

Segway® Personal Transporter i2, x2, x2 Turf Parts Replacement Guide

October 2008



WARNING

RISK OF DEATH OR SERIOUS INJURY



To replace parts on the Segway Personal Transporter, you must read and follow all instructions and warnings in the Segway Personal Transporter Parts Replacement Guide. Failure to do so could result in serious injury or death.

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For support, please contact the company from which you bought the Segway products. For a listing of Authorized Segway Dealers and Distributors, refer to the Segway website at: <http://www.segway.com>.

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⚠ WARNING



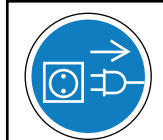
Read all instructions.

To replace parts on the Segway PT, you must read and follow all instructions and warnings in the Segway PT Parts Replacement Guide. Failure to do so could result in serious injury or death.



Power off the Segway PT.

Always power off your Segway PT before performing any maintenance or installing any part or accessory. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.



Unplug the Segway PT.

Always unplug the AC power cord before performing any maintenance or installing any part or accessory. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

⚠ WARNING

BATTERY PACKS

- Do not use the battery packs if the battery pack casing is broken or if battery pack emits an unusual odor, smoke, or excessive heat, or leaks any substance. Avoid contact with any substance seeping from the battery pack.
- Keep out of reach of children and pets. Exposure to battery pack voltage could result in death or serious injury.
- The cells within the battery pack contain toxic substances. Do not attempt to open the battery pack. Do not insert any object into the battery pack or use any device to pry at the battery pack casing. If you insert an object into any of the battery ports or openings you could suffer electric shock, injury, burns, or cause a fire. Attempting to open the battery pack casing will damage the casing and could release toxic and harmful substances, and will render the pack unusable.
- Observe and follow all safety information on the warning label found on the battery pack.
- Only charge the battery packs using charging devices approved by Segway.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

WARNING

QUESTIONS

If you have any questions about the instructions in this guide, please contact a Segway Service Representative to avoid confusion leading to serious injury or death or damage to property.



Purpose

The purpose of this guide is to provide instructions for servicing the 2nd Generation (“Gen 2”) Segway Personal Transporter (Segway PT) models i2, x2, and x2 Turf.

Audience

Chapters 1 through 6 of this manual are written for either customers or Segway trained, certified service technicians working under agreement with Segway Inc. Chapters 7 through 14 of this manual are written for only Segway trained, certified service technicians working under agreement with Segway Inc.

Certification

Becoming a Segway certified technician involves a four-level certification process. The service technician may be required to undergo training at each level. Upon satisfactory completion of this training, the service technician becomes certified to maintain the Segway PT parts and assemblies according to the following scheme:

Level	Parts and Assemblies Certified to Maintain	Maintenance Instructions
1	• Customer Replaceable Parts - LeanSteer Frame - Mats - Battery Packs - Tire/Wheel Assembly - Fender • Gearbox Removal	• Chapter 1 • Chapter 2 • Chapter 3 • Chapter 4 • Chapter 5 • Chapter 8
2	• Level 1 (same as above) • Powerbase Trim • Serviceable Power Base • Console	• Same as above • Chapter 6 • Chapter 7 • Chapter 9
3	• Level 1 and Level 2 (same as above) • Embedded Systems - Chassis Cover - CU Boards - Balance Sensor Assembly (BSA) - Motor - Power Base Chassis	• Same as above • Chapter 10 • Chapter 11 • Chapter 12 • Chapter 13 • Chapter 14
4	• Level 1, Level 2, and Level 3 (same as above) • Diagnostics (with special tools)	• Same as above

Organization

This manual organizes parts replacement instructions into two general categories: Instructions intended for either customers or service technicians ([Chapter 1](#) through [Chapter 6](#)), and instructions intended for service technicians only ([Chapter 7](#) through [Chapter 14](#)).

The instructions in [Chapter 8](#) through [Chapter 14](#) describe procedures for replacing parts after having established a serviceable power base (which is described in [Chapter 7](#)).

Chapter	Description
page ix	Contains important safety information you must read before servicing the Segway PT.
page xv	Shows an exploded replacement parts diagram.
Chapter 1	Describes removal and installation procedures for the LeanSteer frame.
Chapter 2	Describes removal and installation procedures for the mats.
Chapter 3	Describes troubleshooting, removal, and installation procedures for the Li-ion batteries.
Chapter 4	Describes removal and installation procedures for the tire/wheel assembly.
Chapter 5	Describes removal and installation procedures for the fender.
Chapter 6	Describes removal and installation procedures for the power base trim (fascia).
Chapter 7	Describes procedure for establishing a serviceable power base.
Chapter 8	Describes troubleshooting, removal, and installation of a gearbox assembly.
Chapter 9	Describes removal and installation procedures for the console and related components.
Chapter 10	Describes removal and installation procedures for the chassis cover.
Chapter 11	Describes troubleshooting, removal, and installation procedures for the CU boards.
Chapter 12	Describes removal, and installation procedures for the balance sensor assembly.
Chapter 13	Describes removal and installation of a motor assembly.
Chapter 14	Describes power base chassis.
Appendix A	Describes standard tests to perform after servicing the Segway PT.
Appendix B	Provides parts lists for the Gen 2 Segway PT.
Appendix C	Lists and describes fasteners that are approved for use in servicing the Segway PT.
Appendix D	Lists recommended tools and diagnostic equipment necessary to properly service a Segway PT.
Glossary	Lists and briefly defines product specific and other terms used in this manual.



Safety Messages

Standards

Safety messages for this guide and product safety signs and labels are based on standards set forth by the American National Standards Institute for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials (ANSI). To assist in the communication of safety information across language barriers, some safety graphics are based on standards set forth by the International Standards Organization (ISO).

Safety Alert Symbol



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Signal Words



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



CAUTION, used without the safety alert symbol, is used to address practices not related to personal injury.



NOTICE is used to address practices not related to personal injury.

Terminology

Throughout this guide, the term “model x2” refers to both the x2 and x2 Turf models unless otherwise noted.

Customer Replaceable Kits and Technician Replaceable Parts

Subassemblies qualified in this guide as Customer Replaceable may be installed by the customer. Otherwise, subassemblies are qualified as installable only by a Certified Service Technician.

A subassembly that is available as a replaceable kit is shipped in a box and includes all parts and fasteners needed to install the subassembly. These kits are listed under the heading **Replaceable Kits** on the first page of each chapter. All parts included in a Replaceable Kit should be replaced.

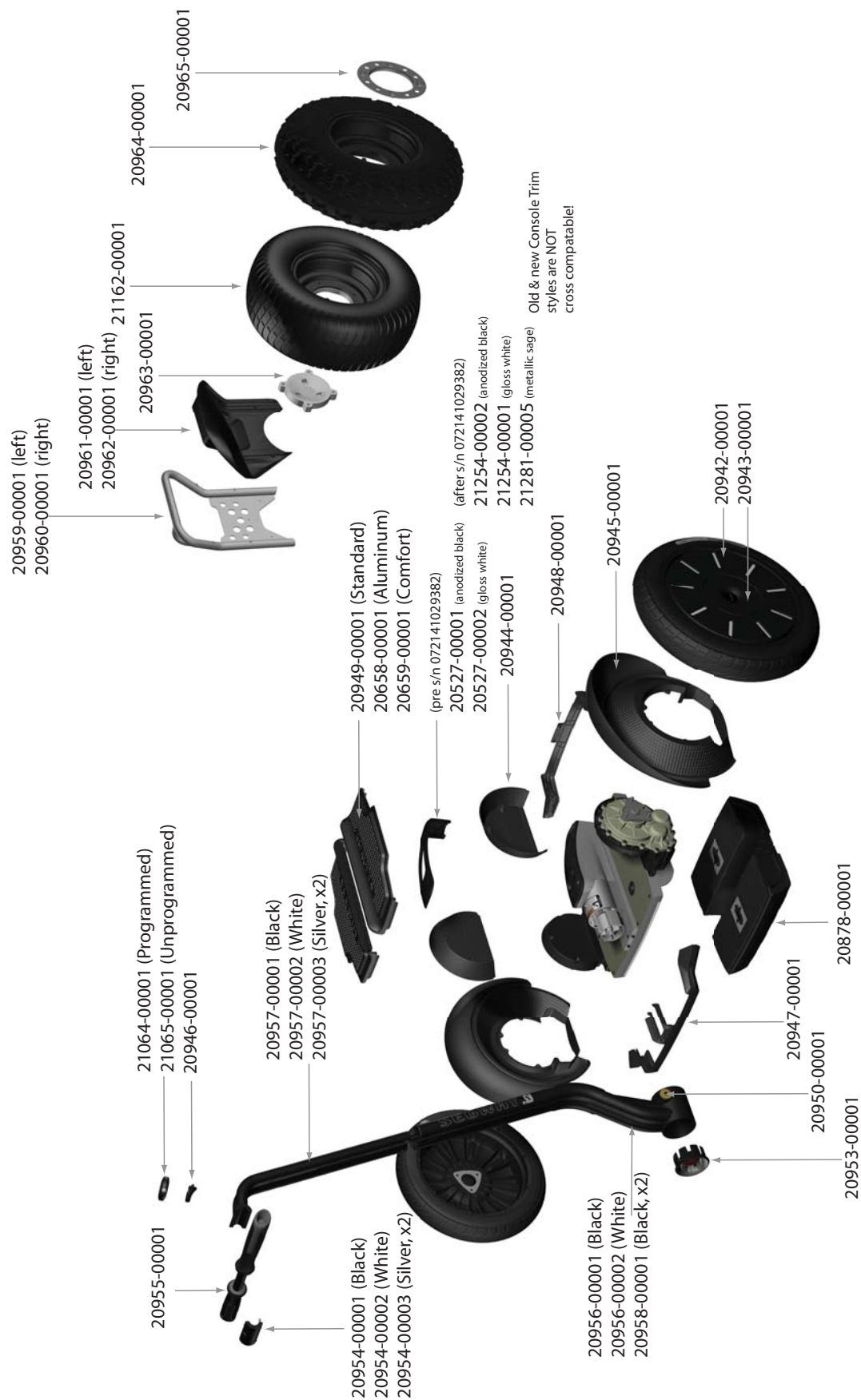
When individual parts of a subassembly are available for replacement, these parts are shipped without fasteners and are intended for installation only by a Certified Service Technician. These parts are listed under the heading **Technician Replaceable Parts** on the first page of each chapter.

Related User Materials

The following additional materials may be needed for reference during parts replacement procedures:

- Segway PT i2, x2 Reference Manual
- Segway Personal Transporter (PT) i2, x2 Getting Started Manual

Please check the Segway website (www.segway.com) for updates to the Reference Guide and Getting Started Manual, or contact Segway to confirm you have on hand the most recently updated service publications.



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1. LeanSteer™ Frame

This chapter describes removal and installation procedures for the LeanSteer frame on a Gen 2 Segway PT. The LeanSteer frame pivots at the base to control left/right direction of the PT.

The following warnings apply to the instructions in this Section 1 regarding the LeanSteer Frame.

Applies to Models

i2, x2, x2 Turf

Qualifications

Customer Replaceable

Customer Replaceable Kits

See [Table B-3](#) on page B-4.

Technician Replaceable Parts

See [Table B-4](#) on page B-5.

Required Tools

- Torque wrench
- Hex wrench, 3mm
- Hex wrench, 5mm

WARNING



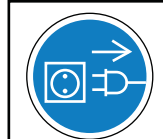
Read all instructions.

Failure to do so could result in serious injury or death.



Power off the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.



Unplug the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

WARNING

LEANSTEER

- LeanSteer frame must be properly attached and secured. Failure to properly attach the LeanSteer frame and/or maintain the torque on the wedge clamp fastener could result in machine malfunction and could cause personal injury or damage to the Segway PT. Using the Segway PT without properly assembling the LeanSteer frame and/or maintaining the torque on the wedge clamp fastener could lead to an unexpected change in steering and could result in serious injury and/or damage to the Segway PT from loss of control, collisions, and falls.
- Check the tightness of the joint between the LeanSteer frame and the pivot base assembly routinely and every time the LeanSteer frame is removed and reinstalled (using the method outlined in the document).

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.



Figure 1-1 shows the components of the LeanSteer frame.

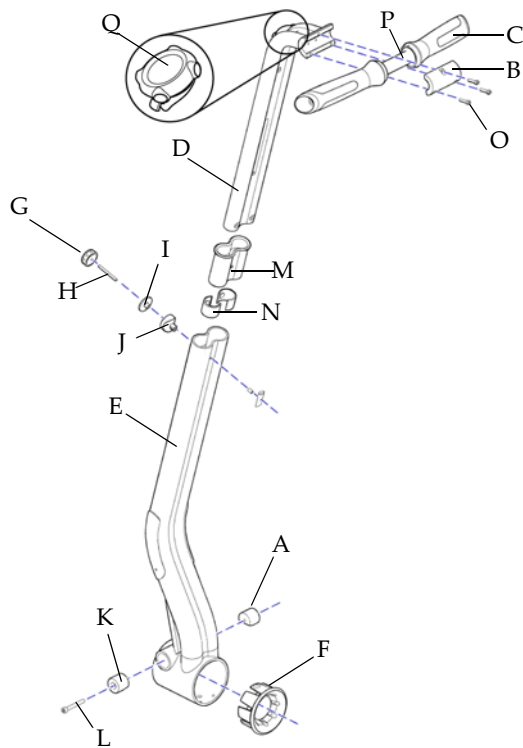


Figure 1-1: LeanSteer Frame Components

- A Wedge, Threaded Side
- B Outer Bar Clamp
- C Grip Trim
- D Upper LeanSteer Frame
- E Lower LeanSteer Frame
- F Handlebar Hub Trim
- G Height Adjustment Knob
- H M4 Threaded Rod
- I Washer
- J Height Adjustment Wedge
- K Wedge, Counterbore Side
- L Fastener, SHCS, M6 x 1.0 x 45, Hex
- M Slide, Top, Spacer
- N Upper Handlebar Stop
- O Fastener, SHCS, M4x20
- P Handlebar Tube
- Q InfoKey and InfoKey Dock

When to Replace

You need to replace the LeanSteer frame if any part is bent or otherwise broken. Typically, you can replace one of its components.

Handlebar Removal and Installation

To remove handlebar from LeanSteer frame:



1. Make sure Segway PT is powered off and unplugged.
2. Use 3mm hex wrench to remove (3) fasteners. See [Figure 1-2](#).

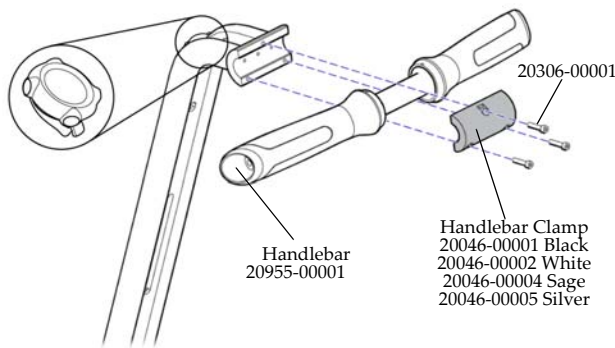


Figure 1-2: Installing and Removing Handlebar

3. Remove handlebar and handlebar clamp from LeanSteer frame.

To install handlebar on LeanSteer frame:



1. Make sure Segway PT is powered off and unplugged.
2. Place handlebar against LeanSteer frame with the bevel facing backward and Segway logo facing up. See [Figure 1-2](#).
3. Position handlebar clamp against handlebar.
4. Insert (3) fasteners (20306-00001) through handlebar clamp into LeanSteer frame and tighten by hand.
5. Check to ensure that gap between handlebar clamp and LeanSteer frame is even and equidistant between top and bottom.
6. Using 3mm hex wrench, alternate between 3 fasteners, evenly tightening in small increments until full torque setting of 6.0 N-m is achieved.
7. Perform post-service tests ([page A-1](#)).



LeanSteer Frame Removal

To remove LeanSteer frame:



1. Make sure Segway PT is powered off and unplugged.

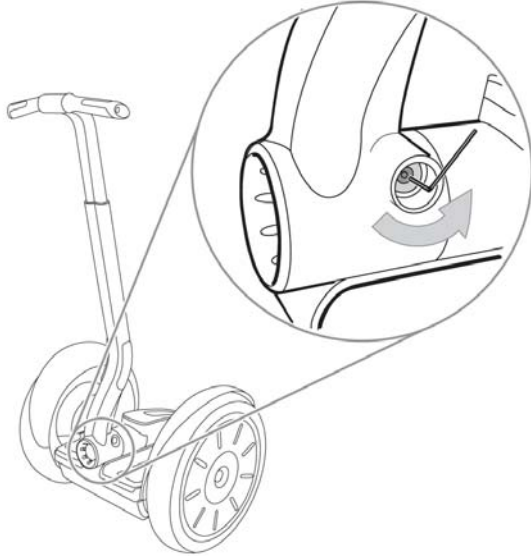


Figure 1-3: Loosen Fastener Holding LeanSteer Frame

2. Using 5mm hex wrench, remove fastener holding LeanSteer frame in place. See [Figure 1-3](#).
3. Move LeanSteer frame all the way to the left and right until loose. You might hear and feel a click when wedge clamp assembly releases from pivot assembly. See [Figure 1-4](#).
4. Slide LeanSteer frame away from pivot assembly, as shown in [Figure 1-5](#). This should require minimal force.

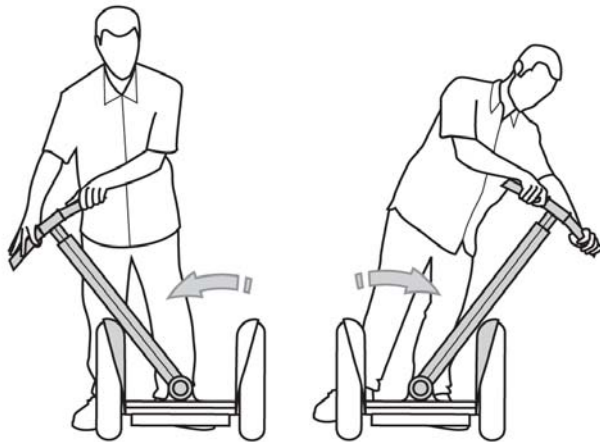


Figure 1-4: Releasing LeanSteer Frame from Pivot Base Assembly

NOTICE

If wedge clamps fall out or are removed during this procedure, put them aside in a safe place as you will need them to reattach LeanSteer frame to pivot assembly.

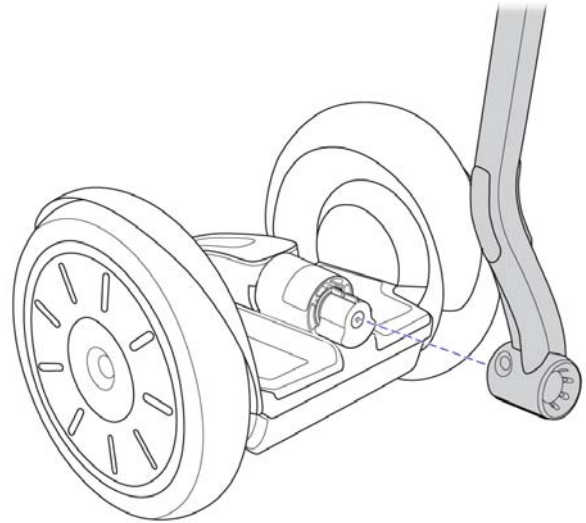


Figure 1-5: Remove LeanSteer Frame from Pivot Assembly

LeanSteer Frame Installation

To install LeanSteer frame:



1. Make sure Segway PT is powered off and unplugged.
2. Slide LeanSteer frame onto pivot assembly. See [Figure 1-6](#).

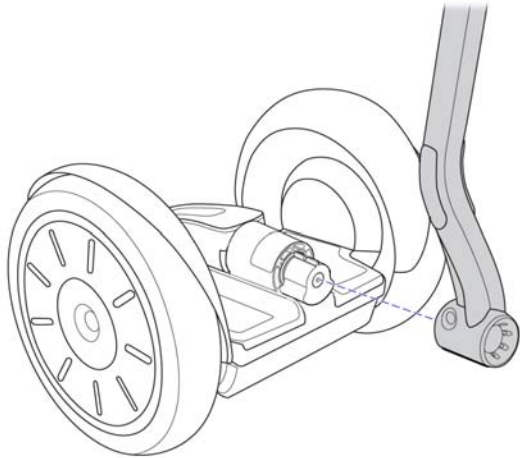


Figure 1-6: Attach LeanSteer Frame to Pivot Assembly

3. If wedge clamps are not installed, install each wedge clamp, curved side facing down and inserted in either side of LeanSteer frame base. See [Figure 1-7](#).

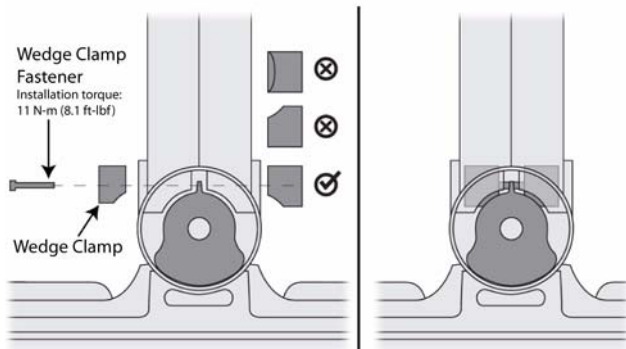


Figure 1-7: Install Wedge Clamps Curved Side Down

4. Loosely thread in wedge clamp fastener.
5. Prior to tightening fastener, visually check that handlebar is straight and centered. If it is not straight and centered, adjust LeanSteer frame to straighten and center it. Fastener must go through notch in pivot assembly.
6. Tighten fastener (20631-00001) to 11.0 N-m (8.1 ft-lbf). See [Figure 1-8](#).

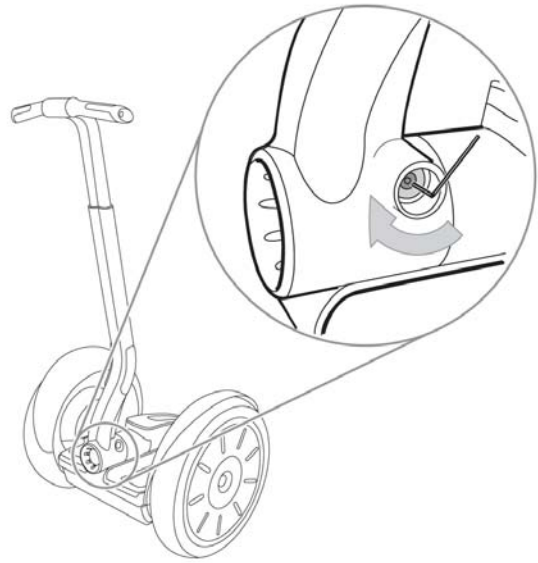


Figure 1-8: Tighten Fastener Holding LeanSteer Frame in Place

7. Move LeanSteer frame fully left and right, until it touches each fender, and ensure LeanSteer frame returns to a straight-up position. If LeanSteer frame does not return to a straight-up position, loosen wedge clamp fastener and return to Step 5. See [Figure 1-9](#).

NOTICE

If LeanSteer frame makes a clunking or popping sound when moved, frame was not properly aligned when torqued. Loosen LeanSteer frame (without removing), realign, and retorque.

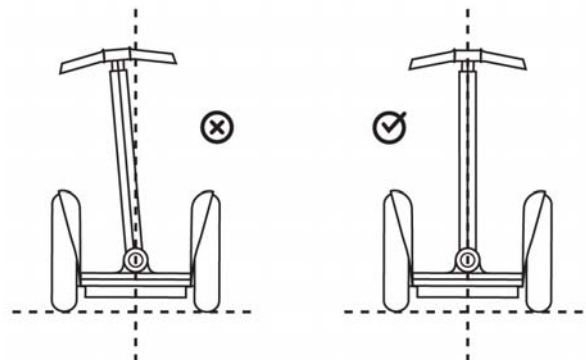


Figure 1-9: Ensure LeanSteer Frame Returns to a Straight-up Position

8. Perform post-service tests ([page A-1](#)).

Wireless InfoKey™ Controller Removal and Installation

To remove Wireless InfoKey controller:

1. Press release tab at bottom of InfoKey Controller dock adapter. See **1** in [Figure 1-10](#).
2. Slide Wireless InfoKey Controller out of Wireless InfoKey controller dock adapter. See **2** in [Figure 1-10](#).

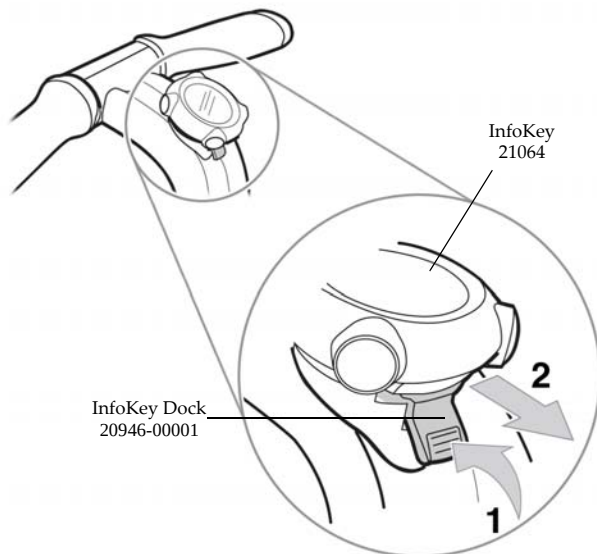


Figure 1-10: Remove Wireless InfoKey Controller

To install Wireless InfoKey controller:

1. Make sure InfoKey Controller dock is installed ([page 1-8](#)).
2. Place Wireless InfoKey controller onto dock adapter and slide into place until release tab (**1** in [Figure 1-10](#)) is engaged.
3. Perform post-service tests ([page A-1](#)).

Wireless InfoKey Controller Dock Removal and Installation

To remove Wireless InfoKey controller dock:



1. Make sure Segway PT is powered off and unplugged.
2. Using 3mm hex wrench, remove fastener that holds Wireless InfoKey controller dock to LeanSteer frame. See [Figure 1-11](#).
3. Remove Wireless InfoKey controller dock.

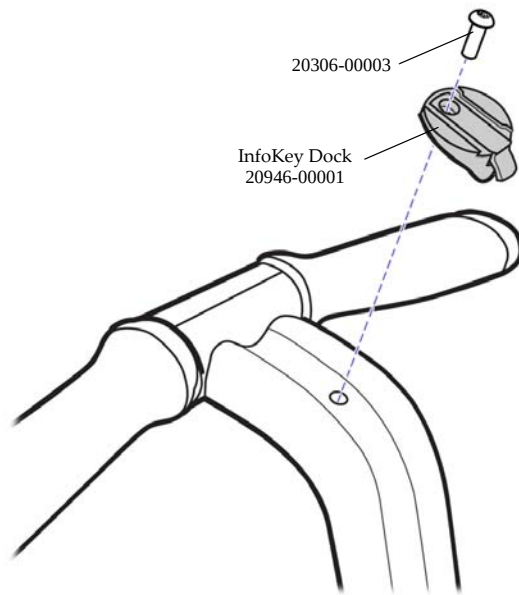


Figure 1-11: Replace Wireless InfoKey Controller Dock

To install Wireless InfoKey controller dock:



1. Make sure Segway PT is powered off and unplugged.
2. Place Wireless InfoKey controller dock against upper LeanSteer frame with release tab oriented at bottom. See [Figure 1-11](#).
3. Thread 3mm fastener (20306-00003) through hole in top of Wireless InfoKey controller dock and into upper LeanSteer frame.
4. Using 3mm hex wrench, tighten fastener to 2.0 N-m (18 in-lbf).
5. Perform post-service tests ([page A-1](#)).



Wireless InfoKey Controller Battery Removal and Installation

To remove battery:



1. Make sure Segway PT is powered off and unplugged.
2. Rotate Wireless InfoKey controller 45 degrees counterclockwise and separate from dock adapter ring. See [Figure 1-12](#).

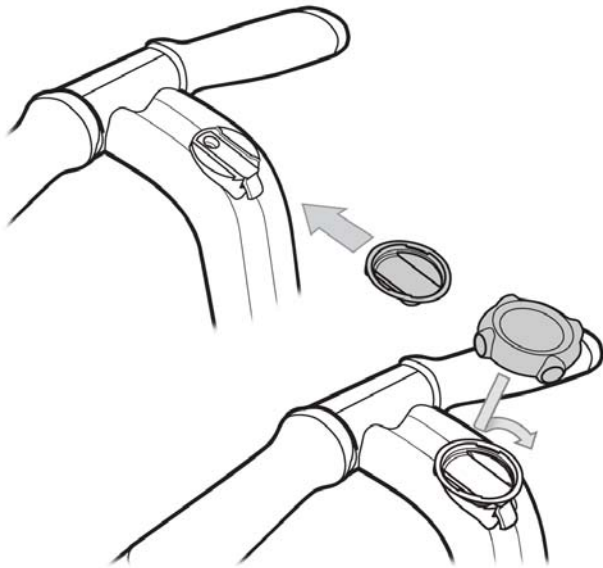


Figure 1-12: Remove or Replace Wireless InfoKey Controller on Dock Adapter Ring

3. Using a coin or a flathead screwdriver, unscrew back cover of Wireless InfoKey controller and remove battery. See [Figure 1-13](#).

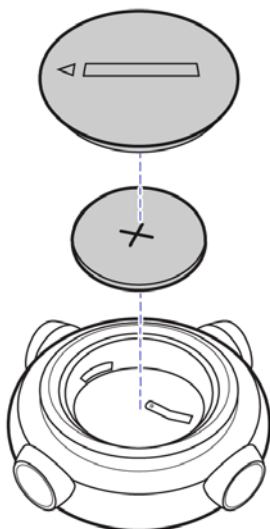


Figure 1-13: Remove or Install Wireless InfoKey Controller Battery

To install battery:



1. Make sure Segway PT is powered off and unplugged.
2. Verify that new battery is type CR2430, available as part of Segway InfoKey kit (21064-00001).
3. Insert Wireless InfoKey controller battery with positive (+) side showing. See [Figure 1-13](#).
4. Reattach the Wireless InfoKey controller's back cover using a coin or flathead screwdriver.
5. Place Wireless InfoKey controller on dock adapter ring and rotate clockwise until the Wireless InfoKey controller is locked into position. (An audible click should be detected.) See [Figure 1-12](#).
6. Perform post-service tests ([page A-1](#)).

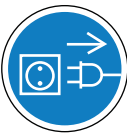


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2. Mats

This chapter describes removal, inspection, and installation of mats on a Gen 2 Segway PT.

The following warnings apply to the instructions in this Section 2 regarding Mats:

 WARNING		
 Read all instructions. Failure to do so could result in serious injury or death.	 Power off the Segway PT. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	 Unplug the Segway PT. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

 WARNING
MATS Always ensure that the top of the powerbase and bottom of mat are clean, dry, and free of debris. These mats protect the rider detect sensors located beneath them. Mats should be secured in place prior to riding. Failure to follow these instructions could interfere with the operation of the Segway PT leading to serious injury or death or damage to property.

Applies to Models

i2, x2, x2 Turf

Qualifications

Customer Replaceable

Customer Replaceable Kit

i2/x2 Standard Mat Kit (20949-00001)

(1) Mat

(2) Mats

i2/x2 Aluminum Mat Kit (20658-00001)

(2) Mats

i2/x2 Comfort Mat Kit (20659-00001)

(2) Mats

When to Replace

Your Segway PT comes with two mats installed to the right and left of the console. Mats are a functional component of the Rider Detect feature; mats permit a wide range of foot positions to achieve rider detection. These mats protect the rider detect sensors located beneath them, and provide a comfortable surface on which to stand. Mats should be secured in place prior to riding.

It is appropriate to replace a mat if any worn edges or tears are observed.

Mat Removal and Installation

To remove mat:



1. Make sure Segway PT is powered off and unplugged.
2. Lift mat off power base. See [Figure 2-1](#).

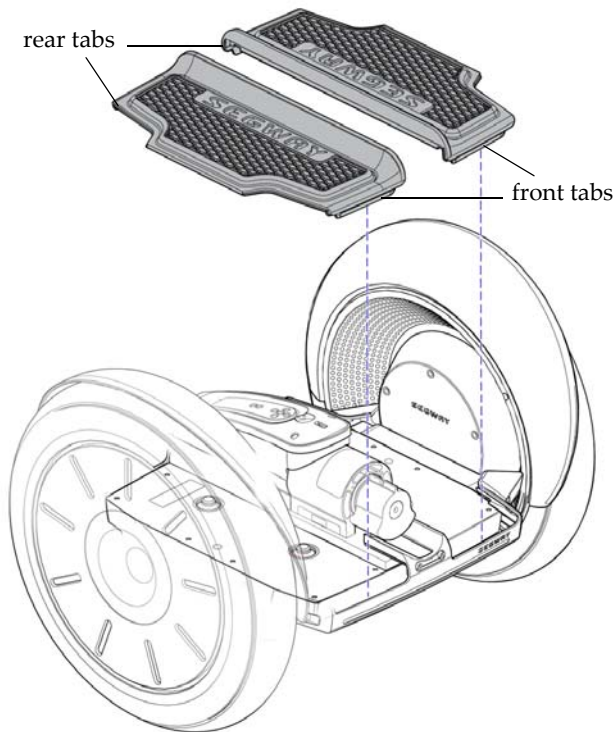


Figure 2-1: Remove or Install Mats

To install mat:



1. Make sure Segway PT is powered off and unplugged.
2. Verify that top of power base and bottom of mat are clean, dry, and free of debris.
3. Place mat on power base.
4. Fit mat's rubber tabs into slots formed by gap between front and rear fascia and power base. See [Figure 2-1](#).
5. Tuck tabs in place around entire perimeter of mat while you press down.
6. Visually confirm that mat is properly aligned and all rubber tabs are tucked in prior to riding.
7. Perform post-service tests ([page A-1](#)).

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3. Battery Packs

This chapter describes removal and installation procedures for the Li-ion batteries used on a Gen 2 Segway PT. For information on using the batteries, including charging and maintaining them, safety rules, specifications, and general care, refer to *Segway PT i2, x2 Reference Manual*.

The following warnings apply to the instructions in this Section 3 regarding Battery Packs:

Applies to Models

i2, x2, x2 Turf

Qualifications

Customer Replaceable

Customer Replaceable Kit

Battery Kit (20878-00001)

(1) Li-ion Battery

(4) Fasteners, M4 x 0.7 x 30

Required Tools

- Torque wrench, 3mm drive
- Hex wrench, 3mm

WARNING



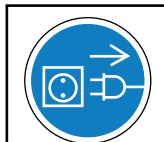
Read all instructions.

Failure to do so could result in serious injury or death.



Power off the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.



Unplug the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

WARNING

BATTERY PACKS

- Do not use battery pack if battery pack casing is broken or if battery pack emits an unusual odor, smoke, or excessive heat, or leaks any substance. Avoid contact with any substance seeping from the battery pack.
- Keep out of reach of children and pets. Exposure to battery pack voltage could result in death or serious injury.
- The cells within the battery pack contain toxic substances. Do not attempt to open the battery pack. Do not insert any object into the battery pack or use any device to pry at the battery pack casing. If you insert an object into any of the battery ports or openings you could suffer electric shock, injury, burns, or cause a fire. Attempting to open the battery pack casing will damage the casing and could release toxic and harmful substances, and will render the pack unusable.
- Observe and follow all safety information on the warning label found on the battery pack.
- Only charge the battery packs using charging devices approved by Segway.
- Comply with all local and federal individual country laws when disposing of and transporting Segway PT batteries.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

When to Replace

Replace batteries as advised by a Segway Service Representative.



Battery Removal and Installation

The Segway PT has two battery packs. The PT operates at the performance level allowed by the lesser battery. If it is necessary to replace a battery because of damage or a fault condition other than end of service life, consider whether to replace both batteries based upon the service life remaining in the undamaged, fault-free battery.

Redundancy is a critical safety feature built into the Segway PT that also applies to the batteries. Therefore, you should replace batteries in pairs.

NOTICE

To isolate a problem to a specific battery, swap front and rear battery packs to confirm that the error condition follows the problem battery.

To remove batteries:



1. Make sure Segway PT is powered off and unplugged.
2. Position Segway PT on an angle or upside down so that bottom of chassis is exposed. See [Figure 3-1](#).
3. Using 3mm hex wrench, remove fasteners that hold battery in place (4 per battery).
4. Pull battery straight off chassis.
5. Repeat Steps 3 and 4 for other battery.

NOTICE

Consult your local recycling center for proper disposal of the batteries.

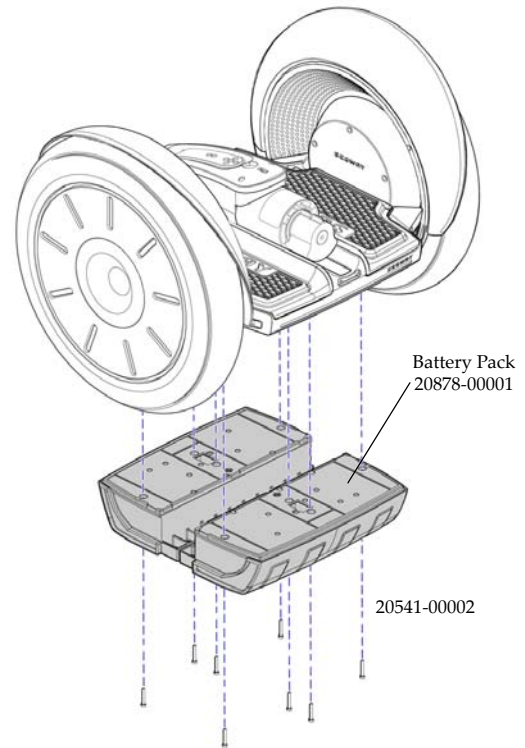


Figure 3-1: Remove or Install Battery

To install batteries:



1. Make sure Segway PT is powered off and unplugged.
2. Position Segway PT on an angle or upside down so that bottom of chassis is exposed. See [Figure 3-1](#).
3. Inspect battery gasket to ensure that gasket is free of debris. If gasket is damaged or missing, do not install battery pack. If the battery gasket is damaged, contact Segway for a replacement.
4. Install battery on power base with curved edge facing out. Ensure battery is properly seated and aligned with edge of power base trim.
5. Out of the four SHCS, M4 x 0.7 x 30, self-sealing hex fasteners (20541-00002) supplied with battery kit, use 3mm torque wrench to first install and tighten (2) **center** fasteners to 1.6 N-m.

6. Using 3mm torque wrench, install and tighten remaining (2) **outer** fasteners to 1.6 N-m.

NOTICE

Do not use power tool. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.

7. Repeat Steps 3 through 5 for other battery.
8. Perform post-service tests ([page A-1](#)).

NOTICE

Be sure to reinstall all four fasteners per battery. Segway approved fasteners should be used. If a fastener is missing, insert center fasteners first.

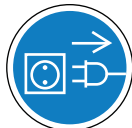


4. Tire/Wheel Assembly

This chapter describes the removal and installation procedures for the tire/wheel assembly of a Gen 2 Segway PT. For general tire care information, refer to *Segway PT i2, x2 Reference Manual*.

There are two tire/wheel assemblies per PT.

The following warnings apply to the instructions in this Section 4 regarding Tire/Wheel Assembly:

 WARNING		
 Read all instructions.	 Power off the Segway PT.	 Unplug the Segway PT.
Failure to do so could result in serious injury or death.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

 WARNING
TIRE/WHEEL ASSEMBLY Each model—i2, x2, or x2 Turf—has a unique type of tire/wheel assembly. The x2 and x2 Turf share the same type of hub adapter, but the x2 Turf tire/wheel assembly requires the use of an additional spacer. Because of differences in the software, i2 and x2/x2 Turf wheels and tires are not interchangeable. Use only i2 wheels and tires on i2 models, x2 and x2 Turf wheels and tires on x2 and x2 Turf models. Failure to adhere to these warnings could lead to serious injury or death or damage to property.

Applies to Models

i2, x2, x2 Turf

Qualifications

Customer Replaceable

Customer Replaceable Kits

i2 Fender (20945-00001)

Included with kit:

- (1) i2 fender
- (4) Fasteners

x2 Fender Frame kit (right side) (20960-00001)

Included with kit:

- (1) x2 fender
- (1) x2 fender frame
- (2) Fender fasteners
- (3) Fender frame fasteners

x2 Fender Frame kit (left side) (20959-00001)

Included with kit:

- (1) x2 fender
- (1) x2 fender frame
- (2) Fender fasteners
- (3) Fender frame fasteners

i2 Tire and Wheel (20942-00001)

- (1) Tire and wheel
- (3) Wheel nuts
- (1) Wheel cap

i2 Wheel Cap (20943-00001)

- (1) Wheel cap

x2 Tire and Wheel (20964-00001)

- (1) Tire and wheel
- (4) Fasteners, 30mm

x2 Turf Tire and Wheel (21162-00001)

- (1) Turf tire and wheel
- (4) Fasteners, 40mm
- (1) Spacer

x2 Wheel Hub Adapter (20963-00001)

- (1) Wheel hub
- (4) Fasteners, 30mm

x2 Wheel Trim (20965-00001)

- (1) Wheel trim
- (4) Fasteners, 30mm

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

x2 Turf Spacer (21370-00001)

- (1) Spacer
- (4) Fasteners, 40mm

i2 Tube Replacement Kit (21193-00001)

- (5) Tubes

i2 Tire Replacement Kit (21471-00001)

- (5) Tires

Required Tools

- Torque wrench, 3/8" drive
- Hex socket wrench, 13mm
- Hex wrench, 8mm
- 3-in. 3/8" drive socket extension (Model x2)
- Air pump with Schrader valve attachment
- Low pressure inflation gauge
- Tire irons (2), motorcycle type
- Bar clamp (to break tire bead)

When to Replace

You need to replace a tire/wheel assembly or the tire tube (model i2) under any of the following conditions, including, without limitation:

- Persistent leak in tire after reinflation
- Wheel is cracked or bent
- Tire is flat, cracked, or excessively worn. Excess wear is determined as follows:
 - Model i2—Center rib is worn flush with tire surface
 - Model x2—Diamond pattern on center rib is no longer visible
 - Model x2 Turf—Tire tread depth is less than 3/32" (2.38mm)

Tire inflation pressure can dramatically affect range traction and tread wear. Ensure tires are properly inflated as follows:

- (Model i2) 15 psi (1.03 bar)
- (Model x2) 4 psi (.275 bar)



Tire/Wheel Assembly Removal and Installation, i2 Only

NOTICE

Support your Segway PT by means other than resting on its wheels. Support of the unit from below the batteries is recommended. As an alternative, the Segway PT can be positioned on its side.

To install tire / wheel assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Place tire/wheel assembly on gearbox flange. See [Figure 4-1](#).
3. Using 13mm torque wrench, drive (3) wheel nuts (20158-00001) and torque to 30 N-m. Tighten only to the prescribed torque.
4. Install wheel cap.
5. Perform post-service tests ([page A-1](#)).



To remove tire / wheel assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Support unit or turn unit on its side.
3. Remove wheel cap. Press on edge of wheel cap and lift off from opposite edge. (Model x2 Turf has spacer as shown on [page xv](#).) See [Figure 4-1](#).
4. Using 13mm socket wrench, remove (3) wheel nuts (20158-00001).

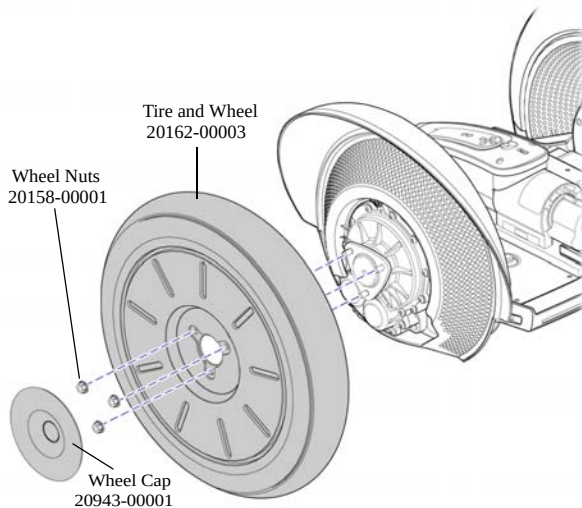


Figure 4-1: Remove Tire/Wheel Assembly, i2

5. Remove tire/wheel assembly.



Tire/Wheel Assembly Removal and Installation, x2 only

To remove tire / wheel assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Support unit or turn unit on its side.
3. If removing tire/wheel assembly and hub adapter, proceed to [page 4-6](#).
4. Use 8mm hex wrench to remove (4) fasteners. See [Figure 4-2](#).

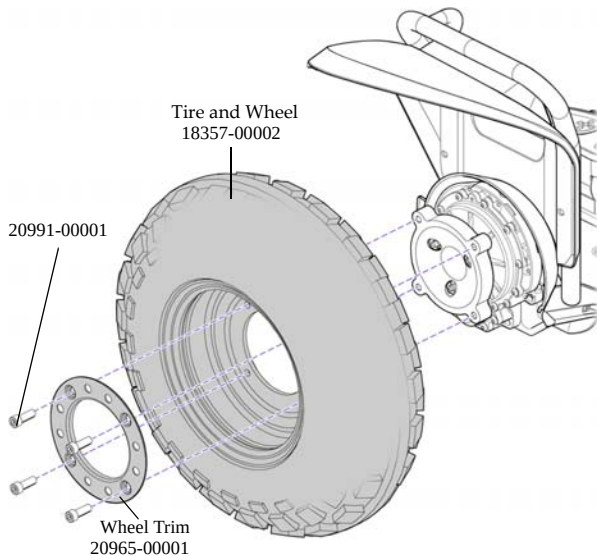


Figure 4-2: Remove or Install Tire/Wheel Assembly, x2

5. Lift off wheel trim.
6. Loosen tire/wheel assembly by tapping side of wheel with plastic or rubber mallet.
7. Lift off tire/wheel assembly.

To install tire / wheel assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Inspect wheel mounting surfaces; use alcohol wipes to clean off all debris.
3. Place wheel over hub adapter with valve stem facing outward; align mounting holes.
4. Place wheel trim on wheel; align mounting holes. See [Figure 4-2](#).
5. Thread (4) 8mm fasteners (20991-00001) through trim and wheel and into hub adapter.
6. While holding tire to keep from rotating, use 8mm torque wrench to tighten to 30 N-m. Tighten only to the prescribed torque.
7. Perform post-service tests ([page A-1](#)).



Tire/Wheel Assembly Removal and Installation, x2 Turf only

To remove tire /wheel assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Support unit or turn unit on its side.
3. If removing tire/wheel assembly and hub adapter, proceed to [page 4-6](#).
4. Use 8mm hex wrench to remove (4) 8mm fasteners. See [Figure 4-3](#).

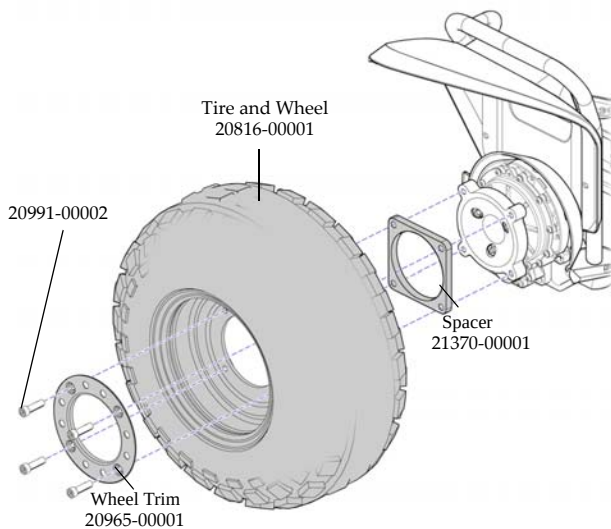


Figure 4-3: Remove or Install Tire/Wheel Assembly, x2 Turf

To install tire /wheel assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Inspect wheel mounting surfaces; use alcohol wipes to clean off all debris.
3. Place spacer over hub adapter; align mounting holes. See [Figure 4-3](#).
4. Place wheel over hub adapter with valve stem facing outward; align mounting holes.
5. Place wheel trim on wheel; align mounting holes.
6. Thread (4) 8mm fasteners (included with kit) through trim and wheel and into hub adapter.
7. While holding tire to keep from rotating, use 8mm torque wrench to tighten to 30 N-m. Tighten only to the prescribed torque.
8. Perform post-service tests ([page A-1](#)).



5. Lift off wheel trim.
6. Loosen tire/wheel assembly by tapping side of wheel with plastic or rubber mallet.
7. Lift off tire/wheel assembly, including spacer. See [Figure 4-3](#).

Hub Adapter Removal and Installation, x2/x2 Turf

To remove hub adapter:



1. Make sure Segway PT is powered off and unplugged.
2. Remove tire/wheel assembly:
 - Model x2, [page 4-4](#)
 - Model x2 Turf, [page 4-5](#)

NOTE: This step is not required if you are removing entire wheel assembly from gearbox.

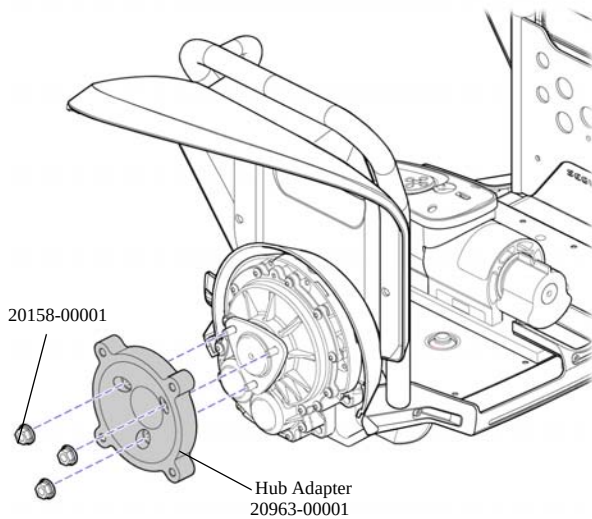


Figure 4-4: Remove or Install Hub Adapter, x2

3. Using 13mm hex wrench, remove (3) fasteners attaching hub adapter to wheel.
4. Lift off hub adapter.

To install hub adapter:



1. Make sure Segway PT is powered off and unplugged.
2. Inspect mounting surface; use alcohol wipes to clean off all debris.
3. Align three center holes in hub adapter or entire wheel assembly with lugs on gearbox. Seat hub adapter over lugs against gearbox flange. See [Figure 4-4](#).
4. Thread (3) 13mm wheel nuts (20158-00001) through holes in hub adapter onto lugs.
5. Using 13mm torque wrench, tighten to 30 N-m.
 Tighten only to the prescribed torque.
6. Perform post-service tests ([page A-1](#)).



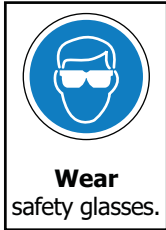
Tire Tube Removal and Installation, i2

To remove tire tube:



1. Make sure Segway PT is powered off and unplugged.

CAUTION



Wear safety glasses to avoid eye injury.

2. Remove tire/wheel assembly ([page 4-3](#)).
3. Remove valve stem cap and release air from tire by pushing down on valve needle. Maintain downward pressure on valve needle while squeezing tire to ensure tire is completely emptied of air. ([Figure 4-5](#))

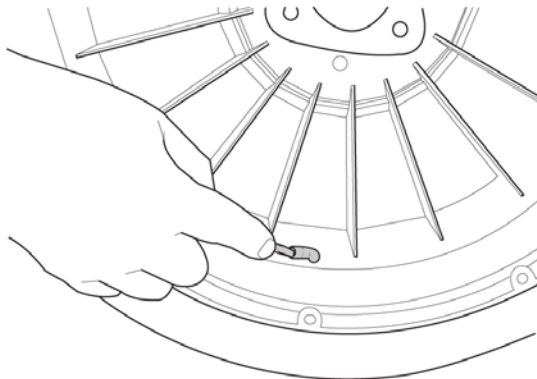


Figure 4-5: Deflate Tire

NOTICE

The i2 tire is tightly fitted to wheel in a manner similar to a motorcycle tire mounted to a rim.

4. Using a bar clamp, break tire bead by positioning clamp jaws against inner and outer sidewall of tire and tightening clamp. Continue to break tire bead in this manner, shifting clamp over 6" each time. ([Figure 4-6](#)).

NOTICE

Carefully position clamp to avoid puncturing tire. Insert clamp on tire wall, centering clamp at tire specification label.

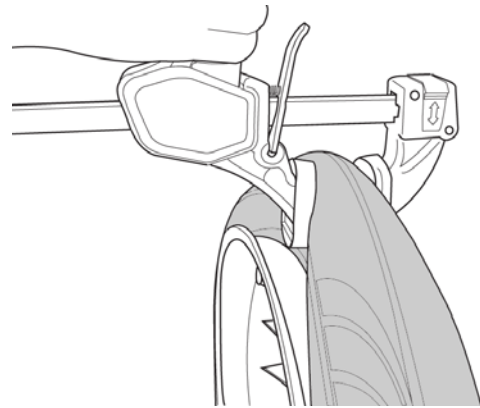


Figure 4-6: Break Tire Bead

CAUTION



Rim has sharp edge. Use caution when handling. Avoid pinch between wheel and tire.

5. Finish separating tire bead by hand. ([Figure 4-7](#)).

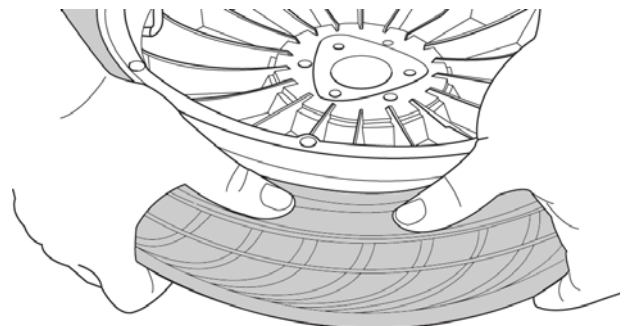


Figure 4-7: Separate Bead by Hand

6. Place wheel face down on a clean smooth surface. With inside of wheel facing up, pry one end of tire iron underneath lip of tire bead, pulling it up above rim (Figure 4-8).

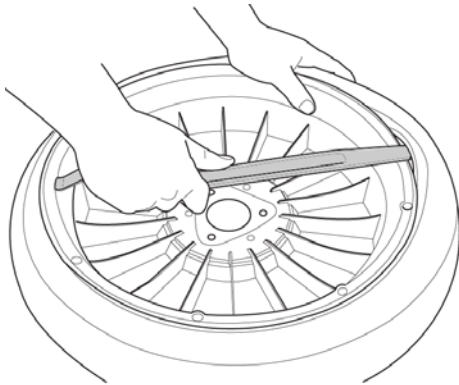


Figure 4-8: Insert First Tire Iron

CAUTION



Improper placement of tire irons can result in pinching.

**Finger or
hand hazard.**



7. Reminder: Wear safety glasses.
8. Insert a second tire iron under tire bead about 6" away from first tire iron and pry that portion of tire over rim (Figure 4-9).

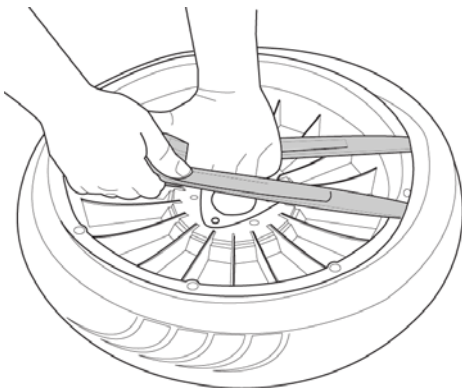


Figure 4-9: Insert Second Tire Iron

9. Pull first tire iron out and reinsert under bead about 6" away from other tire iron.

Repeat until entire side of tire is lifted over rim (Figure 4-10).

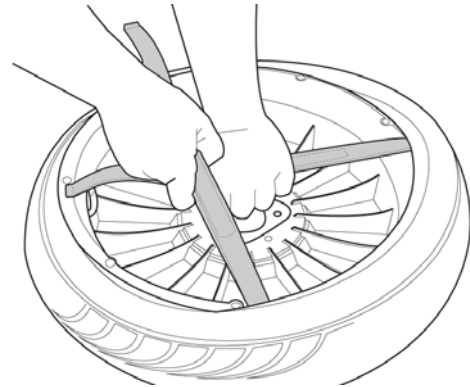


Figure 4-10: Re-insert Tire Iron

10. Push valve stem through rim into tire and extract tube (Figure 4-11).

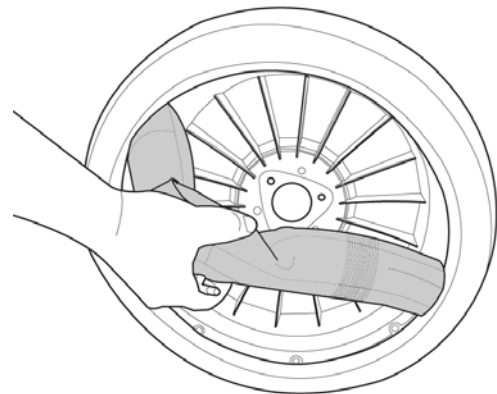


Figure 4-11: Extract Tube

NOTICE

If replacing tire, work outside bead over inside of wheel to remove tire completely. See Figure 4-12.

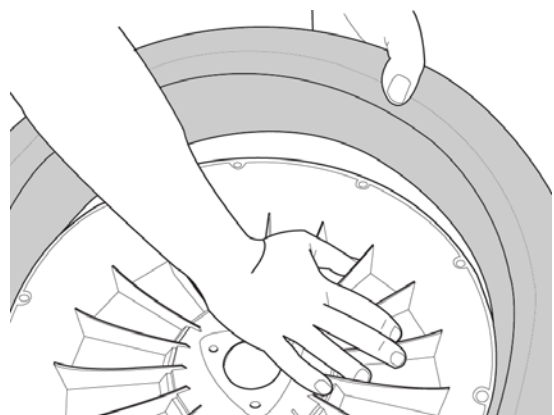


Figure 4-12: Remove or Install Tire



To install tire tube:

NOTICE

- Use only Segway-approved tube (18911-00001—single; 21193-00001—quantity five). The 90-degree bend in valve stem is necessary for proper clearance.
- To install new tire (use Segway part number 20543-00001), seat outside bead on wheel by hand before installing tube (Figure 4-12).



1. Make sure Segway PT is powered off and unplugged.



2. Reminder: Wear safety glasses.
3. Inflate tube with just enough air to give tube a circular shape (Figure 4-13).

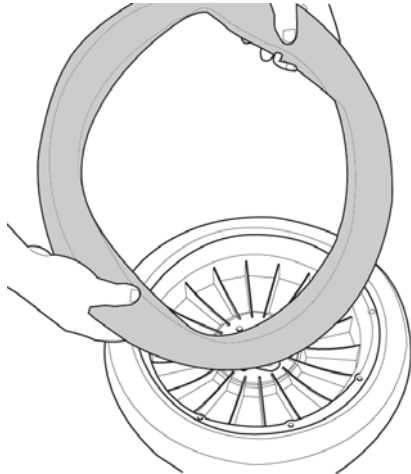


Figure 4-13: Inflate Tube Until Circular in Shape

4. Align valve stem with opening in rim and feed tube into tire around rim (Figure 4-14). Make sure there are no kinks, bends, or folds in tube. Push valve stem through opening in rim.

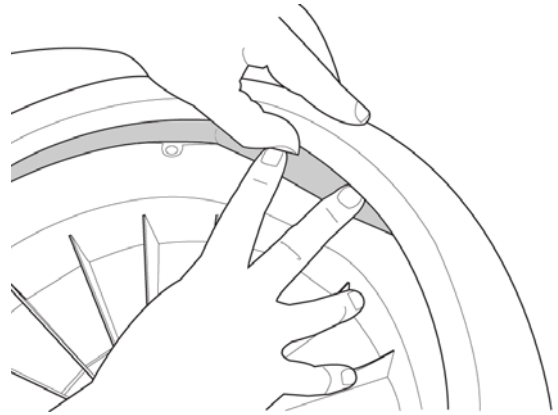


Figure 4-14: Feed Tube into Tire Around Rim

5. Work outside bead by hand back over rim as much as possible (Figure 4-15).

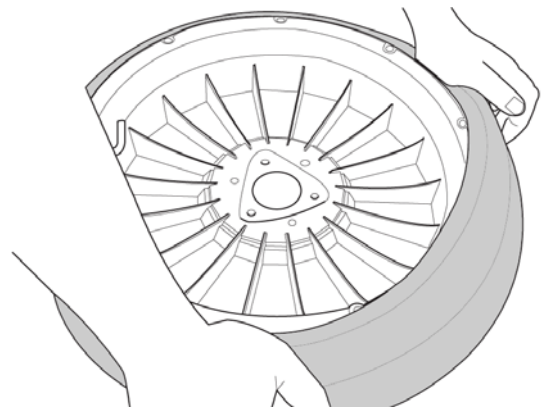


Figure 4-15: Work Outside Bead by Hand

NOTICE

A puncture can occur if tube is pinched between tire iron and tire bead or rim.

6. Use tire iron to lift remaining bead over rim, being careful not to pinch or bind tube or crack plastic wheel ([Figure 4-16](#)).

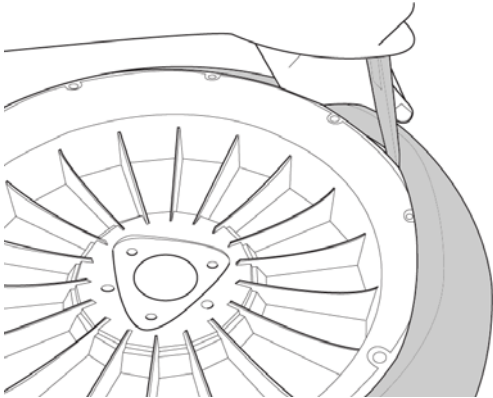


Figure 4-16: Use Tire Iron to Lift Remaining Bead

CAUTION



To avoid pinching, keep hands and fingers away from bead during inflation.

7. Using air pump with Schrader valve attachment (or other source of forced air), inflate tire enough to seat tire beads ([Figure 4-17](#)). It may be necessary to over-inflate tire to properly seat tire beads. When properly seated, tire and wheel will have an even, slight gap. Ensure tire stem is angled 45 degrees toward chassis.

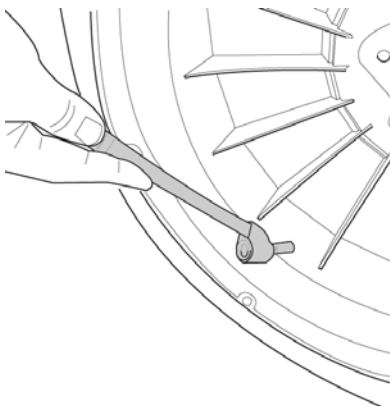


Figure 4-17: Inflate Tire

NOTICE

If tire is over-inflated from seating beads, release air until pressure reaches 15 psi.

8. Install tire/wheel assembly ([page 4-3](#)).
9. Perform post-service tests ([page A-1](#)).



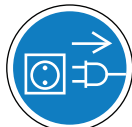
5. Fenders

This chapter describes the removal and installation procedures for the fender of a Gen 2 Segway PT. The fenders on the Segway PT are designed to protect the rider from debris and to safeguard the rider while leaning into turns.

There are two fenders per Segway PT.

The model i2 has one type of fender; model x2 has another type of fender (which attaches to a fender frame).

The following warnings apply to the instructions in this Section 5 regarding Fenders:

 WARNING		
 Read all instructions.	 Power off the Segway PT.	 Unplug the Segway PT.
Failure to do so could result in serious injury or death.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

 CAUTION	
 Finger or hand hazard.	Failure to follow these instructions could cause personal injury.

Applies to Models

i2, x2, x2 Turf

Qualifications

Customer Replaceable

Customer Replaceable Kits

i2 Fender (20945-00001)

- (1) Fender
- (4) Fasteners, 11mm

x2 Fender

(20961-00001 Left • 20962-00001 Right)

- (1) Fender
- (4) Fasteners, 18mm

x2 Fender Frame

(20959-00001 Left • 20960-00001 Right)

- (1) Fender frame
- (4) Fasteners, 18mm
- (3) Fasteners, 28mm

Required Tools

- Torque wrench, 3/8" drive
- 3/8" hex socket wrench, 13mm drive
- Hex bit, 4mm
- T-20 6-lobe bit
- 1/4" hex bit adapter

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

When to Replace

You need to replace a fender, for reasons that include, but are not limited to, if it is cracked or otherwise broken.



Fender Removal and Installation, i2

To remove fender:



1. Make sure Segway PT is powered off and unplugged.
2. Remove tire/wheel assembly ([page 4-3](#)).
3. Using a T-20 6-lobe , remove (4) button-head fasteners. See [Figure 5-1](#).

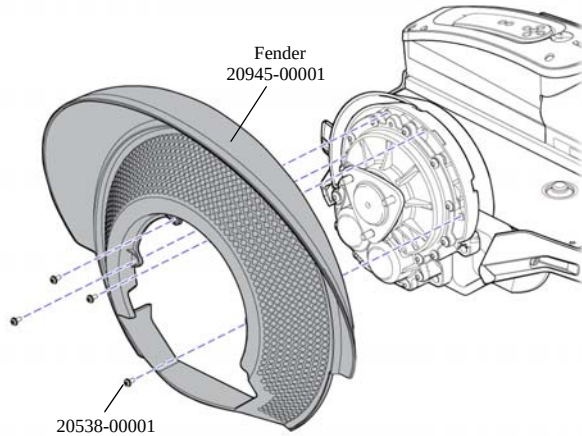


Figure 5-1: Remove or Install Fender, i2

To install fender:



1. Make sure Segway PT is powered off and unplugged.
2. Orient and place fender on gearbox. Use T-20 6-lobe wrench to drive (4) button-head fasteners (20538-00001) and torque to 1.5 N-m. See [Figure 5-1](#).
3. Install tire/wheel assembly ([page 4-3](#)).
4. Perform post-service tests ([page A-2](#)).

4. Lift fender and remove from gearbox.

Fender Removal and Installation, x2

To remove fender:



1. Make sure Segway PT is powered off and unplugged.
2. Remove tire/wheel assembly ([page 4-4](#)).
3. Using a 4mm wrench, remove (4) button-head fasteners to detach fender from fender frame. See [Figure 5-2](#).

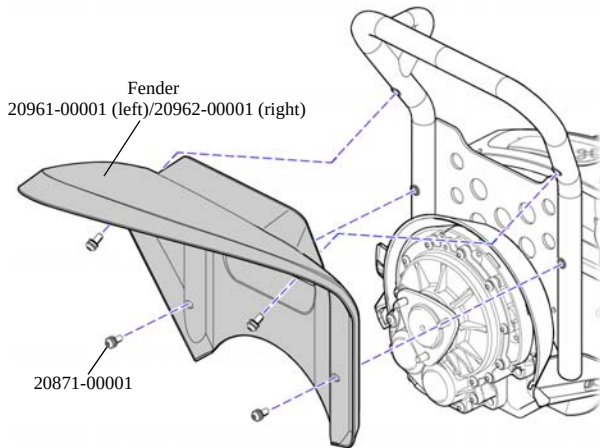


Figure 5-2: Remove or Install Fender, x2

To install fender:



1. Make sure Segway PT is powered off and unplugged.
2. Orient and place left fender on left fender frame, and right fender on right fender frame.
3. Ensure grommets are in place on fender. If grommets need to be installed use finger to push grommet into place. Note that grommets are bidirectional and can be installed from either side of fender.
4. Using a 4mm wrench, drive (4) button-head fasteners (20871-00001) until seated. Tighten one-half to one full turn. See [Figure 5-2](#).
5. Attach fender to fender frame ([page 5-5](#)).
6. Install tire/wheel assembly ([page 4-4](#)).
7. Perform post-service tests ([page A-1](#)).

NOTICE

Fender and frame assembly can be removed as a unit by removing fender frame fasteners ([page 5-5](#)).



Fender Frame Removal and Installation, x2

To remove fender frame:



1. Make sure Segway PT is powered off and unplugged.
2. Remove tire/wheel assembly:
 - Model x2, [page 4-4](#)
 - Model x2 Turf, [page 4-5](#)
3. Remove fender ([page 5-4](#)).
4. Using a 4mm hex wrench, remove (3) button-head frame fasteners and discard.

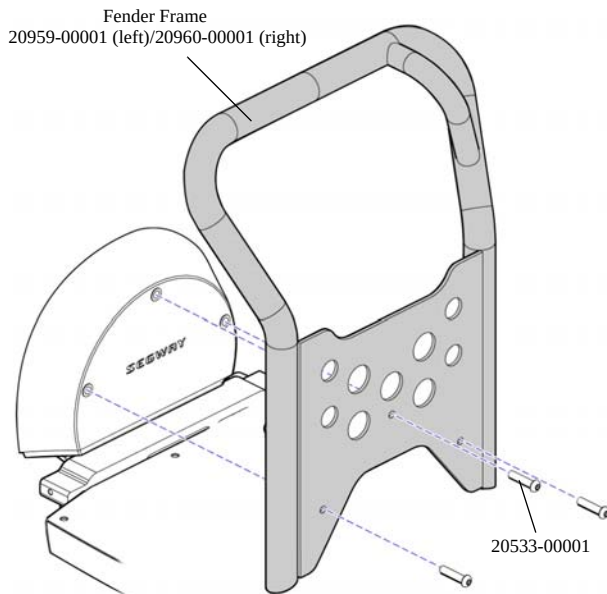


Figure 5-3: Remove or Install Fender Frame, x2

To install fender frame:



1. Make sure Segway PT is powered off and unplugged.
2. Orient and place left and right fender frames on appropriate side of gearbox.

NOTICE

Gearbox cover must be in place and properly seated.

3. Using a 4mm hex wrench, drive (3) new button-head fasteners (20553-00002) and torque to 6 N-m.
4. Install fender ([page 5-4](#)).
5. Install tire/wheel assembly:
 - Model x2, [page 4-4](#)
 - Model x2 Turf, [page 4-5](#)
6. Perform post-service tests ([page A-1](#)).

NOTICE

Fender and fender frame assembly can be removed as a unit (not shown). If so, frame fasteners should be discarded and replaced with new ones.

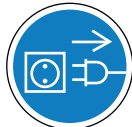
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6. Power Base Trim

This chapter describes removal and installation procedures for the power base trim (fascias and gearbox trim cover) on a Gen 2 Segway PT. Each Segway PT has front and rear fascia.

The following warnings apply to the instructions in this Section 6 regarding Power Base Trim:

 WARNING		
 Read all instructions.	 Power off the Segway PT.	 Unplug the Segway PT.
Failure to do so could result in serious injury or death.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

 CAUTION	
 Finger or hand hazard.	Failure to follow these instructions could cause personal injury.

Applies to Models

i2, x2, x2 Turf

Qualifications

Customer Replaceable

Customer Replaceable Kits

i2/x2 Power Base Front Trim (Fascia) Kit
(20947-00001)

(1) Front fascia

Without Parking Stand:

(4) Fasteners, 10mm

With Parking Stand Mounted:

(2) Outer fasteners, 10mm

(2) Center fasteners, 14mm

i2/x2 Power Base Rear Trim (Fascia) Kit
(20948-00001)

(1) Rear fascia

(4) Fasteners, 10mm

Console Cover Trim Kit, v1
(20951-00001 Black • 20951-00002 White)

(1) Console cover

Console Cover Trim Kit, v2
(21281-00001 Black • 21281-00002 White • 21281-00005 Metallic Sage)

(1) Console cover

i2/x2 Gearbox Trim Cover Kit (20944-00001)

(1) Gearbox trim cover

(3) 20553-00001 fasteners

Technician Replaceable Parts

Console Trim, v1
(20723-00001 Black • 20723-00002 White)

Console Trim, v2
(20934-00001 Black • 20934-00002 White • 20934-00003 Metallic Sage)

Required Tools

- Hex wrench, 4mm
- Torque wrench, 4mm drive

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

When to Replace

You need to replace front or rear fascia including without limitation if either is physically damaged. In addition, several other procedures require fascia or gearbox trim cover removal and installation.



Before Removing Fascias



1. Make sure Segway PT is powered off and unplugged.
2. Remove one tire/wheel assembly:
 - Model i2, [page 4-3](#)
 - Model x2, [page 4-4](#)
 - Model x2 Turf, [page 4-5](#)
3. Because of interference on the i2 and x2, you must remove the following:
 - (Model i2 only) Remove one fender ([page 5-3](#)).
 - (Model x2 only) Remove both fenders ([page 5-4](#)) and fender frames as a unit ([page 5-5](#)).

All PT models have been manufactured with one of two revisions of the console housing and trim. The revision is determined by the part number of the console trim, which is located on the forward part of the housing and is visible after the cover is removed. The part numbers for each revision of the console trim are as follows:

- First Revision: 20951-00001 (Black) or 20951-00002 (White)
- Second Revision: 21281-00001 (Black) or 21281-00002 (White)

NOTICE

First-revision console housing cover parts are no longer manufactured or supported. First-revision components are not compatible with second-revision components; similarly, second-revision components are not backward compatible with first-revision components. AS A RESULT, IF ANY FIRST-REVISION CONSOLE HOUSING, GASKET, OR COVER IS DAMAGED, THE COVER, GASKET, HOUSING, AND TRIM MUST ALL BE REPLACED USING THE CURRENT (SECOND) REVISION.

Fascia Removal and Installation

To remove front fascia:



1. Make sure Segway PT is powered off and unplugged.
2. Use 4mm hex wrench to remove (4) fasteners from front fascia. See [Figure 6-1](#).

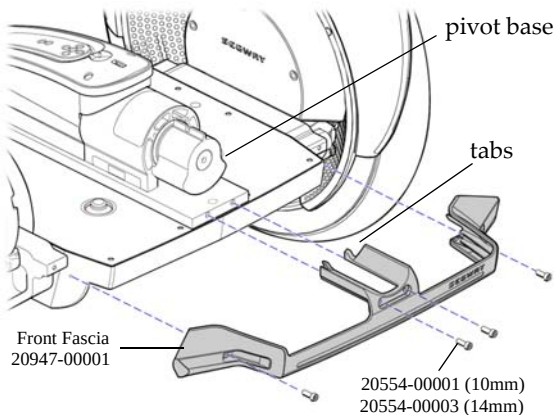


Figure 6-1: Remove or Install Front Fascia

3. Remove fascia and clean all debris from mounting surfaces.

To remove rear fascia:



1. Make sure Segway PT is powered off and unplugged.
2. Use 4mm hex wrench to remove (4) fasteners from rear fascia. See [Figure 6-2](#).

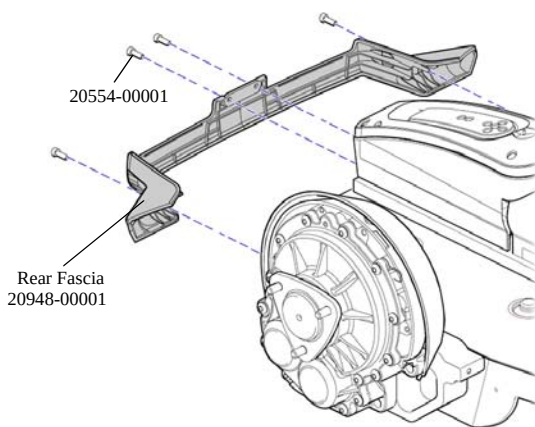


Figure 6-2: Remove or Install Rear Fascia

3. Remove fascia and clean all debris from mounting surfaces.

To install front fascia:



1. Make sure Segway PT is powered off and unplugged.
2. With fender (model i2 only) and tire/wheel assembly off, align front fascia tabs with holes beneath pivot base hub, and be sure they are free of debris and properly seated before threading fasteners. See [Figure 6-1](#).

NOTICE

TABS ARE DELICATE AND CAN BREAK EASILY IF NOT PROPERLY ALIGNED INTO PIVOT BASE HOLES.

3. Thread (4) 4mm fasteners (20554-00001) into fascia.
4. Using 4mm torque wrench, drive fasteners and torque to 1.5 N-m.

To install rear fascia:



1. Make sure Segway PT is powered off and unplugged.
2. Thread (4) 4mm fasteners (20554-00001) into fascia. See [Figure 6-2](#).
3. Using 4mm torque wrench, drive fasteners and torque to 1.5 N-m.

After installing fascia:

1. (Model i2 only) Install fender ([page 5-3](#)).
2. (Model x2 only) Install both fender ([page 5-4](#)) and frame assemblies, each as a unit ([page 5-5](#)).
3. Install tire/wheel assembly:
 - Model i2 ([page 4-3](#))
 - Model x2 ([page 4-4](#))
 - Model x2 Turf ([page 4-5](#))
4. Perform post-service tests ([page A-1](#)).



Gearbox Trim Cover Removal and Installation

To remove gearbox trim cover:



1. Make sure Segway PT is powered off and unplugged.
2. (Model x2) Remove fender and frame assembly ([page 5-5](#)) and G-box cover.
3. (Model i2) Using 4mm hex wrench, loosen and remove (3) button-head fasteners from gearbox trim cover. See [Figure 6-3](#).

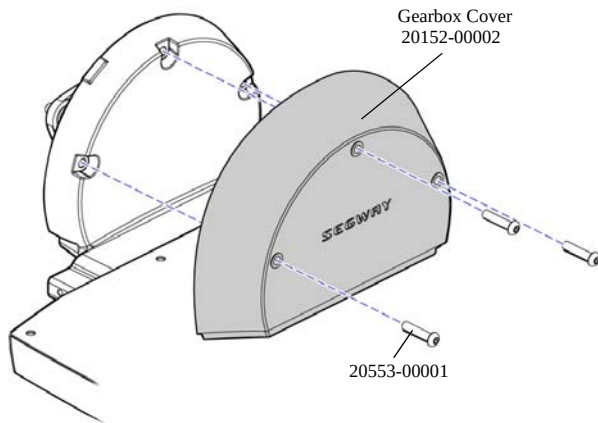


Figure 6-3: Remove Gearbox Trim Cover

4. Set aside fasteners and trim piece.

To install gearbox trim cover:



1. Make sure Segway PT is powered off and unplugged.
2. Align holes in gearbox trim cover with holes in gearbox.
3. (Model x2 only) Install both fender ([page 5-4](#)) and frame assemblies ([page 5-5](#)).
4. Thread (3) button-head fasteners (20553-00001) through holes in gearbox trim cover into gearbox. See [Figure 6-3](#).
5. Using 4mm torque wrench, drive fasteners and torque to 6.0 N-m.
6. Perform post-service tests ([page A-1](#)).

Console Trim Removal or Installation

To remove console trim:



1. Make sure Segway PT is powered off and unplugged.
2. Pull up on front portion of trim and tilt it away from charge port. See [Figure 6-4](#).

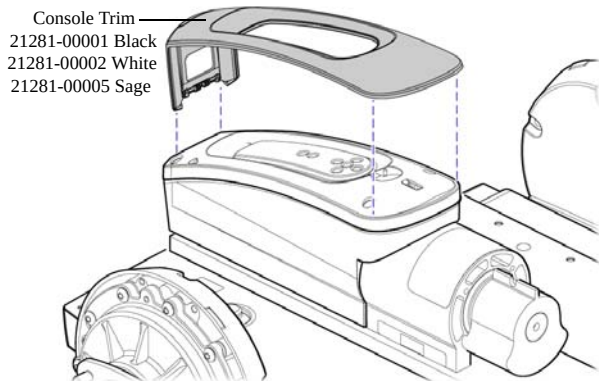


Figure 6-4: Remove or Install Console Trim

To install console trim:



1. Make sure Segway PT is powered off and unplugged.
2. Press rear portion of console trim over charge port.
3. Tilt front portion of console trim to engage with console. See [Figure 6-4](#).
4. Perform post-service tests ([page A-1](#)).

CAUTION

Make sure IEC connector (charge) port remains clean and dry.



WARNING

The following sections in this guide are intended for use by Segway certified service technicians only. Segway does not recommend that non-certified individuals replace any of the components described in the following sections. Warranty will be void if components in any of the following sections are replaced by an individual other than a Segway certified service technician.

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7. Serviceable Power Base

This chapter describes the serviceable power base for a Gen 2 Segway PT. [Figure 7-1](#) illustrates a serviceable power base.

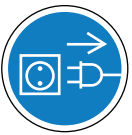
The following warnings apply to the instructions in this Section 7 regarding the Serviceable Power Base:

Applies to Models

i2, x2, x2 Turf

Qualifications

Certified Service Technician

 WARNING		
 Read all instructions.	 Power off the Segway PT.	 Unplug the Segway PT.
Failure to do so could result in serious injury or death.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

 CAUTION	
 Sharp edge.	Failure to follow these instructions could lead to personal injury.

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.



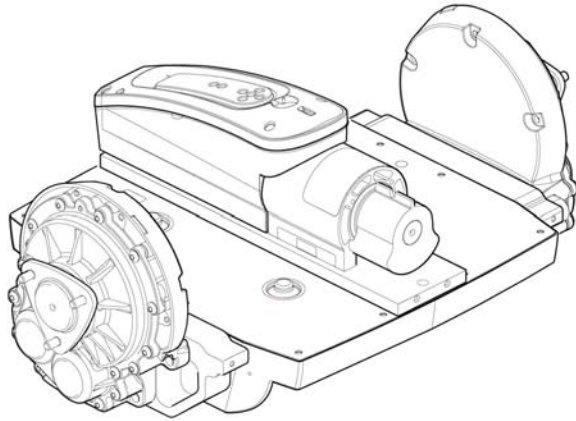


Figure 7-1: Serviceable Power Base

In many cases, the serviceable power base will be used as a replaceable module. Note that the unit serial number and Wireless InfoKey controller are associated with the serviceable power base.

Establishing a Serviceable Power Base

The serviceable power base is the launch point for many service procedures. Throughout this guide, you will be instructed to “establish a serviceable power base,” which means to remove (or reassemble) the following components from the Segway PT:

- LeanSteer frame (*qty* 1) ([page 1-5](#))
- Mat (*qty* 2) ([page 2-3](#))
- Battery packs (*qty* 2) ([page 3-3](#))
- Tire/wheel assembly (*qty* 2):
 - Model i2, [page 4-3](#)
 - Model x2, [page 4-4](#)
 - Model x2 Turf, [page 4-5](#)
- Fender (*qty* 2)
 - Model i2 ([page 5-2](#))
 - Model x2 ([page 5-4](#))
- Power base trim (*qty* 2)
 - Front and rear fascia ([page 6-4](#))
 - Gearbox cover trim ([page 6-5](#))
- Console trim ([page 6-6](#))

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8. Gearbox

This chapter describes troubleshooting, removal, and installation of a gearbox assembly on a Gen 2 Segway PT. Note that the Segway PT has two gearboxes.

The following warnings apply to the instructions in this Section 8 regarding the Gearbox:

Applies to Models

i2, x2, x2 Turf

Qualifications

Certified Service Technician

Required Tools

- Ratchet, 3/8" drive
- Torque wrench, 3/8" drive
- Socket wrench, 13mm, 3/8" drive
- T-20 6-lobe wrench (Model i2)
- T-45 6-lobe socket wrench, 3/8" drive
- Socket extension, 3-in. 3/8" drive
- Hex wrench, 4mm
- Hex wrench, 5mm
- Rubber mallet
- Scraper (to remove RTV silicone sealant)
- Razor blade

⚠ WARNING



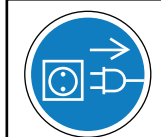
Read all instructions.

Failure to do so could result in serious injury or death.



Power off the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.



Unplug the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

⚠ CAUTION



Finger or hand hazard.

Failure to follow these instructions could cause personal injury.

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

CAUTION

GEARBOX

Gearboxes are not field serviceable. Do not attempt to open gearbox for lubrication or repair. You must replace the entire gearbox assembly if the gearbox is not operating normally.

When to Replace

It is appropriate to remove and inspect or replace the gearbox for reasons that include, but are not limited to, the presence of the following symptoms.

- Excessive wheel wobble that cannot be remedied by either changing wheel position on gearbox by rotating mounting position by 180 degrees or by replacing the tire/wheel assembly.

The wheel hub has three holes that correspond to three gearbox flange studs. The wheel can mount to the gearbox in any of three positions, relative to these holes. Clocking the wheel (that is, advancing the wheel to the next of these three possible positions) might minimize wheel wobble on some units.

- Excessive and progressively worsening noise and/or vibration that cannot be remedied by removing potential obstructions of the wheel, by properly inflating the tire, or by replacing the tire/wheel assembly.

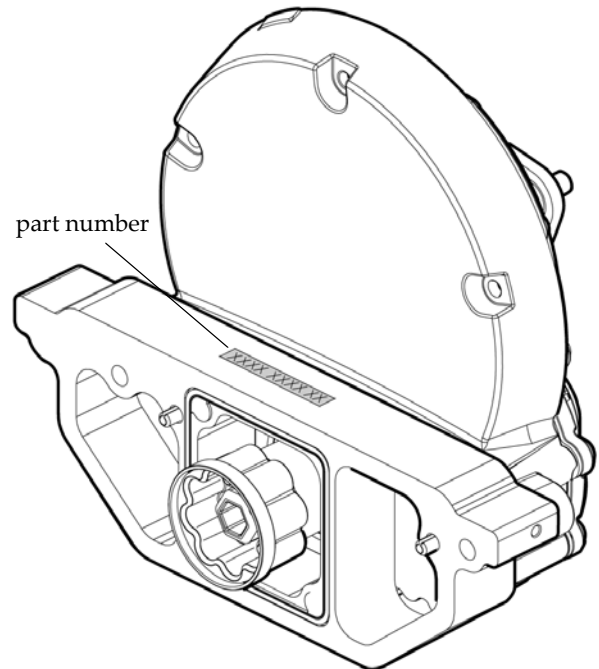


Figure 8-1: Gearbox Spacer Part Number

NOTICE

RTV Silicone Sealant vs. Gasket

Early production i2 models were assembled using room temperature vulcanizing (RTV) silicone sealant to seal the gearbox to the Segway PT chassis. More recently, some parts were changed to allow use of a gasket in place of the RTV silicone sealant.

How to tell the difference

Gearbox spacers with a 10-digit part number stamped on the top and bottom were assembled with a gasket. Gearbox spacers that do not have a 10-digit part number were assembled using RTV silicone sealant. See [Figure 8-1](#).

Why does this matter?

Gearboxes originally installed using RTV silicone sealant *cannot* be reinstalled. The factory-installed sealant provides an environmental seal that prevents damage to the sensitive electronics inside the Segway PT platform. Field reinstallation of RTV silicone sealant is not supported by Segway.

When a gearbox with RTV silicone sealant is removed for the purpose of replacing the elastomer bushing, the entire gearbox also needs to be replaced with a new replacement gearbox and gasket.

Replacement gearboxes shipped from Segway are backward compatible with all i2 and x2 models.

NOTICE

Field reinstallation of RTV silicone sealant is neither recommended nor supported by Segway. Warranty will be void if this restriction is not followed.

Gearbox Removal

NOTICE

Support your Segway PT by means other than resting on its wheels. Support of unit from below batteries is recommended. As an alternative, the Segway PT can be positioned on its side.

To remove gearbox:



1. Make sure Segway PT is powered off and unplugged.
 2. Remove LeanSteer frame ([page 1-5](#)).
 3. Remove mats ([page 2-3](#)).
 4. Remove wheel ([page 4-3](#)).
 5. (Model i2) Remove fender ([page 5-3](#)).
 6. (Model x2) Remove fender and frame assembly ([page 5-5](#)).
 7. Remove front and rear fascia trim ([page 6-4](#)).
 8. Remove gearbox trim cover ([page 6-5](#)).
 9. Remove gearbox fasteners. Using a 3/8" ratchet fitted with a T-45 6-lobe socket, loosen and remove (3) gearbox fasteners.
- Gearbox fasteners are installed with thread lock compound and require significant leverage to loosen for the duration of thread engagement. Use of new gearbox fasteners with new thread lock compound is required for proper installation.



10. Remove gearbox. Using rubber mallet, gently tap chassis side of gearbox housing alternating front to back. Repeat until gearbox is unseated. Lift gearbox off chassis and set aside.

CAUTION

Gearbox might separate from gearbox spacer. If this occurs, remove battery pack ([page 3-3](#)) to gain access to bottom inside edge of spacer. To remove, tap inside edge of spacer. Do not pry aluminum-to-aluminum surfaces to prevent surface damage; preserve gasket integrity for reuse. If gasket is damaged or becomes damaged through removal or installation, replacement of the damaged gasket is required.

CAUTION



Machined surfaces of gearbox can be sharp.



Keep hand and fingers clear of mating surfaces while seating gearbox and spacer to chassis.

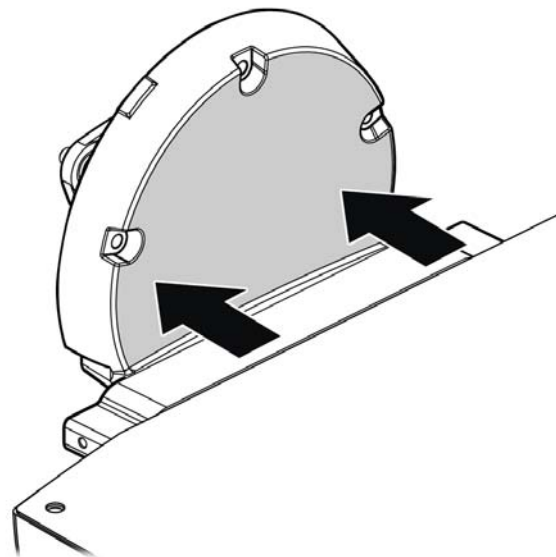


Figure 8-2: Tap Gearbox to Unseat



Gearbox Installation

To install gearbox:

-  1. Make sure Segway PT is powered off and unplugged.
2. Inspect motor coupling and elastomer bushing. Replace elastomer bushing if it is worn out. See [page 13-5](#).
3. If RTV silicone sealant is present on chassis, use razor blade or utility knife blade (set at 90-degree angle to the chassis surface) to carefully and gently scrape away all RTV sealant residue from chassis mating surface. Do not scratch machined surface. Always work in downward direction to prevent contaminants from falling into motor cavity. See [Figure 8-3](#).
4. Completely remove thread lock compound from gearbox fastener holes. Use cotton swabs to thoroughly clean excess thread lock compound from internal threads. First use window cleaner, then isopropyl alcohol, to remove thread lock compound. See [Figure 8-4](#).

NOTICE

To prevent contamination, cover motor cavity.

CAUTION



Machined surfaces of gearbox and chassis can be sharp.

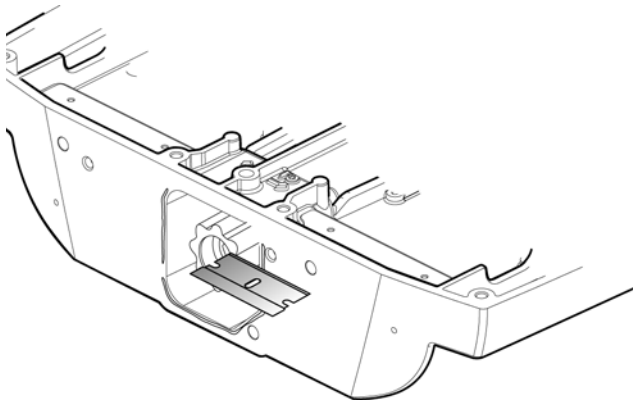


Figure 8-3: Remove RTV Sealant from Chassis Mating Surface

NOTICE

Cover motor cavity to prevent contamination. Using a vacuum cleaner or similar tool, remove any foreign material from motor cavity prior to re-installation.

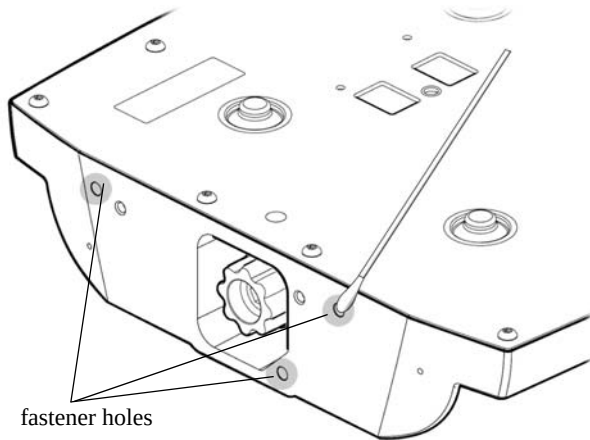


Figure 8-4: Remove Thread Lock Compound from Fastener Holes

5. Ensure gasket is present (see ["When to Replace"](#) on page 8-3) and oriented properly in groove of gearbox spacer gasket. See [Figure 8-5](#).

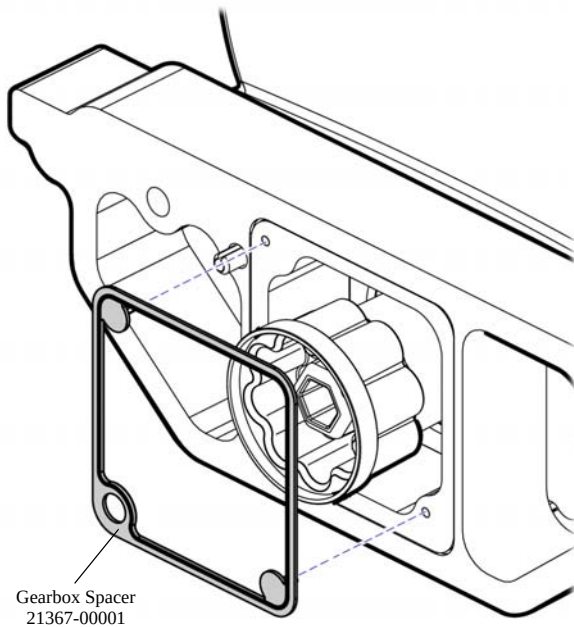


Figure 8-5: Align Gearbox Spacer Gasket

6. Align couplings and gearbox housing roll pins with chassis. (Roll pin on right not pictured.) See [Figure 8-6](#).

NOTICE

Although motor is shown out of position in [Figure 8-6](#) (to make couplings and roll pins visible), motor is still in place during this procedure.

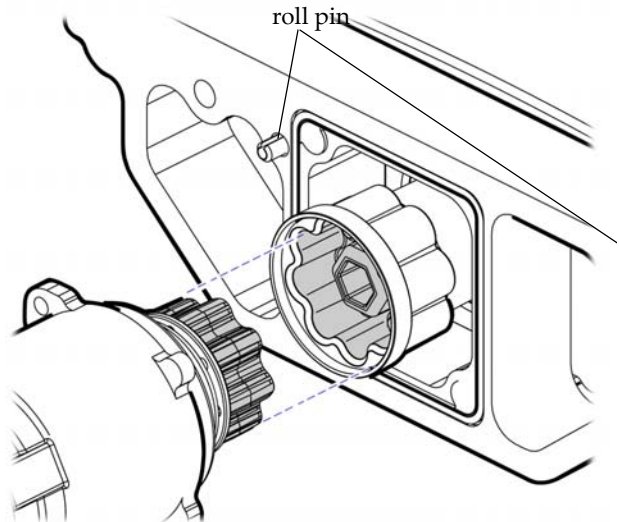


Figure 8-6: Align Couplings and Gearbox Housing Roll Pins with Chassis

7. Check to ensure both gaskets are in good condition and properly located.
8. Inspect roll pins to ensure they are in place on the chassis and free of residue.
9. Using rubber mallet, *gently tap* gearbox outer cover at locations indicated by arrows in [Figure 8-7](#) to seat gearbox against chassis until mating surfaces are flush. Alternate strike points from side to side for even seat.

CAUTION

DO NOT STRIKE THE FLANGE OR GEARBOX!



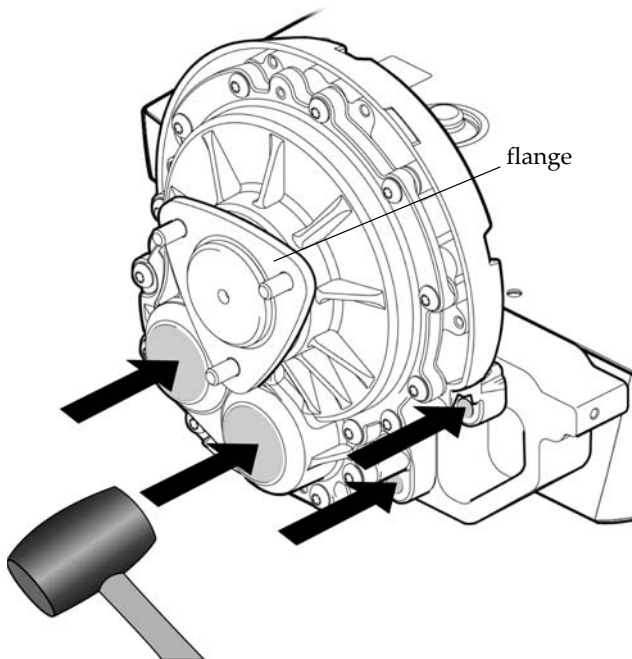


Figure 8-7: Tap Gearbox to Seat Against Chassis

NOTICE

Do not use gearbox fasteners to seat gearbox to chassis. Make sure gearbox and spacer are completely seated prior to tightening gearbox to specified torque. Failure to do so could result in stripped chassis holes.

10. Install (3) *new* gearbox fasteners (20537-00002). Thread in by hand, and then torque to 40 N-m using T-45 6-lobe wrench with 3/8"-drive socket. See [Figure 8-8](#).

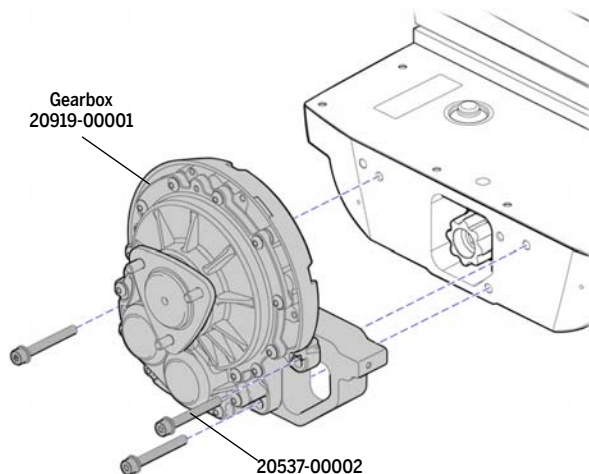


Figure 8-8: Install Gearbox Fasteners

11. Reinstall fascia trim ([page 6-4](#)).

12. Reinstall gearbox trim cover ([page 6-5](#)).

13. (Model i2) Reinstall fender ([page 5-3](#)).

(Model x2) Reinstall fender ([page 5-4](#)) and fender frame ([page 5-5](#)).

14. Reinstall appropriate tire/wheel assembly:

- Model i2 ([page 4-3](#))
- Model x2 ([page 4-4](#))
- Model x2 Turf ([page 4-5](#))

15. Reinstall mats ([page 2-3](#)).

16. Reinstall LeanSteer frame ([page 1-6](#)).

17. Perform post-service tests ([page A-1](#)).

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9. Console

This chapter describes removal and installation procedures for the console and related components on a Gen 2 Segway PT.

The following warnings apply to instructions in this Section 9 regarding the Console:

Applies to Models

i2, x2, x2 Turf

Qualifications

Certified Service Technician

Required Tools

- Torque wrench, 5mm drive
- T-20 6-lobe wrench
- T-25 6-lobe wrench
- T-27 6-lobe wrench
- T-30 6-lobe wrench
- Hex wrench, 2mm
- Hex wrench, 2.5mm
- Hex wrench, 3mm
- Hex wrench, 5mm
- Loctite 20-gauge taper tip
- Tube of Loctite 127864XB RTV sealant
- Caulking gun
- UIC cover extraction tool

⚠ WARNING



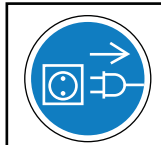
Read all instructions.

Failure to do so could result in serious injury or death.



Power off the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.



Unplug the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

⚠ CAUTION



Finger or hand hazard.

Failure to follow these instructions could cause personal injury.

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

When to Replace

When the brass insert is damaged, the entire console must be replaced. See [Figure 9-2](#).



Console components are shown in [Figure 9-1](#).

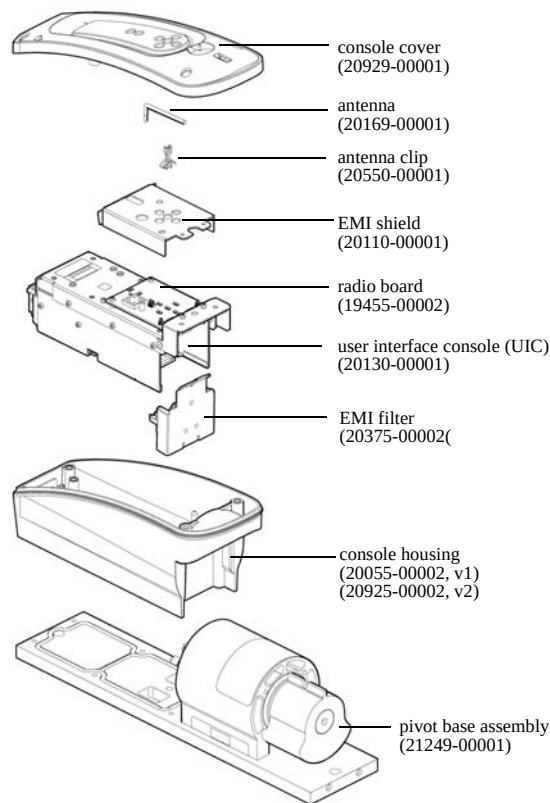


Figure 9-1: Console Components

Before Servicing the Console

All PT models have been manufactured with one of two revisions of the console housing and cover. The revision is determined by the part number of the housing, which is located on the forward part of the housing and is visible after the cover is removed. The console housing part numbers for each revision are as follows:

- First Revision: 20055-00002
- Second Revision: 20925-00002

NOTICE

First-revision console housing cover parts are no longer manufactured or supported. First-revision components are not compatible with second-revision components; similarly, second-revision components are not backward compatible with first-revision components. AS A RESULT, IF ANY FIRST-REVISION CONSOLE HOUSING, GASKET, OR COVER IS DAMAGED, THE COVER, GASKET, HOUSING, AND TRIM MUST ALL BE REPLACED USING THE CURRENT (SECOND) REVISION.

Console Cover Removal and Installation

The console cover is rarely replaced. It is typically removed only when you need to access other console components, and may be reinstalled if no damage occurs to the console cover and gasket during removal.

The console cover is sealed to the console using RTV silicone sealant. Peeling up of the console cover is accomplished by overcoming the adhesion of the RTV sealant. Damage can occur to the cover and/or gasket during removal, so extreme care is needed during the removal process. If damaged, replacement with a new cover or gasket will be necessary.

To remove console cover:



1. Make sure Segway PT is powered off and unplugged.
2. Remove console cover trim ([page 6-6](#)).
3. Depending on revision, use T-20 or T-25 6-lobe wrench to remove (4) screws holding console cover to console housing. See [Figure 9-2](#).

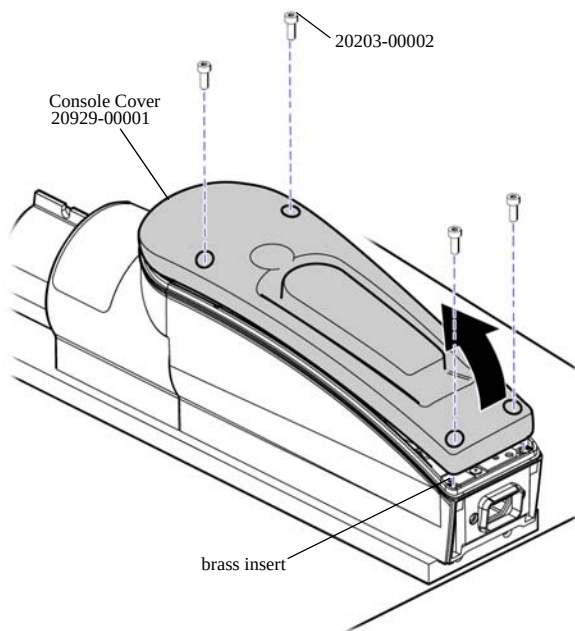


Figure 9-2: Remove or Install Console Cover

4. Carefully pry off the console cover using the UIC cover extraction tool (21813-00001) designed for this purpose ([Figure 9-3](#)). You

can purchase this tool and instructions from Segway.



Figure 9-3: UIC Cover Extraction Tool (21813-00001)

CAUTION

Because console cover was installed using RTV sealant, cover strongly adheres to console. Take care to pry cover loose slowly from console to avoid damaging cover and gasket.



5. Inspect the UIC housing assembly for damage. Housings with brass inserts that have stripped loose during disassembly must be replaced; the integrity of these brass inserts is critical to obtaining a correct environmental seal between the housing and the cover.

To install console cover:



1. Make sure Segway PT is powered off and unplugged.
2. To prevent gasket from falling out when cover is tipped during installation, apply even bead of Loctite 127864XB RTV sealant only into gasket channel in cover, using a 20-gauge (0.32in. / 0.8mm) tip. Lay gasket into RTV bead and press lightly to seat.

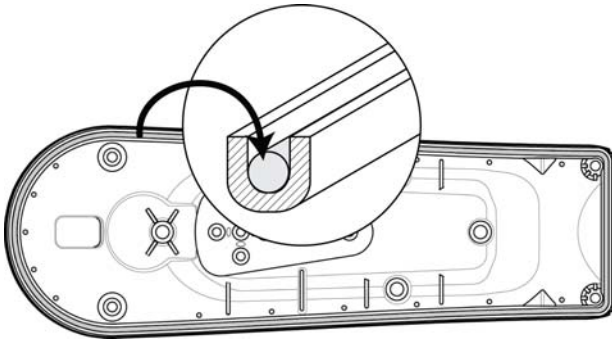


Figure 9-4: Apply Bead of RTV Silicone Sealant

3. Install a 14-gauge (0.64in. / 1.6mm) tip on RTV tube and lay a smooth, continuous bead of sealant over entire top of gasket, leaving no gaps over entire perimeter. See [Figure 9-5](#).

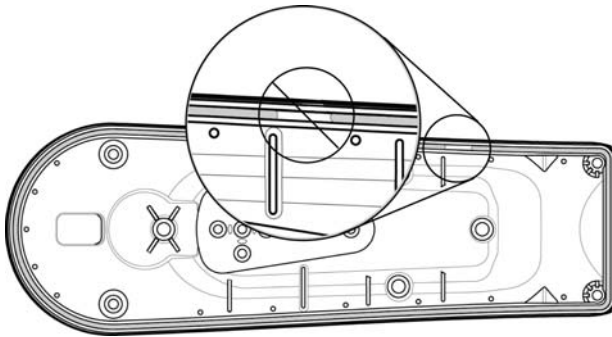


Figure 9-5: Apply Bead of RTV Silicone Sealant

4. Place console cover on housing, install fasteners (20203-00002), and torque to 2.6 N-m.

CAUTION

RTV silicone sealant is necessary to ensure water-tight seal between console housing and cover. Improper installation of sealant or cover could result in damage to electronics inside unit. RTV sealant must cure for at least 24 hours prior to exposure to a wet environment.

5. Perform post-service tests ([page A-1](#)).

EMI Shield Removal and Installation

It is necessary to remove the electromagnetic interference (EMI) shield to gain access to the diagnostic interface connectors on the console radio board. When replacing the user interface console (UIC), the replacement UIC will include the EMI shield. There should be no reason to replace the EMI shield alone.

To remove EMI shield:



1. Make sure Segway PT is powered off and unplugged.
2. Remove console cover ([page 9-4](#)).
3. Remove the radio's antenna by lifting up while twisting gently until it unseats from the radio board.
4. Depending upon revision, use a 2mm or 2.5mm wrench to remove the four (4) M3 x 6 button head cap screws holding the electromagnetic interference (EMI) shield to the UIC. See [Figure 9-6](#).

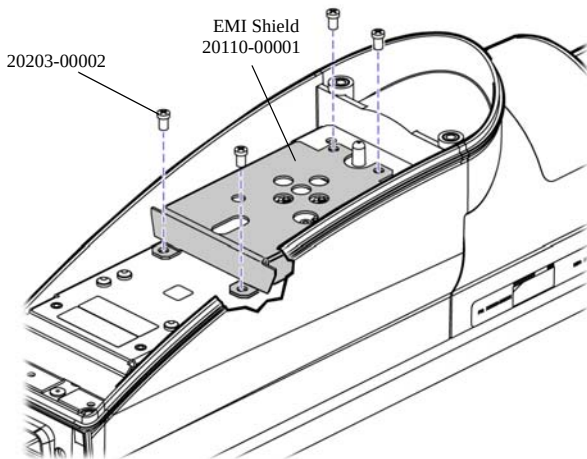


Figure 9-6: Remove or Install EMI Shield



DISCARD FASTENERS AFTER REMOVAL! DO NOT REUSE!

5. Carefully lift the EMI cover up and away from the radio board assembly.
6. When instructed by Diagnostics manual, connect diagnostic equipment to Service Header A and Service Header B connectors on console radio. See [Figure 9-7](#).

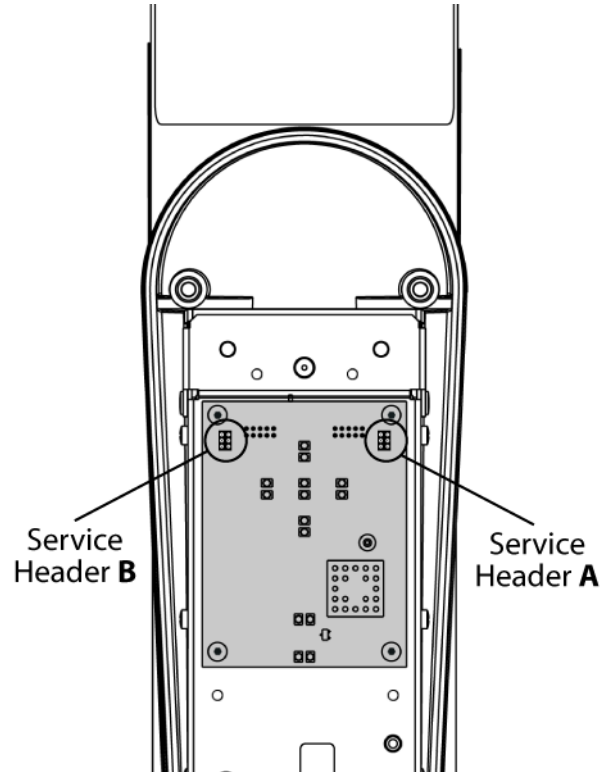


Figure 9-7: Connect Diagnostic Equipment to Connectors on Console Radio

To install EMI shield:



1. Make sure Segway PT is powered off and unplugged.
2. Disconnect diagnostic equipment.
3. Seat EMI shield on UIC. Thread (4) cap screws (20203-00002) through holes in EMI shield to pivot base. Using 2.5mm 6-lobe wrench, drive each screw and torque to 2.6 N-m. See [Figure 9-6](#).
4. Perform post-service tests ([page A-1](#)).



Radio Board Removal and Installation

NOTICE

Radio boards are electronically bound to the serial number of the PT and must be ordered from Segway, pre-programmed for the specific serial number of the PT that is being serviced; otherwise, the InfoKey will not start the unit.

To remove radio board:



1. Make sure Segway PT is powered off and unplugged.
2. Remove the PT battery packs ([page 3-3](#)).
3. Remove console cover ([page 9-4](#)).
4. Remove EMI shield and antenna ([page 9-6](#)).
5. Depending upon the revision, use a 2mm or 2.5mm wrench to remove the four (4) M3 x 6 button head cap screws holding the radio board to the UIC.



DISCARD FASTENERS AFTER REMOVAL! DO NOT REUSE!

6. Gently pull the radio board up and away from the UIC. Package the radio board for return to customer because it cannot be reused. Place radio board in ESD bag or on clean ESD work surface.

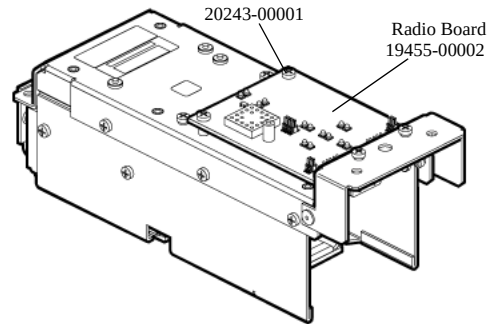


Figure 9-8: Remove or Install Radio Board

7. Verify that the serial number of the PT matches the serial number printed on the packaging for the replacement radio board.

NOTICE

Retain replacement part packaging to use as packaging for returning original radio board to customer (upon customer request).

To install radio board:



1. Make sure Segway PT is powered off and unplugged with batteries removed.
2. Align radio board connectors with mating connectors on the UIC. Apply pressure first at the front of the radio board to seat the connectors, then gently press board into place.

NOTICE

Do not force the board into place; it should fit easily with only light pressure.

3. Insert 4 M3 x 6 fasteners (20243-00001). Use a 2.5mm wrench to drive each screw and torque to 0.8-1.0 N-m. See [Figure 9-8](#).
4. Install EMI shield and antenna ([page 9-6](#)).

5. Install console cover ([page 9-4](#)).
6. Install battery packs ([page 3-3](#)).
7. Perform post-service tests ([page A-1](#)).

User Interface Console (UIC) Removal and Installation

All electronic components in the Segway PT are redundant (A and B) for safety. The A and B connectors are differently sized to ensure proper connection when installing. The UIC contains the console radio and charge port power supply.

⚠ WARNING

If no Hi-Pot and Ground Bond Tester is available, the removal and installation of the UIC should not be performed as the consequence of not being able to test could lead to serious injury, death, and/or damage to the Segway PT.

When to Replace

Replace the UIC when directed to do so by a Segway Service Representative.

The console radio is electronically bound to the other electronics inside the power base and the Wireless InfoKey controller. Replacement of the UIC assumes interaction with G2SART.

To remove UIC:



1. Make sure Segway PT is powered off and unplugged.
2. Remove console cover ([page 9-4](#)).
3. Use T-20 6-lobe wrench to remove (4) fasteners holding UIC to console housing.

4. Use 2.5mm hex wrench to remove (2) M2.5 fasteners from rear on either side of charge port. See [Figure 9-9](#).

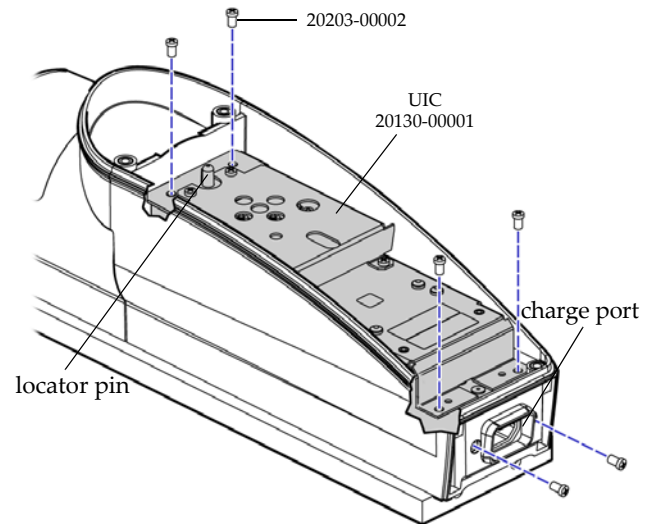


Figure 9-9: Remove or Install UIC

5. Slide IEC connector away from gasket.

⚠ CAUTION



Failure to follow these instructions could lead to injury.

6. Lift UIC straight up until clear of locator pin (refer to 1 in [Figure 9-10](#)).

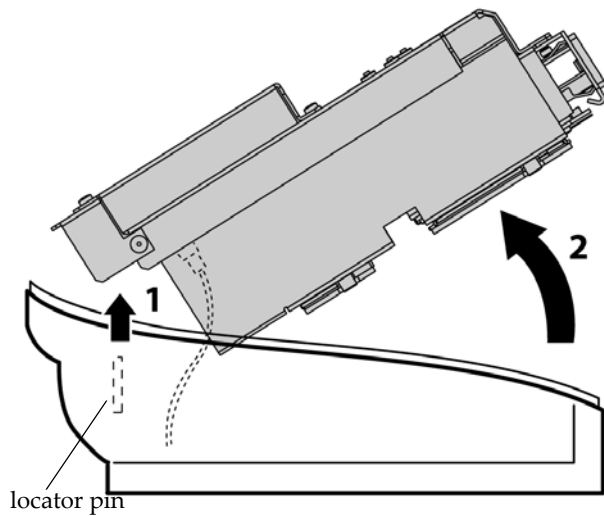


Figure 9-10: Lift or Lower UIC Over Locator Pin

7. Angle UIC upward from rear (refer to 2 in [Figure 9-10](#)) to expose UIC connectors to A and B CU harnesses. While pressing connector locking tabs, gently remove connectors to disconnect. Do not strain harnesses. See [Figure 9-11](#).

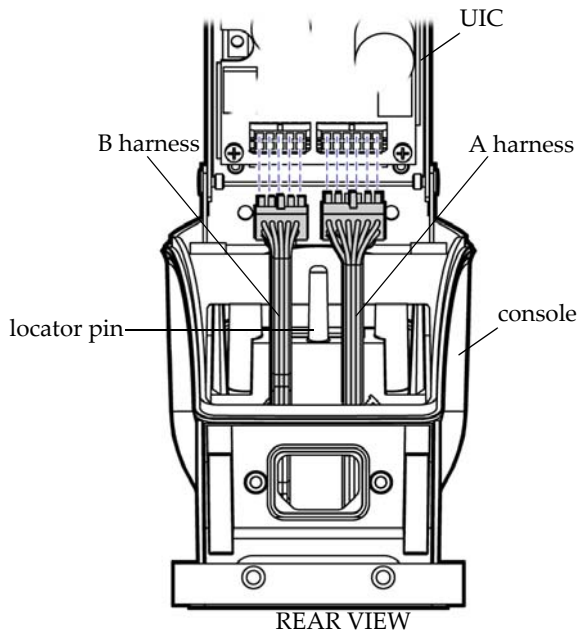


Figure 9-11: Disconnect or Connect A and B Harnesses

8. Lift off UIC and place in ESD bag or on clean ESD work surface.

To install UIC:



1. Make sure Segway PT is powered off and unplugged.
2. Inspect harnesses for damage to insulation or kinks. Ensure connector locking mechanism is intact.

CAUTION

If harness wires are pinched or exhibit insulation damage or the connector is damaged so as to prevent positive locking upon installation, the harness must be replaced.

3. Orient UIC in console housing. Make sure CU harnesses are properly positioned in plastic guide clips to prevent crushing of harnesses.
4. To avoid crushing steering sensor harnesses, make sure harnesses are properly positioned in channel around UIC mounting bosses. See [Figure 9-12](#).
5. Be sure retention putty is installed and keeps harness seated correctly around bosses.
6. Connect (2) CU harness connectors to front of UIC.
7. Orient hole in UIC over locator pin (refer to 1 in [Figure 9-10](#)) and lower UIC into console housing, taking care to fold harnesses into void without pinching.

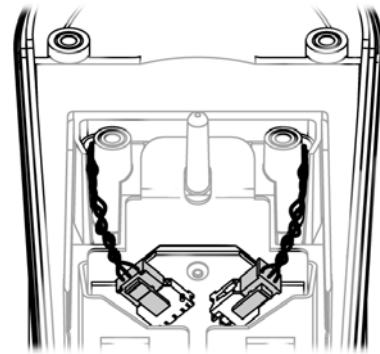


Figure 9-12: Position Harnesses in Channel



NOTICE

The CU harness connectors are different sizes to facilitate attachment to correct harness.

8. Thread (4) SHCS, M4 x 0.7 x 16, 6-lobe screws (20203-00002) through top of UIC into console housing. Refer to (B) in [Figure 9-9](#).
9. Using a T-20 6-lobe wrench, drive each screw and torque to 1.8 N-m.
10. Inspect the gasket at inside of charge port ([Figure 9-9](#)) to ensure it is not damaged. If damaged, replace console housing.
11. Thread (2) SHCS, M3 x 0.5 x 10, self-sealing, hex screws (20477-00001) through UIC into rear of console housing. Inspect for gasket at screw head to shank. If damaged or missing, replace fastener. See [Figure 9-9](#).

WARNING

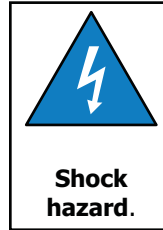
Damaged gasket could lead to ingress, shock hazard, or both.



12. Using 2.5mm hex wrench, drive each screw and torque to 0.7 N-m.
When properly torqued, these fasteners seal gap between charge port gasket and console housing..
13. Reinstall EMI shield and antenna, if necessary ([page 9-6](#)).
14. Reinstall console cover ([page 9-4](#)).
15. Perform post-service tests ([page A-1](#)).

Hi-Pot and Ground Bond Test Operation

WARNING



Only personnel who have been trained on Hi-Pot and Ground Bond test equipment should perform these tests. Use of Hi-Pot and Ground Bond test equipment by untrained personnel can result in electrocution. If Hi-Pot and Ground Bond test equipment is

not available, these components should not be replaced.

Hi-Pot and Ground Bond tests must be performed after installation of UIC. For more information, see *Segway Hi-Pot Tester* document 21172-00001, Section 5.

1. Verify testers' parameter settings are configured correctly.
2. Connect line cord (Internal Electric Technical commission (IEC) cable from tester) to device under test (DUT) and attach two alligator-clip leads to each side of chassis.
3. Using precautions for high voltage, remove hands from all leads. Move back, away from the DUT. Start test. Tests complete in this order: Hi-Pot Ground Continuity, Hi-Pot, and Ground Bond.
4. Testers should indicate a PASS condition. A continuous alarm tone indicates a FAIL condition. Press red STOP button on testers. If both tests pass, stamp "HP OK" on chassis.
5. Disconnect line cord and alligator-clip leads from DUT.

EMI Filter Removal and Installation

When to Replace

Replace the electromagnetic interference (EMI) filter when directed to do so by the *Segway PT i2, x2 Diagnostics Guide*, or as advised by a Segway Service Representative.

To remove EMI filter:



1. Make sure Segway PT is powered off and unplugged.
2. Remove console cover and set aside (page 9-4).
3. Lift off UIC and place in ESD bag or on clean ESD work surface (page 9-9).
4. Disconnect (2) steering sensor harness connectors at top of EMI filter. Keep retention putty for reuse during installation. While pressing connector locking tabs, gently remove connectors to disconnect. Do not strain harnesses. See Figure 9-13.

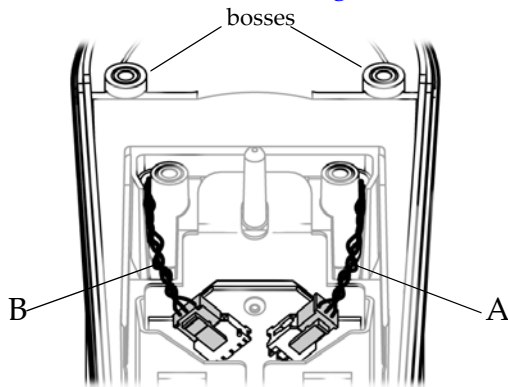


Figure 9-13: Disconnect or Connect Steering Sensor Harnesses

NOTICE

If connector locking tab breaks off or if insulation is damaged or pinched, replacement of the steering sensor is required.

5. Use T-30 6-lobe wrench to remove (1) center screw that anchors pivot base assembly to

chassis and secures EMI filter to bottom of console housing. See Figure 9-14.

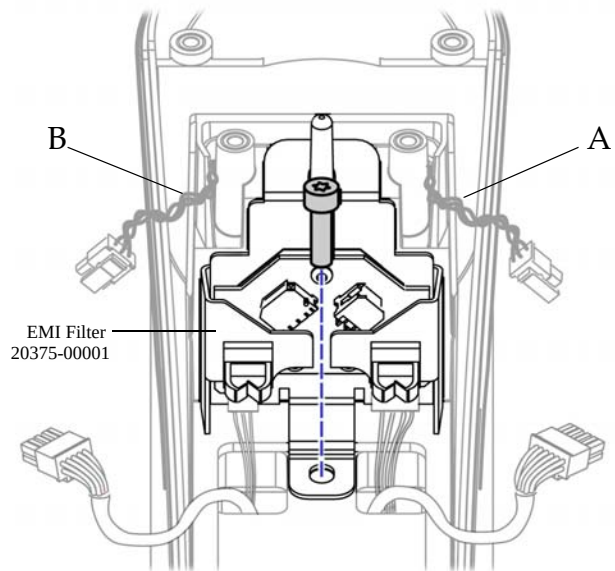


Figure 9-14: Remove or Install EMI Filter Screw

6. Lift EMI filter off locator pin and disconnect (2) balance sensor assembly harness connectors from bottom of EMI filter by holding down locking tab on connector. See [Figure 9-15](#).

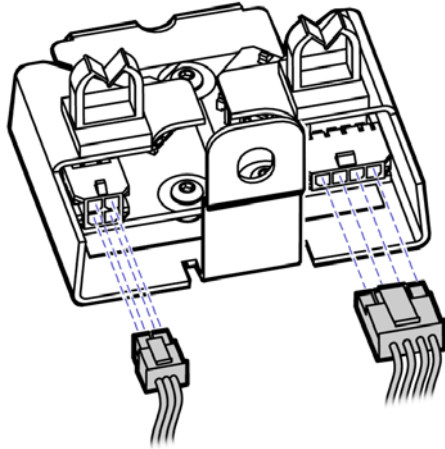


Figure 9-15: Disconnect or Connect Balance Sensor Assembly Harness Connectors

4. Seat EMI filter in place over locator pin. Thread (1) SHCS, M6 x 1 x 30, SEMS, 6-lobe fastener (20539-00001) through EMI filter and base plate into chassis cover. See [Figure 9-14](#).
5. Route and connect (2) steering sensor harnesses around bosses as shown in [Figure 9-13](#). Proper routing ensures cables will not be pinched when you install console cover. Reinstall retention putty to hold harnesses in place.
6. Using T-30 6-lobe wrench, drive each screw and torque to 11.0 N-m.
7. Perform post-service tests ([page A-1](#)).

7. Unseat BSA harnesses from plastic positioning clips.
8. Set aside EMI filter and place in ESD bag or on clean ESD work surface.

To install EMI Filter:



1. Make sure Segway PT is powered off and unplugged.
2. Any PT without ferrite cores must be retrofitted with ferrites upon reassembly. One small ferrite core (21270-00001) is placed on each BSA harness between chassis cover and EMI filter. One large ferrite core (21271-00001) is placed on B side CU harness (10-pin connector) between chassis cover and UIC.

NOTICE

Ferrite cores can physically impede installation of new UIC. Take special care to correctly place ferrite cores and route cables to avoid damage or pinching when installing UIC.

3. Position EMI filter and connect (2) balance sensor assembly harness connectors. See [Figure 9-15](#).

Pivot Base Assembly Removal and Installation

The pivot base assembly consists of the pivot base, gaskets (2), and pivot assembly (pivot and steering sensor), as shown in [Figure 9-16](#).

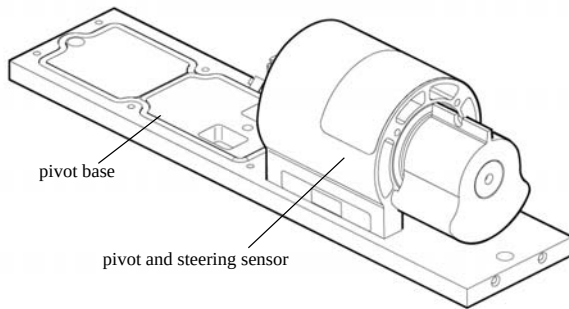


Figure 9-16: Pivot Base Assembly Components

When to Replace

Replace the pivot base assembly when directed to do so by a Segway Service Representative.

The pivot base assembly components are not field serviceable. If you determine that the pivot base assembly is either defective or damaged, the entire pivot base assembly must be replaced as a unit.

To remove pivot base assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Establish a serviceable power base ([page 7-1](#)).
3. Remove console cover and set aside ([page 9-4](#)).
4. Remove UIC and set aside ([page 9-9](#)).
5. Remove EMI filter and set aside ([page 9-12](#)).
6. Use T-30 6-lobe wrench to remove (2) screws that anchor base plate to chassis (see [Figure 9-16](#)).
7. Carefully remove large ferrite core from CU harness and small ferrite cores from BSA harnesses.

NOTICE

Do not damage ferrites because they must be reinstalled. If no ferrite cores are present, see in [step 8](#) on page 9-15. Damaged ferrites must be replaced.

8. Lift pivot base straight up, feeding harnesses through holes. Viewing from the rear of the chassis, the harness connections should be as follows:
 - Left side: 10-pin harness and a smaller harness with purple wires.
 - Right side: 12-pin harness and a smaller harness with orange wires.

See [Figure 9-17](#).

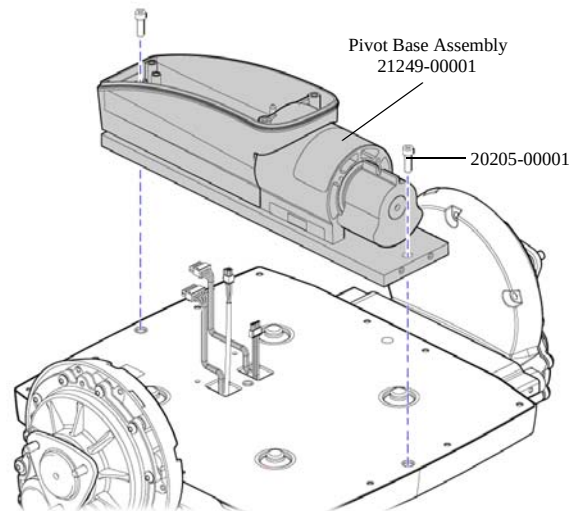


Figure 9-17: Remove Pivot Base Assembly (with Console Housing Attached)

9. Feed harnesses down through holes in pivot base to remove console housing.
10. Inspect gasket to ensure it is clean and in good condition.
11. Remove pivot base assembly.
12. Remove console housing ([page 9-16](#)).



To install pivot base assembly:



1. Make sure Segway PT is powered off and unplugged.
2. Install console housing ([page 9-16](#)).
3. With pivot base angled straight up, guide (4) harness connectors through bottom of base plate. See [Figure 9-17](#).
4. Thread (2) SHCS, M6 x 1 x 20, 6-lobe screws (20205-00001) through base plate and chassis cover into chassis.
5. Inspect harnesses to ensure proper alignment.
6. Using T-30 6-lobe wrench, drive each screw and torque to 11.0 N-m.
7. Install EMI filter ([page 9-13](#)).
8. Any PT without ferrite cores must be retrofitted with ferrites upon reassembly. One small ferrite core (21270-00001) is placed on each BSA harness between chassis cover and EMI filter. One large ferrite core (21271-00001) is placed on B side CU harness (10-pin connector) under UIC.

NOTICE

Ferrite cores can physically impede installation of new UIC. Take special care to correctly place ferrite cores and route cables to avoid damage when installing UIC.

9. Install UIC ([page 9-10](#)).
10. Install console cover ([page 9-5](#)).
11. Perform post-service tests ([page A-1](#)).

Console Housing Removal and Installation

The console housing contains the UIC and EMI filter.

When to Replace

Replace the console housing if (including and without limitation):

- It is cracked or otherwise physically damaged.
- The charge port gasket is damaged.

To remove console housing:



1. Make sure Segway PT is powered off and unplugged.
2. Remove pivot base assembly ([page 9-14](#)).
3. Depending on revision, use T-20 6-lobe wrench or 3mm hex wrench to remove (6) screws that attach base plate to console housing. See [Figure 9-18](#).

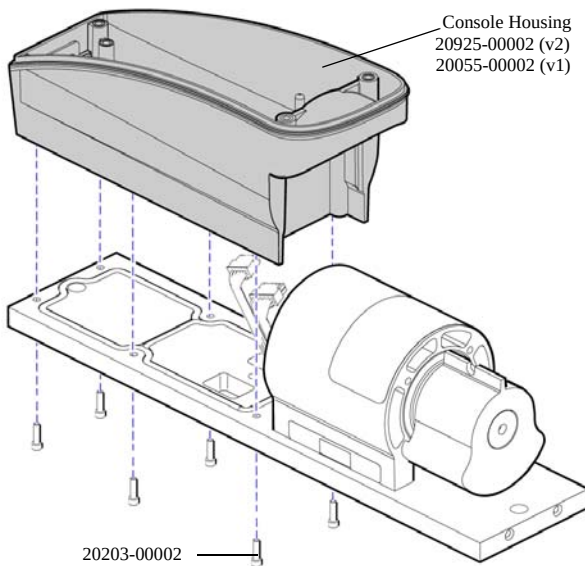


Figure 9-18: Remove and Install Console Housing

4. Remove console housing.

NOTICE

If the inserts or plastic are damaged, the console housing must be replaced.

To install console housing:



1. Make sure Segway PT is powered off and unplugged.
2. Thread (6) SHCS, M4 x 0.7 x 16, 6-lobe screws (20203-00002) through base plate into console housing. See [Figure 9-18](#).
3. Using a T-20 6-lobe wrench, drive each screw and torque to 1.0 N-m.
4. Perform post-service tests ([page A-1](#)).

NOTICE

First-revision console housing cover parts are no longer manufactured or supported. First-revision components are not compatible with second-revision components; similarly, second-revision components are not backward compatible with first-revision components. AS A RESULT, IF ANY FIRST-REVISION CONSOLE HOUSING, GASKET, OR COVER IS DAMAGED, THE COVER, GASKET, HOUSING, AND TRIM MUST ALL BE REPLACED USING THE CURRENT (SECOND) REVISION.





10. Chassis Cover

This chapter describes removal and installation procedures for the chassis cover on a Gen 2 Segway PT.

The following warnings apply to instructions in this Section 10 regarding the Chassis Cover:

WARNING



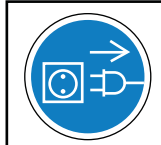
Read all instructions.

Failure to do so could result in serious injury or death.



Power off the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.



Unplug the Segway PT.

Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

Applies to Models

i2, x2, x2 Turf

Qualifications

Certified Service Technician

Technician Replaceable Parts

Chassis Cover (20316-00001)

Chassis cover, i2 with warning label (no fasteners included)

Chassis Cover Fastener (20540-00001)

(12) Chassis fasteners

Required Tools

- T-27 6-lobe wrench

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

When to Replace

Under most circumstances, the chassis cover is removed to service the machine or components in the power base, and is reused to cover the power base during reassembly. It is appropriate to replace the chassis cover with a new one if either of the following symptoms are present:

- When the edge gasket or the bolt gasket is torn.
- When the cover is bent or warped.
- When the rider detect button is damaged.

CAUTION

The edge gasket must be capable of maintaining a seal between the cover and chassis interface. Damage to edge gasket requires replacement of cover.

Chassis Cover Removal and Installation

To remove chassis cover:



1. Make sure Segway PT is powered off and unplugged.
2. Establish a serviceable power base ([page 7-1](#)).
3. Remove pivot base assembly ([page 9-14](#)).
4. Use T-27 6-lobe wrench to remove (12) screws that attach chassis cover to chassis. See [Figure 10-1](#).



DISCARD FASTENERS AFTER REMOVAL! DO NOT REUSE!

5. Feed harnesses down through holes in cover.
6. Remove chassis cover.

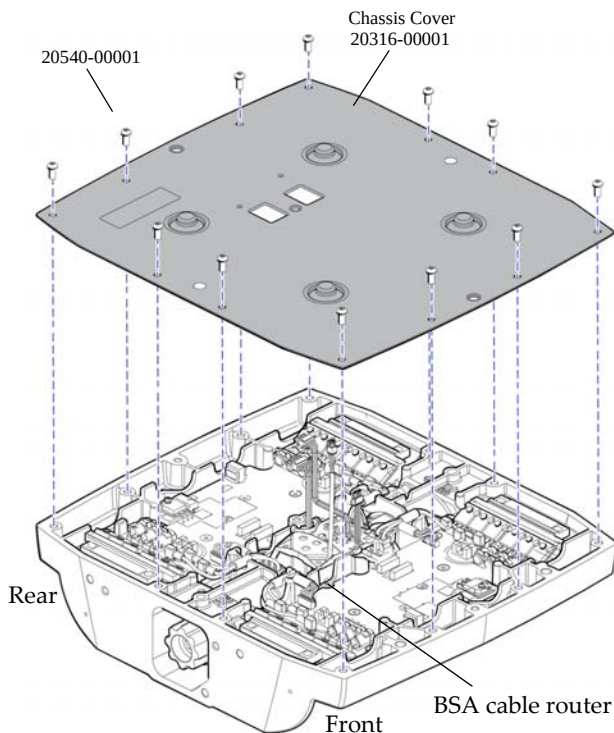


Figure 10-1: Remove or Install Chassis Cover

To install chassis cover:

CAUTION

Make sure motor and BSA harnesses are seated in notches in chassis and cable router so that they cannot be pinched when cover is installed.



1. Make sure Segway PT is powered off and unplugged.
2. To ensure proper installation torque of new fasteners, completely remove thread lock compound from power base fastener holes and mating surfaces and clean so that gasket contacts aluminum. Use cotton swabs, first with window cleaner, then with isopropyl alcohol.
3. Orient cover so that openings for harnesses are toward rear and warning label is on right-hand side.



4. Ensure that wires are correctly routed through BSA cable router. Feed up CU and BSA harnesses through holes in cover. See [Figure 10-2](#).

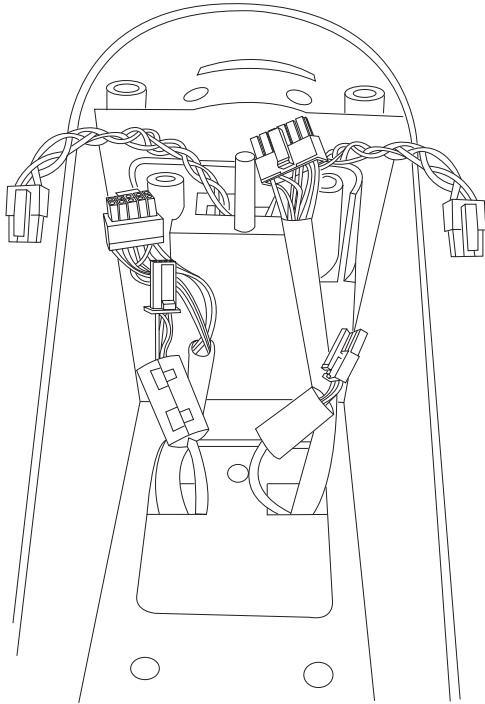


Figure 10-2: BSA Cable Orientation

5. Reinstall ferrite cores. See [Figure 10-3](#).

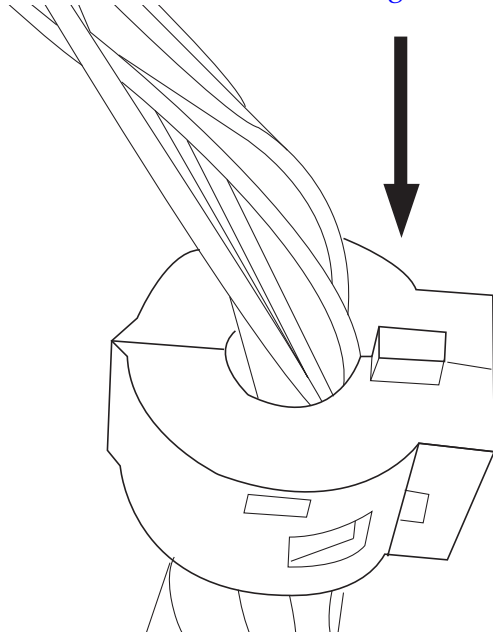


Figure 10-3: Ferrite Core

6. Viewing from the rear of the chassis, the cable connections should be as follows:
 - Left side: 10-pin connector and a smaller connector with purple wires.

- Right side: 12-pin connector and a smaller connector with orange wires.

See [Figure 10-4](#).

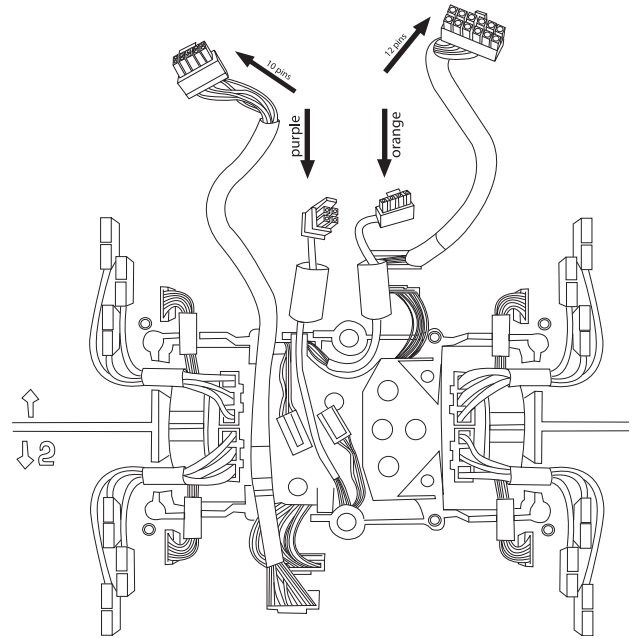


Figure 10-4: Cable Connections

7. Install cover and thread (12) *new* BHCS, M6 x 1.0 5x14, 6-lobe screws (20540-00001) through chassis cover into chassis. See [Figure 10-1](#).
8. Using a T-27 6-lobe wrench, drive each screw and torque to 6.0 N-m.
9. Perform post-service tests ([page A-1](#)).



11. CU Board

This chapter describes troubleshooting, removal, and installation procedures for the control unit (CU) boards on a Gen 2 Segway PT.

The following warnings apply to instructions in this Section 11 regarding the CU Board:

Applies to Models

i2, x2, x2 Turf

Qualifications

Certified Service Technician

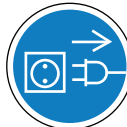
Technician Replaceable Parts

CU Board (20807-00001)

Gen 2 controller board

Required Tools

- T-10 torque wrench
- T-10 6-lobe wrench
- Small flathead screwdriver

 WARNING		
 Read all instructions. Failure to do so could result in serious injury or death.	 Power off the Segway PT. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	 Unplug the Segway PT. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.
 Remove battery packs. Failure to do so could result in serious injury or death or damage to property.		

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

When to Replace

Replace a CU board when diagnostic testing determines the board is defective. For diagnostic procedures, contact a Segway Service Representative.



CU Board Removal

To remove CU board:



1. Make sure Segway PT is powered off and unplugged.
2. Establish a serviceable power base ([page 7-1](#)).
3. Remove pivot base assembly ([page 9-14](#)).
4. Remove chassis cover ([page 10-3](#)).
5. Disconnect (2) CU motor harnesses from motors (one per motor). See [Figure 11-1](#).

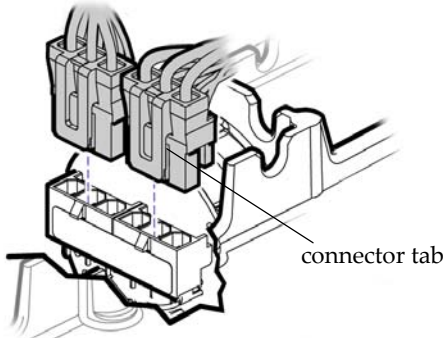


Figure 11-1: Disconnect CU Motor Harness from Motor

6. Use small flathead screwdriver to gently lift tab on connector, and then carefully pull on connector to unseat. See [Figure 11-2](#).

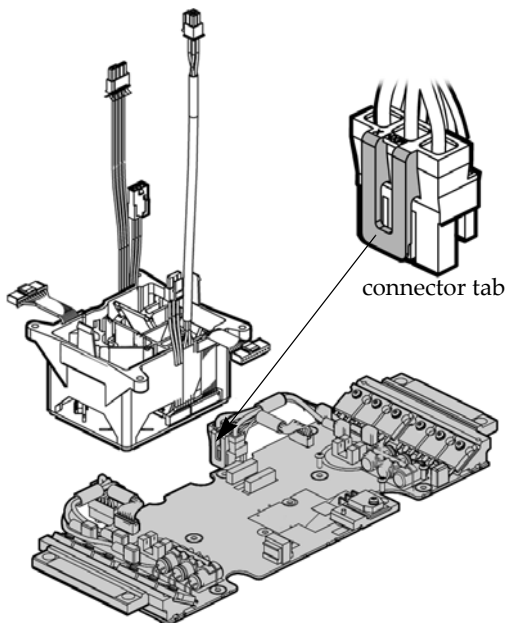


Figure 11-2: Pry Connector Tab

7. Disconnect balance sensor assembly harness and CU harness from CU board by squeezing plastic tab on connector and gently pulling connector. See [Figure 11-3](#).
8. Use a T-10 6-lobe torque wrench to remove 14 self-tapping screws that mount the CU board to the chassis. See [Figure 11-4](#).



DISCARD FASTENERS AFTER REMOVAL! DO NOT REUSE!

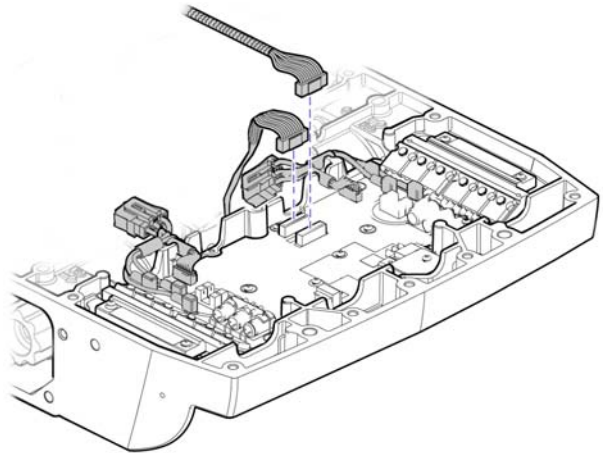


Figure 11-3: Disconnect Harnesses from CU Board

9. Grasp CU board on edge of heat sink and lift from chassis. See [Figure 11-4](#).

Grasp board by edges when removing

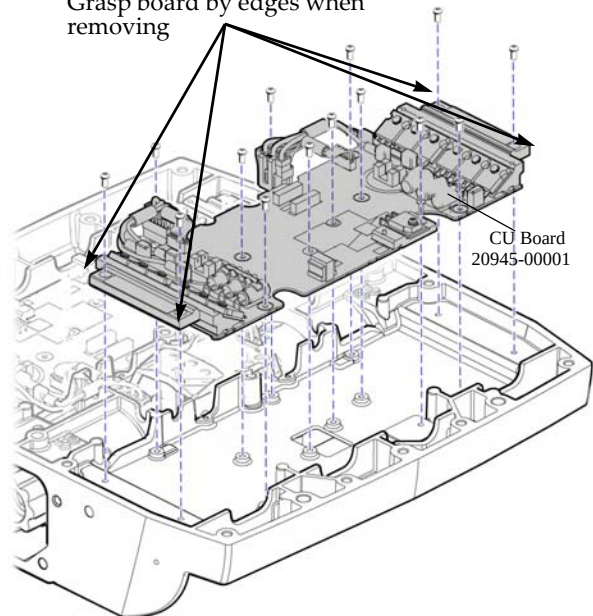


Figure 11-4: Remove CU Board



10. Using proper ESD practices, place CU board in static bag for return shipment pursuant to terms and conditions of Segway PT warranty or other established procedures.

CU Board Installation

To install CU board:



1. Make sure Segway PT is powered off and unplugged.
2. Inspect and verify that chassis is clear of debris.
3. Make sure mating surface (underside of heat sink) is clean. While handling CU board by its edges, position board in chassis and securely seat board against chassis.
4. Thread (14) M3 x 0.5 x 8 (20973-00001) through CU board into chassis. See [Figure 11-5](#).



For installation, use only Segway approved fasteners.

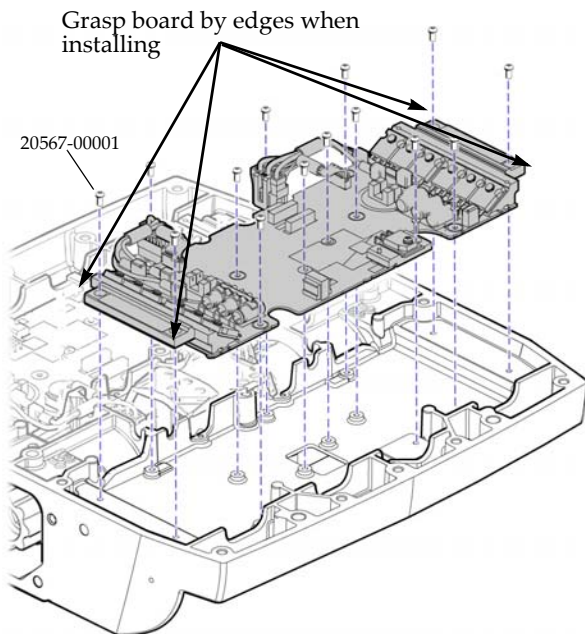


Figure 11-5: Install CU Board

5. Using T-10 6-lobe wrench, drive each screw and torque to 1.6 N-m.
6. Connect balance sensor assembly harness and CU harness to socket on CU board. See [Figure 11-6](#).



CAUTION

CU harnesses are different lengths. Short CU harness connects to the A side of CU board (rear) and long CU harness connects to B side of CU board (front).

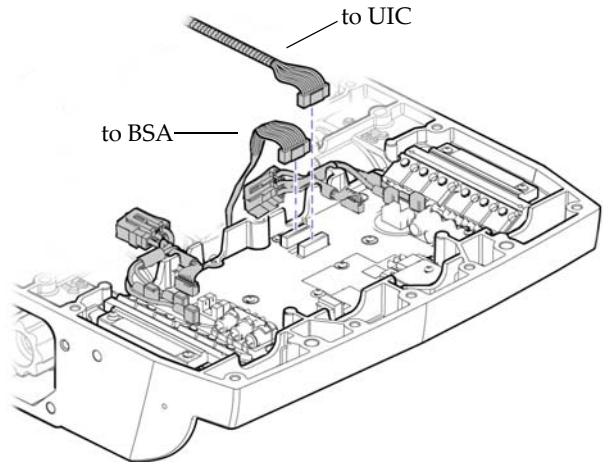


Figure 11-6: Connect Harnesses to CU Board

7. Connect (2) CU motor harnesses to motors (one per motor). Rotate each harness as you insert connector so that smaller gauge wires are beneath larger gauge wires. Make sure clip locks over mating feature on motor connector. See [Figure 11-7](#).

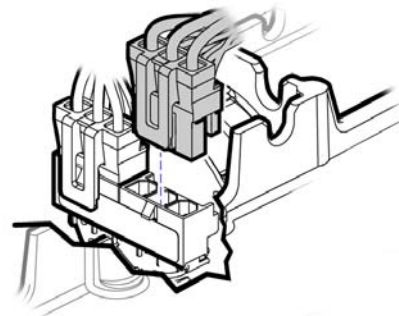


Figure 11-7: Connect CU Motor Harness to Motor

8. Locate abrasion protection sleeves and position so wires are protected as they pass through notches in chassis. See [Figure 11-8](#).

For installation, use only Segway approved fasteners.

CAUTION

Make sure motor and BSA harnesses are seated in notches in chassis and cable router so that they cannot be pinched when cover is installed.

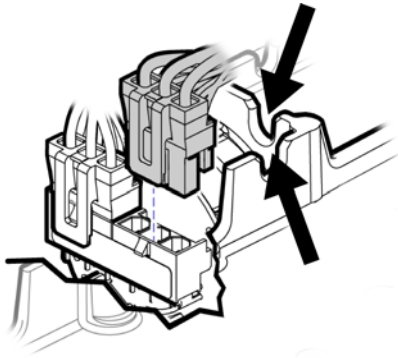


Figure 11-8: Place Wires in Abrasion Protection Sleeves

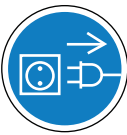
9. Perform post-service tests ([page A-1](#)).



12. Balance Sensor Assembly

This chapter describes removal and installation procedures for the balance sensor assembly (BSA) on a Gen 2 Segway PT.

The following warnings apply to instructions in this Section 12 regarding the Balance Sensor Assembly:

 WARNING		
 Read all instructions.	 Power off the Segway PT.	 Unplug the Segway PT.
Failure to do so could result in serious injury or death.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.
 Remove battery packs.		
Failure to do so could result in serious injury or death or damage to property.		

Applies to Models

i2, x2, x2 Turf

Qualifications

Certified Service Technician

Technician Replaceable Parts

Balance Sensor Assembly (19457-00002)

Fasteners not included

Balance Sensor Assembly Fastener
(20566-00001)

(4) Fasteners, pan-head, self-tapping,
M3 x 0.5 x 12

Required Tools

- T-10 torque wrench
- T-10 6-lobe wrench

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

When to Replace

Replace BSA when diagnostic testing determines the assembly is defective. For diagnostic procedures, contact a Segway Service Representative.



BSA Removal and Installation

To remove BSA:



1. Make sure Segway PT is powered off and unplugged.
2. Establish a serviceable power base ([page 7-1](#)).
3. Remove pivot base assembly ([page 9-14](#)).
4. Remove chassis cover ([page 10-3](#)). Disconnect (2) balance sensor assembly (BSA) harnesses from CU board sockets by squeezing plastic tab on connector and gently pulling connector.
5. Remove cables from BSA cable router.
6. Remove plastic BSA cable router (20532-00001). (See [Figure 12-1](#) for a close-up view.)

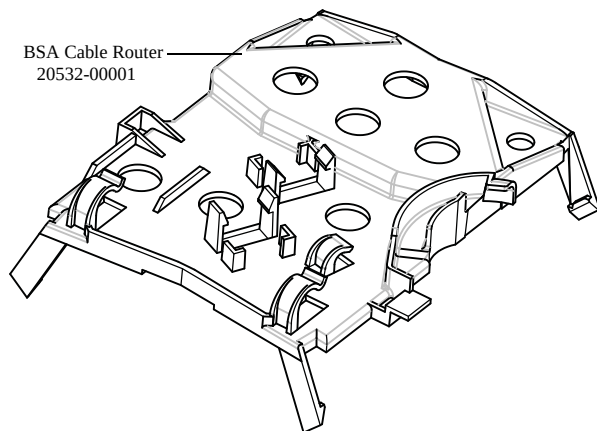


Figure 12-1: BSA Cable Router



7. Use T-10 6-lobe wrench to remove (4) pan-head, M3 x 0.5 x 12, self-tapping screws that attach balance sensor assembly to chassis. **DISCARD FASTENERS AFTER REMOVAL! DO NOT REUSE!**
8. Lift balance sensor assembly from chassis. Avoid touching circuit board located on bottom of balance sensor assembly.



9. If you are reusing this balance sensor assembly, place on appropriate anti-static surface or ESD bag.

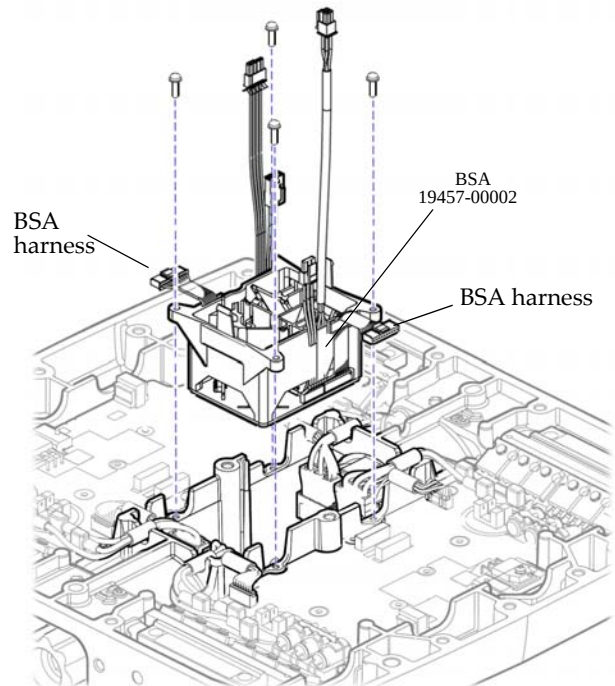


Figure 12-2: Disconnect Balance Sensor Assembly Harnesses from CU Boards

To install BSA:



1. Make sure Segway PT is powered off and unplugged.
2. Take new BSA from static bag and place BSA cable router on top. Place newly assembled BSA in chassis. Route cables into cable router. See [Figure 12-1](#).
3. Thread (4) pan-head, M3 x 0.5 x 12, non-self-tapping screws (20972-00001) through balance sensor assembly mounting tabs and into chassis. See [Figure 12-2](#).

For installation, use only Segway approved fasteners.

4. Using T-10 6-lobe wrench, drive each screw (20972-00001) and torque to 1.6 N-m.
5. Insert and seat (2) balance sensor assembly harnesses into A and B headers on CU board. See [Figure 12-2](#).



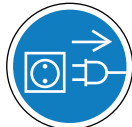
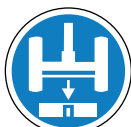
6. Perform post-service tests ([page A-1](#)).
7. Start machine before finishing assembly.



13. Motor

This chapter describes the removal and installation of a motor assembly on a Gen 2 Segway PT. Note there are two motors on the Segway PT.

The following warnings apply to instructions in this Section 13 regarding the Motor:

 WARNING		
 Read all instructions. Failure to do so could result in serious injury or death.	 Power off the Segway PT. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	 Unplug the Segway PT. Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.
 Remove battery packs. Failure to do so could result in serious injury or death or damage to property.		

Applies to Models

i2, x2, x2 Turf

Qualifications

Certified Service Technician

Technician Replaceable Parts

Motor with Coupling (21089-00001)

(2) Motor with coupling

Fasteners *not* included.

Fasteners (20536-00001)

(4) Fasteners, SHCS, M5 x 0.8 x 12

Drive Hub (21090-00001)

Elastomer Bushing (21091-00001)

Required Tools

- T-25 torque wrench
- T-20 6-lobe wrench
- Small flathead screwdriver

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

When to Replace

It is appropriate to replace a motor if the following symptoms are present:

- Motor source of noise
- Motor loose
- Motor cracked or damaged
- Elastomer damaged

Diagnostics determine whether the motor is defective. For diagnostic procedures, contact a Segway Service Representative



Motor Removal

To remove motor:



1. Make sure Segway PT is powered off and unplugged.
2. Establish a serviceable power base ([page 7-1](#)).
3. Remove gearbox on same side of machine as motor that you want to remove ([page 8-4](#)).
4. Remove pivot base assembly ([page 9-14](#)).
5. Remove chassis cover ([page 10-3](#)).
6. Use small flathead screwdriver and gently lift tab on connector (see [Figure 13-1](#)) from back of motor, and then carefully pull on both connectors to unseat. See [Figure 13-2](#).

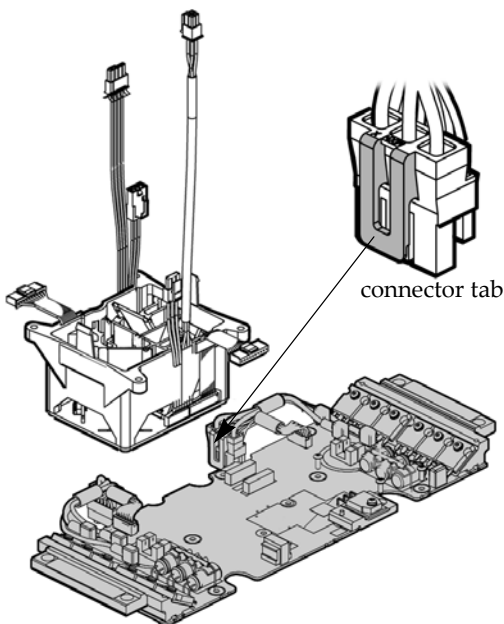


Figure 13-1: Pry Connector Tab

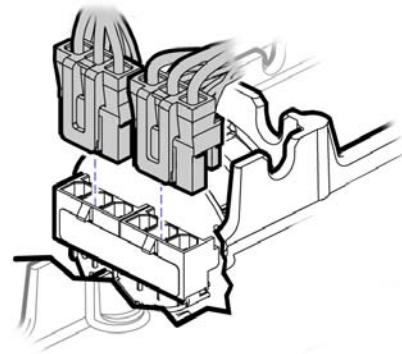


Figure 13-2: Disconnect CU Motor Harness from Motor

7. Use T-25 6-lobe wrench to remove (2) SHCS, M5 x 0.8 x 12, 6-lobe screws that attach motor to chassis. See [Figure 13-3](#).

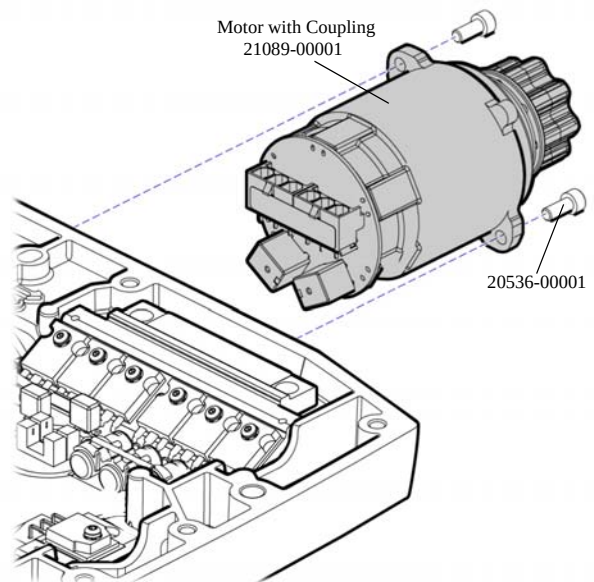


Figure 13-3: Remove Motor

8. Pull motor straight out of side of chassis.

Motor Installation

To install motor:



1. Make sure Segway PT is powered off and unplugged.
2. Clean motor well.
3. Completely remove thread lock compound from motor fastener holes. Use cotton swabs to thoroughly clean excess thread lock compound from internal threads. First use window cleaner, then isopropyl alcohol, to remove thread lock compound.
4. Slide motor into chassis. It will fit only one way. Fit is snug.

NOTICE

Make sure motor harness does not block motor as it is inserted into chassis. Motor will not seat properly if connector is pinched between motor and BSA.

5. Thread (2) SHCS, M5 x 0.8 x 12, 6-lobe screws (20536-00001) through motor mounting tabs into chassis. See [Figure 13-4](#).



Use of new motor fasteners with new thread lock compound is required for proper installation.

6. Using T-25 6-lobe wrench, drive each screw and torque to 5.0 N-m.
7. Connect (2) CU motor harnesses to motor. See [Figure 13-5](#).

NOTICE

Rotate each harness as you insert connector so that smaller gauge wires are beneath larger gauge wires.

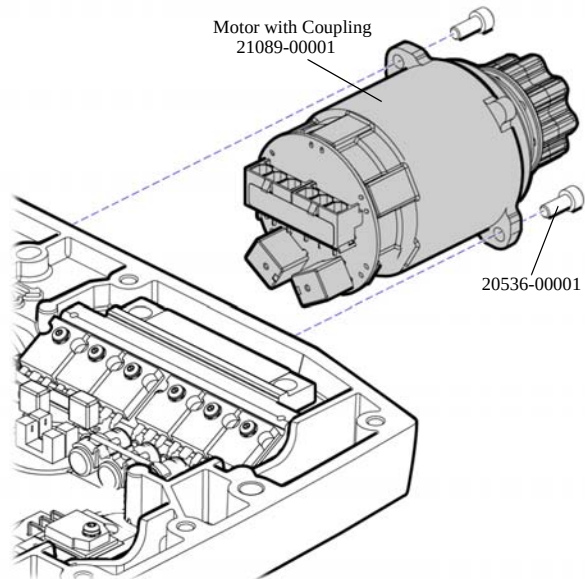


Figure 13-4: Install Motor

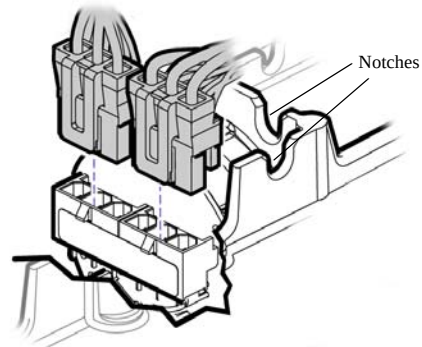


Figure 13-5: Connect CU Motor Harnesses to Motor

8. Locate abrasion protection sleeves and position so wires are protected as they pass through notches in chassis.

CAUTION

Make sure cables are seated in notches in chassis so that they cannot be pinched when cover is installed.

9. Perform post-service tests ([page A-1](#)).



Elastomer Bushing Inspection, Removal, and Installation

To inspect elastomer bushing:

Check to see if elastomer bushing is worn or damaged. Presence of excessive particles of elastomer material indicates replacement is necessary. See [Figure 13-6](#).

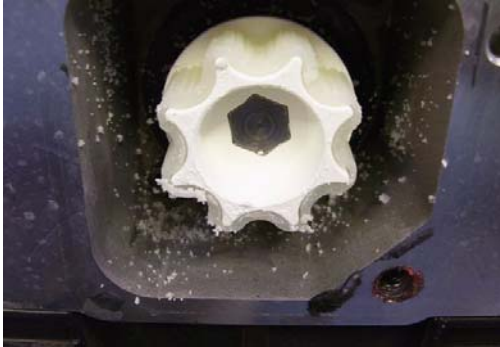


Figure 13-6: Inspect Elastomer Bushing

To remove elastomer bushing:



1. Make sure Segway PT is powered off and unplugged.
2. Pull elastomer bushing off motor coupling.

CAUTION

Completely clean residue from drive coupling and cavity using cotton swabs and household window cleaner. Repeat process with isopropyl alcohol until fully clean.

To install elastomer bushing:



1. Make sure Segway PT is powered off and unplugged.
2. Making sure tabs on elastomer bushing go on first, align new elastomer bushing with coupling, and slide on until seated. See [Figure 13-7](#).

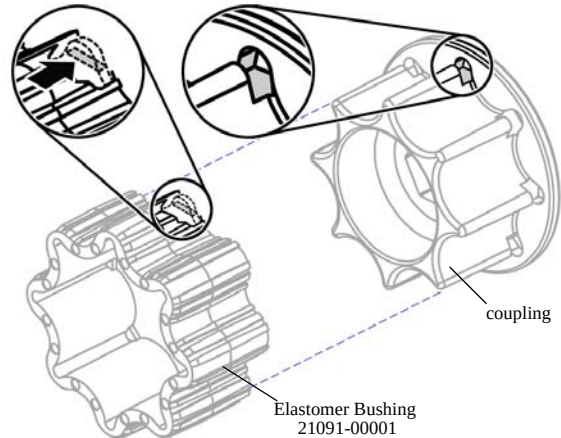


Figure 13-7: Install Elastomer Bushing

CAUTION

Do not remove coupling from motor. If damaged, replace entire motor assembly.

3. Perform post-service tests ([page A-1](#)).

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14. Power Base Chassis

This chapter describes disassembly and reassembly procedures for the power base chassis on a Gen 2 Segway PT.

The following warnings apply to instructions in this Section 14 regarding the Power Base Chassis:

Applies to Models

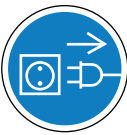
i2, x2, x2 Turf

Qualifications

Certified Service Technician

Technician Replaceable Parts

Power Base Chassis (17124-00003)

 WARNING		
 Read all instructions.	 Power off the Segway PT.	 Unplug the Segway PT.
Failure to do so could result in serious injury or death.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.	Failure to follow these instructions could lead to electrical shock, serious injury, death, or damage to property.
 Remove battery packs.		
Failure to do so could result in serious injury or death or damage to property.		

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "[Fasteners](#)" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#) on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.



Figure 14-1 illustrates the power base chassis.

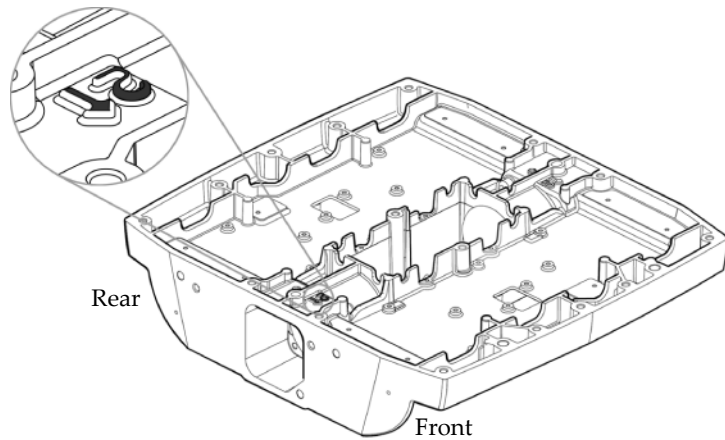


Figure 14-1: Power Base Chassis

The inset in [Figure 14-1](#) enlarges the numeral 2 and arrow stamped on the chassis to indicate the front of the chassis.

When to Replace

Replace the chassis when diagnostic testing or inspection determines the assembly is defective. For diagnostic procedures, contact a Segway Service Representative.

The Segway PT chassis is serialized and may only be replaced with permission from Segway. A new serial number may be issued, and the serialized replacement chassis may be shipped to order from Segway Service Headquarters.

You should replace a power base chassis under any of the following conditions, including, without limitation:

- Stripped screw holes
- Cracks are visible
- Ingress of moisture or dirt is evident
- Battery vent is damaged

Disassembling and Reassembling Chassis Components

To disassemble chassis components:

Remove components from damaged chassis by following procedures for individual Segway PT components:



1. Make sure Segway PT is powered off and unplugged.
2. Establish a serviceable power base ([page 7-1](#)).
3. Remove gearbox (*qty* 2) ([page 8-4](#)).
4. Remove pivot base assembly ([page 9-14](#)).
5. Remove chassis cover ([page 10-3](#)).
6. Remove CU board (*qty* 2) ([page 11-3](#)).
7. Remove balance sensor assembly ([page 12-3](#)).
8. Remove motor (*qty* 2) ([page 13-3](#)).

To reassemble chassis components:

Install components onto replacement chassis by following procedures for individual Segway PT components:



1. Make sure Segway PT is powered off and unplugged.
2. Install motor (*qty* 2) ([page 13-4](#)).
3. Install balance sensor assembly ([page 12-3](#)). Use self-tapping fasteners.
4. Install CU board (*qty* 2) ([page 11-5](#)). Use self-tapping fasteners.
5. Install chassis cover ([page 10-3](#)).
6. Install pivot base assembly ([page 9-15](#)).
7. Install gearbox (*qty* 2) ([page 8-5](#)).





A. Post-Service Tests

This chapter describes standard tests to perform after servicing the Gen 2 Segway PT.

The following warnings apply to instructions in this Section A regarding Post-Service Tests.

WARNING



Failure to do so could result in serious injury or death.

CAUTION

ESD PROCEDURES

Any time repair involves opening the console or chassis cover, best-practice electrostatic discharge (ESD) control procedures must be followed. Failure to follow ESD procedures could result in personal injury or damage to property.

Start-up Test

To perform a start-up test, do the following:

- Make sure Wireless InfoKey controller properly powers on machine without an error message.

Standard Check

To perform a standard check, do the following:

1. Check that fasteners are in place, secure, and torqued correctly.
2. Check wheels for wear, tightness, and tire pressure.
3. Check that mats are intact, secure, and free of debris.
4. Check LeanSteer frame for tightness; make sure LeanSteer frame returns to center.
5. Check to make sure that no part is damaged or loose.

Operational Test

To perform an operational test, do the following:

1. Check for obstruction under mats.
2. Check LeanSteer frame for tightness and centered orientation.
3. Turn on and power off machine twice.
4. Confirm adequate battery levels.
5. Turn on machine to test rider detect. (Make sure that display does not indicate that rider detect button is on at start-up.) Tilt unit back and press on each rider detect button.
6. While holding machine platform level, tap mat with your foot to enter balance mode.
7. Step on and ride machine.
 - a. Move forward and backward.
 - b. Turn 360 degrees to the left and to the right.



NOTICE

Kits include all needed repair components.

- [Table B-1](#) lists parts kits by part number.
- [Table B-2](#) lists individual replacement parts (excluding parts for the LeanSteer frame).
- [Table B-3](#) lists LeanSteer frame parts kits by part number.
- [Table B-4](#) lists LeanSteer frame parts kits by model and color.

Table B-1: Parts Kits by Part Number

Part Number	Name	Description
20658-00001	i2/x2 Aluminum Mat Kit	Includes mats (2)
20659-00001	i2/x2 Comfort Mat Kit	Includes mats (2)
20878-00001	Battery Kit	Includes Li-ion Battery (1) and fasteners (4)
20942-00001	i2 Wheel Kit	Includes wheel (1), wheel cap (1), and wheel nuts (3)
20943-00001	i2 Wheel Cap Kit	Includes wheel cap (1)
20944-00001	i2/x2 Gearbox Cover Kit	Includes gearbox cover (1) and fasteners (3)
20945-00001	i2 Fender Kit	Includes fender (1), fasteners (4)
20946-00001	InfoKey Customer Replaceable Parts Kit	Includes dock and fastener, battery, and all bezels
20947-00001	i2/x2 Power Base Front Trim (Fascia) Kit	Includes front trim (fascia) (1), fasteners (4)
20948-00001	i2/x2 Power Base Rear Trim (Fascia) Kit	Includes rear trim (fascia) (1), fasteners (4)
20950-00001	i2/x2 Wedge and Bolt Kit	Includes wedge set and bolt
20949-00001	i2/x2 Standard Mat Kit	Includes mats (2)
20951-00001	i2/x2 Console Cover Trim Kit, v1, Black	Includes black console cover (1)
20951-00002	i2/x2 Console Cover Trim Kit, v1, White	Includes white console cover (1)
20959-00001	x2 Fender Frame Kit (Left)	Includes left fender frame (1) and fasteners
20960-00001	x2 Fender Frame Kit (Right)	Includes right fender frame (1) and fasteners
20961-00001	x2 Fender Kit (Left) (1)	Includes left fender (1) and fasteners
20962-00001	x2 Fender Kit (Right)	Includes right fender (1) and fasteners
20963-00001	x2 Wheel Hub Adapter	Includes hub (1) and fasteners
20964-00001	x2 Tire and Wheel Kit (<i>hub not included</i>)	Includes tire/rim (1) and fasteners
20965-00001	x2 Wheel Trim Kit	Includes trim (1) and fasteners

Table B-1: Parts Kits by Part Number (Continued)

Part Number	Name	Description
21064-00001	InfoKey Kit, Bound, Programmed	Includes all three ring backings, spare battery, and InfoKey dock (1)
21065-00001	InfoKey Kit, Unbound, Unprogrammed	Includes all three ring backings, spare battery, and InfoKey dock (1)
21162-00001	x2 Turf Tire/Wheel and Spacer Kit	Includes tire/rim (1), spacer (1), and fasteners
21193-00001	i2 Tube Replacement Kit	Includes tubes (5)
21281-00001	Console Cover Trim Kit, v2, Black	Includes black console cover (1)
21281-00002	Console Cover Trim Kit, v2, White	Includes white console cover (1)
21281-00005	Console Cover Trim Kit, v2, Metallic Sage	Includes metallic sage console cover (1)
21290-00001	Serviceable Power Base Kit, i2	Includes Serviceable Power Base Kit, i2
21370-00001	x2 Turf Spacer Kit	Includes spacer (1) and fasteners (4)
21471-00001	i2 Tire Replacement Kit	Includes tires (5)
21702-00001	Serviceable Power Base Kit, x2	Includes Serviceable Power Base Kit, x2

Table B-2: Parts List (excluding LeanSteer frame)

Part Number	Name	Description
17124-00003	Power Base Chassis	Includes power base chassis (1)
18911-00001	i2 Tube Replacement	Includes tube (1)
19455-00002	UIC Circuit Board	Includes UIC circuit board (1)
19457-00002	Balance Sensor Assembly	Includes balance sensor (1)
20055-00002	Console Housing, v1	Includes console housing (1)
20110-00001	Console EMI Shield	Includes EMI shield (1)
20130-00001	UIC	Includes UIC (1)
20152-00002	Gearbox Cover	Includes gearbox cover (1)
20169-00001	Console Antenna (<i>holder not included</i>)	Includes console antenna (1)
20249-00001	Li-ion Battery Fasteners	Includes fasteners (50)
20316-00001	Chassis Cover	Includes i2 chassis cover with warning label (1)
20375-00002	EMI Filter	Includes EMI filter (1)
20536-00001	Motor Fasteners	Includes fasteners (4)
20537-00001	Gearbox Fasteners	Includes fasteners (3)
20550-00001	Console Antenna Holder	Includes holder for console antenna (1)
20566-00001	Balance Sensor Assembly Fasteners	Includes fasteners (4)



Table B-2: Parts List (excluding LeanSteer frame) (Continued)

Part Number	Name	Description
20723-00001	Console Trim, v1	Black
20723-00002	Console Trim, v1	White
20807-00001	CU Board	Includes Gen 2 controller board (1)
20925-00002	Console Housing, v2	Includes console housing (1)
20928-00001	Console Cover Gasket	Includes console cover gasket (1)
20929-00001	Console Cover	Includes console cover (1)
20934-00001	Console Trim, v2	Black
20934-00002	Console Trim, v2	White
20934-00003	Console Trim, V2	Metallic Sage
21089-00001	Motor with Coupling Kit	Includes motor with coupling (2)
21091-00001	Elastomer Bushing	Includes elastomer bushing (1)
21249-00001	Pivot Base	Includes pivot base (1)
21270-00001	Ferrite Core	Includes small ferrite core (1)
21271-00001	Ferrite Core	Includes large ferrite core (1)
21813-00001	UIC Cover Extraction Tool	Includes tool (1)

Table B-3: LeanSteer Frame Parts Kits

Part Number	Name	Description
20805-00001	Height Adjustment Knob Kit	Handlebar adjustment wedge (1)
		Knob washer (1)
		Height adjustment knob assembly (1)
20950-00001	i2 / x2 Wedges and Bolt Kit	Wedge clamp fastener (1)
		Set of wedges (1)
20953-00001	i2 / x2 LeanSteer Frame Emblem Kit	Handlebar hub trim with label
20954-00001	i2 Handlebar Clamp Kit, Black	Clamp (1)
		Fasteners, 20mm (3)
20954-00002	i2 Handlebar Clamp Kit, White	Clamp
		Fasteners, 20mm
20954-00003	x2 Handlebar Clamp Kit, Silver	Clamp
		Fasteners, 20mm
20955-00001	i2 / x2 Handlebar with Grips Kit	Handlebar with grips
20957-00001	i2 Upper LeanSteer Frame Kit, Black	Slide, top, spacer
		Upper handlebar stop
		Upper LeanSteer frame
		Outer bar clamp
20957-00002	i2 Upper LeanSteer Frame Kit, White	Slide, top, spacer
		Upper handlebar stop
		Upper LeanSteer frame
		Outer bar clamp
20957-00003	i2 Upper LeanSteer Frame Kit, Silver	Slide, top, spacer
		Upper handlebar stop
		Upper LeanSteer frame
		Outer bar clamp
20956-00001	i2 Lower LeanSteer Frame Kit, Black	Lower LeanSteer frame
20956-00002	i2 Lower LeanSteer Frame Kit, White	Lower LeanSteer frame
20958-00001	x2 Lower LeanSteer Frame Kit, Black	Lower LeanSteer frame



Callouts in the following table refer to [Figure 1-1](#).

Table B-4: LeanSteer Frame Parts by Model and Color

Callout	Description	i2 White	i2 Black	i2 Sage	x2
A	Wedge, threaded side	21069-00001	21069-00001	21069-00001	21069-00001
B	Outer bar clamp	20046-00002	20046-00001	20046-00004	20046-00003
C	Grip trim	18892-00001	18892-00001	18892-00001	18892-00001
D	Upper LeanSteer frame	20048-00002	20048-00001	20048-00004	20048-00003
E	Lower LeanSteer frame	20529-00002	20529-00001	20529-00003	20491-00000
F	Handlebar hub trim	20358-00001	20358-00001	20358-00001	20358-00001
G	Height adjustment knob	20750-00001	20750-00001	20750-00001	20750-00001
H	M4 threaded rod	20752-00001	20752-00001	20752-00001	20752-00001
I	Washer	20751-00001	20751-00001	20751-00001	20751-00001
J	Height adjustment wedge	20042-00001	20042-00001	20042-00001	20042-00001
K	Wedge, counterbore side	21067-00001	21067-00001	21067-00001	21067-00001
L	Fastener, SHCS, M6x1.0x45, Hex	20631-00001	20631-00001	20631-00001	20631-00001
M	Slide, top, spacer	20040-00001	20040-00001	20040-00001	20040-00001
N	Upper handlebar stop	20041-00001	20041-00001	20041-00001	20041-00001
O	Fastener, SHCS, M4x20	20306-00001	20306-00001	20306-00001	20306-00001
P	Handlebar tube	20045-00001	20045-00001	20045-00001	20045-00001

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⚠ WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "Fasteners" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see [Table C-1](#)).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

Table C-1: Fasteners

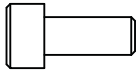
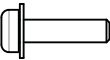
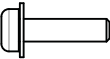
Part Number	Application	Qty/Unit	Drive	Torque (N-m)
20536-0001	Motor	4	T-25	5.0
SHCS, M5 x 0.8 x 12	 			
20566-00001	Balance Sensor Assembly (OEM)	4	T-15	1.6
Self-tapping for use only in replacement chassis, M3 x 0.5 x 12, T-10 drive	 			
20972-00001	Balance Sensor Assembly	4	T-15	1.6
For use when reinstalling into original chassis	 			
20567-00001	CU Board (OEM)	28	T-15	1.6
Self-tapping for use only when installing into new chassis	 			
20973-00001	CU Board	28	T-15	1.6
For use when reinstalling into original chassis	 			

Table C-1: Fasteners (Continued)

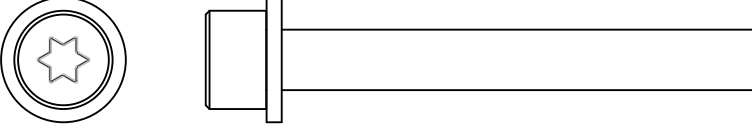
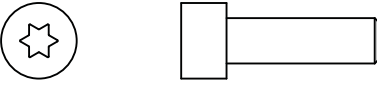
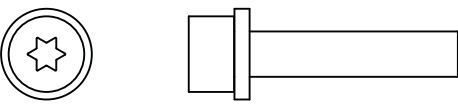
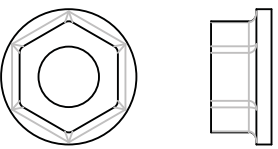
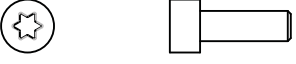
Part Number	Application	Qty/Unit	Drive	Torque (N-m)
20540-00001	Chassis Cover	12	T-27	6.0
				
20537-00002	Gearbox	6	T-45	40.0
				
20205-00001	Pivot Base Assembly, Front and Rear	2	T-30	11.0
				
20539-00001	Pivot Base Assembly, Center	1	T-30	11.0
				
20158-00001	Wheels (i2)	6	13mm	30.0
				
20203-00002	UIC (top and cover)	8 each	T-20	1.8
				
20203-00002	Console Housing	6	T-20	2.6
				
20243-00001	Radio Board	4	2.5 mm	0.8 - 1.0
M3 x 6				
20477-00001	UIC (Rear)	2	2.5mm	0.7
				

Table C-1: Fasteners (Continued)

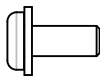
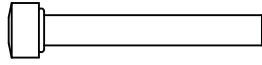
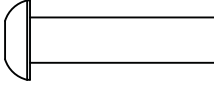
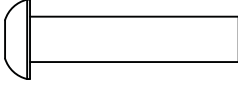
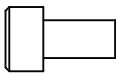
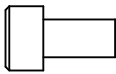
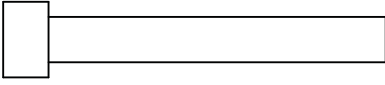
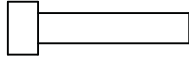
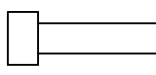
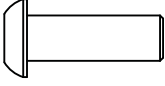
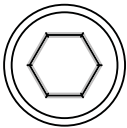
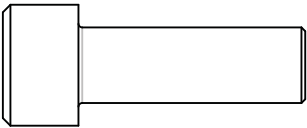
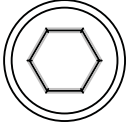
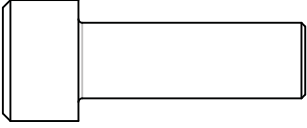
Part Number	Application	Qty/Unit	Drive	Torque (N-m)
20538-00001	Fender (i2)	8	T-20	1.5
	 			
20541-00002	Battery Packs	8	3mm	1.6
SHCS, M4 x 0.7 x 30, self-sealing hex	 			
20553-00001	Gearbox Trim (i2)	6	4mm	6.0
	 			
20553-00002	x2 Fender Frame	6	4mm	6.0
	 			
20554-00001	Fascias	8	4mm	1.5
10mm, for installation without parking stand	 			
20554-00003	Fascias/Parking Stand	8	4mm	1.5
14mm, for installation with parking stand	 			
20631-00001	LeanSteer Frame Clamp	1	5mm	11.0
	 			
20306-00001	Handlebar Clamp	1	3mm	6.0
SHCS, M4 x 20, 3mm drive	 			
20306-00003	InfoKey Dock	1	3mm	2.0
SHCS, M4 x 16, 3mm drive	 			
20871-00001	Fender (x2)	4	4mm	
	 			

Table C-1: Fasteners (Continued)

Part Number	Application	Qty/Unit	Drive	Torque (N-m)
20991-00001	x2 Wheel/Hub Adapter	8	8mm	35.0
				
20991-00002	x2 Turf Wheel/Hub Adapter	8	8mm	35.0
				



D. Recommended Tools and Diagnostic Equipment

Table D-2 lists and briefly describes required tools and equipment that you should have on hand prior to servicing the Gen 2 Segway PT.

WARNING

FASTENERS

- Use only Segway-approved fasteners.
- Do not tighten or reuse any fastener except the screws used to attach the battery packs, wheel nuts, and LeanSteer frame. Instead, when any other fastener is loose or removed, replace the fastener with a new Segway-approved fastener. See Appendix C, "Fasteners" for more information.
- Before using a fastener, make certain the fastener is the correct size and type with any necessary washer and thread lock in place (see Table C-1 on page C-1).
- Since the pre-applied thread lock compound is intended for single use only, reuse of fasteners is not permitted with the exception of the wheel nuts, battery fasteners, and LeanSteer clamp bolt.
- Do not attempt to repair any stripped or damaged screw hole. Instead, replace the part. If replacement part is not available, do not reassemble.
- Insert fasteners slowly and carefully. Do not cross-thread or over-tighten fasteners. Tighten only to the prescribed torque.
- Failure to adhere to these warnings could lead to serious injury or death or damage to property.

Table D-2: Equipment List

TOOL	DESCRIPTION
Low pressure inflation gauge	
Alcohol wipes	
Cotton swabs	
Caulking gun	
ESD equipment	Field electrostatic discharge (ESD) kit includes static mat, wrist strap, line with gator clip, and ground lead. Correct grounding of mat and wrist strap is essential.
Small flathead screwdriver	
Hex bits	2.5mm, 3mm, 4mm, 5mm, 8mm
Hex wrenches	2.5mm, 3mm, 4mm, 5mm, 8mm
1/4" square to 1/4" hex adapter	
Loctite 127864XB RTV sealant	One tube; ensures water-tight seal between console housing and cover
Loctite 20-gauge taper tip	Needed to apply RTV sealant

Table D-2: Equipment List

TOOL	DESCRIPTION
Multi-meter	Capable of measuring both voltage and resistance as called out in <i>Segway PT i2, x2 Diagnostics Guide</i>
Mallet	Plastic or rubber, 20 oz. or 24 oz.
Ratchet	3/8" drive
Blade (razor or utility knife)	For removal of room temperature vulcanizing (RTV) silicone sealant (not all models)
Six-lobe bits	Recommend (2) each of the following sizes: T-20, T-45
Six-lobe wrenches	T-10, T-20, T-25, T-27, T-30, T-45
Socket extension	3-in. 3/8" drive
Socket	Hex, 13mm; 6-point is preferred
Tire pump	Air pump with Schrader valve attachment
Tire iron (<i>qty</i> 2)	Approximately 14" long, motorcycle type
Trigger-style bar clamp	12" bar-clamp (measured by the maximum opening)
Torque wrenches	Adapter to fit the following hex and 6-lobe bits: 3/8" drive torque limiting ratchet (40-50 N-m minimum range) 1/4" drive torque limiting ratchet (5-13.5 N-m minimum range) 1/4" drive torque limiting screwdriver (0.3-1.6 N-m minimum range)
UIC cover extraction tool	Specially designed tool for removing UIC cover without damaging brass inserts. Order from Segway (part number 21813-00001).



6-lobe wrench (torx)

A wrench with a star-shaped head that fits the socket of a 6-lobe fastener. The Segway PT uses 6-lobe fasteners in places, such as the chassis, that should be accessed only by a Certified Service Technician.

balance sensor assembly (BSA)

The central monitoring unit, found in the center of the platform, which accounts for variable terrain and communicates with the controller boards and the motors to balance the Segway PT.

console electronics

See **user interface console (UIC)**.

control unit (CU) boards

The two integrated circuit boards located in the platform. The CU board in the front is often referred to as the “A” board, and the board in the rear as the “B” board (arrows on the chassis point to the front of the unit).

display

Circular window on info key that shows machine conditions through LCD segments and LED colored lights.

environmental seal

A watertight seal necessary to prevent damage to the Segway PT.

EMI

Electromagnetic interference.

ESD

See **Electrostatic discharge**.

Electrostatic discharge

The rapid discharge of accumulated electrical charge. To prevent damage to the Segway PT, a Certified Service Technician should always stand on a static mat or wear a grounding heel or wrist strap while working on electrical elements of the Segway PT.

flange

Triangular plate with three wheel mounting studs affixed to the end of the gearbox output shaft.

harness

A group of cables bound together to form one assembly, typically with connectors that plug or snap into place.

hex wrench

A hexagonal wrench that fits the socket of a hex fastener.

IEC (International Electrotechnical Commission) connector

This is the location where the Segway PT is plugged in to charge (charge port).

LeanSteer frame

Comprises all of components in the steering assembly (upper and lower frame, handlebars, height adjustment knob, wedges) that attach to pivot base.

N-m (Newton-meter)

The measurement unit for torquing nuts, bolts, and screws.

roll pins

The two small cylindrical pegs located on the gearbox that fit into holes on the chassis and align the gearbox on the chassis.

RTV silicone sealant

A silicone sealant that vulcanizes at room temperature, and is used in some models in place of a gasket to seal the gearbox to the Segway PT chassis.

serviceable power base

Comprises the following components: chassis, cover, gearboxes, motors, CU boards, BSA, pivot base, console electronics. The Wireless InfoKey controller is bound to the serviceable power base. The serviceable power base can only be serviced by a trained, authorized Segway technician.

torque wrench

A wrench that measures the amount of turning and twisting force applied in tightening a nut or bolt.

user interface console (UIC)

Comprises the battery charger power supply, the console radio (used for communicating with the Wireless InfoKey controller), and the user interface LEDs.

Wireless InfoKey controller

Operates and monitors the Segway PT. The Wireless InfoKey controller has four buttons around the outer edge and a display in the center.