

Service Manual for *Quikstak* 'smart-stackers'



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General Description of QUIKSTAK "Smart-Stackers"

QUIKSTAK stackers are battery-powered, non-counter-balanced forklifts, having outriggers going forward either straddling or underneath the load. QUIKSTAKS are available as either 'pushed' versions or 'self-propelled walk-behind', and are available in a range of lift heights and weight capacities.

Lifting force comes from a single displacement-type hydraulic ram. Models with less than 1.5m lift height usually have a direct-acting ram; those with higher lift use the more conventional arrangement with lift chains passing over rollers on top of the ram.

Lifting force is provided by a 24-volt hydraulic power-pack; this is a complete unit comprising the motor, pump, oil tank, all control valves (check valve, pressure relief valve, solenoid lowering valve, pressure-compensating lowering speed valve), and oil filters.

Two deep-cycle gel batteries are connected in series to provide 24 volts for the motor and control circuit. The fully automatic battery charger is mounted internally; the machine may be used while the charger is connected, but the charger is automatically disconnected when the forks are being raised.

Almost all QUIKSTAK stackers are fitted with a patented infra-red height sensing function, which automatically adjusts the fork height up or down to maintain a constant working level, as product is loaded or unloaded. The infra-red sensor is a retro-reflective type that emits an infra-red beam, and receives a reflected signal from any object within its range.

The sensor's range is adjustable up to 700mm out from the fork backplate, and height is adjustable between 750mm and 1000mm from the floor. In some applications (particularly in the woodworking industry) it is desirable to have a delay between when the product is detected by the sensor, and when the forks actually move. Fixed and variable delays are available to suit most applications.

Self-propelled QUIKSTAKS have a large single rear wheel, with a 1200 watt motor and gearbox mounted in the hub. An electronic controller regulates direction, speed, and power according to the position of a thumb-operated control on the handle-head. Various parameters in the controller can be altered to achieve the optimum performance for each application. The controller also has a self-diagnostic function and will report faults by a series of coded flashes on an LED.

Pushed versions have two large-diameter wheels on a common axle which can "rock" a little to allow for uneven floors. When the park brake is applied, a bar locks into grooves machined around the inner rim of both wheels, holding the machine firmly regardless of the condition of the floor.

The forks slide in the masts on specially shaped blocks of self-lubricating nylon. Although they have a little more friction than rollers, the contact surface is many times larger allowing much higher loads to be put on the masts without deformation. Replacement and adjustment of the mast blocks is also very easy.

Trouble Shooting

If the forks will not go up:

1) No power at all (no LED's glowing, no response)

Possible Causes	Refer to Section	Page
Batteries discharged	2.5	11
Control circuit fuse blown	1.5	8
Faulty Charger relay	1.4.3	8
Broken or loose wires	-	-
Emergency Stop switch not working	1.8	9

2) LED (s) glowing, but no response when switches operated

Possible Causes	Refer to Section	Page
Charger relay not working	1.4.3	8
Broken or loose wires		
Emergency Stop switch not working	1.8	9
Raise / Lower switches not working	1.6/1.7	9
Faulty raise solenoid (motor relay)	1.1/3.3	7, 14
Top microswitch sticking on	2.0	9
Faulty motor	2.4	10

3) Forks go up on Manual but not on Automatic

Possible Causes	Refer to Section	Page
Faulty infra-red sensor	1.3	7
Faulty Auto switch or wiring	1.7	9
Object being detected by sensor		

4) Forks go up on Automatic but not on Manual

Possible Causes	Refer to Section	Page
Faulty Manual switch or wiring	1.6	9

If the forks will not come down

5) Forks will not go down in Manual or Automatic

Possible Causes	Refer to Section	Page
Lowering valve not working	1.2 / 3.5	7, 15
Lowering solenoid coil faulty	1.2 / 3.5	7, 15
Wires to lowering solenoid broken or loose		
Mast blocks tight in mast	4.2	19
Forks jammed against top stop blocks	2.0	9
Lift Ram sticking	5.2	21
Pressure-compensating valve blocked	3.7	16

6) Forks come down in Manual but not Automatic

Possible Causes	Refer to Section	Page
Lower microswitch jammed	2.1	10
Faulty sensor, Auto switch, or wiring	1.3 / 1.7	7, 9

7) Forks come down in Automatic but not Manual

Possible Causes	Refer to Section	Page
Faulty manual switch, or loose wire	1.6	9

Other Electrical Problems

8) Battery Charger Not Charging

Possible Causes	Refer to Section	Page
Power socket not live (blown fuse)	1.4	8
Faulty charging lead	1.4	8
Input or output fuses in charger blown	1.4	8
Faulty diode	1.4.2	8
Charger cut-out relay not working	1.4.3	8
Faulty charger	1.4	8

9) Other

Fault	Possible cause	Page
Short Battery Charge life	Batteries need replacing	11
Batteries go flat overnight or when machine is not in use	"Auto-Down" switch left on	9

Note: For all problems relating to the drive system on Self-Propelled machines, refer to Section 7

Non-Electrical Problems

Fault	Possible cause	Page
Oil leaks	Band clamp around tank is not tight	18
	Hose fittings not tight	18
	Leaking ram seal	18
	Oil level in tank too high	18
	Oil getting hot	18
Sensor slowly dropping	Chain tension insufficient	31
Excessive free-play in fork frame	Mast blocks worn	20
Machine difficult to move	Wheel bearings rusty	
	Outriggers not parallel	32

Electrical Fault - Finding

Procedure for Checking Electrical Components

To carry out the following checks, it may be necessary to remove both batteries, place them on the ground to the left of the rear wheels, and reconnect the cables. When testing for current, the easiest tool to use is a "test probe", with a clip on a lead; a light glows when the probe is touched onto anything that completes the circuit. For example, when testing for a positive signal on a certain wire, connect the lead onto the negative battery terminal, and touch the probe onto the wire.

Alternatively, use a good quality multimeter in 0 – 30VDC mode. To test for a positive signal, hold the black probe on the negative battery terminal, and the red probe on the wire or terminal to be tested. To test for a negative signal, hold the red probe on the positive battery terminal, and the black probe on the wire or terminal to be tested.

1.1 To Check the Raise Relay

- 1) The motor should normally run when the 'Manual Up' switch is pressed. If the motor does not run, first check that the upper microswitch has not jammed in (see section 2.0, page 15), then check 2 and 3 below. If the relay 'clicks' but the motor does not run, short across the 2 large terminals with a screwdriver; if the motor runs now, the relay contacts are probably faulty and the relay should be replaced.
- 2) Test for a positive signal at the orange wire, when the 'Manual Up' switch is pressed.
- 3) Test for a negative signal at the grey wire, when the 'Manual Up' switch is pressed.

If either wire is not giving the correct signal check the wiring and switches for breaks or poor connections. If both signals are present, but the relay does not click, its internal coil is probably faulty. To remove, see section 3.3, page 22.

1.2 To check the Lowering Solenoid

- 1) The lowering solenoid should make a faint 'click' when the 'Manual Down' switch is pressed. If not check 2 and 3 below. If it clicks but the forks do not come down, the problem will probably either be hydraulic (section 3) or mechanical (refer to section 4).
- 2) Check for a positive signal at the blue wire, (on the centre pin of 9-pin plug at far left of the machine)
- 3) Check for a negative signal at the white wire (on the bottom cut-out microswitch at the lower left of machine).

If either of these wires is not giving the correct signal check the wiring and switches for breaks or poor connections. If both signals are present, but the solenoid does not click, the coil may be faulty. To gain access to the coil, it is necessary to remove the fibreglass cover (section 3.1, 1-4)

1.3 To check the Infra-red Sensor

If the automatic height-sensing function is not working and a faulty sensor is suspected, check the following:

- 1) Turn to 'Auto-Up'; the green LED on the sensor should come on, and the forks should raise; when something is held in front of the sensor, the red LED should also come on, and the forks stop. Test again in 'Auto-Down' (the forks should go down, when an object is in front of the sensor, and stop when it is removed). If the LED's don't come on, check that the brown wire to the sensor has a positive signal (Auto-Up or Down switch on) and the blue/white wires have a negative signal. If the signals are correct but the LED's do not turn on, the sensor is probably faulty.
- 2) If the LED's come on but the forks do not go up and down correctly, check the grey wire for a negative signal when the sensor is at rest, and the black wire for a negative signal when an object is detected. If either one is incorrect, the sensor's internal relay is probably faulty, and the sensor will need to be replaced.



1.4 To check the Battery Charger:

The chargers in the Quikstaks have been upgraded as new and better technology has been developed -

- Early machines had a 12v system and a single 'Arlec' charger,
- 24v systems pre 2003 were fitted with a simple open auto charger,
- 24v systems between 2003 and 2006 had a 'YK2408' 3-stage, aluminium body charger,
- From late 2006 to mid 2010 a 'Powertech' gold charger was used and a 'Powertech' silver is used currently.

To check the battery charger, measure the battery voltage with the charger unplugged, then again with the charger plugged in. If the voltage does not increase with the charger plugged in, check the following:

- The power outlet (wall socket) is actually live
- The charger is switched on
- The charging lead is not damaged
- The input and output fuses on the charger have not blown.*
- The bullet connectors on the red and black wires from the charger are connected properly.
- The wires to the charger are connected to the terminals on the inside of the charging socket.

The 'YK' and 'Powertech' type chargers can be very simply removed for checking – simply disconnect the 2 bullet connectors, cable clips and slide the charger up out of the mounting rails. The 'YK' chargers have two fuses on the top of the unit, the 'Powertech' gold chargers have a single internal fuse* and the 'Powertech' silver units are all electronic and have no fuses.

Note: only 'Powertech' silver chargers are now available. If you are unsure of which model of charger you have or any details regarding its repair or replacement, please contact your supplier or the manufacturer.

- To replace a gold charger, reconnect positive and negative output connectors, mains input lead to socket and add earth from socket to frame.
- To replace a 'YK' charger, connect output leads direct to positive and negative of batteries in series using leads supplied with eyes.



*Care must be taken when replacing fuses – only a registered electrician may open and service chargers.

1.4.2 Diode

Check the diode (very small square electronic component mounted just to the left of the relay). If it appears to be heat-damaged, replace it. Using a multimeter, hold the red probe on the positive battery terminal, and the black probe on the right leg of the diode (should be 26-29VDC when the charger is plugged in). Then put the black probe onto the left leg of the diode. If the voltage here is more than 1.6 volts lower than the other side, the diode should be replaced.

1.4.3 Charger relay

With 'YK' chargers, the charger relay (24VDC) should "click" every time the charger is plugged in or unplugged. If there is no "click", check the input and output fuses on the charger. Check also the relay (automotive type, mounted just to the left of the charger)

With 'Powertech' chargers the relay should "click" only when the raise switch is pressed.

1.5 To Replace the Control Circuit Fuse:

Remove the access panel. The main control fuse is in an in-line case just above the batteries, and just to the left of centre. If it has blown, replace with an 8 amp standard automotive type fuse, ¼" x 1¼".

Control Switches and lights

1.6 Manual Raise / Lower Rocker Switch (Cole Hersee 58027-11)

This is a 3-position, 2-pole switch with spring-return to centre. The actual switch cavity is sealed; however over time dust or moisture can penetrate the seal, and prevent an effective contact. The switch clips into a rectangular cut-out in the fibreglass cover. To remove, firstly remove the access panel, reach up inside, squeeze the clips on the ends of the switch, and push it out. If any of the wires are removed, they must be replaced in the same position.



1.7 Automatic Raise / Lower Rocker Switch (Cole Hersee 58027-07)

This is very similar to the manual switch above, except that it stays in any of the 3 positions. If this switch is left in the Auto-Down position when the machine is not in use, it can cause the lowering solenoid to energise. If this happens the batteries will become drained fairly quickly.

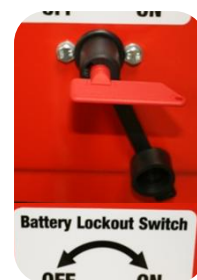
1.8 Emergency Stop Switch (Schneider ZB5-AS54)

It is more difficult to disengage the lower portion of the Schneider switches; a small flat screwdriver must be inserted as shown (arrow) and levered. Once the lower portion is disengaged, the nut on the inside can be unscrewed, and the upper portion removed. Note that a metal plate is fitted between the nut and the fibreglass, to prevent the switch from turning.



1.9 Emergency Battery Lockout Switch

From mid 2010, the Quikstak has been fitted with a battery lockout key switch which cuts the power supply from the batteries in case of an emergency. It is not recommended to use unless necessary. This can be retro fitted to a machine if required.



2.0 Upper Microswitch

A microswitch is mounted either at the top right-hand corner of the "front panel" (1 metre lift machines), or inside the cross-member (on machines with greater than 1 metre lift height). This microswitch is triggered by a plate welded to the back of the "fork upright member", and cuts the power to the motor relay, when the forks reach maximum height.

If the roller arm becomes bent or is not adjusted correctly, it may not stop the motor when the forks reach the top. When this happens, the "trigger plates" welded to the back of the forks come up against 2 "stop bolts", which stop the forks going any higher. If this happens, press the Emergency Stop immediately, and fix or adjust the microswitch before using again.



If the mast blocks are badly worn, the trigger plates can try to bypass the stop bolts; generally when this happens, the chrome bar comes past the seal in the head of the ram, and some oil leaks out. If this does occur, the forks must be forced back down, while the Manual Lower switch is operated, so the chrome bar can re-enter the seal. Again, the microswitch must be repaired or adjusted before using again. The mast blocks should also be replaced (section 4.5).

2.1 Lower Microswitch

This is mounted near the lower left-hand corner of the front panel. Its purpose is to cut out the AUTO-DOWN function when the forks are approximately 200mm off the floor, to prevent a pallet accidentally being lowered onto the operator's feet. It needs to be adjusted accurately in order to work properly.

If it jams in, the Auto-down function will not work, but Manual Down will work as usual. If this occurs, free the roller, and bend it so that it is just triggered by the trigger plate.



2.2 Battery Monitor Panel

Quikstak stackers have a single battery-status LED, with 3 states: Green steady (OK for use), Red steady (recharging recommended), and Red flashing (recharge as soon as possible). During recharging the LED will remain red until the batteries have been recharged to approximately 90%, then it will turn green.



2.3 Charger Socket

The charger socket may occasionally break or crack if the charging lead is pulled at an angle. To replace it, drill out the securing rivets, and disconnect the wires from the inside terminals. The new socket can be riveted in, or screwed if this is easier. The brown wire must connect to the top terminal, green to centre, and blue to the bottom terminal.



From 2004 on, a metal support plate was fitted inside the fibreglass cover, to provide extra reinforcement. This plate can be retrofitted to older models if desired. Please contact Simpro to obtain a plate.

2.4 24VDC Motor

The motors are permanent-magnet type, with 900 watts output. They are generally very reliable and long-lasting. There are 4 brushes which do gradually wear down; as these are difficult to replace, it is generally more economical to fit a complete new motor.

To do this the entire powerpack must be removed (section 3.1). The motor is held on to the main block with 2 cap screws. When installing a new motor, take care to engage the motor shaft with the coupling correctly, and ensure that it is correctly oriented. The motor relay may be swapped over from the old motor, if it is still serviceable.

Battery Care and Service

QUIKSTAK stackers use 2 deep-cycle batteries, linked in series to give 24 volts. Before mid-2005, most machines were fitted with 2 lead-acid batteries, which require regular maintenance and care. From mid-2005 on, machines have generally been supplied with sealed, maintenance-free gel batteries. Simpro recommends that gel batteries are fitted whenever the original batteries become unserviceable. If batteries are sourced from a supplier other than Simpro, they must have a maximum "depth" (front to back) of 135mm, and ideally should be approximately 50amp/hr.

2.5.2 Battery Life

Depending on the level of usage, lead-acid batteries typically give 2 – 3 years* of use before requiring replacement. Maximum life is obtained by frequent charging, without letting the batteries get deeply discharged. As the charger is automatic, there is no risk of overcharging the batteries.

Gel batteries should give up to 5 years* of use before requiring replacement.

The batteries should be replaced when the useful life of a charge gets too low, or if a faulty battery is suspected.

NOTE: If the batteries do not give much use from a charge, check that this is not resulting from a short-circuit, or the "AUTO-DOWN" switch being left on. When the machine is at rest there should be no current draw. Also check that the charger is working, by reading the voltage across both batteries when off charge, then plugging the charger in. The voltage should immediately start to rise. If not, check the charger. (See section 1.4)

*Subject to conditions of use.

2.5.3 To Test Batteries

- 1) Using a multimeter, check the voltage of each battery with the charger disconnected. If below 12 volts, even after having been charged, the battery is probably faulty and should be replaced.
- 2) If the voltage is OK when at rest, but a fault is still suspected, check again while raising a load on the forks. Depending on the load, the voltage of each battery may drop down to 10-11 volts. If lower than this, replace the battery.

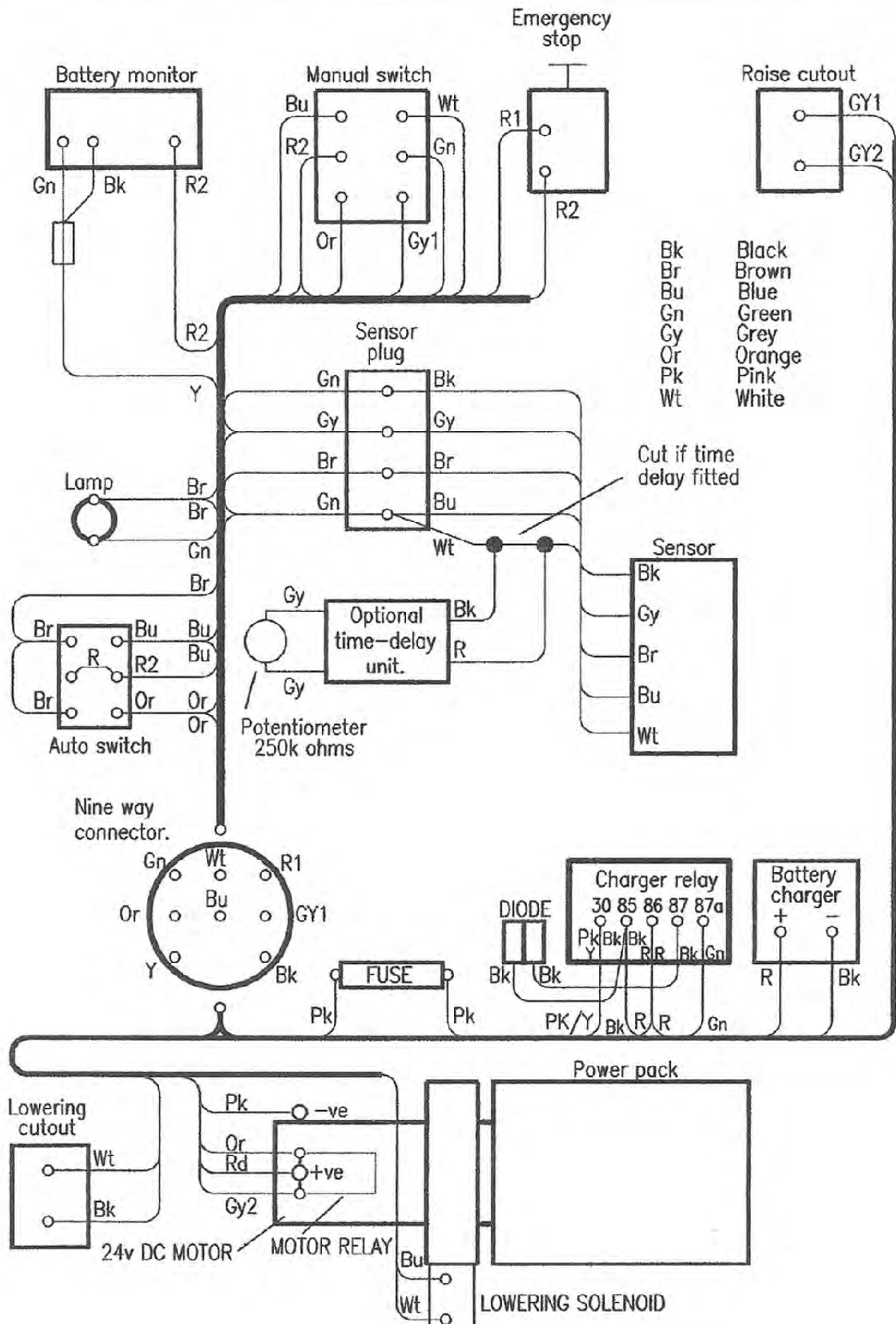
2.5.4 Battery Replacement:

- 1) Always replace with 2 batteries of the same type.
- 2) Ensure that they are installed the right way around, and that the cables are connected correctly. (Red lead to positive, black lead to negative). *

Gel batteries should be installed with the positive terminals to the left. When installing gel batteries, put the right-hand battery in first, connect the black battery cable, and then slide it as far as possible to the right. Then install the left-hand battery, connect the red battery cable, and the joiner cable from the negative of the left battery to the positive of the right one.



Standard Wiring Diagram

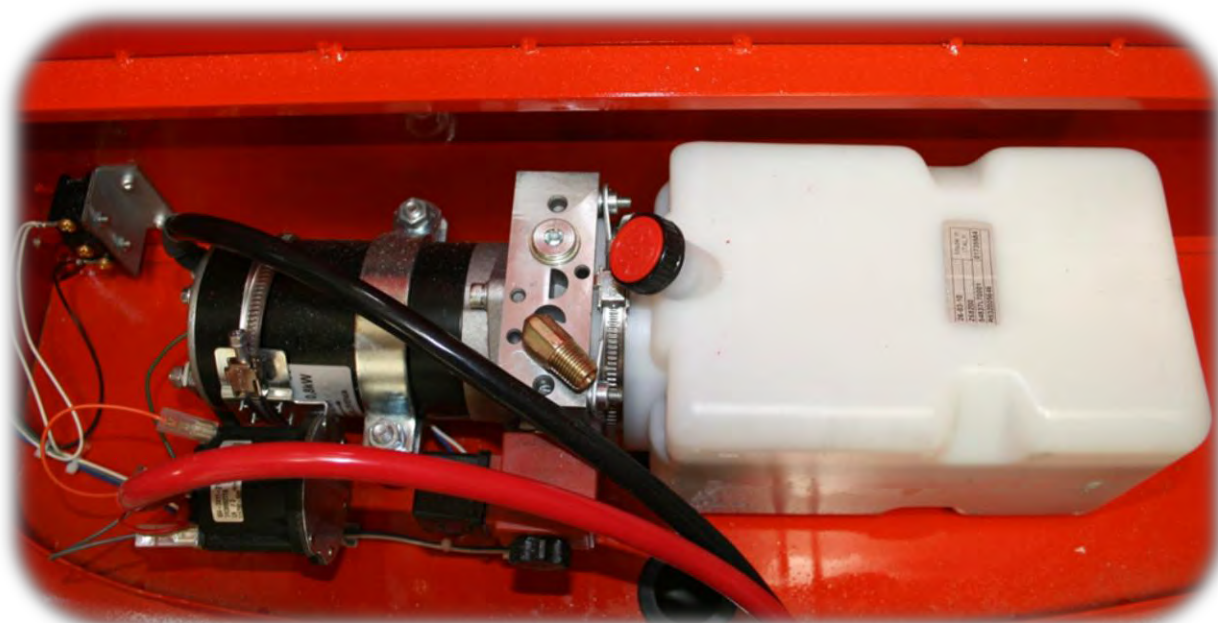


3.0 Hydraulic Power Pack – Service

QUIKSTAK stackers use top quality European powerpacks, which have proved to be very reliable and long lasting, and require no regular maintenance. "Hidroirma" brand powerpacks were used up until approximately early 2003; after this mostly "Oil Sistem" brand units were used, though some Hidroirma units were used. With the Hidroirma powerpacks, the hydraulic hose connects into the rear vertical face of the main block; on Oil Sistem units the hose connects into the top face. (see photo below)

All powerpacks have a pressure-compensating lowering speed valve; this automatically regulates the lowering speed, regardless of the weight on the forks.

The powerpacks also have a check valve, solenoid lowering valve, pressure-relief valve, and oil filter (suction type on Oil Sistem units, return type on Hidroirma).



3.1 To Remove the Powerpack:

- 1) Ensure the forks are fully lowered.
- 2) Using a sharp knife, inserted between the fibreglass cover and the steel frame, cut the black plastic retaining clips (3 on each side, 3 on top)
- 3) Undo the grubscrew holding the sensor adjusting knob onto the shaft, and remove the knob.
- 4) Pull the cover out a little, remove the 3 wires from the charger socket, and separate the 2 halves of the wiring loom plug. Lift the cover away.
- 5) Undo the battery cables, remove the batteries and support frame(s).
- 6) Undo the hydraulic hose connection using an 11/16" spanner, and tape or plug the end of the hose to prevent contamination.
- 7) Remove the orange and grey wires from the motor relay.
- 8) Remove the 2 bolts holding the motor clamp bracket.
- 9) Carefully raise the powerpack (Hidroirma brand only), until the lowering solenoid is in view. Undo the knurled nut securing the solenoid, and remove it along with the outer o-ring. Lay the solenoid on the chassis and remove the powerpack.

3.2 To Install the Powerpack

Installation is a reversal of the above procedure, with attention to the following points:

- 1) An o-ring goes each side of the solenoid, on the valve stem.
- 2) The knurled nut should be only tightened by hand. DO NOT USE EXCESSIVE FORCE.
- 3) Ensure the solenoid is correctly oriented before replacing the powerpack (Hidroirma).
- 4) The orange and grey wires can go on either of the motor relay terminals.
- 5) Obtain replacement plastic retaining clips from Simpro, tap in to hold the fibreglass cover.
- 6) After refitting, check carefully all functions, and check that there are no oil leaks.

3.3 To Replace the Motor Relay: (with the powerpack in place)

- 1) Remove the access panel, batteries and battery-support frames.
- 2) Remove the 2 switching wires, battery cable, and motor cable from the relay terminals.
- 3) Undo the 2 securing screws and remove the relay. On machines with "Oil Sistem" powerpacks, it may be easiest to remove the entire fibreglass cover as detailed above (Section 3.1, steps 2-4).
- 4) Fitting the new relay is a reversal of the above procedure.

3.4 To Replace the Lowering Solenoid Coil

Hidroirma Brand

- 1) Remove the powerpack as described in section 3.1
- 2) Remove the screw holding the plug onto the solenoid and remove the plug.
- 3) Fit the plug to the new solenoid
- 4) Reassemble with attention to notes in section 3.2.

Oil Sistem Brand

- 1) Remove the fibreglass cover as detailed in section 3.1, steps 2-4.
- 2) Undo the knurled nut holding the solenoid onto the valve.
- 3) When refitting, ensure there is an o-ring each side of the coil, and do up the nut finger-tight only.

3.5 To Remove the Lowering Valve:

1. Remove powerpack as described in section 3.1.
2. Hold the powerpack vertically in a vice, and unscrew the valve from the main body using a 15/16" spanner.
3. Clean the valve carefully with compressed air. Ensure that the centre poppet can move freely, and that it seals firmly on the valve seat when released.
4. Clean the valve orifice before refitting the valve.
5. Reassemble with attention to notes in section 3.2

3.6 Pressure-Relief Valve Setting

NOTE: The relief valve is set at the factory so the stacker can lift just more than it's rated capacity. Increasing the pressure setting without calibration equipment is dangerous and will void the warranty.

If the stacker will not lift it's rated capacity, first lubricate the masts, and check the mast blocks for wear. Also check the battery voltage and motor condition. If all of these are OK, contact the manufacturer (see page 44).

3.7 To Remove Pressure-Compensating Lowering Speed Valve (PCLSV):

Hidroirma Brand

1. Remove the powerpack as described in section 3.1.
2. Hold the powerpack vertically in a vice, and remove the 1/4" BSP fitting from the pressure port using a 9/16" spanner.
3. The PCLSV is right at the bottom of the pressure port, and can be unscrewed using a 10mm- wide flat screwdriver.
4. Clean the valve carefully using compressed air.
5. Ensure the port is clean before refitting. Tighten the valve firmly at the bottom of the orifice.
6. Use Ceelon tape (or similar sealant) only where the elbow fitting screws into the power pack body. Do Not use sealant on the hydraulic hose connection.

Oil Sistem Brand

1. Remove the Lowering valve as described in section 3.5.
2. The PCLSV is in the same orifice, just below the lowering valve. Using a pair of long-nose pliers, grip the cross-pin and pull the PCLSV out, with a twisting motion.
3. Clean carefully, then replace.
4. Reassembly is a reversal of the above procedure.

3.8 To Clean the Tank and Oil Filter:

NOTE: Hidroirma powerpacks have a return-line filter; Oil Sistem units have a suction strainer, which is easy to remove and clean once the tank is removed.

1. Remove the power pack as described in section 3.1.
2. Hold the power pack vertically in a vice, remove the hose-clip and the clamps holding the tank onto the main body. (Use a 5mm Allen Key).
3. Pull the main body up off the tank, and lay carefully on it's side. Dispose of the old oil, clean the tank thoroughly.

Hidroirma only

1. Hold the power pack upside-down in a vice. Mark the pump to ensure correct reassembly, then undo the 4 cap screws holding the pump to the body. In particular note the 2 small rings that ensure the pump locates accurately onto the body. (cont'd)

2. Remove the cap screws holding the filter, remove, and clean it carefully with petrol. Clean the body also of all traces of foreign matter, using compressed air.
3. Reassemble carefully. Cleanliness is essential; the pump must be fitted the correct way around, and all screws tightened firmly and evenly.
4. When refitting the tank, ensure that the o-ring is correctly seated in it's groove, and do up the hose clamp directly over the o-ring. The filler cap should be on the opposite side to the lowering valve.
5. Refill the tank with clean hydraulic oil, ISO 32 viscosity.
6. Test the machine with a full load, and check carefully to ensure there are no oil leaks.

Oil Sistem

If necessary, the filter may be unscrewed and cleaned with degreaser and compressed air.

3.9 Oil Leaks

If an oil leak is suspected, check the following:

1. There is a hose-clamp around the plastic tank, where it joins onto the body of the power pack. Occasionally, if this clamp is not tight enough, a small amount of oil can seep out of the tank. The clamp screw can normally be easily accessed by moving the batteries apart; do it up as tight as possible. Any oil sitting on the chassis should be wiped up, in view of confirming that the leak has stopped.
2. Ensure that the fittings at both ends of the hydraulic hose are tight. While extremely rare, it is possible for the hose itself to leak. If this is suspected, wipe all oil off the machine, then leave the machine standing, with weight on the forks, for several hours. If more oil leaks out, try replacing the hose (only a genuine part should be used, available from Simpro or an agent).
3. A further possibility is that the oil could be foaming, and coming out the filler/breather on the tank. This can happen if very heavy loads are being picked up, and the oil is bypassing through the pressure-relief valve. This generates a lot of heat, and makes the oil foam, causing the tank to overflow.

If the loads being raised are more than the rated capacity of the machine, either the weight of the loads should be reduced, or a higher capacity machine used. If the loads are within the rated capacity, but the relief valve is still 'blowing', it can be adjusted (by authorized persons only).

The oil level in the tank can be lowered a little in many cases, to help prevent overflowing. With the forks fully raised, there should be a minimum of 20mm oil across the bottom of the tank. If more than this, try pumping out some of the surplus.

4. If the top cut-out switch (when the forks are fully raised) fails to work, oil can leak from the top of the ram. This will normally be obvious, by oil running down the ram body. If this occurs, check and adjust the top cut-out switch.

4.0 Removal and Refitting of Forks

Models with Direct-acting Ram:

4.1 Removal

1. Fully lower the forks
2. Remove the circlip securing the top of the ram to the centre post of the fork back plate.
3. Remove the 2 M10 bolts (16mm spanner), one each side of the top of the front panel (or cross-member, on models lifting higher than 1 metre). Note the way the flat washer(s) and spring washer are fitted, to ensure correct reassembly.
4. Lift the forks out, using another forklift, chain block or other safe, approved method to support them evenly.

NOTE: Just as the top plastic blocks come out of the mast, the ram will come out of the centre post, and should be carefully rested against one mast.

4.2 Refitting

1. Ensure the four blocks are correctly positioned on the fork spigots.
2. Raise the forks, then carefully lower them into the masts, ensuring they are held level at all times.
3. Just before the top blocks enter the masts, hold the ram upright, so that it enters the hole at the bottom of the forks.
4. Take special care that the top microswitch roller does not get damaged or bent by the forks.
5. Lower the forks fully, making sure the spigot on top of the ram passes through the hole.
6. Check the side-to-side clearance of the forks in the masts. Ideally, there should be 1-2mm of free play at the bottom, and at the height of the top blocks. The free play can be adjusted by adding or removing 1" x 1/16" flat washers under the plastic blocks. If adjustment is required, remove the forks, add or subtract washers to the relevant blocks, and refit the forks. Recheck the clearance.
7. When satisfied, replace the circlip and the 2 M10 bolts.
8. Raise the fork fully and check that the top microswitch works properly. Check also that the forks go down without sticking.

Models with Compound Ram:

4.3 Removal

1. Lower the forks onto a support block (approx 50mm high), then press the ram down while holding the 'Down' switch, to take the tension off the chains.
2. Remove the spring clips on the connecting links holding the chain to the adjusting bolts, and remove the connecting links.
3. Remove the circlips securing the chain rollers onto the shaft on top of the ram, slide the chain rollers off, and drape the chains over the front of the fork back-plate.
4. Remove the 2 M10 stop-bolts and spring washers from the 100 x 50 RHS cross-member.
5. Carefully lift the forks up and out of the masts, preferably using another forklift so the forks are supported flat.

4.4 Refitting

1. Refitting is a reversal of the above procedure; take special care that the top microswitch roller does not get damaged or bent during refitting.
2. Check and adjust the mast block clearance as described in section 4.2.
3. It is essential that the chain adjustment bolts are adjusted correctly, to ensure that both chains are taking an equal share of the load. With the forks right down, pull the long portion of both chains forward, and adjust the Nylock nuts until they both pull forward evenly.
4. Refit the 2 M10 stop-bolts, then raise the forks fully to check that the top microswitch works correctly, and that the forks go down smoothly, without sticking.

4.5 Mast Blocks

The mast blocks are made from a special oil-impregnated nylon material that combines exceptional strength with good wear properties, and minimal friction. Generally they will give years of service without needing replacement; if one side of the blocks does wear they can be rotated 180° to extend their life. The lower blocks tend to wear at the back, and the upper ones at the front.

To rotate or replace the blocks, follow the steps in section 4.2. Note that, although most machines have "tapered flange channel" masts, some have "parallel flange channel" masts. Please specify when ordering replacement mast blocks.

5.0 Lift Ram – Removal, Service and Replacement

5.1 Removal

Direct-Acting Types

1. Ensure the forks are fully lowered. Disconnect one battery cable, for safety.
2. Remove the circlip on top of the centre member of the forks.
3. Raise the forks fully, using any available form of lifting device. Do not use the stacker's powerpack.
4. Pull the base of the ram forward sufficiently to undo the hydraulic hose fitting (11/16" spanner).
5. Remove the ram.
6. Plug the end of the hose to prevent contamination.

Compound-Acting Types (with chains and rollers)

1. Raise the forks fully, and support them firmly so they cannot fall.
2. Press the Manual Lower switch, and hold until the ram has fully retracted.
3. Disconnect one battery cable, for safety.
4. Remove the access panel; undo both bolts holding the top bracket to the front panel.
5. Pull the base of the ram forward sufficiently to undo the hydraulic hose fitting (11/16" spanner).
6. Remove the ram.
7. Plug the end of the hose to prevent contamination.

5.2 Service

The rams fitted to QUIKSTAK stackers are of the displacement type, and only have a head seal, sealing on the chromed spear. There is no piston, nor any internal means of preventing the spear from coming out of the ram body. Once the ram and forks are assembled in the stacker, the spear cannot come out. In practice, the rams have proved very reliable and service, if necessary, is very simple.

1. Hold the ram in a vice, with the port up and the port end slightly lower than the open end.
2. Carefully grip the end of the chrome spear and pull it right out of the ram body. Lay on clean rags or paper, and take special care that it does not receive any knocks which may damage the surface.
3. Drain and dispose of the oil in the ram body.
4. To replace the seal, pick the old one out from it's groove just below the top of the ram, and replace with an identical seal.
5. Clean the inside of the ram thoroughly.
6. Smear oil around the inside of the head, and seal, and replace the chrome bar.
7. The air should be removed from the ram by holding it upside-down and pumping oil in through the port, then retracting the ram until no air comes out. Alternatively, hold the ram in a vice with the port at the top, and the port-end of the ram slightly higher. Connect a hose to the port, and dip the end into a container of clean hydraulic oil. Pull the chrome bar out a little, then slowly push back. Repeat until no more air comes out

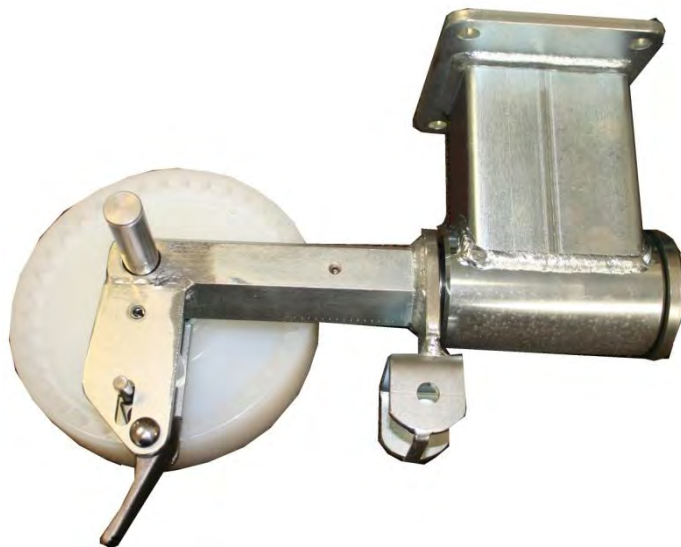
5.3 Replacement

1. Replacement is a reversal of the process described in section 5.1. Ensure the hose connection is tight.
2. Test-run and check carefully for oil leaks.

Rear Wheel Assembly, Park Brake

To Dismantle and Reassemble the Park Brake:

1. Raise the rear of machine slightly off the ground and pack under the back upright member, so the wheels are clear of the ground.
2. Press the brake pedal down, then remove the circlip from one side of the wheel axle; remove the wheels and axle.
3. To remove the brake pedal, the domed star lock washer on one end of the pivot shaft will have to be destroyed. Tap one side with a hammer until the shaft comes free of the star lock; remove the shaft and pedal.
4. If pedal spring is to be replaced, pull the end out of the slot in the roll-pin, flip the brake pin around, and remove the screw holding the spring to the pin.
5. If the brake pin is to be replaced, remove the spring as described above, then slide the pin out through the slot.
6. To reassemble, insert the pin into the slot, screw the spring on with an M4 x 8 screw using Loctite retaining compound. Ensure the spring is on the correct side of the pin. Insert the other end of the spring into the slot of the roll-pin.
7. Smear a little grease on the part of the pedal that pushes against the brake pin, then replace the pedal, pass the shaft through and gently tap on a new 8mm domed star lock washer.
8. Lock the pedal down, then reassemble the wheels and axle, ensuring that a flat washer is put each side of the wheels.
9. Test that the brake is free of the wheels in 'OFF' position, and securely locks both wheels in 'ON' position.



6.2 To Replace the Spindle Bearings:

1. Raise the rear of the machine, and undo the 4 bolts holding the rear wheel assembly to the chassis.
2. Loosen the 2 M8 grub screws, part way up the hexagonal bar.
3. The Ø25mm bar to which the top disc is screwed, and which goes down through the spindle bearings and into the hex bar, can now be extracted. It may be a tight fit in the hex bar, but generally once it has moved a little it should come out easily. If necessary, try driving a screwdriver between the square plate on the top of the hex bar and the thrust bearing at the bottom of the spindle.
4. When the hex bar is removed, the Ø25 bar can be driven back through the spindle bearings. Ensure the thrust bearing is kept clean.
5. If the spindle bearings need replacing, drive them out from the opposite end with a suitable bar. Fit new bearings, (available from Simpro or any bearing supplier). The top bearing is a 6005 2RS, and the lower one is a 30205 tapered roller bearing. (Early machines have a 6005 2RS bearing and a 51305 thrust bearing at the bottom)
6. Reassemble the shaft through the bearings, and the hex bar. Align the shaft so the spring hook on the top disc is opposite the brake pedal and tighten the grub screws. Refit the wheels.
7. Remount the complete assembly onto the machine.

6.3 To Adjust the Height of the Rear Wheel Assembly:

3. Remove and dismantle as described in section 6.2, 1-3
4. If rear of machine needs to be raised, add Ø25mm flat washers to the desired thickness under the thrust bearing, and then reassemble.

Note that raising the rear of the machine only, will tend to tip the machine and forks slightly forward. This can be counteracted to some degree by shifting the outrigger wheels to the lower holes. If the whole machine is raised, the forks will be slightly higher off the floor. If this is a problem, please contact the manufacturer.

6.4 To Remove and Refit the Outrigger Wheels:

1. Support the front of the outriggers on 25mm high packers.
2. Using a 3/8" diameter shaft, drive the roll-pin axles out.
3. If refitting the wheels using the lower holes, raise the outriggers another 15mm.
4. Tap the roll-pin through one side of the carrier bracket, with the slot down. Insert the wheel, and tap the roll-pin right through.

7.0 Electronic Drive Units for Self-Propelled stackers

Self-propelled QUIKSTAK stackers have either a 'Reghel' (early models) or a 'Zapi' drive unit. Both types comprise a single drive wheel (with motor and gearbox mounted in the hub), electronic control box, and handle-head. A plug-in calibration unit allows various parameters to be set (e.g., acceleration rate, speed limits, and maximum power), and on the Zapi unit the calibration unit can also display faults, current status of switches, and hours of use. Both types signal faults via a series of coded flashes on a LED.

The electronic controller is very sensitive and moisture in the handle-head switches can cause it to shut down. A sequence must also be followed when using the machine, or it will not operate.

7.1 Fault-Finding

If the machine will not move, work through the following check list:

1. It will not move if:

- the charger is plugged in
- The emergency Stop button is pressed in
- The key switch is not 'ON'
- The tiller is not held in the correct position
- The incorrect 'start' sequence is followed

The correct 'start' sequence is:

- Turn the key on, wait for 1-2 seconds, for the controller to do a self-diagnosis.
- Pull the tiller handle down
- Operate the forward/reverse control

Check all the above. If it still will not move, check the following items:

2. Check that the batteries are charged, and connections to the controller and motor are secure.
3. The main line contactor should 'click' when the tiller handle is pulled down. If it does not, open the right-hand door, to gain access to the controller, and see if the red LED is flashing. If it is, the number of flashes in each series indicates the type of fault; see the following chart for details.
4. The park brake coil should 'click' when the forward / reverse control is moved. If it does not, check the electrical connection to the brake (24V when tiller is in operating position). If an electrical signal is getting through but it still doesn't 'click', the electromagnetic coil could be faulty, or the brake lining may be "frozen" onto the disc.
5. If all of the above checks show OK, the fault will almost certainly be either in the handle-head wiring, or between the handle-head and controller.

As the Zapi brand is the most common type, we only give here information relating to that brand. Please contact Simpro for details about the Reghel brand.

Fault-Finding

Zapi Controller

Check the voltages at the plugs as shown below:

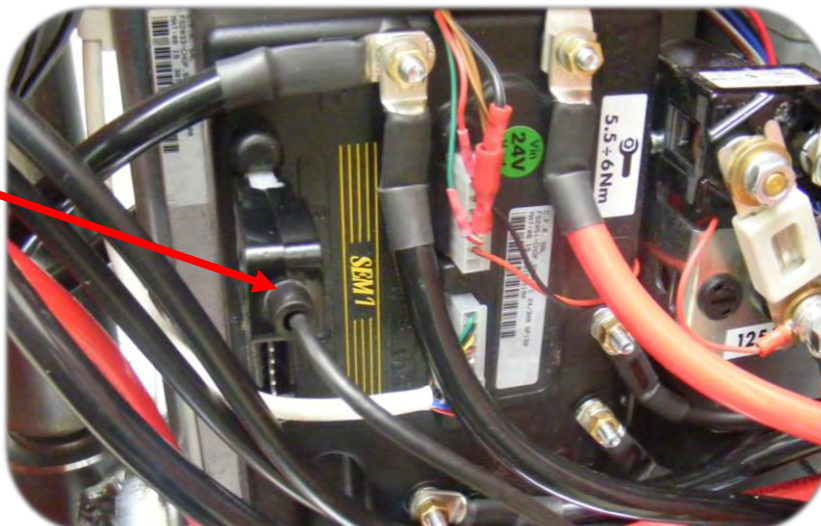
<u>Plug A</u>	<u>(8-pin)</u>	<u>Input / Output</u>
1	-----	O positive to hour meter (not used)
2	White / Blue	I positive signal into controller from key switch
3	Black	O negative to main contactor (switches contactor on)
4	Red / Black	O negative to park brake (switches brake coil on)
5	Yellow	I positive when key on, tiller handle in operating position.
6	Black	O negative at all times
7	Red / Black	O positive supply to contactor, switches in handle, and tiller position switches.
8		I Hard & Soft switch (not used)

<u>Plug B</u>	<u>(6-pin)</u>	<u>Input / Output</u>
1	Green	O Potentiometer wiper terminal
2	Black	I Potentiometer negative
3	Orange	I Potentiometer positive
4	Yellow / Black	I positive from reverse command
5	Grey	I positive from rapid inversion (belly switch)
6	Blue / Black	I positive from forward command

<u>Plug C</u>	<u>(3-pin)</u>	<u>Input / Output</u>
1		O positive supply to Speed Limits 1 and 2
2		I positive when speed switch is set to "medium"
3		I positive when speed switch is set to "low"

If a Zapi Diagnostic Console is available, this can be used to check all faults, and the current status of all switches. If necessary a console may be loaned from Simpro or an agent.

SP controller showing diagnostic unit plugged in.



Diagnostic LED flash codes

ZAPI Controller

No of Flashes

Messages

Notes

1	LOGIC FAILURE #1	Problem with Logic or Line Contactor
1	WATCH-DOG	Logic board and/or software failure
1	EEPROM KO	Problem with EEPROM or Logic
2	INCORRECT STARTS	Starting sequence for travel not correct
2	FORW + BACK	Double running requests
3	CAPACITOR CHARGE	Problem in Power Block
3	VMN NOT OK	Problem with Chopper
3	VFIELD NOT OK	Problem with Field Voltage
4	VACC NOT OK	Potentiometer Wiper
4	PEDAL WIRE KO	Pedal Wire not OK
5	NO FIELD CUR.	Field wiring not OK or field current Sensor not OK
5	HIGH FIELD CUR.	Field wiring not OK or field current Sensor not OK
5	STBY 1 HIGH	High current at the stand-by sensor of Armature current not OK
5	1=0 EVER	No current: sensor of armature current Not OK
6	CONTACTOR DRIVER	Contacteur Driver not OK
6	COIL SHORTED	Coil contactor shorted
6	CONTACTOR CLOSED	Line Contactor contact not OK
7	TH. PROTECTION	Temperature too high (70°C) or low (10°C)
32	BATTERY LOW	Battery too low

7.3 To Replace motor brushes

1. Disconnect one of the battery cables from one battery.
2. Remove the fibreglass cover over the wheel and motor.
3. Unclip the band at the end of the motor.
4. Undo the screws securing the wires, lift the springs to one side and remove the brushes.
5. Fit new brushes, replace springs, and screw wires tightly.
6. Replace band and fibreglass cover, taking care that the cables to the brake are correctly positioned.

7.4 To adjust the park brake

1. Remove the fibreglass wheel cover.
2. Pull the rubber cover off the brake assembly. (If fitted)
3. At rest, there should be a clearance of 2.0mm between the steel disc next to the electromagnetic coil, and the coil itself, all around the disc.
4. To adjust the clearance, loosen the 3 cap screws holding the coil on, turn the hexagon adjusting bolts. Looking at the end of the brake, turning the nuts clockwise increases the gap. Turn them evenly and check the gap beside each adjuster. When correct, tighten the cap screws.
5. The actual spring pressure applied to the brake disc can also be adjusted, by turning the disc at the centre of the coil. Turning clockwise increases the brake pressure; generally, unless a loaded machine is to be parked on a ramp, fairly light spring pressure is best.

7.5 To remove the park brake assembly

1. Remove the fibreglass wheel cover
2. Disconnect the wires to the brake coil.
3. Undo the 3 cap screws holding the brake on, and remove the coil.
4. The friction disc can now be removed from the splined shaft.
5. To remove the steel disc from the coil undo the 3 adjusting bolts. Mark the position of the disc for correct reassembly. Remove the 3 outer and 4 inner springs, and 4 small spacers from the coil.
6. Clean all parts; check the amps draw of the coil if any fault is suspected (should be approximately 1 amp at 24VDC).
7. Reassemble carefully in reverse order, and then adjust the clearance as described in section 7.4.

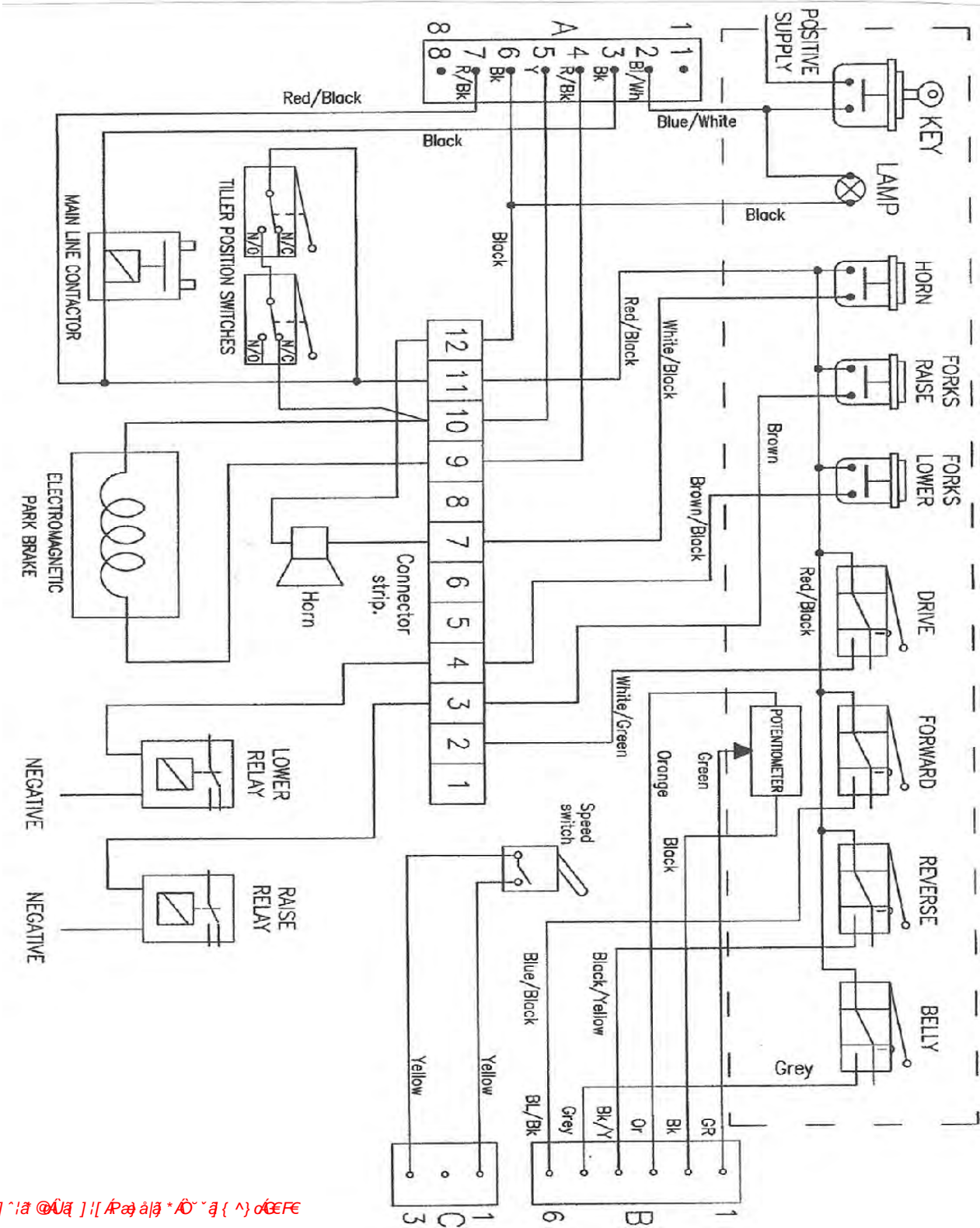
To select a different tone on the horn

1. Open the right-hand door
2. The sounder is the red box mounted just above the controller. The outer section is clipped onto the base section; carefully prise it off.
3. 32 different sounds are available, by altering the position of the five small switches located inside. A chart showing the range can be supplied if desired.
4. Clip the cover back on, ensuring the o-ring is in place.

To replace the gas strut

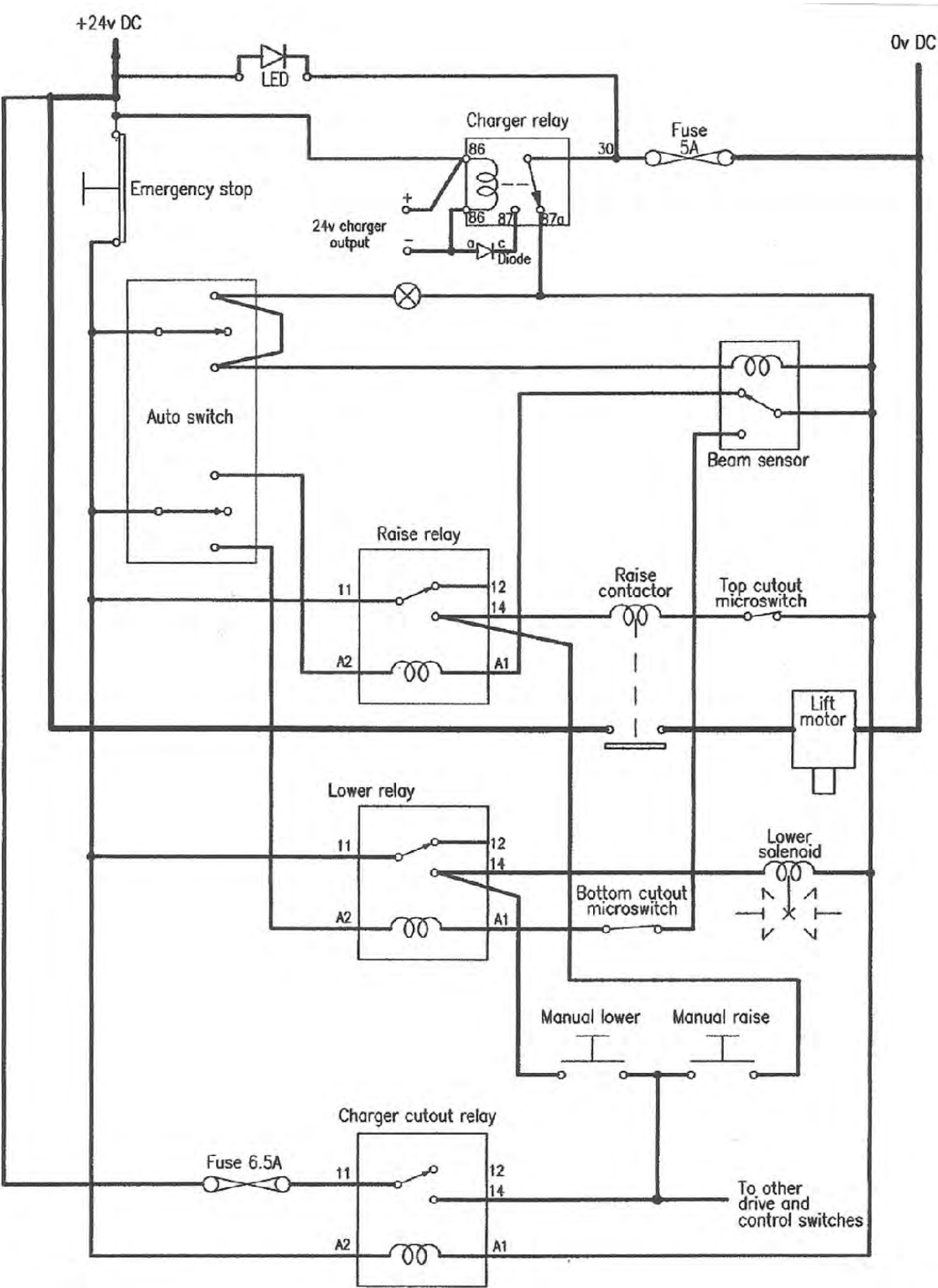
1. Near the ends of the gas strut is a small slide-out wedge of plastic. Once this wedge is pulled out a little, the strut can be pulled off its mounting pins.
2. The strut must be fitted with a body uppermost. Clip it back onto its mounting pins, and then push the wedges in.

Traction Control Wiring (ZAPI Brand Controller)



1 0 [] ' i a @ U a] : [A a a a * A ~ a { ^ } o e f e

Self Propelled Quikstak with ZAPI Controller Circuit Diagram



Self Propelled Quikstak Smart-Stacker Controller, Motor, and Battery Wiring.(ZAPI brand controller)

8 General Items

8.1 Sensor mounting bracket



To Remove:

- 1) Undo the grub screw holding the adjusting knob on
- 2) Disconnect the plug that connects the sensor to the main loom.
- 3) Undo the 3 screws holding the aluminium bracket to the front panel, and slide the shaft out of the top support bracket.
- 4) Lift the assembly out.

Refitting:

Refitting is the reverse of the above procedure.

Adjustment of chain tension:

The bottom sprocket is mounted on an eccentric spacer. Turn the spacer using a 13mm spanner to tighten or loosen the chain tension. This should only be done when the assembly is mounted in the machine. The chain should be tight enough to ensure the sensor does not fall under its own weight.

8.2 Fibreglass Cover

If the fibreglass cover needs to be removed for any reason, the best way is to punch the plastic clips right through with a 6mm punch, and fit new clips when refitting the cover. Cracks and other damage can be repaired by the manufacturer, or by any qualified fibreglass company.

8.3 Polycarbonate Screen

To Remove:

Undo the M5 screw in the centre at the bottom, and slide the screen up and out of the channels. Replacement panels are available if the existing one is scratched or damaged.

8.4 Outrigger Mounting

The outriggers fit into channels welded to the bottom of the main frame. Straddle-type outriggers have a brace, with a tongue that slips into a pocket welded to the masts.

When fitting outriggers to a machine, it should be raised, ideally about 1 metre (Sling off the lifting brackets welded to the top of the masts). Insert the tongue into the pocket, and then insert the outrigger into the channel. Ensure that the outriggers are fully inserted; if possible, use a clamp, or put a spacer cut to the correct width between the outer end of the outriggers, and put a load-binder around the outriggers near the main frame. With pressure on them, tap them with a hammer and piece of wood.

Insert the 2 countersunk bolts each side, and tighten to the recommended torque setting (see table below).

	Bolt Size	Torque Setting	
1000kg	10 x 100	80ft / lbs	110 NM
1500kg	12 x 100	100ft / lbs	140NM
2500kg	16 x 130	120ft / lbs	170 NM

Ensure that the outriggers are parallel and square off the machine. If not, contact the manufacturer.

Spare Parts for **Quikstak** “smart-stackers”

August 2010

Description	Part #	
24 volt charger	19150H	 <p>(Replaces all previous models- requires plate below)</p>
New charger mount plate to suit above	-	
24 volt ISKRA motor	38724IS	
24 volt contactor	18224	
24 volt power pack	18112	
12 volt battery	C91255	

Charging Lead

19129



Chassis socket

39116



24 volt Battery-status LED

19158



Emergency stop switch

19127



Infra-red sensor

19126



Auto-on Indicator

19120



24vdc lowering solenoid coil

18200



Microswitch

19123



Battery lock-out switch

19149



QS raise/lower switch

– Auto

19125

– Manual

19124



Outrigger wheel Ø100mm

13108



Rear tiller wheel Ø200mm 16130



Brake kit:
pedal 16110
spring 16111
8mm pin 16112



Tiller handle 16122



Tiller handle spring 16127



Sensor knob 10136



Mast sliding block 10110



1.5' Ram seal 141506

