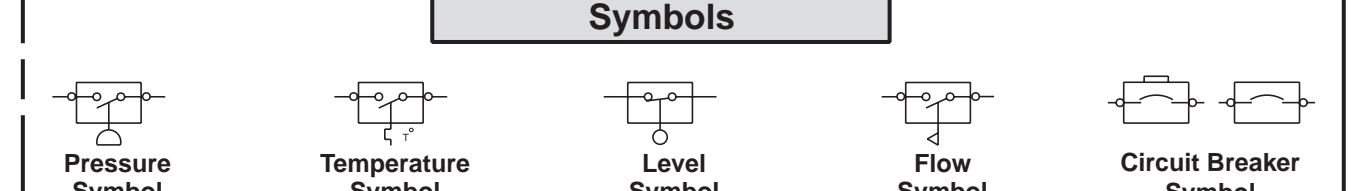


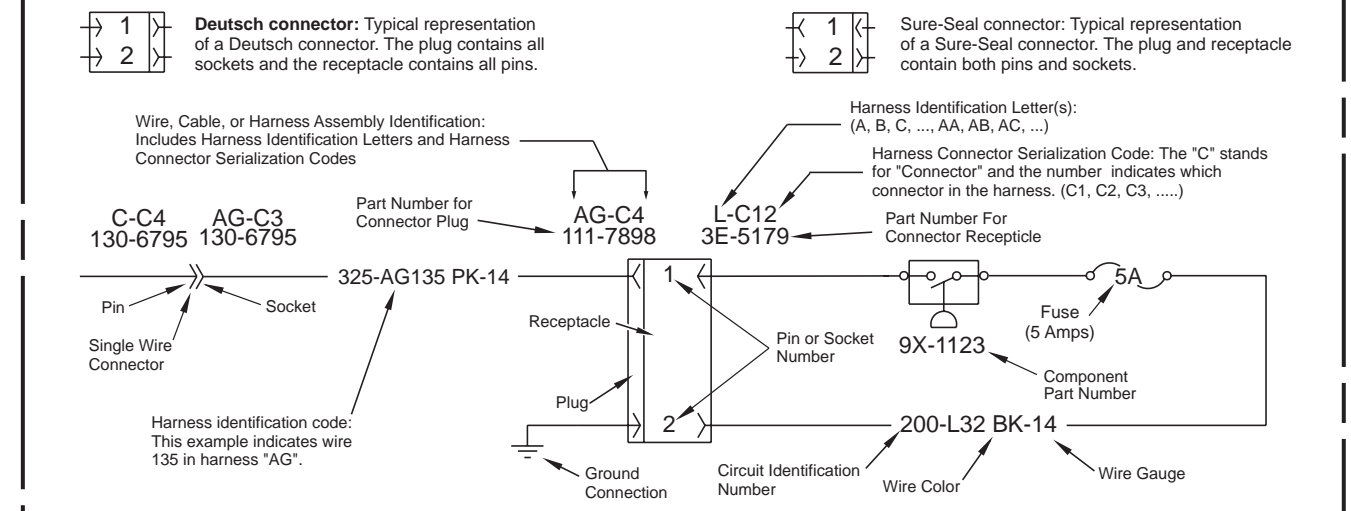
Harness And Wire Electrical Schematic Symbols



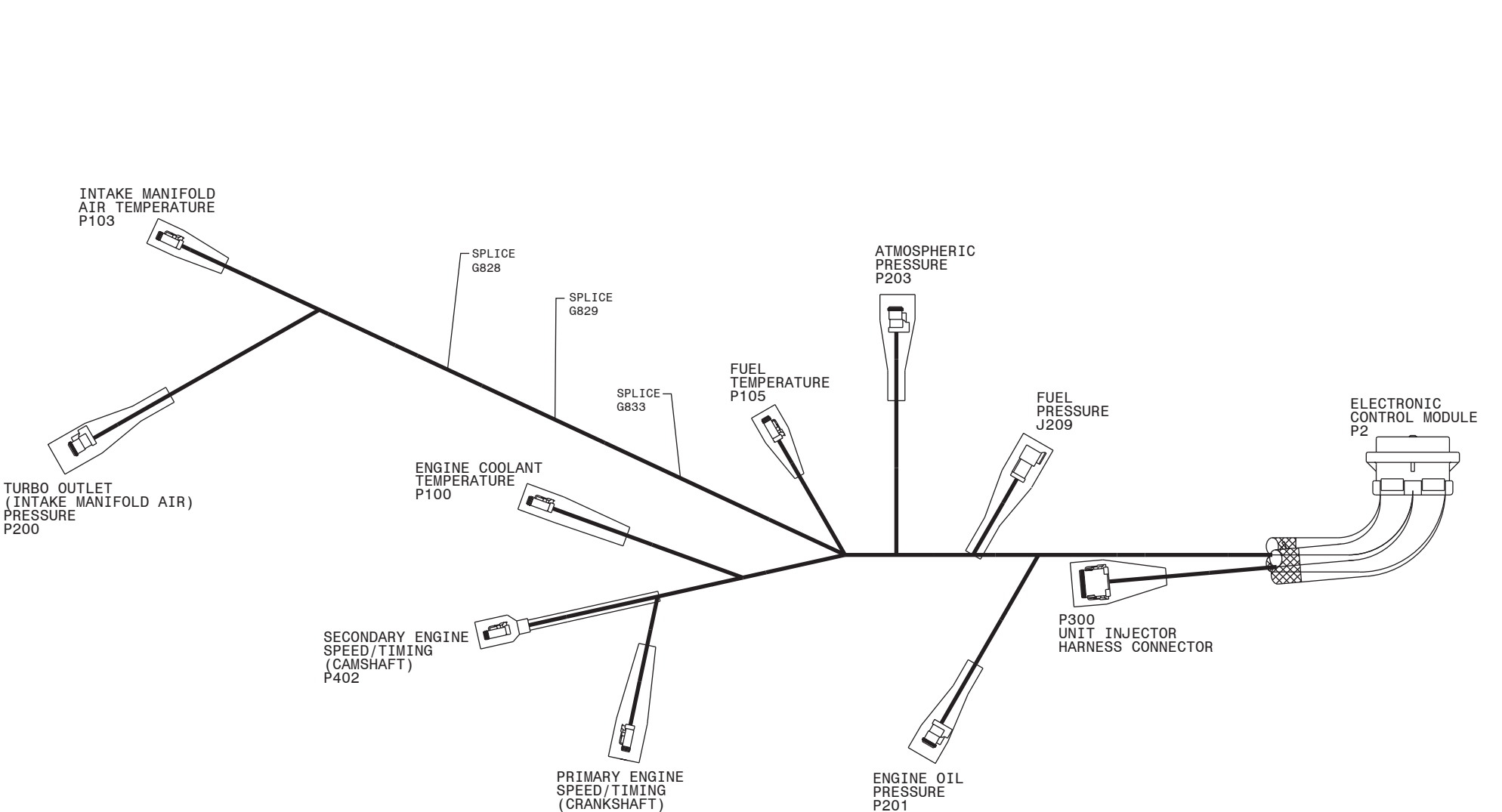
Symbols and Definitions

- Fuse** - A component in an electrical circuit that will open the circuit if too much current flows through it.
- Switch (Normally Open)** - A switch that will close at a specified point (temp, press, etc.). The circle indicates that the component has screw terminals and a wire can be disconnected from it. No circle indicates that the wire cannot be disconnected from the component.
- Switch (Normally Closed)** - A switch that will open at a specified point (temp, press, etc.). No circle indicates that the wire cannot be disconnected from the component.
- Ground (Wired)** - This indicates that the component is connected to a grounded wire. The grounded wire is fastened to the machine.
- Ground (Case)** - This indicates that the component does not have a wire connected to ground. It is grounded by being fastened to the machine.
- Reed Switch** - A switch whose contacts are controlled by a magnet. A magnet closes the contacts of a normally open reed switch; it opens the contacts of a normally closed reed switch.
- Sender** - A component that is used with a temperature or pressure gauge. The sender measures the temperature or pressure. Its resistance changes to give an indication to the gauge of the temperature or pressure.
- Relay (Magnetic Switch)** - A relay is an electrical component that is activated by electricity. It has a coil that makes an electromagnet when current flows through it. The electromagnet can open or close a valve or move a piece of metal that can do work.
- Solenoid** - A solenoid is an electrical component that is activated by electricity. It has a coil that makes an electromagnet when current flows through it. The electromagnet can open or close a valve or move a piece of metal that can do work.
- MAGNETIC LATCH SOLENOID** - A magnetic latch solenoid is an electrical component that is activated by electricity and held latched by a permanent magnet. It has two coils (latch and unlatch) that make electromagnet when current flows through them. It also has an internal switch that places the latch coil circuit open at the time the coil latches.

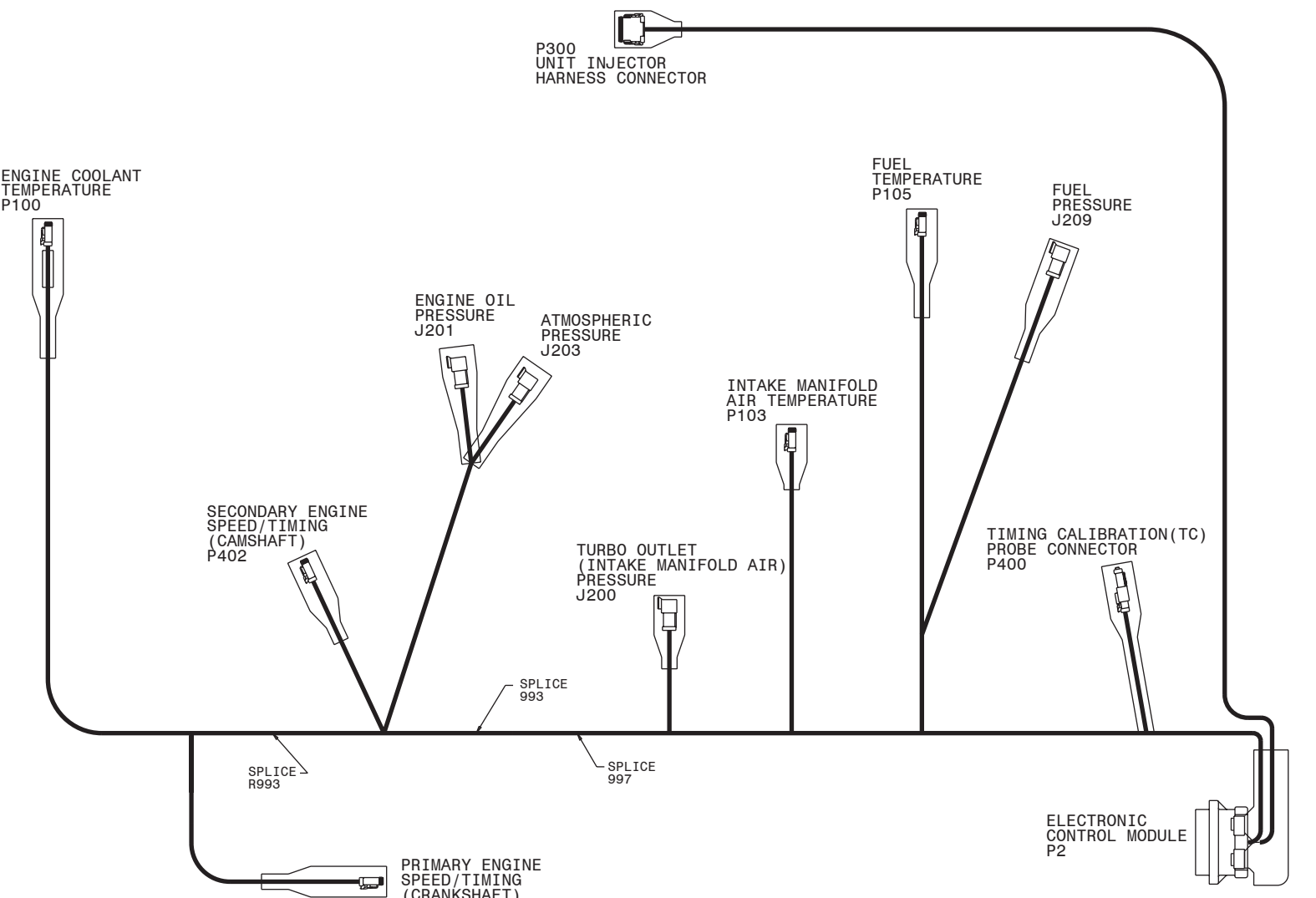
Harness and Wire Symbols



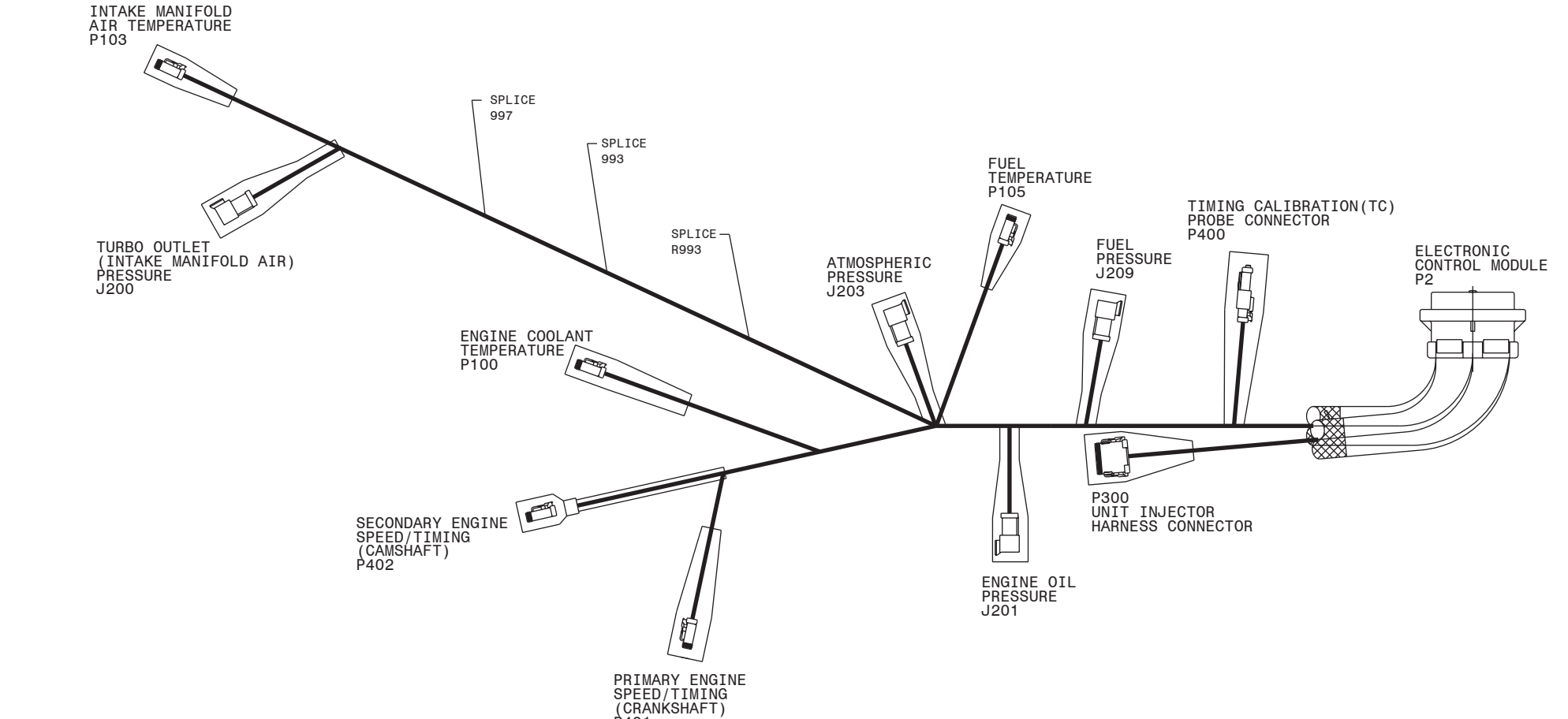
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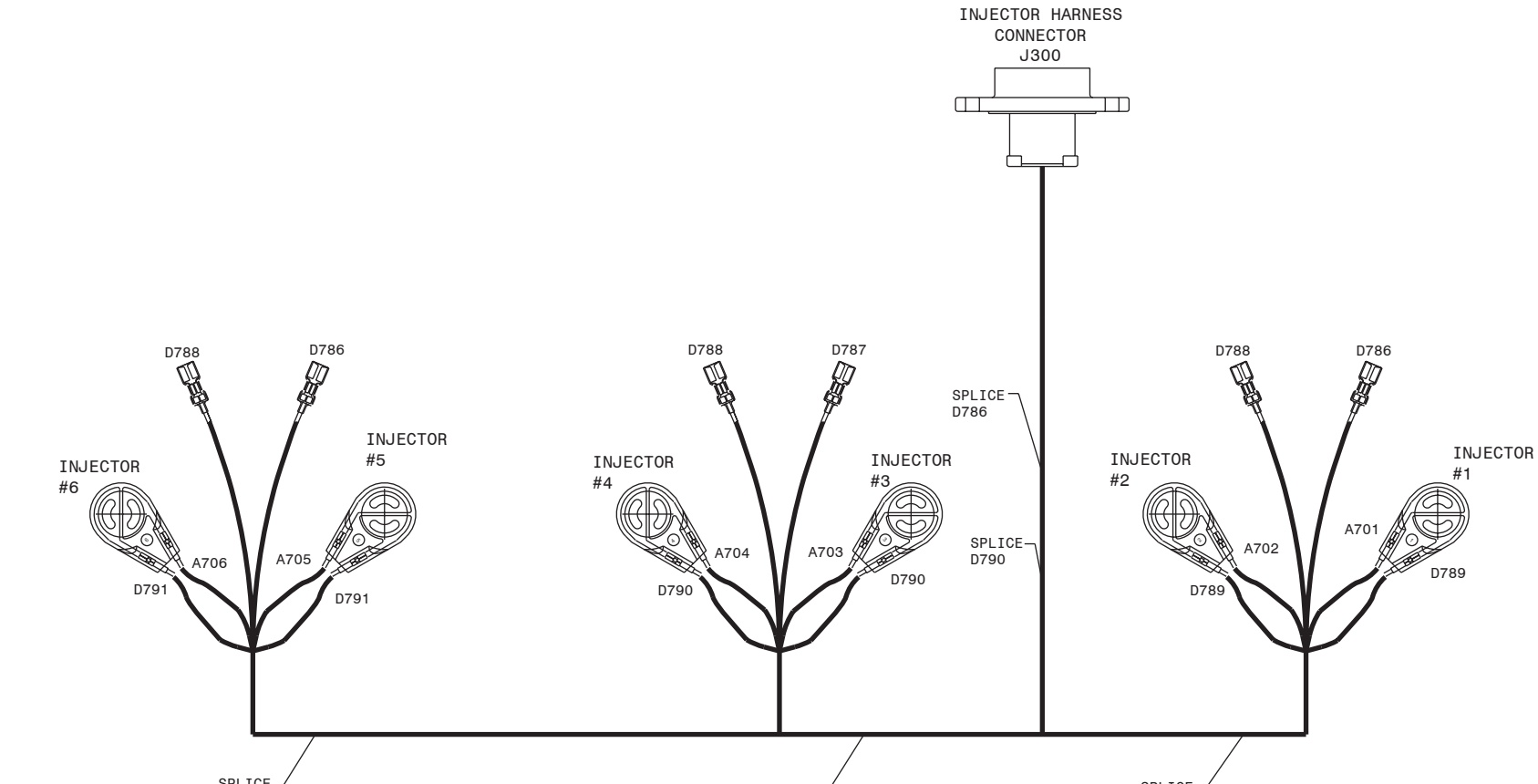
CONNECTOR AND SPLICE LOCATIONS FOR HARNESSES 226-5758 AND 243-6620 (C-10/C-12) INTEGRAL SENSORS



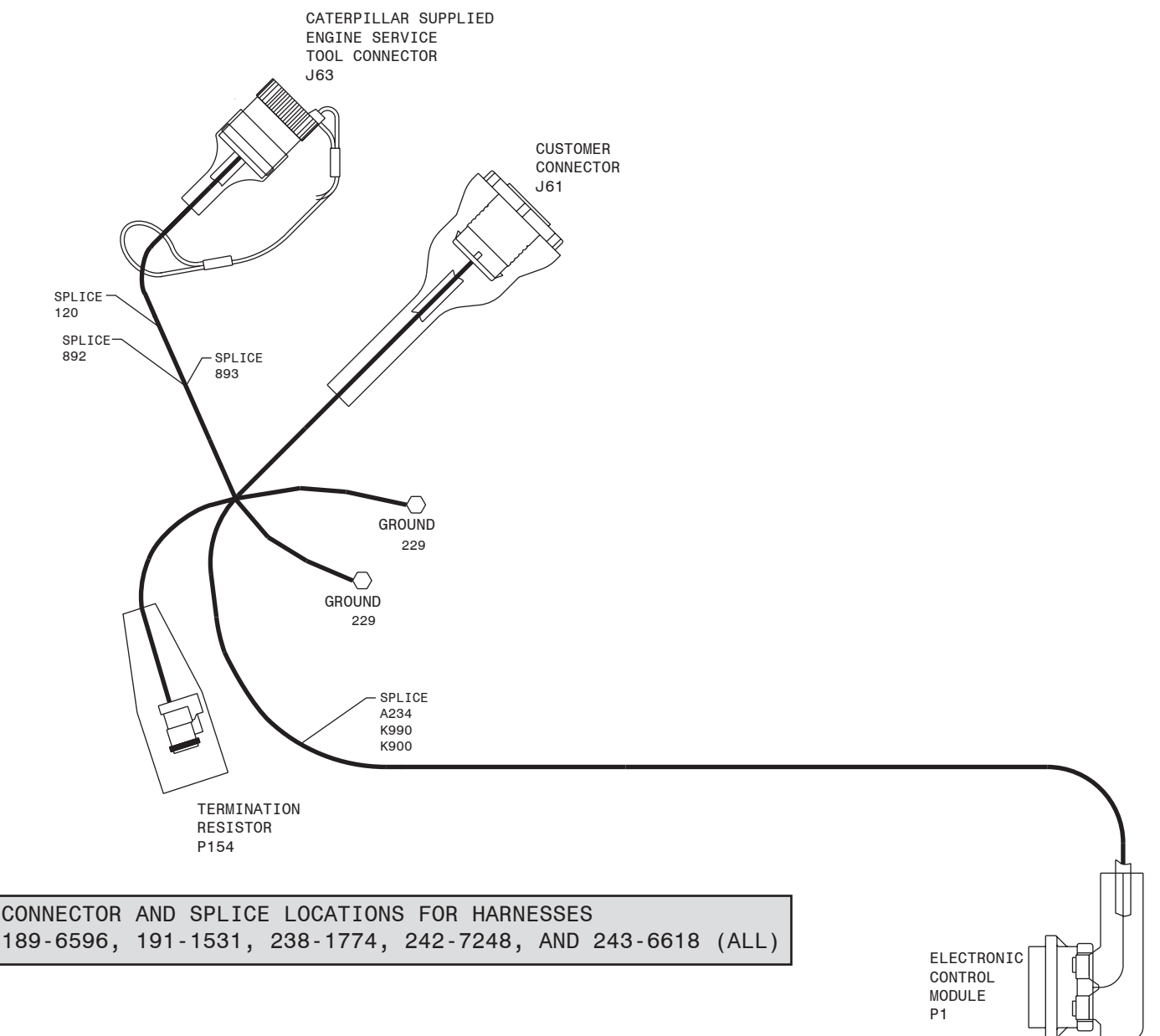
CONNECTOR AND SPLICE LOCATIONS FOR HARNESSES 191-5204, 238-1773, AND 237-7955 (C-15/C-16)



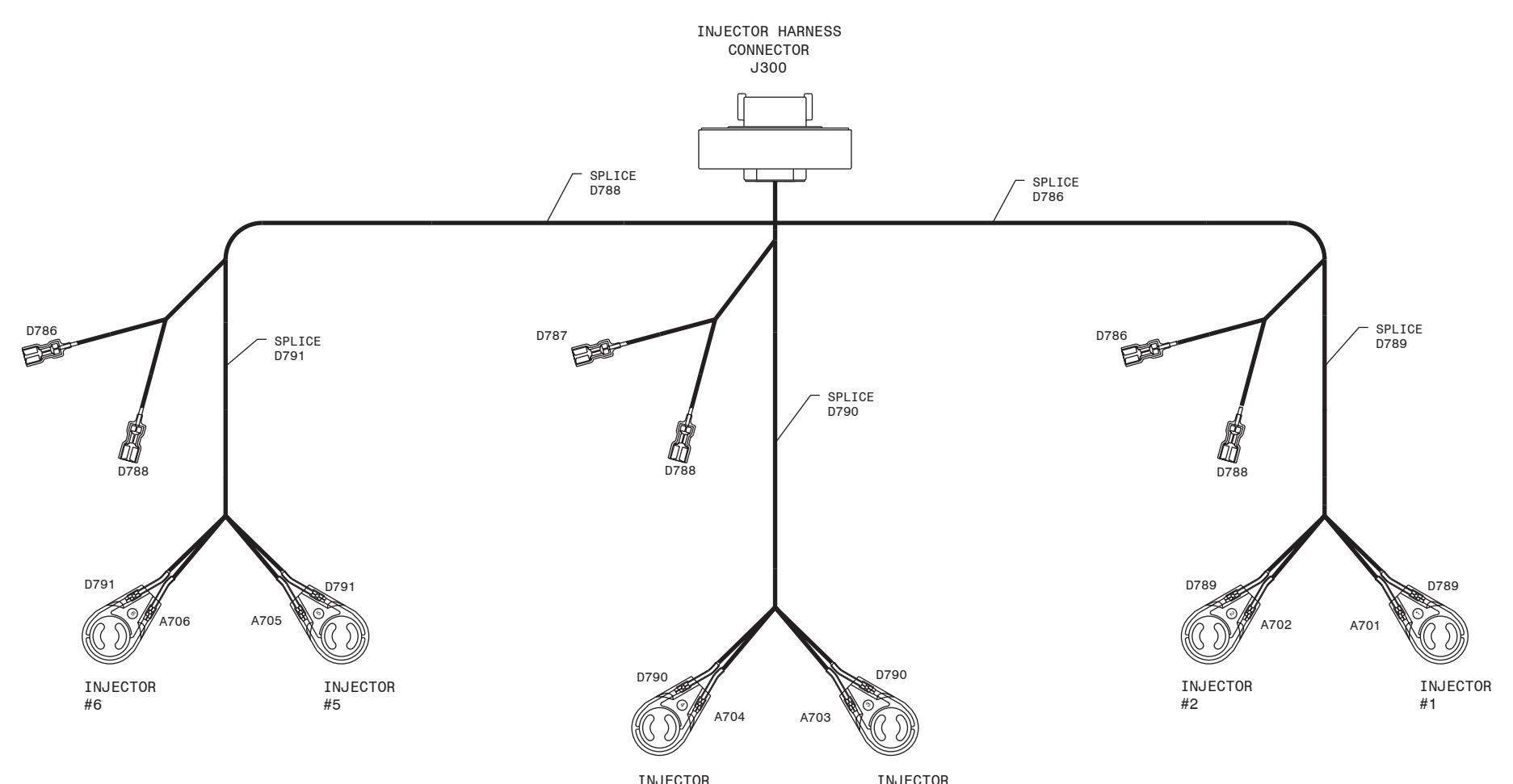
CONNECTOR AND SPLICE LOCATIONS FOR HARNESS 189-6594 (C-10/C-12) PIGTAIL SENSORS



CONNECTOR AND SPLICE LOCATIONS FOR HARNESS 122-1486 (C-15/C-16)



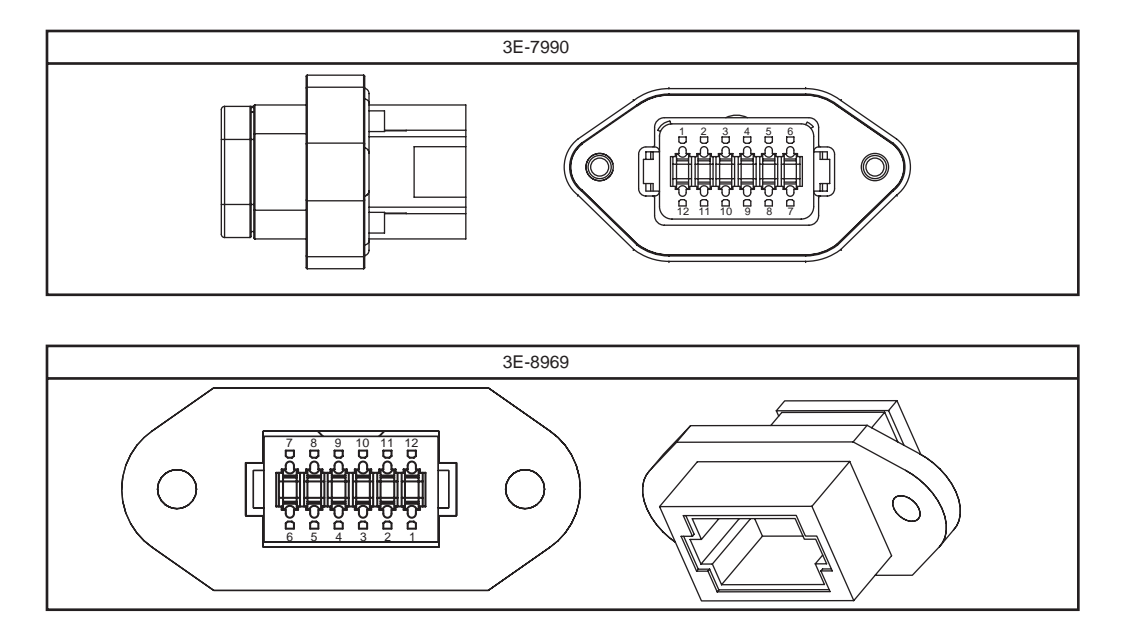
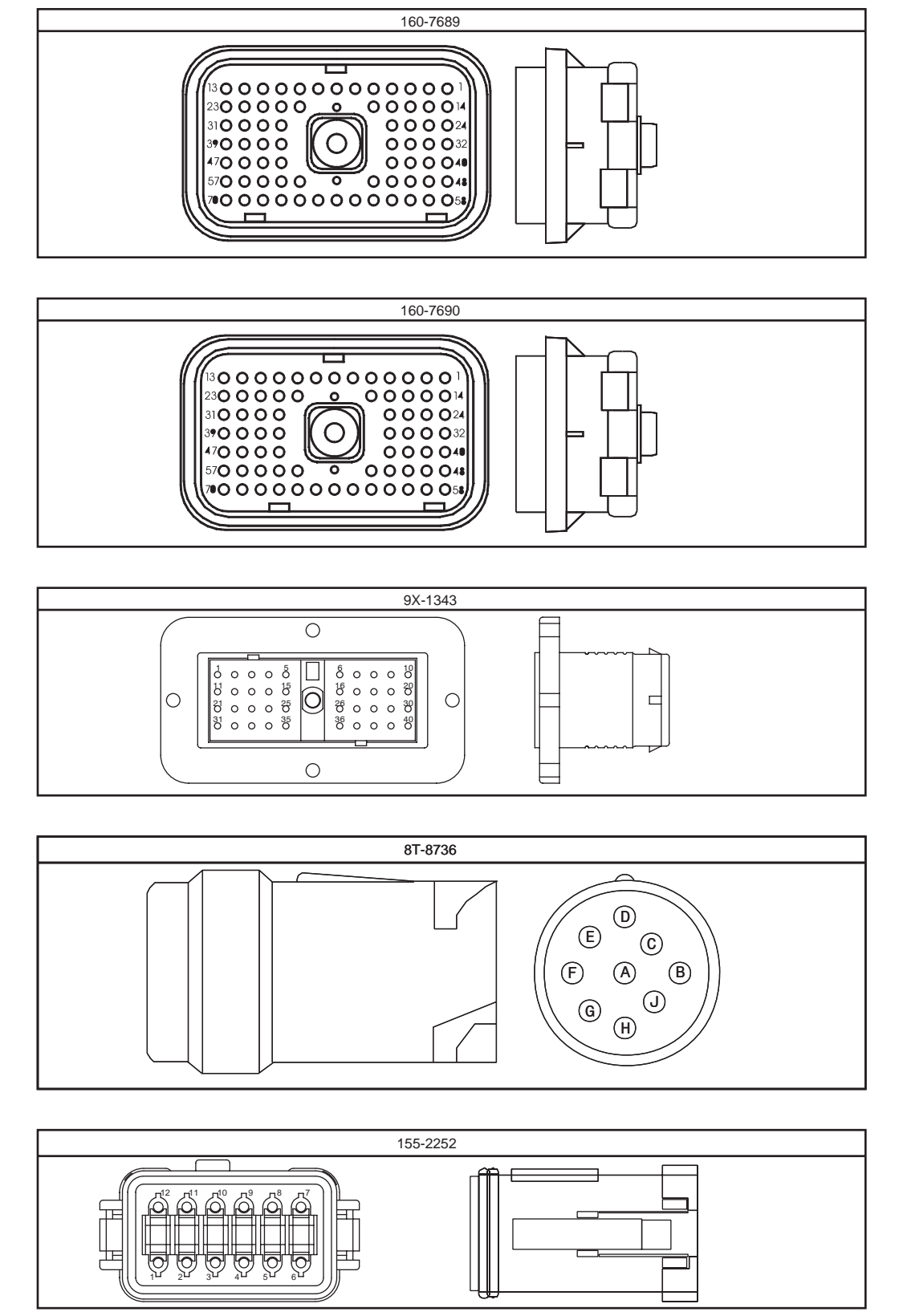
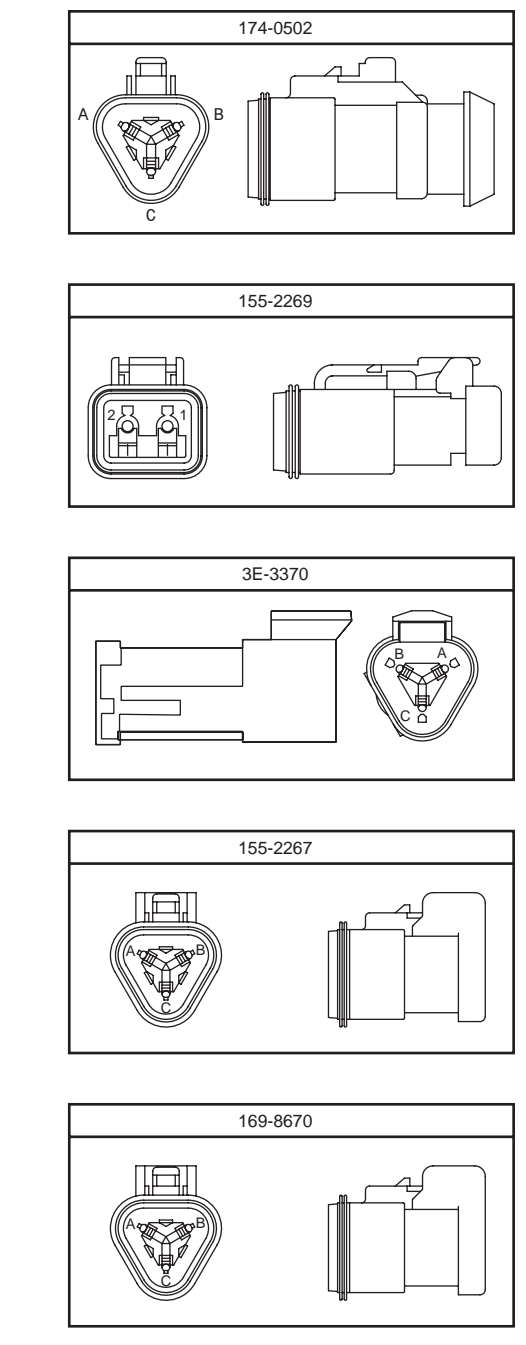
CONNECTOR AND SPLICE LOCATIONS FOR HARNESSES 189-6596, 191-1531, 238-1774, 242-7248, AND 243-6618 (ALL)



CONNECTOR AND SPLICE LOCATIONS FOR HARNESS 4P-9537 (C-10/C-12)

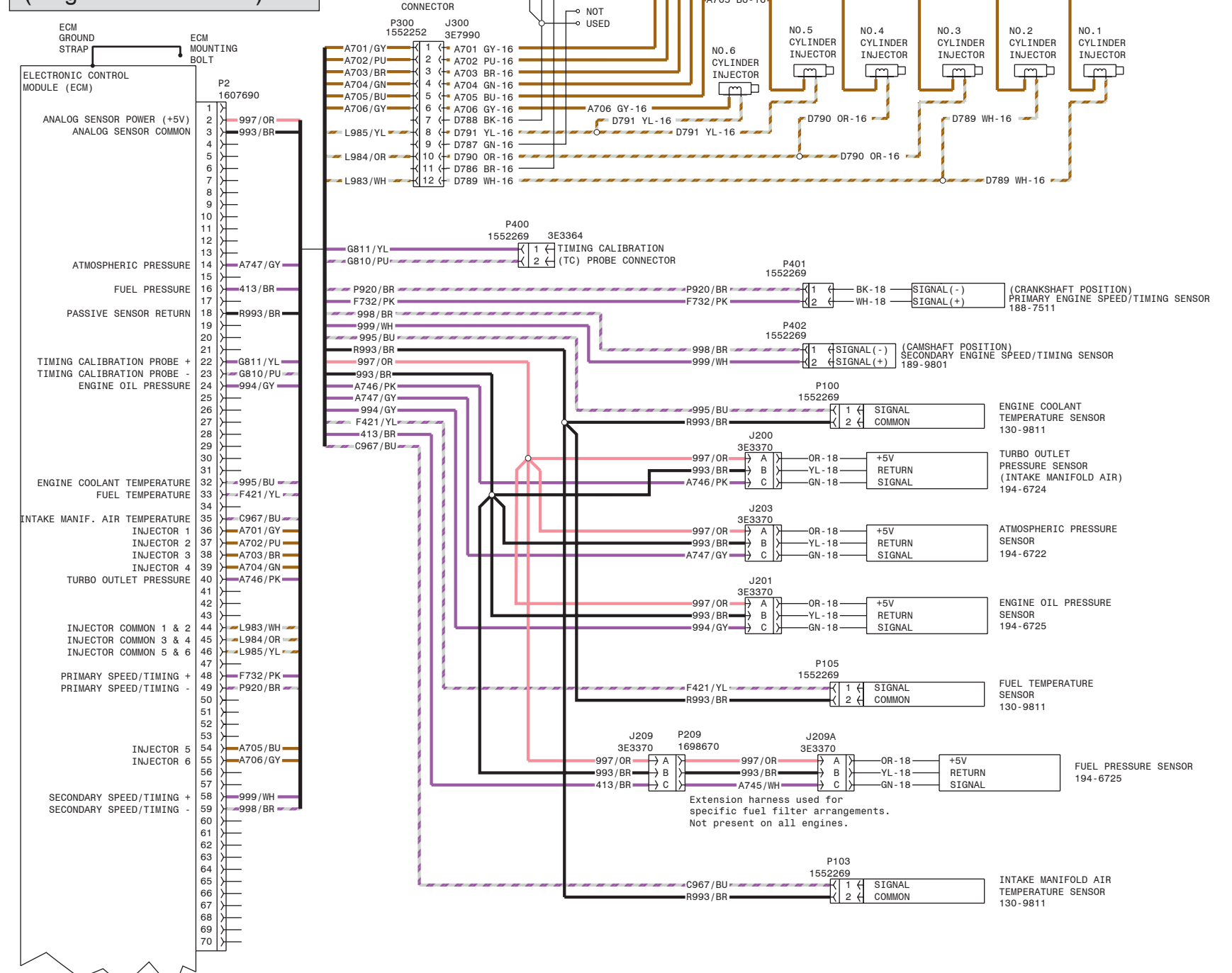
Schematic
C-10, C-12, C-15 and C-16
Industrial Engine
Electrical System

- Z2B1-UP
- Z2C1-UP
- BDL1-UP
- BEM1-UP
- BFM1-UP
- BCX1-UP

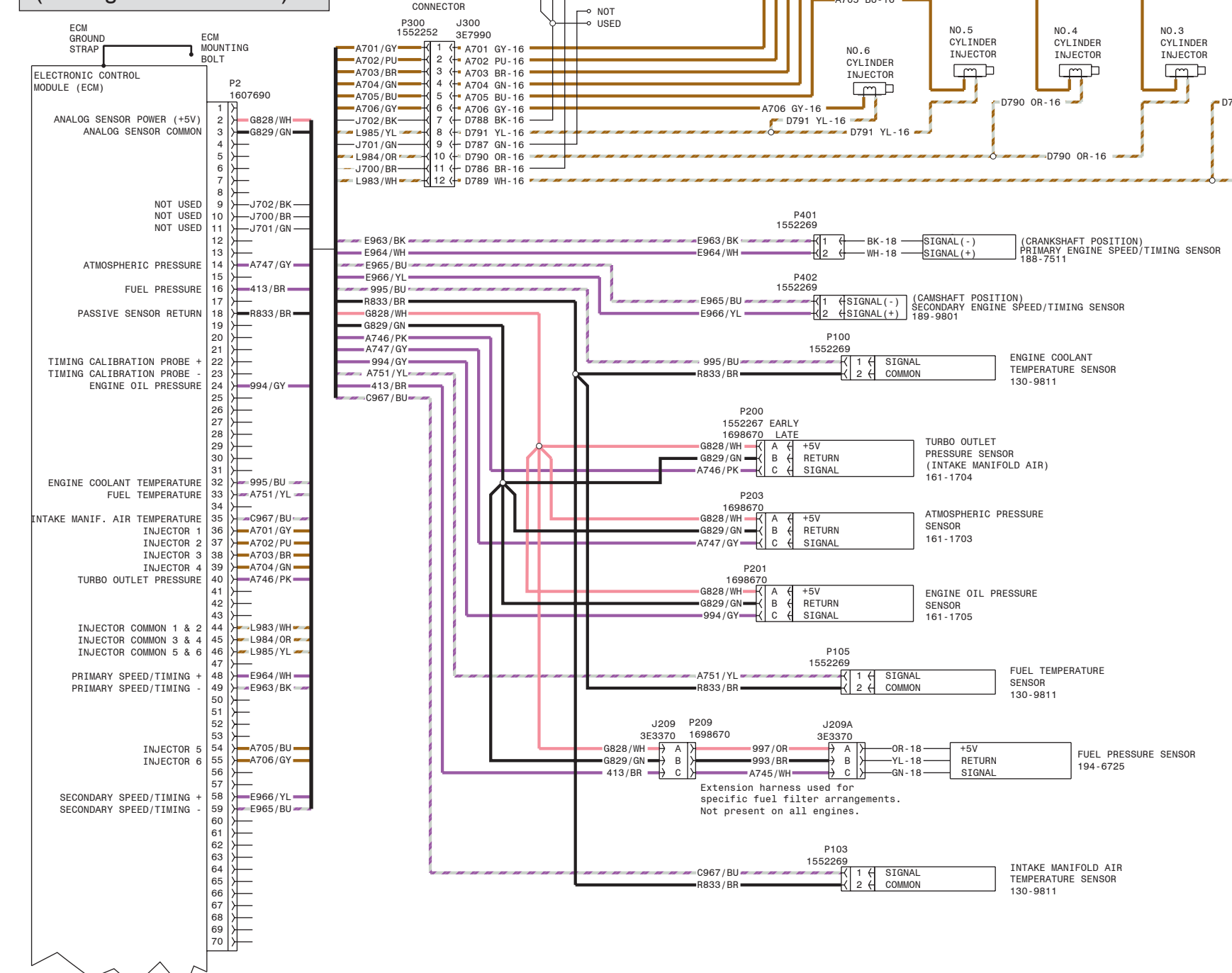


Related Electrical Service Manuals		
Title	Industrial Engine	Form Number
Installation Guide	C-10-C-12	REN50871
System Operation	C-10-C-12	SEN9573
Test and Adjust	C-10-C-12	SEN9576
Troubleshooting	C-10-C-12	SEN9576
Installation Guide	C-15-C-16	REN50871
System Operation	C-15-C-16	REN2347
Test and Adjust	C-15-C-16	SEN9576
Troubleshooting	C-15-C-16	SEN9576
System Operation	C-10(2B), C-15(2C)	SEN9563
Test and Adjust	C-10(2B), C-15(2C)	SEN9563
Troubleshooting	C-10(2B), C-15(2C)	REN5061

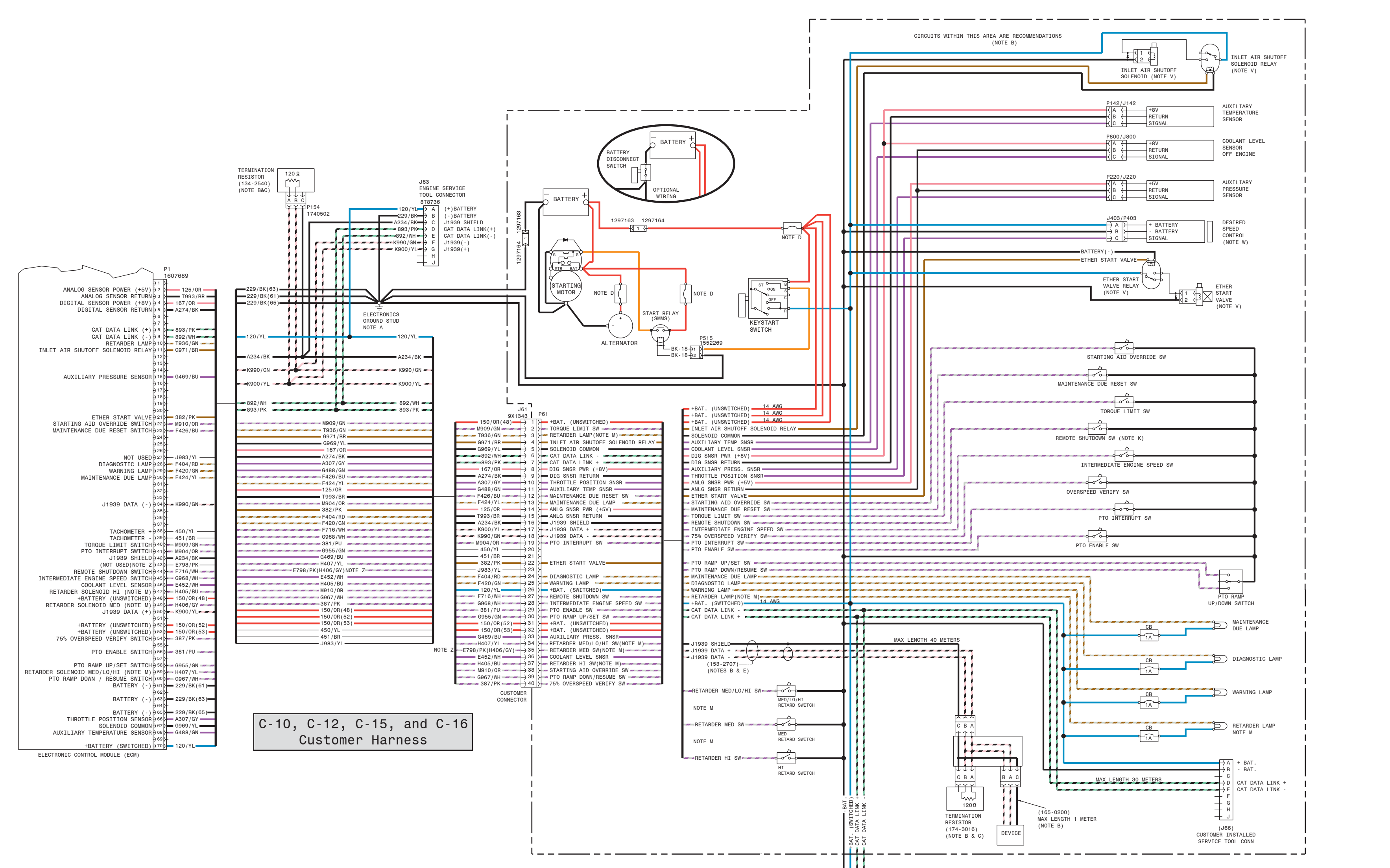
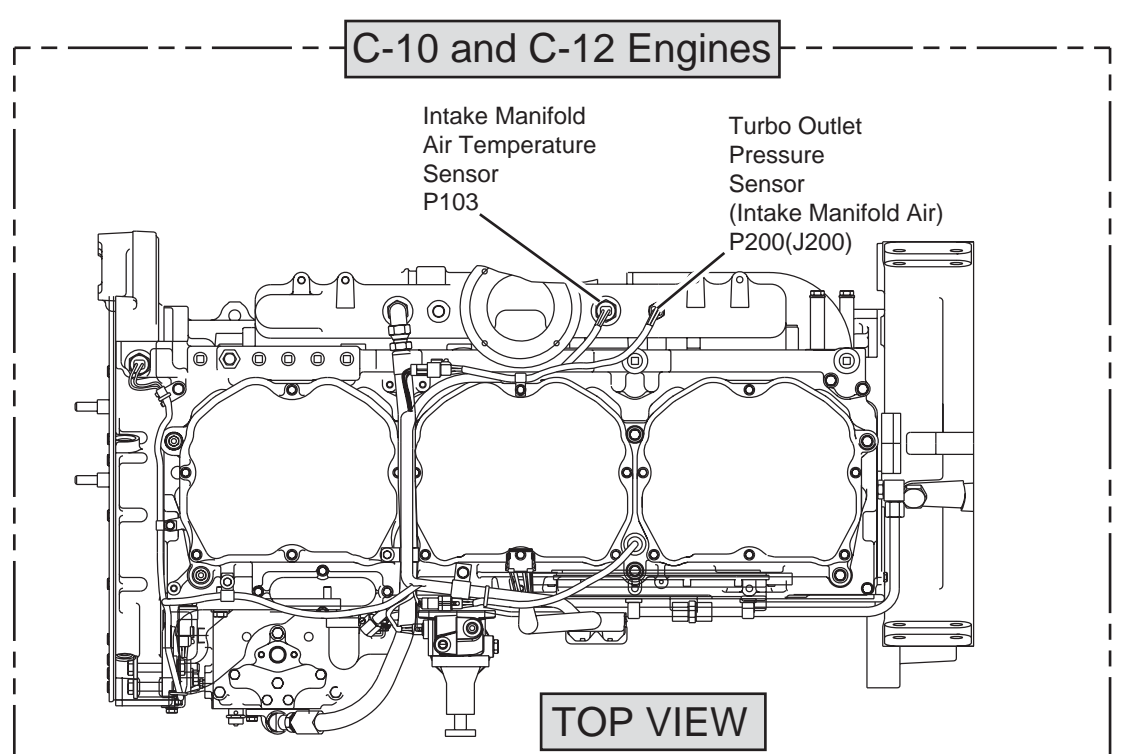
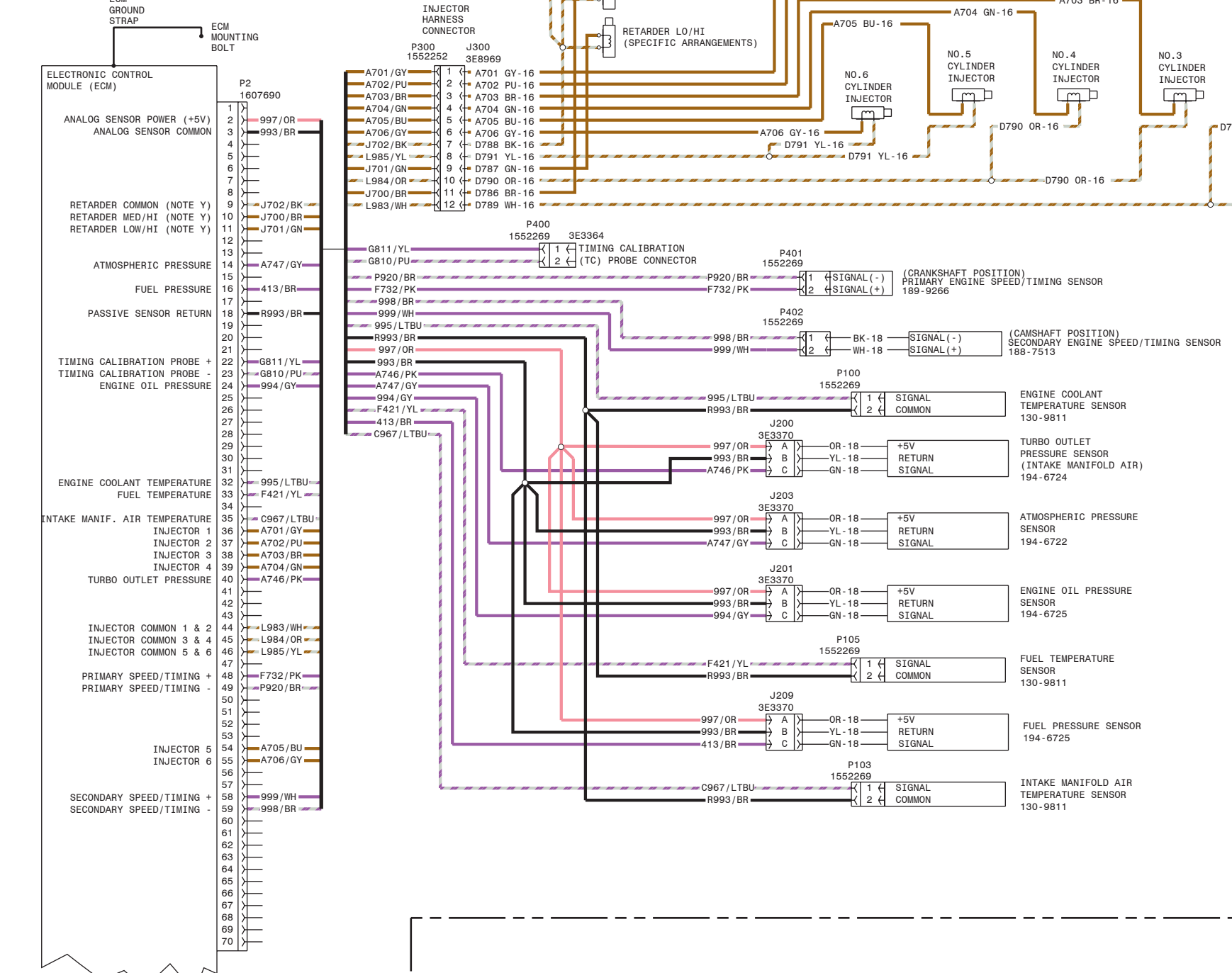
C-10 and C-12 Engine and Injector Harness (Pigtail Sensors)



C-10 and C-12 Engine and Injector Harness (Integral Sensors)

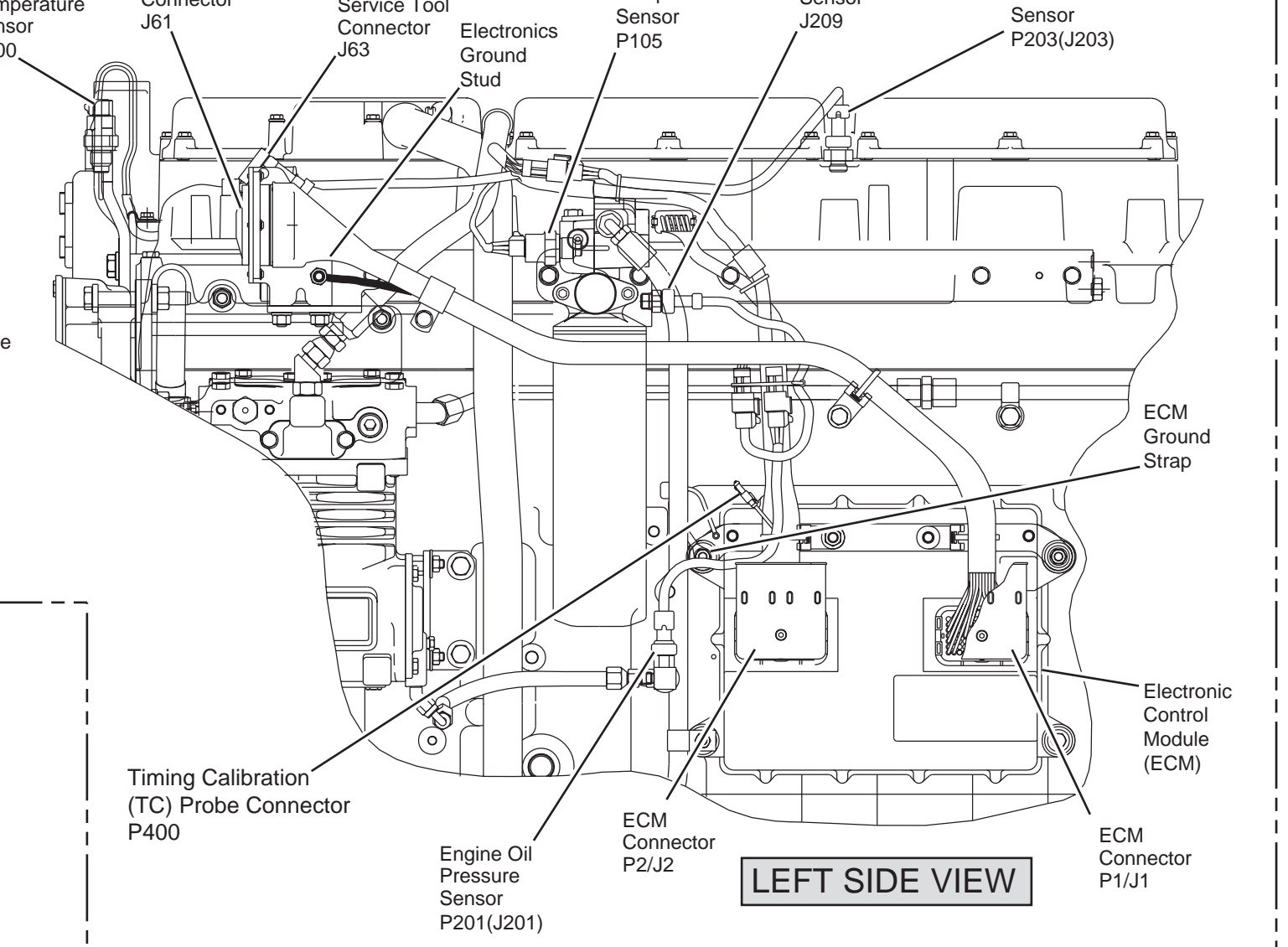
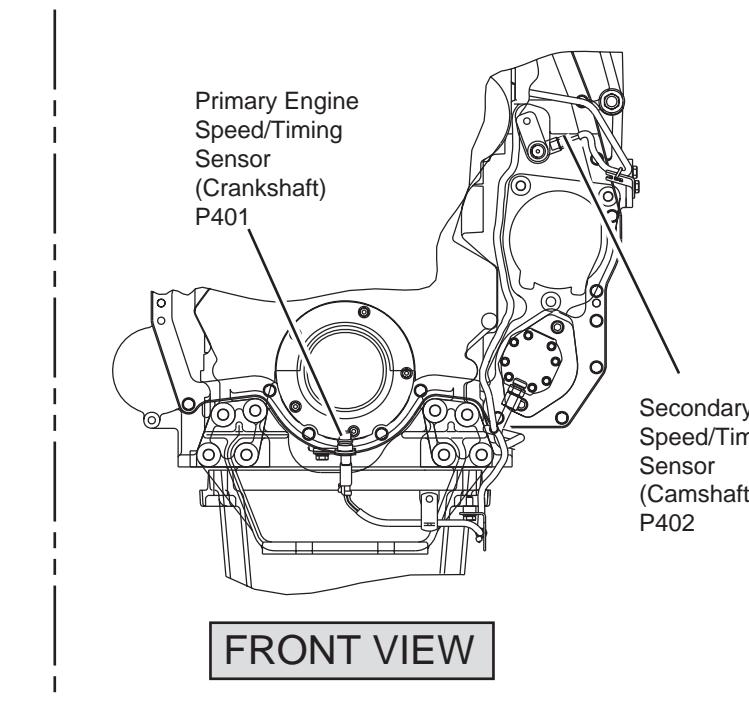


C-15 and C-16 Engine and Injector Harness



Engine Control Module

CID	Component
0001	Injector #1
0002	Injector #2
0003	Injector #3
0004	Injector #4
0005	Injector #5
0006	Injector #6
0007	Timing Sensor
0041	8 Volt DC Supply
0091	Throttle Position
0094	Fuel Pressure
0100	Engine Oil Pressure
0110	Engine Coolant Temperature
0169	System Voltage
0172	Intake Manifold Air Temp
0174	Fuel Temperature
0247	Data Link Communications
0253	Programmable Module
0254	Electronic Control Module
0281	Engine Timing
0282	5 Volt Sensor DC Power Supply
0283	Digital Sensor Supply
0286	Check Programmable Parameters
0273	Turbo Outlet Pressure
0274	Atmospheric Pressure
0300	Speed / Timing Sensor
0342	Loss of Secondary Engine Speed
0545	Ether Start Relay
1835	Auxiliary Pressure Sensor
1836	Auxiliary Temperature Sensor



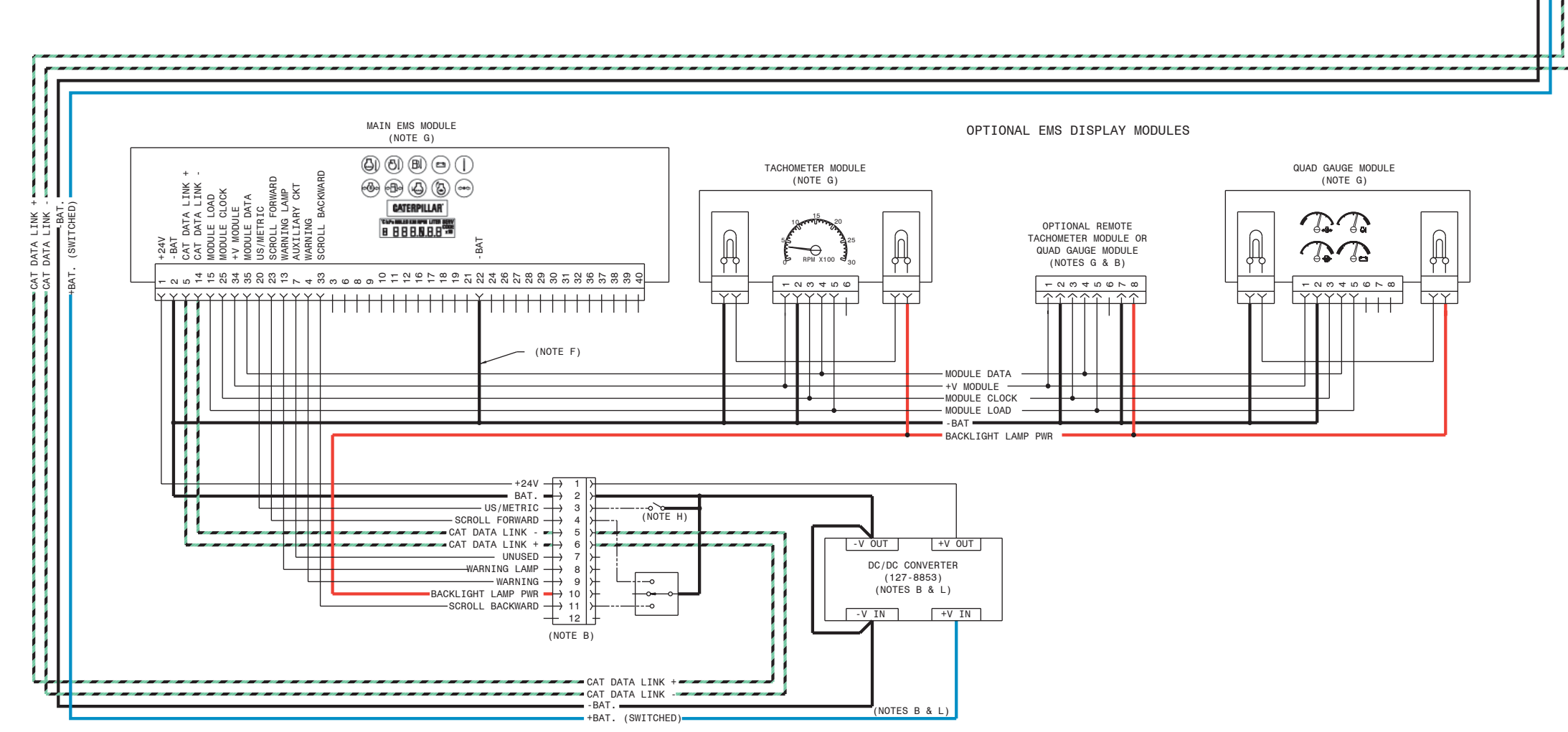
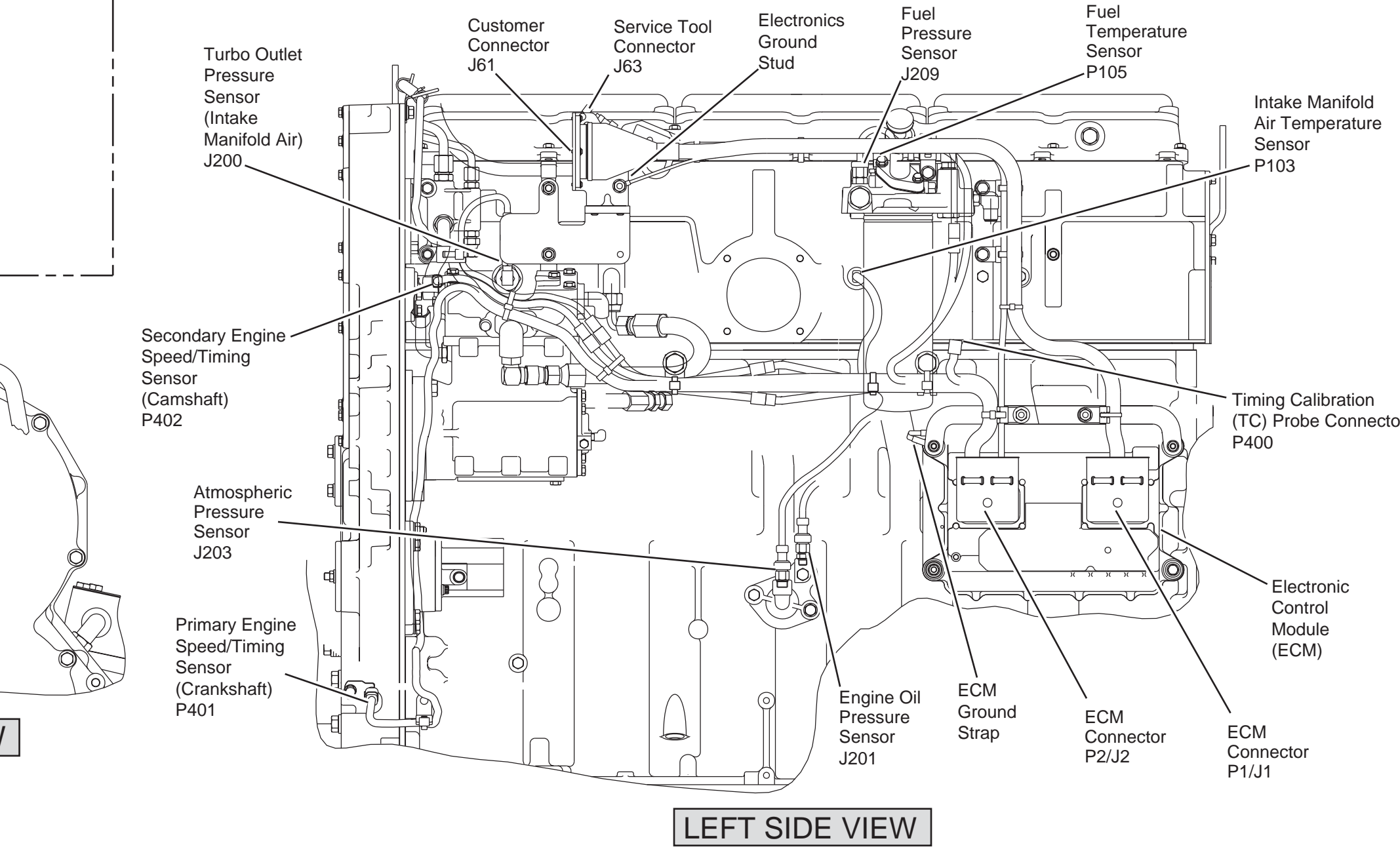
Event Codes For ADEM III ECM

Event Code	Condition
E004	Engine Overspeed Shutdown
E005	Fuel Filter Restriction Derate
E006	Fuel Filter Restriction Shutdown
E015	High Engine Coolant Temperature Derate
E016	High Engine Coolant Temperature Shutdown
E017	High Engine Coolant Temperature Warning
E025	High Inlet Air Temperature Derate
E027	High Inlet Air Temperature Warning
E039	Low Engine Oil Pressure Derate
E040	Low Engine Oil Pressure Shutdown
E054	High Fuel Temperature Derate
E055	High Fuel Temperature Shutdown
E056	High Fuel Temperature Warning
E067	Low Engine Coolant Level Derate
E068	Low Engine Coolant Level Shutdown
E069	Low Engine Coolant Level Warning
E096	Fuel Filter Restriction Warning
E096	High Fuel Pressure
E100	Low Engine Oil Pressure Warning
E190	Engine Overspeed Warning
E443	High Auxiliary Pressure
E445	High Auxiliary Temperature

Failure Mode Identifiers (FMI)

FMI No.	Failure Description
0	Data valid but above normal operational range.
1	Data valid but below normal operational range.
2	Data erratic, intermittent, or inconsistent.
3	Voltage above normal or shorted high.
4	Voltage below normal or shorted low.
5	Current below normal or open circuit.
6	Current above normal or grounded circuit.
7	Mechanical system not responding properly.
8	Abnormal frequency, pulse width, or period.
9	Abnormal update.
10	Abnormal rate of change.
11	Failure mode not identifiable.
12	Bad device or component.
13	Out of calibration.
14	Parameter failures.
15	Parameter failures.
16	Parameter not available.
17	Module not responding.
18	General hardware failure.
19	Condition not met.
20	Parameter failures.

C-15 and C-16 Engines



NOTE A: THE CUSTOMER CONNECTOR BRACKET GROUND STUD MUST HAVE A DIRECT WIRE CONNECTION TO BATTERY (-). THIS CONNECTION CAN BE MADE AT THE STARTER (-) TERMINAL.

NOTE B: REFER TO THE INSTALLATION GUIDE FOR ADDITIONAL INSTALLATION DETAILS.

NOTE C: MAXIMUM LENGTH OF DATA BUS TERMINATION RESISTOR TO TERMINATION RESISTOR IS 40 METERS.

NOTE D: PLACE APPROPRIATE CIRCUIT PROTECTION.

NOTE E: USE RECOMMENDED CABLE OR EQUIVALENT PER SAE J1939 SPECIFICATIONS FOR ALL J1939 DATA LINK CONNECTIONS.

NOTE F: P1N 25 ON THE 12 PIN DATA MODULE 40 PIN CONNECTOR MUST BE CONNECTED TO BATTERY (-) FOR PROPER OPERATION.

NOTE G: ONE MAIN EMB MODULE IS REQUIRED FOR EACH DESIRED MONITORING STATION. THE TACHOMETER AND GAUGE UNITS ARE A MAIN EMB MODULE.

NOTE H: THE DEFAULT SETTING FOR THE EMB IS METRIC UNITS. IF U.S. UNITS ARE REQUIRED NO CONNECTION IS NEEDED. IF U.S. UNITS ARE REQUIRED, A PERMANENT CONNECTION TO BATTERY (-) IS REQUIRED.

NOTE I: WHEN THE SHUTDOWN SWITCH IS CONNECTED TO BATTERY (-) THE ECM DISABLES THE FUEL INJECTION RELAY. THIS ACTION CAUSES THE ENGINE TO SHUTDOWN WHILE LEAVING THE ECM POWERED TO MONITOR ENGINE DIAGNOSTICS.

NOTE J: 12 VOLT BATTERY SYSTEMS MUST USE THE DC/DC CONVERTER STARTER TO OPERATE PROPERLY. EA 15.1 SYSTEMS SHOULD CONNECT SWITCHED BATTERY DIRECT TO P1N6 1 & 2 ON THE 12 PIN EMB HARNESS CUSTOMER CONNECTOR.

NOTE K: THE RETARDER FEATURE IS ONLY AVAILABLE ON SPECIFIC MODELS.

NOTE L: ARC SUPPRESSION DIODES ARE REQUIRED ON RELAY COILS AND SOLENOID COILS.

NOTE M: WIRING FOR DESIRED SPEED CONTROL DETERMINED BY APPLICATION. FOR DESIRED SPEED CONTROL, REFER TO THE EMISSIONS INSTALLATION GUIDE.

NOTE N: HARNESSES 237-7506 -00 AND 238-1773 -00 HAVE WIRING J200/01, J201/01, AND J202/01 INSTALLED. ALL OTHER C-15/C-16 ENGINE HARNESSES DO NOT INCLUDE THESE WIRES.

NOTE O: HARNESS 242-7248 -00 HAS WIRE H406/OV INSTALLED. ALL OTHER CUSTOMER HARNESSES HAVE WIRE E798/PK INSTALLED. H406/OV TERMINATES AT P1/49 AND J61/15. E798/PK TERMINATES AT P1/49 AND J61/15C.

NO ADDITIONAL CONNECTIONS ARE ALLOWED TO ANY WIRES WITHOUT CATERPILLAR ENGINEERING APPROVAL.

UNLESS OTHERWISE SPECIFIED:

- ALL WIRES TO BE 16 AWG OR LARGER SAE J1128 TYPE SXL OR EQUIVALENT. FOR TRESTED PAIR SPECIFICATION SEE SAE J1708.
- ELIMINATION OF ANY COMPONENTS SHOWN WILL DISABLE CERTAIN ENGINE FEATURES. CONTACT CATERPILLAR ENGINEERING WHEN CONSIDERING COMPONENT REMOVAL.

ABBREVIATION

ALT ALTERNATOR
ATA AMERICAN TRUCKING ASSOCIATION
CB CIRCUIT BREAKER
CIS CUSTOMER IDENTIFICATION SWITCH
ECM ELECTRONIC CONTROL MODULE
EIS ELECTRONIC INJECTION SYSTEM
PIM PULSE WIDTH MODULATION
START STARTER MOTOR
SMS START MOTOR MAIN SWITCH

THIS SCHEMATIC IS FOR THE C-10, C-12, C-15, and C-16 INDUSTRIAL ENGINES WIRING DIAGRAMS 201-0640 (00) AND 238-1773 (00)

PART NO.	QTY.	NAME	HARNESS TABLE
189-6594	05	J2/ENGINE (C-10/C-12 Pigtail Sensors)	
226-5758	03	J2/ENGINE (C-10/C-12 Integral Sensors)	
243-6020	00	J2/ENGINE (C-10/C-12 Specific Arrangements)	
191-5204	02	J2/ENGINE (C-15/C-16)	
238-1773	00	J2/ENGINE (C-15/C-16 Retarder)	
237-7595	01	J2/ENGINE (C-15/C-16 Specific Arrangements)	
189-6596	04	J1/CUSTOMER (C-10/C-12)	
243-6018	00	J1/CUSTOMER (C-10/C-12 Specific Arrangements)	
191-1531	04	J1/CUSTOMER (C-15/C-16)	
238-1774	00	J1/CUSTOMER (C-15/C-16 Retarder)	
242-7248	00	J1/CUSTOMER (C-15/C-16 Specific Arrangements)	
49-9537	07	INJECTOR (C-10/C-12)	
122-1486	10	INJECTOR (C-15/C-16)	
132-3144	00	FUEL PRESSURE EXTENSION (C-10/C-12)	