

EC160B/180B/210B/240B/290B/360B/460B

Machine information system change

System layout change

Electronic control system overview

VECU input & output

Control circuit

EECU Electric circuit(EC160B/180B/210B/240B/290B)

EECU Electric circuit(EC360B/460B)

Machine status indication(IECU)

IECU Electric circuit

Old instrument panel circuit

Power ON/OFF procedure

Indicator operation

MCD(Machine Display Center) operation

X1 option flow setting

Pop-up indicator

Code lock(Anti-theft)

Error Message(ECU)

Error Message(Communication & Elec. system)

Error Message(Hydraulic system)

Error Message(Engine)

Error Message(Engine)

Old start circuit(EC160B/180B/210B/240B/290B)

Start circuit (Old alternator & New IECU- EC160B/180B/210B)

Start circuit (New alternator & Old Inst. panel-EC240B/290B)

Start circuit (New alternator & New IECU- EC160B/180B/210B/240B/290B)

Old start circuit(EC360B/460B)

Start circuit (New alternator & Old Inst. panel-EC360B/460B)

Start circuit (New alternator & New IECU- EC360B/460B)

Alternator change

Safety relay change(Add time delay function)

UPDATE-EC160B~460B-01

UPDATE-EC160B~460B-02

UPDATE-EC160B~460B-03

UPDATE-EC160B~460B-04

UPDATE-EC160B~460B-05

UPDATE-EC160B~460B-05-1

UPDATE-EC160B~460B-05-2

UPDATE-EC160B~460B-06

UPDATE-EC160B~460B-07

UPDATE-EC160B~460B-07-1

UPDATE-EC160B~460B-08

UPDATE-EC160B~460B-09

UPDATE-EC160B~460B-10

UPDATE-EC160B~460B-11

UPDATE-EC160B~460B-12

UPDATE-EC160B~460B-13

UPDATE-EC160B~460B-14

UPDATE-EC160B~460B-15

UPDATE-EC160B~460B-16

UPDATE-EC160B~460B-17

UPDATE-EC160B~460B-18

UPDATE-EC160B~460B-19

UPDATE-EC160B~460B-20

UPDATE-EC160B~460B-21

UPDATE-EC160B~460B-22

UPDATE-EC160B~460B-23

UPDATE-EC160B~460B-24

UPDATE-EC160B~460B-25

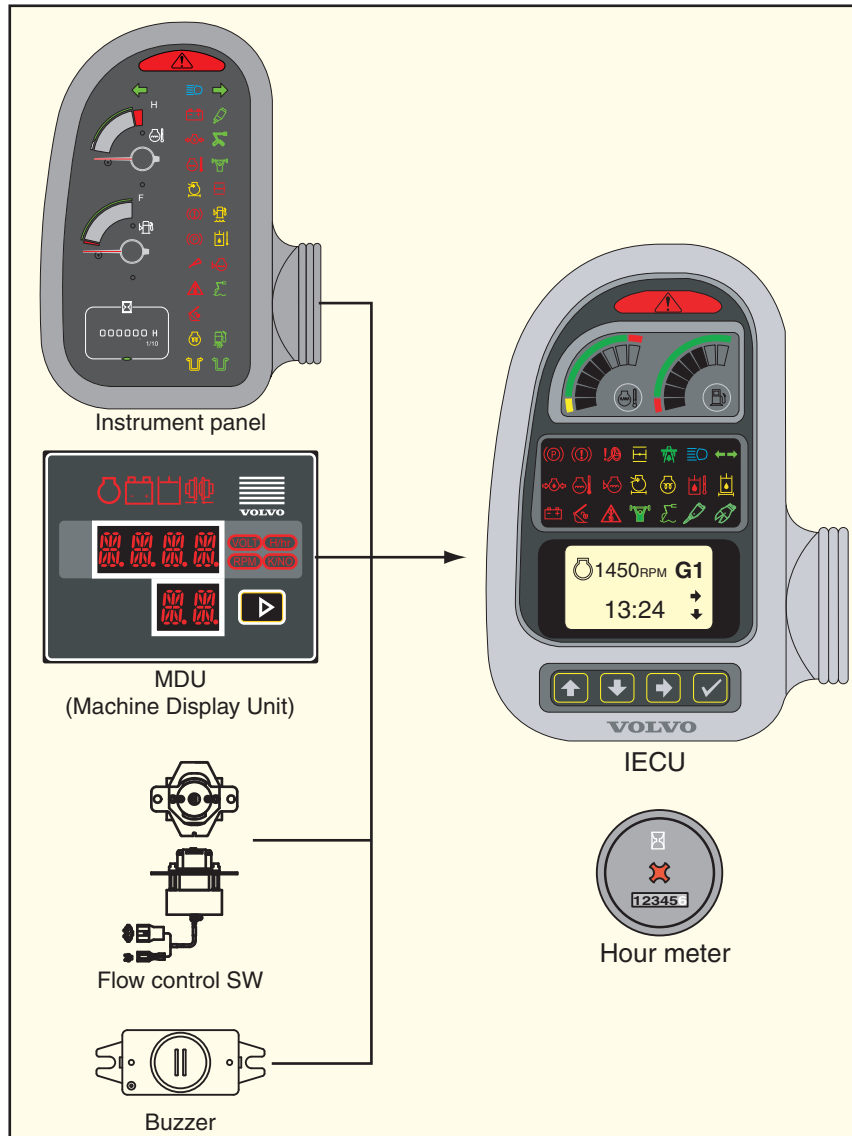
UPDATE-EC160B~460B-26

UPDATE-EC160B~460B-27

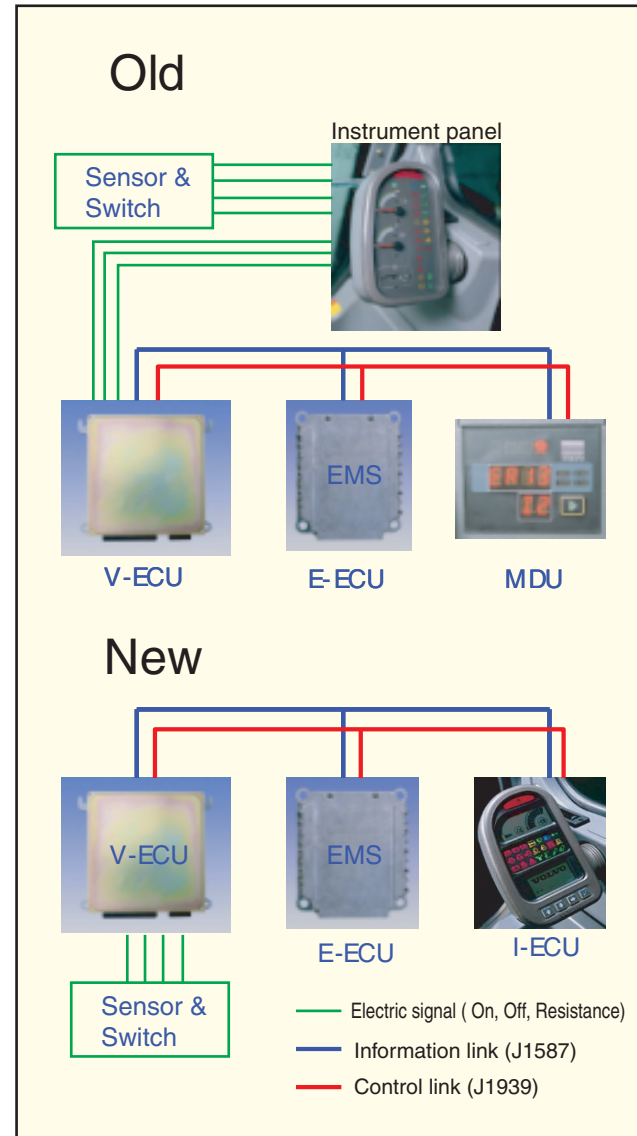
**CLICK THE VOLVO-LOGO IN
THE LOWER RIGHT CORNER
TO RETURN TO THIS MENU**

Machine Information System Change

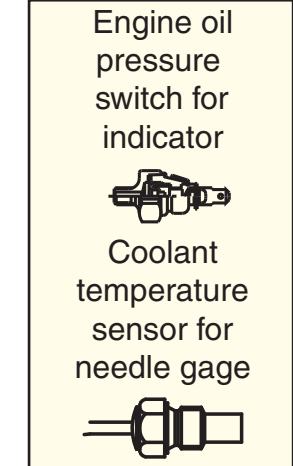
1. Integration of hardware



2. Simplifying electric circuit by using communication line instead of the various direct electric connection



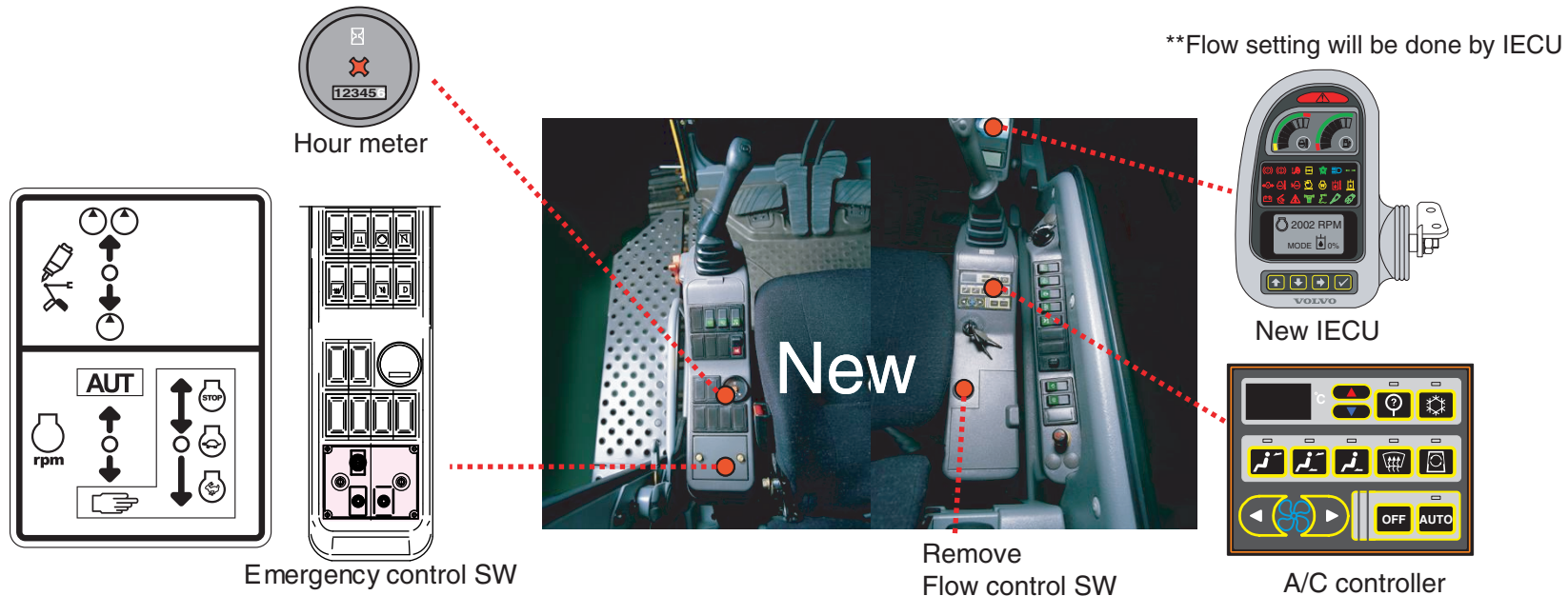
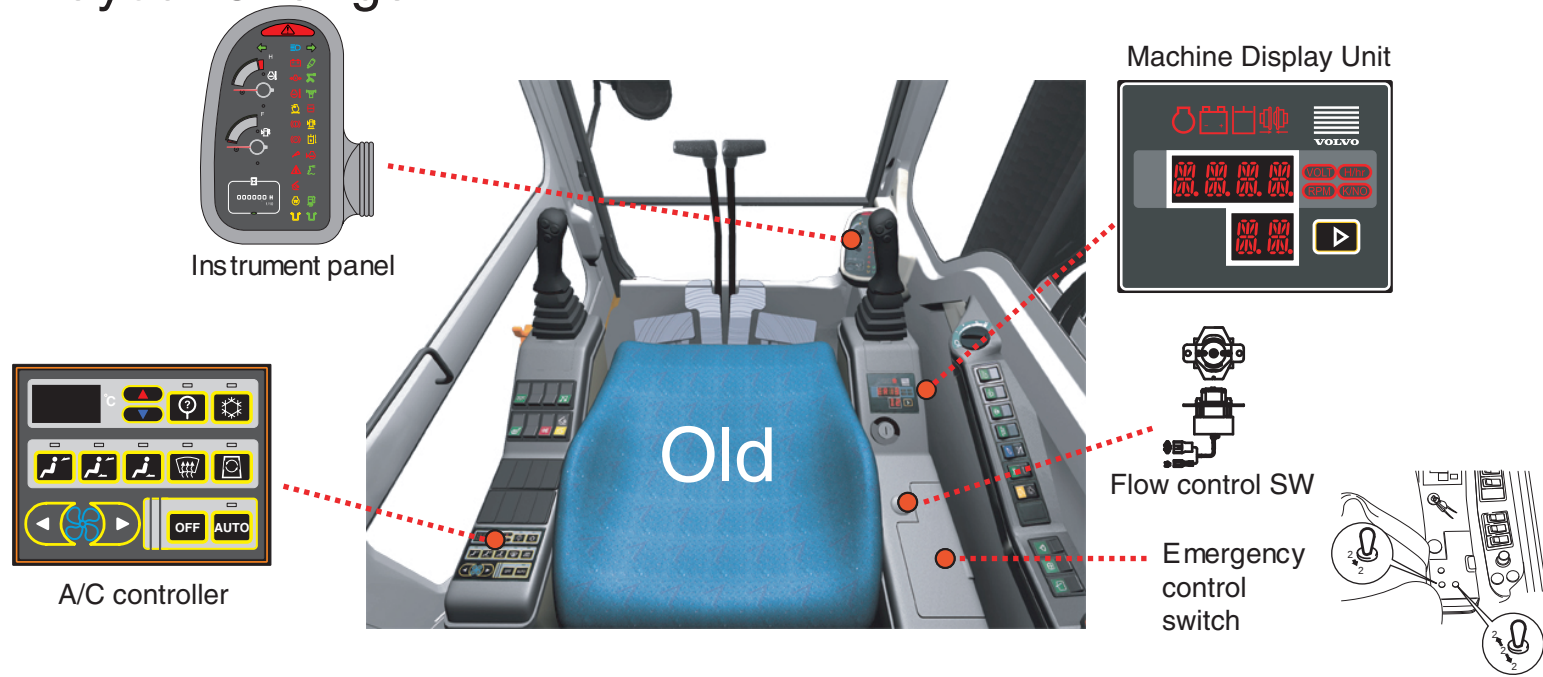
3. Removing duplicated sensor



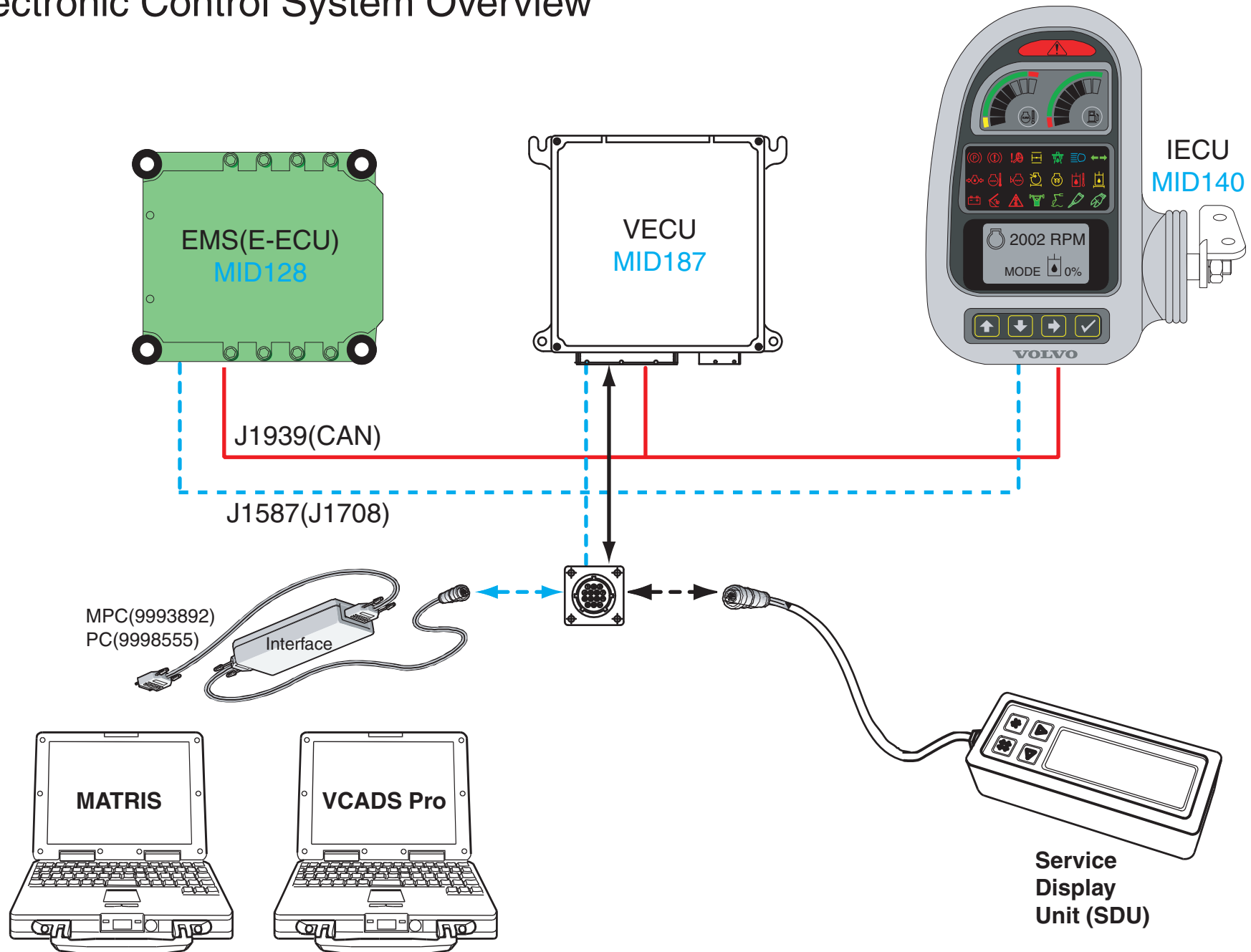
4. Changing Connection to VECU

- Fuel level sender
- Overload warning select switch & pressure switch
- Alternator charging signal
- Auto-grease ind. signal
- Buzzer stop & Confirm switch for Quick fit

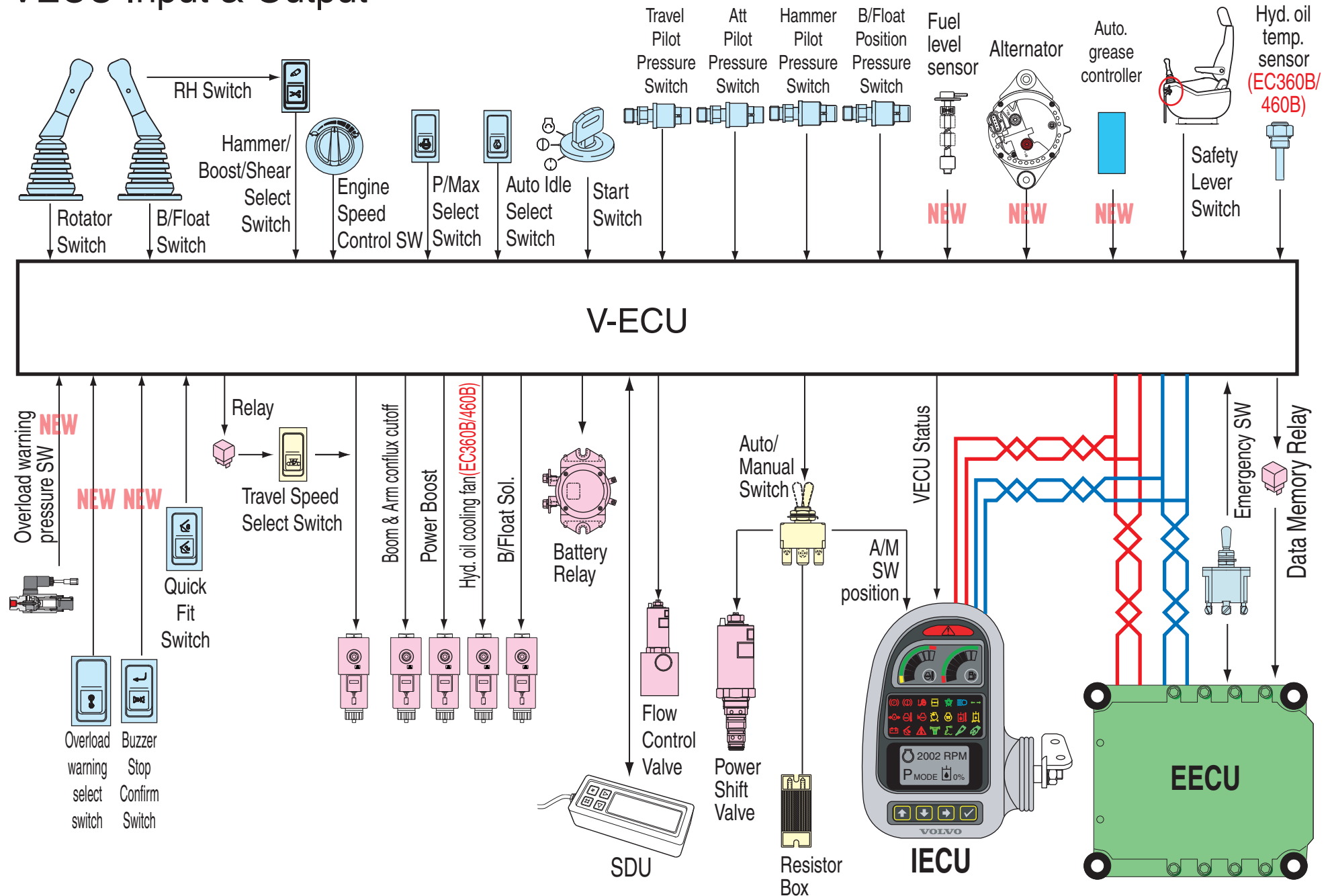
System Layout Change



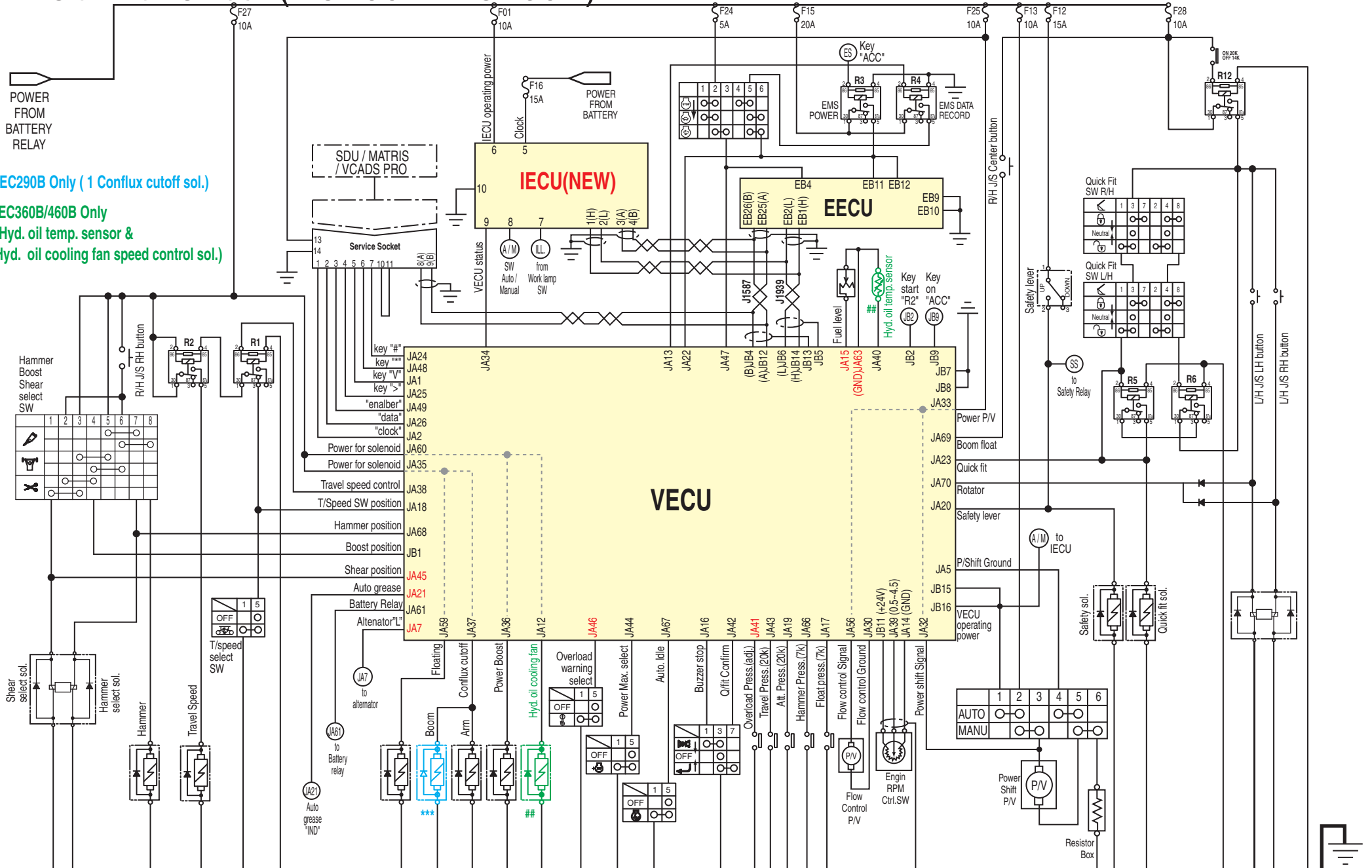
Electronic Control System Overview



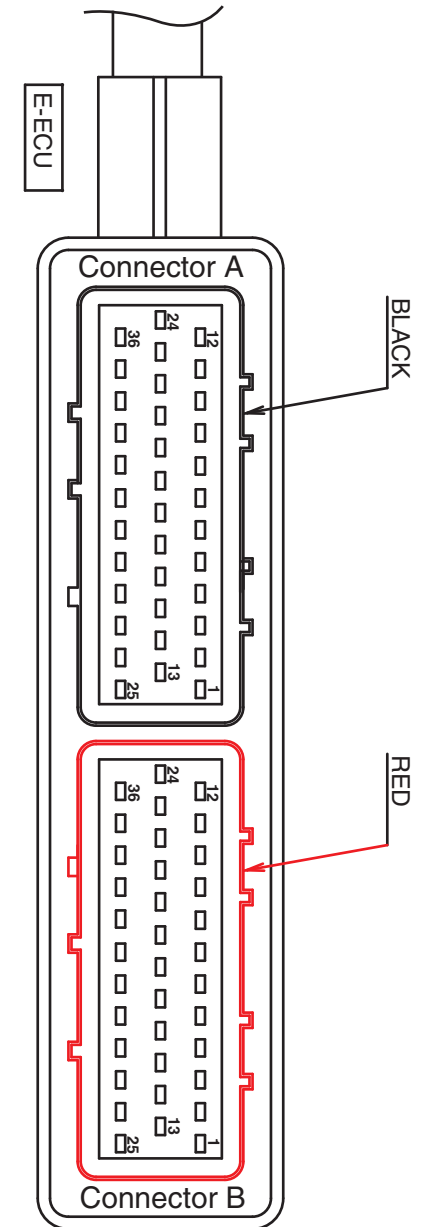
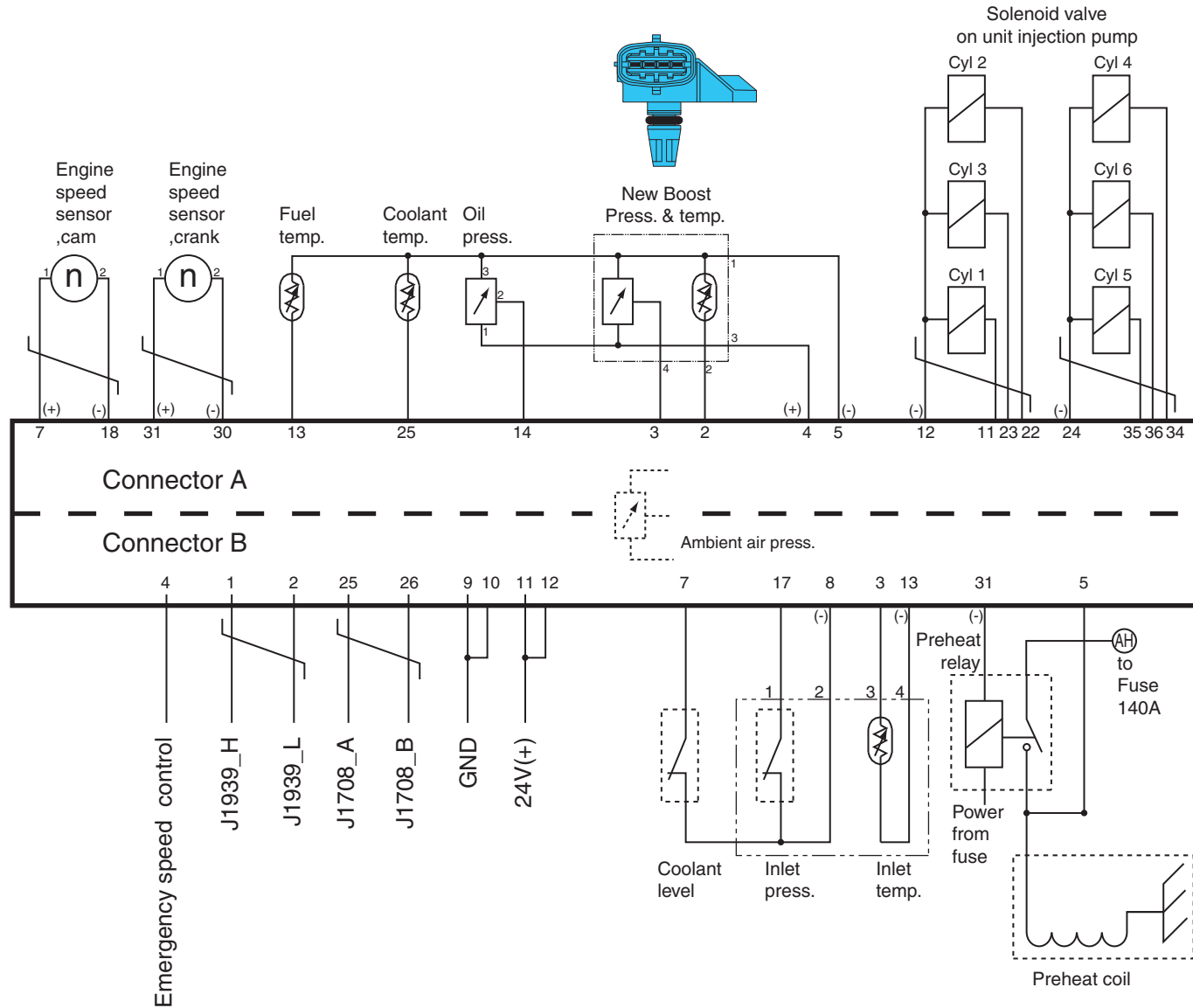
VECU Input & Output



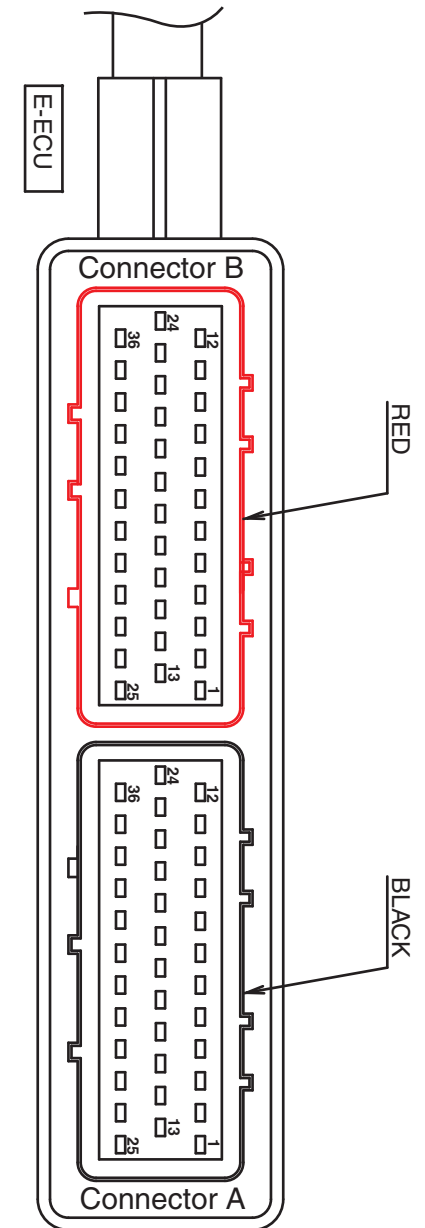
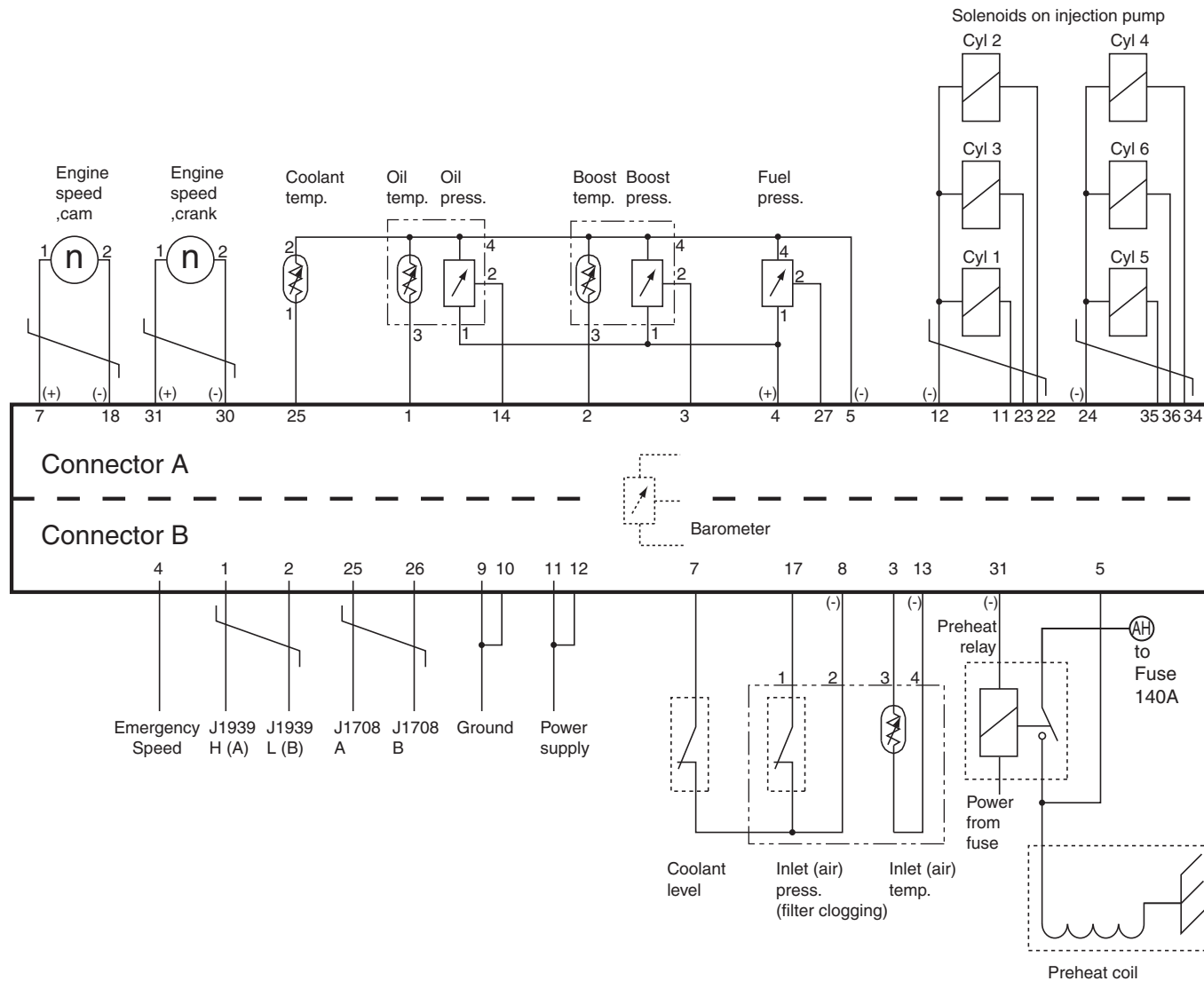
Control Circuit(EC160B~EC460B)



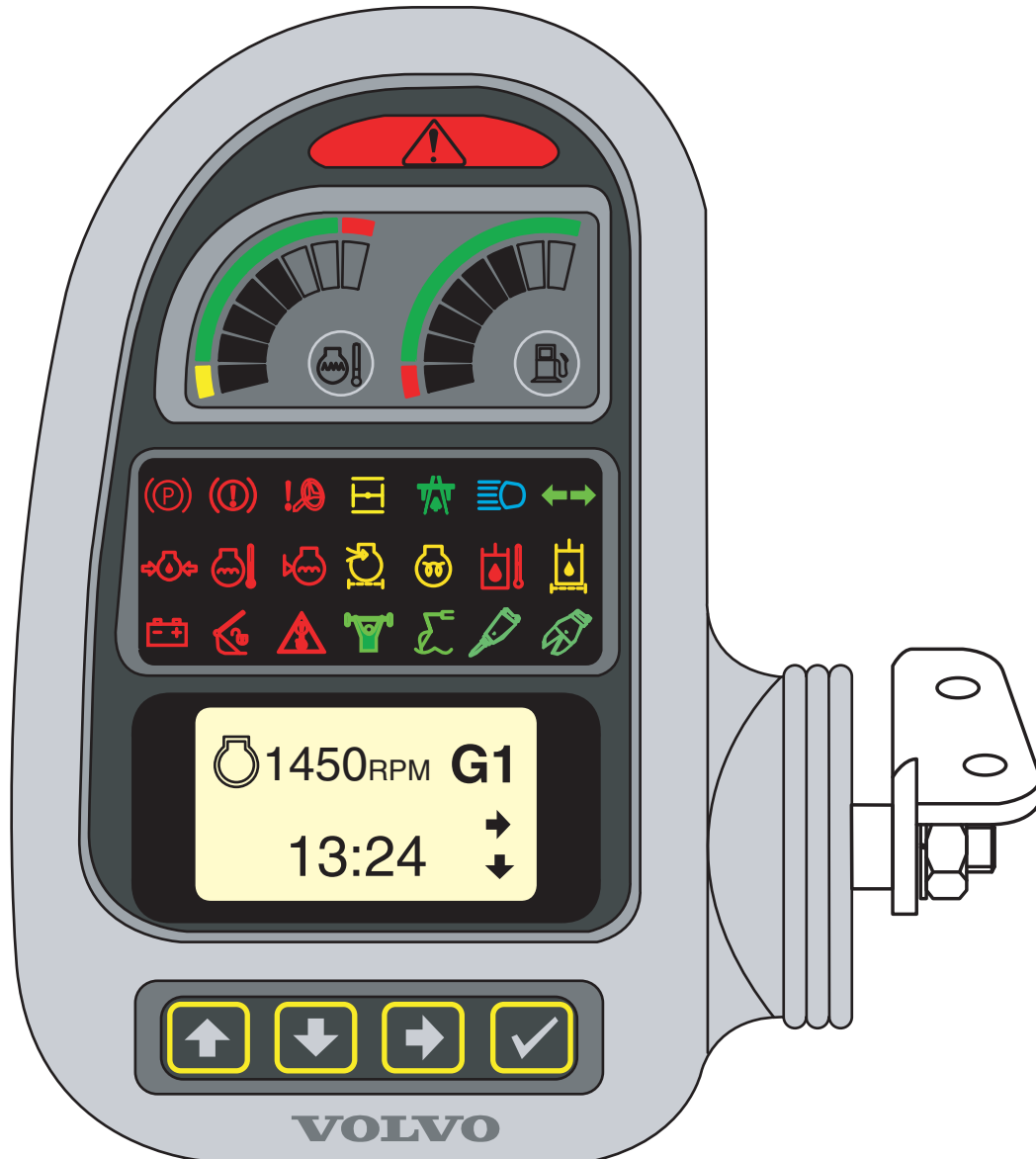
EECU Electric Circuit(EC160B/180B/210B/240B/290B)



EECU Electric Circuit(EC360B/460B)

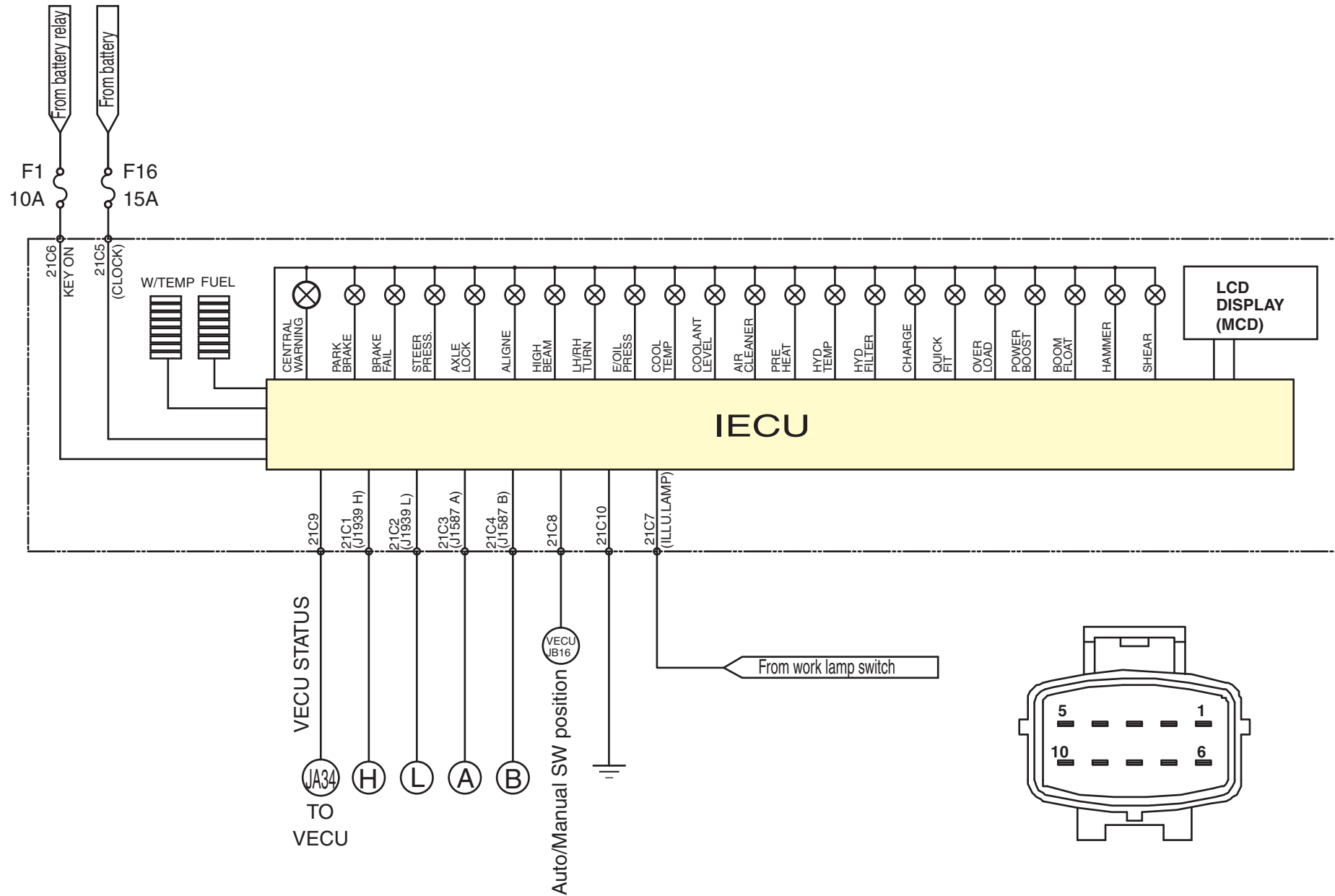


Machine Status Indication (IECU)

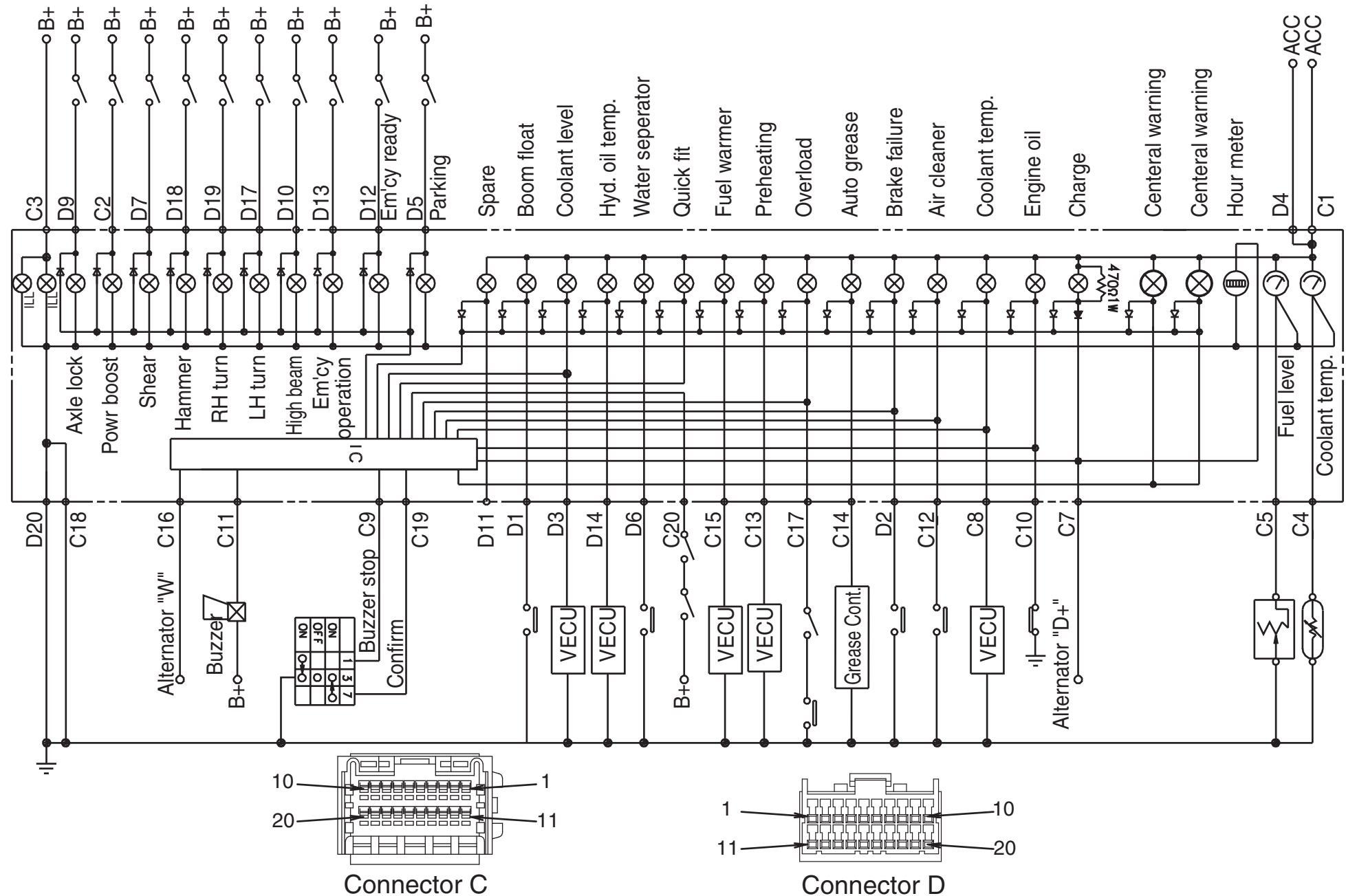


Group	Name	Color	Remark
Lamp	Central warning lamp	Red	Flashes when a fault occurs
Gauge	Fuel level gauge	-	8 Step, TN-LCD, Transflective
	Engine coolant temperature gauge	-	Back light by white color LED
Indicator	Parking brake lamp	Red	used at wheel excavator
	Brake oil pressure warning lamp	Red	used at wheel excavator
	Steering pressure low	Red	N/A
	Oscillation lock	Yellow	used at wheel excavator
	Alignment	Green	N/A
	Working lights lamp (* High beam lamp)	Blue	High beam at wheel excavator
	Left/right turn signal lamp	Green	used at wheel excavator
	Engine oil pressure warning lamp	Red	
	Engine coolant temperature warning lamp	Red	
	Coolant level lamp	Red	
	Air cleaner clogging warning lamp	Yellow	
	Air preheating lamp	Yellow	
	Hydraulic oil temperature warning	Red	
	Hydraulic oil filter clogging	Yellow	N/A
	Battery charge warning lamp	Red	
	Quickfit lamp	Red	
	Overload warning lamp	Red	
	Power booster	Green	
	Float operation indicator	Green	
	Hammer selecting indicator	Green	
	Shear selecting indicator	Green	
MCD	Electronic Display Unit (Message Center Display)		128x64 pixels LCD Back light by amber colored LED
Key	Up	-	Screen Up
	Down	-	Screen Down
	Scroll	-	Scroll
	Confirm	-	Confirm
Buzzer	Buzzer		sounds when fault occurs and buttons are pressed
Real time Clock	Real time clock		Capacitor supply power to clock for 500 hrs without external power

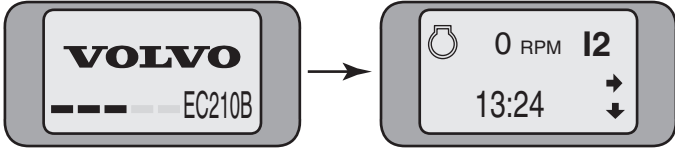
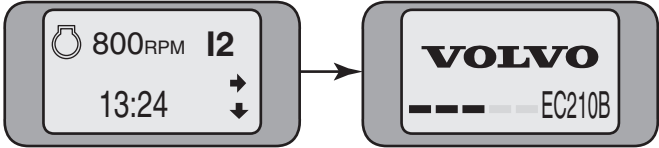
IECU Electric Circuit



Old Instrument Panel Circuit



Power On/Off procedure

Power	Key on -> 3 sec.	Key Off -> 3 sec. (After receiving "off" signal from VECU)
Central warning lamp	On for 3 sec.	off
Gauge	all segment "On" immediatly	all segment "Off" immediatly
Indicator	all lamp "On" for 3 sec.	Off
MCD (Message Center Display)		
Gauge back light	On	Off
MCD back light		
Button back light		
Buzzer	Warning sound 2 times	Silent
Button	Locked(no response)	Locked(no response)

Indicator operation

Category	Symptom	Operation		
		Indicator	Central warning	Buzzer Sound
Alarm	Engine coolant temperature high	On	Blink	Alarm
	Engine oil pressure low	On	Blink	Alarm
	Overload warn	On	Blink	Alarm
	Brake oil pressure low	On	Blink	Alarm
	Quickfit open	On	Blink	Alarm
	Steering pressure low	On	Blink	Alarm
Caution	Battery no-charge	On	Blink	Caution
	Air cleaner clogging	On	Blink	Caution
	Coolant level low	On	Blink	Caution
	Hydraulic oil temperature high	On	Blink	Caution
	Hydraulic oil filter clogging	On	Blink	Caution
Telltale	Air preheating	On	X	X
	Alignment	On	X	X
	Parking brake	On	X	X
	High Beam (Working lamp)	On	X	X
	Left/right turn signal	On	X	Alarm
	Hammer selecting	On	X	X
	Shear selecting	On	X	X
	Power boost operating	On	X	X
	Oscillation lock	On	X	X
	Float operation	On	X	X

Buzzer Alarm sound will last until operator pushes confirm button of IECU

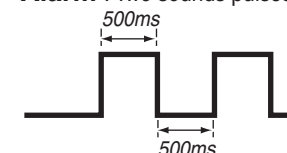


(1) Buzzer Sound spec.

Caution : One sound pulse

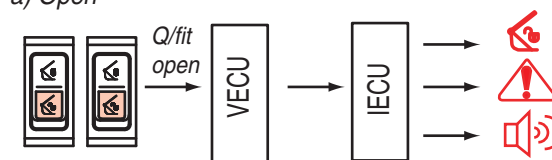


Alarm : Two sounds pulses every seconds

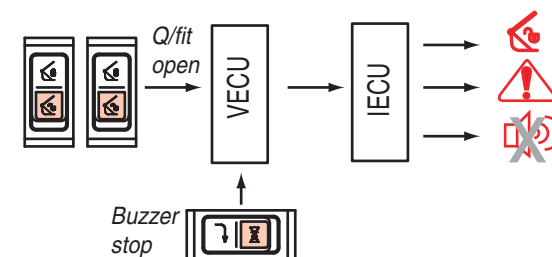


(2) Quick fit buzzer stop & Confirm

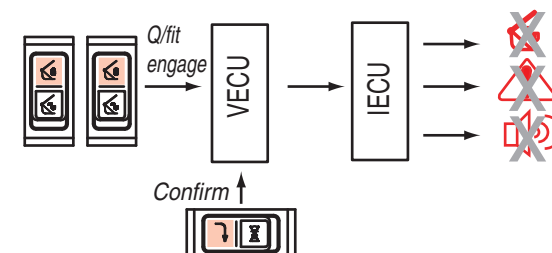
a) Open



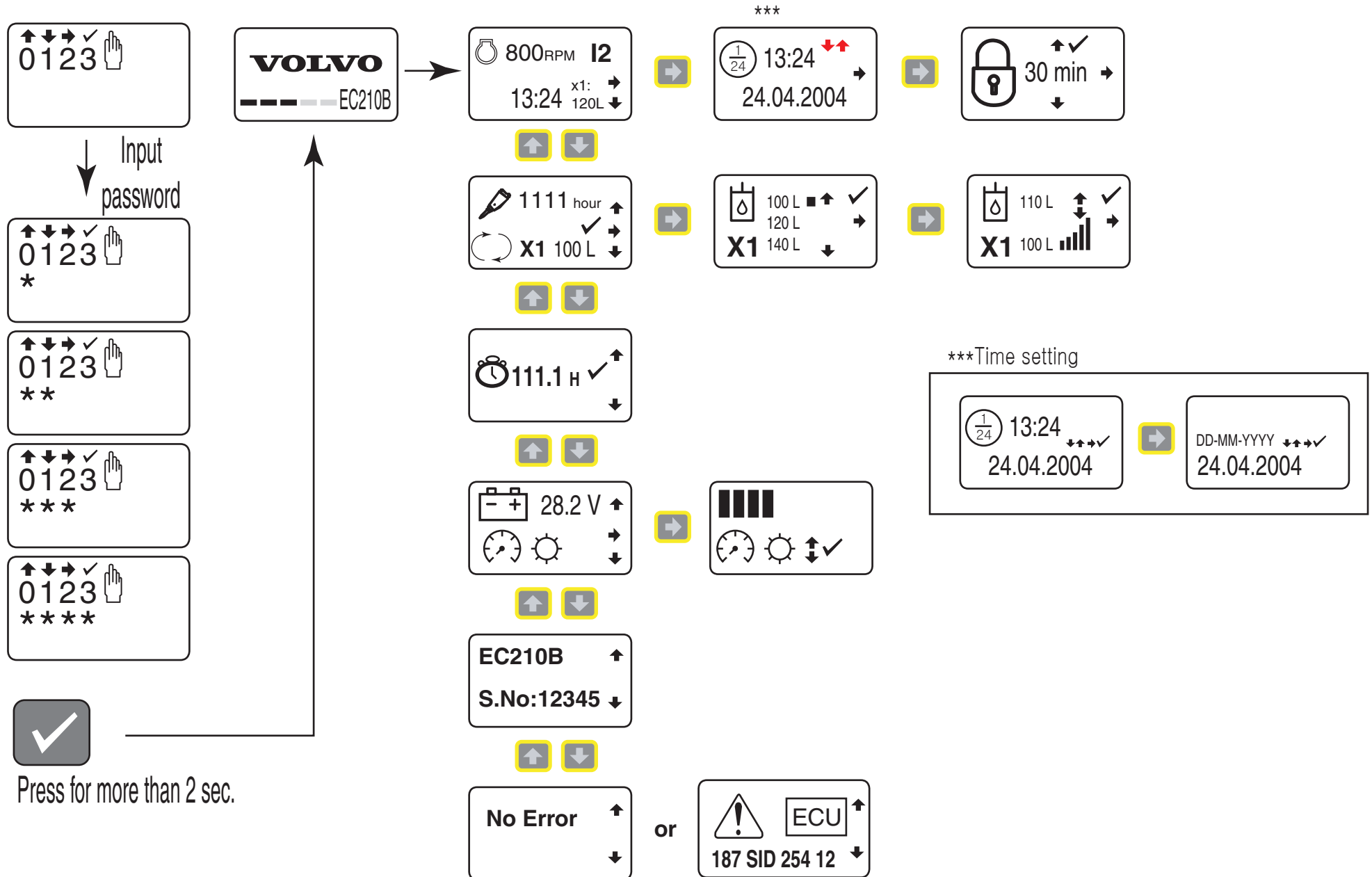
b) Buzzer stop



c) Q/fit engage & Confirm

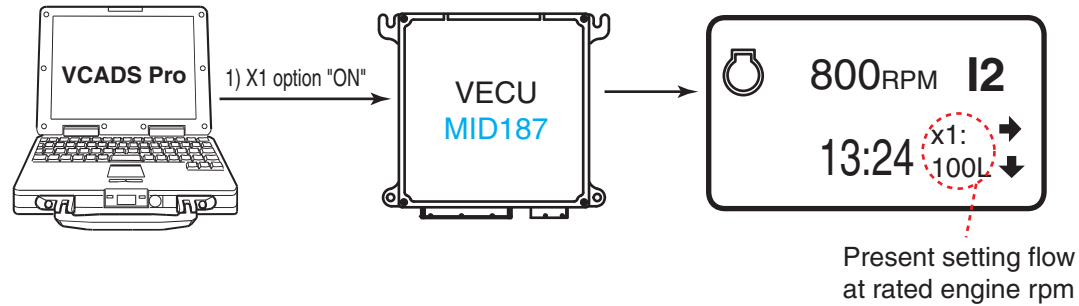


MCD operation

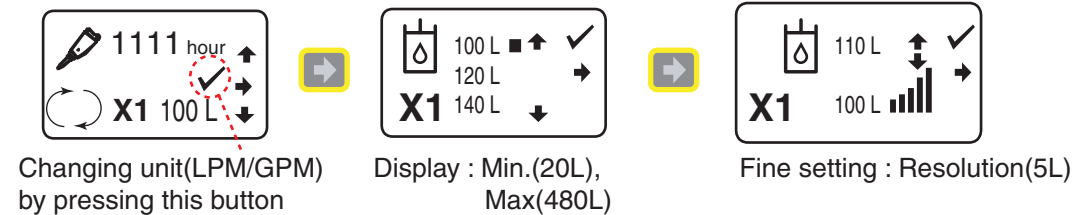


X1 Option flow setting

(1) Parameter programming : X1 option(ON)



(2) Flow setting

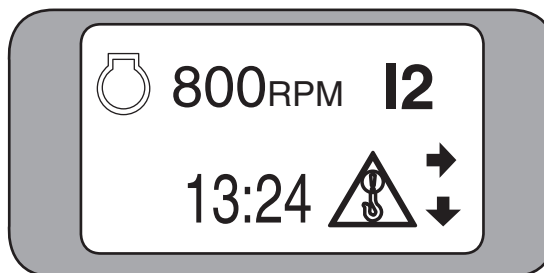


(3) Max. & Min. flow at rated engine rpm

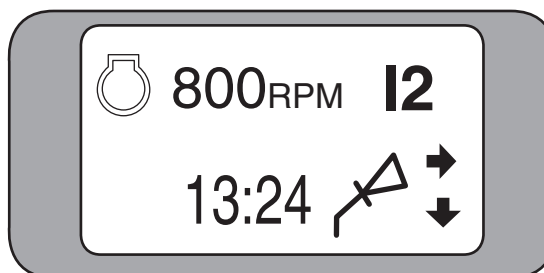
Model		Pump flow (Lpm / Gpm)	PV current (mA)
EC160B	Max.	143/38	270
	Min.	30/8	610
EC180B	Max.	143/38	270
	Min.	30/8	610
EC210B	Max.	200/53	260
	Min.	40/11	600
EC240B	Max.	230/61	280
	Min.	40/11	610
EC290B	Max.	250/66	280
	Min.	40/11	610
EC360B	Max.	280/74	300
	Min.	40/11	600
EC460B	Max.	345/91	300
	Min.	40/11	630

Pop-up indicator

**Overload selection
(not warning)**



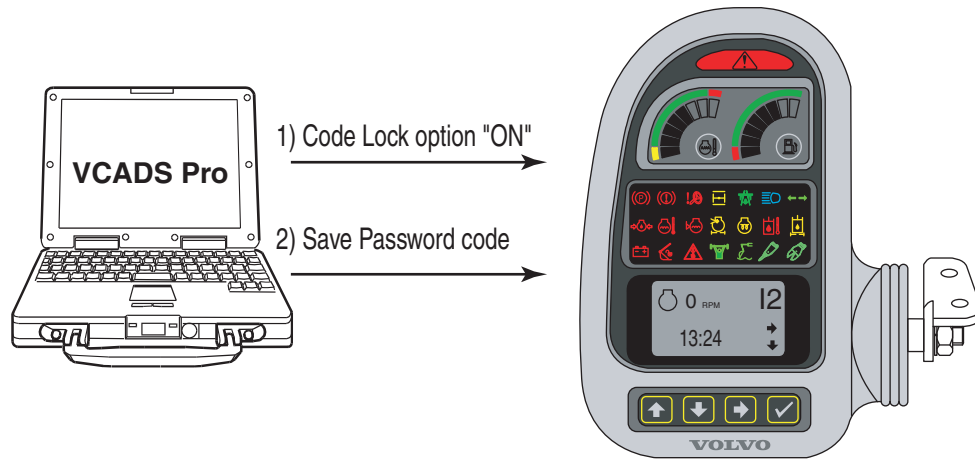
Auto grease



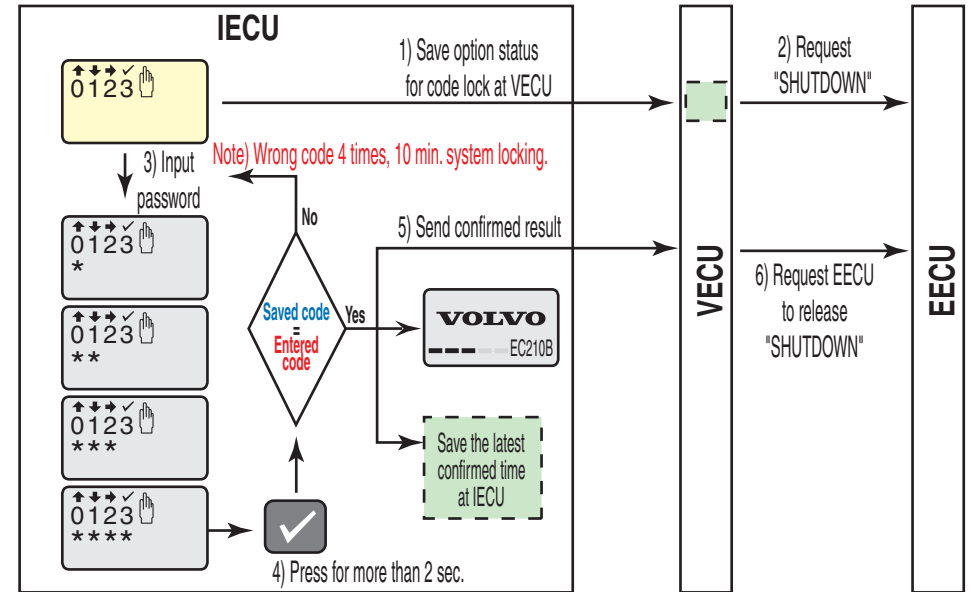
**** If two pop-up indicators are activated at the same time, The indicator of highest priority is shown on MCD.
Priority (1 : Overload selection, 2 : Auto grease)**

Code Lock(Anti-theft)

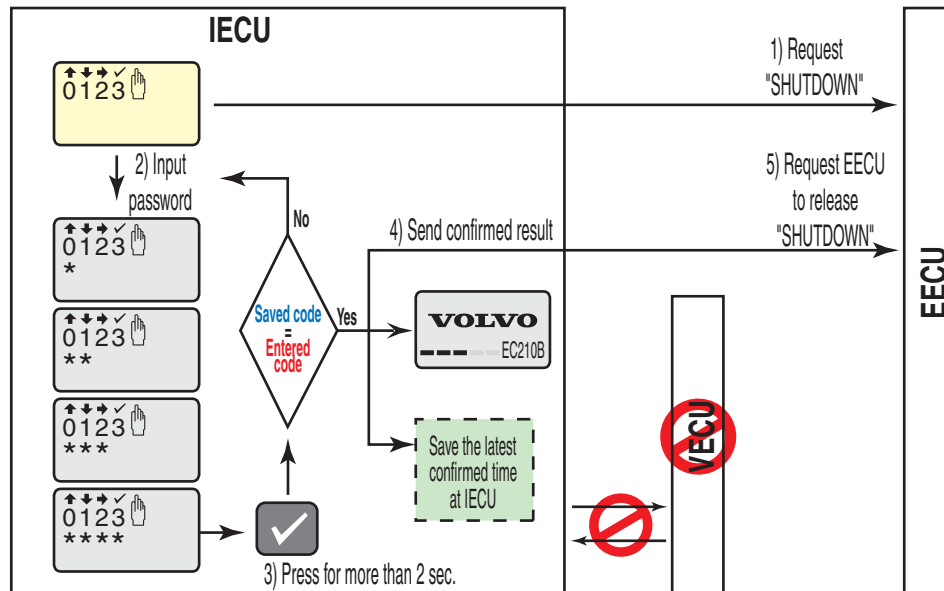
(1) Parameter programming



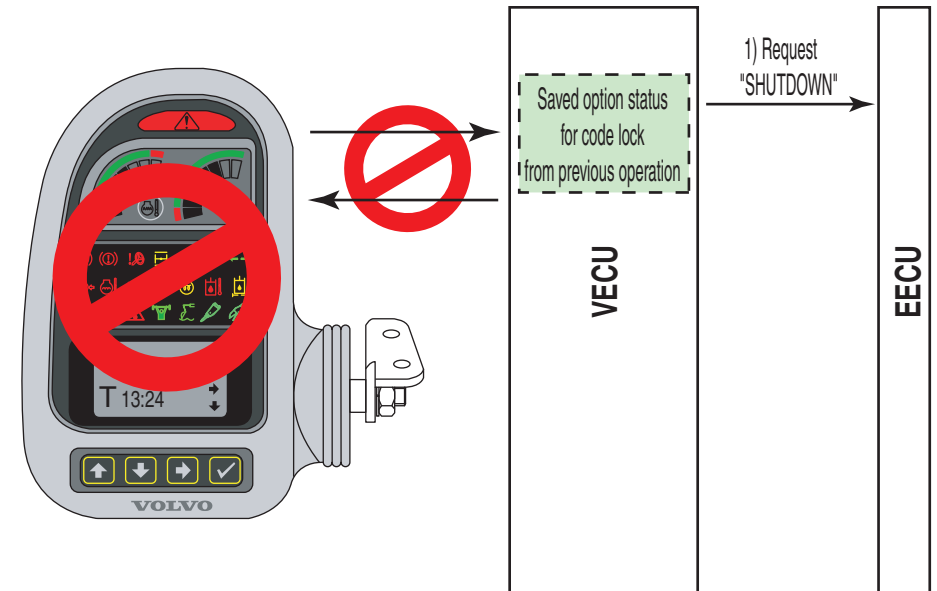
(2) After Code Lock enabled, Key "ON"



(3) VECU abnormal

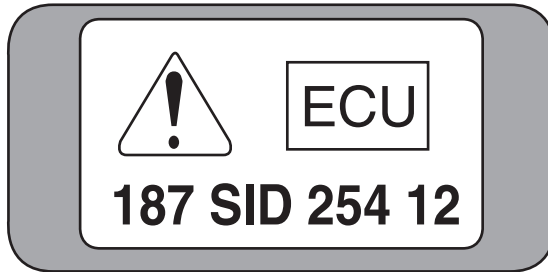


(4) IECU abnormal



Error Message (ECU)

(1) VECU



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
11	187	SID 240	2	Blink	Alarm	Program memory failure(Flash)
	187	SID 253	2	Blink	Alarm	Data set memory failure(EEPROM)
	187	SID 254	12	Blink	Alarm	Controller failure
	***Auto/manual switch is Auto position and there is no VECU status signal.			Blink	Alarm	Controller failure



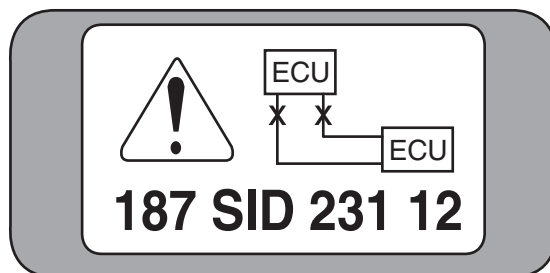
(2) EECU



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
12	128	SID 240	2	Blink	Alarm	Program memory failure(Flash)
	128	SID 253	2	Blink	Alarm	Data set memory failure(EEPROM)
	128	SID 253	12	Blink	Alarm	Bad component
	128	SID 253	13	Blink	Alarm	out of calibration
	128	SID 254	12	Blink	Alarm	Controller failure

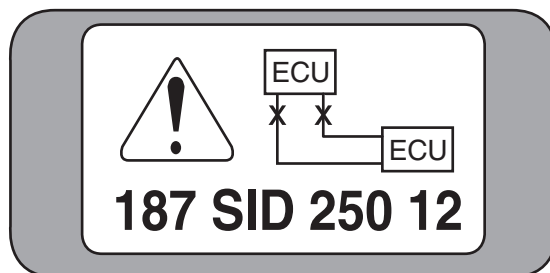
Error Message (Communication & Electric system)

(1) J1939 - CAN Bus



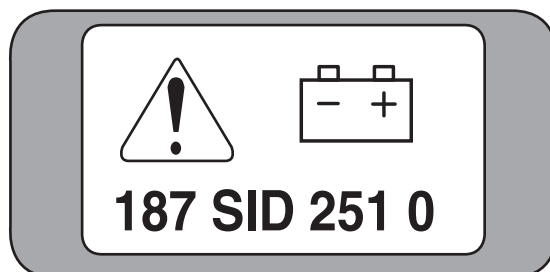
Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
13	128	SID 231	9	Blink	caution	Communication J1939 error
	128	SID 231	11	Blink	caution	J1939 Other malfunction
	128	SID 231	12	Blink	caution	J1939 defective unit or component
	187	SID 231	9	Blink	caution	Communication J1939 error
	187	SID 231	12	Blink	caution	J1939 defective unit or component

(2) J1587 - Information Bus



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
14	128	SID 250	12	Blink	caution	Communication J1587 error
	187	SID 250	9	Blink	caution	J1587 Communication error
	187	SID 250	12	Blink	caution	J1587 defective unit or component

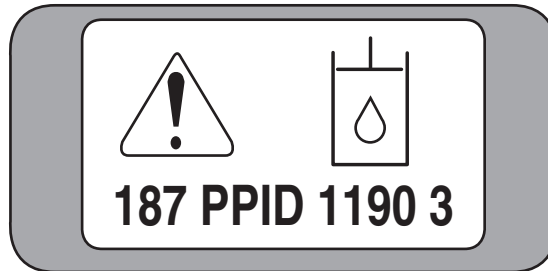
(3) Battery



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
21	187	SID 251	0	Blink	caution	Battery voltage, too high
	187	SID 251	1	Blink	caution	Battery voltage, too low

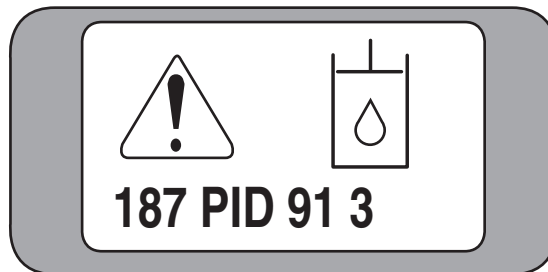
Error Message (Hydraulic system)

(1) Power shift proportional valve



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
31	187	PPID 1190	3	Blink	caution	Power shift PV, High voltage
	187	PPID 1190	4	Blink	caution	Power shift PV, low voltage
	187	PPID 1190	5	Blink	caution	Power shift PV, open circuit

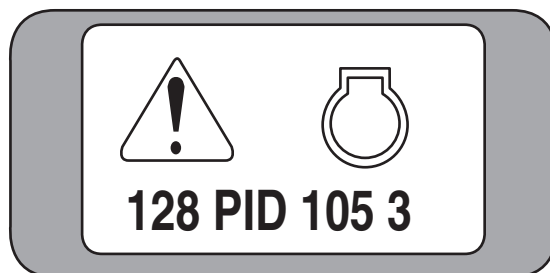
(2) Pedal pressure sensor



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
33	187	PID 91	3	Blink	caution	Pressure sensor, High voltage
	187	PID 91	4	Blink	caution	Pressure sensor, low voltage
	187	PID 91	5	Blink	caution	Pressure sensor, open circuit

Error Message (Engine)

(1) Boost temperature sensor



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
42	128	PID 105	3	Blink	caution	too high voltage, shorted high
	128	PID 105	4	Blink	caution	too low voltage, shorted low
	128	PID 105	11	Blink	caution	Not identified, Other malfunction

(2) Speed sensor (flywheel)



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
43	128	SID 22	2	Blink	caution	Intermittent or incorrect data
	128	SID 22	3	Blink	caution	too high voltage, shorted high
	128	SID 22	8	Blink	caution	Abnormal frequency
	128	SID 22	0	Blink	caution	valid, but too high above normal
	128	SID 22	14	Blink	caution	Special instruction

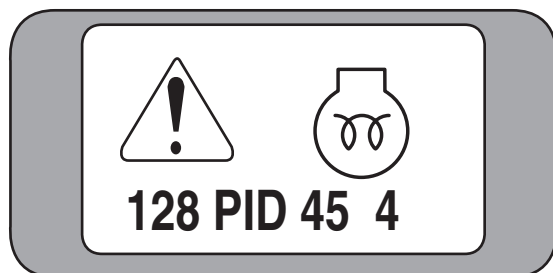
(3) Boost pressure sensor



Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
44	128	PID 102	3	Blink	Alarm	too high voltage, shorted high
	128	PID 102	4	Blink	Alarm	too low voltage, shorted low
	128	PID 102	11	Blink	Alarm	Not identified, Other malfunction
	128	PID 102	2	Blink	Alarm	Intermittent or incorrect data

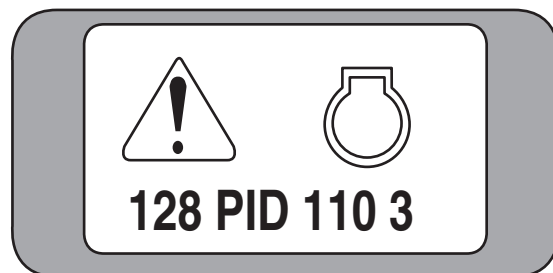
Error Message (Engine)

(4) Preheater



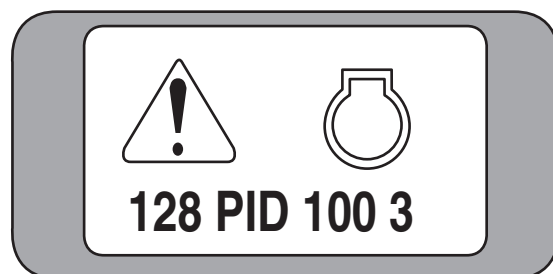
Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
	128	PID 45	3	Blink	Caution	High voltage
	128	PID 45	4	Blink	Alarm	Low voltage (problem because preheat relay always ON)
	128	PID 45	5	Blink	Caution	open circuit, disconnected
	128	SID 70	3	Blink	Alarm	High voltage(Coil On)
	128	SID 70	4	Blink	Caution	Low voltage
	128	SID 70	5	Blink	Caution	too low current

(5) Coolant temperature sensor



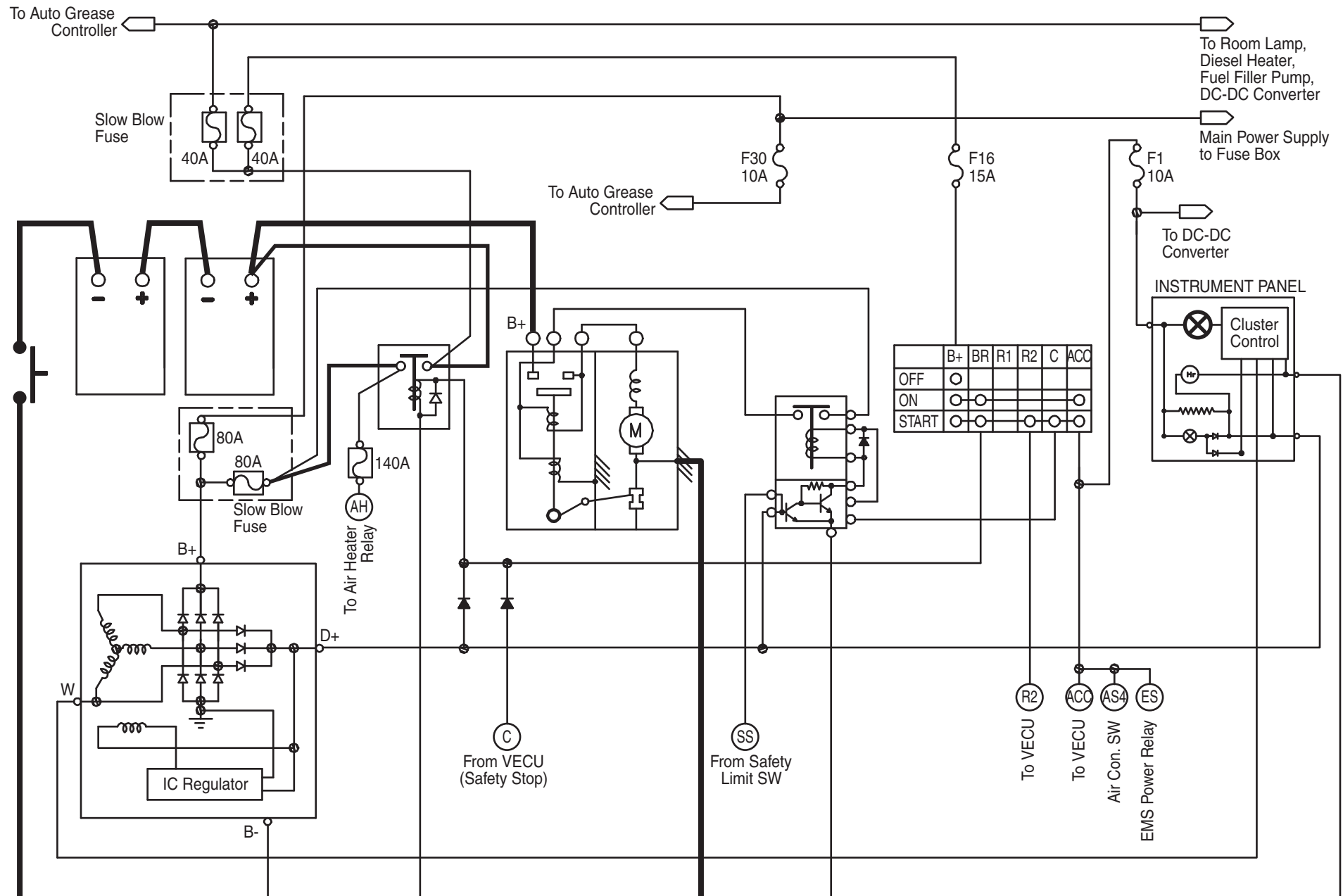
Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
	128	PID 110	2	Blink	Alarm	Intermittent or incorrect data
	128	PID 110	3	Blink	Alarm	too high voltage, shorted high
	128	PID 110	4	Blink	Alarm	too low voltage, shorted low

(6) Oil pressure sensor

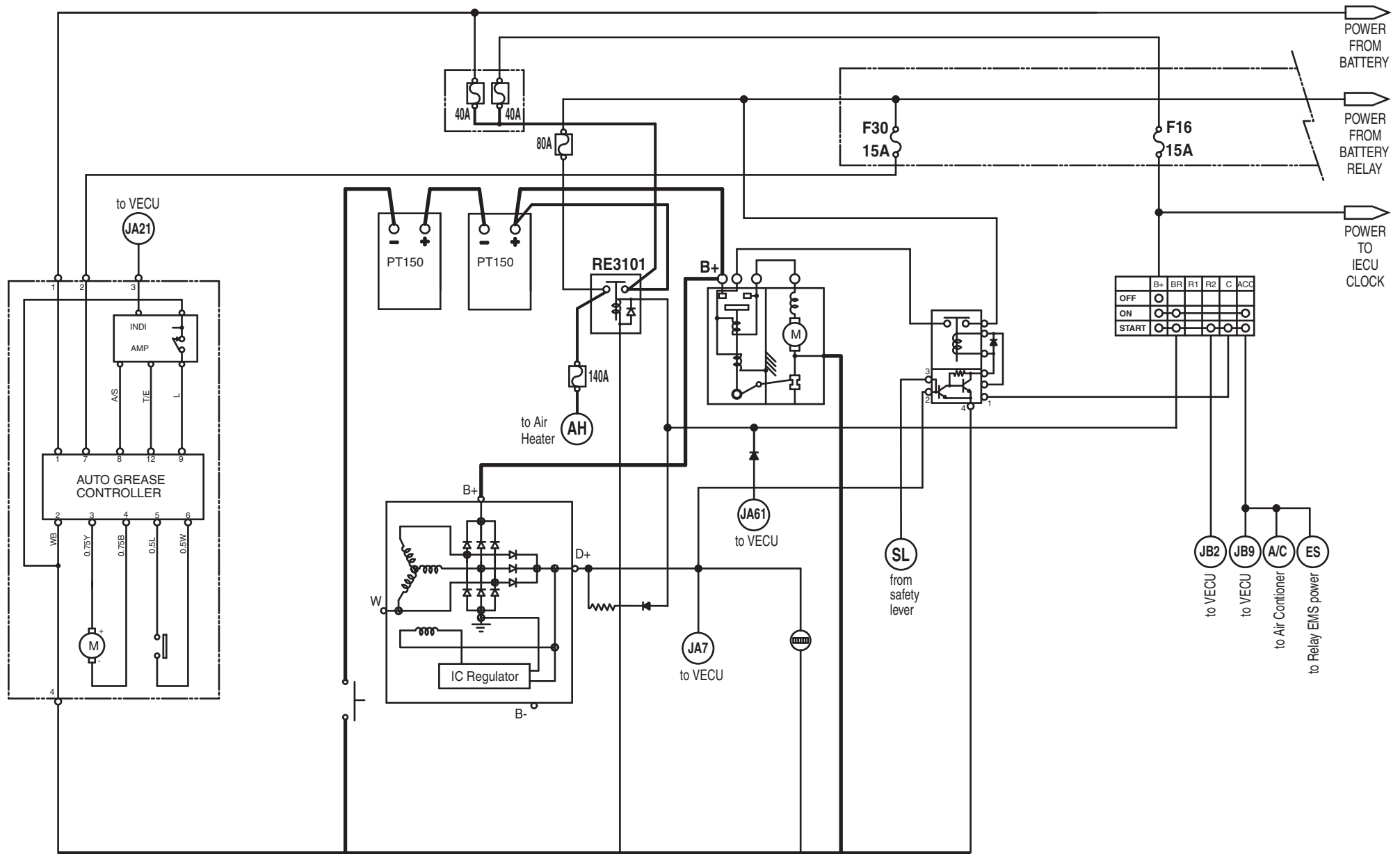


Error Code	From MID	Signal	FMI Code	Central Warning lamp	Buzzer	Source
	128	PID 100	2	Blink	Alarm	Intermittent or incorrect data
	128	PID 100	3	Blink	Alarm	too high voltage, shorted high
	128	PID 100	4	Blink	Alarm	too low voltage, shorted low

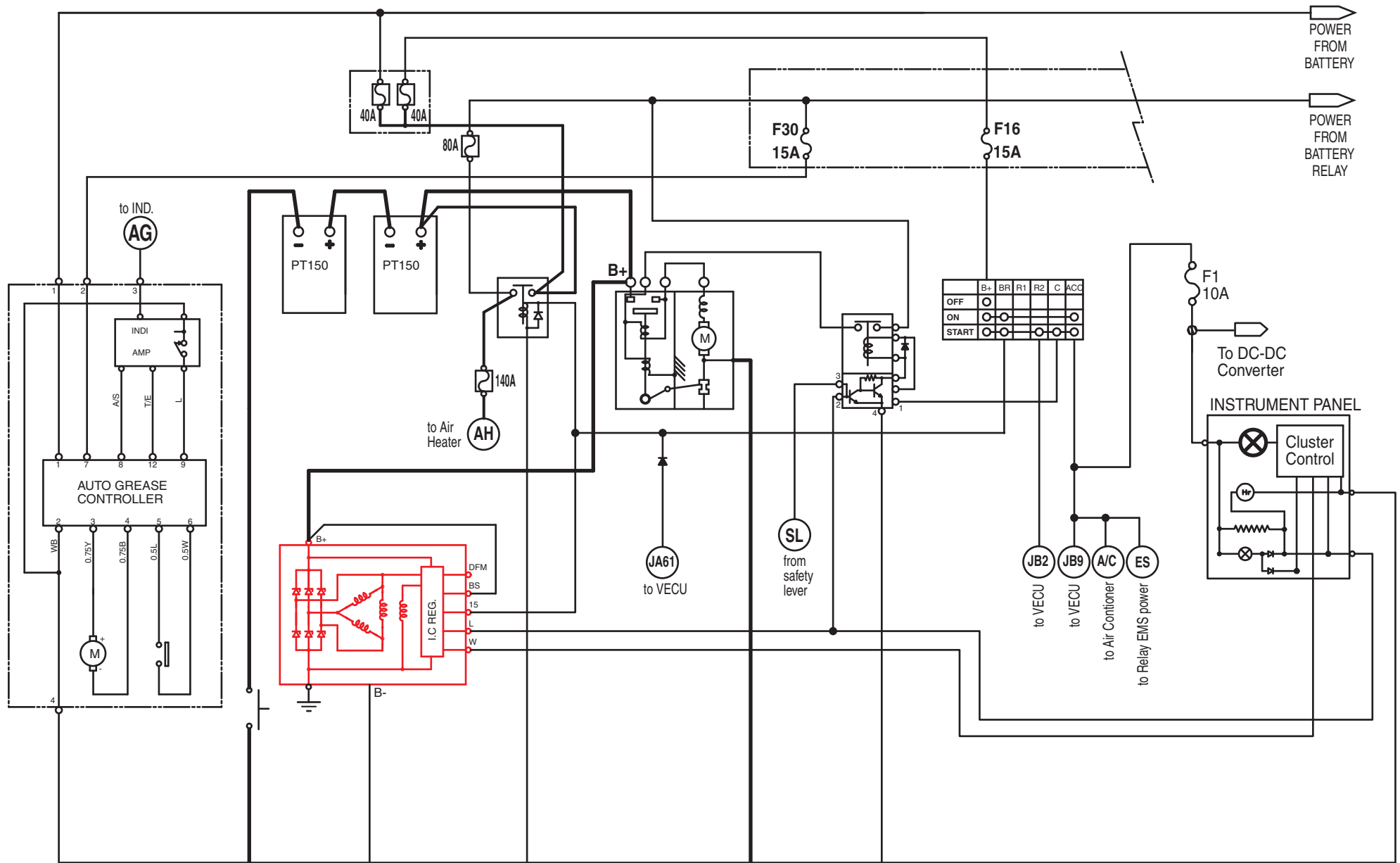
Old Start Circuit(EC160B/180B/210B/240B/290B)



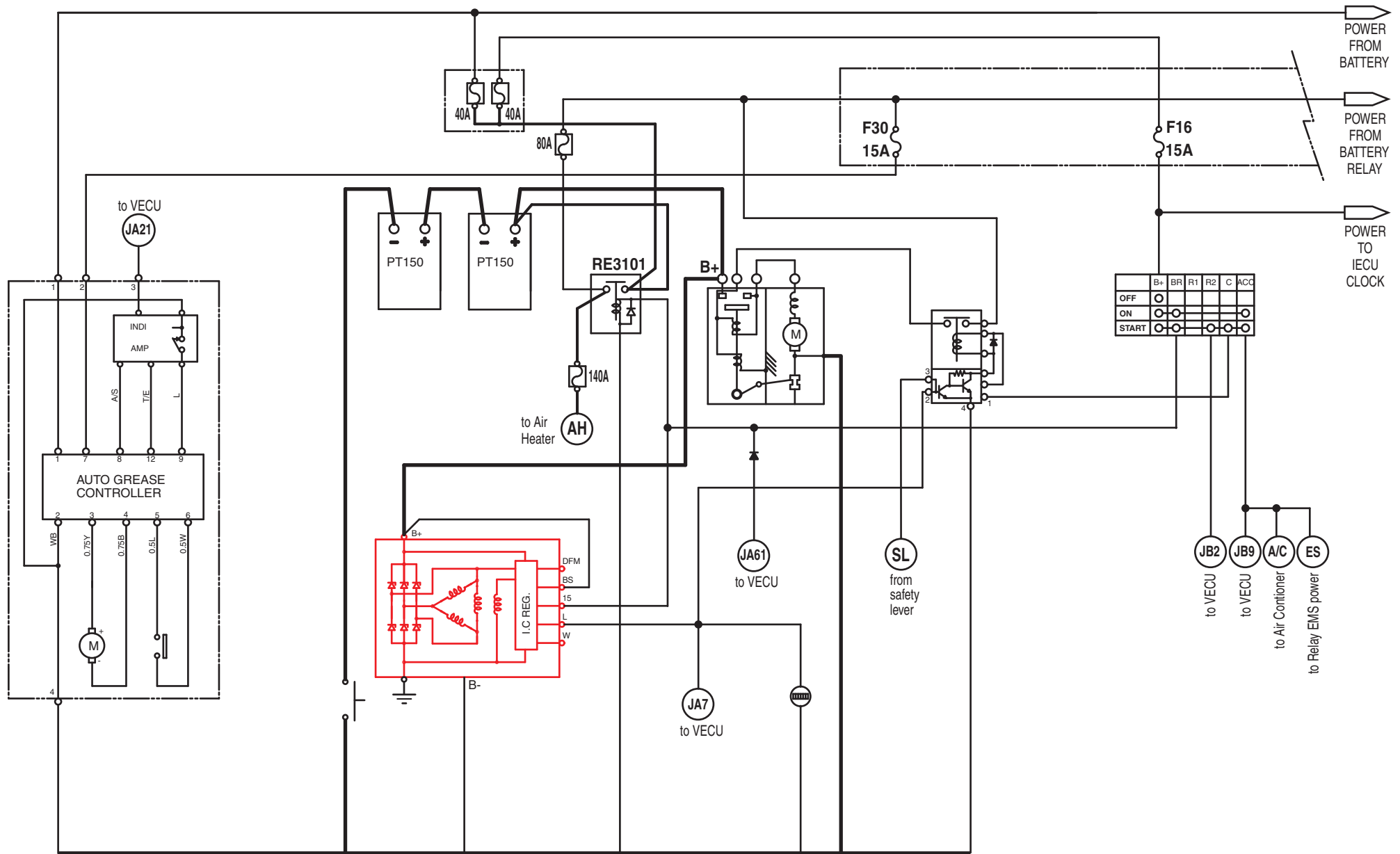
Start Circuit(Old Alternator & New IECU- EC160B/180B/210B)



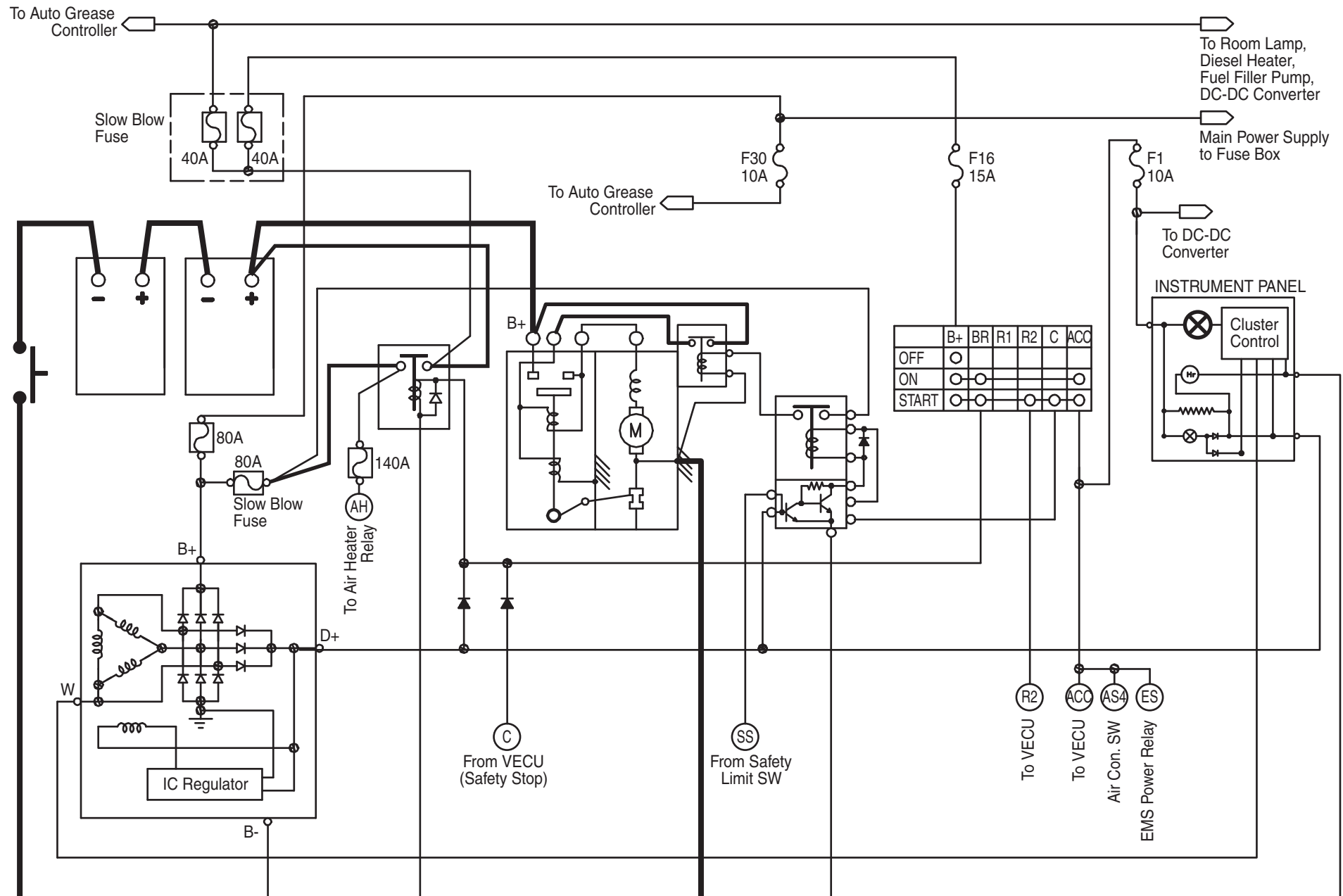
Start Circuit(New Alternator & Old Inst. panel- EC240B/290B)



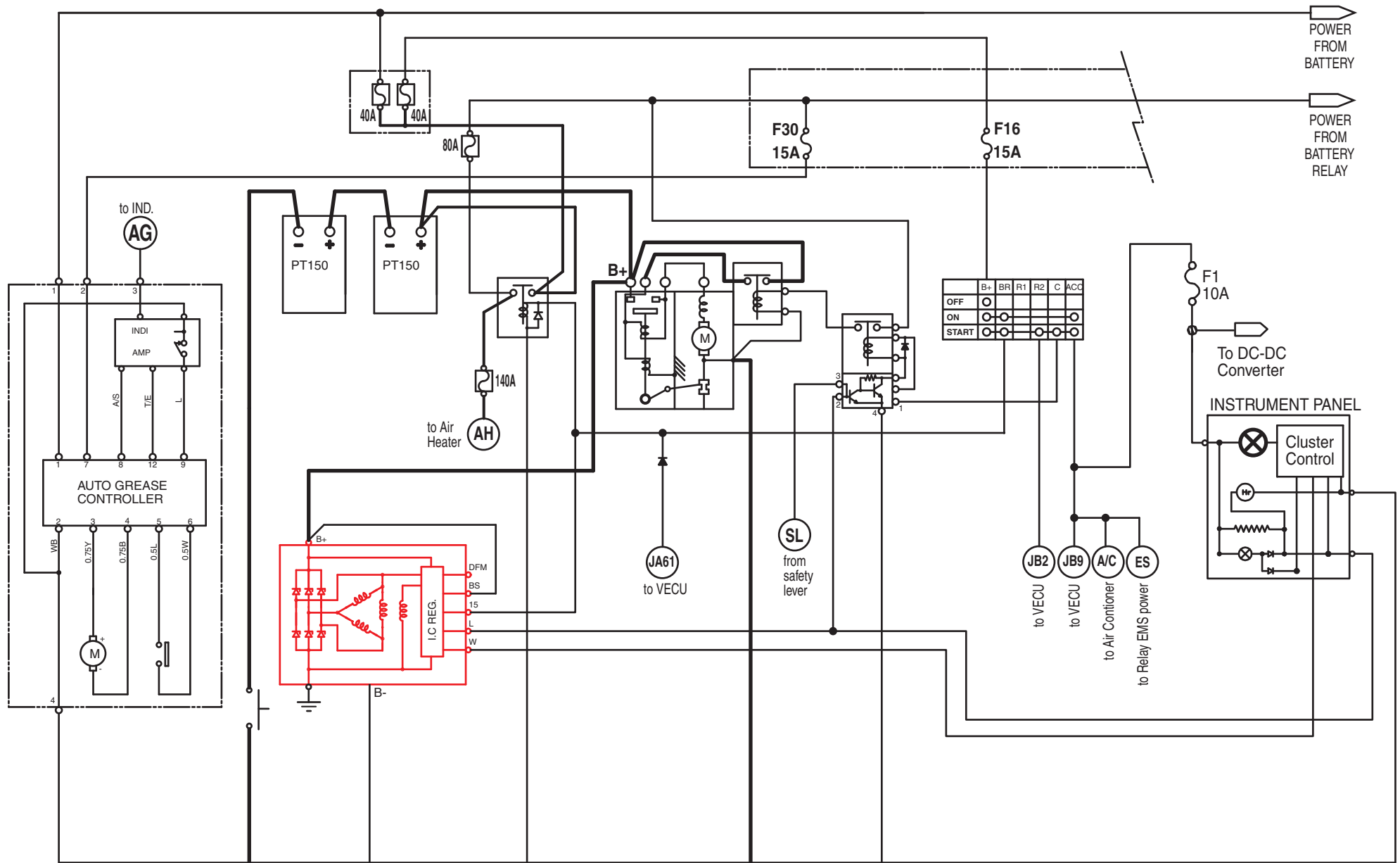
Start Circuit(New Alternator & New IECU- EC160B/180B/210B/240B/290B)



Old Start Circuit(EC360B/460B)



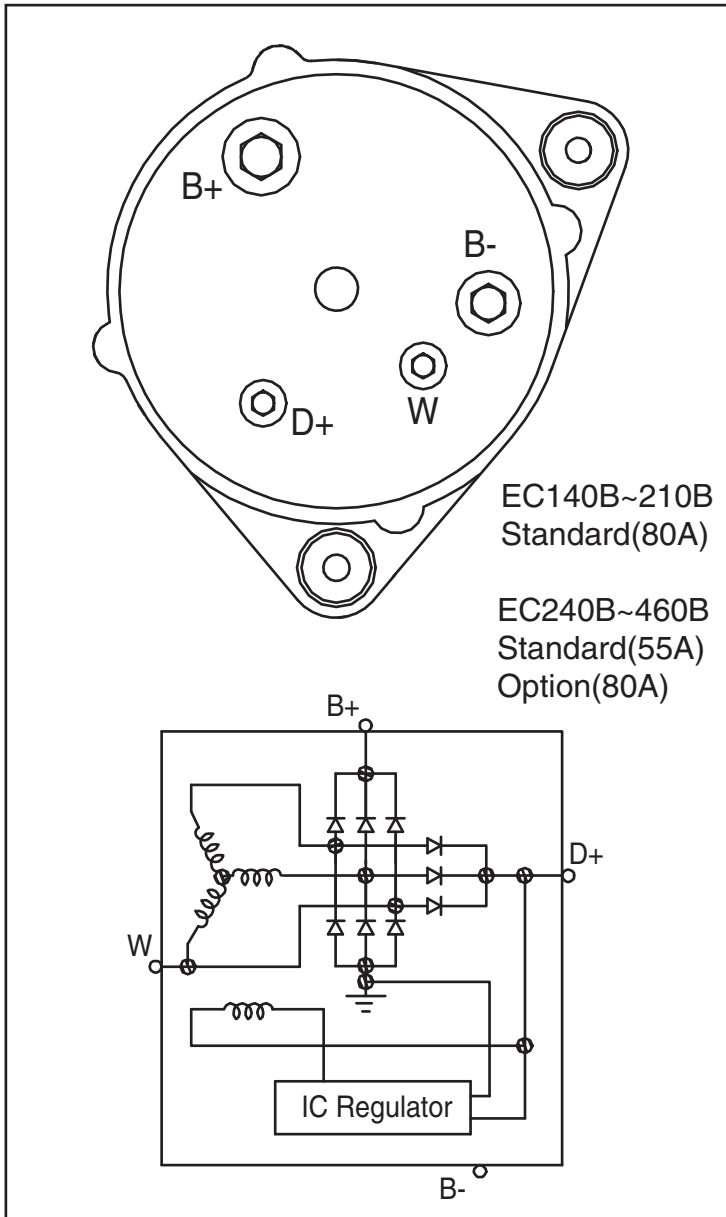
Start Circuit(New Alternator & Old Instrument panel - EC360B/460B)



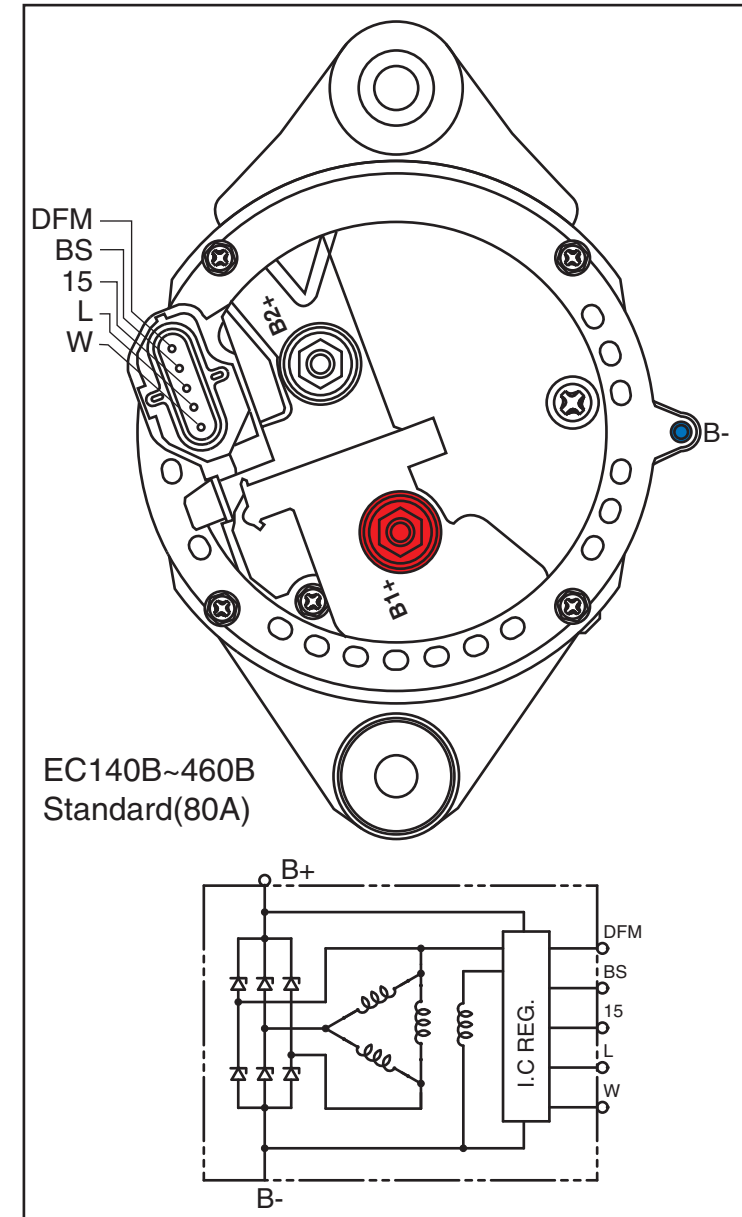


Alternator change

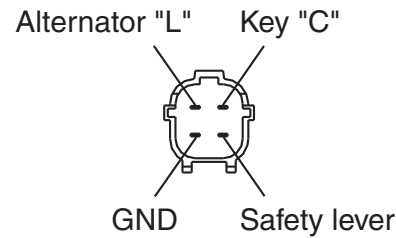
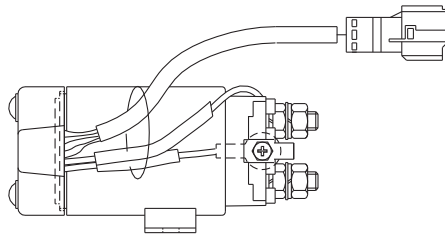
OLD



NEW



Safety relay change(Add time delay function)



*** During the air bleeding procedure from fuel line, We need more cranking time to start engine. But at this situation, new alternator produce a little bit higher voltage at the terminal "L". So this voltage deenergize safety relay and interrupt start motor. To prevent this, we add the time delay function at safety relay.

(1) Old(14526226)

	Normal operation	Hold key switch on ST position after engine started.	Turn the key switch to ST and ON while engine is running	Start the engine again after the failure
KEY SWITCH				
SAFETY RELAY				
STARTER				
ENG				
ALT				
SAFETY RELAY	_____	Prevent overrunning	Prevent restart	Prevent overrunning while motor is cranking

(1) New(14531201)

***td = 30 +/- 5sec

	Normal operation	Hold key switch on ST position after engine started.	Turn the key switch to ST and ON while engine is running	Start the engine again after the failure
KEY SWITCH				
SAFETY RELAY				
STARTER				
ENG				
ALT				
SAFETY RELAY	_____	Prevent overrunning	Prevent restart	Prevent overrunning while motor is cranking