# Chapter 4 CONTROLLER 1. Outline

The controllers control the forklift truck and engine. Each controller is located as shown below.



- Meter Panel 2.
- 3. Input unit
- 4. ECM

- 5. Gateway
- 6. VCM-6 (Vehicle Control Module)

#### **Main Functions of Controllers** 2.

Each controller connects into a CAN network, and information is exchanged between controllers through the CAN network. VCM-6 (vehicle control module) controller controls the whole forklift truck system, and the other controllers control relevant components.



- 2. Input unit
- 3. Output unit
- Meter panel 4.

5. Gateway

6. ECM

7. Connector Primary function of each control is described below:

## 2.1 Meter Panel

The meter panel is located below the steering wheel. It displays fuel gauge, water temperature gauge, travel speed, clock time, and self-diagnostic information.

For the other functions, see "3. ELECTRICAL SYSTEM".

## 2.2 VCM-6 (Vehicle Control Module)

The VCM-6 controller is located on the left side of the forklift truck and controls the whole forklift truck system (driving/ mast interlock system, steering knob deviation correction, etc.)

## 2.3 ECM (Engine Control Module)

The ECM controller is located on the left side of the forklift truck and controls the engine. For more information, see Engine Service Manual.

## 2.4 Input and Output Units

The input/output units are mounted on the forklift truck, and read signals from FC lever and control the FC control valve.

## 2.5 Gateway

Located on the left side of forklift truck, the gateway transforms signals of the ECM and VCM-6.

## **CHAPTER 4 CONTROLLER**

## 2.6 GSE Connector

When using service tool, the GSE connector is used to connect PC and the forklift truck. The GSE connector is located under the cup holder on the right side of dashboard.

(1) Pull up the upper side rim of the cup holder.



(2) With the rim of the cup holder raised, push the cup holder in the direction of the mast.



(3) Remove the cup holder and remove the GSE connector from inside.



1. GSE connector

## 3. Service Tool

## 3.1 Service Tool Menus

Select functions from the main menu window.



### File menu

- Print: allows you to print the screen being displayed.
- Exit: allows you to terminate the application.

### **Monitor menu**

- Input monitor: allows you to monitor input values.
- Output monitor: allows you to monitor output values.
- Custom monitor: allows you to monitor customized input/output values.
- Truck status: allows you to monitor the current truck conditions.
- Truck history: allows you to check the past history.

### **Monitor menu**

- Set-up option: allows you to monitor or change setup values.
- Oscilloscope: allows you to view a graph of input/ output values. Also allows you to store the graph being displayed. Thus, a graph stored in memory can be redisplayed.

- Active test: operating conditions can be checked by outputting signals.
- Destination change: allows you to change the controller to connect and the controller to control.
- Firmware update: allows you to update the firmware of controller being connected.

### **Communication menu**

- Setup: allows you to setup communication port, communication speed, and flow control.

### Language menu

- allows you to select a language in the language menu.

### Help menu

- Contents: allows you to view contents of help menu.
- Topics: allows you to search help topics.
- Pop up display: allows you to have a pop-up display of item name/button name.
- Version information: allows you to check version information.

## 3.2 Outline of Toolbox

## Input monitor

The monitor is used to check input status of sensors and switches.

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ubleshooting m.       Image: Second Rever Market Mark	ubleshooting m.   -up option   FNR lever   -up option   billoscope   ive Test   mection change   nnection change   new model     FNR lever   Verified   FNR lever   It operation Switch   * - *   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***   *****   *****   *****   ************************************	ubleshooting m.       FNR lever       * - *       * * * *       *         -up option       Direction lever [Hex]       * - *       * * * *       *         Direction no Switch       * - *       * * * *       *       *         Lift operation Switch       * - *       * * * *       *       *         Score       Tilt operation Switch       * - *       * * * *       *         Wast high Switch       * - *       * * * *       *       *         Tilt autor-stop Switch       * - *       * * * *       *       *         Nor Test       *       * * *       *       *       *         Speed (Em/h]       0.2 - 4.8       * * *       *       *       *         Speed limit SW       * - *       * * * *       *       *       *         Innection change       Speed limit SW       * - *       * *** *       *       *         nware Update       Handle angle [deg]       * - *       * *** *       *       *       *         Handle center Switch       * - *       * *** *       *       *       *       *         Description of a monitor item       *       *       *       *       *       * <td< td=""><td></td><td>Direction lever N</td><td>* - *</td><td>***</td><td>*</td><td>*</td><td>=</td></td<>		Direction lever N	* - *	***	*	*	=
This is the set of	t-up option it-up	t-up option       Direction lever [Hex]       + - + *** + *         Direction lever [Hex]       + - + *** + *         Lift operation Switch       + - + *** + *         trive Test       Mast high Switch       + - + *** + *         Innection change       Weight 0 set Switch       + - + *** + *         mometion change       Speed Sensor error [V]       1.4 - 4.8 *** + *         mometion change       Speed Imit SW       + - + *** + *         mometion change       Speed Imit SW       + - + *** + *         mometion change       Speed Imit SW       + - + *** + *         mometion change       Speed Imit SW       + - + *** + *         mometion change       Speed Imit SW       + - + *** + *         Speed Imit SW       * *** + *       *         Speed Imit SW       * *** + *       *         Speed Imit SW       * *** + *       *         Made angle [deg]       * - * *** + *       *         Handle angle target [deg]       * - * *** + *       *         Description of a monitor item       Imit and the set of the	publeshooting m	END layer	* - *	***		*	
t-up option       Lift operation Switch       * - *       * * *       *         cilloscope       Lift operation Switch       * - *       * * * *       *         file operation Switch       * - *       * * * *       *       *         mast high Switch       * - *       * * * *       *       *         file operation Switch       * - *       * * * *       *       *         file operation Switch       * - *       * * * *       *       *         file operation Switch       * - *       * * * *       *       *         file operation Switch       * - *       * * * *       *       *         file operation Switch       * - *       * * * *       *       *         file operation Switch       * - *       * * * *       *       *         file operation Switch       * - *       * * * *       *       *         peed [km/h]       0.20 - 4.8       * * * *       *       *         speed limit SW       * - *       * * * *       *       *         mware Update       *       * * * *       *       *       *         ange model       Wheel angle [deg]       * - *       * * *       *       *	t-up option       Lift operation Switch       * - *       * * * *       *         cilloscope       Tilt operation Switch       * - *       * * * *       *         tive Test       Mast high Switch       * - *       * * * *       *         nnection change       Speed [km/h]       0.2 - 4.8       * * * *       *         speed [km/h]       0 - 30       * * * *       *       *         speed [km/h]       0 - 30       * * * *       *       *         speed [km/h]       0 - 30       * * * *       *       *         speed limit SW       * - *       * * *       *       *         speed limit SW       * - *       * * *       *       *         mware Update       Handle angle [deg]       * - *       * * *       *         Handle angle [fv]       0.28 - 4       * ***       *       *         Handle center Switch       * - *       * * *       *       *         Handle center Switch       * - *       * * *       *       *         Wheel angle [V]       0.28 - 4       ***       *       *         Description of a monitor item       *       *       *       *       *         Vel	t-up option Lift operation Switch + - + + + + + + Lift operation Switch + - + + + + + + Lift operation Switch + - + + + + + Mast high Switch + - + + + + + Tilt auto-stop Switch + - + + + + + Tilt auto-stop Switch + - + + + + + Speed [km/h] 0 - 30 + + + + + Speed [km/h] 0 - 30 + + + + + Speed [km/h] Speed limit SW + - + + + + + Speed limit SW + - + + + + + Speed limit SW Snow mode Switch + - + + + + + Speed limit SW + - + + + + + Speed limit SW + - + + + + + Handle angle [deg] + - + + + + + Handle angle [deg] + - + + + + + Handle angle [deg] + - + + + + + Handle center Switch + - + + + + + + Handle center Switch + - + + + + + + Handle center Switch + - + + + + + + + Handle center Switch + - + + + + + + + Handle center Switch + - + + + + + + + Handle center Switch + - + + + + + + + Handle center Switch + - + + + + + + + + Handle center Switch + - + + + + + + + + + Handle center Switch + - + + + + + + + + + + Handle center Switch + - + + + + + + + + + + + + + + + + + +		Direction lever [Hev]	* - *	***	*	*	
Till operation Switch       1	Tilt operation Switch + - + + + + + + + + + + + + + + + + +	Till operation Switch       1	t-up option	Lift operation Switch	* - *	***	*	*	
iilloscope       Mast high Switch       i - i       i + i       i         ive Test       iiilit angle [V]       0.2 - 4.8       iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	Mast high Switch       1	iiiloscope       Mast high Switch       * - *       * * * *       *         ive Test       Tilt auto-stop Switch       * - *       * * * *       *         ive Test       Weight 0 set Switch       * - *       * * * *       *         inection change       Speed [km/h]       0.2 - 4.8       * *       *         inection change       Speed [km/h]       0 - 30       ****       *         speed limit SW       * - *       ****       *       *         speed limit SW       * - *       ****       *       *         mware Update       Image index       * - *       ****       *       *         innee model       Update       * - *       ****       *       *       *         Image model       Veloate       * - *       ****       *       *       *       *         Image model       Veloate       * - *       ****       *       *       *       *       *       *       *       *         Update       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *	ap option	Tilt operation Switch	* - *	***	*	*	
itil auto-stop Switch       * - *       ****       *         Tilt auto-stop Switch       * - *       ****       *         Tilt auto-stop Switch       * - *       ****       *         Tilt auto-stop Switch       * - *       ****       *         mnection change       Weight 0 set Switch       * - *       ****       *         speed limit SW       0.2 - 4.8       ****       *       *         Speed limit SW       * - *       ****       *       *         speed limit SW       * - *       ****       *       *         Speed limit SW       * - *       ****       *       *         Speed limit SW       * - *       ****       *       *         speed limit SW       * - *       ****       *       *         Speed limit SW       * - *       ****       *       *         Handle angle [deg]       * - *       ****       *       *         Handle angle [V]       0.28 - 4       ****       *       *       *         Description of a monitor item       *       *       *       *       *       *	init auto-stop Switch       * - *       *** *       *         tive Test       Weight 0 set Switch       * - *       *** *       *         innection change       Weight 0 set Switch       * - *       *** *       *         innection change       Speed [km/h]       0 - 30       *** *       *         innection change       Speed [km/h]       0 - 30       *** *       *         innection change       Speed sensor error [V]       1.4 - 4.8       *** *       *         innection change       Speed sensor error [V]       1.4 - 4.8       *** *       *         innection change       Speed sensor error [V]       1.4 - 4.8       *** *       *         innection change       Speed sensor error [V]       0.28 - 4       *** *       *         Handle angle [deg]       * - *       *** *       *       *         Handle center Switch       * - *       *** *       *       *         Description of a monitor item       *       *       *       *       *         V       Show description       *       *       *       *       *       *         Stop Recording       Stop Recording       Reset Values       *       *       *       *	initial auto-stop Switch       * - * *** *       *         tite auto-stop Switch       * - * *** *       *         tite auto-stop Switch       * - * *** *       *         tite auto-stop Switch       * - * *** *       *         innection change       *       * - * *** *       *         innection change       Speed [km/h]       0 - 30       *** *       *         Speed [km/h]       0 - 30       *** *       *       *         Speed [km/h]       0 - 30       *** *       *       *         Speed [km/h]       0 - 30       *** *       *       *         Speed limit SW       * - *       *** *       *       *         Speed limit SW       * - *       *** *       *       *         Snow mode Switch       * - *       *** *       *       *         Handle angle [deg]       * - *       *** *       *       *         Handle center Switch       * - *       *** *       *       *       *         Description of a monitor item       *       *       *       *       *         Wheel angle [V]       Show description       *       Start Recording       Reset Values         No Communication		Mast high Switch	* - *	***	*	*	
tive Test       If it angle [V]       0.2 - 4.8       ****       *         mnection change       Weight 0 set Switch       * - *       ****       *         speed [km/h]       0 - 30       ***       *         speed sensor error [V]       1.4 - 4.8       ****       *         speed limit SW       * - *       ****       *         speed limit SW       * - *       ****       *         mware Update       ange model       * - *       ****       *         Index angle [deg]       * - *       ****       *         Handle angle [deg]       * - *       ****       *         Handle center Switch       * - *       ****       *         Description of a monitor item       •       •       •	tive Test tive Test tive Test meetion change meetion change meware Update ange model  Tilt angle [V] 0.2 - 4.8 **** *  Weight 0 set Switch * - * **** *  Speed [km/h] 0 - 30 *** *  Speed [km/h] 0 - 30 *** *  Speed [km/h] 0 - 30 *** *  Speed [km/h] * - * *** *  Speed [km/h] * - * *** *  Speed [km/h] * - * *** *  Speed [km/h] * * * * * * * * * * * * * * * * * * *	tive Test  tive Test  tive Test  meetion change  mware Update  ange model	cilloscope	Tilt auto-ston Switch	* - *	***	*	*	
ive Test       Weight 0 set Switch       * -*       ****       *         mection change       Speed [km/h]       0 - 30       ****       *         speed sensor error [V]       1.4 - 4.8       ***       *         mware Update       *       *       *         ange model       *       *       *         Meight 0 set Switch       * - *       ****       *         Inware Update       *       *       *         ange model       *       ****       *         Description of a monitor item       *       *       *         Image model       *       *       *       *	ive Test       Weight 0 set Switch       * - *       * * * *       *         unection change       Speed [km/h]       0 - 30       * * * *       *         speed limit SW       * - *       * * * *       *         nware Update       Handle angle [deg]       * - *       * * * *         handle angle [deg]       * - *       * * * *       *         ange model       0.28 - 4       * * * *       *         Description of a monitor item       •       •       •         V       Show description       •       •       •         Start Recording       Stop Recording       Reset Values       •	ive Test       Weight 0 set Switch       * - *       ****       *         mection change       Speed [km/h]       0 - 30       ****       *         speed limit SW       * - *       ****       *         speed limit SW       * - *       ****       *         mware Update       angle [deg]       * - *       ****       *         ange model       0.28 - 4       ****       *       *         Description of a monitor item       •       •       •       •         Show description       Start Recording       Stop Recording       Reset Values			02-48	***	*	*	
Speed [km/h]       0 - 30       ***       *       *         nnection change       Speed [km/h]       1.4 - 4.8       ***       *       *         mware Lipdate       Snow mode Switch       * - *       ***       *       *         ange model       Meel angle [deg]       * - *       ****       *       *         Description of a monitor item       •       •       ****       *       •	Speed [km/h]       0 - 30       ***       *         nnection change       Speed [km/h]       1.4 - 4.8       ***       *         Speed limit SW       * - *       ***       *       *         Snow mode Switch       * - *       ***       *       *         Handle angle [deg]       * - *       ***       *       *         Handle angle [deg]       * - *       ***       *       *         Handle angle [row mode Switch       * - *       ***       *       *         Wheel angle [v]       0.28 - 4       ***       *       *         Handle center Switch       * - *       ****       *       *         Description of a monitor item       *       *       *       *         Show description       Start Recording       Stop Recording       Reset Values	Speed [km/h]       0 - 30       ***       *       *         nnection change       Speed [km/h]       1.4 - 4.8       ***       *       *         speed limit SW       * - *       ***       *       *       *         speed limit SW       * - *       ***       *       *       *         mware Update       Handle angle [deg]       * - *       ***       *       *         Handle angle [deg]       * - *       ***       *       *       *         ange model       0.28 - 4       ***       *       *       *         Description of a monitor item       *       *       *       *       *         Wheel angle [v]       0.28 - 4       ***       *       *       *       *         Description of a monitor item       *       *       *       *       *       *         Description       Start Recording       Stop Recording       Reset Values       *       *	tive Test	Weight 0 set Switch	* - *	***	*	*	
nmection change       Speed sensor error [V]       1.4 - 4.8       ****       *         Speed limit SW       * - *       ****       *       *         snow mode Switch       * - *       ****       *       *         Handle angle [deg]       * - *       ****       *       *         Handle angle [deg]       * - *       ****       *       *         Handle angle [deg]       * - *       ****       *       *         Handle angle center Switch       * - *       ****       *       *         Description of a monitor item       •       •       •       •	Speed sensor error [V]       1.4 - 4.8       **** *       *         Speed limit SW       * - *       **** *       *         mware Update       *       * - *       **** *       *         ange model       *       - *       **** *       *         Description of a monitor item       *       *       *       *         Show description       *       *       *       *         Start Recording       Stop Recording       Reset Values       *	nmection change mection change method by the series of error [V] 1.4 - 4.8 *** * Speed sensor error [V] 1.4 - 4.8 *** * Speed limit SW * - + *** * * Speed limit SW * - + *** * * * * * * * * * * * * * * * * *		Speed [km/h]	0 - 30	***	*	*	
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mware Update       Snow mode Switch       * - *       ****       *       *         Handle angle [deg]       * - *       ****       *       *         Handle angle [deg]       * - *       ****       *       *         ange model       0.28 - 4       ****       *       *         Description of a monitor item       •       •       •       •	Snow mode Switch       * - *       ****       *         Handle angle [deg]       * - *       ****       *         Handle angle [deg]       0.28 - 4       *       *         Wheel angle [V]       0.28 - 4       *       *         Handle center Switch       * - *       ****       *         Description of a monitor item       •       •       •         Image Start Recording       Stop Recording       Reset Values	Snow mode Switch       * - *       ****       *         Handle angle [deg]       * - *       ****       *         Handle angle [deg]       0.28 - 4       ****       *         Handle center Switch       * - *       ****       *         Handle center Switch       * - *       ****       *         Description of a monitor item       •       •         Image Start Recording       Stop Recording       Reset Values	nnection change	Speed limit SW	* - *	***	*	*	
mwware Update       Handle angle [deg]       * - *       ****       *         ange model       Handle angle [transference [transference]]       0.28 - 4       ****       *         Meel angle [v]       0.28 - 4       ****       *       *         Handle center Switch       * - *       ****       *       *         Description of a monitor item	mware Update       Handle angle [deg]       * - *       ****       *         Handle angle target [deg]       * - *       ****       *         wheel angle [V]       0.28 - 4       ****       *         Handle center Switch       * - *       ****       *         Description of a monitor item       •       •       •         V       Show description       •       •         Start Recording       Stop Recording       Reset Values	mware Update       Handle angle [deg]       * - *       ****       *         Handle angle target [deg]       * - *       ****       *       *         ange model       0.28 - 4       ****       *       *         Description of a monitor item       * - *       ****       *       *         Description of a monitor item       *       *       *       *         V       Show description       *       *       *         Start Recording       Stop Recording       Reset Values		Snow mode Switch	* - *	***	*	*	
Handle angle target [deg] * - * *** * * * * * * * * * * * * * *	Handle angle target [deg] * - * *** * * * * * * * * * * * * * *	Handle angle target [deg] * - * *** * * * * * * * * * * * * * *	mware Update	Handle angle [deg]	* - *	***	*	*	
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Description of a monitor item	Description of a monitor item      Show description      Start Recording Stop Recording Reset Values	Description of a monitor item      Show description      Start Recording      Stop Recording      Reset Values	ange model	Handle center Switch	* - *	***	*	*	~
	Image: Show description       Start Recording     Stop Recording       Reset Values	Show description           Start Recording         Stop Recording         Reset Values		Description of a monitor item	1 				
No Communication			No Communication	Show description	Sto	op Recordir	IE	Reset Va	alues
No Communication	2	2	Vo Communication	Show description	Sta	op Recordir	rg	Reset Va	alues
Communication 3	3	3	o Communication	Show description	Sta	op Recordir	ng	Reset V:	alues

1. Input monitor button

3. Description of the monitor item

2. Monitor window

## CHAPTER 4 CONTROLLER

Item		ltem	
Seat switch	ON/OFF	4V-5V changeover switch	ON/OFF
Seat switch timer	ON/OFF	IN-UNIT status (RIO2)	Normal/ Faulty
Seat belt switch	ON/OFF	Lowering speed switch	ON/OFF
DC power supply [V]		Lift operation switch	ON/OFF
Direction lever F	ON/OFF	Tilt operation switch	ON/OFF
Direction lever N	ON/OFF	Mast high switch	ON/OFF
Direction lever R	ON/OFF	Tilt auto-stop switch	ON/OFF
FNR lever		Tilt angle [V]	
Joystick (Lift lever 1) signal [%]		Weight 0 set switch	ON/OFF
Joystick (Lift lever 1) status		Speed [km/h]	
Joystick (Lift lever 2) signal [%]		Speed sensor error [V]	
Joystick (Lift lever 2) status		Speed limit SW	
Joystick (Tilt lever 1) signal [%]		Power/Soft mode switch	ON/OFF
Joystick (Tilt lever 1) status		Handle angle [deg]	
Joystick (Tilt lever 2) signal [%]		Handle angle target [deg]	
Joystick (Tilt lever 2) status		Auto light signal	ON/OFF
Joystick (ATT1 lever 1) signal [%]		Coolant low level switch	ON/OFF
Joystick (ATT1 lever 1) status		Air cleaner switch	ON/OFF
Joystick (ATT1 lever 2) signal [%]		Transmission warning switch	ON/OFF
Joystick (ATT1 lever 2) status		Fuel warning switch	ON/OFF
Joystick (ATT2 lever 1) signal [%]		Oil temperature switch	ON/OFF
Joystick (ATT2 lever 1) status		Mode select switch	ON/OFF
Joystick (ATT2 lever 2) signal [%]		Oil pressure LIFT [MPa]	
Joystick (ATT2 lever 2) status		AUX AI [HEX]	

## **Output monitor**

The monitor is used to check the output status of sensors and switches.

Monitor						Clos
	utout Monitor					
ut Monitor	Item	Normal R	Value	Min	Max	
1	Transmission signal N	* - *	***	*	*	
	Transmission solenoid F	* - *	***	*	*	
	Transmission solenoid R	* - *	***	*	*	
Status	Transmission solenoid curr	* - *	***	*	*	
Jatus	Unload solenoid	* - *	***	*	*	
	Unload solenoid feedback [	* - *	***	*	*	
listory	Liftlock solenoid	* - *	***	*	*	
	Liftlock solenoid feedback	* - *	***	*	*	
schooting m	Tiltlock solenoid	* - *	***	*	*	
	Tiltlock solenoid feedback	* - *	***	*	*	
	Park brake a larm	* - *	***	*	*	
option	Over load alarm 1	* - *	***	*	*	
	Over speed alarm	* - *	***	*	*	
scone	Idle-up solenoid	* - *	***	*	*	
	Angle adjust solenoid	* - *	***	*	*	
	Angle adjust tilt lock curre	* - *	***	*	*	
Test	Auto light OUT	* - *	***	*	*	
	AUX out 1	* - *	***	*	*	
tion change	AUX out 2	* - *	***	*	*	
don change	AUX out 3	* - *	***	*	*	
re Update						
model						
	Description of a monitor item					
	J					
L						
	🔽 Show description					
						<b>D</b>
	Start Depending	- 8 Str	m Kecor	ding		Reset Values
	Start Recording		sp ite eei			

1. Output monitor button

## **CHAPTER 4 CONTROLLER**

Signals that can be monitored are listed below:

Item	Item	
Transmission signal N	Solenoid output (ATT3 valve 2) output [mA]	
Transmission solenoid F	Solenoid output (ATT3 valve) feedback [mA]	
Transmission solenoid R	Solenoid output (ATT3 valve 1) output	
Transmission solenoid current [mA]	Solenoid output (ATT3 valve 2) output	
Solenoid output (Lift valve 1) output [mA]	Solenoid output (ATT3 valve) status	
Solenoid output (Lift valve 2) output [mA]	PWM voltage (RIO1) [V]	
Solenoid output (Lift valve) feedback [mA]	PWM voltage (RIO1)	
Solenoid output (Lift valve 1) output [mA]	OUT-UNIT status (RIO1)	
Solenoid output (Lift valve 2) output [mA]	Unload solenoid	
Solenoid output (Lift valve) status	Unload solenoid feedback [mA]	
Solenoid output (Tilt valve 1) output [mA]	Lift lock solenoid	
Solenoid output (Tilt valve 2) output [mA]	Lift lock solenoid feedback [mA]	
Solenoid output (Tilt valve) feedback [mA]	Tilt lock solenoid	
Solenoid output (Tilt valve 1) output	Tilt lock solenoid feedback [mA]	
Solenoid output (Tilt valve 2) output	Park brake alarm	
Solenoid output (Tilt valve) status	Overload alarm	
Solenoid output (ATT1 valve 1) output [mA]	Overspeed alarm	
Solenoid output (ATT1 valve 2) output [mA]	Angle adjust solenoid	
Solenoid output (ATT1 valve) feedback [mA]	Angle adjust tilt lock current [mA]	
Solenoid output (ATT1 valve 1) output	Auto light OUT	
Solenoid output (ATT1 valve 2) output	Parking brake pressure leakage	
Solenoid output (ATT1 valve) status	AUX out 2	
Solenoid output (ATT2 valve 1) output [mA]	AUX out 3	
Solenoid output (ATT2 valve 2) output [mA]	Limp home	
Solenoid output (ATT2 valve) feedback [mA]	Shift solenoid 1 output status	ON/OFF
Solenoid output (ATT2 valve 1) output	Shift solenoid 1 feedback status	
Solenoid output (ATT2 valve 2) output	Parking brake solenoid	ON/OFF
Solenoid output (ATT2 valve) status	Parking brake solenoid feedback [mA]	
Solenoid output (ATT3 valve 1) output [mA]		

## **Custom monitor**

Custom monitor screen allows you to select a monitor item you wish to view. The controller reads the value of selected item and displays it on the screen.

	,1									
Input Monitor	Gus	tom Monitor							Cla	se
Output Monitor		Item		Normal R	Value	Min	Max			
Custom Monitor					Value		1010X			
Fault Status										
Truck History		Description o	f a monitor item-							
Troubleshooting m										
Set-up option								~		
Oscilloscope										
Active Test										
Connection change										
Firmware Update										
Change model										
		🔽 Show des	scription	Dis	play Item	n Edit	_ z	loom		
		Sta	rt Recording	St	op Recor	ding		Reset Valu	ues	
No Communication										
									2	
										505825

1. Custom monitor button

2. Reset values button

## **CHAPTER 4 CONTROLLER**

To select items, press the Display Item Edit Button to open the Display Item Window, and select items you need to check.



- Selection items
   Add button
- 3. OK button



1. Items to be added



1. Added items

### **Truck status**

Click the truck status button from the menu or toolbox to display the truck status monitor screen in the main window. In the truck status monitor screen, you can monitor a warning that has occurred. Pressing the troubleshooting manual button in the lower part of screen brings up a list of diagnostic code and the troubleshooting information.

	1			
Input Monitor				Close
Output Monitor	Frror Code	Description		
Custom Monitor				
Truck Status				
Fault History				
Troubleshooting m				
Set-up option				
Oscilloscope				
Active Test				
Connection change				
Firmware Update				
Change model				
		Record	Troubleshooting manual	
No Communication			2	
			£	505

1. Truck status button

2. Troubleshooting manual button

FG/FD15N-35N	l, FG/FD10ND-35ANFT, GP/DP15N-35N, GP/DP15ND-35NFT, P3000-7000 - Microsoft Internet Explo	er 📒	C
Ele Edit Yew	Fgvantes Iools Help		
Geade + 🕤	🕐 🛋 🐔 🔎 Search 👷 Favorites 🚱 🍙 - 🌺 🔜 🕒 🦓		
lddress 🕘 C:lProgr	am Nies(UP-TINE)dat/MagelanMTS.html	🖌 🏹 😨	Lin
	TROUBLESHOOTING		
Contents			
Error Code	Description		
<u>F-01</u>	Memory error		
<u>F-02</u>	Battery voltage fault		
F-03	VCM communication error		
<u>F-04</u>	EGM communication error		
F-05	DCM communication error		
<u>F-07</u>	MP communication error		
F-08	TMS communication error		
F-10	Lift lever neutral		
<u>F-11</u>	Tilt lever neutral		
F-12	Att1 lever neutral		
F-13	Att2 lever neutral		
E-14	Att3 lever neutral		
F-16	Shift Lever Abnormal Signal		
<u>F-17</u>	Vehicle Speed Abnormal Signal		
F-20	Lift lever error		
<u>F-22</u>	Tilt lever error		
F-24	Att1 lever error		
Done		Nv Computer	

Fie Fox New	Favorites Iools He	Np	
GBack . O	- 🖹 🗟 🏠	🔎 Search 🤺 Favorites 🥝 🎯 🍓 🔜 🔢	3
Address 🔊			Go Links
Error code	F-75	Error name Unload Solenoid Abnormal Signal	
Error criteria	Unload solenoid cur Threshold Check: (1) Duration: (1) 1800 m	rent is abrormal (outside the specified range). 160 mA or less, or (2) 2.4 A or more s or more or (2) 200 ms or more	
Error cause	1. Abnormal unload : 2. Abnormal harness 3. Abnormal controll	aolenoid ar	
Processing flow			
1	F-75	)	
	$\square$	s	
Using a teste ON terminal	, check unload sciencid res of the VCM controller	istance at the	
	is installation normal?		
	N		
		Y	
	Is resistance near 0 ohm?		
	→N		
A 1994 - 2004		Pleasant the releval	<b>9</b> -7-10-10
コページが表示されま	J.		2 71 3283-9

## **Truck history**

Click the truck history button from the menu or toolbox to read past warnings stored in the memory of controller. If the read is successfully completed, the dialog box displays a "Read successful" message. If not, a "Read error" message is displaced. Then, the truck history monitor screen is displayed in the main windows.

put Monitor							Clos	e
utput Monitor	Fav. It Histor	y Error Code	Description			Hou	r BDI	
ustom Monitor	140.		Desci priori			Hot		_
ault Status								
ruck History								
oubleshooting m								
et-up option								
scilloscope								
ctive Test								
onnection change								
rmware Update								
ange model								
			_		1			1
		Record		Clear		Troublesho	oting manual	

1. Truck history button



- 1) When the read is successful
- 1. Success dialog

- 2) When the read is unsuccessful
- 2. Error dialog

## Set-up option

Click the set-up option button from the menu or toolbox to display the setup option screen in the main window. In the setup option screen, you can monitor the current setup values, or you can rewrite the setup values. Click the write button to save your changes.

		1 /				
Input Monitor		/			Write	Cancel
Output Monitor	Page/1	Page 2 #1-#	B   Page 3 <b>#</b> 9- <b>#</b> 16	6   Page 4 <b>#</b> 17- <b>#</b> 25	Page 5 #26-#32   Page	e 6 #33-#41   Page 🚺
Custom Monitor	-Se S	t <b>-up option</b> tandard 1				Execute
Truck Status						
Truck History						
Troubleshooting m						
Set-up option						
Uscilloscope						
Active Test						
Connection change						
Firmware Update						
Change model						
Communication En	rror					
						505

1. Set-up option button

### Oscilloscope

Click the oscilloscope button from the menu or toolbox to display the oscilloscope screen in the main window. The oscilloscope screen shows a graph of the input/output values you wish to check. The user can set up two items (CH1 and CH2) as input/output values to be expressed in the graph. The time axis of the graph is expressed in seconds. The user also can store the data of the graph being displayed on the screen, and display the graph by reading it from the memory. The graph screen can be printed out on a printer by clicking the Print Screen button. Note that these graphs will have some amount of lag in the wave pattern and a margin of error due to the simple function of an oscilloscope. To obtain an accurate wave pattern, use a dedicated measuring instrument.



1. Oscilloscope button

Input/output read set-up button

2.

3. Time axis set-up button

Item Name				
Item Name	Seat Switch		Oscilloscope Setting	
Division			Time	
Self-adjustmen	ıt		Time (sec)	1
Division	0.50			р <u>–</u>
Line color				OK Casaal
Line color	Yellow			OK Cancer
		OK Cancel		
		OK Cancel	2	

## **CHAPTER 4 CONTROLLER**

1. Channel setting screen

2. Time axis set-up screen



### Active test

Click the active test button from the menu or toolbox to display the active test screen in the main window. In active test screen, you can check the operating conditions by selecting signals you wish to confirm. The active test screen consists of the output signal names on the left side of screen and the monitored values on the right side of screen.

Input Menitor			Write	Cancel
Output Monitor	Active Text1 Active Test2			
Oustam Monitar	Active est flag			
Fault Status	Un lov/d solenoid		United solenoid	
Fault History		_	Unioad solenoid feedback (mA)	
Troubleshooting m			Littlock solenoid	
Set-up option	Tilt lock valve solenoid	Г	Tiltlock solenoid	
Ossillasson			Tiltlock solenoid feedback [mA]	
Active Test	Power steering correction solenoid		Angle adjust sciencid	
			Angle adjust tilt lock current [mA]	
Firmware Update				
Change model				
Communication Err	nor			

1. Active test button

### **Connection change**

Click the connection change button from the menu or toolbox to display the connection/target change dialog box. The connection/target change dialog box allows you to change the connecting controller and target controller. To change the connection, select the controller being connected to the cable from the selection box on the right. To change the target, select an appropriate controller from the selection box of target on the right. After the selection of the connection and target, click the OK button. Then the change of connection and target controllers will be executed. Click the cancel button if you wish it unchanged.



1. Connection change button

### **Firmware update**

Click the firmware update on the menu or click the firmware update button of toolbox to display the firmware update screen. The displayed contents vary depending on the controller being connected. On firmware update screen, the user can select the software version of controller as well as write software, or can update the software. Firmware can be updated in a setup mode only. Note that updates are available at any time on the controller that does not have a setup mode.

	1	
Input Monitor		Update Cancel
Output Monitor	Firmware Update	
Custom Monitor	Version	
Truck Status		
Truck History	Created date	
Troubleshooting m	Program file	Select
Set-up option	Pr/Jgram created date	
Oscilloscope	Program version	
Active Test	ROM sum value	
Gonnection change		
Firmware Update	Return ROM sum value	
Communication Error		
		505836

1. Firmware update button

#### **Mast Interlock System** 4.

#### Function 4.1

When the operator leaves the operator seat while the engine is running, the built-in seat switch is activated to lock the mast. The mast will not move even if the lift or tilt lever is operated.



1)	STOP
1)	2101

Key switch	F	Operator seat	Meter panel	Contro	ol lever
position	Engine status	Vacant or Occupied	Mast interlock icon	Lift	Tilt
	Stop	Occupied	OFF	Not active	Not active
	Stop	Vacant	OFF	Not active	Not active
	Stop	Occupied	OFF	Lowering only	Not active
	Stop	Vacant	Blinking	Not active	Not active
	Running	Occupied	OFF	Active	Active
	nanning	Vacant	Blinking	Not active	Not active

## **Controller function**

The controller monitors the seat switch and if the operator is not seated, the controller locks the lift and tilt motions.

## VCM-6 controller, mast interlock function

The VCM-6 controller interrupts electric current supply to the unload solenoid and the lift lock solenoid if the operator is not seated.

## 4.2 Checking the Operation of Mast Interlock System of VCM-6 Controller

### Mast interlock system

- Raise the forks high enough to see them from the operator seat.
- Apply the parking brake and place the direction lever in the NEUTRAL position. Then, under the engine idling condition (the accelerator pedal not depressed condition), half rise from the operator seat.
- Make sure that the mast interlock icon blinks a few seconds later. Operate the lift lever to make sure that the forks will not move up and down.
- Operate the tilt lever to ensure the mast does not tilt forward or backward.



## **A** CAUTION

Make sure that sufficient space is available for the forklift truck to move around and that no one or no obstacle is around the forklift truck.

# Checking the operation of mast Interlock System of VCM-6 Controller

(1) Connect the service tool to VCM-6 controller.

(

- (2) Turn the key switch to the ON position and start the engine.
- (3) Display the input monitor screen of the service tool.
- (4) Sit in the operator seat and make sure that the seat switch status and the seat switch timer are ON on the input monitor screen.

(5)	Display the service tool output monitor screen. When
	the status of the seat switch timer is ON, the controller
	unlocks the mast interlock and turns the unload output
	and the lift lock output ON.
	Vou can aparate the mast system under this condition

You can operate the mast system under this condition.

t Monitor		
		1
Seat Switch	* - *	0
Seat Switch timer	<b>x</b> - <b>x</b>	0
DC power supply [V]	7.1 - 20.9	12.1
Accel Switch	* - *	0
Park brake Switch	* - *	0
Direction lever F	* - *	OF
Direction lever N	* - *	01
Direction lever R	* - *	OF
ENB lever	* - *	Neutra

nut Monitor		
	Need Door	
	NUT Mai Ne lige	Valu
Solenoid output (ATTS valve) feedback [mA]	* .\*	
Solenoid output (ATT3 valve 1) output	* - *	Norm
Solenoid output (ATT3 valve 2) output	<b>x</b> - x	Norm
Solenoid output (ATT3 valve) status	* - *	Norm
PWM voltage (RIO1) [V]	* - * \	
PWM voltage (RIO1)	* - *	Norm
Unload solenoid	* - *	0
Unload solenoid feedback [mA]	* - *	9.6
Liftlock solenoid	* - *	0
Liftlock solenoid feedback [mA]	* - *	9.6
I IITIOCK SOIENOID TEEDDACK [m A]	* - *	19.3
Park brake alarm	* - *	OF
Over load alarm 1	* - *	OF
Over speed alarm	* - *	OF
Angle adjust solenoid	* - *	OF
Angle adjust tilt lock current [mA]	* - *	19.3
Auto light OUT	* - *	OF
AUX out 1	* - *	OF
AUX out 2	* - *	OF
AUX out 3	* - *	OF
Limp home	* - *	OF

(6) Leave the operator seat, and make sure that the seat switch turns OFF on the input monitor screen and the seat switch timer turns OFF a few seconds later (function of seat delay counter).

	L	Ň
Seat Switch	* = *	OFF
Seat Switch timer	* - *	ON
DC power supply [V]	7.1 - 20.9	12.16
Accel Switch	* - *	ON
Park brake Switch	* - *	ON
Direction lever F	* - *	OFF
Direction lever N	* - *	ON
Direction lever R	* - *	OFF
FNR lever	* - *	Neutra
Joystick (Lift lever 1) signal [%]	-100 - 100	0
Joystick (Lift lever 1) status	* - *	Norma
Joystick (Lift lever 2) signal [%]	-100 - 100	(
Joystick (Lift lever 2) status	* - *	Norma
Joystick (Tilt lever 1) signal [%]	-100 - 100	(
Joystick (Tilt lever 1) status	* - *	Norma
Joystick (Tilt lever 2) signal [%]	-100 - 100	0
Joystick (Tilt lever 2) status	* - *	Norma
Joystick (ATT1 lever 1) signal [%]	-100 - 100	0
Joystick (ATT1 lever 1) status	* - *	Norma
Joystick (ATT1 lever 2) signal [%]	-100 - 100	0
Joystick (ATT1 lever 2) status	* - *	Norma
Joystick (ATT2 lever 1) signal [%]	-100 - 100	(
Joystick (ATT2 lever 1) status	* - *	Norma
Joystick (ATT2 lever 2) signal [%]	-100 - 100	(

250 m		
Seat Switch	* - *	OF
Seat Switch timer	* - *	OF
0		AF
no bomer anbbia fai	1.1 - 20.9	12.1
Accel Switch	* = *	0
Park brake Switch	* = *	0
Direction lever F	* = *	OF
Direction lever N	* - *	0
Direction lever R	* - *	OF
FNR lever	* - *	Neutra
Joystick (Lift lever 1) signal [%]	-100 - 100	
Joystick (Lift lever 1) status	* - *	Norma
Joystick (Lift lever 2) signal [%]	-100 - 100	
Joystick (Lift lever 2) status	* - *	Norma
Joystick (Tilt lever 1) signal [%]	-100 - 100	
Joystick (Tilt lever 1) status	* - *	Norma
Joystick (Tilt lever 2) signal [%]	-100 - 100	
Joystick (Tilt lever 2) status	* - *	Norma
Joystick (ATT1 lever 1) signal [%]	-100 - 100	
Joystick (ATT1 lever 1) status	* - *	Norma
Joystick (ATT1 lever 2) signal [%]	-100 - 100	
Joystick (ATT1 lever 2) status	* - *	Norma
Joystick (ATT2 lever 1) signal [%]	-100 - 100	
Joystick (ATT2 lever 1) status	* - *	Norma
Joystick (ATT2 lever 2) signal [%]	-100 - 100	

(7) Make sure that the mast interlock icon on the meter panel blinks.



1. Blinking

(8) The unload solenoid output and the lift lock solenoid output will turn OFF when the mast interlock system is activated.

Under this condition, operate the lift lever to make sure that the forks will not move up and down. Also operate the tilt lever to make sure that the mast will not tilt forward and backward.

a	Normal Range	Valu
Solenoid output (ATT3 valve 2) outp	* - *	
Solenoid output (ATT3 valve) feedba	* - *	
Solenoid output (ATT3 valve 1) output	* - *	Norm
Solenoid output (ATT3 valve 2) output	* - *	Norm
Solenoid output (ATT3 valve) status	* - *	Norm
PWM voltage (RIO1) [V]	* - *	
PWM voltage (RIO1)	* - *	No
Unload solenoid	* - *	OF
Unload solenoid feedback [mA]	* - *	9.6
Liftlock solenoid	* - *	OF
Liftlock solenoid feedback [mA]	* - *	9.6
Tiltlock solenoid feedback [mA]	* - *	19.3
Park brake alarm	* - *	OF
Over load alarm 1	* - *	OF
Over speed alarm	* - *	OF
Angle adjust solenoid	* - *	OF
	* = *	19.3
Angle adjust tilt lock current [mA]	* - *	OF
Angle adjust tilt lock current [mA] Auto light OUT	* - *	OF
Angle adjust tilt lock current [mA] Auto light OUT AUX out 1		0.5
Angle adjust tilt lock current [mA] Auto light OUT AUX out 1 AUX out 2	* - *	UF
Angle adjust till lock current [mA] Auto light OUT AUX out 1 AUX out 2 AUX out 3	* - * * - *	OF

### If seat switch is not turned ON

Check the seat switch operation and wiring connections by referring to 4-41 "Harness Codes", 4-41 "VCM-6", and 4-58 "Seat Switch".

### If unload solenoid is not turned ON

Check the solenoid output according to 4-26 "Active Test Inspection Procedure". If the solenoid output will not turn ON even after the active test inspection, see 4-62 "Truck Status Display and Troubleshooting" and check for the possible causes of the diagnostic code F-75 and F-79.

### If lift lock solenoid is not turned ON

Check the solenoid output according to 4-26 "Active Test Inspection Procedure". If the solenoid output will not turn ON even after the active test inspection, see 4-62 "Truck Status Display and Troubleshooting" and check for the possible causes of the diagnostic code F-77 and F-79.

## 4.3 Active Test Inspection Procedure

- (1) Connect the service tool and turn the key switch to the ON position.(Do not turn the engine ON.)
- (2) Display the active test screen by pressing the active test button in the service tool screen.



- 1) Active test screen
- 1. Active test flag

- 2. Active test
- 3. Write button

 (3) Insert a check mark in the box of the active test flag, and press the write button.
 When the write confirmation dialogue box is displayed, press the YES button.



(4) When the write completed dialogue box is displayed, press the OK button.



- (5) Insert a check mark in the box of the unload solenoid/ lift lock valve solenoid, and press the write button.
- (6) When the write confirmation dialogue box is displayed, press the YES button the same as (3) above, and when the write completed dialogue box is displayed, press the OK button to complete the set-up.





2. Write button

(7) Press the output monitor button on the service tool screen, and check the electrical current values of the unload solenoid and the lift lock valve solenoid. If the value is not close to 2500 mA, a defect is suspected.

Item	Normal Range	Value	Min Val	Max 1
Solenoid output (ATT3 valve) feedt/ack [mA]	* - *	0	0	
Solenoid output (ATT3 valve 1) ou put	* - *	Normal	*	
Solenoid output (ATT3 valve 2) ou/put	* - *	Normal	*	
Solenoid output (ATT3 valve) stat/is	* - *	Normal	*	
PWM voltage (RIO1) [V]	* - *	0	0	
PWM voltage (RIO1)	* - *	Normal	*	
			*	
Unload solenoid	* - *	ON		
Unload solenoid feedback [mA]	* - *	2249.09	9.67	236
Liftlock solenoid	* - *	ON	*	
Liftlock solenoid feedback [mA]	* - *	2249.09	9.67	236
Tiltlock solenoid	* - *	OFF	*	
			19.35	1
Park brake alarm	* - *	OFF	*	
Over load alarm 1	* - *	OFF	*	
Over speed alarm	* - *	OFF	*	
Angle adjust solenoid		UFF	*	
Angle adjust tilt lock current [mA]	:-:	19.35	19.35	
AUX and 1		OFF		
AUX out 1		011	:	
AUX out 2		011		
Limp home		OFF		
Limp nome		OFF	-	

1. Check current values

- (8) After confirmation, turn the key switch to the OFF position to terminate the active test. (Be sure to turn OFF the key switch before moving on to the next operation).
- Note: If a defect is found, see 4-62 "Truck Status Display and Troubleshooting" and check for the possible causes of the diagnostic code F-75, F-77, and F-79.

## 5. Driving Interlock System

## 5.1 Controller Function

- The controller monitors the conditions described below. If all the conditions are met, the controller activates the driving interlock system.
  - The operator is not seated. (Seat switch and seat switch timer [OFF])
  - Forklift truck speed is less than 4 km/h (2.5 MPH). (Speed sensor value)
  - The parking brake is released (at pulled position). (Parking brake switch is ON)



1) No Power Travel

- (2) The controlled condition by the driving interlock system will vary depending on forklift truck speed.
  - If the speed is more than 4 km/h (2.5 MPH), the driving interlock control is de-activated.
  - If the speed is less than 4 km/h (2.5 MPH), the transmission solenoid F and R are turned OFF, and the power from the engine is cut off.
  - If the speed is less than 1 km/h (0.62 MPH), the parking brake solenoid is turned OFF, and the parking brake (negative brake) is activated to stop the forklift truck.
- Note: Because the controller electrically controls the system, there is no physical movement of the direction lever and the parking brake lever.

## **A** CAUTION

- (1) Be alert when the forklift truck is on a grade. The forklift truck may move and accelerate, instead of being stopped, depending on a road condition.
- (2) Be sure to check the driving interlock function before operating the forklift truck.
- (3) This interlock system is provided only for risk reduction in case of a contingency. Always drive the forklift truck properly with safety in mind.
- (4) When restoring the forklift truck to its normal driving condition, be sure to follow the instructions below:
  - Sit properly in the operator seat.
  - Depress the brake pedal and stop the truck completely.
  - Place the direction lever in the NEUTRAL position once, and then shift it back to the FORWARD or REVERSE position.
  - Pull the parking brake lever in the lock position, and then push it back to the released position.
- (5) When replacing the operator seat with a new one, be sure to use a genuine Mitsubishi forklift truck seat with the operator presence switch.

## 5.2 Checking the Operation of Driving Interlock Function

### **Driving interlock system**

- (1) Slightly raise the forks from the ground.
- (2) With the engine idling (do not depress the accelerator pedal), place direction selector lever to FORWARD or REVERSE position, and then half rise from the operator seat.
- (3) Make sure the driving interlock indicator icon blinks several seconds later and the forklift truck stops.
- (4) To restore the forklift truck to its normal driving condition, sit properly on the operator seat and depress the brake pedal to stop the forklift truck. Place the direction lever in the NEUTRAL position once, and then shift the direction lever to FORWARD or REVERSE position.



## **A** CAUTION

- Be sure to check the driving interlock system on a hard and level surface. On grade or ramp, the forklift truck moves due to its own weight.
- Make sure that sufficient space is available for the forklift truck to move around and that no one or no obstacle is around the forklift truck.

### **Checking the Operation of driving Interlock Function**

- (1) Connect the service tool to VCM-6 controller.
- (2) Turn the key switch to the ON position and start the engine.
- (3) Display the input monitor screen (VCM-6) of service tool.
- (4) While sitting in the operator seat and monitoring the input monitor screen, make sure the seat switch and seat switch timer is turned ON.

Seat Switch	* - *	0
Seat Switch timer	• - •	
DG power supply [V]	£.1 = 20.9	12.0
Accel Switch	<b>8</b> – <b>8</b>	0
Park brake Switch	8 - 8	0
Direction lever F	* = *	OF
Direction lever N	* - *	0
Direction lever R	* = *	01
FNR lever	* - *	Neutr
Joystick (Lift lever 1) signal [%]	-100 - 100	
Joystick (Lift lever 1) status	* = *	Norm
Joystick (Lift lever 2) signal [%]	-100 - 100	
Joystick (Lift lever 2) status	* = *	Norm
Joystick (Tilt lever 1) signal [%]	-100 - 100	
Joystick (Tilt lever 1) status	* = *	Norm
Joystick (Tilt lever 2) signal [%]	-100 - 100	
Joystick (Tilt lever 2) status	* - *	Norm
Joystick (ATT1 lever 1) signal [%]	-100 - 100	
Joystick (ATT1 lever 1) status	* - *	Norm
Joystick (ATT1 lever 2) signal [%]	-100 - 100	
Joystick (ATT1 lever 2) status	* - *	Norm
Joystick (ATT2 lever 1) signal [%]	-100 - 100	
Joystick (ATT2 lever 1) status	* = *	Norm
Joystick (ATT2 lever 2) signal [%]	-100 - 100	

- (5) Display the output monitor screen (VCM-6) of service tool.
- (6) Place the direction lever in the FORWARD position. Make sure that shift lever (F) Input and T/M control valve (F) output are turned ON and the T/M control valve current is around 1000 mA on the screen.

Provide the second s		
Item	Normal Range	Value
Seat Switch	8 - 8	10/
Seat Switch timer	* - *	10/
Seatbelt Switch	* - *	10/
DC power supply IV1	7.1 - 20.9	11. je
Park brake Switch	* - *	ON
Direction lever F	* - *	ON
Direction lever R	* - *	OFF
FNR lever	* - *	Folward
Joystick (Lift lever 1) signal [%]	-100 - 100	\ (
utput Monitor		
Team	Narmal Danca	V-1.
Iransmission signal N		UFF
Transmission solenoid F	* - *	ON
Transmission solenoid R	* - *	OFF
Transmission solenoid current [mA]	* - *	1702.54
Solenoid output (Lift valve 2) output	<b>*</b> - <b>*</b>	0
Solenoid output (Lift valve) feedbac	* - *	0
Solenoid output (Lift valve 1) output	* - *	Norma
Seleneid euteut (Lift uslue 2) euteut	* - *	Norma
Solenolu output triit valve 27 output		

(7) Leave the operator seat, and make sure that the seat switch turns OFF on the input monitor screen and the seat switch timer turns OFF a few seconds later (function of seat delay counter).

Seat Switch	<b>x</b> - <b>x</b>	OF
Seat Switch timer	* - *	0
DC power supply [V]	1.1 - ZU.9	11.34
Accel Switch	* - *	01
Park brake Switch	8 - 8	01
Direction lever F	* - *	01
Direction lever N	* - *	OFI
Direction lever R	* - *	OFI
FNR lever	* - *	Forward
Joystick (Lift lever 1) signal [%]	-100 - 100	(
Joystick (Lift lever 1) status	* - *	Norma
Joystick (Lift lever 2) signal [%]	-100 - 100	(
Joystick (Lift lever 2) status	* - *	Norma
Joystick (Tilt lever 1) signal [%]	-100 - 100	(
Joystick (Tilt lever 1) status	* - *	Norma
Joystick (Tilt lever 2) signal [%]	-100 - 100	(
Joystick (Tilt lever 2) status	* - *	Norma
Joystick (ATT1 lever 1) signal [%]	-100 - 100	(
Joystick (ATT1 lever 1) status	* - *	Norma
Joystick (ATT1 lever 2) signal [%]	-100 - 100	(
Joystick (ATT1 lever 2) status	* - *	Norma
Joystick (ATT2 lever 1) signal [%]	-100 - 100	(
Joystick (ATT2 lever 1) status	* - *	Norma
Joystick (ATT2 lever 2) signal [%]	-100 - 100	

Seat Switch		UF
Seat Switch timer	1	UF OF
DO HOMEI SUPPLY LVJ	1.1 20.3	11.3
Accel Switch	* - *	0
Park brake Switch	* - *	0
Direction lever F	* - *	0
Direction lever N	* - *	OF
Direction lever R	* - *	OF
FNR lever	* - *	Forwar
Joystick (Lift lever 1) signal [8]	-100 - 100	
Joystick (Lift lever 1) status	* - *	Norm
Joystick (Lift lever 2) signal [8]	-100 - 100	
Joystick (Lift lever 2) status	* - *	Norm
Joystick (Tilt lever 1) signal [%]	-100 - 100	
Joystick (Tilt lever 1) status	* - *	Norm
Joystick (Tilt lever 2) signal [%]	-100 - 100	
Joystick (Tilt lever 2) status	* - *	Norm
Joystick (ATT1 lever 1) signal [%]	-100 - 100	
Joystick (ATT1 lever 1) status	* - *	Norm
Joystick (ATT1 lever 2) signal [%]	-100 - 100	
Joystick (ATT1 lever 2) status	* - *	Norm
Joystick (ATT2 lever 1) signal [%]	-100 - 100	
Joystick (ATT2 lever 1) status	* - *	Norm
Joystick (ATT2 lever 2) signal [%]	-100 - 100	

(8) Make sure that the neutral icon (N) on the meter panel blinks. Blinking of N icon means that the driving interlock is activated.



1. Blinking

(9) When the driving interlock is activated, T/M control valve (F) output is not turned ON even if the status of the direction lever (F) input is ON.

Item	Normal Range	Val
Seat Switch	* - *	1
Seat Switch timer	* - *	
Seatbelt Switch	* - *	12
DC power supply [V]	7.1 - 20.9	11.
Accel Cuitch	• - •	816 Q.
rark brake owitch	• - • ·	
Direction lever F	* - *	
Urgetien lever V		
		Earm
		101#4
put Monitor		
Item	Normal Range	Va
iransmission signal N	• - •	
Transmission solenoid F	8 - 8	0
- · · · · · · · · · · · · · · · · · · ·		
Iransmission solenoid current ImAl	* - *	19

- (10) When the driving interlock is activated, make sure that the parking brake solenoid is OFF even if the parking brake switch is ON.
- Note: Because this forklift truck's parking brake is a negative type parking brake, the parking brake is activated when the solenoid is OFF.

lten	Normal Rance	1 Jun
Parking brake switch	* - *	01
Un pressure Lini Unpoj	u = 21.7	-1.00
AUX AI ÜHEKI	¥ = ¥	(
Parking brake pressure switch	X - 8	01
		0 EI
LPG empty switch	x - s	
LPQ empty ewitch Fuel warning LPQ	* - •	Norma
LPG empty switch Fuelwarning LPG put Manitor	* - •	Norma
LPG empty switch Fuel warning LPG but Monitor	* - • * - •	Norma
LPG empty switch Fuel warning LPG but Monitor	* - *	Norma

(11) To unlock the driving interlock, sit on the operator seat and return the direction lever to the NEUTRAL position. At this time, make sure that the driving interlock indicating N icon changes from blinking to a steady glow.

### If seat switch is not turned ON

Check the seat switch operation and wiring connections by referring to 4-41 "Harness Codes", 4-41 "VCM-6", and 4-58 "Seat Switch".

# When T/M forward/backward solenoid warning occurs

Check the solenoid output by referring to 4-34 "Active Test Inspection Procedure". If the solenoid output will not turn ON even after the active test inspection, see 4-62 "Truck Status Display and Troubleshooting".

Check for the possible causes of the diagnostic code F-85, F-87 and F-89.

## When a speed or speed sensor warning occurs

See 4-62 "Truck Status Display and Troubleshooting" to check for the possible causes of the diagnostic code F-17 and F-34.

## 5.3 Active Test Inspection Procedure

## **A** CAUTION

During the active test inspection, the front wheels will rotate. To prevent the forklift truck from moving, be sure to block or raise the front wheels before conducting active test inspection.

- (1) Connect the service tool and turn the key switch to the ON position.(Do not turn the engine ON.)
- (2) Display the active test screen by pressing the active test button in the service tool screen.



- Active test
   Active test flag
- Write button

(3) Insert a check mark in the box of the active test flag, and press the write button. When the write confirmation dialogue box is displayed, press the YES button.

(4) When the write completed dialogue box is displayed,

press the OK button.





- 2. Write button
- Gancel Write Active Test1 Active Test2 Active test flag M Unload solenoid OFF Unload solenoid 9.67 Lift lock valve solenoid Liftlock solenoid OFF 9.67 Tilt lock valve solenoid OFF -19,35 Power steering correction sol OFF OK 19.35 501356

- (5) Insert a check mark in the box of either T/M solenoid F or T/M solenoid R, and press the write button.
- (6) When the write confirmation dialogue box is displayed, press the YES button the same as (4) above, and when the write completed dialogue box is displayed, press the OK button to complete the set-up.
- Note: Do not check both boxes of T/M solenoid F or T/M solenoid R to avoid the controller damage.



(7) Press the output monitor button in the service tool screen to display the output monitor screen. Make sure that the T/M control valve current is 1000 mA or around.

ut Monitor			
Item	Normal Range	Value	
Transmission signal N	* - *		
Transmission solenoid F	* - *	0	
Transmission solenoid current [mA]	* - *	1862.1	
Solenoid output (Lift valve 2) output	* - *		
Solenoid output (Lift valve) feedbac	* - *	(	
Solenoid output (Lift valve 1) output	* - *	Norma	
Solenoid output (Lift valve 2) output	* - *	Norma	
Solenoid output (Lift valve) status	* - *	Norma	
Solenoid output (Tilt valve 1) output	* - *	(	
Solenoid output (Tilt valve 2) output	* - *	(	
Solenoid output (Tilt valve) feedbac	* - *	(	
Solenoid output (Tilt valve 1) output	* - *	Norma	
Solenoid output (Tilt valve 2) output	* - *	Norma	
Solenoid output (Tilt valve) status	* - *	Norma	
Solenoid output (ATT1 valve 1) outp	* - *	(	
Solenoid output (ATT1 valve 2) outp	* - *	(	
Solenoid output (ATT1 valve) feedba	* - *	(	
Solenoid output (ATT1 valve 1) output	* - *	Norma	
Solenoid output (ATT1 valve 2) output	* = *	Norma	
Solenoid output (ATT1 valve) status	* - *	Norma	

- (8) After confirmation, turn the key switch to the OFF position to terminate the active test. (Be sure to turn OFF the key switch before moving on the next operation).
- Note: If a defect is found, see 4-62 "Truck Status Display and Troubleshooting" and check for the possible causes of the diagnostic code F-85, F-87, and F-89.

## 6. Seat Belt Warning Icon

## 6.1 Function of Seat Belt Warning Icon

### Seat belt warning icon

This icon blinks when the seat belt is not worn or not buckled properly.

### **Controller function**

The controller sends a warning signal to the meter panel if the seat belt is not fastened.



1. Seat belt warning icon

## 6.2 Checking the Operation of Seat Belt Warning Icon

- (1) Connect the service tool to VCM-6 controller.
- (2) Turn the key switch to the ON position and start the engine.
- (3) Display the input monitor screen of the service tool.
- (4) Make sure that the seat switch status is turned OFF when the seat belt is not fastened or not buckled properly.

Also check that the seat belt warning icon in the meter panel glows.

Item	Normal Range	Value
Seat Switch	8 - 8	1 01
Seatbelt Switch	* - *	OFF
Accel Switch	* - *	01
Park brake Switch	* - *	01
Direction lever F	* - *	OFI
Direction lever N	* - *	01
Direction lever R	* - *	OFI
FNR lever	* - *	Neutra
Joystick (Lift lever 1) signal [%]	-100 - 100	(
Joystick (Lift lever 1) status	* - *	Norma
Joystick (Lift lever 2) signal [%]	-100 - 100	(
Joystick (Lift lever 2) status	* - *	Norma
Joystick (Tilt lever 1) signal [%]	-100 - 100	(
Joystick (Tilt lever 1) status	* - *	Norma
Joystick (Tilt lever 2) signal [%]	-100 - 100	(
Joystick (Tilt lever 2) status	* - *	Norma
Joystick (ATT1 lever 1) signal [%]	-100 - 100	(
Joystick (ATT1 lever 1) status	8 - 8	Norma
Joystick (ATT1 lever 2) signal [%]	-100 - 100	
Joystick (ATT1 lever 2) status	* - *	Norma
Joystick (ATT2 lever 1) signal [%]	-100 - 100	(
Joystick (ATT2 lever 1) status	* - *	Norma
Joystick (ATT2 lever 2) signal [%]	-100 - 100	(



1. Illuminates

Item	Normal Dance	Value
Item Sast Switch		Value
aeat awiten timer		
Seatbelt Switch	* - *	ON
Accel Switch	<b>\$ - \$</b>	ON
Park brake Switch	* - *	ON
Direction lever F	* - *	OFF
Direction lever N	* - *	ON
Direction lever R	* - *	OFF
FNR lever	* - *	Neutral
Joystick (Lift lever 1) signal [%]	-100 - 100	0
Joystick (Lift lever 1) status	* - *	Normal
Joystick (Lift lever 2) signal [%]	-100 - 100	0
Joystick (Lift lever 2) status	* - *	Normal
Joystick (Tilt lever 1) signal [%]	-100 - 100	0
Joystick (Tilt lever 1) status	* - *	Normal
Joystick (Tilt lever 2) signal [%]	-100 - 100	0
Joystick (Tilt lever 2) status	* - *	Normal
Joystick (ATT1 lever 1) signal [%]	-100 - 100	0
Joystick (ATT1 lever 1) status	* - *	Normal
Joystick (ATT1 lever 2) signal [%]	-100 - 100	0
Joystick (ATT1 lever 2) status	* - *	Normal
Joystick (ATT2 lever 1) signal [%]	-100 - 100	0
Joystick (ATT2 lever 1) status	* - *	Normal
Joystick (ATT2 lever 2) signal [%]	-100 - 100	0

(5) Make sure that the seat belt switch turns ON and the seat belt warning icon in the meter panel goes out when the seat belt is properly fastened.
## 7. Parking Brake Warning Alarm and Warning Icon

## 7.1 Checking the Operation of Parking Brake Warning Alarm/Warning Icon

Regardless whether the engine is stopped or running, leaving the operator seat with the parking brake released activates the operator presence switch to cause the warning alarm to sound.



1. Parking brake warning icon 2. Parking brake lever

## **A** CAUTION

- (1) Before operating the forklift truck, be sure to check the parking brake warning icon and buzzer work properly.
- (2) The warning alarm and the warning icon alert the operator to set the parking brake lever before leaving the forklift truck. Properly maintain the warning alarm and icon so that they function correctly.
- (3) How to park the forklift truck:
  - Park the forklift truck on a hard and level surface.
  - Place the direction lever in the NEUTRAL position.
  - Lower the forks until the fork tips touch the floor/ground.
  - Apply the parking brake.
  - Turn the engine OFF and remove the key.
- (4) When replacing the operator seat with a new one, be sure to use a genuine Mitsubishi forklift truck seat with the operator presence switch.

#### **Controller function**

With the key switch in the ON position, the controller turns the warning alarm output ON if it detects that the operator seat is vacant and the parking brake is released. (Warning alarm activates).

When the key switch is in the OFF position, the VCM-6 controller does not activate since the power to the controller is OFF. In this case, the relay circuit causes the warning alarm to activate.

## 7.2 Parking Brake Warning Alarm

- (1) Connect the service tool to the VCM-6 controller.
- (2) Turn the key switch to the ON position and start the engine. (Keep the parking brake engaged).
- (3) Display the input monitor screen of the service tool.
- (4) Sit in the operator seat and make sure that the seat switch status and the seat switch timer are ON on the input monitor screen.

(5)	Make sure the parking brake switch turns ON on the	
	input monitor screen.	
	Also make sure the parking brake warning icon glows.	

Input Monitor

 Seat Switch
 \* - \*
 ON

 Seat Switch timer
 \* - \*
 ON

 DC power supply [V]
 7.1 - 20.9
 12.16

 Accel Switch
 \* - \*
 ON

 Dr power supply [V]
 7.1 - 20.9
 12.16

 Drection lever F
 \* - \*
 ON

 Direction lever F
 \* - \*
 OFF

 Direction lever R
 \* - \*
 OFF

 FNR lever
 \* - \*
 Neutral

 501333
 501333
 501333

Item	Normal Range	Value
Seat Switch	* - *	OFF
Seat Switch timer	* - * \	OFF
Seatbelt Switch	* - *	OFF
DC power supply [V]	7.1 - 20.9	12.05
Park brake Switch	*-*	ON
Direction lever N	<b>x</b> - <b>x</b>	UN
Direction lever R	* - *	OFF
FNR lever	* - *	Neutra
Joystick (Lift lever 1) signal [%]	-100 - 100	0
Joystick (Lift lever 1) status	* - *	Norma
Joystick (Lift lever 2) signal [%]	-100 - 100	0
Joystick (Lift lever 2) status	* - *	Norma
Joystick (Tilt lever 1) signal [%]	-100 - 100	0
Joystick (Tilt lever 1) status	* - *	Norma
Joystick (Tilt lever 2) signal [%]	-100 - 100	0
Joystick (Tilt lever 2) status	<b>x</b> = <b>x</b>	Norma
Joystick (ATT1 lever 1) signal [%]	-100 - 100	0
Joystick (ATT1 lever 1) status	* - *	Norma
Joystick (ATT1 lever 2) signal [%]	-100 - 100	
Joystick (ATT1 lever 2) status	* - *	Norma
Joystick (ATT2 lever 1) signal [%]	-100 - 100	0
Joystick (ATT2 lever 1) status	* - *	Norma
Joystick (ATT2 lever 2) signal [%]	-100 - 100	0



1. Illuminates

(6) Release the parking brake and leave the operator seat.

(7) Make sure that seat switch and the parking brake switch turn OFF in the input monitor screen. Also make sure that the parking brake warning icon in the meter panel goes out and the warning alarm activates.

t Monitor		
A G III	inormal number	
Seat Switch	* - *	OF
Seat Switch timer	* - *	OF
ellik ellik		-
DO power supply [v]	1.1 - 20.9	12.1
Accel Switch	* - *	0
Park brake Switch	* - *	0
Direction lever F	<b>x</b> - <b>x</b>	OF
Direction lever N	* - *	0
Direction lever R	* - *	OF
FNR lever	* - *	Neutr
Joystick (Lift lever 1) signal [%]	-100 - 100	
Joystick (Lift lever 1) status	* - *	Norm
Joystick (Lift lever 2) signal [%]	-100 - 100	
Joystick (Lift lever 2) status	* - *	Norm
Joystick (Tilt lever 1) signal [%]	-100 - 100	
Joystick (Tilt lever 1) status	* - *	Norm
Joystick (Tilt lever 2) signal [%]	-100 - 100	
Joystick (Tilt lever 2) status	* - *	Norm
Joystick (ATT1 lever 1) signal [X]	-100 - 100	
Joystick (ATT1 lever 1) status	* - *	Norm
Joystick (ATT1 lever 2) signal [X]	-100 - 100	
Joystick (ATT1 lever 2) status	<b>x</b> = <b>x</b>	Norm
Joystick (ATT2 lever 1) signal [%]	-100 - 100	
Joystick (ATT2 lever 1) status	* - *	Norm
Joystick (ATT2 lever 2) signal [%]	-100 - 100	

Item	Normal Range	Value
Seat Switch	8 - 8	OFF
Seat Switch timer	* - *	<b>C</b> FF
Seatbelt Switch	* - *	ONF
DC nower sunnly IVI	71-209	12 08
Park brake Switch	8 - 8	OFF
Direction lever N	8 - 8	ON
Direction lever R	8 - 8	OFF
FNR lever	* - *	Neutral
Joystick (Lift lever 1) signal [%]	-100 - 100	0
Joystick (Lift lever 1) status	* - *	Norma
Joystick (Lift lever 2) signal [%]	-100 - 100	0
Joystick (Lift lever 2) status	* - *	Normal
Joystick (Tilt lever 1) signal [%]	-100 - 100	0
Joystick (Tilt lever 1) status	* - *	Norma
Joystick (Tilt lever 2) signal [%]	-100 - 100	0
Joystick (Tilt lever 2) status	* - *	Norma
Joystick (ATT1 lever 1) signal [%]	-100 - 100	0
Joystick (ATT1 lever 1) status	* - *	Norma
Joystick (ATT1 lever 2) signal [%]	-100 - 100	0
Joystick (ATT1 lever 2) status	* - *	Norma
Joystick (ATT2 lever 1) signal [%]	-100 - 100	0
Joystick (ATT2 lever 1) status	* - *	Norma
Joystick (ATT2 lever 2) signal [%]	-100 - 100	0



1. OFF

(8) Apply the parking brake. Make sure that the parking brake warning icon in the meter panel illuminates and the buzzer stops sounding.

### 7.3 Checking the Operation of Parking Brake Warning Alarm/Warning Icon With Key in OFF Position

- (1) Lock the parking brake and keep it locked. Place the direction lever in NEUTRAL. Turn the key switch to the OFF position and turn OFF the engine. The power to the VCM-6 controller and meter panel will be turned OFF.
- (2) Make sure that the parking brake warning alarm activates when the parking brake is released. (This function is not affected by the seat switch status).
- (3) Make sure that the parking brake warning alarm stops when the parking brake is shifted to the locked position.

# **A** CAUTION

Be sure to park the forklift truck on a hard and level surface to check this function.

#### If seat switch is not turned ON

Check the seat switch operation and wiring connections by referring to 4-41 "Harness Codes", 4-41 "VCM-6", and "4-58 "Seat Switch".

#### If parking brake switch is not turned ON

Check the parking switch operation and wiring connections by referring to 4-41 "Harness Codes", 4-41 "VCM-6", and "4-58 "Parking Brake Switch".

#### If warning alarm is not turned ON

If the warning alarm is not turned ON, check the warning alarm output by referring to 4-26 "Active Test Inspection Procedure".

If the warning alarm does not activate even after the active test inspection, check the wiring connections by referring to 4-41 "Harness Codes", 4-41 "VCM-6", 4-60 "Warning Alarm", 4-60 "Warning Alarm Relay", and 4-61 "Warning Alarm Circuit".



# 8. Harness Codes

### 8.1 VCM-6

#### VCM-6 pin assignments



4-41

### VCM-6 controller signal assignments (E-01)

Pin No.	Wire No. (Wire Color)	Signal Name
1	520 (G)	Mode select switch
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	522 (W)	Power selector switch
8	-	-
9	525 (Br)	Direction lever switch (F)
10	526 (L/W)	Direction lever switch (R)
11	552 (L)	T/M shift solenoid output
12	529 (Y/R)	Auto light sensor (+)
13	528 (Y/b)	Auto light sensor (-)
14	530 (R/Y)	Oil pressure sensor (+5V)
15	531 (Y/L)	Oil pressure sensor signal
16	-	-
17	532 (L)	Oil pressure sensor GND
18	500 (2R)	Power supply (+12V)
19	-	-
20	-	-
21	-	-
22	-	-
23	-	-
24	-	-
25	980 (2B)	Power supply GND
26	501 (R)	Power supply (+12V)
27	-	-
28	-	-
29	-	-
30	533 (R/W)	Unload solenoid output (+)
31	535 (Y/W)	Lift lock solenoid (+)
32	534 (G/W)	Unload solenoid (-)
33	537 (Y)	Warning alarm output
34	981 (2B)	Power supply GND

### VCM-6 controller signal assignments (E-02)

Pin No.	Wire No. (Wire Color)	Signal Name
1	538 (L/W)	Seat switch
2	539 (G/W)	Seat belt switch
3	540 (G/R)	Direction lever switch (N)
4	-	-
5	541 (Br)	Weight zero set switch
6	542 (Y/L)	Coolant low level switch
7	543 (R/Y)	Air cleaner clog switch
8	544 (Br/W)	Torque converter oil temperature switch
9	-	-
10	546 (G)	Speed sensor signal (+)
11	547 (G/B)	Speed sensor signal (-)
12	-	-
13	-	-
14	-	-
15	548 (W)	Transmission solenoid F (+)
16	549 (Y)	Transmission solenoid R (+)
17	550 (R/B)	Transmission solenoid (-)
18	-	-
19	-	-
20	-	-
21	503 (W/R)	Auto light relay (-)
22	-	-
23	-	-
24	-	-
25	-	-
26	568 (Y/B)	GND
27	569 (Y/R)	FWE
28	559 (W/L)	RX-232C TXD
29	560 (W/G)	RS-232C RXD
30	561 (L/B)	RX-232C GND
31	470 (P)	CAN H
32	471 (P/G)	CAN L
33	-	-
34	-	-

## 8.2 Input Unit and Output Unit (FC model)

Input unit pin assignments



### Input unit signal assignments (E-04)

Pin No.	Wire No. (Wire Color)	Signal Name
1	A078 (1.25 Y/B)	Power supply (+12V)
2	-	-
3	-	-
4	-	-
5	S027 (W/B)	CAN H
6	S028 (L/R)	CAN L
7	-	-
8	-	-
9	G022 (0.85 B)	GND
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	G024 (B/Y)	Switch GND
18	-	-
19	-	-
20	-	-
21	A076 (L/R)	Digital input 3
22	-	-
23	-	-
24	S020 (G/L)	Analog input 7/Attachment 2/3 lever (Option)
25	S019 (G/B)	Analog input 8/Attachment 2/3 lever (Option)
26	-	-
27	A084 (L/R)	Analog 5V (lift)
28	S026 (W/Y)	Analog input 1 (lift)
29	S025 (W/R)	Analog input 2 (lift)
30	S024 (Y/B)	Analog input 3 (tilt)
31	S023 (Y/L)	Analog input 4 (tilt)
32	S022 (L/Y)	Analog input 5/Attachment 1 lever (Option)
33	S021 (L/B)	Analog input 6/Attachment 1 lever (Option)
34	G021 (B/L)	Analog GND

#### Output pin assignments (E-03)



### Output signal assignments

Pin No.	Wire No. (Wire Color)	Signal Name
1	504A (R/L)	Power supply (+12V)
2	-	-
3	-	-
4	-	-
5	474A (P)	CAN H
6	475A (P/G)	CAN L
7	-	-
8	-	-
9	984A (0.85B)	GND
10	-	-
11		-
12	574 (W/L)	Solenoid PMW 9 (+)
13	575 (W/R)	Solenoid PMW 10 (+)
14	576 (W/G)	Solenoid PMW 9 (-)/10 (-)
15	-	-
16	-	-
17	-	-
18	507A (R/B)	Emergency stop button
19	582 (G)	Solenoid PMW 5 (+) /Attachment 1 lever (Option)
20	583 (G/W)	Solenoid PMW 6 (+) /Attachment 1 lever (Option)
21	584 (G/B)	Solenoid PMW 5 (-), 6 (-) /Attachment 1 lever (Option)
22	578 (Y)	Solenoid PMW 7 (+) /Attachment 2 lever (Option)
23	579 (Y/L)	Solenoid PMW 8 (+) /Attachment 2 lever (Option)
24	580 (Y/B)	Solenoid PMW 7 (-), 8 (-) /Attachment 2 lever (Option)
25	985 (0.85 B/W)	GND (solenoid)
26	508 (R/B)	Emergency stop button
27	590 (Br)	Solenoid PMW 1 (+) /Lift up
28	591 (L)	Solenoid PMW 2 (+) /Lift down
29	592 (L/B)	Solenoid PMW 1 (-), 2 (-) /Lift up
30	586 (R/W)	Solenoid PMW 3 (+) /Tilt forward
31	587 (L/W)	Solenoid PMW 4 (+) /Tilt backward
32	588 (W/B)	Solenoid PMW 3 (-), 4 (-) /Tilt backward
33	-	-
34	986 (0.85B/W)	GND (solenoid)

## 8.3 Input Unit and Output Unit

Input unit pin assignments



### Input unit signal assignments (E-04)

Pin No.	Wire No. (Wire Color)	Signal Name
1	A078 (1.25 Y/B)	Power (+12V)
2	-	-
3	-	-
4	-	-
5	S027 (W/B)	CAN H
6	S028 (L/R)	CAN L
7	-	-
8	-	-
9	G022 (0.85 B)	GND
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	G024 (B/Y)	Switch GND
18	-	-
19	-	-
20	-	-
21	A076 (L/R)	Digital input 3
22	-	-
23	-	-
24	S020 (G/L)	Analog input 7 /Attachment 2/3 lever (option)
25	S019 (G/B)	Analog input 8 /Attachment 2/3 lever (option)
26	-	-
27	A084 (L/R)	Analog 5V (Lift)
28	S026 (W/Y)	Analog input 1 (Lift)
29	S025 (W/R)	Analog input 2 (Lift)
30	S024 (Y/B)	Analog input 3 (Tilt)
31	S023 (Y/L)	Analog input 4 (Tilt)
32	S022 (L/Y)	Analog input 5 /Attachment 1 lever (option)
33	S021 (L/B)	Analog input 6 /Attachment 1 lever (option)
34	G021 (B/L)	Analog GND

#### Output unit pin assignments (E-03)



### Output unit signal assignments

Pin No.	Wire No. (Wire Color)	Signal Name
1	504A (R/L)	Power (+12V)
2	-	-
3	-	-
4	-	-
5	474A (P)	CAN H
6	475A (P/G)	CAN L
7	-	-
8	-	-
9	984A (0.85B)	GND
10	-	-
11		-
12	574 (W/L)	Solenoid PMW 9 (+)
13	575 (W/R)	Solenoid PMW 10 (+)
14	576 (W/G)	Solenoid PMW 9 (-)/10 (-)
15	-	-
16	-	-
17	-	-
18	507A (R/B)	Emergency stop button
19	582 (G)	Solenoid PMW 5 (+) /Attachment 1 lever (option)
20	583 (G/W)	Solenoid PMW 6 (+) /Attachment 1 lever (option)
21	584 (G/B)	Solenoid PMW 5 (-), 6 (-) /Attachment 1 lever (option)
22	578 (Y)	Solenoid PMW 7 (+) /Attachment 2 lever (option)
23	579 (Y/L)	Solenoid PMW 8 (+) /Attachment 2 lever (option)
24	580 (Y/B)	Solenoid PMW 7 (-), 8 (-) / Attachment 2 lever (option)
25	985 (0.85 B/W)	GND (Solenoid)
26	508 (R/B)	Emergency stop button
27	590 (Br)	Solenoid PMW 1 (+) /Lift up
28	591 (L)	Solenoid PMW 2 (+) /Lift down
29	592 (L/B)	Solenoid PMW 1 (-), 2 (-) /Lift up
30	586 (R/W)	Solenoid PMW 3 (+) /Tilt forward
31	587 (L/W)	Solenoid PMW 4 (+) /Tilt backward
32	588 (W/B)	Solenoid PMW 3 (-), 4 (-) /Tilt backward
33	-	-
34	986 (0.85B/W)	GND (Solenoid)

### 8.4 ECM

ECM controller pin assignments



1. ECM (H-01)

2. ECM (H-02)

#### ECM controller signal assignments (H-01)

Pin No.	Wire No. (Wire Color)	Signal Name
1	701 (1.25 R/B)	Battery + (A)
2	991 (3B)	Battery - (1)
3	703 (3R)	Battery + (B)
4	992 (2B)	Battery - (2)
5	705 (2R)	Battery + (C)
6	993 (2B)	Battery - (3)
7	707 (Lg/Y)	Lambda sensor heating
8	708 (Y)	Start request input
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	714 (Br/B)	DPF pressure sensor supply
15	-	-
16	716 (R)	Throttle 1 5V supply
17	-	-
18	-	-
19	719 (G/R)	Air temperature signal

Pin No.	Wire No. (Wire Color)	Signal Name
20	720 (G/Y)	Air temperature GND
21	-	-
22	722 (L/W)	Glow plug control feedback
23	-	-
24	-	-
25	-	-
26	-	-
27	727 (Y/B)	Start control output battery (-)
28	728 (L)	Main relay
29		
30	730 (Y/W)	Water IN fuel switch
31		
32		
33		
34		
35		
36	736 (Br/Y)	DPF pressure sensor GND
37		
38	738 (B/W)	Throttle 1 GND
39		
40		
41	741 (L/B)	Glow plug control GND
42		
43	743 (L)	DPF force regeneration switch
44		
45		
46	488 (G)	CAN H
47	489 (G/W)	CAN L
48	748 (Y/G)	DPF disabled lamp
49		
50		
51		
52	752 (L/R)	Glow plug control command
53	753 (Y/R)	Start control output battery (+)
54	754 (Y/B)	IGN switch
55		
56		
57		

Pin No.	Wire No. (Wire Color)	Signal Name
58	758 (Br/R)	DPF pressure sensor signal
59	759 (R/B)	Manual regeneration interlock
60	760 (G)	Throttle 1 signal
61		
62		
63	763 (Lg/W)	Lambda voltage
64	764 (Lg)	Lambda sensor current pump
65		
66	766 (L/W)	Regeneration disable switch
67		
68		
69	769 (Y/R)	Oil pressure lamp
70		
71		
72		
73		
74	774 (Y/L)	HEST lamp
75		
76	776 (G/W)	Throttle 1 IVS signal
77		
78		
79	779 (Y/R)	DOC inlet temperature sensor GND
80	780 (Y)	DOC inlet temperature sensor signal
81	781 (L/B)	Exhaust gas temperature GND
82	782 (L/O)	Exhaust gas temperature signature
83	783 (Br/W)	DPF inlet temperature sensor GND
84	784 (Br)	DPF inlet temperature sensor signal
85	785 (Lg/R)	Lambda virtual GND
86	786 (Lg/B)	Lambda current adjust
87		
88		
89		
90		
91		
92		
93		
94	794 (Y/B)	DPF lamp

### ECM controller signal assignments (H-02)

Pin No.	Wire No. (Wire Color)	Signal Name	
1	801 (2 G/B)	Injector 1 HIGH bank 2	
2	802 (2 Lg/R)	Injector 2 HIGH bank 2	
3			
4	804 (Y)	Electric waste gate value actuator	
5			
6	806 (L/R)	Oil pressure switch	
7			
8	808 (Br)	TVA position sensor supply	
9	809 (Y/G)	EGR position sensor supply	
10	810 (G/R)	Boost pressure sensor supply	
11	811 (L/O)	Fuel rail pressure sensor supply	
12	812 (Lg/Y)	Exhaust gas absolute pressure sensor supply	
13	813 (Br/R)	Camshaft speed sensor supply	
14	814 (Br/B)	Camshaft speed sensor signal	
15	815 (1.25 L)	Fuel metering unit supply	
16	816 (2 G/Y)	Injector 1 HIGH bank 1	
17	817 (2 Lg)	Injector 2 HIGH bank 1	
18			
19			
20			
21			
22			
23	823 (G)	Fuel temperature sensor GND	
24	824 (Y/W)	EGR position sensor GND	
25	825 (G/B)	Boost pressure sensor GND	
26	826 (L/Y)	Fuel rail pressure sensor GND	
27	827 (Lg/B)	Exhaust gas absolute pressure sensor GND	
28	828 (Br/Y)	Camshaft speed sensor GND	
29			
30			
31	831 (2 G/L)	Injector 1 LOW bank 1	
32	832 (2 G/R)	Injector 1 LOW bank 2	
33			
34	834 (L/R)	TVA motor (-)	
35	835 (Y/B)	EGR motor (-)	
36			
37	837 (Br/B)	TVA position sensor GND	
38	838 (G/W)	Fuel temperature sensor signal	

Pin No.	Wire No. (Wire Color)	Signal Name
39	839 (Y/L)	EGR position sensor signal
40	840 (G/Y)	Boost pressure sensor signal
41	841 (L/B)	Fuel rail pressure sensor signal
42		
43	843 (Lg/W)	Exhaust gas absolute pressure sensor signal
44	844 (Br/W)	Crankshaft speed sensor (-)
45		
46	846 (2 Lg/B)	Injector 2 HIGH bank 2
47		
48	848 (2 Lg/Y)	Injector 2 LOW bank 2
49	849 (L)	TVA motor (+)
50	850 (Y/R)	EGR motor (+)
51		
52		
53	853 (Br/R)	TVA position sensor signal
54		
55	855 (G/L)	Turbo inlet temperature
56		
57	857 (Lg/R)	Coolant sensor signal
58	858 (Lg)	Coolant sensor GND
59	859 (Br)	Crankshaft speed sensor (+)
60	860 (1.25 L/W)	Fuel metering unit

### 8.5 Meter Panel

Meter panel pin assignments



### Meter panel signal assignments (H-12)

Pin No.	Wire No. (Wire Color)	Signal Name
1	300 (R/G)	Battery (+)
2	982 (B)	Truck body GND
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	983 (B)	Truck body GND
9	-	-
10	312 (G)	ALT L
11	-	-
12	-	-
13	301 (R/W)	IGN
14	-	-
15	314 (Y/B)	Fuel sensor
16	-	-
17	316 (W/R)	Brake fluid sensor
18	317 (L)	Parking brake
19	-	-
20	-	-
21	-	-
22	-	-
23	486 (P)	CAN terminal
24	471 (P/G)	CAN LOW
25	470 (P)	CAN HIGH
26	486 (P)	CAN terminal

## 8.6 Seat Switch





### 8.7 Parking Brake Switch



## 8.8 Direction Lever Switch



## 8.9 Travel Speed Sensor



### 8.10 T/M Solenoid



1. T/M forward/backward solenoid

### 8.11 Unload Solenoid



1. Unload solenoid

## 8.12 Warning Alarm



Note: Wire number 271 becomes 537 in the VCM-6 controller connector. (Wire harness branching)

### 8.13 Warning Alarm Relay



1. Relay box

## 8.14 Warning Alarm Circuit



- 2. Warning alarm
- 3. Warning alarm relay
- 4. Park brake switch

- 2) Relay ON when key switch is ON
- 3) Warning alarm relay
- 4) Warning alarm
- 5) VCM-6 controller
- 6) To ECM
- 7) Parking brake buzzer activates if the key switch is turned OFF without applying the parking brake.
- 8) To meter panel and VCM-6

# 9. Truck Status Display and Troubleshooting

## 9.1 Truck Status Display

#### **Truck status display**

Warnings that have been present are displayed.

#### Troubleshooting

Display the truck status screen by clicking the truck status button either from the monitor menu or toolbox. When the screen is displayed, press the troubleshooting button on the bottom right of the screen to display a list of diagnostic codes and their descriptions.

#### Example: Diagnostic code 34 (Speed sensor warning)

- (1) Connector contact bad
- (2) Harness bad
- (3) Speed sensor bad
- (4) Controller bad

🖉 FD/FG3	35N-55N, DP/GP40N-55N, P8000-12000 - M	
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<u>F-20</u>	Lift lever warning	
<u>F-22</u>	Tilt lever warning	
<u>F-24</u>	Att1 lever warning	
<u>F-26</u>	Att2 lever warning	
<u>F-28</u>	Att3 lever warning	
<u>F-29</u>	Joystick Lever Warning	
<u>F-30</u>	Main oil pressure sensor warning	
15 00V	h <u>a</u>	
<u>F-34</u>	Vehicle Speed Sensor Abnormal Signal	
1 00		
<u>F-38</u>	Tilt sensor warning	
<u>F-40</u>	Steering Abnormal Signal	
	501538	

#### **Check items**

- (1) Connector connection check
- (2) Harness connection check
- (3) Sensor connection check

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	1.Connector contact bad	1.Connector connection check		
	2.Hamess bad	2.Harness connection check		
ed sensor warning	3.Speed sensor bad	3.Sensor connection check		
	4.Controller bad			
F-34				
	The vehicle speed sense Threshold Check: 13 Vo Duration: 40 which speed 2. Ahormal installation 2. Ahormal installation 3. Abriormal harness w F=34	Anormal metallation of vehicle speed sensor     Anormal metallation	Acceleration     A	

# 9.2 Diagnosis Table (F Code)

### Diagnostic code table

Diagnostic code descriptions

Diagnosis	Lift Lever Neutral Warning (F10) Diagnostic name and diagnostic code
	• Input signal<2.3 V
Logic conditions	A FOO A FOO B FOO
	Warning occurs under Warning occurs under condition A or B condition A
Recovery	Recovers automatically when the lever is placed in NEUTRAL.
Action	• Turn OFF all solenoid outputs of operating Control action when warning occurs functions.
LED blink pattern	C See "LED blink pattern" on 4-75 "LED Blink Pattern"

Diagnosis	VCM Memory warning (E01)
Logic conditions	· EEPROM Sum check value (when key switch is ON)
Recovery	Turn ON power again.
Action	$\cdot$ Stop the operation of controller (UP-TIME and CAN communication will not stop)
LED blink pattern	В
Diagnosis	VCM Battery voltage warning (F02)
Logic conditions	• Power supply voltage is 7 V or less (1-second continuity) • Power supply voltage is 21 V or more (1- second continuity)
Recovery	Auto recovery
Action	· Turn OFF all solenoid outputs.
LED blink pattern	В
Diagnosis	VCM communication warning (F03)
Logic conditions	• CAN transmission from VCM-6 is not available F03 (2-second continuity)
Recovery	Auto recovery
Action	· Warning indication only, the operation continues.
LED blink pattern	В
Diagnosis	ECM Communication warning (F04)
Logic conditions	No CAN sent from ECM. (2-second continuity) F04
Recovery	Auto recovery
Action	· Activates with default values of ECM incoming data.
LED blink pattern	В
Diagnosis	OCM communication warning (F06)
Logic conditions	No CAN received from OCM. (2-second F06
Recovery	Auto recovery
Action	· Activates with default values of OCM incoming data.
LED blink pattern	В
Diagnosis	MP Communication warning (F07)
Logic conditions	No CAN received from meter panel.     F07     F07
Recovery	Auto recovery
Action	· Activates with default values of metal panel incoming data.
LED blink pattern	В

Diagnosis	TMS communication warning (F08)
Logic conditions	No CAN received from TMS. (2-second F08
Recovery	Auto recovery
Action	· Activates with default values of TMS incoming data.
LED blink pattern	В
Diagnosis	Lift Lever Neutral Warning (F10)
Logic conditions	· Lift lever open angle is 20% or more. F10
Recovery	Auto recovery when the lever is placed in NEUTRAL.
Action	• Turn OFF all solenoid outputs of operating functions. • Turn OFF the unload solenoid.
LED blink pattern	C
Diagnosis	Tilt Lever Neutral Warning (F11)
Logic conditions	• Tilt lever open angle is 20% or more. F11 (when key switch is ON)
Recovery	Auto recovery when the lever is placed in NEUTRAL.
Action	• Turn OFF all solenoid outputs of operating functions. • Turn OFF the unload solenoid.
LED blink pattern	C
Diagnosis	Attachment 1 Lever Neutral Warning (F12)
Logic conditions	Attachment 1 lever open angle is 20% or more. F12 (when key switch is ON)
Recovery	Auto recovery when the lever is placed in NEUTRAL.
Action	<ul> <li>Turn OFF all solenoid outputs of operating functions.</li> <li>Turn OFF the unload solenoid.</li> </ul>
LED blink pattern	C
Diagnosis	Attachment 2 Lever Neutral Warning (F13)
Logic conditions	Attachment 2 lever open angle is 20% or more. (when key switch is ON)     F13
Recovery	Auto recovery when the lever is placed in NEUTRAL.
Action	• Turn OFF all solenoid outputs of operating functions. • Turn OFF the unload solenoid.
LED blink pattern	C

Diagnosis	Attachment 3 Lever Neutral Warning (F14)
Logic conditions	• Attachment 3 lever open angle is 20% or more. F14 (when key switch is ON)
Recovery	Auto recovery when the lever is placed in NEUTRAL.
Action	• Turn OFF all solenoid outputs of operating functions. • Turn OFF the unload solenoid.
LED blink pattern	C

Diagnosis	Shift Lever Warning (F16)
Logic conditions	Shift lever overlap input     No shift lever signal (1800 ms continuity)
Recovery	Auto recovery with shift lever in N position
Action	· Turn OFF the T/M forward/backward solenoids outputs.
LED blink pattern	C

Diagnosis	Vehicle Speed Warning (F17)
Logic conditions	· Speed>30 km/h (18.6 MPH) (400 ms continuity) F17
Recovery	Auto recovery
Action	<ul> <li>With T/M shift lock control, neglects the speed.</li> <li>Speed of 0 km/h (0 MPH) is sent to other controllers.</li> </ul>
LED blink pattern	C

Diagnosis	Shift Lever Warning (F20)
Logic conditions	• CAN receiving of abnormal flag from input unit. F20
Recovery	Turn ON power again.
Action	• Turn OFF the lift solenoid output. (Before 400-millisecond continuity, set the current command value to 0mA.)
LED blink pattern	D

Diagnosis	Tilt Lever Warning (F22)
Logic conditions	· CAN receiving of abnormal flag from input F22 unit.
Recovery	Turn ON power again.
Action	· Turn OFF the lift solenoid output. (Before 400-millisecond continuity, set the current command value to 0mA.)
LED blink pattern	D

Diagnosis	Attachment 1 Lever Warning (F24)
Logic conditions	• CAN receiving of abnormal flag from input F24
Recovery	Turn ON power again.
Action	· Turn OFF the lift solenoid output. (Before 400-millisecond continuity, set the current command value to 0mA.)
LED blink pattern	D

Diagnosis	Attachment 2 Lever Warning (F26)
Logic conditions	• CAN receiving of abnormal flag from input F26
Recovery	Turn ON power again.
Action	· Turn OFF the lift solenoid output. (Before 400-millisecond continuity, set the current command value to 0mA.)
LED blink pattern	D

Diagnosis	Attachment 3 Lever Warning (F28)
Logic conditions	• CAN receiving of abnormal flag from input F28
Recovery	Turn ON power again.
Action	· Turn OFF the lift solenoid output. (Before 400-millisecond continuity, set the current command value to 0mA.)
LED blink pattern	D

Diagnosis	Joystick Lever redundant warning (F29)
Logic conditions	Abnormal lever signals of both primary and secondary
Recovery	Turn ON power again.
Action	· Indication only
LED blink pattern	D

Diagnosis	Sensor battery warning (F31)
Logic conditions	Sensor battery is 2.5 V or less (20-millisecond F31 continuity)
Recovery	Turn ON power again.
Action	<ul> <li>Sensor battery is 2.5 V or less. Photoelectronic sensor: Keep the status before warning occurs.</li> <li>12V DC power: Not considered as a fault.</li> <li>Tilt angle sensor, Oil pressure sensor [lift]: No tilt auto-stop control, as it is not considered as a fault.</li> <li>Speed sensor: not considered as a fault. Speed value is valid.</li> <li>No warning detection is performed for current break, short, or leaks of solenoid [unload/lift lock], T/M control valve [F/R], power steering control valve/tilt lock solenoids (solenoid output status before warning is maintained). (20 ms continuity)</li> </ul>
LED blink pattern	В

Diagnosis	Oil pressure sensor (lift) warning (F32)
Logic conditions	Input signal is 0.1 V or less (400-millisecond continuity)     Input signal is 4.9 V or more (400-millisecond continuity)     F32
Recovery	Turn ON power again.
Action	· No tilt action with the load indication OFF and the tilt auto-stop SW ON.
LED blink pattern	D

Diagnosis	Vehicle Speed Sensor Warning (F34)
Logic conditions	Input signal is 1.3V or less (400-millisecond continuity)     Input signal is 4.9 V or more (400-millisecond continuity)     F34
Recovery	Turn ON power again.
Action	<ul> <li>With T/M shift lock control, neglects the speed.</li> <li>On the forklift trucks with ECM, maximum speed limit value plus 1 km/h (0.6 MPH) is transmitted.</li> <li>On non-electric control engine, 0km/h is transmitted.</li> </ul>
LED blink pattern	D

Diagnosis	Tilt angle warning (F38)
Logic conditions	<ul> <li>Input signal is 0.1 V or less (400-millisecond continuity)</li> <li>Input signal is 4.9 V or more (400-millisecond continuity)</li> </ul>
Recovery	Turn ON power again.
Action	· No tilt action with the tilt auto-stop ON.
LED blink pattern	D

Diagnosis	RI01 warning (F41)
Logic conditions	• CAN receiving of abnormal flag from output unit. F41
Recovery	Auto recovery
Action	· Indication only

Diagnosis	RI01 PWM power warning (F44)
Logic conditions	• CAN receiving of abnormal flag from output unit. F44
Recovery	Auto recovery
Action	· Indication only
LED blink pattern	В

Diagnosis	RI01 communication warning (F45)
Logic conditions	• Power supply voltage is 10V or more and No CAN received from output unit. (500ms F45 continuity)
Recovery	Auto recovery
Action	· Activates with default values of output unit incoming data.
LED blink pattern	В
Diagnosis	RI02 warning (F46)
Logic conditions	• CAN receiving of abnormal flag from input unit. F46
Recovery	Auto recovery
Action	· Indication only
LED blink pattern	В
Diagnosis	RI02 communication warning (F49)
Logic conditions	• Power supply voltage is 10V or more and No CAN received from input unit. (100ms continuity)     •••••••••••••••••••••••••••••••••
Recovery	Auto recovery
Action	· Activates with default values of output unit incoming data.
LED blink pattern	В
Diagnosis	Lift Up Solenoid Warning (F50)
Logic conditions	• CAN receiving of abnormal flag from output F50
Recovery	Turn ON power again.
Action	· Set the lift current command value to 0 mA.
LED blink pattern	E
Diagnosis	Lift Down Solenoid Warning (F52)
Logic conditions	• CAN receiving of abnormal flag from output unit. F52
Recovery	Turn ON power again.
Action	· Set the lift current command value to 0 mA.
LED blink pattern	E
Diagnosis	Lift Solenoid Leak (F54)
Logic conditions	• CAN receiving of abnormal flag from output     unit.     F54
Recovery	Turn ON power again.
Action	$\cdot$ Set the current command value of all operating functions to 0 mA and turn OFF unload solenoid.
LED blink pattern	E

Diagnosis	Tilt Forward Solenoid Warning (F55)
Logic conditions	CAN receiving of abnormal flag from output     mit.     F55
Recovery	Turn ON power again.
Action	· Set the lift current command value to 0 mA.
LED blink pattern	E
Diagnosis	Tilt Backward Solenoid Warning (F57)
Logic conditions	• CAN receiving of abnormal flag from output F57 unit.
Recovery	Turn ON power again.
Action	· Set the lift current command value to 0 mA.
LED blink pattern	E
Diagnosis	Tilt Solenoid Leak (F59)
Logic conditions	• CAN receiving of abnormal flag from output F59
Recovery	Turn ON power again.
Action	$\cdot$ Set the current command value of all operating functions to 0 mA and turn OFF unload solenoid.
LED blink pattern	E
Diagnosis	Attachment 1A Solenoid Warning (F60)
Logic conditions	• CAN receiving of abnormal flag from output unit. F60
Recovery	Turn ON power again.
Action	· Set Attachment 1 current command value to 0 mA.
LED blink pattern	E
Diagnosis	Attachment 1B Solenoid Warning (F62)
Logic conditions	• CAN receiving of abnormal flag from output F62
Recovery	Turn ON power again.
Action	· Set Attachment 1 current command value to 0 mA.
LED blink pattern	E
Diagnosis	Attachment 1 Solenoid Leak (F64)
Logic conditions	CAN receiving of abnormal flag from output     F64
Recovery	Turn ON power again.
Action	· Set the current command value of all operating functions to 0 mA and turn OFF unload solenoid.
LED blink pattern	E

Diagnosis	Attachment 2A Solenoid Warning (F65)
Logic conditions	· CAN receiving of abnormal flag from output unit. F65
Recovery	Turn ON power again.
Action	· Set Attachment 2 current command value to 0 mA.
LED blink pattern	E
Diagnosis	Attachment 2B Solenoid Warning (F67)
Logic conditions	· CAN receiving of abnormal flag from output F67
Recovery	Turn ON power again.
Action	· Set Attachment 2 current command value to 0 mA.
LED blink pattern	E
Diagnosis	Attachment 2 Solenoid Leak (F69)
Logic conditions	• CAN receiving of abnormal flag from output unit. F69
Recovery	Turn ON power again.
Action	$\cdot$ Set the current command value of all operating functions to 0 mA and turn OFF unload solenoid.
LED blink pattern	E
Diagnosis	Attachment 3A Solenoid Warning (F70)
Logic conditions	· CAN receiving of abnormal flag from output F70
Recovery	Turn ON power again.
Action	· Set Attachment 3 current command value to 0 mA.
LED blink pattern	E
Diagnosis	Attachment 3B Solenoid Warning (F72)
Logic conditions	• CAN receiving of abnormal flag from output F72
Recovery	Turn ON power again.
Action	· Set Attachment 3 current command value to 0 mA.
LED blink pattern	E
Diagnosis	Hour meter GAP warning (F73)
Logic conditions	Hour meter difference between meter panel and VCM-6 is ± 24 hours or more.
Recovery	Update #252 M/P hour meter with service tool.
Action	<ul> <li>VCM-6 sends zero to hour meter.</li> <li>VCM-6 hour meter is not overwritten.</li> </ul>
LED blink pattern	E

Diagnosis	Attachment 3 Solenoid Leak (F74)
Logic conditions	• CAN receiving of abnormal flag from output F74
Recovery	Turn ON power again.
Action	$\cdot$ Set the current command value of all operating functions to 0 mA and turn OFF unload solenoid.
LED blink pattern	E

Diagnosis	Unload Solenoid Warning (F75)
Logic conditions	Current value is 160 mA or less (1800- millisecond continuity)     Input signal is 2.4 A or more (200-millisecond continuity)     F75
Recovery	Turn ON power again.
Action	· Turn OFF the unload solenoid output.
LED blink pattern	E

Diagnosis	Lift lock valve warning (F77)
Logic conditions	Current value is 160 mA or less (1800- millisecond continuity)     Current value is 3.4A or more (200-millisecond continuity)
Recovery	Turn ON power again.
Action	· Turn OFF the Lift lock valve output.
LED blink pattern	E

Diagnosis	Unload lift lock solenoid leak (F79)
Logic conditions	· Current value is 500 mA or more when output F79 is OFF. (600-millisecond continuity)
Recovery	Turn ON power again.
Action	· Turn OFF all solenoid outputs of operating functions.
LED blink pattern	E
Diagnosis	Power steering control (correction) valve solenoid warning (F80)
Logic conditions	Current value is 160 mA or less (400- millisecond continuity)     Current value is 3.54A or more (200- millisecond continuity)     F80
Recovery	Turn ON power again.
Action	· Turn OFF the power steering correction solenoid output.
LED blink pattern	E
Diagnosis	VCM tilt lock valve warning (F82)
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Logic conditions	<ul> <li>Current value is 160 mA or less (1800- millisecond continuity)</li> <li>Current value is 2.88A or more (200- millisecond continuity)</li> </ul>
Recovery	Auto recovery
Action	· Turn OFF the tilt lock valve output.
LED blink pattern	E
Diagnosis	Power steering correction solenoid leak (F84)
Logic conditions	Current value is 180mA or more when output is OFF.     F84 (600-millisecond continuity)
Recovery	Turn ON power again.
Action	· Turn OFF the power steering correction solenoid output.
LED blink pattern	E
Diagnosis	T/M Forward Solenoid Warning (F85)
Logic conditions	Current value is 250mA or less (1800- millisecond continuity)     Current value is 3.8 A or more (200-millisecond continuity)
Recovery	Turn ON power again.
Action	· Turn OFF the T/M forward solenoid output.
LED blink pattern	E
Diagnosis	T/M Backward Solenoid Warning (F87)
Logic conditions	Current value is 250mA or less (1800- millisecond continuity)     Current value is 3.8 A or more (200-millisecond continuity)
Recovery	Turn ON power again.
Action	· Turn OFF the T/M backward solenoid output.
LED blink pattern	E
Diagnosis	Transmission Solenoid Leak (F89)
Logic conditions	• Current value is 280mA or more when output is OFF. F89 (600-millisecond continuity)
Recovery	Auto recovery
Action	· Turn OFF the T/M forward and backward solenoids outputs.
LED blink pattern	E

Diagnosis	Parking seizure warning (F92) *Serious warning
Logic conditions	• Parking brake SW is ON when traveling at speed of 5 km/h (3.107 miles/h) or more.
Recovery	Turn ON power again.
Action	· Serious warning mode of meter panel.
LED blink pattern	E

Diagnosis	Shift solenoid 1 warning (F93)		
Logic conditions	Current value is 600 mA or less when output is ON. (1800-millisecond continuity) F93		
Recovery	Turn ON power again.		
Action	· Turn OFF the shift solenoid 1 output.		
LED blink pattern	E		

Diagnosis	M/P memory check warning (P01)		
Logic conditions	• EEPROM Warning P01		
Recovery	Turn ON power again.		
Action	· EEPROM initialization		
LED blink pattern			

Diagnosis	VCM communication warning signal (P03)			
Logic conditions	• No CAN received from VCM-6 P03			
Recovery	Auto recovery			
Action	· Warning indication only, the operation continues.			
LED blink pattern				

Diagnosis	ECM communication warning signal (P04)		
Logic conditions	• No CAN received from ECM P04		
Recovery	Auto recovery		
Action	· Warning indication only, the operation continues.		
LED blink pattern			

Diagnosis	M/P memory check warning signal (P07)		
Logic conditions	• No CAN sending from M/P P07		
Recovery	Auto recovery		
Action	· Warning indication only, the operation continues.		
LED blink pattern	-		

# 9.3 LED Blink Pattern

When diagnostic codes cannot be identified due to the following reasons; meter panel failure, VCM-6 communication circuit problem, GSE cable damage, or no presence of UP-TIME service tool, you can identify diagnostic codes to some extent by reading the LED blink patterns of the VCM-6 controller.

Note: Place the key switch in the ON position for checking.

LED blink pattern	LED blinking status		
A	Lighting 1.2 1.2 (sec.) OFF 1.2 1.2		
В	Lighting 1.2 0.3 (sec.) OFF0.6 2.7		
C	Lighting 1.2 0.3 0.3 (sec.) OFF 0.6 0.6 1.8		
D	Lighting 1.2 0.3 0.3 0.3 (sec.) OFF 0.6 0.6 0.6 0.9		
E	Lighting 1.2 0.3 0.3 0.3 0.3 (sec.) OFF0.60.9		
F	Lighting OFF (No change: LED light remains ON or OFF.)		

# 9.4 Diagnostic Codes and Troubleshooting

Note: See the engine service manual when the diagnostic code that starts with "D" is displayed on the meter panel screen.

Diagnostic code	Diagnostic code name	Probable cause	Check items
F-01 D-51	Memory check warning	1. Controller bad	
		1. Connector contact bad	1. Connector connection check
F-02	Supply power voltage warning	2. Harness bad	2. Harness connection check
		3. Controller bad	
		1. Connector contact bad	1. Connector connection check
F-03	VCM communication warning	2. Harness bad	2. Harness connection check
L-03		3. VCM-6 Controller bad	3. Communication line check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
F-04	FCM Communication warning	2. Harness bad	2. Harness connection check
L-04		3. ECM Controller bad	3. Communication line check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
F-07	MD Communication warning	2. Harness bad	2. Harness connection check
L-07	MP Communication warning	3. Meter panel defect	3. Communication line check
		4. Controller bad	
Γ.09		1. Connector contact bad	1. Connector connection check
D-58	TMS communication warning	2. Harness bad	2. Harness connection check
P-08		3. TMS Controller bad	3. Communication line check
2.00		4. Controller bad	
E 00	Load type set warning	1. Controller setting failure	1. Check setting with service tool.
F-09		2. Controller bad	
		1. Connector contact bad	1. Connector connection check
F-10	Lift lever neutral warning	2. Harness bad	2. Harness connection check
		3. Lift lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
F-11	Tilt lever neutral warning	2. Harness bad	2. Harness connection check
F-11	The level neutral warning	3. Tilt lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
F_10	Attachment1 lever neutral	2. Harness bad	2. Harness connection check
F-12	warning	3. Attachment 2 lever bad	3. Lever connection check
		4. Controller bad	

Diagnostic code	Diagnostic code name	Probable cause	Check items
F-13	Attachment 2 lever neutral	1. Connector contact bad	1. Connector connection check
		2. Harness bad	2. Harness connection check
	warning	3. Attachment 2 lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E 14	Attachment 3 lever neutral	2. Harness bad	2. Harness connection check
Г-14	warning	3. Attachment 3 lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E 16	Chift lover warping	2. Harness bad	2. Harness connection check
F-10	Shirt level warning	3. Shift lever bad	3. Shift lever check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E 17	Vahiela enood warning	2. Harness bad	2. Harness connection check
F-17	venicle speed warning	3. Vehicle speed sensor bad	3. Sensor connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E 20	Lift lover warning	2. Harness bad	2. Harness connection check
1-20		3. Lift lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E_22	Tilt lever warning	2. Harness bad	2. Harness connection check
1-22		3. Tilt lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E-24	Attachment 1 lever warning	2. Harness bad	2. Harness connection check
1-24	Attachment Tiever warning	3. Attachment 1 lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E-26	Attachment 2 lever neutral	2. Harness bad	2. Harness connection check
F-20	warning	3. Attachment 2 lever bad	3. Lever connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E-28	Attachment 3 lever neutral	2. Harness bad	2. Harness connection check
F-28	warning	3. Attachment 3 lever bad	3. Lever connection check
		4. Controller bad	

Diagnostic code	Diagnostic code name	Probable cause	Check items
F-29	loystick redundant warning	1. Joystick lever bad	1. Check if any other warnings are present (Examples: F20, F22, F24, F26 or F28)
	, , , , , , , , , , , , , , , , , , ,	2. Input unit bad	2. Input unit check
		3. Harness bad	3. Harness connection check
		1. Wheel angle sensor bad	1. Wheel angle sensor check
F-31	Sensor voltage warning	2. VCM-6 bad	2. VCM-6 check
		3. Harness bad	3. Harness connection check
		1. Connector contact bad	1. Connector connection check
F 24	Vahiela speed concernusming	2. Harness bad	2. Harness connection check
г-34	venicle speed sensor warning	3. Vehicle speed sensor bad	3. Sensor connection check
		4. Controller bad	
		1 Connector contact had	1. Link connection and damage check
			2. Connector connection check
F-38	Tilt angle sensor warning	2. Harness bad	3. Harness connection check
		3. Tilt angle sensor bad	4. Sensor connection check
		4. Controller bad	
		1. Connector contact bad	1. Connector connection check
E 40	Stooring worning	2. Harness bad	2. Harness connection check
F-40	Steering warning	3. Wheel angle sensor bad	3. Sensor connection check
		4. Controller bad	
F-41	Output unit warning	1. Output unit bad	1. Output unit check
		1. Power shortage	1. Battery voltage check
EAA	Output unit PWM voltage warning	2. Output unit bad	2. Output unit check
Г-44		3. VCM-6 bad	3. VCM-6 check
		4. Harness bad	4. Harness connection check
	Output unit communication warning	1. Output unit bad	1. Output unit check
F-45		2. VCM-6 bad	2. VCM-6 check
		3. Harness bad	3. Harness connection check
F-46	Input unit warning	1. Input unit bad	1. Input unit check
		1. Input unit bad	1. Input unit check
F-49	Input unit communication warning	2. VCM-6 bad	2. VCM-6 check
		3. Harness bad	3. Harness connection check
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-50	Lift up solenoid warning	3. Harness bad	3. Harness connection check
		4. Lift up solenoid bad	4. Lift up solenoid connection check
		5. Controller bad	

Diagnostic code	Diagnostic code name	Probable cause	Check items
F-52		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
	Lift down solenoid warning	3. Harness bad	3. Harness connection check
		4. Lift up solenoid bad	4. Lift up solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-54	Lift solenoid leak	3. Harness bad	3. Harness connection check
		4. Lift up solenoid bad	4. Lift up solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-55	Tilt FW solenoid warning	3. Harness bad	3. Harness connection check
		4. Tilt FW solenoid bad	4. Tilt FW solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-57	Tilt BW solenoid warning	3. Harness bad	3. Harness connection check
		4. Tilt BW solenoid bad	4. Tilt BW solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-59	Tilt solenoid leak	3. Harness bad	3. Harness connection check
		4. Tilt lock solenoid bad	4. Tilt solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-60	Attachment 1A solenoid	3. Harness bad	3. Harness connection check
	warning	4. Attachment 1A solenoid bad	4. Attachment 1A solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
	Attachment 1B solenoid warning	2. Diode bad	2. Diode connection check
F-62		3. Harness bad	3. Harness connection check
1 02		4. Attachment 1B solenoid bad	4. Attachment 1B solenoid connection check
		5. Controller bad	

Diagnostic code	Diagnostic code name	Probable cause	Check items
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-64	Attachment 1 solenoid leak	3. Harness bad	3. Harness connection check
		4. Attachment 1 solenoid bad	4. Attachment 1 solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-65	Attachment 2A solenoid	3. Harness bad	3. Harness connection check
	warning	4. Attachment 2A solenoid bad	4. Attachment 2A solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-67	Attachment 2B solenoid	3. Harness bad	3. Harness connection check
	warning	4. Attachment 2B solenoid bad	4. Attachment 2B solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-69	Attachment 2 solenoid leak	3. Harness bad	3. Harness connection check
		4. Attachment 2 solenoid bad	4. Attachment 2 solenoid connection check
		5. Controller bad	
	Attachment 3A solenoid warning	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-70		3. Harness bad	3. Harness connection check
		4. Attachment 3A solenoid bad	4. Attachment 3A solenoid connection check
		5. Controller bad	
F-72		1. Connector contact bad	1. Connector connection check
	Attachment 3B solenoid warning	2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Attachment 3B solenoid bad	4. Attachment 3B solenoid connection check
		5. Controller bad	
F-73	Hour meter gap warning	1. Hour meter time difference between VCM-6 and M/P.	1. Connect service tool and update #252 M/P hour meter.

Diagnostic code	Diagnostic code name	Probable cause	Check items
F-74		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
	Attachment 3 solenoid leak	3. Harness bad	3. Harness connection check
		4. Attachment 3 solenoid bad	4. Attachment 3 solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-75	Unload solenoid warning	3. Harness bad	3. Harness connection check
		4. Unload solenoid bad	4. Unload solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-77	Lift lock solenoid warning	3. Harness bad	3. Harness connection check
		4. Lift lock solenoid bad	4. Lift lock solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-78	Parking solenoid leak	3. Harness bad	3. Harness connection check
		4. Parking solenoid bad	4. Parking solenoid connection check
		5. Controller bad	
	Unload solenoid leak	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-79		3. Harness bad	3. Harness connection check
		4. Unload solenoid bad	4. Unload solenoid connection check
		5. Controller bad	
	Power steering correction valve solenoid warning	1. Connector contact bad	1. Connector connection check
F-80		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Power steering correction valve solenoid bad	4. Power steering correction valve solenoid connection check
		5. Controller bad	
F-82	Lift lock solenoid warning	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Tilt lock solenoid bad	4. Tilt solenoid connection check
		5. Controller bad	

Diagnostic code	Diagnostic code name	Probable cause	Check items
F-84	Power steering correction valve solenoid leak	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Power steering correction valve solenoid bad	4. Power steering correction valve solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-85	T/M forward solenoid warning	3. Harness bad	3. Harness connection check
		4. T/M forward solenoid bad	4. T/M FW solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
	- 441 1 1 1 1	2. Diode bad	2. Diode connection check
F-87	I/M backward solenoid warning	3. Harness bad	3. Harness connection check
		4. T/M backward solenoid bad	4. T/M BW solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
F-89	T/M solenoid leak	3. Harness bad	3. Harness connection check
		4. T/M solenoid bad	4. T/M solenoid connection check
		5. Controller bad	
		1. Connector contact bad	1. Connector connection check
F-92	Parking seizure warning	2. Harness bad	2. Harness connection check
1-92		3. Parking switch bad	3. Switch connection check
		4. Controller bad	
	Shift solenoid 1 warning	1. Connector contact bad	1. Connector connection check
F-93		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Shift solenoid bad	4. Shift solenoid connection check
		5. Controller bad	
D-01		1. Erratic, intermittent, or incorrect	1. Throttle switch circuit check
	Accelerator sensor 1 warning	2. Erratic, intermittent, or incorrect	2. Analog throttle position sensor circuit check
		3. Voltage above normal	3. Analog throttle position sensor circuit check
		4. Voltage below normal	4. Analog throttle position sensor circuit check
D-05	Fuel rail pressure warning (pump)	1. Fuel rail pressure relief valve is active	1. Fuel rail pressure problem

Diagnostic code	Diagnostic code name	Probable cause	Check items
D-07		1. Pressure is high	1. Fuel rail pressure problem
		2. Pressure is low	2. Fuel rail pressure problem
	Fuel rail pressure sensor warning	3. Voltage above normal	3. Engine pressure sensor open or short circuit check
		4. Voltage below normal	4. Engine pressure sensor open or short circuit check
	Injector N/V-cylinder 1	1. Erratic, intermittent, or incorrect	1. Injector data incorrect check
D-09		2. Current below normal	2. Injector solenoid circuit check
		3. Current above normal	3. Injector solenoid circuit check
		1. Erratic, intermittent, or incorrect	1. Injector data incorrect check
D-10	Injector N/V-cylinder 2	2. Current below normal	2. Injector solenoid circuit check
		3. Current above normal	3. Injector solenoid circuit check
		1. Erratic, intermittent, or incorrect	1. Injector data incorrect check
D-11	Injector N/V-cylinder 3	2. Current below normal	2. Injector solenoid circuit check
		3. Current above normal	3. Injector solenoid circuit check
		1. Erratic, intermittent, or incorrect	1. Injector data incorrect check
D-12	Injector N/V-cylinder 4	2. Current below normal	2. Injector solenoid circuit check
		3. Current above normal	3. Injector solenoid circuit check
D 21	Fuel control valve warning	1. Current below normal	1. Solenoid valve check
D-21		2. Current above normal	2. Solenoid valve check
	EGR inlet/outlet pressure warning	1. Voltage above normal	1. Engine pressure sensor open or short circuit check
D-22		2. Voltage below normal	2. Engine pressure sensor open or short circuit check
		3. Calibration required	3. Sensor calibration required check
		4. Data drifted low	4. 5V sensor supply circuit check
D-24	Engine speed sensor warning	1. Abnormal frequency, pulse width, or period	1. Engine speed/timing sensor circuit check
		2. Engine speed is too high	2. Engine overspeeds
		3. Engine timing sensor defective	3. Engine speed/timing sensor circuit check
D-25	Engine over-run warning	1. Abnormal frequency, pulse width, or period	1. Engine speed/timing sensor circuit check
		2. Engine speed is too high	2. Engine overspeeds
D-26		1. Boost pressure is high	1. Intake manifold air pressure is high
	Boost pressure sensor warning	2. Boost pressure is low	2. Intake manifold air pressure is low
D-29	Atmospheric pressure sensor warning	1. Voltage above normal	1. Engine pressure sensor open or short circuit check
		2. Voltage below normal	2. Engine pressure sensor open or short circuit check
		3. Data drifted low	3. 5V sensor supply circuit check

Diagnostic code	Diagnostic code name	Probable cause	Check items
D-30	CAN signal warning	1. Abnormal update rate	1. CAN data link circuit check
D-31		1. Voltage above normal	1. Starter relay circuit check
	Starter relay warning	2. Current below normal	2. Starter relay circuit check
		3. Current above normal	3. Starter relay circuit check
	Water temperature sensor warning	1. Temperature is high	1. Coolant temperature is too high
D-32		2. Voltage above normal	2. Engine temperature sensor open or short circuit check (Passive sensors)
		3. Voltage below normal	3. Engine temperature sensor open or short circuit check (Passive sensors)
D-33	ECM system warning	1. Calibration memory is erratic, intermittent, or incorrect	1. Flash programming
		2. Calibration module is erratic, intermittent, or incorrect	2. ECM memory check
D 24		1. Current above normal	1. Injector solenoid circuit check
0-54		2. Not responding correctly	2. Injector solenoid circuit check
	Fuel temperature sensor (inlet) warning	1. Voltage above normal	1. Engine temperature sensor open or short circuit check (Passive sensors)
D-35		2. Voltage below normal	2. Engine temperature sensor open or short circuit check (Passive sensors)
		3. Temperature is high	3. Fuel temperature is high
D-37	EGR position sensor warning	1. Voltage above normal	1. Valve position sensor check
		2. Voltage below normal	2. Valve position sensor check
	EGR warning	1. Current below normal	1. Motorized valve check
D-40		2. Current above normal	2. Motorized valve check
		3. Not responding properly	3. Motorized valve check
D-43	ECM relay warning	1. Not responding correctly	1. Electric power supply check
U-43		2. Special instruction	2. Electric power supply check
D-44	Glow plug warning	1. Not responding correctly	1. Glow plug starting aid check
D-48	Glow relay warning	1. Current above normal	1. Glow plug relay circuit check
D-52	Supply power voltage warning	1. Power input 1 is erratic, intermittent, or incorrect	1. Ignition keyswitch circuit and battery supply circuit check
		2. Voltage above normal	2. Ignition keyswitch circuit and battery supply circuit check
		3. Voltage below normal	3. Ignition keyswitch circuit and battery supply circuit check
	Overheat warning (STEP 1)	1. Temperature is high	1. Coolant temperature is too high
D-63		2. Voltage above normal	2. Engine temperature sensor open or short circuit check (Passive sensors)
		3. Voltage below normal	3. Engine temperature sensor open or short circuit check (Passive sensors)

Diagnostic code	Diagnostic code name	Probable cause	Check items
D-64	Overheat warning (STEP 2)	1. Temperature is high	1. Coolant temperature is too high
		2. Voltage above normal	2. Engine temperature sensor open or short circuit check (Passive sensors)
		3. Voltage below normal	3. Engine temperature sensor open or short circuit check (Passive sensors)
D-67	W/G bypass valve warning	1. Current below normal	1. Solenoid valve check
D-07		2. Current above normal	2. Solenoid valve check
D-70	Sensor supply power voltage warning	1. Voltage is erratic, intermittent, or incorrect	1. 5V sensor supply circuit check
		1. Voltage above normal	1. Oxygen level check
D-74	Lambda sensor warning	2. Voltage below normal	2. Oxygen level check
		3. Current below normal	3. Oxygen level check
D-75	Idle switch warning	1. Erratic, intermittent, or incorrect	1. Idle validation switch circuit check
D-80	Air intake throttle position	1. Voltage above normal	1. Valve position sensor check
	warning	2. Voltage below normal	2. Valve position sensor check
D-82	Exhaust temperature sensor warning	1. Voltage above normal	1. Engine temperature sensor open or short circuit check
0-02		2. Voltage below normal	2. Engine temperature sensor open or short circuit check
	DPF inlet temperature sensor warning	1. Voltage above normal	1. DPF temperature sensor open or short circuit check (Active sensors)
D-83		2. Voltage below normal	2. DPF temperature sensor open or short circuit check (Active sensors)
		3. Temperature is low	3. DPF temperature is low
D-84	DPF absolute pressure sensor warning	1. Voltage above normal	1. Engine pressure sensor open or short circuit check
		2. Voltage below normal	2. Engine pressure sensor open or short circuit check
	DPF differential pressure sensor warning	1. Abnormal rate of change	1. Differential pressure problem
D-85		2. Pressure is high	2. DPF collects excessive soot
		3. Pressure is low	3. Differential pressure problem
D-87	DPF warning	1. Soot load percent is high	1. DPF collects excessive soot
D-89	Engine oil pressure sensor warning	1. Voltage above normal	1. Engine oil pressure sensor open or short circuit check
		2. Voltage below normal	2. Engine oil pressure sensor open or short circuit check
		3. Pressure is low	3. Low engine oil pressure
		4. Data drifted low	4.5V sensor supply circuit check
D-90	Engine oil viscosity warning	1. Viscosity is low	1. Oil contains fuel
D-97	Intake manifold pressure sensor warning	1. Pressure is severely high	1. Intake manifold air pressure is high
0-92		2. Pressure is severely low	2. Intake manifold air pressure is low

Diagnostic code	Diagnostic code name	Probable cause	Check items
D-93	Intake manifold temperature sensor warning	1. Voltage above normal	1. Intake manifold temperature sensor open or short circuit check (Passive sensors)
		2. Voltage below normal	2. Intake manifold temperature sensor open or short circuit check (Passive sensors)
		3. Temperature is high	3. Intake manifold air temperature is high
D-94	Air intake temperature sensor warning	1. Voltage above normal	1. Air take temperature sensor open or short circuit check (Passive sensors)
		2. Voltage below normal	2. Air take temperature sensor open or short circuit check (Passive sensors)
	Fuel rail pressure sensor warning	1. Pressure is high	1. Fuel rail pressure problem
D-95		2. Pressure is low	2. Fuel rail pressure problem
		3. Voltage above normal	3. Engine pressure sensor open or short circuit check
		4. Voltage below normal	4. Engine pressure sensor open or short circuit check
D-96	Fuel leak warning	1. Leakage is most severely high	1. Fuel rail pressure problem
D-97	ECM system warning	1. Calibration memory is erratic, intermittent, or incorrect	1. Flash programming
		2. Calibration module is erratic, intermittent, or incorrect	2. ECM memory check
D-98	DPF warning	1. Soot load percent is severely high	1. DPF collects excessive soot
P-03	VCM communication warning	1. Connector contact bad	1. Connector connection check
		2. Harness bad	2. Harness connection check
		3. VCM-6 Controller bad	3. Communication line check
		4. Controller bad	
P-06	OCM communication warning	1. Connector contact bad	1. Connector connection check
		2. Harness bad	2. Harness connection check
		3. OCM Controller bad	3. Communication line check
		4. Controller bad	