

VERSE Manual

Firmware v1.4 · rehmlights.com/support.html

DMX Analyzer by REHMLIGHTS Firmware v1.4 · Hardware Rev 4

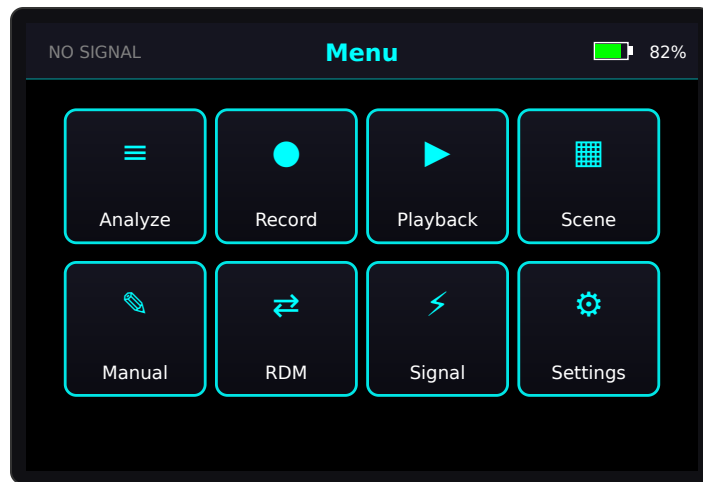
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1. The instrument

VERSE is a handheld DMX512 analyzer and RDM controller. It reads a line, drives one, measures the electrical health of one, and configures the fixtures on it.

It is self-contained: color touchscreen, internal battery, SD card. No phone, no pairing, no second device to keep charged.



Main menu

The status bar is constant. Left is the back button and the signal state; the center names the screen; the right shows battery.

2. Power

ACTION	RESULT
Hold power button	Turn on
Short press	Screen off, or wake — the unit keeps running
Long press (2 s)	Power-off dialog

Power-off is a true hardware disconnect - the battery is physically dropped off the system rail, so a unit left switched off will still have charge in it weeks later. Wake by holding the button, or by plugging in USB.

Plugging in USB while off shows a charging screen, then returns to off — the same behavior as a phone. Press the button during that screen to boot instead.

Charging is over USB-C. Use only 18650 cells.

Charging while switched off

Switch off with the charger connected and VERSE shows the charging display and then blanks, the way a phone does. It stays that way until the charger is removed, at which point it switches off properly. Pressing the button while it waits brings it back.

It cannot switch fully off while a charger is attached - the charger holds the system rail up whatever the battery does - so it holds instead of trying.

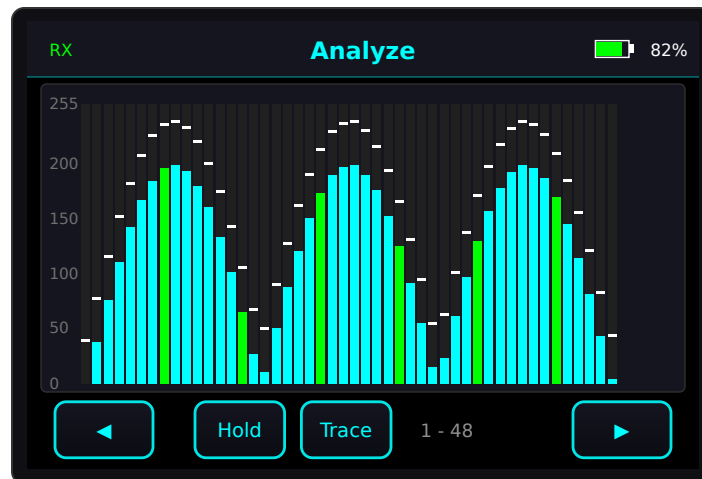
3. Connecting to a line

Both XLR connectors are wired to the same transceiver, making the second a **passive thru**. VERSE can therefore sit inline in a live chain without interrupting it — plug it between console and rig and the show continues while you watch.

Termination is a jumper (J3) on the board inside the case, so changing it means opening the unit - four screws. It ships un-terminated, which is correct for the usual case of VERSE sitting inline in a chain.

Fit it only when VERSE is the last device on the run. Terminating mid-chain loads the line and causes exactly the marginal faults you would then go looking for.

4. Analyze



Analyze

48 channels a page, eleven pages covering the full universe. Bar height is level; color runs cyan to magenta as the value climbs. The scale down the left is in 8-bit values.

Use the arrows to page. The status bar shows RX when frames are arriving.

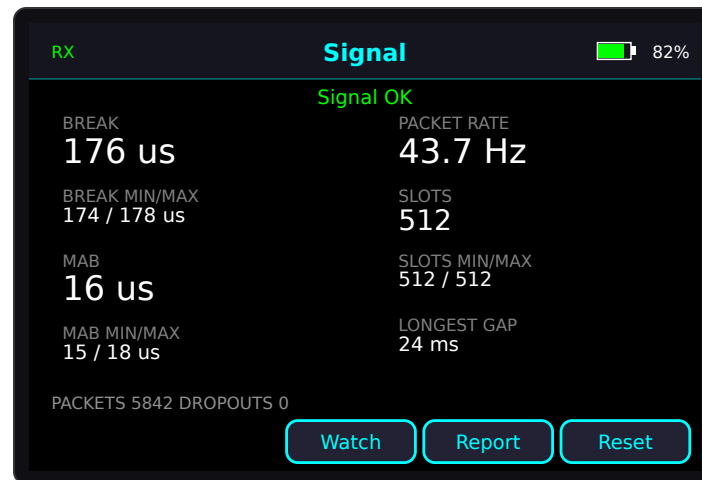
Hold marks the highest value each channel has reached with a thin line above the bar. A channel that spikes for one frame leaves a mark you can find afterwards, which is the point - the spike itself is long gone by the time you notice the light flicker. Turning Hold off clears the marks.

Trace colors any channel that has changed in the last few seconds white, whatever its level. Useful for finding which channel a console is actually driving, or for spotting a channel that moves when nothing should be moving.

Both track the whole universe, not only the page on screen, so paging away and back does not lose what was caught while you were looking elsewhere.

5. Signal

Analyze tells you what is on the line. Signal tells you whether the line is *well*.



Signal

READING	MEANING	TYPICAL
Break	Low period marking the start of a packet	88–176 μ s
MAB	Mark after break, before the start code	12–16 μ s
Packet rate	Frames per second	up to ~44 Hz
Slots	Channels in the last packet	often 512
Longest gap	Worst interval between packets	~25 ms at 40 Hz
Dropouts	Times the signal vanished after being present	0

Min/max hold is the useful part. A break that wanders, a slot count that changes, or a longest gap far above the frame period all point at a problem that an instantaneous reading would miss. **Reset** clears the holds.

Break and MAB are measured by a PIO state machine watching the receive pin alongside the UART, at 0.5 μ s resolution. It only observes — enabling it cannot disturb reception.

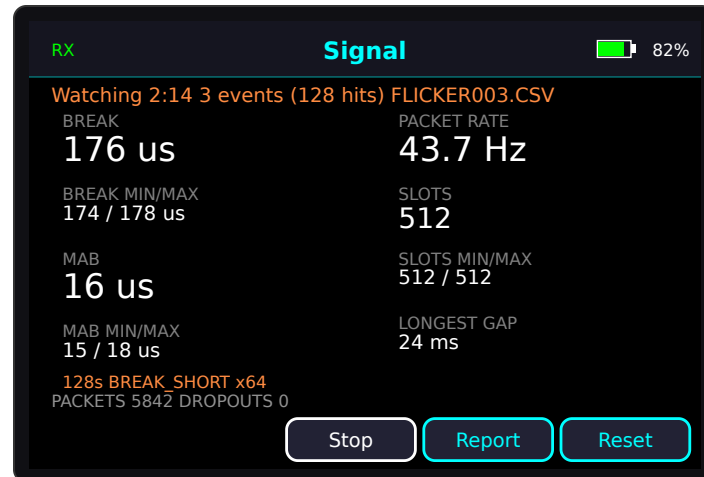
Watching a line unattended

An SD card is required to keep a log. Without one the watch still runs and still shows findings on screen, but nothing is written down - which defeats leaving it somewhere and coming back.

Live readings only help while somebody is looking at them. Intermittent faults are hard precisely because the line behaves whenever anyone checks.

Press **Watch** on the Signal screen. The button turns green, the status line shows how long it has been running and how many events it has caught, and VERSE records anything that departs from normal, timestamped from the moment watching began. Press it again to stop, which closes the log.

Leave it running. Nothing else needs pressing, and the unit can sit inline on the rig for hours on battery.



Watching a line

It learns what the line looks like when healthy over the first few seconds and judges later readings against that, so a console that runs at 39 Hz with 300 slots is not reported as faulty for being itself.

RECORDED AS	MEANING
SIGNAL_LOST / SIGNAL_BACK	The line stopped and started
LONG_GAP	A gap well beyond the normal frame interval - a dropped packet
BREAK_SHORT / BREAK_LONG	Break outside the standard's limits
MAB_SHORT	Mark after break too short
SLOTS_CHANGED	The universe changed size, usually a source change
RATE_CHANGED	Sustained shift in packet rate

The two most recent appear on screen in amber, on the right. With an SD card fitted the full list is written to FLICKER###.CSV — elapsed time, event, the value measured and what it was judged against — flushed after every batch, so pulling the power costs you nothing but the last moment.

Reading a log back, a real disconnection looks like this:

```
78200,SLOTS_CHANGED,78,512
79600,SIGNAL_LOST,0,0
83600,SIGNAL_BACK,3590,0
84600,RATE_CHANGED,39999,3590
```

The first column is milliseconds since the watch started. Read in order: the universe shrank to 78 slots mid-frame as the connector lost contact, the line went dead a second later, came back four seconds after that, and the packet rate settled once it had. The partial frame is the useful part - it caught the connector failing before anything else noticed.

A line that is merely marginal rather than broken shows up as repeated `BREAK_SHORT` or `LONG_GAP` entries without any `SIGNAL_LOST` between them. That is the pattern worth chasing when a rig flickers but never quite drops.

The report

Report on the Signal screen turns a watch into an answer: how long it ran, how much of that time the signal was up, what was seen, and what it most likely means - with what to check, most likely first.

The verdict says what to look at rather than what is broken, and the figures behind it stay on screen, because the evidence supports "suspect the console" far better than it supports "the console is faulty". The log on the card remains the record to show someone else.

Every verdict it can give:

VERDICT	MEANS
Line healthy	Nothing recorded. Timing, rate and universe size steady and in spec throughout
No signal seen	Nothing arrived at all. Not a healthy line - a line with no DMX on it, or one VERSE could not read
Signal dropped / Signal keeps dropping	The line went dead. Connectors first, then the cable, then termination
Source timing is bad	Over 5% of packets mis-timed. Fixtures miss packets they cannot see the start of
Timing out of spec	Occasional mis-timed packets. Tolerant fixtures will not care; fussy ones may stutter
Two sources on this line	The universe size kept changing. Two things transmitting on one pair
Packets arriving late	Gaps longer than expected, but the signal never stopped. The source pausing, not a broken connection
The source changed	Size or rate changed once. Something was reconfigured

The two that matter most are the two extremes. **Line healthy** is only given when nothing at all was recorded - a watch on a dead line reports *No signal seen*, not health, because being told a line is fine when nothing has ever come down it is the worst answer a diagnostic tool can give.

Files on the card

Settings has **Files**: everything the card holds, with sizes and free space, and a Delete that asks first. Recordings can also be managed from Playback, but the flicker logs could not be seen at all from the unit before - the only way to know what was on the card was to take it out.

How many events is normal

None. A healthy line logs nothing at all, however long it is watched.

Any steady trickle of events means something real. A handful of `BREAK_SHORT` entries in half a minute is a source or a cable worth looking at, not background noise - the break is generated by hardware at the console and should not wander.

VERSE has been checked against a break of known width: driving the line itself with a 176us break, disconnected from any other source, it read 174-178us over 3,788 breaks and logged no events at all. So the figures it reports are the line's, to within a microsecond or two.

Without a card it still watches; only the on-screen list is kept.

Because both XLRs are a passive thru, VERSE can be left inline on a live rig for hours on battery. Come back and read what happened.

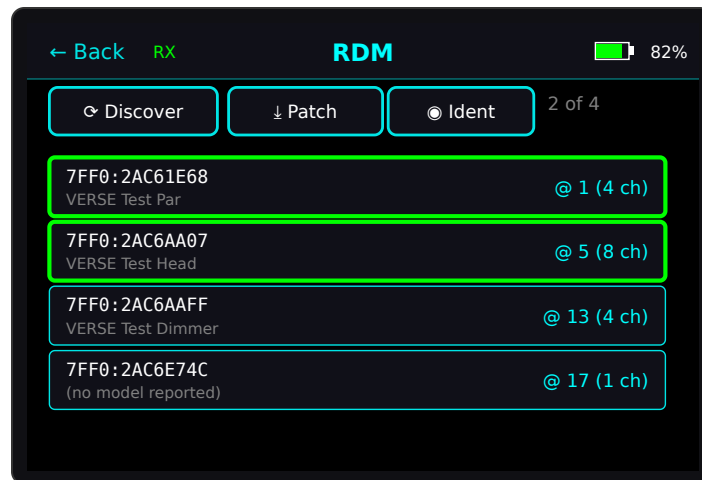
This is the one thing on VERSE that no amount of staring at a console will do for you. Plug it in, press Watch, and go and do something else.

6. RDM

RDM (ANSI E1.20) is two-way. Instead of only sending levels, VERSE can ask fixtures who they are and tell them to change.

Discovery

Press **Discover**.



RDM list

Each row shows the fixture's UID, its model, and its address with footprint. The counters along the bottom are diagnostic — mostly of interest when something is not working.

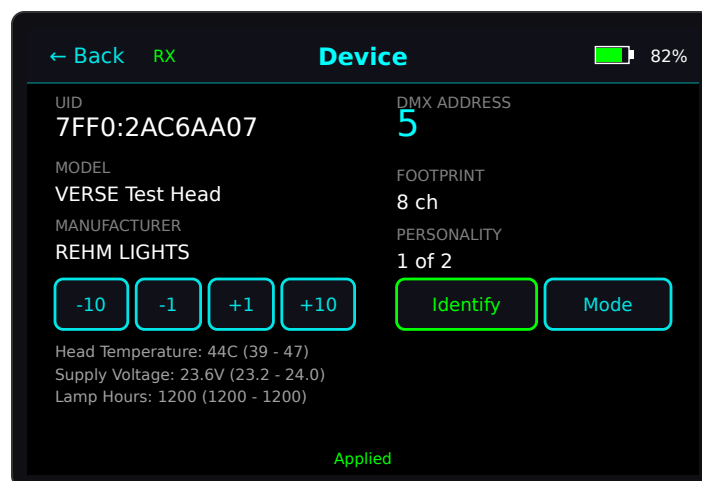
Discovery is a binary search across a 48-bit address space, so it takes a few seconds and the progress bar moves in bursts. Probes are retried before a branch is written off, because a dropped reply and an empty stretch of the address space look identical from this end.

Anything found on a previous sweep that this one misses is then asked for directly, by name. A broadcast probe can collide with other fixtures answering at the same moment; an addressed request cannot, so it succeeds where the search failed. A fixture that has genuinely been unplugged still drops off the list, because it will not answer either.

Discovery needs the line to itself. Unplug the console first. Two transmitters on one pair collide.

A single fixture

Tap a row.



RDM device

CONTROL	DOES
-10 / -1 / +1 / +10	Change the DMX start address
Identify	Fixture announces itself so you can find it physically
Mode	Cycle personality

Changing personality can change the footprint — an 8-channel mode becoming 16 — and the footprint reading updates to match.

Sensors load automatically. Values shown with the fixture's own min/max hold, so a fan that stalled an hour ago still shows its high-water mark.

A refused change reports **"Device refused the change"** rather than failing quietly.

Working on several at once

Long-press a row to mark it — green border. The header shows how many are marked. **Patch** and **Ident** then act on the marked fixtures only, or on everything when nothing is marked.

Autopatch

Patch assigns consecutive addresses from 1, spacing each fixture by its own footprint so no two overlap.

It asks first, and says how many fixtures it is about to change. Re-addressing a standing rig is destructive - the previous addresses are gone unless somebody wrote them down - and one stray tap should not be able to do it.

With footprints of 3, 8, 4 and 1, the result is 1, 4, 12 and 16.

If a fixture does not report a footprint it is skipped rather than guessed at. If a write is not acknowledged its block is still reserved, since a lost acknowledgement does not mean the fixture ignored the instruction — and a gap is harmless next to an overlap.

Selection is cleared by a new sweep, because the list order changes.

What to expect from real fixtures

Not every fixture implements every parameter. Model and manufacturer names are optional and frequently absent — a blank name is normal, not a fault. VERSE shows what a fixture reports and leaves the rest empty rather than inventing it.

7. Record and playback

An SD card is required. Both recording and playback read and write the card directly; without one, Record reports no card and Playback has nothing to list.

Record captures the incoming universe. **Playback** replays a capture back onto the line.

Useful for a fault that happens once, for carrying a console's output back to the bench, or for driving a rig without hauling a desk to it.

The files

Recordings are saved as REC_001.DMX , REC_002.DMX and so on, at the root of the card. Each file holds a short header - channel count, frame count and the frame rate the recording was actually captured at - followed by the frames themselves.

Playback uses the stored rate, so a capture plays back at the speed it was recorded, not at some nominal one.

The files are ordinary files. Move a card between units, or copy a recording from one card to another, and it plays on any VERSE.

Playback options

CONTROL	DOES
Play	Starts the selected recording
Loop	Repeats instead of stopping at the end
All	Plays every recording in turn rather than just the selected one
Loop + All	Plays all of them, then starts again

Playback drives the line - VERSE becomes the source while it runs, so nothing else should be transmitting. Stop playback before plugging back into a console.

Delete a recording by long-pressing its row in the list.

8. Scenes and manual control

Tap a scene button to select it, Capture to store the current look in it, and TX Enable to output it. **Hold a scene button to clear it.** The screen says so, since a long press is not something anyone guesses at.

Manual drives channels directly — set a level, see the fixture respond.

Scene stores fixed looks and recalls them. Scenes survive a power cycle.

Both transmit, so they need the line to themselves.

9. Settings

SETTING	NOTES
Brightness	Backlight level
Theme	Color scheme. VERSE, Gold, Heat Wave, Galaxy, Night Vision, DMX Green, Rose, Ice Blue - eight distinct hues
Screen timeout	Blank after inactivity; the unit keeps running. Never, 1, 5, 10, 30 min or 1 hour - 30 minutes by default
Diagnostics	Engineering readouts on the RDM and Signal screens. Off by default
DIP Calc	Opens the calculator

The firmware version sits at the bottom of the screen.

Restarting, and updating firmware

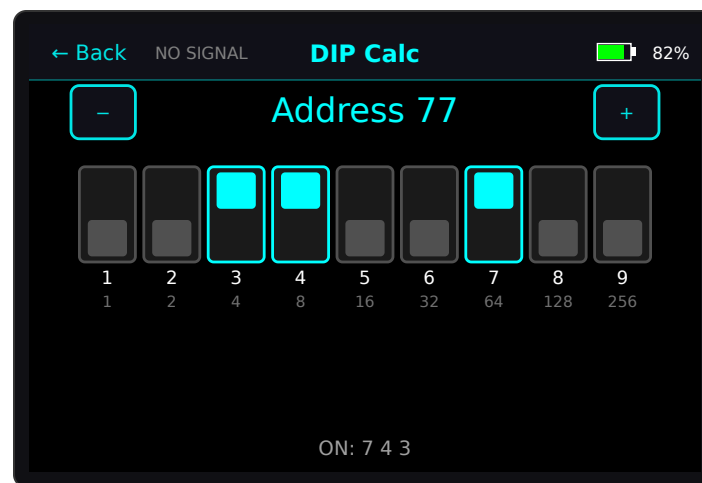
Settings has **Restart** and **Firmware**. Restart reboots the unit; recordings, scenes and settings are all kept. Firmware restarts it as a USB drive to copy a new `.uf2` onto - nothing is erased by entering it, and powering off and on again returns to normal if it was opened by mistake.

Both exist so that neither needs the board's own button, which is behind four screws.

In firmware update mode the firmware is not running, so the screen stays dark and the power button does nothing. There are two ways back: copy a `.uf2` onto the drive, or **unplug USB and hold the power button for about 10 seconds**, which makes the charger cut and restore power regardless of what the processor is doing. Nothing is lost either way.

The USB lead has to come out first. With it in, the charger holds the system rail up and the reset cannot take effect - the same reason powering off waits for the lead to be removed.

10. DIP calculator



DIP calculator

Older fixtures are addressed with a bank of switches. Switches 1 through 9 carry binary weights 1 to 256, and the address is their sum plus one.

Works in both directions: tap switches to read off the address, or step the address with +/- and copy the switch positions onto the fixture. The line underneath names the switches to raise.

11. Troubleshooting

No signal

Check the cable first — most faults are cables. Confirm the console is actually outputting. Open Signal: if packets are counting but Analyze looks wrong, the data is arriving and the problem is upstream in patching.

RDM finds nothing

Unplug every other DMX source. Terminate the last device. Confirm the fixtures actually support RDM — many do not, and a fixture without it is invisible here however healthy it is.

Termination

RDM asks fixtures to talk back, so the line carries traffic in both directions and reflections matter far more than they do for plain DMX. An unterminated run that plays back fine can be unreliable for RDM on the same cable.

The terminator belongs at the **far end of the line, after the last fixture** - not on VERSE, unless VERSE is itself the last thing on the run. Terminating at the source end while the far end is open leaves the reflection that causes the trouble.

Intermittent discovery, or a fixture that appears as a bare UID with no model or address, is the usual sign.

"Line busy" during discovery

Something other than an RDM responder is transmitting. Discovery is unreliable while it does, and no fixture is at fault.

The usual culprit is a fixture in master mode. Several makes sync to each other over the DMX pair when they see no signal - and a controller running RDM stops sending DMX to listen, which is exactly the cue for them to start. Disconnect them, or turn that mode off, and search again.

VERSE searches around it rather than giving up, so whatever did answer is still listed.

RDM finds some fixtures but not all

Run Discover again. Discovery is probabilistic against non-compliant fixtures, and a second sweep often completes the list. Consistent absence usually means that fixture does not implement RDM.

Blank model or manufacturer

Normal. Those parameters are optional and often unimplemented.

Flicker with no obvious cause

Open Signal and leave VERSE inline. Watch dropouts and longest gap over minutes. A break or slot count that wanders points at a fixture or splitter misbehaving rather than at the console.

Getting more detail

Settings has a **Diagnostics** switch. With it on, the RDM and Signal screens gain a line of engineering counters - transactions sent, replies received, timeouts, retries, collisions and checksum failures.

They are meant for bench work rather than for patching a rig, which is why they are off by default. Turn them on if a line is behaving strangely and you want to see what VERSE is seeing, or if you are reporting a fault.

A change is refused

The screen says so. Some fixtures reject addresses that would run past the end of the universe, or modes they cannot enter while running.

12. Specifications

Processor	RP2040, dual core
Display	3.5" 480×320 color, capacitive touch
DMX	DMX512-A, 250 kbps, isolated RS-485
Connectors	2 × XLR-3, wired as a passive thru
Termination	120 Ω, jumper selected (J3)
RDM	ANSI E1.20 controller
Timing resolution	0.5 μs, break and MAB
Storage	microSD
Battery	18650, USB-C charging, BQ25895
Standby	~12 μA in ship mode

VERSE Manual, firmware v1.4. REHM LIGHTS, Temecula CA. Support, firmware and documentation at rehmlights.com/support.html