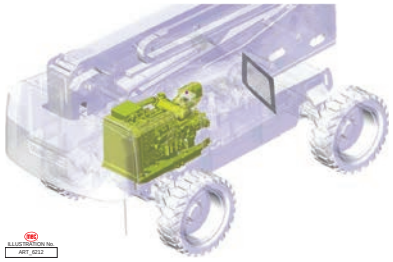
Power Supply System

All the following components displayed in this section can be found on the engine side of the boom machine. The image to the right show the location of the engine for a quick visual reference.



Batteries

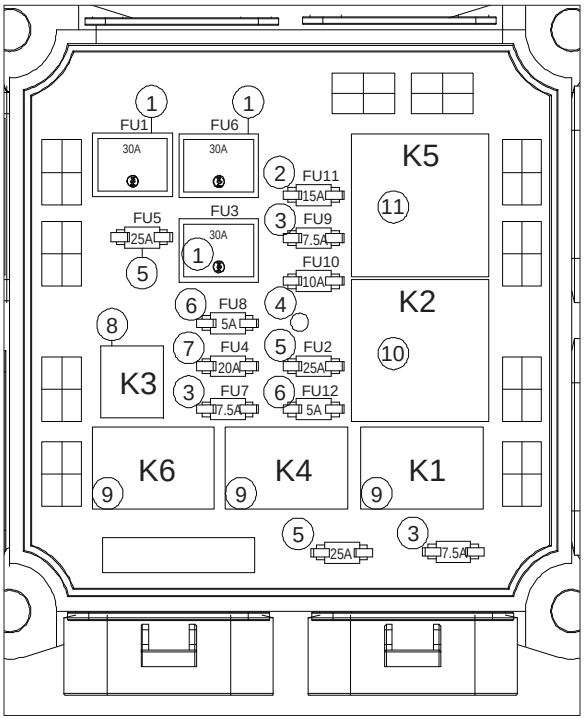
The boom machine is equipped with 2 12-Volt 110ah batteries. These batteries are used to power the control system and in the event of power failure, they can be used to activate emergency operations.

Fuse Box

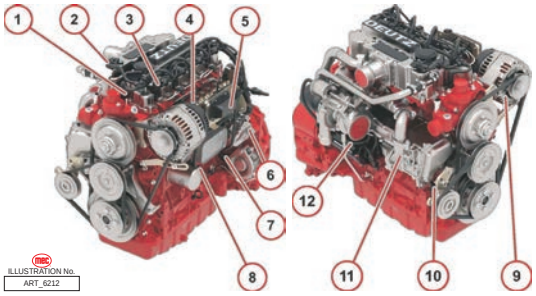
- Fuse 13: 80amps, connect to “Relay & Fuse Box”.
- Fuse 14: 200amps, connect to Emergency Pump-Motor.
- Fuse 15: 150amps, connect to Engine Preheating Device.
- Fuse 16: 125amps, connect to Engine Generator.

Relay Description	
K1	Beacon & Buzzer
K2	Power supply to Main Controller, Display & Chassis Device
K3	Diesel Pump Relay
K4	Horn Relay
K5	Total Power Relay
K6	Spare

No.	Fuse Description	
FU1	30 A	Engine ECU
FU2	25A	Beacon & Buzzer
FU3	30A	Power supply to Main Controller, Display & Chassis Device
FU4	20A	Diesel Pump
FU5	25A	FU7+FU8
FU6	30A	FU9+FU10+FU11
FU7	7.5A	Horn
FU8	5A	Key Switch, Bypass Switch, K2 & K5
FU9	7.5A	Sensor Power, Engine ECU Logic Supply + FU12
FU10	10A	PVG Valve
FU11	15A	Power supply for electrical equipment on boom and platform
FU12	5A	Engine Generator Magnetization

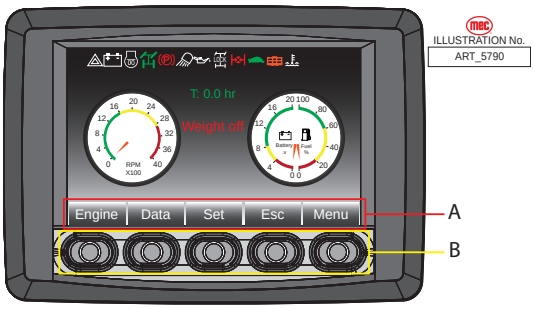


Engine



1. Coolant temperature sensor
2. Intake pressure & temperature sensor
3. Fuel injector
4. Fuel rail pressure sensor
5. Electrical plug (connect to engine ECU)
6. High Pressure Pump FCU (Fuel Control Unit)
7. Crankshaft speed sensor
8. Engine-oil pressure sensor
9. Generator
10. Camshaft speed sensor
11. Exhaust gas recirculation regulator
12. Start-motor

Diagnose Menu Interface



The Diagnostic panel contains the basic information for monitoring operation of the machine.

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
- Parking brake active 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

The central band shows:

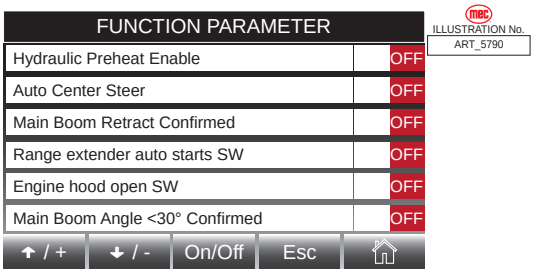
- The engine rev counter to the left hand side
- The number of working hours in the center, the batteries voltage, the fuel level and the engine fault code
- The engine oil pressure indicator and the engine water temperature indicator on the right hand side.

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. Pressing “**🡅 / ✚**” or “**🡇 / ▬**” is used to choose the item separately. 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.

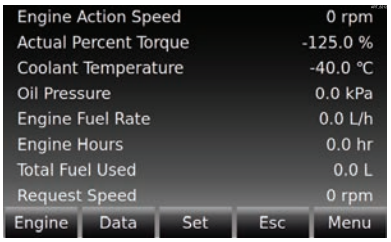
The top row of icons are listed in the chart below.

	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-light: Off		Work-light: On
	Engine oil pressure: Normal		Engine oil pressure: Low
	Differential-lock: Off		Differential-lock: On
	Oscillating system: Off		Oscillating system: On
	Engine fan reversing system: Off		Engine fan reversing system: On
	Slow Speed		High Torque Mode		Fast Speed
	Platform control		Ground control

Engine Status Menu

Display read signals from the engine ECU through the CAN bus.

1. At the Main Menu, press the Engine button to enter the Engine Status Menu.

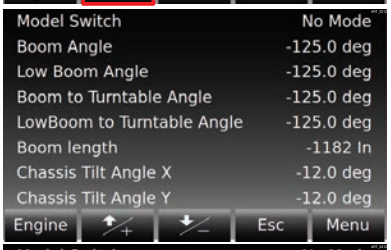


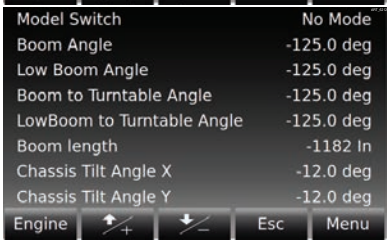
2. In the Engine Status Menu, information for the engine will be displayed.
3. Press the “**Esc**” button to go back.

Vehicle Data Menu

Displays read CAN bus signals from master controller on turntable. The values are calibrated on the machine, not sensor raw data.

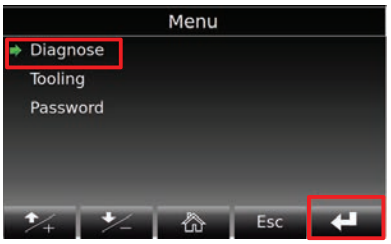
1. To be see information detected by the machine sensors, please press the Data button.
2. Press the up button "**/**" or down button "**/**" to switch between the two pages of machine information.
3. Press the "**Esc**" button to go back.



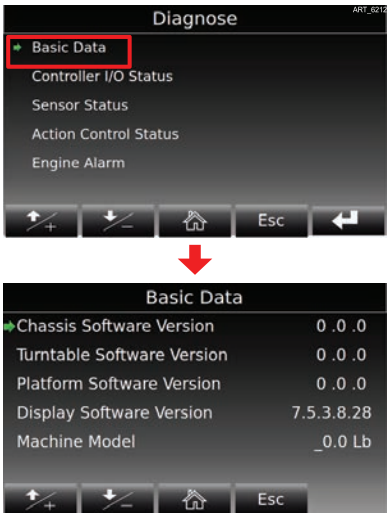


Diagnose Menu

1. To diagnose the machine, press the Menu button.
2. Once you are in the Menu interface, press the Enter button ( ) to enter the Diagnose Menu.
3. When you are in the Diagnose Menu, you can view the following information:
   - Machine software version
   - Input/Output signals
   - Sensors information
   - Parameters of each action
   - Engine information



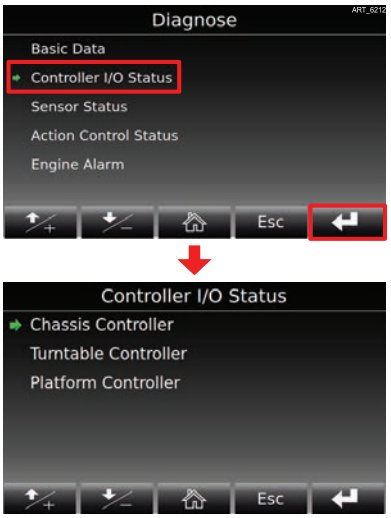
Basic Data Menu



1. Once you are in the Diagnose Menu, press the Enter button ( ) to enter the Basic Data Menu to view the machine software version and the machine model.
2. In the Basic Data Menu, both the machine software version and the machine model are now displayed.
3. Press the "**Esc**" button to go back.

Controller I/O Status Menu

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



1. Once you are in the Diagnose Menu, to view Input/Output signals, press the down button "**/ -**" to select "Controller I/O Status" then press the Enter button ( ).
2. Once you are in the Controller I/O Status Menu, press the up button "**/ +**" or down button "**/ -**" to select the chassis controller, turntable controller, and platform controller.
3. Press the Enter button ( ) to enter the menu of the selected controller and view the Input/Output signal data.
   - The tables below contain the values for the relevant controllers are as follows
     - Chassis Controller table values start on page 44.
     - Turntable Controller table values start on page 45
     - Platform Controller table values start on page 46
4. Press the "**Esc**" button to go back.

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	Frame Leveling Left (39) / Right (55)	0 mA
C1: 15, 40	Park Brake Release Valve	0 mA
C1: 16, 41	Oscillating Rear-Axle: Left Valve A	0 mA
C1: 30, 42	Oscillating Rear-Axle: Left Valve B	0 mA
C1: 31, 43	Oscillating Rear-Axle:Right Valve A	0 mA
C1: 32, 44	Oscillating Rear-Axle:Right Valve B	0 mA
C2: 13, 29, 47	Steer Valve: 4-Wheel Mode (13) / Crab Mode (29)	0 mA
C2: 14, 48	Differential Lock Valve	0 mA
C2: 15, 67	Frame Leveling Proportional Valve	0 mA

Chassis Controller		
Pin Definition		**Value**
C2: 16, 32, 68	Steer Valve: Left (16) / Right(32)	0 mA
C2: 34	Left Oscillating Cylinder: Signal 3 NO	True: Oscillate False: Lock
C2: 35	Left Oscillating Cylinder: Signal 1 NC	True: Lock False: Oscillate
C2: 36	Right Oscillating Cylinder: Signal 4 NO	True: Oscillate False: Lock
C2: 37	Right Oscillating Cylinder: Signal 2 NC	True: Lock False: Oscillate
C2: 42	Turntable Proximity Switch: Left	True: At middle position False: Out of middle position
C2: 55	Turntable Proximity Switch: Right	
C2: 56	Turntable Proximity Switch: Middle	
C2: 57	Steer Angle: Front-Axle	2500mV
C2: 58	Steer Angle: Rear-Axle	2500mV

Turntable Controller		
Pin Definition		**Value**
C1: 8	Main boom lower-down switch	True: Lower Down False: Standby
C2: 62	Main boom lift-up switch	True: Lift Up False: Standby
C1: 9	Main boom extend-out switch	True: Extend Out False: Standby
C1: 10	Main boom retract-in switch	True: Retract In False: Standby
C1: 11	Engine: Air filter	False
C1: 14, 39, 55	Drive forward(39) / backward(55)	0 mA
C1: 24	Main boom down limit switch	True: Stowed False: Raised
C1: 25	Lower boom down limit switch	True: Stowed False: Raised
C1: 26	Main boom: Chain limit switch	True: Normal False: Alarm
C1: 27	GPS: Machine lock low	False
C1: 28	Emergency pump switch	True: Input Signal False: Standby
C1: 29	Key switch signal	True: Ground Control False: Platform Control
C1: 30, 42	Hydraulic generator proportional valve	0 mA
C1: 47		
C1: 36	Jib lift-up switch	True: Lift Up False: Standby
C1: 52	Jib lower-down switch	True: Lower Down False: Standby
C1: 37	Hydraulic oil temperature sensor	False
C1: 38	Engine: Alternator signal	True: Standby False: Alternator Running
C1: 45	GPS: Hour meter (running signal)	False
C1: 46	To Motion beacon relay	Machine Running → True Standby → False
C1: 53	Fuel level	19.2%

Turntable Controller		
Pin Definition		**Value**
C1: 54	Engine start / stop button	True: Signal Input False: Standby
C2: 3	Low speed switch	True: Signal Input False: Standby
C2: 4	High speed switch	True: Signal Input False: Standby
C2: 5	Platform level-up switch	True: Level Up False: Standby
C2: 6	Platform level-down switch	True: Level Down False: Standby
C2: 9	Lower-boom lift-up switch	True: Lift Up False: Standby
C2: 10	Lower-boom lower-down switch	True: Lower Down False: Standby
C2: 19	Frame level-left switch	True: Level Left False: Standby
C2: 20	Frame level-right switch	True: Level Right False: Standby
C2: 21	Platform swing: right switch	True: Rotate Right False: Standby
C2: 22	Platform swing: left switch	True: Rotate Left False: Standby
C2: 26	Turntable rotation: right switch	True: Rotate Right False: Standby
C2: 41	Turntable rotation: left switch	True: Rotate Left False: Standby
C2: 38	Chassis by-pass switch	True: Standby False: By-Pass Input
C2: 46	Overload indicator	Overload → True → Light Up
C2: 49	Engine start signal (output to engine ECU)	True: Engine Start False: Standby
C2: 50	Hydraulic-oil radiator (output to KA8)	True: Radiator Running False: Standby
C2: 51	Emergency pump (output to KM2)	True: Emergency Pump Running False: Standby
C2: 52	Horn (output to KA4)	True: Horn Sound False: Standby
C2: 54	GPS: Machine lock high	False
C2: 61	BA/BT mode switch	True: Modified False: Standby
C2: 64	Alarm buzzer (chassis)	False

Platform Controller		
Pin Definition		**Value**
C1: 8	Drive-joystick analog 1	0.00%
C1: 9	Drive-joystick analog 2	0.00%
C1: 10	Turntable-joystick analog (1, X)	0.00%
C1: 11	Hydraulic generator: start/stop	False
C1: 13	Force-drive switch	False
C1: 14, 39, 55	Jib up/down current	0 mA
C1: 24	Jib amplitude joystick analog (1, Y)	0.00%
C1: 25	Platform swing joystick analog (2, X)	0.00%

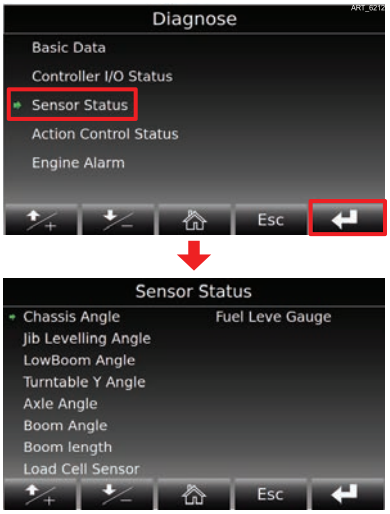
Platform Controller		
Pin Definition		**Value**
C1: 26	Main boom amplitude joystick analog (2, Y)	0.00%
C1: 31, 43, 59	Platform swing current	0 mA
C1: 36	Load analog signal A	1368mV
C1: 52	Load analog signal B	1455mV
C1: 38	Ultrasonic top crash prevention, Left	50mV
C1: 54	Ultrasonic top crash prevention, Right	0mV
C2: 3	Driving speed mode: Slow	False
C2: 4	Driving speed mode: Fast	True
C2: 6	Jib low proximity switch	True
C2: 9	Platform level-up switch	True: Level up False: Standby
C2: 10	Platform level-down switch	True: Level down False: Standby
C2: 11	Main boom retract-in switch	True: Retract in False: Standby
C2: 12	Main boom extend-out switch	True: Extend out False: Standby
C2: 19	Frame level-left switch	True: Level left False: Standby
C2: 20	Frame level-right switch	True: Level right False: Standby
C2: 21	Lower-boom lift-up switch	True: Lift up False: Standby
C2: 22	Lower-boom lower-down switch	True: Lower down False: Standby
C2: 27	Dead-man switch of middle joystick	True: Activated False: Standby
C2: 28	Crab Mode switch	True: Crab Mode False: Standby
C2: 41	4-Wheel Mode switch	True: 4-Wheel Mode False: Standby
C2: 34	Dead-man switch of left joystick	True: Activated False: Standby
C2: 35	RPM + switch	True: RPM + False: Standby
C2: 36	RPM - switch	True: RPM - False: Standby
C2: 37	Axle differential-lock switch	True: Differential-lock False: Standby
C2: 42	Right turn switch	True: Turn right False: Standby
C2: 61	Left turn switch	True: Turn left False: Standby
C2: 43	Alarm buzzer (platform)	True: Alarm False: Standby
C2: 46	Overload indicator	Overload → True → Light up
C2: 54	Emergency pump switch	True: Signal input False: Standby
C2: 55	Horn switch	True: Signal input False: Standby
C2: 56	Anti-pinch	True

Platform Controller		
Pin Definition		Value
C2: 57	BA/BT mode switch	True: Modified False: Standby
C2: 58	Bypass switch	True: Signal input False: Standby
C2: 62	Dead-man switch of drive joystick	True: Signal input False: Standby

Sensor Status Menu

Displays read original raw data from the sensors through the CAN bus.

For instructions on how to enter the Diagnose Menu, refer to page 43.



1. Once you are in the Diagnose Menu, press the down button "🡻 / −" to select "Sensor Status" then press the Enter button (↵).
2. Once you are in the Sensor Status Menu, press the up button "🡹 / +" or down button "🡻 / −" to select the sensor you want to select.
3. Press the Enter button (↵) to enter the menu of the selected sensor and display the related data.
4. Press the "**Esc**" button to go back.

The values shown in the charts below for each angle are for reference of how the information will be displayed when viewed.

Chassis Angle	
Chassis Angle X1	-1.4 deg
Chassis Angle X2	1.4 deg
Chassis Angle Y1	-0.1 deg
Chassis Angle Y2	0.1 deg

Jib Leveling Angle	
Jib Angle 1	224.2 deg
Jib Angle 2	135.8 deg

Low Boom Angle	
Low Boom Angle	-4.0 deg

Turntable Y Angle	
Turntable Y Angle 1	-0.5 deg
Turntable Y Angle 2	0.5 deg

Axle Angle	
Front Axle Angle 1	0.0 deg
Front Axle Angle 2	0.0 deg
Rear Axle Angle 1	0.0 deg
Rear Axle Angle 2	0.0 deg

Boom Angle	
Main Boom Angle 1	-65.0 deg
Main Boom Angle 2	65.0 deg

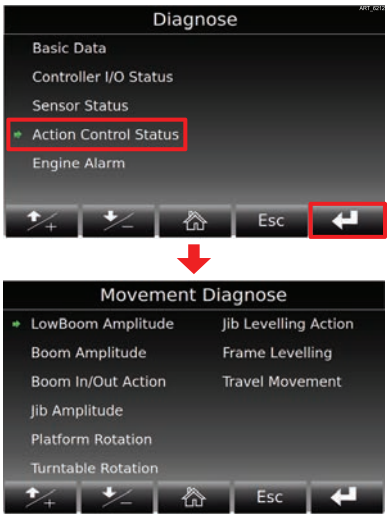
Boom Length	
Main Boom Length 1	0 In
Main Boom Length 2	-0 In

Load Cell Sensor	
Load Cell Analog 1	1368 mV/V
Load Cell Analog 2	1457 mV/V

Fuel Level Gauge	
Fuel Sensor Analog	19.2%

Action Control Status Menu

Action control status shows machine movement command request and output percentage by movement groups.



1. Once you are in the Diagnose Menu, press the down button "**/**" to select "Action Control Status" then press the Enter button ( ).
2. Once you are in the Action Control Status Menu, press the up button "**/**" or down button "**/**" to select the sensor you want to select.
3. Press the Enter button ( ) to enter the menu of the selected function and display the related data.
4. Press the "**Esc**" button to go back.

The values shown in the charts below for each angle are for reference of how the information will be displayed when viewed.

Low Boom Amplitude	
Platform Joystick Analog	False
Ground Control Switch	False
PWM Output A	0.0%
PWM Output B	0.0%
PWM Output Percent A	0.0%
PWM Output Percent B	0.0%

Boom Amplitude	
Platform Joystick Analog	-0.4%
Ground Control Switch	False
PWM Output A	0.0%
PWM Output B	0.0%
PWM Output Percent A	0.0%
PWM Output Percent B	0.0%

Boom In/Out Action	
Platform Joystick Analog	False
Ground Control Switch	False
PWM Output A	0.0%
PWM Output B	0.0%
PWM Output Percent A	0.0%
PWM Output Percent B	0.0%

Jib Amplitude	
Platform Joystick Analog	-0.2%
Ground Control Switch	False
PWM Output A	0 mA
PWM Output B	0 mA
PWM Output Percent	0.0%

Platform Rotation	
Platform Joystick Analog	-0.4%
Ground Control Switch	False
PWM Output A	0 mA
PWM Output B	0 mA
PWM Output Percent	0.0%

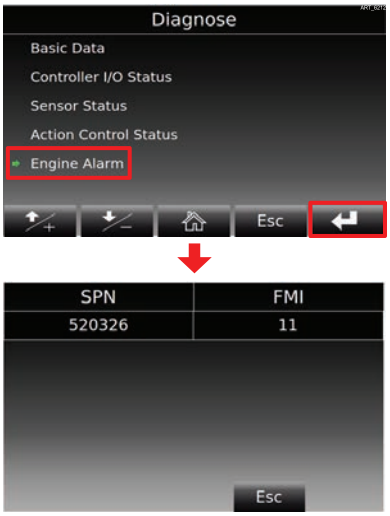
Turntable Rotation	
Platform Joystick Analog	-0.4%
Ground Control Switch	False
PWM Output A	0.0%
PWM Output B	0.0%
PWM Output Percent A	0.0%
PWM Output Percent B	0.0%

Jib Leveling Action	
Platform Joystick Analog	False
Ground Control Switch	False
PWM Output A	0.0%
PWM Output B	0.0%
PWM Output Percent A	0.0%
PWM Output Percent B	0.0%

Frame Leveling	
Platform Control Signal	False
Ground Control Signal	False
PWM Output A	0 mA
PWM Output B	0 mA
Percent Output Signal	0 mA
Percent Output	0.0%

Travel Movement	
Travel Speed PWM Output A	0 mA
Machine Travel_PWM B	0 mA
Travel Speed Percent	0.0%

Engine Alarm



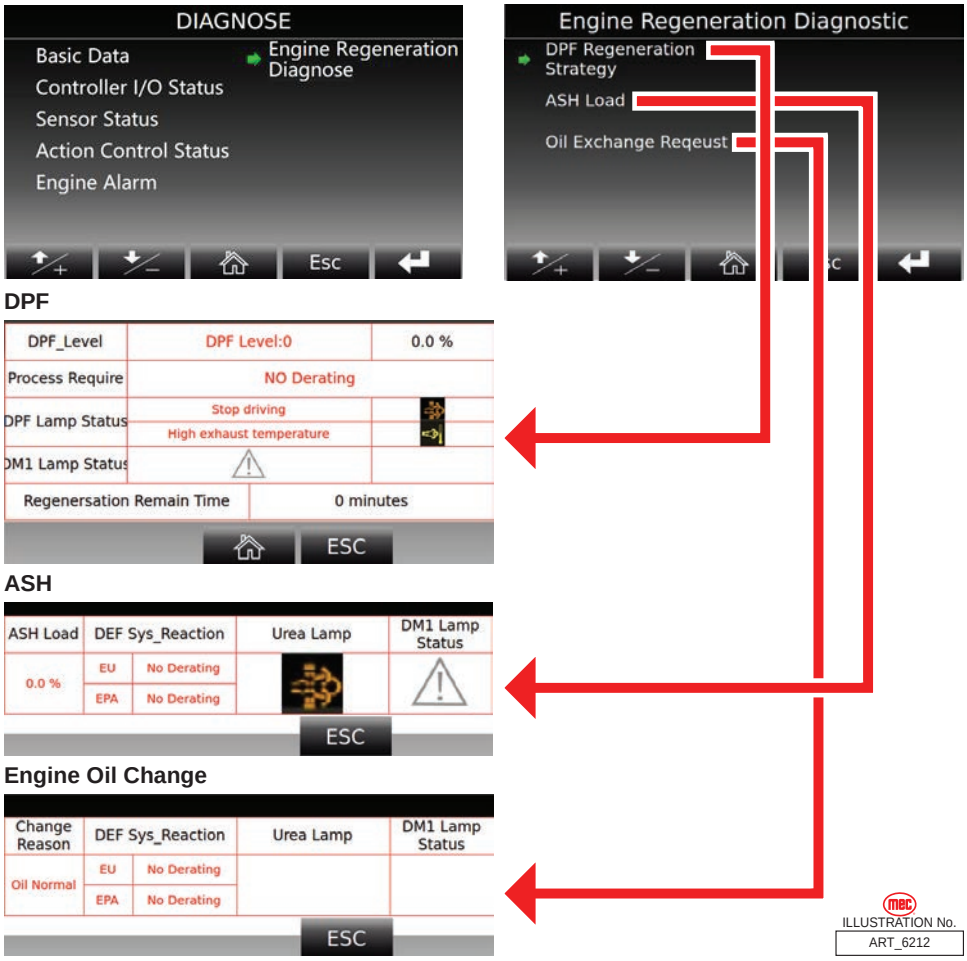
Displays the engine ECU's broadcasting DM1 message.

1. Once you are in the Diagnose Menu, press the down button "🡻 / ▬" to select the "Engine Alarm" then press the Enter button (↵).
2. Once you are in the Engine Alarm menu, you can view SPN (Suspect Parameter Number) and the FMI (Failure Mode Identifier).
3. Press the "**Esc**" button to go back.

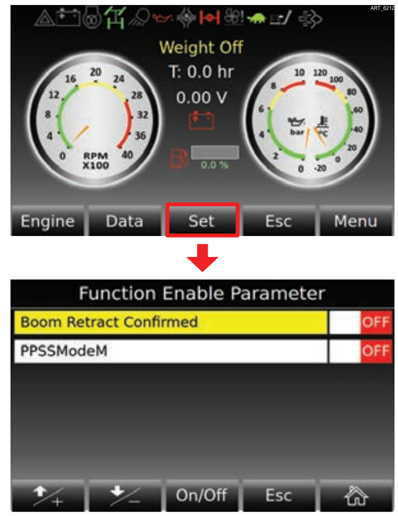
The values shown in the chart are for reference of how the information will be displayed when viewed.

Engine Regeneration Diagnose

1. Once you are in the Diagnose Menu, press the down button "🡻 / ▬" to select "Engine Regeneration Diagnose" then press the Enter button (↵).
2. Once you are in the Engine Regeneration Diagnose Menu, press the up button "🡹 / ✚" or down button "🡻 / ▬" to select the function you want to select.
3. Press the Enter button (↵) to enter the selected function and display the related data.
4. Press the "**Esc**" button to go back.



Settings Interface



Quick Setup

1. Press and hold the “Set” button for several seconds then release to enter the “Quick Setup” interface.
2. Press the “**Esc**” button to go back when you are done.

Boom Retract Confirmed

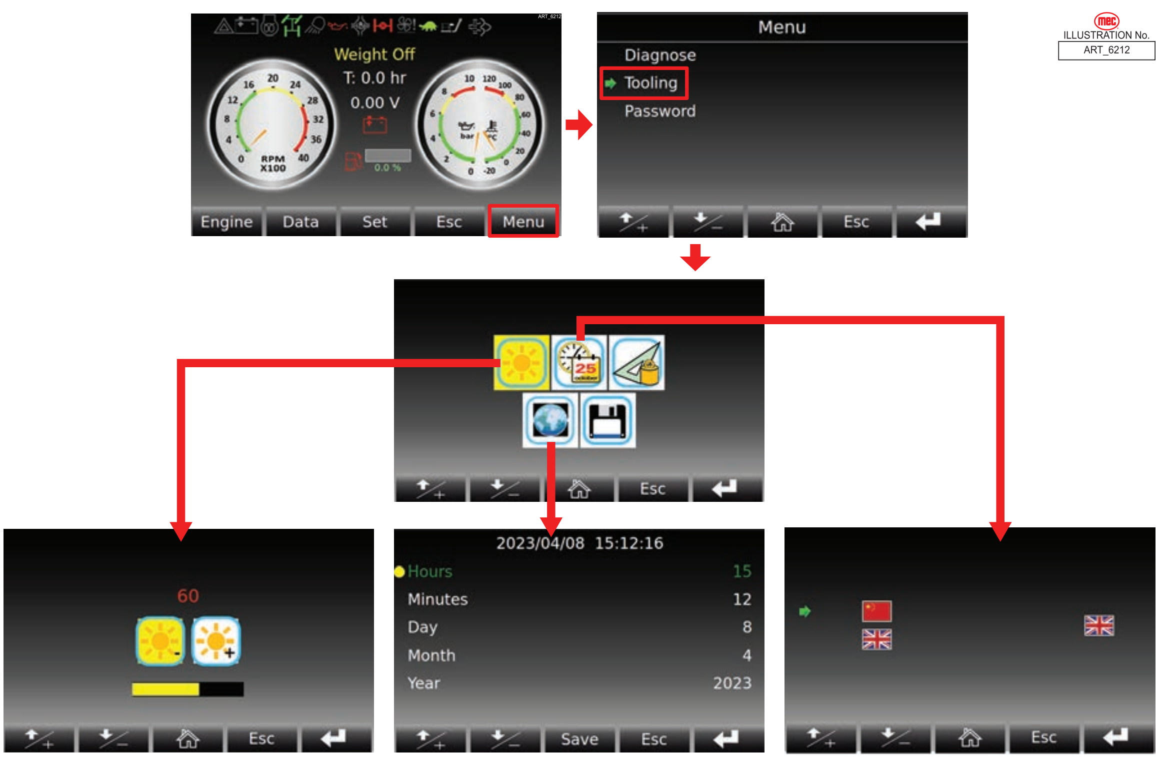
- The sensor is faulty and the controller does not know the status of the boom.
- Retract boom in emergency way, then turn on this function. In this method, machine can be driven to warehouse for repairing.

PPSS Mode

- This function can be switched on when ultrasonic sensors are installed on the platform frame to prevent the platform frame from colliding with obstacles above it.

Tool Interface Adjustments

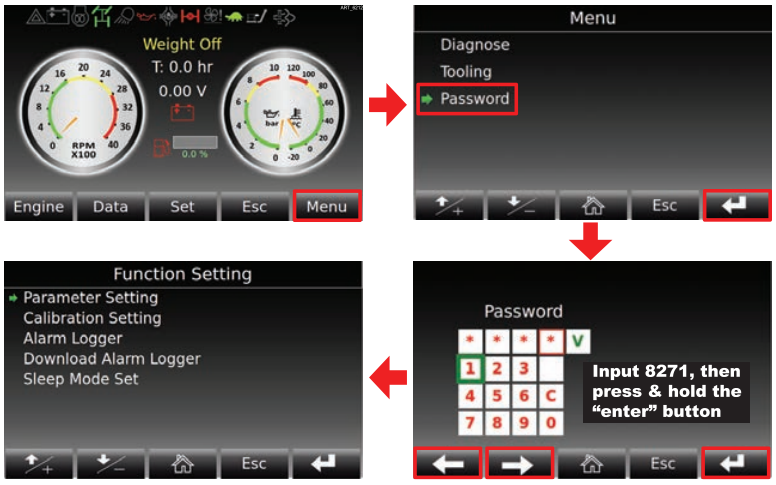
1. If the screen brightness, year/time, and or the language needs to be adjusted then follow these steps.
2. Press the Menu button then press the down button “↓ / −” to select the “Tooling” menu and press the Enter button (↵).
3. Use the respective buttons to make the changes need to the selected function.
4. Press the “**Esc**” button to go back when you are done.



Brightness Time Language

Function Setting Menu

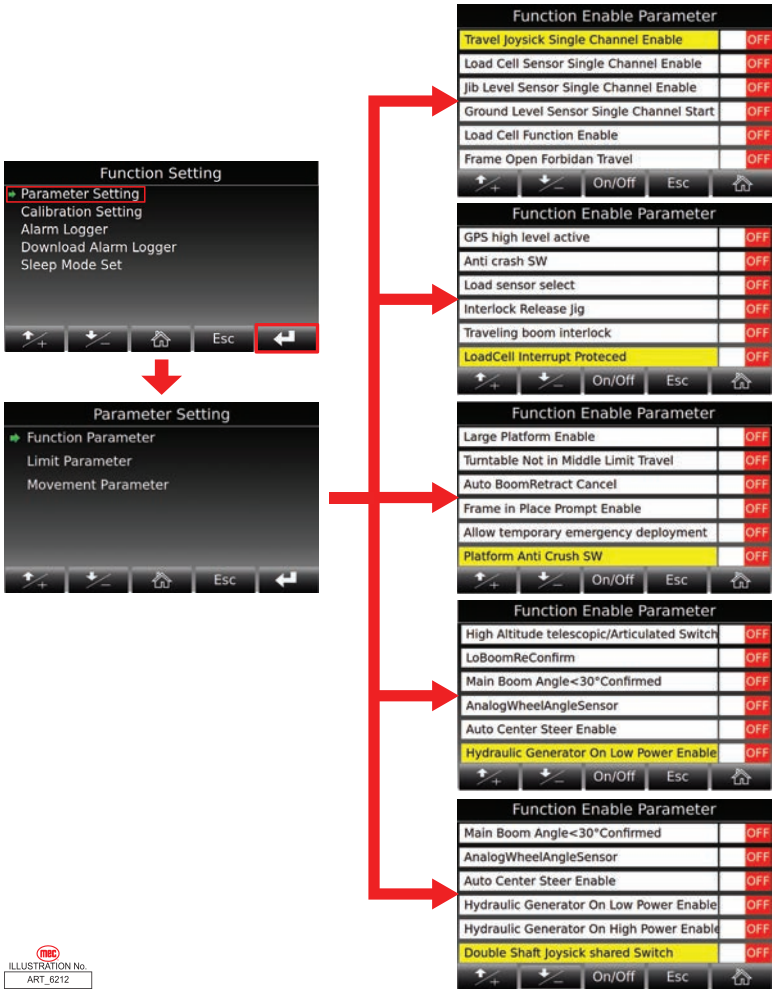
1. From the Main Menu, press the Menu button to enter the Menu interface.
2. In the Menu interface, press the down button "🡻 / 🡺" to select the "Password" menu and press the Enter button (↵).
3. In the Password Menu, press the left arrow button "🡸" and the right arrow button "🡺" to select the individual characters and press the Enter button (↵)to enter the select character.
4. Enter the password "8271" then press and hold the Enter button (↵) to enter the Function Setting Menu.



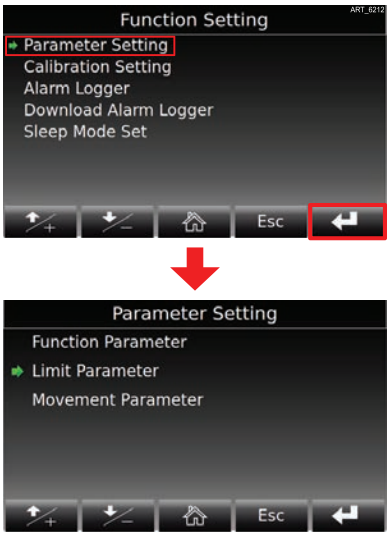
Function Parameter Menu

Function parameters set functions on/off. The display sends button action to the controller, then reads controller feedback status for each function on or off.

1. After following the instructions to enter the Function Setting Menu on page 52, press the Enter button (↵) on "Parameter Setting".
2. In the Parameter Setting Menu, select the Function Parameter and press the Enter button (↵).
3. In the Function Parameter menu, you can enable or disable certain machine functions.



Limit Parameter

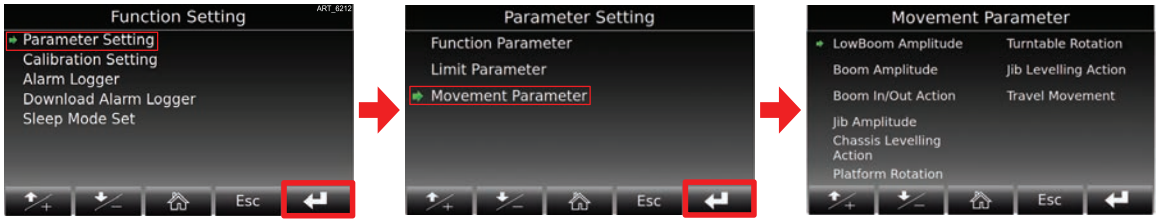


1. After following the instructions to enter the Function Setting Menu on page 52, press the Enter button (↵) on “Parameter Setting”.
2. In the Parameter Setting Menu, press the down button “🡻 / ▬” to select the Limit Parameter and press the Enter button (↵).
3. Limit parameters sets the engine rpm and output limitation for machine movements.

The values shown in the chart are for reference of how the information will be displayed when viewed.

LowBoom Up Speed	1600rpm	4-Wheel Mode Traction Speed	1800rpm
LowBoom Down Speed	1600rpm	Steering Speed	1200rpm
Boom Up Speed	2000rpm	Boom Out Max Reduction Percent	35.2%
Boom Down Speed	1800rpm	Boom In Min Reduction Percent	47.2%
Boom Out Speed	1600rpm	Boom up/down follows out reduction ratio	85.2%
Boom In Speed	1600rpm	Boom Up Max Open Follows LowBoom	50.0%
Jib Up Speed	1200rpm	Boom Max Angle Reduction Percent	75.2%
Jib Down Speed	1200rpm	Jib Open Follow Platform Right Rotation	32.0%
Platform CW Rotation Speed	1000rpm	Jib Open Follow Platform Left Rotation	32.0%
Platform CCW Rotation Speed	1000rpm	MC43 one key leveling Output Ratio	100.0%
Turntable CW Rotation Speed	1000rpm	Turntable Follow Out Reduction Ratio	83.2%
Turntable CCW Rotation Speed	1000rpm	Jib Up PVG Open Speed	50.0%
Multi Action Speed	2300rpm	Jib Down PVG Open Speed	43.2%
Jib Up Leveling Engine Speed	1400rpm	Boom down max open follow lowboom	68.8%
Jib Down Leveling Engine Speed	1400rpm	Boom down min angle reduction percent	50.0%
High Speed Driving Speed	2400rpm	Generator High Power Speed	2000rpm
Climbing Speed Driving Speed	1800rpm	Generator Low Power Speed	1800rpm
Low Speed Driving Speed	1500rpm	Generator High Power Current	1050mA
High Altitude Driving Speed	1200rpm	Generator Low Power Current	850mA

Movement Parameter



1. After following the instructions to enter the Function Setting Menu on page 52, press the Enter button (↵) on “Parameter Setting”.
2. In the Parameter Setting Menu, press the down button “🡻 / ▬” to select the Movement Parameter and press the Enter button (↵).
3. In the Movement Parameter Menu, you can see the parameters of the machine during an action.
4. Press the up button “🡹 / ✚” or down button “🡻 / ▬” to select the function you want to select then

press the Enter button (↵) on the selected function.

The values shown in the chart are for reference of how the information will be displayed when viewed.

Low Boom Amplitude	
P508 Up start slope	5000ms
P509 Up stop slope	3000ms
P510 Down start slope	4000ms
P511 Down stop slope	2000ms
P801 Up speed percent	91.2%
P802 Down speed percent	80.0%
P803 Up multi speed percent	66.0%
P804 Down multi speed percent	64.8%

Boom Amplitude	
P548 Up start slope	2000ms
P549 Up stop slope	4000ms
P550 Down start slope	5000ms
P551 Down stop slope	1500ms
P811 Up speed percent	80.0%
P812 Down speed percent	90.0%
P813 Up multi speed percent	82.0%
P814 Down multi speed percent	90.0%

Boom In/Out Action	
P568 Out start slope	5000ms
P569 Out stop slope	2000ms
P570 In start slope	3000ms
P571 In stop slope	2000ms
P816 Out speed percent	96.0%
P817 In speed percent	74.0%
P818 Out multi speed percent	73.2%
P819 In multi speed percent	66.0%

Jib Amplitude	
P588 Up start slope	1000ms
P591 Down stop slope	1140ms
P589 Up stop slope	2000ms
P590 Down start slope	2000ms
P821 Up speed percent	95.2%
P822 Down speed percent	96.0%
P823 Up multi speed percent	80.0%
P824 Down multi speed percent	75.2%

Chassis Leveling	
Left start slope	2500ms
Left stop slope	1000ms
Right start slope	2500ms
Right stop slope	1000ms
Left multi speed percent	78.0%
Right multi speed percent	88.0%
Left speed percent	64.8%
Right speed percent	64.8%

Platform Rotation	
P628 CW start slope	1000ms
P629 CW stop slope	1500ms
P630 CCW start slope	1000ms
P631 CCW stop slope	1500ms
P931 CW speed percent	80.0%
P832 CCW speed percent	80.0%
P833 CW multi speed percent	44.8%
P834 CCW multi speed percent	44.8%

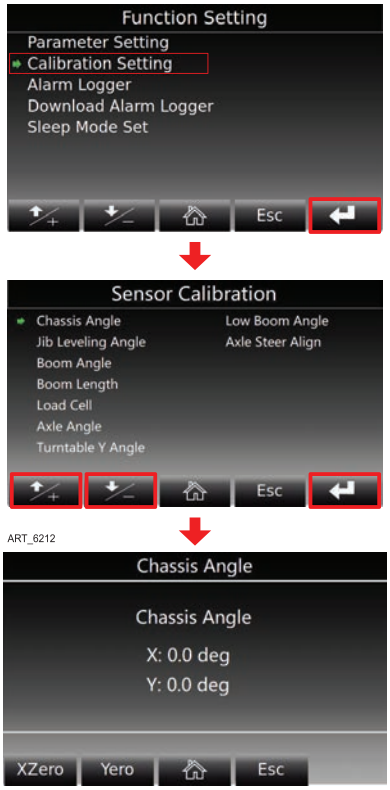
Turntable Rotation	
P648 CCW start slope	3500ms
P649 CCW stop slope	3500ms
P650 CW start slope	3500ms
P651 CW stop slope	3500ms
P836 CCW speed percent	50.0%
P837 CW speed percent	50.0%
P838 CCW multi speed percent	44.8%
P839 CW multi speed percent	44.8%

Jib Leveling	
P707 Up start slope	2000ms
P708 Up stop slope	2000ms
P709 Down start slope	2000ms
P710 Down stop slope	2000ms
P811 Up percent	64.8%
P812 Down percent	64.8%
P813 Up multi speed percent	44.8%
P814 Down multi speed percent	50.0%

Travel Movement	
P668 Forward start slope	2500ms
P669 Forward stop slope	1500ms
P670 Backward start slope	2500ms
P671 Backward stop slope	1500ms
P861 Forward safety slow	22.0%
P862 Backward safety slow	16.0%
P863 Forward fast percent	96.0%
P864 Backward fast percent	88.0%

Travel Movement	
P865 Forward climbing percent	36.0%
P866 Backward climbing percent	32.0%
P867 Forward big steer/manual slow	40.0%
P868 Backward big steer/manual slow	40.0%
P869 Forward big steer percent	30.0%
P870 Backward big steer percent	32.0%
P415 Steer speed	100.0%

Calibration Setting



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

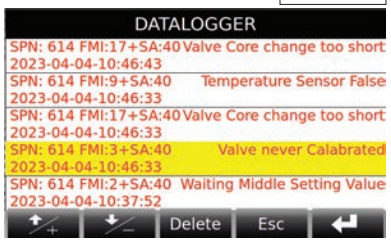
1. After following the instructions to enter the Function Setting Menu on page 52, press the down button "🡻 / ▬" to select the "Calibration Setting" menu and press the Enter button (↵).
2. In the Sensor Calibration menu, using the up button "🡹 / ✚" and/or down arrow "🡻 / ▬" to select the function you want to calibrate and then press the Enter button (↵).

The following example is used an example to demonstrate how to recalibrate a sensor.

1. Take "chassis angle" as an example: If operator replaces a new tilt sensor, the user needs to drive the machine to a level ground first, and then enter the calibration interface, as shown in the following figure.
2. Press & hold "XZero" button for several seconds to calibrate the X-axis, press & hold "YZero" button for several seconds to calibrate the Y-axis.

ART_6212

ILLUSTRATION No.
ART_6212



Alarm Logger

1. After following the instructions to enter the Function Setting Menu on page 52, press the down button "🡻 / ▬" to select the "Alarm Logger" menu and press the Enter button (↵).
2. In the Alarm Logger menu, you can browse the machine's historical fault codes.

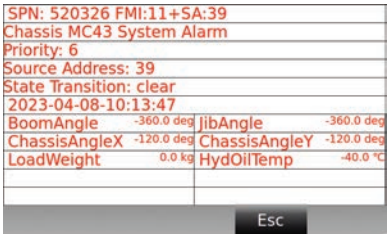
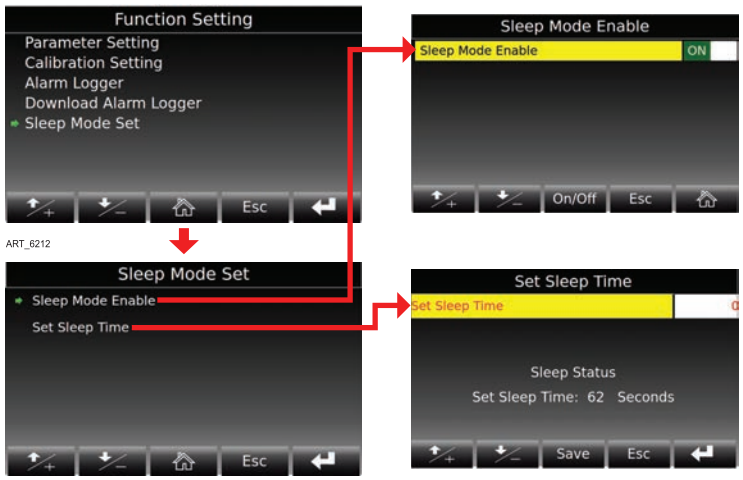


ILLUSTRATION No.
ART_6212

3. To download the Alarm Logger data, make sure that the machine is parked on a flat, level and firm surface.
4. Turn the machine off and plug in a USB into the USB port.
5. Turn the machine on with the USB still in the USB port and the image to the right will appear on the interface.

Sleep Mode Set Menu

1. After following the instructions to enter the Function Setting Menu on page 52, press the down button "🡻 / ▬" to select the "Sleep Mode Set" menu and press the Enter button (↵).
2. In the Sleep Mode Set, you can choose to enable or disable the Diagnostic Panel auto-dimness, or change the length before the screen dims.
   - The default dormancy time of the display is 5 minutes (300 seconds).
   - The minimum settable dormancy time is 1 minute (60 seconds).

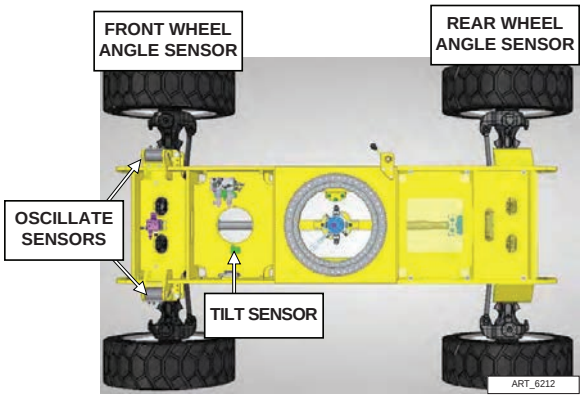


Sensors and Calibration

Tilt Sensor

When the machine is raised, the maximum tilt angle allowed by the machine is 3°.

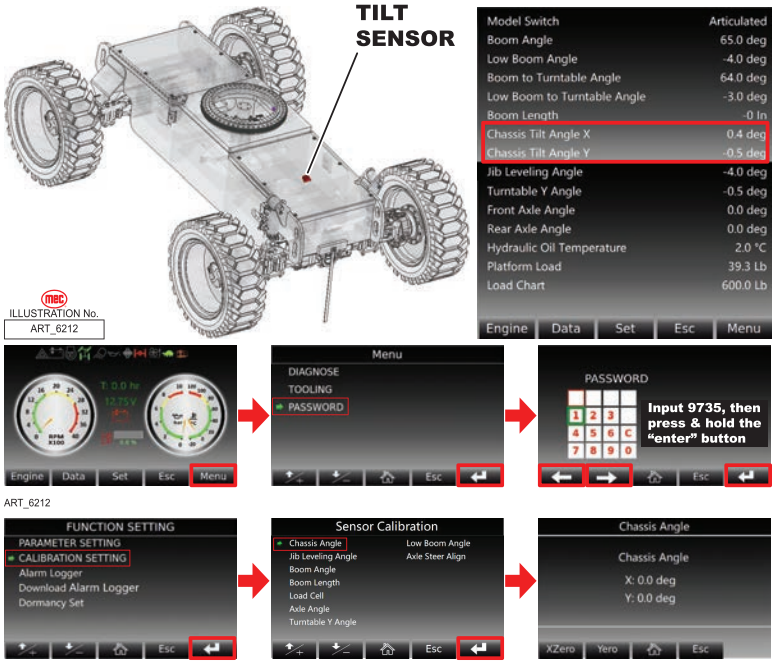
The tilt sensor will monitor the horizontal angle value of the chassis in real time. If the tilt angle of the chassis is too large, the system will give an alarm and prohibit continued work.



If you want to see detailed information detected by the machine sensors, refer to page 42 for Machine details.

Tilt Sensor Calibration

1. Make sure that the machine is parked on a flat, level and firm ground. Make sure that the tilt value of the machine for both the X-axis and Y-axis is 0°.
2. From the Main Menu, press the Menu button and from the Menu interface, press the down button "🡻 / ▬" to select the "Password" menu and press the Enter button (↵).
3. Enter the password "9735," then press and hold the Enter button (↵) to enter the Function Setting Menu.
4. Press the down button "🡻 / ▬" to select the "Calibration Setting" menu and press the Enter button (↵).
5. Inside the Sensor Calibration menu, select "Chassis Angle" and press the Enter button (↵).
6. Press & hold "XZero" button for several seconds to calibrate the X-axis.
7. Press & hold "YZero" button for several seconds to calibrate the Y-axis.

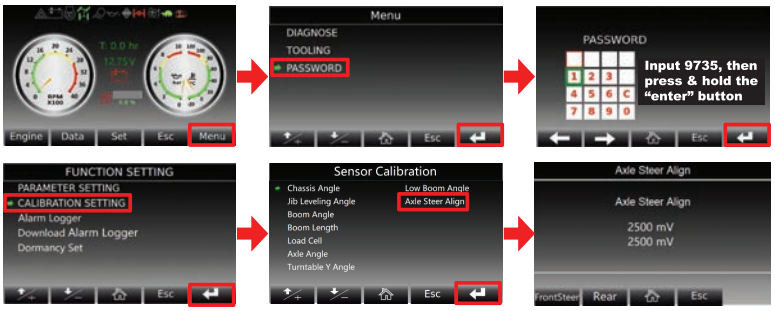


Axle Angle Sensor

The analogue voltage value is about 2500mV when the wheel is in the neutral position.

Chassis Controller		
C2: 57	Steer angle: Front-axle	2500mV
C2: 58	Steer angle: Rear-axle	2500mV

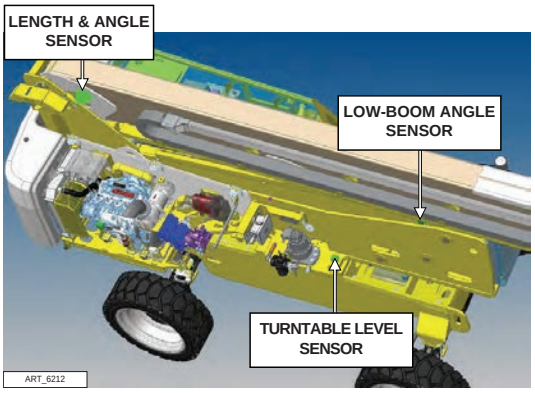
Axle Angle Sensor Calibration



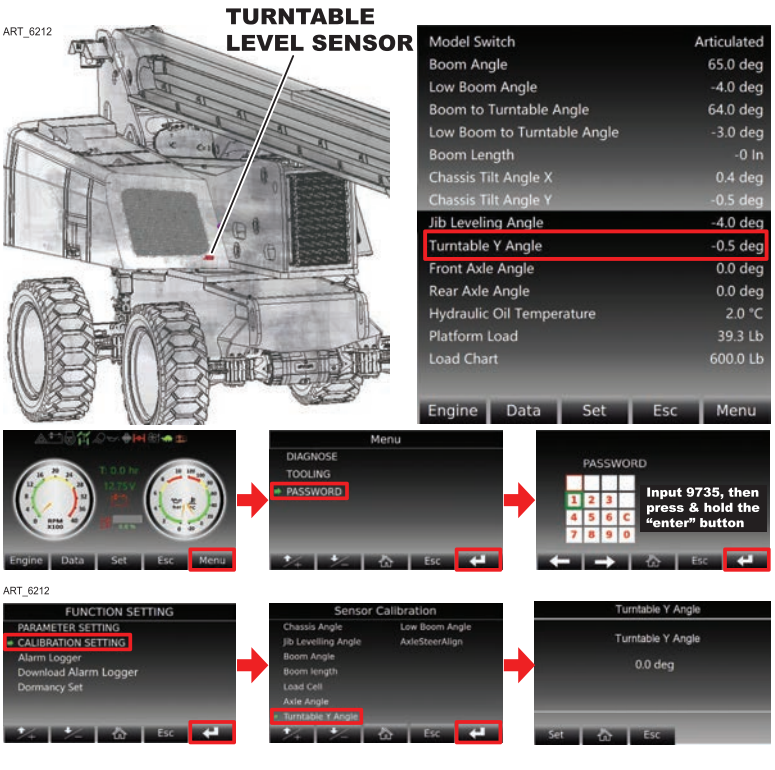
1. Make sure that the machine is parked on a flat, level and firm ground. Make sure that the front and rear wheels are in the neutral position.
2. From the Main Menu, press the Menu button and from the Menu interface, press the down button "🡻 / ▬" to select the "Password" menu and press the Enter button (↵).
3. Enter the password "9735," then press and hold the Enter button (↵) to enter the Function Setting Menu.
4. Press the down button "🡻 / ▬" to select the "Calibration Setting" menu and press the Enter button (↵).
5. Inside the Sensor Calibration menu, select "Axle Steer Align" and press the Enter button (↵).
6. Press & hold "Front Steer Align" button for several seconds to calibrate the front axle
7. Press & hold "Rear" button for several seconds to calibrate the rear axle.

Turntable Level Sensor

Detects the Y-angle of the turntable and compensates for the following angle of the main boom in articulating mode.



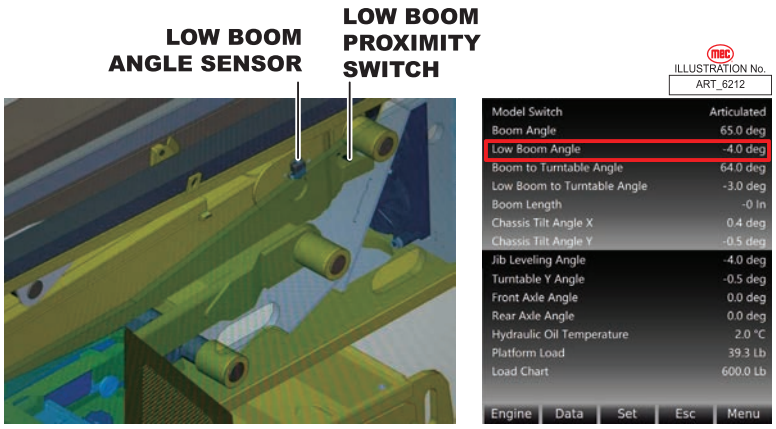
Turntable Level Sensor Calibration



1. Make sure that the machine is parked on a flat, level and firm ground.
2. From the Main Menu, press the Menu button and from the Menu interface, press the down button "🡻 / ▬" to select the "Password" menu and press the Enter button (↵).
3. Enter the password "9735," then press and hold the Enter button (↵) to enter the Function Setting Menu.
4. Press the down button "🡻 / ▬" to select the "Calibration Setting" menu and press the Enter button (↵).
5. Inside the Sensor Calibration menu, select "Turntable Y Angle" and press the Enter button (↵).
6. Press & hold "Set" button for several seconds to calibrate the sensor.

Low Boom Angle Sensor

Chassis Controller		
C1: 25	Lower Boom Down Limit Switch	True: Stowed False: Raised



Low Boom Angle Sensor Calibration

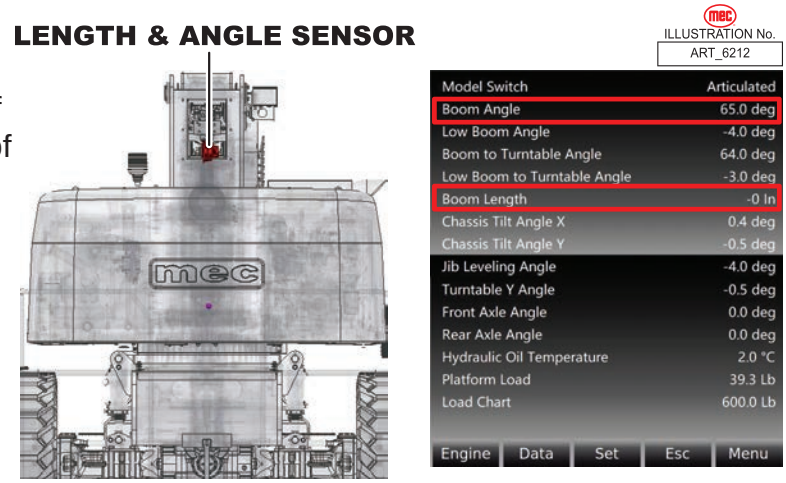
1. Make sure that the machine is parked on a flat, level and firm ground. Raise the riser boom so that the angle is 0°.
2. From the Main Menu, press the Menu button and from the Menu interface, press the down button "🡻 / ▬" to select the "Password" menu and press the Enter button (↵).
3. Enter the password "9735," then press and hold the Enter button (↵) to enter the Function Setting Menu.
4. Press the down button "🡻 / ▬" to select the "Calibration Setting" menu and press the Enter button (↵).
5. Inside the Sensor Calibration menu, select "Low Boom Angle" and press the Enter button (↵).
6. Press & hold "Set" button for several seconds to calibrate the sensor.

Main Boom Length & Angle Sensor

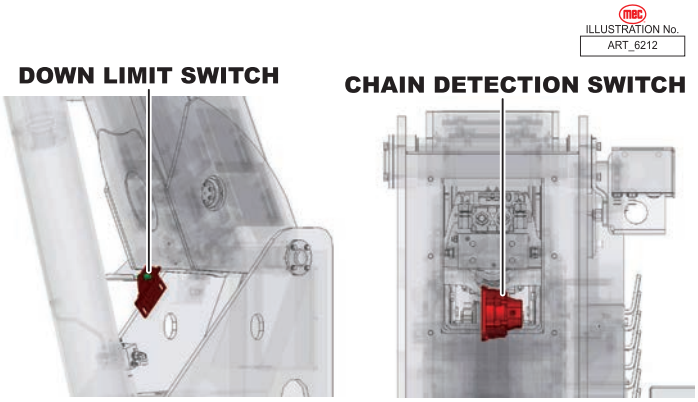
The sensor can monitor the length and angle of the main-boom in real time. There are 2 kinds of switches that can detect the state of the main-boom.

- Down limit switch
- Chain detection switch.

Operators can check whether the switches are faulty in the parameters interface of main controller.

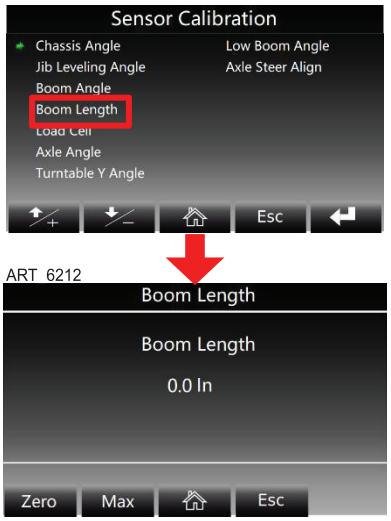


Turntable Controller		
C1: 24	Main Boom Down Limit Switch	True: Stowed False: Raised
C1: 26	Main Boom: Chain Detection Switch	True: Normal False: Alarm



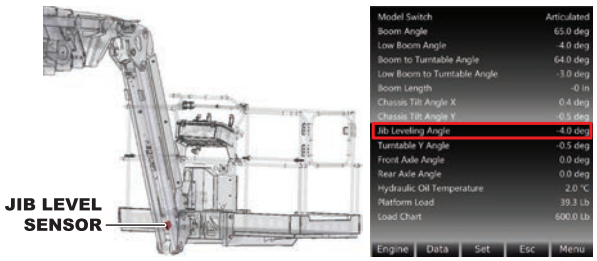
Boom Angle Sensor Calibration

1. Make sure that the machine is parked on a flat, level and firm ground. Make sure that the main boom is fully retracted and the boom angle is 0°.
2. From the Main Menu, press the Menu button and from the Menu interface, press the down button "🡻 / ▬" to select the "Password" menu and press the Enter button (↵).
3. Enter the password "9735," then press and hold the Enter button (↵) to enter the Function Setting Menu.
4. Press the down button "🡻 / ▬" to select the "Calibration Setting" menu and press the Enter button (↵).
5. Inside the Sensor Calibration menu, select "Boom Angle" and press the Enter button (↵).
6. Press & hold "Set" button for several seconds to calibrate the sensor.
7. Press "Esc" button to escape from above interface, then select "Boom Length".
8. Under the premise that the main-boom is fully retracted, press the "Zero" button to calibrate the retracted length;
9. Extend the main-boom completely, and press the "Max" button to calibrate the extended length.



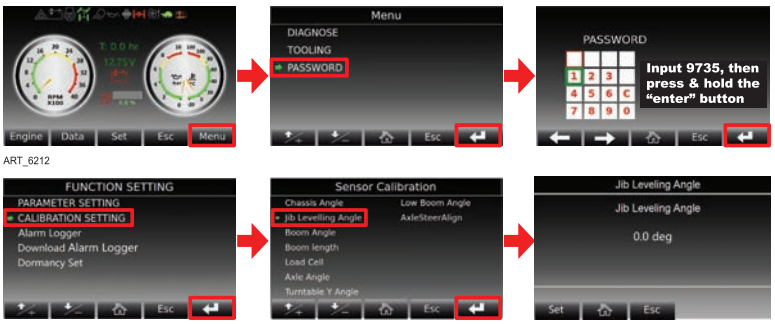
Jib Level Sensor

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



Jib Level Sensor Calibration

1. Make sure that the machine is parked on a flat, level and firm ground and that the platform is level.
2. From the Main Menu, press the Menu button and from the Menu interface, press the down button "🡻 / ▬" to select the "Password" menu and press the Enter button (↵).

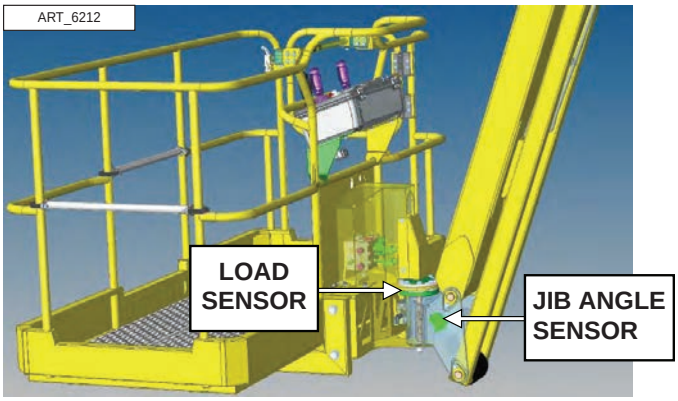


3. Enter the password “9735,” then press and hold the Enter button ( ) to enter the Function Setting Menu.
4. Press the down button “ / ” to select the “Calibration Setting” menu and press the Enter button ( ).
5. Inside the Sensor Calibration menu, select “Jib Leveling Angle” and press the Enter button ( ).
6. Press & hold “Set” button for several seconds to calibrate the sensor.

Load Sensor & Signal Amplifier

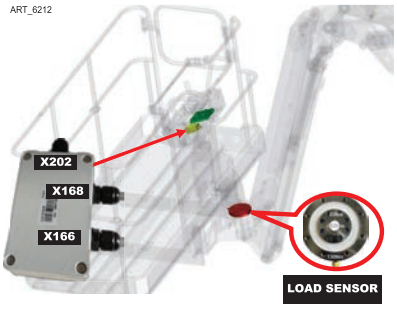
Load sensor

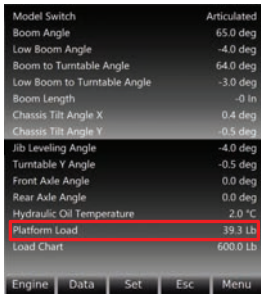
- It can accurately measure the load change on the platform and can intuitively display the current load on the display.



Signal amplifier

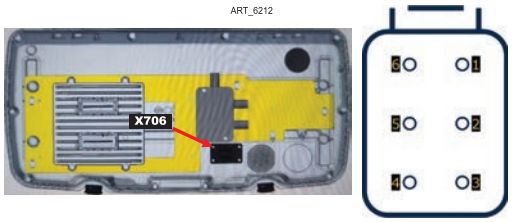
- The output signal of the load sensor is very weak (mV level), and the controller cannot directly process the signal. Therefore, a signal amplifier is required to amplify the weakly changed differential signal output by the sensor for the controller to process.





The method to confirm whether the load sensor is normal:

1. In platform box, find the connector “X706”
2. Turn on the machine, measure the input voltage to load sensor (Between pin 2 & 5: 8V);
3. No load on platform, measure the output voltage of signal 1 and signal 2 respectively (about 1.9mV);
4. Rated load on platform (900lb), measure the output voltage of signal 1 and signal 2 in the same way (about 3.9mV).



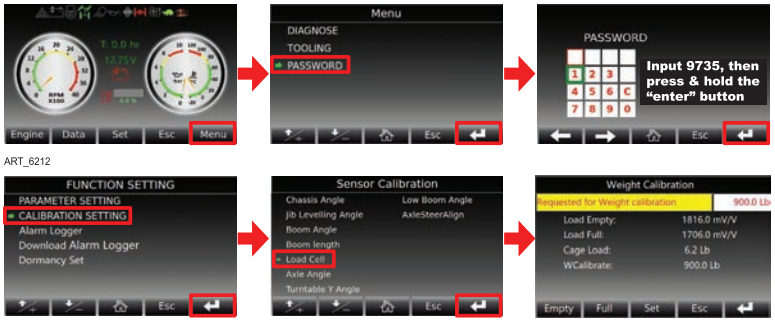
	Signal 1, Signal 2 (Pin 1 & 3; pin 4 & 6)	Amplified signals (Menu, diagnose, sensor status)
No load	1.9mV	1300mV
Rated load	3.9mV	2200mV

Note: The values measured above are for reference only.

Note: When it is difficult to judge, disconnect load sensor from amplifier to eliminate interference of the amplifier with the signal (see picture).

Load Sensor Calibration

1. Make sure that the machine is parked on a flat, level and firm ground and that the platform is level.
2. From the Main Menu, press the Menu button and from the Menu interface, press the down button "🡻 / 🡺" to select the "Password" menu and press the Enter button (↵).

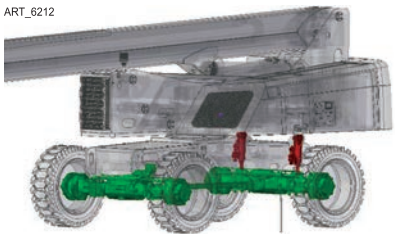


3. Enter the password "9735," then press and hold the Enter button (↵) to enter the Function Setting Menu.
4. Press the down button "🡻 / 🡺" to select the "Calibration Setting" menu and press the Enter button (↵).
5. Inside the Sensor Calibration menu, select "Load Cell" and press the Enter button (↵).
6. With the platform completely empty of tools and personnel, press & hold the "Empty" button for several seconds to calibrate the "empty-load".
7. Put the maximum rated load on platform, then press "Full" button for several seconds to calibrate the "full-load".

Oscillating Axle

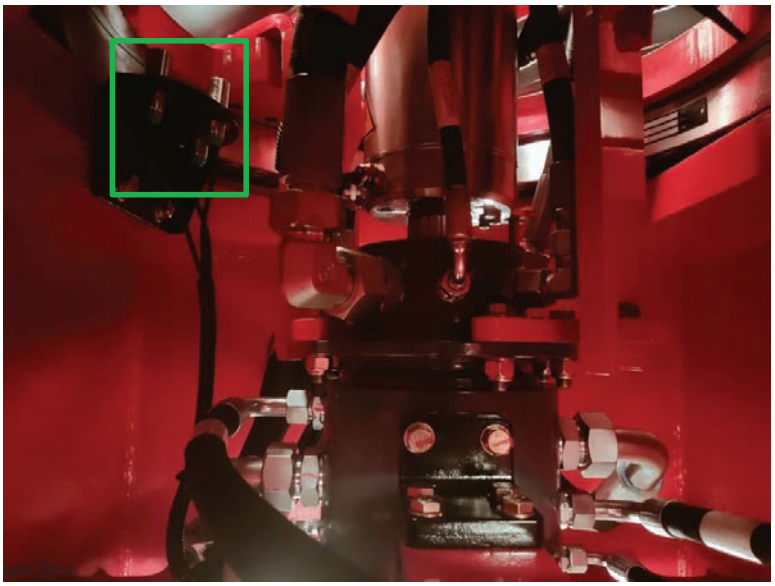
At the front axle, there are 2 oscillating cylinders:

- 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 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.



Input Pin	Lock State	Oscillate State
C2: 34 Left Oscillating Cylinder: Signal 3 NO	False	True
C2: 35 Left Oscillating Cylinder: Signal 1 NC	True	False
C2: 36 Right Oscillating Cylinder: Signal 4 NO	False	True
C2: 37 Right Oscillating Cylinder: Signal 2 NC	True	False

Turntable Proximity Switches (NO)



These 3 switches are used to detect what state the turntable is currently in.

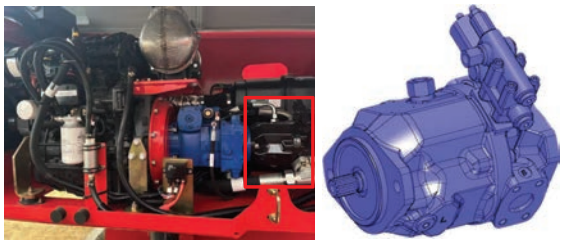
If the turntable deviates from the middle position within 15° to the left or right, and two or more limit switches are triggered, the control system will determine that the turntable is currently in the middle position.

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

I/O status of main controller

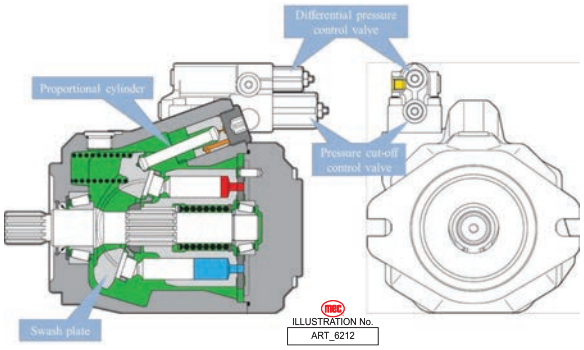
Input pin	Description
C2: 42 Turntable Proximity Switch: Left	True: At Middle Position False: Out Of Middle Position
C2: 55 Turntable Proximity Switch: Right	
C2: 56 Turntable Proximity Switch: Middle	

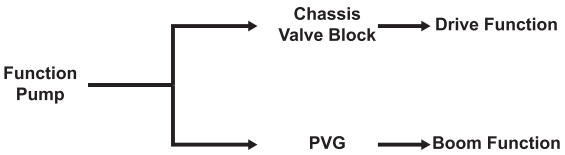
Function System



Function Pump

Function Pump	
Displacement	45cc
Rated Working Pressure	265bar

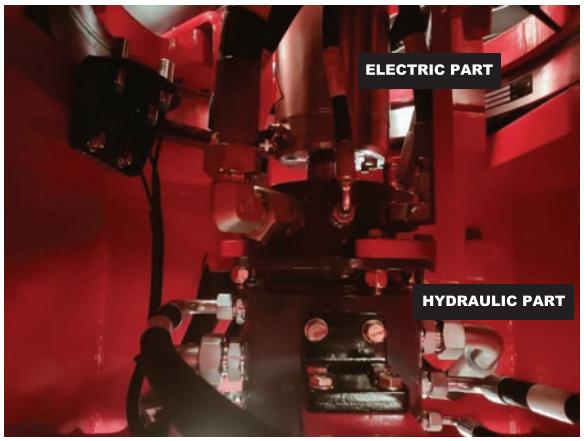




Rotary Coupling

The rotating joint can be divided into two parts: Electrical part & Hydraulic part.

It can connect the wires and oil pipes between chassis and turntable, so that the turntable can rotate 360° without interruption.

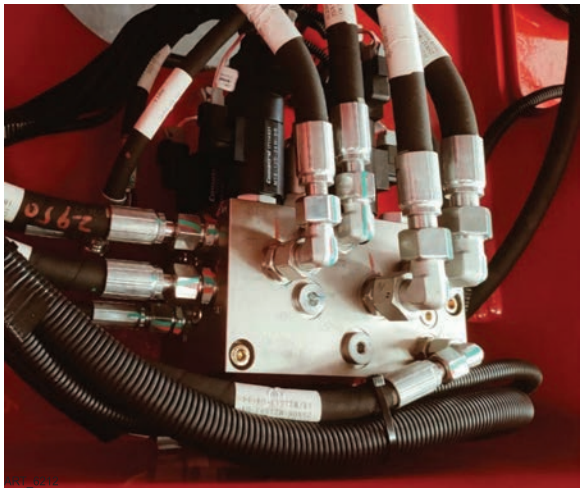


Chassis Valve Block

The Chassis valve block location at the chassis front side.

It can realize the function of chassis movement, for example release the wheel brake, differential lock, four wheels steering, frame leveling (Option).

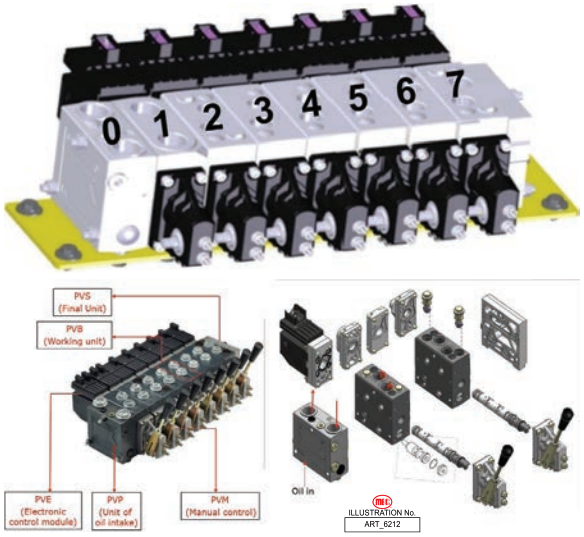
Refer to page 72 for the schematic.



PVG

The PVG is located at right side of the machine. By controlling the opening and closing of the oil circuit, many functions of boom movement can be realized.

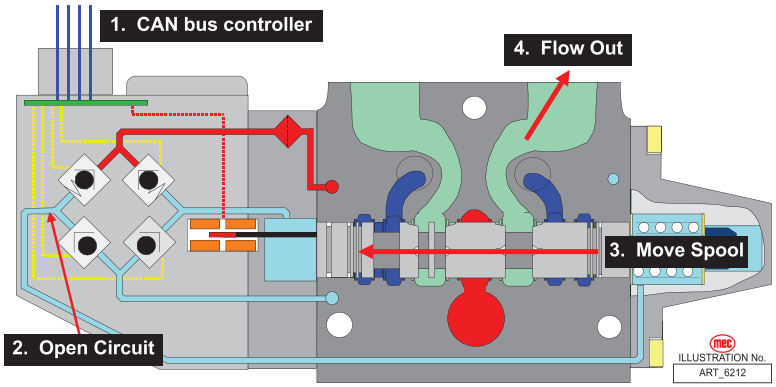
Through the “M port”, the oil pressure inside the valve block can be measured to check whether the oil system is normal.



Function Enable

No matter what you want to do (main-boom amplitude, turntable rotation…), first of all, the piece 1 will be energized.

Under the premise that piece 1 is energized, if piece 2 is energized, the main-boom can be extended or retracted; if piece 3 is energized, the main-boom can be lifted or lowered, etc.

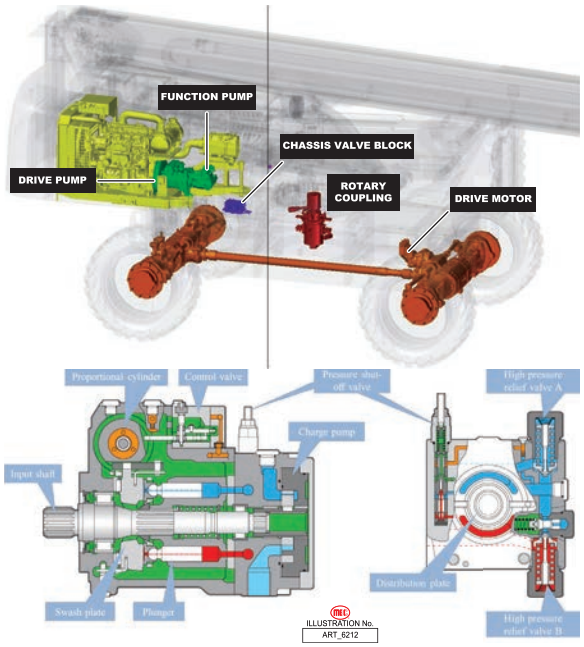


Platform Valve Block

When the piece 1 & piece 6 of PVG 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.

For this valve block, it has 2 functions: platform swing, and jib amplitude.

Drive System

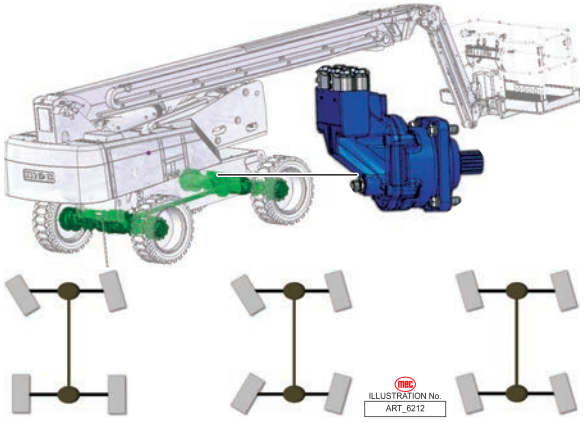


Drive-Pump

The engine can drive the drive-pump (Drive-pump, 90cc) to run, so that hydraulic oil flows into the drive-motor (via rotary-coupling).

Drive-motor

Drive-motor	
Displacement	90cc
Rated Working Pressure	400bar



Drive-axle

The drive motor can provide power to the drive-axle, thereby realizing the function of four-wheel drive. At the same time, the front and rear axles are each equipped with a steering cylinder, so this model also has the function of four-wheel steering: 2-wheel mode, 4-wheel mode, and crab mode.

Wheel Reducer Gear

For detailed information on checking the gear oil level, refer to page 26.

For detailed information on changing the gear oil level, refer to page 32.

For detailed information on the wheel nut torque, refer to page 23.

Gear Oil	
Sae Viscosity Grade	80W-90
Industry Specification	API GL-5
Recommended Oil	Mobil Delvac™ Gear Oil 80W-90

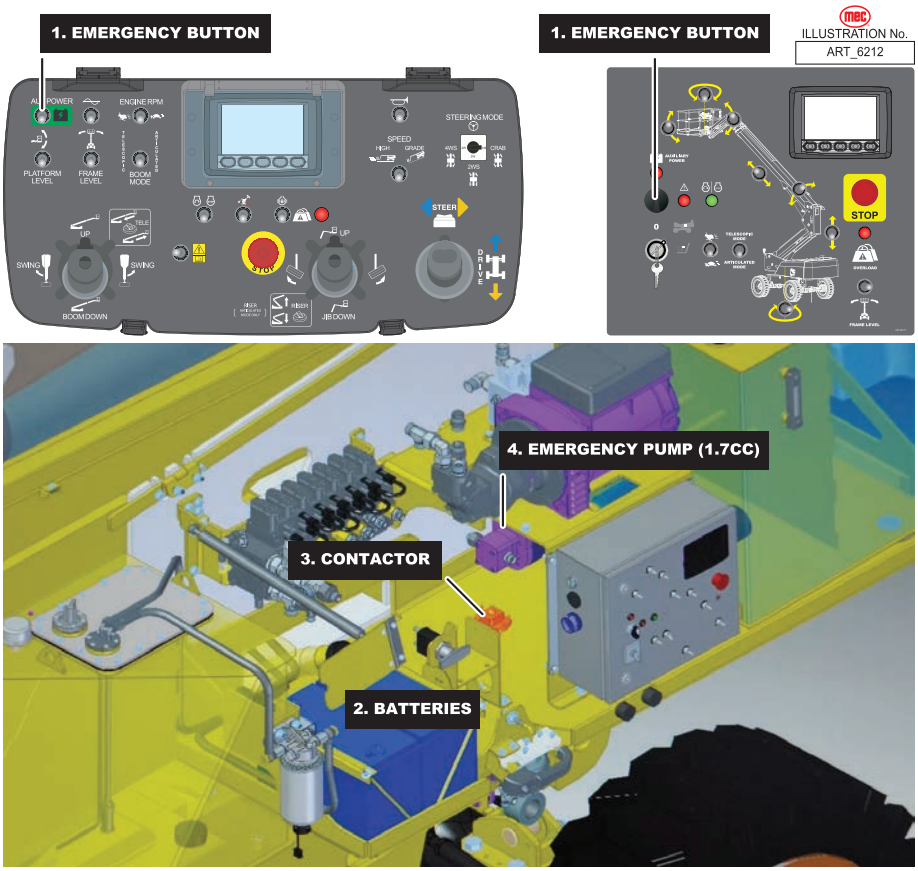
Auxiliary Power System

If primary power fails while the platform is elevated, use the Auxiliary Power System to safely lower the platform.

WARNING

Do not climb down the boom assembly or exit the platform while elevated.

ALWAYS check over, under and around the machine for personnel, structures and obstructions before activating any control function and continue to watch for hazards while operating the machine.



This function uses battery power from the auxiliary battery to lower the platform.

- Push and hold the Auxiliary Power Switch, then use the Boom Extend/Retract function to retract the boom.
- Continue to hold the Auxiliary Power Switch, then use the Boom Lift/Lower function to lower the boom.

The Auxiliary Power System is used to lower the platform in case of primary power failure. To lower the platform, activate the Auxiliary Power Switch to run the auxiliary hydraulic pump. Pushing the Auxiliary Power Switch will energize the emergency-pump contactor. Afterwards, the batteries can provided power to the emergency-pump. The emergency pump can then supply hydraulic oil to the machine and be used to lower the boom and or the platform.

Electrical Schematic, Lower Controls

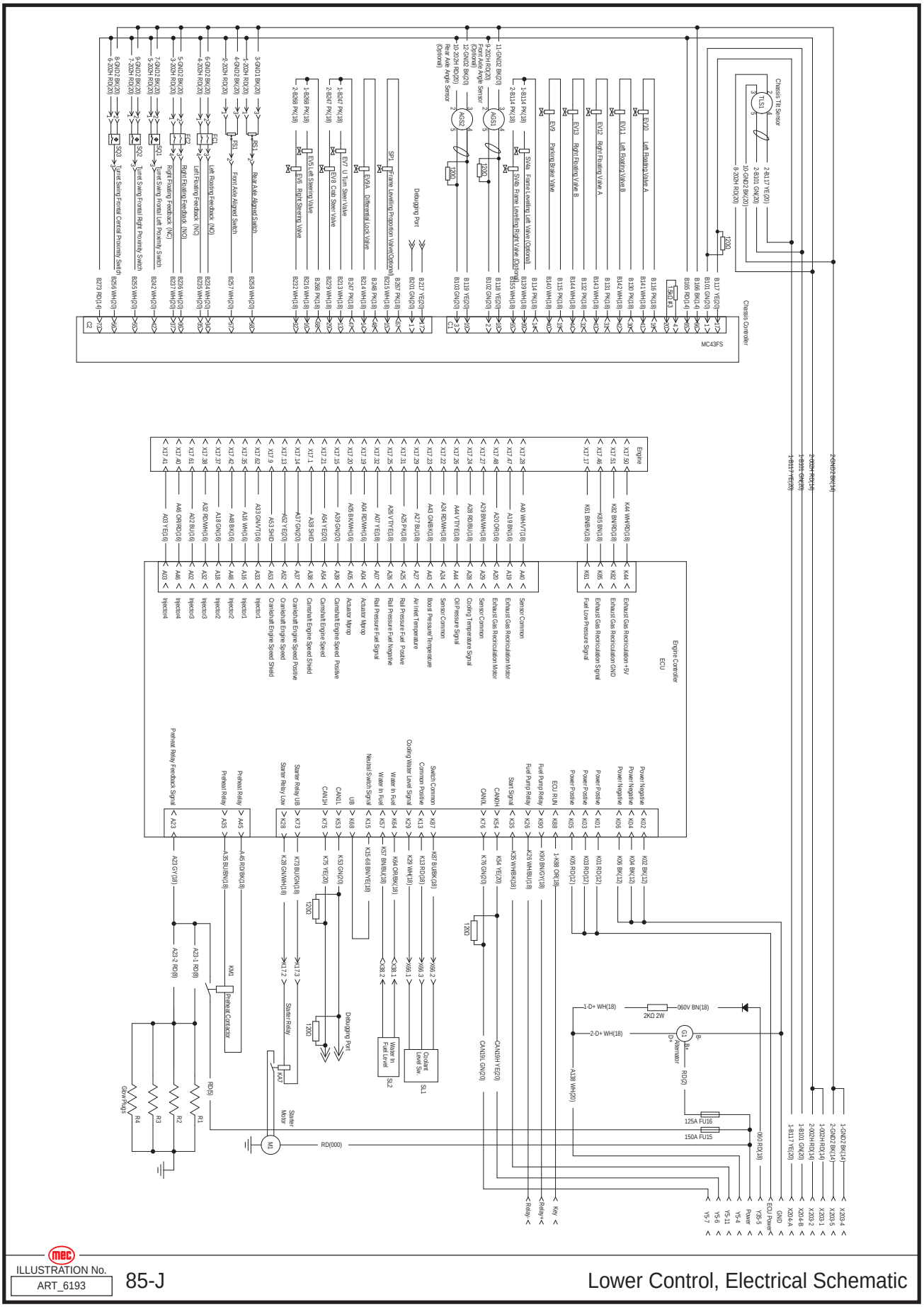


ILLUSTRATION No.
ART_6193

85-J

Lower Control, Electrical Schematic

Electrical Schematic, Chassis

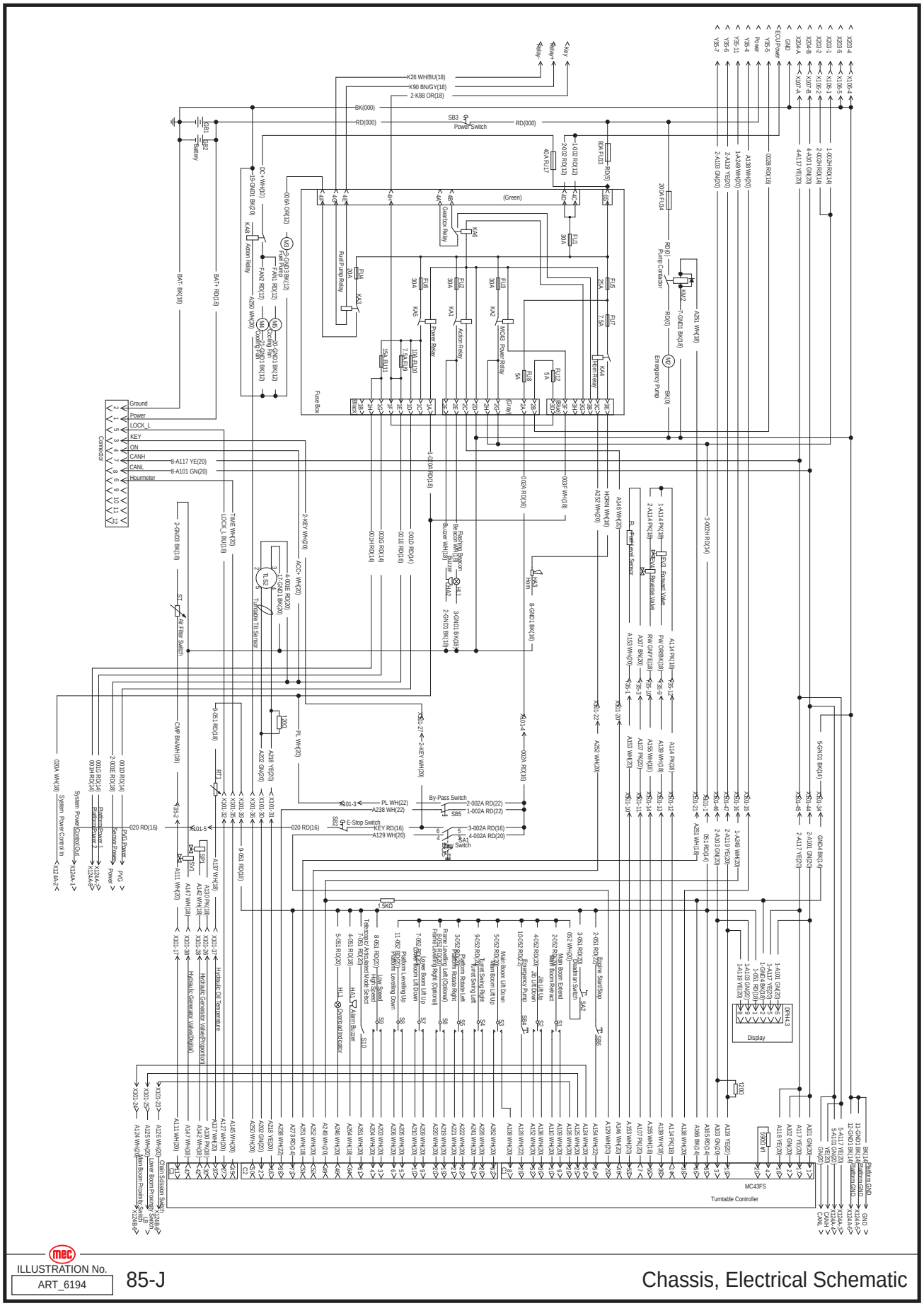


ILLUSTRATION No. ART_6194

85-J

Chassis, Electrical Schematic

Electrical Schematic, Upper Controls

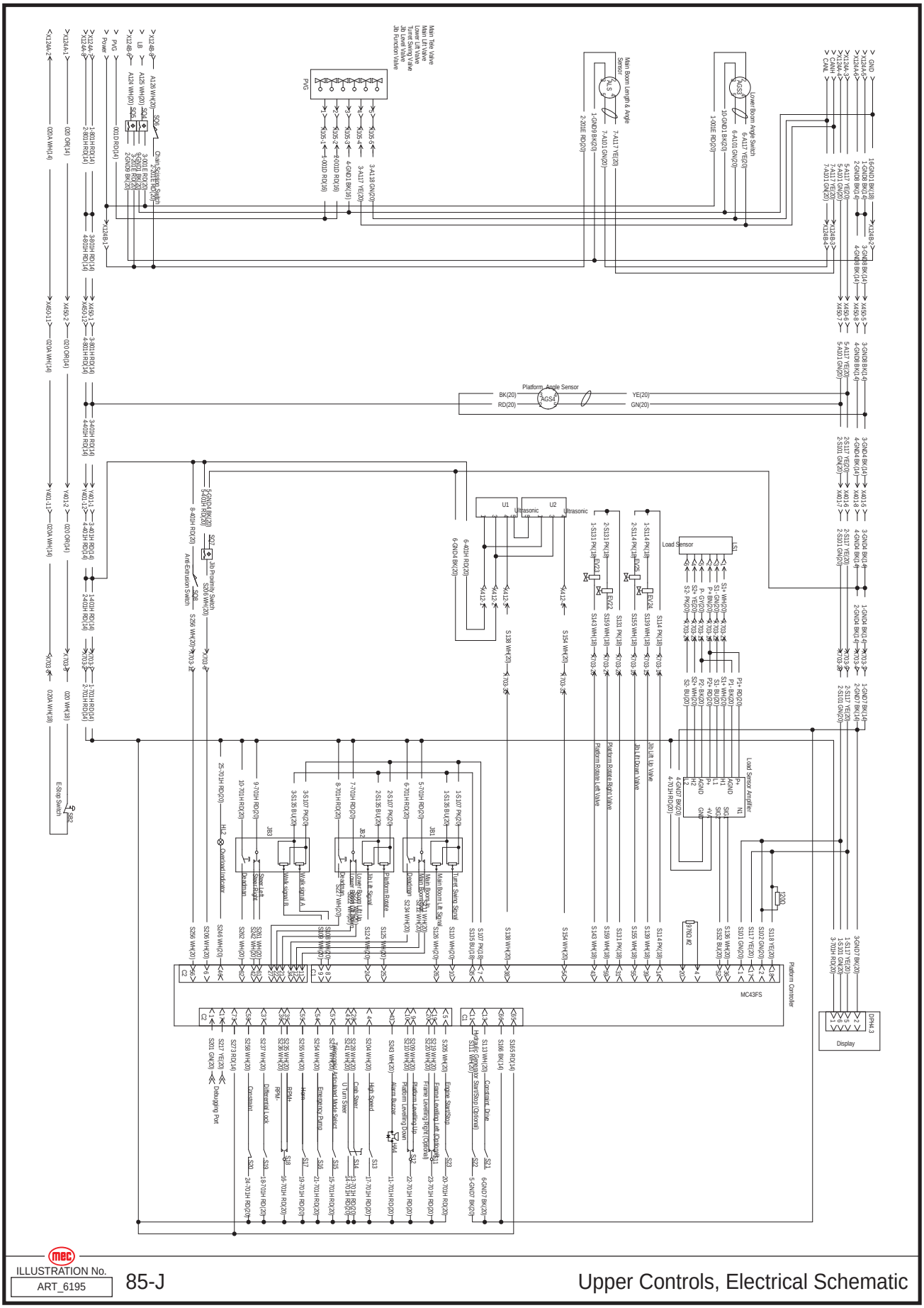


ILLUSTRATION No. ART_6195

85-J

Upper Controls, Electrical Schematic

Hydraulic Schematic

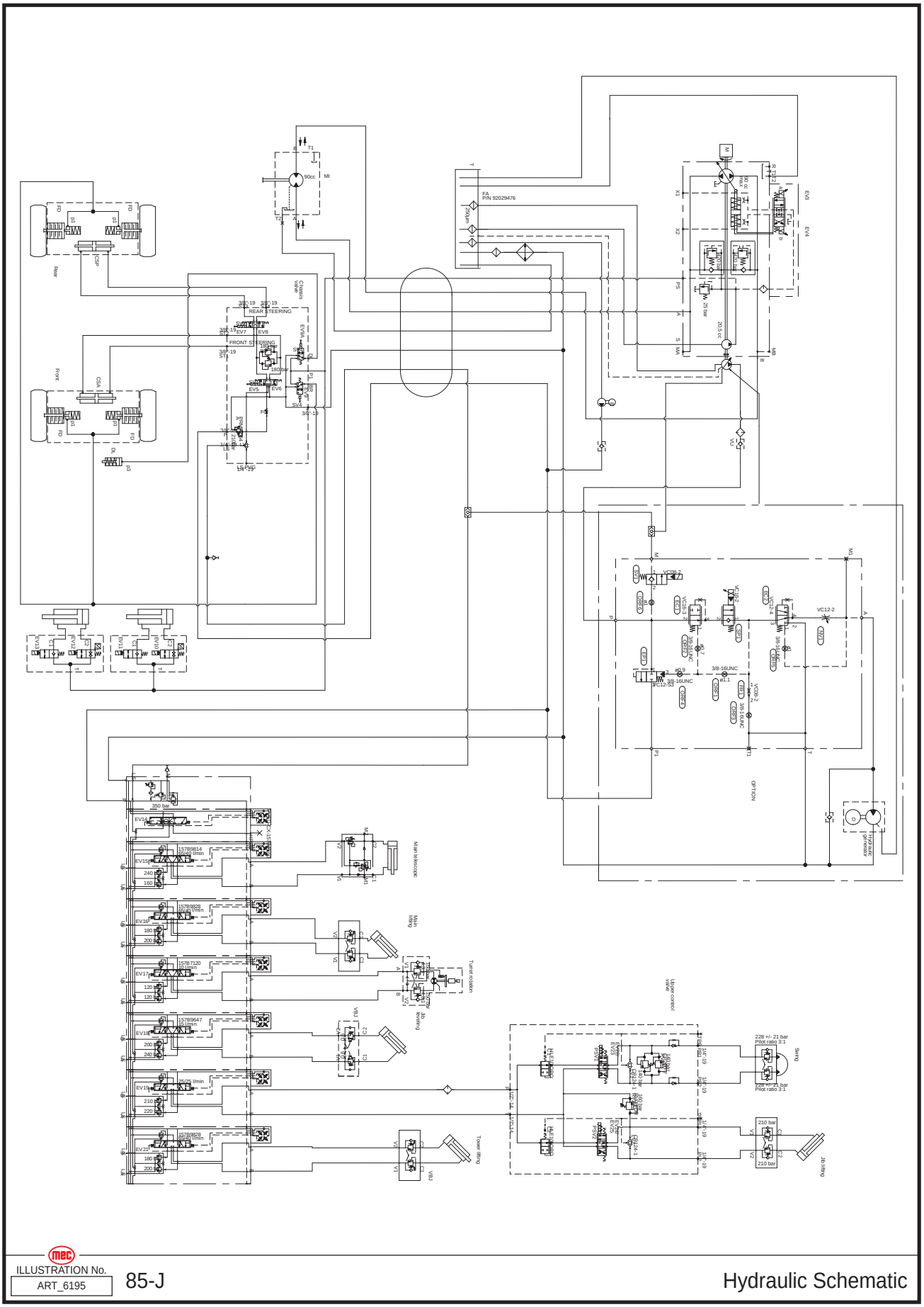


ILLUSTRATION No.
ART_6195

85-J

Hydraulic Schematic

Chassis Valve Block Schematic

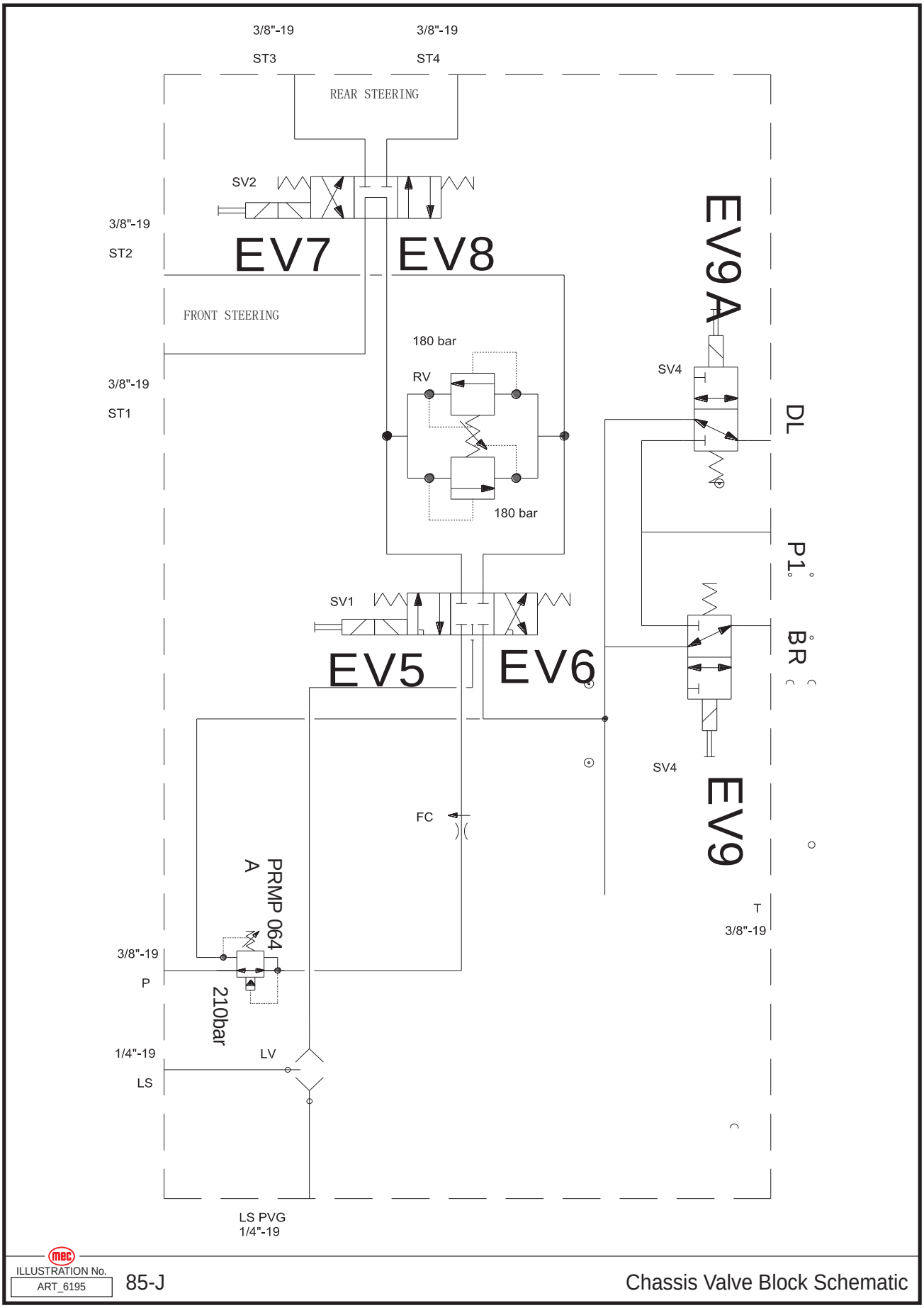
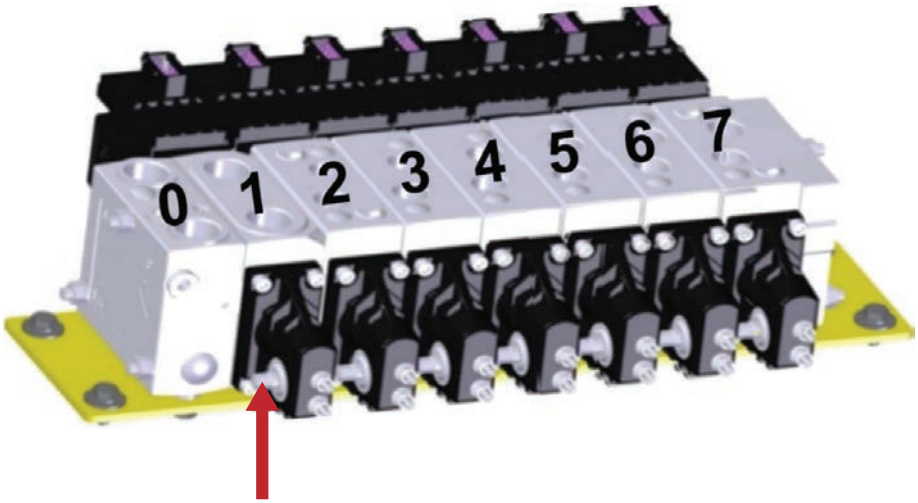


ILLUSTRATION No. ART_6195 85-J Chassis Valve Block Schematic

PVG Ports



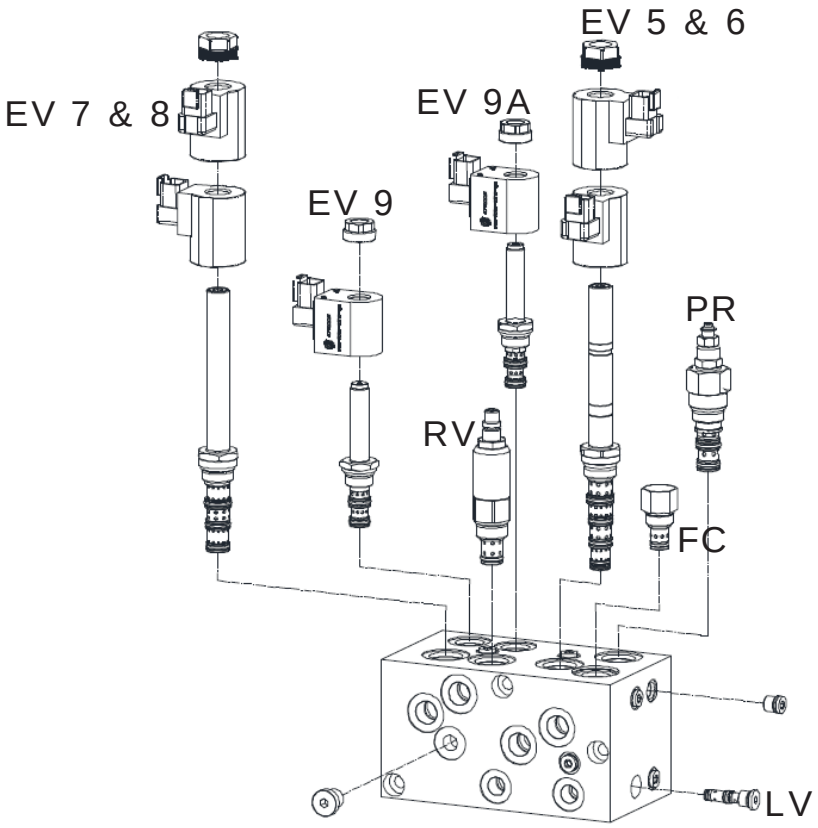
USE 9MM-WRENCH

When the control system is faulty, you can use 9mm-wrench to move the valve spool. In this way, some oil circuits are manually opened to achieve specific functions.

NO.	Function
Piece 1	Function Enable
Piece 2	Main Boom Telescopic
Piece 3	Main Boom Amplitude
Piece 4	Turntable Rotation
Piece 5	Jib Leveling
Piece 6	To Platform Valve Block
Piece 7	Low Boom Amplitude

ILLUSTRATION No. ART_6214 85-J PVG Ports

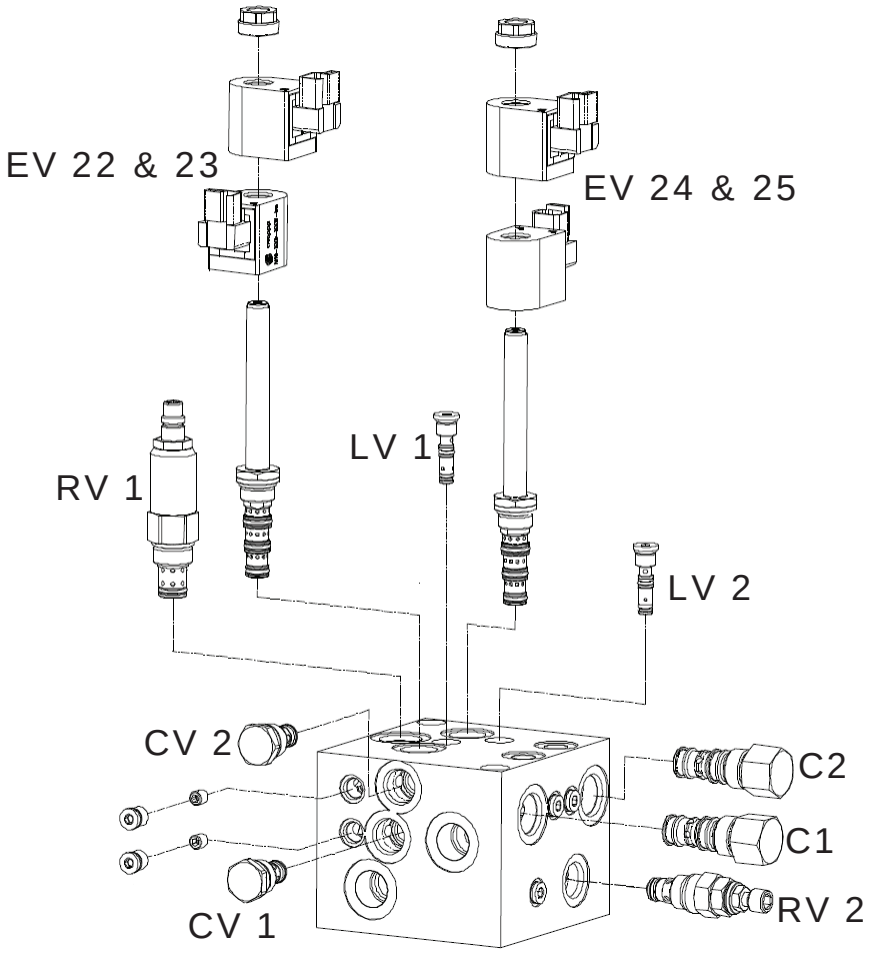
Chassis Valve Block Ports



NO.	Function
EV 5 & 6	Left / Right Steering
EV 7 & 8	4-Wheel Mode / Crab Mode
EV 9	Brake Release
EV 9A	Differential Lock
PR	Pressure Reducing Valve
FC	Flow Control Valve
RV	Relief Valve, 180bar
LV	Shuttle Valve

ILLUSTRATION No. ART_6215 85-J Chasis Valve Block Ports

Platform Valve Block Ports



NO.	Function
EV 22 & 23	Platform Swing Valve
EV 24 & 25	Jib Amplitude Valve
RV 1	140 Bar (Swing)
RV 2	160 Bar (Amplitude)
LV 1	Shuttle Valve (Swing)
LV 2	Shuttle Valve (Amplitude)
CV 1 & 2	Check Valve
C 1 & 2	Logic Element

ILLUSTRATION No. ART_6216 85-J Platform Valve Block Ports