

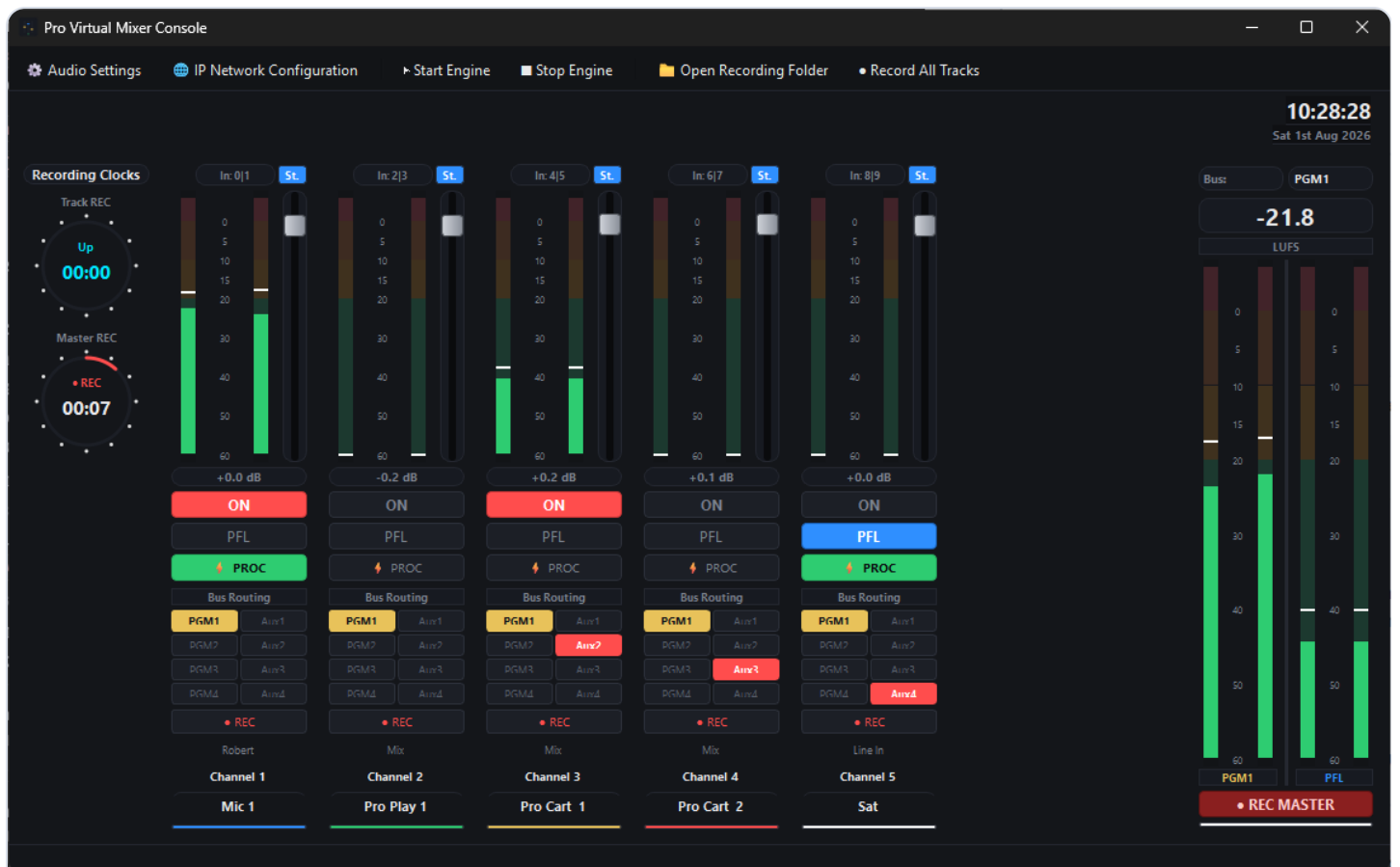
USER MANUAL

Pro Virtual Mixer Console It is a standalone virtual mixing console. It combines per-channel DSP processing, an 8-bus routing matrix, and bidirectional UDP network integration with the automation of Pro Play Radio and Pro Cart Radio.

INTRODUCTION & KEY CONCEPTS

Pro Virtual Mixer Console It replaces a physical mixing console with a software-controlled mixing surface. Each audio channel is an independent channel with its own VU meter, fader, ON/PFL logic, three-stage DSP insert (HPF, 3-band parametric EQ, dynamic compressor), and free routing to any combination of eight output buses.

It communicates with **Pro Play Radio and Pro Cart Radio** via a dedicated UDP channel, acting as a virtual replacement for the Fader Start GPIO wiring between a physical console and the automation software.



Pro Virtual Mixer Console: full working session with five channel strips, Recording Clocks panel and Master Bus Panel.

SYSTEM & SOFTWARE REQUIREMENTS

1. HARDWARE SPECIFICATIONS (PC)

Processor (CPU): Real-time DSP (HPF + 3-band EQ + compressor) runs per channel, per audio block, so clock speed and core count both matter as channel count grows.

- **Minimum:** Intel Core i3 (8th Gen) or AMD Ryzen 3. Sufficient for up to 6 channels at 48 kHz / 256 samples.
- **Recommended:** Intel Core i5 (10th Gen+) or AMD Ryzen 5, for consoles of 12+ channels or lower buffer sizes.

RAM:

- **Minimum:** 4 GB.
- **Recommended:** 8 GB+, especially when several channels record simultaneously to WAV.

Storage: An SSD is strongly recommended, since per-track and master recordings are written live to disk as uncompressed WAV.

2. AUDIO INTERFACE

Pro Virtual Mixer Console is designed around **multi-channel** audio hardware. The default configuration expects up to **16 physical inputs** and **16 physical outputs**, freely assignable per channel and per bus.

- **Minimum:** Stereo integrated audio (functional for a single-channel test setup).
- **Recommended:** Professional multi-channel USB/AoIP interface (RME, Focusrite, Behringer, ESI) exposing at least 8–16 I/O.

Signal Path:

- Physical Input → Channel Strip (HPF → EQ → Compressor) → Fader → Bus Routing Matrix
- Any channel can bypass the bus matrix entirely via a **Direct Output** device/pair.
- PFL taps a dedicated monitoring bus, independent from the program buses.

3. SOFTWARE ENVIRONMENT

- **OS:** Windows 10/11 (64-bit) recommended — required for USB dongle licensing via WMI.
- **Runtime:** Python 3 with PySide6, sounddevice (PortAudio), soundfile, NumPy, SciPy.
- **Network:** Wired Ethernet recommended for reliable low-latency UDP communication with Pro Play Radio.

DEFAULT ENGINE PARAMETERS

PARAMETER	DEFAULT VALUE	NOTES
Sample Rate	48,000 Hz	Selectable: 44.1 / 48 / 88.2 / 96 kHz
Block Size	256 samples	Configurable 32–4096 samples
Input / Output Channels	16 / 16	Configurable 1–64
Mixer Channels	6 strips	Configurable 1–32, added/removed live
Output Buses	8 (4× PGM, 4× Aux)	Each independently mapped to a hardware output pair
Local UDP Port	9001	Mixer's own command listener
Remote UDP Port	9000	Matches Pro Play Radio's default GPI listener



Ideal Machine:

Mini PC i5 (12th Gen+), 16 GB RAM, NVMe SSD, and a 16-in/16-out professional audio interface for a full 12-channel console with all DSP inserts active.

INSTALLATION & LICENSING

Pro Virtual Mixer Console ships as a single self-contained application. On launch, it validates the **USB Security Dongle** before any window is created.

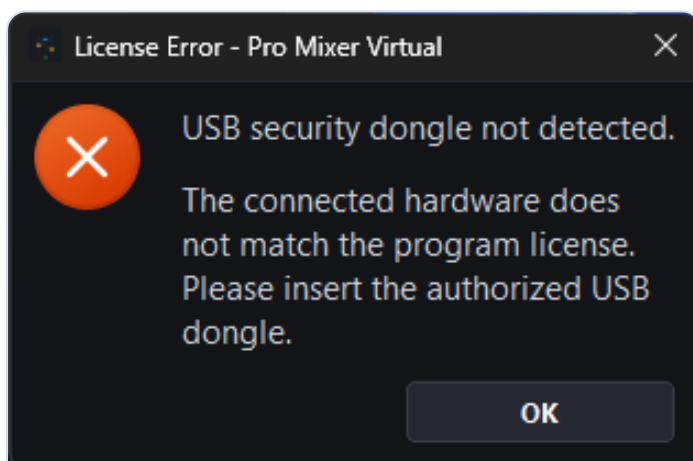


Technical Note:

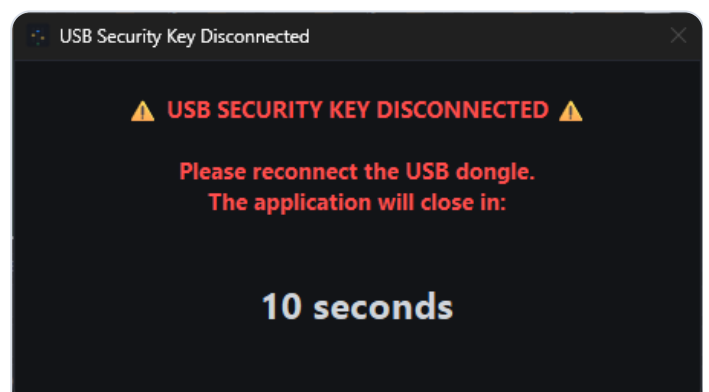
The license check reads the serial number of connected USB storage devices via WMI (Windows only). Always connect the authorized dongle directly to a motherboard USB port — cheap hubs can cause intermittent verification failures.

FIRST-LAUNCH SEQUENCE

1. The application queries all USB disk drives through WMI and compares their serial number against the authorized license.
2. If no match is found, a styled critical error dialog is shown ("USB security dongle not detected") and the application exits immediately.
3. Once validated, the main console window opens with the last saved configuration automatically restored from `%APPDATA%\ProMixerVirtual\mixer_config.json`.
4. A background monitor re-checks the dongle every 60 seconds for the entire session (see [Security & Data](#)).



License Error dialog: shown at startup if no authorized USB security dongle is detected.



USB Security Key Disconnected: non-closable countdown warning shown if the dongle is removed during an active session.

INTERFACE OVERVIEW

The console uses the same dark studio skin as the rest of the Pro Suite Radio family. The layout is split into three fixed zones so the working area stays consistent regardless of channel count.

HEADER & TOOLBAR

A slim header bar shows the application title with a live clock and date aligned to the right. Directly below it, the main toolbar exposes the actions used most often during a live show:

ACTION	FUNCTION
 Audio Settings	Opens the Global Hardware & Channel Setup dialog.
 IP Network Configuration	Opens the UDP/GPI network and hotkey mapping dialog.
 Start Engine /  Stop Engine	Starts or stops the real-time audio stream.
 Open Recording Folder	Opens the WAV output folder in the file explorer.
 Record All Tracks	Arms per-track recording on every channel simultaneously.

MAIN WORK AREA

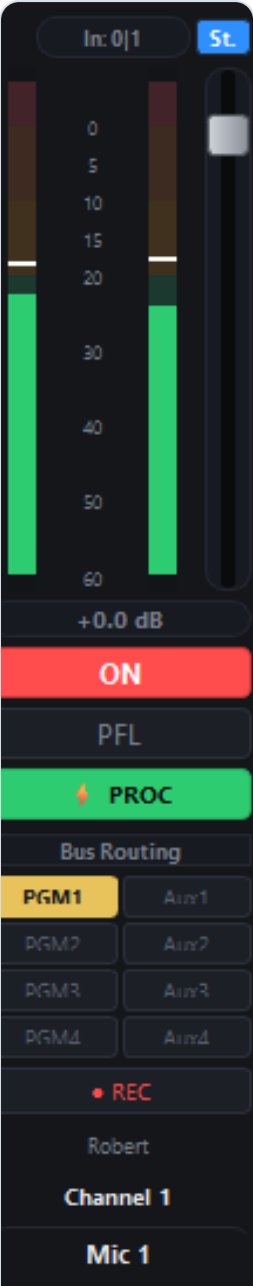
Below the toolbar, three regions sit side by side: a fixed **Recording Clocks** panel on the left, a horizontally scrollable row of **Channel Strips** in the center, and a fixed **Master Bus Panel** on the right — always visible regardless of how many channels are loaded.



Live Metering:

All VU meters and recording indicators refresh on a 33 ms UI tick, giving smooth, low-latency visual feedback of every channel and bus in real time.

CHANNEL STRIP



Every strip is a self-contained control unit. From top to bottom:

Channel Strip (real screenshot): VU meters, fader, ON/PFL, DSP processing, bus routing grid, recording and metadata labels.

CONTROL	BEHAVIOR
	Opens the per-channel Audio Settings dialog (input/output device, physical channels, metadata).
St.	Toggles Stereo (L/R) vs Mono mode. Locked while a recording is active on that channel.
VU Meter + Fader	Vertical stereo VU meter next to a -60 dB to +6 dB fader (0.1 dB resolution).
dB readout	Live numeric readout of the current fader gain.
ON	Latching red button. Toggling it can send a configured UDP command to Pro Play Radio (e.g. start/stop a player).
PFL	Latching blue button. Routes the channel to the independent pre-fader-listen monitoring bus.
 PROC	Opens the DSP Insert Rack. Turns green whenever the insert chain is active.
Bus Routing Grid	Eight toggle buttons (PGM1–4 in gold, Aux1–4 in red) for free channel-to-bus assignment.
• REC	Arms per-track recording to a timestamped WAV file.
Role / User / Name	Editable metadata fields shown directly on the strip (e.g. "Host", "Sophia", "Mic 01").
Color bar	Bottom accent strip using one of 15 selectable channel colors.



Hotkeys:

Any channel's

ON

button can also be assigned a single keyboard key from the IP Network Configuration dialog, letting an operator trigger it directly from the computer keyboard.

PER-CHANNEL AUDIO ROUTING

Clicking the  icon on any strip opens its dedicated Audio Settings dialog, used to wire that specific channel to real hardware independently from the global device selection.

FIELD	DESCRIPTION
Channel Name	Label shown at the bottom of the strip.
Stereo Mode	Enables the L/R pair for both input and direct output.
Input Device	Use the global input device, or pin this channel to a specific audio interface.
Input Channel L / R	Physical input channel index(es) feeding this strip.
Direct Output Device	Optional dedicated output device, bypassing the bus matrix.
Direct Output L / R	Physical output channel(s), or "None" to route exclusively via buses.
Role (Line 1) / User (Line 2)	Free-text metadata shown on the strip (e.g. role and operator name).
Channel Color	One of 15 accent colors for quick visual identification.



Independent Streams:

Because input/output devices can be assigned per channel, a single console session can simultaneously combine a multi-channel USB interface, an AoIP virtual soundcard, and dedicated hardware faders on separate devices.

DSP INSERT RACK

Each channel carries its own real-time processing chain, opened from the ⚡ **PROC** button. Every stage can be enabled or bypassed independently, plus a master switch for the whole insert.

Processing Insert DSP — Mic 1

✓ ⚡ MASTER INSERT SWITCH

✓ High-Pass Filter (HPF)

Cutoff Freq

60 Hz

✓ 3-Band Parametric Equalizer

Low Freq

Low Gain

Mid Freq

Mid Gain

High Freq

High Gain

120 Hz

+0.0 dB

1000 Hz

+0.0 dB

8700 Hz

+6.0 dB

✓ Dynamic Compressor

Threshold

Ratio

Makeup

-30.0 dB

18.5:1

20.4 dB

OK

Processing Insert DSP dialog: illuminated rotary encoders for HPF, 3-band EQ and compressor, live on channel "Mic 1".

Processing Insert DSP dialog: illuminated rotary encoders for HPF, 3-band EQ and compressor, live on channel "Mic 1".

PARAMETER REFERENCE

STAGE	PARAMETER	RANGE	DEFAULT	
HPF	Cutoff Frequency	20 – 500 Hz	80 Hz	
	Low Freq / Gain	40–500 Hz / ±15 dB	120 Hz / 0 dB	
	Mid Freq / Gain	200–8000 Hz / ±15 dB	1000 Hz / 0 dB	
3-Band EQ	High Freq / Gain	2000–16000 Hz / ±15 dB	8000 Hz / 0 dB	
	Compressor	Threshold	–40 to 0 dB	–18 dB
		Ratio	1:1 to 20:1	2:1
		Makeup Gain	0 to 24 dB	0 dB

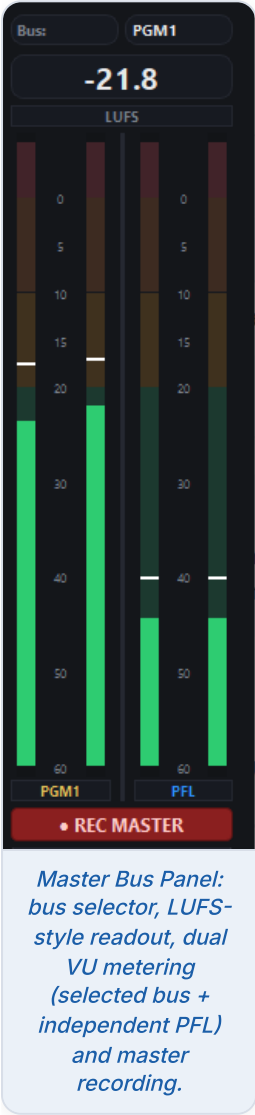
HPF uses a 2nd-order Butterworth filter; EQ bands use peaking biquads; the compressor applies a smoothed RMS envelope follower. All stages process in real time with no audible dropout when parameters are changed live.

BUS ROUTING & MASTER PANEL

The mixer provides **8 independent output buses** — four Program buses and four Auxiliary buses — each mapped to its own hardware output pair. Any channel can feed any combination of buses simultaneously via its routing grid.

BUS	TYPE	TYPICAL USE
PGM1 – PGM4	Program (gold)	On-air program mixes, satellite feeds, backup studios.
Aux1 – Aux4	Auxiliary (red)	Recording sends, IFB/mix-minus, external streaming encoders.

MASTER BUS PANEL



Fixed on the right edge of the console, the Master Bus Panel monitors any selected bus alongside an independent PFL feed.



PFL Monitoring:

The PFL meter is always active and independent of the selected program bus, so an operator can cue up the next source without affecting what listeners hear on air.

RECORDING

Pro Mixer Virtual can record audio at two levels simultaneously: individual channels and the full master bus mix, both as uncompressed WAV files.

PER-TRACK RECORDING

Pressing **• REC** on any strip arms that channel for recording (mono or stereo, matching its current mode) to a timestamped file such as `Mic_01_20260719_143210.wav`, saved under

`~/ProMixer_Recordings`.

MASTER RECORDING

The **• REC MASTER** button on the Master Bus Panel captures the currently selected bus (e.g. PGM1) as a single stereo WAV file — ideal for archiving the full on-air mix.

RECORDING CLOCKS PANEL

A dedicated panel on the left of the console shows two circular timers:

- **Track REC** — starts automatically the moment the first channel begins recording, and resets when the last active track stops.
- **Master REC** — starts and resets with the master bus recording.



Engine Required:

Recording cannot be armed while the Audio Engine is stopped. Start the engine first from the toolbar, or the REC button will automatically release with a status bar warning.

NETWORK & AUTOMATION (UDP GPI/GPO)

Pro Mixer Virtual replaces physical GPIO wiring between a console and **Pro Play Radio** with a bidirectional UDP link, configured from  **IP Network Configuration**.

GLOBAL UDP SETTINGS

FIELD	DESCRIPTION
Enable Network Control	Master switch for the entire UDP subsystem.
Automation IP	IP address of the machine running Pro Play Radio.
Remote UDP Port	Default port used for outgoing commands (default 9000).
Local Listening UDP Port	Default port Pro Mixer Virtual listens on for inbound commands (default 9001).
Test PING UDP	Sends a test packet to confirm connectivity without affecting either application.

PER-CHANNEL COMMAND MAPPING

Each channel can be linked to a play/stop command pair, an optional single-key hotkey, and — critically — its **own Remote/Local UDP port pair**, overriding the global defaults above. This lets a single console talk to several Pro Play Radio instances (or additional Pro Mixer units) at once, each on its own port.

IP Network Configuration dialog: global UDP settings plus a per-channel command table with independent Remote/Local UDP ports.

CH #	CHANNEL	ON CMD (PLAY)	OFF CMD (STOP)	HOTKEY	REMOTE PORT	LOCAL PORT
#1	Mic 1	—	—	1	9000	9001
#2	Pro Play 1	PLAY 1	STOP 1	2	9000	9001
#3	Pro Play 2	PLAY 2	STOP 2	3	9000	9002
#4	Pro Cart 1	PLAY 1	STOP 1	4	9100	9101
#5	Pro Cart 2	PLAY 2	STOP 2	5	9100	9102
#6	Sat. Pro Play	SAT_START 1	SAT_STOP	6	9000	9001



Reading the example:

Channels #2/#3 target one Pro Play Radio instance on port 9000 (its own local ports 9001/9002 keep replies separate), while #4/#5 target a second instance listening on port 9100. Channel #1 (a live mic) carries only a hotkey, with no play/stop command needed.

Outgoing Commands

Toggling a channel's **ON** button sends its configured play or stop command to the Remote UDP Port of that row — for example, pressing ON on "Pro Play 1" sends **PLAY 1** to port 9000.

Incoming Commands

Pro Mixer Virtual also listens for inbound orders on each channel's local port, allowing external automation to mirror channel state:

- **ON <n>** / **OFF <n>** — sets the ON button state of channel n.
- **PFL <n>** — toggles the PFL button of channel n.



Pre-Config:

Confirm that each channel's Remote UDP Port matches the GPI listening port configured on the corresponding automation system's *Settings > IP Network* (commonly Port 9000 for Pro Play Radio), and that all machines share a wired Gigabit network segment.

GLOBAL HARDWARE SETUP

The **Audio Settings** dialog is the central place to configure the audio engine and every channel at once, without opening each strip's individual dialog.

Global Audio Hardware & Channel Setup

Global Hardware / PFL Output Settings

Global Input Device:

[0] Asignador de sonido Microsoft - Input (m2 out:0)

Global Output Device:

[8] Asignador de sonido Microsoft - Output (m0 out:2)

Refresh Devices

PFL Output Device:

[10] SUB2 OUT (GO-MIXER STUDIO) (m0 out:2)

PFL Hardware Channels:

L:

0

R:

1

Sample Rate:

48000

Block Size (Buffer):

512

Input Channels:

2

Output Channels:

2

Total Mixer Channels:

5

Test Hardware Config

Hardware detected: 33 input device(s), 29 output device(s).

Per-Channel Input/Output, Naming, Display

Ch #	Name	Role (Line 1)	User (Line 2)	Input Device	In L	In R	Output Device	Out L	Out R	ST	Color
#1	Mic 1	Robert	Channel 1	[3] LINE IN (GO-MIXE	0	1	[9] MAIN OUT (GO:M	0	1	✓	Blue
#2	Pro Play 1	Mix	Channel 2	[3] LINE IN (GO-MIXE	2	3	[9] MAIN OUT (GO:M	2	3	✓	Green
#3	Pro Cart 1	Mix	Channel 3	[3] LINE IN (GO-MIXE	4	5	[9] MAIN OUT (GO:M	4	5	✓	Gold / Yellow
#4	Pro Cart 2	Mix	Channel 4	[3] LINE IN (GO-MIXE	6	7	[9] MAIN OUT (GO:M	6	7	✓	Red
#5	Sat	Line In	Channel 5	[3] LINE IN (GO-MIXE	8	9	[9] MAIN OUT (GO:M	8	9	✓	White

OK

Cancel

Global Audio Hardware & Channel Setup dialog: device selection, engine parameters and the full per-channel bulk-edit table.

GLOBAL HARDWARE & PFL OUTPUT

FIELD	DESCRIPTION
Global Input / Output Device	Default audio interface used by channels that don't override it.
PFL Output Device	Optional independent device for the PFL monitoring feed.
PFL Hardware Channels (L/R)	Physical output pair carrying the PFL signal.
Sample Rate	44100 / 48000 / 88200 / 96000 Hz.
Block Size	32 – 4096 samples (lower = less latency, higher CPU sensitivity).
Input / Output Channels	Total physical channel count exposed to the engine (1–64).
Total Mixer Channels	Number of channel strips (1–32); strips are added or removed live.
Test Hardware Config	Validates the chosen sample rate and channel counts against the real device before starting.

PER-CHANNEL BULK TABLE

Below the global section, a scrollable table lists every channel with its name, role/user labels, input/output device and physical channel assignment, stereo mode, and color — allowing an operator to reconfigure an entire console in one pass.



PortAudio Channel Errors:

If the engine fails to start with a channel-count error, use

Refresh Devices

and

Test Hardware Config

first, and make sure Input/Output Channels do not exceed what the selected physical device actually supports.

SECURITY & DATA PERSISTENCE

USB SECURITY DONGLE

Licensing follows the same standardized pattern used across the Pro Suite Radio family: an authorized serial number is checked via WMI against connected USB storage devices at launch, and continuously in the background.

CHECK	BEHAVIOR
Startup check	Blocks application launch entirely if no authorized dongle is present.
Background monitor	Re-checks every 60 seconds; requires 2 consecutive failures before acting (debounce).
Warning modal	Non-closable 30-second countdown dialog if the dongle is not detected.
Forced shutdown	Application terminates immediately if the countdown reaches zero.

CONFIGURATION PERSISTENCE

Every parameter change — fader position, EQ/compressor settings, bus routing, channel names, colors, and network mapping — is saved automatically to:

```
%APPDATA%\ProMixerVirtual\mixer_config.json
```

This file is reloaded on the next launch, so the entire console — wiring, DSP, and automation links included — is restored exactly as it was left.

KEYBOARD SHORTCUTS

Channel hotkeys are assigned per channel from the IP Network Configuration dialog and toggle the channel's **ON** state directly.

KEY	DEFAULT ASSIGNMENT
–	Toggle ON for channels 1 through 9 (default mapping, fully customizable).



Text-Field Safe:

Hotkeys are automatically ignored whenever the keyboard focus is inside a text field (channel name, role, or user labels), preventing accidental triggers while editing metadata.

TECHNICAL SUPPORT & DIAGNOSTICS



Emergency Checklist:

If the engine won't start, verify: (1) an Input and Output device are both selected in Audio Settings, (2) the USB dongle is connected directly to the motherboard, and (3) the selected sample rate is supported by the hardware via Test Hardware Config.

For advanced support, contact your local Pro Suite Radio distributor.