



25-Seven® Voltair™ Software Package v2.3.2– Update Instructions & Release Notes

2 August 2016, Cleveland, Ohio USA

25-Seven’s new firmware update—version 2.3.2 for the Voltair processor (p/n 1490-00160-001)—is part of our continuing program of Voltair enhancements, adding features and enhancements to our flagship product. This document describes the installation process, as well as all changes implemented since the release of Voltair Firmware 2.0.

Installation Instructions

Voltair must be running version 1.5 or later to update to v2.3.2. If you are running an earlier version, contact Telos Support +1-216-622-0247. To install a firmware package on Voltair:

1. Download v.2.3.2. The link can be found on the Voltair product page: telosalliance.com/25-Seven/Voltair
2. Connect to your Voltair’s web interface.
3. Make sure your Voltair is in bypass.
4. Click on the “Utilities” tab at the top of the page.
5. In the “System Software Upgrades” section, click “Copy upgrade package to Voltair.”
6. Click the “Choose File” button and use the file popup window to choose the software update file, and then click “Open” or “OK.”
7. A new “Copy...” button will appear on the page. Click it.
8. Wait for the file to upload and install.
9. Click the “View or switch running Voltair version” link.
10. Click the “Switch” link to the right of the name of the version you are installing.
11. Wait for Voltair to switch to the new version and reboot. You’re done!

25-Seven Voltair v2.3.2 Release Notes

Changes from Firmware 2.2 to Firmware 2.3.2

Firmware Update 2.3.2 for the Voltair processor added two significant new features:

- Encoder Distortion Testing and Display
- Flexible Program Output

These features, in addition to other changes made since the release of Voltair version 2.0 are the critical components of a new “monitor only” version of the Voltair product known as Voltair M.

Encoder Distortion Testing and Display

As part of its calibration process, Voltair has always measured the level of distortion generated by the attached watermarking encoder. Over the years, we have discovered that some encoders, even when not actually adding watermark tones, may distort the audio signal. If this distortion is too high, Voltair will refuse to calibrate to the encoder. Since the calibration data in our system logs tells us about the signal health of individual encoders, we decided to turn our field experience into a diagnostic feature.

Firmware 2.3.2 adds a new “Calibration” section to the external web Information page, which shows the results of this distortion testing:

Calibration	
Date	2016-02-04 14:23:07 EST
Result	success
Channel status (L/R)	good / good
Channel distortion (L/R)	0.002% / 0.002%
ID status	good

This displays the date of the most recent calibration, whether it was successful, a broad test of each channel’s quality (“good,” “marginal,” or “bad”), and a measure of the amount of residual distortion in each channel. Note that the distortion numbers shown are generated as part of the calibration process, but are *not* formal distortion measurements such as THD+N. However, they can be useful for detecting encoders whose audio path may be distorting your station’s feed.

Cases where encoders fail to calibrate or contribute noise to an airchain have been pretty rare, but we have seen enough instances that we wanted to provide our customers with a tool to do their own diagnosis. If your encoder fails to calibrate, it may be generating excessive noise. And given that all electronics age, simply recalibrating every six to 12 months and comparing results with a benchmark may alert you to a potential problem or changing condition.

Flexible Program Output

Voltair is designed to be in the transmission chain, with its Program Output driving the “Output to Transmitter” connectors. For firmware up to and including Version 2.0, Voltair’s Program Output has always been fixed to a single point: standard Voltair-enhanced audio. Version 2.2 introduced the new “Monitor Only” mode, where, if desired, Voltair would output the encoded audio exactly as received from the watermark encoder; customers could use this mode in situations where Voltair’s encoding enhancement was not needed or desired.

Voltair firmware 2.3.2 replaced the “Monitor Only” feature with “Flexible Program Output,” allowing users to choose any of four types of Program Output:

- "Enhanced Audio": PPM®-encoded audio, enhanced by Voltair
- "Encoded Audio": PPM®-encoded audio, straight from the encoder with no enhancement
- "Studio Input": the "Input from Studio" audio stream, with no watermark codes
- "Raw Tones": the PPM® encoding tones added by the encoder, with no source signal

“Enhanced Audio” is the factory default. This is the same enhanced audio output that was the only output in earlier software versions. “Encoded Audio” is the audio exactly as encoded by the watermarking encoder, with none of Voltair’s processing enhancements applied. “Studio Input” copies audio directly from the “Input from Studio” connectors to the “Output to Transmitter” unchanged, without passing through the watermark encoder; with this choice, the Voltair/Encoder system will pass audio like a simple cable, while measuring the potential ‘encodability’ of the audio.

These outputs allow you to easily listen to the difference between unmodified studio audio, encoded audio, and Voltair-enhanced audio, making it easier to make enhancement level and processing choices that balance encoding robustness against perceivable audio artifacts.

The fourth audio output choice, “Raw Tones” should never be used on air. This choice lets you listen to the extracted, “unmasked” watermark tones that the encoder adds to your program audio. Listening to raw tones can be unpleasant, but as a sonic tool, it may be useful in evaluating the effects of processing and different programming types on encoding. Used as an offline testing tool, it can provide you auditory insight into the encoding process, and help you better understand the interplay between audio sources, watermarking, and Voltair enhancement.

Misusing the program output function could leave you without Voltair's enhancement, or even completely without PPM® encoding. As a safety feature, the Program Output is "locked" to the "Enhanced Audio" choice, so that your Voltair will function as expected.

If you wish to change your Program Output, you must first unlock it. To do so, go to the Utilities page on the external web interface and click on the "Switch Voltair Program Output from **locked** to **unlocked**..." link. You will be given a warning about your choice; if you confirm, your Program Output will remain the same but will now be easily settable.

Once unlocked, you can change the Program Output either via the front panel LCD or via the external web interface. Go to the "System" tab on the front panel display, select "Voltair Program Output," and then use the jog knob (on the front panel display) or the up and down arrow keys (on the external web interface) to change the output. You'll immediately hear the changes. Again, **be careful**: you do *not* want to broadcast raw encoding tones.

To lock the Program Output back on "Enhanced Audio," go back to the Utilities tab, click "Switch Voltair Program Output" from **unlocked** to **locked** and then confirm your choice.

Internal Changes

As usual, this update adds a number of internal optimizations and error checks:

- Improved logging
- Underrun detection
- Modifications to support our new Voltair M (Monitor) product
- Licensing and data export improvements

Changes from Firmware 2.0 to Firmware 2.2

Firmware Update 2.2 for the Voltair processor added three significant features:

- Encoding Failure detection and alarm
- Monitor Only mode
- Layer 2 Compatibility

In addition, it included a number of smaller changes:

- The data extraction and control language was extended
- GPIO outputs were regularized
- Various minor tweaks, tuning, and bug fixes.

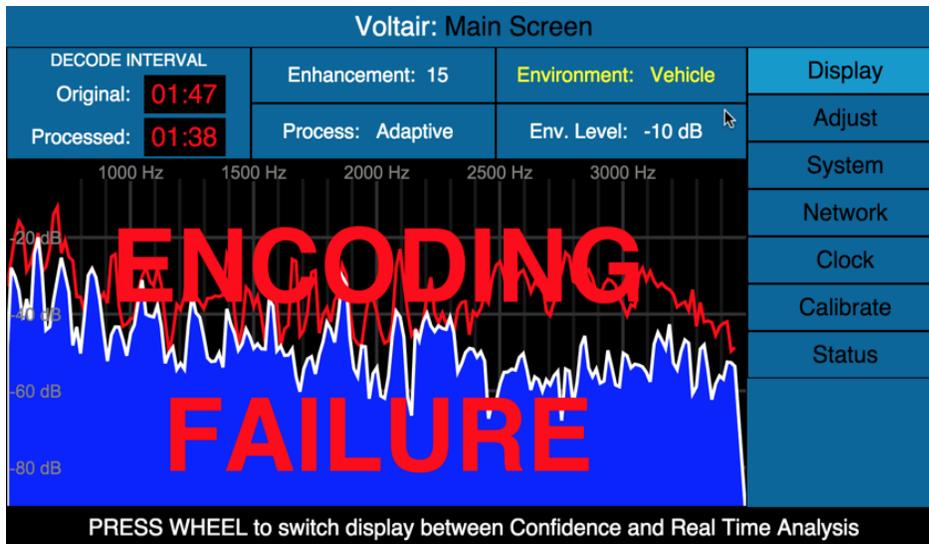
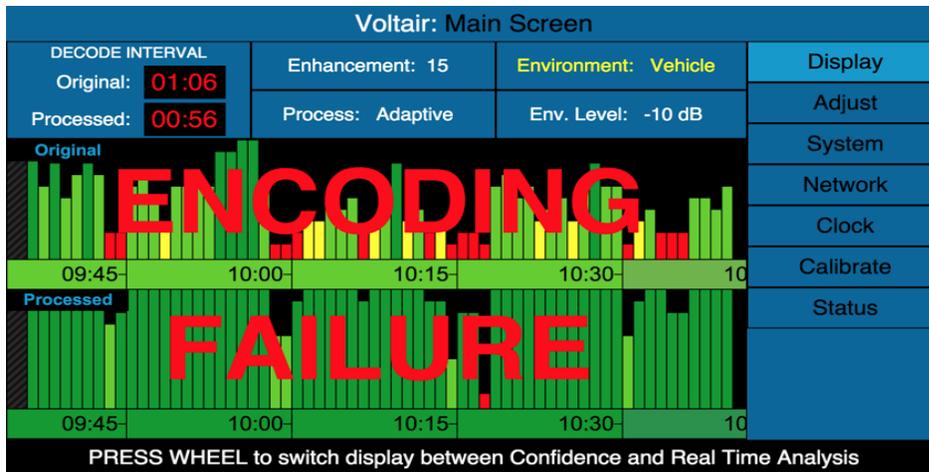


Encoding Failure Alarm

Voltair firmware 2.2 introduced a new Encoding Failure alarm, enhancing its existing monitoring functions. This alarm is triggered when encoding confidence becomes completely absent, and resets once confidence is restored. The alarm is shown on the screen, triggers a GPIO output, and is recorded in the internal history data for data extraction. This feature can provide early detection of a watermark encoder malfunction, or of abnormally low encode energy. A user control lets you adjust the time threshold for failure event detection.

While an Encoding Failure alarm is active, it is reported in a number of ways:

- "ENCODING FAILURE" is shown prominently on the front panel display:



- “ENCODING FAILURE” is shown on the front panel Status page:

Voltair: System Status	
NTP Status: synchronized	Display
Calibration date: Nov 06 09:36PM 2015	Adjust
IP Address / Mask: 192.168.1.14 / 24	System
MAC Address: 08:60:6e:f6:4c:1b	Network
GPIO Inputs: 000000	Clock
Temperature: 100.9°F / 38.3°C	Calibrate
Encoding Status: ** ENCODING FAILURE **	Status
PPM™ Encode Layer: 2	
Version: 2.2b4	
Current system status	

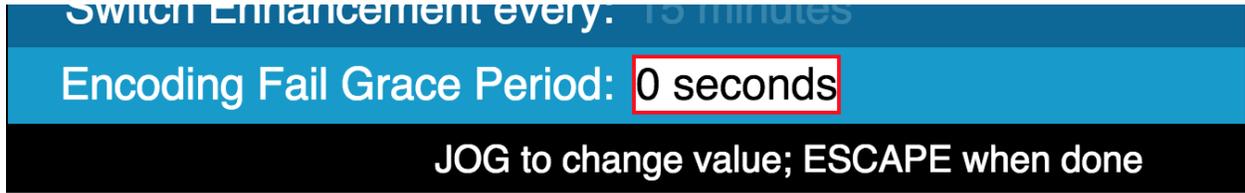
- GPIO output number 8 (on the DB-25 pin 3) is pulled low
- A "not Encoding" message will be available on the data extraction and control port for real-time monitoring over IP
- The information is written to the internal confidence history

After the fact, Encoding Failure alarms can be viewed in either of the downloadable minute-by-minute history spreadsheets, as well as through the replay function of the data extraction and control port.

The Encoding Failure alarm is always triggered if the encoder completely fails or is put into bypass. However, it will also trigger if there is a significant period of completely unencodable audio (e.g. silence or some types of extreme distortion). We have experienced both types of failure in our Encoding Failure testing.



Different formats have different encodability characteristics, so a “Grace Period” control is provided to help avoid triggering spurious encoding failure alarms. The Grace Period setting is available on the front panel System screen:



The factory default value of 0 seconds gives the quickest and most sensitive results, but with some formats or even with small periods of dead air, there may be false alarms. To avoid any false positives, users may want to set the Grace Period to 5, 10, or more seconds. When a Grace Period is set and encoding fails, Voltair will wait for that time value to pass before triggering an alarm. If encoding returns before the Grace Period has completed, then the grace period will be reset and no alarm will be reported.

Monitor Only Mode

NOTE: Voltair Firmware 2.2's Monitor Only mode has been superseded by Firmware 2.3.2's Flexible Program Output.

Layer 2 Compatibility

Nielsen's PPM® encoders can be configured to function in different sets of frequency bands for different markets. In the United States, Nielsen has standardized on what is known as the Layer 1 frequencies. In other countries, Nielsen and its licensees also (and sometimes concurrently) use a different set of frequencies known as Layer 2.

Voltair was initially created for the US market, with the ability to calibrate only to with PPM® encoders configured for Layer 1. In order to provide value to customers worldwide, Voltair firmware 2.2 adds compatibility with Layer 2 encoders. Note that Voltair must be configured to work with the proper layer for the attached encoder. If Voltair is configured for a different layer than the encoder, it will be unable to calibrate, and if running will show zero encoding confidence.





All Voltairs ship configured for Layer 1. To switch your configuration to Layer 2, connect to the external web browser interface and go to the "Utilities" tab. Under the "Maintenance" section you'll see a new link, "Switch encoding from Layer 1 to Layer 2." Click the link, and you'll be brought to a confirmation page to make sure that a) you want to make this change, and b) you are in bypass. If you click the "Switch to Layer 2" button, then Voltair will delete its calibration and reboot into Layer 2 mode, and will stay in that mode, even through power-cycles, until reconfigured. Since calibrations are encoder-specific, and encoders are layer-specific, you must recalibrate whenever you switch encoders.

Voltair functions identically in either Layer 1 or Layer 2 mode. The currently configured Layer is shown on the main display's "Status" screen, and on the external web browser interface's "Information" tab.

Audio Mode	Monitor Only
PPM™ Encode Layer	1
Test Enhancement Switching	Disabled

To switch your configuration back to Layer 1 mode, go to the external web browser interface's "Utilities" page, and click the "Switch encoding from Layer 2 to Layer 1" link. Confirm that Voltair is in bypass and then click the "Switch to Layer 1" button. Voltair will delete its calibration and reboot into Layer 1 mode, and it will once again be configured to work with a Layer 1 encoder.

Data Extraction and Control Extensions

Two new messages have been added to the control language available on port 8259 of Voltair:

- notEncoding=<value>: Indicates whether an Encoding Alarm is active (value equals 1) or not (value equals 0)
- monitorOnly=<value>: Indicates whether Monitor Only mode is active (value equals 1) or not (value equals 0)

GPIO Output Changes

In addition to adding output 8 (pin 3) to indicate a Not Encoding alarm as described above, Voltair firmware 2.2 has made changes in how some of the pins function.

The GPIO outputs include three pins that indicate when the Decode Interval timer has not been reset in a given amount of time. Output 2 (pin 6) indicates when the Decode Interval timer is greater than one minute; output 3 (pin 18) indicates when it is greater than two minutes, and output 4 (pin 5) indicates when it is greater than five minutes.

In Voltair firmware 2.2, these outputs now only activate while Voltair is running (e.g. when not in bypass or calibrating).





Other Changes

To facilitate more flexible importation of Voltair data, there are two new History file output formats: Minute-by-minute CSV (Comma Separated Value), and Detailed CSV.

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