

## KOK Composite® Night Magic Blades

### Features

- Night magic blades are made in various lengths: 600 mm, 620 mm, 690 mm and 710 mm
- They are able to draw picture in range from 50 to 2000 RPM (revolutions per minute)
- The capacity of the blade memory is up to 240 graphic images.
- The rotor blades do not require any special additional connection wiring or any electronic upgrade
- The synchronization, controlling, power and lighting electronic are already inserted inside of the blade
- The rotor blades are comprised of 64 bright LEDs (pure red on the upside, pure green on downside and one white LED at the end of the blade for marginal circle light)

The basic package of the rotor blades include one pair of blades in the lengths of 600 mm, 620 mm, 690 mm or 710 mm, one infrared transmitter IRT2, communication and charger Dongle v0.33, USB cable, and two turning on jumpers.

### **Warning!!! THIS PRODUCT IS NOT A TOY**

**The manufacturer and seller assume no liability for the operation or the use of this product. Improper use of this product can result in serious injury or even death. Intended for use only by adults with experience flying remote control helicopters. After the sale of this product we cannot maintain any control over its operation or usage.**

### Battery and charging

The battery is placed in the blade and fully charged is able to supply the blades for 21 minutes of full lightening. Usual ten minutes flight can discharge about 10-20 % of the total LiPo 1S battery with the capacity of 450 mAh. The battery charger is included in the communication module (Dongle). The charging current is 450 mA if the SWITCH 2 is in position ON or 100 mA if the SWITCH 2 is in position OFF. If the PC is unable to supply the battery charger with 450 mA directly through the USB port, set SWITCH 2 to position OFF for limiting the charging current to 100 mA. This option extends the charging process four times. The problem may occur when an incorrect USB cable (also using non powered USB hubs) that causes voltage loss and extends the charging time or disables the charging process.

To charge the battery, plug the Dongle in the blade connector (USB connector and dongle LEDs facing UP side of the blade) and the USB port or USB adapter. The red LED in Dongle steady lighted on indicates the charging process. Switch red LED off or flashing up in one second intervals indicates that battery is fully charged and charging is finished. Light fading or periodic switching off of the red LED signalizes

low voltage in the USB cable or the PC port. The Dongle can be warm during the charging process. The charging process is interrupted during reading or writing data to the blade, indicating by flashing green LED on Dongle. The charging process is automatically restored after the blade operation is finished.

**KOK Composite® accepts no responsibility for damage or injury during indoor, non-monitored or other high risk charge activity.**

**KOK Composite® takes no responsibility for the LiPo battery inside of the blade, if charging was not provided through supplied Dongle and if you forgot switched blade ON for long time. Always keep battery charged at least 60% of capacity.**

## Picture synchronization and transmitter IRT2

The rotor blade includes an integrated synchronization module which can hold position for stable image at various revolution intervals. The drawing range of rotor revolutions is (theoretically) 50 RPM to 3500 RPM but maximal construction 2000 RPM!

The synchronization electronic is based on the infrared transmitter and receiver. The IRT2 transmitter is usually located on the helicopter tube or on the frame. It depends on the helicopter construction. IRT2 can be powered from battery or receiver and allowed voltage range is from 3,3 V to 15 V and the sink current of IRT2 is 30 mA. The infrared light spectrum was chosen for optical check (by eye) when the IRT2 is ON. It is purple-red color light and practical range between IRT2 and blade is 200 mm. To ensure proper synchronization, it is important to direct the IRT2 ray between the blade diodes LED2 and LED3 counted from the blade root. To make the IR more visible for eye, try to use digital camera in your mobile. Digital cameras are sensitive to the IR radiation and the ray is easily observed.

The IR light influenced by an excessive sunlight exposure is visible only in night or twilight. The synchronization is almost impossible in summer during the sunset. Although the visibility is lowered, the concentration of IR light is too big.

The farther the IRT2 from the rotor blade is, the greater the view of the ray under the angle of 20 degrees is. This process evokes that the beginning of blade synchronization scanning is shifted from center of helicopter tail and is necessary to enter correct value into the Night Magic Blade Manager application (NMBM) in PC as the sensor angle position when writing pictures to the blade. It is recommended to switch on the blade with enabled option "Display scanning light effect", wait until the "scanning light effect" starts to move, and begin to gradually rotate blade closer to the IRT2 facing the revolutions direction until the "scanning light effect" stops to move. Stop moving "scanning light effect" means that IR sensor is exposed by IR light). Then, measure the angle of blade deflection from the helicopter tail, and set correct angle value in the NMBM application according your measured value. This process ensures to view the images exactly as you can see in the NMBM application.

The IR receiver is situated in the rotor blade between the LED2 and LED3 (counted from the blade root). This space should not be ever covered.

## Blade operating and flying

The rotor blade has a connector on the front edge. This connector serves to images programming, blade switching ON and battery charging. For turning blade ON, the jumper must be plugged between the pins 1 and 2 (counted from the blade root). In case that you put the jumper connector to other two pins, the blade electronics and battery will not be damaged. However, in case of three-pin connector jumper (made by other manufactures), the blade electronic and battery could be damaged.

Turning the blade ON is indicated by two flashes of the marginal white LED, consequently all diodes flash once, and then one LED lights up signaling battery voltage. The voltage range increases from the first diode nearest to the blade root (LED1) with 3,3 V up to the last diode LED 64 with 4,25 V. In case, the battery voltage decreases in the flight down to 3,5 V the blade writes "LOW BATTERY" for 10 seconds and lights up the diodes LED1 and LED64 for two minutes to enable safe landing. Then, the all LEDs will turn off, but the blade electronics are still sinking the current from blade battery and blade MUST be turned OFF and connected to blade battery charger (Dongle). In case of poor battery performance (battery has been deeply discharged) and the battery voltage decreases down to 3V, the blade turns OFF all LEDs immediately. Please don't forget that turned blade ON is still supplied with the voltage and it is necessary to turn it off because entire battery might be damaged. The shut down blade test is not recommended because it is usually forgotten, and the battery is destroyed.

In case, the blade flashes very shortly after turning it on, the battery had voltage only of 3,4V, and it is strongly recommended to charge the blade battery immediately. Other error signals inform of number of marginal white LED diode flashes right after turning it ON are:

- 1 - Short flash means low battery voltage
- 2 - Initialization successful
- 3 - Configuration error
- 4 - Electronic error
- 5 - Formatting images memory

It is possible to control the battery voltage in the NMBM application in the status bar. In case of internal battery destruction, it is possible to supply the blade with our external battery box placed under the blade grip.

The rotor blade includes 64 LEDs which are able to change the combinations of lightening in rotary motion, and thereby create full picture. The picture is divided into 512 sectors in one revolution. This means, the lighted point on the blade root is shorter than the point at the very end of the blade. The end point of the 710 mm rotor

blade is about 8 mm long line. The images are drowning from the beginning of the synchronizing ray. Rapid revolutions change (engine rev up) at low RPM cause to see deformed picture connection lines between the pictures. This effect disappears at 1300 rpm and higher, or you can set higher minimal synchronization RPM ("Start drawing from" in the NMBM). The picture is stable even in TIC-TOC.

## **Dongle drivers and Night Magic Blades Manager installation**

Night Magic Blades Manager is suitable for Windows 2000, XP, Server 2003, Vista, Server 2008, Windows 7 and Server 2008 R2 (x86 and x64) operating systems with .NET Framework 2.0 installed. If you don't have .NET Framework 2.0 installed please download from Microsoft web site and install before installing Night Magic Blades Manager application.

For Dongle driver installation, download driver package with the file name "KOKDongleV0.33WinDrivers.zip" from our web site and extract to your hard disk. Connect Dongle to USB cable and plug to USB port on your PC. When new hardware installation notification occurs, choose driver installation from path where you have extracted drivers. If you have internet connection you can choose download from Microsoft update web site.

For Night Magic Blades Manager application installation, download package with the file name "NightMagicBladesManagerSetup.zip" from our web site and extract to your hard disk. Run setup.exe and follow installation wizard instructions.

## **Application - Night Magic Blade Manager**

The NMBM application provides communication with the rotor blade, pictures organization, playlist management, basic drawing, importing images created in other graphic applications, firmware updating, blade identification, and data storing.

The rotor blade memory capacity is capable of 240 various pictures. The sequence of the picture depends on the preprogrammed playlist. It is possible to create simple picture interchange with certain duration or complex animations e.g. the batman's wing flapping. The duration of the picture interchange varies in the range of 0,1 second up to 999 seconds, and is active only during the blade synchronization.

Pictures in the NMBM application indicate on which position of the blade memory picture number is stored. If a new picture is created on position 1 in the NMBM application, with command "Write picture to blade" this picture will be written to the position 1, and the picture in blade on position 1 will be overwritten. The process of reading picture from the blade into the application is similar. It is possible to create pictures in the NMBM application offline. Created pictures and playlist can be saved or written into the blade memory.

Playlist describes the sequences presentation stored pictures. Playlist is divided into lines and each line is one sequence of pictures with same parameters. Each sequence has followed parameters:

- Sequence repeats – describes repeating counts of picture sequences and can be in range 1 to 255
- Picture duration – describes how long will be each picture in sequence displayed on the rotor and can be in range from 0,1 second to 999 seconds
- Picture sequence – describes order of displaying pictures on the rotor and the syntax can be e.g. 1,3,5-12

For example, the playlist line (sequence) can be:

- Sequence repeats: 5
- Picture duration: 1
- Picture sequence: 1,3 -10,22

This example means that picture number 1 will presented for 1 second, than the picture 3 is presented for 1 second too and all next pictures 4,5,6,7,8,9,10,22 will be presented for one second each. This process will repeat 5 times. The total sequence time will take 50 seconds.

It is possible to add playlist lines, change, delete or modify their picture sequence in order to achieve desired effect of displayed pictures. After a successful playlist presentation, the program will continue from the last sequence to the first one.

Once the sequence presentation is completed, the blades display a blank picture (one revolution of switched LEDs off). Therefore, if you want display only one picture or one sequence forever is recommended to set Sequence repeats to maximum to avoid flashing displayed picture.

The number of playlist lines is limited by the total content of the playlist. The NMBM application will notify you about an excessively large playlist. It is possible to read/write the playlist into the blade without need to read/write pictures. The picture numbers represent the positions in the NMBM application as well as the positions in the blade memory.

Firmware stored in the rotor blade can be updated with our company's new versions which might eliminate not yet discovered errors or upgrade the program possibilities. This firmware can be updated with NMBM application and the Dongle. The newest firmware versions will be published on our website. In case of any other questions, visit the FAQ section on our website <http://www.kokcomposite.com>

KOK Composite® wishes you many unforgettable moments with the KOK Night Magic Blades!

