SECTION 2: ESR 750 ELECTRIC MODEL

This section contains parts illustrations, parts lists, as well as troubleshooting information for the Electric Go-Ped® models, ESR750, ESR750Ex and their motor.

2.1. ESR750 & ESR750Ex Motor Service

The ESR750 motor is a brush DC motor. It consists of a Field (steel tube and magnets) an Armature (rotating portion) and Comm End (brush assembly and finned heat sink).

Figure #1 shows the major motor components disassembled.

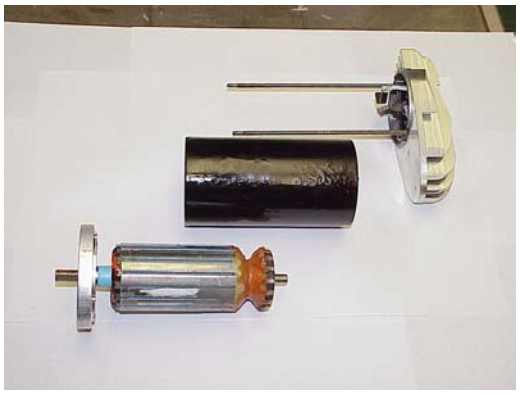


Figure 1

To remove the motor from the ESR frame first turn off the ON/OFF switch, then disconnect the motor wires from the Comm End shown in Figure #2.
You will need to pull back the rubber boots and remove the two outer ¼-20 nuts. Do NOT remove the two inner nuts which are behind the two terminal rings.
Next, disconnect the small plastic two-wire connector which is for the motor thermostat. The connector has a locking tab which can easily be released with a small flat head screwdriver or even a small zip tie.

Figure 2

Next remove the fender and look at the Drive End as shown in Figure #3.
Remove the chain and drive sprocket. The sprocket is held on with a small set screw. Once the set screw is removed you might need a sprocket puller to easily slide it off the shaft.
Now remove the M6x35 bolt (shown black in this photo) which retains the motor into the frame.
Last, slide the motor out of the frame. A piece of adhesive-backed plastic may have been used between the motor and the inside of the tube to shim the motor in the frame. You will need to reuse or replace that shim. It is used to prevent the motor from vibrating or rattling in the frame.
You may need to twist the motor or tap GENTLY with a rubber mallet to remove the motor. Be careful with the motor. The brush card holder and the magnets can both be broken if abused.

Figure 3

Once the motor is removed, you should scribe lines on the motor field and the motor end caps for easy reassembly. On the bottom of the motor simply scribe small marks across the joint between each end cap and the motor Field. Those marks will help you re-align the rotation of the end caps during re-assembly. Proper alignment is important for good motor performance. If the end caps are improperly twisted the motor will run less efficiently.

Now you are ready to open the motor up. Looking again at Figure #3 you will see two small hex nuts which are part of the motor. Remove those nuts and the lock washers behind them. Now you can pull the motor apart into three parts as shown in Figure #1. You might need to tap GENTLY on the finned Comm End to separate it from the Motor Field.

When you separate the motor the brushes will be pushed out of the holder by the four brush springs. Be careful not to lose the springs.

Figure 4

Inspect the armature. The epoxy which is orange in this photo will probably be much darker in color. This is a normal effect caused by brush dust. Inspect the face of the commutator for any bad segments. The segments are the pie-shaped copper portions of the commutator. A bad segment will look much different than the rest of the commutator. It will be blackened or discolored. That is indicative of a broken connection in the winding.
Also check the bearing which is in the billet aluminum Drive End plate.

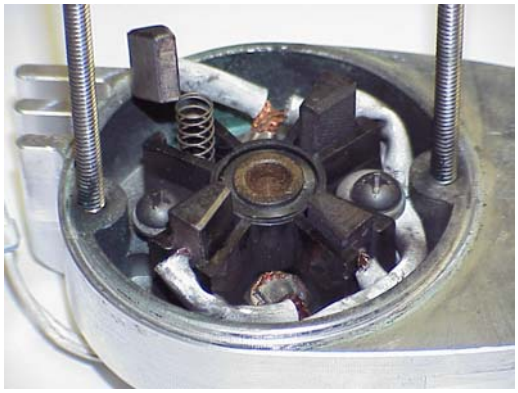


Figure 5

Brush Spring

Brushes

Brush Holder

Now inspect the Comm End (Figure 5). The four brushes should have been pushed up and possibly out of the brush holder by the four springs. Make sure the brushes are moving freely and are not stuck in the holder.
Inspect the brushes. When new they are ½" tall. If the brushes are less than .225" tall, they should be replaced. Brush life will probably be at least 750 hours of use.
Inspect the brush holder for cracks or signs of overheating or deformation.

If necessary, disassemble the Comm End.
First turn the Comm End over to the finned side and remove the two ¼-20 flanged nuts from the terminal studs. Remove and save the two black plastic flanged washers which are below the nuts.
Next turn the comm end back over and remove the two Philips Head screws from the brush holder. Be sure to save the washers, and remember their locations. The Comm End is now fully disassembled. Note the location and routing of the brushes and wires before removing them!
FYI - The small electrical component epoxied into the end cap is the thermostat. It should not be removed.

Comm End Reassembly:

- Place the brush holder into the end cap.
- Place the brushes in their holders the way you found them, and place the terminal studs through the holes in the end cap. If you install the brushes wrong the motor may run in reverse or not at all. *Don't install the brush springs yet.
- Hold the parts in place with your hand and flip the end cap over. Install the two black plastic flanged washers, and then install the two ¼-20 flanged nuts. That will hold the brushes and brush holder in place. Tighten the nuts to 20-25 in-lbs. Over tightening can break the brush holder.
- Flip the comm end back over. Reinstall the Philips head screws and washers the way you found them. Torque the screws to 20-25 in-lbs. It is very important that the wires be routed correctly. Where the two long brush wires cross, they are retained by the washer under one of the Philips head screws. Make sure that the white plastic insulating sleeves are correctly placed to prevent the copper wires from contacting the aluminum end cap. Make sure that the bushes can freely slide in the holder. If a brush cannot move freely, the motor will fail after a small amount of use!

>>As the motor spins the commutator gradually wears down the brushes. The brush springs insure that the brushes stay in constant contact with the commutator. If a brush becomes stuck, it will gradually lose contact with the face and electricity will begin arcing to the commutator. This will gradually degrade the commutator. It will also cause overheating which could damage the brushes, the wires, or the brush holder. When a stuck brush occurs the rider will feel his power diminish to about 50% of normal as the motor begins to malfunction.

- When you are ready to reassemble the motor you can reinstall the brush springs. It can be difficult to hold the brushes in place while you assemble the motor. Using the drawing below you can make a simple tool to make this task easier. Simply cut the shape out of a rigid metal or plastic sheet perhaps 1/8" thick. Make sure you clean the tool off thoroughly so that no particles are left behind in the motor.

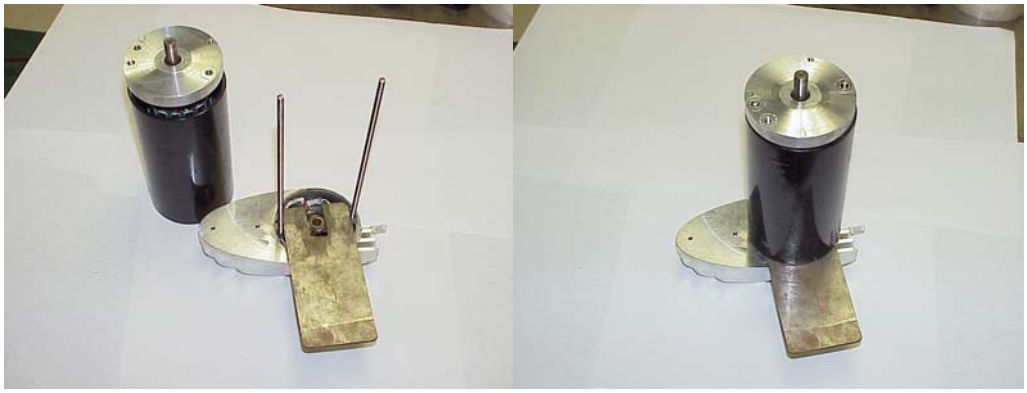
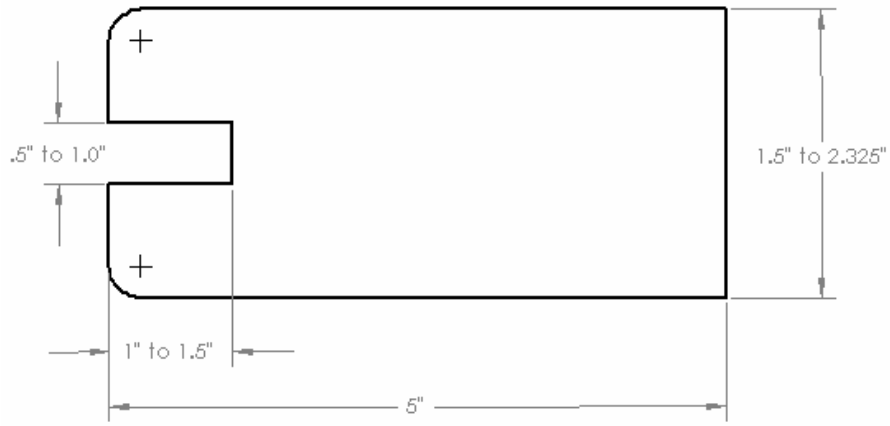


Figure 6 & 7



Motor Reassembly:

- With the Comm End reassembled, drop the four brush springs into the holder, and then push the brushes down on top of the springs. Use the tool described above (or something similar) to hold the brushes in place as shown in Figure #6.

- Put the Armature through the Field, and place them both down onto the Comm End as shown in Figure #7. Make sure that you have both end oriented correctly. Use the marks you scribed across the Field and End Caps to realign the ends with the Field.
- Pull the tool out, and allow the field to drop all the way down onto the Comm End.
*You may need to help guide the two long threaded-rods through the holes on the Drive End. You may also need to help align the end of the armature into the bronze bushing in the Comm end.
- Once the three sections are assembled, recheck your rotation to make sure your scribed marks are aligned. Then install the lock washers and nuts. Torque to 25-39 in-lbs.

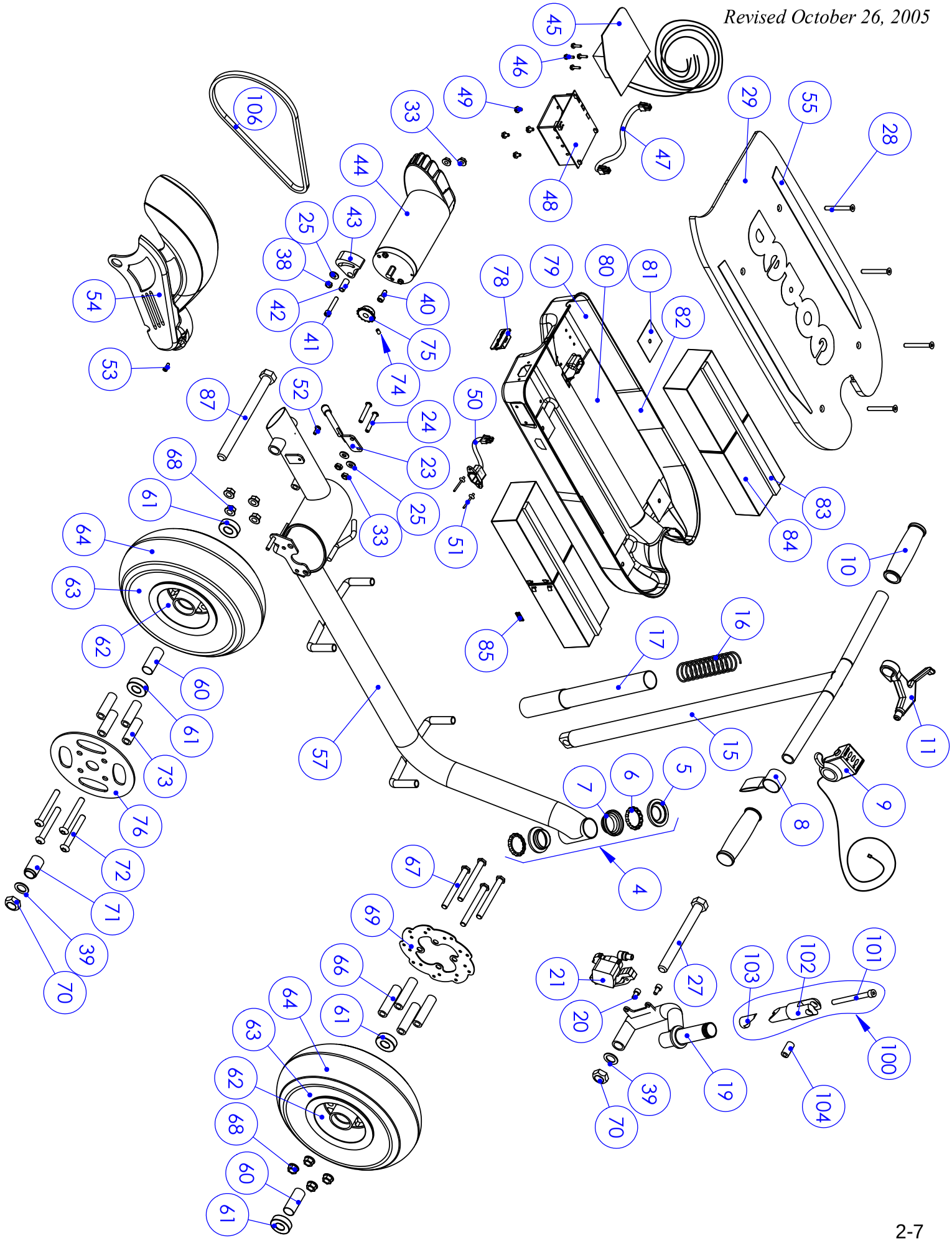
Turn the output shaft and make sure the motor spins. There will be drag from the magnets, but you should be able to turn the shaft by hand.

Motor Reinstallation:

- Reinstall the motor in the scooter frame. Reinstall the plastic shim between the motor and the inside of the frame tube to keep the motor from vibrating in the frame.
- Install the M6x35 socket head bolt, which both mounts the chain tensioner AND retains the motor in the frame. Torque to 8 ft-lbs. The original bolt has a locking nylon patch, which is only good for one or two installations. If the patch is worn out, use a new bolt or Blue Loctite.
- Reinstall the sprocket and chain. You might need to clean up the end of the motor shaft to allow the sprocket to easily reinstall. Sandpaper or a file can quickly accomplish this.
- Hook the small plastic 2-wire thermostat connector back together.
- Hook the motor wires back up. Make sure the terminal rings are not left close to the aluminum end cap, or a short could occur. Torque the two outer ¼-20 nuts to 20-25 in-lbs. Overtightening could break the brush holder! Those nuts have a nylon locking insert which can only be reused a couple of times. If the nuts are not locking properly, replace them with new ones!
- With the rear wheel OFF THE GROUND turn on the scooter and apply the throttle. Make sure the rear wheel is spinning the correct direction. If it is spinning backwards, reverse the two motor wires.
-Reinstall the rubber boots over the terminals.
-Reinstall the fender.

Motor Testing:

You can test the motor in the following way:
-With the motor installed in a scooter remove the chain.
-Either hook up a Go-prammer to the scooter, or place a clamp type amperage probe over one of the two motor wires (but not both wires!) You may need to remove the deck to install the clamp probe.
-If using the Go-prammer, use the instruction manual to switch to the “CURRENT” parameter under the Debug Menu.
-Run the motor at full throttle with no load and measure the amperage draw. It should be **less than 4.2amps**. If you are using the Go-prammer to measure current, use the chart in the instruction manual to translate the reading on the screen into amperage.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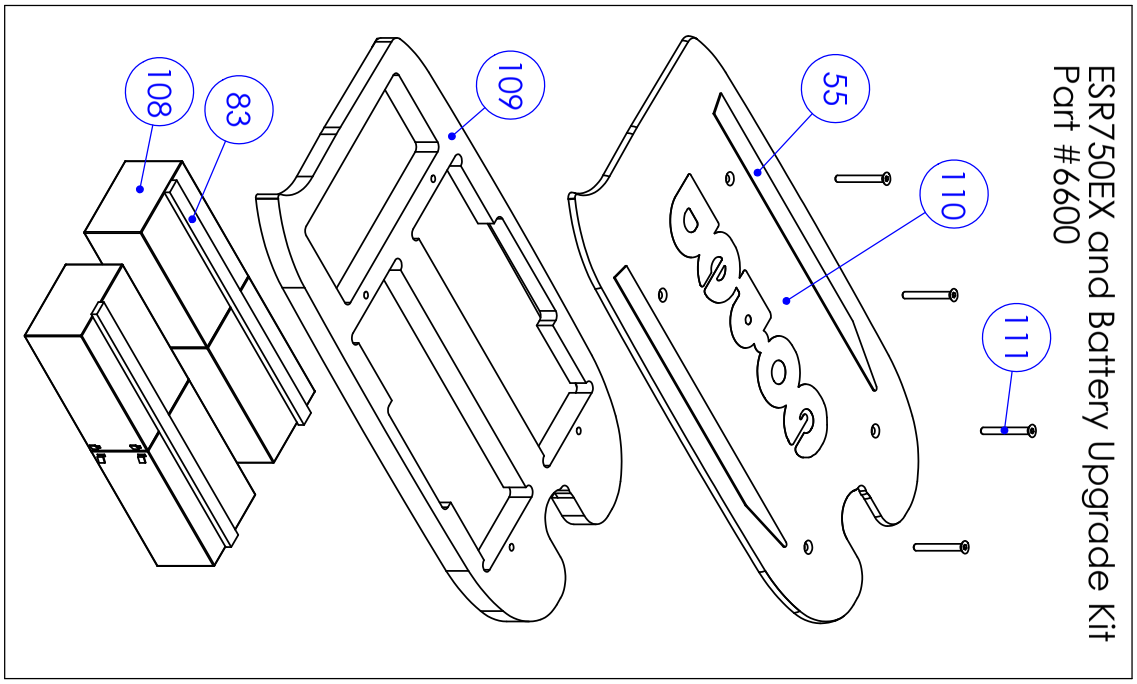
ESR750EX and Battery Upgrade Kit
Part #6600
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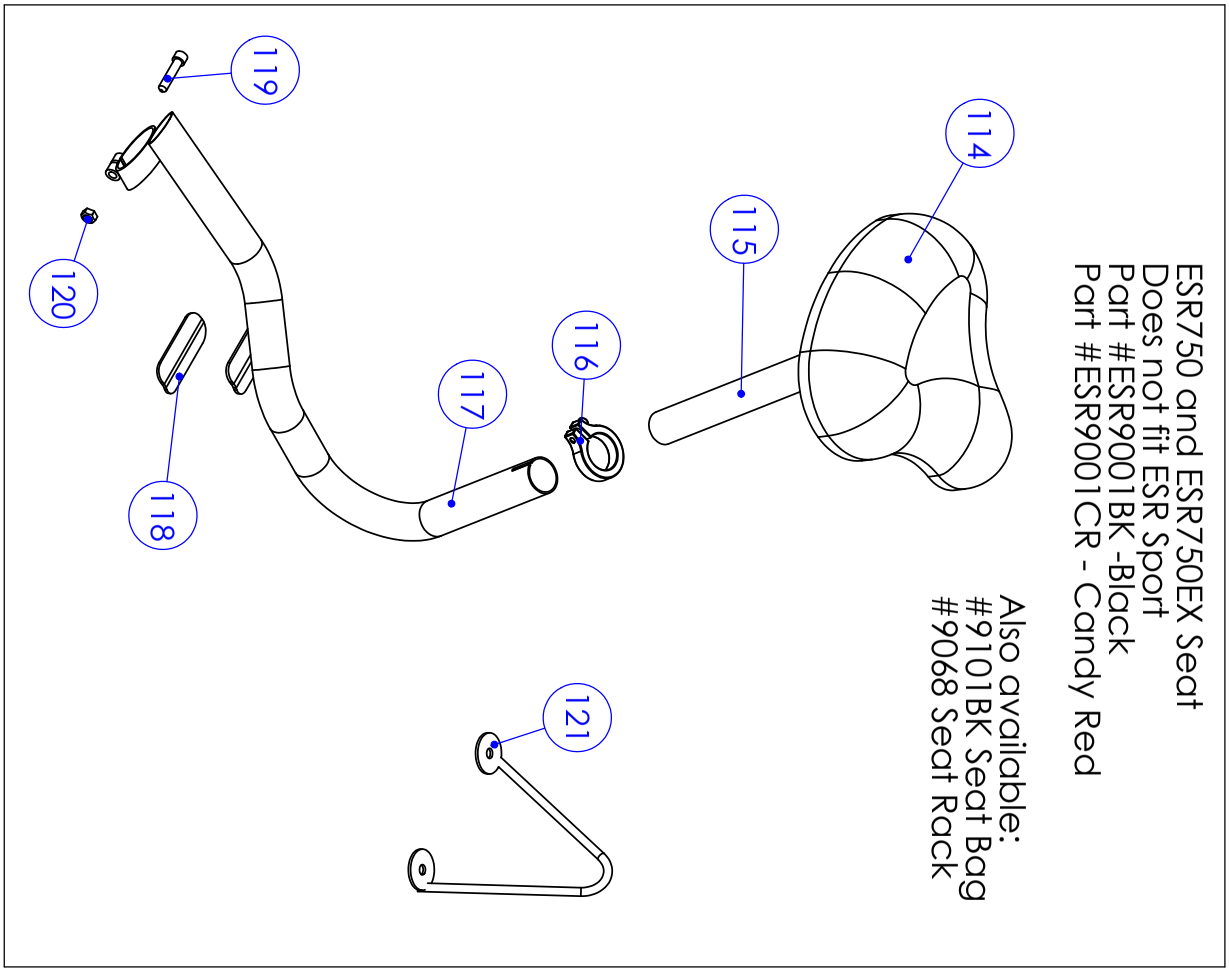
ESR750 and ESR750EX Seat
Does not fit ESR Sport
Part #ESR9001BK -Black
Part #ESR9001CR - Candy Red
Also available:
#9101BK Seat Bag
#9068 Seat Rack
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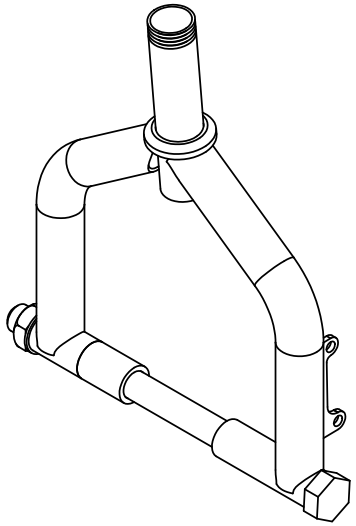
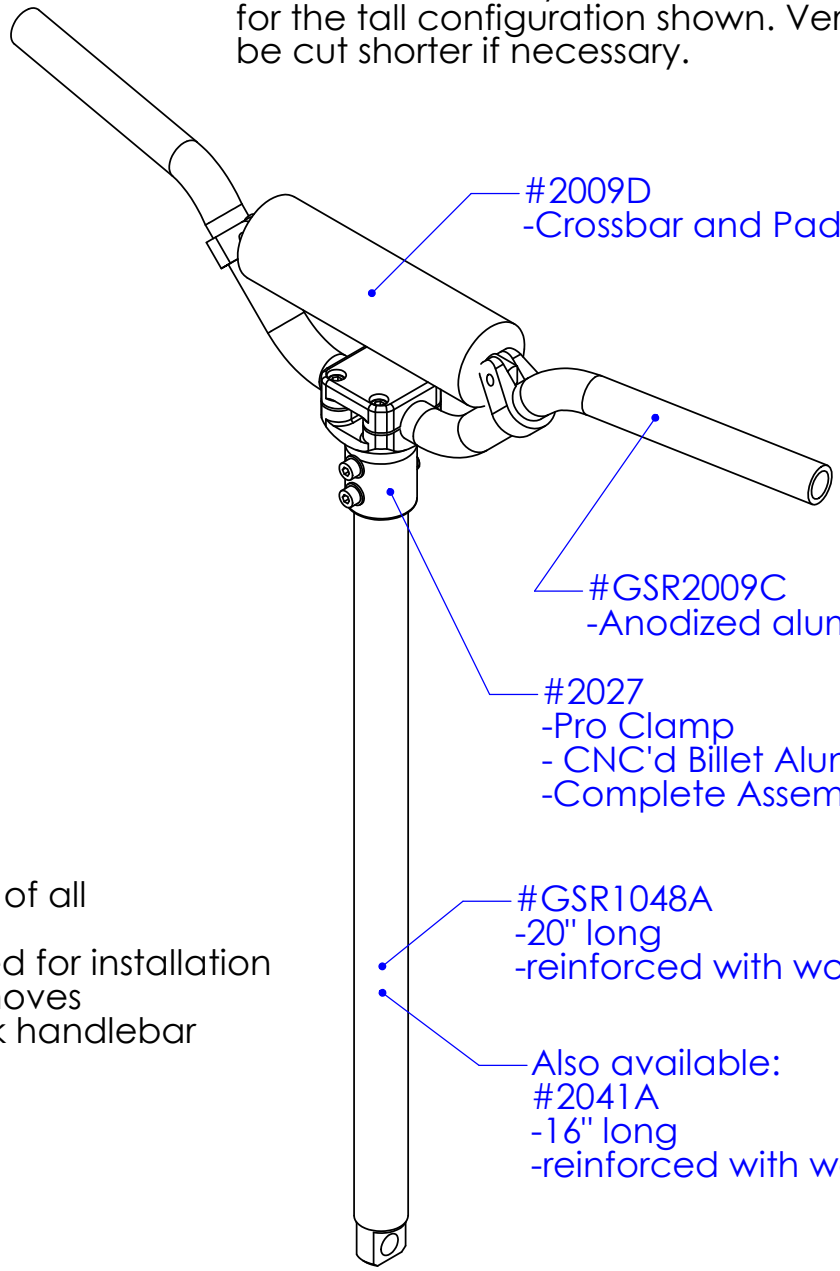
Other Available Accessories

Part #BF1127B
-"Bothie" two sided fork.
-Available In Black. Not available in Candy Red to match ESRs.
-Includes new axle bolt and spacer.



Wider High Performance Handlebar
-Parts must be purchased Separately.
-Some older ESRs may have too short a throttle wire for the tall configuration shown. Vertical tube can be cut shorter if necessary.



#2009D
-Crossbar and Pad Assembly

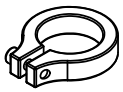
#GSR2009C
-Anodized aluminum riser bar

#2027
-Pro Clamp
- CNC'd Billet Aluminum
-Complete Assembly

#GSR1048A
-20" long
-reinforced with wood dowel

Also available:
#2041A
-16" long
-reinforced with wood dowel

#1022C
Slide Tube Clamp
-Installs on the bottom of all T-bar Slide tubes.
-T-bar must be removed for installation
-Tightening clamp removes some forward/back handlebar looseness.



Item	Part #	Description	Qty
-	-	-	-
4	1028	Front fork bearing kit, 2 bearings, 2 cups, 1 nut	0
5	1028N	Head set; Fork nut	1
6	1028B	Head set; bearing (single)	2
7	1028C	Head set; Bearing cup (single)	2
8	1411	Carry Loop, nylon	1
9	6109, 6110A, 6110B	ESR Throttle Lever, See identification chart to select correct model	1
10	1049	Grip Set	1
11	1048L	Brake Lever (Left)	1
-	-	-	-
15	GSR1041	T-bar anodized, 24.75”	1
16	1060	Safety Spring	1
17	1022	Slide Tube Assmbly	1
-	-	-	-
19	MD1027CR MD1027BK	Front Fork, single sided, 10” wheel, Maddog brake, Candy Red or BlacK	1
20	1090	Bolt; Maddog Brake Mount; M6x12	2
21	1083A	Maddog Brake Caliper	1
-	-	-	-
23	6128	Kickstand; complete; black with spring and rubber foot	1
24	GSR1035	Bolt; ¼-20 x 1.5” Button Head for kickstand mount	2
25	1076	Washer, ¼” SAE flat	3
-	-	-	-
27	BF1033	Bolt; front axle; 5/8-18 x 6"	1
28	6114	Bolt; deck mount; 1/4-20 x 1-3/4 Torx Flat Head thread cutting (tool size T30)	4
29	E1006	Deck, with grip tape and foam, (ESR750 & ESR Sport, Not EX deck)	1
-	-	-	-
33	KN1009	Nut; 1/4-20 Nylock	4
-	-	-	-
38	1026	Nut, M6 low nylock	1
39	BF1036	Washer; axle; 1"OD x 5/8" ID x .060"	2
40	6133	Bolt; motor mount; M6x18 Socket head	1
41	1401	Bolt; motor mount; M6x35 SHCS	1
42	TB1028	Steel Tube, inserts into plastic chain guide, 3/8”x.78”	1
43	6102	Chain guide, plastic	1
44	6800	Electric Motor	1
45	6113A	Controller board (left side of pan, with attached wires) **This is the current version of controller which works with Throttle 6110B. Older controllers available. **Ask Customer Service.**	1
46	6115	Screw; controller mount; 6 x 5/8" Hex washer head	4
47	6148	Wire; DC interconnect; Controller to NEW charger	1
48	6118A	Charger (New style with aluminum “U” housing)	1
49	6013	Screw; Charger Mount; 10-32 x 5/16 hex wshr head	4
50	6108A	A/C Inlet; (for new charger)	1
51	6136	Pop rivet; for A/C Inlet	2
52	6016	Bolt; fender mount; 10-32 x ½” Philips Head (type F)	1
53	6015	Bolt; fender mount; M4x12 Socket Head	1
54	6008	Fender; rear; ESR750 &EX	1
55	2001	Deck Grip Tape Set	1
-	-	-	-
57	ESR1001CR ESR1001BK	Frame, ESR750 Candy Red or BlacK	1
-	-	-	-
60	BF1038B	Spacer, wheel bearing, Mag Rim (10" PT)	2
61	BF1038A	Bearing; Mag Wheel; 10" (PT)	4
62	2026M	Wheel; 10"PT, 2pcs. Magnesium	2
63	BF1058T	Inner Tube; 10"PT	2
64	BF1059O	Tire; no tube, Powerplay TT	2
-	-	-	-
66	1087	Spacer; front wheel to brake disk	4
67	1088	Bolt 3/8-24 x 3.5" Low hex head; front wheel assy	4
68	8008	Nut; 3/8-24 center lock	8
69	8003SS	Brake Disc, hardened stainless steel	2
70	BF1037	Nut; axle, 5/8-18 nylock	2
71	6127	Spacer; rear axle, stepped for fender	1
72	GSR1045	Bolt; Rear wheel assembly; 3/8"-24 x 3" Button Head	4
73	GSR1014	Spacer; Wheel to sprocket	4
74	6006	Set screw for sprocket; M5 x 8	1
75	6009.15	Sprocket, 15 tooth, #25	1
76	GSR1013.1	Sprocket; 76 tooth (alum)	1
-	-	-	-
78	6003	Rubber Plug; installs into rear of pan; holds data plug	1

79	6107R 6107	Battery Pan; ESR750 and EX, not Sport. Red or Black	1
80	6120C	Foam Pad; 1/8” thick installs under batteries	2
81	6131	Rubber pan dust shield. Square 2”x2” w/ center hole	4
82	6121	Plastic insulation tape; white; prevents short between pan & batteries	2
83	6119C	Foam Rubber Tape; 1/4"x 1/2"; sold per ft. Also used on deck.	88”
84	6005	Battery; HR6-12 T2 SLA (ESR750 & Sport, Not EX)	4
85	6126	Battery connector; Joins each pair of batteries. Old style was 4” long wire. Now a small metal tab is used.	2
-	-	-	-
87	1404	Bolt; rear axle 5/8-18 x 7.5"	1
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100	1043	Lower hinge FTG. assy; Aluminum	1
101	1044	Bolt; lower hinge FTG. 5/16-24	1
102	1043A	Lower hinge FTG; clear anodized aluminum	1
103	1045	Wedge lug; lower hinge FTG.	1
104	1056	Handle hinge pin	1
-	-	-	-
106	6103	Chain; #25 Hard, 106 link (ESR750 & EX; not Sport)	1

THE FOLLOWING ITEMS ARE ON PAGE 2-15

108	6005B	Battery; HR9-12 T2 (larger battery; EX and upgrade)	4
109	1006ES	Deck Spacer; 1” thick wood	1
110	E1006F	Deck; no grip tape; ¼” thick	1
111	6114B	Bolt; deck mount; 1/4-20 x 2-1/4 Torx Flat Head thread cutting (tool size T30)	4
-	-	-	-
114	9004	Seat with hardware	1
115	1094	Seat post; aluminum	1
116	1095	Seat post collar	1
117	ESR9002BK ESR9002CR	Seat frame, Black or Candy Red	1
118	6305	Neoprene rubber foot	1
119	1097	Bolt; 5/16-24 x 1.5 SHCS	1
120	7025	Nut; 5/16-24 nylock	1
121	6119	Toe Guard; black	1

ITEMS NOT SHOWN ON PARTS ILLUSTRATION

	1081	Brake Cable, 38"H / 48"C	1
	1063	Yellow Warning Sticker	1
	1064	Red Warning Sticker	1
	1061	Sticker; Reflective T-Bar pad	1
	1053	Large Zip Tie (black; 8")	1
	1053S	Small Zip Tie (black; 4")	2
	1065	Sticker; www.goped.com	1
	1068	Sticker; made in USA	1
	6002	A/C power cord, 72”	1
	6010	Sticker; Goped decal, metallic; for side of pan	2
	6011	Sticker; ESR750 (installs on tail of frame)	1
	6012	Sticker; Chrome Decal (ESR750) for slide tube	1
	6022	Heat Shrink tubing for throttle wire connection	1
	6033	Sticker; “CE” for europe	1
	6108	Old A/C inlet. Used on early ESRs with Old charger.	0
	6110	Old On/Off Switch. Used on early ESRs, placed on left side of T-bar.	0
	6116	Old Charger LED board. Used on early ESRs. Installed between Old charger and controller	0
	6118	Old Charger. Used on early ESRs. This charger does not have “U” shaped aluminum housing	0
	6129	Sticker; “HOT” for motor	1
	6160	White/Red warning sticker	1
	9031	User Manual (ESR)	1
	GSR1055	Sticker; Goped (Installs on fender)	1

Problem		Action		Solution
Acceleration and hill climbing greatly reduced from when scooter was new. Change was rapid and power loss may be %50.		Disconnect chain from motor. Use an amp meter to measure amp draw at full throttle, and no load, at a full charge. Draw should not exceed 4.2amps.		If draw exceeds 4.2amps, motor is malfunctioning.
Range is extremely low. May have reduced suddenly from one trip to the next.	1	A motor malfunction could cause abnormally high current draw. Use amp meter to measure draw as described above.		If draw exceeds 4.2amps, motor is malfunctioning.
	2	A battery wire could have become disconnected, causing the scooter to run on only 2 batteries instead of 4.		Open Pan and inspect for disconnected battery wires.
	3	Batteries could be old and need replacement. In this case the range degradation would be gradual, not immediate.		Replace batteries.
Motor is making noise, but scooter will not move or operates intermittently		Check drive sprocket set screw. If the screw has loosened up, it could be slipping on the motor shaft. This problem is sometimes be misdiagnosed as electrical.		Put drop of Blue Loctite on set screw and re-tighten.
Deck Removal:				
While working on an ESR you might find it necessary to remove the deck. The first several hundred ESRs which were produced have had the decks sealed to the aluminum pans with clear silicone. It is pretty easy to remove the deck, but the first time you do it can be a little tricky. First remove the four deck bolts. Now start by running a razor blade all the way around the scooter in the joint between the wood deck and the aluminum pan. This will begin to cut the silicone. Next take a long flat blade screw driver and start to pry the deck up at the FRONT of the scooter. (The electronics are all the rear of the scooter.) As you pry the deck up you will be able to see more of the silicone. Cut the silicone with the razor. The more you cut, the more you'll be able to raise the deck. Gradually work your way around the deck until enough of the silicone it cut for the deck to be removed.				

Problem		Action		Solution
Scooter will not operate				
A) Throttle LEDs DO turn on and clicking IS heard from pan when on/OFF switch IS operated. (The clicking noise is the relay on the controller board. It should click when the ON/OFF switch is operated.)		(1)Check to make sure wires are correctly attached to motor. (2)Measure voltage at motor wires while operating throttle. Make sure reading is about 24V at full throttle.		If 24V is found and wires are properly connected, motor must be malfunctioning. If 24V is NOT found at motor, then throttle or controller is malfunctioning.
B) Throttle LEDs do NOT turn on and/or clicking is NOT heard from pan when on/OFF switch IS operated.		(1)Check for throttle or ON/OFF switch malfunction. (2)Open pan and check if power is getting to controller. Controller should be receiving about 24V.		If problem wasn't found with step 1 or 2, controller may be malfunctioning.
Faulty throttle suspected.		Disconnect throttle at 8 pin connector, and install new throttle. If that does not solve the problem, the fault may be in the controller.		If the controller is suspected, install a known good controller to see if the problem is solved.
Faulty ON/OFF switch suspected.		Disconnect ON/OFF at 2 pin connector, and install new ON/OFF If a known good ON/OFF switch isn't available you can short the two metal pins in the wire coming from the controller. When the circuit is completed, the controller should click and turn on. If that does not solve the problem, the fault may be in the controller.		If the controller is suspected, install a known good controller to see if the problem is solved.
Batteries bad or disconnected.		Remove deck. Inspect wires to be sure that all connections are still attached. With meter measure voltage across each battery. Voltage should be approximately 12V.		If connectors are off, reinstall and glue with silicone to insure that they do not come back off. If batteries are bad, replace the entire battery pack, not just one cell.

Problem		Action		Solution
Charger problems				
Background: Power flows from the inlet plug (110V or 220V AC) to the charger. Then 24V DC power flows from the charger to the small LED board. Then 24V DC power flows from the LED board to the Controller. The power passes through the controller to the batteries. The batteries are wired into two individual 24V battery packs which are in parallel. There are short connection wires between each set of batteries. If one of those wires is disconnected the scooter WILL run on half the batteries with 50% of normal range. Those connection wires should have silicone adhering them in place to prevent accidental disconnection.				
Testing the charging system: When testing the charging system for proper operation it is a good idea to first disconnect the batteries so that you do not get a false voltage reading from the batteries. After the batteries are disconnected, you can individually measure the voltage across both sets of battery wires. With the charger plugged in, the voltage to the batteries should be about 24V. If you do not read approximately 24V going to the batteries, then there is a breakdown somewhere in the system.				
A) LED on side of pan will not light when cord plugged in.	1	The outlet in the wall may be off. Plug in a lamp to make sure it is live.		
	2	The A/C cord may be bad. Try using a cord known to be good, or test the cord with a multimeter.		
	3	Charger may be malfunctioning. Remove deck, and with scooter plugged in carefully measure for 24V output from Charger. (2 wire connector, not 3 wire.)		If no 24V output, carefully check 110V A/C wires between charger and plug receptacle. If no problem found, replace charger. If 24V present go to next test.
	4	Charger LED board may be malfunctioning. Measure for 24V output from LED board to controller. It will be necessary to disconnect the LED board from the controller to perform this test.		Replace LED board if necessary.
B) LED goes to green immediately after plugging in scooter, even though batteries are known to be discharged.		There is probably a disconnection somewhere between the LED board and the batteries. The LED board may be disconnected from controller; the controller may be disconnected from batteries; or the short wires connecting the batteries may be off. Check all those connections.		

Error Codes				
The ESR controller is very advanced and has self-diagnostic features. If the ESR senses a problem it will alert the rider, similar to a "check engine" light in a car. The warning comes in the form of flashing codes on the Flux Capacitor LEDs. The codes are listed below for your reference. These codes can also be retrieved and reset using the Go-Prammer.				
Fault Code		**Problem**		**Possible Cause**
21		Motor Short		Bad motor, shorted connection to motor or controller
22		Motor Open		Bad motor, Loose/broken connection to motor or controller
32		Overtemperature		Excessive Use, Excessive ambient temperature, or controller
41		Charger Overvoltage		Battery Charger
42		Charge Mode Time Out		Probably a bad battery
51		Internal Controller Fault		Controller
53		Throttle Failband		Throttle control is malfunctioning, loose/broken cable, controller
62		Internal Controller Fault		Controller