

SHOPRIDER[®]

SCOOTERS

SERVICE MANUAL



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TOOLS REQUIRED FOR SCOOTER SERVICING

13 mm Socket with Ratchet; 9, 10, 11, 13, 26 mm Spanner; Soldering Iron;

4, 5, 6 mm Allen Key; Flat Head Screw Driver; Pozidrive No.2 Head Screw Driver

CHAPTER 1: ASSEMBLY

Shoprider Scooters will require partial assembly before delivery to customer. These are general instructions for assembly. Components may vary slightly between models.

- ☛ **NOTE!** - Upon receipt of the scooter, please open the carton and inspect the scooter **BEFORE SIGNING THE RECEIVING DOCUMENT**. If unable to do so, please sign for the scooter **UNCHECKED**. Please note any damage on the receiving document. You are responsible for inspecting the scooter immediately for shipping damage.

1.1 - Removal from shipping carton

- 1) Carefully remove the packaging from the carton. (Scooter should be right side up.)
 - 2) Remove all loose pack parts and set aside for later use.
 - 3) Using a knife cut down the carton at the front of the scooter. (Do not cut down carton if scooter has been damaged. Advise DMA immediately so that there can be a claim made on the carriers. Go to step 6 for removal without breaking down carton.)
 - 4) Release scooter by moving free wheel lever at the rear of the scooter.
 - 5) Wheel scooter out of the container.
- ☛ **CAUTION!** - Do not pull on plastic shroud.
- 6) Bring handle bar to the up-right position and lock into place with red tiller lever.
 - 7) Remove the seat by first pulling up the seat lever, and then pulling straight up on the seat. (You may need to turn the seat from side to side as you are pulling straight up.)
 - 8) Remove the rear plastic shroud by pulling gently straight up.
 - 9) To lift scooter directly out of box, without breaking down box, first follow steps 6 - 8. With two people, carefully remove scooter from box. (One person should lift at front bumper, front frame or red lifting handle, the other person should lift from rear frame or handle on Transaxle)

1.2 - Installing batteries

- 1) Place charged batteries on to the trays located on the base of the scooter. Note the position of batteries as indicated by the Pos. (+) and Neg. (-) marks on the trays.
 - 2) Bolt the battery plugs to their terminal posts on the batteries. (Tighten nuts with wrench or pliers to ensure a good connection.)
- ☛ **IMPORTANT!** - Connect to the appropriate terminals on the battery as indicated by Pos. (+) and Neg. (-) markings on wire harness and batteries.
- 1) Attach the battery carrying straps and fastening strap.
- ☛ **IMPORTANT!** - If batteries are installed incorrectly, damage can occur to the batteries, rear chassis cover, and rear wheels.

1.3 - Cable Connections

- 1) Connect the two battery plugs to their polarised mates on the control box. (See fig. 10, Appendix C)
- 2) Connect the main console control cable from the front section to its mate on the control box.
- 3) Connect the charging receptacle cable from the front section to its mate on the control box.
- 4) Connect the motor/brake cable to its mate on the control box.

1.4 - Test Procedure

- 1) Insert the key into the ignition and turn to the on position.
- 2) The green LED light should be illuminated. This indicates that there is a good charge on the batteries.
- 3) Test the horn button.
- 4) Set the speed adjustment dial to the minimum setting. Press the forward and then the reverse on the thumb control lever. On models fitted with Penny and Giles control main controllers there is a three-second delay before the switch will operate.
- 5) Test forward and reverse at variable speed settings. The scooter should accelerate and decelerate smoothly.

1.5 - If the scooter will not operate

- 1) Check that all the wire harness connections at control box are attached to their mates.
- 2) Check for correct polarity connections at the battery terminals.
- 3) Make sure the terminal bolts at the batteries have been tightened.
- 4) Make certain the batteries are fully charged.
- 5) Check that the battery charger plug is not connected. *(This will cut the power to the scooter)*
- 6) Check that the red lever at transmission is engaged. *(In the lock position)*

➡ **NOTE!** - *If there is no fault found at these points, refer to trouble-shooting guide located in Chapter 4 of this manual.*

CHAPTER 2: ROUTINE SERVICE

LUBRICATION

Shoprider Scooters should be lubricated in the following areas as indicated below:

2.1 - Transaxle

The Transaxle is a sealed unit and should not need lubrication unless it is leaking or has developed a squeak or noise. If this is the case, look to page 22 in the Troubleshooting guide section of this manual. We recommend the use of semifluid gear gel or an equivalent grease depending on what the Transaxle contains.

2.2 - Steering

- 1) Remove handle bar at tiller lever.
- 2) Remove front plastic shroud.
- 3) Unscrew lock nut and collar at steering shaft.
- 4) Lubricate with a light oil.
- 5) Inspect ball joints and steering linkages for stiffness.

2.3 - Seat

- 1) Remove seat from scooter and place upside down.
- 2) Apply grease along slider at base of seat.
- 3) Add a thin coating of grease to seat post on scooter frame.

2.4 - Articulation Points

There are two points where the frame allows for lateral movement. The rear articulation point is located where the drive section joins the frame. The front articulation point is located where the steering section joins the frame. Spray some light oil or similar lubricant into these areas.

CHAPTER 3: SCOOTER MAINTENANCE

3.1 - Batteries

When the batteries resist a charge, have limited life or discharge prematurely, this is usually an indication that the charger is faulty or the batteries may need replacement.

Although a battery may show a voltage near twelve volts, this does not necessarily ensure the batteries ability to hold a charge. Special battery testers are available to detect any faults in sealed lead acid batteries.

3.1.1 - Battery Testing

The batteries supplied with all the scooters are all sealed lead acid either the Gel type or re-combination type. To ensure the true test of the batteries are carried out it is necessary to use the special Battery tester available, the procedure is as follows:

- 1) Connect the clips to the terminals red to positive black to negative.
- 2) Switch to the on position (*no link up to any mains power is required*).
- 3) Press the button on this will show 1- 0.
- 4) Press High the last reading will be shown.
- 5) Press to set the amperage of the battery using the plus or minus symbols.
- 6) When reaching the correct amperage for the battery
- 7) Press the start button and the test will begin.

3.1.2 - Common Battery Problems

- ♦ **Sulphated cells** - Older batteries can have mineral build up on the internal plates causing it to have reduced power limiting the scooters range.
- ♦ **Shorted cell** - Although a rare occurrence this condition will cause battery to reject a charge. The battery must be replaced.
- ♦ **Insufficient charge** - Depending on the size of batteries used and how discharged they were it can take up to 17 hours to obtain a full charge.
- ☛ **NOTE!** - *Refer to manufacturer recommendations.*

Typically, batteries have a life expectancy of 1-year depending on their usage. It is recommended that batteries be replaced in pairs when they get near the end of their life span.

For longer battery life, it is recommended that the batteries are charged before they become completely depleted. It is better to charge batteries daily after each use.

- ☛ **IMPORTANT!** - *Do not allow batteries to remain discharged for an extended period.*

3.2 - Battery Charger

There are five sizes of 24 Volt battery chargers supplied: 2 A , 4 A, 4 A (*Shoprider*), 5 A and 7 A (J. M. Clark), all for use with sealed lead acid batteries. The sizes of batteries are 17 A/h, 30 A/h, 38 A/h, 48 A/h and 70 A/h. The following specification refers to the blue or grey chargers. The black smaller charger is the *Shoprider* battery charger that operates on a constant reading of the voltage.

3.2.1 - General Specification

Input: 220/240 Volts, 50 Hz

Output: The charger provides a constant current limited output until the battery on charge voltage reaches 29 Volts. This voltage is then maintained constant and current gradually reduces as the battery becomes charged. This constant voltage phase lasts for 8 hours. After this period has expired the battery is fully charged and a green LED on the front panel of the battery charger illuminates.

Maintenance: After the time period described above has expired and the fully green LED has illuminated, the constant voltage level falls from 29 Volts to 27.1 Volts. At this level, the battery is held in a fully charged condition.

Slow Start: There is a short delay (approx. 2 sec) after the battery is connected before charging commences. This ensures that a secure battery connection has been made.

Overall Timer: An over timer is included which starts to operate at the beginning of charge. This timer is set to run for approximately 16 hours. When the battery voltage reaches the constant voltage level of 29 Volts this timer is aborted and is no longer effective. If the on charge voltage fails to reach 29 Volts (*due to battery failure*) the charge is terminated after the pre-set period as a safety precaution.

3.2.2 - General Operating Instructions

The battery to be charged must have a terminal voltage of 12 Volts minimum. If batteries are discharged below this level, the charger will not operate. Please follow the operating instructions given on the battery charger.

- **WARNING!** - *Do not expose to rain or spray. Do not obstruct ventilator slots or over heating will result. No smoking or naked flames in battery vicinity. Under no circumstances should this charger be used to attempt to recharge non-rechargeable batteries. To change the power cord the charger must be returned to the manufacturer.*

3.3 - Upper Control Box Assembly

Type A: Complete control box dark Grey in colour.

Type B: The tiller cover includes all the operating components .

Type A

The upper control box assembly is located on the top of the steering handle. This control box can be replaced as whole unit. (See 3.1.1 below). There are a number of serviceable components inside the control box as noted. (See fig. 9, Appendix C)

3.3.1 - Removing Upper Control Box Assembly

- 1) Remove the tiller cover.
The two pieces of the tiller cover assembly are held together by plastic tabs (See fig. 7, Appendix C). To remove the cover, carefully insert a flat-head screwdriver at the seam on the lower left side and push on the inner piece to work the tabs out of the slots. (*Be careful to not scratch the paint.*) On the long Tiller Cover Assembly the Phillips screw in front must be removed before the two pieces can be worked apart.
- 2) Disconnect the red connector on the cable.
- 3) Remove the four Phillips screws that hold the box to the mounting plate.
- 4) On the new tiller 4 screws at the side of the tiller cover can be released to remove head set.

3.3.2 - Testing Throttle Control and Speed Potentiometers

- 1) Remove and disconnect the upper control box assembly from the scooter handlebars.
- 2) Open the upper control box casing.
- 3) With an ohmmeter check for dead spots in the throttle control potentiometer by connecting one lead to the centre terminal and the other lead to the right or left terminal.
- 4) Slowly turn the potentiometer. The ohmmeter should show a smooth resistance curve up the scale. *(From approximately 2.5kΩ at no throttle to 0kΩ at full throttle).*
- 5) Perform the same test for the opposite terminal *(If applicable)*.
- 6) If there are any abrupt drops in resistance when performing this test, the potentiometer should be replaced.

3.3.3 - Throttle Control Potentiometer Calibration

- 1) Remove and disconnect upper control box assembly from the handle bar.
- 2) Remove the thumb lever from the throttle control potentiometer.
- 3) With an ohmmeter measure the resistance from the centre to the left lead and from the centre to the right lead. These two resistance values should be equal.
- 4) Turn the shaft on the potentiometer until the resistance from left to centre equals the resistance from right to centre.
- 5) Re-install thumb lever and tighten Allen screws.

3.3.4 - Throttle Control 5kΩ Potentiometer Replacement

- 1) Remove and disconnect upper control box assembly from the handle bar.
- 2) Remove the thumb lever from the Throttle control potentiometer by loosening the two small Allen screws at the post. (See fig. 9, Appendix C)
- 3) Next, remove the four screws that join the plastic casing.
- 4) With a soldering iron, disconnect the three wires to the potentiometer noting the positions of the colour-coded wires.
- 5) Remove the nuts and spring that are holding the potentiometer in place and then remove the potentiometer.
- 6) Install the new potentiometer by reversing the above steps *(Do not forget to solder the wires to their appropriate terminals)*.

3.3.5 - Speed Control 25kΩ Potentiometer Replacement

- 1) Remove and disconnect upper control box assembly from the handlebars.
- 2) Remove the knob from speed potentiometer *(using small flat-head screwdriver to loosen the holding screw)*.
- 3) Open control box casing. (See fig. 9, Appendix C)
- 4) With soldering gun, disconnect the two wires to the potentiometer noting the position of the colour-coded wires.
- 5) Remove the nut holding the potentiometer and remove the potentiometer.
- 6) Install new potentiometer, tightening the nut. Solder the wires onto the correct terminals of the potentiometer and re-install the control knob.

3.3.6 - Upper Control Box Assembly Circuit Board Replacement

- 1) Remove and disconnect the upper control box assembly.
- 2) Open the control box casing. (See fig. 9, Appendix C)
- 3) Disconnect the LED leads from the pins on the circuit board.
- 4) With a soldering iron de-solder red wire from key switch.
- 5) De-solder black wire from horn button.

☛ **NOTE!** - *Some boards have two Black wires to horn.*

- 6) Install the new circuit board and replace the LED leads. Re-solder the black and red wires.

☛ **NOTE!** - *Bar level indicator is replaced complete with PCB.*

Release retaining clip under bar level indicator inside head set to remove.

3.3.7 - Reversing the Throttle Lever Control

- 1) Remove upper control box assembly and open casing. (See fig. 9, Appendix C)
- 2) With a soldering iron, de-solder the orange and yellow wires at the Throttle control potentiometer. Reverse these wires and re-solder them to the potentiometer.
- 3) Close upper control box casing.

The description refers to the type A version. The operation on testing and repairing is the same as that of the Type B.

☛ **NOTE!** - *The throttle can also be reversed through Penny & Giles control box with programmer.*

3.4 - Transistorised Motor Control Unit (Main Control Box Assembly)

The Motor Control Unit (Main Control Box Assembly) is the central processor for the scooter receiving input from the Upper Control Box Assembly and battery charger and directing output to the motors, brakes and batteries. All internal connections are made with plug in type connectors making for easy circuit board installation and removal.

The Main Control Box Assembly is located in the rear section mounted close to the Transaxle. The control box can be removed as a whole unit by removing the two screws on the mounting plate. There are five colour-coded quick connectors linking the control box with its various components.

The *Shoprider* and *Sunrunner* Scooters from 1997 on use Penny & Giles Solo main controllers. Previous controls are the Curtis PMC 1203A, the Curtis PMC 1208A, the Dynamic DS100, the IPC, and Penny and Giles DT125. The current model is the latest state of the art Penny & Giles Solo 60 Amp and 70 Amp.

The model number sticker located inside the control box on the relays can identify the control unit. (Identifying which controller your scooter has will help in troubleshooting.) However, this is not possible with the Dynamic DS100 and Penny & Giles controllers. These controllers have to be returned for repair or replacement.

3.4.1 - Some Important Motor Controller Features

Thermal Protection

Both the motor and controller are protected by a circuit which detects an over temperature condition. The circuit reduces controller output drive current until the controller cools back down. It then returns to normal current output.

Polarity Protection

When the key switch is turned on a pre-charge control circuit detects incorrect polarity at the battery terminals and will not allow the controller to be switched on.

High Pedal Disable

When the key switch is turned on, the high pedal detect looks for applied throttle. If this condition is found the controller will remain in neutral until the throttle is returned to a low level. This prevents the scooter from starting abruptly when switched on.

Under Voltage Detect

When the batteries discharge to about two thirds of their capacity this circuit cuts back motor current to maintain battery voltage to the cut back level. This prevents the batteries from depleting completely (*thus helping to extend battery life*).

Potentiometer Fault Detection

If the throttle control potentiometer wire or wiper are broken this circuit will return the controller to neutral preventing a loss of control.

3.4.2 - Circuit Board Replacement (Curtis and IPC only)

- 1) Disconnect the five colour coded connectors from the motor controller and remove the mounting screws.
 - 2) Remove the screws on the control box and open the casing.
 - 3) Remove the wires to the circuit breaker.
- **NOTE!** - *Breaker may be externally mounted in which case remove the wire leads on the circuit board.*
- 4) Remove the white two-pronged connector from the electromagnetic brakes.
 - 5) Remove the two large black and red wires from the batteries.
 - 6) Remove the two large black and red wires from the motor control. (*Note which wire connects to each terminal to ensure you maintain same motor direction.*)
 - 7) Finally, remove the five-pin connector from the tiller control.
 - 8) Install new circuit board in the reverse order, taking care to attach battery and motor wires in correct polarity.
- **NOTE!** - *Depending on the circuit card you have, the above connections may be slightly different. Be sure you label the wires as you disconnect them so that you will be able to reinstall all wires in the correct place.*

Penny and Giles control boxes can be adjusted using the SP1B Programmer there is no need to go into the control box (suitable for DT125 & Solo).

3.5 - Adjustments (Curtis & IPC only)

3.5.1 - Throttle Acceleration and Deceleration

The time it takes to go from 0 to 100% throttle in forward or reverse can be adjusted from 0.5 to 3.5 seconds by independently adjusting the ACC (*acceleration*) and DEC (*deceleration*) trim pots located on the Curtis 1203 and the IPC circuit boards. (See Appendix D). The relative position of the trim pot to time constraints is illustrated on the chart. The acceleration and deceleration can also be adjusted on the DS100 by using a Dynamic Programmer. The acceleration and deceleration cannot be adjusted on the Curtis 1208 circuit board. Because it may be necessary to make a number of adjustments to fine tune this function, just remove the controller cover and expose the trim pots if possible. (*Disconnect batteries first!*) Use a plastic screwdriver to turn the trim pots if available.

- **WARNING!** - *Voltage may still be present at circuit board. Use caution not to short any ex-*

posed wires.

3.5.2 - Top Speed Setting (Model TE-777 Only)

Vehicle top speed can be optionally set with the use of a resistor or trim pot located at the power output (speed control) potentiometer. This resistor will reduce the top speed of the scooter in both forward and reverse. To increase the speed of the TE-777, simply remove the resistor and re-solder the wire directly to the potentiometer. (See Appendix D)

3.5.3 - Reverse Speed Scaling

The reverse speed trim pot is located next to the ACC and DEC trim pots on the Curtis 1203 and IPC circuit boards. The reverse speed factory setting is 60% approx. This pot has an adjustable range between 40 and 100%. As with the throttle ACC and DEC trim pots, the reverse speed can be adjusted using the same method as above. To adjust the reverse speed on the DS-100, the Dynamic programmer is needed. The reverse speed cannot be adjusted on the 1208 circuit board.

3.6 - Steering

Locking Steering Tiller

The steering tiller is located at the point where the handle bar joins the steering shaft. There are three types of steering tillers used on the *Shoprider* Scooters. Both types allow the user to lock the handle bar at varied angles to the rider. Although the three steering tillers differ slightly in appearance they are both installed and removed in the same manner.

3.6.1 - Replacing Locking Steering Tiller

- 1) Remove the handle bar cover assembly. (See fig. 7, Appendix C)
- 2) Remove the two Allen type screws securing the handle bar to the tiller. (See fig. 8, Appendix C)
- 3) Disconnect the cable to the upper control box.
- 4) Remove the handlebars by pulling straight up while twisting left to right.
(Skip step 5 unless you are replacing top half of tiller only.)
- 5) Remove the large bolt or knob holding both halves of the steering tiller together.
- 6) Remove the front chassis cover.
- 7) Remove the two Allen type screws securing the tiller to the steering shaft.
- 8) Install the new steering tiller using the same procedure in reverse.

3.6.2 - Replacing the Steering Shaft

- 1) Remove handle bar cover ass'y and charging plug receptacle (fig. 6, App. C).
- 2) Disconnect the cable to the upper control box.
- 3) Remove the large bolt or knob, holding the two halves of the steering tiller together.
- 4) Remove the front chassis cover.
- 5) Remove the two Allen type screws securing the tiller to the steering shaft. (See fig. 5, Appendix C)
- 6) Remove the two bolts connecting the steering shaft "U" plate to the steering linkage.
- 7) Remove the bearing cap nut.
- 8) Pull the steering shaft down through the frame
- 9) Retain all the bearings and housings for re-assembly.

3.6.3 - Replacing Front Wheel Axle or Bearings

- 1) Remove the front chassis cover.

- 2) Raise the front wheels off the ground and place a block under the frame.
 - 3) Remove the centre bolt on the wheel hub holding the wheel to the axle spindle. (See fig. 5, Appendix C)
 - 4) Disconnect the connecting rod ball joint(s) from the wheel axle.
- **NOTE!** - *It may be necessary to tap the ball joint out with a small hammer because of the compression fit.*
- 5) Remove the cotter pin and the wheel axle-retaining nut.
 - 6) Pull the wheel axle straight up and remove the bearings.
 - 7) Lubricate or replace the front axle bearings if necessary.
 - 8) Install the new wheel axle.

3.6.4 – Converting Handle Bar to Delta Control with Reverse Throttle Control (Not applicable on the model TE889DX, DXS, DXF or NB)

- 1) Remove handle bar cover assembly. (See fig. 7, Appendix C)
- 2) Disconnect cable to upper control box.
- 3) Remove upper control box assembly from the handlebars.
- 4) Remove the two Allen screws attaching the handle bar to the steering tiller.
- 5) Remove handlebars by pulling straight up while twisting left to right.
- 6) Install the new delta type handle bar.
- 7) Open casing on the upper control box.
- 8) With a soldering gun de-solder and reverse connections on the orange and yellow wires at the throttle control potentiometer or at the plug. (See 3.3.7)
- 9) Close upper control console casing.
- 10) At the thumb control lever, install the two lever extensions with the nuts and bolts provided.

➤ **NOTE!** - *It may be necessary to replace the thumb lever. Some thumb levers do not have holes pre-drilled for the extensions.*

- 11) Finally re-install the upper control console and handle bar cover and change the labels to denote forward and reverse.

➤ **NOTE!** - *Delta controls can not be fitted to NB or DX scooter models.*

3.7 - Transaxle

The motor, electromagnetic brake and Transaxle are housed in one unit attached to the rear frame section. The Transaxle, much like a car's differential, is a sealed unit requiring little or no maintenance. These three components make up the drive train and can be serviced independently.

3.7.1 - Removing the Transaxle

- 1) Raise the rear wheels off the ground and place a block under the frame.
- 2) Locate the "U" clamp over the left axle. (See fig. 4, Appendix C)
- 3) Remove the two lock nuts under the frame.
- 4) Remove the "U" clamp and bracket.
- 5) Where the right axle joins the frame, remove the two nuts under the frame along with the rubber spacer and bracket.

If the Transaxle does require lubricant, simply remove the four bolts holding the motor and insert the lubricant. This refers to the Transaxle that has the motor with the worm gear from the motor. The sealed Transaxle can be recognised by the motor being fixed by a coupling, also

the motor has carbon brush holder ports that are proud. (*The fitting on the top of the Transaxle is a breather only*).

3.8 - Electro-magnetic Brake

The Electro-magnetic brake is located on the end of the motor and may be housed inside an aluminium cover. The magnetic brake is an independent unit that joins with the motor at the drive shaft. When the brake receives current from the motor control unit, an electromagnetic coil releases the normally engaged disk brake. Should the scooter lose its normal braking efficiency it may be necessary to replace the magnetic brake.

3.8.1 - Replacing the Electro-magnetic Brake

- 1) Remove the three screws holding the aluminium brake cover. (*if applicable*)
- 2) Disconnect the cable to the brake.
- 3) Remove the three screws attaching the brake to its connecting plate.
- 4) The newer brakes may have a different style drive axle (*looks like a hex nut*) so the old drive axle will need to be removed. Use a small nail to drive the roll pin through the hole in the drive axle and drive shaft.
- 5) Install the new style drive axle and use a 2 mm Allen head drive to tighten.
- 6) Install the new magnetic brake and fasten with the three screws.

3.9 - Drive Motor

Shoprider Scooters use direct drive from the 24 Volt direct current motors. The drive motors use maintenance free sealed bearings on the main shaft. Should a loss of power be traced to the motor the cause is most probably insufficient contact at the carbon brushes. The procedure for replacing the brushes is listed below.

3.9.1 - Drive Motor Removal

- 1) Disconnect the drive motor and magnetic brake cables. (fig. 3, Appendix C)
- 2) Remove the aluminium brake cover. (*if applicable*)
- 3) Remove the Electro-magnetic brake and connecting plate.
- 4) Remove the four Allen type bolts attaching the drive motor to the Transaxle.

3.10 - Tyres and Wheels

Shoprider Scooters use 8,10 and 12 inch pneumatic tyres and tubes mounted on two piece split rims. The entire wheel and hub can be removed for access to the wheel bearings or the tyre and rim can be removed for changing a flat tyre.

3.10.1 - Replacing the Inner Tube or Tyre

- 1) Raise the wheels off the ground and place a block under the frame.
- 2) Remove the hubcap by grasping and pulling straight out. (*if applicable*)
- 3) Remove the wheel from the axle by removing the (13 mm) centre bolt.
- 4) Deflate the inner tube.
- 5) Remove the four bolts attaching the rim to the hub.
- 6) Separate the rim from the tyre.
- 7) You can now replace the inner tube or tyre.

3.10.2 - Checking the Wheel Bearings

- 1) Raise the wheels off the ground and place a block under the frame.
- 2) Remove the hubcap (*if necessary*).

- 3) Remove the centre bolt holding the wheel rim to the hub. (See fig. 4, App. C)
- 4) Pull the entire wheel and the hub off the axle.
- 5) The wheel bearings can be tapped out of the hub with a small hammer against a screw-driver.
- 6) Examine bearings for build up of dirt or foreign matter.
- 7) Clean or replace bearings as required.

➡ **WARNING!** - *Never remove any bolts before deflating tire.*

3.10.3 - Tyre Pressure

Correct tyre pressure is necessary to have the scooter move with minimum resistance while maintaining a comfortable ride. Tyre inflation pressures are recommended by the manufacturer for the different sized wheels and should be checked regularly. An under inflated tyre can cause a sloppy ride with reduced range and uneven wear. Similarly, an over inflated tyre can also cause uneven wear and an uncomfortable ride.

The chart below shows the manufacturers recommended tyre pressure for different sized wheels. Tyre pressure may be reduced by 3 p.s.i. to give a smoother ride over small bumps.

<u>Wheel Size</u>	<u>Tyre Pressure</u>	<u>Min.</u>	<u>Max.</u>
8 inch	25 p.s.i.	22	25
10 inch	25 p.s.i.	22	25
12 inch	25 p.s.i.	20	25
14 inch	20 p.s.i.	15	20

3.11 The Seat

The *Shoprider* and *Sunrunner* Scooters use two types of removable swivel seats. One type of seat, the fish-on seat, a folding backrest with an optional sliding bracket for forward and backward adjustment. The other type of seat used is the high-back deluxe seat with headrest. This seat allows the user to recline slightly, however it does not work with the slider brackets. Both seats can rotate 360° using a lever to lock the seat in any position. Any maintenance on the seats will likely be to the locking lever assembly or the slider bracket described below. Seat stem fittings from 1997 have square seat stem for the chassis.

3.11.1 - Replacing the Seat Sliding Bracket

- 1) Remove the seat from the scooter and place upside down on a clean surface.
- 2) Remove the four bolts holding the locking swivel base to the sliding bracket. (See fig. 10)
- 3) Remove the four Allen type bolts attaching the sliding bracket to the seat.
- 4) Install new sliding bracket.

3.11.2 - Replacing the Seat Locking Lever and Collar/Adj. Seat Height

- 1) Remove the seat from the scooter and place upside down on a clean surface.
- 2) Remove the self-locking nut holding the locking lever in place. (See fig. 10)
- 3) Remove the Allen type bolt retaining the seat-clamping collar.
- 4) The 1995 or newer models (except TE-999) have 5 height adjustment so the locking lever and collar can be moved to a different position, thus raising or lowering the height of the seat.

☛ **NOTE!** - *If the lever sticks, spray some lubricant (WD-40) on the post. If this does not work, remove some of the paint away from the collar. Use a rubber mallet to tap the collar off the post.*

☛ **WARNING!** - *Changing seat height affects the stability of scooter.*

3.11.3 - Seat and Locking Swivel Base (Pre-'96)

- 1) Place the seat upside down on a clean surface.
- 2) Position the swivel base over the four bolts on the bottom of seat sliding bracket. Bolt the swivel base onto the seat-sliding bracket with the arm holders positioned toward the backrest. (See fig. 10)
- 3) Insert the arms into their appropriate holders on the left and right sides of seat base.
- 4) Place the knobs into the threaded holes on the seat base and tighten to secure arms in place.
- 5) Re-engage the transmission by bringing the red lever at the Transaxle back to the lock position.
- 6) Replace the rear plastic shroud cover.
- 7) Position seats spindle over top of attachment post and then gently drop the seat into place.
- 8) Press down on the seat-locking lever. This will secure the seat into place and prevent it from rotating.

☛ **NOTE!** - *The seat lever can be installed on the left or right side by removing the seat lever bolt and rotating the lever 90 degrees.*

3.11.4 - Reversing Seat Locking Lever (Pre-'94)

- 1) Remove the seat from the scooter and place upside down on a clean surface.
- 2) Remove the self-locking nut holding the locking lever in place. (See fig. 10)
- 3) Remove the Allen type bolt retaining the seat-clamping collar and install the lock lever in the reverse direction.

3.12 - Miscellaneous

3.12.1 - Replacing the Chrome Bumper

- 1) Remove the two bolts located at the front of the frame under the plastic shroud.
- 2) Place the bumper between the frame and the guard plate with the holes aligned.
- 3) Replace the bolts and adjust the position of the bumper. Now tighten the bolts into place.

☛ **NOTE!** - *On the newer models, the bumper is pre-installed.*

CHAPTER 4: TROUBLE SHOOTING

4.1 Troubleshooting Guide

CONDITION

- ✦ No power, scooter will not move with key switched on.

POSSIBLE CAUSE

- ✦ Circuit breaker on main control box is tripped.
- ✦ Fuse blown (*check fuse in main control box assembly*).
- ✦ Incorrect polarity at battery terminals.
- ✦ Dead batteries.
- ✦ Charging cable is still connected to charging receptacle.
- ✦ One of the cable connections at the main control box is loose.
- ✦ Control connection cable disconnected.
- ✦ Broken key switch.
- ✦ Throttle stuck fully open.
- ✦ Throttle control potentiometer broken.
- ✦ Speed potentiometer broken. (See 3.3)
- ✦ After turning on key three seconds not waited.
- ✦ Carbon brushes stuck in their housings or springs failed.

SOLUTION

- ✦ Check above possible causes first. If these check OK, the problem is likely to be in the control connection cable or upper control box.
- ✦ Verify that the upper control box is getting 24V. (*Blue wire on red connector*)
- ✦ If the upper control box is not getting 24V, replace control connection cable.
- ✦ If the upper control box is getting 24V, check key switch operation and verify wiring in the upper control box. Trace voltage from key switch on to find where the problem occurs. (*Replace upper control box if necessary*)

CONDITION

- ✦ Scooter has reduced power, limited speed and range.

POSSIBLE CAUSE

- ✦ One or both batteries need replacement.
- ✦ Insufficient charging time, batteries are not fully charged.
- ✦ Fault with charger, batteries not receiving a proper charge.
- ✦ Cable connectors not making proper contact.
- ✦ Corrosion or bad connection at battery terminals..

SOLUTION

- ✦ Perform a battery test (See 3.1).
- ✦ Check all wire connections from batteries to control box.
- ✦ Check battery charger output.
- ✦ Check battery charger for short circuit or reverse polarity.

- ✦ Check battery charger AC Circuit Breaker and fuse.

CONDITION

- ✦ Scooter has no power or reduced power in forward or reverse.

POSSIBLE CAUSE

- ✦ Cable connection may be loose.
- ✦ Throttle control lever has slipped on potentiometer shaft and is not achieving full rotation.
- ✦ Throttle or speed potentiometer is broken. (See Chapter 3)
- ✦ Throttle control lever is not centred on potentiometer shaft.
- ✦ Acceleration trim pot on control box circuit board is adjusted to low.
- ✦ Motor not receiving proper voltage, or motor not working.

SOLUTION

- ✦ Re-seat cable connections, tighten nuts on battery terminals.
- ✦ Test throttle and speed potentiometers (See Chapter 3)
- ✦ Examine Throttle control lever for looseness on potentiometer shaft.
- ✦ Verify that brake completely disengages when Throttle control lever is pressed.
- ✦ Verify motor voltage from the main control box assembly. *(Should range from 0V to 24V as you engage Throttle control to full throttle.)*
- ✦ If motor voltage is OK, check motor to ensure it is drawing around 4 Amp unloaded. *(If motor is drawing too much current, replace motor.)*

CONDITION

- ✦ Erratic throttle control, scooter hesitates in forward or reverse, dead spots in throttle control travel.

POSSIBLE CAUSE

- ✦ Faulty throttle control potentiometer.
- ✦ Loose cable connection to motor.
- ✦ Loose battery terminal connection.
- ✦ Worn carbon brushes or springs in motor.

SOLUTION

- ✦ Test throttle control potentiometer or try with a different upper control box assembly. (See 3.3)
- ✦ Check cable connections to motor and batteries.
- ✦ Test with new motor installed.

CONDITION

- ✦ Horn sounds weakly when throttle applied.

POSSIBLE CAUSE

- ✦ Low battery voltage.
- ✦ Fault at upper control box circuit board

- ✦ Moisture in the upper control box.

SOLUTION

- ✦ Test the batteries (3.1.1) and check battery connections.
- ✦ Test with new upper control box assembly. If this resolves problem change circuit board (See 3.3)

CONDITION

- ✦ Scooter suddenly stops while in motion and brakes engage instantly.

POSSIBLE CAUSE

- ✦ Lost contact at key switch.
- ✦ Fuse blown at main control box assembly.
- ✦ Lost connection in wire harness.
- ✦ Circuit breaker tripped on control box.
- ✦ Relay not working or lost connection to relay.

SOLUTION

- ✦ Check all wire harness connections.
- ✦ Check fuses and circuit breakers.
- ✦ Try replacing with new control console.
- ✦ Check connections on relay. Replace relay if necessary.

CONDITION

- ✦ Circuit breaker trips frequently.

POSSIBLE CAUSE

- ✦ Overload caused by excessive demand on motors.
- ✦ Heavy load on a steep incline.
- ✦ Brakes seized or no disengaging causing motor to strain and overheat
- ✦ Low tyre pressure or seized wheel bearings.

SOLUTION:

- ✦ Find out what type of terrain and load scooter is subject to. You may require more powerful model.
- ✦ Check that the batteries capacity matches demand from motors. (See 3.1)
- ✦ Make certain brakes disengage when scooter moves.
- ✦ Check that motor is not drawing too much current (should be approx. four amps unloaded.)
- ✦ If no fault found elsewhere, replace circuit breaker. (See 3.4)

CONDITION:

- ✦ Control box hum, brakes disengage (click) when key switched on up.
- ✦ Scooter moves slowly without touching throttle control.

POSSIBLE CAUSE

- ✦ Throttle has not returned to neutral position. May be stuck partially open.

- ✦ Return spring worn or broken.
- ✦ Potentiometer not centred at neutral.
- ✦ Throttle control getting stuck on plastic tiller cover.

SOLUTION:

- ✦ With an ohmmeter, test throttle control potentiometer for neutral.
- ✦ Examine return spring for excessive play.
- ✦ Check for any obstructions in throttle control lever path.
- ✦ Straighten upper control box if necessary.

CONDITION

- ✦ Flashing red, yellow and/or green LED lights.

POSSIBLE CAUSE

- ✦ Battery cable connectors not making proper contact.
- ✦ Fault in control connection cable.
- ✦ Fault in upper control box assembly.
- ✦ Lost connection at relay for charging interlock in control box.

SOLUTION

- ✦ Tighten battery cable connections with wrench or pliers to ensure proper contact.
- ✦ Check control connection cable for shorted or open lines.
- ✦ Check upper control box assembly for any visible faults, loose wire, etc. See 3.5.4
- ✦ Replace with another upper control box assembly if necessary.
- ✦ Replace PCB in speed control box..

CONDITION

- ✦ Reduced braking power, slow to engage, slipping on incline.

POSSIBLE CAUSE

- ✦ Brakes worn out.
- ✦ Weak spring brake.
- ✦ Deceleration trim pot on control box circuit board improperly adjusted.
- ✦ Throttle control pot not centred.

SOLUTION

- ✦ Brake should engage 3 - 5 seconds after releasing throttle.
- ✦ Check wire connection to magnetic brake.
- ✦ Replace electromagnetic brake if necessary.
- ✦ Adjust dec. trim pot on ctrl. box circuit board (*only IPC & Curtis 1203*). (See 3.4)
- ✦ Listen for brake clicking on then off when key switched on. (See 3.3)

CONDITION

- ✦ Brake won't disengage or engage randomly.

POSSIBLE CAUSE

- ♦ Faulty electromagnetic brake.
- ♦ Wires to brake disconnected.
- ♦ Fault in wiring or in control box.

SOLUTION

- ♦ Test for voltage at wire harness to the brake by connecting a voltmeter and applying throttle. If no voltage present, problem is with control box.
- ♦ Test spring brake. Scooter should not be able to roll with power off.
- ♦ Listen for brake engaging when key turned on. (See 3.3) *(Brake should stay engaged until throttle is pushed, then disengage or click off.)*

CONDITION

- ♦ Motor runs but scooter does not move.

POSSIBLE CAUSE

- ♦ Free wheeling lever at Transaxle is not engaged.
- ♦ Free wheel lever is slipping on shaft.

SOLUTION

- ♦ If there is difficulty engaging lever, roll the scooter ahead a bit and try again. Sometimes gears are just slightly out of mesh with each other.

CONDITION

- ♦ Excessive noise from Transaxle area.

POSSIBLE CAUSE

- ♦ Gear lubricant not reaching parts of Transaxle.
- ♦ Wheel axle bearings contaminated or worn out.
- ♦ Imperfect mounting surfaces between Transaxle and motor faceplate.

SOLUTION

- ♦ Pull motor and check grease level in the Transaxle. It should be approximately 1/2 cup of oil or grease. The lubricant should be covering half of the lowest gear/cog so enabling the rest of the gears to receive lubrication. *Gear lubricant can gravitate and pool in low areas, missing some parts.* (See Chapter 2)
- ♦ Remove motor and rotate 180°, then re-install.
- ♦ Inspect wheel axle bearings.
- ♦ Make sure that all nuts and clamps are secure.
- ♦ Make certain that the motor gasket is in place.

CONDITION

- ♦ Scooter stops but lights and horn work.

POSSIBLE CAUSE

- ♦ Charging relay in motor control box is not secure.
- ♦ Problem with the motor control printed circuit (PC) board.

SOLUTION

- ♦ Open motor ctrl. box and remove the electricians tape from the relay. Make sure all the con-

nections are intact. Re-insulate and secure the relay so that it cannot move.

- ✦ Replace PC board. (See 3.4)

CONDITION

- ✦ Scooter pulls to one side.

POSSIBLE CAUSE

- ✦ Uneven tyre pressure in front wheels.
- ✦ Excessive tyre wear on one wheel.
- ✦ Front wheels out of alignment.
- ✦ Worn ball joints or excessive play in linkage.
- ✦ Wheel bearing worn out or contaminated.

SOLUTION

- ✦ Lift front end and secure handle bar. Grasp wheel and rock back and forth watching for loose joints. (See 3.6)

CONDITION

- ✦ Excessive play in steering, squealing from tyres when moving on floors.

POSSIBLE CAUSE

- ✦ Front wheel out of alignment.
- ✦ Worn ball joints or excessive play in linkage.

SOLUTION

- ✦ Wheels pointed in different direction cause squealing. Raise front end and secure steering handle bar. Rock wheels back and forth. Watch for loose or worn steering linkage. Use a straight edge on tires to see if they are out of alignment.

CONDITION

- ✦ Batteries not charging or not holding charge.

POSSIBLE CAUSE

- ✦ Battery voltage too low.
- ✦ Faulty charging cable.
- ✦ Charger not working.
- ✦ Charging circuitry in main control box assembly not working.

SOLUTION

Ohm test the charging cable - replace if necessary.

Test scooter with a different charger, if new charger works, replace charger.

Check wiring in main control box assembly - replace in line relay if necessary.

If batteries, charger, and all wiring are good, replace controller PCB. (*Note the model number of the PCB, for example 1208-2330.*)

CONDITION

- ♦ Motor overheating.

POSSIBLE CAUSE

- ♦ Brake sticking.
- ♦ No voltage to brake. (*Brake not releasing.*)
- ♦ Faulty motor.

SOLUTION

- ♦ Remove three screws holding brake to motor and check if the brake will move freely with your finger.
- ♦ If voltage to brake is not 24V when power is turned on and 0V when throttle is engaged, replace main controller circuit board.
- ♦ Replace motor if necessary.

4.2 - General Troubleshooting Tips & Test Points

The most common problem with the scooters is in the **batteries**.

Check the battery cables for secure terminal connection.

Measure **motor voltage** at the white 4-pin connector going to the motor. (*The thicker wires are the motor wires*). This should measure 0 Volts when you first turn on scooter. As you press throttle and increase speed, this will increase to a maximum of 24 Volts.

Measure **brake voltage** at the white 2-pin connector going to the brake. This should measure 0 Volts when the brake is engaged (*either with scooter powered on or off*). Once you engage the throttle, the brake voltage should increase to 24 volts, thus releasing the brake. (*If less than 24 Volts is going to the brake, the brake may only be partially releasing.*)

Intermittent problems are usually caused by faulty wiring. Check all connections and run a continuity test on the wiring.

If, after thoroughly troubleshooting the scooter, you have any further questions, please call the DMA **Shoprider** service department and we will be glad to assist you.

For warranty replacement, have the Model #, Serial # and purchase date of the scooter ready, as well as the consumer name.

The scooter model and serial numbers are located on the frame of the scooter. On four-wheel scooters, you will find the silver label in the front axle area, between the front tyres. On three wheel scooters, the label is located on the rear frame between the anti-tip wheels.

(*Older TE-777 has the label on the frame in the battery area*).

APPENDIX A

SHOPRIDER LIGHT PACKAGE INSTALLATION

Wiring Harness

- ♦ Lay out wiring harness (*four pin white connector faces back*)
- ♦ Install rear interconnect to wiring harness at four pin white connector.

Power Cable and Switch

- ♦ Remove tiller cover and connect light package power lead connector (*one red and two black wires attached into connector*) to power connector off of red upper control box connection (*green and blue wire*).
- ♦ The yellow, green and red wires (*with terminal lugs*) are not used and should be taped back with electrical tape.
- ♦ Run wiring harness down the tiller of the scooter and underneath the scooter along the same path as the control connection cable and charging cable.

Front Headlight

- ♦ Attach mounting bracket to the headlight using the hardware provided.
- ♦ Mount headlight at the base of the tiller. Remove the Allen head bolts from tiller, and re-install with mounting bracket. (*on 3 wheel scooters, this is where the red lifting handle is located*)
- ♦ Connect one of the black headlight wires to the black wire on the wiring harness.
- ♦ Connect the other black headlight wire to the red wire on the wiring harness.
- ♦ The green and yellow wires are not used - tie them back with cable ties.

Tail Lights

- ♦ Drill two holes for each taillight on the top of the rear chassis cover. (*One hole is for the mounting screw, the other is to run the black wire through*)
- ♦ Mount taillights and run black wires through holes.
- ♦ Before tightening mounting screws, fully connect the red ground (terminal lug) to each screw on the underside of the cover.
- ♦ Connect the male black and red wires of the taillights to the female black and red wires of the rear interconnect.
- ♦ Use cable ties to tie back loose cabling, if necessary.

Installation Complete

- ♦ Turn on the scooter and test the system.

SPECS:

- ♦ 24 volt DC systems.
- ♦ Replacement bulbs, 24 volt DC.
- ♦ While installing, do not let the black and red wires touch. May cause fuse to blow.

PARTS LIST:

- 1 Wiring harness
- 1 Rear interconnect
- 1 Front headlight with mounting bracket, bolts and nuts
- 2 Rear taillights with mounting screws
- 1 Red ground wire
- 1 Switch

APPENDIX A

WIRING DIAGRAM. SINGLE LIGHT. TWO REAR LIGHTS. INDICATORS (2 FRONT, 2 BACK).

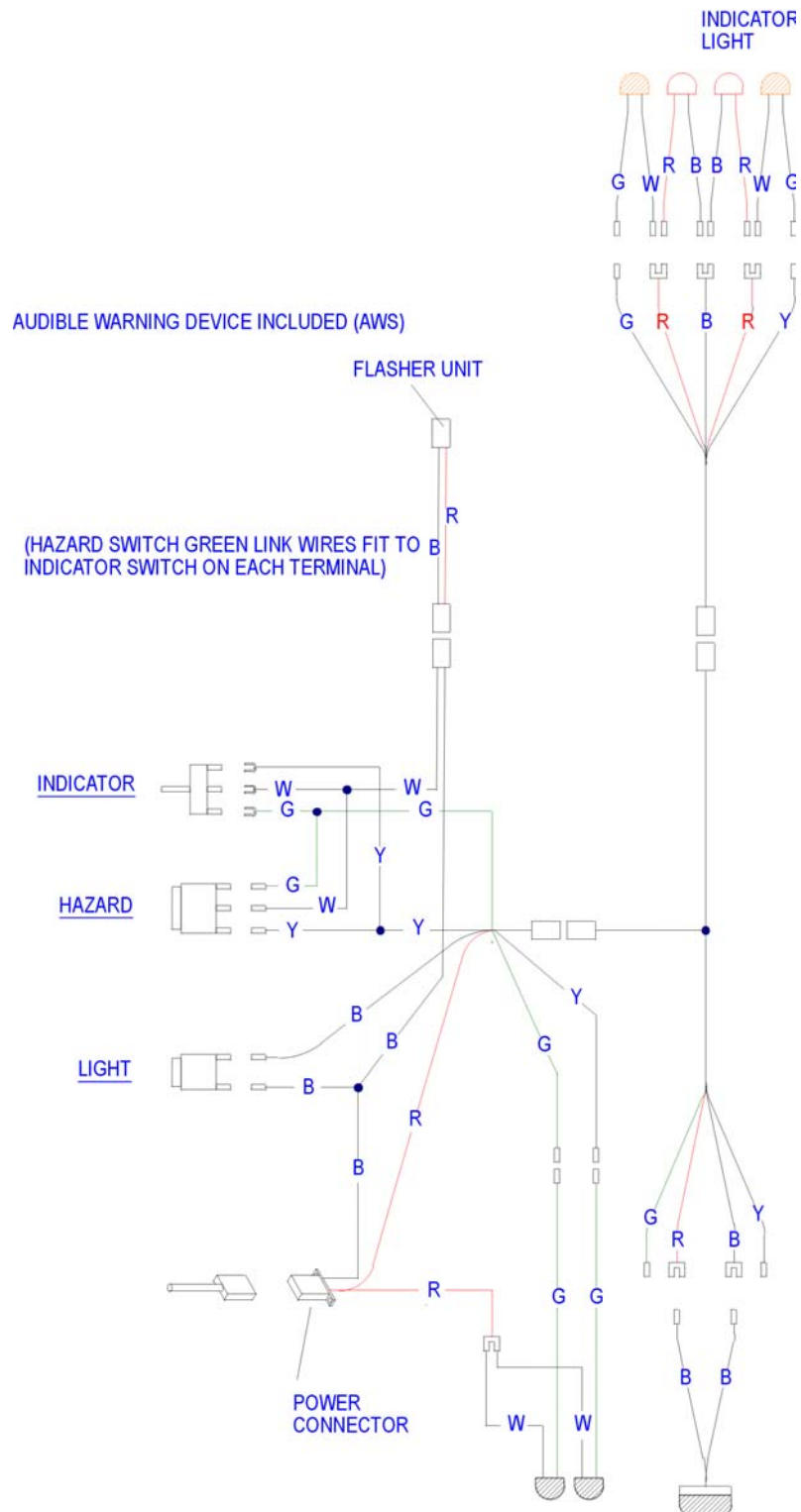


fig. 1

APPENDIX B

TE-889 BATTERY INSTALLATION

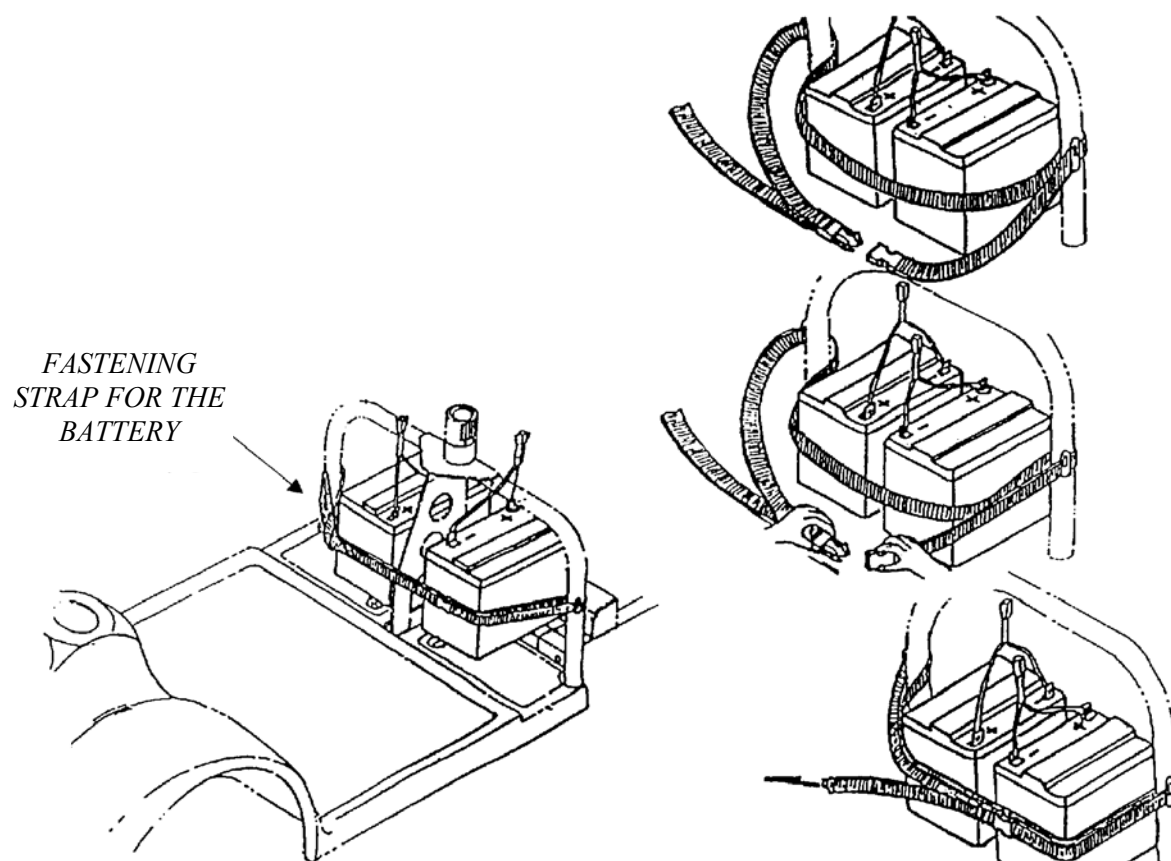


fig. 2

APPENDIX C

TRANSAXLE ASSEMBLY

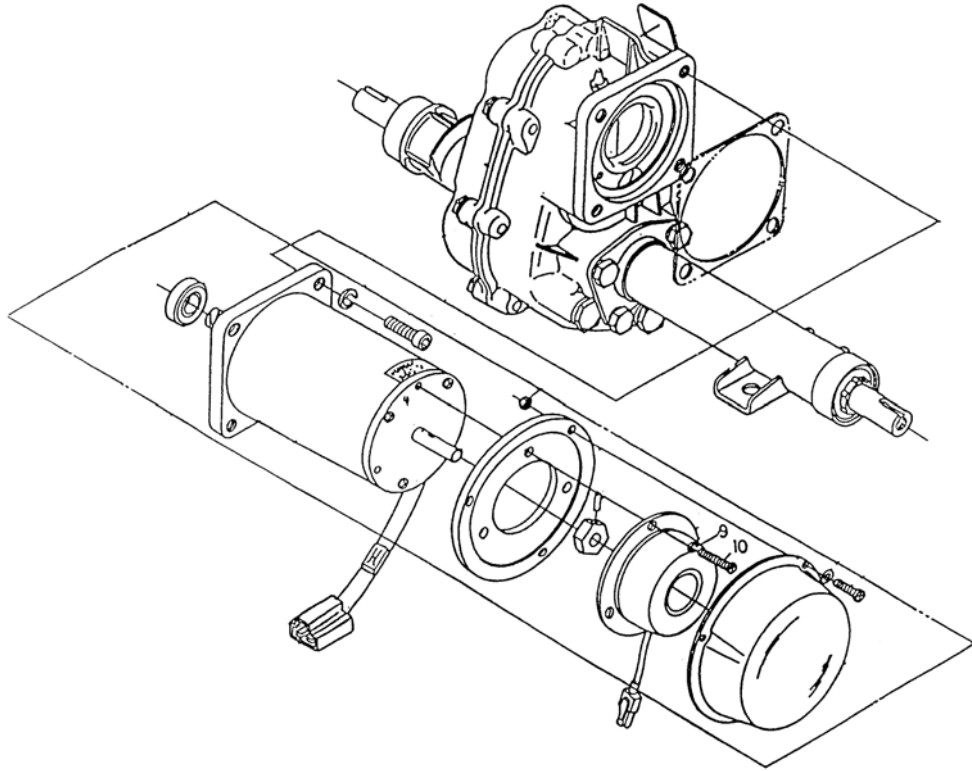


fig. 3

REAR CHASSIS C/W TRANSAXLE

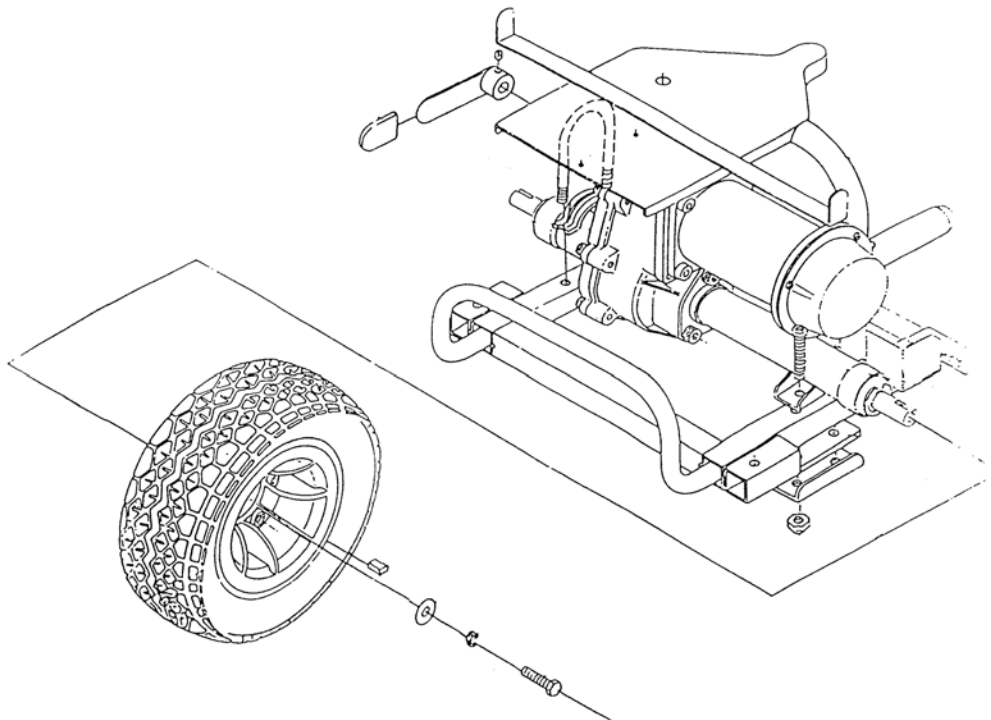


fig. 4

APPENDIX C

FRONT STEERING ASSEMBLY (TE-888/889)

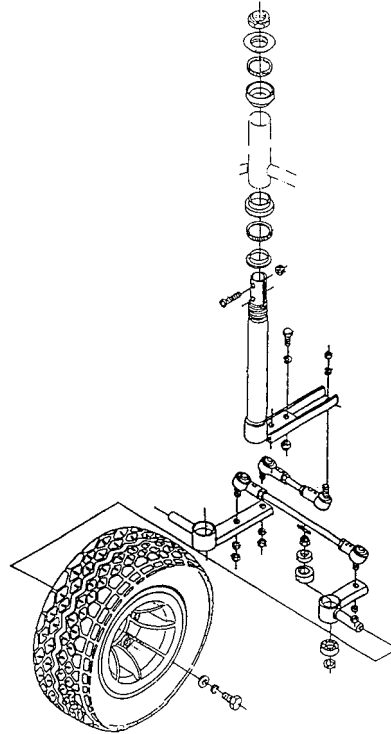


fig. 5

SEAT ASSEMBLY (PRE 1994 TYPE)

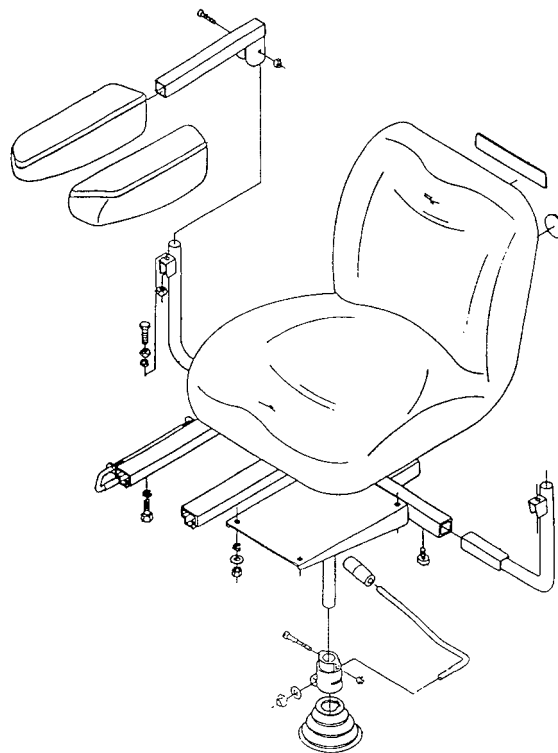


fig. 6



APPENDIX C

UPPER SPEED CONTROL BOX

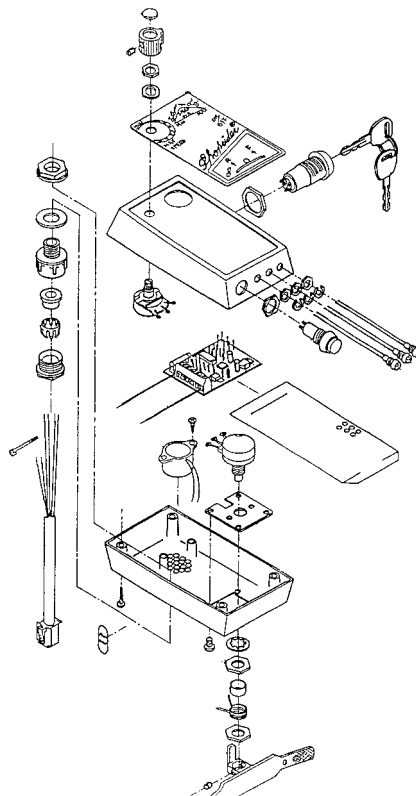


fig. 9

CONTROL & CHARGING WIRING

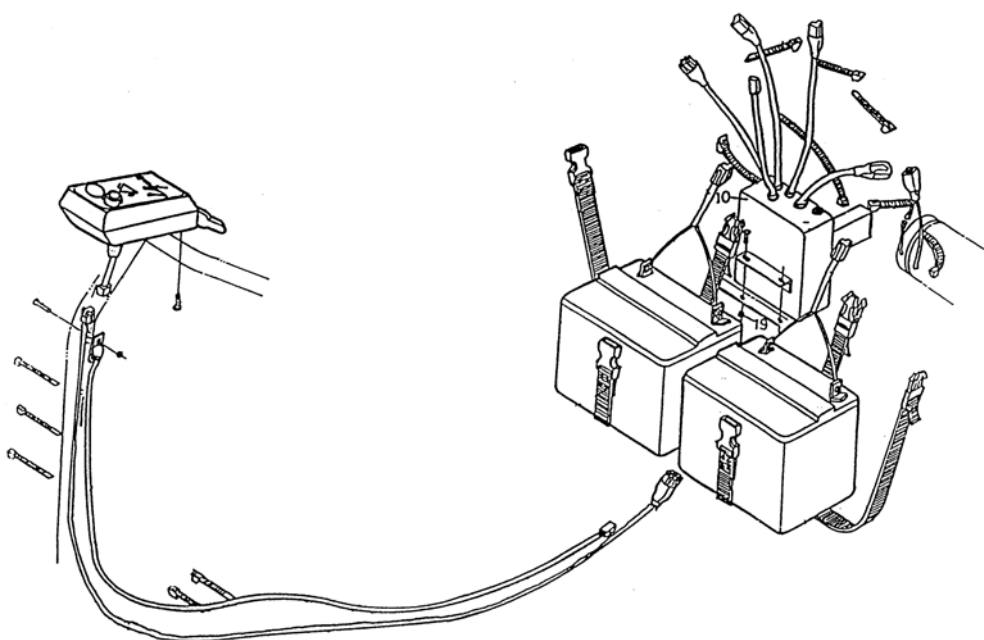


fig. 10

APPENDIX D

CURTIS CONTROL PCB 1203A

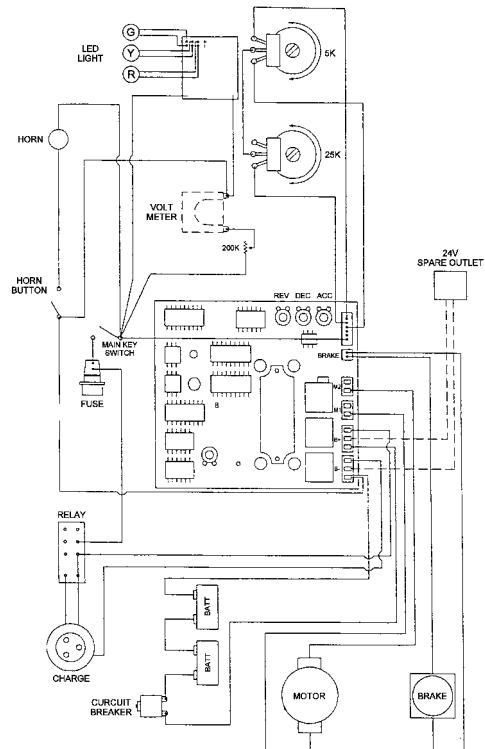


fig. 11

CURTIS CONTROL PCB 1208A

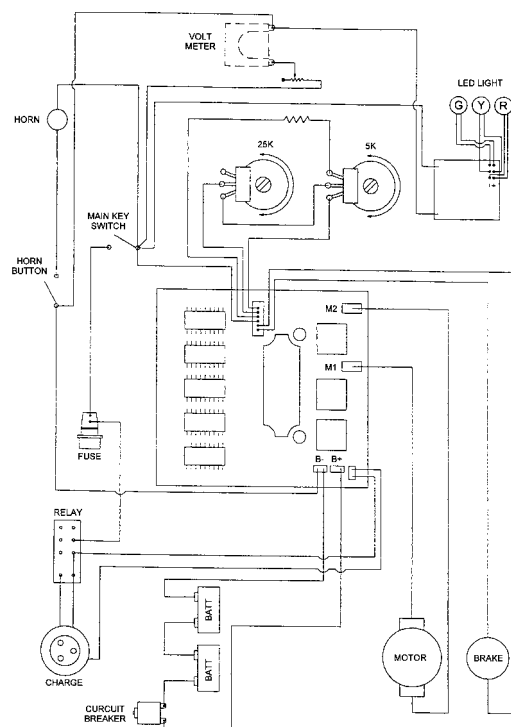


fig. 12

APPENDIX D

IPC CONTROL PCB

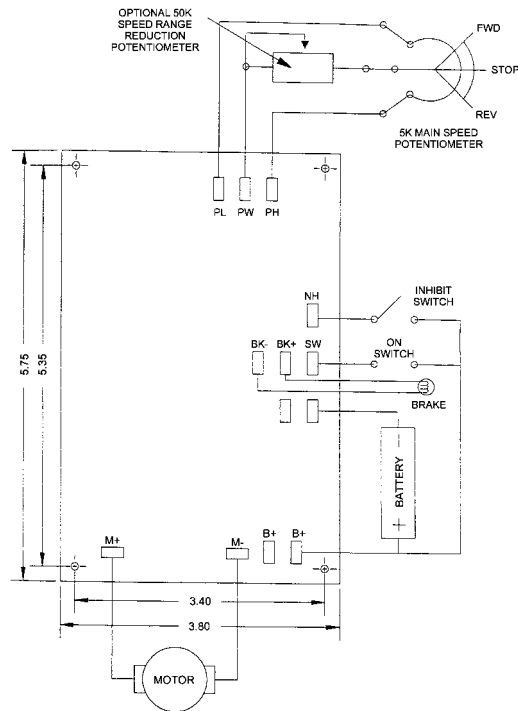


fig. 13

UPPER CONTROL BOX WIRING DIAGRAM

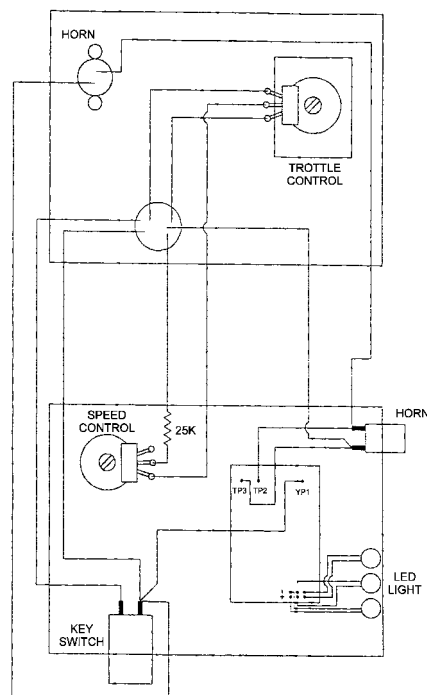


fig. 14

APPENDIX D

BATTERY VOLTAGE AUDIBLE WARNING

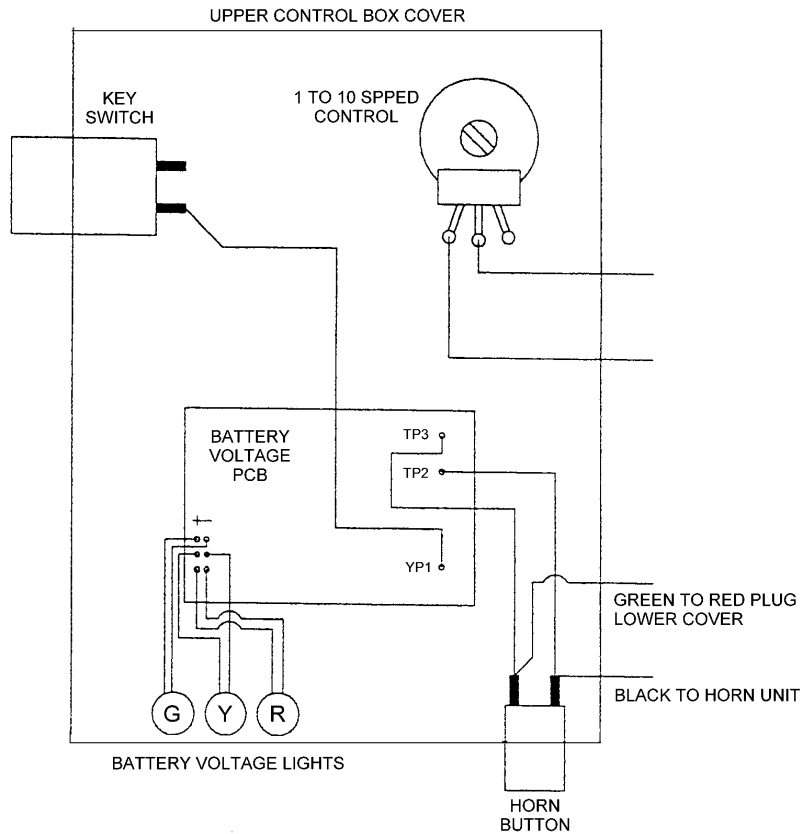


fig. 15

Disconnection Instructions

To disconnect low voltage horn:

- 1) De-solder the 1 mm black wire connecting the horn button to TP2.
- 2) On the low voltage PCB at TP2 cover wire end with insulating tape and clip the other wires with cable tie.

DYNAMIC FAULT SHEET

Flash Code (No. of flashes)	Fault Displayed by Programmer	DS 100 Condition	Comment
1	Battery needs re-charging.	Driving still possible.	The battery voltage has dropped below 23.3 Volts in neutral. Recharge the batteries soon.
2	Battery voltage too low.	Drive inhibited.	The battery voltage at the Controller has dropped to 16.5 Volts. Check the battery condition and connections
3	Battery voltage too high.	Drive inhibited.	The battery voltage at the Controller is greater than 32 Volts. Check the battery condition and connections. Suspect a charger malfunctions.
4	Current limit time out.	Drive inhibited.	The Controller has detected a shorted motor. Check the loom for shorts or check out the motor. Contact your Service Agent.
5	Brake feedback error.	Drive inhibited.	Check that the park brake release switch is off. Check the park brake and wiring for open or short circuits. Contact your Service Agent.
6	Speed pot not in neutral.	Drive inhibited. Drive possible if neutral selected.	Return the speed lever to neutral. Readjust the speed lever neutral if necessary. Consult your Service Agent.
7	Speed pot. error.	Drive inhibited.	Check speed pot wiring for open or short circuits. Speed pot may not be correctly set up. Contact your Service Agent.
8	Motor volts error.	Drive inhibited.	Contact your Service Agent.
9	Other internal errors.	Drive inhibited.	Contact your Service Agent.

