

ELECTRICAL SYSTEM



ELECTRICAL SYSTEM

 **CAUTION!**

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that is in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
Mega 500-V (Tier II)	2001 and Up

TABLE OF CONTENTS

Overview	4
Electric Supply System	6
Engine Starting Circuit	8
Operation During Start Process	8
Operation After Start Process	10
Engine Stop and Derating System	12
Operation In Engine Stop.....	12
Operation in Engine Derating.....	12
Charging System.....	14
Monitoring System	15
Instrument Panel	16
Function Check	17
Monitoring System Schematic	18
Operation	20
Windshield Wiper	24
Front Windshield Wiper	24
Rear Windshield wiper	25
Lighting System.....	28
Light Circuit	28
Engine Control System.....	31
ECM Block Diagram	31
ECM Electric Circuit	32
ECM External Circuit.....	32
ECM Internal Circuit.....	33
ECM System Component.....	34
ECM (Electronic Control Module).....	34
Alternate (Switchable) Torque Switch	34
Alternate Low Idle Switch.....	35
Idle Speed Control Switch.....	35
Engine Diagnostic Switch.....	36
Engine Fault Codes.....	36

Fault Code Information	38
Electronic Accelerator	45
Electric Specification	45
Switch Specification	45
Mechanical Specification (Pedal Sensor).....	46
Data Link	46
LIS (Load Isolation System) - Option	46
Aeb Starter	48
Introduction	48
List of Abbreviations	48
Procedure to Start AEB.....	48
Display During AEB-mode	49

OVERVIEW

The electrical system for this equipment is DC 24 volts. The rated voltage for all electric components is 24 volts with the exception of the car stereo and the air-conditioning control actuator. The system contains two 12 volt batteries connected in series and a three phase AC generator with a rectifier. The electric wiring used in the system is easily identifiable by the insulator color. The color symbols used in the electrical system are listed in the following chart.

Electric Wire Color

Symbol	Color
W	White
G	Green
Or	Orange
B	Black
L	Blue
Lg	Light Green

Symbol	Color
R	Red
Gr	Gray
P	Pink
Y	Yellow
Br	Brown
V	Violet

NOTE: *RW: Red wire with White stripe*
R - Base Color, W - Stripe Color

NOTE: *0.85G: Nominal sectional area of wire core less insulator = 0.85 mm² (0.03 in²)*

ELECTRIC SUPPLY SYSTEM

The electric power circuit supplies electric current to each electric component. It consists of a battery, battery relay, starter switch, circuit breaker, fusible link and fuse box.

The negative terminal of the battery is grounded to the vehicle body.

Even when the starter switch is in the "OFF" position, electric current is supplied to the following components through battery → fusible link → fuse circuit.

1. Cabin light, fuel pump switch, No. 1 terminal of DC-DC converter (back up for car stereo memory).
2. "B" terminal of starter switch and No. 22 terminal of air conditioner control panel.
3. Power terminal "B" of engine stop motor.

When the starter switch is in the preheat, on and start positions, the current flows from the battery → fusible link → fuse → starter switch "B" terminal/starter switch "BR" terminal → diode → battery relay "BR" terminal which activates the coil of the battery relay and the electric supply system is energized.

When the battery relay's contacts are connected, all electric devices can be operated.

While the engine is not running, the electric power for all electric devices are supplied by the battery. Once the engine is started the power is supplied from the alternator.

ENGINE STARTING CIRCUIT

OPERATION DURING START PROCESS

When the starter switch is turned to the start position, the safety relay (14) is opened by the current flow from the connected "52" and "67" terminals of the transmission controller (13) and the "S" and "E" terminals of the starter controller (7) are connected. At this time the contacts in the starter relay (8) are closed by the current flow from the battery (1), to the fusible link (3), to the "B" terminal of the starter switch (5), to the "C" terminal of the starter relay (8), to the "D" terminal of the starter relay (8), to the "S" terminal of starter controller (7), to the "E" terminal of the starter controller, and then to the ground.

When the contact point "B" and "PP" of starter relay (8) are connected, the pinion gear of the starter (9) is pushed forward and makes contact with the ring gear of the flywheel and the internal contacts of the starter are connected.

The current flows from the battery (1), to the "A" terminal of the battery relay (2), to the "B" terminal of the battery relay (2), and then to the "B" terminal of the starter (9). The starter motor is rotated and the engine is started.

The engine can be cranked only when the transmission selector switch (11) is the neutral position. If the transmission selector switch (11) is in forward or reverse, the current that flows the switch (11) to the starter controller (7) opens the path to ground for the starter relay (8). This prevents the starter relay (8) from closing.

OPERATION AFTER START PROCESS

Once the engine has been started, the belt driven alternator (10) generates a current. The output generated by the alternator is a square wave pulse voltage through the "P" terminal and the frequency of the pulse voltage is proportional to the rotation of the alternator. The starter controller (7) monitors the frequency of the output current. Once the frequency equivalent to 500 rpm is sensed the connection between "S" and "E" terminals and the connection between "B" and "PP" terminals are opened. As a result the rotation of the starter (9) is stopped. Once the engine is running, the starter (9) will not operate even if the starter switch (5) is moved to the start position, preventing possible damage to the starter (9).

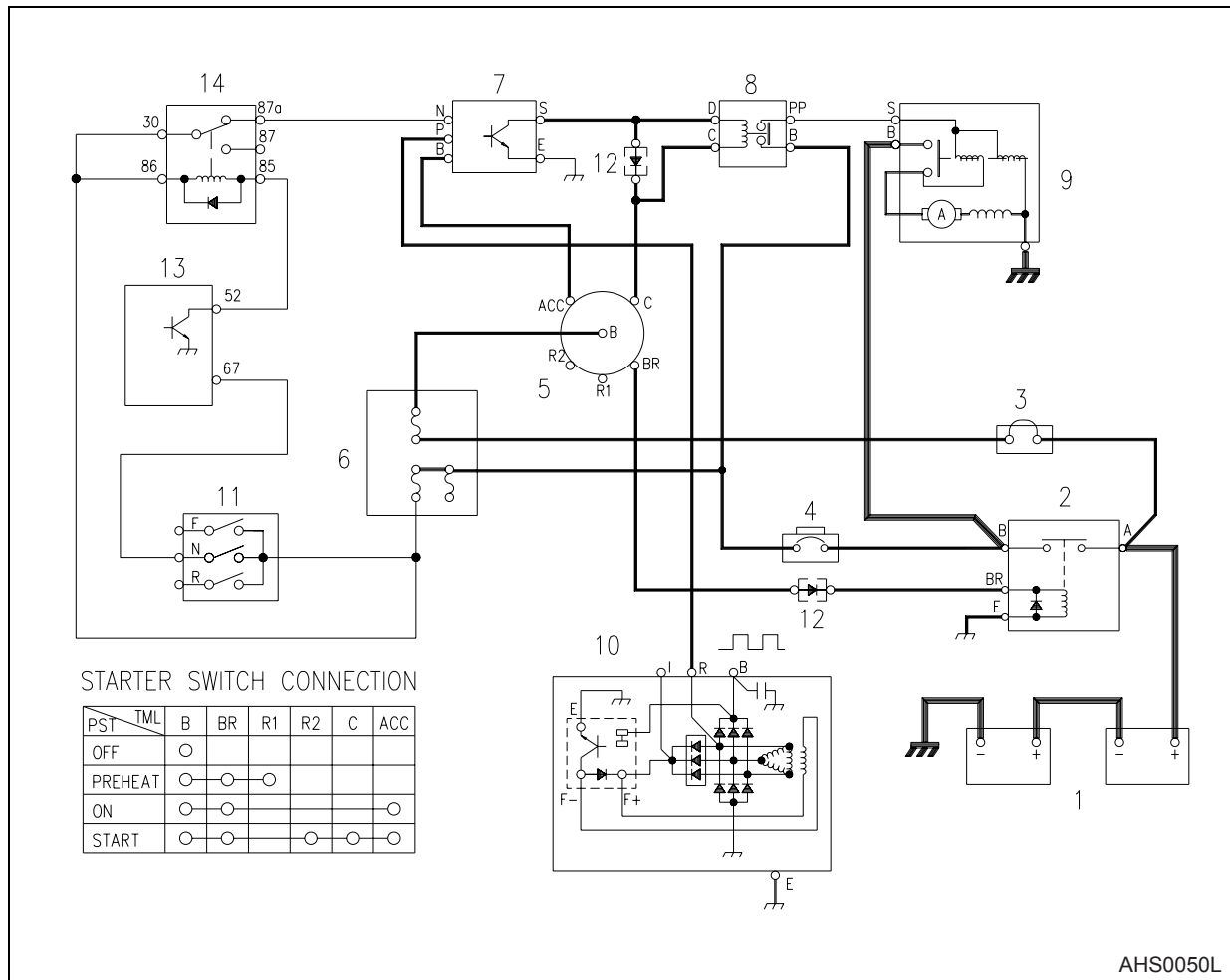


Figure 3 OPERATION OF START CIRCUIT (2) - IMMEDIATELY AFTER START

Reference Number	Description
1	Battery
2	Battery Relay
3	Fusible Link
4	Circuit Breaker
5	Starter Switch
6	Fuse Box
7	Starter Controller

Reference Number	Description
8	Starter Relay
9	Starter
10	Alternator
11	Transmission Selector Switch
12	Diode
13	Transmission Controller
14	Safety Starter Switch

ENGINE STOP AND DERATING SYSTEM

OPERATION IN ENGINE STOP

The engine stop is achieved by the "open" or "closed" operation of the fuel shutoff valve controlled by ECM (Electronic Control Module).

OPERATION IN ENGINE DERATING

For the purpose of reducing the input torque during the clutch slip when a shuttle shift is done, engine derating is to be used.

When the shuttle shift is occurring, the contacts points "30" and "87" of the engine derating relay (7) are closed due to the signal of the transmission controller (10). Then the control signal flows from the No.23 terminal of ECM (8) to the No.9 and 10 terminals.

In accordance with this, the engine RPM will be dropped down for maximum 0.7 seconds. (The operating time is set automatically in dependent of vehicle speed.)

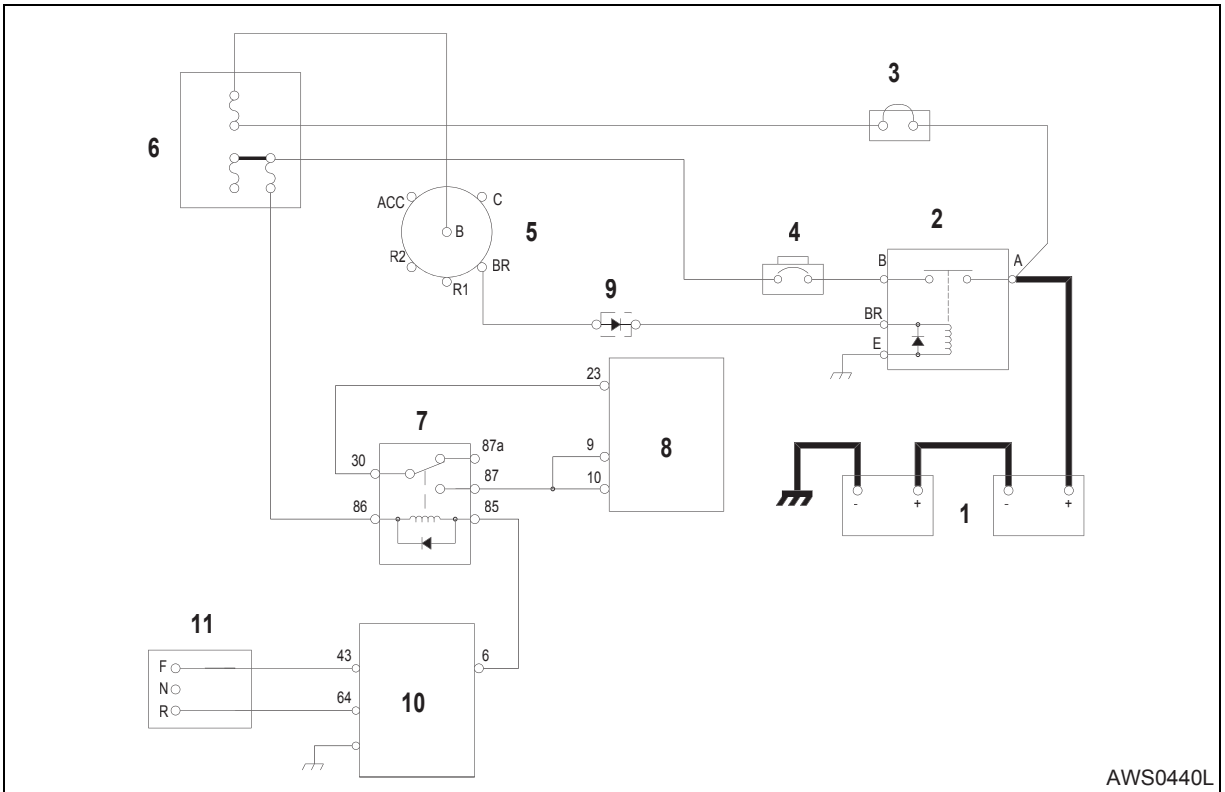


Figure 4 ENGINE DERATING CIRCUIT

Reference Number	Description
1	Battery
2	Battery Relay
3	Fusible Link
4	Circuit Breaker
5	Starter Switch
6	Fuse Box

Reference Number	Description
7	Engine Derating Relay
8	ECM (Electronic Control Module)
9	Diode
10	TCU (Transmission Controller)
11	Shift Lever Switch

CHARGING SYSTEM

When the starter switch (5) is turned to the "ON" position, an initial excited current flows to the field coil of the alternator (7) through the battery relay (2) and circuit breaker (4). When the engine is started from this condition the alternator (7) starts charging. The current flows from the "B+" terminal of alternator (7), to the circuit breaker (4), to the battery relay (2), and to the battery (1).

The alternator also supplies electric current to other electrical components. When the alternator (7) starts to operate, a current flows from the "R" terminal of alternator to the diode (8) and then to the battery relay (2) coil securing a path for the charging current to the battery (1). Thus, preventing the possibility of a high voltage build up and possible damage to the electrical system.

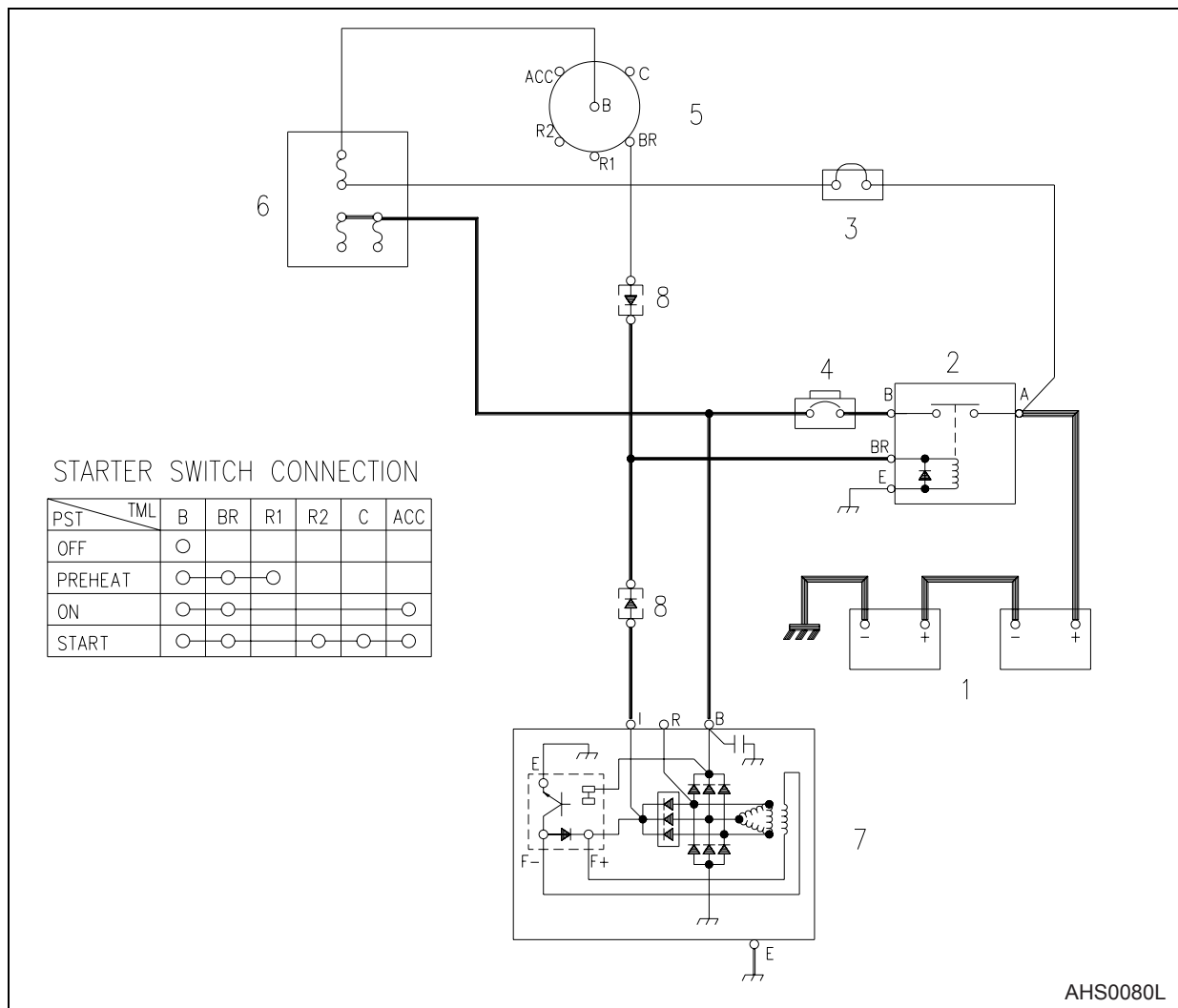
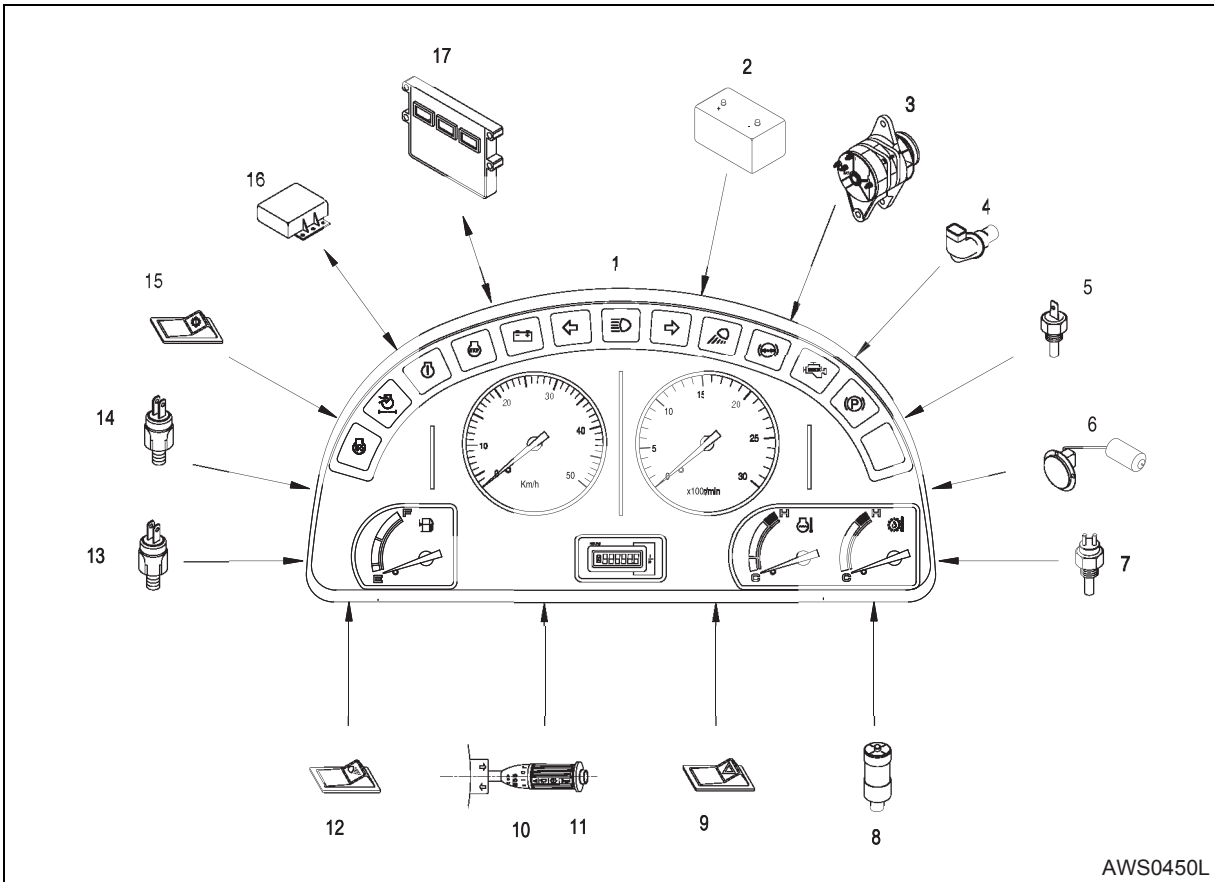


Figure 5 CHARGING CIRCUIT

Reference Number	Description
1	Battery
2	Battery Relay
3	Fusible Link
4	Circuit Breaker

Reference Number	Description
5	Starter Switch
6	Fuse Box
7	Alternator
8	Diode

MONITORING SYSTEM



AWS0450L

Figure 6

Reference Number	Description
1	Instrument Panel
2	Battery
3	Alternator
4	Speed Sensor
5	Coolant Temperature Sensor
6	Fuel Sensor
7	Transmission Oil Temperature Sensor
8	Air Cleaner Indicator
9	Hazard Warning Light Switch

Reference Number	Description
10	Turn Signal Light Switch
11	High Beam Switch
12	Work Light Switch
13	Brake Oil Pressure Switch
14	Parking Brake Pressure Switch
15	Transmission Cut-off Switch
16	Control Unit
17	ECM (Electronic Control Module)
18	Control Unit

The monitoring system displays the various data and warning signals onto the instrument panel by processing the information gathered from the various sensors throughout the equipment.

INSTRUMENT PANEL

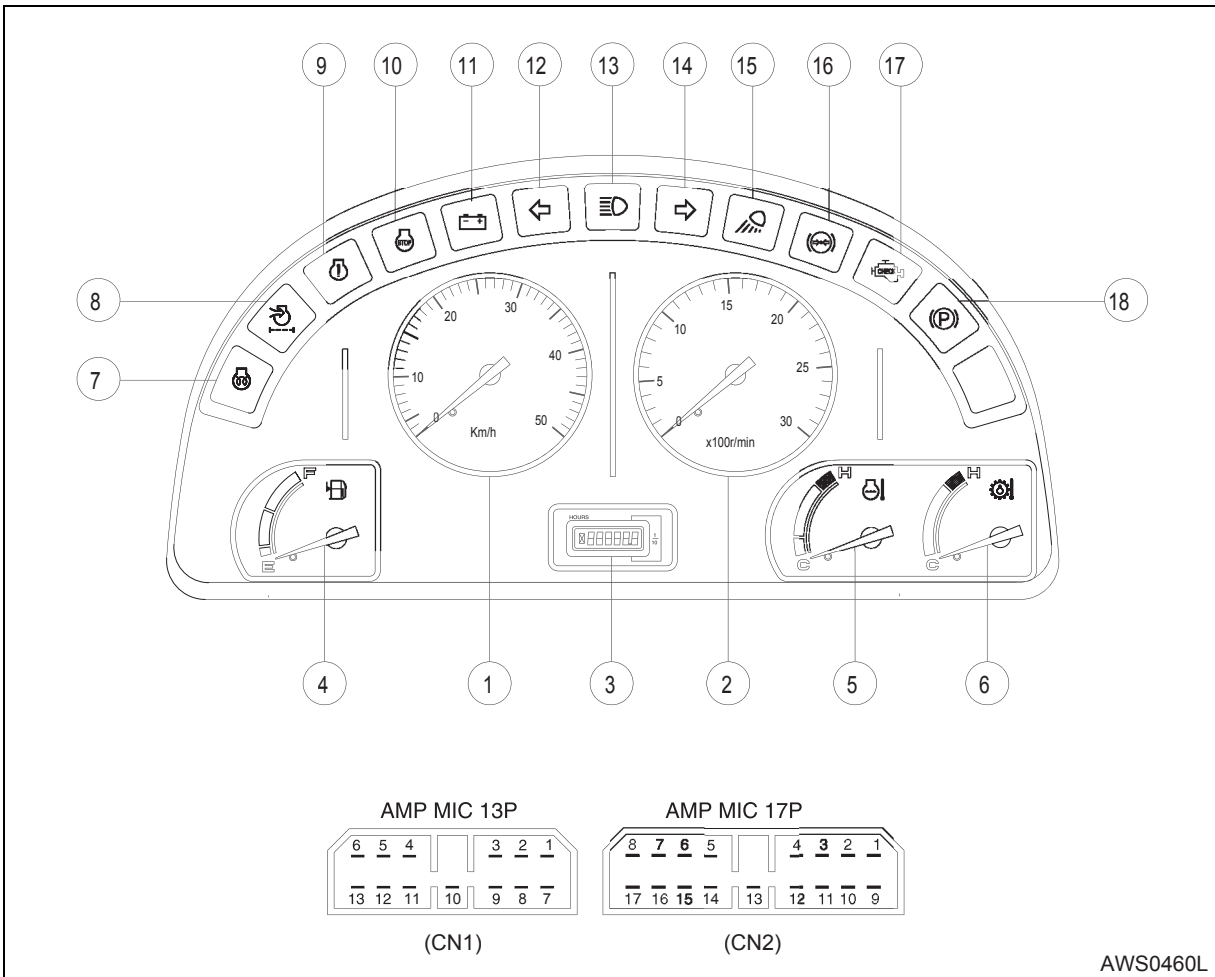


Figure 7

Reference Number	Description
1	Speed Meter
2	Tachometer
3	Hour Meter
4	Fuel Gauge
5	Engine Coolant Temperature Gauge
6	Transmission Oil Temperature Gauge
7	Preheat Indicator
8	Air Cleaner Clogging Warning Light
9	Engine Check Light

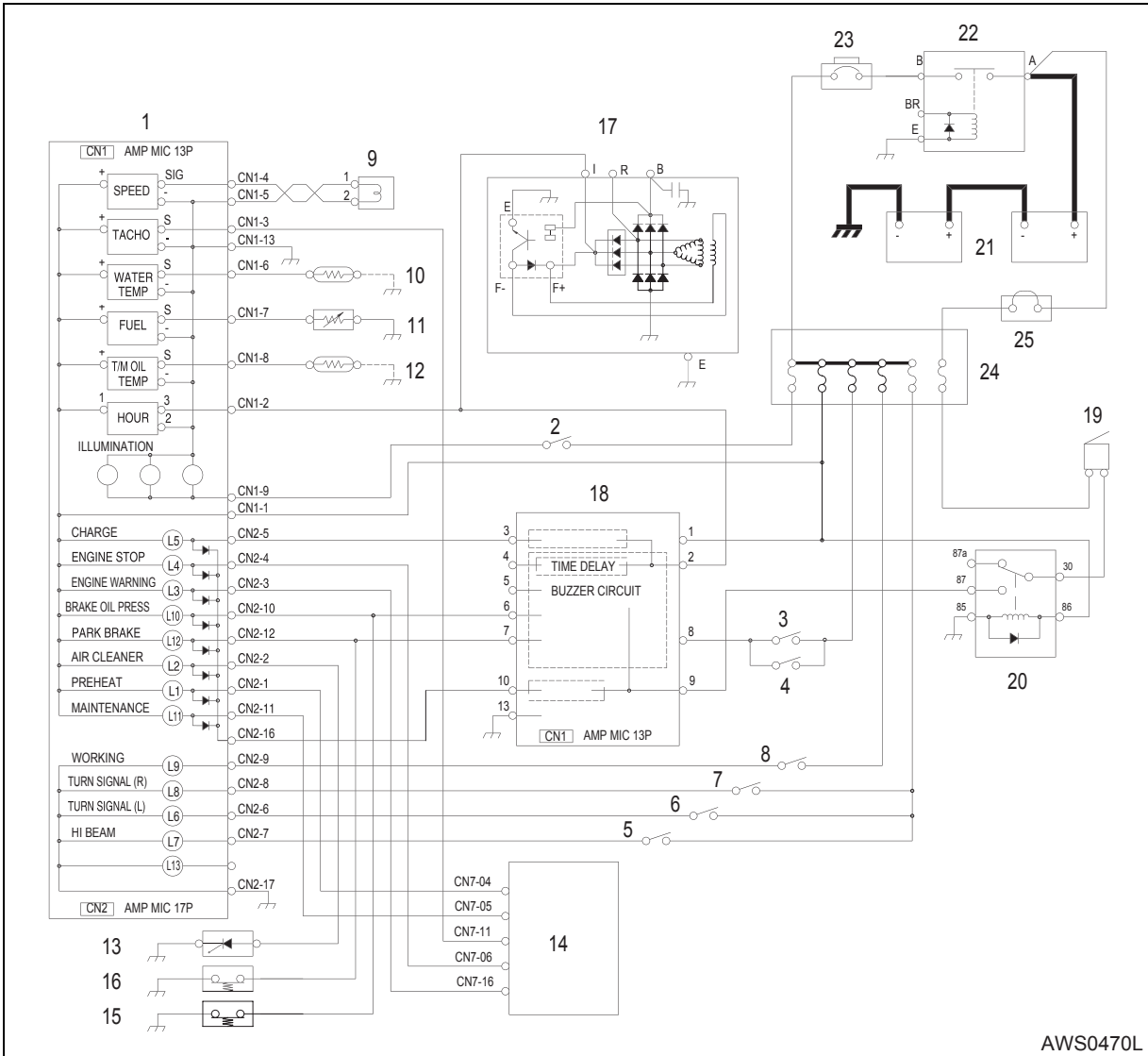
Reference Number	Description
10	Engine Stop Light
11	Charging Warning Light
12	Turn and Hazard Warning Light
13	High Beam Indicator
14	Turn and Hazard Warning Light
15	Work Light Indicator
16	Brake Oil Pressure Warning Light
17	Engine Maintenance Light
18	Parking Brake Indicator

FUNCTION CHECK

When the starter switch is turned to the "ON" position, all displays, switch lights and warning lights except turn and hazard warning light, high beam indicator and working light indicator will be lit for two seconds and the warning buzzer will sound.

Any lights which do not light up during the function check should be replaced.

MONITORING SYSTEM SCHEMATIC



AWS0470L

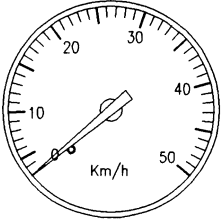
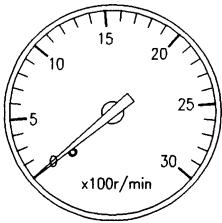
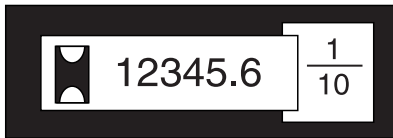
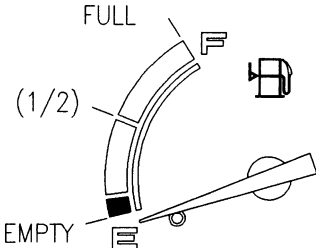
Figure 8

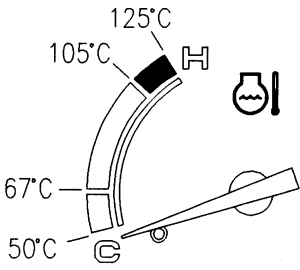
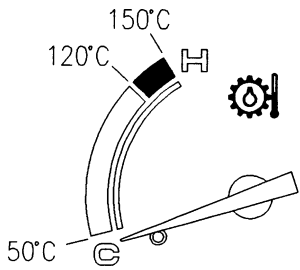
Reference Number	Description
1	Instrument Panel
2	Head Light Switch
3	Forward Lever Switch
4	Reverse Lever Switch
5	High Beam Switch
6	Left Turn Light Switch
7	Right Turn Light Switch
8	Working Light Switch
9	Speedometer
10	Coolant Temperature Sensor
11	Fuel Sensor
12	Transmission Oil Temperature Sensor
13	Air Cleaner Clogging Warning Light

Reference Number	Description
14	ECM (Electronic Control Module)
15	Brake Oil Pressure Switch
16	Parking Brake Pressure Switch
17	Alternator
18	Control Unit
19	Alarm Buzzer
20	Alarm Relay
21	Battery
22	Battery Relay
23	Circuit Breaker
24	Fuse Box
25	Fusible Link






OPERATION








Instruments

Function	Display	Sensor Specification	
		Input Terminal	Input Specification
Speedometer	 <p>HAAG0360</p>	CN1-4 CN1-5	10 km/h- 905 Hz 20 km/h- 1,811 Hz 30 km/h- 2,716 Hz 40 km/h- 3,622 Hz $*F = 90.55 V [Hz]$ F : Frequency of transmission controller V: Speed (km/h)
Tachometer	 <p>HAAG0370</p>	CN1-3	500 rpm - 100 Hz 1000 rpm - 200 Hz 1500 rpm - 300 Hz 2000 rpm - 400 Hz 2500 rpm - 500 Hz 3000 rpm - 600 Hz $*F = 0.2 N [Hz]$ F : Frequency of alternator "P" terminal N: Engine rpm
Hour Meter	 <p>0012</p>	CN1-2	ALTERNATOR "I" Terminal voltage (24V)
Fuel Level Gauge	 <p>HAAG0380</p>	CN1-7	EMPTY - Above 90 Ohm 1/2 - 38 Ohm FULL - Below 10 Ohm

Function	Display	Sensor Specification	
		Input Terminal	Input Specification
Engine Coolant Temperature Gauge	 <p>HAAG0390</p>	CN1-6	50°C - Above 188.2 Ohm 67°C - 102 Ohm 105°C - 32 Ohm 125°C - Below 19.8 Ohm
Transmission Oil Temperature Gauge	 <p>HAAG0400</p>	CN1-8	50°C - Above 322.8 Ohm 120°C - 36.5 Ohm 150°C - Below 18.6 Ohm

Indicator Lights

Symbol	Description	Input Terminal	Operation	Remarks
	Preheat	CN2-11	Lights up while the air heater is heated. (when the terminal input is grounded.)	
	Air Cleaner	CN2-2	Lights up when the air cleaner is clogged.	
	Engine Check	CN2-3	Lights up when the non-fatal system error occurred at the engine itself or peripherals.	In the diagnostic mode, will flash after the engine stop light completes the three-digit fault code.
	Engine Stop	CN2-4	Lights up when the fatal system error happened to the engine itself or peripherals.	Also used to flash out the fault code number in the diagnostic mode.
	Charging	CN2-5	Lights up when not charging. (And "R" terminal output of the alternator drops below 24 V.)	Under normal conditions, start up and unlighted once engine is running.

Symbol	Description	Input Terminal	Operation	Remarks
	Left Turn and Hazard Light	CN2-6	Lights up when the left turn signal or hazard light switch is applied. (Terminal input is to 24 V)	
	Right Turn and Hazard Light	CN2-8	Lights up when the right turn signal or hazard light switch is applied. (Terminal input is to 24 V)	
	High Beam	CN2-7	Lights up when the high beam switch is applied. (Terminal input is to 24 V)	
	Working Light	CN2-9	Lights up when the front or rear working light switch is applied. (Terminal input is to 24 V)	
	Brake Oil Pressure	CN2-10	Unlighted when the brake oil pressure increase over 65 kgf/cm ² and lights up when the brake oil pressure drops below 60 kgf/cm ² . (When the input terminal is grounded)	Under normal conditions, will be alight before engine start up and unlighted once engine is running.
	Maintenance	CN2-11	Lights up when the concerned of engine maintenance or service is required. (When the input terminal is grounded)	
	Parking Brake	CN2-12	Lights up when the parking brake switch is applied. (Terminal input is to 24 V)	Under any conditions, will be alight before engine start up.

Initial Operation

Item	Input (Terminal)	Output (Operation and initial setting mode)
Initial Operation	CN 1-1	<ul style="list-style-type: none"> All indicator lights are turned on and turned off after 2 seconds. (Except for turn signal indicator, high beam indicator and working light indicator.) Warning buzzer is activated and turned off after 2 seconds. Monitoring system displays present condition.

Control Unit Operation

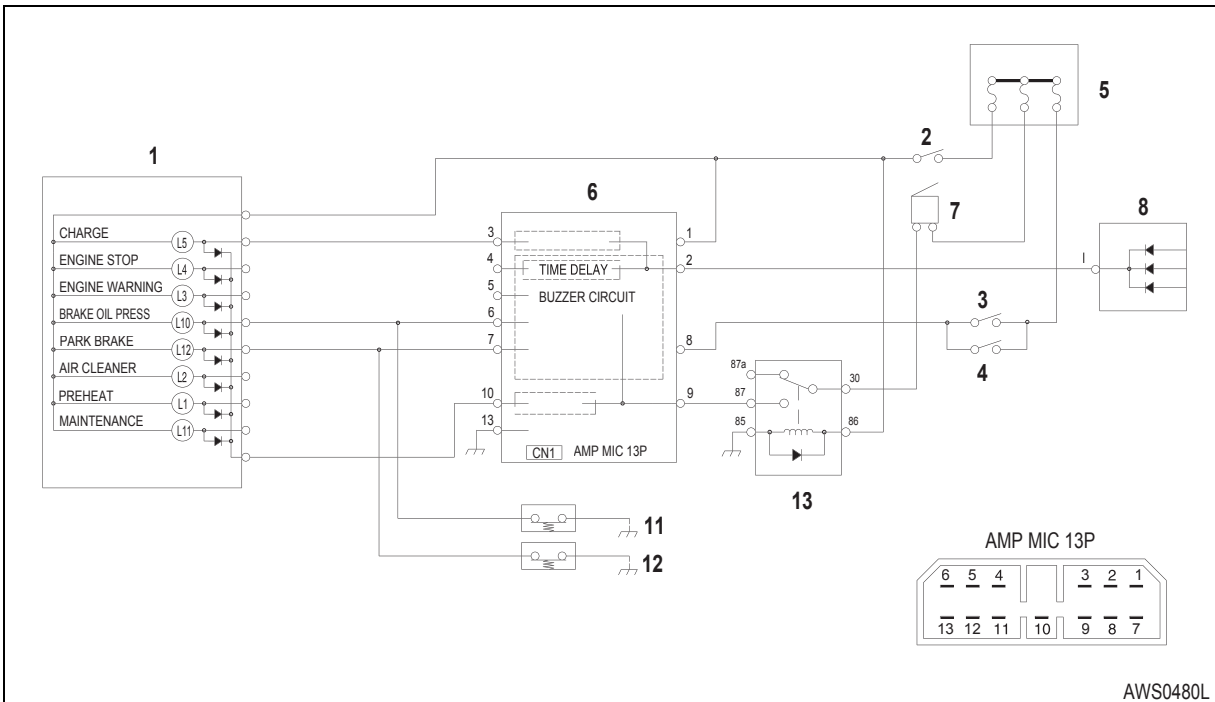


Figure 9

Reference Number	Description
1	Instrument Panel
2	Starter Switch
3	Forward Lever Switch
4	Reverse Lever Switch
5	Fuse Box
6	Control Unit

Reference Number	Description
7	Warning Buzzer
8	Alternator
11	Brake Oil Pressure Switch
12	Parking Brake Pressure Switch
13	Alarm Relay

Characteristic of Operation

	Input	Output	
1	When starter switch is "ON."	All indicator lights are turned on and turned off after 2 - 2.5 seconds. At this time the warning buzzer will sound.	
2	When "I" terminal voltage of alternator.	is below 12 ± 1 V.	The charging light, L5, will be alight.
		is above 12 ± 1 V.	The charging light, L5, will be unlighted.
3	When "I" terminal voltage of alternator is above 12 ± 1 V.	Brake oil pressure switch is "ON."	Warning buzzer sounds immediately.
		Forward and reverse lever switch is "ON" and parking brake pressure switch is "ON."	Warning buzzer sounds immediately.

Reference Number	Description
1	Fuse Box
2	Wiper Washer Switch
3	Wiper Relay
4	Wiper Timer

Reference Number	Description
5	Wiper Motor
6	Washer Tank
7	Diode

REAR WINDSHIELD WIPER

You can control rear windshield wiper by pressing wiper washer switch (2) in the switch panel.

- 1st wiper action (Wiper and washer activate the same time, automatic return)

Fuse box (1), to the washer tank (4), to the 5,7 terminal of switch (20) are connected, then activates windshield washers. Also fuse box (1), to the B,L terminal of wiper motor (3), to the diode (5), to the 5,7 terminal of switch (2) are connected, then activates wiper.

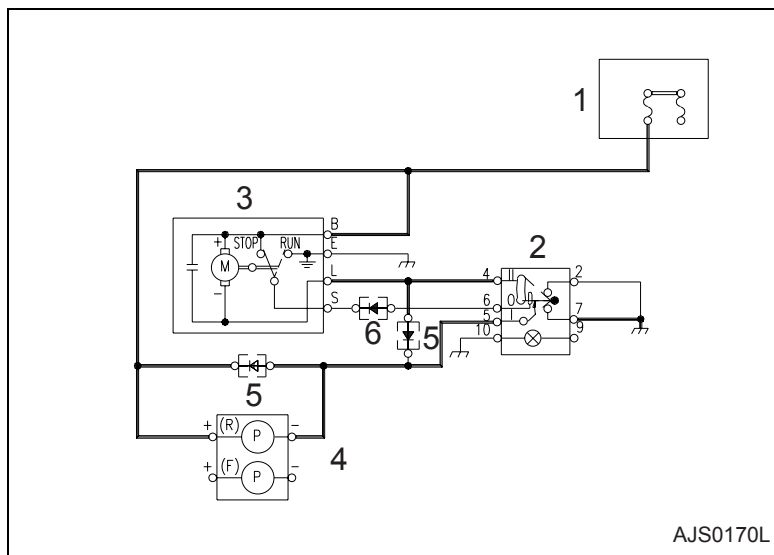


Figure 11 REAR WINDSHIELD WIPER 1ST ACTION CIRCUIT

Reference Number	Description
1	Fuse Box
2	Wiper/washer Switch
3	Wiper Motor

Reference Number	Description
4	Washer Tank
5	Diode
6	Diode

- 2nd wiper action (Only wiper action)

Fuse box (1), to the B,L terminal of wiper motor (3), to the 4,2 terminal of switch (2) are connected, then activates wiper.

- When you turn off windshield wiper switch in 1st or 2nd position, electric current flows fuse box (1), to the B,L terminal of wiper motor (3), to the 4,6 terminal of wiper switch (2), to the diode (6), to the S,E terminal of wiper motor (3).

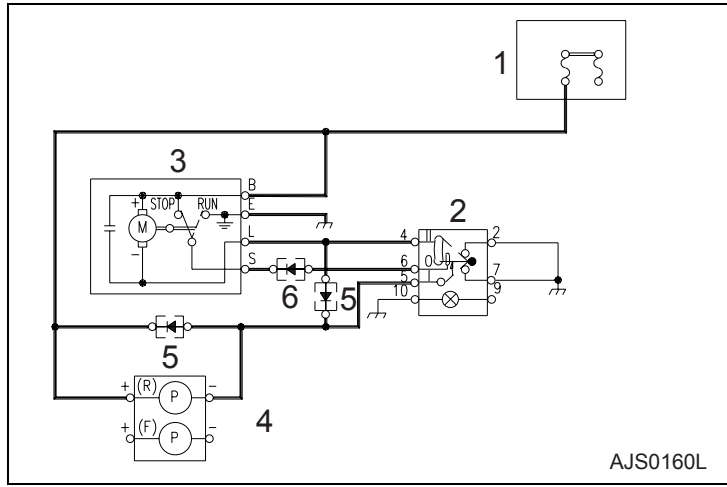


Figure 12 REAR WINDSHIELD WIPER STOP CIRCUIT

Reference Number	Description
1	Fuse Box
2	Wiper/washer Switch
3	Wiper Motor

Reference Number	Description
4	Washer Tank
5	Diode
6	Diode

LIGHTING SYSTEM

LIGHT CIRCUIT

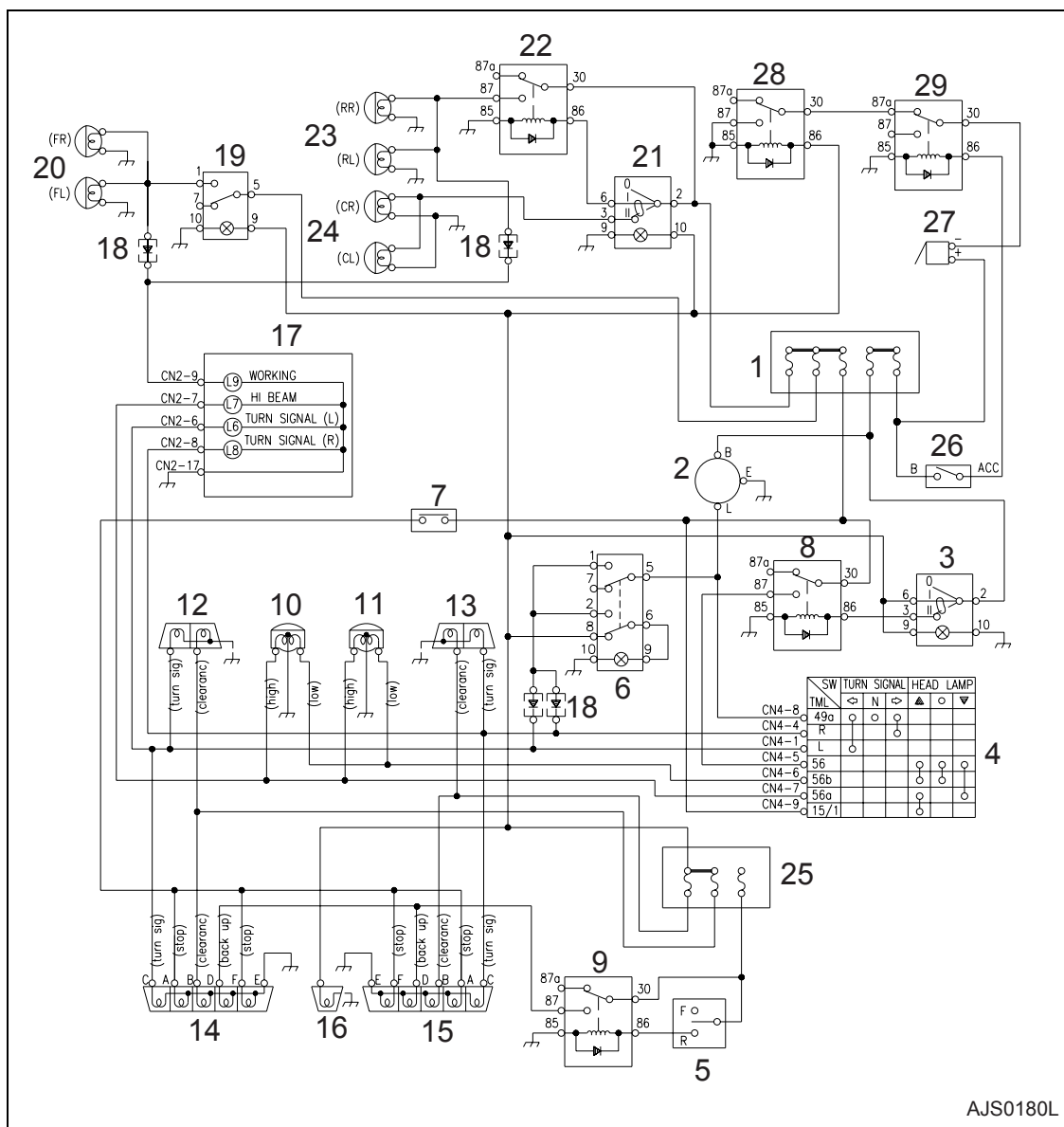


Figure 13 LIGHT CIRCUIT

Reference Number	Description
1	Fuse Box 1
2	Blinker Unit
3	Headlight Switch
4	Combination Switch
5	Shift Lever Switch
6	Hazard Switch
7	Stop Light Switch
8	Headlight Relay
9	Reverse Relay
10	Headlight (L)
11	Headlight (R)
12	Front Combination Light (L)
13	Front Combination Light (R)
14	Rear Combination Light (L)

Reference Number	Description
15	Rear Combination Light (R)
16	License Plate Light
17	Instrument Panel
18	Diode
19	Front Working Light Switch
20	Front Working Light
21	Rear Working Light Switch
22	Working Light Relay
23	Rear Working Light 1
24	Rear Working Light 2
25	Fuse Box 2
26	Starter Switch
27	Pilot Buzzer
28	Alarm Relay 1
29	Alarm Relay 2

The lighting system consists of the headlight, the position light, the turn signal light, the hazard light, the stop light, the license plate light, the working light, the rotating beacon light (option) and the switches, which are used to turn on the lights.

1. When the headlight switch (3) is in the first step, through the fuse box 1 (1) to the "2," "6" terminal of headlight switch (3), the following lights will be "ON."
 - A. The front combination light (L)(12) and rear combination light (L) through the fuse box 2 (23).
 - B. The front combination light (R)(13) and rear combination light (R) through the fuse box 2 (23).
 - C. The illumination lights through the "9" terminal of all kind of rocker switches include the headlight switch (3), the front working light switch (19), the rear working light (21) and the hazard switch (6).
 - D. The license plate light (16).
2. When the headlight switch (3) is in the second step, the current flows through the fuse box 1 (1), to the "2," "3" terminal of headlight switch (3) and to the "86," "85" terminal of headlight relay (8), and the "30," "87" terminal of headlight relay (8) is connected. As a result, through the fuse box 1 (1) to the "30," "87" terminal of headlight relay (8), the voltage is applied to the "56" terminal of combination switch (R)(4).
 - A. At this time if the combination switch (4) is in the "0" position, the current flows to the "56b" terminal and it allow the low light, which is in the headlight (L)(10) and the headlight (R)(11), to be turned "ON."
 - B. Also if the combination switch (4) is in the "t" position, the current flows to the "56a" terminal and it allow the high light, which is in the headlight (L)(10) and the headlight (R)(11), to be "ON." At the same time the current flows to the "CN2-7" terminal of instrument panel (17) and the headlight indicator L7 will be "ON,"
 - C. And if the combination switch (4) is in the "s" position, the current flows to the "56b" terminal and it allows the low light, which is in the headlight (L)(10) and the headlight (R)(11), to be "ON."

At the same time another current flows from the fuse box 1 (1) to the "15/1," "56b" terminal of combination switch (4) and the high light, which is in the headlight (L)(10) and the headlight

(R)(11) will be turned "ON," and the other current flows to the "CN2-7" terminal of instrument panel (17) and the headlight indicator will be "ON."

The combination switch (4) is returned automatically.

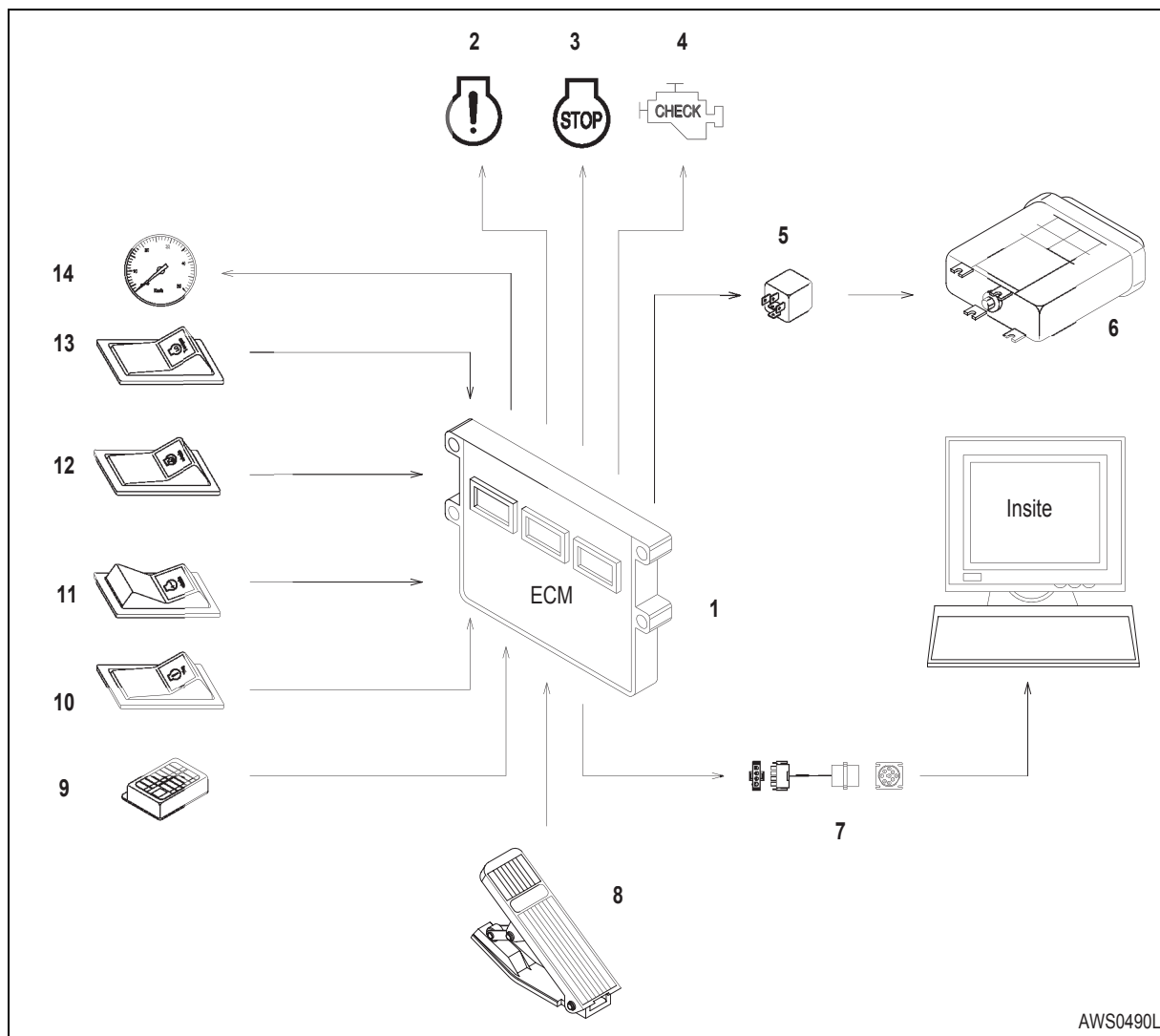
3. When the combination switch (4) is in the "←" (or "→") position, the current flows from the fuse box 1 (1), to the blinker unit (2), to the "L" (or "R") terminal through "49a" terminal of combination switch (4), to the "C" terminal of front combination light (L)(12) and the rear combination light (L)(14) (or to the front combination light (R)(13) and the rear combination light (R)(15)). This current makes the turn signal light turn "ON." At the same time the current flows to the "CN2-6" terminal (or to the CN2-8 terminal) of instrument panel and the turn signal light indicator L6 (or L8) will be "ON."
4. If you operates the hazard light switch (6), the current flows from to the fuse box 1 (1), to the blinker unit (2), to the "5," "1" terminal of hazard switch (6), to the diode (18), to the front combination light (L)(12) and the front combination light (R)(13), to the "C" terminal of rear combination light (L)(14) and rear combination light (R)(15). This current makes the turn signal light turn "ON."

At the same time through the "2," "6" terminal of hazard switch (6), the voltage is applied to the "9" terminal and the illumination light used to symbol light will be "ON." Also the current flows to the "CN2-6," "CN2-8" terminal of instrument panel (17) and the turn signal light indicator "L," "L8" will be "ON."
5. When the shift lever switch (5) is in the "R" position, the contact points "30" and "87" of the reverse relay (9) are closed due to current flowing from the fuse box 2 (23), to the shift lever switch (5), to the "86" terminal of reverse relay (9) and to the ground. Thus the current flows from fuse box 2 (23), to the reverse relay (9) and to the "D" terminal of rear combination light (L)(14) and rear combination light (R)(15). And the reverse light will be "ON."
6. When the brake pedal is depressed and at the same time the stop light switch (7) is turned "ON," the current flows the from fuse box 1 (1), to the stop light switch (7) and to the "F" terminal of rear combination light (L)(14) and rear combination light (R)(15). And the stop light will be "ON."
7. When the front working light switch (19) is in the "ON" position, the current flows from the fuse box 1 (1), to the "5," "1" terminal of front working light switch (19) and to the front working light (20).

This current makes the front working lights turn "ON." At the same time the working light indicator, L9," is turned "ON" due to the current flowing from the diode (8) to the "CN2-9" terminal of instrument panel (17).
8. When the rear working light switch (21) is in the second step, the contact points "30" and "87" of the working light relay (22) is closed due to the flowing current from the fuse box 1 (1), to the "2" and "6" terminal of the working light switch (21), to the "86" terminal of the working light relay (22) and to the ground. Thus the current flows from the fuse box 1 (1), to the working light relay (22) and to the rear working light 1 (23) mounted on radiator guard. As a result the rear working light (23) turns "ON". At the same time the working light indicator "L9" turns "ON" due to the current flowing from the diode (18) to the "CN2-9" terminal of the instrument panel.
9. When the rear working light switch (21) is in the second step, the contact points "30" and "87" of the working light relay (22) is closed due to the flowing current from the fuse box 1 (1), to the "2" and "6" and "3" terminal of the working light switch (21), the rear working (23) is operated like being described above clause "8" and the rear working light (24) mounted on the cabin turns "ON" at the same time.
10. When the headlight switch (3) is in the first step or in the second step while the starter switch (26) is in the "OFF" position, the contact point "30," "87" of alarm relay 1 (28) is closed due to the excited current, which flows to the coil of alarm relay 1 (28) and the pilot buzzer (27) will sound. But when the headlight switch (3) is in the first step or in the second step while the starter switch (26) is in the "ON" position, the contact point "3," "87" of alarm relay 2 (29) is closed due to the excited current, which flows to the coil of alarm relay 2 (29). At the same time the current is not supplied to the "30" terminal of alarm relay 1 (28) and the pilot buzzer will not sound any more.

ENGINE CONTROL SYSTEM

ECM BLOCK DIAGRAM



AWS0490L

Figure 14

Reference Number	Description
1	ECM (Electronic Control Module)
2	Engine Check Warning Light
3	Engine Stop Warning Light
4	Engine Maintenance Light
5	Engine Derating Relay
6	TCU (Transmission Control Unit)
7	Data Link Harness

Reference Number	Description
8	Electronic Accelerator Pedal
9	Fuse Box
10	Engine Diagnostic Switch
11	Idle Speed Control Switch
12	Alternate Low Idle Switch
13	Alternate Torque Switch
14	Taco Meter

ECM ELECTRIC CIRCUIT

ECM EXTERNAL CIRCUIT

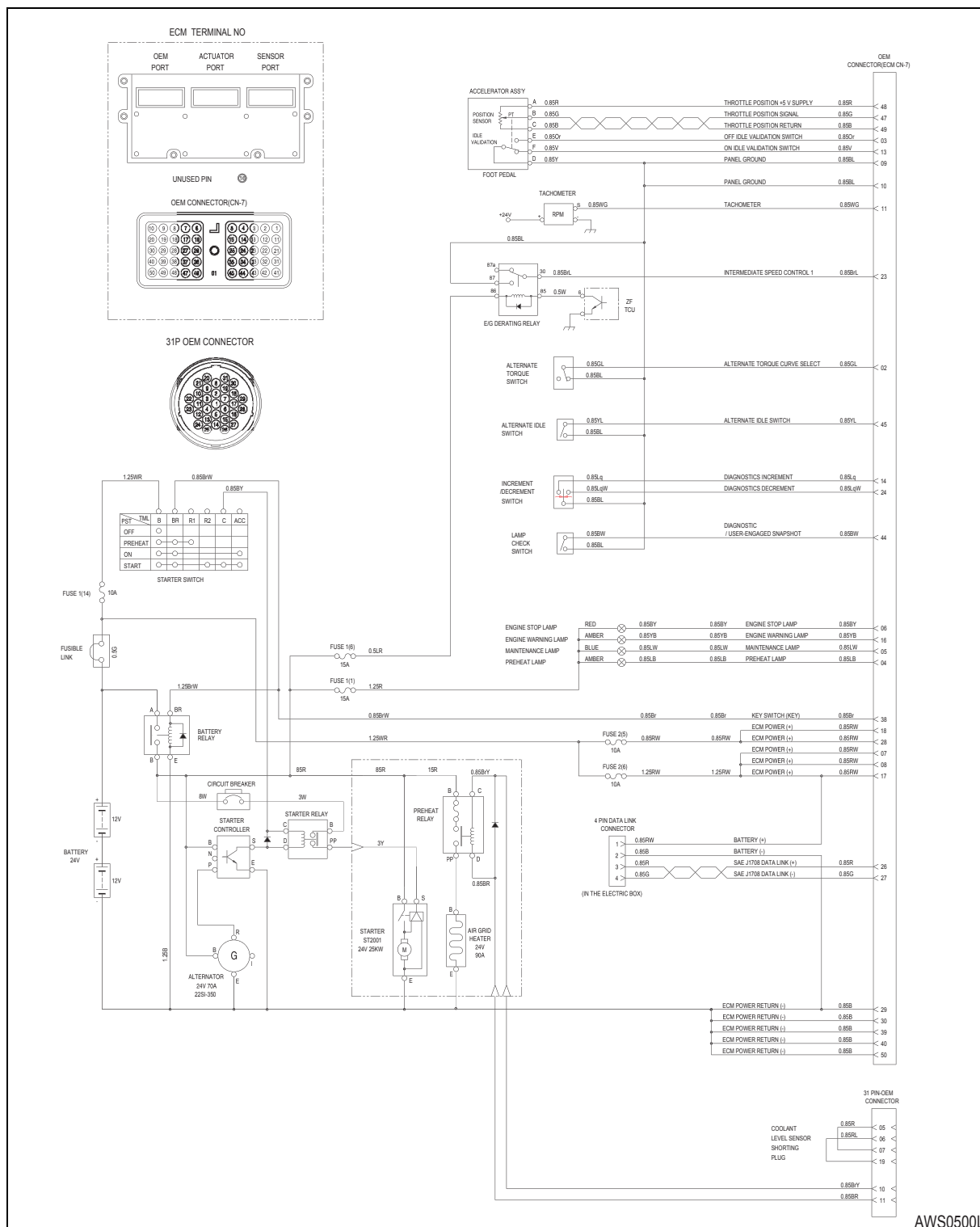


Figure 15

AWS0500L

ECM INTERNAL CIRCUIT

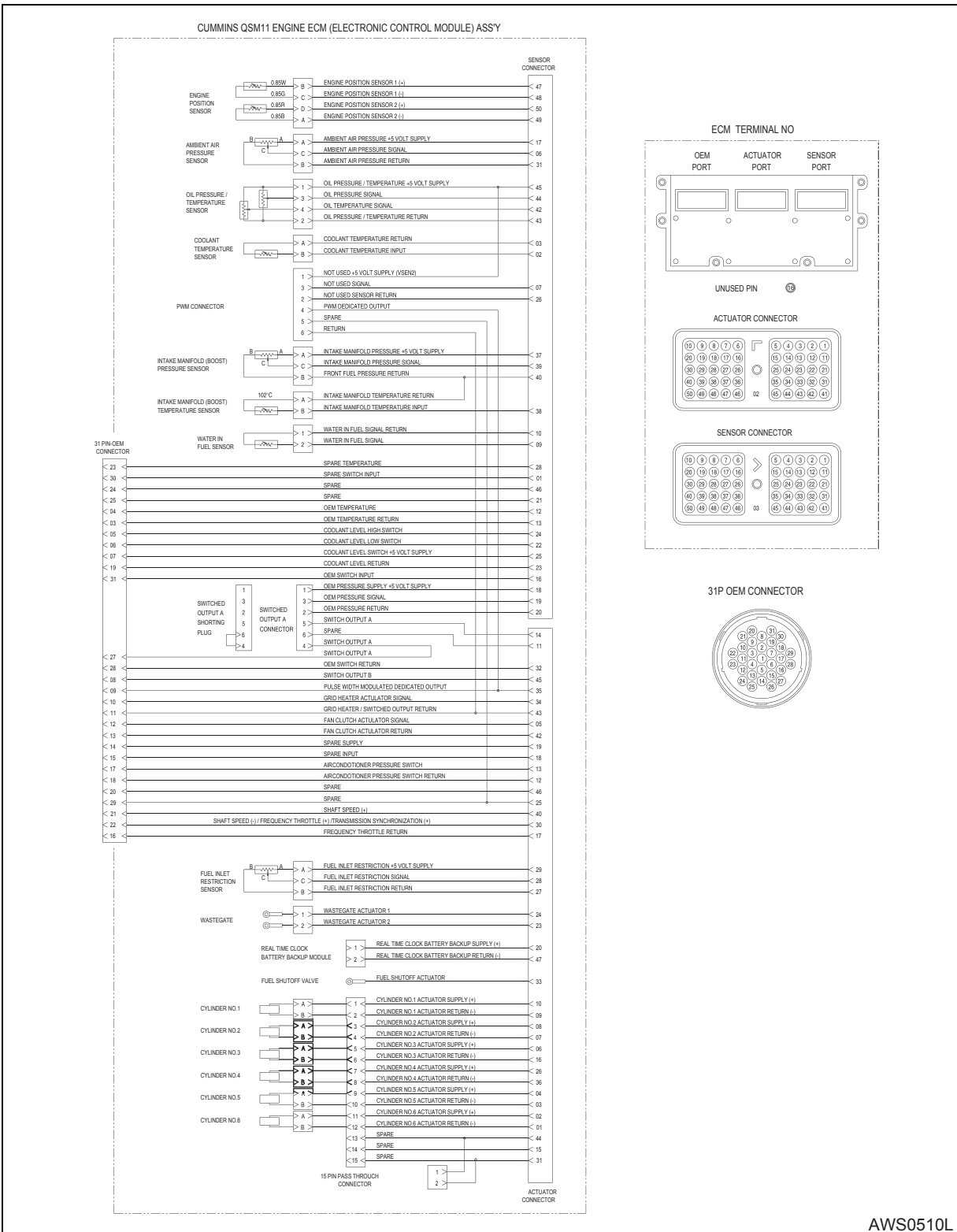


Figure 16

ECM SYSTEM COMPONENT

ECM (ELECTRONIC CONTROL MODULE)

1. The ECM (Electronic Control Module) is the control center of the system. It processes all of the inputs and sends commands fuel system, vehicle and engine control devices.
2. The ECM performs diagnostic tests on most of its circuit and will activate a fault code if a problem is detected in one of these circuits. Along with the fault code identifying the problem, a snapshot of engine operating parameters at the time of fault activation is also stored in memory.

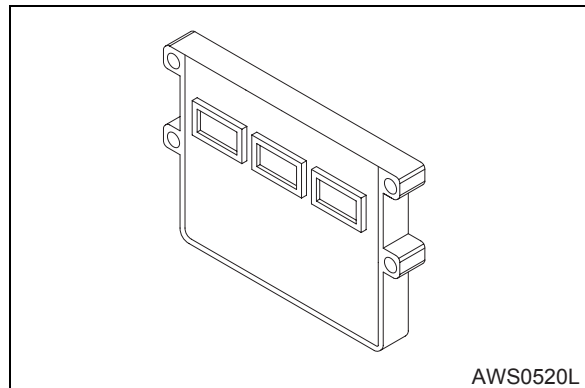


Figure 17

ALTERNATE (SWITCHABLE) TORQUE SWITCH

The alternate torque switch provides the ability to select up to additional derated torque curves. This alternate torque feature allows the operator to switch between 100% throttle torque curves and up to derated torque curve (80%) and improves operating efficiency in loaded versus unloaded conditions.

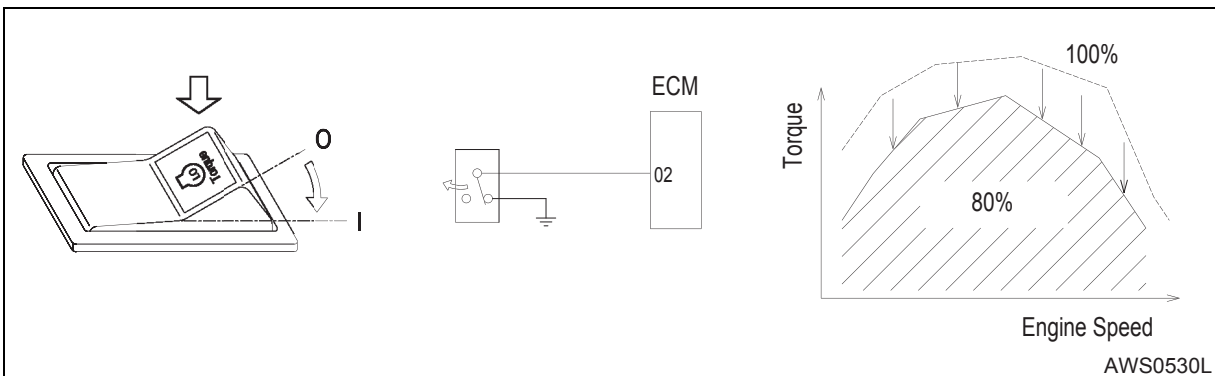


Figure 18

ALTERNATE LOW IDLE SWITCH

The alternate low idle switch allows operator to select an alternate idle speed (about 1,200 rpm). This feature is activated whenever the normally open alternate low idle switch is closed and 0 volts are detected by the ECM on the alternate low idle signal line. This is convenient to use when operator wants to decrease warm-up time in the winter.

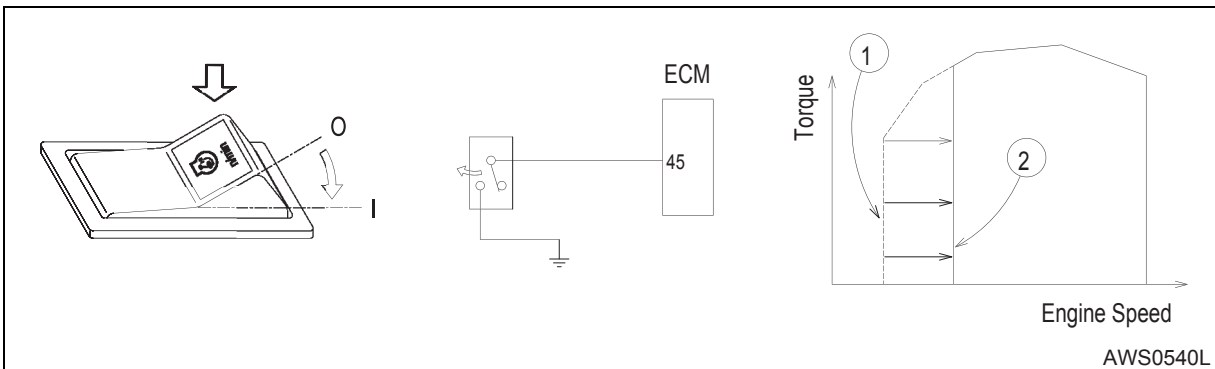


Figure 19

Reference Number	Description
1	Low Idle Speed Setting
2	Alternate Low Idle Speed Setting

IDLE SPEED CONTROL SWITCH

The idle speed control switch allows the idle speed to be adjusted in 25-rpm increments by pressing the rocker switch. The switch will only work from 800 to 900 rpm.

Pressing the "I" position of the switch will increase (+) engine rpm.

Pressing the "II" position of the switch will decrease (-) engine rpm.

This switch is also used to view the next or previous fault code in the diagnostic mode.

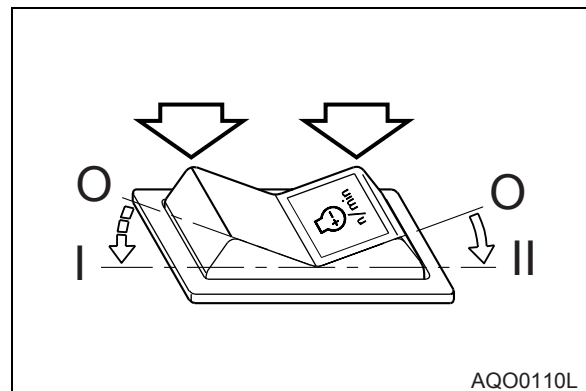


Figure 20

ENGINE DIAGNOSTIC SWITCH

If the engine check light (Yellow) or the engine stop light (Red) or the engine maintenance light (Blue) comes on when the engine is running, it means a fault code has been recorded.

During this time, the engine diagnostic switch allows the operator to view the fault codes.

The severity of the fault will determine the light that will come "ON" and the active fault codes can be viewed using the engine stop light as described below.

To view the fault codes:

1. Engine must be shut off (not running)
2. Starter switch must be in the "ON" position.
3. Engine diagnostic switch must be in the "I" position.

The engine stop and check lights flash if there are any fault codes to display. If there are no fault codes to display, the engine stop and check lights will remain lit.

ENGINE FAULT CODES

If there are fault codes to be displayed, the engine check light will flash momentarily. Then the engine stop light will flash the first, second and third digits of the fault code.

1. Engine Stop Light (Red)
2. Engine Check Light (Yellow)
3. Engine Maintenance Light (Blue)

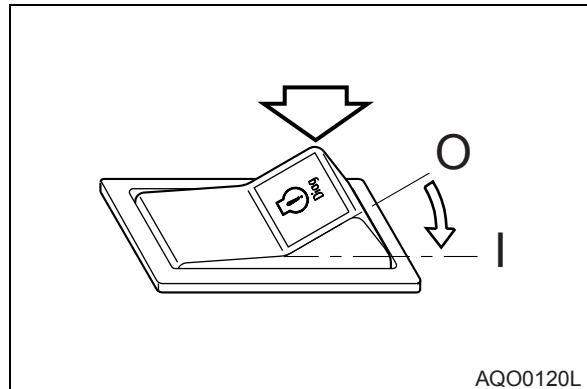


Figure 21

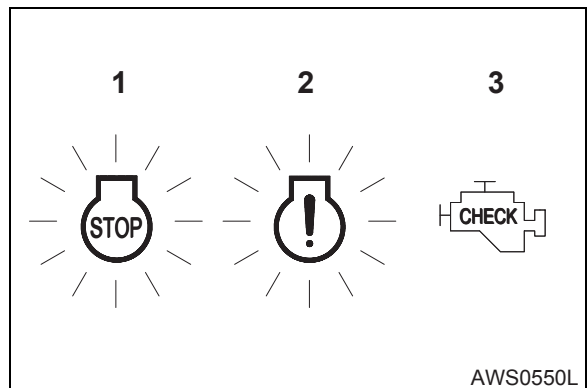


Figure 22

- Example:

NOTE: *The engine check light will flash between each fault code.*

This pattern repeats itself until the fault is cleared or the diagnostic switch is turned "OFF."

To view the next or previous fault code, press the idle speed control switch (Figure 20) in the "I" position or "II" position.

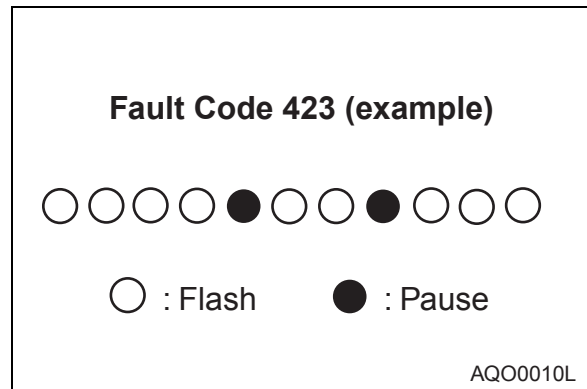


Figure 23

FAULT CODE INFORMATION

Fault Code Light	J1587 PID(P) SID(S) FMI	J1939 SPN FMI	Reason	Effect
111 Red	S254 12	629 12	Error internal to the ECM related to memory hardware failures or internal ECM voltage supply circuits.	Engine will not start.
115 Red	P190 2	190 2	No engine speed signal detected at both engine position sensor circuits.	Engine will die and will not start
121 Yellow	P190 10	190 10	No engine speed signal detected from one of the engine position sensor circuits.	None on performance.
122 Yellow	P102 3	102 3	High voltage detected on the intake manifold pressure circuit.	Derate in power output of the engine
123 Yellow	P102 4	102 4	Low voltage detected on the intake manifold pressure circuit.	Derate in power output of the engine
131 Red	P091 3	91 3	High voltage detected at the throttle position signal circuit.	Severe derate (power and speed). Limp home power only.
132 Red	P091 4	91 4	Low voltage detected at the throttle position signal circuit.	Severe derate (power and speed). Limp home power only.
133 Red	P029 3	974 3	High voltage detected at the remote throttle position signal circuit.	None on performance if remote throttle is not used.
134 Red	P029 4	974 4	Low voltage detected at the remote throttle position signal circuit.	None on performance if remote throttle is not used.
135 Yellow	P100 3	100 3	High voltage detected at the oil pressure circuit.	No engine protection for oil pressure
141 Yellow	P100 4	100 4	Low voltage detected at the oil pressure circuit.	No engine protection for oil pressure
143 Yellow	P100 1	100 18	Oil Pressure signal indicates oil pressure below the low oil pressure engine protection limit.	Progressive power and speed derate with increasing time after alert. If Engine Protection Shutdown 30 seconds after red light starts flashing.
144 Yellow	P110 3	110 3	High voltage detected at the coolant temperature circuit.	Possible white smoke. Fan will stay on if controlled by the electronic control module (ECM). No engine protection for coolant temperature.
145 Yellow	P110 4	110 4	Low voltage detected at the coolant temperature circuit.	Possible white smoke. Fan will stay on if controlled by electronic control module (ECM). No engine protection for coolant temperature.
147 Red	P110 4	91 8	A frequency of less than 100Hz was detected at the frequency throttle signal pin of the actuator harness connector at the ECM.	Calibration dependent power and speed derate.
148 Red	P091 8	91 8	A frequency of more than 100Hz was detected at the frequency throttle signal pin of the actuator harness connector at the ECM.	Calibration dependent power and speed derate.

Fault Code Light	J1587 PID(P) SID(S) FMI	J1939 SPN FMI	Reason	Effect
151 Red	P110 0	110 0	Coolant temperature signal indicates coolant temperature above 104°C [220°F].	Progressive power derate with increasing time after alert. If Engine Protection shutdown feature is enabled, engine will shut down 30 seconds after red light starts flashing.
153 Yellow	P105 3	105 3	High voltage detected at the intake manifold temperature circuit.	Possible white smoke. Fan will stay on if controlled by electronic control module (ECM). No engine protection for coolant temperature.
154 Yellow	P105 4	105 4	Low voltage detected at the intake manifold temperature circuit.	Possible white smoke. Fan will stay on if controlled by electronic control module (ECM). No engine protection for coolant temperature.
155 Red	P105 0	105 0	Intake Manifold temperature signal indicates temperature above 87.7°C [190°F].	Progressive power derate with increasing time after alert. If Engine Protection shutdown feature is enabled, engine will shut down 30 seconds after red light starts flashing.
187 Yellow	S232 4	620 4	Low voltage detected on the ECM voltage supply line to some sensors (VSEN2 supply).	Engine will run derated. No engine protection for oil pressure and coolant level.
211 None	A216 11	1484 31	Additional OEM or Vehicle diagnostic codes have been logged. Check other ACME's for diagnostic codes.	None on engine performance.
212 Yellow	P175 3	175 3	High voltage detected at the oil temperature circuit.	No engine protection for oil temperature.
213 Yellow	P175 4	175 4	Low voltage detected at the oil temperature circuit.	No engine protection for oil temperature.
214 Red	P175 0	175 0	Oil temperature signal indicates oil temperature above 123.9°C [255°F]	Progressive power derate with increasing time after alert. If Engine Protection shutdown feature is enabled, engine will shut down 30 sec. after red light starts flashing.
219 Maintenance	P017 1	1380 17	Low oil level was detected in the Centinel makeup oil tank.	None performance. Centinel deactivated.
221 Yellow	P108 3	108 3	High voltage detected at the ambient air pressure circuit.	Derate in power output of the engine
222 Yellow	P108 4	108 4	Low voltage detected at the ambient air pressure circuit.	Derate in power output of the engine
223 Yellow	P085 4	1265 4	Incorrect voltage detected at the Centinel actuator circuit by the ECM.	None n performance. Centinel deactivated.
227 Yellow	P232 3	620 3	High voltage detected on the ECM voltage supply line to some sensors (VSEN2 supply).	Engine will run derated. No engine protection for oil pressure and coolant level.

Fault Code Light	J1587 PID(P) SID(S) FMI	J1939 SPN FMI	Reason	Effect
234 Red	P190 0	190 0	Engine speed signal indicates engine speed is greater than 2730 rpm.	Fuel shutoff valve closes until engine speed fails to 2184 rpm.
235 Red	P111 1	111 1	Coolant level signal indicates coolant level is below the normal range.	Progressive power derate with increasing time after alert. If Engine Protection shutdown feature is enabled, engine will shut down 30 sec. after red light starts flashing.
237 Yellow	S030 2	644 2	Duty cycle of the throttle input signal to the primary or secondary engine for multiple unit synchronization is less than 3percent or more than 97 percent.	All engines (primary and secondary) are shut down with increasing time after alert if harscoupled. Only secondary engine are shut down with increasing time after alert if soft coupled.
241 Yellow	P084 2	84	2 The ECM lost the vehicle speed signal.	Engine speed limited to Maximum Engine Speed without vehicle speed sensor parameter value cruise control, gear-down protection and road speed governor will not work (automotive only)
242 Yellow	P084 10	84 10	Invalid or inappropriate vehicle speed signal detected. Signal indicates an intermittent connection or VSS tampering.	Engine speed limited to Maximum Engine Speed without vehicle speed sensor valve cruise control, gear-down protection and road speed governor will not work (automotive only)
245 Yellow	S033 4	647 4	Less than 6 VDC detected at fan clutch circuit when on. Indicates an excessive current draw from the ECM or faulty ECM output circuit.	The fan may stay on at all times.
254 Red	S017 4	632 4	Less than 6 VDC detected at FSO circuit when on. Indicates an excessive current draw from the ECM or a faulty ECM output circuit.	The ECM turns off the FSO supply voltage. The engine will shut down.
255 Yellow	S017 3	632 3	Externally supplied voltage detected going to the fuel shutoff solenoid supply circuit.	None on performance. Fuel shutoff valve stays open.
285 Yellow	S231 9	639 9	The ECM expected information from a multiplexed device but did not receive it soon enough or did not receive it at all.	At least one multiplexed device will not operate properly.
286 Yellow	S231 13	639 13	The ECM expected info from a multiplexed device but only receive a portion of the necessary information.	At least one multiplexed device will not operate properly.
287 Red	S091 2	91 19	The OEM vehicle electronic control unit (VECU) detected a fault with its throttle pedal.	The engine will only idle.

Fault Code Light	J1587 PID(P) SID(S) FMI	J1939 SPN FMI	Reason	Effect
288 Red	S029 2	974 19	The OEM vehicle electronic control unit (VECU) detected a fault with its remote throttle.	The engine will not respond to the remote throttle.
293 Yellow	S154 3	1083 3	High voltage detected at the OEM temperature sensor signal pin of the 31-pin OEM connector.	No engine protection for OEM temperature.
294 Yellow	S154 4	1083 4	Low voltage detected at the OEM temperature sensor signal pin of the 31-pin OEM connector.	No engine protection for OEM temperature.
295 Yellow	S108 2	108 2	An error in the ambient air pressure sensor signal was detected by the ECM.	Engine is derated to no air setting.
297 Yellow	S223 3	1084 3	High voltage detected at the OEM pressure sensor signal pin of the 31-pin OEM connector.	No engine protection for OEM pressure
298 Yellow	S223 4	1084 4	Low voltage detected at the OEM pressure sensor signal pin of the 31-pin OEM connector.	No engine protection for OEM pressure
299 Yellow	S117 11	1384 31	Engine shutdown by device other than key switch before proper engine cool down resulting in filtered load factor above maximum shutdown threshold.	No action taken by the ECM.
311 Yellow	S001 6	651 6	Current detected at No.1 injector when voltage is turned off.	Current to injector is shut off.
312 Yellow	S005 6	655 6	Current detected at No.5 injector when voltage is turned off.	Current to injector is shut off.
313 Yellow	S003 6	653 6	Current detected No.3 injector when voltage is turned off.	Current to injector is shut off.
314 Yellow	S006 6	656 6	Current detected No.6 injector when voltage is turned off.	Current to injector is shut off.
315 Yellow	S002 6	652 6	Current detected No.2 injector when voltage is turned off.	Current to injector is shut off.
319 Maintenance	S251 2	251 2	Real time clock lost power.	None on performance. Data in the ECM will not have accurate time and data information.
321 Yellow	S004 6	654 6	Current detected No.4 injector when voltage is turned on.	Current to injector is shut off.
322 Yellow	S001 5	651 5	No current detected at No.1 injector when voltage is turned on.	Current to injector is shut off.
323 Yellow	S005 5	655 5	No current detected at No.5 injector when voltage is turned on.	Current to injector is shut off.
324 Yellow	S003 5	653 5	No current detected at No.3 injector when voltage is turned on.	Current to injector is shut off.
325 Yellow	S006 5	656 5	No current detected at No.6 injector when voltage is turned on.	Current to injector is shut off.
331 Yellow	S002 5	652 5	No current detected at No.2 injector when voltage is turned on.	Current to injector is shut off.
332 Yellow	S004 5	654 5	No current detected at No.4 injector when voltage is turned on.	Current to injector is shut off.

Fault Code Light	J1587 PID(P) SID(S) FMI	J1939 SPN FMI	Reason	Effect
341 Yellow	S253 2	630 2	Severe loss of data from the ECM.	Possible no noticeable performance effects OR hard starting. Fault information. Trip information, and maintenance monitor data may be inaccurate.
343 Yellow	S254 12	629 12	Internal ECM error.	Possible none on performance or severe derate.
349 Yellow	S191 0	191 16	A frequency greater than calibrated threshold was detected at the tail shaft governor signal pin of the 31-pin OEM connector.	Calibration dependent power and speed derate.
352 Yellow	S232 4	1079 4	Low voltage detected on the ECM voltage supply line to some sensors (VSEN1 supply).	Engine is derated to no air setting.
386 Yellow	S232 3	1079 3	High voltage detected on the ECM voltage supply line to some sensors (VSEN1 supply).	Engine is derated to no air setting.
387 Yellow	S221 3	1043 3	High voltage detected on the ECM voltage supply line to the throttle(s) (VTP supply).	Engine will only idle.
415 Red	P100 1	100 18	Oil Pressure signal indicates oil pressure below the very low oil pressure engine protection limit.	Progressive power derate with increasing time from alert. If engine protection shutdown feature is enabled, engine will shut down 30 seconds after red light starts flashing.
418 Maintenance	S097 0	97 15	Water has been detected in the fuel filter.	Possible white smoke. loss of power, or hard starting.
419 Yellow	S102 0	1319 2	An error in the intake manifold pressure sensor signal was detected by the ECM.	Engine is derated to no air setting.
422 Yellow	S111 2	111 2	Voltage detected simultaneously on both the coolant level high and low signal circuits OR no voltage detected on both circuits.	No engine protection for coolant level.
426 None	S231 2	639 2	Communication between the ECM and the J1939 data link has been lost.	None on performance. J1939 devices may not operate.
428 Yellow	S097 3	97 3	High voltage detected at water-in-fuel sensors.	None on performance.
429 Yellow	S097 4	97 4	Low voltage detected at water-in-fuel sensors.	None on performance.
431 Yellow	S23 02	558 2	Voltage detected simultaneously on both the idle validation off-idle and on-idle circuits.	None on performance.

Fault Code Light	J1587 PID(P) SID(S) FMI	J1939 SPN FMI	Reason	Effect
432 Red	S230 13	558 13	Voltage detected at idle validation on-idle circuit when voltage at throttle position circuit indicates the pedal is not at idle OR voltage detected at idle validation off-idle circuit when voltage at throttle position circuit indicates the pedal is at i	Engine will only idle.
433 Yellow	P102 2	102 2	Voltage signal at intake manifold pressure circuit indicates high intake manifold pressure but other engine characteristics indicate intake manifold pressure must be low.	Derate to no air setting.
434 Yellow	P251 2	627 2	Supply voltage to the ECM fell below 6.2 VDC for a fraction of a second OR the ECM was not allowed to power down correctly (retain battery voltage for 30 seconds after key off.)	Possible no noticeable performance effects OR possibility of engine dying OR hard starting. Fault information, Trip information, and maintenance monitor data may be inaccurate.
435 Yellow	P100 2	100 2	An error in the oil pressure sensor signal was detected by the ECM.	None on performance. No engine protection for oil pressure.
441 Yellow	P168 1	168 18	Battery voltage below normal operating level.	Possible no noticeable performance effects OR possibility of rough idle.
442 Yellow	P168 0	168 16	Battery voltage above normal operating level.	None on performance.
443 Yellow	P221 4	1043 4	Low voltage detected on the ECM voltage supply line to throttle(s) (VTP supply).	Engine will only idle.
489 Yellow	P191 1	191 18	Auxiliary speed frequency on input pin indicated that the frequency is below a calibration dependent threshold.	Engine will only idle.
527 Yellow	P040 S1543	702 3	Less than 17.0 VDC detected at the dual output A signal pin of the 31-pin OEM connector.	No action taken by the ECM.
528 Yellow	P093 2	93 2	Less than 17.0 VDC detected at the dual output B signal pin of the 31-pin OEM connector.	No action taken by the ECM
529 Yellow	S051 3	703 3	Less than 17.0 VDC detected at the dual output B signal pin at the ECM.	No action taken by the ECM.
551 Yellow	S230 4	558 4	No voltage detected simultaneously on both the idle validation off-idle and on-idle circuits.	Engine will only idle.
581 Yellow	P105 3	1381 3	High voltage detected at the fuel inlet restriction sensor signal pin.	Fuel inlet restriction monitor deactivated.
582 Yellow	P105 4	1381 4	Low voltage detected at the fuel inlet restriction sensor signal pin.	Fuel inlet restriction monitor deactivated.
583 Yellow	P105 1	1381 18	Restriction has been detected at the fuel pump inlet.	Fuel inlet restriction monitor warning is set.

Fault Code Light	J1587 PID(P) SID(S) FMI	J1939 SPN FMI	Reason	Effect
596 Yellow	P167 0	167 16	High battery voltage detected by the battery voltage monitor feature.	Yellow light will be lit until high battery voltage condition is corrected.
597 Yellow	P167 1	167 18	ICON has restarted the engine three times within three hours due to low battery voltage (automotive only) OR low battery voltage detected by the battery voltage monitor feature	Yellow light will be lit until low battery voltage condition is corrected. The ECM may increase idle speed and deactivate idle decrement switch if idle speedup is enabled. The engine will run continuously if ICON is active (automotive only).
598 Red	P167 1	167 1	Very low battery voltage detected by the battery voltage monitor feature.	Red light lit until very low battery voltage condition is corrected.
611 None	S151 11	1383 31	Engine shutdown by operator before proper engine cool down resulting in filtered load factor above maximum shutdown threshold.	No action taken by the ECM.
951 None	P166 2	166 2	A power in balance between cylinders was detected by the ECM.	Engine may have rough idle or misfire.

ELECTRONIC ACCELERATOR

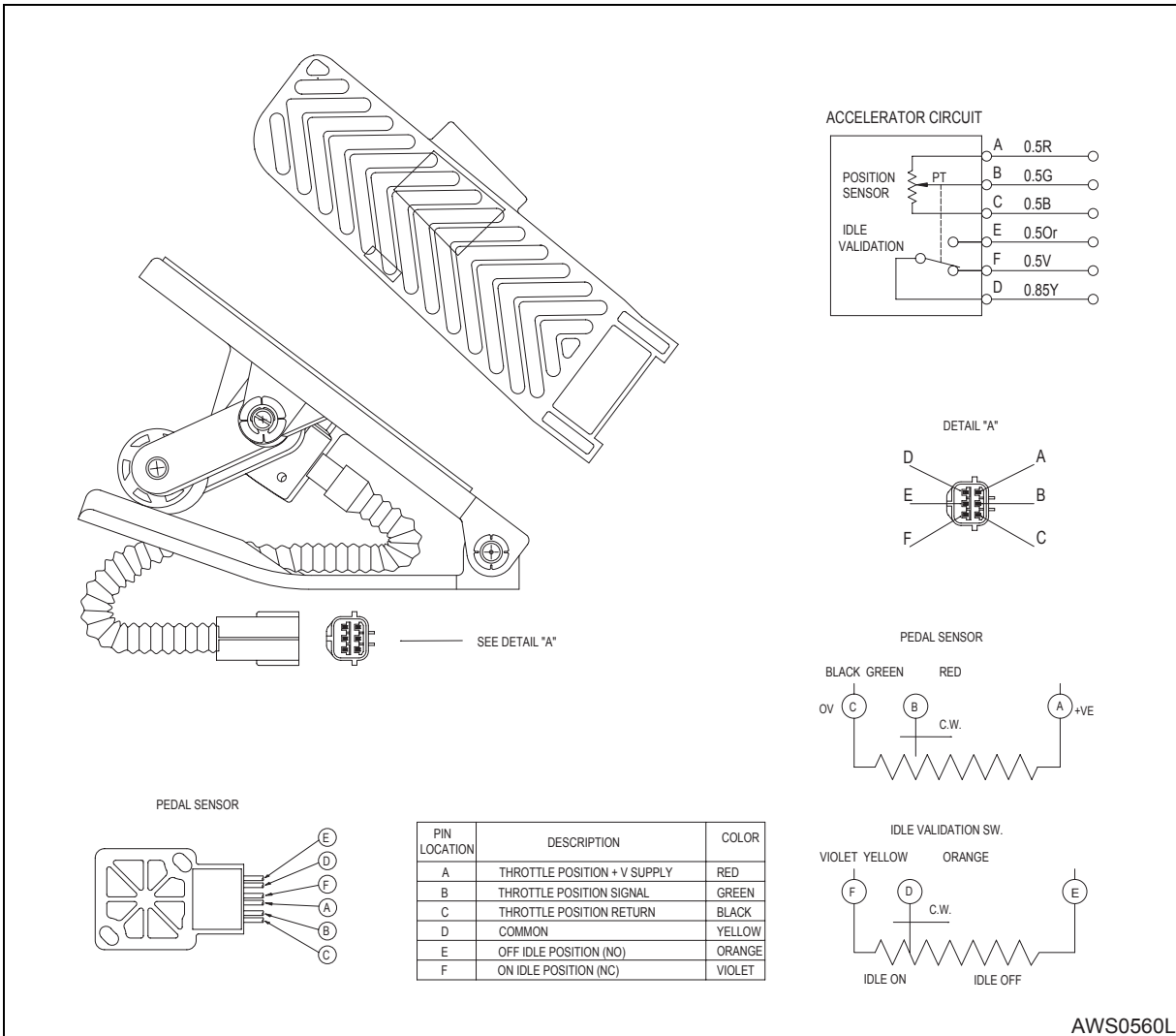


Figure 24

ELECTRIC SPECIFICATION

1. Total Resistance: 2.5K Ohm \pm 10% (at 20°C)
2. Linearity: \pm 2% over 5% ~ 85% of output
3. Power Rating: 0.15W (at 85°C)

SWITCH SPECIFICATION

1. Idle Validation Sw.2: IVS3 - (0.5° ~ 3.5°) (Normally Closed)
2. Idle Validation Sw.3: 13° \pm 2° (Normally Open)
3. Continuous Limit Current: Max. 20mA

MECHANICAL SPECIFICATION (PEDAL SENSOR)

1. Rotating Angle: $83^\circ \pm 2^\circ$
2. Spring Return Force: 150 ~ 200 Nm at $40^\circ \pm 2^\circ$

DATA LINK

The ECM (Electronic Control Module) communicates with service tools through an SAE J1939 data link or SAE J1708 datalink.

Using Insite, the data link permits limited modification of ECM features and parameters, and downloading of entire ECM calibrations.

NOTE: To use a Insite, you need a data link harness designed by DHIM.

NOTE: The 4-pin AMP connector, is used as engine-side data link, is located in the electric box.

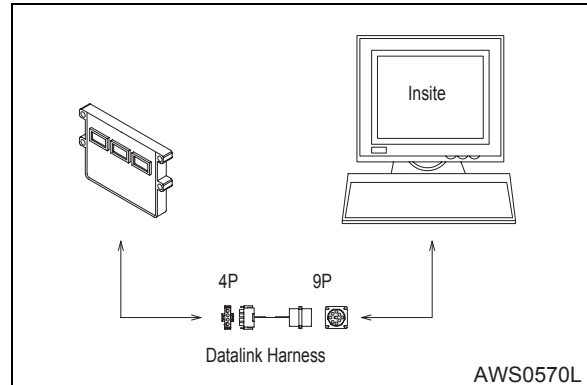


Figure 25

LIS (LOAD ISOLATION SYSTEM) - OPTION

Excessive bucket pitching is drastically reduced and good floatation is maintained for minimum operator fatigue and maximum productivity. LIS is useful for sites where frequent cycles of loading and carry are needed or rough terrain.

When the LIS switch is in the "I" position and vehicle speed is above 8 km/h, the LIS solenoid valves(14) are energized and the LIS system is "ON".

When the LIS switch is in the "I" position and vehicle speed is below 6 km/h, the LIS solenoid is de-energized and the LIS system is "OFF".

NOTE: If the switch is in the 'O' position, regardless of the vehicle speed the LIS solenoid valves (14) de-energized and the LIS system is not operating.

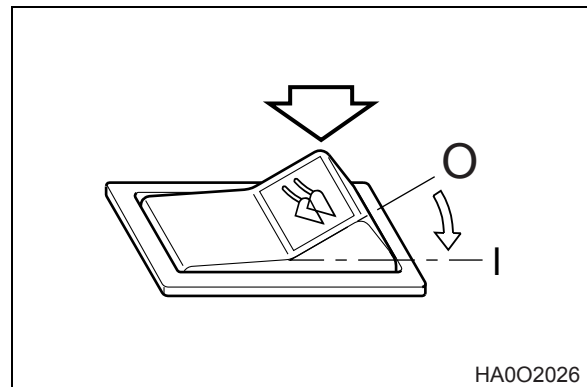
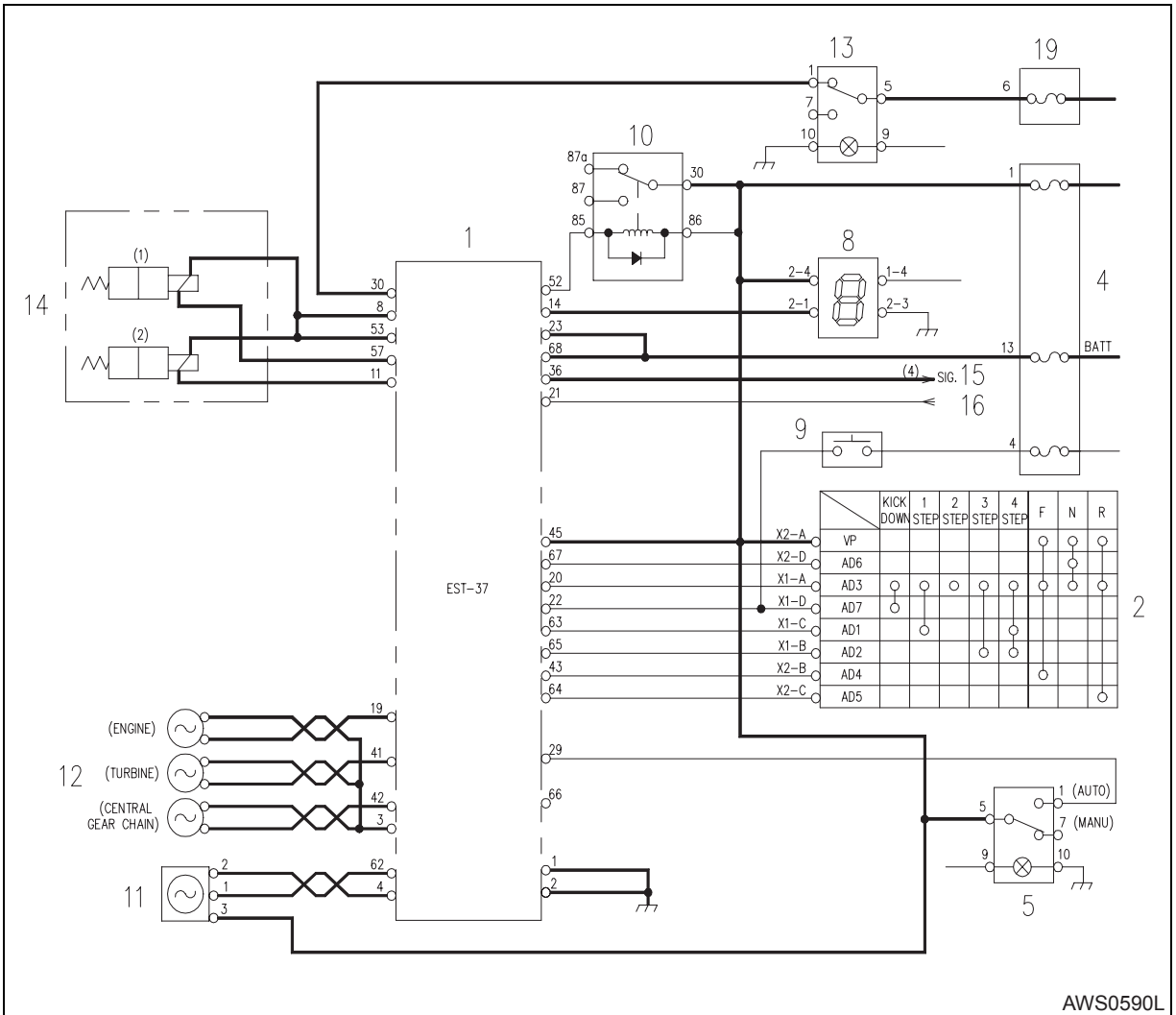


Figure 26



AWS0590L

Figure 27

Reference Number	Description
1	Transmission Controller
2	Shift Lever Switch
4	Fuse Box 1
5	Auto Selector Switch
8	Display
9	Downshift Switch
10	Safety Start Switch

Reference Number	Description
11	Output Speed Sensor
12	Speed Pick-up (3)
13	LIS Switch (Option)
14	LIS Solenoid Valve
15	Speedometer
16	Parking Brake Switch
19	Fuse Box 2

AEB STARTER

INTRODUCTION

The AEB - Starter is a tool to start the AEB of ergo power transmissions by an easy way. It's useful to work with the ZF - Display because you get all messages about the AEB state via the ZF-Display. The AEB - Starter itself doesn't show any informations.

The AEB-starter works with the diagnostic plug which is in the electric box.

To insure the highest level of shift quality, AEB must be done under following conditions:

- Before putting the vehicle into service
- When the transmission or TCU been replaced.

NOTE: The error code "F6" will be shown in the display as long as the AEB is not done.

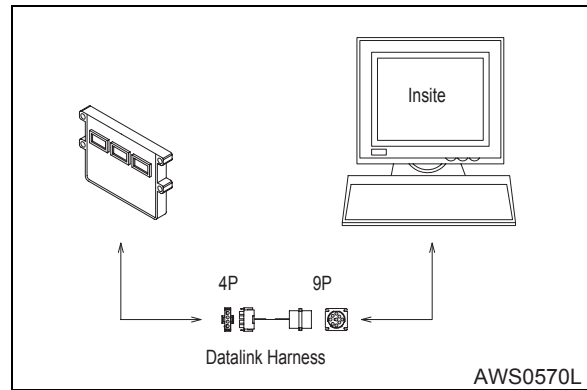


Figure 28

LIST OF ABBREVIATIONS

AEB: Automatic Filling Parameter Adjustment

TCU: Transmission Control Unit

PROCEDURE TO START AEB

	Step to do	Display message	Remarks
1	Warm up transmission	Normal operating messages	
2	Turn off starter switch	Nothing	
3	Plug in AEB-starter		
4	Bring shift lever to "N" position. Engage park brake.		
5	Start engine	"PL"	TCU must recognize PL for at least 2s before you can press the button
6	Put engine speed to 800 rpm	"PL" if start conditions are ok	
7	Press button of the AEB-Starter	"ST" if start conditions are ok	The button must not be released before TCU has started the AEB or quit with an error code
8	Hold button until AEB has started	"K1" ... (Information about the AEB state)	TCU has started the AEB, and goes on adjusting K1, K2, ..., KR. (Button may be released)
9	Wait until AEB has finished	"OK" (AEB has been successful)	

	Step to do	Display message	Remarks
10	Turn off starter switch and unplug AEB-Starter	Nothing	

DISPLAY DURING AEB-MODE

Symbol	Meaning	Remarks
PL	AEB - Starter is plugged at the diagnostic plug	
ST	AEB-Starter-button is pressed	
K1... K4,KV,KR	Calibrating clutch K1... K4,KV,KR	
- and Kx	Wait for start, initialization of clutch Kx, x: 1, 2, 3, 4, V, R	
≡ and Kx	Fast fill time determination of clutch Kx	
= and Kx	Compensating pressure determination of clutch Kx	
OK	Calibration for all clutches finished	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on) after removing AEB-Starter
STOP	AEB canceled (activation stopped)	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
STOP and Kx	AEB stopped, clutch Kx can't be calibrated	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
Spanner and Kx	Kx couldn't be calibrated, AEB finished	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
↑ E	Engine speed too low, → raise engine speed	
↓ E	Engine speed too high, → lower engine speed	
↑ T	Transmission oil temperature too low → heat up transmission	
↓ T	Transmission oil temperature too high → cool down transmission	
FT	Transmission temperature not in defined range during calibration	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
FB	Operating mode not NORMAL or transmission temperature sensor defective or storing of calibrated values to EEPROM-has failed.	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
FO	Output speed_not_zero	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
FN	Shift lever not in Neutral position	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
FP	Parking brake_not_applied	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)
STOP	AEB - Starter was used incorrect or is defective	Transmissions stays in neutral, you have to restart the TCU (starter switch off/on)

NOTE: *To prevent the transmission oil temperature from falling down while AEB operating, keep the transmission oil temperature about 80°C before starting AEB. (Temperature Range: 60°C ~ 90°C)*



ELECTRICAL SCHEMATIC (MEGA 500-V (TIER II))



CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that is in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
Mega 500-V (Tier II)	2001 and Up

TABLE OF CONTENTS

General Description..... 3
Mega 500-V (Tier II) 4

GENERAL DESCRIPTION

Schematic(s) presented in this section are laid out on facing pages.

An overlapping edge has been taken into consideration so that a photocopy can be made and pasted together to make a complete schematic.

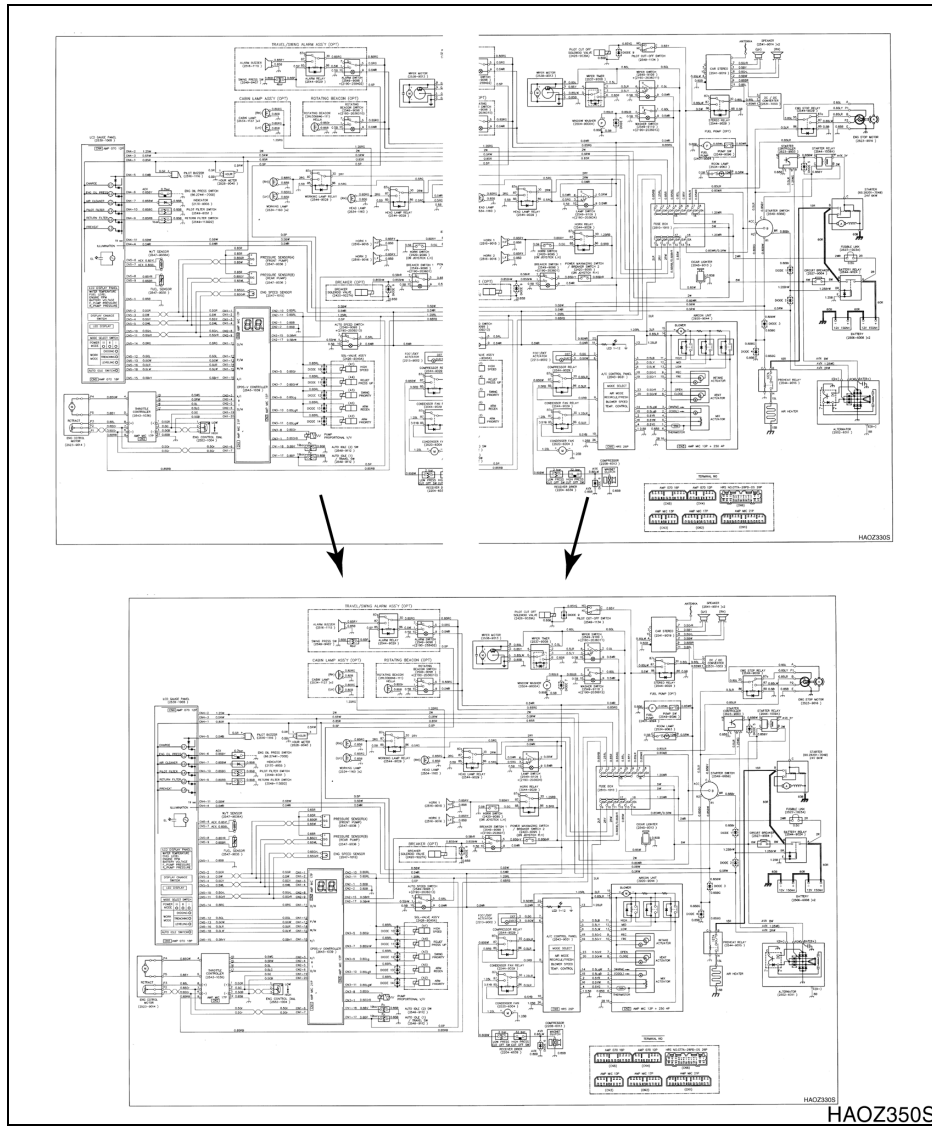


Figure 1

MEGA 500-V (TIER II)

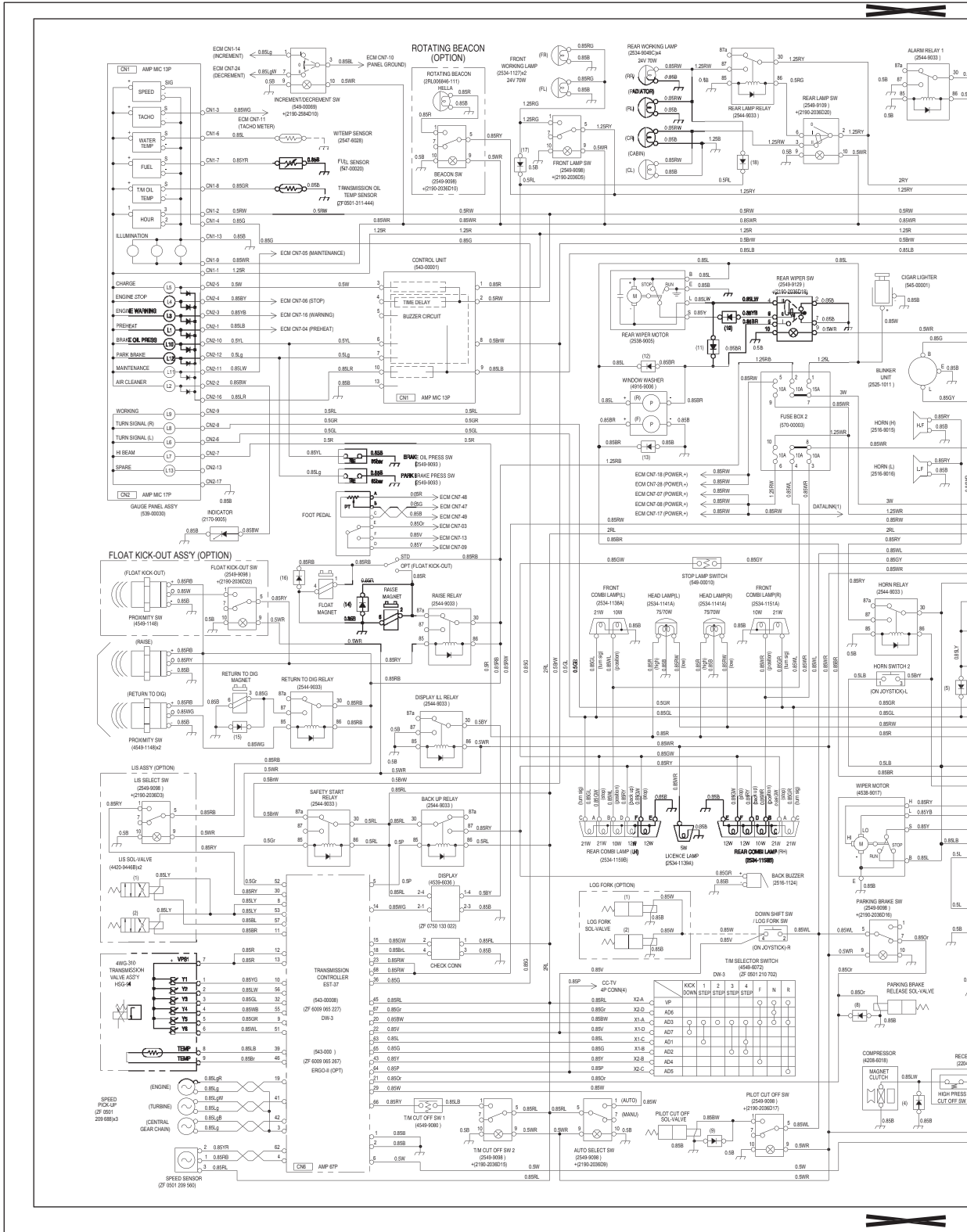
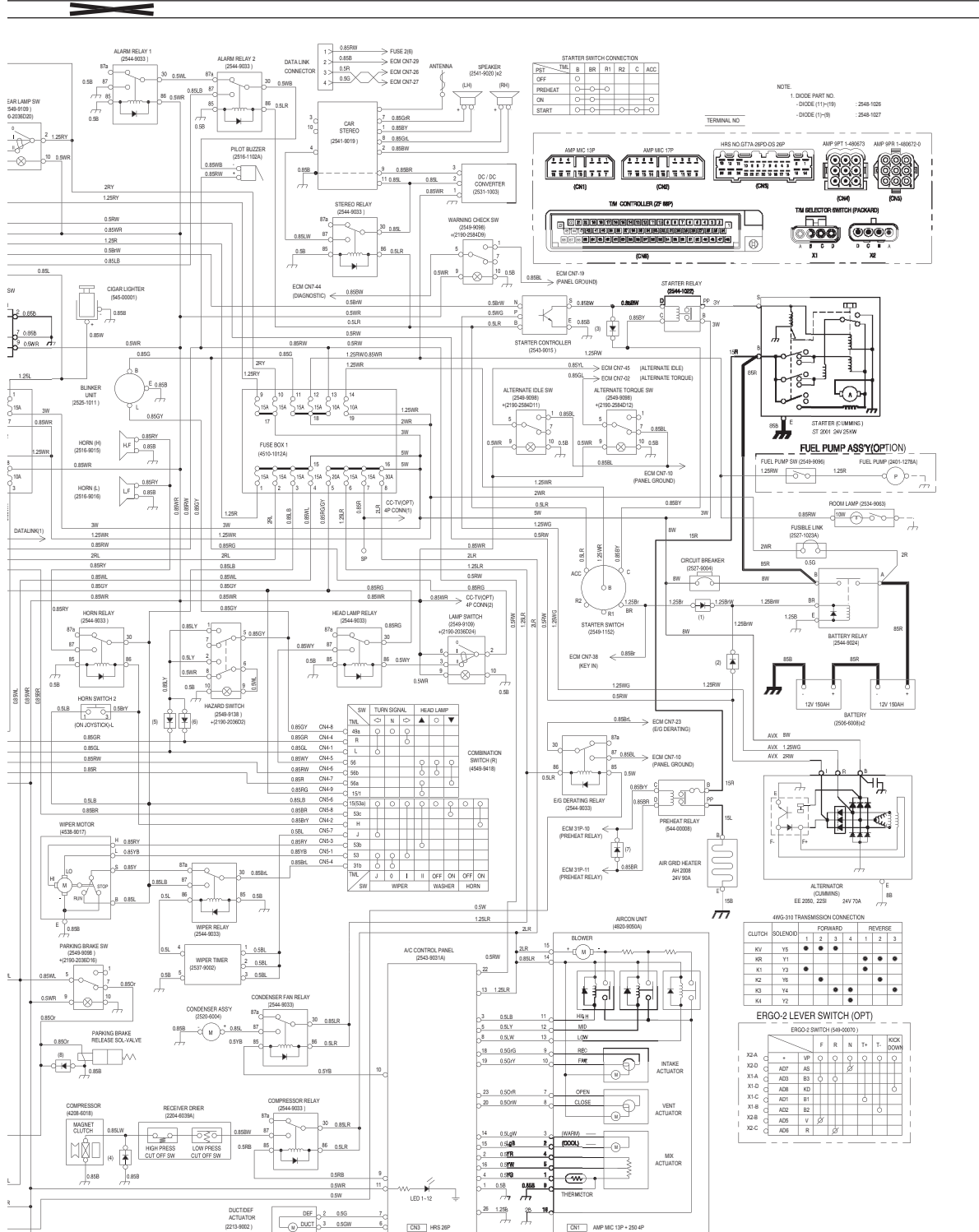


Figure 2



Mega 500-V (Tier II)

AWS0430L

ATTACHMENTS

