

APPENDIX A: CODES

The codelisted may not be used in all applications. A default value in the normal operating range is used by the ECM to provide for engine operation if a sensor failure is present.

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|-------------------------|-----|-----|-----|--|
| -- | 240 | -- | 2 | Fram Checksum Incorrect |
| -- | 251 | -- | 10 | Clock Module Abnormal Rate |
| -- | 251 | -- | 13 | Clock Module Fault/Failure |
| -- | -- | 253 | 13 | Incompatible Calibration Version |
| -- | -- | 254 | 0 | External Failed RAM |
| -- | -- | 254 | 1 | Internal Failed RAM |
| -- | -- | 254 | 6 | Entered Boot Via Switches |
| 11 | 187 | -- | 4 | Variable Speed Governor Sensor Voltage Low |
| 11 | 187 | -- | 7 | Variable Speed Governor Switch System Not Responding |
| 12 | 187 | -- | 3 | Variable Speed Governor Sensor Voltage High |
| 13 | 111 | -- | 4 | Coolant Level Sensor Input Voltage Low |
| 13 | 111 | -- | 6 | Add Coolant Level Sensor Input Voltage Low |
| 14 | 52 | -- | 3 | Intercooler Coolant Temperature Sensor Input Voltage High |
| 14 | 110 | -- | 3 | Coolant Temperature Sensor Input Voltage High |
| 14 | 175 | -- | 3 | Oil Temperature Sensor Input Voltage High |
| 15 | 52 | -- | 4 | Intercooler Coolant Temperature Sensor Input Voltage Low |
| 15 | 110 | -- | 4 | Coolant Temperature Sensor Input Voltage Low |
| 15 | 175 | -- | 4 | Oil Temperature Sensor Input Voltage Low |
| 16 | 111 | -- | 3 | Coolant Level Sensor Input Voltage High |
| 16 | 111 | -- | 5 | Add Coolant Level Sensor Input Voltage High |
| 17 | 72 | -- | 3 | Throttle Plate Position Sensor Input Voltage High |
| 17 | 51 | -- | 3 | Throttle Position Sensor Input Voltage High |
| 18 | 72 | -- | 4 | Bypass Position Sensor Input Voltage Low |
| 18 | 51 | -- | 4 | Throttle Plate Position Sensor Input Voltage Low |
| 21 | 91 | -- | 3 | Throttle Position Sensor Input Voltage High |
| 22 | 91 | -- | 4 | Throttle Position Sensor Input Voltage Low |
| 23 | 174 | -- | 3 | Fuel Temperature Sensor Input Voltage High |
| 23 | -- | 65 | 3 | Oxygen Content Circuit Input Voltage High |
| 24 | 174 | -- | 4 | Fuel Temperature Sensor Input Voltage Low |
| 24 | -- | 65 | 4 | Oxygen Content Circuit Input Voltage Low |
| 25 | -- | -- | -- | Reserved for "No Codes" |
| 26 | -- | 25 | 11 | Aux. Shutdown #1 Active |
| 26 | -- | 61 | 11 | Aux. Shutdown #2 Active |
| 27 | 171 | -- | 3 | Ambient Air Temperature Sensor Input Voltage High (Release 2.00 or later only) |

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|-------------------------|-----|-----|-----|--|
| 27 | 172 | -- | 3 | Air Temperature Sensor Input Voltage High |
| 27 | 105 | -- | 3 | Intake Manifold Temperature Sensor Input Voltage High |
| 28 | 171 | -- | 4 | Ambient Air Temperature Circuit Failed Low (Release 2.00 or later only) |
| 28 | 172 | -- | 4 | Air Temperature Sensor Input Voltage Low |
| 28 | 105 | -- | 4 | Intake Manifold Temperature Sensor Input Voltage Low |
| 31 | -- | 51 | 3 | Aux. Output #3 Open Circuit (High Side) - S3 |
| 31 | -- | 51 | 4 | Aux. Output #3 Short To Ground (High Side) - S3 |
| 31 | -- | 51 | 7 | Aux. Output #3 Mechanical System Fail - S3 |
| 31 | -- | 52 | 3 | Aux. Output #4 Open Circuit (High Side) - T3 |
| 31 | -- | 52 | 4 | Aux. Output #4 Short To Ground (High Side) - T3 |
| 31 | -- | 52 | 7 | Aux. Output #4 Mechanical System Fail - T3 |
| 32 | -- | 238 | 4 | SEL Open Circuit |
| 32 | -- | 238 | 3 | SEL Short to Battery (+) |
| 32 | -- | 239 | 3 | CEL Short to Battery (+) |
| 32 | -- | 239 | 4 | CEL Open Circuit |
| 33 | 102 | -- | 3 | Turbo Boost Pressure Sensor Input Voltage High |
| 34 | 102 | -- | 4 | Turbo Boost Pressure Sensor Input Voltage Low |
| 35 | 100 | -- | 3 | Oil Pressure Sensor Input Voltage High |
| 35 | 19 | -- | 3 | High Range Oil Pressure Sensor Input Voltage High |
| 36 | 100 | -- | 4 | Oil Pressure Sensor Input Voltage Low |
| 36 | 19 | -- | 4 | High Range Oil Pressure Sensor Input Voltage Low |
| 37 | 94 | -- | 3 | Fuel Pressure Sensor Input Voltage High |
| 37 | 18 | -- | 3 | High Range Fuel Pressure Sensor Input Voltage High |
| 37 | 95 | -- | 3 | Fuel Restriction Sensor Input Voltage High |
| 38 | 94 | -- | 4 | Fuel Pressure Sensor Input Voltage Low |
| 38 | 18 | -- | 4 | High Range Fuel Pressure Sensor Input Voltage Low |
| 38 | 95 | -- | 4 | Fuel Restriction Sensor Input Voltage Low |
| 39 | -- | 152 | 7 | EGR Valve Not Responding (Release 29.0 or later) |
| 39 | -- | 153 | 7 | VNT Vanes Not Responding (Release 29.0 or later) |
| 41 | -- | 21 | 0 | Too Many SRS (missing TRS) |
| 42 | -- | 21 | 1 | Too few SRS (missing SRS) |
| 43 | 111 | -- | 1 | Coolant Level Low |
| 44 | 52 | -- | 0 | Intercooler Coolant Temperature High |
| 44 | 110 | -- | 0 | Coolant Temperature High |
| 44 | 172 | -- | 0 | Air Inlet Temperature High |
| 44 | 175 | -- | 0 | Oil Temperature High |
| 44 | 105 | -- | 0 | Intake Manifold Temperature High |
| 45 | 100 | -- | 1 | Oil Pressure Low |

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|-------------------------|-----|-----|-----|--|
| 45 | 19 | -- | 1 | High Range Oil Pressure Low |
| 46 | 168 | -- | 1 | ECM Battery Voltage Low |
| 46 | -- | 214 | 1 | RTC Backup Battery Voltage Low (Release 29.0 or later) |
| 46 | -- | 232 | 1 | Sensor supply Voltage Low |
| 47 | 94 | -- | 0 | Fuel Pressure High |
| 47 | 102 | -- | 0 | Turbo Boost Pressure High |
| 47 | 106 | -- | 0 | Air Inlet Pressure High |
| 47 | 164 | -- | 0 | Injection Control Pressure High |
| 47 | 18 | -- | 0 | High Range Fuel Pressure High |
| 48 | 18 | -- | 1 | High Range Fuel Pressure Low |
| 48 | 94 | -- | 1 | Fuel Pressure Low |
| 48 | 106 | -- | 1 | Air Inlet Pressure Low |
| 48 | | 154 | 1 | EGR Temperature Low (Release 29.0 or later) |
| 48 | | 155 | 1 | EGR Delta Pressure Low (Release 29.0 or later) |
| 48 | 164 | -- | 1 | Injection Control Pressure Low |
| 52 | -- | 254 | 12 | A/D Conversion Fail |
| 53 | -- | 253 | 2 | Nonvolatile Checksum Incorrect |
| 53 | -- | 253 | 12 | EEPROM Write Error |
| 53 | -- | 253 | 13 | Out of Calibration |
| 54 | 84 | -- | 12 | Vehicle Speed Sensor Fault |
| 55 | -- | 216 | 14 | Other ECU Fault (Release 27.0 or later) (This fault is logged in conjunction with another fault to indicate missing information from another ECU.) |
| 55 | -- | 231 | 12 | J1939 Data Link Fault |
| 55 | -- | 248 | 8 | Proprietary Data Link Fault (Master) |
| 55 | -- | 248 | 9 | Proprietary Data Link Fault (Receiver) |
| 56 | -- | 250 | 12 | J1587 Data Link Fault |
| 57 | -- | 249 | 12 | J1922 Data Link Fault |
| 58 | 92 | -- | 0 | Torque Overload |
| 61 | -- | xxx | 0 | Injector xxx Response Time Long |
| 62 | -- | 26 | 3 | Aux. Output #1 Short to Battery (+) - F3 |
| 62 | -- | 26 | 4 | Aux. Output #1 Open Circuit - F3 |
| 62 | -- | 40 | 3 | Aux. Output #2 Short to Battery (+) - A2 |
| 62 | -- | 40 | 4 | Aux. Output #2 Open Circuit - A2 |
| 62 | -- | 53 | 3 | Aux. Output #5 Short to Battery (+) - W3 |
| 62 | -- | 53 | 4 | Aux. Output #5 Open Circuit - W3 |
| 62 | -- | 54 | 3 | Aux. Output #6 Short to Battery (+) - X3 |
| 62 | -- | 54 | 4 | Aux. Output #6 Open Circuit - X3 |
| 62 | -- | 55 | 3 | Aux. Output #7 Short to Battery (+) - Y3 |
| 62 | -- | 55 | 4 | Aux. Output #7 Open Circuit - Y3 |
| 62 | -- | 56 | 3 | Aux. Output #8 Short to Battery (+) - A1 |
| 62 | -- | 56 | 4 | Aux. Output #8 Open Circuit - A1 |

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|-------------------------|-----|-----|-----|---|
| 62 | -- | 26 | 7 | Aux. Output #1 Mechanical System Not Responding Properly -F3 |
| 62 | -- | 40 | 7 | Aux. Output #2 Mechanical System Not Responding Properly -A2 |
| 62 | -- | 53 | 7 | Aux. Output #5 Mechanical System Not Responding Properly - W3 |
| 62 | -- | 54 | 7 | Aux. Output #6 Mechanical System Not Responding Properly - X3 |
| 62 | -- | 55 | 7 | Aux. Output #7 Mechanical System Not Responding Properly - Y3 |
| 62 | -- | 56 | 7 | Aux. Output #8 Mechanical System Not Responding Properly - A1 |
| 63 | -- | 57 | 3 | PWM #1 Short to Battery (+) |
| 63 | -- | 57 | 4 | PWM #1 Open Circuit |
| 63 | -- | 58 | 3 | PWM #2 Short to Battery (+) |
| 63 | -- | 58 | 4 | PWM #2 Open Circuit |
| 63 | -- | 59 | 3 | PWM #3 Short to Battery (+) |
| 63 | -- | 59 | 4 | PWM #3 Open Circuit |
| 63 | -- | 60 | 3 | PWM #4 Short to Battery (+) |
| 63 | -- | 60 | 4 | PWM #4 Open Circuit |
| 63 | -- | 57 | 0 | PWM #1 Above Normal Range |
| 63 | -- | 57 | 1 | PWM #1 Below Normal Range |
| 63 | -- | 58 | 0 | PWM #2 Above Normal Range |
| 63 | -- | 58 | 1 | PWM #2 Below Normal Range |
| 63 | -- | 59 | 0 | PWM #3 Above Normal Range |
| 63 | -- | 59 | 1 | PWM #3 Below Normal Range |
| 63 | -- | 60 | 0 | PWM #4 Above Normal Range |
| 63 | -- | 60 | 1 | PWM #4 Below Normal Range |
| 64 | 103 | -- | 8 | Turbo Speed Sensor Input Failure |
| 64 | 103 | -- | 0 | Turbo Overspeed |
| 65 | 51 | -- | 0 | Throttle Plate Position Above Normal Range |
| 65 | 51 | -- | 1 | Throttle Plate Position Below Normal Range |
| 65 | 51 | -- | 2 | Throttle Plate Position Erratic |
| 65 | 51 | -- | 7 | Throttle Plate Not Responding |
| 65 | 107 | -- | 3 | Air Filter Restriction Sensor Voltage High |
| 65 | 107 | -- | 4 | Air Filter Restriction Sensor Voltage Low |
| 66 | -- | 76 | 0 | Engine Knock Level Above Normal Range |
| 66 | -- | 76 | 3 | Engine Knock Level Sensor Input Voltage High |
| 66 | -- | 76 | 4 | Engine Knock Level Sensor Input Voltage Low |
| 66 | -- | 76 | 7 | Engine Knock Level Sensor Not Responding |
| 66 | 99 | -- | 3 | Oil Filter Restriction Sensor Voltage High |
| 66 | 99 | -- | 4 | Oil Filter Restriction Sensor Voltage Low |
| 67 | 109 | -- | 3 | Coolant Pressure Sensor Input Voltage High |
| 67 | 109 | -- | 4 | Coolant Pressure Sensor Input Voltage Low |

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|-------------------------|-----|-----|-----|--|
| 67 | 106 | -- | 3 | Air Inlet Pressure Sensor Input Voltage High |
| 67 | 106 | -- | 4 | Air Inlet Pressure Sensor Input Voltage Low |
| 67 | 20 | -- | 3 | High Range Coolant Pressure Sensor Input Voltage High |
| 67 | 20 | -- | 4 | High Range Coolant Pressure Sensor Input Voltage Low |
| 68 | -- | 230 | 6 | TPS Idle Validation Circuit Fault (short to ground) |
| 68 | -- | 230 | 5 | TPS Idle Validation Circuit Fault (open circuit) |
| 71 | -- | xxx | 1 | Injector xxx Response Time Short |
| 72 | 84 | -- | 0 | Vehicle Overspeed |
| 72 | 84 | -- | 11 | Vehicle Overspeed (Absolute) |
| 72 | -- | 65 | 0 | Oxygen Content Too High |
| 72 | -- | 65 | 1 | Oxygen Content Too Low |
| 73 | -- | 151 | 14 | ESS Transmission Stuck in Gear |
| 73 | -- | 226 | 11 | Transmission Neutral Switch Failure (ESS Transmission) |
| 73 | -- | 227 | 2 | Aux Analog Input Data Erratic, Intermittent, or Incorrect (ESS Transmission) |
| 73 | -- | 227 | 3 | Aux Analog Input #1 Voltage High (ESS Transmission) |
| 73 | -- | 227 | 4 | Aux Analog Input #1 Voltage Low (ESS Transmission) |
| 73 | -- | 77 | 0 | Gas Valve Position Above Normal Range |
| 73 | -- | 77 | 1 | Gas Valve Position Below Normal Range |
| 73 | -- | 77 | 3 | Gas Valve Position Input Voltage High |
| 73 | -- | 77 | 4 | Gas Valve Position Input Voltage Low |
| 73 | -- | 77 | 7 | Gas Metering Valve Not Responding |
| 73 | 107 | -- | 0 | Air Filter Restriction High |
| 74 | 99 | -- | 0 | Oil Filter Restriction High |
| 74 | 70 | -- | 4 | Optimized Idle Safety Loop Short to Ground |
| 75 | 168 | -- | 0 | ECM Battery Voltage High |
| 75 | -- | 214 | 0 | RTC Backup Battery Voltage High (Release 29.0 or later) |
| 75 | -- | 232 | 0 | Sensor Supply Voltage High |
| 76 | 121 | -- | 0 | Engine Overspeed With Engine Brake |
| 77 | 3 | - | 0 | Cylinder Head Temperature Above Range (Release 31.0 or later) |
| 77 | 19 | - | 0 | Extended Range Oil Pressure Above Range (Release 31.0 or later) |
| 77 | 20 | - | 0 | Extended Range Coolant Pressure Above Range (Release 31.0 or later) |
| 77 | 72 | - | 0 | Bypass Blower Door Position Above Range (Release 31.0 or later) |
| 77 | 72 | - | 1 | Bypass Blower Door Position Below Range (Release 31.0 or later) |
| 77 | 73 | - | 1 | Pump Pressure Below Range (Release 31.0 or later) |

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|-------------------------|-----|-----|-----|---|
| 77 | 81 | - | 0 | Exhaust Back Pressure Above Range (Release 31.0 or later) |
| 77 | 81 | - | 1 | Exhaust Back Pressure Below Range (Release 31.0 or later) |
| 77 | 81 | - | 3 | Exhaust Back Pressure Failed High (Release 31.0 or later) |
| 77 | 81 | - | 4 | Exhaust Back Pressure Failed Low (Release 31.0 or later) |
| 77 | 81 | - | 12 | Exhaust Back Pressure at Rampdown Threshold (Release 31.0 or later) |
| 77 | 95 | - | 1 | Fuel Filter Differential Pressure Below Range (Release 31.0 or later) |
| 77 | 99 | - | 1 | Oil Filter Differential Pressure Below Range (Release 31.0 or later) |
| 77 | 100 | - | 0 | Engine Oil Pressure Above Range (Release 31.0 or later) |
| 77 | 102 | - | 1 | Turbo Boost Pressure Below Range (Release 31.0 or later) |
| 77 | 105 | - | 1 | Inlet Manifold Temperature Below Range (Release 31.0 or later) |
| 77 | 107 | - | 1 | Air Filter Differential Pressure Below Range (Release 31.0 or later) |
| 77 | 108 | - | 0 | Barometric Pressure Above Range (Release 31.0 or later) |
| 77 | 108 | — | 1 | Barometric Pressure Below Range (Release 31.0 or later) |
| 77 | 109 | — | 0 | Coolant Pressure Above Range (Release 31.0 or later) |
| 77 | 110 | — | 1 | Coolant Temperature Below Range (Release 31.0 or later) |
| 77 | 110 | — | 0 | Coolant Level Above Range (Release 31.0 or later) |
| 77 | 171 | — | 0 | Ambient Air Temperature Above Range (Release 31.0 or later) |
| 77 | 171 | — | 1 | Ambient Air Temperature Below Range (Release 31.0 or later) |
| 77 | 172 | — | 1 | Air Inlet Temperature Below Range (Release 31.0 or later) |
| 77 | 174 | — | 0 | Fuel Temperature Above Range |
| 77 | 174 | — | 0 | Fuel Temperature Below Range |
| 77 | 175 | — | 1 | Engine Oil Temperature Below Range (Release 31.0 or later) |
| 77 | 177 | — | 0 | Transmission Oil Temperature Above Range (Release 31.0 or later) |
| 77 | 177 | — | 1 | Transmission Oil Temperature Below Range (Release 31.0 or later) |
| 77 | 177 | — | 3 | Transmission Oil Temperature Failed High (Release 31.0 or later) |
| 77 | 177 | — | 4 | Transmission Oil Temperature Failed Low (Release 31.0 or later) |
| 77 | 222 | — | 14 | Anti-Theft Fault Present (Release 31.0 or later) |
| 77 | 251 | — | 10 | Clock Module Abnormal Rate of Change (Release 31.0 or later) |

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|-------------------------|-----|-----|-----|--|
| 77 | 251 | — | 13 | Clock Module Failure (Release 31.0 or later) |
| 77 | 252 | — | 10 | Clock Module Abnormal Rate of Change (Release 31.0 or later) |
| 77 | 252 | — | 13 | Clock Module Failure (Release 31.0 or later) |
| 78 | 86 | -- | 14 | Cruise Control/Adaptive Cruise Control Fault (Release 27.0 or later) |
| 81 | -- | 20 | 3 | Timing Actuator (Dual Fuel) Input Voltage High |
| 81 | 98 | -- | 3 | Oil Level Sensor Input Voltage High |
| 81 | 101 | -- | 3 | Crankcase Pressure Sensor Input Voltage High |
| 81 | 153 | -- | 3 | Extended Crankcase Pressure Input Voltage High (Release 27.0 or later) |
| 81 | 154 | -- | 3 | EGR Temperature Input Voltage High (Release 29.0 or later) |
| 81 | 155 | -- | 3 | EGR Delta Pressure Input Voltage High (Release 29.0 or later) |
| 81 | 164 | -- | 3 | Injection Control Pressure Circuit Voltage High |
| 81 | 173 | -- | 3 | Exhaust Temperature Sensor Input Voltage High |
| 82 | -- | 20 | 4 | Timing Actuator (Dual Fuel) Input Voltage Low |
| 82 | 98 | -- | 4 | Oil Level Sensor Input Voltage Low |
| 82 | 101 | -- | 4 | Crankcase Pressure Sensor Input Voltage Low |
| 82 | 153 | -- | 4 | Extended Crankcase Pressure Input Voltage Low (Release 27.0 or later) |
| 82 | 154 | -- | 4 | EGR Temperature Input Voltage Low (Release 29.0 or later) |
| 82 | 155 | -- | 4 | EGR Delta Pressure Input Voltage Low (Release 29.0 or later) |
| 82 | 164 | -- | 4 | Injection Control Pressure Sensor Input Voltage Low |
| 82 | 173 | -- | 4 | Exhaust Temperature Sensor Input Voltage Low |
| 83 | 98 | -- | 0 | Oil Level High |
| 83 | 101 | -- | 0 | Crankcase Pressure High |
| 83 | 153 | -- | 0 | Extended Crankcase Pressure High (Release 27.0 or later) |
| 83 | 154 | -- | 0 | EGR Gas Temperature High |
| 83 | 155 | -- | 0 | EGR Delta Pressure High |
| 83 | 173 | -- | 0 | Exhaust Temperature High |
| 83 | 73 | -- | 0 | Pump Pressure High |
| 84 | 98 | -- | 1 | Oil Level Low |
| 84 | 101 | -- | 1 | Crankcase Pressure Low |
| 84 | 153 | -- | 1 | Extended Crankcase Pressure Low (Release 27.0 or later) |
| 85 | 190 | -- | 0 | Engine Overspeed |
| 85 | 190 | -- | 14 | Engine Overspeed Signal (Release 28.0 or later) |
| 86 | 73 | -- | 3 | Pump Pressure Sensor Input Voltage High |
| 86 | 108 | -- | 3 | Barometric Pressure Sensor Input Voltage High |
| 87 | 73 | -- | 4 | Pump Pressure Sensor Input Voltage Low |

| DDC Code # (Flashed) | PID | SID | FMI | Description |
|---------------------------------|------------|------------|------------|--|
| 87 | 108 | -- | 4 | Barometric Pressure Sensor Input Voltage Low |
| 88 | 109 | -- | 1 | Coolant Pressure Low |
| 88 | 20 | -- | 1 | High Range Coolant Pressure Low |
| 89 | 95 | -- | 0 | Fuel Restriction High |
| 89 | 111 | -- | 12 | Maintenance Alert Coolant Level Fault |

A.1 PIDS

The codes listed are sorted by PID.

| PID | FMI | DDC Code # (Flashed) | Description |
|-----|-----|-------------------------|--|
| 3 | 0 | 77 | Cylinder Head Temperature Above Range (Release 32.0 or later) |
| 18 | 0 | 47 | High Range Fuel Pressure High |
| 18 | 1 | 48 | High Range Fuel Pressure Low |
| 18 | 3 | 37 | High Range Fuel Pressure Sensor Input Voltage High |
| 18 | 4 | 38 | High Range Fuel Pressure Sensor Input Voltage Low |
| 19 | 0 | | Extended Range Oil Pressure Above Range (Release 31.0 or later) |
| 19 | 1 | 45 | High Range Oil Pressure Low |
| 19 | 3 | 35 | High Range Oil Pressure Sensor Input Voltage High |
| 19 | 4 | 36 | High Range Oil Pressure Sensor Input Voltage Low |
| 20 | 0 | | Extended Range Coolant Pressure Above Range (Release 31.0 or later) |
| 20 | 1 | 88 | High Range Coolant Pressure Low |
| 20 | 3 | 67 | High Range Coolant Pressure Sensor Input Voltage High |
| 20 | 4 | 67 | High Range Coolant Pressure Sensor Input Voltage Low |
| 51 | 0 | 65 | Throttle Plate Position Above Normal Range |
| 51 | 1 | 65 | Throttle Plate Position Below Normal Range |
| 51 | 2 | 65 | Throttle Plate Position Erratic |
| 51 | 3 | 17 | Throttle Plate Position Sensor Input Voltage High |
| 51 | 4 | 18 | Throttle Plate Position Sensor Input Voltage Low |
| 51 | 7 | 65 | Throttle Plate Not Responding |
| 52 | 0 | 44 | Intercooler Coolant Temperature High |
| 52 | 3 | 14 | Intercooler Coolant Temperature Sensor Input Voltage High |
| 52 | 4 | 15 | Intercooler Coolant Temperature Sensor Input Voltage Low |
| 70 | 4 | 74 | Optimized Idle Safety Loop Short to Ground |
| 72 | 0 | 77 | Bypass Blower Door Position Above Range (Release 31.0 or later) |
| 72 | 1 | 77 | Bypass Blower Door Position Below Range (Release 31.0 or later) |
| 72 | 3 | 17 | Bypass Position Sensor Input Voltage High |
| 72 | 4 | 18 | Bypass Position Sensor Input Voltage Low |
| 73 | 0 | 83 | Pump Pressure High |
| 73 | 1 | 77 | Pump Pressure Below Range (Release 31.0 or later) |
| 73 | 3 | 86 | Pump Pressure Sensor Input Voltage High |
| 73 | 4 | 87 | Pump Pressure Sensor Input Voltage Low |
| 81 | 0 | 77 | Exhaust Back Pressure Above Range (Release 31.0 or later) |
| 81 | 1 | 77 | Exhaust Back Pressure Below Range (Release 31.0 or later) |
| 81 | 3 | 77 | Exhaust Back Pressure Failed High (Release 31.0 or later) |
| 81 | 4 | 77 | Exhaust Back Pressure Failed Low (Release 31.0 or later) |
| 81 | 12 | 77 | Exhaust Back Pressure at Rampdown Threshold (Release 31.0 or later) |
| 84 | 0 | 72 | Vehicle Overspeed |

| PID | FMI | DDC Code # (Flashed) | Description |
|-----|-----|-------------------------|---|
| 84 | 11 | 72 | Vehicle Overspeed (Absolute) |
| 84 | 12 | 54 | Vehicle Speed Sensor Fault |
| 86 | 14 | 78 | Cruise Control/Adaptive Cruise Control Fault (Release 27.0 or later) |
| 91 | 3 | 21 | Throttle Position Sensor Input Voltage High |
| 91 | 4 | 22 | Throttle Position Sensor Input Voltage Low |
| 92 | 0 | 58 | Torque Overload |
| 94 | 0 | 47 | Fuel Pressure High |
| 94 | 1 | 48 | Fuel Pressure Low |
| 94 | 3 | 37 | Fuel Pressure Sensor Input Voltage High |
| 94 | 4 | 38 | Fuel Pressure Sensor Input Voltage Low |
| 95 | 0 | 89 | Fuel Restriction High |
| 95 | 1 | 77 | Fuel Filter Differential Pressure Below Range (Release 31.0 or later) |
| 95 | 3 | 37 | Fuel Restriction Sensor Input Voltage High |
| 95 | 4 | 38 | Fuel Restriction Sensor Input Voltage Low |
| 98 | 0 | 83 | Oil Level High |
| 98 | 1 | 84 | Oil Level Low |
| 98 | 3 | 81 | Oil Level Sensor Input Voltage High |
| 98 | 4 | 82 | Oil Level Sensor Input Voltage Low |
| 99 | 0 | 74 | Oil Filter Restriction High |
| 99 | 1 | 77 | Oil Filter Differential Pressure Below Range (Release 31.0 or later) |
| 99 | 3 | 66 | Oil Filter Restriction Sensor Voltage High |
| 99 | 4 | 66 | Oil Filter Restriction Sensor Voltage Low |
| 100 | 0 | 77 | Engine Oil Pressure Above Range (Release 31.0 or later) |
| 100 | 1 | 45 | Oil Pressure Low |
| 100 | 3 | 35 | Oil Pressure Sensor Input Voltage High |
| 100 | 4 | 36 | Oil Pressure Sensor Input Voltage Low |
| 101 | 0 | 83 | Crankcase Pressure High |
| 101 | 1 | 84 | Crankcase Pressure Low |
| 101 | 3 | 81 | Crankcase Pressure Sensor Input Voltage High |
| 101 | 4 | 82 | Crankcase Pressure Sensor Input Voltage Low |
| 102 | 0 | 47 | Turbo Boost Pressure High |
| 102 | 1 | 77 | Turbo Boost Pressure Below Range (Release 31.0 or later) |
| 102 | 3 | 33 | Turbo Boost Pressure Sensor Input Voltage High |
| 102 | 4 | 34 | Turbo Boost Pressure Sensor Input Voltage Low |
| 103 | 0 | 64 | Turbo Overspeed |
| 103 | 8 | 64 | Turbo Speed Sensor Input Failure |
| 105 | 0 | 44 | Intake Manifold Temperature High |
| 105 | 1 | 77 | Inlet Manifold Temperature Below Range (Release 31.0 or later) |
| 105 | 3 | 27 | Intake Manifold Temperature Sensor Input Voltage High |
| 105 | 4 | 28 | Intake Manifold Temperature Sensor Input Voltage Low |
| 106 | 0 | 47 | Air Inlet Pressure High |

| PID | FMI | DDC Code # (Flashed) | Description |
|-----|-----|-------------------------|--|
| 106 | 1 | 48 | Air Inlet Pressure Low |
| 106 | 3 | 67 | Air Inlet Pressure Sensor Input Voltage High |
| 106 | 4 | 67 | Air Inlet Pressure Sensor Input Voltage Low |
| 107 | 0 | 73 | Air Filter Restriction High |
| 107 | 1 | 77 | Air Filter Differential Pressure Below Range (Release 31.0 or later) |
| 107 | 3 | 65 | Air Filter Restriction Sensor Voltage High |
| 107 | 4 | 65 | Air Filter Restriction Sensor Voltage Low |
| 108 | 0 | 77 | Barometric Pressure Above Range (Release 31.0 or later) |
| 108 | 1 | 77 | Barometric Pressure Below Range (Release 31.0 or later) |
| 108 | 3 | 86 | Barometric Pressure Sensor Input Voltage High |
| 108 | 4 | 87 | Barometric Pressure Sensor Input Voltage Low |
| 109 | 0 | 77 | Coolant Pressure Above Range (Release 31.0 or later) |
| 109 | 1 | 88 | Coolant Pressure Low |
| 109 | 3 | 67 | Coolant Pressure Sensor Input Voltage High |
| 109 | 4 | 67 | Coolant Pressure Sensor Input Voltage Low |
| 110 | 0 | 44 | Coolant Temperature High |
| 110 | 0 | 77 | Coolant Temperature Below Range (Release 31.0 or later) |
| 110 | 1 | 77 | Coolant Temperature Above Range (Release 31.0 or later) |
| 110 | 3 | 14 | Coolant Temperature Sensor Input Voltage High |
| 110 | 4 | 15 | Coolant Temperature Sensor Input Voltage Low |
| 111 | 1 | 43 | Coolant Level Low |
| 111 | 3 | 16 | Coolant Level Sensor Input Voltage High |
| 111 | 4 | 13 | Coolant Level Sensor Input Voltage Low |
| 111 | 5 | 16 | Add Coolant Level Sensor Input Voltage High |
| 111 | 6 | 13 | Add Coolant Level Sensor Input Voltage Low |
| 111 | 12 | 89 | Maintenance Alert Coolant Level Fault |
| 121 | 0 | 76 | Engine Overspeed With Engine Brake |
| 153 | 3 | 81 | Extended Crankcase Pressure Sensor Input Voltage High (Release 27.0 or later) |
| 153 | 4 | 82 | Extended Crankcase Pressure Sensor Input Voltage Low (Release 27.0 or later) |
| 153 | 0 | 83 | Extended Crankcase Pressure High (Release 27.0 or later) |
| 153 | 1 | 84 | Extended Crankcase Pressure Low (Release 27.0 or later) |
| 164 | 0 | 47 | Injection Control Pressure High |
| 164 | 1 | 48 | Injection Control Pressure Low |
| 164 | 3 | 81 | Injection Control Pressure Circuit Voltage High |
| 164 | 4 | 82 | Injection Control Pressure Sensor Input Voltage Low |
| 168 | 0 | 75 | ECM Battery Voltage High |
| 168 | 1 | 46 | ECM Battery Voltage Low |
| 171 | 0 | 77 | Ambient Air Temperature Above Range (release 31.0 or later) |
| 171 | 1 | 77 | Ambient Air Temperature Below Range (release 31.0 or later) |
| 171 | 3 | 27 | Ambient Air Temperature Sensor Input Voltage High (Release 2.00 or later only) |

| PID | FMI | DDC Code # (Flashed) | Description |
|-----|-----|-------------------------|---|
| 171 | 4 | 28 | Ambient Air Temperature Circuit Failed Low (Release 2.0 or later only) |
| 172 | 0 | 44 | Air Inlet Temperature High |
| 172 | 1 | 77 | Air Inlet Temperature Below Range (Release 31.0 or later) |
| 172 | 3 | 27 | Air Temperature Sensor Input Voltage High |
| 172 | 4 | 28 | Air Temperature Sensor Input Voltage Low |
| 173 | 0 | 83 | Exhaust Temperature High |
| 173 | 3 | 81 | Exhaust Temperature Sensor Input Voltage High |
| 173 | 4 | 82 | Exhaust Temperature Sensor Input Voltage Low |
| 174 | 0 | 77 | Fuel Temperature Above Range |
| 174 | 1 | 77 | Fuel Temperature Below Range |
| 174 | 3 | 23 | Fuel Temperature Sensor Input Voltage High |
| 174 | 4 | 24 | Fuel Temperature Sensor Input Voltage Low |
| 175 | 0 | 44 | Oil Temperature High |
| 175 | 1 | 77 | Engine Oil Temperature Below Range (Release 31.0 or later) |
| 175 | 3 | 14 | Oil Temperature Sensor Input Voltage High |
| 175 | 4 | 15 | Oil Temperature Sensor Input Voltage Low |
| 177 | 0 | 77 | Transmission Oil Temperature Above Range (Release 31.0 or later) |
| 177 | 1 | 77 | Transmission Oil Temperature Below Range (Release 31.0 or later) |
| 177 | 3 | 77 | Transmission Oil Temperature Failed High (Release 31.0 or later) |
| 177 | 4 | 77 | Transmission Oil Temperature Failed Low (Release 31.0 or later) |
| 187 | 3 | 12 | Variable Speed Governor Sensor Voltage High |
| 187 | 4 | 11 | Variable Speed Governor Sensor Voltage Low |
| 187 | 7 | 11 | Variable Speed Governor Switch System Not Responding |
| 190 | 0 | 85 | Engine Overspeed |
| 190 | 14 | 85 | Engine Overspeed Signal (Release 28.0 or later) |
| 222 | 14 | 77 | Anti-Theft Fault Present (Release 31.0 or later) |
| 240 | 2 | -- | Fram Checksum Incorrect |
| 251 | 10 | 77 | Clock Module Abnormal Rate of Change (Release 31.0) |
| 251 | 13 | 77 | Clock Module Failure (Release 31.0) |
| 252 | 10 | 77 | Clock Module Abnormal Rate of Change (Release 31.0) |
| 252 | 13 | 77 | Clock Module Failure (Release 31.0) |

A.2 SIDS

The codes listed are sorted by SID.

| SID | FMI | DDC Code # (Flashed) | Description |
|-----|-----|-------------------------|---|
| xxx | 0 | 61 | Injector xxx Response Time Long |
| xxx | 1 | 71 | Injector xxx Response Time Short |
| 20 | 3 | 81 | Timing Actuator (Dual Fuel) Input Voltage High |
| 20 | 4 | 82 | Timing Actuator (Dual Fuel) Input Voltage Low |
| 21 | 0 | 41 | Too many SRS (missing TRS) |
| 21 | 1 | 42 | Too few SRS (missing SRS) |
| 25 | 11 | 26 | Aux. Shutdown #1 Active |
| 26 | 3 | 62 | Aux. Output #1 Short to Battery (+) - F3 |
| 26 | 4 | 62 | Aux. Output #1 Open Circuit - F3 |
| 26 | 7 | 62 | Aux. Output #1 Mechanical System Not Responding Properly - F3 |
| 40 | 3 | 62 | Aux. Output #2 Short to Battery (+) - A2 |
| 40 | 4 | 62 | Aux. Output #2 Open Circuit - A2 |
| 40 | 7 | 62 | Aux. Output #2 Mechanical System Not Responding Properly - A2 |
| 51 | 3 | 31 | Aux. Output #3 Open Circuit (High Side) - S3 |
| 51 | 4 | 31 | Aux. Output #3 Short To Ground (High Side) - S3 |
| 51 | 7 | 31 | Aux. Output #3 Mechanical System Fail - S3 |
| 52 | 3 | 31 | Aux. Output #4 Open Circuit (High Side) - T3 |
| 52 | 4 | 31 | Aux. Output #4 Short To Ground (High Side) - T3 |
| 52 | 7 | 31 | Aux. Output #4 Mechanical System Fail - T3 |
| 53 | 3 | 62 | Aux. Output #5 Short to Battery (+) - W3 |
| 53 | 4 | 62 | Aux. Output #5 Open Circuit - W3 |
| 53 | 7 | 62 | Aux. Output #5 Mechanical System Not Responding Properly - W3 |
| 54 | 3 | 62 | Aux. Output #6 Short to Battery (+) - X3 |
| 54 | 4 | 62 | Aux. Output #6 Open Circuit - X3 |
| 54 | 7 | 62 | Aux. Output #6 Mechanical System Not Responding Properly - X3 |
| 55 | 3 | 62 | Aux. Output #7 Short to Battery (+) - Y3 |
| 55 | 4 | 62 | Aux. Output #7 Open Circuit - Y3 |
| 55 | 7 | 62 | Aux. Output #7 Mechanical System Not Responding Properly - Y3 |
| 56 | 3 | 62 | Aux. Output #8 Short to Battery (+) - A1 |
| 56 | 4 | 62 | Aux. Output #8 Open Circuit - A1 |
| 56 | 7 | 62 | Aux. Output #8 Mechanical System Not Responding Properly - A1 |
| 57 | 0 | 63 | PWM #1 Above Normal Range |
| 57 | 1 | 63 | PWM #1 Below Normal Range |
| 57 | 3 | 63 | PWM #1 Short to Battery (+) |
| 57 | 4 | 63 | PWM #1 Open Circuit |
| 58 | 0 | 63 | PWM #2 Above Normal Range |
| 58 | 1 | 63 | PWM #2 Below Normal Range |
| 58 | 3 | 63 | PWM #2 Short to Battery (+) |

| SID | FMI | DDC Code # (Flashed) | Description |
|-----|-----|-------------------------|--|
| 58 | 4 | 63 | PWM #2 Open Circuit |
| 59 | 0 | 63 | PWM #3 Above Normal Range |
| 59 | 1 | 63 | PWM #3 Below Normal Range |
| 59 | 3 | 63 | PWM #3 Short to Battery (+) |
| 59 | 4 | 63 | PWM #3 Open Circuit |
| 60 | 0 | 63 | PWM #4 Above Normal Range |
| 60 | 1 | 63 | PWM #4 Below Normal Range |
| 60 | 3 | 63 | PWM #4 Short to Battery (+) |
| 60 | 4 | 63 | PWM #4 Open Circuit |
| 61 | 11 | 26 | Aux. Shutdown #2 Active |
| 65 | 0 | 72 | Oxygen Content Too High |
| 65 | 1 | 72 | Oxygen Content Too Low |
| 65 | 3 | 23 | Oxygen Content Circuit Input Voltage High |
| 65 | 4 | 24 | Oxygen Content Circuit Input Voltage Low |
| 76 | 0 | 66 | Engine Knock Level Above Normal Range |
| 76 | 3 | 66 | Engine Knock Level Sensor Input Voltage High |
| 76 | 4 | 66 | Engine Knock Level Sensor Input Voltage Low |
| 76 | 7 | 66 | Engine Knock Level Sensor Not Responding |
| 77 | 0 | 73 | Gas Valve Position Above Normal Range |
| 77 | 1 | 73 | Gas Valve Position Below Normal Range |
| 77 | 3 | 73 | Gas Valve Position Input Voltage High |
| 77 | 4 | 73 | Gas Valve Position Input Voltage Low |
| 77 | 7 | 73 | Gas Metering Valve Not Responding |
| 151 | 14 | 73 | ESS Transmission Stuck in Gear |
| 152 | 7 | 39 | EGR Valve Not Responding (Release 29.0 or later) |
| 153 | 7 | 39 | VNT Vanes Not Responding (Release 29.0 or later) |
| 154 | 1 | 48 | EGR Temperature Low (Release 29.0 or later) |
| 154 | 3 | 81 | EGR Temperature Low (Release 29.0 or later) |
| 154 | 4 | 82 | EGR Temperature Input Voltage Low (Release 29.0 or later) |
| 154 | 0 | 83 | EGR Gas Temperature High |
| 155 | 1 | 48 | EGR Delta Pressure Low (Release 29.0 or later) |
| 155 | 3 | 81 | EGR Delta Pressure Input Voltage High (Release 29.0 or later) |
| 155 | 4 | 82 | EGR Delta Pressure Input Voltage Low (Release 29.0 or later) |
| 155 | 0 | 83 | EGR Delta Pressure High |
| 214 | 1 | 46 | RTC Backup Battery Voltage Low (Release 29.0 or later) |
| 214 | 0 | 75 | RTC Backup Battery Voltage High (Release 29.0 or later) |
| 216 | 14 | 55 | Other ECU Fault (Release 27.0 or later) (This fault is logged in conjunction with another fault to indicate missing information from another ECU.) |
| 226 | 11 | 73 | Transmission Neutral Switch Failure (ESS Transmission) |
| 227 | 2 | 73 | Aux Analog Input Data Erratic, Intermittent, or Incorrect (ESS Transmission) |
| 227 | 3 | 73 | Aux Analog Input #1 Voltage High (ESS Transmission) |

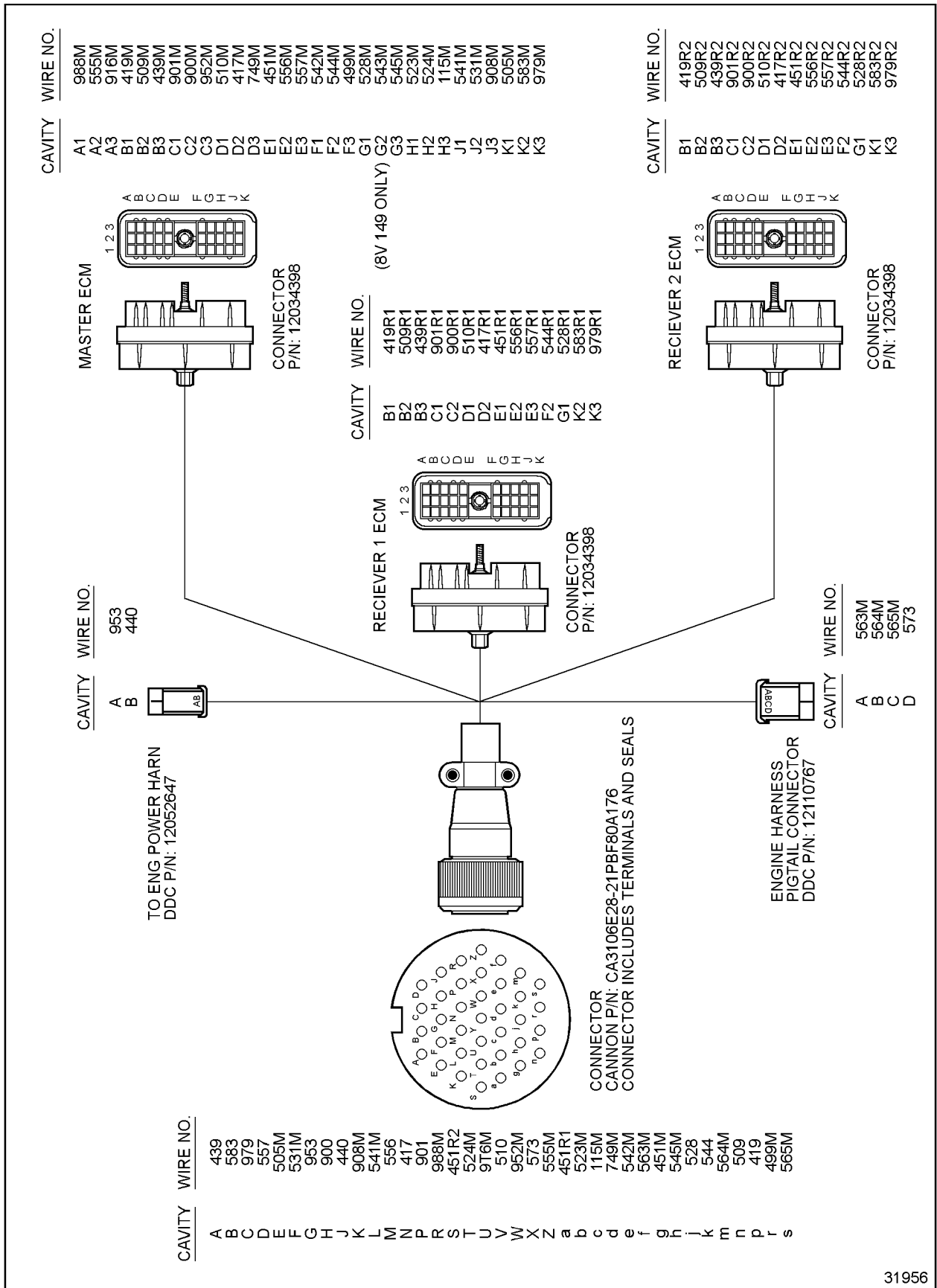
| SID | FMI | DDC Code # (Flashed) | Description |
|-----|-----|-------------------------|---|
| 227 | 4 | 73 | Aux Analog Input #1 Voltage Low (ESS Transmission) |
| 230 | 5 | 68 | TPS Idle Validation Circuit Fault (open circuit) |
| 230 | 6 | 68 | TPS Idle Validation Circuit Fault (short to ground) |
| 231 | 12 | 55 | J1939 Data Link Fault |
| 232 | 0 | 75 | Sensor Supply Voltage High |
| 232 | 1 | 46 | Sensor supply Voltage Low |
| 238 | 3 | 32 | SEL Short to Battery (+) |
| 238 | 4 | 32 | SEL Open Circuit |
| 239 | 3 | 32 | CEL Short to Battery (+) |
| 239 | 4 | 32 | CEL Open Circuit |
| 248 | 8 | 55 | Proprietary Data Link Fault (Master) |
| 248 | 9 | 55 | Proprietary Data Link Fault (Receiver) |
| 249 | 12 | 57 | J1922 Data Link Fault |
| 250 | 12 | 56 | J1587 Data Link Fault |
| 253 | 2 | 53 | Nonvolatile Checksum Incorrect |
| 253 | 12 | 53 | EEPROM Write Error |
| 253 | 13 | -- | Incompatible Calibration Version |
| 253 | 13 | 53 | Out of Calibration |
| 254 | 0 | -- | External Failed RAM |
| 254 | 1 | -- | Internal Failed RAM |
| 254 | 6 | -- | Entered Boot Via Switches |
| 254 | 12 | 52 | A/D Conversion Fail |

APPENDIX B: HARNESS WIRING DIAGRAMS

| | | |
|-------------|---|------|
| Figure B-1 | Engine Interface Harness - Series 149 Multi-ECMs | B-3 |
| Figure B-2 | Engine Interface Harness, Series 4000, Multi-ECM | B-4 |
| Figure B-3 | Engine Power Harness- Series 4000, Multi-ECM | B-5 |
| Figure B-4 | Engine Power Harness — Series 149 Multi-ECM | B-6 |
| Figure B-5 | Optional Engine Power Harness - Series 2000 Multi-ECM | B-7 |
| Figure B-6 | Vehicle Power Harness - Series 2000, Multi-ECM | B-8 |
| Figure B-7 | Vehicle Power Harness - Series 149 | B-9 |
| Figure B-8 | Vehicle Power Harness - Series 4000 | B-10 |
| Figure B-9 | Injector Harness Schematic - Series 92-6V | B-11 |
| Figure B-10 | Injector Harness Schematic -Series 92-8V and Series 149- 8V | B-12 |
| Figure B-11 | Injector Harness Schematic - Series 60 | B-13 |
| Figure B-12 | Injector Harness Schematic - Series 60 with Jake Brake | B-14 |
| Figure B-13 | Injector Harness Schematic - Series 50 | B-15 |
| Figure B-14 | Injector Harness Schematic - Series 50 with Jake Brake | B-16 |
| Figure B-15 | Injector Harness Schematic - Series 2000-8V | B-17 |

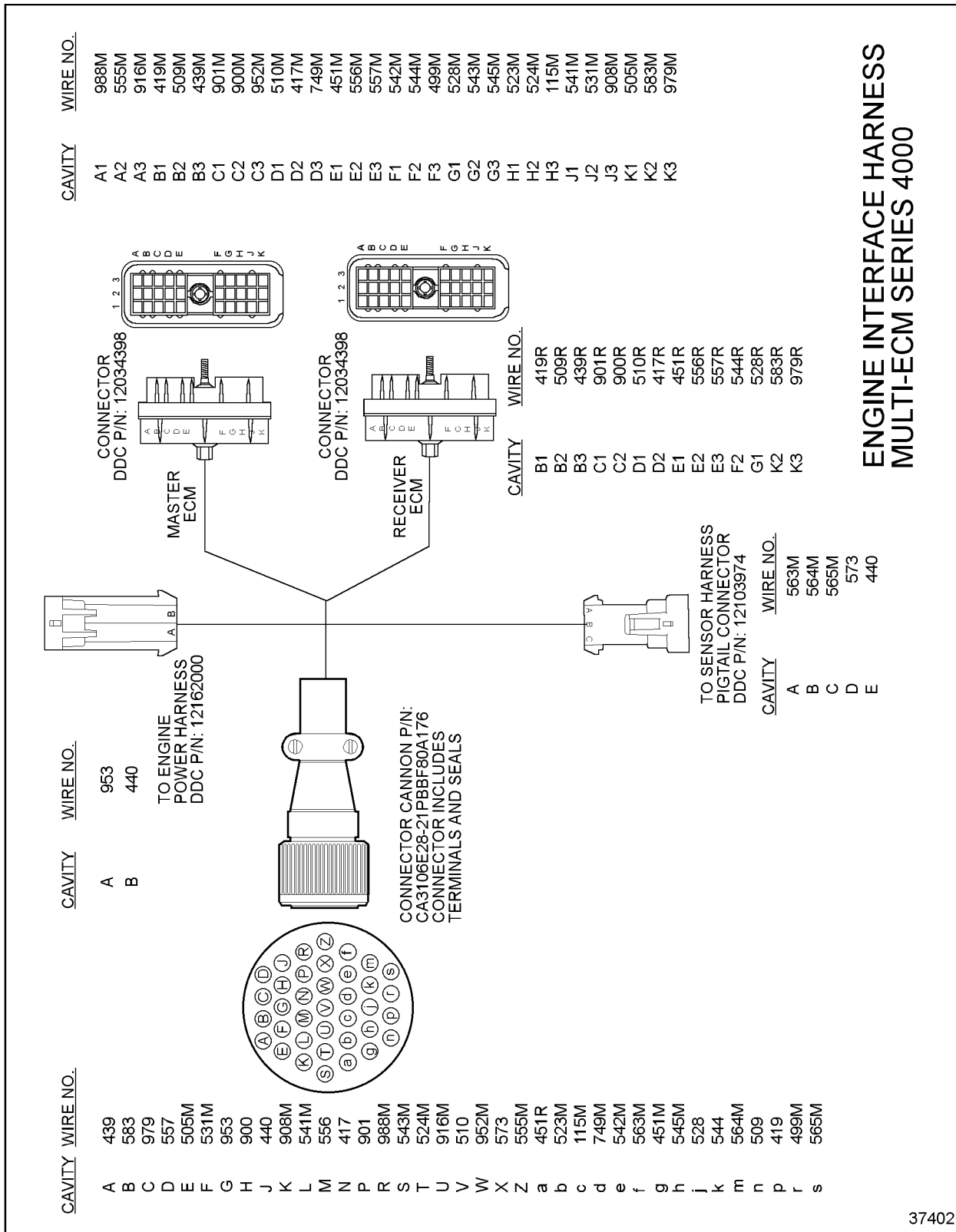
The following harness schematics may be found on the DDC extranet:

- Vehicle Interface Harness
- Vehicle Interface Harness - Series 4000
- Vehicle Interface Harness - Series 2000 Single-ECM
- Vehicle Interface Harness - Series 2000 Multi-ECM (1 of 2)
- Vehicle Interface Harness - Series 2000 Multi-ECM (2 of 2)
- Engine Sensor Harness - Series 60/50
- Engine Sensor Harness - Series 4000-12V & 16V
- Engine Sensor Harness - Series 149
- Engine Sensor Harness - Series 2000-8V
- Engine Sensor Harness - Series 2000-12V & 16V
- Engine Interface Harness,-Series 2000, Multi-ECM
- Injector Harness Schematic - Series 71-12V and Series 149-12V
- Injector Harness Schematic - Series 92-12V
- Injector Harness Schematic - Series 92-16V
- Injector Harness Schematic - Series 149-16V
- Injector Harness Schematic - Series 149-20V
- Injector Harness Schematic - Series 4000-12V
- Injector Harness Schematic - Series 4000-16V
- Injector Harness Schematic - Series 2000-12V
- Injector Harness Schematic - Series 2000-16V
- 12V Series 4000 Marine Exhaust Temperature Sensors
- 8V Series 4000 Marine Exhaust Temperature Sensors
- 16V Series 4000 Marine Exhaust Temperature Sensors
- 12V and 16V Series 4000 Marine Engine Harness



31956

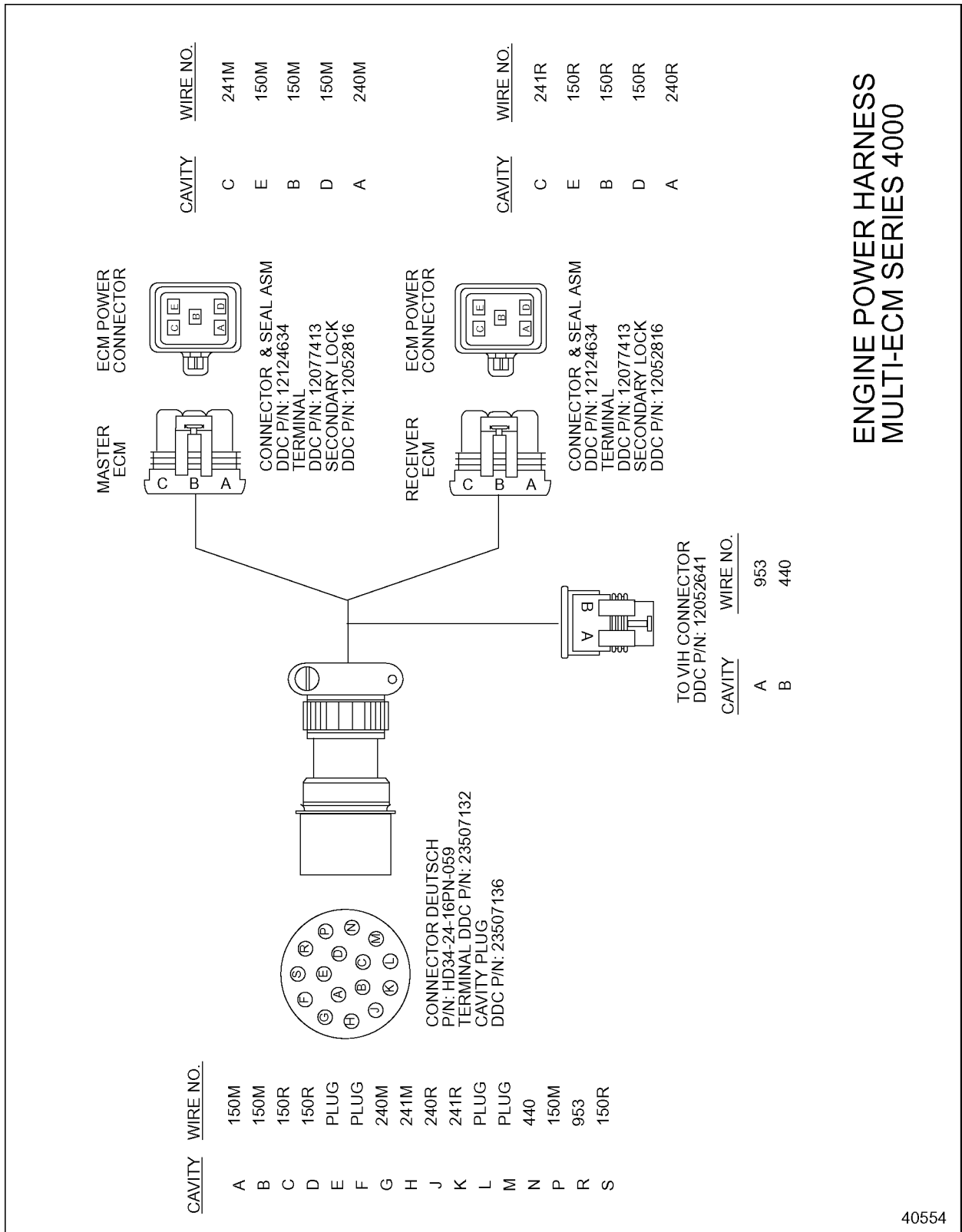
Figure B-1 Engine Interface Harness - Series 149 Multi-ECMs



**ENGINE INTERFACE HARNESS
MULTI-ECM SERIES 4000**

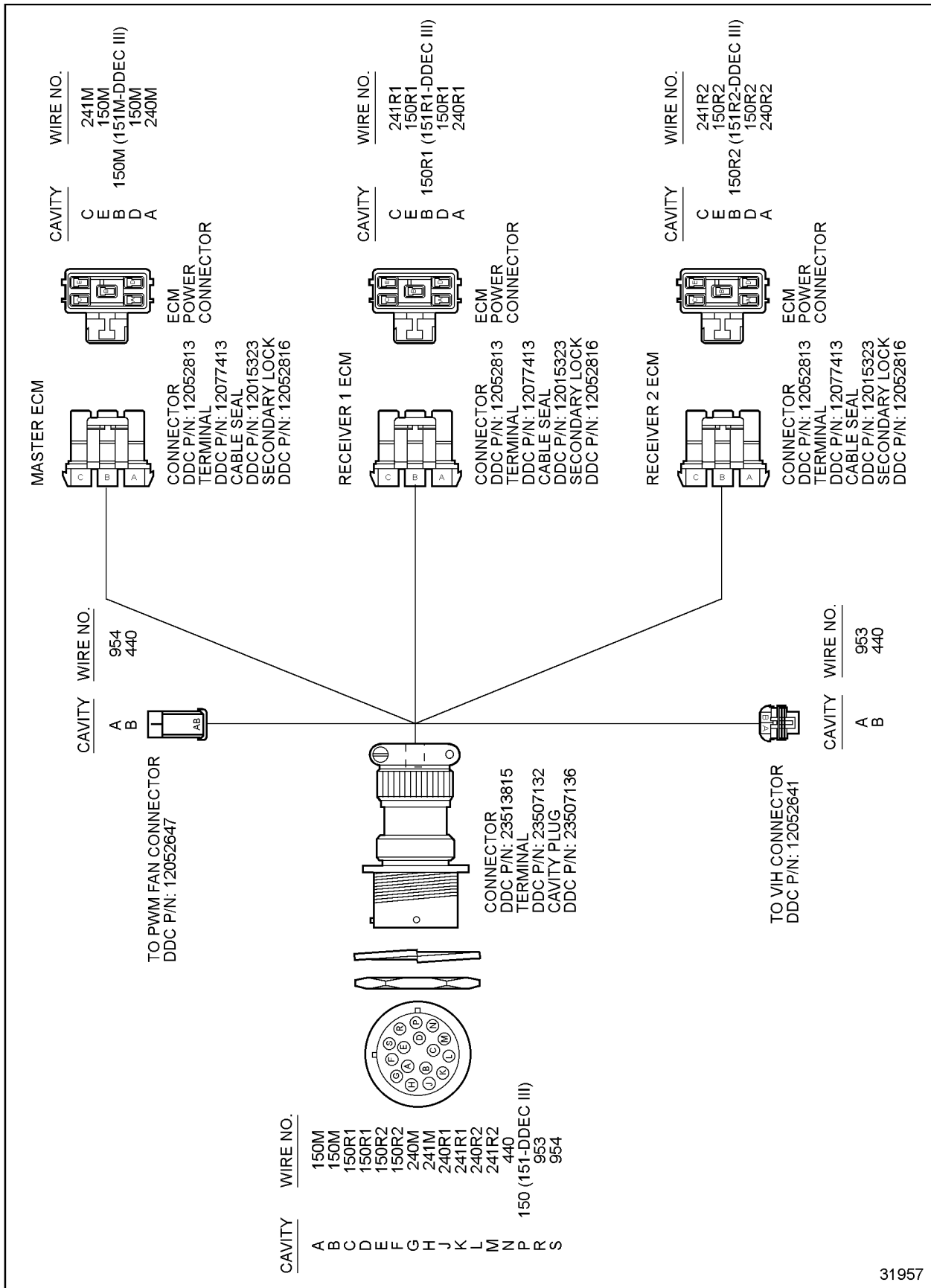
37402

Figure B-2 Engine Interface Harness, Series 4000, Multi-ECM



40554

Figure B-3 Engine Power Harness- Series 4000, Multi-ECM



31957

Figure B-4 Engine Power Harness — Series 149 Multi-ECM

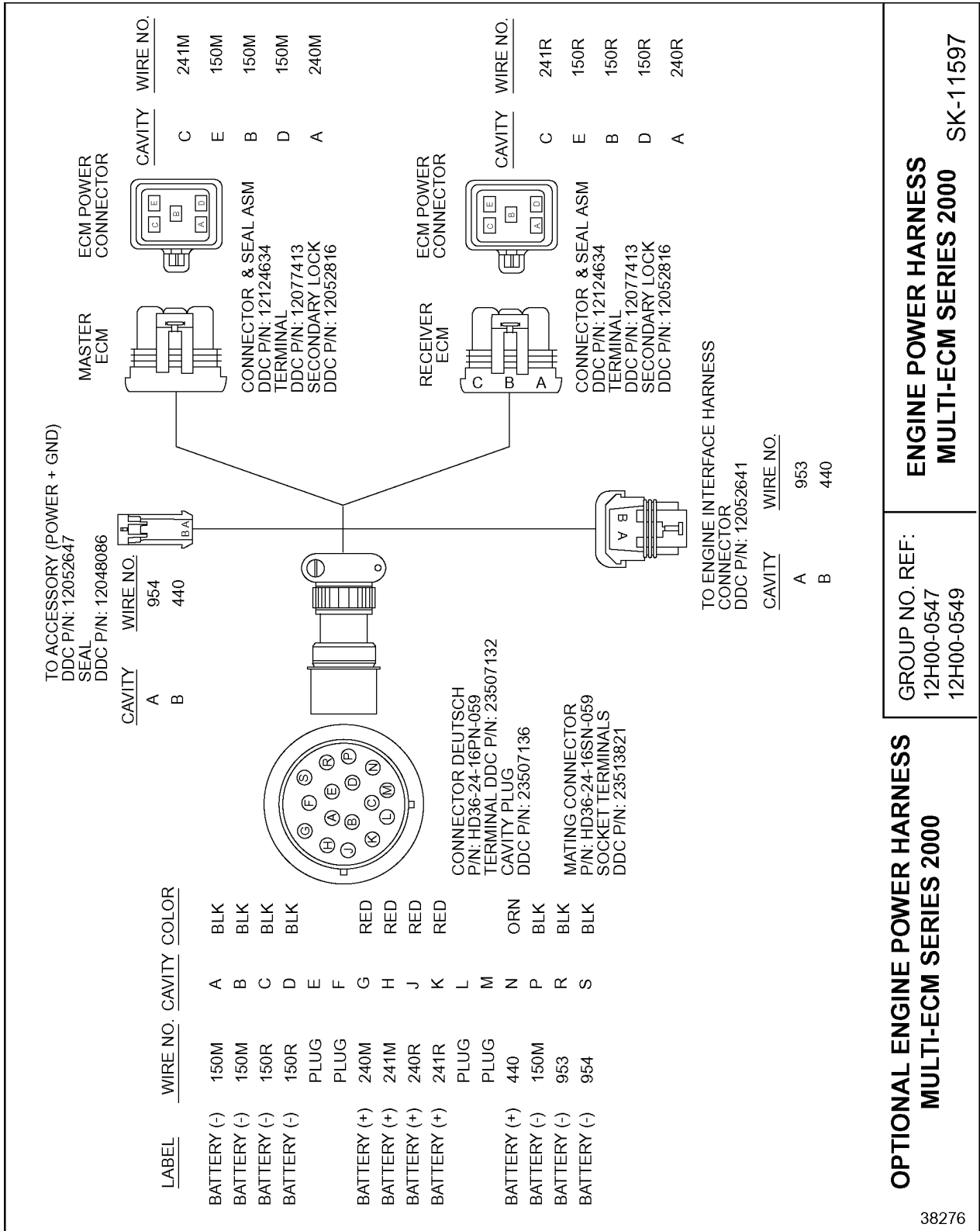


Figure B-5 Optional Engine Power Harness - Series 2000 Multi-ECM

OPTIONAL ENGINE POWER HARNESS
 MULTI-ECM SERIES 2000

GROUP NO. REF:
 12H00-0547
 12H00-0549

ENGINE POWER HARNESS
 MULTI-ECM SERIES 2000

SK-11597

38276

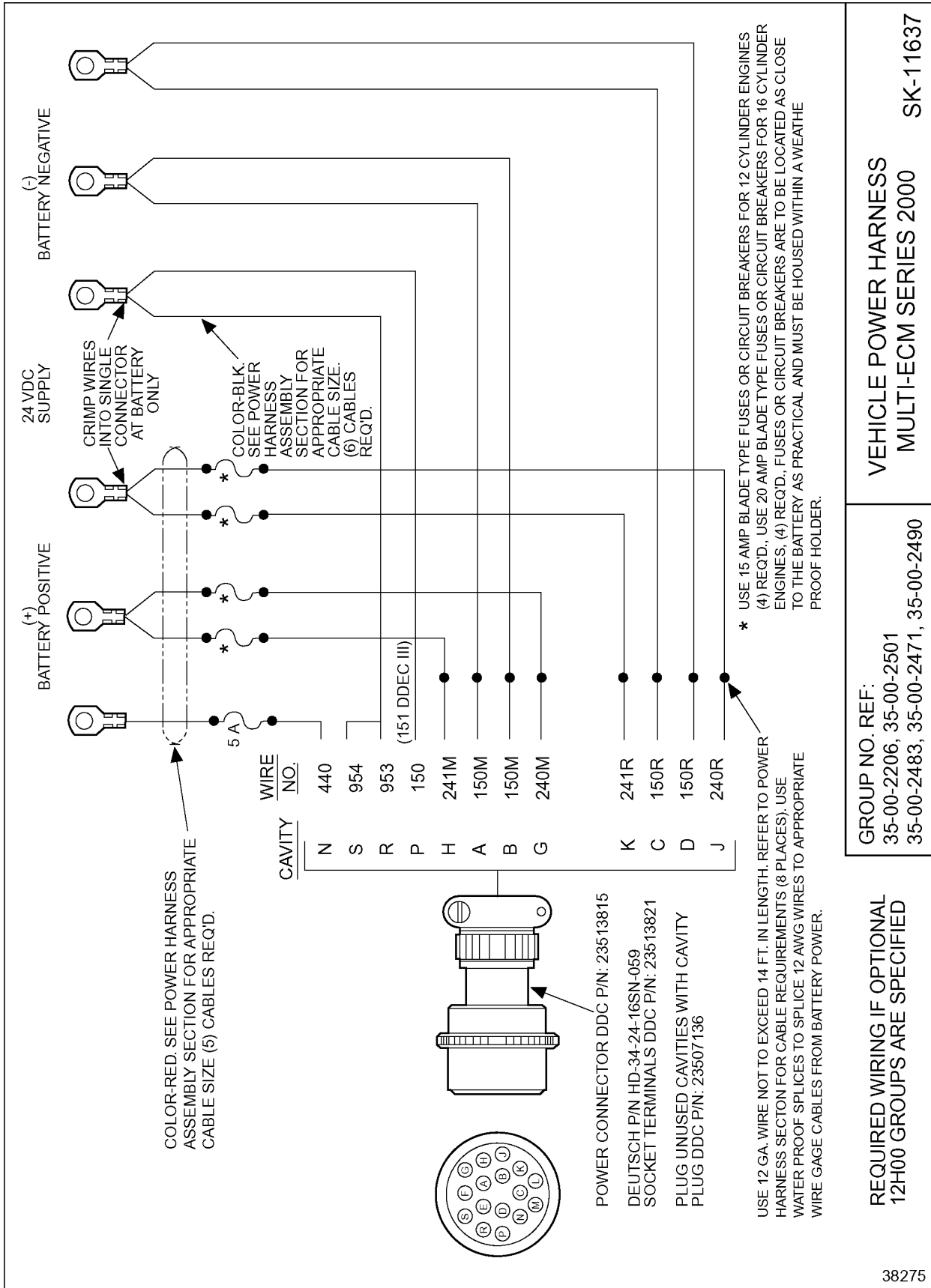


Figure B-6 Vehicle Power Harness - Series 2000, Multi-ECM

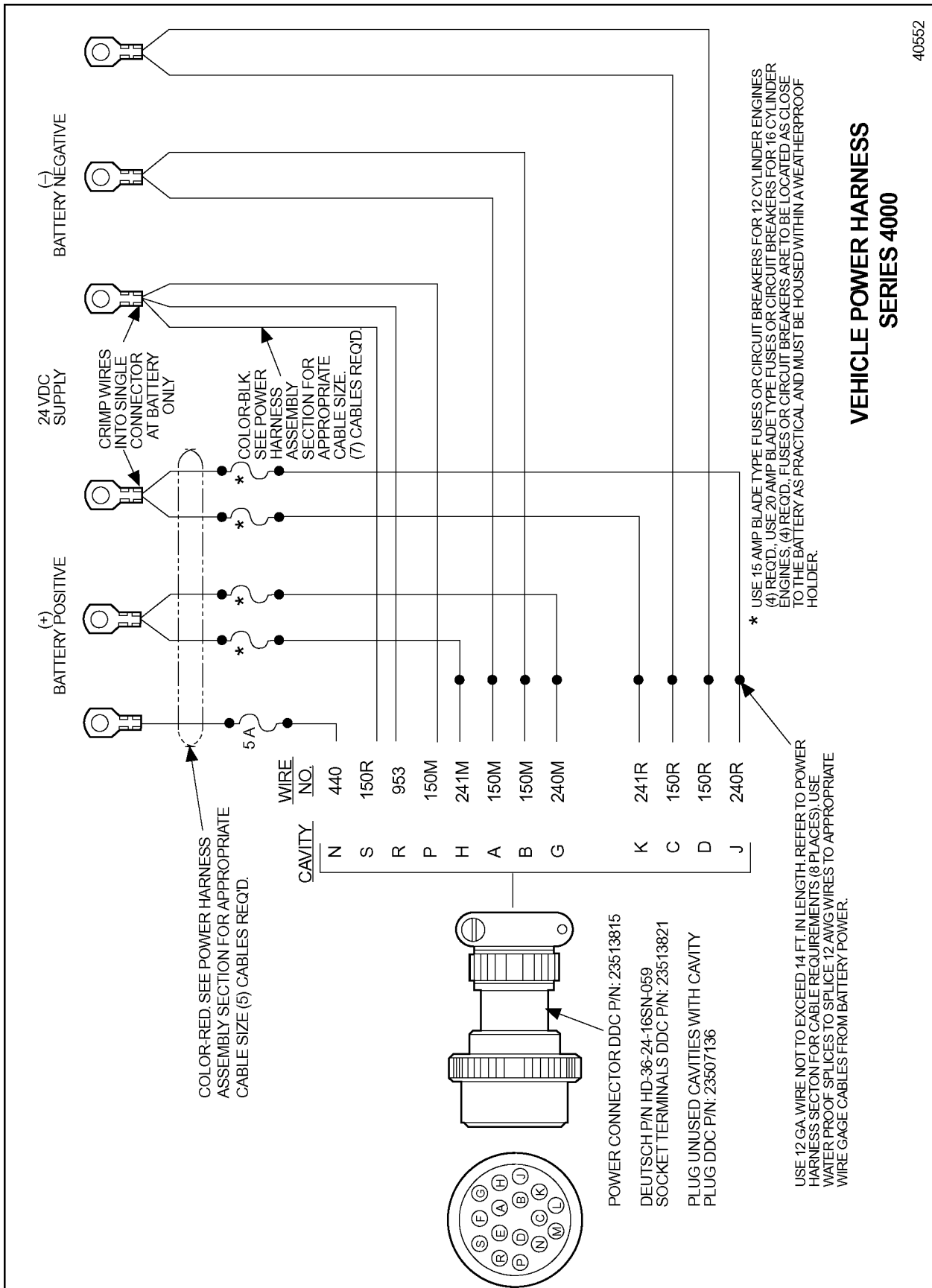


Figure B-8 Vehicle Power Harness - Series 4000

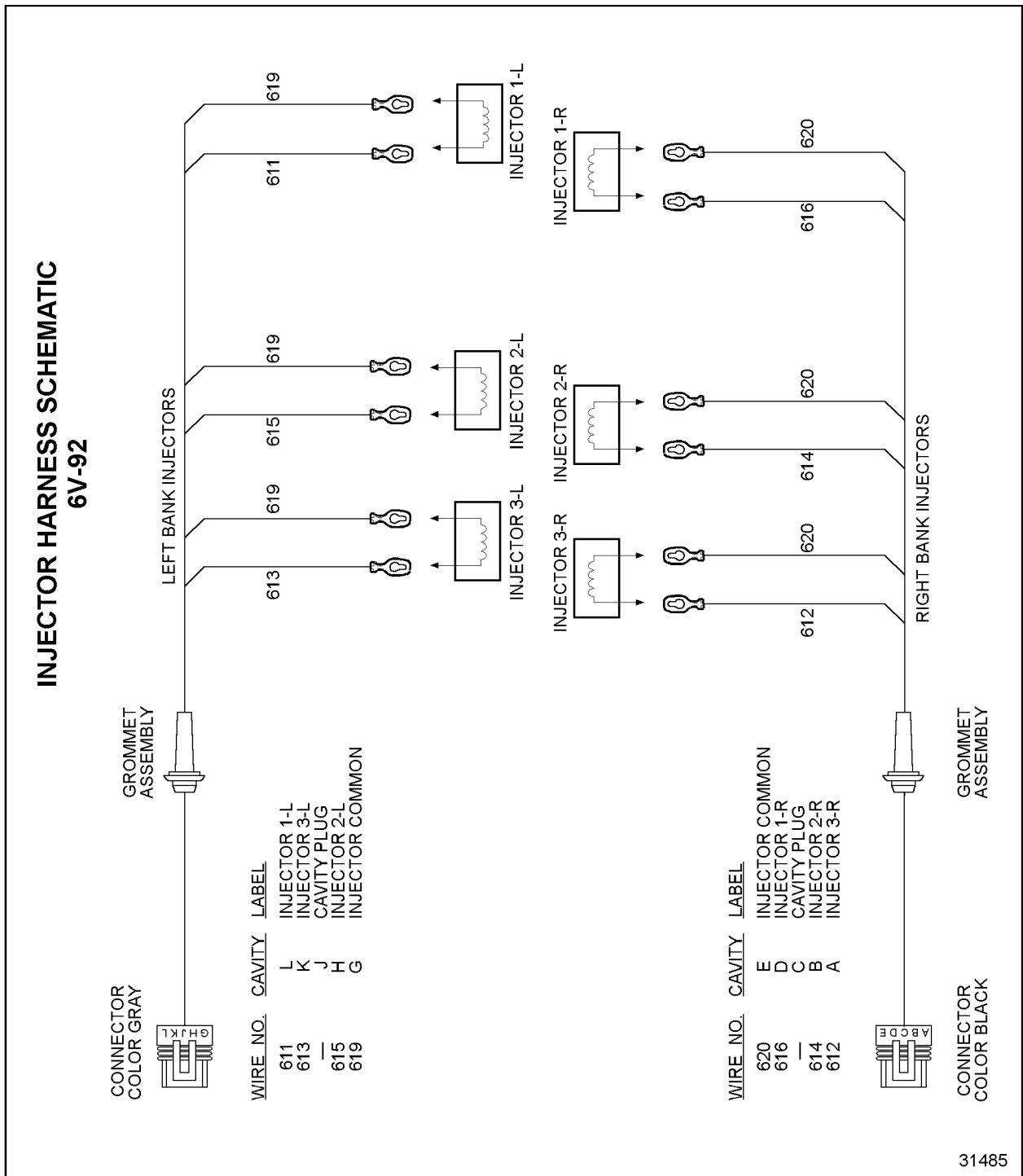


Figure B-9 Injector Harness Schematic - Series 92-6V

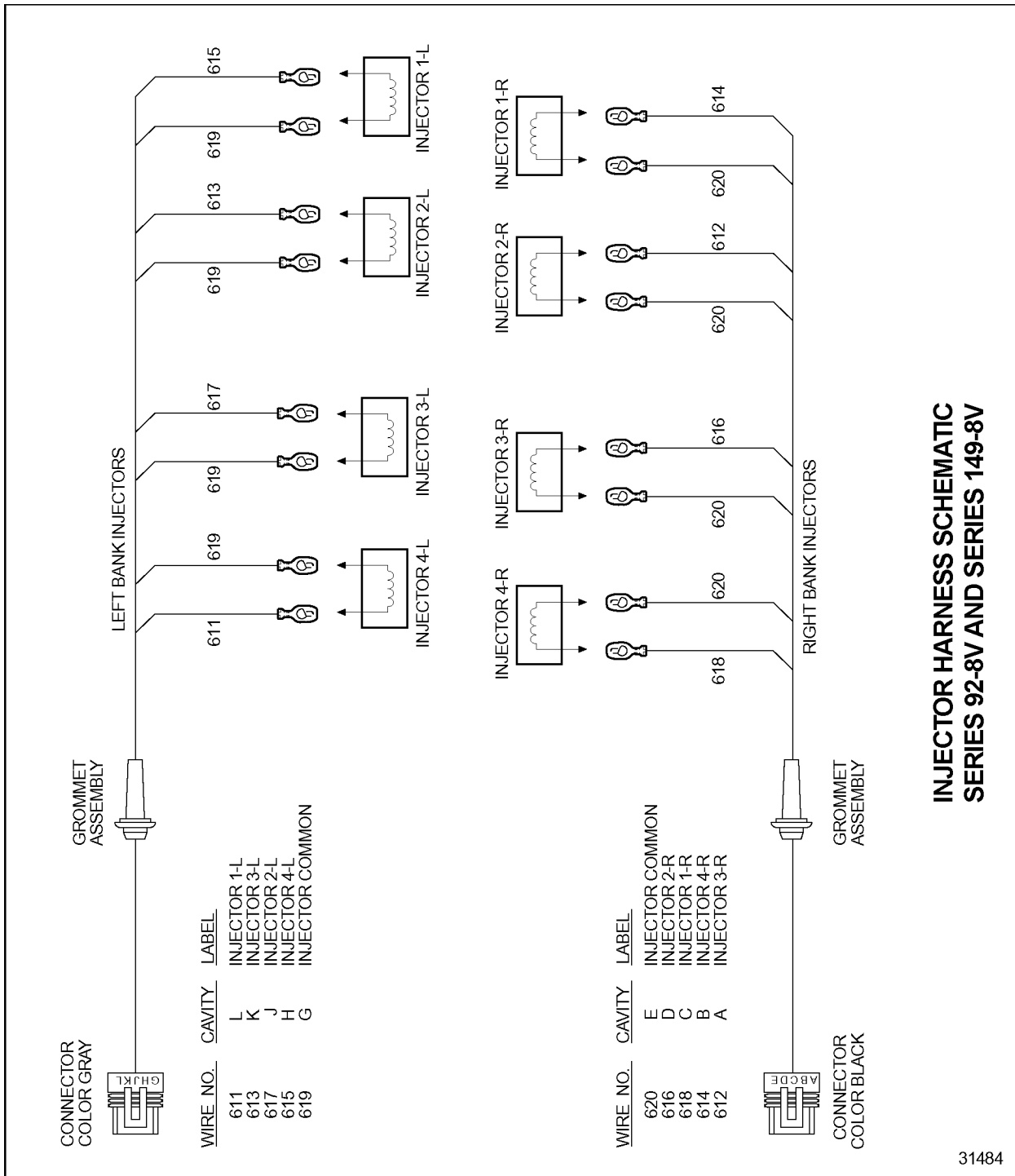
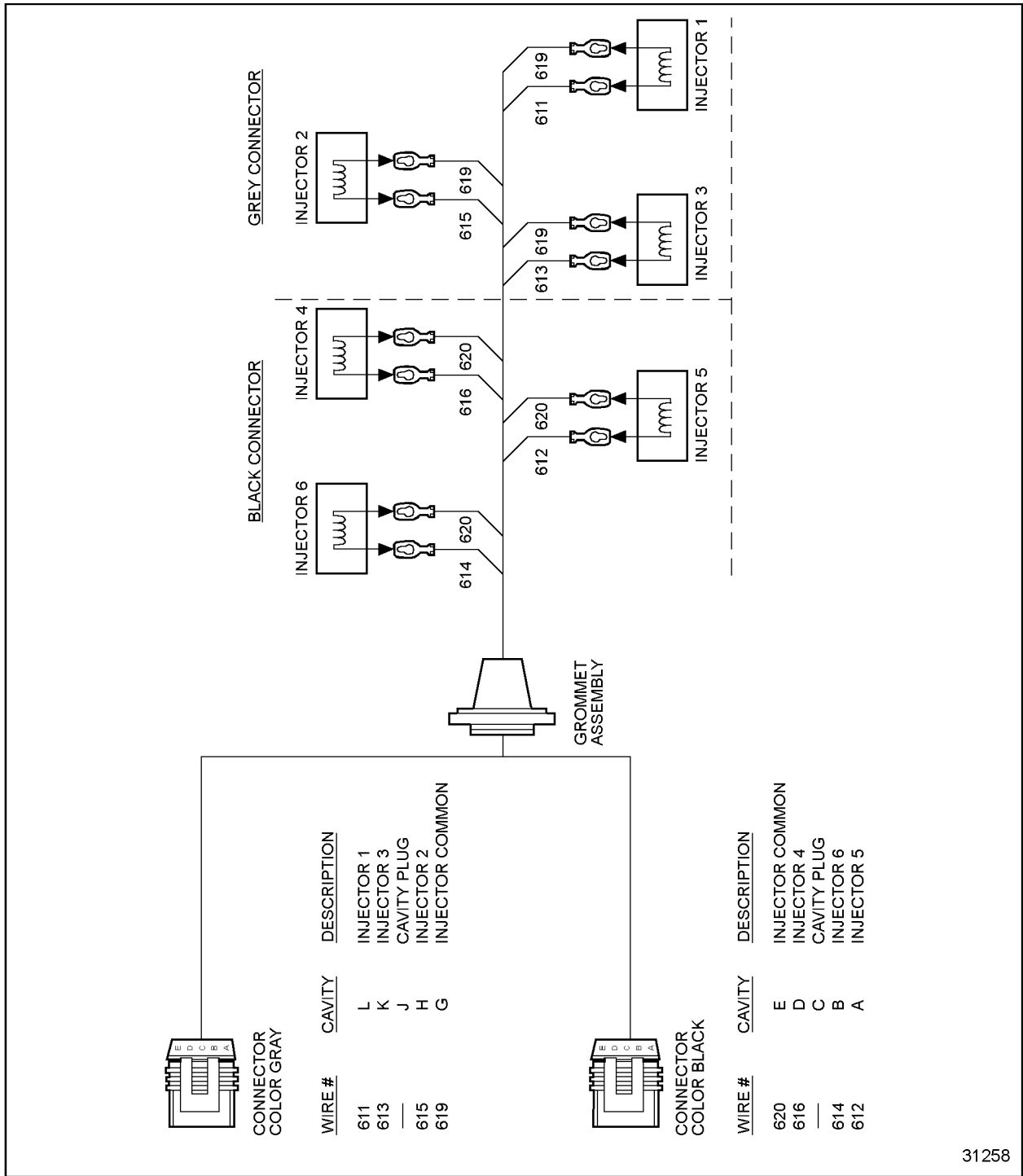


Figure B-10 Injector Harness Schematic -Series 92-8V and Series 149- 8V



31258

Figure B-11 Injector Harness Schematic - Series 60

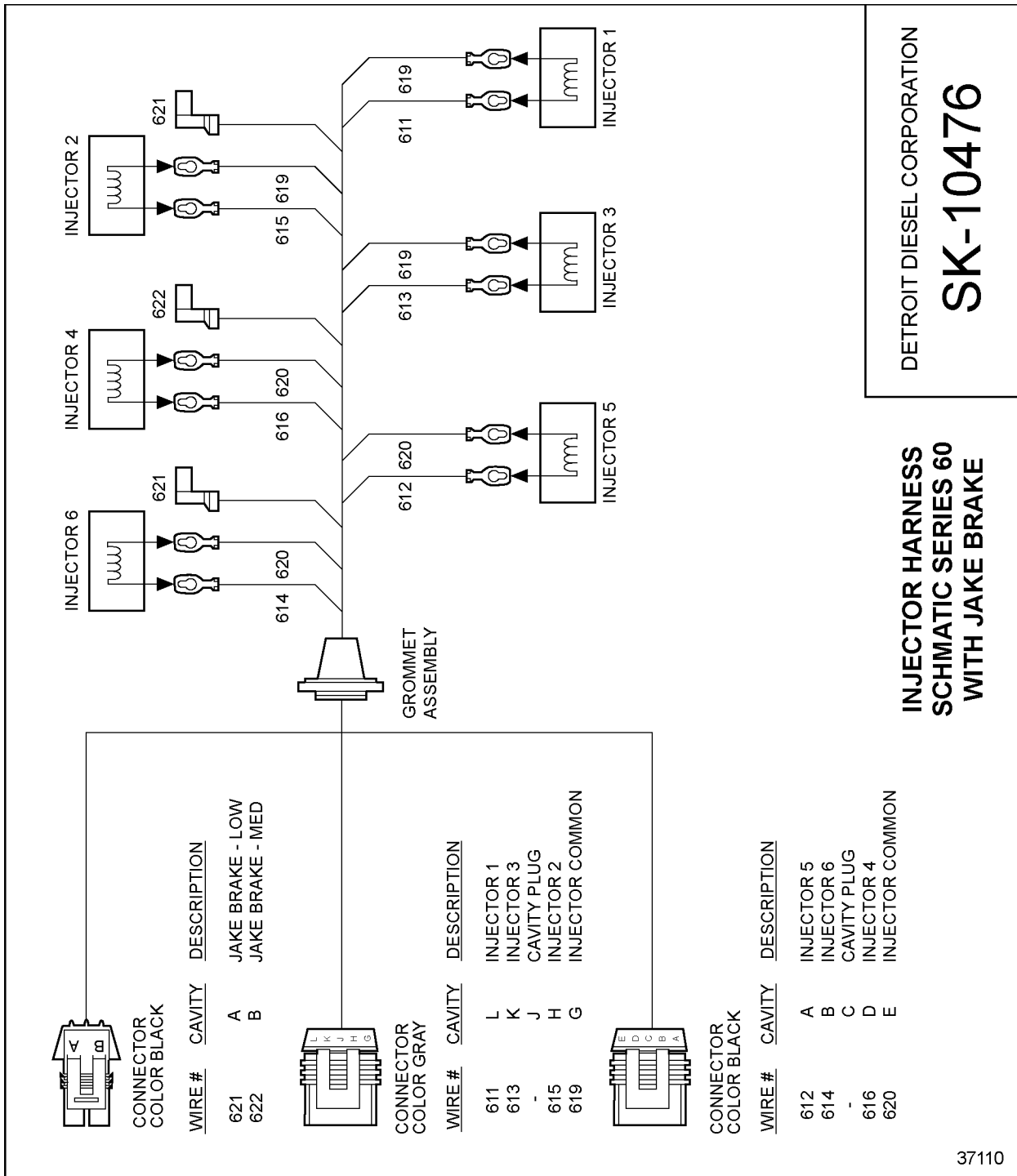
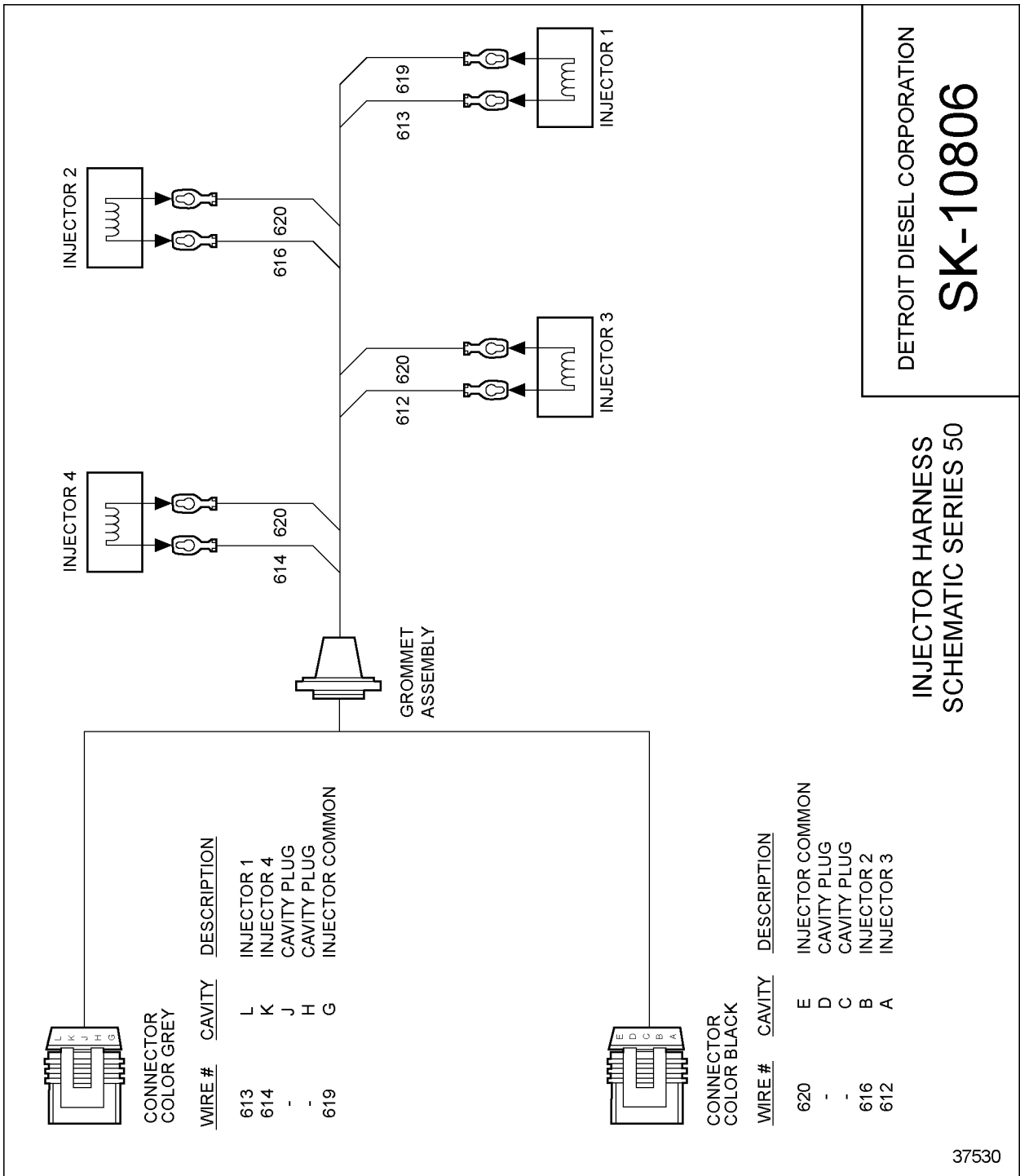


Figure B-12 Injector Harness Schematic - Series 60 with Jake Brake



DETROIT DIESEL CORPORATION
SK-10806

**INJECTOR HARNESS
SCHEMATIC SERIES 50**

37530

Figure B-13 Injector Harness Schematic - Series 50

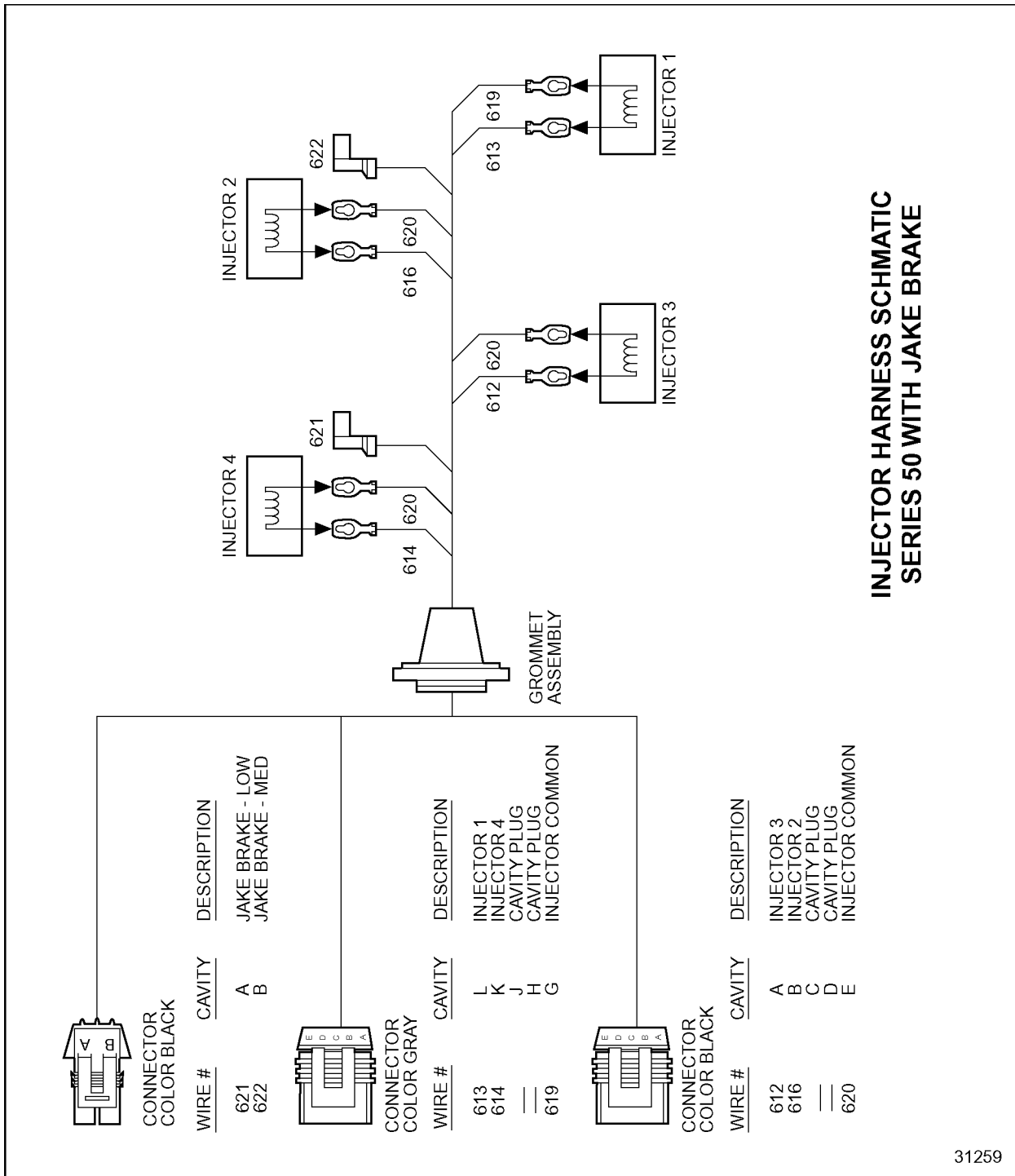


Figure B-14 Injector Harness Schematic - Series 50 with Jake Brake

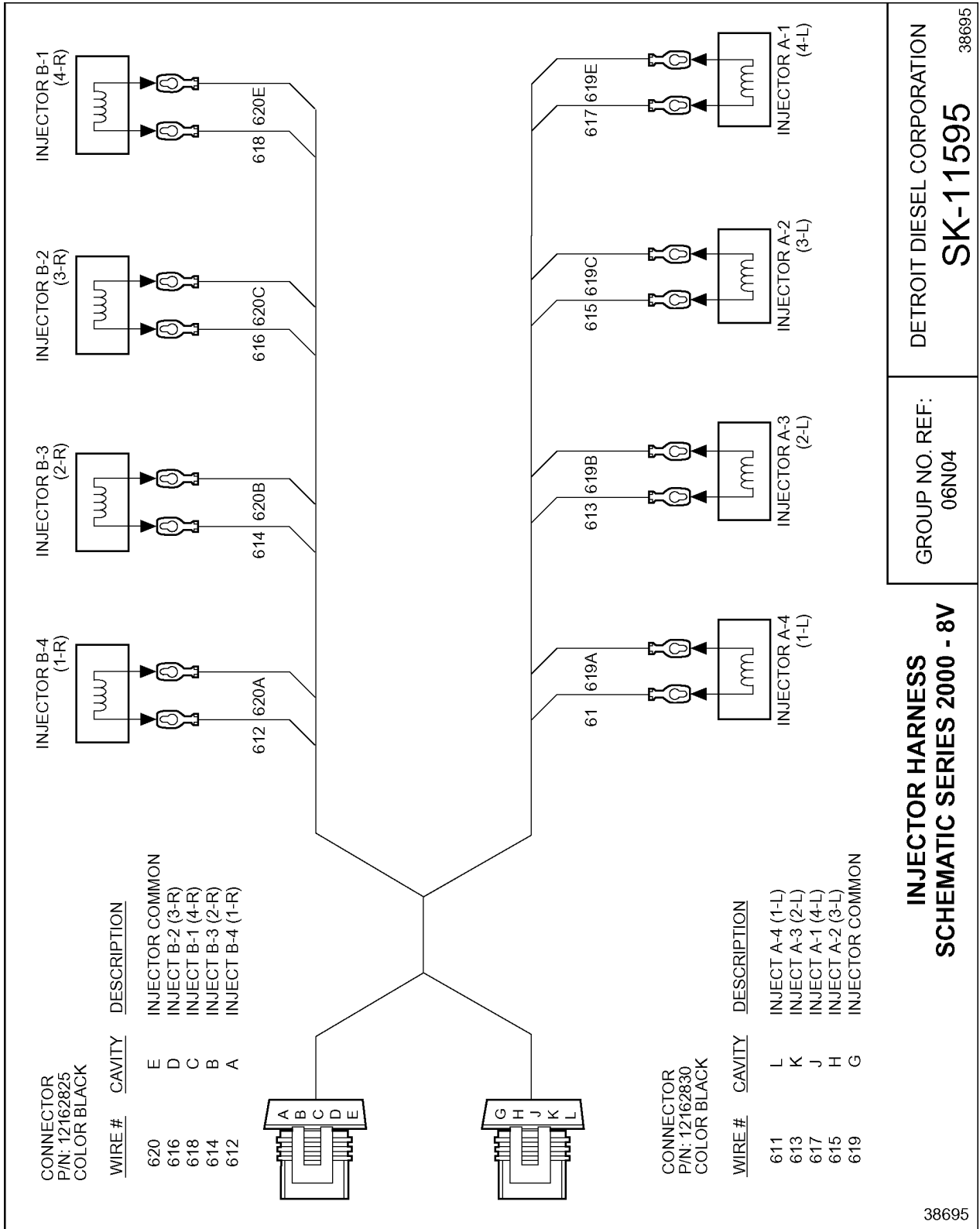
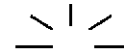


Figure B-15 Injector Harness Schematic - Series 2000-8V

APPENDIX C: SYMBOLS

ALARM

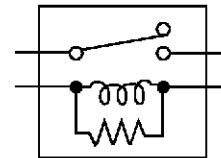


COIL

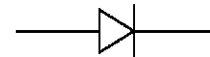


COIL, RELAY

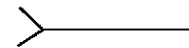
Normally open single pole double throw relay



DIODE



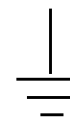
FEMALE TERMINAL



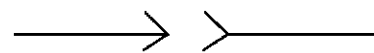
FUSE



GROUND, BATTERY



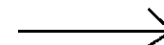
INLINE CONNECTION



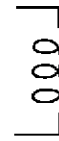
LIGHT



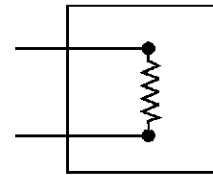
MALE TERMINAL



PICKUP, MAGNETIC



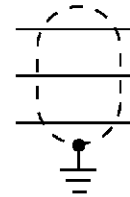
POTENTIOMETER



RESISTOR



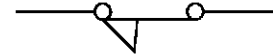
SHIELDED CABLE



SPLICE



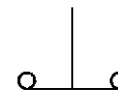
SWITCH, LIGHT
(Normally Closed)



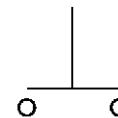
SWITCH, LIGHT
(Normally Open)



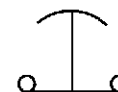
SWITCH, MOMENTARY
(Closed)



SWITCH, MOMENTARY
(Open)



SWITCH, MUSHROOM-HEAD SAFETY
(Normally Closed)

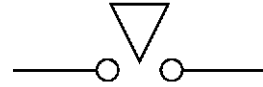


40397

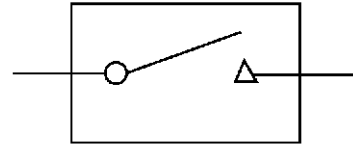
SWITCH, PRESSURE
(Closes on Rising Pressure)



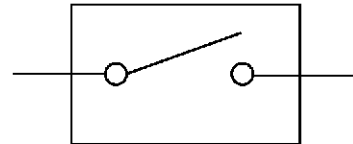
SWITCH, SAFETY INTERLOCKS
(Circuit Closing)



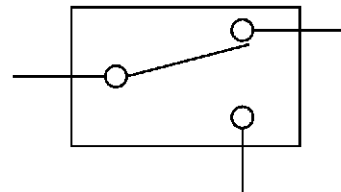
SWITCH, SINGLE POLE, SINGLE THROW
(With Spring Return)



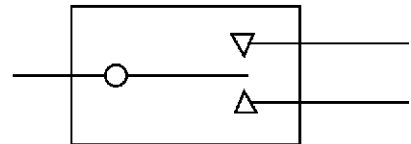
SWITCH, SINGLE POLE, SINGLE THROW
(Without Spring Return)



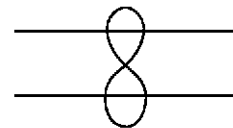
SWITCH, SINGLE POLE, DOUBLE THROW
(Without Spring Return)



SWITCH, SINGLE POLE, DOUBLE THROW
(With Double Spring Action)



TWISTED PAIR



40398

APPENDIX D: ACRONYMS

| | |
|------|------------------------------------|
| ABS | Anti-lock Braking System |
| ACLS | Add Coolant Level Sensor |
| ACS | Application Code System |
| ACPS | Air Compressor Pressure Sensor |
| AFRS | Air Filter Restriction Sensor |
| AIM | Auxiliary Interface Module |
| ATI | Aux Timed Input |
| ATS | Air Temperature Sensor |
| CEL | Check Engine Light |
| CFPS | Common Rail Fuel Pressure Sensor |
| CLS | Coolant Level Sensor |
| CPS | Coolant Pressure Sensor |
| CTS | Coolant Temperature Sensor |
| DDC | Detroit Diesel Corporation |
| DDDL | Detroit Diesel Diagnostic Link |
| DDEC | Detroit Diesel Electronic Controls |
| DDR | Diagnostic Data Reader |
| DRS | DDEC Reprogramming System |
| ECM | Electronic Control Module |
| EDM | Electronic Display Module |

| | |
|--------|--|
| EFC | Electronic Fire Commander |
| EFPA | Electronic Foot Pedal Assembly |
| EEPROM | Electronically Erasable Programmable Read Only Memory |
| EOP | Engine Over Temperature Protection |
| ESH | Engine Sensor Harness |
| ESS | Engine Synchro Shift |
| ETS | Exhaust Temperature Sensor |
| EUI | Electronic Unit Injectors |
| EUP | Electronic Unit Pump |
| FEI | Fuel Economy Incentive |
| FMI | Failure Mode Identifier |
| FPS | Fuel Pressure Sensor |
| FRS | Fuel Restriction Sensor |
| FTS | Fuel Temperature Sensor |
| HEI | Half Engine Idle |
| ICPS | Intercooler Coolant Pressure Sensor |
| ICTS | Intercooler Coolant Temperature Sensor |
| IRIS | InfraRed Information System |
| ISD | Idle Shutdown |
| LSG | Limiting Speed Governor |
| OEM | Original Equipment Manufacturer |
| OI | Optimized Idle |

| | |
|-----|------------------------------------|
| OLS | Oil Level Sensor |
| OPS | Oil Pressure Sensor |
| OTS | Oil Temperature Sensor |
| MAS | Maintenance Alert System |
| MPG | Miles Per Gallon |
| MPH | Miles Per Hour |
| MID | Message IDentification Character |
| MUI | Mechanical Unit Injector |
| PGN | Parameter Group Number |
| PID | Parameter IDentification Character |
| PTO | Power Take-off |
| PSG | Pressure Sensor Governor |
| PVM | Pulse to Voltage Module |
| PW | Pulse Width |
| PWM | Pulse Width Modulated |
| SEL | Stop Engine Light |
| SEO | Stop Engine Override |
| SRS | Synchronous Reference Sensor |
| SID | Subsystem IDentification Character |
| TBS | Turbo Boost Sensor |
| TDC | Top Dead Center |

| | |
|------|---------------------------------------|
| TPS | Throttle Position Sensor |
| TRS | Timing Reference Sensor |
| VEPS | Vehicle Electronic Programming System |
| VIH | Vehicle Interface Harness |
| VIN | Vehicle Identification Number |
| VSG | Variable Speed Governor |
| VSL | Vehicle Speed Limiting |
| VSS | Vehicle Speed Sensor |

APPENDIX E: VENDORS

Compatible engine accessories may be obtained from several vendors. This section provides vendors name, address.

FANS

Single-speed fans are available from:

Linnig Corp.

P.O. Box 2002
Tucker, GA 30084
Phone: (770) 414-9499

Index Sensors & Controls, Inc.

13205 Southeast 30th Street
Bellevue, WA 98005-4433
Phone: (206) 746-4049

Bendix (A division of Allied Signal)

901 Cleveland St.
P.O. Box 4016
Elyria, OH 44036
Phone: 1-800-AIR-BRAKE

Kysor

1100 Wright Street
Cadillac, MI 49601
Phone: (616) 779-7528

Horton, Inc.

2565 Walnut Street
Roseville, MN 55113
Phone: 1-800-621-1320

Two-speed fans are available from:

Linnig Corp

P.O. Box 2002
Tucker, GA 30084
Phone: (770) 414-9499

A variable speed fan is available from:

Rockford Powertrain, Inc.

1200 Windsor Road
Rockford, IL 61132-2908
Phone: (815) 633-7460

VEHICLE SPEED SENSORS

Wabash Technologies

1375 Swan Streets
Huntington, Indiana 46750-0829
Phone: 219-356-8300
Fax: 219-356-3846

Airpax Instruments

Phillips Technologies
150 Knotter Drive
Cheshire, Connecticut 06410
Phone: 1- 800-643-0643

Electro Corporation

1845 57th Street
Sarasota, Florida 34243
Tel: 941-355-8411
Fax: 941-355-3120

ELECTRONIC FOOT PEDAL ASSEMBLY

Williams Controls

14100 S.W. 72nd Avenue
Portland, Oregon 97223
Phone: (503) 684-8600

Bendix Heavy Vehicle Systems

901 Cleveland
Elyria, Ohio 44036
Phone: 1-800-AIR-BRAKE

King Controls

5100 West 36th Street
St. Louis Park, Minnesota 55416
Phone: (612) 922-6889

HAND THROTTLE

Morse Controls

21 Clinton Street
Hudson, Ohio 44236
Phone: (330) 653-7701
Fax: (330) 653-7799

DOCUMENTATION

SAE International

400 Commonwealth Drive
Warrendale, PA 15096
Attention: Publications
Phone: (412) 776-4970

DIAGNOSTIC DATA READER

Kent-Moore

28635 Mound Road
Warren, MI 48092
Phone: 1-800-328-6657

SHRINK WRAP

Alpha Wire Corporation

711 Lidgerwood Ave
P.O. Box 711
Elizabeth, New Jersey 07207-0711
Phone: 1-800-52ALPHA

Raychem Corporation, Corporate Division

300 Constitution Drive, Bldg. B
Menlo Park, CA 94025
Phone: (650)-361-2755

GLOSSARY

| | |
|-----------------------------------|--|
| Add Coolant Level Sensor | Provides another coolant level sensor, higher in the top tank of the vehicle cooling system. Typically, this is used to recognize the coolant is low, but not low enough to activate the DDEC engine protection. |
| Air Temperature Sensor | An intake mounted sensor which provides air temperature information to the ECM. Located in the bottom middle of the air intake manifold on the Series 50 and Series 60 Engines. |
| Check Engine Light | A panel mounted yellow indicator light, provided by the vehicle OEM as standard. |
| Coolant Level Sensor | Activates the engine protection if the coolant level is low. |
| Coolant Temperature Sensor | Provides coolant level information to the ECM. Used for engine protection. |
| Communication Harness | This OEM supplied harness connects the ECM's J1922 and J1939 ports to other vehicle systems. |
| Cruise Control | Operates in either Engine or Vehicle Speed Mode and maintain a targeted speed (MPH or RPM) by increasing or decreasing fueling to maximize fuel economy and driveability. |
| Check Engine Light | A panel mounted yellow indicator light. Provided by the vehicle OEM as standard. |
| Customer Option Password | A 4 digit alphanumeric password to protect and change customer parameters in the DDR. This password is set with the DDR. This password does <u>not</u> protect the horsepower rating. |
| DDEC IV | Fourth generation of Detroit Diesel Electronic Controls. |
| Deceleration Light | Illuminates on the rear of the vehicle when you take your foot off the accelerator pedal to indicate that the vehicle is slowing down. Typically, this is used on the rear of a bus that operates in the city. |
| Diagnostic Request Switch | A switch that allows the yellow and red lights to flash two digit diagnostic codes when the engine is idling or off. The yellow light flashes inactive (or historic) codes. The |

red light flashes active codes. These two digit codes are defined on the DDEC diagnostic data reader pocket card. This can be the same switch as the stop engine override.

Electronic Control Module

The ECM includes control logic to provide overall engine management. The ECM continuously performs self diagnostic checks and monitors other system components

Electronic Fire Commander

A complete pressure governor control unit for DDEC IV engines. The EFC displays engine RPM, battery voltage, engine oil pressure, and either engine oil temperature or engine coolant temperature (programmable).

Electronic Unit Injector

Provides fuel delivery to the engine cylinders. The EUI controls injection timing and metering using a solenoid operated valve. The duration of valve closure determines the quantity of fuel injected.

Electronic Fire Commander

Designed for the fire fighting and emergency services market, EFC combines the DDEC Pressure Sensor Governor (PSG), a system monitor, and a pump panel display for vital engine operating parameters into one compact, durable package.

Engine Brakes Cruise Control

Provides cruise control compatibility with engine brakes. While in cruise control, the engine brakes will turn on and go off automatically in order to maintain the same cruise set speed.

Engine Brake LOW ON (Above Cruise Control)

The additional engine speed above the driver selected cruise speed that the low engine brakes (Jake Brakes) turn on.

Engine Brake Medium/High On (Increment)

Sets the engine brake medium and high limits to a vehicle speed above engine brake low.

Engine Fan Braking

Automatically engages the cooling fan clutch when all the engine brakes are on, (HIGH).

Engine Interface Harness

Used in multi-ECM applications is usually installed at the factory and delivered connected to all ECMs. Ends with a quick disconnect connector. The OEM VIH connects to the quick disconnect connector.

Engine Protection

Provides three levels of protection to the engine if it is operating out of the limits. These three levels are warning, rampdown, and shutdown. Coolant level,

coolant temperature, oil temperature, oil pressure, and two additional sensors provide protection to the engine. Typically, the additional sensors are used for high oil temperature in the automatic transmission, low oil level in the engine, and other vehicle systems that require the engine to shutdown.

| | |
|---|---|
| Engine Over Temperature Protection | The reduction in operating power from between the time the CEL and the SEL illuminates. For high coolant and/or oil temperature <u>only</u> . |
| Engine Overspeed | Logs diagnostic code at 2500 RPM, DDC standard. |
| Engine Sensor Harness | Connects the ECM to all engine sensors, facilitates the receipt of inputs and outputs signals, controlling the fuel injection process and engine speed. |
| Failure Mode Identifier | The FMI describes the type of failure detected in the subsystem and identified by the PID or SID. |
| Fan Clutch Override | Used to engage the cooling fan when desired. Fan Controls use the DDEC oil temperature, coolant temperature, or air temperature sensors to engage the cooling fan. |
| Fuel Pressure Sensor | Provides fuel pressure information to the ECM. Used for diagnostics. |
| Fuel Temperature Sensor | Provides fuel temperature information to the ECM. Used for determining hot fuel, and adjusting the calibration based on this temperature. |
| Half Engine Idle | The engine idles on three of the cylinders to reduce the amount of white smoke on cold engine start-up. |
| High Range Max MPH | Defines the minimum vehicle speed required to activate the high range max RPM function. This is used to encourage the driver to use high gear, while in cruise control. |
| High Range Max RPM | Limits the maximum engine speed in the top range of gears, encouraging the driver to upshift to the next higher gear to increase vehicle speed. This function will determine the vehicle speed limit, unless a slower speed limit is selected for the vehicle speed limit parameter. During the shift sequence, the high range max MPH must be reached before the high range max RPM is achieved. |

| | |
|---|---|
| Horsepower Rating Password | A 4 digit alphanumeric password to protect and activate the horsepower rating in the ECM. This password is set with the DDR. |
| Horsepower Rating Security | Protects the multiple horsepower ratings in the ECM. Only one rating will be available with this feature turned on. This lock is set at the time of engine order from DDC or the OEM. |
| Idle Shutdown Override With Throttle | Allows the engine shutdown to be canceled by depressing the accelerator pedal while the yellow check engine light is flashing 90 seconds before engine shutdown. |
| Idle Time | The amount of time spent idling before the engine will automatically shutdown; set with the DDR. |
| Idle Timer Shutdown | Allows the engine to shutdown after a customer set time expires on idling (low idle or high idle or PTO). |
| Injector Harness | Installed at the factory and are delivered connected to the injection units and the ECMs. |
| InfraRed Information System | Provides infrared two-way communication between a vehicle and a PC. |
| Limiting Speed Governor | Maintains vehicle speed based on driver throttle input. The engine changes RPM to maintain a vehicle speed with the accelerator pedal. |
| Maintenance Alert System | Monitors engine fluid levels and filter restrictions and notifies the driver and/or technician when maintenance is required. |
| Maximum Security | Protects and locks out <u>all</u> of the programmed parameters in the ECM. This lock is set at the time of engine order from DDC or at the OEM. Feature settings cannot be changed with maximum security turned on. |
| Oil Pressure Sensor | Provides engine oil pressure to the ECM. Used for engine protection. |
| Oil Temperature Sensor | Provides the engine oil temperature to the ECM. Used for engine protection and fan controls. |
| Parameter Identification Character | A PID is a single byte character used in J1587 messages to identify the data byte(s) that follow. |

| | |
|---|---|
| PasSmart | Allows a fleet manager to enable a second Vehicle Limit Speed (VLS) above the normal VLS to assist while passing other vehicles on the highway. This second VLS is programmed for a limited duration during a given time period (interval). |
| Power Harness | Connects battery power (12 or 24 volts) and ground to the ECM and includes fuse(s) or circuit breaker(s). OEM supplied. |
| Power Take Off | A mechanical gear device used to divert engine horsepower to other machinery. |
| Progressive Shifting | Encourages the driver to shift in to a higher gear before the engine reaches governed speed. The Spec Manager program should be utilized to determine maximum vehicle speed. Typically, this is used on 2100 RPM rated engines. |
| Pressure Sensor Governor For Fire Trucks | Maintains a set water pressure on a fire truck water pump. The engine speed will vary to maintain a constant water pressure. This feature is in fire trucks. |
| Pressure Sensor Governor Light For Fire Trucks | Indicates that the Pressure Sensor Governor is active. |
| Pulse Width | The duration of time the injectors are fueling the engine, measured in degrees of rotation of the engine. |
| Pulse Width Modulated | A type of electrical signal output. |
| SAE J1587 | Communication link used for DDR, Data Hub, ABS, etc. |
| SAE J1922 | Communication link used for traction control systems and CEEMAT Fuller transmissions. |
| SAE J1939 | Communication link used for multiple block engines and other vehicle systems. |
| Starter Lockout | Prevents the starter from activating after the engine is already running. Typically, this is used in buses. |
| Stop Engine Light | A panel mounted red indicator light provided by the OEM as standard. |
| Stop Engine Override | This switch allows an override of the engine protection system when toggled in the rampdown or shutdown mode |

every 30 seconds. This can be the same switch as the diagnostic request.

| | |
|--|--|
| Subsystem Identification Character | A SID is a single byte character used to identify field-repairable or replaceable subsystems for which failures can be detected or isolated. |
| Synchronous Reference Sensor | Indicates a specific cylinder in the firing order; tells the ECM when the #1 cylinder is at top dead center of its stroke. DDC standard. |
| Timing Reference Sensor | Indicates crank position of every cylinder; tells the ECM where the rotation of the engine is or when to fuel each cylinder. DDC standard. |
| Throttle Inhibit | Disables the accelerator pedal by making it unresponsive when a switch is toggled. Typically, this is used in buses for when the doors are open, or when the pressure governor system is active in a fire truck. |
| Throttle Position Sensor | Converts the operator's hand throttle and/or foot pedal input into a signal for the ECM, better known as the accelerator pedal. This pedal, located on the floor of the vehicle cab, tells the ECM how much fuel is needed based on the driver input. Provided by the OEM, standard. |
| Top Dead Center | When the piston is at the top of the stroke nearest the head of the engine. The point at which the piston stops going up and starts going down. |
| Turbocharger Boost Sensor | Provides air pressure (atmospheric and boost) information from turbocharger to the ECM. This sensor is located in the air intake manifold. Used for white smoke and emissions. DDC standard. |
| Variable Speed Governor | Maintains a constant engine speed with varying loads. A variable speed governor is referred to as: high idle, fast idle, hand throttle, Vernier, voltage divider, power take off (PTO), cruise control, or cruise switch PTO. |
| Vehicle Electronic Programming System | A PC software package used to change the parameters to be programmed into the DDEC IV ECM. OEM supplied. |
| Vehicle Interface Harness | Connects the ECM to other vehicle systems. |
| Vehicle Power Shutdown | Allows the chassis power and DDEC power to shutdown after idling on low idle, high idle, or PTO for the set |

idle time. The idle shutdown override with throttle will override the vehicle power shutdown. In addition, the vehicle power will shutdown after an engine protection shutdown. This can be overridden by the stop engine override switch.

Vehicle Speed Limiting

The vehicle's fastest speed. limits the vehicle from going faster than a preset limit.

Vehicle Speed Maximum

The fastest vehicle speed (MPH/KPH) the driver is allowed to travel on flat ground.

Vehicle Speed Sensor

Tells the ECM how fast the vehicle is going. This magnetic pickup is located on the tail shaft of the transmission or on the rear drive wheel of the vehicle. Provided by the OEM. Required for cruise control, vehicle speed limiting, vehicle overspeed with/without throttle, progressive shift, and engine brakes. Optional.

Wire Comb

A strain relief for the back of the VIH connector to prevent water from entering the connector from the back. Used in all Series 50, Series 149, and Industrial applications.

INDEX

A

- Active Codes, 5-24
- Add Coolant Level Sensor (ACLS), 3-133
- Aftermarket Installed Sensors, 3-146
- Air Compressor Control, 5-3
 - decrease (set/coast on), 5-4
 - digital inputs, 4-17
 - digital outputs, 4-20
 - increase (resume/acceleration on), 5-3
 - load switch, 5-4
 - multiple pressure ratings, 5-4
 - shutdown, 5-4
 - solenoid, 5-4
- Air Compressor Pressure Sensor (ACPS), 3-126
- Air Filter Restriction Sensor (AFRS), 3-128
- Air Intake Temperature Sensor, 3-129
- Air Temperature Sensor (ATS), 3-111
- Allision World Transmission Series, 5-242
- Ambient Air Temperature Sensor, 3-146
- Anti-Lock Brake Systems, 5-9

B

- Battery
 - average drain current, 3-44–3-45
 - switch ground, 3-25
- Battery Isolator, 3-46
- Battery Size, 3-46
- Bendix, E-1

C

- Charge Air Temperature Sensor, 3-111
- Check Engine Light (CEL)
 - activated to flash codes, 5-53
 - as used in MAS, 5-108
 - engine overtemperature protection, 5-47, 5-50
 - engine protection, 5-45
 - flashing codes, 4-8
 - idle shutdown, 5-91
 - rampdown, 5-46
 - requirements and guidelines, 3-160
 - use in diagnostics, 5-24

wiring, 3-161

Circuits

- data link, 3-70
- data link, 800 & 801, 3-70
- data link, 900 & 901, 3-70
- data link, 925 & 926, 3-70
- return power (ground), 3-70

Codes, A-1

- active flashed, 5-25
- inactive flashed, 5-25

Common Rail Fuel Pressure Sensor (FPS), 3-112

Communication Harness, 3-27, connector-to-ECM, 3-59

Communication Link, J1939, 6-41

Conduit and Loom, 3-101

Connector Removing Tools, 3-71

Connectors

- 1708/1587 data link connector, 3-66
- communication harness-to-ECM connector, 3-59
- engine interface harness quick disconnect connector, 3-60
- engine power harness quick disconnect connector, 3-61
- ESH-to-ECM connector, 3-64
- power harness-to-ECM connector, 3-58
- Required Connectors, 3-53
- SAE 1939/J1587 data link connector, 3-66
- VIH-to-ECM connector, 3-56

Coolant Level Sensor (CLS), 3-130

Coolant Pressure Sensor (CPS), 3-112

Coolant Temperature Sensor (CTS), 3-113

Crankcase Pressure Sensor, 3-112, 3-114

Crimp Tools, 3-71

Criteria, wires, 3-69

Cruise Control, 5-13

- cruise power, 5-58
- digital inputs, 4-4
- engine brake, 5-39
- engine speed, 5-13
- vehicle speed, 5-13

Current

- amount of current draw, 3-44, 3-46
 - CEL requirements, 3-160
 - rated fuse current, 3-52
 - SEL requirement, 3-162
-

D

- Data Card, 5-161
- Data Hub, 5-131
- Data Link
 - 1708/1587
 - connector, 3-66
 - messages, 6-4
 - circuits 800 & 801, 3-70
 - circuits 900 & 901, 3-70
 - circuits 925 & 926, 3-70
 - SAE J1587, 6-3, 3-70, anti-lock brakes, 5-9
 - SAE J1922, 6-33, 3-70, anti-lock brakes, 5-9
 - SAE J1939, 3-70, anti-lock brakes, 5-9
 - SAE J1939/J1587, connector, 3-66
- Data Logger, 5-146, installation, 5-147
- DDC, supplied hardware, 3-3
- DDEC III Data Pages, 5-132
- DDEC Reports, 5-133
- DDEC Reprogramming System (DRS), 7-29
- Deceleration Light, 4-22
- Detroit Diesel Diagnostic Link (DDDL), 7-27
 - instrumentation menu, 5-115
 - maintenance alert menu, 5-113
- Deutsch Connectors, 3-54, 3-79
- Deutsch Terminals
 - installation, 3-79
 - removal, 3-82
- Diagnostic Data Reader (DDR), 7-7
 - maintenance status menu, 5-112
 - menu options, 7-10
 - activate outputs, 7-22
 - calibration changes, 7-19
 - diagnostic codes, 7-12
 - engine data list, 7-11
 - engine/trip data, 7-18
 - fuel injector, 7-17
 - maintenance status, 7-25
 - MIDs received, 7-23
 - reset AFR table, 7-24
 - switch/light status, 7-21
 - transmissions, 7-24
 - view calibration, 7-15
- Diagnostic Request Switch, 7-3, 4-8, 5-25–5-26, 5-53
- Diagnostics, 5-23
 - check engine light, 5-24
 - diagnostic request switch, 5-25
 - stop engine light, 5-24
 - stop engine override switch, 5-26
- Digital Inputs, 4-1
 - air compressor load switch, 4-17
 - auxiliary coolant level switch, 4-16
 - cruise control, 4-4
 - engine brake, 4-6
 - engine protection, 4-8
 - engine ratings, 4-10
 - engine synchro shift, 4-15
 - fan control, 4-11
 - parking brake interlock, 4-16
 - pressure sensor governor, 4-12
 - rpm freeze, 4-17
 - throttle control, 4-13
 - throttle kickdown, 4-17
- Digital Outputs, 4-1, 4-18
 - air compressor load solenoid, 4-20
 - coolant level low light, 4-21
 - cruise control active light, 4-21
 - deceleration light, 4-22
 - engine brake active, 4-22
 - ESS high range solenoid, 4-24
 - ESS low range solenoid, 4-23
 - ether injection, 4-24
 - external engine brake enable, 4-25
 - external engine synchronization/frequency input
 - active, 4-25
 - fan control, 4-26
 - high coolant temperature light, 4-27
 - high crankcase pressure light, 4-27
 - high oil temperature light, 4-28
 - low coolant pressure light, 4-28
 - low ddec voltage warning light, 4-29
 - low oil pressure light, 4-29
 - optimized idle active light, 4-30
 - pressure sensor governor active light, 4-21
 - pressure sensor governor mode light, 4-30
 - service now lamp, 4-31
 - starter lockout, 4-33
 - Top2 shift lockout solenoid, 4-34
 - Top2 shift solenoid, 4-33
 - transmission retarder, 4-34
 - vehicle power shutdown, 4-35
 - VSG active indication, 4-36

E

- Edm and Aim, 5-27
- EDM and AIM, 5-27
- Electronic Control Module (ECM), 3-5
 - connections to other vehicle systems, 3-17
 - diagnostics, 5-23
 - environmental conditions, 3-7
 - master ECM, 3-13, 3-20

- multi-ECMs, 3-6
 - engine sensor harness, 3-13
 - master ECM, 3-6
 - receiver ECM, 3-6
 - vehicle interface harness, 3-20
 - operating voltage, 3-43
 - receiver ECM, 3-13
 - Electronic Fire Commander (EFC), 1-6, 5-31
 - Electronic Foot Pedal Assembly (EFPA), 3-155, as OEM requirement, 3-3
 - Electronic Speed Switch (ESS-2), 5-35
 - Electronic Unit Injector (EUI), 3-30
 - Engine Brake, 5-39
 - active, 5-40
 - clutch released input, 5-40
 - cruise control, 5-39
 - digital inputs, 4-6
 - digital outputs, 4-22
 - disable, 5-39
 - engine fan braking, 5-40
 - minimum mph, 5-40
 - service brake control of, 5-40
 - Engine Interface Harness, 3-20
 - Engine Interface Harness Quick Disconnect Connector, 3-60
 - Engine Power Harness, 3-40
 - Engine Power Harness Quick Disconnect Connector, 3-61
 - Engine Protection, 5-45
 - diagnostic request switch, 5-53
 - digital inputs, 4-8
 - engine overtemperature protection, 5-47
 - rampdown, 5-46
 - shutdown, 5-47
 - stop engine override
 - continuous override - option 1, 5-55
 - continuous override - option 2, 5-55
 - momentary override, 5-54
 - warning only, 5-46
 - Engine Ratings, 5-57
 - cruise power, 5-58
 - digital inputs, 4-10
 - limiting torque curve, 5-58
 - switches, 5-57
 - Engine Sensor Harness, 3-9, with multi-ecms, 3-13
 - Engine Synchro Shift (ESS)
 - digital inputs, 4-15
 - digital outputs, 4-23–4-24
 - transmission interface, 5-247
 - ESH-to-ECM Connector, 3-64
 - Ether Start, 5-61
 - digital outputs, 4-24
 - ether start harness, 5-64
 - Exhaust Temperature Sensor (ETS), 3-138
- ## F
- Fan Control, 5-69
 - digital inputs, 4-11
 - digital outputs, 4-26
 - dual fans, 5-75
 - single fan, 5-71
 - two-speed fan, 5-77
 - variable speed single-fan, 5-80
 - Ferrule, 3-86, 3-88
 - Fire Truck Pump Pressure Sensor, 3-140
 - Flash Codes, 7-3, 5-25, definition of, 5-26
 - FMI
 - DDEC identifier, 6-3
 - definition of, 5-26
 - Fuel Economy Incentive, 5-83
 - Fuel Pressure Sensor, 3-115
 - Fuel Pressure Sensor (FPS), 3-115
 - Fuel Restriction Sensor (FRS), 3-116, 5-122
 - Fuel Temperature Sensor (FTS), 3-117
- ## G
- Glow Plug Controller, 5-85, 5-87, oem connections, 5-86
 - Governor Droop, 5-215
 - Governors, 5-215
 - limiting speed governor, 5-215
 - overall governor gain, 5-187
 - variable speed governor, 5-220
- ## H
- Half Engine Idle, 5-89
 - Hardware
 - supplied by DDC, 3-3
 - supplied by OEM, 3-3
 - Harnesses
 - ambient air temperature harness, 3-148
 - communication harness, 3-27

communication Harness, 1-2
 data logger modem harness, 5-150
 data logger power harness, 5-148
 engine interface harness, 3-20
 engine power harness, 3-40
 engine sensor harness, 3-9
 engine sensor harness, construction and industrial,
 3-11
 engine sensor harness, genset, 3-12
 engine sensor harness, multi-ecm, 3-13
 engine sensor harness, on-highway, 3-9
 ether start, 5-64
 Injector Harness, 3-29
 MAS display harness, 5-128
 power harness, 3-33
 ProDriver DC jumper harness, 5-169
 ProDriver DC vehicle harness, 5-168
 prodriver vehicle harness, 5-158
 vehicle interface harness, construction and industrial,
 3-21
 vehicle interface harness, multi-ecm, 3-20
 vehicle interface harness, on-highway, 3-17
 vehicle power harness, 3-40

Horton Industries, Inc., E-1

Hot Idle, 5-215

I

Idle Shutdown Timer, 5-91
 ambient air temperature override disable, 5-93
 enabled on VSG, 5-93
 idle shutdown override, 5-92
 vehicle power shutdown, 5-93

Ignition, ignition source, 3-25

Inactive Codes, 5-24

Index Sensors & Controls, Inc., E-1

Intercooler Coolant Pressure Sensor, 3-112

Intercooler Coolant Temperature Sensor (ICTS), 3-113

J

J1939, 6-76, diagnostic layer parameter group number
 response definitions, 6-76

K

Kent-Moore, 3-71

Kysor, E-1

L

Lights, 3-159

CEL, 3-159

SEL, 3-162

Limiting Speed Governor (LSG), 5-215

control options, 5-217

dual electronic foot pedal assembly, 5-219

electronic foot pedal assembly, 5-217

with VSG as a secondary control, 5-215

Linnig Corp, E-1

Low Gear Torque Limiting, 5-105

M

Main Power Supply Shutdown, 3-48

Maintenance Alert System, 5-107

add coolant level sensor, 5-120

air filter restriction sensor, 5-118

Detroit Diesel Diagnostic Link, 5-113

diagnostic data reader, 5-112

display module, 5-110

fuel restriction sensor, 5-122

oil level sensor, 5-123

ProDriver, 5-109

Management Information Products, 5-131

data hub, 5-131

data logger, 5-146

DDEC data, 5-133

DDEC III data pages, 5-132

DDEC reports, 5-133

ProDriver, 5-151

ProDriver DC, 5-161

ProManager, 5-144

Marine Controls, 5-175

control station, 5-176

engine room, 5-177

Master ECM, 3-13, 3-20

Message Identification Character (MID), description
 of, 6-3

Metri-Pack Connectors

150 series, 3-54

280 series, 3-54

630 series, 3-54

MIDs

DDEC identifier, 6-3

supported by DDEC, 6-33

Multi-ECM

connectors, 3-60

engine interface harness, 3-60

- vehicle interface harness, 3-53
- DDC-supplied hardware, 3-3
- engine interface harness, 3-20
- engine power harness, 3-40
- engine sensor harness, 3-13
- first receiver ECM, 3-20
- master ECM, 3-6, 3-20
- OEM-supplied hardware, 3-3
- receiver ECM, 3-6
- second receiver ECM, 3-20
- Series 2000 engine sensor harness, 3-15
- Series 2000 vehicle interface harness, 3-22
- Series 4000 engine sensor harness, 3-14
- Series 4000 vehicle interface harness, 3-21
- stop engine override switch, 3-20
- vehicle power harness, 3-40
- welding precaution, 3-50

O

OEM

- diagnostic connector, 3-66
- installed sensors, 3-125
- supplied hardware, 3-3
- supplied harness, 3-17, 3-27, 3-33, 3-40
- supplied lights, 3-159
- supplied throttle control device, 3-155

Oil Level Sensor (OLS), 3-118, 5-123

Oil Pressure Sensor (OPS), 3-118

Oil Temperature Sensor (OTS), 3-119

Optical Coolant Level Sensor, 3-136

Optimized Idle, 2-8, 5-179

- digital outputs, 4-30
- engine mode, 5-180
- thermostat mode, 5-180

Optimum Load Signal, 5-185

Overall Governor Gain, 5-187

P

PasSmart, 5-189

PIDs, 6-4–6-6, A-9

- DDEC identifier, 6-3
- definition of, 5-26
- double byte parameters, 6-18
- single byte parameters, 6-8
- variable length parameters, 6-24

Power Harness, 3-33

- connector-to-ECM, 3-58
- connectors, 3-39

- dual-fuse installation, 3-33
- single-fuse installation, 3-35

Pressure Governor Light, 4-30

Pressure Mode, 5-197

Pressure Sensor Governor (PSG), 5-197

- digital inputs, 4-12
- digital outputs, 4-30
- pressure mode, 5-197
- rpm mode, 5-197
- switches, 5-198

ProDriver, 1-6, 5-151

- installation, 5-151, 5-163
 - flush mount, 5-152
 - surface mount, 5-155
- maintenance alert system, 5-109
- ProDriver reports, 5-142

ProDriver DC, 5-161

- data card, 5-161
- installation
 - flush mount, 5-163
 - surface mount, 5-166

Progressive Shift, 5-203

- high range, 5-205
- low range #1, 5-204
- low range #2, 5-204

ProManager, 5-144

Pulse to Voltage Module (PVM), 5-209

PWM 1 Port, 5-233

R

Receiver ECMs

- first receiver, 3-13, 3-20
- second receiver, 3-13, 3-20

Rockford Powertrain, Inc., E-1

RPM Mode, 5-197

S

SAE J1128, 3-19

SAE J1587, 5-233

- anti-lock brakes, 5-9
- diagnostic connector, 3-67
- message format, 6-3
- PIDs, 6-4–6-6
 - double byte parameters, 6-18
 - single byte parameters, 6-8
 - transmitter data request, 6-7

- variable length parameters, 6-24
 - transmission interface, 5-241
 - SAE J1922, 6-33
 - anti-lock brakes, 5-9
 - communication harness design guidelines, 3-28
 - message format, 6-33
 - MIDs, 6-33
 - parameters available, 6-33
 - powertrain control data link, 5-233
 - transmission interface, 5-241
 - SAE J1939, 6-41
 - anti-lock brakes, 5-9
 - communication harness design guidelines, 3-28
 - data link layer parameter group number response definitions, 6-71
 - message format, 6-41
 - powertrain control data link, 5-233
 - transmission interface, 5-241
 - SAE J1939/71, application layer parameter group definitions, 6-42
 - Safety Precautions, 2-1
 - Sensors, 3-105–3-106, 3-112–3-114, 3-118–3-120, 3-125
 - add coolant level sensor, 3-133
 - air compressor pressure sensor, 3-126
 - air filter restriction sensor, 3-128
 - air intake temperature sensor, 3-129
 - air temperature sensor, 3-111
 - ambient air temperature sensor, 3-146
 - charge air temperature sensor, 3-111
 - common rail fuel pressure sensor, 3-112
 - coolant level sensor, 3-130
 - coolant pressure sensor, 3-112
 - coolant temperature sensor, 3-113
 - crankcase pressure sensor, 3-114
 - exhaust temperature sensor, 3-138
 - factory-installed sensors, 3-106, function and location, 3-106
 - fire truck pump pressure sensor, 3-140
 - fuel pressure sensor, 3-115
 - fuel restriction sensor, 3-116
 - fuel temperature sensor, 3-117
 - intercooler coolant pressure sensor, 3-112
 - intercooler coolant temperature sensor, 3-113
 - OEM-installed sensors, 3-125, function and guidelines, 3-125
 - oil level sensor, 3-118
 - oil pressure sensor, 3-118
 - oil temperature sensor, 3-119
 - optical coolant level sensor, 3-136
 - synchronous reference sensor, 3-120
 - throttle position sensor, 3-141
 - timing reference sensor, 3-120
 - turbo boost sensor, 3-123
 - vehicle speed sensor, 3-142
 - SEO Switch, 7-3, 4-8, 5-26
 - Service Now Lamp, 4-31
 - SIDs, A-13
 - DDEC identifier, 6-3
 - definition of, 5-26
 - SK-10658 Power Harness - Multi-ECMs - Series 149, E-1, B-9
 - Society of Automotive Engineers (SAE), 3-28
 - Starter Lockout, 4-33
 - Stop Engine Light (SEL)
 - activated to flash codes, 5-53
 - as used in MAS, 5-108
 - engine overtemperature protection, 5-47, 5-50
 - engine protection, 5-45
 - flashing codes, 4-8
 - rampdown, 5-46
 - requirements and guidelines, 3-162
 - shutdown, 5-47
 - use in diagnostics, 5-24
 - wiring, 3-163
 - Stop Engine Override (SEO) Switch, 5-53, multi-ECMs, 3-20
 - Stop Engine Override Options, 5-54
 - Synchronous Reference Sensor (SRS), 3-120
- ## T
- Tachometer Drive, 5-213
 - Tape and Taping, 3-103
 - Terminal Installation
 - Deutsch connectors, 3-79
 - pull-to-seat, 3-76
 - push-to-seat, 3-72
 - quick disconnect connector, 3-83
 - Terminal Removal
 - Deutsch terminals, 3-82
 - main VIH, 3-89
 - pull-to-seat, 3-79
 - push-to-seat, 3-75
 - Throttle Control, 3-155, 5-215, digital inputs, 4-13
 - Throttle Devices, 3-155, electronic foot pedal assembly, 3-155
 - Throttle Position Sensor (TPS), 3-141
 - Timing Reference Sensor (TRS), 3-120

Top2, 5-245, digital outputs, 4-33–4-34

Transmission Interface, 5-233

- Allison hydraulic transmission, 5-240
- Allison interface modules, 5-236
- Allison world transmission, 5-242
- digital input and output transmissions, 5-245
- Eaton CEEMAT transmission, 5-244
- Eaton Top2, 5-245
- GE propulsion system controller, 5-238
- Meritor engine synchro shift, 5-247
- PWM1 operation, 5-233
- SAE J1939 transmissions, 5-244
- Voith transmission, 5-239
- ZF Ecomat, 5-239

Transmission Retarder, 5-253, digital outputs, 4-34

Turbo Boost Sensor (TBS), 3-123

V

Variable Speed Governor (VSG), 5-220

- alternate minimum VSG, 5-225
- cruise switch VSG, 5-222
- dual throttle controls, 5-228
- electronic foot pedal assembly, 5-224
- frequency input, 5-231
- hand throttle, 5-223
- voltage dividers, 5-225

Vehicle Electronics Programming System (VEPS), 7-5

Vehicle Interface Harness (VIH)

- construction and industrial, 3-21
- multi-ecm, 3-20
- multi-ecm, engine interface harness, 3-20
- on-highway, 3-17
- wire comb, 3-56

Vehicle Power Harness, 3-40

Vehicle Power Shutdown, 4-35, 5-91

Vehicle Speed Limiting, 5-255

Vehicle Speed Sensor (VSS), 3-142

- magnetic pickup requirements, 3-143
- open collector requirements, 3-145

VIH-to-ECM Connector, 3-56

Voith Retarder, 4-34

VSG, digital outputs, 4-36

W

Weather Pack Connectors, 3-54

Welding, 3-49–3-50

Wire Comb, 3-56

Wires

- criteria, 3-69
- recommendations, 3-69
- requirements, 3-69

Wiring

- add coolant level sensor, 3-135
- add coolant level sensor with dash-mounted light, 5-121, 3-134
- air compressor pressure sensor, 3-127
- air filter restriction sensor, 5-119, 3-129
- Allison transmission
 - automatic transmission open collector speed sensor, 5-238, 5-243
 - hydraulic transmission, 5-240
 - maximum feature throttle interface module, 5-237
 - throttle interface module, 5-236
 - WT-series, 5-242
- CEEMAT transmission, 5-244
- check engine light, 3-161
- coolant level sensor, 3-131
- data link circuits, 3-70
- data logger modem harness, 5-150
- data logger power harness, 5-148
- dual hand throttle, 5-230
- engine synchro shift, 5-249
- fire truck pump pressure sensor, 3-141
- fuel restriction sensor, 5-122
- GE propulsion system controller, 5-238
- magnetic pickup VSS, 3-143
- management information system, 5-159
- multiple warning lights, 3-164
- oil level sensor, 5-123
- open collector VSS, 3-144
- optical coolant level sensor harness, 3-137, 3-139
- optimum load signal interface, 5-185
- power harness - single-ECM, dual-fuse, 3-33
- power harness - single-ECM, single-fuse, 3-36
- power harness wire resistance, 3-70
- pressure sensor governor, 5-199
- ProDriver DC jumper harness, 5-169
- ProDriver DC vehicle harness, 5-168
- ProDriver vehicle harness, 5-158
- return power (ground) circuits, 3-70
- splicing and heat shrink, 3-91
- stop engine light, 3-163
- tachometer, 5-213
- Top2 transmission, 5-246
- vehicle power harness
 - Series 149, 3-41
 - Series 4000, 3-42
- Voith transmission, 5-239
- ZF Ecomat transmission, 5-239