The joy and misery of connecting a car to the internet niklas.gawell@springworks.se

8TH FEBRUARY 2017

THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET



• Because we can

THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET



- Because we can
- To know more about your car



- Because we can
- To know more about your car
- To do more with your car



let's look at an example

let's look at an example



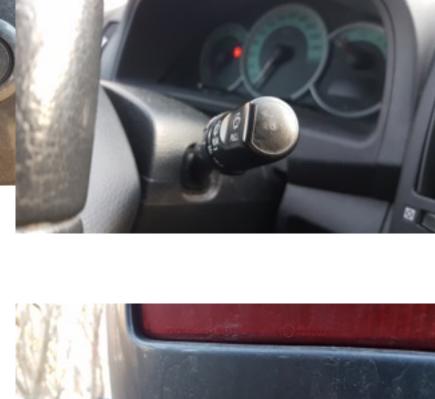
input devices





THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET





output devices

















output devices







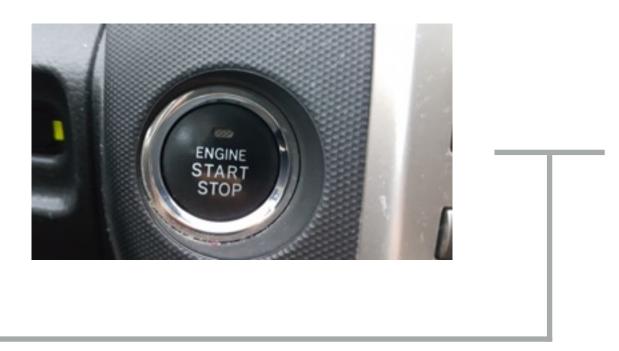




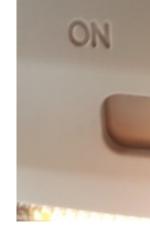
THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET











THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET





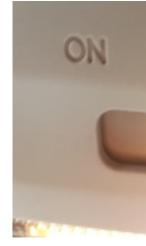








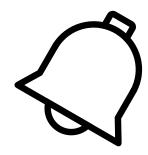






THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET



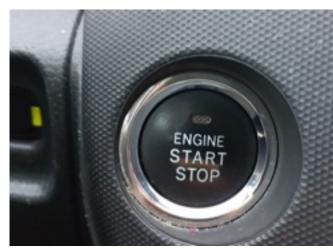




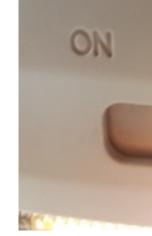












THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET

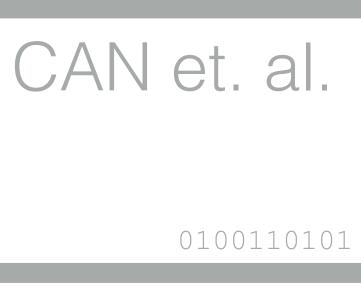




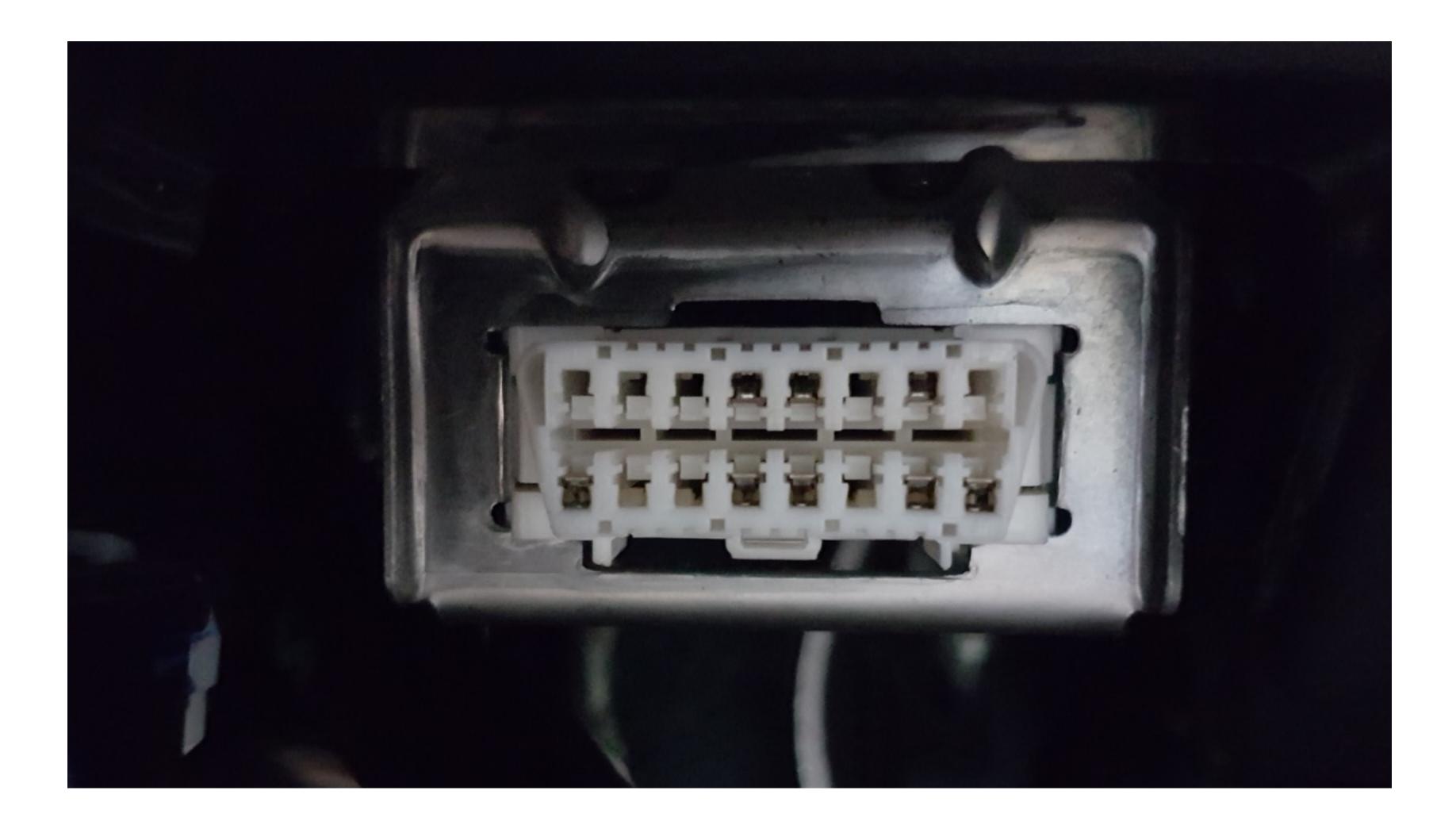








network connector



Let's get connecting!

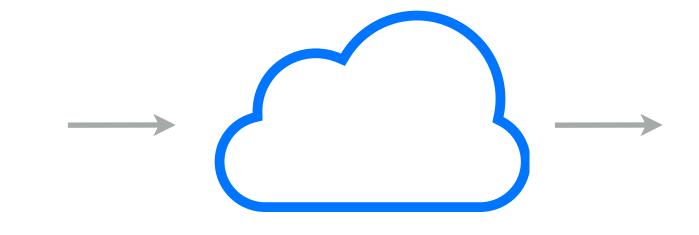


10	2017-01-11	16:29	2017-01-11 2017-01-11		0.5	Oxövligen 2F, 139 50 Värmdö, Sverige Gillets väe 2, 139 50 Värmdö, Sverige
1	2017-01-11	15:58	2017-01-11		15.1	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
10	2017-01-11	07:48	2017-01-11		15.2	Angsviksvägen 8, 139 50 Värmdö, Sverige
16	2017-01-11	07:34	2017-01-11		7.5	Boda byväg 28, 139 90 Värmdö, Sverige
15	2017-01-10	19:05	2017-01-10		15.8	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
14	2017-01-10	17:29	2017-01-10		16.0	Boda byväg ZA, 139 90 Värmdö, Sverige
13	2017-01-10	16:27	2017-01-10		7.5	Gillets väg 2, 139 50 Värmdö, Sverige
12	2017-01-10	16:21	2017-01-10		0.5	Oxövägen 2F, 139 50 Värmdö, Sverige
1	2017-01-10	16:04	2017-01-10	16:13	6.5	18.48574, 59.32245
10	2017-01-10	08:05	2017-01-10	08:15	7.0	Ängsviksvägen 8, 139 50 Värmdö, Sverige
19	2017-01-10	07:43	2017-01-10		7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
18	2017-01-09	16:49	2017-01-09	17:01	7.5	Ängsviksvägen 6-8, 139 50 Vänmdö, Sverige
17	2017-01-09	16:23	2017-01-09	16:35	8.2	Viks skolväg 22, 139 35 Värmdö, Sverige
10	2017-01-09	16:13	2017-01-09	16:21	3.5	Skärgårdsvägen, 134 44 Gustavsberg, Sverige
15	2017-01-09	15:53	2017-01-09	16:03	4.3	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
4	2017-01-09	07:52	2017-01-09	08:17	15.2	Ängsviksvägen 9, 139 50 Värmdö, Sverige
19	2017-01-09	07:35	2017-01-09	07:46	7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
12	2017-01-07	16c47	2017-01-07		7.9	Oxövägen 2F, 139 50 Värmdö, Sverige
1	2017-01-07	16:36	2017-01-07		6.3	Skärgårdsvägen 268, 139 30 Värmdö, Sverige
10	2017-01-07	16:18	2017-01-07		1.7	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
9	2017-01-07	13:45	2017-01-07		16.0	Boda byväg 2B, 139 90 Värmdö, Sverige
8	2017-01-06	20:18	2017-01-06	20:34	12.3	Torsby Älgstig 1-3, 139 51 Värmdö, Sverige
12	2017-01-06	20:03	2017-01-06	20:06	1.8	Centrumvägen 1, 139 30 Värmdö, Sverige
10	2017-01-06	19:55	2017-01-06	19:58	1.0	Skärgårdsvägen 266, 139 30 Värmdö, Sverige
15	2017-01-06	19:17	2017-01-06	19:37	14.3	Boda byväg 2B, 139 90 Värmdö, Sverige
4	2017-01-05	13:25	2017-01-05	13:45	15.7	Viks skolväg 22, 139 35 Värmdö, Sverige
3	2017-01-05	13:14	2017-01-05	13:21	3.4	Fenix väg 4, 134 44 Gustavsberg, Sverige
2	2017-01-05	12:52	2017-01-05	12:56	0.8	MEDEAS VAG 1, 134 44 Gustavsberg, Sverige
1	2017-01-05	12:21	2017-01-05	12:25	1.0	222, 134 44 Gustavsberg, Sverige
0	2017-01-05	12:10	2017-01-05	12:18	3.5	Ösby badväg 3, 134 38 Gustavsberg, Sverige
9	2017-01-05	09:39	2017-01-05	10:12	21.7	Boda byväg 2B, 139 90 Värmdö, Sverige
8	2017-01-02	16:40	2017-01-02	17:11	18.7	Afrodites väg 4, 134 44 Gustavsberg, Sverige
7	2017-01-02	15:33	2017-01-02	15:58	18.5	Boda byväg 28, 139 90 Värmdö, Sverige
6	2017-01-01	20:11	2017-01-01	20:21	7.3	Angsviksvägen Z, 139 50 Varmdo, Sverige

armdo, Sverige Boda byvag 28, 139 90 V MEDEAS VÄG 3, 134 44 G stavsberg, Sverige Boda byväg 28, 139 90 V3 irmdö, Sverige Ösby badväg 3, 134 38 Gu stavsberg, Sverige 222, 134 44 Gustavsberg, ORIONS VÄG 6, 134 44 G tavsberg, Sverige Fenix väg 4, 134 44 Gusta Viks skolväg 22, 139 35 V Boda byväg 28, 139 90 Va Skärgårdsvägen 262, 139 0 Värmdö, Sverige Centrumvägen 1, 139 30 Torsby Algstig 1-3, 139 5 Boda byväg 28, 139 90 V Skärgårdsvägen 220, 139 35 Värmdö, Sverige Skärgårdsvägen 268, 139 30 Värmdö, Sverige Oxövägen 27, 139 50 Värm Boda byväg 28, 139 90 V. Ängsviksvägen 7, 139 50 Idrottsvägen 4A, 134 40 stavsberg, Sverige Skärgårdsvägen, 134 44 0 stavsberg, Sverige Viks skolväg 22, 139 35 V Ängsviksvägen 8, 139 50 Boda byväg 28, 139 90 Va Angsviksvägen 8, 139 50 18.48571, 59.32247 Oxövägen 2F, 139 50 Värn Gillets väg 2, 139 50 Vän Boda byväg 28, 139 90 Va Skärgårdsvägen 224, 139 5 Värmdö, Sverige Boda byväg 28, 139 90 V3 Ängsviksvägen 8, 139 50 1 Idrottsvägen 4A, 134 40 0 ntavsberg, Sverige Oxövägen 2F, 139 50 Vär Gillets väg 2, 139 50 Vän Boda byväg 28, 139 90 Vä

Let's get connecting!

armdo, Sverige
ustavsberg, Sverige
ärmdö, Sverige
ustavsberg, Sverige
, Sverige
ustavsberg, Sverige
avsberg, Sverige
färmdö, Sverige
ärmdö, Sverige
30 Värmdö, Sverige
Vänndö, Sverige
I Värmdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
30 Värmdö, Sverige
mdő, Sverige
ärmdö, Sverige
Värmdö, Sverige
Gustavsberg, Sverige
Gustavsberg, Sverige
Farmdö, Sverige
Värmdö, Sverige
ärmdö, Sverige
Värmdö, Sverige
mdő, Sverige
mdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
ärmdö, Sverige
Värmdö, Sverige
Gustavsberg, Sverige
mdö, Sverige
mdö, Sverige
armdis. Sverige



Let's get connecting!

Lean haz standard?



(e)obd-(II) Regulates network protocol and connector semi compulsory list of queries Engine and maintenance information

Lean haz standard?

0 4 PDs segoned [01-20] 1.8 2 Chapma Sensor 7 A Vitage 1 4 Monter status since DFC dates 6, founder of DFC.) 8. Short term hat tim 8. Short term hat tim 2 2 Freez DFC 8. Short term hat tim 8. Short term hat tim 4 1 Calculated explore had 18 2 8. Short term hat tim 5 1 Explore for target fo	PID (hex)	Data bytes returned	Description	PID (hex)	Data bytes returned	Description		
Image: Constraint of the status size of CDCs / classes (productor large MR.) Image: Constraint of CD / classes (productor large MR.) Image: Constraint of CD / classes Image: Constraint of CD / classes 3 2 Preses DTC B Dolgen Benox B A Nongen Benox B 4 2 Preses DTC B Dolgen Benox B A Nongen Benox B 5 1 Casuad de regine bold B C 1 Obygen Benox B 6 1 Dord term fuel ton-Bark 1 B 1 Output status 7 4 Long term fuel ton-Bark 2 10 4 Presence regine tatt 60 1 Train gold social pressure 12 2 Part Bard Bearse (picture term fuel ton Bark 2) 7 4 Long term fuel ton-Bark 2 12 2 Part Bard Bearse (picture term fuel ton match 2) 60 1 Instatus multical castary terms 2 12 2 Part Bard Bearse (picture term fuel ton Bark 2) 10 2 MAAT ari fore trats 2 Part Bard Bearse (picture term fuel ton Bark 2) 11 1	particular second		PIDs supported (01 - 20)					
L Compare Sensor 8 2 Protect DTC 3 2 Fuel system status 4 Canceled and member of DTCs.) 5 1 Engine Sensor 8 6 1 Canceled and member of DTCs.) 7 1 Canceled and members of DTCs.) 7 1 Canceled and members of DTCs.) 8 1 Canceled and members of DTCs.) 9 1 Lengtsm half in-metax.2 10 1 Canceled and members of DTCs.) 11 1 Fail Real Gauge Pressure (Ide Lawk) 12 1 Part Real Pressure onjust status 13 1 Congen Sensor 1 14 1 Timing abasec 15 1 Convagen Sensor 1				1A	5			
3 2 Fuel splam status 3 2 Fuel splam status 4 1 Circulated engine load 12 1 OBD standards Rive vehicle contorms to 5 1 Engine contain timegentature 10 1 Origin sensors present (in 4 bank) 6 1 Bhort tem fuel tim—Bark 1 10 1 Auxiliary rapit status 7 1 Long tem bark film—Bark 2 2 Rut me since engine stat 9 1 Long tem bark film—Bark 2 2 2 Plant Tem statuce engine stat 06 1 Bread tem hast imm—Bark 2 2 2 Plant Hall Pressure (ideal, or gassline direct impt(Mi, on 06 1 Under sensore 22 2 Plant Hall Pressure (ideal, or gassline direct impt(Mi, on 06 1 Under sensore 23 2 Fuel pressure (ideal, and status 14 1 Timing advance 10 2 All Foot-Art Equivalinon Ratio 14 2 All Foot-Art Equivalinon Ratio 0 Untage 14 2 <td>- 1</td> <td></td> <td>status and number of DTCs.)</td> <td></td> <td></td> <td>Oxypen Sensor 8</td>	- 1		status and number of DTCs.)			Oxypen Sensor 8		
3 2 Print parameter 4 1 Calculated engine load 10 1 Object standards this vehicle conforms to 5 1 Engine contact temperatures 10 1 Output sensors present (in 4 Lanks) 6 1 Short tem fuel timBack 1 10 1 Output sensors present (in 4 Lanks) 8 1 Short tem fuel timBack 2 11 1 Auxiliary sign t stans 9 1 Long tem fuel timBack 2 2 Run time since engine stat 06 1 Fuel pressure 12 2 Poil Hail Pressure (relative to manified velocum) 06 1 Unities at temperature 23 2 Fuel Rai Gauge Presuue (relative to manified velocum) 06 1 Unities at temperature 0 0 0 0 06 1 Intradia sa temperature 12 6 4 Alt Fuel-Act Equivalence Rate 11 1 Throng advance 0 0 0 0 0 12 1 Com	2	2	Freeze DTC	1.0	2			
4 1 Catolisation region to degree to de	3	5	Fuel system status					
3 1 Ergen costant imperations 6 1 Both term fuel frim—Bank 1 7 1 Long term ball frim—Bank 2 8 1 Short term fuel frim—Bank 2 9 1 Long term ball frim—Bank 2 9 1 Long term fuel frim—Bank 2 9 1 Long term fuel frim—Bank 2 0A 1 Fuel framsult frim—Bank 2 0 1 Fuel framsult f	- 4	1	Calculated engine load					
i Output Output Image: Constraint of the constent of the constraint of the constraint of the constra	5	1	Engine coolant temperature					
is Congrammentation Congrammentation is 1 Congrammentation Congram	6	1	Short term fuel trim-Bank 1					
a 1 Short term fuel from - Bark 2 3 2 3 2 3 3 2 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3	7	1	Long term fuel trim-Bank 1					
9 1 Long term hast PinBank 2 0A 1 Fuel Pressure 0a 1 Initialiar manifold aboolds pressure 0c 2 Engine RPM 0c 1 Which speed 0c 1 Initial associe 0c 1 Initial associe 0c 1 Initial associe 0c 1 Orogen Sensor 2 0cr 1 Orogen Sensor 2 0cr 1 Orogen Sensor 3 11 Orogen Sensor 1 Orogen Sensor 4 12 Orogen Sensor 1 Orogen Sensor 4 13 Orogen Sensor 2 Part Hail Piet-Art Equivalence Ratio 14 2 Art Net-Art Equivalence Ratio 15 2 Art Stand term huel term 16 2 Art Net-Art Equivalence Ratio 17 <td></td> <td>1</td> <td>Short term fuel trim-Bank 2</td> <td></td> <td></td> <td></td>		1	Short term fuel trim-Bank 2					
OK 1 Pull pressure Ga 1 Initiale markfold isoluting pressure Gc 2 Engine RPM Go 1 Whitcle speed Gr 1 Whitcle speed Gr 1 Training advance Gr 1 Initiale ait temperature Gr 1 Initiale ait temperature Gr 1 Onryan Sensor 1 Gr 1 Initiale ait temperature Gr 1 Onryan Sensor 2 Gr AB: Float-Ar Equivalence Ratio CD: Voltage CD: Voltage 13 1 Onryan Sensor 1 Gr AB: Float-Ar Equivalence Ratio CD: Voltage CD: Voltage 14 2 AB: Float-Ar Equivalence Ratio CD: Voltage B: Short tem huel tem 15 2 A: Voltage 16 2 A: Voltage 17 2 A: Voltage 18 COryagen Sensor 3 A: Short tem huel tem B		1	Long term fuel trim-Bank 2					
oa i industry pressure ic 2 Engine RPM AB: Fuel-AE Equivalence Ratio ic 1 Thring advance Organ Sensor 1 ice 1 Thring advance Organ Sensor 2 ice 1 Intraction and temperature Organ Sensor 2 ice 1 Intraction and temperature Organ Sensor 2 ice 1 Conversal temperature Organ Sensor 1 ice 0 MAR are temperature Organ Sensor 1 ice 0 Organ Sensor 1 Organ Sensor 2 ice 0 Organ Sensor 1 Organ Sensor 1 ice 0 Organ Sensor 2 Organ Sensor 3 ice 0 Organ Sensor 3 Organ Sensor 4 ice 0	0A	1	Fuel pressure					
0c z Lington Horid $0c$ 1Unique Horid $0c$ 1Unique Horid $0c$ 1Unique Anace $0c$ 1Intake air temperature $0c$ 1Intake air temperature 10 2MAF air flow rate 10 2MAF air flow rate 11 1Thrattle position 12 1Commanded econdary air status 13 1Commanded econdary air status 13 1Commanded econdary air status 14 2Origen Sensor 1 14 2Origen Sensor 2 15 2Active Voltage 16 2Origen Sensor 2 15 2Active Voltage 16 2Origen Sensor 3 13 2Origen Sensor 4 14 2Origen Sensor 1 15 2Active Voltage 16 2Origen Sensor 3 16 2Origen Sensor 3 17 2Active Voltage 18 2Active Voltage 19 2Active Voltage 19 2Active Voltage 19 2Active Voltage 10 10 10 10 10 10 10 10 10 10 10 10 10	08	1	Intake manifold absolute pressure	23	5			
601Which speedCD: Voltage671Initiak as itemperature254Orgen Sensor 2671Initak as itemperature254Orgen Sensor 2102MAF air flow rate00 rigen Sensor 3264AB: Fuel - Air Equivalence Ratio111Throthis position264AB: multi-Air Equivalence Ratio00 rigen Sensor 3131Commanded secondary air status264AB: multi-Air Equivalence Ratio142Orgen Sensor 100 rigen Sensor 1274AB: multi-Air Equivalence Ratio152A: Voltage00 rigen Sensor 200 rigen Sensor 300 rigen Sensor 4162Origen Sensor 2300 rigen Sensor 43162Origen Sensor 3284Origen Sensor 4162Origen Sensor 3284AB: Fuel - Air Equivalence Ratio162Origen Sensor 3300 rigen Sensor 43172A: Voltage00 rigen Sensor 53182A: Voltage00 rigen Sensor 53182A: Voltage00 rigen Sensor 53192B: Short term fuel tion284Origen Sensor 6192A: Voltage201Commanded EGR192B: Short term fuel tion281Commanded EGR192B: Short term fuel tion281Commanded EGR <td>0C</td> <td>2</td> <td>Engine RPM</td> <td></td> <td></td> <td></td>	0C	2	Engine RPM					
OP 1 Initials air temperature 25 4 AB: Pols-At Equivalence Ratio (D. Voltage 10 2 MAF air flow rate 0 </td <td>00</td> <td>1</td> <td>Vehicle speed</td> <td>24</td> <td></td> <td></td>	00	1	Vehicle speed	24				
No 1 Under all implementation 10 CD: Voltage 10 2 MAF air flow rate CD: Voltage 11 1 Thruttlie position AB: Fuel-Arc Equivalence Ratio 12 1 Conversaled secondary air status 13 1 Oncygen sensors present (in 2 banks) 14 2 A: Voltage 14 2 A: Voltage 15 2 A: Voltage 15 2 A: Voltage 16 2 A: Voltage 15 2 A: Voltage 16 2 A: Voltage 16 2 A: Voltage 17 2 A: Voltage 18 2 A: Voltage 18 2 A: Voltage 18 2 B: Short term fuel term 18 2 B: Short term fuel term 19 2 B: Short term fuel term 19 2 B: Short term fuel term	08	1	Timing advance			Oxygen Sensor 2		
10 2 MAF at flow rate 11 1 Throthe position AB: Fuel-Ar Equivalence Ratio 12 1 Commanded secondary at status CD: Voltage 13 1 Oxygen Sensor 4 CD: Voltage 14 2 Chypen Sensor 1 CD: Voltage 14 2 B: Short term fuel term CD: Voltage 15 2 Chypen Sensor 2 CD: Voltage 16 2 A: Voltage CD: Voltage 16 2 CD: Voltage CD: Voltage 15 2 CD: Voltage CD: Voltage 16 2 A: Voltage CD: Voltage 16 2 A: Voltage CD: Voltage 16 2 A: Voltage CD: Voltage 17 2 CD: Voltage CD: Voltage 18 2 A: Voltage CD: Voltage 19 2 A: Voltage CD: Voltage 18 2 A: Voltage CD: Voltage 18 <	017	1	Intake air temperature	25	4			
11 1 Throthis position 26 4 AB: Fuel-Ar Equivalence Platic 12 1 Commanded secondary air status CD: Voltage CD: Voltage 13 1 Oxygen sensor 1 CD: Voltage CD: Voltage 14 2 A: Voltage CD: Voltage CD: Voltage 14 2 A: Voltage CD: Voltage CD: Voltage 15 2 A: Voltage CD: Voltage CD: Voltage 16 2 A: Voltage CD: Voltage CD: Voltage 16 2 A: Voltage CD: Voltage CD: Voltage 16 2 A: Voltage CD: Voltage CD: Voltage 17 2 Corgen Sensor 4 CD: Voltage CD: Voltage 18 2 Corgen Sensor 5 CD: Voltage CD: Voltage 18 2 Corgen Sensor 4 CD: Voltage CD: Voltage 19 2 R: Voltage CO: Voltage CD: Voltage 19 2 R: Voltage CO: Voltage CO: Voltage 19 2 R: Voltage CO: Voltage CO: Voltage 19 2 R: Voltage CO: Voltage CO: Voltage 19 2 R: Vol	1.0	2	MAF air flow rate					
12 1 Commanded secondary air status CD: Voltage 13 1 Oxygen sensors present (in 2 banka) 27 4 Chygen Sensor 4 14 2 Chygen Sensor 1 Chygen Sensor 2 Chygen Sensor 5 14 2 B: Short term huel trim 28 4 AB: Fuel-A: Equivalence Ratio 15 2 Chygen Sensor 2 Chygen Sensor 5 Chygen Sensor 5 15 2 A: Voltage Chygen Sensor 5 Chygen Sensor 5 16 2 B: Short term huel trim Chygen Sensor 4 Chygen Sensor 6 16 2 A: Voltage Chygen Sensor 7 Chygen Sensor 7 17 2 Chygen Sensor 5 Chygen Sensor 7 Chygen Sensor 7 18 2 Chygen Sensor 5 Chygen Sensor 6 Chygen Sensor 7 18 2 Chygen Sensor 5 Chygen Sensor 6 Chygen Sensor 7 18 2 Chygen Sensor 5 Chygen Sensor 6 Chygen Sensor 6 18 2 A: Voltage Chygen Sensor 6 Chygen Sensor 6 19 2 Chygen Sensor 5 Chygen Sensor 6 Chygen Sensor 6 19 2 Chygen Sensor 5 Chygen Sensor 6 Chygen Sensor 6 18 <	11	1	Thrattle position	26	4			
10 10 Output for construction 14 2 A: Woltage 14 2 A: Woltage 15 2 A: Woltage 15 2 A: Woltage 15 2 A: Woltage 16 2 A: Woltage 17 2 A: Woltage 18 2 Oxygen Sensor 4 18 2 Oxygen Sensor 5 18 2 A: Woltage 19 2 A: Woltage <td>12</td> <td>1</td> <td>Commanded secondary air status</td> <td></td> <td></td> <td></td>	12	1	Commanded secondary air status					
Life Chycles Sensor 1 A: Witage Chycles Sensor 2 B: Short term fuel term 15 2 A: Witage 15 2 A: Witage 16 2 A: Witage 16 2 A: Witage 16 2 A: Witage 17 2 A: Witage 18 2 A: Witage 19 2 A: Witage	1.3	1	Oxygen sensors present (in 2 banks)					
14 2 A: Yolinge B: Short term huel term 15 2 A: Yolinge B: Short term huel term 15 2 A: Yolinge A: Yolinge B: Short term huel term 16 2 A: Yolinge A: Yolinge B: Short term huel term 16 2 A: Yolinge A: Yolinge B: Short term huel term 17 2 A: Yolinge B: Short term huel term 17 2 A: Yolinge B: Short term huel term 18 2 A: Yolinge B: Short term huel term 18 2 A: Yolinge B: Short term huel term 18 2 A: Yolinge B: Short term huel term 19 2 A: Yolinge B: Short term huel term				27	- 4			
Image: Comparison of the compar	14	2						
15 2 A: Votage Orygen Sensor 6 16 2 B: Short term fuel trim 19 4 Orygen Sensor 6 16 2 A: Votage 0 0 16 2 B: Short term fuel trim 19 4 AB: Fuel-Ar: Equivalence Ratio CD: Votage 17 2 Orygen Sensor 4 A: Votage 0 0 18 2 Orygen Sensor 5 B: Short term fuel trim 28 4 AB: Fuel-Ar: Equivalence Ratio CD: Votage 18 2 Orygen Sensor 5 B: Short term fuel trim 22 1 Orygen Sensor 8 18 2 A: Votage B: Short term fuel trim 22 1 Commanded EGR 19 2 B: Short term fuel trim 22 1 Commanded EGR 19 2 B: Short term fuel trim 28 1 Commanded evagorative purge				28	4	AB: Fuel-Air Equivalence Ratio		
Image: Construction of the co	15	2						
16 2 Chypen Sensor 3 A: Voltage CD: Voltage 17 2 B: Short term fuel tim 2A AB: Fuel-AE: Equivalence Ratio CD: Voltage 17 2 A: Voltage 2A AB: Fuel-AE: Equivalence Ratio CD: Voltage 17 2 A: Voltage 2A AB: Fuel-AE: Equivalence Ratio CD: Voltage 18 2 Chypen Sensor 5 A: Voltage Corrypen Sensor 8 B: Short term fuel tim 18 2 A: Voltage B: Short term fuel tim 2B 19 2 A: Voltage B: Short term fuel tim 2E 19 2 B: Short term fuel tim 2E 19 2 B: Short term fuel tim 2E			B: Short term fuel trim					
Image: Constraint of the constr				29				
17 2 Orgen Senor 4 A: Voltage B: Shot term fuel bin 2A 4 AB: Fuel-A: Equivalence Ratio CD: Voltage 18 2 Orgen Senor 5 A: Voltage B: Shot term fuel bin 2B 4 Orgen Senor 8 CD: Voltage 18 2 Orgen Senor 5 A: Voltage B: Shot term fuel bin 2C 1 Commanded EGR 19 2 A: Voltage B: Shot term fuel bin 2E 1 Commanded evaporative purge	16	2				Oxygen Sensor 7		
17 2 A: Voltage C: Voltage 18 2: B: Shot term fuel bin 2: B: Shot term fuel bin 18 2: B: Shot term fuel bin 18 2: B: Shot term fuel bin 18 2: B: Shot term fuel bin 19 2: B: Shot term fuel bin				28	4			
Image: Comparison of the compar	17	2	A: Voltage					
Lis 2 A: Voltage B: Shot term fuel trim 2C 1 CD: Voltage 19 2 A: Voltage B: Shot term fuel trim 2C 1 Convenanded EGR 19 2 A: Voltage B: Shot term fuel trim 2D 1 EGR Error 19 2 B: Shot term fuel trim 2E 1 Commanded evaporative purpe				20				
B: Short term fuel trim 2C 1 Conveanded EGR 19 2 A: Votage B: Short term fuel trim 2D 1 EGR Error 19 2 A: Votage B: Short term fuel trim 2E 1 Commanded evaporative purge								
19 2 A: Votage 28 1 Commanded evaporative purge	1.0	2		36	1	Commanded EGR		
19 2 A: Votage 28 1 Commanded evaporative purge			Oxygen Sensor 6	20	1	EGR Error		
B: Short Rem fuel trim	19	2	A: Voltage	28	1	Commanded evaporative purge		
IF I FUELTARA LEVEL IPOL			8: Short term fuel trim	28	1	Fuel Tank Level Input		

Description
Warm-ups since codes cleared
Distance traveled since codes cleared
Evap. System Vapor Pressure
Absolute Barometric Pressure
Oxygen Sensor 1 AB: Fuel-Air Equivalence Ratio CD: Current
Oxygen Sensor 2 AB: Fuel-Air Equivalence Ratio CD: Current
Oxygen Sensor 3 AB: Fuel-Air Equivalence Ratio CD: Current
Oxygen Sensor 4 AB: Fuel-Air Equivalence Ratio CD: Current
Oxygen Sensor 5 AB: Fuel-Air Equivalence Ratio CD: Current
Oxygen Sensor 6 AB: Fuel-Air Equivalence Platio CD: Current
Oxygen Sensor 7 AB: Fuel-Air Equivalence Ratio CD: Current
Oxygen Sensor 8 AB: Fuel-Air Equivalence Ratio CD: Current
Catalyst Temperature: Bank 1, Sensor 1
Catalyst Temperature: Bank 2, Sensor 1
Catalyst Temperature: Bank 1, Sensor 2
Catalyst Temperature: Bank 2, Sensor 2
PIDs supported [41 - 60]
Monitor status this drive cycle
Control module voltage
Absolute load value
Fuel-Air commanded equivalence ratio
Relative throttle position
Ambient air temperature
Absolute throttle position B
Absolute throttle position C

ND	Data bytes	Provide State
юх)	returned	Description
49	1	Accelerator pedal position D
4A	1	Accelerator pedal position E
48	1	Accelerator pedal position F
éC.	1	Commanded throttle actuator
4D	2	Time run with MIL on
48	2	Time since trouble codes cleared
41	4	Maximum value for Fuel-Air equivalence ratio, oxygen sensor voltage, oxygen sensor current, and intake manifold absolute pressure
50	4	Maximum value for air flow rate from mass air flow sensor
51	1	Fuel Type
52	1	Ethanol fuel %
53	2	Absolute Evap system Vapor Pressure
54	2	Evap system vapor pressure
55	2	Short term secondary oxygen sensor trim, A: bank 1, B: bank 3
56	2	Long lerm secondary oxygen sensor trim, A: bank 1, B: bank 3
5.7	2	Short term secondary oxygen sensor trim, A: bank 2, B: bank 4
58	2	Long term secondary oxygen sensor trim, A: bank 2, B: bank 4
59	2	Fuel rail absolute pressure
5A	1	Relative accelerator pedal position
58	1	Hybrid battery pack remaining life
9C	1	Engine oil temperature
5Ð	2	Fuel injection timing
5E	2	Engine fuel rate
5P	1	Emission requirements to which vehicle is designed
60	4	PIDs supported [61 - 80]
61	1	Driver's demand engine - percent torgue
62	1	Actual engine - percent torque
63	2	Engine reference torque
64	5	Engine percent torque data
65	2	Auxiliary input / output supported
66	5	Mass air flow sensor
67	3	Engine-coolant temperature
68	7	Intake air temperature sensor
69	7	Commanded EGR and EGR Error
6A.	5	Commanded Diesel intake air flow control and relative intake air flow position
68	5	Exhaust gas recirculation temperature

6C 5 Commanded thrattle actuator core 6D 6 Fuel pressure 6E 5 Hylection pressure 6F 3 Turbooharger compr 70 9 Boost press 71 5 Variable Geometry 1 72 5 Wastlegat 73 5 Exhaust 1 74 5 Turbooharger 75 7 Turbooharger 76 7 Turbooharger 76 7 Turbooharger 77 5 Charge air cooler to 78 7 Diesel particula 79 9 Exhaust Gas temper 79 9 Exhaust Gas temper 70 9 Diesel particula 70 9 Diesel particula 70 9 Diesel particula 71 1 NOk NTE contr 72 13 Engine run time for Auxiliary En 73 5 NOk NTE contr	Descr	Data bytes returned	PID (hex)
68 5 Injection pressur 67 3 Turbocharger compr 70 9 Boost press 71 5 Variable Geometry 72 5 Wariable Geometry 73 5 Exhaust 74 5 Turbocharger 74 5 Turbocharger 76 9 Exhaust 74 7 Turbocharger 77 8 Charge air cooler to 78 9 Exhaust Gas temper 79 9 Exhaust Gas temper 79 9 Diesel particult 70 0 Diesel particult 70 1 NCN NTE cont 70 1 NCN NTE cont 71 1 PM INTE cont 72 13 Engine run time for Auxiliary En 73 5 NCN to state 74 21 Engine run time for Auxiliary En 75 1 NCN tor state 76 <td>Commanded throttle actuator cor</td> <td>5</td> <td>6C</td>	Commanded throttle actuator cor	5	6C
6P 3 Turbocharger compr 70 9 Boost press 71 5 Variable Geometry 72 5 Wastlegat 73 6 Exhaudt 74 5 Turbocharger 75 7 Turbocharger 76 7 Turbocharger 76 7 Turbocharger 77 5 Charge air cooler to 78 7 Turbocharger 79 9 Exhaust Gas temper 79 9 Exhaust Gas temper 70 9 Diesel particular tilts 70 9 Diesel particular tilts 70 1 NOR NTE contr 71 13 Engine run time for Auxiliary Er 80 4 PID support 81 21 Engine run time for Auxiliary Er 82 21 Engine run time for Auxiliary Er 83 5 NOx reager 84 Maniloid surfac <	Fuel pressure (6	6D
70 9 Boost pess 71 5 Variable Geometry 72 5 Wariable Geometry 73 5 Exhauting 74 5 Turbocharger 74 7 Turbocharger 76 7 Turbocharger 77 8 Charge air cooler to 78 9 Exhaust Gas temper 79 9 Exhaust Gas temper 74 7 Diesel particula 78 7 Diesel particula 79 9 Exhaust Gas temper 74 7 Diesel particula 75 9 Diesel particula 70 1 NOx NTE contr 71 13 Engine r 72 13 Engine res 74 7 Dissel particula 75 1 PM NTE contr 76 4 PIDs support 81 21 Engine run time for Auxuilary En 82 <	Injection pressure	5	68
71 5 Variable Geometry 72 5 Waringat 73 5 Exhaust 74 5 Turbocharger 74 7 Turbocharger 76 7 Turbocharger 77 6 Charge air cooler to 78 9 Exhaust Gas temper 78 9 Exhaust Gas temper 78 7 Diesel particula 79 9 Exhaust Gas temper 7A 7 Diesel particular filto 7D 1 NOx NTE contr 7E 1 PM NTE contr 7F 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary En 82 5 NOx reage 84 Manifold surfac 85 NOx reage	Turbocharger compr	3	67
72 5 Wastegat 73 5 Exhautt 74 5 Turbocharger 75 7 Turbocharger 76 7 Turbocharger 77 5 Charge air cooler to 78 9 Exhaust Gas temper 78 9 Exhaust Gas temper 78 7 Diesel particult 78 7 Diesel particult 78 9 Exhaust Gas temper 79 7 Diesel particult 78 9 Diesel Particulate filte 79 7 Diesel Particulate filte 70 1 NOx NTE cont 71 1 PM NTE cont 72 13 Engine r 74 1 PM NTE cont 77 13 Engine r 78 21 Engine run time for Auxiliary En 81 21 Engine run time for Auxiliary En 82 5 NOx reage 84<	Boost press	9	70
73 5 Exhault 74 5 Turbocharger 75 7 Turbocharger 76 7 Turbocharger 77 6 Charge air cooler to 78 9 Exhaust Gas temper 78 9 Exhaust Gas temper 78 7 Diesel particul 78 7 Diesel particul 78 7 Diesel particul 78 7 Diesel particul 79 9 Exhaust Gas temper 79 9 Exhaust Gas temper 79 9 Diesel particul 70 Diesel particulate filte To 71 1 NOx NTE contr 72 13 Engine r 74 1 PM NTE contr 77 13 Engine r 80 4 PiDs support 81 21 Engine run time for Auxiliary En 82 5 NOx te 84 Ma	Variable Geometry	5	71
14 5 Turbocharger 15 7 Turbocharger 76 7 Turbocharger 77 5 Charge air cooler to 78 9 Exhaust Gas temper 79 9 Exhaust Gas temper 78 7 Diesel particular 78 7 Diesel particular 79 9 Exhaust Gas temper 79 9 Diesel Particulate filt 70 1 NOx NTE contr 70 1 PM NTE contr 70 1 PM NTE contr 71 13 Engine r 80 4 PIDs supper 81 21 Engine run time for Auxiliary En 83 5 NOx te 84 Manifold surfac 84	Wastegat	5	72
115 7 Turbocharger 176 7 Turbocharger 177 5 Charge air cooler ter 178 9 Exhaust Gas temper 179 9 Exhaust Gas temper 178 7 Diesel particula 178 7 Diesel particula 170 1 NCx NTE control 170 1 PM NTE control 171 1 NCx NTE control 172 13 Engine r 180 4 PIDs support 181 21 Engine run time for Auxiliary En 182 5 NCX es 183 5 NCX es 184 Manifold surfact 185 NCX reage	Exhaust	5	73
76 7 Turbochage 77 5 Charge air cooler to 78 9 Exhaust Gas temper 79 9 Exhaust Gas temper 78 7 Diesel particula 78 7 Diesel particulate file 70 1 NCx NTE control 70 1 PM NTE control 71 13 Engine 80 4 PIDs support 81 21 Engine run time for Auxiliary En 83 5 NOx saliary En 84 Manifold surfac NOx reage 84 Particulate matter	Turbochar	5	34
TT 6 Charge air cooler to 78 9 Exhaust Gas temper 79 9 Exhaust Gas temper 78 7 Diesel particular 78 7 Diesel particular 70 9 Diesel particular 70 1 NOx NTE contr 72 1 PM NTE contr 72 13 Engine r 70 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary Engine run time for Auxil	Turbocharger	7	75
70 9 Exhaust Gas temper 79 9 Exhaust Gas temper 78 7 Diesel particular 70 9 Diesel particular 70 9 Diesel particular 70 9 Diesel Particular 70 1 NOx NTE contr 70 1 PM NTE contr 70 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary En 82 21 Engine run time for Auxiliary En 83 5 NOx reage 84 Manifold surfac 85 NOx reage 86 Particulate mat	Turbocharger	7	76
79 9 Exhaust Gas temper 7A 7 Diesel particular 7B 7 Diesel particular 7C 9 Diesel Particular 7D 1 NOx NTE contr 7F 1 PM NTE contr 7P 13 Engine 1 80 4 PIDs support 81 21 Engine run time for Auxiliary En 82 21 Engine run time for Auxiliary En 83 5 NOx reage 84 Manifold surfac NOx reage 86 Particulate matt Particulate matter	Charge air cooler te	5	77
TA T Diesel particula 7B 7 Diesel particula 7C 9 Diesel Particulate file 7D 1 NOx NTE contr 7E 1 PM NTE contr 7F 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary En 83 5 NOx N e spite 84 Manifold surfact NOx reage 86 Particulate matter NOX reage	Exhaust Gas temper	9	78
7B 7 Diesel particular 3C 9 Diesel Particular file 3D 1 NOx NTE contr 7E 1 PM NTE contr 7F 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary En	Exhaust Gas temper	9	79
TC 9 Diesel Particulate file 7D 1 NOx NTE control 7E 1 PM NTE control 7P 13 Engine of the second se	Diesel particula	7	7A
7D 1 NOx NTE cont 7E 1 PM NTE cont 7P 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary Engine ran time for Auxiliary Engine run time	Diesel particula	7	78
7E 1 PM NTE contr 7F 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary En 82 21 Engine run time for Auxiliary En 83 5 NOx s 84 Manifold surfac 85 NOx reage 86 Particulate matt	Diesel Particulate filte	9	7C
Tr 13 Engine r 80 4 PIDs support 81 21 Engine run time for Auxiliary Engine run	NOx NTE cont	1	70
80 4 PIDs support 81 21 Engine run time for Auxiliary En 82 21 Engine run time for Auxiliary En 83 5 NOx s 84 Manifold surfac 85 NOx reage 86 Particulate matting	PM NTE contr	1	78
81 21 Engine run time for Auxiliary En 82 21 Engine run time for Auxiliary En 83 5 NOx s 84 Manifold surfac 85 NOx reage 86 Particulate matt	Engine	13	717
82 21 Engine run time for Auxiliary En 83 5 NOx s 84 Manifold surfac 85 NOx reage 86 Particulate matt	PIDs support	4	80
83 5 NOx s 84 Manifold surfac Manifold surfac 85 NOx reage NOx reage 86 Particulate matter NOX reage	Engine run time for Auxiliary En	21	81
Nanifold surfac S NOx reage Periculate matt	Engine run time for Auxiliary En	21	82
85 NOx reage 86 Particulate matt	NOx s	5	83
86 Particulate matt	Manifold surfac		- 84
	NOx reage		85
87 Intake manifold a	Particulate matt		86
	Intake manifold a		87



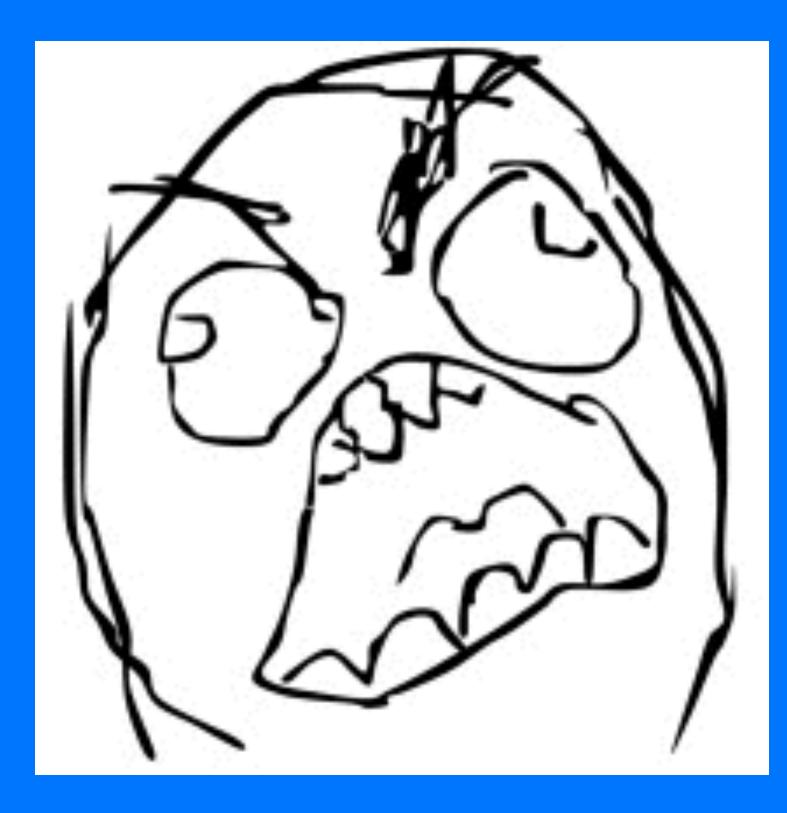
contra approxim
re control system
ressor infet pressure
sure control
turbo (VGT) control
ite control
pressure
irger RPM
r temperature
r temperature
emperature (CACT)
nature (EGT) Bank 1
nature (EGT) Bank 2
late filter (DPF)
late filter (DPF)
ter (DPF) temperature
trol area status
trol area status
run Sme
rted [81 - A0]
missions Control Device(AECD)
missions Control Device(AECD)
sensor
ce temperature
ent system
ter (PM) sensor
absolute pressure

(e)obd compliance

(e)obd compliance

00	01	02	03	04	05	06	07	08	09	0a	0b	0c	0d	0e	0f
10	11	12	13	14	15	16	17	18	19	1a	1b	1c	1d	1e	1f
20	21	22	23	24	25	26	27	28	29	2a	2b	2c	2d	2e	2f
30	31	32	33	34	35	36	37	38	39	3a	3b	3c	3d	3e	3f
40	41	42	43	44	45	46	47	48	49	4a	4b	4c	4d	4e	4f
50	51	52	53	54	55	56	57	58	59	5a	5b	5c	5d	5e	5f
60	61	62	63	64	65	66	67	68	69	6a	6b	6c	6d	6e	6f
70	71	72	73	74	75	76	77	78	79	7a	7b	7c	7d	7e	7f
80	81	82	83	84	85	86	87	88	89	8a	8b	<mark>8</mark> c	8d	8e	8f

(e)obd compliance







• Target a specific vehicle

THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET





- Target a specific vehicle
- Use common features





- Target a specific vehicle
- Use common features
- Bring your own features





Back to our example

- Target a specific vehicle
- Use common features
- Bring your own features

6	2017-01-01	20:11	2017-01-01	20:21	7.3	Angsviksvagen Z, 139 50 Varmdo, Sverige
7	2017-01-02	15:33	2017-01-02	15:58	18.5	Boda byväg 28, 139 90 Värmdö, Sverige
8	2017-01-02	16:40	2017-01-02	17:11	18.7	Afrodites väg 4, 134 44 Gustavsberg, Sverige
9	2017-01-05	09:39	2017-01-05	10:12	21.7	Boda byväg 28, 139 90 Värmdö, Sverige
0	2017-01-05	12:10	2017-01-05	12:18	3.5	Ösby badväg 3, 134 38 Gustavsberg, Sverige
۰,	2017-01-05	12:21	2017-01-05	12:25	1.0	222, 134 44 Gustavsberg, Sverige
2	2017-01-05	12:52	2017-01-05	12:56	0.8	MEDEAS VÄG 1, 134 44 Gustavsberg, Sverige
5	2017-01-05	13:14	2017-01-05	13:21	3.4	Fenix väg 4, 134 44 Gustavsberg, Sverige
4	2017-01-05	13:25	2017-01-05	13:45	15.7	Viks skolväg 22, 139 35 Värmdö, Sverige
6	2017-01-06	19:17	2017-01-06	19:37	14.3	Boda byväg 2B, 139 90 Värmdö, Sverige
6	2017-01-06	19:55	2017-01-06	19:58	1.0	Skärgårdsvägen 266, 139 30 Värmdö, Sverige
2	2017-01-06	20:03	2017-01-06	20:06	1.8	Centrumvägen 1, 139 30 Värmdö, Sverige
ŧ,	2017-01-06	20:18	2017-01-06	20:34	12.3	Torsby Älgstig 1-3, 139 51 Värmdö, Sverige
2	2017-01-07	13:45	2017-01-07	14:06	16.0	Boda byväg 2B, 139 90 Värmdö, Sverige
e,	2017-01-07	16:18	2017-01-07	16:21	1.7	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
n)	2017-01-07	16:36	2017-01-07	16:44	6.3	Skärgårdsvägen 268, 139 30 Värmdö, Sverige
2	2017-01-07	16c47	2017-01-07	16:58	7.9	Oxövägen 2F, 139 50 Värmdö, Sverige
9	2017-01-09	07:35	2017-01-09	07:46	7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
4	2017-01-09	07:52	2017-01-09	08:17	15.2	Ängsviksvägen 9, 139 50 Värmdö, Sverige
6	2017-01-09	15:53	2017-01-09	16:03	4.3	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
¢	2017-01-09	16:13	2017-01-09	16:21	3.5	Skärgårdsvägen, 134 44 Gustavsberg, Sverige
7	2017-01-09	16:23	2017-01-09	16:35	8.2	Viks skolväg 22, 139 35 Värmdö, Sverige
s,	2017-01-09	16:49	2017-01-09	17:01	7.5	Ängsviksvägen 6-8, 139 50 Vänndö, Sverige
s,	2017-01-10	07:43	2017-01-10	07:54	7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
a,	2017-01-10	08:05	2017-01-10	08:15	7.0	Ängsviksvägen 8, 139 50 Värmdö, Sverige
n)	2017-01-10	16:04	2017-01-10	16:13	6.5	18.48574, 59.32245
12	2017-01-10	16:21	2017-01-10	16:23	0.5	Oxövägen 2F, 139 50 Värmdö, Sverige
0	2017-01-10	16:27	2017-01-10	16:40	7.5	Gillets väg 2, 139 50 Värmdö, Sverige
4	2017-01-10	17:29	2017-01-10	17:52	16.0	Boda byväg 2A, 139 90 Värmdö, Sverige
5	2017-01-10	19:05	2017-01-10	19:25	15.8	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
e,	2017-01-11	07:34	2017-01-11	07:44	7.5	Boda byväg 28, 139 90 Värmdö, Sverige
σ	2017-01-11	07:48	2017-01-11	08:14	15.2	Ängsviksvägen 8, 139 50 Värmdö, Sverige
e,	2017-01-11	15:58	2017-01-11	16:18	15.1	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
ė,	2017-01-11	16:29	2017-01-11	16:31	0.5	Oxövägen 2F, 139 50 Värmdö, Sverige
e.	2017-01-11	16:36	2017-01-11	16:49	7.5	Gillets väe 2, 139 50 Värmdö, Sveriee

Boda byvag 28, 139 90 V MEDEAS VÄG 3, 134 44 G Boda byväg 28, 139 90 V Ösby badväg 3, 134 38 Gs 222, 134 44 Gustavsberg, ORIONS VÄG 6, 134 44 0 Fenix vig 4, 134 44 Gust Viks skolväg 22, 139 35 Boda byväg 28, 139 90 \ Skärgårdsvägen 262, 13 Centrumvägen 1, 139 3 Torsby Algstig 1-3, 139 5 Boda byväg 28, 139 90 kärgårdsvägen 220, 1 Skärgårdsvägen 268, 13 Oxövägen 2F, 139 50 Vä Boda byväg 28, 139 90 V ingsviksvägen 7, 139 5 idrottsvägen 4A, 134 40 Skärgårdsvägen, 134 44 Viks skolväg 22, 139 35 ingsviksvägen 8, 139 5 Boda byväg 28, 139 90 V Angsviksvägen 8, 139 50 8.48571, 59.32247 Oxövägen 2F, 139 50 Väri Gillets väg 2, 139 50 Va Boda byväg 28, 139 90 \ Skärgårdsvägen 224, 13 Boda byväg 28, 139 90 V Ängsviksvägen 8, 139 50 Idrottsvägen 4A, 134 40 Oxövägen 2F, 139 50 Vä Gillets väg 2, 139 50 Vän Boda byväg 28, 139 90 V

armdo, Sverige
ustavsberg, Sverige
ärmdö, Sverige
ustavsberg, Sverige
, Sverige
ustavsberg, Sverige
avsberg, Sverige
Färmdö, Sverige
ärmdö, Sverige
30 Värmdö, Sverige
Vänndö, Sverige
I Värmdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
30 Värmdö, Sverige
mdő, Sverige
ärmdö, Sverige
Värmdö, Sverige o
Gustavsberg, Sverige
Gustavsberg, Sverige
Farmdő, Sverige
Värmdö, Sverige
ärmdö, Sverige
Värmdö, Sverige
40. A
mdő, Sverige
mdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
ärmdö, Sverige Värmdö, Sverige
Värmdö, Sverige Gustavsberg, Sverige
mdö, Sverige
mdö, Sverige
ärmdö. Sverige





Back to our example

- Target a specific vehicle
- Use common features
- Bring your own features

+

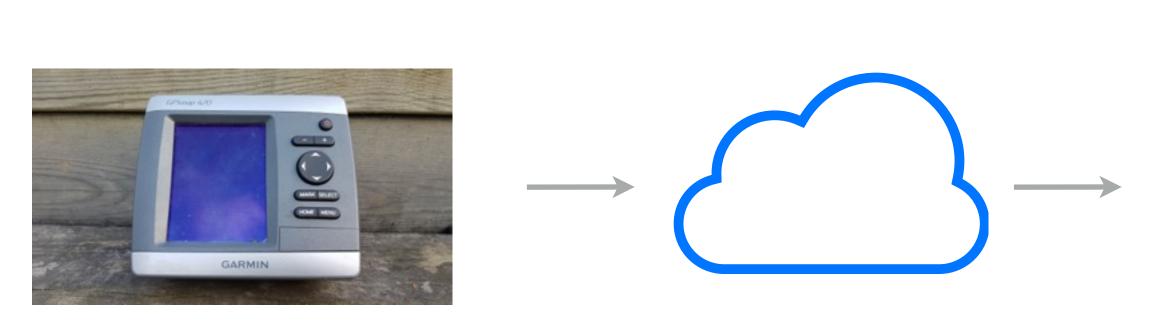


6	2017-01-01	20:11	2017-01-01	20:21	7.3	Angsvikavagen Z, 139 50 Varmdo, Sverige
7	2017-01-02	15:33	2017-01-02	15:58	18.5	Boda byväg 28, 139 90 Värmdö, Sverige
8	2017-01-02	16:40	2017-01-02	17:11	18.7	Afrodites väg 4, 134 44 Gustavsberg, Sverige
9	2017-01-05	09:39	2017-01-05	10:12	21.7	Boda byväg 2B, 139 90 Värmdö, Sverige
0	2017-01-05	12:10	2017-01-05	12:18	3.5	Ösby badväg 3, 134 38 Gustavsberg, Sverige
۰,	2017-01-05	12:21	2017-01-05	12:25	1.0	222, 134 44 Gustavsberg, Sverige
2	2017-01-05	12:52	2017-01-05	12:56	0.8	MEDEAS VÄG 1, 134 44 Gustavsberg, Sverige
3	2017-01-05	13:14	2017-01-05	13:21	3.4	Fenix väg 4, 134 44 Gustavsberg, Sverige
4	2017-01-05	13:25	2017-01-05	13:45	15.7	Viks skolväg 22, 139 35 Värmdö, Sverige
6	2017-01-06	19:17	2017-01-06	19:37	14.3	Boda byväg 2B, 139 90 Värmdö, Sverige
8	2017-01-06	19:55	2017-01-06	19:58	1.0	Skärgårdsvägen 266, 139 30 Värmdö, Sverige
2	2017-01-06	20:03	2017-01-06	20:06	1.8	Centrumvägen 1, 139 30 Värmdö, Sverige
ŧ,	2017-01-06	20:18	2017-01-06	20:34	12.3	Torsby Älgstig 1-3, 139 51 Värmdö, Sverige
2	2017-01-07	13:45	2017-01-07	14:06	16.0	Boda byväg 2B, 139 90 Värmdö, Sverige
e,	2017-01-07	16:18	2017-01-07	16:21	1.7	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
e,	2017-01-07	16:36	2017-01-07	16:44	6.3	Skärgårdsvägen 268, 139 30 Värmdö, Sverige
2	2017-01-07	16c47	2017-01-07	16:58	7.9	Oxövägen 2F, 139 50 Värmdö, Sverige
9	2017-01-09	07:35	2017-01-09	07:46	7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
4	2017-01-09	07:52	2017-01-09	08:17	15.2	Ängsviksvägen 9, 139 50 Värmdö, Sverige
6	2017-01-09	15:53	2017-01-09	16:03	4.3	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
¢	2017-01-09	16:13	2017-01-09	16:21	3.5	Skärgårdsvägen, 134 44 Gustavsberg, Sverige
7	2017-01-09	16:23	2017-01-09	16:35	8.2	Viks skolväg 22, 139 35 Värmdö, Sverige
s,	2017-01-09	16:49	2017-01-09	17:01	7.5	Ängsviksvägen 6-8, 139 50 Vänndö, Sverige
s,	2017-01-10	07:43	2017-01-10	07:54	7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
e,	2017-01-10	08:05	2017-01-10	08:15	7.0	Ängsviksvägen 8, 139 50 Värmdö, Sverige
n)	2017-01-10	16:04	2017-01-10	16:13	6.5	18.48574, 59.32245
12	2017-01-10	16:21	2017-01-10	16:23	0.5	Oxövägen 2F, 139 50 Värmdö, Sverige
3	2017-01-10	16:27	2017-01-10	16:40	7.5	Gillets väg 2, 139 50 Värmdö, Sverige
4	2017-01-10	17:29	2017-01-10	17:52	16.0	Boda byväg 2A, 139 90 Värmdö, Sverige
5	2017-01-10	19:05	2017-01-10	19:25	15.8	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
e.	2017-01-11	07:34	2017-01-11	07:44	7.5	Boda byväg 28, 139 90 Värmdö, Sverige
0	2017-01-11	07:48	2017-01-11	08:14	15.2	Ängsviksvägen 8, 139 50 Värmdö, Sverige
	2017-01-11	15:58	2017-01-11	16:18	15.1	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
ė.	2017-01-11	16:29	2017-01-11	16:31	0.5	Oxövägen 2F, 139 50 Värmdö, Sverige
	2017-01-11	16:36	2017-01-11	16:49	7.5	Gillets väe 2, 139 50 Värmdö, Sverige

Boda byvag 28, 139 90 V MEDEAS VÄG 3, 134 44 G Boda byväg 28, 139 90 V Ösby badväg 3, 134 38 G 222, 134 44 Gustavsberg ORIONS VÄG 6, 134 44 Fenix viig 4, 134 44 Gust Viks skolväg 22, 139 35 Boda byväg 28, 139 90 \ kärgårdsvägen 262, 13 Centrumvägen 1, 139 3 Torsby Algstig 1-3, 139 Boda byväg 28, 139 90 ärgårdsvägen 268, 13 Oxövägen 2F, 139 50 Va loda byväg 28, 139 90 gsviksvägen 7, 139 5 tsvägen 44, 134 4 Skärgårdsvägen, 134 44 Viks skolväg 22, 139 35 gsviksvägen 8, 139 5 Boda byväg 28, 139 90 \ Angsviksvägen 8, 139 5 3.48571, 59.32242 xövägen 2F, 139 50 Vä Gillets väg 2, 139 50 Va Boda byväg 28, 139 90 \ Skärgårdsvägen 224, 13 Boda byväg 28, 139 90 V Ängsviksvägen 8, 139 50 kfrottsvägen 4A, 134 40 Oxövägen 2F, 139 50 Vä Gillets väg 2, 139 50 Vän Boda byväg 28, 139 90 V

armdo, Sverige
ustavsberg, Sverige
ärmdö, Sverige
ustavsberg, Sverige
, Sverige
ustavsberg, Sverige
avsberg, Sverige
Färmdö, Sverige
ärmdö, Sverige
30 Värmdö, Sverige
Vänndö, Sverige
I Värmdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
30 Värmdö, Sverige
mdő, Sverige
ärmdö, Sverige
Värmdö, Sverige o
Gustavsberg, Sverige
Gustavsberg, Sverige
Farmdő, Sverige
Värmdö, Sverige
ärmdö, Sverige
Värmdö, Sverige
40. A
mdő, Sverige
mdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
ärmdö, Sverige Värmdö, Sverige
Värmdö, Sverige Gustavsberg, Sverige
mdö, Sverige
mdö, Sverige
ärmdö. Sverige





Back to our example

- Target a specific vehicle
- Use common features
- Bring your own features

+

6	2017-01-01	20:11	2017-01-01	20:21	7.3	Angsviksvägen Z, 139 50 Varmdo, Sverige
7	2017-01-02	15:33	2017-01-02	15:58	18.5	Boda byväg 28, 139 90 Värmdö, Sverige
8	2017-01-02	16:40	2017-01-02	17:11	18.7	Afrodites väg 4, 134 44 Gustavsberg, Sverige
9	2017-01-05	09:39	2017-01-05	10:12	21.7	Boda byväg 2B, 139 90 Värmdö, Sverige
10	2017-01-05	12:10	2017-01-05	12:18	3.5	Ösby badväg 3, 134 38 Gustavsberg, Sverige
11	2017-01-05	12:21	2017-01-05	12:25	1.0	222, 134 44 Gustavsberg, Sverige
12	2017-01-05	12:52	2017-01-05	12:56	0.8	MEDEAS VÄG 1, 134 44 Gustavsberg, Sverige
13	2017-01-05	13:14	2017-01-05	13:21	3.4	Fenix väg 4, 134 44 Gustavsberg, Sverige
14	2017-01-05	13:25	2017-01-05	13:45	15.7	Viks skolväg 22, 139 35 Värmdö, Sverige
15	2017-01-06	19:17	2017-01-06	19:37	14.3	Boda byväg 2B, 139 90 Värmdö, Sverige
10	2017-01-06	19:55	2017-01-06	19:58	1.0	Skärgårdsvägen 266, 139 30 Värmdö, Sverige
2	2017-01-06	20:03	2017-01-06	20:06	1.8	Centrumvägen 1, 139 30 Värmdö, Sverige
	2017-01-06	20:18	2017-01-06	20:34	12.3	Torsby Älgstig 1-3, 139 51 Värmdö, Sverige
2	2017-01-07	13:45	2017-01-07	14:06	16.0	Boda byväg 2B, 139 90 Värmdö, Sverige
10	2017-01-07	16:18	2017-01-07	16:21	1.7	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
21	2017-01-07	16:36	2017-01-07	16:44	6.3	Skärgårdsvägen 268, 139 30 Värmdö, Sverige
12	2017-01-07	16c47	2017-01-07	16:58	7.9	Oxövägen 2F, 139 50 Värmdö, Sverige
19	2017-01-09	07:35	2017-01-09	07:46	7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
4	2017-01-09	07:52	2017-01-09	08:17	15.2	Ängsviksvägen 9, 139 50 Värmdö, Sverige
6	2017-01-09	15:53	2017-01-09	16:03	4.3	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
10	2017-01-09	16:13	2017-01-09	16:21	3.5	Skärgårdsvägen, 134 44 Gustavsberg, Sverige
17	2017-01-09	16:23	2017-01-09	16:35	8.2	Viks skolväg 22, 139 35 Värmdö, Sverige
18	2017-01-09	16:49	2017-01-09	17:01	7.5	Ängsviksvägen 6-8, 139 50 Värmdö, Sverige
19	2017-01-10	07:43	2017-01-10	07:54	7.5	Boda byväg 2B, 139 90 Värmdö, Sverige
ia)	2017-01-10	08:05	2017-01-10	08:15	7.0	Ängsviksvägen 8, 139 50 Värmdö, Sverige
pr)	2017-01-10	16:04	2017-01-10	16:13	6.5	18.48574, 59.32245
12	2017-01-10	16:21	2017-01-10	16:23	0.5	Oxövägen 2F, 139 50 Värmdö, Sverige
10	2017-01-10	16:27	2017-01-10	16:40	7.5	Gillets väg 2, 139 50 Värmdö, Sverige
4	2017-01-10	17:29	2017-01-10	17:52	16.0	Boda byväg 2A, 139 90 Värmdö, Sverige
15	2017-01-10	19:05	2017-01-10	19:25	15.8	Skärgårdsvägen 220, 139 35 Värmdö, Sverige
e,	2017-01-11	07:34	2017-01-11	07:44	7.5	Boda byväg 28, 139 90 Värmdö, Sverige
17	2017-01-11	07:48	2017-01-11	08:14	15.2	Angsviksvägen 8, 139 50 Värmdö, Sverige
10	2017-01-11	15:58	2017-01-11	16:18	15.1	Idrottsvägen 4A, 134 40 Gustavsberg, Sverige
e,	2017-01-11	16:29	2017-01-11	16:31	0.5	Oxövägen 2F, 139 50 Värmdö, Sverige
	2017-01-11	16:36	2017-01-11	16:49	7.5	Gillets väe 2. 139 50 Värmdö, Sveriee

Boda byvag 28, 139 90 V MEDEAS VÄG 3, 134 44 G Boda byväg 28, 139 90 V Ösby badving 3, 134 38 0 222, 134 44 Gustavsber ORIONS VÄG 6, 134 44 Fenix viig 4, 134 44 Gust Viks skolväg 22, 139 35 Boda byväg 28, 139 90 kärgårdsvägen 262, 1 rvägen 1, 1393 Torsby Algstig 1-3, 139 Boda byväg 28, 139 90 reardsvägen 268, 1 xövägen 2F, 139 50 V oda byväg 28, 139 90 /ägen 4A, 134 4 kärgårdsvägen, 134 44 Viks skolväg 22, 139 35 Boda byväg 28, 139 90 \ Ängsviksvägen 8, 139 5 xövägen 2F, 139 50 Vä Gillets väg 2, 139 50 Vä Boda byväg 28, 139 90 \ Skärgårdsvägen 224, 13 Boda byväg 28, 139 90 V Ängsviksvägen 8, 139 50 Idrottsvägen 4A, 134 40 Oxövägen 2F, 139 50 Va Gillets väg 2, 139 50 Vän Boda byväg 28, 139 90 V

armdo, Sverige
ustavsberg, Sverige
ärmdö, Sverige
ustavsberg, Sverige
, Sverige
ustavsberg, Sverige
avsberg, Sverige
Färmdö, Sverige
ärmdö, Sverige
30 Värmdö, Sverige
Vänndö, Sverige
I Värmdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
30 Värmdö, Sverige
mdő, Sverige
ärmdö, Sverige
Värmdö, Sverige o
Gustavsberg, Sverige
Gustavsberg, Sverige
Farmdő, Sverige
Värmdö, Sverige
ärmdö, Sverige
Värmdö, Sverige
40. A
mdő, Sverige
mdö, Sverige
ärmdö, Sverige
35 Värmdö, Sverige
ärmdö, Sverige Värmdö, Sverige
Värmdö, Sverige Gustavsberg, Sverige
mdö, Sverige
mdö, Sverige
ärmdö. Sverige

Where to go next?



Where to go next?

Target a specific vehicle

THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET

VS.

B.Y.O.F / Common features



Where to go next?

Identify vehicle

THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET

VS.

B.Y.O.F / Common features



THE JOY AND MISERY OF CONNECTING A CAR TO THE INTERNET

