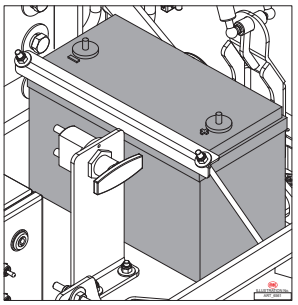
Power Supply System

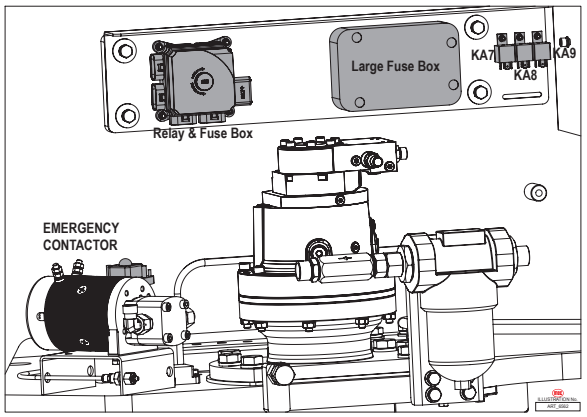
Battery



A single, 12 Volt 110Ah battery is used to power the control systems and some emergency operations.

Refer to page 12 for Auxiliary Power System and Test.
Refer to page 13 for information about the Battery Disconnect Switch.

Contactor, Relay & Fuse



Fuse 14
- 200 Amps and connects to the emergency Auxiliary Power pump.

Fuse 15
- 80 Amps and connects to the Relay & Fuse Box

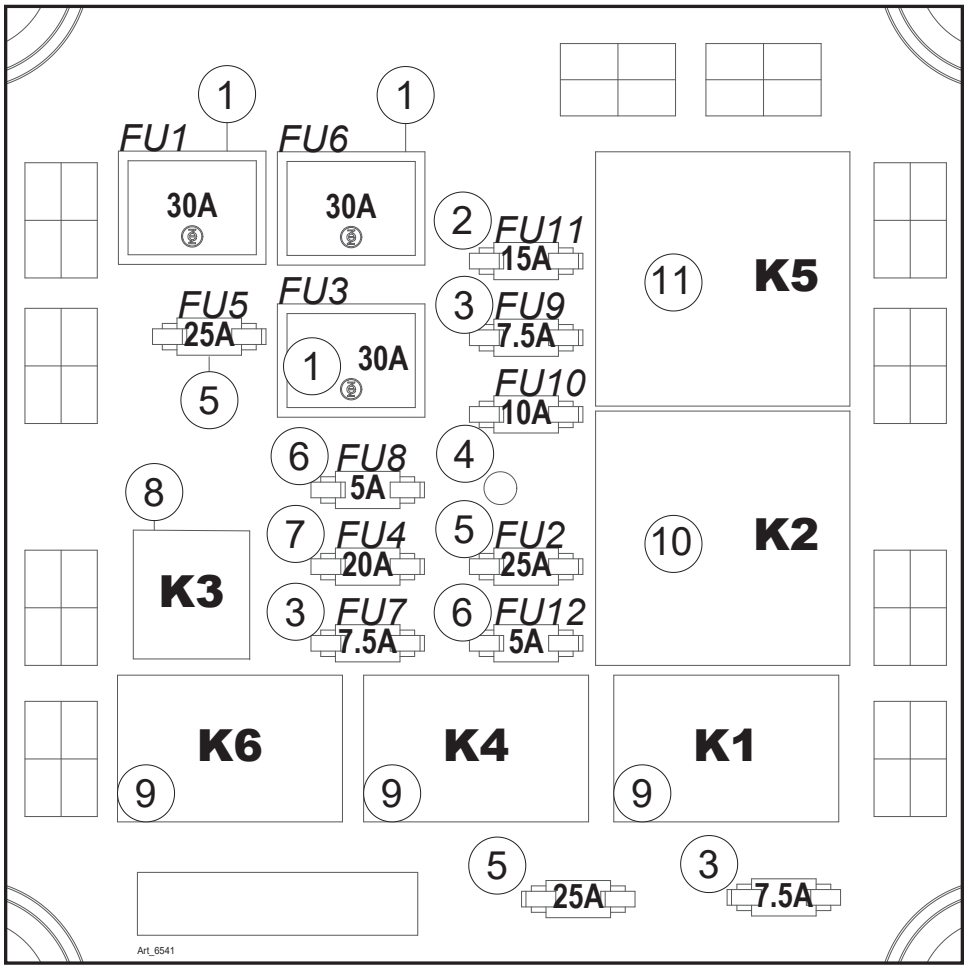
Fuse 23
- 50 Amps and connects to engine generator & preheating device.

KA7
- ECU power relay

KA8
- Starter relay

KA9
- Preheat relay

Relay & Fuse Box

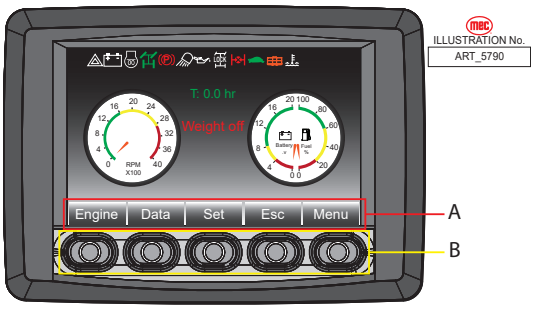


Relay Description	
K1	Hydraulic Fan Relay
K2	Power Supply Fuel (Main Controller)
K3	N/A
K4	Horn Relay
K5	Total Power Relay (Fuel Pump)
K6	N/A

Fuse Description		
FU1	30 Amps	Engine ECU
FU2	30 Amps	2 Cooling fans of hydraulic oil
FU3	30 Amps	Main Controller
FU4	20 Amps	N/A
FU5	25 Amps	FU7+FU8
FU6	30 Amps	1C, FU12 5 Amps: Fuel Pump FU9 7.5 Amps: Chassis Power FU10 10 Amps: PVG Power FU11 15 Amps: Platform Power
FU7	7.5 Amps	Horn
FU8	5 Amps	Main Circuit
FU9	7.5 Amps	1E: Chassis Power
		K3: Action relay
FU10	10 Amps	PVG Power
FU11	15 Amps	Power Supply to Platform
FU12	5 Amps	Fuel Pump

Diagnostics Menu Interface

Diagnostics Panel



This panel contains the basic information for monitoring operation of the boom.

Row “A” displays the pages and options available in the lower part of the screen and is controlled by the corresponding buttons on row “B”.

The upper band shows:

- Alarm indicator light
- Steering mode selection indicator light
- Differential lock active indicator light
- Front axle lock active indicator light
- Movement speed selection indicator light: slow/fast
- Controls position indicator light: ground/platform
- Overload indicator light

The central band shows:

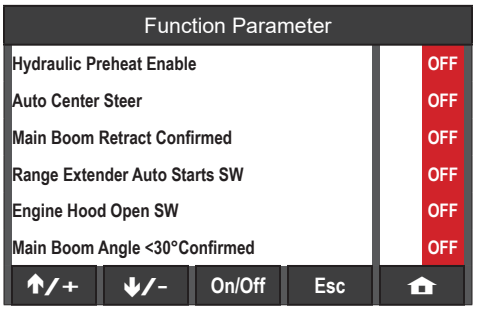
- The engine rev counter to the left hand side
- The number of working hours in the center, the batteries voltage, the fuel level and the engine fault code
- The engine oil pressure indicator and the engine water temperature indicator on the right hand side.

The bottom band shows the information shown on the pages that can be accessed:

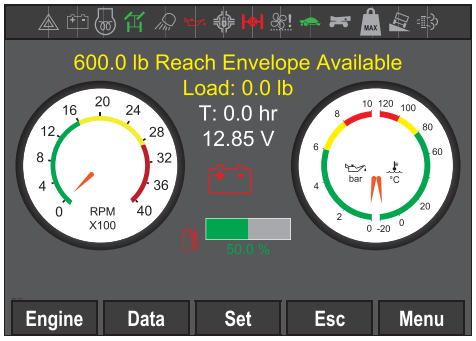
- Engine data (RPM, drive torque percentage measured, coolant temperature, oil pressure, fuel consumption, operating hours, quantity of fuel used)
- Operational data (angular inclination of main boom, angular inclination of riser boom, inclination of the platform, inclination of the chassis on the horizontal plane, load measured on platform);
- Options settings (hydraulic preheat enable; Auto center steer; main boom retract confirmed; range extender auto start sw; engine hood open sw; main boom angle<30°confirmed)

The setting interface could be entered by pressing the setting button and holding for one second. The optional function can be turned on or off without a password, after entering the setting interface. The procedures are as follows:

1. You can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/–) to select the item you want. The chosen item would be shown in yellow background.
2. Pressing “On/Off” and holding on is used to turn on or off the corresponding function.
3. It returns back to main interface, when the button “Esc” is pressed.



Diagnose Menu Interface Symbols



After entering boot interface, the display will automatically switch to the main interface after a few seconds.

The top row of icons are listed in the chart below.

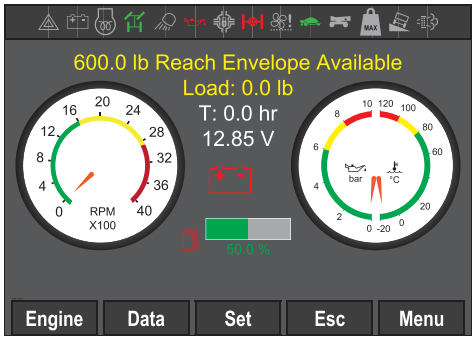
	System: No Alarm		System: Alarm		
	Power Supply: Engine Generator		Power Supply: 12V-Battery		
	Engine Preheat: Off		Engine Preheat: On		
	Mode Selected: 4-Wheel		Mode Selected: Crab		Mode Selected: 2-Wheel
	Work Lights: Off		Work Lights: On		
	Engine Oil Pressure: Normal		Engine Oil Pressure: Low		
	Differential-Lock: Off		Differential-Lock: On		
	Oscillating system: Off		Oscillating system: On		
	Hydraulic Cooling Fan: Off		Hydraulic Cooling Fan: On		
	Slow Speed		High Torque Mode		Fast Speed
	Platform Controls		Ground Control		
	Platform not Overloaded		Platform Overloaded		
	Tilt Angel <5°		Tilt Angel >5°		
	Engine Regeneration: Off		Engine Regeneration: On		

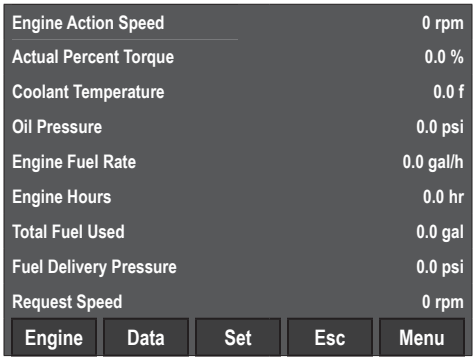
Machine Details Interface

Engine Interface Menu

The “Engine” and “Data” interface will display read signals from the engine ECU through the CAN bus.

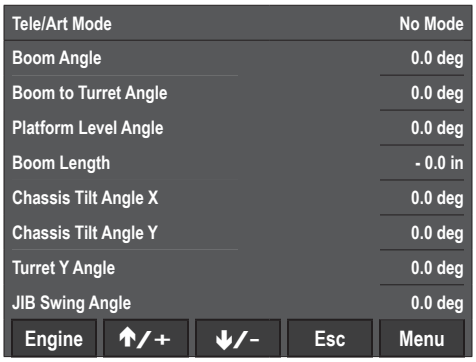
1. From the “Home Screen”, press the black button under the “Engine” icon shown on the diagnostic panel.
2. The “Engine” interface will display engine relevant information.
3. If you want to return back to the “Home Screen”, press the black button under the Escape icon (**Esc**).

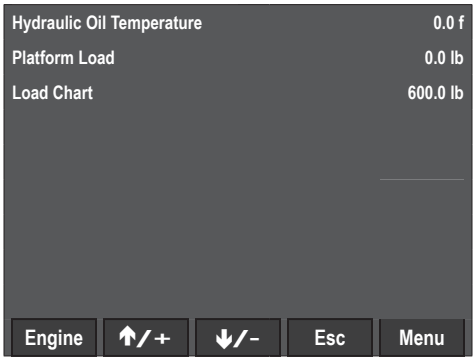




Data Interface Menu

1. In the “Engine” interface, press the black button under the “Data” icon shown on the diagnostic panel.
   - You can also access the “Data” interface by press the black button under the “Data” icon shown on the “Home Screen”.
2. In the “Data” interface, sensor data will be displayed.
3. You can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/–) to switch between the different pages to display different information about the machine.
4. If you want to return back to the “Home Screen”, press the black button under the Escape icon (**Esc**).

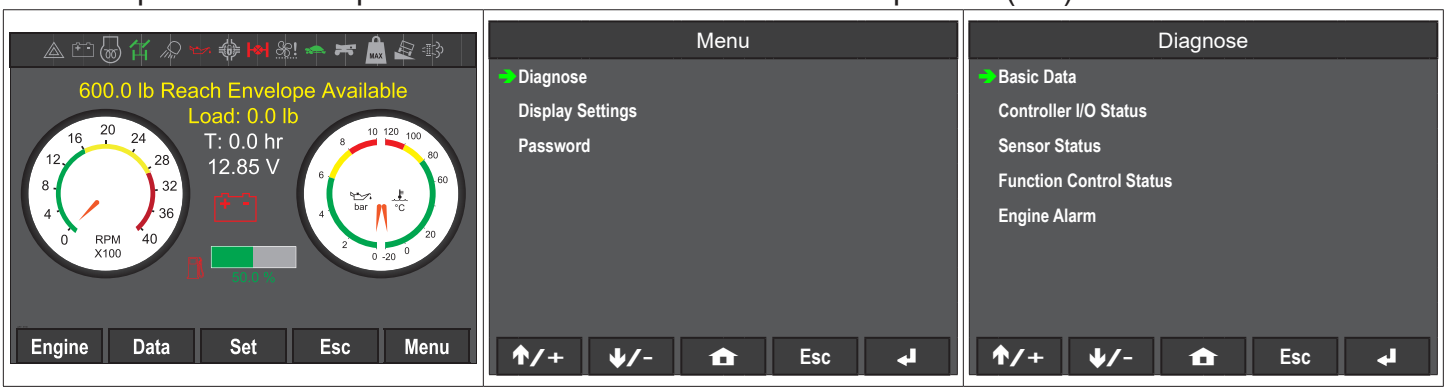




Diagnostic Menu Interface

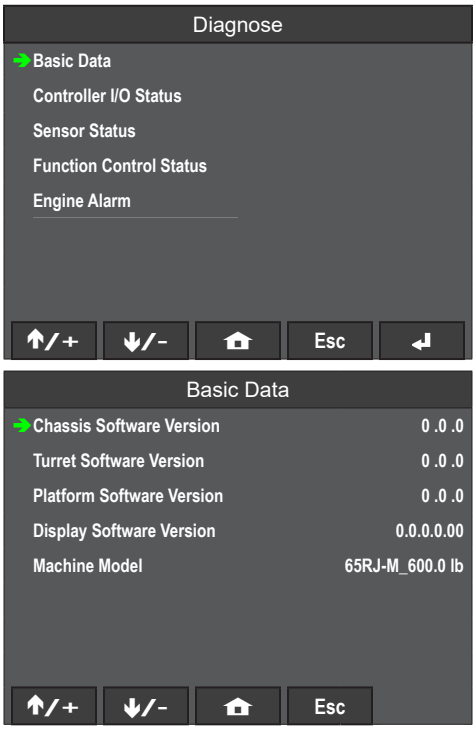
Diagnose Menu

1. From the ""Home Screen", press the black button under the "Menu" icon shown on the diagnostic panel.
2. In the "Menu" interface, make sure that the "Diagnose" option is selected.
   - You can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) to make sure that the "Diagnose" option is selected.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
4. In the "Diagnose" interface, you can view options that will display the following information:
   - Machine Software Versions
   - Input/Output signals
   - Sensors information
   - Parameters of each action
   - Engine Alarm information
5. To return to the "Home Screen", press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

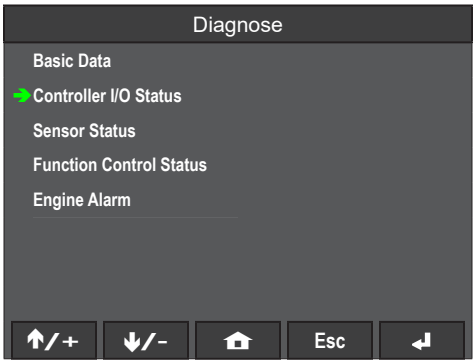


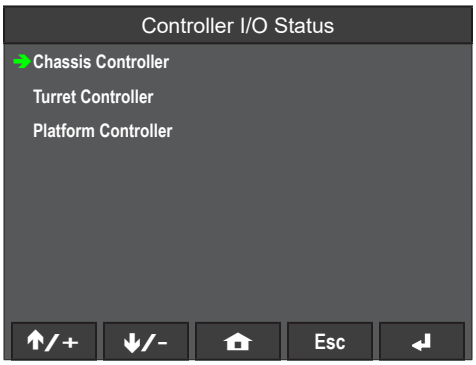
Basic Data

1. In the "Diagnose" interface, make sure that the "Basic Data" option is selected.
   - You can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) to make sure that the "Basic Data " option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. The current machine software versions and machine model will be displayed.
4. To return to the "Home Screen", press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).



Controller I/O Status





This read shows read CAN signals from the controller to get I/O status.

1. In the “Diagnose” interface, make sure that the “Controller I/O Status” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Controller I/O ” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. In the “Controller I/O Status” interface, controllers whose input/output signals you can view will be shown.
4. Select a controller by pressing the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to select the controller information you want to view.
5. Press the black button under the Enter icon (↵) shown on the diagnostic panel to view the selected controller information.
   - For Chassis Controller values, refer to page 45.
   - For Turret Controller values, refer to page 46.
   - For Platform Controller values, refer to page 47.
6. When you are in the Controller you have selected, press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to scroll through the list of signals.
7. When you are done looking through the Controller I/O values, press the black button under the Escape icon (**Esc**) to return back to the “Controller I/O Status” interface.
8. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

True or False in this interface is only a signal received or sent in the controller, it does not mean that the actuator has received the relevant signal! When necessary, it is still necessary to measure the signal at the corresponding component!

Chassis Controller		
Pin	**Definition**	**Value**
C1: 14, 39, 55	Chassis leveling valve	0 mA
C1: 15, 40	Brake release valve	0 mA
C1: 16, 41	Rear axle lock valve, Output A (Left)	0 mA
C1: 30, 42	Rear axle lock valve, Output B (Left)	0 mA
C1: 31, 43	Rear axle lock valve, Output A (Right)	0 mA
C1: 32, 44	Rear axle lock valve, Output B (Right)	0 mA
C1: 37	Oscillate pressure sensor A	4 mA
C1: 53	Oscillate pressure sensor B	20 mA
C2: 13, 29, 47	U-turn and Crab-turn steer mode valve	0 mA
C2: 14, 48	Differential lock valve	0 mA
C2: 15, 67	Chassis level proportional valve	0 mA
C2: 16, 32, 68	Steer directional valve	0 mA

Chassis Controller		
Pin	**Definition**	**Value**
C2: 34	Oscillate cylinder feedback signal 3 left NO	FALSE
C2: 35	Oscillate cylinder feedback signal 1 left NC	FALSE
C2: 36	Oscillate cylinder feedback signal 4 right NO	FALSE
C2: 37	Oscillate cylinder feedback signal 2 right NC	FALSE
C2: 42	Turret to left proximity	TRUE
C2: 52	High speed valve	FALSE
C2: 55	Turret to right proximity	TRUE
C2: 56	Turret to middle proximity	TRUE
C2: 57	Front steer neutral position signal	2475 mV
C2: 58	Rear steer neutral position signal	2465 mV

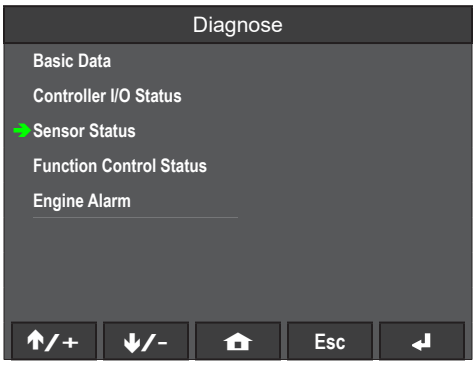
Turret Controller		
Pin	**Definition**	**Value**
C1: 8	Boom down toggle switch input	FALSE
C2: 62	Boom up toggle switch input	FALSE
C1: 9	Boom out toggle switch input	FALSE
C1: 10	Boom in toggle switch input	FALSE
C1: 11	Air filter restriction input	TRUE
C1: 14, 39, 55	Travel forward, backward valve	0 mA
C1: 26	Chain break switch	TRUE
C1: 27	GPS machine lock low switch	FALSE
C1: 28	Emergency pump toggle switch input	FALSE
C1: 29	Key switch	TRUE = Ground Control
C1: 30, 42	Hydraulic generator coil current	0 mA
C1: 36	Jib up toggle switch input	FALSE
C1: 37	Hydraulic oil temperature sensor	1130Ω
C1: 38	Alternator charging input	TRUE
C1: 45	Hour meter output	FALSE
C1: 46	Motion beacon relay	FALSE
C1: 48	Engine power	TRUE
C1: 52	Jib down toggle switch input	FALSE
C1: 53	Fuel level sensor	252Ω
C1: 54	Engine start/stop button	FALSE
C2: 3	Turtle mode toggle switch input	FALSE
C2: 4	Rabbit mode toggle switch input	FALSE
C2: 5	Platform level up toggle switch input	FALSE
C2: 6	Platform level down toggle switch input	FALSE
C2: 9	Riser up toggle switch input	FALSE
C2: 10	Riser down toggle switch input	FALSE
C2: 11	Ground control deadman	FALSE
C2:19	Chassis left leveling switch input	FALSE
C2: 20	Chassis right leveling switch input	FALSE
C2: 21	Platform right rotation toggle switch input	FALSE
C2: 22	Platform left rotation toggle switch input	FALSE

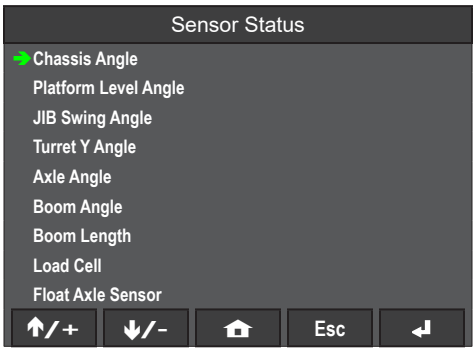
Turret Controller		
Pin	**Definition**	**Value**
C2: 26	Turret right rotation toggle switch input	FALSE
C2: 41	Turret left rotation toggle switch input	FALSE
C2: 28	Engine cover proximity input	FALSE
C2: 38	E-stop circuit bypass switch	TRUE
C2: 46	Overload lamp	FALSE
C2: 49	Engine start relay output	FALSE
C2: 50	Hydraulic oil cooling fan output	FALSE
C2: 51	Emergency pump contactor signal	FALSE
C2: 52	Horn relay	FALSE
C2: 54	GPS machine lock high switch	FALSE
C2: 57	Jib right rotation Ccw Cmd switch	FALSE
C2: 58	Jib left rotation Ccw Cmd switch	FALSE
C2: 61	Telescope/Articulate toggle switch input	FALSE
C2: 64	Alarm output	FALSE

Platform Controller		
Pin	**Definition**	**Value**
C1: 8	Drive joystick analog input channel 1	0.0%
C1: 9	Drive joystick analog input channel 2	0.0%
C1: 10	Turret rotate analog (1# Joystick X axial)	0.0%
C1: 11	Hydraulic generator start/stop button	FALSE
C1: 13	Turret not neutral, force travel switch	FALSE
C1: 14, 39, 55	Jib up/down valve	0 mA
C1: 15	Upper release current	0 mA
C1: 16	Jib rotation current	0 mA
C1: 24	Jib amplitude analog (1# Joystick Y axial)	0.0%
C1: 25	Platform rotate analog (2# Joystick X axial)	0.0%
C1: 26	Boom amplitude analog (2# Joystick Y axial)	0.0%
C1: 31, 43, 59	Platform swing valve	0 mA
C1: 36	Loadcell sensor A	1314 mV
C1: 52	Loadcell sensor B	1338 mV
C1: 38	PPSS sensor analog input (left)	0 mV
C1: 54	PPSS sensor analog input (right)	0 mV
C2: 3	Drive speed selection - Grade	FALSE
C2: 4	Drive speed selection – High	TRUE
C2: 6	Jib down proximity switch	TRUE
C2: 9	Platform level down switch	FALSE
C2: 10	Platform leveling down instruction switch	FALSE
C2: 11	Boom in switch input	FALSE
C2: 12	Boom out switch input	FALSE
C2: 19	Chassis level left input	FALSE
C2: 20	Chassis level right input	FALSE
C2: 21	Riser up switch input	FALSE
C2: 22	Riser down switch input	FALSE

Platform Controller		
Pin	**Definition**	**Value**
C2: 25	Collision detection	FALSE
C2: 27	Jib turret joystick enable	FALSE
C2: 28	Steer mode select crab steer	FALSE
C2: 34	Boom joystick enable switch	FALSE
C2: 35	Engine rpm increase switch input	FALSE
C2: 36	Engine rpm decrease switch input	FALSE
C2: 37	Differential lock switch input	FALSE
C2: 41	4w steer switch input	FALSE
C2: 42	Right steer button	FALSE
C2: 43	Buzzer button	FALSE
C2: 46	Overload lamp	FALSE
C2: 54	Emergency pump button	FALSE
C2: 55	Horn input	FALSE
C2: 56	Anti-crush proximity switch input	TRUE
C2: 57	Telescope/Articulate switch	FALSE
C2: 58	Interlock bypass switch	FALSE
C2: 61	Steer left button	FALSE
C2: 62	Drive joystick enable	FALSE
C2: 63	Anti-crush lamp output	FALSE

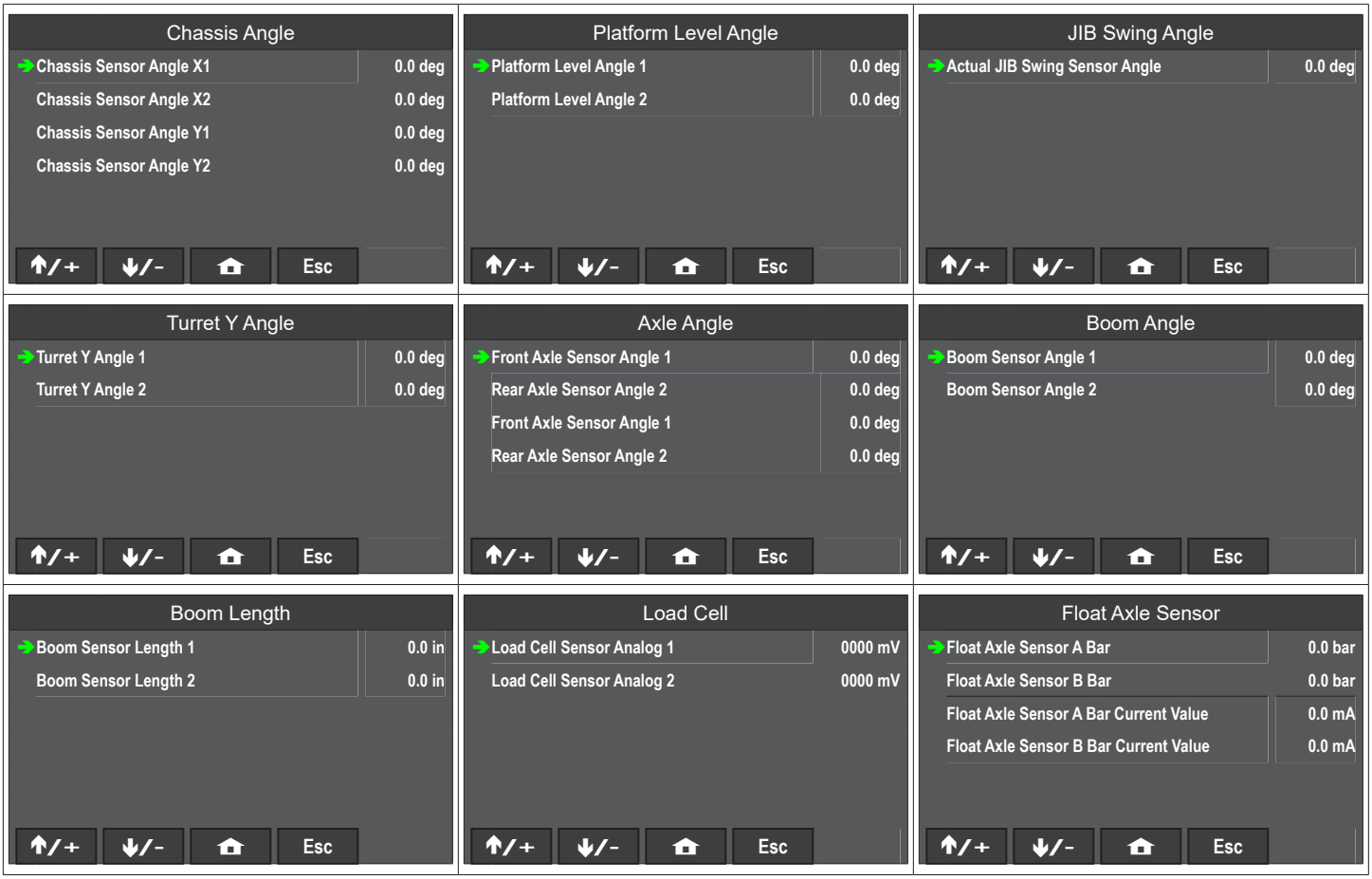
Sensor Status



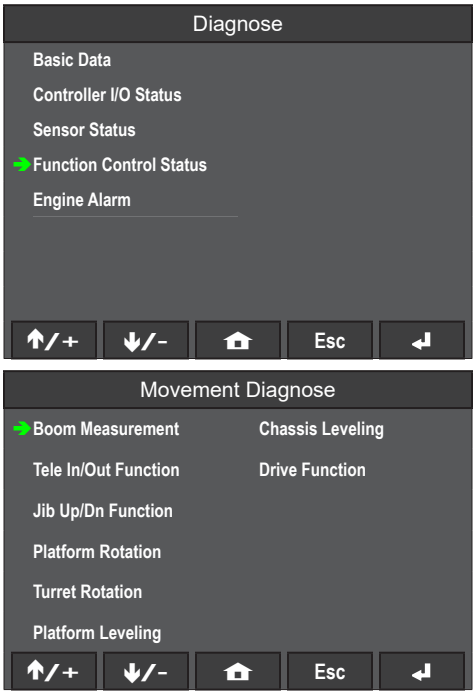


1. In the “Diagnose” interface, make sure that the “Sensor Status” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Sensor Status” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. To select the sensor whose information is being received, press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to select the sensor information you want to view.
4. Press the black button under the Enter icon (↵) shown on the diagnostic panel to view the selected sensor information.
5. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

The values shown in the chart are for reference on how the information will be displayed when viewed and may vary from machine to machine.



Movement Diagnose



The “Function Control Status” interface shows machine movement command request and output percentage by movement groups.

1. In the “Diagnose” interface, make sure that the “Function Control Status” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Function Control Status” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. Use the Up Arrow (↑/+) and/or Down Arrow (↓/-) to select the machine movement information you want to view.
4. Press the black button under the Enter icon (↵) shown on the diagnostic panel to view the selected machine movement information.
5. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

The values shown in the chart are for reference on how the information will be displayed when viewed and may vary from machine to machine.

Boom Measurement

Boom Platform Up/Dn Toggle Switch	0.0 %
Boom Ground Up/Dn Toggle Switch	FALSE
Boom Up PWM Output Request	0.0 %
Boom Dn PWM Output Request	0.0 %
Boom Up/Dn Output Percent A	0.0 %
Boom Up/Dn Output Percent B	0.0 %

↑/+ ↓/- Esc

Tele In/Out Function

Tele In/Out Joystick Toggle SW	FALSE
Tele In/Out Lower Toggle SW	FALSE
Tele In Output Request	0.0 %
Tele Out Output Request	0.0 %
Tele In/Out Output Percent A	0.0 %
Tele In/Out Output Percent B	0.0 %

↑/+ ↓/- Esc

Jib Up/Dn Function

Jib Platform Up/Dn Joystick Analog	0.0 %
Jib Ground Up/Dn Toggle SW	FALSE
Jib Up/Dn Solenoid PWM Output A	0 mA
Jib Up/Dn Solenoid PWM Output B	0 mA
Jib Up/Dn PWM Output Percent	0.0 %

↑/+ ↓/- Esc

Platform Rotation

Platform Rotation Joystick Analog	0.0 %
Ground Rotation Toggle SW	FALSE
Platform Rotation PWM Output A	0 mA
Platform Rotation PWM Output B	0 mA
Platform Rotation Output Percent	0.0 %

↑/+ ↓/- Esc

Turret Rotation

Turret Platform Rotation Joystick Analog	0.0 %
Turret Ground Rotation Toggle Switch	FALSE
Turret Rotation CW Output Request	0.0 %
Turret Rotation CCW Output Request	0.0 %
Turret Rotation Output Percent A	0.0 %
Turret Rotation Output Percent B	0.0 %

↑/+ ↓/- Esc

Platform Leveling

Upper Platform Level Toggle SW	FALSE
Lower Platform Level Toggle SW	FALSE
Platform Level Up PWM Request	0.0 %
Platform Level Dn PWM Request	0.0 %
Platform Leveling Output Percent A	0.0 %
Platform Leveling Output Percent B	0.0 %

↑/+ ↓/- Esc

Chassis Leveling

Chassis Leveling Platform Toggle SW	FALSE
Chassis Leveling Ground Toggle SW	FALSE
Chassis Level Direction Output Measured A	0 mA
Chassis Level Direction Output Measured B	0 mA
Chassis Level Speed Current Output Measured	0 mA
Chassis Level PWM Request	0.0 %

↑/+ ↓/- Esc

Drive Function

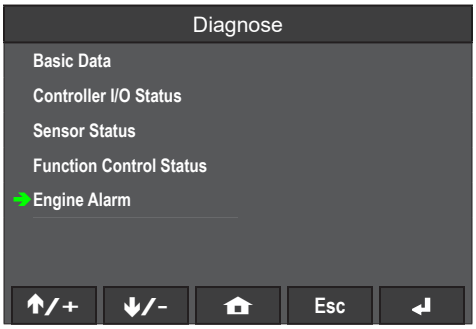
Drive Speed PWM A	0 mA
Drive Speed PWM B	0 mA
Drive Speed Request	0.0 %

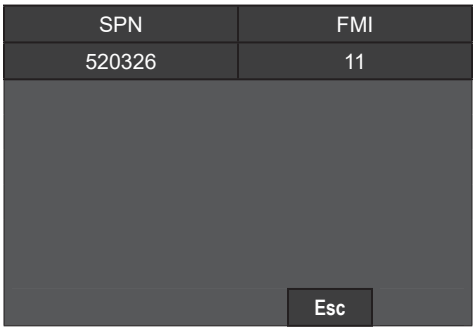
↑/+ ↓/- Esc

Engine Alarm

The “Engine Alarm” interface displays the engine ECU’s broadcasting DM1 message.

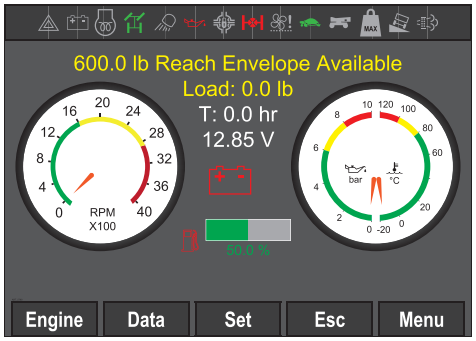
1. In the “Diagnose” interface, make sure that the “Engine Alarm” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Engine Alarm” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. To return back to the “Diagnose” interface, press the black button under the Escape icon (**Esc**).
4. Back in the “Diagnose” interface, to return to the “Home Screen”, press the black button under the Home icon (⌂).
5. Refer to page 74 for Fault Codes.

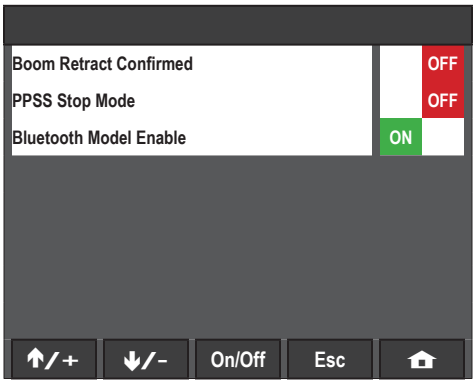




Settings Interface

Quick Setup Interface Menu





1. From the “Home Screen”, press and hold then release the black button under the “Set” icon shown on the diagnostic panel to enter the “Quick Setup” interface.
2. In the “Quick Setup” interface you can turn on or turn off the certain machine functions.
   - Boom Retract Confirmed
   - PPSS Stop Mode
   - Bluetooth Model Enable
3. Press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) select the function you want.
4. Press the black button under the On/Off (**On/Off**) to turn on or turn off the selected machine function.
   - If there is a green square with the words “ON”, then the function has been enable.
   - If there is a red square with the words “OFF”, then the function has been disabled.
5. To return to the “Home Screen”, press the black button under the Home icon (🏠) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

Boom Retract Confirmed

- If the Main Boom Length sensor is faulty and the operator confirms that the main boom is fully retracted, then the operator’s can turn this function on and the machine will be ready to drive.

PPSS Stop Mode

- If the machine is equipped with the optional PPSS system, then turn this function on to enable the PPSS system.

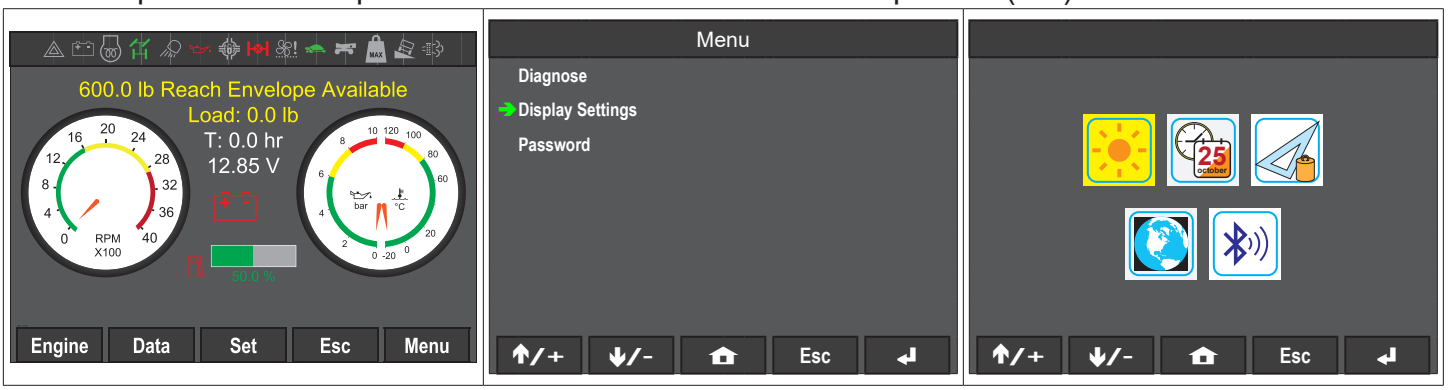
Bluetooth Model Enable

- If the Bluetooth Model is enabled and the Bluetooth feature in the Bluetooth Menu on page 54 is turned on as well, then the machine can be programmed via Bluetooth.

Display Settings Interface

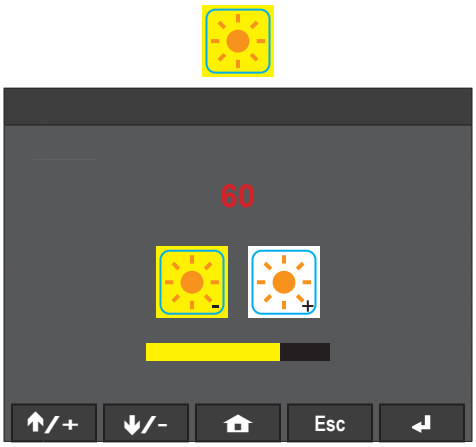
1. From the “Home Screen”, press the black button under the “Menu” icon shown on the diagnostic panel.
2. In the “Menu” interface, make sure that the “Display Settings” option is selected.
   - You can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) to make sure that the “Display Settings” option is selected.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
4. In the “Display Settings” interface, you can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) to select the option you want.
   - The current selected menu will be highlighted in yellow.
5. Press the black button under the Enter icon (↵) shown on the diagnostic panel to enter the currently selected option.

6. To return to the “Home Screen”, press the black button under the Home icon (🏠) or to go back to a previous menu press the black button under the Escape icon (**Esc**).



Brightness Menu

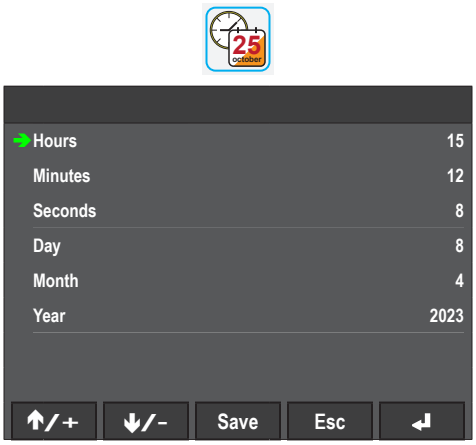
1. In the “Display Settings” interface, make sure that the “Brightness” icon (sun) is selected then press the black button under the Enter icon (↵) shown on the diagnostic panel to enter the “Brightness” menu
2. In the “Brightness” interface, the left icon (–) is used to lower the screen brightness and the right icon (+) is used to increase the screen brightness.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to switch between the left and right icons. The current selected icon will be highlighted in yellow.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel on the current selected icon to either increase or lower the screen brightness.



4. To return to the “Home Screen”, press the black button under the Home icon (🏠) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

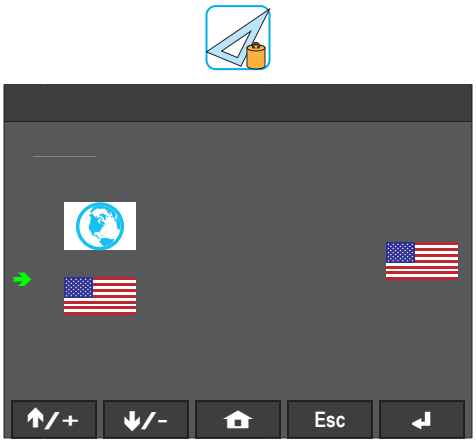
Date & Time Menu

1. In the “Display Settings” interface, make sure that the “Date & Time” icon (clock & calendar) is selected then press the black button under the Enter icon (↵) shown on the diagnostic panel to enter the “Date & Time” m interface enu
2. In the “Date & Time” interface, you can change the following: hours, minutes, seconds, day, month, and year.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to change the current selection.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel on the current selected icon and the text will change to green.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to change the number of the selected item.
4. If you want to save any changes made, then press the black button under the Save (**Save**) to save the changes made.



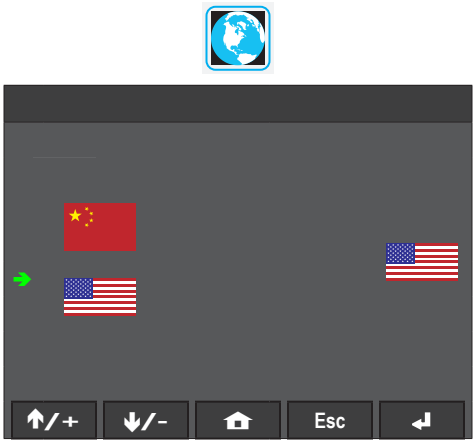
5. To return to the “Home Screen”, press the black button under the Home icon ( ) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

Units of Measurement Menu



1. In the “Display Settings” interface, make sure that the “Units of Measurement” icon (Triangle protractor and weight) is selected then press the black button under the Enter icon ( ) shown on the diagnostic panel to enter the “Units of Measurement” menu
2. In the “Units of Measurement” interface, you can switch between Metric and Imperial units of measurements to be shown on the display.
   - You can press the black button under the Up Arrow (/ +) and/or Down Arrow (/ -) to change the current selection.
   - The current units of measurement will be indicated by the flag on the right hand of the screen.
3. Press the black button under the Enter icon ( ) shown on the diagnostic panel on the current selected icon and the display will reboot to now display the selected units of measurement.
4. To return to the “Home Screen”, press the black button under the Home icon ( ) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

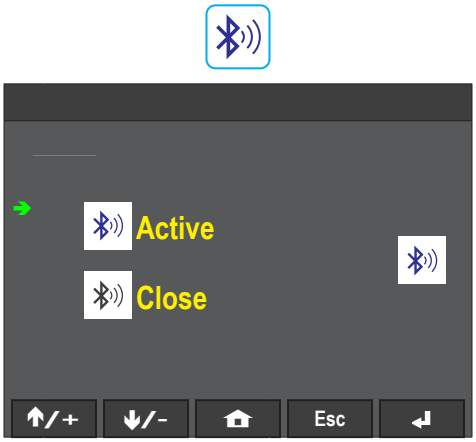
Language Menu



1. In the “Display Settings” interface, make sure that the “Language” icon (world) is selected then press the black button under the Enter icon ( ) shown on the diagnostic panel to enter the “Language” interface.
2. In the “Language” interface, you can switch between Chinese and English for the display language.
   - You can press the black button under the Up Arrow (/ +) and/or Down Arrow (/ -) to change the current selection.
   - The current select language will be indicated by the flag on the right hand of the screen.
3. Press the black button under the Enter icon ( ) shown on the diagnostic panel on the current selected icon and the text will change to the selected language.
4. To return to the “Home Screen”, press the black button under the Home icon ( ) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

Bluetooth Menu

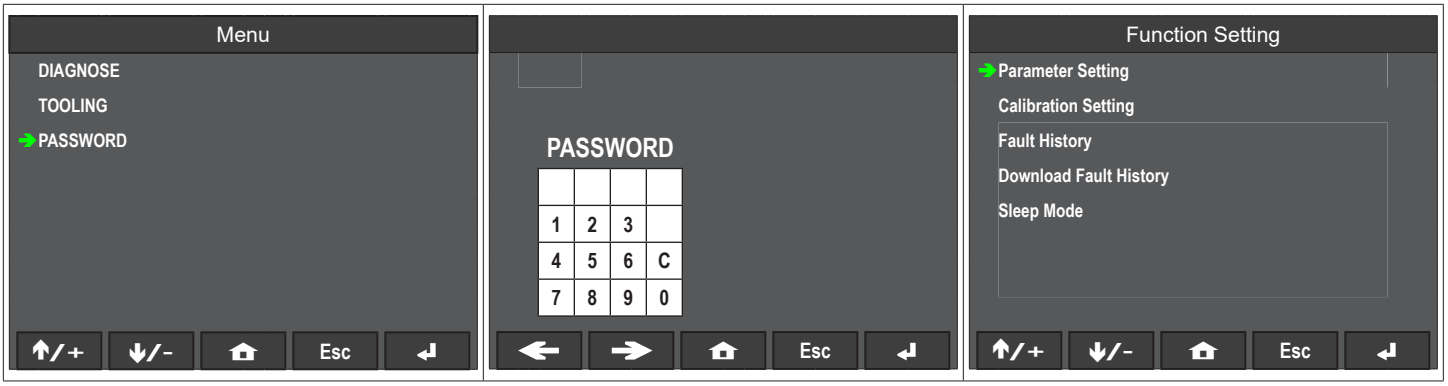
1. In the “Display Settings” interface, make sure that the “Bluetooth” icon (Bluetooth symbol) is selected then press the black button under the Enter icon (↵) shown on the diagnostic panel to enter the “Bluetooth” interface.
2. In the “Bluetooth” interface, you can turn on or turn off the Bluetooth feature.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to change the current selection.
   - The current status of the Bluetooth function will be indicated by the right icon.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel on the current selected icon and Bluetooth will now be turned on or off depending on y our selection.



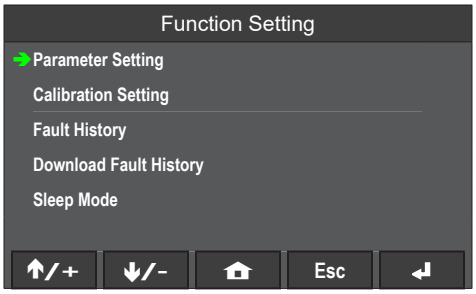
4. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

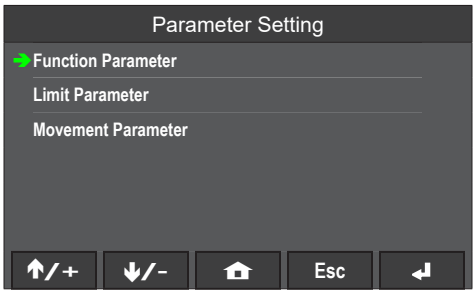
Function Settings Interface

1. From the “Home Screen”, press the black button under the “Menu” icon shown on the diagnostic panel.
2. In the “Menu” interface, make sure that the “Password” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Password” option is selected.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
4. In the “Password” menu, press the black button under the Left Arrow (←) and/or Right Arrow (→) to select the correct characters.
5. Once you have a character selected, press the black button under the Enter icon (↵) shown on the diagnostic panel to enter the selected key.
6. Enter “9735”, then hold and release the Enter icon (↵) to enter the “Function Setting” interface.



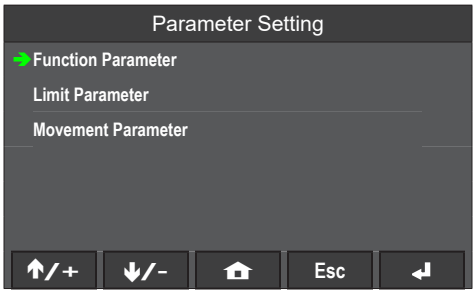
Parameter Settings Interface

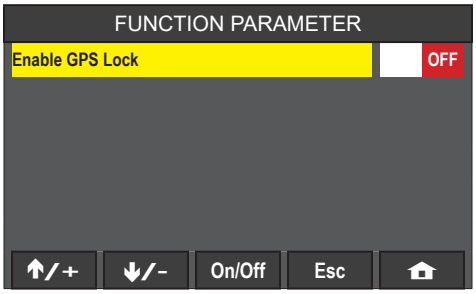




1. To access the “Function Setting” interface, follow the instructions on page 54.
2. In the “Function Setting” interface, make sure that the “Parameter Setting” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Parameter Setting” option is selected.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
4. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

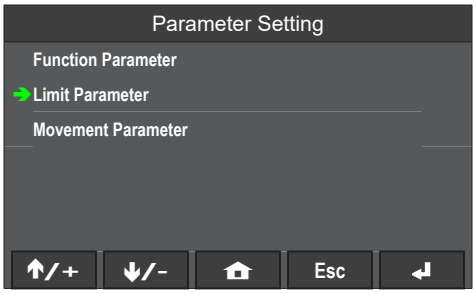
Function Parameter

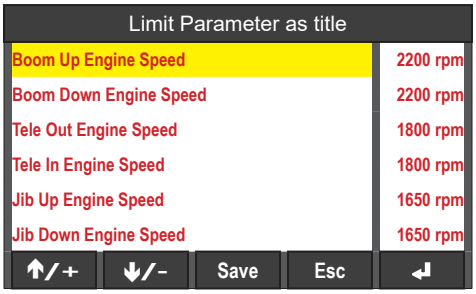




1. In the “Parameter Setting” interface, make sure that the “Function Parameter” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Function Parameter” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. In the “Function Parameter” interface, you can press the black button under the On/Off (**On/Off**) to turn on to turn on or turn off the machine GPS Lock.
   - If there is a green square with the words “ON”, then the function has been enable.
   - If there is a red square with the words “OFF”, then the function has been disabled.
4. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous interface press the black button under the Escape icon (**Esc**).

Limit Parameter

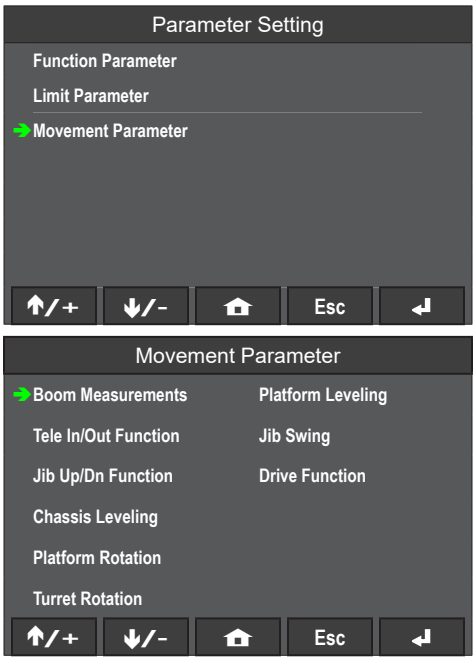




1. In the “Parameter Setting” interface, make sure that the “Limit Parameter” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Limit Parameter” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. In the “Limit Parameter” interface, press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to scroll through the list of parameter values.
4. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

The values shown in the chart are for reference on how the information will be displayed when viewed and may vary from machine to machine.

Movement Parameter



1. In the “Parameter Setting” interface, make sure that the “Movement Parameter” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Movement Parameter” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. In the “Movement Parameter” interface, you can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to select the parameter you want.
4. Press the black button under the Enter icon (↵) shown on the diagnostic panel to enter the currently selected parameter.
5. For some of the machine parameters, you will have to press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to scroll through the entire list of parameter values.
6. To return back to the “Movement Parameter” interface after entering one of the parameter interfaces, press the black button under the Escape icon (**Esc**).
7. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

The values shown in the chart are for reference on how the information will be displayed when viewed and may vary from machine to machine.

Boom Measurements		Tele In/Out Function		Jib Up/Dn Function	
P548 Boom Up Start Ramp	2000 ms	P568 Boom Out Start Ramp	3000 ms	P588 Jib Up Start Ramp	2000 ms
P549 Boom Up Stop Ramp	1500 ms	P569 Boom Out Stop Ramp	2000 ms	P591 Jib Down Stop Ramp	1140 ms
P550 Boom Down Start Ramp	3000 ms	P570 Boom In Start Ramp	3000 ms	P589 Jib Up Stop Ramp	2000 ms
P551 Boom Down Stop Ramp	1500 ms	P571 Boom In Stop Ramp	2000 ms	P590 Jib Down Start Ramp	2000 ms
P811 Boom Up Opening	81.2 %	P816 Boom Out Opening	52.0 %	P821 Jib Up Speed Opening	55.2 %
P812 Boom Down Opening	53.2 %	P817 Boom In Opening	50.0 %	P822 Jib Down Speed Opening	60.0 %
P813 Boom Up Multi Opening	90.0 %	P818 Boom Out Multi Opening	50.0 %	P823 Jib Up Multi Speed Opening	46.0 %
P814 Boom Down Multi Opening	52.0 %	P819 Boom In Multi Opening	35.2 %	P824 Jib Down Multi Speed Opening	40.0 %
				Jib Up Max Open M Wh Jib Rot	80.0 %
				Jib Dn Max Open M Wh Jib Rot	75.2 %
↑/+ ↓/- Save Esc ↵		↑/+ ↓/- Save Esc ↵		↑/+ ↓/- Save Esc ↵	

Chassis Leveling

Chassis Left Leveling Start Ramp	2500 ms
Chassis Left Leveling Stop Ramp	1000 ms
Chassis Right Leveling Start Ramp	2500 ms
Chassis Right Leveling Stop Ramp	1000 ms
Chassis Left Leveling Multi Opening	78.0 %
Chassis Right Leveling Multi Opening	88.0 %
Chassis Left Leveling Opening	64.8 %
Chassis Right Leveling Opening	64.8 %

↑/+ ↓/- Save Esc ↵

Platform Rotation

P628 Platform CW Rotation Start Ramp	2000 ms
P629 Platform CW Rotation Stop Ramp	1500 ms
P630 Platform CCW Rotation Start Ramp	2000 ms
P631 Platform CCW Rotation Stop Ramp	1500 ms
P831 Platform CW Rotation Opening	36.0 %
P832 Platform CCW Rotation Opening	30.8 %
Platform CW Max Open Multi Jib Up	29.2 %
Platform CCW Max Open Multi Jib Up	24.0 %
Platform CW Max Open Multi Jib Dn	35.2 %
Platform CCW Max Open Multi Jib Dn	28.0 %
Bkt Rt Max Open Multi Jib Rot	30.0 %
Bkt Lf Max Open Multi Jib Rot	30.0 %

↑/+ ↓/- Save Esc ↵

Turret Rotation

P648 Turret CW Rotation Start Ramp	3500 ms
P649 Turret CW Rotation Stop Ramp	3500 ms
P650 Turret CCW Rotation Start Ramp	3500 ms
P651 Turret CCW Rotation Stop Ramp	3500 ms
P836 Turret CW Opening	50.0 %
P837 Turret CCW Opening	55.2 %
P838 Turret CW Multi Opening	40.0 %
P839 Turret CCW Multi Opening	44.8 %

↑/+ ↓/- Save Esc ↵

Platform Leveling

P707 Platform Level Up Start Ramp	2000 ms
P708 Platform Level Up Stop Ramp	2000 ms
P709 Platform Level Down Start Ramp	2000 ms
P710 Platform Level Down Stop Ramp	2000 ms
P851 Platform Level Up Opening	45.2 %
P852 Platform Level Down Opening	47.2 %
P853 Platform Level Up Multi Opening	44.8 %
P854 Platform Level Down Multi Opening	50.0 %

↑/+ ↓/- Save Esc ↵

Jib Swing

Jib Left Swing CW Start Ramp	1500 ms
Jib Left Swing CCW Stop Ramp	1500 ms
Jib Right Swing CW Start Ramp	1500 ms
Jib Right Swing CCW Stop Ramp	1500 ms
Jib Left Swing CW Speed Percent	33.2 %
Jib Right Swing CCW Speed Percent	33.2 %
Jib Left Swing CW Multi Action Speed	36.8 %
Jib Right Swing CCW Multi Action Speed	30.0 %
Jib Rt Max Open M Wh Plat Rot	35.2 %
Jib Lf Max Open M Wh Plat Rot	40.0 %

↑/+ ↓/- Save Esc ↵

Drive Function

P668 Drive Forward Start Ramp	2500 ms
P669 Drive Forward Stop Ramp	1500 ms
P670 Drive Backward Start Ramp	2500 ms
P671 Drive Backward Stop Ramp	1500 ms
P861 Drive Forward Elevated Slow Opening	14.0 %
P862 Drive Backward Elevated Slow Opening	22.0 %
P863 Drive Forward Fast Opening	75.2 %
P864 Drive Backward Fast Opening	75.2 %
P865 Drive Forward Grade Opening	30.0 %
P866 Drive Backward Grade Opening	30.0 %
P867 Drive Forward 4W Steer/ Slow Opening	48.0 %
P868 Drive Backward 4W Steer/ Slow Opening	52.0 %
P869 Drive Forward 4W Steer Opening	33.2 %
P870 Drive Backward 4W Steer Opening	33.2 %
P415 Steer Speed Opening	100.0 %

↑/+ ↓/- Save Esc ↵

Calibration Settings

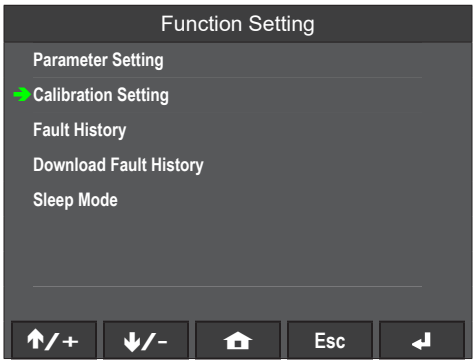
If the sensor or MC43FS (controller) fails, the corresponding sensor needs to be re calibrated.

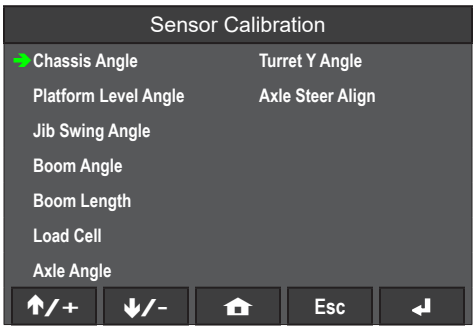
DANGER

Improper calibration can result in machine instability leading to death or serious personal injury. The following operations must be performed in its entirety as described herein to prevent improper machine operation. Read all instructions closely before attempting each step of the calibration procedure.

Calibration Setting Interface

1. To access the “Function Setting” interface, follow the instructions on page 54.
2. In the “Function Setting” interface, make sure that the “Calibration Setting” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Calibration Setting” option is selected.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
4. In the “Sensor Calibration” interface, you will see the various sensors that you will be able to calibrate. Press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to select the machine sensor you want to calibrate.
5. Once you have the sensor that you want to calibrate, press the black button under the Enter icon (↵) shown on the diagnostic panel to enter the selected sensor calibration interface.

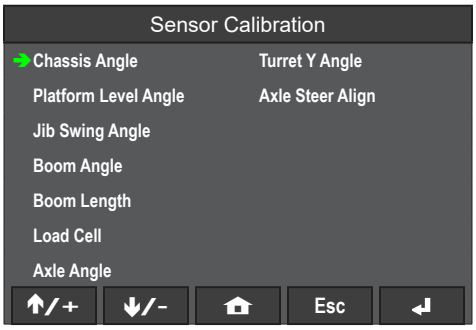


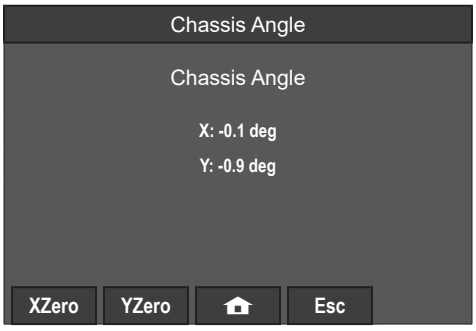


Chassis Angle Calibration

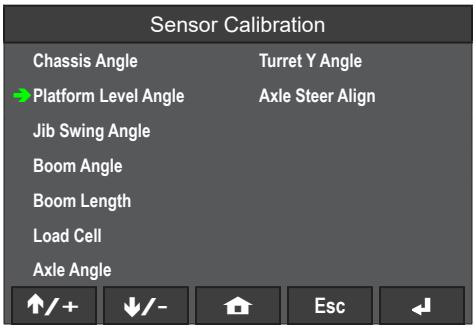
For basic information about the Chassis Tilt Sensor, refer to page 66.

1. Make sure that the machine is parked on a flat, level surface.
2. Make sure that both the X-Axis and Y-Axis sensor data is 0 degrees.
3. In the “Chassis Angle” interface, press and hold the black button under XZero (**XZero**) for several seconds to calibrate the Chassis X-Axis.
4. In the “Chassis Angle” interface, press and hold the black button under YZero (**YZero**) for several seconds to calibrate the Chassis Y-Axis.
5. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).





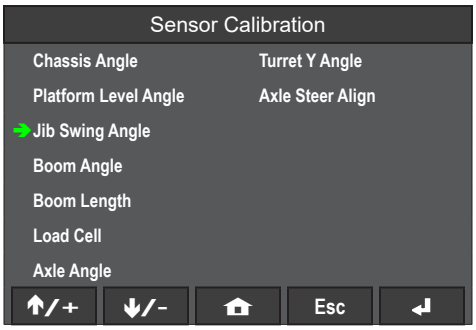
Platform Level Angle Calibration

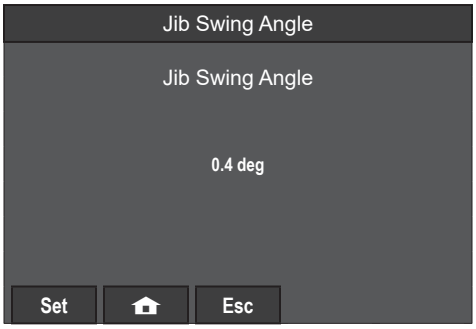


For basic information about the Platform Level Angle Sensor, refer to page 67.

1. Make sure that the machine is parked on a flat, level surface and that the main boom is fully retracted and stowed.
2. Make sure that the Platform Level Angle sensor data is 0 degrees.
3. In the “Platform Level Angle” interface, press and hold the black button under Set (**Set**) for several seconds to calibrate the platform level angle.
4. To return to the “Home Screen”, press the black button under the Home icon ( ) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

Jib Swing Angle Calibration





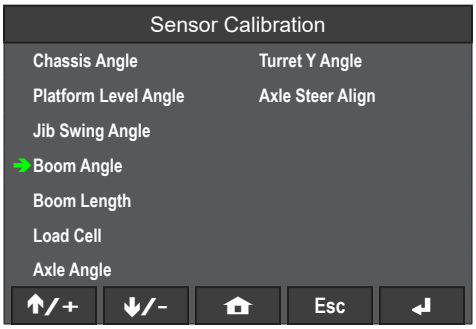
For basic information about the Jib Swing Angle Sensor, refer to page 67.

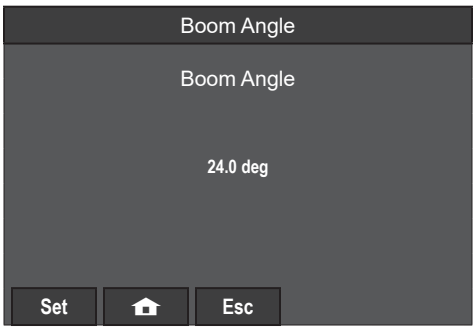
1. Make sure that the machine is parked on a flat, level surface and that the main boom is fully retracted and stowed.
2. Make sure that the Jib Swing Angle sensor data is 0 degrees.
3. In the “Jib Swing Angle” interface, press and hold the black button under Set (**Set**) for several seconds to calibrate the jib swing angle.
4. To return to the “Home Screen”, press the black button under the Home icon ( ) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

Boom Angle Calibration

For basic information about the Boom Angle sensor, refer to page 66.

1. Make sure that the machine is parked on a flat, level surface and that the main boom is fully retracted and stowed.
2. Make sure that the Boom Angle sensor data is 0 degrees.
3. In the “Boom Angle” interface, press and hold the black button under Set (**Set**) for several seconds to calibrate the main boom angle.
4. To return to the “Home Screen”, press the black button under the Home icon ( ) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

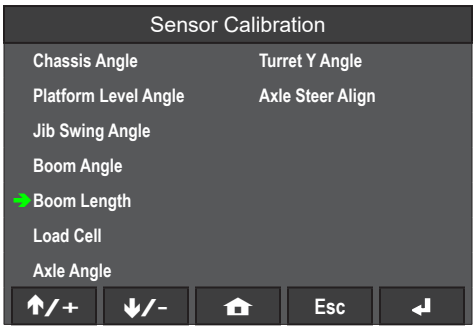


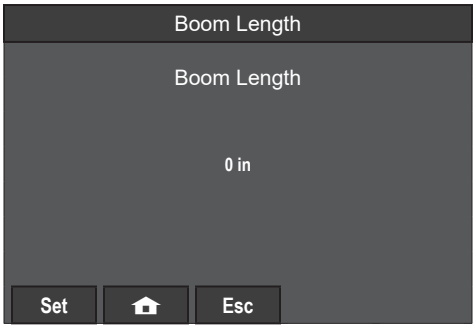


Boom Length Calibration

For basic information about the Boom Length sensor, refer to page 66.

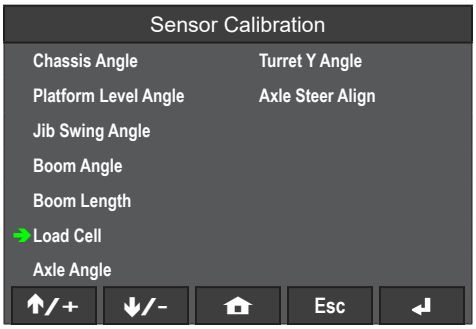
1. Make sure that the machine is parked on a flat, level surface and that the main boom is fully retracted and stowed.
2. Make sure that the Boom Length sensor data is 0 inches.
3. In the “Boom Length” interface, press and hold the black button under Set (**Set**) for several seconds to calibrate the main boom length.
4. To return to the “Home Screen”, press the black button under the Home icon ( ) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

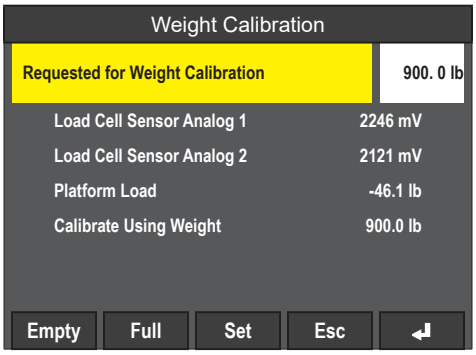




Load Cell Calibration

For basic information about the Load Cell sensor, refer to page 68.

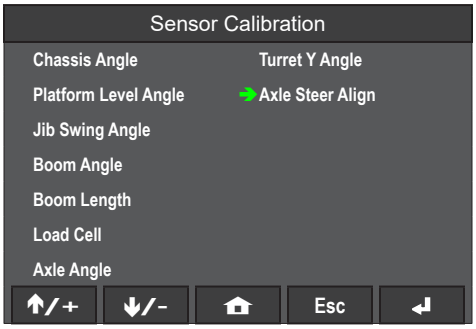


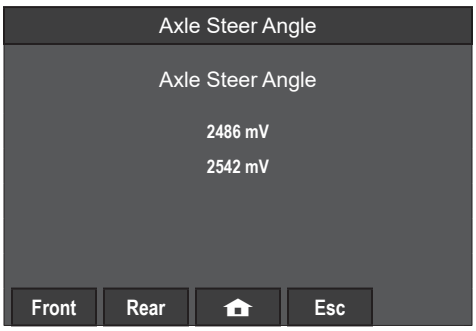


1. Make sure that the machine is parked on a flat, level surface and that the main boom is fully retracted and stowed with the platform empty.
2. In the “Weight Calibration” interface, press and hold the black button under Empty (**Empty**) for several seconds to calibrate the empty platform load.
3. Put the maximum rated load on the platform then press and hold the black button under Full (**Full**) for several seconds to calibrate the full platform load.
4. To go back to a previous menu press the black button under the Escape icon (**Esc**).

Axle Steer Align Calibration

For basic information about the Axle Steer sensors, refer to page 69.





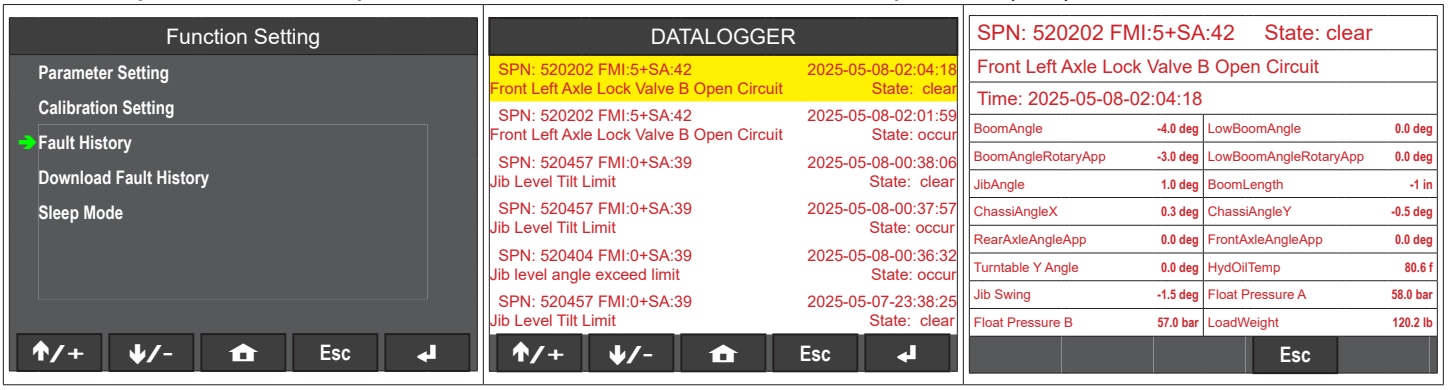
1. Make sure that the machine is parked on a flat, level surface and that both tires are pointing straight parallel with the chassis.
2. In the “Axle Steer Angle” interface, press and hold the black button under Front (**Front**) for several seconds to calibrate the front axle angle sensor.
3. In the “Axle Steer Angle” interface, press and hold the black button under Rear (**Rear**) for several seconds to calibrate the front axle angle sensor.
4. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).

Fault Code Interface

The machine will keep a history of previous fault codes.

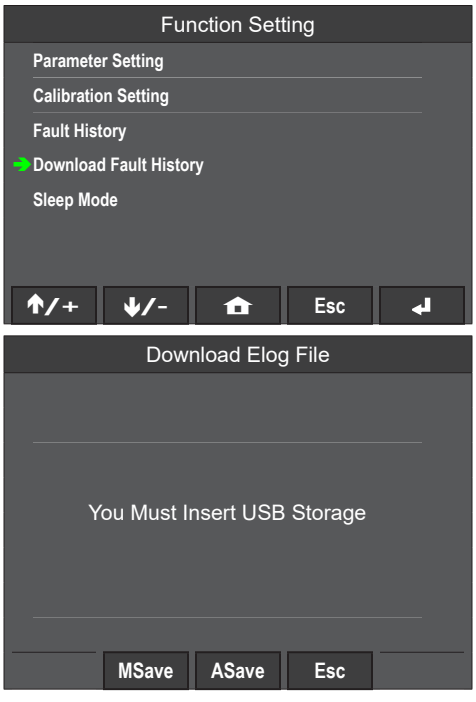
Fault History Interface

1. To access the “Function Setting” interface, follow the instructions on page 54.
2. In the “Function Setting” interface, make sure that the “Fault History” option is selected.
   - You can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) to make sure that the “Fault History” option is selected.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
4. In the “Fault History” interface, press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) to scroll through the machine history of previous faults with each fault code entry displaying: the SPN, FMI, the date and time, fault code description, and the state of the fault.
5. If you press the black button under the Enter icon (↵) shown on the diagnostic panel on the currently select fault code, you will see the machine sensor data at the time of the fault code.
6. If you are inside the machine fault code data interface, press the black button under the Escape icon (**Esc**) to go back to the “DATALOGGER” interface.
7. To return to the “Home Screen”, press the black button under the Home icon (🏠) or to go back to a previous menu press the black button under the Escape icon (**Esc**).



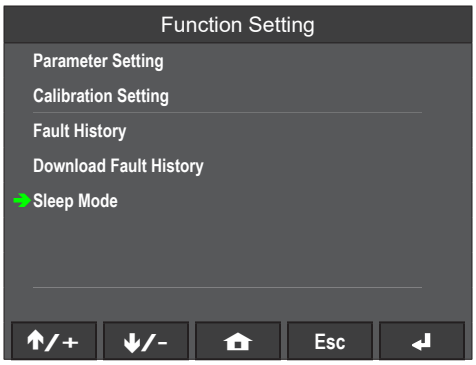
Download Fault History

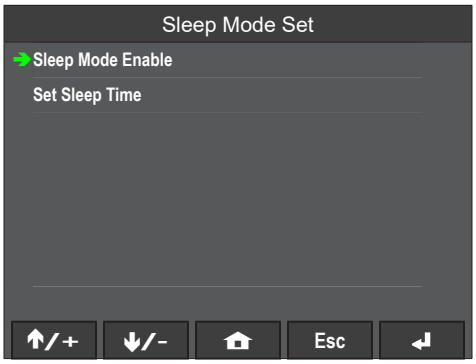
1. In the “Function Setting” interface, make sure that the “Download Fault History” option is selected.
   - You can press the black button under the Up Arrow (🡅/+) and/or Down Arrow (🡇/-) to make sure that the “Download Fault History” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. In the “Download Fault History” interface,



Sleep Mode Interface

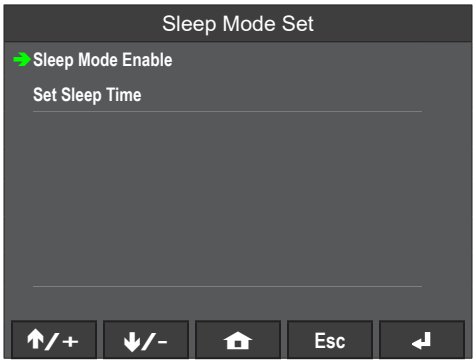
Sleep Mode Set Interface

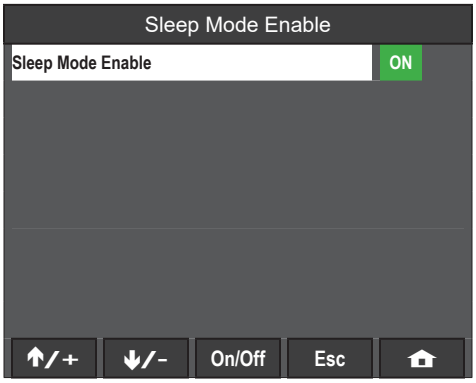




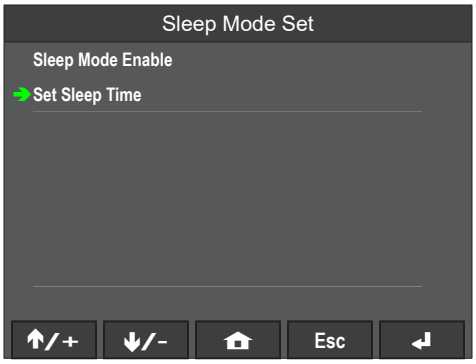
1. To access the “Function Setting” interface, follow the instructions on page 54.
2. In the “Function Setting” interface, make sure that the “Sleep Mode” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Sleep Mode” option is selected.
3. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
4. In the “Sleep Mode” interface, press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to select the interface you want to enter.
5. Once you have the interface you want to enter selected, press the black button under the Enter icon (↵) shown to enter the selected interface.

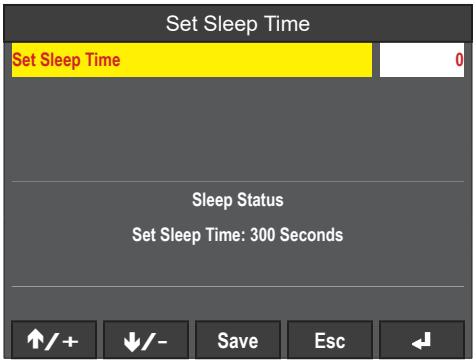
Sleep Mode Enable Interface





1. In the “Sleep Mode Set” interface, make sure that the “Sleep Mode Enable” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Sleep Mode Enable” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. In the “Sleep Mode Enable” interface, press the black button under the On/Off (**On/Off**) to turn on or turn off the selected machine function.
   - If there is a green square with the words “ON”, then the function has been enable.
   - If there is a red square with the words “OFF”, then the function has been disabled.
4. To return to the “Home Screen”, press the black button under the Home icon (⌂) or to go back to a previous menu press the black button under the Escape icon (**Esc**).





Set Sleep Time Interface

1. In the “Sleep Mode Set” interface, make sure that the “Set Sleep Time” option is selected.
   - You can press the black button under the Up Arrow (↑/+) and/or Down Arrow (↓/-) to make sure that the “Set Sleep Time” option is selected.
2. Press the black button under the Enter icon (↵) shown on the diagnostic panel.
3. In the “Set Sleep Time” interface, you can set the amount of seconds it takes before the display goes to sleep.

Sensors, Switches, and Manifolds

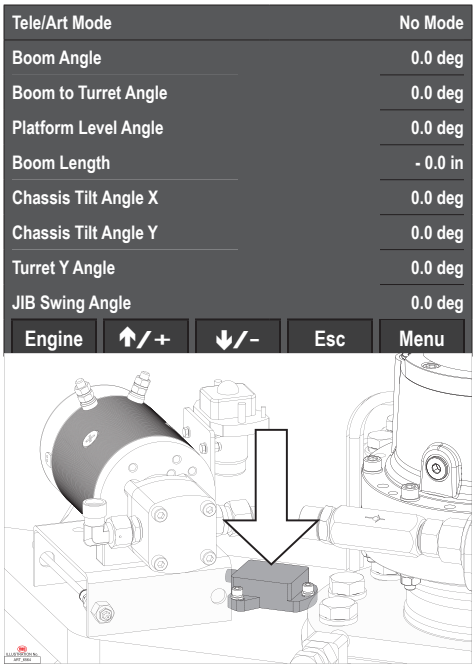
Tilt Sensor

When the machine is raised, the maximum tilt angle allowed by the machine is 5°.

The tilt sensor will monitor the horizontal angle value of the chassis in real time. If the tilt angle of the chassis is too large, the system will give an alarm and prohibit continued work.

In the “Data” interface, you can see the Chassis Tilt Axle data. Refer to page 43 for instructions on how to view the “Data” interface.

For instructions on how to calibration the Chassis Angle sensor, refer to page 59.



Boom Length & Boom Angle Sensor

The sensor can monitor the length and angle of the main-boom in real time. There are 2 kinds of switches that can detect the state of the main boom.

- Down limit switch
- Length Angle Sensor

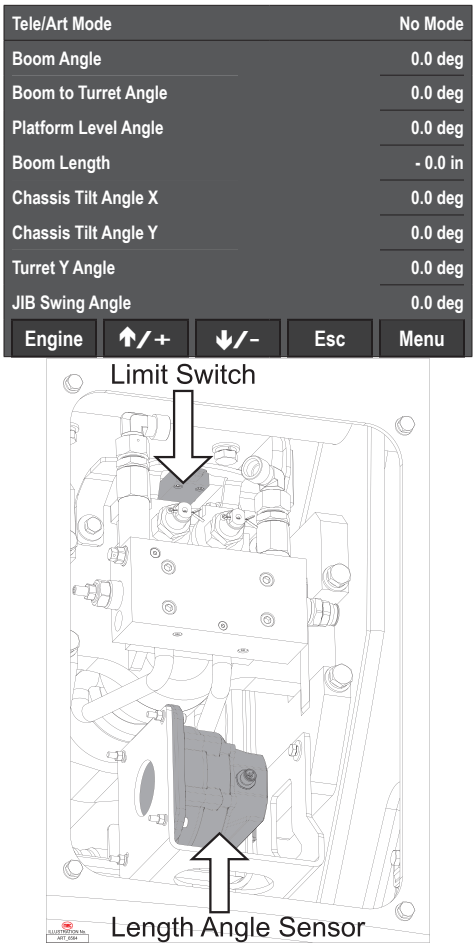
Operators can check whether the limit switch is faulty in the parameters interface of main controller. To check the I/O Status, refer to page 45 for instructions.

The parameter of should read as “TRUE” and if the parameter reads as “FALSE” the limit switch and boom chains should be examined.

Turret Controller		
Pin	**Definition**	**Value**
C1: 26	Chain Break Switch	TRUE

In the “Data” interface, you can see the Boom Length and Boom Angle data. Refer to page 43 for instructions on how to view the “Data” interface.

For instructions on how to calibration the Boom Angle sensor refer to page 61 and for the Boom Length sensor refer to page 61.

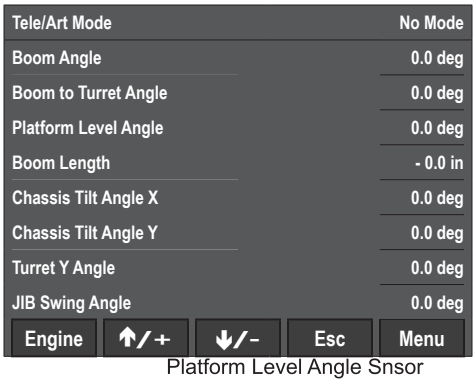


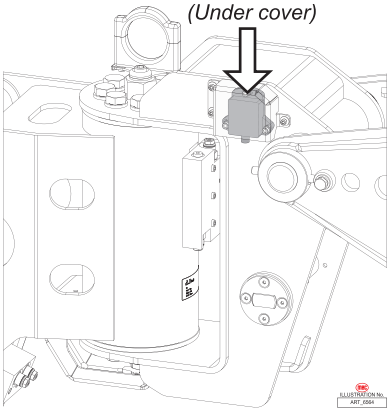
Platform Level Angle Sensor

The sensor can monitor the angle of platform in real time to ensure the safety of the operator.

In the “Data” interface, you can see the Platform Level Angle data. Refer to page 43 for instructions on how to view the “Data” interface.

For instructions on how to calibration the Platform Level Angle sensor, refer to page 60.



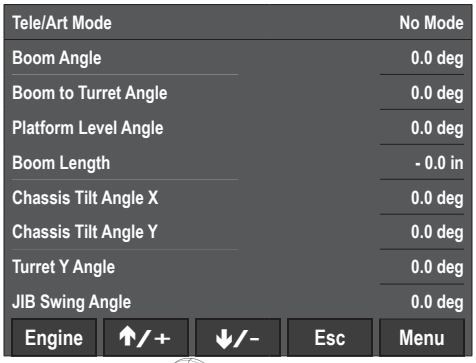


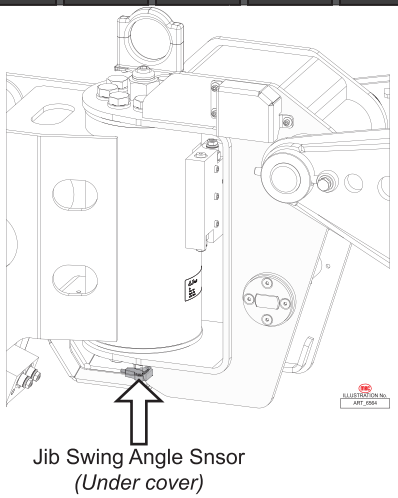
Jib Swing Angle Sensor

The sensor can monitor the angle of the jib in real time to ensure the safety of the operator.

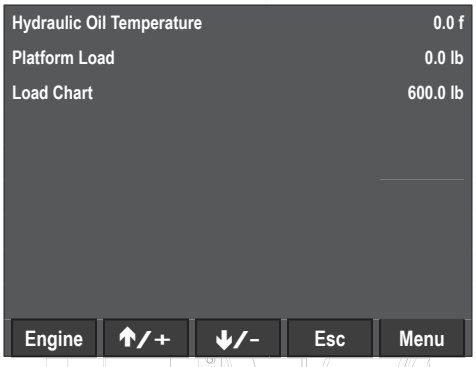
In the “Data” interface, you can see the Jib Swing Angle data. Refer to page 43 for instructions on how to view the “Data” interface.

For instructions on how to calibration the Jib Swing Angle sensor, refer to page 60.





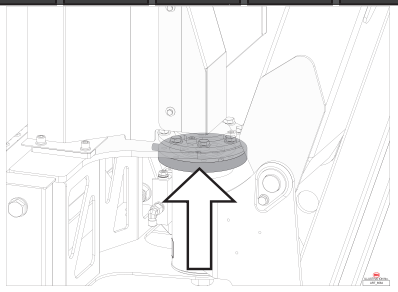
Platform Load Sensor & Signal Amplifier



The Platform Load Sensor can monitor the angle of the jib in real time to ensure the safety of the operator.

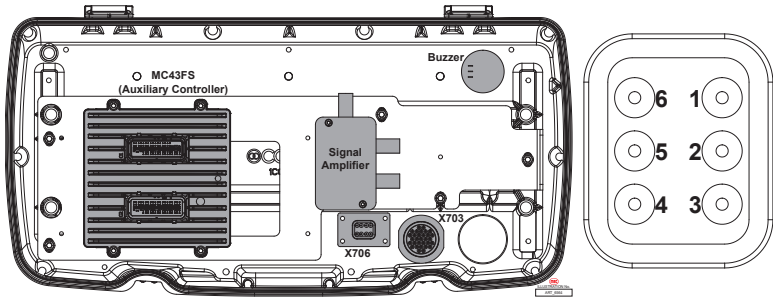
In the “Data” interface, you can see the Platform Load data. Refer to page 43 for instructions on how to view the “Data” interface.

The output signal of the load sensor is very weak (mV level), and the controller cannot directly process the signal. Therefore, a signal amplifier is required to amplify the weakly changed differential signal output by the sensor for the controller to process.



For instructions on how to calibration the Load Cell sensor, refer to page 62.

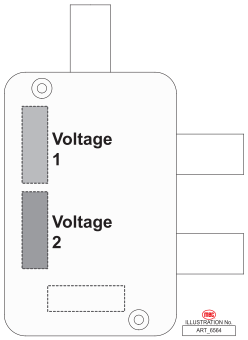
To confirm whether the load sensor is normal, perform the following instructions.



1. In the platform box, find the connector “X706”.
   - Pin 1: Signal 1 +
   - Pin 2: Power +
   - Pin 3: Signal 1
   - Pin 4: Signal 2 +
   - Pin 5: Power
   - Pin 6: Signal 2
2. Turn on the machine, measure the input voltage to load sensor (Between pin 2 & 5: 8V).
3. With the platform being empty, measure the voltage values of signal 1 and signal 2 respectively (about 1.9mV).
   - Signal 1: red pen to Pin 1, black pen to Pin 3.
   - Signal 2: red pen to Pin 4, black pen to Pin 6.
4. With the platform holding the maximum amount of weight, measure the voltage values of signal 1 and signal 2 in the same way (about 3.4mV).

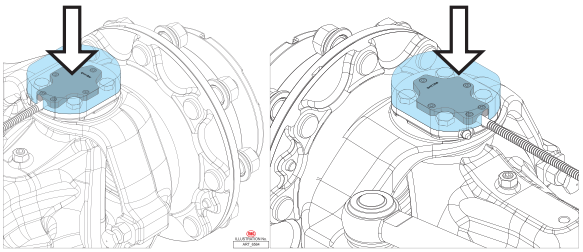
Note: The values measured above are for reference only, and there may be differences between different models.

When it is difficult to judge, disconnect the load sensor from signal amplifier to eliminate interference of the amplifier with the signal.



1. Measure Voltage 1 & 2 directly (mV).
2. Remove the white wires & green wires from the amplifier, then measure Voltage 1 & 2 (mV).

Axle Steer Angle Sensors



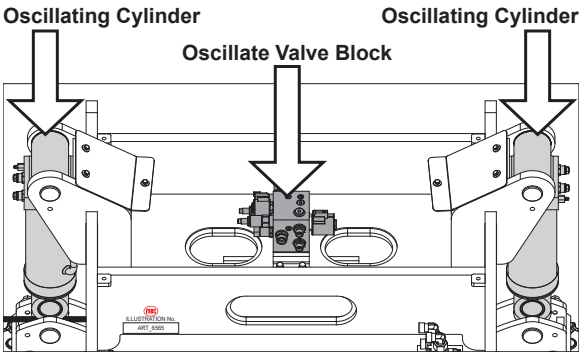
There is a steer angle sensor on each axle to detect whether the tires are in the neutral position. Each sensor is under a plastic covering to prevent them from being damaged.

For instructions on how to calibration the Axle Steer Angle sensor, refer to page 62.

Operators can check whether the sensor is faulty in the parameters interface of main controller. To check the I/O Status, refer to page 45 for instructions.

Chassis Controller		
Pin	**Definition**	**Value**
C2: 57	Front Steer Neutral Position Signal	2500mV
C2: 58	Rear Steer Neutral Position Signal	2500mV

Oscillating Axle



	Oscillating Axles Disengaged
	Oscillating Axles Engaged

At the front axle, there are 2 oscillating cylinders.

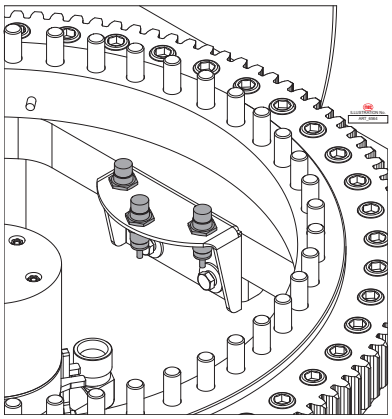
When the machine is driving at stowed state, the spools on these 2 cylinders open the oil circuit, allowing the front axle to oscillate freely according to the terrain and the corresponding icon of the Main Menu display will light up.

In other cases, the oscillating axle of the machine is in a lock state, and the axle cannot oscillate to ensure the safety of the machine.

Operators can also check the I/O Status of the 2 oscillating axles, refer to page 45 for instructions.

Chassis Controller			
Pin	**Definition**	**Value (Locked State)**	**Value (Oscillating State)**
C2: 34	Oscillate Cylinder Feedback Signal 3 Left NO	FALSE	TRUE
C2: 35	Oscillate Cylinder Feedback Signal 1 Left NC	FALSE	TRUE
C2: 36	Oscillate Cylinder Feedback Signal 4 Right NO	FALSE	TRUE
C2: 37	Oscillate Cylinder Feedback Signal 2 Right NC	FALSE	TRUE

Turret Limit Switches



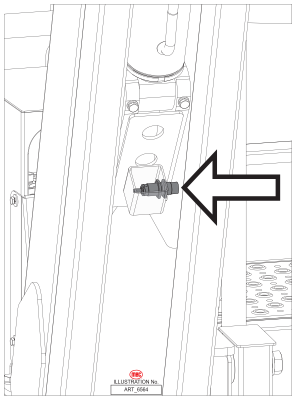
These 3 sensors are used to detect what state the turret is currently in.

If the turret is not in the neutral position, the system will limit some of the machine's functions to ensure the safety of operators.

Operators can also check the I/O Status of the 3 turret limit switches, refer to page 45 for instructions.

Chassis Controller			
Pin	**Definition**	**Value (Neutral Position)**	**Value (Out of Neutral Position)**
C2: 42	Turret to Left Proximity	TRUE	FALSE
C2: 55	Turret to Right Proximity	TRUE	FALSE
C2: 56	Turret to Middle Proximity	TRUE	FALSE

Jib Limit Switch



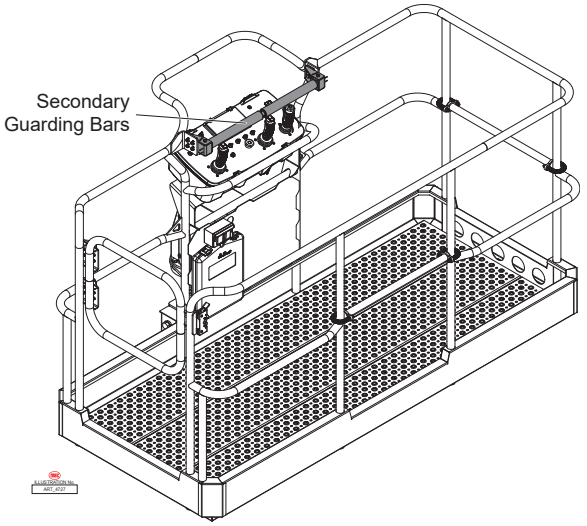
The Jib limit switch is used to detect whether the jib reaches the lowest or highest position.

When reaching the lowest or highest position, it will reduce the speed of the jib.

Operators can also check the I/O Status of the jib limit switch, refer to page 45 for instructions. When the value is "TRUE", then the jib is currently either at its lowest or highest position.

Platform Controller		
Pin	**Definition**	**Value**
C2: 6	Jib Down Proximity Switch	TRUE

Secondary Guarding



1. As a safety feature, there are 2 yellow colored swinging bars positioned above the Platform controls. If one or both bars are pushed forward, all machine functions will stop immediately sounding an alarm.
2. If at any time one or both bars are depressed, evaluate the instance that caused the actuation and proceed accordingly with choice 3 or 4.
3. To reset the system, allow the bars to return to the natural centered position, return all control handles to neutral position and release all enable trigger switches. Normal operation may be resumed.

4. To enable limited operation while one or both bars are depressed, push up and hold the Emergency Platform Bypass switch (see illustration to right). While holding the Bypass switch, select the desired function and operate it in the normal procedure. Certain lift functions such as Riser Boom Up, Main Boom Up, and Telescope out are not available in this bypass mode.
5. If normal operation doesn't resume, please contact Product Support for assistance.

ILLUSTRATION No.
ART_6097

Emergency Platform Bypass Switch

ILLUSTRATION No.
ART_6097

Horn Button

At the Platform Controls, press the Horn Button and the horn will sound to warn other personnel to avoid accidents.

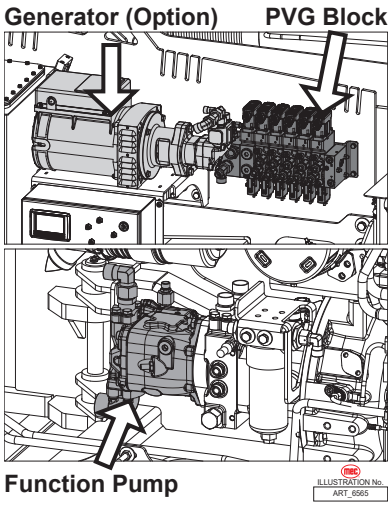
Beacon & Buzzer

When operating the machine, the beacon will flash and the buzzer will sound at a fixed frequency, to acting as a warning to all nearby personnel.

Machine System Components and Functions

Function System Component

Function Pump



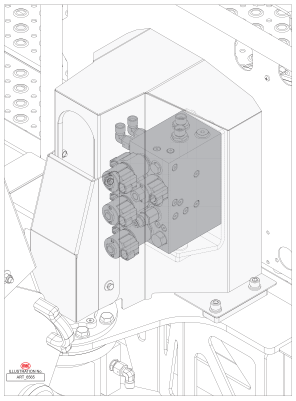
The 35CC Functions Pump delivers hydraulic fluid under pressure to the Functions Manifold and provides pressure to the platform and turntable functions, in addition to controlling the axle cylinders and the brakes. Refer to page 93 for Function Pump ports.

PVG Block

The PVG is located by the lower controls. By controlling the opening and closing of the oil circuits, many functions of boom movement can be activated. In the event of an emergency, the PVG blocks can be operated manually for emergency operation. Refer to page 94 for port specific machine functions.

Hydraulic Zone			
Climate	Polar Regions	Temperate Zone	Tropical Zone
ISO Grade	32#	46#	68#
Capacity	29 gal (110L)		
Recommended Oil	Mobil Univis N 32	Mobil Univis N 46	Mobil Univis N 68

Platform Valve Block

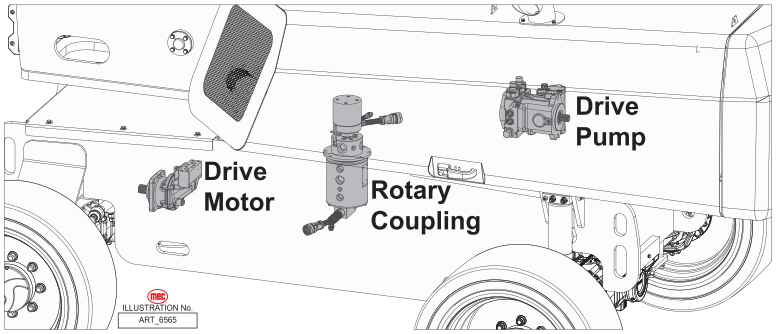


When unit #1 & unit #6 of the PVG Block are energized, then the oil will flow into the Platform Valve Block. Various functions are realized by controlling the valves on the platform valve block.

The valve block has 3 functions: platform rotation, jib rotation, and jib lift/lower. Refer to page 95 for port specific machine functions.

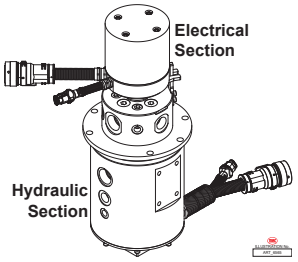
Drive System Component

Drive Pump & Drive Motor



The engine powers the drive pump to run, so that hydraulic oil flows into the drive motor which powers the drive axle.

Rotary Coupling



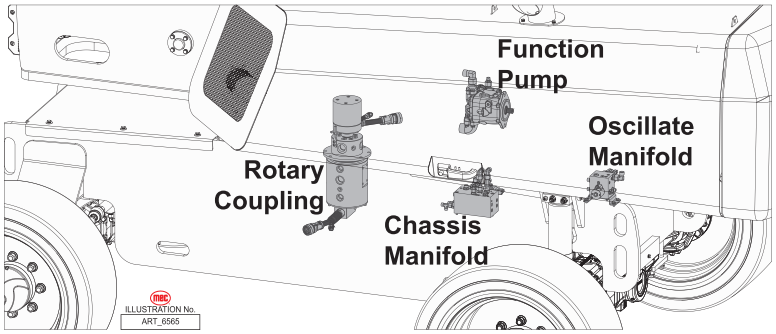
The Rotary Coupling can be divided into two parts: electrical part and hydraulic part.

The Rotary Coupling connects electrical wires and hydraulic oil hoses between the chassis and the boom, so that the turret can rotate 360° without interruption.

Chassis & Oscillate Valve Block

Chassis Valve Block

The Chassis Valve Block has several functions such as steering, brake release, differential lock, and even steering mode. Refer to page 96 for port specific machine functions.



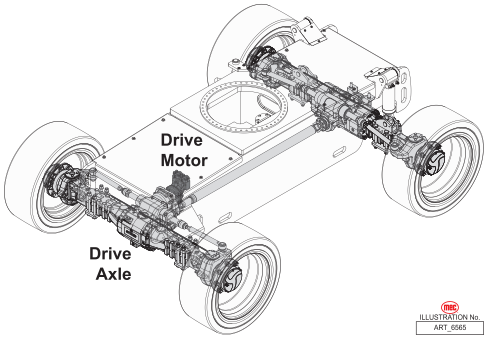
Oscillate Manifold

For information about the Oscillating Axle system then refer to page 69. Refer to page 97 for port specific machine functions.

Drive Axle

The drive motor can provide power to the drive axle, thereby realizing the function of four wheel drive.

In addition to front wheel steering, the machine also has 2-Wheel Steering & Crab Steering.



From the upper controls, the Steering Mode can be selected and the corresponding icon of the Main Menu display will light be displayed.

	**4-Wheel Steer** The front and rear wheels steer in opposite directions.
	**2-Wheel Steer** Only the front two wheels steer.
	**Crab Steer** All four wheels turn in the same direction.

Fault Codes

Warning Code		
SPN	**FMI**	**Description**
520232	2	Overloaded Light Limit
520232	3	Overloaded Heavy Limit
520347	11	Table Tilt Zero Set Out of Range
520353	15	Boom Angle Sensor Internal Error
520364	1	Chassis Leveled
520400	0	Boom Stowed Position
520401	0	Boom Max Height Limit
520402	0	Boom Length Min Limit
520403	0	Boom Length Max Limit
520404	0	Jib Level Angle Exceed Limit
520406	0	Engine Coolant High Temperature Limit
520409	0	Engine Air Filter Failure
520410	0	Engine Hood Open
520411	0	Low Fuel Level
520412	0	Hydraulic Oil High Temperature
520418	24	Front Axle Tilt Angle Zero Calibration Set
520418	25	Rear Axle Tilt Angle Zero Calibration Set
520418	26	Jib Rotation Center Set
520420	0	Telescope Mode, Riser Angle Too Low
520423	0	Swing Joystick Error
520423	1	Boom Up/Dn Joystick Error
520424	0	Load Cell Sensor Error
520425	0	Platform Swing Joystick error
520426	0	Jib Joystick Error
520427	0	Drive Joystick Error
520428	0	Chain Proximity Switch Error
520430	0	Chassis Extension Prohibits Drive
520431	0	Drive Prohibits Chassis Extension
520432	0	Amplitude & telescope limit early warning
520433	0	Emergency Pump Operation Halted
520433	1	Emergency Pump Operation Timed Out
520435	0	Amplitude & telescope limit
520436	0	Secondary Guarding Switch Open
520438	0	Speed Limited - Generator Enabled
520438	2	Frame leveling prohibit movement
520442	0	Hint for battery working for a long time
520444	0	Tilt Turntable not in center position
520445	0	Tilt Limit Boom Up
520446	0	Tilt Limit Telescope Out
520453	0	Telescope Mode, Riser Angle Too High
520454	0	Travel interlock - Retract Boom

Warning Code		
SPN	**FMI**	**Description**
520457	0	Jib Level Tilt Limit
520458	0	PPSS Warning
520458	2	PPSS Detects Obstruction
520460	0	Analog sensor error
520461	0	PVG Valves Type Wrong
520462	0	GPS remote lock vehicle
520463	0	Riser Reach High Limit
520464	0	Riser Reach Low Limit
520467	0	Boom Reaches Max Angle Limit Action
520469	0	Tilt Limit Riser Up
520479	0	Engine Regeneration Limit Action
520480	0	Regeneration Request Limit Extend
520484	0	Drive Prohibit, Use Rotated Switch
520601	2	Engine Start Protect, Pleaser Wait
520656	1	Please Boom Down to Change Articulated/Telescopic
520656	2	Please Riser Down to Change Articulated/Telescopic
520656	3	Please Boom In to Change Articulated/Telescopic
520656	5	Entered Telescopic Mode Successfully
520657	1	Please Boom Dn or Riser Up to Telescopic
520657	2	Please Boom Up or Riser Dn to Telescopic
520657	3	Please Boom Dn to Articulated
520657	4	Please Riser Dn to Articulated
520657	5	Entered Articulated Mode Successfully
520667	2	Boom Down to Change Articulated/Telescopic

Alarm Codes		
SPN	**FMI**	**Description**
520193	5	Upper Release Valve Open Circuit
520193	6	Upper Release Valve Short Circuit
520193	5	HydraulicGeneratorConsPresValve Open Circuit
520193	6	HydraulicGeneratorConsPresValve Short Circuit
520200	5	Parking Brake Valve Open Circuit
520200	6	Parking Brake Valve Short Circuit
520201	5	Front Left Axle Lock Valve A Open Circuit
520201	6	Front Left Axle Lock Valve A Short Circuit
520202	5	Front Left Axle Lock Valve B Open Circuit
520202	6	Front Left Axle Lock Valve B Short Circuit
520203	5	Front Right Axle Lock Valve A Open Circuit
520203	6	Front Right Axle Lock Valve A Short Circuit
520204	5	Front Right Axle Lock Valve B Open Circuit
520204	6	Front Right Axle Lock Valve B Short Circuit
520205	5	Steering Left/Right Valve Open Circuit
520205	6	Steering Left/Right Valve Short Circuit
520213	5	Steering UTurn Valve Open Circuit

Alarm Codes		
SPN	**FMI**	**Description**
520213	6	Steering UTurn Valve Short Circuit
520226	4	Travel Joystick 2 Open Circuit
520226	3	Travel Joystick 2 Short Circuit
520227	2	Travel Joystick Redundancy Error
520228	1	Axle Tilted
520243	13	Platform Riser Up Input Initial Error
520244	13	Platform Riser Down Input Initial Error
520245	13	Platform HydrGenerator Input Initial Error
520270	4	Jib Angle1 Open Circuit
520270	3	Jib Angle1 Short Circuit
520271	4	Jib Angle2 Open Circuit
520271	3	Jib Angle2 Short Circuit
520272	4	Riser Angle1 Open Circuit
520272	3	Riser Angle1 Short Circuit
520273	4	Riser Angle2 Open Circuit
520273	3	Riser Angle2 Short Circuit
520274	2	Left Floating Axis Switch Redundancy Error
520275	2	Right Floating Axis Switch Redundancy Error
520284	13	Platform Engine RPM Increase Initial Error
520285	13	Platform Engine RPM Decrease Initial Error
520191	5	Jib Swing Valve Open Circuit
520191	6	Jib Swing Valve Short Circuit
520192	5	Jib Lifting/Lowering Valve Open Circuit
520192	6	Jib Lifting/Lowering Valve Short Circuit
520195	5	Platform Rotation Valve Open Circuit
520195	6	Platform Rotation Valve Short Circuit
520197	5	Platform Alarm Buzzer Open Circuit
520197	6	Platform Alarm Buzzer Short Circuit
520198	5	Controller Guard Warning Light Open Circuit
520198	6	Controller Guard Warning Light Over load
520199	5	Drive Forward/Backward Valve Open Circuit
520199	6	Drive Forward/Backward Valve Short Circuit
520206	5	Starter Open Circuit
520206	6	Starter Short Circuit
520207	5	Hydraulic Oil Cooling Fan Output Open Circuit
520207	6	Hydraulic Oil Cooling Fan Output Short Circuit
520208	5	Horn Output Open Circuit
520208	6	Horn Output Short Circuit
520212	5	Emergency Pump Power Output Open Circuit
520212	6	Emergency Pump Power Output Short Circuit
520214	5	Steering Rear Valve Open Load
520214	6	Steering Rear Valve Overload
520215	5	Axle Differential Lock Valve Open Circuit

Alarm Codes		
SPN	**FMI**	**Description**
520215	6	Axle Differential Lock Valve Short Circuit
520216	5	Flashing Beacon Open Circuit
520216	6	Flashing Beacon Short Circuit
520218	5	Chassis Alarm Open Circuit
520218	6	Chassis Alarm Short Circuit
520219	5	Hydraulic Generator Output Open Circuit
520219	6	Hydraulic Generator Output Short Circuit
520221	4	Platform Swing Joystick Open Circuit
520221	3	Platform Swing Joystick Short Circuit
520222	4	Boom Up/Dn Joystick Open Circuit
520222	3	Boom Up/Dn Joystick Open Circuit
520223	4	Swing Joystick Open Circuit
520223	3	Swing Joystick Short Circuit
520224	4	Jib Joystick Open Circuit
520224	3	Jib Joystick Short Circuit
520225	4	Drive Joystick Open Circuit
520225	3	Drive Joystick Short Circuit
520228	0	Chassis Tilted
520229	0	Bypass Emergency Switch Input
520230	4	Boom Angle 2 Load Open Circuit
520230	3	Boom Angle 2 Load Short Circuit
520231	1	Jib Swing Status Prohibit Movement
520232	0	Overloaded
520232	1	Overload Function Disabled
520232	4	Weight Below Zero
520233	13	Jib Swing L Initial Error (CH)
520234	13	Jib Swing R Initial Error (CH)
520239	0	Platform Module CAN-BUS Time Out
520240	0	Engine Timed Out
520242	13	Differential Gear (NO) Initial Error
520246	2	Load Cell Redundance Error
520247	4	Load Cell 1 Open Circuit
520247	3	Load Cell 1 Short Circuit
520257	13	Drive Joystick AI Initial Error
520258	2	Boom Angle Redundancy Error
520259	4	Boom Angle 1 Open Circuit
520259	3	Boom Angle 1 Short Circuit
520260	2	Boom Length Redundancy Error
520261	4	Boom Length 1 Open Circuit
520261	3	Boom Length 1 Short Circuit
520262	4	Boom Length 2 Open Circuit
520262	3	Boom Length 1 Short Circuit
520263	2	Chassis Tilt X Redundancy Error

Alarm Codes		
SPN	**FMI**	**Description**
520264	4	Chassis Tilt X1 Open Circuit
520264	3	Chassis Tilt X1 Short Circuit
520265	4	Chassis Tilt X2 Open Circuit
520265	3	Chassis Tilt X2 Short Circuit
520266	2	Chassis Tilt Y Redundancy Error
520267	4	Chassis Tilt Y1 Open Circuit
520267	3	Chassis Tilt Y1 Short Circuit
520268	4	Chassis Tilt Y2 Open Circuit
520268	3	Chassis Tilt Y2 Short Circuit
520269	2	Platform Angle Redundancy Error
520276	13	Platform Up Input Initial Error
520277	13	Platform Down Input Initial Error
520278	13	Steer Left Input Initial Error
520279	13	Steer Right Input Initial Error
520280	13	Telescope In Initial Error
520281	13	Telescope Out Initial Error
520283	13	Drive Joystick Enable Input Initial Error
520286	13	Engine Start Input Initial Error
520287	13	Chassis Level Right Input Initial Error (Platform)
520288	13	Chassis Level Left Input Initial Error (Platform)
520289	13	Emergency Pump Input Initial Error
520290	13	Deadman Input Initial Error
520291	13	Boom Up Input Initial Error
520292	13	Boom Down Input Initial Error
520293	13	Telescope Out Input Initial Error
520294	13	Telescope In Input Initial Error
520295	13	Jib Up Input Initial Error
520296	13	Jib Down Input Initial Error
520297	13	Platform Left Input Initial Error
520298	13	Platform Right Input Initial Error
520299	13	Chassis Reduce throttle Input Initial Error
520300	13	Chassis Increase throttle Input Initial Error
520302	13	Emergency Pump Input Initial Error
520303	13	Engine Start Input Initial Error
520304	13	Jib Swing L SW Initial Error (PL)
520305	13	Jib Swing R SW Initial Error (PL)
520306	13	Chassis Level Right Input Initial Error (Ground)
520307	13	Chassis Level Left Input Initial Error (Ground)
520308	13	Turret Swing Left Input Initial Error
520309	13	Turret Swing Right Input Initial Error
520311	13	Platform Lvl Up Input Initial Error
520312	13	Platform Lvl Dn Input Initial Error
520313	13	Chassis Riser Up Input Initial Error

Alarm Codes		
SPN	**FMI**	**Description**
520314	13	Chassis Riser Down Input Initial Error
520315	9	PVG1 Timeout
520316	9	PVG2 Timeout
520317	9	PVG3 Timeout
520318	9	PVG4 Timeout
520319	9	PVG5 Timeout
520320	9	PVG6 Timeout
520321	9	PVG7 Timeout
520322	9	PVG8 Timeout
520323	13	Left Axle Lock Power On Feed Back Error
520323	11	Left Axle Lock Power Off Feed Back Error
520323	0	Float Axis Current Sensor Error
520324	13	Right Axle Lock Power On Feed Back Error
520324	11	Right Axle Lock Power Off Feed Back Error
520325	11	Turntable Proximity Switch Error
520326	11	Turret Module System Alarm
520327	0	Bypass On
520328	11	Platform Module System Alarm
520329	0	Select Correct Machine Model
520330	0	Engine Cover Open
520331	4	Load Cell 2 Open Circuit
520331	3	Load Cell 2 Short Circuit
520332	13	Platform Horn Switch Initial Error
520334	13	PVG CANopen Valve Internal Error
520335	13	PVG CANopen Valve Internal Error
520336	13	PVG CANopen Valve Internal Error
520337	9	PVG1 CANopen Timeout
520338	9	PVG2 CANopen Timeout
520339	9	PVG3 CANopen Timeout
520340	9	PVG4 CANopen Timeout
520341	9	PVG5 CANopen Timeout
520342	9	PVG6 CANopen Timeout
520343	9	PVG7 CANopen Timeout
520344	9	PVG8 CANopen Timeout
520347	2	Turntable Tilt Angle Redundancy Error
520347	9	Turntable Angle Sensor Y1 Timeout
520347	10	Turntable Angle Sensor Y2 Timeout
520348	3	Turntable tilt angle Y1 Short Circuit
520348	4	Turntable tilt angle Y1 Open Circuit
520348	5	Turntable tilt angle Y2 Short Circuit
520348	6	Turntable tilt angle Y2 Open Circuit
520349	13	Ground Control Enable Switch Error
520350	9	LoadCell1 Timeout

Alarm Codes		
SPN	**FMI**	**Description**
520351	9	LoadCell2 Timeout
520352	9	Riser Angle2 Timeout
520352	16	RaiseBoom Angle Dynamic Check Error
520352	17	RaiseBoom Angle Zero Set Out Range
520352	18	RaiseBoom Angle Static Check Error
520353	9	Boom Angle Timeout
520353	10	Boom Angle Dynamic Check Error
520353	11	Boom Angle Zero Set Range Error
520353	12	Boom Angle Static Check
520354	9	Boom Length Timeout
520354	11	Boom Length Zero Set Out of Range
520354	10	Boom Length Dynamic Check Error
520356	9	Jib Angle1 Timeout
520357	9	Jib Angle2 Timeout
520358	9	Riser Angle1 Timeout
520358	2	Riser Angle Redundancy Error
520358	17	Riser Angle Zero Set Out of Range
520359	9	Chassis Tilt X1 Timeout
520359	11	Chassis Tilt Angle X Zero Set Out of Range
520360	9	Chassis Tilt X2 Timeout
520361	11	Chassis Tilt Angle Y Zero Set Out of Range
520366	0	Jib Swing Sensor Timeout
520367	5	Jib Swing Angle Open Circuit
520367	6	Jib Swing Angle Short Circuit
520450	0	Override Functions
520450	1	Override Function Active
520450	2	Override Function Not Allowed
520451	13	PVG CANopen Valve Internal Error
520452	13	PVG CANopen Valve Internal Error
520453	13	PVG CANopen Valve Internal Error
520460	13	Basket Rotation Joystick Initial Error
520461	13	Boom Up/Dn Joystick Initial Error
520462	13	Swing Joystick Initial Error
520463	13	Jib Up/Dn Joystick Initial Error
520482	0	
520483	13	Platform Turntable Force Travel Button Initial Error
520485	13	Boom Joystick Enable Button Initial Error
520486	13	Jib Joystick Enable Button Initial Error
520487	1	Alternator Error
520489	1	Engine Module Alarm
520491	1	PPSS Sensor Left Error
520491	2	PPSS Sensor Right Error
520528	5	Drive High-Speed Valve Open Circuit

Alarm Codes		
SPN	**FMI**	**Description**
520528	6	Drive High-Speed Valve Short Circuit
520529	5	Chassis Level Prop Valve Open Circuit
520529	6	Chassis Level Prop Valve Short Circuit
520530	5	Chassis Level Direction Valve Open Circuit
520530	6	Chassis Level Direction Valve Short Circuit
520543	11	Turret Module System Alarm
520564	9	Front Wheel Sensor Error
520565	9	Rear Wheel Sensor Error
520570	5	Front Axle Angle Sensor 1 Open Circuit
520570	6	Front Axle Angle Sensor 1 Short Circuit
520570	9	Front Axle Angle Sensor 1 Timeout
520570	2	Front Axle Angle Sensor Redundant Error
520571	5	Front Axle Angle Sensor 2 Open Circuit
520571	6	Front Axle Angle Sensor 2 Short Circuit
520571	9	Front Axle Angle Sensor 2 Timeout
520572	5	Rear Axle Angle Sensor 1 Open Circuit
520572	6	Rear Axle Angle Sensor 1 Short Circuit
520572	9	Rear Axle Angle Sensor 1 Timeout
520572	2	Rear Axle Angle Sensor Redundant Error
520573	5	Rear Axle Angle Sensor 2 Open Circuit
520573	6	Rear Axle Angle Sensor 2 Short Circuit
520573	9	Front Axle Angle Sensor 2 Timeout
520605	20	Display Application Version Wrong
520607	15	Engine Power Control Open Circuit
520607	17	Engine Power Control Short Circuit
520612	4	Fuel Level Sensor Open Circuit
520612	3	Fuel Level Sensor Short Circuit
520613	4	Hydaulic Temperature Sensor Open Circuit
520613	3	Hydaulic Temperature Sensor Short Circuit
520638	5	Overload Light Open Circuit
520638	6	Overload Light Short Circuit
520667	1	Telescopic to Articulated Limit Action
520668	1	Articulate/Telescope Selection Limit Action
521296	0	Chassis Module CAN-Bus Time Out
520821	1	PVG Error, Back to Neutral Position No1
520821	2	PVG Error, Back to Neutral Position No2
520821	3	PVG Error, Back to Neutral Position No3
520821	4	PVG Error, Back to Neutral Position No4
520821	5	PVG Error, Back to Neutral Position No5
520821	6	PVG Error, Back to Neutral Position No6
520821	7	PVG Error, Back to Neutral Position No7
520821	8	PVG Error, Back to Neutral Position No8

Engine Code		
SPN	**FMI**	**Description**
172	4	Intake air temp. error: Low Ground short circuit of sensor or harness - Battery voltage is normal Voltage of intake air temperature sensor is 0.2 V or less
172	3	Intake air temp. error: High Open circuit or +B short circuit of sensor or harness - Battery voltage is normal Voltage of intake air temperature sensor is 4.95 V or above
102	4	Boost pressure sensor: Low Ground short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal Voltage of boost pressure sensor is 0.2 V or below
102	3	Boost pressure sensor: High Open circuit or +B short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal Voltage of boost pressure sensor is 4.9 V or above
723	8	No input of G sensor (Camshaft position sensor) pulse Open circuit or short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal - Engine is not stalled No recognition of G sensor pulse
723	2	G-sensor (Camshaft position sensor) pulse number error Open circuit or short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal - Engine is not stalled - Engine speed is 350 rpm or higher Pulse count per rotation is not 3 teeth
676	5	Open circuit of glow relay driving circuit Open circuit of air glow relay - Battery voltage is normal - Glow relay is being energized Open circuit of harness or Open circuit of relay coil
523544	4	Ground short of glow relay driving circuit - Battery voltage is normal - Glow relay is being energized Ground short circuit of harness
523538	2	QR data read error - Key switch is ON QR data read error from EEPROM
523538	7	QR data is unwritten - Key switch is ON Area of QR data on EEPROM is vacant
676	0	Glow heater relay driving circuit overheat Overheat of glow plug driving circuit - Battery voltage is normal - Glow relay is being energized Glow relay coil resistance or load is too high that the specified value of ECU

Engine Code		
SPN	**FMI**	**Description**
1485	2	Failure of main relay - Key switch turn OFF - Engine stops Main relay stays active longer than 1 sec without command
677	4	Ground short of Starter relay driving circuit - Battery voltage is normal Ground short circuit of harness
108	4	Barometric pressure sensor error (Low side) Sensor or ECU internal circuit short to ground - Battery voltage is normal Barometric pressure sensor voltage: 0.2 V or less
108	3	Barometric pressure sensor error (High side) Sensor or ECU internal circuit short to +B - Battery voltage is normal Barometric pressure sensor voltage: 4.850 V or more
171	4	Intake air temp. built-in MAF sensor: Low Ground short circuit of sensor or harness - Battery voltage is normal Intake air temp. built-in MAF sensor voltage: 0.2 V or less
171	3	Intake air temp. built-in MAF sensor: High Open circuit or +B short circuit of sensor or harness - Battery voltage is normal Intake air temp. built-in MAF sensor voltage: 4.850 V or more
523700	13	KBT-EEPROM check sum error - Battery voltage is normal
523589	17	Low coolant temp. in parked regeneration During regeneration mode, Engine warm-up condition is not satisfied (coolant temp. is low) - During parked active regeneration mode Engine coolant temp. stays below 50 degC (122 degF) for 1500 seconds or more under parked regeneration process
523590	16	Parked regeneration time out Time out error: regeneration incomplete due to low temperature of DPF - During parked active regeneration mode - Coolant temp. is 50 degC (122 degF) or more Regeneration process is not completed within 2700 sec
523603	15	Over heat pre-caution Coolant temp. - Coolant temp. sensor is normal Engine coolant temperature >= 110 degC (230 degF)
523591	2	CAN CCVS (Parking SW and Vehicle speed) frame error CAN_CCVS communication stopping - Battery voltage is normal - Starter switch signal is not activated CAN CCVS frame time out error
523592	2	CAN_CM1 communication stopping - Battery voltage is normal - Starter switch signal is not activated CAN CM1 frame time out error
523593	2	CAN_DDC1 communication stopping - Battery voltage is normal - Starter switch signal is not activated CAN DDC1 frame time out error
523594	2	CAN_ETC2 communication stopping - Battery voltage is normal - Starter switch signal is not activated CAN ETC2 frame time out error
523595	2	CAN_ETC5 communication stopping - Battery voltage is normal - Starter switch signal is not activated CAN ETC5 frame time out error

Engine Code		
SPN	**FMI**	**Description**
523596	2	CAN_TSC1 communication stopping - Battery voltage is normal - Starter switch signal is not activated No request to “TSC1 buffer” continues 3 times after over-ride control request (other than 0x00)
523598	2	CAN_EBC1 communication stopping - Battery voltage is normal - Starter switch signal is not activated CAN EBC1 frame time out error
636	7	Large phase shift between NE pulse and G pulse - Battery voltage is normal - Sensor supply voltage VCC# is normal - NE signal is normal - G signal is normal - Engine speed is 350 rpm or higher - Coolant temperature is 10 degC (50 degF) or higher (Approximately) Phase difference between NE pulse and G pulse is within +30 and - 20 degree
157	0	Actual pressure exceeds the command pressure - Rail pressure sensor is normal - Sensor supply voltage VCC# is normal Actual pressure > 179 MPa (1830 kgf/cm2, 26000 psi)
110	4	Ground short circuit of sensor or harness - Battery voltage is normal Voltage of coolant temperature sensor is 0.176 V or less
110	3	Open circuit or +B short circuit of sensor or harness - Battery voltage is normal Voltage of coolant temperature sensor is 4.870 V or above
636	8	Open circuit or short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal - Engine is not stalled No recognition of Ne sensor pulse
636	2	Open circuit or short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal - Engine is not stalled Pulse count per rotation is not 58 teeth
523544	3	+B short of glow relay driving circuit - Battery voltage is normal - Glow relay is being energized +B short circuit of harness
168	4	Open circuit, short circuit or damage of harness Failure of battery - Key switch is ON - Starter switch signal is not activated ECU recognition of battery voltage is below 8 V Not monitored during cranking
168	3	Open circuit, short circuit or damage of harness Failure of battery - Key switch is ON - Starter Switch signal is not activated ECU recognition of battery voltage is above 16 V

Engine Code		
SPN	**FMI**	**Description**
1347	3	+B short circuit of SCV (MPROP) - Battery voltage is normal - Key switch is ON - Starter switch signal is not activated +B short circuit of SCV
3510	4	Sensor supply voltage 2 error or recognition error - Battery voltage is normal - Key switch turn ON - Starter switch signal is not activated Voltage to sensor is below 4.75 V
3510	3	Sensor supply voltage 2 error or recognition error - Battery voltage is normal - Key switch turn ON Voltage to sensor is more than 5.25 V
3511	4	Sensor supply voltage 3 error or recognition error - Battery voltage is normal - Key switch turn ON - Starter switch signal is not activated Voltage to sensor is below 4.75 V
3511	3	Sensor supply voltage 3 error or recognition error - Battery voltage is normal - Key switch turn ON Voltage to sensor is more than 5.25 V
91	4	Ground short circuit or open circuit of sensor or harness - Battery voltage is normal - Sensor supply voltage VCC1 is normal Voltage of accelerator position sensor 1 is 0.3 V or less
91	3	Battery short circuit out of sensor or harness - Battery voltage is normal - Sensor supply voltage VCC1 is normal Voltage of accelerator position sensor 1 is 4.8 V or less
29	4	Ground short circuit or open circuit of sensor or harness - Battery voltage is normal - Sensor supply voltage VCC1 is normal Voltage of accelerator position sensor 2 is 0.3 V or less
29	3	Battery short circuit out of sensor or harness - Battery voltage is normal - Sensor supply voltage VCC1 is normal Voltage of accelerator position sensor 2 is 4.8 V or less
523543	2	Accelerator position sensor signal error (sensor or harness open circuit, ground short circuit etc.) - Battery voltage is normal - Key switch turn ON - Starter switch signal is not activated Accelerator position sensor error signal received by CAN
132	1	Engine inlet air mass flow rate lacking (Disconnect turbo blower intake hose) - Engine is operating 1000 rpm or higher - Coolant temp. is 15 degC (59 degF) or higher (Coolant temp. sensor is normal) - MAF sensor is normal - EGR valve is normal - Intake throttle valve is normal - Battery voltage is normal Engine Inlet Air Mass Flow Rate: less than half of target value

Engine Code		
SPN	**FMI**	**Description**
523574	3	EGR actuator open circuit - Battery voltage is normal EGR actuator open error signal received via CAN
523574	4	EGR actuator coil short - Battery voltage is normal EGR actuator coil short error signal received via CAN
523572	4	EGR position sensor failure - Battery voltage is normal EGR position sensor error signal received via CAN
3242	4	Ground short circuit of sensor or harness - Battery voltage is normal DPF inlet temp. sensor (T1) voltage: 0.08 V or less
3242	3	Open circuit or +B short circuit of sensor or harness - Battery voltage is normal - Coolant temp. is 50 degC (122 degF) or more continues longer than 10 min after engine starting - 100 degC (212 degF) ≤ T0 ≤ 800 degC (1472 degF): continues longer than 10 sec or 100 degC (212 degF) ≤ T2 ≤ 800 degC (1472 degF): continues longer than 10 sec DPF inlet temp. sensor (T1) voltage: 4.92 V or more
4765	4	Ground short circuit of sensor or harness - Battery voltage is normal DOC inlet temp. sensor (T0) voltage: 0.08 V or less
4765	3	Open circuit or +B short circuit of sensor or harness - Battery voltage is normal - Coolant temp. is 50 degC (122 degF) or more continues longer than 5 min after engine starting - 100 degC (212 degF) ≤ T1 ≤ 800 degC (1472 degF): continues longer than 10 sec or 100 deg C (212 degF) ≤ T2 ≤ 800 degC (1472 degF): continues longer than 10 sec DOC inlet temp. sensor (T0) voltage: 4.92 V or more
523580	2	Intake throttle feedback error - Battery voltage is normal (Approximate parameter) Deviation of throttle position is not corrected in 20 times of duty error recovery action
91	2	Deviation from designed correlation in two sensors - Battery voltage is normal - Accelerator position sensor 1 is normal - Accelerator position sensor 2 is normal Deviation from designed correlation in two sensors
523575	7	EGR actuator valve stuck - Battery voltage is normal EGR actuator valve stuck error signal received via CAN
523576	2	EGR (DC motor) overheat - Battery voltage is normal EGR (DC motor) temp. error signal (thermistor: 125 degC or more)
523577	2	EGR (DC motor) temp. sensor failure - Battery voltage is normal EGR (DC motor) temp. sensor error signal received via CAN
3246	4	Ground short circuit of sensor or harness - Battery voltage is normal DPF outlet temp. sensor (T2) voltage: 0.08 V or less

Engine Code		
SPN	**FMI**	**Description**
3246	3	Open circuit or +B short circuit of sensor or harness - Battery voltage is normal - Coolant temp. is 50 degC (122 degF) or more: continues longer than 10 min after engine starting - 100 degC (212 degF) ≤ T0 ≤ 800 degC (1472 degF): continues longer than 10 sec or 100 degC (212 degF) ≤ T1 ≤ 800 degC (1472 degF): continues longer than 10 sec DPF outlet temp. sensor (T2) voltage: 4.92 V or more
3251	4	Ground short circuit of sensor or harness - Battery voltage is normal - Sensor supply voltage VCC# is normal - Starter Switch signal is not activated DPF differential pressure sensor voltage: 0.2 V or less
3251	3	Open circuit or +B short circuit of sensor or harness - Battery voltage is normal - Sensor supply voltage VCC# is normal - Starter switch signal is not activated DPF differential pressure sensor voltage: 4.800 V or more
523582	4	Intake throttle lift sensor: Low - Battery voltage is normal - Sensor supply voltage VCC# is normal Intake throttle lift sensor voltage: 0.151 V or less
523582	3	Intake throttle lift sensor: High - Battery voltage is normal - Sensor supply voltage VCC# is normal Intake throttle lift sensor voltage: 4.848 V or more
3701	15	PM accumulation level 3 - Battery voltage is normal PM accumulation more than trigger level Regeneration level = 3
3701	16	PM accumulation level 4 - Battery voltage is normal PM accumulation more than trigger level Regeneration level = 4
132	15	Disconnect the hose between the turbo blower out and intake flange Boost pressure sensor error - Other than during regeneration mode - Engine speed is 1600 rpm or more - MAF sensor is normal - EGR valve is normal - Intake throttle valve is normal - Boost pressure sensor is normal - Barometric pressure sensor is normal - Coolant temp. sensor is normal Boost pressure sensor output is below target level in high air flow operating condition
523599	0	All exhaust temp. sensor failure simultaneously - Engine speed is 1400 rpm or more - Quantity of injection is 15mm3/st or more - Coolant temp. is 50 degC (122 degF) or more: continues longer than 300 sec - Passed 100 sec after cranking All exhaust temp. sensor failure (sensor low) simultaneously
523602	0	Time interval from the end time to the start time of the regeneration - Battery voltage is normal - Key switch is ON Regeneration time interval within 30 min. occurs three times continuously

Engine Code		
SPN	**FMI**	**Description**
523578	2	No communication with EGR - Battery voltage is normal - Starter switch signal is not activated Interruption of CAN
633	7	Pressure limiter emergency open - Sensor supply voltage VCC# is normal Pressure limiter emergency open Engine speed is more than 10 rpm
1347	7	SCV stuck at open position (Actual rail pressure continuously exceeds the command rail pressure) - Engine is operating (Q: 3 mm3/st or higher) - Injector is normal - Battery voltage is normal - Sensor supply voltage VCC# is normal - Rail pressure sensor is normal Discharge request of supply pump goes below -1800 mm3/st and the actual rail pressure is 20 MPa (200 kgf/cm2, 2900 psi) higher than command pressure
1239	1	Fuel leak from high pressured fuel system (Fuel consumption is calculated from the difference of fuel pressure of before and after the injection, and the error will be detected when excess fuel consumption is found) - Battery voltage is normal - Sensor supply voltage VCC# is normal - Rail pressure sensor is normal - Supply pump (SCV) is normal - Injector and injector drive circuit are normal - NE signal is active [Engine is operating (700 rpm or higher)] - No DTC of P0087, 0088, 0089 Pump supplies fuel fully The deviation between actual rail pressure and desired one is more than 20 MPa (200 kgf/cm2, 2900 psi)
157	4	Ground short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal Voltage of rail pressure sensor is 0.065 V or less
157	3	Open circuit or +B short circuit of sensor or harness Failure of sensor - Battery voltage is normal - Sensor supply voltage VCC# is normal Voltage of rail pressure sensor is 3.235 V or above
523535	0	Injector charge voltage: High - Battery voltage is normal - CPU is normal Injector charge voltage: High
651	3	Open circuit of harness Open circuit of injector coil - Engine is operating - Battery voltage is normal - During injection - CPU is normal
653	3	Open circuit of harness Open circuit of injector coil - Engine is operating - Battery voltage is normal - During injection - CPU is normal

Engine Code		
SPN	**FMI**	**Description**
654	3	Open circuit of harness Open circuit of injector coil - Engine is operating - Battery voltage is normal - During injection - CPU is normal
652	3	Open circuit of harness Open circuit of injector coil - Engine is operating - Battery voltage is normal - During injection - CPU is normal
110	0	Overheat of engine coolant temperature - Coolant temperature sensor is normal Engine coolant temperature >= 120 degC (248 degF)
190	0	Engine speed exceeds threshold speed - Key switch is ON Engine speed >= 3500 rpm
100	1	Oil pressure switch - Battery voltage is normal - Key switch turn ON - Starter switch signal is not activated - 10 sec or more after engine start [700 rpm or higher] Oil pressure switch ON: continues 1 sec or more
628	2	FLASH ROM error - Key switch is ON Check-sum error
1077	2	Failure of CPU and/or IC - Key switch is ON - Battery voltage is 10 V or more - Starter switch signal is not activated CPU and/or IC fatal error
523527	2	Failure of monitoring IC of CPU - Key switch is ON - Battery voltage is 10 V or more - Starter switch signal is not activated Failure of monitoring IC of CPU
523525	1	Injector charge voltage: Low Failure of charge circuit of ECU - Battery voltage is normal - CPU is normal Injector charge voltage: Low Failure of charge circuit of ECU
1347	5	Open circuit of SCV (MPROP) - Battery voltage is normal - Key switch is ON - Starter Switch signal is not activated
1347	4	Ground short circuit of SCV(MPROP) - Battery voltage is normal - Key switch is ON - Starter Switch signal is not activated
1077	12	Injector drive IC error or Open circuit of No.1 & 4 cylinder injector or Open circuit of No.2 & 3 cylinder injector - Key switch is ON - Battery voltage is 10 V or more - Starter switch signal is not activated

Engine Code		
SPN	**FMI**	**Description**
523605	6	Short circuit in Injector driver IC - Battery voltage is normal - Key switch is ON Injector IC report the error
3509	4	Sensor supply voltage 1 error or recognition error - Battery voltage is normal - Key switch turn ON - Starter switch signal is not activated Voltage to sensor is below 4.75 V
3509	3	Sensor supply voltage 1 error or recognition error - Battery voltage is normal - Key switch turn ON Voltage to sensor is more than 5.25 V
523523	3	Wiring harness short to +B or Wiring harness short to ground - Engine is operating - Battery voltage is normal
523524	3	Wiring harness short to +B or Wiring harness short to ground - Engine is operating - Battery voltage is normal
679	7	Rail pressure value is sticking or too low engine power not to open PL valve forcibility - Battery voltage is normal - Key switch is ON - after DTC0088, P0089 After fault opening PLV, rail pressure is above 160 MPa (1630 kg/cm2, 23200 psi)
679	16	Rail pressure value is too high or low despite the existence of response that the pressure limiter opened - Battery voltage is normal - Key switch is ON Pressure limiter open (the opening response is detected) Rail pressure value is not within 50 MPa (510 kg/cm2, 7250 psi) and 120 Mpa (1230 kg/cm2, 17400 psi)
523547	2	CAN2 +B or GND short circuit or high traffic error - Battery voltage is normal - Key switch is ON
523604	2	CAN1 +B or GND short circuit or high traffic error - Battery voltage is normal - Key switch is ON
523548	2	CAN-KBT original frame open circuit error - Battery voltage is normal - Key switch turn OFF to ON - Starter switch signal is not activated
132	4	Open circuit or ground short circuit of sensor or harness - Battery voltage is normal - Starter switch signal is not activated - Sensor supply voltage is normal Mass air flow sensor voltage: 0.1 V or less
132	3	+B short circuit of sensor or harness - Battery voltage is normal - 800 rpm ≤ engine speed ≤ 3000 rpm - Target intake mass air flow is 350 or less and it continues for 3 sec - Sensor supply voltage is normal Mass air flow sensor voltage: 4.9 V or more at normal operation condition

Engine Code		
SPN	**FMI**	**Description**
3252	0	DOC is heated up due to unburned fuel - Other than during regeneration mode - Coolant temp. is 50 degC (122 degF) or more continues longer than 5 min after engine starting T1 - T0 ≥ 250 degC (482 degF)
4765	0	DOC inlet temp. (T0): High - Exhaust gas temp. sensor T0, T1 and T2 are normal - Battery voltage is normal DOC inlet temp. (T0) : 700 degC (1292 degF) or more (In Non-Turbo Engine's case, 730 degC (1346 degF) or more)
3242	0	DPF inlet temp. (T1): High - Exhaust gas temp. sensor T0, T1 and T2 are normal - Battery voltage is normal DPF inlet temp. (T1): 715 degC (1319 degF) or more
3246	0	DPF outlet temp. (T2): High - Exhaust gas temp. sensor T0, T1 and T2 are normal - Battery voltage is normal DPF outlet temp. (T2): 820 degC (1508 degF) or more
3701	0	PM accumulation level 5 - Battery voltage is normal PM accumulation more than trigger level Regeneration level = 5
523601	0	Exhaust gas temperature sensor 0, 1, 2 output - Battery voltage is normal All exhaust temp. (T0,T1,T2) reduces down to 300 degC (572 degF)

Hydraulic Schematic

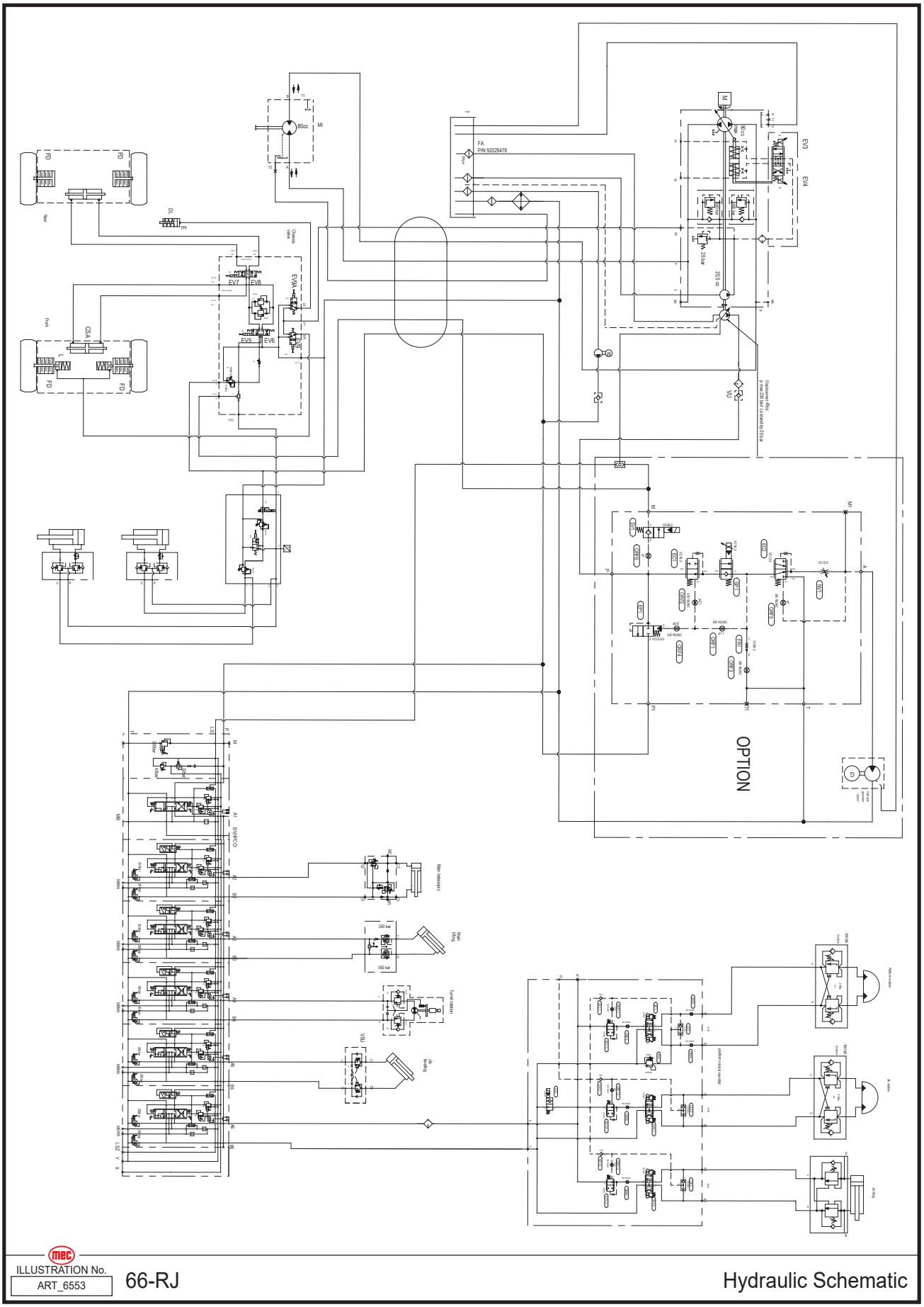
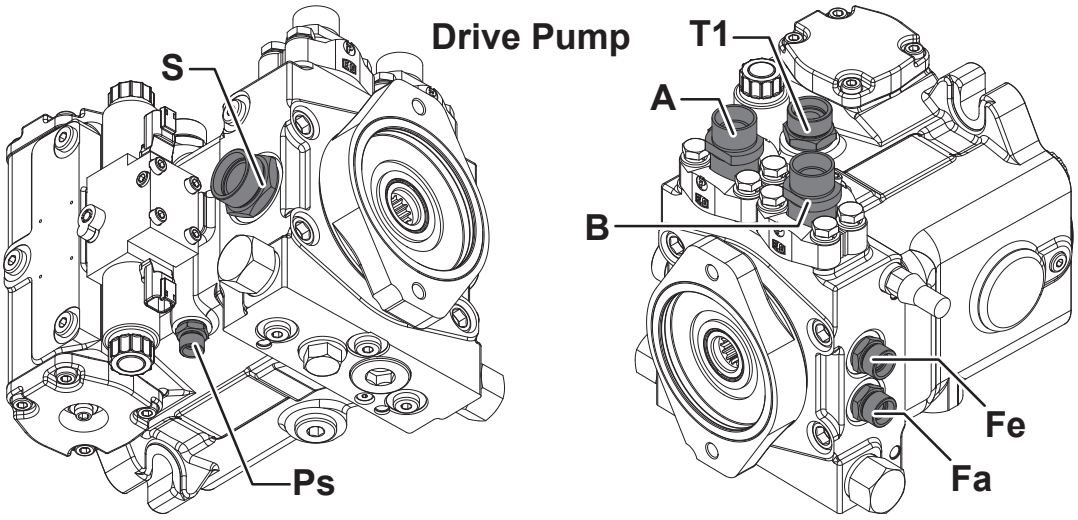


ILLUSTRATION No.
ART_6553

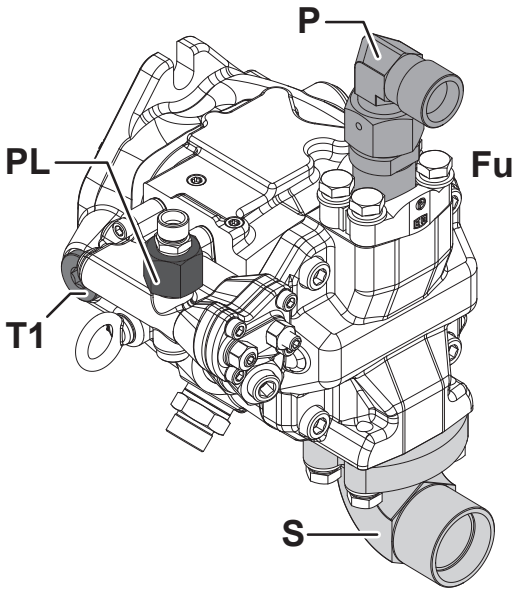
66-RJ

Hydraulic Schematic

Pump Ports



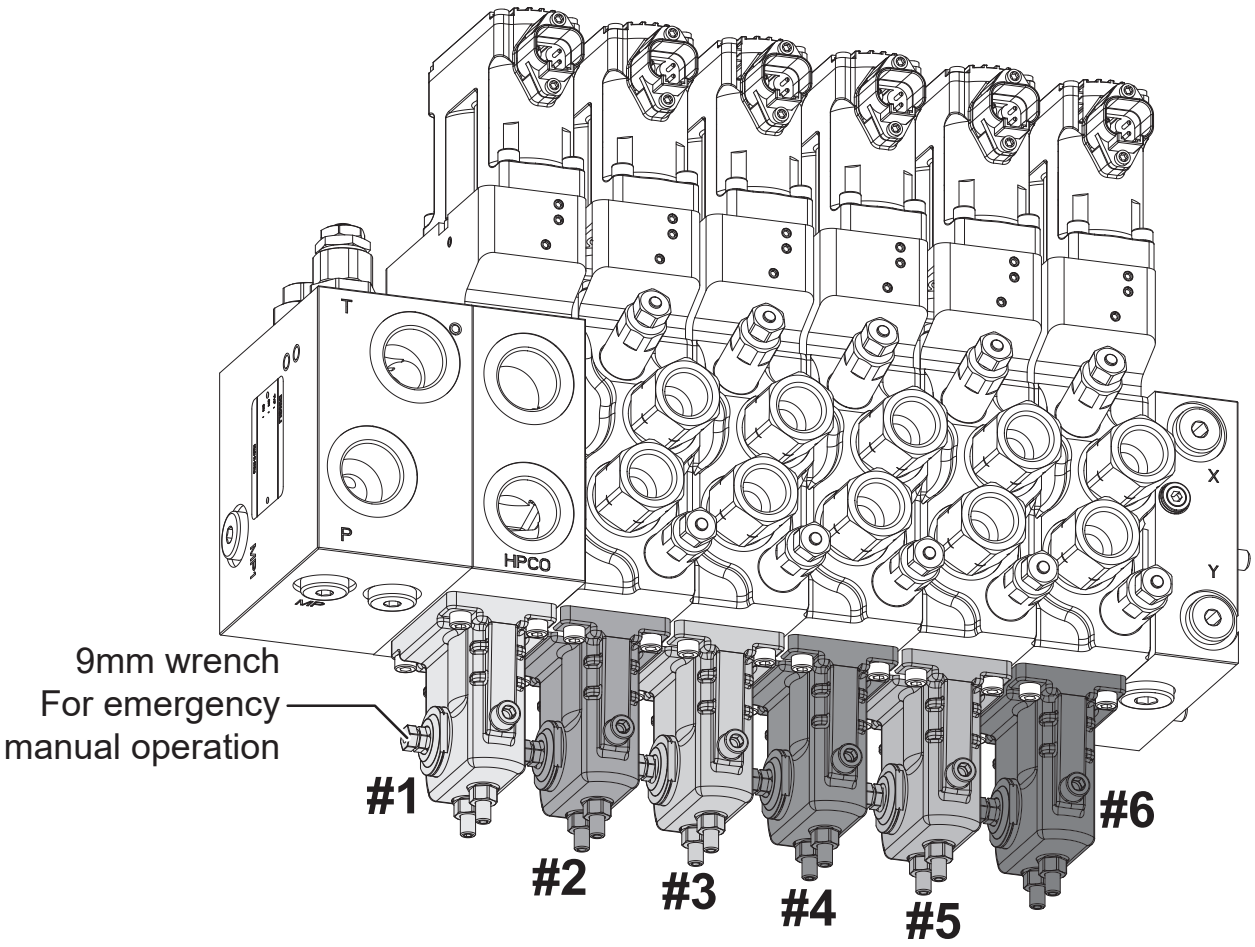
Port	Description
A	Port A
B	Port B
T1	Case Drain
Fa	From High Pressure Charge Filter Outlet
Fe	To High Pressure Charge Filter Inlet
S	Suction Port
Ps	Load Sense



Port	Description
P	Out to High Pressure Hydraulic Filter
S	Suction from Hydraulic Tank
PL	Load Sense Control
T1	Case Drain

ILLUSTRATION No. ART_6560 66-RJ Pump Ports

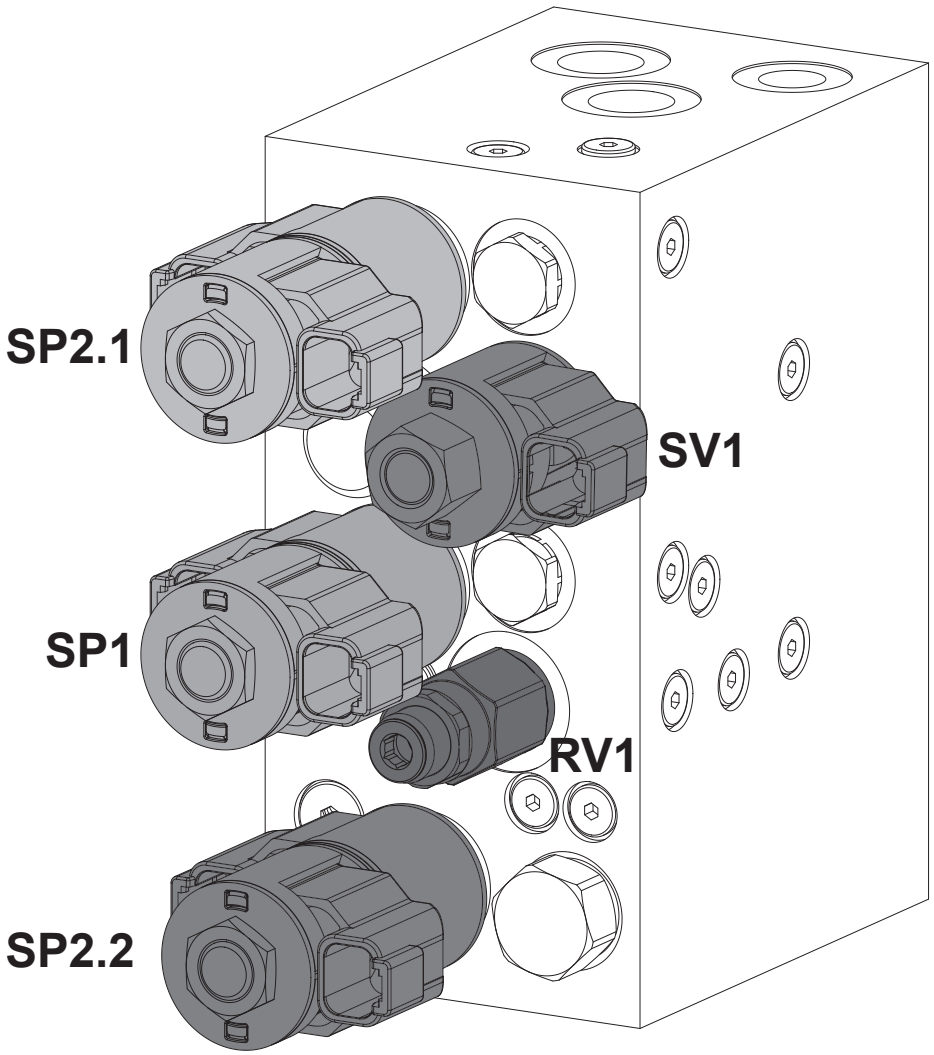
PVG Block Ports



Number	Function
#1	Function Enable Valve
#2	Main Boom Extend/Retract
#3	Main Boom Lift/Lower
#4	Turret Rotation
#5	Jib Leveling
#6	To Platform Valve Block

ILLUSTRATION No. ART_6566 66-RJ PVG Block

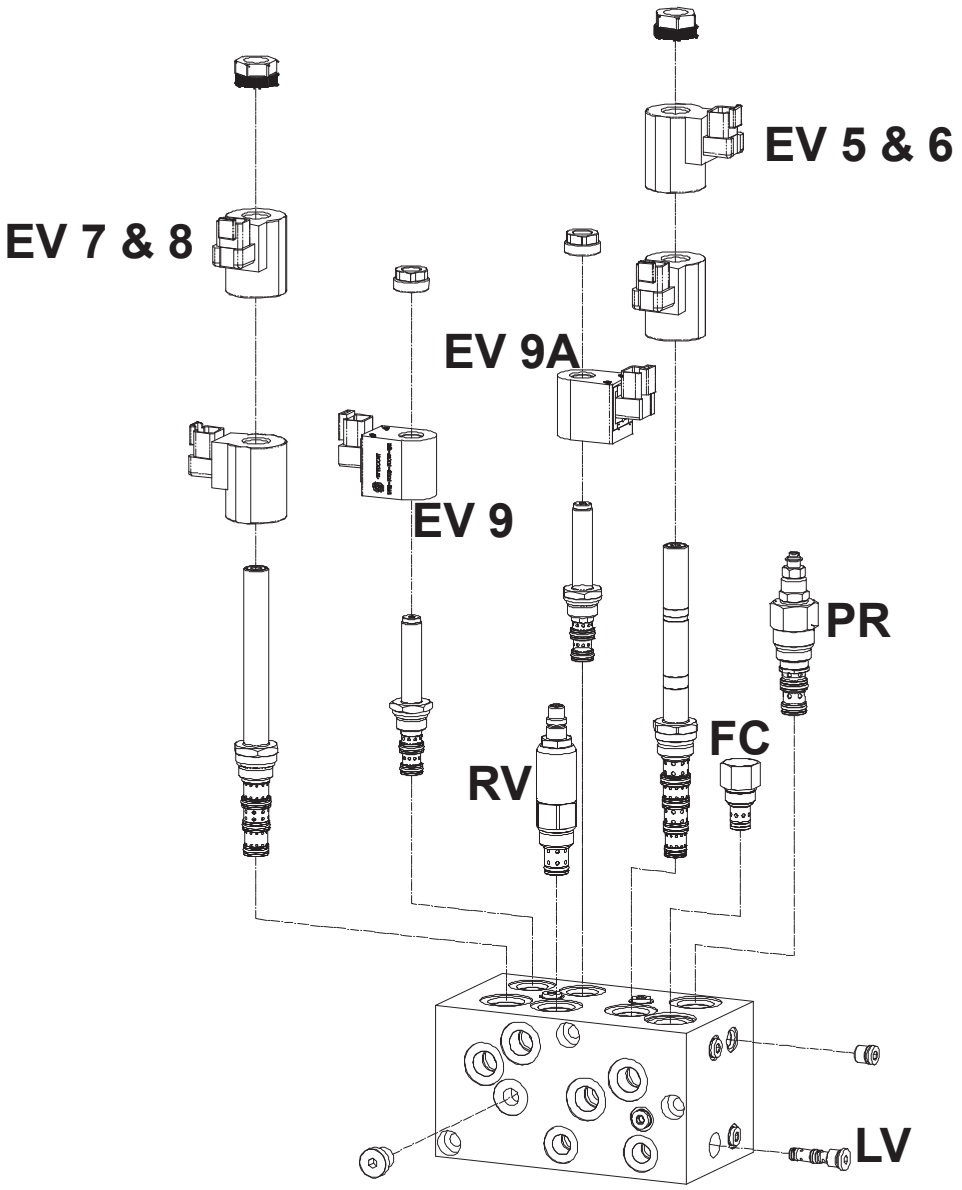
Platform Valve Block Ports



Number	Function
SP1	Platform Rotation
RV1	Relief Valve,140bar
SP2.1	Jib Rotation
SP2.2	Jib Lift/Lower
SV1	Unload valve

ILLUSTRATION No. ART_6567 66-RJ Platform Valve Block

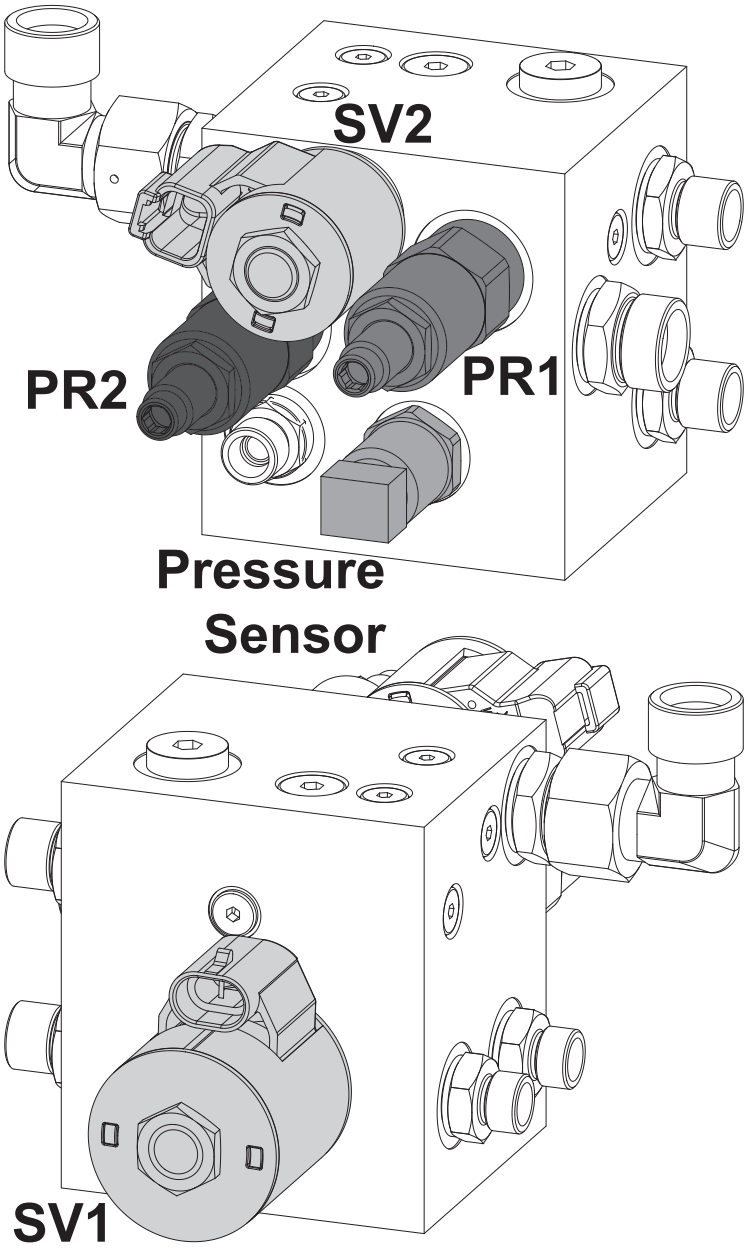
Chassis Manifold Ports



Number	Function
EV 5 & 6	Left/Right Steering
EV 7 & 8	4-Wheel Steer / Crab Steer
EV 9	Brake Release
EV 9A	Differential Lock
PR	Pressure Reducing Valve
FC	Flow Control Valve
RV	Relief Valve, 180 Bar
LV	Shuttle Valve

ILLUSTRATION No. ART_6568 66-RJ Chassis Manifold

Oscillate Valve Block Ports



Number	Function
SV1	Oscillate Valve 1
SV2	Oscillate Valve 2
PR1	Pressure Reducing Valve 1
PR2	Pressure Reducing Valve 2

ILLUSTRATION No. ART_6569 66-RJ Oscillate Valve Block

Electrical Schematic, Lower Controls

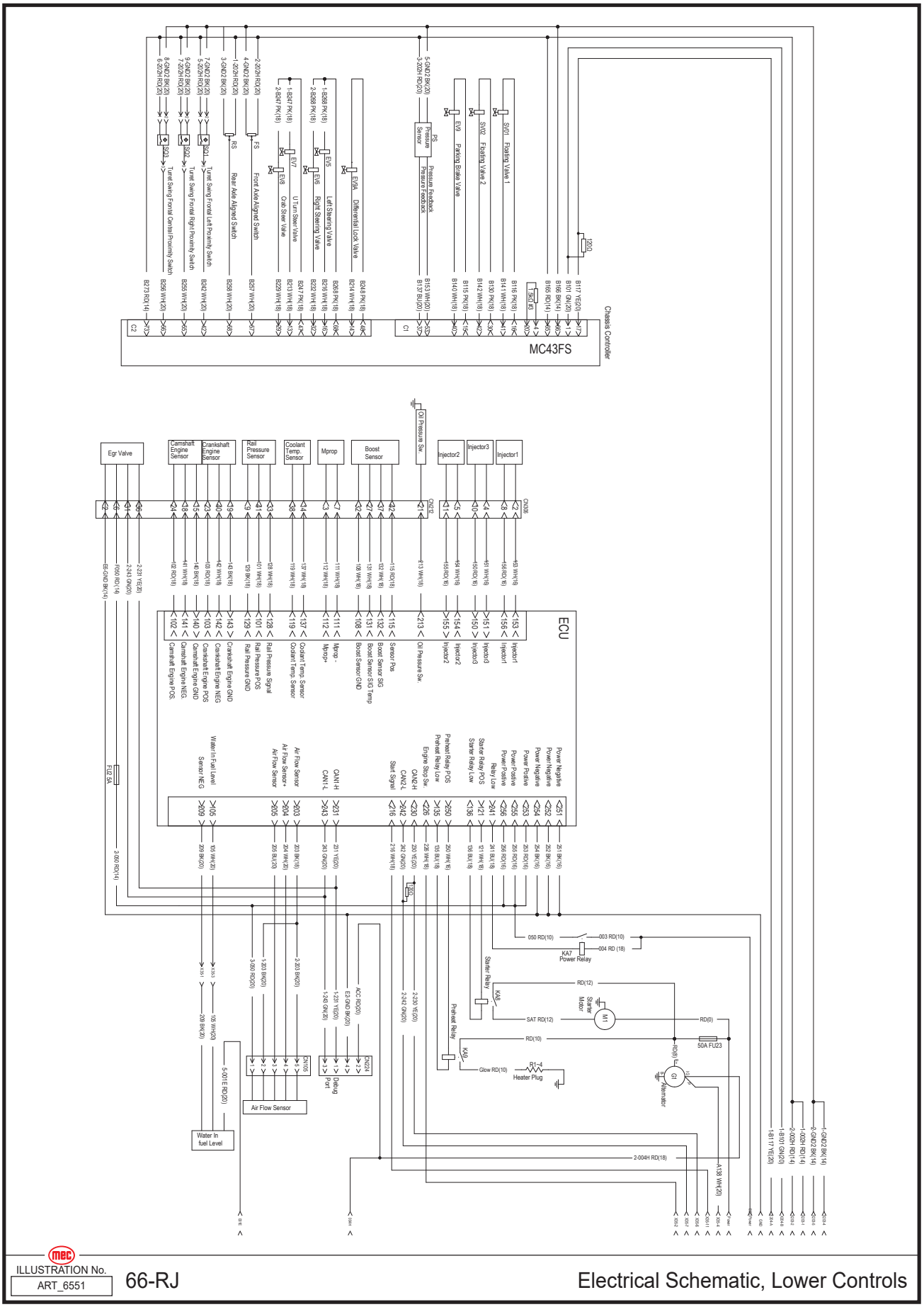


ILLUSTRATION No. ART_6551

66-RJ

Electrical Schematic, Lower Controls

Electrical Schematic, Chassis

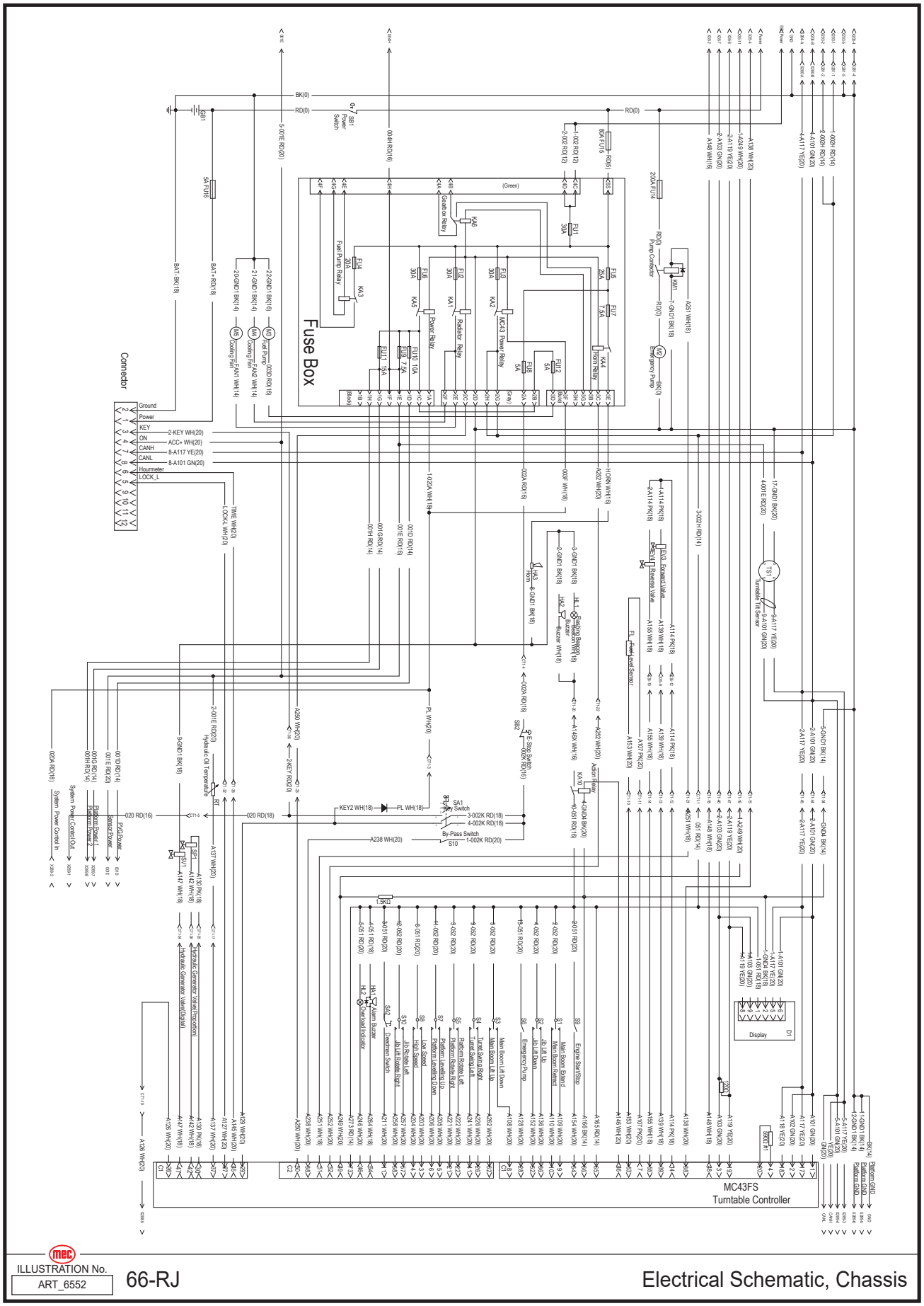


ILLUSTRATION No. ART_6552

66-RJ

Electrical Schematic, Chassis

Electrical Schematic, Upper Controls

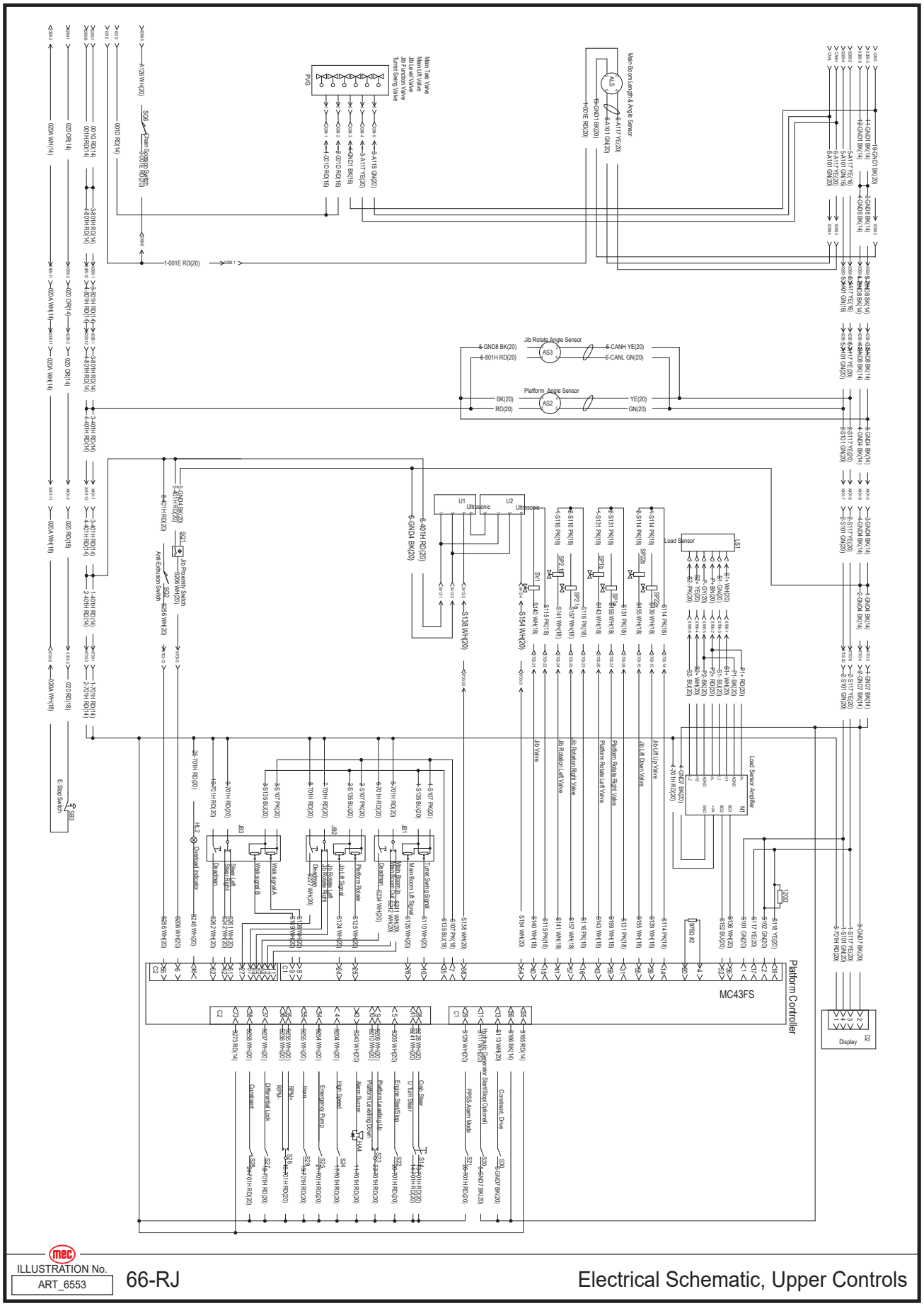


ILLUSTRATION No. ART_6553

66-RJ

Electrical Schematic, Upper Controls