| Component Identifiers (CID[1]) Module Identifier (MID[2]) Primary Electronic Control Module (MID No. 036) | |
|---|---|
| CID | Component |
| 0001 | Injector Cylinder #1 |
| 0002 | Injector Cylinder #2 |
| 0003 | Injector Cylinder #3 |
| 0004 | Injector Cylinder #4 |
| 0005 | Injector Cylinder #5 |
| 0006 | Injector Cylinder #6 |
| 0007 | Injector Cylinder #7 |
| 0008 | Injector Cylinder #8 |
| 0009 | Injector Cylinder #9 |
| 0010 | Injector Cylinder #10 |
| 0011 | Injector Cylinder #11 |
| 0012 | Injector Cylinder #12 |
| 0013 | Injector Cylinder #13 |
| 0014 | Injector Cylinder #14 |
| 0015 | Injector Cylinder #15 |
| 0016 | Injector Cylinder #16 |
| 0091 | Throttle Position Sensor |
| 0094 | Fuel Delivery Pressure Sensor |
| 0100 | Engine Oil Pressure Sensor |
| 0101 | Crankcase Air Pressure Sensor |
| 0110 | Engine Coolant Temperature Sensor |
| 0168 | Electrical System Voltage |
| 0190 | Engine Speed Sensor |
| 0248 | Data Link |
| 0253 | Personality Module |
| 0254 | Payload Electronic Control Module |
| 0261 | Engine Timing Calibration |
| 0262 | 5 Volt Sensor Power Supply |
| 0263 | Sensor Power Supply |
| 0267 | Remote Shutdown Input |
| 0268 | Programmed Parameter Fault |
| 0273 | Turbocharger Outlet Pressure Sensor |
| 0274 | Atmospheric Pressure Sensor |
| 0275 | Right Turbocharger Inlet Pressure Sensor |
| 0276 | Left Turbocharger Inlet Pressure Sensor |
| 0279 | Aftercooler Coolant Temperature Sensor (front) |
| 0289 | Fuel Pressure Sensor - before fuel filter |
| 0336 | Engine Control Switch |
| 0337 | Remote Emergency Stop Switch |
| 0338 | Engine Pre-lube Pump Relay |
| 0342 | Engine Pre-lube Pump Relay |
| 0444 | Starter Motor Relay |
| 0446 | Air Shutdown Relay |
| 0542 | Engine Oil Pressure Sensor - before oil filter |
| 0650 | Harness Code |
| 0827 | Left Exhaust Temperature Sensor |
| 0828 | Right Exhaust Temperature Sensor |
| 1495 | Injector Codes |
| **Secondary Electronic Control Module (MID No. 047)** | |
| CID | Component |
| 0001 | Injector Cylinder #1 |
| 0002 | Injector Cylinder #2 |
| 0003 | Injector Cylinder #3 |
| 0004 | Injector Cylinder #4 |
| 0005 | Injector Cylinder #5 |
| 0006 | Injector Cylinder #6 |
| 0007 | Injector Cylinder #7 |
| 0008 | Injector Cylinder #8 |
| 0009 | Injector Cylinder #9 |
| 0010 | Injector Cylinder #10 |
| 0011 | Injector Cylinder #11 |
| 0012 | Injector Cylinder #12 |
| 0013 | Injector Cylinder #13 |
| 0014 | Injector Cylinder #14 |
| 0015 | Injector Cylinder #15 |
| 0016 | Injector Cylinder #16 |
| 0190 | Engine Speed Sensor |
| 0342 | Secondary Engine Speed Sensor |

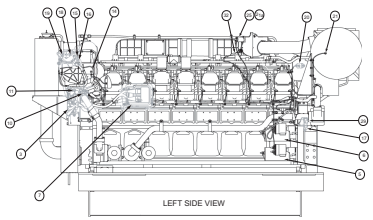
[1] The CID is a diagnostic code that indicates which circuit is faulty.

[2] The MID is a diagnostic code that indicates which electronic control module diagnosed the fault.

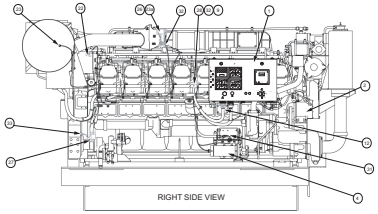
| Failure Mode Identifiers (FMI)[1] | |
|---|---|
| FMI No. | Failure Description |
| 0 | Data valid but above normal operational range. |
| 1 | Data valid but below normal operational range. |
| 2 | Data erratic, intermittent, or incorrect. |
| 3 | Voltage above normal or shorted high. |
| 4 | Voltage 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 | Sensor supply fault. |
| 19 | Condition not met. |
| 20 | Parameter failures. |

[1]The FMI is a diagnostic code that indicates what type of failure has occurred.

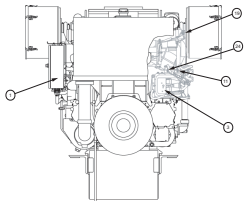
## Component Locations



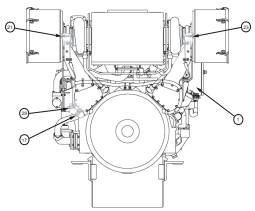
LEFT SIDE VIEW



RIGHT SIDE VIEW



FRONT VIEW

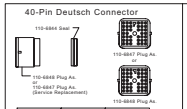


REAR VIEW

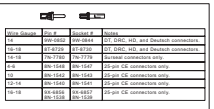
| Component Location | | | | | |
|---|---|---|---|---|---|
| Component | Schematic Location | Machine Location | Component | Schematic Location | Machine Location |
| Alarm | E-12 | 1 | Sensor - Engine Speed Timing (Secondary) | C-4 | 29 |
| Alternator | D-7 | 2 | Sensor - Fuel Filter Press (Filtered) | B-3 | 18 |
| Assembly - Diode (Note 2) | C-12, C-2, D-2 | 9 | Sensor - Fuel Filter Press (Unfiltered) | B-3 | 19 |
| Assembly - Relay Board | F-4 | Note 4 | Sensor - L. Turbo Exhaust Temp | A-7 | 20 |
| Assembly - Relay Board | F-2 | Note 4 | Sensor - L. Turbo Inlet Press (Note 3) | B-3 | 21,21a |
| Batteries | E-6 | Note 1 | Sensor - R. Turbo Exhaust Temp | A-7 | 22 |
| Breaker - Alternator | E-9 | 1 | Sensor - R. Turbo Inlet Press (Note 3) | B-4 | 23,23a |
| Breaker - Battery | E-9 | 1 | Sensor - Throttle Position (Port) | I-7 | Note 4 |
| Breaker - Control Switch | C-10 | 1 | Sensor - Throttle Position (Starboard) | I-7 | Note 4 |
| Breaker - Customer Power | F-9 | 1 | Sensor - Transmission Oil Temperature | G-5 | Note 1 |
| Breaker - EMS II | D-11 | 1 | Sensor - Transmission Oil Pressure | G-5 | Note 1 |
| Breaker - Engine Control (Primary) | D-11 | 1 | Sensor - Turbo Outlet Press | B-3 | 24 |
| Breaker - Engine Control (Secondary) | D-11 | 1 | Solenoid - Air Shut-off (Left Side) | D-6 | 25 |
| Breaker - Mag Relay | E-10 | 1 | Solenoid - Air Shut-off (Right Side) | D-6 | 26 |
| Breaker - Main Crank E-Stop | E-9 | 1 | Solenoid - Air Start (if equipped) | D-6 | 27 |
| Breaker - PRCM | G-10 | 1 | Solenoid - Cylinder Head (Note 2) | C-2, D-2 | 28 |
| Breaker - Relay | E-10 | 1 | Switch - Alarm Silence | F-12 | 1 |
| Control - Engine (Primary) | A-6 | 3 | Switch - Air Shutoff LH | D-5 | 25 |
| Control - Engine (Secondary) | D-4 | 7 | Switch - Air Shutoff RH | D-5 | 26 |
| Gauge - Cluster #1 | I-4 | Note 4 | Switch - Charger Fault | H-5 | Note 1 |
| Gauge - Cluster #1 | G-12 | 1 | Switch - Control | C-10 | 1 |
| Gauge - Cluster #2 | I-4 | Note 4 | Switch - Customer Shut-down | H-4 | Note 4 |
| Gauge - Cluster #2 | G-11 | 1 | Switch - E-Stop | D-11 | 1 |
| Gauge - Cluster #3 | G-10 | 1 | Switch - Engine Protection Override | C-10 | 1 |
| Module - Customer Communication | I-6 | Note 4 | Switch - Fuel Level | H-5 | Note 1 |
| Module - Prog Relay Control | F-6 | Note 4 | Switch - LHRH | E-12 | 1 |
| Module - Relay Driver | F-3 | Note 4 | Switch - Manual Crank | E-10 | 1 |
| Module - Relay Driver | F-1 | Note 4 | Switch - Mode/Clear | E-12 | 1 |
| Monitor- EMS II | F-12 | 1 | Switch - Overspeed Verify | C-10 | 1 |
| Monitor - Electronic (EMS) | I-2 | Note 4 | Switch - Prelube Override | C-10 | 1 |
| Motor - Prelube | D-6 | 4 | Switch - Prelube Press | B-7 | 31 |
| Motor - Starter (1/2 Group) | E-7 | 5 | Switch - Remote Start/Stop | H-4 | Note 4 |
| Motor - Starter (1/2 Group) | D-7 | 6 | Switch - Scroll | G-3 | Note 4 |
| Potentiometer | G-3 | Note 4 | Switch - Service | F-12 | 1 |
| Pyrometer | B-2 | 1 | Switch - Throttle Synchronization | I-7 | Note 1 |
| Relay - Air Shut-off LH | E-11 | 1 | Tachometer | I-3 | Note 4 |
| Relay - Air Shut-off RH | E-11 | 1 | Terminal Block (TB-1) | E-9 | 1 |
| Relay - Customer Power | G-9 | 1 | Terminal Block (TB-2) | D-10 | 1 |
| Relay - E - Stop | C-12 | | Terminal Block (TB-3) | C-11 | 1 |
| Relay - E - Stop Lockout | D-12 | | Terminal Block (TB-4) | E-10 | 1 |
| Relay - EMS II | D-12 | 1 | Terminal Block (TB-5) | G-12 | 1 |
| Relay - Engine Control (Primary) | C-11 | 1 | Terminal Block (TB-6) | G-11 | 1 |
| Relay - Engine Control (Secondary) | C-11 | 1 | Terminal Block (TB-7) | G-11 | 1 |
| Relay - General Alarm | F-10 | 1 | Terminal Block (TB-8) | G-11 | 1 |
| Relay - Mag #1 | E-10 | 1 | Terminal Block (TB-9) | G-11 | 1 |
| Relay - Mag #2 | E-10 | 1 | Terminal Block (TB10) | C-8 | 1 |
| Relay - PRCM | G-10 | 1 | Terminal Block (TB-11) | C-8 | 1 |
| Relay - Prelube (Master) | E-11 | 1 | Terminal Block (TB-12) | F-9 | 1 |
| Relay - Prelube (Slave) | F-11 | 1 | Terminal Block (TB-13) | G-8 | 1 |
| Relay - Shut-down Notify | F-9 | 1 | Terminal Block (TB-14) | F-9 | 1 |
| Sensor - Aftercooler Temp | B-4 | 10 | Terminal Block (TB-15) | F-9 | 1 |
| Sensor - Atmospheric Press | B-3 | 11 | Terminal Block (TB-16) | G-9 | 1 |
| Sensor - Crankcase Press | B-3 | 12 | Terminal Block (TB-17) | G-9 | 1 |
| Sensor - Engine Coolant Level | G-5 | Note 1 | Terminal Block (TB-18) | G-9 | 1 |
| Sensor - Engine Coolant Temp | B-4 | 14 | Terminal Block (TB-19) | F-9 | 1 |
| Sensor - Engine Oil Press (Filtered) | B-3 | 15 | Terminal Block (TB-20) | F-9 | 1 |
| Sensor - Engine Oil Press (Unfiltered) | B-3 | 16 | Thermocouple (Note 2) | A-1, B-1 | 32 |
| Sensor - Engine Speed Timing (Primary) | A-7 | 17 | Timer - Air Shut-off | D-11 | 1 |

Note 1: Customer supplied component.
Note 2: One located at each cylinder.
Note 3: Locations marked with an "a" indicate the sensor location when the engine is equipped with an air shut-off.
Note 4: Remote mounted.

### 40-Pin Deutsch Connector

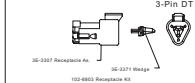



| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14 | XW-0852 | XW-0844 |
| 16-18 | 8T-6729 | 8T-6730 |



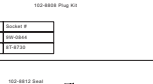
| Wire Gauge | Pin # | Socket # | Notes |
|---|---|---|---|
| 14 | XW-0852 | XW-0844 | DT, DRC, HD, and Deutsch connectors |
| 16-18 | 8T-6729 | 8T-6730 | DT, DRC, HD, and Deutsch connectors |
| 14-18 | 7N-7780 | 7N-7779 | Kurtzer connectors only |
| 4-6 | 8N-1548 | 8N-1547 | 25-pin CE connectors only |
| 10 | 8N-1542 | 8N-1543 | 25-pin CE connectors only |
| 12-14 | 8N-1540 | 8N-1541 | 25-pin CE connectors only |
| 16-18 | 9X-6856<br>8N-1538 | 9X-6857<br>8N-1539 | 25-pin CE connectors only |

### 2-Pin Sure-Seal Plug



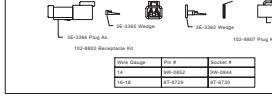

| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14-18 | 7N-7780 | 7N-7779 |

### 9-Pin HD10 Receptacle




| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14 | XW-0852 | XW-0844 |
| 16-18 | 8T-6729 | 8T-6730 |

### 3-Pin DT Plug



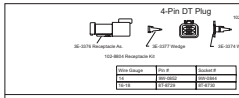

| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14 | XW-0852 | XW-0844 |
| 16-18 | 8T-6729 | 8T-6730 |

### 2-Pin DT Plug



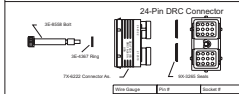

| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14 | XW-0852 | XW-0844 |
| 16-18 | 8T-6729 | 8T-6730 |

### 4-Pin DT Plug



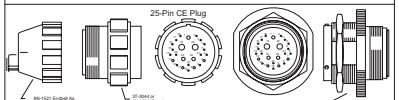

| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14 | XW-0852 | XW-0844 |
| 16-18 | 8T-6729 | 8T-6730 |

### 24-Pin DRC Connector



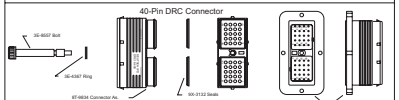

| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14 | XW-0852 | XW-0844 |
| 16-18 | 8T-6729 | 8T-6730 |

### 25-Pin CE Plug




| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 4-6 | 8N-1548 | 8N-1547 |
| 10 | 8N-1542 | 8N-1543 |
| 12-14 | 8N-1540 | 8N-1541 |
| 16-18 | 9X-6856<br>8N-1538 | 9X-6857<br>8N-1539 |

### 40-Pin DRC Connector




| Wire Gauge | Pin # | Socket # |
|---|---|---|
| 14 | XW-0852 | XW-0844 |
| 16-18 | 8T-6729 | 8T-6730 |

CATERPILLAR®

RENR1297-04
August 2006

# Schematic

## 3500B Engine for Marine Propulsion Electrical System

| 3508B: | 3512B: | 3516B: |
|---|---|---|
| 2BM1-UP | BRN1-UP | 4BW1-UP |
| 3PS1-UP | 2EZ1-UP | CDE1-UP |
| 7SM1-UP | 2GW1-UP | 8CN1-UP |
| 1TW1-UP | 7HM1-UP | 3CW1-UP |
| | 3RS1-UP | 8KN1-UP |
| | 4TN1-UP | 3SS1-UP |

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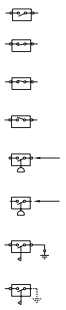
### Electrical Schematic Symbols And Definitions



Normally open switch that will close with an increase of a specific condition (temp-press-etc.).

Normally open switch that is closed due to an applied condition, and will open again with a specific decrease in that condition.

Normally closed switch that will open with an increase of a specific condition.

Normally closed switch that is open due to an applied condition, and will close again with a specific decrease in that condition.

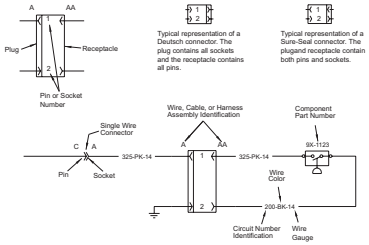
The circle indicates that the component has screw terminals and a wire can be disconnected from it.

No circle indicates that the wire cannot be disconnected from the component.

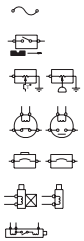
This indicates that the component has a wire connected to it that is connected to ground.

This indicates that the component does not have a wire connected to ground. It is grounded by being fastened to the machine.

### Harness And Wire Electrical Schematic Symbols




### Electrical Schematic Symbols And Definitions



**FUSE** - A component in an electrical circuit that will open the circuit if too much current flows through it.

**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 the switch part of the relay.

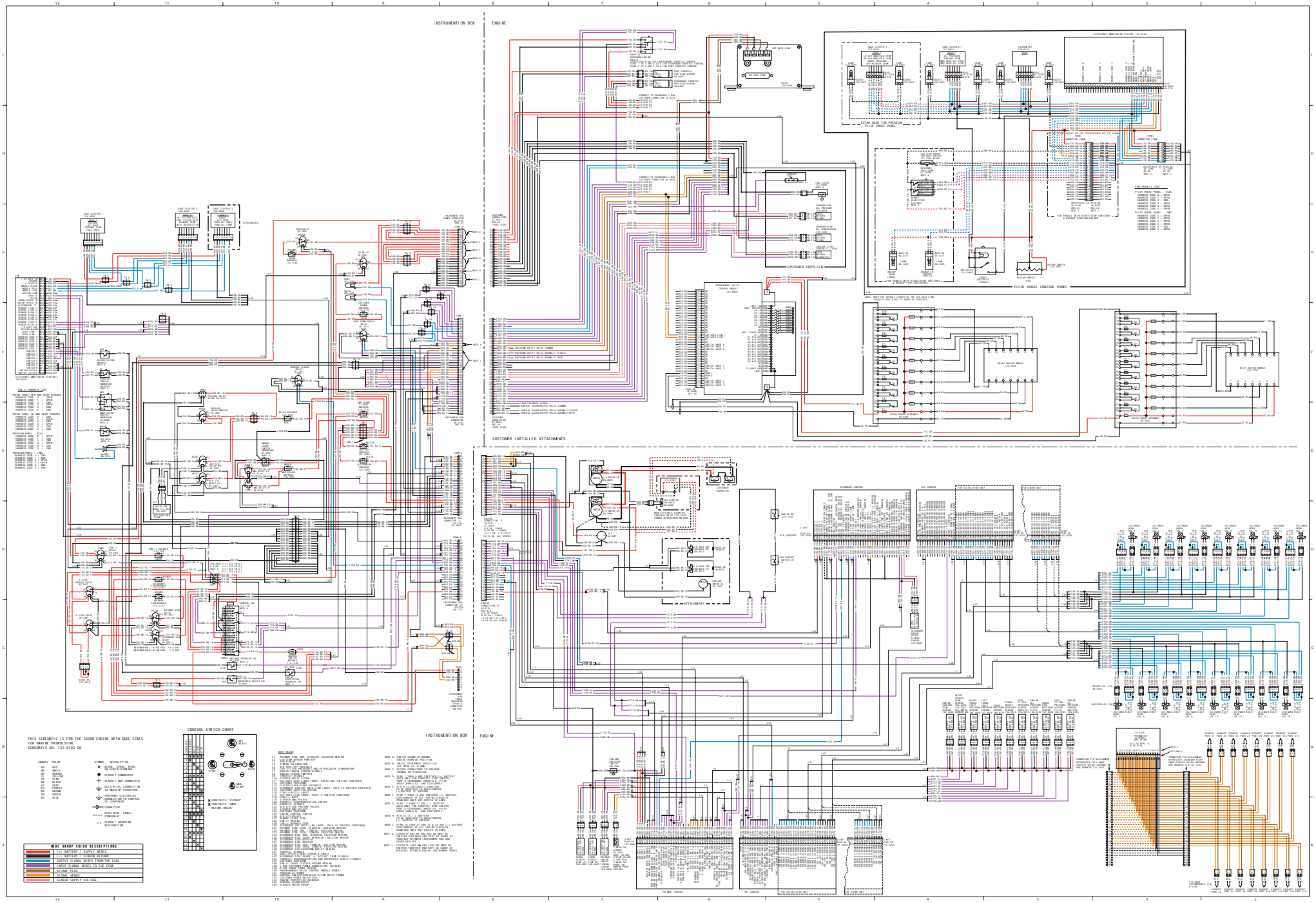
**CIRCUIT BREAKER (C/B)** - A component in an electrical circuit that will open the circuit if too much current flows through it. This does not destroy the circuit breaker and it can be reset to become part of the circuit again.

**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 latch 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.

RENR1297-04

RENR1297-04


INSTRUMENT ON BOX
ENGINE
CUSTOMER SUPPLIED
PILOT HOUSE CONTROL PANEL
CUSTOMER INSTALLED ATTACHMENTS
ATTACHMENTS
CONTROL SWITCH CHART
WIRE GROUP COLOR DESCRIPTIONS
(-) BATTERY / SUPPLY WIRES
(-) BATTERY / SENSOR RETURN
OUTPUT SIGNAL WIRES FROM THE ECM
INPUT SIGNAL WIRES TO THE ECM
SIGNAL PLUS
SIGNAL WIRES
SENSOR SUPPLY VOLTAGE
THIS SCHEMATIC IS FOR THE 3500B ENGINE WITH DUEL ECMS FOR MARINE PROPULSION.
SCHEMATIC NO. 132-8103-06