

Kansas City PM Characterization Study

Final Report

Appendix J

Round 2 SEMTECH Checklist

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Sponsors:

National Renewable Energy Laboratory, U.S. Department of Energy
Federal Highway Administration, U.S. Department of Transportation
STAPPA-ALAPCO Emission Inventory Improvement Program
Coordinating Research Council Inc. (Project No. E-69)

Prepared for EPA by
Eastern Research Group, Incorporated
Austin, TX

Bevilacqua-Knight Incorporated
Oakland, CA

NuStats LLC
Austin, TX

Desert Research Institute
Reno, NV

EPA Contract No. GS 10F-0036K

October 27, 2006
Revised April 2008 by EPA staff



United States
Environmental Protection
Agency

EPA420-R-08-009
April 2008

Vehicle License _____

Date _____

VEHICLE INFORMATION PACKET FOR KC 480 VEHICLE STUDY ROUND 2 TESTING

General Vehicle Information Packet Cover sheet

Make: _____ Model: _____ Model Year: _____

Color: _____ # of doors: _____

BKI Information Below

BKI Run Number(s):

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Fuel Collected? ☐ Yes ☐ No

Oil Collected? ☐ Yes ☐ No

Test Inertia: _____

Test HP _____

Smoke Observation: ☐ None ☐ Light ☐ Medium ☐ Heavy

Did MIL illuminate during testing? Yes / No If "Yes", please note date(s) and time(s),
download the trouble codes, and list the trouble codes on the next page.

Vehicle License _____ Date _____

KC 480 Vehicle Study SEMTECH Round 2 Testing

General Vehicle Information

ERG staff to perform OBDII scans and record OBDII information

Pre-Testing OBDII Check

Please list communication protocol shown on code reader display: _____

Turn vehicle on. Is MIL light on? (check engine, service **engine** soon) ☐ Yes ☐ No

Downloaded MIL Status: ☐ MIL Commanded on ☐ MIL Commanded off

Please indicate which OBDII monitors are **NOT** ready: ☐ Evap system ☐ EGR

☐ Catalyst ☐ Ox Sensor Other(s): _____ ☐ None

Confirmed Codes:

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

☐ None

Pending Codes:

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

☐ None

Post-Testing OBDII Check (only if MIL illuminates during testing)

Turn vehicle on. Is MIL light on? (check engine, service **engine** soon) ☐ Yes ☐ No

Downloaded MIL Status: ☐ MIL Commanded on ☐ MIL Commanded off

Please indicate which OBDII monitors are **NOT** ready: ☐ Evap system ☐ EGR

☐ Catalyst ☐ Ox Sensor Other(s): _____ ☐ None

Confirmed Codes:

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

☐ None

Pending Codes:

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

P				
---	--	--	--	--

☐ None

Vehicle License _____ Date _____

KC 480 Vehicle Study SEMTECH Round 2 Testing

General Vehicle Information

Odometer: _____ (Miles / Km) Air Conditioning? Yes / No

VIN:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Vehicle Type: ☐ Car ☐ Truck ☐ Van ☐ SUV

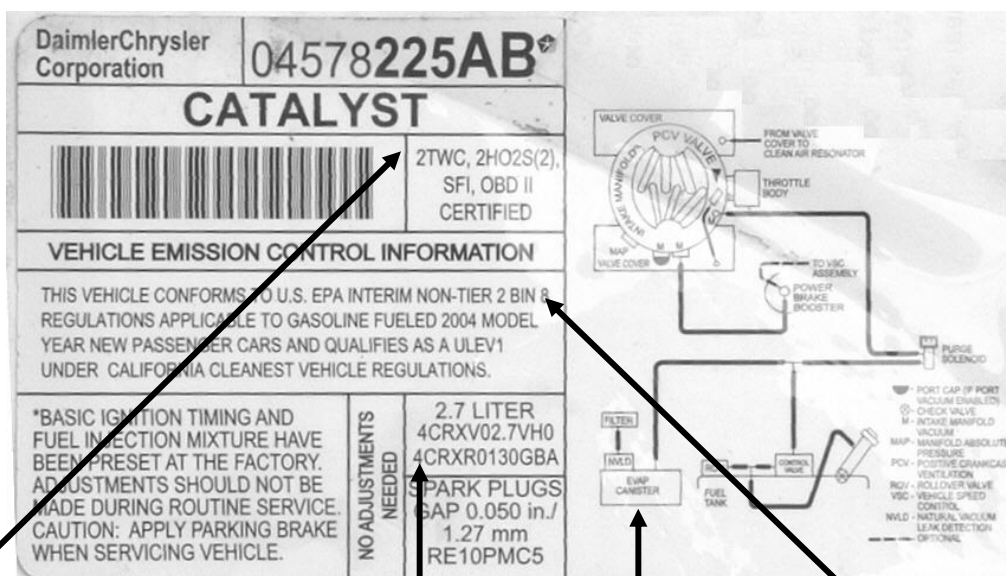
Mfr Date (on doorjamb) ____ / ____ **Total** GVWR (on doorjamb): _____ Lbs / kg

Drive Type: ☐ FWD ☐ RWD ☐ On-demand 4WD ☐ Full-time 4WD

<input type="checkbox"/> Automatic transmission <input type="checkbox"/> With overdrive <input type="checkbox"/> Without overdrive	<input type="checkbox"/> Manual transmission Circle # of Forward Gears: 3 4 5 6, Unk
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Engine and Emission Survey Information

(note: the majority of the following information is listed on the underhood emissions certification decal, as shown below. Use Part D of the "Installation Guidelines" for additional info on visually confirming items.)



This box lists the emission control components: 2TWC = catalytic converters (dual three-way); 2HO2S = oxygen sensors (two heated ox sensors); SFI = port injection (sequential fuel injection). Look here also for "PCV", AIR, TAC, and EGR.

This box lists the displacement (2.7 L), engine family (top #), and evaporative family (bottom #).

This area shows the engine's vacuum routing. Look here for evaporative system (including the words "evap" and or "canister"). Also check for PCV and EGR.

This box lists engine certification year (2004) and certification level (Tier 2, Bin 8, California ULEV1)

Vehicle License _____ Date _____

KC 480 Vehicle Study SEMTECH Round 2 Testing

General Vehicle Information

of Cylinders: _____ Displacement: _____ In³ L

Note: The underhood label will list the displacement, but probably not the # of cylinders. The # of ignition wires may indicate the number of cylinders. If you're not certain, just leave "# of cylinders" blank.

Engine Certification Year _____ ☐ OBD I ☐ OBD II ☐ No OBD

Emissions Cert: ☐ USEPA ☐ California ☐ Canada

Other certification info from hood sticker (i.e., Tier 2, ULEV, etc.) _____

System	Yes	No	Unk	System	Yes	No	Unk
Positive Crankcase Ventilation (listed as "PCV" on label)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Evaporative Emissions Control System (Diagram will be on label, if present. Look for words "evap canister")	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermostatic Air Cleaner Assembly (listed as "TAC" on label. Verify assembly is still present.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Catalytic Converter (listed as "CAT", "TWC", etc. on label. Visually verify presence of cat under vehicle.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Air Injection (listed as "AIR" on label. Verify system is still present.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fuel Fillpipe Restrictor (Remove fuel cap to verify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exhaust Gas Recirculation (listed as "EGR" on label, verify still present if vehicle is older than 1996.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Oxygen Sensor (listed as "Ox", "O2", or "HO2S" on label. Verify presence if vehicle is older than 1996.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Engine Family (top # on sticker) _____

Evaporative Family (bottom # on sticker) _____

Fuel Delivery: ☐ Carb ☐ Port Fuel-Injected ☐ Throttle-body ☐ Hybrid

Note: Port fuel-injected vehicles will have "MPI", "SFI", "MPFI" listed on underhood sticker. Note that the presence of the words "throttle-body" on label does not mean the vehicle has "throttle-body" fuel delivery (throttle-body on the label generally refers to point of air delivery). Please leave fuel delivery blank if not certain.

Air Intake: ☐ Normal ☐ Turbocharged ☐ Supercharged

Part 1: SEMTECH Installation for Round 2 Preconditioning Drives Data Collection Sheet

Date ____ / ____ / ____

Vehicle License: _____

Installation Tech: _____ PEM Serial Number ____ - ____

SEMTECH System Information

SEMTECH Status Summary Screen

FID Fuel Pressure: _____ (psig) Battery Voltage: _____ (V)

Independent Weather Station Data

Ambient Temperature: _____ (deg C) Relative Humidity: _____ (%)

SEMTECH Status Summary Screen (After warmup is complete)

FID Oven Temperature: _____ (deg C) Chiller Temp: _____ (deg C)

SEMTECH System Pressures

P_{ambient} _____

P₁ _____ (mbar) P₂ _____ (mbar) P₃ _____ (mbar)

OBDII Communication Protocol for Vehicle Interface

Note: use the "AutoXray" OBDII scanner to determine type of communication protocol. If that is unsuccessful, use Part B of the "Installation Guidelines".

- | | | | |
|---|--|------------------------------------|-------------------------------------|
| <input type="checkbox"/> SAE-J1850 VPW | <input type="checkbox"/> SAE-J1850 PWM | <input type="checkbox"/> ISO-14230 | <input type="checkbox"/> ISO-9141-2 |
| <input type="checkbox"/> ISO-11898 | <input type="checkbox"/> ISO-15765 | <input type="checkbox"/> SAE-J1939 | <input type="checkbox"/> SAE-J1708 |
| <input type="checkbox"/> Vehicle will not communicate using any of the above communication protocols. | | | |

Zero, Audit, and Span Cylinder Numbers

Zero gas cylinder ID #	Audit Gas Cylinder ID #	Span Gas Cylinder ID #

Part 1: SEMTECH Installation for Round 2 Preconditioning Drives Installation Checklist

Vehicle License _____

✓	#	Task
<input type="checkbox"/>	1 2 12 13 19	Install SEMTECH & battery in trunk, connect power supply, turn SEMTECH on. Ensure positive battery terminal is covered with boot.
<input type="checkbox"/>	4, 5, 14	Install FID drain and autozero (ambient) tubes, run outside trunk
<input type="checkbox"/>	15	Install GPS (wipe base clean)
<input type="checkbox"/>	16	Install weather probe
<input type="checkbox"/>	17	Install VI (where it won't be kicked)
<input type="checkbox"/>	18	Install and purge correct size flow meter and matched control box. Ensure shielding is away from battery.
<input type="checkbox"/>	N/A	Plug in external thermocouple
<input type="checkbox"/>	3	Logon with host computer
<input type="checkbox"/>	N/A	Verify comm. with right SEMTECH
<input type="checkbox"/>	10	Perform a SEMTECH leak check
<input type="checkbox"/>	11	Verify analyzer sample intervals are system control = 1000 ms, FID = 500 ms, NDIR=1200, NDUV = 500 ms.
<input type="checkbox"/>	21	Acquire VI
<input type="checkbox"/>	43	Set HC range to 10,000.
<input type="checkbox"/>	22	Acquire GPS, aux temp, & flowmeter. Set CO units to PPM.
<input type="checkbox"/>	N/A	In Config 3, enable autozero (all but CH4), 120 mins, 5 ppm drift)
<input type="checkbox"/>	7	Close FID bottle, then do a FID leak check (<1 psi/minute decay)
<input type="checkbox"/>	25	Disconnect power supply, verify and record battery voltage
<input type="checkbox"/>	8	Record ambient conditions
<input type="checkbox"/>	9	Ensure P1, P2, P3 are within 200 psi

✓	#	Task
<input type="checkbox"/>	12	Open FID bottle, Ignite FID (15 minutes before testing). Check FID pressure, replace if under 200 PSI. Ensure outlet regulator is set to 30 PSI output.
<input type="checkbox"/>	N/A	Ensure EXFM box pressure/temp LEDs are off, and autozero is on
<input type="checkbox"/>	26	Set transport delays (6,6,0,5,5,0), mass calc from flow meter, speed from GPS, RPM from ECM. Calc limits @ 1000 RPM/s, 21.0 mph/s, 0.050 gal/s, & 0.50 %C. HC ratio @ 1.8 & SG @ 0.744.
<input type="checkbox"/>	28 29 30	Enter test info, flowmeter ID #, notes, select all post-processing output groups, save setup and exit
<input type="checkbox"/>	44	Start vehicle & verify data in road test screen
<input type="checkbox"/>	NA	Use "ST_PLATE_precond" for filename
<input type="checkbox"/>	24 31	Check for system faults and warnings, verify warm-up, record temperatures
<input type="checkbox"/>	NA	After installation review, begin session mgr
<input type="checkbox"/>	32	Record cylinder numbers on sheet
<input type="checkbox"/>	33	Perform a zero calibration
<input type="checkbox"/>	34- 39	Perform gas and O ₂ audits (and calibrations and reaudits, if needed).
<input type="checkbox"/>	42	START THE TEST (in the session manager)
<input type="checkbox"/>	40	Prepare vehicle for testing, close trunk, have picture taken of flowmeter setup
<input type="checkbox"/>	N/A	Do precond run, watch road test screen
<input type="checkbox"/>	46	After precond run, stop test, do a post-test audit and then a zero (zero on ambient)
<input type="checkbox"/>	NA	Stop and close the session manager, turn FID off
<input type="checkbox"/>	N/A	Remove equipment, purge flowmeter, charge battery
<input type="checkbox"/>	N/A	Ensure test file is uploaded

Part 2: SEMTECH Installation for Round 2 Dyne Sampling Data Collection Sheet

Date ____ / ____ / ____

Vehicle License _____

Installation Tech: _____ PEM Serial Number ____ - ____

SEMTECH System Information

SEMTECH Status Summary Screen

FID Fuel Pressure: _____ (psig)

Independent Weather Station Data

Ambient Temperature: _____ (deg C) Relative Humidity: _____ (%)

SEMTECH Status Summary Screen (After warmup is complete)

FID Oven Temperature: _____ (deg C) Chiller Temp: _____ (deg C)

SEMTECH System Pressures

P_{ambient} _____

P₁ _____ (mbar) P₂ _____ (mbar) P₃ _____ (mbar)

OBDII Communication Protocol for Vehicle Interface

Note: use the "AutoXray" OBDII scanner to determine type of communication protocol. If that is unsuccessful, use Part B of the "Installation Guidelines".

- | | | | |
|---|--|------------------------------------|-------------------------------------|
| <input type="checkbox"/> SAE-J1850 VPW | <input type="checkbox"/> SAE-J1850 PWM | <input type="checkbox"/> ISO-14230 | <input type="checkbox"/> ISO-9141-2 |
| <input type="checkbox"/> ISO-11898 | <input type="checkbox"/> ISO-15765 | <input type="checkbox"/> SAE-J1939 | <input type="checkbox"/> SAE-J1708 |
| <input type="checkbox"/> Vehicle will not communicate using any of the above communication protocols. | | | |

Zero, Audit, and Span Gas Information

Zero gas cylinder ID #	Audit Gas Cylinder ID #	Span Gas Cylinder ID #

Part 2: SEMTECH Installation for Round 2 Dyne Sampling Installation Checklist

Vehicle License _____

✓	#	Task
<input type="checkbox"/>	16	Ensure weather probe & external temp thermocouple are hooked up
<input type="checkbox"/>	17	Install VI (where it won't be kicked)
<input type="checkbox"/>	18	Install and purge correct size flow meter & matched control box.
<input type="checkbox"/>	10	Perform a SEMTECH leak check
<input type="checkbox"/>	11	Verify analyzer sample intervals are system control = 1000 ms, FID = 500 ms, NDIR=1200, NDUV = 500 ms.
<input type="checkbox"/>	21	Acquire VI
<input type="checkbox"/>	43	Set HC range to 10,000.
<input type="checkbox"/>	22	Acquire aux temp & flowmeter. Set CO units to PPM.
<input type="checkbox"/>	8	Write ambient conditions
<input type="checkbox"/>	9	Ensure P1, P2, P3 are within 200 psi
<input type="checkbox"/>	12	Open FID bottle, Ignite FID (15 minutes before testing)
<input type="checkbox"/>	N/A	Ensure EXFM box pressure/temp LEDs are off, and autozero is on

✓	#	Task
<input type="checkbox"/>	26	Set transport delays (6,6,0,5,5,0), mass calc from flow meter, speed from ECM, RPM from ECM. Calc limits @ 1000 RPM/s, 21.0 mph/s, 0.050 gal/s, & 0.50 %C. HC ratio @ 1.8 & SG @ 0.744.
<input type="checkbox"/>	28 29 30	Enter test info, flowmeter ID #, notes, select all post-processing output groups, save setup and exit
<input type="checkbox"/>	44	In Road Test screen, ensure VI is acquired, exhaust flowmeter temp is valid, and weather station and aux temp data is acquired
<input type="checkbox"/>	NA	Use "ST_PLATE_run #" for filename
<input type="checkbox"/>	24 31	Check for system faults and warnings, verify warm-up, record temperatures
<input type="checkbox"/>	NA	Begin the session manager
<input type="checkbox"/>	32	Record cylinder numbers on sheet
<input type="checkbox"/>	33	Perform a zero calibration
<input type="checkbox"/>	34- 39	Perform gas and O ₂ audits (and calibrations and reaudits, if needed).
<input type="checkbox"/>	42	START THE TEST (in the session manager)
<input type="checkbox"/>	44	During dyne run, watch road test screen for dilution, HC range, etc. Adjust HC range as needed, but don't peg readings.
<input type="checkbox"/>	46	After dyne run, stop test, do a post-test audit and then a zero (zero on ambient)
<input type="checkbox"/>	NA	Stop and close the session manager, turn FID off
<input type="checkbox"/>	N/A	Purge flowmeter after each run.
<input type="checkbox"/>	N/A	Ensure test files are uploaded (daily is OK)

Part 3: SEMTECH Installation for Round 2 Vehicle Driveaways Data Collection Sheet

Date ____ / ____ / ____

Vehicle License _____

Installation Tech: _____ PEM Serial Number ____ - ____

SEMTECH System Information

SEMTECH Status Summary Screen

FID Fuel Pressure: _____ (psig) Battery Voltage: _____ (V)

Independent Weather Station Data

Ambient Temperature: _____ (deg C) Relative Humidity: _____ (%)

SEMTECH Status Summary Screen (After warmup is complete)

FID Oven Temperature: _____ (deg C) Chiller Temp: _____ (deg C)

SEMTECH System Pressures

P_{ambient} _____

P₁ _____ (mbar) P₂ _____ (mbar) P₃ _____ (mbar)

OBDII Communication Protocol for Vehicle Interface

Note: use the "AutoXray" OBDII scanner to determine type of communication protocol. If that is unsuccessful, use Part B of the "Installation Guidelines".

- | | | | |
|---|--|------------------------------------|-------------------------------------|
| <input type="checkbox"/> SAE-J1850 VPW | <input type="checkbox"/> SAE-J1850 PWM | <input type="checkbox"/> ISO-14230 | <input type="checkbox"/> ISO-9141-2 |
| <input type="checkbox"/> ISO-11898 | <input type="checkbox"/> ISO-15765 | <input type="checkbox"/> SAE-J1939 | <input type="checkbox"/> SAE-J1708 |
| <input type="checkbox"/> Vehicle will not communicate using any of the above communication protocols. | | | |

Zero, Audit, and Span Gas Information

Zero gas cylinder ID #	Audit Gas Cylinder ID #	Span Gas Cylinder ID #

Part 3: SEMTECH Installation for Round 2 Vehicle Driveaways Installation Checklist

Vehicle License _____

✓	#	Task
<input type="checkbox"/>	1 2 12 13 19	Install SEMTECH & 2 batteries in trunk, connect power supply, turn SEMTECH on. Ensure positive battery terminals are covered with boots.
<input type="checkbox"/>	4, 5, 14	Replace FID bottle (outlet @ 30 psi), open FID fuel supply, Install FID drain and autozero (ambient) tubes, run outside trunk
<input type="checkbox"/>	15	Install GPS (wipe base clean first)
<input type="checkbox"/>	16	Install weather probe
<input type="checkbox"/>	17	Install VI (where it won't be kicked)
<input type="checkbox"/>	18	Install and purge correct size flow meter & matched control box. Ensure shielding is away from batteries.
<input type="checkbox"/>	N/A	Plug in external thermocouple
<input type="checkbox"/>	3	Logon with host computer
<input type="checkbox"/>	N/A	Verify comm. with right SEMTECH
<input type="checkbox"/>	10	Perform a SEMTECH leak check
<input type="checkbox"/>	11	Verify analyzer sample intervals are system control = 1000 ms, FID = 500 ms, NDIR=1200, NDUV = 500 ms.
<input type="checkbox"/>	21	Acquire VI
<input type="checkbox"/>	43	Set HC range to 10,000.
<input type="checkbox"/>	22	Acquire GPS, aux temp, & flowmeter. Set CO units to PPM, set FID to "auto".
<input type="checkbox"/>	N/A	In Config 3, enable autozero (all but CH4), 120 mins, 5 ppm drift)
<input type="checkbox"/>	7	Close FID bottle, then do a FID leak check (<1 psi/minute decay)
<input type="checkbox"/>	25	Disconnect power supply, verify and write battery voltage of both batteries
<input type="checkbox"/>	8	Record ambient conditions

✓	#	Task
<input type="checkbox"/>	9	Ensure P1, P2, P3 are within 200 psi
<input type="checkbox"/>	12	Open FID bottle, Ignite FID (15 minutes before testing)
<input type="checkbox"/>	N/A	Ensure EXFM box pressure/temp LEDs are off, and autozero is on
<input type="checkbox"/>	26	Set transport delays (6,6,0,5,5,0), mass calc from flow meter, speed from GPS, RPM from ECM. Calc limits @ 1000 RPM/s, 21.0 mph/s, 0.050 gal/s, & 0.50 %C. HC ratio @ 1.8 & SG @ 0.744.
<input type="checkbox"/>	28 29 30	Enter test info, flowmeter ID #, notes, select all post-processing output groups, save setup and exit
<input type="checkbox"/>	44	Start vehicle & verify data in road test screen
<input type="checkbox"/>	NA	Use "ST_PLATE_driveaway" for filename
<input type="checkbox"/>	24 31	Check for system faults and warnings, verify warm-up, record temperatures
<input type="checkbox"/>	NA	After installation review, begin session mgr
<input type="checkbox"/>	32	Record cylinder numbers on sheet
<input type="checkbox"/>	33	Perform a zero calibration
<input type="checkbox"/>	34- 39	Perform gas and O ₂ audits (and calibrations and reaudits, if needed).
<input type="checkbox"/>	42	START THE TEST (in the session manager)
<input type="checkbox"/>	40	Prepare vehicle for testing, connect 2 nd battery, pull charger, run Ethernet cord out trunk, close trunk, seal, etc.
<input type="checkbox"/>	N/A	Have picture taken of flowmeter setup
<input type="checkbox"/>	N/A	When vehicle returns, remove equipment, purge flowmeter, charge batteries
<input type="checkbox"/>	N/A	Ensure test file is uploaded

Part 4: SEMTECH Installation for *Replicate* Round 2 Precond Drives Data Collection Sheet

Date ____ / ____ / ____

Vehicle License _____

Installation Tech: _____ PEM Serial Number ____ - ____

SEMTECH System Information

SEMTECH Status Summary Screen

FID Fuel Pressure: _____ (psig) Battery Voltage: _____ (V)

Independent Weather Station Data

Ambient Temperature: _____ (deg C) Relative Humidity: _____ (%)

SEMTECH Status Summary Screen (After warmup is complete)

FID Oven Temperature: _____ (deg C) Chiller Temp: _____ (deg C)

SEMTECH System Pressures

P_{ambient} _____

P₁ _____ (mbar) P₂ _____ (mbar) P₃ _____ (mbar)

OBDII Communication Protocol for Vehicle Interface

Note: use the "AutoXray" OBDII scanner to determine type of communication protocol. If that is unsuccessful, use Part B of the "Installation Guidelines".

- | | | | |
|---|--|------------------------------------|-------------------------------------|
| <input type="checkbox"/> SAE-J1850 VPW | <input type="checkbox"/> SAE-J1850 PWM | <input type="checkbox"/> ISO-14230 | <input type="checkbox"/> ISO-9141-2 |
| <input type="checkbox"/> ISO-11898 | <input type="checkbox"/> ISO-15765 | <input type="checkbox"/> SAE-J1939 | <input type="checkbox"/> SAE-J1708 |
| <input type="checkbox"/> Vehicle will not communicate using any of the above communication protocols. | | | |

Zero, Audit, and Span Gas Information

Zero gas cylinder ID #	Audit Gas Cylinder ID #	Span Gas Cylinder ID #

Part 4: SEMTECH Installation for *Replicate* Round 2 Precond Drives

Installation Checklist

Vehicle License _____

✓	#	Task
<input type="checkbox"/>	1 2 12 13 19	Install SEMTECH & battery in trunk, connect power supply, turn SEMTECH on. Ensure positive battery terminal is covered with boot.
<input type="checkbox"/>	4, 5, 14	Install FID drain and autozero (ambient) tubes, run outside trunk
<input type="checkbox"/>	15	Install GPS (wipe base clean)
<input type="checkbox"/>	16	Install weather probe
<input type="checkbox"/>	17	Install VI (where it won't be kicked)
<input type="checkbox"/>	18	Install and purge correct size flow meter and matched control box. Ensure shielding is away from battery.
<input type="checkbox"/>	N/A	Plug in external thermocouple
<input type="checkbox"/>	3	Logon with host computer
<input type="checkbox"/>	N/A	Verify comm. with right SEMTECH
<input type="checkbox"/>	10	Perform a SEMTECH leak check
<input type="checkbox"/>	11	Verify analyzer sample intervals are system control = 1000 ms, FID = 500 ms, NDIR=1200, NDUV = 500 ms.
<input type="checkbox"/>	21	Acquire VI
<input type="checkbox"/>	43	Set HC range to 10,000.
<input type="checkbox"/>	22	Acquire GPS, aux temp, & flowmeter. Set CO units to PPM.
<input type="checkbox"/>	N/A	In Config 3, enable autozero (all but CH4), 120 mins, 5 ppm drift)
<input type="checkbox"/>	7	Close FID bottle, then do a FID leak check (<1 psi/minute decay)
<input type="checkbox"/>	25	Disconnect power supply, verify and record battery voltage
<input type="checkbox"/>	8	Record ambient conditions
<input type="checkbox"/>	9	Ensure P1, P2, P3 are within 200 psi

✓	#	Task
<input type="checkbox"/>	12	Open FID bottle, Ignite FID (15 minutes before testing). Check FID pressure, replace if under 200 PSI. Ensure outlet regulator is set to 30 PSI output.
<input type="checkbox"/>	N/A	Ensure EXFM box pressure/temp LEDs are off, and autozero is on
<input type="checkbox"/>	26	Set transport delays (6,6,0,5,5,0), mass calc from flow meter, speed from GPS, RPM from ECM. Calc limits @ 1000 RPM/s, 21.0 mph/s, 0.050 gal/s, & 0.50 %C. HC ratio @ 1.8 & SG @ 0.744.
<input type="checkbox"/>	28 29 30	Enter test info, flowmeter ID #, notes, select all post-processing output groups, save setup and exit
<input type="checkbox"/>	44	Start vehicle & verify data in road test screen
<input type="checkbox"/>	NA	Use "ST_PLATE_precond_rep" for filename
<input type="checkbox"/>	24 31	Check for system faults and warnings, verify warm-up, record temperatures
<input type="checkbox"/>	NA	After installation review, begin session mgr
<input type="checkbox"/>	32	Record cylinder numbers on sheet
<input type="checkbox"/>	33	Perform a zero calibration
<input type="checkbox"/>	34- 39	Perform gas and O ₂ audits (and calibrations and reaudits, if needed).
<input type="checkbox"/>	42	START THE TEST (in the session manager)
<input type="checkbox"/>	40	Prepare vehicle for testing, close trunk, have picture taken of flowmeter setup
<input type="checkbox"/>	N/A	Do precond run, watch road test screen
<input type="checkbox"/>	46	After precond run, stop test, do a post-test audit and then a zero (zero on ambient)
<input type="checkbox"/>	NA	Stop and close the session manager, turn FID off
<input type="checkbox"/>	N/A	Remove equipment, purge flowmeter, charge battery
<input type="checkbox"/>	N/A	Ensure test file is uploaded

Part 5: SEMTECH Installation for *Replicate* Round 2 Dyne Sampling Data Collection Sheet

Date ____ / ____ / ____

Vehicle License _____

Installation Tech: _____ PEM Serial Number ____ - ____

SEMTECH System Information

SEMTECH Status Summary Screen

FID Fuel Pressure: _____ (psig)

Independent Weather Station Data

Ambient Temperature: _____ (deg C) Relative Humidity: _____ (%)

SEMTECH Status Summary Screen (After warmup is complete)

FID Oven Temperature: _____ (deg C) Chiller Temp: _____ (deg C)

SEMTECH System Pressures

P_{ambient} _____

P₁ _____ (mbar) P₂ _____ (mbar) P₃ _____ (mbar)

OBDII Communication Protocol for Vehicle Interface

Note: use the "AutoXray" OBDII scanner to determine type of communication protocol. If that is unsuccessful, use Part B of the "Installation Guidelines".

- | | | | |
|---|--|------------------------------------|-------------------------------------|
| <input type="checkbox"/> SAE-J1850 VPW | <input type="checkbox"/> SAE-J1850 PWM | <input type="checkbox"/> ISO-14230 | <input type="checkbox"/> ISO-9141-2 |
| <input type="checkbox"/> ISO-11898 | <input type="checkbox"/> ISO-15765 | <input type="checkbox"/> SAE-J1939 | <input type="checkbox"/> SAE-J1708 |
| <input type="checkbox"/> Vehicle will not communicate using any of the above communication protocols. | | | |

Zero, Audit, and Span Gas Information

Zero gas cylinder ID #	Audit Gas Cylinder ID #	Span Gas Cylinder ID #

Part 5: SEMTECH Installation for *Replicate* Round 2 Dyne Sampling Installation Checklist

Vehicle License _____

✓	#	Task
<input type="checkbox"/>	16	Ensure weather probe & external temp thermocouple are hooked up
<input type="checkbox"/>	17	Install VI (where it won't be kicked)
<input type="checkbox"/>	18	Install and purge correct size flow meter & matched control box.
<input type="checkbox"/>	10	Perform a SEMTECH leak check
<input type="checkbox"/>	11	Verify analyzer sample intervals are system control = 1000 ms, FID = 500 ms, NDIR=1200, NDUV = 500 ms.
<input type="checkbox"/>	21	Acquire VI
<input type="checkbox"/>	43	Set HC range to 10,000.
<input type="checkbox"/>	22	Acquire aux temp & flowmeter. Set CO units to PPM.
<input type="checkbox"/>	8	Write ambient conditions
<input type="checkbox"/>	9	Ensure P1, P2, P3 are within 200 psi
<input type="checkbox"/>	12	Open FID bottle, Ignite FID (15 minutes before testing)
<input type="checkbox"/>	N/A	Ensure EXFM box pressure/temp LEDs are off, and autozero is on

✓	#	Task
<input type="checkbox"/>	26	Set transport delays (6,6,0,5,5,0), mass calc from flow meter, speed from ECM, RPM from ECM. Calc limits @ 1000 RPM/s, 21.0 mph/s, 0.050 gal/s, & 0.50 %C. HC ratio @ 1.8 & SG @ 0.744.
<input type="checkbox"/>	28 29 30	Enter test info, flowmeter ID #, notes, select all post-processing output groups, save setup and exit
<input type="checkbox"/>	44	In Road Test screen, ensure VI is acquired, exhaust flowmeter temp is valid, and weather station and aux temp data is acquired
<input type="checkbox"/>	NA	Use "ST_PLATE_run #_rep" for filename
<input type="checkbox"/>	24 31	Check for system faults and warnings, verify warm-up, record temperatures
<input type="checkbox"/>	NA	Begin the session manager
<input type="checkbox"/>	32	Record cylinder numbers on sheet
<input type="checkbox"/>	33	Perform a zero calibration
<input type="checkbox"/>	34- 39	Perform gas and O ₂ audits (and calibrations and reaudits, if needed).
<input type="checkbox"/>	42	START THE TEST (in the session manager)
<input type="checkbox"/>	44	During dyne run, watch road test screen for dilution, HC range, etc. Adjust HC range as needed, but don't peg readings.
<input type="checkbox"/>	46	After dyne run, stop test, do a post-test audit and then a zero (zero on ambient)
<input type="checkbox"/>	NA	Stop and close the session manager, turn FID off
<input type="checkbox"/>	N/A	Purge flowmeter after each run.
<input type="checkbox"/>	N/A	Ensure test files are uploaded (daily is OK)