# Massachusetts HDOBD Pilot Program

Craig Woleader, P.E.

MassDEP Vehicle Inspection and Maintenance Program

# Massachusetts I&M Program Overview

- Annual Safety and Emissions Inspection
- Decentralized network of ~1,800 inspection stations
- ~5 million vehicle inspections per year
- All on-road vehicles get a safety inspection
  - Non-commercial safety or Federal DOT equivalent commercial safety
- ~3/4 of the Massachusetts fleet gets an emission inspection
  - OBD - MY2006 and newer light-duty vehicles <=8,500 lbs
  - OBD - MY2007 and newer med-duty diesel vehicles <=14,000 lbs.
  - OBD - MY2008 and newer med-duty non-diesel vehicles <=14,000 lbs.
  - Diesel opacity SAE J1667 snap acceleration test – MY1984 and newer diesel vehicles >10,000 lbs. that don't get OBD
- No new model year emissions test exemptions

# HDOBD Background

- Federal requirement to phase in HDOBD for vehicles >14,000 lbs. starting with MY2010
  - 100% complete by MY2013
- HDOBD specification SAE J-1939
  - 9 pin round connector
- LD/MDOBD specification SAE J-1979
  - 16 pin connector
- OEMs may use <u>either spec</u> for their Heavy Duty vehicles
  - HD gasoline vehicles appear to be using same OBD systems as their MD vehicles, example Ford 6.8L V-10, J-1979
  - Smaller HD diesel OEMs (GM, Ford, FCA) appear to be using the same OBD system as their MD vehicles, example Ford 6.7L V-8, J-1979
  - Mack and Isuzu using J-1979 LD/MD OBD spec on the engines we scanned
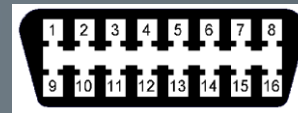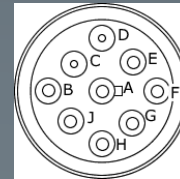
# HDOBD Pilot Program

- Purpose – integrate OBD testing into the I&M program for HD vehicles >14,000 lbs
  - Replace diesel opacity test for MY2014 and newer diesel vehicles
  - Create emission test for MY2014 and newer <u>non-diesel</u> vehicles
- MassDEP working in conjunction with I&M program network contractor, Applus Technologies
- 3 phases to Pilot Program
  - Phase 1 – Hardware and software shakedown
  - Phase 2 – Add HDOBD to I&M program as Fast Pass alt. to opacity test
    - Use opacity as a backup test if vehicle fails HDOBD
  - Phase 3 – Transition from Fast Pass HDOBD to Pass/Fail
    - No backup opacity test
    - HDOBD for non-diesel vehicles

# Phase 1

- Developed J-1939 firmware upgrade to OBD scan tool (BAR certified DAD)
- Developed software to perform scans and store data
  - Helpful features – scan VIN barcode and VIN decoder
- Completed Fall/Winter 2019
- Successfully scanned 75 HDOBD vehicles
- Currently creating standardized format for J-1939 data

# HDOBD Test Equipment

# Phase 1 – Testing Locations and Vehicles

- Tri-State Trucking – Shrewsbury, MA
  - Freightliner dealership, Cummins, Detroit Diesel, and Paccar engines
- Ballard Mack, Auburn, MA
  - Mack and Isuzu dealership
- City of Boston School Bus Yard – Dorchester, MA
  - Thomas school buses – Cummins, Ford
- Worcester and Merrimac Valley Regional Transit Authorities
  - Diesel and Hybrid Buses – Cummins
- Cumberland Farms Distribution Center – Westboro, MA
  - Misc fuel tanker trucks and Semis
- Minuteman Truck Center
  - Ford truck dealership

# Phase 1 – Engines tested

| Make | Protocol | Displacement |
| --- | --- | --- |
| Cummins | J-1939 | 6.7L, 8.9L, 11.9L, 12.8L, 15L |
| Detroit Diesel | J-1939 | 12.8L, 14.8L, 15.6L |
| Isuzu | J-1979 | 5.2L |
| Mack | J-1979 | 10.8L, 12.7L |
| Navistar | J-1939 | 7.6L |
| PACCAR | J-1939 | 12.9L |
| Volvo (MY2012) | J-1939 | 12.8L |
| Ford | J-1979 | 6.7L |

# Phase 1 – HDOBD Results

- Still working on table structure and formatting for J-1939 data
  - Raw scans files are text, varying size, typically >2000 lines of data
- Challenges
  - Minimum of 3 modules responding to OBD requests, don't know which modules will support which data (monitors, MIL, DTCs)
  - Have seen up to 6 modules responding
  - No way to store a complete scan in a single row or VID record
  - A lot of extra data, examples
    - Idle time
    - Fuel used
    - Engine revolutions!

# Phase 2 – Fast Pass HDOBD

- Purpose - gather large amounts of HDOBD data without failing vehicles and inconveniencing motorists
- Inspection lane software modified to add HDOBD tests for all MY2014 and newer vehicles that would normally receive an opacity test.
  - HDOBD Pass = emissions pass, no opacity test
  - HDOBD Fail = back up opacity test used to determine emissions Pass/Fail
- Likely use same pass/fail criteria as recommended by EPA
  - "Best Practices for Addressing OBD Readiness in IM Testing of Diesel Vehicles Under 14,000 Pounds Gross Vehicle Weight Rating" – 3/7/2013
  - Permanent DTCs and miles/trips since code clearing replace strict monitor readiness requirements
- Writing software specs now, projected implementation winter 2020

# Phase 3 – Pass/Fail HDOBD

- Phase 2 may run a year or longer to gather adequate data for designing the Pass/Fail program

- Possible Challenges
  - Odd early year compliance problems?  Think MY1996 passenger car readiness problems.
  - High failure rates? Will repair industry be prepared to fix these?
  - Push back from trucking industry, other stakeholders?
  - Tampering of emissions controls and OBD systems?

- Pass/Fail program design will be done in consultation with CA, EPA, and other interested states