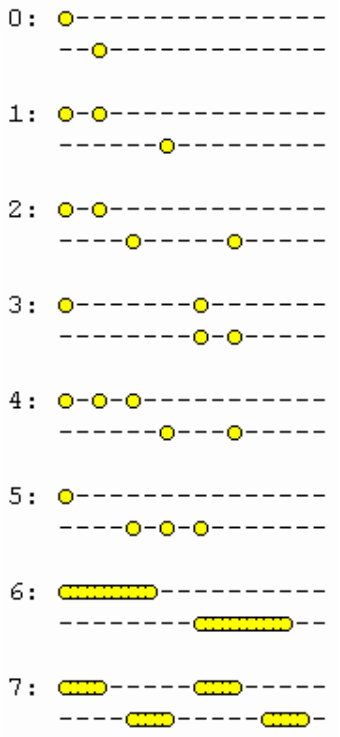
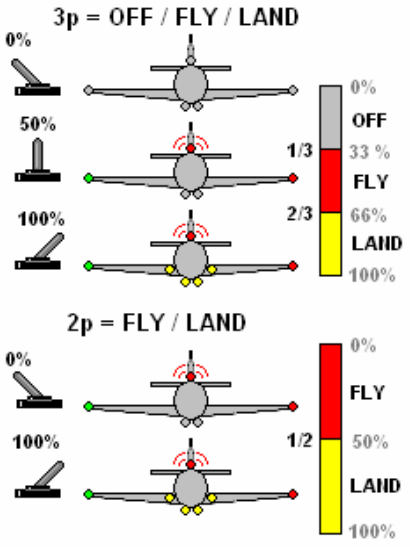
Illumination Unit Night Fly NF-3 RC

Description: **NF-3 RC** units are designed for illumination of the Slow and ParkFly models for flying at night. They are used to power colour ultra bright LEDs (Light-Emitting Diode) It contains six independent current-powered outputs with the nominal current of 20 mA. Two outputs are for position lights (**P1, P2**), two independently flashing ones are designed to power the anti-collision flash lights (**F1, F2**), and two outputs power the landing lights (**L1 and L2**). Operation of the output L2 is one second delayed to the output L1 so that gradual turning-on by the pilot can be caused.



Anti-collision light outputs flash with one second period. Three jumper contacts (**1, 2, 4**) enable to choose one of 8 flashing combinations. Combination sequence number is determined by the total of connected jumpers. When open, all jumpers make 0.

"**3P**" jumper is used to operate the lights; it allows you to select between 3-position and 2-position control (Fly/Land). In the latter the position and anti-collision lights start work when the unit is connected to the accumulator and the landing lights are controlled by the remote controller. In the 3-position control (Off/Fly/Land) the standard reach deviation is divided approximately in thirds. In the first one all lights are off, in the second position the position lights and anti-collision lights are on and in the third position the landing lights are on.



Controlled with a remote controller, anti-collision and landing lights automatically begin to flash when the plane is unable to receive a signal from the remote controller.

If the receiver connecter is disconnected, the unit is uncontrolled. In this case the position and flashing lights start work immediately after the voltage is turned on. The jumper "**3P"** can be used to turn landing lights on manually. If disconnected, the landing lights are switched on, if connected, the lights are off.

Unit is compatible with Graupner or Hitec-type connectors. The receiver circuit and the light circuits are galvanically separated by an opto-coupler.

The lights are powered from the positive pole of accumulator. The negative pole is common for all circuits. The unit input is diode-protected against reversing of polarity. **ATTENTION**: by types for models powered by a four-cell with voltage of 4.8V this protection is switched of. The current stabilization unit needs a minimum of 1.4V. White and green diodes require approximately 3.4V so that no reserve for safety diode requiring another 0.7V is available. It means that polarity reversing by small voltage units can only occur for a short time (a few seconds); after that, they are damaged due to heat. Therefore, pay attention to the connection of current leads to the accumulator and use connectors where no unintentional polarity reversing is possible.

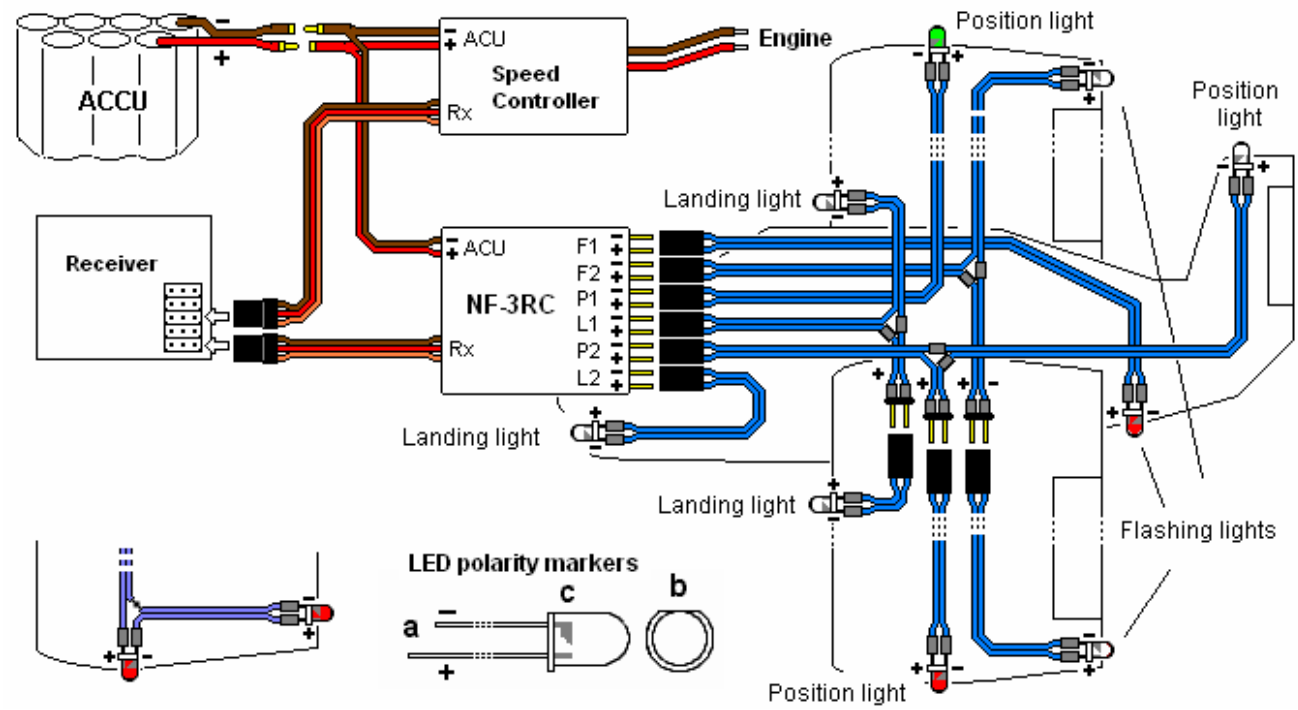
The outputs maintain the nominal current in the wide range of voltage from (4.8) 6 to 14V without the need to connect compensating series resistance in the circuit. The stabilization starts working from 5.0 V already; therefore it is possible to connect the unit with the used NiCd or NiMH batteries with 4 -10 cells or Li-Pol with 2 – 3 cells. As the number of the cells of the powering accumulator increases, so does the number of diodes that can be connected (serially) in one output. Using seven-cell-accumulator, two green (white) diodes or 3 red (yellow) diodes can be connected in one circuit. It is only necessary to assume that the summa of voltages of diodes plus approximately 1.8V (necessary for a good functionality of NF) is below the voltage of accumulator, otherwise the circuit starts to decrease the current in the diodes and the luminosity falls down. Approximate voltage of the diodes is shown in the table 1. The colours of diodes in one circuit can be combined.

Installation procedure: The typical connections are shown by the scheme below. Number, colour as well as position of diodes in a specific model may vary. By models with on-board power supply of 6V and less there will probably not be possible to connect more than one diode to the circuit if you do not use a separate supply with a higher voltage for the light supply.

You may check function of the unit before installation by connecting it to the accumulator and touching light circuit outputs with diodes. In this way it is also possible to check the diode's colour as well. If you inverse the input voltage, there is neither danger for the unit nor for the diodes. **ATTENTION :** Do not test the diodes by connecting them directly

to the accumulator. Without using a compensating resistance you would destroy the diodes. When connecting the diodes you have to observe the polarity. The positive pole has a longer outlet (**a**) and the negative pole has a trimmed edge **(b)** and usually extends inside the body **(c)** to hold the chip.

A short-term short circuit does not harm the circuits thanks to the current outlets. The circuit regulates the current by burning the voltage difference between the supply voltage and the necessary voltage for diodes in the transistor. The worst condition for the unit is the case when the circuit is supplied by high voltage and short circuit at the output occurs. In that moment, the entire power (the passing current x power supply voltage) changes to heat in the transistor. The transistors cannot burn more than 0.25W for a long-term period. Talking about current of 20mA, there is voltage of maximum 12V.



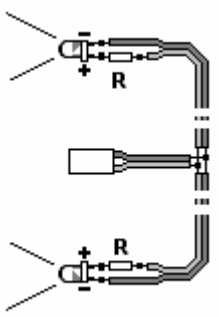
In case there is at least one diode connected to the circuit, the transistor is relieved. The maximum operational voltage of 14V stated in the parameters is in accordance with that (12V transistor + approx. 2V diode). By a bigger amount of diodes in all circuits the circuit can theoretically operate up to the voltage of 17V (twelve-cell). However, the warranty does not apply by such an operation.

The scheme contains two lights in the circuit Land1 and one light in the circuit Land2. The circuits by NF-3RC are electrically equal (contrary to NF-3X and NF-3XL) and the number of lights is limited by the power supply voltage only. Due to the fact that the circuits work as current supplies they can be connected parallel to reach a bigger current in the diodes. Such a solution is offered just by the connection of the circuits Land1 and Land2 in case the plane is equipped with only one or two landing head lights. As there is the one-second delay by the circuit Land2 gradual turning-on of the landing lights using double current compared to other currents can be achieved.

On the other hand, if there is insufficient voltage for the required number of diodes, the diodes can be connected parallel but the light intensity will be lower. Both varieties are described and shown in the second and third scheme in the chapter “Example of a car model connection.”

Insertion in the model:

You have also to keep certain rules to ensure the model to be visible in all positions so that flying at the night time is secure. Ultra bright LEDs are directional light sources compared to light bulbs. The directional feature of diodes should be adjusted; otherwise the model will be hardly visible in some angles. The easiest way to do it is to coarsen the diode surface with sandpaper. You can also drip a small amount of glue from the fusing gun onto the diode or to combine both methods. In case the wing is a hard-profile wing, two lights placed are of benefit, one on the wing entering edge and the other on the wing trailing edge and to point them to the front and to the back.



Additional light insertion in the ready model is not easy. It is easier to begin with a new model. The wires should not form surface loops. Both wires should go as close as possible to each other. The wiring should also be designed with disassembly in mind. Additional connectors or serial adaptors can be used, either home made or ordered. For serial connection of diodes adaptors for servo-cables cannot be used.

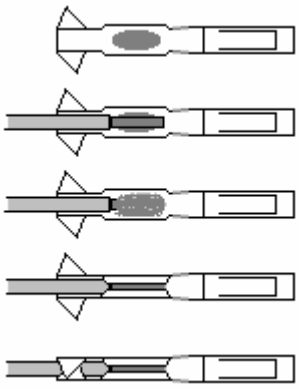
The diode wiring is not a source of interference. However, it might distribute interference through the entire model from an insufficiently shielded engine. Therefore, it is not recommended to lay them concurrently with the receiver antenna as they could affect the reception. Thus it can happen that a model that used to fly without problems starts plucking after installation of lights (e.g. by certain revolutions). After installation it is better to check the model’s behaviour on the

ground first and improve shielding if necessary or (in especially severe cases) to put a suppression component before the illumination unit supply. A separate supply for the model illumination can be used too, but it is easier to connect the NF-3RC to a power supply accumulator the way it is shown in the picture. The total average current consumption by all circuits being connected is about 70 mA in case of seven-cell supply. During 10 minutes of fly the light circuits burn only a little bit more than **1** % of capacity of a 700 mAh accumulator.

Making the cabling:

Whether you use any pair-cable or enamel, it is necessary to prepare cables with a sufficient reserve. A few centimetres in excess can always be hidden but just one missing centimetre will cause a big trouble.
Before connecting the diodes remove the insulation from 5mm of the cable and tin the diode and the cable. This will shorten time needed for soldering. If you intend to put thermo-shrinkable insulation tube over the connection, prepare 9mm-long pieces of insulation. They shall be pulled on the wire beforehand as far as possible from the intended soldered connection – if you don't do so, they might shrink in a wrong place. After soldering in both stems and cooling pull the insulation on the connection and heat it gently from all sides with the solder so that it would shrink (you need to try it). It is recommended to heat at a place behind the tip where the solder is clean. Thus the insulation will not be littered with tin and resin.

After fixing the diodes and checking the length of cables connectors have to be connected. They could be crimped without soldering but once you have the solder in your hand or do not have the tools for crimping, I would recommend soldering. Divide the couple of wires for about 20-25mm and remove about 4mm of the insulation of wire and tin it. If you are not fast, the insulation will recede a little more. Shorten the un-insulated tinned wires to 2-3mm. Break off two sockets and gently clamp them parallel in a clamp at a distance at which they will be in the connector. The included fork adaptor can be used for clamping as well. Ideally you fix the sockets and the wire on a surface area.

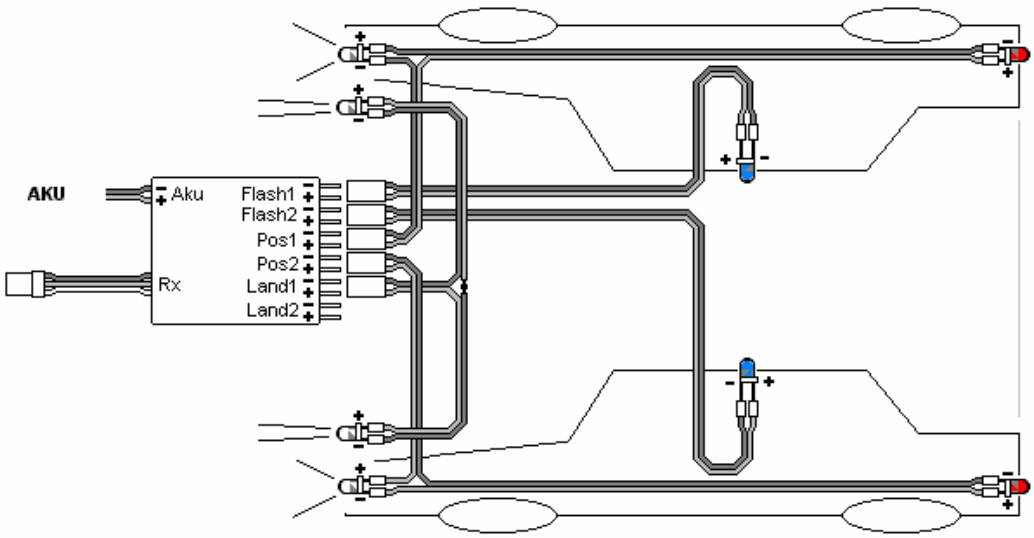


Drop a little tin in the middle part of the socket, not too much. The thin tube tin is easier to dose. Put the wire in the farther socket and heat it so that the tin connects. Then repeat it with the closer socket. See to it that the wire and the socket would be in line. If your hand slips, you can heat the wire again and when it gets released, fix it. Keep eye on the solder temperature, you might lose the insulation. Keep the same polarity with all the cables, it is aesthetical.

Bend the borders of the channels round with flat pliers. Then bend the plates around the insulation and finally put the sockets into the connector so that the locks would lock on and cannot be pulled out again. If there is resistance, gently try to lift the lock on the connector with a tip. Not too much, otherwise it will stay open forever. Lean the tip at the edge of the socket and gently move it forward. You probably used too much tin or bent the borders too little.

Example of a car model connection (parallel connection of LED and outputs is shown):

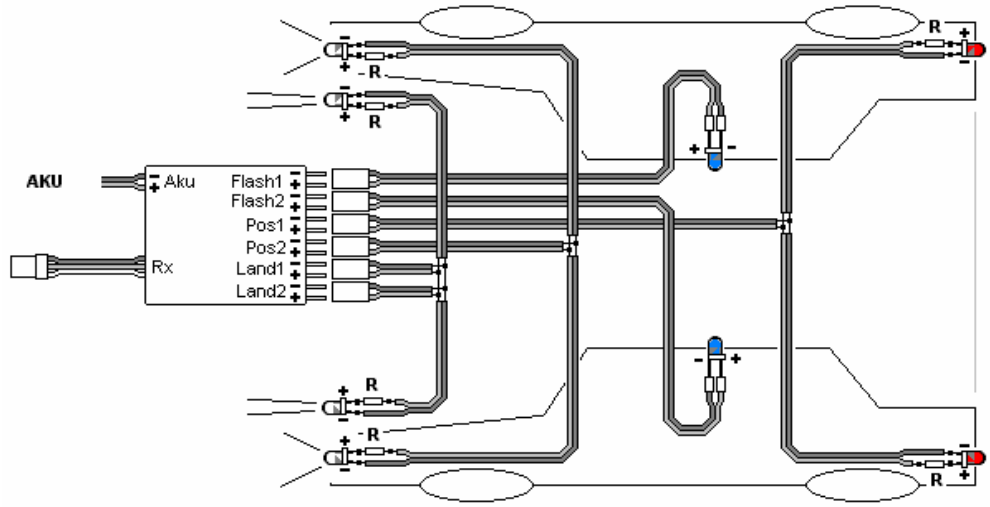
The first picture shows the light connection in a car model with two front head lights and a strobe light. The first pair of head lights is connected together with the end lights to the circuits Pos1 and Pos2, representing low beam. The other pair is connected to the circuit Land1, representing full beam. This purpose should be taken into consideration while choosing the illumination angle of the diodes. The flash circuits can be set up to a slow flashing or a fast flashing 1:1, using them as strobe lights.



Connection to the power supply and to the receiver is the same as by the plane model without any indications.

The shown connection requires an accumulator with a supply voltage of at least 8.6V (minimum seven-cell). This is given by the fact that two white diodes for full beam in series require about 6.8V and another 1.8V are necessary to stabilize the current in the circuit.

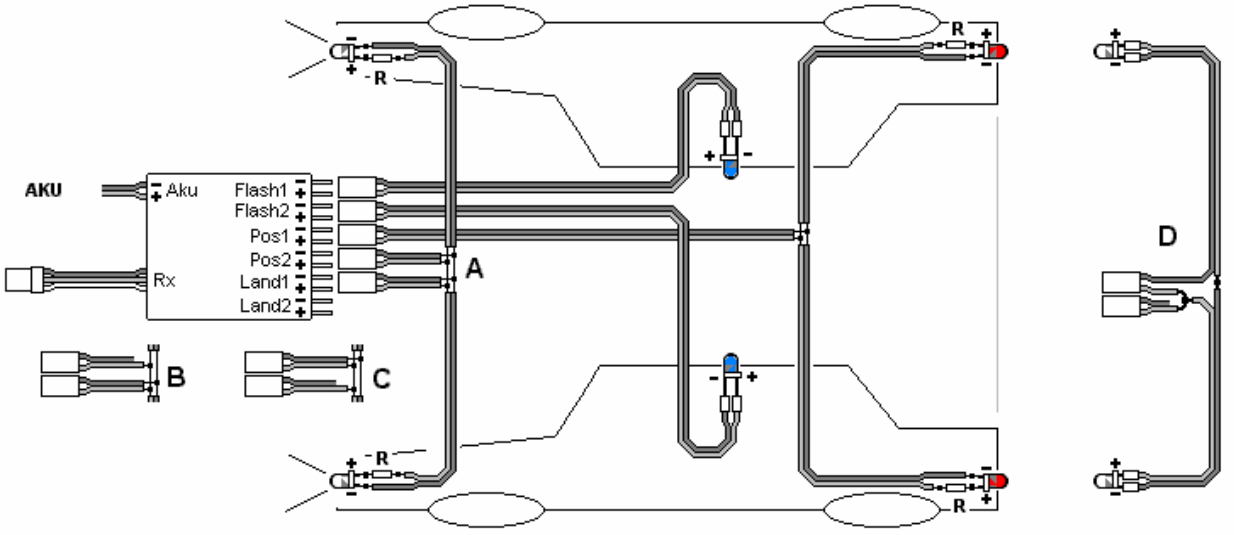
If there is no sufficient power supply available, the second connection with parallel-connected diodes can be used. This connection works starting with 6V (types for small voltage starting with 4.8V). The current is divided between both diodes. In this connection, half-strong light by low beam and rear lights has to be expected, which may be sufficient by smaller car models anyway.



To divide the current in the diodes equally, both diodes in the current have to be the same type and colour, otherwise the diode with a smaller voltage will be alight only.

However, even using diodes of the same type a brighter shine of one diode can occur due to production tolerance. Then it is recommended to connect each diode with a resistor of about 10 Ohms in series as shown in the scheme to decrease the effect of the production tolerance.

Another option is to connect only one pair of front lights. The position circuit outputs as well as landing circuit outputs are parallel-connected to one pair of front lights. Switching the main beam on, the current adds up to the low beam current and the light intensity increases to double. When connecting the circuits parallel, polarity and plus "+" of one circuit has to be connected with plus of the other. Negative poles (minus) are joint ones in the NF units so that you need to connect only one of them. The options A, B and C in the scheme are equal.



Note: In the last scheme shown, lights and headlamps are parallel-connected. However, even in case of a serial light connection a parallel circuit connection is possible; this is shown in the picture D and could be used in case of the first scheme i.e. the car model. Aeromodellers may use it for parallel-connected circuits Land1 and Land2 to reach an effect of gradual turning-on of landing lights.

Have a nice fly.

Technical parameters :	**min.**	**typ.**	**max.**
Input Voltage :	5V	9V	14V
Consumption (unit):	18mA	20mA	25mA
Outputs Pos and Land:	19mA	20mA	23mA
Flash (freq. 1 Hz) :		impulsions 66ms	
Temperature :		0 - 70°C	
Dimensions :		55 x 24 x 7mm	
Weight :		8,6g	
Weight of diode :	0,15g	0,32g	(3mm / 5mm)

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