
SERVICE MANUAL

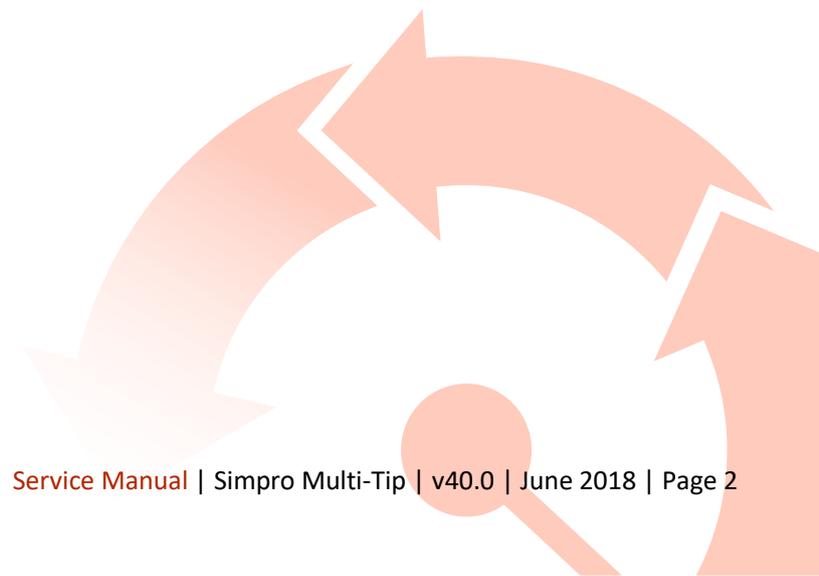
Simpro Multi-Tip





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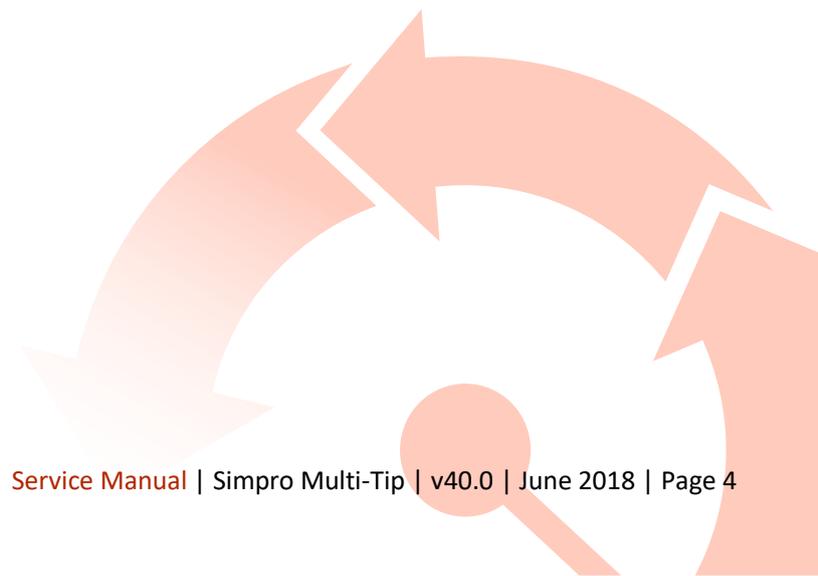
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Contents

1	General Overview	5
2	Layout of Parts	6
3	Troubleshooting Guide	7
4	Electrical System	8
4.1	General Description.....	8
4.2	Wiring and Circuit Diagrams.....	8
4.3	Battery.....	9
4.3.1	Removal and Refitting.....	9
4.3.2	Testing.....	9
4.3.3	Care	9
4.3.4	Replacement	9
4.4	Battery Isolator.....	10
4.5	Battery Charger	10
4.5.1	Testing.....	10
4.5.2	Removal and Refitting.....	10
4.6	Motor Relay	11
4.6.1	Testing.....	11
4.6.2	Removal and Refitting.....	11
4.7	Lowering Valve Solenoid	12
4.7.1	Testing.....	12
4.7.2	Removal and Refitting.....	12
4.8	Control Switches.....	13
4.8.1	Removal and Refitting.....	13
4.9	12v DC Electric Motor.....	13
4.9.1	Removal and Refitting.....	13
5	Hydraulic Powerpack	14
5.1	General Description.....	14
5.2	Removal and Refitting	14
5.3	Lowering Valve	15
5.3.1	Removal and Refitting.....	15
5.4	Pressure Relief Valve	15

5.4.1	Adjustment.....	16
5.5	Check Valve	16
6	Hydraulic Ram.....	17
6.1	General Description.....	17
6.2	Removal and Refitting	17
6.3	Dismantling and Servicing	17
6.4	Hose-burst Valve (if fitted)	18
6.5	Ram-end Roller Replacement.....	18
7	Bin Cradle.....	19
7.1	General Description.....	19
7.2	Removal and Refitting	19
7.3	Cradle Jamming	20
7.3.1	Cradle jams at top of cycle	20
7.3.2	Cradle jams while partway lowered.....	20
8	General	21
8.1	Cradle Carrier	21
8.2	Mast Blocks	22
8.2.1	Removal and Refitting.....	22
8.3	Gas Strut.....	22
8.4	Lifting Chain.....	22
8.4.1	Removal and Refitting.....	22
8.5	Tipping Guide Gate Flap	23
8.6	Tipping Guide Frame	23
8.6.1	Adjustment.....	23
8.7	Castor Wheels	23
9	Spare Parts Guide	24



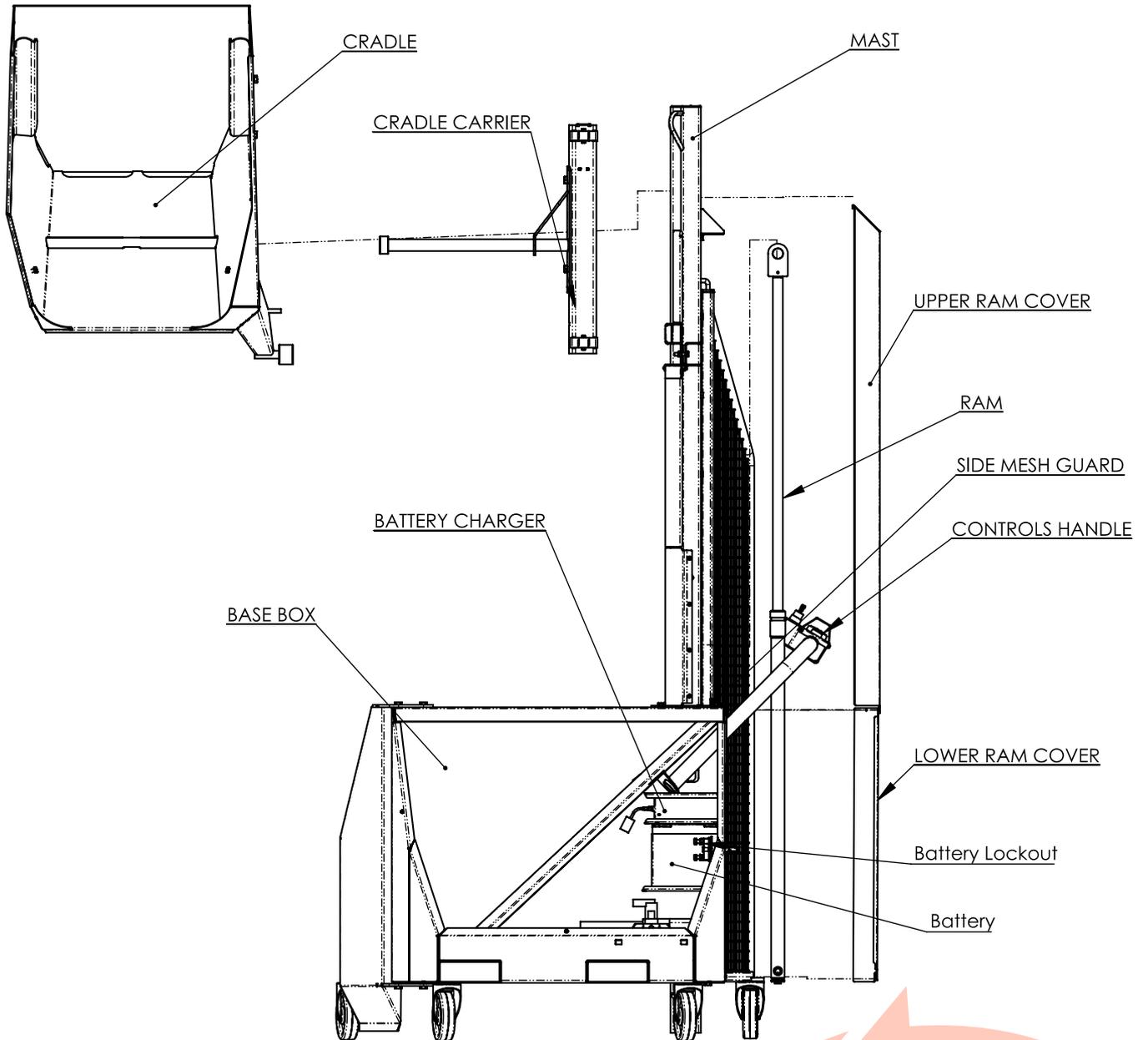
1 General Overview

The lifting power for Multi-Tip tippers comes from a hydraulic power pack, normally battery-powered but may be mains-powered (refer to separate booklet for service of mains-powered machines). When the “Raise” button is pressed, the motor runs and hydraulic oil is forced under pressure into the lift ram, causing it to extend. The ram has a roller on the end; as it extends, a chain is pulled up around the roller, which lifts the bin cradle.

When the “Down” button is pressed, a solenoid valve opens and the hydraulic oil flows back into the tank at a controlled rate. The bin and cradle are not powered down – they come down by gravity alone. The whole action is smooth and efficient, and can handle very heavy bins continuously with little or no maintenance.



2 Layout of Parts



3 Troubleshooting Guide

Issue	Possible Cause	Action / Reference
Lift motor does not run when the Raise and Safety buttons are pressed	Battery Discharged	Refer to section 4.3 or 4.5
	Battery Isolator turned off	Turn isolator switch on. Refer to section 4.4
	Faulty motor relay or contactor	Refer to section 4.6
	Faulty control switch or wiring	Refer to section 4.8
	Faulty motor	Refer to section 4.9
	Blown fuse	Replace blown fuse
Lift motor runs but the cradle does not lift	'Lower' button stuck on	Refer to section 4.8
	Foreign matter in the lowering valve	Refer to section 4.7
	Bin too heavy or pressure-relief valve adjusted incorrectly	Refer to section 5.4
	Oil level too low	Locate and rectify source of oil leak before topping up oil reservoir
The cradle won't come down from the top	Lack of lubrication	As the arms come down by gravity alone, the frame must be able to move freely. Lubricate with a silicon spray or dry lubricant. Do not use grease or oil.
	Gas strut bent or damaged	Contact Simpro to arrange replacement.
	Lifting chain rusty or seized	Refer to section 8.4
	Lowering solenoid valve sticking	Refer to section 5.3
	Lowering solenoid coil malfunction	Refer to section 4.7
	'Lower' button malfunction	Refer to section 4.8
The cradle jams partway down	Mast bent or damaged	Contact Simpro to arrange repair.
	Tipping guide flap not working properly, or trigger pin out of alignment	Refer to section 8.6

4 Electrical System

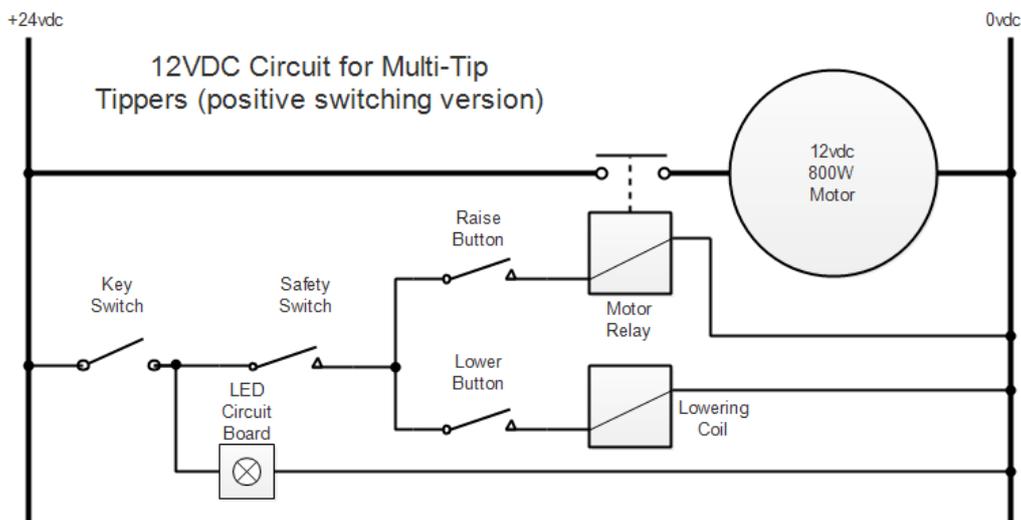
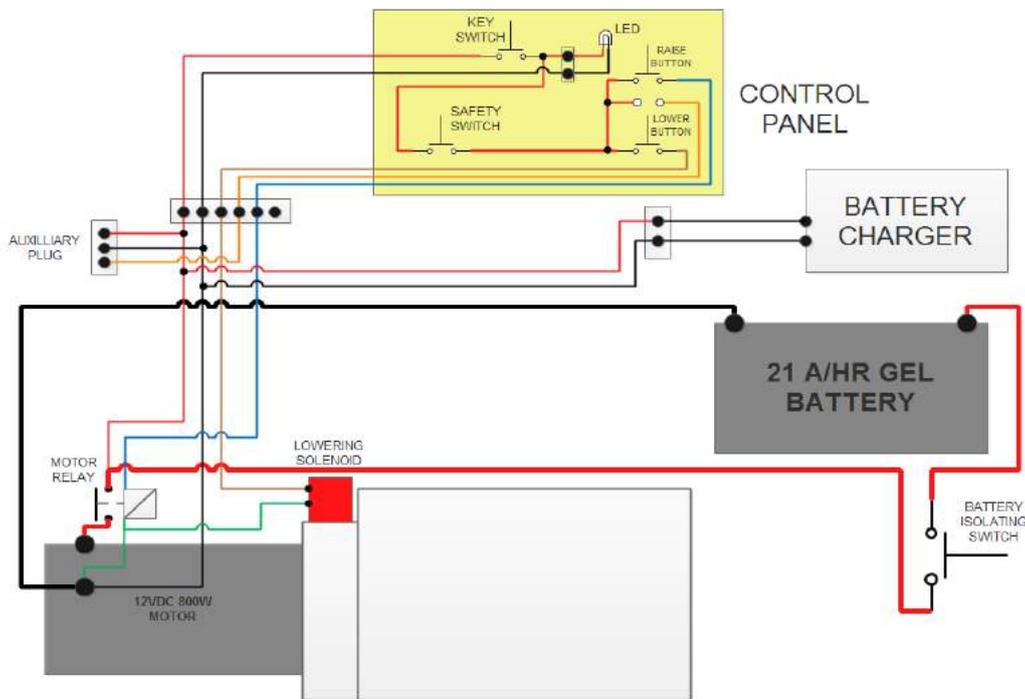
4.1 General Description

The motor relay and lowering coil are connected to negative all the time, and the positive is switched in the handle controls. The positive signal goes through the Key switch, then the Safety button switch, and finally the Raise and Lower switches. There are no limit switches – the operator simply releases the buttons when the cradle is fully raised or lowered.

The Control switches are rated to IP 66 and the motor is IP55.

Always keep the charging socket dry. If it gets wet, it should be dried before the lead is plugged in.

4.2 Wiring and Circuit Diagrams



4.3 Battery

Battery-powered machines normally have a sealed 21 amp-hour gel battery mounted on a bracket at the right-hand side of the main box. Depending on the amount of usage, the battery should have a life of 2 - 3 years; if used continuously or not maintained correctly, the life may be reduced.

A battery with larger capacity can be fitted if required. This does take longer to recharge.

Note: If the battery is flat or not holding its charge, or if the LED remains red after being on charge for several hours, check the following possibilities before replacing the battery:

- I. If the machine has not been used for several weeks, the battery may have gone completely flat. (Note: a battery that is left discharged for several weeks can lose its capacity to hold a charge).
- II. Confirm that the charger is working correctly – see section 4.5.
- III. If the LED develops a fault it may flash red even when the battery is in good condition.

4.3.1 *Removal and Refitting*

Remove the main cover panel, undo the terminal bolts, bend down the retainer flap on the left with pliers or an adjustable spanner, and slide the battery out. When replacing, ensure the positive terminal is to the right, and that the red cable is connected to the positive terminal. Bend the retainer flap up again to hold the battery in place.

4.3.2 *Testing*

Remove the box cover panel. Measure the battery voltage with a multi-meter, with the charger disconnected. Plug the charger in, and measure the voltage again. Disconnect the charger, and measure the voltage again. Finally, measure it while pressing the “Raise” button.

If the voltage increases when the charger is connected, but drops below 12 volts when it is disconnected, the battery probably needs replacing. If the voltage does not increase when the charger is connected, check the charger (See Section 4.5)

If the voltage drops more than 1.5 volts when the Raise button is pressed with no load on the cradle, the battery probably needs replacing. If you are unsure, or if the battery is less than a year old, return it to your battery supplier for testing.

4.3.3 *Care*

Keep the battery clean and dry by wiping with a soft cloth. Ensure that both terminal clamps are securely tightened.

4.3.4 *Replacement*

Depending on the tipping height, a full charge of the battery should be sufficient to empty at least 2½ tonnes of product. If the battery will not hold sufficient charge, and is over a year old, it may be due for replacement.

Also check the battery charger as described in the following section.

If replacement is necessary, ensure that the new battery has equivalent specifications.

4.4 Battery Isolator

A heavy-duty battery isolator is mounted on the side of the main box. This must be turned on before anything on the machine will work. It is primarily intended as a means of quickly disconnecting the battery in case of an emergency, or before doing maintenance.

4.5 Battery Charger

4.5.1 Testing

If the battery does not hold its charge, or will not accept a charge, the fault may be either with the battery or the charger. Follow the steps below to determine whether the charger is working correctly:

- I. Remove the access panel on the main box.
- II. With a multi-meter in DC voltage mode, measure the voltage of the battery when the charger is not plugged in. It should normally be between 12.2 & 12.6 volts.
- III. Plug the charger in, and check the voltage again. It should quickly rise to around 13 volts, then slowly increase to about 13.7 volts.
- IV. If the voltage doesn't rise, check the wall socket, the charging lead, and the 2-way plug from the charger that connects into the loom.
- V. If the tests indicate a faulty charger, replace it as detailed above.

4.5.2 Removal and Refitting

- I. Loosen the screws holding the outer cover panel and lift it off.
- II. Disconnect the plug connecting the charger to the wiring loom.
- III. Bend the retaining tab down with pliers or an adjustable spanner, and slide the charger out.
- IV. To replace, slide a new charger in, and bend the tab back up to retain it.
- V. Connect the wiring plug and socket.



Powerpack enclosure

- Battery charger is visible at top right.
- Charger is secured by two folding tabs.

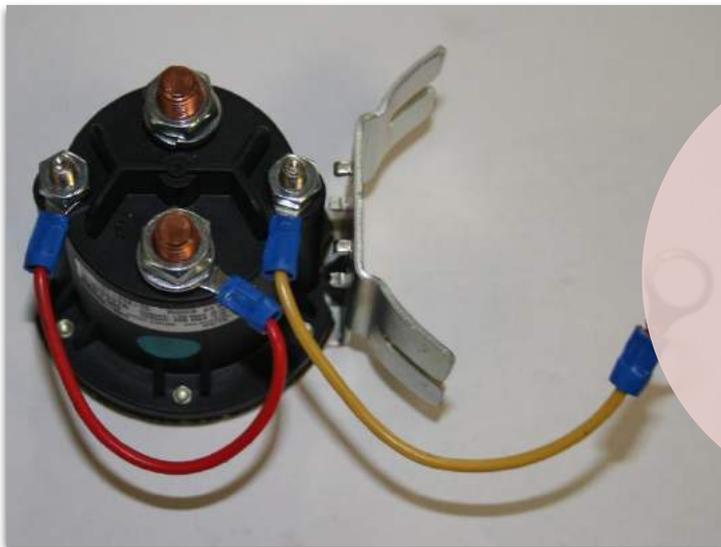
4.6 Motor Relay

4.6.1 Testing

- I. Remove the box cover panel. The relay is mounted on top of the motor.
- II. The relay should 'click' when the "Raise" and "Safety" switches are pressed. If there is no click, check that there is a positive signal on the blue wire when the Raise and Safety buttons are pressed, and that the black wire has a negative connection. If a signal is present but the relay does not 'click', it may have a faulty winding. If no signal is present, check the wiring and switches in the control handle.
- III. If the relay 'clicks' but the motor does not run, hold a screwdriver across the two large terminals on the relay. If the motor runs now, the contacts inside the relay are probably faulty and it should be replaced. If it still does not run, the fault is probably either the battery or the motor itself.

4.6.2 Removal and Refitting

- I. Disconnect the switching wires and cables from the relay, noting their position for correct replacement.
- II. Remove the screws or band clamp holding the relay on to the motor.
- III. Replace the relay, reconnect the wires and test.



Motor
relay

4.7 Lowering Valve Solenoid

4.7.1 Testing

- I. The solenoid should make a faint 'click' when the 'Lower' switch is pressed. If not, the fault may be either electrical or mechanical. If the wiring is OK, the red coil will be magnetic when the Raise button is pressed (i.e. small pieces of steel will be attracted to it).
- II. If the coil does not become magnetic, check the switches and wiring in the control handle.
- III. If the wiring is OK, check the coil itself. Remove the plug, then using a multi-meter in 200-ohm range, hold a probe on the 2 opposite terminals; it should give a reading of between 6 and 8 ohms.
- IV. If the coil appears to be working properly, remove and check the valve as described in section 2.4

4.7.2 Removal and Refitting

- I. Undo the knurled nut on the valve stem.
- II. Remove the solenoid coil, noting the orientation.
- III. Replace the correct way around, refit the O-ring and nut. The nut must be tightened finger-tight only.



Lowering Valve Solenoid

- When open, this electromagnetic valve allows oil to flow back into the reservoir, lowering the cradle

4.8 Control Switches

4.8.1 Removal and Refitting

- I. Remove the screws holding the top cover of the handle controls.
- II. The coupling plate and contact blocks can be removed from the switch by turning the release plate.
- III. The individual contact blocks can also be removed if necessary, by unclipping from the coupling plate.
- IV. The top portion of the switch can be removed by unscrewing the nut under the control panel.
- V. When refitting, note that the small locating lug on the Raise/Lower switch goes in the cut-out in the cover.



Control Switches

- Safety Button
- Raise/Lower Buttons
- Key Switch

4.9 12v DC Electric Motor

The motor used on a battery-powered Multi-Tip is an 800 watt, series-wound 12v DC motor. It has 4 brushes which wear down over time; as they are difficult and time-consuming to replace, it is usually better to fit a complete new motor.

Positive supply to the motor comes through the relay mounted on the side of the motor (see section 4.6); negative is permanently connected to the motor terminal.

4.9.1 Removal and Refitting

- I. Remove the entire power pack as described in section 5.2.
- II. Undo the 2 cap screws holding the motor to the power pack and lift it away.
- III. The power pack must be held vertical when refitting the motor; ensure the coupling engages correctly with the pump shaft.

5 Hydraulic Powerpack

5.1 General Description

The motor, pump, oil tank, and all control valves are mounted into one integral unit, referred to as the 'powerpack'.

The control valves are: check, pressure-relief, and solenoid-operated lowering.

The power-packs are very reliable and long-lasting, and no regular maintenance is required. Possible faults include:

- I. Foreign matter in the lowering valve (symptoms – raising slowly or not at all, coming back down without pushing the Lower button)
- II. Blocked suction strainer (raising slowly or not at all, noisy operation)
- III. Worn shaft or shaft seal (slow lifting, noisy operation, oil foaming)
- IV. Low oil level (normally only following an oil leak)
- V. Worn brushes

There is an oil-level gauge on the side of the main box; the level should be approximately in line with the upper indicators when the cradle is fully lowered.



Hydraulic Powerpack

- Note the oil reservoir, motor, and control valves

5.2 Removal and Refitting

- I. Ensure the cradle is fully lowered.
- II. Loosen the screws holding the outer cover and remove it.
- III. Make note of the wiring connections to the motor and disconnect. Undo the retainer nut holding the lowering solenoid coil on and remove it.

- IV. Undo the swivel fitting holding the hydraulic hose to the power pack. Plug or tape the fittings to prevent ingress of dirt.
- V. Undo the 2 bolts or screws holding the power pack mount bracket and lift it away.

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

- I. Ensure the wiring is reconnected the same as original.
- II. Do not use thread sealant on the hydraulic fitting.
- III. Test for correct operation before refitting the cover.

5.3 Lowering Valve

5.3.1 Removal and Refitting

- IV. Unscrew the retainer nut and slide the coil off.
- V. Unscrew the valve from the main body using a ring spanner.
- VI. 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.
- VII. Clean the valve orifice before refitting the valve.
- VIII. Refit the valve and coil.



Lowering Valve

- From top left:
valve cartridge,
coil, retainer nut;
rubber gasket;
DIN plug

5.4 Pressure Relief Valve

The pressure-relief valve limits the maximum hydraulic pressure flowing to the ram, and thus the maximum weight that can be lifted. If the bin is heavier than the setting will allow, the motor and pump still run but the oil just bypasses straight back into the tank. While this does not do any harm to the machine, oil passing through the relief valve generates a lot of heat; for this reason, if the

relief valve is 'blowing' frequently, either the setting should be increased, or the bin weight reduced.

Authorization must be obtained from the manufacturer before adjusting the pressure-relief valve setting. Unauthorized adjustment will void the warranty.

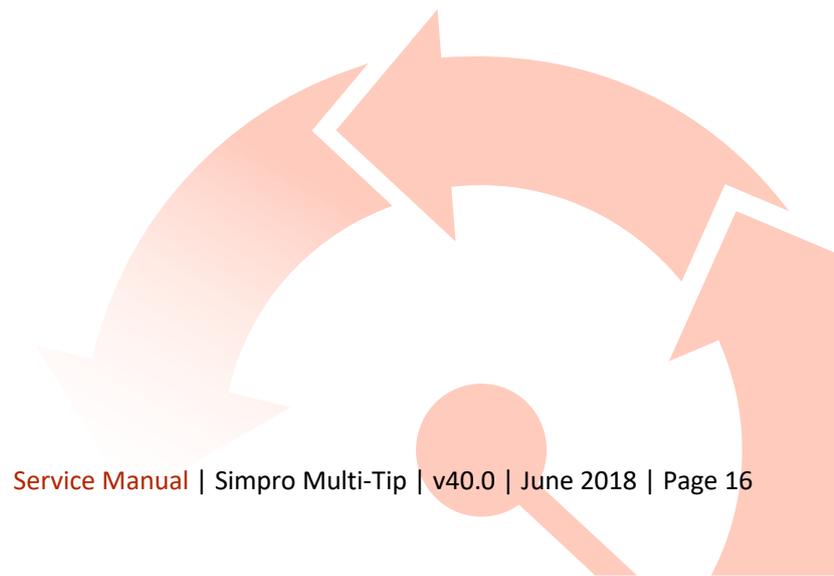
5.4.1 *Adjustment*

- I. Remove the box cover.
- II. The relief valve adjustment screw is located in the top face of the main powerpack body.
- III. Remove the outer cap, loosen the locknut then turn the screw clockwise to increase the pressure.
- IV. Test the capacity using a full bin. The point where maximum pressure needed is just before the cradle reaches the horizontal position. Set the pressure to just enough to pick up the heaviest bins.
- V. When pressure setting is sufficient, tighten the locknut and replace the cap.
- VI. Refit the cover.

5.5 Check Valve

The check valve prevents the oil from flowing back through the pump when the motor is stopped. It very rarely fails, but if some foreign matter gets in, it may not seal properly, allowing the cradle to come down when the Raise button is released.

A special tool is needed to extract the check valve. Please contact Simpro if you think it may need to be removed.

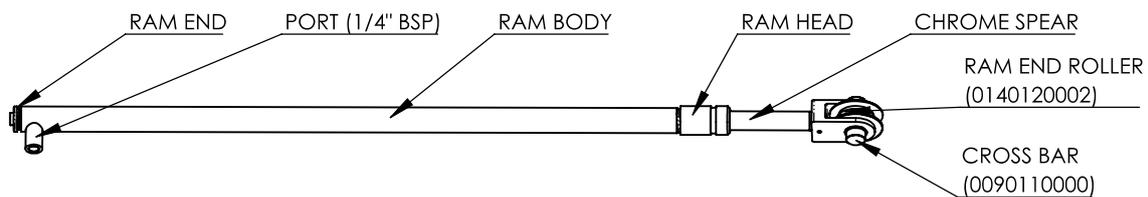


6 Hydraulic Ram

6.1 General Description.

Multi-Tip bin-tippers use a single-acting displacement-type hydraulic ram, which requires very little maintenance. There is no piston, just a seal in the head which seals onto the chrome-bar spear.

A 'hose-burst valve' is fitted at the port, which locks the ram if the hydraulic hose should burst.



6.2 Removal and Refitting

- I. Lower the cradle fully, and then remove the upper and lower ram covers.
- II. Undo the hydraulic hose fitting at the bottom of the ram.
- III. Disconnect the chain from the adjusting bolt and tie it to the mesh guard to stop it falling down inside the mast.
- IV. Loosen the ram adjustment screws.
- V. Lift the ram out of the bracket, carefully feeding the port through the cut-outs in the mast and bracket.
- VI. Refitting is a reversal of the above procedure.
- VII. Extend the ram fully, ensuring it is centred between the rams stops, then tighten the adjustment screws.

6.3 Dismantling and Servicing

- I. Hold the ram body horizontally in a vice, with the roller end raised slightly.
- II. Pull the chrome-bar spear right out of the ram body, and lay aside, taking care not to damage the chrome surface.
- III. Take the ram body out of the vice, and pour the small amount of remaining oil into a suitable container for disposal.
- IV. If the seal has been leaking, pick it out of its groove near the end, using a small, sharp screwdriver.
- V. If there is a pinhole leak in a weld, it is generally best to fit a complete replacement ram body, and return the faulty one to Simpro for repair. If this is not feasible, mark the location of the hole, and grind a groove at least 3mm deep, and 10mm each side of the hole. If possible, weld using MIG or arc welder. If a welder is not available, it may be

brazed, but difficulty may be experienced because of oil contamination. The seal will need to be replaced, if the hole is in the “head” weld.

- VI. The ram body should be cleaned with degreaser, and then blown out with compressed air.
- VII. To reassemble, fit a new seal (#R44035), if necessary. Smear oil on the seal and inside the head. Wipe the chrome bar carefully, and then fit it back into the ram body, using a twisting action as it goes through the seal.

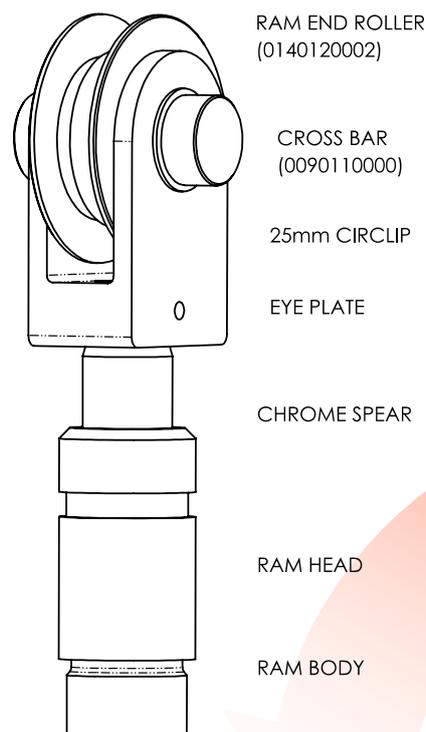
6.4 Hose-burst Valve (if fitted)

The hose-burst valve operates if the flow out of the ram exceeds approx. 10 litres/min. If it does lock, the hose must be repaired, then the ram extended slightly before it will reset.

The valve cartridge may be unscrewed from the port with a special tool available from Simpro.

6.5 Ram-end Roller Replacement

- I. Lower the cradle to the ground, then remove the upper and lower ram covers.
- II. Disconnect the chain from the adjusting bolt and tie it to the mesh guard with wire to stop it falling down inside the mast.
- III. Remove the circlip on one end of the roller axle and push or tap it through until the roller can be extracted.
- IV. When refitting, smear the inside of the roller liberally with grease, press the axle back through, and replace the circlip.

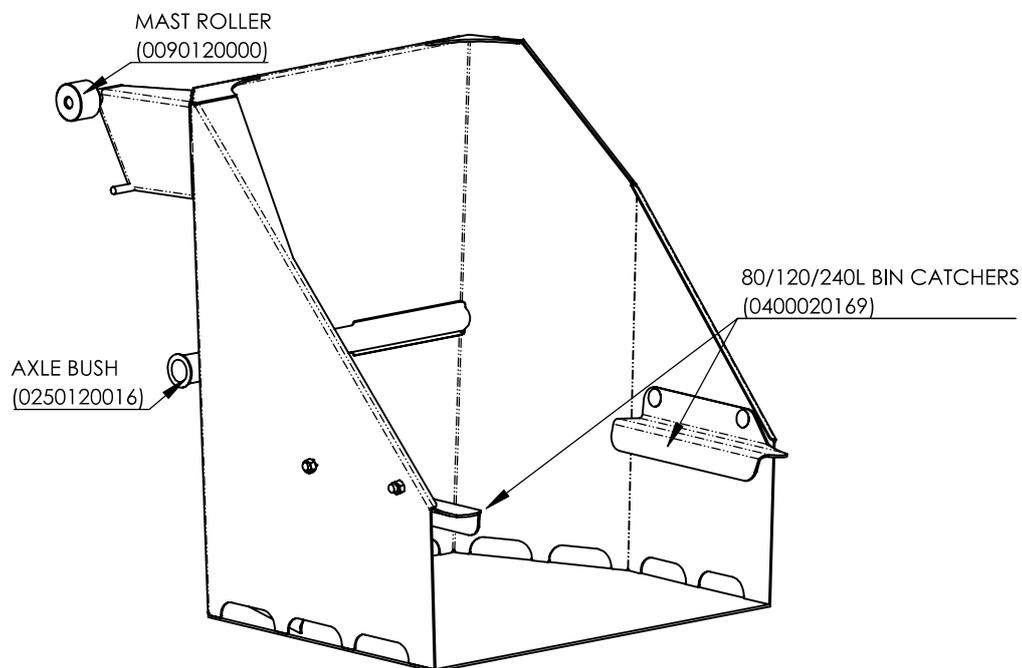


7 Bin Cradle

7.1 General Description

The standard cradle is designed to hold all common 2-wheeled bins up to 240 litres. A range of catch kits can be bolted on to enable it to hold 205-litre steel and plastic drums, Brute bins, and other similar drums.

Other cradles are available to suit many other bins and drums, and these can be quickly and easily interchanged if desired.



7.2 Removal and Refitting

- I. Raise the cradle by approx. 800mm, undo the grub-screw in the outer shaft collar (3/16" Allen key), and remove the collar.
- II. Slide the cradle off the shaft, tipping to horizontal once the follower roller is clear of the tipping guide.
- III. Refitting is a reversal of the above procedure. Ensure the follower roller is correctly located in the guide track, and slide the shaft collar up against the nylon bush when the cradle is on as far as it can go. Tighten the grub-screw, then test-run the machine to make sure the follower roller is not pressing too tightly against the guide track.

7.3 Cradle Jamming

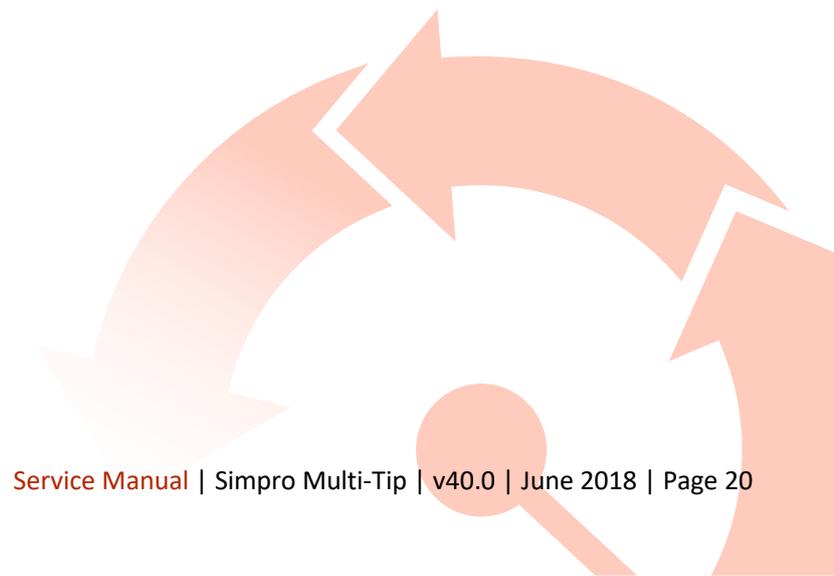
7.3.1 *Cradle jams at top of cycle*

The cradle is not powered down; it is lowered by gravity alone. A gas strut is fitted on the “cradle-carrier” frame which runs inside the mast. This forces the cradle down for the first 75mm; by the time it has got this far it will normally keep coming down, unless a component is bent or damaged.

If it will not come down at all, check that the lowering solenoid is operating (see section 1.5)

7.3.2 *Cradle jams while partway lowered*

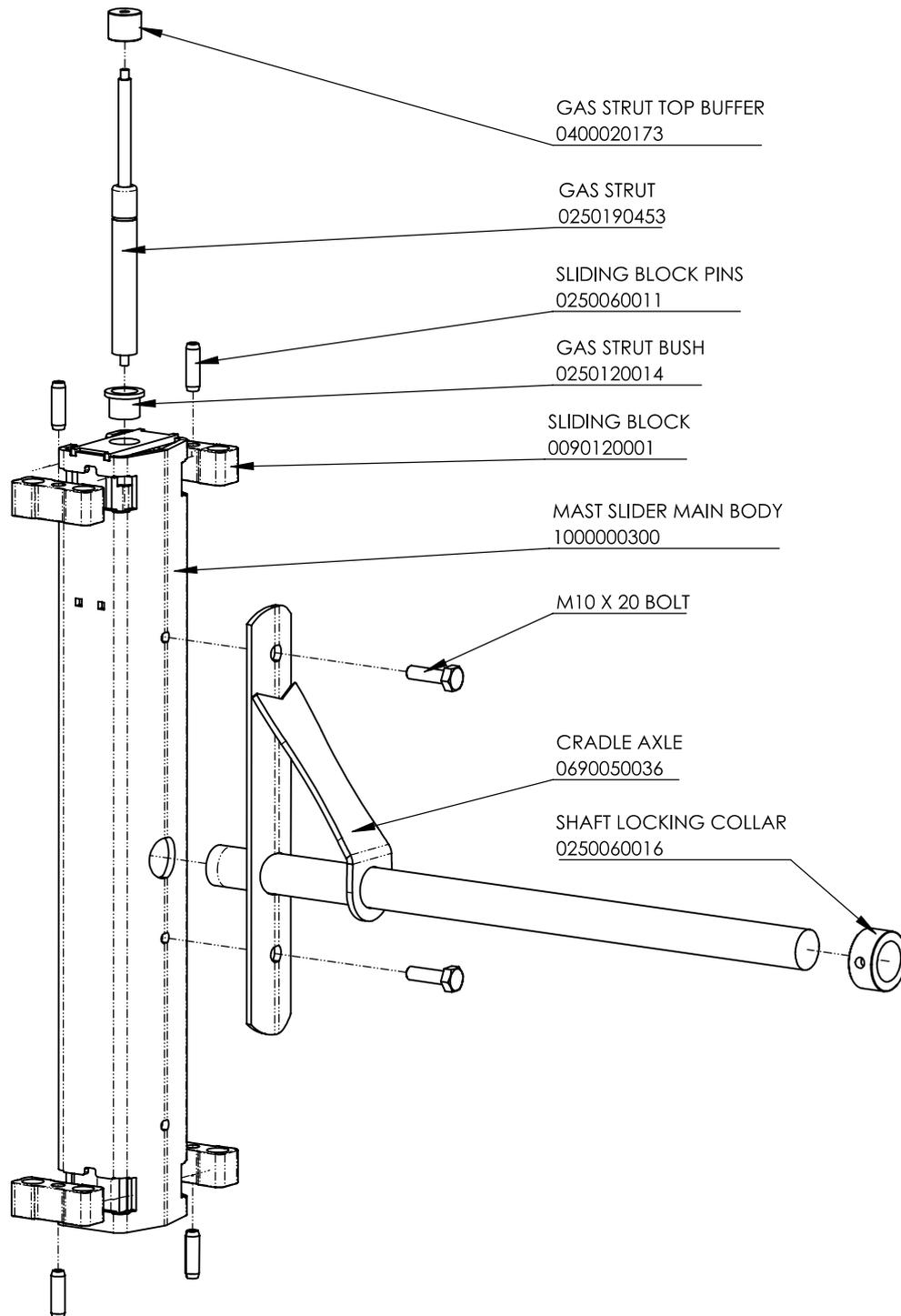
- I. Check that the stainless steel flap is being triggered by the pin on the cradle. The flap should be lifted just before the roller comes back to it.
- II. Spray inside the mast, around the cradle bushes, and the follower roller with silicon spray.
- III. Check the position of the shaft collar on the end of the main shaft. The follower roller at the top of the cradle should be held firmly against the guide, but not so tight that it causes the cradle to jam.



8 General

8.1 Cradle Carrier

The Cradle Carrier is a fabricated steel frame with four plastic 'mast blocks'. The lifting chain hooks onto a bracket at the bottom, and the cradle axle bolts onto it. It also has a gas strut mounted at the top, which helps to ensure the cradle does not stick at the top.



8.2 Mast Blocks

The Cradle Carrier has four moulded plastic blocks that run in the mast. If they are worn down, the carrier will rub against the mast, causing sticking, a grinding noise, and wear of the mast and/or carrier.

8.2.1 Removal and Refitting

- I. Remove the cradle carrier as described in section 5.1.
- II. Lever the blocks out of the carrier frame, and tap the pins out of the blocks.
- III. Tap the pins into the new blocks, with 5mm protruding top and bottom.
- IV. Before fitting the new blocks to the carrier, check that they slide freely all the way up the mast. If they are tight at any point, they may have to be filed or machined to fit.
- V. One end of the blocks is slightly extended; this is normally the 'wear face', and goes towards the back at the bottom, and the front at the top.
- VI. Tap the blocks into place, ensuring correct orientation, then slide the carrier up and down in the mast to check that it does not stick or jam. If the carrier or the mast is slightly twisted, one or more blocks can be turned end-for-end to minimize the impact of this.
- VII. When satisfied, reassemble in the reverse order.

8.3 Gas Strut

The gas strut is threaded into a plate on the inside of the mast sliding assembly. To remove, lower the cradle fully, and lock the machine out. Reach inside the mast and twist the gas strut anti-clockwise about 5 complete turns, and it will come free. Re-fitting is a reversal of this process.

8.4 Lifting Chain

Multi-Tip tippers have a single lifting chain, which is attached to the ram mount bracket by means of an adjusting bolt, and to the "cradle-carrier" which run inside the mast. The chain is ½" British Standard simplex, nickel-plated. The chain goes around a roller on the top of the ram, then down inside the mast to a bracket on the cradle-carrier.

Spray the chain occasionally with good-quality penetrating / lubricating oil. Unscrew the ram-cover and spray as much of the chain as possible, taking care not to allow fingers or clothing to become trapped.

8.4.1 Removal and Refitting

- I. Remove the cradle and unbolt the main shaft from the cradle-carrier.
- II. Unscrew and remove the upper and lower ram covers. Release the clip on the connecting link attaching the chain to the adjusting bolt.
- III. Lie the machine over on its front so the mast is horizontal, and slide the cradle carrier out the bottom of the mast.
- IV. Disconnect the chain from the bracket at the bottom of the cradle carrier. Re-connect the new chain, and tap the bracket with a hammer to ensure that the chain is retained tightly.
- V. Reassembly is a reversal of this process.

8.5 Tipping Guide Gate Flap

A gate flap is used to 'switch' the follower roller during the lifting and lowering cycle. The flap must move freely without sticking. A pin welded to the cradle lifts the flap when the cradle is approximately horizontal while lowering. The roller itself lifts the flap when the cradle is lifting.

The cradle must be correctly located on the shaft for the flap to work properly. Adjust the shaft collar so the follower roller runs firmly against the guide.

8.6 Tipping Guide Frame

The 'following roller' on the cradle should be gently pressing against the Tipping Guide frame throughout the entire tipping cycle. If the roller is too tight, or has more than 2mm clearance while tipping, the frame may need to be aligned.

8.6.1 *Adjustment*

- I. Loosen the Nylock nut on the M8 bolt going right through the tipping guide and adjusting bracket.
- II. Take the cradle up to the horizontal position.
- III. Loosen the locknut on the alignment bolt, and turn it so the roller is just pressing against the guide at the outer end.
- IV. When in the right place, tighten the locking bolt.

8.7 Castor Wheels

As standard, 4 castors with 125mm diameter 'Blue Resilex' wheels are fitted. The two castors at the "operator" end are braked. The castors are secured to the base with a single M12 coach bolt through the centre.

9 Spare Parts Guide

The following table above includes only the most common parts.

A full list of parts is available on request from Simpro, or may be viewed on our support site <http://support.simpro.world>

Part Number	Description
0230040001	Tip guide flap
0090120001	Mast blocks
0140120002	Ram-end Roller
0090120000	Following roller
0790050003	Key Switch
0790050189	Raise/Lower Button
0790050005	Safety Button
0880050017	12vdc motor relay
0250090064	12vdc lowering solenoid coil
0250040087	Non-braked 125mm Castor
0250040090	Braked 125mm Castor
1000000303	Gas Strut assembly
0410050039	Battery Charger
0090090006	Ram Seal



Multi-Tip 1600, Stainless Steel.
Many other options available.
<http://simpro.world/multi-tip>
