

NavAlert II
Pilot's Operating Handbook

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Getting Started

Your NavAlert II provides four distinct functions:

- Altitude alerts (audible and visual) prior to reaching a desired altitude and alerts if you should deviate from that altitude
- GPS navigation displays such as ground track and distance to waypoint
- GPS alerts (audible and visual) for waypoint passage and updates
- Backup CDI and Glideslope display for VOR/LOC and GPS receiver (optional)

The NavAlert II is easy to learn and brings useful information right into your primary instrument scan, helping to manage your cockpit workload.

Using the NavAlert II Control Knob

A single rotary knob controls all functions of the NavAlert II. The knob is used in three different ways:

- **Turning the knob** selects a new target altitude for the level-off reminder
- **Pushing and simultaneously turning the knob** selects the mode displayed in the left window. Making choices within a mode usually requires further action by simply turning the switch (while **not** pushed in).
- **Momentarily pushing the knob** clears the Level-off Alert and the Gear Alert. When setting an altitude, momentarily pressing the switch toggles between the 1000's digit and the 100's digit. Momentarily pressing the switch also locks in a value such as the default brightness or loudness level when the AUX mode is selected.

Initializing the NavAlert II

Upon power-up, the NavAlert II displays the revision level of its internal software, and then waits for you to initialize it with three important pieces of information:

- **BARO** (altimeter) setting. Push and hold the knob, and turn it one click clockwise (CW). **BARO** will display in the left window and **29.92** will display on the right. Set the current barometric pressure using the knob (not pushed in). To set the rightmost digit, push the knob momentarily and then turn it to select the digit.
- **DESTINATION** elevation. Push and turn the knob clockwise once again and **DEST** will display on the left and **D 0.0** will display on the right. Enter the elevation of your destination airport MSL using the knob. The digit flashing is the thousands digit. To set the hundreds digit, momentarily push the knob first. This is for the **GEAR** alert as you descend for a landing. It's worth making the effort!
- **TARGET** altitude for the Level-off Alert. Push and turn the knob clockwise once more, and **TARG** will display in the left window and **T 0.0** will display on the right. Enter your initial climb target altitude on the right using the same technique you used to set Destination elevation.

Finally, push and turn the knob once more to lock in your target altitude.

NOTE:

- If the “**t**” in the target display is flashing and is lower case, your Mode C altitude encoder has not yet warmed up and is not providing altitude information to either the NavAlert II or to your transponder.
- If the left display is just four dots, the GPS receiver is not yet supplying data.

NavAlert II Functions

Selecting GPS Data in the Two Windows

The NavAlert II can display GPS data in the two display windows while the altitude alerter continues to run in the background.

- **To change what is being displayed in the right window**, push and turn the knob two clicks CW and **SEL>** (Select Right) will display on the left. Release the knob, then immediately continue turning it to select a display item from the list below.
- **To change what is being displayed in the left window**, push and turn the switch two clicks CCW and you will see **<SEL** (Select Left). Release the knob, then immediately continue turning it to select a display item from the list below.

After 3 seconds with no knob turns, the NavAlert II will accept your selection and return to the normal display mode.

If the NavAlert II is not receiving GPS data, four dots will appear in lieu of any of the GPS displays.

- Ground Track (**tk** 210) 210 degrees
- Current Waypoint ID **KBWI** or **LEEAH** shown as **LEE-** then **-AH**
- GPS CDI 1.0 nm full scale with Track error (reference bar at bottom = low sensitivity)
- GPS CDI 0.3 nm full scale with Track Error (reference bar at top = high sensitivity)
- VOR/LOC/GS display (option) This shows a CDI from the selected navigation source and a glideslope display if an ILS is selected.
- Current altitude as seen by ATC **A12.5** This shows twelve thousand, five hundred feet. This is your altitude from your encoder corrected for the current baro. If the encoder has not warmed up, **AWUp** will display. If an invalid altitude is received **AErr** will display. This display can be used as an emergency backup altimeter with 100 foot resolution.

- Time to waypoint (hrs:min or min:sec) **3:52**
- Distance to waypoint **12.5 nm**
- Track Error in degrees with turn arrow **5-->** turn 5 degrees right
- Ground Speed in knots **225 kt**

To select which data you want in the left window,

Selecting Target Altitude and Baro Setting

As you are flying ATC will assign new altitudes. The switch is always “hot” to set a new target altitude no matter what is being displayed. The first click (either CW or CCW) will put **TARG** in the left window and your current Target on the right. This is the target set mode. Each click from then on changes the Target by 1,000 feet with each CW click increasing it and each CCW click decreasing it.

If you need to set the hundreds digit, simply push the switch momentarily and then set the hundreds digit. The digit that is flashing is the one that can be changed. When you finish entering a new Target, the display will go back to its last parameters automatically.

If you see a lower case “t” when setting a new target altitude, the unit is not receiving good Mode C information and the **LEVL**, **CLMB**, **DIVE**, and **GEAR** alerts will not be operational

ATC will give you new barometric settings periodically, which must be set into the NavAlert II as well as your pressure altimeter. To change the baro setting, push and turn the switch one click CW. **BARO** will display in the left window and the last entered baro setting on the right. Use the switch to set in the new baro. Set it just like you would using the knob on your altimeter.

Now you know everything you need to know to operate the NavAlert II with a few exceptions that we’ll save for later.

As a reminder, pushing the switch while turning it will select the Mode, like **BARO, SEL>**, **<SEL, AUX** or **TARG** which generally will require an immediate turning of the switch to select the number or function you want. The switch can be used anytime to set a new target altitude without any other actions.

If you want to constantly display your current Target altitude in the right window, select **TARG** mode. If the “T” is lower case and flashing, invalid Mode C information is being received. The left display can be used to display a GPS parameter, or some other data. To momentarily see your current Target altitude, just turn the switch one click either way. After a few seconds, the previous displays will re-appear.

Altitude Alerts

One of the reasons you bought the NavAlert II is to assist in managing your altitude by helping to avoid altitude busts. As you approach your Target altitude, you will hear a rather distinctive tone, followed by the left display flashing **LEVL** and right display showing your Target altitude. You must acknowledge the flashing **LEVL** alert by pressing the switch.

If you have an altitude-hold autopilot, you should prepare to engage the hold mode soon after the **LEVL** alert is acknowledged. If not, then prepare to level off manually. If you go past your target, you will be reminded with a **CLMB** or **DIVE** alert every 10 seconds.

If you are climbing and you fail to reach your target in a reasonable time after the **LEVL** alert, you will get a **CLMB** alert as a reminder to continue climbing. If you are descending and fail to reach your Target in a reasonable time after the **LEVL** alert, you will get a **DIVE** alert as a reminder to continue your descent.

Once you are level at your target altitude, you will get a **DIVE** or **CLMB** alert if you deviate by more than 200 feet above or below the target. This alert will occur every 10 seconds until you either change the target or re-establish the previously set target altitude. The ATC computer are programmed to alarm if you are 300 feet or more off your assigned altitude. The NavAlert will alert you when there is a 200-foot deviation in plenty of time to take corrective action.

GPS Alerts

There are two GPS related alerts. When you are within one minute of the waypoint you are currently navigating towards, there will be a beep and the display will flash the waypoint ID in the left window. The right window will show the distance to that waypoint. The previous windows will be restored automatically.

The second GPS alert is generated when your GPS receiver selects a new waypoint as would happen in a flight plan or instrument approach. This alert also has a beep, flashes the new waypoint ID in the left window and displays the number of degrees to turn (with direction arrow) to get to the next waypoint.

Note that most GPS receivers anticipate the turn and will select the next waypoint prior to actually reaching it. This is when you should commence your turn.

The previous windows will be restored automatically after these two alerts. These alerts will occur even if you are displaying the current waypoint in one of the windows.

Display Brightness and Other System Settings (AUX mode)

While pushing the switch and turning it, you probably noticed the **AUX** mode. The **AUX** mode is for changing things in the NavAlert II that are seldom changed. For example, the display brightness setting is the most used function of **AUX** mode.

To change a parameter under AUX mode, push in the switch and turn it until **AUX** displays in the left window. **DISP** (Display) will show in the right window. If you want to change the display brightness, simply wait until **BRTE** pops up and then turn the switch to select the desired level.

After you have selected the desired brightness, you can:

1. Do nothing in which case the new level is temporary (night flying) or
2. You can press the switch and this level will become the new power-on default level.

All the other parameters that are settable in the **AUX** mode operate the same way. Here are those parameters:

DEST Use to change the Destination elevation for the GEAR alert (can be changed in 100 foot steps only)

OSET Use to change the Offset for the Level alert (100 ft to 1,000 ft) prior to reaching your target. Fast climbing aircraft should use the higher values. Piston aircraft generally use 200 or 300 feet for OSET.

HOME Use to change your Home airport's elevation to be used as default for the Destination elevation during initialization.

LOUD Use to set the loudness of the audio alert

EnMt Use to select inches or hectopascals (Eng=inches, Met-Hp) for barometric pressure setting

For some special parameters that are usually set once like the Gear Altitude, see appendix.

To change one of the above parameters, select AUX Mode. Then turn the switch to select the desired parameter and wait about a second. Then use the switch to actually change the parameter. Remember, momentarily pressing

the switch will store that parameter and use it again when the NavAlert is turned on. Otherwise that setting is temporary.

Flying With the NavAlert II

Using the Navigation Displays

The navigation displays offer valuable information to the pilot. Here are some tips on how to use this information.

The **time-to-waypoint and distance-to-waypoint** displays are useful during enroute flying and instrument approaches. These parameters will let you know when to expect to across a waypoint where you may have to change your heading or altitude.

The **Ground track** display is extremely useful during instrument approaches of all kinds since it displays your **track over the ground**.

By flying the proper ground track when the CDI centered, you will track perfectly with all wind corrections taken into account. Even on an ILS approach, if the CDI is centered and you then keep the ground track equal to the published inbound course, you will fly the LOC precisely. Ground track is also useful during GPS, VOR, and NDB approaches.

The **Track Error** display shows the difference between desired track (established when your GPS starts navigating to a new waypoint) and your ground track. This display is especially useful during enroute flying and during GPS approaches. The arrow shows which way to turn and the number is how many degrees to turn to make the track error zero. If track error is zero, there is a double-ended arrow.

If the CDI is not centered prior to making Track Error zero, you will be flying parallel to the desired course rather than on the desired course. When making a cut to intercept a course, ignore the Track Error until the CDI is centered and then turn to make it zero.

Ground speed is useful during the short final segment of any landing. By comparing your ground speed to the indicated airspeed, you can get a sense of the winds. If ATIS is calling for light winds on the surface and you show a 20 kt headwind at 800 feet AGL, you may encounter wind shear while descending.

The two **GPS CDI** displays (1.0 nm and 0.3 nm full scale) can be used as a backup if your primary CDI fails. The GPS CDI display also shows Track Error up to 9 degrees with a direction arrow in the outer two characters. If the Track Error exceeds 9 degrees, the outer two characters are replaced with two direction arrows both pointing the way to turn. Zero Track Error is displayed as two outwardly pointing arrows.

When the CDI is centered, there are double vertical bars in the middle that look like a runway. If the CDI reaches full scale, it will flash. The high sensitivity (0.3nm full scale, \pm .15nm) is what a GPS receiver uses from the final approach fix to the missed approach point. Each visible increment represents 0.015 nm or 90 feet of lateral deviation in the high sensitivity mode.

If the CDI needle spills over into the outer characters, the Track Error display is replaced by the CDI. Having the CDI and track error in one window provides all the lateral guidance information required to track a course accurately.

The **current waypoint** can be displayed in either window. This is the waypoint that your GPS is now navigating towards. When on a GPS flight plan or GPS approach, the receiver will automatically update the waypoints. If the waypoint has 5 characters, the first three will be shown followed by a dash alternating with the last two.

When a new waypoint is selected, the left window will flash the new waypoint for a few seconds and the right window will show the required turn. The waypoint update will also generate a beep in your headphones.

You can also select your current altitude as a display in either window. This is shown as an **A** with your altitude to the right. This is your pressure altitude corrected by the barometric pressure. This is the altitude that ATC sees on their scope for your aircraft. You may use this display as a backup altimeter with 100-foot resolution should your primary altimeter fail.

There is an optional **LOC/VOR/GS display** that is designed to be a backup for the primary HSI/CDI. This feature is especially useful if your HSI is electronic and could go blank. This display is driven from **whichever navigation source** has been selected by the pilot. For example, if the GPS is driving the HSI, then the CDI presentation on this display will be from the

GPS. If an ILS is tuned in and selected to the HSI, this display will be from the LOC/GS receiver. Just think of this window as a miniature CDI (with GS) that can be used to safely fly approaches or enroute.

The NavAlert II LOC/VOR/GS/GPS display has its horizontal reference bar in the *middle* to distinguish it from the GPS only digital CDI displays which have the reference bar on the top or bottom. The LOC/VOR/GS feature has a vertical CDI needle that can move across the entire window. When the CDI is centered, there are double vertical bars that look like a runway. If the CDI reaches full scale, it will flash. If a VOR or GPS is tuned it, there are To/From arrows in the corners of the window. If the nav signal is lost, only the two horizontal reference bars will show indicating no useful information.

The Glide Slope is presented as two horizontal bars in the outer two characters. When aligned with the two center reference bars, the GS is centered. If you fly above the glideslope, the two bars will descend below the reference bars and vice-versa. If the glideslope bars reach full scale, they will flash. If the glideslope signal is lost, the two outer GS bars will disappear.

Using the Gear Alert

The **GEAR** alert is a reminder to check that your gear is down when you are descending for a landing. You can set the Gear altitude to sound from 500 to 1,000 AGL at your destination airport. The default is 1,000 feet.

Since you entered the **DEST**ination airport's elevation when you initialized the NavAlert II, the instrument knows when you are 1,000 AGL on the descent. At this point the **GEAR** alert will sound and flash. You cannot stop the sound unless you actually acknowledge the alert by **pushing the switch**. This is when you should verify that your gear is down and locked and that all other pre-landing checklist items have been taken care of. The NavAlert will sound this alert even if your gear is already down.

If you change your destination while in flight, be sure to update your new destination's elevation using the **AUX/DEST** mode.

The **GEAR** alert will not arm unless you are at least 100 feet above your destination airport plus the Gear altitude. For example, if your destination

was set to 900 feet and your Gear altitude is 1,000 feet, you must climb to $900+1,000+100=2,000$ feet to arm the **GEAR** alert. So a low trip around the pattern will NOT arm it!

And please be sure to enter your destination's elevation. Your insurance agent will smile every time you do it.

Silencing the Altitude Alerts

When you are descending for a landing, there comes a point in the flight where you no longer want **LEVL** or **CLMB/DIVE** alerts. To stop all altitude alerts, simply crank in a target altitude that is above you. Since you are descending, you'll never get another altitude alert with one important exception.

There was a good reason to enter the Destination airport's elevation when you fired up the NavAlert II. As you descend within 1,000 of the ground at your destination, the gear alert will sound and flash **GEAR** in the left window and your altitude on the right. The **GEAR** alert is obnoxious (for a reason) and must be acknowledged by clearing it by pushing the switch. The **GEAR** alert does not know if your gear is down; it's just a reminder to check the gear and other pre-landing items. It is strongly suggested that you verify the gear down lights prior to clearing the **GEAR** alert.

During enroute climbs and descents, always set the desired target as soon as ATC gives it to you. This is a very simple operation since the switch can be used at any time to select a new target. Remember that the first click brings up the Target Set mode with the current target on the right. Each additional click will change the altitude by 1,000 feet.

Note: Even if you have selected the target to be displayed in the right window using the normal **TARG** mode, you still must turn the switch to select the Target Set mode.

Once you have selected the Target Set mode, you can immediately push the switch to set the hundreds digit. For example, you are level at 3.0 (3,000 ft) and you are cleared to 2.3 (2,300), you can immediately go to the 100's digit and turn it CCW. The target will go to 2.9 on the first CCW click and you continue to 2.3. There is no need to first set the 1,000's digit and then go to the 100's digit if the new target is reasonably close to the old one.

Flying Non Precision Approaches

Each segment of a non-precision approach usually has a different published altitude terminating with the MDA on the final segment. Treat these intermediate altitudes and the MDA like any other target altitude. Just select the new target when appropriate and level off according to the approach plate. It is especially important to not drift down from your target to avoid underlying obstructions. The NavAlert provides a 200-foot buffer for the **CLMB** alert, but don't depend on it when on a non-precision approach. Maintain the published altitude.

Flying Precision Approaches

ILS precision approaches terminate at DA (Decision Altitude) which is typically 200 above the end of the runway. You can use the NavAlert II on an ILS approach to assist in determining the approach of DA.

Let's say that your Offset parameter is set to 300 feet. This means that you will get a **LEVL** alert 300 feet above your target when on a descent. And let's say that the published DA is 1,235 feet. If you set in a target of 1,300 feet (rounding up for safety), you will get a **LEVL** alert at 1,600 feet which will tell you that DA is coming up soon. At this point you will want to crank in any altitude above 1,600 as you clear the **LEVL** alert to eliminate any more alerts, since you will not be leveling off at the DA.

Error Conditions and Abnormal Displays

If you attempt to set in a Target altitude when you first initialize the NavAlert 2 and you see the “t” flashing, this means that your encoder has not yet warmed up. ATC will not see your altitude and you will not receive the **LEVL** alert on climbout unless the flashing “t” becomes solid and upper case.

If you see a lower case “t” when setting in a new target altitude, the unit is not receiving good Mode C information and the **LEVL**, **CLMB**, **DIVE**, and **GEAR** alerts will not be operational.

If you select the Altitude display in either window, you normally see your pressure altitude corrected for barometric pressure, just as the controller sees you on his scope. However, if the encoder has not yet warmed up, you will see **AWup**. If you see **AErr**, the NavAlert 2 is receiving bad data from your encoder. Check with ATC to see if they are seeing you at an unusual altitude or go to the GPS altitude page and see if your GPS is receiving good Mode C altitude from your encoder to determine the extent of the problem.

If you see four dots in lieu of any GPS parameter, your GPS receiver is not sending valid data to the NavAlert 2. Some GPS receivers do not send out any data until there is some minimal ground speed at which point the NavAlert 2 GPS displays will become active.

A Note From Our Lawyers:

Remember that your pressure altimeter is the only source of accurate altitude information in your cockpit. The NavAlert II is advisory in nature and is not a replacement for your altimeter.

The **GEAR** alert will NOT prevent a gear up landing; it is only a reminder to perform your pre-landing checklist. And it works only if you set in your destination’s elevation and keep the baro up to date. If you change your destination in flight, use the AUX mode to select a new destination elevation.

The **GEAR** alert will not go off unless you climb at least 100 feet above the Gear Altitude (settable to 500 to 1,000 feet AGL). For example, if your destination is set to 1,200 feet and the Gear altitude is set to 1,000 feet, you must climb to at least 2,300 feet to arm the **GEAR** alert. **Flying a low pattern will not arm the gear alert.**

The only guaranteed way to prevent a gear up landing is not to take off or to leave the gear down at all times! Or fly a fixed gear aircraft.

Appendix

Special Parameters for Those with a Need to Know

There are several special parameters that are meant to be set once. They are accessed by going to **AUX** Mode, then selecting **EnMt** and then waiting a few seconds. Then **ENG** will appear followed by **SAUX** in the left window and **CDBP** in the right. Immediately turn the knob to select the desired special parameter. Then wait for the current value to display then quickly turn to knob to change it. When you are done, you must quickly push in the switch to lock in the new value.

CDBP Use to set the number of beeps for a CLMB or DIVE alert (1-10)

GEAR Use to turn the Gear alert ON or OFF

GALT Use to set the height above your destination airport for the GEAR alert. The range is 500 to 1,000 feet

SALT Use to select pressure altitude or baro corrected altitude to the GPS receiver from the serial altitude output **BARP** or **BARC**

SFMT Use to select format of serial altitude data. TRIM=Trimble, NSTR=Northstar, APOL=Apollo UPSAT, and GARM=Garmin

GPSB Use to set baud rate for all but Apollo format 9600 or 1200 baud

DFLT Use to set all parameters to factory defaults (Yes or No)