SY0302 FMS TRAINER 2

INSTRUMENTS
OBJECTIVES

• Review basic FMS/GPS functions and operations required during the INSTRUMENT phase of training.
• This lesson is required to be completed prior to the I3201 simulator event.
LESSON TOPICS

• Building an active flight plan
• Building a standby flight plan
• Manual RAIM check
• Selecting and deselecting satellites
• Radar departure to the first waypoint
• Turning at Fly-By waypoints
• Manually inserting a holding fix
• Exiting holding
• Deleting a holding fix
• Enroute, Terminal and approach modes
• Missed approach procedures
• Activating standby flight plan
• Radar Vectors to Final Approach Course
• DME HOLD function
Building an active flight plan

• The T-6B FMS provides the capability to preload a RTE-1 (route 1 flight plan) with all waypoints required to takeoff from Airport “A”, fly a published DP, navigate via waypoints and or airways to a primary destination, execute a published STAR, shoot an RNAV (GPS) approach to airport “B”, execute the published missed approach procedure, activate a RTE-2 (route 2 flight plan) and fly to airport “C” with the same preloaded capabilities.
Building an active flight plan

• For our example we will load RTE-1 with a flight plan from KNSE (Whiting Field NAS -North) to KHBG (Hattiesburg Bobby L. Chain MUNI).

  • **ORIGN** – KNSE

  • **DEST** – KHBG

  • **Route of flight:**
    PENSI MVC V222 LBY

  • **Approach:**
    KHBG RNAV (GPS) Z RWY 13
    (DIYET transition)
Building an active flight plan

• From the MFD menu page 1/2, select the ROUTE page by pressing LSK R2.
Building an active flight plan

• RTE-1 is currently active.

NOTE
If RTE-2 is active it can be used to load the first route and RTE-1 can be used for the alternate/standby route.
Building an active flight plan

• To clear an existing flight plan, put the airport where your flight will originate from in the scratch pad (KNSE)
• Upload it to the ORIGIN at LSK L1
Building an active flight plan

• All previously existing waypoints will be removed from RTE-1.

Note
Putting the word delete in the scratch pad and uploading it to the ORIGIN (LSK L1) will Delete the ORIGN, DEST and all waypoints.
Building an active flight plan

• Next put your destination airport in the scratchpad and upload it to DEST using LSK R1.
Building an active flight plan

• In order for the FMS to accept a flight plan there must be at least one waypoint between the ORGIN and DEST.
• To enter individual waypoints in the route of flight move to RTE 1 page 2/2 using LSK LR.
Building an active flight plan

• Route of flight never begins with an airway.
• WAYPOINTS are entered in the “TO” positions (on the right side).
• AIRWAYS are entered in the “VIA” positions (on the left side).
• Enter the first waypoint into the scratch pad (PENSI).
• Upload it from the scratchpad to the “TO” position at LSK R1
Building an active flight plan

• Note that the word DIRECT auto fills in the VIA position.
• The system will only accept an AIRWAY for entry to the via positions after line 1.
• If nothing is entered in the “VIA” position (left side), it defaults to “DIRECT”.

![Image of flight plan interface showing DIRECT auto fill in VIA position]
Building an active flight plan

• Our next waypoint, MVC is also a direct leg.
• Enter MVC into the scratch pad and upload it to LSK R2.
Building an active flight plan

• Once again the VIA line is auto filled with DIRECT.
Building an active flight plan

• At this point our route will be continued on the airway V222.
• Place V222 in the scratchpad and upload it to the VIA line at LSK L3.
Building an active flight plan

• We have now designated MVC as the point where the V222 airway will be joined.
• Next we need to identify the waypoint at which we intend to exit V222.
Building an active flight plan

• In the SCRATCHPAD, enter the last WAYPOINT on V222 we intend to use (LBY for our example).
• Upload LBY from the SCRATCHPAD to the “TO” position at LSK R3.
Building an active flight plan

• All waypoints that exist in the database on V222 airway between our airway entry point of MVC and our exit point at LBY will be automatically loaded into the route (this will be seen when we review the LEGS pages).
• Next we can move to the DEP/ARR page to load an approach at our destination
• LSK UL will take us to the MFD MENU page 1/2.
Building an active flight plan

• From the MFD MENU page 1/2, select DEP/ARR at LSK R3.
Building an active flight plan

• On the DEP/ARR INDEX page you can access any available departures using the left LSK’s labeled “DEP”.
• Standard Terminal Arrivals (STARS) and Instrument Approach procedures are accessed via the associated right LSK’s labeled “ARR”.
• Select LSK L1 “DEP” to view any Departure Procedures from KNSE.
Building an active flight plan

• Note that there are no Departures available for this airport.
• Select LSK UL to return to the NAV page.
Building an active flight plan

• From the NAV page use LSK R5 to return to the DEP/ARR pages to address our intended arrival.
Building an active flight plan

• Arrival options for our destination KHBG are available via LSK R2.
Building an active flight plan

• Note there are no STARS for this airport.
• Based on preflight planning we would select an approach for our destination.
• For our example we will use the RNAV (GPS) Z RWY 13.
• Use LSK R2 to select this approach.
Building an active flight plan

• There are three transitions listed for this approach.
• If no transition is selected, the system will not load associated waypoints for specific IAFs, HILO patterns, Arcing or any PT tracks.
• Because it is easier to bypass potentially unneeded waypoints upon arrival, than to reload the approach to obtain additional required waypoints. It is recommended to select a transition.
• For our example we expect the DIYET transition. Select this using LSK R3.
Building an active flight plan

• A SEL beside the approach and transition you have selected.
• Use LSK R6 to move to the LEGS pages to verify the flight plan waypoint data and sequence.

Note
if you wish to change your selected approach, reselecting LSK R1 will restore the list of available approaches.

If you wish to change the selected transition, reselecting LSK R2 will restore the list of available transitions.
Building an active flight plan

Note
In our example we are viewing LEGS page 1/3.

• Use current charts and approach publications (updated with NOTAMS and TCNs) to review the flight plan sequence insuring there are no discrepancies between what is current and what has been retrieved from the NAV database.
• Notice that the V222 waypoints (YARBO and PICAN) between our V222 airway entry/exit points have been automatically included.
• Use LSK LR to move through the remaining pages 2/2 and 3/3.
Building an active flight plan

• If the last point entered in the route of flight differs from the first waypoint on the selected approach, a ROUTE DISCONTINUITY will be inserted following the last waypoint in the Route of flight.

• The FMS will not automatically sequence past a discontinuity.

• To remove a discontinuity, copy the first point following the discontinuity into the SCRATCHPAD using the adjacent LSK (DIYET at LSK L2 in our example).
Building an active flight plan

• Upload the waypoint to the position of the discontinuity (DIYET to LSK L1 in our example).
Building an active flight plan

• Use LSK LR to continue reviewing the remaining pages for all waypoints including missed approach procedures, for sequence and accuracy.
Building an active flight plan

• There will be a flashing light located near LSK UR.
• This indicates that the (modifications) have not been saved/executed.
Building an active flight plan

• Once the LEGS have been reviewed for accuracy, the UFCP EXEC key is used to save/execute the flight plan.
Building an active flight plan

• An additional method to aid checking for route accuracy (sanity check), is to use the ROSE PLAN view on the NAV page.
• From the NAV page select LSK LL until the ROSE PLAN view is displayed.
Building an active flight plan

• Select a range scale that will provide an uncluttered view of the selected waypoint (the 5 nm scale works well).

• Use the NEXT button at LSK R6 to cycle through the waypoints. Each time it is pressed the display will cycle to the next point in the planned sequence.

• In this frame we are at KNSE and the next point is to our WNW.
Building an active flight plan

• Now PENSI is centered with the next point to the North.
• The magenta line from KNSE to PENSI indicates the active leg of our flight.
• The white lines from PENSI onward indicate inactive legs of the flight plan.
• Press LSK R6 again to move to the next waypoint.
Building an active flight plan

• Now MVC is centered with the next point to the West (this is where we joined V222).
• Press LSK R6 to move to the next point.
Building an active flight plan

• YARBO with the next point to the West.
• Press LSK R6 to move to the next point.
Building an active flight plan

• PICAN with the next point to the West.
• Press LSK R6 to move to the next point.
Building an active flight plan

• LBY with the next point to the North.
Building an active flight plan

• Now that we are close to the airport changing the range scale will allow you to view most of the waypoints for the approach.
• The (IAF) DIYET, (IF) HILGA, (FAF) CUPPA and part of the (MAP) RWY13/O.
• Press LSK R6 to cycle through each point.

Note
NETTI on the approach plate is not in the FMS database. It is identified in relation to RWY13/O.
Building an active flight plan

• IAF DIYET
Building an active flight plan

(IF) HILGA
Building an active flight plan

• (FAF) CUPPA
Building an active flight plan

• (MAP) RWY13/O
• The /O at RWY13 indicates a “FLY OVER” waypoint (all GPS missed approach waypoints are FLY OVER points).
• After the MAP, selecting NEXT (LSK R6) brings you back to the beginning of the flight plan.

NOTE
On the NAV page, missed approach waypoints are not shown until MISS APR is selected. All waypoints can be viewed on the TSD display once within range.
Building an active flight plan

• At this point you can return to the ROSE MAP view by using LSK LL.
Building a standby flight plan

• ROUTE 2 (RTE-2), the non-active route, can be loaded for an alternate or second destination.
• For our example we will assume landing at KHBG (Hattiesburg) and then departing RWY 13 to KMSY (New Orleans INTL).

**ORIGN** – KHBG

**DEST** – KMSY

**ROUTE** – LBY2.LBY (SID) LBY.RYTHM4 (STAR)

**APPROACH** – (Radar Vectors) KMSY RNAV (GPS) Y RWY 11
EATON TWO DEPARTURE

TOP ALTITUDE:
3000

TAKEOFF MINIMUMS:
Rwy 13: ATC climb of 300’ per NM to 600.
Rwy 15: Do not exceed 230K until established on heading 320°.
Rwy 31: Standard.

TAKEOFF OBSTACLE NOTES:
Rwy 13: Numerous trees beginning 1184’ from DER, 26° left of centerline, up to 111° AGL (251° MSL). Multiple trees beginning 202’ from DER, 49° right of centerline, up to 59° AGL/229° MSL.
Rwy 31: Numerous trees beginning 189° from DER, 111° left of centerline, up to 102° AGL/252° MSL. Multiple trees beginning 854’ from DER, 69° right of centerline, up to 84° AGL/234° MSL.

Note: Chart not to scale.

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAY 13: Climbing right turn heading 320° and LBY VORTAC R-166 to LBY VORTAC. Thence . . . .

TAKEOFF RUNWAY 31: Climb heading 309° and LBY VORTAC R-166 to LBY VORTAC. Thence . . . .

. . . . Maintain 3000 or ATC assigned altitude. Expect clearance to filed altitude 10 minutes after departure.

EATON TWO DEPARTURE
(LBY2.LBY) 21 JUL 16
ARRIVAL ROUTE DESCRIPTION

EATON TRANSITION (LBY.RYTHM4): From over LBY VORTAC via LBY R-216 to RYTHM INT. Thence . . . .

MC COMB TRANSITION (MCB.RYTHM4): From over MCB VORTAC via MCB R-173 to RYTHM INT. Thence . . . .

MERIDIAN TRANSITION (MEI.RYTHM4): From over MEI VORTAC via MEI R-215 to ZYDCO INT then via MCB R-173 to RYTHM INT. Thence . . . .

NATCHEZ TRANSITION (HEZ.RYTHM4): From over HEZ VOR/DME via HEZ R-125 to ZYDCO INT then via MCB R-173 to RYTHM INT. Thence . . . .

. . . . from over RYTHM INT via MCB R-173 to RAYOP INT. Thence . . . .

LANDING LOUIS ARMSTRONG RWY 20: Intercept I-ONW localizer course and expect clearance for LOC Rwy 20 approach.
LANDING OTHER RUNWAYS: Expect vectors to final approach course.
Building a standby flight plan

• From the ROSE MAP view of the NAV page, use LSK L5 to access the ROUTE page (also accessible from the MFD MENU page 1/2).
Building a standby flight plan

• From the ACT RTE 1 page select RTE 2 (the inactive route) at LSK L6.
Building a standby flight plan

• All the characters are cyan indicating that you are working with an inactive route.
• Now load the airport that our second leg will begin from as the RTE-2 ORIGIN.
Building a standby flight plan

• Enter the second leg ORIG, KHBG into the scratchpad.
• Upload it to the ORIGN at LSK L1.
Building a standby flight plan

• Enter the second leg DEST, KMSY into the scratchpad.
• Upload it to DEST at LSK R1.
Building a standby flight plan

• We could use LSK LR (NEXT) to move to page 2 (the VIA-TO page) to load a route as before but for this route there is a DP (SID), that terminates at a transition point for a STAR to our destination.

• As long as there is at least one waypoint between the ORIGN and DEST the FMS will accept the plan.

• In this case, we will move to the DEP/ARR page to retrieve the SID and STAR waypoints.

• Press LSK UL to return to the NAV page.
Building a standby flight plan

• From the NAV PAGE select LSK R5 to access the DEP/ARR page.

NOTE
DEP/ARR pages are also available from the MFD MENU page 1/2.
Building a standby flight plan

• Select DEP (departure procedures) for KHBG using LSK L3.
Building a standby flight plan

• There is a SID (standard instrument departure) available for both runway 13 and 31. It is the LBY2. (The graphic depiction for this departure is located in the Low Altitude Approach Plates.
• Based on preflight weather we will plan on runway 13 for the departure.
• Select the LBY2 SID using LSK L1.
Building a standby flight plan

- A dot is next to LBY1 indicating it has been selected.
- A note in the scratchpad directs you to select a departure runway.
- Use LSK R1 to select runway 13.
Building a standby flight plan

- Appears next to LBY2 and runway 13 indicating they are both now selected for use.
- Return to the NAV page using LSK UL.

**NOTE**

To change the SID, reselecting LSK L1 will bring up the list of available SIDs.

To change the RWY, reselecting LSK R1 will bring up the list of available RWYS.
Building a standby flight plan

• From the NAV page select LSK R5 to return to the DEP/ARR page 1/1.
Building a standby flight plan

• On the DEP/ARR page 1/1, select LSK R4 to access available Arrival options for KMSY (all available STARs and or approach procedures).
Building a standby flight plan

• On the ARRIVALS page, STARS will be listed on the left, approaches on the right.

• In the STAR publication, we find that our destination has 4 STAR options. The RHYTHM FOUR ARRIVAL, (EATON TRANSITION), begins at LBY (the point at which our selected SID terminated).

• Select the RHYTHM FOUR ARRIVAL “RYTHM4” using LSK L3.
Building a standby flight plan

• Note that the RYTHM4 ARRIVAL has been selected.

• There are 4 published transitions for this arrival.

• In our example, select the LBY (EATON TRANSITION) using LSK L3.
Building a standby flight plan

• Note that the RYTHM4 STAR and LBY TRANS indicate selected.
• The associated waypoints will provide navigational guidance to our destination terminal area.
• Next from the right side, we can load an approach based on preflight weather, NOTAMS or information from the AP/1 and IFR Enroute Supplement.
• Note, there are 3 pages of available approach procedures in this example.
• Use the LR and LL LSKs to find the page with the desired approach procedure.
Building a standby flight plan

• In our case, the RNAV (GPS) Y RWY 11 (RNAV11 Y) appears on page 2/3.

• To load this approach with all its associated waypoints, press LSK R2.
Building a standby flight plan

• Based on the expected arrival, select an appropriate transition.
• For our example load the RQR transition (remember, it is easier to delete any unneeded waypoints than to reload the entire approach).
• Select LSK R2 to load the RQR transition.
Building a standby flight plan

- `<SEL>` now appears beside our choices.
- Under STARS we have selected:
  - RYTHM4 (RYTHM FOUR) arrival
  - LBY (EATON) TRANSITION
- Under APPROACHES we have selected:
  - RNAV11 Y APPROACH
  - RQR TRANSITION
- Selecting LSK R6 CONFIRM, will save the fight plan.
Building a standby flight plan

•From the ARRIVALS PAGE LSK R6 LEGS can be use to access the RTE-2 legs pages to review the plan for accuracy and address route discontinuities as required.

NOTE
The LEGS page is also available from the MFD MENU page 1/2.
Building a standby flight plan

• In this example there are three pages of legs information (viewing 1/3 at this time).
• Use the Hattiesburg SID from the Low Altitude Approach Plate to verify the departure waypoints.
• Use the STAR publication to verify ARRIVAL waypoints.
• Use LSK LR to move to the next page.
Building a standby flight plan

• On page 2/3, Use the STAR publication to verify the final ARRIVAL waypoint.
• Note the discontinuity between the STAR and the approach.
• Use the Approach Plate for KMSY to verify the approach waypoints.
• Use LSK LR to move to the next page
Building a standby flight plan

• Use the Approach Plate for KMSY to verify the remaining approach waypoints including the missed approach.
• To address the previously noted route discontinuity, use LSK LL to move back to page 2/3.
Building a standby flight plan

• The discontinuity can be removed (close up the flight plan) by pressing LSK L3 to copy the first waypoint in the approach (RQR) to the scratchpad.
• With RQR in the scratchpad it can be uploaded to the point of discontinuity by selecting LSK L2.

**NOTE**

Where the discontinuity represents a clearance limit, leaving it in place may serve as a reminder to obtain further clearance prior to proceeding past the clearance limit.
Building a standby flight plan

• With the discontinuity removed the FMS will continue sequencing to RQR after reaching RAYOP.
• LSK R6 CONFIRM must be selected to save this modification to the route.
Building a standby flight plan

• With both flight plans loaded return to the NAV PAGE to begin the flight.
Manual RAIM check

• A RAIM (Receiver Autonomous Integrity Monitoring) Check, can be manually performed to predict signal availability for your destination.
• From the MFD MENU page 1/2, select LSK R6 to access the INITREF page.

Note
It is not recommended to perform manual predictive RAIM request when the aircraft is about to enter the APPROACH phase of flight as the FMS automatically sends request as well. No manual request should be performed when the aircraft is within 6 nm of the FAF waypoint.
Manual RAIM check

- On INIT/REF INDEX page 1/2 select LSK R5 for NAV STATUS.
Manual RAIM check

• On the NAV STAUS INDEX page 1/1 select PREDICT RAIM using LSK L1.
Manual RAIM check

• The destination airport is shown at LSK L1.
• The ETA is shown at LSK L2.
• Arrival times listed on the right hand side of the display are for the destination ETA (at LSK R2) and intervals of 5 minutes before or after the ETA up to a maximum of 15 minutes.
• The predicted Horizontal Integrity Limits (HIL) codes/accuracy are displayed next to the arrival times.

- Possible HIL codes/accuracy are:
  - **APPR** $\leq 0.3$ nm
  - **TERM** $>0.3$ but $\leq 1.0$ nm
  - **ENRT** $>1.0$ nm but $\leq 2.0$ nm
  - **NONE** $>2.0$ nm
  - **** No HIL due to GPS sensor failure or lack of current almanac information.
Selecting and deselecting satellites

• GPS satellites can be excluded from the Predictive RAIM calculations.
• If a satellite is reported unreliable via NOTAM’s, use LSK R6 to access the SAT DESEL page.
Selecting and deselecting satellites

• On the GPS SAT DESELECT page 1/1, key the undesirable satellite’s Pseudo Range Number (PRN) into the scratchpad.
  For our example we will deselect PRN 07.
• Once in the scratchpad upload the undesirable PRN to the LSK L1 position.
Selecting and deselecting satellites

• The deselected PRN will appear in reverse video white color.
Selecting and deselecting satellites

- To Reselect a previously deselected satellite the process is very similar.
- Type the PRN you wish to RESELECT into the scratch pad (07 in our example).
- Upload the desired PRN to LSK L2.
Selecting and deselecting satellites

- The absence of any highlighted PRN’s in the list indicates all satellites available for selection.
Radar departure to the first waypoint

• During a Radar departure it is not uncommon to be vectored around traffic prior to being cleared to proceed to the first waypoint.

• This can result in an “off course” (CDI no longer centered) situation.

• Once cleared to proceed direct to the active waypoint turn to the head of FMS needle (BP 2).
Radar departure to the first waypoint

• Once headed towards the active waypoint we need to get the FMS CDI to reflect a new course from our current position direct to the active waypoint.
  (Get the CDI to center)

• This can be accomplished from the LEGS pages.
Radar departure to the first waypoint

• To set a direct course from your present position, to any waypoint in the flight plan (PENSI in our case), copy it to the scratchpad by pressing its associated LSK (LSK L1 for PENSI).
Radar departure to the first waypoint

• Once the desired waypoint is in the scratchpad, upload it to the active waypoint position (LSK L1 on the ACT RTE page 1).
Radar departure to the first waypoint

• The EXEC light \textbf{EXEC} will illuminate. To make the modification \textbf{MOD} active press the EXEC button on the UFCP.
Radar departure to the first waypoint

• With the change Active (ACT), the new course will provide tracking from the aircrafts present position to the active waypoint.
Turning at a waypoint

• The FMS CDI provides tracking information between each waypoint in the flight plan.
Turning at a waypoint

• As you approach an active FLYBY waypoint, the waypoint name will become highlighted in magenta with white letters. **PENSI**

• The FMS will compute a lead turn point that will provide an on course solution to the next waypoint.
Turning at a waypoint

• When it is time to begin the turn to intercept the next course, the head of the FMS CDI will point to the next course to be flown on the HSI.
• The deflected CDI will begin flashing. If a smooth standard rate of turn is used at this time, it will result in an on course indication at the end of the turn.
Turning at a waypoint

• The new active waypoint and its distance will be displayed on the PFD (LSK R6 and L5) and also on the NAV page.
Manually inserting a holding fix

• During the flight it may be necessary to hold at any of the waypoints along your route.
• This can be accomplished by accessing the HOLD page from the MFD MENU page 1/2.

NOTE
If there are no holding points in the current route of flight, a /H will be loaded into the SCRATCHPAD and the LEGS page 1 will be displayed.
Manually inserting a holding fix

• If there is a holding point already in the flight plan, the first one in sequence will be displayed. (in our example it is HILGA, our missed approach holding fix)

• On the RTE HOLD page 1/1, select NEW HOLD at LSK L6.

NOTES
Selecting New Hold, will place a /H in the SCRATCHPAD and bring up the LEGS pages.

The /H can also be put into the SCRATCHPAD manually using the UFCP and manually switching to the LEGS page.
Manually inserting a holding fix

• Upload the /H to the LSK adjacent to the desired holding waypoint (we will use MVC for our example).
• This will return you to the HOLD page with the waypoint already loaded with a default pattern.
Manually inserting a holding fix

• LSK L1 shows the proposed holding FIX.
• LSK L2 can be used to toggle between a RIGHT (standard) or LEFT (non-standard) pattern.
• LSK L3 shows the flight plan course leading to the FIX.
• LSK L4 is leg time (defaulted to 1.0 minutes).
• LSK L5 provides leg length in distance if required.
• LSK R5 displays the EXIT TYPE (This will always be MANUAL for user created holding fixes).
Manually inserting a holding fix

• For our example we will use the holding clearance;

“Hold south of the MVC VOR on the 180 radial make left turns with 5 mile legs, expect further clearance five minutes after never.”

• Using LSK L2 we have toggled TURN DIR to LEFT for Non-Standard holding.
Manually inserting a holding fix

- The Holding course will be 360.
- Enter 360 into the scratchpad and uploaded it to LSK L3.
Manually inserting a holding fix

• To set the leg length, enter 5 into the scratch pad and upload it to LSK L5.
Manually inserting a holding fix

- Review Holding data
  LSK L1 FIX MVC
  LSK L2 TURN DIR LEFT
  LSK L3 INBD CRS 360°
  LSK L5 LEG DIS 5.0 NM

- Once all data is reviewed and correct the (modification) will need to be executed using the EXEC button on the UFCP.
- The green light will be flashing at the top of the display as a reminder.
Manually inserting a holding fix

• Once the new holding has been activated a green /H will appear next to the holding waypoint on the LEGS page.
Manually inserting a holding fix

• The holding pattern will be depicted on the NAV page once it is within range.
• As you approach the fix a message will be displayed prompting the type of holding entry to be used.
• Crossing the fix, the FMS will not sequence beyond a manually entered holding waypoint until the exit is armed or another waypoint is manually selected as the active waypoint.
Exiting Holding

• Once established in holding (anytime after first passage of the holding waypoint) and cleared to proceed on course, the EXIT HOLD should be armed to allow the FMS to resume normal sequencing.
• To ARM the EXIT, select the HOLD page from the MFD MENU page 1/2.
Exiting Holding

• Use LSK R6 to select EXIT HOLD.
Exiting Holding

• The green **EXEC** light is a reminder that this **MOD** has not been saved/activated.
• Pressing the EXEC button on the UFCP will save/activate the change.
Exiting Holding

• Once executed on the UFCP, EXIT ARMED will appear at LSK R6.
• With the EXIT ARMED, the FMS will sequence to the next waypoint at the next passage of the holding waypoint.
Deleting a holding fix

• To cancel or remove an existing holding waypoint prior to entering holding, simply enter / in the scratchpad and upload it to the existing holding waypoint on the LEGS page.
Deleting a holding fix

• The modification will require that the EXEC button be selected on the UFCP for the change to take effect.
• This process will remove Manually entered holding fixes.
• It can also be used to delete holding patterns that are part of a loaded approach procedure.
Enroute, Terminal and Approach modes

• When PFD SOURCE is FMS, the phase of flight is displayed on the PFD. There are three phases consisting of:
  - Enroute
  - Terminal
  - Approach

• During FMS operations, the HSI lateral deviation scale changes with the current phase of flight.

• On departure the system will be in the Terminal mode.

• HSI lateral deviation scale will be:
  - **1 NM full scale** (.5 nm per dot).
Enroute, Terminal and Approach modes

• During departure, Terminal mode remains active until either of the following conditions are met:

  - The radial distance from the departure airport becomes greater than 33 nm.
  
  OR

  - The aircraft reaches 16,000 feet above the departure airport's elevation.
Enroute, Terminal and Approach modes

• Transition from the Terminal mode to the Enroute mode will trigger the following changes:

- HSI lateral deviation scale changes over a 10 second period from 1 nm to:
  **5 nm full scale** (2.5 nm per dot).

- The phase of flight indication adjacent to the HSI will change from TERM to **ENR** and flash for 15 seconds.
Enroute, Terminal and Approach modes

• Upon reaching the transition point from Enroute to the destination Terminal area, the NAV page will display the advisory message:

[FMS: HSI SCALES CHANGING]
Enroute, Terminal and Approach modes

• Transition from Enroute to the destination Terminal area requires:

  - Radial distance from the destination airport is less than 30 nm.

  **AND**

  - The aircraft descends below 15,000 feet above the destination airports elevation.
Enroute, Terminal and Approach modes

• Arrival in the destination terminal area triggers the following changes:
  
  - HSI lateral deviation scale changes over a 10 second period from 5 nm to:
    **1 nm full scale** (.5 nm per dot).

  - The phase of flight indication adjacent to the HSI will change from ENR to **TERM** and flash for 15 seconds.
Enroute, Terminal and Approach modes

• Approaching the destination airport, with a valid GPS approach selected and loaded into the active flight plan from the navigation database, the following indications will be noted:

• 3 nm prior to the FAF - the NAV page will display the advisory message;
Enroute, Terminal and Approach modes

• At 2 nm inbound to the FAF, with GPS approach integrity (RAIM) predicted to exist at the FAF, missed approach point (MAP), and the current aircraft position, the FMS transitions automatically to the approach mode, with the following indications:

  **ON THE NAV PAGE**
  - Non-precision approach (NPA) advisory illuminates at top of MFD.
  - The miss approach (MISS APR) prompt is displayed at the bottom right LSK on the NAV page.
Enroute, Terminal and Approach modes

ON THE PFD

- Non-precision approach advisory illuminates at top of MFD.

- APR replaces TERM adjacent to the HSI and flashes for 15 seconds.

- HSI lateral deviation scale changes over a 10 second period from 1 nm to:

  .3 nm full scale (.15 nm per dot).
Missed approach procedures

- Upon reaching the MAP (missed approach point), the FMS will not automatically sequence to, or display any follow-on missed approach waypoints.
Missed approach procedures

• After the MAP, course guidance along the FAC will continue to be provided by the FMS.
• Once initial missed approach actions are taken (two positive rates gear, above 110 flaps) the additional (follow-on) waypoints can be activated by selecting LSK LR (MIS APR) on the NAV PAGE.
Missed approach procedures

• Once MISS APR is activated, the FMS will display and sequence through any follow on waypoints normally.

• Here the display shows the need for a right turn to proceed direct to HILGA/H our missed approach holding point which is 15.1 nm behind us.
Activating RTE-2

• The inactive route (in our example RTE-2) can be activated to fly to your next destination.
• This may be done on the deck prior to taking off for the second leg of your flight or during a missed approach.
• To activate an inactive route, from the NAV page select LSK L5 to access the ROUTE page.
Activating RTE-2

• On the ACT RTE page 1, select LSK L6 to bring up the inactive route (RTE 2 in our example).
Activating RTE-2

- **INACTIVE** route information will be displayed in **CYAN**.
- Select LSK R6 (ACTIVATE) to change this route from inactive to active.
Activating RTE-2

- This will bring up the RTE 2 LEGS page.
- The modification will have to be accepted by pressing the EXEC button on the UFCP.
Activating RTE-2

- Once executed, RTE 2 will be displayed as ACT RTE 2 LEGS on the top line.
- At this time you could return to the NAV page and continue your flight to the next destination.
Radar Vectors to Final Approach Course (RVFAC)

• The last waypoint in the flight plan to KMSY (prior to the approach) is RAYOP (part of the RYTHM4 STAR).
Radar Vectors to Final Approach Course (RVFAC)

• From the RHYTHM FOUR ARRIVAL DESCRIPTION, aircraft receiving clearance for approaches and landings to anything other than RWY 20 at KMSY should expect vectors to the final approach course.
Radar Vectors to Final Approach Course (RVFAC)

The following example will outline procedures required to set the FMS up to assist with Radar vectors to the FAF (KUSTE) for: New Orleans/Louis Armstrong INTL (KMSY) RNAV (GPS) Y RWY 11.

After RAYOP the FMS was programmed to RQR (the IAF for this approach).

Instead, we are receiving vectors to KUSTE (the FAF for this approach).
Radar Vectors to Final Approach Course (RVFAC)

- During RVFAC we will most likely receive vectors that will not maintain the FMS programmed track of; RAYOP, RQR, FIGUR, KUSTE.

- To aid in orientation during vectors to the FAF, it would be helpful to display an extended final approach course leading to the FAF KUSTE and set KUSTE as the active waypoint.
Radar Vectors to Final Approach Course (RVFAC)

- This can be accomplished using the LEGS pages.
- To access the LEGS pages from the NAV page, select LSK L2.
Radar Vectors to Final Approach Course (RVFAC)

• Use LSK LR (if required) to access the LEGS page with the FAF.

• In this example, KUSTE, the FAF is located on LEGS page 1/2.

• Copy the FAF KUSTE to the scratch PAD by selecting the adjacent LSK (L3 in this example).

• Once the FAF waypoint is in the scratchpad, upload it to the active waypoint position (LSK L1 on LEGS page 1).
Radar Vectors to Final Approach Course (RVFAC)

• Note that the current course to KUSTE is 176° (this represents a direct course from present position).

• If the modification is executed (EXEC on the UFCP) at this point, the direct course of 176° will be used.

• We are being vectored to intercept the FAC of 106° (the course between KUSTE and RWY11).

• Note that the FMS has placed 106° at LSK R6 as a suggested FAC.

Note
Any desired course can be put into the SCRATCHPAD and uploaded as the INTC CRS.
Radar Vectors to Final Approach Course (RVFAC)

- Magnetic courses defined by conventional NAVAIDS are determined by the application of the NAVAIDS magnetic variation. In contrast, RNAV GPS systems use an algorithm which applies the magnetic variation. This may result in small differences in the course provided from the database and the course displayed on the approach plate. However, both courses will produce an acceptable solution when using the appropriate IFR navigation system.
- With the PFD Source in FMS use the course acquired from the database.
Radar Vectors to Final Approach Course (RVFAC)

• To use the database recommended course of 106°, select LSK R6

Note
It is important to note that when you select LSK R6 (INTC CRS) that the font used to display 106° will change from medium to large and the green triangle next to the INTC CRS (106°) will disappear.

(This is really a small font change, ensure your attention is on the course as you select LSK R6, make sure the green triangle goes away with LSK selection)
Radar Vectors to Final Approach Course (RVFAC)

• Note the following changes on LEGS page 1:
  - The font of the intc crs listed at LSK R6 has changed from medium to large and the green triangle had been removed.
  - The course leading to the FAF KUSTE has changed to 106°.

• To accept the (modification) select EXEC on the UFCP.
Radar Vectors to Final Approach Course (RVFAC)

• Note that (MODIFICATION) has changed to (ACTIVE) and the FAF is highlighted in magenta as the new active waypoint.

• Return to the NAV display using LSK UL.
Radar Vectors to Final Approach Course (RVFAC)

• The NAV display now shows the intercept course extending outward from the FAF.

• This will aid in general orientation of our aircrafts position and heading with relation to the FAC during radar vectors.
DME HOLD Function

• Normally when a VHF NAVAID frequency is tuned, the FMS also auto tunes the aircraft’s DME transceiver to that NAVAID’s paired UHF frequency.

• In situations were DME information is needed from a source other than the NAVAID being used for VHF navigation, the DME HOLD function can be employed.

• For example, the (KNPA) ILS Z or LOC/DME 7L uses DME from NPA (UHF channel 119x) and Localizer course information from I-NPA (VHF 109.3).
DME HOLD Function

• To use DME HOLD, the first action is to find the paired VHF frequency for the our desired DME channel (119x in our example).

  NOTE

  TACAN channels may be assumed “X” unless noted as “Y”

• The paired frequency may be found on the Enroute Chart (paired frequencies are listed in parenthesis).
DME HOLD Function

• Paired frequencies may also be found in the Flight Information Handbook (FIH).
DME HOLD Function

• The FMS database also has the frequency pairing tables.
• To find the paired frequency for NPA, select the NAV TUNE priority function Button (PRB) on the UFCP to access the NAV TUNE- VOR/LOC page.
• Enter the NAVAID identifier (NPA) into window 2 and press ENT.
• The paired frequency will be displayed in window 3.
DME HOLD
Function

• If the DME paired frequency is known it can be loaded into window 3 on the UFCP persistent display.
DME HOLD Function

• Next use the PFB NAV TUNE to access the NAV-DME page.
DME HOLD Function

• The W2 key is used to toggle between DME HOLD ON/OFF.

  **NOTE**
  
  Presence of the letter H following the frequency in window 2 indicates that DME HOLD is ON.

• Press W2 until the “H” appears after the frequency.
DME HOLD Function

• Now on the persistent display, enter the VHF frequency required for course guidance (I-NPA 109.3 for our example).
DME HOLD Function

• The PFD will display the VHF navigation frequency just below the PFD SOURCE and with BP 1 selected to VOR/LOC it will also be displayed adjacent to LSK L6.
DME HOLD Function

- The Paired frequency and it’s associated DME will be displayed in AMBER color.
- Note the letter H preceding the paired frequency. This indicated that DME frequency is being held.
- Until the H is removed, subsequent changes in the VHF NAV frequency will no longer auto tune the DME transceiver.