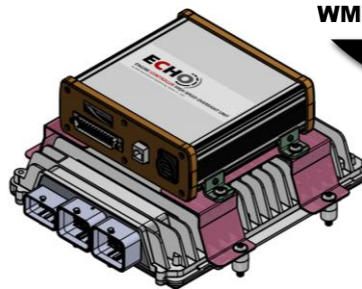




## ENGINE CONTROLLER HIGH SPEED OVERSIGHT UNIT

By WM International Engineering, Darien, IL - USA



**WM INTERNATIONAL  
Engineering**

## ECHO HIGHLIGHTS

### 1 Capabilities

- High-speed sampling at 50kHz or 200kHz
- 8 analog inputs, 4 digital I/O, 1 pair of crank and cam inputs
- 1.5GHz processor
- CAN 2.0 and 1 gigabit ethernet data communication

### 2 Performance

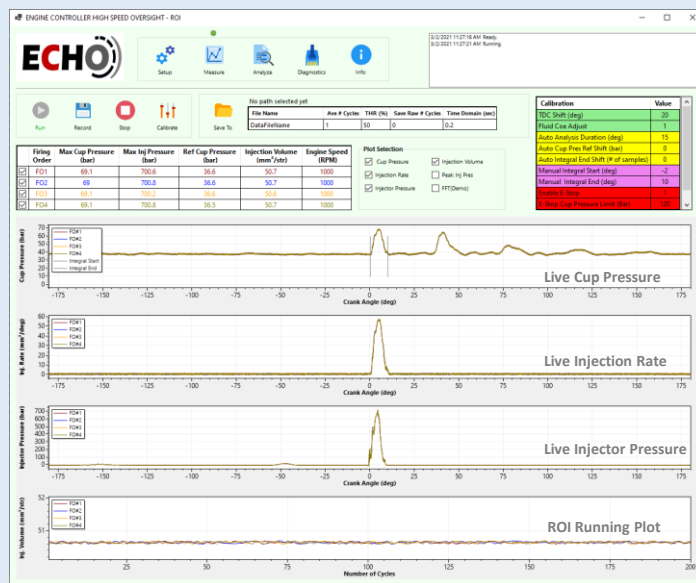
- Sync with plant to **resolve data in crank angle** over 10,000RPM
- Perform **real-time analysis** with customizable algorithm
- Fast CAN 2.0 **close-loop feedback** to critical systems.
- Visualize live data in **license-free software**

### 3 Usage Cases

- Cylinder pressure feedback control
- Engine calibration fine-tuning
- Fuel injection analysis
- Control validation

## ECHO Mar 2021 Release 4 upgrades include:

- ✓ **Improved crank domain data acquisition:** added a new method to work with a single trigger event (e.g., one-tooth crank wheel). This provides easy use and synchronization without crank or cam signals.
- ✓ **Rate of injection algorithm:** ECHO's software has added a new analysis routine to capture injector rate of injection ( $\text{mm}^3/\text{ms}$ ), detect start-and-end of injection, and calculate injection volume at each cycle.



Rate of Injection Application

- ✓ Improved time domain mode operation: optimized buffer to allow faster UI response and added rolling plot mode.
- ✓ General GUI optimization: allow plot selection of individual lines and relocated the record input to measure page for convenience.

## HIGHLIGHT STORY

DeltaHawk Engines is an aviation powertrain company based in Racine, WI, and uses **ECHO** to assist its latest development and certification program. The company is on its track to produce an FAA-certified engine that runs on jet-A fuel and operates on aircrafts such as the Cirrus SR20.

The engineers at DeltaHawk use **ECHO** to optimize their fuel pump calibration process. **ECHO** calculates shot-to-shot injection volume in real-time. Engineers see the variations for each cylinder via GUI and verify the pump's plunger-to-plunger flows. The data is broadcasted to the local controller area network (CAN) DAQ system instrumented to streamline the data collection process.



DeltaHawk's DH180A4 engine featured in EAA AirVenture Oshkosh