

# **G1000**<sup>™</sup>

VHF NAV/COM pilot's guide for Mooney M20M & M20R

Record of Revisions			
Revision	Date of Revision	Revision Page Range	Description
А	10/18/04	4-1 – 4-21	Initial release.

### 4.1 INTERFACE INTRODUCTION

### **OVERVIEW**

On both the Primary Flight Display (PFD) and the Multi Function Display (MFD), the G1000 VHF NAV/ COM interface occupies the top portion of the panel. As shown in the figure below, the NAV-related controls, windows and fields are located on the left side, whereas the COM-related controls, windows and fields are located on the right side.

This section provides information on the following aspects of the G1000 VHF NAV/COM interface:

- Windows and fields
- Radio selection
- Color code
- Tuning box
- Frequency Toggle Arrow
- Radio status indications
- Controls



Figure 4.1.1 G1000 VHF NAV/COM Interface (PFD)

### WINDOWS AND FIELDS

On both the PFD and the MFD, the NAV and COM Frequency windows are located at the top of the display on either side of the Navigation Status bar.

- The **NAV Frequency window** is displayed to the left of the Navigation Status bar.
- The **COM Frequency window** is displayed to the right of the Navigation Status bar.

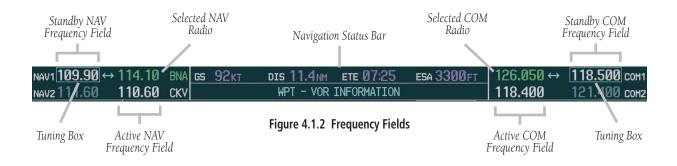
Each radio frequency sub-window is composed of two (2) fields, a **standby field** and an **active field**.

- In the NAV Frequency window, the active frequency field is located on the right side, while the standby frequency field is located on the left side.
- In the COM Frequency window, the active frequency field is located on the left side, while the standby frequency field is located on the right side.

### RADIO SELECTION

Radio selection is performed as follows:

- NAV radio selection is performed via the CDI softkey located on the PFD:
  - When NAV1 radio is selected, a single green arrow labeled either 'VOR1' or 'LOC1' is displayed on the HSI.
  - When NAV2 radio is selected, a double green arrow labeled either 'VOR2' or 'LOC2' is displayed on the HSI.
- COM radio selection is performed via the COM1 MIC or COM2 MIC keys located on the audio panel:
  - **COM1 MIC** key selects COM1 radio.
  - COM2 MIC key selects COM2 radio.



### **COLOR CODE**

Frequencies located in the **active field** are displayed in **either green or white**.

- An active frequency that is displayed in green indicates that the corresponding radio is selected (i.e., in use) on the audio panel (COM) or on the HSI (NAV).
- An active frequency that is displayed in **white** indicates that the corresponding radio is not selected on the audio panel (COM) or on the HSI (NAV).



**NOTE:** In GPS mode, both active NAV frequencies are displayed in white.

Frequencies located in the **standby field** are displayed in **either white or gray**.

- The standby frequency that appears in the tuning box is displayed in **white**.
- The standby frequency that is not in the tuning box is displayed in **gray**.

### **TUNING BOX**

On both the PFD and the MFD, a cyan (i.e., light blue) tuning box appears around the standby frequency field and can be moved from one standby frequency field to another for the purpose of tuning or radio selection by pressing the dual **COM** or **NAV** knob.



Figure 4.1.3 Frequency Toggle Arrow and Tuning Box

### FREQUENCY TOGGLE ARROW

In both the COM and NAV windows, a **Frequency Toggle Arrow** appears next to the tuning box, between the active and standby frequencies. Pressing the dual **COM** or **NAV** knob toggles both the frequency tuning box and the **Frequency Toggle Arrow** between the radios.



**NOTE:** If the frequency tuning box is on a selected COM sub-window when a signal is received or transmitted for this radio, the **Frequency Toggle Arrow** is replaced by an **RX** or a **TX** indication, respectively.



**NOTE:** Pressing the **Frequency Toggle** key places this standby frequency into the active field, and vice versa.

### RADIO STATUS INDICATIONS

- **RX** When a signal is received on a COM radio, a white **RX** indication appears to the right of the corresponding COM frequency for the duration of the signal reception.
- TX When a COM radio is keyed, a white TX indication appears to the right of the corresponding COM frequency for the duration of the signal transmission.
- ID When the Morse code identifier is ON for a NAV radio, a white ID indication appears to the left of the corresponding active NAV frequency and the Morse code identifier for this frequency can be heard if the corresponding NAV radio is selected on the audio panel.

### **CONTROLS**

The NAV Frequency window is controlled by knobs and keys located to the left side of the display, while the COM Frequency window is controlled by knobs and keys located to the right side of the display.

The controls associated with the NAV window are as follows:

#### A VOL/PUSH ID knob

- **Turn** to adjust the NAV radio volume level.
- Press to turn the Morse code identifier ON and OFF

### • A **Frequency Toggle** key

- Press to toggle the NAV frequencies between the active and standby fields.
- A dual **NAV** knob
  - Turn to tune a NAV frequency in the NAV tuning box (large knob for MHz; small knob for kHz).
  - Press to toggle the NAV tuning box between the NAV radios.

The controls associated with the COM window are as follows:

### A VOL/PUSH SQ knob

- Turn to adjust the COM radio volume level.
- Press to turn automatic squelch ON and OFF.

### • A **Frequency Toggle** key

- Press to toggle the COM frequencies between the active and standby fields.
- Press and hold for approximately two (2) seconds to tune the emergency frequency (121.500 MHz) automatically in the active COM field.

#### • A dual **COM** knob

- Turn to tune a COM frequency in the COM tuning box (large knob for MHz; small knob for kHz).
- Press to toggle the COM tuning box between the COM radios.

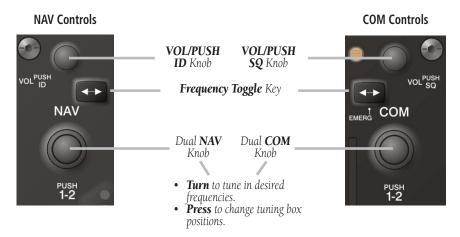


Figure 4.1.4 NAV/COM Controls

### 4.2 COM FREQUENCY WINDOW

### **OVERVIEW**

The G1000 COM radios can be tuned either over the 118.000 to 136.975 MHz frequency range with 25 kHz spacing selected or over the 118.000 to 136.990 MHz frequency range with 8.33 kHz spacing selected.



**NOTE:** COM channel spacing can be configured through the MFD, in the System Setup Page of the AUX Page group.

The Communications Frequency window is located to the right of the Navigation Status bar, provides the control and display of dual VHF Radio Communication Transceivers (COM1 and COM2) and displays the following information:

- COM1 and COM2 active and standby frequencies
- Color-coded indication of the selected COM radio
- Indication of signal reception and transmission

### **VOLUME**

COM radio volume level can be adjusted from 0 to 100% of available volume (in increments of 3.25 percentage points) using the **VOL/PUSH SQ** knob located above the **COM Frequency Toggle** key. Turning the **VOL/PUSH SQ** knob clockwise increases volume level for the COM radio on which the tuning box is placed, while turning this knob counterclockwise decreases volume level for this COM radio.

When adjusting volume level for a COM radio, volume level is displayed in place of the corresponding standby COM frequency and the associated COM radio name (i.e., 'COM1' or 'COM2') is replaced by the term 'VOLUME'. Volume level remains displayed in the COM Frequency window for a duration of two (2) seconds after volume level is last changed.

119.700 124.150 com1 135.675 35% VOLUME

Figure 4.2.1 COM Volume Level

### **AUTOMATIC SQUELCH**

Automatic squelch provides maximum sensitivity to weaker signals while canceling most localized noise sources. Automatic squelch can be disabled for a COM radio by pressing the **COM** knob to select the desired COM sub-window, then by pressing the **VOL/PUSH SQ** knob.

When automatic squelch is disabled for a COM radio, COM audio remains continuously open and an RX indication appears between the active and standby frequency fields of this radio.



Figure 4.2.2 Overriding Automatic Squelch



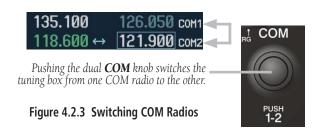
**NOTE:** Pressing the **VOL/PUSH SQ** knob when automatic squelch is disabled reactivates the automatic squelch function.

# SWITCHING THE TUNING BOX BETWEEN COM RADIOS

Pressing the dual **COM** knob toggles the frequency tuning box between the COM1 and COM2 fields.



**NOTE:** When a different COM MIC is selected on the audio panel, the frequency tuning box also moves on both the PFD and MFD.



### **MANUALLY TUNING A COM FREQUENCY**

COM frequency manual tuning is performed by using the dual **COM** knob.

- The MHz (left) portion of the frequency can be tuned by turning the large **COM** knob.
- The <a href="https://khz.com/khz.com/khz.com/khz">kHz (right) portion of the frequency can be tuned by turning the small COM knob.</a>

The frequency is tuned in the standby frequency field of the COM Frequency window. Turning either knob clockwise increases the tuned frequency. Conversely, turning either knob counterclockwise decreases the tuned frequency.

### **TOGGLING COM FREQUENCIES**

Pressing the **COM Frequency Toggle** key toggles the COM frequencies between the active and standby fields of the COM radio on which the **Frequency Toggle Arrow** is located.



Figure 4.2.4 Toggling COM Frequencies

### **SELECTING A COM RADIO**

The desired COM radio can be selected using the **COM MIC** keys located on the audio panel. When a **COM MIC** key is annunciated on the audio panel, the corresponding active COM frequency is displayed in green in the COM Frequency window.





**NOTE**: Please see the Audio Panel Pilot's Guide for further details on the **COM MIC** keys.

### **RADIO STATUS**

When a COM radio is keyed, a white **TX** indication appears to the right of the active COM frequency to indicate that a transmission is in progress. The **TX** indication disappears once COM transmission is completed.

When a COM signal is received, a white **RX** indication appears to the right of the active COM frequency to indicate that a COM signal reception is in progress. The **RX** indication disappears once COM signal reception is over.

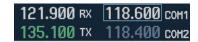


Figure 4.2.6 Radio Status Indications



**NOTE:** If a signal is transmitted or received on a COM radio for which frequency toggling is enabled (i.e., on which the tuning box is located), the **Frequency Toggle Arrow** disappears and is replaced by a **TX** or an **RX** indication, respectively.

### **EMERGENCY FREQUENCY (121.500 MHZ)**

When a COM tuning failure is detected by the system, the emergency frequency (121.500 MHz) is automatically loaded in the active frequency field of the COM radio for which the tuning failure was detected.



Figure 4.2.7 COM Tuning Failure



**NOTE:** In the event of a dual display failure, the emergency frequency (121.500 MHz) automatically becomes available to the pilot through the pilot headset.

### **Quickly Tuning and Activating 121.500 MHz**

Pressing and holding the **COM Frequency Toggle** key for approximately two (2) seconds automatically loads the emergency COM frequency (121.500 MHz) in the active frequency field of the COM radio for which frequency toggling is enabled.

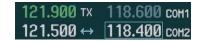


Figure 4.2.8 Quickly Tuning 121.500 MHz

### **STUCK MICROPHONE**

If the COM1 (or COM2) push-to-talk (PTT) switch becomes stuck, or is accidentally left in the keyed position, or if a signal continues to be transmitted after the switch is released, the COM transmitter automatically times out (i.e., ceases to transmit) after 35 seconds of continuous transmitting and an alert appears on the PFD to advise the crew of a stuck COM microphone (see figure below).



Figure 4.2.9 Stuck COM Microphone Alert

### **OPERATION – COM**

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### 4.3 NAV FREQUENCY WINDOW

### **OVERVIEW**

The G1000 NAV radios can be tuned over the 108.00 to 117.95 MHz frequency range with 50 kHz spacing. The Navigation Frequency window is located to the left of the Navigation Status bar, provides the control and display of dual VOR/ILS receivers (NAV1 and NAV2) and displays the following information:

- NAV1 and NAV2 active and standby frequencies
- NAV1 and NAV2 identifier indication (if the active NAV frequency is a valid frequency and its Morse code identifier signal is received by the system).
- Color-coded indication of the selected NAV radio
- Indication of the Morse code identifier status

### **VOLUME**

NAV radio volume level can be adjusted from 0 to 100% of available volume (in increments of 3.25 percentage points) using the **VOL/PUSH ID** knob located above the **NAV Frequency Toggle** key. Turning the **VOL/PUSH ID** knob clockwise increases volume level for the NAV radio on which the tuning box is placed, while turning this knob counterclockwise decreases volume level for this NAV radio. When adjusting volume level for a NAV radio, volume level is displayed in place of the corresponding standby NAV frequency and the associated NAV radio name (i.e., 'NAV1' or 'NAV2') is replaced by the term 'VOLUME'. Volume level remains displayed in the NAV Frequency window for a duration of two seconds after volume level is last changed.



Figure 4.3.1 NAV Volume Level

### **MORSE CODE IDENTIFIER**

Pressing the **VOL/PUSH ID** knob toggles the Morse code identifier ON and OFF for the active NAV frequency next to which the tuning box is located. When the Morse code identifier is ON, an **ID** indication appears to the left of the corresponding active NAV frequency.



Figure 4.3.2 ID Indication

The Morse code identifier for an active NAV frequency can only be heard if the Morse code identifier for the corresponding NAV radio is turned on (i.e., if the ID indication appears next to the active NAV frequency) and if the corresponding NAV radio is selected on the audio panel (i.e., if the associated NAV radio annunciator light is illuminated on the audio panel).



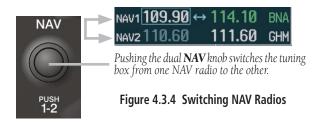
Figure 4.3.3 Morse Code Identifier Audio



**NOTE:** When a VOR signal is received, the VOR/LOC name identifier is displayed to the right of the corresponding active NAV frequency, regardless of the status of the Morse code identifier.

# SWITCHING THE TUNING BOX BETWEEN NAV RADIOS

Pressing the dual **NAV** knob toggles the frequency tuning box between the NAV1 and NAV2 sub-windows.





**NOTE:** When a different NAV radio is selected on the HSI via the **CDI** key, the NAV frequency tuning box also moves on the PFD and MFD. However, the NAV frequency tuning box does not move when GPS mode is selected.

### **MANUALLY TUNING A NAV FREQUENCY**

NAV frequency manual tuning is performed by using the dual **NAV** knob.

- The MHz (left) portion of the frequency can be tuned by turning the large **NAV** knob.

The frequency is tuned in the standby frequency field of the NAV Frequency window. Turning either knob clockwise increases the tuned frequency. Conversely, turning either knob counterclockwise decreases the tuned frequency.

### **TOGGLING NAV FREQUENCIES**

Pressing the **NAV Frequency Toggle** key toggles the NAV frequencies between the active and standby fields of the NAV radio on which the **Frequency Toggle Arrow** is located.

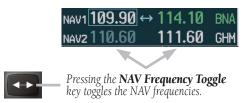


Figure 4.3.5 Toggling NAV Frequencies

### **SELECTING A NAV RADIO**

The desired NAV radio can be selected using the **CDI** softkey located on the PFD. The three navigation modes that can be selected with the **CDI** softkey are as follows:

- **VOR1** (or **LOC1**) If NAV1 is selected as the NAV mode, a **single green arrow** labeled either 'VOR1' or 'LOC1' is displayed on the HSI and the active NAV1 frequency is displayed in green.
- VOR2 (or LOC2) If NAV2 is selected as the NAV mode, a double green arrow labeled either 'VOR2' or 'LOC2' is displayed on the HSI and the active NAV2 frequency is displayed in green.
- GPS If GPS mode is selected, a single magenta arrow appears on the HSI and neither NAV radio is selected.



**NOTE:** In GPS mode, both active NAV frequencies are displayed in white.



**NOTE:** When a VOR signal is received, the corresponding VOR/LOC name identifier is displayed to the right of the associated active NAV frequency.



Figure 4.3.6 Selecting a NAV Radio

### **OPERATION – NAV**

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### 4.4 FREQUENCY AUTO-TUNING

### **OVERVIEW**

The G1000 system offers multiple auto-tuning capabilities that help reduce cockpit workload. The PFD allows for the auto-tuning of COM frequencies associated with the nearest airports, while the MFD provides auto-tuning of both COM and NAV frequencies from various pages. In addition, regardless of the display, the pertinent primary NAV frequency is entered automatically in the NAV window upon approach loading or approach activation.

In brief, frequencies can be automatically loaded into their respective frequency windows in the following ways:

- By using the **ENT** key when the frequency is highlighted on the appropriate page (PFD and MFD).
- Upon loading or activating an approach (PFD and MFD).



**NOTE:** Turn the **FMS** knob to scroll through a list of frequencies.

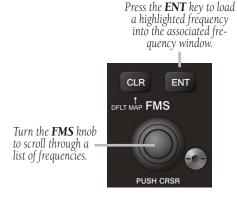


Figure 4.4.1 Loading Frequencies

### **AUTO-TUNING ON THE PFD**

COM frequencies for the nearest airports may be viewed and automatically loaded from the Nearest Airports window on the PFD.

# To auto-tune a COM frequency for a nearby airport:

- Press the NRST softkey to open the Nearest Airports window, which displays the list of airport identifiers and corresponding COM frequencies.
- Turn either FMS knob to highlight the desired COM frequency, and ensure that the COM frequency tuning box is on the desired COM sub-window.
- 3. Press the **ENT** key to load the COM frequency into the COM tuning box.



**NOTE:** When the desired frequency is entered in the tuning box, it becomes a standby frequency. Pressing the **Frequency Toggle** key places this standby frequency into the active field.



Pressing the **NRST** softkey opens the Nearest Airports window

Figure 4.4.2 Nearest Airports Window (PFD)

### **AUTO-TUNING ON THE MFD**

Frequencies can be selected and loaded from the following MFD pages:

- WPT Airport Information
- WPT VOR Information
- NRST Nearest Airports
- NRST Nearest VOR
- NRST Nearest Frequencies



Figure 4.4.3 MFD Page Group Icon



**NOTE:** <u>In NAV mode</u>, upon any VOR/ILS approach activation, the appropriate NAV frequency is automatically loaded into the **standby field of the selected NAV** radio, regardless of the current MFD page that is displayed.



**NOTE:** <u>In GPS mode</u>, upon any VOR/ILS approach activation, the appropriate NAV frequency is automatically loaded into the **active field of NAV1**, regardless of the current MFD page that is displayed.

### WPT – Airport Information Page

The Airport Information Page displays runway information and a list of frequencies for the selected airport identifier as well as departure, arrival and approach information

### To display the entire list of frequencies for a desired airport:

- On the Airport Information Page, press the INFO softkey to display runway and frequency information for a specific airport.
- 2. Press the **FMS** knob to activate the selection cursor in the window.
- Turn the FMS knob to select the desired airport identifier and press the ENT key. A list of all available frequencies for the selected airport appears.



Figure 4.4.4 WPT – Airport Information Page (INFO)

# To load the desired COM frequency into the COM tuning box:

- When the list of frequencies for the selected airport is displayed, highlight the desired frequency by turning the large FMS knob.
- 2. Press the ENT key.



**NOTE:** The runway Pilot Controlled Lighting (PCL) frequency (located in the Runways box of the INFO portion of the Airport Information Page) may also be highlighted with the **large FMS** knob and loaded into the COM tuning box by pressing the **ENT** key.

# To load the primary approach NAV frequency into the NAV tuning box:

- On the Airport Information Page, press the APR softkey to display approach information for a specific airport.
- Press the FMS knob to activate the selection cursor in the window.
- Turn the large FMS knob to highlight the primary NAV frequency located in the Primary Frequency box.
- 4. Press the **ENT** key.



Figure 4.4.5 WPT – Airport Information Page (APR)

### WPT – VOR Information Page

The VOR Information Page displays information specific to individual VORs, including the airport that is nearest to the selected VOR.

### To load a VOR frequency into the NAV window:

- On the VOR Information Page, press the FMS knob to activate the VOR Information window.
- Turn the FMS knob as needed to select the desired VOR and press the ENT key to validate the selection.
- 3. Turn the **large FMS** knob to highlight the VOR frequency and press the **ENT** key to load this frequency into the tuning box of the NAV Frequency window.



**NOTE:** If the **MENU** key is pressed when on the VOR Information Page, the 'View Recent VOR List' menu option is displayed for quick access to recently used VORs. However, if no VOR frequencies have been tuned, this menu option is grayed out.



Figure 4.4.6 WPT - VOR Information Page

### NRST – Nearest Airports Page

The Nearest Airports Page displays a list of the nearest airports as well as related runway, frequency and approach information. On this page, any frequency associated with the selected airport can be loaded into the NAV or COM Frequency window.

# To display the entire list of frequencies for a nearby airport and load a frequency from that list:

- On the Nearest Airports Page, press the FMS knob to activate the selection cursor in the Nearest Airports window.
- 2. Turn the **FMS** knob to scroll through the list of nearest airport identifiers until the desired nearest airport is highlighted.
- Press the FREQ softkey to activate the selection cursor in the Frequencies box.
- 4. Turn the **FMS** knob to scroll through the list of frequencies for the selected airport.
- 5. When the desired frequency is highlighted, press the **ENT** key to load this frequency into the tuning box of the appropriate Frequency window (NAV or COM).



Figure 4.4.7 NRST – Nearest Airport Page

### NRST – Nearest VOR Page

The Nearest VOR Page displays a list of the nearest VORs together with related information, including the associated VOR frequency.

### To load a VOR frequency into the NAV window:

- On the Nearest VOR Page, press the FMS knob to activate the Nearest VOR window.
- Turn the FMS knob to scroll through the list of nearest VORs until the desired nearest VOR is highlighted.
- Press the FREQ softkey to activate the selection cursor in the Frequency box and press the ENT key to load the frequency into the tuning box of the NAV Frequency window.



Figure 4.4.8 NRST – Nearest VOR Page

### NRST – Nearest Frequencies Page

The Nearest Frequencies Page displays a list of nearest ARTCC, FSS and WX frequencies. For the purpose of frequency selection, the selection cursor can be activated on the ARTCC, FSS, or WX windows by using the **ARTCC**, **FSS** and **WX** softkeys, respectively.

# To view a nearest ARTCC frequency and load it into the standby frequency field:

- Press the ARTCC softkey to activate the selection cursor in the Nearest ARTCC window.
- Turn the small FMS knob to scroll through the list of ARTCC names, then the large FMS knob to highlight the desired ARTCC frequency.
- Press the ENT key to load the desired ARTCC frequency into the tuning box.



**NOTE:** The Nearest ARTCC window contains a numbered list of ARTCC names as well as associated bearing and distance information.

# To view a nearest FSS frequency and load it into the standby frequency field:

- Press the FSS softkey to activate the selection cursor in the Nearest FSS window.
- 2. Turn the **small FMS** knob to scroll through the list of FSS names, then the **large FMS** knob to highlight the desired FSS frequency.
- 3. Press the **ENT** key to load the desired FSS frequency into the tuning box.



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**NOTE:** The Nearest FSS window contains a numbered list of FSS names as well as associated bearing and distance information.

# To view a nearest WX frequency and load it into the standby frequency field:

- Press the **WX** softkey to activate the selection cursor in the Nearest WX window.
- 2. Turn the **FMS** knob to highlight the desired WX frequency.
- 3. Press the **ENT** key to load the desired WX frequency into the tuning box.

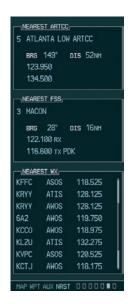


Figure 4.4.9 NRST – Nearest Frequencies Page

# **AUTO-TUNING UPON APPROACH ACTIVATION (NAV FREQUENCIES)**

NAV frequencies can be automatically loaded into the NAV Frequency window upon approach activation, regardless of the display unit being used.



**NOTE:** The primary NAV frequency also becomes auto-tuned upon **loading of an approach**.

# To auto-tune a NAV frequency if the desired approach is not already loaded:

- Press the **PROC** key to open the Procedures window.
- Turn the large FMS knob to highlight the 'SELECT APPROACH' menu option and press the ENT key.
- Use both the FMS knob and the ENT key as needed to select the desired airport, VOR/ILS approach and transition.
- 4. Turn the **large FMS** knob to highlight either the 'LOAD?' or 'ACTIVATE?' prompt and press the **ENT** key. The primary NAV frequency for the activated approach becomes loaded into the standby field of the selected NAV radio.



Figure 4.4.10 Selecting an Approach

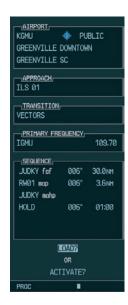


Figure 4.4.11 Loading an Approach

# To auto-tune a NAV frequency if the desired approach is already loaded:

- Press the **PROC** key to open the Procedures window
- Turn the large FMS knob to highlight the 'ACTIVATE APPROACH' menu option and press the ENT key. The approach primary NAV frequency becomes automatically loaded into the standby field of the selected NAV radio.



**NOTE:** If the system is in GPS mode when a VOR/ILS approach is loaded or activated, the approach primary NAV frequency is automatically loaded into the **active field of NAV1**.



**NOTE:** Before loading or activating an approach, the associated primary NAV frequency may be loaded into the NAV tuning box by highlighting the frequency in the Select Approach window via the **FMS** knob, then by pressing the **ENT** key.



**NOTE:** Automatic loading of the NAV frequency also occurs upon vector-to-final activation, if the NAV frequency is not already loaded into either the standby or the active field of the selected NAV radio.



**NOTE:** Approach activation can also be performed via the **MENU** key when the Flight Plan window is open.



Figure 4.4.12 Activating an Approach



**NOTE:** When a VOR/ILS approach has been activated in GPS mode, if the ILS CDI Capture option on the AUX 4 Page is set to AUTO, the system automatically switches to NAV mode as the final approach course is intercepted (if within 15 nm from the FAF). Please see the Multi Function Display Pilot's Guide for details on this feature.



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