

# 17 Electrical

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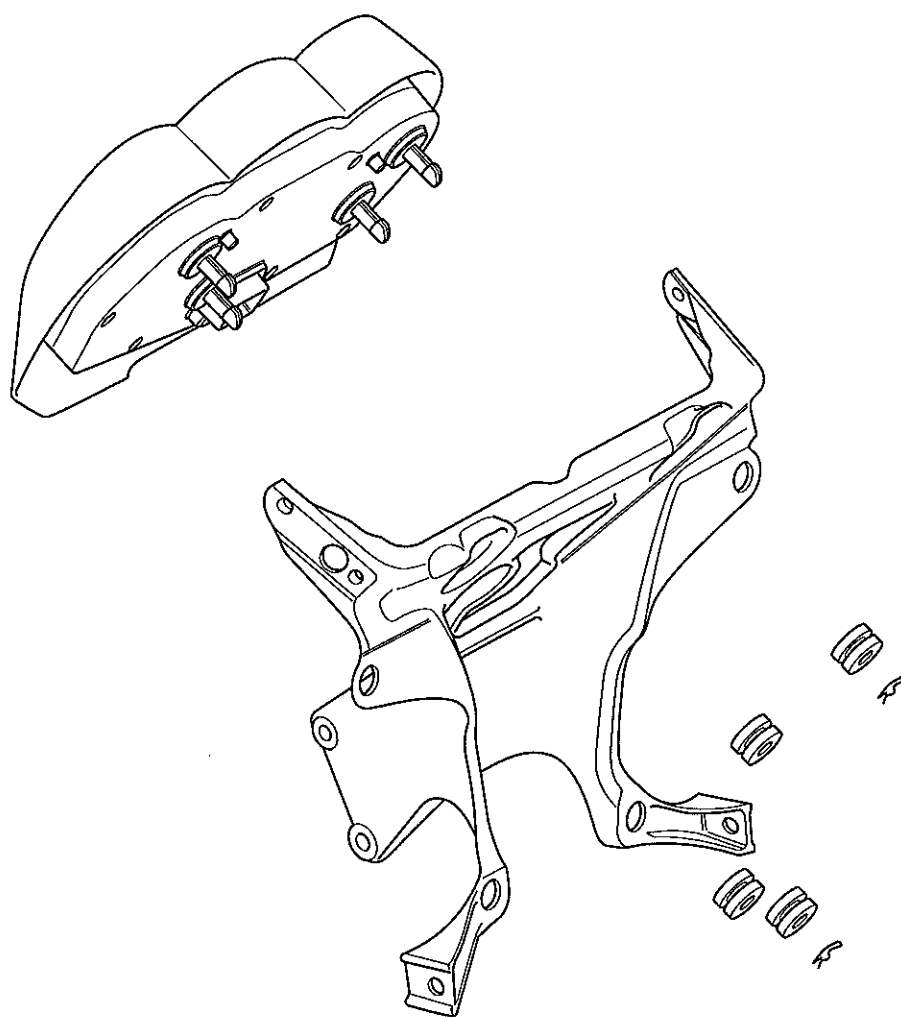
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# Electrical

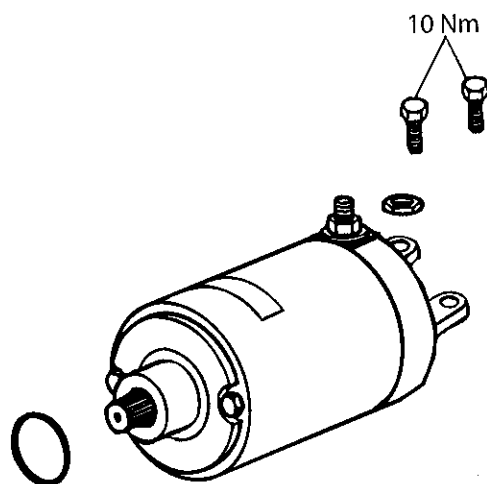
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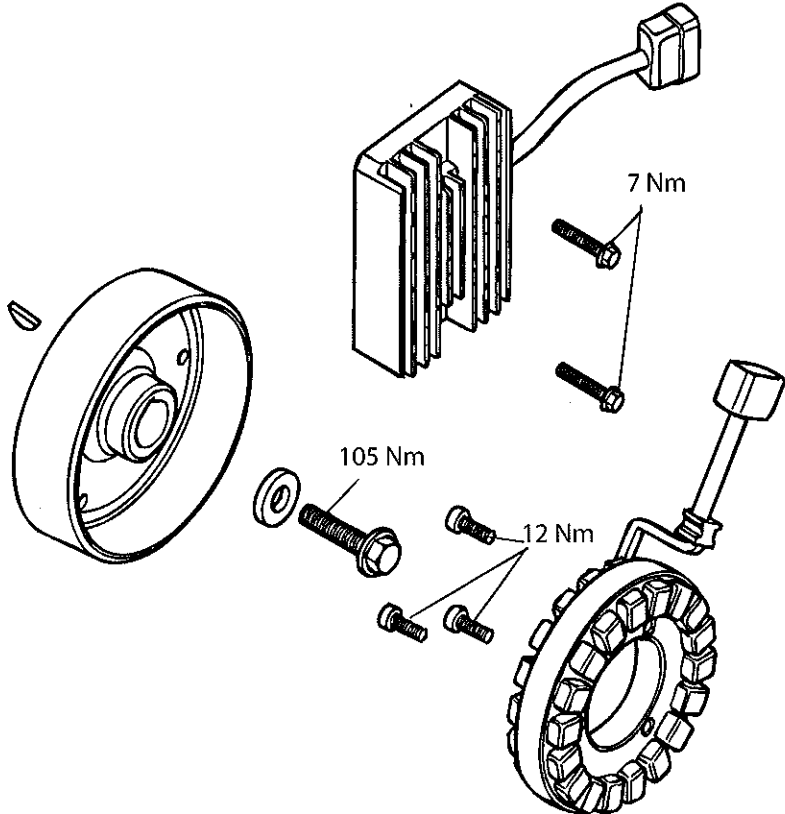
Exploded View - Instruments



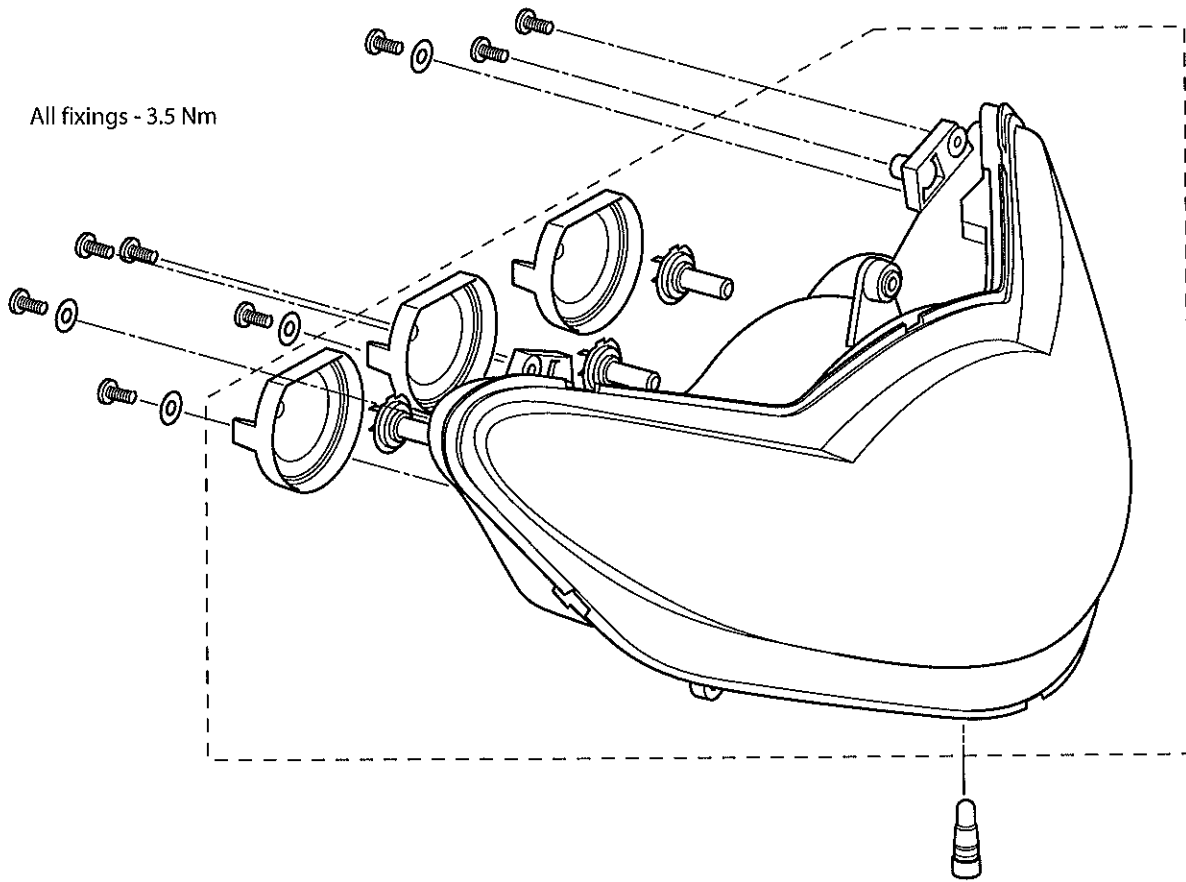
## Exploded View - Starter Motor



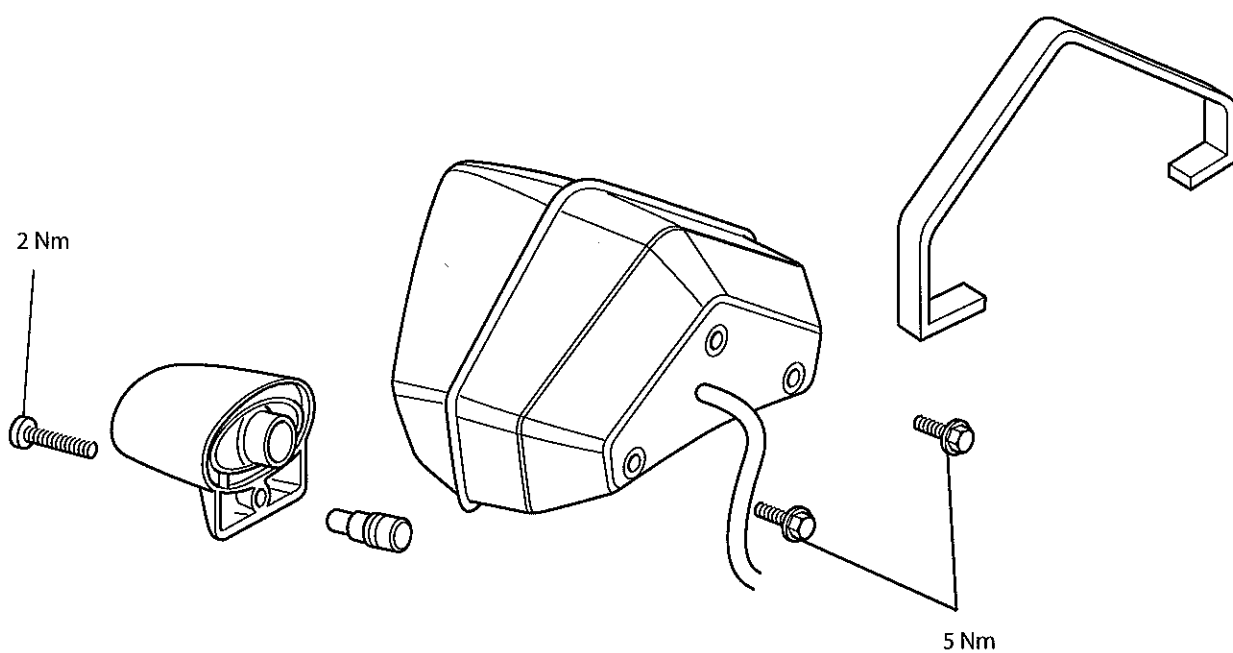
Exploded View - Alternator



## Exploded View - Headlight



Exploded View - Rear Light and Indicators



## Battery

### Warning

The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.

The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.

- If electrolyte gets on your skin, flush with water immediately.
- If electrolyte gets in your eyes, flush with water for at least 15 minutes and SEEK MEDICAL ATTENTION IMMEDIATELY.
- If electrolyte is swallowed, drink large quantities of water and SEEK MEDICAL ATTENTION IMMEDIATELY.

KEEP ELECTROLYTE OUT OF THE REACH OF CHILDREN.

### Warning

The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

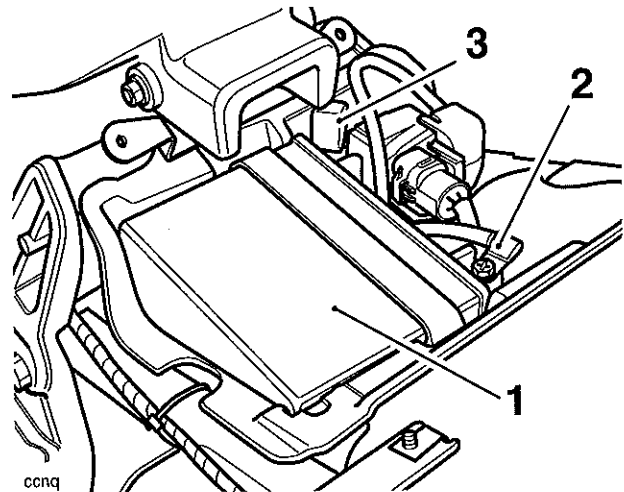
Do not jump start the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite battery gasses causing a risk of personal injury.

### Warning

The battery electrolyte is corrosive and poisonous. Never swallow battery electrolyte or allow to come into contact with the skin. Always wear eye and skin protection when adjusting the electrolyte level.

## Battery Removal

1. Remove the seat (see page 16-8).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear bodywork (see page 16-9).
4. Remove the fuel tank (see page 10-87).
5. Remove the battery strap.
6. Take the battery out of the case.



1. Battery
2. Negative (-) terminal
3. Positive (+) terminal

### Warning

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark, which would ignite battery gases causing a risk of personal injury.

## Battery Refit

### Warning


Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark which would ignite battery gases causing a risk of personal injury.

1. Place the battery in the battery case.
2. Reconnect the battery, positive (red) lead first.
3. Apply a light coat of grease to the terminals to prevent corrosion.
4. Cover the positive terminal with a protective cap.
5. Refit the battery strap.
6. Seat the fuel tank (see page 10-88).
7. Refit the rear bodywork (see page 16-9).



- Refit the seat (see page 16-8).

## New Battery Commissioning

 <b>Warning</b>
The battery electrolyte is corrosive and poisonous. Never swallow battery electrolyte or allow it to come into contact with the skin. To help reduce the risk of injury, always wear eye and skin protection when filling and sealing the battery.

To ensure that a new battery is correctly commissioned and will deliver maximum capacity for starting, the following procedure must be followed.

- Read the instructions and warnings delivered with the battery!
- Place the battery on a flat level surface and remove the sealing foil.
- Remove the battery sealing strip from the electrolyte container (if fitted) and save for use later in this procedure. Do not break the seal on the electrolyte container.
- Place the electrolyte container and adapter (if supplied) on the battery and fill the battery according to the manufacturers instructions.
- After starting to fill the battery with electrolyte, allow the battery to stand for 30 minutes with the filling container in place.
- Check that all of the electrolyte has drained from the container, do not remove container at this point. If the container has not completely drained, gently tap the sides of the container to start the electrolyte flowing again.
- After all of the electrolyte has drained into the battery, allow the battery to stand, with the electrolyte container in place, for a further 30 minutes for batteries 3Ah - 12Ah or 1 hour for batteries greater than 12Ah.
- Remove the electrolyte container and adapter carefully, and dispose of both immediately.
- Fit the sealing caps to the battery according to the battery manufacturers instructions.
- Measure the terminal voltage on the battery to assess the battery condition.
- Charge the battery as necessary (see table of charging time) using a suitable charger (i.e. a charger with a suitably controlled charging current and appropriate cut off voltage.)


Charging Time		
Terminal Voltage Measured	Charge Time (hours)	Charge Cutoff Voltage
12.8	2	14.5
12.7	3	14.5
12.6	4	14.5
12.5	5	14.5
Less than 12.5	8-10	14.5

- Charging current should be controlled to 10% of the nominal capacity (i.e. for a 10AH battery charging current  $I = 0.1 \times 10 = 1A$ ).
- Disconnect the charger and allow the battery to stand for 1 hour before fitting to the motorcycle.
- Fit the battery to the motorcycle, positive (Red) lead first.

### Charging - Battery Already in Service

When re-charging a battery in service, the following precautions must be taken to avoid damage to the battery.

- The charging rate must not exceed 1.0 A except for a boost charge where a maximum charge rate of 5 Amps. (for no longer than 1 hour) is allowed.

 <b>Caution</b>
Boost charge should only be performed if the battery is in a severely discharged state. Boost charging a part discharged battery will damage the cells and plates leading to permanent battery damage.

### Battery Charging – Battery Already in Service

When re-charging a battery in service, the following precautions must be taken to avoid damage to the battery.

- The charging rate must not exceed 1.0 A except for a boost charge where a maximum charge rate of 6 A (for no longer than 1 hour) is allowed.

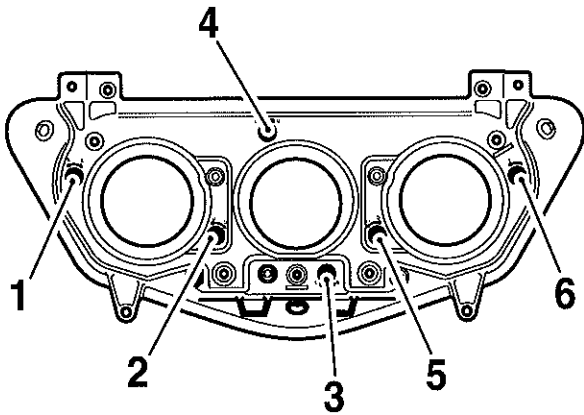
### Battery Maintenance

The battery is a sealed type and does not require any maintenance other than routine recharging such as during storage.

It is not possible to adjust the electrolyte level in the battery.

## Headlight Adjustment

The headlights can be adjusted by means of vertical and horizontal adjustment screws located on the rear of each headlight.



ccoy

1. Horizontal adjustment screw (LH dipped headlight)
2. Vertical adjustment screw (LH dipped headlight)
3. Horizontal adjustment screw (main beam headlight)
4. Vertical adjustment screw (main beam headlight)
5. Vertical adjustment screw (RH dipped headlight)
6. Horizontal adjustment screw (RH dipped headlight)

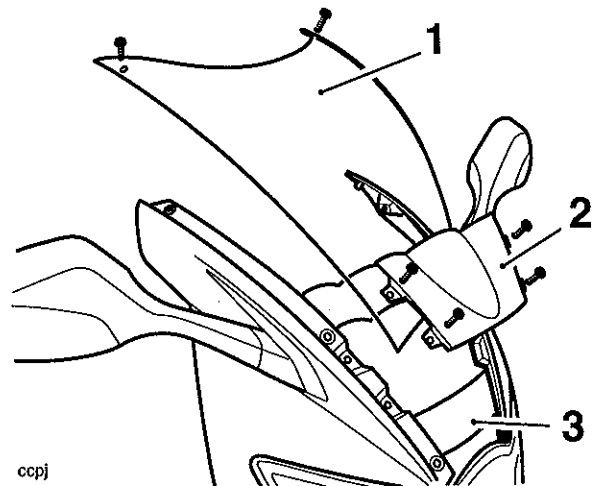
## Main Beam Horizontal Adjustment

### Note:

- The main beam horizontal adjustment screw is accessible without removing any panels. It can be reached from below the lights.

1. Switch the headlight beam on.
2. Turn the horizontal adjustment screw clockwise to move the beam to the left or anti-clockwise to move the beam to the right.
3. Switch the headlights off when the beam settings are satisfactory.

## Main Beam Vertical Adjustment



ccpj

1. Windscreen
2. Cover panel
3. Adjustment screw access

1. Remove the windscreen (see page 16-12).
2. Remove the screws securing the cover panel and remove the panel.
3. The vertical adjustment screw is now accessible.
4. Switch the headlight main beam on.
5. Turn the vertical adjustment screw clockwise to raise the beam or anti-clockwise to lower the beam.
6. Switch the headlight off when the beam setting is satisfactory.
7. Refit the cover panel.
8. Refit the windscreen (see page 16-12).

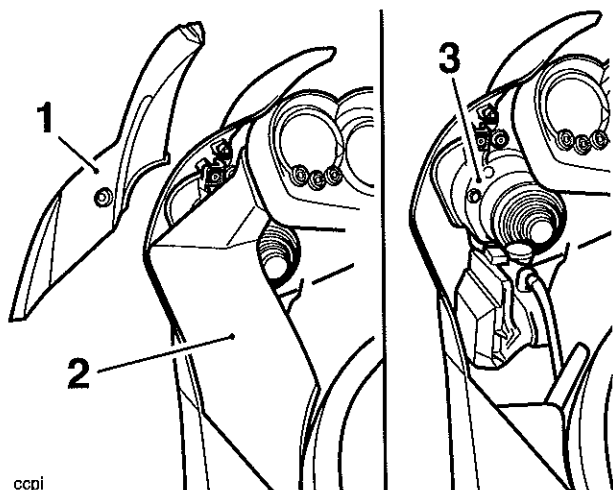
## Dipped Beam Vertical Adjustment

### Note:

- The dipped beam vertical adjustment screws are accessible without removing any panels. They can be reached from below the lights on the left or right hand side.
- Turn the handlebars for ease of access.

1. Switch the headlight dip beam on.
2. Turn the vertical adjustment screws anti-clockwise to raise the beams or clockwise to lower the beams.
3. Switch the headlights off when the beam settings are satisfactory.

## Dipped Beam Horizontal Adjustment



ccpi

Left hand headlight adjustment shown.

1. Left hand infill panel
2. Coolant expansion tank cover
3. Left hand dip beam adjustment screw

1. Remove the infill and cover panels (see page 16-9).

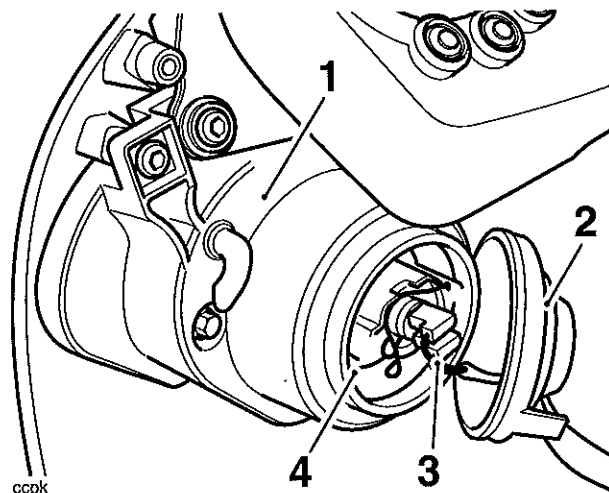
### Note:

- It is not necessary to remove the stowage box liner or the fuse box.
2. Switch the headlight dipped beam on.
  3. The adjustment screws are now accessible.
  4. On the right hand headlight turn the horizontal adjustment screw clockwise to move the beam to the right or anti-clockwise to move the beam to the left.
  5. On the left hand headlight turn the horizontal adjustment screw anti-clockwise to move the beam to the right or clockwise to move the beam to the left.
  6. Switch the headlights off when the beam settings are satisfactory.
  7. Refit the infill panels.

## Dipped Headlight Bulb Access

### Note:

- It is not necessary to remove the headlights when bulb replacement becomes necessary. The left and right infill panels, coolant expansion tank and stowage / fuse box cover panels do have to be removed.



ccpk

1. Headlight
2. Rubber cover
3. Multi pin electrical connection
4. Bulb retainer

1. Remove the seat (see page 16-8).
2. Disconnect the battery, negative (black) lead first.
3. Remove the infill panels (see page 16-9).

### Note:

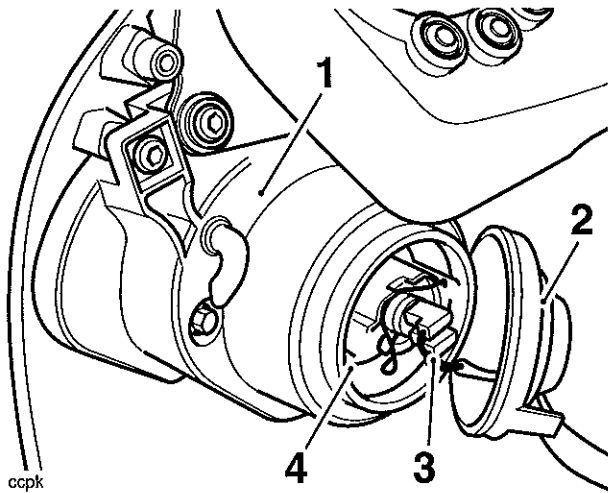
- It is not necessary to remove the stowage box liner or the fuse box.
4. Switch the headlight main beam on.
  5. Turn the vertical adjustment screw clockwise to raise the beam or anti-clockwise to lower the beam.
  6. Switch the headlight off when the beam setting is satisfactory.
  7. Bulb replacement is as per dipped beam.

## Main Beam Headlight Bulb Replacement

1. Remove the seat (see page 16-8).
2. Disconnect the battery, negative (black) lead first.
3. Unscrew the nuts securing the headlight unit to the support bracket and release the unit.
4. Remove the rubber cover and disconnect the electrical connectors from the bulb to be replaced.

## Electrical

- Detach the wire bulb retainer from the clip. It is not necessary to undo the screw.



- Headlight
- Rubber cover
- Multi pin electrical connection
- Bulb retainer

- Remove the bulb from the headlight unit.
- Installation is the reverse of the removal procedure.

### **Caution**

When reconnecting the battery, connect the positive (red) lead first.

### **Warning**

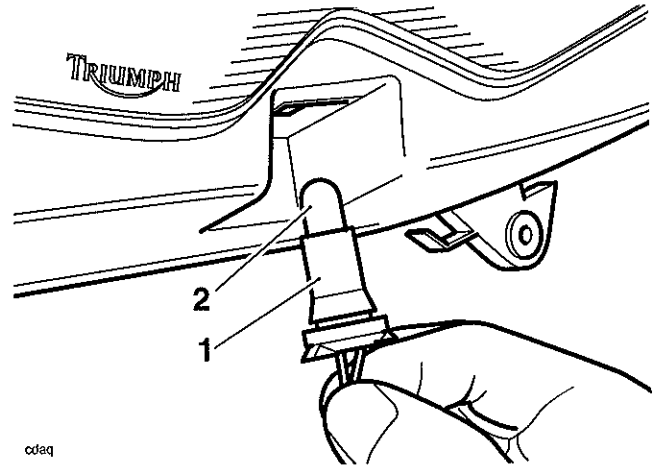
Do not reconnect the battery until the assembly process has been completed. Premature battery reconnection could result in ignition of the battery gases causing risk of injury.

### **Warning**

The bulb becomes hot during use. Always allow sufficient time for the bulb to cool before handling. Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before re-use.

## Front Position Light

The position lamp is fitted within the headlight aperture.



- Position Light
- Bulb Holder

## Bulb Replacement

- Carefully remove the rubber bulb holder from the back of the position lamp and detach the bulb.
- Installation is the reverse of the removal procedure.

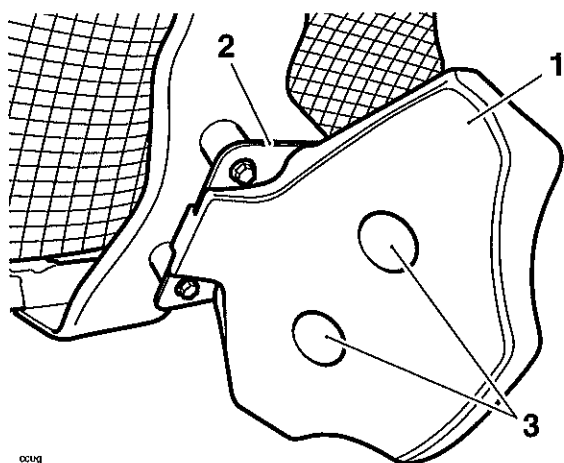
## Rear Light

### Note:

- The rear light is a sealed for life LED unit and must be replaced in the event of a failure.

### Rear Light Replacement

1. Remove the rear seat (see page 16-8).
2. Disconnect the battery negative (black) lead first.



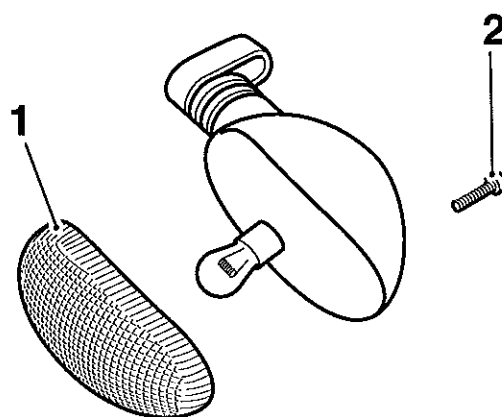
1. Protective cover
2. Mounting bracket
3. Fixings locations

3. Release the two fixings securing the protective cover and slide out.
4. Disconnect the wiring harness.
5. Release the three fixings securing the lighting unit to the mounting bracket.
6. Release the light from the rear mudguard and remove the assembly.
7. Installation is the reverse of the removal procedure.

### Note:

- Connect the battery positive (red) lead first.

## Rear Indicator Bulb Replacement



ccoa

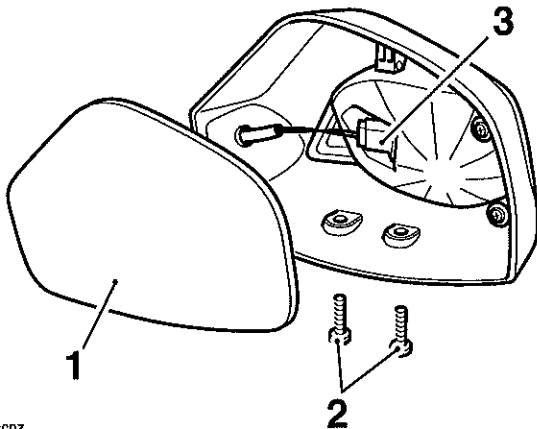
1. Indicator lens
2. Lens screw

The lens on each indicator light is held in place by a securing screw located in the body of the light.

1. Release the screws and remove the lens to gain access to the bulb for replacement.
2. Installation is the reverse of the removal procedure.

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## Front Indicator Bulb Replacement

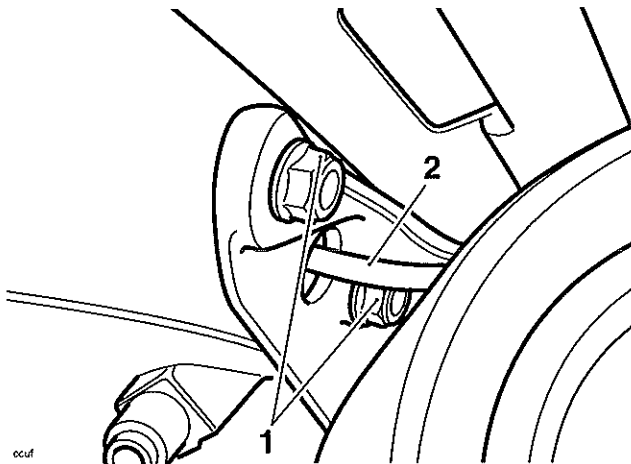


ccnz

1. Mirror
2. Securing screws
3. Bulb holder

1. Release the screws in the underside of the mirror shell and remove the mirror glass to gain access to the bulb holder.
2. Carefully detach the rubber bulb holder from its grommet and detach the bulb.
3. Installation is the reverse of the removal procedure.

## Number Plate Light Bulb



ocuf

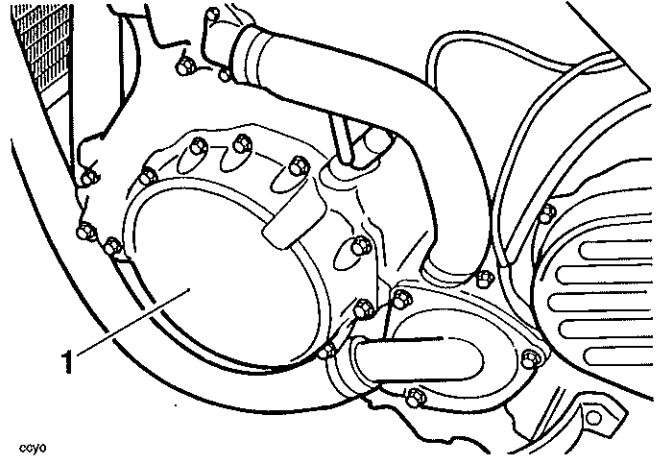
1. Securing screw
2. Number plate light unit

1. Remove the protective cover as described in Rear Light.
2. Carefully remove the rubber bulb holder and detach the bulb.
3. Installation is the reverse of the removal procedure.

## Alternator

### Removal

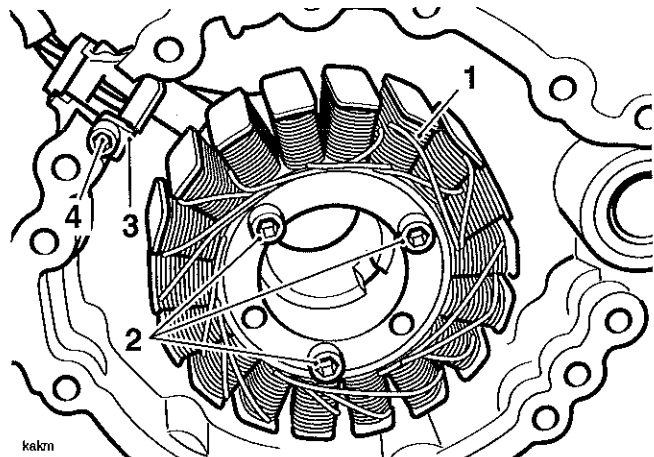
1. Remove the seats (see page 16-8).
2. Disconnect the battery negative (black) lead first.
3. Remove the left hand lower fairing (see page 16-11).
4. Release the bolts securing the left hand crankshaft cover to the engine.



ooyo

1. Left hand engine cover

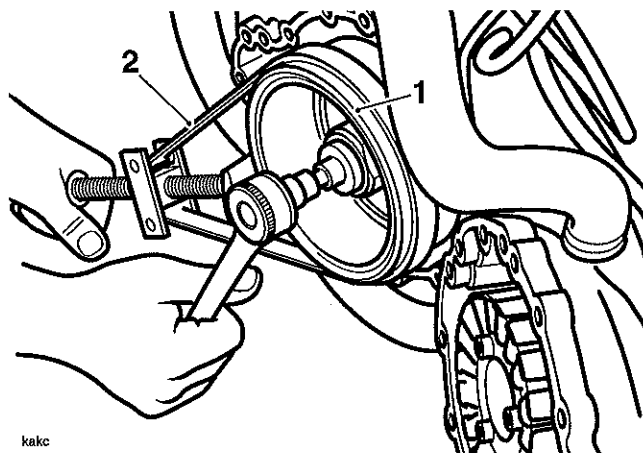
5. Remove the cover.
6. Withdraw the cover from the crankcase against the pull of the alternator magnet.
7. To remove the stator from the cover, release the three bolts in the centre of the cover and release the bolt securing the cable bracket.



kekkn

1. Stator
2. Stator bolts
3. Cable bracket
4. Cable bracket bolt
8. Withdraw the stator.

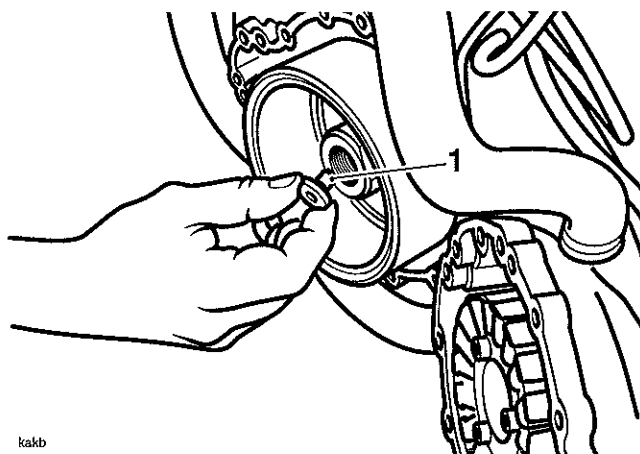
9. To remove the rotor, prevent the crankshaft from rotating using tool T3880375, and remove the centre bolt from the left hand end of the crankshaft.



kakc

1. Rotor  
2. Tool T3880375

10. With the rotor bolt removed, locate the spigot from the larger of the two thrust pads supplied with tool T3880365 to the crankshaft.



kakb

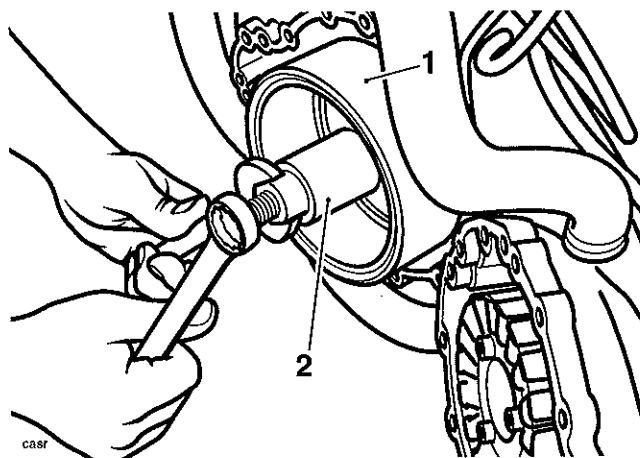
### 1. Thrust pad

11. Assemble tool T3880365 to the threaded centre section of the rotor.

### Note:

- Ensure that the thrust pad does not fall out during assembly of the tool.

12. Hold the centre of the tool to prevent rotation then tighten the draw-bolt in the centre of the tool to release the taper seating of the rotor from the crankshaft.



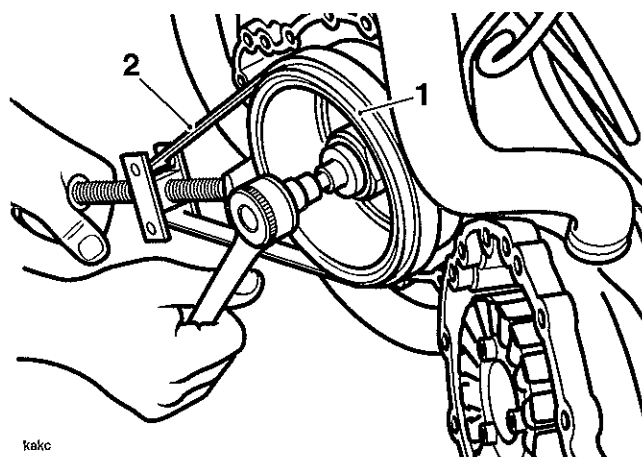
caar

1. Rotor  
2. Tool T3880365

13. Withdraw the rotor and tool as an assembly and then separate the tool from the rotor.

### Assembly

1. Assemble the rotor to the keyway on the crankshaft.
2. Refit tool T3880375 to prevent the crankshaft from rotating.
3. Tighten the rotor retaining bolt to **105 Nm**.



kakc

1. Rotor  
2. Tool T3880375

4. Remove tool T3880375.
5. Locate the stator to the engine cover.
6. Apply silicone sealer to the cable grommet and align the cable to the exit slot.
7. Fit the cable retainer bracket and tighten the retainer bolt to **12 Nm**.

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8. Tighten the stator bolts to **12 Nm**.
9. Refit the left hand engine cover incorporating a new gasket. Tighten the cover fixings to **9 Nm**.
10. Refit the left hand fairing (see page 16-12).
11. Reconnect the battery positive (red) lead first.
12. Refit the seat (see page 16-8).

## Alternator Rectifier

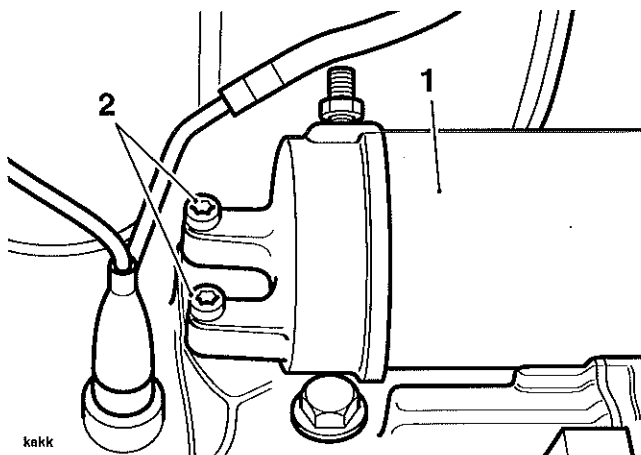
### Note:

- The alternator rectifier is located on the right hand side of the engine. The rectifier does not contain any serviceable parts and must be replaced if faulty.

## Starter Motor

### Removal

1. Remove the seat (see page 16-8).
2. Disconnect the battery negative (black) lead first.
3. Remove the left hand fairing (see page 16-11).
4. Remove the fuel tank (see page 10-87).
5. Remove the low oil pressure warning light switch (see page 8-11).
6. Ease the boot from the starter lead and then release the lead nut.
7. Detach the lead.
8. Release the bolts securing the starter to the crankcase.



### 1. Starter motor

### 2. Bolts

9. Ease the starter motor from the right hand engine cover while gently moving the camshaft oil feed pipe out of the way.

## Inspection

1. Ensure the motor turns freely and without binding.
2. Check the starter 'O' ring for damage and deterioration. Replace as necessary.

## Installation

1. Fit the starter motor to the right hand engine cover ensuring that the 'O' ring does not become damaged during installation.
2. Fit and tighten the starter bolts to **10 Nm**.
3. Refit the lead and secure with the nut. Tighten to **7 Nm**.
4. Refit the boot.
5. Refit the low oil pressure warning light switch (see page 8-11).
6. Refit the left hand fairing (see page 16-12).
7. Refit the fuel tank (see page 10-88).
8. Reconnect the battery positive (red) lead first.
9. Refit the seat (see page 16-8).

## Fuses

A blown fuse is indicated when all of the systems protected by that fuse become inoperative. When checking for a blown fuse, use the table below to establish which fuse has blown.

### Fuse Identification

Circuit Protected	Rating (Amps)	Position
Starter solenoid, dip and main beam headlights	20	1
Ignition switch main feed, tail lights, number plate light, side lights, fuel pump	10	2
Indicators, brake light, horn	10	3
Blank	N/A	4
Blank	N/A	5
Accessory socket, heated grips	10	6
Cooling fan	15	7
Engine management system	20	8
Alarm, diagnostic connector, instruments	15	9
GPS	2	10



**Note:**

- The fuse identification numbers listed above correspond with those printed on the fuse box cover.

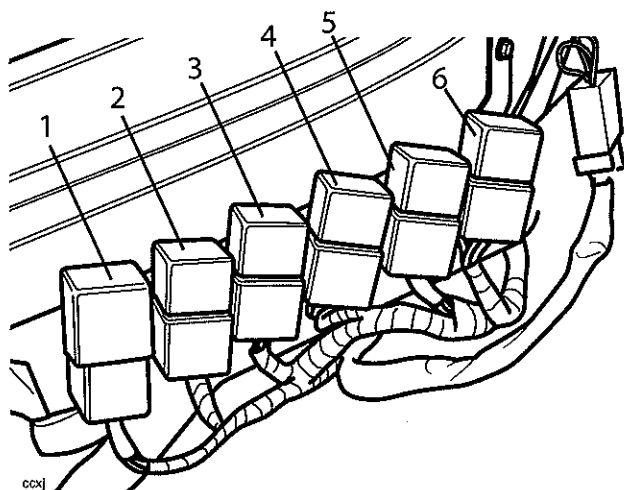
## Relay Pack

The relay pack is situated on the right hand side of the motorcycle behind the side panel.

**Note:**

- The relays are attached to their brackets by means of barbed extensions. Never exert extreme force when removing a relay as this may cause damage and never pull on the relay block connector.

## Identification of Relays

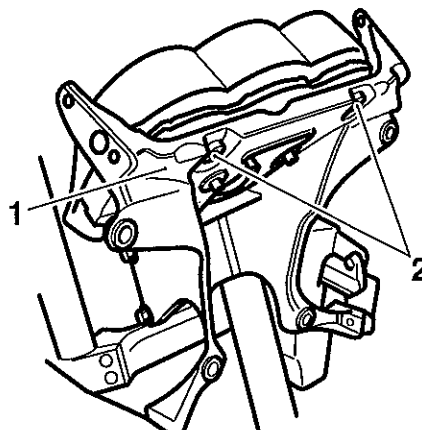


1. Indicator relay
2. Headlamp relay
3. Starter relay
4. Cooling fan relay
5. Fuel pump relay
6. Engine Management System (EMS) relay

## Instrument Pack

### Removal

1. Remove the seat (see page 16-8).
2. Disconnect the battery, negative (black) lead first.
3. Remove the cockpit (see page 16-13).
4. Release the fixings securing the instrument pack to the cockpit subframe.



1. Cockpit Subframe
2. Instrument Pack Fixings

5. Raise the instrument pack and disconnect the connections to the main harness.
6. The pack can now be removed.

### Installation

1. Position the instrument pack to the cockpit subframe.
2. Connect the instruments to the main harness.
3. Place the pack in position.
4. Refit the clips to the clevis pins.
5. Refit the cockpit (see page 16-13).
6. Reconnect the battery positive (red) lead first.
7. Refit the seat (see page 16-8).

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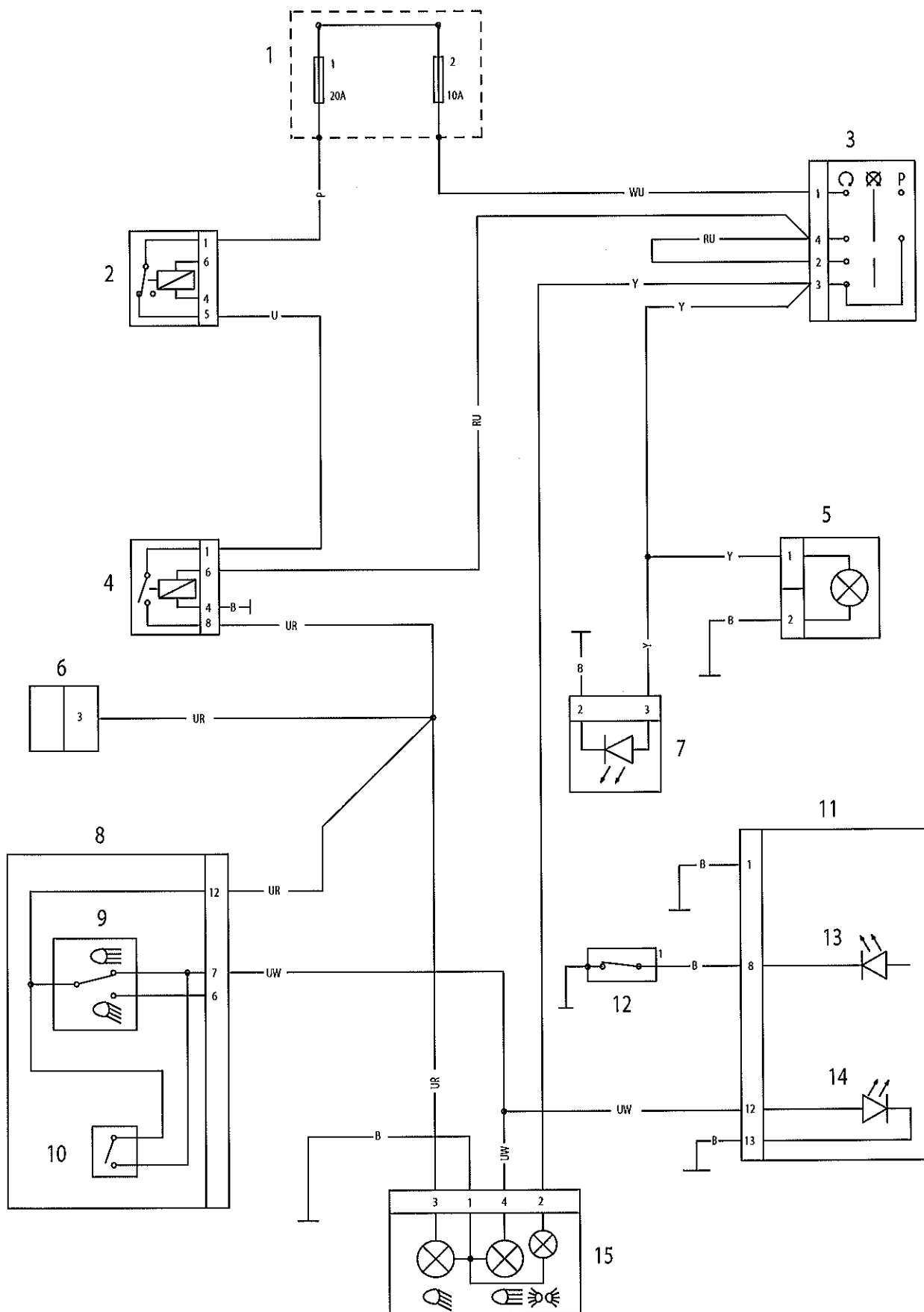
## Lighting Circuit Diagram

### Key to circuit diagram

Key	Item Description
1	Fuse Box (Fuses 1 and 2)
2	Starter relay
3	Ignition switch
4	Headlamp relay
5	Number plate light
6	Accessory Heated Handlebar Grips
7	Tail light
8	Left-Hand switch cube assembly
9	Main / dip beam switch
10	Pass switch
11	Instrument assembly
12	Oil pressure switch
13	Oil pressure warning light
14	Main beam warning light
15	Headlight assembly

### Key to wiring colours

Key	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate / Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue



# Electrical

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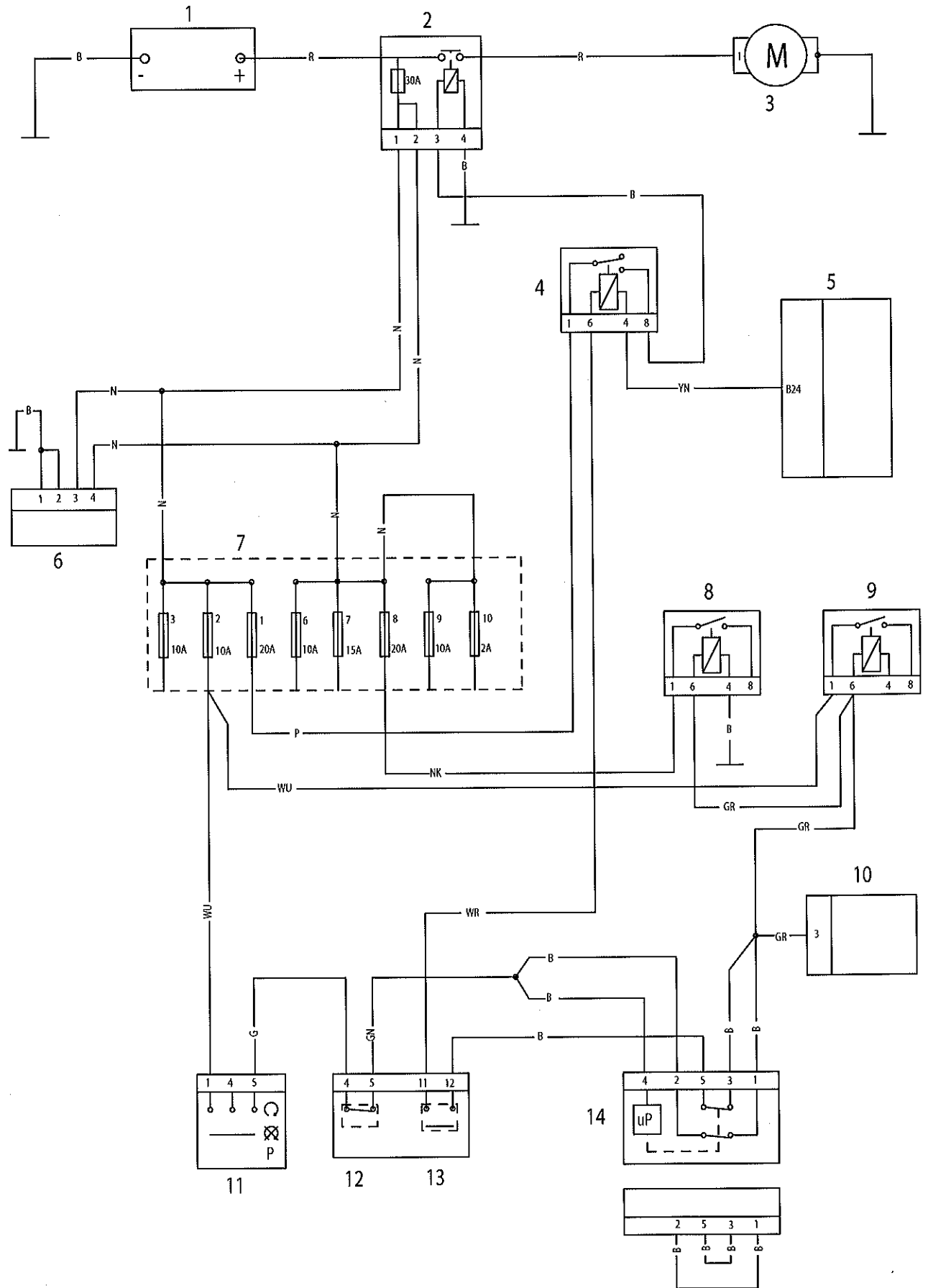
## Starting/charging Circuit Diagram

### Key to circuit diagram

Key	Item Description
1	Battery
2	Starter Solenoid (fused)
3	Starter Motor
4	Starter Relay
5	Engine Control Module
6	Regulator / Rectifier
7	Fuse box (Fuses 1 to 10)
8	Engine Management System Relay
9	Fuel Pump Relay
10	Instrument Assembly
11	Ignition Switch
12	Engine Kill Switch
13	Starter Switch
14	Alarm

### Key to wiring colours

Key	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate / Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue



# Electrical

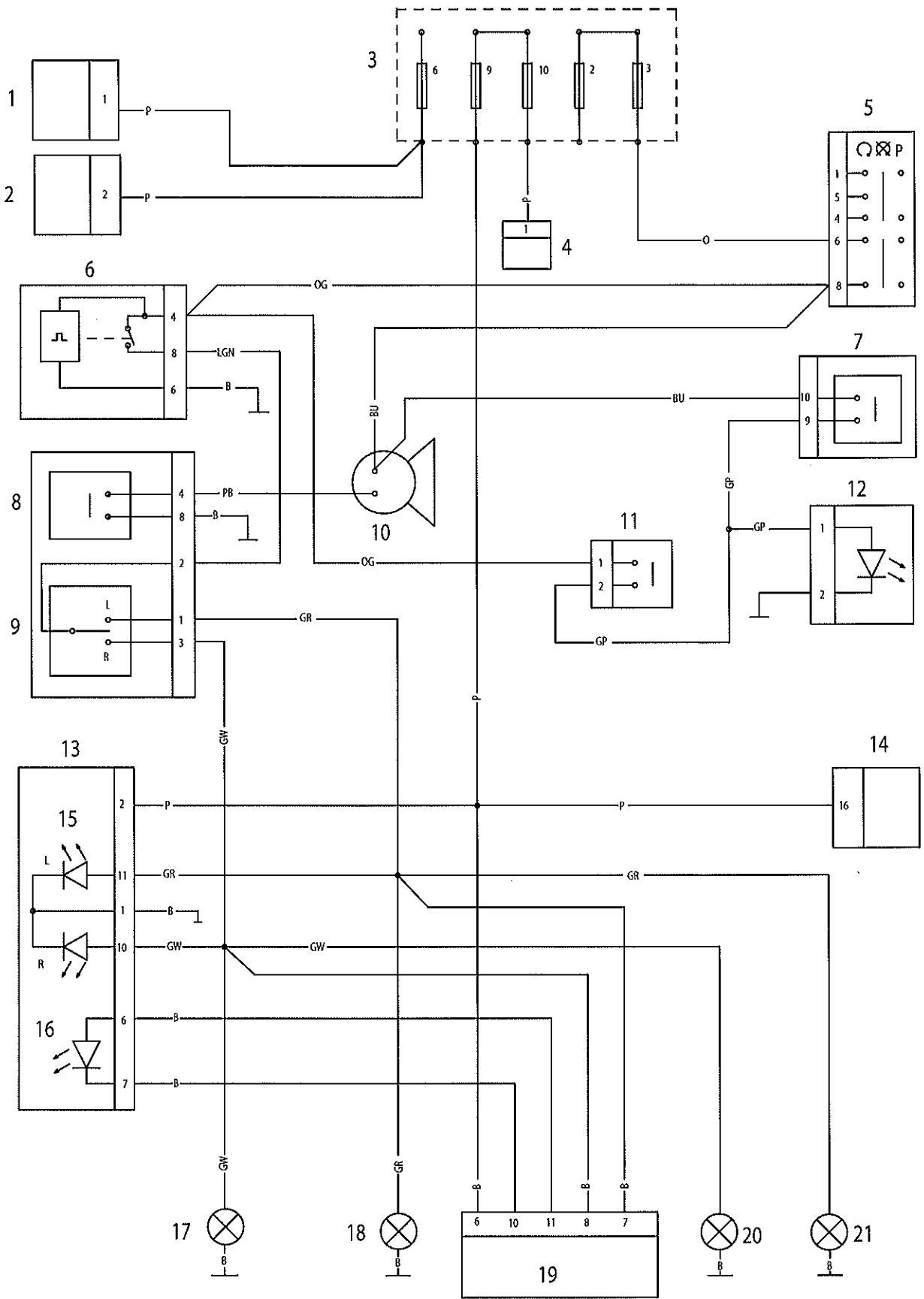
## Auxiliary and Accessory Circuit

### Key to circuit diagram

Key	Item Description
1	Accessory Heated Handlebar Grips
2	Accessory Socket
3	Fuse Box (Fuse #2, 3, 6, 9 & 10)
4	Accessory Satellite Navigation system
5	Ignition Switch
6	Indicator Relay
7	Front Brake Light Switch
8	Horn Switch
9	Direction Indicator Switch
10	Horn
11	Rear brake light switch
12	Brake light
13	Instrument Assembly
14	Diagnostic connector
15	Direction indicator (Instruments)
16	Alarm LED
17	Front right direction Indicator
18	Front left direction Indicator
19	Alarm unit
20	Rear right direction indicator
21	Rear left direction indicator

### Key to wiring colours

Key	Wiring Colour
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Y	Yellow
LG	Light Green
LU	Light Blue



# Electrical

## Main Wiring Circuit Diagram - Models without ABS Brakes

### Key to circuit diagram

Key	Item Description
1	Instrument Assembly
2	Vehicle Speed Sensor
3	Front Brake Lever Switch
4	Engine Kill Switch
5	Starter Button
6	Oil Pressure Switch
7	Engine Control Module
8	Neutral Switch
9	Lambda Sensor
10	Fuel Injector 1
11	Fuel Injector 2
12	Fuel Injector 3
13	Exhaust Air Injection Solenoid
14	Fuel Level Sender
15	Idle Speed Control Actuator
16	Fall Detection Switch
17	Inlet Air Temperature Sensor
18	Throttle Potentiometer
19	Coolant Temperature Sensor
20	Ambient Pressure Sensor
21	MAP Sensor
22	Purge Valve
23	Ignition Coil 1
24	Ignition Coil 2
25	Ignition Coil 3
26	Diagnostic Connector
27	Side stand Switch
28	Engine Management Relay
29	Fuel Pump Relay
30	Fuel Pump
31	Cooling Fan Relay
32	Cooling Fan
33	Engine Earth
34	Crankshaft Sensor
35	Rear Break Lever Switch
36	RH Rear Indicator
37	Rear Light
38	Number Plate Light
39	LH Rear Indicator

40	Alarm Connector (Accessory)
41	Satellite Navigation Connector (Accessory)
42	Starter Motor
43	Starter Solenoid (Fused)
44	Battery
45	Starter Relay
46	Rectifier / Regulator
47	Alternator
48	Fuse Box
49	Ignition Switch
50	Headlight Relay
51	Accessory Socket
52	Heated Handlebar Grips Connector (Accessory)
53	Clutch Lever Switch
54	Horn Button
55	Direction Indicator Switch
56	Headlamp Dip Switch
57	Direction Indicator Unit
58	LH Front Indicator
59	Position Light
60	Dip Beam bulb #1
61	Main Beam bulb
62	Dip Beam bulb #2
63	Horn
64	RH Front Indicator