

Service and Maintenance for Scooters

Workshop Manual
Little Star (4 Wheel)

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The Little Star mobility scooter is a versatile indoor/occasional outdoor, 4-wheeled machine.

Features include;

Folding tiller assembly, moulded lightweight padded seat with width adjustable armrests, 2" seat height adjustment, 2-Amp off-board automatic charger, front shopping basket and easy-clean floor mat.

Sunrise Medical is ISO 9001 certified.

This product is manufactured to comply with the requirements of EEC directives 93/42/EEC and 89/336/EEC

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Product Information

It is potentially hazardous to fit or use any parts other than genuine Sunrise Medical parts.
The company disclaims all liability for the consequences of such use, which in addition, voids the machine warranty.

This vehicle is for the carriage of
ONE PERSON
And **MUST NOT** be used for any other purpose.



Safety Information

Whilst working on powered mobility products, it is essential to observe good working practice. Below are a series of safety guidelines and recommendations. Please note that these precautions are intended to serve only as a guide and are not intended to supersede or replace any safety statute, NHS or other safety regulations.

General

- Always wear suitable protective clothing when handling batteries.
- Always wear suitable eye protection when drilling or inspecting.
- When safe to do so, wear protective gloves when handling the running gear or batteries, as these parts are exposed to paths, parks etc.
- If the drive wheels have to be raised off the floor, always use a pair of axle stands to secure the vehicle correctly.

Batteries

All work carried out on batteries or battery boxes should demand a degree of extra caution.

- Always make sure that the batteries are disconnected from the vehicle before commencing work.
- Always check that the battery charger is disconnected from the vehicle / batteries before commencing work.
- Do not smoke.
- Keep batteries away from all sources of ignition.
- Do not place objects on the battery tops.
- Always try to keep someone within earshot of your work area so that they may come to your assistance if needed.
- Always wear personnel protection when handling batteries including, eye / face protection and gloves.
- Make sure there is easy access to soap and water in case of acid spills.
- Avoid touching eyes or unprotected parts of the body while working on batteries.
- Remember that non-sealed batteries can contaminate any packaging, housing, or boxes they may have been transported in, so handle all packaging with care especially when disposing of.
- If battery acid should come into contact with bare skin or clothing, be sure to wash immediately using plenty of soap and water. If battery acid enters the eyes, flush with running cold water for as long as possible while medical help is sought.

Safety Information

Batteries

- When the tops of batteries are exposed, take extra care when working on or around the terminals.
- Do not allow metal tools to drop on to or touch the exposed terminals of the batteries or other exposed connections as this could cause a short circuit, which may result in an explosion.
- Remove personnel items of jewellery such as rings, watches, chains etc. before commencing work on batteries. If such items were to cause short circuit whilst being worn, very serious burns would result.
- Batteries are constructed using very heavy materials, because of this it is essential that correct lifting techniques be employed when moving batteries around. It is also recommended that safety footwear be worn.
- When disposing of old batteries, please ensure that correct disposal procedures are followed. Contact your local authority for their recommendations.

Battery Chargers

- Remember battery chargers are Mains Driven Units.
- Always observe all guidelines and laws relating to mains-connected installations and equipment.
- Never operate the battery charger in wet or damp conditions.
- If you suspect that the charger has been exposed to water or excessive damp, do not use it. Return the unit back to the dealer/supplier for inspection.
- If the battery charger is suspected of being defective or is visibly damaged, return the unit back to the dealer for inspection.

Tools Required

Recommended Tools

- The following list of tools should enable any task to be dealt with. Some will only occasionally be needed, but it is advisable to own or have access to them.
1. Metric socket set
 2. Imperial socket set
 3. Hexagon wrenches, (imperial & metric)
 4. 3.5 - 8mm flat screwdriver
 5. No. 0 cross-head screwdriver
 6. No. 1 cross-head screwdriver
 7. No. 2 cross-head screwdriver
 8. Metric combination spanner set 5 - 25mm
 9. Imperial combination spanner set 1/8 - 1"
 10. Mole grips
 11. Long nose pliers
 12. Adjustable Spanner
 13. Combination pliers
 14. Circlip pliers
 15. Hammer, (small & large)
 16. Soft hammer, (rubber, hide or nylon)
 17. Feeler gauges, (metric & imperial)
 18. Stanley knife
 19. Pin punches
 20. Electric drill, (mains/battery)
 21. Drill bits, (metric & imperial)
 22. Hacksaw, (standard & junior)
 23. Torque wrench
 24. Steel engineering rule
 25. Tape measure
 26. Tyre pump
 27. Tyre pressure gauge
 28. Personal safety gear
 29. Wire strippers/cutters
 30. Tag crimper
 31. Multi-meter
 32. Battery tester
 33. Hand held electronic programmers
 34. Parts manuals & workshop manuals
 35. Tyre levers

Service & Inspection (Annual)

Controller

- On/off Switch
- PCB Plug Connections
- Operation
- Dynamic Braking
- Programmable Settings, (where applicable)
- Test Run

Batteries

- Physical Inspection
- Connections
- Discharge Test
- Up/Down Slope

Wheels & Tyres

- Wear
- Pressure, (Pneumatic Only)
- Bearings, (Where appropriate)
- Wheel Nuts
- Castors, (Where appropriate)
- Stub Axles

Motors

- Wiring
- Noise
- Connections
- Brake
- Brushes

Chassis

- Condition, (Welded Joints etc.)
- Steering, (Twists etc.)

Upholstery / Seat

- Seat
- Back
- Arm pads
- Seat Slide Mechanism, (where fitted)
- Set Post Assy

Electrical

- Loom
- Connections
- Lights/Indicators

Drive

- Forwards
- Reverse
- Emergency Stop
- Left Turn
- Right Turn
- Up/Down Slope
- Over Obstacles
- Parking Brake

Technical Specifications



Little Star

Overall length	38" / 96cm
Overall width	20" / 50cm
Maximum user weight	250lbs / 18st / 113kg
Maximum gradient	6 degrees
Range	8m / 12km
Speed	4mph / 6kph
Turning radius	43" / 110cm
Weight	77lbs / 35kg including batteries.
Heaviest part	44lbs / 20kg chassis.
Battery capacity	10AH
Adjustable seat height	14" / 16"- 35cm / 41cm
Front wheel diameter	7" / 18cm
Rear wheel diameter	7.5" / 19cm

Range given represents test conditions. Please note that temperature, user weight, terrain and battery capacity may affect overall performance.

CHAPTER

1

Front Wheels



1. Use a thin-blade knife to.....



2. carefully prize off the hubcap.



3. Use a cross-head screwdriver to undo the centre wheel securing bolt.



4. Pull the Front Wheel from the Stub Axle.



5. Note the number of shims behind the front wheels.



6. Front Wheel assembly.

CHAPTER

2

Rear Wheels



1. Use a thin-blade knife to lift the hub cap.



2. Undo the centre bolt using a 13.00mm socket.



3. Remove the centre bolt, noting the positions of the spring washer and flat washer.



4. Carefully remove the wheel, taking care not to lose the Drive Key.



5. Use a pair of thin-nosed pliers to remove the Drive Key.



6. The Rear Wheel assembly & parts.

CHAPTER
3

Seat & Armrests



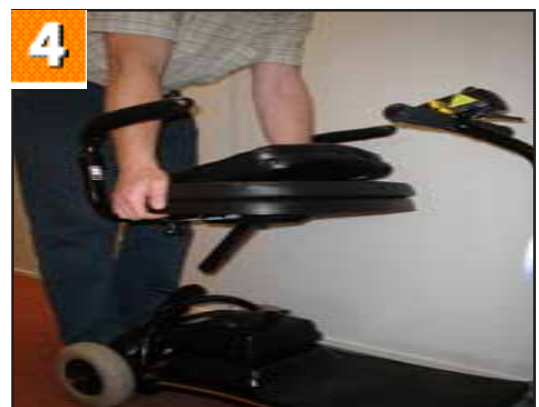
1. Shows the seat in operating position.



2. Fold the Backrest down.



3. Loosen the seat locking lever by turning anti-clockwise.



4. Lift the Seat assembly off.



5. The Seat assembly clear of the scooter.



6. The underside of the Lightweight Seat Assembly.



7. Undo the hand-wheel by tuning it anti-clockwise.



8. Remove the Armrests or adjust them to the desired width.



9. Hold the top of the Seat Stem & grab hold of the securing pin.



10. Pull the securing pin out.



11. Move the securing pin to the desired location and refit the pin.



12. Ensure the pin is pushed fully into place.

CHAPTER
4

Battery Box



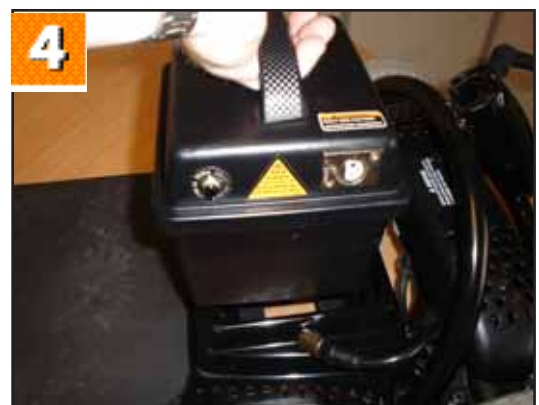
1. The Battery Box in situ.



2. Shows the power lead connected to the battery.



3. remove the power lead by pressing in the metal tab on the battery socket.



4. Use the handle to lift the Battery Box away from the scooter.



5. The battery box removed.

CHAPTER
5

Batteries & Battery Box



1. Shows the location of the 12 battery box screws beneath the lip of the battery box.



2. Undo the screws using a long phillips screwdriver.



3. With the Battery Box on a flat surface, carefully lift the lid up.



4. The Batteries in situ.



5. Use thin-nosed pliers to release the positive terminals....CAUTION! Take care not to short out the terminals.



6. and the negative terminals on both batteries.



7. Lift each battery clear of the battery box.



8. Shows the battery box base.



9. To access the 40A main blade fuses, flip up the lid on the fuse holder and pull the fuse out.



10. View of the battery main lead and socket.



11. The battery connection / charging socket is secured by 2 small bolts.



12. Using long-nosed pliers undo the small bolts on the battery connection / charging



13. Remove the charging socket.



14. Using a small flat screwdriver remove the cable connecting the charge socket to the fuse holder.



15. Once removed carefully lift the tab on the connectors ready for re-assembly.



16. Using a 14mm ring spanner undo the power cut out nut.



17. Remove the power cut out from inside the battery box lid.



18. Shows the batteries, fuses, power cut out and connection / charger socket.

CHAPTER
6

Rear Drive Assembly Panel



1. With the seat removed, use a phillips screwdriver to undo the rear panel retaining screw.



2. Slide out the rear panel by angling it slightly through the rear frame.



3. The rear panel and fixing screw.

CHAPTER
7

Rear Drive Assembly Motor Leads



1. Using long-nosed pliers bend open the clip around the power terminal plug.



2. Disconnect the power plug & socket.

CHAPTER

8

Rear Drive Assembly Motor/Brake



1. To inspect the micro-switch, lift the plastic end cover off the motor.



2. The micro-switch can then be accessed.



3. To release the motor studs a combination of 5.0mm hex driver....



4. and a 5.00mm hex key is required.



5. Note that the motor loom clamp is attached to one of the motor studs.



6. Shows the position of the rear panel bracket on the motor.



7. Gently ease the motor away from the transaxle.



8. Lift the motor clear of the chassis.



9. When refitting, the drive shaft coupling on the motor must line up with the drive shaft coupling inside the transaxle, (see over).



10. Shows the position of the freewheel extension lever held by 2 phillips screws.



11. Use a 10.00mm spanner and a screw-driver.....



12. to remove the stabiliser wheels.

CHAPTER
9

Rear Drive Assembly Transaxle

Coupling



1. The drive coupling on the transaxle gearbox, must align with the motor drive coupling when reassembled.



2. Location of 2 of the transaxle mounting bolts.



3. Location of the other 2 transaxle mounting bolts.



4. Use a 13.00mm socket/spanner to undo the four mounting bolts.



5. Remove the motor bolts carefully taking care not to damage the rubber mounts.



6. Carefully lift the transaxle out of the chassis.



7. Carefully remove the rubber mounts for inspection.



8. The transaxle assembly without motor/brake.

CHAPTER 10

Tiller Assembly



1. View of the tiller locking mechanism.



2. The two lower tiller mounting studs.



3. Lower the tiller by turning the black screw anti-clockwise.



4. Shows the tiller locking screw and locking plate removed.



5. Undo the lower tiller mounting studs using a 4.00mm hex key and a 10.00mm spanner.



6. To release the tiller cable, remove the battery and lift the rear panel from the frame.



7. Move the panel over to expose the controller and main wiring looms.



8. Shows the controller and main wiring looms.



9. Using long-nosed pliers and wire cutters release the tiller cable from its ties.



10. Do this all the way along to the controller.



11. Cut the cable ties holding the tiller connector.



12. Cut the cable ties around the tiller connector protective sheathing and slide it away.



13. Release the tiller loom from the control box connector.



14. Carefully feed the tiller cable through the front panel and lift the tiller clear.



15. Undo the upper tiller mounting studs using a 4.00mm hex key and a 10.00mm spanner.



16. The tiller folding mechanism.



17. The Tiller Assembly complete with Main Loom.

CHAPTER

11

Main Controller



1. Unplug the tiller loom from the main controller.



2. Using long-nosed pliers and wire cutters release the motor and power cable from their ties.



3. Unscrew the two screws visible from the top of the main controller. Note: Threadlock is used on these screws.



4. Lift out the main controller.



5. The main controller with tiller, motor and battery wiring shown.

CHAPTER

12

Front Panel



1. With the battery and tiller removed lift up the front panel from the rear pulling it off the frame clips and velcro.



2. Move the panel away from the velcro and put in a position ready to lift clear.



3. Lift the panel clear of the frame.



4. Shows the position of the front panel velcro (centre) and 4 frame clips (corners).



5. Shows the position of the 2 front velcro pads on the panel.

Steering Head



1. Use a large adjustable spanner to loosen the steering head nut.



2. Remove the steering head nut using your fingers as this is quicker.



3. Undo the bearing retaining nut.



4. Using long-nosed pliers carefully remove the steering head upper bearing.



5. Position the wheels to make access to the steering link possible.



6. Use a 13mm spanner and socket to undo the steering link connector.



7. Remove the steering link from the steering head bracket.



8. Remove the spacer and bolt from the steering head bracket.



9. Lower the steering head bracket out of the frame. NOTE: This is only possible when the Front Frame Bump Stops have been removed. (See Chapter 16).



10. The steering head bracket showing the lower bearing in position.

CHAPTER
14

Main Frame Steering



1. Use a 13mm socket and spanner to remove the other end of the steering link.



2 Remove the self locking nut from the top.



3. Lift off the steering link.



4. Lift off the long spacer tube.



5. Lower the bolt out of the stub axle and remove the short spacer tube.



6. Remove the bolt from the steering link.



7. Use a 13.00mm socket & spanner to undo the other end of the steering link.



8. Remove the self-locking nut from the top.



9. Lower the bolt out of the stub axle and remove the short spacer tube.



10. Lift the steering link off the bolt.

CHAPTER
15

Main Frame Stub Axles



1. The Stub Axle is secured by a 19.00mm nut.



2. Remove the nut and the spacer.



3. The stub axle may need to be carefully tapped with a nylon hammer and rotated to aid removal.



4. Remove the Stub Axle assembly Repeat the process for the other side.



5. The Stub Axle assembly, nut & spacer.

CHAPTER
16

Front Frame Bump Stops



1. Using an allen key remove the bolt holding the front axle cross member.



2. Show view from the underside of cross member.



3. Once loose it maybe quicker to use your fingers to remove.



4. Pull cross member forwards remembering where the spacers are fitted.



5. Show front axle cross member removed.



6. Inspect bump stop on frame for wear and damage, replace if necessary.

CHAPTER **17**

Tiller Assembly



1. Remove the Tiller assembly as previously described.



2. The Loom Clips can be removed with a flat screwdriver.



3. Undo the four screws in the bottom of the tiller fascia box.



4. Once removed feed the cable through the tiller section.



5. Feed the white plug through the hole in the tiller shaft.



6. The tiller fascia control box.



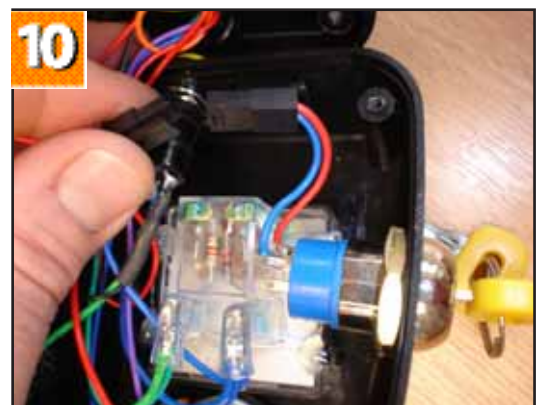
7. Using a small phillips screwdriver undo the 4 screws in the underside corners of the fascia control box.



8. Carefully lift open the fascia control box.



9. Shows the position of the key switch.



10. Disconnect the black connector from the key switch.



11. Using an adjustable spanner undo the large retaining nut on the back of the key switch.



12. Carefully slide the key assembly out of the fascia control box.



13. Using a flat bladed screwdriver carefully lift off the speed control knob.



14. Undo the locking nut with a ring spanner.



15. Remove the locking nut and washer from the speed potentiometer.



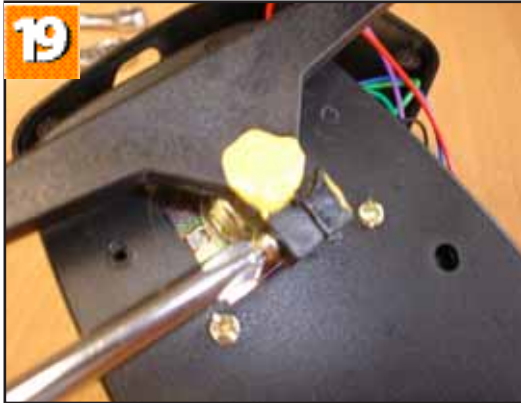
16. Shows the speed potentiometer.



17. Undo the locking nut on the horn button with a spanner or long-nosed pliers.



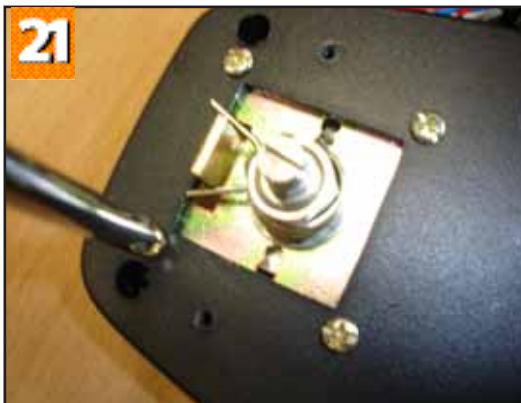
18. Slide out the horn button.



19. Using a small phillips screwdriver undo the wig-wag retaining screw.



20. With a flat bladed screwdriver carefully lever the wig-wag from the potentiometer shaft.



21. Using a small phillips screwdriver remove the 4 screw holding the wig-wag potentiometer.



22. Carefully lift out the wig-wag potentiometer.



23. The wig-wag potentiometer.

Please use this Workshop Manual
in conjunction with the
Little Star Owners Manual
and Parts Manual.