

GMA 350

pilot's guide



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This manual reflects the operation of GMA 350 units with mod level 0 or later. Some differences in operation may be observed when comparing the information in this manual to earlier or later Mod status levels.

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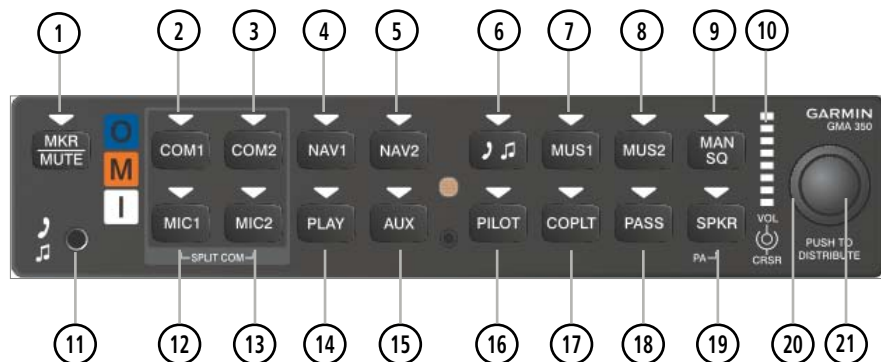
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CAUTION: *Incorrect aircraft wiring could short the left channel or both channels to ground if a monaural headset is plugged into the stereo jacks. If wired incorrectly, fail-safe operation will not work.*

CONTROLS





GMA 350 Controls



NOTE: When a key is selected, a triangular annunciator above the key is illuminated.

- ① **MKR/MUTE** – Selects marker beacon receiver audio. Mutes the currently received marker beacon receiver audio. Deactivates automatically and marker beacon audio is heard when the next marker beacon signal is received. Also, stops play of recorded COM audio.
- ② **COM1** – When selected, audio from the #1 COM receiver can be heard. Press and hold to enable/disable monitored COM muting during primary COM reception.
- ③ **COM2** – When selected, audio from the #2 COM receiver can be heard. Press and hold to enable/disable monitored COM muting during primary COM reception.
- ④ **NAV1** – When selected, audio from the #1 NAV receiver can be heard.
- ⑤ **NAV2** – When selected, audio from the #2 NAV receiver can be heard.

- ⑥  – Selects and deselects audio from a telephone or entertainment device connected to the Front Panel Jack. Audio from a telephone connected to the rear of the audio panel is used if a device is not connected to the Front Panel Jack. Press and hold to enable/disable  muting during reception.
- ⑦ **MUS1** – Selects and deselects music entertainment audio. Press and hold to enable/disable **MUS1** muting during reception.
- ⑧ **MUS2** – Selects and deselects music entertainment audio. Press and hold to enable/disable **MUS2** muting during reception.
- ⑨ **MAN SQ** – Manual Squelch annunciator. When lit, squelch is controlled manually.
- ⑩ **Volume Indicator** – Indicates volume/squelch setting relative to full scale.
- ⑪ **Front Panel Jack** – Used for an entertainment or telephone input.
- ⑫ **MIC1** – Selects the #1 transmitter for transmitting. COM1 receive is simultaneously selected when this key is pressed allowing received audio from the #1 COM receiver to be heard. COM2 receive can be added by pressing the **COM2** Key. Selection of a second MIC button initiates Split-COM mode. When in Split-COM mode, the pilot is using COM1, the copilot is using the COM2.
- ⑬ **MIC2** – Selects the #2 transmitter for transmitting. COM2 receive is simultaneously selected when this key is pressed allowing received audio from the #2 COM receiver to be heard. COM1 receive can be added by pressing the **COM1** Key. Selection of a second MIC button initiates Split-COM mode. When in Split-COM mode, the pilot is using COM1, the copilot is using the COM2.
- ⑭ **PLAY** – Press once to play the latest recorded memory block. Press while audio is playing begins playing the previously recorded memory block. Each subsequent press thereafter plays the previous block of memory.

- ⑮ **AUX** – When selected, audio from the AUX inputs can be heard.
- ⑯ **PILOT** – Controls the pilot intercom system. Press and hold to toggle 3D Audio on/off for all headset positions.
- ⑰ **COPLT** – Controls the copilot intercom system. Press and hold to toggle copilot configuration between crew and passenger.
- ⑱ **PASS** – Controls the passenger intercom system. Press and hold to enable/disable passenger muting during reception.
- ⑲ **SPKR** – Selects and deselects the cabin speaker. COM, NAV, AUX, and MKR receiver audio can be heard on the speaker. Press and hold for 2 seconds for Passenger Address (PA). The **SPKR** key flashes during PA.
- ⑳ **Cursor (CRSR) Control Knob** – Turn to move the cursor (flashing white or blue annunciator) to the desired source.
- ㉑ **Volume (VOL) Control Knob** – Turn the smaller knob to control volume or squelch of the selected source (indicated by the flashing white or blue annunciator). When the volume control cursor is not active press to switch to Blue-Select mode. If the volume control cursor is active, press twice (once to cancel the cursor, twice to activate Blue-Select mode).

FEATURES AND OPERATION

The GMA 350 Audio Panel provides the traditional audio selector functions of microphone and receiver audio selection. The Audio Panel includes an intercom system (ICS), a marker beacon receiver, and a COM clearance recorder. Ambient noise from the aircraft radios is reduced by Avionics Squelch (ASQ). When no audio is detected, ASQ processing further reduces the amount of background noise. The **MAN SQ** Key toggles between manual and automatic intercom system (ICS) squelch. In automatic ICS squelch mode, threshold adjustments are handled automatically by the system. In manual ICS squelch mode, individual threshold adjustments can be made for the pilot, copilot, and passenger microphones by the crew. The ability to adjust individual thresholds for each ICS position further reduces the amount of background noise from the radios.

Pushbutton keys control audio selection. When a key is selected, a triangular annunciator above the key is illuminated. Annunciator brightness is adjusted automatically by photocell dimming. Key brightness is adjusted by the radio dimming bus control. Three Aux inputs are available for additional avionics or audio devices.

Upon installation, the unit may be configured in various ways depending on aircraft type and the needs of the pilot.

POWER-UP

The GMA 350 performs a self-test during power-up. During the self-test all Audio Panel annunciator lights illuminate for approximately two seconds. Once the self-test is completed, most of the settings are restored to those in use before the unit was last turned off.

MONO/STEREO HEADSETS

Stereo headsets are recommended when using the GMA 350. Using a monaural headset in a stereo jack shorts the right headset channel output to ground. While this does not damage the Audio Panel, a person listening on a monaural headset hears only the left channel in both ears. If a monaural headset is used at one of the passenger positions, any other passenger using a stereo headset hears audio in the left ear only.

TRANSCEIVERS



NOTE: *Transceiver functions may also be accessed via Voice Recognition commands. Refer to the Voice Recognition section for more information.*

Audio from the #1 or #2 COM receiver can be selected independently by pressing the respective Key(s) (**COM1** or **COM2**).

Pressing MIC1 or MIC2 selects the #1 or #2 transmitter and simultaneously selects the related COM receiver (COM1 or COM2) allowing received audio to be heard. The other COM receiver can be added by pressing the respective key. During reception of audio from the COM radio selected for transmission, audio from the other COM radio is muted.

ENABLING/DISABLING MONITORED COM MUTING

Press and hold **COM1** or **COM2** to enable/disable monitored COM muting during reception of audio from the COM radio selected for transmission. The aural message “**Mute Monitored COM on Primary COM Reception Enabled/Disabled**” is heard.

SPLIT-COM MODE

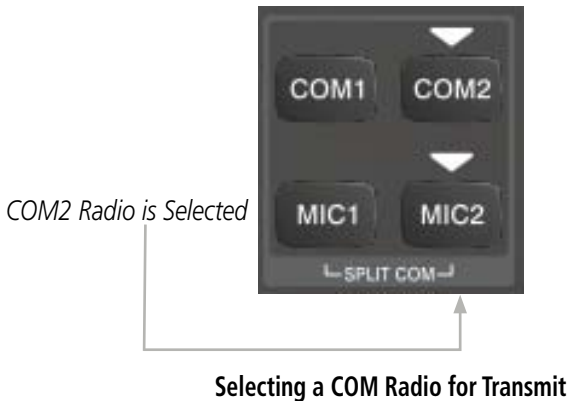


NOTE: Split COM performance is affected by the distance between the COM antennas and the separation of the tuned frequencies. If the selected COM frequencies are too close together, interference may be heard during transmission on the other radio.

During Split-COM operation, both the pilot and the copilot can transmit simultaneously over separate radios.

Pressing both **MIC** Keys simultaneously initiates Split-COM Mode (i.e., COM1/COM2). The respective COM1/MIC1 or COM2/MIC2 annunciators are illuminated indicating Split-COM operation. Split-COM operation is cancelled by pressing one of the selected MIC Keys again.

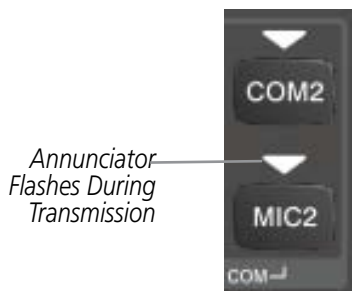
In Split-COM mode, the pilot uses COM1 and the copilot uses COM2.



TRANSMIT INDICATIONS

During COM transmission, the active transceiver (MIC1 or MIC2) Key Annunciator flashes approximately once per second.

During Split-COM transmission, the MIC1 annunciator flashes when the pilot's microphone PTT is pressed. The MIC2 annunciator flashes when the copilot's microphone PTT is pressed.



COM Radio Transmit Indication

RECEIVERS



NOTE: Receiver functions may also be accessed via Voice Recognition commands. Refer to the Voice Recognition section for more information.

Pressing the **NAV1** and/or **NAV2** Key(s) selects/deselects the receiver audio for the corresponding navigation radio source. The selected audio source can be heard over the headset and the speaker (if selected). All radios can be selected individually or simultaneously.



Selecting a NAV Radio Receiver

MARKER BEACON RECEIVER

The marker beacon receiver detects any marker beacon signal within the reception range of the aircraft.

When a marker beacon signal is detected, the lamps illuminate, and an associated keyed-tone is heard when MKR audio is selected. Marker beacon lamps operate independently of any audio selection and cannot be turned off.



Marker Beacon Key & Lamps

The marker beacon signal sensitivity threshold can be set to High, Low, or User Selectable (toggle switch required).

The receiver detects the three marker tones (outer, middle, and inner).

Audio Frequency	Audio Keying	Lamp Actuated
400 Hz (Outer)	— — — — —	Blue
1300 Hz (Middle)	· — — · — — · — — · — —	Amber
3000 Hz (Inner)	· · · · ·	White

The GMA 350 provides three states of marker beacon operation; On, Muted, and Deselected. The **MKR/MUTE** key annunciator indicates when marker beacon audio is selected. Marker beacon audio is not heard when the annunciator is off or when the annunciator is on with the marker beacon audio muted.

TURNING MARKER BEACON AUDIO ON

With the MKR/MUTE annunciator off, press the **MKR/MUTE** Key to activate marker beacon audio and illuminate the MKR/MUTE annunciator.

MUTING MARKER BEACON AUDIO

During marker beacon audio reception, press the **MKR/MUTE** Key to mute the audio. The MKR/MUTE annunciator remains lit, but the current marker tone is silenced. Audio muting deactivates automatically and marker beacon audio is heard when the next marker beacon signal is received.

DESELECTING MARKER BEACON AUDIO

To deselect marker beacon audio, press the **MKR/MUTE** Key twice during marker beacon reception or once if a marker beacon signal is not detected.

INTERCOM SYSTEM (ICS)



NOTE: *Intercom functions may also be accessed via Voice Recognition commands. Refer to the Voice Recognition section for more information.*

The GMA 350 includes a six-position intercom system (ICS), two MUSIC inputs, and one telephone/entertainment input for the pilot, copilot and passengers. The intercom provides Pilot, Copilot, and Passenger audio isolation.



Intercom Controls

Press the **PILOT**, **COPLT**, and/or **PASS** Keys to distribute as required. If the annunciators are lit, those positions will share intercom audio. If an annunciator is NOT lit that position is isolated from the others.

COPILOT CONFIGURED AS CREW OR PASSENGER



NOTE: *When the copilot position is configured as a passenger, the **COPLT** Key is disabled and the copilot headset is treated as a ‘passenger’ for intercom and entertainment audio distribution.*

The copilot position can be configured as crew (**COPLT** Key enabled) or as a passenger (**COPLT** Key disabled). Pressing and holding the **COPLT** Key toggles the copilot position configuration between passenger and crew. The aural message “**Copilot Configured as Passenger**” or “**Copilot Configured as Crew**” is heard.

INTERCOM MODES



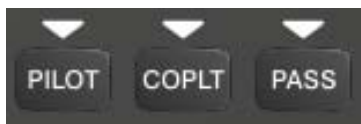
NOTE: In the following modes the copilot position is configured as crew.



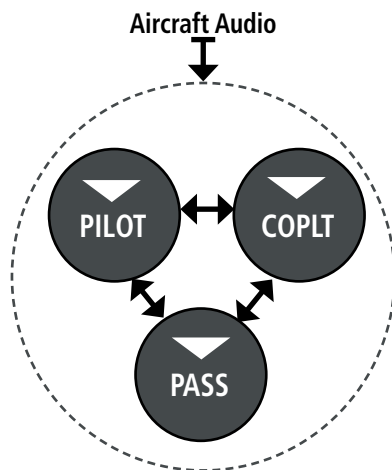
NOTE: In the default ICS configuration, only the pilot and copilot positions can hear aircraft alerts.

ALL INTERCOM MODE

In 'All Intercom' mode the Pilot, Copilot, and Passengers hear each other and hear the aircraft audio.



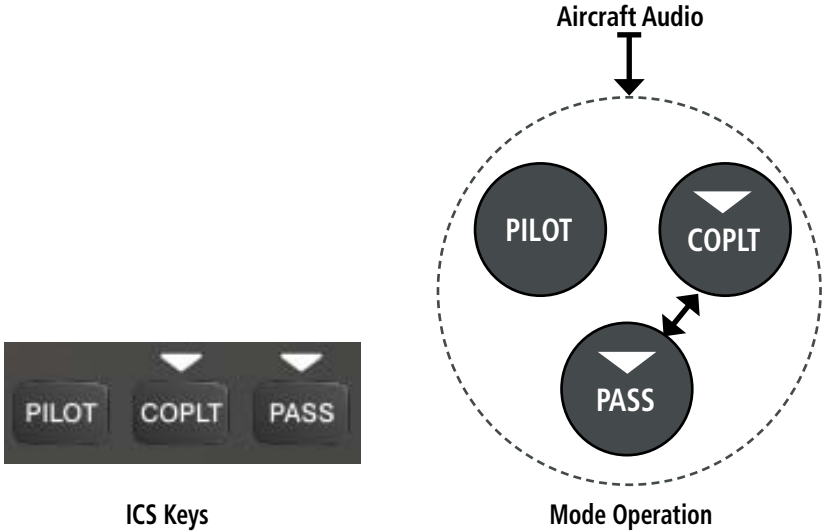
ICS Keys



Mode Operation

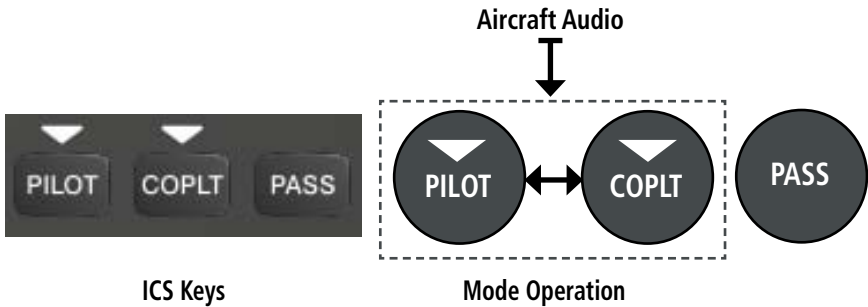
PILOT ISOLATE MODE

In 'Pilot Isolate' mode the Pilot, Copilot, and Passengers hear the aircraft audio. The Copilot and Passengers also hear each other.



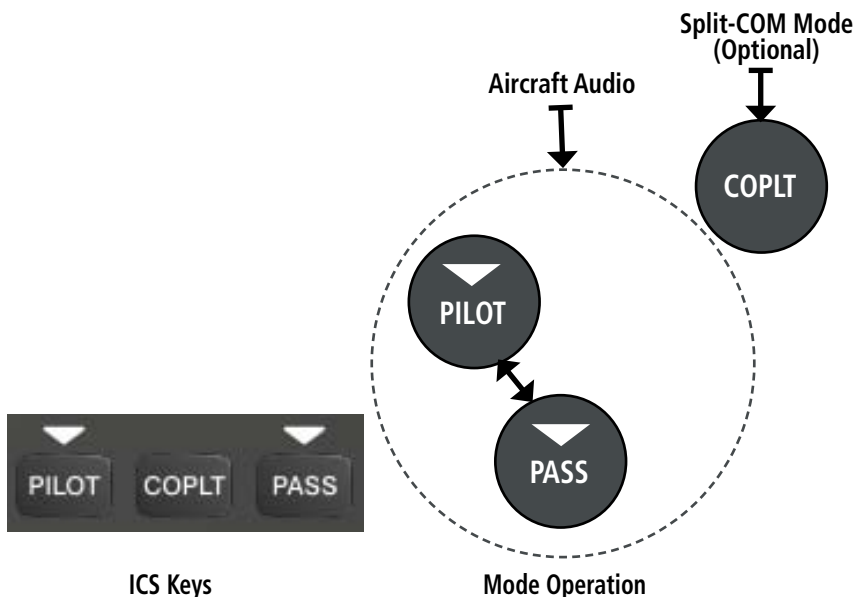
PASSENGER/CREW ISOLATE MODE

In 'Passenger/Crew Isolate' mode the Pilot and Copilot hear the aircraft audio and each other. The Passengers hear each other.



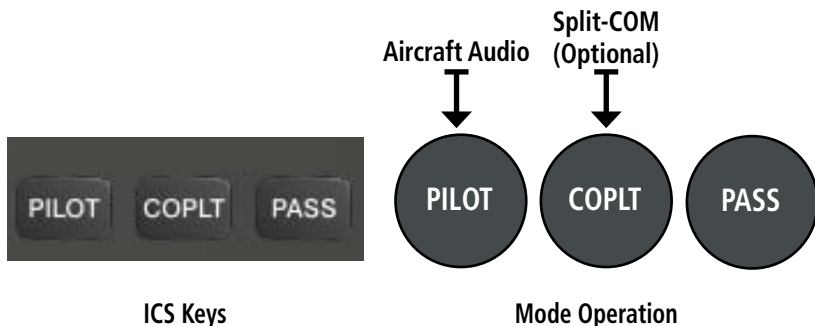
COPILOT ISOLATE MODE

In ‘Copilot Isolate’ mode the Pilot and Passengers hear the aircraft audio and each other. The Copilot has the option to use Split-COM mode.



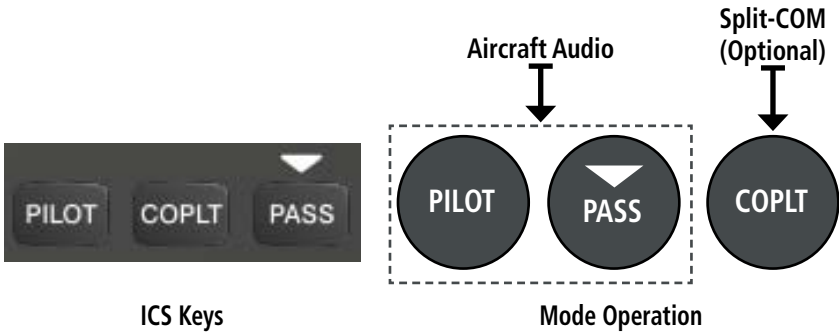
ALL ISOLATE MODE

In ‘All Isolate’ mode the Pilot hears the aircraft audio. The Copilot has the option to use Split-COM mode. The Passengers hear each other.



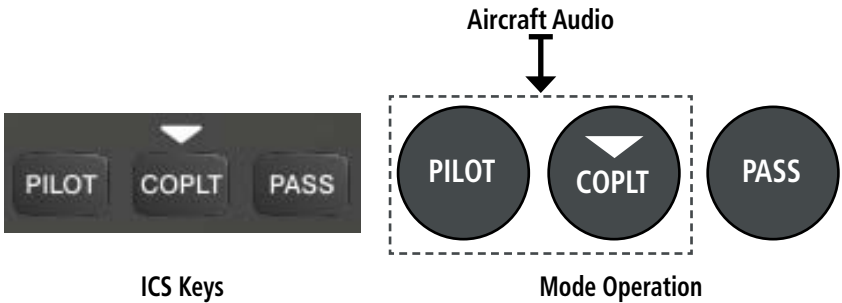
PILOT & COPILOT ISOLATE MODE

In 'Pilot & Copilot Isolate' mode the Pilot and Passengers hear the aircraft audio. The Copilot has the option to use Split-COM mode.



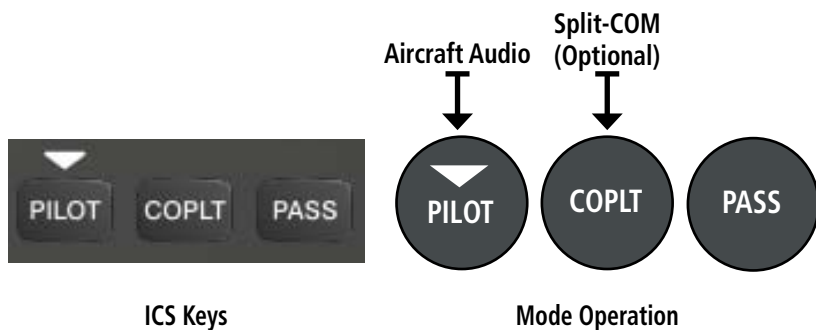
PILOT & PASSENGER ISOLATE MODE

In 'Pilot & Passenger Isolate' mode the Pilot and Copilot hear the aircraft audio. The Passengers hear each other.



COPILOT & PASSENGER ISOLATE MODE


In 'Copilot & Passenger Isolate' mode the Pilot can hear the aircraft audio. The Copilot has the option to use Split-COM mode. The Passengers hear each other.



INTERCOM VOLUME AND SQUELCH

The **VOL/CRSR** Knob controls selection and volume or manual squelch adjustment for audio sources that may not be adjustable anywhere else in the system. The small knob controls the volume or squelch. Turning the large knob activates and/or moves the cursor (flashing white annunciator/ or flashing blue annunciator in Blue-Select Mode) to select the audio source to adjust. The cursor will time-out after a few seconds and the position of the cursor will always default back to the **PILOT** Key. Pressing the small knob cancels the cursor.


BLUE-SELECT MODE (TELEPHONE/ENTERTAINMENT DISTRIBUTION)


The music (MUS1/MUS2) and telephone/entertainment () audio are distributed using the Blue-Select Mode. The following example indicates that the pilot, copilot, and passengers will all hear the telephone/entertainment audio.



Blue-Select Mode (Telephone/Entertainment Distribution)

The Blue-Select Mode is entered by pressing the small knob when the volume control cursor (flashing white annunciator) is not active. If the volume control cursor is active, press the small knob twice. The first press will cancel the volume control cursor, the second will activate Blue-Select Mode.

The annunciator over the  Key will be flashing blue. Any combination of the annunciators over the **PILOT**, **COPLT**, and **PASS** buttons may be blue. Select the desired button to turn the blue annunciator on or off to distribute the telephone/entertainment audio to selected crew/passenger positions. Turn the large knob to select **MUS1** or **MUS2** and select the crew positions to receive the music audio.

Selecting any key other than **PILOT**, **COPLT**, **PASS**, **MUS1**, **MUS2**, or  will cancel Blue-Select Mode. Pressing the small knob will also cancel Blue-Select Mode. After approximately ten seconds with no input, the Blue-Select Mode will automatically cancel.

ADJUSTING INTERCOM VOLUME

When the cursor is on **PILOT**, **COPLT**, or **PASS**, the Volume Control Knob adjusts the intercom volume for the listener.

ADJUSTING MANUAL SQUELCH

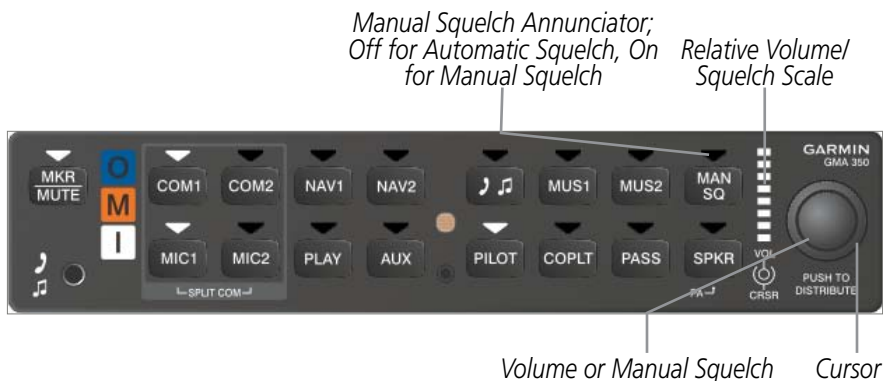
When the cursor is on **MAN SQ**, the Volume Control Knob adjusts the ICS Squelch Threshold (the volume level that must be exceeded to be heard over the intercom).

ADJUSTING SPEAKER VOLUME

When the cursor is on SPKR, the Volume Control Knob adjusts the speaker volume of the selected sources (COM, NAV, AUX, MKR).

ADJUSTING MKR, AUX, , AND MUSIC VOLUME

When the cursor is on MKR, AUX, , MUS1 or MUS2, the Volume Control Knob adjusts the individual volume of the selected source.



Volume/Squelch Control

SPEAKER

All of the radios can be heard over the cabin speaker. Pressing the **SPKR** Key selects and deselects the cabin speaker. Speaker audio is muted when the PTT is pressed. Certain aural alerts and warnings (autopilot, traffic, altitude) are always heard on the speaker, even when the speaker is not selected.



Speaker Key

PASSENGER ADDRESS MODE (PA MODE)

Press and hold the **SPKR** Key for 2 seconds to initiate Passenger Address Mode. PA Mode is annunciated by a rapid blinking of the SPKR annunciator. When in PA Mode the crew can use the PTT “Push-to-Talk” button to deliver announcements over the speaker, to the passenger headsets, or both depending on configuration.

SPLIT-PA MODE

During Split-PA Mode the pilot can continue to use the radio(s) while the copilot delivers PA announcements. To initiate Split-PA Mode, first enter Split-COM Mode by pressing both **MIC** Keys simultaneously, then press and hold the **SPKR** Key for 2 seconds.

3D AUDIO

3D Audio is useful when multiple audio sources are present. By using different responses in each ear, 3D audio processing creates the illusion that each audio source is coming from a unique location or seat position.

Because this feature uses different signals for left and right channels, it requires wiring for stereo intercom and stereo headsets. If 3D audio is activated when mono headsets are in use, the listener will still hear all audio sources; however, there is no benefit from location separation.

With a single COM selected and 3D Audio enabled, the listener hears the audio source at the 12 o'clock position. If both COMs are selected, the listener hears COM1 at 11 o'clock and COM2 at the 1 o'clock position. All other intercom positions are processed to sound like their relative seat location. By default, the GMA350 assumes the pilot sits in the left seat. A Garmin authorized service center can make changes to the default configuration.

ENABLING 3D AUDIO

Press and hold the **PILOT** Key to toggle 3D audio processing on and off for all headset positions. When 3D Audio is enabled, the aural message “3D audio left” is heard in the left ear followed by “3D audio right” in the right ear. If the aural messages are not heard in only the left and then the right ear respectively, the cause may be aircraft wiring or headset settings. Refer to the following table if a headset or aircraft wiring problem is suspected.

3D Audio Troubleshooting		
Symptom(s)	Cause(s)	Solution(s)
“3D audio left” message heard in both ears. “3D audio right” message not heard	1) Mono headset in use	1) Use a stereo headset
	2) Stereo headset in use with mono/stereo switch set to ‘mono’	2) Set mono/stereo switch on headset to ‘stereo’
	3) Aircraft wiring has left audio wired to both left and right channels of stereo headset jack	3) If after checking solutions #1 and #2 see a service center as soon as possible to inspect/correct wiring. This wiring fault can cause fail-safe audio not to function.
“3D audio left” message heard in both ears, followed by “3D audio right” message heard in both ears	1) Mono headset in use	1) Use a stereo headset
	2) Stereo headset in use with mono/stereo switch set to mono	2) Set mono/stereo switch on headset to ‘stereo’
	3) Incorrect aircraft wiring (left/right shorted together)	3) If after checking solutions #1 and #2 see a service center as soon as possible to inspect/correct wiring. This wiring fault can cause fail-safe audio not to function.

3D Audio Troubleshooting		
Symptom(s)	Cause(s)	Solution(s)
"3D audio right" message heard in both ears. "3D audio left" not heard	1) Incorrect aircraft wiring (right channel used for mono instead of left or left/right swapped)	1) See a service center as soon as possible to inspect/correct wiring. This wiring fault can cause fail-safe audio not to function.
"3D audio left" message heard in right ear only followed by "3D audio right" message heard in left ear only	1) Stereo headset is on backwards	1) Verify correct orientation from the left/right indication on each side of the headset or the position of the boom mic (usually attached on left side). If the headset is backwards left/right position information will be swapped.
	2) Incorrect aircraft wiring (left/right channels swapped)	2) See a service center as soon as possible to inspect/correct wiring. This wiring fault can cause fail-safe audio not to function.
"3D audio left" message heard in left ear only, no audio heard in right ear.	1) Aircraft wired for mono intercom	1) See a service center to wire the installation for stereo headsets.
"3D audio right" message heard in right ear only, no audio heard in left ear	1) Incorrect aircraft wiring (right channel used for mono instead of left, or left/right swapped)	1) See a service center as soon as possible to inspect/correct wiring. This wiring fault can cause fail-safe audio not to function.

3D Audio Troubleshooting

CLEARANCE RECORDER AND PLAYER

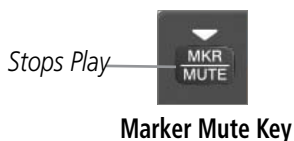
The GMA 350 contains a digital clearance recorder that records up to 2.5 minutes of the selected COM radio signal. Recorded COM audio is stored in separate memory blocks. Once 2.5 minutes of recording time have been reached, the recorder begins recording over the stored memory blocks, starting from the oldest block.

Pressing the **PLAY** Key once plays the latest recorded memory block. The Play function can also be accessed via Voice Recognition commands. Refer to the ‘Voice Recognition’ section for more information.

Pressing the **MKR/MUTE** Key during play of a memory block stops play. If a COM signal is detected during play of a recorded memory block, play is halted.


Pressing the **PLAY** Key while audio is playing begins playing the previously recorded memory block. Each subsequent press of the **PLAY** Key selects the previously recorded memory block.



Powering off the unit automatically clears all recorded blocks.



VOICE RECOGNITION

Voice Recognition allows the pilot /copilot to control the GMA 350 using spoken commands. To activate Voice Recognition, press and hold the “Push-to-Command” button while speaking a command. The release of the “Push-to-Command” button signals the GMA 350 to respond. Spoken commands are generally the action or button followed or preceded by a command (e.g., “Select”, “Enable”, “Disable”, etc). The following table lists the available Voice Recognition commands and their associated actions:


Control	Example Phrase	Action
COM	"COM one"	Toggles COM1
	"Select COM two"	Enables COM2
	"COM two disable"	Disables COM2
NAV	"NAV two"	Toggles NAV2
	"NAV two enable"	Enables NAV2
MIC	"MIC one"	Selects MIC1
	"Split one two"	Selects Split 1/2
AUX	"AUX"	Toggles AUX
	"Tel"	Toggles TEL/JACK
MUSIC	"MUSIC 1"	Toggles MUS1
	"MUSIC 2 off"	Disables MUS2
SPKR	"Speaker"	Toggles SPKR
MKR	"Marker"	Toggles MKR
	"Marker mute"	Mutes MKR
PILOT	"Pilot"	Toggles PILOT
	"Pilot isolate"	Isolates PILOT
COPLT	"Copilot"	Toggles COPLT
PASS	"Passenger"	Toggles PASS
COPLT is PASS	"Copilot is passenger"	Enables copilot as passenger
COPLT is Crew	"Copilot is crew"	Enables copilot as crew
Clearance Recorder	"Play"	Enables playback command
Distribution	"Distribute tel to pilot"	Distributes TEL to only PILOT
	"Distribute tel to all"	Distributes TEL to PILOT, COPLT, and PASS
	"Distribute music1 to none"	Removes MUS1 distribution from PILOT, COPLT, and PASS
	"Distribute music 1 to pilot and passenger"	Distributes MUS1 to PILOT and PASS
Passenger Address	"P A"	Toggles PA

Control	Example Phrase	Action
MAN SQ	"Manual squelch"	Toggles MAN SQ
3D Audio	"3D audio"	Enables 3D audio
	"Standard audio"	Disables 3D audio
Volume	"Aux volume up 3"	Increases AUX volume by 3 detents
	"Copilot volume down"	Decreases COPLT volume by 1 detent
Monitor Mute	"Monitor mute"	Toggles Monitor Mute
MUS1 & MUS2 Mute	"Music 1 mute"	Toggles MUS1 Mute
 Mute	"Tel mute"	Toggles  mute
PASS Mute	"Passenger mute"	Toggles Passenger Mute
Cursor	"Cursor off"	Cancels cursor

Voice Recognition Commands

ENTERTAINMENT INPUTS

The GMA 350 provides three stereo telephone/entertainment inputs:

- The telephone/entertainment () Key controls a telephone or entertainment device connected to the rear of the audio panel or to the Front Panel Jack.
- The **MUS1** and **MUS2** Key controls the Entertainment Music audio input.


The Front Panel Jack can be used as an entertainment input or a telephone input (in which case, it operates simultaneously with the rear telephone interface). The Front Panel Jack is a 3.5-mm stereo jack that is compatible with popular portable entertainment devices such as MP3s, CD players, and cell phones. The headphone outputs of the entertainment devices are plugged into the Front Panel Jack.

Distribution of the entertainment inputs are configured in Blue-Select Mode.

TELEPHONE AND ENTERTAINMENT MUTING

Telephone and entertainment muting can be enabled or disabled by the user, however it is always muted during alerts.

ENABLING/DISABLING MUTING

Press and hold the **MUS1**, **MUS2**, or () Key for two seconds to toggle muting on and off. The aural message “**Mute Music on Reception Enabled/Disabled**” or “**Mute Tel and Jack on Reception Enabled/Disabled**” is heard.

FAIL-SAFE OPERATION

If there is a failure of the GMA 350 or when power is not applied, a fail-safe circuit connects the pilot's headset and microphone directly to the COM1 transceiver. Audio is not available on the speaker during Fail-safe operation.



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