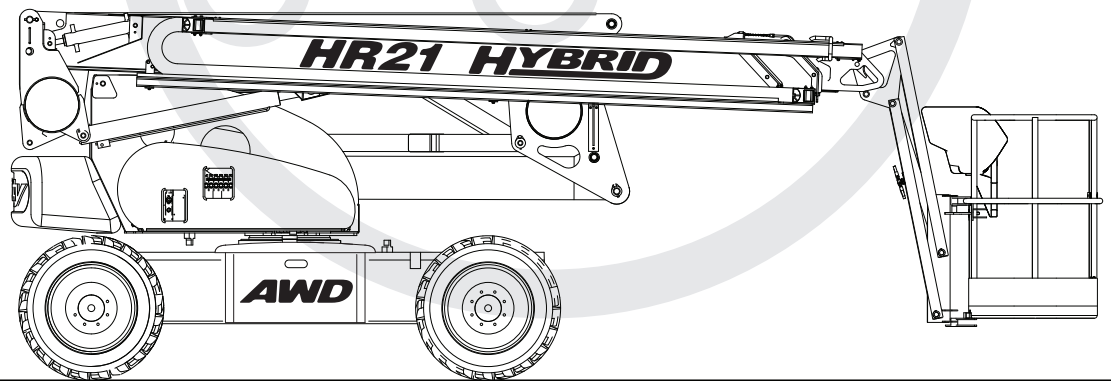


nifty

Heightrider

Operating & Safety Instructions **MODEL HR21 HYBRID SERIES AWD**



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1 Introduction and General Information

1.1 FOREWORD

The purpose of this manual is to provide the customer with safety, operating and maintenance instructions essential for proper machine operation.

This manual should be READ and fully UNDERSTOOD before any attempt is made to operate the machine!

Niftylift has no direct control over the machine's application and use, therefore conformance with good safety practices is the responsibility of the user and operating personnel.

These manuals are very important tools - Keep them with the machine at all times.

All information in these manuals is based on the use of the machine under proper operating conditions. **Alteration and/or modification of the machine are STRICTLY FORBIDDEN.**

Remember: Any equipment is only as safe as those who operate it!

1.2 SEVERITY OF HAZARDS

The use of this type of equipment presents certain dangers to the operator which is clearly identified both in this manual and on the machine. The varying levels of risk are defined as follows:

DANGER

If not correctly followed there is a high probability of serious injury or death to personnel.

WARNING or CAUTION

If not correctly followed there is some possibility of serious injury or death to personnel.

The 'Safety Alert Symbol' is used to call attention to potential hazards which may lead to serious injury or death, if ignored.



IMPORTANT and INSTRUCTIONS

This denotes procedures essential to safe operation and prevention of damage to, or destruction of the machine.

NOTICE

This indicates general safety rules and/or procedures relating to the machine.

It is the owner's/user's responsibility to know and comply with all applicable rules, regulations, laws, codes and any other requirements applicable to the safe use of this equipment.

1.3 SCOPE

These operating instructions contain all the necessary information required to allow the safe operation of any Niftylift Height Rider 21 Hybrid, powered by diesel (D) and DC electric (E).

For further technical information, circuit diagrams and specific instructions for all maintenance which may need to be carried out by specialist trained personnel, see the associated Workshop and Parts manual for your model of Niftylift Height Rider.

1.4 INTRODUCING THE HEIGHT RIDER SELF-PROPELLED (SP) SERIES

Please note at the time of going to press all information, illustrations, details and descriptions contained herein are valid. Niftylift reserves the right to change, modify or improve its products without any obligations to install them on previously manufactured machines.

If, after reading this manual you require further information, please do not hesitate to contact us.

Niftylift Ltd, Fingle Drive, Stonebridge, Milton Keynes MK13 0ER, Great Britain

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Tel: +61 (0) 2 4964 9765 Fax: +61 (0) 2 4964 9714

Driven from the platform, the Niftylift Height Rider 21 Hybrid is an extremely versatile articulated boom platform of unique and simple design. It is capable of placing two men and their tools up to a height of 20.7m (67ft 9in) or an outreach of 12.60m (41ft 4in).

The compact narrow base and tight turning circle, powered slew, up and over capability, good outreach, combined with sensitive controls, ensure excellent manoeuvrability and maximum efficiency.

High traction tyres and powerful hydraulic wheel motors give unsurpassed performance with the option of fast drive speed when the booms are in the stowed position. Automatic braking and audible alarms activated by a four-degree tilt sensor help to prevent the operator from working on unsafe terrain whilst elevated.

The Niftylift Height Rider 21 Hybrid provides a fast, safe, cost effective method of access, both inside and out, for a multitude of applications where overhead working is required. It operates from either battery or diesel power via an electric motor or diesel engine, both of which are coupled to a single hydraulic pump.



Models include the following:

DE: - BI-ENERGY (DIESEL & BATTERY)

Operating & Safety Instructions**1.5 GENERAL SPECIFICATION**

FEATURE	HR21 HYBRID AWD
MAXIMUM HEIGHT - WORKING	20.8m 68ft 2in
MAXIMUM HEIGHT - PLATFORM	18.8m 61ft 8in
MAXIMUM OUTREACH	12.8m 41ft 11in
MAXIMUM HEIGHT – STOWED	2.15m 7ft
MAXIMUM WIDTH	2.27m 7ft 5in
MAXIMUM LENGTH – STOWED	5.00m 16ft 5in
PLATFORM CAPACITY - Europe	225kg (500lbs)
WHEELBASE	2.30m 7ft 6in
TURNING RADIUS – OUTSIDE	3.99m 13ft 1in
TURRET ROTATION	355°
TURRET TAIL SWING	0.49m 1ft 7in
TRAVEL SPEED	(2WD) (AWD) 0 – 2.8mph 0 - 1.4mph 0 – 4.5kph 0 – 2.25kph
PLATFORM SIZE	1.80m x 0.70m 5ft 11in x 2ft 2in
CONTROLS	Proportional electric over hydraulic
HYDRAULIC PRESSURE	280bar
TYRES	Solid
GRADEABILITY	40%
MINIMUM VEHICLE WEIGHT	6,660kg 14,683lb
MAXIMUM GROUND PRESSURE	0.1125kn/cm ² 23,526lb/ft ²
MAXIMUM ALLOWABLE INCLINATION	4.0°
POWER SOURCE	DE (Diesel & Battery) - Kubota 722 engine and 8 x 6v 350 AH batteries

1.6 IDENTIFICATION (UK PLATE)

			
NIFTYLIFT LTD., FINGLE DRIVE, STONEBRIDGE MILTON KEYNES MK13 0ER ENGLAND TEL 01908 223456 : FAX 01908 312733 e-mail: info@niftylift.com			
SERIAL No			
TYPE			
YEAR OF MANUFACTURE			
WEIGHT			kg
RATED LOAD	PERSONS	+	kg
MAXIMUM SAFE WORKING LOAD			kg
MAXIMUM PULL			N
MAXIMUM WIND SPEED			m/s
MAX. ALLOWABLE INCLINATION			Deg.
MAXIMUM HYDRAULIC PRESSURE			bar
MAXIMUM VOLTAGE			V
AMPS			A
ELEC. CCT D	ISSUE		P10805/7
HYD. CCT D	ISSUE		

This manufacturer's plate is attached to the chassis of each machine at the time of manufacture on every Niftylift. Please ensure all sections have been stamped and are legible.

1.7 EC DECLARATION OF CONFORMITY (Typical)



EC DECLARATION OF CONFORMITY

MANUFACTURER AND
PERSON RESPONSIBLE
FOR DOCUMENTATION:

**NIFTYLIFT LTD
MALCOLM NORTH**

ADDRESS:

**CHALKDELL DRIVE,
SHENLEY WOOD,
MILTON KEYNES,
MK5 6GF
ENGLAND.**

MACHINE TYPE:

MOBILE ELEVATING WORK PLATFORM

MODEL TYPE:

SERIAL NUMBER:

NOTIFIED BODY:

TUV NORD CERT GmbH

NOTIFIED BODY NUMBER: 0044

ADDRESS:

POSTFACH 10 32 61
D-45141 ESSEN
GERMANY

CERTIFICATE NUMBER:

APPLICABLE STANDARDS:

EN 280:2013
DIN EN 60204-1, 2006/42/EC

*We hereby declare that the above mentioned machine conforms
with the requirements of the Machinery Directive, 2006/42/EC
and EMC Directive 2004/108/EC*

SIGNED:

A handwritten signature in dark ink, appearing to read 'M.D. North'. The signature is written in a cursive, slightly slanted style.

DATE:

NAME: Malcolm North

POSITION: Engineering Manager

NOTE:

THIS DECLARATION CONFORMS WITH THE REQUIREMENTS OF ANNEX II-1.A OF THE COUNCIL DIRECTIVE 2006/42/EC. ANY MODIFICATIONS TO THE ABOVE MENTIONED MACHINE WILL INVALIDATE THIS DECLARATION, AND THE MACHINE'S APPROVAL.

2 Safety

2.1 MANDATORY PRECAUTIONS

When operating your Niftylift, your safety is of utmost concern. In order to fully appreciate all aspects of the machine's operation it should be ensured that each operator has **READ** and fully **UNDERSTOOD** the relevant manual covering machine use, maintenance and servicing. If any doubts exist concerning any points covered in your manual, contact your local dealer or Niftylift Ltd.

Before using any Niftylift, thoroughly inspect the machine for damage or deformation to all major components. Likewise, check the control systems for hydraulic leaks, damaged hoses, cable faults or loose covers to electrical components. At no time should damaged or faulty equipment be used - Correct all defects before putting the platform to work. If in doubt, contact your local dealer or Niftylift Ltd (see page 3 for contact details).



THE MANUFACTURER HAS NO DIRECT CONTROL OVER THE MACHINE APPLICATION AND USE. THEREFORE CONFORMANCE WITH GOOD SAFETY PRACTICES IS THE RESPONSIBILITY OF THE USER AND HIS OPERATING PERSONNEL. FAILURE TO UNDERSTAND AND FOLLOW ALL SAFETY RULES COULD RESULT IN SERIOUS INJURY OR DEATH.

- 2.1.1** Only trained persons are permitted to operate the Niftylift.
- 2.1.2** Always operate the Niftylift in full accordance with the manufacturer's Operating & Safety Instructions for that model.
- 2.1.3** Before use each day and at the beginning of each shift, the Niftylift shall be given a visual inspection and functional test including, but not limited to, operating and emergency controls, safety devices, personal protective clothing, including fall protection, air, hydraulic and fuel system leaks, cables and wiring harness, loose or missing parts, tyres and wheels, placards, warnings, control markings and Operating and Safety Manuals, guards and guard rail systems and all other items specified by the manufacturer.
- 2.1.4** Any problems or malfunctions that affect operational safety must be repaired prior to use of the platform, with specific regard to any safety components refer to the Parts Manual for part numbers and details. If in doubt, contact Niftylift Ltd (Details on page 3). **Ensure wheels are chocked before carrying out any maintenance that involves gearbox disengagement as described in Section 5.5.**
- 2.1.5** Always ensure that all warning labels, instructions, placards, control markings and safety manuals are intact and clearly legible. If replacements are required contact your local dealer or Niftylift. Always observe and obey safety and operating instructions on such labels.
- 2.1.6** Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.
- 2.1.7** Before the Niftylift is used and during use the user shall check the area in which it is to be used for possible hazards such as, but not limited to, uneven ground drop-offs, holes, bumps, obstructions, debris, floor and overhead obstructions, high voltage conductors, wind and weather, unauthorised persons and any other possibly hazardous conditions.
- 2.1.8** Never exceed the maximum platform capacity, as indicated on the decals and machine serial plate.
- 2.1.9** Only operate the Niftylift on a firm, level surface.

Operating & Safety Instructions

- 2.1.10** Never position any part of the Niftylift inside the **Minimum approach distances (MAD)** to above-ground electrical conductors as listed in the table below. (Reference ISO 18893:2014).

Voltage range (kV)	MAD (m)
<0.7	1
≥0.7 to 7	1.2
>7 to 50	3
>50 to 220	4
>220 to 500	5
>500 to 750	10
>750 to 1000	13
>1000 to 1250	16

**THIS MACHINE IS NOT INSULATED.**

If in doubt, contact the local appropriate governing authority.

- 2.1.11** On entering the platform ensure that the drop down entry bar is closed afterwards.


- 2.1.12** Use of an approved safety belt and lanyard, hard hat and appropriate safety clothing is mandatory. Fasten harness to designated harness securing points within the platform and do not remove until leaving the platform whilst in the stowed position.

- 2.1.13** Always remain standing within the platform. Do not attempt to increase your height or reach by standing and/or climbing on the platform guard rails or any other object. **KEEP YOUR FEET ON THE PLATFORM FLOOR.** Do not sit, stand or climb on the guard rail, mid rail or boom linkage. Use of planks, ladders or any other devices on the Niftylift for achieving additional height or reach shall be prohibited.



- 2.1.14** Do not use the platform levelling system to artificially increase the outreach of the platform. Never use boards or ladders in the platform to achieve the same result.
- 2.1.15** Do not use the platform to lift overhanging or bulky items that may exceed the maximum capacity or carry objects that may increase the wind loading on the platform. (e.g. Notice boards etc.)
- 2.1.16** The Niftylift shall not be operated from a position on trucks, trailers, railway cars, floating vessels, scaffolds or similar equipment unless the application is approved in writing by Niftylift Ltd in the UK.
- 2.1.17** Always check that the area below and around the platform is clear of personnel and obstructions before lowering or slewing. Care should be taken when slewing out into areas where there may be passing traffic. Use barriers to control traffic flow or prevent access to the machine.
- 2.1.18** Stunt driving and horseplay, on or around the Niftylift, is not permitted.
- 2.1.19** When other moving equipment and vehicles are present, special precautions shall be taken to comply with local ordinances or safety standards established for the work place. Warnings such as, but not limited to, flags, roped off areas, flashing lights and barricades shall be used.

Operating & Safety Instructions

- 2.1.20** Before and during driving while the platform is elevated the operator shall maintain a clear view of the path of travel, maintain a safe distance from obstacles, debris, drop offs, holes, depressions, ramps and other hazards to ensure safe elevated travel. Maintain a safe distance from overhead obstacles.
- 2.1.21** Under all travel conditions the operator shall limit travel speed according to conditions of ground surface, congestion, visibility, slope, location of personnel and other factors causing hazards of collision or injury to personnel.
- 2.1.22** The aerial platform shall not be driven on grades, side slopes or ramps exceeding those for which the aerial platform is rated by the manufacturer.
- 2.1.23** The aerial platform is not equipped for or intended for use on a public highway.
- 2.1.24** It shall be the responsibility of the user to determine the hazard classification of any particular atmosphere or location. Aerial platforms operated in hazardous locations shall be approved and suitable for the duty. (See ANSI/NFPA 505 where applicable).
- 2.1.25** The operator shall immediately report to his supervisor any potentially hazardous location(s) (environment) which become evident during operation.
- 2.1.26** If an operator encounters any suspected malfunction of the Niftylift or any hazard or potentially unsafe condition relating to capacity, intended use or safe operation, he shall cease operation of the Niftylift and request further information as to safe operation from his management, or owner, dealer or manufacturer before further operation of the Niftylift.
- 2.1.27** The operator shall immediately report to his superior any problems or malfunctions of the Niftylift, which becomes evident during operation. Any problems or malfunctions that affect the safety of operation shall be repaired prior to continued use.
- 2.1.28** The boom and platform of the Niftylift shall not be used to jack the wheels off the ground.
- 2.1.29** The Niftylift shall not be used as a crane.
- 2.1.30** The Niftylift shall not be positioned against another object to steady the platform.
- 2.1.31** Care should be taken to prevent rope, electric cords and hoses from becoming entangled in the aerial platform.
- 2.1.32**  Batteries shall be recharged in a well-ventilated area free of flame, sparks or other hazards (e.g. do not smoke near the machine), which may cause explosion. Highly explosive hydrogen gas is produced during the charging process.
- 2.1.33** When checking electrolyte levels great care should be taken to protect eyes, skin and clothing. Battery acid is highly corrosive and protective glasses and clothing is recommended.
- 2.1.34** If the platform or elevating assembly becomes caught, snagged or otherwise prevented from normal motion by adjacent structure or other obstacles, such that control reversal does not free the platform, all personnel shall be removed from the platform safely before attempts are made to free the platform using ground controls.

2.1.35

When the machine is not in use always stow the booms correctly.
NEVER LEAVE THE KEYS IN THE MACHINE, if it is to be left for any period of time. Use wheel chocks if leaving on an incline.

Operating & Safety Instructions

- 2.1.36** The engine must be shut down while fuel tanks are being filled. Fuelling must be done in a well-ventilated area free of flame, sparks or any other hazard that may cause fire or explosion. **PETROL (GASOLINE), LIQUID PROPANE AND DIESEL FUELS ARE FLAMMABLE.**

2.1.37



NEVER START THE NIFTYLIFT IF YOU SMELL PETROL (GASOLINE), LIQUID PROPANE OR DIESEL FUEL. THESE FUELS ARE HIGHLY FLAMMABLE

- 2.1.38** The operator must ensure that engine powered machines are used in a well-ventilated area to minimise the risk of carbon monoxide poisoning.

- 2.1.39** The operator shall implement means provided to protect against use by unauthorised persons.

- 2.1.40** Never remove anything that may affect the stability of the machine such as, but not limited to, batteries, covers, engines, tyres or ballast.

- 2.1.41** The operator must ensure that the controls are not obstructed (e.g. by tools or equipment) and **clear access to the Emergency Stop** is available at all times.

- 2.1.42** All persons in the cage must take suitable precautions to prevent items falling or being ejected from the cage. E.g. Tethering tools to the machine or operator if practical and an assessment of any resulting risks is acceptable.

2.2 ENVIRONMENTAL LIMITATIONS

Unless specifically configured otherwise, the machine will have a short operational time in extreme temperatures such as freezers and cold storage, due to reduced battery performance. For electrical cables and components, the temperature must be within the range -5°C to 60°C.

The machine is limited in high temperatures because of the cooling requirement for engines and hydraulic oil. Coolant temperatures must be within the range -37°C to 110°C (at 50% mixture of water to anti-freeze). Oil temperature not to exceed -23°C to 90°C.

The recommended operational range for these machines is - 5°C to +40°C. Please contact Niftylift Ltd for special considerations if the machine is required to operate outside these temperatures.

Extended operation in dusty environments is not recommended, frequent cleaning will be necessary. All dust, dirt, salt encrustation, excess oil or grease should be removed. Deposits of paint or bitumen, particularly on legends or labels should be removed.

All standard Niftylift machines are rated for a wind speed of 12.5 m/s, which equates to 45kph / 28mph or force 6 on the Beaufort scale. No attempt should be made to operate a Niftylift in wind strengths above this limit and if the operator has any doubts over the wind speed he / she should cease operation immediately until it can be established that the wind speed has fallen to a safe level.



DO NOT USE THE NIFTYLIFT IN ELECTRICAL STORMS

2.3 NOISE AND VIBRATION

The airborne noise emission on the Height Rider range of machines does not exceed 85dB(A), measured at a perpendicular distance of 4m, under equivalent continuous A-weighted sound pressure test conditions. This was based on a Diesel powered machine, working on high throttle, and under load. All other models will exhibit significantly lower emissions than this figure, dependant on power option. In normal operation the Vibration level to which the operator is subjected will not exceed a weighted root mean square acceleration value of 2.5 m/s².

2.4 TEST REPORT

All Niftylift machine models are subjected to a comprehensive 'type test' which duplicates all combinations of safe working load (SWL), overload, windage, inertia and pull force to assess the various safe stability criteria. Self propelled machines are also subjected to kerb and braking tests at the SWL to satisfy additional 'worse case' stability requirements.

Each individual machine is then subjected to static overload tests on flat level ground with 150% of the SWL, exceeding the requirements of EN280 for power operated MEWPs. Self propelled machines are also tested at the maximum working angle **plus** 0.5° with a test load of 125% of the SWL. Finally, on all machines, a functional test is performed with 110% of SWL.

All safety devices are checked for correct operation, operating speeds are checked against benchmark figures and the dynamic functions ensure that all acceleration and deceleration forces are within acceptable limits. All noted defects are rectified and recorded before the machine is permitted to enter into service.

3 Preparation and Inspection

3.1 UNPACKING

Since the manufacturer has no direct control over the shipping or carriage of any Niftylift it is the responsibility of the dealer and/or owner and/or lessee to ensure the Niftylift has not been damaged in transit and a Pre-operational Report has been carried out by a qualified engineer before the aerial platform is put into service.

- A) Remove all ropes, straps and or chains used to secure the aerial platform during transit.
- B) Ensure any ramp, loading dock or forklift used is capable of supporting or lifting the aerial platform.
- C) If the aerial platform is to be driven off, please ensure that the operator has read and fully understood this entire manual. Refer to the appropriate section for precise operating instructions.

*****Carry out the Pre-operational Report before placing machine in service.**

3.2 PREPARATION FOR USE

Whilst every effort has been made at the Niftylift factory to ensure your machine arrives in a safe and operable condition it is necessary to carry out a systematic inspection prior to putting the aerial platform into service.



THIS IS NOT A REQUEST IT IS MANDATORY

To assist the user in this task you will find enclosed a Pre-operational Report, which must be filled out upon delivery/receipt of the machine.

Before the user carries out the Pre-operational Report he must have read and fully understood all the contents of the Operating, Safety and Maintenance Manual.



WARNING - DO NOT OPERATE A POTENTIALLY DEFECTIVE OR MALFUNCTIONING MACHINE. CORRECT AND REPAIR ANY DEFECTS BEFORE OPERATING YOUR NIFTYLIFT.

MACHINE STABILITY



The machine requires battery mass for stabilisation. If the batteries or any other significant component have been removed, **the machine will be unstable**. Contact Niftylift, UK before removal or replacement of any significant component.

3.3 PRE-OPERATIONAL SAFETY CHECK SCHEDULES

Before use each day and at the beginning of each shift the aerial platform shall be given a visual inspection and functional test including, but not limited to, the following:

3.3.1 DAILY SAFETY CHECKS

- 1) Check that all labels (decals) are in place and legible.
- 2) Visually inspect the machine for damaged or loose components.
- 3) Check that batteries are charged (Refer to Section 4.6 for further information).
- 4) Check the fuel level (if applicable).
- 5) Check that canopies/covers and guards are in place and secure.
- 6) Check that the boom rest switch is operable (if applicable).
- 7) Check that control levers are secure and operate freely.
- 8) Check that operating buttons and emergency stop buttons function properly.
- 9) Check the operation of the manual hand pump.
- 10) Visually inspect all hydraulic hoses and fittings for damage or leaks.
- 11) Check that the platform pivot pins and their tag bolts are secure.
- 12) Check that the tilt alarm is functioning properly (On a slope of 4° or more the alarm should sound and drive should be disabled).
- 13) Check the operation of SiOPS™ (Refer to Section 4.3.3).
- 14) Check the operation of the cage weigh system. See section 4.5.3 for testing and verification procedure.

3.3.2 WEEKLY SAFETY CHECKS

- 1) Inspect tyres and wheels for damage and wear.
- 2) Check that the joystick manipulators are secure.
- 3) Check battery fluid levels and specific gravity (after charging) and general condition.
- 4) Check hydraulic oil level, ISO Grade 22 (European), Grade 32 (Rest of World).
Note; Tank is pressurised; therefore air will be released if filler cap is removed.
- 5) Inspect the engine air filter and clean or replace if necessary.
- 6) Inspect hose track for damage or missing parts.

Operating & Safety Instructions**3.3.3 MONTHLY SAFETY CHECKS**

- 1) Check the engine oil level (if applicable).
- 2) Check the wheel nuts (torque 110ft lbs / 150Nm).
- 3) Check that the bolts holding the wheel motors to the chassis are secure.
- 4) Check that the slew worm/pinion is secured and correctly in mesh. Clean and re-grease.
- 5) Inspect brakes for operation and wear.
- 6) Inspect the engine fuel tank for damage or leaks.
- 7) Check telescopic boom wear pads and nylon studs (if applicable).
- 8) Check and adjust if necessary the Nylatron studs around the telescope boom.
- 9) Every **Six** months perform a **thorough examination** in accordance with the 'Lifting Operation and Lifting Equipment Regulations' (LOLER) 1998, Regulation (9)(3)(a).

3.3.4 ANNUAL SAFETY CHECKS

- 1) Check that all pivot pins and their tag bolts are secure.
- 2) Inspect for any cracks or badly rusted areas on booms and chassis.
- 3) Change the hydraulic oil filters and suction filter (Inside tank).
- 4) Check that slew ring bolts are secure (torque 220ft lbs. 300Nm).

Toughcage

Niftylift **toughcage** is fully UV stabilised for outdoor use in the most demanding climates. However, the user and machine owner should consider the following;

- Discolouration of the material may occur; this is a natural aging process which does not significantly alter the material properties.
- Degredation to the floor may occur as a consequence of product use and effect of UV exposure. The **toughcage**'s multi-layer construction means degradation of the top surface may occur over time without compromising the structural strength of the internal and base layers.
- The rate at which the **toughcage** floor ages is dependant upon the machines application and its country of use (Typical levels of UV exposure). Refer to table below for aging rate applicable to your specific area.

UK, NETHERLANDS, GERMANY, POLAND, SCANDINAVIA, CANADA, RUSSIA	14 years
FRANCE, ITALY, USA (NORTH EAST STATES)	11 years
SPAIN, GREECE, TURKEY, CHINA, USA (MID WEST STATES), AUSTRALIA (TASMANIA)	9.5 years

MALAYSIA, INDONESIA	8 years
USA (SOUTH STATES), SOUTH AMERICA, AUSTRALIA (VICTORIA, NEW SOUTH WALES)	7.5 years
USA (WEST STATES), SOUTH AFRICA, INDIA, PAKISTAN, IRAN, AUSTRALIA (WESTERN, SOUTH, QUEENSLAND)	7 years
NORTH AFRICA, SAUDI, DUBAI, AUSTRALIA (NORTHERN TERRITORY)	6 years

Note: The date of manufacture of the **tough** cage floor is located on its underside.

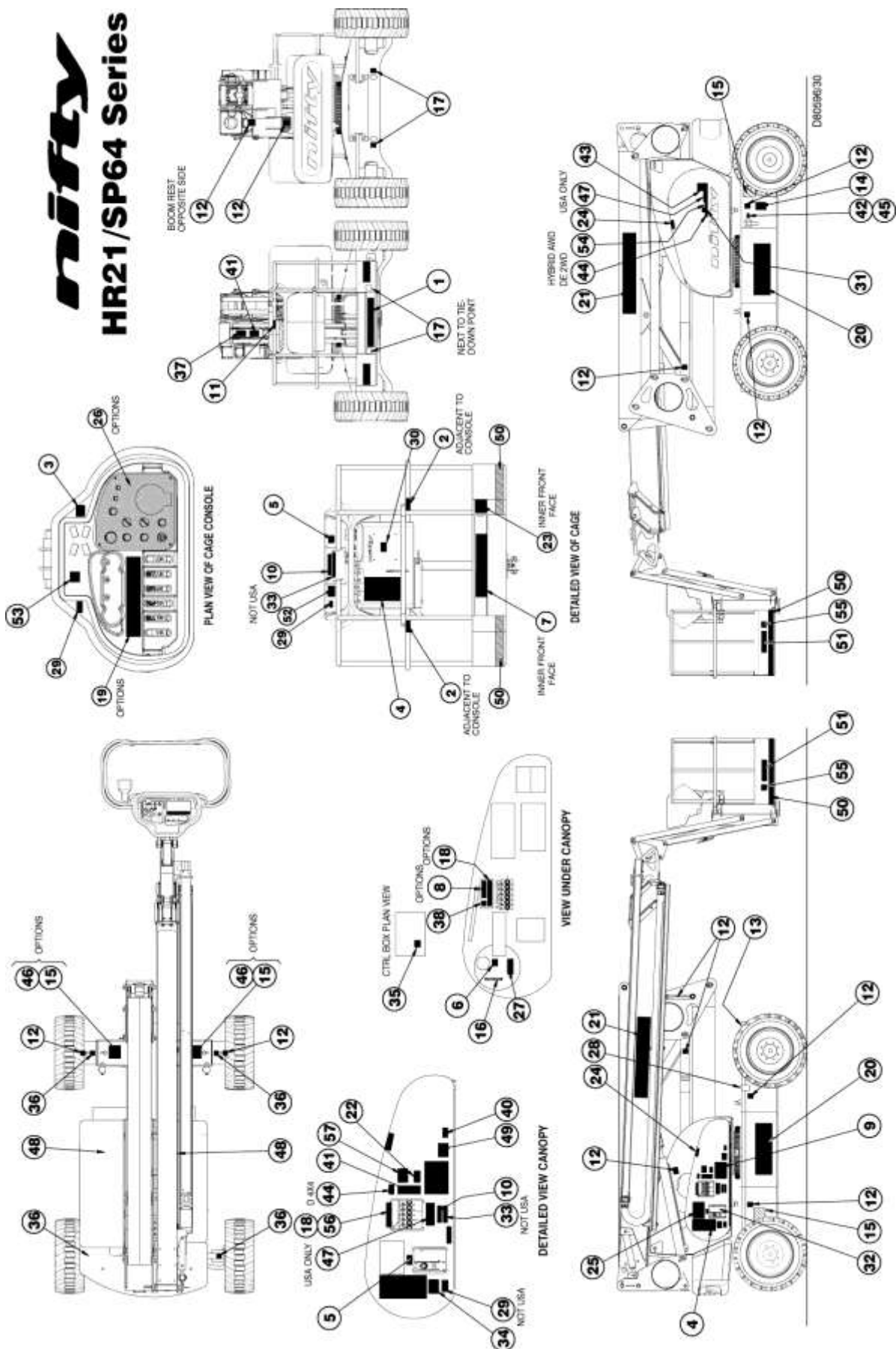
Niftylift recommends that the user and machine owner regularly inspect the tough cage floor for damage. If any significant damage is found then the floor must be replaced. For further guidance please contact Niftylift Limited.

Operating & Safety Instructions**3.4 PLACARD, DECALS & INSTALLATION (UK SPEC)**

ITEM	DESCRIPTION	NUMBER	QTY
1	"Niftylift.com"	P14390	1
2	Harness Point	P14883	2
3	Head Protection	P14921	1
4	Danger HR & TM's	P24900	2
5	"If E-Stop Disabled	P14864	2
6	Hydraulic Oil	P17226	1
7	SWL 225kg	P17328	1
8	Manual Hand Pump	P22859	1
9	Daily Safety Check List	P14908	1
10	"If Tilt Alarm Sounds"	P14868	2
11	Cage Gate Warning	P18335	1
12	Hand Crush – Pictorial	P14782	11
13	Travel Direction	P14784	1
14	Serial Plate	P15383	1
15	Gearbox Disengage	P19180	4
17	Tie-Down Point	P24025	4
18	Hydraulic Levers - Base	P19748	1
19	Hydraulic Levers – Cage	P19747	1
20	"AWD" Logo	P21771	2
21	"HR21 Hybrid" Logo	P21770	2
22	Battery drain	P19850	1
23	Footswitch	P14884	1
24	No Step	P14785	4
25	General Notice HR's	P18870	1
26	Control Buttons – Cage	P20663	1
28	Diesel	P14414	1
29	Clunk Click	P19961	2
30	Operating Instructions	P14892	1
31	Noise Warning	P17124	1
32	Control Buttons – Base	P21750	1
33	Overload Warning	P18848	2
35	Trip – Push to Reset	P19056	1
36	Point Loading	P14972	4
37	"Raise Flyboom"	P19442	1
38	Emergency Control Location	P22877	1
40	Chain Inspection	P16535	1
41	HR21 Slew Pin	P18587	2
42	Charger Socket	110v P26424 240v P26425	1 1
43	Charger Warning	P21951	1
44	Battery Isolator	P18600	1

49	Emergency Instructions	P21700	1
50	Hazard tape	N/A	N/A
51	Toughcage	P21816	2
52	SiOPS Instructions	P22820	1
53	Danger - Do not place objects	P21511	1
54	Hot Surfaces/Moving machinery	P22314	1
55	Cage Tie-down Warning	P21404	2
56	Hydraulic Levers (5) - Base	P22815	1
57	AC Generator Drain	P22860	1

nifty
HR21/SP64 Series



3.5 TORQUE REQUIREMENTS

BOLT QUALITY/SIZE	Tightening torque in lbs ft (Nm)					
	Plated			Unplated		
Grade	8.8	10.9	12.9	8.8	10.9	12.9
M 6	5 (7)	8 (10)	9 (12)	6 (8)	8 (11)	10 (13)
M 8	13 (17)	18 (25)	22 (29)	14 (19)	20 (27)	23 (32)
M 10	25 (34)	36 (49)	43 (58)	27 (37)	40 (54)	46 (63)
M 12	43 (58)	63 (85)	73 (99)	47 (63)	69 (93)	80 (108)
M 14	68 (93)	100 (135)	117 (158)	74 (101)	109 (148)	127 (172)
M 16	106 (143)	154 (209)	180 (245)	115 (156)	168 (228)	197 (267)
M 20	212 (288)	301 (408)	352 (477)	224 (304)	328 (445)	384 (521)
M24	362 (491)	515 (698)	602 (806)	383 (519)	561 (760)	656 (889)
WHEEL NUTS	110 ft lbs (150 Nm)					
WHEEL GEARBOX NUTS	99 ft lbs (135 Nm)					
SLEW RING BOLTS	220 ft lbs (300 Nm)					

This torque chart is based on the following assumptions:

- 1) Bolts to ISO 898-1 "Mechanical properties of fasteners made of carbon steel and alloy steel"
- 2) For "unplated" bolts, all grades:
 - Hex head bolts
 - Black oxide steel bolt with a rolled & oiled thread, no finish on steel nut
 - Prevailing torque includes Nylock (minimum prevailing torque figure assumed)
 - Medium Clearance holes to ISO 273
 - Bolt tightening condition = Yield factor of 75%
- 3) For "plated" bolts, all grades:
 - Hex head bolts
 - Zinc plated oiled (rolled or cut) steel external thread with no finish on steel internal thread
 - Prevailing torque includes Nylock (minimum prevailing torque figure assumed)
 - Medium Clearance holes to ISO 273
 - Bolt tightening condition = Yield factor of 75%

Figures quoted in **Nm** have been calculated in Nm and then rounded to the nearest whole number. Figures quoted in **lb-ft** have been calculated in Nm, converted using a factor of 0.737561 and then rounded.

4 Operation

4.1 CONTROL CIRCUIT COMPONENTS

4.1.1 MAIN CONTROL BOARD: - Situated under the left-hand superstructure cover, the encapsulated control board comprises a PCB (printed circuit board) design which incorporates all of the relays to control the machine operation. The control boards are common to all models, and contain functions which might not be utilised on your particular machine.

4.1.2 TILT ALARM: - Fitted to the superstructure underneath the base controls cover, a solid state sensor which monitors the inclination of the machine. It directly controls the BRV (Brake Release Valve) and the Drive Flow Control valve. Also, if the platform is in use, i.e. Booms are raised, once the inclination exceeds the pre-set limit, it will disable the drive to the machine and sound the alarm. In order to recover the machine, the platform operation is unaffected, allowing the operator to restore drive when the machine is stowed. It is then possible to drive back onto level ground, fully restoring machine operation.

4.1.3 MULTI-TONE SOUNDER: - Situated on the side of the base control box is a small piezo electric sounder, which is used to provide an intermittent alarm whenever the machine is in operation. Pushing the green "power control" button or depressing the foot switch in the cage (if fitted) will energise this sounder. This serves to warn personnel of the operation of the machine.

This device also sounds to indicate a number of other machine conditions as follows;

Tilt Alarm: - If this sensor detects excessive inclination with the booms raised, it will sound continuously in conjunction with the tilt warning light (see Page 26).

Cage Weigh: - If the electronic load cell detects an overload condition it will sound continuously in conjunction with the cage overload warning light. Note; this also occurs on machine start for approximately 2 seconds during the load cell configuration sequence.

Battery management: - when a low battery state is reached, the "pulsing" of the D.C. motors is mimicked by the sounder reinforcing the message to the operator to charge the machine. Note; if the sounder activates whilst using electric power only, it is advisable to start the engine enabling the operator continued use of the machine, whilst recharging the batteries.

Fuel level: - the sounder will activate when the low fuel warning light illuminates.

4.1.4 HORN: - Also located on the back of the base control box is a horn. It can be used as a manual alert, by pushing the "Horn" button at the Platform control position.

4.1.5 DRIVE CONTROL VALVE (DCV): - The DCV is comprised of several individual components all directly involved in the hydraulic supply to the wheel drive motors. Principally, the drive control valves change the hydraulic motor displacement from High to Low and also controls switching between 2WD and 4WD (where applicable). This control function allows the operator to select both High Gradeability/Off Road Drive from High displacement, or High Drive (Hare) and Low Drive (Tortoise) from Low displacement.

4.1.6 SUSPENSION CONTROL VALVE: - This valve controls the cylinders on the unique suspension system. This system will only be active when the booms are in the down position and the telescope is retracted.

4.1.7 BOOM-SWITCHES: - Mounted on the tele-knuckle and links knuckle, and operated by any of the booms raising and/or the telescopic boom extending, these switches control both the operation of the Tilt Alarm Sensor, and the speed control function. With the booms in the stowed position, the Tilt Alarm Sensor is by-passed, allowing the machine to negotiate slopes in excess of the permissible working angle, without isolating the drive function. At the same time, High drive (Depicted by a Hare Icon) is possible, as is fast throttle on those machines so equipped. When the booms are raised or the telescope is out, the Tilt Alarm Sensor becomes activated, only slow speed operation is possible and only Low drive (Depicted by a Tortoise Icon) is permitted. When the booms are raised and the telescope out is engaged, the machine goes to a third slower speed. These control functions are of primary importance to safety of the machine and operator; **under no circumstances should this control function be isolated or by-passed.**

4.1.8 BATTERY MANAGEMENT: - Battery condition is permanently monitored by the control circuit, such that when available power has decreased to 20% of full charge, the battery status circuit begins to "chop" the power to the hydraulic motors. This function causes the drive system to stop & start alternately, signalling to the operator that re-charging is necessary. At the same time the sounder will begin to sound intermittently and the low battery warning light will illuminate, reinforcing the charge warning. At this point, sufficient power remains to drive to the nearest power point. Should the operator ignore the on-set of the discharge warning, the "chopping" will continue until the machine is rendered inoperative. Immediate charging will then be required.

Note; During normal machine usage with the engine running, the batteries are on continuous recharge which is indicated by a flashing light (refer to Section 4.2.1). The exception to this is when the control system decides that additional electric power is required in order to maintain drive/function speed. If the operator is using electric power only and a low battery warning has activated, it is advisable to start the engine, enabling continued use of the machine, whilst at the same time recharging the batteries.

Under no circumstances should a machine be left fully discharged or severe battery damage can occur in a relatively short time.

4.1.9 BATTERY ISOLATOR: - A battery disconnect plug is located beneath the base control canopy, which allows the machine control and power circuits to be isolated from the batteries themselves. Under normal operation, the machine Key switch should be used to isolate the machine, with the Battery plug only being required for emergencies to disconnect the batteries in the event of a short circuit, or during servicing of the machine to ensure that the power is disconnected.

On electric and bi-energy machines, the battery charging circuit is connected directly to the battery side, so charging is un-affected by use of this switch. The main battery pack is grounded to the chassis.

4.1.10 DUTY SELECTOR: - On multiple power option machines, the machine will default to electric power unless the diesel engine has been started.

Operating & Safety Instructions

4.1.11 DIESEL ENGINE: - A Kubota 722 engine described in the maintenance section of the Workshop Manual, driving a swash plate pump with integral relief valve on the main control valve. This arrangement allows two speed operation of all functions.

4.1.12 HOUR METER: - Monitors and displays time of diesel engine usage (Located on base control box).

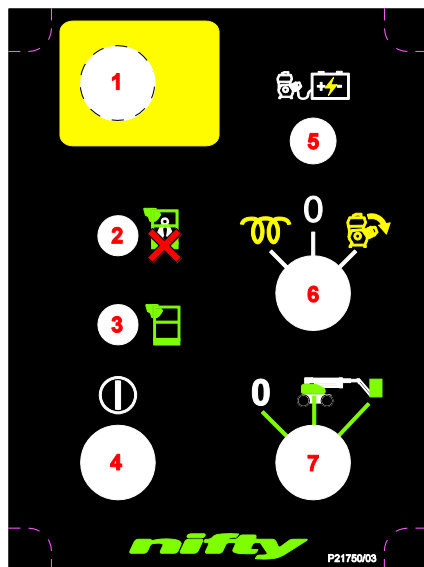
4.1.13 FUSES AND TRIP SWITCHES: -

- 1) **325A** fuse inside front end of chassis, adjacent to battery charger (batteries).
- 2) **125A** fuse near the diesel engine battery (starter motor and alternator).
- 3) **15A** circuit breaker in main PCB box (main control system 12v).
- 4) **10A** circuit breaker in main PCB box. (main control system 48v).
- 5) **35A** circuit breaker in main PCB box (heavy duty circuit for diesel throttle/Glow plug).
- 6) **16A** circuit breaker in step-down unit.
- 7) **1A** fuse in battery canopy (Control side).

4.1.14 LOAD SENSING CONSOLE (SIOPS™): - This machine incorporates a load sensing cage console that senses if the operator has been pushed or has fallen against the console. If the load applied to the front of the console is greater than the pre-determined amount, the footswitch will be disabled to increase operator safety and reduce the possibility of sustained involuntary operation of the cage controls. For further information refer to Section 4.3.3.

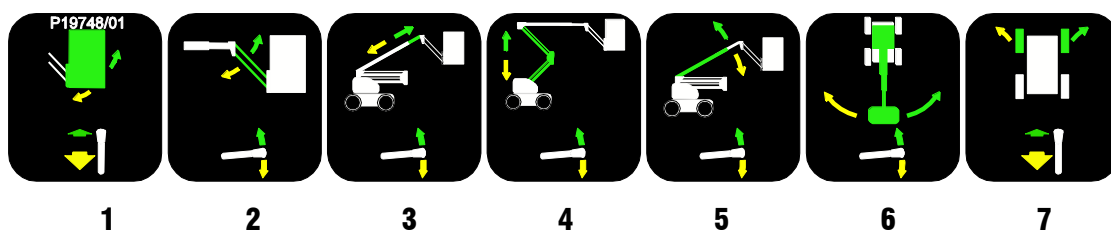
4.2 GROUND CONTROL OPERATION

4.2.1 GROUND CONTROL FUNCTIONS



1 Emergency Stop	Push to Stop machine	Turn clockwise to Release
2 Cage Overload Indicator	Flashing red (Refer to Section 4.5)	
3 Cage Overload Indicator	Constant green (Refer to Section 4.5)	
4 Green Power Button	Push and hold to activate machine	
5 Battery Recharge Lamp	Flashes during machine operation to indicate batteries are being recharged	
6 Diesel Glow/Start Selector	Anti-clockwise for Glow , Clockwise to Start engine	
7 Base/Platform Selector	Clockwise for Platform, Centre for Base, 0 for all power off	

Base Levers



1 Operates Platform Levelling	Up for Forward **	Down for Backward **
2 Operates the Flyboom	Up for Up	Down for Down
3 Operates Telescoping	Up for Tele Out	Down for Tele In
4 Operates the Link Booms	Up for Up	Down for Down
5 Operates the Upper Boom	Up for Up	Down for Down
6 Operates Swing	Up for Right	Down for Left
7 Operates Front Wheel Steer	Up for Right	Down for Left

Operating & Safety Instructions**4.2.2 OPERATION**

ALWAYS ALLOW THE ENGINE TO WARM UP BEFORE OPERATING.

**ALL MODELS**

- 1) Ensure all red emergency stops are out.
- 2) Turn **Base/Platform** selector at ground control station to **Ground** (Centre).
- 3) For **Battery** powered operation, go to step 7).
- 4) For **Diesel** powered operation, go to step 5).

DIESEL ENGINE

- 5) **COLD ENGINE:** - turn the **Diesel Glow/Start** selector to the **Glow** position (anti-clockwise). This engages the glow plug pre-heat system. Hold for 10 seconds then turn the key to the **Start** position (fully clockwise) and the engine will start.
- 6) **WARM ENGINE:** - turn the **Diesel Glow/Start** selector to the **Start** position (clockwise) and the engine will start.

Note: Unless the diesel engine is running, the HR21 Hybrid will automatically default to the electrical power source (battery).

ALL MODELS

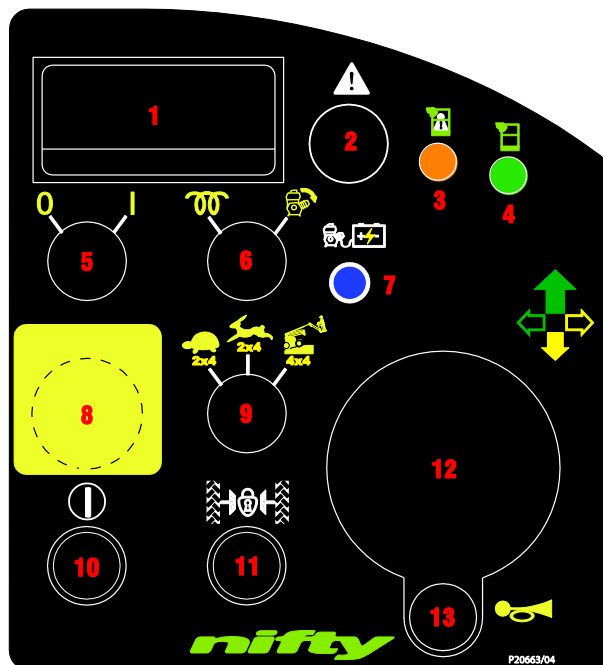
- 7) Push and hold green power button on the base control box.
- 8) Select a function and operate the appropriate hydraulic lever in full accordance with manufacturers operating and safety manual.
Note: Move lever until resistance is felt, then push/pull harder to activate function.
- 9) To return control to the platform turn the **Base/Platform** selector to the **Platform** position (clockwise).
- 10) When not in use, return machine to stowed position. **Note:** Fully lower the Link booms first (Lever 4) followed by the Upper boom (Lever 5) for smooth operation. Turn the **Base/Platform** selector anti-clockwise to the **Off** position, remove key and chock wheels.

EMERGENCY PROCEDURES

- 1) Push in red emergency stop to shut down all functions.
- 2) In the event that the controls fail or the operator becomes incapacitated the booms can be operated by using the hand pump which is located under the canopy next to the base controls. To operate:
 - a) Move and hold lever to be operated.
 - b) Use hand pump lever to move machine.
 - c) Release control lever to halt machine movement.

4.3 PLATFORM CONTROL OPERATION

4.3.1 PLATFORM CONTROL FUNCTIONS

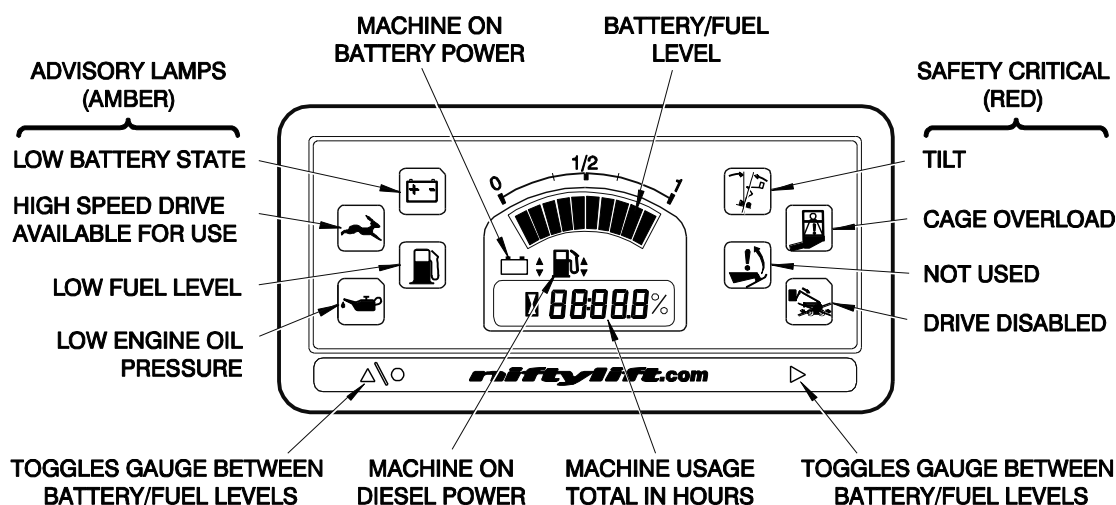


1 Digital Gauge	See diagram on page 26	
2 Safety Warning Lamp	Indicates Safety Critical Problem (Refer to Digital Gauge immediately)	
3 Cage overload indicator	Constant or Flashing amber (Refer to Section 4.5)	
4 Cage overload indicator	Constant green (Refer to Section 4.5)	
5 On/Off Switch	Cage functions ONLY	
6 Diesel Glow/Start	Anti-clockwise for Glow , Clockwise to Start engine	
7 Battery Recharge Lamp	Flashes during machine operation to indicate batteries are being recharged	
8 Emergency Stop	Push to Stop machine	Turn clockwise to Release
9 Drive Speed Selector	Turn Clockwise - Slow, Fast and High Gradeability/Off-road modes	
10 Green Power Button	Push and hold to activate machine	
11 Diff-lock lamp	Illuminates when Off-road (AWD) mode is selected.	
12 Joystick	Grip the joystick and hold the trigger switch at the front. Machine movement is achieved by slowly moving the joystick away from the neutral position in the required direction. Steer by using the thumb rocker switch located on top of the joystick.	
13 Horn	Push to sound	

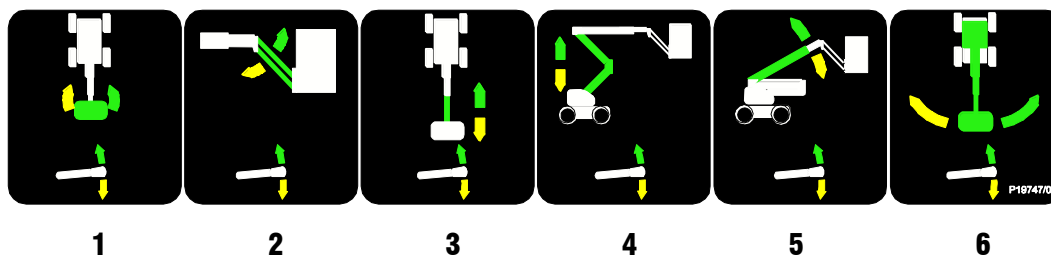
Operating & Safety Instructions

MULTI-FUNCTION DIGITAL GAUGE

Situated on the Cage Control Panel, this gauge provides a warning indication for a range of functions. The red warning lamps on the right hand side indicate a safety critical situation where **immediate** action is required; the amber lamps on the left are advisory. It also displays fuel or battery levels when machine is in operation, automatically reverting to fuel level when diesel engine is started. Refer to diagram below.



CAGE LEVERS



1 Operates Platform Rotation	Up for Clockwise	Down for Anti-Clockwise
2 Operates the Flyboom	Up for Up	Down for Down
3 Operates Telescoping	Up for Tele-In	Down for Tele-Out
4 Operates the Link Booms	Up for Up	Down for Down
5 Operates the Upper Boom	Up for Up	Down for Down
6 Operates Swing	Up for Right	Down for Left

4.3.2 OPERATION



NEVER START THE NIFTYLIFT IF YOU SMELL PETROL (GASOLINE), LIQUID PROPANE OR DIESEL. THESE FUELS ARE FLAMMABLE.

BEFORE OPERATING THE NIFTYLIFT ENSURE THAT EACH OPERATOR HAS READ AND FULLY UNDERSTOOD THE OPERATING MANUAL. FAILURE TO DO SO MAY RESULT IN DEATH OR SERIOUS INJURY.

ALL MODELS

- 1) Ensure all red emergency stops are out.
- 2) Turn the **Base/Platform** selector at the ground control station to **Platform** (clockwise).
- 3) For **Battery** powered operation, go to step 7).
- 4) For **Diesel** powered operation, go to step 5).

DIESEL ENGINE

- 5) **COLD ENGINE:** - turn the **Diesel Glow** selector left to engage the glow plug pre-heat system and hold for 10 seconds, then turn the **Diesel Start** selector to the **Start** position (right) and the engine will start.
- 6) **WARM ENGINE:** - turn the **Diesel Start** selector to the **Start** position (right) and the engine will start.

Note: Unless the diesel engine is running, the HR21 Hybrid will automatically default to the electrical power source (battery).

ALL MODELS

- 7) Depress the footswitch (if available) or push and hold green power button on the platform control box.
- 8) Select a function and operate the hydraulic control levers in full accordance with manufacturers operating and safety manual.
- 9) To return control to the base turn **Base/Platform** selector to the **Base** position (centre).
- 10) When not in use, return machine to stowed position. **Note:** Fully lower the Link booms first (Lever 4) followed by the Upper boom (Lever 5) for smooth operation. Turn the **Base/Platform** selector anti-clockwise to the **Off** position, remove key and chock wheels.



ALWAYS ENSURE THE AERIAL PLATFORM IS ON A FIRM LEVEL SURFACE AND THE AREA IS FREE OF ANY OVERHEAD OBSTRUCTIONS.

ENGAGING THE RED EMERGENCY STOP BUTTON WILL SHUT DOWN THE ENGINE, AND THE ELECTRIC CIRCUIT PREVENTING OPERATION OF ANY FUNCTION.

4.3.3 SiOPS™ - LOAD SENSING CONSOLE (If fitted)

WHEN OPERATING THIS MACHINE THE USER MUST BE AWARE OF ANY OVERHEAD OBSTRUCTIONS.

This machine incorporates a load sensing cage console that senses if the operator has been pushed or has fallen against the console. If the load applied to the front of the console is greater than the pre-determined amount, the footswitch will be disabled to increase operator safety and reduce the possibility of sustained involuntary operation of the cage controls.

Note: The green button will flash once the footswitch has been disabled, but continues to be available for use at all times. This allows the operator to use the cage control functions and manoeuvre the machine to a safe position.

To reset the footswitch:

- 1) Release the load from the front of the console.
- 2) Ensure cage controls are in the neutral position and clear of objects.
- 3) Raise foot clear of footswitch then lower foot onto footswitch.
- 4) Footswitch is now active and full control has been restored.

Note: If SiOPS™ has been activated and the footswitch is not reset within **15 seconds**, the blue warning beacon will flash (If fitted, located on underside of the cage) and a warning announcement will sound until the footswitch is reset as described previously.

4.4 DRIVING CONTROLS



DO NOT OPERATE THE NIFTYLIFT WHILST ELEVATED UNLESS ON A FIRM, LEVEL SURFACE FREE FROM ANY POSSIBLE OBSTRUCTIONS OR HAZARDS BOTH AT GROUND LEVEL AND OVERHEAD.

- 1) Check proposed route for possible hazards, obstructions and personnel.
- 2) Depress switch located on the front of the joystick.
- 3) Use the **Drive Speed** selector on the platform control station to determine speed.

Low Drive (Tortoise) - gives low speed and low engine revs.

High Drive (Hare) - gives high speed and high engine revs.

HG Drive (High Gradeability) - gives low speed, high engine revs and high gradeability.

N.B. High Drive (Hare) is only available when the booms are in the stowed position. The HR21 Hybrid will default to Low Drive speed whenever the booms are elevated.

If the machine is driven on slopes exceeding 10° it automatically reverts to 4WD (Low speed) until the joystick is released.

Also, the machine has an additional tilt sensor that monitors its inclination whilst driving. If it is driven on slopes exceeding 10° the drive speed will automatically revert to HG Drive. To return the machine to High Drive, drive on to level ground (<10°) then release and reactivate the joystick or footswitch.

- 4) Select drive joystick from the platform control box.
 - A. Up for **FORWARD**
 - B. Down for **REVERSE**

Steering is controlled by the rocker-switch button on the top of the joystick

- C. Left for **STEER LEFT**
- D. Right for **STEER RIGHT**

The driving horn is activated by the button on the front of the joystick and there is also a separate horn button on the platform controls for use when the drive and boom controls are switched off.

- 5) All control levers give a fully proportional response therefore the more the lever is moved away from the centre **Off** position the faster the function will become.
- 6) Maximum drive speed is only attainable when all booms are fully stowed and the **Drive Speed** selector is in the **High Drive** (Hare) position.
- 7) When driving with the booms fully stowed, the Tilt Alarm is bypassed to allow the Niftylift to be driven in areas where the slope exceeds the working limit. In normal operation the drive is therefore unaffected when driven onto a slope in excess of this limit, until the booms are raised, whereupon the drive would be disabled and the tilt alarm sounds continuously.
- 8) **Under no circumstances** should any **Height Rider 21 Hybrid** series machine be driven on slopes exceeding the gradeability in the general specification.

Operating & Safety Instructions



ALL NIFTYLIFTS ARE FITTED WITH A TILT ALARM - PRE-SET IN THE FACTORY. ONCE ENERGISED THE NIFTYLIFT WILL LOSE ALL POWER TO DRIVE FUNCTIONS AND A LOUD AUDIBLE ALARM WILL BE ACTIVATED.

TO DE-ACTIVATE, LOWER THE BOOMS FULLY TO STOWED POSITION AND RE-POSITION BASE ON FIRM, LEVEL GROUND.

IF ALARM SOUNDS - DESCEND IMMEDIATELY AND RE-LEVEL MACHINE BASE.

4.5 CAGE WEIGH SYSTEM

4.5.1 LOAD CELL VERSION

The Niftylift HR21 Hybrid is fitted with an electronic load cell. This load cell is a moment-independent, redundant design. This means that independent of the load position inside the cage of the machine, the actual load is measured and if pre-configured limit values are exceeded, warnings will be activated. "Redundant design" means that the load cell design incorporates dual channels that monitor each other. The design of the unit meets the requirements of both BS EN280 and ISO 13849 with a safety integrity level of "Category 3 PL d. (Refer to Appendix A)

4.5.2 FUNCTION

The machine informs the operator, via the load cell output, of the current state of the machine with regard to cage load. There are three output lamps: **green**, **amber** and **red**. The three lamps for the load cell are located on the cage control panel (see section 4.3.1) and ground control panel (see Section 4.2.1) These lamps can be interpreted as follows:

Lamp	Description	Load value	Machine Behaviour
Constant green	Load in the cage does not exceed 80% of safe working load	180kg or less	Normal operation
Constant amber	Load in the cage is 80-90% of safe working load	180kg to 203kg	Normal operation
Flashing amber	Load in the cage is 90% of safe working load	203kg to 225kg	Normal operation
Flashing red (Safety Warning Lamp)	Load in the cage has exceeded safe working load	Above 225kg	Controls isolated – safely remove excess load to restore normal operation

4.5.3 CALIBRATION, INSPECTION AND MAINTENANCE

Calibration, maintenance and repair of the Niftylift HR21 Hybrid cage load cell requires specialist knowledge and equipment. **For this reason, no part of the Niftylift HR21 Hybrid cage-weigh system can be adjusted, repaired or inspected by the operator.**

All enquiries relating to calibration, inspection or maintenance should be directed to Niftylift or one of Niftylift's approved dealers. Contact details are listed in Section 1.4

4.6 BATTERIES AND CHARGING

BATTERIES MUST BE RECHARGED IN A WELL-VENTILATED AREA FREE OF FLAME, SPARKS OR OTHER HAZARDS THAT MAY CAUSE EXPLOSION. HIGHLY EXPLOSIVE HYDROGEN GAS IS PRODUCED DURING THE CHARGING PROCESS.

- 1) Recharge batteries at the end of every working day or shift.
(Note: To recharge batteries fully from flat takes approx. 12 Hours, this consists of 8 hours bulk charging plus 4 hours equalisation. The recharging time can be reduced to approx 4- 6 hours by running the engine whilst charging).
- 2) Plug charger into suitable power supply, either 230 volts or 110 volts AC (see **Charging Limitations**). (Note: If using 230V, use of a suitably rated Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD) at the point of supply is highly recommended.)
- 3) Take note of the indicators provided:
Pulsing Green 50% LED - Batteries are charging and between 0 & 50% capacity.
Constant Green 50% LED and pulsing Green 75% LED - Batteries are charging and between 50% & 75% capacity.
Constant Green 50% & 75% LED's, plus pulsing Green 100% LED - Batteries are charging and between 75% & 100% capacity.
Constant Green 50%, 75% & 100% LED's – batteries are fully charged.
Red Gel lamp – Only applicable to sealed type batteries.
- 4) The charger will automatically switch off once the batteries are fully charged. It is recommended to reconnect the charger to a suitable power supply when the machine is not in use to maintain good battery condition. Charger will monitor and maintain correct battery charge level.



UNDER NO CIRCUMSTANCES SHOULD A MACHINE BE LEFT FULLY DISCHARGED AS SEVERE BATTERY DAMAGE CAN OCCUR IN A RELATIVELY SHORT TIME.

- 5) The machine boom functions can be used whilst on charge. **Do not drive** machine to avoid damage to cables etc. To disconnect charger, firstly switch off the power supply. Ensure LED's are **off** before disconnecting the charger from the power supply.

Notes:

- 1) If the charger is reconnected to the power supply shortly after it has gone through its full charging cycle, the charger will show a Green 50% light, immediately followed by the Green 75% lamp. The charger would then go through its complete cycle again at an accelerated rate, depending on the time difference between connection, reconnection and level of battery charge.
- 2) Some machines are fitted with a Battery Management System, which permanently monitors the condition of the batteries. When the batteries become discharged to 20% of their capacity the management system will begin to "shut down" the hydraulic power packs. This causes the drive/boom operating system to alternately stop and start, signalling to the operator that re-charging is necessary. However, there is sufficient power remaining to enable the operator to drive slowly to the nearest charging point.

- 3) During normal machine usage with the engine running, the batteries are on continuous recharge, except when the control system decides that additional electric power is required in order to maintain drive/function speed.

Should the operator ignore the onset of the battery discharge warning the "shut down" of the motors will continue, until the machine is rendered in-operative. **Immediate charging will then be required.**

CHARGING LIMITATIONS

The capacity of the 110V supply must be capable of 2kW (18A current); hence a small hand-tool transformer must **not** be used with the battery charger.

Note; charger output will fall if air temperature is below 0°C or above 50°C.

Fault Conditions

	LED status	Description
Fault	3 green LED's blink once simultaneously	Output is open or short, output voltage is over limit or output terminals are reversed
	3 green LED's blink twice simultaneously	Input voltage not within range
	3 green LED's blink three times simultaneously	Internal temperature charger limit exceeded
	3 green LED's blink four times simultaneously	Output current limit exceeded
Warning	Green 100% LED blinks continuously	18 hour timer has deactivated the charger due to battery problem. To reset, turn charger off, wait 30 seconds before switching on.

Note; If a fault occurs, the charger emits an audible warning. In addition, if the fault is rectified the charger will restart automatically.

Attention should also be given to the use of extension cables as power leads. Excessive cable lengths from the supply point to the battery charger will result in significant voltage drop, leading to a reduction in the chargers efficiency. In addition, inadequate sized cable cores will have a limiting effect on its current carrying capacity, which will again lead to a reduction in the chargers efficiency. Both of these can result in over-heating of the cable with the attendant risk of fire, short circuits or damage to the components themselves.

The charger requires a minimum battery voltage of 1.5 volts per battery (overall for two batteries 3 volts, for 4 batteries 6 volts for 8 batteries 12 volts). If the voltage is below these values then the charger will not function (Charger will not detect batteries to begin charge.) If the batteries have fallen to such a poor state they will have to be removed from the machine and charged individually with an independent charger until the optimum voltage has been reached. This is best performed at very low currents to 'recover' the batteries if sulphation has already started i.e. a 'trickle' charger. This can take several hours, possibly days. Careful monitoring of the rise of battery voltage will indicate when recovery has been achieved.

BATTERY CONTROLLER

This machine is fitted with a Battery Management System that monitors battery condition. A main component of this is the Battery Controller Unit. If for any reason the battery controller circuit has been disconnected, please ensure that the batteries are **fully recharged** before using the machine as this enables the Battery Controller Unit to reset automatically.

*Note; this requirement does not apply if the battery isolating handle (Anderson connector) **ONLY** has been disconnected.*

The Battery Controller Unit has been calibrated to function correctly with Niftylift factory fitted batteries. If for any reason you suspect **any** of the batteries have been replaced with a non factory fitted unit then please contact the Niftylift Service Department on (44) 01908 857899, Fax: 01908 227460. As machine performance will be severely affected.

TOPPING UP

During the course of normal operation, the batteries should be inspected at least once a fortnight to check the level of electrolyte. During the end of charge, gassing takes place, which will cause a slight reduction in the volume of acid in the battery. This can be topped up with de-ionised water as required. During this inspection, it is useful to note any imbalance in the fluid levels. One indication of a faulty cell would be an increase in the loss of battery acid, which would then require more frequent topping up on that cell, or cells. Faulty cells can liberate excess hydrogen, even during normal operation, with the resulting risk of explosion if ignited. **Any faulty batteries should be replaced as soon as possible with an equivalent sized and rated unit.**

Note: BATTERIES CONTAIN ACID; therefore, protective safety glasses and gloves (Appropriate PPE) MUST be worn whilst performing these checks.

4.7 TRANSPORTING, CRANEAGE, STORAGE AND SETTING TO WORK

4.7.1 TRANSPORTING

The following guidelines should be adhered to ensuring safe transportation of the work platform. Cross loading between transport locations is the most frequent cause of problems, as the method of loading is no longer in sight of our own personnel. The recommendations made herein should be passed on to subsequent carriers, such that the entire journey is carried out without incident. Ensure these guidelines are **read and understood** before lifting or restraining the machine.

- Always ensure the truck or trailer you are loading or towing the Niftylift with can carry it legally.
- If loading by crane the use of shackles and an adequately rated spreader beam, with four leg slings, is **MANDATORY**.
- When loading or un-loading from the side of the vehicle, the use of the forklift pockets to retain one of the forks is recommended. (If fitted). Spread the forks to their widest capacity, with due regard to the components fitted to the machine. Never forklift or crane an entire machine under the booms, always lift beneath the spine or under the ends of the axle mountings in the case of a self-propelled unit. Ensure forklift is adequately rated for the load to be carried.
- Once positioned on the transport carrier ratchet straps should be used to secure the machine. The machine should be positioned to allow easy access around the machine in transit, and to ensure that 'creepage' during transport does not permit the machine to come into contact with other goods being shipped, or the container itself. Some movement of the machine structure might occur during transit, which could lead to fretting or other damage.
- If the machine is equipped with a transit device such as a boom clamp etc, this should be securely applied.
- Strap booms carefully to constrain them from sideways movement. When using straps or chains, adequate packing should be applied to stop any damage to the structure and paintwork. Due regard of the movement of the straps or chains must be taken into account.
- Where a machine has designated points for strapping, lifting or forking, these can be used for tie-down duty. When they are absent, the major structure of the platform can be used, giving due consideration to the design and function of the area chosen. Where possible, use the spine of the machine or axle mounts over which to apply the holding down forces. Using a single plate, such as an outrigger or stabiliser support plate might be unsuitable. If the component was clearly not designed to accommodate a side load, one should not be applied.
- Under no circumstances should straps or chains be applied over booms or through the cage support structure or the cage itself. The relative strength of the carrying structure is not conducive to the massive forces capable of being applied through ratchet chains or slings. Severe damage to the steelwork can be caused, as well as deformation to sensitive mechanisms such as cage weigh assemblies, which would render them useless. Such catastrophic damage to an electronic load cell would require the component to be replaced before the machine would function.

Do not tow machine without first following the towing procedure described in Section 5.5 of this manual.



Operating & Safety Instructions**4.7.2 CRANEAGE**

- 1) Observe all of the limitations relating to straps and chains stated above under 'Transporting'. (4.7.1)
- 2) When utilising the designated lifting points never apply a 'snatch' load, i.e. lift slowly to take up the load before raising. Similarly, do not drop machine when positioning after lifting.
- 3) If the machine is to be lifted by crane, use the designated lifting points and observe the recommendations regarding spreader beams. Individual drawings are available for each machine type, on request. (See list below.)

D80461	HR10/12
D80935	HR15N
D81301	HR17N
D81790	HR15/17 4X4/Hybrid Mk2
D80938	HR21

4.7.3 STORAGE

If being stored for any length of time without use, then the machine should be thoroughly inspected for the following:-

- 1) Grease all bearings /slides, worm drives, etc.
- 2) If machine is to be left on an incline, chock wheels to prevent creep.
- 3) If machine is to be left outdoors or in a hostile environment, cover with suitable weatherproof media to prevent deterioration.

4.7.4 SETTING TO WORK

If your machine has arrived direct from the factory or via a dealer, then it may safely be put straight to work. However, if the machine has been in storage or if unsure about the machine's recent history then a full safety check should be made:

- 1) Check all lubrication points for adequate application of grease, oil etc.
- 2) Inspect all threads for ease of operation - especially descent valves, brake release valve etc.
- 3) Check level and quantity of oil. Remove any contaminants - water, etc.
- 4) Check battery for electrolyte & state of charge.
- 5) Check electrics for damage & insulation.
- 6) Using base controls, cycle machine over complete envelope in accordance with the Operating Instructions. Cure any defects.
- 7) Ensure that all safety devices and controls operate in accordance with the instructions.
- 8) If necessary, perform a load test to establish the machine stability before putting the machine to work.

- 9) On completion of an extended period of road transport, the machine might need additional inspection to identify any transit degradation, which could render the machine unsafe. Perform a P.D.I. inspection on the unit before it enters service. Record any faults found and rectify them immediately.
- 10) If left un-attended for an extended period, it is likely that the hydraulic cage levelling will become un-pressurised. Normal operation is then lost, with a noticeable delay in the forwards or backwards motion as the booms move. To restore normal function, the cage needs to be fully levelled forwards and backwards, using the cage-levelling lever whilst **not** standing in the cage (i.e. with the operator standing adjacent to the cage side whilst simultaneously operating the lever and green button to move the cage). Take care not to become trapped between the moving cage and a fixed object, and ensure those around you are clear of the moving cage. When the system has been charged in both directions, the cage levelling function should be restored. If the system operates but is 'jerky' in either direction, this indicates air in the system. Repeat the procedure as described above until the movements are smooth and un-interrupted. If in doubt, contact our Service Department for further advice.

Niftylift Limited is not liable for any third party damage caused during transport. Careful attention to correct procedures will prevent many of the small snags that can happen in transit. Re-work is both expensive and time consuming. A defective machine arriving at the place of work is a poor advertisement for our product, the company's reputation and those of our dealers and clients. The responsibility for safe and damage-free transport rests with the haulier or his representatives.

5 Emergency Controls

5.1 GENERAL

CHECKING THE OPERATION OF THE EMERGENCY CONTROLS EVERY DAY AND/OR BEFORE EACH SHIFT IS AN ESSENTIAL PART OF THE OPERATOR'S DUTIES



The operator and all ground personnel must be thoroughly familiar with the location and operation of the **EMERGENCY CONTROLS**.

5.2 IN THE EVENT OF AN INCAPACITATED OPERATOR

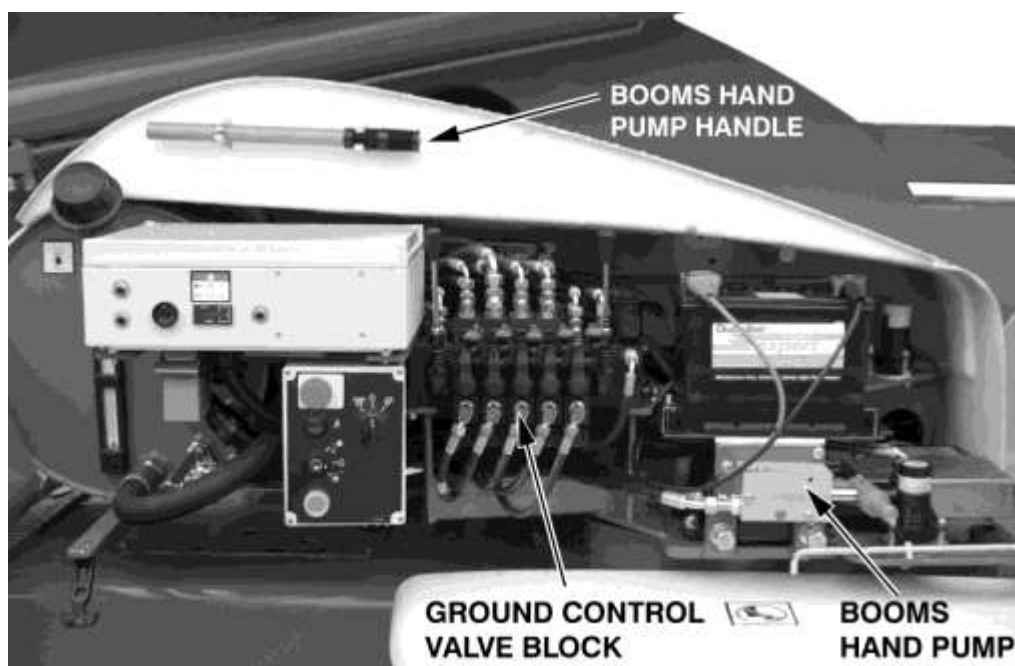
Turn the **Base/Platform** selector at ground control station to **ground** (clockwise). Lower on ground controls as detailed under Section 4.2 Ground Control Operation.

5.3 IN THE EVENT OF MACHINE FAILURE

If all machine power is lost, the **Manual Hand pump** can be used to provide the hydraulic power to manoeuvre the machine. Lower platform using hand lever controls at ground control station. If initial movement of the machine allows the master alarm to reset, normal controls will be available. This is then the fastest method of lowering the platform to the ground.

Note: If the machine is fitted with a cage overload system, and the cage comes into contact with a fixed object whilst operating at height, this would be detected as an overload condition. All power to the machine controls would be lost, requiring the machine to be recovered using the **Manual Hand Pump**. It is sufficient for the cage to be manoeuvred away from the collision point to re-set the cage weigh mechanism, thereby restoring normal machine operation. The cage could then be lowered using the controls as described previously.

Opening the nearside machine canopy reveals the ground controls, plus the dedicated hydraulics for the Emergency recovery of the machine.



5.4 BOOM CONTROLS

On opening the canopy cover, the hand pump handle is revealed. Remove the handle and fit it to the hand pump as shown. When the handle is actuated, hydraulic flow is generated and will be supplied directly to the ground control valve block. Operating the ground control lever will permit the machine to be manoeuvred by the ground personnel.



If desired, the Cage operator can hold the appropriate lever to manoeuvre the machine, whilst a ground operative provides the motive power using the manual hand pump. When not in use, the handle should be stowed back in its clips.

**FOLLOWING AN EMERGENCY DESCENT RECOVERY OF THE PLATFORM,
FULLY EXTEND AND RETRACT ALL CYLINDERS FROM THE GROUND
CONTROL STATION BEFORE USING THE MACHINE.**



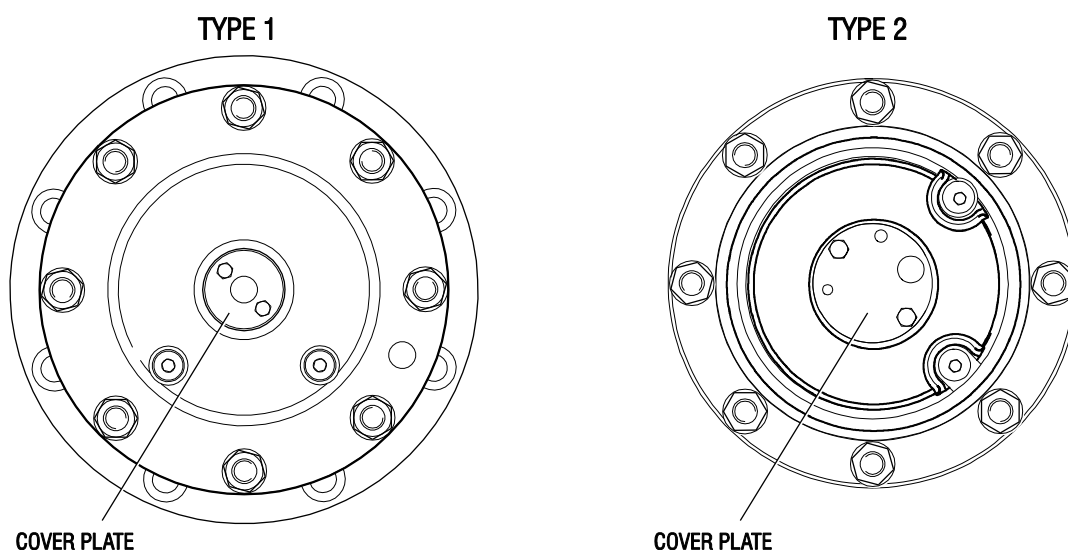
Operating & Safety Instructions

5.5 TOWING

Towing the Niftylift in case of an emergency. If necessary, chock the wheels before carrying out any of the following actions.

5.5.1 IDENTIFYING GEARBOX TYPE

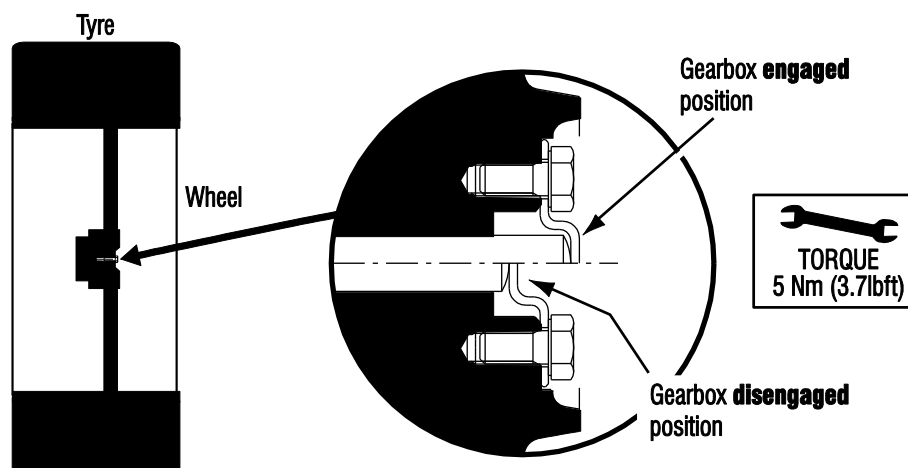
In order to safely tow the HR21, the drive mechanism will need to be bypassed. Identify the type of gearbox fitted to the machine then refer to the relevant procedure for disengagement of the gearboxes.



5.5.2 GEARBOX DISENGAGEMENT (TYPE 1)

The drive gearboxes located on the front and rear wheel hubs must be disengaged as follows;

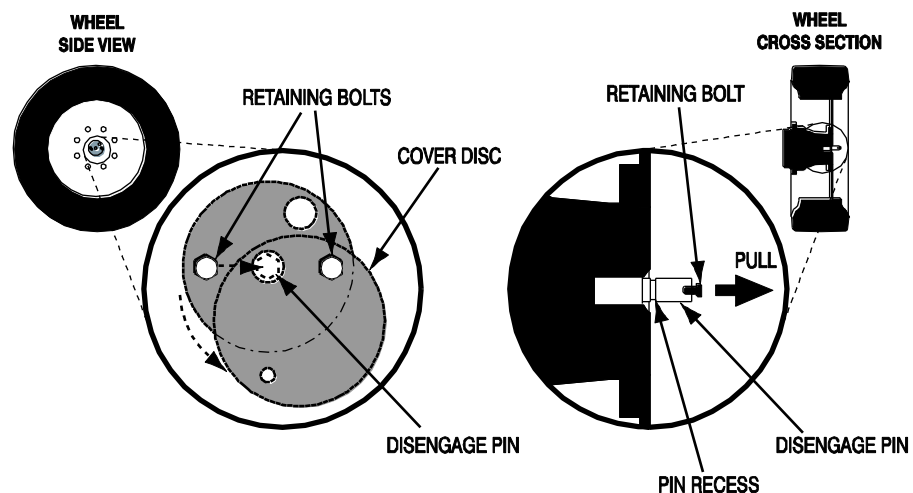
- 1) To disengage the gearbox, remove both screws from the cover plate, turn it upside down (as per the diagram below), re-tighten the M5 screws to a torque of 5 Nm (3.7lbft).
- 2) Before attempting to re-engage the gearbox, ensure that the machine is jacked up so the relevant wheel is clear of the ground in order to prevent damage. **Note; Damage caused by failure to comply with this notice will not be covered by the manufacturer's warranty.**



5.5.3 GEARBOX DISENGAGEMENT (TYPE 2)

The drive gearboxes located on the front and rear wheel hubs must be disengaged as follows;

- 1) Remove both retaining bolts that secure the cover disc to the centre of the wheel hub.
- 2) Partially screw one of the retaining bolts into the end of the central disengage pin and pull the pin out fully, ensuring the recess on the pin is visible.
- 3) Place the cover disc over the pin, ensuring the retaining disc is engaged in the pin recess and secure in place using the remaining retaining bolt.
- 4) To re-engage the gearbox complete the above instructions in reverse order, ensure gearbox drive is free to engage before pushing the pin 'home'. If necessary, jack up each wheel & rotate slightly to allow re-engagement of pin.



Damage caused by failure to comply with these procedures will not be covered by the manufacturer's warranty.

5.5.4 STEER OVERRIDE

The machine can be steered from the ground control station (see Section 4.2). This function is provided to allow correct front wheel alignment prior to towing. To operate, move the lever **up** for steering **left**, or **down** for steering **right** whilst operating the hand pump.

ENSURE MACHINE IS STATIONARY BEFORE OPERATING AS SERIOUS INJURY OR DEATH MAY OCCUR.



5.6 INCIDENT NOTIFICATION

It is a mandatory requirement that any accident or incident involving a Niftylift, regardless of whether any party received injury or property was damaged is reported by telephone directly to Niftylift. Failure to do so may render any warranty on the machine void.

6 Responsibilities

6.1 CHANGES IN OWNERSHIP

When a change of ownership of a Niftylift occurs, it is the responsibility of the seller to notify Niftylift direct of the unit, model and serial number and the name and address of the new owner within 60 days. This important step is required so that all future Technical Bulletins are able to reach the registered owner of each machine without delay. Please note warranties are not transferable.

6.2 Inspection/Service/Pre-Hire Check list

MACHINE SERIAL NO _____

TOWING	PASS	FAIL	N/A
Machine secured on trailer			
Straps correctly positioned and tightened			
Wheels chocked if necessary			
AXLES, WHEELS AND BRAKES			
Wheels are secure, tyre condition acceptable			
Wheel bearings O.K.			
Brake linkages and cables secure			
Brake shoe wear not excessive			
Machine climbs slope			
Brakes hold machine on slope			
Rear hub nut secure			
Track rod secure, not fouling axle plate			
BASE			
Operation of ground control valve and buttons			
Operation of all booms over full range			
Wheel bearings OK			
Cylinders are silent			
Platform is level over full range			
Booms, levelling rods not damaged or distorted			
Booms levelling rods, cylinders not fouling			
Hoses not tight, kinked or fouled			
Operation of manual hand pump			
SLEWING			
Slew assembly and motor are secure			
Worm/wheel mesh correct, no excessive wear			
No end float of worm in housing			
Slew wheel bolts secure			
Slew guards secure			
PLATFORM			
Operation of control valve and buttons			
Operation of SiOPS			
Levelling lock valve holds in both directions, lines vented			
Operation of all booms over full range			
Cylinders are silent			
Platform levelling over full range			
Slewing smooth over full range			
Operation of telescopic boom over full range			
No excessive movement of telescopic boom			

Operating & Safety Instructions

TILT ALARM	PASS	FAIL	N/A
Booms raised on slope - drive disabled, siren tone constant			
Boom operation unaffected			
Booms lowered - drive restored			
INTERNAL (POWER PACK)			
Power pack and all components secure			
All cables and terminals secure			
All hose connections secure			
Hoses not kinked or fouled			
Charger/control box secure			
Batteries secure			
Electrolyte level and specific gravity			
Charger operation			
Hydraulic oil level			
Engine/Gear box oil			
FINISH			
Pivot pin tag bolts			
Correct decals, all visible			
Canopy/bonnets			
Grease nipples (Feet, Knuckle, Centre Post)			
LEAK CHECK			
Cylinders (Lift, Jacks, Telescope, Levelling)			
Control valves			
Check valves			
Power pack/pump			
Slew motor			
Hose connections			
Filter			
Wheel motors			

Comments, remedial work required etc;**INSPECTED BY:** _____**DATE:** ____ / ____ / ____

Appendix A

Safety Related Parts of the Control System (SRP/CS)

The Niftylift control system has been designed and validated according to the required standards. The table below lists the safety related parts of the control system and the level to which they have been approved.

The performance level (PL) of each SRP/CS is specified by BS EN 280:2013 section 5.11 Table 4.

Safety Related Part of the Control System (SRP/CS)	Approval (Standard, Performance Level)
A1 Prevent travel above inclination limit	ISO 13849-1:2008 PL c
A2 Limitation of travelling speed	ISO 13849-1:2008 PL c
A3 Load sensing system	ISO 13849-1:2008 PL d
A4 Platform levelling	ISO 13849-1:2008 PL c
A5 Interlocking of control positions	ISO 13849-1:2008 PL c
A6 Prevent movements of load holding cylinders in case of pipe failure	ISO 13849-1:2008 PL c
A7 Interlocking of travel controls	ISO 13849-1:2008 PL b

A1 PREVENT TRAVEL ABOVE INCLINATION LIMIT

The inclination interlock or Tilt System is PL c in accordance to with ISO 13849-1:2008 as required by BS EN 280:2013

1. The limits of the safety-related parts to the category selected and any fault exclusions;

The tilt interlock is only active when the telescoping booms are lifted up off the boom rest such that the boom switch is actuated.

The boom switch relies on the electrical contacts opening allowing the tilt system to permit drive within the rated angle.

The opening of the contacts is forced by the use of the spring contained within the booms down switch assembly. **Proper maintenance and daily safety checks to be observed**

The boom switch cannot be overridden to bypass the tilt system other than by demounting the switch with the use of tools. **Reasonably foreseeable misuse**

If the boom switch is removed or if it is not maintained in accordance with the appropriated documentation the tilt system may not function in compliance with the requirements as a PL c device.

2. The limits of the SRP/CS and any fault exclusion, for which, when essential for maintaining the selected category or categories and safety performance, appropriate information (e.g. for modification, maintenance and repair) shall be given to ensure the continued justification of the fault exclusion(s);

Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.

Operating & Safety Instructions

Maintenance must only be carried out by appropriately trained and competent persons.

3. The effects of deviations from the specified performance on the safety function(s);

If the tilt interlock does not function as intended it is possible that the Niftylift may encounter slopes for which it is not rated.

If the Niftylift encounters slopes beyond the rating as specified on the serial plate the product may occur instability.

If the product becomes unstable, damage to the Niftylift, other equipment and properties, injury or loss of life of the operator and surrounding persons may be a risk.

4. Clear descriptions of the interfaces to the SRP/CS and protective devices;

The tilt system comprises of a primary device the "tilt sensor" the booms down switch, and control PCBs, and protective devices, for example solenoid operated hydraulic valves or contactors.

If the drive forward or backwards functions are selected when on the boom rest the drive functions will be available regardless of angle of inclination.

If the drive forward or backwards functions are selected when off the boom rest the output from the tilt sensor not being present will deny drive functions.

5. Response time

The tilt sensor is active at all times providing the correct signal in relation to the angle of inclination of the chassis. In the event of encountering an angle of inclination greater than allowable the system will prevent drive functions from being performed until the booms have been lowered on to the boom rest and the angle of inclination has been corrected.

6. Operating limits (including environmental conditions);

All components within the tilt interlock are rated to the environmental conditions acceptable for the machine; refer to Section 2.2.

7. Indications and alarms;

Tilt alarm

The action of the tilt alarm will cause the klaxon to sound and will be indicated by the red warning light on the base and cage location, if the booms are raised and the allowable tilt limit is detected

Tilt sensor fault codes.

Code	Blinks	Meaning
1	1	Internal error - Ask BPE Srl Slave micro controller communication error
2	-	Not used
3	3	Main "ID" safety output error
4	4	Digital inputs check error WQ
5	5	CRC memory error (1). Ask BPE Srl CRC EEPROM
6	-	Not used
7	7	Internal cross check error on X axes. Ask BPE Srl
8	-	Not used

9	5	CRC memory error (1). Ask BPE Srl CRC RAM
10	5	CRC memory error (1). Ask BPE Srl CRC flash
11	-	Not used
12	7	Internal cross check error on Y axes. Ask BPE Srl

8. Muting and suspension of safety functions;

While the tilt sensor is always active the drive interlock is suspended while the booms are on the boom rest. The angle of inclination having been exceeded will be indicated via warning lights regardless of the boom position.

9. Control modes;

The tilt system has no user controllable modes of operation.

10. Maintenance; Maintenance check lists;

Normal maintenance

- Visual check of transducers, board (box) and connection wires.
- Check of power supply to verify it is correct.
- Check of the equipment correct operation, by simulating a locked condition and correspondent rearming. See “Means for easy and safe trouble shooting”
- Check correct operation of the boom switch.

The tilt sensor will not normally require special maintenance. Should special maintenance be required please observe the following precautions.

- Cut off power supply before every check or replacement.
- Do not weld on machine structure before removing power supply (positive and negative) and detaching boxes from vehicle frame or possible connections towards vehicle frame.
- Provide suitable mechanical protections for connection wires, paying particular attention for transducers.
- Do not place board, transducers or cabling close to sources of heat, electromagnetic interferences or power transmissions.
- Do not touch directly boards, transducers and boxes with flushing or degreaser fluids under pressure.
- Do not hole the board box.
- Seal the box and/or the panel who contains the electronic board, to reveal any not authorized access or tampering.

11. Ease of accessibility and replacing of internal parts;

Replacement of parts should only be carried out by appropriately trained and competent persons.

If parts require replacement only replace the whole such as Tilt Sensor, Safety Switch, PCB or Hydraulic valve block.

Do not attempt to open the tilt sensor or replace components soldered to any PCB.

Do not attempt maintenance of hydraulic components i.e. replace seals or internal component.

Only Niftylift original and supplied parts shall be used.

Operating & Safety Instructions

12. Means for easy and safe trouble shooting;

To check the operation of the tilt sensor system

1. Power on the Niftylift and select the base control location.
2. Press the device upper side over the "X+" symbol, until maximum angle and check that green LED goes off.
3. Press the device upper side over the "Y+" symbol, until maximum angle and check that green LED goes off.
4. To check that the rest of the system is operating correct elevate the machine off of the boom rest the minimum amount to allow the booms switch to switch.
5. On the tilt sensor Press the device upper side over the "X+" symbol, until maximum angle and check that red tilt warning illuminates and the tilt alarm sounds
6. On the tilt sensor Press the device upper side over the "Y+" symbol, until maximum angle and check that red tilt warning illuminates and the tilt alarm sounds
7. Power off the Niftylift

13. Information explaining the applications for use relevant to the category to which reference is made;

Not applicable

14. Checking test intervals where relevant.

Check the operation of the tilt sensor system to be made at the beginning of every duty cycle.

A2 LIMITATION OF TRAVELLING SPEED

The limitation of travelling speed interlock, also known as the elevated drive speed system, is PL c in accordance to with ISO 13849-1:2008 as required by BS EN 280:2013

1. The limits of the safety-related parts to the category selected and any fault exclusions;

The elevated drive speed system is only active when the telescoping booms are lifted up off the boom rest such that the boom switch is actuated.

The boom switch relies on the electrical contacts opening allowing the tilt system to permit drive within the rated angle.

The opening of the contacts is forced by the use of the spring contained within the booms down switch assembly. Proper maintenance and daily safety checks to be observed.

The boom switch cannot be overridden to bypass the tilt system other than by demounting the switch with the use of tools.

If the boom switch is removed or if it is not maintained in accordance with the appropriated documentation the elevated drive speed system may not function in compliance with the requirements as a PL c device.

2. The limits of the SRP/CS and any fault exclusion, for which, when essential for maintaining the selected category or categories and safety performance, appropriate information (e.g. for modification, maintenance and repair) shall be given to ensure the continued justification of the fault exclusion(s);

Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.

Maintenance must only be carried on by appropriately trained and competent persons.

3. The effects of deviations from the specified performance on the safety function(s);

If the elevated drive speed interlock does not function as intended it is possible that the Niftylift may experience dramatic dynamic effects which may adversely affect the stability of the product.

If the product becomes unstable, damage to the Niftylift, other equipment and properties, injury or loss of life of the operator and surrounding persons may be a risk.

4. Clear descriptions of the interfaces to the SRP/CS and protective devices;

The elevated drive speed interlock consists of the booms down switch and/or the Tilt switch control PCBs and solenoid operated hydraulic.

If the drive forward or backwards functions are selected when on the boom rest the brake release valve will be energised allowing the drive functions to be used regardless of angle of inclination.

If the drive forward or backwards functions are selected when off the boom rest the output from the tilt sensor is required to energise both the brake release valve and the Master dump to enable drive functions.

5. Response time

The boom switch is active at all times providing the correct signal in relation to the position of the booms. With the booms in the raised position the system will prevent high speed drive functions from being performed until the booms have been lowered on to the boom rest.

6. Operating limits (including environmental conditions);

All components within the tilt interlock are rated to the environmental conditions acceptable for the machine; refer to Section 2.2.

7. Indications and alarms;

There are no indicators or alarms to show that the Niftylift is under the control of the elevated drive speed interlock.

8. Muting and suspension of safety functions;

It is not possible to suspend the operation of the Elevated drive speed interlock with the booms raised or the telescope sections extended.

9. Control modes;

The elevated drive speed interlock has no user controllable modes of operation.

Operating & Safety Instructions*10. Maintenance; Maintenance check lists;*

Normal maintenance

- Check correct operation of the boom switch.

11. Ease of accessibility and replacing of internal parts;

Replacement of parts should only be carried out by appropriately trained and competent persons.

If parts require replacement only replace the whole such as Safety Switch, PCB or Hydraulic valve block.

Do not attempt to open the booms switches, other than to check the condition of the wiring to the switches, or replace components soldered to any PCB.

Do not attempt maintenance of hydraulic components i.e. replace seals or internal component.

Only Niftylift original and supplied parts shall be used.

12. Means for easy and safe trouble shooting;

To check the operation of the elevated drive speed system

- 1) Ensure that the Niftylift has sufficient clearance in all directions to drive for a minimum distance to ascertain that the elevated drive speed is correct.
- 2) Power on the Niftylift and select the cage control location.
- 3) From the cage control elevate the links booms sufficient to remove the telescope sections from the boom rest such that the boom switch is actuated.
- 4) By the use of the drive forward and backwards functions in turn, depress the joystick trigger and depress the joystick in the desired direction.
- 5) Observe that the speed of the drive functions is no more than 1km/h. This can be characterised as a very slow walking pace.
- 6) Release the joystick to cease driving operations.

13. Information explaining the applications for use relevant to the category to which reference is made;

Not applicable

14. Checking test intervals where relevant.

Check the operation of the elevated drive system to be made at the beginning of every duty cycle.

A3 LOAD SENSING SYSTEM

The Load sensing system is PL d in accordance to with ISO 13849-1:2008 as required by BS EN 280:2013

1. The limits of the safety-related parts to the category selected and any fault exclusions;

The load sensing system is activated whenever a green button or footswitch input is given to the PCB. The sensing system is a two-channel device which takes the input from a single load cell bridge on the cage load cell. The actual cage load is determined, and in the case of an overload, the alarm will sound and the output signal is lost.

The loss of the output signal is converted into two separate signals, one of which is used to isolate Channel 1 output (EN) and the other to isolate the Channel 2 output. (GBO). **Proper maintenance and daily safety checks to be observed.**

On initial set-up the machine must be zero loaded to allow the 'Tare' function to register the no-load condition. Following that a calibrated test load is put into the cage to set the upper limit. Proper adherence to the zero set point and the correct test load must be taken to ensure the load sensing system is working correctly. It is possible to apply the overload to the machine in the rest position, and then only to detect this on the next application of the command signal. If the machine has been in the elevated position the consequences of this would be more significant than if the machine were stowed.

Reasonably foreseeable misuse

2. The limits of the SRP/CS and any fault exclusion, for which, when essential for maintaining the selected category or categories and safety performance, appropriate information (e.g. for modification, maintenance and repair) shall be given to ensure the continued justification of the fault exclusion(s);

Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.

Maintenance must only be carried on by appropriately trained and competent persons, who are conversant with all modes of operation, speeds and characteristics of this model.

3. The effects of deviations from the specified performance on the safety function(s);

If the load sensing system does not function as intended it is possible that the Niftylift may encounter overloads for which it is not rated.

If the Niftylift encounters loads beyond the rating as specified on the serial plate the product may occur instability.

If the product becomes unstable, damage to the Niftylift, other equipment and properties, injury or loss of life of the operator and surrounding persons may be a risk.

4. Clear descriptions of the interfaces to the SRP/CS and protective devices;

The load moment control system comprises of a primary device the "load sensor" and control PCB, and protective devices, for example solenoid operated Mater dump valves or contactors.

If the load sensing system cuts out, an alarm will sound and a clear indication of visual overload will be given at each operating position. The system will not re-set until the overload has been removed, by recommendation of reducing the overload in a safe manner.

Operating & Safety Instructions*5. Response time;*

The Load sensing system is active all the time the green button or footswitch is depressed, the application of an overload will be detected within 4 seconds to cater for transient loads and acceleration forces. The alarm and visual indication will continue to sound as long as the machine is overloaded and the command signal is being applied. Removal of the overload by reduction of the applied load will take the cage weight below the threshold for activation as there is 95% hysteresis in the system. Once restored the load system will function as before and no re-calibration will be necessary.

6. Operating limits (including environmental conditions);

All components within the load sensing system are rated to the environmental conditions acceptable for the machine; see **Section 2.2**.

7. Indications and alarms;

The action of the cage overload detection will cause the klaxon to sound and will be indicated by the red warning light on the base and cage location, only as long as the green button or footswitch is continued to be depressed.

8. Muting and suspension of safety functions;

In the case of the overload being detected the alarm can be silenced by releasing the green button or footswitch. Suspension of the function will continue until the overload has been safely removed.

9. Control modes;

The load sensing system has no user controllable modes of operation, other than by use of the calibration tool.

10. Maintenance; Maintenance check lists;

Normal maintenance

- Visual check of transducers, board (box) and connection wires.
- Check of power supply to verify it is correct.
- Check of the equipment correct operation, by simulating an overload condition and correspondent re-setting. See "Means for easy and safe trouble shooting"

The load sensor will not normally require special maintenance

Should special maintenance be required please observe the following precautions.

- Cut off power supply before every check or replacement.
- Do not weld on machine structure before removing power supply (positive and negative) and detaching boxes from vehicle frame or possible connections towards vehicle frame.
- Provide suitable mechanical protections for connection wires, paying particular attention for transducers.
- Do not place board, transducers or cabling close to sources of heat, electromagnetic interferences or power transmissions.
- Do not touch directly boards, transducers and boxes with flushing or degreaser fluids under pressure.
- Do not hole the board box.
- Seal the box and/or the panel who contains the electronic board, to reveal any not authorized access or tampering.

11. Ease of accessibility and replacing of internal parts;

Replacement of parts should only be carried out by appropriately trained and competent persons.
If parts require replacement only replace the whole such as Load Sensor, PCB or Hydraulic valve block.
Do not attempt to open the load sensing PCB or replace components soldered to any PCB.
Do not attempt maintenance of hydraulic components i.e. replace seals or internal component.
Only Niftylift original and supplied parts shall be used.

12. Means for easy and safe trouble shooting;

To check the operation of the load sensor system

1. Power on the Niftylift and select the base control location.
2. Allow the power circuits to cycle and ensure the machine is ready for the command signal.
3. Press the base green button and observe that the machine is ready to function with no load in the cage. (Machine runs, pump flow is available for machine functions.)
4. Select the Cage control position and mount into the cage.
5. Enable the cage controls and then press the cage green button or foot switch to enable the machine functions. (Machine runs, pump flow is available for machine operation.)
6. Add sufficient load to the cage to exceed the safe working load. Press the green button or foot switch and observe that the cage overload system brings in the alarm and halts all machine movements.
7. Remove the overload to below the threshold for safe working load and observe that the cage load control automatically re-sets and restores all machine functions.
8. Power off the Niftylift.

13. Information explaining the applications for use relevant to the category to which reference is made;

Not applicable

14. Checking test intervals where relevant.

Check the operation of the load sensing system to be made at the beginning of every duty cycle.

A4 PLATFORM LEVELLING

The Platform levelling system is PL c in accordance to with ISO 13849-1:2008 as required by BS EN 280:2013

1. The limits of the safety-related parts to the category selected and any fault exclusions;

The Platform levelling system comprises of a load holding device mounted to the slave levelling cylinder.

2. The limits of the SRP/CS and any fault exclusion, for which, when essential for maintaining the selected category or categories and safety performance, appropriate information (e.g. for modification, maintenance and repair) shall be given to ensure the continued justification of the fault exclusion(s);

Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.

In the event of a hose failure ensure a recovery plan is in place that does not require the movement of the luffing booms as the angle of the cage will not be maintained. See effect of deviations from the specified performance below.

Maintenance must only be carried on by appropriately trained and competent persons.

3. The effects of deviations from the specified performance on the safety function(s);

If the levelling system of the product does not function as intended the angle of the cage may not be maintained.

If the angle of cage is not maintained there is an increased risk of ejection of tools and equipment from the cage;

In the event of the operator or other occupants of the cage not using the required safety equipment they may be ejected from the cage and serious injury or death may occur.

There is a load holding device contained within the assembly of the slave levelling cylinder such that if a hose fails the cage position is maintained until the operator can be recovered from the cage.

4. Clear descriptions of the interfaces to the SRP/CS and protective devices;

The levelling system comprises of two hydraulic cylinders and interconnecting hoses.

One is referred to as the Master levelling cylinder

The other is referred to as the Slave levelling cylinder.

In normal operation when the luffing booms are elevated the master levelling cylinder responds to the movement of the booms and causes a transfer of hydraulic fluid to the appropriate side of the slave levelling cylinder.

This transfer of hydraulic fluid maintains the level aspect of the cage.

5. Response time

The Levelling system is a direct acting hydraulic system and as such the response time is near instantaneous.

6. Operating limits (including environmental conditions);

All components within the tilt interlock are rated to the environmental conditions acceptable for the machine; see **Section 2.2**.

7. Indications and alarms;

There are no indicators or alarms to show that the Niftylift levelling system is functioning.

8. Muting and suspension of safety functions;

It is not possible to suspend the operation of the Elevated the levelling system

9. Control modes;

The levelling system has two modes of operation

- 1) Normal movements of the luffing booms cause the system to constantly adjust the cage angle to keep it level.
- 2) Manual adjustment to account for drift of the system over time.

10. Maintenance; Maintenance check lists;

Normal maintenance

- Removal of air from the hydraulic system if the product is left unused for long periods of time.

11. Ease of accessibility and replacing of internal parts;

Replacement of parts should only be carried out by appropriately trained and competent persons.

If parts require replacement only replace the whole components such as hoses, hydraulic cylinders or load holding and over centre valve.

Do not attempt maintenance of hydraulic components i.e. replace seals or internal component.

Only Niftylift original and supplied parts shall be used.

12. Means for easy and safe trouble shooting;

Elevate the luffing booms and check that the cage remains level. If the cage does not remain level the system should be serviced by trained persons fully conversant with the function of the system.

13. Information explaining the applications for use relevant to the category to which reference is made;

Not applicable

14. Checking test intervals where relevant.

Check the operation of the elevated drive system to be made at the beginning of every duty cycle.

A5 INTERLOCKING OF CONTROL POSITIONS

The interlocking of the control positions is PL c in accordance to with ISO 13849-1:2008 as required by BS EN 280:2013

1. The limits of the safety-related parts to the category selected and any fault exclusions;

The physical interlocks between the multiple control positions are controlled through primarily electrical means such that neither position takes sole command unless selected. The alternate control position is then rendered inoperative by isolation of that control circuit. **Proper maintenance and daily safety checks to be observed.**

Since the physical installation of the electrical contacts is the means by which the control circuit operates it is imperative that the functionality is retained. If the internal wiring is interfered with the control isolation could be lost or altered in a way that promotes a dangerous mode of operation.

Reasonably foreseeable misuse

2. The limits of the SRP/CS and any fault exclusion, for which, when essential for maintaining the selected category or categories and safety performance, appropriate information (e.g. for modification, maintenance and repair) shall be given to ensure the continued justification of the fault exclusion(s);

Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.

Maintenance must only be carried on by appropriately trained and competent persons, who are conversant with all modes of operation, speeds and characteristics of this model.

3. The effects of deviations from the specified performance on the safety function(s);

If the interlocking of the control positions does not function as intended it is possible that the Niftylift may allow modes of operation that render it potentially dangerous.

If the controls do not remain independent in their operation, damage to the Niftylift, other equipment and properties, injury or loss of life of the operator and surrounding persons may be a risk.

4. Clear descriptions of the interfaces to the SRP/CS and protective devices;

Each control position is capable of being energised by means of a key operated 'mode selector' which electrically isolates the other circuit when one is selected. The reliability of this function depends on the correct device operator in conjunction with the appropriate contact and internal wiring.

5. Response time

Operation of the mode selector key switch is immediate. Control authority is transferred over and no residual power functions remain with the alternate control position, other than gravity descent (if used.)

6. Operating limits (including environmental conditions);

All components within the control interlock system are rated to the environmental conditions acceptable for the machine; see **Section 2.2.**

7. Indications and alarms;

None, other than by key position.

8. Muting and suspension of safety functions;

None.

9. Control modes;

The standard EU control circuit will permit independent operation of either control position, working through a series Emergency Stop control circuit. In some countries (e.g France and Australia) the alternate control interlock permits the cage system to be isolated by the ground control key switch and will ignore the use of the Cage Emergency Stop. This function effectively promotes the Ground control position to have overall authority over the machine, when selected.

10. Maintenance; Maintenance check lists;

Normal maintenance

- Visual check of switch operators, (Key switch) and connection wires.
- Check of power supply to verify it is correct.
- Check of the equipment correct operation, by selection of the alternate control position and then checking that the green button is inert at the non-selected position.

11. Ease of accessibility and replacing of internal parts;

Replacement of parts should only be carried out by appropriately trained and competent persons.

Individual parts of the control devices can be replaced, ensuring like-for-like exchange of parts, security of the wiring and polarity of components if applicable (Diode outputs etc.)

Only Niftylift original parts shall be used.

12. Means for easy and safe trouble shooting;

To check the operation of the load sensor system.

1. Power on the Niftylift and select the base control location.
2. Allow the power circuits to cycle and ensure the machine is ready for the command signal.
3. Press the base green button and observe that the machine is ready to function with no load in the cage. (Machine runs, pump flow is available for machine functions.)
4. Leave the base key in the ground control position and mount into the cage.
5. Enable the cage controls and then press the cage green button or foot switch to enable the machine functions. Check that no controls are active and that no functions are permitted with the key in the 'ground' control position.
6. Have the base key switch position altered to the Cage position. Check that the control functions are now transferred to the cage, and that all controls are active.
7. Dismount from the cage and check the ground controls are now inoperative. All checks are then complete.
8. Power off the Niftylift.

13. Information explaining the applications for use relevant to the category to which reference is made;

Not applicable

14. Checking test intervals where relevant.

Check the operation of the control position interlock to be made at the beginning of every duty cycle.

A6 PREVENT MOVEMENTS OF LOAD HOLDING CYLINDERS IN CASE OF PIPE FAILURE

The load holding system is PL c in accordance to with ISO 13849-1:2008 as required by BS EN 280:2013

1. The limits of the safety-related parts to the category selected and any fault exclusions;

The load holding system comprises of a load holding device mounted to the cylinder.

2. The limits of the SRP/CS and any fault exclusion, for which, when essential for maintaining the selected category or categories and safety performance, appropriate information (e.g. for modification, maintenance and repair) shall be given to ensure the continued justification of the fault exclusion(s);

Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.

In the event of a hose failure ensure a recovery plan is in place that does not require the movement of the affected cylinder. A safe route of recovery might involve the replacement in-situ of the failed hose before further movement of the machine is possible.

Maintenance must only be carried on by appropriately trained and competent persons.

3. The effects of deviations from the specified performance on the safety function(s);

If the load holding system of the product does not function as intended the angle of the security of the booms may not be maintained.

If the angle of cage is not maintained there is an increased risk of ejection of tools and equipment from the cage;

In the event of the operator or other occupants of the cage not using the required safety equipment they may be ejected from the cage and serious injury or death may occur.

There is a load holding device contained within the assembly of the slave levelling cylinder such that if a hose fails the cage position is maintained until the operator can be recovered from the cage.

4. Clear descriptions of the interfaces to the SRP/CS and protective devices;

The load holding system comprises of a pilot operated over centre valve on each load holding cylinder.

The opening of the load holding valve is dependent on the application of a pilot pressure in the descent line to bring the machine down. Excessive over pressure either by overload or thermal expansion can induce an over centre pilot descent until the excess pressure condition is removed.

5. Response time

The load holding system is a direct acting hydraulic system and as such the response time is near instantaneous.

6. Operating limits (including environmental conditions);

All components within the load holding system are rated to the environmental conditions acceptable for the machine; see **Section 2.2**.

7. Indications and alarms;

There are no indicators or alarms to show that the Niftylift load holding system is functioning.

8. Muting and suspension of safety functions;

It is not possible to suspend the operation of the load holding system.

9. Control modes;

The load holding system has two modes of operation

- 1) Normal movements of the booms cause the system to constantly adjust the cylinders to maintain machine position and load holding.
- 2) Manual adjustment to recover the machine under emergency conditions.

10. Maintenance; Maintenance check lists;

Normal maintenance

- Removal of air from the hydraulic system if the product is left unused for long periods of time.

11. Ease of accessibility and replacing of internal parts;

Replacement of parts should only be carried out by appropriately trained and competent persons.

If parts require replacement only replace the whole components such as hoses, hydraulic cylinders or load holding and over centre valve.

Do not attempt maintenance of hydraulic components i.e. replace seals or internal component.

Only Niftylift original and supplied parts shall be used.

12. Means for easy and safe trouble shooting;

Elevate the luffing booms and check that the cage remains level and the booms remain in their elevated position. If the cage does not remain level the system should be serviced by trained persons fully conversant with the function of the system.

13. Information explaining the applications for use relevant to the category to which reference is made;

Not applicable

14. Checking test intervals where relevant.

Check the operation of the load holding system to be made at the beginning of every duty cycle.

Operating & Safety Instructions**A7 INTERLOCKING OF TRAVEL CONTROLS**

The interlocking of the control positions is PL b in accordance with ISO 13849-1:2008 as required by BS EN 280:2013

1. The limits of the safety-related parts to the category selected and any fault exclusions;

The interlock to prevent simultaneous operation of the booms and travel controls consists of a relay that detects the trigger, as this is only required for boom operation. In the event that the trigger is depressed the boom controls are denied power by this relay. **Proper maintenance and daily safety checks to be observed.**

2. The limits of the SRP/CS and any fault exclusion, for which, when essential for maintaining the selected category or categories and safety performance, appropriate information (e.g. for modification, maintenance and repair) shall be given to ensure the continued justification of the fault exclusion(s);

Do not alter, modify or disable in any way the controls, safety devices, interlocks or any other part of the machine.

Maintenance must only be carried on by appropriately trained and competent persons, who are conversant with all modes of operation, speeds and characteristics of this model.

3. The effects of deviations from the specified performance on the safety function(s);

If the interlocking of the travel controls does not function as intended it is possible that the Niftylift may allow modes of operation that render it potentially dangerous.

If the controls do not remain independent in their operation, damage to the Niftylift, other equipment and properties, injury or loss of life of the operator and surrounding persons may be a risk.

4. Clear descriptions of the interfaces to the SRP/CS and protective devices;

The relay that controls the boom or travel controls is located in the cage panel of the machine.

5. Response time

Loss of the boom functions is immediate as soon as a drive or steer function is selected.

6. Operating limits (including environmental conditions);

All components within the travel control interlock system are rated to the environmental conditions acceptable for the machine; see **Section 2.2**

7. Indications and alarms;

None.

8. Muting and suspension of safety functions;

None.

9. Control modes;

Moving the control lever for drive or steer away from the central rest position immobilises the boom control lever functions. No flow is made available for any segment to the right of the drive/steer controls.

10. Maintenance; Maintenance check lists;

Normal maintenance

- Visual check of all levers including the mechanical links from the levers to the valve spools.
- Ensure the smooth and uninterrupted operation of the two-axis drive steer function, especially the rose joints on the manipulator.
- Check the loss of functions for all boom movements with the machine steer lever operated and held to one end of travel. No boom functions should be available if the steer lever is away from the central rest position. Repeat for drive, but when doing so, be aware of the possibility of the machine moving as the control functions are checked. This should be performed in a clear, open area.

11. Ease of accessibility and replacing of internal parts;

Replacement of parts should only be carried out by appropriately trained and competent persons.

Only Niftylift original and supplied parts shall be used.

12. Means for easy and safe trouble shooting;

To check the operation of the travel control interlock.

1. Power on the Niftylift and select the cage control location.
2. Allow the power circuits to cycle and ensure the machine is ready for the command signal.
3. Press the base green button and operate a boom function to raise.
4. At the same time, operate the trigger and steer the drive wheels in one direction or the other.
5. Observe that the boom control function is lost and does not return until the steer lever is released.
6. In a clear area, repeat for a drive forward/ drive backward lever function whilst operating a boom raise command.
7. Observe that the boom control function is lost and does not return until the drive lever is released.
8. Power off the Niftylift.

13. Information explaining the applications for use relevant to the category to which reference is made;

Not applicable

14. Checking test intervals where relevant.

Check the operation of the travel control interlock to be made at every service interval.

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