

snorkel

660SJ



CE

OPERATOR'S **MANUAL**

ANSI/CSA/CE/AS/NZS
Serial number 000034 and after
Replaces ANSI/CSA/CE/AS/NZS May 2024

Part Number 1432633
August 2024

DANGER

The aerial platform is not electrically insulated. Death or serious injury will result from contact with, or inadequate clearance from, an energized conductor.

Do not go closer than the minimum safe approach distance as defined by the Minimum Safe Approach Distance sections in Chapter 3–Safety.

Regard all conductors as energized.

Allow for electrical wire sag and aerial platform sway.

If the platform, booms, or any part of the aerial platform contacts a high-voltage electrical conductor, the entire machine can become electrically charged.

If that happens, remain on the machine and do not contact any other structure or object. This includes the ground, adjacent buildings, poles, and any other objects that are not part of the aerial platform.

Such contact could make your body a conductor to the other object, creating an electrical shock hazard resulting in death or serious injury.

If an aerial platform is in contact with an energized conductor the platform operator must warn ground personnel in the vicinity to stay away. Their bodies can conduct electricity creating an electrical shock hazard resulting in death or serious injury.

Do not approach or leave the aerial platform until the electricity has been turned off.

Do not attempt to operate the lower controls when the platform, booms, or any part of the aerial platform is in contact with a high-voltage electrical conductor or if there is an immediate danger of such contact.

Personnel on or near an aerial platform must be continuously aware of electrical hazards, recognizing that death or serious injury can result from contact with an energized conductor.

California

Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead components, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

California

Proposition 65 Warning

Diesel and gasoline engine exhaust and some of its constituents are known by the State of California to cause cancer, birth defects or other reproductive harm.

DANGER



Do NOT Go Closer Than The Minimum Safe Approach Distance



Do NOT Operate Outside During a Thunderstorm



Do NOT Operate in Windy or Gusty Conditions



Do NOT Add Anything That Will Increase Wind Loading



Do NOT Drive an Elevated MEWP on Soft, Uneven or Sloping Surfaces



Do NOT Operate an Elevated MEWP on Rough or Uneven Terrain



Do NOT Operate a Stowed MEWP on Rough or Uneven Terrain



Do NOT Operate an Elevated MEWP Near Any Drop-off or Hole



Do NOT Operate a Stowed MEWP Near Any Drop-off or Hole



Do NOT Use The MEWP As a Lifting Tool or Crane



Do NOT Exceed The Maximum Allowable Manual Side Force



Do NOT Operate The MEWP Without Sufficient Clearance



Do NOT Raise The Platform Without First Checking For Obstructions



Do NOT Lower The Platform Without Checking For Obstructions



Do NOT Allow Ground Personnel Near the MEWP During Operation



Do NOT Carry Loads That Extend Beyond The Guardrails



Do NOT Operate an MEWP From Trucks, Trailers, or Similar Equipment



Do NOT Exceed The Platform Rated Work Load



Do NOT Climb on The MEWP



Do NOT Climb on The Guardrails



Do NOT Engage In Any Form of Horseplay



Do NOT Operate an MEWP With Tires That Are in Poor Condition



Do NOT Operate an MEWP That is Damaged or Not Functioning Properly



Do NOT Leave the MEWP With The Key In It



Do NOT Operate an MEWP While Physically Impaired



Do NOT Strike or Bump Stationary Objects With an Elevated MEWP



Do NOT Strike or Bump Stationary Objects With a Stowed MEWP

! WARNING !

SAFETY NOTICE PLEASE READ BEFORE USE

If this machine has been transported in a container the wheels will have been flipped to get it into the container. This will make the machine narrower than the design intent. The machine may be driven with the wheels flipped to load & unload but only ever when in the stowed position. The machine must not be used for a job of work until the wheels have been flipped back round to their correct position.

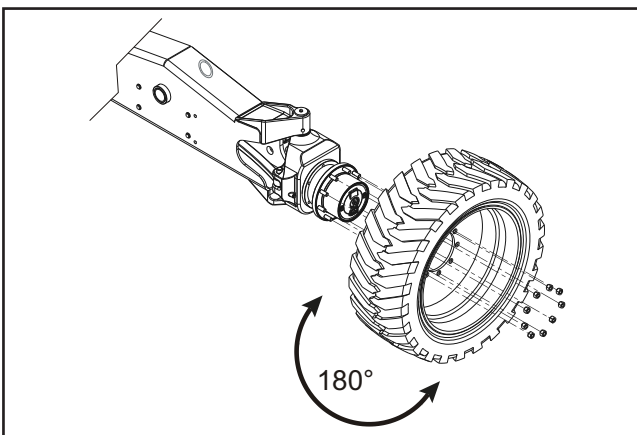


Figure 1 – Correct Wheel Orientation

To flip the wheel back to the correct orientation (refer to Figure 1), use the following instructions.

1. Safely jack the machine.
2. Loosen the 9 retaining lug nuts.
3. Safely remove the wheel from the hub.
4. Flip the wheel 180° so that decal 106171-003 is facing on the inside of the wheel. Refer to Figure 2.
5. Safely fit the wheel back onto the hub.
6. Hand tighten the 9 retaining lug nuts and lower the machine from the jack.
7. Dry torque the lug nuts to 150 ft lbs in a non-circular pattern.



Figure 2 – Wheel Position Decal

The distance between the outer edge of the right wheel to the outer edge of the left wheel should be 2390mm (94 in) when the wheels are correctly orientated. Refer to Figure 3.

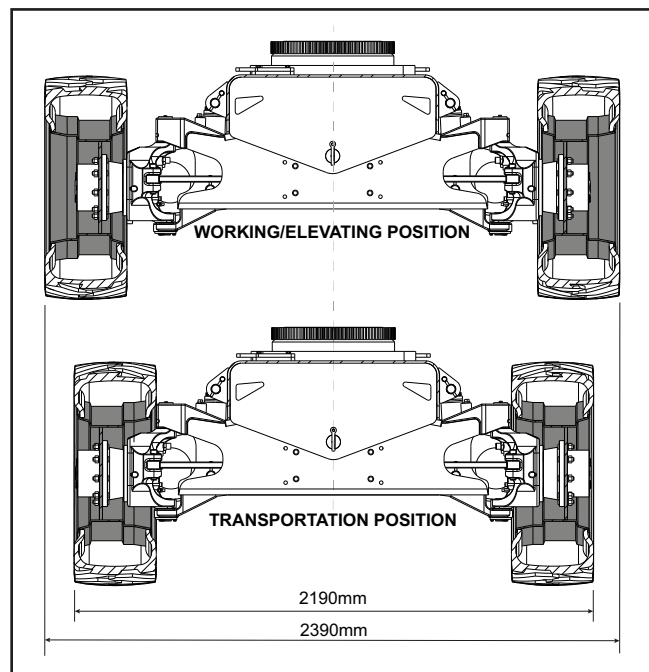


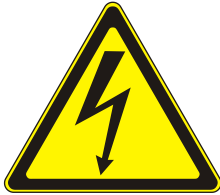
Figure 3 – Wheel Position Distance

SAFETY RULES

⚠Warning

All personnel shall carefully read, understand and follow all safety rules and operating instructions before operating or performing maintenance on any Snorkel aerial work platform.

Electrocution Hazard



THIS MACHINE IS NOT INSULATED!

Tip Over Hazard



NEVER elevate the platform or drive the machine while elevated unless the machine is on a firm, level surface

Collision Hazard



NEVER position the platform without first checking for overhead obstructions or other hazards.

Fall Hazard



NEVER climb, stand, or sit on platform guardrails or midrail.

USE OF THE AERIAL WORK PLATFORM: This aerial work platform is intended to lift persons and his tools as well as the material used for the job. It is designed for repair and assembly jobs and assignments at overhead workplaces (ceilings, cranes, roof structures, buildings etc.). Uses or alterations to the aerial work platform must be approved by **Snorkel**.

THIS AERIAL WORK PLATFORM IS NOT INSULATED! For this reason it is imperative to keep a safe distance from live parts of electrical equipment!

Exceeding the specified permissible maximum load **is prohibited!** See "Platform Capacity" for details.

The use and operation of the aerial work platform as a lifting tool or a crane **is prohibited!**

NEVER exceed the manual force allowed for this machine. See "Manual Force" for details.

DISTRIBUTE all platform loads evenly on the platform.

NEVER operate the machine without first surveying the work area for surface hazards such as holes, drop-offs, bumps, curbs, or debris; and avoiding them.

OPERATE machine only on surfaces capable of supporting wheel loads.

NEVER operate the machine when wind speeds exceed this machine's wind rating. See "Beaufort Scale" for details.

Do not operate the aerial platform in windy or gusty conditions. Do not add anything to or take anything into the aerial platform that will increase the wind loading such as billboards, banners, flags, etc.

IN CASE OF EMERGENCY push EMERGENCY STOP switch to deactivate all powered functions.

IF ALARM SOUNDS while platform is elevated, STOP, carefully lower platform. Move machine to a firm, level surface.

Climbing up the railing of the platform, standing on or stepping from the platform onto buildings, steel or prefab concrete structures, etc., **is prohibited!**

Dismantling the entry gate or other railing components **is prohibited!** Always make certain that the entry gate is closed!

It is prohibited to keep the entry gate in an open position when the platform is raised!

To extend the height or the range by placing of ladders, scaffolds or similar devices on the platform **is prohibited!**

NEVER perform service on machine while platform is elevated without blocking elevating assembly.

INSPECT the machine thoroughly for cracked welds, loose or missing hardware, hydraulic leaks, loose wire connections, and damaged cables or hoses before using.

VERIFY that all labels are in place and legible before using.

NEVER use a machine that is damaged, not functioning properly, or has damaged or missing labels.

To bypass any safety equipment **is prohibited** and presents a danger for the persons on the aerial work platform and in its working range.

NEVER charge batteries near sparks or open flame. Charging batteries emit explosive hydrogen gas.

Modifications to the aerial work platform **are prohibited** or permissible only at the approval by **Snorkel**.

AFTER USE, secure the work platform from unauthorized use by turning the keyswitch off and removing key.

The driving of MEWP's on the public highway is subject to national traffic regulations.

Certain inherent risks remain in the operation of this machine despite utilizing proper design practices and safeguarding.

Harness attachment points are provided in the platform and the manufacturer recommends the usage of a fall restraint harness, especially where required by national safety regulations.

Care must be taken to ensure that the machines meets the requirements of stability during use, transportation, assembly, dismantling when out of service, testing, or foreseeable breakdowns.

In the event of an accident or breakdown see "Emergency Operation." Do not operate the aerial platform if it is damaged or not functioning properly. Qualified maintenance personnel must correct the problem before putting the aerial platform back into service.

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Chapter 1 – Introduction

Aerial Platform Features

The aerial platform is a boom-supported elevating work platform used to raise personnel, their tools, and material to the workstation. The booms are raised and lowered with hydraulic cylinders. Hydraulic motors on the drive wheels provide power to move the aerial platform.

The standard machine includes the following features:

- Proportional boom lift, rotate, and drive controls
- Four wheel hydrostatic drive
- Pivoting front axle
- Foam filled tires
- High engine temperature shut down
- Low oil pressure shut down
- Hour meter
- Horn
- Boom/drive cut-out – machines manufactured after March 2021
- Flashing light
- Drive motion alarm
- Snorkel Guard
- Platform overload system
- Tie-down/lifting lugs
- 5 degree tilt alarm ANSI/CSA
- 5 degree tilt alarm CE/AS/NZS – dual capacity
- 3.5 degree tilt alarm CE/AS/NZS – single capacity
- Hydraulic oil level gauge
- Hydraulic oil cooler
- Diagnostic center display
- Battery operated emergency operating system
- 360 degree continuous turntable rotation
- Saloon entry doors (rear) and two gravity gates (left and right side)
- Two safety lanyard attachments
- Built-in panel carrier
- AC 110 V electrical outlet with GFCI at platform
- Five year limited warranty

The machine may be powered with one of the following engines.

- Cummins QSF diesel engine
- Deutz TCD 2.9 L4 diesel engine
- Kubota V2403-T diesel engine
- Kubota WG2503 gasoline, LPG, or dual fuel

The aerial platform has been manufactured, when applicable, to conform to all applicable requirements of the following organizations:

- Occupational Safety and Health Administration (OSHA)
- American National Standards Institute (ANSI)

Options

The following options may be provided on the machine:

- Dual platform capacity system – 600 and 1,000 lb
- Dual fuel
- Airline to platform
- All motion alarm

- Cold weather start kit
- Hydraulic fluid warm-up system
- Flotation tires w/tire pressure monitor system
- All terrain – independent rubber tracks
- Pressure washer
- Driving lights
- Tow package
- Sandblast protection kit
- Snorkel OnSite telematics
- 39" x 96" (99 cm x 243 cm) 500 lb (227 kg) capacity steel platform with side swing gate (left side) and two gravity gates (right side and rear)
- 39" x 96" (99 cm x 243 cm) 500 lb (227 kg) capacity steel platform with side swing gate (left side) and two gravity gates (right side and rear) with bumpguard
- 5 foot aluminum 600 lb (272 kg) capacity platform with side swing gate (left side) and two gravity gates (right side and rear)
- Platform work lights – flood or halogen
- Pipe rack
- Platform welder – 275 amp
- AC generator – 7.5 kW
- AC generator – 20 kW
- Platform glazier package
- European conformity (CE) certification
- Australian Standards (AS) certification
- Canadian Standards Association (CSA) certification

Operator's Manual

This manual provides information for safe and proper operation of the aerial platform. Some information in this manual refers to options that may or may not be on your machine. Read and understand the information in this Operator's Manual before operating the aerial platform on the job.

Additional copies of this manual may be ordered from Snorkel. Supply the model and manual part number from the front cover to assure that the correct manual will be supplied.

All information in this manual is based on the latest product information at the time of publication. Snorkel reserves the right to make product changes at any time without obligation.

Safety Alerts

A safety alert symbol is used throughout this manual to indicate danger, warning, and caution instructions. Follow these instructions to reduce the likelihood of personal injury and property damage. The terms danger, warning, and caution indicate varying degrees of personal injury or property damage that can result if the instruction is not followed.

Danger

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be used in the most extreme situations.

⚠Warning

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠Caution

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Notes

Notes are used to provide special information or helpful hints to assist in aerial platform operation, but do not indicate a hazardous situation.

Operation

The aerial platform has built-in safety features and has been factory tested for compliance with Snorkel specifications and industry standards. However, any personnel lifting aerial platform can be potentially dangerous in the hands of untrained or careless operators.

⚠Warning

The potential for an accident increases when the aerial platform is operated by personnel who are not trained and authorized. Death or serious injury could result from such accidents. Read and understand the information in this manual and on the placards and decals on the machine before operating the aerial platform on the job.

Training is essential and must be performed by a qualified person.

- Become proficient in knowledge and actual operation before using the aerial platform on the job.
- The operator must be trained and authorized to perform any functions of the aerial platform.
- Operation of the aerial platform must be within the scope of the machine specifications.

The operator bears ultimate responsibility for following all manufacturer's instructions and warnings, regulations and safety rules of their employer and/or any state or federal law.

Maintenance

Complete machine inspection consists of periodic visual and operational checks, along with periodic minor adjustments that assure proper performance. Daily inspection will prevent abnormal wear and prolong the life of all systems. The inspection and maintenance schedule should be performed at the specified intervals and after prolonged periods of storage before returning the machine to service. Inspection and maintenance shall be performed by personnel who are trained and familiar with mechanical and electrical procedures.

Every person who maintains, inspects, tests, or repairs the aerial platform must be qualified to do so. Following the daily prestart inspection in this Operator's Manual will help keep the aerial platform in optimum working condition. Other maintenance functions must be performed by maintenance personnel who are qualified to work on the aerial platform.

⚠Caution

Welding current can be very intense. Damage to electronic components may result. Connect the ground clamp as close as possible to the area being welded. Disconnect battery cables and any microprocessors and engine control modules before welding on the machine.

If it becomes necessary to weld aerial platform components as a method of repair, take all precautions to prevent damage to electronic circuitry and devices on the machine. This includes, but may not be limited to, disconnecting battery cables and electronic devices.

Do not modify this aerial platform without prior written consent of the Snorkel Engineering Department. Modification may void the warranty, adversely affect stability, or affect the operational characteristics of the aerial platform.

Used Material Disposal

For proper used material disposal, refer to all applicable national and/or employer standards before disposal of any environmentally sensitive material including, but not limited to, hydraulic fluid, batteries, and battery fluid.

Manual of Responsibilities – ANSI

All owners and users of the aerial platform must read, understand, and comply with all applicable regulations. Ultimate compliance to OSHA regulations is the responsibility of the user and their employer.

ANSI publications clearly identify the responsibilities of all personnel who may be involved with the aerial platform. A reprint of the "Manual of Responsibilities for Manufacturers, Dealers, Owners, Users, Supervisors, Operators, Occupants, Lessors, Lessees and Brokers of ANSI/SIA A92.22-2020 Safe Use & ANSI/SIAA92.24-2018 Training Requirements for the Use, Operation, Inspection, Testing and Maintenance of Mobile Elevating Work Platforms (MEWP)" is available from Snorkel dealers or from the factory upon request.

Copies are also available from:
Scaffold & Access Industry Association
400 Admiral Boulevard
Kansas City, MO 64106 USA

MEWP Safe Use – AS/NZS

All owners and users of the aerial platform must read, understand, and comply with all applicable regulations as stated in AS/NZS 2550.10:2006. Ultimate compliance is the responsibility of the user and their employer.

AS/NZS 1418.10 Commissioning

Per AS/NZS 1418.10, a machine has been commissioned upon return to Snorkel of a satisfactory completed Pre-Delivery and Inspection Record (PDIR). The PDIR inspection is performed by Snorkel, or its agent, before the machine is delivered to the customer. A completed PDIR form can be obtained, by request, from the sales agent.

CE Compliance

The aerial work platform meets and exceeds the requirements of both EN280:2013 and ANSI A92.5.

Additional Information

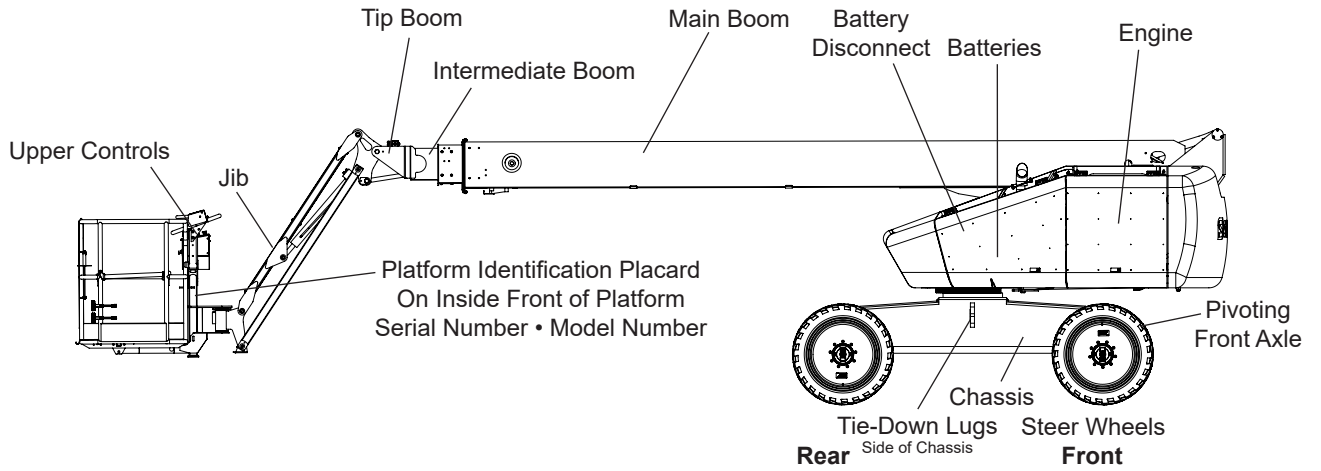
For additional information contact your local dealer or Snorkel at:

Snorkel International
P.O. Box 1160
St. Joseph, MO 64502-1160 USA
1-800-255-0317
<http://www.snorkellifts.com>

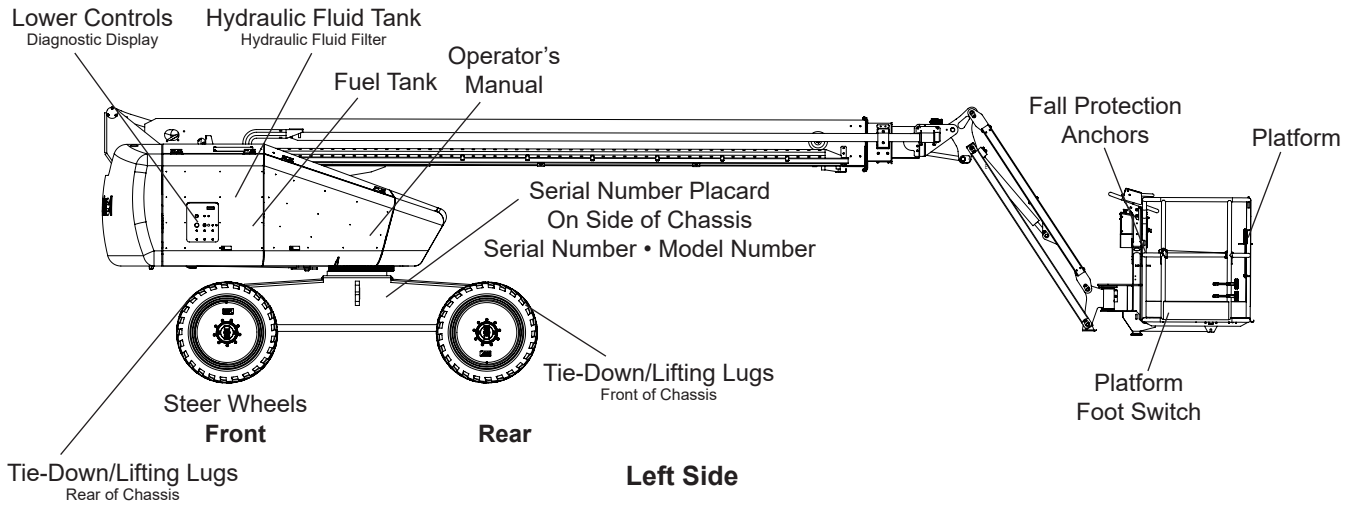
Regional contact information is located on the back cover of this manual.

Chapter 2 – Specifications

Component Identification

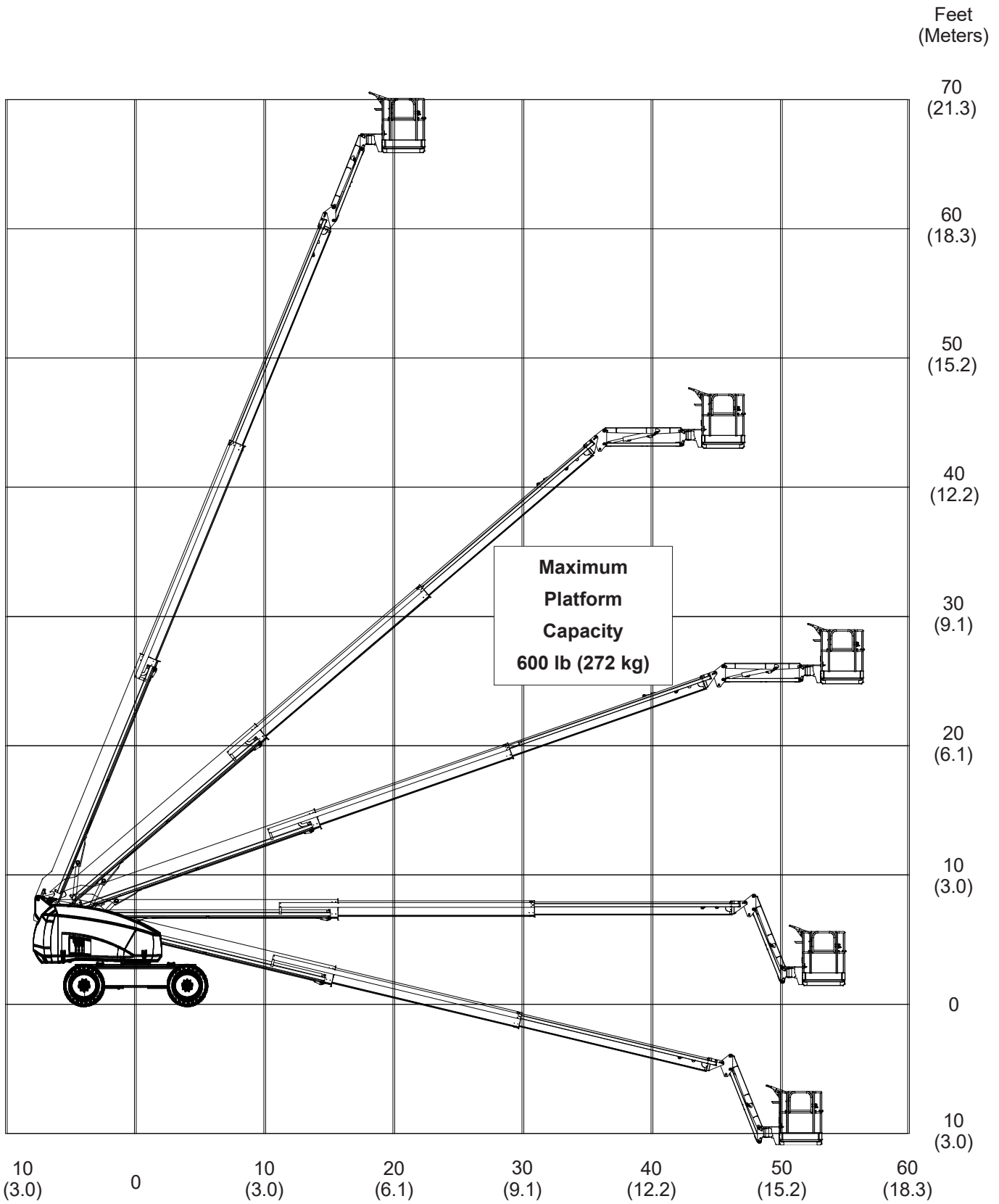


Right Side



Left Side

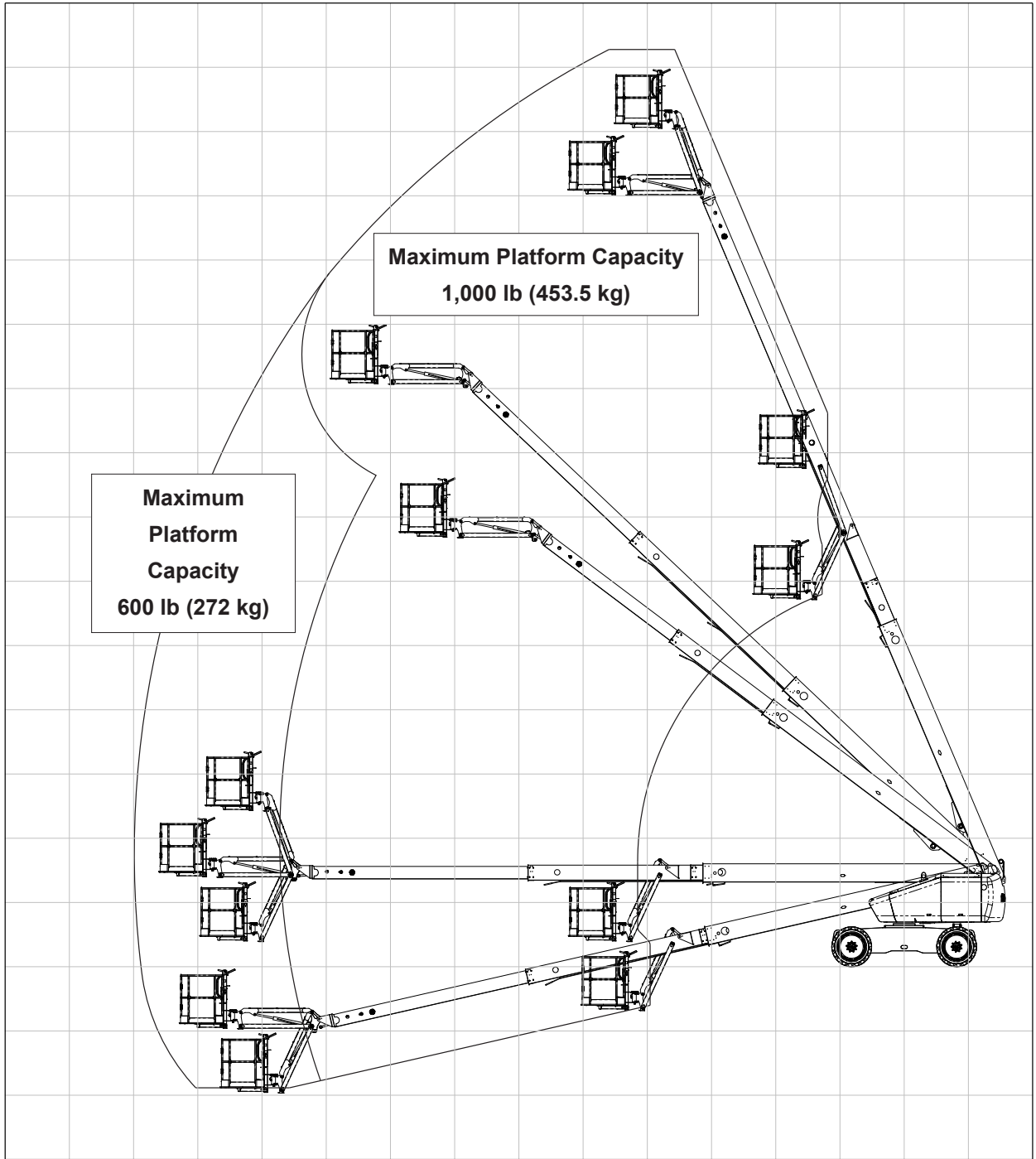
Working Envelope – Single Capacity



Working Envelope – Dual Capacity

Feet
(Meters)

75
(22.9)
70
(21.3)
65
(19.9)
60
(18.3)
55
(16.8)
50
(15.2)
45
(13.7)
40
(12.2)
35
(10.7)
30
(9.1)
25
(7.6)
20
(6.1)
15
(4.6)
10
(3.0)
5
(1.5)
0
5
(1.5)
10
(3.0)



Maximum Platform Capacity
1,000 lb (453.5 kg)

Maximum Platform Capacity
600 lb (272 kg)

65 (19.9) 60 (18.3) 55 (16.8) 50 (15.2) 45 (13.7) 40 (12.2) 35 (10.7) 30 (9.1) 25 (7.6) 20 (6.1) 15 (4.6) 10 (3.0) 5 (1.5) 0 5 (1.5) 10 (3.0)

General Specifications

Aerial Platform

Working height	72' 7" (22.1 m)
All Terrain	72' 11" (22.2 m)
Maximum platform height	66' 7" (20.3 m)
All Terrain	66' 11" (20.4 m)
Horizontal reach	59' 1" (18.0 m)
Main boom	
Articulation	-13.5° to +68°
Extension	28' 8" (8.7 m)
Jib boom	
Articulation	-68.5° to +68.5°
Extension	6' 6" (1.98 m)
Turntable rotation	360° continuous
Turning radius, outside	17' 1" (5.2 m)
All Terrain	27' 6" (8.38 m)
Turning radius, inside	10' 1" (3.1 m)
All Terrain	19' 6" (5.94 m)
Tail swing	3' 11" (1.2 m)
Wheelbase	8' 2" (2.5 m)
Ground clearance	13.5" (34 cm)
All Terrain	17.5" (44.45 cm)
Maximum wheel load	13,820 lb (6,282 kg)
All Terrain	14,500 lb (6,591 kg)
Maximum ground bearing pressure	
All Terrain	146 psi (10.21 kg/cm ²)
All Terrain	20 psi (1.41 kg/cm ²)
Maximum distributed floor load	436 psf (2,127 kg/m ²)
All Terrain	40 psi (195 kg/cm ²)
Tread contact patch	94.75 in ² (611 cm ²)
All Terrain	720 in ² (4645 cm ²)
Level sensor setting – ANSI/CSA	5 degrees
Level sensor setting – CE/AS/NZS	
Dual capacity	5 degrees
Single capacity	3.5 degrees
Level sensor setting	
Welder mounted at front of turntable	3.5 degrees
Weight, EVW approximate	27,300 lbs (12,409 kg)
All Terrain	28,770 lb (13,077 kg)
Maximum allowable manual force (side pull)	
Per occupant	45 lb (200 N)
Maximum allowable manual force (side pull)	
Two occupants total	90 lb (400 N)
Width	
Overall width	8' 2" (2.5 m)
Transport width – wheels flipped	7' 4" (2.2 m)
Stowed length	
Overall length	34' 2" (10.4 m)
Transport length	28' (8.5 m)
Stowed height	8' 3" (2.5 m)
All Terrain	8' 7" (2.61 m)
Transport height	10' 1" (3.1 m)
All Terrain	10' 5.5" (3.18 m)

Platform

Dimensions	
Standard	39" x 96" (1 m x 2.4 m)
Rated work load, standard unrestricted	600 lb (272 kg)
Rated work load, restricted	1,000 lb (453.5 kg)
Rotation	180 degrees

Maximum number of occupants

Indoors	2 people
Outdoors	2 people
Optional AC generator	110 V
Optional AC generator	220 V
Optional AC generator	208 V, 3-phase, 7.5 kw
Optional AC generator	208 V, 3-phase, 10 kw
Optional AC generator	208-230 V, 3-phase, 20 kw

Function Speed

Turntable rotation	
Booms retracted – ANSI	85 to 95 seconds
Booms retracted – CE/AS/NZS	165 to 175 seconds
Main boom	
Raise – ANSI	32 to 38 seconds
Raise – CE/AS/NZS	50 to 55 seconds
Lower – ANSI	32 to 38 seconds
Lower – CE/AS/NZS	50 to 55 seconds
Raise/lower – ANSI	64 to 76 seconds
Raise/lower – CE/AS/NZS	100 to 110 seconds
Extend	30 to 40 seconds
Retract	30 to 40 seconds
Jib boom	
Up	12 seconds minimum
Down	12 seconds minimum
Platform rotation	8 to 15 seconds
Platform leveling	
Raise – ANSI	12 to 22 seconds
Raise – CE/AS/NZS	12 to 22 seconds
Lower – ANSI	12 to 22 seconds
Lower – CE/AS/NZS	12 to 22 seconds
Drive	
High, boom down/retracted	
Forward	3.5 mph (5.6 km/h)
Reverse	3.5 mph (5.6 km/h)
Low, boom up/extended	
Forward	0.75 mph (1.2 km/h)
Reverse – ANSI	0.75 mph (1.2 km/h)
Reverse – CE/AS/NZS	0.6 mph (1.0 km/h)

Drive System

Standard	4WD
Gradeability	45%
Axle	front oscillating
Vertical wheel travel	9" (22.8 cm)
Maximum drive height	66' 7" (20.3 m)
All Terrain	66' 11" (20.4 m)

Tires

Foam filled	355/55 D625, 14 ply
Mass	428.36 lbf (194.30 kg)
Flotation air filled – non-directional	18-625/16PR
Minimum weight with wheel	150 lb (68.2 kg)

Tracks – All Terrain

Independent rubber	18" wide x 150" long
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Electrical System

Voltage	12 V DC negative chassis ground
Source	Two - 12 V 1000 CCA battery
Fluid recommended	distilled water

Hydraulic System

Pressure	
Drive circuit maximum	5,000 psi (34,474 kPa)
Boom circuit maximum	2,800 psi (19,305 kPa)
Reservoir capacity	33.5 US gal (127 l)
System capacity	47.5 US gal (180 l)
Maximum operating temperature	180°F (82°C)
Hydraulic fluid recommended	
Above -12°C (10°F)	ISO VG32
Below -12°C (10°F)	ISO VG15

Engine

Diesel	Cummins QSF
Output	65 hp (48.4kW)
Diesel	Deutz TCD 2.9 L4
Output	75 hp (55.9kW)
Diesel	Kubota V2403-T
Output	48 hp (35.7kW)
Gas/LP dual fuel	Kubota WG2503-GL
Output	61 hp (45.5kW)

Fuel Tank Capacity

Gasoline or Diesel	35 US gal (132 l)
LPG	43.5 lbs (19.7 kg)

Maximum Manual Force

Per occupant	45 lb (200 N)
Two occupants	90 lb (400 N)

Maximum Wind Speed

Gust or steady	28 mph (12.5 m/s)
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Ambient Air Temperature Operating Range

Fahrenheit	0°F to 110°F
Celsius	-18°C to 43°C

Vibration

Hand/arm	less than 2.5 m/sec ²
Body	less than 0.5 m/sec ²

Sound Pressure Level

At work station	below 95 dB(A)
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Sound Power Level

97.5 dB LWAd

Group Classification

Heavy Duty – intended life	100,000 load cycles
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Engine Specifications

Engine	Displacement	Output	Fuel Grade	Coolant	Oil Capacity	Oil Grade
Cummins QSF	171 cu. in. (2.8 liter)	65 hp (48 kW)	Diesel Fuel No. 2-D ASTM D975 ¹	50% water 50% Antifreeze ²	9 qt (8.5 liter)	CES-2008 ¹³ API1 CJ-4 ³ ACEA E9 ³ JAMA DH-2 ³
Deutz TCD 2.9 L4	177 cu. in. (2.9 liter)	75 hp (55.4kw)	Diesel Fuel No. 2-D ASTM D975 ¹	ASTM D6210 (TMCRP 329) ASTM D6211 (TMCRP 330) Heavy Duty Coolant Only ²	9.4 qt (8.9 liter)	API1 CJ-4 ³ ACEA E9 ³
Kubota V2403-T	148.5 cu. in. (2.43 liter)	48 hp (35.7kw)	Diesel Fuel No. 2-D ASTM D975 ¹	50% water 50% Antifreeze ²	2.5 gal (9.5 liter)	API: CF or higher ³
Dual Fuel Kubota WG2503-GL	93.79 cu. in. (1.537 liter)	61 hp (45.5kw)	Gas Unleaded gasoline LPG Commercial LPG	50% water 50% Antifreeze ²	1.59 gal (6 liter)	API: SL or higher ³

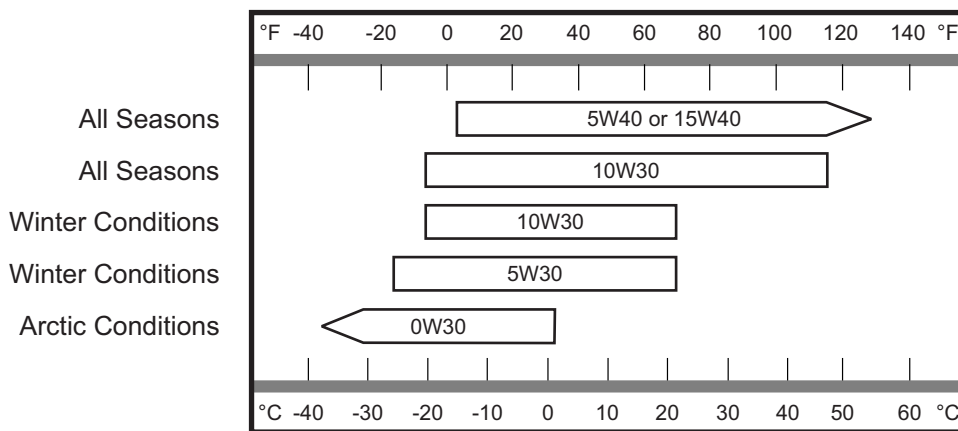
Note 1: Refer to the engine manufacturer's manual for specific fuel recommendations and specifications.

Note 2: Refer to the engine manufacturer's manual for specific coolant recommendations and specifications.

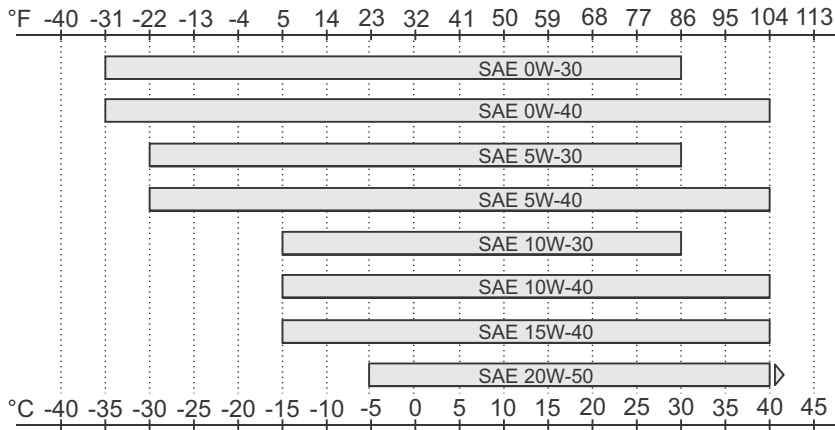
Note 3: Refer to the engine manufacturer's manual for specific lubricating oil recommendations and specifications.

Engine Oil Viscosity

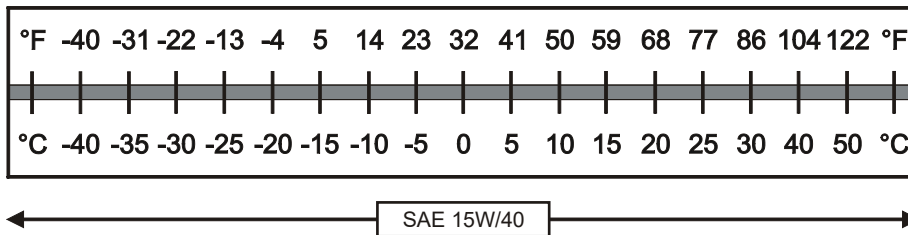
Cummins QSF2.8



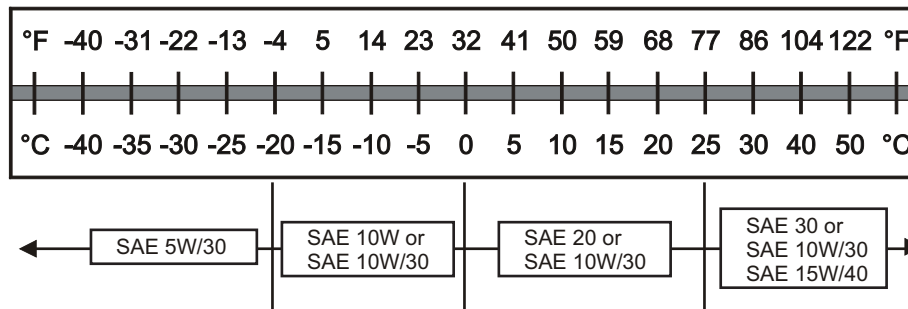
Deutz TCD 2.9 L4



Kubota V2403-T



Kubota WG2503-GL



Chapter 3 – Safety

Knowledge of the information in this manual, and proper training, provide a basis for safely operating the aerial platform. Know the location of all controls and how they operate to act quickly and responsibly in an emergency.

Safety devices reduce the likelihood of an accident.

- Never disable, modify, or ignore any safety device.
- Safety alerts in this manual indicate situations where accidents may occur.

If any malfunction, hazard or potentially unsafe condition relating to capacity, intended use, or safe operation is suspected, stop aerial platform operation and seek assistance.

The operator bears ultimate responsibility for following all manufacturer's instructions and warnings, regulations and safety rules of their employer and/or any state or federal law.

Electrocution Hazards

The aerial platform is made of metal components and is not insulated. Regard all conductors as energized. Do not operate outside during a thunderstorm.

Minimum Safe Approach Distance – ANSI

Minimum safe approach distances to energized power lines and their associated parts must be observed while operating the aerial platform.

▲Danger

The aerial platform is not electrically insulated. Death or serious injury will result from contact with, or inadequate clearance from, an energized conductor. Do not go closer than the minimum safe approach distance as defined by ANSI.

ANSI publications define minimum distances that must be observed when working near bus bars and energized power lines. Table 1 and Figure 3 are reprinted courtesy of Scaffold Industry Association, ANSI/SIA A92.5.

Voltage Range (Phase to Phase)	Minimum Safe Approach Distance	
	Feet	Meters
0 to 300V	Avoid Contact	
Over 300V to 50kV	10	3.05
Over 50kV to 200kV	15	4.60
Over 200kV to 350kV	20	6.10
Over 350kV to 500kV	25	7.62
Over 500kV to 750kV	35	10.67
Over 750kV to 1000kV	45	13.72

Table 1 – Minimum Safe Approach Distance

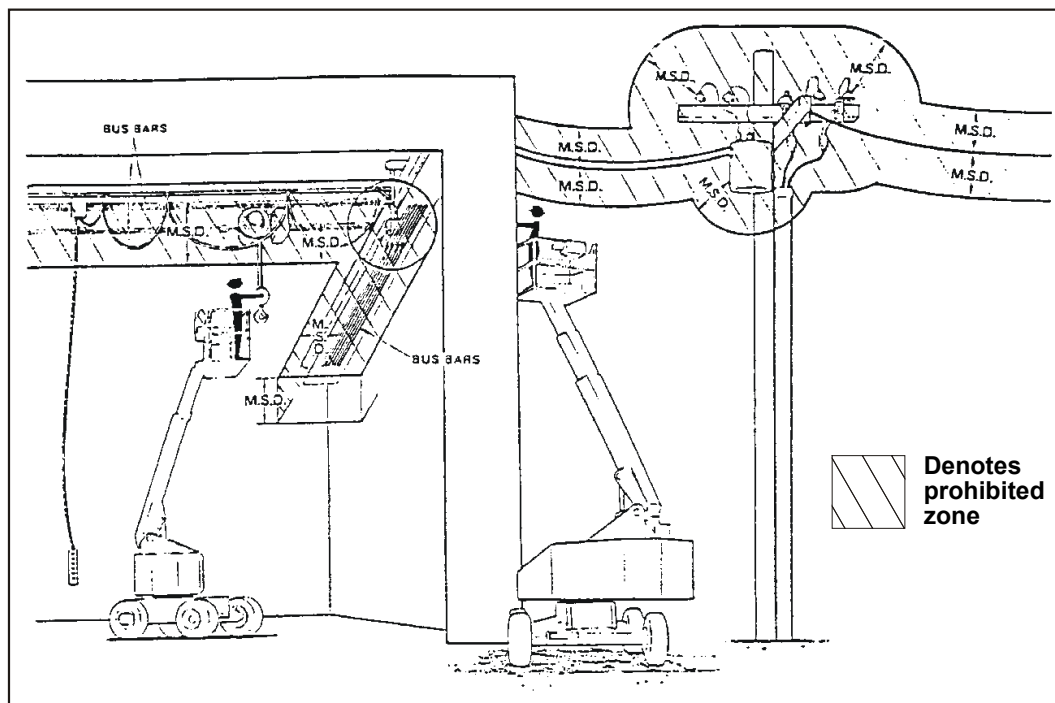


Figure 3 – Minimum Safe Approach Distance

Minimum Safe Approach Distance – AS/NZS
 Minimum safe approach distances to energized power lines and their associated parts must be observed while operating the aerial platform.

⚠ Danger

The aerial platform is not electrically insulated. Death or serious injury will result from contact with, or inadequate clearance from, an energized conductor. Do not go closer than the minimum safe approach distance as defined by national safety regulations.

AS/NZS 2550.10:2006 define minimum distances that must be observed when working near overhead power lines on poles and overhead power lines on towers. Refer to the clearance requirements decals on the machine to determine safe approach distances (refer to Figure 1).

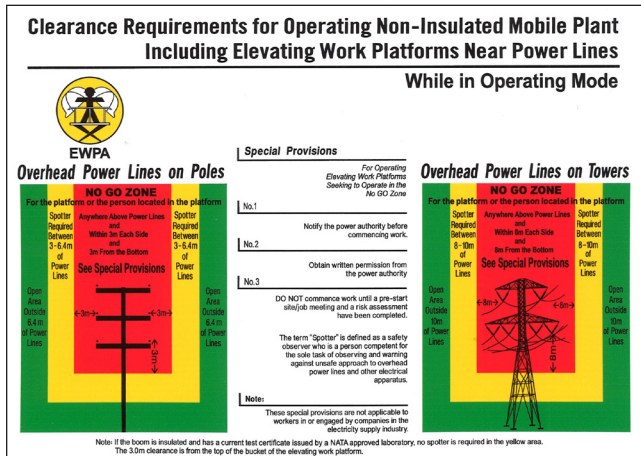


Figure 1 – Minimum Safe Approach Distance

Platform Capacity

Two people and their work materials may occupy the platform.

⚠ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not exceed the capacity values indicated on the machine decals, placards, and in the machine specifications in this manual.

The maximum unrestricted rated load capacity and the maximum number of occupants for the aerial platform are stated on machine decals, placards, and in the machine specifications in this manual.

Manual Force

Manual force is the force applied by the occupants to objects such as walls or other structures outside the work platform.

⚠ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not exceed the maximum allowable manual force indicated on the machine decals, placards, and in the machine specifications in this manual.

The maximum allowable manual force is limited to 45 lbs (200 N) of force per occupant, with a maximum of 90 lbs (400 N) for two occupants.

Wind Speeds

Do not add anything to the aerial platform that will increase the wind loading such as billboards, banners, flags, etc.

⚠ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not operate the machine in wind speeds of 28 mph (12.5 m/s) or greater.

Do not operate the aerial platform in windy conditions with wind gusts or steady wind speeds of 28 mph (12.5 m/s) or greater. Refer to Figure 2.

Prestart Inspection

Perform a prestart inspection before each shift as described in Chapter 7. Do not use the aerial platform on the job unless you are trained and authorized to do so.

Work Place Inspection and Practices

Do not use the aerial platform as a ground connection when welding.

- The welding ground clamp must be attached to the same structure that is being welded.

BEAUFORT RATING	WIND SPEED				GROUND CONDITIONS
	m/s	km/h	ft/s	mph	
3	3,4~5,4	12,25~19,4	11.5~17.75	7.5~12.0	Papers and thin branches move, flags wave.
4	5,4~8,0	19,4~28,8	17.75~26.25	12.0~18	Dust is raised, paper whirls up, and small branches sway.
5	8,0~10,8	28,8~38,9	26.25~35.5	18~24.25	Shrubs with leaves start swaying. Wave crests are apparent in ponds or swamps.
6	10,8~13,9	38,9~50,0	35.5~45.5	24.5~31	Tree branches move. Power lines whistle. It is difficult to open an umbrella.
7	13,9~17,2	50,0~61,9	45.5~56.5	31.~38.5	Whole trees sway. It is difficult to walk against the wind.

Figure 2 – Beaufort Scale

- Electrical current flow can be very intense, causing serious internal damage to some components.

Inspect the area before and during aerial platform use. The following are some potential hazards that may be in the work place:

- Debris
- Slopes
- Drop-offs or holes
- Bumps and floor obstructions
- Overhead obstructions
- Unauthorized persons
- High voltage conductors
- Wind and weather conditions
- Inadequate surface and support to withstand load forces applied by the aerial platform in all operating configurations

Before using the aerial platform in any hazardous (classified) location, make certain it is approved and of the type required by ANSI/NFPA 505 for use in that particular location.

Know and understand the job site traffic-flow patterns and obey the flagmen, road signs, and signals.

While operating the aerial platform, a good safety practice is to have qualified personnel in the immediate work area to:

- Help in case of an emergency
- Operate emergency controls as required
- Watch for loss of control by platform operator
- Warn the operator of any obstructions or hazards that may not be obvious to them
- Watch for soft terrain, sloping surfaces, drop-offs, etc. where stability could be jeopardized
- Watch for bystanders and never allow anyone to be under, or to reach through the booms while operating the aerial platform

Danger

Pinch points may exist between moving components. Death or serious injury will result from becoming trapped between components, buildings, structures, or other obstacles. Make sure there is sufficient clearance around the machine before moving the chassis, booms, or platform. Allow sufficient room and time to stop movement to avoid contact with structures or other hazards.

Always look in the direction of movement.

- Drive with care and at speeds compatible with the work place conditions.
- Use caution when driving over rough ground, on slopes, and when turning.
- Do not engage in any form of horseplay or permit riders any place other than in the platform.

Secure all accessories, containers, tools, and other materials in the platform to prevent them from accidentally falling or being kicked off the platform. Remove all objects that do not belong in or on the aerial platform.

Never steady the platform by positioning it against another platform.

Warning

The potential for an accident increases when operating an aerial platform that is damaged or malfunctioning. Death or serious injury could result from such accidents. Do not operate the aerial platform if it is damaged or malfunctioning.

Do not operate the aerial platform if it is damaged or not functioning properly. Qualified maintenance personnel must correct the problem before putting the aerial platform back into service.

Operation

Use three points of support when entering or exiting the platform. For example, use two hands and one foot when climbing into the platform.

Never cover the platform floor grating or otherwise obstruct your view below. Make sure the area below the platform is free of personnel before lowering.

Keep both feet positioned firmly on the platform floor.

- Operate the controls slowly and deliberately to avoid jerky and erratic operation.
- Always stop the controls in neutral before going in the opposite direction.

Do not dismount while the aerial platform is in motion or jump off the platform.

Properly stow the aerial platform and secure it against unauthorized operation at the end of each work day, before transporting, or if it is left unattended.

Tip-Over and Falling Hazards

Operate the aerial platform only on a firm, flat, level surface capable of withstanding all load forces imposed by the aerial platform in all operating conditions. Refer to the General Specifications chart for the maximum wheel load and ground pressure. Raise the booms only when the aerial platform is on level ground.

Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not drive or position the aerial platform for elevated use near any drop-off, hole, slope, soft or uneven ground, or other tip-over hazard.

All platform occupants must wear a fall restraint or fall arrest device connected to a fall protection anchor as required by national or local regulations and standards.

It is best not to transfer from the platform to another structure or from the structure to the platform, unless that is the safest way to do the job. Judge each situation separately taking the work environment into account. If it is necessary to transfer from the platform to another structure the following guidelines apply:

1. Where possible, place the platform over a roof or walking structure to do the transfer.
2. Transfer your anchorage from one structure to the other before stepping across.
3. Remember that you might be transferring to a structure where *personal fall arrest* is required.
4. Use the platform entrance, do not climb over or through the guardrails.

Never operate the aerial platform without all parts of the guardrail system in place and the gates closed. Make sure that all protective guards, cowlings, and doors are securely fastened.

Do not exceed the platform capacity as indicated on the platform rating placard on the platform. Do not carry loads that extend beyond the platform guardrails without prior written consent from Snorkel.

Do not operate the aerial platform from trucks, trailers, railway cars, floating vessels, scaffolds, or similar equipment unless the application is approved in writing by Snorkel.

Do not use the aerial platform as a crane, hoist, jack, or for any purpose other than to position personnel, tools, and materials.

Do not climb on the guardrails or use ladders, planks, or other devices to extend or increase the work position from the platform.

Take care to prevent rope, electrical cords, and hoses, etc., from becoming caught in or on the aerial platform.

- If the platform or booms becomes caught on an adjacent structure or other obstacle and is prevented from normal motion, reverse the control to free the platform.
- If control reversal does not free the platform, evacuate the platform before attempting to free it.

Electrical System

Charge the batteries in a well-ventilated area free of flame, sparks, or other hazards that might cause fire or explosion.

Do not operate any of the aerial platform functions while the battery charger is plugged in.

Warning

Batteries give off hydrogen and oxygen that can combine explosively. Death or serious injury could result from a chemical explosion. Do not smoke or permit open flames or sparks when checking the batteries.

Battery acid can damage the skin and eyes. Serious infection or reaction could result if medical treatment is not given immediately. Wear face and eye protection when working near the batteries. Thoroughly rinse away any spilled fluid with clean water.

- Batteries contain sulfuric acid that could damage your eyes or skin on contact.
- Wear a face shield, rubber gloves, and protective clothing when working around batteries.
- If acid contacts your eyes, flush immediately with clear water and get medical attention.
- If acid contacts your skin, wash off immediately with clear water.

Hydraulic System

The hydraulic system contains hoses with hydraulic fluid under pressure.

Danger

Hydraulic fluid escaping under pressure can have enough force to inject fluid into the flesh. Serious infection or reaction will result if medical treatment is not given immediately. In case of injury by escaping hydraulic fluid, seek medical attention at once.

Do not place your hand or any part of your body in front of escaping hydraulic fluid. Use a piece of cardboard or wood to search for hydraulic leaks.

Engine and Fuel Handling Precautions

Refer to the engine manufacturer's Operator's Manual for complete information on safe engine operation, maintenance, and specifications.

Danger

Engine exhaust contains carbon monoxide, a poisonous gas that is invisible and odorless. Breathing engine exhaust fumes will cause death or serious illness. Do not run the engine in an enclosed area or indoors without adequate ventilation.

Operate dual fuel machines on LPG fuel when indoors to reduce exhaust fumes and carbon monoxide.

Be careful not to run the diesel fuel tank empty. Bleed the fuel system if air enters the lines between the tank and the injection pump.

Allow the engine to return to idle before shutting the engine off.

Do not smoke or permit open flames while fueling or near fueling operations.

Never remove the fuel cap or fill the fuel tank while the engine is running or hot. Never allow fuel to spill on hot machine components.

Maintain control of the fuel filler nozzle when filling the tank. Spilled fuel is a potential fire hazard.

Do not overfill the fuel tank. Allow room for expansion.

Clean up spilled fuel immediately.

Tighten the fuel tank cap securely. If the fuel cap is lost, replace it with an approved cap from Snorkel. Use of a non-approved cap without proper venting may result in pressurization of the tank.

Never use fuel for cleaning purposes.

For diesel engines, use the correct fuel grade for the operating season.

Caution

Engine coolant escaping under pressure may cause serious burns. Shut the engine off and let it cool before removing the radiator cap.

Let the engine and radiator cool before adding coolant.

Placards and Decals

The aerial platform is equipped with placards and decals that provide instruction for operation and accident prevention. Do not operate the aerial platform if any placards or decals are missing or not legible.

General Safety Rules

This aerial work platform is intended to lift persons, their tools and materials used for the job. It is designed for repair, assembly, and assignments at workplaces above head height (ceilings, cranes, roof structures, buildings, etc.). Uses or alterations to the aerial work platform must be approved by Snorkel.

This aerial work platform is not insulated. Refer to applicable national/governmental/local regulations for safe approach distances.

Exceeding the specified permissible maximum load is prohibited.

The use and operation of the aerial work platform as a lifting tool or a crane is prohibited.

Never exceed the manual force allowed for this machine.

Distribute all platform loads evenly on the platform.

Never operate the machine without first surveying the work area for stationary or moving obstacles and surface hazards such as holes, drop-offs, bumps, curbs, or debris; and avoiding them. Never strike or bump into stationary or moving obstacles while driving or raising and lowering the platform.

Use three points of support when entering or exiting the platform. For example, use two hands and one foot when climbing into the platform.

Platform passengers should watch their hands and fingers for pinch points while holding on the guardrails while the platform is moving.

Operate machine only on surfaces capable of supporting wheel loads.

Never operate the machine when wind speeds exceed the machine's wind rating.

Do not operate the aerial platform in windy or gusty conditions. Do not add anything to the aerial platform that will increase the wind loading such as billboards, banners, flags, etc.

In case of an emergency, push the emergency stop button to deactivate all powered functions.

If an alarm sounds while the platform is elevated, stop and carefully lower platform. Move the machine to a firm, level surface.

Climbing up the railing of the platform, standing on or stepping from the platform onto buildings, steel or prefab concrete structures, etc., is prohibited. Never exit or enter the platform when it is elevated.

For AS/NZS operators, no person shall access or egress from the platform in the elevated position (except in an emergency) unless the requirements of AS2550.10 have been met. For full requirements refer directly to AS2550.10

Dismantling the entry gate or other railing components is prohibited. Always make certain that the entry gate is closed.

It is prohibited to keep the entry gate in an open position when the platform is raised.

To extend the height or the range by placing of ladders, scaffolds or similar devices on the platform is prohibited.

Never perform service on machine while the platform is elevated without blocking booms.

Inspect the machine thoroughly for cracked welds, loose or missing hardware, hydraulic leaks, loose wire connections, and damaged cables or hoses before using.

Verify that all placards and decals are in place and legible before using the machine.

Never use a machine that is damaged, not functioning properly, or has damaged or missing placards and decals.

To bypass any safety equipment is prohibited and presents a danger for the persons on the aerial work platform and in its working range.

Never charge batteries near sparks or open flame. Charging batteries emit explosive hydrogen gas.

Modifications to the aerial work platform are prohibited or permissible only at the approval by Snorkel.

After use, secure the work platform from unauthorized use by turning the keyswitch off and removing key.

Driving MEWP's on public highways is subject to national traffic regulations.

Certain inherent risks remain in the operation of this machine despite utilizing proper design practices and safeguarding.

Fall protection anchors are provided in the platform and the manufacturer recommends the usage of a fall restraint or fall arrest device as required by national or local regulations and standards.

Care must be taken to ensure that the machines meets the requirements of stability during use, transportation, assembly, dismantling when out of service, testing, or foreseeable breakdowns.

In the event of an accident or breakdown see Chapter 10 – Emergency Operation. Do not operate the aerial platform if it is damaged or not functioning properly. Qualified maintenance personnel must correct the problem before putting the aerial platform back into service.

Chapter 4 – Safety Devices

This aerial work platform is manufactured with safety devices, placards, and decals to reduce the likelihood of an accident.

- For the safety of all personnel, do not disable, modify, or ignore any safety device.
- Safety devices are included in the daily prestart inspection.

Warning

The potential for an accident increases when safety devices do not function properly. Death or serious injury could result from such accidents. Do not alter, disable, or override any safety device.

If any safety devices are defective, remove the aerial platform from service until qualified maintenance personnel can make repairs.

Emergency Stop Controls

There is an emergency stop control at the lower and upper controls.

At the lower controls, the emergency stop is a two-position push button (refer to Figure 4.1 and 4.2).

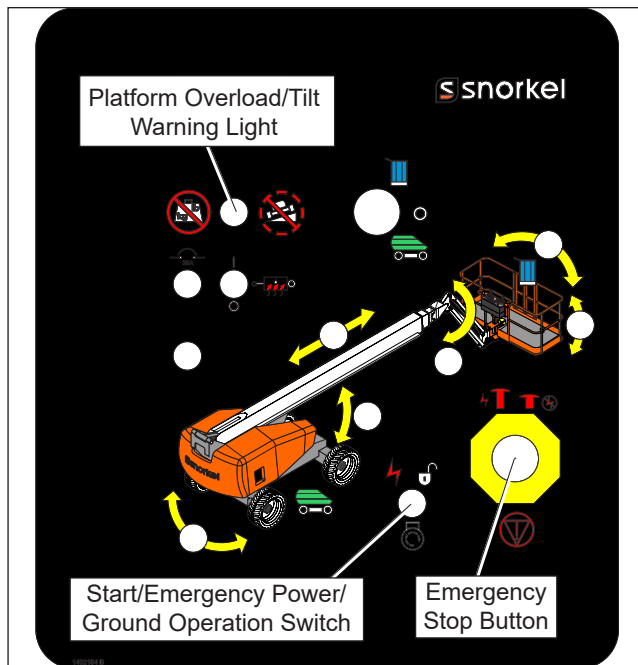


Figure 4.1 – Lower Controls Cummins

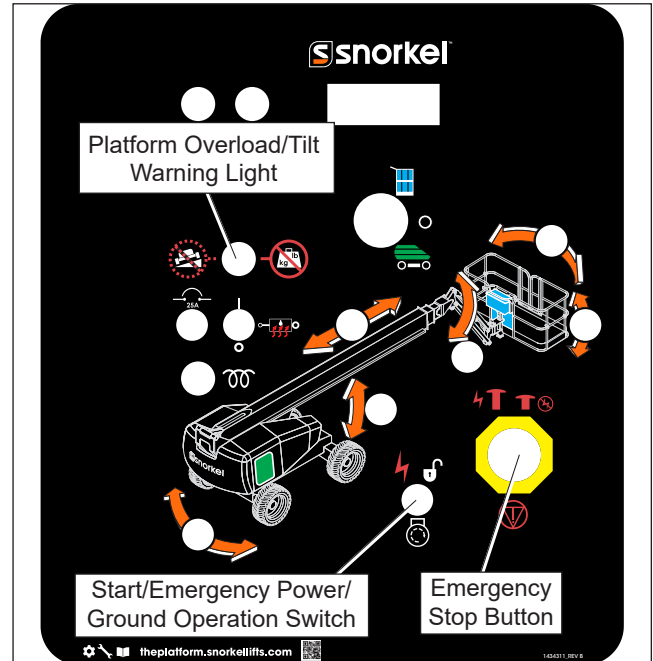


Figure 4.2 – Lower Controls Deutz/Kubota

- Push the emergency stop button inward to disconnect power to all control circuits.
- Pull the button outward to restore power.

Note

The lower controls override the upper controls. If the upper control emergency stop button is engaged, the lower controls can still be used to operate the aerial platform.

At the upper controls, the emergency stop is a two-position push button (refer to Figure 4.3).

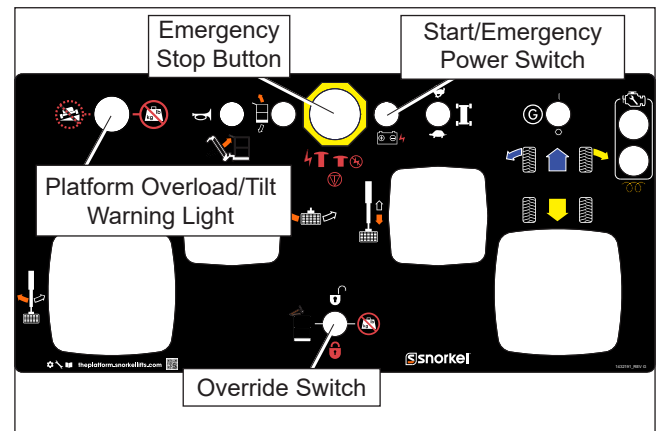


Figure 4.3 – Upper Controls

- Push the emergency stop button inward to disconnect power to the upper control circuits.
- Pull the button outward to restore power.

Emergency Power System

The emergency power system includes a back-up pump, motor, and batteries. Use this system to operate the boom and turntable functions to lower the platform if the main power system fails due to engine or pump failure.

⚠ Caution

The emergency power system is for emergency lowering and stowing only. The length of time the pump can be operated depends on the capacity of the batteries. Do not use this system for normal operation.

- Hold the emergency power switch (refer to Figures 4.1 and 4.2) in the proper position to activate the emergency power system.
- Release the switch to disengage the emergency power system.
- The length of time the pump can be operated depends on the capacity of the batteries.

Emergency Lowering Knob – Single Platform Capacity Machines Only

The emergency lowering knob may be used to lower the booms if the engine will not start and the emergency power system will not work. The knob is on the base end of the main boom lift cylinder and may be accessed from beneath the turntable (refer to Figure 4.4) or behind the engine on the right side of the turntable.



Figure 4.4 – Emergency Lowering Knob

The knob may be turned to open the cylinder bleed down valve for emergency lowering.

Ground Operation Switch

The ground operation switch (refer to Figure 4.1 and 4.2) prevents boom and platform movement if a control switch on the lower control panel is accidentally moved.

Hold the switch up to operate the machine from the lower controls.

Platform Foot Switch

Step down on the platform foot switch (refer to Figure 4.5) to activate the upper controls.

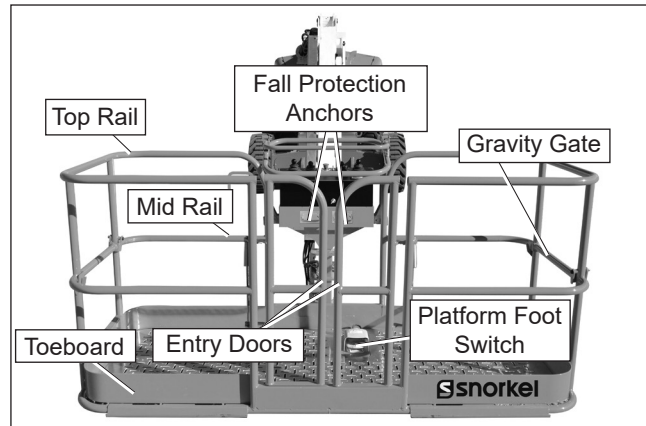


Figure 4.5 – Platform

The foot switch must be engaged and a control must be moved to operate the boom, drive, and/or platform from the upper controls.

Guardrails

The guardrails (refer to Figure 4.5) help protect personnel from falling off the platform.

The guardrail system includes:

- A top rail
- A mid rail
- Saloon entry doors (rear) and two gravity gates (left and right side)
- Toeboards around the sides of the platform.

The gates close automatically after entering or exiting the platform. After entering the platform check to make sure the gates are fully closed.

Fall Protection Anchors

Two anchors for fall protection anchorage are provided below the upper controls at the front of the platform (refer to Figure 4.5).

Note

The fall protection anchors are not for lifting or tying the machine down.

- All personnel in the platform must connect their fall protection device to a fall protection anchor before raising the platform.
- Attach only one fall protection device to each anchor.

Ground Fault Circuit Interrupter

The electrical power outlets at the platform (refer to Figure 4.6) may contain a ground fault circuit interrupter (GFCI) to provide protection for personnel.

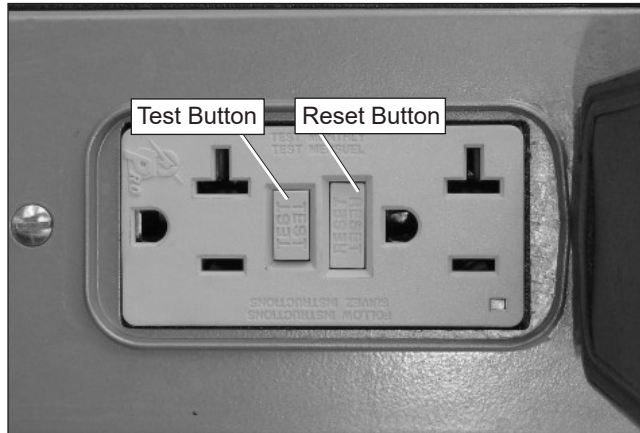


Figure 4.6 – Electrical Power Outlet

Platform Overload Sensing System

All functions are stopped from the upper and lower controls, when the platform overload limit is exceeded. The horn will sound intermittently and the platform overload light (refer to Figure 4.1, 4.2 and 4.3) will blink until the excess load is removed from the platform. At that time, the machine functions are again operational.

If the platform becomes significantly overloaded, or if an upward force on the platform is near rated platform capacity, the system will enter into error mode, stopping all functions from the upper and lower controls. The horn will then sound constantly and the overload light will stay illuminated at the upper and lower controls.

The system will remain in error mode until the excess load is removed from the platform and the emergency stop button or start switch is cycled off and back on, resetting the system. At that time, the machine functions are operational.

⚠Caution

The emergency power system is for emergency lowering and stowing only. The length of time the pump can be operated depends on the capacity of the batteries. Do not use this system for normal operation.

If the platform overload sensing system is tripped while operating the machine or if the system is in error mode and can not be reset, the emergency power system may still be used for emergency machine operation from either the lower or upper controls.

⚠Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not exceed the capacity values indicated on the platform rating placard.

The overload sensing system is not active when the machine is being driven with the booms in the stowed position. This allows the machine to be driven without the system sensing an overload due to rough ground conditions.

To eliminate repeated tripping of the system during machine operation, there is a five second delay in machine functions following:

- starting the engine.
- removing excess load from the platform.

Boom/Drive Cut-out

On machines manufactured after March 2021, boom and drive functions will be cut-out, disabled, when the main boom is elevated or extended from the stowed position and the ground slope exceeds the chassis slope sensor settings. The override switch may be used to stow the machine which then allows all functions to be returned to normal. The emergency power system may be used at this time as well.

When driving the machine unstowed onto a slope, at 4.5 degrees slope drive is paused, an audible two-tone alarm will sound, and the tilt warning light will come on. This warning indicates that the machine may be backed off the slope or stowed without the use of the override switch to do so. If the degree of slope continues to increase to 5 degrees, a constant alarm will sound and boom and drive functions will become disabled requiring the use of the override control to stow the machine.

Tilt Alarm/Warning Lights

If the aerial platform chassis is out of level more than the machine specified slope sensor alarm setting when the main boom is raised or extended:

- the drive function is disabled
- an alarm will sound and the tilt warning light on the lower and upper control panels (refer to Figures 4.1, 4.2 and 4.3) will illuminate.

The tilt alarm is located under the upper control panel.

⚠Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not drive or position the aerial platform for elevated use near any drop-off, hole, slope, soft or uneven ground, or other tip-over hazard.

Completely lower the booms and then drive to a level surface when the tilt alarm sounds.

The tilt alarm and warning lights are for added protection and do not justify operating on anything other than firm, flat, level surfaces.

Engine Protection Systems

A constant tone alarm will sound to warn against high engine temperature or low oil pressure.

The engine will shut-down:

- if the operating temperature exceeds a preset level
- or if the oil pressure is too low for safe operation.

High Engine Temperature Alarm

If the coolant exceeds the engine operating temperature an alarm will sound and the engine will shut off.

Do not restart the engine until the condition that caused the overheating has been corrected.

Low Oil Pressure Alarm

The low oil pressure alarm sounds when the engine oil pressure is near the lower limit for safe engine operation. If the alarm sounds, lower the platform to the ground and then turn the engine off.

- If the engine oil pressure falls below a safe operating value the engine will shut off.
- The engine can be restarted with low oil pressure, but it will only run for a few seconds before it shuts off again.
- Do not restart the engine until the condition that caused the low oil pressure has been corrected.

Horn

The horn may be used to warn personnel on the ground. The horn switch is to the left of the emergency stop button on the upper control panel (refer to Figure 4.7). The horn is operational when the machine is set up for operation from the upper controls.

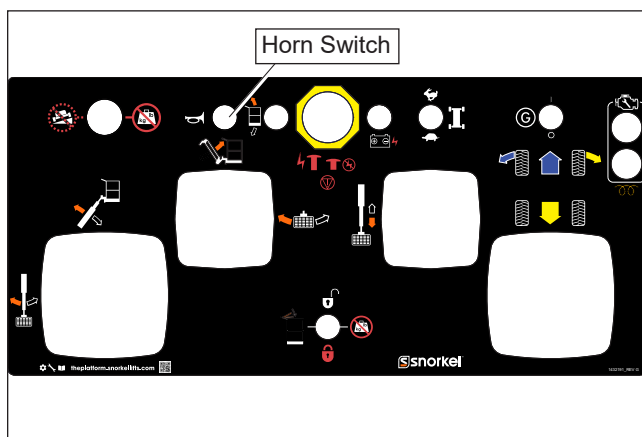


Figure 4.7 – Upper Controls

Drive Motion Alarm

The machine is equipped with a drive motion alarm. When the drive/steer control is moved out of neutral the alarm sounds, in short beeps, to warn personnel in the work area to stand clear.

All Motion Alarm

An optional all motion alarm may be provided on the machine. The alarm sounds, in short beeps, anytime the machine functions are being operated. The alarm is used to warn personnel in the work area to stand clear.

Flashing Lights

There are two amber flashing lights on the machine, one on each side of the main boom mounted on the cowling. The flashing lights warn personnel that the aerial platform is in the area.

The lights flash at approximately one flash per second when the engine is running.

Driving Lights

Optional headlights and blinking tail lights may be installed on the machine. The headlights are located on the top of the front cowling. The tail lights are mounted on the sides of the rear cowling.

Driving lights help improve visibility while driving the aerial platform and help others see it too. Driving lights are not for driving on public roadways.

Platform Work Lights

Optional platform work lights may be located on the top rail of the platform, one on each side of the upper control panel.

Snorkel Guard

The Snorkel Guard (refer to Figure 4.8) is a mechanically activated guarding system which offers an additional level of protection to the operator at the upper controls.

If an operator is involuntarily pushed against the spring-loaded Snorkel Guard rail that is mounted above the upper control panel, the machine functions are disabled.

When the Snorkel Guard is activated:

- the horn sounds.
- the blue light under the upper control panel flashes.
- only main boom down and jib down functions will operate.

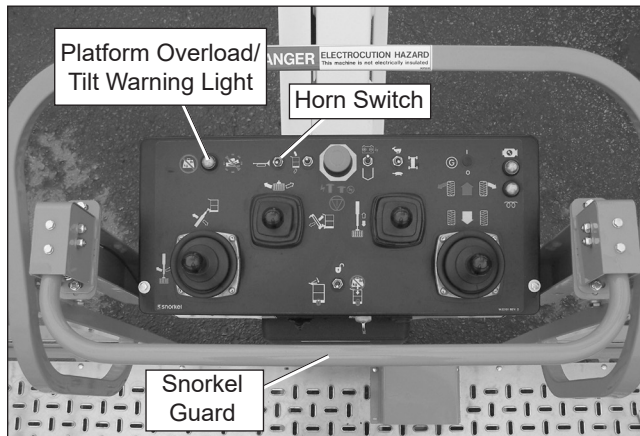


Figure 4.8 – Upper Controls

The lower controls are not affected by the Snorkel Guard activation.

Tire Pressure Monitoring System – Flotation Tires Only

Machines with flotation tires are equipped with a tire pressure monitoring system (TPMS) to monitor each tire's air pressure. Tire inflation has a direct impact on machine stability. If proper tire pressure is not maintained, the TPMS will display a pressure warning light at the lower and upper controls.

Chapter 5 – Gauges and Displays

The aerial platform is equipped with several gauges to monitor the condition of the machine before and during operation.

Diagnostic Center Display

The diagnostic center LCD display (refer to Figure 5.1) is located on the upper right side of the lower control panel.

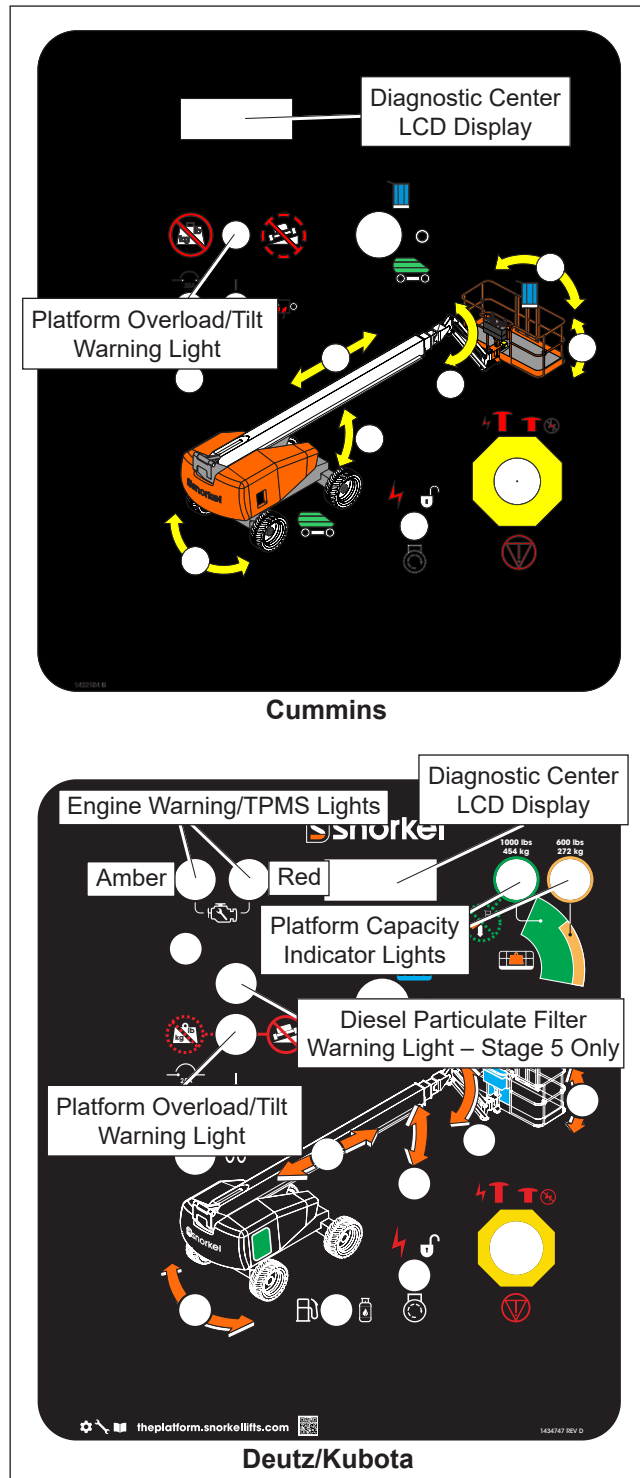


Figure 5.1 – Lower Controls

When the battery disconnect is in the on position and the emergency stop button is enabled at the lower controls, the LCD display shows:

- The accumulated aerial platform operating time.
- “Mode Neutral” is displayed when no functions are being operated. When the machine is operated, the display will indicate the name of that function.

This display is also used by service technicians to troubleshoot and diagnose errors that may occur with the machine operating system.

Platform Overload/Tilt Warning Lights

There is a platform overload/tilt warning light on the lower control panel (refer to Figure 5.1) and on the upper control panel (refer to Figure 5.2).

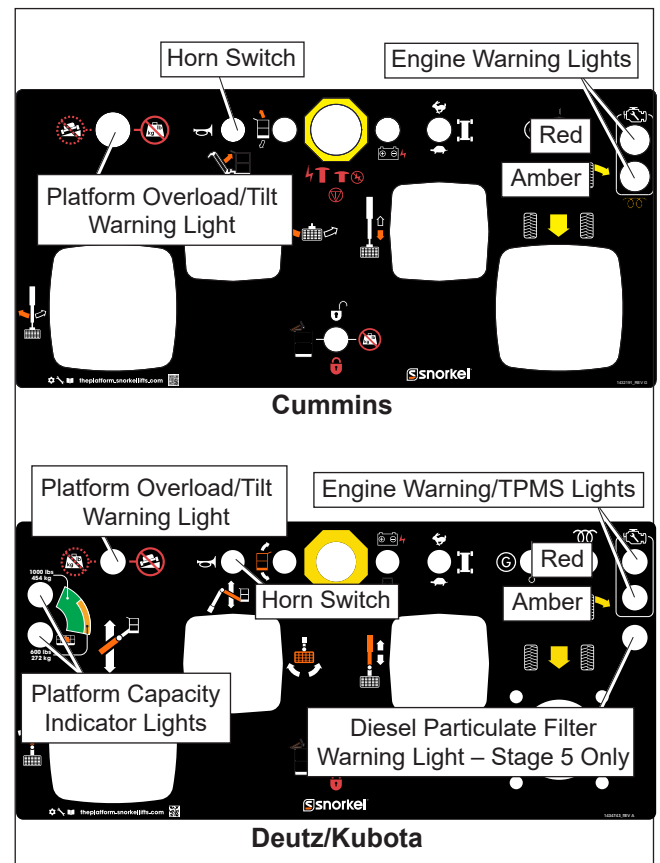


Figure 5.2 – Upper Controls

If the aerial platform chassis is out of level more than the machine specified slope sensor alarm setting when the main boom is raised or extended, an alarm will sound and the tilt warning light on the lower and upper control panels will illuminate.

If the platform is at capacity or if platform capacity is exceeded, the platform overload light on the lower and upper control panels will illuminate.

Dual Platform Capacity System

The optional dual platform capacity system restricts the movement of the platform to keep it within safe work parameters, based on the boom position. The platform capacity will either be 600 lb or 1,000 lb.

The 1,000 lb capacity is active from the boom fully retracted position, to an extend limit that is determined by a boom length limit switch. When the boom is extended beyond the 1,000 lb capacity limit distance, the 600 lb capacity becomes active until the main boom is elevated above a specific boom angle that is determined by boom angle sensors.

There are two indicator lights on the lower and upper control panels (refer to Figure 5.1 and 5.2) that indicate whether the platform is in the 600 lb or 1,000 lb region of the working envelope. Some boom control functions prevent positioning the boom into a restricted position.

Engine Warning Lights

There are two engine warning lights on the lower and upper control panels (refer to Figure 5.1 and 5.2). The warning lights indicate messages to the machine operator as indicated:

- Red – Stop the operation of the machine and engine as quickly as possible to reduce damage to the engine.
- Amber – Warning or check engine. Take the machine to a service center as soon as convenient.

Diesel Particulate Filter Warning Light

Deutz Stage 5 diesel engines use a diesel particulate filter (DPF) system to regulate exhaust emissions. The soot collected in the filter in most instances is burned off during normal engine operation to clean the filter.

A standstill, or manual regeneration to burn off the soot from the filter, is required approximately every 500 engine hours. This time frame may vary based on engine usage. The diesel particulate filter warning light (refer to Figure 5.1 and 5.2) illuminates when a manual regeneration is required.

The warning lights indicate messages to the machine operator as indicated:

- 1 flash every 2 seconds – DPF regeneration is required within the next 50 hours.
- 3 flashes every second – the DPF regeneration is outside of the 50 hour requirement, requiring a service call to reset the system.

Fuel

The fuel gauge is located on top of the diesel or gasoline tank (refer to Figure 5.3). Read the fuel gauge at the line in the clear plastic window. The gauge indicates the fuel tank level in fractions of a full tank.

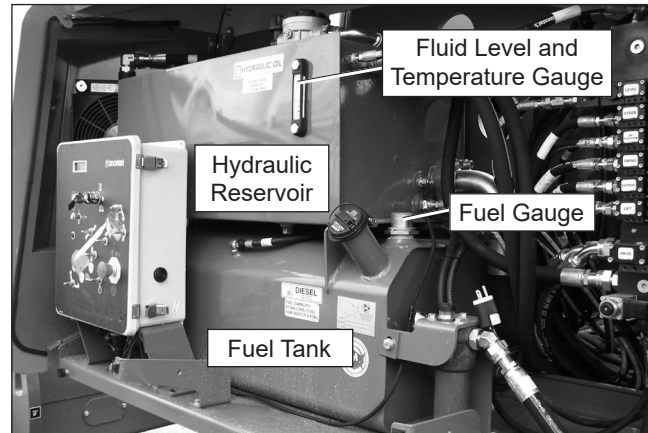


Figure 5.3 – Hydraulic Reservoir and Fuel Tank

Note

Do not run a diesel fuel tank empty. Air in the fuel line makes the engine hard to start.

LPG tanks have a fuel gauge that has two scales. One scale measures the fuel level when the tank is mounted vertical and the other is used when the tank is mounted horizontal (refer to Figure 5.4).

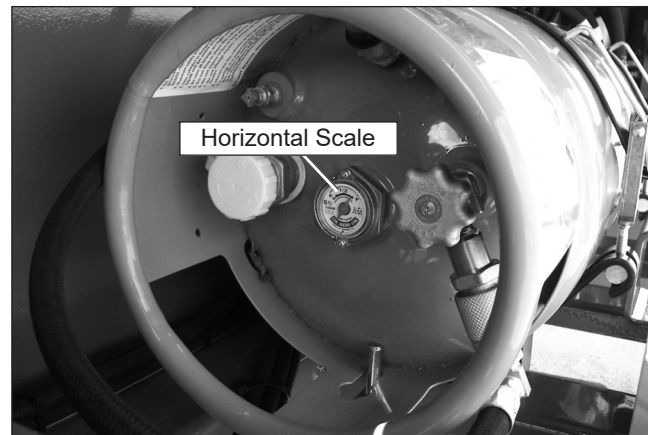


Figure 5.4 – LPG Fuel Tank

The LPG tanks are mounted horizontally on the chassis. Read the horizontal scale to determine the fuel level.

Fluid Level and Temperature Gauge

A sight gauge on the reservoir displays the level and temperature of the hydraulic fluid (refer to Figure 5.3).

Check the fluid level with the aerial platform in the stowed position, booms completely down and retracted. Otherwise, the cylinders act as large reservoirs for hydraulic fluid making the level appear too low. The fluid should be visible in the sight gauge.

If the temperature rises above 180°F (82°C) stop machine operation and let the fluid cool before resuming operation.

Engine Oil

The engine oil level is measured with a dipstick. The dipstick is the only way to accurately determine the engine oil level. The engine oil level should always be between the add and full marks on the dipstick.

Tire Pressure Monitoring System – Flotation Tires Only

There are two tire pressure warning lights on the lower and upper control panels (refer to Figure 5.1 and 5.2). The warning lights indicate messages to the machine operator as indicated:

- **Solid Red** – If any of the tires have pressure of only 75 psi the red warning light will be illuminated and the LCD panel at the lower controls will display **FAULT: TIRE PRES.** Stop the operation of the machine and air-up the tire(s) as required.
- **Solid Amber** – If any of the tires has pressure of only 90 psi the amber warning light will be illuminated and the LCD panel at the lower controls will display **WARN: TIRE PRES.**

Tire pressure should be maintained at 100 psi.

Chapter 6 – Controls

⚠ Danger

Pinch points may exist between moving components. Death or serious injury will result from becoming trapped between components, buildings, structures, or other obstacles. Make sure all personnel stand clear while operating the aerial platform.

- Controls to position the platform are located on the lower control panel on the turntable and on the upper control panel in the platform.
- Controls to drive the aerial platform are located on the upper control panel only.

Battery Disconnect Switch

The battery disconnect is located behind the cowling door on the right side of the turntable (refer to Figure 6.1).

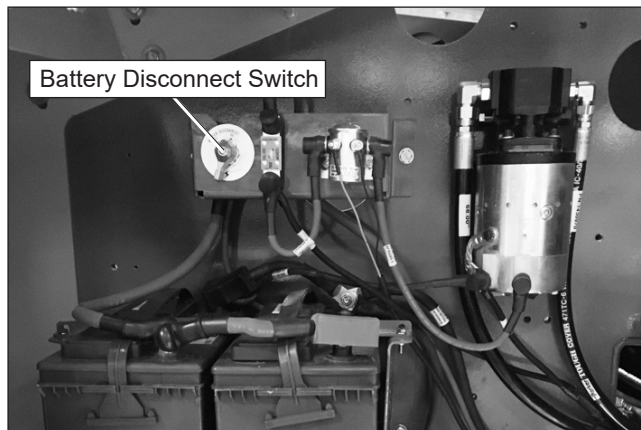


Figure 6.1 – Battery Disconnect Switch

The battery disconnect removes electrical power from all electrically controlled functions when in the off position.

- Place the switch in the on position to electrically connect the batteries to the electrical system.

⚠ Caution

Only authorized personnel should operate the aerial platform. Unqualified personnel may cause injury to coworkers or property damage. Lock the battery disconnect switch in the off position before leaving the aerial platform unattended.

- Place the switch in the off position to prevent unauthorized use of the aerial platform. If so equipped, lock the battery disconnect switch in the off position.

Lower Controls

The lower controls (refer to Figure 6.2) are located on the left side of the turntable. Boom and platform functions can be operated from the lower controls. The following are located on the lower control panel:

- Start/emergency power/ground operation switch
- Emergency stop button
- Controls selector switch
- Rotation switch
- Boom elevation switch
- Boom extension switch
- Jib articulation switch
- Platform level switch
- Platform rotation switch
- Platform overload/tilt warning light
- Diesel particulate filter switch – Deutz Stage 5 only
- Fuel switch (dual fuel machines)
- Hydraulic system warm-up switch (option)

Start/Emergency Power/Ground Operation Switch

This switch (refer to Figure 6.2) is used to operate three machine functions. Engine start, activation of the emergency power system, and enable of the machine functions from the lower controls are all controlled with this switch.

Engine Start

The start switch (refer to Figure 6.2) function works like an automobile ignition switch.

An alarm sounds when the switch is turned on to warn others that the machine engine is being started.

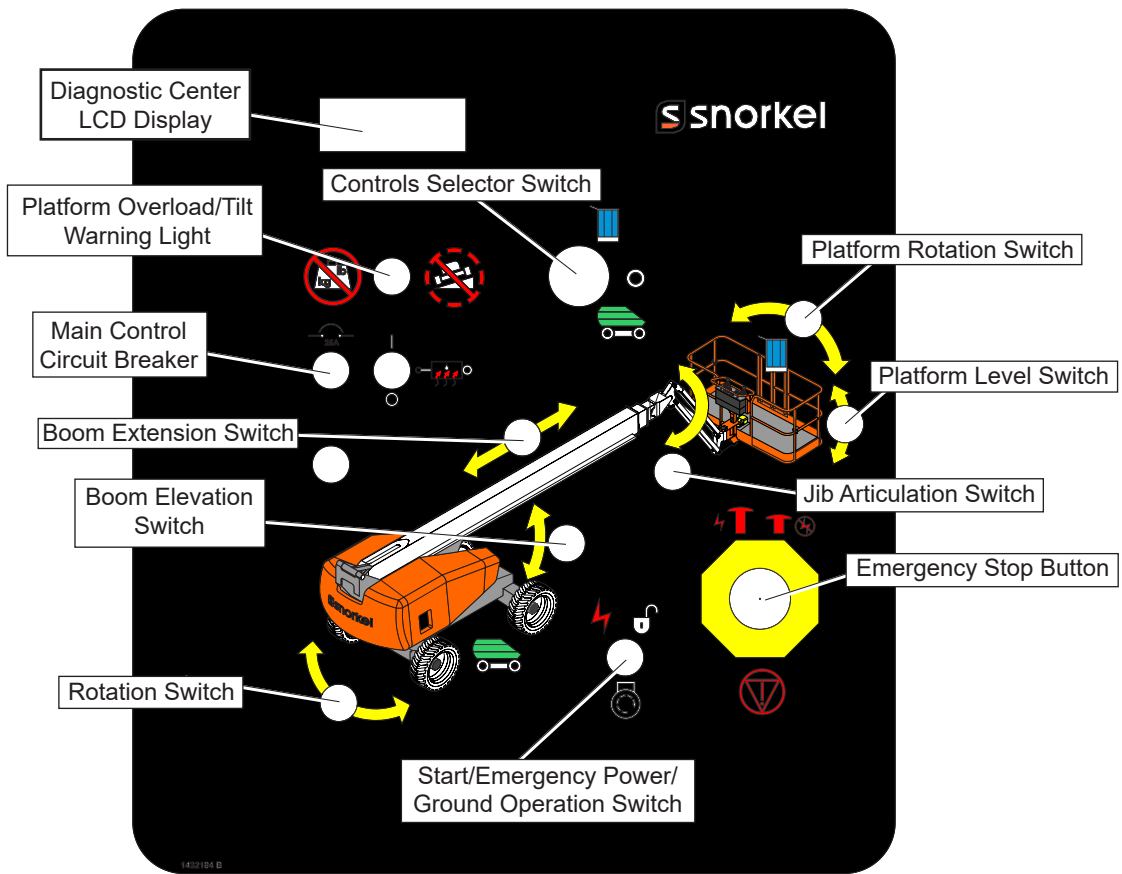
- Before starting the engine, check the Diagnostic Center LCD display window. WAIT TO START will be displayed if the engine is cold and the engine heater is on. The message may appear for 1 to 12 seconds, depending on the engine and ambient air temperature.
- Do not start the engine until the wait message is no longer displayed.
- If the engine turns over but does not start while the WAIT TO START message is displayed, turn the control selector switch to the middle/off position and back to the lower controls position. Do not start the engine until the wait message is no longer displayed.
- Hold the switch downward until the engine starts, then release it to on.
- If the engine dies, the controls switch must be turned to off before the engine can be restarted.

Emergency Power

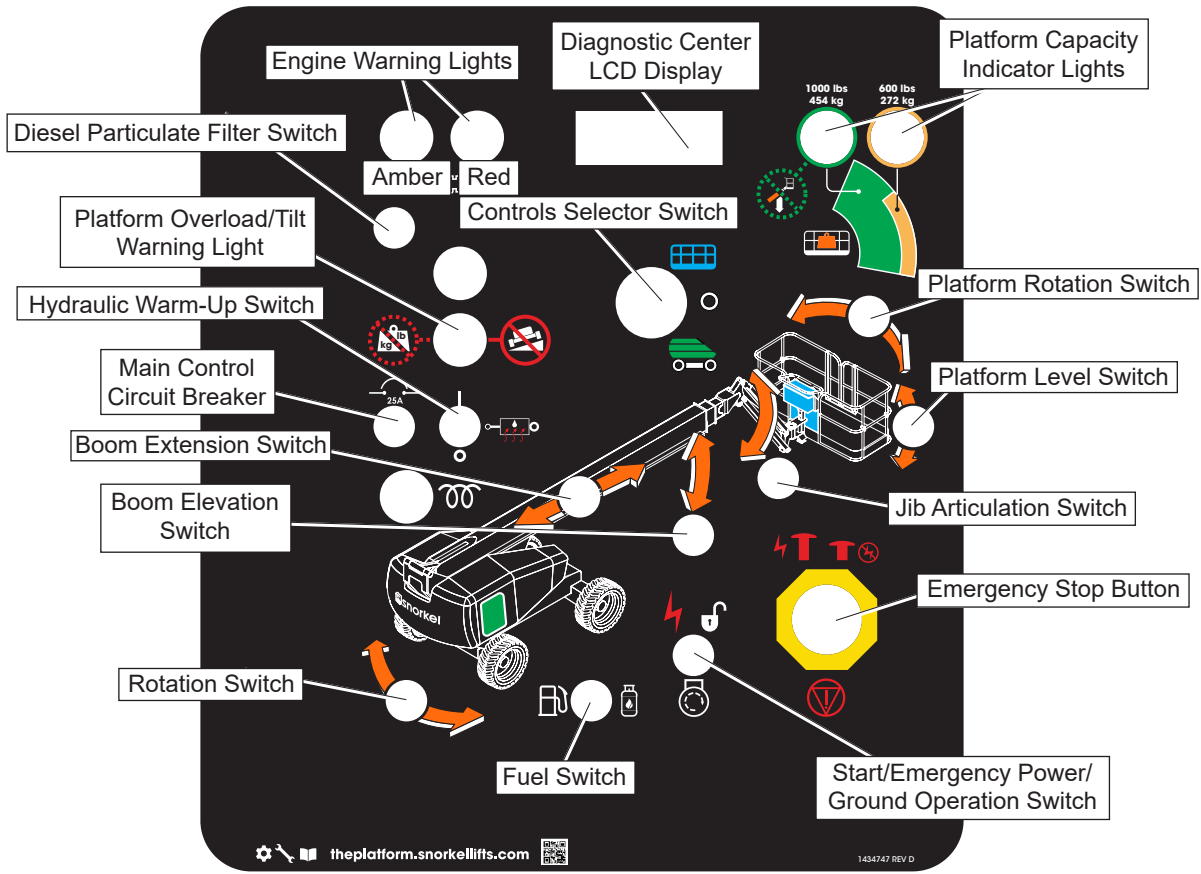
The emergency power function is used to operate turntable, boom, and platform functions using the emergency power system when the engine is off/disabled. The switch is spring returned to the engine position for aerial platform engine operation.

⚠ Caution

The emergency power system is for emergency lowering and stowing only. The length of time the pump can be operated depends on the capacity of the batteries. Do not use this system for normal operation.



Cummins



Deutz/Kubota

Figure 6.2 – Lower Controls

- Hold the switch upward to activate the emergency power system.
- Release the switch to disengage the emergency power system.

Ground Operation

Hold the switch upward continually to operate the machine from the lower controls when the engine is running. The engine speed increases when the switch is held upward. This switch is spring returned to the off position.

Emergency Stop Button

The emergency stop (refer to Figure 6.2) is a two-position, red push button.

- Push the button inward to disconnect power to all control circuits.
- Pull the button outward to restore power.

Controls Selector Switch

Use the controls switch (refer to Figure 6.2) to select between lower control and upper control operation.

- Place the switch in the upward position to operate the aerial platform from the upper controls.
- Place the switch in the downward position for lower control operation.

An alarm sounds when the switch is turned on to warn others that the machine engine is being started.

Rotation Switch

The rotation switch (refer to Figure 6.2) is used to rotate the turntable in a clockwise or counterclockwise direction. The switch is spring returned to the center off position.

- Hold the switch to the right to rotate the turntable counterclockwise.
- Hold the switch to the left to rotate the turntable clockwise.

Boom Elevation Switch

The boom elevation switch (refer to Figure 6.2) is used to raise or lower the main boom. The switch is spring returned to the center off position.

- Hold the switch upward to raise the main boom.
- Hold the switch downward to lower the main boom.

Boom Extension Switch

The boom extension switch (refer to Figure 6.2) is used to extend or retract the booms. The switch is spring returned to the center off position.

- Hold the switch to the right to extend the boom.
- Hold the switch to the left to retract the boom.

Jib Articulation Switch

The jib switch (refer to Figure 6.2) is used to raise or lower the jib. The switch is spring returned to the center off position.

- Hold the switch upward to raise the jib.
- Hold the switch downward to lower the jib.

Platform Level Switch

The platform level switch (refer to Figure 6.2) is used to level the platform floor with respect to the ground. The switch is spring returned to the center off position.

- Hold the switch upward to tilt the platform floor upward or away from the ground.
- Hold the switch downward to tilt the platform floor downward or toward the ground.

Platform Rotation Switch

The platform rotation switch (refer to Figure 6.2) is used to rotate the platform relative to the end of the tip boom. The switch is spring returned to the center off position.

- Hold the switch to the right to rotate the platform counterclockwise.
- Hold the switch to the left to rotate the platform clockwise.

Fuel Switch

Engines on machines with the dual fuel option can be operated using gasoline or liquefied petroleum gas (LPG). Dual fuel machines have a gasoline tank behind the door on the left side of the turntable and an LPG tank mounted on each side of the chassis.

The fuel switch (refer to Figure 6.2) may be used to select between gasoline and LPG operation.

Place the switch in the proper position depending on the type of fuel that is required.

Platform Overload Warning Light

When the platform overload limit is exceeded, the horn will sound intermittently and the platform overload light (refer to Figure 6.2) will blink until the excess load is removed from the platform.

Dual Platform Capacity System

There are two indicator lights on the lower control panel (refer to Figure 6.2) that indicate whether the platform is in the 600 lb or 1,000 lb region of the working envelope. Some boom control functions prevent positioning the boom into a restricted position.

Diesel Particulate Filter Switch

The diesel particulate filter switch (refer to Figure 6.2) is used to perform a manual regeneration of the DPF system. Refer to Chapter 8 for more information on the manual regeneration procedure.

Tilt Alarm

If the aerial platform chassis is out of level more than the machine specified slope sensor alarm setting when the main boom is raised or extended, an alarm will sound and the tilt warning light on the lower control panels (refer to Figure 6.2) will illuminate.

Diagnostic Center Display

The diagnostic center LCD display (refer to Figure 6.2) is located on the left side of the lower control panel.

When the battery disconnect is in the on position and the emergency stop button is enabled at the lower controls, the LCD display shows:

- The accumulated aerial platform operating time.
- “Mode Neutral” is displayed when no functions are being operated. When the machine is operated, the display will indicate the name of that function.

This display is also used by service technicians to troubleshoot and diagnose errors that may occur with the machine operating system.

Hydraulic Oil Warm-Up Switch

The optional hydraulic fluid warm-up switch is used to warm the hydraulic fluid when the ambient temperature is below 32°F (0°C) and boom movement is sluggish because of cold fluid.

Caution

Not all hydraulic fluid is suitable to use in the hydraulic system. Some have poor lubricating characteristics and may increase component wear. Only use hydraulic fluid as recommended.

Use cold weather hydraulic oil as recommended in the machine General Specifications in temperatures of 10°F (-12°C) or below.

The toggle switches for the warm-up system are on the lower control panel and on the front of the upper control panel.

Note

Machine functions are not operational while using the hydraulic warm-up system.

To warm-up the hydraulic fluid from the lower controls:

1. Start the engine from the lower controls.
2. Place the hydraulic fluid warm-up switch in the on position.
 - The engine throttle speed will increase to warm the hydraulic fluid.
 - The engine throttle speed will decrease and return to idle once the hydraulic fluid reaches a preset temperature.

- If the warm-up switch is left on the engine speed will continue to increase and decrease to keep the hydraulic fluid at a preset temperature.

3. When the engine throttle speed returns to idle, place the hydraulic fluid warm-up switch in the off position.

Circuit Breaker Reset Buttons

The lower control panel electrical system has a 25 amp circuit breaker for the main control system circuit. The reset button is on the front of the lower control panel (refer to Figure 6.2).

The circuit breaker protects the electrical wiring and components from electrical overload in case of a short circuit or other fault.

Caution

A tripped circuit breaker indicates a malfunction in the electrical system. Component damage may result if the cause of the malfunction is not corrected. Do not operate the aerial platform if the circuit breaker trips repeatedly.

Push the button to reset the circuit breaker.

Upper Controls

The upper controls are located on the control panel at the platform. Boom, platform, and drive functions can be operated from the upper controls. The following controls are located on the upper control panel.

- Start switch
- Emergency stop button
- Drive joystick
- Drive range switch
- Boom joystick
- Boom extension joystick
- Jib articulation/platform rotate joystick
- Platform level switch
- Engine/emergency power switch
- Horn switch
- Override switch
- Platform overload/tilt warning light
- Fuel switch (dual fuel machines)
- AC generator switch (option)
- Hydraulic system warm-up switch (option)

Start Switch

The engine can be started from the platform using the start switch. The switch on early machines is on the front of the upper control panel (refer to Figure 6.3).

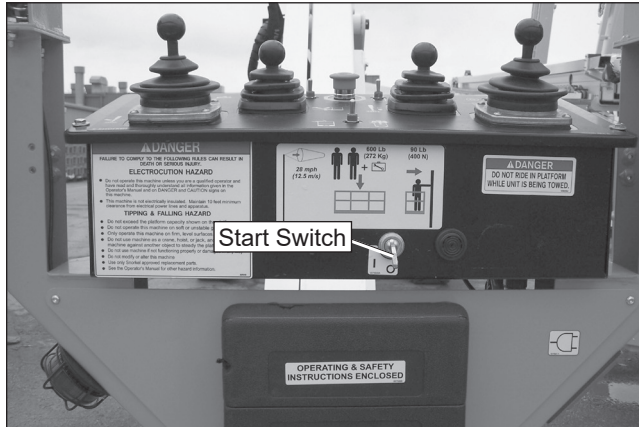


Figure 6.3 – Upper Control Panel Front

Later models have a start/emergency power switch (refer to Figure 6.4).

This switch is similar to an automobile ignition switch.

An alarm sounds when the switch is turned on to warn others that the machine engine is being started.

- Before starting the engine, check the amber engine warning light. The amber light will be flashing if the engine is cold and the engine heater is on. The amber light may flash for 1 to 12 seconds, depending on the engine and ambient air temperature.
- Do not start the engine until the amber light has stopped flashing.

- If the engine turns over but does not start while the amber light is flashing, place the start switch in the off position and back to the on position. Do not start the engine until the amber light stops flashing.
- Place the switch in the start position until the engine starts, then release it to on.
- If the engine dies, the switch must be turned to off before it can be turned back to start.

Note

On some machines it may be necessary to pause about three seconds in the on position before going to start so the starter can engage.

If the platform is to stay in a particular position for a long time, turn the start switch to off to shut off the engine and save fuel.

Emergency Stop Button

The emergency stop is a two-position, red push button on the top of the upper control panel (refer to Figure 6.4).

- Push the button inward to disconnect power from all control circuits at the upper controls.
- Pull the button outward to restore power.

Note

The lower controls override the upper controls. If the upper control emergency stop button is engaged the lower controls can still be used to operate the aerial platform.

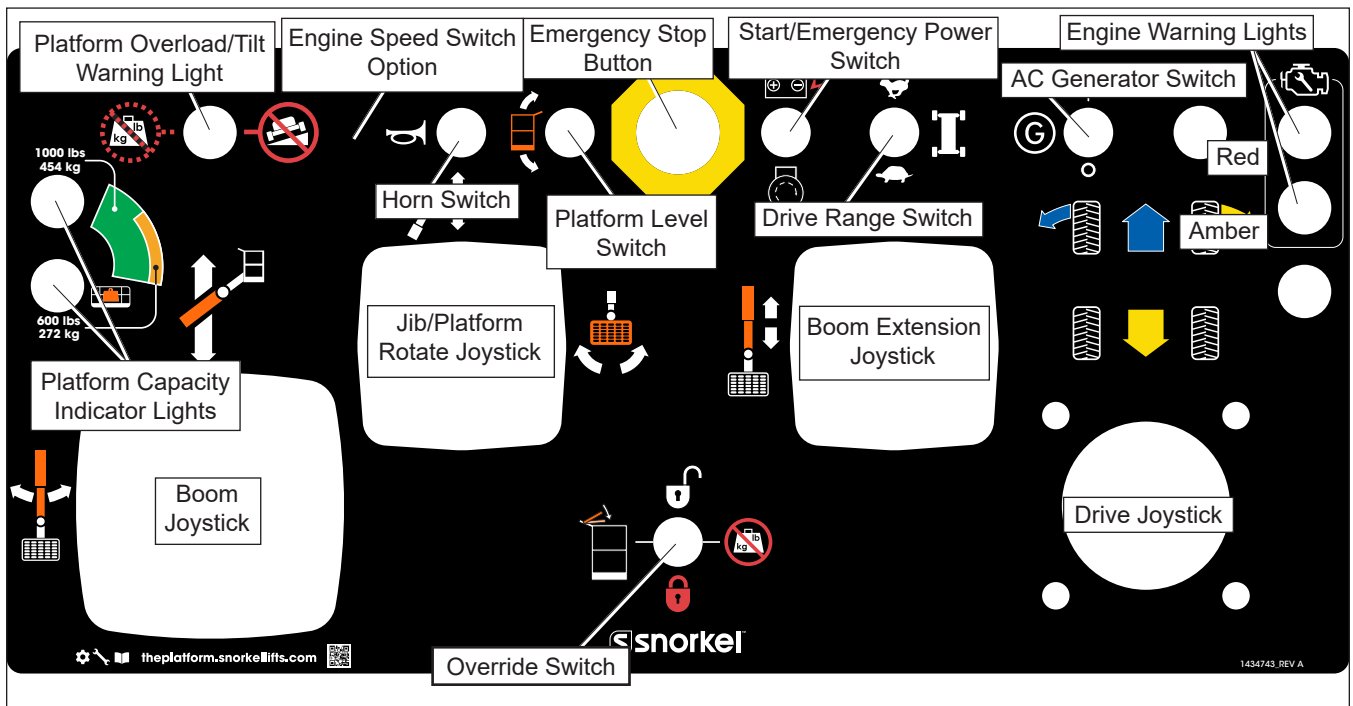


Figure 6.4 – Upper Control Panel Top

- Push the emergency stop button inward when the upper controls are not in use to protect against unintentional operation.

Drive Joystick

The drive joystick (refer to Figure 6.4) is used to control forward and reverse motion of the aerial platform. It is also used to steer the machine. The steering and drive functions may be operated simultaneously.

Note

The distance the joystick is moved is proportional to the speed of the function.

- Hold the joystick forward to move the aerial platform forward and backward to move in reverse as indicated by the directional arrows on the chassis.
- Hold the joystick to the right to steer the aerial platform to the right and to the left to steer to the left as indicated by the directional arrows on the chassis. The wheels will steer only when the drive joystick is in the forward or reverse drive position, or when the booms are stowed.

Note

The steering wheels are not self-centering. Set the steering wheels straight ahead after completing a turn.

Drive Range Switch

The drive range switch (refer to Figure 6.4) has two positions to select drive wheel operation when the booms are in the stowed position; tip boom fully retracted and main boom fully lowered.

- High range (rabbit) – high speed drive with booms in the stowed position.
- Mid range (turtle) – low speed with high torque drive operation with booms in the stowed position.

The drive range operates in low speed when the booms are out of the stowed position, regardless of the position of the drive range switch.

Boom Joystick

The boom joystick (refer to Figure 6.4) is used to raise and lower the main boom and to rotate the turntable. The boom and turntable functions may be operated simultaneously. Boom up and drive functions may also be operated simultaneously.

Note

The distance the joystick is moved is proportional to the speed of the function.

- Hold the joystick forward to raise the main boom and backward to lower the boom.
- Hold the joystick to the right to rotate the turntable counterclockwise and to the left to rotate the turntable clockwise.

Boom Extension Joystick

The boom extension joystick (refer to Figure 6.4) is used to extend or retract the booms.

Note

The distance the joystick is moved is proportional to the speed of the function.

- Hold the joystick forward to retract the booms.
- Hold the joystick backward to extend the booms.

Jib/Platform Rotate Joystick

The jib/platform rotate joystick (refer to Figure 6.4) is used to control jib articulation and platform rotation.

Note

The distance the joystick is moved is proportional to the speed of the function.

- Hold the joystick forward to raise the jib and backward to lower it.
- Hold the joystick to the right to rotate the platform to the right and to the left to rotate the platform to the left.

Platform Level Switch

The platform level switch (refer to Figure 6.4) is used to level the platform floor with respect to the ground. The switch is spring returned to the center off position.

- Hold the switch forward to tilt the platform floor upward or away from the ground.
- Hold the switch backward to tilt the platform floor downward or toward the ground.

Emergency Power Switch

The engine/emergency power switch (refer to Figure 6.4) is used to operate turntable, boom, and platform functions using the emergency power system. The switch is spring returned to the engine position for aerial platform engine operation.

Caution

The emergency power system is for emergency lowering and stowing only. The length of time the pump can be operated depends on the capacity of the batteries. Do not use this system for normal operation.

- Hold the engine/emergency power switch downward to activate the emergency power system.
- Release the switch to disengage the emergency power system.

If the engine is running, it will stop when the switch is placed in the emergency power position.

The emergency power system may be used at the lower controls to lower the platform during a platform overload situation.

Horn Switch

The horn switch is to the left of the emergency stop button on the upper control panel (refer to Figure 6.4). Hold the switch upward to sound the horn.

Engine Speed Switch

The optional engine speed switch is to the left of the horn switch on the upper control panel (refer to Figure 6.4). It is used to set the engine idle speed to either high or low idle. When in the downward or low engine speed position, the engine idle speed is reduced to 1,300 rpm. Low speed may be used to operate with reduced engine noise.

Override Switch

When the Snorkel Guard, platform overload system, bumpguard system, or boom/drive cut-out is activated, the override switch (refer to Figure 6.4) is used to override the system to operate main boom up/down/retract, or turntable rotation and drive functions. The switch is spring returned to the normal operation position.

- Hold the switch upward to override the Snorkel Guard or the platform overload system.
- Release the switch to the downward position to resume normal machine operation.

Platform Foot Switch

The upper controls (refer to Figure 6.5) are interlocked through the platform foot switch.

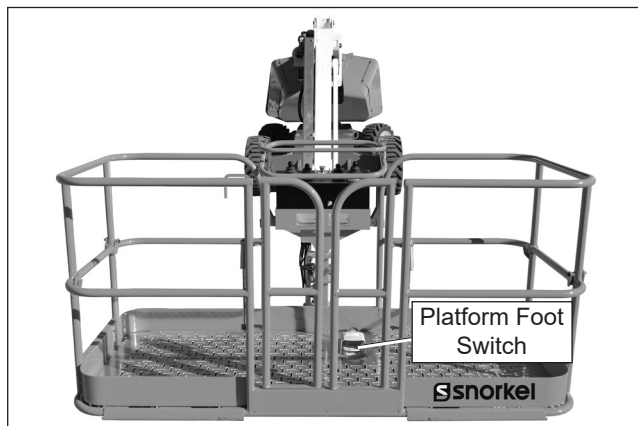


Figure 6.5 – Platform

Step down on and hold the platform foot switch to activate the drive and boom functions from the upper controls.

Platform Overload Warning Light

When the platform overload limit is exceeded, the horn will sound intermittently and the platform overload light (refer to Figure 6.4) will blink until the excess load is removed from the platform.

Dual Platform Capacity System

There are two indicator lights on the upper control panel (refer to Figure 6.4) that indicate whether the platform is in the 600 lb or 1,000 lb region of the working envelope. Some boom control functions prevent positioning the boom into a restricted position.

Tilt Alarm

If the aerial platform chassis is out of level more than the machine specified slope sensor alarm setting when the main boom is raised or extended, an alarm will sound and the tilt warning light on the lower control panels (refer to Figure 6.4) will illuminate.

AC Generator Switch

The switch for the optional AC generator (refer to Figure 6.4) is located on the top of the upper control panel.

With the engine running, place the switch in the generator position to provide electrical power to the electrical outlet at the platform. Return the switch to the off position to turn off the generator and resume machine operation.

Boom and drive functions will operate at reduced speeds while the generator is operating.

AC 20 kW Generator Switch – Platform Welder

The switch for the optional AC 20 kW generator (refer to Figure 6.6) to power a platform welder, is located on the top of the upper control panel. The switch may be used to operate the generator for welding or plasma/gouge cutting. In the center position the generator is off.

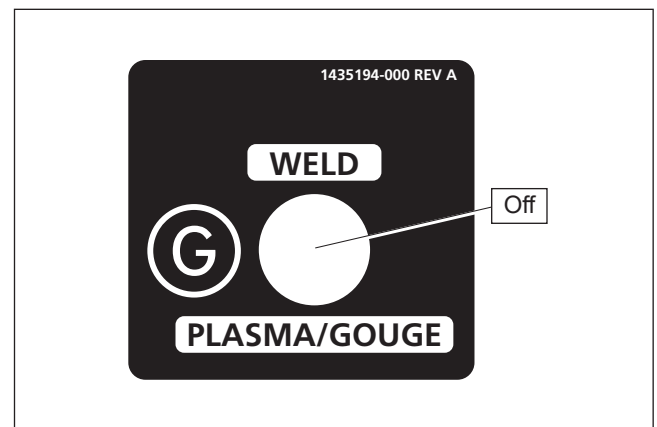


Figure 6.6 – 20 kW Generator Switch

With the engine running, place the switch in the appropriate position to provide electrical power to operate the welder. The engine rpm will increase when the switch is placed in one of the on positions. Return the switch to the off position to turn off the generator and resume machine operation.

Boom and drive functions will operate at reduced speeds while the generator is operating.

Dual Fuel

Engines on machines with the dual fuel option can be operated using gasoline or liquefied petroleum gas (LPG). Dual fuel machines have a gasoline tank behind the door on the left side of the turntable and an LPG tank mounted on each side of the chassis.

There is a fuel switch to select between gasoline and LPG operation on both the lower and upper control panels (refer to Figure 6.2 and 6.7).

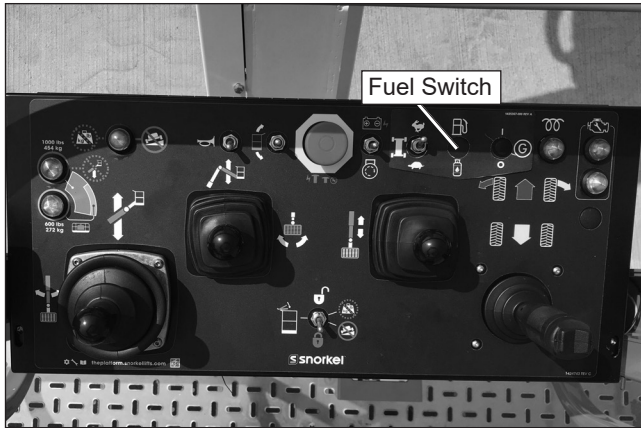


Figure 6.7 – Dual Fuel Upper Control Panel

Place the switch in the proper position depending on the type of fuel that is required.

Hydraulic Oil Warm-Up Switch

The switch for the optional (refer to Figure 6.8) is located on the right side of the upper control panel.

The optional hydraulic fluid warm-up switch is used to warm the hydraulic fluid when the ambient temperature is below 0°C (32°F) and boom movement is sluggish because of cold fluid.

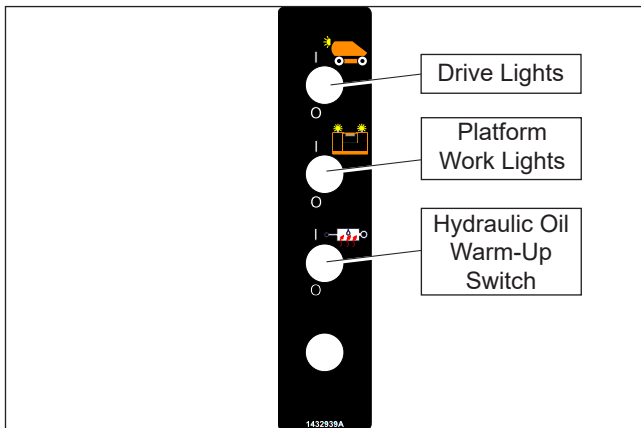


Figure 6.8 – Switch Panel

Caution

Not all hydraulic fluid is suitable to use in the hydraulic system. Some have poor lubricating characteristics and may increase component wear. Only use hydraulic fluid as recommended.

Use cold weather hydraulic oil as recommended in the machine General Specifications. See “Specifications” on page 5.

Note

Machine functions are not operational while using the hydraulic warm-up system.

To warm-up the hydraulic fluid from the upper controls:

1. Start the engine from the upper controls.
2. Place the hydraulic fluid warm-up switch in the on position.
 - The engine throttle speed will increase to warm the hydraulic fluid.
 - The engine throttle speed will decrease and return to idle once the hydraulic fluid reaches a preset temperature.
 - If the warm-up switch is left on the engine speed will continue to increase and decrease to keep the hydraulic fluid at a preset temperature.
3. When the engine throttle speed returns to idle, place the hydraulic oil warm-up switch in the off position.

Driving and Platform Work Lights

The control for the optional driving and tail lights is on the switch panel (refer to Figure 6.8). Place the switch in the on position to operate the driving and work lights.

Chapter 7 – Prestart Inspection

Potential service and safety problems may be detected by inspecting the aerial platform. This chapter includes information on properly inspecting the aerial platform and includes a prestart inspection check list at the end of the chapter to ensure that no areas are overlooked.

Warning

The potential for an accident increases when operating an aerial platform that is damaged or malfunctioning. Death or serious injury could result from such accidents. Do not operate the aerial platform if it is damaged or malfunctioning.

Carefully read, understand and follow all safety rules, operating instructions, decals/placards and any applicable national safety instructions/requirements while performing the prestart inspection.

Perform a prestart inspection at the beginning of each shift, before using the aerial platform on the job. The inspection site must have a smooth and level surface that is unobstructed to allow for full elevation, and be capable of supporting the machine maximum wheel load.

Operator's Manual Holder

The manual holder is located next to the hydraulic reservoir tray behind the cowling on the left side of the machine.

To inspect the Operator's Manual holder:

1. Make certain the Operator's Manual holder is securely fastened in place.
2. Check to see that the proper Operator's Manual is in the holder.
3. Check to see that the manual is complete with all pages intact and in readable condition.
4. Make certain ANSI publication Manual of Responsibilities is in the manual holder.

Engine

Open the doors on the right side of the machine. The latch to hold the engine tray is to the left of the tray (refer to Figure 7.1).

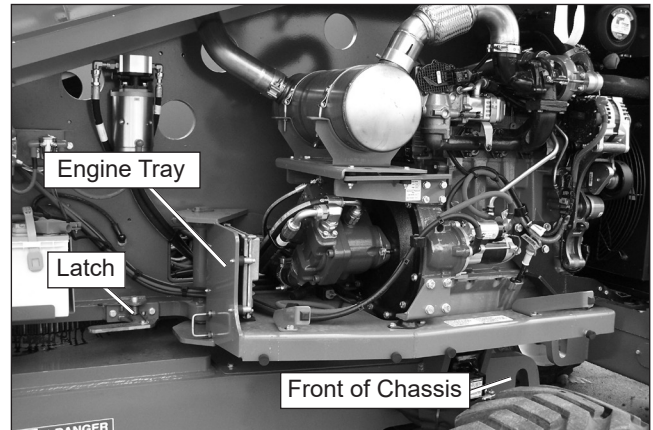


Figure 7.1 – Engine Tray Latch

- Visually inspect the engine and its components with the engine off.
- Inspect the fasteners and latch to make certain they are in good working condition to hold the engine tray in place.

Oil Level

The proper oil level is between the two marks on the dipstick.

To inspect the oil level:

1. Make sure the engine has been off for at least five minutes before checking the oil level. This will allow time for the oil to drain to the pan for a more accurate oil level reading.
2. Remove the dipstick and check to see that the oil level is between the two marks.
3. If necessary, add oil before starting the engine.

Note

Refer to Chapter 2 for the correct engine oil grade and weight.

Coolant

The engine is liquid cooled.

- When the engine is cold, the coolant level should be visible in the sight gauge at the top of the coolant tank (refer to Figure 7.2).
- When the engine is at operating temperature, the coolant should be at the Ok level.

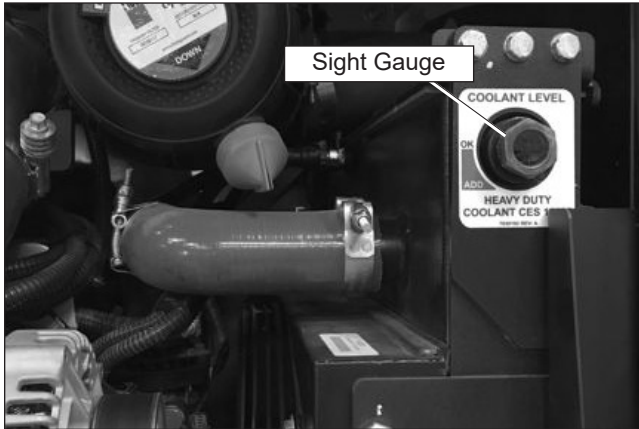


Figure 7.2 – Right Side of Turntable

To inspect the coolant level:

⚠Caution

Engine coolant escaping under pressure may cause serious burns. Shut the engine off and let it cool before removing the radiator cap.

1. Shut the engine off and wait for it to cool.
2. Check to make sure the coolant level is between the Hot and Cold marks on the sight glass
3. If necessary, remove the cap from the coolant reservoir and add coolant. Tightly replace the cap.

Note

Refer to Chapter 2 for engine coolant specifications. The need to regularly add fluid indicates a leak that should be corrected.

Radiator

To inspect the radiator:

1. Inspect the radiator hoses and clamps for wear, leakage, or damage.
2. Make sure the hoses are not hardened, cracked, or feel spongy.
3. Make sure the cap is in place and tight.
4. Check under the chassis for coolant that has leaked. Coolant leaks are easily visible on the ground.
5. Make sure the radiator core and ventilation openings on the cover are free of bugs, dirt, or foreign material that might restrict airflow.

Fuel Tank

Check the fuel level (refer to Figure 7.3) and add fuel if necessary. Make sure the cap is securely fastened.

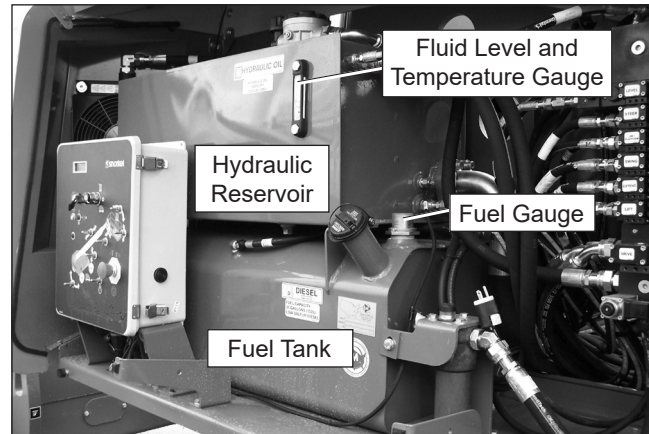


Figure 7.3 – Fuel Tank and Hydraulic Reservoir

Note

Refer to Chapter 2 for fuel grade specifications.

Use the following procedure to change the LPG tank.

1. Close the shutoff valve (refer to Figure 7.4).

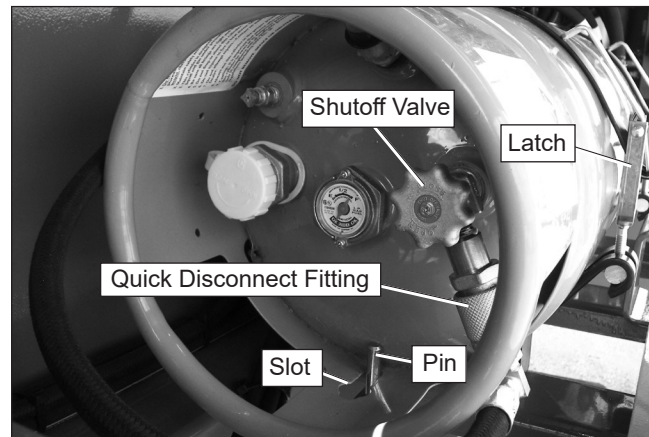


Figure 7.4 – LPG Tank

2. Remove the fuel line from the tank using the quick disconnect fitting.
3. Pull on each latch to release the straps from the tank.
4. Carefully lift the tank from the cradle.
5. Place a full tank in the cradle making sure the slot in the tank aligns with the pin.
6. Latch both straps to secure the tank.
7. Connect the fuel line and open the shutoff valve.

Fuel Line

To inspect the fuel line:

1. Visually inspect the entire length of the fuel line starting at the fuel tank.
2. Trace the line to the engine, inspecting for leaks and damage.

Electrical System

Electrical power is supplied from two 550 CCA, 12 volt batteries. The batteries are under the engine cover on the right side of the machine (refer to Figure 7.5). The batteries supply 12 volt DC electrical power to operate the aerial platform electrical and electrohydraulic components, including the emergency power system.

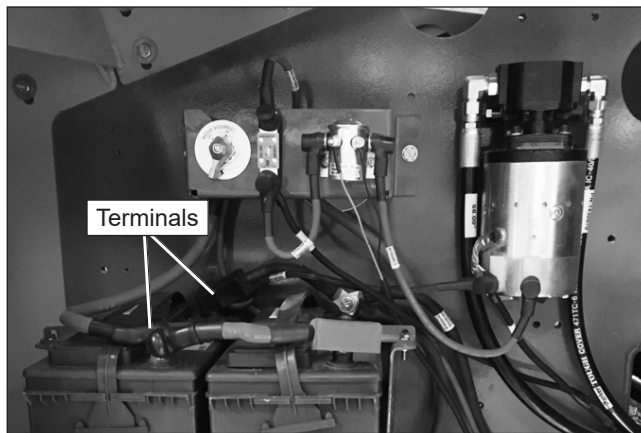


Figure 7.5 – Batteries

⚠Warning

Batteries give off hydrogen and oxygen that can combine explosively. Death or serious injury could result from a chemical explosion. Do not smoke or permit open flames or sparks when checking the batteries.

⚠Caution

Even with low voltage electrical systems, severe arcing can occur. Electrical shock or component damage may result from contact with energized conductors. Use caution when working with any electrical device.

The batteries are automatically charged when the engine is running. Include the batteries when inspecting and servicing the electrical system.

Battery Terminals

To inspect the battery terminals:

1. Check the top of the batteries, the terminals, and cable ends. They should be clean and free of corrosion (refer to Figure 7.5).
2. If necessary, clean the top of the batteries. Clean the terminals and cable ends with a wire brush or terminal cleaning tool.

3. Make sure all cable ends are securely fastened to the terminals.

Cables and Wiring Harness

To inspect the cables and wiring harnesses:

1. Visually inspect all cables and wiring for wear and/or physical damage such as loose connections, broken wires, and frayed insulation.
2. Check the wiring in areas where a change in routing direction may cause them to become pinched.
3. Make sure the cables and wires are properly routed to avoid sharp edges, pinching, and scuffing.

Hydraulic System

Hydraulic power is supplied from an engine driven variable displacement piston pump.

⚠Danger

Hydraulic fluid escaping under pressure can have enough force to inject fluid into the flesh. Serious infection or reaction will result if medical treatment is not given immediately. In case of injury by escaping hydraulic fluid, seek medical attention at once.

The hydraulic reservoir is behind the cowling doors on the left side of the turntable. The pump is mounted on the engine.

Fluid Level

To inspect the fluid level:

1. Make sure the aerial platform is fully stowed on a level surface.
2. Open the cowling door on the left side of the machine.
3. Visually check to make sure the fluid is visible in the sight glass (refer to Figure 7.3).

⚠Caution

Not all hydraulic fluid is suitable to use in the hydraulic system. Some have poor lubricating characteristics and may increase component wear. Only use hydraulic fluid as recommended.

4. If necessary, remove the filler cap and add fluid of the proper type. Replace the cap making sure it is tightly in place.

Note

Refer to Chapter 2 for the proper type and grade of hydraulic fluid to use. The need to regularly add fluid indicates a leak that should be corrected.

Fluid Filter

Checking the condition of the hydraulic fluid filter is part of the machine maintenance schedule and should not be performed by the operator.

Hoses, Tubes, and Fittings

To inspect the hoses, tubes, and fittings:

1. Inspect all hydraulic hoses, tubes, and fittings for wear, leakage, or damage (refer to Figure 7.6).



Figure 7.6 – Hoses, Tubes, and Fittings

2. Make sure the hoses are properly routed to avoid sharp edges, kinking, and scuffing.
3. Inspect the tubes for dents or other damage that may restrict fluid flow.
4. Make sure all hoses and tubes are held firmly in their support brackets.
5. Check under the chassis for fluid that has leaked. Hydraulic fluid leaks are easily visible on the ground.

Tires and Wheels

Visually inspect the tires and wheels (refer to Figure 7.7) to make sure they are suitable for service.



Figure 7.7 – Tires and Wheels

Foam filled tires do not have a pressure decal or a valve core.

To inspect foam filled tires and wheels:

1. Check the wheel lug nuts to see that none are missing, damaged, or loose.
2. Carefully inspect for large holes or cuts where foam is coming out of the tire.
3. Look for large embedded objects, such as angle iron, that can rip a tire open.

Note

Punctures caused by bolts, screws, or nails are not a problem for foam filled tires.

Lower Control Station

With no personnel in the platform, test the operation of each control from the lower controls (refer to Figure 7.8).

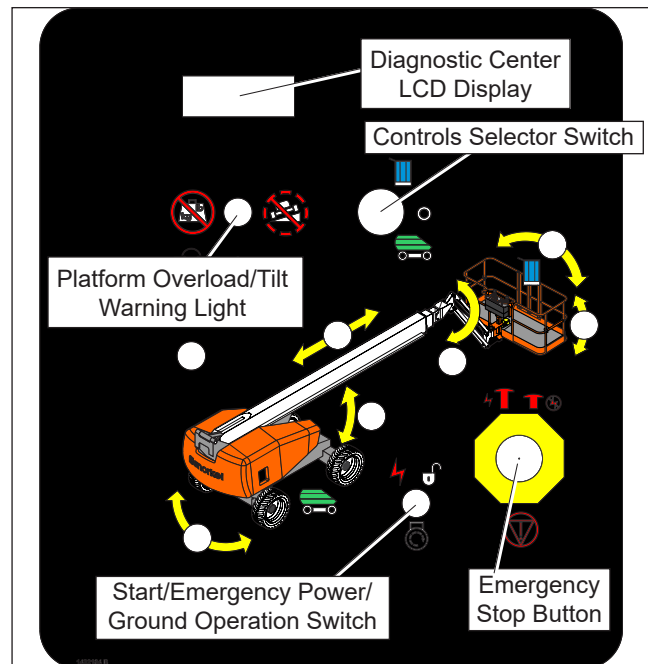


Figure 7.8 – Lower Controls

Operating Controls

Use the following procedure to operate the machine from the lower controls.

1. Turn the battery disconnect switch on.
2. At the lower controls, pull the emergency stop button outward. Place the control selector switch in the lower control position.
3. The start switch (refer to Figure 7.8) function works like an automobile ignition switch.

An alarm sounds when the switch is turned on to warn others that the machine engine is being started.

- Before starting the engine, check the Diagnostic Center LCD display window. WAIT TO START will be displayed if the engine is cold and the engine heater is on. The message may appear for 1 to 12 seconds, depending on the engine and ambient air temperature.
 - Do not start the engine until the wait message is no longer displayed.
 - If the engine turns over but does not start while the WAIT TO START message is displayed, turn the control selector switch to the middle/off position and back to the lower controls position. Do not start the engine until the wait message is no longer displayed.
 - Hold the switch downward until the engine starts, then release it to on.
 - If the engine dies, the controls switch must be turned to off before the engine can be restarted.
4. Hold the ground operation switch upward.

Danger

Pinch points may exist between moving components. Death or serious injury will result from becoming trapped between components, buildings, structures, or other obstacles. Make sure all personnel stand clear of the aerial platform while performing the prestart inspection.

Warning

The potential for an accident increases when operating an aerial platform that is damaged or malfunctioning. Death or serious injury could result from such accidents. Do not operate the aerial platform if it is damaged or malfunctioning.

5. Test the operation of each function in both directions.

Note

When checking the turntable rotation function in the counterclockwise direction, the turntable will rotate toward you.

Emergency Stop

To test the emergency stop button from the lower controls:

1. Push the emergency stop button inward to turn off electrical power.
2. Test the lower control functions to make sure they do not operate.

Emergency Power

To test the emergency power system from the lower controls:

1. Place the battery disconnect switch and the emergency stop button in the on position.
2. Hold the emergency power switch upward to operate the aerial platform from the lower controls using the emergency power system.

Diagnostic Center Display

To test the diagnostic center display on the lower control panel (refer to Figure 7.8), from the lower controls:

1. Turn the battery disconnect switch on.
2. Pull the emergency stop button outward to the on position.
3. The display on the LCD screen should indicate:
 - The accumulated aerial platform operating time.
 - “Mode Neutral” when no functions are being operated. When the machine is operated, the display will indicate the name of that function.

Emergency Lowering Knob – Single Platform Capacity Machines Only

The main boom can be lowered in an emergency using the emergency lowering knob. The emergency lowering knob is at the base of the main boom lift cylinder.

Use the following procedure to test the emergency lowering system.

1. Use the lower controls to raise the main boom.
2. Turn the engine off.

Danger

Pinch points may exist between moving components. Death or serious injury will result from becoming trapped between components. Stand clear of moving components while test operating the machine.

3. Reach upward through the access hole on the bottom of the turntable (refer to Figure 7.9) and slowly turn the knob counterclockwise to open the bleed down valve. The boom should slowly lower by gravity.



Figure 7.9 – Emergency Lowering Knob

⚠ Warning

The potential for an accident increases when safety devices do not function properly. Death or serious injury could result from such accidents. Fully close the emergency lowering knob before operating the aerial platform.

4. Turn the knob clockwise to close the cylinder bleed down valve.

Flashing Lights

The machine may be equipped with two optional flashing lights mounted to the top of the counterweight.

To inspect the flashing light:

1. At the lower controls, pull the emergency stop button outward. Place the control selector switch in the lower control position.
2. Visually check to see that the light is flashing approximately one flash per second.

Note

There is not an off switch for the flashing light. The light cannot be turned off.

Structures

Visually inspect all weldments and related components. It is important to inspect the fasteners that connect the components.

Weldments

To inspect the weldments:

1. Visually inspect all weldments for abnormal wear, abrasion, or deformation that could cause interference between moving parts.
2. Inspect the welds on the structural components. Pay particular attention to boom welds. The area to be inspected should be clean and free of dirt and grease.

3. Look for visible cracks in the welds and at the weld to parent material joints. A bright light may be used to provide adequate visibility of the inspection area.

Boom Slide Pads

The main boom has slide pads (refer to Figure 7.10) between the main and tip boom sections.

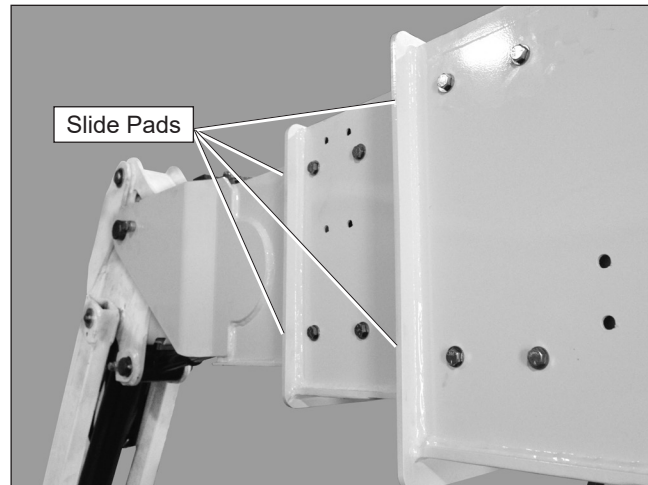


Figure 7.10 – Slide Pads at Tip End of Boom

To inspect the slide pads:

1. Use the lower controls to position the main boom near horizontal. Extend the tip boom about 1' (30 cm).
2. Visually inspect the slide pads to make sure they are securely fastened to the main boom.
3. Inspect the surface where the pads contact the tip boom. The paint must be in place with no signs of bare metal.

Wire Ropes

Visually inspect the wire ropes where they are connected to the outside of the main boom, on the bottom of the tip end of the main boom (refer to Figure 7.11).

Visually inspect the wire rope connections to make sure there is no deformation of the rope and that there are no broken strands.

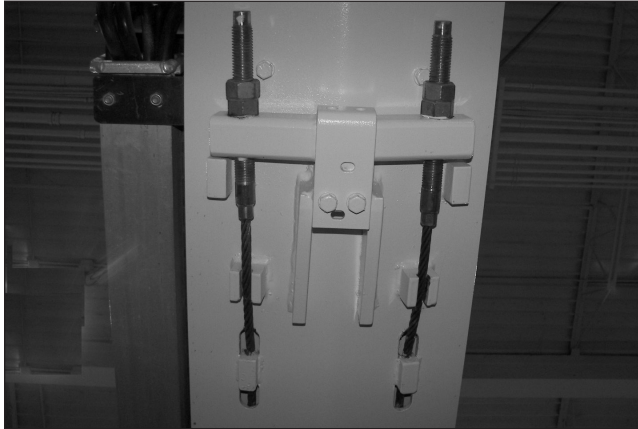


Figure 7.11 – Bottom of Main Boom at Tip End

Also inspect the wire ropes just inside the base end of the main boom (refer to Figure 7.12).

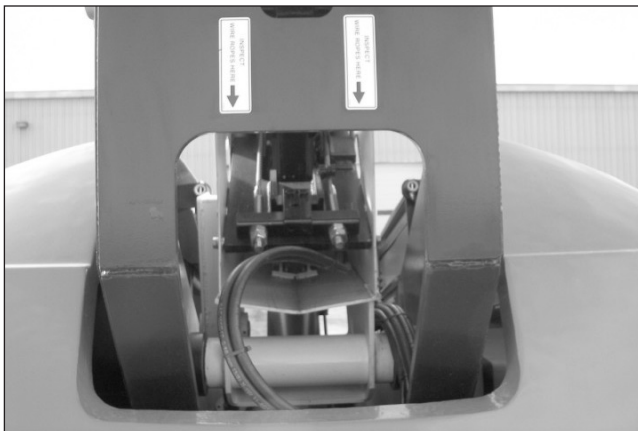


Figure 7.12 – Inside Base End of Main Boom

Fasteners

To inspect the component fasteners:

1. Visually inspect all fasteners to see that none are missing or loose.
2. Inspect all of the bolts, nuts, roll pins, collars, and snap rings that connect the booms and cylinders. They should all be present, tight, and not damaged in any way.
3. Raise the main boom to access the inner race rotation bearing bolts in the turntable (refer to Figure 7.13). The outer race bolts can be viewed from under the chassis looking upward.

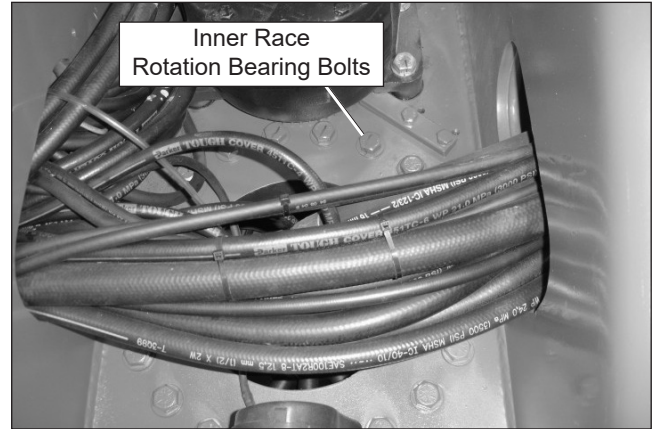


Figure 7.13 – Rotation Bearing Bolts

4. Inspect the inner and outer race rotation bearing bolts to ensure that none are missing, damaged, or loose.

Upper Control Station

Inspect the platform and upper controls, after verifying all functions operated properly from the lower controls.

Guardrail System

The guardrail system includes (refer to Figure 7.14):

- A top rail
- A mid rail
- Three entry gates: one on each side and one rear
- Toeboards around the sides of the platform.

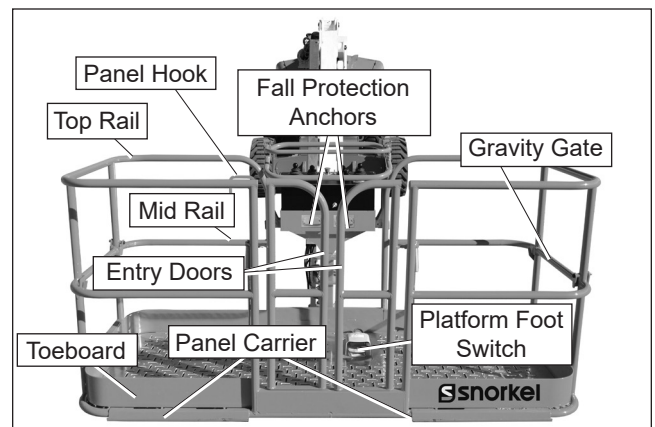


Figure 7.14 – Guardrail System

To inspect the guardrail system:

1. Visually inspect all components of the guardrail system. Make sure the rails and toeboards are all in place and free of any damage or deformation.
2. Visually inspect the rail and toeboard welds for cracks.
3. Visually inspect all bolts and nuts fastening the platform in place. They must be present and not show any signs of looseness.

4. Inspect the gates to be sure they are present, are not damaged, and move freely.

Fall Protection Anchors

There are two fall protection anchors below the upper control panel (refer to Figure 7.14).

To inspect the anchors:

1. Visually inspect the fall protection anchors to make sure they are in place and are not deformed.
2. Look for visible cracks in the welds and at the weld to parent material joints. A bright light may be used to provide adequate visibility of the inspection area.

Operating Controls

Use the following procedure to operate the machine from the upper controls:

1. Turn the battery disconnect switch on.
2. At the lower controls, place the emergency stop switch in the on position. Place the controls switch in the upper control position.
3. At the upper controls (refer to Figure 7.15), pull the emergency stop button outward.

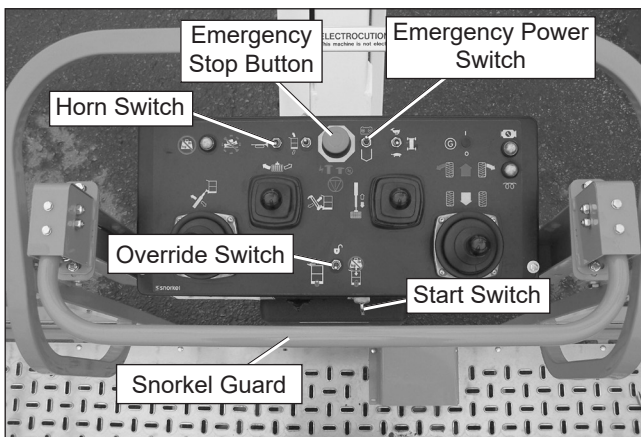


Figure 7.15 – Upper Controls

4. The start switch function is similar to an automobile ignition switch.

An alarm sounds when the switch is turned on to warn others that the machine engine is being started.

- Before starting the engine, check the amber engine warning light. The amber light will be flashing if the engine is cold and the engine heater is on. The amber light may flash for 1 to 12 seconds, depending on the engine and ambient air temperature.
- Do not start the engine until the amber light has stopped flashing.

- If the engine turns over but does not start while the amber light is flashing, turn the start switch to the off position and back to the on position. Do not start the engine until the amber light stops flashing.

- Place the switch in the start position until the engine starts, then release it to on.

- If the engine dies, the switch must be released to off before it can be turned back to start.

⚠ Danger

Pinch points may exist between moving components. Death or serious injury will result from becoming trapped between components, buildings, structures, or other obstacles. Make sure all personnel stand clear of the aerial platform while performing the prestart inspection.

⚠ Warning

The potential for an accident increases when operating an aerial platform that is damaged or malfunctioning. Death or serious injury could result from such accidents. Do not operate the aerial platform if it is damaged or malfunctioning.

5. Test the platform foot switch by moving a boom function control without stepping on the foot switch. If movement occurs the interlock is not functioning properly. Do not operate the machine until the problem is corrected.

6. Test the operation of each control in both directions from the upper controls.

7. The drive range switch and maximum travel speeds are interlocked through limit switches on the main boom that senses the position of the booms.

- When the main boom is raised above horizontal or is extended, the machine should travel in low speed only.
- To operate in high or medium speed the booms must be stowed.

Emergency Stop

To test the emergency stop button from the upper controls:

1. Start the engine from the upper controls.
2. Push the emergency stop button inward to turn off electrical power.
3. Verify that the engine shuts off and the upper control functions do not operate.

Emergency Power

To test the emergency power system from the upper controls:

1. Turn the battery disconnect switch on.
2. At the lower controls, pull the emergency stop button outward and place control selector switch in the upper control position.
3. At the upper controls (refer to Figure 7.15), pull the emergency stop button outward. If equipped with the start switch on the front of the panel, place it in the on position.
4. Hold the engine/emergency power switch in the emergency power position and step on the platform foot switch to verify operation of the aerial platform using the emergency power system.

Horn Switch

Hold the horn switch (refer to Figure 7.15) upward to ensure that it sounds to warn personnel in the area.

Snorkel Guard

To test the Snorkel Guard system:

1. Turn the battery disconnect switch on.
2. At the lower controls, pull the emergency stop button outward and place the control selector switch in the upper control position.
3. At the upper controls, pull the emergency stop button outward (refer to Figure 7.15).
4. Step down on the platform foot switch.
5. Press down on the Snorkel Guard rail and verify that:
 - the horn sounds.
 - the blue light under the upper control panel flashes.
 - only main boom down and jib down functions will operate.
6. Release the Snorkel Guard rail and the override switch. Verify that all other machines function operate.

Electrical Power Outlet

Connect a source of 110 volt AC power to the power-input connector on the right side of the chassis.

Some machines may have an electrical outlet at the platform, but no power-input connector on the chassis. In that case, power is supplied by an optional AC generator. An external power source is not required.

With the engine running, place the AC generator switch in the generator position to provide electrical power to the

electrical outlet at the platform and to the outlet on the end of the generator housing.

Plug an electrical tool into the receptacle at the platform and at the generator and try to operate the tool to verify proper operation of the outlet.

The outlet may be equipped with a ground fault circuit interrupter (GFCI). Use the following procedure to test the GFCI.

1. Push the test button (refer to Figure 7.16).

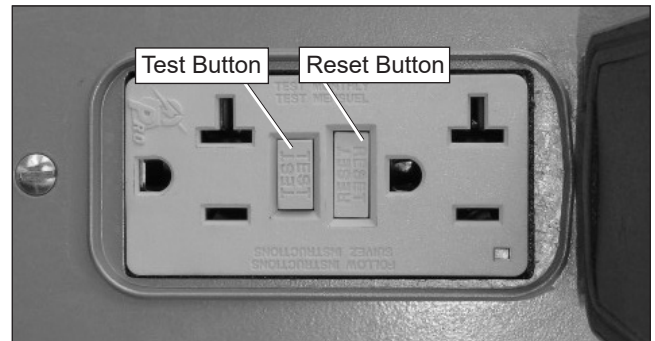


Figure 7.16 – Electrical Power Outlet

2. Plug an electrical tool into the outlet and verify the power is off.
 - If the power was off, push the reset button to restore power.
 - If the power was on, repair or replace the receptacle.

Level Sensor

Use the following procedure to test the level sensor:

▲ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not drive an elevated aerial platform on soft, uneven, or sloping surfaces. Do not drive the machine on grades that exceed 45 percent.

1. With the machine in the stowed position, drive on a grade that is between 5 and 10 degrees. Stop to ensure the brakes engage.

On machines manufactured after March 2021, extend the main boom from the stowed position before driving onto a grade that is between 5 and 10 degrees. Boom and drive functions will be disabled when the machine reaches or exceeds the limit of the chassis slope sensor settings, requiring the use of the override switch to enable those functions.

2. On machines manufactured before April 2021, extend the tip boom about 2' (60 cm).

3. Verify that the tilt alarm sounds and the tilt warning light on the lower and upper control panels are illuminated.

Warning

The potential for an accident increases when safety devices do not function properly. Death or serious injury could result from such accidents. Do not alter, disable, or override any safety device.

4. If the alarm does not sound and the warning lights do not illuminate, remove the machine from service until the problem is corrected.
5. Retract the tip boom and drive the machine to a smooth, flat, level surface.

Panel Carrier

The platform is equipped with built-in panel carrier.

- Inspect the cradles (refer to Figure 7.17) and the hook to make sure they are in good condition and are not bent or distorted.

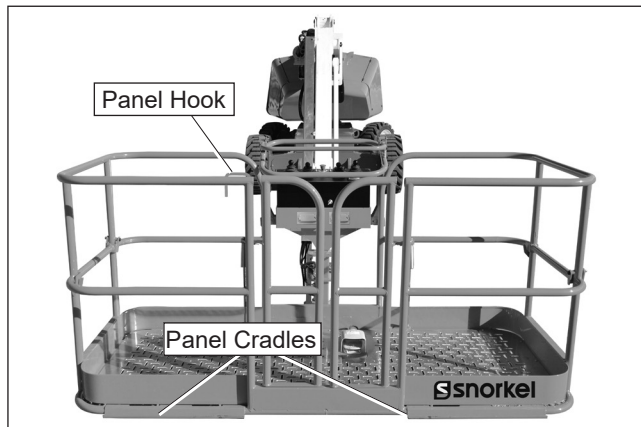


Figure 7.17 – Panel Carrier

All Motion Alarm

The machine may be equipped with an all motion alarm.

- Operate machine functions to ensure that the alarm sounds to warn personnel in the area that the aerial platform is in motion.

Sandblast Protection Kit

The optional sandblast protection kit protects the cylinders from abrasion while sandblasting or from paint overspray. Rubber covers protect each cylinder rod as it extends and retracts. The covers prevent sand and paint from damaging the cylinder seals and rod.

- Inspect the covers while operating the machine to ensure they are securely fastened and completely cover the cylinder rod. Make sure there are no holes in the covers.

Air Line to Platform

The machine may be equipped with an optional air line to the platform.

- Inspect the components, including the air line, mounting hardware, and the caps on the input and output connectors, etc. to verify all components are present and are in working condition.

Driving and Platform Work Lights

The machine may be equipped with driving lights and/or platform work lights.

- Turn the engine on and use the switch on the back of each light to momentarily turn it on to see that it works.

Tow Kit

The machine may be equipped with an optional tow kit.

- Inspect the components, including the tow bar, steer arm, and chains, etc. to verify all components are present and are in working condition.

Platform Glazier Package

The machine may be equipped with an optional platform glazier package.

- Inspect the glazier tray(s) (refer to Figure 7.18) and keeper pins or fasteners to make sure they are in good condition and are not bent or distorted. The straps and padding must be in good condition and not worn, cut or frayed.

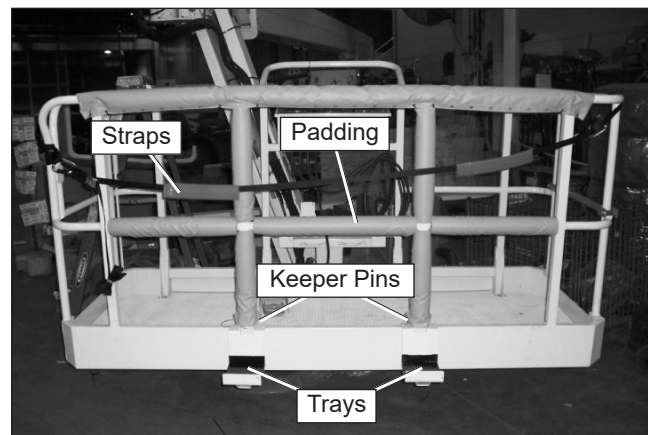


Figure 7.18 – Platform Glazier Package

Platform Welder

The machine may be equipped with an optional welder mounted in the platform.

- Inspect the components, including the welder mounting, welder, cables, safety decals, fire extinguisher, etc. to verify all components are present and are in working condition.

Pipe Rack

The machine may be equipped with an optional pipe rack attached to the rear of the platform guardrails.

To inspect the pipe rack:

1. Visually inspect the mounting plates for abnormal wear, abrasion, or deformation.
2. Visually inspect all fasteners to see that none are missing or loose. They should all be present, tight, and not damaged in any way.
3. Visually inspect the nylon straps. They should both be present and not damaged in any way. Inspect the cam-lock fasteners to ensure they securely engage and release the strap.

Drive Motion Alarm

The machine is equipped with a drive motion alarm.

- Operate the machine functions to ensure that the alarm sounds to warn personnel in the area that the aerial platform is in motion.

Placards and Decals

To inspect the placards and decals:

1. Inspect all safety and operational placards and decals. Make certain they are in place, in good condition, and are legible.
2. Clean the placards and decals with soap and water, and a soft cloth if the words or pictures cannot be seen.

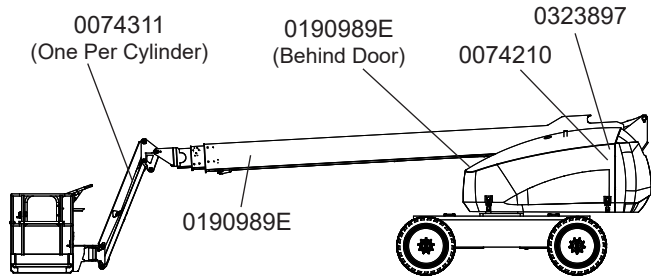
Caution

Solvents may contain hazardous ingredients. Follow the manufacturer's label for proper use and disposal. Wear protective gloves and splash-proof safety glasses when using solvents.

3. Remove wet paint overspray using a natural biodegradable solvent and a soft cloth.
4. Replace any missing or illegible placards or decals before operating the aerial platform.

Placard and decal kits are available from Snorkel.

The safety related placards and decals are illustrated on the following pages.



Right Side



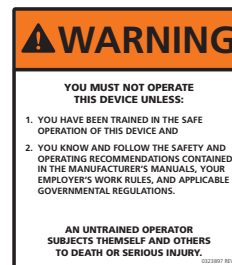
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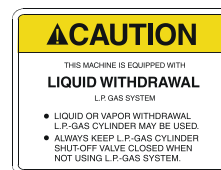
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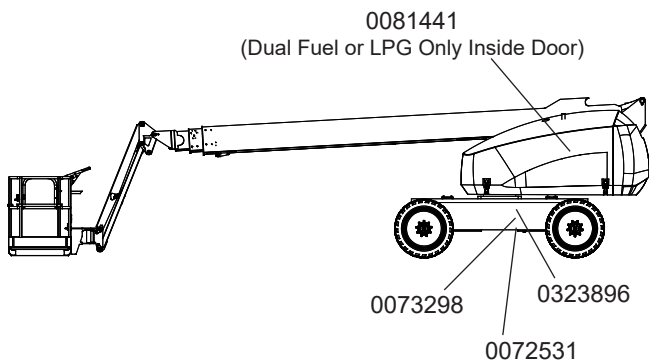
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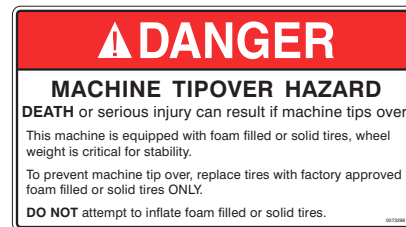
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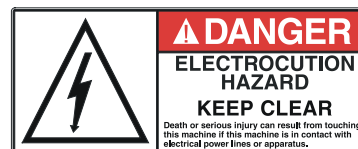
0081441



Right Side



0073298



0323896



0072531

⚠ WARNING

YOU MUST NOT OPERATE THIS DEVICE UNLESS:

1. YOU HAVE BEEN TRAINED IN THE SAFE OPERATION OF THIS DEVICE AND
2. YOU KNOW AND FOLLOW THE SAFETY AND OPERATING RECOMMENDATIONS CONTAINED IN THE MANUFACTURER'S MANUALS, YOUR EMPLOYER'S WORK RULES, AND APPLICABLE GOVERNMENTAL REGULATIONS.

AN UNTRAINED OPERATOR SUBJECTS THEMSELVES AND OTHERS TO DEATH OR SERIOUS INJURY.

0323897

⚠ DANGER

FAILURE TO COMPLY TO THE FOLLOWING RULES CAN RESULT IN DEATH OR SERIOUS INJURY.

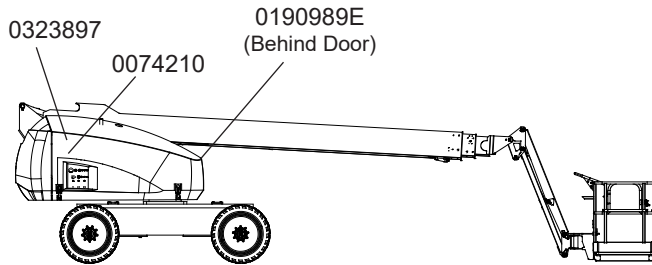
ELECTROCUTION HAZARD

- Do not operate this machine unless you are a qualified operator and have read and thoroughly understand all information given in the Operator's Manual and on DANGER and CAUTION signs on this machine.
- This machine is not electrically insulated. Maintain 10 feet minimum clearance from electrical power lines and apparatus.

TIPPING & FALLING HAZARD

- Do not exceed the platform capacity shown on the platform.
- Do not operate this machine on soft or unstable ground.
- Only operate this machine on firm, level surfaces.
- Do not use machine as a crane, hoist, or jack, and do not position machine against another object to steady the platform.
- Do not use machine if not functioning properly or damaged in any way.
- Do not modify or alter this machine.
- Use only Snorkel approved replacement parts.
- See the Operator's Manual for other hazard information.

0074210



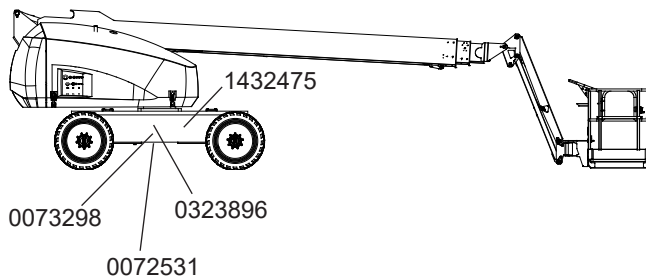
Left Side



0190989E

Snorkel 1-800-252-2117 <small>Snorkel USA, LLC</small> <small>1325 Empire Road</small> <small>Hammondsport, NY 13355</small>		SERIAL NUMBER _____	
TYPE MEWP MODEL NUMBER _____ MONTH / YEAR OF MANUFACTURE _____	SLOPE SENSOR/ALARM SETTING FEET: _____ IN: _____	MAXIMUM WHEEL LOAD lbs _____ kg _____	BATTERY DRIVE MODELS BATTERIES: _____ V, _____ Ah CHARGER INPUT: _____ V
EMPTY VEHICLE WEIGHT _____ lbs ENGINE POWERED MODELS MAXIMUM OUTRIGGER LOAD _____ kg MAXIMUM GRABABILITY _____ ft	MAXIMUM ALLOWABLE MANUAL FORCE (SIDE FALL) _____ lbs MAXIMUM PLATFORM HEIGHT _____ ft MAXIMUM DRIVE HEIGHT _____ m	MAXIMUM ALLOTTED WHEEL WIND SPEEDS Indoors _____ m/s Outdoors _____ m/s	MAXIMUM PLATFORM RESILT _____ m MAXIMUM DRIVE HEIGHT _____ m UNRESTRICTED PLATFORM CAPACITY _____ lbs _____ kg
⚠ CAUTION ⚠ Do not remove any weight from this machine. Any weight added must be distributed equally on each axle. Axle weights, with machine in the stowed position: STEER AXLE _____ lbs _____ kg DRIVE AXLE _____ lbs _____ kg			

1432475



Left Side

⚠ DANGER

MACHINE TIPOVER HAZARD
 DEATH or serious injury can result if machine tips over.

This machine is equipped with foam filled or solid tires, wheel weight is critical for stability.

To prevent machine tip over, replace tires with factory approved foam filled or solid tires ONLY.

DO NOT attempt to inflate foam filled or solid tires.

0073298

⚠ DANGER

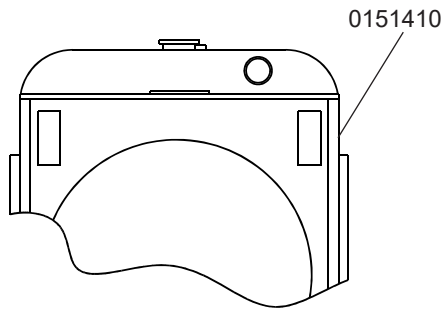
ELECTROCUTION HAZARD
KEEP CLEAR

Death or serious injury can result from touching this machine if this machine is in contact with electrical power lines or apparatus.

0323896

⚠ DANGER **ELECTROCUTION HAZARD**
 This machine is not electrically insulated.

0072531



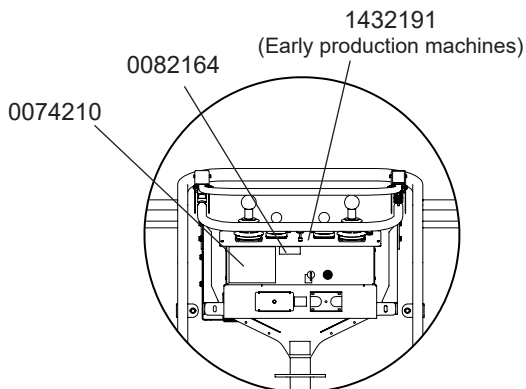
Radiator



0151410



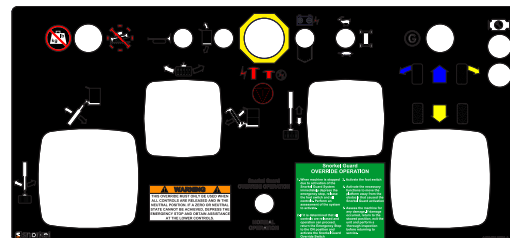
0074210



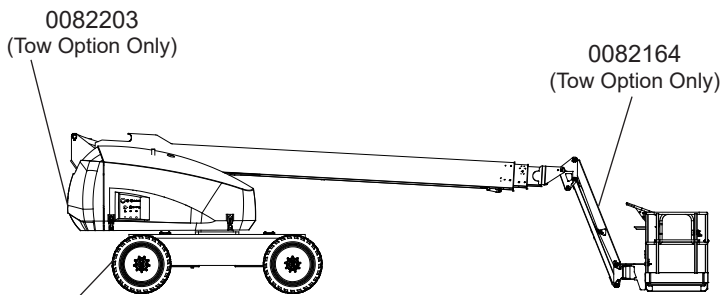
Upper Controls



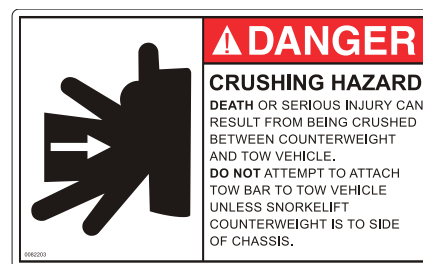
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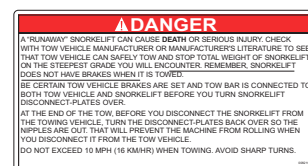
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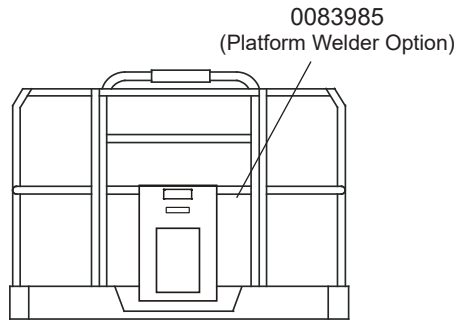
Left Side



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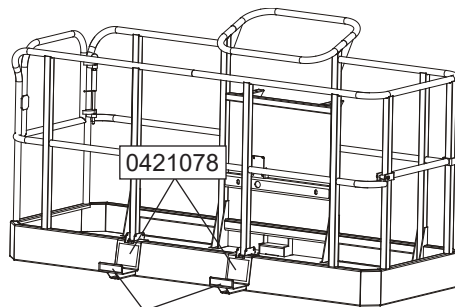
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Platform



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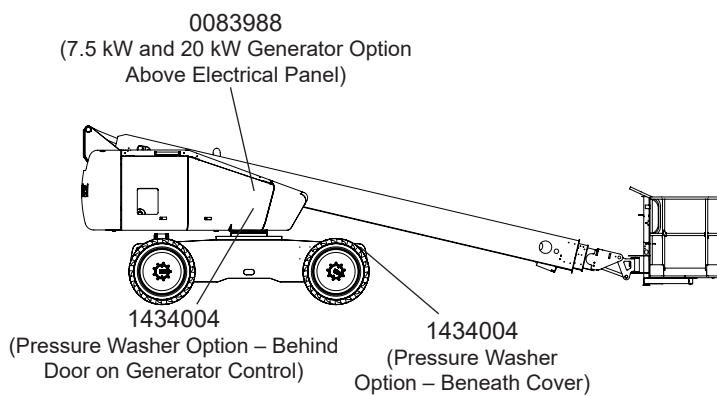
Platform Glazier Package



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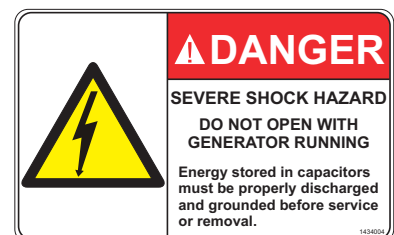
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Left Side



0083988



1434004

Prestart Inspection Checklist

Item	Inspect For	P/F/R
Operator's Manual	In place, all pages readable and intact	
Engine		
Oil level	Between full and add marks	
Coolant	Proper fluid level	
Radiator	Cap tight, good condition and clean	
Fuel tank and line	Tank full, cap in place and tight/no leaks	
Electrical System		
Batteries	Condition and charged for proper operation	
Battery fluid level and terminals	Proper level/clean, connectors tight	
Cables and wiring harness	No wear or physical damage	
Hydraulic System		
Fluid level	Between full and add marks	
Hoses, tubes, and fittings	No leaks	
Cold weather warm-up	Proper operation	
Tires		
Foam filled	Good condition	
Wheels	All wheel lug nuts present and properly torqued	
Lower Control Station		
Operating controls	Proper operation	
Emergency stop and emergency power	Shuts off lower controls/proper operation	
Emergency Lowering	Proper operation	
Level Sensor	Sounds tilt alarm	
Flashing Light	Proper operation	
Structures		
Weldments – Chassis, turntable, booms, platform, etc.	Welds intact, no damage or deformation	
Slide pads	In place, no damage or deformation	
Wire ropes	No deformation or broken strands	
Fasteners	In place and tight	
Upper Control Station		
Guardrail system and fall protection anchors	Welds intact, no damage or deformation	
Panel carrier	No damage or deformation of cradles and hook	
Operating controls – Boom functions, drive, brakes, etc.	Proper operation/drive motion alarm sounds	
Emergency stop and emergency power	Shuts off upper controls/proper operation	
Horn	Sounds when activated	
Snorkel Guard	Proper operation	
Electrical power outlet – GFCI	Proper operation	
Level Sensor		
Machines manufactured before April 2021	Sounds tilt alarm	
Machines manufactured after March 2021	Unstowed disables boom/drive, alarm/tilt light on	
Drive Motion Alarm	Sounds when machines is driven	
Sandblast Protection Kit	In place and proper operation	
Air Line to Platform	No damage or deformation, caps in place	
Drive and Working Lights	No damage or deformation, proper operation	
Tow Kit	In place, no damage or deformation	
Platform Glazier Package	No damage or deformation of trays, pins, and straps	
Platform Welder/Generator	No damage or deformation, proper operation	
Placards and Decals	In place and readable	

Maintenance Table Key: P = Pass, F = Fail, R = Repaired

Performed by: _____ Date: _____

Model Number: _____ Serial Number: _____

Inspection and Maintenance Schedules

Caution

Frequency and extent of periodic inspections may depend on national regulations.

The complete inspection consists of periodic visual and operational checks, along with periodic minor adjustments that assure proper performance. Daily inspection will prevent abnormal wear and prolong the life of all systems. The inspection and maintenance schedule should be performed at the specified intervals and after prolonged periods of storage before returning the machine to service. Inspection and maintenance shall be performed by personnel who are trained and familiar with mechanical and electrical procedures.

Warning

Before performing preventative maintenance, familiarize yourself with the operation of the machine. Always block the elevating assembly whenever it is necessary to perform maintenance while the platform is elevated.

The Daily Preventative Maintenance Checklist has been designed for machine service and maintenance. Please photocopy the Daily Preventative Maintenance Checklist and use the checklist when inspecting the machine.

Chapter 8 – Operation

The aerial platform may be operated from either the lower or upper controls.

Danger

The aerial platform is not electrically insulated. Death or serious injury will result from contact with, or inadequate clearance from, an energized conductor. Do not go closer than the minimum safe approach distance as defined by ANSI or by national safety regulations.

Pinch points may exist between moving components. Death or serious injury will result from becoming trapped between components, buildings, structures, or other obstacles. Make sure there is sufficient clearance around the machine before moving the chassis, booms, or platform. Allow sufficient room and time to stop movement to avoid contact with structures or other hazards.

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Operate the aerial platform on a firm, flat, level surface. Avoid travel speeds and/or rough terrain that could cause sudden changes in platform position. Do not drive or position the aerial platform for elevated use near any drop-off, hole, slope, soft or uneven ground, or other tip-over hazard.

The platform rated load capacity is the total weight of the personnel and equipment that may be lifted in the platform.

The work loads are stated on the platform rating placard at the:

- rear of the platform
- lower controls
- upper controls

Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not exceed the capacity values indicated on the platform rating placard.

Capacity values indicate the rated lifting capacity and do not indicate aerial platform stability.

The operator bears ultimate responsibility for ensuring that the aerial platform is properly set up for the particular conditions encountered.

Cold Weather Start-Up

If the ambient temperature is 32°F (0°C) or below, the engine and hydraulic system oil may need to be warmed before operation. Do not operate the engine at more than a fast idle until the engine and hydraulic oil has had a chance to warm.

Cold, thick hydraulic oil does not flow well and may cause delay in response to control movement. Cold hydraulic oil may also cause cavitation and pump damage. The hydraulic system may be equipped with an optional cold weather warm-up kit.

Hydraulic System Cold Weather Warm-Up

Some machines may have a hydraulic fluid warm-up system that will automatically warm the fluid upon activating the warm-up switch. The hydraulic fluid may also be warmed manually if the machine is not equipped with the optional warm-up system.

Caution

Not all hydraulic fluid is suitable to use in the hydraulic system. Some have poor lubricating characteristics and may increase component wear. Only use hydraulic fluid as recommended.

Use cold weather hydraulic oil as recommended in the machine General Specifications in temperatures of 10°F (-12°C) or below.

Hydraulic System Warm-Up Switch

This system may be used to warm the hydraulic fluid when the ambient temperature is below 32°F (0°C) and boom movement is sluggish because of cold fluid.

There may be a toggle switch for the warm-up system on the lower control panel and/or one on the front of the upper control panel.

The engine must be running and the switch used to turn the system on must be at the same location that the engine was started. For example, if the engine was started from the lower controls, the warm-up switch at the lower controls must be used for the system to operate.

To operate the warm-up system:

1. Start the engine.
2. From the same control station that the engine was started, place the warm-up switch in the on position. The engine throttle speed will increase while the warm-up system is on.
3. After the hydraulic fluid has been warmed to operating temperature and the throttle speed returns to idle, place the warm-up switch in the off position.

Manually Warming The Hydraulic System

The hydraulic oil may be warmed by bottoming out the boom extension cylinder. Raise the main boom so it is horizontal and operate the boom retract function while the machine is stowed. With the cylinder bottomed out the oil flow will produce heat to warm the hydraulic oil.

⚠ Caution

Not all hydraulic fluid is suitable to use in the hydraulic system. Some have poor lubricating characteristics and may increase component wear. Only use hydraulic fluid as recommended.

Use cold weather hydraulic oil as recommended in the machine General Specifications in temperatures of 10°F (-12°C) or below.

Preparing for Operation

Use the following procedure to prepare the aerial platform for operation.

1. Perform a prestart inspection as described in Chapter 7.
2. Place the battery disconnect switch in the on position.
3. Close and latch the cowling doors.

Lower Controls

The lower controls override the upper controls. This means that the lower controls can always be used to operate the platform regardless of the position of the upper control emergency stop button.

Boom, turntable, and platform functions may be operated from the lower controls. The lower controls may be used for initial set up of the aerial platform, and for testing and inspection.

Use the following procedure to operate boom, turntable, or platform functions using the lower controls.

1. On dual fuel machines, set the fuel switch to either LPG or gasoline.
2. Open the shut-off valve on the tank if using LPG.
3. Pull the emergency stop button (refer to Figure 8.1) outward and place the control selector switch in the lower control position.

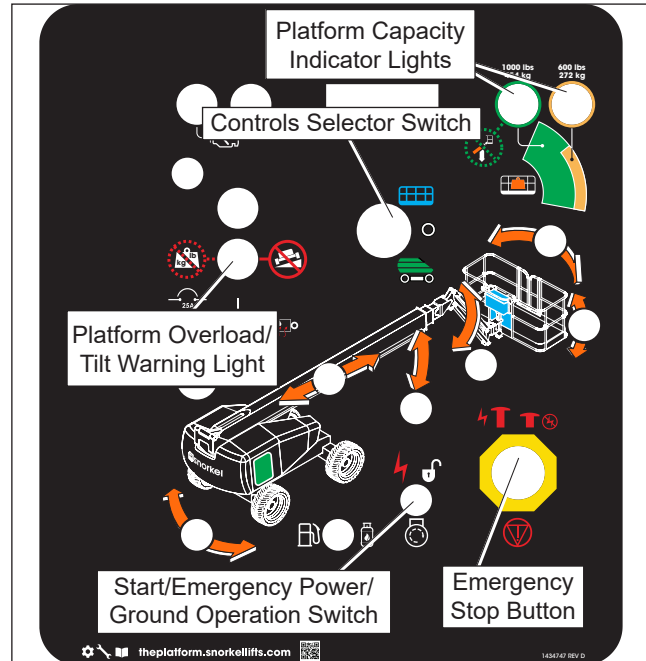


Figure 8.1 – Lower Controls

4. The start switch (refer to Figure 8.1) function works like an automobile ignition switch.

An alarm sounds when the switch is turned on to warn others that the machine engine is being started.

- Before starting the engine, check the Diagnostic Center LCD display window. WAIT TO START will be displayed if the engine is cold and the engine heater is on. The message may appear for 1 to 12 seconds, depending on the engine and ambient air temperature.
- Do not start the engine until the wait message is no longer displayed.
- If the engine turns over but does not start while the WAIT TO START message is displayed, turn the control selector switch to the middle/off position and back to the lower controls position. Do not start the engine until the wait message is no longer displayed.
- Hold the switch downward until the engine starts, then release it to on.
- If the engine dies, the controls switch must be turned to off before the engine can be restarted.

5. Hold the ground operation switch upward while operating the boom and turntable control toggle switches.

Note

If a machine function is not operated within 10 seconds of activating the ground operation switch, no functions will operate until the switch is released and again placed in the enable position.

6. Hold the appropriate toggle switch in the desired direction.
7. Release the toggle switch to stop movement.
8. Release the ground operation switch to the off position when no functions are being operated.

Upper Controls

The upper controls may be used for driving the aerial platform and positioning the booms and platform while on the job.

Use the following procedure to operate machine functions using the upper controls.

1. At the lower controls, pull the emergency stop button outward and place the control selector switch in the upper control position.
2. On dual fuel machines, set the fuel switch to either LPG or gasoline.
3. Open the shut-off valve on the tank if using LPG.
4. Enter the platform and securely close the gate.
5. Attach the fall protection lanyard to one of the anchor points.
6. Pull the emergency stop outward (refer to Figure 8.2).

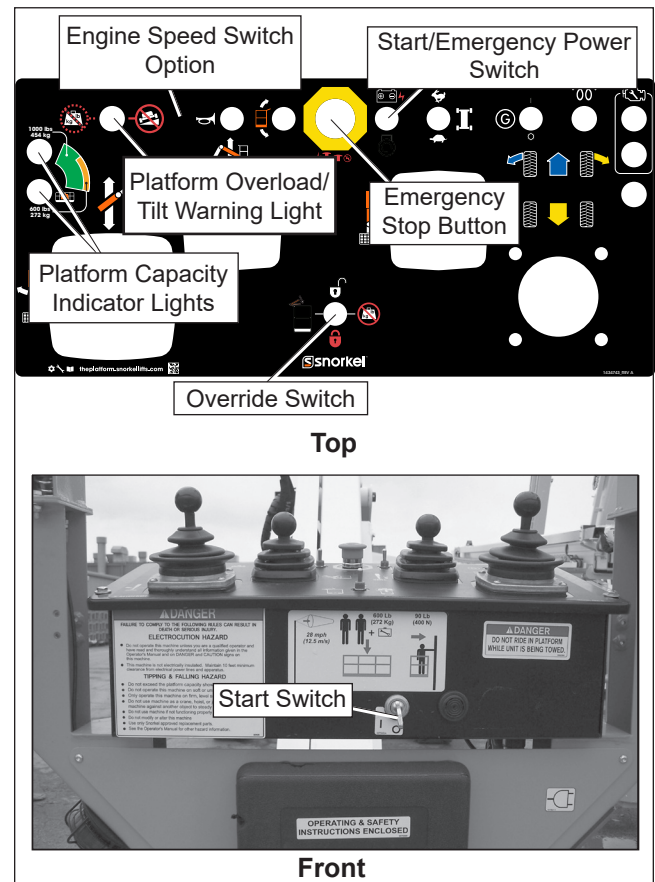


Figure 8.2 – Upper Controls

7. The start switch function is similar to an automobile ignition switch.

An alarm sounds when the switch is turned on to warn others that the machine engine is being started.

- Before starting the engine, check the amber engine warning light. The amber light will be flashing if the engine is cold and the engine heater is on. The amber light may flash for 1 to 12 seconds, depending on the engine and ambient air temperature.
- Do not start the engine until the amber light has stopped flashing.
- If the engine turns over but does not start while the amber light is flashing, turn the start switch to the off position and back to the on position. Do not start the engine until the amber light stops flashing.
- Turn the switch to start until the engine starts, then release it to on.
- If the engine dies, the switch must be released to off before it can be turned back to start.

Engine Speed Switch

The optional engine speed switch is to the left of the horn switch on the upper control panel (refer to Figure 8.2). It is used to set the engine idle speed to either high or low idle. When in the downward or low engine speed position, the engine idle speed is reduced to 1,300 rpm. Low speed may be used to operate with reduced engine noise.

Boom Operation

Use the following procedure to operate the turntable, boom, or platform functions.

1. Step down on the platform foot switch (refer to Figure 8.3). This switch must be held down to operate the upper controls.

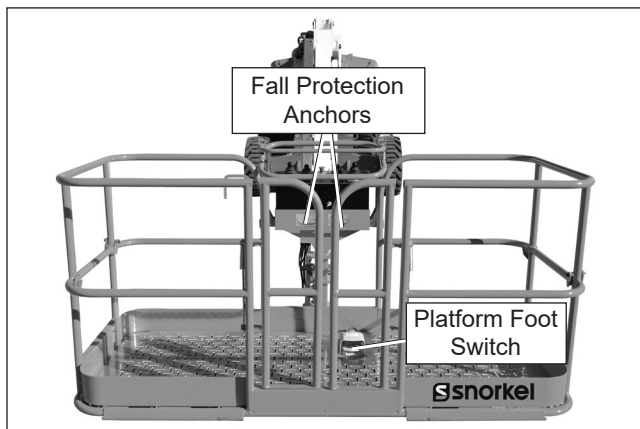


Figure 8.3 – Platform

Note

If a machine function is not operated within 10 seconds of activating the foot switch, no functions will operate until the switch is released and again placed in the enable position.

2. Hold the appropriate control in the desired direction. Always look in the direction of movement.
3. To stop movement release the control to its neutral position or release the foot switch.

Jib and Boom Simultaneous Operation

The jib and boom up/down functions may be operated simultaneously when the chassis tilt is less than 3.5 degrees. When the chassis is tilted 3.5 degrees or more, the jib and boom functions will not operate at the same time as each other.

Dual Platform Capacity System

The optional dual platform capacity system restricts the movement of the platform to keep it within safe work parameters, based on the boom position. The platform capacity will either be 600 lb or 1,000 lb.

The 1,000 lb capacity is active from the boom fully retracted position, to an extend limit that is determined by a boom length limit switch. When the boom is extended beyond the 1,000 lb capacity limit distance, the 600 lb

capacity becomes active until the main boom is elevated above a specific boom angle that is determined by boom angle sensors.

There are two indicator lights on the lower and upper control panels (refer to Figure 8.1 and 8.2) that indicate whether the platform is in the 600 lb or 1,000 lb region of the working envelope. Some boom control functions prevent positioning the boom into a restricted position. The dual platform capacity logic is shown in Figure 8.4.

Boom Extension	Boom Elevation	Load in Platform	Function	Capacity Light/Result
Retracted	Fully lowered	600 lb	Extend	1,000 lb/Can extend
At 600/1000 limit	Horizontal	600 lb	Extend	1,000 lb/Transition to 600 lb as boom is extended
At 600/1000 limit	Horizontal	1,000 lb	Extend	1,000 lb/Transition to 600 lb as boom is extended to limit, then extend and boom down become inactive with tilt/overload light illuminated. Can retract and boom up.
Fully Extended	Fully Elevated	1,000 lb	Boom Down	1,000 lb/Can boom down
Fully Extended	At 600/1000 limit	1,000 lb	Boom Down	1,000 lb/Transition to 600 lb as boom is extended to limit, then extend and boom down become inactive with tilt/overload light illuminated. Can retract and boom up.

Figure 8.4 – Dual Platform Capacity Logic

Driving and Steering

⚠ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not drive an elevated aerial platform on soft, uneven, or sloping surfaces. Do not drive on grades that exceed 45 percent.

For operation on grades up to 45 percent, it is recommended that the main boom be near horizontal and the jib be elevated just enough to provide adequate ground clearance.

A 45 percent grade is a 54" (1.4 m) vertical rise in 10' (3.05 m) horizontal length.

Avoid driving with the platform over the front end of the chassis. In this position the machine is difficult to control because:

- Drive and steer control movements and their resulting machine movements are reversed.
- When driving fast, sudden turns or stops produce more severe reactions to platform occupants.
- More turning space is required to prevent the platform from colliding with obstacles several feet beyond the path of the tires.

⚠ Warning

Death or serious injury could result from improperly driving or steering the aerial platform. Read and un-

Understand the information in this manual and on the placards and decals on the machine before operating the aerial platform on the job.

The blue and yellow arrows on the chassis indicate the direction the chassis will move when the drive or steer control is moved toward the corresponding color.

When the machine is in the stowed position, with the booms centered between the rear wheels, the direction of drive and steer control movement corresponds with the direction of chassis movement.

When the turntable is rotated from the stowed position, with the booms to either side of or in front of the chassis, the direction of control movement does not correspond with the direction of chassis movement.

- To avoid confusion, always drive to the work area or move between work areas with the turntable and booms in the stowed position.
- After arriving at the work area, the booms may be positioned to the side or the front of the chassis for final positioning.
- Always look in the direction of movement as indicated by the directional arrows on the chassis.

Use the following procedure to operate the drive and steer functions.

1. Determine the desired drive range for the specific driving conditions. Place the switch in the appropriate position to achieve the desired drive wheel operation.
 - Use high range (rabbit) when traveling across firm, flat, level surfaces. High range can only be activated when the booms are stowed. High range is for high speed, low torque operation.
 - Use low range (turtle) for driving on loading ramps or other steep grades and when safety considerations demand slow deliberate machine movement. Low range is for low speed, high torque operation.
2. Step down on the platform foot switch.
3. The drive speed is proportional to the joystick position.
 - Push the drive joystick forward to move the chassis forward, the direction of the blue arrow.
 - Pull the joystick backward to move the chassis backward, the direction of the yellow arrow.
4. To stop drive motion, return the joystick to neutral.
5. Steering is controlled with the drive joystick. The joystick controls the two front wheels to steer the aerial platform.

- To steer to the right, move the joystick to the right as indicated by the directional arrows on the chassis.
- To steer to the left, move the joystick to the left as indicated by the directional arrows on the chassis.

Note

The steering wheels are not self-centering. Set the steering wheels straight ahead after completing a turn.

6. After driving to the desired location, release the foot switch, or push the emergency stop button to apply the parking brakes.

Drive Speeds

The drive speed is proportional to the joystick position. The farther the joystick is moved, the faster the travel speed.

Always slow down and shift the drive system to low range before traveling over rough terrain or any sloped surface.

Drive speed ranges are interlocked through limit switches that sense the main boom position.

- When the main boom is elevated or extended, only the slowest drive speed will work regardless of the drive range switch position.
- To avoid a sudden speed change from high to low elevated boom speed, always bring the machine to a stop before raising the booms from the stowed position.

Warning

The potential for an accident increases when safety devices do not function properly. Death or serious injury could result from such accidents. Do not alter, disable, or override any safety device.

Do not use the aerial platform if it drives faster than 0.75 miles per hour (22 feet in 20 seconds) when any of the booms are out of the stowed position.

Pivoting Front Axle

The front axle control system allows the front axle to pivot while driving to keep all four wheels in contact with the ground for better traction and provides a smoother ride over rough terrain. When the machine is stationary, the system hydraulically locks the front axle to provide stability while using the boom functions.

Machine in Stowed Position

When the main boom is in the stowed position, centered over the rear axle, the boom can be extended and/or elevated above horizontal and the front axle will pivot while driving.

When the main boom is below horizontal and retracted, the maximum drive speed is 3.5 mph (5.6 km/h).

Machine Not in Stowed Position

When the turntable is rotated and the boom angle is greater than +/-20° from the stowed position and the main boom is not stowed, the oscillating axle lock-out cylinders will hydraulically lock to prevent movement of the front axle.

With the main boom either elevated above horizontal or extended, the maximum drive speed is limited to 0.75 mph (1.2 km/h).

Stow the main boom before driving the machine to reposition it when operating on uneven surfaces. With the boom stowed, the front axle pivots to keep all four wheels in contact with the ground surface.

Boom and Turntable Position/Axle and Drive Speeds

The position of the booms and turntable have a direct affect on whether or not the front axle will pivot and the maximum drive speed (refer to Figure 8.5).

Condition			Result	
Boom Angle	Boom Position	Turntable Position/Degree from Stowed Position	Axle Pivots?	Maximum Drive Speed
Below Horizontal	Retracted	Any	Yes	3.5 mph (5.6 km/h)
Above Horizontal	Retracted	Stowed – Boom over rear axle/0°	Yes	0.75 mph (1.2 km/h)
Above Horizontal	Extended	Stowed – Boom over rear axle/0°	Yes	0.75 mph (1.2 km/h)
Above Horizontal	Extended	+/- 20° CW or +/- 20° CCW	No	0.75 mph (1.2 km/h)

Figure 8.5 – Boom/Turntable Position Effect on Front Axle and Drive Speed

Drive Motion Alarm

The drive motion alarm sounds loud intermittent beeps anytime the machine is being driven.

Boom/Drive Cut-out

On machines manufactured after March 2021, boom and drive functions will be cut-out, disabled, when the main boom is elevated or extended from the stowed position and the ground slope exceeds the chassis slope sensor settings. The override switch may be used to stow the machine which then allows all functions to be returned to normal. The emergency power system may be used at this time as well.

When driving the machine unstowed onto a slope, at 4.5 degrees slope drive is paused, an audible two-tone alarm will sound, and the tilt warning light will come on. This warning indicates that the machine may be backed off the slope or stowed without the use of the override switch to do so. If the degree of slope continues to increase to 5 degrees, a constant alarm will sound and boom and drive functions will become disabled requiring the use of the override control to stow the machine.

Platform Overload Sensing System

When the platform is at full capacity, the platform overload light at the lower and upper controls (refer to Figures 8.1 and 8.2) will be solid on.

When the platform overload limit is exceeded, all functions are stopped from the upper and lower controls. The horn will sound intermittently and the platform overload lights will blink until the excess load is removed from the platform. At that time, the machine functions are again operational.

If the platform becomes significantly overloaded, or if an upward force on the platform is near rated platform capacity, the system will enter into error mode, stopping all functions from the upper and lower controls. The horn will then sound constantly and the overload light will stay illuminated at the upper and lower controls.

The system will remain in error mode until the excess load is removed from the platform and the emergency stop button or start switch is cycled off and back on, resetting the system. At that time, the machine functions are operational.

⚠Caution

The emergency power system is for emergency lowering and stowing only. The length of time the pump can be operated depends on the capacity of the battery. Do not use this system for normal operation.

If the platform overload sensing system is tripped while operating the machine or if the system is in error mode and can not be reset, the emergency power system may still be used for emergency machine operation from either the lower or upper controls.

⚠Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not exceed the capacity values indicated on the platform rating placard.

The overload sensing system is not active when the machine is being driven with the booms in the stowed position. This allows the machine to be driven without the system sensing an overload due to rough ground conditions.

To eliminate repeated tripping of the system during machine operation, there is a five second delay in machine functions following:

- starting the engine.
- removing excess load from the platform.

Snorkel Guard

The Snorkel Guard is a mechanically activated guarding system which offers an additional level of protection to the operator at the upper controls.

If an operator is involuntarily pushed against the spring-loaded Snorkel Guard rail that is mounted above the upper control panel, the machine functions are disabled.

When the Snorkel Guard is activated:

- the horn sounds.
- the blue light under the upper control panel flashes.
- only main boom down and jib down functions will operate.

The lower controls are not affected by the Snorkel Guard activation.

Override Switch

The override switch at the upper controls may be used to override the Snorkel Guard, platform overload system, bumpguard system, or boom/drive cut-out, when either is activated.

When the platform overload system is activated, the override or the emergency power switch (refer to Figure 8.2) at the upper controls may be used to override the system to operate main boom up/down/retract, jib boom up/down, or turntable rotation and drive functions. The switch is spring returned to the normal operation position.

When the Snorkel Guard system is activated, the override switch (refer to Figure 8.2) at the upper controls may be used to override the system to operate main boom up/down/retract, jib boom up/down and turntable rotation functions.

Warning

The potential for an accident increases when safety devices do not function properly. Death or serious injury could result from such accidents. The override switch must only be used when all controls are released and in the neutral position. If a zero or neutral state cannot be achieved, depress the emergency stop and obtain assistance at the lower controls.

1. When the machine is stopped due to activation of the Snorkel Guard system or overload, immediately depress the emergency stop, release the foot switch and all controls. Perform an assessment of the situation which caused the system to activate.
2. If it is determined that all controls are released and operation can proceed, return the emergency stop to the on position, and activate the override switch.
3. Activate the foot switch.

4. Activate the necessary functions to move the platform away from the obstacle that caused the Snorkel Guard activation or if due to an overload fault, retract the booms then lower in a safe condition.
5. Assess the machine for any damage. If damage occurred, return to the stowed position, exit the unit and perform a thorough inspection before returning to service.

Gradeability

Machine gradeability refers to the maximum slope that the aerial platform is capable of travel under practical conditions. It is based on mathematical calculation, but it also takes into account the practical application.

At any given moment when driving the machine on a slope, at least one, if not all, of the factors contributing to achieving theoretical gradeability will not be at optimal performance. For example, tire contact may not be the same at each drive wheel or the slope conditions may not be optimal, which would then allow for loss of traction.

Percent vs. Degree of Slope

Gradeability is most often referenced as a percentage. That value is based on a slope angle of 45° representing 100% grade.

Angle indicators, or inclinometers, often measure the angle of the slope in degrees not the percent slope. Because of that, it may be useful to understand the relationship between percent slope and the degree of the slope angle as shown in Figure 8.6.

Driving on a Slope

The machine should only be driven on a slope or loading ramp in the stowed position with the platform on the downhill side.

Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not drive on slopes that exceed 45 percent grade, or where conditions of the slope could cause driving to be hazardous.

Place the drive range switch in the low position before attempting to drive the machine on a slope.

Drive the aerial platform only on slopes, or loading ramps that are within the 45 percent grade capability of the aerial platform.

Calculate the percent grade:

- before attempting to climb an unknown grade
- if it is believed that there is a malfunction to determine if the slope is within the actual grade capability of the aerial platform.

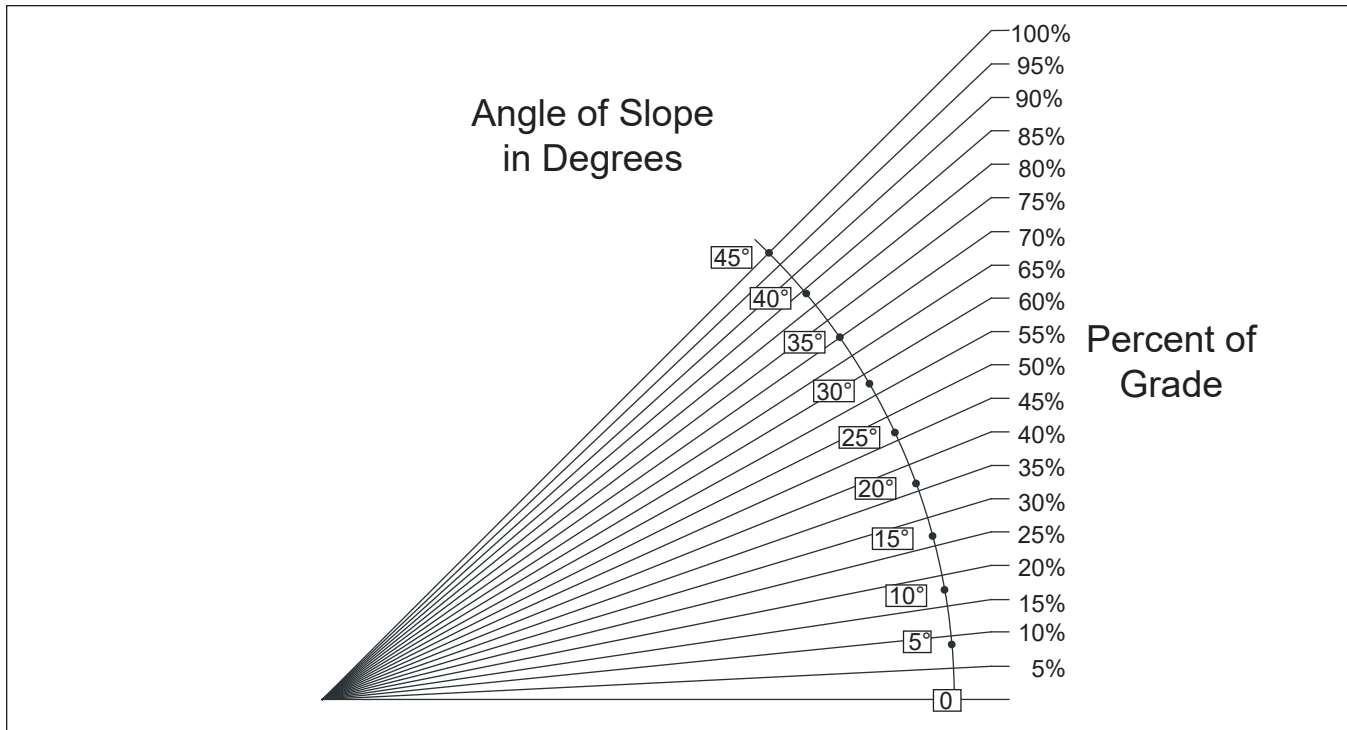


Figure 8.6 – Slope Percent/Degree Conversion

Calculating Percent Grade

The percent grade equals the height (rise) of the slope divided by the length (run) times 100. Refer to Figure 8.7.

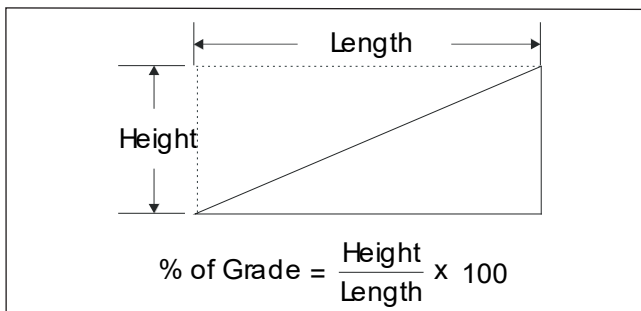


Figure 8.7 – Percent Grade Formula

The grade can be measured with an inclinometer or by using a tape measure, a level, and a straight 2 x 4. If using an inclinometer, refer to the conversion diagram if necessary.

To measure the grade without an inclinometer, use the following procedure.

1. With the 2 x 4 laying parallel with the slope, lay the level lengthwise on the 2 x 4.
2. Holding the downhill end, raise the 2 x 4 until the level indicates that the board is level (refer to Figure 8.8).

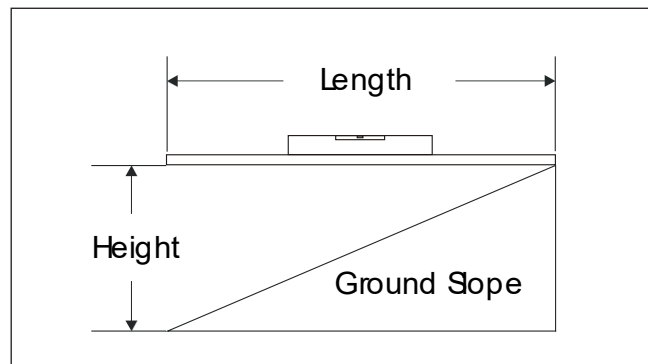


Figure 8.8 – Percent Grade Calculation

3. Use the tape measure to measure the distance (height) from the end of the 2 x 4 to the ground. Record the height distance.
4. Measure the length of the 2 x 4 and record this measurement.
5. Use the formula in Figure 8.6 to calculate the percent of the grade.

Machine Gradeability

The gradeability specification for the 660SJ aerial platforms is 45%. An actual gradeability of 45%, indicates that in most normal working conditions the machine can be driven on a slope with an angle of 24.2 degrees.

Electrical Power Outlet

The electrical outlets at the platform have 2, 3-prong, 110 volt AC electrical connectors. Their combined output is limited by a 15 amp circuit breaker.

Power may be supplied to the outlet using an external power source or by operating the optional AC generator.

To use the outlet, plug a source of power into the power-input connector on the left side of the turntable. Unplug the source of power before moving the aerial platform.

AC Generator

The optional generator supplies power to the electrical outlet when the engine is running. Boom and drive functions will operate at reduced speeds while the generator is operating.

To supply power to the electrical power outlet, start the engine and place the machine/generator switch (refer to Figure 8.9) in the generator position.

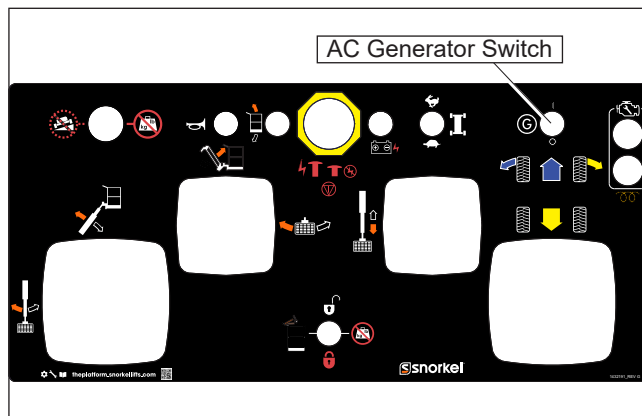


Figure 8.9 – Upper Controls

The engine will run at high idle while the generator is operating. The generator will continue to operate as long as the engine is running and the switch is in the generator position.

AC 20 kW Generator Switch – Platform Welder

The switch for the optional AC 20 kW generator (refer to Figure 8.10) to power a platform welder, is located on the top of the upper control panel. The switch may be used to operate the generator for welding or plasma/gouge cutting. In the center position the generator is off.

With the engine running, place the switch in the appropriate position to provide electrical power to operate the welder. The engine rpm will increase when the switch is placed in one of the on positions. Return the switch to the off position to turn off the generator and resume machine operation.

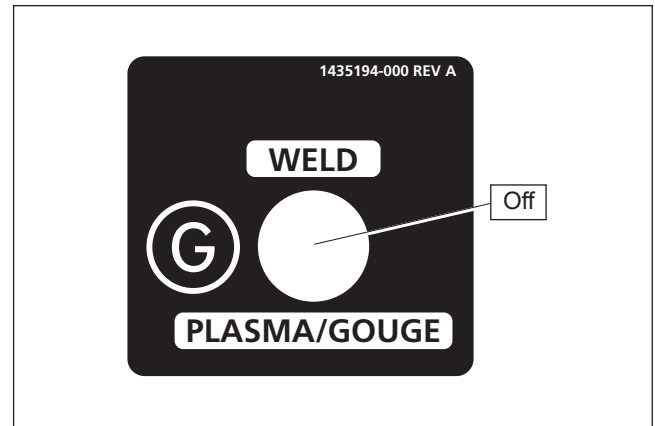


Figure 8.10 – 20 kW Generator Switch

The engine will run at higher idle speed while the generator is operating. The generator will continue to operate as long as the engine is running and the switch is in one of the two generator positions.

Boom and drive functions will operate at reduced speeds while the generator is operating.

Dual Fuel

A dual fuel switch is located on the front of the lower control panel and on the top of the upper control panel.

Before starting the engine, place the fuel switch in the gasoline or the LPG position. Open the shut-off valve on the LPG gas tank if using LPG. Always keep the LPG tank shut-off valve closed when not using LPG.

To switch from gasoline to LPG with the engine running:

1. Open the shut-off valve on the LPG tank.
2. Place the fuel switch in the LPG position.

To switch from LPG to gasoline with the engine running:

1. Place the fuel switch in the gasoline position.
2. Close the shut-off valve on the LPG tank.

Panel Carrier

The panel carrier allows the platform operator to position a panel at the work place.

The panel carrier includes two cradles at the bottom rear of the platform and a hook to place over the panel (refer to Figure 8.11).

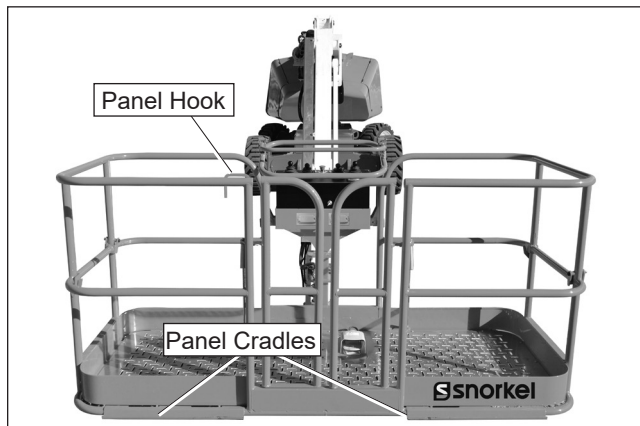


Figure 8.11 – Panel Carrier

The panel carrier is designed to carry a maximum size panel of 4' x 8' (1.2 m x 2.4 m), with a maximum area of 32 ft² (3m²).

Place the panel on the cradles so its longest dimension is across the cradles. The hook should be placed over the panel at its shortest dimension, not to exceed 48" (1.2 m).

Platform Capacity

The platform rated load capacity is the total weight of the personnel and equipment that may be lifted in the platform. The work load is stated on the platform rating placard mounted on the toeboard at the rear of the platform. Do not exceed the rated load capacity.

The maximum total load carried by the panel carrier must not exceed 50 lb (22.7 kg). The weight of the load on the panel carrier reduces the platform capacity by the amount of the load.

▲Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. The panel carrier may increase wind loads on the machine. Do not load the panel carrier anytime the wind speed is greater than 28 mph (12.5 m/s).

Do not operate the machine with a load on the panel carrier unless you have been fully trained and understand the hazards associated with lifting panels attached to the platform.

Diesel Particulate Filter Regeneration

Deutz Stage 5 diesel engines use a diesel particulate filter (DPF) system to regulate exhaust emissions. The soot collected in the filter in most instances is burned off during normal engine operation to clean the filter.

A standstill, or manual regeneration to burn off the soot from the filter, is required approximately every 500 engine hours. This time frame may vary based on engine usage. The DPF light on the lower and upper control panel will illuminate when manual regeneration is required. The

warning lights indicate messages to the machine operator as indicated:

- 1 flash every 2 seconds – DPF regeneration is required within the next 50 hours.
- 3 flashes every second – the DPF regeneration is outside of the 50 hour requirement, requiring a service call to reset the system.

▲Caution

The potential for engine damage increases when soot builds up in the diesel particulate filter. Failure to perform a manual regeneration when indicated may cause severe engine damage. Perform a manual regeneration when indicated by the DPF indicator lamp to avoid engine damage.

The manual regeneration should be performed by qualified personnel. This procedure requires the engine to run continuously, and may take up to an hour or more.

No boom functions are allowed during the regeneration process. If a boom function is operated during this process, the cycle will be disrupted and it will be required to perform the regeneration again. The machine should not be left unattended during the regeneration process.

Use the following procedure to perform a manual regeneration:

1. Verify the fuel level is sufficient for one hour of engine operation.
2. Position the machine in a well ventilated area.
3. Open the cowling doors as the engine surfaces will be hot during the process.
4. Start the engine from the lower controls.
5. Place the DPF switch (refer to Figure 8.12) in the upward position.

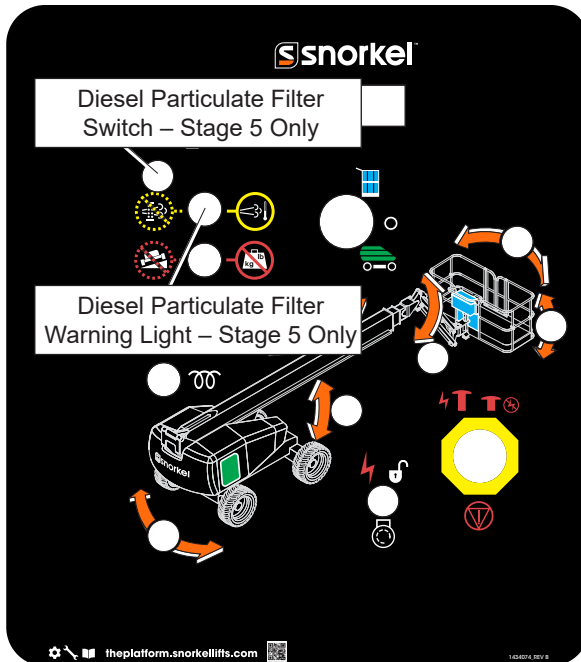


Figure 8.12 – Deutz Stage 5 Lower Controls

6. Once the regeneration process has started the DPF warning light will stay on solid until the regeneration is complete.
7. Allow the manual regeneration to complete without interruption. If a boom function is operated during this process, the cycle will be disrupted and it will be required to perform the regeneration again.
8. When the complete, the engine speed will decrease to idle and the warning light will go off.
9. Turn the engine off and re-start to reset the exhaust emissions system .

Air Line

The optional air line may be used to conduct air for tool operation at the platform.

- The input connector is on the left side of the turntable and the output connector is at the platform on the rotator guard.
- The maximum working pressure of the line is 250 psi (1,723 kPa).

The air line may be used to conduct fluids such as water or antifreeze. Contact Snorkel for compatibility information before using the air line to conduct other fluids.

⚠ Caution

Fluid in the air line may damage some air tools or freeze and damage the line. Drain and blow out the air line after using it to conduct fluids.

Use the following procedure to drain the air line.

1. Close the input connector on the left side of the turntable.
2. Open the output connector at the platform.
3. Raise the main booms slightly above horizontal.
4. Open the input connector on the turntable.
5. Allow the fluid to drain from the line.
6. Lower the boom and close both connections.

Driving Lights

The optional driving lights are for use in dimly lit areas and are not intended for driving on public roadways. There are two headlights at the front of the chassis and two blinking taillights at the rear of the chassis.

The lights are operational when the machine is set up for operation from the upper controls and the light switch is turned on.

If the engine is running, the idle speed increases when the driving lights are turned on.

Note

Working with the driving or platform work lights on, while the engine is off, can discharge the batteries enough that the engine will not start or the emergency power system will not operate. If the engine cannot be left running while the lights are on, start and run the engine for at least 15 minutes each hour.

Platform Work Lights

The optional platform work lights are located on the top rail of the platform next to the upper controls (refer to Figure 8.13). The tilt of the light can be adjusted by using two $\frac{1}{2}$ " wrenches to loosen the bolt below the light. The light can be rotated by using a $\frac{9}{16}$ " wrench.

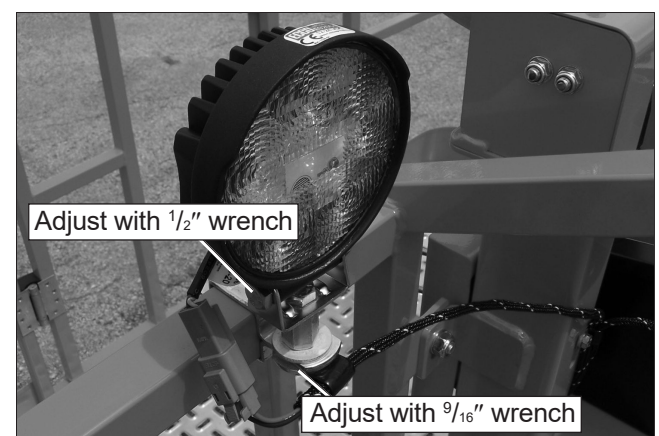


Figure 8.13 – Upper Controls

The lights are operational when the machine is set up for operation from the upper controls.

Platform Glazier Package

The glazier package allows the platform operator to position glass at the work place. Refer to the Glazier Package manual (Snorkel Part Number 0421269) for information on proper use of the glazier package.

The package includes two lined trays with keeper pins, platform rail padding, and tie-down straps with protectors (refer to Figure 8.14).

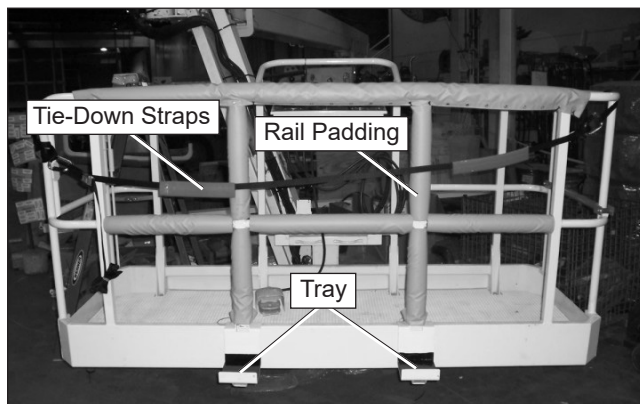


Figure 8.14 – Glazier Package

Platform Capacity

The platform rated load capacity is the total weight of the personnel and equipment that may be lifted in the platform. The work load is stated on the platform rating placard mounted on the toeboard at the rear of the platform. Do not exceed the rated load capacity.

The maximum total load carried by the glazier trays must not exceed 250 lb (113 kg). The weight of the load in the trays reduces the platform capacity by the amount of the load.

⚠Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. The glazier package may increase wind loads on the machine. Do not load the glazier trays anytime the wind speed is greater than 28 mph (12.5 m/s).

Do not operate the machine with a load on the glazier trays unless you have been fully trained and understand the hazards associated with lifting panels attached to the platform.

Platform Welder

The platform welder package allows the platform operator to perform continuous duty stick and TIG welding from the platform. Refer to the Platform Welder Package manual (Snorkel Part Number 0083991) for information on proper operation of the welder package.

The package includes a Lincoln® V275-S welder mounted in the platform (refer to Figure 8.15). Power is supplied to the welder by a hydraulically driven generator mounted on the turntable.

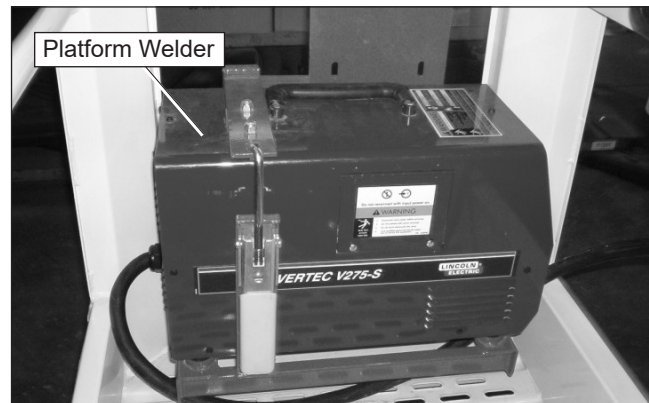


Figure 8.15 – Platform Welder

The welder package includes the following features.

- Lincoln® V275-S welder
- 208 VAC 3-phase generator
- Circuit protection (overcurrent and ground fault)
- Fire extinguisher mounted at the platform

Platform Capacity

The platform rated load capacity is the total weight of the personnel and equipment that may be lifted in the platform. The work load is stated on the platform rating placard mounted on the toeboard at the rear of the platform.

The welder and its associated accessories are considered as equipment and reduces the platform capacity by 110 lb (50 kg).

Pressure Washer

The optional pressure washer may be used for high pressure washing from the platform. The system consists of a generator, generator control, a pressure washer, and a wand with a hose reel at the platform.

The pressure washer specifications are:

- 3,500 psi – adjustable
- 4.8 gpm
- Two 150 gallon water tanks
- Noncontinuous turntable rotation – 180° cw/180° ccw
- Reduced function speeds to 50% when generator in on

Use the following procedure to operate the pressure washer.

1. Fill both of the water tanks with clean water. A garden hose may be attached to the fitting on the side of the pressure washer as a water source also (refer to Figure 8.16).

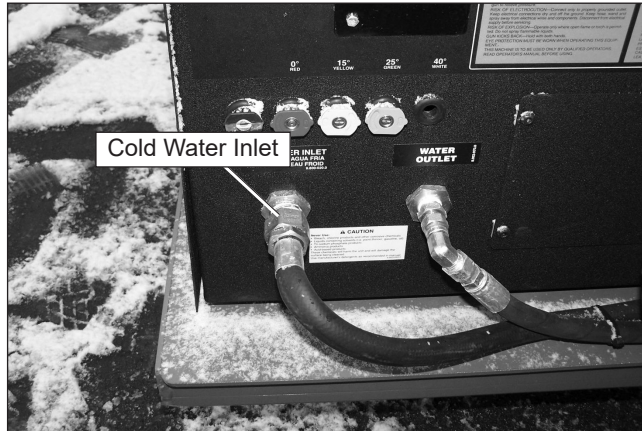


Figure 8.16 – Pressure Washer

2. If a garden hose water source is used, the source switch on the right side of the turntable must be switched downward to the off position. Otherwise, this switch must always be in the upward, on position (refer to Figure 8.17).



Figure 8.17 – Water Source Switch

3. From the upper controls, start the engine and place the machine/generator switch (refer to Figure 8.9) in the generator position.
4. The engine will run at high idle while the generator is operating. The generator will continue to operate as long as the engine is running and the switch is in the generator position.

⚠ Danger

The generator control contains electrical energy stored in capacitors. Death or serious injury will result from contact with, or inadequate clearance from, an energized conductor. Do not open the generator or pressure washer control access doors with the generator running. Energy stored in capacitors must be properly discharged and grounded before service or removal.

5. Do not open the generator or pressure washer control access doors with the generator is running.

6. The pressure washer is enabled when the generator is running.
7. Remove the wand from the holder in the platform to operate the pressure washer.

The water pressure may be adjusted using the knob beneath the pressure washer cover (refer to Figure 8.18).

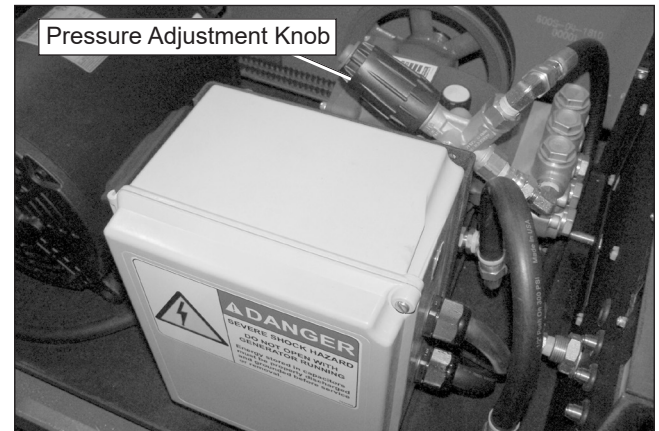


Figure 8.18 – Pressure Adjustment

Pipe Rack

Some machines may be equipped with an optional pipe rack. The pipe rack consists of a pair of supports, mounted to the top and mid rails, one on each side of the rear of the platform (refer to Figure 8.19).

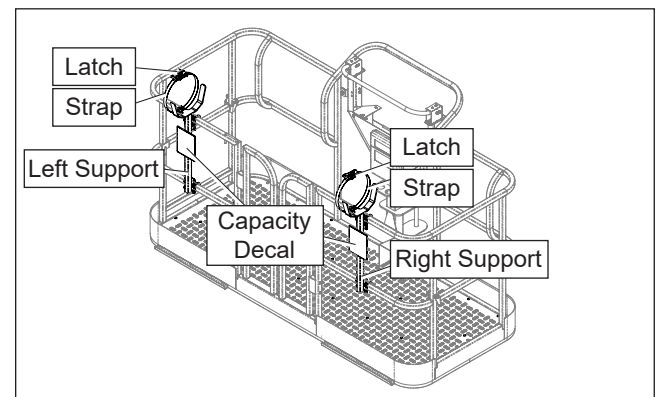
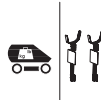
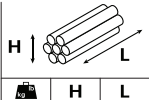
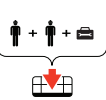


Figure 8.19 – Pipe Rack

⚠ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tipover accident. Do not exceed the capacity values indicated on the platform rating placard and on the pipe rack decal.

The rated load per pair of supports and the platform total capacity including the load on the pipe rack is stated on the pipe rack decal shown in Figure 8.20.

<div style="background-color: red; color: white; padding: 5px; text-align: center;"> ⚠ DANGER ⚠ </div>					
					
		H	H	L	
227kg (500 lbs)					147kg (325 lbs)
272kg (600 lbs)	11kg (25 lbs)	68kg (150 lbs)	150mm (6 in)	305cm (10 ft)	193kg (425 lbs)
454kg (1000 lbs)					374kg (825 lbs)

ENSURE PIPES ARE CENTERED AND OVERHANGS ARE KEPT EQUAL. FIRMLY SECURE PIPES BEFORE OPERATION.

144763 REV C

Figure 8.20 – Pipe Rack Rated Load and Platform Capacity

A pipe rack decal is located on the front of each support at the rear of the platform.

The platform rated work load is the total weight of the personnel and equipment that may be lifted in the platform.

Capacity values indicate the rated lifting capacity and do not indicate aerial platform stability.

The load carried in the pipe rack reduces the platform capacity by the weight of the load being carried.

The platform capacity is reduced by the weight of the two supports and by the weight of the load being carried.

⚠ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tipover accident. Do not exceed the stated pipe length requirements or use with any other platform option.

The pipe rack is not to be used with any other platform option.

When loading the pipe rack:

- Pipe length cannot exceed 10 feet (305cm).
- The height of the pipes in the rack cannot exceed 6 inches (150mm).
- The load in the racks cannot exceed 150 lbs (68kg).
- Pipes must be centered and overhangs must be equal.

The operator bears ultimate responsibility for ensuring that the aerial platform is properly set up for the particular condition encountered.

Use the following procedure to load the pipe rack.

1. Make certain no one is beneath the platform when operating the machine with the pipe racks loaded.

2. At the front and rear, press on the latch lever to release the latch and unfasten the straps.
3. Place the load evenly on the left and right cradles. Do not exceed the rated load on the pipe rack per pair of supports. Refer to the capacity decals on the pipe rack supports and Figure 8.20.
4. Feed the straps through the latch and pull on the straps to secure the load.
5. Secure the load in the racks before operating machine functions.

Snorkel OnSite

Snorkel OnSite is powered by Trackunit telematics. OnSite provides real-time access to machine information such as machine status (on/off), hours, location, and battery level. This data can help identify usage and maintenance trends to maximize operator efficiency. An optional keypad may be used to limit access to only authorized personnel by PIN code or RFID card.

For more information, please refer to the Trackunit information provided with the machine. For Trackunit Technical Support email supportus@trackunit.com or phone 1-844-661-0340. When contacting Trackunit Technical Support, have the Trackunit serial number, (7 digits starting with 3) available to aid in troubleshooting. The serial number can be found on the fleet list or under Fleet/Unit Page/Telematics tab.

Tire Pressure Monitoring System – Flotation Tires Only

There are two tire pressure warning lights on the lower and upper control panels (refer to Figure 8.21).

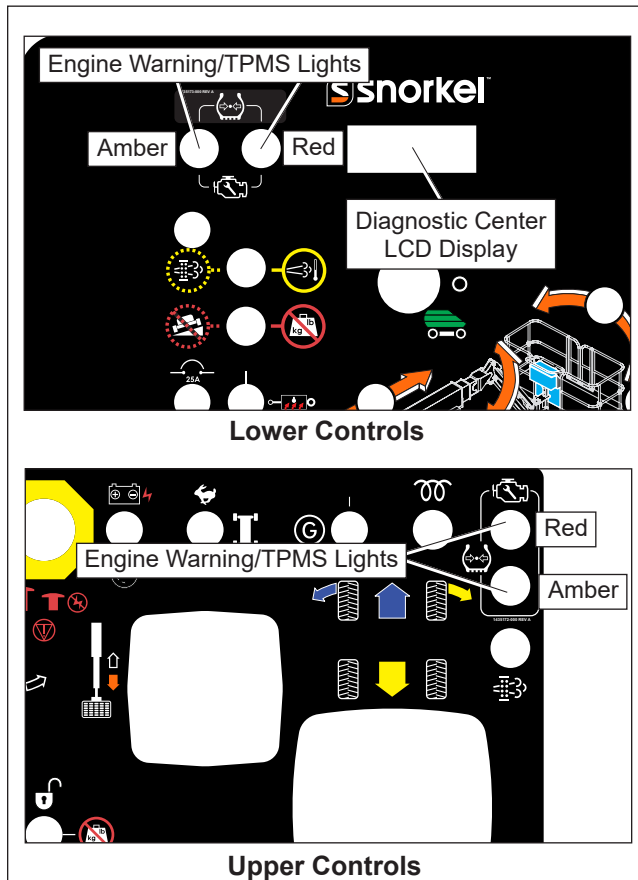


Figure 8.21 – Tire Pressure Monitor Pressure Indicators

The warning lights indicate messages to the machine operator as indicated:

- **Solid Red** – If any of the tires has pressure of only 75 psi the red warning light will be illuminated and the LCD panel at the lower controls will display **FAULT: TIRE PRES.** Stop operation of the machine and air-up the tire(s) as required.
- **Solid Amber** – If any of the tires has pressure of only 90 psi the amber warning light will be illuminated and the LCD panel at the lower controls will display **WARN: TIRE PRES.**

Tire pressure should be maintained at 100 psi.

After Use Each Day

1. Ensure that the platform is fully lowered.
2. Park the machine on a firm level surface, preferably under cover, secure against vandals, children and unauthorized operation.
3. Turn the controls selector switch to OFF and remove the key to prevent unauthorized operation.

Chapter 9 – Stowing and Transporting

To prevent unauthorized use and damage, properly stow the aerial platform at the end of each work day. It must also be properly stowed while transporting.

Stowing

The properly stowed position is shown in Figure 9.1.

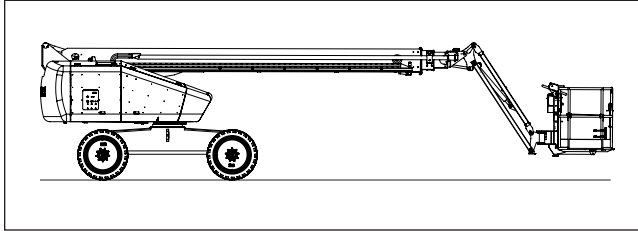


Figure 9.1 – Stowed Position

Use the following procedure to properly stow the aerial platform.

1. Rotate the platform so it is perpendicular to the end of the boom.
2. Fully retract the tip boom and then fully lower the main boom.
3. Lower the jib boom until the platform is near the ground to allow for exiting the platform.
4. Center the booms between the rear wheels.
5. If the engine has just been under load and is hot, let it idle for five minutes before turning the start switch off.
6. Turn the start switch off and place the platform control cover over the upper controls if the machine is equipped with that option.
7. Push the lower controls emergency stop button inward. Place the control selector in the center position and remove the key.
8. Turn the battery disconnect switch off.
9. On dual fuel machines, close the shut-off valve on the LPG tanks.
10. Close and latch the cowling doors.

Transporting

The aerial platform may be moved on a transport vehicle. Depending on the particular situation, the aerial platform may be driven, winched, or hoisted onto a vehicle such as a truck or trailer. Driving is the preferred method.

▲ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Do not drive the machine on ramps that

exceed 45 percent, or where conditions of the ramp could cause driving to be hazardous.

Drive the aerial platform onto the transport vehicle if the ramp incline is within the grade capability of the aerial platform.

A 45 percent grade is a 54" (1.4 m) vertical rise in 10' (3.05 m) horizontal length.

Use a winch to load and unload the aerial platform on ramps that exceed the grade capability of the machine. A winch may also be used when conditions of the ramp could cause driving to be hazardous.

The equipment used to load, unload, and transport the aerial platform must have adequate capacity. Refer to Chapter 2 to determine the approximate weight of the aerial platform.

The user assumes all responsibility for:

- Choosing the proper method of transportation.
- Choosing the proper selection and use of transportation and tie-down devices.
- Making sure the equipment used is capable of supporting the weight of the aerial platform.
- Making sure that all manufacturer's instructions and warnings, regulations and safety rules of their employer, the DOT and/or any other state or federal law are followed.

Driving

Use the following procedure to drive the aerial platform onto the transport vehicle.

1. Locate the transport vehicle so it is in a straight line with the loading ramp.
2. Chock the vehicle wheels so it cannot roll away from the ramp while the machine is loaded.
3. Remove any unnecessary tools, materials, or other loose objects from the platform.
4. Drive the machine to the foot of the loading ramp with the front wheels nearest the ramp. Make sure the machine is centered with the ramps and that the steering wheels are straight.
5. Rotate the platform so it is perpendicular to the boom.
6. Retract the tip boom and raise the main boom and jib so it is horizontal.
7. Rotate the turntable slightly to the side so you can see the front wheels.

8. Verify that the machine wheels, loading ramps, and transport vehicle are aligned.

⚠ Danger

The aerial platform can tip over if it becomes unstable. Death or serious injury will result from a tip-over accident. Set the drive range to low before driving up or down a grade.

9. Place the drive range switch in the low position.
10. Drive the aerial platform onto the transport vehicle in a straight line through the grade transitions with minimal turning.
11. Rotate the turntable to align the main boom between the rear wheels.
12. When driving down the ramp, always back the machine with the platform on the downhill side only.

Winching

Use the following procedure to winch the aerial platform onto the transport vehicle.

1. Locate the transport vehicle so the aerial platform will not roll forward after it is loaded.
2. Remove any unnecessary tools, materials, or other loose objects from the platform.
3. Drive the machine to the foot of the loading ramp with the front wheels nearest the ramp. Make sure the machine is centered with the ramps and that the steering wheels are straight.
4. Fully retract the tip boom. Lower the main boom as much as possible making sure there is adequate ground clearance between the platform and the ramp.
5. Attach the winch to the tie-down lugs (refer to Figure 9.2) on the front of the chassis by looping the chain or cable through the hole in the chassis and back out in between the chassis and the front axle.

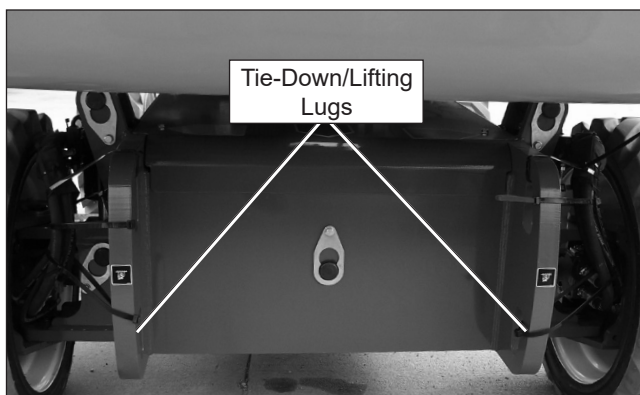


Figure 9.2 – Front Tie-Down/Lifting Lugs

6. At each drive wheel, remove the two bolts from the disconnect plate (refer to Figure 9.3). Turn the plate over so the nipple points inward. Reinstall the two bolts.

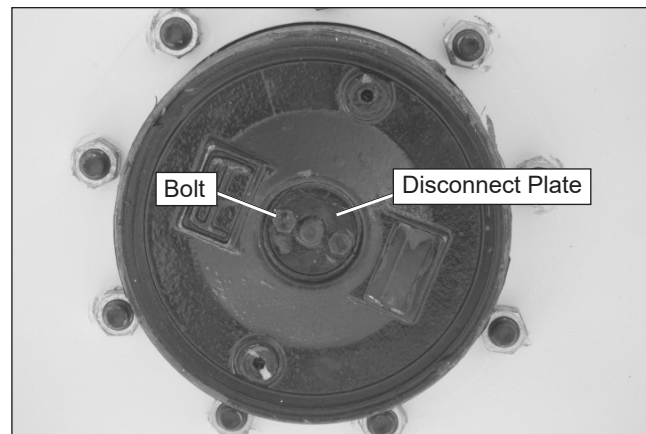


Figure 9.3 – Drive Wheel

7. Use the winch to position the aerial platform on the transport vehicle.

⚠ Warning

The aerial platform is free to move when the drive hubs are disabled. Death or serious injury could result. Re-enable the drive hubs before operating the aerial platform.

8. At each drive wheel, remove the two bolts and return the plate to its original position as shown in Figure 9.3.
9. Start the engine and operate the drive control in forward and reverse several times to engage the drive hubs.

Hoisting

Use a four point sling arrangement attached to the lifting lugs when hoisting the aerial platform. Machine damage can occur if the sling is attached to the booms, turntable, or platform.

⚠ Warning

The potential for an accident increases when the aerial platform is lifted using improper equipment and/or lifting techniques. Death or serious injury could result from such accidents. Use proper equipment and lifting techniques when lifting the aerial platform.

Know the weight of the aerial platform and the capacity of the lifting devices before hoisting.

- Lifting devices include the hoist or crane, chains, straps, cables, hooks, sheaves, shackles, slings, and other hardware used to support the machine.
- The empty vehicle weight is stamped on the serial number placard and is listed in Chapter 2.

The user assumes all responsibility for:

- Making sure the equipment used is capable of supporting the weight of the aerial platform.
- Making sure all manufacturer’s instructions and warnings, regulations and safety rules of their employer and/or any state or federal law are followed.

Use the following procedure to hoist the aerial platform onto the transport vehicle.

1. Properly stow the aerial platform.
2. Inspect the front lifting lugs (refer to Figure 9.2) and the rear lifting lugs (refer to Figure 9.4) to make sure they are free of cracks and are in good condition. Have any damage repaired by a qualified service technician before attempting to hoist the machine.

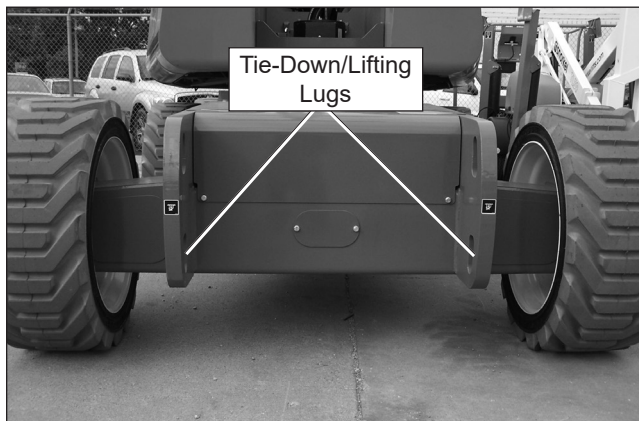


Figure 9.4 – Rear Tie-Down/Lifting Lugs

3. Remove all personnel, tools, materials, or other loose objects from the platform.
4. Connect the chains or straps to the lifting lugs using bolted shackles.

Do not run the sling cable through the lifting lugs.

- Cable damage and/or failure can result from the cable contacting the sharp corners of the lug.
 - There is no effective way of putting a corner protector in the hole of the lifting lug.
5. Use spreader bars of sufficient length to keep the chains, straps, or cables from contacting the turntable or booms.
 - When using cables, use rigid corner protectors at any point where the cable contacts sharp corners to prevent damaging the cable.
 - Careful rigging of the spreaders is required to prevent machine damage.

6. Adjust the length of each chain or strap so the aerial platform remains level when raised off the ground.
7. Use the hoist or crane to carefully raise and position the aerial platform onto the transport vehicle.

Securing for Transport

Use the following procedure to secure the aerial platform on the transport vehicle.

1. Chock the wheels.
2. Remove all personnel, tools, materials, or other loose objects from the platform.
3. Raise the main boom about 1’ (0.3 m).
4. Place a large wood block under the platform support braces (refer to Figure 9.5). Lower the platform so it rests on the wood block.



Figure 9.5 – Platform

5. Place the lower controls emergency stop switch in the off position. Turn the control selector to the center position and remove the key.
6. Turn the battery disconnect switch off and close and latch the cowling doors.
7. On dual fuel machines, close the shut-off valve on the LPG tanks.
8. Use wire-ties to fasten the gravity gates to the guardrails to prevent them from bouncing.

⚠ Caution

Ratchets, winches, and come-alongs may produce enough force to damage machine components. Do not over tighten the straps or chains when securing the aerial platform to the transport vehicle.

8. Use a nylon strap to securely fasten the platform against the wood block. Thread the strap through the tie-down brackets at the front of the platform.

9. Use chains or straps to securely fasten the aerial platform to the transport vehicle using the tie-down lugs as attachment points. Proper tie-down and hauling are the responsibility of the carrier.

Storage

No service is required when storing, or removing the machine from service, for less than one week.

If the machine functions are not cycled for longer than one week:

- Grease exposed cylinder rods with a light, white lithium grease.
- Periodically charge the batteries.

Chapter 10 – Emergency Operation

If the main hydraulic system fails, the aerial platform may be lowered and stowed using the emergency power system. The main boom on single platform capacity machines may be lowered using the emergency lowering knob. The machine may be towed if the drive system fails. Refer to Emergency Power System, Emergency Lowering, or Towing for the appropriate procedure.

Emergency Power System

The emergency power system can be used to operate the machine from the lower or upper controls.

⚠ Caution

The emergency power system is for emergency lowering and stowing only. The length of time the pump can be operated depends on the capacity of the batteries. Do not use this system for normal operation.

Only use the emergency power system if the main power system fails.

Lower Controls

Use the following procedure to operate the machine using the emergency power system from the lower controls.

1. Place the battery disconnect switch in the on position (refer to Figure 10.1).

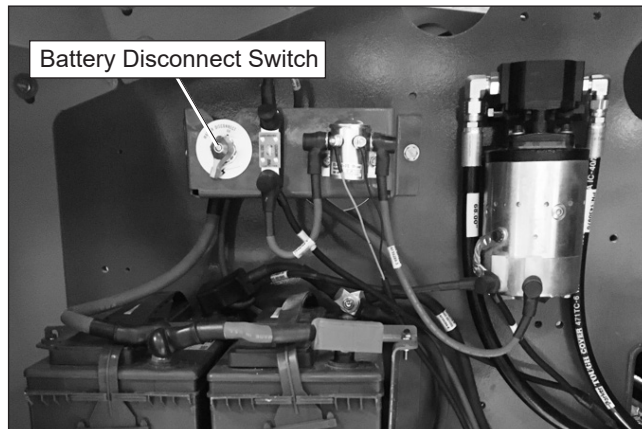


Figure 10.1 – Battery Disconnect Switch

2. Place the key in the control selector switch (refer to Figure 10.2) and turn it to the lower control position.

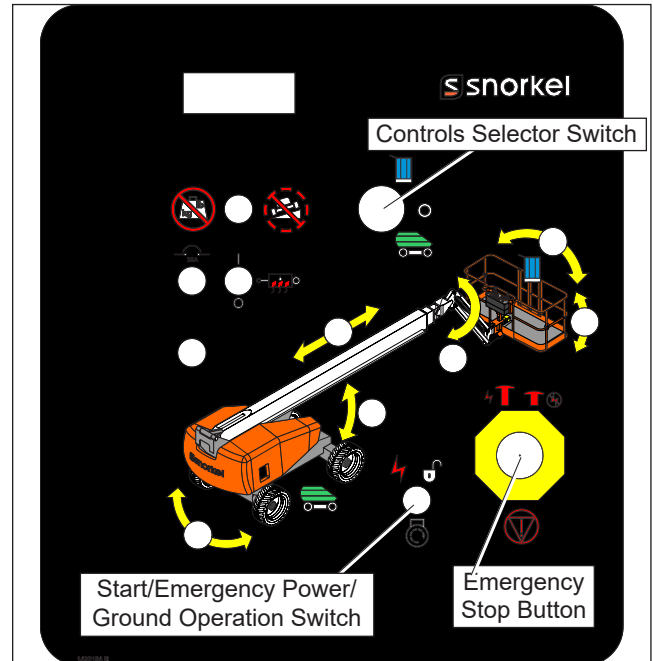


Figure 10.2 – Lower Controls

3. Pull the emergency stop button outward.
4. Hold the emergency power switch upward in the emergency power position.
5. Hold the appropriate function toggle switch in the desired direction.

Upper Controls

For the upper controls to be operational:

- The battery disconnect switch must be in the on position.
- The emergency stop button at the lower controls must be in the on position.
- The controls selector switch at the lower controls must be in the upper control position.

Use the following procedure to operate the machine using the emergency power system from the upper controls.

1. Pull the emergency stop button outward (refer to Figure 10.3).

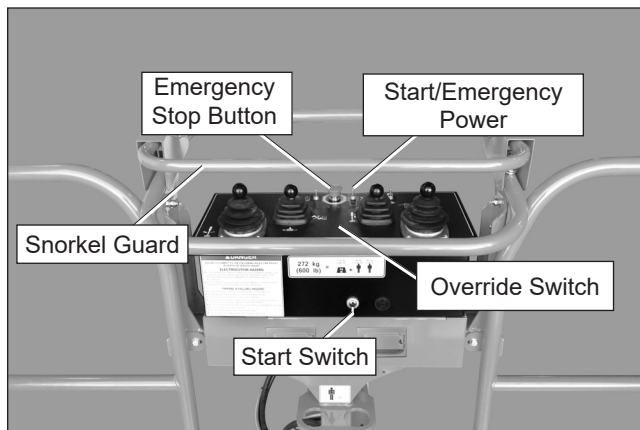


Figure 10.3 – Upper Control Station

2. Turn the start switch on.
3. Step down on the platform foot switch (refer to Figure 10.4).

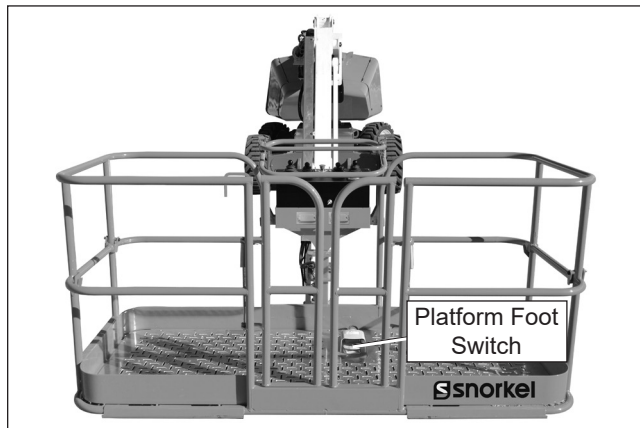


Figure 10.4 – Platform Foot Switch

4. Hold the engine/emergency power switch in the emergency power position.
5. Hold the appropriate function toggle switch in the desired direction.

Override Switch

The override switch at the upper controls may be used to override the Snorkel Guard, platform overload system, bumpguard system, or boom/drive cut-out, when either is activated.

When the platform overload system is activated, the override or the emergency power switch (refer to Figure 10.3) at the upper controls may be used to override the system to operate main boom up/down/retract, jib boom up/down, or turntable rotation and drive functions. The switch is spring returned to the normal operation position.

When the Snorkel Guard system is activated, the override switch (refer to Figure 10.3) at the upper controls may be used to override the system to operate main boom up/down/retract, jib boom up/down and turntable rotation functions.

The lower controls are not affected by the Snorkel Guard activation.

Warning

The potential for an accident increases when safety devices do not function properly. Death or serious injury could result from such accidents. The override switch must only be used when all controls are released and in the neutral position. If a zero or neutral state cannot be achieved, depress the emergency stop and obtain assistance at the lower controls.

1. When the machine is stopped due to activation of the Snorkel Guard system or overload, immediately depress the emergency stop, release the foot switch and all controls. Perform an assessment of the situation which caused the system to activate.
2. If it is determined that all controls are released and operation can proceed, return the emergency stop to the on position, and activate the override switch.
3. Activate the foot switch.
4. Activate the necessary functions to move the platform away from the obstacle that caused the Snorkel Guard activation or if due to an overload fault, retract the booms then lower in a safe condition.
5. Assess the machine for any damage. If damage occurred, return to the stowed position, exit the unit and perform a thorough inspection before returning to service.

Emergency Lowering Knob – Single Platform Capacity Machines Only

The main boom can be lowered in an emergency using the emergency lowering knob at the base of the lift cylinder. The emergency lowering knob allows the main boom to be lowered only. Only use this method if the engine will not start and the emergency power system will not work.

Danger

Pinch points exist between boom components and between the booms and turntable. Death or serious injury will result if the booms or platform lowers onto personnel. Make sure all personnel stand clear while lowering the booms.

Use the following procedure to manually lower the main boom.

1. Reach upward through the access hole on the bottom of the turntable and slowly turn the knob (refer to Figure 10.5) counterclockwise to open the bleed down valve. Control the rate of descent by turning the knob.



Figure 10.5 – Emergency Lowering Knob

⚠Warning

The potential for an accident increases when safety devices do not function properly. Death or serious injury could result from such accidents. Fully close the emergency lowering knob before operating the aerial platform.

2. Turn the knob clockwise to close the cylinder bleed down valve.

Towing

The aerial platform may be towed at slow speeds using the optional tow kit. The tow vehicle must have sufficient capacity to safely tow and stop itself and the aerial platform on the steepest grade and type of surface that may be encountered. Refer to Chapter 2 for the approximate weight of the aerial platform.

⚠Warning

The aerial platform is free to move when the drive hubs are disabled. Death or serious injury could result. Securely fasten the tow vehicle to the aerial platform before disabling the drive hubs.

Use the following procedure to manually disengage the drive hubs and tow the machine.

1. With the machine in the stowed position, remove the tow bar from the storage cradles on the chassis and lay the tow bar near the front of the chassis.

⚠Danger

Pinch points may exist between machine components. Death or serious injury will result from becoming trapped between components. Do not attach the tow bar to the tow vehicle until the counterweight is to the side of the chassis.

2. Rotate the turntable, until the counterweight is to the side of the chassis, to allow room to attach the tow bar.

3. Attach the tow bar (refer to Figure 10.6) to the tow lug with the tow pin and snap pin.

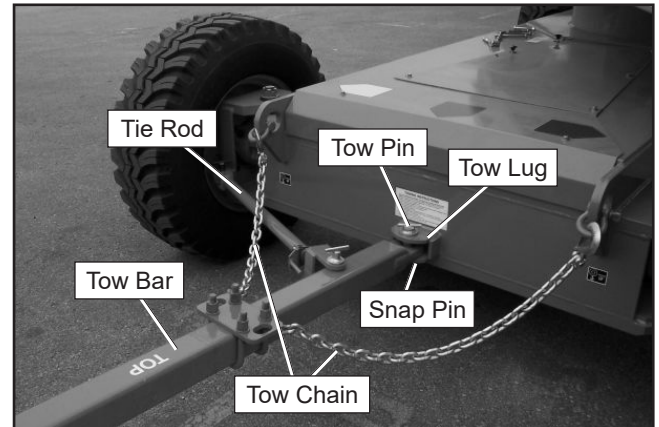


Figure 10.6 – Tow Bar Connection

4. Attach the tie rod to the tow bar and the right hand steering yoke.

⚠Caution

If the tow chains are not properly installed, damage to the tie rod may result. Make certain the tow chain on the right side of the machine goes over the tie rod and not under it.

5. Attach the two tow bar chains to the tie-down lugs. Make certain that the chain goes over the tie rod as shown in Figure 10.6.
6. Attach the ring end of the tow bar to the tow vehicle.
7. Rotate the turntable so the counterweight is back at the front of the chassis. Raise the platform about 3' (1 m) above the ground.
8. Shut the engine off and turn the battery disconnect switch off.
9. Pull the steering float valve knob outward and twist it to lock it in position. The knob is located behind the cowl door on the left side of the turntable.
10. At each drive wheel, remove the two bolts from the disconnect plate (refer to Figure 10.7). Turn the plate over so the nipple points inward. Reinstall the two bolts.

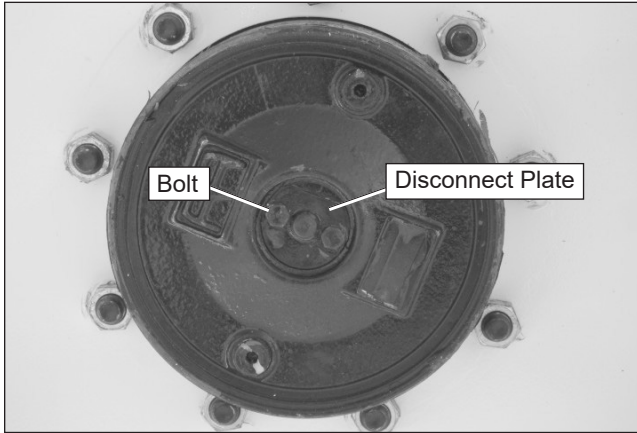


Figure 10.7 – Drive Wheel

11. Do not exceed 10 mph (16 km/h) when towing. Use caution when traveling around a curve or when turning a corner. If a corner is turned too tightly the steering mechanism might be damaged or the tow vehicle and the aerial platform could jackknife.

⚠Warning

The aerial platform is free to move when the drive hubs are disabled. Death or serious injury could result. Re-enable the drive hubs before operating the aerial platform.

12. After towing, pull and twist, then push the steering float valve knob inward.
13. At each drive wheel, remove the two bolts and return the plate to its original position as shown in Figure 10.9.
14. Unfasten the tow vehicle from the machine and replace the tow bar on the storage cradles.
15. Verify that the drive system operates properly.

Chapter 11 – Troubleshooting

The troubleshooting chart may be used to locate and eliminate situations where machine operation may be interrupted. If the problem cannot be corrected with the

action listed, stow the machine and remove it from service. Repairs must be made by qualified maintenance personnel.

Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Engine will not start from lower or upper controls.	Out of fuel. The engine will crank, but will not start.	Add correct type of fuel. Try starting the engine for 20 seconds and then let the starter motor cool for 60 seconds. Repeat as necessary.
	Engine is cold.	When the ambient temperature range is 50°F (10°C) to 23°F (-5°C), let the engine preheat for five seconds before starting the engine. When the ambient temperature range is 50°F (10°C) to 23°F (-5°C), let the engine preheat for five seconds before starting the engine.
	High engine temperature.	Let engine cool. Do not restart the engine until the cause of overheating has been corrected.
	Low oil pressure.	Do not try to start the engine until the cause of low oil pressure has been corrected. The engine can be restarted with low oil pressure, but it will only run a few seconds before it shuts off again.
	Dual fuel machines. The fuel switch on the lower control panel is set incorrectly. The engine cranks, but will not start.	<ul style="list-style-type: none"> • Place the fuel switch on the lower control panel in the proper position for the fuel being used. • Make certain there is fuel in the fuel tank. • If using LPG make certain that the fuel shutoff valve is open. • Try starting the engine for 20 seconds and then let the starter motor cool for 60 seconds. Repeat as necessary.
Engine will not start from lower controls.	Switches are set wrong. The engine will not crank.	Turn the battery disconnect switch on and then at the lower controls: <ul style="list-style-type: none"> • Turn the controls selector switch to off. • Pull emergency stop button outward.
<i>Continued on next page...</i>		

Symptom	Possible Cause	Corrective Action
Engine will not start from lower controls.		<ul style="list-style-type: none"> Place the controls selector switch in the lower control position for 10 seconds and then start the engine.
	The controls selector switch was left in the on position for 30 seconds or longer before starting the engine.	Turn the switch back to off, then to start within 30 seconds.
	The main system circuit breaker on the lower control panel has tripped. The engine will not crank.	Push the main system circuit breaker button back in. If the button pops back out, refer the problem to a qualified service technician.
Engine will not start from upper controls.	Switches are set wrong. The engine will not crank.	Turn the battery disconnect switch on and then at the lower controls: <ul style="list-style-type: none"> Turn the controls selector switch off. Pull the emergency stop button outward. Place the controls selector switch in the upper control position. From the upper controls: <ul style="list-style-type: none"> Turn the start switch off. Pull the emergency stop button outward. Place the start switch in the on position to start.
		The controls selector switch was left in the on position for 30 seconds or longer before turning it to start.
	Engine dies when the control selector switch at the lower controls is placed in the upper control position.	Upper controls are not set-up properly.
Constant tone alarm sounds while the engine is running.	High engine temperature.	Lower the platform and reduce the engine speed to idle for five minutes. Turn the engine off and let it cool. Do not restart the engine until the cause of overheating has been corrected.
	Low oil pressure.	Lower the platform and turn the engine off. Do not restart the engine until the cause of low oil pressure has been corrected.

Symptom	Possible Cause	Corrective Action
Constant tone alarm sounds and engine shuts off.	High engine temperature.	Let the engine cool. Do not restart the engine until the cause of overheating has been corrected.
	Low oil pressure.	Do not restart the engine until the cause of low oil pressure has been corrected. The engine can be restarted with low oil pressure, but it will only run a few seconds before it shuts off again.
Diesel particulate filter warning light is on – Deutz Stage 5 only	Manual regeneration of the DPF system is required.	Refer to Chapter 8, Diesel Particulate Filter Regeneration for proper procedure.
All functions stop working.	Low fluid level in reservoir.	Check fluid level. Add correct type of fluid if necessary.
	Engine or pump failure.	Manually stow the machine using the emergency power system.
	Circuit breaker is tripped.	Push circuit breaker button in to reset.
	Electrical system malfunction.	Manually lower the boom using the emergency power system.
Lower controls do not work.	Battery disconnect switch turned off.	Place switch in the on position.
	Emergency stop button at lower controls is pushed in to the off position.	Pull the emergency stop button outward.
	Controls switch is in the upper control position.	Place the switch in the lower control position.
	Ground operation switch not held in the on position.	Hold the ground operation switch in the on position while operating the control toggle switches.
	Ground operation switch held upward for too long without operating a function. A function must be operated within 10 seconds of activating the ground operation switch, or no functions will operate.	Release the ground operation switch. Operate machine function within 10 seconds of operating the ground operation switch.
Upper controls do not work.	Battery disconnect switch turned off.	Place switch in the on position.
	Emergency stop button at lower and upper controls is in the off position.	Pull the emergency stop buttons outward.
	Controls selector switch at lower controls is in the lower control position.	Place switch in the upper controls position.
	Platform foot switch not engaged.	Step down on platform foot switch while operating controls.

Continued on next page...

Symptom	Possible Cause	Corrective Action
Upper controls do not work.	Foot switch held down for too long without operating a function. A function must be operated within 10 seconds of activating the foot switch, or no functions will operate.	Release the foot switch. Operate machine function within 10 seconds of operating the foot switch.
Boom and drive functions operate at reduced speeds while generator is running.	The AC generator switch is in the generator position.	Normal operation. Boom and drive functions will operate at reduced speeds while the generator is operating.
Boom and drive functions seem sluggish.	Hydraulic oil is cold and thick.	Use cold weather hydraulic oil as recommended for weather conditions. Warm oil before operating the machine.
Main boom will not raise or extend.	Boom switch error. Faulty switch.	Stow the machine and do not operate until repairs are made.
Main boom drifts down.	The emergency lowering valve is open – single platform capacity machines only.	Turn the emergency lowering knob fully clockwise to close the valve.
	Hydraulic system malfunction.	Stow the machine and do not operate until repairs are made.
Drive functions do not work.	Load capacity exceeded.	Remove load from platform. Refer to platform capacity placard for maximum capacity.
	Machine on too steep a grade.	Lower the booms and drive to a level surface.
	Drive hubs are disengaged.	Turn drive wheel disconnect plates around so nipples point outward.
	Low hydraulic system pressure.	Stow the machine and do not operate until repairs are made.
Can not reach maximum drive speed.	Booms are not retracted and lowered.	Fully retract and lower the booms.
	Drive range switch is in low (turtle).	Place the switch in the high (rabbit) position.
	Low engine rpm.	Stow the machine and do not operate until repairs are made.
Wheels will not turn when winching.	Drive hubs are engaged.	Turn drive wheel disconnect plates around so nipples point inward.
Steer wheels do not turn right or left – machines with tow option.	Tow kit steering float valve is open.	Close the steering float valve.
Tilt alarm does not work.	Booms are stowed.	Normal operation. The tilt alarm is not operational when the booms are stowed.

Symptom	Possible Cause	Corrective Action
Circuit breaker will not reset.	Electrical circuit has not had time to cool.	Wait a minute or two for circuit to cool, then push circuit breaker button in to reset.
	Electrical system malfunction.	Do not operate machine until repairs are made.
Electrical outlet does not work.	Power supply not plugged in.	Plug a source of power into the power-input connector on the turntable.
	AC generator switch not in the generator position.	With the engine running, place the AC generator switch in the generator position.
	Power cord to platform is not plugged into the AC generator.	Plug power cord into the outlet on the generator.
Hydraulic fluid temperature 180°F (82°C) or more.	Prolonged boom operation or driving.	Stop operation until fluid cools.
	High pressure fluid return to reservoir caused by kinked or twisted hose.	Remove the kink or twist from the hose. Let fluid cool before operating.
	Hydraulic system component failure.	Stow the machine and do not operate until repairs are made.
Severe hydraulic leak.	Failure of hose, tube, fitting, seal, etc.	Do not operate machine until repairs are made.

Fuel Line Air Bleeding – Kubota V2403-T

If the engine will not start because of air in the fuel line, use one of the following methods to remove the air to restart the engine.

Open Bleeder Valve and Crank Engine

Slightly open the bleeder valve (refer to Figure 11.1) and crank the engine for a few seconds to let the air out. Close the valve and start the engine.

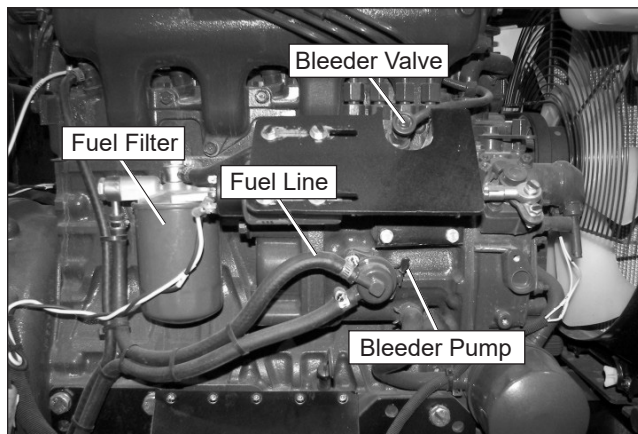


Figure 11.1 – Kubota V2403-T

Fill the Fuel Filter

Remove the fuel filter. Fill the filter with fuel of the correct grade and replace it. Crank the engine for a few seconds to start the engine.

Operate Bleeder Pump

Slightly open the bleeder valve and operate the bleeder pump up and down until the air is out of the line. This may take several minutes of operating the pump before the air is removed from the line. Close the valve and start the engine.

AC 20 kW Generator – Platform Welder

The 20 kW generator for platform welder operation generates 220 volts at a frequency of 62 Hz.

For optimal operation the following must be met:

- Proper engine rpm.
- Proper output voltage.
- Proper output frequency.

Engine RPM

When the generator is switched on, the engine speed will increase as indicated in Figure 11.2.

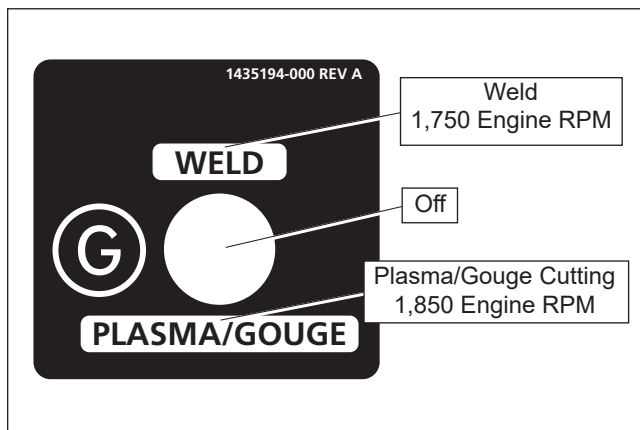


Figure 11.2 – 20 kW Generator Switch

Verify the proper engine speed for each of the two generator functions.

Output Voltage

To adjust generator output voltage:

1. Remove the screwdriver from the generator cover panel.
2. Remove the hardware and cover plate.
3. With the engine on, select one of the generator operating functions (refer to Figure 11.2).
4. Adjust the voltage rotary potentiometer (refer to Figure 11.3) to 208 V to 230 V.

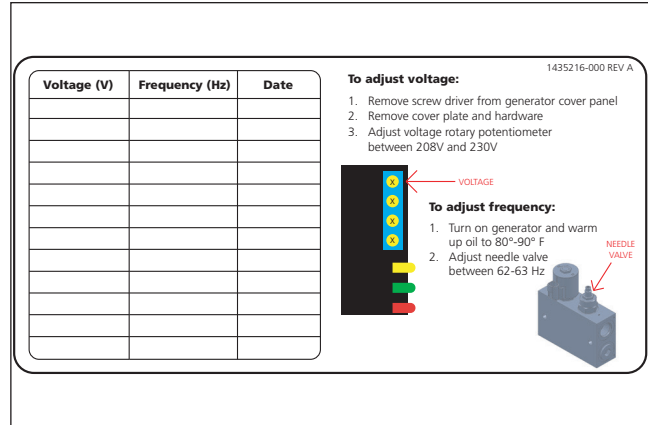


Figure 11.3 – Voltage Adjust Decal

5. Replace the cover plate and hardware.
6. Replace the screwdriver on the cover panel.
7. Log the voltage and date measured on the adjustment log decal with a permanent marker.

Frequency

To adjust generator output frequency:

1. With the engine on, select one of the generator operating functions (refer to Figure 11.2).
2. Warm the hydraulic fluid to 80°F to 90°F (27°C to 32°C).
3. Adjust the needle valve on the flow control manifold (refer to Figure 11.4) to 62 Hz to 63 Hz.

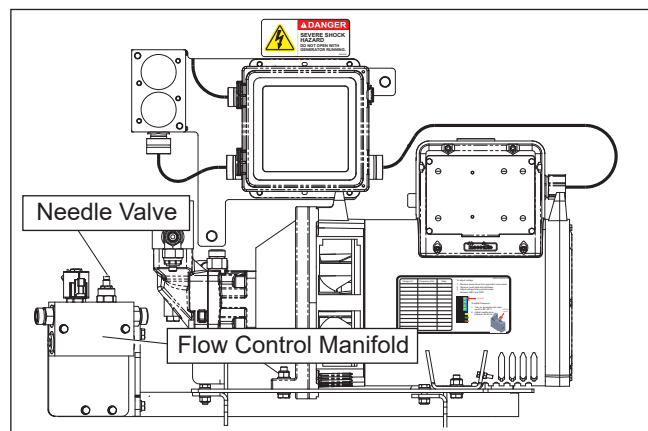


Figure 11.4 – AC 20 kW Generator

4. Log the frequency and date measured on the adjustment log decal with a permanent marker.

Appendix A – Glossary

aerial platform – a mobile device that has an adjustable position platform, supported from ground level by a structure.

ambient temperature – the air temperature of the immediate environment.

authorized personnel – personnel approved as assigned to perform specific duties at a specific location.

base – the relevant contact points of the aerial platform that form the stability support (e.g. wheels, casters, outriggers, stabilizers).

boom – a movable cantilever beam which supports the platform.

center of gravity – the point in the aerial platform around which its weight is evenly balanced.

chassis – the integral part of the aerial platform that provides mobility and support for the booms.

diesel particulate filter (DPF) – a device which removes soot from the exhaust of a diesel engine.

diesel particulate filter regeneration – the process of burning off accumulated soot from the DPF.

fall protection – a system to protect against falls that may include either a fall restraint or personal fall arrest system as required by national or local regulations and standards.

fall restraint – a system that is used while working on a boom lift within the boundaries of platform guardrails to provide restraint from being projected upward from the platform. This system includes a harness or belt, lanyard, and a lanyard anchor. Federal OSHA, ANSI, and Snorkel require the use of additional fall protection beyond the platform guardrails on boom supported aerial platforms.

floor or ground pressure – the maximum pressure, expressed in pounds per square inch, a single wheel concentrates on the floor or ground.

gradeability – the maximum slope that the aerial platform is capable of travel.

ground fault circuit interrupter (GFCI) – a fast-acting circuit breaker that opens to stop electrical circuit flow if it senses a very small current leakage to ground. The GFCI is used to protect personnel against a potential shock hazard from defective electrical tools or wiring.

guardrail system – a vertical barrier around the platform to prevent personnel from falling.

hazardous location – any location that contains, or has the potential to contain, an explosive or flammable atmosphere as defined by ANSI/NFPA 505.

jib – an articulating boom attached to the tip boom which increases the overall boom reach.

level sensor – a device that detects a preset degree of variation from perfect level. The level sensor is used to sound an alarm if operating on a slope greater than the preset value.

lower controls – the controls located at ground level for operating some or all of the functions of the aerial platform.

main boom – a boom assembly located between the turntable and the jib.

manufacturer – a person or entity who makes, builds or produces an aerial platform.

maximum travel height – the maximum platform height or the most adverse configuration(s) with respect to stability in which travel is permitted by the manufacturer.

maximum wheel load – the load or weight that can be transmitted through a single wheel to the floor or ground.

MEWP – Mobile Elevating Work Platform.

Minimum Safe Approach Distance – the minimum safe distance that electrical conductors may be approached when using the aerial platform. Also called M.S.A.D.

operation – the performance of any aerial platform functions within the scope of its specifications and in accordance with the manufacturer's instructions, the users work rules, and all applicable governmental regulations.

operator – a qualified person who controls the movement of an aerial platform.

personal fall arrest system – a fall protection system that is used while working on an unprotected edge (such as a roof top with no guardrail). This system includes a harness, lanyard or other connecting device, a fall arrestor, an energy absorber or decelerator, an anchorage connector, and a secure anchorage such as a building beam, girders or columns. An aerial platform is not a fall arrest anchorage.

platform – the portion of an aerial platform intended to be occupied by personnel with their tools and materials.

platform height – the vertical distance measured from the floor of the platform to the surface upon which the chassis is being supported.

prestart inspection – a required safety inspection routine that is performed daily before operating the aerial platform.

qualified person – a person, who by reason of knowledge, experience, or training is familiar with the operation to be performed and the hazards involved.

rated load capacity – the designed carrying capacity of the aerial platform as specified by the manufacturer.

Snorkel Guard – a mechanically activated guarding system with a spring-loaded rail mounted above the upper control panel. Pushing against the rail activates the system, disabling the machine functions to stop upward movement of the platform.

stow – to place a component, such as the platform, in its rest position.

tip boom – a telescopic boom section that extends and retracts from within the main boom. The tip boom is nearest the platform.

turning radius – the radius of the circle created by the wheel during a 360° turn with the steering wheels turned to maximum. Inside turning radius is the wheel closest to the center and outside turning radius is the wheel farthest from the center.

turntable – the structure above the rotation bearing which supports the booms. The turntable rotates about the centerline of rotation.

unrestricted rated load capacity – the maximum designed carrying capacity of the aerial platform allowed by the manufacturer in all operating configurations.

upper controls – the controls located on or beside the platform used for operating some or all of the functions of the aerial platform.

wheelbase – the distance from the center of the rear wheel to the center of the front wheel.

working envelope – the area defined by the horizontal and vertical limits of boom travel that the platform may be positioned in.

working height – platform height plus six feet.

Appendix B – Inspection Checklists

Prestart Inspection Checklist

Item	Inspect For	P/F/R
Operator's Manual	In place, all pages readable and intact	
Engine		
Oil level	Between full and add marks	
Coolant	Proper fluid level	
Radiator	Cap tight, good condition and clean	
Fuel tank and line	Tank full, cap in place and tight/no leaks	
Electrical System		
Batteries	Condition and charged for proper operation	
Battery fluid level and terminals	Proper level/clean, connectors tight	
Cables and wiring harness	No wear or physical damage	
Hydraulic System		
Fluid level	Between full and add marks	
Hoses, tubes, and fittings	No leaks	
Cold weather warm-up	Proper operation	
Tires		
Foam filled	Good condition	
Wheels	All wheel lug nuts present and properly torqued	
Lower Control Station		
Operating controls	Proper operation	
Emergency stop and emergency power	Shuts off lower controls/proper operation	
Emergency Lowering	Proper operation	
Level Sensor	Sounds tilt alarm	
Flashing Light	Proper operation	
Structures		
Weldments – Chassis, turntable, booms, platform, etc.	Welds intact, no damage or deformation	
Slide pads	In place, no damage or deformation	
Wire ropes	No deformation or broken strands	
Fasteners	In place and tight	
Upper Control Station		
Guardrail system and fall protection anchors	Welds intact, no damage or deformation	
Panel carrier	No damage or deformation of cradles and hook	
Operating controls – Boom functions, drive, brakes, etc.	Proper operation/drive motion alarm sounds	
Emergency stop and emergency power	Shuts off upper controls/proper operation	
Horn	Sounds when activated	
Snorkel Guard	Proper operation	
Electrical power outlet – GFCI	Proper operation	
Level Sensor		
Machines manufactured before April 2021	Sounds tilt alarm	
Machines manufactured after March 2021	Unstowed disables boom/drive, alarm/tilt light on	
Drive Motion Alarm	Sounds when machines is driven	
Sandblast Protection Kit	In place and proper operation	
Air Line to Platform	No damage or deformation, caps in place	
Drive and Working Lights	No damage or deformation, proper operation	
Tow Kit	In place, no damage or deformation	
Platform Glazier Package	No damage or deformation of trays, pins, and straps	
Platform Welder/Generator	No damage or deformation, proper operation	
Placards and Decals	In place and readable	

Maintenance Table Key: P = Pass, F = Fail, R = Repaired

Performed by: _____ Date: _____

Model Number: _____ Serial Number: _____

Frequent Inspection and Maintenance – Every 90 Days or 150 Hours

Item	Procedure	Information	P/F/R
Chassis			
Structural	Check for damage and cracked welds		
Steering cylinder snap rings	Verify that all fasteners are in place and are tight		
Oscillating axle lock cylinders and fasteners	Verify that all fasteners are in place		
Steering linkage	Check for proper operation		
Tires	Check for wear and damage		
Hydraulic tubes and hoses	Check for leaks, wear, and damage		
Drive motor brake	Check for proper operation		
Torque drive and steer wheel lug nuts per placard on wheel	Torque lug bolts/nuts to proper value on machine placard	Front: 180 to 200 ft lb Rear: 180 to 200 ft lb	
Right drive motors	Check for leaks		
Left drive motors	Check for leaks		
Tie-down and lifting lugs	Check for damage and cracked welds		
Decals and placards	Check for damage and readability Order replacements as necessary		
Turntable			
Structural	Check for damage and cracked welds		
Torque turntable top bolts	Torque to proper value	380 ft lbs	
Torque turntable bottom bolts	Torque to proper value	240 ft lbs	
Hydraulic tubes and hoses	Check for leaks, wear, and damage		
Centerpost	Check for leaks, wear, and damage		
Centerpost mounting bolts	Verify that all fasteners are in place and are tight		
Lift cylinder pin caps and tie wire	Verify that all fasteners are in place and are tight		
Lift cylinder and holding valve	Check for leaks, wear, damage, and for proper operation		
Master level cylinder pin caps and tie wire	Verify that all fasteners are in place and are tight		
Master level cylinder and holding valves	Check for leaks, wear, damage, and for proper operation		
Emergency bleed down valve	Check for proper operation		
Cowling	Check for wear/damage and that fasteners are in place and are tight		
Wire harness	Check for wear/damage and that fasteners are in place and are tight		
Rotation brake	Check for proper operation		
Rotation backlash	Check for wear and damage		
Operator's Manual	Proper manual in document holder		
System pressure	Check maximum system pressure	4,900 – 5,000 psi	
Decals and placards	Check for damage and readability Order replacements as necessary		

Frequent Inspection and Maintenance – Every 90 Days or 150 Hours

Item	Procedure	Information	P/F/R
Lower Controls			
Control switch in the lower controls position	Check for proper operation	With selector in the lower controls position, upper controls do not work	
Station selector switch in the upper controls position	Check for proper operation	With selector in the upper controls position, lower controls do not work	
Engine Start – Stop	Check for proper operation		
Throttle High – Low	Check for proper operation		
Turntable CW – CCW	Check for proper operation		
Boom elevation Up – Down	Check for proper operation		
Boom Extend – Retract	Check for proper operation		
Jib Up – Down	Check for proper operation		
Jib rotation CW – CCW	Check for proper operation		
Platform level Up – Down	Check for proper operation		
Platform rotation CW – CCW	Check for proper operation		
Emergency power, all functions	Check for proper operation		
Emergency stop	Check for proper operation		
Booms			
Structural	Check for damage and cracked welds		
Lift cylinder pin caps and tie wire	Verify that all fasteners are in place and are tight		
Hydraulic tubes and hoses	Check for leaks, wear, and damage		
Extension cylinder pin caps and bolt retainer	Verify that all fasteners are in place and are tight		
Extension cylinder and holding valve	Check for leaks, wear, damage, and for proper operation		
Jib boom pin caps and snap rings	Verify that all fasteners are in place and properly installed		
Jib cylinder pin caps and snap rings	Verify that all fasteners are in place and properly installed		
Jib cylinder and holding valve	Check for leaks, wear, damage, and for proper operation		
Slave level cylinder pin caps and tie wire	Verify that all fasteners are in place and are tight		
Slave level cylinder and holding valves	Check for leaks, wear, damage, and for proper operation		
Hose carrier tube and support	Check for residue buildup/proper operation		
Plastic hose track	Check for wear and damage		
Electrical wires	Check for wear and damage		
Decals and placards	Check for damage and readability Order replacements as necessary		
Extension System			
Sheaves and wire rope anchors	Check for wear and damage		
Wire ropes	Check for wear and damage		
Cables	Check for proper installation		
Cables	Properly tensioned		
Whiffle bracket	Check for proper installation	Bracket should be straight	

Frequent Inspection and Maintenance – Every 90 Days or 150 Hours

Item	Procedure	Information	P/F/R
Platform			
Structural	Check for damage and cracked welds		
Entry Gate	Check for proper operation		
Hydraulic tubes and hoses	Check for leaks, wear, and damage		
Slave level cylinder pin caps and tie wire	Verify that all fasteners are in place and are tight		
Slave level cylinder holding valves	Check for leaks, wear, damage, and for proper operation		
Decals and placards	Check for damage and readability Order replacements as necessary		
Upper Control Station			
Foot switch	Check for proper operation	Functions should be operational when foot switch is engaged	
Engine Start – Stop	Check for proper operation		
Throttle High – Low	Check for proper operation		
Turntable CW – CCW	Check for proper operation		
Boom elevation Up – Down	Check for proper operation		
Boom Extend – Retract	Check for proper operation		
Jib Up – Down	Check for proper operation		
Platform level Up – Down	Check for proper operation		
Platform rotation CW – CCW	Check for proper operation		
Drive speed	Boom up and/or extended Low – 0.75 mph	0.75 mph = 100 ft in 86 to 96 sec	
	Boom down and retracted High – 3.5 mph	3.5 mph = 100 ft in 18 to 21 sec	
Drive range – boom stowed	Check for proper operation	Slow speed only with boom raised	
Engine choke – gas engine only	Check for proper operation		
Emergency power, all functions	Check for proper operation		
Emergency stop	Check for proper operation		
Horn	Check for proper operation		
Gradual start to stop lift/swing/ drive controls	Check for proper operation		
Speed limit switch	Check for proper operation		
Tilt alarm	Check for proper operation	5° ANSI/CSA 5° CE/AS/NZS dual capacity 3.5° CE/AS/NZS single capacity	
110 volt AC power to platform	Check for proper operation		
Hydraulic Oil Reservoir			
Filler/breather cap and tank	Check for wear/securely fasten		
Hydraulic fluid level	Check for proper level	Dexron III ATF	
Hydraulic filter	Replace after the first 50 hours, every 90 days or 150 hours thereafter Inspect filter for foreign matter that could indicate component wear		

Frequent Inspection and Maintenance – Every 90 Days or 150 Hours

Item	Procedure	Information	P/F/R
Engine			
Charging system	Check for proper operation		
Air filter	Check for wear and damage		
Hour meter	Check for proper operation		
Belts and hoses	Check for wear and damage		
Hydraulic pump	Check for proper operation		
Battery terminals	Clean terminals and check cable condition		
Battery voltage	Check for proper voltage		
Indicator gauges	Check for wear/damage and proper operation		
Engine oil	Check for wear and damage/level	Between add and full	
Engine coolant	Check level	Between add and full	
Engine Start – Stop	Check for proper operation		
Electric throttle	Check for proper operation		
Electric choke, if equipped	Check for proper operation		
Engine governor setting	Check for proper operation		
Platform Rotator			
Structural	Check for damage and cracked welds		
Hydraulic rotator actuator	Check for leaks, wear, and damage		
Platform rotation holding valve	Check for proper operation		
Mounting bolts and pin caps	Verify that all fasteners are in place and are tight		
Options			
110 volt AC generator	Check for proper operation		
220 volt AC generator	Check for proper operation		
Dual fuel system	Check condition and for proper operation		
LP gas system and control	Check condition and for proper operation		
Drive motion alarm	Check for proper operation		
Flashing light	Check for proper operation		
Cold weather start kit – diesel only	Check for proper operation		
Hydraulic system cold weather warm up kit	Check for proper operation		
Driving lights	Check for proper operation		
Platform work lights	Check for proper operation		
Platform control cover	Check condition and for proper operation		
Sandblast protection kit	Check for proper operation		
Airline to platform	Check for proper operation		
Spark arrestor muffler – Deutz only	Check for wear and damage		
Platform welder	Check condition and for proper operation		
Platform glazier package	Check condition and for proper operation		
Optional platform	Verify that all fasteners are in place and are tight		

Maintenance Table Key: P = Pass, F = Fail, R = Repaired

Performed by: _____ Date: _____

Model Number: _____ Serial Number: _____

Appendix B – Inspection Checklists

Frequent Maintenance – Every 90 Days or 150 Hours

Item	Procedure	Information	P/F/R
Daily maintenance	Perform maintenance as per schedule	Retain copy of checklist	
Preventive inspection maintenance checklist	Perform inspection, complete form	Retain copy of checklist	
Placards and decals inspection	Inspect using drawing and parts listing in Section 1 – Repair Parts Manual	Replace any missing or unreadable decals/placards	
Door hinges and latches	Lubricate	SAE 10W oil or spray lubricant	
Rotation bearing	Lubricate	Extreme Pressure Grease Above 10° F NLGI Grade 2 Below 10° F NLGI Grade 1	
Rotation bearing teeth and pinion	Lubricate	Open Gear Lubricant ASTM D 445	
Tie rods	Lubricate	Extreme Pressure Grease Above 10° F NLGI Grade 2 Below 10° F NLGI Grade 1	
Gear hubs	Check fluid level, fill if low	SAE Grade 80W-90	
Swing drive	Check fluid level, fill if low	SAE Grade 80W-90	
Platform rotator	Refill if disassembled for repairs	Consult factory	
Platform controller	Check smooth operation/speeds		
Batteries	Check specific gravity	1.260/1.275 at 80° F (26° C)	
Hydraulic return filter	Check condition	Replace if dirty	
Engine rpm	Check for proper engine rpm	See engine owner's manual	
Engine oil and filter	Replace per engine owner's manual	See engine owner's manual	
Engine fuel filter	Check condition	Replace every 6 months or if dirty	

Maintenance Table Key: P = Pass, F = Fail, R = Repaired

Performed by: _____ Date: _____

Model Number: _____ Serial Number: _____

Annual Maintenance – Every 500 Hours

Item	Procedure	Information	P/F/R
90 day or 150 hour maintenance	Perform maintenance per schedule	Retain copy of checklist	
Hydraulic oil reservoir	Clean and replace fluid	Dexron III ATF	
Hydraulic return filter	Replace	After first 50 hours, then at recommended interval	
Hydraulic high pressure filter	Clean and reinstall		
Hydraulic pressures	Pump setting Function pressures	Standby pressure: 300 psi	
		Boom up: 2,900 – 3,000 psi	
		Boom down: 1,750 – 1,850 psi	
		Steer: 1,100 – 1,200 psi	
		Level: 2,800 – 2,950 psi	
		Extend/Retract: 2,850 – 2,950 psi	
		Swing: 1,450 – 1,550 psi	
Gear hubs	Replace fluid	SAE Grade 80W-90	
Swing drive	Replace fluid	Sae Grade 80W-90	
Engine coolant	Check condition	See engine owner's manual	

Maintenance Table Key: P = Pass, F = Fail, R = Repaired

Performed by: _____ Date: _____

Model Number: _____ Serial Number: _____



Snorkel Product Warranty Policy

1. Snorkel warrants, its authorized sales and service centers (herein referred to as "SSC"), each new machine manufactured and sold by it to be free from defects in material and workmanship for a period of two (2) years from date of delivery to any customer. The warranty will apply subject to the machine being operated in accordance with the rules, precautions, instructions and maintenance requirements outlined in the relevant Snorkel Operator and Parts/Service manuals. Snorkel further warrants the structural components, specifically the mainframe chassis, turntable, booms and/or scissor arms of each new machine manufactured by it to be free from defects in material and workmanship for an additional period of three (3) years. Any such part or parts which, upon examination by the Snorkel Warranty Department or appointed representative, are found to be defective will be replaced or repaired by Snorkel through local authorized Dealers. The structural warranty specifically excludes adverse effects on the machine structure arising from damage, abuse or misuse of the equipment.
2. Machines may be held in an authorized Distributor/ SSC's stock for a maximum period of six (6) months from the date of shipment from Snorkel, before the warranty period is automatically initiated on each machine.
3. It is the responsibility of the Distributor/SSC to complete and return to Snorkel a Pre-delivery Inspection Record, Warranty Registration Form, before the act of rental / loan / demonstration of the machine or delivery to an end user. In the case of direct sale to end customers the same responsibility lies with the end customer.
4. Any end customer, SSC, distributor or dealer shall not be entitled to the benefits of this warranty and Snorkel shall have no obligations here under unless the "Pre-Delivery and Inspection Record" has been properly completed and returned to the Snorkel Warranty department within fifteen (15) days after delivery of the Snorkel product to the Customer or Dealer's demonstration / rental fleet. Snorkel must be notified, in writing, within ten (10) days, of any machine sold to a Customer from a Dealer/SSC's rental fleet during the warranty period.
5. Any part or parts which upon examination by the Snorkel Product Support Department are found to be defective within the specified warranty period, will be replaced or repaired at the sole discretion of Snorkel through its local Authorized Distributor/SSC, at no charge. Any parts replaced under warranty must be original Snorkel parts obtained through an authorized Snorkel Distributor/SSC unless expressly agreed otherwise in writing and in advance by Snorkel's warranty department.
6. All parts claimed under warranty must be held available for return and inspection upon request for a period of 90 days from date of claim submission, it is necessary that all parts are individually tagged or marked with their part number and the warranty claim number. All parts returning should be still in a factory state, free of any alteration to the original design. If the parts are subject to repair it will need to be pre authorized by the Snorkel Product Support Group and or Warranty Department prior to the repair being completed. After 90 days all parts replaced under warranty which have not been returned, to Snorkel should be destroyed. Failure to produce parts requested by the Warranty Administrator for inspection within a period of 14 days will result in the claim being automatically rejected in full. Materials returned for warranty inspection must have the following procedure:
 - Carefully packaged to prevent additional damage during shipping
 - Drained of all contents and all open ports capped or plugged
 - Shipped in a container tagged or marked with the RMA number
 - Shipped PREPAID (ground service only). Any item(s) returned for warranty by any other means
 - may be refused and returned, unless prior approval is agreed with Snorkel.



Snorkel Product Warranty Policy

7. At the direction of the Snorkel Warranty department, any component part(s) of Snorkel products to be replaced or repaired under this warranty program must be returned freight prepaid for inspection. An RMA (Returns material authorization) must be requested from Snorkel Warranty department, a copy to be placed with the returning component part(s).
8. All warranty replacement parts will be shipped freight prepaid (standard charges, ground shipping only) from the Snorkel Parts department, Service Department or from the Vendor to Dealer/SSC or Customer. Any other shipping method is the customer responsibility.
9. All warranty claims are subject to approval by Snorkel Service department. Snorkel reserves the right to limit or adjust claims with regard to defective parts, labor or travel time based on usual and customary guidelines.
10. Reimbursement policy, labor will be paid at 75% of posted hourly shop rate. Travel time will be paid at \$50 per hour up to a maximum of 3 hours. Snorkel will pay 1 hour of troubleshooting time per warranty claim, unless expressly agreed otherwise in writing and in advance by Snorkel's Warranty Department. An annual rate declaration must be supplied to the Snorkel Warranty administrator by January 31st and will be used as the reimbursable rate for that calendar year.

REPLACEMENT PARTS WARRANTY

- Any part replaced under this limited warranty is not subject to further warranty cover beyond the normal warranty period of the machine upon which the part was installed.
- Any replacement parts sold (not delivered under a warranty claim) will be subject to a warranty period of (6) six months from the date of invoice.
- Parts held by an authorized Distributor/SSC are covered under warranty for a period of (12) twelve months from the date of invoice, provided that those parts have been subject to appropriate storage to prevent damage and deterioration (conditional on Snorkel review).

CLAIM PROCEDURE

The Snorkel Warranty department must be notified within forty-eight hours (48) of any possible warranty situation during the applicable warranty period. Personnel performing major warranty repair or parts replacement must obtain specific approval by the Snorkel Warranty department prior to performing the warranty repair or replacement.

When a Distributor/SSC/Customer perceive a warranty issue to exist the following steps must be adhered to:

- Customer/SSC/Distributor to place a purchase order for genuine Snorkel replacement parts.
- Snorkel to dispatch parts via the requested method (in line with the required response time).
- Confirmation that a qualified technician is available to replace the part and that this person has been accepted by Snorkel to carry out such work under the warranty of the machine. Failure to do this may nullify the warranty.
- Customer/SSC/Distributor to allocate a warranty claim number to the repair.
- All correspondence in respect of the claim to be on an official Snorkel warranty claim form as supplied by Snorkel's warranty department.
- All warranty claims must be submitted within 30 days of the date of the machine repair.

FREIGHT DAMAGE

- If a machine is received in a damaged condition, then the damage must be noted on the bill of lading and/or delivery documents and photographs must be taken at the point of delivery, prior to signing acceptance of the consignment.
- The freight company and Snorkel must be contacted by the Distributor and a damage claim registered by either party immediately.
- The above requirements apply only to freight damage associated with equipment supplied by Snorkel transport. Customer freight issues are excluded from this warranty policy.



Snorkel Product Warranty Policy

THIS PRODUCT WARRANTY POLICY SPECIFICALLY EXCLUDES:

1. Engines, motors, tires and batteries are manufactured by specialist suppliers to Snorkel, who furnish their own warranty policies. Snorkel will, however, to the extent permitted pass through any such warranty protection to the Distributor/SSC/Customer.
2. Any Snorkel product which has been modified or altered outside Snorkel factories without written approval, if such modification or alteration, in the sole judgment of Snorkel Engineering and/or Service Departments, adversely affects the stability, reliability or service life of the Snorkel product or any component thereof.
3. Any Snorkel product which has been subject to misuse and abuse, improper maintenance or accident. "Misuse" includes but is not limited to operation beyond the factory-rated load capacity and speeds. "Improper maintenance" includes but is not limited to failure to follow the recommendations contained in the Snorkel Operation, Maintenance, and repair Parts Manuals.
4. Normal wear of any Snorkel component part(s). Normal wear of component parts may vary with the type, application or type of environment in which the machine may be used; such as, but not limited to sandblasting applications.
5. Routine maintenance, routine maintenance items and minor adjustments are not covered by this warranty, including but not limited to hydraulic fluid, filters and lubrication, paint and decals, engine tune-up, brake adjustments etc. Snorkel will not cover leaks from fittings, hoses and any other connection points after the unit has been in service for 90 days or 150 hours of operation which ever comes first.
6. Any Snorkel product that has come into direct contact with any chemical or abrasive material.
7. Incidental or consequential expenses, losses, or damages related to any part or equipment failure, including but not limited to freight cost to transport the machine to a repair facility, downtime of the machine, lost time for workers, lost orders, lost rental revenue, lost profits, expenses or increased cost. This warranty is expressly in lieu of all other warranties, representations or liabilities of Snorkel, either expressed or implied, unless otherwise amended in writing by Snorkel.
8. Snorkel warranty policy does not cover any duties, taxes, environmental fees including without limitation, disposal or handling of tires, batteries and petrochemical items.
9. Items specifically excluded are: fuel injectors, motor brushes, glow plugs, contactor tips and springs, filters, lamp bulbs, lamp lenses, coolants, lubricants, brake pads and cleaning materials.
10. Failure of replacement parts due to fault misdiagnosis or incorrect fitting by the Distributor/SSC/Customer.

SNORKEL MAKES NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THIS LIMITED WARRANTY. SNORKEL MAKES NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO INJURY TO PERSONS OR PROPERTY.



Snorkel Product Warranty Policy

Wherever possible the end customer shall obtain all warranty support and make all warranty claims through the local Snorkel authorized Distributor/SSC/Dealer. Warranty support should be from the Distributor/SSC/Dealer from whom the Snorkel product was purchased. Where Snorkel equipment is supplied directly from the factory the end customer, or if unable to contact the Distributor/SSC/Dealer, may contact the Snorkel Warranty Department for further assistance.

APPEAL

The buyer may appeal in writing against a rejected or adjusted claim to Snorkel warranty department within a period of 21 days of receiving the rejection or adjustment notice. The appeal should be grounded on express reasons and supported by relevant evidence. Appeals received outside of this time limit will not be considered.

SNORKEL WARRANTY SCHEDULE

Limited Warranty Periods

Item	Warranty Period
New machine materials and workmanship	2 year parts replacement
Structural components (Chassis, Turntable, Booms, Scissors)	5 years parts replacement or repair
Parts held in a Distributor's stock	12 months from date of invoice, subject to adequate storage/protection
Parts sold (non warranty)	6 months from date of invoice
Batteries supplied on new machines	6 months from warranty registration date
Other specifically excluded parts: Fuel injectors Motor brushes Glow plugs Contactor tips and springs Oils Filters Lamp bulbs Lamp lenses Coolants Lubricants Cleaning materials All consumable/wear parts	Not covered by Warranty

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El Distribuidor local / Il Distributore locale**

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