

STARR LABS

GOTAR3

USER MANUAL

PERFORMANCE • CONTROL • MIDI

Firmware reference: 2026-08-27 working release

Manual revision 1.3 | August 27, 2026

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00 | BEFORE YOU BEGIN

About this manual

This manual explains the Gotar3 firmware controls, play modes, OLED and LED feedback, MIDI transmission, and engineering-status System Exclusive behavior. It is written for players first; implementation detail is collected near the end for rig builders and software developers.

RELEASE NOTE The manual follows the active 2026 Gotar3 firmware and matching 128 x 32 OLED controller sources. Features marked Engineering status are not promised as a stable public interface.

Document control

Item	Value
Product	Gotar3
Document	Firmware User Manual
Revision	1.3 / 2026-08-27
Firmware basis	Active Gotar3-newSDK working release; OK-button Slide/KeyPressure shortcuts
Copyright	Copyright © 2026 Starr Labs, Inc. All rights reserved.
Codex edit ID	2026-08-27 — OK shortcuts and Expression Hammer Scaling

Safety and data notes

- Do not set the Gotar down on the USB cable. It is sturdy, but please be careful.
- Save writes the current setup to nonvolatile memory. Entering Edit and changing values alone does not guarantee persistence.
- Panic resets both zone octaves to center for the current session and transmits controller resets on all 16 MIDI channels.

01 | QUICK START

Connect, select a mode, and make music.

Power Up!

The Gotar3 has an onboard rechargeable battery. It charges with a USB standard "printer" style cable plugged into a charger or computer USB port

The OLED display will show the currently active Play mode

Connect and play

1. There are several ways to connect the Gotar:
 - a) Using a standard USB "printer"-style cable, connect Gotar3 to a USB host.
The USB device identifies as "StarrLabs Midi L1".
 - b) connect a MIDI synthesizer, computer interface using a standard 5-wire MIDI cable.
 - c) Using the onboard wireless Bluetooth-MIDI port you can pair to a computer or Mobile device. Look for "Starr Labs BLE-MIDI"
2. Set the receiving instrument to MIDI channel 1 for the default one-channel setup.
3. Play the fingerboard. In Full Poly mode each pressed fret can sound independently.
4. Use the Volume and Mod controls, joystick, ribbon, and NeckStrip to shape the sound.
5. Tap Octave Up or Octave Down to shift the range. The OLED shows Oct -2 through Oct +2, then returns to the active mode display.

Button functions in Performance-Mode

Gesture	Result	Display response
Octave Up	Raise by one octave; maximum +2	Oct -2 <>Oct +2
Octave Down	Lower by one octave; minimum -2	Oct -2<>Oct +2
OK button Tap	Tap to Toggle string Slide mode	SLIDE MODE ON/OFF
OK button long-press	Toggle NeckStrip On/Off	NeckStrip ON/OFF
Hold both octave buttons	Panic: All NotesOff/ CC/ Pitchbend reset	Applies when both buttons are released. No display confirmation.
Ribbon Sensor	Press anywhere for MIDI Sustain CC64	
Press Ribbon-Button#2	Advance through tunings	OLED:display: Tuning name, then mode
Press Ribbon-Button#1	Reserved/ unassigned	Reserved/ no action assigned
Press Bluetooth button	Advertise for pairing with another device	Bluetooth button blinks.

Gesture	Result	Display response
		Solid when successfully paired.
EDIT button press	Enters EDIT mode	“EDIT Mode” on the Display When in the PerformanceMode the display shows current pertinent settings.

BUTTON TIMING Octave and OK short actions occur on release. Holding OK for 700 ms toggles KeyPressure and consumes the press, so Slide is not also toggled. These OK shortcuts are available while playing, not in Edit mode.

Button functions in EDIT-Mode

Gesture	Result	Display response
Tap Octave Up	Raise by one octave; maximum +2. A held fret selects the Split zone	Oct 0, +2 / Oct +2
Tap Octave Down	Lower by one octave; minimum -2. A held fret selects the Split zone	Oct 0, +2 / Oct -2
Tap OK	Reload saved settings; discard unsaved edits	SLIDE MODE ON/OFF
OK long-press for 700 ms while playing	Toggle NeckStrip On/Off	NeckStrip ON/OFF
Hold both octave buttons	Panic: All NotesOff/ CC/ Pitchbend reset	Applies when both buttons are released. No display confirmation.
Ribbon-Button#2	TransposeUp +1 semitone	OLED:display: Shows transposition value
Ribbon-Button#1	TransposeDown -1 semitone	OLED:display: Shows transposition value
Press Bluetooth button	Advertise for pairing with another device	Bluetooth button blinks. Solid when successfully paired.
EDIT button	Exits EDIT mode/ Return to Performance Mode	Current settings on the Display
EDIT-mode : Fret 22/String6	Toggles Expression Edit	Expression Edit dropdown list
EDIT-mode : Channel Up	Scrolls Up the Expression Engine list	Scrolls Up the list

Gesture	Result	Display response
EDIT-mode : Channel Down	ScrollDown the Expression Engine list	Scrolls Down the list
EDIT-mode : Patch Up	Increments a value in the selected Expression setting	Value increases
EDIT-mode :	Decrements a value in the selected Expression setting	Value decreases
EDIT-mode : SAVE	store Preset, transposition and Expression settings	"Saved !"
<< Refer to the EDIT mode	chart at the end of this doc	for Settings Key assignments

Play mode

- EDIT press: enter Edit mode
- OK short press/release: toggle **Slide Mode**
- OK hold 700 ms: toggle **Neckstrip**
- OK double-press: **Toggle Hammer-scaling**
- Octave Up/Down: change octave
- Hold both octave buttons: Panic/reset controllers
- Application button 1: no Play action
- Application button 2: next tuning
- Double-presses: none assigned

Edit mode

- EDIT press: leave Edit mode
- OK press/release: reload saved settings; discard unsaved edits
- Application button 1: transpose up
- Application button 2: transpose down
- Octave Up/Down: adjust octave; a held fret selects the Split zone
- Fret 22/string 6: open or close Expression editor
- Channel +/-: navigate Expression fields
- Patch +/-: change the selected Expression value
- SAVE: store preset, transpose and Expression settings
- Long-presses: none assigned
- Double-presses: none assigned

02 | CONTROLS AND INDICATORS

Performance controls

Control	Normal operation	MIDI output / confirmation
Fingerboard	Velocity-sensitive note entry; behavior depends on mode	Note On; releases are Note On velocity 0
Volume knob	Master performance level	CC7, channel 1
ModWheel knob	Modulation depth	CC1, channel 1
Joystick Y	Bipolar pitch control with center return	14-bit Pitch Bend, channel 1
Joystick X +	Positive direction modulation	CC1, channel 1
Joystick X -	Negative direction breath control	CC2, channel 1
Ribbon	MIDI Sustain with hysteresis	CC64 = 127 press / 0 release, channel 1
NeckStrip	Pressure/expression source; routing is editable	Pressure, CC, Pitch Bend, or RPN
Ribbon button 1	Reserved	None
Ribbon button 2	Next tuning Preset from the list in PlayMode	Display shows the selected tuning
Octave Up / Down	Octave shift	Display shows the Octave setting [-2<>+2]
OK	Tap in Play: Slide; hold 700 ms in PlayMode: KeyPressure; press in Edit: reload saved settings	No direct MIDI message
EDIT	Enter or leave Edit mode	All active notes are released

LED feedback

Indicator	Firmware response	Interpretation
LED1 green	On at power-up and USB connection/configuration; Blinks with an outgoing MIDI event	MIDI activity status
LED2 red	On at power-up and USB configuration; Off in Edit-Mode	Power/Edit status

Common OLED responses

Action	Typical OLED response
Power-up	Starr Labs, then Gotar3
Select a play mode	Full Poly, Strum, TapMono, Slide, Split, or Layer
Change octave	Octave -2 through Octave +2
Change tuning	Tuning name, followed by the active play mode
Enter Edit	EDIT Mode
Save	Saved
Change channel layout	1 Channel or 6 Channels; zone/channel value as applicable
Toggle performance shortcuts	Slide On/Off or KeyPressure On/Off

03 | PLAY MODES

Full Poly

Full Poly is the direct fingerboard mode. Every fret press sends its own note. Multiple notes can sound on a string, subject to the receiving instrument. Velocity follows the selected curve; note release is transmitted as Note On with velocity 0.

Strum

Frets 1-20 select normal notes. Frets 21-24 form the strum zone. Striking a string in the strum zone plays the highest held fret on that string. Moving to a higher fret while a note rings triggers the higher note as a Hammer-on; releasing to a lower held fret produces a Pull-off. When no frets remain held, all ringing notes are released. All 4 frets for a given string are active so fast triggering is easy.

TapMono

TapMono produces one dominant note per string. The highest held fret wins. A fresh tap plays at its measured velocity. A higher tap generates a hammer-on transition; releasing the dominant fret to a lower held fret generates a pull-off. Open-string output is not generated when no fret is pressed.

HAMMER FEEL Set Hammer Scaling in the Expression editor. HardHammer sends full measured hammer-on velocity; SoftHammer scales hammer-ons to 70%. Fresh taps remain full velocity in either setting. SAVE stores the selection in the versioned Expression record.

Slide

When a key is pressed on a string, a slide up or down to a new fret will change the pitch with Pitch Bend rather than retriggering every semitone. The default bend range spans 24 semitones. In one-channel operation, a new string stops other Slide strings to prevent shared-channel bend conflicts. Six-channel operation permits independent string bends. This is called Portamento in keyboard synths.

- On entry, Gotar3 transmits RPN 0 to set the configured pitch-bend range and centers Pitch Bend.
- On exit, it centers sounding strings and restores the configured normal bend range (default 2 semitones).
- A fixed Portamento value overrides adaptive timing; 0 ms selects Adaptive.

Split and Layer

Split divides the fingerboard into Zone 1 (frets 1-12) and Zone 2 (frets 13-24). Layer sends both zones from the same played fret. Each zone can retain its own octave, channel, and patch setting; Patch transmission is active only in one-channel operation.

Choosing a mode

Mode	Best suited to	Performance note
Full Poly	Independent fretted notes and chords	Each qualified press can sound independently
Strum	Fretting with a dedicated strum area	Frets 21-24 act as the strum zone
TapMono	Hammer-on and pull-off technique	Highest held fret on each string controls the note
Slide	Glides and continuous pitch movement	Uses Pitch Bend around one anchor note per string
Split	Two sounds across the neck	Frets 1-12 are Zone 1; 13-24 are Zone 2
Layer	Stacking two sounds	Both zones are sent from the same played fret

04 | TUNINGS, OCTAVE AND TRANSPOSE

Built-in tunings

Tuning	Open-string MIDI notes	OLED label
Guitar	E3, A3, D4, G4, B4, E5	Guitar
Fourths	E3, A3, D4, G4, C5, F5	Fourths
Fourths-C	B2, E3, A3, D4, G4, C5	Fourths-C
Fourths-Eb	D3, G3, C4, F4, A#4, D#5	Fourths-Eb
Fifths	D#3, A#3, F4, C5, G5, D6	Fifths
DADGAD	D3, A3, D4, G4, A4, D5	DADGAD
Octaves	E2, E3, E4, E5, E6, E7	Octaves
Ableton	C0, C2, C4, C6, C8, C0	Ableton
Open G	G3, B3, D4, G4, B4, D5	Open G
Major Thirds	E3, G#3, C4, E4, G#4, C5	Maj3 / build-dependent label

Octave

The stored octave value has five positions: -2, -1, 0, +1, and +2 octaves. Center is 0. In Split editing, hold a fret in the desired zone while using an octave button to direct the change to that zone.

Transpose

In Edit mode, application button 1 raises transposition and application button 2 lowers it. The range is -12 to +12 semitones. The OLED briefly shows the signed value; Save writes the transposition value to nonvolatile memory.

Left-hand operation

The handedness command reverses logical string selection and selects the corresponding six-channel map. The OLED confirms Rt-Hand or Lft-Hand.

05 | EDIT MODE

Enter and leave Edit

Press and release EDIT. Gotar3 releases active notes, stores the prior play mode in RAM, and shows EDIT Mode. Press and release EDIT again to return to the prior mode. Unsaved changes can remain active in RAM but are not guaranteed after power cycling.

Fingerboard Edit map

Fret	String 1	String 2	String 3	String 4	String 5	String 6
22	Guitar	Fourths	Fifths	Octaves	Open G	Ableton / Expression
23	Right / Left	Patch +	Play mode	1 / 6 Ch	NeckStrip	Channel +
24	SAVE	Patch -	Split / 1 Zone	Layer / Split	Velocity curve	Channel -

NUMBERING The table uses the physical one-based fret labels. Firmware comments and source constants are zero-based.

Edit operations

Operation	How to perform it	Result
Select tuning	Press one of the six fret-22 string positions	Selects the labeled direct tuning
Select play mode	Press fret 23 / string 3 repeatedly	Full Poly → Strum → TapMono → Slide
Channel mode	Press fret 23 / string 4	Toggle one channel / six channels
Patch	Press fret 23 or 24 / string 2	Program + / - on selected channel
MIDI channel	Press fret 23 or 24 / string 6	Channel + / -; wraps 1-16 in one-channel mode
Zones	Press fret 24 / string 3	Toggle one zone / two-zone Split
Layer	While Split/Layer is selected, press fret 24 / string 4	Toggle Split Zones / two Layers
Velocity curve	Press fret 24 / string 5	Advance curve 0-15
Save	Press fret 24 / string 1	Store preset, Expression settings, and transpose
Reload saved settings	Press and release OK while in Edit	Reload the main configuration, transpose, and (in Release builds) Expression settings from EEPROM; unsaved edits are discarded

06 | EXPRESSION EDITOR

Open the editor

Enter Edit, then press fret 22 / string 6. The OLED shows EXPR v6 and field 01/24. Channel + and Channel - move through fields. Patch + and Patch - adjust the current value. Press fret 22 / string 6 again to close, or press SAVE to persist and return to Edit.

Control	Expression editor action
Channel + / -	Next / previous field, wrapping at either end
Patch + / -	Increase / decrease or toggle the current value
Fret 22 / string 6	Open / close Expression editor
SAVE	Close editor and execute normal Save

Expression fields

OLED field	Range	Purpose
NeckStrip	Off / On	Master KeyPressure enable
Pressure Dest	0-7	Channel Pressure, CC74, Pitch Bend, CC11, PB+CC74, CC2, Custom CC, RPN
Custom CC	0-127	Controller used by Custom CC destination
RPN MSB / LSB	0-127 each	14-bit RPN parameter selector
PB Depth	0-2400 cents locally	Maximum KeyPressure pitch offset
Pressure Start	0-2046	Raw threshold that maps to output 0
Pressure Full	1-2047	Raw threshold that maps to output 127
Pressure Curve	Linear / Quadratic	Response shape
Slide PB Range	1-24 semitones	RPN 0 range used during Slide
Restore PB Range	1-24 semitones	RPN 0 range restored on Slide exit
Slide Steps	1-16 / semitone	Pitch Bend messages per semitone
Portamento	0-2000 ms	0 = Adaptive; nonzero = fixed glide duration
Gesture Time	5-100%	Portion of gesture interval used by adaptive glide
Min Glide	0-2000 ms	Minimum ramp duration
Min ms/Semitone	0-2000 ms	Distance-based duration floor
Max Glide	Min Glide-2000 ms	Maximum ramp duration

OLED field	Range	Purpose
Held CC	Off / On	Send a CC while a Slide note is held: legacy feature for some synths
Held CC Num	0-127	Held-note CC number
Held CC Value	0-127	Value sent on note start; 0 on stop
Panic	Off / On	Enable additional user Panic CC
Panic CC	0-127	Additional CC number sent on all channels
Panic Value	0-127	Additional Panic CC value
Hammer Scaling	HardHammer / SoftHammer	Full or 70% TapMono hammer-on velocity

DEFAULTS KeyPressure is enabled by default in Release persistence when a valid record exists; compiled defaults select Pitch Bend, 100-cent depth, quadratic response, pressure start 600, full-scale 2047, Slide range 24, restore range 2, five steps/semitone, and adaptive portamento.

KeyPressure destination map

Value	Destination	MIDI output
0	Channel pressure	Channel Pressure
1	Brightness	CC 74
2	Pitch	Pitch Bend
3	Expression	CC 11
4	Pitch + brightness	Pitch Bend and CC 74
5	Breath	CC 2
6	Custom controller	Selected CC number
7	Registered parameter	Selected RPN with 14-bit Data Entry

07 | MIDI IMPLEMENTATION

MIDI implementation chart

Function	Transmitted	Recognized	Remarks
Basic channel	1; selectable 1-16; six-channel and zone maps	No device control parser	Generated notes follow mode/channel map
Mode	Mode 3-style poly transmission	—	Omni receive not implemented
Note number	Yes	No	Tuning + fret + octave + transpose
Velocity	Yes, 1-127	No	16 selectable curves; release uses Note On velocity 0
Note Off 8n	No	No	Uses Note On velocity 0
Poly Key Pressure	No	No	—
Channel Pressure	Selectable NeckStrip destination	No	Joystick center can transmit zero
Pitch Bend	Yes	No	Joystick, Slide, and selectable KeyPressure
Program Change	0-127	No	Patch +/-; one-channel mode
Control Change	Yes	No device control	See controller chart
RPN	RPN 0 and selectable pressure RPN	No	Pitch range setup/restore; 14-bit data entry
System Exclusive	Diagnostic config output; serial pass-through	No config parser	Engineering status
System Common	No generated messages	Cable 1 byte forwarding only	Not interpreted
System Real-Time	No generated messages	Cable 1 byte forwarding only	Not interpreted

Controller chart

Message	Source / purpose	Values
CC1 Modulation	Mod control; joystick X positive; optional custom overlap	0-127
CC2 Breath	Joystick X negative; selectable NeckStrip destination	0-127
CC6 Data Entry MSB	RPN data	0-127
CC7 Volume	Volume control	0-127
CC11 Expression	Selectable NeckStrip or Held CC default; restored to 127 by Panic	0-127
CC38 Data Entry LSB	RPN data	0-127
CC64 Hold 1	Ribbon	0 / 127

Message	Source / purpose	Values
CC74 Brightness/Timbre	Selectable NeckStrip destination	0-127
CC100/101	RPN LSB/MSB selector	0-127
CC112 default	Optional additional Panic CC	Default 127
CC121 Reset All Controllers	Panic, all channels	0
CC123 All Notes Off	Panic, all channels	0
Custom CC	NeckStrip, Held CC, or Panic assignment	0-127

USB and serial routing

- Performance output is placed on USB MIDI cable 0 and transmitted on the 31,250-baud serial MIDI port.
- Host data received on USB cable 1 is forwarded to the serial MIDI transmitter. It is not interpreted as Gotar configuration.
- Serial input is not a supported merge-to-USB path in this firmware revision.

Channel behavior by mode

Configuration	Channel behavior
One-channel	Notes and performance controllers use the selected channel.
Six-channel	Strings use the firmware's six-channel map for independent articulation.
Split	Zone 1 and Zone 2 use their own channel, octave, and patch settings.
Layer	Both zones transmit for the same played fret using their stored settings.
Slide	Six-channel operation permits independent string bends; one-channel operation suppresses conflicting simultaneous bends.
USB cable 1	Host bytes are forwarded to serial MIDI and are not interpreted as configuration commands.

08 | SYSTEM EXCLUSIVE

Support level

Intended diagnostic frame

Offset	Bytes	Meaning
0	F0	System Exclusive start
1-3	00 01 42	Three-byte firmware manufacturer identifier
4-5	sizeH sizeL	Payload size; current preset payload is 13 bytes
6	TuningNumber	Tuning list index
7	is_left_handed	0 right / 1 left
8	velocityMode	Curve 0-15
9	instrument_mode	0 Full Poly, 1 Strum, 2 TapMono, 6 Split, 7 Layer, 8 Slide
10	channelType	0 one channel / 1 six channels
11	zoneCount	1 or 2
12-14	zone 1	Patch, stored octave 1-5, internal MIDI channel 0-15
15-17	zone 2	Patch, stored octave 1-5, internal MIDI channel 0-15
18	checksum	Present in the preset record; not refreshed reliably in this release
19	F7	System Exclusive end

09 | TROUBLESHOOTING

Symptom	Action
No sound	Verify the receiving synth is on channel 1; center the octave; press both octave buttons for Panic; confirm USB MIDI device StarrLabs Midi is selected or Bluetooth connects.
Wrong notes	Check tuning, octave, transpose, and handedness. In Split/Layer, verify both zone octaves.
Slide sounds out of tune	The synth must accept the transmitted RPN 0 pitch-bend range. Match Slide PB Range =24 and confirm the synth does not ignore RPN.
Only one Slide string sounds	One-channel Slide intentionally prevents simultaneous independent bends. Select six-channel operation and use a multitimbral/MPE-capable receiver.

Symptom	Action
Notes hang	Hold both octave buttons for Panic. The firmware sends centered Pitch Bend, CC123, CC121, optional Panic CC, and restores CC11.
Ribbon does not latch	Ribbon is momentary sustain: keep contact above the press threshold; releasing below the off threshold sends CC64 = 0.
NeckStrip has no effect	Hold OK for 700 ms to enable KeyPressure, then verify Pressure Dest and the receiver's controller mapping.
Edit LED does not blink	Use the OLED EDIT Mode screen. The current LED2 blink implementation is not reliable.
Settings return after restart	Use SAVE. Release builds recall the separate Expression record; Debug builds do not recall it automatically.
SysEx backup fails	Configuration SysEx is engineering status in this release and is not a supported backup/restore path.
No MIDI Activity LED	Check power is on. Try both the fretboard and the knobs and joystick. If no activity, power-cycle the Gotar. If the condition email to info@starrlabs.com

Panic sequence

Hold both octave buttons together until the reset occurs, then release both. The current session's zone octaves return to center. Re-select any required octave offsets afterward.

Reload saved settings

Enter Edit and press and release OK to reload the saved main configuration and transpose from EEPROM. Release builds also recall the separate saved Expression record. This is not a factory reset and it does not save the current session; unsaved edits are discarded.

10 | SPECIFICATIONS AND SOURCE NOTES

Firmware specifications

Item	Specification
Fingerboard	6 strings x 24 fret positions; velocity-sensitive scanning
Play modes	Full Poly, Strum, TapMono, Slide, Split, Layer
Octave range	-2 to +2 octaves
Transpose range	-12 to +12 semitones
Velocity curves	16
MIDI channels	1-16; one-channel, six-channel, zone, and special Ableton maps
USB	USB MIDI 2.0; ; StarrLabs Midi L1
Serial MIDI	31,250 baud transmitter
Display	128 x 32 monochrome OLED via QT Py coprocessor
Persistence	13-byte legacy preset + transpose + versioned Expression record
Expression record	Magic GEXP, record v1, payload v7, CRC-8 polynomial 0x07

Gotar3 Gotar4 and Starr Labs names and marks are the property of Starr Labs Inc. MIDI is a technical standard of the MIDI Association. Other product names are the property of their respective owners. Specifications and firmware behavior are subject to change without notice.

Publication confirmation record

Item	Value to confirm	Approval / date
Product spelling	Gotar3 / GoTar / other production name	
Copyright owner	Starr Labs, Inc.	
Firmware build	Shipping source revision and binary hash	
OLED controller	Shipping sketch revision and binary hash	
Panel details	Control labels/order and LED lens colors	
MIDI layout	Six-channel string order	
Drawing revision	Approved front-panel illustration revision	