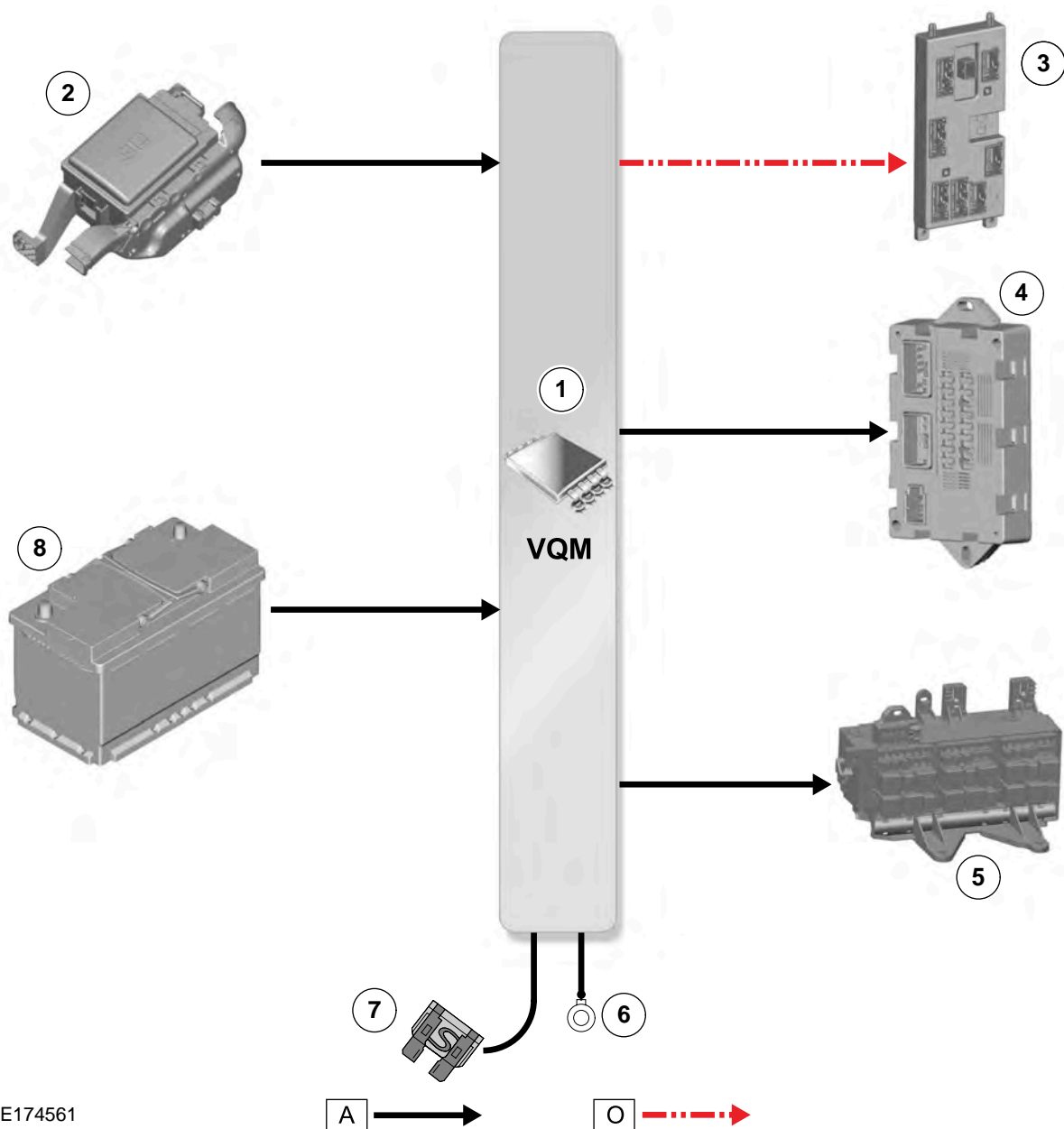


Power Distribution Control Diagram (2 of 2)



E174561

Item	Description	Item	Description
1	Voltage Quality Module	6	Ground
2	Engine Junction Box Rear (EJB2)	7	Power supply – BCM/GWM assembly
3	Body Control Module/Gateway Module (BCM/GWM)	8	Battery
4	Quiescent Current Control Module (QCCM)	A	Hardwired
5	Rear Junction Box (RJB)	O	LIN Bus

MultiCAN Networks

Controller Area Networks (CAN)

A bus network is designed to allow connection and communication of multiple control modules. As additional control modules are added, the bus effectively has to carry more traffic or load. A busy network has a distinct disadvantage; there is little room for error as the bus load is running quite high. If the network fails then we lose communication between a higher numbers of control modules.

To reduce traffic on the network(s) the control modules were prioritized into two groups:

- **High Speed (HS) CAN (500 kb/s)** – Modules manage vehicle movement – powertrain, steering, braking, etc. – and driver safety systems
- **Medium Speed (MS) CAN (125 kb/s)** – Modules manage vehicle body, comfort or display systems (Infotainment, seats, etc.)



E178742

Each group of modules are installed onto a dedicated CAN network. The Body Control Module (BCM) is connected to both networks, providing a link (or gateway) between the two and thus enabling data to be transferred from one network to the other. The process of data transfer between networks places a high load on the BCM's Central Processing Unit (CPU); the facility for message filtering and storage buffering becomes limited, slowing the process down.

MultiCAN Networks

Late model Jaguar vehicles include many of the latest electronically-controlled systems. Each new system requires an additional control module, which adds traffic to the already busy CAN bus networks. The solution was to increase the number of CAN buses from two to four; 'MultiCAN', as the name suggests, allows the use of independent but interconnected bus networks of varying speeds.

The control modules are divided into four major system groups, with each group connected on its respective network:

- Chassis – HS CAN
- Comfort – HS CAN
- Powertrain – HS CAN
- Body – MS CAN



NP16XF003

With each network operating independently, the bus loading and stability of each network is optimized.

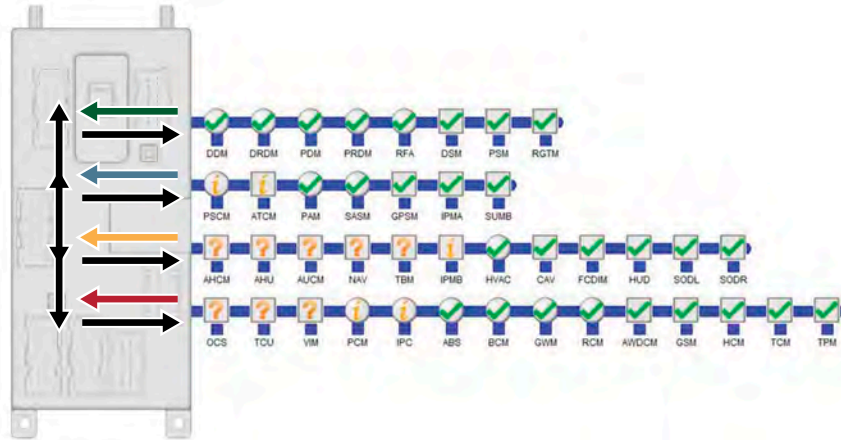
To enhance the functionality of the vehicle systems, any control module connected to a CAN bus can communicate with any other control module connected to a CAN bus, regardless of which network they are connected to.

To protect against network failure and reduce network loading, some control modules are connected to more than one network. In the unlikely case of a network failure, essential data may still be transmitted from these modules onto their other network connection. This allows the modules on that network to operate correctly.

These modules are not responsible for transferring messages from one network to another; although they have two CAN connections, the networks are effectively still separated. Instead, a dedicated Gateway Control Module is utilized to connect and allow messages to pass from one network to another.

Gateway Module (GWM)

The Gateway Module (GWM) is integral to the Body Control Module. The GWM's multiple CAN transceivers allow for connection to all of the networks simultaneously. The Central Processing Unit (CPU) is capable of executing multiple message filtering and message storage buffering. Any message, regardless of operating speed or priority, can pass through the Gateway from one network to another efficiently, with minimum interruption to a network's operating load.



E179077

Network Architecture

Each of the individual network architectures has remained the same: a twisted pair of wires forming a parallel circuit with two 120 Ohm termination resistors. The location and value of the termination resistors are detailed in the table below.

Network	Termination Resistor Locations	Termination Resistor Value
Body MS CAN	Body Control Module/Gateway Module (BCM/GWM) Body Control Module/Gateway Module (BCM/GWM)	120 Ohms (both)
Chassis HS CAN	Restraints Control Module (RCM) Anti-Lock Brake System Control Module (ABS)	120 Ohms (both)
Comfort HS CAN	Body Control Module/Gateway Module (BCM/GWM) Instrument Cluster (IC)	120 Ohms (both)
Powertrain HS CAN	Engine Control Module (ECM) Body Control Module/Gateway Module (BCM/GWM)	120 Ohms (both)

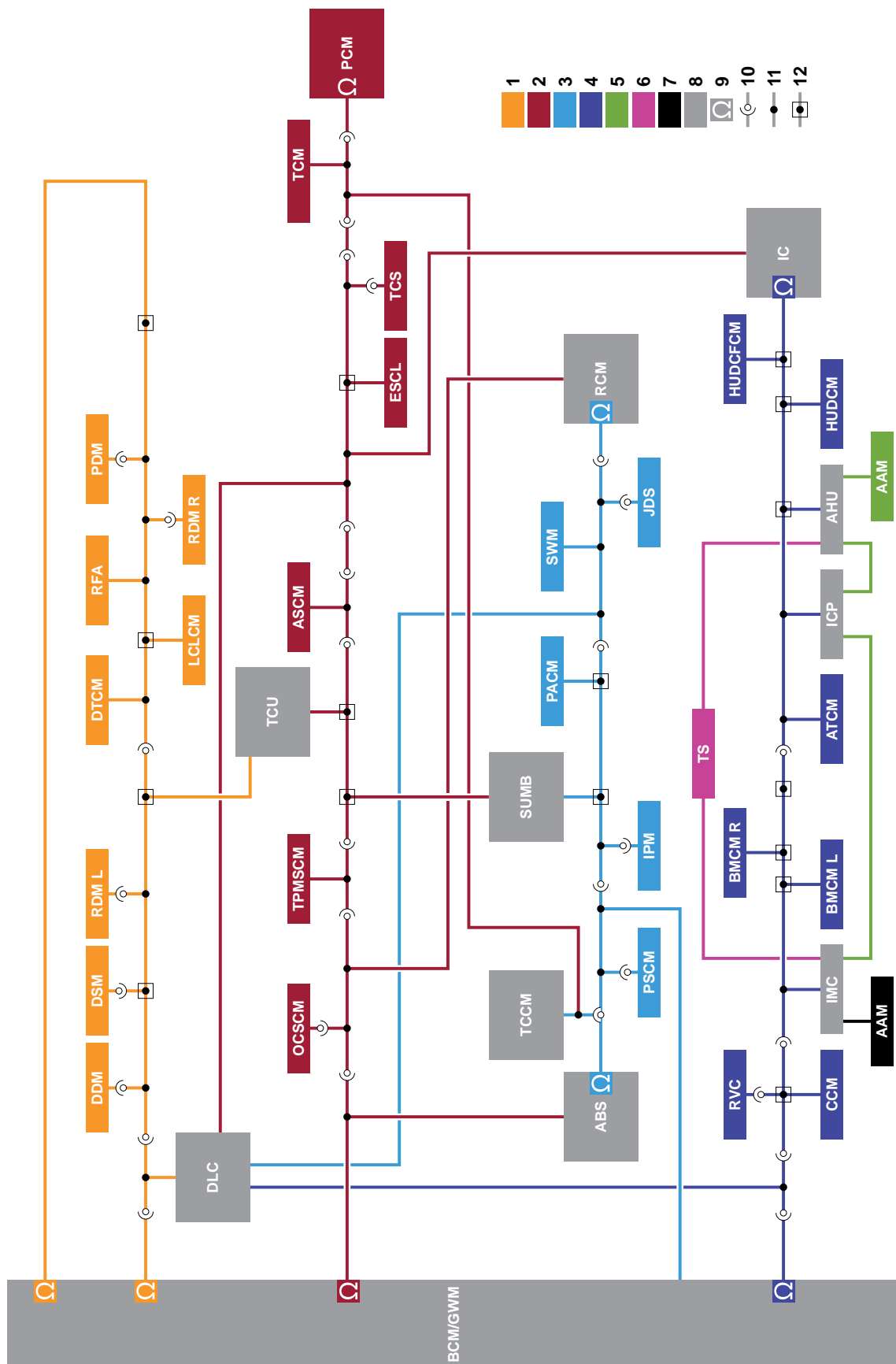
Topology Charts

The Topology charts are color-coded to identify which network each control module is connected to. In the case where a module connects to more than one network, the module is shaded grey; the connecting networks can be identified by the color of the wire. Each network consists of a twisted pair to form a parallel circuit; for clarity, only one wire is shown on the Topology. The locations of the termination resistors are represented by the Ohm symbol (Ω) on the appropriate control module.

The Topology charts have been developed to be used as a network map to assist with understanding shared communications and/or to identify network faults.

NOTE: Full option sets shown. Presence of individual modules will depend on market and specification.

XE Network Topology



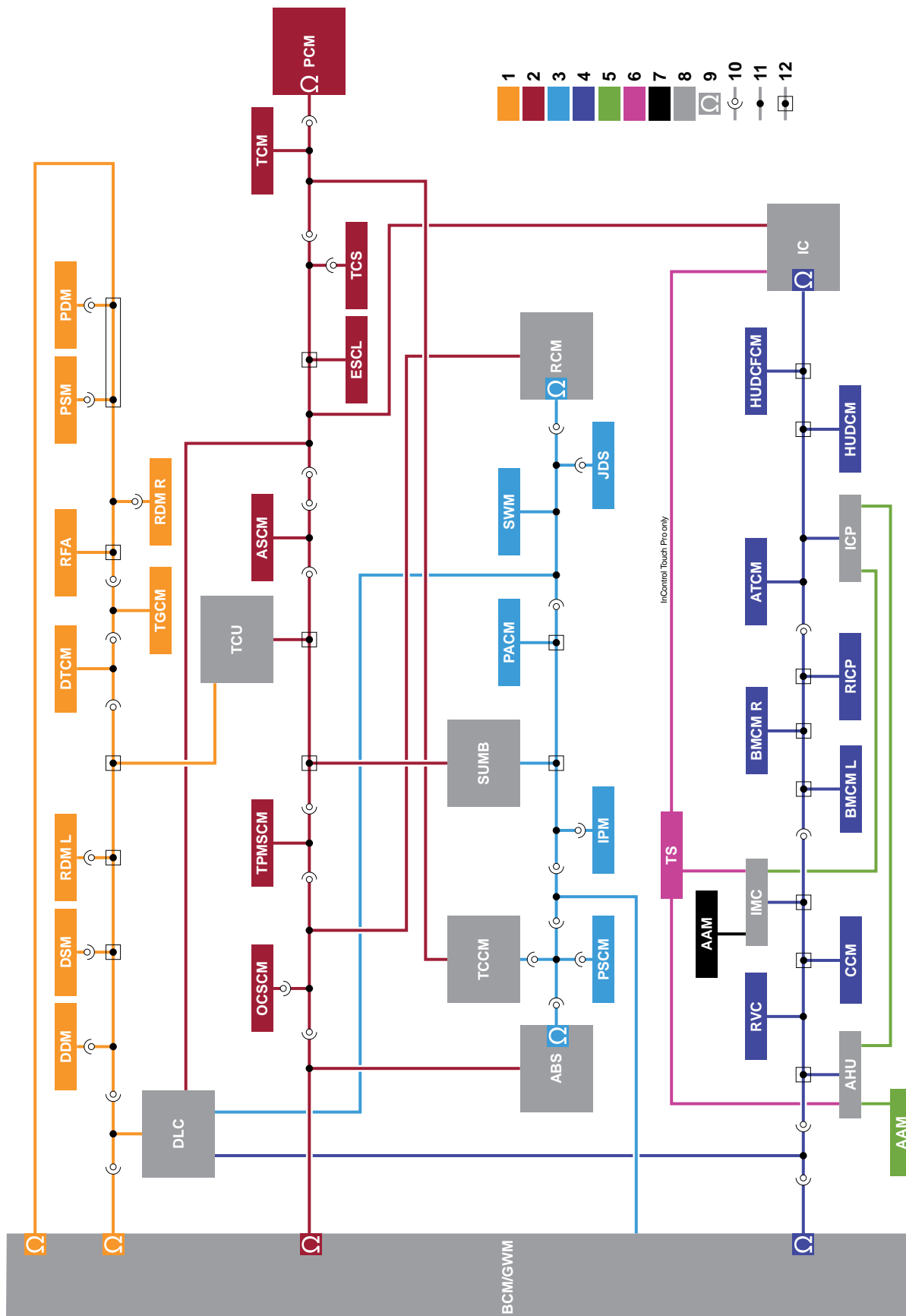
NP17J009

Item	Description	Item	Description
1	Body MS CAN	7	Ethernet
2	Powertrain HS CAN	8	Module connected to multiple Networks
3	Chassis HS CAN	9	Termination Resistor
4	Comfort HS CAN	10	Connector
5	Infotainment Local CAN	11	Splice
6	APIX2	12	Header

Acronym	Module
Body MS CAN	
BCM/GWM	Body Control Module / Gateway Module
DDM	Driver Door Module
DLC	Data Link Connector
DSM	Driver Seat Module
DTCM	Deployable Towbar Control Module
RFA	Remote Function Actuator
LCLCM	Luggage Compartment Lid Control Module
PDM	Passenger Door Module
RDM L	Rear Door Module Left
RDM R	Rear Door Module Right
TCU	Telematics Control Module
Powertrain HS CAN	
ABS	Anti-Lock Braking System Control Module
ASCM	Adaptive Speed Control Module
BCM/GWM	Body Control Module / Gateway Module
DLC	Data Link Connector
ESCL	Electronic Steering Column Lock Module
IC	Instrument Cluster
OCSCM	Occupant Classification System Control Module
RCM	Restraints Control Module
PCM	Powertrain Control Module
SUMB	Suspension Control Module
TCM	Transmission Control Module
TCCM	Transfer Case Control Module
TCS	Transmission Control Switch
TCU	Telematics Control Module
TPMSCM	Tire Pressure Monitoring System Control Module
Infotainment Local CAN	
AAM	Audio Amplifier Module (InControl Touch)
AHU	Audio Head Unit (InControl Touch)
IMC	Infotainment Master Controller (InControl Touch Pro)
ICP	Integrated Control Panel

Acronym	Module
Chassis HS CAN	
ABS	Anti-Lock Braking System Control Module
BCM/GWM	Body Control Module / Gateway Module
DLC	Data Link Connector
IPM	Image Processing Module
JDS	Jaguar Drive Switchpack
PACM	Parking Aid Control Module
PSCM	Power Steering Control Module
RCM	Restraints Control Module
SUMB	Suspension Control Module
SWM	Steering Wheel Module
TCCM	Transfer Case Control Module
Comfort HS CAN	
AHU	Audio Head Unit (InControl Touch)
ATCM	Automatic Temperature Control Module
BCM/GWM	Body Control Module / Gateway Module
BMCML	Blind Spot Monitoring Control Module Left
BMCMR	Blind Spot Monitoring Control Module Right
CCM	Camera Control Module
DLC	Data Link Connector
HUDCFM	Head Up Display Cooling Fan Control Module
HUDCM	Head Up Display Control Module
IC	Instrument Cluster
IMC	Infotainment Master Controller (InControl Touch Pro)
ICP	Integrated Control Panel
RVC	Rear View Camera
APIX2	
AHU	Audio Head Unit (InControl Touch)
IMC	Infotainment Master Controller (InControl Touch Pro)
TS	Touch Screen
Ethernet	
AAM	Audio Amplifier Module (InControl Touch Pro)

F-PACE Network Topology



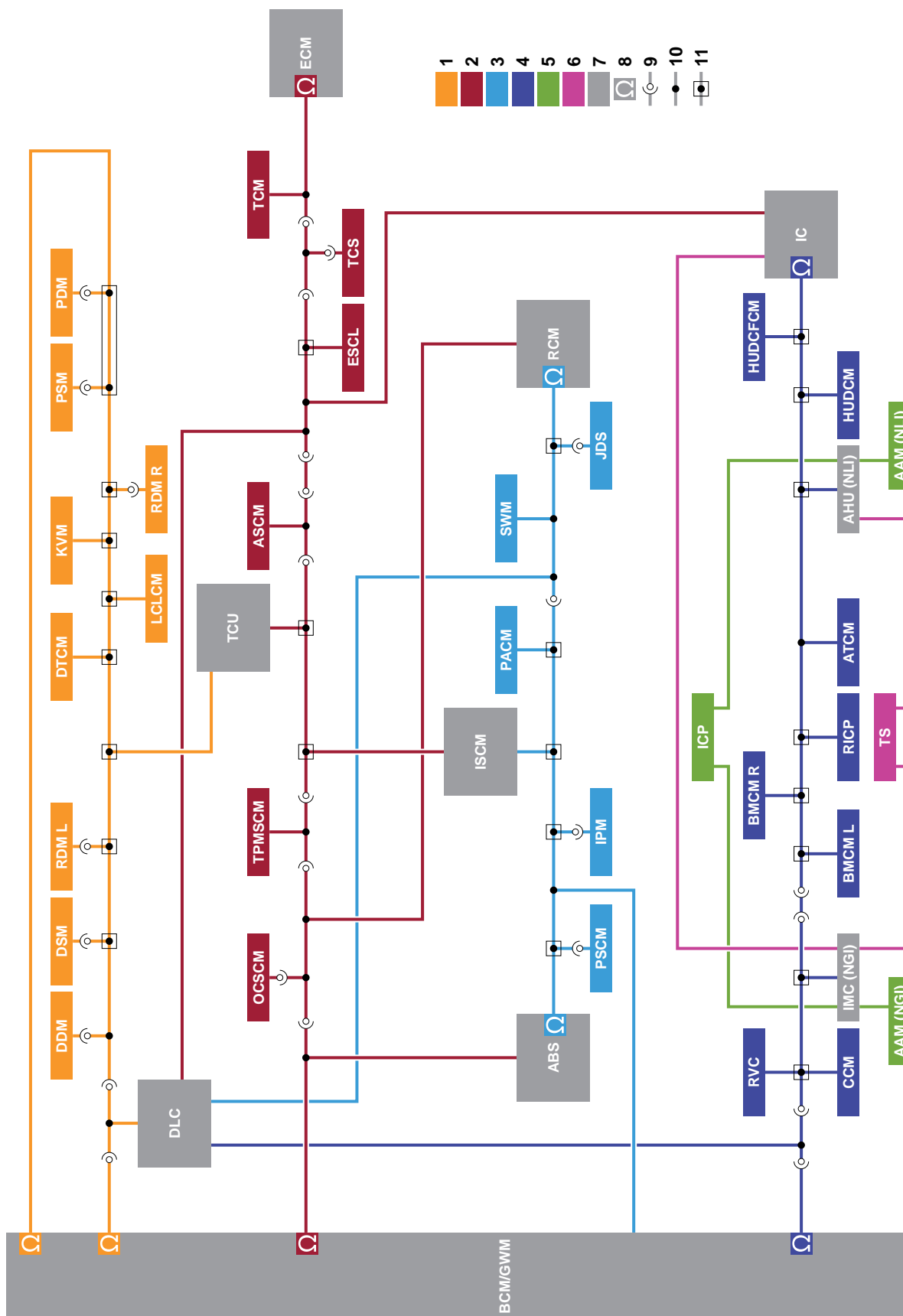
NP17J010

Item	Description	Item	Description
1	Body MS CAN	7	Ethernet
2	Powertrain HS CAN	8	Module connected to multiple Networks
3	Chassis HS CAN	9	Termination Resistor
4	Comfort HS CAN	10	Connector
5	Infotainment Local CAN	11	Splice
6	APIX2	12	Header

Acronym	Module
Body MS CAN	
BCM/GWM	Body Control Module / Gateway Module
DDM	Driver Door Module
DLC	Data Link Connector
DSM	Driver Seat Module
DTCM	Deployable Towbar Control Module
PDM	Passenger Door Module
PSM	Passenger Seat Module
RDM L	Rear Door Module Left
RDM R	Rear Door Module Right
RFA	Remote Function Actuator
TCU	Telematics Control Module
TGCM	Tailgate Control Module
Powertrain HS CAN	
ABS	Anti-Lock Braking System Control Module
ASCM	Adaptive Speed Control Module
BCM/GWM	Body Control Module / Gateway Module
DLC	Data Link Connector
ESCL	Electronic Steering Column Lock Module
IC	Instrument Cluster
OCSCM	Occupant Classification System Control Module
RCM	Restraints Control Module
PCM	Powertrain Control Module
SUMB	Suspension Control Module
TCM	Transmission Control Module
TCCM	Transfer Case Control Module
TCS	Transmission Control Switch
TCU	Telematics Control Module
TPMSCM	Tire Pressure Monitoring System Control Module
Infotainment Local CAN	
AAM	Audio Amplifier Module (InControl Touch)
AHU	Audio Head Unit (InControl Touch)
IMC	Infotainment Master Controller (InControl Touch Pro)
ICP	Integrated Control Panel

Acronym	Module
Chassis HS CAN	
ABS	Anti-Lock Braking System Control Module
BCM/GWM	Body Control Module / Gateway Module
DLC	Data Link Connector
IPM	Image Processing Module
JDS	Jaguar Drive Switchpack
PACM	Parking Aid Control Module
PSCM	Power Steering Control Module
RCM	Restraints Control Module
SUMB	Suspension Control Module
SWM	Steering Wheel Module
TCCM	Transfer Case Control Module
Comfort HS CAN	
AHU	Audio Head Unit (InControl Touch)
ATCM	Automatic Temperature Control Module
BCM/GWM	Body Control Module / Gateway Module
BMCML	Blind Spot Monitoring Control Module Left
BMCMR	Blind Spot Monitoring Control Module Right
CCM	Camera Control Module
DLC	Data Link Connector
HUDCFM	Head Up Display Cooling Fan Control Module
HUDCM	Head Up Display Control Module
IC	Instrument Cluster
IMC	Infotainment Master Controller (InControl Touch Pro)
ICP	Integrated Control Panel
RICP	Rear Integrated Control Panel
RVC	Rear View Camera
APIX2	
AHU	Audio Head Unit (InControl Touch)
IC	Instrument Cluster (InControl Touch Pro)
IMC	Infotainment Master Controller (InControl Touch Pro)
TS	Touch Screen
Ethernet	
AAM	Audio Amplifier Module (InControl Touch Pro)

XF Network Topology (For Reference)



XEFPD006

Item	Description	Item	Description
1	Body MS CAN	7	Module connected to multiple Networks
2	Powertrain HS CAN	8	Termination Resistor
3	Chassis HS CAN	9	Connector
4	Comfort HS CAN	10	Splice
5	Infotainment Local CAN	11	Header
6	APIX2		

Acronym	Module
Body MS CAN	
BCM/GWM	Body Control Module / Gateway Module
DDM	Driver Door Module
DLC	Data Link Connector
DSM	Driver Seat Module
DTCM	Deployable Towbar Control Module
KVM	Keyless Vehicle Module
LCLCM	Luggage Compartment Lid Control Module
PDM	Passenger Door Module
PSM	Passenger Seat Module
RDM L	Rear Door Module Left
RDM R	Rear Door Module Right
TCU	Telematics Control Module
Powertrain HS CAN	
ABS	Anti-Lock Braking System Control Module
ASCM	Adaptive Speed Control Module
BCM/GWM	Body Control Module / Gateway Module
DLC	Data Link Connector
ECM	Engine Control Module
ESCL	Electronic Steering Column Lock Module
IC	Instrument Cluster
ISCM	Integrated Suspension Control Module
OCSCM	Occupant Classification System Control Module
RCM	Restraints Control Module
TCM	Transmission Control Module
TCS	Transmission Control Switch
TCU	Telematics Control Module
TPMSCM	Tire Pressure Monitoring System Control Module
Infotainment Local CAN	
AAM	Audio Amplifier Module
AHU	Audio Head Unit (InControl Touch)
ICP	Integrated Control Panel
IMC	Infotainment Master Controller (InControl Touch Pro)

Acronym	Module
Chassis HS CAN	
ABS	Anti-Lock Braking System Control Module
BCM/GWM	Body Control Module / Gateway Module
DLC	Data Link Connector
IPM	Image Processing Module
ISCM	Integrated Suspension Control Module
JDS	Jaguar Drive Switchpack
PACM	Parking Aid Control Module
PSCM	Power Steering Control Module
RCM	Restraints Control Module
SWM	Steering Wheel Module
Comfort HS CAN	
AHU	Audio Head Unit (InControl Touch)
ATCM	Automatic Temperature Control Module
BCM/GWM	Body Control Module / Gateway Module
BMCM L	Blind Spot Monitoring Control Module Left
BMCM R	Blind Spot Monitoring Control Module Right
DLC	Data Link Connector
HUDCFM	Head Up Display Cooling Fan Control Module
HUDCM	Head Up Display Control Module
IC	Instrument Cluster
IMC	Infotainment Master Controller (InControl Touch Pro)
CCM	Camera Control Module
RICP	Rear Integrated Control Panel
RVC	Rear View Camera
APIX2	
AHU	Audio Head Unit (InControl Touch)
IC	Instrument Cluster
IMC	Infotainment Master Controller (InControl Touch Pro)
TS	Touch Screen

Control Module Locations

The interactive wiring diagrams found on TOPIx provide a useful tool for locating the control modules on the vehicle. To locate a control module:

- Select the appropriate wiring diagram
- Locate a connector for the control module
- Click on the connector reference number
- A graphic will appear displaying the control module and its position on the vehicle

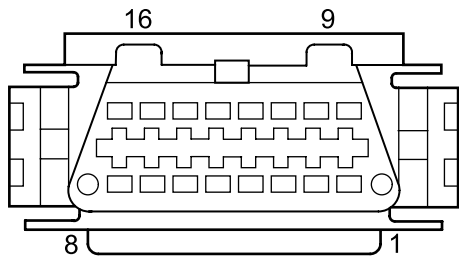
MultiCAN Networks Summary

- The MultiCAN system utilizes four independent CAN bus networks (3 High Speed and 1 Medium Speed)
- Each network operates independently of the others
- Each network is constructed and operates using the standard CAN bus architecture
- Each network has two termination resistors
- The Gateway Module serves as a network hub, allowing messages to transfer from one network to another
- Some control modules are connected to more than one network
- The network Topology provides a diagnostic map

CAN Networks provide an efficient, robust and reliable module communication system. Network faults are very rare, and diagnosing them can be a challenge. Experience and knowledge will aid the technician diagnosing network faults efficiently.

Data Link Connector

The data link connector provides a connection point to all of the MultiCAN networks. All of the following measurements may be taken at this socket.



E178745

INSTRUCTION				
OBJECTIVE: To identify the connector pins for the 4 CAN networks.				
ACTIVITY: Using the electrical guides provided, identify the correct pins for each CAN network in the Data Link Connector.				
TIME: 15 minutes.				

Network	Termination Resistor Locations	Termination Resistor Value	DLC Pins	
			CAN High	CAN Low
Body MS CAN	Body Control Module/Gateway Module (BCM/GWM) Body Control Module/Gateway Module (BCM/GWM)	120 Ohms (both)		
Chassis HS CAN	Restraints Control Module (RCM) Anti-Lock Brake System Control Module (ABS)	120 Ohms (both)		
Comfort HS CAN	Body Control Module/Gateway Module (BCM/GWM) Instrument Cluster (IC)	120 Ohms (both)		
Powertrain HS CAN	Engine Control Module (ECM) Body Control Module/Gateway Module (BCM/GWM)	120 Ohms (both)		

NOTE: For the purpose of this training course, a diagnostic box has been supplied. This is not a mandatory special tool – it will simply provide a quick and efficient method for taking accurate measurements. Measurements are to be taken directly from the back of the connector if a diagnostic box is not available.