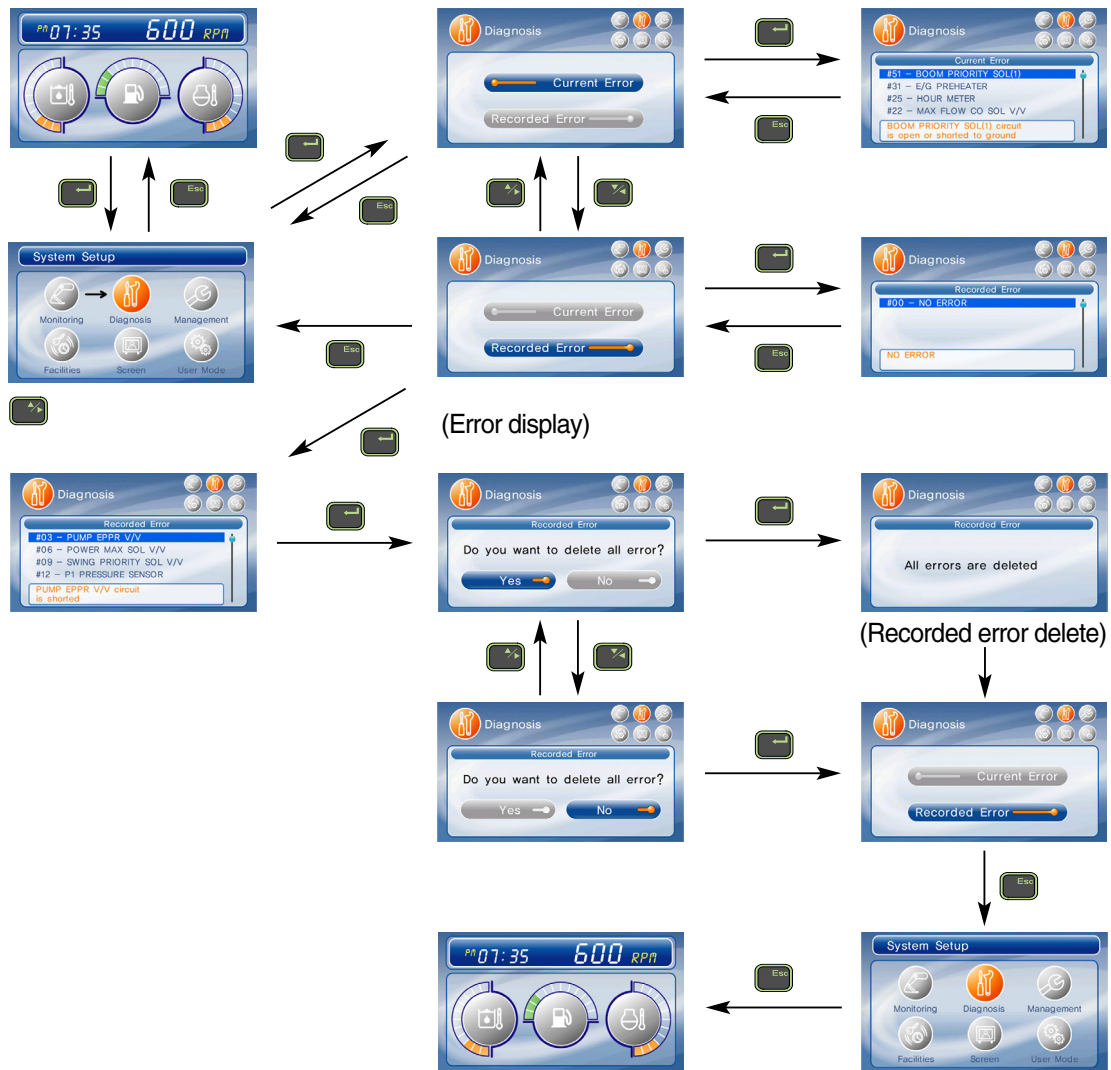


GROUP 9 SELF-DIAGNOSTIC SYSTEM

1. OUTLINE

When any abnormality occurs in the NEW CAPO system caused by electric parts malfunction and by open or short circuit, the CPU controller diagnoses the problem and sends the error codes to the cluster and also stores them in the memory.

2. CURRENT ERROR DISPLAY



6. ERROR CODES TABLE

| Error code No. | Description |
|----------------|--|
| 1 | Short circuit in accel actuator system |
| 2 | Potentiometer circuit is shorted to Vcc(5V) or battery + |
| 3 | Short circuit in pump EPPR valve system |
| 4 | Short circuit in boom down EPPR valve system |
| 5 | Short circuit in travel speed solenoid system |
| 6 | Short circuit in power boost solenoid system |
| 7 | Short circuit in max flow solenoid system |
| 10 | Short circuit in hour-meter system |
| 11 | Accel dial circuit is shorted to Vcc(5V) or battery + |
| 12 | P1 pressure sensor circuit is shorted to power supply(24V) line |
| 13 | P2 pressure sensor circuit is shorted to power supply(24V) line |
| 14 | P3 pressure sensor circuit is shorted to power supply(24V) line |
| 15 | Boom down pressure circuit is shorted to power supply(24V) line |
| 16 | Accel actuator circuit is open or shorted to ground |
| 17 | Potentiometer circuit is open or shorted to ground |
| 18 | Pump EPPR valve circuit is open or shorted to ground |
| 19 | Boom down EPPR valve circuit is open or shorted to ground |
| 20 | Travel speed solenoid circuit is open or shorted to ground |
| 21 | Power boost solenoid circuit is open or shorted to ground |
| 22 | Max flow solenoid circuit is open or shorted to ground |
| 25 | Hour-meter circuit is open or shorted to ground |
| 26 | Accel dial circuit is open or shorted to ground |
| 27 | P1 pressure sensor circuit is open or shorted to ground |
| 28 | P2 pressure sensor circuit is open or shorted to ground |
| 29 | P3 pressure sensor circuit is open or shorted to ground |
| 30 | Boom down pressure sensor circuit is open or shorted to ground |
| 31 | Engine preheater circuit is open or shorted to ground |
| 32 | Travel alarm buzzer circuit is open or shorted to ground |
| 33 | Alternator circuit is open or shorted to ground |
| 34 | Controller input voltage is below 18V |
| 35 | Controller input voltage is over 38V |
| 36 | Communication error with cluster |
| 37 | Engine speed sensor circuit is open or shorted to ground |
| 38 | Anti-restart relay circuit is open or shorted to ground |
| 39 | Accel actuator does not stop at a target position |
| 40 | There is more than 500rpm difference between target speed and actual speed |

| Error code No. | Description |
|----------------|--|
| 41 | Hydraulic oil temperature sensor circuit is shorted to ground |
| 42 | Fuel level sensor circuit is shorted to ground |
| 43 | Coolant temperature sensor circuit is shorted to ground |
| 44 | Boom up pressure sensor circuit is shorted to power supply(24V) line |
| 45 | Hydraulic oil temperature sensor circuit is open or shorted to battery + |
| 46 | Fuel level sensor circuit is open or shorted to battery + |
| 47 | Coolant temperature sensor circuit is open or shorted to battery + |
| 48 | Boom up pressure sensor circuit is open or shorted to ground |
| 49 | Engine preheater circuit is shorted to battery + |
| 51 | Boom priority solenoid circuit is open or shorted to ground |
| 56 | Travel alarm buzzer circuit is shorted to battery + |
| 58 | Boom priority solenoid circuit is shorted to battery + |

8. ENGINE FAULT CODE INFORMATION

| SPN | FMI | Fault code No. | Description | |
|-----|-----|----------------|---|----------------------------------|
| 91 | 2 | SPN91-FMI2 | Throttle Position Sensor Data Erratic, Intermittent, or Incorrect | |
| | 3 | SPN91-FMI3 | (Secondary) Throttle Position Sensor Voltage Above Normal or Shorted High | |
| | 4 | SPN91-FMI4 | (Secondary) Throttle Position Sensor Voltage Below Normal or Shorted Low | |
| | 8 | SPN91-FMI8 | (Secondary) Throttle Position Sensor Abnormal Frequency or Period | |
| | 12 | SPN91-FMI12 | (Secondary) Throttle Position Sensor Bad Device or Component | |
| 100 | 1 | SPN100-FMI1 | Engine Oil pressure Low-Warning | |
| | 2 | SPN100-FMI2 | Engine Oil Pressure Low-Derate | |
| | 3 | SPN100-FMI3 | Engine Oil Pressure Sensor Voltage Above Normal or Shorted High(Shutdown) | |
| | 4 | SPN100-FMI4 | Engine Oil Pressure Sensor Voltage Below Normal or Shorted Low | |
| 105 | 10 | SPN100-FMI10 | Engine Oil Pressure Sensor 5V Supply Connection Open Circuit | |
| | 1 | SPN105-FMI1 | Inlet Manifold Air Temp High-Warning | |
| | 2 | SPN105-FMI2 | Inlet Manifold Air Temp High-Derate | |
| | 3 | SPN105-FMI3 | Inlet Manifold Air Temp Sensor Voltage Above Normal or Shorted High | |
| 106 | 4 | SPN105-FMI4 | Inlet Manifold Air Temp Sensor Voltage Below Normal or Shorted Low | |
| | 3 | SPN106-FMI3 | Inlet Manifold Pressure Sensor Voltage Above Normal or Shorted High | |
| | 4 | SPN106-FMI4 | Inlet Manifold Pressure Sensor Voltage Below Normal or Shorted Low | |
| 106 | 10 | SPN106-FMI10 | Inlet Manifold Pressure Sensor 5V Supply Connection Open Circuit | |
| | 110 | 1 | SPN110-FMI1 | Engine Coolant Temp High-Warning |
| | | 2 | SPN110-FMI2 | Engine Coolant Temp High-Derate |
| 3 | | SPN110-FMI3 | Engine Coolant Temp Sensor Voltage Above Normal or Shorted High(Shutdown) | |
| 4 | | SPN110-FMI4 | Engine Coolant Temp Sensor Voltage Below Normal or Shorted Low | |
| 157 | 3 | SPN157-FMI3 | Fuel Rail Pressure Sensor Voltage Above Normal or Shorted High | |
| | 4 | SPN157-FMI4 | Fuel Rail Pressure Sensor Voltage Below Normal or Shorted Low | |
| 158 | 2 | SPN158-FMI2 | Keyswitch Data Erratic, Intermittent, or Incorrect | |
| 168 | 0 | SPN168-FMI0 | ECU Battery Power Excessive | |
| | 1 | SPN168-FMI1 | ECU Battery Power Low | |
| | 2 | SPN168-FMI2 | ECU Battery Power Intermittent | |
| 190 | 1 | SPN190-FMI1 | Engine Overspeed - Warning | |
| | 8 | SPN190-FMI8 | Speed/Timing Sensor Abnormal Signal Frequency | |
| 558 | 2 | SPN558-FMI2 | (Secondary) Throttle Position Sensor Idle Validation Switch | |
| 630 | 2 | SPN630-FMI2 | Customer or System Parameters Data Incorrect | |
| 631 | 2 | SPN631-FMI2 | Engine Software Data Incorrect | |
| 637 | 11 | SPN637-FMI11 | Primary to Secondary Engine Speed Signal Calibration Fault | |
| 639 | 9 | SPN639-FMI9 | SAE J1939 Data Link Abnormal Update | |
| 646 | 5 | SPN646-FMI5 | Turbo Wastegate Solenoid Current Low | |
| | 6 | SPN646-FMI6 | Turbo Wastegate Solenoid Current High | |
| 651 | 5 | SPN651-FMI5 | Cylinder #1 Injector Current Low | |

※ SPN : Suspect Parameter Number

FMI : Failure Mode Identifier

| SPN | FMI | Fault code No. | Description |
|------|-----|----------------|--|
| 651 | 6 | SPN651-FMI6 | Cylinder #1 Injector Current High |
| | 7 | SPN651-FMI7 | Cylinder #1 Injector Not Responding |
| 652 | 5 | SPN652-FMI5 | Cylinder #2 Injector Current Low |
| | 6 | SPN652-FMI6 | Cylinder #2 Injector Current High |
| 653 | 7 | SPN652-FMI7 | Cylinder #2 Injector Not Responding |
| | 5 | SPN653-FMI5 | Cylinder #3 Injector Current Low |
| | 6 | SPN653-FMI6 | Cylinder #3 Injector Current High |
| 654 | 7 | SPN653-FMI7 | Cylinder #3 Injector Not Responding |
| | 5 | SPN654-FMI5 | Cylinder #4 Injector Current Low |
| | 6 | SPN654-FMI6 | Cylinder #4 Injector Current High |
| 655 | 7 | SPN654-FMI7 | Cylinder #4 Injector Not Responding |
| | 5 | SPN655-FMI5 | Cylinder #5 Injector Current Low |
| | 6 | SPN655-FMI6 | Cylinder #5 Injector Current High |
| 656 | 7 | SPN655-FMI7 | Cylinder #5 Injector Not Responding |
| | 5 | SPN656-FMI5 | Cylinder #6 Injector Current Low |
| | 6 | SPN656-FMI6 | Cylinder #6 Injector Current High |
| 676 | 7 | SPN656-FMI7 | Cylinder #6 Injector Not Responding |
| | 5 | SPN676-FMI5 | Glow Plug Start Aid Relay Current Low |
| 678 | 6 | SPN676-FMI6 | Glow Plug Start Aid Relay Current High |
| | 3 | SPN678-FMI3 | ECU 8V DC Supply Voltage Above Normal or Shorted High |
| 723 | 4 | SPN678-FMI4 | ECU 8V DC Supply Voltage Below Normal or Shorted Low |
| | 8 | SPN723-FMI8 | Secondary Engine Speed Sensor Abnormal Signal Frequency |
| 1079 | 3 | SPN1079-FMI3 | 5V Sensor DC Supply Voltage Above Normal or Shorted High |
| | 4 | SPN1079-FMI4 | 5V Sensor DC Supply Voltage Below Normal or Shorted Low |
| 1188 | 7 | SPN1188-FMI7 | Turbo Wastegate Not Responding |
| 1347 | 5 | SPN1347-FMI5 | Fuel Rail Pump Output Current Low |
| | 6 | SPN1347-FMI6 | Fuel Rail Pump Output Current High |
| | 7 | SPN1347-FMI7 | Fuel Rail Pump Output Not Responding |

※SPN : Suspect Parameter Number

FMI : Failure Mode Identifier