CarMD
VEHICLE HEALTH INDEX

10
A DECADE OF DATA

This year marks the **10th anniversary of the CarMD Vehicle Health Index**.

CarMD has spent a decade reporting on check engine light-related problems, repairs and associated costs.

Having built the most comprehensive and dynamic database of failures and repairs related to vehicle on-board diagnostic systems, CarMD is uniquely qualified to provide unbiased data on repair costs and trends. CarMD distributes this Index each April during Car Care Awareness Month to remind vehicle owners about the importance of paying attention to maintenance needs and inspections to help avoid unforeseen problems.

This Index also serves to provide the automotive industry with year-over-year data, shedding light on trends related to the type and cost of repairs. This data can be used to identify emerging issues and drive automotive aftermarket decisions from regional parts purchase forecasting to repair shop pricing to customer education.

Over the past 10 years, the CarMD Vehicle Health Index has reported on data derived directly from more than **41 million vehicles** on the road in the U.S.

In this year's special anniversary report, CarMD shares data from the past calendar year as well as a compilation of findings over the past decade. It also adds network scan insight to cover newer vehicle technology.

2010
2011 2012 2013 2014 2015 2016 2017 2018 2019
2020

What is Distinctive About CarMD's Index?

This is the first and most comprehensive industry report to provide consumers and the automotive aftermarket with year-over-year check engine light repair insight. Since 1996, every vehicle sold in the United States has been required to have an on-board diagnostic (OBDII) system. It monitors roughly 80% of a vehicle's systems to trigger the check engine light and alert drivers about issues related to emissions, fuel economy, drivability and cost of ownership. CarMD's data comes directly from each vehicle's OBDII system, reported by vehicle owners and the professionals who service them. From this data, CarMD has built a database of failures and repairs related to a vehicle's on-board diagnostic system. Each CarMD Vehicle Health Index draws from this database, and CarMD's nationwide network of Automotive Service Excellence (ASE)-certified technicians who have validated related failures and fixes.

What can a Decade of Diagnostics Tell You?

This data can inform B2B parts manufacturers and automotive aftermarket retail buyers as they extrapolate year-over-year and regional trends related to vehicle diagnostic data and related parts failures. The auto parts industry can use this data to be sure the right parts are available in the right quantities. When used in conjunction with other resources such as Innova Repair Solutions, the CarMD PRO SCAN inspection solution and CarMD Garage, this Index can provide insight to repair professionals on the type of parts most likely to need a repair when a car rolls into the service bay. It can also help them see if their parts and labor pricing is in line with the average repair costs in their regions. Additionally, this data provides a way to educate drivers about the importance of heeding warning lights, common repairs in their region and related symptoms to improve vehicle life and cost of ownership.
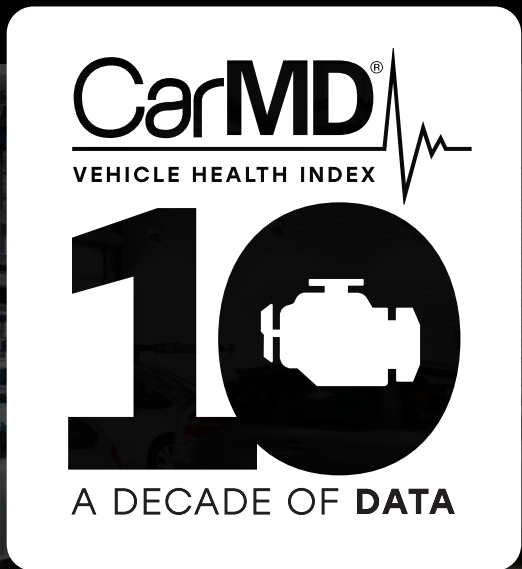
A DECADE OF
Check Engine Light Data

How have check engine light-related car problems changed in the past decade? CarMD reports on data from **>41 million cars and trucks** needing repairs from **2010 – 2020**.

CarMD®
VEHICLE HEALTH INDEX
10
A DECADE OF **DATA**

Check Engine Light On?

A car's check engine light monitors emissions and drivetrain issues.
Ignoring it will **hurt the environment**, **reduce fuel economy** and lead to more **problems down the road**.

CO_2
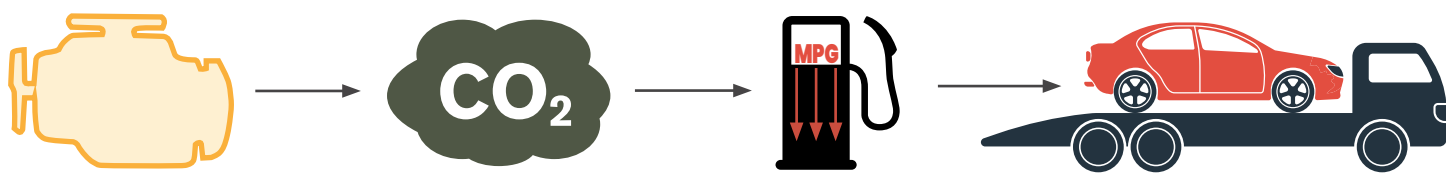
Diagnosing DTCs
How Do You Know What's Wrong?

Auto repair techs use 5-digit alphanumeric diagnostic trouble codes (DTCs) to help ID why the check engine light came on. A scan tool can help access these codes.

The most common DTC is P0420, designating Catalyst B1 Deterioration, which often indicates a faulty O2 sensor or catalytic converter. Data from sources like Innova RepairSolutions2 and **CarMD PRO SCAN can further pinpoint the proper repair.**

P0420
www.CarMD.com

Don't Panic! It can be as simple & affordable as a loose gas cap.

2010: Gas cap was 9.2% of repairs
2019: Gas cap was 4.5% of repairs

Newer vehicles with capless gas tanks have contributed to a drop in gas cap-related CEL's.

O2
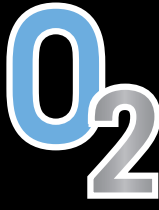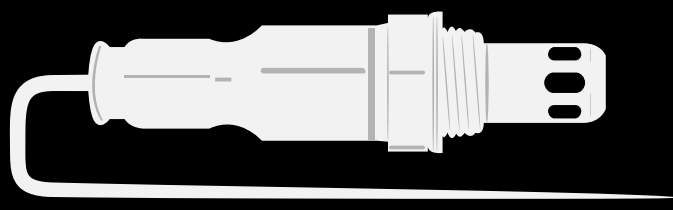
Oxygen Sensors

The most common CEL repair this decade is "**replace O2 sensor.**" The cost has trended up and % has trended down.

2010: $233   2019: $246
Average cost to replace O2 sensor

10 YEAR LOOK
Most Common Check Engine Car Repair in the U.S.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fix	O2 Sensor	O2 Sensor	O2 Sensor	O2 Sensor	O2 Sensor	O2 Sensor	O2 Sensor	O2 Sensor	Ignition Coils & Spark Plug	Catalytic Converter
%	9.34%	9.17%	8.31%	7.55%	7.10%	7.01%	7.99%	5.90%	5.81%	5.69%

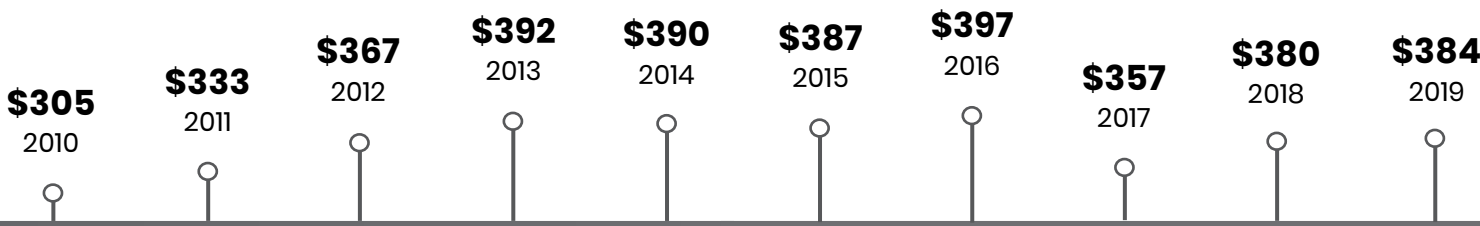## Possible CEL Fixes nearly Doubled in the Last Decade

Today's cars have more computerized sensors than ever before. In 2010 CarMD identified **675** different possible fixes for a check engine light. In 2019 that nearly doubled to **1,283** fixes.

WWW.
For more information on check engine light health,
Please visit **www.carmd.com**

10 YEAR LOOK
Average Cost of Check Engine Light Repairs

$305 2010
$333 2011
$367 2012
$392 2013
$390 2014
$387 2015
$397 2016
$357 2017
$380 2018
$384 2019

Summary of Findings:

This 2020 Index statistically analyzes more than 15.9 million failures and recommended repairs for vehicles in the U.S., over the past calendar year.

COSTS TO REPAIR:
In 2019, costs to repair check engine light issues were up just 1% on average in the U.S. Average overall labor expense per repair was down just over 5%, and parts costs were up about 6%. Car repair costs were up in three of four U.S. regions, with the exception being the Midwest where costs were down 1.6% over the past year.

TYPES OF REPAIRS:
In 2019, for the first time since CarMD has reported on these rankings, "replace catalytic converter" was the most common check engine light repair, accounting for 5.69% of repairs. Catalytic converters are costly repairs that don't typically fail unless maintenance and other repairs are ignored, or a vehicle is up there in age. This can be partially explained by the trend up in average vehicle age from 11.7 years in 2018 to 11.8 years in

2019. Back in 2010 when CarMD first started publishing Vehicle Health Index data, the average vehicle age was 10.6 years old. As people keep their cars and trucks longer, the automotive aftermarket will need to adjust related parts forecasts accordingly.

MOST EXPENSIVE:
Out of more than 1,200 different possible repairs, the most expensive repair seen in 2019 by CarMD's network was "replace engine," costing as much as $7,300. However, drivers should not panic when their car's check engine light comes on because this repair only accounted for one-half of 1% of repairs.

LEAST EXPENSIVE:
Some of the least expensive repairs included "replace gas cap," and "replace electronic engine control (EEC) fuse" – both which cost under $50.

BIGGEST MOVES:
Our data reports an increase in percentage of mass air flow sensors (MAF sensors) and fuel injectors needing replacement. MAF sensors moved from the no. 7 to the no. 5 most common repair and from 3.60% of repairs in 2018 to 4.28% of repairs in 2019. Fuel injectors went from the no. 9 most common repair to no. 7, but remained steady at 2.7% of repairs. Automotive aftermarket retailers and parts manufacturers can use this information along with other industry data to have meaningful discussions about inventory and parts forecasting.
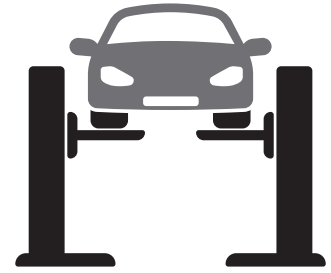
The year's Vehicle Health Index as well as historical reports are available here.

Additional, customized reports are available upon request.
Please visit **www.carmd.com/big-data/** for more information.

10 Most Common Check Engine Repairs in the U.S.

2019

2010

Rank	Vehicle Repair	Total Avg. Repair Cost	% of 2019 Repairs	2018 Rank		Rank	% of 2010 Repairs
#1	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,375.70	5.69%	#3	⬆	#3	6.4%
#2	Replace Oxygen Sensor(s) (O2S)	$245.88	5.67%	Tie #1	⬇	#1	9.3%
#3	Replace Ignition Coil(s) and Spark Plug(s)	$386.89	5.23%	Tie #1	⬇	#20	1.1%
#4	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$25.00	4.57%	#4		#2	9.3%
#5	Replace Mass Air Flow (MAF) Sensor	$345.69	4.28%	#7	⬆	#4	4.4%
#6	Replace Ignition Coil(s)	$214.98	3.84%	#5	⬇	#8	2.6%
#7	Replace Evaporative Emissions (EVAP) Purge Control Valve	$144.07	3.54%	#6	⬇	N/A	N/A
#8	Replace Fuel Injector(s)	$457.63	2.70%	#9	⬆	N/A	N/A
#9	Replace Evaporative Emissions (EVAP) Purge Solenoid	$150.85	2.46%	#8	⬇	#21	1.0%
#10	Replace Thermostat	$240.46	2.27%	#10		#15	1.4%

(Ten most common vehicle repairs are based on 15,869,285 repairs recommended in calendar year 2019 on 1996-2019 model year vehicles. This data applies to > 85% of cars, light trucks, minivans, SUVs and hybrids on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)

Most Common Repairs

These were the most common repairs needed when the check engine light illuminated on U.S. vehicle dashboards during calendar year 2019:

1. Replace Catalytic Converter

This was the most commonly diagnosed car repair and accounted for 5.69% of repairs in 2019. A catalytic converter usually won't fail unless a related root cause – such as a faulty spark plug – is ignored for too long. But as consumers hold on to their cars longer, vehicles will outlast parts like the catalytic converter. Nearly a million (906,133 vehicles) had a catalytic converter replacement suggested in 2019.

SYMPTOMS
Failing catalytic converters may cause the vehicle to experience reduced acceleration, sluggish engine performance, dark exhaust smoke and heat under the engine.

REPAIR COST
The average cost to replace a catalytic converter in 2019 was **$1,375** but can usually be avoided if other issues are addressed in a timely manner. The average cost to replace a catalytic converter in 2010 was $1,008.

2. Replace Oxygen Sensor

This was the 2nd most common repair in 2019 totaling 5.67% – just slightly fewer than this year's most common fix.
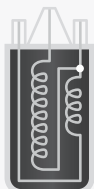
SYMPTOMS
O2 sensors can fail prematurely due to lack of maintenance like neglecting oil changes. Many drivers ignore the O2 sensor because their car often seems like it's driving just fine, but in reality it's reducing your fuel economy and slowly doing more damage to your car.

REPAIR COST
The average cost to replace an O2 sensor in 2019 was **$245**. The average cost to replace an O2 sensor in 2010 was $238.

3. Replace Ignition Coil(s) and Spark Plug(s)

This was the 3rd most common repair accounting for 5.23% of repairs in 2019. This is an example of how ignoring a smaller problem like a spark plug can snowball into the need for more than one repair.

SYMPTOMS
Spark plugs and ignition coils work together to help the engine start, and keep running. Faulty spark plugs can trigger ignition coil failure, which is why they are often replaced simultaneously. Symptoms may include slow acceleration, loss of power, poor fuel economy, engine misfires and trouble starting the car.

REPAIR COST
The average cost to replace ignition coil(s) and spark plug(s) in 2019 was **$386**. The average cost to replace ignition coil(s) and spark plug(s) in 2010 was $393.

4. Tighten or Replace Fuel Cap

This was the 4th most common repair comprising 4.57% of repairs in 2019.
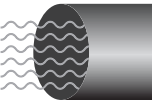
SYMPTOMS
Missing or damaged gas caps can cost time and money, triggering the check engine light and a repair shop visit. If left unchecked, a gas cap problem can cause reduced fuel economy and harm the environment.

REPAIR COST
The average cost to replace a gas cap in 2019 was **$25**. The average cost to replace a gas cap in 2010 was not calculated by CarMD.

5. Replace Mass Air Flow Sensor

This was the 5th most common repair in 2019 with 4.28% of repairs – up from the no. 7 spot last year.
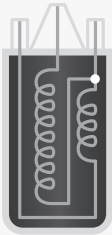
SYMPTOMS
The MAF sensor is responsible for metering the air coming into a car's engine and determining how much fuel to inject into the engine. Some of the symptoms are stalling and hesitation during acceleration. When malfunctioning, it can lower fuel economy by as much as 25%.

REPAIR COST
The average cost to replace a MAF sensor in 2019 was **$345**. The average cost to replace a MAF sensor in 2019 was $376.

6. Replace Ignition Coil(s)

This was the 6th most common CEL repair in 2019 accounting for 3.84% of repairs.
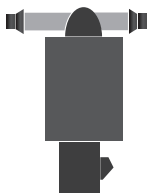
SYMPTOMS
Ignition coils help the engine start and keep running. They take the battery's 12-volt current and step it up to ignite the spark plugs. Your car may have only one ignition coil, or as many as it has cylinders. Symptoms may include rough idling – particularly at low speeds – or trouble starting the car, resulting from faulty spark plugs, high underhood temperatures and age. A driver should pay attention to possible symptoms surrounding engine coil failure as it will soon affect other vehicle systems, such as the costly catalytic converter, and can leave them stranded by the roadside.

REPAIR COST
The average cost to replace ignition coil(s) and spark plug(s) in 2019 was **$386**. The average cost to replace ignition coil(s) and spark plug(s) in 2010 was $393.

7. Replace Evaporative Emissions (EVAP) Purge Control Valve

This was the 7th most common check engine-related repair with 3.54% of needed repairs in 2019, down from no. 6 last year.

SYMPTOMS
This valve is part of the car's EVAP system, which prevents fuel tank vapors from escaping into the atmosphere. When the engine is warmed up, its computer gradually opens the purge valve to allow fuel vapor to be moved from the charcoal canister to be burned in the engine. If the purge flow is less or more than is expected, the car may idle roughly or inconsistently. Since many of the most common problems share similar symptoms, it is important to properly diagnose check engine light issues.

REPAIR COST
The average cost to replace an EVAP purge control valve in 2019 was **$144**. The average cost to replace an EVAP purge control valve in 2010 was not reported by CarMD because it was not among the top repairs.

8. Replace Fuel Injector(s)

This was the 8th most frequent repair with 2.70% of repairs in 2019.
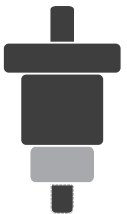
SYMPTOMS

Fuel injectors help make sure the car's fuel comes out as a fine mist so it can mix with the air passing into the cylinder. Some vehicles have more than one fuel injector, which is called muti-point fuel injection. A failing fuel injector can cause engine performance issues, poor idling; engine misfires and reduced fuel economy.

REPAIR COST

The average cost to replace fuel injector(s) in 2019 was **$457**. The average cost to replace fuel injector(s) in 2010 was $518.

9. Replace Evaporative Emissions (EVAP) Purge Solenoid

This was the 9th most common repair with 2.46% of repairs in 2019.

SYMPTOMS

Your car's EVAP purge solenoid helps control how much fuel vapor escapes into the atmosphere from your car. The purge solenoid is controlled by the engine control module or powertrain control module. It operates on a duty cycle and could be left partially open. A bad EVAP purge solenoid will also cause rough idling and difficulty starting the car.

REPAIR COST

The average cost to replace an EVAP purge solenoid in 2019 was **$150**. The average cost to replace an EVAP purge solenoid in 2010 was $144.

10. Replace Thermostat

This was the 10th most common repair in 2019 with 2.27% of repairs in 2019.

SYMPTOMS

The car's thermostat regulates the engine coolant temperature to warm and cool to ideal "operating temperature." It opens and closes as needed to regulate temperature. When a thermostat fails, it often gets stuck open. If the vehicle's computer doesn't see the engine coolant temperature rise to "operating temperature" within a fixed amount of time, it will set the check engine light and overheat. A vehicle's thermostat can rust and fail if the coolant is not changed at recommended mileage intervals, or the vehicle is subjected to extreme temperatures.

REPAIR COST

The average cost to replace a thermostat in 2019 was **$240**. The average cost to replace a thermostat in 2010 was $147.

Parts manufacturers can license specific data from CarMD to determine failures by region, and year, make, model and mileage. More information is available here: www.carmd.com/big-data/. **Contact CarMD to discuss how we can address your specific data request needs.**

10 Most Common DTCs

Diagnostic trouble codes (DTCs) are alphanumeric codes that a vehicle's computer outputs when it detects a problem. These codes are transmitted by a vehicle's on-board diagnostic (OBD) system. They can be accessed using a diagnostic scan tool or code reader that plugs into the OBD connector. The following are the most commonly reported DTCs on vehicles with a CEL problem in 2019 as compared with a decade ago when CarMD first started reporting this data.

The 10 Most Common Diagnostic Trouble Codes (DTCs)

2019   2010

2019 Rank	DTC	Description	% of 2019 Repairs	2010 Rank		% of 2010 Issues
#1	P0420	Catalyst System Efficiency Below Threshold	3.48%	#2	⬆	4.1%
#2	P0171	System Too Lean	3.14%	#1	⬇	5.5%
#3	P0455	Evaporative Emission System Leak Detected (large leak)	3.00%	#5	⬆	2.7%
#4	P0300	Random/Multiple Cylinder Misfire Detected	2.94%	#3	⬇	3.9%
#5	P0301	Cylinder 1 Misfire Detected	2.63%	#10	⬆	1.6%
#6	P0456	Evaporative Emission System Leak Detected (very small leak)	2.51%	#12	⬆	1.2%
#7	P0442	Evaporative Emission System Leak Detected (small leak)	2.49%	#4	⬇	2.7%
#8	P0304	Cylinder 4 Misfire Detected	2.37%	#14	⬆	1.1%
#9	P0303	Cylinder 3 Misfire Detected	2.36%	#11	⬆	1.3%
#10	P0302	Cylinder 2 Misfire Detected	2.35%	#15	⬆	1.1%

New this year!

Network System (NS) Issues
TOP 10 NS MODULE REPORTING ISSUES

CarMD's diagnostic knowledgebase monitors Network System (NS) diagnostic data to go beyond powertrain, ABS and SRS modules. Newer cars and trucks have hundreds of different modules that can fail. These are parts like backup camera, adaptive cruise control, adaptive headlights, lane departure alert and seat belt retractor. In addition to tracking check engine light-related issues, This insight is available to repair shops using CarMD PRO SCAN to enable them to catch problems on a customer's vehicle that may not be identifiable during a visual inspection. Based on data from vehicles scanned in 2019, CarMD found that 80% of vehicles reported at least one issue that needs attention, averaging six different potential problems.

Rank	Module Name	% of 2019 Issues
#1	BCM - Body Control Module	2.92%
#2	TCM - Transmission Control Module	2.63%
#3	IPC - Instrument Panel Cluster	2.28%
#4	ECM - Engine Control Module	2.14%
#5	PCM - Powertrain Control Module	2.12%
#6	Radio	1.93%
#7	SIR - Supplemental Inflatable Restraint	1.79%
#8	EBCM - Electronic Brake Control Module	1.69%
#9	RCM - Restraint Control Module	1.38%
#10	ABS - Anti-Lock Brake / Traction Control Module	1.33%

National Repair Costs

In 2019, we saw national total check engine light repair costs trend up slightly. While labor costs were down 5.5% year-over-year from 2018 to 2019, parts costs were up 5.7%. In looking at a decade of data as reported by the CarMD Vehicle Health Index from 2010 to 2020 for the previous calendar year, car repair costs are 7% higher than they were when CarMD started reporting this data 10 years ago.

10 YEAR LOOK
U.S. Average Car Repair Cost Trends 2010-2019

Year	Labor	Parts	Total Average Repair Cost
2010	$143.61	$212.44	$356.05
2011	$118.61	$215.32	$333.93
2012	$138.96	$228.88	$367.84
2013	$157.23	$235.26	$392.49
2014	$161.61	$228.77	$390.38
2015	$155.15	$232.16	$387.31
2016	$162.46	$235.41	$397.87
2017	$141.16	$216.29	$357.45
2018	$157.04	$223.81	$380.85
2019	$148.26	$236.64	$384.90

2019 National Average Check Engine Light-Related Repair Cost

AVG: $384.90

Regional Repair Costs

Repair costs were up in three of four regions of the U.S., with the exception being the Midwest where car repair costs were down 1.6%.

- Vehicle owners in the West paid the most for check engine-related car repairs ($398) – over 10% more than drivers in the Midwest, who paid the least ($360).
- The region with the highest average labor expense for a check engine light repair was the South ($151.22) where the average hourly labor rate according to Undercar Digest was $89.53.
- The region with the lowest average labor expense for a check engine light repair was the Northeast ($141.00) where the average hourly labor rate according to Undercar Digest was $82.72.

2019 Average Cost to Repair a Check Engine Light Issue - By Region
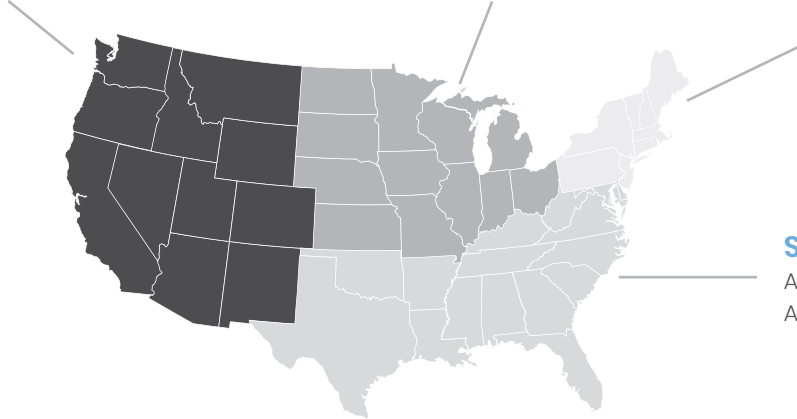
West: $398.26
Average Labor Cost: $146.67
Average Parts Cost: $251.59

Midwest: $360.44
Average Labor Cost: $146.42
Average Parts Cost: $214.02

Northeast: $384.08
Average Labor Cost: $141.00
Average Parts Cost: $243.08

South: $392.47
Average Labor Cost: $151.22
Average Parts Cost: $241.25

### Yearly Comparison of Regional Average Check Engine-Related Repair Costs
Source: CarMD.com Corp.

Region	Total Average Repair Costs (2018)	Total Average Repair Costs (2019)	Percentage Change from 2018 to 2019	
South	$385.46	$392.47	Up 1.8%	⬆
West	$386.78	$398.26	Up 2.9%%	⬆
Midwest	$366.31	$360.44	Down 1.6%	⬇
Northeast	$379.76	$384.08	Up 1.1%	⬆

Southern Repair Costs & Data

The 10 Most Common Check Engine Vehicle Repairs in the Southern U.S. – 2019

Rank	Vehicle Repair	Total Average Repair Cost (Parts&Labor)	% 2019 Southern U.S. Repairs	Change In Rank Since 2018
#1	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,364.58	5.91%	Up from no. 3 ⬆
#2	Replace Ignition Coil(s) and Spark Plug(s)	$387.99	5.80%	Down from #1 ⬇
#3	Replace Oxygen Sensor(s) (O2S)	$243.25	5.49%	Down from #2 ⬇
#4	Replace Mass Air Flow (MAF) Sensor	$344.84	4.48%	Up from #6 ⬆
#5	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$25.18	4.12%	Down from #4 ⬇
#6	Replace Ignition Coil(s)	$212.96	4.07%	Down from #5 ⬇
#7	Replace Evaporative Emissions (EVAP) Purge Control Valve	$142.81	3.35%	No change
#8	Replace Fuel Injector(s)	$447.42	2.84%	No change
#9	Replace Thermostat	$237.58	2.22%	Up from #10 ⬆
#10	Replace Evaporative Emissions (EVAP) Purge Solenoid	$152.66	2.19%	Down from #9 ⬇
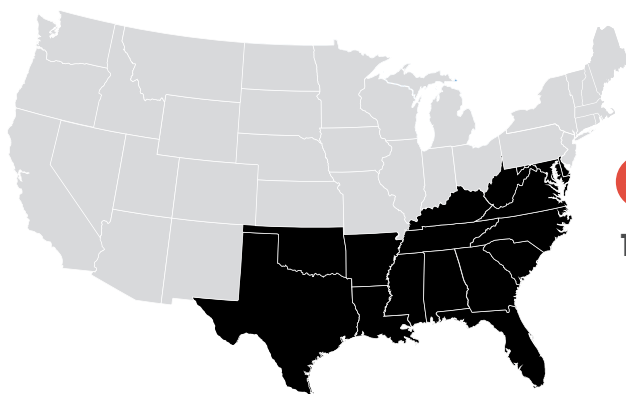
⬆ 1.8%

$392.47
Average cost to repair a vehicle's check engine light problem in the Southern U.S. in 2019.

(Ten most common vehicle repairs in the Southern U.S. are based on 7,350,072 repairs in 2019 in AL, AR, DC, DE, FL,GA, KY, LA, MD, MS, NC, OK, TN, VA, SC, TX and WV. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)
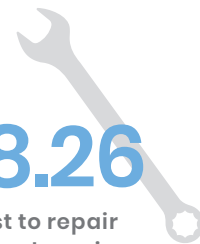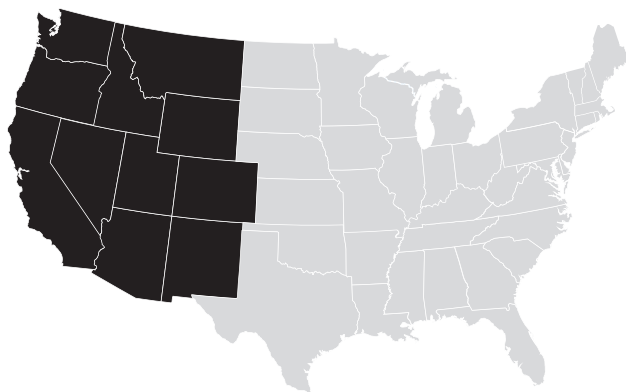
CarMD

Western Repair Costs & Data

The 10 Most Common Check Engine Vehicle Repairs in the Western U.S. – 2019

Rank	Vehicle Repair	Total Average Repair Cost (Parts&Labor)	% 2019 Western U.S. Repairs	Change In Rank Since 2018	
#1	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,434.23	5.65%	Up from #3	⬆
#2	Replace Oxygen Sensor(s) (O2S)	$258.65	5.25%	Down from #1	⬇
#3	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$25.45	4.88%	Up from #4	⬆
#4	Replace Mass Air Flow (MAF) Sensor	$360.41	4.84%	Up from #5	⬆
#5	Replace Ignition Coil(s) and Spark Plug(s)	$385.07	4.77%	Down from #2	⬇
#6	Replace Ignition Coil(s)	$218.37	3.91%	No Change	
#7	Replace Evaporative Emissions (EVAP) Purge Control Valve	$147.64	3.09%	No Change	
#8	Replace Fuel Injector(s)	$479.37	2.57%	Up from #9	⬆
#9	Replace Thermostat	$237.92	2.49%	Down from #8	⬇
#10	Replace Spark Plug Wires and Spark Plugs	$339.02	2.15%	Not listed in 2018	

⬆ 2.9%

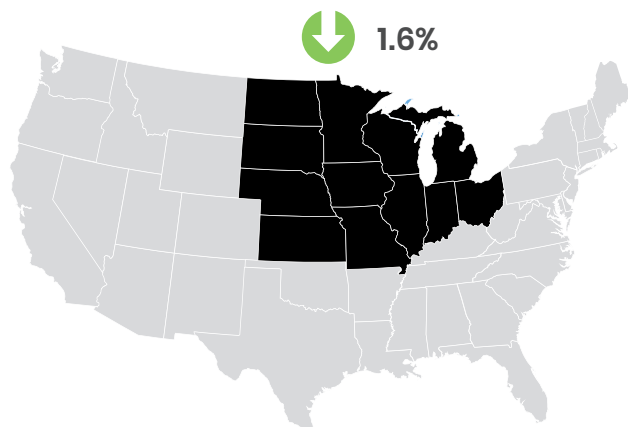**$398.26**

Average cost to repair a vehicle's check engine light problem in the Western U.S. in 2019.

(Ten most common vehicle repairs in the Western U.S. are based on 4,064,819 repairs in 2019 in AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA and WY. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)

CarMD

Midwestern Repair Costs & Data

The 10 Most Common Check Engine Vehicle Repairs in the Midwestern U.S. – 2019

| Rank	Vehicle Repair	Total Average Repair Cost (Parts&Labor)	% 2019 Midwestern U.S. Repairs	Change In Rank Since 2018
#1	**Replace Oxygen Sensor(s) (O2S)**	$234.89	5.91%	No Change
#2	**Replace Catalytic Converter(s) with new OE Catalytic Converter(s)**	$1,345.94	5.29%	No Change
#3	**Inspect for Loose Fuel Cap and Tighten or Replace as Necessary**	$24.76	4.72%	Up from #4 ⬆
#4	**Replace Ignition Coil(s) and Spark Plug(s)**	$389.24	4.48%	Down from #3 ⬇
#5	**Replace Evaporative Emissions (EVAP) Purge Control Valve**	$141.17	4.00%	No Change
#6	**Replace Mass Air Flow (MAF) Sensor**	$327.06	3.77%	No Change
#7	**Replace Ignition Coil(s)**	$215.76	3.34%	No Change
#8	**Replace Evaporative Emissions (EVAP) Purge Solenoid**	$147.42	3.04%	No Change
#9	**Replace Fuel Injector(s)**	$477.96	2.92%	No Change
#10	**Replace Thermostat**	$243.20	2.29%	No Change

⬇ 1.6%

$360.44

Average cost to repair a vehicle's check engine light problem in the Midwestern U.S. in 2019.

(Ten most common vehicle repairs in the Midwestern U.S. are based on 3,693,880 repairs in 2019 in IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD and WI. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)

CarMD

Northeastern Repair Costs & Data

## The 10 Most Common Check Engine Vehicle Repairs in the Northeastern U.S. – 2019

Rank	Vehicle Repair	Total Average Repair Cost (Parts&Labor)	% 2019 Northeast U.S. Repairs	Change In Rank Since 2018
#1	Replace Oxygen Sensor(s) (O2S)	$263.64	6.50%	No change
#2	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,342.41	6.29%	No change
#3	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$23.56	5.90%	No change
#4	Replace Ignition Coil(s) and Spark Plug(s)	$381.96	4.65%	No change
#5	Replace Mass Air Flow (MAF) Sensor	$349.04	4.33%	Up from #6 🔺
#6	Replace Ignition Coil(s)	$218.97	3.85%	Down from #5 🔻
#7	Replace Evaporative Emissions (EVAP) Purge Control Valve	$148.48	3.82%	No change
#8	Replace Evaporative Emissions (EVAP) Purge Solenoid	$151.27	2.64%	No change
#9	Replace Fuel Injector(s)	$451.66	2.22%	No change
#10	Replace Thermostat	$249.26	2.03%	No change
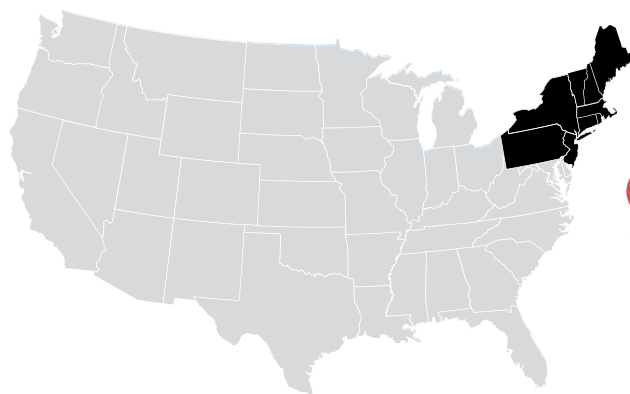
1.1% ▲

$384.08

Average cost to repair a vehicle's check engine light problem in the Northeastern U.S. in 2019.
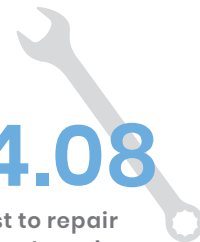
(Ten most common vehicle repairs in the Northeastern U.S. are based on 2,159,192 repairs in 2019 in CT, MA, ME, NH, NJ, NY, PA, RI and VT. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)

Most Expensive Car Repairs

The most expensive repair in the CarMD database in 2019 was "replace engine block assembly" ($7,348). This repair is indicative of the fact that cars are being made to outlast parts such as their engine. The good news is that this repair accounted for less than one-tenth of 1% of needed repairs.

One of the five most expensive repairs in 2019 was "replace hybrid battery" accounting for only 0.01% of repairs at a top cost of $4,330. When we first began reporting the Vehicle Health Index, CarMD hypothesized that as hybrid vehicles gained in popularity the price of hybrid battery replacements would trend down, but that has not been the case. In 2010, "replace hybrid battery" also accounted for 0.01% of repairs, but the top cost at the time was under $3,000. Year, make and model of vehicle affect repair cost, but this part cost has not trended down as hybrid vehicle registrations have gone from roughly 2% of the U.S. market in 2010 to nearly 8% of U.S. market in 2019.

10 Pricey Check Engine-Related Vehicle Repairs and Their Costs

2019 / 2010

Rank	Vehicle Repair	Top Cost of this Repair in 2019	Top Cost of this Repair in 2010
#1	Replace Engine Block Assembly	$7,348	Not Reported
#2	Replace Transmission and Torque Converter	$5,280	$3,485
#3	Replace Transmission Assembly	$4,310	$3,177
#4	Replace Hybrid Battery	$4,330	$2,992
#5	Replace Cylinder Head Assembly	$2,625	$1,873
#6	Replace Electronic Brake Control Module (EBCM)	$1,140	$1,134
#7	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$2,512	$1,008
#8	Replace ABS Modulator Assembly	$1,767	$992
#9	Replace Engine Control Module (ECM)	$839	$898
#10	Replace Powertrain Control Module (PCM)	$897	$703

Least Expensive Car Repairs

The **least expensive repair** is "Inspect for Loose Fuel Cap and Tighten or Replace as Necessary" at an average cost of $25. The ten least expensive repairs account for roughly 5 percent of all needed repairs. Back in 2010, when the gas cap was the root cause of a check engine light, it was most often in need of tightening versus replacing.
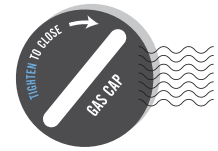
10 Inexpensive Check Engine-Related Vehicle Repairs and Their Costs

2019   **2010**

Rank	Vehicle Repair	Cost of this Repair in 2019	Cost of this Repair in 2010
#1	Tighten or Replace Fuel Tank Gas Cap	$25 (newer systems are more sophisticated and may require diagnostic time)	$1 (most often needed tightening versus a replacement)
#2	Replace Electronic Throttle Control System (ETCS) Fuse	$40	Not Reported
#3	Inspect Fuel Cap Gasket	$50	Not Reported
#4	Adjust Tire Pressure and Reset Tire Pressure Sensor	$51	$78
#5	Clean Ground Wire	$57	$87
#6	Inspect Battery and Charging System	$103	$84
#7	Inspect for Leak at Exhaust Pipe and Repair as Necessary	$104	$134
#8	Inspect Cooling System and Repair As Necessary	$105	$146
#9	Replace Evaporative Emissions (EVAP) Hose(s)	$105	$99
#10	Replace Air Filter Element	$106	$99

Index Methodology

CarMD has compiled the industry's most comprehensive database of OBD2-related problems and associated fixes uploaded by automotive technicians and vehicle owners since 1996.

The data for the 2020 CarMD® Vehicle Health Index™ was procured from repairs uploaded to the CarMD diagnostic database from Jan. 1, 2019 to Dec. 31, 2019. This year's index also reviewed past indices for a historical look at 10 years of data. The data comes directly from the vehicles themselves to the CarMD database without any human interface. This database is also used to support products such as CarMD PRO SCAN, an automated network inspection solution for technicians.

The data was collected and analyzed was from between Mar. 13, 2020 and Mar. 26, 2020.

Virtually all makes and models of cars, light trucks, minivans, SUVs and hybrids made since 1996 – foreign and domestic – with on board diagnostic second generation (OBD2) technology are included in the Index. Those makes and models with more registered vehicles on the road may have a larger statistical weighting in the Index findings, as will vehicles that experience more failures or whose owners seek guidance from sources that report to the CarMD database.

The 2020 Index statistically analyzes 15,869,285 repairs as well as a compilation of more than 41 million vehicles reporting check engine health to CarMD since 2010. Each recommended repair has also been reviewed and validated by CarMD's team of ASE-certified Master Technicians and then output based on a probability algorithm that takes into account the vehicle's year, make, model, mileage, postal code, DTCs and similar vehicle problems to produce a most likely repair. Because the data stems from those U.S. vehicle owners and automotive technicians who elected to use the diagnostic devices and/or upload data into the CarMD database; no estimates of theoretical sampling error can be calculated.

All 50 U.S. states, plus the District of Columbia, are represented in this Index. The states with larger registered vehicle populations and participating ASE-certified technicians may have a larger quantity of logged repairs; however, all have been averaged into the overall Index findings. For regional data, CarMD used the U.S. Census Bureau Regions and Division Map to define regions.

Repair costs are based on parts and dealer list plus 10 percent markup. Labor rates are procured from several sources, including the Undercar Digest National and Regional Hourly Shop Labor Rate reports, as well as the average amount of time required for each repair. Both are updated annually.

CarMD has contracted with an independent consulting company to create and maintain the database for compiling and generating this Index.

On a daily basis, CarMD's nationwide network of thousands of automotive service excellence (ASE)-certified technicians recommend, confirm and upload repairs and costs by region to the CarMD database. As a result, subsequent CarMD Vehicle Health Index reports will draw from an updated sampling of diagnostic trouble codes, expert fixes and repair costs.

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