

ABS ASSIGNMENT

University of Wales Trinity Saint David

School of Engineering

Motorsport engineering

Oliver godon

P150782

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Emission control diagnosis

Andrew Gibson

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1 Introduction

In this assignment, the subject of abs (antilock brake system) will be covered, specifically testing that was conducting in the workshop, also with a brief overview of what abs is and then shall be covering a fault chart. With the testing, we shall be going through the methodology and the results including the tables of values recorded and then the schematics.

2 Brief insight & testing Methodology

So with abs, it is a system that is designed to stop wheels locking up in hazardous road conditions for example wet or slippery roads, it does this by detecting when one wheel or more is about to lock and keeps brake pressure constant or reduces to keep vehicle steerable.

Methodology for the Bosch system.

Started off by setting up the multi-meter, set up the rig to have 10 newton's of brake pressure applied. Once set up we then attached an earth to the frame work of the testing rig. With all of this done we could then start static testing each pin locations on the plugs, one plug having 15 pins and the other having four, checking the voltage with ignition off to start with and on all 15 pins on the first plug. The switching the ignition on and retesting them all and record all figures into a table to be assessed later. Then going back to the first plug and doing the dynamic testing doing pins 1 to 15 and record all result on diagrams.

Moving onto the other plug with four pins, and again testing with ignition off and ignition on. Recording the results and explain them later. Then tested the second plug again using the Bosch oscilloscope to do some dynamic testing.

Methodology for the Teves system.

With this system, set up the rig to have 10 newton's of brake pressure applied. Once we've set up we then attached an earth to the frame work of the testing rig, testing pins one to 25, static testing to start things off, ignition off and then ignition on. Recording all results and explain them at a later date. Now that the static testing is finished can now use the Bosch oscilloscope tester and do the dynamic testing also recording the results.

3 Results

As you can see on the right of the page, the Bosch system static. As you can tell from the table on the right while the ignition is off, zero voltage can be found. With ignition on however there is levels of voltage shown. Starting off with the larger plug (one with more pin locations). When doing static testing, pins 1(abs warning lamp actuation), 9 (brake light switch feed) and 12 (serial data wire) are the only ones showing any significant voltage. With pins 2(N/S/R wheel speed sensor ground), 4(N/S/R wheel speed sensor signal), 5(O/S/F wheel speed sensor ground), 6(O/S/R wheel speed sensor signal), 7(N/S/F wheel speed speed sensor ground), 10(O/S/F wheel speed sensor signal), 13 (N/S/F wheel speed sensor signal) and 14 (O/S/R wheel speed sensor ground) having little voltage, essentially showing that they send a signal to their destinations. With pin 15 (diagnostic excitation lead) not showing any voltage in a static testing state.

Bosch system- Static

2 front black and yellow wires are front solenoids
2 green wires are rear solenoids

Right plug

ON		OFF		ON		OFF	
1	11.83v	0.00v	9	11.83v	0.00v		
2	0.20v	0.00v	10	0.34v			
3			11				
4	0.34v	0.00v	12	10.66v	0.00v		
5	0.20v	0.00v	13	0.34v			
6	0.34v	" "	14	0.20v	0.00v		
7	0.20v	0.00v	15	0.00v	0.00v		
8							

Left plug- Static

ON		OFF		dynamic	
1	11.79v	0.00v	1	11.79v	
2	12.08v	0.00v	2	11.96v	
3	0.00v	0.00v	3	0.04v (Earth)	
4	11.79v	0.00v	4	11.79v	

On to the dynamic testing for the 15 pin plug on the Bosch system. Pins 1, 9 and 12 having similar results to the static testing with the ignition on. With pins 4, 6, 10 and 13 having increased voltage. These are the signal pins for each wheel sensor and in a dynamic testing situation they have an increased signal strength. The ground wheel speed sensors, pins 2 & 5 & 7 & 14, having no change in voltage from static to dynamic testing. Pin 15 is now showing a slight voltage and shows that it's sending a signal, this pin is for sending a signal to the ECU (electronic control unit).

Dynamic- Bosch (Right plug)

1	11.79v	9	11.80v
2	0.20v	10	1.2v -0.90v
3		11	
4	1.7v -0.9v	12	10.56v
5	0.20v	13	1.7v -0.90v
6	1.7v -0.9v	14	0.20v
7	0.20v	15	0.01v
8			

Pin 15- Sending data to the ecu

Solenoids

All show battery voltage untill brake is applied and then a drop in voltage occurs

Onto the 4 pin plug on the Bosch system. Ignition off in the static testing showing zero voltage on all pins. With ignition on, Pin 3 being the earth connection.

Left plug- Static

ON		OFF		dynamic	
1	11.79v	0.00v	1	11.79v	
2	12.08v	0.00v	2	11.96v	
3	0.00v	0.00v	3	0.04v (Earth)	
4	11.79v	0.00v	4	11.79v	

With pins 1 and 4 showing the exact same results in static as they are in dynamic. Pin 2 suffering a slight decline in voltage from 12.08v down to 11.96v.

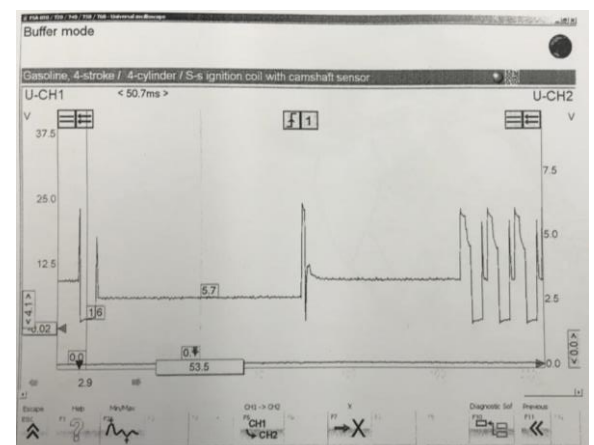
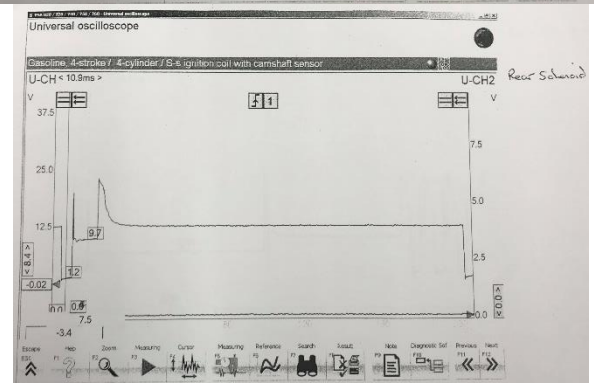
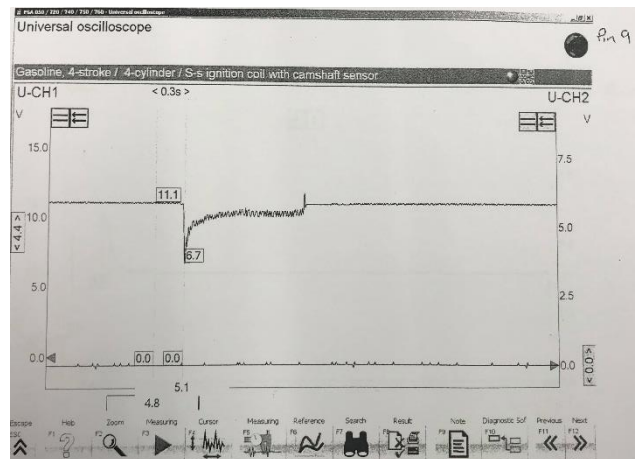
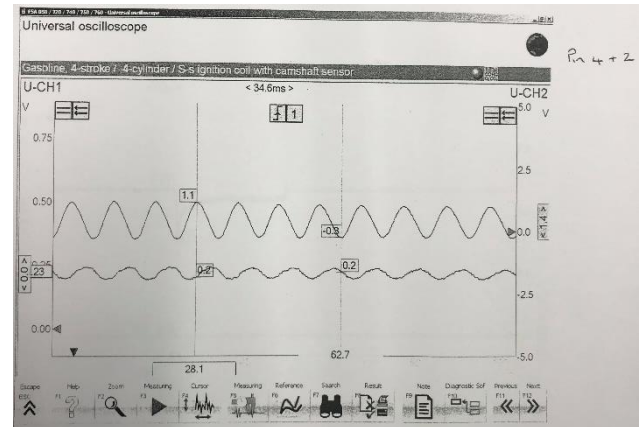
The Bosch schematics

On the right you should be able to see the universal oscilloscope schematic for pins 4 (N/S/R wheel speed sensor signal) and 2 (N/S/R wheel speed sensor ground), as you may be able to notice, the waves for the two pins match each other, however pin 4 being the top wave has a higher amplitude and pin 2 has a low amplitude.

Now onto pin 9's universal oscilloscope schematic, where you can see when the brake is applied there's a dip in voltage.

Now to the schematics for the rear solenoid, the top one being the universal oscilloscope, the bottom one being the buffer mode schematic. Not overly sure what these mean so some extra research is needed to fully understand what this mean.

Similar situation with this schematic, it's the buffer mode schematic for the rear solenoid for the Bosch 2-eh abs system. There seems to be some frequency fluctuations at an irregular rate which is intriguing.



The Teves system test results.

On the right you should see the table for the static results for the Teves abs system test. This system has 25 pins. With pins 3, 4, 5, 6, 14, 15, 21, 22 and 23 have no pin. Pins 1, 2, 10 and 11 are the same in static with on and off because they are all speed sensors. Pin 7 being the live from the car battery, so will always have a constant voltage unless there's a battery fault. Pin 9 being the battery live on ignition. Pin 12 is live from switch to battery. Pin 24 & 8 are the earth (ground). Pin 25 is the permanent live.

Onto the dynamic testing for the Teves system, in the dynamic testing it shows zero voltage for the earth pin 8 and pin 24. Pins 17 to 20 showing a dip in about half the voltage from static testing to the dynamic testing. With 7, 9, 10, 12 and 16 showing just a small decrease in voltage. Then pins 1, 2, 11 and 13 all show that they have a slight increase in voltage. Pins 1, 2, 10 and 11 being the earth return sensors. Pins 17, 18, 19 and 20 are signal outputs from prerifal wheel speed.

As you can see on the right, this is the universal oscilloscope for the teves system, pins 2 and 19, in comparison to the bosch system where we looked at two pins on the same schematic. This shows that the top pin has a lower amplitude but a higher frequency to the bottom pin.

ABS Testing System - Teves system static

IGN	DEF	ON	IGN OFF	ON		
Pin no: 1	2.34v	2.34v	11.2.34v	2.34v	24	0.00v
2	2.34v	"	12.0.00v	12.05v	25	12.18v
3	No pin		13.10.38v	10.38v		
4	No pin		14			
5	No pin		15			
6	No pin		16	0.00v	12.07v	
7	12.13v	12.13v	17	2.35v	"	"
8	0.00v	"	18	2.35v	"	"
9	0.00v	12.15v	19	2.35v	"	"
10	2.34v	2.34v	20	2.55v	"	"

Pin 1 and 2 the same because they are ~~both~~ ^{all} speed sensors 10 and 11

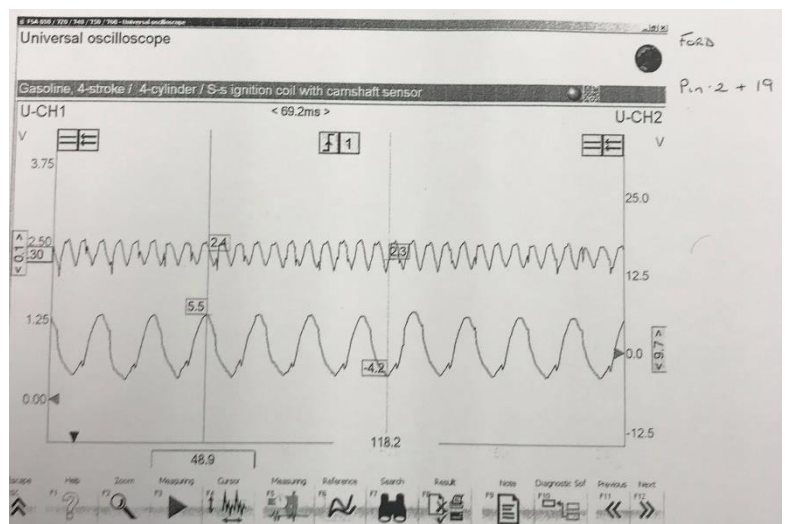
Pin 7 is live from battery (Permanent)
 Pin 9 is live from battery (Ign)
 Pin 12 is live from switch to battery
 Pin 24 and 8 are earth (ground)
 Pin 25 permanent live

Teves

Dynamic test with oscilloscope

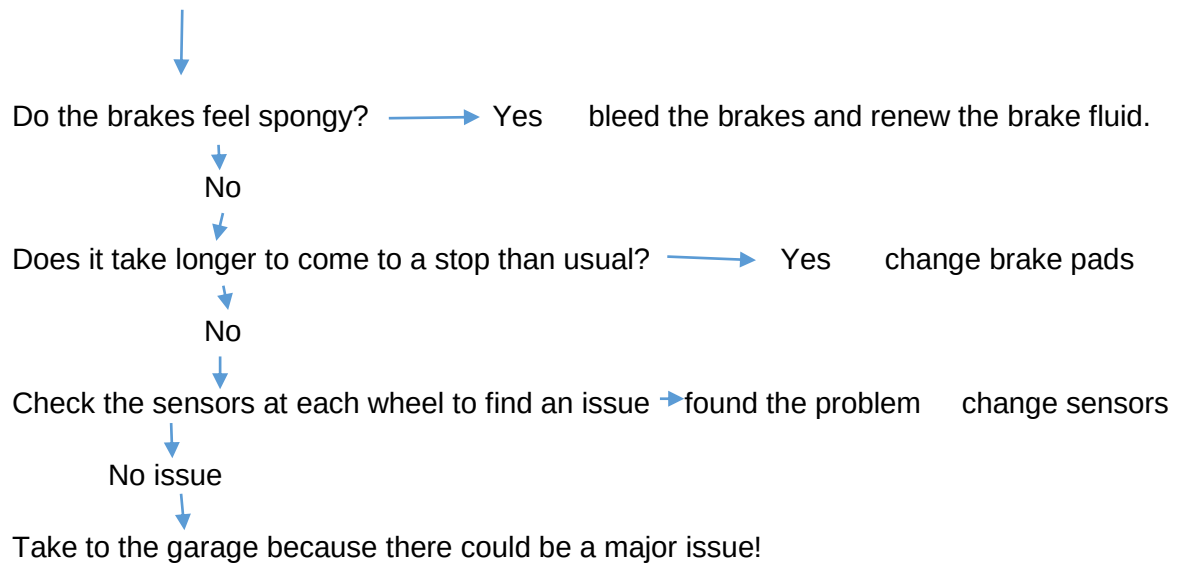
1	2.34v	2.60v	11	2.34v	2.60v	21	
2	2.34v	2.60v	12	11.90v		22	
3			13	9.38v		23	
4			14			24	0.00v (Earth)
5			15			25	12.03v
6			16	11.99v			
7	12.07v		17	5.80v			
8	0.00v (Earth)		18	5.80v			
9	12.11 (live Ign)		19	5.80v			
10	2.34v	2.60v	20	5.80v			

1, 2, 10, 11 - Earth return back to sensor
 17, 18, 19, 20 - Signal outputs from prerifal wheel speed



4 Fault chart

Warning light has come on



5 Conclusion

In conclusion, this essay has shown my knowledge and understanding at the task in hand, and that I was able to carry out the test/task asked of us in a professional manor and in a group. Also shows a good level of knowledge when discussing the results as you can see in the results section of this essay.

6 References

Bosch, safety & comfort and convenience systems, Robert Bosch GmbH page 82- 101 anti-lock braking system (abs). (Robert bosch, 2006)

Bosch handbook. (Bauer, 1996)