⑪ Air brake ON/OFF (only AIR mode)

```
ABRAKE ON/OFF
 Off      ± Air
```

Setting range: On/Off
Default: Off

Select air brake ON or OFF.

⑫ Setting of motor pole number

```
MOTOR POLE NUM
2   Pole  ± Air
```

Setting range: 2~36 poles
Default: 2

Change the value according to the motor to use.

※ This setting is required to indicate actual RPM.

⑬ Setting of gear ratio

```
  GEAR RATIO
1.0 : 1   ± Air
```

Setting range: 1.0:1 ~ 25.0:1
Default: 1.0:1

Input the gear ratio (motor RPM : rotor RPM).

※ RPM to indicate is calculated by motor pole number and gear ratio.

⑭ Indication of maximum RPM

```
  MAXIMUM RPM
000000 RPM ± Air
```

The maximum RPM during the last flight is indicated.

※ RPM to indicate is calculated by motor pole number and gear ratio. Default is test value when the ESC leaves the factory. It changes when the motor is run.

⑮ Indication of average RPM

```
  AVERAGE RPM
000000 RPM ± Air
```

The average RPM during the last flight is indicated.

※ RPM to indicate is calculated by motor pole number and gear ratio. Default is test value when the ESC leaves the factory. It changes when the motor is run.

⑯ Down load the set data to the ESC

```
  DOWN LOAD
Really? No ± Air
```

This is to write (transfer) the set values to the ESC. Press INC(+) to start writing.

※ Beep once every second continues until the writing is completed. If you want to quit in the middle, press DEC(-).

⑰ Access to the stored data in the programmer

```
 RESTORE MEMORY
Really? No ± Air
```

This is to access the stored data in the programmer. Press INC(+) to start the process.

※ Beep once every second continues until the process is completed. If you want to quit in the middle, press DEC(-).

⑱ Storing the set data in the programmer' s memory

```
 BACKUP MEMORY
Really? No ± Air
```

This is to store the set date in the programmer' s memory. Press INC(+) to start the process.

※ Beep once every second continues until the process is completed. If you want to quit in the middle, press DEC(-).

SPECIFICATIONS

	OCA-150
Function	Forward-Stop-Brake-Reverse
Working voltage range	6~25V
Load current (Peak)	50A (60A 5 seconds)
BEC output	5.5V, 3A (Peak 5A)
Size	50x25x10mm
Weight	52g
Cell number	6-18 NiCd/NiMH, 2-6 LiPo
Parameter setting	ESC/ESC Programmer OCP-1 (Optional extra)
Protective function	Start protection/Low voltage cut-off/No signal cut-off/Overheat protection
PWM Frequency	32kHz

※ Cool Power FET: Latest generation power FET
※ ESC Programmer OPC-1: By connecting to OCA-150, 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 extraordinary due to overload, restrict 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.

● **Pay careful attention to the advices with the following headings.**

⚠DANGER
This covers the possibility which might involve death and serous 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.

Graphic symbols: ⃠ ; Prohibited items ❗ ; Items never fail to take action

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O.S.ENGINE

IMPORTANT: It is of vital importance, before attempting to operate your OCA-150 to read through this instruction manual.

BRUSHLESS MOTOR ESC FOR HELICOPTERS/AIRPLANES **OCA-150**

INSTRUCTION MANUAL

● Corresponding motors

For airplanes: Check the specifications of the motor and relationship with the propeller (Dia. and pitch) ,and select propellers with which more than 45A current may not flow.

※ O.S. brushless motors OMA-3810-1050, OMA-3815-1000, OMA-3820-1200 and OMA-3825-750 are recommended. Even with these motors, carefully select Propellers with which more than 45A current may not flow.

For helicopters (suitable for 450 class helicopters): Select motors of 3500~4400 KV values. (400~550W class)

※ The motor of more than 45A maximum current cannot be used, otherwise the ESC may be failed.

The OCA-150 is ECS installed with the latest FET for brushless motors. By using an optional extra ESC Programmer OCP-1, settings of ESC can be programmed quickly and securely to meet model' s specific requirements.

● Before operating OCA-150

※Misuse or abuse of LiPo batteries is very dangerous. Be sure to follow the instruction manual supplied with the batteries.

※ Be sure to install the connectors which match the batteries, securely soldering to the battery connecting wires of the ESC. Never use the ESC with the connectors temporarily connected.

※ Batteries can be used: LiPo 2~6 cells (7.4~22.2V), NiCd/NiMH 6~18 cells (7.2~21.6V)

※OCA-150 is equipped with BEC output as power output for receiver. Do not connect the battery for receiver when connecting the OCA-150. If both the ESC and the receiver battery are connected to a receiver, receiver, ESC and batterieswill be failed.

■Notes on installation

⚠WARNINGS

❗ **Never use the OCA-150 beyond the working conditions listed in the specifications listing.**

⃠ **Do not mistake the polarity of the batteries.**
※ Reverse connection may cause fire and ESC will be damaged or be burnt instantly.

⃠ **Never short out any place of the ESC, batteries, motor, receiver and connectors.**
※ Short circuit may cause fire and ESC will be damaged or be burnt instantly.
※ Be sure to install the ESC so that the soldering connection of the input/output wires may not touch conductive part.

❗ **Be sure to install the receiver and receiver antenna away from the place where high current flows such as ESC, motor wires, battery wires, power batteries.**
※ Malfunction of the receiver due to noise will cause to lose model control which is very dangerous.

❗ **Be sure to insert connectors all the way securely.**
※ Disconnection due to vibration may cause to lose model control which is very dangerous.

❗ **Be sure to install the ESC so that oil, grease and water may not come in contact with the ESC.**

❗ **Be sure to install the ESC at the place where there is plenty of air flow for cooling.**

⃠ **Do not wrap the ESC with aluminum foil, etc.**
※ Wrapping may spoil cooling effect and the ESC may not develop its original performance.

❗ **Be sure to install the motor securely and fix all the wires.**

⚠NOTE

⃠ **Do not disassemble. Do not open the ESC case.**
※ Opening of the case may cause damage inside components and render it irreparable.

■Notes on operation

⚠WARNINGS

❗ **Never touch or allow any part of the body to come into contact with any rotating part while operating.**
※ Sudden rotating may cause serious injury.
※ Be careful with some receivers the motor may rotate for a moment when the power puts on.

⃠ **Do not fly when rainy.**
※ Entry of water drops into the ESC may cause malfunction and out of model control which is very dangerous. Also, it will cause failure. If malfunction is detected due to entry of water drops, send the ESC to the manufacturer or its distributor in each country for inspection and repair.

❗ **Be sure to follow the procedures mentioned below as to ON and OFF of the power switch.**
- **ON:** Hold the throttle stick at stop position. Switch on **the transmitter then receiver** power.
- **OFF:** Hold the throttle stick at stop position. Switch off **the receiver then transmitter** power.

※ With reverse procedure propeller may rotate suddenly, which is very dangerous.

❗ **Be sure to remove the batteries when not in use.**
※ Accidental switching on may cause sudden rotating of propeller or cause fire, which is very dangerous.

❗ **Be sure to check the ESC and all the movements of model controls before attempting flight.**
※ Incorrect settings or using of unsuitable model may cause to lose model control which is very dangerous.

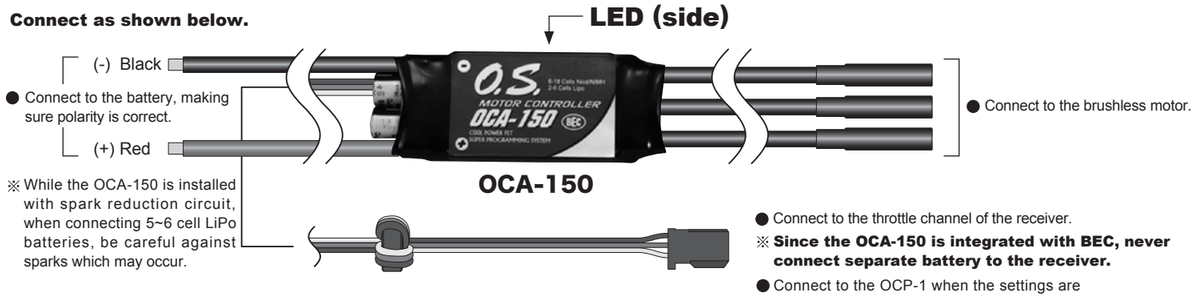
⚠NOTE

⃠ **Do not touch the motor nor ESC right after flight.**
※ Touching them may cause burn.

HOW TO CONNECT THE OCA-150

〔PREPARATION〕
Solder the corresponding battery connector to the battery connection wires of the ESC. Also, use a heat-shrink tube to isolate the connection.
Solder 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.

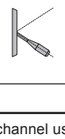


SETTING OF THROTTLE POSITIONS

Set the high point and the slowest point as follows.
(In case of model type AIR/HELI)

「**Preparation**」
As explained before, connect the ESC, receiver and motor. **Do not connect power battery at this time.**

「**Preparation**」
Set the throw angle of the throttle channel on the transmitter 100%. **In case of Futaba, set the reverse function of the throttle channel to the reverse.**

	Procedure	Stick	LED
①	**Power the transmitter on and hold the throttle stick at full high.**		-----
↓			
②	**Connect the power battery.** ● 10 seconds after a short beep, a double beep is emitted.		Lights up
↓			
③	**Within 3 seconds after the step ②, fully pull down the throttle stick.** ● After a short beep, a double beep is transmitted.		
↓			
④	**Disconnect the power battery.**		

※ When the LED on the ESC flashes, reverse the throttle channel using the servo reverse function on the transmitter. Disconnect the power battery and repeat the procedure from the beginning.

※ In case of model type CAR or BOAT and reverse function ON, step ③ should be replaced with the following.
Set the throttle stick neutral (a short beep)→reverse(a short beep)→(a double beep)→disconnect power battery to set high point, neutral point and reverse point.

SETTING OF PARAMETERS

Five parameters can be set without using the programmer in the following manner.

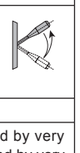
No.	Parameter type	When selecting the parameter	When checking and changing the parameter	
		LED/Beep	LED Lights up/ Beep (every 2 seconds)	LED flashes/ Beep (every 0.5 seconds)
1	Battery type	One flash/Beep (continues)	LiPo	NiCD/NiMH
2	Direction of motor rotation	Two flashes/Beeps (continues)	Normal	Reverse
3	Governor ON/OFF (HELI) Brake ON/OFF (AIR) Reverse ON/OFF (CAR/BOAT)	Three flashes/ Beeps (continues)	OFF	ON
4	Model type	Four flashes/Beeps (continues)	AIR	HELI
5	Model type	Five flashes/Beeps (continues)	BOAT	CAR

〔**IMPORTANT**〕 **After setting model type at No.4 or No.5, do not check the setting, or the different model type will be overwritten.**

● How to select parameter type (number).

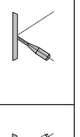
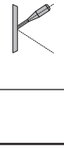
Select the parameter type (number) with the following procedure.

「**Preparation**」
As explained before, connect the ESC, receiver and motor. **Do not connect power battery at this time.**

	Procedure	Stick	LED
①	**Switch the receiver on and hold the throttle stick at full high position.**		-----
↓			
②	**Connect the power battery.** ● 10 seconds after a short beep, a double beep is emitted and after 3 seconds a long double beep is emitted.		Lights up
	● Then, very short beep continues. (This confirms the **parameter No.1** is selected.)		
↓			
③	**Move the throttle stick quickly high→slow →high.** ● Very short double beep continues. (This confirms the **parameter No.2** is selected.)		Flashes
↓			
By repeating step③, **parameter No.3** (to be confirmed by very short triple beep) through **parameter No.5** (to be confirmed by very short quintuple beep) can be selected.			

● How to change parameter.

After selecting the parameter No. as explained above, change the parameter with the following procedure.

	Procedure	Stick	LED
	(Parameter to check or change is being selected.)		Flashes
↓			
①	**Hold the throttle stick at the slowest position.** ● After 3 seconds, a beep is emitted. ● Then, LED and beep show the current setting.		Lights up or Flashes
↓			
②	**(to change the current setting)** **Move the throttle stick quickly slow→high →slow.** ● LED indication and beep change to confirm setting changed.		
	(to return to parameter No. selection) **Move the throttle stick to full high position.** ● A double beep is emitted to confirm returned to parameter selection.		Flashes
↓			
③	**Disconnect the power battery** ● Setting is saved.		

INITIAL SETTING

The following example explains how to set initial setting to use governor (in case of HELI) or air brake (in case of AIR).

SETTING OF THROTTLE POSITIONS

Store full high and slowest positions of the throttle stick in the ESC.

※ Follow the SETTING OF THROTTLE POSITIONS procedure explained before.

↓

SETTING OF PARAMETERS

Set each parameter of the ESC according to the using conditions.

〔**IMPORTANT**〕
With the OCA-150, model type AIR is stored as default. First select model type AIR or HELI and make each setting.

● SELECTION OF BATTERY TYPE (Parameter No.1)

Select according to the type of power battery to use.

LiPo: LiPo battery
NiCD/NiMH: NiCd battery or Nickel-metal hydride battery

● ON/OFF OF GOVERNOR (Parameter No.3) (In case of HELI)

To use governor function, set ON.

● ON/OFF OF AIR BRAKE (Parameter No.3) (In case of AIR)

To use air brake function, set ON.

※ Set each parameter following the SETTING OF PARAMETERS explained before.

※ Detailed setting of parameter can be set using the optional extra ESC Programmer OCP-1.

After completing the initial setting, disconnect the power battery.

NORMAL OPERATION

⚠ WARNINGS

Be sure to set the parameters according to the throttle positions and using conditions before using the OCA-150.

When normal operation is ready, check the direction of motor rotation. If the rotation is reverse, correct it by re-setting of the parameter or changing connection of the motor.

※ Wrong setting may cause sudden rotation of the motor or out of model control which is very dangerous.

● In normal operation, connect the power battery with the throttle stick at the slowest position. After hearing a set of very short and short beep, you can operate the ESC. At this time, LED lights up.

※ If the power battery is connected with the throttle stick not at the slowest position, LED flashes. In this case, move the throttle stick to the slowest position and a set of very short and short beep is emitted to confirm ready to operate.

※ If the power battery is connected with the throttle stick at high and entered into the setting mode, disconnect the power battery and repeat from the beginning.

SETTINGS USING ESC PROGRAMMER OCP-1

By using an optional extra ESC Programmer OCP-1, settings of ESC can be programmed quickly and securely to meet model' s specific requirements.

● Connection of the programmer

Connect the OCP-1, power battery and motor to OCA-150 as explained before.

● Operation of editing buttons

Selection of setting item	Select setting parameter with outer arrow buttons(↓ or ↑).
Change of setting	Use inner INC(+) and DEC(-) buttons to select setting or change setting.
Change of model type	You can change model type by pressing both arrow buttons at the same time.

● Setting items

Items can be programmed with the OCP-1 are listed below.

Setting Item (Model type: HELI/AIR)	
① Selection of battery type	⑩ Selection of air brake type (only AIR)
② Setting of cut off voltage	⑪ Air brake ON/OFF (only AIR)
③ Selection of cut off type	⑫ Setting of motor pole number
④ Selection of motor rotating direction	⑬ Setting of gear ratio
⑤ Setting of advance timing	⑭ Indication of maximum RPM
⑥ Setting of acceleration	⑮ Indication of average RPM
⑦ Setting of start power	⑯ Down load the set data to the ESC
⑧ Response setting of governor function (only HELI)	⑰ Access to the stored data in the programmer
⑨ Governor function ON/OFF (only HELI)	⑱ Storing the set data in the programmer' s memory

● How to set

When the OCP-1 and power battery are connected to the ESC, current settings of the ESC are automatically stored in the OCP-1.

Select the item to change with the arrow buttons (↓ or ↑) and change the setting with INC(+) and DEC(-) buttons.

〔**IMPORTANT**〕
When the parameter setting of the ESC with the OCP-1 is completed, write the set data to the ESC with "⑯Down load the set data to the ESC" function. Set data cannot be written to the ESC with only parameter setting.

① Selection of battery type

SELECT BATTERY
LiPo ± Air

Setting range: LiPo, NiCd
Default: LiPo

Select power battery type to use with INC(+) and DEC(-) buttons.

※ When the battery type is changed, "CUT OFF VOLTAGE" and "CUT OFF TYPE" parameters are changed.

② Setting of cut off voltage

CUT OFF VOLTAGE
Auto ± Air

Setting range: Auto, 4.5~50V
Default: Auto

Set the cut off voltage according to the battery to use with INC(+) and DEC(-) buttons.

※ With LiPo in Auto mode, the ESC cuts off at 3V per cell. In case of NiCd, the ESC cuts off at total 12V.

③ Selection of cut off type

CUT OFF TYPE
Soft Off ± Air

Setting range: Soft off, Hard off
Default: Soft off

Select the cut-off method when battery voltage drops to the set cut-off voltage.

④ Selection of motor rotating direction

MOTOR DIRECTION
Normal ± Air

Setting range: Normal, Reverse
Default: Normal

Select motor rotating direction.

※ If the direction is reverse, change the mode.

※ Direction can be changed by changing connection of the motor.

⑤ Setting of advance timing

ADVANCE TIMING
8 ° ± Air

Setting range: 0~25°
Default: 8°

The following range of values is recommended.

0~10° for in-runner motors
14~25° for out-runner motors

⑥ Setting of acceleration

ACCELERATION
Normal ± Air

Setting range: Lowest/Low/Normal/High/Highest
Slow ⇔ Fast
Default: Normal

Set how fast the ESC runs up to maximum speed using INC(+) and DEC (-) buttons. (Delay function) Usually this function is set when ON/OFF is done with switch.

⑦ Setting of start power

START POWER
Normal ± Air

Setting range: Lowest/Low/Normal/High/Highest
(Power small) ⇔ (Power large)
Default: Normal

Set the power (torque) level of the motor starting up.

※ When used in a helicopter model, the value should be small to avoid premature gear wear.

⑧ Response setting of governor function (only HELI mode)

RESPONSE OF GOV
Fastest ↕Heli

Setting range: Slowest/Slow/Normal/Fast/Fastest
Slow ⇔ Fast
Default: Slowest

To set the governor working response characteristics.
Note: The faster, the higher current is consumed.

※ To avoid shortening ESC and power battery life, it is suggested to set slower.

⑨ Governor function ON/OFF (only HELI)

GOVERNOR ON/OFF
On ↕Heli

Setting range: On/Off
Default: Off

Select governor function ON or OFF.

※ Governor function works to keep the RPM corresponding to throttle position (throttle curve) against load changes due to pitch operation or voltage changes of the power batteries. Note that higher current of the power batteries is consumed.

⑩ Selection of air brake type (only AIR mode)

AIR BRAKE TYPE
Normal ± Air

Setting range: Slow/Normal/Fast or Value 5~100%
Slow ⇔ Fast
Default: Normal

With model type AIR, adjust the air brake effect. Select to stop the motor gradually or suddenly with INC(+) and DEC(-) buttons.

※ With 100% motor stops suddenly.