



# Dealer's Manual

## SHIMANO *ULTEGRA* 6770 Series



<b>IMPORTANT NOTICE</b> .....	4
<b>TO ENSURE SAFETY</b> .....	5
<b>ELECTRONIC GEAR SHIFTING SYSTEM</b> .....	14
<b>SYSTEM CONFIGURATION DETAILS</b> .....	16
<b>SPECIFICATIONS</b> .....	18
<b>INSTALLATION</b> .....	20
■ Installation of the dual control lever	
■ Installation of the brake cables	
■ Installation of the front derailleur.....	21
■ Installation of the rear derailleur.....	23
■ Installation of the chain	
<b>CONNECTION OF THE ELECTRIC WIRES</b> .....	24
■ Names and example locations of each part	
■ Front junction: Connection of junction (A).....	25
■ Connection to the Dual control lever	
■ Installation of the battery mount.....	26
■ Rear junction: Connection of junction (B) External type.....	27
■ Rear junction: Connection of junction (B) Built-in type.....	31
■ Installation of the bottle cage adapter.....	35
<b>ADJUSTMENT</b> .....	36
■ Adjustment of the rear derailleur	
■ Adjustment of the front derailleur.....	39
<b>OTHER FUNCTIONS</b> .....	40
■ Battery charge display function	
■ RD Protection	
<b>MAINTENANCE</b> .....	41
■ Disassembly of the bracket unit and lever unit	
■ Assembly of the switch unit.....	42
■ Assembly of the bracket unit and lever unit.....	43
■ Replacement of the pulley.....	44
<b>HANDLING THE BATTERY</b> .....	45
■ Storing the battery	
■ Battery life	
■ Guide to charging time	
■ Proper use of the battery.....	46
<b>BATTERY CHARGER</b> .....	46
■ Charging the battery.....	47
■ Troubleshooting	
<b>INTERCHANGEABILITY INFORMATION</b> .....	47

## IMPORTANT NOTICE

- This dealer's manual is intended primarily for use by professional bicycle mechanics.

Users who are not professionally trained for bicycle assembly should not attempt to install the components themselves using the dealer's manuals.

If any part of the information on the manual is unclear to you, do not proceed with the installation. Instead, contact your place of purchase or a local bicycle dealer for their assistance.

- Make sure to read all instruction manuals included with the product.
- Do not disassemble or modify the product other than as stated in the information contained in this dealer's manual.
- All dealer's manuals and instruction manuals can be viewed on-line on our website (<http://si.shimano.com>).
- Please observe the appropriate rules and regulations of the country, state or region in which you conduct your business as a dealer.

**For safety, be sure to read this dealer's manual thoroughly before use, and follow it for correct use.**

The following instructions must be observed at all times in order to prevent personal injury and physical damage to equipment and surroundings.

The instructions are classified according to the degree of danger or damage which may occur if the product is used incorrectly.

 **DANGER**

Failure to follow the instructions will result in death or serious injury.

 **WARNING**

Failure to follow the instructions could result in death or serious injury.

 **CAUTION**

Failure to follow the instructions could cause personal injury or physical damage to equipment and surroundings.

## TO ENSURE SAFETY



Be sure to observe the following in order to avoid burns or other injury from fluid leakages, overheating, fire or explosions.

Be sure to also inform users of the following:

### <SM-BTR1: Battery>

Do not use anything other than the special charger to charge the battery.	If any non-specified items are used, fire, overheating or leakages may occur.
Do not heat the battery or throw it into fire.	If this is not observed, fire or bursting may occur.
Do not leave the battery in places which may exceed 60°C in temperature, such as places which are exposed to direct sunlight inside vehicles on hot days or near stoves.	If this is not observed, leakages, overheating or bursting may cause fire, burns or other injury to occur.
Do not disassemble or modify the battery or apply solder directly to the battery terminals.	
Do not connect the (+) and (-) terminals with metallic objects. Do not carry or store the battery together with metallic objects such as necklaces or hairpins.	If this is not observed, short-circuits, overheating, burns or other injury may occur.
If any liquid leaking from the battery gets into the eyes, immediately wash the affected area with clean water without rubbing the eyes, and then seek medical advice.	If this is not done, blindness may occur.

### <SM-BCR1: Battery Charger / SM-BCC1: Battery Charger Cord >

Do not get the charger wet or use it while it is wet, and do not touch or hold it with wet hands.	If this is not observed, problems with operation or electric shocks may occur.
Do not cover the charger with a cloth or similar while it is in use.	If this is not observed, heat may build up and the case may become deformed, or fire or overheating may occur.
Do not disassemble or modify the charger.	If this is not observed, electric shocks or injury may occur.
Use the charger at the specified power supply voltage only.	If a power supply voltage other than that specified is used, fire, explosions, smoke, overheating, electric shocks or burns may occur.
Do not touch metallic parts of the charger or the AC adapter if there is a lightning storm.	If lightning strikes, electric shocks may occur.



## WARNING

- **When installing components, be sure to follow the instructions that are given in the instruction manuals.**

It is recommended that you use only genuine Shimano parts. If parts such as bolts and nuts become loose or damaged, the bicycle may suddenly fall over, which may cause serious injury.

In addition, if adjustments are not carried out correctly, problems may occur, and the bicycle may suddenly fall over, which may cause serious injury.

-  Be sure to wear safety glasses or goggles to protect your eyes while performing maintenance tasks such as replacing parts.
- This dealer's manual is for use with the ULTEGRA 6770 series (electronic gear shifting system) only. For any information regarding the ULTEGRA 6700 series which does not appear in this manual, refer to the Service Instructions included with each component.
- After reading this dealer's manual thoroughly, keep it in a safe place for later reference.

### Be sure to also inform users of the following:

#### <SM-BTR1: Battery>

If charging is not complete after 1.5 hours of charging time has elapsed, stop the charging.	If this is not observed, fire, bursting or overheating may occur.
Do not place the battery into fresh water or sea water, and do not allow the battery terminals to get wet.	
The operating temperature ranges for the battery are given below. Do not use the battery in temperatures outside these ranges. 1. During discharge: -10 °C - 50 °C 2. During charging: 0 °C - 45 °C	If the battery is used or stored in temperatures which are outside these ranges, fire, injury or problems with operation may occur.
Do not use the battery if it has any noticeable scratching or other external damage.	If this is not observed, bursting, overheating or problems with operation may occur.
Do not subject the battery to strong shocks or throw it.	
Do not use the battery if leakages, discoloration, deformation or any other abnormalities occur.	
If any leaked fluid gets on your skin or clothes, wash it off immediately with clean water.	The leaked fluid may damage the skin.
Do not use or place the battery at or near sources of fire.	If this is not observed, sparking, bursting, fire or electric shocks may result.
Do not recharge the battery in places which have high humidity or outdoors.	
Do not insert or remove the plugs while they are wet. If the insides of the plugs are wet, dry them thoroughly before inserting them.	

**<SM-BCR1: Battery Charger / SM-BCC1: Battery Charger Cord>**

Be sure to hold the power cable by the power plug when connecting and disconnecting the power plug from the electrical outlet.	If you do not hold the power cable by the power plug, fire or electric shocks may occur. * If heat or acrid-smelling smoke is coming out from the power plug. * There may be a bad connection inside the power plug.
Do not overload the electrical outlet with appliances beyond its rated capacity, and use only a 100 – 240 V AC electrical outlet.	If the electrical outlet is overloaded by connecting too many appliances using adapters, overheating resulting in fire may occur.
Do not damage the power cord or power plug. (Do not damage, process, forcibly bend, twist or pull them, bring them near hot objects, place heavy objects on them or bundle them tightly together.)	If they are used while damaged, fire, electric shocks or short-circuits may occur.
Do not use the charger with commercially-available electrical transformers designed for overseas use.	If this is not observed, they may damage the charger.
Always be sure to insert the power plug as far as it will go.	If this is not observed, fire may occur.

**<FC-6700: Front Chainwheel>**

- Before riding the bicycle, check the crank arms thoroughly to see if they contain any cracks. If the crank arms are cracked, they may break and you may fall off the bicycle.

**For Installation to the Bicycle, and Maintenance:**

- When the shifting switch is operated, the motor which drives the front derailleur will operate without stopping at the shifting lever position. Always be sure to disconnect the battery before carrying out installation, otherwise your fingers may become stuck.

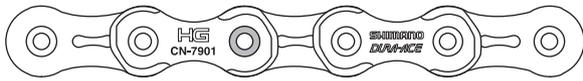
**<FC-6700: Front Chainwheel>**

- The two left crank arm mounting bolts should be tightened alternately in stages rather than each bolt being fully tightened all at once. Use a torque wrench to check that the final tightening torques are within the range of 12 - 14 N·m. Furthermore, after riding approximately 100 km (60 miles), use a torque wrench to re-check the tightening torques. It is also important to periodically check the tightening torques. If the tightening torques are too weak or if the mounting bolts are not tightened alternately in stages, the left crank arm may come off and the bicycle may fall over, and serious injury may occur as a result.
- If the inner cover is not correctly installed, corrosion of the axle may occur, and this may damage the axle and the bicycle may fall over, and serious injury may occur as a result.

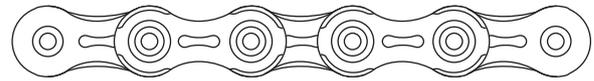
## <CN-6701: 10-speed Chain for Road Riding>

- **Maintenance interval depends on the usage and riding circumstances. Clean regularly the chain with an appropriate chaincleaner. Never use alkali based or acid based solvents such as rust cleaners. If those solvent be used chain might break and cause serious injury.**
- **In order to obtain good gear shifting performance, applicable chains have a forward side and a reverse side, and the sides are marked so that the chains will face the correct way when installed. The proper design performance will be obtained when the chains are installed so that they face the correct way. If the chains are installed so that they face the opposite way, they may come off and the bicycle may fall over and serious injury may occur as a result.**

Forward (outer side)



Reverse (inner side)

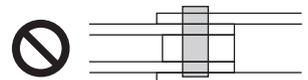
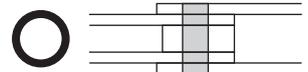


The side with the marks shown in the illustration is the forward side (outer side).

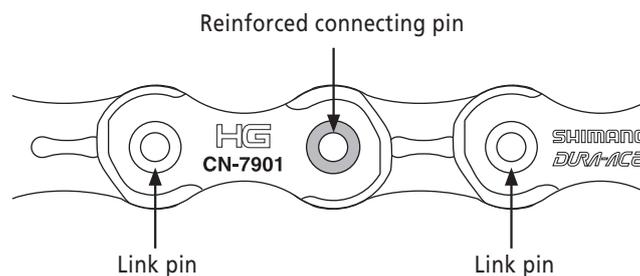
- Narrow-type chains must always be connected using reinforced connecting pins.
- If the chain is connected by using connecting pins other than reinforced connecting pins, or by using reinforced connecting pins or tools which are not suitable for the chain, the connecting force provided maybe insufficient, and the chain may break or fly off.

Chain	Reinforced connecting pin	Tool
CN-7901 / 6701 / 5701 / 4601 10-speed compatible super-narrow chain	Grooved (3) 	TL-CN32/33
	Grooved (2) 	TL-CN23 TL-CN27

- After connecting the chain, be sure to feel the connection with your fingers to check that both ends of the connecting pin and the surfaces of the links are flush with each other. (The opposite end of the pin which has been broken off should feel as though it is projecting very slightly.)



- If the length of the chain needs to be readjusted for reasons such as changes to the sprocket configuration, cut the chain at a place which is not connected by means of a reinforced connecting pin. If you cut the chain at a place which has been connected using a reinforced connecting pin, it will damage the chain.



- Use a TL-CN41 chain wear indicator (Y12152000) or a similar tool to check if the chain has become stretched or damaged. If the chain has become stretched or damaged, it may break and the bicycle may fall over, so the chain should be replaced.
- When readjusting the length of the chain, be sure to insert the reinforced connecting pin from the same side as the chain cutter was inserted (the same direction as when the chain was cut).
- Be careful not to let the cuffs of your clothes get caught in the chain while riding, otherwise you may fall off the bicycle.

**CAUTION**

Be sure to also inform users of the following:

**<SM-BCR1: Battery Charger / SM-BCC1: Battery Charger Cord>**

- Disconnect the power plug from the electrical outlet before cleaning.

**<SM-BTR1: Lithium Ion Battery>**

- Do not disassemble or break the battery. If this is not observed, there is the danger that fire or burns may result.
- Do not heat the battery to temperatures which exceed 60°C (140°F). In addition, do not put the battery into fire. Follow the instructions provided by the battery's manufacturer.
- Store the battery in a safe place away from the reach of infants and pets.

**NOTE**

Be sure to also inform users of the following:

- Be sure to keep turning the crank during the lever operation.
- Be careful not to get water into the terminal.
- If gear shifting operations cannot be carried out smoothly, clean the front and rear derailleurs and lubricate any moving parts.
- You should periodically wash the chainrings in a neutral detergent. In addition, cleaning the chain with neutral detergent and lubricating it can be an effective way of extending the useful life of the chainrings and the chain.
- Do not use thinner or other solvents to clean any of the components. Such substances may damage the surfaces.
- Do not clean the bicycle with a high-pressure washer. If water gets into any of the components, operating problems or rusting may result.
- Handle the components carefully, and avoid subjecting them to any strong shocks.
- Contact the place of purchase for updates of the component software. The most up-to-date information is available on the Shimano website.
- Products are not guaranteed against natural wear and deterioration from normal use and aging.
- For maximum performance we highly recommend Shimano lubricants and maintenance products.

**<SM-BCR1: Battery Charger / SM-BCC1: Battery Charger Cord>**

- If not using the battery for long periods, remove it and store it away in a safe place.
- Used batteries should be disposed of in accordance with local waste regulations. Alternatively, ask the place of purchase or a bicycle dealer for disposal.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Do not let children play near these items.



Information on disposal in countries other than the European Union  
This symbol is only applicable within the EU.  
Used electrical items (battery chargers and battery charger cords) should be disposed of in accordance with local laws and regulations, or ask the place of purchase or a bicycle dealer for disposal.



## <SM-BTR1: Battery>

- The battery is uncharged at the time of purchase. Before riding, be sure to charge the battery until it is fully charged.
- When storing the battery away, remove the battery from the bicycle and install the terminal cover first.
- If the battery is stored away while the battery charge is 50% or higher (the indicator is illuminated green), the battery will last longer.  
It is recommended that you check the condition of the battery about once every half a year.
- If the battery is stored in cold locations, the performance of the battery may drop and the length of time that it can be used may become shortened.
- The battery is a consumable item. The battery will gradually lose its capacity for charging after repeated use and after time has passed. If the length of time that the battery can be used becomes extremely short, it has probably reached the end of its life, and so you will need to purchase a new battery.
- The life of the battery will vary depending on factors such as the storage method, the usage conditions, the surrounding environment and the characteristics of the individual battery pack.
- The charging time is approximately 1.5 hours. (Note that the actual time will vary depending on the amount of charge remaining in the battery.)
- If the battery feels difficult to insert or remove, apply specified grease (DURA-ACE grease) to the part that touches the O-ring at the side.
- For the DURA-ACE (7970), the bicycle can be ridden for approximately 1000 km on a full charge. For the ULTEGRA (6770), the riding distance will be shorter. (Approximately 30% less according to tests carried out by Shimano.)
- Charging can be carried out at any time regardless of the amount of charge remaining. Always be sure to use the special battery charger to charge the battery until it is fully recharged.
- If the battery has become fully spent, charge it as soon as possible. If you leave the battery without charging it, it will cause the battery to deteriorate.
- If you will not be riding the bicycle for a long period, remove the battery from the bicycle and recharge it periodically. In addition, take care not to let the battery become fully spent.

	<p>Information on disposal in countries other than the European Union This symbol is only applicable within the EU. Used batteries should be disposed of in accordance with local laws and regulations, or ask the place of purchase or a bicycle dealer for disposal.</p>
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## <ST-6770: Dual Control Lever>

- Be sure to rotate the front chainwheel when carrying out any lever operations which are related to gear shifting.

## <RD-6770: Rear Derailleur>

- If the amount of looseness in the links is so great that adjustment is not possible, you should replace the derailleur.
- Periodically clean the derailleur and lubricate all moving parts and pulleys.
- If there is a large amount of play in the pulleys which causes worrying noise while riding, replace the pulleys.

## For Installation to the Bicycle, and Maintenance:

- Do not keep connecting and disconnecting the small waterproof connector. It may impair the function.
- Be sure to attach dummy plugs to any unused terminals.
- The units are designed to be fully waterproof to withstand wet weather riding conditions. However, do not deliberately place them into water.
- Always be sure to use the Shimano original tool TL-EW02 to remove the electric wires.
- If the chain keeps coming off the sprockets during use, replace the sprockets and the chain.
- Do not disassemble, otherwise operating problems will result.
- The motors of the front derailleur and the rear derailleur cannot be repaired.
- Contact Shimano for information regarding the shipment of the battery charger to South Korea and Malaysia.

### <EW-SD50/EW-SD50-I: Electric Wires / SM-EWC2: Electric Wire Covers>

- Secure the electric wires with cable ties so that they do not interfere with the chainrings, sprockets and tires.
- The strength of the adhesive is fairly weak, to prevent the paint on the frame from being peeled off at the same time when removing the electric wire cover for reasons such as replacing the electric wires. If the electric wire cover is peeled off, replace it with a new one.  
When removing the electric wire cover, do not peel it off too vigorously. If this is not observed, the paint on the frame will peel off too.
- Do not remove the wire holders which are attached to the built-in type electric wires (EW-SD50-I). The wire holders prevent the electric wires from moving inside the frame.

### <ST-6770: Dual Control Lever>

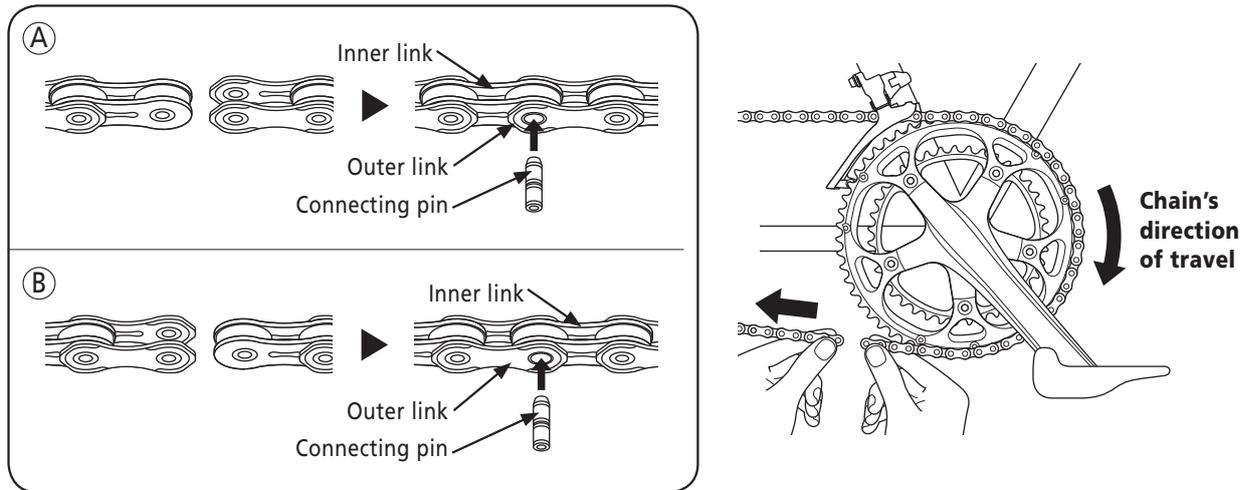
- SW-R610 cannot be used with ST-6770 because the shape of its connector is different from that of E-TUBE.
- Dummy plugs are installed at the time of shipment from the factory. Do not remove them except when necessary.
- When routing the electric wires, take care to ensure that they do not interfere with the brake levers.

### <RD-6770: Rear Derailleur>

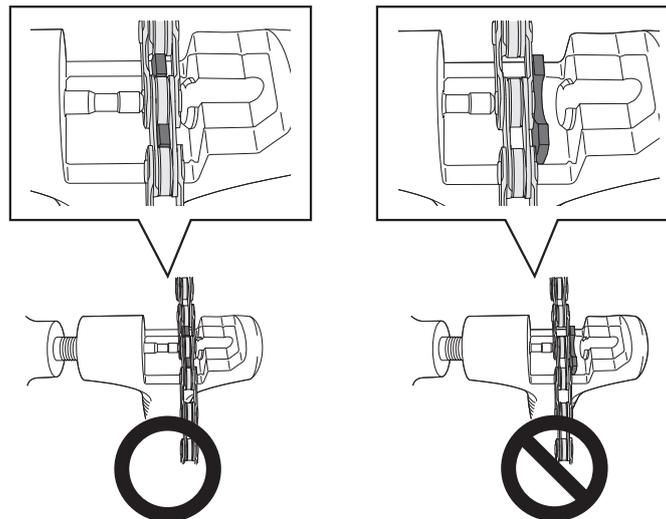
- Always be sure to adjust the top adjustment bolt and the low adjustment bolt according to the instructions given in the adjustment section. If these bolts are not adjusted, the chain may become clamped between the spokes and the large sprocket and the wheel may lock, or the chain may slip onto the small sprocket.
- If gear shifting adjustment cannot be carried out, check the degree of parallelism at the rear end of the bicycle. Also check if the cable is lubricated and if the outer casing is too long or too short.
- The tension pulley has an arrow on it to indicate the direction of rotation. Install the tension pulley so that the arrow is pointing clockwise when looking at the outer side of the derailleur.

## <CN-6701: 10-speed Chain for Road Riding>

- As illustrated in Fig. A, we strongly recommend to set the connecting pin in the hole of the outer link on the front side in the direction of travel. The chain's level of strength is enhanced compared to the method in Fig. B.



- Place the chain into the chain cutting tool as shown in the illustration. If the chain is set incorrectly into the chain cutting tool, it will break the positioning plate.



## **Be sure to also inform users of the following:**

### **<System power reset>**

When the system fails to operate, the system may be recovered by resetting the system power.

After the battery is removed, about one minute is usually required for the system power to reset.

#### **In the case of using SM-BTR1**

Remove the battery from the battery mount. After about one minute, install the battery.

#### **In the case of using SM-BTR2**

Disconnect the plug from SM-BTR2. After about one minute, insert the plug.

### **<Notes when reinstalling and replacing components>**

When the product is reassembled or replaced, it is automatically recognized by the system to allow operation according to the settings.

If the system does not operate after reassembly and replacement, follow the system power reset procedure above to check the operation.

## **For Installation to the Bicycle, and Maintenance:**

If the component configuration changes or malfunction is observed, use the E-TUBE PROJECT software to update the firmware of each component to the latest version and perform a check again.

Also make sure that E-TUBE PROJECT software is the latest version. If the software is not the latest version, the component compatibility or the product functions may not be sufficiently available.

## ELECTRONIC GEAR SHIFTING SYSTEM

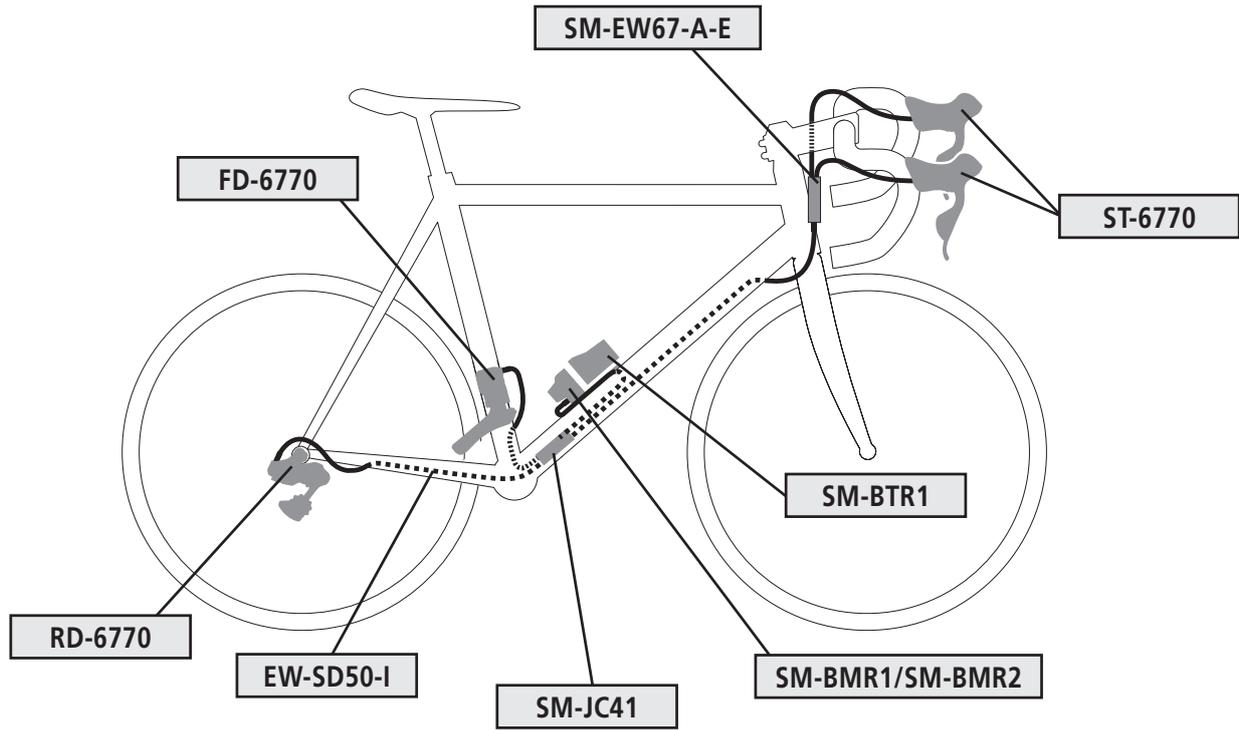
# SHIMANO ULTEGRA

In order to obtain the optimum performance, it is recommended that you use the following combination of components.

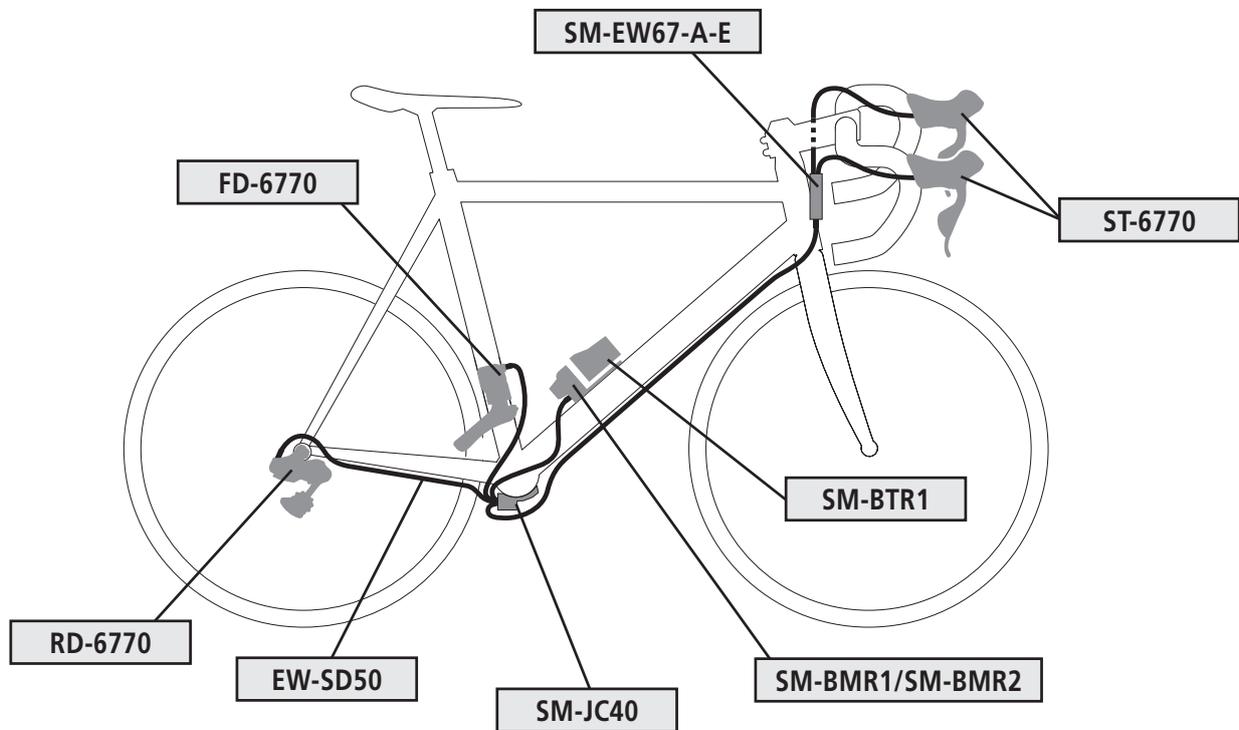
Series	ULTEGRA 6770
Dual control lever	ST-6770*
Tool	TL-EW02
Front derailleur	FD-6770*
Band adapter	SM-AD67
Rear derailleur	RD-6770*
Chain	CN-6701
Front junction: Junction (A)	SM-EW67-A-E*
Electric wires	EW-SD50* / EW-SD50-I*
Electric wire cover	SM-EWC2*
Grommets	SM-GM01* / GM02*
Lithium ion battery	SM-BTR1*
Battery charger	SM-BCR1*
Battery charger (SM-BCR1) cord	SM-BCC1*
Battery mount	SM-BMR1* / SM-BMR2*
Bottle cage adapter	SM-BA01
Rear junction: Junction (B)	SM-JC41* (built-in type) / SM-JC40* (external type)
PC Linkage Device	SM-PCE1
Front chainwheel (bottom bracket)	FC-6700 / FC-6750 (SM-BB6700)
Front hub	HB-6700
Freehub	FH-6700
Cassette sprocket	CS-6700
Caliper brakes	BR-6700
Cantilever brakes	BR-CX70
Wheels	WH-6700
Pedals	PD-6700-C / PD-6700

\* These components are part of the ULTEGRA 6770 series (electronic gear shifting system).

Built-in type (SM-JC41)

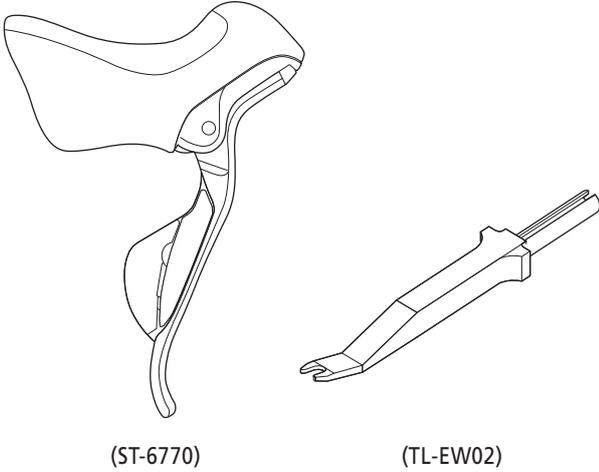


External type (SM-JC40)

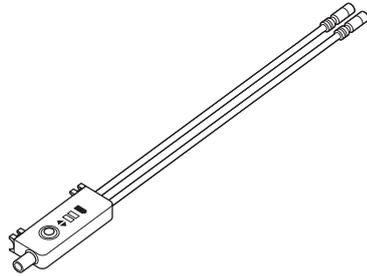


# SYSTEM CONFIGURATION DETAILS

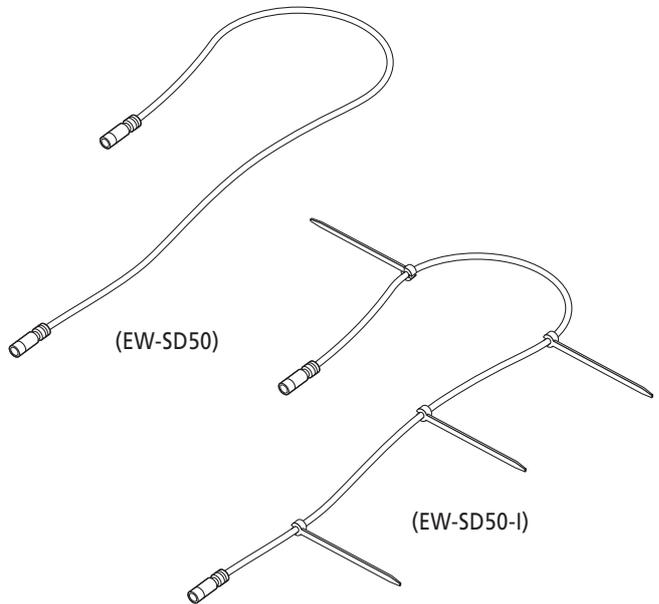
## ■ Dual control lever (ST-6770) / Electric wire tool (TL-EW02)



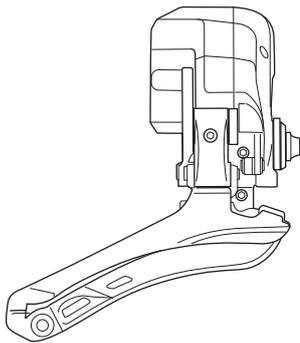
## ■ Front junction: Junction (A) (SM-EW67-A-E)



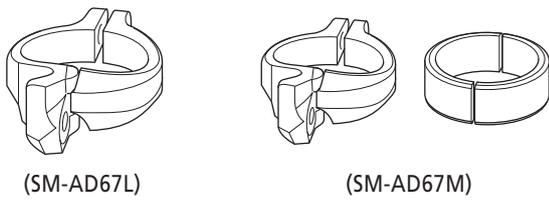
## ■ Electric wires (EW-SD50 / EW-SD50-I)



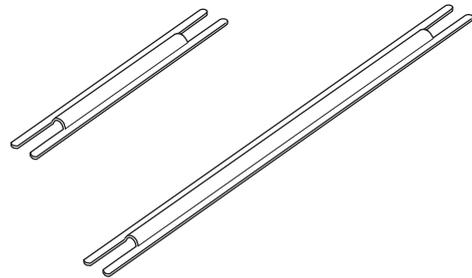
## ■ Front derailleur (FD-6770)



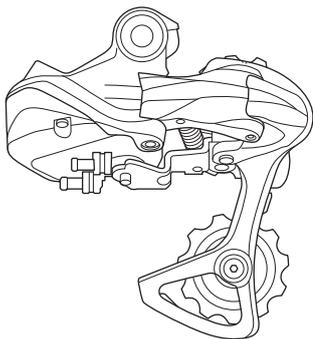
## ■ Band adapter (SM-AD67)



## ■ Electric wire cover (SM-EWC2)



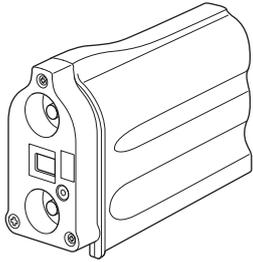
## ■ Rear derailleur (RD-6770)



## ■ Frame grommets (SM-GM01 / SM-GM02)



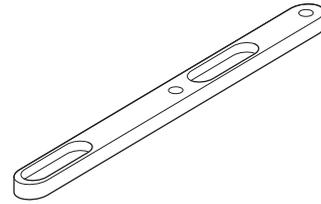
■ **Lithium ion battery (SM-BTR1)**



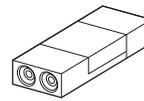
**Accessories**

- Terminal cover

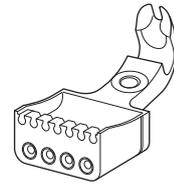
■ **Bottle cage adapter (SM-BA01)**



■ **Rear junction: Junction (B)**  
**Built-in type (SM-JC41) /**  
**External type (SM-JC40)**

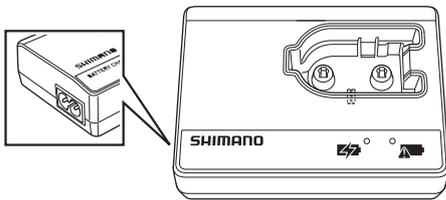


(SM-JC41)

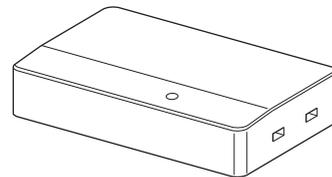


(SM-JC40)

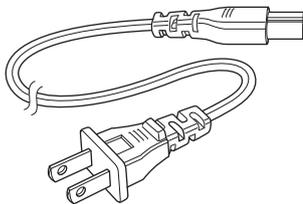
■ **Battery charger (SM-BCR1)**



■ **E-TUBE PROJECT:**  
**System checker (SM-PCE1)**



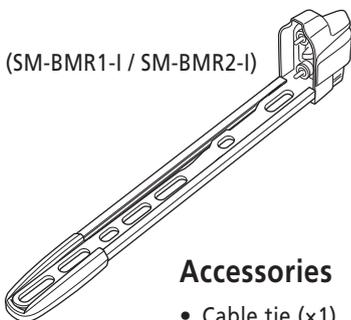
■ **Battery charger cord (SM-BCC1)**



**Accessories**

- PC-link cable (x2) 2m
- USB cable (x1) 50cm

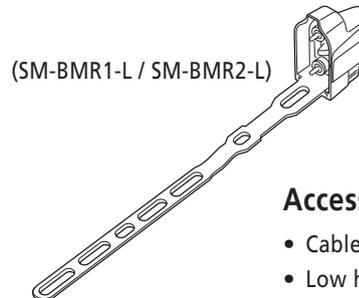
■ **Battery mount (SM-BMR1/SM-BMR2)**



(SM-BMR1-I / SM-BMR2-I)

**Accessories**

- Cable tie (x1)
- Low head M4 bolt (x1)
- Spacer (x3)



(SM-BMR1-L / SM-BMR2-L)

**Accessories**

- Cable tie (x1)
- Low head M4 bolt (x1)



(SM-BMR1-S / SM-BMR2-S)

**Accessories**

- M4 bolt (x2)

# SPECIFICATIONS

## ■ Front derailleur

Type	Brazed-on type	Band type		
Model number	FD-6770-F	FD-6770-L	FD-6770-M	FD-6770-S
Band adapter (installation band diameter)	-	SM-AD67L (34.9 mm)	SM-AD67M (31.8 mm)	SM-AD67MS (28.6 mm)
Number of larger chainring teeth	50 - 56 T			
Difference in number of larger and smaller chainring teeth	16T or less			
Chainstay angle ( $\alpha$ )	61° - 66°			
Chain line	43.5 mm			

## ■ Rear derailleur

Type	SS
Total capacity	33 T
Maximum no. of largest sprocket teeth	28 T
Minimum no. of largest sprocket teeth	23 T
Maximum no. of smallest sprocket teeth	12 T
Minimum no. of smallest sprocket teeth	11 T
Difference in number of teeth from front	16T or less

## ■ Battery

Battery unit	Lithium ion
Nominal capacity	530 mAh
Weight	Standard 71 g
Operating temperature range	During discharge: -10 °C - 50 °C During charging: 0 °C - 45 °C
Storage temperature range	-20 - 60 °C
Nominal voltage	7.4 V

## ■ Battery charger

Input	100 - 240 V AC, 50/60 Hz
Output	8.4 V DC, 0.55 A
Dimensions	Approx. 100 mm (W) x 30 mm (H) x 72 mm (D)
Weight	Approx. 110 g
Operating temperature	0 - 45 °C
Storage temperature	-20 - 60 °C

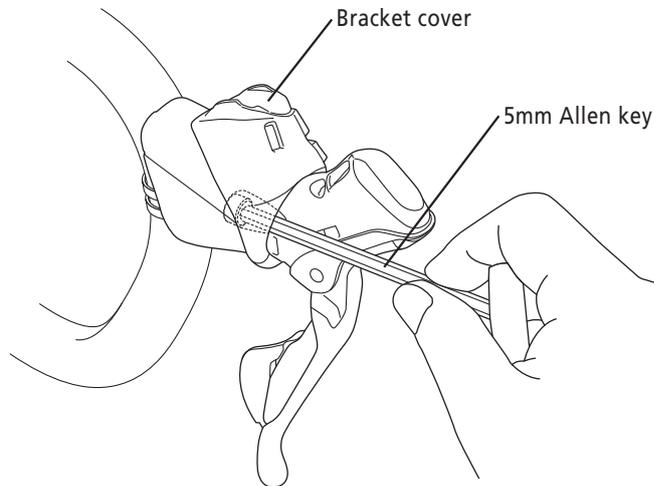
## ■ Battery charger cord

(Refer to page 48)

# INSTALLATION

## ■ Installation of the dual control lever

Open up the bracket cover from the front, and then use a 5 mm Allen key to tighten the mounting nut in order to secure the lever unit.



**Tightening torque:**  
6 - 8 N·m {53 - 69 in. lbs.}

When installing the components to carbon frame/handle bar surfaces, verify with the manufacturer of the carbon frame/parts for their recommendation on tightening torque in order to prevent over tightening that can cause damage to the carbon material and/or under tightening that can cause lack of fixing strength for the components.

## ■ Installation of the brake cables

### Cables used



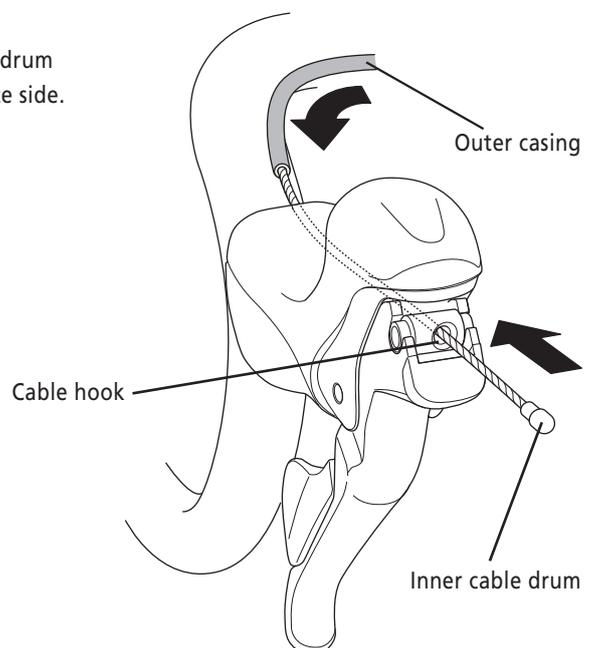
Inner cable ... 1.6 mm dia.



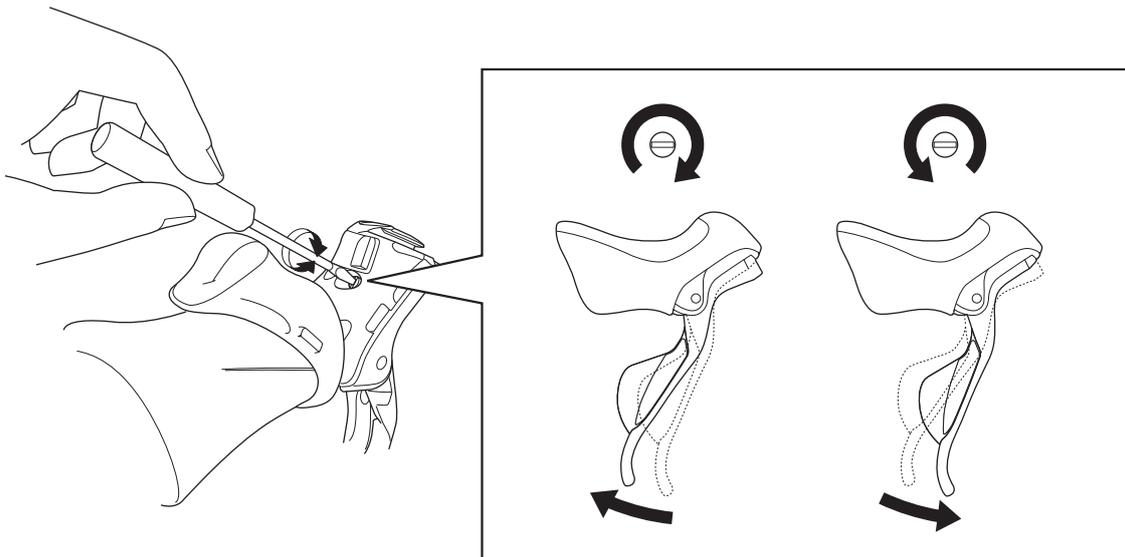
SLR outer casing ... 5 mm dia.

Use cables which are long enough so that they still have some slack even when the handlebars are turned as far as they will go to the left and to the right.

1. Gently pull the brake lever.
2. Pass the inner cable through from directly in front, set the inner cable drum into the cable hook, and then install the outer casing from the opposite side.



The lever stroke can be smoothly adjusted using the bolt on the top of the bracket unit. Check the lever operation while adjusting.



## ■ Installation of the front derailleur

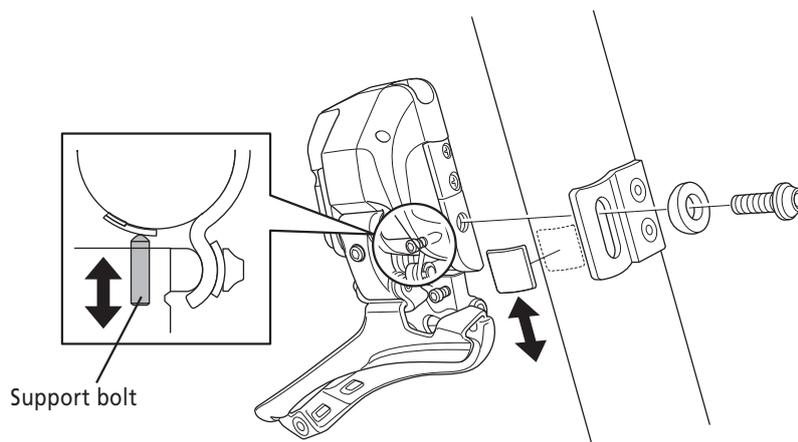
1. Install the front derailleur to the frame.

### When installing a brazed-on type

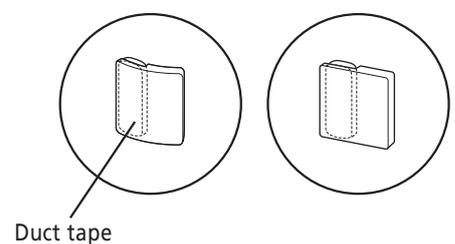
If installing the front derailleur to a brazed-on type frame, a protector must be attached to the seat tube. Always be sure to install the protector in order to prevent damage to the frame from the pressure applied by the support bolt of the front derailleur.

### Installation of the protector

Check the position where the support bolt directly touches the frame when the support bolt of the front derailleur is being adjusted, and attach the protector in that position. In addition, avoid positioning the duct tape that attaches the protector to the seat tube in the location where the support bolt directly touches the frame.

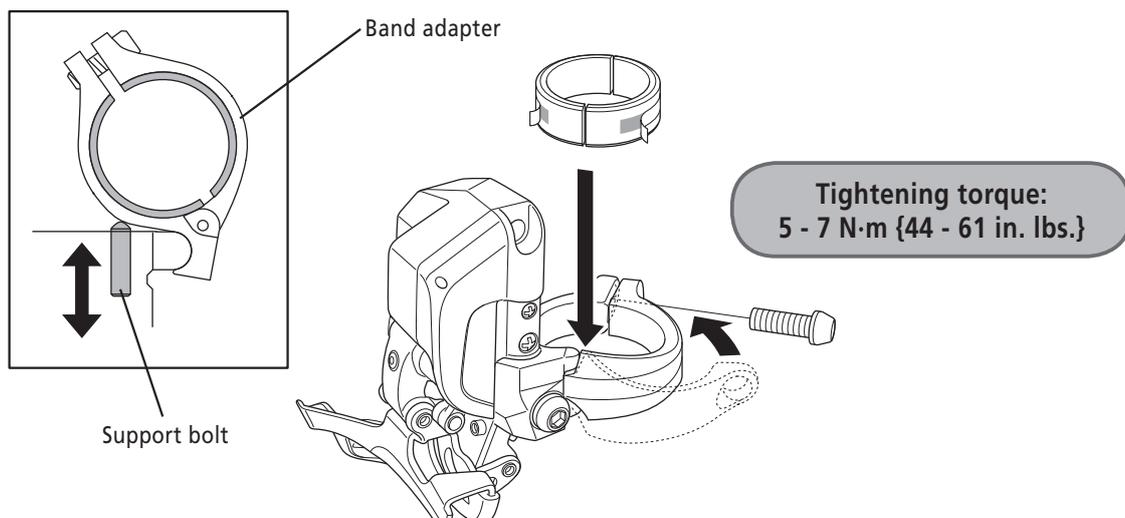


\* Protectors with a curved adhesion surface and a flat adhesion surface exist as shown in the illustration, so use whichever type matches the shape of the frame.



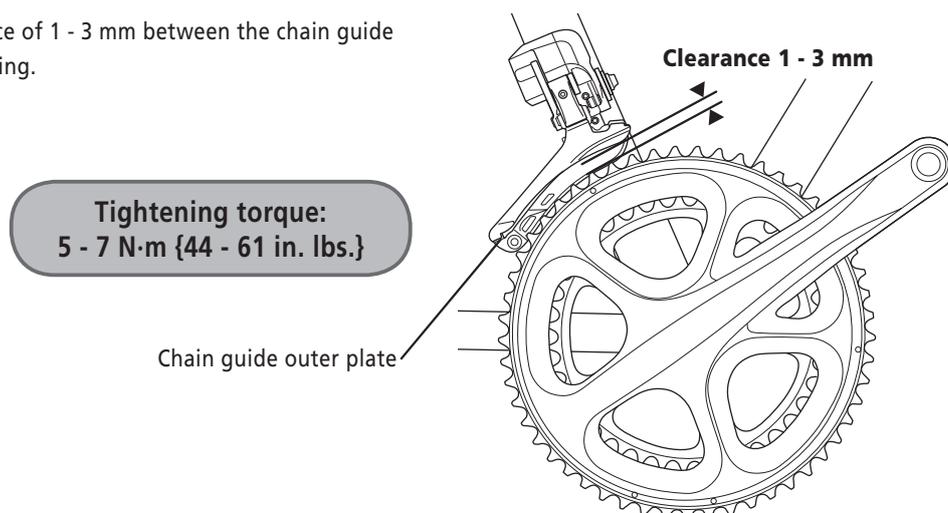
## When installing a band type

\* If using the band adapter (SM-AD67), a support bolt will be necessary. A protector and a mounting washer will not be needed. Use the SM-AD67 in combination with the FD-6770. The SM-AD11/15 cannot be installed.

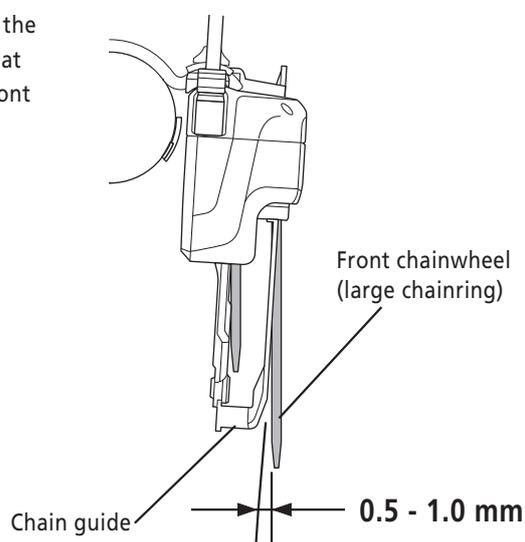


When installing the components to carbon frame/handle bar surfaces, verify with the manufacturer of the carbon frame/parts for their recommendation on tightening torque in order to prevent over tightening that can cause damage to the carbon material and/or under tightening that can cause lack of fixing strength for the components.

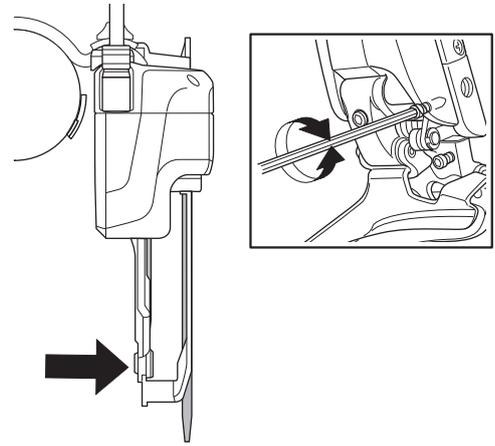
2. Adjust so that there is a clearance of 1 - 3 mm between the chain guide outer plate and the large chainring.



3. Use a 5 mm Allen key to secure the chain guide outer plate so that the flat part of the plate is directly above the large chainring and so that the rear edge of the chain guide is within 0.5 - 1.0 mm from the front edge of the chain guide.

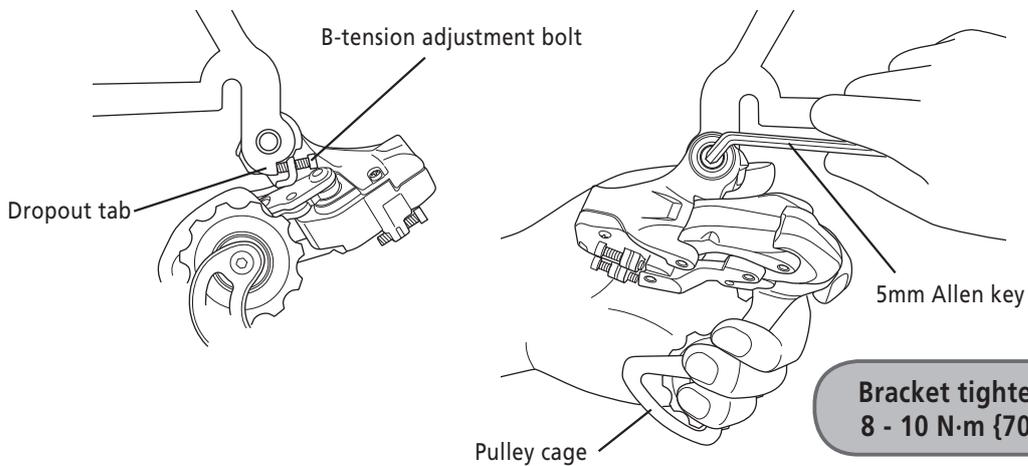


4. Use a 2 mm Allen key to turn the support bolt in order to adjust the position of the front derailleur so that the flat part of the chain guide outer plate is directly above and parallel to the large chainring.



## ■ Installation of the rear derailleur

When installing the rear derailleur, make sure that the B-tension adjustment bolt does not touch the dropout tab and cause it to bend.

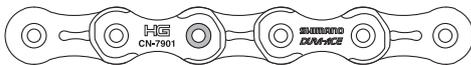


## ■ Installation of the chain

### Note:

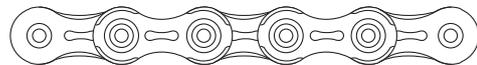
\* This 10-speed chain for road riding has a differently-shaped forward side and reverse side in order to improve high gear shifting performance.

Forward (outer side)

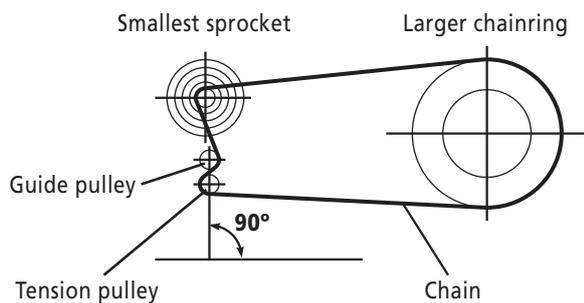


The side with the marks shown in the illustration is the forward side (outer side).

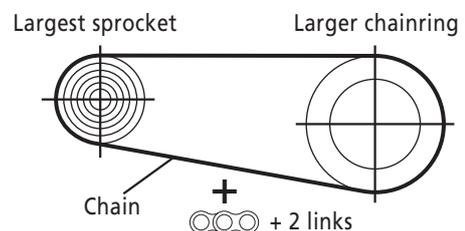
Reverse (inner side)



## Chain length



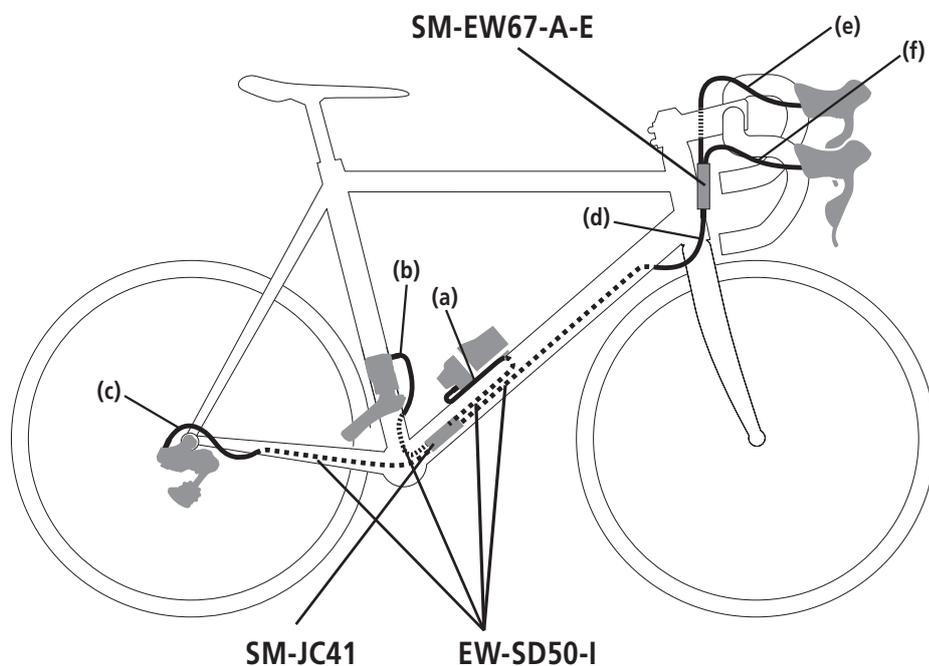
\* If the largest sprocket is 28T or more  
Add 2 links while the chain is on the larger chainring and the largest sprocket.



## CONNECTION OF THE ELECTRIC WIRES

### Names and example locations of each part

#### Built-in type (SM-JC41)



**Note:**

Cable length (EW-SD50)

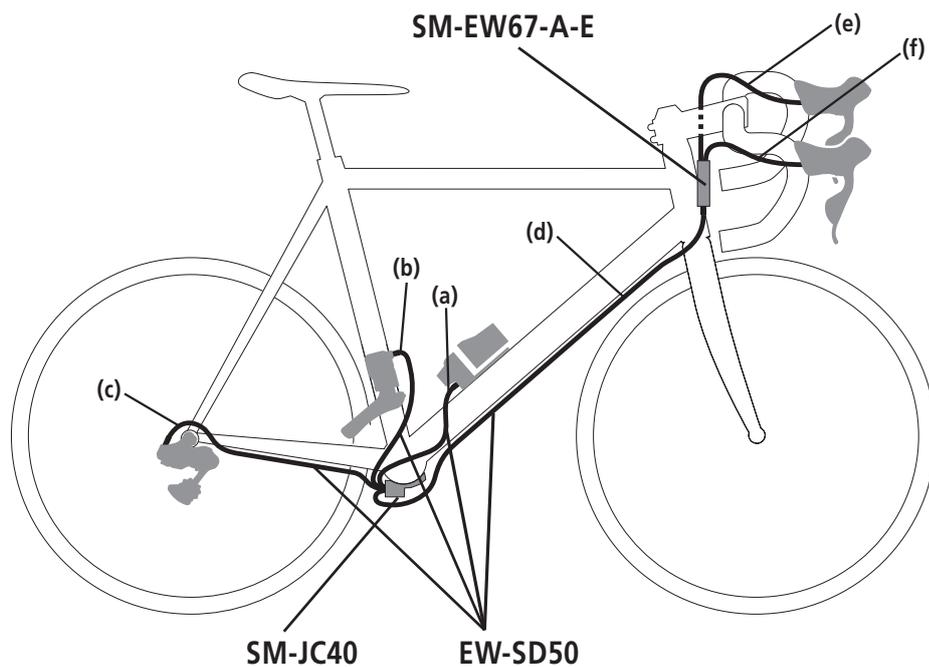
(a) + (b)  $\leq 1500\text{mm}$

(a) + (c)  $\leq 1700\text{mm}$

(d)  $\leq 1400\text{mm}$

(e) , (f)  $\leq 500\text{mm}$

#### External type (SM-JC40)



**Note:**

Cable length (EW-SD50)

(a) + (b)  $\leq 900\text{mm}$

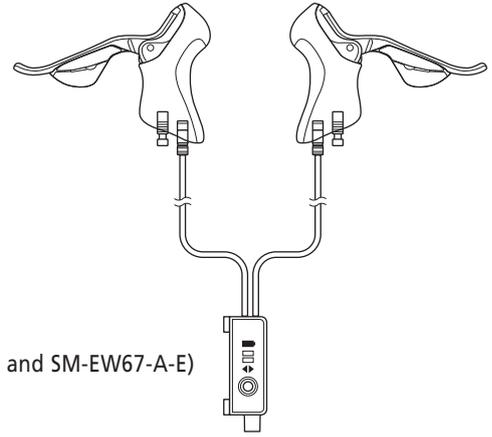
(a) + (c)  $\leq 1100\text{mm}$

(d)  $\leq 1400\text{mm}$

(e) , (f)  $\leq 500\text{mm}$

## ■ Front junction: Connection of junction (A)

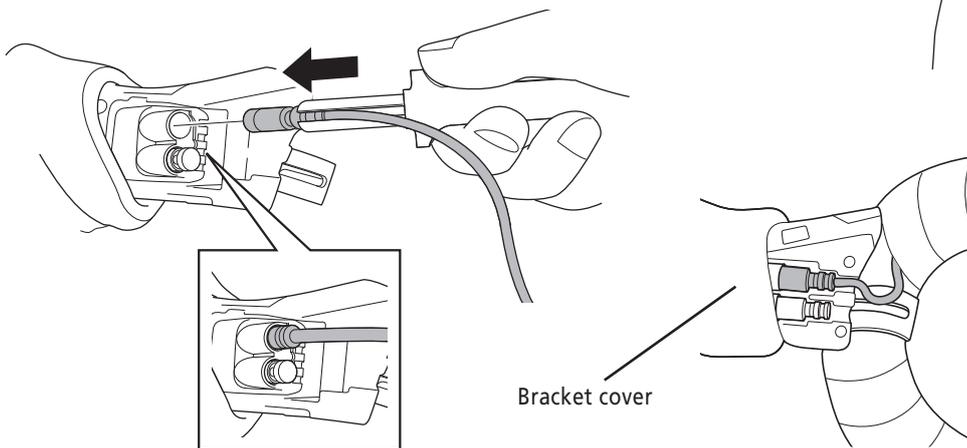
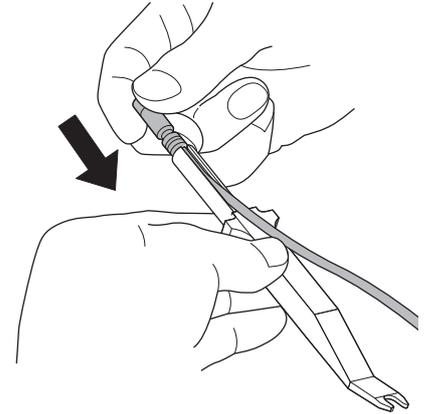
When routing the SM-EW67-A-E, allow enough looseness in the cable so that the ST-6770 installation position can be adjusted and so that the handlebars can be turned fully to the left and right. When routing the electric wires, they can be wrapped around the handlebars when wrapping the handlebar tape.



(Sample connection diagram for ST-6770 and SM-EW67-A-E)

## ■ Connection to the Dual control lever

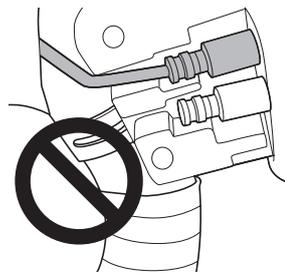
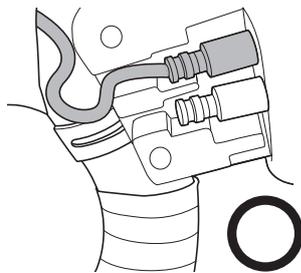
1. Use the Shimano original tool TL-EW02 to connect to the ST-6770. Set so that the projection on the connector is aligned with the groove on the narrow end.
2. Open up the bracket cover and lift up the connector cover. Use the TL-EW02 to connect the connector of the electric wire to the terminal on the lever side. Be sure to push them together until they connect with a click. Either the top or bottom terminal can be used.



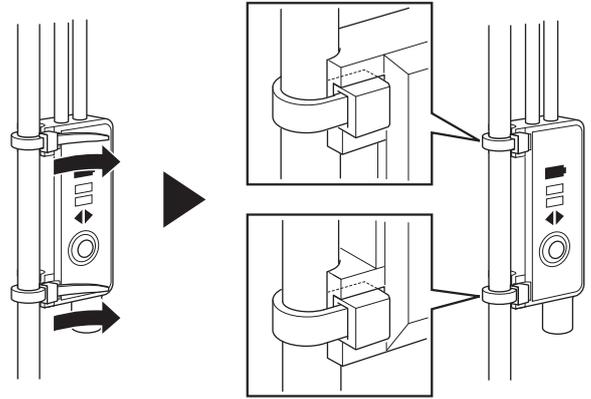
\* The remaining terminal can be used for an additional satellite switch or the SM-PCE1.

### Note:

- The electric wire could be pulled by gripping and rolling bar-tape. To prevent wire coming off from dual control lever, keep the length margin of electric wire at bracket cover even after bar-tape is rolled up.
- This length margin of electric wire is also necessary to open the bracket cover when additional switch and the SM-PCE1 is connected.



- Use the accessory cable ties to secure junction (A) to the outer casing of the brake cable.

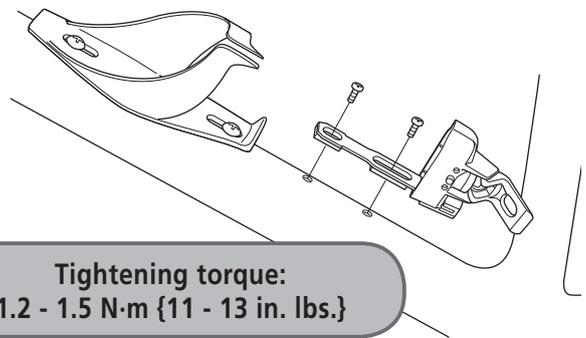
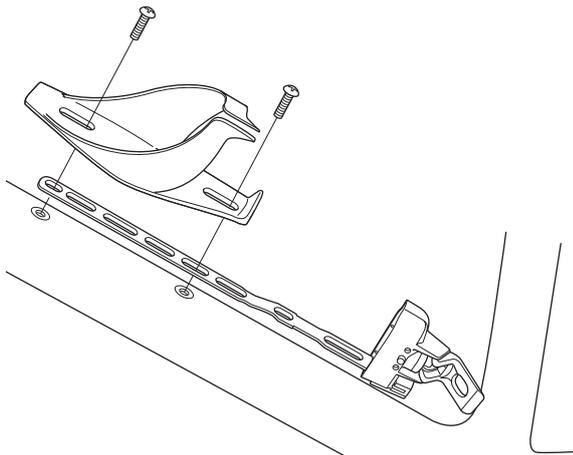


## ■ Installation of the battery mount

- Set the battery mount into position. Use the bottle cage fixing bolt to provisionally install the battery mount to the bottom of the bottle cage.

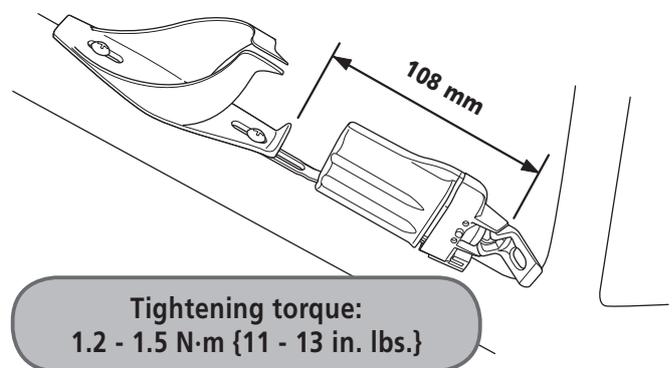
Use the bolts which are included with the bottle cage to secure the SM-BMR1-L/ SM-BMR2-L (long type).

Refer to the Service Instructions for the bottle cage for details on the tightening torques.



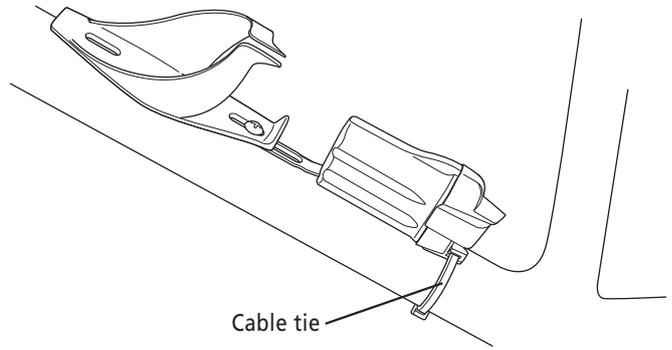
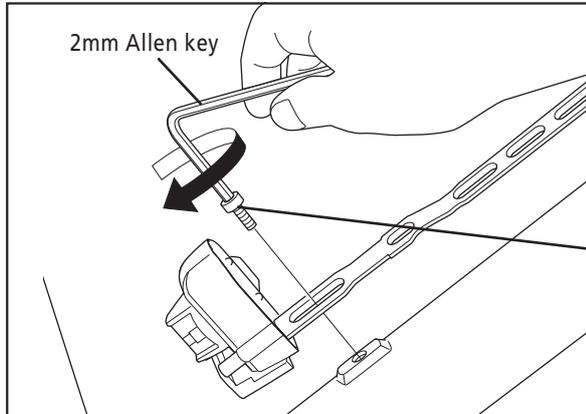
Use the included M4 bolts to secure the SM-BMR1-S/ SM-BMR2-S (short type).

- Leave a space of 108 mm or more at the end of the battery mount. Check that the battery can be inserted and removed while the bottle cage is installed.



3. Tighten the bolt of the bottle cage to secure the battery mount. For the SM-BMR1-L/SM-BMR2-L (long type), use the accessory cable tie to secure the battery mount to the frame.

\* If there is a mounting boss on the frame, the battery mount can be secured to the frame with a bolt.

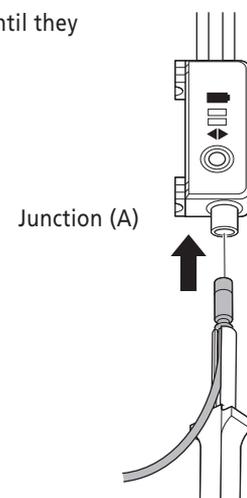
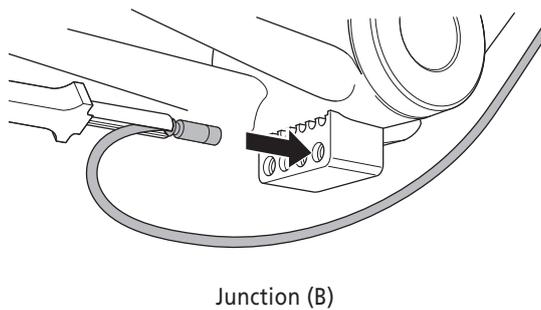


**Tightening torque:**  
1.2 - 1.5 N·m {11 - 13 in. lbs.}

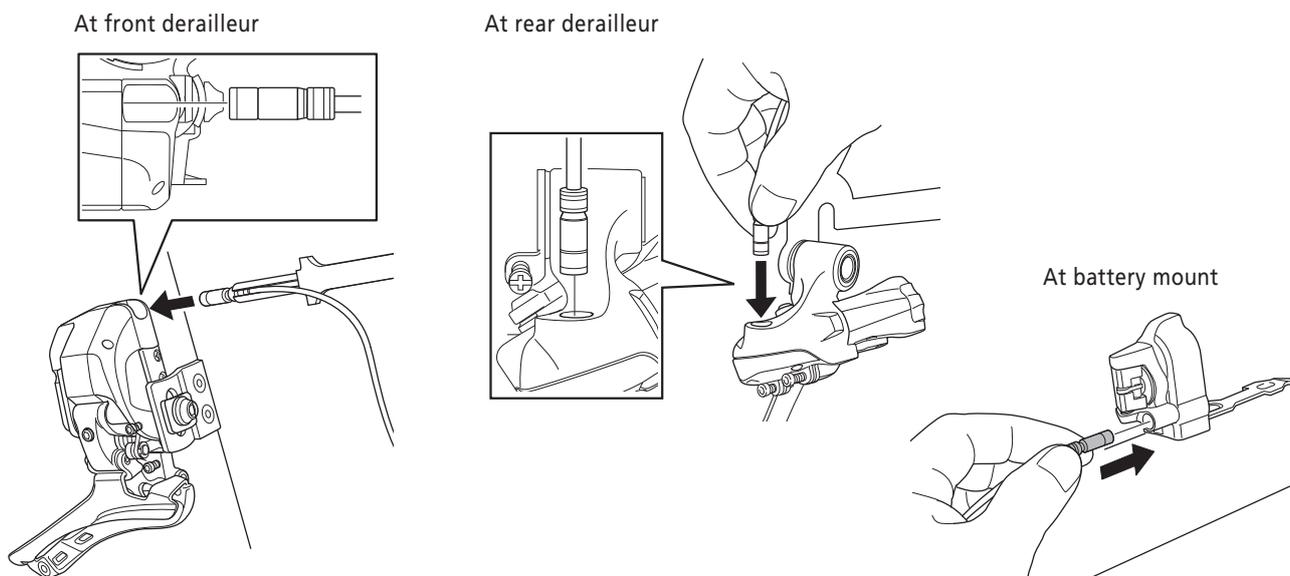
## ■ Rear junction: Connection of junction (B) External type

### External type (SM-JC40)

1. Connect the electric wires to junction (A) and junction (B). Be sure to push them together until they connect with a click.



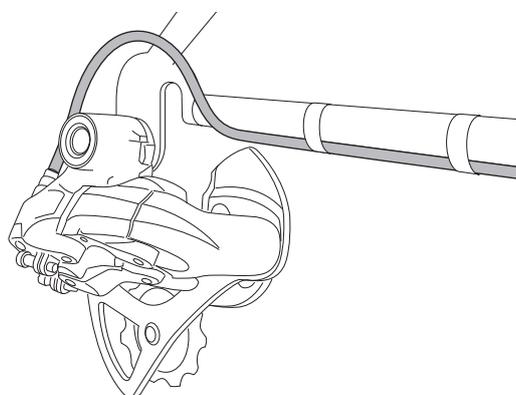
2. Connect the electric wires to the front derailleur, the rear derailleur and the battery mount.



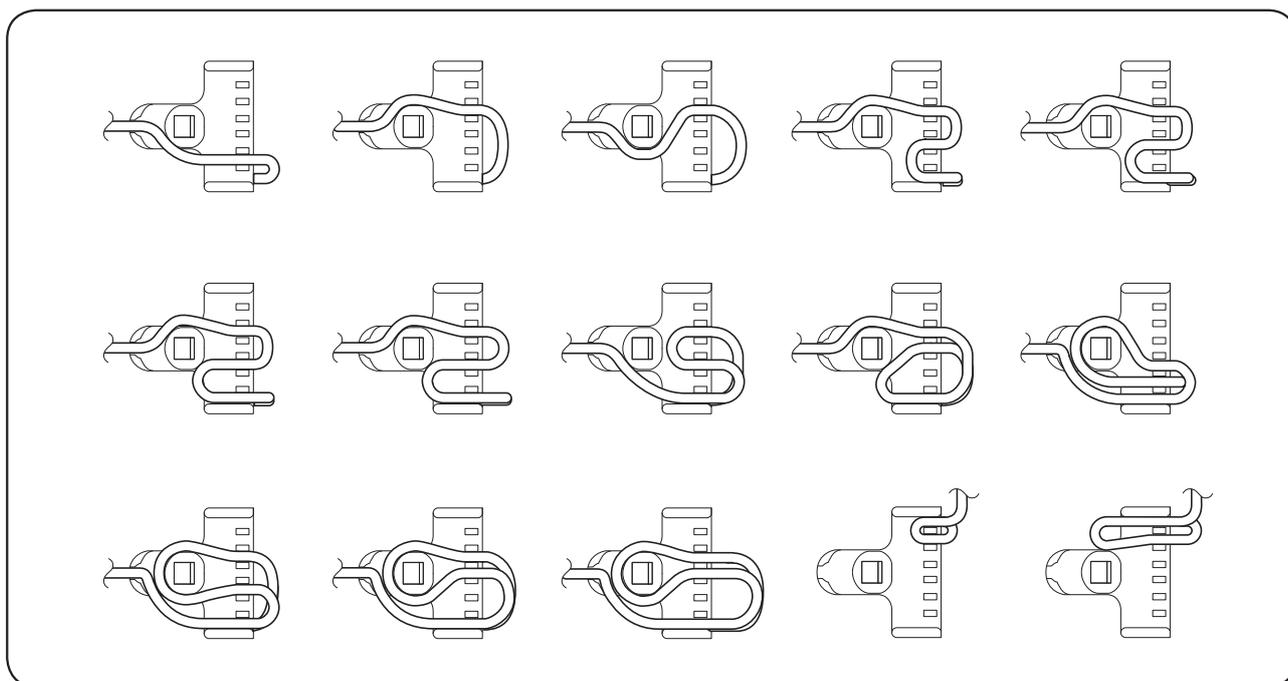
3. Provisionally secure the electric wire along the frame with tape, and then connect it to junction (B).

\* When routing the electric wire to the rear derailleur, be sure to install it to the bottom of the chainstay to avoid any interference between the cable and the chain.

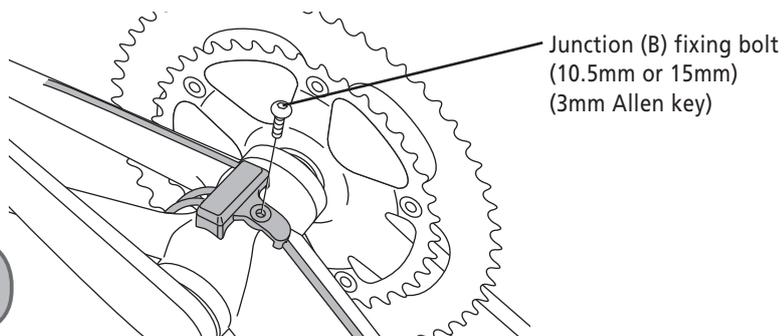
\* Wind any excess length of electric wire inside junction (B) to adjust the length.



### Example of adjusting junction (B) length

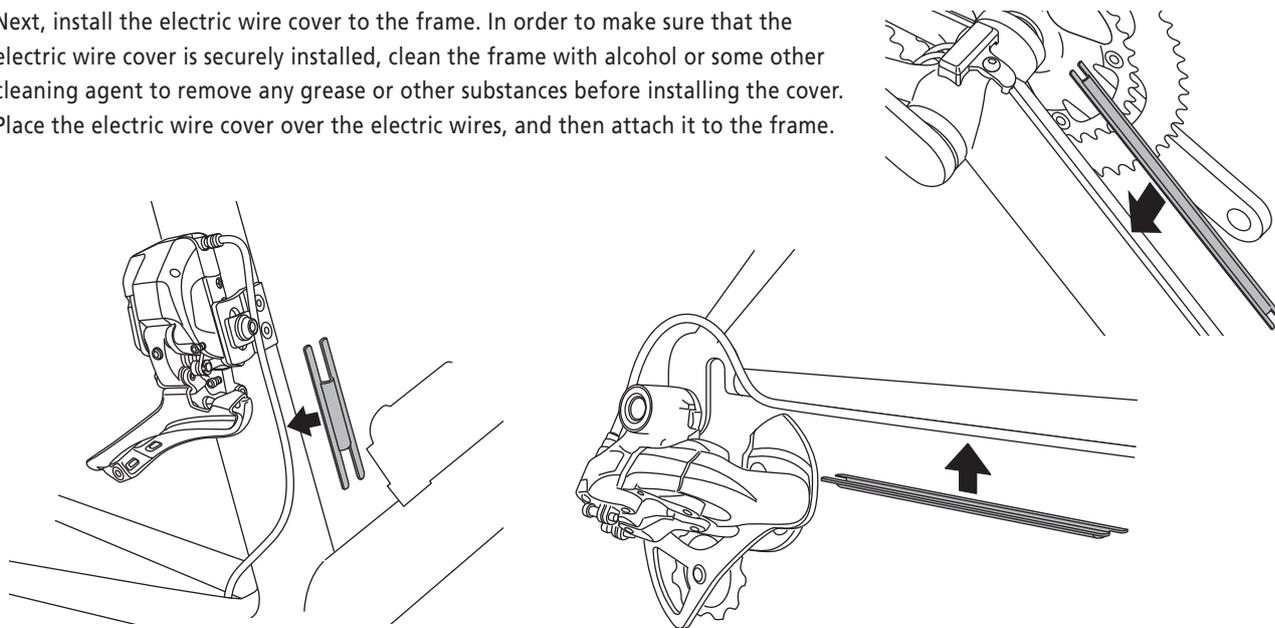


4. Once the electric wires have been routed, secure junction (B) underneath the bottom bracket shell.



**Tightening torque:**  
1.5 - 2 N·m {14 - 17 in. lbs.}

5. Next, install the electric wire cover to the frame. In order to make sure that the electric wire cover is securely installed, clean the frame with alcohol or some other cleaning agent to remove any grease or other substances before installing the cover. Place the electric wire cover over the electric wires, and then attach it to the frame.



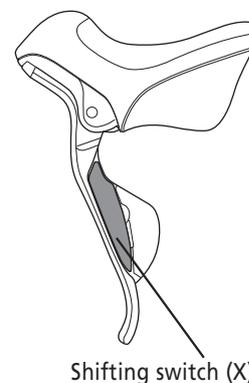
### Checking connections

After connecting the electric wires to all of the components, install the battery and check the operation.

Operate the shifting switches and check that the front derailleur and rear derailleur both operate.

### Note:

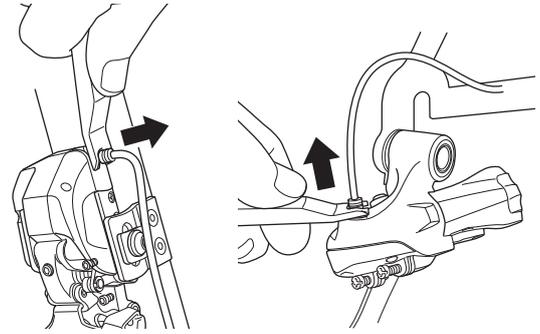
\* If not installing the chain at this point, be sure to operate shifting switch (X) for the left lever once or more to set the front derailleur to the larger chainring position when installing the chain. After this, be sure to remove the battery.



## Disconnection of the electric wires

This is a small waterproof connector. Do not repeat connecting and disconnecting it. The waterproof section or the connecting section may become worn or deformed, and the function may be affected.

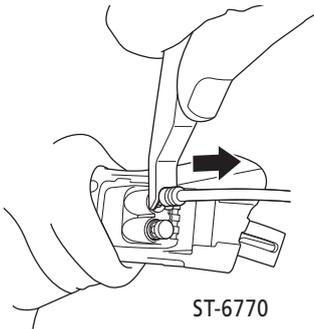
Use the wide end of the Shimano original tool TL-EW02 to disconnect the electric wires. If you pull too firmly on the connectors, problems with operation may occur. Insert the Shimano original tool so that the flat side is facing toward the derailleur, and then tilt it so as to pull out the connector of the electric wire.



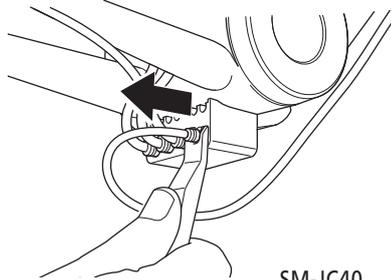
FD-6770

RD-6770

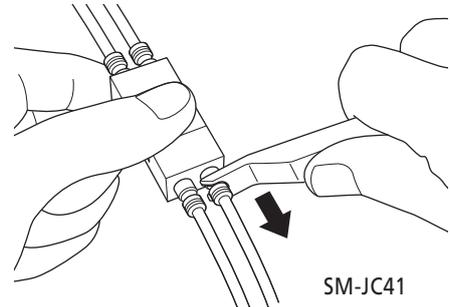
When disconnecting the electric wire from a lever, face the flat side toward the lever. When disconnecting the connector of junction (A) or junction (B), insert the Shimano original tool so that the flat side is facing toward junction.



ST-6770



SM-JC40



SM-JC41

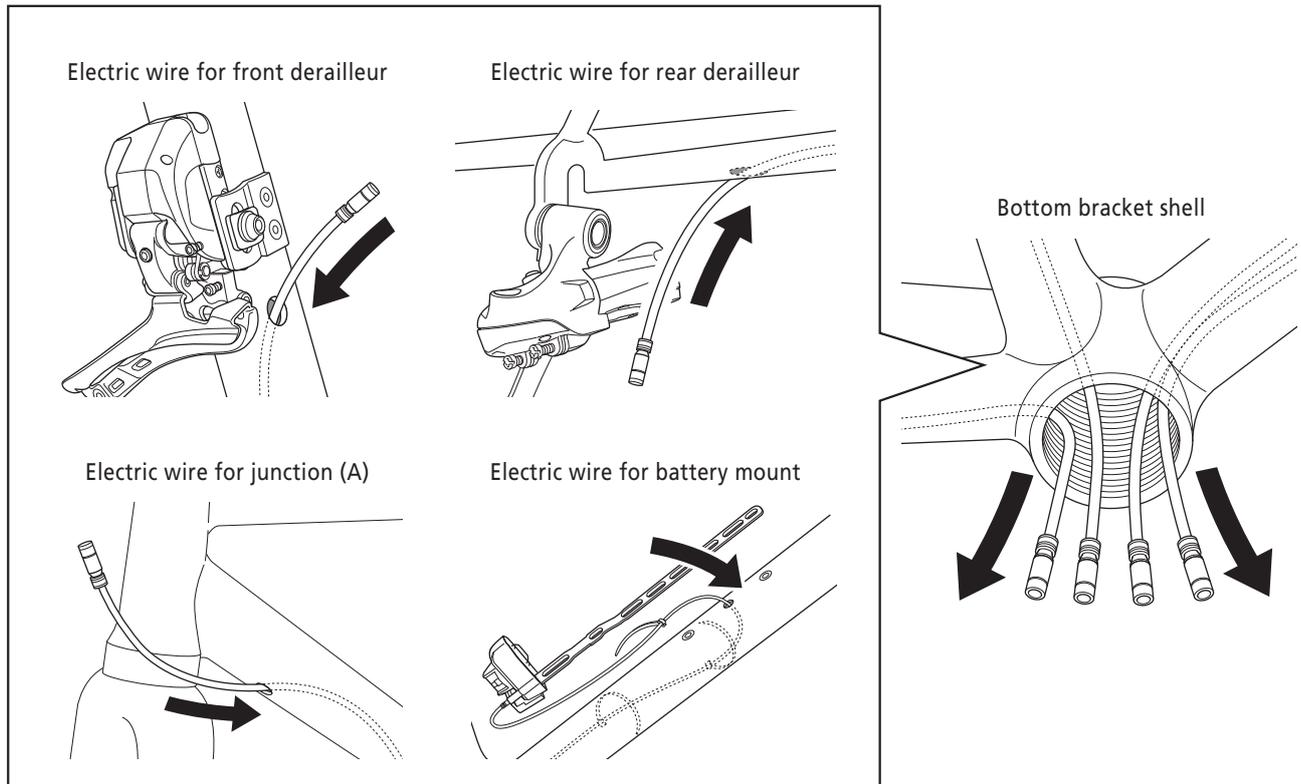
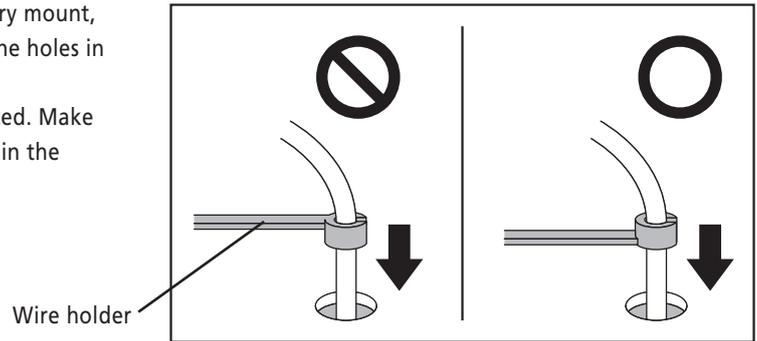
\* Run any excess length of electric wire along the handlebar, and use cable ties or similar to secure the electric wire to the handlebar.

## ■ Rear junction: Connection of junction (B) Built-in type

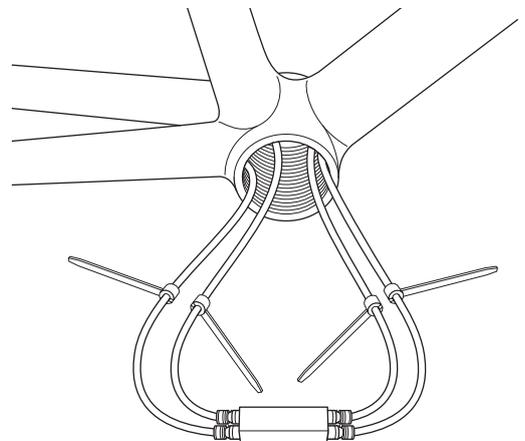
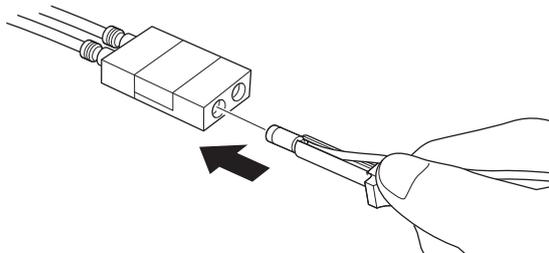
### Built-in type (SM-JC41)

1. First pass the electric wires for junction (A), the battery mount, the front derailleur and the rear derailleur through the holes in the frame into the bottom bracket shell.

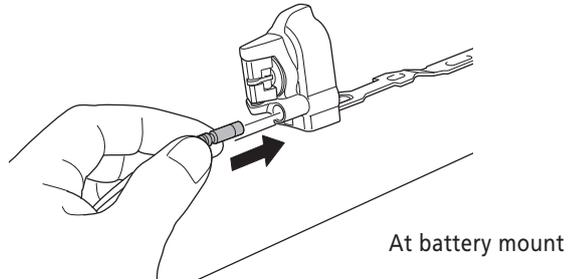
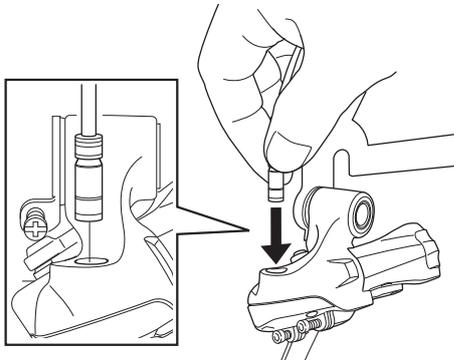
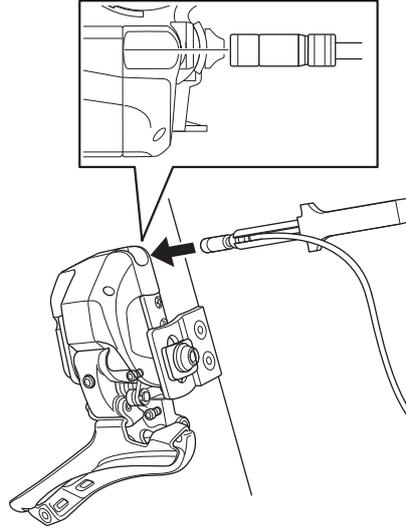
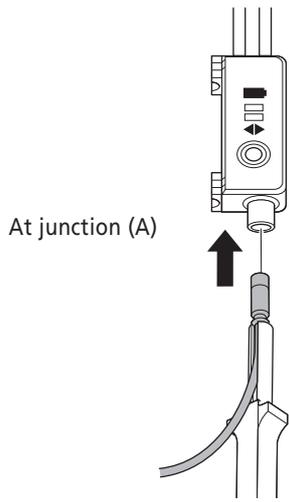
\* The electric wires have a correct way of being inserted. Make sure that you insert them from the direction shown in the illustration.



2. Connect each electric wire to junction (B). Be sure to push them together until they connect with a click.

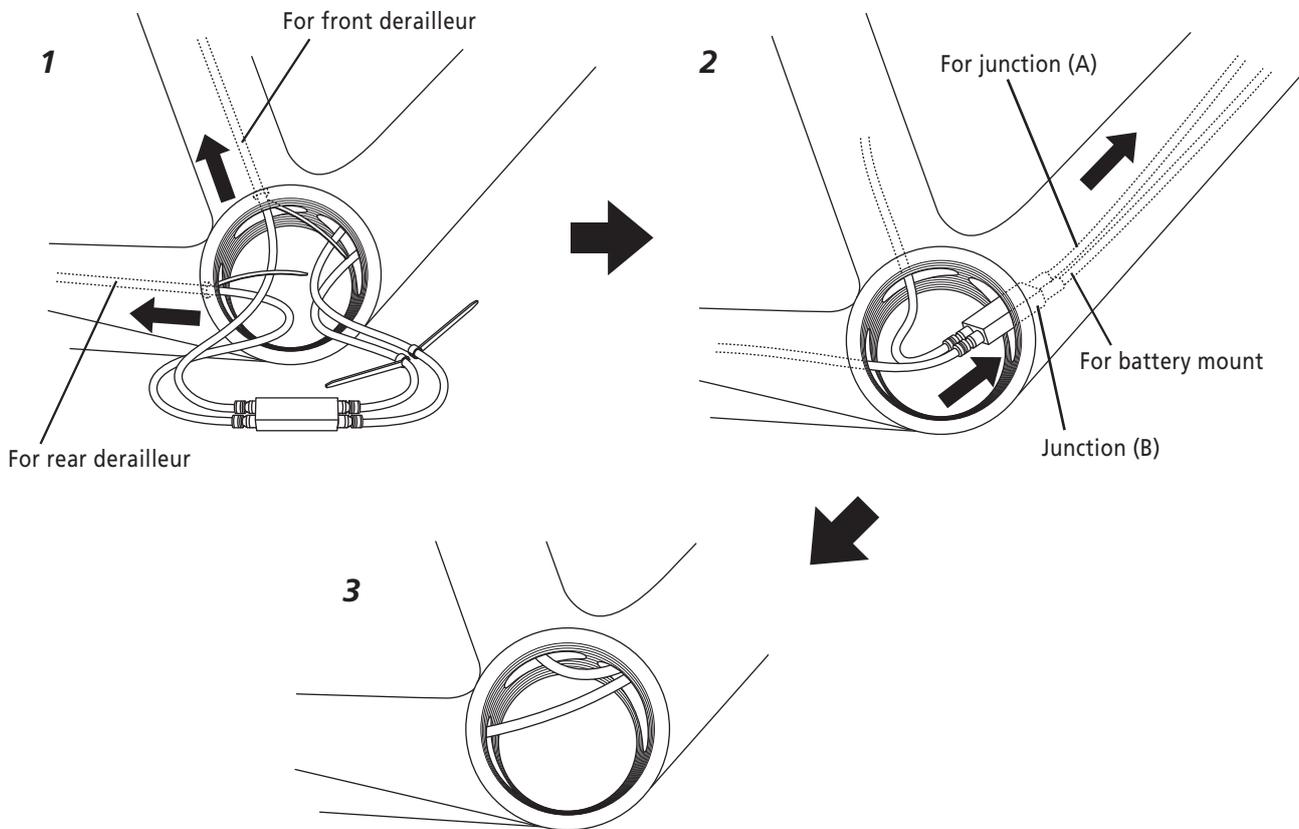


**3.** Connect the electric wires to junction (A), the front derailleur, the rear derailleur and the battery mount.



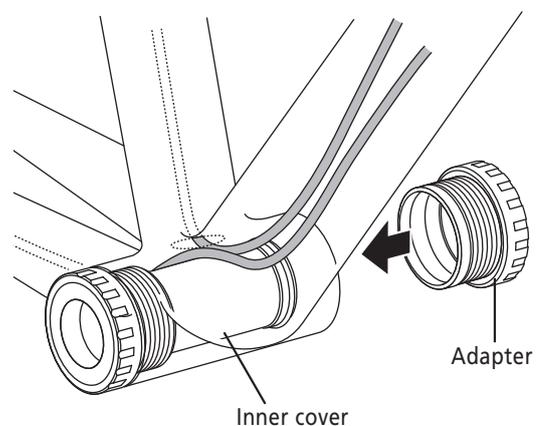
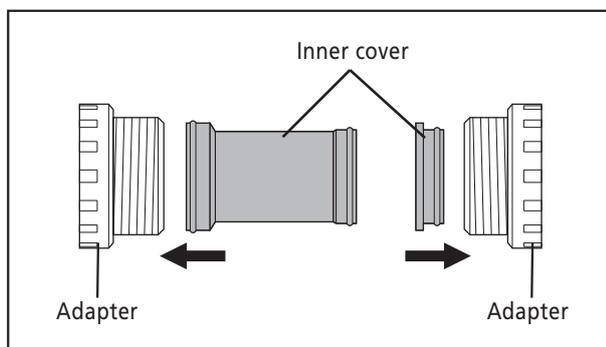
## Routing junction (B) and the electric wires inside the frame

1. Pass the electric wires for the front derailleur and the rear derailleur through the seat tube and chainstay respectively.
2. Pass the electric wires for junction (A) and the battery mount and junction (B) through the down tube. Check that the screws of the bottom bracket shell do not damage any of the components at this time.
3. Set the electric wires so that only the electric wires for the front derailleur and the rear derailleur are visible inside the bottom bracket shell, and if any extra parts such as wire holders are protruding, push them back inside the frame.



## Assembly of the bottom bracket shell

1. When installing the inner cover to the bottom bracket shell, make sure that the electric wires for the front derailleur and the rear derailleur pass over the top of the inner cover.
2. Install the inner cover to the bottom bracket adapter.

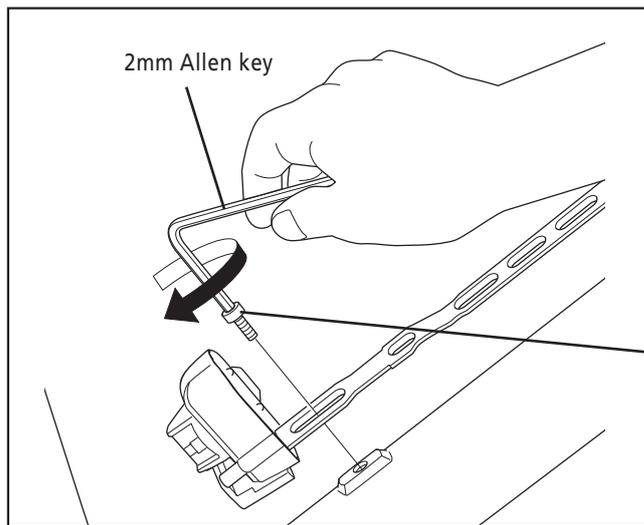
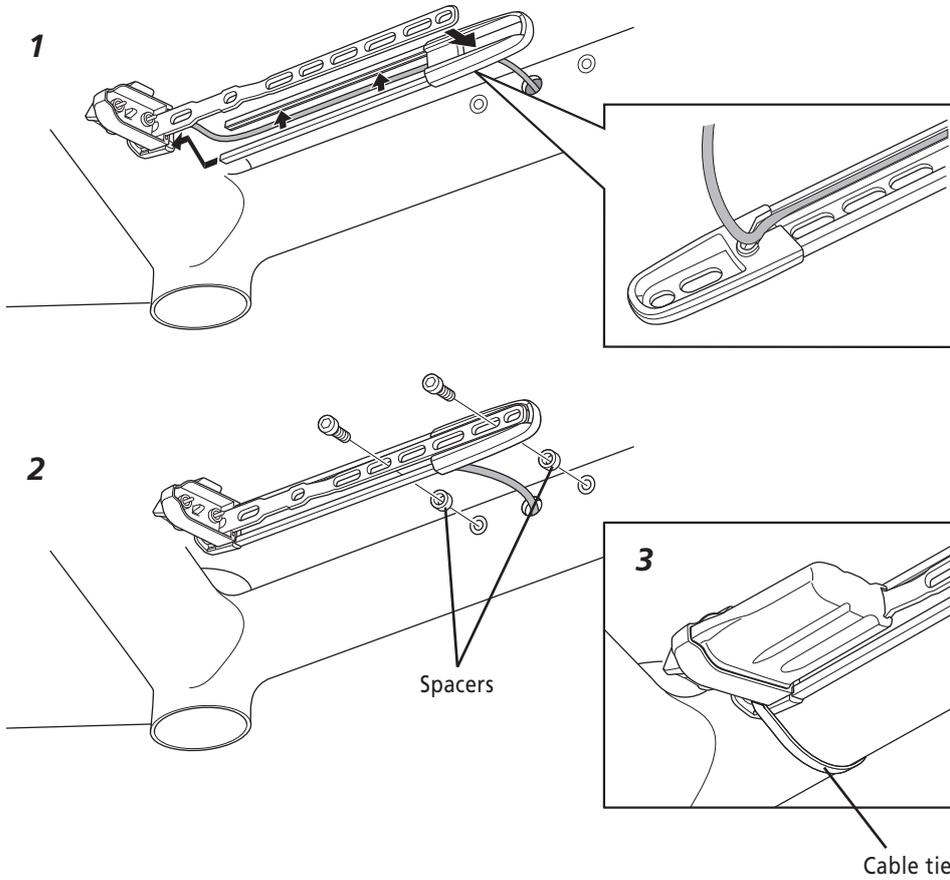


### Note:

\* If using a frame which does not have enough space between the inside of the bottom bracket shell and the inner cover to route the electric wires use an inner cover which is sold separately.

## Installation of the battery mount

1. Set the electric wire for the battery mount into the groove in the electric wire cover for the battery mount.
2. Place the accessory spacers in between the battery mount and the frame and then secure them by tightening the bolts.
  - \* If installing the bottle cage, it is easier to install it at this stage.
  - \* Refer to the Service Instructions for the bottle cage for details on the tightening torques.
3. Use the accessory cable tie to secure the battery mount to the frame.



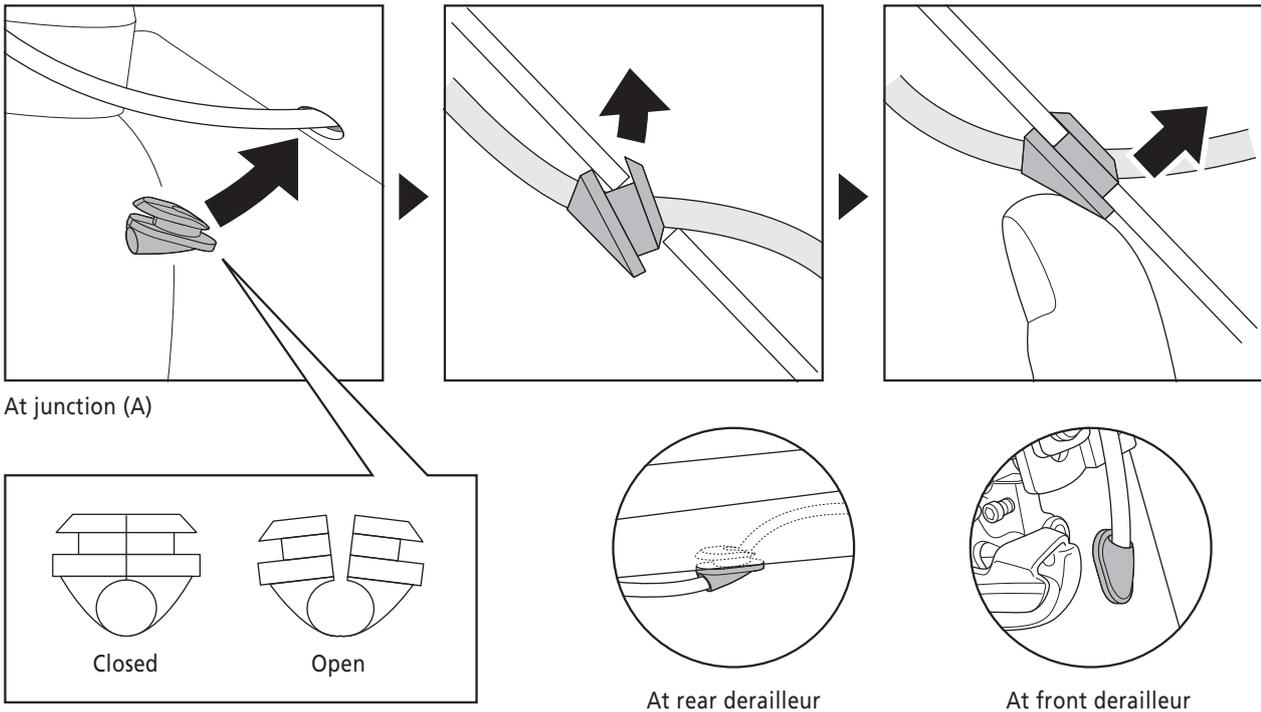
\* If there is a mounting boss on the frame, the battery mount can be secured to the frame with a bolt.

Battery mount fixing bolt  
(M4 x 15mm)

**Tightening torque:**  
1.2 - 1.5 N·m {11 - 13 in. lbs.}

## Installation of the grommets

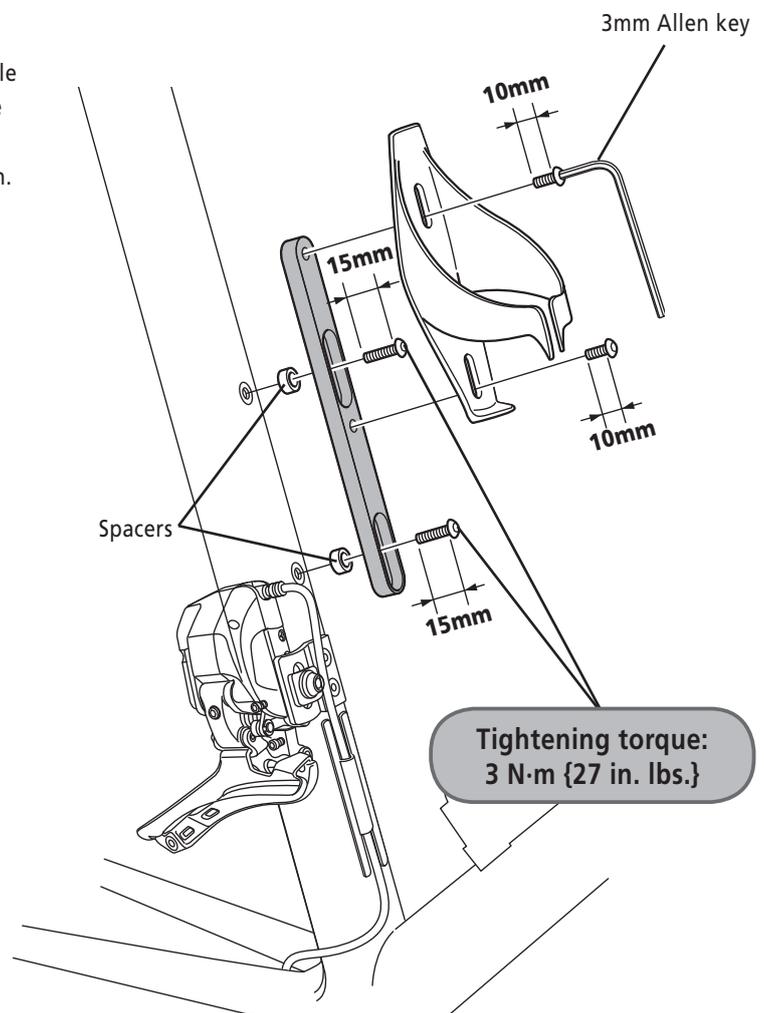
Install grommets in appropriate positions for the electric wires by inserting the bottoms into the holes in the frame and then pushing the tops to fit them into place.



## ■ Installation of the bottle cage adapter

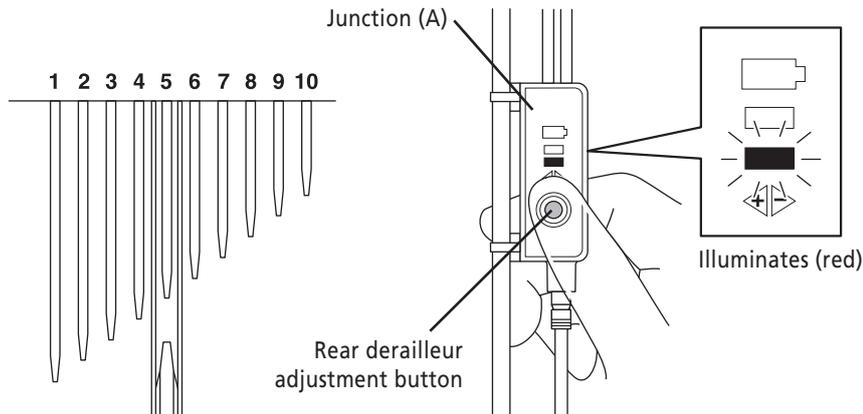
If the bottle cage which is installed to the seat tube interferes with the battery, move the position of the bottle cage upward. The installation position for the bottle cage can be moved upward by a minimum of 32 mm and a maximum of 50 mm from the original installation position.

- \* If it interferes with the mounting boss for the front derailleur, use the accessory spacer.
- \* Refer to the Service Instructions for the bottle cage for details on the tightening torques.



# ADJUSTMENT

## ■ Adjustment of the rear derailleur



1. Install the battery.
2. Shift the rear derailleur to the 5th sprocket position. Press the button at the junction (A) of the SM-EW67-A-E until the red LED illuminates in order to switch to rear derailleur adjustment mode. Note that if you keep pressing the button after the red LED has illuminated, RD Protection Reset will activate.

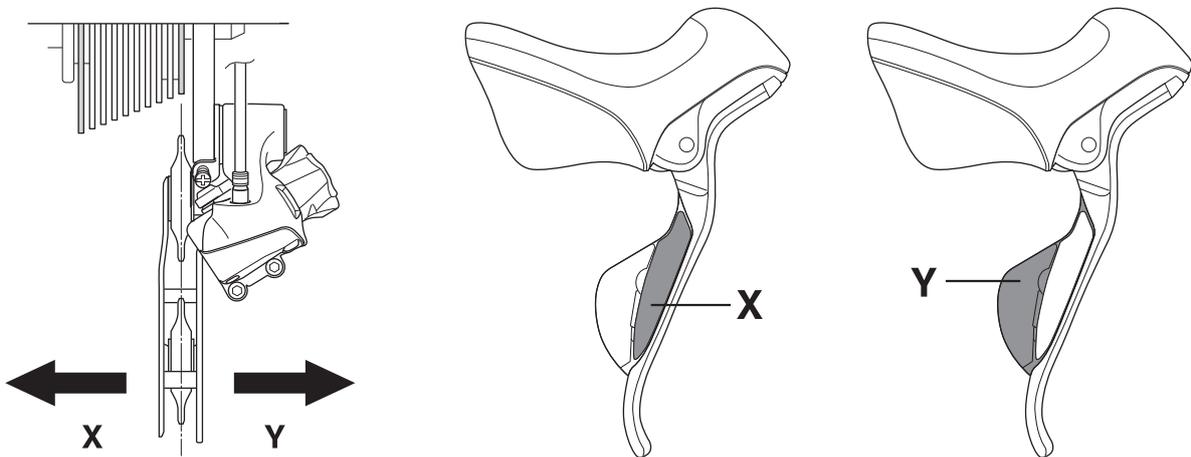
\*For details on RD Protection, refer to "RD Protection" of "OTHER FUNCTIONS".

3. If shifting switch (X) is pressed once while the initial setting condition is active, the guide pulley will move one step toward the inside.

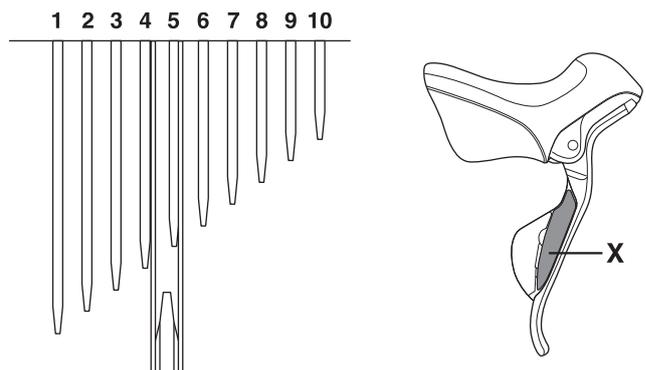
If shifting switch (Y) is pressed once, the guide pulley will move one step toward the outside.

The guide pulley can move 15 steps inward and 15 steps outward from the initial position, for a total of 31 positions.

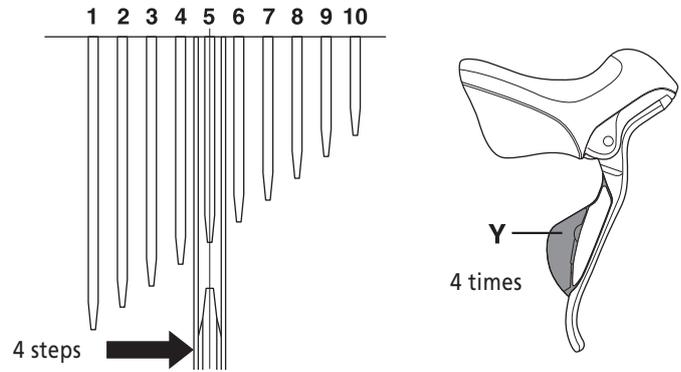
When adjusting, the guide pulley will overrun slightly and then move back in an exaggerated movement so that you can check the adjustment direction. When checking the positions of the guide pulley and the sprocket, check at the position where the guide pulley finally stops.



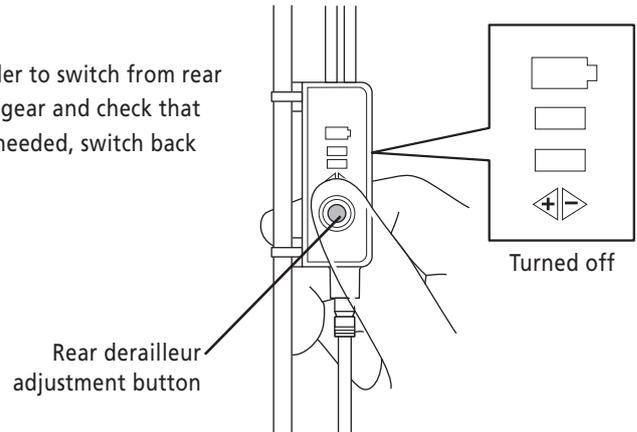
4. While turning the front chainwheel, operate shifting switch (X) to move the guide pulley toward the inside until the chain touches the 4th sprocket and makes a slight noise.



5. Next, operate shifting switch (Y) 4 times to move the guide pulley toward the outside by 4 steps to the target position.



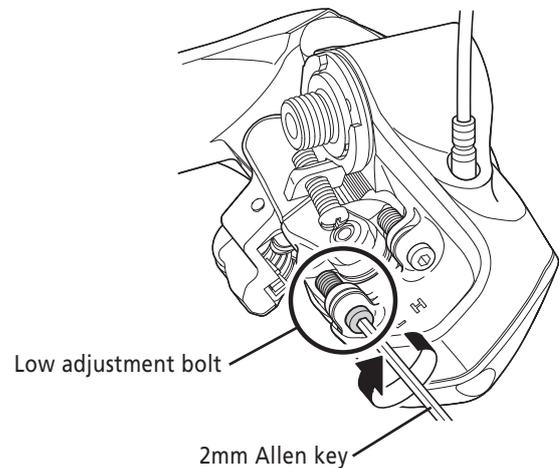
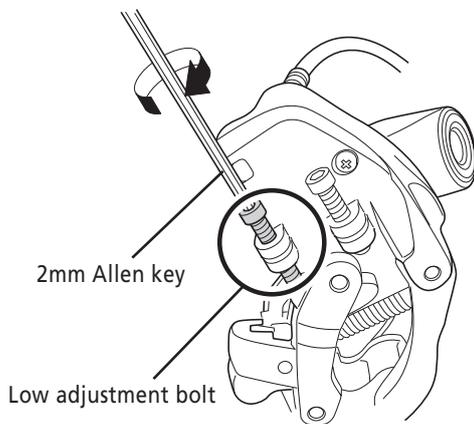
6. Press the button at junction (A) until the red LED turns off in order to switch from rear derailleur adjustment mode to gear shifting mode. Shift to each gear and check that no noise is generated at any gear position. If fine adjustment is needed, switch back to adjustment mode and readjust the rear derailleur.



7. Next, carry out the adjustments for the low adjustment bolt and top adjustment bolt.

### <Low adjustment>

Shift the rear derailleur to the largest sprocket, and then tighten the low adjustment bolt until it touches against the stopper. If it is tightened too much, the motor will detect a problem and gear shifting operation will not be carried out correctly.

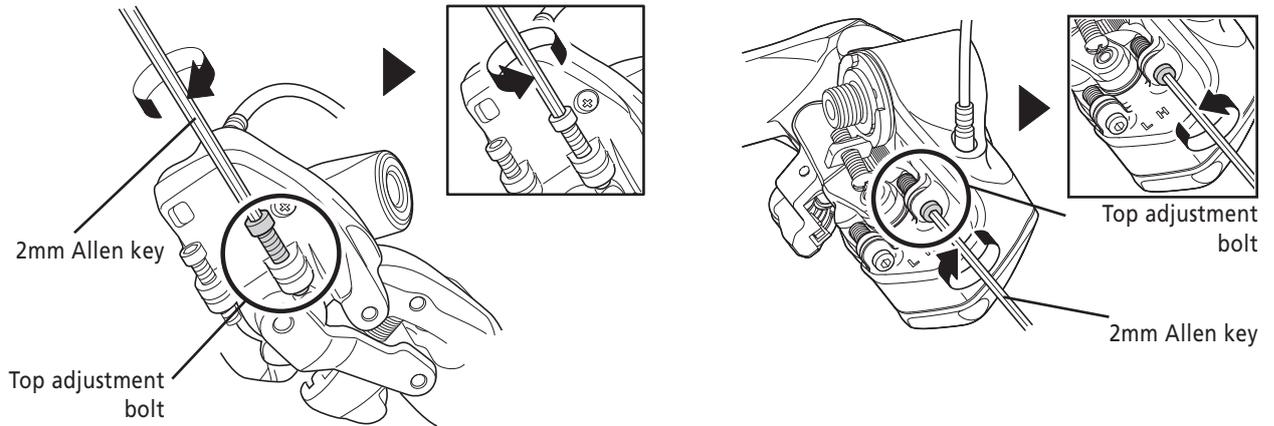


### Symptom

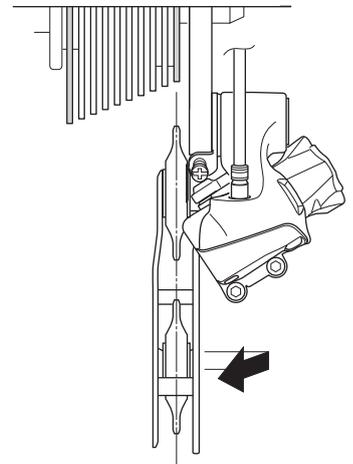
- Does not shift to low gear.
- Noise does not stop.
- Battery charge disappears quickly.  
(load is being placed on the motor.)

## <Top adjustment>

Shift the rear derailleur to the smallest sprocket, and then tighten the top adjustment bolt until it touches the stopper at the position where the rear derailleur finally stopped. From this position, turn the top adjustment bolt counterclockwise one turn so that an over-stroke allowance can always be maintained.

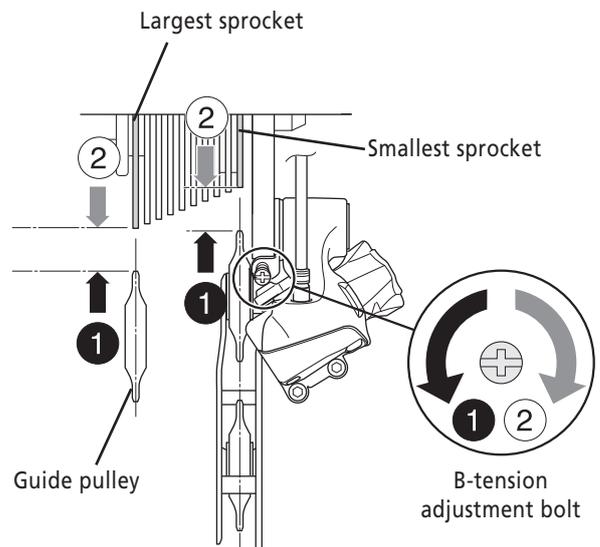


By shifting from a large sprocket to a smaller sprocket, the rear derailleur will move toward the outside by the over-stroke allowance and then move back.



### 8. Adjust the B-tension adjustment bolt.

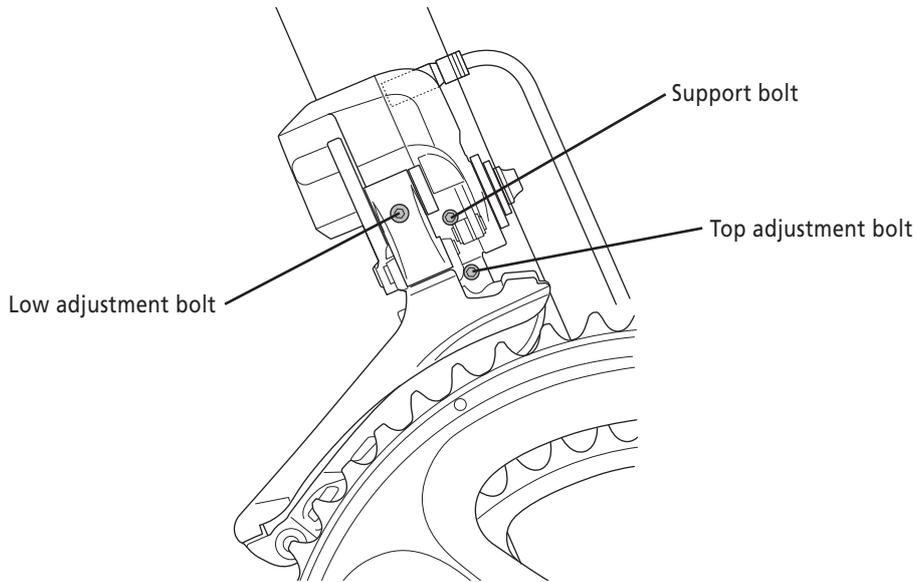
Set the chain onto the smaller chainring and the largest sprocket, and then turn the crank arms backward. Turn the B-tension adjustment bolt to adjust so that the guide pulley moves close to the sprocket without obstructing the chain. Next, set the chain onto the smallest sprocket and check in the same way that the guide pulley does not obstruct the chain.



## ■ Adjustment of the front derailleur

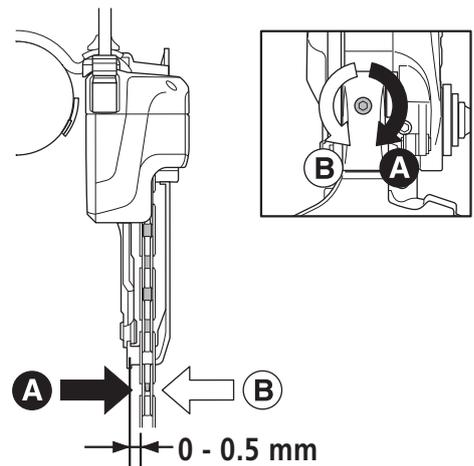
### Note:

\* The low adjustment bolt, the top adjustment bolt and the support bolt are close to each other. Make sure that you are using the correct bolt for adjustment.



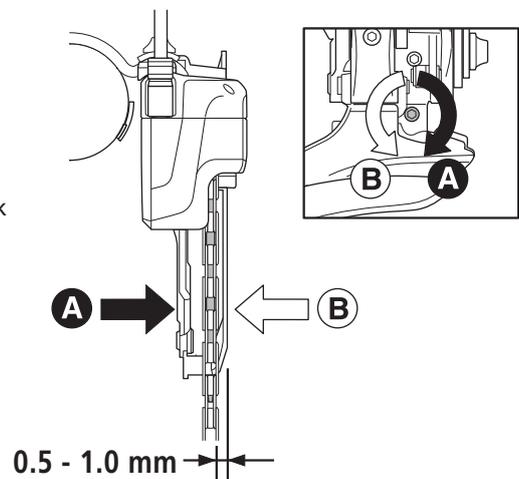
### <Low adjustment>

Set the chain onto the smaller chainring and the largest sprocket. Use a 2 mm Allen key to turn the low adjustment bolt to adjust so that there is a clearance of 0 - 0.5 mm between the chain and the chain guide inner plate.



### <Top adjustment>

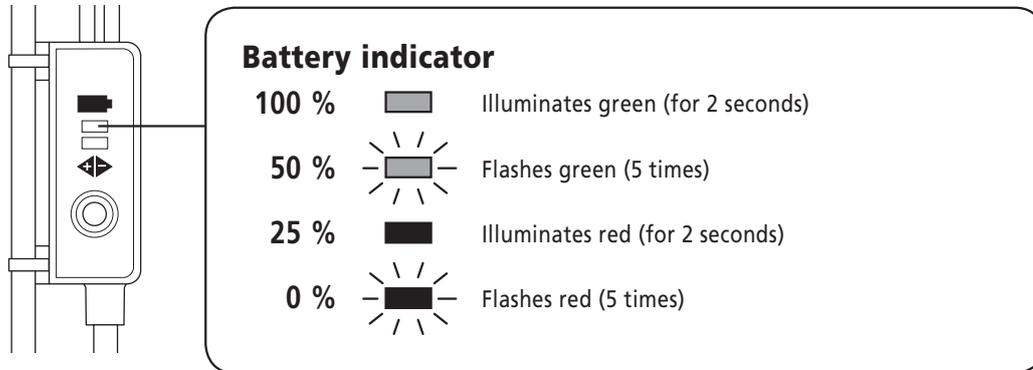
Next, set the chain onto the larger chainring and the smallest sprocket. Use a 2 mm Allen key to turn the top adjustment bolt to adjust so that there is a clearance of 0.5 - 1.0 mm between the chain and the chain guide outer plate. Move the front derailleur and the rear derailleur to all gear positions, and check that the chain guide does not touch the chain.



## OTHER FUNCTIONS

### ■ Battery charge display function

Press and hold either shifting switch for 0.5 seconds or more. You can check the amount of battery charge remaining using the battery indicator on junction (A).

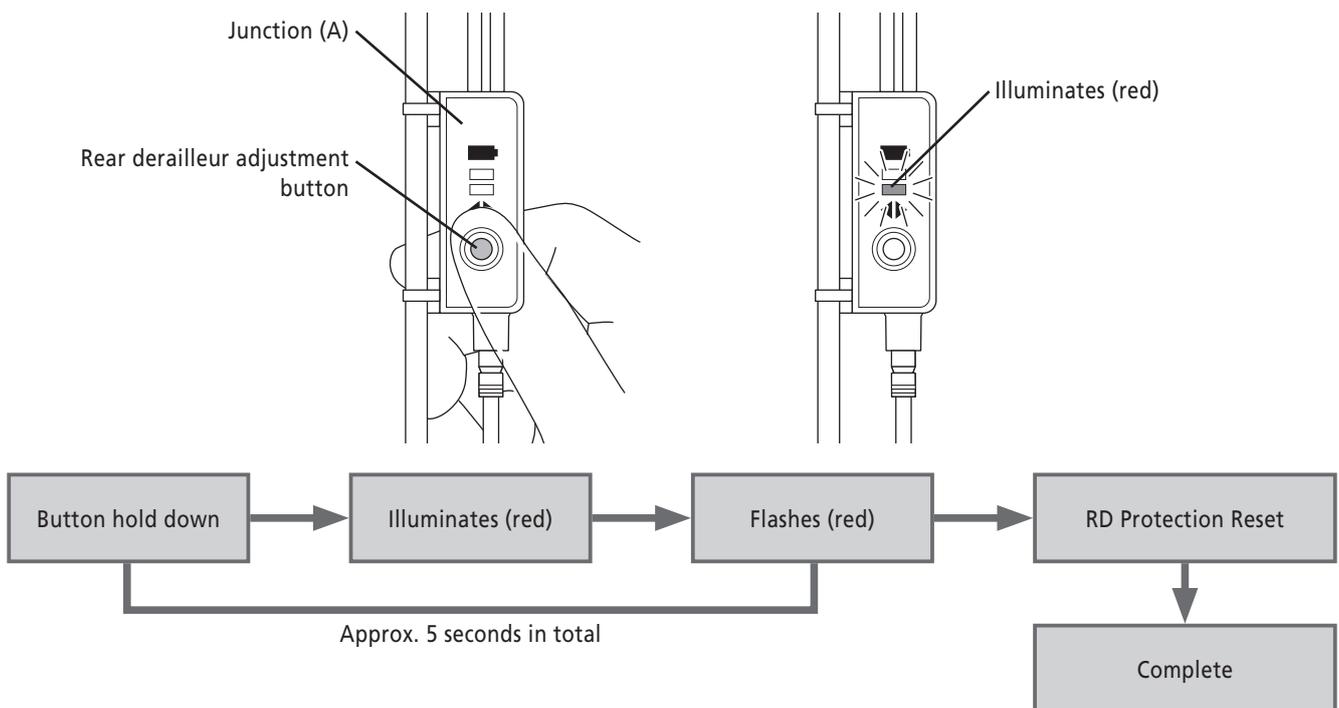


\* When the battery charge is low, first the front derailleur will stop operating, and then the rear derailleur will stop operating. When the battery charge has been fully spent, the derailleurs will be fixed at the last gear shifting position. If the battery indicator is illuminated red, it is recommended that you recharge the battery as soon as possible.

### ■ RD Protection

\* Rotate the front chainwheel when activating RD Protection Reset.

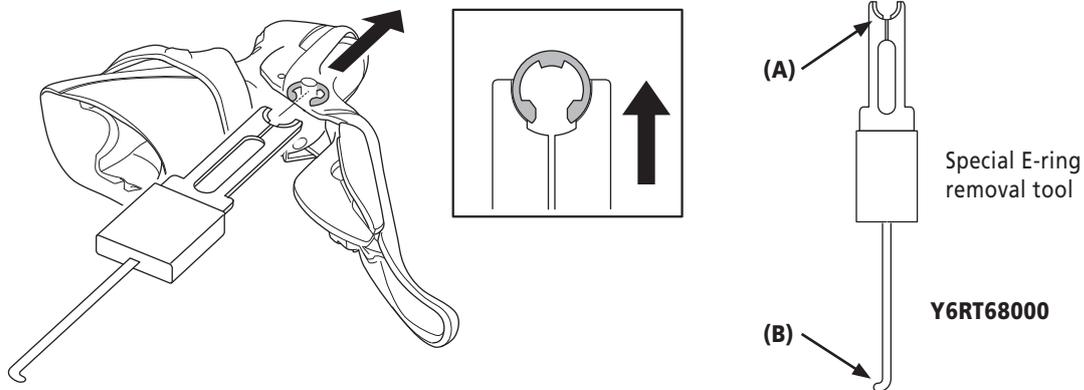
If the bicycle receives a strong impact, the RD Protection operates and the connection between the motor and the link is momentarily severed so that the rear derailleur will no longer operate. If this happens, hold down the rear derailleur adjustment button on junction (A) of SM-EW67-A-E for 5 seconds or longer to activate RD Protection Reset, which will restore the connection between the motor and the link. If RD Protection Reset does not activate, push/pull the cage sideways or move it forward and backward by hand. Operate the shifting switches to check that the connection has been restored.



When the red LED on junction (A) is illuminated, the rear derailleur cannot shift gears. Keep pressing the rear derailleur adjustment button until the red LED turns off.

## ■ Disassembly of the bracket unit and lever unit

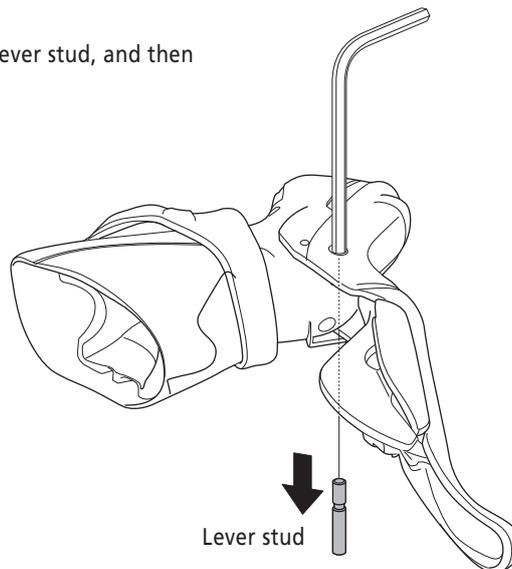
1. Use the Shimano original tool which is sold separately to remove the E-ring.  
Align part B of the Shimano original tool with the removal direction of the E-ring. Next, set part A onto the E-ring and remove the E-ring.



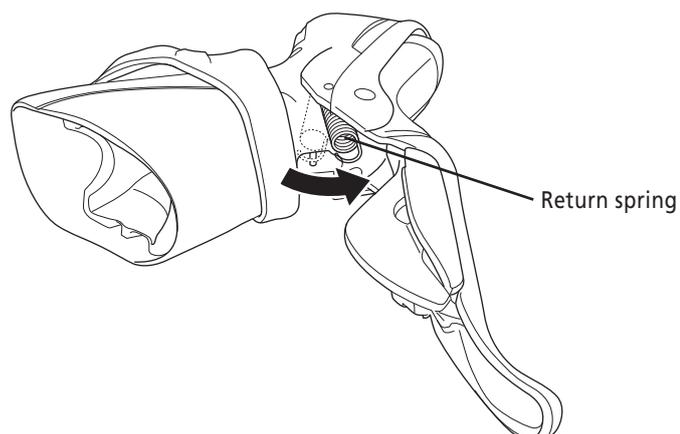
### Note:

\* The E-ring may fly off suddenly during removal, so check that there are no people or objects nearby while removing the E-ring.

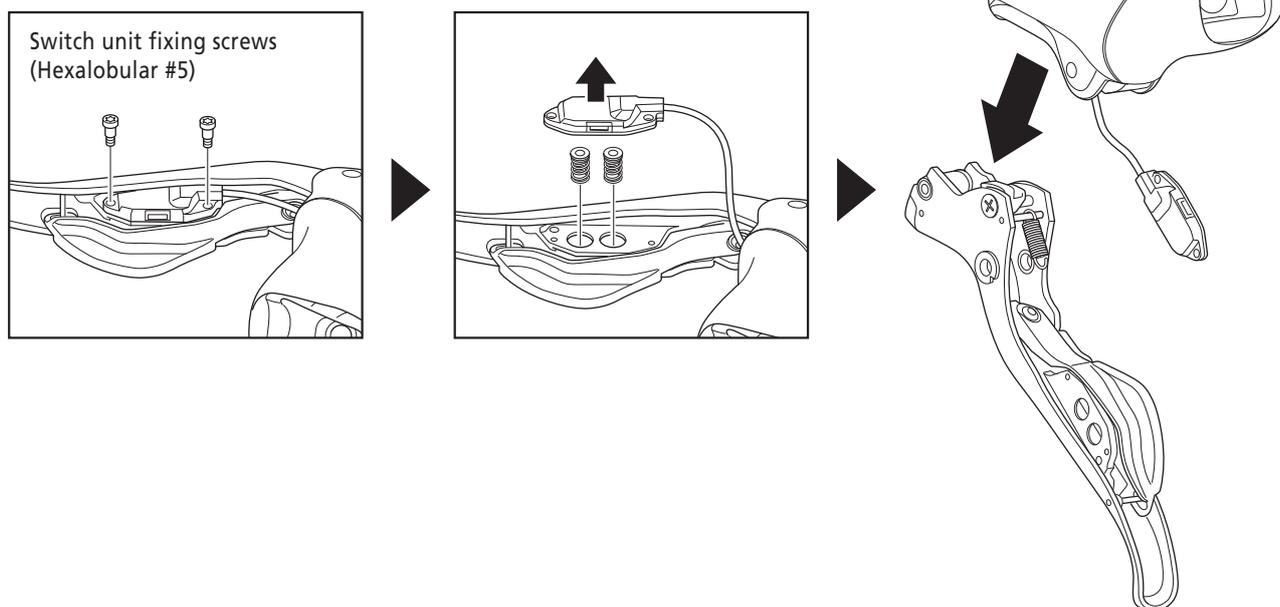
2. Insert an Allen key or a similar tool into the hole in the lever stud, and then tap it with a plastic mallet to push out the lever stud.



3. Remove the return spring.

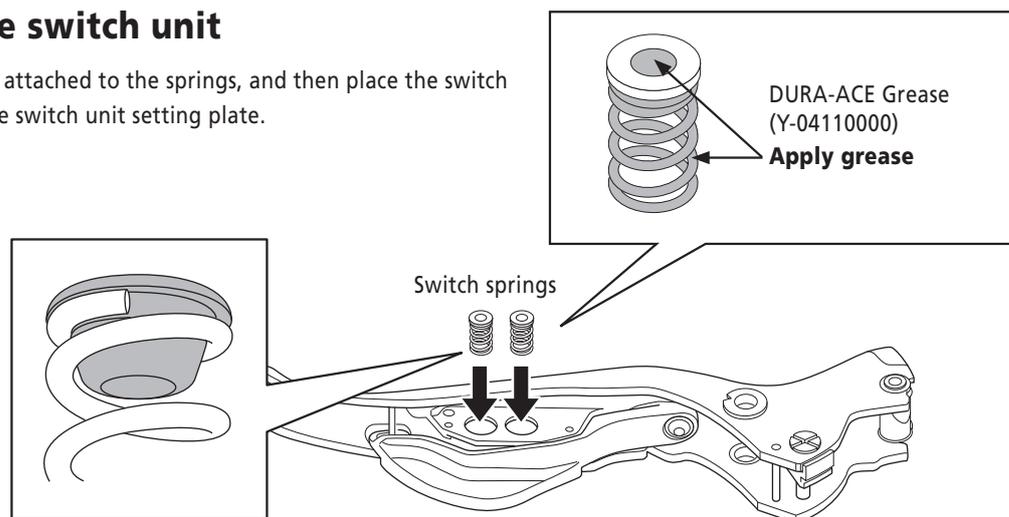


4. Remove the two switch unit fixing screws, and then remove the switches and the switch springs. The bracket unit and the lever unit can then be disassembled.

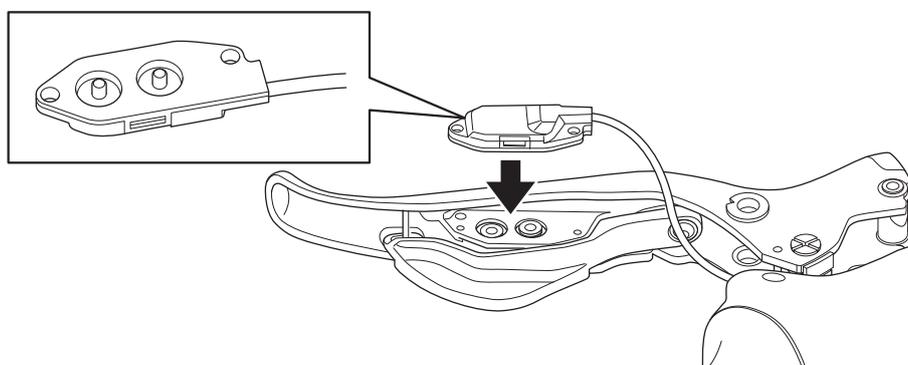


## ■ Assembly of the switch unit

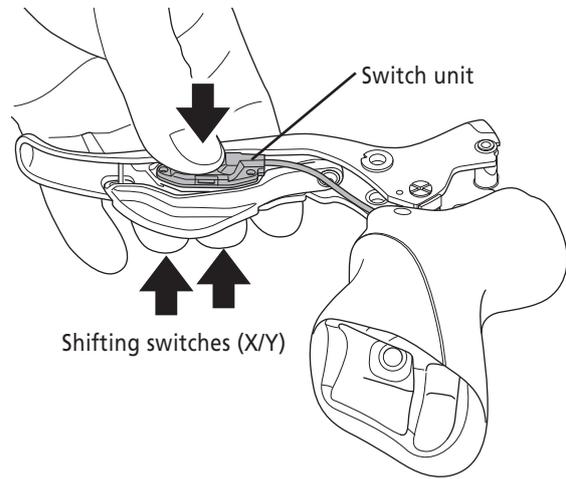
1. Check that the buttons are attached to the springs, and then place the switch springs into the holes in the switch unit setting plate.



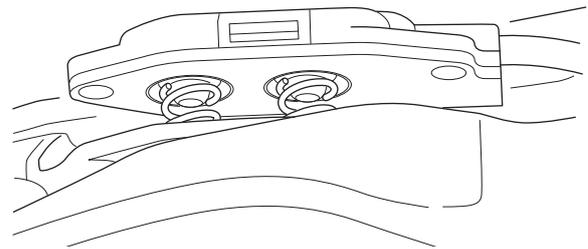
2. Place the switch unit against the mounting surface of the switch unit setting plate.



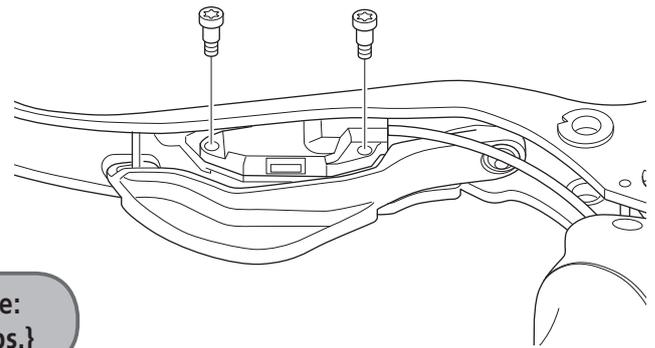
3. Press the switch unit by hand so that the switch springs go into the grooves in the buttons, and then push the shifting switches (X and Y) in as far as they will go.



4. Make a gap between the switch unit and the switch unit setting plate and check that the end of the rubber on the switch unit is on the button.



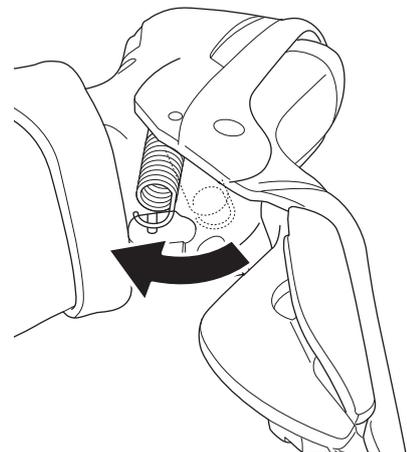
5. Return the switch unit to the setting position for the switch unit setting plate, and while pressing it by hand, operate the shifting switches (X and Y) once more and check that the switches turn on. Install the switch using the switch unit fixing screws.



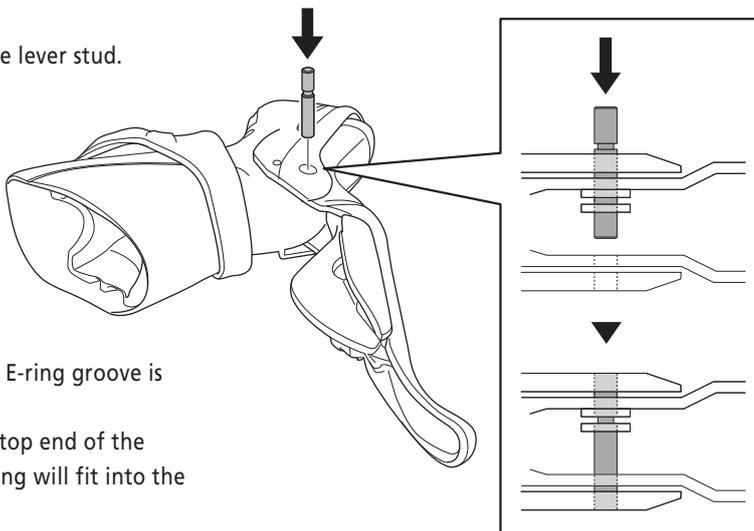
**Tightening torque:**  
0.18 N·m {1.6 in. lbs.}

## ■ Assembly of the bracket unit and lever unit

1. Assemble the bracket unit and the lever unit, and then attach the return spring.

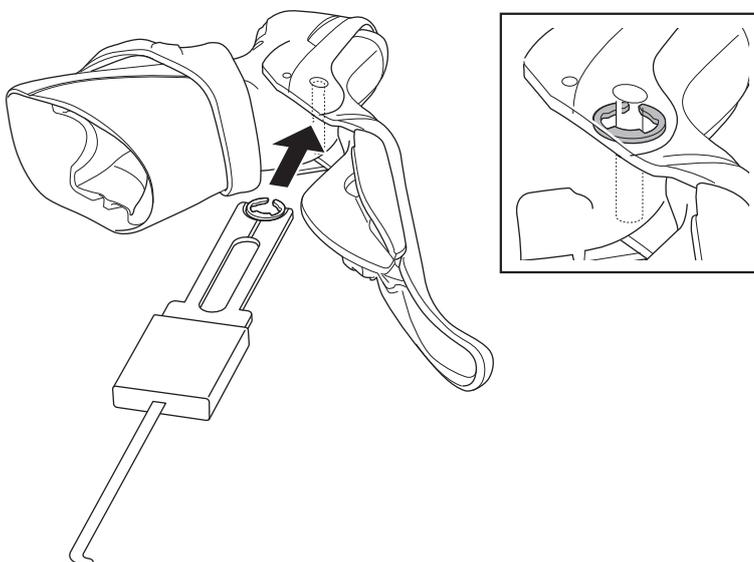


**2.** Align with the hole in the stud, and then press-fit the lever stud.



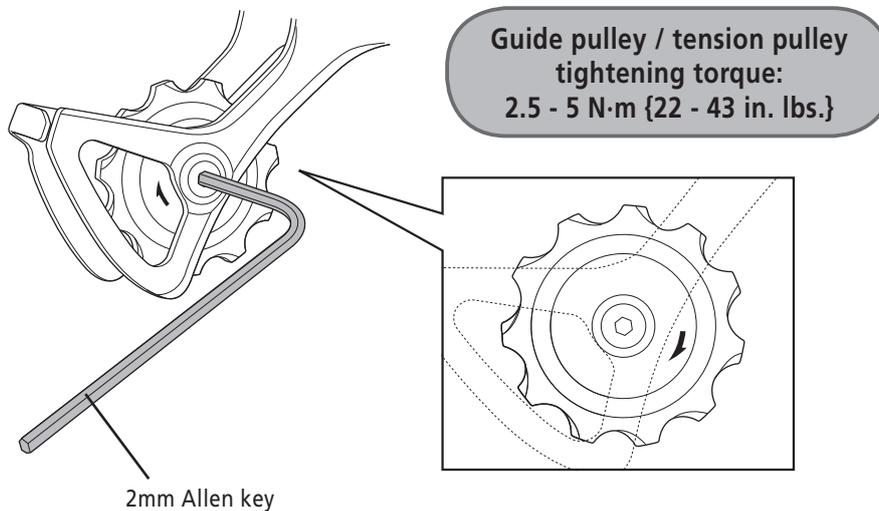
- \* The correct direction for the lever stud is when the E-ring groove is at the top.
- \* Check that the surface of the bracket unit and the top end of the lever stud are flush with each other so that the E-ring will fit into the groove.

**3.** Use part A of the Shimano original tool to install the E-ring.



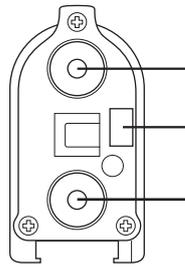
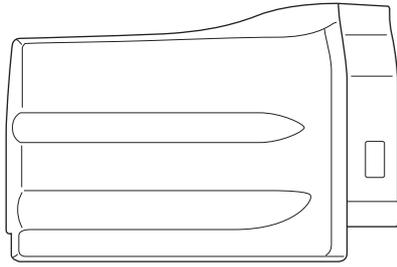
- \* Operate the shifting switches (X and Y) and check that they turn on, and check that the lever operates smoothly.

## ■ Replacement of the pulley



## HANDLING THE BATTERY

The battery is a lithium ion battery. Use the special battery charger (SM-BCR1) to recharge the battery. Never use any other battery charger to recharge the battery. If this is not observed, explosions or fire may result.

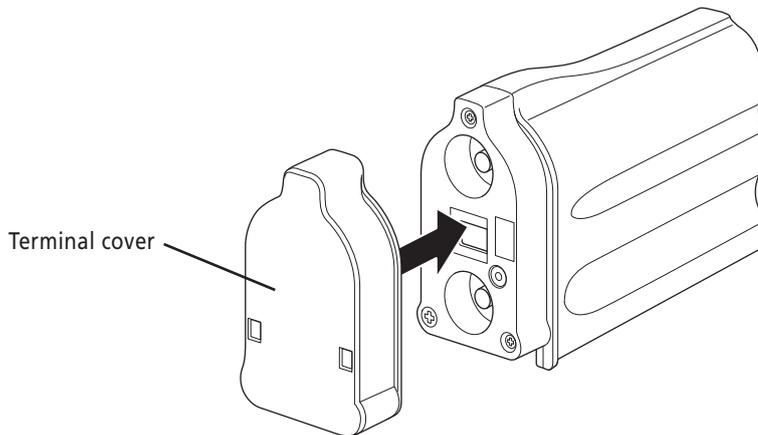


### Electrical contacts

Do not modify or damage these, otherwise problems with operation will result. Take proper care when handling the battery.

## ■ Storing the battery

When storing the battery away, remove the battery from the system and install the terminal cover first.



- If the battery is stored away while the battery charge is 50% or higher (the indicator is illuminated green), the battery will last longer.  
It is recommended that you check the condition of the battery about once every half a year.
- If the battery is stored in cold locations, the performance of the battery may drop and the length of time that it can be used may become shortened.

## ■ Battery life

- The battery is a consumable item. The battery will gradually lose its capacity for charging after repeated use and after time has passed. If the length of time that the battery can be used becomes extremely short, it has probably reached the end of its life, and so you will need to purchase a new battery.
- The life of the battery will vary depending on factors such as the storage method, the usage conditions, the surrounding environment and the characteristics of the individual battery pack.

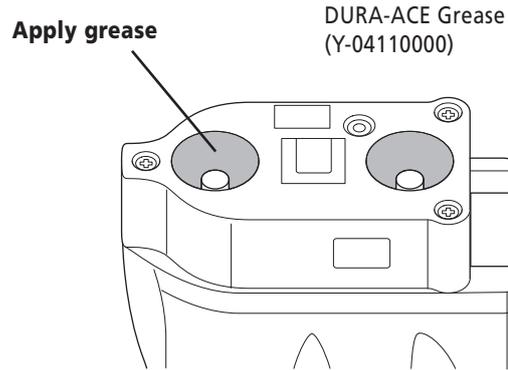
## ■ Guide to charging time

The charging time is approximately 1.5 hours.

(Note that the actual time will vary depending on the amount of charge remaining in the battery.)

## ■ Proper use of the battery

If the battery feels difficult to insert or remove, apply some specified grease (DURA-ACE grease).  
Apply the specified grease to the sides where the O-rings touch.

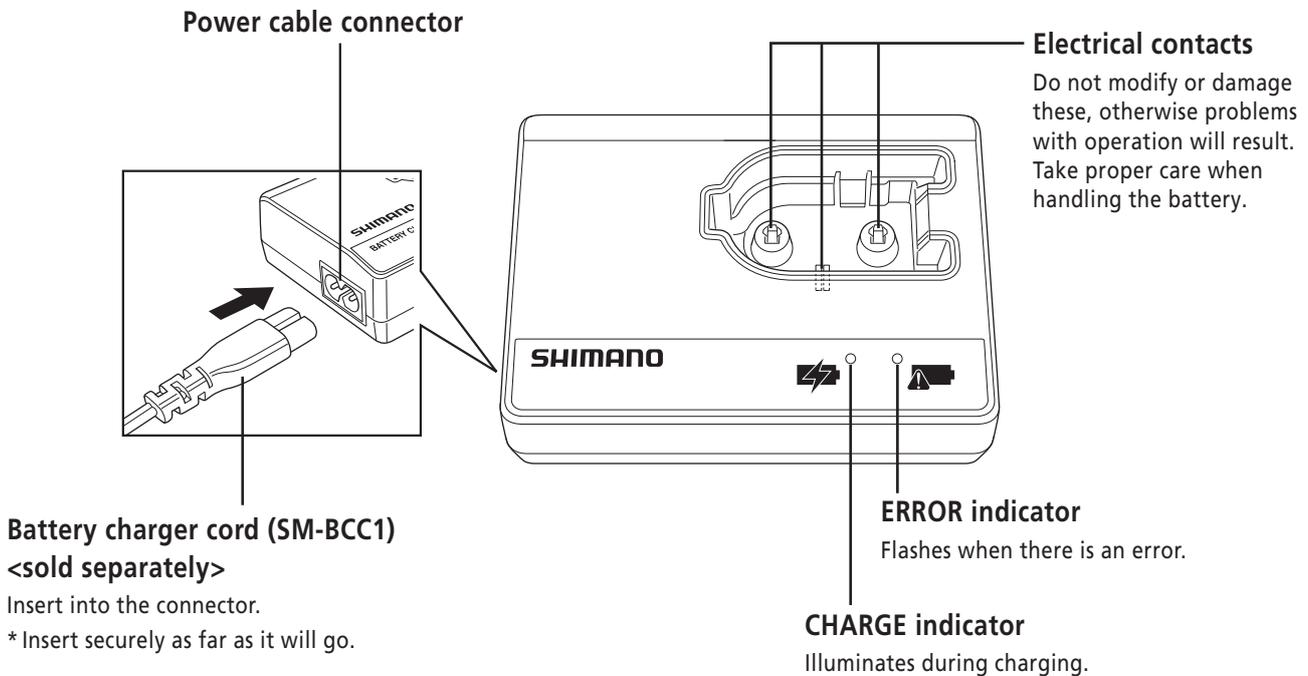


### Note:

\* For the DURA-ACE (7970), the bicycle can be ridden for approximately 1000 km on a full charge. For the ULTEGRA (6770), the riding distance will be shorter. (Approximately 30% less according to tests carried out by Shimano.)

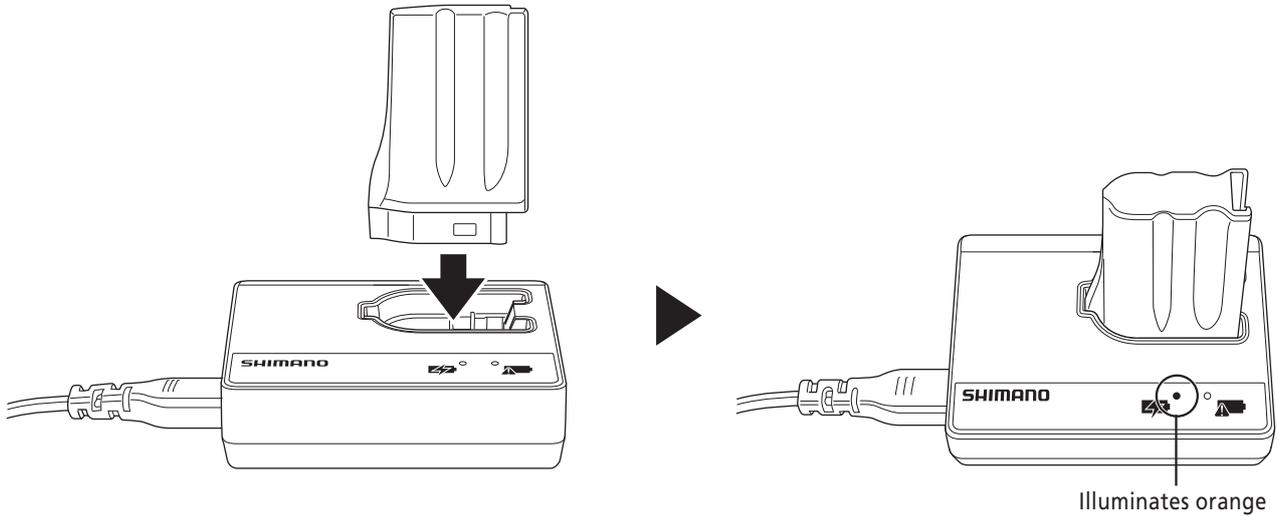
## BATTERY CHARGER

The battery charger is a special battery charger for use only in recharging Shimano lithium ion batteries.  
Never insert any other type of battery into the battery charger. If this is not observed, explosions or fire may result.



## ■ Charging the battery

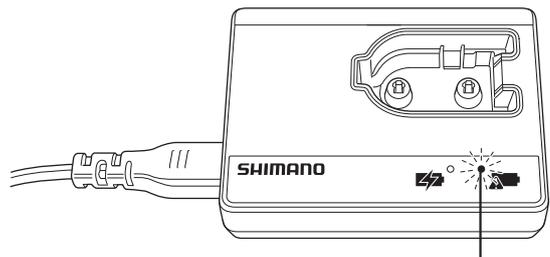
1. Insert the plug of the battery charger into an electrical outlet.
2. Place the battery securely into the battery charger as far as it will go.
  - \* The charging time is approximately 1.5 hours. (Note that the actual time will vary depending on the amount of charge remaining in the battery.)
3. When the CHARGE indicator (orange) turns off, charging is complete.
  - \* If the ERROR indicator flashes, it means that there may be a problem with the battery. Refer to the troubleshooting section for details.
4. Disconnect the plug of the battery charger from the electrical outlet, and store the battery charger in a safe place according to the safety instructions.



## ■ Troubleshooting

### If an error occurs

- Remove the battery from the battery charger, disconnect the plug from the electrical outlet, and then repeat the charging operation.
- If charging cannot be carried out even after the above steps are taken, the ambient temperature may be too low or too high, or there may be a problem with the battery.



If charging is not possible, the ERROR indicator on the battery charger will flash.

## INTERCHANGEABILITY INFORMATION

The ULTEGRA 6770 series is not interchangeable with the DURA-ACE 7970 series.

# INSTRUCTIONS

## IMPORTANT SAFETY INSTRUCTIONS

- SAVE THESE INSTRUCTIONS.

## DANGER

- TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK,  
CAREFULLY FOLLOW THESE INSTRUCTIONS.

For connection to a supply not in the U.S.A., use an attachment plug adapter of the proper configuration for the power outlet, if needed.

This power unit is intended to be correctly orientated in a vertical or floor mount position.

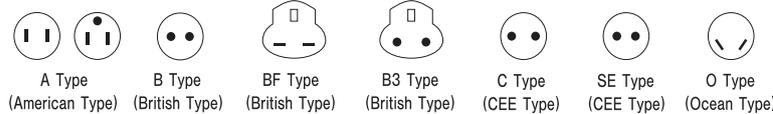
Battery to be recharged for this product is follows

Brand Name : SHIMANO

Battery Type : SM-BTR1

Rating : DC7.4V 500mAh

### Representative plug of power supply cord of countries around the world.



Attention: Power cord meeting demands from each country shall be used.

-For only the United States  
Use a UL Listed, 1.8-3m (6-10ft), Type SPT-2 or NISPT-2, AWG no.18 power supply cord, rated for 125V minimum 1A, with a non-polarized NEMA 1-15P plug rated for 125V 10A.\*

The representative supply voltage and plug type are described in this chart.  
Depend on an area, Different type of plug and supply voltage are used.

Europe				North America			
Countries	Voltage	Frequency (Hz)	Plug type	Countries	Voltage	Frequency (Hz)	Plug type
Austria	230	50	C	Canada	120	60	A
Belgium	230	50	C	USA	120	60	A
Czech	220	50	C	<b>Central America</b>			
Denmark	230	50	C	Countries	Voltage	Frequency (Hz)	Plug type
Finland	230	50	C	Bahamas	120/240	60	A
France	230	50	C	Costa Rica	110	60	A
Germany	230	50	C	Cuba	110/220	60	A/C
Greece	220	50	C	Dominican(rep)	110	60	A
Hungary	220	50	C	El Salvador	110	60	A
Iceland	230	50	C	Guatemala	120	60	A
Ireland	230	50	C/BF	Honduras	110	60	A
Italy	220	50	C	Jamaica	110	50	A
Luxemburg	230	50	C	Mexico	120/127	60	A
Netherlands	230	50	C	Nicaragua	120/240	60	A
Norway	230	50	C	Panama	110/220	60	A
Poland	220	50	C	<b>South America</b>			
Portugal	230	50	C	Countries	Voltage	Frequency (Hz)	Plug type
Romania	220	50	C	Argentina	220	50	C/BF/O
Russia	220	50	C	Brazil	127/220	60	A/C
Slovak	220	50	C	Chile	220	50	C
Spain	127/230	50	C	Colombia	120	60	A
Sweden	230	50	C	Peru	220	60	A/C
Switzerland	230	50	C	Venezuela	120	60	A
UK	240	50	BF	<b>Middle East</b>			
<b>Asia</b>				Countries	Voltage	Frequency (Hz)	Plug type
Countries/Regions	Voltage	Frequency (Hz)	Plug type	Iran	220	50	C/BF
China	220	50	A	Iraq	220	50	C/BF
Hong Kong	200/220	50	BF	Israel	230	50	C
India	230/240	50	C	Saudi Arabia	127/220	50	A/C/BF
Indonesia	127/230	50	C	Turkey	220	50	C
Japan	100	50/60	A	UAE	240	50	C/BF
Korea(rep)	220	60	C	<b>Africa</b>			
Malaysia	240	50	BF	Countries	Voltage	Frequency (Hz)	Plug type
Philippines	220/230	60	A/C	Algeria	127/220	50	C
Singapore	230	50	BF	Congo(dem)	220	50	C
Taiwan	110	60	A	Egypt	220	50	C
Thailand	220	50	C/BF	Ethiopia	220	50	C
Vietnam	220	50	A/C	Kenya	240	50	C/BF
<b>Oceania</b>				Nigeria	230	50	C/BF
Countries	Voltage	Frequency (Hz)	Plug type	South Africa	220/230	50	C/BF
Australia	240	50	O	Tanzania	230	50	C/BF
New Zealand	230/240	50	O	Tunisia	220	50	C

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

# SHIMANO

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Please note: specifications are subject to change for improvement without notice. (English)

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