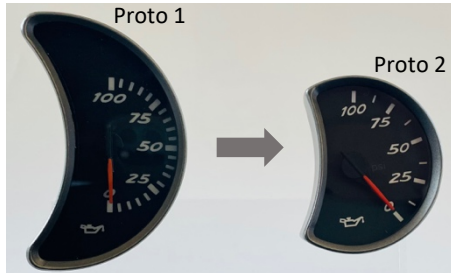


Roadmap Product – Proto 2 Update

Porsche 987.1 Oil Pressure Gauge



Update Oil Gauge: 20% Smaller



Improved Readability



Color Match Improvement



Accurate, Smooth and Robust

<https://youtu.be/ztfi7EWcMK4>

Development Status and Field Trial Outcome

We are happy with the results of the first field trial that spanned 4 weeks. The field trial units included the custom stepper motor and low-power microcontroller with great results: 1. Smaller gauge dimension due to the new stepper motor 2. Low current draw with the new microcontroller. 3. Accuracy. The following table contains the high-level descriptions of the field trials test cases and results.

TESTS	DESCRIPTION	TEST RESULTS
INTEGRATION TEST	Install oil pressure gauge into a 987.1 to integrate with 12V power, headlight sensing and oil pressure sensor installed on M97 engine. This include wire assemblies and new fuse clip & fuse installed in the OEM fuse box. <ul style="list-style-type: none"> • Test for pressure accuracy • Test for proper operation and power-on/power-off cycles • Inject faults and gauge resiliency to faults • Susceptibility test for EMI and voltage & current fluctuations • Test duration: 4 weeks 	1. Continuous, accurate operation during daily drives. Flawless power-up and no-faults during daily drives. 2. Design changes: <ul style="list-style-type: none"> a. Increased decoupling capacitor size to ensure gauge can handle voltage fluctuations from the vehicle 12V system. b. Updated software to increase the LED backlight intensity to match the intensity of OEM gauge backlight.
ENDURANCE TEST	Long-running test with continuous operation for 7 days in the test lab environment - absolutely no resets or power cycles. Monitor internal test points and signals: voltage regulators, oil pressure sensor output, PWM signals to control stepper motor.	1. Proper analog values within operational range 2. Proper digital signals for stepper motor control 3. Voltage, current and power consumption values are within specifications 4. All ICs operated well within operational temperatures as specified in respective datasheets

Field Trial Test and Results

Next Steps

With a sound design, faultless operation and great uptime at this phase of development, we will focus on the final plastics to follow the design language of the OEM gauge cluster, visual integration of the mounting plastics and optimized installation location. Below is the industrial design rendering for the final gauge and mounting plastics. We will update the 3D model, print (3D printer) fit check units and injection mold the production plastics by the end of November.



Design Language, Integration and Mounting Location

DEVELOPMENT	ACTIONS
OPTIMIZE INTEGRATION AND INSTALLATION	<ol style="list-style-type: none"> 1. Industrial Design: Visual alignment of OEM bezel with aftermarket gauge bezel. 2. Optimize the aftermarket gauge placement for quick glance through the steering wheel.
EASE OF INSTALLATION	<ol style="list-style-type: none"> 1. Elegant mounting bracket design 2. Ease of installation 3. No-cut installation 4. Wire assembly kits, fuse clips & fuse
FIELD TRIALS 2 AND TRACK DAYS	<ol style="list-style-type: none"> 1. Additional daily drives – data collection sessions 2. Track days: Chuckwalla and Buttonwillow
ENVIRONMENTAL TESTS	<ol style="list-style-type: none"> 1. Temperature range test 2. Vibration test 3. Drop test 4. ESD test 5. Touch temperature test
RAMP-UP PRODUCTION	<ol style="list-style-type: none"> 1. First article plastics for inspection and approval for production 2. First-pass PCBA for qualification 3. Final color-matched paint

On-track to Availability Dates

Target availability of the oil pressure gauge is January 2025. For the remainder of 2024, we will perform stress, accelerated-life, environmental and field trial tests in real-world conditions to ensure gauge accuracy and robustness.

Focus Group Participation

If you are interested in participating in the focus group, please send us an email at support@pinnacleanalog.com.

- Receive development updates
- Influence the final design by participate in Zoom feature review, technical updates and feedback meetings
- Receive pre-launch updates