
Table of Contents

Engine Electronics IPO's

| Subject | Page |
|--|----------|
| IPO's | 3 |
| M5.2.1: Inputs - Processing - Outputs | 5 |
| M5.2.1 ECM I: Inputs - Processing - Outputs | 6 |
| M5.2.1 ECM II: Inputs - Processing - Outputs | 7 |
| ME7.2: Inputs - Processing - Outputs | 8 |
| MS S52: Inputs - Processing - Outputs | 9 |
| MS S54: Inputs - Processing - Outputs | 10 |
| MS41.1 & MS41.2: Inputs - Processing - Outputs | 11 |
| MS41.1: Inputs - Processing - Outputs | 12 |
| MS42: Inputs - Processing - Outputs | 13 |
| MS43: Inputs - Processing - Outputs | 14 |
| MS45: Inputs - Processing - Outputs | 15 |
| MS45.1: Inputs - Processing - Outputs | 16 |
| ME 9.2: Inputs - Processing - Outputs | 17 |
| MED 9.2.1: Inputs - Processing - Outputs | 18 |
| MED 9.2.1: Inputs - Processing - Outputs | 19 |
| MED 9.2.3: DME Interface (N62) | 20 |
| MSV70: Inputs - Processing - Outputs | 22 |
| MSV80 (N52KP): DME Interface | 24 |
| MSD80 (E9x): Inputs - Processing - Outputs | 26 |
| MSD80 (E7x): Inputs - Processing - Outputs | 28 |
| MSD80 (N52): DME Interface | 30 |
| MSD81 (N54): DME Interface | 31 |
| MEVD17.2 (N55): DME Interface | 32 |
| MEVD17.2 (N55): Inputs - Processing - Outputs | 34 |
| MEVD17.2 Control Unit | 36 |
| MSD85 (N63): DME Interface | 38 |
| MSD85 Control Unit | 40 |
| MSD87-12 (N74): DME Interface | 42 |
| MSD87-12: Control Unit | 43 |

Engine Electronics IPO's

Model: All

Production: All

OBJECTIVES

After completion of this module you will be able to:

- Understand the concept of IPO.
- Name the main IPO's for Engine Electronics
- Describe the main components of the DME Interface

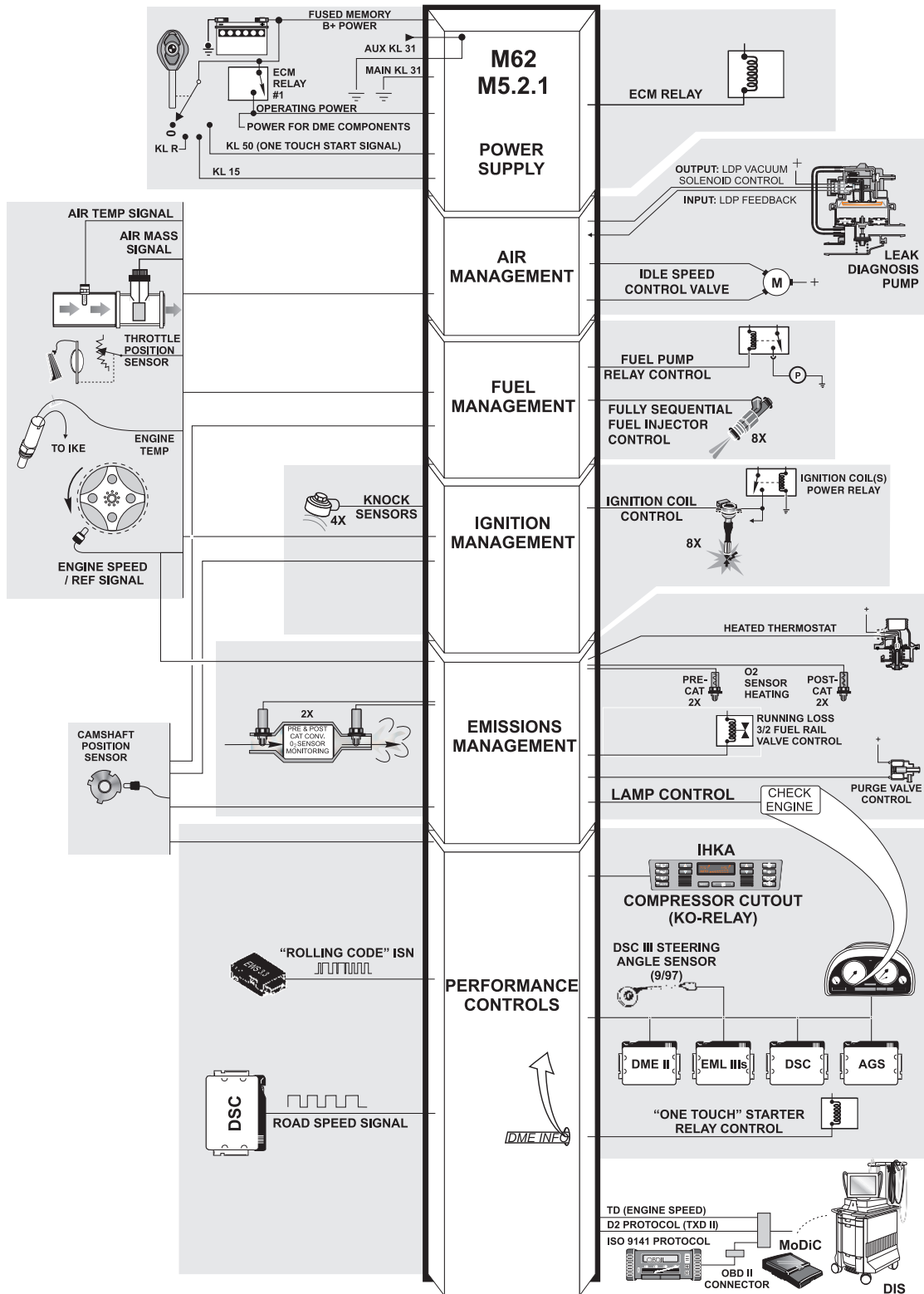
IPO's

The chart shown below is a quick reference of BMW Engine Management Systems by application to BMW models, engines and model years. This will help you get familiar with the systems by identifying the correct version that you are diagnosing.

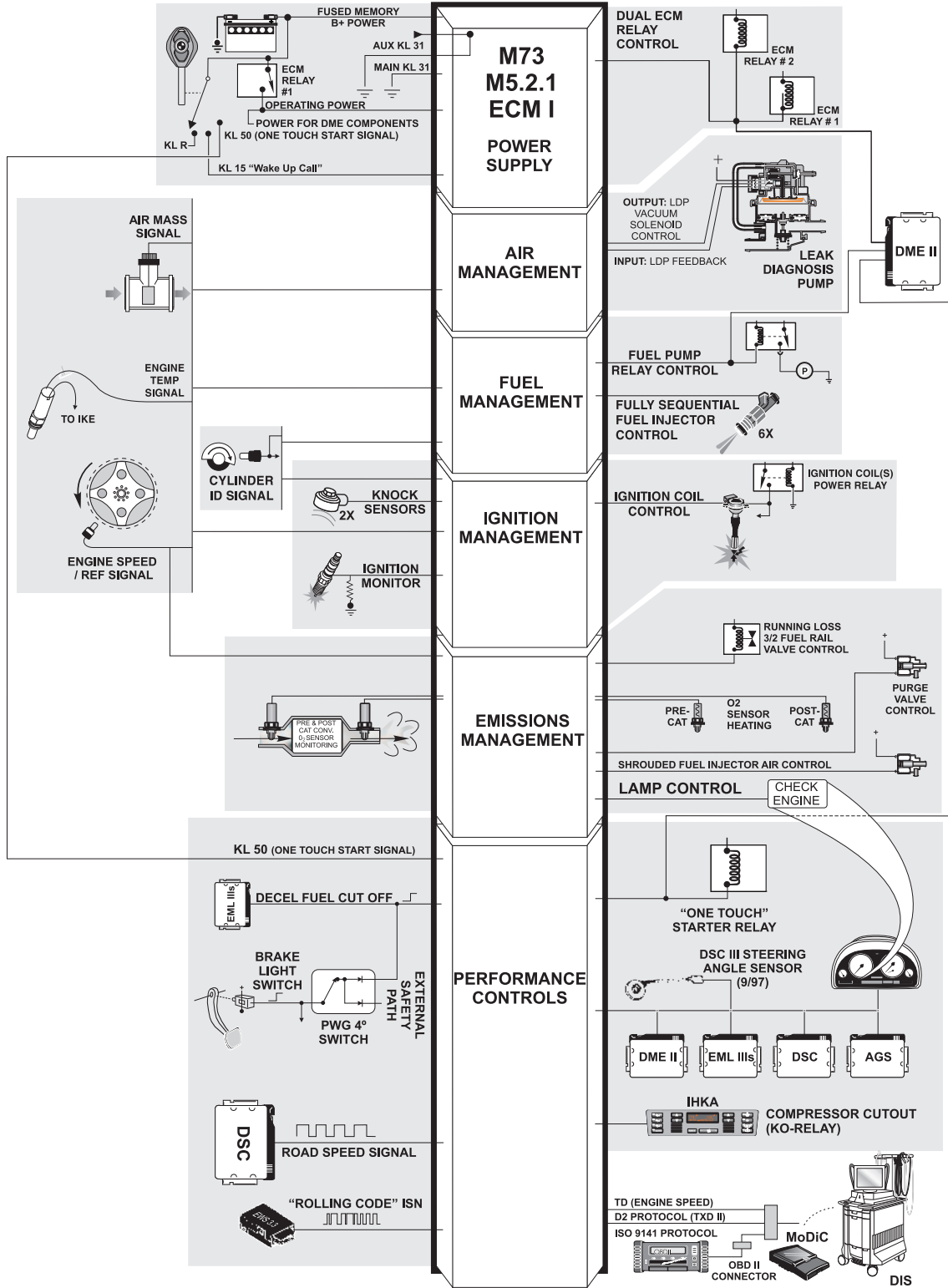
| ENGINE MANAGEMENT CONTROL VERSIONS | | | |
|---|----------------------|---------------|---|
| VERSION | VEHICLE MODEL | ENGINE | MODEL YEAR |
| M1.2 | E32 / M5 | M70 / S38 | M70 = 1988 - 1999 S38 = 1991 - 1993 |
| M1.7 | E31 / E32 | M70 | 1991 - 1994 |
| M1.7 | E30 | M42 | 1990 - 1993 |
| M1.7 | E36 | M42 | 1992 - 1995 |
| M1.7 | E36 | M42 / DISA | 1995 |
| M1.7.1 | E31 | S70 | 1991 - 1992 |
| M1.7.2 | E36 | M42 /DISA | 1992 |
| M3.1 | E34 | M50 | 1991 - 1992 |
| M3.1 | E36 | M50 | 1992 |
| M3.3 | E32 | M60 | 1993 - 1994 |
| M3.3 | E31 / E34 | M60 | 1994 - 1995 |
| M3.3.1 | E34 / E36 | M50TU | 1993 - 1995 |
| M5.2 | E36 / Z3 | M44 | 1996 - 1998 |
| M5.2 | E31 / E38 / E39 | M62 / M73 | 1995 - 1997 |
| MS41.1 | E36 / E39 /Z3 | M52 | 1996 - 1998 |
| MS41.2 | E36 M3 | S52 | 1996 - 1998 |
| M5.2.1 | E38 / E39 | M62 / M73 | 1998 - 1999 |
| MS42 | E46 / E39 /Z3 | M52TU | 1998 - 2000 |
| MS43 | E46 / E39 / E53 / Z3 | M54 | E46 2001 - 2002 Z3 2001 - 2002 E39 2001 - 2003 E53 2001 - 2006 |
| ME7.2 | E39 / E38 / E53 | M62TU | 1999 - 2001 |
| MS S52 | E39 M5 / E52 Z8 | S62 | M5 1999 - 2003 Z8 2000 - 2003 |
| MS S54 | E46 M3 | S54 | 2001 -2007 |
| BOSH = M; SIEMENS = MS | | | |

| ENGINE MANAGEMENT CONTROL VERSIONS | | | |
|---|---|---------------|-------------------|
| VERSION | VEHICLE MODEL | ENGINE | MODEL YEAR |
| MS45 | E85 | M54 | 2003 - 2006 |
| MS45 | E83 all except M54B30 AUTO | M54 | 2003 - 2006 |
| MS54.1 | E83 with M54B30 auto | M54 | 2003 - 2006 |
| MS45.1 | E46 | M54 | 2003 - 2006 |
| MS45.1 | E46 | M56 SULEV | 2003 - 2006 |
| ME 9.2 | E65/66 | N62 | 2002 - 2003 |
| ME9.2.1 | E53 / E60 / E63 / E64 / E65 / E66 | N62 | 2004 - 2004 |
| ME 9.2.2 | E53 / E60 / E63 / E64 / E65 / E66 | N62 | 2005 - 2007 |
| MED 9.2.1 | E66 | N73 | 2003 - 2006 |
| ME 9.2.3 | E70 | N62 | 2006 - 2010 |
| MSS65 | M5, M6 (E6x) | S85 | 2006 - 2009 |
| MSV70 | E90, E91, E92, E93, E60, E70. | N52 | 2004 - 2006 |
| MSV80 | E82, E88, E90, E91, E92, E93, E60, E70. | N52KP | 2006 - |
| MSD80 | E82, E90, E92, E93, E60, E61. | N54 | 2006 - 2008 |
| MSD81 | E70, E71, E82, E84, E88, E89, E90, E92, E93, F07, F10 | N54 | 2008 - |
| MEVD 17.2 | E82, E88, E90, E91, E92, E93, E60, E70. | N55 | 2010 - |
| MSD85 | E70, E71, E72, F01, F02, F04, F07, F10 | N63 | 2009 - |
| MSD85.1 | E70 M / E71 M | S63 | 2009 - |
| MSD87-12 | F01, F02 | N74 | 2009 - |
| | | | |
| BOSH = M; SIEMENS = MS | | | |

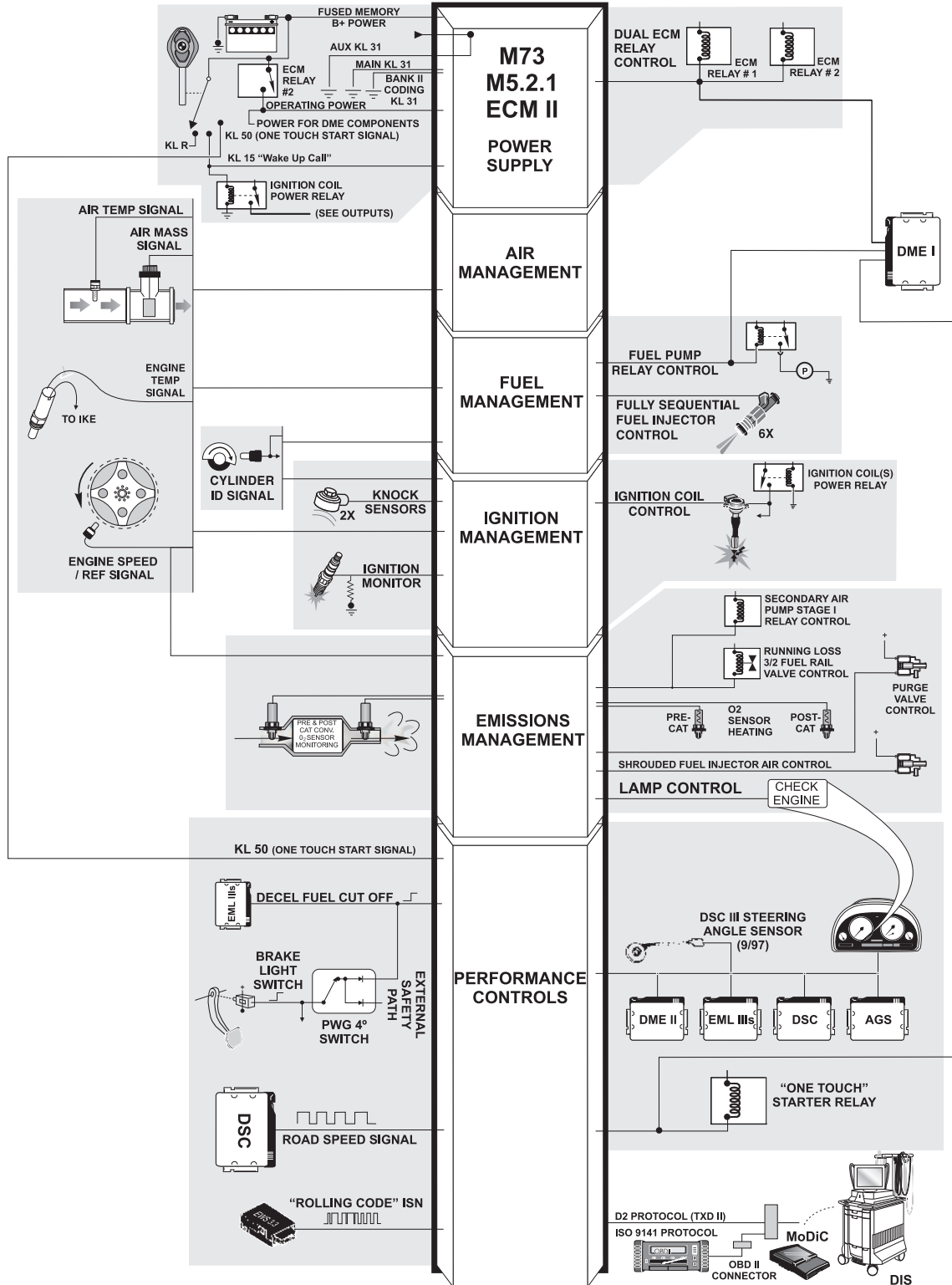
M5.2.1: Inputs - Processing - Outputs



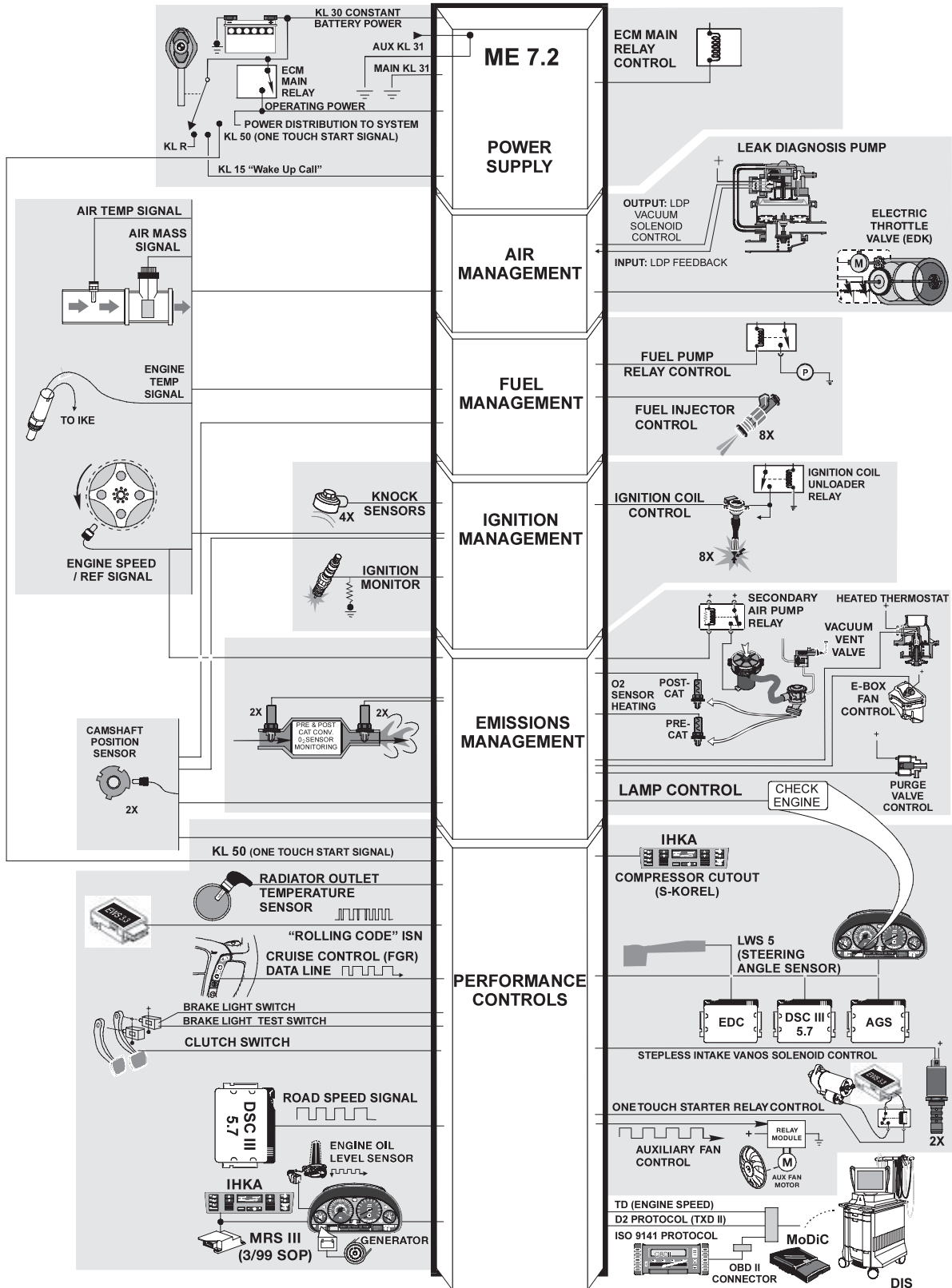
M5.2.1 ECM I: Inputs - Processing - Outputs



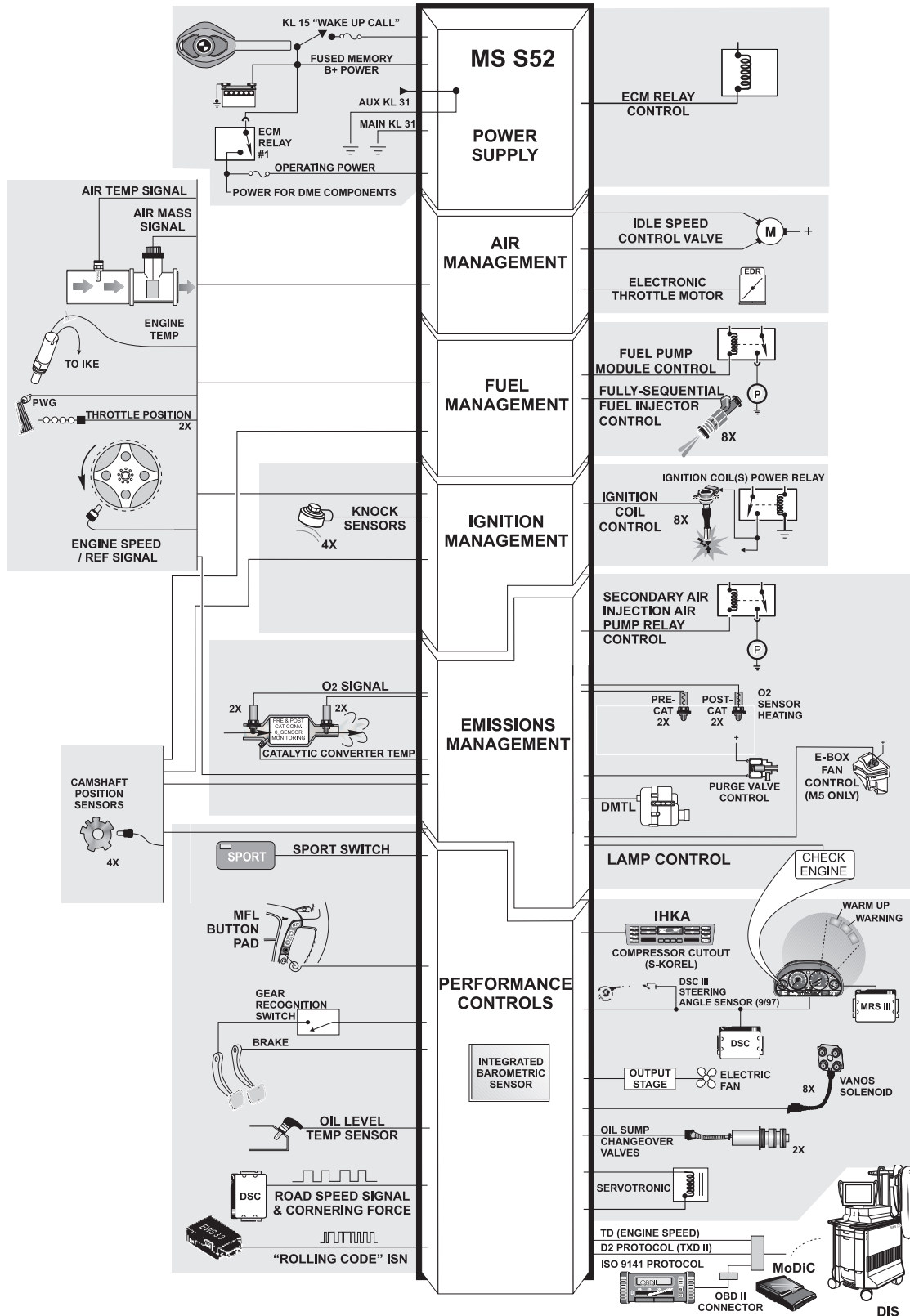
M5.2.1 ECM II: Inputs - Processing - Outputs



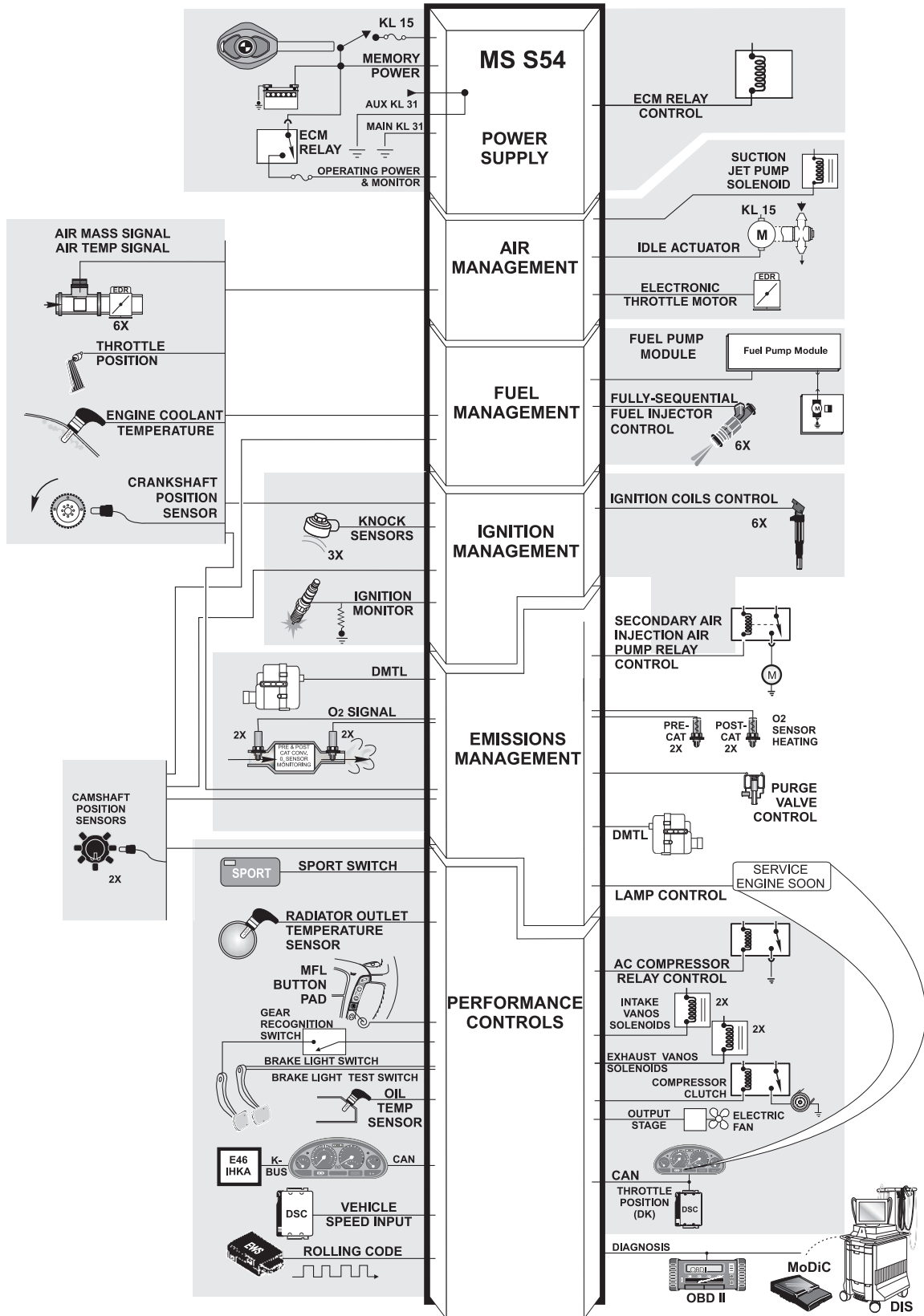
ME7.2: Inputs - Processing - Outputs



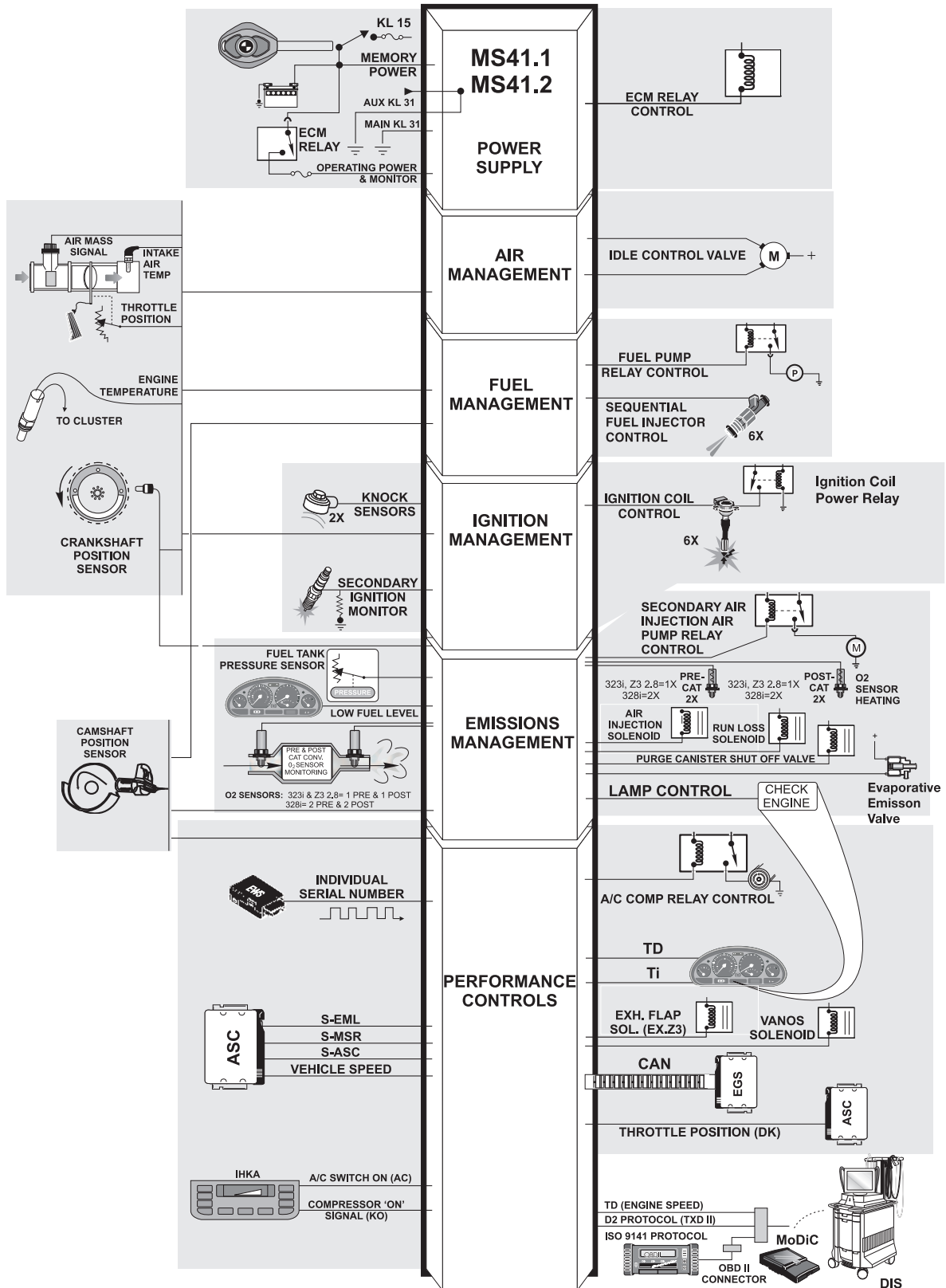
MS S52: Inputs - Processing - Outputs



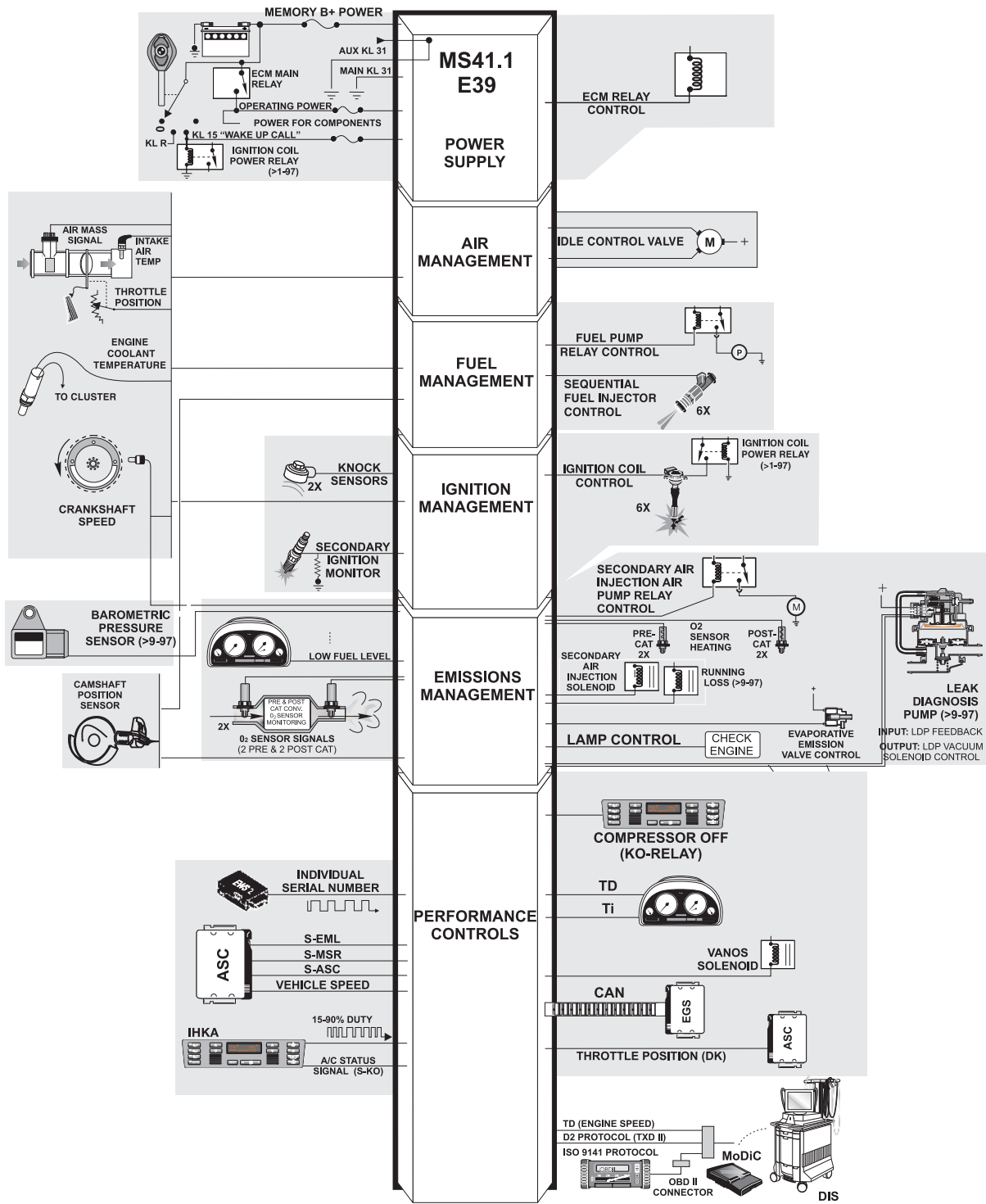
MS S54: Inputs - Processing - Outputs



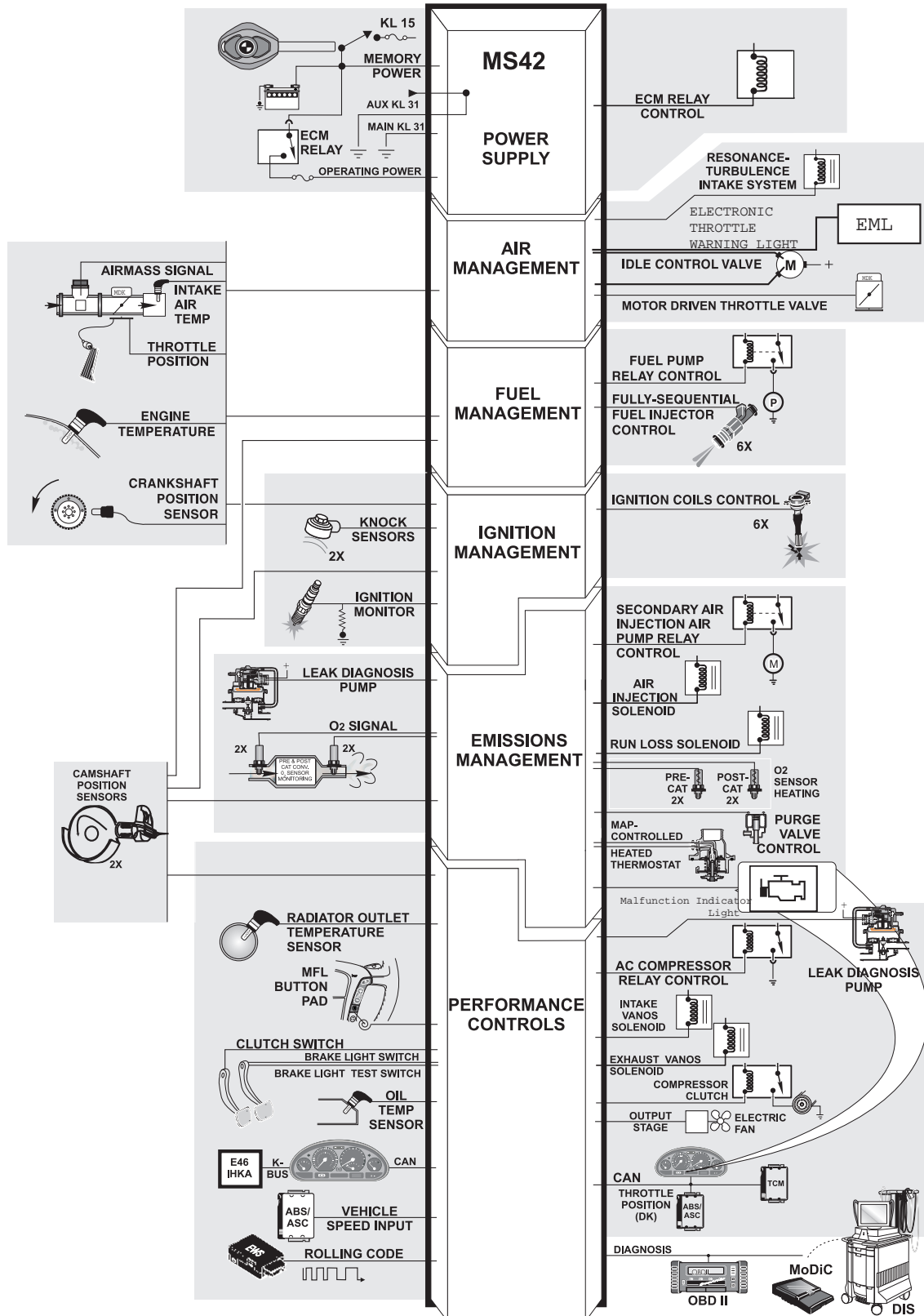
MS41.1 & MS41.2: Inputs - Processing - Outputs



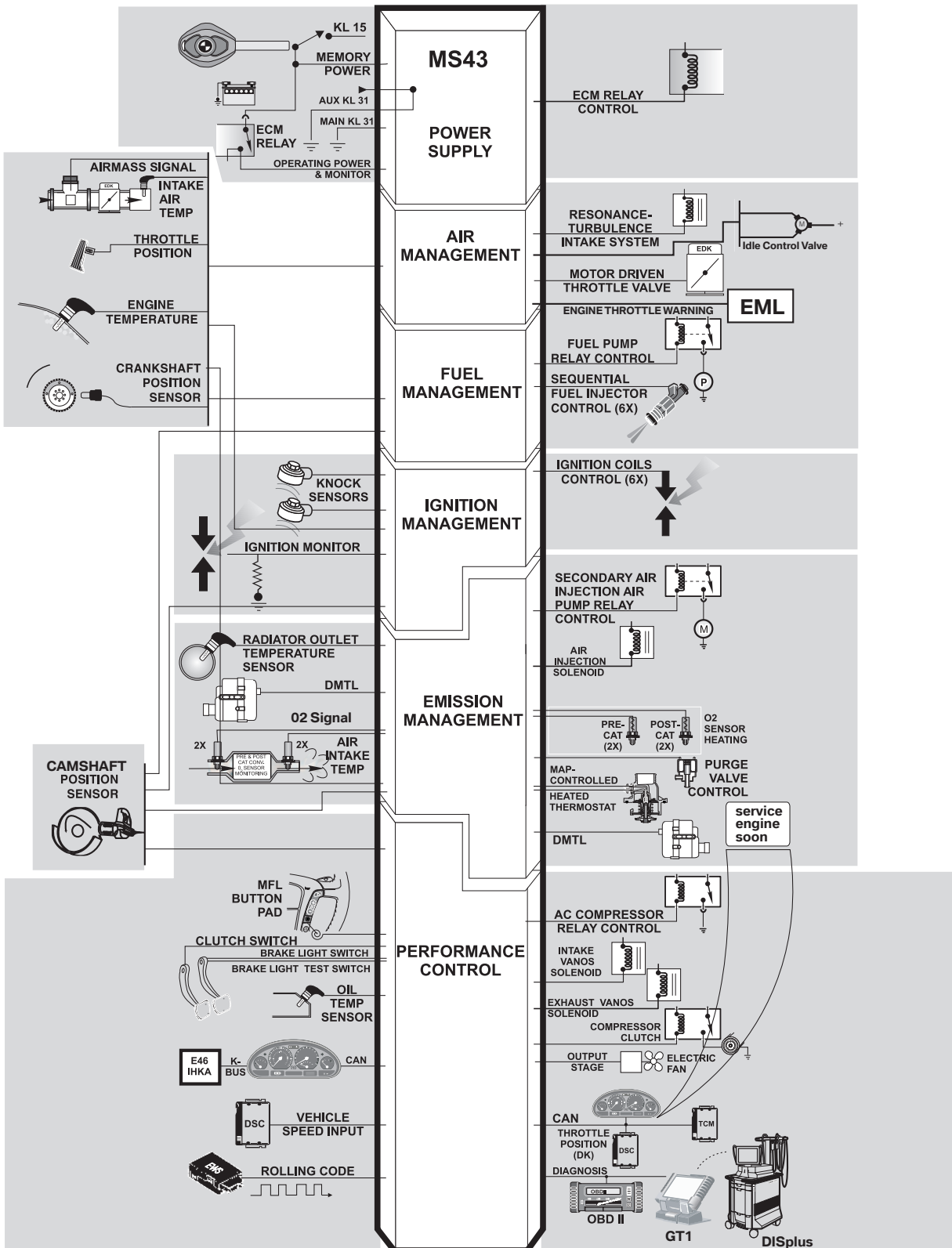
MS41.1: Inputs - Processing - Outputs



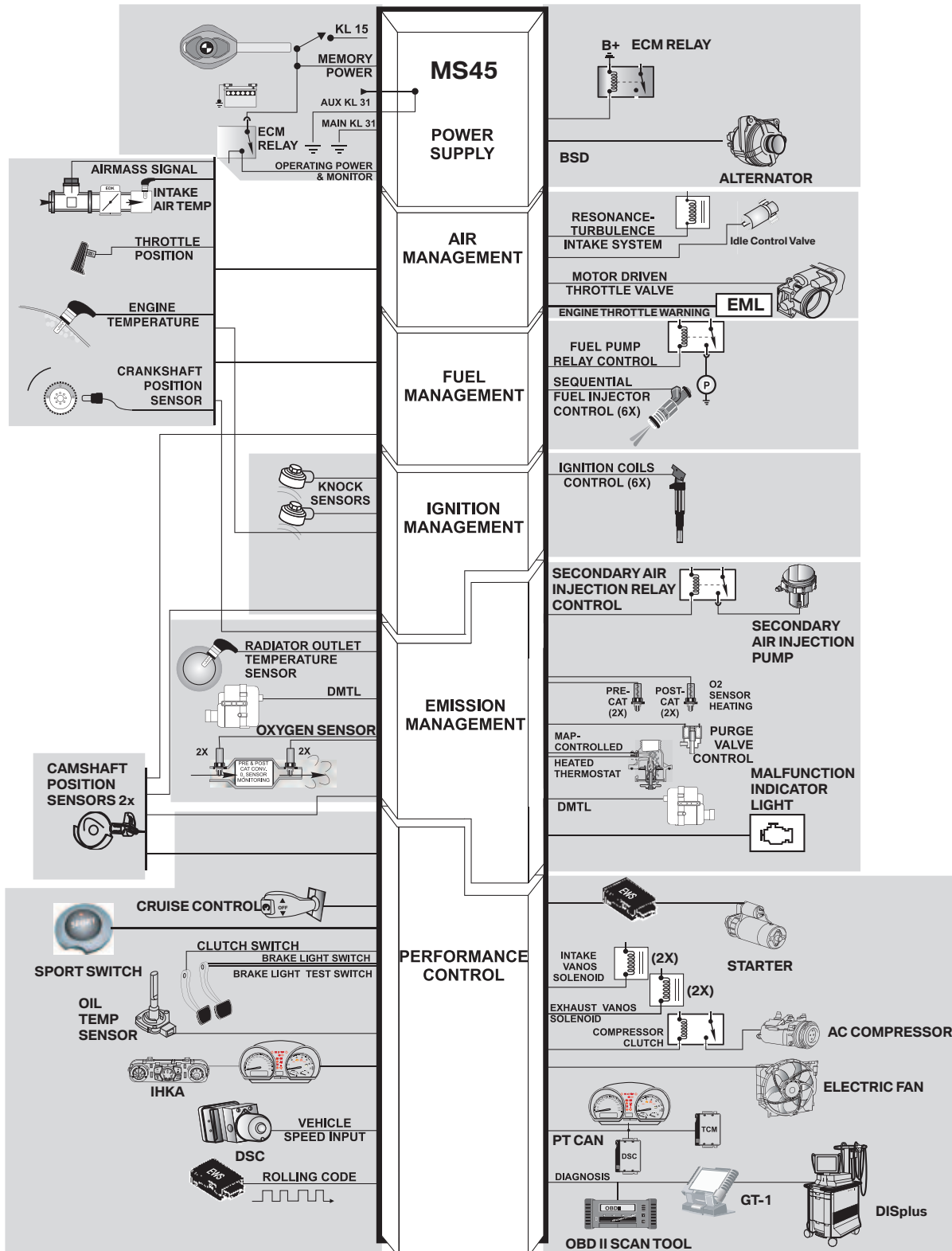
MS42: Inputs - Processing - Outputs



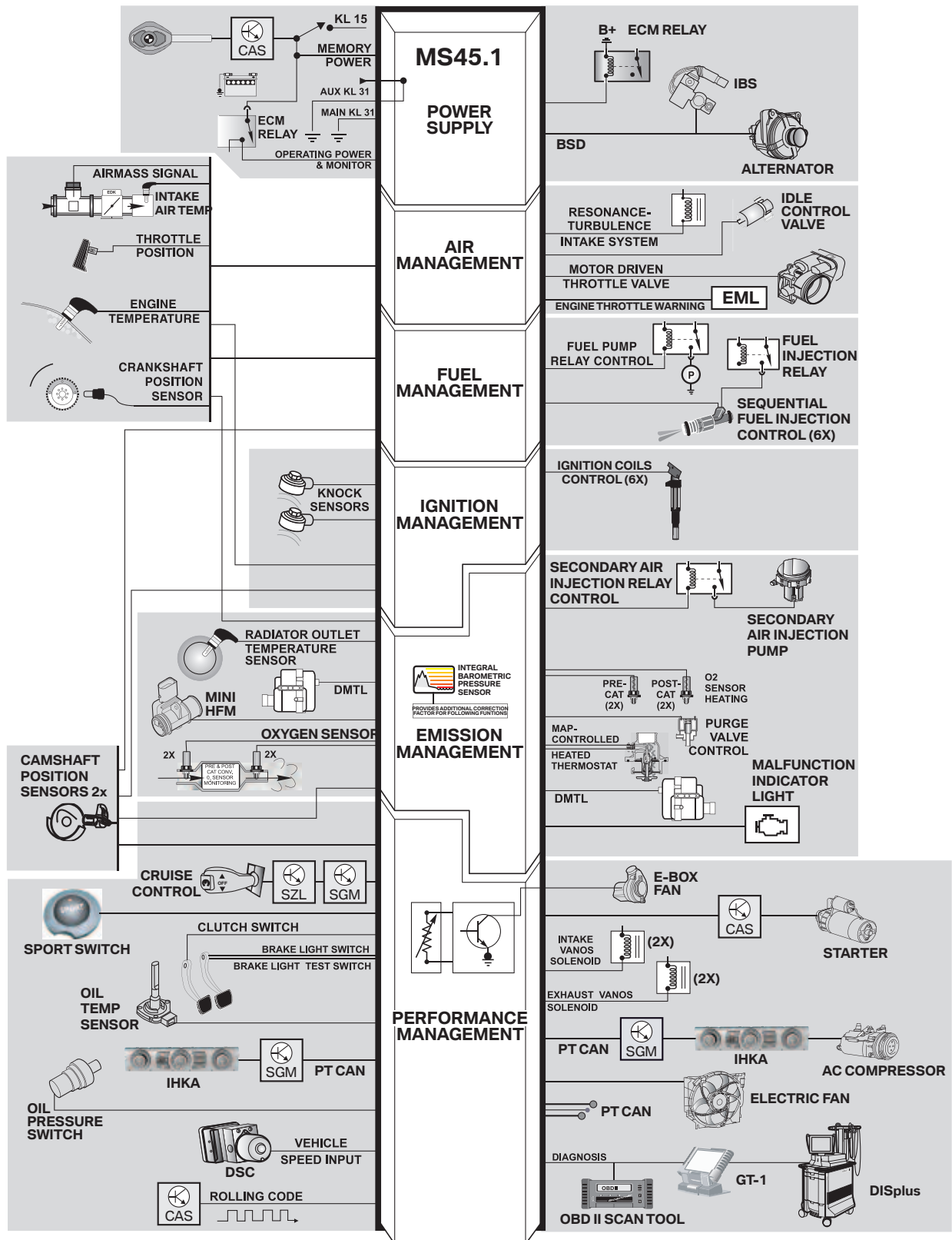
MS43: Inputs - Processing - Outputs



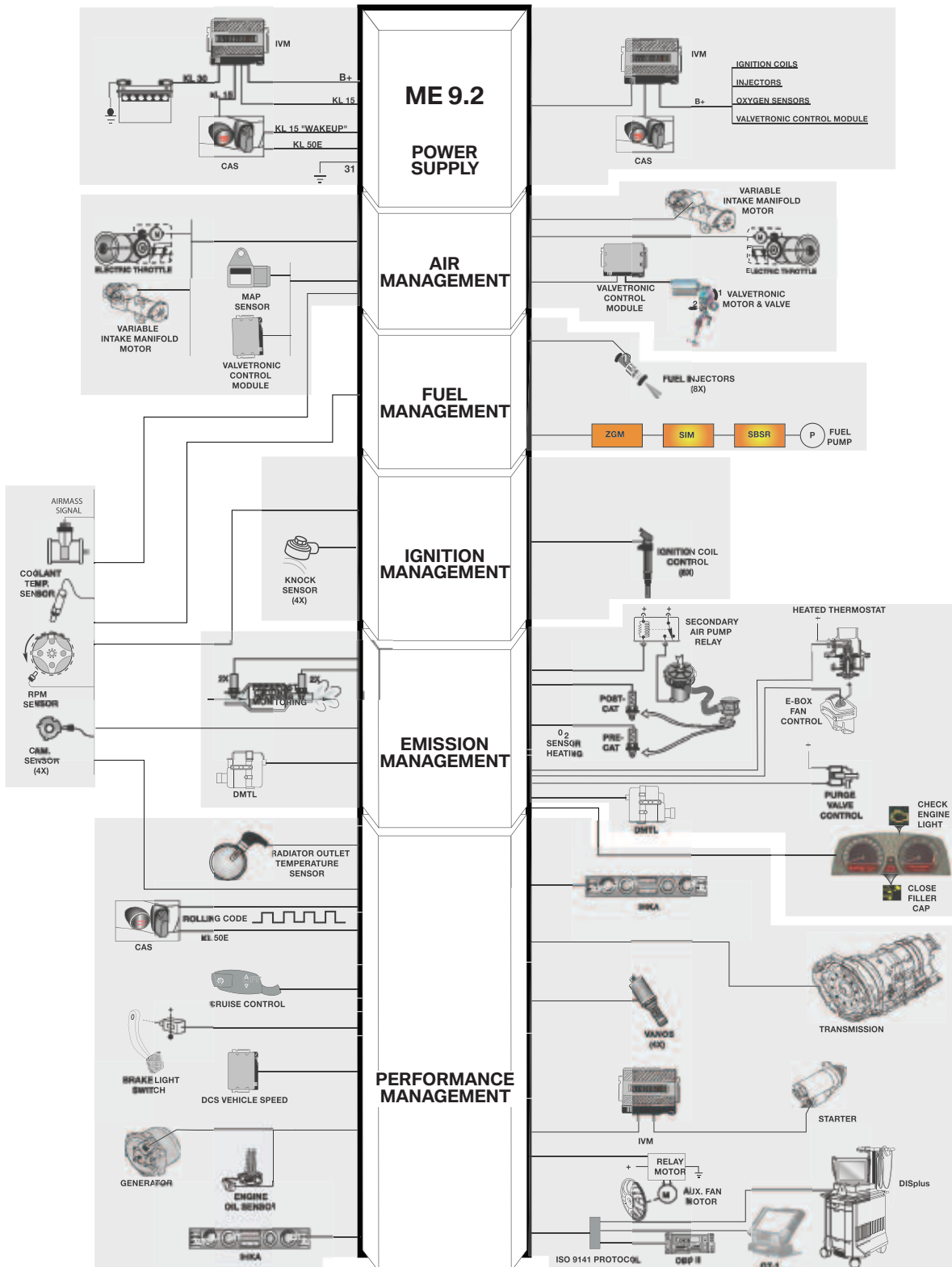
MS45: Inputs - Processing - Outputs



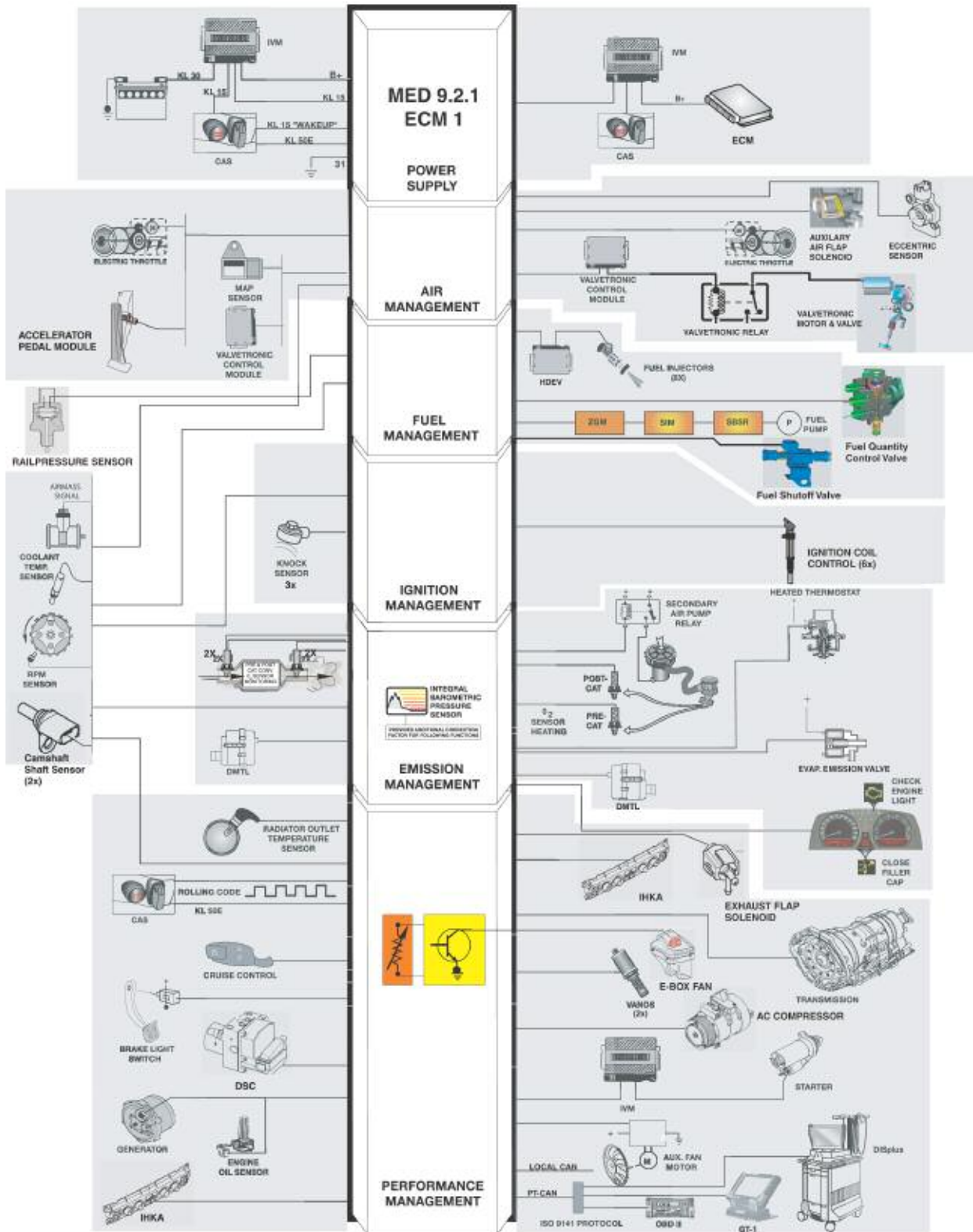
MS45.1: Inputs - Processing - Outputs



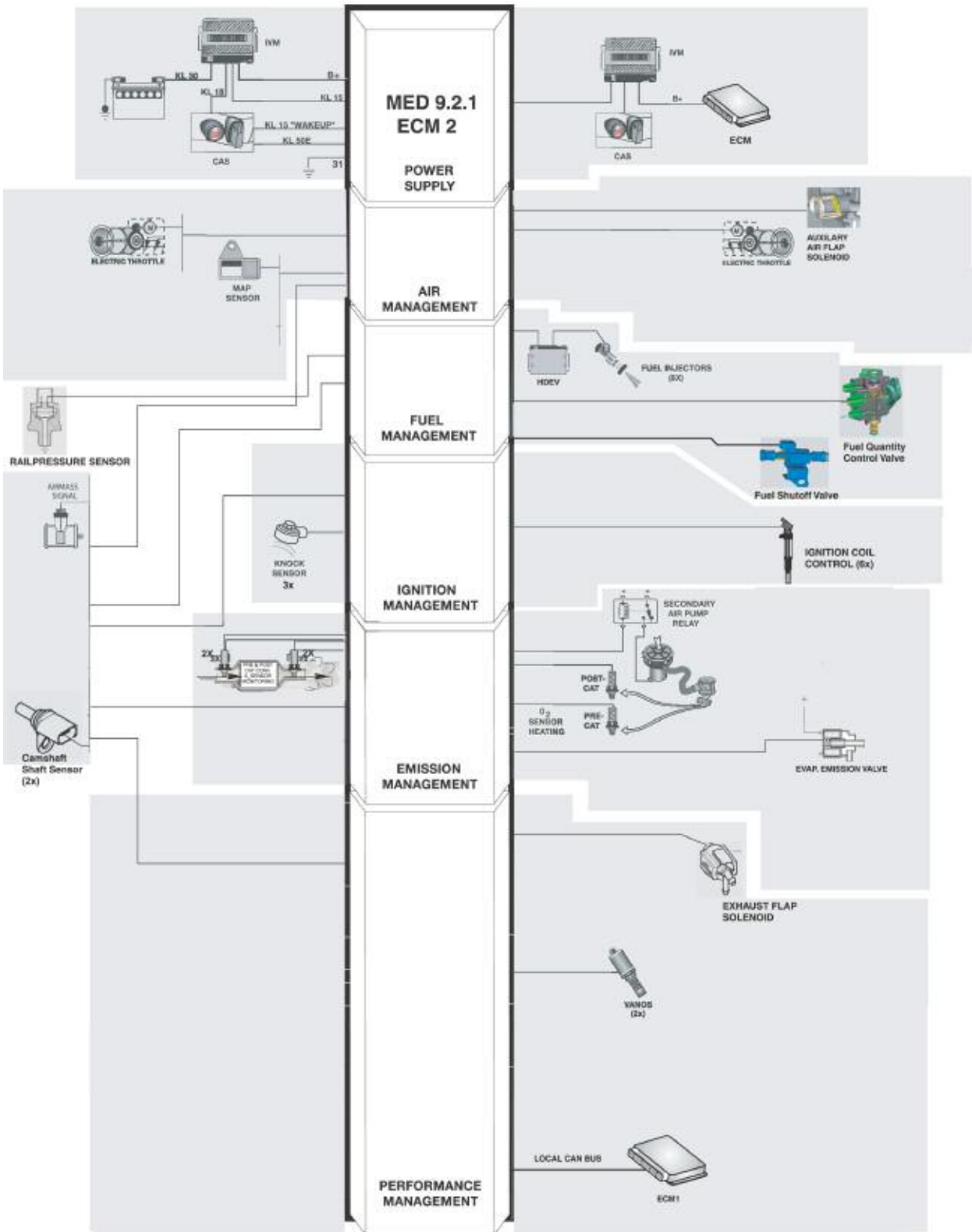
ME 9.2: Inputs - Processing - Outputs



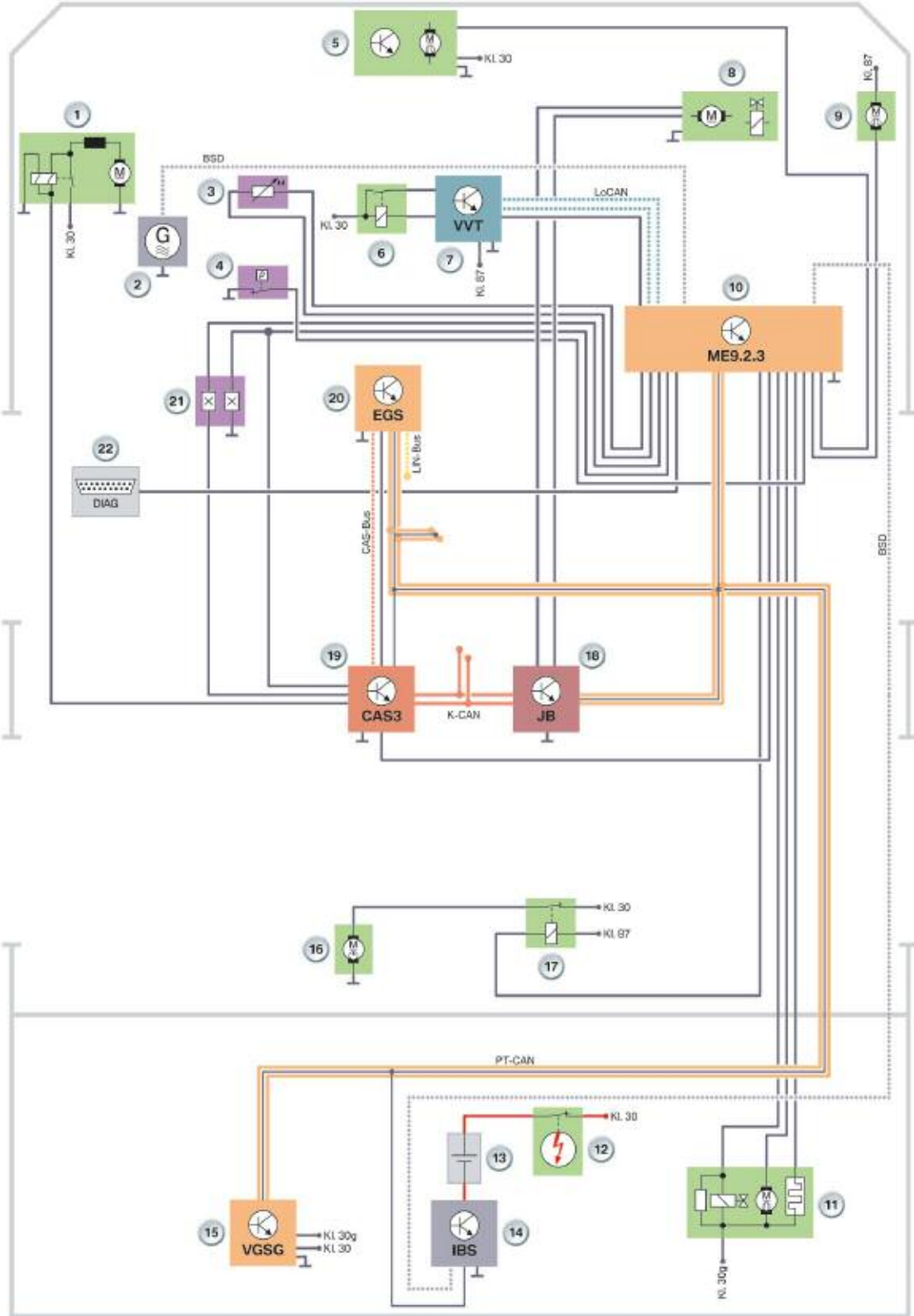
MED 9.2.1: Inputs - Processing - Outputs



MED 9.2.1: Inputs - Processing - Outputs

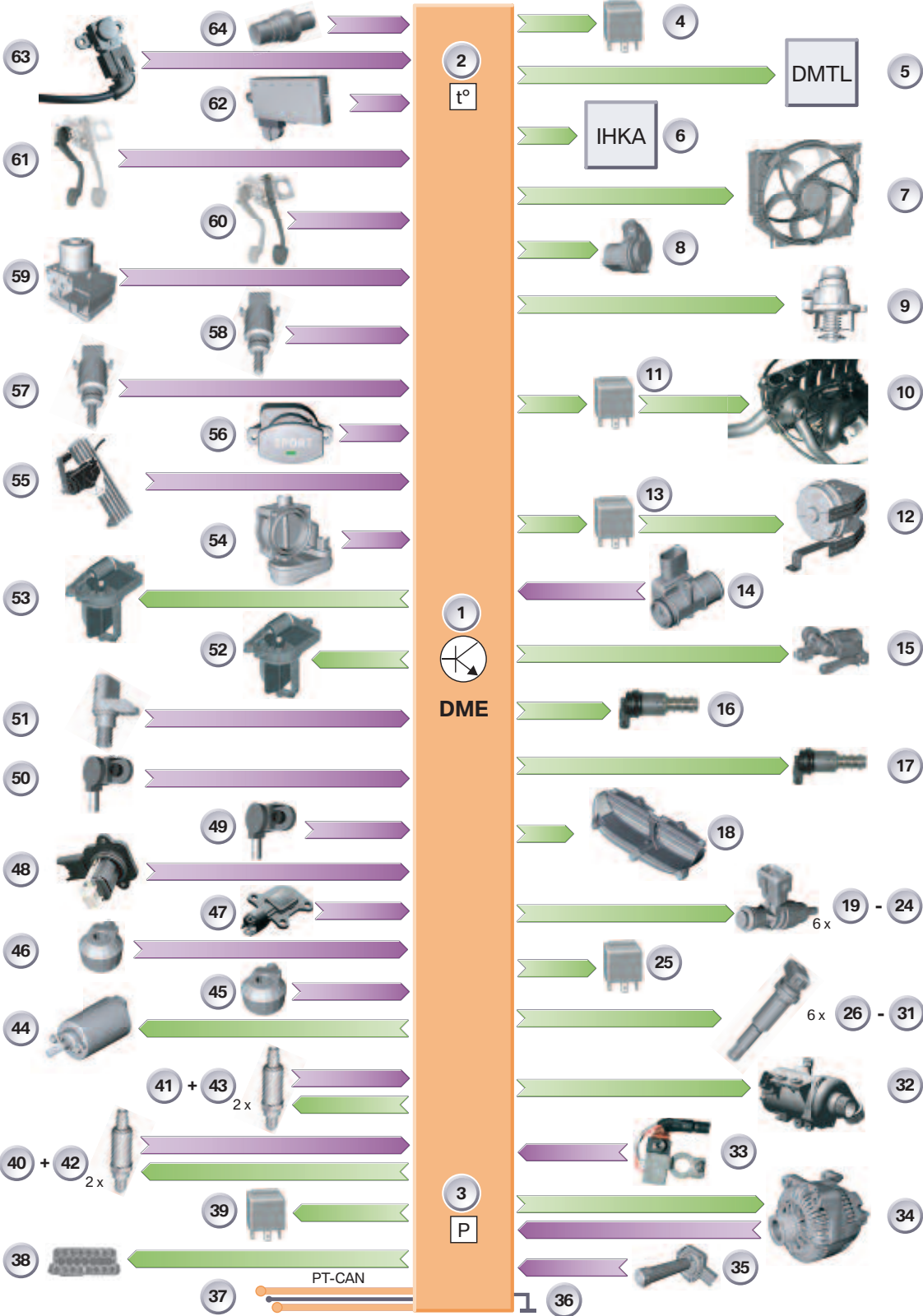


MED 9.2.3: DME Interface (N62)



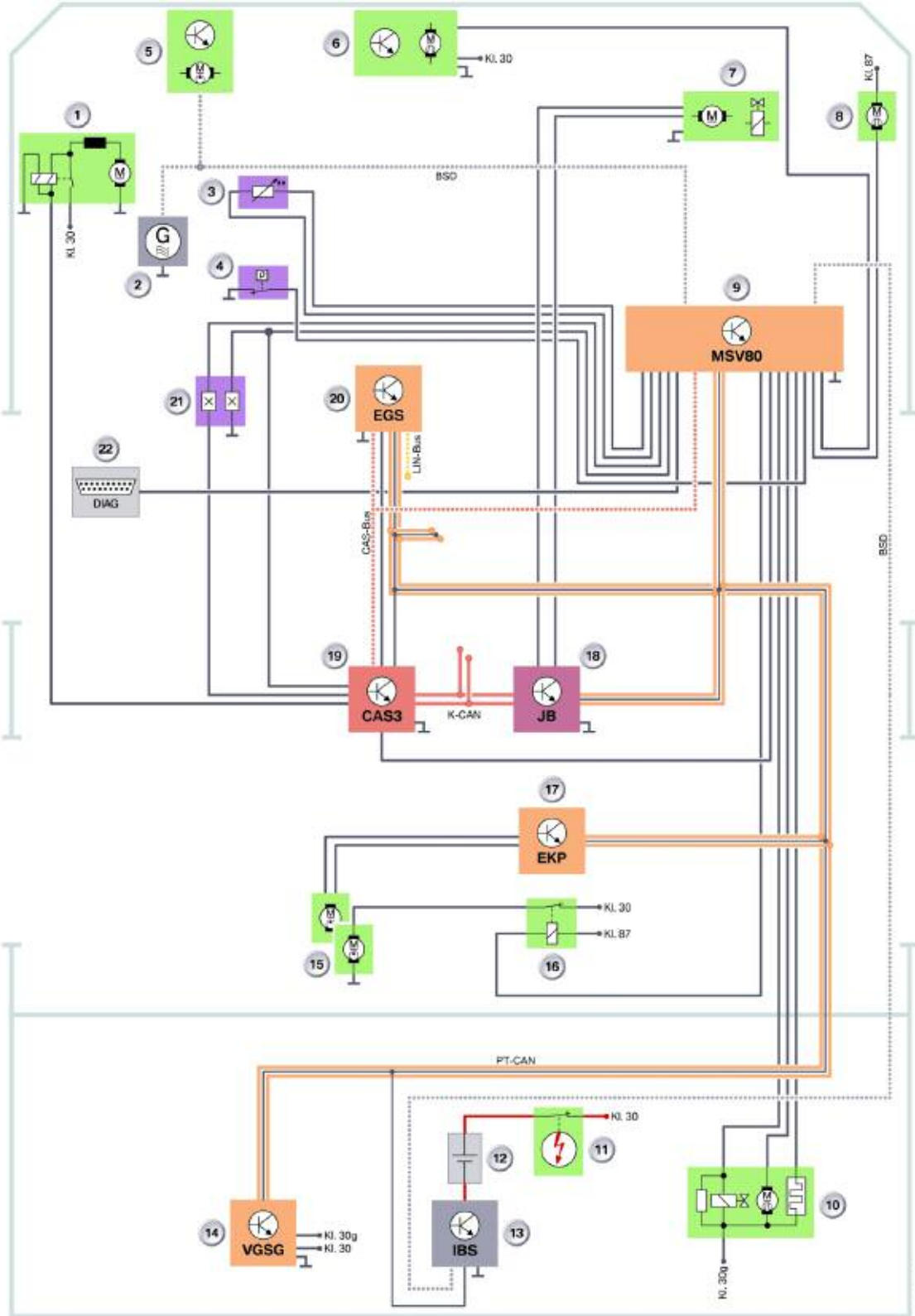
| Index | Explanation |
|--------------|--|
| 1 | Starter |
| 2 | Alternator |
| 3 | Coolant temperature sensor at radiator outlet |
| 4 | Oil pressure switch |
| 5 | Electric fan (engine cooling) |
| 6 | VALVETRONIC relay |
| 7 | VALVETRONIC control unit |
| 8 | Magnetic clutch, A/C compressor |
| 9 | E-box fan |
| 10 | DME control unit (Digital Motor Electronics) |
| 11 | Diagnosis module for fuel tank leakage (DMTL) |
| 12 | Safety battery terminal |
| 13 | Battery |
| 14 | Intelligent battery sensor |
| 15 | Transfer box control unit |
| 16 | Electric fuel pump (EKP) |
| 17 | EKP relay |
| 18 | Junction box control unit |
| 19 | CAS control unit (Car Access System) |
| 20 | EGS control unit (Electronic Transmission Control) |
| 21 | Brake light switch |
| 22 | Diagnosis connection |

MSV70: Inputs - Processing - Outputs



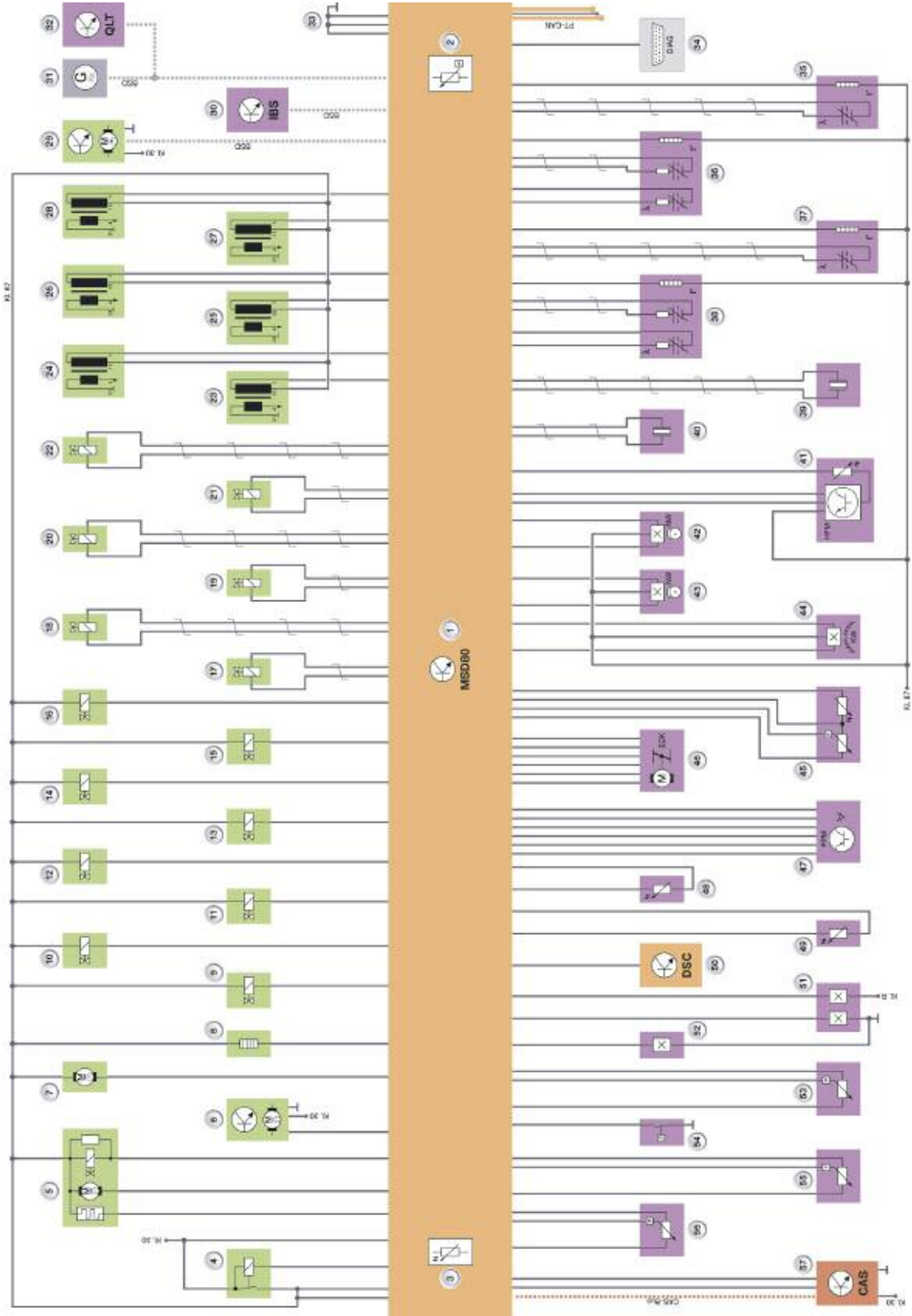
| Index | Explanation | Index | Explanation |
|--------------|---|--------------|--|
| 1 | DME (ECM) | 38 | Diagnosis connection |
| 2 | Integral ambient temperature sensor | 39 | Valvetronic relay |
| 3 | Integral ambient pressure sensor | 40 | Oxygen Sensor |
| 4 | DME (ECM) main relay | 41 | Oxygen Sensor |
| 5 | DM-TL | 42 | Oxygen Sensor |
| 6 | IHKA | 43 | Oxygen Sensor |
| 7 | Electric engine cooling fan | 44 | Valvetronic motor |
| 8 | E-Box fan | 45 | Knock sensor (cyl 1-3) |
| 9 | Characteristic map thermostat | 46 | Knock sensor (cyl 4-6) |
| 10 | Crankcase ventilation heater | 47 | Eccentric shaft sensor |
| 11 | Crankcase ventilation heater relay | 48 | Hot-film air mass meter (HFM) |
| 12 | Secondary air pump | 49 | Exhaust camshaft sensor |
| 13 | Secondary air pump relay | 50 | Intake camshaft sensor |
| 14 | HFM for Secondary air | 51 | Crankshaft sensor |
| 15 | Fuel tank vent valve (TEV) | 52 | DISA actuator |
| 16 | VANOS solenoid valve (Intake cam) | 53 | DISA Actuator |
| 17 | VANOS solenoid valve (Exhaust cam) | 54 | Electric Throttle Valve (EDK) |
| 18 | Electro-magnet for airflap control (not for US) | 55 | Accelerator Pedal Module (FPM) |
| 19-24 | Fuel injectors | 56 | SPORT button |
| 25 | Fuel injector relay | 57 | Coolant temperature sensor (engine temp) |
| 26-31 | Ignition coils | 58 | Coolant temperature sensor (radiator outlet) |
| 32 | Electric coolant pump | 59 | DSC module |
| 33 | Intelligent Battery Sensor (IBS) | 60 | Brake Light Switch (BLS) |
| 34 | Alternator | 61 | Clutch switch |
| 35 | Oil Condition Sensor (OZS) | 62 | Car Access System (CAS) |
| 36 | Ground connection | 63 | Differential pressure sensor |
| 37 | PT-CAN | 64 | Oil pressure switch |

MSV80 (N52KP): DME Interface



| Index | Explanation |
|--------------|--|
| 1 | Starter |
| 2 | Alternator |
| 3 | Coolant temperature sensor at radiator outlet |
| 4 | Oil pressure switch |
| 5 | Electric coolant pump (EWP) |
| 6 | Electric fan (engine cooling) |
| 7 | Magnetic clutch, A/C compressor |
| 8 | E-box fan |
| 9 | DME control unit (Digital Motor Electronics) |
| 10 | Diagnosis module for fuel tank leakage (DMTL) |
| 11 | Safety battery terminal |
| 12 | Battery |
| 13 | Intelligent battery sensor |
| 14 | Transfer box control unit |
| 15 | Electric fuel pump (EKP) |
| 16 | EKP relay |
| 17 | EKP module (only ECE) |
| 18 | Junction box control unit |
| 19 | CAS control unit (Car Access System) |
| 20 | EGS control unit (Electronic Transmission Control) |
| 21 | Brake light switch |
| 22 | Diagnosis connection |

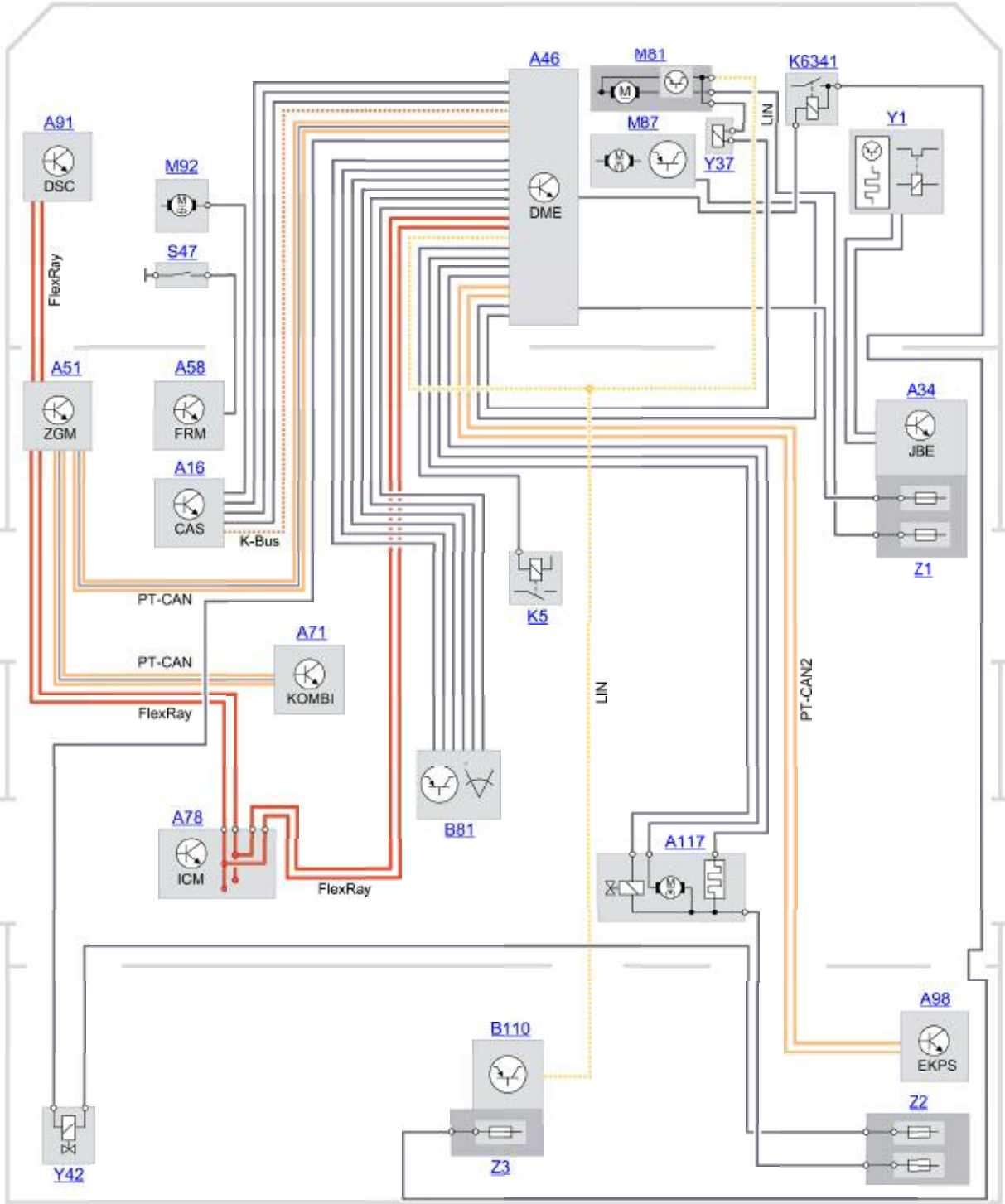
MSD80 (E9x): Inputs - Processing - Outputs



| Index | Explanation | Index | Explanation |
|-------|---|-------|---|
| 1 | ECM (DME - MSD80) | 34 | Diagnostics connection |
| 2 | Temperature sensor in DME control unit | 35 | Oxygen sensor (secondary O2 sensor with discontinuous characteristic) |
| 3 | Ambient-pressure sensor in DME control unit | 36 | Oxygen sensor (primary O2 sensor with continuous characteristic) |
| 4 | DME main relay | 37 | Oxygen sensor (secondary O2 sensor with discontinuous characteristic) |
| 5 | Diagnosis module for fuel tank leakage (DMTL) | 38 | Oxygen sensor (primary oxygen sensor with continuous characteristic) |
| 6 | Electric fan (engine cooling) | 39-40 | Knock sensors |
| 7 | E-box fan | 41 | Hot-film air-mass sensor (HFM) |
| 8 | Characteristic map thermostat | 42 | Camshaft sensor, inlet |
| 9 | Fuel tank vent valve (TEV) | 43 | Camshaft sensor, exhaust |
| 10 | VANOS solenoid valve, inlet | 44 | Crankshaft sensor |
| 11 | VANOS solenoid valve, exhaust | 45 | Pressure/temperature sensor before throttle valve (boost pressure) |
| 12 | Sound flap | 46 | Throttle valve |
| 13 | Exhaust flap | 47 | Accelerator pedal module |
| 14 | Fuel-supply control valve | 48 | Coolant-temperature sensor at engine outlet |
| 15 | Wastegate valve, bank 1 | 49 | Coolant-temperature sensor at radiator outlet |
| 16 | Wastegate valve, bank 2 | 50 | DSC control unit (Dynamic Stability Control) |
| 17-22 | Piezo-injectors | 51 | Brake-light switch |
| 23-28 | Ignition coils | 52 | Clutch switch |
| 29 | Electric coolant pump | 53 | Pressure sensor after throttle valve (intake-manifold pressure) |
| 30 | Intelligent battery sensor | 54 | Oil pressure switch |
| 31 | Alternator | 55 | Low-pressure fuel sensor |
| 32 | Oil condition sensor | 56 | High-pressure fuel sensor (rail pressure sensor) |
| 33 | Ground connection | 57 | CAS control unit (Car Access System) |

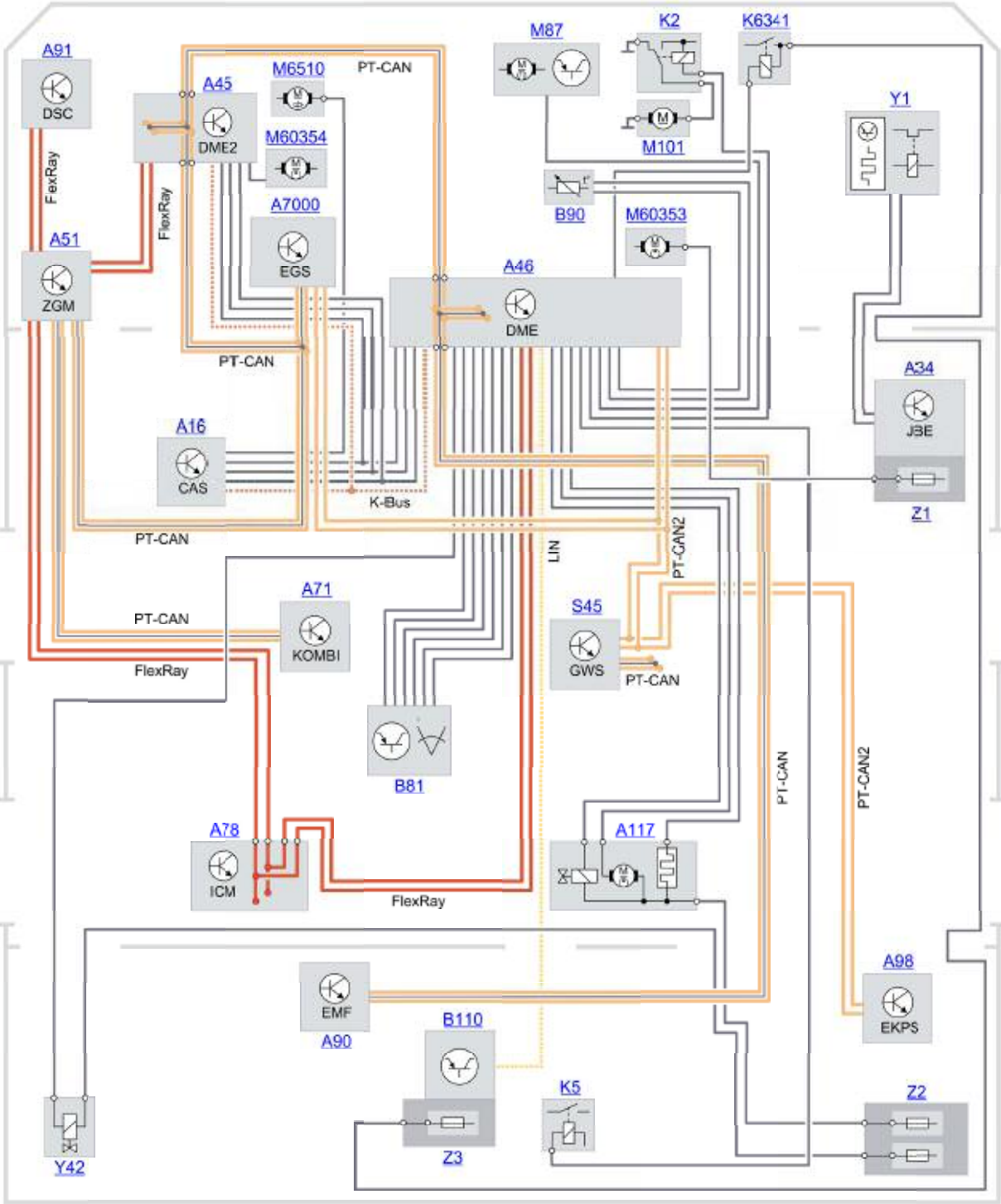
| Index | Explanation | Index | Explanation |
|-------|---|-------|---|
| 1 | ECM (DME - MSD80) | 34 | Valvetronic Relay |
| 2 | Temperature sensor in DME control unit | 35 | Oxygen sensor (secondary O2 sensor with discontinuous characteristic) |
| 3 | Ambient-pressure sensor in DME control unit | 36 | Oxygen sensor (primary O2 sensor with continuous characteristic) |
| 4 | DME main relay | 37 | Oxygen sensor (secondary O2 sensor with discontinuous characteristic) |
| 5 | Electric Fuel Pump (EKP) | 38 | Oxygen sensor (primary oxygen sensor with continuous characteristic) |
| 6 | EKP Relay | 39 | Valvetronic actuator motor (VVT) |
| 7 | DM-TL | 40-41 | Knock sensors |
| 8 | Electric fan (engine cooling) | 42 | Eccentric shaft sensor |
| 9 | E-box fan | 43 | Hot-film Air Mass Meter (HFM) |
| 10 | Characteristic map thermostat | 44 | Camshaft sensor, inlet |
| 11 | Fuel tank vent valve (TEV) | 45 | Camshaft sensor, exhaust |
| 12 | VANOS solenoid valve, inlet | 46 | Crankshaft sensor |
| 13 | VANOS solenoid valve, exhaust | 47 | DISA Actuator motor |
| 14 | Sound flap | 48 | DISA Actuator motor |
| 15 | Exhaust flap | 49 | Throttle valve |
| 16-21 | Fuel injectors | 50 | Accelerator pedal module |
| 22-27 | Ignition coils | 51 | Coolant-temperature sensor at engine outlet |
| 28 | Electric coolant pump | 52 | Coolant-temperature sensor at radiator outlet |
| 29 | Intelligent battery sensor | 53 | DSC control unit |
| 30 | Alternator | 54 | Brake light switch |
| 31 | Oil condition sensor | 55 | Differential pressure sensor |
| 32 | Ground connection | 56 | Oil pressure switch |
| 33 | Diagnostics connection | 57 | CAS control unit (Car Access System) |

MSD80 (N52): DME Interface



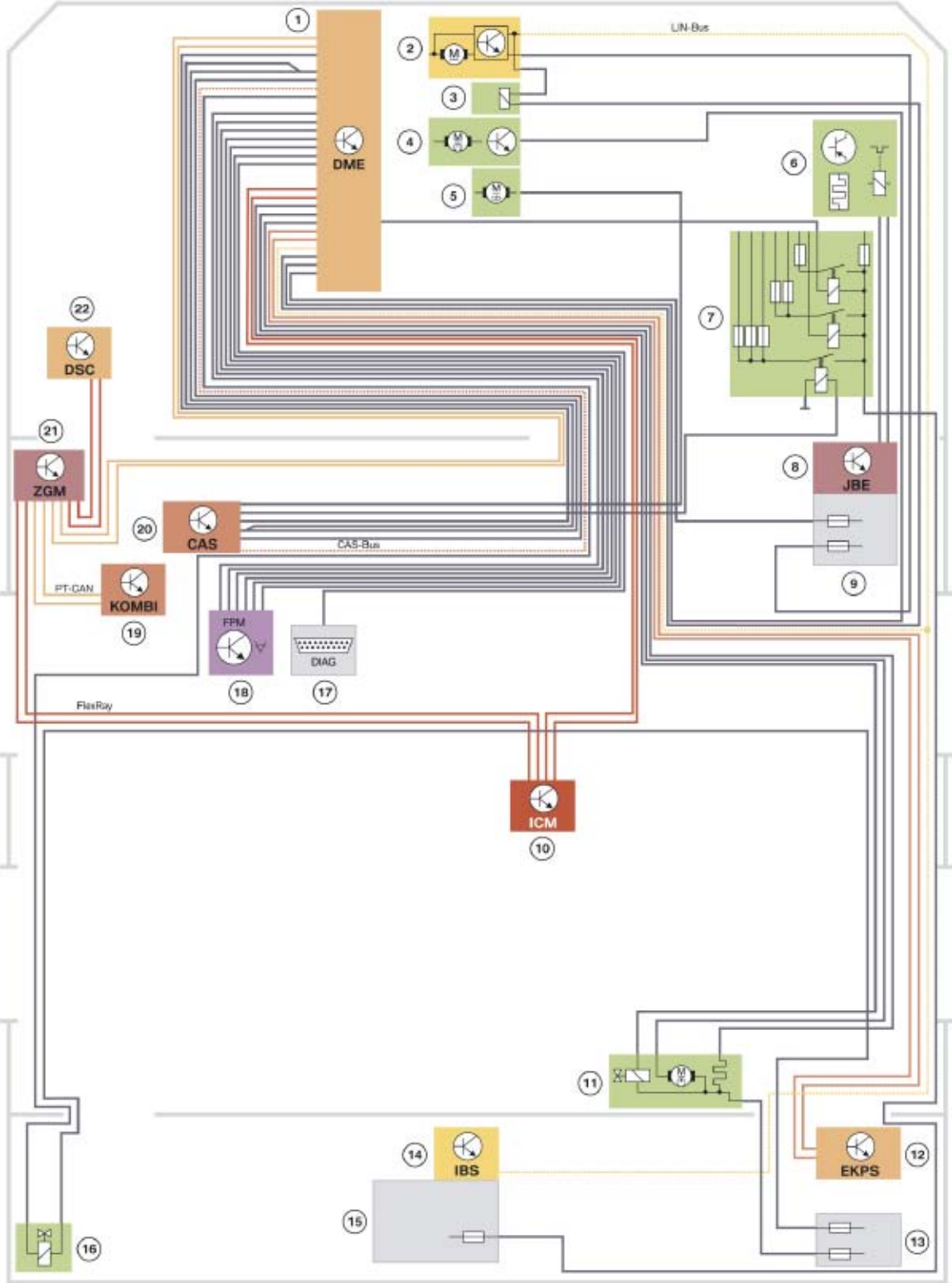
ISTA wiring schematic: SSP-BSB-T6109024 Motor interface N52

MSD81 (N54): DME Interface



ISTA wiring schematic: SSP-BSB-T6109019 Motor interface N54

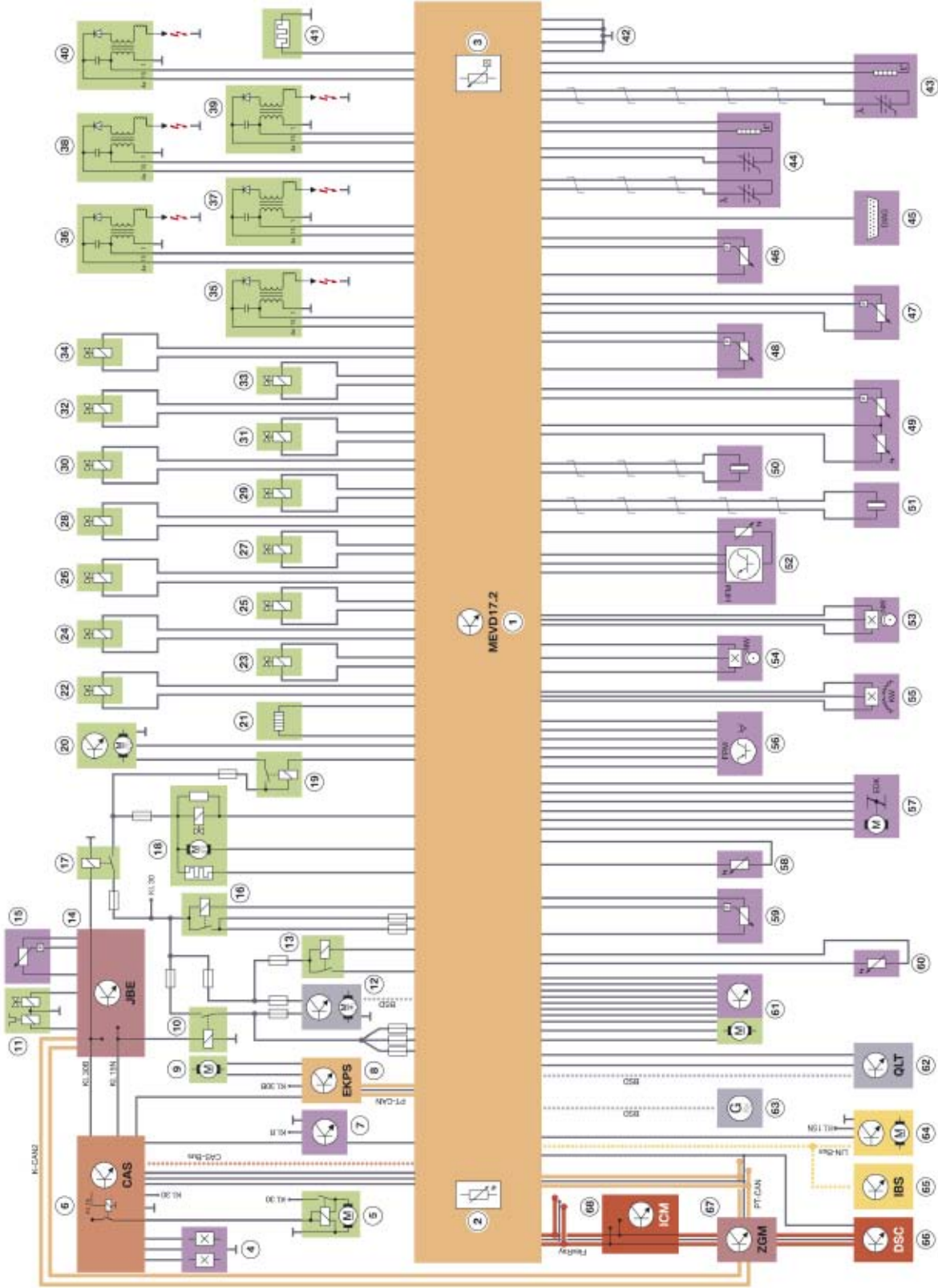
MEVD17.2 (N55): DME Interface



ISTA wiring schematic: SSP-BSB-T6109023 Motor interface N55

| Index | Explanation |
|--------------|--|
| 1 | Digital Motor Electronics |
| 2 | Electric air flap control |
| 3 | Mechanical air flap control |
| 4 | Electric fan |
| 5 | Starter |
| 6 | A/C compressor |
| 7 | Front power distribution box |
| 8 | Junction box electronics |
| 9 | Junction box |
| 10 | Integrated Chassis Management |
| 11 | Fuel tank leak diagnostic module |
| 12 | Electronic fuel pump controller |
| 13 | Rear power distribution box |
| 14 | Intelligent battery sensor |
| 15 | Battery power distribution box |
| 16 | Exhaust flap changeover valve |
| 17 | Diagnosis socket (engine speed signal) |
| 18 | Accelerator pedal module |
| 19 | Instrument cluster |
| 20 | Car Access System |
| 21 | Central Gateway Module |

MEVD17.2 (N55): Inputs - Processing - Outputs



| Index | Explanation | Index | Explanation |
|--------------|--|--------------|--|
| 1 | Engine electronics Valvetronic, direct injection 17.2 MEVD17.2 | 35-40 | Ignition coils |
| 2 | Ambient pressure sensor | 41 | Engine breather heater |
| 3 | Temperature sensor | 42 | Ground connections |
| 4 | Brake light switch | 43 | Oxygen sensor after catalytic converter |
| 5 | Starter | 44 | Oxygen sensor before catalytic converter |
| 6 | Car Access System (CAS) | 45 | Diagnostic socket |
| 7 | Clutch module | 46 | Low-pressure fuel sensor |
| 8 | Electronic fuel pump control (EKPS) | 47 | Intake manifold pressure sensor after throttle valve |
| 9 | Electric fuel pump | 48 | Fuel rail pressure sensor |
| 10 | Terminal 15N relay | 49 | Charge air temperature and pressure sensor |
| 11 | A/C compressor | 50 | Knock sensor, cylinders 1 - 3 |
| 12 | Coolant pump | 51 | Knock sensor, cylinders 4 - 6 |
| 13 | Valvetronic relay | 52 | Hot-film air mass meter (HFM) |
| 14 | Junction Box Electronics (JBE) | 53 | Intake camshaft sensor |
| 15 | Refrigerant pressure sensor | 54 | Exhaust camshaft sensor |
| 16 | Relay, ignition and injection | 55 | Crankshaft sensor |
| 17 | Terminal 30B relay | 56 | Accelerator Pedal Module (FPM) |
| 18 | Fuel tank leak diagnosis module (DMTL) | 57 | Throttle valve (MDK) |
| 19 | Electric fan relay | 58 | Coolant temperature sensor at engine outlet |
| 20 | Electric fan | 59 | Oil pressure sensor |
| 21 | Characteristic map thermostat | 60 | Oil temperature sensor |
| 22 | Diverter valve | 61 | Valvetronic servomotor |
| 23 | Fuel tank vent valve | 62 | Oil condition sensor |
| 24 | VANOS solenoid valve, intake camshaft | 63 | Alternator |
| 25 | VANOS solenoid valve, exhaust camshaft | 64 | Active cooling air flap control |
| 26 | Oil pressure control valve | 65 | Intelligent battery sensor (IBS) |
| 27 | Electropneumatic pressure converter (EPDW) for wastegate valve | 66 | Dynamic stability control (DSC) |
| 28 | Quantity control valve | 67 | Central Gateway Module (ZGM) |
| 29-34 | Fuel injectors | 68 | Integrated Chassis Management (ICM) |

MEVD17.2 Control Unit

The N55 engine is equipped with the Bosch engine management MEVD17.2 :

- The MEVD17.2 is integrated in the intake system and is cooled by the intake air.
- The MEVD17.2 is FlexRay-compatible and directly supplies voltage to the sensors and actuators.

The top side of the DME housing also serves as the bottom section of the intake manifold. The housing is contoured in the area of the intake manifold to ensure optimum air flow. An O ring type seal is installed between the DME housing and the intake. The plug connections between the wiring harness and DME are water-tight.

N55, engine management MEVD17.2



| Index | Explanation |
|-------|--|
| 1 | Engine wiring harness, sensor 1 (Module 100) |
| 2 | Engine wiring harness, sensor 2 (Module 200) |
| 3 | Connection, vehicle wiring harness (Module 300) |
| 4 | Engine wiring harness, Valvetronic (Module 400) |
| 5 | Connection, voltage supply (Module 500) |
| 6 | Engine wiring harness, injection and ignition (Module 600) |

For the first time, an engine-mounted Digital Motor Electronics (DME) module is used. The DME is bolted to the intake manifold and is cooled by the intake air.

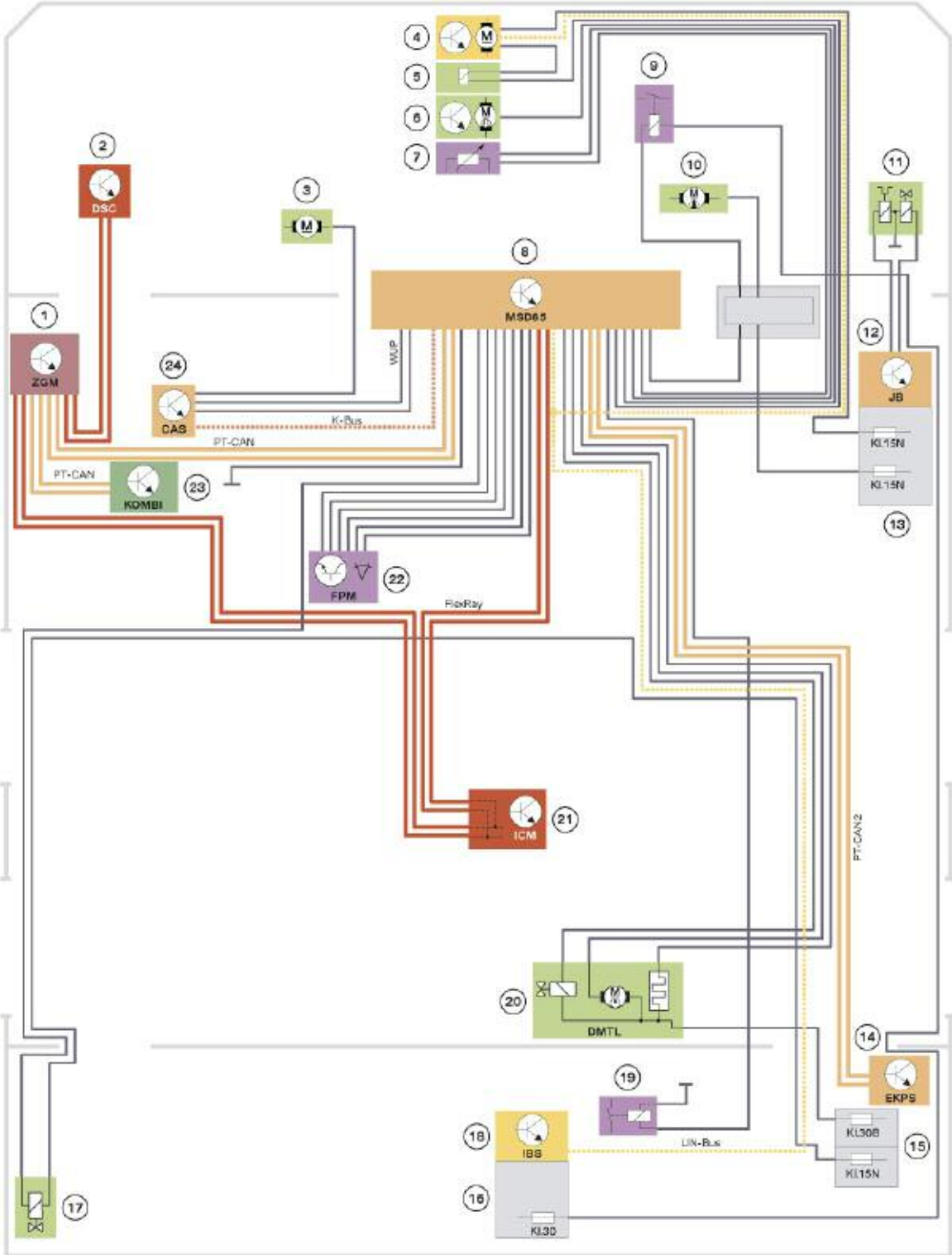
The engine mounted DME has the following advantages:

- Engine wiring harness is divided into six individual modules
- All electrical components on the engine are supplied directly via the DME
- The E-box is no longer need
- 211 pins are available
- The plug-in connectors are water-tight

N55, wiring harness routing



MSD85 (N63): DME Interface



ISTA wiring schematic: SSP-BSB-T6109021 Motor interface N63

| Index | Explanation | Index | Explanation |
|--------------|--|--------------|----------------------------------|
| 1 | Central gateway module | 13 | Junction box power distributor |
| 2 | Dynamic Stability Control | 14 | Electronic fuel pump controller |
| 3 | Starter | 15 | Power distributor, rear right |
| 4 | Active cooling air flaps | 16 | Power distributor, battery |
| 5 | Passive cooling air flaps | 17 | Exhaust flaps |
| 6 | Electric fan | 18 | Intelligent battery sensor |
| 7 | Coolant temperature sensor at radiator outlet | 19 | Electric fan relay |
| 8 | MSD85 | 20 | Fuel tank leak diagnostic module |
| 9 | Electric auxiliary coolant pump for charge air cooling | 21 | Integrated Chassis Management |
| 10 | DME main relay | 22 | Accelerator pedal module |
| 11 | A/C compressor | 23 | Instrument cluster |
| 12 | Junction box electronics | 24 | Car Access System |

MSD85 Control Unit

Due to the changes brought about with the new N63 engine, the engine management system has been adapted accordingly.

The new system, designated MSD85, works in conjunction with the High Precision Injection (HPI) system which is familiar from the N54 engine.

The high level of technology on the N63 engine place high demands on the DME system. The ECM used features a very powerful 150 MHz processor and features a new connector concept.

The connector concept consists of five chambers and functional configuration. This means each chamber is assigned to a specific function group.



The following list outlines the configuration of the chambers in corresponding order:

- Chamber 1 (8 pins): Ignition
- Chamber 2 (59 pins): Engine plug, cylinder bank 1 and several central engine functions
- Chamber 3 (40 pins): Vehicle plug
- Chamber 4 (54 pins): Engine plug, cylinder bank 2 and several central engine functions
- Chamber 5 (16 pins): Fuel injection

An engine plug relates to sensor/actuator connections on the engine while the vehicle plug represents the interface to the vehicle specific components.

The functions of the engine management system are described in the respective systems.



The N63 engine is controlled by the MSD85. This control unit has been modified to make it compatible with the FlexRay bus.

The control unit is located to the front of the right-side spring strut dome. This control unit is liquid-cooled rather than air-cooled.

For this purpose, the housing of the control unit features two windings in the one coolant line, which is connected to the low temperature cooling circuit for charge air cooling.

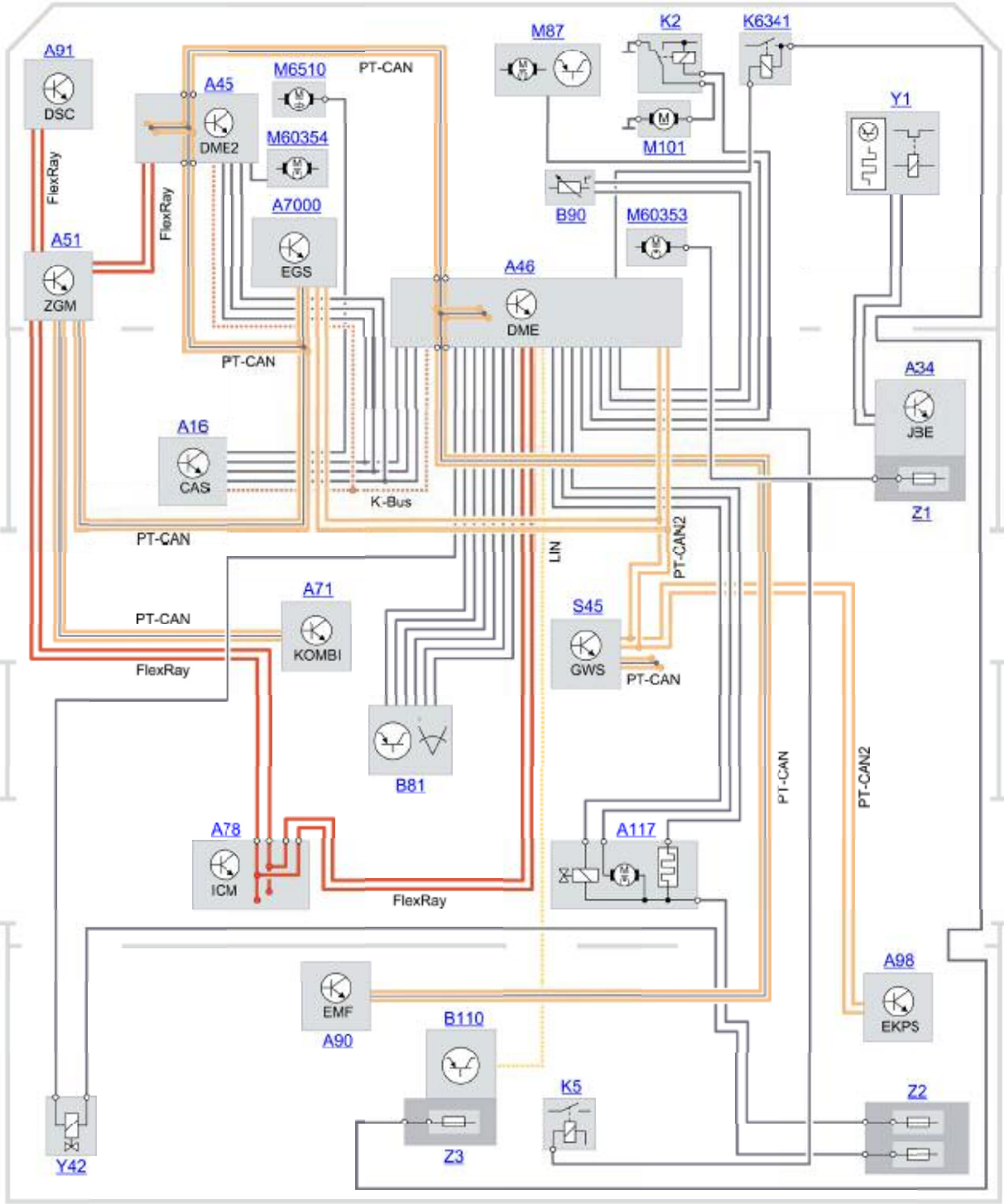
The lower section of the electronics box is open to the outside. The upper section, which contains the connections, has a watertight seal.

Cooling of the engine control unit of the N63 engine



| Index | Explanation | Index | Explanation |
|-------|-----------------------|-------|---------------------|
| 1 | Sealing frame | 5 | Coolant line |
| 2 | Electronics box cover | 6 | Engine control unit |
| 3 | Coolant return | 7 | Electronics box |
| 4 | Coolant supply | | |

MSD87-12 (N74): DME Interface



ISTA wiring schematic: SSP-BSB-T6109020 Motor interface N74

MSD87-12: Control Unit

Two water-cooled MSD87-12 control units are used. The same water tight components as those on the MSD85 (N63 engine in the F01) have been used. As on the predecessor engine N73, a primary (master) and secondary concept strategy has been implemented with the two control units. They have the same hardware, software and data records. The connected sensor system runs an automatic primary (master) and secondary identification. In this arrangement, the master is responsible for communication with the complete vehicle and the specified nominal values for the engine functions. The control unit is designed with the current software for the vehicle network with FlexRay.

NOTES

PAGE