# *California Type Evaluation Program*
## *Certificate of Approval*
## *Weighing and Measuring Devices*

**For:**
Taximeter
Single-Rate
Digital Electronic
Model: Flywheel TaxiOS™

**Submitted By:**
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**Standard Features and Options**

- Single Rate, Software-Based Taximeter, Computes Fare Based on Time or Distance
- Taximeter Consists of a Secure Android Smartphone and a Receipt Printer Connected via Bluetooth
- Capacity of Displays: Fare 5 Digits, Extras 4 Digits
- Tolls and Surcharges Can be Added Both Manually or Automatically
- Ability to Place the Taximeter in TIME OFF Mode
- Displays:
    - Measured (M) Miles (Total Distance Traveled)
    - Fare Miles (Total Distance Less the Distance Traveled Below A Specified Speed, e.g., 12 mph)
    - Wait Time on the Display
- Color Coded Indicators Show Connectivity to On-Board Diagnostics (O), GPS (G), Mobile Network (C) and Printer (P)
- Customer Can Choose-Printed Paper or Email Receipts
- Meter Display and Summing of Fare, Extra (Surcharges) and Tolls
- Calibration Parameters Stored in the Secure Non-Volatile Memory of the Smartphone, Only Accessible by Service Agents
- Event Logger Method of Sealing Calibration Adjustments
- Printer Connected via Secure Bluetooth Pairing
- Software Version: 3.8.44 or Higher

**Options:**
- Credit/Debit Card Reader

This device was evaluated under the California Type Evaluation Program (CTEP) and was found to comply with the applicable requirements of California Code of Regulations for "Weighing and Measuring Devices." Evaluation results and device characteristics necessary for inspection and use in commerce are on the following pages.

Kristin J. Macey, Director
Effective Date: February 22, 2016

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Taximeter, Single-Rate, Digital Electronic / Flywheel TaxiOS™

**Application:** The Flywheel TaxiOS™ taximeter consists of a secure Android smartphone and receipt printer that connects to the smartphone via Bluetooth. The taximeter calculates and displays the fare (price to pay) at a predetermined rate, the charge for hire of a vehicle on the basis of time or distance.

**Identification:** The "About" section in the TaxiOS™ taximeter software displays the manufacturer name, model name, software version, and International Mobile Station Equipment Identity (IMEI) of the phone. The "About" section also displays a unique version code (a cryptographically generated value of the software version number) for weights and measures officials. Lack of the unique version code would indicate that the software was altered by someone other than the manufacturer. The combination of the weights and measures official's unique login ID and unique version code proves the authenticity of the software.

**Sealing:** The taximeter requires an On-Board Diagnostics (OBD) reader to operate. Upon installation, a Service Agent seals the OBD reader which is documented in the event logger. The taximeter software runs on a secure Android smartphone and does not require a separate physical seal for ports.

The calibration of the taximeter for a standard mile is only accessible to Service Agents and saved in a secure private memory space of the device. An event logger is used to document calibration adjustments and OBD replacement (see picture of Event Logger screen on Page 4). Flywheel personnel can perform programming of fare rates (for each jurisdiction) via a secure cloud connection to the device and does not require the use of a means of security. The smartphone will be locked into a 'Kiosk' mode, which prevents access to all non-TaxiOS™ software on the phone.

**Operation:** Time only is measured while waiting, parking, or traveling slow speeds. Time and distance measurements are never determined simultaneously. The taximeter can be programmed to automatically charge for surcharges and tolls and also allows manual input.

There are three modes of operation for the taximeter corresponding to the roles of users: Drivers, Weights and Measures Officials, and Service Agents. There is also a separate operating mode when communication with the OBD is lost.

Drivers - Normal Operation: A driver can login using his/her unique login ID and password. Upon login, the driver has the ability to "Start Meter", "Go on a Break", or "Start Flat Rate." The flat rate option only appears if there is a flat rate defined in the geographical area.

During all trips, the screen displays actual measured miles, metered miles, and wait time. Drivers have the ability to pause and resume the taximeter. The driver has an option to press "TIME OFF" on the same screen to have the meter calculate a fare based only on distance. If applicable, Flywheel personnel will have set up tolls and surcharges to be added automatically based on rules specific to the geolocation (area) where the taximeter is operating. At the end of the trip, a receipt may be printed or emailed to the passenger.

Weights and Measures Officials – Verification and Testing: A weights and measures official will send an email to support@flywheel.com with the title "Request Inspector Login Credentials: <county name>." A Flywheel representative will generate a unique login ID and temporary password and send further instructions on how to change the password.

Upon login, the weights and measures official is presented with a list displaying "Event logs," "Calibration Parameters", and an "About" section containing the manufacturer's name, model name, software version number, IMEI of the phone, and unique version code that defines the authenticity of the Flywheel device. Weights and measures officials have read-only access to calibration parameters. Weights and measures officials also have the ability to seal or reject upon inspection by selecting "PASS" or "FAIL" while logged in as an inspector. If the weights and measures official selects "FAIL" in the verification/testing mode, drivers are unable to login and the device becomes inoperable until repaired.

Service Agents – Maintenance, Adjustments and/or Repair: A Service Agent will send an email to support@flywheel.com with the title "Request Service Agent Credentials: <Agent Name>." A Flywheel representative will schedule an in-person or virtual meeting to verify the Service Agent's credentials and provide a unique login ID and password.

The Service Agent then logs in using his unique login ID (Registered Service Agent License Number) and password. Upon login, the Service Agent is presented with a list of "Event Logs", "Calibration Parameters", and an "About" section. Service Agents have both read and write access to the calibration parameters. The Service Agent will have ability to review and clear "FAIL" meter status set by the official during inspection.

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OBD Failure Case: If there is loss of the OBD signal during a trip, the fare will be calculated only at the "Wait Time" rate. The driver will receive the following notification during a trip: *"OBD connection lost. Charging the passenger only for wait time."* After the trip is completed, another message is displayed informing the driver: *"OBD connection lost. Meter is deemed inoperable. Please return to the garage to get it fixed."* The driver will be unable to take future rides until the OBD connection is repaired and the device is marked "PASS" by a Service Agent.

**Test Conditions:** A Motorola Moto E (XT1528) 4G LTE smartphone with an Android version 5.1 operating system for running the Flywheel TaxiOS software, a compatible model PO8-5802LD mini portable Bluetooth thermal receipt printer, and an OBDLink LX Vehicle On-Board Diagnostics Bluetooth interface were submitted for evaluation.

The emphasis of this evaluation was on device design, operation and performance. Several series of laboratory and "measured mile" field tests were performed to determine compliance and accuracy with respect to time, distance, interference, voltage variation and power interruption. Tests to demonstrate the effect of GPS signal loss on accuracy were performed in areas with tunnels, "urban canyons", and steep changes in altitude. Tests were also conducted to confirm that distances traveled were not accumulated during the failure of the OBD and loss of the GPS signal. All displayed information was evaluated for compliance with visibility, clarity and required information. Receipts were printed during the tests and receipt formats and required information were evaluated. The RFI test was waived as the TaxiOS software was designed to include an integrated proprietary software drop-in replacement for the regular taxi dispatch radio system. Subsequent field testing was not performed for this software-based device.

**Evaluated By:** A. Brezoica, R. Takemori

**Type Evaluation Criteria Used:** *California Code of Regulations, Title 4, Division 9, Article 1. National Uniformity, Exceptions and Additions 2016 Edition*

**Conclusion:** The results of the evaluation and information provided by the manufacturer indicate the device complies with applicable requirements.

**Example(s) of Device:**


TaxiOS™ Taximeter, Software version 3.8.44

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TaxiOS™ Taximeter and Printer Mounted in Vehicle

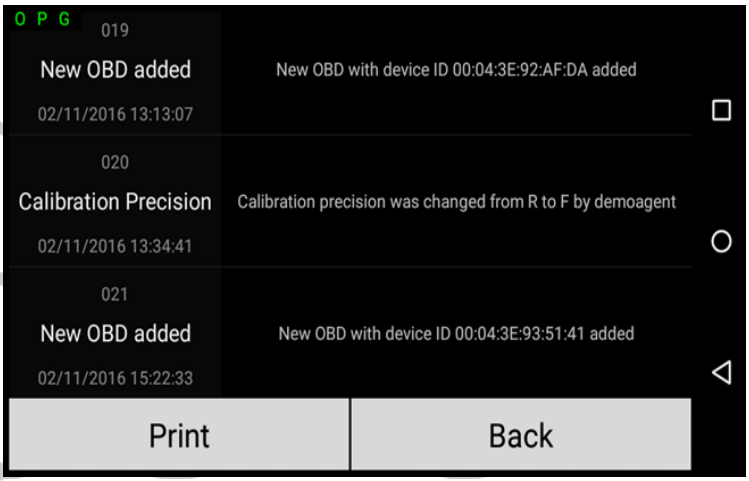
OBD Device Mounted in Vehicle

RIDE RECEIPT

| | |
|---|---|
| FLEET: | Flywheel Taxi |
| MEDALLION: | 1111 |
| DATE: | 02/18/16 |
| TRANSACTION ID: | 177507597 |
| START: | 18:36 |
| END: | 18:37 |
| MILES: | 0.27 |
| FARE MILES: | 0.27 |
| TRIP DURATION: | 00:01:25 |
| WAIT TIME: | 00:01:08 |
| BASE FARE: | $3.50 |
| FARE FOR DISTANCE: | $0.55 |
| FARE FOR TIME: | $0.55 |
| EXTRA: | $0.00 |
| TOLLS: | $0.00 |
| TIP: | $0.00 |
| TOTAL: | $4.60 |

Contact support@flywheel.com
for customer assistance

Sample Receipt




Sample Inspector/ Service Agent Event Log


Message Displayed When OBD Connection is Lost During Fare

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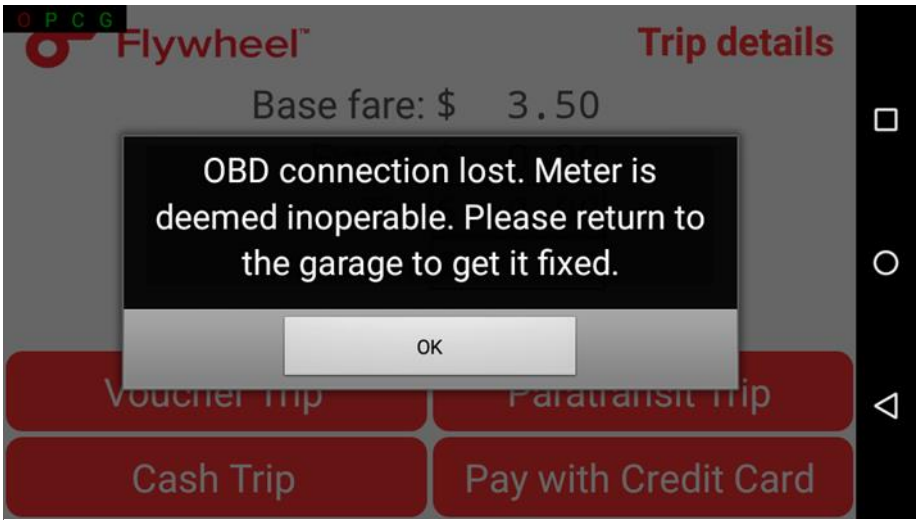
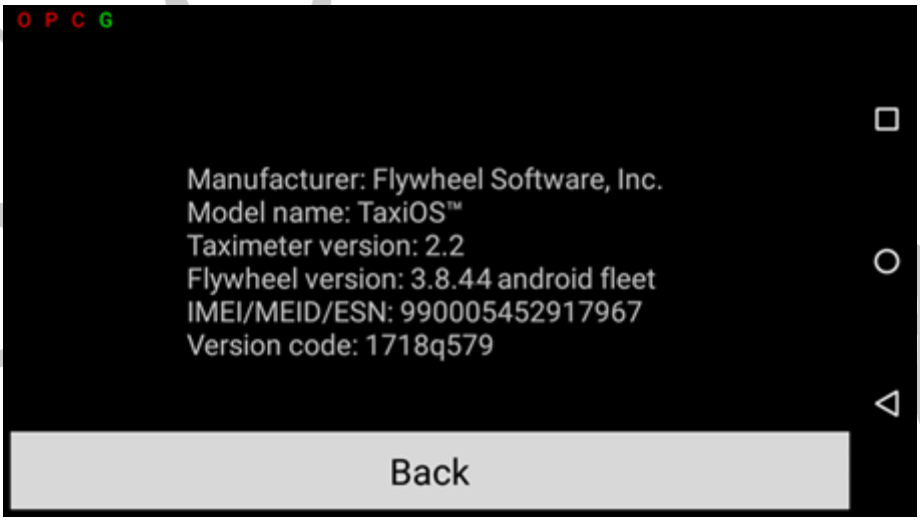
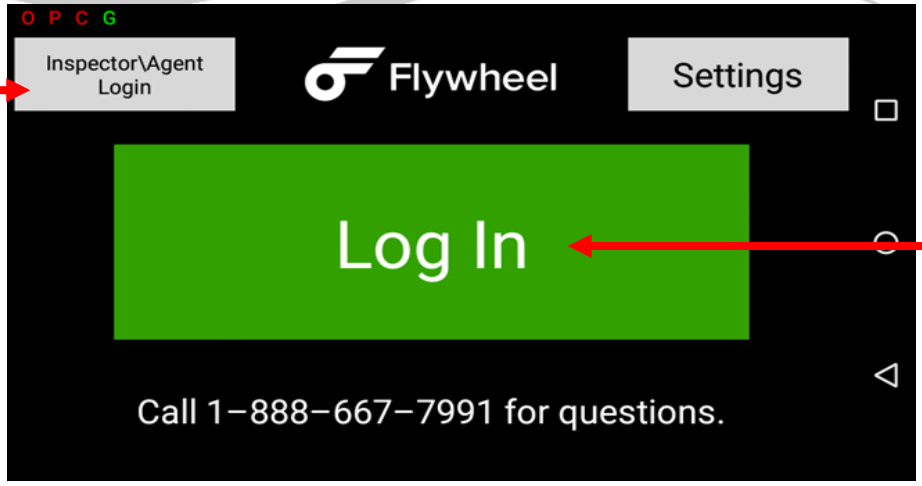



Message Informing Driver That OBD Connection is Lost and to Return to Garage for Repairs




About Screen Displaying Device Identification




Inspector and Service Agent Login

Driver Login

TaxiOS™ Login Screen