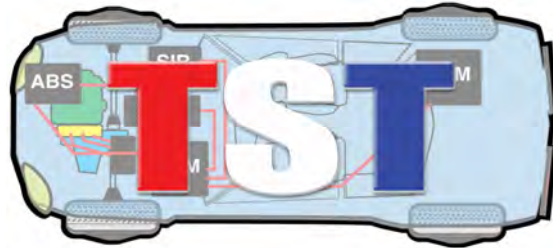


MOTOR AGE
TRAINING



"Diagnosing Vehicle Problems Utilizing The Ultra Autel Scan Tool"

Presented by Motor Age and TST

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What To Expect From This Webinar

- **A 60 to 90+ Minute Webinar**
- Your handout can be downloaded from <https://www.tstseminars.org/motorage-tst-10-24>
- **Have Something To Write With**
- **All Slides Are Numbered**
- **For Best Results Hard Wire Your Tablet, Laptop, Computer or TV**
- The Recording Will Be Available at [Motor Age Training Account](#) & [TSTseminars.org](#)

**MOTOR AGE
TRAINING**



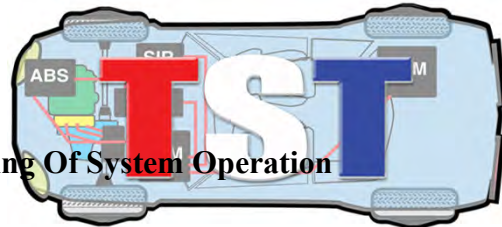
3

3

What Will Be Covered

- **PID Diagnosis, Which Ones To Look At**
- **STFT & LTFT Fuel Analysis**
- **MAF - O2 & Other Sensor Testing**
- **Graphing Data PIDs For A Better Understanding Of System Operation**
- **Using The Autel Labscope For A Deeper Diagnosis Of Sensors & Actuators**
- **Live On Vehicle Demonstrations**

**MOTOR AGE
TRAINING**



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Autel Ultra Scan Tool



5

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Autel Ultra Scan Tool - EOBD



6

Autel Ultra Scan Tool - EOBD

The screenshot shows the 'DTC&FFD' menu selected in the Autel Ultra Scan Tool. The 'Trouble codes' table is displayed with the following data:

DTC	Status	Description
P0023	\$10 Current	Vehicle communication bus A performance
P0155	\$10 Current	Lost communication with instrument panel cluster (IPC) control module
P0302	\$10 Pending	Cylinder 3 misfire detected
P0029	\$10 Pending	Vehicle communication bus A performance
P1100	\$10 Pending	Lost communication with instrument panel cluster (IPC) control module
P1101	\$10 Permanent	Lost communication with instrument panel cluster (IPC) control module
P0000	\$10 Permanent	Vehicle communication bus A performance
P0100	\$1E Current	Lost communication with ECM/PCM A
	\$1F	

At the bottom of the screen, there are buttons for 'Remote Expert', 'Vehicle Data', 'Freeze Frame', 'Erase codes', 'Read codes', 'Search', and 'ESC'. The vehicle information at the bottom left reads: VIN: 794402H0L0031489, Power: 190, Info: E000000113135-4(CAN).

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Autel Ultra Scan Tool - EOBD

The screenshot shows the 'I/M readiness' menu selected in the Autel Ultra Scan Tool. The 'Since DTCs cleared' table is displayed with the following data:

Code	Description	Status
\$1E	Malfunction Indicator lamp status	ON
\$1E	Misfire monitoring	N/A
\$1E	Fuel system monitoring	N/A
\$1E	Comprehensive component monitoring	OK
\$1E	Catalyst monitoring	N/A
\$1E	Heated catalyst monitoring	N/A
\$1E	Evaporative system monitoring	N/A
\$1E	Secondary air system monitoring	N/A
\$1E	Oxygen sensor monitoring	N/A

An 'ESC' button is visible at the bottom right of the screen. The vehicle information at the bottom left reads: VIN: 794402H0L0031489, Power: 190, Info: E000000113135-4(CAN).

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Autel Ultra Scan Tool - EOBD



9

Autel Ultra Scan Tool - EOBD



10

Autel Ultra Scan Tool - EOBD

EOBD V7.13

EOBD > ISO 15765-4 (CAN) > Live data

50 items selected

Name	Value	Range	Unit
\$10 Intake air temperature (bank 1 sensor 1)	78.8	-4.00...248.00	°F
\$10 Intake air temperature (bank 1 sensor 2)	73.4	-4.00...248.00	°F
\$10 Commanded throttle actuator A control	3.1	0...100	%
\$10 Relative throttle A position	2.7	0...100	%
\$1E Relative throttle A position	2.7	0...100	%
\$10 Commanded boost pressure A	14.27	0.00...297.03	psi
\$10 Boost pressure sensor A	14.21	0.00...297.03	psi
\$10 Commanded boost pressure B	0	0.00...297.03	psi
\$10 Commanded wastegate A position	100	0...100	%

Cancel All Show Selected Graph Merge To Top Setting Clear Data Freeze Record Review Back

11

Autel Ultra Scan Tool - EOBD

EOBD V2.13

EOBD > ISO 15765-4 (CAN) > Live data

50 items selected

Name	Value	Range	Unit
\$10 Relative throttle A position	2.7	0...100	%
\$1E Relative throttle A position	2.7	0...100	%
\$10 Commanded boost pressure A	14.27	0.00...297.03	psi
\$10 Boost pressure sensor A	14.21	0.00...297.03	psi
\$10 Commanded boost pressure B	0	0.00...297.03	psi
\$10 Commanded wastegate A position	100	0...100	%
\$10 Wastegate A position	100	0...100	%
\$10 Fuel system A use percentage (bank 1)	100	0...100	%
\$10 EVAP system vapor pressure A (wide range)	0.15	-263.10...263.09	inH2o

Cancel All Show Selected Graph Merge To Top Setting Clear Data Freeze Record Review Back

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD - ISO 15765-4 (CAN) - Live data

50 items selected

Name	Value	Range	Unit
<input checked="" type="checkbox"/> \$10 Numbers of DTCs	2	0...127	
<input checked="" type="checkbox"/> \$1E Numbers of DTCs	1	0...127	
<input checked="" type="checkbox"/> \$10 Fuel system A status	CL		
<input checked="" type="checkbox"/> \$10 Fuel system B status	-		
<input checked="" type="checkbox"/> \$10 Calculated load value	14.1	0...100	%
<input checked="" type="checkbox"/> \$1E Calculated load value	17.6	0...100	%
<input checked="" type="checkbox"/> \$10 Short term fuel trim (bank 1)	-14.06	-100...99.22	%
<input checked="" type="checkbox"/> \$10 Long term fuel trim (bank 1)	-15.62	-100...99.22	%
<input checked="" type="checkbox"/> \$10 Intake manifold absolute pressure	4.25	0.00...49.31	psi

Cancel All Show Selected Graph Merge To Top Setting Clear Data Freeze Record Review Back

13

Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD - ISO 15765-4 (CAN) - Live data

50 items selected

Name	Value	Range	Unit
<input checked="" type="checkbox"/> \$10 Absolute throttle position	13.7	0...100	%
<input checked="" type="checkbox"/> \$1E Absolute throttle position	13.7	0...100	%
<input checked="" type="checkbox"/> \$10 Location of oxygen sensors	B1S12-B2S---		
<input type="checkbox"/> \$10 Oxygen sensor output voltage (bank 1 sensor 2)	0.76	0...1.275	V
<input checked="" type="checkbox"/> \$10 Short term fuel trim (bank 1 sensor 2)	-1.56	-100...99.22	%
<input checked="" type="checkbox"/> \$10 OBD requirements to which vehicle is designed	OBDII		
<input checked="" type="checkbox"/> \$10 Time since engine start	411	0...65535	sec
<input checked="" type="checkbox"/> \$1E Time since engine start	410	0...65535	sec
<input type="checkbox"/> \$10 Distance since last engine start	0.00	0.00...40721.5	mi

Cancel All Show Selected Graph Merge To Top Setting Clear Data Freeze Record Review Back

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD > ISO 15765-4 (CAN) > Live data

50 items selected

Name	Value	Range	Limit
<input checked="" type="checkbox"/> \$1E Distance travelled while MIL is activated	0	0.00...40721.56	miles
<input checked="" type="checkbox"/> \$10 Fuel rail pressure	516.33	0.00...95050.46	psi
<input checked="" type="checkbox"/> \$10 Equivalence ratio (lambda) (bank 1 sensor 1)	1.017	0...1.999	
<input checked="" type="checkbox"/> \$10 Oxygen sensor voltage (bank 1 sensor 1)	2.326	0...7.999	V
<input checked="" type="checkbox"/> \$10 Commanded evaporative purge	20.8	0...100	%
<input checked="" type="checkbox"/> \$10 Fuel level input	62.7	0...100	%
<input checked="" type="checkbox"/> \$10 Number of warm-ups since diagnostic trouble codes cleared	255	0...255	
<input type="checkbox"/> \$1E Distance traveled since DTCs cleared	40721.56	0.00...40721.56	miles
<input checked="" type="checkbox"/> \$10 Distance traveled since DTCs cleared	40721.56	0.00...40721.56	miles

Cancel All Show Selected Graph Merge To Top Setting Clear Data Freeze Record Back

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD > ISO 15765-4 (CAN) > Live data

50 items selected

Name	Value	Range	Limit
<input type="checkbox"/> \$1E Distance traveled since DTCs cleared	40721.56	0.00...40721.56	miles
<input checked="" type="checkbox"/> \$10 Distance traveled since DTCs cleared	40721.56	0.00...40721.56	miles
<input checked="" type="checkbox"/> \$10 Barometric pressure	14.21	10.30...15.95	psi
<input checked="" type="checkbox"/> \$1E Barometric pressure	14.21	10.30...15.95	psi
<input checked="" type="checkbox"/> \$10 Catalyst temperature (bank 1 sensor 1)	701.78	-4.00...1832.00	°F
<input checked="" type="checkbox"/> \$10 Control module voltage	14.612	0...65.535	V
<input checked="" type="checkbox"/> \$1E Control module voltage	14.492	0...65.535	V
<input checked="" type="checkbox"/> \$10 Absolute load value	20	0...100	%
<input checked="" type="checkbox"/> \$10 Fuel/air commanded equivalence ratio	0.991	0...1.999	

Cancel All Show Selected Graph Merge To Top Setting Clear Data Freeze Record Back

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Autel Ultra Scan Tool - EOBD

Name	Value	Range	Unit
\$1E Control module voltage	14.475	0...65.535	V
\$10 Absolute load value	16.5	0...100	%
\$10 Fuel/air commanded equivalence ratio	0.991	0...1.999	
\$10 Absolute throttle position B	13.3	0...100	%
\$10 Accelerator pedal position D	20.8	0...40	%
\$1E Accelerator pedal position D	20.8	0...40	%
\$10 Accelerator pedal position E	10.2	0...40	%
\$10 Type of fuel currently being utilized by the vehicle	GAS		
\$10 Absolute EVAP system vapor pressure	14.32	0.00...47.53	psi

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Autel Ultra Scan Tool - EOBD

Name	Value	Range	Unit
\$1E Accelerator pedal position D	20.8	0...40	%
\$10 Accelerator pedal position E	10.2	0...40	%
\$10 Type of fuel currently being utilized by the vehicle	GAS		
\$10 Absolute EVAP system vapor pressure	14.32	0.00...47.53	psi
\$10 Short term secondary oxygen sensor fuel trim - bank 1 (use if only 1 fuel trim value)	-1.56	-100...99.22	%
\$10 Long term secondary oxygen sensor fuel trim - bank 1 (use if only 1 fuel trim value)	0	-100...99.22	%
\$10 Mass air flow sensor A	0	0.00...4.51	lb/s
\$10 Engine coolant temperature 1	149	-4.00...248.00	°F
\$1E Engine coolant temperature 1	149	-4.00...248.00	°F

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Autel Ultra Scan Tool - EOBD



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Autel Ultra Scan Tool - EOBD



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Autel Ultra Scan Tool - EOBD

The screenshot displays the 'On-Board monitor(HONDA)' interface. The left sidebar shows navigation options: DTC&FPD, I/M readiness, Live data, On-Board monitor (selected), Component test, Vehicle information, and Vehicle status. The main area shows a table of test results for A/F sensor (bank 1) with three entries.

Module	Description	SID	TID	Min	Max	Value	Unit	Result
\$10	Check of A/F sensor 'non-activation' time. See test ID \$81 and \$82 for 'non-activation' criteria	01	80	0.00 0	0.20 0	0.19 4	koh m	OK
\$10	Check of A/F sensor 'non-activation' by monitoring the sensor element resistance during A/F feedback control	01	87	0.00 0	0.27 0	0.15 4	koh m	OK
\$10	Check of A/F sensor 'non-activation' by monitoring the sensor cell voltage	01	82	0.24 9	0.75 2	0.42 5	V	OK

At the bottom, there is an 'ESC' button and a status bar showing 'VCM', battery level at 90%, and time 5:56.

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Autel Ultra Scan Tool - EOBD

The screenshot displays the 'On-Board monitor(HONDA)' interface with a different set of test results. The left sidebar is the same as in the previous image. The main area shows a table of test results for A/F sensor (bank 1) with five entries.

Module	Description	SID	TID	Min	Max	Value	Unit	Result
\$10	Check of A/F sensor 'non-activation' by monitoring the sensor cell voltage	01	82	0.24 9	0.75 2	0.42 5	V	OK
\$10	Check of A/F sensor 'non-activation' by monitoring the sensor cell voltage during A/F feedback control	01	88	0.24 9	0.75 2	0.43 0	V	OK
\$10	Check of the A/F sensor 'too lean' by monitoring the A/F sensor signal	01	83	0.00 00	3.27 63	2.31 37	V	OK
\$10	Check of A/F sensor rationality by monitoring the sensor signal during fuel cut condition	01	84	2.54 88	4.10 64	3.62 79	V	OK
\$10	Check of A/F sensor 'out							

At the bottom, there is an 'ESC' button and a status bar showing 'VCM', battery level at 90%, and time 5:56.

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Autel Ultra Scan Tool - EOBD

On-Board monitor(HONDA)

Module	Description	SPID	TID	Min	Max	Value	Unit	Result
\$10	Check of the A/F sensor 'too lean' by monitoring the A/F sensor signal	01	83	0.00 00	3.27 63	2.31 37	V	OK
\$10	Check of A/F sensor rationality by monitoring the sensor signal during fuel cut condition	01	84	2.54 88	4.10 64	3.62 79	V	OK
\$10	Check of A/F sensor 'out of range' by monitoring the sensor signal	01	86	0.00 00	4.64 34	2.25 58	V	OK
\$10	\$ 01 89	01	89	232	6553 5	2725		OK

Secondary HO2S (bank)

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Autel Ultra Scan Tool - EOBD

On-Board monitor(HONDA)

Module	Description	SPID	TID	Min	Max	Value	Unit	Result
\$10	\$ 01 89	01	89	232	5	2725		OK
\$10	Response check of secondary Heated Oxygen Sensor (HO2S) by monitoring the sensor output voltage during fuel cut condition	02	9D	0.00 0	0.39 7	0.04 5	V	OK
\$10	\$ 02 9E	02	9E	0.05 0	65.5 35	0.64 3	V	OK

Secondary HO2S (bank 1)

Catalyst (bank 1)

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Autel Ultra Scan Tool - EOBD

The screenshot displays the 'On-Board monitor(HONDA)' interface. The left sidebar shows navigation options: DTC&FPD, I/M readiness, Live data, On-Board monitor (selected), Component test, Vehicle information, and Vehicle status. The main area shows a table of monitoring data.

Module	Description	MID	TID	Min	Max	Value	Unit	Result
\$10	\$ 02 9E	02	9E	0.05 0	55.5 35	0.64 3	V	OK
Catalyst (bank 1)								
Catalyst capability, monitored by measuring the stability of the secondary Heated Oxygen Sensor (HO2S) output value								
\$10		21	A1	0.00 0	3.00 0	0.00 0	V	OK
VTC (VVT) system								
Response check of VTC (VVT) system by								
				11.9	51.9	33.5		

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Autel Ultra Scan Tool - EOBD

The screenshot displays the 'On-Board monitor(HONDA)' interface with a list of VTC (VVT) system checks. The left sidebar is the same as in the previous screenshot.

Module	Description	MID	TID	Min	Max	Value	Unit	Result
\$10	Response check of VTC (VVT) system by monitoring divergence of actual camshaft angle from target angle	35	D4	11.9 0	51.9 0	33.5 0	°	OK
\$10	Check of VTC (VVT) system by comparing the actual camshaft angle to the target camshaft angle	35	D5	0.00 0	61.7 0	0.00 0	°	OK
\$10	\$ 35 D7	35	D7	0.00	0.00	0.00	°	OK
\$10	\$ 35 D9	35	D9	-10.0 0	10.0 0	-1.60 0	°	OK
\$10	\$ 35 DA	35	DA	0.00	19.3 0	15.8 0	°	OK
\$10	\$ 35 DR	35	DR	0.00	41.7	0.70	°	OK

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD > ISO 15765-4 (CAN) > On-Board monitor

On-Board monitor(HONDA)

Module	Description	MID	TID	Min	Max	Value	Unit	Result
\$10	\$ 35 D9	35	D9	-10.0 0	10.0 0	-1.60	*	OK
\$10	\$ 35 DA	35	DA	0.00	19.3 0	15.8 0	*	OK
\$10	\$ 35 DB	35	DB	0.00	41.7 0	0.20	*	OK
\$10	\$ 35 DC	35	DC	0.00	0.00	0.00	*	OK
\$10	\$ 35 DD	35	DD	-10.0 0	10.0 0	-0.50	*	OK
EVAP system								
\$10	\$ 3C BE	3C	BE	-4.75	-0.45	-0.67	psi	OK

ESC

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD > ISO 15765-4 (CAN) > On-Board monitor

On-Board monitor(HONDA)

Module	Description	MID	TID	Min	Max	Value	Unit	Result
\$10	\$ 3C BE	3C	BE	-4.75	-0.45	-0.67	psi	OK
EVAP system								
\$10	Purge flow and/or EVAP canister purge valve check by monitoring fuel tank pressure sensor value while the engine is running	3D	B9	4.99 9	100.006	100.006	%	OK
\$10	\$ 3D BB	3D	BB	4.99 9	100.006	100.006	%	OK
\$10	\$ 3D BC	3D	BC	00.0 0	00.0 0	00.0 0	m/s	OK
Misfire								

ESC

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD - ISO 15765-4 (CAN) - On-Board monitor

On-Board monitor(HONDA)

Module	Description	MID	TID	Min	Max	Value	Unit	Result
Misfire								
\$10	The average number of misfires detected during the last ten driving cycles for #1 cylinder	A2	0B	0	65535	0	counts	OK
\$10	Misfire counters in #1 cylinder for the last 200 revolutions	A2	0C	0	65535	0	counts	OK
Misfire								
\$10	The average number of misfires detected during the last ten driving cycles for #2 cylinder	A3	0B	0	65535	0	counts	OK
\$10	Misfire counters in #2 cylinder for the last 200 revolutions	A3	0C	0	65535	0	counts	OK

ESC

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD - ISO 15765-4 (CAN) - On-Board monitor

On-Board monitor(HONDA)

Module	Description	MID	TID	Min	Max	Value	Unit	Result
Misfire								
\$10	The average number of misfires detected during the last ten driving cycles for #2 cylinder	A3	0B	0	65535	0	counts	OK
\$10	Misfire counters in #2 cylinder for the last 200 revolutions	A3	0C	0	65535	0	counts	OK
Misfire								
\$10	The average number of misfires detected during the last ten driving cycles for #3 cylinder	A4	0B	0	65535	5	counts	OK
\$10	Misfire counters in #3 cylinder for the last 200 revolutions	A4	0C	0	65535	4	counts	OK
Misfire								

ESC

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD > ISO 15765-4 (CAN) > On-Board monitor

On-Board monitor(HONDA)

Module	Description	MID	CID	Min	Max	Value	Unit	Pass/Fail
\$10	The average number of misfires detected during the last ten driving cycles for #3 cylinder	A4	0B	0	65535	5	counts	OK
\$10	Misfire counters in #3 cylinder for the last 200 revolutions	A4	0C	0	65535	4	counts	OK
\$10	Misfire							
\$10	The average number of misfires detected during the last ten driving cycles for #4 cylinder	A5	0B	0	65535	0	counts	OK
\$10	Misfire counters in #4 cylinder for the last 200 revolutions	A5	0C	0	65535	0	counts	OK

ESC

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Autel Ultra Scan Tool - EOBD

EOBD V2.13
EOBD > ISO 15765-4 (CAN) > Vehicle information

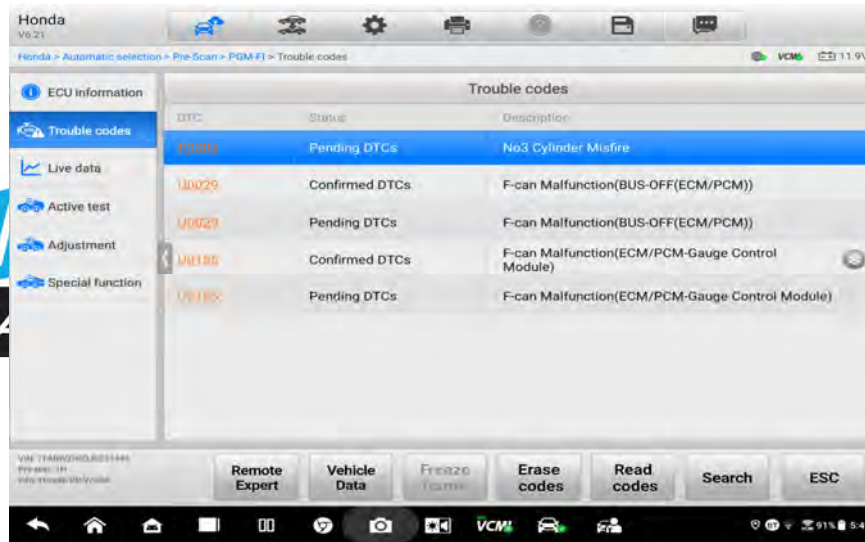
Vehicle general information

Vehicle ID number	
\$10 VIN	7FARW2H50JE031449
Calibration ID	
\$10 Calibration identifications1	37805-5PA-A890
\$1E Calibration identifications1	28101-5RG-A040
Calibration verification numbers	
\$10 Calibration verification numbers 1	98E062B6
\$1E Calibration verification numbers 1	6A94956C
ECU name	
\$10 ECU name	ECM-EngineControl-Engine control module

ESC

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Autel Ultra Scan Tool - Honda



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Autel Ultra Scan Tool - Honda



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Autel Ultra Scan Tool - Honda



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Autel Ultra Scan Tool - Honda



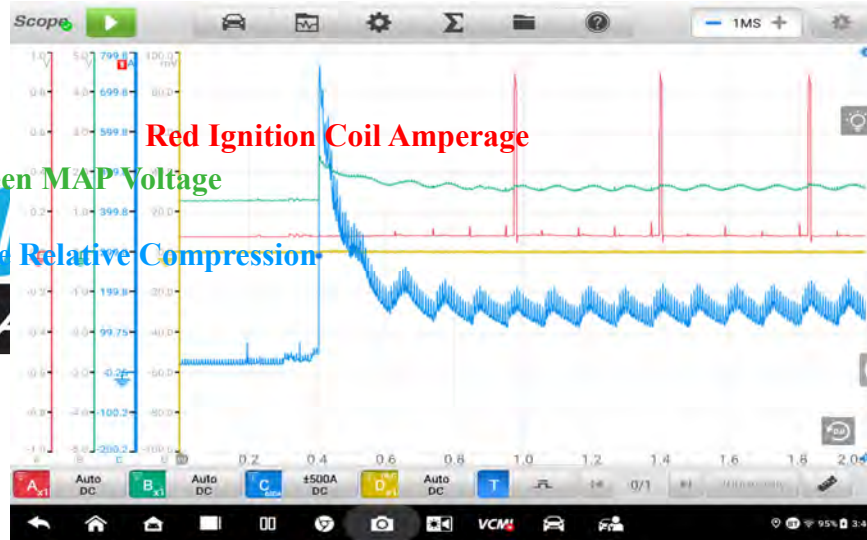
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Autel Ultra Scan Tool - Honda



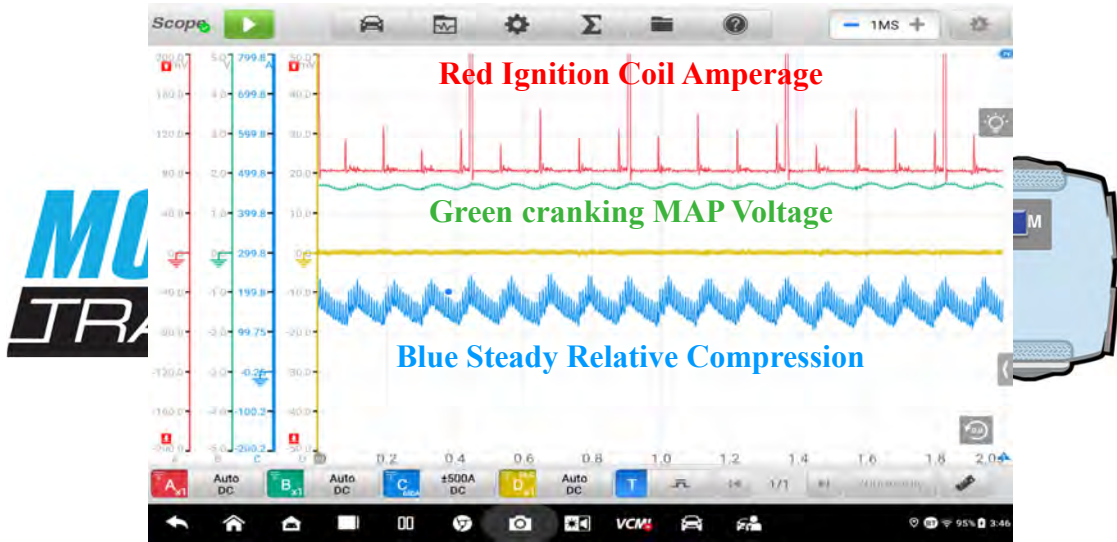
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Autel Ultra Scan Tool - Labscope



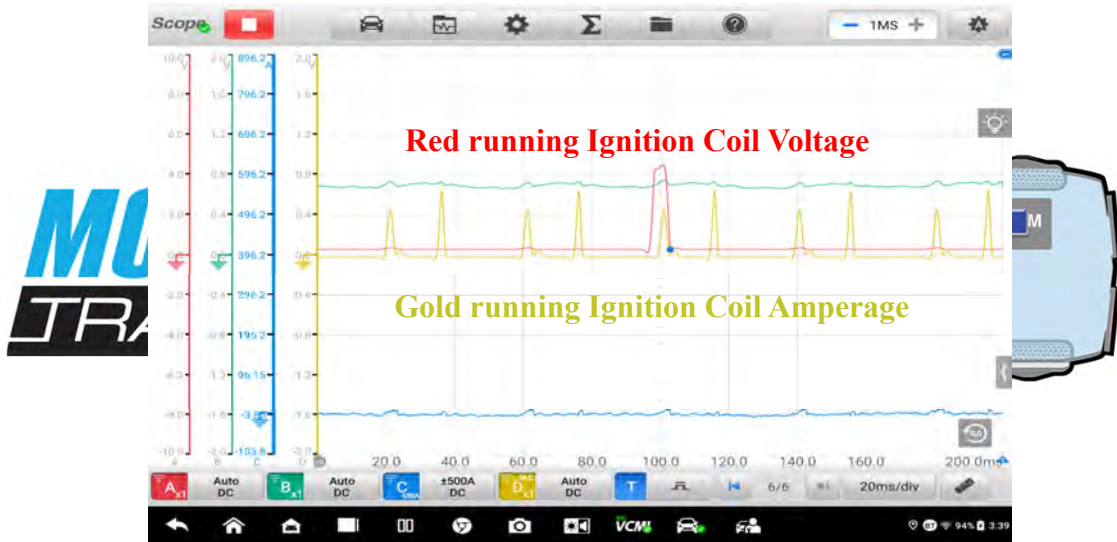
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Autel Ultra Scan Tool - Labscope



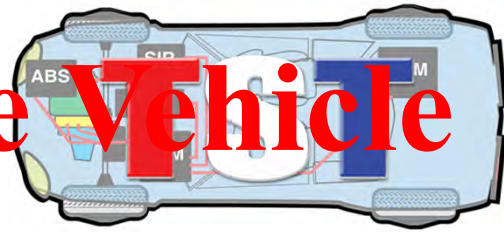
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Autel Ultra Scan Tool - Labscope



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MOTOR AGE
TRAINING



On To The Vehicle

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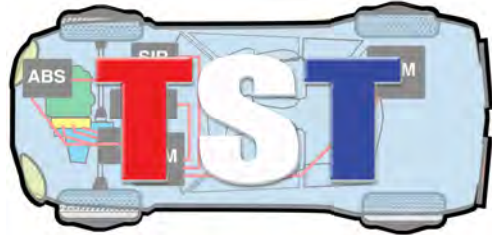
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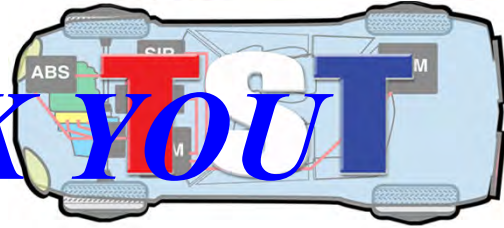
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MOTOR AGE
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THANK YOU



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