GARMIN

GTN Xi Series
TAWS

Cockpit Reference Guide

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SOFTWARE VERSION

This guide reflects the operation of GTN Xi Series Main software v20.40. Some differences in operation may be observed when comparing the information in this manual to later software versions.

INFORMATION & SUPPORT

For more information about GTN Xi product features, consult *GTN Xi Series Pilot's Guide*, P/N 190-02327-03. An electronic version of the pilot's guide is available for viewing on your computer or portable device. Go to garmin.com/manuals and enter the product name or serial number.

For comprehensive web-based training on the latest GTN Xi Series software updates and features, purchase GTN Essentials 2.0 eLearning Course from garmin.com.

For information regarding the Aviation Limited Warranty, refer to Garmin's website.

For aviation product support, visit flyGarmin.com.

WARNING

Do not use terrain avoidance displays as the sole source of information for maintaining separation from terrain and obstacles. Garmin obtains terrain and obstacle data from third-party sources and cannot independently verify the accuracy of the information.

NOTE

Some data contained in the terrain and obstacle databases comes from government agencies. Garmin accurately processes and cross-validates the data, but cannot guarantee the accuracy and completeness of the data.

NOTE

Terrain and obstacle alerting is not available north of 89° North latitude and South latitude. This is due to limitations present within the Terrain database and the system's ability to process the data representing the affected areas.

Record of Revision

REVISION	DATE	CHANGE DESCRIPTION
B	07.18.25	Added flaps information to Excessive Below Glideslope/Glidepath Deviation alert condition description.
A	03.11.24	Production Release.

SETUP

WARNING

Do not use Terrain and obstacle data to navigate or maneuver around terrain. Information is to aid situational awareness only.

Display Terrain Data On Map

From the Home page:

1. Tap **Map** > **Menu**.
2. Select **Terrain**.

Access Terrain Menu Functions

From the Home page:

Tap **Terrain** > **Menu** to access pilot settings as well as self-test and alert inhibit functions. Selections are grouped by function: View, Layers, and TAWS.

Customize Terrain Page Features

CHANGE VIEW FORMAT

From the Home page:

1. Tap **Terrain** > **Menu**.
2. Choose **360** or **Arc**.

DISPLAY ACTIVE FLIGHT PLAN OVERLAY

From the Home page:

1. Tap **Terrain** > **Menu**.
2. Select **Flight Plan**.

DISPLAY TERRAIN & OBSTACLE/WIRE LEGEND

From the Home page:

1. Tap **Terrain** > **Menu**.
2. Select **Legend**.

TAWS-A

Alert Availability

The following alert types may be available when one or more of the active annunciations are displayed.

ALERT TYPE	ACTIVE ANNUNCIATIONS								
	TAWS TEST	TAWS N/A	TAWS FAIL	TAWS INHB	GPWS N/A	GPWS FAIL	GPWS INHB	G/S INHB G/P INHB	FLAP OVRD
Imminent Impact (IOI, ITI, ILI)					X	X	X	X	X
Required Clearance (ROC, RTC, RLC)					X	X	X	X	X
Premature Descent Alert (PDA)					X	X	X	X	X
Excessive Descent Rate (EDR)		X	X	X				X	X
Excessive Closure Rate (ECR)		X	X	X				X	X
Negative Climb Rate (NCR)		X	X	X				X	X
Flight Into Terrain (FIT)		X	X	X				X	X[1]
Glideslope/Glidepath Deviation (GSD)		X	X	X					X
Altitude Voice Callout (VCO)		X	X	X	X	X	X	X	X

[1] Portions of FIT alerting-based flap position disable when the "FLAP OVR" annunciation is active.

Alert Types

The following alert types may occur during one or more conditions. Imminent Impact and Clearance alerts are functions of Forward Looking Terrain Avoidance (FLTA).

ALERT TYPE		CONDITION
FLTA	**Imminent Impact**[1]	Aircraft reaches the minimum clearance altitude of any obstacle (IOI), terrain (ITI), or power line (ILI) in the projected flight path.
	Required Clearance[1]	Aircraft's vertical flight path is projected to be within the minimum clearance altitude of an obstacle (ROC), terrain (RTC), or power line (RLC).
Premature Descent[2]		Aircraft is significantly below the normal approach path for the nearest runway. • Altitude is <700 ft above terrain • Distance from destination airport is 15 NM or less
Excessive Descent Rate		Aircraft descends toward terrain at an excessive rate.
Excessive Closure Rate[3]		Aircraft closes upon terrain at a rate excessive for gear and flaps.
Negative Climb Rate		Aircraft loses altitude following takeoff. • Altitude is <700 ft above terrain • Distance from departure airport is 5 NM or less • Deviation from departure heading is <110°
Flight Into Terrain		Aircraft is too low with respect to terrain. Based on landing gear status, flap position, and ground speed.
Excessive Below Glideslope or Glidepath Deviation		Aircraft is significantly below the glidepath for the selected approach. Active only after departure and when the following conditions are met. • Altitude is <1,000 ft AGL • Flaps are in landing configuration • Gear is configured for landing • ILS, LPV, or LNAV/VNAV approach is active and the unit is indicating vertical navigation

[1] Alerting inhibited <200 ft AGL within 0.5 NM of approach runway or <125 ft AGL within 1.0 NM of runway threshold.

[2] Alerting inhibited within 0.5 NM of approach runway or <125 ft AGL within 1.0 NM of runway threshold. Alerting thresholds for final descent are based on current position, speed, and flight path data.

[3] Alerting inhibited within 5 NM of nearest airport, except when FLTA is not available. In such cases, "TAWS N/A" or "TAWS FAIL" annunciates and ECR alerting remains active until landing.

Inhibit TAWS-A Alerts

NOTE

Always use discretion when inhibiting TAWS alerts. Re-activate the alert function when appropriate.

Inhibit TAWS alerts in one of two ways:

Tap **Terrain** > **Menu** > **TAWS Inhibit**.

OR

Tap **TAWS Inhibit** on the terrain pop-up alert.

"TAWS INHB" annunciates at the bottom of the TAWS-A display.

FLTA & PDA ALERTING	
INHIBIT	Manually inhibits FLTA or PDA visual alerts for low altitude approaches.
AUTOMATIC INHIBIT	Automatically inhibits FLTA alerts when the aircraft meets the following approach criteria. • Altitude <200 ft above runway elevation • Position <0.5 NM of approach end or between each runway end

INHIBIT GLIDESLOPE/GLIDEPATH DEVIATION ALERTS (GSD)

From the Home page:

Tap **Terrain** > **Menu** > **G/S Inhibit**.

"G/S INHB" annunciates at the bottom of the TAWS-A display.

Glideslope (G/S) alerts are only inhibited for a single approach. To inhibit G/S alerts on the next approach, activate the G/S Inhibit function again between the first and second approaches.

To enable glideslope or glidepath alerts, toggle the inhibit function off.

G/S Inhibit Function[1]

- Alerts are inhibited independent from all other FLTA, PDA, and GPWS alerts
- Only active for a single approach; does not remain active for subsequent approaches

[1] GTN Xi software earlier than 20.40: To prevent nuisance alerts, always activate the G/S Inhibit function when flying a localizer backcourse approach.

INHIBIT GPWS ALERTS (EDR, ECR, FIT, AND NCR)

From the Home page:

Tap **Terrain** > **Menu** > **GPWS Inhibit**.

"GPWS INHB" annunciates at the bottom of the TAWS-A display.

To enable GPWS alerts, toggle the inhibit function off.

Enable Flap Override

From the Home page:

Tap **Terrain** > **Menu** > **Flap Override**.

"FLAP OVRD" annunciates at the bottom of the TAWS-A display. The annunciation is not shown if GPWS alerts (including FIT) are also inhibited.

Altitude Voice Call Out Alerts

From the Home page:

Tap **Menu** > **ALT Callouts** and toggle the desired altitude key(s).

TAWS-A provides aural advisory alerts as the aircraft descends, beginning at 500 ft above the terrain, as determined by the radar altimeter (if greater than 5 NM from the nearest airport) or 500 ft above the nearest runway threshold elevation (if less than 5 NM from the nearest airport). Upon descent to this altitude, TAWS-A issues the aural alert message "Five-hundred."

Additional voice call out (VCO) alerts may be selected by the flight crew to occur at the following altitudes.

PILOT CONFIGURABLE VCOs	
Based on nearest runway threshold when within 5 NM of the airport	• 400 ft • 300 ft • 200 ft • 100 ft
Based on radar altimeter	• 50 ft • 40 ft • 30 ft • 20 ft • 10 ft

TAWS-A Alerts

TAWS-A ALERT INDICATIONS	
ANNUNCIATION	**CONDITION | POP-UP | AURAL MESSAGE**
PULL UP	**Condition:** FLTA Terrain Warning (RTC-W, ITI-W) **Pop-up Alert:** • "Terrain Ahead - Pull Up" **or** • "Terrain - Pull Up" **Aural Message:** • "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" **or** • "Terrain, Terrain; Pull Up, Pull Up"
PULL UP	**Condition:** FLTA Obstacle Warning (ROC-W, IOI-W) **Pop-up Alert:** • "Obstacle Ahead - Pull Up" **or** • "Obstacle Pull Up" **Aural Message:** • "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" **or** • "Obstacle, Obstacle; Pull Up, Pull Up"
PULL UP	**Condition:** FLTA Wire Warning (RLC-W, ILI-W) **Pop-up Alert:** "Wire Ahead - Pull Up" **Aural Message:** • "Wire Ahead, Pull Up; Wire Ahead, Pull Up" **or** • "Wire, Wire; Pull Up, Pull Up"
PULL UP	**Condition:** Excessive Descent Rate Warning (EDR) **Pop-up Alert:** "Pull Up" **Aural Message:** "<whoop> <whoop> Pull Up"
PULL UP	**Condition:** Excessive Closure Rate Warning (ECR) **Pop-up Alert:** "Pull Up" **Aural Message:** "<whoop> <whoop> Pull Up"

TAWS-A ALERT INDICATIONS	
ANNUNCIATION	**CONDITION | POP-UP | AURAL MESSAGE**
TERRAIN	**Condition:** FLTA Terrain Caution (RTC-C, ITI-C) **Pop-up Alert:** • "Terrain Ahead" **or** • "Caution - Terrain" **Aural Message:** • "Terrain Ahead; Terrain Ahead" **or** • "Caution, Terrain; Caution, Terrain"
OBSTACLE	**Condition:** FLTA Obstacle Caution (ROC-C, IOI-C) **Pop-up Alert:** • "Obstacle Ahead" **or** • "Caution - Obstacle" **Aural Message:** • "Obstacle Ahead; Obstacle Ahead" **or** • "Caution, Obstacle; Caution, Obstacle"
WIRE	**Condition:** FLTA Wire Caution (RLC-C, ILI-C) **Pop-up Alert:** "Wire Ahead" **Aural Message:** • "Wire Ahead; Wire Ahead" **or** • "Caution, Wire; Caution, Wire"
TERRAIN	**Condition:** Premature Descent Alert Caution (PDA) **Pop-up Alert:** "Don't Sink" **Aural Message:** "Too Low, Terrain"
TERRAIN	**Condition:** Excessive Descent Rate Caution (EDR) **Pop-up Alert:** "Sink Rate" **Aural Message:** "Sink Rate"
TERRAIN	**Condition:** Excessive Closure Rate Caution (ECR) **Pop-up Alert:** "Terrain" **Aural Message:** "Terrain, Terrain"

TAWS-A ALERT INDICATIONS	
ANNUNCIATION	**CONDITION | POP-UP | AURAL MESSAGE**
TERRAIN	**Condition:** Negative Climb Rate Caution (NCR) **Pop-up Alert:** • "Don't Sink" **or** • "Too Low - Terrain" **Aural Message:** • "Don't Sink" **or** • "Too Low, Terrain"
TERRAIN	**Condition:** Flight Into Terrain High Speed Caution (FIT) **Pop-up Alert:** "Too Low, Terrain" **Aural Message:** "Too Low, Terrain"
TERRAIN	**Condition:** Flight Into Terrain Gear Caution (FIT) **Pop-up Alert:** "Too Low, Gear" **Aural Message:** "Too Low, Gear"
TERRAIN	**Condition:** Flight Into Terrain Flaps Caution (FIT) **Pop-up Alert:** "Too Low, Flaps" **Aural Message:** "Too Low, Flaps"
TERRAIN	**Condition:** Flight Into Terrain Takeoff Caution (FIT) **Pop-up Alert:** "Too Low, Terrain" **Aural Message**: "Too Low, Terrain"
GLIDESLOPE	**Condition:** Glideslope Deviation Caution (GSD)[1] **Pop-up Alert:** "Glideslope" **Aural Message:** "Glideslope"

TAWS-A ALERT INDICATIONS	
ANNUNCIATION	**CONDITION | POP-UP | AURAL MESSAGE**
None	**Condition:** Altitude Voice Call Out (VCO) **Pop-up Alert:** None **Aural Messages:** • "Five-Hundred" Pilot Configurable VCOs: • "Four Hundred" • "Three Hundred" • "Two Hundred" • "One Hundred" • "Fifty" • "Forty" • "Thirty" • "Twenty" • "Ten"

[1] Alert is available if a valid ILS is being used for navigation, even when no valid GPS signal is being received.

TAWS-A System Status

TAWS-A conducts a self-test of its aural and visual annunciations during power-up. An aural alert is issued upon test completion. A manual test function is also available when the aircraft is on-ground (Home > **Terrain** > **Menu** > **Test TAWS**).

Testing is disabled when ground speed exceeds 30 kts.

TAWS-A SYSTEM STATUS INDICATIONS	
ANNUNCIATION	**CONDITION | AURAL MESSAGE**
None	**Condition:** TAWS available **Aural Message:** "TAWS Available"
TAWS TEST	**Condition:** TAWS system test in progress **Aural Message:** None
None	**Condition:** TAWS system test is successful **Aural Message:** "TAWS System Test OK"
TAWS INHB	**Condition:** TAWS alerting is disabled **Aural Message:** None
TAWS N/A	**Condition:** TAWS is not available due to one of the following: • No GPS position • GPS position unavailable/degraded • Outside of terrain database coverage **Aural Message:** "TAWS Not Available"
TAWS FAIL	**Condition:** • TAWS system test fails • Incorrect TAWS configuration • Invalid/missing terrain, airport, or obstacle database • TAWS audio fault **Aural Message:** "TAWS System Failure"
None	**Condition:** Sufficient GPS signal reception restored **Aural Message:** "TAWS Available" (aural message only in flight)
GPWS INHB	**Condition:** GPWS Inhibit function active **Aural Message:** "GPWS System Failure"

TAWS-A SYSTEM STATUS INDICATIONS	
ANNUNCIATION	**CONDITION | AURAL MESSAGE**
GPWS N/A	**Condition:** GPWS is not available due to one of the following: • Incorrect TAWS configuration • Radar altimeter unavailable • GPS position unavailable/degraded • TAWS audio fault **Aural Message:** "GPWS System Failure"
GPWS FAIL	**Condition:** • Incorrect TAWS configuration • Radar altimeter unavailable • GPS position unavailable/degraded • TAWS audio fault **Aural Message:** "GPWS System Failure"
G/S INHB	**Condition:** Glideslope Inhibit function active **Aural Message:** None
FLAP OVRD	**Condition:** FLAP Override function active **Aural Message:** None

TAWS-B

Alert Types

The following alert types may be available in one or more terrain alerting modes. Imminent Impact and Clearance alerts are Forward Looking Terrain Avoidance (FLTA).

ALERT TYPE		CONDITION
FLTA	**Imminent Impact**[1]	Aircraft reaches the minimum clearance altitude of any obstacle (IOI), terrain (ITI), or power line (ILI) in the projected flight path.
	Required Clearance[1]	Aircraft's vertical flight path is projected to be within the minimum clearance altitude of an obstacle (ROC), terrain (RTC), or power line (RLC).
Premature Descent[2]		Aircraft is significantly below the normal approach path for the nearest runway. • Altitude is <700 ft above terrain • Distance from destination airport is 15 NM or less
Excessive Descent Rate		Aircraft descends toward terrain at an excessive rate.
Negative Climb Rate		Aircraft loses altitude following takeoff. • Altitude is <700 ft above terrain • Distance from departure airport is 5 NM or less • Deviation from departure heading is <110°

[1] Alerting inhibited <200 ft AGL within 0.5 NM of approach runway or <125 ft AGL within 1.0 NM of runway threshold.

[2] Alerting inhibited within 0.5 NM of approach runway or <125 ft AGL within 1.0 NM of runway threshold. Alerting thresholds for final descent are based on current position, speed, and flight path data.

Inhibit TAWS-B Alerts

NOTE

Always use discretion when inhibiting TAWS alerts. Re-activate the alert function when appropriate.

Inhibit TAWS alerts in one of two ways:

Tap **Terrain** > **Menu** > **TAWS Inhibit**.

OR

Tap **TAWS Inhibit** on the terrain pop-up alert.

"TAWS INHB" annunciates at the bottom of the TAWS-B display.

FLTA & PDA ALERTING	
INHIBIT	Manually inhibits FLTA, PDA, EDR, and NCR visual alerts for low altitude approaches.
AUTOMATIC INHIBIT	Automatically inhibits FLTA alerts when the aircraft meets the following approach criteria. • Altitude <200 ft above runway elevation • Position <0.5 NM of approach end or between each runway end

Altitude Voice Call Out Alerts

TAWS-B provides an aural advisory alert as the aircraft descends through 500 ft above the terrain, as determined by GPS (if greater than 5 NM from the nearest airport) or 500 ft above the nearest runway threshold elevation (if less than 5 NM from the nearest airport). Upon descent to this altitude, TAWS-B issues the aural alert message "Five-hundred."

TAWS-B Alerts

TAWS-B ALERT INDICATIONS	
ANNUNCIATION	**CONDITION | POP-UP | AURAL MESSAGE**
PULL UP	**Condition:** FLTA Terrain Warning (RTC-W, ITI-W) **Pop-up Alert:** • "Terrain Ahead - Pull Up" **or** • "Terrain - Pull Up" **Aural Message:** • "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" **or** • "Terrain, Terrain; Pull Up, Pull Up"
PULL UP	**Condition:** FLTA Obstacle Warning (ROC-W, IOI-W) **Pop-up Alert:** • "Obstacle Ahead - Pull Up" **or** • "Obstacle Pull Up" **Aural Message:** • "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" **or** • "Obstacle, Obstacle; Pull Up, Pull Up"
PULL UP	**Condition:** FLTA Wire Warning (RLC-W, ILI-W) **Pop-up Alert:** "Wire Ahead - Pull Up" **Aural Message:** • "Wire Ahead Pull Up, Wire Ahead Pull Up" **or** • "Wire, Wire, Pull Up, Pull Up"
PULL UP	**Condition:** Excessive Descent Rate Warning (EDR-W) **Pop-up Alert:** "Pull Up" **Aural Message:** "Pull Up"

TAWS-B ALERT INDICATIONS	
ANNUNCIATION	**CONDITION | POP-UP | AURAL MESSAGE**
TERRAIN	**Condition:** FLTA Terrain Caution (RTC-C, ITI-C) **Pop-up Alert:** • "Terrain Ahead" **or** • "Caution - Terrain" **Aural Message:** • "Terrain Ahead; Terrain Ahead" **or** • "Caution, Terrain; Caution, Terrain"
OBSTACLE	**Condition:** FLTA Obstacle Caution (ROC-C, IOI-C) **Pop-up Alert:** • "Obstacle Ahead" **or** • "Caution - Obstacle" **Aural Message:** • "Obstacle Ahead; Obstacle Ahead" **or** • "Caution, Obstacle; Caution, Obstacle"
WIRE	**Condition:** FLTA Wire Caution (RLC-C, ILI-C) **Pop-up Alert:** "Wire Ahead" **Aural Message:** • "Wire Ahead, Wire Ahead" **or** • "Caution Wire, Caution, Wire"
TERRAIN	**Condition:** Premature Descent Alert Caution (PDA) **Pop-up Alert:** "Don't Sink" **Aural Message:** "Too Low, Terrain"
TERRAIN	**Condition:** Excessive Descent Rate Caution (EDR-C) **Pop-up Alert:** "Sink Rate" **Aural Message:** "Sink Rate"

TAWS-B ALERT INDICATIONS	
ANNUNCIATION	**CONDITION | POP-UP | AURAL MESSAGE**
TERRAIN	**Condition:** Negative Climb Rate Caution (NCR-C) **Pop-up Alert:** • "Don't Sink" **or** • "Too Low - Terrain" **Aural Message:** • "Don't Sink" **or** • "Too Low, Terrain"
None	**Condition:** Voice Call Out (VCO-500) **Aural Message:** "Five-Hundred"

TAWS-B System Status

TAWS-B conducts a self-test of its aural annunciations during power-up. An aural alert is issued upon test completion. A manual test function is also available when the aircraft is on-ground (Home > **Terrain** > **Menu** > **Test TAWS**).

Testing is disabled when ground speed exceeds 30 kts.

TAWS-B NOT AVAILABLE ALERT

TAWS-B requires a 3D GPS position solution along with specific vertical accuracy minimums. Should the position solution become degraded or if the aircraft is out of the database coverage area, the annunciation "TAWS N/A" is generated in the annunciation window and on the TAWS-B page. The aural message "TAWS Not Available" is generated. When the GPS signal is re-established and the aircraft is within the database coverage area, the aural message "TAWS Available" is generated (when the aircraft is airborne).

TAWS-B FAILURE ALERT

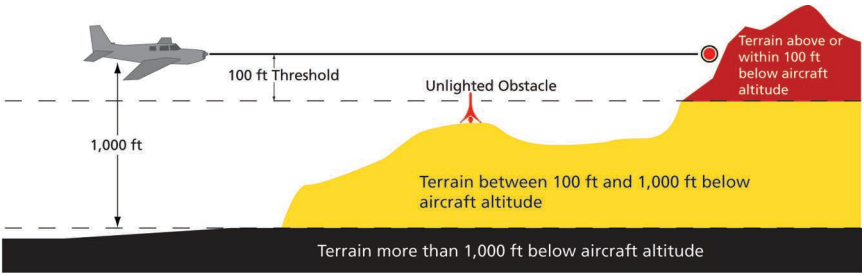
TAWS-B continually monitors several system-critical items such as database validity, hardware status, and GPS status. If the terrain/obstacle database is not available, the aural message "TAWS System Failure" is generated along with a "TAWS FAIL" annunciation.

TAWS-B SYSTEM STATUS INDICATIONS	
ANNUNCIATION	**CONDITION | AURAL MESSAGE**
None	**Condition:** TAWS available **Aural Message:** "TAWS Available"
TAWS TEST	**Condition:** TAWS system test in progress **Aural Message:** None
None	**Condition:** TAWS system test is successful **Aural Message:** "TAWS System Test OK"
TAWS INHB	**Condition:** TAWS alerting is disabled **Aural Message:** None
TAWS N/A	**Condition:** TAWS not available **Aural Message:** "TAWS Not Available"
TAWS FAIL	**Condition:** TAWS system test fails **Aural Message:** "TAWS System Failure"

SYMBOLS

Terrain Elevation Depictions

Color shading depicts terrain elevations relative to the aircraft's position and altitude. Colors automatically adjust as the aircraft's altitude changes.



Terrain Shading

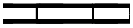
Tower Obstacles

UNLIGHTED OBSTACLE		LIGHTED OBSTACLE		OBSTACLE LOCATION
<1000' AGL	>1000' AGL	<1000' AGL	>1000' AGL	
				Above or within 100 ft below current altitude.
				Between 100 ft and 1,000 ft below current altitude.
				Between 1,000 ft and 2,000 ft below current altitude.

Wind Turbine Obstacles

UNLIGHTED WIND TURBINE OBSTACLE	LIGHTED WIND TURBINE OBSTACLE	OBSTACLE LOCATION
		Above or within 100 ft below current altitude.
		Between 100 ft and 1,000 ft below current altitude.
		More than 1,000 ft below current altitude.

Power Line Obstacles

OBSTACLE	POWER LINE OBSTACLE LOCATION
	Above or within 100 ft below current altitude.
	Between 100 ft and 1,000 ft below current altitude.
	Between 1,000 ft and 2,000 ft below current altitude.

Obstacle Groups

An asterisk indicates when the obstacle database contains only a single latitude and longitude for a group of obstacles. This occurrence is rare.

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