

SECTION 4 - MACHINE OPERATION

- Disconnect power supply before connecting or disconnecting battery.
- Do not use the battery charger to charge the batteries of other vehicles; the battery charger installed was specially designed to charge the type of lithium batteries used on this machine. Do not attempt to charge any other type of batteries.
- Do not attempt to repair the battery charger. Opening the cover may expose the user to the risk of electric shock.
- Do not open battery charger, opening it may affect the index of protection (IP) even after it has been closed again.
- If battery charger is not working correctly or is damaged, disconnect it immediately from power outlet and the battery socket and contact a qualified JLG equipment mechanic.

Charge Curve

The battery charger features just one charge curve (IUIa) plus balancing and maintenance, designed specifically for charging the lithium-ion battery pack on this machine.

Cold Weather Charging

Lithium battery pack discharge and/or recharge with positive lithium battery level (SOC>0) is possible over 14°F (-10°C).

In cold environmental temperature (not lower than -13°F (-25°C), the on-board electric heaters automatically warm up the cells. The heaters are activated by the BMS when the minimum cell temperature is 32°F (0°C). The heaters are automatically switched off when the minimum cell temperature raises over 35.6°F (2°C).

In cases where the battery charger is connected, when the minimum cell temperature is 32°F (0°C), the charger only supplies 3A to supply power to the heaters until a positive minimum cell temperature is reached.

From -13°F (-25°C) to 32°F (0°C) with null lithium battery level (SOC=0) the heaters will only work while the battery charger is connected to the machine.

The battery cold/heater activated icon will be shown on the display when the heaters are enabled. The machine can only be moved in the lower speed while the heater system is active.



Cooling Fans

In hot environmental temperatures, the cooling fans systems becomes active to cool down the battery cells. This system is automatically activated by the BMS when cell temperature raises over 98.6°F (37°C). The cooling fans system will automatically shut off when cell temperature cools down to 95°F (35°C).

SECTION 4 - MACHINE OPERATION

4.10 SHUT DOWN AND PARK

CAUTION

WHEN PARKING THE MACHINE ON A SLOPE OR UNEVEN GROUND WITH THE OUTRIGGERS RETRACTED, PARK WITH THE TRACKS IN THE FULLY WIDENED POSITION AND BLOCK THE TRACKS USING WEDGES TO PREVENT MACHINE MOVEMENTS.

1. Drive machine to a reasonably well protected area.
2. Ensure machine in the closed position.
3. Remove all load and allow engine to operate 3-5 minutes at LOW setting to permit reduction of internal engine temperatures.
4. Shut down diesel/electric engine with the same button on the platform remote control box used to start it. Complete machine shut down takes approximately 1 minute, LCD display OFF.
5. At ground and platform controls, push-in emergency stop buttons, turn power switch to OFF and remove key at the ground control station. Turn off engine and remove the key.
6. If machine is to be shut down for long periods of time, turn battery disconnect switch (1), RED handle located on the electrical/battery tray housing, to the POWER OFF position.

POWER ON

Clockwise
(As Shown)

POWER OFF

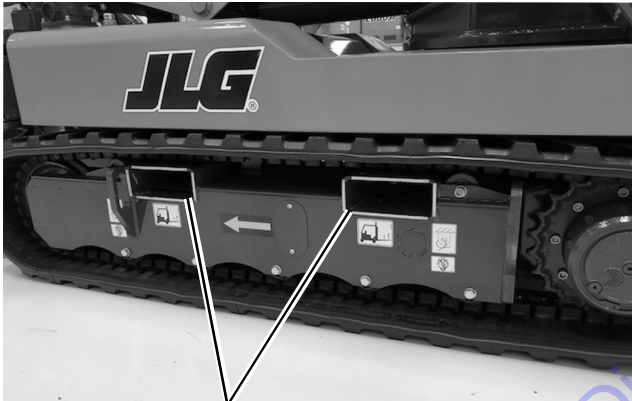
Counter-
Clockwise



BATTERY DISCONNECT SWITCH - DIESEL/AC-ELECTRIC

4.11 LIFTING AND TIE DOWN

Lifting with a forklift



1

OL00310

⚠ WARNING

DO NOT LIFT MEWP WITH A FORKLIFT UNLESS MEWP IS IN THE CLOSED, TRANSPORT POSITION WITH THE TRACKS IN THE EXTENDED POSITION. THE BOOM MUST BE ALIGNED AND CLOSED COMPLETELY. THE OUTRIGGERS MUST BE RETRACTED AND LOCKED.

1. Determine gross weight of the MEWP, refer to the serial number tag, or weigh the individual unit to find out the gross vehicle weight. Choose a forklift capable of lifting the MEWP.

2. Make sure that the boom is closed and properly aligned. All outriggers are fully retracted and the tracks are fully extended.
3. Remove all loose items from the MEWP.
4. Slide forks into the forklift lifting points (1) of the MEWP.

NOTE: *This procedure requires qualified personnel to operate the forklift. You must comply with all local government regulations and regulations or requirements identified by the forklift manufacturer.*

Lifting with slings or chains

⚠ WARNING

DO NOT LIFT MEWP WITH SLINGS OR CHAINS UNLESS MEWP IS IN THE CLOSED, TRANSPORT POSITION WITH THE TRACKS IN THE EXTENDED POSITION. THE BOOM MUST BE ALIGNED AND CLOSED COMPLETELY. THE OUTRIGGERS MUST BE RETRACTED AND LOCKED.

1. Determine gross weight of machine, refer to the serial number tag, or weigh the individual unit to find out the gross vehicle weight.
2. Make sure that the boom is closed and properly aligned. All outriggers are fully retracted and the tracks are fully extended.
3. Remove all loose items from the machine.
4. Properly adjust the rigging to prevent damage to the machine and so the machine remains level.

SECTION 4 - MACHINE OPERATION

5. Width of slings must not exceed 2.36 in (60 mm), the width of the chains must not exceed .984 in (25 mm), the diameter of the ropes must not exceed .984 in (25 mm) in order not to exert a pressure in an abnormal direction on the outrigger plate.

NOTICE

USE OF ROPES, CHAINS OR SLINGS WITH LENGTH LESS THAN 10 ft (3m) COULD CAUSE PERMANENT DAMAGE TO MACHINE OUTRIGGERS.

To lift machine, a separate sling must be attached to each outrigger using the appropriate lifting points as indicated in Figure 4-8..

Weight of machine is not spread equally over the four outriggers (See Figure 4-9.). Minimum required capacity of the four ropes, chains or slings used must be no less than 4,409 lb (2000 kg) and their length no less than 10 ft (3m) and all identical.

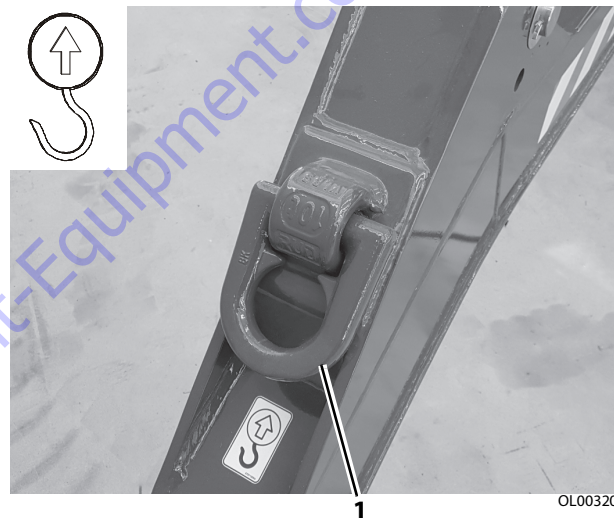


Figure 4-8. Machine Lifting Points

1. Outrigger Lifting Lug

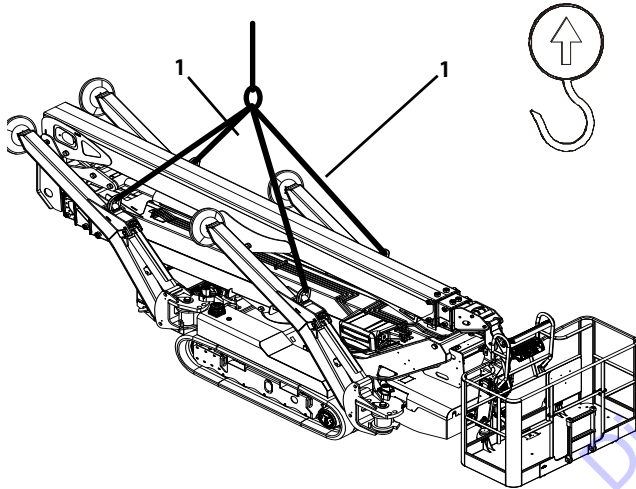


Figure 4-9. Lifting Machine - Attach Points

1. Lifting Slings

Tie Down (See Figure 4-10.)

NOTICE

WHEN TRANSPORTING MACHINE, BOOM MUST BE FULLY LOWERED INTO THE BOOM REST.

- Travel up ramps with platform behind machine.
- Do not contact ground with jib or bottom of platform when loading/unloading. Operate machine from ground using the platform controls detached from platform box. Raise jib to prevent contact with the ground. See "Jib Position for Traveling" on page 4-8.
- ALWAYS load/unload the machine with track fully extended.
 1. Place booms in the stowed position.
 2. Remove all loose items from machine.
 3. Secure chassis using straps or chains of adequate strength.

CAUTION

DO NOT MAKE CONNECTIONS AT POINTS DIFFERENT THAN THOSE IDENTIFIED BY THE TIE DOWN LOCATION DECAL SHOWN. THIS COULD CAUSE PERMANENT DAMAGE RESULTING IN COLLAPSE OF THE PRODUCT.

SECTION 4 - MACHINE OPERATION

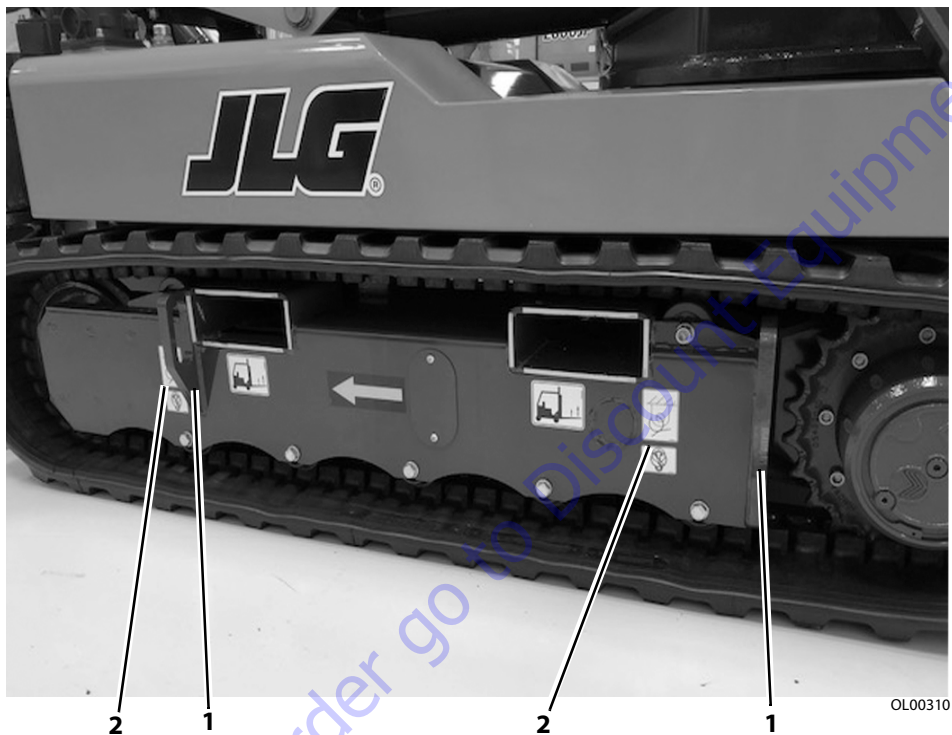
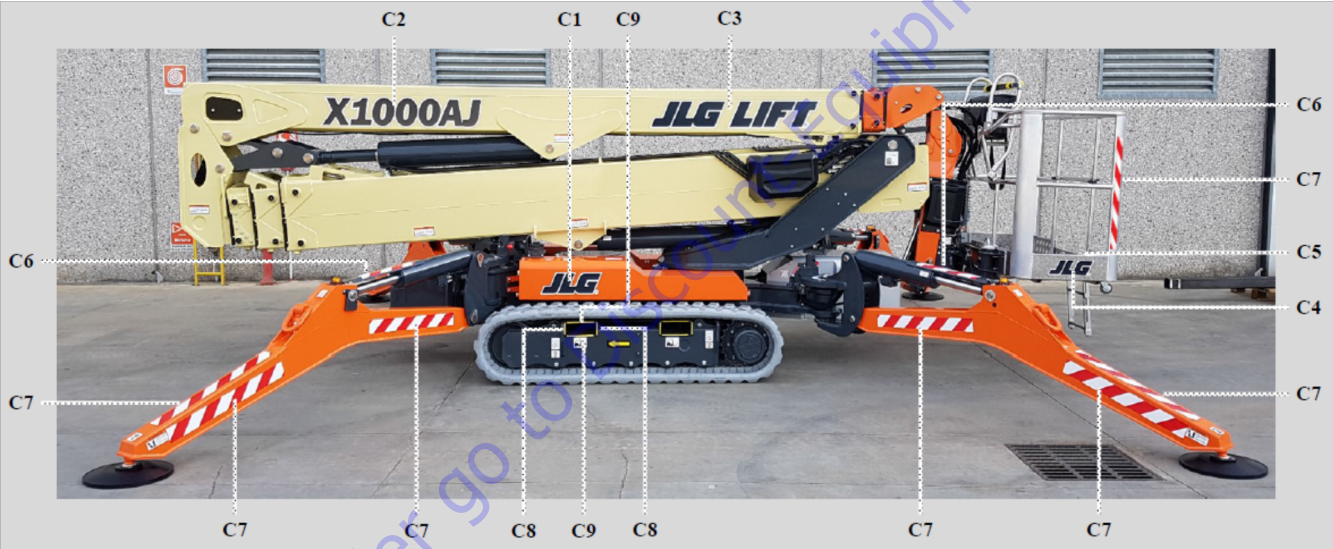


Figure 4-10. Machine Tie-Down Points (both sides of machine)

1. Tie-Down Loop
2. Tie-Down Decal

SECTION 4 - MACHINE OPERATION

4.12 MACHINE DECALS (X1000AJ)



OL00660

Figure 4-11. X1000AJ - Decal installation - Sheet 1

SECTION 4 - MACHINE OPERATION



OL00670

Figure 4-12. X1000AJ - Decal Installation - Sheet 2



OL00680

Figure 4-13. X1000AJ - Decal Installation - Sheet 3

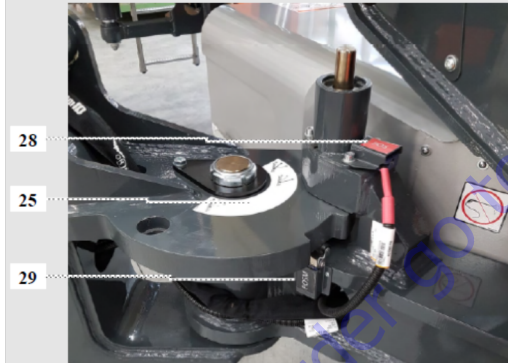
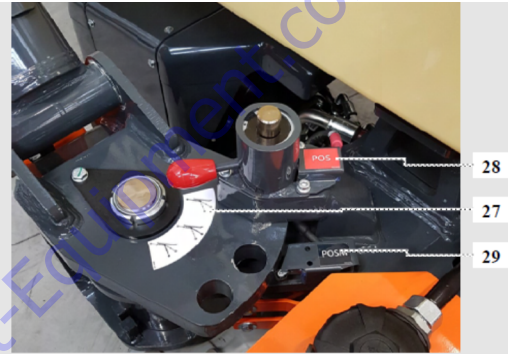
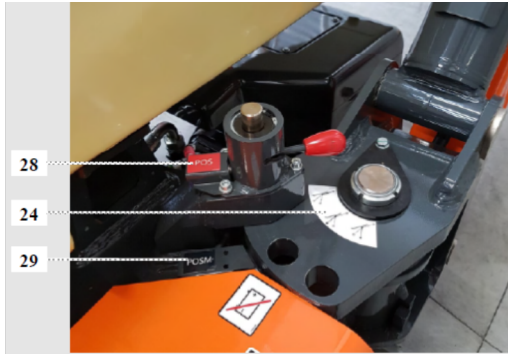
SECTION 4 - MACHINE OPERATION



OL00690

Figure 4-14. X1000AJ - Decal Installation - Sheet 4

SECTION 4 - MACHINE OPERATION



OL00700

Figure 4-15. X1000AJ - Decal Installation - Sheet 5

SECTION 4 - MACHINE OPERATION

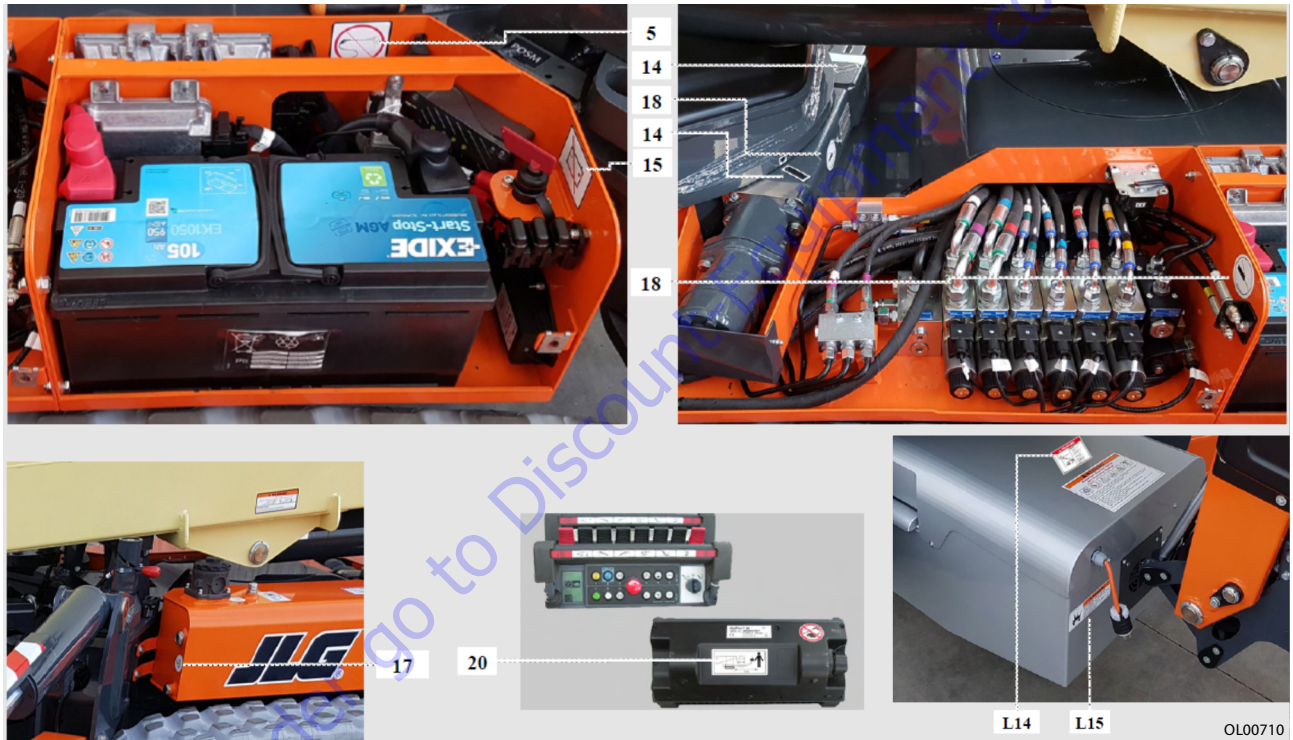
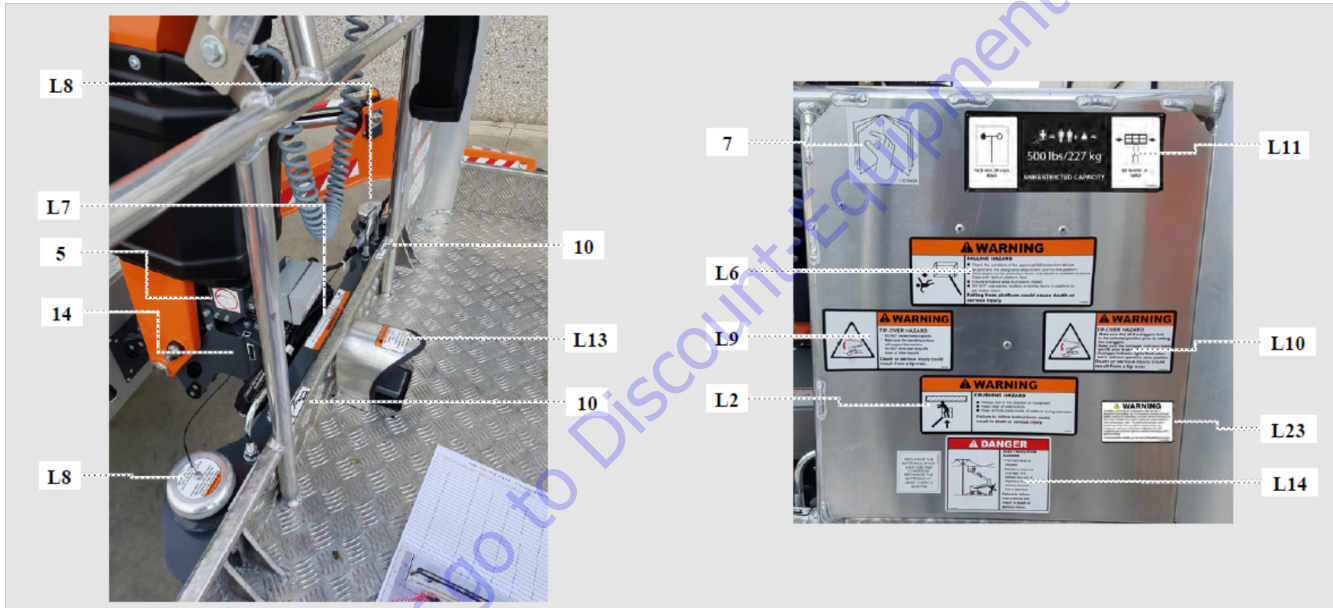


Figure 4-16. X1000AJ - Decal Installation - Sheet 6

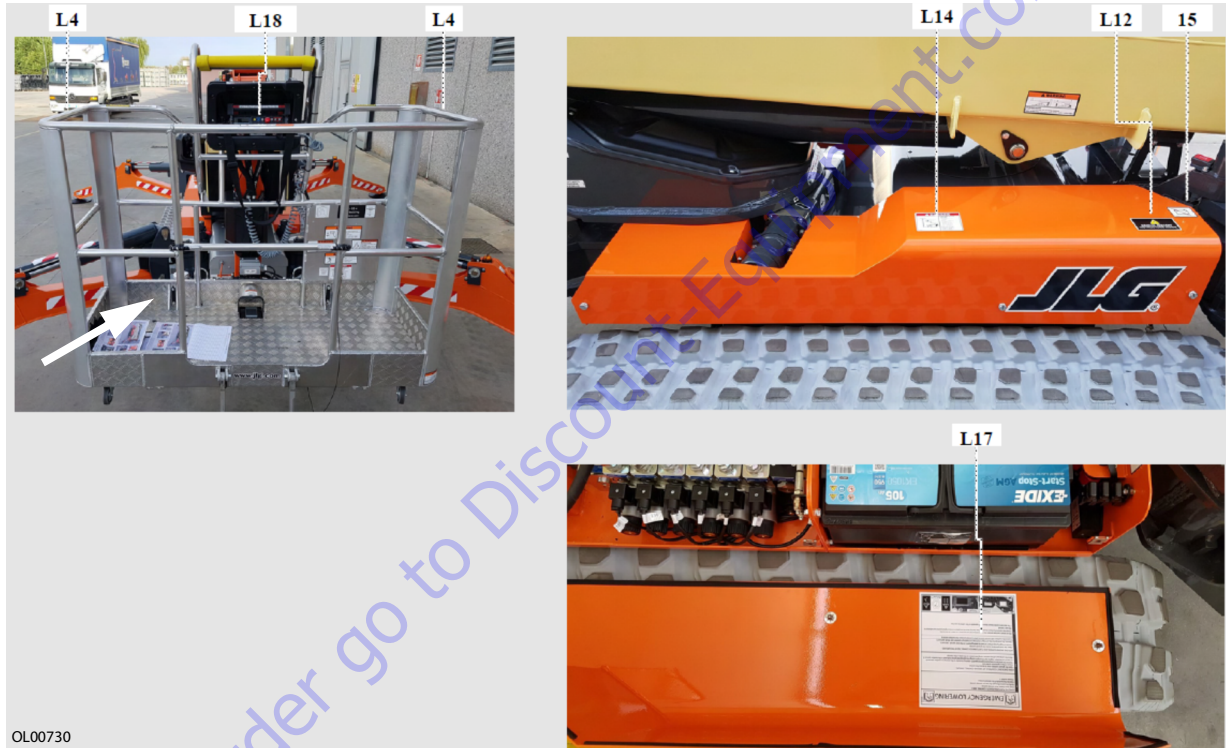
SECTION 4 - MACHINE OPERATION



OL00720

Figure 4-17. X1000AJ - Decal Installation - Sheet 7

SECTION 4 - MACHINE OPERATION



OL00730

Figure 4-18. X1000AJ - Decal Installation - Sheet 8

SECTION 4 - MACHINE OPERATION



Figure 4-19. X1000AJ - Decal Installation - Sheet 9

SECTION 4 - MACHINE OPERATION

Table 4-2. X1000AJ - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
1	06555500	OUTRIGGER NUMBER 1
2	06555600	OUTRIGGER NUMBER 2
3	06555700	OUTRIGGER NUMBER 3
4	06555800	OUTRIGGER NUMBER 4
5	1001125483	DO NOT WASH
6	06040500	YELLOW ARROW BLACK BACKGROUND
7	1701640	READ THE MANUAL
8	1703814	ANCHORING POINT
9	07071200	LIFTING POINT
10	1704277	SAFETY POINT ATTACH
11	06164700	HYDRAULIC OIL FILTER
12	07056700	PROHIBITION OF LIFTING
13	07350300	LIFTING PLATFORM
14	06706500	BASKET ALIGNMENT (2 PIECES)
15	1702155	BATTERY DISCONNECT UNDER
16		
17	06165000	HYDRAULIC OIL LEVEL
18	06136900	GREASE POINTS
19	08042100	REACTION TO THE SOIL STABILIZERS
20	07240300_B	DISTANCE 1m ON TELE/ RADIO CONTROLS
21		

SECTION 4 - MACHINE OPERATION

Table 4-2. X1000AJ - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
22		
23	1704125	ATTAC O ARIA E ACQUA
24	08056100	RIGHT FRONT STABILIZER POSITION CONTROL
25	08056200	RIGHT REAR STABILIZERS POSITION CONTROL
26	08061400	LEFT REAR STABILIZER POSITION CONTROL
27	08061300	LEFT FRONT STABILIZER POSITION CONTROL
28	08042600	RED POS
29	08042700	POSM BLACK
30	08061600	AIR AND WATER ATTACH
C1	07060500	JLG DECAL
C2	08014500	X1000AJ DECAL
C3	08042000	JLG LIFT DECAL
C4	07690100	JLG DECAL
C5	07691500	WWW.JLG.COM DECAL
C6	06039900	RED/WHITIE STRIPES
C7	06039700	RED/WHITE STRIPES
C8	07268300	ATTENTION LIFTING FORKS
C9	07268400	ATTENTION LIFTING FORKS
D1	07056300	DANGER 230VOLT
D1	07056400_B	DANGER 120VOLT

SECTION 4 - MACHINE OPERATION

Table 4-2. X1000AJ - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
D2	06214200	REFRIGERANT LIQUID BACKGROUND
D3	06060000	ENGINE OIL LEVEL
D4	1701505	DIESEL FUEL
D5	06056300	DANGER STICK HAZARD
D6	17527700014	BIODEGRADABLE OIL
D7	1001228370	CANADIAN REGULATIONS
D7	1001223453	CANADIAN REGULATIONS
L1	07056100	CRUSH DANGER
L2	1706387	PERICOLO SCHIACCIAMENTO
L3	1706099	PERICOLO SCHIACCIAMENTO
L4	1702868_B	PERICOLO SCHIACCIAMENTO
L5	07056200	CRUSH ATTACK LOWER LIM
L6	1706386	DANGER HAZARD
L7	07051100_B	FALL DANGER - RESTORE THE CAPS
L8	07051000	UNLOCK ONLY IN THE CASES EXPECTED
L9	1706133_C	DANGER
L10	07058700	STABILIZER POSITION
L11	081081GB	MAX LOAD IN PLATFORM
L12	1702901	EMERGENCY DESTRUCTION
L13	3252347_B	ATTENTION PEDAL
L14	1706128_E	DANGER ELECTRIC SHOCK

SECTION 4 - MACHINE OPERATION

Table 4-2. X1000AJ - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
L15	1703813	DANGER BATTERY EXPLOSION
L16	1704972_C	DANGER EXPLOSION
L17	080422GB	EMERGENCY DESCENT THERMAL ENGINE AND LITHIUM
L18	1706385_C	SCROLLING OF BARRIER CLOSING
L19	1705514	CSA COMPLIANCE
L20	1706135_B	USE PLATFORM
L21	080423GB	DISTRIBUTOR BUTTONS UPPER AERIAL PARTS
L22	080424GB	DISTRIBUTOR BUTTONS UPPER AERIAL PARTS
L23	08069800	PROP 65

4.13 MACHINE DECALS (X33JP)

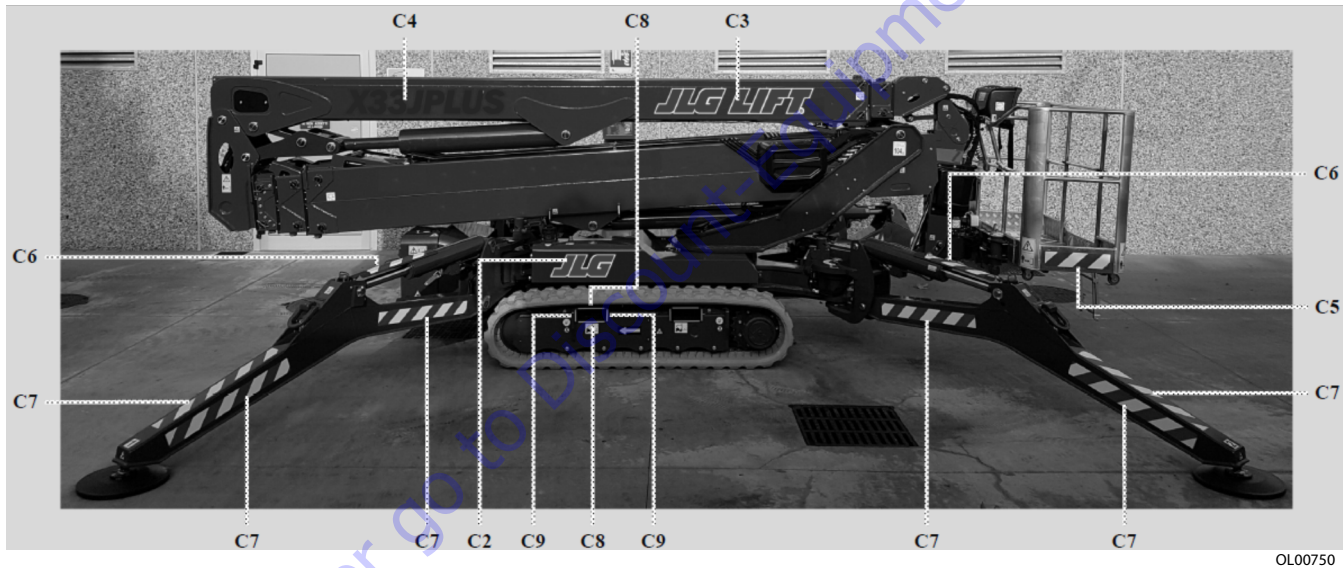
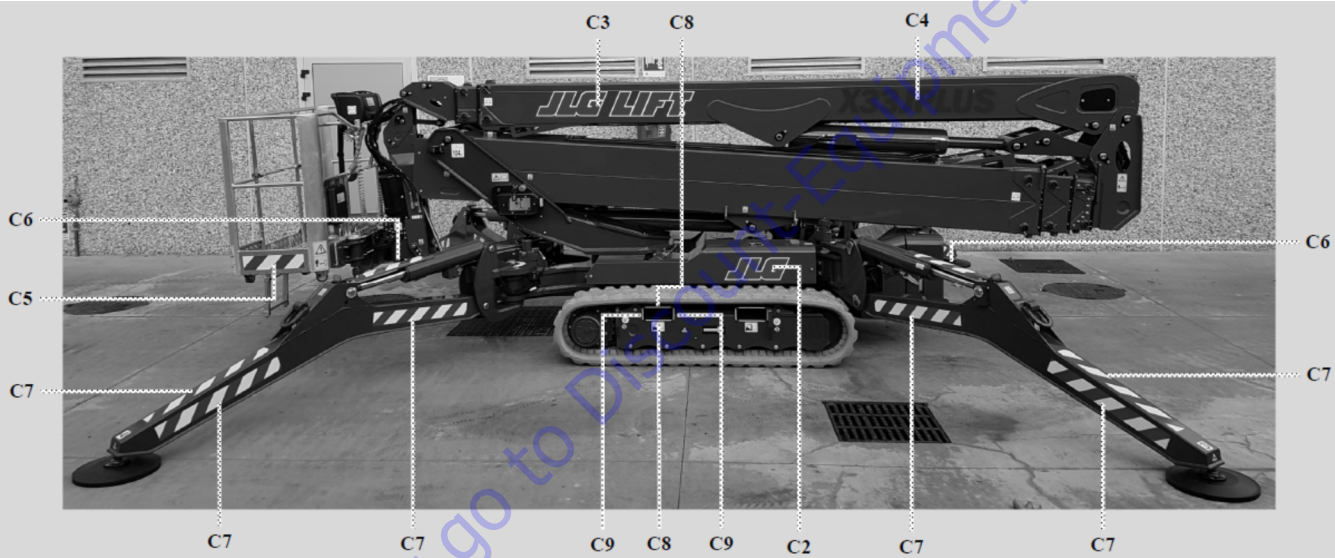


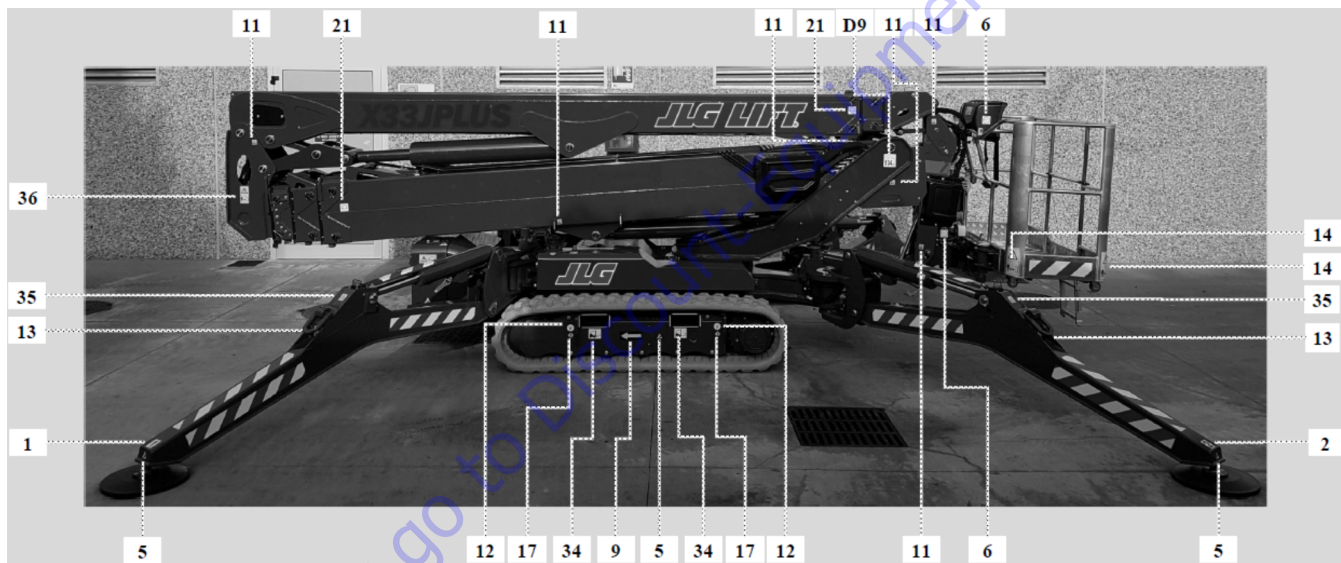
Figure 4-20. X33JP - Decal Installation - Sheet 1



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Figure 4-21. X33JP - Decal Installation - Sheet 2

SECTION 4 - MACHINE OPERATION



OL00770

Figure 4-22. X33JP - Decal Installation - Sheet 3

SECTION 4 - MACHINE OPERATION

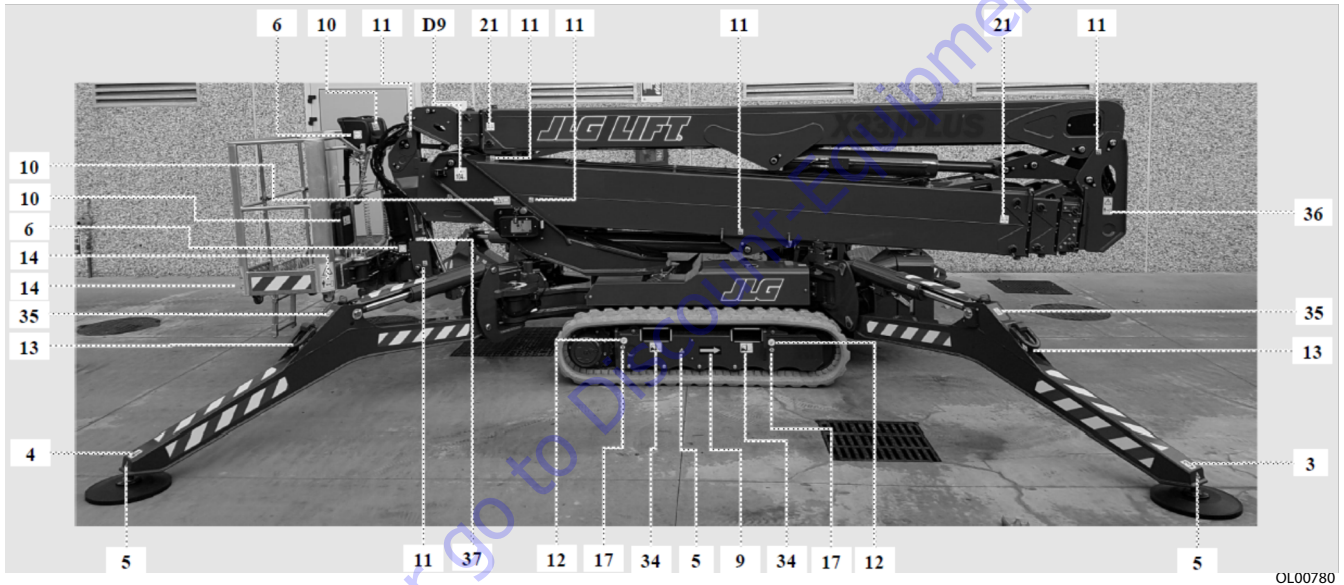


Figure 4-23. X33JP - Decal Installation - Sheet 4

SECTION 4 - MACHINE OPERATION

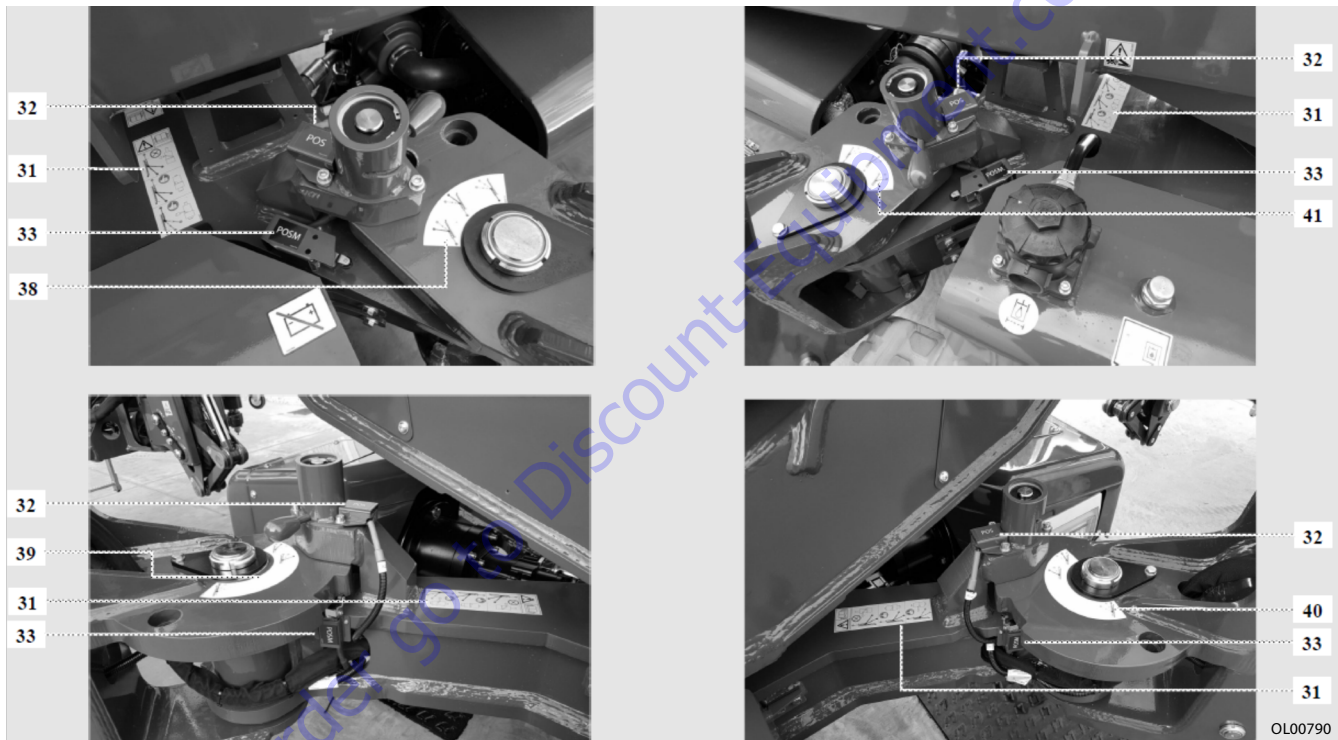


Figure 4-24. X33JP - Decal Installation - Sheet 5

SECTION 4 - MACHINE OPERATION



Figure 4-25. X33JP - Decal Installation - Sheet 6

SECTION 4 - MACHINE OPERATION

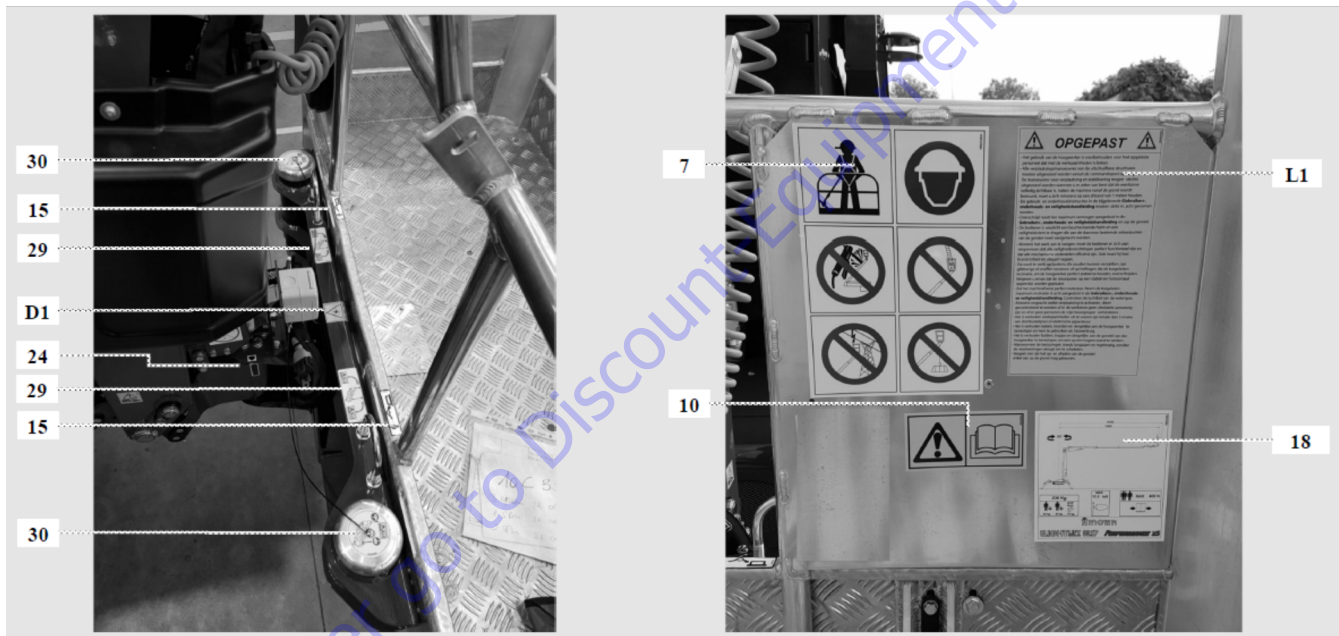


Figure 4-26. X33JP - Decal Installation - Sheet 7

SECTION 4 - MACHINE OPERATION

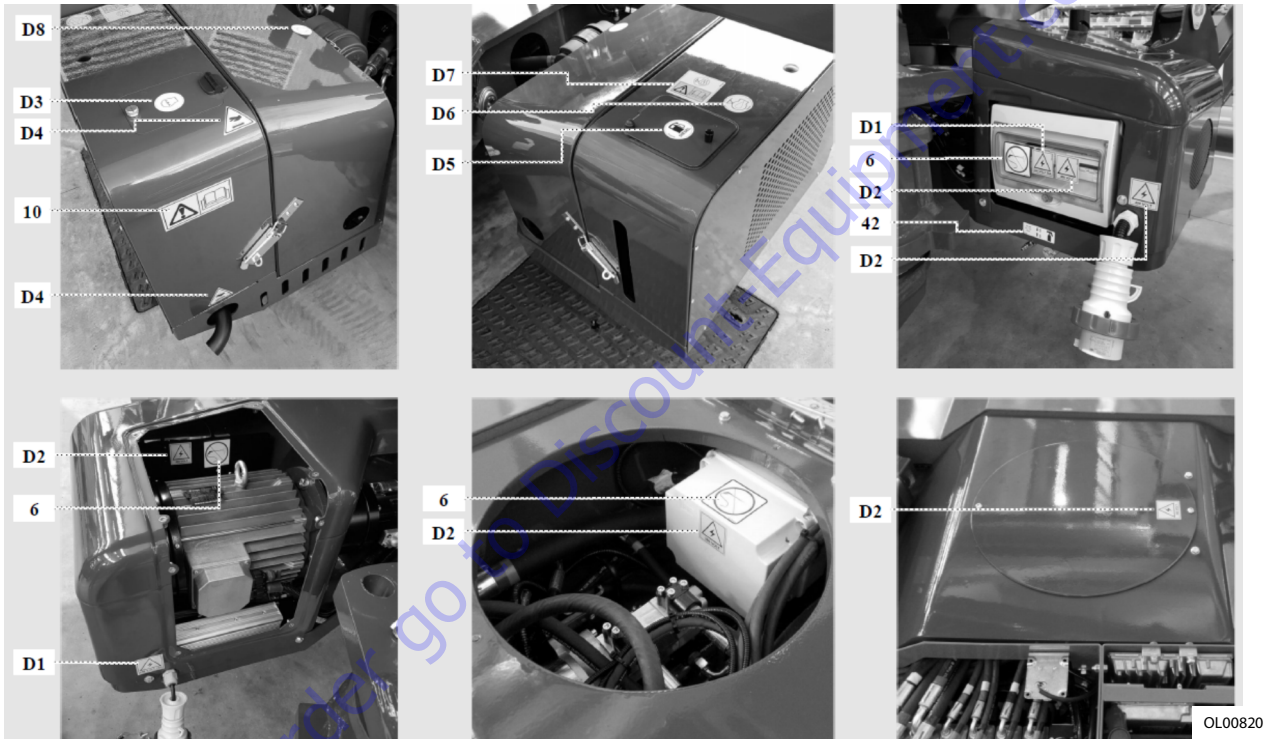


Figure 4-27. X33JP - Decal Installation - Sheet 8

SECTION 4 - MACHINE OPERATION



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Figure 4-28. X33JP - Decal Installation - Sheet 9

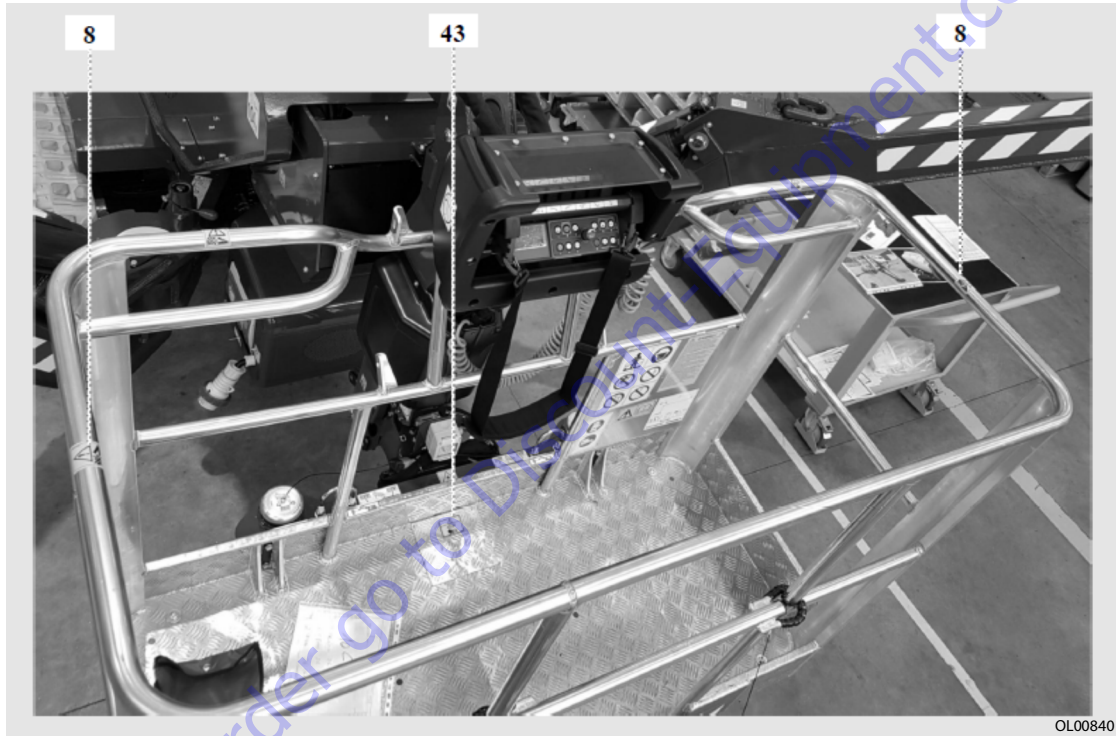


Figure 4-29. X33JP - Decal Installation - Sheet 10

SECTION 4 - MACHINE OPERATION

Table 4-3. X33JP - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
1	06555500	OUTRIGGER NUMBER 1
2	06555600	OUTRIGGER NUMBER 2
3	06555700	OUTRIGGER NUMBER 3
4	06555800	OUTRIGGER NUMBER 4
5	06041200	CRUSHING FOOT HAZARD
6	1001125483	DO NOT WASH
7	06924300	IMBRAGATURA - DIVIETI SERIE METAL
8	1706493_B	SLOWING LOCKING CLOSING
9	06040500	YELLOW ARROW BLACK BACKGROUND
10	06040900	READ THE MANUAL
11	06041300_B	CAUTION DANGER CUTS
12	1703814	ANCHORING POINT
13	07071200	LIFTING POINT
14	06040300	DANGER KEEP DISTANCE
15	1704277	SAFTEY BELT ATTACH
16	06136900	GREASE POINT
17	06311200	PROHIBITION OF LIFTING

SECTION 4 - MACHINE OPERATION

Table 4-3. X33JP - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
18	08043400	TWO PERSON RATING X33JPLUS
19	08042800	DISTRIBUTOR BUTTONS UPPER AERIAL PARTS
20	08042900	DISTRIBUTOR BUTTONS UPPER AERIAL PARTS
21	06704400_B	SHOULDER PADS ADJUSTMENT
22	07240300_B	DISTANCE 1 METER ON TELE / RADIO CONTROLS
23	07056800	EMERGENCY DESCENT INSIDE
24	06706500	PLATFORM ALIGNMENT (2 PIECES)
25	1702155	BATTERY
26	1701504	HYDRAULIC OIL
27	06164700	HYDRAULIC OIL FILTER
28	06165000	HYDRAULIC OIL LEVEL
29	06448100_B	RESTORE THE STOPS GUIDE
30	06448200_B	UNLOCK ONLY IN THE CASES EXPECTED
31	08042500	MICRO STABILIZERS CONTROL
32	08042600	POS RED
33	08042700	POSM BLACK
34	07350300	LIFTING PLATFORM
35	08043000	REACTION TO THE SOIL STABILIZERS
36	07058800	DANGER KEEP DISTANCE

SECTION 4 - MACHINE OPERATION

Table 4-3. X33JP - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
37	1704125	AIR AND WATER ATTACH
38	08056100	RIGHT FRONT STABILIZER POSITION CONTROL
39	08056200	RIGHT REAR STABILIZERS POSITION CONTROL
40	08061400	LEFT REAR STABILIZER POSITION CONTROL
41	08061300	LEFT FRONT STABILIZER POSITION CONTROL
42	08061600	AIR AND WATER ATTACH
43	1705828	INSTRUCTIONS PEDAL
C2	07060500	JLG DECAL
C3	08042000	JLG LIFT DECAL
C4	08038500	X33JPLUS DECAL
C5	06086700	RED/WHITE STRIPES DECAL
C6	06039900	RED/WHITE STRIPES DECAL
C7	06039700	RED/WHITE STRIPES DECAL
C8	07268400	ATTENTION LIFTING FORKS
C9	07268300	LIFTING FORKS
C10	07678200	HINOWA DECAL
D1	07056300	DANGER 220 VOLT 16A

SECTION 4 - MACHINE OPERATION

Table 4-3. X33JP - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
D1	07056400_B	DANGER 230VOLT 16A
D2	08061500	DANGER 400VOLT
D3	06214200	REFRIGERANT LIQUID
D4	06056300	BURN HAZARD
D5	06043900	DIESEL FUEL
D6	06060000	ENGINE OIL LEVEL
D7	06227200_B	CHECK ENGINE OIL LEVEL
D8	06164600	AIR FILTER
D9	07034200_B	NOISE 104 Db
L1	06555300_C	USE TRACKED AIR PLATFORM - ITALIAN
L2	080432IT	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - ITALIAN
L1	06562600_C	USE TRACKED AIR PLATFORM - ENGLISH
L2	080432GB	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - ENGLISH
L1	06562600_C	USE TRACKED AIR PLATFORM - FRENCH
L2	080432FR	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - FRENCH

SECTION 4 - MACHINE OPERATION

Table 4-3. X33JP - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
L1	06562600_C	USE TRACKED AIR PLATFORM - GERMAN
L2	080432DE	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - GERMAN
L1	06562600_C	USE TRACKED AIR PLATFORM - SPANISH
L2	080432ES	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - SPANISH
L1	06562600_C	USE TRACKED AIR PLATFORM - DUTCH
L2	080432NL	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - DUTCH
L1	06562600_C	USE TRACKED AIR PLATFORM - SWEDISH
L2	080432SW	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - SWEDISH
L1	06562600_C	USE TRACKED AIR PLATFORM - PORTUGUESE
L2	080432PT	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - PORTUGUESE
L1	06562600_C	USE TRACKED AIR PLATFORM - DANISH
L2	080432DA	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - DANISH
L1	06562600_C	USE TRACKED AIR PLATFORM - NORWEGIAN

SECTION 4 - MACHINE OPERATION

Table 4-3. X33JP - Decal Installation - Standard

ITEM #	PART NUMBER	DESCRIPTION
L2	080432NO	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - NORWEGIAN
L1	06562600	USE TRACKED AIR PLATFORM - RUSSIAN
L2	080432RU	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - RUSSIAN
L1	06562600_B	USE TRACKED AIR PLATFORM - POLISH
L2	080432PL	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - POLISH
L1	06562600	USE TRACKED AIR PLATFORM - SLOVENIAN
L2	080432SL	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - SLOVENIAN
L1	06562600_B	USE TRACKED AIR PLATFORM - FINNISH
L2	080432FI	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - FINNISH
L1	06562600	USE TRACKED AIR PLATFORM - CZECH
L2	080432CE	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - CZECH
L1	06562600	USE TRACKED AIR PLATFORM - JAPANESE
L2	080432JA	DESCENT OF EMERG LL3317 THERMAL ENGINE AND LITHIUM - JAPANESE

SECTION 5. EMERGENCY PROCEDURES

5.1 GENERAL

This section explains the steps to be taken in case of an emergency situation while operating.

5.2 INCIDENT NOTIFICATION

JLG Industries, Inc. must be notified immediately of any incident involving a JLG product. Even if no injury or property damage is evident, the factory should be contacted by telephone and provided with all necessary details.

- USA: 877-JLG-SAFE (554-7233)
- EUROPE: (32) 0 89 84 82 20
- AUSTRALIA: (61) 2 65 811111
- E-mail: ProductSafety@JLG.com

Failure to notify the manufacturer of an incident involving a JLG Industries product within 48 hours of such an occurrence may void any warranty consideration on that particular machine.

NOTICE

FOLLOWING ANY ACCIDENT, THOROUGHLY INSPECT MACHINE AND TEST ALL FUNCTIONS FIRST FROM GROUND CONTROLS, THEN FROM PLATFORM CONTROLS. DO NOT LIFT ABOVE 10 FT (3 M) UNTIL YOU ARE SURE ALL DAMAGE HAS BEEN REPAIRED, IF REQUIRED, AND ALL CONTROLS ARE OPERATING CORRECTLY.

SECTION 5 - EMERGENCY PROCEDURES

5.3 EMERGENCY OPERATION

Power Main Cut-Off Switch Location

A battery cut-off switch (1) - (RED handle) is located on the inside of the battery/electrical box tray, just behind the outrigger mount. When switched off - handle turn all the way counter-clockwise - all electrical power to the lithium system is shut down. The 12v system will remain active to supply power to the boards.

POWER ON
Clockwise
(As Shown)

POWER OFF
Counter-
Clockwise



BATTERY DISCONNECT SWITCH - DIESEL/AC-ELECTRIC

SECTION 5 - EMERGENCY PROCEDURES

Operator Unable to Control Machine

IF PLATFORM OPERATOR IS PINNED, TRAPPED OR UNABLE TO OPERATE OR CONTROL MACHINE:

- 1.** Other personnel should operate the machine from ground controls only as required.
- 2.** Other qualified personnel on the platform may use the platform controls. DO NOT CONTINUE OPERATION IF CONTROLS DO NOT FUNCTION PROPERLY.
- 3.** Cranes, forklift trucks or other equipment can be used to remove platform occupants and stabilize machine motion.

Platform or Boom Caught Overhead

If the platform or boom becomes jammed or snagged in over-head structures or equipment, do the following:

- 1.** Shut off the machine.
- 2.** Rescue all people in the platform before freeing the machine. Personnel must be out of the platform before operating any controls on the machine.
- 3.** Use cranes, forklifts, or other equipment to stabilize motion of the machine to prevent a tip over as required.
- 4.** From the ground controls, use the Auxiliary Power System (if equipped) to carefully free the platform or boom from the object.
- 5.** Once clear, restart the machine and return the platform to a safe position.
- 6.** Inspect the machine for damage. If the machine is damaged or does not operate properly, turn off the machine immediately. Report the problem to the proper maintenance personnel. Do not operate the machine until it is declared safe for operation.

SECTION 5 - EMERGENCY PROCEDURES

Emergency Descent

The purpose of the Emergency Descent function (ED) is to bring the operator down to an accessible zone in case the main power source (diesel engine or electric motor) is not working. The purpose of this system is not to close the machine or operate boom functions. It can be activated from the platform control box or ground control station.

In order to activate ED, the same safety conditions valid for normal operation boom movements must be verified by the system. The "machine stabilized icon" must be present on the display.

In order to activate ED, it is necessary to keep the emergency descent button (4) pressed in while performing the appropriate function.



While using ED, if the main power comes back on, ED will continue to draw power from the 12V battery.

Once the triangle button is pressed and held, the desired function can be selected. Once the function is selected, the DC electric pump is activated. The DC electric pump is deactivated when the function selection (joystick) is released.

In order to use the 12V battery to perform an emergency descent, it must contain 11V to start the procedure. During the procedure, if the battery drops to 9V, the emergency descent will stop. You will have to charge the battery before the emergency procedure can continue. Stopping the emergency procedure at 9V ensures that the battery will have

enough power to keep the machine's various circuit boards supplied with the correct voltage.

NOTE: *When using the 12V battery to perform an emergency descent, operation of the swing and main boom retract function are limited to 10 seconds. You must activate the function again to continue emergency descent by releasing the function and re-engaging.*

Some functions will not operate since this is a gravity lowering system. The MAIN DOWN symbol will appear on the display if one of those functions are selected. Also, if the function is not allowed, when trying to perform a function, the pump will run for 5 seconds and shut off.

Functions possible during emergency descent are:

- Tower Boom retract
- Main Boom lowering
- Main Boom retract, only possible if the angle between main boom and ground is over -15°, limited to 10 second intervals
- Swing, limited to 10 second intervals
- Jib open and close


⚠ CAUTION

ENSURE BOOM IS NOT POSITIONED OVER THE OUTRIGGERS OR OVERHEAD OF PERSONNEL BEFORE LOWERING.

SECTION 5 - EMERGENCY PROCEDURES

Using Platform Control Box from Platform

(See Figure 5-1.)

1. Check emergency stop button (**10**) is in the ON position by turning it clockwise.
2. Press platform foot switch and hold to floor on platform.
3. Press and hold down the emergency lowering button (**4**) with hazard symbol on platform control box. The LCD display (**23**) will show the hazard triangle symbol in position 8 on the LCD display. 
4. Select a boom function to operate by moving it's controller in the direction for lowering. (items **15**, **16**, and **19**)
5. When finished, release emergency lowering button (**4**), and foot switch.
6. Position (*press*) the emergency stop button (**10**) to the OFF position.

NOTE: *The same functions can be operated with the ground control station to lower the platform.*

SECTION 5 - EMERGENCY PROCEDURES

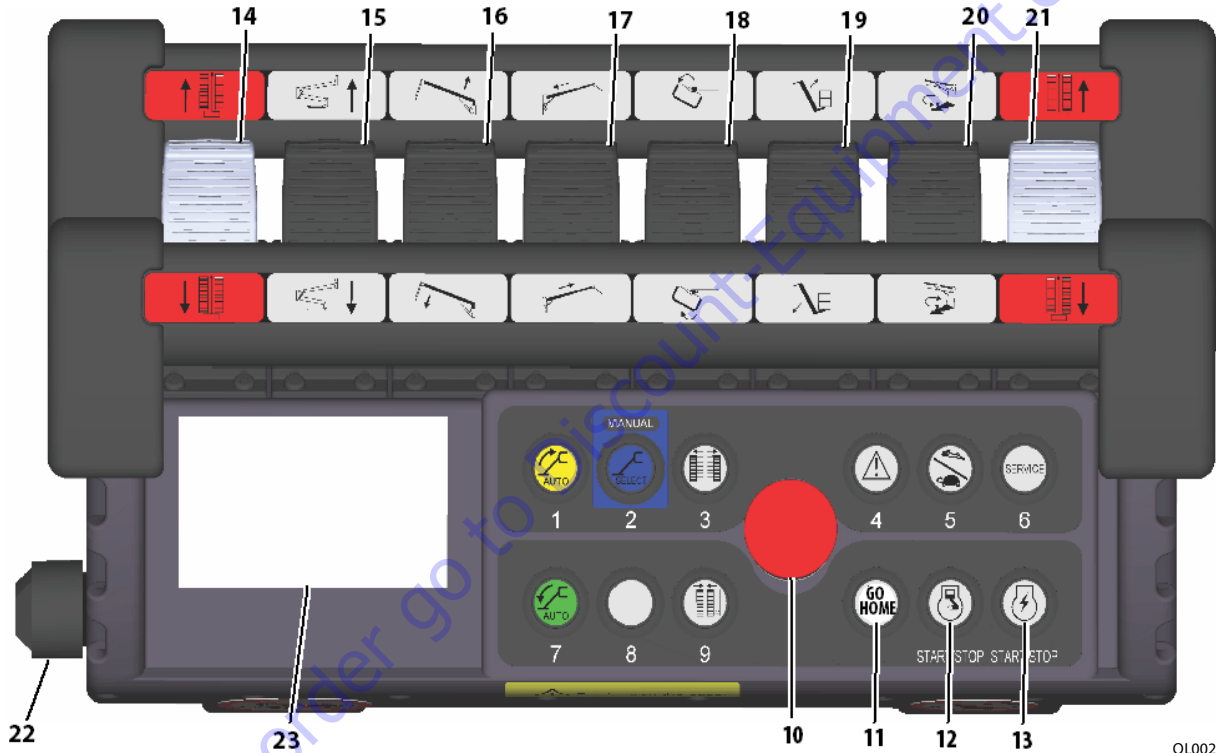


Figure 5-1. Platform/Remote Control Station

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SECTION 5 - EMERGENCY PROCEDURES

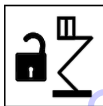
5.4 BYPASS KEY

⚠ WARNING

THIS FEATURE MUST ONLY BE USED AS DESCRIBED BELOW. THE MACHINE COULD TIP OVER IF THESE DIRECTIONS ARE NOT FOLLOWED.

The machine has a key for bypassing the platform safety systems. The key used to activate the bypass switch. It is fastened to the inside cover of the ground control station.

The bypass system is used to operate (and will only operate) a machine with a qualifying fault. The bypass icon is displayed and the alarm will sound. This system must only be used by qualified personnel.



1. Remove key and insert it into the bypass key switch (1). Turn switch (right/left) and hold to activate bypass button (2). The bypass icon will be displayed.
2. Press the bypass button (2) to activate bypass mode and operate the appropriate functions to bring the machine to safety while keeping bypass key turned.
3. After operation, return bypass key to its neutral position and return key to its fastener.

After using the bypass system, a qualified JLG mechanic must be contacted to determine the reason for needing to use this feature. Return the key to the where you found it and secure it in that location.

The safety device circuit board records every time the safety device bypass key is activated along with the movements made during these operations.

NOTE: *In case of machine with restricted area of operation, the bypass of the safety devices does not allow the boom assembly to go out of the safe working area.*

⚠ WARNING

SAFETY DEVICE BYPASS ALLOWS OPERATION OF MACHINE WITH AN OVERLOAD IN THE PLATFORM. THE OVERLOAD ALARM WILL SOUND AND THE OVERLOAD ICON WILL BE ON THE PLATFORM/REMOTE CONTROL BOX DISPLAY. REMOVE OVERLOAD FROM THE PLATFORM BEFORE OPERATION.

SECTION 5 - EMERGENCY PROCEDURES

Using Emergency Descent In Case Of An Outrigger Losing Contact With The Ground

One or more of the outriggers may lose contact with the ground which will result in the platform control box functions being inoperable except for emergency lowering.

To restore platform control box functions, lower and retract the booms and then reposition the machine and properly set the outriggers.

Use the emergency descent from the platform if possible by using the following sequence, fully retract main boom, fully lower jib and fully lower main boom.

If this is not possible, have a properly trained person on the ground bypass the platform safety devices and allow the operator in the platform to lower and retract the booms or allow emergency operations to bring the platform back to the ground.

1. Remove key and insert it into the bypass key switch (1). Turn switch (right/left) and hold to activate bypass button (2). The bypass icon will be displayed.
2. Press the bypass button (2) to activate bypass mode and operate the appropriate functions to bring the machine to safety while keeping bypass key turned.



3. Operate the machine from the platform control ONLY carrying out operations that allow the tower boom lowering, main boom retract and jib lowering. The main boom must be fully retracted prior to operating swing and main boom lowering functions.
4. After operation, return bypass key to its neutral position and return key to its fastener.

⚠ WARNING

NEVER PERFORM OPERATIONS DIFFERENT TO THOSE LISTED OR THAT CAN IN SOME WAY REDUCE THE STABILITY OF THE MACHINE. THE ORDER OF THE BOOM MOVEMENTS MUST BE DONE IN A WAY TO PREVENT ANY OPERATION THAT REDUCES THE STABILITY OF THE MACHINE.

5. Once booms and jib are fully lowered and aligned, release the key and secure the key to the emergency ground control box.

If machine is set up in the reduced stabilization area, bypassing the safety devices does not allow the boom to go out of the working area related to that outrigger configuration.

SECTION 5 - EMERGENCY PROCEDURES

Machine Realignment Emergency Procedure

THIS OPERATION MUST ONLY BE PERFORMED WITH THE BOOMS AND JIB FULLY LOWERED AND RETRACTED TO THE WORKING POSITION.

During transport, the turntable may swing and become out of alignment with the base. If this occurs, one of the two EMERGENCY PROCEDURES given below can be used:

Machine Realignment:

1. Open the ground control station.
2. Remove key and insert it into the bypass key switch (1). Turn switch (right/left) and hold to activate bypass button (2). The bypass icon will be displayed.
3. Press the bypass button (2) to activate bypass mode and operate the appropriate swing function to bring the machine into alignment while keeping bypass key turned.



4. Once machine is aligned, return bypass key to its neutral position and return key to its fastener.

NOTE: *In case of machine with restricted work area, the bypass of the safety devices does not allow the boom assembly to go out of the working area related to that outrigger configuration.*

SECTION 5 - EMERGENCY PROCEDURES

Movement Of Tracks With Machine Not Aligned:

OPERATION ONLY ALLOWED TO GO TO A CONDITION SUITABLE TO CARRY OUT THE PROCEDURE INDICATED IN "MACHINE RE-ALIGNMENT" ABOVE. ALL OTHER USE IS PROHIBITED.

1. Open the ground control station.
2. Remove key and insert it into the bypass key switch (1). Turn switch (right/left) and hold to activate bypass button (2). The bypass icon will be displayed.
3. Press the bypass button (2) to activate bypass mode and operate the appropriate drive/steer functions while extreme caution while keeping bypass key turned.



4. Move machine to a proper location to perform "Machine Realignment" procedure to realign the machine.
5. At the end of operation, return bypass key to its neutral position and return key to its fastener.

The control circuit board records every activation of the safety device bypass key.

SECTION 6. GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

6.1 INTRODUCTION

This section of the manual provides additional necessary information to the operator for proper operation and maintenance of this machine.

The maintenance portion of this section is intended as information to assist the machine operator to perform daily maintenance tasks only, and does not replace the more thorough Preventive Maintenance and Inspection Schedule included in the Service and Maintenance Manual.

NOTICE

AVOID PRESSURE-WASHING ELECTRICAL/ELECTRONIC COMPONENTS. IF PRESSURE-WASHING THE MACHINE IS NEEDED, ENSURE MACHINE IS SHUT DOWN BEFORE PRESSURE-WASHING. SHOULD PRESSURE WASHING BE UTILIZED TO WASH AREAS CONTAINING ELECTRICAL/ELECTRONIC COMPONENTS, JLG INDUSTRIES, INC. RECOMMENDS A MAXIMUM PRESSURE OF 750 PSI (52 BAR) AT A MINIMUM DISTANCE OF 12 IN (30.5 CM) AWAY FROM THESE COMPONENTS. IF ELECTRICAL/ELECTRONIC COMPONENTS ARE SPRAYED, SPRAYING MUST NOT BE DIRECT AND ONLY FOR BRIEF TIME PERIODS TO AVOID HEAVY SATURATION.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

6.2 OPERATING SPECIFICATIONS

Table 6-1. Operating Specifications

Model	X1000AJ/X33JP
Maximum work load (capacity)	500 lbs (230 kg)
Max. Vertical Platform Height	100 ft (30,5 m)
Max. Vertical Working Height	108 ft (33 m)
Max. Horizontal Platform Reach	52.5 ft (16 m)

Dimensional Data

Table 6-2. Dimensional Data

Model	X1000AJ/X33JP
Overall Width	without Platform: 3.92 ft (1,19 m) with Platform: 5.25 ft (1,6 m)
Outriggers Deployed Full Width	15.1 ft x 20.7 ft (4.6 m x 6.3 m)
Stowed Height	6.5 ft (1.99m)
Stowed Length	21.3 ft (6.5 m)
Approach angle	Front: 18° Rear: 16°

Chassis

Table 6-3. Chassis Data

Model	X1000AJ/X33JP
Maximum Travel Grade w/ boom in stowed position (gradeability)	16°
Maximum Travel Side Slope w/ boom in stowed position	16° (29%)
Turning radius	360°
Maximum ground pressure per outrigger	58 psi (4 daN/cm ²)
Maximum outrigger pad load	11,240 lb (5000 daN)
Outrigger pad diameter	14.7 in (400 mm)
Max drive speed (with std. 2nd speed)	Diesel Engine: 1.1 mph (1,8 km/h) (Lithium) Electric Engine: 0.8 mph (1,3 km/h)
Max hydraulic system pressure	3,046 psi (210 bar)
Maximum wind speed	28 mph (12,5m/s)
Maximum manual force	90 lb (400N)
Electrical system voltage	12V
Lithium-Ion system voltage	76V
Gross machine weight (platform empty)	Diesel: 16,865 lb (7650 kg) Lithium: 16,975 lb (7700 kg)

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Capacities

Table 6-4. Capacities

Model	X1000AJ/X33JP
Hydraulic Tank	21.1 gal (80 L)
Fuel Tank	Diesel: 6.6 gal (25 L)
Engine Oil	Diesel: 0.98 gal (3.71L)

Electric Motor Data

Table 6-6. Electric Motor Specifications

Model	X1000AJ/X33JP
Rated Input Voltage	380V
Rated Frequency	50Hz
Rated Power	11 Kw

Engine Data

Table 6-5. Kubota D902 Specifications

Model	X1000AJ/X33JP
Type	Liquid cooled
Number of cylinders	3
Displacement	55 cu. in. (898 cm ³)
Output	21.6 hp (16.1 kW)
High engine speed	3200 RPM
Battery	12V - 105Ah - 950A
Alternator	40A - 3200RPM

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Lithium-Ion Battery Pack Specifications

Table 6-7. Lithium Ion Specifications

Model	X1000AJ/X33JP
Battery Pack	
No. of cells in the battery pack:	26 cells
Rated voltage of each cell:	3.2 volt
Max. cell voltage:	3.65 volt
Min. cell voltage:	2.5 volt
Features of complete pack:	76 volt - 100 ampere/h
*Charge cycles:	2000 cycles
Cathode:	Lithium Ion Phosphate (LiFePO4)
Anode:	Graphite
Memory effect:	NO
Battery Charger	
Type:	120V (+/- 30V) - 50/60 Hz
Necessary time to recharge:	4 hrs to 80% of recharge
Electric System	76 volt for the Lithium battery pack - 12 volt lead battery
Electric Motor	76 volt - three phase - 2000 watt
* The charge cycles have to be considered based on the fact that there is not memory effect in the lithium batteries, i.e. 2000 charges at 100% or 4000 charges at 50%, etc.	

Major Component Weights

Table 6-8. Major Component Weights

Model	X1000AJ/X33JP
Engine (Dry Weight)	Kubota D902 Diesel: 158 lb. (72 kg)
Boom Sections Combined	4,916 lb. (2,230 kg)
Lift Cylinders	
	Level Cylinder: 16.5 lb. (7.5 kg)
	Jib Cylinder: 26.5 lb. (12 kg)
	3rd boom level cylinder: 16.5 lb. (7.5 kg)
	Lift cylinder: 198.4 lb. (90 kg)
	Upper lift cylinder: 154.3 lb. (70 kg)
	Swing Actuator: 44 lb. (20 kg)
	Telescope cylinder: 209.4 lb. (95 kg)
Platform	1 - occupants: 77.2 lb. (35 kg) 2 - occupants: 110.2 lb (50 kg)
Chassis	Diesel: 4,718 lb (2,140 kg)

6.3 SERVICE/MAINTENANCE

Cleaning the Machine

⚠ WARNING

WHEN WASHING THE MACHINE, THE MAIN POWER SWITCH MUST BE DISENGAGED, THE KEY REMOVED AND THE EMERGENCY STOP BUTTON PRESSED.

- Washing the outside of the machine;

Never use flammable liquids. Adopt the above safety measures to prevent sparks due to short-circuits.

If washing the track with a cleaning solution, carefully cover all the vital parts and above all the electrical components. Follow the instructions provided by the manufacturer of the cleaning solution.

Clean the machine using only water-soluble detergents.

The more often the machine is cleaned, the more it will need to be re-greased (*see lubrication chart*).

Do not wet the electric motors and the other electrical components directly.

Do not aim the spray directly onto decals and rating plates.

- Cleaning the electrical system;

⚠ WARNING

NEVER CLEAN THE INVERTER OR THE ELECTRIC MOTOR WITH WATER, AS THIS MAY CAUSE DAMAGE TO THE ELECTRICAL SYSTEM.

NOTICE

ONLY USE DRY DETERGENTS, IN ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS. NEVER REMOVE COVERS, GUARDS AND THE LIKE.

Clean the electrical system using a dry, non-metallic brush and low pressure air.

- After cleaning

Dry the machine carefully before starting it again (for example using compressed air).

⚠ WARNING

IF, DESPITE ALL THE PRECAUTIONS, MOISTURE HAS PENETRATED INTO THE ELECTRIC MOTOR OR OTHER PARTS OF THE ELECTRIC SYSTEM, THESE MUST BE DRIED USING COMPRESSED AIR TO AVOID THE RISK OF SHORT CIRCUITS.

Lubrication

(See Figure 6-1.)

Hydraulic Oil

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Table 6-9. Hydraulic Oil Specifications

Hydraulic System Operating Temperature Range	Viscosity Grade
14deg F (-10 deg C) and 104deg F (+40deg C)	ISOVG46
14deg F (-10 deg C) or above 104deg F (+40deg C)	ISO68

NOTE: When adding or replacing hydraulic oil only use JLG approved hydraulic oil. Do not mix oils unless directed by JLG.

Recommended Gearbox Oils

600 XP 150
EP 150
Blasia 150
Spartan EP150

Engine Oil

SAE 10W30

Greasing and Lubrication

Recommended lubricants

Contact Grease EP (blue in color) is used to grease the turntable and cylinder pins on the chassis

GR MU EP1 Grease is used to grease the expansion guide of the chassis, the track tension valve, and basket support pins

White EP NLGI 2 Grease is used on the boom extensions

Either MU EP1 or Esso Beacon EP2 is used to grease the coupler and belt tensioner

Greasing Locations (See Figure 6-1.)

NOTE: Use a brush to spread grease onto telescopic boom wear pad areas.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Hydraulic Oil Specifications

Fluid Description	Proprieties		Base				Classifications		
	Viscosity at 40°C (cst, Typical)	Viscosity Index	Mineral Oils	Vegetable Oils	Syntetic	Syntetic Polyol Esters	Readily Biodegradable*	Virtually Non-toxic**	Fire Resistant***
Pakelo Hydraulic EP Extra ISO 68	68	180	X						
Pakelo Hydraulic EP Extra ISO 46	46	160	X						
GeolubeECO Hydraulic ISO 46 (P/N 17527700)	47.3	144				X	X		
Pakelo Hydraulic EP Extra ISO 32	32	160	X						
Pakelo Hydraulic EP Extra ISO 22	22	180	X						
SHELL TELLUS S3V 68	68	180	X						
SHELL TELLUS S3V 46	46	160	X						
MobilEAL EnviroSynH46 (P/N2300029)	46	145				X	X		
SHELL TELLUS S3V 32	32	160	X						
SHELL TELLUS S3V 22	22	180	X						

Figure 6-1. Hydraulic Oil Specifications

* Readily biodegradable classification indicates one of the following: CO2 Conversion > 60% per EPA 560/6-82-003 / CO2 Conversion > 80% per CEC-L-33-A-93.

** Virtually Non-toxic classification indicates an LC50 > 5000 per OECD 203.

*** Fire Resistant classification indicates Factory Mutual Research Corp. (FMRC) Approval.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

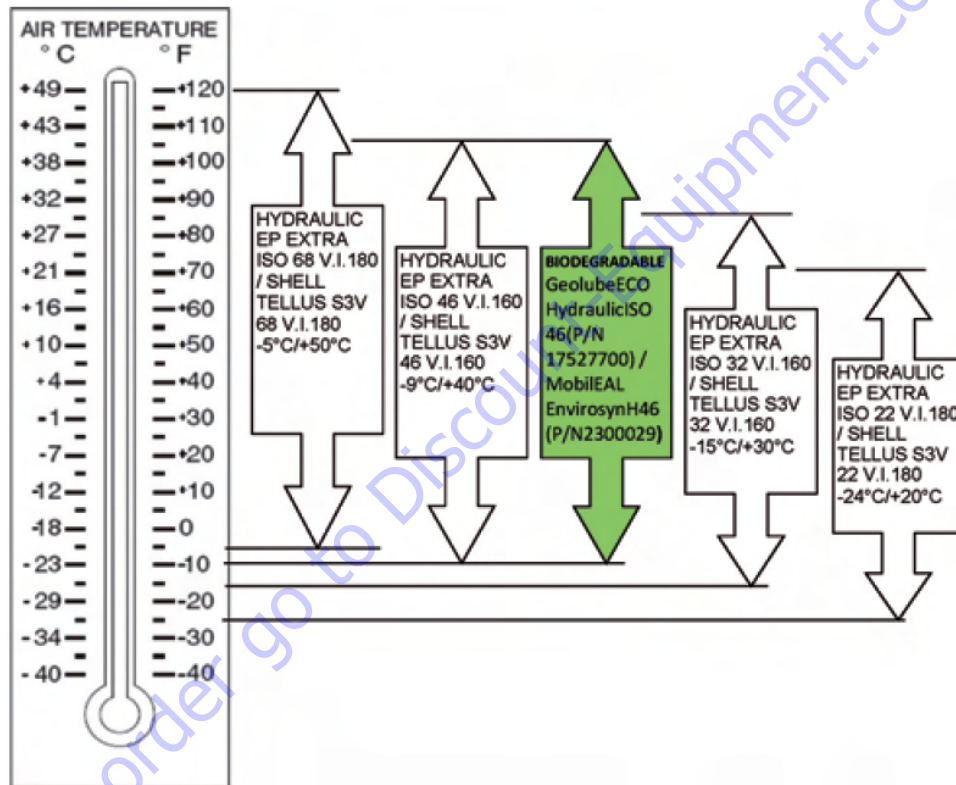


Figure 6-2. Hydraulic Oil Operating Temperatures

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE


Table 6-10. Component Maintenance Intervals - X1000AJ/X33JP - with Diesel Engine

Component	Operation	Pre-Start	As Needed	Hours						
				10	50	100	250	500	1000	2000
Dry Air Filter(Diesel Engine)	Check/Clean	•								
	Replace							•		
Engine Oil (Diesel Engine)	Check Level	•								
	Replace				•*	•				
Engine Oil Filter (Diesel Engine)	Check/Clean				•					
	Replace						•			
Fuel Filter (Diesel Engine)	Clean	•								
	Replace							•		
Cooling System (Diesel Engine)	Check Level	•								
	Liquid Add and Replacement							•		
Water Separator (Diesel Engine)	Clean and Drain Water	•			•*		•			
Hydraulic Oil	Check Level	•								
	Replace								•	
Hydraulic Oil Filter	Replace Cartridge				•*		•			
Articulated Joint Points	Grease				•*	•				
Battery	Check		•							
Reduction Gear Oil	Check Level					•				
	Replace					•*			•	
Machine	General Periodic Check								•	•*

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Table 6-10. Component Maintenance Intervals - X1000AJ/X33JP - with Diesel Engine

Component	Operation	Pre-Start	As Needed	Hours						
				10	50	100	250	500	1000	2000
Extension Arm Internal Sliding Ring (if equipped)	Check Wear						•			
	Replace								•	
Turntable Bolt Tightening	Check						•*	•		
Platform Mount Pin Nuts	Check torque 148 ft. lb. (200 Nm)								•****	
Extension Ropes and pulleys (if equipped)	Check Wear								•**	•*
	Replace									•***



- * 1st time interval then per chart thereafter
- ** At least every 3 months or 1000 hrs. of operation
- *** At least every 5 years or 2000 hrs of operation. Check every year. If torque is not correct, replace the nuts with new nuts of same specification. Install dry without using grease or oil to specified torque.
- **** At least once a year. Replace nuts if not properly torqued.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Table 6-11. Component Maintenance Intervals - X1000AJ/X33JP - with Lithium-Ion Battery Pack

Component	Operation	Pre-Start	As Needed	Hours						
				10	50	100	250	500	1000	2000
Hydraulic Oil	Check Level	•								
	Replace								•	
Hydraulic Oil Filter	Replace Cartridge				•*		•			
Articulated Joint Points	Grease				•*	•				
Battery (Auxiliary)	Check		•							
Reduction Gear Oil	Check Level					•				
	Replace				•*				•	
Machine	General Periodic Check								•	•*
Extension Arm Internal Sliding Ring (if equipped)	Check Wear						•			
	Replace								•	
Turntable Bolt Tightening	Check						•*	•		
Platform Mount Pin Nuts	Check torque 148 ft. lb. (200 Nm)								•****	
Extension Ropes and pulleys (if equipped)	Check Wear								•**	•*
	Replace									•***

* 1st time interval then per chart thereafter

** At least every 3 months or 1000 hrs. of operation

*** At least every 5 years or 2000 hrs of operation. Check every year. If torque is not correct, replace the nuts with new nuts of same specification.
Install dry without using grease or oil to specified torque.

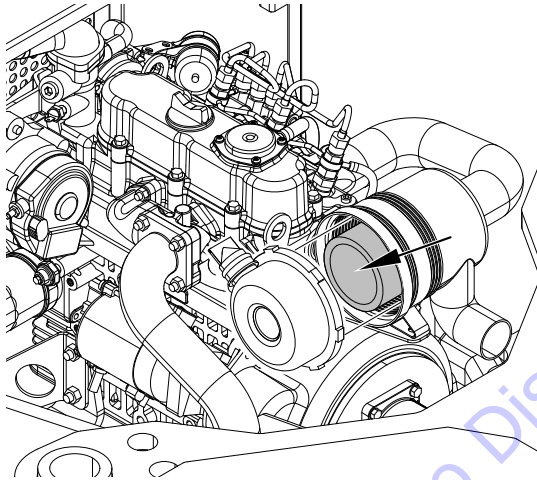
**** At least once a year. Replace nuts if not properly torqued.



SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Engine Air Filter

Kubota
D902
Diesel



Lube Point(s) - Replaceable Paper Element, or Foam Filter Element

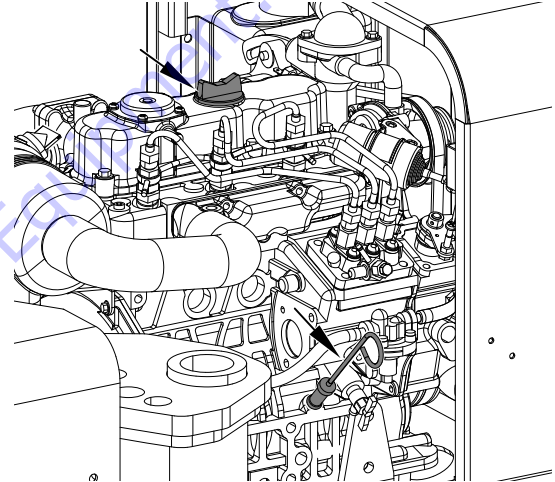
Interval - Check daily. Replace paper element after 500 hrs of operation, sooner if operating in a dusty environment.

The foam element can be washed out in warm soapy water, then rinse and let dry, Dip in clean engine oil and squeeze out the excess oil. If too much oil is left in the foam the engine will smoke when started.

Engine Oil

Kubota
D902
Diesel

DIPSTICK



Lube Point(s) - Fill Cap on Valve Cover or Dip Stick Tube

Oil Capacity - Diesel 0.98 gal (3.71L) - API - CC grade or better

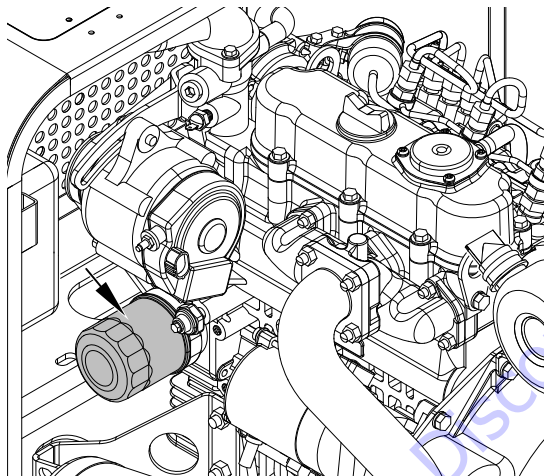
Interval - Check fill level on dipstick daily.

Change oil/filter per maintenance interval chart -
(See Table 6-10)

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Engine Oil Filter (if equipped)

Kubota
D902
Diesel



Lube Point(s) - Filter Cartridge/replaceable
Interval - Clean every 100 hours. Replace 500 hours.

Engine Fuel Filter/Sediment Bowl (if equipped)

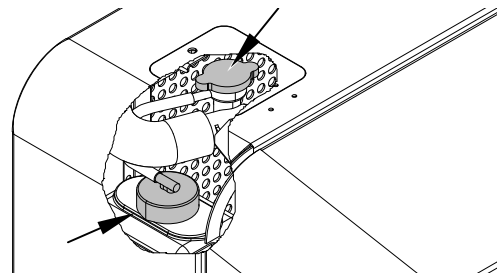
Kubota
D902
Diesel



Interval - Clean every 100 hours

Engine Cooling System and Fluid (if equipped)

Kubota
D902
Diesel

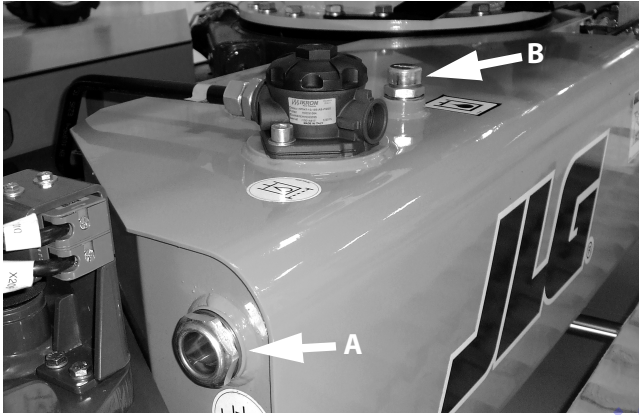


Interval - Check daily. Replace fluid every 500 hours

NOTE: Coolant utilized is to be compliant with SAE J 1034

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Hydraulic Oil



Lube Point(s) - Fill Cap

Capacity - 21.1 gallons (80 liters)

Interval - Check level daily. Change every two years or 1000 hours of operation

NOTE: Hydraulic oil levels are to be checked with the machine in transport position while on a firm, level and uniform surface. Oil level must be half-way in the level indicator (Indicator-A). To add hydraulic oil use (cap-B).

Hydraulic Oil Filter Cartridge



Lube Point(s) - Filter Cap (Indicator A)

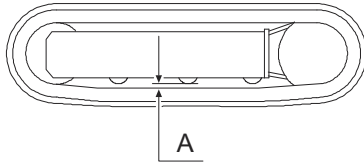
Interval - Replace after first 50 hours of use. Replace thereafter every 250 hours and every time the hydraulic oil is replaced.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Rubber Track Maintenance/Replacement

Check track tension

Stop the machine on a firm, level, and uniform surface. Raise the machine off the surface using the outriggers. Measure distance A from the bottom of the roller to the inside of the rubber belt. The rubber track tension is to be between 0.4 in (10 mm) and 0.6 in (15 mm).

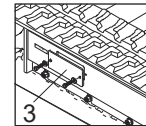
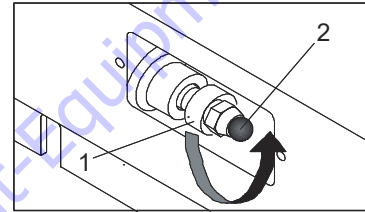


NOTE: If the track is out of tolerance immediately discontinue use of the machine

⚠ WARNING

THE GREASE CONTAINED WITHIN THE HYDRAULIC TRACK IS PRESSURIZED. NEVER LOOSEN GREASING VALVE 1 MORE THAN ONE (1) TURN. NEVER LOOSEN GREASE VALVE 2.

1. Ensure all debris has been removed between the wheel teeth and track links.
2. Remove the screws from the adjustment access lid
- 3.



⚠ DANGER

3. Loosening of the track.
4. Slowly unscrew valve 1 in the counterclockwise direction. Do not exceed one (1) screw rotation.
5. If the grease does not begin to drain, slowly rotate the track.
6. Once correct track tension has been achieved, turn grease valve 1 clockwise to tighten valve.
7. Clean area of all trace grease.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

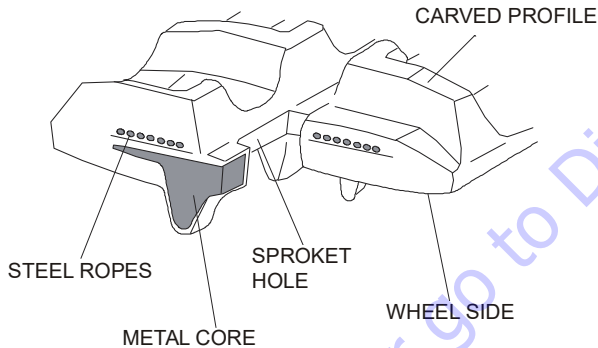
Tightening of the track

- Connect a grease gun to grease valve 2 and add grease until belt tension is within the specified values.

NOTE: If the track does not return to the specified values by following the above procedure immediately discontinue use and contact service personnel.

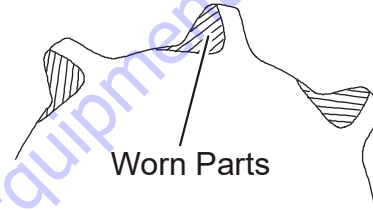
Checking the rubber tracks

- If broken steel ropes are noted discontinue use until damaged components are replaced



- If broken metal cores are noted discontinue use until damaged components are replaced

- If metal cores are separating discontinue use of the machine until the damaged components are replaced.



- If abrasive or fatigue cracks are noted it is recommended the machine be removed from service until the components are replaced.



Track Torque

It is extremely important to apply and maintain proper track mounting torque.

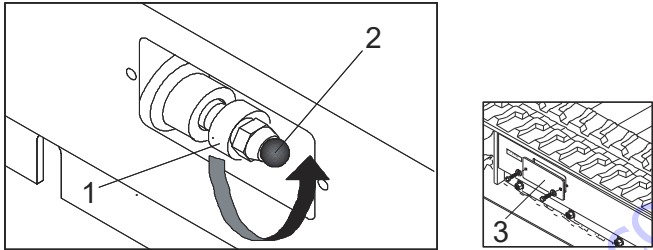
⚠ WARNING

TRACK NUTS MUST BE INSTALLED AND MAINTAINED AT THE PROPER TORQUE TO PREVENT LOOSENING OF THE TRACK, BROKEN STUDS, AND POSSIBLE DANGEROUS SEPARATION OF THE TRACK FROM THE TEETH.

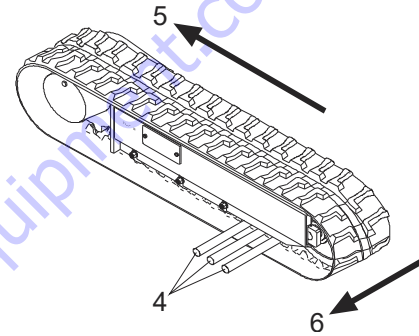
SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Replacing Rubber Tracks

1. Elevate the machine on firm, level and uniform surface utilizing the outriggers.
2. Remove the screws and remove cover 3 as shown in figure.



3. To loosen the track, slowly unscrew valve 1 in a counter-clockwise direction. Do NOT exceed one (1) rotation.
4. Allow grease to drain. If grease does not drain, slowly rotate the track.
5. Insert three steel pipes 4 between the rollers of the track. Turn the driving wheel backwards 5 to engage the track tensioning wheel. Apply an outward force 6 to lift the track from the track tensioning wheel.



Installation of Rubber Track

1. Ensure all hydraulic cylinder grease have been removed
2. Align the track links with the wheel teeth. Position the other end of the track on the track tensioning wheel
3. Slowly rotate the drive wheel in reverse while, using one steel pipe, pushing the track plate inside the frame.
4. Verify the track links have engaged the wheel teeth in the track tensioning wheel
5. Adjust track tension (see Loosening/Tightening track section).

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Wire Cable Inspection

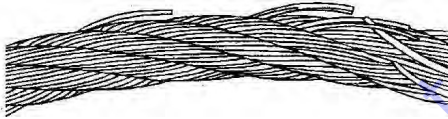
A qualified technician shall conduct the following:

1. Remove all covers from the third boom section and two boom extensions and inspect the wire ropes and pulleys for any damage.
2. Wire cables when pulled on manually shall not move more than an eighth (1/8) inch.
3. Wire rope torque is 10Nm

Inspection

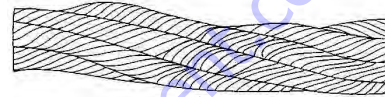
NOTE: The pictures in this section are just samples to show the replacement criteria of the rope.

1. Inspect ropes for broken wires, particularly valley wire breaks and breaks at end terminations.



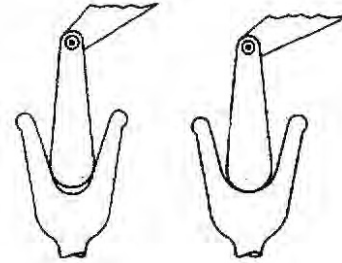
NOTE: Flexing a wire rope can often expose broken wires hidden in valleys between strands.

2. Inspect ropes for corrosion.
3. Inspect ropes for kinks or abuse.



NOTE: A kink is caused by pulling down a loop in a slack line during improper handling, installation, or operation.

4. Inspect sheaves for condition of bearings/pins.
5. Inspect sheaves for condition of flanges.
6. Inspect sheaves with a groove wearout gauge for excessive wear.



NOTE: Observe the groove so that it may be clearly seen whether the contour of the gauge matches the contour of the bottom of the groove.

7. Ropes passing inspection should be lubricated with wire rope lubricant before reassembly.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Wire Cable Adjustment

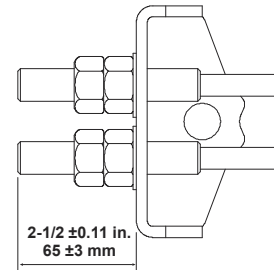
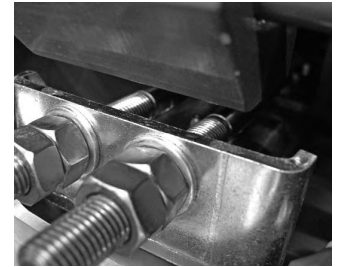
To check for correct wire cable tension position machine on a firm, level, and uniform surface.

1. Remove the cover on the third boom section
2. Loosen the register counter-nuts allowing for access to the wire cable adjustment nuts
3. Position both boom extensions until approximately 12-15 inches of the inner booms are showing
4. Tighten nuts on the retract cables to a torque of 10Nm (7.4ftlbs)



5. Fully extend both boom extensions. Retract the boom extension sections between 12-15 inches.

6. Torque the bolts on the extend cables until the threads extend $2\text{-}1/2 \pm 0.11$ inches ($65\text{mm} \pm 3\text{mm}$) from the boom section. Do not twist cable while tightening.



7. Cycle the boom extensions five (5) times and verify the wire cables are at a torque of 10Nm (7.4ft-lbs)
8. Verify during the cycle testing that no rubbing occurs from the wire rope cables

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

9. Upon verification tighten the counter-nuts and reattach any removed covers

Wear Pad Inspection

Check for distance between wear pads and boom sections. Distance is to be no more than 1/32nd inch.

Turntable Attach Bolts

Ensure the bolts of the coupling elements (turntable) are torqued to 183 ft-lb. (248 Nm)

Battery Maintenance and Charging - Diesel/AC-Electric

NOTE: *The battery is a maintenance free battery. Do NOT attempt to open a maintenance-free sealed battery.*

External Battery Charger Use

WARNING

WHEN AN EXTERNAL BATTERY CHARGER IS TO BE USED, CHARGING HARNESS MUST BE PLUGGED INTO A GROUNDED RECEPTACLE. IF RECEPTACLE IS NOT GROUNDED AND A MALFUNCTION SHOULD OCCUR, THE MACHINE COULD CAUSE SERIOUS ELECTRICAL SHOCK.

1. Open battery cover.
2. Disconnect the terminal clamps from the battery poles.
3. Connect the cables of the charger to the battery poles. and turn on the battery charger

NOTE: *Re-charge voltage should never exceed 14.7 volts and the load intensity shall be 0.2% of the value indicated below and on the lid of the battery.*

4. When charging is completed turn off the battery charger before disconnecting the cables from the battery poles
5. Return the terminal clamps to the battery poles and lubricate with the appropriate product
6. Close battery cover.

NOTICE

IT IS GOOD PRACTICE TO AVOID PRESSURE-WASHING ELECTRICAL/ELECTRONIC COMPONENTS. IN THE EVENT PRESSURE-WASHING THE MACHINE IS NEEDED, ENSURE THE MACHINE IS SHUT DOWN BEFORE PRESSURE-WASHING. SHOULD PRESSURE WASHING BE UTILIZED TO WASH AREAS CONTAINING ELECTRICAL/ELECTRONIC COMPONENTS, JLG INDUSTRIES, INC. RECOMMENDS A MAXIMUM PRESSURE OF 750 PSI (52 BAR) AT A MINIMUM DISTANCE OF 12 INCHES (30.5 CM) AWAY FROM THESE COMPONENTS. IF ELECTRICAL/ELECTRONIC COMPONENTS ARE SPRAYED, SPRAYING MUST NOT BE DIRECT AND BE FOR BRIEF TIME PERIODS TO AVOID HEAVY SATURATION.

6.4 ELECTRIC MOTOR MAINTENANCE

Periodically check the condition of the following electric motor components.

Electric Motor

The electric motor is located inside of the rear hydraulic valve distributor support cover.

- POWER SUPPLY TERMINALS

Check tightness of the nuts on the power supply terminals and make sure the insulation is intact.

- FAN

Keep air intakes clean and make sure the fan can rotate freely.

- BEARINGS

Check the condition of the bearings, in the event of noise contact JLG for replacement, the life of the bearings is reduced significantly in heavy duty operating conditions.

NOTE: *This motor is "brushless" therefore no brushes need to be checked or replaced.*

6.5 PLATFORM CONTROL SERVICE MENU

Service Button

(See Figure 3-3. on page 3-10)

A SERVICE button (*item 6*) is present on the remote control which allows to view the status of the machine parameters and is an aid in the safety checks of the machine.

By pressing the SERVICE button a numerical menu is displayed on the LCD display (*item 15*), each of these menu items can be accessed by pressing the corresponding platform/remote control buttons (*numbered 1 thru 9*) below the buttons.

1 - INPUT

2 - LANGUAGE

3 - ERRORS

4 - RAMPS

5 - CURRENT

6 - W. HOURS

7 - SETUP

8 - JOYSTICK

9 - EXIT

MENUS 4; 5; CANNOT BE ACCESSED

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Menu Input

The signals that arrive at the board from the various sensors mounted on the machine and from the platform/remote control commands are displayed. The status of the input and the following selection to scroll the menu appears for each screen:

- 1 - PREV - access the previous input
- 2 - NEXT - access the successive input
- 9 - ESC - escape from the INPUT menu

LIGHTLIFT SELF-PROPELLED AERIAL PLATFORM - X100AJ	
ST1 GNDA	Both ON indicate the stabilizer 1 rests on the ground.
ST1 GNDB	
ST2 GNDA	Both ON indicate the stabilizer 2 rests on the ground.
ST2 GNDB	
ST3 GNDA	Both ON indicate the stabilizer 3 rests on the ground.
ST3 GNDB	
ST4 GNDA	Both ON indicate the stabilizer 4 rests on the ground.
ST4 GNDB	
ST1 OPEN A	Both ON indicate the stabilizer 1 is completely open, TOTAL AREA.
ST1 OPEN B	
ST2 OPEN A	Both ON indicate the stabilizer 2 is completely open, TOTAL AREA
ST2 OPEN B	

ST3 OPEN A	Both ON indicate the stabilizer 3 is completely open, TOTAL AREA
ST3 OPEN B	
ST4 OPEN A	Both ON indicate the stabilizer 4 is completely open, TOTAL AREA
ST4 OPEN B	
BYPASAE A	Both ON indicate aerial part safety devices have been disconnected by the specially provided key.
BYPASAE B	
BYPASCB A	Both ON indicate undercarriage part safety devices have been disconnected by the specially provided key.
BYPASCB B	
EM. GRND A	Both ON indicate that emergency stop button isn't pressed (from ground).
EM. GRND B	
FOTO A	Both ON indicate that the photocells are aligned.
FOTO B	
EM R.C. GND	Both ON indicate that the remote control button isn't pressed (from ground).
ST12 CLOSED	ON status indicates the stabilizers 1-2 are completely up and pressurized.
ST34 CLOSED	ON status indicates the stabilizers 3-4 are completely up and pressurized.
TEMP ALRM A	Both ON indicate the external temperature probe is activated (only Russian version).
TEMP ALRM B	
GENERATOR	ON or OFF depending on whether, the engine is ON or OFF.
EMERG. COMM	ON position indicates the emergency buttons are activated.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

MICROROPES	ON position indicates both cables are working.
START M. TE	ON position indicates the engine start button (from ground) is pressed.
MOTOR TEMP.	OFF position with the engine running indicates the alarm is activated.
MOTOR PRESS.	ON position with the engine running indicates the alarm is activated.
START M. EL	ON position indicates the remote control from ground is activated by the provided key.
MICROJIB A	Both ON indicates the JIB arm is completely closed.
MICROJIB B	
PEDALE	ON position indicates the pedal within the basket is pressed. (only pedal version)
EM BASK. A	Both ON indicates the emergency STOP (of the remote control) within the basket isn't pressed
EM BASK. B	
POSM 1 A	Both ON indicates the stabilizer 1 is in stabilization position.
POSM 1 B	
POSM 2 A	Both ON indicates the stabilizer 2 is in stabilization position.
POSM 2 B	
POSM 3A	Both ON indicates the stabilizer 3 is in stabilization position.
POSM 3B	

POSM 4A	Both ON indicates the stabilizer 4 is in stabilization position.
POSM 4B	
R.C. PLATFORM	ON position indicates the remote control is in its mount. (in the platform).
INCLIN. X	Indicates the inclination of X axis in tenths of a degree.
INCLIN. Y	Indicates the inclination of Y axis in tenths of a degree.
LOAD	Indicates the weight in the platform in pounds.
POS. 1E2	Indicates 1° and 2° arm cylinder stroke in tenths of a millimeter.
POS. 3	Indicates 3° arm cylinder stroke in tenths of a millimeter.
ROTATION A	Indicates the angular position of the aerial part in degrees (180° - aligned photocells).
MOTOR RPM	Indicates the engine speed.
CURRENT A	Indicates the power to proportional valve.
CURRENT B	Indicates the power to proportional valve.
CURRENT C	Indicates the power to proportional valve.
TEMPERAT.	Indicates the temperature measured by the electrical probe.
SUPPLY (V)	Indicate the voltage (In volts).

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Errors Menu

Indicates the agreement (OK) or not (FAULT) status of the sensors that have a double control.

The sensors are listed on different screens use:

- 1 - PREV - access the previous input
- 2 - NEXT - access the successive input
- 9 - ESC - escape from the INPUT menu

If the OK symbol appears at the side of the sensor it means that the two elements of the same sensor sent identical information.

If the FAULT symbol appears at the side of the sensor it means that the two elements of the same sensor sent inconsistent information.

The last page of the error menu describes the error code relating to the battery charger system, inverter or battery pack. (See "Lithium-Ion Machine Fault Codes" on page 6-26.)

Errors are indicated by the "spanner" icon in position 7 on the remote control display (See "Platform/Remote Control Station Functions" on page 3-9.).



If there are operating problems with the machine and the "spanner" icon is shown on the display, do not operate machine until repaired by a JLG factory trained technician.

Working Hours Menu

Indicates the number of machine working hours.

Set-up Menu

The items in this menu cannot normally be accessed.

Joystick Menu

Displays the signal that each individual Joystick sends to the main board.

6.6 LITHIUM-ION MACHINE - MAINTAINANCE

Battery Pack System Components and Maintenance

⚠ CAUTION

WHEN RECHARGING THE BATTERY PACK AND DURING ANY OTHER MAINTENANCE OPERATION ON THE BATTERY PACK, IT IS NECESSARY TO USE AT LEAST THE PERSONAL PROTECTIVE EQUIPMENT (PPE) LISTED BELOW.

- Eye protection devices
Protective glasses, for protection against sprays of hazardous materials.

- Hand protection devices
Hand protection gloves, for protection and insulation during work on live parts.
- Foot protection devices
Shoes with antistatic coating able to insulate the worker during work on the electrical parts of the system.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Lithium-Ion Machine Fault Codes

(See "Errors Menu" on page 6-24 info for display information)

Table 6-12. Inverter Fault Codes

CODE	DESCRIPTION
1	Wrong Config Cause - EEPROM memory not configured. Solution - Contact Hinowa after sales service.
8	Watch Dog Cause - Inverter cannot start or stop electric motor. Solution - Check connections and continuity of electric motor. If OK, replace inverter.
13	Eeprom KO Cause - EEPROM hardware or software problem. Solution - Replace inverter.
16	Aux output KO Cause - Problem with electromechanical brake. Solution - This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
17	Logic failure #3 Cause - Activated in the event of high inverter current peaks. Solution - This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
18	Logic Failure #2 Cause - Internal fault in the inverter. Solution - Replace inverter.

Table 6-12. Inverter Fault Codes

CODE	DESCRIPTION
19	Logic failure #1 Cause - Sudden voltage surge or voltage drop. Solution - This is a temporary problem due to certain working conditions. If problem persists, replace inverter.
30	VMN low Cause - Inverter power supply voltage is lower than battery voltage, or alternatively incorrect connection to positive battery pole. Solution - Check connection to positive battery pole. If problem persists, replace inverter.
31	VMN High Cause - One motor phase not connected correctly or faulty. Solution - Check motor phases. If problem persists, replace inverter.
37	Contact closed Cause - Relay remains closed when power to coil is disconnected. Solution - Check relay.
38	Contact Open Cause - Inverter supplies power to relay coil but contact doesn't close. Solution - Check relay and power supply to coil.
49	I=0 Ever Cause - Feedback current from motor sensor not constantly at 0. Solution - Check connection to motor.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Table 6-12. Inverter Fault Codes

CODE	DESCRIPTION
53	STBY I high Cause – Internal fault detected in the inverter. Solution – This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
60	Capacitor Charge Cause – Internal fault in the inverter. Solution – Check connections and motor phases.
61	High temperature Cause – High temperature inside the inverter. Solution – Improve cooling to inverter. If fault persists, contact JLG after-sales service.
65	Motor temperature Cause – High motor temperature. Solution – Temporarily stop machine to allow motor to cool down.
67	Can Bus KO Cause – Inverter doesn't receive any information from Can Bus line. Solution – Check connections using multifunction tester.
70	Encoder Error Cause – Problem detected with encoder (=motor speed sensor). Solution – Check speed sensor connection. Anomaly may also have been caused by fault with bearing.

Table 6-12. Inverter Fault Codes

CODE	DESCRIPTION
73	Thermis sensor KO Cause – Signal from temperature sensor greater than 4.95 Volts or less than 0.1 Volt. Solution – This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
74	Driver shorted Cause – Relay power supply fault. Solution – Check relay power supply. This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
75	Driver shorted Cause – Relay power supply fault. Solution – Check relay power supply. This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
76	Coil shorted Cause – Problem detected with relay coil. Solution – Make sure relay coil is intact.
78	VACC not OK Cause – Solution – This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Table 6-12. Inverter Fault Codes

CODE	DESCRIPTION
79	Incorrect start Cause – Incorrect starting procedure. Solution – Check electrical connections. This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
86	Pedal wire KO Cause – Solution – This is generally a temporary problem due to certain working conditions. If problem persists, replace inverter.
93	Wrong set batt Cause – With power connected, battery test detected incorrect batteries fitted. Solution – Replace batteries with the original ones supplied directly by JLG.
94	Current sensor KO Cause – Set up procedure for maximum current in progress. Solution – Contact JLG after-sales service.
99	Check up needed Cause – Solution – Contact Hinowa after.sales service.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

BMS Fault Codes - (Battery Management System)

(See "Errors Menu" on page 6-24 info for display information)

NOTE: The CODE column indicates the CAN CODE in the message sent by the battery charger. The normal mains voltage tolerance is the rated value $\pm 15\%$.

CODE – TYPE OF ERROR

A99E01 – Configuration error

A99E02 – Incorrect voltage

A99E03 – Incorrect temperature

A99E04 – Excess discharge current

A99E05 – Excess charge current

A99E06 – Pre.charge error

A99E07 – No 12 V power supply

A99E08 – No 12 V power supply

A99E09 – High battery compartment temperature

A99E10 – High electronic board temperature

A99E11 – Incorrect self.protection device temperature

A99E12 – Fault on all temperature sensors

A99E13 – Temperature sensor fault

A99E14 – Earth connection fault

A99E01 – Incorrect system configuration

A99E02 – Incorrect voltage

A99E03 – Incorrect temperature

A99E04 – Excess discharge current

A99E05 – Excess charge current

A99E06 – Pre.charge error

A99E07 – No 12 V power supply

A99E08 – No 12 V power supply

A99E09 – High battery compartment temperature

A99E15 – Boot loader error

A99E16 – Secondary protection

A99E17 – Control device error

A99E18 – Power board error

A99E19 – I2C module not ready

A99E20 – I2C TX error

A99E21 – I2C RX error

A99E22 – I2C RX error 2

A99E23 – AD error

A99E99 – General error

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Battery Charger Fault Codes

(See "Errors Menu" on page 6-24 info for display information)

Table 6-13. Battery Charger Fault Codes

CODE	DESCRIPTION	STATUS	ACTION
8	Internal logic fault.	Battery charger stops working.	Contact service dept. or change product.
13	Communication problem with external memory.	Battery charger stops working.	Contact service dept. or change product.
18	Extended shutdown or power failure.	Battery charger stops supplying power. Operation resumes as soon as alarm conditions are no longer present or after restarting.	If problem is a power failure, check battery charger mains power supply.
19	Internal logic fault.	Battery charger stops working.	Contact service dept. or change product.
240	Digital input is open and managed as hardware start-stop.	Battery charger stops charging until digital input closes.	Close digital input.
241	Problem in CANBUS communication with other systems in the network.	The way this is managed may change based on different firmware releases.	Check correct operation of CANBUS system.
242	Error when reading internal memory on micro controller.	Battery charger stops working.	Contact service dept. or change product.
244	Mains voltage lower than maximum operating range tolerance.	Battery charger won't start charging until mains voltage returns within normal operating range.	Make sure mains voltage is within correct operating parameters.
245	Abnormal current draw in primary section.	Battery charger stops supplying power. Operation resumes as soon as alarm conditions are no longer present.	If problem persists, contact service dept. or change product.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Table 6-13. Battery Charger Fault Codes

CODE	DESCRIPTION	STATUS	ACTION
246	Stage 1 ended by timeout without reaching control voltage.	Battery charger stops working.	Make sure battery capacity is compatible or check that battery is compliant with battery charger. If battery is correct and problem persists, contact service dept.
248	Temperature inside battery charger too high.	If internal temperature exceeds 80°C, battery charger reduces power to 80%, while it stops operating altogether if internal temperature exceeds 90°C. Battery charger starts at full power again when internal temperature falls below 70°C.	
249	Battery temperature too high.	If temperature exceeds 55°C or is less than -20°C, battery charger stops working. When battery temperature falls below 45°C or exceeds -10°C battery charger resumes normal operation.	
251	Power failure detected.	Battery charger stops supplying power. Operation resumes as soon as alarm conditions are no longer present.	If problem persists, check battery charger mains power supply.
252	Short-circuit in battery charger output.	Battery charger stops working.	Turn off battery charger and resolve short circuit at output. If problem persists, contact service dept. or change product.
253	Mains voltage higher than maximum operating range tolerance.	Battery charger won't start charging until mains voltage returns within normal operating range.	Make sure mains voltage is within correct operating parameters.

6.7 LITHIUM-ION BATTERY PACK - HANDLING IN DANGEROUS CONDITIONS

Battery cells must be handled correctly in order to ensure proper and safe use. However, if mistakes are made in handling the cells, causing explosion or venting, the user has to be equipped so as to be able to face this emergency.

The purpose of this section is to train the user on safe handling of cells that have been subjected to extreme conditions.

These Conditions Are As Follows:

1. Hot cells
2. Cells that have released substances or vented
3. Exploded cells
4. Fire enveloping the lithium batteries

Procedure For Handling Hot Cells

As soon as it has been established the temperature of a cell has risen considerably, the first action is evacuation of personnel from the affected area. The area has to be isolated and nobody can enter if not strictly necessary.

If possible, before leaving the area, the person who first identified the problem has to check if there is an external short-circuit and resolve it as soon as possible. After the short-circuit has been resolved, the cell will start to cool down. However, the area has to remain isolated until the cell reaches ambient temperature and is removed from the area. The temperature of the cell has to be checked periodically using a remote sensor such as an infrared sensor. If the cell remains hot the following actions must be assessed.

Minimum Equipment Required:

- Infrared temperature probe
- Safety glasses
- Hard hat with impact resistant face visor
- Non-conductive pliers
- Hand, arm and body protection

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Start Procedure;

1. Evacuate the area as soon as abnormal cell temperature has been established.
2. Periodically check temperature of the cell using a remote sensor for the first two hours or until one of the following cases occur:
 - The cell starts to cool down
 - The cell vents
 - The cell explodes
3. If the cell starts cooling, check the temperature every hour until ambient temperature has been reached.
4. If a temperature sensor is not available, do not handle the cell for a minimum of 24 hours.
5. Remove cell from the work area when ambient temperature has been reached and return to normal operations.
6. Dispose of the cell in accordance with existing legislation (in the country in question) on hazardous materials.

Procedures in cases of venting or explosion are examined in the following paragraphs.

Procedure For Handling Vented Cells

In normal conditions a cell does not show leaks or venting, however a cell may vent or release substances if the critical temperature is reached or if the protective glass metal seal breaks due to severe mechanical conditions.

The severity of the leak consequent to venting ranges from slight leak around the seal to a violent leak of substances through the vent. In some cases, if the cell is not plugged, it may behave as a projectile.

Electrolyte inside the cell may cause very serious irritation to the respiratory tract, eyes and skin. In addition, venting may cause emission of highly corrosive vapors in the work environment. In this case, all protective equipment suited to limit exposure to toxic fumes must be available.

Minimum Equipment Required;

- Class D fire extinguisher
- Eye protection or face shield
- Respirator with filter for hydrochloric acid and sulphur dioxide
- Neoprene gloves
- Acid resistant lab coats
- Baking soda, calcium oxide or acid absorbent in kit form
- Vermiculite
- Plastic bags

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Start Procedure;

In the event of electrolyte release from the cells, proceed as follows:

1. Evacuate the people exposed to fumes from the area.
2. Air the environment until the complete removal of the cell and until the characteristic pungent odor has disappeared.
3. If the cell is too hot, allow it to cool to ambient temperature before handling it (see "Procedure For Handling Hot Cells" on page 6-32).
4. Wear safety equipment: coat, gloves, mask and filters, and move the cell to a well-ventilated area.
5. Place every cell in a sealable plastic bag and remove the excess air, then seal the bag.
6. Place a cup of vermiculite in a second bag, place first bag in the second and seal it.
7. Place everything in a third bag with some baking soda and seal the bag.
8. Absorb and collect the leaked electrolyte with absorbent material or baking soda.
9. Place the absorbent material in a bag and seal it.
10. Clean area with plenty of water.
11. Dispose of hazardous material in accordance with the local legislation in force.

First Aid In The Event Of Contact With The Electrolyte

EYES

Immediately wash the eyes in abundant running water for at least 15 minutes, keeping the eyelids open and flushing the eye and back of the eyelid. Immediately seek medical help.

SKIN

Wash in cold water under a shower, remove contaminated garments. Continue washing for at least 15 minutes. Seek medical help where necessary.

RESPIRATORY TRACT

Move person(s) outdoors into the open air. If person(s) has difficulty breathing, have oxygen administered by trained personnel. If breathing stops, apply mouth-to-mouth resuscitation and immediately seek emergency medical help.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Procedure For Exploded Cells

Explosion of lithium batteries is not likely, it is a rare event that only occurs when an abnormal condition causes the temperature to rise and reach a critical point. However, in the event of lithium battery explosion the environment will quickly be filled with dense white smoke which will cause serious irritation to the respiratory tract, eyes and skin. Precautions must be taken to limit exposure to these fumes.

Minimum Equipment Required;

- Class D fire extinguisher
- Class ABC extinguisher for any secondary fires
- Eye protection or face shield
- Respirator with filter for hydrochloric acid and sulphur dioxide
- Neoprene gloves
- Acid-resistant lab coats
- Baking soda, calcium oxide or acid absorbent in kit form
- Vermiculite
- Plastic bags

Start Procedure;

In the event of cell explosion, proceed as follows:

1. Evacuate personnel from the areas contaminated by smoke.
2. Ventilate the rooms until the cell has been removed from the area and until the characteristic pungent odor has disappeared.
3. Even if this is quite unlikely, there may be fires as a consequence of the explosion. The ways these emergencies are faced are described in the following paragraph.
4. The exploded cell may be hot. Allow it to cool down to ambient temperature before handling it (see Procedure for handling hot cells).
5. Wear safety equipment: coat, gloves, mask and filters.
6. In case of explosion the area around the cell will be covered by a black carbonaceous material which contains metallic parts of the cell. Cover the carbonaceous residues with a 50/50 mixture of baking soda and vermiculite or other absorbent material. Avoid contact between the metallic residues and charged cells, as this condition may cause a short.circuit.
7. Place contaminated material in a sealable plastic bag and remove excess air.
8. Seal the bag.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

9. Place a cup of vermiculite in a second bag, place the first bag in the second and seal it.
10. Clean area with plenty of water and keep cleaning with water and soap.
11. Dispose of hazardous material in accordance with the local legislation in force.

First Aid In The Event Of Contact With The Electrolyte;

EYES

Immediately wash eyes in abundant running water for at least 15 minutes, keeping the eyelids open and flushing the eye and back of the eyelid. Immediately seek medical help.

SKIN

Wash in cold water under a shower, remove contaminated garments. Continue washing for at least 15 minutes. Seek medical help where necessary.

RESPIRATORY TRACT

Move casualty outdoors into the open air. If person(s) has difficulty breathing, have oxygen administered by trained personnel. If breathing stops, apply mouth-to-mouth resuscitation and immediately seek emergency medical help.

Lithium Battery Fire

All metals may burn in certain conditions, which depend on certain factors such as: physical state, presence of oxidizing atmospheres and severity of the source of ignition. Alkali metals such as lithium may burn in normal atmospheres. In addition, lithium reacts explosively with water to form hydrogen and the presence of small quantities of water may set fire to the material and the hydrogen gas that is released. Once metal fires start they are very hard to extinguish with ordinary equipment. This is partly due to the strong heat produced by the burning metal, whose temperature may reach 1832°F (1000°C). In addition, lithium may react with certain materials commonly used in fire extinguishers, like water and CO₂. Special extinguishers are required, designed for controlling and extinguishing lithium fires.

In particular, graphite-based extinguishers (Lith-x) are used. Usually these extinguishers work by forming a crust or a layer of material on the surface of the burning metal. Lith-x, which is a common graphite-based agent, may be used with an extinguisher or spread over the fire. In the event of lithium fire, the room may fill with a dense white smoke, mostly formed by lithium oxide and other metal oxides. This condition may cause serious damage to the respiratory tract, skin and eyes. All precautions needed to limit exposure to these fumes must be adopted. It should be noted that this procedure is applicable only to fires on individual cells. Larger fires have to be managed only by professionally trained personnel.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

Finally, it should be noted that in the presence of combustible materials other than lithium it is advisable to use different types of extinguishers in conjunction to better ensure the extinguishing action of each on the appropriate material, however do not use water or CO2 extinguishers directly on lithium fires.

Minimum Equipment Required;

- Class D fire extinguisher
- Class ABC extinguisher for any secondary fires
- Breathing apparatus
- Fireproof clothing
- Fireproof gloves
- Mask or protective glasses
- Non-conductive pliers
- Dustpan, mineral oil

Start Procedure;

1. In the event of fire on one cell, a team of experienced fire-fighting personnel has to be contacted. The personnel must be properly trained to fight lithium battery fires.
2. Evacuate personnel from all areas and sound the fire alarm.
3. The fire-fighting personnel go to the area where the fire is located and gather all the information regarding the situation and the person who gave the alarm.

4. Quarantine the area. Air the rooms until the burning material has been removed from the area and the characteristic pungent odor has disappeared.
5. Two members of the team enter the area with appropriate safety equipment.

NOTE: *Lithium melts at 356°F (180°C). It becomes highly reactive and when it catches fire it may eject molten lithium particles. For this reason the surrounding cells may overheat and cause a violent explosion. The fire-fighting personnel must pay attention to any dangerous materials located near the fire.*

6. Completely cover fire with extinguishing material. Never leave fire unattended as it may develop again.
7. If necessary, extinguish secondary fires with suitable extinguishers.
8. After all material has burned and cooled down, carefully mix residual material to prevent resumption of the fire.
9. Put the material in a metal drum, cover the surface with plenty of extinguishing material.
10. Residual material may contain un-reacted lithium, therefore limit exposure to rain by covering, for example, with mineral oil.
11. Wear safety equipment: coat, gloves, mask and filters.

SECTION 6 - GENERAL SPECIFICATIONS AND OPERATOR MAINTENANCE

12. The area around the cell will be covered by a black carbonaceous deposit which contains metallic parts of the cell. Cover the carbonaceous residue with a 50/50 mixture of baking soda and vermiculite or other absorbent material. Avoid contact between the metallic residue and charged cells as this condition may cause a short.circuit.
13. Place the contaminated material in a sealable plastic bag and remove the excess air.
14. Seal the bag.
15. Place a cup of vermiculite in a second bag, place the first bag in the second and seal it.
16. Clean the area with plenty of water and keep cleaning with water and soap.
17. Dispose of hazardous material in accordance with the local legislation in force.

First Aid In The Event Of Contact With The Electrolyte;

EYES

Immediately wash the eyes in abundant running water for at least 15 minutes, keeping the eyelids open and flushing the eye and back of the eyelid. Immediately seek medical help.

SKIN

Wash in cold water under a shower, remove contaminated garments. Continue washing for at least 15 minutes. Seek medical help where necessary.

RESPIRATORY TRACT

Move person(s) outdoors into the open air. If person(s) has difficulty breathing, have oxygen administered by trained personnel. If breathing stops apply mouth-to-mouth resuscitation and immediately seek emergency medical help.

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