

DETROIT DD13 / DD15 — WIRING & PINOUT CHEAT SHEET

MCM · CPC · ACM · CAN Bus · DVOM Tests | Blue Collar Empire Diesel Academy

Reference use only. Always confirm circuit numbers against the current OEM schematic for your engine serial & GHG family (EPA10, GHG14, GHG17, GHG21). Colors and pin assignments can vary with harness revision, model year, and vehicle OEM.

Motor Control Module (MCM) — engine-mounted

Two 120-pin connectors (Vehicle #1 & Engine #2). Powers injectors, monitors engine sensors, drives VGT, EGR & fuel actuator.

Pin	Circuit	Function	Wire	Nominal (KOEO / KOER)
1-1	Batt +	Unswitched B+	RED 10 ga	12.4–14.2 V
1-2	Batt +	Unswitched B+	RED 10 ga	12.4–14.2 V
1-3	GND	Chassis ground	BLK 10 ga	< 0.10 V drop
1-4	GND	Chassis ground	BLK 10 ga	< 0.10 V drop
1-15	Ign	Switched ignition	PNK	12 V KOEO
1-25	CAN-H	J1939 Engine bus	YEL (twist)	2.5–3.5 V active
1-26	CAN-L	J1939 Engine bus	GRN (twist)	1.5–2.5 V active
1-40	5V Ref A	Sensor 5V bus A	GRY	5.00 ± 0.05 V
1-41	Sig GND A	Sensor return A	BLK/WHT	0.00 V
1-42	5V Ref B	Sensor 5V bus B	GRY	5.00 ± 0.05 V
1-43	Sig GND B	Sensor return B	BLK/WHT	0.00 V
1-55	Rail Press	Fuel rail sensor sig	TAN	0.5 V idle → 4.2 V load
1-56	Boost	Intake manifold press	LT BLU	0.5–4.5 V
1-57	Oil Press	Engine oil pressure	ORN	0.5–4.5 V
1-71	Cam Pos	Camshaft sensor sig	WHT	0–5 V square (crank)
1-72	Crank Pos	Crank sensor sig	WHT	0–5 V square (crank)
2-5	Inj Cyl 1 Hi	Injector solenoid +	BLU	90 V pulse (scope)
2-6	Inj Cyl 1 Lo	Injector solenoid –	BLK	return
2-7/8	Inj Cyl 2	+ / – pair	BLU/BLK	90 V pulse
2-9/10	Inj Cyl 3	+ / – pair	BLU/BLK	90 V pulse
2-11/12	Inj Cyl 4	+ / – pair	BLU/BLK	90 V pulse
2-13/14	Inj Cyl 5	+ / – pair	BLU/BLK	90 V pulse

Pin	Circuit	Function	Wire	Nominal (KOEO / KOER)
2-15/16	Inj Cyl 6	+ / – pair	BLU/BLK	90 V pulse
2-30	VGT PWM	Turbo actuator ctrl	GRN	PWM 200 Hz
2-31	VGT Fbk	Actuator position	GRY	0.5–4.5 V
2-45	EGR Mtr +	EGR valve motor	BRN	0–12 V PWM
2-46	EGR Mtr –	EGR valve motor	BRN/WHT	return
2-47	EGR Pos	EGR feedback	GRY	0.5–4.5 V
2-60	Coolant Tmp	ECT thermistor	TAN/WHT	3.5 V @ 20°C → 0.5 V hot
2-61	Oil Tmp	EOT thermistor	TAN/WHT	3.5 V @ 20°C → 0.5 V hot
2-62	Fuel Tmp	Fuel thermistor	TAN/WHT	0.5–4.5 V
2-90	Fuel Actr	Metering actuator	WHT/BLU	PWM

Common Powertrain Controller (CPC) — cab-mounted

Bridges driver inputs (pedal, ignition, PTO, cruise) to Engine J1939. Four connectors — 1 (Vehicle Interface), 2 (Cab Interface), 3 (Powertrain), 4 (Diagnostic).

Conn/Pin	Circuit	Function	Wire	Nominal
1-1	Batt +	Unswitched B+	RED 12ga	12.4–14.2 V
1-2	GND	Chassis ground	BLK 12ga	< 0.10 V drop
1-3	Ign	Key-on 12 V	PNK	12 V KOEO
1-14	Start Enable	Neutral/clutch permit	YEL/WHT	12 V when safe
1-27	Park Brake	Signal input	GRY	12 V set / 0 V rel
1-33	Cruise ON	Momentary switch	BLU	12 V pressed
1-34	Cruise Set/Coast	Momentary switch	BLU/WHT	12 V pressed
1-35	Cruise Res/Accel	Momentary switch	GRN/WHT	12 V pressed
2-1	APP 1	Accel pedal signal 1	TAN	0.5 V idle → 4.5 V WOT
2-2	APP 2	Accel pedal signal 2	GRN	0.25 V idle → 2.25 V WOT
2-3	APP 5V	Pedal reference	GRY	5.00 ± 0.05 V
2-4	APP GND	Pedal return	BLK/WHT	0.00 V
2-5	IVS	Idle Validation Sw	ORN	0/12 V
3-1	CAN-H (Eng)	J1939 Engine bus	YEL	recessive 2.5 V
3-2	CAN-L (Eng)	J1939 Engine bus	GRN	recessive 2.5 V
3-3	CAN-H (Veh)	J1939 Vehicle bus	YEL	recessive 2.5 V
3-4	CAN-L (Veh)	J1939 Vehicle bus	GRN	recessive 2.5 V
3-9	PTO Enable	Remote PTO input	WHT/BLU	12 V active
3-10	PTO Set	PTO speed set	WHT/GRN	12 V pressed
3-14	Fan Req	Cooling fan cmd out	BRN	12 V PWM
3-18	Brake Sw	Service brake input	RED/WHT	12 V pressed
3-19	Clutch Sw	Clutch pedal input	RED/BLU	12 V engaged
4-1	9-pin +	Deutsch DL C	RED	battery
4-2	9-pin –	Deutsch DL D	BLK	ground
4-3	CAN-H DL	J1939 Diag bus	YEL	diagnostic
4-4	CAN-L DL	J1939 Diag bus	GRN	diagnostic

Aftertreatment Control Module (ACM) — near ATS

Controls DEF pump & dosing valve, NOx sensors, DPF/DOC thermocouples, regen and inducement logic. Two connectors: 1 (Vehicle/CAN/Power), 2 (Sensor).

Pin	Circuit	Function	Wire	Nominal
1-1	Batt +	Unswitched B+	RED 10ga	12.4–14.2 V
1-2	GND	Ground	BLK 10ga	< 0.10 V drop
1-3	Ign	Switched 12V	PNK	12 V KOEO
1-10	CAN-H	J1939 Engine bus	YEL	60 Ω across H/L
1-11	CAN-L	J1939 Engine bus	GRN	
1-15	DEF Pump +	Supply pump motor	RED/WHT	12 V PWM
1-16	DEF Pump –	Supply pump motor	BLK/WHT	return
1-20	DEF Doser Hi	Metering valve +	BLU	12 V PWM
1-21	DEF Doser Lo	Metering valve –	BLU/BLK	return
1-25	DEF Line Htr 1	Suction line heater	BRN	12 V PWM
1-26	DEF Line Htr 2	Pressure line heater	BRN/WHT	12 V PWM
1-27	Tank Htr Valve	Coolant sol. ctrl	GRN	12 V active
1-35	HC Doser	7th injector (if eq.)	WHT	12 V PWM
2-1	5V Ref	DEF quality/pres 5V	GRY	5.00 V
2-2	Sig GND	Sensor return	BLK/WHT	0 V
2-5	DEF Pres	Pressure sig	TAN	0.5–4.5 V
2-6	DEF Level	Tank level sig	ORN	0.5–4.5 V
2-7	DEF Temp	Tank thermistor	TAN/WHT	0.5–4.5 V
2-10	DOC In Temp	T1 thermocouple	WHT twist	mV — use TC mode
2-11	DPF In Temp	T2 thermocouple	WHT twist	mV — use TC mode
2-12	DPF Out Temp	T3 thermocouple	WHT twist	mV — use TC mode
2-15	SCR In Temp	T4 thermocouple	WHT twist	mV — use TC mode
2-20	Δ P DPF Hi	Delta P sensor sig	TAN	0.5 V clean → 4.0 V loaded
2-30	NOx-In Data	Smart sensor CAN-H	YEL	500 kbps sub-bus
2-31	NOx-In Data	Smart sensor CAN-L	GRN	
2-32	NOx-Out Data	Smart sensor CAN-H	YEL	500 kbps sub-bus
2-33	NOx-Out Data	Smart sensor CAN-L	GRN	

J1939 CAN Backbone & Diagnostic Connectors

Bus	Speed	CAN-H color	CAN-L color	Terminating Ω	Notes
Engine J1939	250 kbps	Yellow (twisted)	Green (twisted)	60 Ω H $\leftrightarrow$ L	MCM, CPC(3-1/2), ACM
Vehicle J1939	250 kbps	Yellow	Green	60 Ω H $\leftrightarrow$ L	CPC(3-3/4), TCM, ABS, cluster
Diagnostic (DL)	250 kbps	Yellow	Green	shares bus	9-pin Deutsch pins C/D
NOx sub-bus	500 kbps	Yellow	Green	internal	ACM $\leftrightarrow$ smart NOx sensors

9-Pin Deutsch Diagnostic Connector (SAE J1939-13)

Pin	Signal	Wire color	Nominal
A	GND	Black	0 V
B	Battery +	Red	12/24 V
C	CAN-H (250k)	Yellow	2.5–3.5 V
D	CAN-L (250k)	Green	1.5–2.5 V
E	CAN shield	Bare	chassis ref
F	J1708 +	White	legacy PLC
G	J1708 –	Black/White	legacy PLC
H	CAN-H (500k)	Yellow	on newer trucks
J	CAN-L (500k)	Green	on newer trucks

DVOM Test Procedures & Pass Criteria

Use a true-RMS DVOM with min/max. Back-probe with T-pins — never pierce insulation. Verify meter with a known reference before condemning parts. Always test the ground side before the power side.

#	Test	Meter setup	Where to probe	Pass criteria	If out of spec
1	Battery source at MCM	V DC, 20 V range	MCM 1-1/1-2 $\rightarrow$ 1-3/1-4 (KOEO)	≥ 12.4 V, ≤ 0.1 V ripple	Trace to batts, mega-fuse, starter stud
2	Ground voltage drop	V DC, 200 mV range	MCM 1-3 $\rightarrow$ engine block (KOER, load ON)	< 100 mV	Clean/retorque batt-to-block strap
3	5V reference (MCM)	V DC, 20 V	MCM 1-40 $\rightarrow$ 1-41 (KOEO)	5.00 ± 0.05 V	Unplug sensors one at a time to find short
4	J1939 backbone resistance	Ω , 200 Ω range, key OFF, batts disc.	9-pin DL pin C $\leftrightarrow$ pin D	55–65 Ω	120 Ω = missing terminator · 0 Ω = short
5	CAN-H bias (active)	V DC, 20 V, KOEO	DL pin C $\rightarrow$ GND	2.5–3.5 V	Flat 0 or 12 V = dominant fault
6	CAN-L bias (active)	V DC, 20 V, KOEO	DL pin D $\rightarrow$ GND	1.5–2.5 V	Mirror of CAN-H
7	Fuel rail sensor	V DC, KOEO	MCM 1-55 $\rightarrow$ 1-41	0.45–0.55 V idle	Check 5V ref & return; swap sensor
8	Injector solenoid Ω	Ω , 200 Ω , connector unplugged	MCM 2-5 $\leftrightarrow$ 2-6 (cyl 1) etc.	0.30–0.60 Ω each	Open = injector · Low = shorted turns

#	Test	Meter setup	Where to probe	Pass criteria	If out of spec
9	EGR motor Ω	Ω , 200 Ω , unplugged	MCM 2-45 $\leftrightarrow$ 2-46	3–7 Ω @ 20°C	Replace EGR actuator
10	VGT actuator supply	V DC, KOEO	VGT harness B+ $\rightarrow$ GND	12 V $\pm$ 0.5 V	Check 20 A actuator fuse
11	DEF doser coil Ω	Ω , unplugged	ACM 1-20 $\leftrightarrow$ 1-21	10–14 Ω	Replace doser valve
12	DEF pump current	A DC clamp	ACM 1-15 supply lead	0.8–2.5 A while priming	Sticking pump / plugged filter
13	DEF line heater Ω	Ω , unplugged, cold	ACM 1-25 $\leftrightarrow$ chassis GND	1.5–4 Ω per element	Replace heated line
14	NOx sensor supply	V DC, KOEO	Sensor connector B+ $\rightarrow$ GND	12 V steady	Check ACM-fed relay/fuse
15	Thermocouple integrity	mV, TC (K-type) mode	T2 / T3 / T4 pins at ACM	Reads ambient at rest, rises with heat	Open TC or reversed polarity
16	Cam / crank signal	AC V or Hz, cranking	MCM 1-71 / 1-72 $\rightarrow$ GND	AC signal present while cranking	Check air gap & connector
17	CPC accelerator sig 1	V DC, KOEO	CPC 2-1 $\rightarrow$ 2-4	0.50 V idle $\rightarrow$ 4.50 V WOT	Verify 5V ref & sensor GND
18	CPC accelerator sig 2	V DC, KOEO	CPC 2-2 $\rightarrow$ 2-4	0.25 V idle $\rightarrow$ 2.25 V WOT	Sig 2 = 1/2 of Sig 1
19	Ignition feed	V DC, KOEO	MCM 1-15, CPC 1-3, ACM 1-3	$\geq$ 11.5 V, all three modules	Bad ignition relay if any drops
20	Voltage drop under crank	V DC, cranking	Batt post $\rightarrow$ MCM 1-1	< 0.30 V drop	Cable/lug corrosion; replace