Countries:	AUSTRALIA, BAHAMAS, BOLIVIA, BELIZE, CHILE, TAIWAN, COLOMBIA, COSTA RICA, DOMINICAN REPUBLIC, ECUADOR, EL SALVADOR, TRINIDAD AND TOBAGO, UNITED STATES, URUGUAY, VENEZUELA, ARUBA, NICARAGUA, PERU, PUERTO RICO, Curaçao, GUAM, GUATEMALA, GUYANA, HAITI, HONDURAS, JAMAICA, KOREA, SOUTH KOREA, NEW ZEALAND, PANAMA	**Document ID:**	IK1200526
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Current Language:	English	**Last Modified:**	8/11/2015
Other Languages:	Français, Español,	**Author:**	Jaime Ochoa
Viewed:	16692		

Less Info

Title: I-6 MAF Sensor Calibration Diagnostics

Applies To: 2010 + MaxxForce DT, 9, 10, N9 & N10 (ESN 3,300,000 and later)

CHANGE LOG

DO NOT delete the CHANGE LOG

Updated : 08/10/2016 - Added step based diagnostics; 02/16/15 - Added information on MAF A/B coefficients set to 0; 05/29/14 - Author changed to Jaime Ochoa. Rewrote entire MAF article to include diagnostic information for MAF sensor calibration failure.

DESCRIPTION

This document provides diagnostic steps for MAF sensor calibration failures.

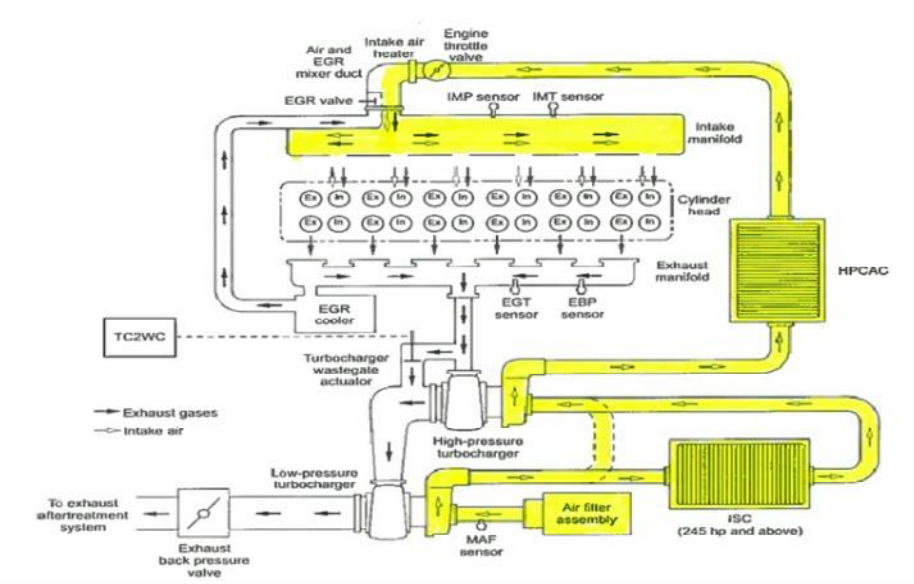
The MAF calibration is used to measure the volume and density of air entering the engine at any given time. The ECM uses this MAF to:

- Calculate the correct amount of EGR during engine operation
- Limit fueling to minimize soot (smoke limited fueling)

MAF Calibration Pre-Checks

NOTE:Verify the following before running the MAF Calibration Procedure:

• No active fault codes, other than SPN 132 FMI 13
• KOER Standard Test run at or above 158°F (70°C)
• Engine Oil Temperature (EOT) at or above 176°F (80°C)
• Engine Coolant Temperature (ECT) at or above 176°F (80°C)
Temperatures need to stay above 176°F (80°C) during entire test
• DPF Status = Regeneration Not Needed
• No leaks in intake air system
• No leaks in exhaust system
• No shop exhaust hose attached
• No engine performance issues
• No engine misfire issues
• Engine hood is closed
• Transmission in Park or Neutral
• Clutch engaged
• Engine Fan OFF
• Parking brake ON
• Power Takeoff (PTO) disabled
• Direct Drive Power Takeoff (PTO) disconnected
• Air conditioning OFF
• Accelerator pedal not depressed
• MAF sensor within KOEO specification
• IMP sensor within KOEO specification
• IMT sensor within -22°F (-30°C) and 257°F (125°C)
Continue to MAF Calibration Procedure



SYMPTOMS

Diagnostic Trouble Codes:

Fault Code	Fault Description	Action
132-11	MAF sensor calibration – insufficient number of data points	Follow below diagnostics
132-13	MAF sensor calibration Needed	Follow below diagnostics
132-14	MAF sensor calibration Failed	Follow below diagnostics

Lamp Reaction:

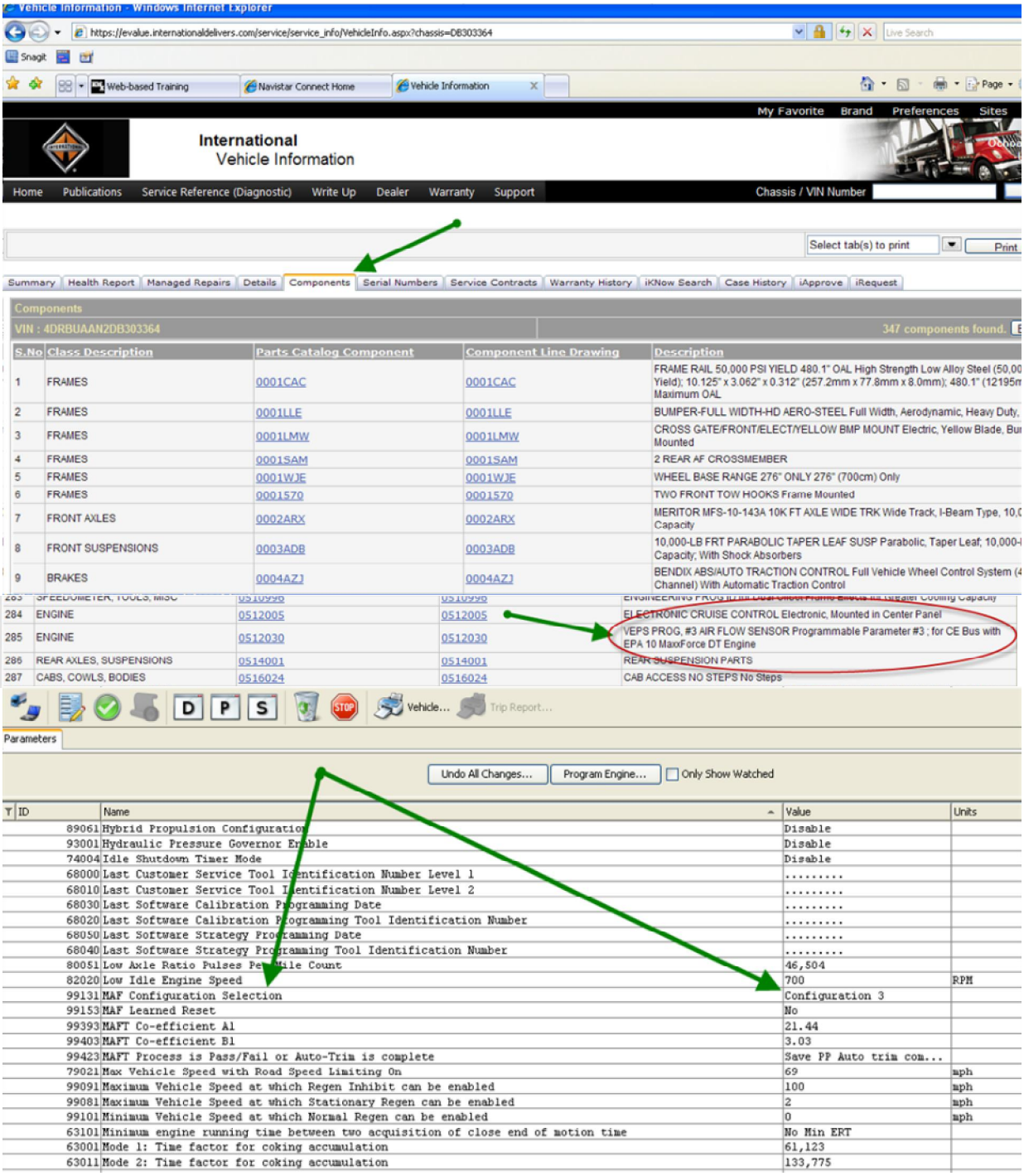
Amber Warning Lamp (AWL) illuminates when any of these faults are detected.

DIAGNOSTICS

Step	Action	Decision
1	1. Turn ignition switch to ON, engine OFF. 2. Start ServiceMaxx™ software. 3. Start engine. Ensure engine operating temperature is at or above 176°F (80°C). 4. Run KOER Standard Test. 5. Run MAF Sensor Calibrate procedure. Does MAF calibration fail?	Yes:Continue to Step 2. No:If calibration is successful, clear previously active MAF fault.

Step	Action	Decision
2	Ensure MAF configuration is the same between the Service Portal and ServiceMaxx (Graph 1). 1. Check MAF Configuration in Service Portal (Enter last 8 of VIN in ISIS -> Select Components Tab -> Scroll down and check which VEPS PROG, AIR FLOW SENSOR Programmable Parameter # is set) 2. Check ServiceMaxx for what MAF Configuration is programmed into the unit (Parameters tab -> Parameter ID 99131) Note: Monaco RV 405HP, Monaco RV350 HP and KME Firetruck 405HP MAF configuration should be set to 5. Does the MAF configuration match?	Yes:Continue to Step 3. No:Open case file for I6 technical service team and request MAF configuration programming due to incorrect information.

Graph 1



Step	Action	Decision
3	**Using ServiceMaxx,please check parameters 99393 (MAFT Coefficient A) and 99403 (MAFT Coefficient B) for being set to 0.00. This will also be accompanied with performance issues including not being able to rev engine over 1300 RPM.** **Are MAF coefficients both set to 0.00?**	**Yes:The values should not read 0.00. Please open a case file with I6 Technical Service group and provide this information in the description. Parameters are not dealer writeable.** **No:Continue to Step 4.**

Step	Action	Decision
4	**Visually inspect intake air system and CAC system for boost leaks.Visually inspect hoses and clamps from turbocharger to intake manifold: Look for tears in boost hoses, improper sealing of hoses, loose clamps, etc** **Were any leaks identified?**	**Yes: Repair leaks. If boost leak is large, please rerun MAF. If boost leak is minor, proceed to step 5.** **No: Continue to Step 5**

Step	Action	Decision
5	Please check the quality of the air filter and check if it's an OEM brand or not. Is the air filter plugged/dirty? Is the air filter a non-OEM brand?	Yes to plugged:Replace as needed, then move on to Step 6 Yes to non-OEM:Install OEM air filter and rerun MAF calibration No:Continue to Step 6

Step	Action	Decision
6	Please check exhaust manifold for excessive leaks at the rear (large amounts of soot) and cracks throughout the manifold. Is the exhaust manifold cracked or leaking from the rear (cylinder 6)?	Yes:Replace with exhaust manifold kit NOTE:ReferenceIK1200949 No:Continue to Step 7

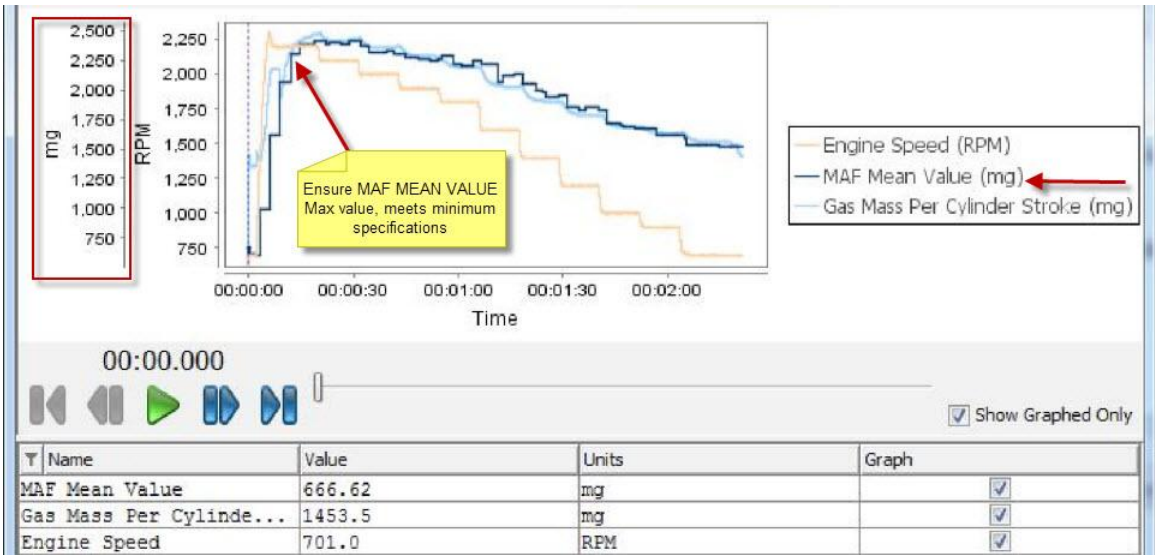
Step	Action	Decision
7	Using ServiceMaxx,compare IMP, IMT and EBP readings to specifications. Also pull sensors and inspect coking or damage. Are ServiceMaxx readings KOEO specifications? Are the sensors plugged or damaged?	Yes to KOEO:Check circuits for issues Yes to plugged/damaged:Clean/replace as needed No:Continue to Step 8

Step	Action	Decision
8	Using terminal test kit, inspect connections at the MAF Air Flow (MAF) sensor. With key OFF, disconnect MAF sensor connector. Check MAF sensor and connector for the following: Damaged or pinched wires Corroded terminals Loose, bent, or broken pins Broken connector housing. Are the MAF sensor connector, harness, and terminals clean and undamaged?	Yes:Continue to Step 9 No:Repair connector, harness, or terminal damage. After repairs are complete, clear the code, and retest for the fault.

Step	Action	Decision
9	Check if unit is a Monaco RV and check ServiceMaxx's default page under Vehicle Information for rated power. Is the unit a Monaco RV with rated power of 350 HP?	Yes:If unit has good power and no issues other than passing a MAF calibration. Please open a case file and request MAF A/B coefficient programming. No:Continue to Step 10

Step	Action	Decision
10	Perform & record MAF Sensor Calibration if one was not already recorded. Plot MAF Mean Value, Gas Mass per Cylinder Stroke and Engine Speed (Excel or in ServiceMaxx). Graph 2 Is MAF Mean Value > (greater than) 1500 MG?	Yes:Continue to Step 12 No:Continue to Step 11

Graph 2

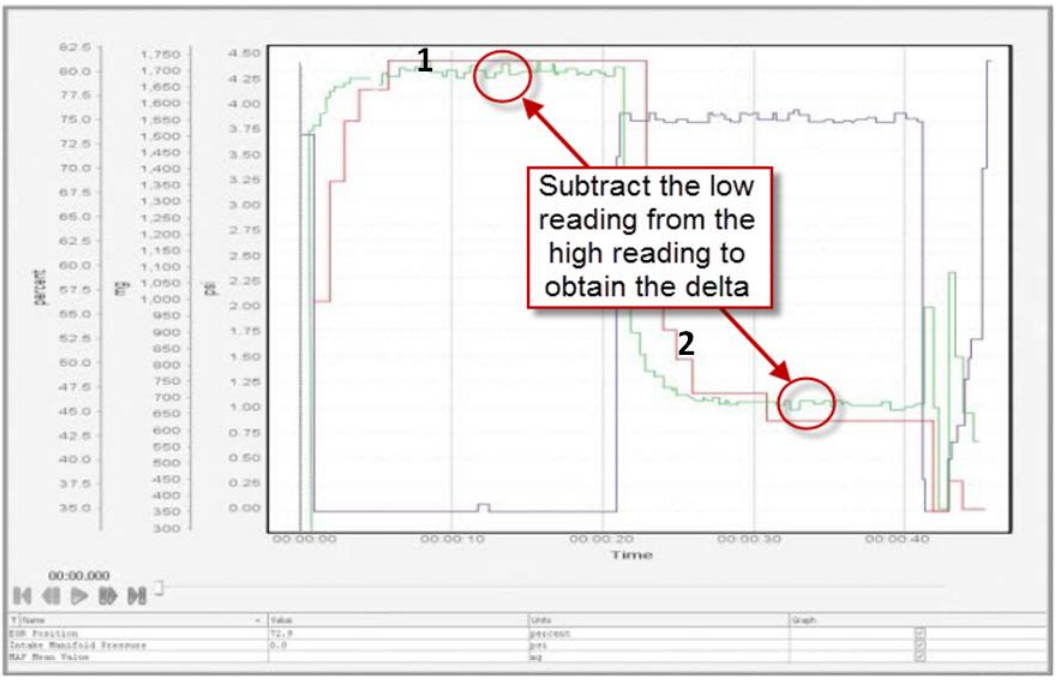


Name	Value	Units	Graph
MAF Mean Value	666.62	mg	☑
Gas Mass Per Cylinde...	1453.5	mg	☑
Engine Speed	701.0	RPM	☑

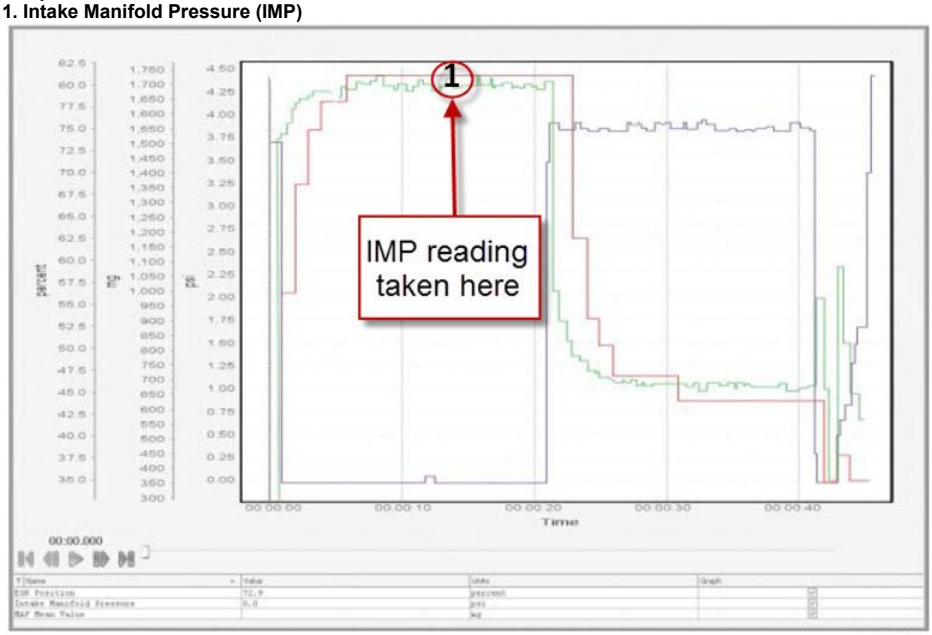
Step	Action	Decision
11	**Inspect turbos for coking (refer to IK1200656) and inspect CAC for plugging/restrictions.** **If unit has an interstage cooler, please ensure it is not plugged.** **Are turbos coked and/or CAC restricted?**	**Yes:Follow IKnow article for cleaning procedure and clean/replace CAC as needed. IK1201175 - CAC Cleaning Procedure** **No:Continue to Step 12**

Step	Action	Decision
12	**Perform & Record Air Management Test.** **MAF Mean Value Delta obtain the reading by subtracting the high reading in the beginning of the test to the low reading near the end as shown below in Graph 3:** **1. 466 ST ≥ 690 mg** **2. 466 HT ≥ 740 mg** **3. 570 ≥ 850 mg** **Intake Manifold Pressure (IMP) Graph 4:** **1. 2 + PSI** **Does Air Management test meet specifications listed above?**	**Yes:Continue to Step 16** **No IMP:Continue to Step 16** **No MAF Delta:Continue to step 13**

Graph 3
1. MAF Mean Value High Point
2. MAF Mean Value Low Point



Graph 4
1. Intake Manifold Pressure (IMP)



Step	Action	Decision
13	Remove the Engine Throttle Valve (ETV) from theEGR mixer housing and inspect for80% or more plugging Is a severe amount of plugging present in the EGR mixer housing?	Yes:Clean plugging as needed,do not replace the EGR valveclean & replace O-rings if needed. No:Go to step 14

Step	Action	Decision
14	Perform EGR Operational Test 5 times and check for a sticking valve. (Tests-> KOEO Tests-> High output state test) Do not remove the EGR valve unless it is stuck open more than 1/8” Is EGR valve stuck open?	Yes:Replace and retest for MAF calibration No:Go to step 15

Step	Action	Decision
15	Remove rear EGR crossover pipe and inspect for plugging Is the rear of the EGR cooler plugged?	Yes:Replace the EGR cooler, clear the code. Than rerun AMT and ensure flow is good. Rerun MAF calibration afterwards.

		No:Continue to Step 16

Step	Action	Decision
16	**Inspect Boost Control Solenoid (BCS) and boost lines for any damage or leaking lines. Test BCS per manual or follow Turbocharger wastegate adjustment in IK1201103.** **Is the BCS or boost lines damaged?**	**Yes:Replace failed component and retest.** **No:Continue to Step 17**

Step	Action	Decision
17	**Test charge air cooler (CAC) and hoses for boost leaks using kit ZTSE 4341. If no leaks are present, follow smoke test with Navistar LeakLocator (tool number 19-700-01).** **Are hoses, clamps or CAC leaking?**	**Yes:Replace/repair leaking components as needed and retest for MAF calibration.** **No:Continue to Step 18**

Step	Action	Decision
18	**If no external leaks are found, inspect turbos for coking (refer to IK1200656) and inspect CAC for plugging/restrictions.** **If unit has an interstage cooler, please ensure it is not plugged.** **Are turbos coked and/or CAC restricted?**	**Yes:Follow IKnow article for cleaning procedure and clean/replace CAC as needed.** **No:Please contact technical service team for additional assistance.**

SPECIAL TOOL(s) or SOFTWARE

Tool Description	Tool Number	Comments
EZ-Tech Laptop	N/A	N/A
Cleaning Management System (CMS)	12-353-01	
Charge Air Cooler (CAC) Adapter Flushing Kit	09-925-01	
Charge Air Cooler (CAC) Pressure Test Kit	ZTSE 4341	

PARTS

ONLY replace parts if diagnostics lead to failed component.

Part Number	Quantity Required	Description	Notes
1890997C92	1	VALVE ASSY EGR	
7092501C95	1	KIT, EXHAUST MANIFOLD ASSEMBLY	
1846481C92	1	SENSOR, INTAKE MANIFOLD PRESSURE	
1881015C92	1	SENOSR, INTAKE MANIFOLD TEMP	
1883423C91	1	SENSOR, EXHAUST BACK PRESSURE	
1881016C92	1	SENSOR, MASS AIR FLOW	
2512460C1	5 gal	Fluid, EGR Cleaning	

WARRANTY INFORMATION

Standard Repair Time(s):

Step	Description	Chassis	Engine	SRT	Hours
1	**MAF Sensor Calibration**	**All Models**	**MAXXFORCE DT/9/10, N9/10**	**A12-3510T-1**	**0.2**
2-5	**SMX and Visual Inspection**	**All Models**	**All Engines/Pre-check**	**N/A**	**0.00**
6	**Exhaust Manifold Replacement**	**RE/Motorhome**	**MAXXFORCE DT**	**NH12-6356T-21**	**6.6**
		RE/Motorhome	**MAXXFORCE DT/9/10, N9/10**	**NH12-6356T**	**7.0**
		CE/BE below 245HP	**MAXXFORCE DT**	**GY12-6356T-21**	**5.0**

		CE/BE above 245HP	MAXXFORCE DT/9/10, N9/10	GY12-6356T-24	5.4
		4300/4400 below 245HP	MAXXFORCE DT	KL12-6356T-21	6.8
		4300/4400 above 245HP	MAXXFORCE DT/9/10, N9/10	KL12-6356T-24	7.4
		7000 series below 245HP	MAXXFORCE DT	M12-6356T-24	6.7
		7000 series above 245HP	MAXXFORCE DT/9/10, N9/10	M12-6356T-25	7.2
7	Removing and checking them	All Models	MAXXFORCE DT/9/10, N9/10	SRT Sensor	
8	MAF Sensor replacement	CE/BE	MAXXFORCE DT/9/10, N9/10	GY12-8993T	0.5
		RE	MAXXFORCE DT/9/10, N9/10	I12-8993T	0.4
		4300/4400	MAXXFORCE DT/9/10, N9/10	KL12-8993T	0.5
		7300/7400/7500	MAXXFORCE DT/9/10, N9/10	M12-8993T	0.5
9-10	MAF Sensor Calibration	All Models	MAXXFORCE DT/9/10, N9/10	A12-3510T-1	0.2
11	CAC Cleaning	All Models	MAXXFORCE DT/9/10, N9/10	A09-3925A	1.1
	CAC Replacements	CE/BE	MAXXFORCE DT/9/10, N9/10	GY09-3925T	2.7
		4300/4400	MAXXFORCE DT/9/10, N9/10	KL09-3925T	3.5
12	Air Management System (AMS) Test	All Models	MAXXFORCE DT/9/10, N9/10	G12-2267K	0.1
13-15	AMS Diagnostics	All Models	MAXXFORCE DT/9/10, N9/10	G12-2280K	1.4
16	Boost Control Solenoid (BCS) Valve, Replace	CE/ BE	MAXXFORCE DT/9/10, N9/10	GY12-6954T-20	0.4
		4300/4400	MAXXFORCE DT/9/10, N9/10	KL12-6954T-20	0.4
		7300/7400/7500	MAXXFORCE DT/9/10, N9/10	M12-6954T-20	0.4
17	CAC Pressure Test	All Models	MAXXFORCE DT/9/10, N9/10	KL09-3925T-1	N/A
18	CAC Replacement	CE/BE	MAXXFORCE DT/9/10, N9/10	GY09-3925T	2.7
		4300/4400	MAXXFORCE DT/9/10, N9/10	KL09-3925T	3.5
	CAC Cleaning	All Models	MAXXFORCE DT/9/10, N9/10	A09-3925A	1.1

Warranty Claim Coding:

Group	Noun
12000	716

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