antenna re-work
    - Post-WAAS - trivial add of MLB antenna under glareshield
  - Re-install Instrument Panel, Center Console and “boxes”
  - Post install check-out

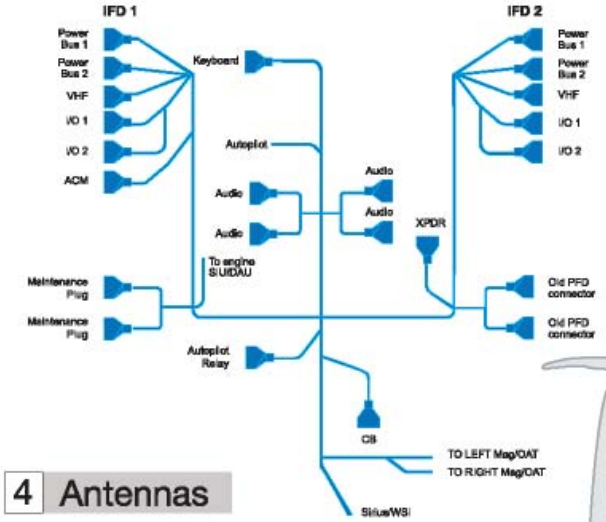
- The pre-fab’d harness that is installed leaves the existing airplane harness in place
  - Saves a lot of install time and complexity
  - Actually uses some of the original harness wiring and connections
  - As a result, this does add about 13 extra pounds

## 1 Removal

- Panel Contents: PFD, MFD, 430s, XPDR, Audio Select Panel, XM Receiver
- Instrument Panel
- Center Console

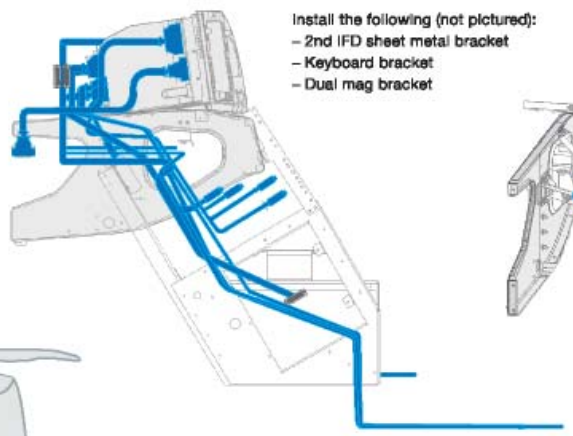
- Sell removed 430 units
- Return PFD, MFD, XM Receiver to Avidyne

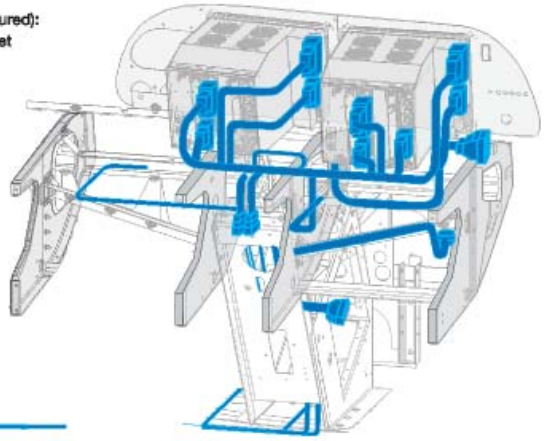
## 2 Wire Harness




## 3 Connections

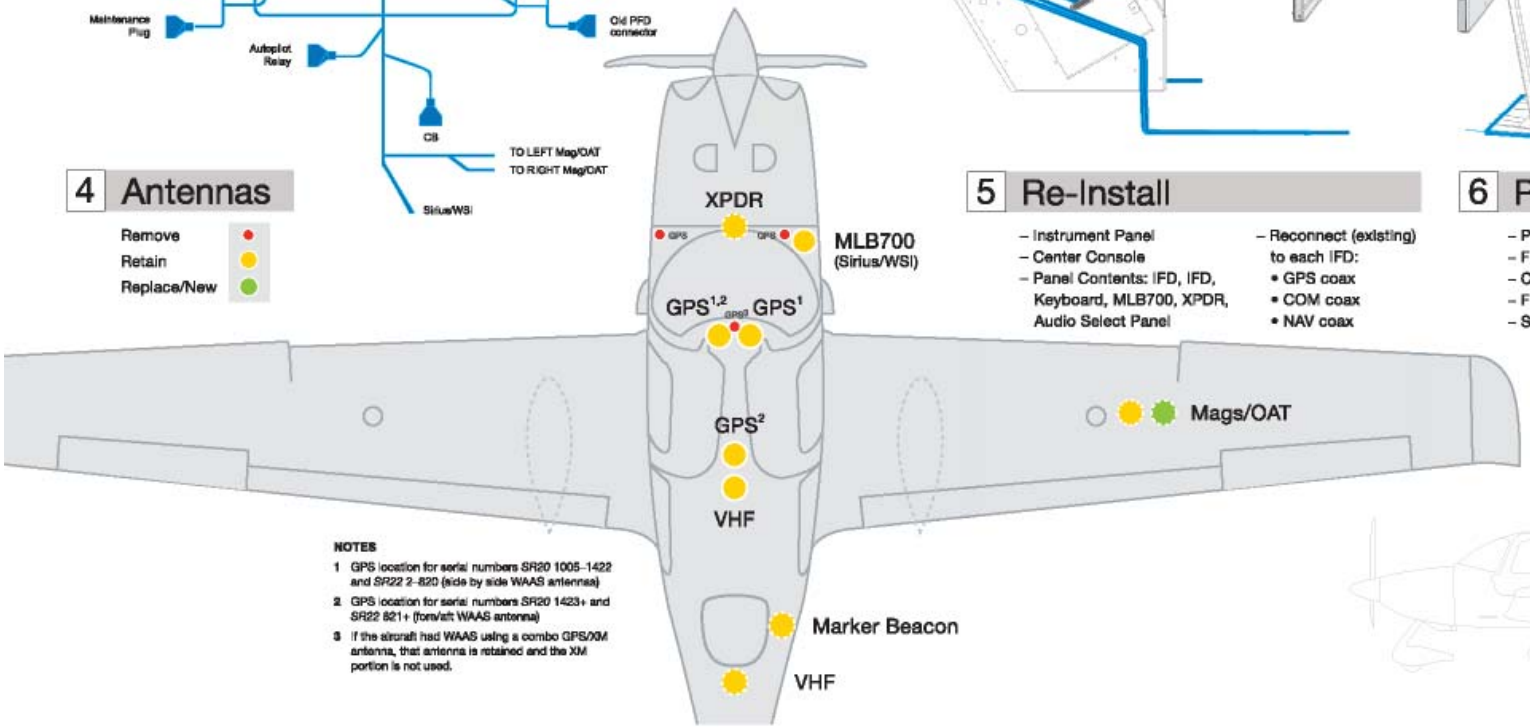
Install the following (not pictured):
- 2nd IFD sheet metal bracket
- Keyboard bracket
- Dual mag bracket





## 4 Antennas

Remove
Retain
Replace/New




NOTES
1. GPS location for serial numbers SR20 1005–1422 and SR22 2–820 (side by side WAAS antennas)
2. GPS location for serial numbers SR20 1423+ and SR22 821+ (fore/aft WAAS antenna)
3. If the aircraft had WAAS using a combo GPS/XM antenna, that antenna is retained and the XM portion is not used.

## 5 Re-Install

- Instrument Panel
- Center Console
- Panel Contents: IFD, IFD, Keyboard, MLB700, XPDR, Audio Select Panel
- Reconnect (existing) to each IFD:
  - GPS coax
  - COM coax
  - NAV coax

## 6 Post-Install

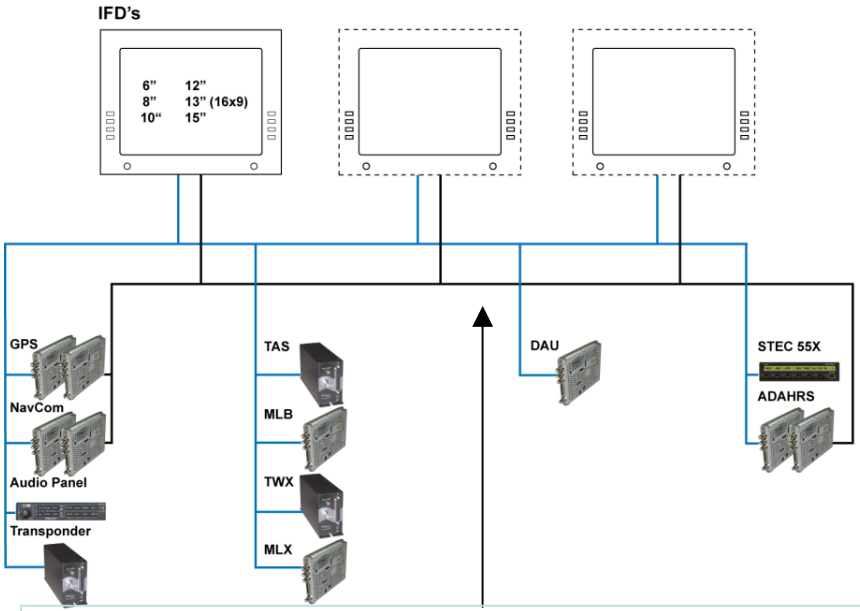
- Power on
- Functional ops check
- Calibration
- Flight test
- Sign off

# R9 Architecture

# Entegra Rel 9 Architecture and Databus

## New Architecture for a New Era in Avionics

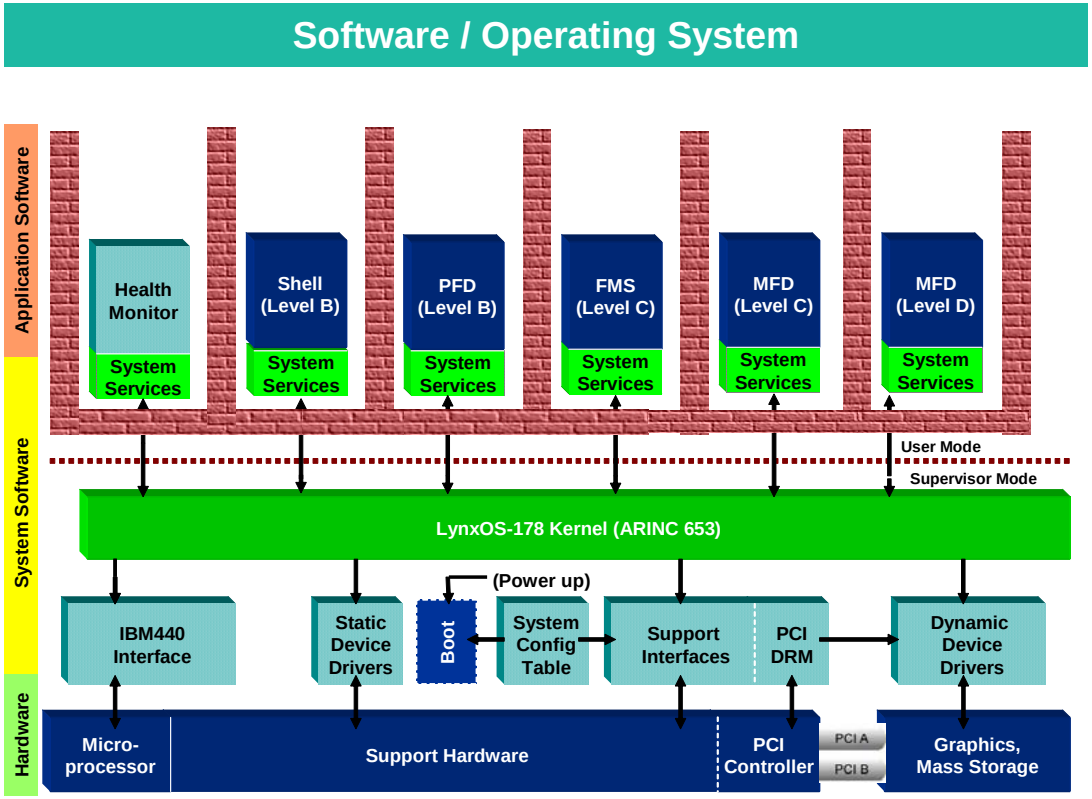
- Superior integration, high performance, low weight, modular and high growth potential
- True dual redundant, peer-to-peer databus design allows superior integration with a high performance, high authority autopilot and various other modular avionics components
- Databus advantages include:
  - Allows display of more systems data
  - Lower weight and cost
  - Greater accuracy and update rates
  - Standardized, logical and consistent
  - Increased bandwidth
  - Shorter debugging time
  - Simplifies aircraft engineering and installation
  - Monitors avionics and aircraft system information
  - Event logging and system health messages prioritized
- No single point of failure, no need for diminished reversionary modes




- True Dual Databus Design
  - Reduced weight
  - Reduced wiring
  - Improved manufacturability and serviceability
  - Reduced install time
  - Lower overall cost of operation

# Entegra Release 9 Software Architecture

- Level A operating system with ARINC 653 partitioning
- Entegra's software architecture is specifically designed to be robustly partitioned and promote the advantages of higher levels of integration without compromising safety by generating the unwanted side effects of failure propagation
- Entegra's partitioned software architecture provides the following advantages:
  - Higher reliability
  - Easier growth – less retesting
  - Lower cost & lower schedule risk – systems integration, systems evolution, ICD develop / maintain and airplane level changes

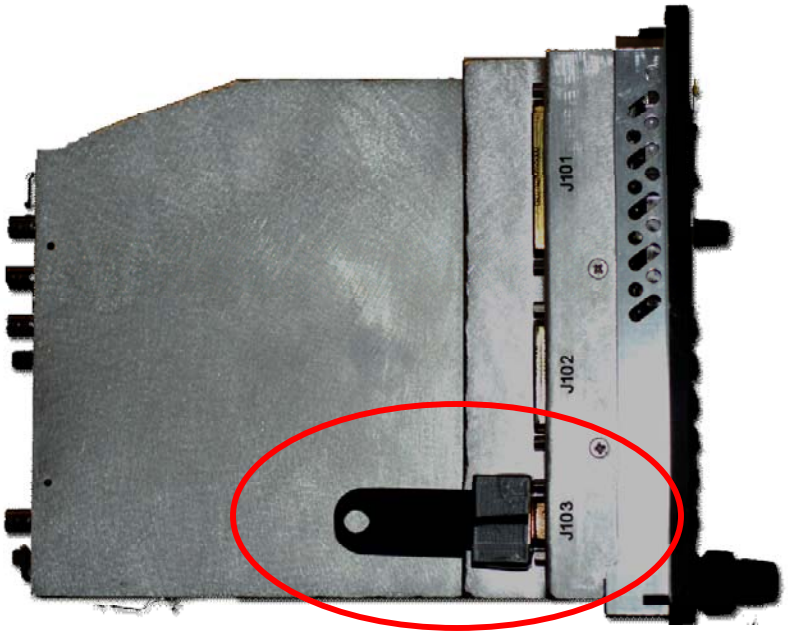



This is the same architecture used by Honeywell and Collins in much bigger class aircraft

# *Entegra Release 9 Hardware Architecture*

- Multiple Sizes and Form Factors
  - 6”, 8”, 10”, 12”, 15” displays
  - Integral chassis and Remote chassis
    - Provides customer/aircraft flexibility – volume constraints, weight distribution considerations
    - Remote chassis – no fans required
- Dozens of design improvements from 1st generation to 2nd generation
  - Based on 5+ years and thousands of units of field service history
    - Cabling
    - Backlighting
    - Serviceability access
    - Environmental monitoring
- LRU Concept
  - Each module (e.g. GPS, VHF, I/O, etc) are individual LRUs and can be removed and replaced without altering rest of unit
  - Supported by extensive on-board diagnostics
- Aircraft Configuration Modules
  - Display “personality” definition
  - Aircraft and User preferences retained in ACM
  - Stores calibration and service history


# *Aircraft Configuration Module (ACM)*

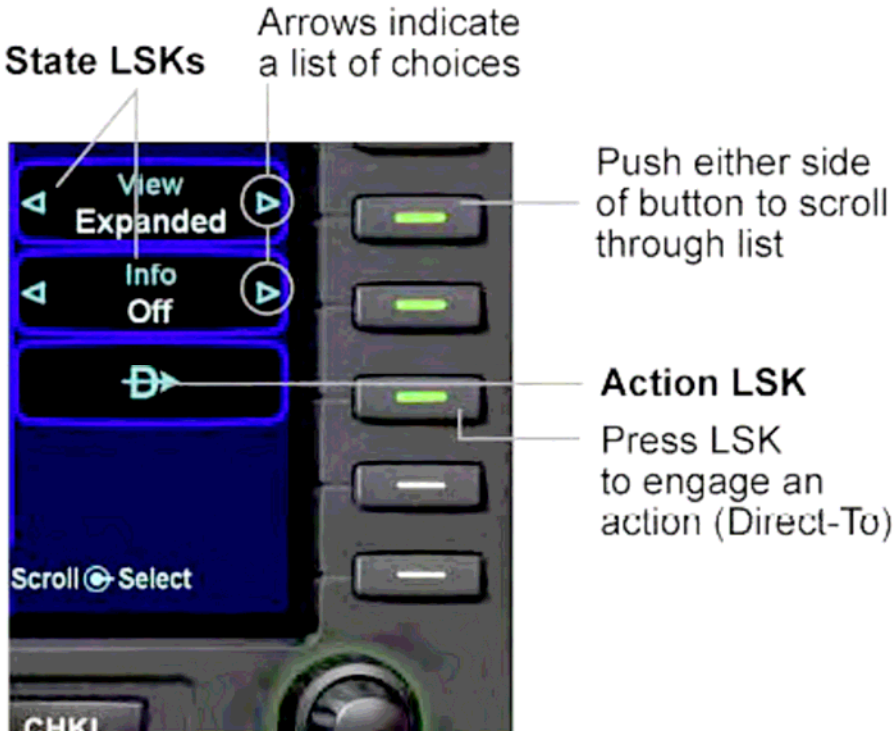



- Stores all aircraft-specific avionics configuration information
- It plugs into the back of IFD and stays with the aircraft harnessing
- It was designed to significantly reduce the time to restore an aircraft to flight status following the removal/replacement/reconfiguration
- It also significantly reduces the likelihood of human error when trying to reconfigure a system following maintenance
- Calibrations, setup options, some pilot preferences and even some data logs are stored in the ACM

# User Interface

- Page and Tab


- Home Tabs
  - Press and hold center of page function key
- Persisted Tabs
  - Go away and come back to same
- Auto step Tabs
  - Press and hold left or right edge of page function key
- Line Select Keys
  - Individually addressable
    - Only useable LSKs lit up
  - Two main types
    - State vs Action keys



# *Backup Com Tuning*

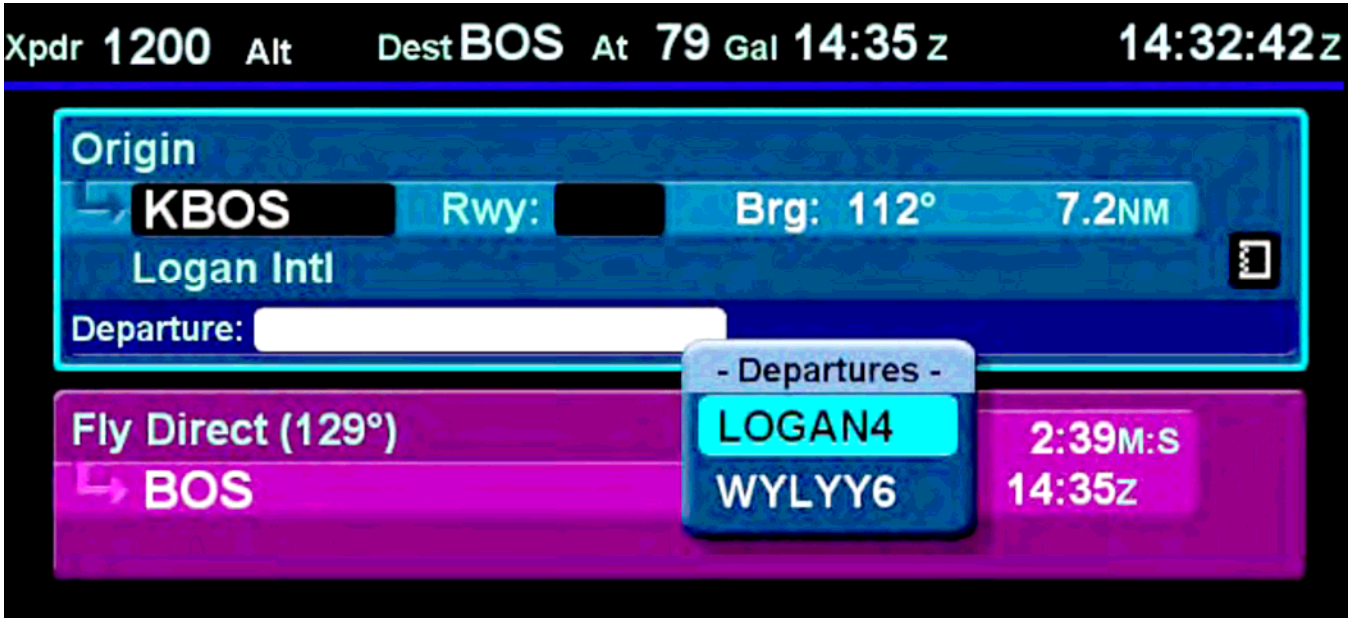
- Can use the IFDs to tune com radios if desired
  - Intended to be a backup capability, not primary method (use the keyboard for that)

- Use any datablock format page on MFD
- Left side LSKs and knob control tuning, flip-flop

- LSK L2 - use to switch between Com and Nav controls
- Outer/Inner rings of left bezel knob to select desired frequency
- Pushing of LSKs L3 or L4 perform the flip-flop action
- Frequency just tuned is displayed in large font just above left bezel knob
  - Stays there until timeout or other action selected

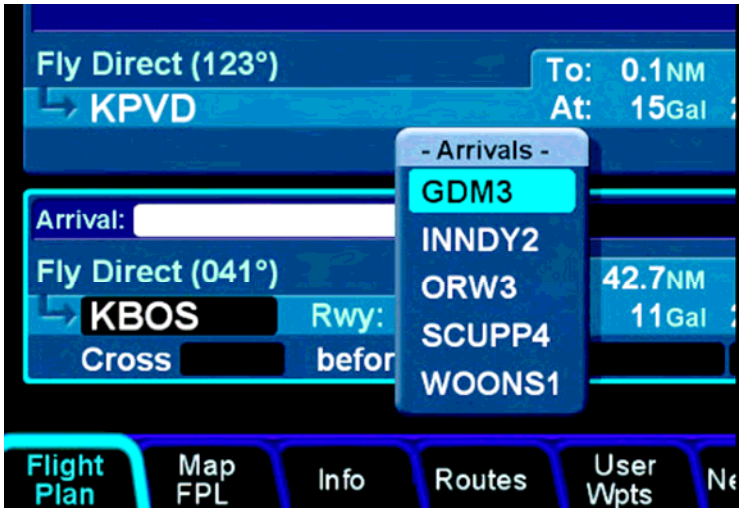
# *Adding Departures to Flight Plan (FMS900w)*

- As part of the flight plan building, published departures can be added and then automatically filled in
- Only applies to “Origin” waypoints
- Use the FMS knob to highlight the Departure field, then push in for a dropdown list of available departures
- Scroll up/down that list with the FMS knob, then push in to automatically load the desired departure into the flight plan



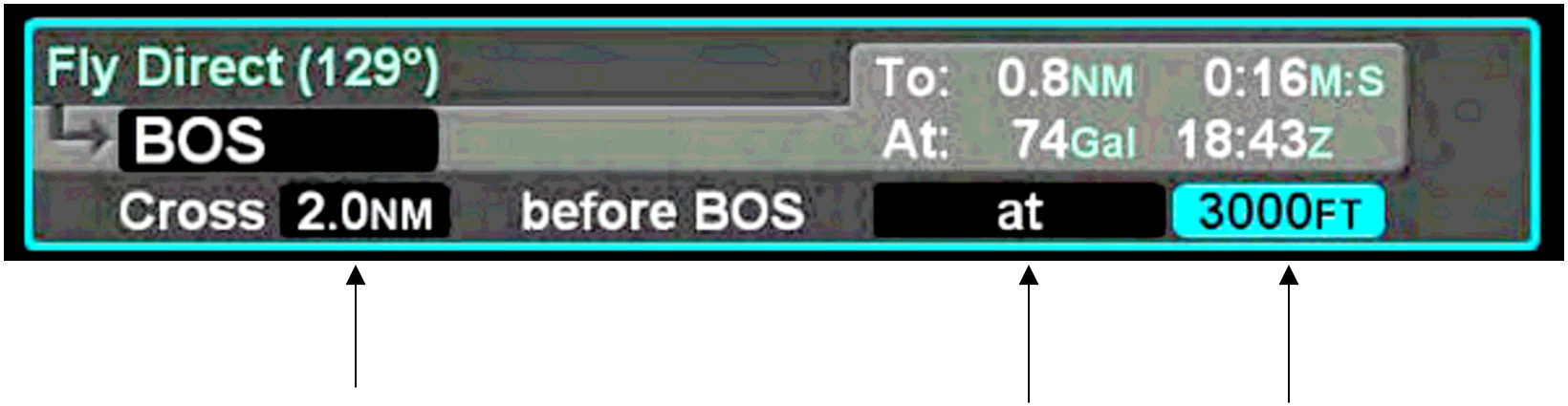
# Adding Arrivals and Approaches (FMS900w)

- 2 methods to add arrivals and approaches to a flight plan
  - Press the PROC button on keyboard
  - Use the FMS knob to scroll up/down the flight plan and highlight the desired arrival or approach field
- PROC method:
  - Just keep pushing PROC key until the desired field presents dropdown list. Use FMS knob to scroll up/down list and push to select
- FMS knob method:
  - Use the FMS knob to scroll up/down list and push to select
- In both cases, once the FMS knob is pushed in, the flight plan automatically fills in the procedure




# *Adding a Vertical Constraint to a Waypoint*

- Use the FMS knob to position the Edit Cursor over the desired field in a waypoint
- Push in the knob to put that field into edit mode
- Type or twist your desired value
- This will provide a:
  - Vertical Speed Required cue on the VSI
  - Visual depiction of the crossing constraint on the map
  - A top of descent cue on the map
- Vertical constraints are automatically added to approach waypoints with vertical constraints in the published procedure



# *Holding Operations*

- Holds can be put on all waypoints except:
  - Legs that terminate at an altitude
  - Legs that terminate with a DME distance
  - Legs that terminate with radial crossings
- Use the FMS knob to create an edit cursor and push in to generate a drop list of available options
- Select “Hold at <waypoint name>” and push in again to select

- To edit a hold, position an edit cursor around the holding leg of interest
- Use the FMS knob to highlight the specific field and make the edit
  - Turn direction
  - Leg length
  - Leg units
  - Inbound leg course

# Gaps and Discontinuities

- Sometimes the FMS cannot compute guidance between two points
  - Invalid leg type combination
- If the gap is not closed, the FMS cannot sequence to the next waypoint
- To close a gap, use the FMS knob to scroll up/down as required in the flight plan to place the edit surround cursor around the “Gap in Route” message. Then press the Connect LSK
  - Connects the two legs via a direct (straight) leg

# *Lateral Offsets*

- Some techniques and reasons why:
  - Offset yourself from a busy airway centerline for personal traffic deconfliction
  - In theory, FAA may request/require you to fly an offset
  - Cheat a little closer to a coast line
  - Because you are a power user and you can (and it's simple)
- From the Flight Plan tab, press the "Offset Route" LSK
  - Cursor needs to be on active leg (magenta leg) to see LSK label
- Use the right hand bezel knob to dial in the desired offset
  - Outer knob is coarse control (1 nm increments)
  - Inner knob is fine control (0.1 nm increments)
  - Rotate knobs left for left offset and right for right offsets
- Will have to press the "Confirm Right/Left x.x NM" LSK
- To cease offset operations, press the "Delete Offset" LSK
- Max offset allowed is 20nm

# *Use of Vectors Mode*

- Provides a means to temporarily divert off of planned route
  - Think of the weather avoidance scenario
    - Use the power of datalink overlay and Vectors to effortlessly avoid the threat
  - Think of the airspace avoidance scenario
    - For example, skirt around the edge of a MOA or controlled airspace
- Also provides a means to respond to ATC vectors in the departure or terminal area

- No need to change flight plan at all!
- No need to change autopilot mode at all!

- Press the -V-> function key on the keyboard
- Spin the HDG knob on the keyboard
- Watch the dashed magenta line move and position it where you want
- Use the PFD L5 LSK to arm/disarm the intercept
  - Vectors to Localizer final but not cleared the approach

# *Keyboard Integration – Clearance Entry*

- Flight from Phoenix Sky Harbor to Kansas City

# *Keyboard Integration – Clearance Entry*


- Use “.” or “Enter” between the procedure and the transition or between the airway and the exit leg
- Only enter enough characters to select the desired entry
  - Extra characters are OK, but not necessary
- 31 keystrokes for the above flight plan
  - <Enter>M.A<Enter>
  - <Enter>J2.L<Enter>
  - <Enter>J.I<Enter>
  - EMP<Enter>
  - KMC<Enter>
  - <Proc><Proc><Proc>J.E<Enter>

# *Quick Switch to Vectors-To-Final*

- When an approach is already loaded with an IAF and you want to switch quickly to a vectors approach
  - <Proc> - opens the approach dropdown
  - <Enter> - selects the current approach
  - <Enter> - selects vectors-to-final

# *Paste Identifier*

- FMS watches the identifier of interest and allows it to be pasted in a future operation
  - Flight Plan – Info
  - Nearest – Info

- Example
  - Look up an identifier on Info page
  - Tab back to the flight plan page
  - Open insert dropdown and select “Waypoint”
  - Paste button on LSK R2 contains identifier from info page
    - Press to use that identifier

# *Direct-To*

- Button available on LSK R4 of every FMS page
  - On-path
    - Works whether you think about identifier first or last
      - First – move cursor to the leg, then press –D->
      - Last – press –D-> then move cursor to desired identifier
  - Off-path
    - Keyboard entry enabled
    - GeoFill from present position
- Keyboard –D-> always available

# *Flight Plan Scrolling*

- Outer knob “quick twist” causes the cursor to jump
  - Use scroll bar to determine relative position of active leg
  - Cursor above the active leg
    - CCW twist jumps to origin
    - CW twist jumps to active leg
  - Cursor below the active leg
    - CCW twist jumps to active leg
    - CW twist jumps to the destination

# *Knob press with cursor on a leg*

- A hold is actually inserted *after* a leg, but some users think of it as being placed *on* a leg
  - Push knob while on a leg will automatically move the cursor down to an insert position and open the dropdown
  - Hold is available in that dropdown

# *Multiple Destinations*

- A flight plan can contain more than one airport
- Approaches or arrivals can be placed on any airport in the flight plan at any time
  - Good way to pre-plan alternates
- Current destination is the first airport with an approach, arrival, or runway after the active leg

# *Cancel Vectors on Active Leg*

- When –V-> is active, R1 on the Flight Plan page shows “Cancel Vectors”
  - “Offset” is available at the insert cursor position above the leg

# *Retry Approach*

- LSK L5 on the PFD will show “Retry Approach” when:
  - Active leg is in the missed approach
  - The approach transition is vectors to final

- Why not available for published IAFs?
  - Because the aircraft is at low altitude, we don’t want to automatically create a –D-> leg that could fly you into an obstacle
  - Technique for non-published missed:
    - Activate the leg to the IAF
    - Activate –V-> to intercept the desired leg of the approach
  - Technique for published missed
    - When established on the missed, -D-> the IAF

# *Hold Course Reversal*

- If the course reversal is not necessary, that hold can be deleted
  - Position cursor on the hold, press “Delete Hold” on LSK R5
  - Only procedure leg that can be deleted.

# *Distance to VHF Navaid (DVN)*

- "Pseudo DME" function
  - Computes terrestrial range, not slant range
  - Range from current GPS position to the station position from the navigation database

- Distance computed when:
  - The tuned navaid identifier has been decoded by the radio
  - The tuned navaid is a VOR, VORTAC, ILS/DME, VOR/DME
    - Identified as "VHF Navaid" in the nav database
    - Notice it is NOT required to have a DME component

# *Background Nav Radio Tuning*

- On Approach
  - Nav1 tuned to the navaid defining final approach
  - Before aircraft is on final, Nav2 tuned to
    - Active leg fix if it is a VHF Navaid (VOR, etc)
    - Recommended navaid for the active leg
  - Once aircraft is on final Nav2 tuned to missed approach navaid

- Departure, Enroute, Arrival
  - Search forward and backward from active leg to find first leg with a recommended navaid or terminated by a VHF Navaid
  - If the active leg has a recommended navaid, Nav1 is tuned to that and Nav2 is tuned to the backward navaid
  - Otherwise, Nav1 is tuned to the closer of the two navaids and Nav2 is tuned to the other

# *Keyboard*

- CLR key will perform a “Delete” function when applicable to the field highlighted by the cursor
  - On a leg, deletes the leg
  - On a field, clears the field
  - On a “Gap In Route” discontinuity, closes the gap

# *Clear the flight plan*

- Go to the Routes tab
- Move cursor to the “Current Route” item
- Press LSK R5 to “Delete Current”
- System will switch to the flight plan tab

# *"Home" Keys*

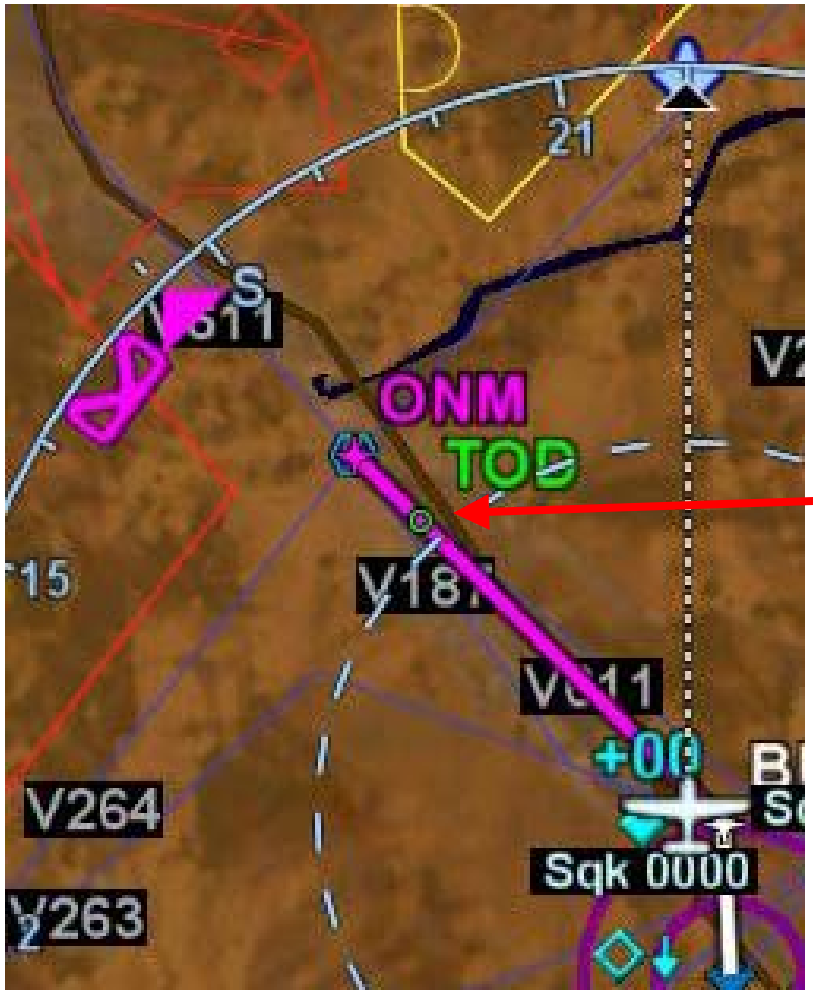
- Press and hold any of the bottom buttons to get to a known state in that subsystem
  - PFD – Nav Display tab, Flight Plan On, CDI Off
  - FMS – Flight plan tab, Expanded view, Info Off, Cursor around the active leg which is placed on the second line of the display
  - MAP – Map+ tab, Lightning Off, Wx Reports METARs, Land Low, Nav Medium, Wx Overlay NOWrad
  - SYS – Engine tab
  - Checklist – first Emergency checklist tab

- Detailed definition in Pilot Guide, 1st page of Appendix D

# Range to Altitude

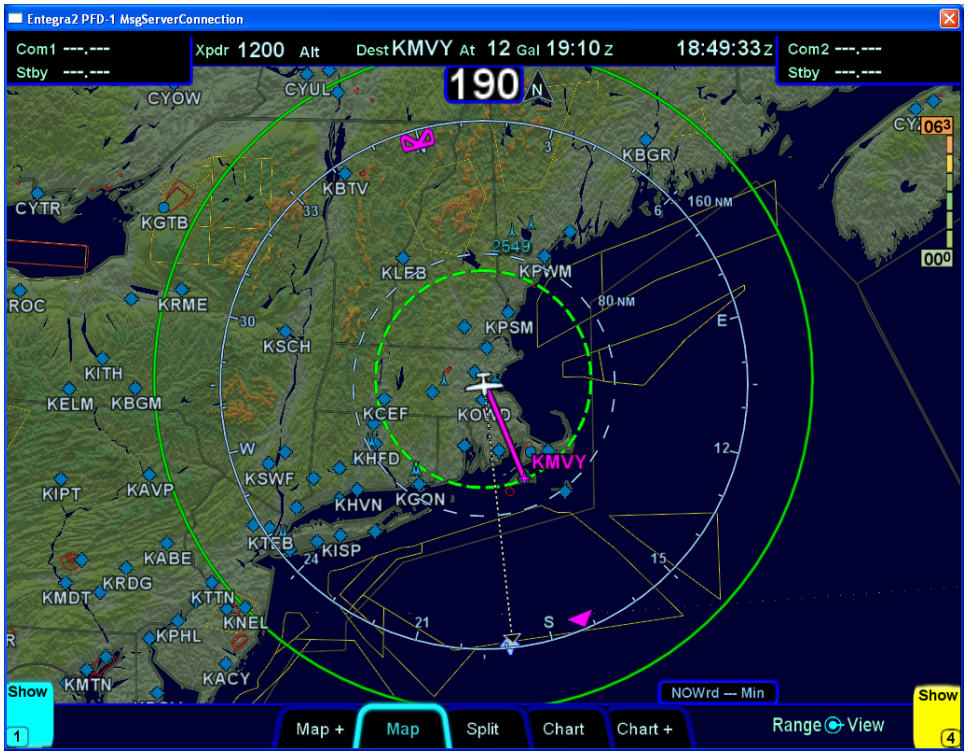

- Small green arc depicts the geographic point where, at the current vertical speed, the aircraft will reach the altitude target (Alt Bug value).
- Removed when current aircraft altitude is within 150’ of target altitude
- No setup option to prevent this feature from displaying
- One technique is to use it to judge if current climb or descent rate will clear an airspace altitude “shelf” constraint (e.g. Class B altitude bands)

# Top of Descent (TOD)




- Small green circle drawn on map indicates appropriate geographic location to start an enroute descent
- It needs to have a Destination defined in the flight plan and this destination needs to have an arrival or an approach as part of the flight plan before it can be computed
- How is it computed?
  - If there is a vertical constraint defined in the flight plan in any downpath waypoint, then it will use that vertical constraint as the target altitude and base it's computations on that
  - If there is no vertical constraint in any downpath waypoint in the flight plan, then it will use the destination elevation as the target altitude.
  - The rate of descent used for the calculation is a setup option on the FMS sub-tab of the Setup tab on the SYS page. Factory default rate-of-descent is 500 fpm

# Fuel Range Ring

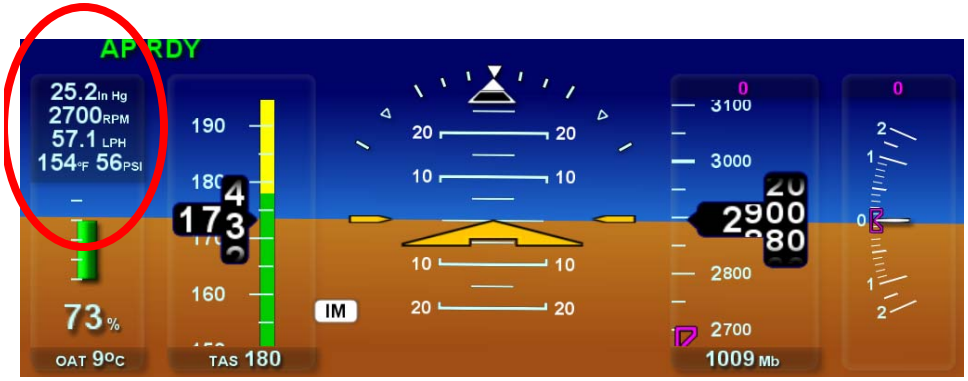


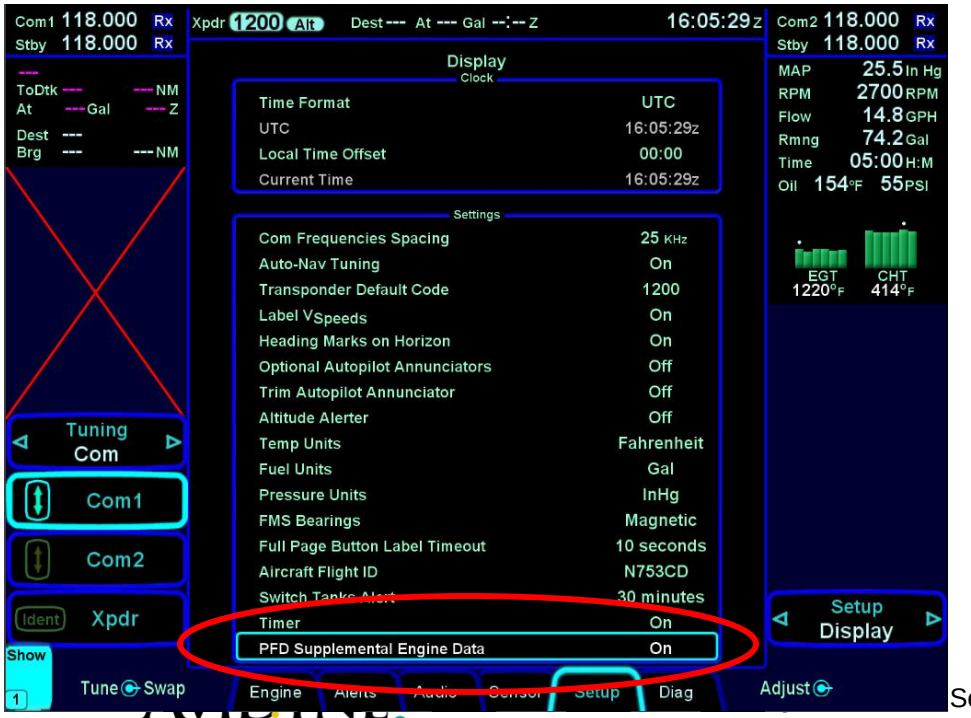

- Green fuel range ring shows max range of aircraft with a 45 min reserve
  - Dashed green = range leaving reserve
  - Solid green = range using the reserve
- Calculation is based on groundspeed (and therefore indirectly winds) and fuel totalizer value
- When only reserve fuel remains, the circle turns to yellow
- There is no setup option to turn these rings off
- Early software versions of R9 resulted in the fuel ring not being displayed at ranges or map declutter settings that did not show Special Use Airpaces (SUA)

# Airspace Alerting


- CAS messages are provided to alert pilot to presence of controlled/restricted airspace
  - Class B, C, D, TCA
  - Restricted, Warning, ADIZ
- Based on 4-D trajectory
  - 5 min look-ahead
- Think of this as using the aircraft velocity vector to compute
  - As long as the 3-D vector does not clip any part of the controlled/restricted airspace, no alert will be issued
    - You can miss an “inverted wedding cake” shelf by 10 feet and never get an alert by design

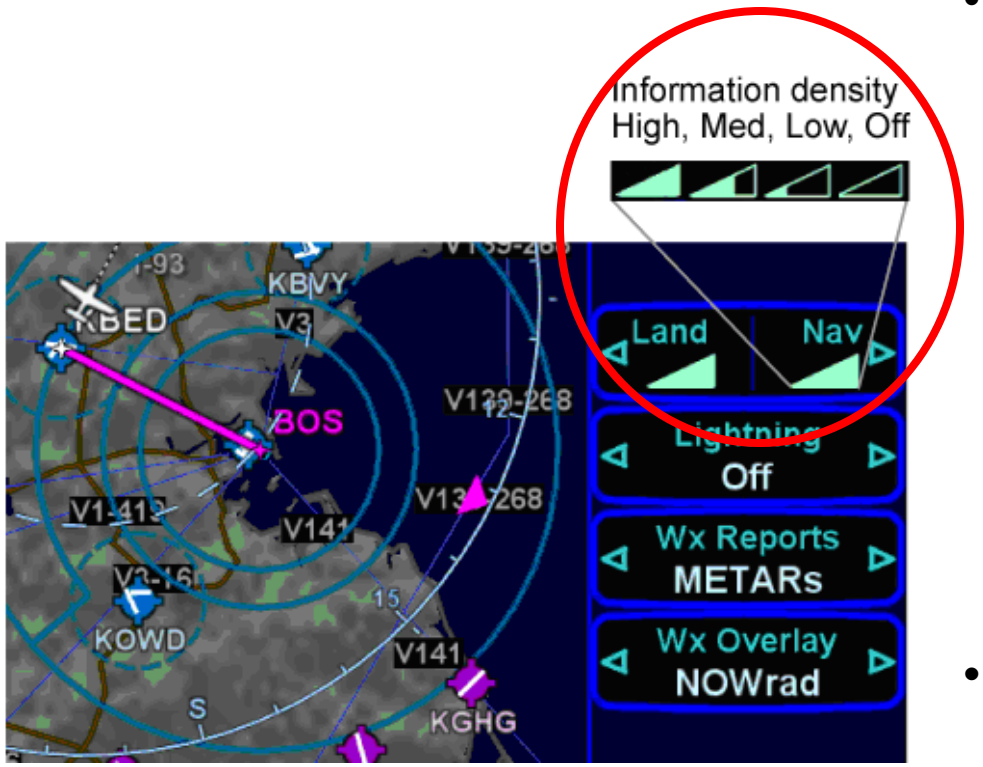
# Supplemental Engine Parameters on PFD




- Added in software release 9.0.2 in Sep ’09
- Even though there is always monitoring going on behind the scenes of all engine parameters, some pilots want additional engine parameters on the PFD
- There is a setup page option to turn it on (factory default is off)
  - They are either all on or all off, not individually selectable
- Normally aspirated pistons will display:
  - Manifold Pressure
  - RPM
  - Fuel Flow
  - Oil Temperature
  - Oil Pressure

# Map Declutter Settings




- Declutter triangle concept is still the same but it's been broken out into two types:
  - Land declutter…..
    - Terrain
    - Political boundaries
    - Rivers/Lakes/Oceans
    - Roads
  - Nav declutter……
    - Airspace
    - Victor/Jet airways
    - Obstacles
    - Navaids
- Each IFD can be individually controlled
- 4 levels
  - High, Medium, Low, Off

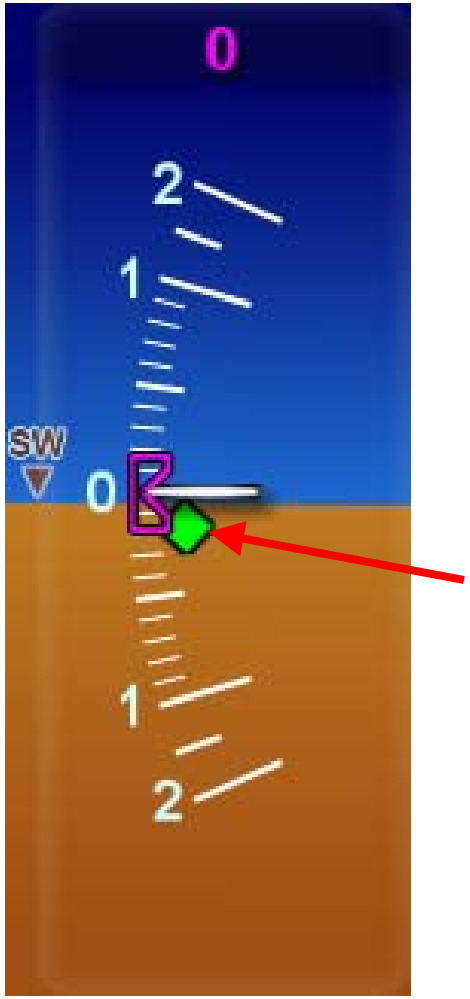
# Map Setup


- Access this page via the SYS key, Setup tab and cycle through the R5 Setup LSK until “Map” is displayed
- Can individually adjust most fields to create a custom declutter setting or use the R3 Default LSK to select:
  - Factory
  - IFR
  - VFR
  - Custom

# *“Etch-a-Sketch” mode*

- This is a combination of using the FMS Course Function and Vectors mode
- Using the active waypoint in the flight plan, the FMS Course Function knob (left bezel knob on left IFD with Primary Nav = FMS) can be used to select the desired inbound/outbound course from the waypoint
- At the same time, or right after the desired FMS course has been set, use the Vectors control (“Heading” knob on keyboard when the “-V->” button is active) to chose the desired intercept point to that FMS course line
- Since you can use the two knobs simultaneously and the entries are displayed in a graphical manner, it does feel like you are using a Etch-a-Sketch toy
- But, once you see this function in action, you can see the power of it

# Vertical Speed Required (VSR)



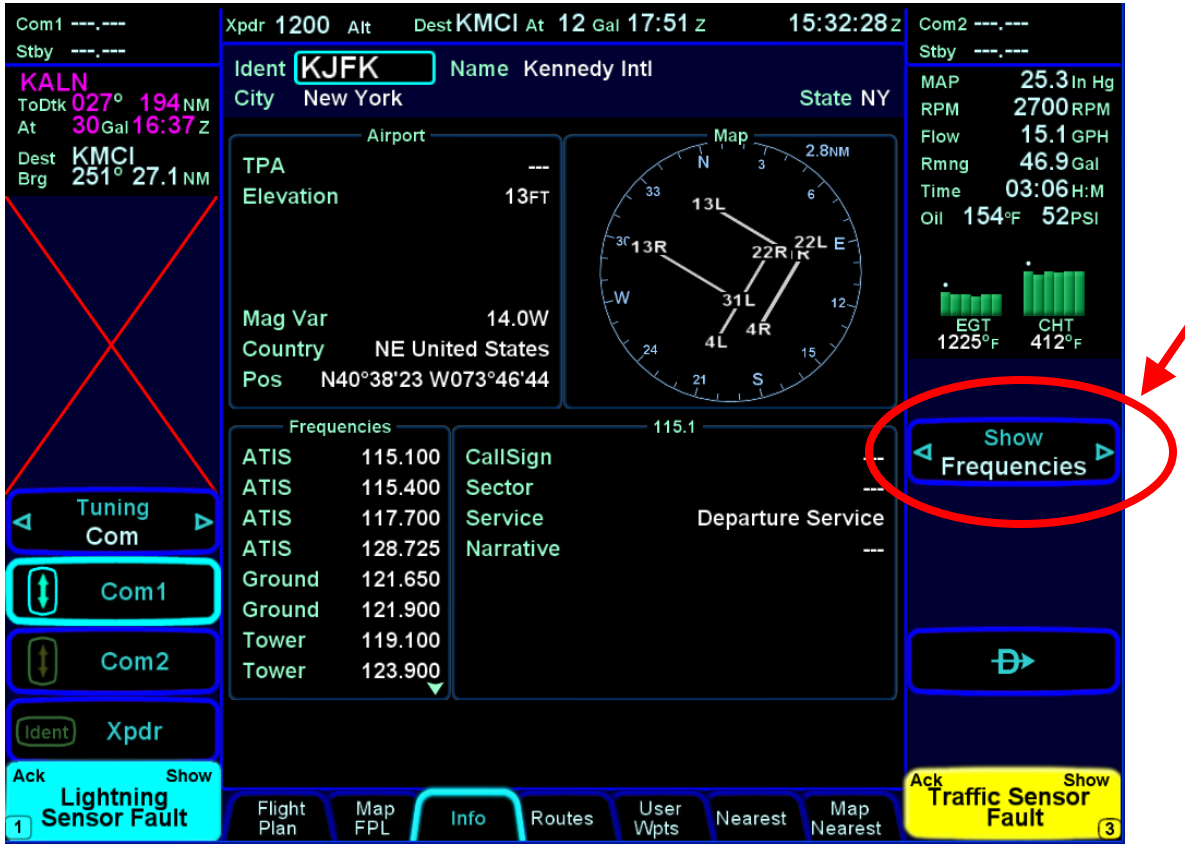

- Green diamond is drawn on the VSI scale to indicate the target vertical speed as computed by the FMS to make the next vertical constraint in the flight plan
- The shape is such that the point of the diamond touches the VSI scale at the target VSI and will perfectly fill the notch in the VSI Bug depiction
- A common technique is to dial the VSI bug so that the VSR diamond fits into the notch and press VS on the autopilot
- The VSI bug will not automatically couple itself to the VSR diamond – this is a manual dial mode
- If there is no vertical constraint in the flight plan, there will be no VSR displayed on the VSI scale

# “Proc” button on Keyboard


- Use it as a shortcut to attach a published arrival or approach procedure to a waypoint in the flight plan
- 1st press → MFD displays Flight Plan tab of FMS page with the Approach field of the next destination after current leg highlighted in reverse video, and a dropdown box of available published approaches listed
- 2nd press → Steps the reverse video over the Arrival field and presents a drop down list of available choices
- All subsequent presses → Steps through all following destination airfields approaches and arrivals until it wraps back around to top of flight plan
- Use the FMS knob on keyboard (or right hand knob on IFD) to scroll through the list of choices and push in on desired choice
- If no flight plan in the FMS, pressing PROC will present the Flight Plan tab on MFD with insert cursor at top of the page
- Only truly functional for FMS900w systems

Update this shot to show proc list on KB display and PROC key lit in green

# Info Tab of FMS




- The center and lower panes on this tab will change based on what is selected in the “Show” LSK
  - LSK choices are:
    - Frequencies
      - Example shown in figure
    - Weather
      - METAR
      - Winds Aloft
      - Temps Aloft
      - TAF
    - Runway
      - Lists all Rwy data
    - Calculator
      - Sunrise/Sunset
      - Density Altitude
- Use a combo of outer and inner rings of right bezel knob to scroll through the fields and make choices
- Can also just type in a new identifier on keyboard at any time

# *Backcourse Operations*

- If you've selected the published Backcourse approach from the list of available approach options for the destination in the FMS, then the rest of the operation is automatic
  - Primary Navigation (LSK L1) = Nav1 or Nav2
  - Front course value is set in the left IFD via the left knob
- When the FMS has determined that it is established on the back course localizer, the HDI on the bottom edge of the PFD ADI indicates "LOC BCRS"
  - Both the HDI and CDI will display correct sensing
- For autopilot-coupled approaches, the REV button will need to be pressed for the autopilot to turn in the correct direction

# *ILS Approaches in R9*

- Criteria here applies to ILS, LOC, LDA, SDF
- R9 will automatically switch from FMS to Nav1 (VHF Nav) when “established”
  - Within 1 dot deviation and within 45 degrees course deviation (intercept) for 5 seconds prior to changing
  - This also applies to the autopilot
  - If the above criteria are met, R9 will automatically engage NAV/APR and GS on the autopilot
    - GS will arm if in ALT mode and driving into glide slope from below

# *VOR Approaches in R9*

- VOR approaches require manual intervention
- Typical Techniques:
  - Ensure approach is loaded in the FMS
  - Manually select NAV on autopilot, no GPSS,  OR
  - Fly in NAV GPSS on the autopilot with Primary Nav = Nav1 inside the FAF
    - Primary Nav switch to Nav1 is **not** automatic
    - Primary Nav **will** automatically switch back to FMS when passing the MAP

# *WAAS Precision Approaches in R9*

- R9 will fly a published WAAS Precision approach (LPV) just like an ILS and will do so coupled to the autopilot under the following criteria:
  - Established within 1 dot deviation and within 15 degrees course deviation (intercept) for 5 seconds
  - Primary Nav source stays as FMS
  - Autopilot will automatically switch to NAV/APR mode and arm the GS under the conditions listed above
    - ALT mode will need to be active to arm the GS mode

# *Non-Precision GPS Approaches in R9*

- R9 supports the following non-precision GPS approaches:
  - LNAV
    - Manually select NAV-GPSS and VS on the autopilot to fly this type of approach
  - LNAV + V
    - Can manually couple to the autopilot
    - Vertical guidance does not take into account any step down fixes or potential obstacles (hence the manual coupling)
  - LNAV/VNAV
    - Automatic coupling to the autopilot is similar to LPV approaches
    - The only real difference between LPV and LNAV/VNAV operationally is the tolerances on the approach. Rel 9 treat them the same

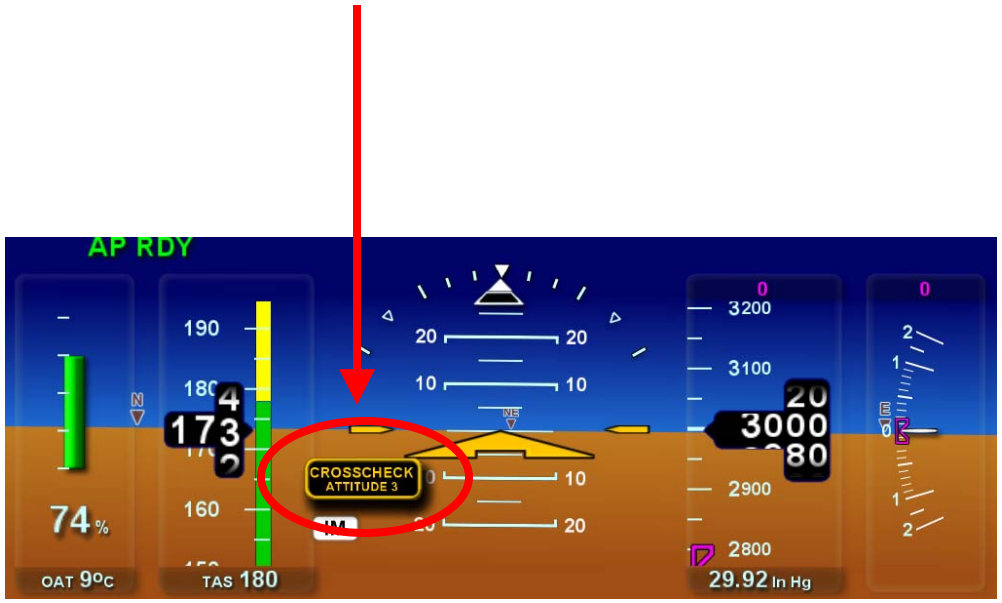
# Warmstart


- If an IFD was fully aligned and then experienced a power loss of up to 30 seconds, when power is restored, the IFD will enter warmstart mode
- A message is displayed on the ADI as follows:
  - PLEASE STANDBY – 2 seconds
  - ATTEMPTING QUICK RESTART – 10 second countdown
- No need to limit dynamic maneuvering during warmstart attempt
- 2 unsuccessful warmstarts in a row will result in a full alignment attempt

# Fast Erect

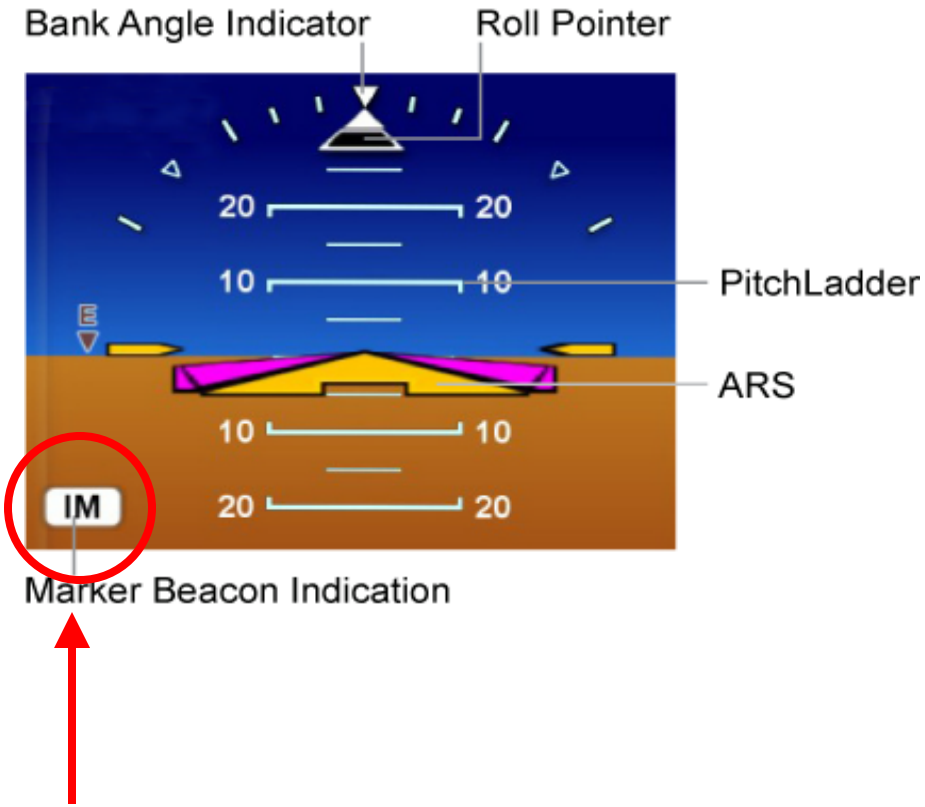

- Typically a recoverable ADAHRS anomaly
- In a dual ADAHRS system, this may be invisible to the pilot aside from an automatic switch to the offside ADAHRS
- In a single ADAHRS system or if the ADAHRS source selection is not Auto, then the following indications are presented:
  - All normal buttons labels on the PFD is removed
  - Attitude data removed and replaced with Red-X
  - A “Start Fast Erect” button label and message box appears
- Be sure you are in straight and level attitude before pressing
- After pressing, a 10 sec countdown is presented and at the end of that time, attitude will be displayed

# Crosscheck Attitude




- Each ADAHRS is constantly monitoring itself
- Triggers for this alert require a higher level of vigilance but do not warrant removal of the data and are not necessarily indicative of a hardware or software failure
- If equipped with dual ADAHRS and the source selection is set to Auto, the system will automatically switch to display the off-side ADAHRS data and not present a Crosscheck Attitude message
- If equipped with single ADAHRS, or the source selection is set to 1 or 2, a “CROSSCHECK ATTITUDE” message is displayed on the ADI
- If the message is presented, be sure to perform a disciplined crosscheck of the cockpit standby instruments

# Marker Beacon




- Only displayed on the ADI when aircraft is equipped with a PS Engineering Audio Select Panel
- The lamps will display on both the Audio Select Panel and the PFD
- Outer Markers, Middle Markers, Inner Markers and Airway Markers are all capable of being displayed
  - Airway markers display as “IM”

# *PS Engineering Audio Panel Techniques*

- Use MON1 or MON2 to monitor other frequencies without having to put them into the active freq of either radio
  - The monitor function lets you listen to whatever freq is in the standby freq of the radio (MON1 = COM1 Standby, MON2 = COM2 Standby)
    - Put ATIS/AWOS/ASOS into MON2 and monitor it as required
    - Put 121.5 into MON2 and monitor during cross country legs
    - Etc
  - Use the Monitor button on the PS Engineering panel to “toggle” the monitor on/off
- Volume control for the Monitor “channels” are on the SYS page function, AUDIO tab (SYS-AUDIO)

# *Power Outage Scenarios*

- All equipment required for IFR flight remains fully IFR capable indefinitely when only Alt2 remains
  - With discretion with the use of Pitot Heat, landing lights and TKS, a pilot can easily fly longer and retain sensors, transponder, flaps, and trim for landing at destination
- R9 can run indefinitely on combined Alt2/Bat2 supply
  - Alt2/Bat2 also powers the autopilot
- With the loss of Alt1, the audio panel will only operate as long as Bat1 lasts
- Life of Bat1 can be extended by pulling one of two circuit breakers from IFD1 and IFD2
  - By specifically pulling the IFD CB that comes from the Main Bus, the life of Bat1 will be extended
- R9 FAQs on the www.release9.com website provides more test results for some scenario based tests

# *FMS900w vs. FMS400*

- They are the same FMS with the following differences:
  - FMS400 does not have any WAAS precision approach capability
    - FMS400 approach drop down list will not include any precision WAAS approach options
    - There is no need to equip the aircraft with WAAS-capable antennas
  - FMS400 does not support airway navigation as part of FMS flight plan drop down lists
    - This means each waypoint/intersection of an airway must be typed into the flight plan (but Geofill still makes this very easy)
  - FMS400 does not support factory enabled Arrivals and Departures
    - In this configuration, there is no ability to create drop down lists to select published arrivals or departures to airfield
  - Lack of selecting published arrivals, approaches and departures from an airfield means that the keyboard PROC key has no real use
  - The Setup Main tabs of the SYS page will display which FMS is loaded in the IFD

# *Items or Features that can be "turned off"*

- PFD Timer
  - Use Setup Display tab
- HSI CDI
  - CDI on/off LSK on PFD pages
- Flight Plan overlay on HSI
  - Flt Plan on/off LSK on PFD pages
- Bearing Pointer overlay on HSI
  - "Off" selection in Bearing Ptr LSK
- PFD Heading Horizon Tick Marks
  - Use Setup Display tab
- Altitude Alerting
  - Use Setup Display tab
- Labeled Vspeeds on ADI
  - Use Setup Display tab
- Most map features
  - Use the Declutter triangles on Map pages
- Extra 55X autopilot annunciators
  - Use Setup Display tab
- Trim in motion annunciator
  - Use Setup Display tab
- Switch Tanks Alert message
  - Use Setup Display tab
- Supplemental Engine data on PFD
  - Use Setup Display tab
- Victor and Jet airways in FMS dropdowns
  - Use Setup FMS tab
- Arrivals and Departures in FMS dropdowns
  - Use Setup FMS tab
- Map page compass rose
  - Use Setup Map tab
- Use of Altitude filter on Map declutter settings
  - Use Setup Map tab