



## USER MANUAL FIBER OPTIC IGNITION CUTOFF

### **Description**

The fibre-optic ignition cutoff was designed specifically for large RC models powered by gasoline engines with electronic spark ignition. Its main task is to separate receiver circuits with RC accessories from the circuit powering the ignition unit, which may cause strong electromagnetic interference, and as a result loss of control. *FORCE* ignition cutoff considerably reduces the possibility of RC range loss. Simultaneously, giving the possibility to emergency turn off the engine in a few ways.

The *FORCE* ignition cutoff is equipped with additional functions which additionally increases safety during practicing this wonderful hobby:

**- Fibre-optic transmission controlling ignition unit (ON-OFF)**

Total resistance to electromagnetic interference induced in the ignition by separating circuits for a distance at least 30 cm

**- Switching ON and OFF ignition directly from RC transmitter**

Applied to switch off the engine also in case of throttle servo breakdown

**- Ignition switching sequence protection**

When the ignition cutoff switch at TX is in "ON" position during preparation and powering up the model, the ignition WON'T TURN ON! This prevents unexpected starting the engine. In order to turn on the ignition you must at first place TX cutoff switch into the OFF position and then "ON" (operating similar as in the electric motors controllers)

**- Fail-Safe function**

Possible to setup a Fail-Safe function. In case of the communication lack with model for longer than 0.5 seconds the ignition will turn off the engine

**- LED indicating the operating status**

Clearly visible diode indicates whether the ignition unit is turned off or on. Additionally the LED performs an important signaling role in case of stopping the engine by interference and transition into the Fail-Safe mode, or problems with the electrical installation.

During disruption for longer than 0.5 seconds, the device is switched into the third operating status (Fail-Safe) causing switching the engine off and start blinking of diode. Diode will still blink also after the end of disruption. That means also after landing. In this way LED informs from what reasons the engine stopped in the air. Change of TX cutoff switch position also doesn't erase the error of blinking diode. In order to reset Fail-Safe signaling (blinking) you must turn off and again turn on *FORCE* power with the main power switch.

The engine will be turned off and diode will start blinking in the case of:

- Range loss for longer than 0.5 seconds
- Faulty power supply of the RC receiver (breaks with the power supply or its lack)
- Mechanical damage of the fibre-optic
- Faulty power supply of the ignition system (breaks with the power supply)

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### - Wide range of power supply voltage

The *FORCE* cutoff works correctly with 3.6 V on the RC receiver side, and 3.6 V on the ignition battery side. Maximum allowed supply voltage on both sides is 13.0 V. Maximum current consumption allowed is 5.0 A constant and 30.0 A temporarily.

The *FORCE* cutoff consists of the fibre-optic transmitter module plugged in the RC receiver and powered directly from it. Fibre-optic receiver module along with the ignition cutoff and signaling diode powered from the ignition battery. Fibre-optic wire\*. For correct operation the device requires separate channel from the receiver.

### Technical data

#### **Fiber Optic transmitter**

- dimensions: 35mm x 11mm x 13mm
- RX plug: Futaba, 300mm
- power supply: 3,6V – 13,0V
  - 2 - 3 x (LiPo/Li-Ion/LiFe)
  - 4 - 9 x (NiMh/NiCd)
- weight ~ 10,0 gram

#### **Fiber Optic receiver with ign. cutoff**

- dimensions: 47mm x 22mm x 13 mm
- power supply plug: Futaba / JR male 150mm
- ignition plug: Futaba / JR female 150mm
- LED wire: 300mm diode (fi)3mm
- power supply: 3,6V – 13,0V
  - 2 - 3 x (LiPo/Li-Ion/LiFe)
  - 4 - 9 x (NiMh/NiCd)
- weight: ~ 15,0 gram
- load capacity: constant 5A, temporarily 30A

\* Delivered fibre-optic wire of length 0.5 m, 0.7 m and 1.0 m. There is a possibility of shortening by the user.

\* The *FORCE* cutoff works correctly even with the wire 20.0 m (above this length wasn't tested).

\*\* **The *FORCE* cutoff works also with newest high-voltage HV receivers, both in the standard speed mode as well as high HS speed.**

### **Installation**

Device must be installed inside the fuselage. Fibre-optic transmitter with the **RCVR** description is installed near the RC receiver and plugged in its free proportional channel. The fibre-optic receiver along with the ignition cutoff is installed near the ignition circuit of the engine system, it may be under the engine cowl. Although the device is resistant to vibrations, but if possible you must install them on elastic foam plate.

Fibre-optic receiver is powered from the ignition battery (output with the **BAT** description) and installed right behind the mechanical power switch with or without voltage stabilizer. Voltage stabilizer should be applied if the level of battery voltage is higher than acceptable input voltages for ignition unit or *FORCE* ignition cutoff. Stabilizer can be installed both before as well as behind the *FORCE ignition cutoff*.

Ignition unit is connected to the output with **IGN** description and it is powered directly from it. Signaling LED diode must be installed in the visible place, it provides useful information about operating status of *FORCE*.

In order to connect the fibre-optic transmitter with fibre-optic receiver must: Loos the protection nut on the fibre-optic connector, insert reliably the fibre-optic wire into the decisive resistance (in practice the wire slides to depth of 17.0 mm), next tight the nut with suitable sensitive. Good habit may be marking the end of wire e.g. white piece of the tape at distance of 17.0 mm in order to control from time to time the state of its set. The wire if necessary can be shortened to the demanded length using a sharp knife. In addition must pay attention so that the cut is possible perpendicular to the wire axis. Fibre-optic wire is very elastic, the minimal radius of bending is 7.0 mm.

Because the main task of *FORCE* cutoff is electric separation of the RC receiver circuits from ignition circuits, should make every effort so that remaining wires of these circuits won't mix with each other and were possible as farthest from each other. The only element connective both circuits should be the fibre-optic wire.

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## First run

During first run it is necessary to carry out the calibration of channel in which the *FORCE* cutoff is plugged, analogy like during the regulation of servomechanism end points. The *FORCE* cutoff recognizes 3 levels of the input signal from the RC receiver, corresponding to 3 operation status (see Figure below).



Calibration procedure along with adjusting of Fail-Safe level should proceed as follows: Set the value of signal on the RC receiver channel in which *FORCE* is plugged on value in which the device operates in the Fail-Safe mode (diode will start to blink – short red impulses). Program the transmitter/receiver so that this value will be generated during the break of connection in the Fail-Safe mode (procedure of programming the receiver in F/S is different for all sort of transmitters producers, we recommend to look into the instruction or to get in touch with the seller).

Next step is to reduce signal value by setting the EPA (End Point Adjustment) in RC transmitter to such values that the cutoff could switch only between the value TURN ON and TURN OFF. For all sort of apparatus producers these values may slightly differ. Value of switch from ON to OFF position has hysteresis, which protects against appearance of the uncertain state.

## Principles of operation and modes

The *FORCE* cutoff has a few modes and securities:

- **Switching sequence protection** – if during startup the RC transmitter and power switch in the model (both the RC receiver and ignition system) switch on the RC TX, responsible for turning on the *FORCE* cutoff, is the ON position. Ignition NOT! Will be turn on. This protection is similar to electric model engines which secure during the adjusted of high rpm and doesn't start the engine during power model switch. In order to start the ignition must at first set the TX lever into the OFF position and then into the ON position. It is aware switching the ignition.
- **LED Diode signaling the operation status** – four states of the diode are possible. Diode is TURNED OFF, when the ignitions is switched off by the user through the lever cutoff on TX and there was no problems with the connection. Diode is TURNED ON CONTINUOUSLY, when the ignitions was switched on by the user through the lever on RC TX and were no problems with the connection. Diode BLINKS SHORT IMPULSES, when the ignition was switched off by break occurrence in communication between the model and transmitter of modeler for longer than 0.5 seconds. If connection will return the diode will turn into BLINKS LONG IMPULSES state, the ignition is switched on again due to the position of lever cutoff on RC TX; however the blink signal indicates that there was a problem with the connection during flight. While disruption the engine will be turned off; however for large models equipped with the starter it is possible to restart engine during flight. Disruptions signal (diode BLINKS) it is possible to delete only by manually restarting on power switch for *FORCE* ignition cutoff in the circuit of ignition power.
- **Problems with power supply of the RC receiver** – if such a problem will appear and modeler won't be able to control the model flight by lack of receiver and serve power. Also the *FORCE* cutoff will turn into the Fail-Safe state and shout off the engine. Diode BLINKS.
- **Problem with fibre-optic transmission** – as a result of improper fibre-optic installation, or if the wire will be heavily damaged or pops out from the nest, also the Fail-Safe mode will be activated and the engine will be turned off, diode BLINKS.

Blinking diode signal of the Fail-Safe can be used to maintain a range test before the flight. For that purpose must: Turn on the RC TX, turn on the power of model (receiver and ignition circuits). At TX cutoff lever position in the position TURNED OFF must move away with TX to the appropriate distance. After return to the model check the status of LED. If diode BLINKS it means that the receiver turned into the Fail-Safe mode during moving away with the transmitter. If diode doesn't blink it means that there was no problem with the connection during the test.

**NOTE!!!**

If RC transmitter which you have doesn't have the possibility to program the Fail-Safe mode you must omit this stage of programming the transmitter and confine to set up EPA value of the given channel in order to be able turn *FORCE* on and off by cutoff, without inserting device into the blinking diode state. The *FORCE* cutoff then won't inform about the lack of connection with model and will not turn off the engine in this case. However, still the blinking diode will inform about problems with power of the RC receiver or fibre-optic connection.

**NOTE!!!**

Remember that application of security *FORCE* type doesn't justify the implementation of careless electrical installation. All wires and connections should be carefully made and appropriately secured. Additional safety increase is a task of *FORCE* cutoff during practicing this hobby, rather than avoiding or eliminating errors of the assembly other elements.

***Thank you for the trust and purchase of devices. Simultaneously we wish successful flights and unforgettable moments while piloting your wonderful models.***

