

Entegra Release 9 Self Study Material *“Basic User” Course*

14 Sep 2009
Version 1.0



Transition Training Block Agenda

- Academics
 - R9 Basic Concepts
 - R7/8 → R9 Differences
 - FMS Operations
 - Radios/Transponder Operations
 - Enroute Operations
 - Autopilot Operations
 - Terminal Area Operations
 - Divert/Missed Approach Operations
 - Recommended System Flow
 - Night Operations
 - Caution Alerting System
 - System Failures
 - System Setup
 - WAAS Operations
 - WSI Operations
 - Pilot Guide Organization

Module Objective

- Assumption:
 - You are already familiar with the basic tenets of R9
- Objectives:
 - Provides an introductory self-study version for R9. By taking this course, you should be prepared for a productive R9 sim session and/or orientation flight. If taken after a flight, this module should be helpful in reinforcing what was learned in-flight.

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



R9 Basic Concepts

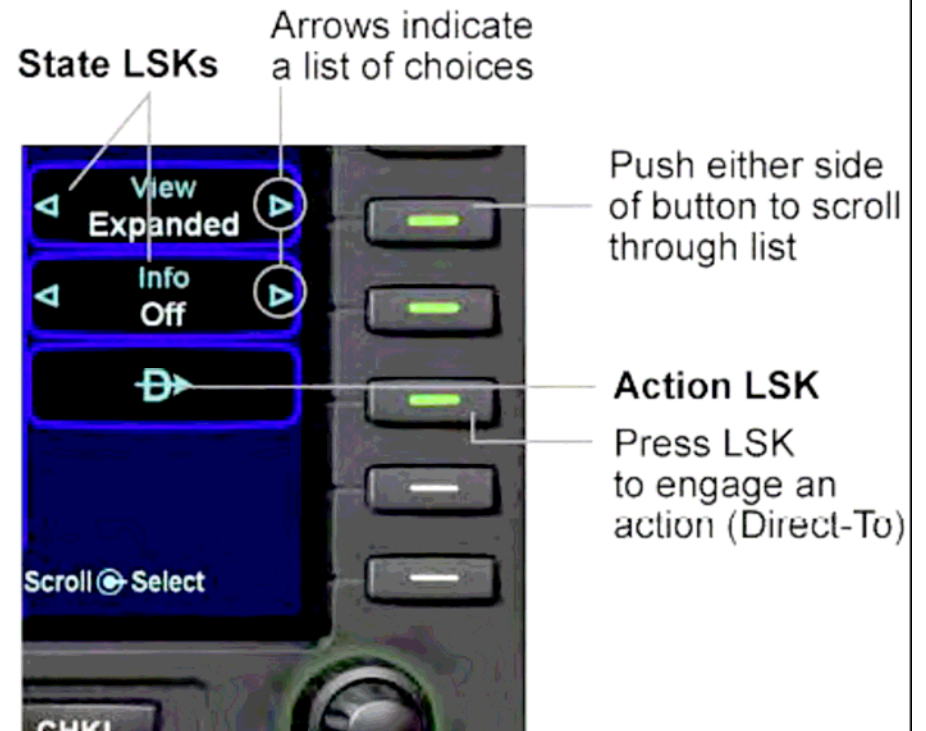


User Interface

- Page and Tab



- Line Select Keys
 - Individually addressable
 - Two main types



4 Display Formats

Example

- Half Page Format
 - PFD ADI always on upper half
 - Bottom half (ND box) is selected via page function keys
- Full Page Format
 - Function selected takes up full page
 - LSKs can be set up to time out if desired, just like EX5000
- Datablock Format
 - Left/Right sides are populated with fixed and pilot-selectable datablocks
- Split Format
 - IFD split vertically down the center
 - Mostly designed to be “info”pages

PFD

Map

Map +

Map-FPL



“ND Box” Concept — *press function key on bezel to fill the ND box*

ND Box



ND Box Examples



Keyboard Layout

Map panning joystick

Function Keys

Dedicated Volume and Swap Keys

Autopilot Control Knobs



Startup

- IFDs and Keyboards automatically boot up when power applied
 - BAT2 → PFD, Keyboard (and MFD)
 - BAT1 → MFD
- No on/off switches
- Wakeup brightness is 100%
- ADAHRS warm-up box just like your existing system
 - Will get a yellow caution lamp if ADAHRS2 still aligning
 - Alignment time still 2+45 from time warm-up box displayed
 - Can still taxi early but we don't recommend that
- Right IFD startup behavior
 - Initial Fuel page if all databases and software current
 - All buttons/knobs locked out until set initial fuel
 - System Status page if databases or software non-current

Initial Fuel Page

All other LSKs and Function Keys locked until select "Done"



Fuel LSKs

Inner Knob Turn left or right = Fine tuning
Push = Enter or Done

Outer Ring Turn left or right = Coarse tuning



R7/R8 --> R9 Differences



General Differences

- Page Navigation
 - Page and Tab UI (R9) vs. Knob rotation through pages (R8 and earlier)
 - Function Keys along bottom of each bezel
- Display Redundancy
 - Identical HW and SW
 - Each display able to back each other up
- Display Brightness and Resolution
 - Wakeup brightness – now 100% (R9) instead of 75% (R8 and earlier)
 - XGA resolution – higher res than 1st generation displays
 - Backlighting technology and reliability – LED backlighting solves top reliability issue from 1st generation displays
- Dedicated controls
 - Baro knob – each IFD has own baro knob
 - AP Targets (Altitude, Heading, Vertical Speed) – all dedicated knobs on keyboard and autopilot now

General Differences (cont.)

- Caution-Warning System added
 - Master Caution Warning/Caution lamps on PFD
- Switch Tanks alert added
 - Timing is pilot selectable
- Failure modes are much more robust
 - No loss of function, just loss of redundancy (function still available on 2nd display)
- Maintenance and system upgrades much simpler
 - Most of parts can be replaced in the field instead of shipping back to factory
- Extensive on-board diagnostics and troubleshooting available
 - Pinpoints the problem LRU
- SW updating now all can be done in the field
 - USB port on front of each bezel therefore no factory return required

PFD Page Changes

- ND Box concept (lower half of the PFD)
 - HSI replacement
 - Function keys – use them to fill the ND box with desired info
 - Can't put map into North Up or display Charts (FAA prohibition)
- Altitude Alerting
 - Pilot selectable option - defaults to Off
 - Visual alerts approaching the target altitude and deviating from it
- Timer
 - Use for any scenario
 - Pilot selectable option - defaults to On
- Winds Calm
 - Winds less than 5 knots now display as "Winds Calm"
- Active Com Freq (only works with PS Engineering PMA8000B)
 - Decodes and displays agency and freq

Map Page Changes

- Declutter Controls slightly different – separated nav and land data
- Map panning is new feature – use keyboard joystick to pan
- Fuel range ring new feature
- Chart extent box new feature
- Datalink switched over to Sirius/WSI from XM/WxWorx
- No dedicated TAWS page
 - Aural in headset and CAS messages including Master Caution instead
- TWX (Avidyne lightning) full color mode not yet supported
 - Expect support in first half 2010
- Some Release 8 Wx Datalink features not yet supported
 - Canadian and Caribbean weather reporting
 - Expect support in first half 2010

Improved Autopilot Integration (55X)

- Does not require roll servo mod
- Increased lateral performance
 - R9 FMS provides precise input to autopilot
 - Minimizes overshoots
 - Precision tracking of flight planned route
- New automation during approach transitions
 - If flying enroute in GPSS mode, no longer need to press the NAV button on autopilot control head to transition from GPSS to NAV (localizer)
 - FMS will auto toggle the autopilot at appropriate time
- Advisory VNAV from FMS
 - Vertical Speed Required (VSR) cue provided on VSI tape when altitude constraints in the FMS
 - Will tell you exactly what VS the autopilot should fly

Elements that haven't changed

- Vspeeds on Air Speed Indicator
- Engine Indication on ADI
- Heading Horizon Tick Marks
- Projected Track Lines
- Bearing Pointer on PFD
- Trend Vectors
- Rate of Turn Indicator
- Taxi Charts

FMS Operations

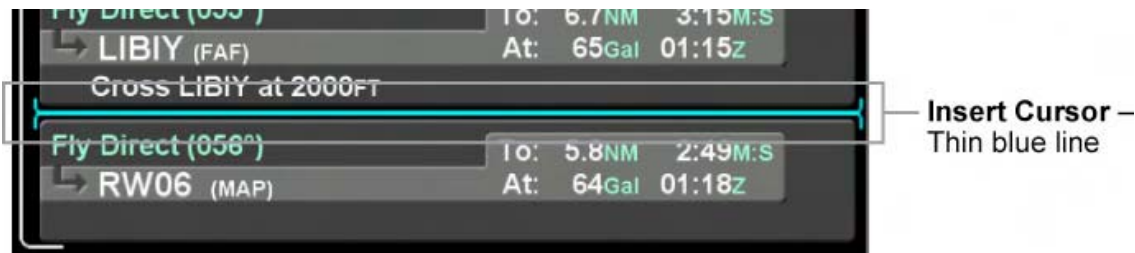


Basic FMS Philosophy

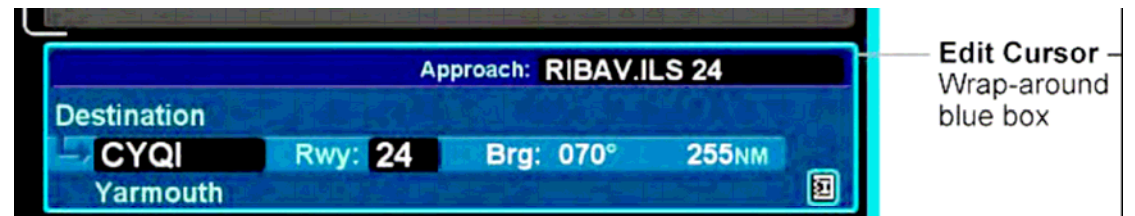
- “Fly the Magenta Line”
 - Much faster and easier to build a flight plan than any system you’ve ever used
 - Use the power of the FMS and the display graphics to fly the active leg of the flight plan via the map
 - Migrate away from the use of an HSI
 - Deviation is still presented, even without an HSI
- Use the automation to reduce your workload in-flight
 - Flight plan automatically activates on departure roll
 - Transponder automatically switches Alt mode
 - Traffic sensor automatically switches out of standby on departure roll
 - Engage the pre-set autopilot targets/mode on climbout
 - Use the FREQ LIST button to rapidly find and select frequencies
- Single pilot IFR/IMC operations has just become much easier, much safer, and therefore, something that all of us can do and be extremely comfortable
 - Think about how much freedom this gives you to use your plane to its fullest extent. This should increase the utility of your airplane

FMS Basic Concepts

- All edits are live edits (no scratchpad)
- Color coding scheme in place
 - Origin and landable airports – Blue
 - Current leg – Magenta
 - All other leg types – Gray
- Cursor types
 - Insert Cursor



- Edit Cursor



Flight Plan Creation

- 1st time “Flight Plan” tab is accessed on any given flight:
 - Empty Flight Plan page presented
 - Origin is automatically populated
 - Insert cursor positioned right below origin
- Fastest (and primary) method of Flight Plan entry is via the keyboard, and specifically the FMS knob
 - Just push and twist the FMS knob to highlight and select the desired option
 - If need to type in a waypoint, use the keyboard and by the 1st or 2nd character, Geofill has already filled in the right one
 - Airway planning only requires you to select the exit point (FMS900w)
 - Add as many procedures (FMS900w) and destinations/alternates as you want

Saving/Naming a Flight Plan

- Use the Routes tab of FMS page
- A route name will be automatically filled in if your flight plan has a valid origin and destination
 - “KBED - KMLB”
- Name is editable
 - Use right knob to ensure edit cursor
 - Push the knob, if required
 - Use keyboard to type name
 - Press Enter LSK
- Can save up to 32 flight plans



- “Copy” LSK can be used to save flight plan as well



Activating a Flight Plan

- Automatically activates at approximately 40 knots GS
- Manual option available via LSK on right side
- Note: If you made the flight plan on the Routes tab, you will have to manually activate it via the LSK method

Other Misc Flight Plan Actions

- Copying a Flight Plan
 - Use Routes tab
 - Highlight desired route from the list via FMS knob
 - Press Copy LSK
 - Edit the name as desired
- Inverting a Flight Plan
 - Use Routes tab
 - Highlight desired route from the list via FMS knob
 - Press Invert LSK
 - Name of flight plan is reversed - either keep the name if you're happy or type in a new one via keyboard
- Compacting or Expanding Flight Plan View
 - If you would like to see every leg, set the View LSK to Expanded (default value)
 - To abbreviate the viewed flight plan, set View to Compact
 - Hides all intermediate legs of an airway between entry and exit as well as procedures
 - The active procedure or airway is always Expanded despite the View choice

Using the Radios and Transponder



General Radio and Transponder Info

- Keyboard is primary location for com tuning
- Nav tuning is automatic - flight plan will do that tuning for you
 - Can manually tune nav freqs via the keyboard if desired
- Keyboard is primary location for transponder code/mode entry
- Backup locations for all those tasks are all on the datablock pages of the MFD
- Radio freqs are always displayed in top left/right corners of MFD
- Radio freqs are always displayed on the left edge of keyboard
- When integrated with PS Engineering Audio Panel, decoded freq of selected radio displayed on PFD (eg “Seattle App”)



Primary Com Tuning

- Keyboard Function Keys will always time out to whichever Com radio is lit on the Audio Select Panel w/i 10 sec
- If COM1 or COM2 Function Key active (lit in green), just type a number on keyboard
 - Puts that freq into standby freq of the selected (lit in green) radio
 - Shortcuts provided for faster radio tuning
 - No need to enter leading “1”
 - No need to type in decimal point
 - No need to type in trailing zeros
 - No need to type in the thousandths digit in 8.33 KHz spacing
 - Font on keyboard goes extra large when typing new freq
- Com entry is confirmed by:
 - Press “Enter” on keyboard to confirm it into standby position, OR
 - Press the Flip-Flop key to move it immediately into active position, OR
 - Wait for time out which will put it in standby position with trailing zeros
- Dedicated volume knobs along left edge of keyboard display
- Push those volume knobs to toggle squelch on/off



Frequency List

- Use **FREQ LIST** function key on keyboard
- Presents a list of most logical frequencies for your geographic position and phase of flight on the keyboard display
- Scroll up/down list as required using **FMS** knob
- Push **FMS** knob in to nominate freq to standby position of active radio



Nav Tuning

- Remember, it's automatic if a flight plan is entered
 - Tunes the VORs and Localizers used to define your flight plan into Nav1
- Manual means is provided on keyboard
 - Works exactly like the Com Tuning
 - Or type the VOR ID (e.g. "MLB")
- Backup means is available via MFD datablock pages
 - Works exactly like the Com Tuning

- If you're a flight plan entry kind of pilot, there is no reason to ever tune a nav frequency again. Ever.

Typical Enroute Operations



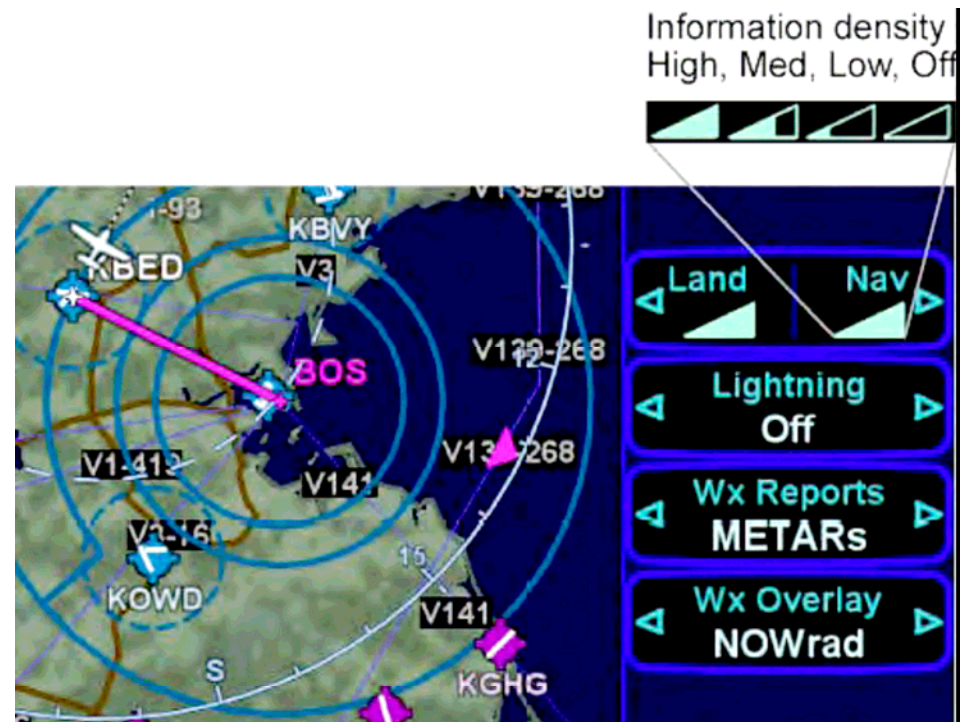
Engine Leaning

- Very similar to previous generation Entegra
- Differences:
 - Start Lean Assist LSK
 - Lean Assist status block area
 - Need to press “End Lean Assist” (used to press Normalize) once Best Economy or Best Power is displayed
- Techniques for how to perform and throttle techniques haven't changed
 - But if you take your time between boost pump on - switch tanks - boost pump off, you may likely get a Fuel Flow Changed message and therefore get bumped out of Lean Assist

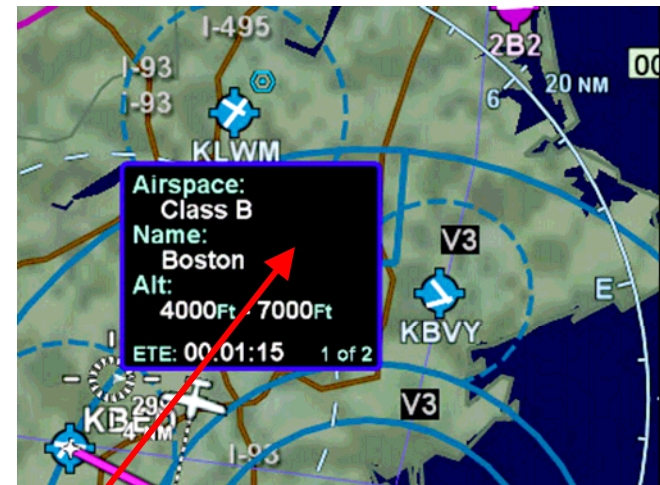


Use of the Map

- Map Layouts – use tabs to pick it
 - Full
 - Datablock
 - Split
 - Half
- Map Views – push knob to pick it
 - North Up
 - Heading(Track) Up - 360
 - Heading(Track) Up - 200
- Map Range – twist knob
 - Same as E1
 - Right knob (except in split pages)
- Map Declutter – use LSK
 - Same concept of triangles as E1
 - But split up into Land and Nav
- Each IFD can be set up differently



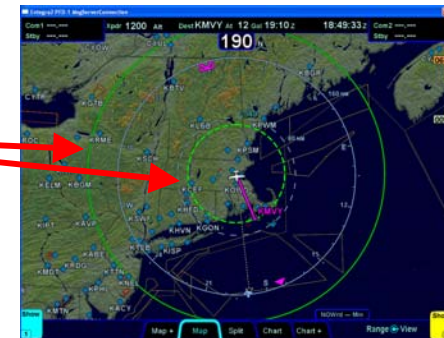
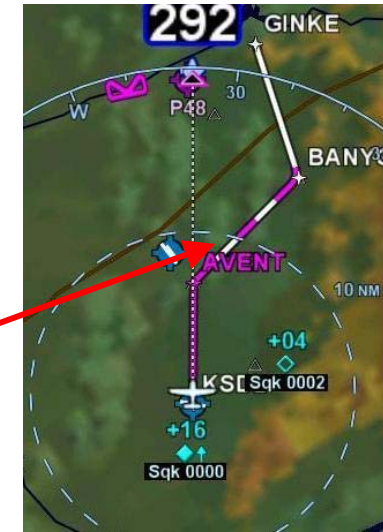
Map Panning



- Use cursor on keyboard to pan map
- Twist action of cursor control will change map range
- Snap vector of bearing and distance from ownship next to cursor
- Hover over hotspots for pop up boxes
 - Twist of cursor now will step through pop up box pages, if multiple
 - Push the cursor will exit panning mode and recenter map on ownship

Other Cool Map Features

- Next Leg Depiction on Map
 - Current leg = magenta
 - Next leg = candy cane (magenta/white stripes)
 - Think of teardrop holding pattern or procedure turn
 - Rest of legs = white
- Fuel Range Ring
 - Dashed green ring indicates max range with reserve fuel
 - Solid green ring indicates max range using your reserve fuel
 - Green becomes yellow if all you have left is reserve fuel
- Chart Extent Box
 - Represents geographic boundaries of the flight plan instrument procedure
 - Gives you a good visual cue when it's appropriate to select the chart for viewing
 - Ownship symbol will be present on the chart



Modifying a Flight Plan

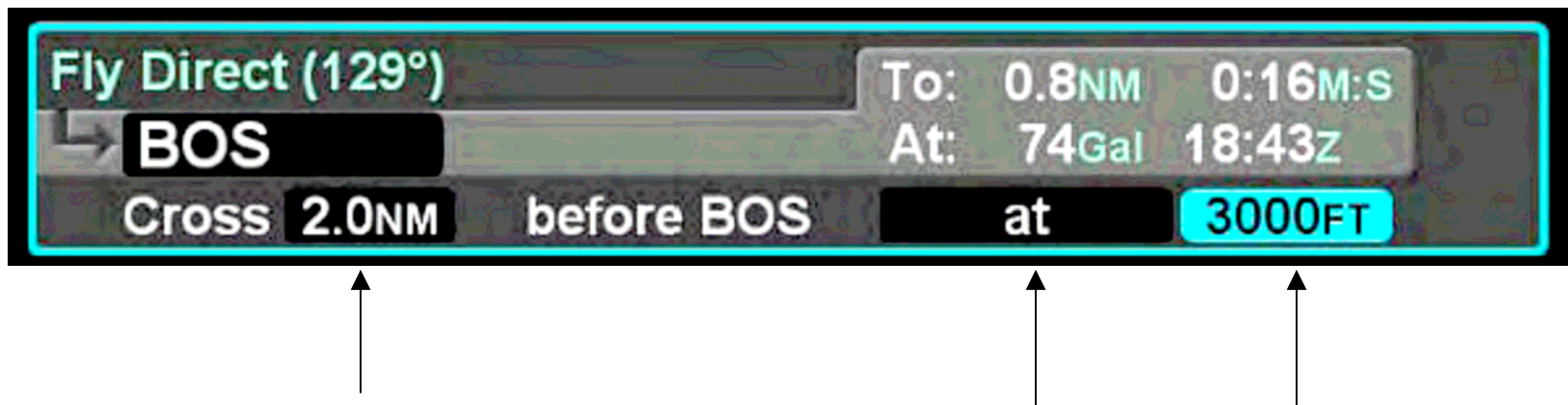
- Insert a Waypoint
 - Pick any page/tab combo that shows your flight plan
 - Use the FMS knob to scroll up/down flight plan as required, to position your insert cursor where you want it
 - Push in the FMS knob to present a dropdown view of your options
 - Use the FMS knob to scroll up/down drop down list as required to select the option you prefer
 - Push in the FMS knob to select that option
 - If you want to enter a Waypoint, start typing on the keyboard and remember that by the 1st or 2nd character, you should be done
- Editing a Waypoint
 - Use the same methodology as above to select the waypoint and field you want to edit (will be reverse highlighted)
 - Push in the FMS knob to present a dropdown list of your options or start typing in the keyboard for your edit

Modifying a Flight Plan (cont.)

- Deleting a Waypoint
 - Pick any page/tab combo that displays your flight plan
 - Use the FMS knob to scroll up/down the list as required to place the edit cursor around the waypoint to be deleted
 - Press the CLR button on the keyboard to delete the waypoint
 - Continue pressing CLR to walk up the flight plan deleting waypoints as you go
 - An alternative method is to press the Delete Waypoint LSK if you are on the Flight Plan tab
- Deleting an Entire Flight Plan
 - Select the Routes tab of the FMS page
 - Either press the Delete Current LSK and then confirmation box, OR use the right hand bezel knob to scroll up/down list of flight plans to highlight the one you want to delete

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 when a runway is selected
 - A plain english description of the vertical constraint in the flight plan leg



Creating a User Waypoint

- There are 4 ways, all from the User Waypoint tab of FMS page
 - Present Position
 - Press PPOS LSK to take a snapshot of where you are
 - Automatically creates, labels and saves the waypoint
 - Enter Latitude/Longitude
 - Press NEW LSK
 - Then use FMS knob to select lat/lon fields and type in coordinates
 - Press Confirm LSK to save it
 - Enter Place/Bearing/Distance
 - Press NEW LSK
 - Then use FMS knob to select the Place/Bearing/Distance fields and type in values from keyboard
 - Press the Confirm LSK to save it
 - Use the Map Cursor
 - Select User Waypoints tab on PFD and one of the Map tabs on MFD
 - Activate the map pointer using keyboard cursor
 - Press the Pointer LSK on the PFD
 - Automatically creates, labels and saves the waypoint

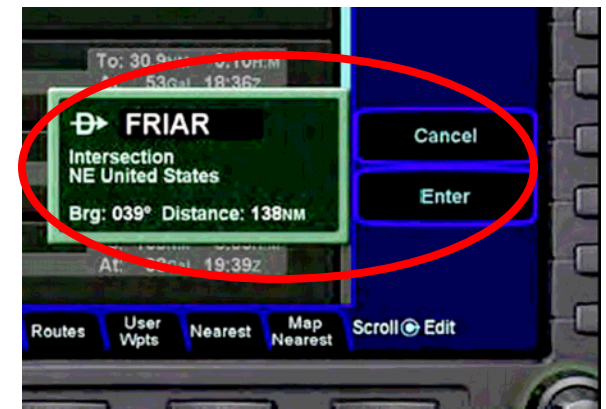
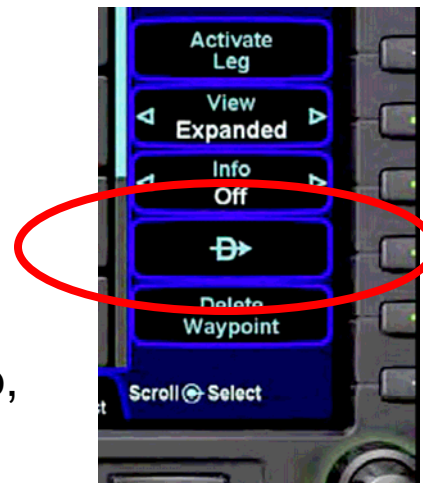
Entering and Intercepting a Radial

- FMS Course mode makes the current waypoint act like a VOR allowing you to fly inbound or outbound a specified radial
- Use the PFD page, Primary Nav --> FMS
- Left knob labeled “Course”
 - Inner ring adjusts by 1 degree increments
 - Outer ring adjusts by 10 degree increments
- Rotate the knob as required to select your desired radial
 - Watch the CRS value display the selected value within the Primary Nav datablock
- Pushing the left knob in takes you out of FMS Course function
- Also exited when the airplane intercepts the active waypoint in a To intercept or when intercepting a down-path leg in the From case

- Power User technique - combine this FMS Course function with Vectors for “Etch-A-Sketch” capability

Direct-To Operations

- Press the -D-> button on the keyboard at any time
 - Brings up Flight Plan tab of FMS page
 - Green Direct-To dialog box is presented
 - Geofill will populate the dialog box with most logical choice
 - Either press Enter or type desired point into keyboard or use the FMS knob to scroll up/down the flight plan waypoints as desired
- If already on the Flight Plan tab, you could press the -D-> LSK
 - Then pick up as above



Graphical Flight Plan Legs



- Each Flight Plan leg is written in English/Clearance Language
- Enhanced with graphical presentations when useful
 - Procedure Turns with Course Reversals
 - Holding Patterns

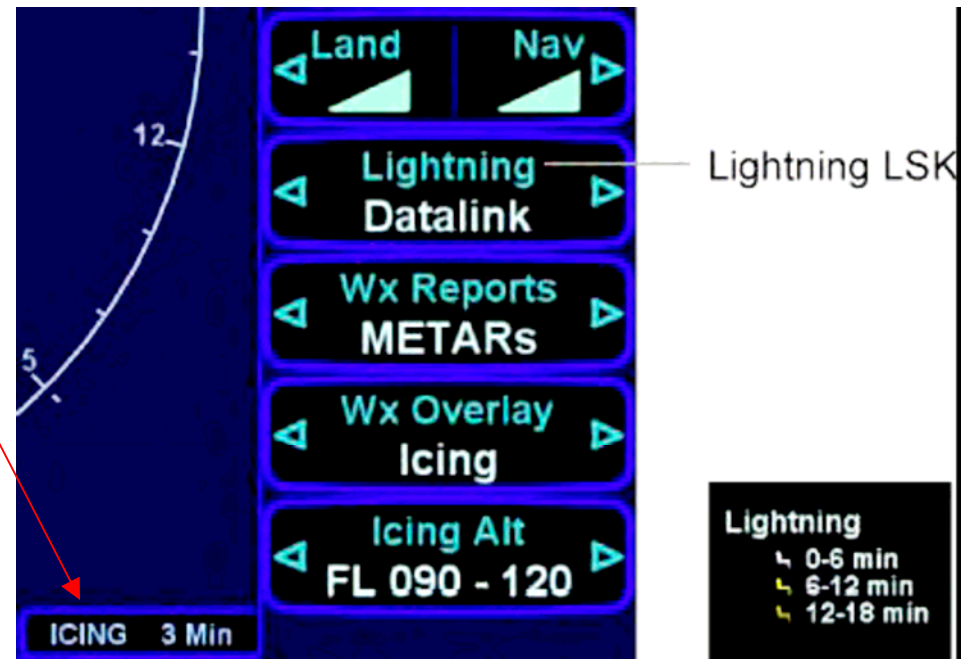
Nearest Function

- Dedicated Function Key on Keyboard
 - Press NRST function key --> MFD switches to Map-Nearest tab
 - Can use right hand bezel knob to scroll up/down that list
 - As you scroll through the list, the airport or fix is highlighted on the map
 - Each subsequent press of the NRST function key steps through a different category of nearest items
 - Nearest Airports to Present Position
 - Nearest Airports to Destination
 - Nearest VORs
 - Nearest NDBs
 - Nearest Intersections
 - Nearest ARTCCs
 - Nearest FSS
- Also have two tabs on FMS Page
 - Map-Nearest: same split page referenced above
 - Nearest: datablock formatted page for larger view of nearest data



Datalink Operations

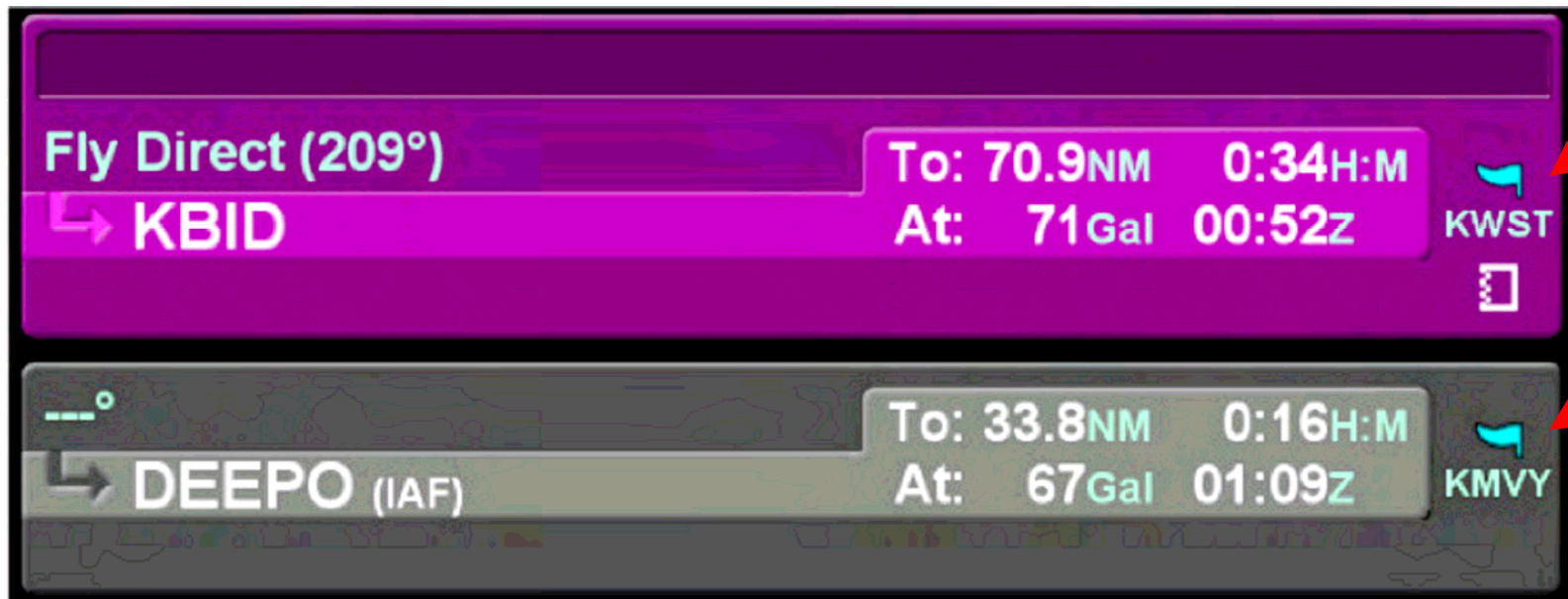
- Very similar operations to E1
- Ages presented at bottom of map
- TFRs always displayed
- Overlays controlled via LSKs along right side
 - Lightning LSK
 - Determines source of lightning overlay on map
 - Button label behavior dependent on type sensor installed (see section 5 of the pilot guide)
 - Wx Reports LSK
 - METARS, AIRMET/SIGMETs, All, Off
 - Wx Overlay LSK
 - NOWRad, NOWRad+, Icing, Icing+, Off
 - Icing Alt LSK
 - Controls vertical slice being displayed
- NOWRad and Icing no coverage areas indicated by hatching
 - Hatching also indicates datalink areas not yet received



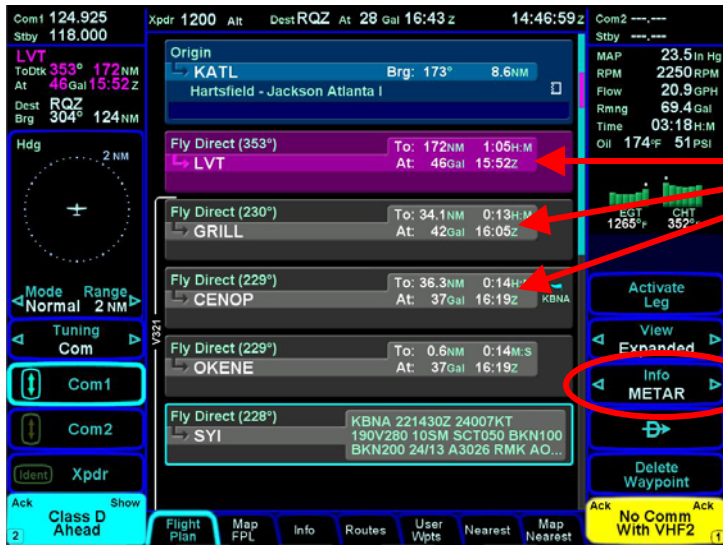
The + suffix indicates display of storm cell info that includes cloud tops, directional and speed vectors and hail prediction

METARS in Flight Plan

- Each leg of a flight plan will have an associated METAR flag
- Represents closest reporting station
 - May not be the same location as the leg itself
 - Will always be identified right below flag to know where this weather was from



Info for a Flight Plan leg



- The shaded, raised strip within each flight plan leg is sometimes called the “paddle”
- Use the Info LSK (R3) on the flight plan tab to change the data displayed on the paddle
 - Off = Waypoint data
 - METAR = Undecoded METAR text
 - Nav = Nav data about waypoint



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!
 - It's an effortless way to divert and recapture plan

- 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

Autopilot Operations



Basic Autopilot Control

- Dedicated bug controls now
 - Altitude on keyboard
 - Heading on keyboard
 - Vertical Speed on STec
- Keyboard display goes to extra large font when changing value and times out in a few seconds
- Autopilot relay modified and allows continued autopilot control and operations even in the event of a lost left IFD
- Values highlighted in reverse video on PFD while being changed and times out in a few seconds



More on Autopilot Bug Control

- Keyboard knobs have several behaviors available
- Altitude Bug
 - Rotating knob changes by 500' increments
 - Pushing and rotating knob changes by 100' increments
 - Can type in any value on keyboard when Alt Bug is active
 - Pushing the knob syncs to nearest 100' of current altitude
- Heading Bug
 - Rotating knob changes by 10 deg increments
 - Pushing and rotating knob changes by 1 deg increments
 - Pushing the knob syncs to current heading
- Vertical Speed Bug
 - Rotating knob on Stec changes by 100 fpm



- Rotate to set Altitude Bug
- Rotate = 500ft increments
 - Push and rotate = 100ft increments
 - Rotate and then type numeric keys for 1ft increments

Autopilot Annunciations



- Very similar operations from E1
- Added -V-> annunciation when in Vectors mode

Some Recommended Autopilot Techniques

- Pre-Takeoff
 - Place the AP in HDG mode (GPSS will not work without groundspeed) and shortly after takeoff, place the AP in GPSS/ALT/VS mode and use Vectors FMS mode (press –V-> on the keyboard) with the dedicated HDG bug to make your initial climbout once the AP is activated. When you intercept your flight plan course or enter a "Direct To", the FMS will switch out of Vectors mode
- Enroute
 - Fly in GPSS/ALT mode with an active flight plan in the FMS. If a divert is needed off the flight plan for any reason (e.g. weather along route, traffic conflict, etc), press the –V-> button on the keyboard and spin the heading bug as required. When clear of the conflict, spin the heading bug back to create an intercept to the original flight plan.
- ILS Approach
 - System auto switches from FMS to VHF Nav when established (1 dot deviation and within 45 deg course deviation for 5 sec). Autopilot mode switching will follow by automatically engaging NAV/APR and GS. Glide slope must be captured from below.
- WAAS Precision Approach (LPV)
 - Primary Nav stays in FMS mode and the autopilot will auto switch to NAV/APR with GS armed when established (1 dot deviation and within 15 deg course deviation for 5 sec).
- Non-Precision GPS Approach (LNAV, LNAV+V, LNAV/VNAV)
 - LNAV allows for manual coupling to the autopilot. Must use NAV and a VS mode to make this happen.
 - LNAV+V allows for manual coupling but since the vertical guidance does not take into account step down fixes or potential obstacles we do not automatically select this for the pilot
 - LNAV/VNAV allows for automatic coupling just like an LPV approach. The only real difference between LPV and LNAV/VNAV operationally is the tolerances on the approach.

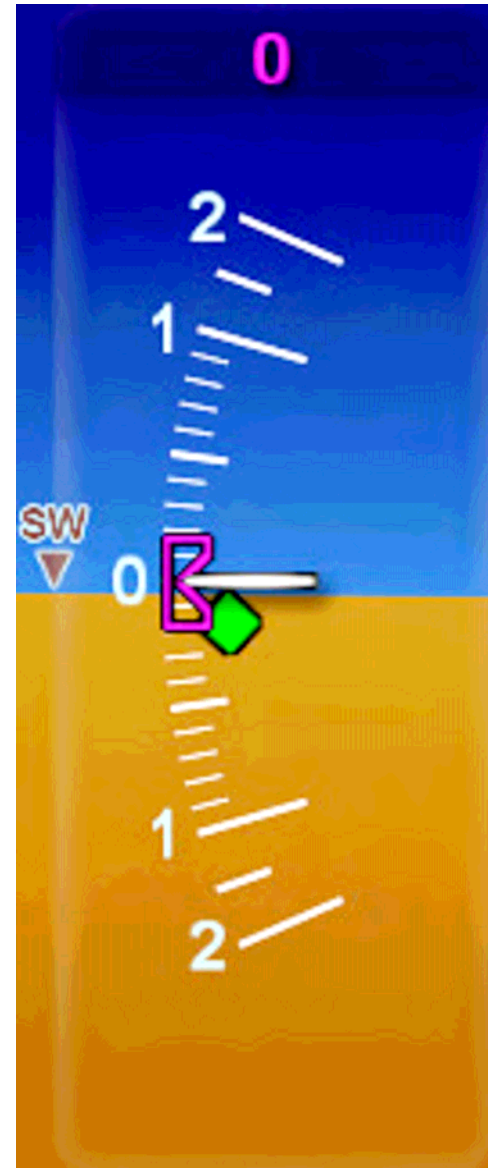


Terminal Area Operations



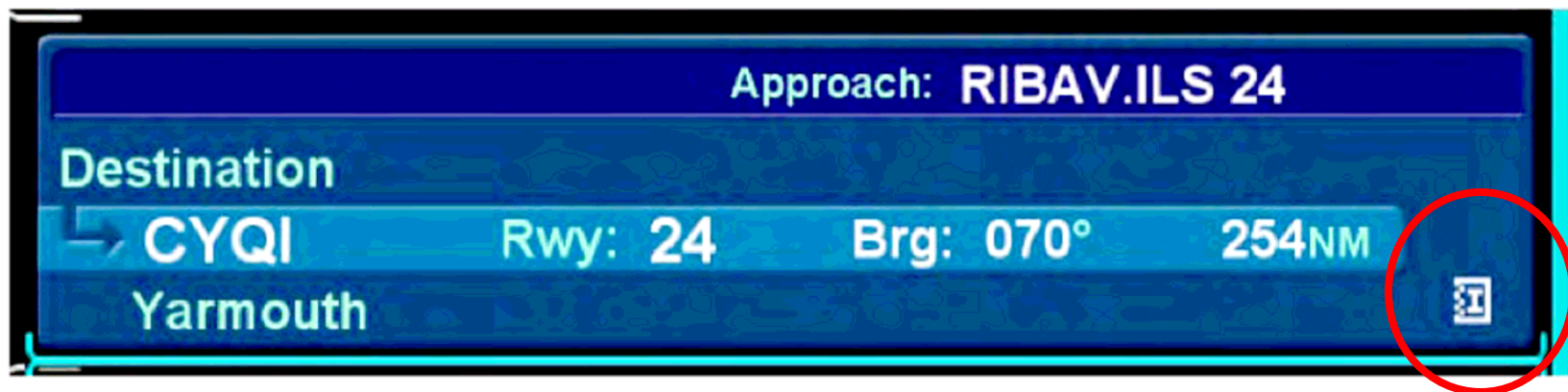
Enroute Descents

- Top of descent cues on map
 - A green circle is drawn on the map with TOD label to indicate when it is time to start the descent
- Vertical Speed Required cue on the VSI
 - If you've entered some vertical constraints into your flight plan, the VSR is displayed on the VSI
 - Match the actual VSI with the VSR and this will ensure you meet that vertical constraint
 - If using VS mode of autopilot, just dial in the VS target to match the VSR



Hot Links to Charts

- Automatically present if the blue flight plan leg (airfields) has at least one published approach associated with it
- Use the FMS knob to scroll up/down until the chart icon is highlighted in reverse video
- Press the FMS knob
 - Either the specific chart for the published procedure will appear OR the directory of possible procedures for that airfield



PFD L5 LSK “Hook” into FMS

The L5 LSK can be thought of as your plan decision maker. It provides context sensitive choices and cues for the next pertinent decision

- **Fly Vectors**
 - Press this LSK to enable Vectors mode
 - Will not intercept approach legs past FAF
- **Arm Intercept**
 - Appears when in Vectors mode and the intercept is not armed
 - Use this to create a smooth intercept of the final approach course
- **Disarm Intercept**
 - Appears once an intercept has been armed
 - Use this if ATC has not cleared you for the approach and you need to continue on the vector across final
- **Activate Approach**
 - Displayed if either the next downpath approach in the flight plan is preceded by a discontinuity and the aircraft is within 40 nm of the FAF, or
 - The next leg of the flight plan is the first leg of a published approach and either there is a discontinuity or a Vectors-To-Final arrival is selected
- **Retry Approach**
 - Displayed when the active leg of the flight plan is part of a published missed approach and you were conducting a VTF approach
 - Selecting this option will put FMS back into Vectors mode to retry the approach
 - This option will not be displayed if you were on a published approach
- **Enable Published Missed**
 - Displayed when the next leg of the flight plan is the first leg of a published missed approach
 - Typically occurs immediately after the FAF
 - Selecting this option will activate the published missed approach for that approach if in the flight plan
- **Continue/Exit Hold**
 - Displayed when the active leg of the flight plan is a hold and is not the last leg of the route

Use of the Timer

- Three kinds of uses – see page Section 6 of your Pilot Guide
 - Time a course or holding pattern
 - Time a one-time event
 - Time and continue

Diverts/Missed Approaches



Missed Approaches

- Ensure the published missed approach was part of your flight plan
- Can be manually activated anytime inside the FAF
 - Press the PFD L5 LSK, which should be labeled “Enable Published Missed”
- Smoothly apply power, establish proper attitude, trim for the power setting then use the autopilot and target bugs to produce a smooth and precise flight condition
- FMS will automatically toggle the Primary Nav LSK from Nav1 to FMS under the following conditions:
 - Past MAP
 - Autopilot is not engaged
 - “Enable Published Missed” LSK has been pressed
- If you weren’t executing a full published missed approach, the L5 LSK will display “Retry Approach” under the following conditions:
 - Active leg is part of a published missed approach
 - You were conducting a Vectors-To-Final approach

Recommended System Flow



Recommended System Flow

- Left IFD
 - Use the outboard function keys
 - CHKL during ground ops and in-flight as required
 - Prior to takeoff, one technique is to select an Emer checklist tab such as Engine Failure – that way, it's available with a single button press
 - PFD for HSI or other use (e.g. EVS)
- Right IFD
 - Use the middle three function keys
 - FMS – enter flight plan then use Map-FPL tab
 - Map – select Map+ tab with preferred map view and range
 - SYS – select Engine tab
 - Flow is right to left
 - SYS/Engine → Taxi, Takeoff
 - Map/Map+ → Climb, Initial enroute, or VFR flight
 - FMS/Map-FPL → Enroute, Terminal, Approach phases
- Now just press the function keys along the bottom edge of the bezel for quick changes

Night Operations



Night Ops

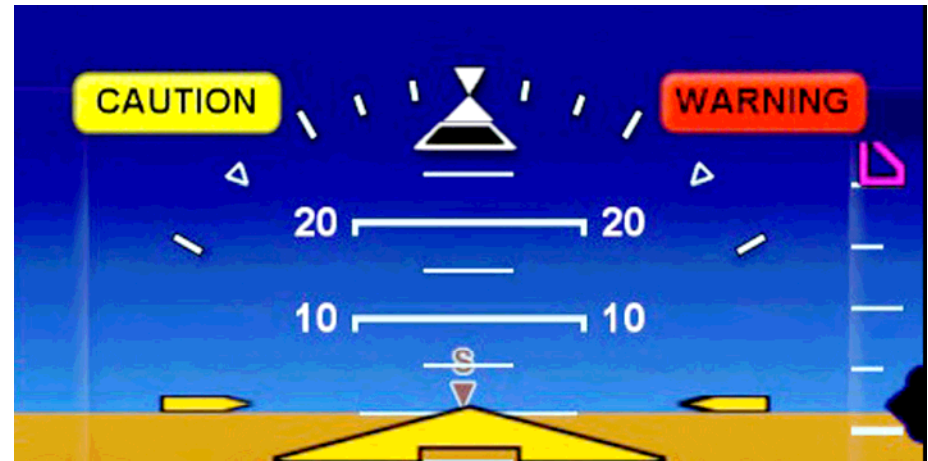
- Actually becomes a pleasant experience
- Minimal lighting considerations
 - IFD Display Brightness
 - Individual BRT/DIM rocker switches on each display
 - Controls LCD brightness
 - IFD Bezel Brightness
 - Controlled by cockpit dimming rheostat on the bolster
 - Controls Keyboard backlighting as well
 - Active buttons are still presented in green, just dimmer
 - Keyboard Display Brightness
 - Controlled by same cockpit dimming rheostat just mentioned
 - Keyboard Bezel Brightness
 - Controlled by same cockpit dimming rheostat just mentioned
 - Charts Lighting
 - There is a Day/Night lighting LSK (day is a bright white background)
 - Technique only - turning map terrain on/off

Caution-Warning Alerting System (CAS)

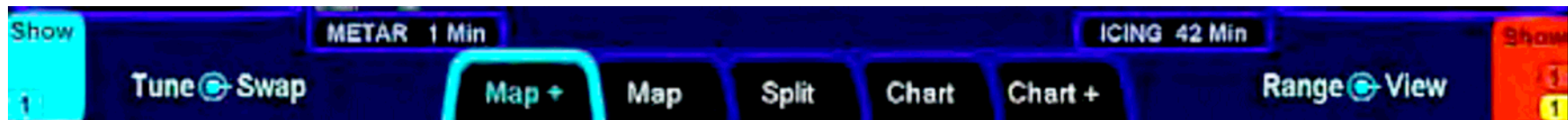


Levels of Warning

- Warnings (red) - Immediate action should be taken/performed
- Cautions (yellow) - Immediate attention should be applied
- Advisories (cyan) - A change in system state that you should be aware of
- Behaviors
 - Master Caution Lamps
 - Red Warning - Acknowledge flashing but will remain steady for duration of condition
 - Yellow Caution - Acknowledge flashing and will extinguish
 - New flashing for each new condition
 - High Oil and Low Volts have permanent red lamps for duration of condition



Message Bar Behavior



- Each IFD has two message bar areas (bottom left and right corners)
 - Advisories are on the left and Warnings/Cautions are on the right
- Numeric indications telling you how many of each type are currently active
- Top of each message bar will present “Ack” and/or “Show”
 - Press the corresponding side of the LSK to either acknowledge the message (and take no further action) or show more information (MFD will likely change pages)
 - IFDs are sync'd so that ack'ing on one acks for all
- When all active messages have been acknowledged, left with reminder tabs
 - Show color and number of active alerts in each color category

System Alerts Tab



Miscompares



- In dual systems, the parameters shown in yellow to the left are always subjected to comparators
- If a miscompare is detected, the condition is presented by the highlighted yellow with associated text shown in this figure
- In the event a miscompare is detected and displayed, apply diligence in crosschecking all on-board data sources

System Failures



General Info

- Current draw is such that load shedding is not required
 - Each IFD draws 4.25 amps (nominal ops) or 8.25 amps (radio transmit)
- Pick any bus or alternator combination - system can operate in all cases
- A failure is “a shrug”
 - You don’t lose any functionality*
 - You only lose redundancy
- * exceptions listed in Section 10 of the Pilot Guide and are non-hazardous
 - Loss of PFD could result in loss of:
 - Control and Display of Becker Mode C
 - No comm with EGPWS
 - Low Fuel discretes inop
 - Not allowed to display Chart data on a single IFD (North Up orientation)
 - Loss of MFD could result in loss of:
 - Mode control of L3 Skywatch
 - Can not mute Avidyne TAS aural alerts
 - No comm with L3 WX500 Stormscope
 - No manual tuning of DME, if equipped



Loss of an IFD

- How tell?
 - Bezel backlighting and display go black
- What lost?
 - Nothing aside from * exception list on previous slide
 - If lose left IFD, right IFD will automatically start behaving like a left IFD
- Recommended Actions
 - No change in operations but be aware you have lost redundancy
 - If you suspect the left IFD is operating in an anomalous way, you can press the PFD page function key on the right IFD
 - Consider cycling both circuit breakers of the affected IFD, depending on what the System Status tab says on remaining IFD

Loss of Display (LCD)

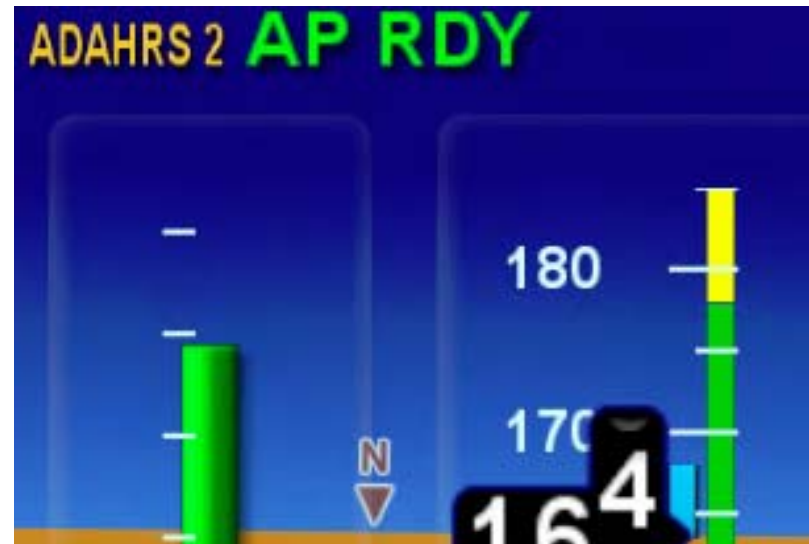
- How tell?
 - Display goes black but bezel backlighting is still present
- What lost?
 - Only the affected IFD display
 - Still have redundant sensors available on the databus
- Recommended Actions
 - If lost the left IFD display, press the PFD page function key on right IFD
 - Otherwise, no change to operations

Loss of Keyboard

- How tell?
 - Display and backlighting go black
 - Com tuning or autopilot bug changing is not immediately displayed on PFD
- What lost?
 - Only the primary (or easiest) means of accomplishing task
 - Everything conducted on keyboard can be done on bezels
- Recommended Actions
 - Select “Bug Select” tab on PFD
 - Select a datablock view on MFD (for Com, Nav, Transponder tuning)
 - Use right knob of MFD for FMS data entry
 - Use Audio tab of SYS page for volume and squelch control

Loss of ADAHRS

- How tell?
 - Yellow Caution lamp and associated message
 - Dual system: Assuming ADAHRS Src switch is set to Auto (default setting), an automatic switchover will occur and if using a cross-side ADAHRS, the top left corner of the IFD will display indication
 - Single system: Red-Xs displayed in place of instrument
- What lost?
 - Dual system: Just your redundancy and cross checking
 - Single system: Display of attitude on IFDs
- Recommended Actions
 - Dual system: No change to operations
 - Single system: Refer to backup instruments



System Setup & User Preferences



Setup Pages

- Main
 - Informational only (SW part numbers, database currency, FMS type, etc)
- Display
 - A host of user-configurable choices here
 - Turn Vs speeds on/off
 - Select Baro units (In Hg, hP, mB)
 - Map page button timeout duration
 - Etc
- FMS
 - Modifies FMS algorithms
 - Power user feature – see pilot guide if interested
- Map
 - Customize some map settings such as airport filters, declutter density, etc
- Datablocks
 - Customize what data you want presented in the various IFD and Keyboard datablocks
- Autopilot
 - Allows for technician calibration of the STec 55X autopilot

Database Updates and Data Logs



Database Updates

- This is how you will update your periodic Charts data and Nav data and Obstacle data
- Ensure IFD is off
- Insert USB Fob populated with updated chart or nav data
- Power up IFD
- Select “Setup” tab of SYS page then pick “Update Databases” LSK
- Respond to Confirm/Cancel prompt
- Ensure the dialog box that is now presented has the desired databases to be updated checked (and no other)
- Typical update times:
 - US Charts = 11 min (not required to be loaded on left IFD)
 - US Nav Data = 4.5 min
- Press Done LSK when all set to reboot into flight mode
- Verify databases were updated via the Setup tab from the SYS page



Datalogs Download

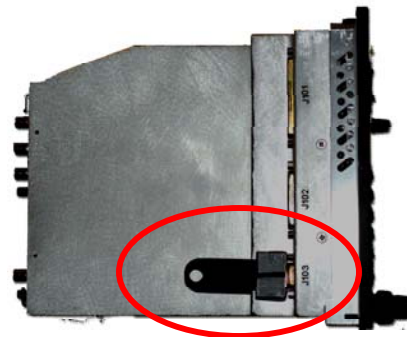
- All data remains the property of Avidyne
- Most is accessible for you to use as you see fit
- Some 3rd party tools for some data analysis are either updated and available now, or in process of being upgraded to support R9
 - CirrusReports – upgrade complete and available
 - EGTMonitor – upgrade in process and expected in fall 2009

Software Updates

- The initial certification was Release 9.0.0 (Apr 2009)
- Release 9.0.1 certified in Aug 2009
 - It is a minor release where we have cleaned up some issues that we believe would have been customer sat problems
- We expect to have 9.0.2 ready to go by end of September 2009
 - The objective of this release was to address any issues that were found during the Pilot Program
 - FMS400, supplemental engine data on PFD, single ADAHRS config
 - 2 Mode C transponder issues , Radio Transmitter issue resolved
- The software updates will be performed from the USB port on the front of each bezel
 - The IFDs will not need to come back to Avidyne
 - You will have to have the update done at an approved Avidyne Service Center
 - We now have a number of shops qualified to do upgrades for R9 and ultimately, in the future, several hundred world-wide

Service and Upgrades

- Aircraft Configuration Module
 - Stores all aircraft-specific avionics configuration data
 - Plugs directly into back of IFD1
 - Stays permanently connected to aircraft harness
 - Designed to prevent any need for IFD setup or recalibrations following service
 - Eliminates mistakes
 - Big time savings



WAAS Fundamentals



WAAS Fundamentals

- Basic Theory
 - A handful of ground stations scattered throughout US.
 - Monitor GPS signals and provide correction signals to a couple GEO satellites
 - They in turn broadcast those corrections to your on-board receiver
 - This allows more precise lateral and vertical navigation
 - Provides an electronic glidepath
- Types of Approaches
 - “Non-Precision” (use MDA)
 - GPS Overlays (RNAV)
 - LNAV
 - “Precision” - approaches with vertical guidance (use DA)
 - LNAV/VNAV
 - LPV (Localizer performance with vertical guidance)

WAAS Fundamentals (cont.)

- Integration with R9
 - R9 automatically provides the best available approach based on signal integrity
 - Fly LNAV/VNAV and LPV approaches like an ILS
 - Radios will autotune and decode station ID
 - For GPS Overlay and LNAV approaches, put the MDA in Alt Bug
 - Loss of signal integrity on approach will result in Advisory message
- Other Considerations
 - W on RNAV approach charts - may indicate WAAS outage information
 - Otherwise, look for WAAS NOTAMS

WSI and Sirius Fundamentals



Sirius/WSI Fundamentals

- Two broadcast systems (weather and music) available today for CONUS
 - XM - WxWorx
 - Sirius - WSI
- Sirius and XM are merging. Sirius was the acquiring party
- R9 will only support Sirius/WSI
 - MLB700 is included as part of the package
- WSI Weather provides notably higher levels of quality control
 - They use proprietary algorithms that eliminate most radar artifacts
 - Removes false precipitation indications
 - Final quality analysis is completed by on-staff meteorologists
- Sirius satellite coverage is superior
 - Larger footprint that extends further north and south
 - METARS and TAFs available in Caribbean, Mexico and parts of Central America as well as Canada

Sirius/WSI Fundamentals (cont.)

- Better feature set available with WSI
 - Altitude selectable icing severity
 - SLD (supercooled large droplet)
 - Temps aloft at 3K' increments (XM is freezing level only)
 - Faster METAR acquisition
 - METARS sent every 5 min [3 updates for complete US coverage]
 - WSI uses the composite data which means that it shows the strongest return in the vertical column ensuring that the pilot will not penetrate hazardous or severe weather
- More attractive pricing models
 - Avidyne Essential (basic) = \$29.99/month
 - Avidyne Performance (extras) = \$44.99/month (\$5 less than XM)
 - Avidyne Professional (adds SLD icing) = \$54.99/month
 - Sirius music = \$12.95/month



Broadcast Product Statistics

Product	WSI Data Rate (nominal)	XM Data Rate (nominal)
NEXRAD	5 min	5 min
METARs	5 min	12 min
TAFs	10 min	12 min
TFRs	15 min	12 min
Winds	30 min	12 min
Temps	30 min	12 min
AIR/SIGMETs	5 min	12 min
Lightning	5 min	5 min
Echo Tops	5 min	1.25 min
Icing	30 min	Not supported by Entegra

