



INSPECTION UPDATE

WINTER 2024
VOLUME #25, ISSUE 4

IN THIS ISSUE:

- **Program News**
 - Hybrid IMPAC Meeting – 12/12
- **MAC Corner**
 - Intermittent No-start Issue
- **Program Updates for 2025**
 - New Year/New Stickers
 - Emission Changes – 1/1/25
 - Motorcycle Stickers for 2025
- **Inspector / Station Reminders**
 - Inspection Guidance: Rear Impact Guard
 - Heavy Duty OBD Communication Reminder
 - eServices Portal
 - Return Workstation Components
 - OBD Communication (2020-21) - Ford Escape
 - Scanning Stickers
 - Inspector Training
- **Program Statistics**

PROGRAM NEWS

Hybrid IMPAC Meeting – Thursday, Dec. 12th

Our next meeting is on Thursday, December 12 from 11:00am - 12:30pm and will be conducted in a hybrid format, allowing participants to join either in person or via Zoom. This approach accommodates the varied needs and preferences of our team, while ensuring flexibility and accessibility for all. For those who can attend in person, it fosters direct, collaborative engagement, while the virtual option supports remote team members or those unable to be physically present. By combining both formats, we aim to maximize participation and inclusivity, ensuring everyone has an equal opportunity to contribute regardless of location.

Attend in person:

NEW LOCATION:
Mass Highway District 3, 499 Plantation Street, Worcester

Join virtually via Zoom meeting:

<https://us02web.zoom.us/j/85378077816?pwd=q3llaMctbl8oBkNdvflPwp7CvLRXvj.1>

Meeting ID: 853 7807 7816

Passcode: 284018

One tap mobile

+13017158592,,85378077816#,,,284018#

MAC CORNER

Intermittent No-start Issue

The following article was contributed to us by Bob Powell, a registered repair technician working at Perron's Automotive in Longmeadow. This article demonstrates the need of a great diagnostic approach to an intermittent no-start issue utilizing an oscilloscope. Thank you for sharing, Bob!

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The article is about a vehicle that had previous work done by the customer and other shops where the coil pack and crank sensor were replaced (about a year ago). The customer replaced the cam sensor and crank sensor himself, but continued to have stalling and no start issues.



The first time I saw the Jeep Cherokee Sport 4.0L, it was towed in as a crank no start. I found a stored P0340 no cam signal. The engine had a new cam reluctor and sensor installed, and I verified the reluctor was turning when the engine was cranked. I also verified the cam sensor had a 5v reference, a ground, and there was 5v on the signal wire with the sensor unplugged. I scoped the signal wire when cranking and there was just a constant 5v, no square waves, so I replaced the cam sensor. The engine started right up. I drove the Jeep around a bit, and it ran fine and restarted normally. I declared the Jeep fixed, and the customer picked up the vehicle.

The customer came back the next day and said the Jeep died on him a couple times randomly, but it would restart. We had him leave the Jeep with us again to take a more in depth look this time.

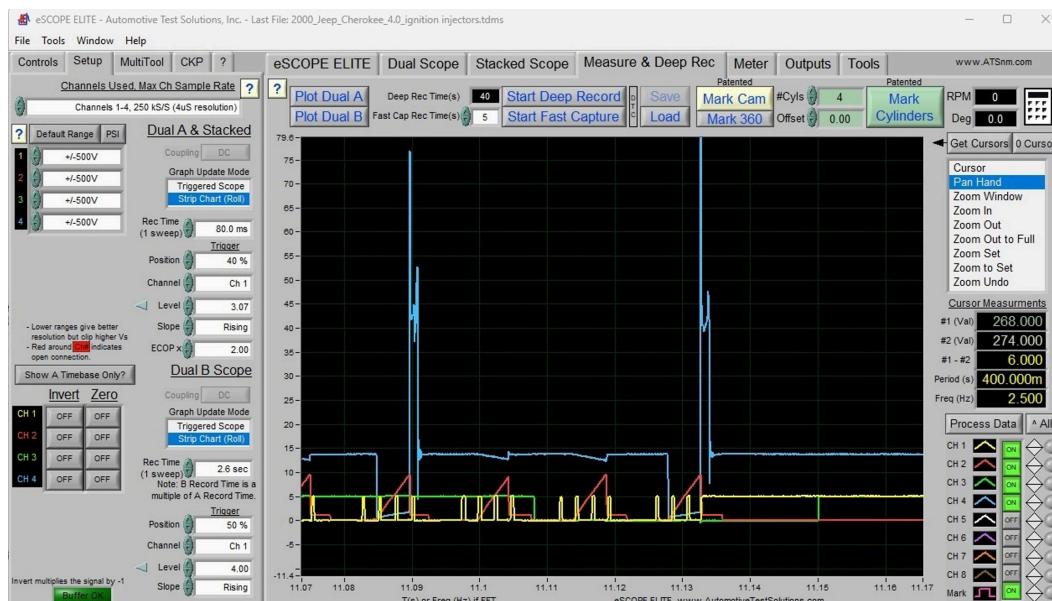
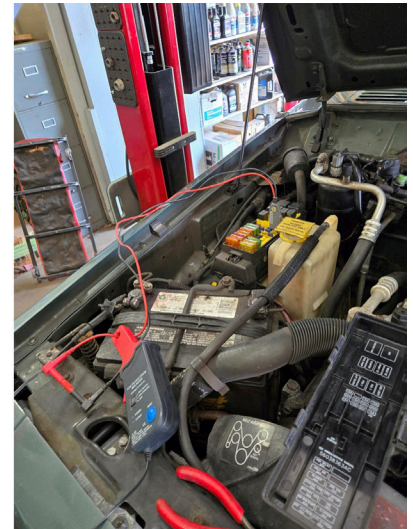
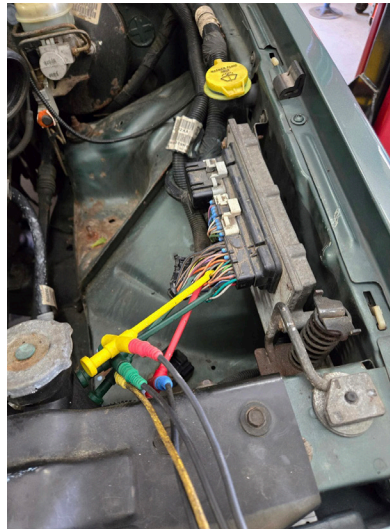
The codes stored this time were P0351 and P0353 related to the primary circuit for ignition coil 1 and 3. I thought that was a little odd since those codes weren't there before and I never experienced any misfiring. Since the coil pack was already replaced previously, I decided to do some more scope testing before condemning any other parts.

I scoped the cam, crank, injector, and coil current. I tapped into the signal wires at the PCM and used an amp clamp on the ignition/injector fuse.

When the engine died, I saw the crank sensor stopped triggering and the ignition and injection stopped.

The cam sensor signal continued until the engine stopped turning (yellow is crank signal and green is cam). This was a repeatable issue every time the engine quit running, and the crank sensor signal quit first.

The PCM supplies 5v on the signal wire and the sensor grounds it to create the signal. I tested the power, and the ground and signal wires - and they checked out good. The customer had mentioned that he recently replaced the sensor, so I decided to inspect that part.



Article continued on to next page

The crank sensor bracket was cut and hacked up. After further discussion with the customer, he said it was very difficult to hold the sensor and start the bolts at the same time, hence he modified the bracket to allow him to start the bolts first and then slide the sensor onto the bolts. (Umm, yeah that's not how it works)

Once again, I had discovered an obvious problem and assumed that a new crank sensor would fix this permanently. I did my due diligence and inspected the tone ring. I used a mirror to look through the bell housing hole while someone turned the engine over for me. Since the tone ring looked perfectly fine, I ordered and installed a new crank sensor.

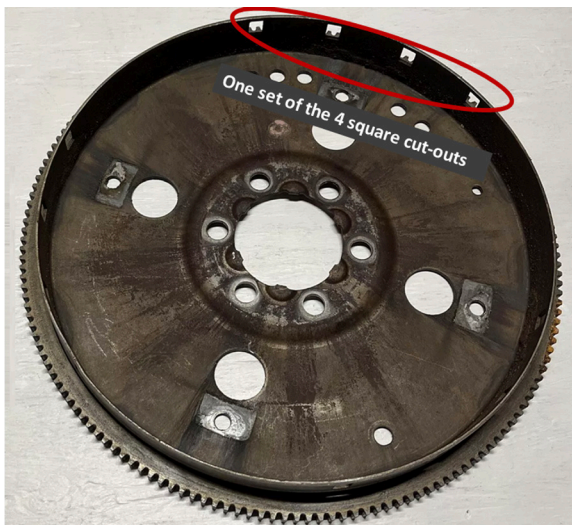


After installation, the engine did start normally, however, the Jeep still randomly stalled at times. I scoped it again and noticed that the crank sensor signal was still failing and causing the engine to stall.

To recap, I found and replaced both a camshaft sensor and a crankshaft sensor that were bad, but it turns out they were not the root cause of this intermittent stall. At this point, I knew I needed to spend more time analyzing the waveform captures in detail. Something strange was happening and I needed to sift through the data for clues.

I scoped the sensor power, and the ground and signal when the engine stalled and there was never any fault in the 5v ref or the ground. The tone ring has three sections of 4 notches creating 3 groups of 4 square waves, all evenly spaced. It seemed that every time the engine quit, the sensor signal would go high on the last notch and stay there until the engine stopped turning.

While looking at the capture, I noticed the coils didn't always fire on the last crank pulse. Sometimes they fired slightly



before the last pulse. However, every time the crank pulse latches high, it coincided with a coil firing. For whatever reason, the crank signal always latched high at the 4th notch no matter when else a coil firing event occurred.

Ok, now I'm getting somewhere. I have seen many intermittent issues caused by bad ignition coils. I'm beginning to believe that the sensor is being spiked by the coils causing it to latch high and stall the engine. The Jeep always restarts immediately. I have not experienced any noticeable misfires, but I do suspect that the ignition coil pack may be faulty.

In one of my captures, I noticed that on most of the ignition events there is a large negative voltage spike of about minus 40 volts. This is a significant negative spike which can back feed into the system and cause various anomalies. The crank signal is glitching intermittently which is causing one of the firing events to drop out intermittently. I believe this is all related to the negative voltage spikes.

Since the coil pack has already been replaced, next up is to inspect the spark plugs. The Jeep did not have OE brand plugs and the electrodes were extremely worn with very large gaps. These plugs would obviously cause much higher firing voltages than normal. I thought it made sense to install some new plugs and then retest.

After the new spark plugs were installed, the crank sensor fault and stalling were gone completely. I took the vehicle on an extended road test a couple times and it never stalled again. There were no symptoms and no more codes.

I spent some time with the scope analyzing the signals to get a better idea of exactly what was happening. In reality, this scenario would require more detailed paragraphs about how I navigated the scope and analyzed my captures.

If you would like to see Bob provide additional (scope) analysis, he made a [screen video recording](#) of how he used the features of the scope to really dissect the waveforms.

The video recording provides a much better view to see the process than trying to explain on paper. The scope Bob used for this diagnosis is tablet-based running on Windows 11.

PROGRAM UPDATES FOR 2025

New Year/New Stickers:

The delivery of stickers expiring in 2026 and associated supplies to inspection stations is underway. If you have not yet received your first quarter sticker supply, here is what you need to know:

- The color for these stickers is BLUE.
- In late November, stickers for the 1st quarter of 2025 (2026 expiration stickers) began to be delivered to all other stations in the network.
- Program staff will visit your station providing you the 1st quarter inventory. To make the exchange as seamless as possible, please have an Inspector available to receive the sticker books into your workstations, then, store them in a safe place until January 1st.

At the beginning of the new year, place all unused 2025 (yellow) stickers in a secure place for your RMV Field Representative to collect.

Please be sure to contact us if you do not receive your 2025 inventory or should you have any questions about the inventory received (1-844-358-0135).



Emission Changes Effective January 1, 2025:

As the new year approaches, we want to remind you of the changes that will take effect on January 1, 2025, relative to the model years of vehicles subject to Massachusetts Vehicle Check emissions testing, repair waiver expenditure limits, and economic hardship repair extension criteria.

Vehicle Model Years Required to Receive an Emissions Test

Vehicle model years 2011 and newer will still be required to receive emissions tests, but 2010 and older model year vehicles will be exempt. Below is an applicable model year schedule for calendar year 2025.

2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Exempt
Five model years old or newer					Over five and up to ten model years old					Over ten model years old				

New Repair Waiver Expenditure Limits

This new information is provided at the bottom of the second page of the VIR for vehicles that fail their emissions tests. Below are the calendar year 2025 Consumer Price Index (CPI)-adjusted waiver expenditure limits chart:

\$1,150	for vehicles five model years old or newer;
\$1,050	for vehicles over five but not exceeding 10 model years old; and,
\$950	for vehicles over 10 model years old.

Economic Hardship Failure Repair Extension Diagnostic Limits

This new information is provided on the [Massachusetts Vehicle Check Program](#) website for vehicles that fail their emissions tests. Below is the calendar year 2025 CPI-adjusted economic hardship failure repair extension diagnostic limits chart:

\$1,725	for vehicles five model years old or newer;
\$1,575	for vehicles over five but not exceeding 10 model years old; and,
\$1,425	for vehicles over 10 model years old.

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Motorcycle Stickers for 2025

Motorcycle Inspection Station Transactions Available Using the Online eServices Portal

You can purchase 2025 Motorcycle inspection stickers and Request a Rebate of Unused 2024 Motorcycle inspection stickers through the RMV's eServices Portal. If you do not have access to the eServices Portal, go to: <https://www.mass.gov/how-to/how-to-obtain-access-to-inspection-station-eservices-portal>.

Ordering 2025 Motorcycle Certificates of Inspection

Once signed into the eServices Portal <https://atlas-mymv.massdot.state.ma.us/eservices/> / select Order Motorcycle Inspection Stickers

- Review transaction information page. To begin the transaction, select NEXT.
 - Enter the number of sticker packages requested (100 stickers per pack)
 - Enter your email address and confirm the address, select NEXT
- Verify fees due (Sticker fee per package \$250.00 / UPS shipping fee \$8.50), select NEXT
- Select Payment method (Checking Account/Credit/Debit Card), select Next
- Enter banking or credit card information, select NEXT
- Review transaction and accept terms to continue, select SUBMIT

Once your transaction has been submitted you will receive a confirmation email, and stickers will be mailed to the address provided to the RMV via UPS next-day delivery.

When you receive your 2025 stickers, you may start issuing them on January 1, 2025, the stickers will already be loaded into your station inventory.

Request Rebate of Unused 2024 Motorcycle Stickers

Once signed into the eServices Portal <https://atlas-mymv.massdot.state.ma.us/eservices/> / select Motorcycle Inspection Sticker Rebate

- Review transaction information page. To begin the transaction, select NEXT.
 - Enter the appropriate Rebate request information:
 - Enter the year of the inspection stickers for which you are requesting a rebate.
 - Enter your email address and confirm the address.
 - Select the REBATE button.
- Select Next.
- Review transaction (# of stickers returned, rebate amount (\$2.50 per sticker), rebate type (Rebate), and accept terms to continue. Select SUBMIT.

Once your transaction has been submitted you will receive a confirmation email.

For help documentation go to: <https://www.mass.gov/info-details/rmv-system-atlas-training-materials> and click on Inspection Stations Help Documentation.

Do not destroy or dispose of your inventory of 2024 stickers; once your transaction has been submitted your RMV field investigator will be notified. To complete the rebate request you must hold all unused stickers for the field investigator to pick up and reconcile before your rebate can be approved and finalized.

Questions?

Send an email to the Vehicle Safety & Compliance Services team at RMVinspection@dot.state.ma.us

INSPECTION / STATION REMINDERS

Inspection Guidance: Rear Impact Guard

The Federal Motor Carrier Safety Administration (FMCSA) added Rear Impact Guard to the Appendix A to Part 396—Minimum Periodic Inspection Standards. The appendix provides the minimum list of components that must be inspected on each commercial vehicle to verify they are in proper working order at least once every 12 months.

During your rear impact guard inspection, the following aspects should be assessed:

- **Condition:** Inspect the guard's overall condition for damage, corrosion, or any other structural issues that may affect its effectiveness.
- **Mounting and Attachment:** Ensure that the rear impact guard is securely attached to the vehicle and properly mounted according to industry standards.
- **Clearance:** The space or clearance between the ground and the bottom edge of the rear impact guard. This clearance is crucial to ensure that smaller vehicles do not slide under the rear of the larger vehicle in the event of a collision.
- **Welds and Fasteners:** Examine the welds and fasteners for signs of wear, damage, or rust that could compromise the guard's structural integrity.

Rear impact guards are intended to reduce injuries and fatalities associated with lighter vehicles by preventing intrusion underneath the rear of a heavier vehicle during an impact, as well as absorbing some of the collision's energy. One set of mandates applies to trailers, while the other is specific to trucks.

The rear impact guard requirements were established to enhance safety by reducing the risk of underride crashes, where a vehicle can slide under the rear of a commercial vehicle during a collision.

For detailed, technical guidance, carriers should refer to FMCSA's Federal Motor Carrier Safety Regulations (FMCSR) under [§393.86](#), which specifically addresses rear impact guard standards.



Heavy Duty OBD Communication Reminder

The Massachusetts Vehicle Check program started to test 2014 and up Heavy-duty vehicles using an OBDII test in October of 2022. Over 92,000 HD OBD tests have been performed as of the publication of this article.

Tachometer and Temperature (tach/temp) data is also being gathered during opacity tests on all 2007 and newer vehicles. This is a reminder to inspectors that you must “snap” the throttle as directed during the opacity test. Trying to lightly feather the throttle will result in extra snaps and a failed test.



There has been a relatively high communications failure rate mostly due to inspectors bypassing the tach/temp data gathering and also the OBDII data connection. To properly gather this data, the OBDII connector from the workstation should be plugged directly into the vehicle's factory OBDII connector.

Plugging into an aftermarket OBDII connector due to a data logger or other device being plugged into the factory connector can lead to no communication. When using the 6 or 9 pin Deutsch connector adapters, it is essential to use the locking ring when making the connection to the vehicle. Failure to do this can result in no communication. The best way to connect is to note the position of the

key on the center pin of the vehicle's DLC, rotate the cable end to match it, push it onto the DLC and twist the locking ring to secure it in place.

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At some point in the future, bypassing the OBDII test or tach/temp data gathering will result in a Test Interruption. This will result in longer test times while Opus intervenes during the test to discuss the bypass with the inspector. This will inconvenience both the station and the motorist. If your workstation is having problems now when you try to perform these tests, please contact the call center for technical assistance (844-358-0135).

If you are performing opacity tests outside and have a wireless DAD, you should already be getting prompted to connect to the vehicle to gather tach/temp data. If you are having connection problems, a Bluetooth extender is available from Opus to help with the connection.

If you have a wired DAD and do not perform the snap opacity test indoors, DEP staff will be evaluating the next steps to take with your station. A wireless DAD upgrade may be available for your workstation to allow you to perform the opacity test outside while gathering tach/temp data.

eServices Portal

The portal is easy to use, convenient, and free for inspection stations and enables stations to:

- View current inspection station license details.
- Renew inspection station licenses.
- Replace inspection station licenses (if lost or damaged).
- Order motorcycle inspection stickers.
- Request rebate or credit of unused motorcycle inspection certificates.

If you do not currently have access to the portal, go to: <https://www.mass.gov/how-to/renew-your-vehicle-inspection-station-license> and select How to Obtain Access to Inspection Station eServices Portal. Select How to Request and the plus sign next to Online. You must complete both the RMV Business Partner Contact Form and the eServices Administrator Access Form.

Return Workstation Components

Please remember to return all loaned and defective workstation parts as soon as you receive your part shipment from Opus.

When it is determined that you have an inoperative component, not due to neglect or abuse, Opus will arrange for delivery of a replacement component at no cost to the facility. As a reminder, in the Station Participation Agreement (SPA) you agreed to return the old part promptly after receiving the replacement component. You will find instructions and a return shipment label inside the box.

Failure to return inoperative components as outlined in your SPA agreement hinders the program from providing prompt parts exchange with every facility and may result in you being invoiced for the component.

OBD Communication 2020 and 2021 Ford Escape

In the past, you may have experienced problems completing an OBD test on certain model year 2020 and 2021 Ford vehicles.

During the OBD test, if one of these vehicles cannot communicate with the workstation's scan tool, **inspectors should now complete the inspection** and direct the motorist to the [Massachusetts Vehicle Check Program](#) website to view the Ford document.

You should encourage the motorist to make an appointment with their Ford dealership and have a copy of the document handy for their visit. Inspectors should remind their customers they can return to their station for a free retest within 60 days once the problem is fixed by Ford.

Ford has documented the following vehicles have problems communicating with state emission test equipment, like the DAD used in the Massachusetts Vehicle Check Program:

- 2020 - 2021 Escape, Escape hybrid
- 2020 - 2021 Lincoln Corsair
- 2021 - 2022 Bronco Sport
- 2021 - 2022 E-Series chassis vehicles

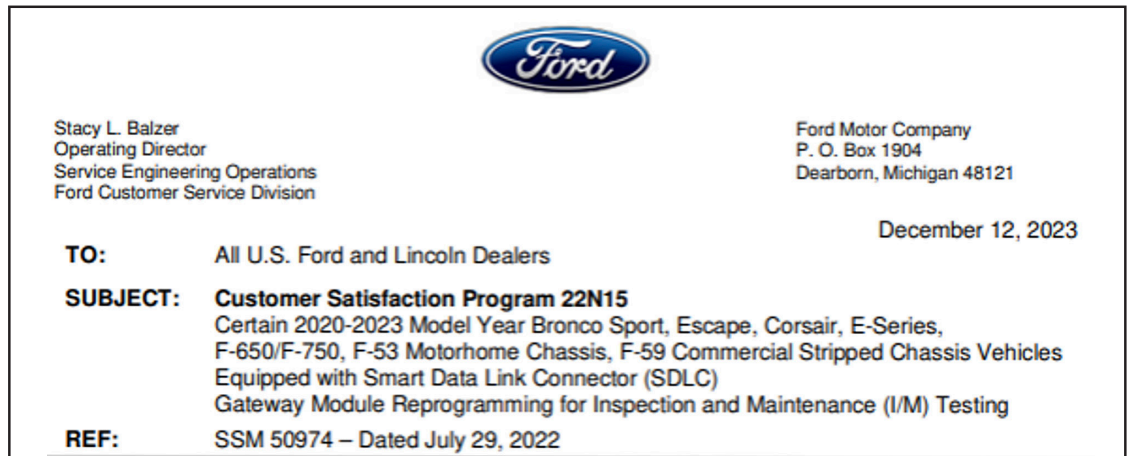
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- 2021 - 2023 F-650/F-750 vehicles
- 2020 - 2022 F-53/F-59 motorhomes and commercial chassis vehicles

The MA Vehicle Check Program has been offering help inspecting these vehicles while Ford investigated the problem. As needed, these vehicles have been given test exceptions to skip the OBD test. Starting November 1, 2024, the Program will no longer be offering test exceptions for these vehicles.

Ford has issued the following repair campaign that describes the problem and their solution to reprogram these vehicles, free of charge.

The complete document is available on National Highway Traffic Safety Administration (NHTSA) [website](#), is posted on the MVC Program website homepage and will be sent to all stations via email and a workstation message.



Scanning Stickers

Scanning an existing inspection sticker can be a quick and accurate way to enter a vehicle's VIN at the beginning of an inspection – But a few precautions must be taken:

- Scan the correct barcode – the larger horizontal 2D provides the vehicle's data.
- Only the current generation of inspection stickers can be scanned – visually confirm the two-piece design (issued October 1, 2017, to present) prior to scanning.
- Never scan stickers from other states or jurisdictions – they will not provide the correct information.

For additional guidance, please refer back to the Fall Newsletter: <https://www.mavehiclecheck.com/s/Inspection-Update-Fall-2024-1.pdf>

Inspector Training

The Massachusetts Vehicle Check Program offers Inspector training every month at many of our MAC locations. The training type and locations for the current month is determined by applications we received from the previous month.

The sooner we receive your application, the better we can assist you and ensure we offer the appropriate trainings for the following month.

- The RMV provides inspector licenses to applicants who have:
- Completed certification training
- Applied for the Inspector License
- Paid all applicable fees
- Holds a Driver's License for type of vehicle you will be inspecting

Steps to Becoming an Inspector:

1. Submit an Inspector License Application to the RMV.
 - You can complete the application online at the [Online RMV Service Center](#)
2. Submit Training Application to Opus

Application is available on our [Program website](#):
Stations & Inspector Tab >> Stations and Inspectors Resources >> Inspector Training Application

Reminder: We have resumed providing Inspector training in the Norwood area utilizing our MAC located on Route 1 in Norwood.

PROGRAM STATISTICS

MASSACHUSETTS VEHICLE CHECK PROGRAM AT A GLANCE July through September 30, 2024		
Enforcement Statistics	Count	
Violations Issued to Inspectors	47	
Violations Issued to Stations	54	
Inspector Privileges Revoked	4	
Inspectors Required to Retrain	3	
Inspectors Suspended	28	
Stations Suspended	36	
Customer Service Center Calls	Count	
Motorist Calls Received	1,723	
Inspection Station Calls Received	12,158	
Inspector Training	Count	
Initial Non-Commercial Inspectors Trained	296	
Initial Commercial Inspectors Trained	59	
Initial 7D Inspectors Trained	17	
Initial Motorcycle Inspectors Trained	5	
Licensed Stations	Count	
Class A Stations	1,171	
Class B Stations	231	
Class C Stations	15	
Class D Stations	285	
Class E Stations	7	
Waivers and Repair Hardships	Count	
Emissions Waivers Issued	10	
Repair Hardships Issued	5	
Inspections/Tests (Initial)	Count	Failure Rate
Non-Commercial Safety Inspections	1,310,631	6.8%
Commercial Safety Inspections	41,201	7.8%
7D Safety Inspections	652	2.9%
TNC Inspections	24,757	1.1%
OBD Emissions Tests	1,093,911	6.9%
Opacity Emissions Tests	14,805	7.3%