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### *Your Instructor For This Seminar*

- National Trainer, ASE World Class, Master Auto, Truck, School Bus, L1, L3, CNG
- ATTP Master Instructor, New York State, CT and New Jersey
- STS (Service Technician Society) 2003 President
- TST (Technicians Service Training) Founder and President
- Author / Co Author/ Technical adviser on 25 plus books including
- OBD II and Mode 6, and Understanding and Diagnosing Hybrid Vehicles
- Published articles for multiple newsletters, and magazines
- Picked as one of the Top Instructors in the country by EPA & SAE
- Numerous Radio, TV, Internet, and SAE Video appearances
- PTEN, Motor Age and TST Webcast Instructor - Dorman Training Director
- Motor Magazine Top 20 award winner
- Provider of OBD II Training for 14 states, Ontario Canada and the US EPA
- Guest speaker at SAE Congress, IM Solutions and Clean Air Conference



**"G" Jerry Truglia**

[gtruglia@dormanproducts.com](mailto:gtruglia@dormanproducts.com)

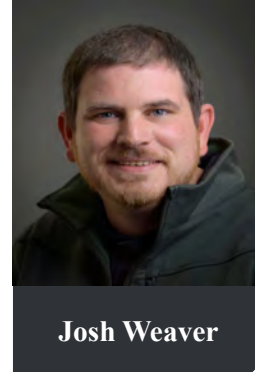


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## Your Instructor For This Seminar

- Associate Degree in Applied Science for Automotive Technology
- College was affiliated with General Motors and Chrysler, and I interned for Ford allowing me to learn all 3 domestic Brands
- Worked for a Kia dealership for 10 years and achieved Kia Master Tech Status
- Lead tech at the dealership allowing me to see the most difficult customer concerns
- Pennsylvania State inspection Emissions tech with waiver license
- Holds A.S.E. L1 Advance Engine Performance
- Holds A.S.E. L3 Light Duty Hybrid Specialist
- E.P.A. 609
- Manager of a 6 bay repair shop which also had a 6 bay body shop, allowing me to see a wide variety of electrical, drivability issues and module programming



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## What Will Be Covered

### Instructions For This webinar

This webinar will be approx. 1 hours long

- All slides that are presented are in your handout and are numbered
- Have a pen or pencil and paper for notes
- Questions can be asked at anytime

01 Thermal imaging theory

02 Thermal imagers

03 Thermal imager test

04 Tips and tricks

05 Case studies

This Dorman Lunch & Learn will cover the Do's & Don't of using a Thermal Imager on a vehicle. Thermal imaging is the MRI into the component being tested such as, parasitic draw, heating & AC system, catalytic converters, brake systems and everything and anything that produces heat. The Thermal Imager makes diagnosing quick and easy. Watch us use in on a vehicle.



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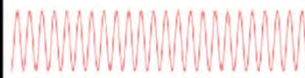
## Emissivity

**Emissivity is how well an object emits radiation**

$$E = \frac{\text{thermal radiation from an object surface}}{\text{radiation from an ideal blackbody surface}} \text{ (at the same temperature and distance)}$$



**Emissivity of less than 1**



**Emissivity of 1 or 100%**

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## Emissivity

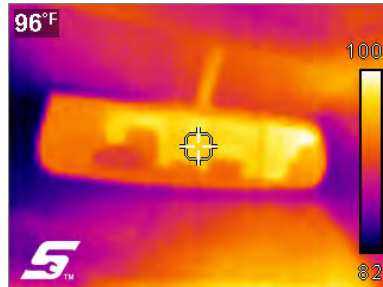
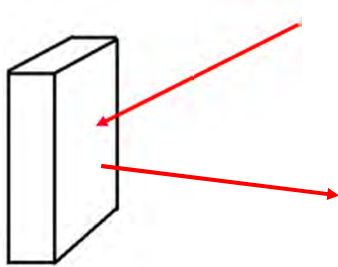


**Black bumper cover is hotter than the chrome bumper**

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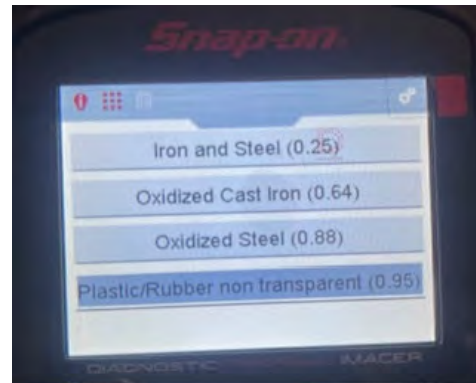
## Reflective Radiation

Radiation from a source in front of an object that reflects off the surface of another



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## Settings



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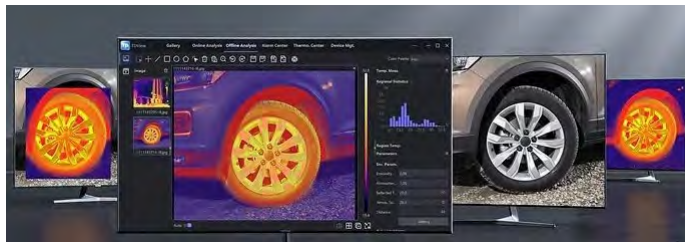
## Thermal Imagers



Range in price from couple hundred dollars to thousands of dollars

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## Different Imaging



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## Thermal Imaging

Heat is a byproduct of current, thermal imaging can help show an increase in resistance by showing an increase in heat or heat in a circuit from current draw

**When applying thermal imaging techniques, the possibilities are endless and is only limited by our imagination**

## Checking Parasitic Draw Vehicle Prep

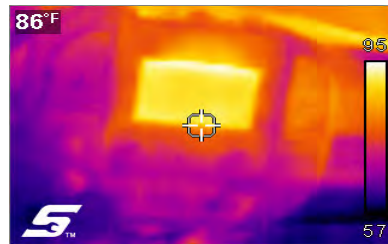
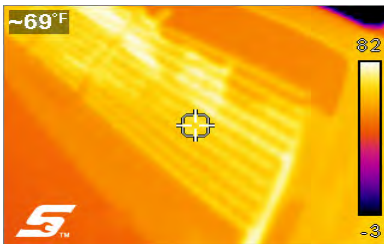
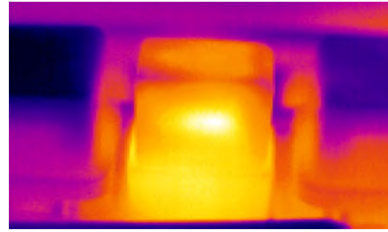
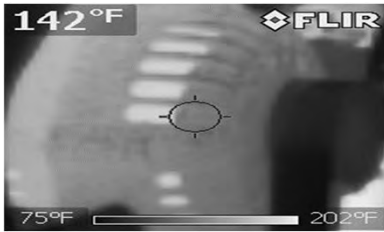
**It is very important that the entire car is at the same temperature.** The best thing to do is leave the vehicle in the bay **overnight so its at room temperature for the next morning.** I like to scan the vehicle with thermal imager first thing in the morning before I even turn on the lights.

**Preparation is a very important, for successful current draw finding with thermal imaging.**

1. Open all doors, trunk and hood
2. Make sure all latches are in the closed position
3. Keep the key far away from the vehicle
4. Have all fuse box covers and panel covers removed so that you look at all fuses with out disturbing the vehicle while its in sleep mode



## Checking Parasitic Draw Scanning The Vehicle



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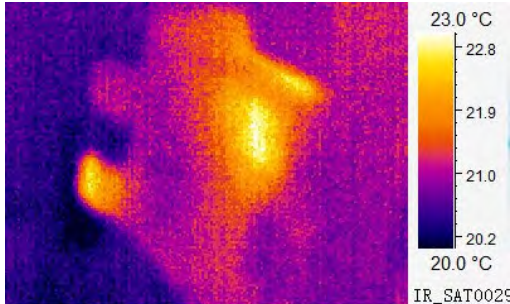
## Checking Parasitic Draw Scanning The Vehicle



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## Parasitic Draw

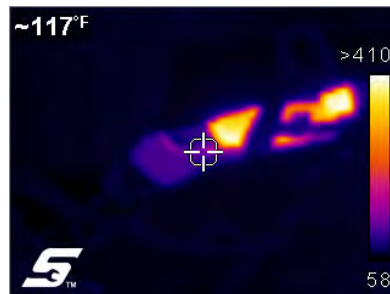
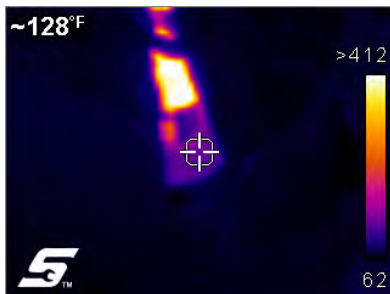
**2010 Honda Odyssey 3.5L, V6 came in with a complaint of a dead battery.** Using a thermal imager led us to the right rear side sliding door motor assembly and the right rear body module that were draining the battery. Using a thermal imager can save time and make you money. **Always make sure that the vehicle is cold for best results.**



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## Engine Misfire Diagnostics

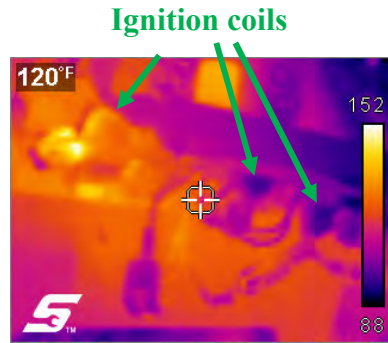
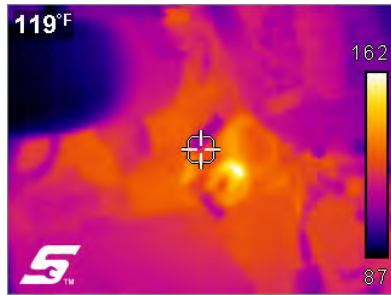
**A good way to test for a misfire is to use a thermal imaging camera.** Check the temperature for each cylinder, the one that is cooler is the problem cylinder.



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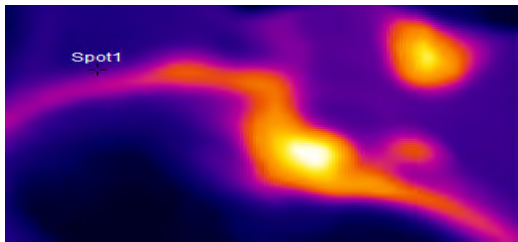
## Engine Misfire Diagnostics



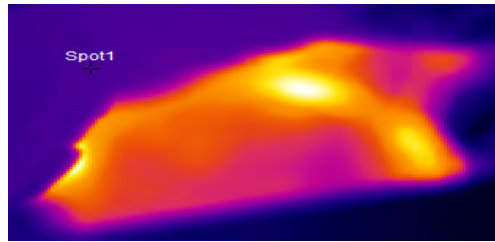
Shorted Coil

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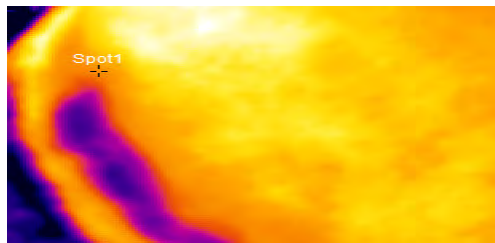
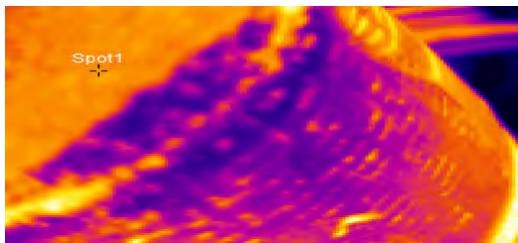
## Helpful Tool For P0421 & P0431



Bank 1

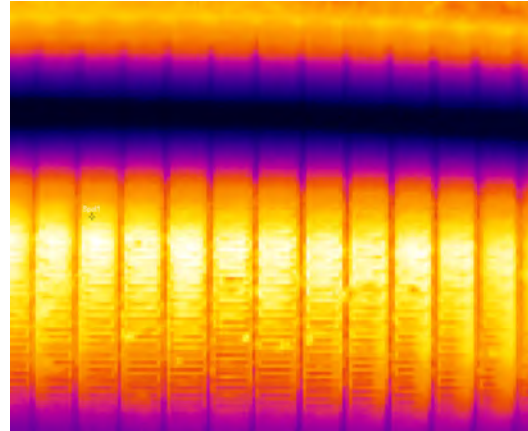
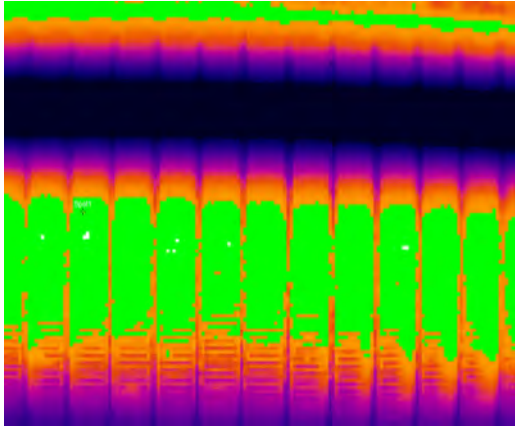


Bank 2



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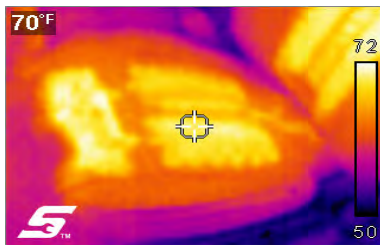
## A/C Condenser Compressor Off (Left) Compressor On (Right)



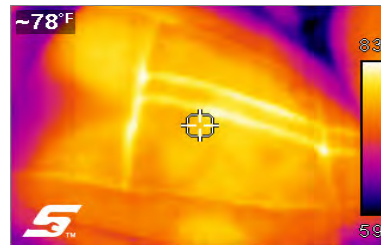
An approximate 40 - 50 - degree temperature drop across the condenser is normal on many vehicles.

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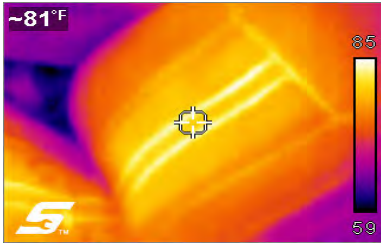
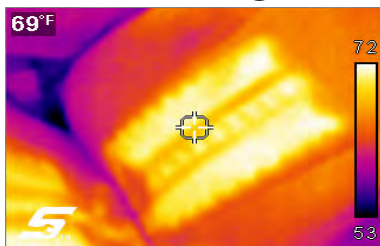
## Heated Seats



Working

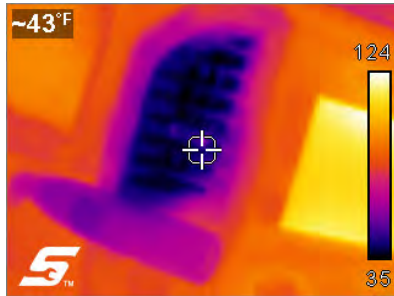


Not working



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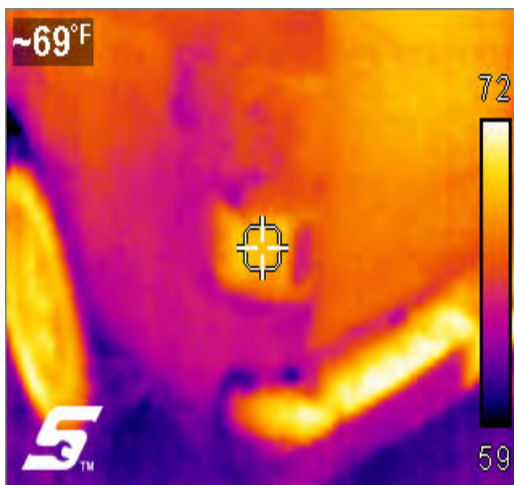
## Blend Door



**Left side vent is 20 degrees cooler than the right side**

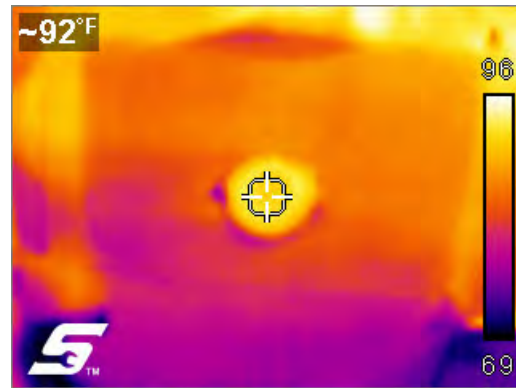
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## Blind Spot Detection



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## Tips And Tricks



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## Tips And Tricks

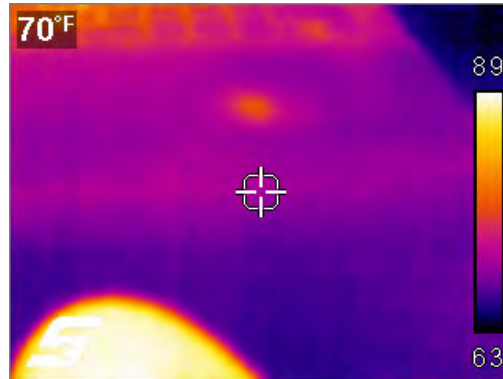


**The use of electrical tape or foot powder spray can be used to help with emissivity issues from shiny objects**

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## Tips And Tricks

If you find that camera keeps updating or recalibrating



**Keep your finger in front of the camera as a constant heat source**

## Case Studies

## 2008 Hybrid Honda Civic DTC 66-0 - P1570 Battery Module Problem

**All DTC Check**

- 61-21 MODULATOR-CONTROL UNIT POWER SOURCE LOW VOLTAGE
- 61-1 MODULATOR-CONTROL UNIT INITIAL IG LOW VOLTAGE
- EPS Confirmed DTCs (Permanent)
  - 12-01 Motor Power Supply Voltage
  - 11-02 Control Unit Power Supply Voltage
- Electrical Powertrain / IMA Confirmed DTCs (Permanent)**
  - 66-0 Battery Module Individual Voltage Problem**
- Tire Pressure Monitoring System Confirmed DTCs (Permanent)
  - 13 Tire2 Low Air Pressure
  - 15 Tire3 Low Air Pressure
- Hydraulic Booster Confirmed DTCs (Permanent)
  - 61 CONTROL UNIT LOW VOLTAGE

**66 (P1570) BATTERY MODULE INDIVIDUAL VOLTAGE PROBLEM**

**POSSIBLE FAILURES**

- Battery Module defect
- BCM Module internal failure

**NOTE**

BCM : Battery Condition Monitor  
MCM and BCM have two types, Separated and Integrated.  
Separated type has two ECUs, MCM and BCM. Integrated type has one ECU which included two CPUs, MCM and BCM.

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## 2008 Hybrid Honda Civic DTC 66-0 - P1570 Battery Module Problem

**IMA BATTERY MODULE 8 VOLTAGE [V]**

(Description)  
This is showing the voltage of IMA BATTERY MODULE 8. In the lower figure, the number of the battery module shows 11. The number changes by a model.

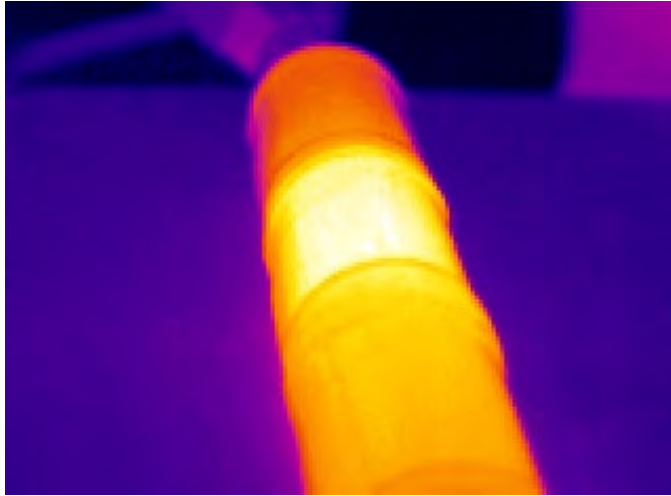
(Operating Range)  
14.3V - 18.0V

(Reference)

Signal	Value	Units
MCM Relay 2 (IG Hold Relay 2)	ON	
MCM Relay 1 (IG Hold Relay 1)	ON	
H.V. Contactor	ON	
BYPASS Contactor	OFF	
Total Voltage of All IMA Battery Modules	134.03	V
IMA Battery Module 1 Voltage	11.10	V
IMA Battery Module 2 Voltage	12.70	V
IMA Battery Module 3 Voltage	14.90	V
IMA Battery Module 4 Voltage	13.30	V
IMA Battery Module 5 Voltage	10.40	V
IMA Battery Module 6 Voltage	12.50	V
IMA Battery Module 7 Voltage	14.60	V
<b>IMA Battery Module 8 Voltage</b>	<b>8.50</b>	<b>V</b>
IMA Battery Module 9 Voltage	12.60	V
IMA Battery Module 10 Voltage	9.90	V
IMA Battery Module 11 Voltage	13.00	V
IPU Module Fan Speed	0	RPM
History of IPU Module Fan Stop	OFF	
DC-DC Converter Temperature	48.2	°F
Target Voltage of DC-DC Converter Output	13.80	V
DC-DC Converter Information	Normal	

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## 2008 Hybrid Honda Civic DTC 66-0 - P1570 Battery Module Problem



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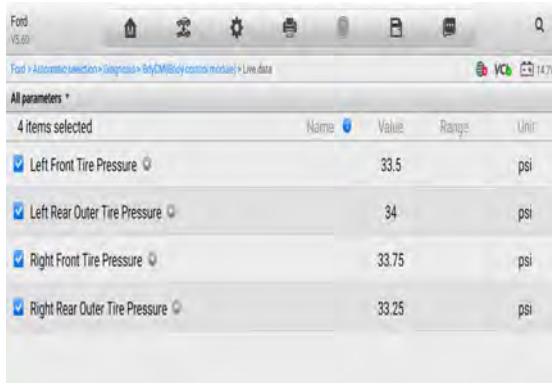
## 2018 Ford Escape Pulls To The Left

**Customer states vehicle pulls to the left even after they had 4 new tires and alignment done**



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## 2018 Ford Escape Pulls To The Left



Ford V5.60

Ford > Automatic selection > Chassis > Body/Chassis/Control Module > Live data

All parameters \*

4 items selected			
Name	Value	Range	Unit
Left Front Tire Pressure	33.5		psi
Left Rear Outer Tire Pressure	34		psi
Right Front Tire Pressure	33.75		psi
Right Rear Outer Tire Pressure	33.25		psi



Select all 0 items selected

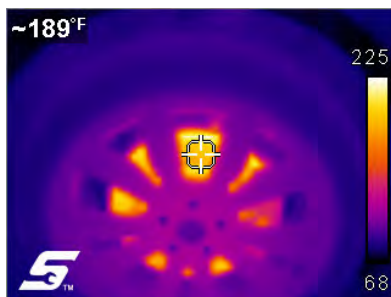
Name	Value	Range	Unit
Steering Wheel Angle	0	[0..1000]	°
Steering Wheel Angle Change Rate (Short Filtered)	0	[0..500]	°/s
Steering Wheel Angle Sensor Status	CORRECT		
Total Distance	68066.15		miles

The basics are checked, and tire pressures are good and steering angle sensor reads 0 deg when centered

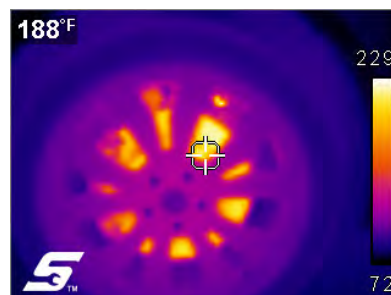
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## 2018 Ford Escape Pulls To The Left

Left front wheel



Right Front Wheel

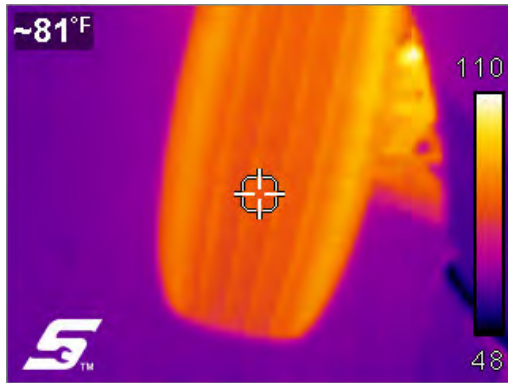


Wheels were checked to see if maybe the pull was caused by the brakes

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## 2018 Ford Escape Pulls To The Left



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*Questions?*

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# *Thank You!*

Please scan the QR code to fill out a quick survey about this presentation

