ANTI-LOCK BRAKING SYSTEM

FAULT DIAGNOSIS

System Test

TEST 1 Battery voltage at ECM	
Multi-meter connected to terminals 1 and 2 at ECM Set to 'DC VOLTS' Ignition 'ON' should be over 10 volts	– If incorrect check battery condition – Check wiring from terminal 2 to ignition switch – Check wiring from terminal 1 to earth

TEST 2 Main relay continuity	
Test between Terminals 1 and 3 ECM Ignition 'OFF' Multi-meter to OHMS Should have continuity	– If incorrect remove relay and check terminal 3 to pin 30 at relay – Check wiring from pin 87a of relay to earth – If OK renew relay

TEST 3 Main relay continuity	
Test between Terminals 1 and 20 ECM Ignition 'OFF' Multi-meter to OHMS Should have continuity	– If incorrect remove relay and check wiring from terminal 20 to pin 30 at relay – Check wiring from pin 87a of relay to earth – If OK renew relay

TEST 4 Main relay resistance test	
Terminals 8 and 1 ECM Ignition 'OFF' Multi-meter to OHMS Should be 50 to 100 ohms	– If incorrect remove main relay and check wiring from terminal 8 to pin 86 at relay – Check wiring from pin 85 at relay to earth

TEST 5 Main relay operation	
Bridge ECM terminals 2 and 8 Multi-meter to ECM terminals 1 and 3 Ignition 'ON' Multi-meter to DC VOLTS Should be over 10 volts	– If incorrect ignition OFF remove main relay and check fuse – Check wiring from pin 87 of relay to fuse – Remove bridge wire

TEST 6 Main relay operation	
Bridge ABS terminals 2 and 8 Multi-meter to ECM terminals 1 and 20 Ignition 'ON' Multi-meter to DC VOLTS Should be over 10 volts	– If incorrect and wiring OK renew relay – Remove bridge wire

TEST 7 Left-hand side rear wheel sensor resistance check	
Connect Multi-meter between terminals 24 and 6 Ignition 'OFF' Multi-meter to OHMS Resistance should be 0.8 – 1.4 K ohms	– If incorrect check wheel sensor connector – Disconnect wheel sensor and check sensor resistance if incorrect renew sensor – If resistance of sensor correct check wiring from sensor to ECM block connector terminals 6 and 24

TEST 8 Right-hand side front wheel sensor resistance check	
Connect Multi-meter between terminals 25 and 7 Ignition 'OFF' Multi-meter to OHMS Resistance should be 0.8 – 1.4 K ohms	– If incorrect check wheel sensor connector – Disconnect wheel sensor and check sensor resistance if incorrect renew sensor –If resistance of sensor correct check wiring from sensor to ECM block connector terminals 7 and 25

TEST 9 Right-hand side rear wheel sensor resistance check	
Connect Multi-meter between terminals 22 and 4 Ignition 'OFF' Multi-meter to OHMS Resistance should be 0.8 – 1.4 K ohms	– If incorrect check wheel sensor connector – Disconnect wheel sensor and check sensor resistance if incorrect renew sensor –If resistance of sensor correct check wiring from sensor to ECM block connector terminals 4 and 22

TEST 10 Left-hand side front wheel sensor resistance check	
Connect Multi-meter between terminals 23 and 5 Ignition 'OFF' Multi-meter to OHMS Resistance should be 0.8 – 1.4 K ohms	– If incorrect check wheel sensor connector –Disconnect wheel sensor and check sensor resistance if incorrect renew sensor – If resistance of sensor correct check wiring from sensor to ECM block connector terminals 5 and 23

TEST 11 Left-hand side rear sensor voltage	
Raise car on wheel free ramp Spin wheel at 1 rev per second Multi-meter connected to terminals 24 and 6 of ECM Ignition 'OFF' Multi-meter to AC VOLTS Should be 0.04 – 0.1 volts	– If incorrect: – Check sensor mounting – Check toothed wheel – Check hub carrier

TEST 12 Right-hand side front sensor voltage	
Raise car on wheel free ramp Spin wheel at 1 rev per second Multi-meter connected to terminals 25 and 7 of ECM Ignition 'OFF' Multi-meter to AC VOLTS Should be 0.15 – 0.7 volts	– If incorrect: – Check sensor mounting – Check toothed wheel – Check vertical link

TEST 13 Right-hand side rear sensor voltage	
Raise car on wheel free ramp Spin wheel at 1 rev per second Multi-meter connected to terminals 22 and 4 of ECM Ignition 'OFF' Multi-meter to AC VOLTS Should be 0.04 – 0.1 volts	– If incorrect: – Check sensor mounting – Check toothed wheel – Check hub carrier

TEST 14 Left-hand side front sensor voltage	
Raise car on wheel free ramp Spin wheel at 1 rev per second Multi-meter connected to terminals 23 and 5 of ECM Ignition 'OFF' Multi-meter to AC VOLTS Should be 0.15–0.7 volts	– If incorrect: – Check sensor mounting – Check toothed wheel – Check vertical link

TEST 15 Sensor cable screen continuity test	
Left-hand rear Multi-meter connected to terminals 6 and 1 Ignition 'OFF' Multi-meter to OHMS Should be zero reading	– If incorrect check that sensor is not earthed – Check sensor cable from sensor to module is not earthed

TEST 16 Sensor cable screen continuity test	
Right-hand front Multi-meter connected to terminals 7 and 1 Ignition 'OFF' Multi-meter to OHMS Should be zero reading	– If incorrect check that sensor is not earthed – Check sensor cable from sensor to module is not earthed

TEST 17 Sensor cable screen continuity test	
Right-hand rear Multi-meter connected to terminals 4 and 1 Ignition 'OFF' Multi-meter to OHMS Should be zero reading	– If incorrect check that sensor is not earthed – Check sensor cable from sensor to module is not earthed

TEST 18 Sensor cable screen continuity test	
Left-hand front Multi-meter connected to terminals 5 and 1 Ignition 'OFF' Multi-meter to OHMS Should be zero reading	– If incorrect check that sensor is not earthed – Check sensor cable from sensor to module is not earthed

TEST 19 Check valve block earth connection	
Connect multi-meter between terminal 11 and 1 at ECM connector Multi-meter to OHMS	– If no continuity disconnect the valve block – Check pin 7 of valve block is earthed to housing and valve block housing is earthed to vehicle – Check wiring from terminal 11 of ECM to pin 7 of valve block

TEST 20 Main valve resistance	
Multi-meter connected to terminals 11 and 18 of ECM Ignition 'OFF' Multi-meter to OHMS Correct reading 2 – 5 ohms	– If incorrect disconnect the main valve – Measure main valve resistance – Check continuity of wiring from pin 1 of valve to terminal 18 of ECM connector – Check wiring from terminal 11 of ECM connector to earth – Check pin 1 terminal of valve to earth

TEST 21 Check resistance of RH front inlet valve (RHD)	
Multi-meter connected to terminals 15 and 11 of ECM Ignition 'OFF' Multi-meter to OHMS Should be 5 – 7 ohms	– If incorrect disconnect valve block and measure resistance between valve pins 1 and 7 – Check wiring from ECM terminal 15 to pin 6 of valve block

TEST 22 Check resistance of rear inlet valve (RHD)	
Multi-meter connected to terminals 17 and 11 of ECM Ignition 'OFF' Multi-meter to OHMS Should be 5 – 7 ohms	– If incorrect disconnect valve block and measure resistance between valve pins 1 and 7 – Check wiring from ECM terminal 17 to pin 3 of valve block

TEST 23 Check resistance of LH front inlet valve (RHD)	
Multi-meter connected to terminals 35 and 11 of ECM Ignition 'OFF' Multi-meter to OHMS Should be 5 – 7 ohms	– If incorrect disconnect valve block and measure resistance between valve pins 5 and 7 – Check wiring from ECM terminal 35 to pin 1 of valve block

TEST 24 Check resistance of rear outlet valve	
Multi-meter connected to terminals 33 and 11 of ECM Ignition 'OFF' Multi-meter to OHMS Should be 3 – 5 ohms	– If incorrect disconnect valve block and measure resistance between valve pins 4 and 7 – Check wiring from ECM terminal 33 to pin 4 of valve block

TEST 25 Check resistance of RH front outlet valve (RHD)	
Multi-meter connected to terminals 34 and 11 of ECM Ignition 'OFF' Multi-meter to OHMS Should be 3 – 5 ohms	– If incorrect disconnect valve block and measure resistance between valve pins 5 and 7 – Check wiring from ECM terminal 34 to pin 5 of valve block

TEST 26 Check resistance of LH front outlet valve (RHD)	
Multi-meter connected to terminals 16 and 11 of ECM Ignition 'OFF' Multi-meter to OHMS Should be 3 – 5 ohms	– If incorrect disconnect valve block and measure resistance between valve pins 2 and 7 – Check wiring from ECM terminal 16 to pin 2 of valve block

TEST 27 (APPLIES TO RHD) Inlet and outlet valve function	
Bridge ABS module terminals 2, 16 and 35 Ignition 'OFF' Apply foot brake LH front wheel should be locked Switch ignition 'ON' Road wheel must now rotate Brake pedal must not go to the floor	– If an incorrect result is obtained renew valve block – Check electric / hydraulic interconnection

TEST 28 (APPLIES TO RHD) Inlet and outlet valve function	
Bridge ABS module terminals 2,15 and 34 Ignition 'OFF' Apply foot brake RH front wheel should be locked Switch ignition 'ON' Road wheel must now rotate Brake pedal must not go to the floor	– If an incorrect result is obtained renew valve block – Check electric / hydraulic interconnection

TEST 29 Inlet and outlet valve function	
Bridge ABS module terminals 2,17 and 33 Ignition 'OFF' Apply foot brake Both rear wheels should be locked Switch ignition 'ON' Road wheels must now rotate Brake pedal must not go to the floor	– If an incorrect result is obtained renew valve block – Check electric / hydraulic interconnection

TEST 30 Fluid level warning indicator and pressure warning switch continuity	
Switch ignition 'ON' and wait for pump to stop running Switch ignition 'OFF' Connect Multi meter to terminals 9 and 10 of ECM Should have continuity	– If incorrect disconnect reservoir plug, check for continuity between reservoir pins 1 and 2 – Disconnect pressure warning switch, check plug for continuity between pressure warning switch pins 3 and 5 – Check fluid level – Check wiring between terminals 9 and 10

TEST 31 Pressure warning switch operation	
With the ignition switched 'OFF' pump the brake pedal 20 times until the pedal travel becomes hard Connect Multi meter set to OHMS to ECM terminals 9 and 10 Should be no continuity	– If incorrect check for no continuity at pins 3 and 5 of pressure warning switch. – If continuity exists renew pressure switch

TEST 32 Short out pressure warning switch, fluid level switch circuit	
Multi meter connected to ECM connector terminals 9 and 1; then 10 and 1 Should be no continuity	– If incorrect check pressure warning and fluid level switches – Check wiring between switches and ECM connectors 9 and 10, and switches themselves for ground short