ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

International® VT 275

WARNING

To avoid serious personal injury, possible death or damage to the engine or vehicle, read all safety instructions in the "Safety Information" section of *Engine Diagnostics Manual* EGES-305 before doing diagnostic procedures.

Notes

- Information on this form for vehicle mounted components was current at the time of publication. Updates may be made to introduce product improvements and technical advancements. See correct truck service manual for chassis wiring.
- Colored lines on this schematic go to connector terminals for sensors and actuators.

Color code for schematic lines	Schematic Line description
Red	12 Volts (VBAT)
Red	High side driver control
Purple	Injectors (48 Volts)
Blue	VREF (5 Volts)
Green	Signal circuit
Brown	Data Communication Link
Black	Ground circuit
Black	Low side driver control

CKP CMP EOT ECT MAT EOP switch ICP MAP MAF/IAT sensor

ENGINE MOUNTED COMPONENTS

ECM Engine (gray) X-1 X-2

DB-LG	IAT	X1-7	
LB-R	MAF	X2-2	
GY-R	Signal Ground	X1-6	
BR-W	VREFA	X1-14	
LG-BK	MAP	X2-3	
DB-LG	ICP	X1-20	
BR-O	EOP	X1-13	
R-W	MAT	X2-14	
LG-R	ECT	X1-8	
LG-R	EOT	X2-1	
R	CMP (+)	X1-9	
O	CMP (-)	X1-10	
BK	CMP/CKP SHD	X1-11	
GY	CKP (+)	X1-1	
DB	CKP (-)	X1-2	
W-R	BCS	X2-18	
P-O	IPR PWR	X2-24	
Y-R	IPR	X1-12	
P-O	GPC	X1-17	
W-LG	GPD	X1-21	
P	IAHC	X1-18	
BR	IAHD	X2-11	
BK-PK	OWL	X1-23	
LG-Y	CKPO	X1-19	
DB-O	CMPO	X1-24	
R-LG	CAN 2 (+)	X2-6	
LB-W	CAN 2 (-)	X2-13	
BK	CAN 2 SHD	X2-12	
GY	BOO	X1-15	
R-Y	BPS	X1-16	

1	ACT PWR	DB-LG
2	ACT PWR GND	BK
3	CAN 2 (+)	R-LG
4	CAN 2 (-)	LB-W
6	Valve Motor + (U Phase)	BR-LG
7	Valve Motor + (V Phase)	G-R
8	Valve Motor + (W Phase)	P
9	Position Sensor Shield Drain	BK
12	Sensor Supply	R-PK
13	Position Sensor (U Phase)	Y-W
14	Position Sensor (V Phase)	O-W
15	Position Sensor (W Phase)	BR-W
16	Sensor Supply Ground	BK-PK

8 7 6 1 4 3 2 5

EGR valve controller

Mitsubishi EGR Valve

BCS actuator

IPR actuator

IDM X-3 X-2 X-1

X3-5	CKPO
X3-10	CMPO
X3-30	CAN 2 (+)
X3-31	CAN 2 (-)
X3-7	VIGN
X3-27	IDM MPR
X3-8	IDM LOGIC PWR
X3-4,23	IDM MAIN PWR
X3-24,25	IDM MAIN PWR
X3-1,2,3	IDM GND
X3-22,26	IDM GND
X3-28	ATA (+)
X3-29	ATA (-)

ECM Chassis (white) X-3 X-4

X3-1	WIF	
X3-19	RPRE	
X3-20	RVAR	
X3-22	A/C control	
X3-23	ECI	
X4-15	FPM	
X4-17	WEL	
X3-11	TACH	
X3-14	RAS	
X3-21	SCS	
X4-6	COO	
X3-10	AC demand	
X3-12	CAN 1 (+)	
X3-13	CAN 1 (-)	
X3-15	CAN 1 SHD	
X3-17	VSS CAL (speedo)	
X3-24	BAP	
X4-18	APS	
X4-24	Signal Ground	
X4-4	VREFB	
X4-12	IVS	
X3-9	FPC	
X3-5	ECM MPR	
X3-7	Battery Ground	
X3-6	Battery Ground	
X4-2	ECM PWR	
X4-1	ECM PWR	
X3-8	DDS	
X3-3	VIGN	
X4-20	ATA (+)	
X4-21	ATA (-)	

12 Pin connector

BK	4	Act Pwr Gnd
P-O	9	VIGN
DB-LG	10	Act Pwr
R-Y	8	IDM MPR
W	6	IDM Logic Pwr
W	12	IDM Main Pwr
BK-W	1	IDM Pwr Gnd
LB-PK	2	ATA (+)
T	3	ATA (-)
W-BK	11	ALT I-Sense
R-W	7	A/C Clutch (+)
DB-Y	5	A/C Clutch (-)

8 Pin connector

BPS	8
BOO	2
OWL	1
Starter sol	7

Glow plugs

Cylinder 1 Cylinder 3 Cylinder 5

R

Open coil ground	T-Y	X1-3
Open coil power	LG-BK	X1-17
Close coil ground	LG-R	X1-8
Close coil power	LG-O	X1-18
Open coil ground	LG-Y	X1-1
Open coil power	O-Y	X1-23
Close coil ground	Y-LB	X1-6
Close coil power	O-LB	X1-24
Open coil ground	LG-W	X1-2
Open coil power	W-BK	X1-19
Close coil ground	W-LB	X1-5
Close coil power	DB	X1-20

Injector drain wire ground

L

Open coil ground	LB-R	X2-2
Open coil power	W-LB	X2-17
Close coil ground	O-Y	X2-6
Close coil power	W	X2-18
Open coil ground	T-LG	X2-1
Open coil power	DB-O	X2-21
Close coil power	LB-BK	X2-5
Close coil power	DG-LG	X2-22
Open coil ground	O-LG	X2-4
Open coil power	BK-PK	X2-19
Close coil ground	W-P	X2-8
Close coil power	DG-P	X2-20

Cylinder 2 Cylinder 4 Cylinder 6

Glow plugs

Glow plug relay

To battery power feed on starter

IAH relay

To battery power feed on starter

Glow Plug Circuits			
Color	Yellow	Red	White
Cylinder	1	3	5
Cylinder	2	4	6

Alternator control Alternator power B+ at Starter stud

To starter solenoid

A/C clutch

C A A C

VEHICLE MOUNTED COMPONENTS

Body Builder

In-cab cruise switches

A/C switch in control head

T-stat switch

Low-pressure switch

High-pressure switch

1A

Transmission position switch

Ignition switch 0 = Off 1 = Acc 2 = Run 3 = Crank 4 = Lock

Starter motor relay 85 30 40A 86 87 To starter solenoid

A/C clutch relay 1 3 40A 2 5

Instrument Panel RPM MPH

BAP

APS / IVS

TMC Connector (316) 9 8 12 72 Park interlock

Diagnostic connector A (237)

Normally closed pressure switch 5A

Normally open pedal switch 5A

IDM relay 86 87 85 30 10A

ECM relay 2 5 1 3 10A

Fuel pump relay 2 5 1 3

Fuel pump 1 2 20A

WIF probe 1 2

Fuel heater 1 2

From relay B+

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ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

International® VT 275

SIGNAL VALUES (All values with breakout box installed on ECM and harness)

WARNING: Read safety instructions in *Diagnostic Manual EGES-305*, before starting diagnostic procedures.

Pin	Item	Circuit	Circuit Color	Key ON		Low Idle			High Idle			Operating Range	Comments
				Signal	Actual value	Signal	Data List	Actual value	Signal	Data List	Actual value		
X1 ENGINE CONNECTOR (GRAY)													
1	CKP (+)	Crankshaft Position	GY	0V		650 – 700 Hz	700 rpm		3.3 k Hz	3400 rpm		0 – Governed speed	DMM set to DCV – Hz, EST pid Engine speed
2	CKP (-)	Crankshaft Position	DB										
6	SIGNAL GND	Signal ground	GY-R	0V		0V			0V			0V	Ground for engine sensors
7	IAT	Inlet Air Temperature	DB-LG	Temp. depend.		Temp. depend.			Temp. depend.			0V – 5V	DMM set to V, EST – Continuous Monitor Session
8	ECT	Engine Coolant Temperature	LG-R	Temp. depend.		Temp. depend.			Temp. depend.			0V – 5V	DMM set to V, EST – Continuous Monitor Session
9	CMP (+)	Camshaft Position	R	0V		700 rpm②	700 rpm		3400 rpm②	3400 rpm		0 – Governed speed	DMM set to DCV – rpm②, EST – pid Engine speed
10	CMP (-)	Camshaft Position	O										
11	CMP/CKP SHD	Cam/Crank Shield	BK	0V		0V			0V				Ground shield for CMP/CKP sensors
12	IPR	Injection Pressure Regulator	Y-R									0V – B+	Duty cycle, duty controlled; low side driver
13	EOP	Engine Oil Pressure	BR-O	5V at 0 psi		0V	40 psi		0V	40 PSI		0V – 5V	Switch – Off = 5V = 0 psi / ON = 0V = 40 psi
14	VREF A	Voltage Reference A (Engine)	BR-W	5V ± 0.5V		5V			5V			5V ± 0.5	VREF for engine sensors
15	BOO	Brake On/Off	GY	0V Off – B+ On		0V			0V			0V – B+	0V at normal state, B+ depressed
16	BPS	Brake Pressure Switch	R-Y	B+ Off – 0V On		B+			B+			0V – B+	B+ at normal state, 0V depressed
17	GPC	Glow Plug control	P-O	0V Off – B+ On		0V – B+	Off/On		0V – B+	Off/On		0V – B+	0V = GPC off, B+ = GPC on, EST – Output State Test
18	IAHC	Inlet Air Heater Control	P	0V Off – B+ On		0V – B+	Off/On		0V – B+	Off/On		0V – B+	0V = IAHC off, B+ = IAHC on, EST – Output State Test
19	CKPO	Crankshaft Position Out	LG-Y	0 Hz		650 – 700 Hz	700 rpm		3.3 k Hz	3400 rpm		0 – Governed speed	DMM set to DCV - Hz
20	ICP	Injection Control Pressure	DB-LG	0.25V		Performance Specs			Performance Specs			0 – 4061 psi	1V = 625 psi, EST – No Start session
21	GPD	Glow Plug Diagnostics	W-LG	0V Off – B+ On		0V – B+	Off/On		0V – B+	Off/On		0V – B+	0V = GPC off, B+ = GPC on, EST – Output State Test
23	OWL	Oil Warning Lamp	BK-PK									0V – B+	Chassis body builder option only
24	CMPO	Camshaft Position Out	DB-O	0 rpm		700 rpm②	700 rpm		3400 rpm②	3400 rpm		0 – Governed speed	DMM set to DCV – rpm②
X2 ENGINE CONNECTOR (GRAY)													
1	EOT	Engine Oil Temperature	LG-R	Temp. depend.		Temp. depend.			Temp. depend.			0V – 5V	DMM set to V, EST – Continuous Monitor Session
2	MAF	Mass Air Flow	LB-R	Performance Specs		Performance Specs			Performance Specs				DMM set to Hz, EST – Continuous Monitor Session
3	MAP	Manifold Air Pressure	LG-BK	Performance Specs		Performance Specs			Performance Specs				DMM set to V, EST – Continuous Monitor Session
6	CAN 2 (+)	CAN 2 (Private)	R-LG	1 – 4V		1 – 4V			1 – 4V			1 – 4V	Digital signal communication
11	IAHD	Inlet Air Heater Diagnostic	BR	0V Off – B+ On		0V – B+	Off/On		0V – B+	Off/On		0V – B+	0V = IAHC off, B+ = IAHC on Output State Test
12	CAN2 SHD	CAN 2 Shield	BK	0V		0V			0V				Ground shield for CAN 2
13	CAN 2 (-)	CAN 2 (Private)	LB-W	1 – 4V		1 – 4V			1 – 4V				Digital signal communication
14	MAT	Manifold Air Temperature	R-W	Temp. depend.		Temp. depend.			Temp. depend.			0V – 5V	DMM set to V, EST – Continuous Monitor Session
18	BCS	Boost Control Solenoid	W-R	0V		0V – B+	Off/On		0V – B+	Off/On		0V – B+	0V = Not enabled, B+ = enabled, EST- Output State Test
24	IPR PWR	Injection Pressure Regulator Power	P-O	B+		B+			B+			B+	Switched Ignition power key On = B+, Key Off = 0V
X3 CHASSIS CONNECTOR (WHITE)													
1	WIF	Water In Fuel		0V – 7V		0V – 7V	No/Yes		0V	No/Yes		0V – B+	0V = No water, 7V = water in fuel, EST – No/Yes
3	VIGN	ECM Switch Ignition voltage		B+		B+			B+			0V – B+	Switched Ignition power key On = B+, Key Off = 0V
5	ECM MPR	ECM Main Power Relay Control		0.6V – 1V		0.6V – 1V			0.6V – 1V			0.6V – 1V/B+	0.6V – 1V = MPR On / B+ = MPR Off
6	Battery GND	Battery Ground		0V		0V			0V			0V	ECM Ground
7	Battery GND	Battery Ground		0V		0V			0V			0V	ECM Ground
8	DDS	Driveline Disengagement Switch		0V – B+		B+			B+			0V – B+	Key On = 0V in gear / B+ = Park and neutral
9	FPC	Fuel Pump control		0V Off – B+ On		B+	Yes		B+	Yes		0V – B+	B+ = FPC On, 0V = FPC Off, EST – Output State Test
10	A/C Demand	Air Conditioner Demand		0V		0V – 5V			0V – 5V			0V – 5V	5V with A/C switch on, freon switches closed. 0V Off
11	TACH	Tachometer Output											Chassis body builder option only
12	CAN 1 (+)	CAN 1 (Public)		1V – 4V		1V – 4V			1V – 4V			1V – 4V	Digital signal communication
13	CAN 1 (-)	CAN 1 (Public)		1V – 4V		1V – 4V			1V – 4V			1V – 4V	Digital signal communication
14	RAS	Resume Accel Switch		0V Off – B+ On		0V – B+			0V – B+			0V – B+	Momentary switch 0V at normal state / B+ depressed
15	CAN 1 SHD	CAN 1 Shield		0V		0V			0V			0V	Ground shield for CAN 1
17	VSS CAL	Vehicle Speed Signal											Chassis body builder option only
19	RPRE	Remote Preset (PTO)											Chassis body builder option only
20	RVAR	Remote Variable (PTO)											Chassis body builder option only
21	SCS	Speed Control Switch		0V Off – B+ On		0V Off – B+ On			0V Off – B+ On				Momentary switch 0V at normal state / B+ depressed
22	A/C control	Air Conditioner Control		B+		0V Off – B+ On			0V Off – B+ On			0V – B+	B+ A/C command Off, 0V A/C command On
23	ECI	Engine Crank Inhibit		0V / 4V – 5V		4 – 5V			4 – 5V			0V – B+	0V allows cranking / 4 – 5V inhibits cranking
24	BAP	Barometric Pressure		Alt. Depend.		Alt. Depend			Alt. Depend			0V – 5V	DMM set to V, EST – Continuous Monitor session
X4 CHASSIS CONNECTOR (WHITE)													
1	ECM PWR	ECM Power		B+		B+			B+			0V – 5V	ECM B+ from ECM relay
2	ECM PWR	ECM Power		B+		B+			B+			0V – 5V	ECM B+ from ECM relay
4	VREF B	Voltage Reference B (Chassis)		5V ± 0.5		5V ± 0.5			5V ± 0.5			5V ± 0.5V	5V voltage reference for chassis sensors
6	COO	Cruise ON / OFF Switch		0V Off – B+ On		0V – B+	Off/On		0V-B+	Off/On		0V Off – B+ ON	Cruise control On/Off switch
12	IVS	Idle Validation Switch		0V Off		0V			B+			0V – B+	0V at normal state, B+ pedal depressed
15	FPM	Fuel Pump Monitor		0V Off – B+ On		B+	Yes		B+	Yes		0V – B+	B+ = FPC On, 0V = FPC Off, EST – Output State Test
17	WEL	Warn Engine Lamp											Chassis body builder option only
18	APS	Accelerator Position Sensor		0.7V – 4.2V		0.7V	0%		4.2V	102%		0V – 5V	0.7V = 10% / 4.2V = 102%
20	ATA (+)	Communication Link		0.1V – 1.2V		0.1V – 1.2V			0.1V – 1.2V			0V – 5V	Diagnostic / Programming
21	ATA (-)	Communication Link		0.0V – 4.2V		0.0V – 4.2V			0V – 4.2V			0V – 5V	Diagnostic / Programming
24	Signal GND	Signal Ground		0V		0V			0V			0V	Ground for chassis sensors