



VFS101 Pilot's Guide

VFS101-PMAN3, Revision B

Revision History

Rev.	Date	Page	Description	Sig.
A	18-Dec-2012	All	Initial Release	JSM
B	8-Jul-2013	1, 12, 14, 20, 24 16	Expand maximum flightplan waypoints from 31 to 100. Allow intersection waypoints to be omitted for successive airways.	JSM

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Preface

This manual provides detailed instructions for using the VFS101 Speech Recognition System with Garmin GNS 430 / 530 or 430W / 530W series GPS units. Please carefully review the complete manual and familiarize yourself with the system before attempting to use the VFS101 in flight.

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I.0 Introduction

The VoiceFlight VFS101 is a revolutionary speech-recognition system that allows pilots to rapidly enter navigational waypoints using their voice. The system provides accurate speech recognition, and nearly instantaneous response, for the great majority of pilots and flight environments. Voice entry of complex flightplans can be performed approximately ten times faster than is possible with conventional knob-twisting. The system is speaker independent and operates without any type of “enrollment” or tuning before use.

For routine flight operations, the VFS101 provides convenient, “hands-free” entry of Direct-To waypoint destinations directly into the aircraft's primary Garmin GPS unit. For safety, an audio read-back of the intended waypoint is presented for confirmation before the new destination is activated.

The VFS101 also provides the capability to enter complex flight plans using speech commands. The system typically recognizes waypoint entries faster than the pilot is able to (clearly) speak them. In addition to rapid entry of multiple waypoints, the system performs automatic expansion of airways, also provided via voice entry.

The VFS101 operates on the primary GPS's active flightplan. The flightplan's title line is continually updated to display new waypoints as they are added to the flightplan and to display error messages describing any problems that are encountered.

A suite of voice commands are available for editing the flightplan, to correct errors, or accommodate routing changes. The context of editing operations is displayed on the flightplan title line.

The VFS101 system does not alter or interfere with manual operation of the aircraft GPS. If the pilot experiences difficulties or confusion while utilizing the VFS101, conventional manual operations are readily available.

The VoiceFlight Activation Switch (VAS) is typically mounted on the pilot yoke and is activated by the pilot when speech commands are provided to the VFS101. The VFS101 will not recognize speech, or transmit updates to the GPS units, unless the VAS is depressed.

The GNS 430 / 530 and GNS 430W / 530W series GPS units have historically been limited to a maximum of 31 waypoints per flightplan. However, when a GNS 430W / 530W is updated to Main Software Version 5.00 or later, this limit is expanded to 100 waypoints. In this document, this limitation will be referred to as “31 or 100 waypoints” with the implicit dependency on the Main Software version installed into the GPS unit.

1.1 Operating Limitations

- VFS101 editing operations are limited to the en-route section of the active flightplan on the primary GPS.
- The VFS101 will not allow editing of an active navigation leg.
- All VFS101 operations are suspended when an approach is loaded into the active flightplan. VFS101 operations will be restored after the approach is removed.
- It is the pilot's responsibility to ensure that the correct navigational data is installed on the VFS101. Failure to use current navigational data may result in incorrect airway expansion and an inability to enter some waypoints using the VFS101.
- If the navigational database installed on the VFS101 is not current, the pilot must manually verify the correctness of each waypoint and airway entered using the VFS101 by comparison to current navigational charts.
- Each individual pilot should complete the Pilot Qualification procedures described in Section 4.2 before attempting to use the VoiceFlight unit for actual in-flight navigation. This is to ensure the VFS101 is able to safely recognize the pilot's voice, and that the pilot is familiar with the VFS101's operation.

2.0 Operational Overview

This section includes the key information needed to operate the VFS101. A more detailed description of VFS101 functions can be found in section 5 of this guide.

- The system recognizes speech only while the VoiceFlight Activation Switch (VAS) is depressed.
- Upon depressing the VAS, do not begin speaking until the System Ready "Double Beep" is heard. If the "double beep" is not heard, release the switch and attempt to identify the problem.
- The VFS101 only recognizes words from the ICAO spelling alphabet, and only when they are used in the correct syntax. Using the wrong words, or in the wrong order will not work. The ICAO alphabet can be found in Section 5.2.
- If a speaking mistake is made, momentarily release the VAS, then depress it again before attempting to repeat the desired phrase.
- Audio output from the VFS101 stops upon VAS release. Prematurely releasing the VAS will prevent VFS101 Audio feedback, such as confirmation read-back of Direct-To commands.
- When entering waypoints into the active flightplan, individual legs may be up to 250 nautical miles in length. Cross country flightplans can be built from sequences of individual 250 nautical mile legs.

- Direct-To destinations may be up to 1,000 nautical miles from the aircraft's position if they are an airport or VOR, up to 250 nautical miles if they are any other waypoint type, or an unlimited distance if they are present in the active flightplan on the primary GPS.
- The VFS101 is designed to recognize only the currently eligible waypoints. If an intended waypoint is repeatedly mis-recognized as some other waypoint, it is likely that the intended waypoint is not currently eligible. Potential causes include:
 - Missing prefix character on an airport name (e.g. "K" on alphabetic airports within the continental U.S.)
 - An airway is active, and spoken waypoint is not located on that airway (Note: airports are never on airways)
 - The waypoint is located outside of the current search radius. This is 250 nautical miles for most commands, and 1,000 nautical miles for Airport and VOR Direct-Tos.
 - The waypoint is missing from the VFS101 navigation database
- During initial familiarization with the VFS101 unit, some pilots have a tendency to release the VAS sooner, and more frequently, than is necessary. This tendency is reduced as the pilot gains more experience with the unit.
- Upon entering a Direct-To waypoint, confirm that the destination identifier and the track displayed on the map page are correct.
- The blinking cursor shown on the GPS does NOT represent VFS101 selection of a waypoint. The selection of a waypoint is shown by asterisks surrounding the waypoint on the flightplan title line.
- If the VFS101 or GPS units exhibit anomalous behavior turn off the VFS101 using the dedicated circuit breaker or power switch.
- The VFS101 will shut down if the VAS is depressed and released five times without successfully recognizing speech. This is for safety reasons. To re-start the VFS101, remove power from the VFS101 (not the GPS) using the dedicated VFS101 circuit breaker or switch. Wait at least 5 seconds then re-apply power. The VFS101 will restart in approximately 20 seconds.
- When entering a flightplan into the GPS, it is beneficial to have the active flightplan displayed on the primary GPS. This is accessed by pressing the FPL button.
- When a VFS101 error tone is heard, examine the title line of the active flightplan on the primary GPS. An error message will be displayed there for several seconds. See Appendix C for a listing of these messages and their causes.
- The internal processor of the GNS 430 / 530 series GPS units is considerably slower. On these units, VFS101 responses may be delayed for a second or two in specific circumstances (e.g. processing the first speech command with a long flightplan).

3.0 VFS101 Interconnect Diagram

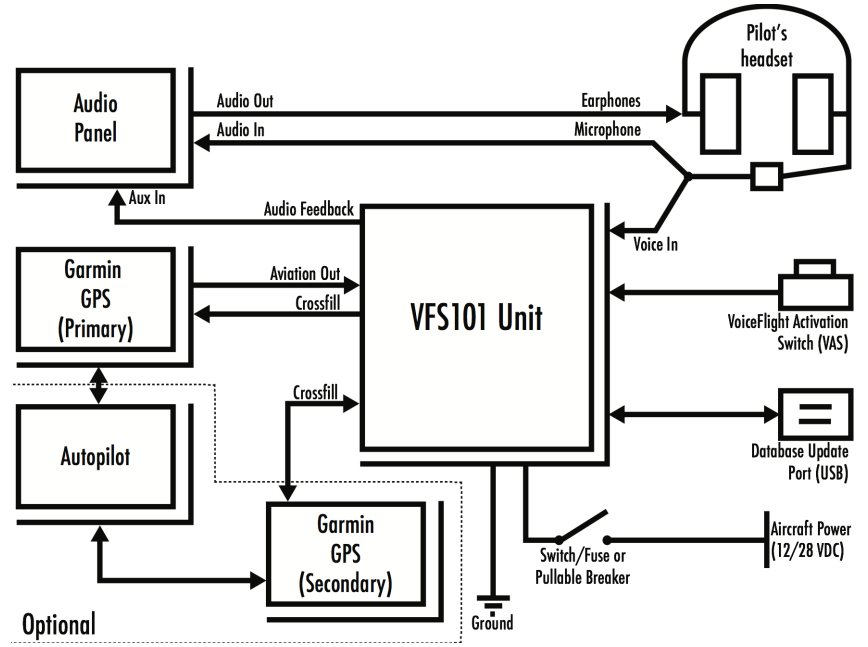
The VFS101 system consists of a single 3.3 in x 5.5 in x 1 in, unit which is mounted behind the aircraft's instrument panel. This unit has a single DB-25 connector and connects to other aircraft systems as shown in the VFS101 System Block Diagram.

All waypoints input through the VFS101 appear on the primary GPS. The optional secondary GPS is connected to allow the pilot to continue to use the crossfill functionality to send flightplans from one GPS to the other.

The database update port is a standard USB jack which accepts USB flash storage devices, used to install new navigational data.

The switch/fuse or pullable breaker can be used to disable the VFS101 in the event it exhibits anomalous behavior, or to restart the VFS101 after a shutdown.

The VFS101 audio output is directly connected to the audio panel intercom system.



4.0 Getting Started

This section contains examples of how to enter Direct-To commands and a short flightplan. If difficulties are encountered during any of the following exercises, please refer to the trouble-shooting section of this manual (sec. 6.0), consult with your authorized avionics installer, or contact VoiceFlight Systems technical support.

4.1 Cautions

- After depressing the VoiceFlight Activation Switch (VAS), do not begin speaking until the double-beep is heard.
- Confirm all airway expansions prior to use.
- Upon entering a Direct-To waypoint, confirm that the destination identifier and the track displayed on the map page are correct.
- If the VFS101 or GPS unit exhibit anomalous behavior turn off the VFS101 using the dedicated circuit breaker or power switch.
- The VFS101 navigation database must be updated every 28 days in synchronization with the AIRAC charting cycle.
- The blinking cursor shown on the GPS does NOT represent VFS101 selection of a waypoint. The selection of a waypoint is shown by asterisks surrounding the waypoint on the flightplan title line.
- Do not initiate conventional crossfill or manual flightplan editing operations while the VAS is depressed.

- While inserting waypoints on GNS 430W / 530W series GPS units, the VFS101 may insert temporary waypoints at the bottom of the flightplan. If these are not automatically removed, discontinue VFS101 operations and remove them manually.

4.2 Pilot Qualification Procedure

The pilot qualification procedure is designed to confirm that the VFS101 is able to recognize a given pilot's voice and to familiarize the pilot with the system. Each pilot should complete pilot qualification before using the VFS101 for in-flight entry of navigational data.

Complete the procedures described in sections 4.3 and 4.4 twice each, once on the ground, and the second time in flight while flying under VFR conditions in an environment where the procedure can be safely completed. The qualification is complete when the procedures can be performed without errors.

4.3 Activating a Direct-To Waypoint

For this exercise, select two or three nearby waypoints and record their identifiers exactly as would be used manually with the Garmin GPS units. The selected waypoints must be within 1,000 nautical miles for airport identifiers or VORs, and within 250 nautical miles for all other waypoint types.

For illustration, this document uses two identifiers: Chicago's O'Hare International airport "KORD" and the "SAGES" navigational fix near KHFD. This example assumes the aircraft is located at KHFD in Hartford, CT.

It will be helpful for this initial example to write down the ICAO alphabet translation for the selected identifiers. (The ICAO alphabet appears in the Detailed Functional Description section of this document, and on the VFS101 Quick Reference Card).

For our example waypoints:

KORD -> Kilo Oscar Romeo Delta

SAGES -> Sierra Alpha Golf Echo Sierra

Note:

Initial familiarization is performed in a safely positioned stationary aircraft without the engine running.

Position the aircraft in a location where the GPS antennas have an unobstructed view of the sky. Apply power to the audio panel, the primary Garmin GPS unit, and the VFS101 unit.

Allow the GPS unit to complete its initialization and self-test. Acknowledge the initial test screens by pressing the ENT button. Wait for the GPS to acquire satellites. The VFS101 will complete its initialization before the GPS units are ready.

From the pilot seat, connect a standard aviation headset to the pilot headset jacks. Place the headset microphone close to your lips and adjust the audio panel for a comfortable sidetone volume.

Adjust the primary GPS unit to display the first navigation page. This can be accomplished by depressing the CLR button for a full two seconds, as well as by a variety of other methods.

The VoiceFlight Activation Switch (VAS) is located on the pilot yoke and must be depressed when speaking to the VFS101 system. Examine the switch labels to confirm the VAS location. Always use extra caution to insure that the VAS is utilized, and not the radio transceiver Push-To-Talk switch.

Momentarily depress and hold the VAS. A "double-beep" should be heard through the headset indicating that the VFS101 is operating and ready to recognize speech.

When utilizing the VFS101, do not begin speaking unless the system-ready "double-beep" is heard. Instead, release the VAS and attempt to determine the cause of the problem.

Attempt to initiate a Direct-To operation on the primary GPS using the selected sample waypoint. For illustration, this document uses KORD. You should substitute an airport identifier or VOR identifier within 1,000 nautical miles of the current aircraft location.

1. Depress the VAS (and do not release it until instructed).
2. Clearly and distinctly say exactly the following words: (substituting a waypoint identifier near the current aircraft location)
"DIRECT" "KILO" "OSCAR" "ROMEO" "DELTA"
"ACTIVATE"

Direct-To commands begin with the word "DIRECT" (not "Direct-To"), are followed by the spelling of the intended waypoint and end with the word "ACTIVATE".

3. If the above words were properly entered, the VFS101 should immediately begin playing an audio message confirming the entered waypoint. In the example this would be:
"Confirm Kilo Oscar Romeo Delta Direct ?"
4. If the stated waypoint is correct, promptly release the VAS and then immediately "Double Click" the VAS for confirmation (i.e. Release the VAS, then depress and release the VAS TWICE in rapid succession). This operation must be completed within 2 seconds of the audio message completing to be accepted.
5. If the "Double Click" was completed promptly, the GPS display should show the new Direct-To location near the bottom of the first navigation page. If an error tone is heard, the most likely cause is that the double-click was performed too slowly. Try again beginning with step 1 and be sure to press and release the VAS twice within two seconds of the audio message finishing.
6. Always confirm that the correct waypoint identifier appears on the GPS and that the track displayed on the map page is correct. If the aircraft were in flight, the GPS would immediately begin navigating a new course to the specified waypoint.
7. Assuming the first waypoint was successfully entered, repeat the same procedure with the second nearby waypoint.
8. For additional familiarization, re-enter the Direct-To several times, alternating between the two destination waypoints, until comfortable with the procedure.

9. When finished with the Direct-To familiarization procedure, cancel the active Direct-To using the manual GPS controls. (Press the Direct-To button, MENU button, then the ENT button.)

4.4 Entering a Flightplan

Having successfully completed entry of Direct-To destinations, this section demonstrates the entry of entire flightplans. For this phase, select at least three nearby waypoints.

The VFS101 uses waypoint locations to improve recognition accuracy. When a flightplan is entered using speech, each leg is limited to 250 nautical miles. If the flightplan is empty, then the VFS101 will recognize waypoints within 250 nautical miles of the aircraft's current position. If the flightplan is not empty, then it will recognize waypoints within 250 nautical miles of the last waypoint in the flightplan. This allows long flightplans to be entered, so long as each leg is no longer than 250 nautical miles.

For illustration in this document, KHFD (Hartford, CT), SAGES, and the Kingston VOR "IGN" will be used. You should formulate a flightplan beginning at your current airport, keeping in mind the 250 nautical mile leg length limitation.

Entry and editing of flightplans are performed within the en-route section of the active flightplan on the primary GPS.

1. If necessary, re-apply power to the avionics equipment and initialize the GPS unit as described above.
2. Adjust the Primary GPS to display the active flightplan. This is performed by pressing the "FPL" button on the primary GPS.

3. The title line shown at the top of the flightplan provides the best feedback on VFS101 status and operations.
4. Begin flight plan entry with the first sample waypoint. The identifier "KHFD" is used in this example. You should substitute a waypoint near the aircraft's current location.
5. Depress and hold the VAS until otherwise instructed.
6. Carefully speak the waypoint identifier, immediately followed by the word "ENTER" as shown below (substituting the first waypoint in your flightplan):
"KILO" "HOTEL" "FOXTROT" "DELTA" "ENTER"
7. If the phrase was successfully recognized, a single "Beep" will be heard through the pilot headset.
8. The recognized waypoint identifier will be displayed for reference on the flightplan title line and the waypoint will be added to the end of the flightplan.
9. Release the VAS. (It is not necessary to release the VAS between waypoints and is indicated here to allow the user an opportunity to prepare for the next waypoints.)
10. Add the second and third sample waypoints to the flightplan. For this example, it may be helpful to write down the ICAO translations before proceeding.
11. Depress and hold the VAS until otherwise instructed.
12. Carefully speak the second waypoint identifier, followed by the word "ENTER" as shown below (substituting the next waypoint in your flightplan):
"SIERRA" "ALPHA" "GOLF" "ECHO" "SIERRA" "ENTER"
13. If correctly recognized, a single "Beep" will be heard.
14. Without releasing the VAS, enter the third waypoint identifier followed by the word "ENTER" (substituting the next waypoint in your flightplan):
"INDIA" "GOLF" "NOVEMBER" "ENTER"
15. If correctly recognized, a single "Beep" will be heard.
16. Release the VAS and inspect the flightplan. All three of the sample waypoints should appear in sequence.
17. To familiarize yourself with the distinctive VFS101 error tone, depress the VAS and speak the word "ACTIVATE" by itself.
18. Examine the flightplan title line for feedback describing the error. The title line should display "NOT RECOGNIZED" for approximately two seconds. Release the VAS. Whenever a VFS101 error tone is heard, an explanation of the error will be shown on the title line.
19. To illustrate simple error correction, depress the VAS and clearly speak "ERASE WAYPOINT".
20. If correctly recognized, a single "Beep" will be heard. The last waypoint in the flightplan ("IGN" in the example) will disappear from both the flightplan and the title line. Release the VAS.
21. It is not necessary to release the VAS between any of these commands. If the pilot observes a recognition error on the previous waypoint, he can simply speak "ERASE WAYPOINT" and then retry the previous waypoint entry.

22. For additional practice, clear the flightplan and re-enter all of the waypoints. Start by depressing and holding the VAS.
23. Carefully speak the words: "START" "NEW" "FLIGHTPLAN".
24. An audio message "Confirm Start New Flight Plan?" should be heard. Just as with the Direct-To, confirm the command by double-clicking the VAS within two seconds. The entire contents of the flightplan should disappear.
25. After Depressing the VAS, re-enter all of the waypoints (for our example):
"KILO" "HOTEL" "FOXTROT" "DELTA" "ENTER"
"SIERRA" "ALPHA" "GOLF" "ECHO" "SIERRA" "ENTER"
"INDIA" "GOLF" "NOVEMBER" "ENTER"
26. Release the VAS.
27. Examine the flightplan entries and confirm that all of the sample waypoints were correctly entered.

5.0 Detailed Functional Description

This section provides a detailed description of how the VFS101 operates. For each behavior, a diagram shows the speech patterns used to activate the command. These diagrams are also shown on the VFS101 Quick Reference Card.

5.1 VoiceFlight Activation Switch (VAS)

The VFS101 speech-recognition system accepts speech input only when the VoiceFlight Activation Switch (VAS) is depressed. This switch is typically mounted on the left side of the pilot's yoke, and labeled VAS or VFS101. (Your installation may vary.)

Depressing the VAS should result in the pilot hearing a distinctive "double beep" sound through the aircraft audio system. This sound indicates the VFS101 system is active and awaiting input. Do not begin speaking until the double-beep is heard.

Releasing the VAS terminates all audio output from the VFS101 system, and discards any partial entry or extraneous noise. This behavior can be used in the event of a speech error to quickly clear the mistake and start over. Releasing the VAS also cancels any waypoint selections or incomplete airway entries.



5.2 ICAO Spelling Alphabet

The VFS101 uses the ICAO spelling alphabet (Alpha, Bravo, Charlie, etc.) for speech recognition. When using the VFS101 to input navigational information, be sure to use those words shown in the table below. Non-standard words (Adam, Billy, Fox, Ohh, etc.) will not be recognized.

ICAO Spelling Alphabet			
Alpha	Juliet	Sierra	Two
Bravo	Kilo	Tango	Three
Charlie	Lima	Uniform	Four
Delta	Mike	Victor	Fife
Echo	November	Whiskey	Six
Foxtrot	Oscar	X-Ray	Seven
Golf	Papa	Yankee	Eight
Hotel	Quebec	Zulu	Niner
India	Romeo	One	Zero

If you are having difficulty entering an airport waypoint remember that airport waypoints may be prefaced with a “K” (Kilo) in the continental United States or a “P” (Papa) in Alaska and Hawaii. Numbers must be entered as a string of digits e.g. “Fife Zero Niner”, not “five-hundred and nine”.

5.3 Title Line

The VFS101 uses the title line of the active flightplan on the primary GPS to provide feedback on it's activities. When using the VFS101, the pilot should monitor the title line to confirm that the speech commands have been correctly recognized. If the VFS101 generates an error tone, an error message will be displayed on the title line for several seconds. A list of these messages and their causes is found in Appendix C.

When the GPS is proceeding Direct-To a waypoint which does not appear in the active flightplan, the title line is not available (since it is displaying the Direct-To waypoint.) To allow access to the title line, the VFS101 will temporarily move this direct-to waypoint to the end of the flightplan to allow access to the title line, then remove it from the flightplan when it has finished using the title line.

An active Direct-To targeting a non-flightplan waypoint will also prevent the pilot from entering the configuration display interface, adjusting the VFS101 audio output volume, or changing the airway compression setting (see section 7). To access the title line for configuration entry, the Direct-To must first be canceled using the manual controls. (Press Direct-To, then MENU, then ENT.)

5.4 Direct-To

CAUTION: Destination Waypoint and displayed track must be verified on the map page.

The VFS101 can be used to enter Direct-To waypoints. These appear on the primary navigation page of the Primary GPS, just as any other Direct-To waypoint would. The procedure for entering a Direct-To waypoint is shown in the diagram below.

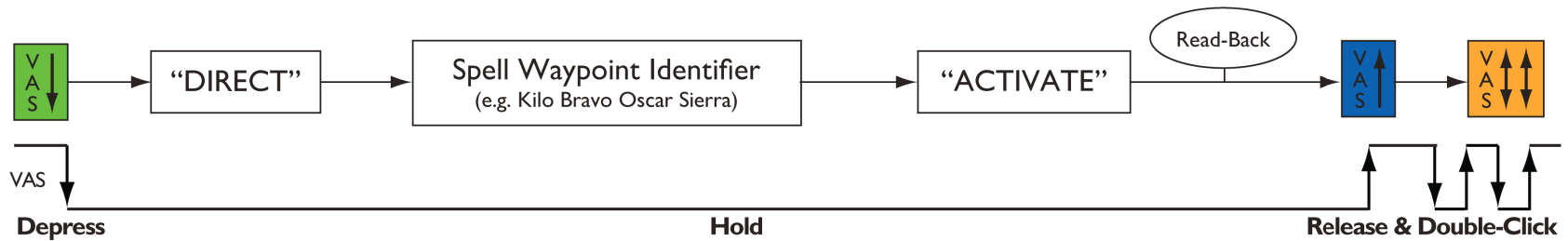
1. Adjust the Primary GPS to display the primary NAV Page.
2. Depress and hold the VAS. As usual, a double-beep should be heard (not illustrated).
3. Say “DIRECT” (not “Direct-To”), then spell the desired Direct-To waypoint using the ICAO spelling alphabet, followed by the word “ACTIVATE”.
4. Instead of a beep, the VFS101 will play an audio read-back of the waypoint it recognized.
5. If and only if the read-back is correct, rapidly release and then double-click the VAS to confirm it. This must be completed within two seconds of the audio message finishing or the

VFS101 will sound an error tone and the command will be rejected.

6. On the Primary GPS, confirm that the entered waypoint appears as the Direct-To waypoint. Also verify the track displayed on the NAV map page.

Waypoints eligible for recognition as part of direct-to commands include:

- All waypoints within 250 nautical miles of the aircraft's current position
- All airports and VORs within 1,000 nautical miles of the aircraft's current position
- All waypoints in the active flightplan on the primary GPS



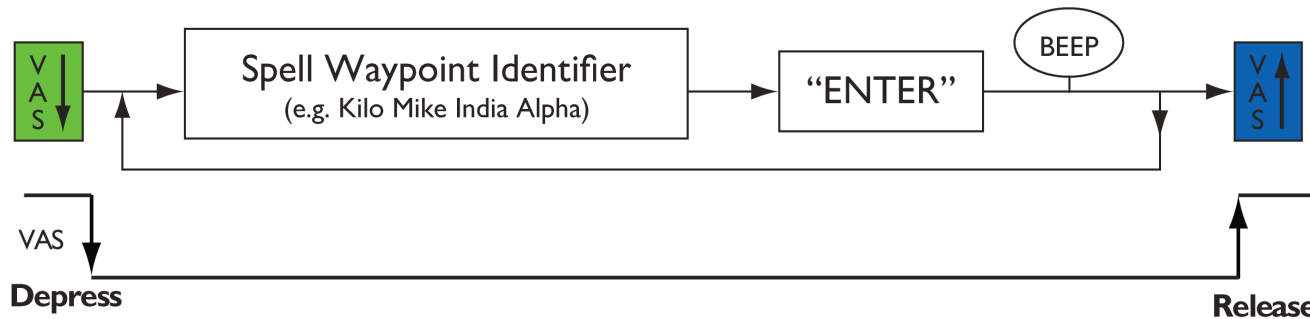
5.5 Waypoint Entry

The VFS101 allows the pilot to enter waypoints into the en-route section of the active flightplan on the primary GPS.

The Garmin GNS 430 / 530 and 430W / 530W series GPS units limit flightplans to 31 or 100 waypoints. Attempting to enter more than 31 or 100 waypoints in a flightplan via the VFS101 will result in an error tone being played through the audio system, and an error message appearing on the title line of the primary GPS.

If the VFS101 is exhibiting poor recognition, first make sure the pilot microphone is close to the lips, then try speaking more slowly. Be sure to speak clearly, pronouncing every syllable of each word. Leaving out a syllable, or running words together makes it more difficult for the VFS101 to understand pilot speech. Pay particular attention to fully enunciating the “t” sounds at the end of words such as foxtrot, start, and flight (plan).

The following diagram illustrates the procedure for entering a waypoint:



1. Adjust the Primary GPS to display the active flightplan.
2. Depress and hold the VAS. As usual, a “double-beep” should be heard (not illustrated).
3. Spell a waypoint identifier using the ICAO phonetic alphabet, followed by the word “ENTER”.
4. A single “beep” tone should be heard, indicating that the recognition has been successful. Confirm that the correct waypoint has been recognized by examining the title line of the flightplan. It will display the last two waypoints in the flightplan while the VAS is depressed.

For example if the last two waypoints entered were “ALB” and “KHFD” the title line would read:

ALB -> KHFD -> ?

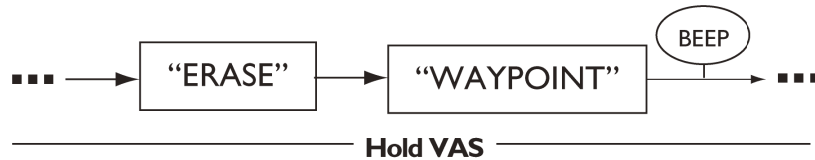
5. Additional waypoints may be entered if required, or the VAS may be released.

Which waypoints are eligible for entry using speech depends on the active flightplan. If the flightplan is empty all waypoints within 250 nautical miles of the aircraft's current location can be entered. If the flightplan contains one or more waypoints then all waypoints within 250 nautical miles of the last waypoint in the flightplan can be entered.

Since the recognition radius moves each time a waypoint is entered, long cross-country flightplans can be entered, so long as each leg is less than 250 nautical miles in length.

5.6 Error Correction

In the event a waypoint is incorrectly recognized, or if a mistake is made in waypoint entry, the command "ERASE WAYPOINT" may be used to erase the last en-route waypoint in the active flightplan. The following diagram illustrates the process of erasing a waypoint:



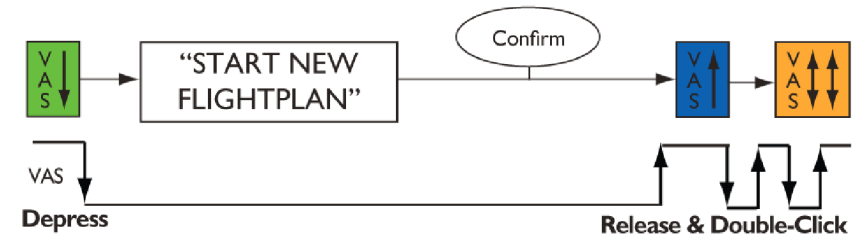
Note: "ERASE WAYPOINT" will not erase a waypoint which is part of the active navigation leg. Attempting to do so will result in an error. If a waypoint other than the last en-route waypoint in the flightplan must be erased, then see Section 5.9 of this guide.

5.7 Starting a new Flightplan

To erase the entire contents of the active flightplan:

1. Depress and hold the VAS.
2. Say the words "START NEW FLIGHTPLAN".
3. An audio message will be played: "Confirm Start New Flight Plan".
4. Double Click the VAS to confirm the command.
5. Verify that the contents of the active flightplan have been erased.
6. Release the VAS, or begin entering waypoints into the now-empty flightplan.

Note: "START NEW FLIGHTPLAN" will also erase any departure or arrival procedures present in the flightplan.



5.8 Airway Entry

CAUTION: The sequence of waypoints generated for an airway must be carefully verified before the flightplan is navigated.

The VFS101 is capable of automatically expanding airways. The entry of an airway is valid only when there are one or more waypoints already in the flightplan. If no waypoint has been selected, then the last en-route waypoint in the active flightplan will be used as the waypoint where the airway will be entered.

The process for entering an airway is:

1. Adjust the Primary GPS to display the active flightplan.
2. While the VAS is depressed, say the initial airway letter identifier (e.g. “VICTOR” for Victor airways, “JULIET” for Jet Routes, “TANGO” for T Routes, etc.), then spell the remainder of the airway using the ICAO alphabet (for example: “VICTOR FIFE ZERO”), then say “ENTER”.
3. If the VFS101 generates a beep indicating successful recognition, verify the airway was correctly recognized by looking at the title line. The line should show the entry waypoint and airway name, followed by a question mark.

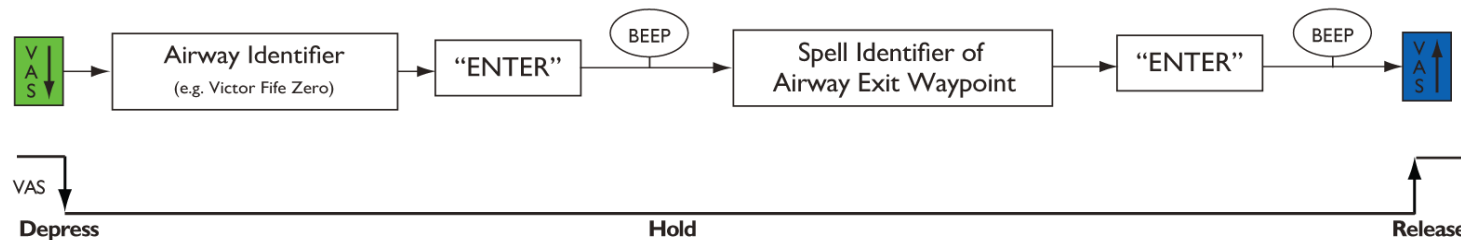
For example, if the entry waypoint was “BOS” and the airway entered was “VICTOR THREE” then the display should read:

BOS -> V3 -> ?

4. Enter the waypoint to exit the airway using the ICAO spelling alphabet, followed by the word “ENTER”. Listen for the beep indicating successful recognition.
5. If this completes the flightplan, release the VAS, otherwise continue entering waypoints.
6. Before navigating the flightplan, carefully verify that the airway was correctly expanded by scrolling through the waypoints using the manual GPS interface.

Releasing the VAS before an exit waypoint has been recognized will terminate the airway entry. This is useful if an airway name is recognized in error.

Note: The Garmin GPS units are limited to 31 or 100 waypoints per flightplan. Some airway routes may be too long to be fully expanded. If such an entry is attempted the VFS101 will sound an error tone, display a warning message (“TOO MANY WAYPOINTS”) on the title line, and insert as many of the waypoints into the flightplan as possible. Airway Compression (section 7.4) may be used to reduce the number of waypoints in an airway expansion.



5.9 Advanced Editing

In addition to adding waypoints to the end of the en-route section of the active flightplan it is possible to insert and delete waypoints at other locations in that section. The VFS101 editing system works by first selecting a waypoint in the flightplan, then performing various editing operations at that point. To do this, first select the waypoint for modification according to the diagram shown below.

This will change the title line of the active flightplan to indicate that the waypoint has been selected. If (for example) you selected the waypoint “BOSOX” which was located after “BOS” in the flightplan, and before “ALB” the title line would read:

```
BOS -> *BOSOX* -> ALB
```

Since editing is permitted only in the en-route section, selection of departure and arrival waypoints is not allowed. Also, inserting a waypoint into the middle of an active navigational leg is not allowed, and will generate an error. Any waypoints inserted will appear in the flightplan immediately before (above) the selected waypoint.

Waypoints entered must be within 250 nautical miles of either the waypoint preceding the selected waypoint if the selected waypoint is not the first waypoint in the flightplan or of the selected waypoint if the selected waypoint is the first waypoint in the flightplan.

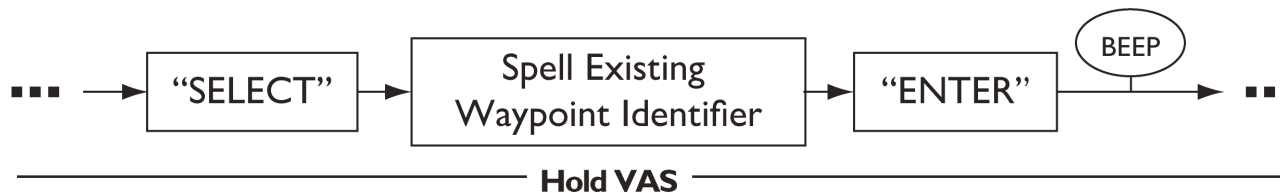
Airways may be entered and will use the waypoint immediately preceding the selected waypoint as the airway entry waypoint.

The “ERASE WAYPOINT” command will erase the selected waypoint, and select the waypoint immediately following (below) the erased waypoint. Releasing the VAS will terminate the selection of a waypoint.

Selection can also be used to erase multiple waypoints at a time, for example in the event of a major routing change. This is done using the “ERASE REMAINDER” command.

1. Adjust the Primary GPS to display the active flightplan.
2. Depress and hold the VAS.
3. Select the last waypoint in the flightplan which is to be retained, using the “SELECT” command described above.
4. Say “ERASE REMAINDER” and listen for the audio message requesting confirmation of the command.
5. Double-Click the VAS within two seconds to confirm.
6. Verify that the waypoints following the selected waypoint have been erased.

Note: ERASE REMAINDER will erase any arrival procedures present in the active flightplan.



6.0 Troubleshooting

This section describes some common error messages that may be generated by the VFS101, as well as solutions to some common problems. A full list of VFS101 error messages can be found in Appendixes B and C.

- If the VFS101 does not respond when depressing the VAS, verify the VFS101 Circuit Breaker is closed, or the VFS101 fuse is intact. If equipped with a dedicated power switch, confirm the switch is in the on position.
- When an error tone is heard from the VFS101, the title line of the active flightplan on the primary GPS will briefly display a message describing the cause of the error.
- The VFS101 relies on location information from the primary GPS to function. If the VFS101 is not receiving location information from the primary GPS when the VAS is depressed, then the title line of the flightplan on the primary GPS will briefly display “NO GPS POS DATA” and the VFS101 will refuse to process speech commands. Examine the Primary GPS to determine if sufficient satellite coverage is available.
- If the VFS101 is not responding, and the title line of the flightplan on the Primary GPS reads *VFS101 SHUTDOWN*, then the VFS101 has seen too many VAS closures and openings without a successful recognition and has shut down for safety reasons. The VFS101 can be restarted by removing, and then reapplying power using the VFS101 circuit breaker or switch.
- After the VAS has been depressed without issuing a single beep or an error tone for 20 seconds, the VFS101 will terminate its recognition attempt and issue an error tone. A new speech entry cannot begin until the VAS has been released and depressed.
- If the steps above are unable to restore proper operation, remove power from the VFS101 unit (via dedicated circuit breaker or switch) and refer the unit to authorized maintenance personnel.
- If the primary GPS navigational database's cycle number (version) does not match the cycle of the navigational database on the VFS101 then a warning message indicating this will be played through the audio system.
- When a new navigational database is installed, calibration will be required before the VFS101 can be used. An audio message will be played when the VAS is depressed indicating that calibration is required. See section 7.3 for information on calibration. This issue is applicable only when the VFS101 is used with Garmin GNS 430W / 530W series GPS units.
- While extremely unlikely, it is possible that the contents of a stored flightplan originally entered using the VFS101 could change after a GPS power cycle. Verify all stored flightplans before activation.
- When entering successive airways, intermediate intersection waypoints may be omitted, but the final exit waypoint is still required. For example: BOS V292 V106 PWL is acceptable.

7.0 Settings and Maintenance

7.1 Volume Adjustment

If the volume level of the VFS101's audio output requires adjustment relative to other audio sources, the following procedures may be used. These procedures are only to be used while the aircraft is not moving.

To INCREASE the VFS101 audio output volume:

1. Plug a suitable aviation headset into the pilot headset jack.
2. Adjust the Primary GPS to display the active flightplan.
3. If the title line is obscured by a Direct-To operation, cancel the Direct-To by pressing the Direct-To button, then the MENU button, then the ENT button on the primary GPS.
4. With the aircraft audio panel, VFS101 and primary GPS powered up, enter a new title for the active flightplan on the primary GPS containing the letter "U" (for "UP") in the first character position and no other characters. Press ENT to install the new title.
5. Wait at least 10 seconds.
6. Briefly depress and release the VAS.
7. The title line will change to: "V <Volume Level 0-63> UP?" where the content in < > is replaced with a number indicating the current volume level (e.g V 49).
8. Briefly press and release the VAS again. This will increase the volume by one step. A tone should be heard through the

headset at the new volume level. Repeat until the volume is at the desired level.

9. Depress and hold the VAS for at least two seconds. This will return the VFS101 to normal operations, with the new output volume level.

To DECREASE the VFS101 audio output volume:

1. Plug a suitable aviation headset into the pilot headset jack.
2. Adjust the Primary GPS to display the active flightplan.
3. If the title line is obscured by a Direct-To operation, cancel the Direct-To by pressing the Direct-To button, then the MENU button, then the ENT button on the primary GPS.
4. With the aircraft audio panel, VFS101 and primary GPS powered up, enter a new title for the active flightplan on the primary GPS containing the letter "D" (for "DOWN") in the first character position and no other characters. Press ENT to install the new title.
5. Wait at least 10 seconds.
6. Briefly depress and release the VAS.
7. The title line will change to: "V <Volume Level 0-63> DOWN?" where the content in < > is replaced with a number indicating the current volume level (e.g. V 41).
8. Briefly press and release the VAS again. This will decrease the volume by one step. A tone should be heard through the headset at the new volume level. Repeat until the volume is at the desired level.

9. Depress and hold the VAS for at least two seconds. This will return the VFS101 to normal operations, with the new output volume level.

7.2 Updating the Navigational Database

It is necessary to update the VFS101 navigational database every 28 days in synchronization with the AIRAC charting cycle. These updates should be done at the same time as a new navigation data-card is installed in the Primary GPS (and secondary GPS if so equipped).

It is the pilot's responsibility to ensure that the correct navigational data is installed on the VFS101. Failure to use current navigational data may result in incorrect airway expansion and an inability to enter some waypoints using the VFS101.

If the VFS101 navigational database and Primary GPS navigation database do not have the same cycle number, the VFS101 will play an audio warning message the first time the VAS is depressed after the unit is powered on. The VAS must remain depressed throughout the entire message to confirm the message has been heard or it will repeat. This warning ONLY indicates the GPS navigational database and the VFS101 navigational databases do not match. This could be the result of the VFS101 **or** the GPS navigational databases not being current.

The VFS101 is unable to identify the specific situation where both databases are non-current but have matching cycle numbers. The fact that the GPS database is not current will be evident on the GPS startup screens. If the GPS is subsequently updated without a

matching update to the VFS101, audio messages will then be generated by the VFS101.

Operating the VFS101 with an obsolete navigational database is permissible, however doing so imposes an operational restriction:

If the navigational database installed on the VFS101 is not current, the pilot must manually verify the correctness of each waypoint and airway entered using the VFS101 by comparison to current navigational charts.

To update the VFS101 Navigational Database, utilize the following procedure:

1. Download the navigational database from the “Navigation Update” section of the VoiceFlight Systems website (<http://www.voiceflight.com>) which corresponds to the Primary GPS navigation database. If the website is unavailable contact VoiceFlight Systems customer support for assistance. Contact information can be found in section 8.0 of this document. The computer used for this should be running a recent version of Microsoft Windows, Apple OS X or Linux to insure proper support for the USB flash drive used in step 2.
2. Insert the supplied USB flash drive into a USB port on the computer. On most systems the flash drive should be automatically opened (mounted) by the operating system. Transfer the downloaded navigational database file to the Flash Drive. If other VoiceFlight files (files with the extension “.vfs”) exist on the USB drive, erase them. Do not place the update file into any sub-directories on the flash drive. Eject

the flash drive and remove it from the computer's USB port. See appendix D for generic downloading instructions.

3. At the aircraft, plug a suitable aviation headset into the pilot's headset jacks so that audio responses from the VFS101 can be heard. Alternatively, the aircraft's cockpit speaker may be utilized.
4. If an updated GPS navigation data-card is available install it as per Garmin instructions.
5. With the aircraft stationary, apply power to the GPS unit(s), aircraft audio panel and the VFS101. Wait at least thirty seconds for the VFS101 to initialize. Wait for the GPS(s) to initialize, and acknowledge their self-test screens as required. Display the active flightplan page on the GPS by depressing the FPL button.
6. Insert the USB flash drive into the VFS101 USB jack. Wait at least one minute for the update to be performed.
7. Depress and hold the VAS. An audio message indicating that the navigational update has completed should be heard through the audio system. If the audio message is not heard release the VAS, wait another full minute and try depressing the VAS again. If the message is still not heard, remove the USB drive, remove power from the units and repeat steps 5 through 7.
8. If the audio message "Database Calibration Required, Double-Click to Begin" is heard immediately following the "Navigation Update Complete" message, complete the procedure described in section 7.3, then proceed with step 9 of this procedure.

9. Remove the USB flash drive from the VFS101 USB jack.
10. Depress and hold the VAS. If the explicit warning message "Warning: Navigation cycle dates do not match" is **not** heard, then the VFS101 has determined that the navigational databases have matching cycle dates.

7.3 Database Calibration

This section is applicable only to VFS101 units used with Garmin GNS 430W / 530W series GPS units. It is not required for VFS101 units used with Garmin GNS 430 / 530 series GPS units.

Database calibration is a process that synchronizes the waypoints from the VFS101 navigational database with those present on the primary GPS. Recalibration is required whenever the navigational data of the primary GPS or VFS101 is changed. Although the individual databases can be updated independently, it is recommended that the GPS and VFS101 be updated at the same time and that the new GPS data-card is installed before the VFS101 database is updated and recalibration is performed. The length of time required for calibration will depend on the differences between the two databases but will complete in less than five minutes in all cases. The VFS101 will not begin calibration if the GPS reports the aircraft is in motion.

1. Display the active flightplan page on the primary GPS by depressing the FPL button.
2. Depress and hold the VAS. An audio message "Database Calibration Required, Double-Click to Begin" will be heard.
3. Promptly double-click the VAS to begin the calibration process.

4. The VFS101 will then begin a calibration cycle. During this time the flightplan on the primary GPS will fill with waypoints. Do not use the GPS during this time. After calibration is complete the original active flightplan will be restored.

7.4 Setting Airway Compression

The flightplan of Garmin GNS 430 / 530 series and 430W / 530W series GPS units is limited to a maximum of 31 or 100 waypoints. This is insufficient to contain some airways if all waypoints, including intermediate waypoints on straight segments are included. Airway compression is an optional feature that eliminates those intermediate waypoints whose removal does not change the course of the airway more than 0.1 nautical miles, or cause a leg to be longer than 100 nautical miles. Radio Nav-aids are never eliminated. Airway compression is disabled by default.

To enable or disable airway compression:

1. Plug a suitable aviation headset into the pilot headset jack.
2. Adjust the primary GPS to display the active flightplan.
3. If the title line is obscured by a Direct-To operation, cancel the Direct-To by pressing the Direct-To button, then the MENU button, then the ENT button on the primary GPS.
4. With the aircraft audio panel, VFS101 and primary GPS powered up, enter a new title for the active flightplan on the primary GPS consisting of the letter "A" (for AIRWAY) in the first character position, and no other characters. Press ENT to install the new title.
5. Wait at least 10 seconds.

6. Depress and hold the VAS.
7. An audio message indicating the new status of airway compression will be heard through the audio system. Release the VAS.
8. Repeating the process will toggle airway compression to the opposite state. (Disabled if enabled, enabled if disabled.)

Note: With airway compression enabled, an audio caution message will be played the first time the VAS is depressed each time the VFS101 is powered on.

7.5 Configuration Display Mode

The Configuration Display Mode is used to display the current volume setting, airway compression setting, the part numbers and checksums of the software installed on the VFS101, and the part number and checksum of the installed navigational database. The procedure described here should not be used while the aircraft is moving:

1. Adjust the primary GPS to display the active flightplan.
2. If the title line is obscured by a Direct-To operation, cancel the Direct-To by pressing the Direct-To button, then the MENU button, then the ENT button on the primary GPS.
3. With the aircraft audio panel, VFS101 and primary GPS powered up, enter a new title for the active flightplan on the primary GPS consisting of the letter "C" (for "Configuration") in the first character position, and no other characters. Press ENT to install the new title.
4. Wait at least 10 seconds.

5. Briefly depress and release the VAS.
6. The VFS101 will enter configuration display mode. The title line of the flightplan will be re-written to display the current VFS101 volume setting. By quickly pressing and releasing the VAS, the next configuration item will be displayed. The following table shows the order of the configuration items displayed, and the content shown on the title line for each item.

Items enclosed in angle brackets (<>) will be replaced with the indicated item. For example the first item displayed could read “V 47”.

7. To exit configuration display mode, press and hold the VAS for two seconds.

7.6 GPS Crossfill Mode

VoiceFlight strongly recommends that all GPSs be configured for manual crossfill operations (rather than “auto”). This setting is located under “crossfill” on the first GPS AUX page.

Note that when the primary GPS receives FlightPlan data from the VFS101, it assumes that the data was sent by the secondary GPS and therefore will never reflect that data back to the secondary GPS, even if configured for auto crossfill mode.

VFS101 Configuration Display Mode items		
#	Description	Displayed on Title Line
1	Current Volume Setting	V <Volume setting 0-63>
2	Airway Compression	AC <ENABLED or DISABLED>
3	Navigational Database Cycle/Date	DB <Cycle/Date>
4	Navigational Database checksum	DC <Checksum>
5	Recognition Processor Software part number	RP <Part Number>
6	Recognition Processor Software checksum	RC <Checksum>
7	Interface Processor Software part number	IP <Part Number>
8	Interface Processor Software checksum	IC <Checksum>

8.0 Limited Warranty

VoiceFlight Systems LLC warrants its new products and parts against defects in material and/or workmanship for two years from the date of purchase. During this period, VoiceFlight Systems LLC will, at its sole option, repair or replace defective product or parts without charge to you, excluding shipping or offer a full refund of the purchase price.

The warranties and remedies contained herein are exclusive and in lieu of all other warranties express or implied or statutory, including any liability arising under any warranty of merchantability or fitness for a particular purpose, statutory or otherwise. This warranty gives you specific legal rights, which may vary from state to state.

IN NO EVENT SHALL VOICEFLIGHT SYSTEMS LLC BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you.

VoiceFlight Systems LLC retains the exclusive right to repair or replace the unit or software or offer a full refund of the purchase price at its sole discretion. Such remedy shall be your sole and exclusive remedy for any breach of warranty.

To obtain warranty service contact VoiceFlight Systems customer service at:

VoiceFlight Systems, LLC
105 Jordan Road
Troy, NY 12180
Telephone: (518) 720-0060

Appendix A: Packing List

As shipped, the VFS101 system (VFS101-KIT001) includes the following items:

- VFS101, The VFS101 unit
- VFS101-Z001, USB mass storage drive (“thumb drive”) with VoiceFlight Logo
- VFS101-PMAN3, VFS101 Pilot's Guide (this document)
- VFS101-QRC3, VFS101 Pilot's Quick Reference Card
- Certificate of Conformance
- Product Registration Card
- GPL License and California Prop. 65 Disclosure

The optional VFS101 Installation Accessory kit (VFS101-KIT003) includes:

- 24 contact sockets
- D-Sub 25 pin female connector, back-shell & screw locks
- VFS101-CA004, USB Jack and cable assembly
- VFS101-M007, USB Jack retention clip
- Two 4-40 screws for affixing retention clip

Appendix B: Aural Messages

Confirm <Waypoint Name> Direct

Pilot requested Direct-To a specified waypoint. VFS101 is awaiting VAS Double-Click to confirm recognized waypoint.

Confirm Start New Flightplan

Pilot entered a Start New Flightplan command. VFS101 is awaiting VAS Double-Click to confirm clearing the active flightplan.

Confirm Erase Remainder

Pilot entered an Erase Remainder command. VFS101 is awaiting VAS Double-Click to confirm clearing the remainder of the flightplan.

Caution: Airway Compression Enabled

The optional airway compression feature is enabled. Any airways entered may contain a reduced sequence of waypoints.

Warning: Navigation Cycle Dates Do Not Match

The navigation database currently installed in VFS101 does not match the navigation database card installed in the primary GPS.

Database Calibration Required, Double-Click to Begin

The navigation data in the primary GPS or VFS101 has changed, and the VFS101 needs to synchronize with the new data. Double-Click the VAS to begin this process. The VFS101 will not function until calibration has been completed.

Database Calibration Required, VoiceFlight Disabled

Database calibration is required, but can not be started because the aircraft is in motion. Stop the aircraft and depress the VAS

again to allow calibration to begin. The VFS101 will remain disabled until database calibration has been completed.

Navigation Update Complete

Previous update of VFS101 navigation database was successfully completed.

Software Update Complete

Previous update of VFS101 operational software was successfully completed.

VoiceFlight Disabled

VFS101 operations terminated after five successive attempts without successful recognition. Unit remains inactive until the VFS101's power is cycled.

GPS Not Ready

The primary GPS is not communicating with the VFS101.

Approach Loaded. VoiceFlight Suspended

The VFS101 has detected an approach loaded into the active flightplan on the primary GPS. The VFS101 will suspend operations until this approach is removed.

Airway Compression Enabled

The optional Airway compression feature is enabled.

Airway Compression Disabled

The optional Airway compression feature has just been disabled.

GPS Busy, VoiceFlight Suspended

After four minutes of continuous activity, the VFS101 will suspend operations for 20 seconds to allow the GPS units to complete prior updates. This is only applicable to the Garmin GNS 430 /530 series GPS units.

Appendix C: Title Line Messages

Message	Meaning
NOT RECOGNIZED	Spoken phrase was not recognized as valid command or eligible waypoint.
INVALID ON AIRWAY	VFS101 is expecting exit waypoint for airway.
INVALID SELECTION	Selection of waypoints within departure and arrival procedures is not supported.
INVALID EDIT	Active navigation leg may not be modified and waypoints in departure and arrival procedures may not be individually erased.
NOT WITH SELECTION	DIRECT-TO is not valid while waypoint is selected.
VAS WAS RELEASED !	VAS was released before Direct-To confirmation could be requested.
NO PRIOR WAYPOINT	When a waypoint is selected, airway entry begins with (and requires) preceding waypoint.
SELECTION REQUIRED	ERASE REMAINDER command requires a previously selected waypoint.
TOO MANY WAYPOINTS	Garmin GPS flightplan is full (31 or 100 waypoints).

Message	Meaning
NO DOUBLE CLICK !	Direct-To waypoint, START NEW FLIGHTPLAN, or ERASE REMAINDER command was not confirmed by prompt double-click of VAS.
- WAITING TOO LONG -	VAS depressed for 20 seconds without successful recognition. Release VAS before continuing.
NO GPS POS DATA	VFS101 is not receiving valid position data from the GPS. Check satellite signal reception.
* VFS101 SHUTDOWN *	Five successive attempts without any successful recognition. VFS101 operations terminated until the VFS101 is restarted by cycling the power.
CALIBRATION ERROR	The VFS101 was unable to insert a requested waypoint due to a calibration error. Examine recent entries and update via manual entry.
WAYPOINT NOT FOUND	The requested waypoint could not be located in the VFS101 internal navigation database.

Appendix D: Database Download

On a Windows 7 computer, the following steps may be used to download a navigation update file from the VoiceFlight website and transfer it to the supplied VoiceFlight USB Thumb Drive:

- 1) Insert the USB drive in the computer receptacle. The AutoPlay box should appear. Left-click "Open Folder to view files".
- 2) A window will open showing the current contents of the thumb drive. If there are files on the drive, they will be listed. Otherwise, you will see a line of text stating the drive is empty.
- 3) If there are files on the drive, right-click on the filename and a selection menu will appear. Left-click on DELETE. The file name in the list should disappear and be replaced with a line of text stating the drive is empty. Make sure the drive is empty before proceeding.
- 4) Now go to <http://www.voiceflight.com/content/updates> using your web browser. Right-click on the navigation database file you want to download. A menu will pop up.
- 5) Left-click on "Save Target as..."
- 6) Another window will appear. On the left side, select the USB thumb drive by left-clicking on it. The file will now be downloaded onto the selected disk.
- 7) The downloaded file name will appear in the thumb drive folder.

8) Right-click on the thumb drive name in the list on the left of the window and then left-click on EJECT. The window will disappear and it is safe now to remove the thumb drive.