9. Governor function ON/OFF (only HELI)

Select governor function ON or OFF.

10. Setting of advance timing

Select the advanced angle of the current to the motor or the way to advance the angle.

**ADVANCE TIMING**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Off</th>
<th>6°</th>
<th>12°</th>
<th>18°</th>
<th>24°</th>
<th>30°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed 8°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed 16°</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AUTO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft(0-7)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Medium(8-15)</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hard(16-25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Fixed 8°**: Advanced angle fixed at 8°. General use/Fr Acro models
- **Fixed 16°**: Advanced angle fixed at 16°. When stressing power
- **AUTO**: Automatic advance 0°~25°. Full automatic/General use
- **Soft(0-7)**: Semi automatic 0°~7°. General use/Acro models
- **Medium(8-15)**: Semi automatic 8°~15°. Helicopters
- **Hard(16-25)**: Semi automatic 16°~25°. When stressing power

**OCA-230 SPECIFICATIONS**

- Cool-Power FET: Latest generation power FET
- Programming card OCP-2: By connecting to the ESC, detailed setting can be done easily.
- Start protection: Stops involuntary starting of the motor.
- Low voltage cut-off: Stops the motor before the voltage reaches the level where control is lost and potential over-discharge damage to the cells occurs.
- No signal cut-off: Switches the ESC OFF when signal from the transmitter is not received.
- Overheat protection: When the temperature rises excessively due to overload, restart output to protect the ESC.
- Battery cell number auto recognition: Function to recognize automatically cell number of the battery to connect.
- BEC output: Power to receiver is supplied from the ESC. SC1204 is adopted

**OCA-240 SPECIFICATIONS**

- Cool-Power FET: Latest generation power FET
- Programming card OCP-2: By connecting to the ESC, detailed setting can be done easily.
- Start protection: Stops involuntary starting of the motor.
- Low voltage cut-off: Stops the motor before the voltage reaches the level where control is lost and potential over-discharge damage to the cells occurs.
- No signal cut-off: Switches the ESC OFF when signal from the transmitter is not received.
- Overheat protection: When the temperature rises excessively due to overload, restart output to protect the ESC.
- Battery cell number auto recognition: Function to recognize automatically cell number of the battery to connect.
- BEC output: Power to receiver is supplied from the ESC. SC1204 is adopted

**OCA-230 CONNECTION**

1. Prepare ESC, motor, programming card, and batteries.
2. Connect the jumper pin to the terminal of item you would like to set.
3. Connect motor and ESC to the ESC.
4. Connect the ESC to the batteries. Setting is completed after a beep.
5. If the jumper pin is not connected properly, four short alarm beeps sound and setting is stopped. Make sure the jumper pin is connected properly to each item. If the number of the jumper pin is short, setting cannot be done.
6. In case of OPTO ESC, connect 5~8V batteries to the power input connector on the programming card and carry out 4. Procedure.
7. When the setting is done correctly, a beep sounds. If the setting is not done correctly, four beep sounds.

**OCA-240 CONNECTION**

1. Connect the ESC to the transmitter.
2. Connect the battery to the ESC.
3. Connect the motor to the ESC.
4. Connect the receiver to the ESC.
5. Connect the programming card to the ESC.

**OCA-230 / OCA-240**

The OCA-230 / OCA-240 are ESC with the latest FET for brushless motors. By using supplied Programming card OCP-2, the ESC can be programmed quickly and securely to meet model's specific requirements.

**INSTRUCTION MANUAL**

**O.S. ENGINE**

**BRUSHLESS MOTOR ESC**

**FOR HELICOPTERS/ AIRPLANES**

- **OCA-230**
- **OCA-240**

**SUPPLIED WITH OCA-240 (Programming card)**

**CORRESPONDING CHECK**

- **For airplanes**: Check the specifications of the motor and relationship with the propeller (Dia. and pitch) and select propeller with which more than below mentioned current may not flow.
- **For helicopters**: Check the specifications of the motor and relationship with the propeller (Dia. and pitch) and select propeller with which more than below mentioned current may not flow.

- **Notes on installation**
  **WARNINGs**
  - Be sure to insert the ESC in the way securely.
  - Be sure to install the ESC so that it is at the place where there is plenty of air flow for cooling.
  - Be sure to install the ESC so that the short circuit connection is not due to contact between parts.
  - Do not disconnect the ESC wires during operation. Be sure to do so only when the ESC is turned OFF.

- **Notes on operation**
  **WARNINGs**
  - Do not use the OCA-230 / OCA-240 on the OCA-230 / OCA-240.
  - Be sure to remove the ESC where the motor may cause damage to ESC components and parts.

**HOW TO CONNECT THE OCA-230 / OCA-240**

**PREPARATION**

- Select the corresponding battery connector to the battery connection wires of the ESC. Also, use a heat-shrink tube to isolate the connection.
- Select the corresponding battery connector to the motor connection wires of the ESC. Also, use a heat-shrink tube to isolate the connection.

**Connect as shown below,**

- **Red**
  - Connect to the transmitter.
  - Connect to the throttle channel.
  - Since the OCA-230 / OCA-240 is integrated with BEC, never connect separate battery to the receiver.
  - Connect to the OCP-2 when the setting is completed.

- **Black**
  - Connect to the receiver.

**NOTE**

- Be sure to insert the ESC in the way securely.
- Be sure to install the ESC so that it is at the place where there is plenty of air flow for cooling.
- Do not disconnect the ESC wires during operation. Be sure to do so only when the ESC is turned OFF.
- Be sure to remove the ESC where the motor may cause damage to ESC components and parts.

**Graphic symbols**

- ☒: Prohibited Items
- ☐: Items never fail to take action

**DANGER**

This covers the possibility which might involve death and serious injury.

**WARNINGS**

These cover the possibilities which might involve death and serious injury and also may cause damage or injury.

**NOTES**

These cover the many other possibilities, generally less obvious source of danger, but which, under certain circumstances, may also cause danger or injury.

**O.S. ENGINES**

**WEBSITE**

URL: http://www.os-engines.jp

**TEL:** 045-560-3225
**FAX:** 045-560-3226

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INSTALLATION OF THE ESC

Install the ESC in the model using Velcro tape or double faced tape so that it may not be affected by vibration or shock. Make sure both the ESC and motor receive plenty of air flow for cooling via cooling slots. Insufficient cooling by air may damage the ESC and motor.

Notes on Operation
- When using the BEC, it is suggested to set the BEC current less than 3A with the OCA-230 and less than 4A with the OCA-240.
- It is suggested to use maximum current of the motor less than one minute.
- Since the overheat protection function is integrated with the ESC, motor stops running when the FET temperature rises to the limit.
- When the signal from the transmitter is not received for approx. 3 seconds, motor stops. When the signal from the receiver is input, motor starts running with the throttle at stop position or brake position.
- Do not connect to the batteries with wrong polarity, or the ESC will be destroyed immediately.
- If the ESC is connected to the batteries with the throttle high, short beeps start sounding after approx. 5 seconds. In this case, pull down the throttle to the stop position or brake position, or disconnect the batteries from the ESC.

NORMAL SETTING

Switch the transmitter on and make sure ATV/AFR shows +/-100% (in case of computer radio).
- In case of a Futaba transmitter, set the throttle channel "Reverse". When connecting to the batteries, be sure to pull down the throttle or place the throttle at brake position.
- You may hear "start sound" and the motor starts running.

SETTING OF THROTTLE POSITIONS

- Do not install a propeller on the motor yet.
- Switch the transmitter "ON". In case of a Futaba transmitter, set the throttle channel "Reverse".
- Pull down the throttle fully and connect the ESC to the batteries.
- "Start sound" mentioned below will sound, if not, adjust the ATV/AFR value.
- Lowest throttle position is set with battery cut off number beeps plus a beep in case of brake ON or two beeps in case of brake OFF.
- Full throttle position is fixed, Power reduction can be adjusted by the value of ATV/AFR.
- Disconnect batteries from the ESC.

DEFAULT

- Battery Type: Li-Po
- Cut off cell Voltage: 3.2V
- Cut off Type: Reduce power
- Start Power: Soft
- Acceleration: Normal
- PWM Frequency: 16kHz
- Brake Type: Off
- Rotation: Normal
- Governor Mode: Off
- Advance Timing: Auto

WARNING

1. Be sure to connect the ESC to batteries just before the flight and disconnect it right after landing.
2. When the ESC is connected to batteries, handle the model with utmost attention.
3. Rotating propeller is very dangerous. Always make sure you are safe and away from the rotating propeller.
4. Model equipped with a strong motor is very dangerous.
5. A strong motor system is very dangerous.
6. Large current may heat leads and batteries. Be sure to connect leads with utmost care.
7. Poor connection may cause fire and burn.
8. If the model only at permitted airfield, Never fly it over nor near the onlookers. While this ESC is equipped with a safety alarm program, as owner you are responsible for safety operation of your motor, ESC and batteries, so act with discretion and care at all times.

SETTINGS USING PROGRAMMING CARD OCP-2

By using a supplied ESC Programming Card OCP-2, parameters of the ESC can be set quickly and accurately to meet model's specific requirements. The OCP-2 cannot be used with other ESCs than the OCA-230/OCA-240. The programmer OCP-1 cannot be used with the OCA-230/OCA-240.

- Selection example
- Brake OFF is selected.
- Selection example
- Advance Timing Auto is selected.

1. Selection of battery type
Select power battery type to use.
- NIMH (Nickel-metal-hydride battery)
- LIPo (Lithium polymer battery)

2. Setting of cut off voltage
Set the cut off voltage of LiPo battery.
- LOW 3.1V
- HIGH 3.2V

3. Selection of cut off type
Select the motor behavior when the battery voltage drops.
- REDUCE POWER
- STOP MOTOR

4. Setting of start power
Set the power (torque) level of the motor starting up.
- HARD
- SOFT

5. Setting of acceleration
Set the motor response to the throttle work.
- LOW
- NORMAL
- HIGH

6. Setting of PWM frequency
Set the switching frequency of the current to the motor.
- 8 kHz
- 16 kHz

7. Setting of brake type
Set the strength of brake. When slowing down with brake, the motor regenerates.
- OFF
- 20%
- 50%
- 80%

8. Setting of motor rotating direction
Select motor rotating direction.
- NORMAL
- REVERSE

Connection of the programming card
Connect the OCP-2, power battery and motor to OCA-230/OCA-240 as explained before.

Setting items
Items can be set with the OCP-2 are listed below.

- Battery Type
- Cut off cell Voltage
- Start Power
- Acceleration
- PWM Frequency
- Brake Type
- Rotation
- Governor Mode
- Advance Timing

Input power terminal: Use when connecting to OPTO ESC, Input voltage: 5-8V

Explanation of the terminals
Selection example
The place where this pin is covered by jumper pin shows battery LiPo mode. This concept applies to all other terminals.
INSTALLATION OF THE ESC
Install the ESC in the model using Velcro tape or double faced tape so that it is not affected by vibration or shock. Make sure both the ESC and motor receive plenty of air flow for cooling via cooling holes. Inefficent cooling by air may damage the ESC and motor.

Notes on Operation
- When using the BEC, it is suggested to set the BEC current less than 3A with the OCA-230 and less than 4A with the OCA-240.
- It is suggested to use maximum current of the motor less than one minute.
- Since the overheat protection function is integrated with the ESC, motor stops running when the FET temperature rises to the limit.
- When the signal from the transmitter is not received for approx. 3 seconds, motor stops. When the signal from the receiver is input, motor starts running with the throttle at stop position or brake position.
- Do not connect to the batteries with wrong polarity, or the ESC will be destroyed immediately.
- If the ESC is connected to the batteries with the throttle high, short beeps start sounding after approx. 5 seconds. In this case, pull down the throttle to the stop position or brake position, or disconnect the batteries from the ESC.

WARNINGs
- Be sure to connect the ESC to batteries just before the flight and disconnect it right after landing.
- When the ESC is connected to batteries, handle the model with utmost attention.
- Rotating propeller is very dangerous. Always make sure you are safe and away from the rotating propeller.
- Model equipped with a strong motor is very dangerous.
- A strong motor system is very dangerous.
- Large current may heat leads and batteries. Be sure to connect leads with utmost care.
- Poor connection may cause fire and burn.

SETTINGS USING PROGRAMMING CARD OCP-2
By using a supplied ESC Programming Card OCP-2, parameters of the ESC can be set quickly and accurately to meet model's specific requirements. The OCP-2 cannot be used with other ESCs than the OCA-230/OCA-240. The programmer OCP-1 cannot be used with the OCA-230/OCA-240.

NORMAL SETTING
Switch the transmitter on and make sure ATVA/FAR shows +/-100% (in case of computer radio).
In case of a Futaba transmitter, set the throttle channel “Reverse”. When connecting to the batteries, be sure to pull down the throttle or place the throttle at brake position.
You may hear “Start sound” and the motor starts running.

SETTING OF THROTTLE POSITIONS
- Do not install a propeller on the motor yet.
- Switch the transmitter “ON”. In case of a Futaba transmitter, set the throttle channel “Reverse”.
- Pull down the throttle fully and connect the ESC to the batteries.
- “Start sound” mentioned below will sound. If not, adjust the ATVA/FAR value.
- Lowest throttle position is set with battery cell number beeps plus a beep in case of brake ON or two beeps in case of brake OFF.
- Full throttle position is fixed. Power reduction can be adjusted by the value of ATVA/FAR.
- Disconnect batteries from the ESC.

DEFAULT
- Battery Type: Li-Po
- Cut off cell Voltage: 2.3V
- Cut off Type: Reduce power
- Start Power: Soft
- PWM Frequency: 16KHz
- Brake Type: Off
- Rotation: Normal
- Governor Mode: Off
- Advance Timing: Auto

Connection of the programming card
Connect the OCP-2, power battery and motor to OCA/230/OCA-240 as explained before.

Setting Items
Items can be set with the OCP-2 are listed below.

|-----------------|------------------------|----------------|---------------|----------------|-----------------|--------------|------------|----------------|-----------------|

1. Selection of battery type
Select power battery type to use.
- NiMH (Nickel-metal-hydride battery)
- LiPO (Lithium polymer battery)

2. Setting of cut off voltage
Set the cut off voltage of LiPo battery.
- Low 3.1V
- Cut off cell voltage
- Normal 3.2V
- Normal cell voltage

3. Selection of cut off type
Select the motor behavior when the battery voltage drops.
- Reduce power
- Stop motor

4. Setting of start power
Set the power (torque) level of the motor starting up.
- Hard
- Start power
- Soft

5. Setting of acceleration
Set the motor response speed to the throttle work.
- Low
- Normal
- High

6. Setting of PWM frequency
Set the switching frequency of the current to the motor.
- 8KHz
- 16KHz

7. Setting of brake type
Set the strength of brake. When slowing down with brake, the motor regenerates.
- Off
- 20%
- 50%
- 80%

8. Selection of motor rotating direction
Select motor rotating direction.
- Normal
- Reverse

Input power terminal:
Use when connecting to OPTO ESC, Input voltage: 5-8V
INSTRUCTION MANUAL

BRUSHLESS MOTOR ESC
FOR HELICOPTERS/AIRPLANES

OCA-230 / OCA-240

IMPORTANT: It is of vital importance, before attempting to operate your OCA-230/OCA-240 to read through this instruction manual.

Notes on installation

1. Be sure to install the ESC so as not to leak, grease and water may not come in contact with the ESC.

2. Do not install the ESC at the place where there is plenty of air flow for cooling.

3. Do not wrap the ESC with aluminum foil, etc.

4. Be sure to install the ESC so that the soldering connection of the power and signal contacts are not cramped upon each other.

5. Be sure to install the receiver and receiver antenna away from the place where high current flows such as ESC, motor wires, battery wires, etc.

OCA-230 / OCA-240 are ESC installed with the latest FET for brushless motors. By using supplied Programming card OCP-2, settings of ESC can be programmed quickly and securely to meet models specific requirements.

How to connect

1. Connect to the battery, making sure polarity is correct.

2. Connect to the throttle channel of the receiver.

3. Since the OCA-230/OCA-240 is integrated with SEC, never connect separate battery to the receiver.

4. Connect to the OCP-2 when the settings are made with the OCP-2.

OCA-230 / OCA-240 are equipped with BEC output as power output for receiver. Do not connect the battery for receiver when connecting the OCA-230 / OCA-240, or both the ESC and batteries may break.

PREPARATION

Solder the corresponding battery connector to the battery connection wires of the ESC. Also, use a heat-shrink tube to isolate the connection. Select the corresponding connectors (female) to the motor connection wires of the ESC. Also, use a heat-shrink tube to isolate the connection.

Connect as shown below.