ESP32 Oil Node - Technician Checklist

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1) Visual & Wiring Checks
- Confirm common ground between ESP32, TFT, sensors, and relay.
- TFT VCC !' 3.3V, TFT GND !' GND, MOSI=GPIO23, SCK=GPIO18, CS=GPIO5, DC=GPIO2, RST=GPIO4.
- Flow sensor VCC !' 5V, Signal !' GPIO27, GND !' GND.
- Pump relay IN !' GPIO26, Relay VCC !' 5V, Pump !' 12V (fused).
- Ultrasonic TRIG/ECHO default GPIO18/19 (consider moving to 22/21 if conflict).

2) Touchscreen & Display
- Confirm touchscreen wiring: CS !' GPIO21 (or configured pin), GND, VCC.
- Power on device; verify TFT shows the home screen and status.
- On Admin page: Press "Calibrate Touch" (or long-press D) and follow prompts.
- Tap all calibration targets; verify captured raw values and saved message.

3) Buzzer & Feedback (optional)
- If buzzer present, set BUZZER_PIN in firmware and enable TOUCH_FEEDBACK_BEEP.
- Verify beep on touch and on calibration steps.

4) Flow Sensor Calibration
- From IDLE, press A to enter calibration mode.
- Press D to toggle pump and dispense a known volume (e.g., 1 L).
- Enter actual volume and press # to save pulses-per-liter.
- Verify reported pulses/liter is within expected range (400-500 for AICHI OF05ZAT).

5) Functional Test
- Log in as operator (if required) and request a small dispense (1 L).
- Verify pump starts and stops at requested volume and receipt is displayed.
- Check cloud event (if online) for DISPENSE_DONE and PUMP_ON/ PUMP_OFF events.

Notes: Ensure fuses and flyback diodes are in place for the pump; test in safe controlled environment.