

WiFi Consist Master

Operation Manual

Firmware v1.85 • Model Railroad DCC / LCC Consist Controller



This manual covers everyday use of the WiFi Consist Master panel: connecting it to your layout, building and managing locomotive consists from the front panel or a web browser, saving and recalling favorite lineups, and troubleshooting common issues. It is written for the person operating the panel at the layout, not for firmware development.

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1. What This Device Does

The WiFi Consist Master is a standalone control panel that talks to JMRI over your layout's WiFi network and lets you build, edit, and recall multiple-unit locomotive consists without touching a computer. It works with:

- DCC command stations that support JMRI's consist tool — EasyDCC, NCE, Digitrax, and Lenz (XPressNet).
- LCC (OpenLCB) layouts, using JMRI Memory variables to track consist membership.

The panel automatically detects which type of system JMRI is connected to and adjusts its behavior accordingly — you don't need to configure this yourself.

Every consist you build is remembered even after a power cycle: the panel keeps its own backup copy in onboard flash memory (NVRAM) and will restore anything JMRI has lost track of the next time it reconnects.

Two or more panels can share the same JMRI server and stay in sync with each other: if a panel is currently viewing a consist that another panel — or JMRI's own Consist Tool — changes, it updates live to match, no manual refresh needed.

2. Front Panel Overview

The panel has two small OLED screens, four pushbuttons, and a quad rotary encoder with a push-button and RGB ring per digit for engine entry.

Buttons

Button	Function
NEXT	Move to the next consist address.
PREV	Move to the previous consist address.
DIR	Toggle the direction used when the next engine is added.
PAGE	Page through a long engine list, or (held) trigger a factory reset or WiFi reset — see Section 12.

Note: Adding, removing, and clearing engines is done with the four encoder push-buttons, not separate panel buttons — see Section 5.

3. Installation and First-Time Setup (WiFi)

Physical Installation

The panel ships fully assembled — there is no wiring, soldering, or DCC bus connection required. Unlike command-station-side hardware, the panel only ever talks to JMRI over your layout's WiFi network, so it can be placed anywhere within WiFi range of your router, not necessarily near the track or command station.

1. Choose a location within range of your layout's WiFi network, close enough to read and reach comfortably while operating.
2. Connect the included USB power cable to the panel and to any USB power source (a wall adapter, computer, or powered hub).
3. The panel powers on immediately — both OLED screens light up, and the left screen briefly shows the startup message before moving on to WiFi setup below.

Note: The panel does not need to be physically near your command station or DCC bus — only within WiFi range of the same network your JMRI computer or server is on.

WiFi Setup

The very first time the panel is powered on — or any time its WiFi credentials have been cleared — it starts in setup mode automatically:

1. The left screen shows "WiFi Setup" and the name of a temporary network to join: ConsistMaster-Setup.
2. On your phone or laptop, join that network.
3. A setup page should open automatically (most phones prompt you). If it doesn't, open a browser and go to 192.168.4.1.
4. Select your home/layout WiFi network from the list (or type its name manually if it isn't shown), enter the password, and tap Save.
5. The panel reboots and connects to your real network. Once connected, it begins searching for JMRI automatically.

Note: If you ever need to change which WiFi network the panel is on, see Section 12, "Resetting WiFi."

4. Connecting to JMRI

Once on your network, the panel looks for JMRI in two ways:

- If it has connected to a JMRI server before, it tries that same address first for a fast reconnect.
- Otherwise (or if that fails), it scans your local subnet automatically until it finds a JMRI server with the WebSocket/JSON server enabled on port 12080.

Requirements on the JMRI side:

- JMRI's JSON server / WebSocket server must be enabled and running.
- For DCC systems (EasyDCC, NCE, Digitrax, Lenz), JMRI's consist support must be active for your command station.
- For LCC layouts, JMRI must be connected to the layout as an LCC (OpenLCB) node — the panel's LCC mode only works if JMRI itself has an active LCC connection configured, not a DCC connection. The panel then uses JMRI Memory variables named IMCM<address>, which JMRI creates automatically as needed.

While searching, the right-hand screen shows "JMRI Unreachable." Once connected, the panel automatically:

1. Detects which command station type JMRI is talking to.
2. Loads its own saved backup of every consist for that type of system from flash memory.
3. Pulls the current live consist list from JMRI so the two stay in sync.
4. Restores anything it remembers that JMRI does not currently have (see the caution below).

Caution: If a consist was intentionally deleted from inside JMRI's own Consist Tool — rather than lost because JMRI restarted — this automatic restore will recreate it on the real track the next time the panel reconnects to JMRI. If you delete a consist in JMRI directly, also clear it from the panel (Section 5) so the panel's own backup is updated.

5. Building a Consist from the Front Panel

Choosing a consist address

Use NEXT / PREV to move between consist addresses. The valid range depends on your command station:

System	Valid Addresses	Notes
EasyDCC	1 – 99	Hard limit of the EasyDCC command station.
Lenz (XPressNet)	1 – 99	Layout convention matching EasyDCC's addressing, not a hardware limit.
NCE	1 – 127	
Digitrax	1 – 127 (dense)	Higher LocoNet consist numbers (up to 9999) are also supported — see Section 11.
LCC (OpenLCB)	1 – 127	JMRI must be connected as an LCC node — see Section 4.

With the quad encoder

Each of the four encoder knobs controls one digit of the engine address (thousands, hundreds, tens, ones). Turn a knob to change its digit; the current 4-digit number is shown large on the right screen.

If JMRI's roster has an entry for the address you're dialing in, its Road Name and Model appear next to the digits — Road Name on top, Model underneath — a moment after you stop turning the knobs. This also appears when paging through Recent Engines (Section 9). It comes from JMRI's roster, refreshed automatically in the background every 60 seconds, and only shows for a roster entry whose **DCC Address** field is actually set to that number — in JMRI, an entry's name/ID (e.g. "1234") is a separate field from its DCC Address, so an entry named after an address but never given that address in the DCC Address field will not be found. If nothing appears, either the address isn't in your roster, or that field wasn't set.

Press	Action
Knob 1 (leftmost)	Add the dialed engine to the consist, in the direction set by DIR.
Knob 2	Remove the dialed engine from the consist.
Knob 3	Clear the whole consist. While browsing a saved/recent engine (see below), removes that item instead.
Knob 4 (rightmost)	Toggle Engine Entry mode on/off.

With Engine Entry mode on, pressing PAGE cycles through saved consists and recently-used engines for quick recall; pressing Knob 1 while browsing loads the highlighted saved consist instead of adding a single engine.

Direction, lead, and rear roles

Press DIR before adding an engine to set whether it runs forward or reverse. The first engine added to an empty consist becomes the Lead unit. The second engine added becomes the Rear unit and automatically runs mirrored (a unit added "reverse" as the rear coupler runs physically backward relative to the lead, so the whole consist still moves the same direction together). Any additional engines become Mid units.

Note: If you add an engine that's already elsewhere in a different consist, the panel automatically jumps you to that consist instead of creating a duplicate.

6. The Left and Right Displays

Left screen

- Current consist address.
- Lead engine number and its direction.
- The lead engine's Road Name and Model from the JMRI roster, when available (see Section 5) — left blank if that address isn't in the roster.
- The panel's web address (<http://<ip address>/>) once connected to WiFi, or "JMRI: scanning..." while searching.
- Firmware version and the detected command station type.

Right screen

- Engine count for the current consist.
- A scrollable list of engines in Lead → Mid → Rear order, with role and direction shown for each.
- Page indicator (Page X/Y) when the consist has more engines than fit on one screen.
- "Free=N" in the top-right corner (Digitrax systems only) — the real number of LocoNet consist slots still available, read live from JMRI. See Section 10.
- "LINK NOT CONFIRMED" or "SLOT FULL?" warnings on Digitrax systems if the panel could not verify that a change actually reached the command station (see Section 11).

7. Using the Web Interface

The panel also hosts its own web page on your network, useful for controlling it from a phone, tablet, or computer without walking up to the panel. The address is shown on the left OLED once connected (for example, <http://192.168.1.42/>).

The web page offers everything the front panel does:

- PREV / NEXT to change the consist address, and CLEAR CONSIST.
- A live list of engines currently in the consist — tap any engine to load its address and direction into the entry field. Each engine's Road Name and Model appear next to its number when its address has a matching JMRI roster entry (see Section 5); the same information also appears next to each engine in your saved consists, further down the page.
- An address entry box with FWD/REV toggle and ADD / REMOVE buttons.
- A row of recently-used engines you can tap to recall.
- A Saved Consists section for loading or clearing presets (see Section 8).
- A Digitrax Slots section — this only appears when JMRI is actually connected to a Digitrax system; it is hidden entirely on EasyDCC, NCE, Lenz, or LCC layouts.

The page auto-refreshes roughly every 1.5 seconds, so it will reflect changes made from the front panel (or from JMRI itself) without needing to reload.

8. Saved Consists (Presets)

The panel can remember up to 6 snapshots of a consist per address, so you can quickly recall a favorite lineup later without re-dialing every engine.

How consists get saved

- Automatically, any time a consist has gone unchanged for about one minute.
- Automatically, any time you press CLEAR on a non-empty consist (a snapshot is taken right before it's cleared).

Saves rotate through 6 slots per address — the oldest slot is reused once all 6 are filled, so recent snapshots are never lost to older ones.

Recalling a saved consist

- Front panel: turn on Engine Entry mode, press PAGE to browse, press Knob 1 to load the highlighted preset.
- Web page: open the Saved Consists card for the current address and tap Load on the slot you want.

Loading a preset first clears whatever is currently in that consist, then re-adds each saved engine in order.

Caution: If a saved consist stops loading correctly, or the web page stops showing any Saved Consists at all, the panel's onboard flash storage may need a factory reset (Section 12) to fix it — this is a known limitation of the onboard storage after a long history of heavy use, not something you did wrong. A factory reset clears every saved preset along with WiFi credentials, so only saved lineups you're prepared to rebuild.

9. Recent Engines

The panel keeps a short list (up to 6) of the most recently added engines, across any consist, for fast re-entry. This list appears alongside saved consists when browsing/recalling on the front panel, and as a row of tappable chips on the web page.

10. Digitrax Slot Tracking

This section only applies when JMRI is connected to a Digitrax system. On EasyDCC, NCE, Lenz, or LCC layouts, none of this applies and the related web page section is hidden automatically.

Digitrax command stations have a limited number of LocoNet consist slots, which varies by model. The panel tracks an estimated slot usage count so you have a sense of how close you are to the limit.

Automatic detection

When the panel connects, it reads JMRI's connection description and, if it recognizes the command station model, sets the correct slot count automatically:

Model	Slots	Notes
DCS52	21	
DCS100 / DCS200	22	Can be switched to 120 via OpSw44 on the command station — the panel cannot see this switch, so override manually if yours is set that way.
DCS210	100	
DCS240 / DCS240+	400	400 total requires Expanded Slots enabled (OpSw 40) and a DT402R2 or newer throttle; otherwise 120. JMRI reports this command station as “DCS240Plus” — the panel still detects it correctly. Some JMRI versions have limited reliability accessing slots above 120, so

		if adds fail near the higher end, use the manual override below.
DB150	22	Unlike DCS100/DCS200, this model has not been checked for an equivalent switchable higher-slot mode — if yours behaves differently than 22, use the manual override below.

Manual override

On the web page's Digitrax Slots card, you can type in a slot count and tap Set Max Slots. This takes over from automatic detection permanently (until you clear it by re-flashing or resetting preferences) — useful if your model isn't recognized, or if you've enabled a higher-slot mode via a command station option switch.

Link verification and slot-full warnings

Because Digitrax's LocoNet consist changes happen asynchronously, the panel double-checks every add/remove/clear against JMRI's live state before considering it successful. If a change can't be confirmed after a couple of retries, the right-hand screen shows LINK NOT CONFIRMED. It only escalates to SLOT FULL? if the panel's own real-time slot count (see "Free=N" above) also shows no slots available — so this warning reflects genuine slot exhaustion, not just a slow or unconfirmed response. If you see it, try clearing an idle consist elsewhere and adding the engine again.

11. System Differences (EasyDCC / NCE / Digitrax / Lenz / LCC)

System	Behavior specific to this system
EasyDCC	Consist addresses limited to 1–99. On first connecting after power-up, the panel starts on consist 99.
Lenz (XPressNet)	Uses Advanced Consist addressing (like EasyDCC/NCE) rather than XPressNet's native 2-engine "Double Header" mode, so there's no engine-count limit. No LocoNet-style slot table applies (that's Digitrax-only).
NCE	Adding a 3rd+ engine uses a "reduce to lead, then rebuild" sequence internally to keep the rear-unit slot assignment correct — this is automatic and may take a couple of seconds for large consists.
Digitrax	Uses the extra link-verification, slot tracking, and idle-slot sweeping described in Sections 5 and 10. Clearing a consist removes engines one at a time rather than all at once.
LCC (OpenLCB)	Requires JMRI to be connected to the layout as an LCC (OpenLCB) node — this mode will not work over a DCC connection. Consist membership is tracked via JMRI Memory variables rather than JMRI's DCC consist manager. The panel directly commands each engine's throttle (speed, direction, functions) to keep followers in sync with the lead unit.

12. Resetting WiFi

To connect the panel to a different WiFi network, or if it's lost its saved credentials:

At power-up

1. Hold the BOOT button on the panel's circuit board while powering it on.

2. Keep holding for 5 seconds — the left screen shows a countdown progress bar.
3. Once the bar completes, the saved WiFi credentials are cleared and the panel restarts directly into setup mode (Section 3).

While running

1. Press and hold the PAGE button. The right screen shows a countdown that tells you which action you're about to trigger.
2. **Release between 5 and 10 seconds** for a **full factory reset** — this clears WiFi credentials, the saved JMRI connection, every saved preset, and all onboard consist backups. Use this if saved consists stop working correctly (see the caution in Section 8).
3. Keep holding to **10 seconds** instead for a narrower **WiFi-only reset** — clears just the saved WiFi credentials, leaving presets and backups intact.
4. Release before 5 seconds at any point to cancel without changing anything.

13. Troubleshooting

"JMRI Unreachable" won't go away

- Confirm JMRI is running and its JSON/WebSocket server is enabled (port 12080).
- Confirm the panel and the computer running JMRI are on the same network/subnet.
- Power-cycle the panel to force a fresh subnet scan.

A consist reappeared after I deleted it in JMRI

- This is expected behavior — see the caution in Section 4. Clear the consist from the panel (or the web page) as well so its own backup no longer remembers it.

"LINK NOT CONFIRMED" or "SLOT FULL?" (Digitrax)

- See Section 10. Try the action again; if it persists, check the command station's slot usage directly and clear any idle consists.

Front panel shows digits but nothing happens when I press a knob

- Confirm the panel shows a connected status (not "JMRI Unreachable") — engine changes are disabled while JMRI is unreachable or while a sync is in progress.

LCC mode isn't working / consist changes don't take effect

- Confirm JMRI itself is connected to the layout as an LCC (OpenLCB) node. If JMRI is connected via a DCC connection instead, LCC mode will not function — see Section 4.

Can't reach the web page

- Confirm you're on the same WiFi network as the panel.
- Check the address shown on the left OLED — it changes if the panel gets a new IP address from your router.

14. Quick Reference

Action	How
Change consist address	NEXT / PREV buttons
Set direction for next add	DIR button, before adding
Add engine	Dial address, press Knob 1
Remove engine	Dial address, press Knob 2
Clear consist	Press Knob 3

Browse saved consists / recent engines	PAGE, with Engine Entry mode on
LCC mode requirement	JMRI must be connected as an LCC (OpenLCB) node
Reset WiFi at power-up	Hold BOOT for 5s while powering on
Reset WiFi while running	Hold PAGE continuously for 10s
Factory reset (WiFi, presets, backups)	Hold PAGE, release between 5–10s
Open web control page	Browse to the address shown on the left OLED

End of manual.