ROYALE SCOOTER – SERVICE AND REPAIR MANUAL

Contents:

SCOOTER MAINTENANCE

Your power scooter is designed for minimal maintenance. However, like any motorized vehicle it requires routine maintenance. To keep your **scooter** for years of trouble-free operation, we recommend you follow the following maintenance checks as scheduled.

DAILY CHECKS

1. Visual check on the conditions of tyres.
2. Inspect the battery gauge on the display to determine if batteries need to be charged.

WEEKLY CHECKS

Your scooter comes with standard pneumatic tyres. Make sure to maintain the pressure of the tires between 30-35 psi.

MONTHLY CHECKS

Visually inspect the controller harnesses. Make sure that they are not frayed, cut or have any exposed wires.

SEMI-ANNUAL CHECKS

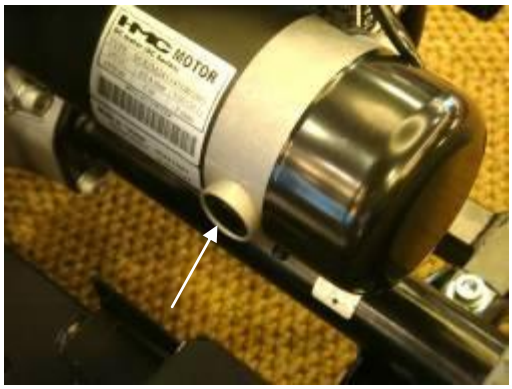
Check the motor brushes. We recommended that your authorized dealer inspect the brushes every six months or sooner if your power scooter is not operating smoothly. If inspection determines excessive wear on the brushes, they must be replaced or motor damage will result.

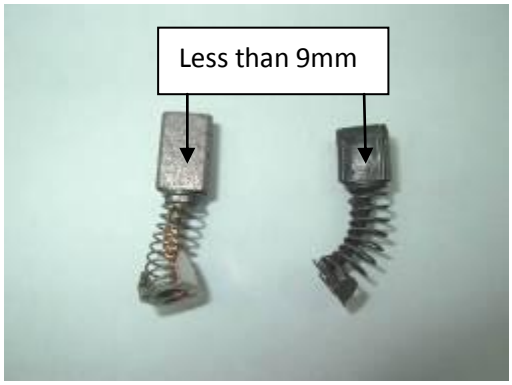
The brushes should be inspected for wear and colour of the braiding inside the spring. If the braiding is dark brown, red, silver, purple or gold then the brush needs replacing.

Warning! Failure to maintain the brushes could void the power scooter warranty.

To inspect or replace the motor brushes:

1. Unscrew the motor brush caps (by using a screwdriver on the caps shown by the white arrow).
2. Remove the brushes.
3. Inspect the brushes for wear (replace if less than 9mm)
4. Replace the brushes if necessary.





Inspect the state of the battery terminals every six months. Make sure that they are not corroded and the connections are tight. Periodically apply a thin film of petroleum jelly on the surface of terminals to guard against corrosion.

CHECKS:

- Make sure you keep the controller clean whilst protecting it from rain or water. Never hose off your scooter or place it in direct contact with water.

- Keep wheels free from lint, hair, sand and carpet fibres.

- Visually inspect the tyre tread. If less than 1mm (1/32"), please have your tyres replaced by your local dealer.

- All upholstery can be washed with warm water and mild soap. Occasionally check the seat and back for sagging, cuts and tears. Replace if necessary. Do not store your scooter in damp or humid conditions as this will lead to mildew and rapid deterioration of the upholstery parts.

- All moving mechanisms will benefit from simple lubrication and inspection. Lubricate using petroleum jelly or light oil. Do not use too much oil, otherwise small drips could stain and damage carpets and furnishings etc. Always perform a general inspection of the tightness of all nuts and bolts.

ANNUAL SERVICE

We recommend the scooter is servicing by annually by your dealer or competent technician. The service schedule is shown on page 6

TROUBLESHOOTING AND FAULT REPAIR

RHINO controller: If your scooter is fitted with a Rhino controller, which continuously monitors the operating conditions of your scooter.

Error Number Reference	Fault	Impact on Scooter	Notes
1	Battery needs recharging	Will drive	Battery charge is running low. Recharge the batteries as soon as possible.
2	Battery voltage too low	Drive inhibited	Battery charge is empty. Recharge the batteries. If the scooter is left off for a few minutes, battery charge may recover sufficiently to allow driving for a short period of time.
3	Battery voltage too high	Drive inhibited	Battery charge is too high. If a charger is plugged in, unplug it or turn the Charge/Run switch to Run. Scooters powered by RHINO will charge the batteries when traveling down slopes or decelerating. Excessive charging in this manner may cause this fault. Turn the scooter power off and then back on again.
4	Current limit time out	Drive inhibited	The scooter has drawn too much current for too long, possibly because the motor has been over worked, jammed or stalled. Turn the scooter power off, leave for a few minutes, and then turn the power back on again. The controller has detected a shorted motor. Check the loom for shorts and check the motor. Contact your service agent.
5	Brake fault	Drive inhibited	Check that the park brake release lever is in the engaged position. The park brake coil or wiring is faulty. Check the park brake and wiring for open or short circuits. Contact your service agent.
6	Out of Neutral at Power Up	Drive inhibited	Throttle is not in neutral position when tuning switch key on. Return throttle to neutral, turn power off and back on again. Throttle may need to be re-calibrated Check throttle wiring.
7	Speed Pot Error	Drive inhibited	The throttle or its wiring is faulty. Check for open or short circuits. Throttle may not be correctly set up. Contact your service agent.
8	Motor Volts Error	Drive inhibited	The motor or its wiring is faulty. Check for open or short circuits. Contact your service agent.
9	Other Internal Errors	Drive inhibited	Contact your service agent.
10	Push Too Fast fault	Drive inhibited	The scooter has been pushed faster than the programmed "Push Speed' parameter when the Park Brake Release function has been operated. The scooter has been pushed faster than the programmed "Rollaway Speed" parameter when the Park Brake has been mechanically released. Turn the scooter off and then back on again.

S-DRIVE controller: If your scooter is fitted with a S-Drive controller, which continuously monitors the operating conditions of your scooter.

Error Number Reference	Fault	Impact on Scooter	Notes
1	Low Voltage	Error flashing	The battery requires charging or there is a bad connection to the battery.
2	Motor Connection	Scooter will not drive	There is a bad connection to the motor. Check all connections between the motor and controller.
3	Short Circuit	Scooter will not drive	The motor has experienced a short circuit to a battery connection. Check all motor and battery connections.
4	Not Used	Not Applicable	Not Applicable
5	Not Used	Not Applicable	Not Applicable
6	Inhibit	Scooter will not drive	Inhibit circuit has become active not permitting drive. Likely to be caused by a charger being connected or a fault within the controller or wiring.
7	Throttle Fault	Scooter will not drive	A throttle fault has been indicated. Ensure the throttle is in neutral before switching the scooter on. Throttle may require calibration.
8	Controller Fault	Scooter will not drive	A controller fault has been indicated. Make sure all connections are secure. Also cycle keyswitch as this fault can be initiated by a break in the circuit during keyswitch initiation.
9	Brake Fault	Scooter will not drive	There is a fault within the electromagnetic brake circuit, Check all brake and motor connections. Make sure controller connections are secure and that the scooter is not in freewheel mode.
10	Excessive Voltage	Scooter will not drive	An excessive voltage has been applied to the controller. This is very often caused by a poor battery connection. Check all connections from the batteries to the controller.

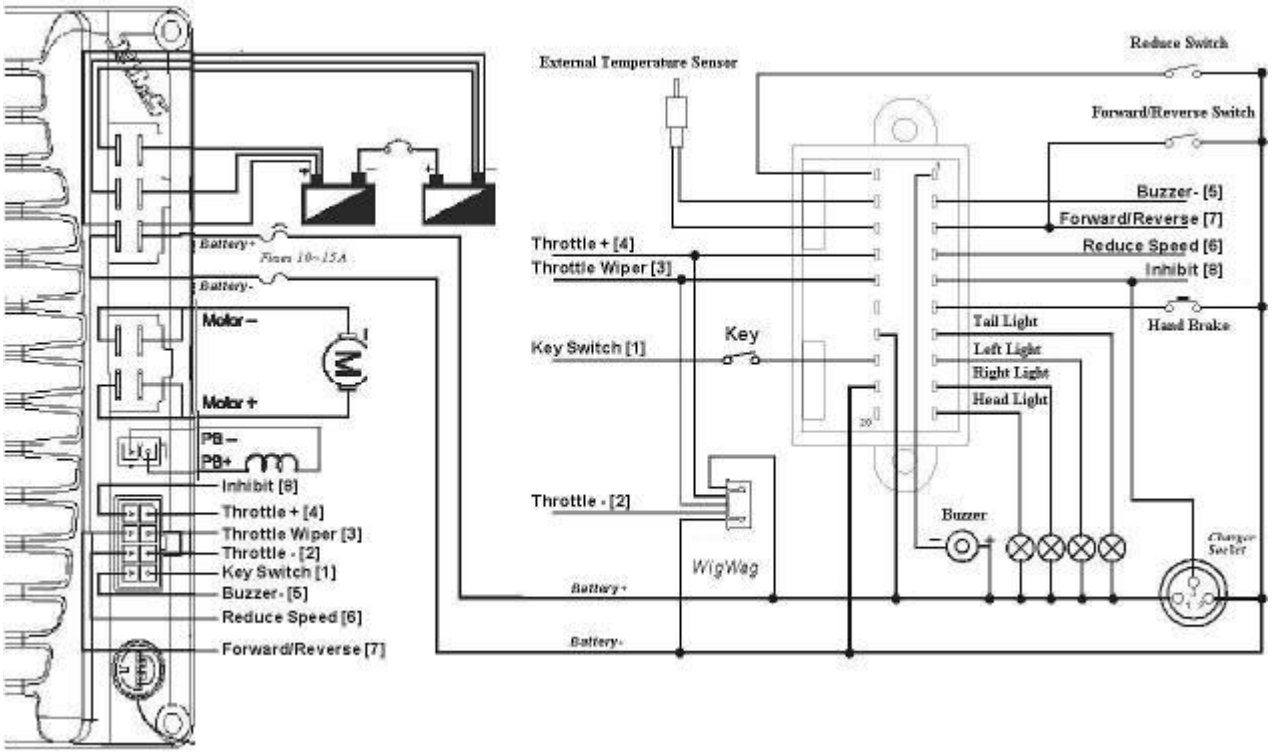
Note:

If you experience any technical problems, it is recommended that you check with your local dealer before attempting to troubleshoot on your own.

The following symptoms could indicate a serious problem with your scooter. Contact your local dealer if any of the following arises:

1. Motor noise
2. Frayed harnesses
3. Cracked or broken connectors
4. Uneven wear on any of tires
5. Jerky motion
6. Pulling to one side
7. Bent or broken wheel assemblies
8. Does not power up
9. Powers up, but does not move

Royale 3 and 4 (Rhino)



SERVICE RECORD (SHOWN IN USER MANUAL)

YEAR	1	2	3	4	5	YEAR	1	2	3	4	5
Service Dates						Service Dates					
Controller						Upholstery					
On/off switch						Seat					
Control Lever						Back					
Braking						Armrests					
Recharge point						Electrics					
Batteries						Connections condition					
Levels						Lights					
Connections						Test run					
Discharge test						Forwards					
Wheels and Tyres						Reverse					
Wear						Emergency stop					
Pressure						Left turn					
Bearings						Right turn					
Wheel nuts						Slope test					
Motors						Over obstacles					
Wiring						List Items repaired					
Noise											
Connections											
Brake											
Brushes											
Chassis											
Condition											
Steering											

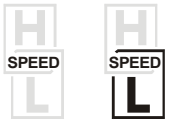
DISPLAY SPECIFICATIONS

Below is a comprehensive specification and functional manual for the digital display. It is a technical reference guide for dealers and engineers.

Speed Sensor and Display

ITEM	SPECIFICATION
Operation Features	Speed detection by speed sensor from transaxle with conversion at 1400rpm equal to 60km/h.
Tolerance	15~20%
Digits range	· 19.9: 0~19.9 › 19.9: displayed by integer "20~199" (199 max)
Display Switch Button	Initial setting at km/h, switch to MPH by MODE and SET buttons

High / Low / Turn Speed

ITEM	SPECIFICATION
Operation Features	(1) Switch High / Low speed by pressing button  once. (TRN as control signals) Press one time: High-speed <<--->> Low-speed (with memory storage). (2) Take exterior turn-switch as determinant signal (TRN as control signals).
Symbols on LCD	" H " symbol means "High Speed":  " L " symbol means "Low Speed":  " L " symbol flashing means "Turn Speed": 
Flicker Frequency	1 sec.

Power Indication / Battery Gauge

<table>
<tr><th>ITEM</th><th>SPECIFICATION</th></tr>
<tr><td>Battery Remaining Capacity</td><td>
<table>
<tr><th>Remaining Capacity (%)</th><th>Voltage (V)</th><th>Scale Bar</th></tr>
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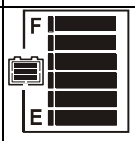
(6)</td><td>＞ 25.42</td><td>  </td></tr>
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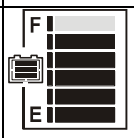
(5)</td><td>≦ 25.42</td><td>  </td></tr>
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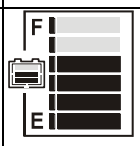
(4)</td><td>≦ 25.12</td><td>  </td></tr>
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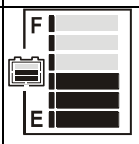
(3)</td><td>≦ 24.78</td><td>  </td></tr>
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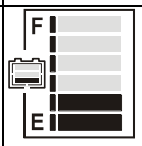
(2)</td><td>≦ 24.42</td><td>  </td></tr>
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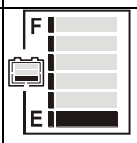
(1)</td><td>≦ 23.88</td><td> 
and  Flashing</td></tr>
<tr><td>20</td><td>Low-power Warning</td><td>  Warning LED Flashing</td></tr>
</table>
</td></tr>
<tr><td>Flicker Frequency</td><td>2 sec.</td></tr>
<tr><td>Operation Characters</td><td>(1) Scale status only decrease, won't increase.
(2) When the remaining capacity was less than 30%, warning sound ("Be-Be" two short sounds) act at 5 seconds intervals.
While (a) Key Off (b) Charging Mode (c) Sleep Mode, warning sound released.</td></tr>
</table>

<table>
<tr><th>ITEM</th><th>SPECIFICATION</th></tr>
<tr><td>Charge Indication</td><td>
<table>
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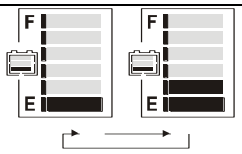
(2)</td><td>＜ 25.44</td><td>  </td></tr>
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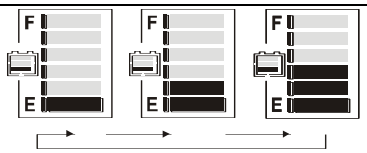
(3)</td><td>＞ 25.44</td><td>  </td></tr>
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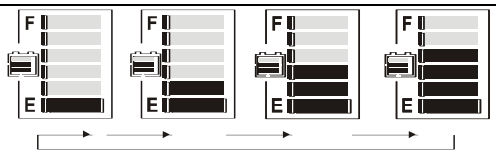
(4)</td><td>＞ 26.18</td><td>  </td></tr>
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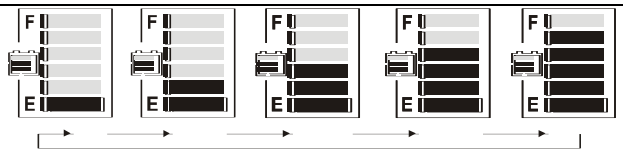
(5)</td><td>＞ 26.92</td><td>  </td></tr>
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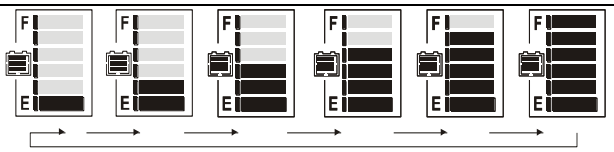
(6)</td><td>＞ 28.5</td><td>  </td></tr>
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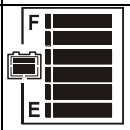
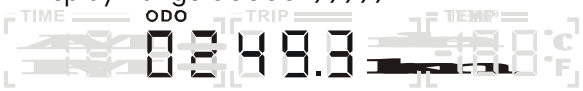
(7)</td><td></td><td>  </td></tr>
</table>
</td></tr>
<tr><td>Increase Frequency</td><td>0.5 sec.</td></tr>
<tr><td>Operation Character</td><td>(1) Scale status only decrease, won't increase.
(2) Take the PIN3(CH3) of charger as determinant signal, enter 「Charging Mode」 when CH3 grounding (L), not only “KEY ON” or “KEY OFF”.</td></tr>
<tr><td>Remarks</td><td>Above scale bar status only for reference, must take the indicator of charger as the precise diagnosis.</td></tr>
</table>

Clock

ITEM	*SPECIFICATION*
Tolerance (per day)	±2 sec.
Initial Setting Value	『Hour ： Min』 mode：『AM 12:00』
『Hour : Min』 Setting (12-Hour format)	Display range : AM12:00 ~ PM11:59  When『Hour』 is between 1 and 9 o'clock, displayed at 1~9.

Odometer

ITEM	SPECIFICATION
Operation Features	Odometer detected by the signal of Opto Coupler then converts into distance.
Display Switch Button	「km/h」 means the odometer displayed as kilometer. 「mph」 means the odometer displayed as mile.
Accumulative Display [ODO]	(1) Display Range:00000~99999  (2) Once the total mileage up to 99999km or 62149mile (99999·1.609mile), the counter will restart from “00000”.
TRIP Counter	(1) Display Range：00.0~99.9  (2) When over 99.9km, display stop counting (won’t restart from “00.0”).
Operation status	(1) Odometer indication display on ODO mode when Power On, then switch to TRIP mode after 5 seconds. (2) TRIP can be reset to “00.0”.

Headlight Control

ITEM	SPECIFICATION
Operation Feature	Take exterior headlight switch as determinant signal. (1) Switch on/off the head light by pressing button  once, then LED  will turn on/off simultaneously. (2) LCD backlights turn on / turn off with head light.
Power Saving Mode	When motor stop, the modulation down to 30% (Headlight) When motor act, 100% output power (Headlight)
Usage Condition	While (a) KEY OFF (b) Power-Saving mode (c) Sleep mode , all functions closed.
Determinant Condition	(1) 2.2V **>** WIP **>** 2.8V (100% Full-power) (2) 2.2V＜WIP＞2.8V (100% Full-power) (3) Full / Half power switch at real time. (4) The determination of “Reversing Mode” need to consider the motor direction and panel setting.
Remarks	(1) Loop Load: 24V/50W max (2) With “short circuit” and “overload” protection

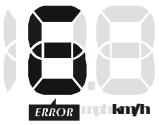
Back-up Lamp Control

ITEM	SPECIFICATION
Operation Feature	Take exterior back-up lamp switch as determinant signal. (1) Switch on/off the head light by pressing button  once, then LED  will turn on/off simultaneously. (2) LCD backlights turn on / turn off with head light.
(Control Mode) **Brake-lamp Mode** **Reversing-lamp Mode**	When motor changes from act (go forward) to stop, the lamp reinstated after flashing for 3 sec. Determine as "Reversing Mode", back-up lamp keep flashing. Reverse warning sound can be set by panel (Turn on / Turn off)
Usage Condition	While (a) KEY OFF (b) Charging Mode (c) Sleep Mode, all functions closed. * Brake-lamp & Reversing-lamp Mode won't be limited by Back-up lamp switch on or off.
Flicker Frequency	1 sec.
Determinant Condition	(1) 2.2V **>** WIP **>** 2.8V (50% Half-power) (2) 2.2V＜WIP＞2.8V (100% Full-power) (3) Full / Half power switch at real time. (4) The determination of "Reversing Mode" need to consider the motor direction and panel setting.
Remarks	(1) Loop Load : 24V/50W max (2) With "short circuit" and "overload" protection

Indicators and Parking-Lamp Control

ITEM	SPECIFICATION
Operation Feature	Take exterior left-right indicators and parking-lamps switch as the determinant signal.
Control Mode **(Left-direction lamp)**	Press button  once, the right-indicator and  turn off, left-indicator and  flashing, warning sound act. Press  again to turn off left-indicator.
(Right-direction lamp)	Press button  once, the right-indicator and  turn off, left-indicator and  flashing, warning sound act. Press  again to turn off left-indicator.
(Parking lamp)	Press button  once,  turn on, right-left indicators and  flashing , warning sound act . Press  again to turn off the Parking lamp function.
Usage Condition	While (a) KEY OFF (b) Charging Mode (c) Sleep Mode, all functions closed.
Flicker Frequency	1 sec.
Warning Sound Frequency	One short “Bi” sound per second
Determinant Condition	Left-Right indicators have priority to Parking lamp. *<Ex.>* *If “Parking lamp” turned on already, now you start “Right indicator” function, the flashing indicator lamps will change from both side (left & right) to right side, and the “Parking lamp” function will be closed.*
Remarks	(1) Load circuit for left-direction light: 24V/50W max (2) Load circuit for right-direction light: 24V/50W max (3) With “short circuit” and “overload” protection

Malfunction Message / Fault code

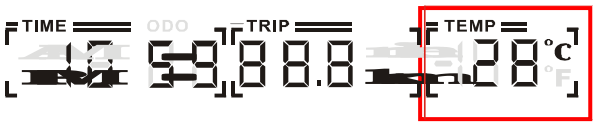
ITEM	SPECIFICATION
Operation Feature	Take the connector pin (KEY) of controller as determinant signal, then converts it into digital code.
Usage Condition	When the controller send out an error message, red LED flashing with controller signal at same time, the "Error message code" will show on LCD. 
Flicker Frequency	1 sec.

Controller message (Flicker)	Message code	ERROR symbol	LED (Flicker)	*Status*
1	--	--	Flashing, opposite to controller message.	Battery needs charge soon.
2	2	On		Low-voltage, needs charge now
3	3	On		Over-voltage
4	4	On		Over-current
5	5	On		Park Brake lost or faulted
6	6	On		Accelerator not align center
7	7	On		Accelerator broken or faulted
8	8	On		Motor broken or faulted
9	9	On		Others

5-12. Power On Self Test

ITEM	SPECIFICATION
Initial Status	When scooter power on, the control panel will go through a self-test routine; the backlight and all LCD segments will be tuned on for 3 seconds, then switch automatically to the general operation mode (ODO).

Temperature meter (TEMP)

ITEM	SPECIFICATION
Operation Feature	Temperature detected by temperature sensor (NTC) from transformation with signal.
Tolerance	± 2°C
Display Range	-20°C ~50°C -4°F ~122°F 
Display Switch Button	When display °C, degree stand for Celsius thermometer When display °F, degree stand for Fahrenheit thermometer

Reverse Indicator

ITEM	SPECIFICATION
Operation Feature	Take exterior forward / backward switch as determinant signal.
Power Saving Mode	When switch direct to “forward”, no symbol on LCD. When switch direct to “backward”,  symbol flashing on LCD.
Flicker Frequency	1 sec.

Adjust Buttons

ITEM	SPECIFICATION
Button	[redacted] "MODE" switch [redacted] Function set
General Display Mode (TRIP)	Press SET for 3 seconds to reset TRIP at "00.0".
Setting Mode	Press MODE and SET simultaneously for more than 2 seconds. to enter "Setting Mode", then 『Hour：MIN』 start flashing. (1) When 『Hour』 flashing: Press SET to increase of number, then press MODE to enter "Setting Mode" of 『MIN』. (2) When 『MIN』 flashing: Press SET to increase of number, then press MODE to enter "Setting Mode" of 『km/h & mph』. (3) When 『km/h』 or 『mph』 flashing Press SET to choose "km/h" or "mph" type, then press MODE to enter "Setting Mode" of 『°C / °F』 (4) When 『°C』 or 『°F』 flashing Press SET to choose °C or °F.
Escape from Setting Mode	Under setting mode, if below situations happened, will auto save the last setting value then escape to general operation mode. (1) No any operation of ADJ button for 20 sec. (2) Press MODE and SET at same time for more than 2 sec.

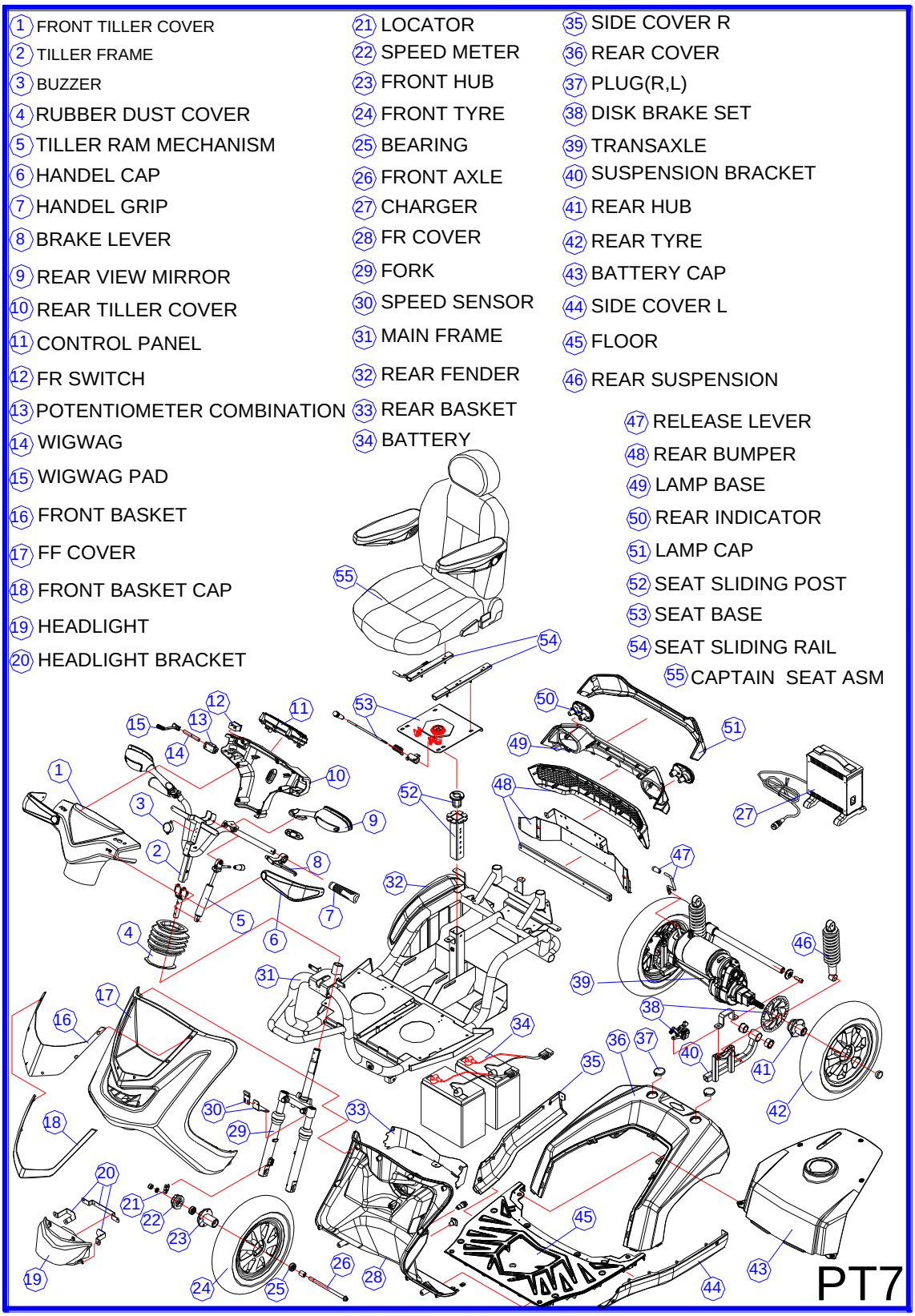
ITEM	SPECIFICATION
Operation Status	(1) 『Hour：Min』, 『km/h』 or 『mph』, 『°C』 or 『°F』 offer Cyclical Switch function. (2) When adjusting 『Hour：Min』, press [SET] to increase number, if press [SET] for more than 2 seconds, the number will increase continuously until button released, setting value with Cyclical Switch function (only 2 seconds from 0 to 9). * If 『Hour』 less than 10, the denary "0" doesn't display.。
Remarks	Button tones: one short "Bi" sound

LCD Backlight

ITEM	SPECIFICATION
LCD Backlight	When pressing [MODE] and [SET] buttons, the backlight will be turned on voluntarily and turned off No any operation of ADJ button more than 5 sec.

BILL OF MATERIALS / PARTS REFERENCE – ROYALE 3

These diagrams are for parts reference only. To order parts, please consult the full parts lists:



BILL OF MATERIALS / PARTS REFERENCE - ROYALE 4

These diagrams are for parts reference only. To order parts, please consult the full parts lists: