User Manual for Kakapo "Egg Timer" transmitters V6.3

1.0 Background

Version 6.3. "Egg Timer" transmitters have been developed specifically for Kakapo.

The "Egg Timer" developed for Kakapo has been designed to detect the start and end of incubation. The transmitters output the number of days since the start or end of incubation. In addition there are a further 10 outputs, a description of these outputs is provided below.

2.0 Turning a transmitter on or off

Over view

The radio output of a transmitter can be turned on and off using a magnet. At the time of turn it is recommended that the user set the time of day in hours after midnight. If the time of day is set correctly then the transmitter will automatically adjust itself so that it rolls over each 24 hour period at 0800 in the morning. If the time is not set at turn on then the transmitter will role over 24 hour periods based on the time it was turned on.

When the Egg Timer is turned on it will start in the incubating state. In theory this should be impossible, since transmitters are normally changed outside the breeding season and a brood patch and or egg would be noticed if the bird was incubating. After 8 days the transmitter will have built an activity profile for the bird and should switch to not incubating. However it is possible that the bird is incubating and in this case it will not switch out of the initial incubating state.

Turn on and time setting

A magnet is used to turn the transmitters on and off. When a magnet is placed in the correct location the transmitter will sound a tone (heard on a suitable receiver) for approximately 1 second.

The magnet must be held in place until the continuous tone turns itself off, then moved away briefly from the transmitter and returned to the TX. The transmitter will then start to output pulses at a rate of one every 1.5 seconds. Each pulse represents one hour after midnight. Count all the pulses as heard and remove the magnet when the count gets to the current time in number of hours after midnight. Once the required number of pulses has been heard the magnet is permanently removed and the turn on sequence is complete.

If the time of turn on was 3pm the time would be set as 15 hours after midnight, therefore requiring the magnet to be held in place until 15 pulses had been counted.

The turn on sequence is aborted if the magnet is not held in place long enough for the continuous tone to turn off by itself or if the magnet is not returned fast enough to count one or more pulse to set the time.

When the time set function is used a partial (non 24 hour) first day will be created, any activity that occurs during this partial day is ignored. Ie if a transmitter is turned on at 3pm the first partial day will be 17 hours long and the first full day will be from 0700 the next morning. If a transmitter is turned on at midnight then the time should be set as 24 hours after midnight since it is not possible to set zero hours after midnight.

Turn off

When a magnet is placed in the correct location the transmitter will sound a tone (heard on a suitable receiver) for approximately 1 second. The magnet must be held in place until the continuous tone turns itself off, then moved away permanently. If the magnet is not held in place for long enough for the tone to turn it's self off or not moved away fast enough after the tone has turn it's self off the turn off sequence is aborted.

Checking the time set after turn on

To check the time that has been set, the user may listen to the outputs. Immediately after turn on the transmitter will output 10 pulses at a rate of 48 pulses per minute (one pulse every 1.25 seconds) the output sequence will then start and be transmitted to the user in the format described later. The first number set is for days since change of state and the second for duration of the last incubation. After turn on these two output slots are "hijacked" and are used to transmit the software version number and the time of turn on that has been set. The version number is inserted in the days since change of state slot and the time of turn on is inserted in the duration of the last incubation slot. The time of turn on is cleared at the end of the first partial day along with the software version number to zero. The zeroed days since change of state counter increments up one, at each full 24 hour period roll over and is reset in the normal way when the transmitter changes state to not nesting.

If a mistake is made setting the time, turn the transmitter off and try again, it's fun you'll enjoy it.

3.0 Pulse rates

"Egg Timer" transmitters can output 3 different pulse rates.

30ppm = not incubating
48ppm = incubating
80ppm = mortality

4.0 Outputs

4.1 Over view and explanations

The not incubating, incubating, and mortality pulse rates are broken every 10 minutes by a series of 11 outputs as described in the following list.

1. **Days since change of state**
2. **Duration in days of last incubation state**
3. **Activity yesterday.**
4. **Activity 2 days ago.**
5. **Activity 3 days ago.**
6. **Activity 4 days ago.**
7. **Activity 5 days ago.**
8. **Activity 6 days ago.**
9. **Activity 7 days ago.**
10. **Long term mean**
11. **Battery weeks of life remaining.**

The transmitters will not start to give accurate information about the bird until at least 8 days after turn on, by which time the activity profile for the bird will have been confirmed.

Days since change of state output

The days since change of state outputs the number of days since the change of state to not incubating, incubating and mortality.

Duration in days of last incubation state

The number of days the previous incubation state lasted for.

Activity output

Reports the total time in lots of 10 minutes that the bird is considered to be active.

Weeks of life remaining output

Is an estimate of the projected time remaining in weeks before the battery has the potential to go flat. It may be useful as a guide to help prioritise transmitter changes, or to assess the appropriate action should a bird be incubating near the end of the transmitters expected life.

The transmitter will continually adjust the projected time remaining and despite starting at 60 weeks is likely to take longer than 60 weeks to count down to zero. However a transmitter that spends some time in mortality may count down to zero in less than 60 weeks because of the higher pulse rate.

The transmitter will always remember how much time is remaining even if turned off and on multiple times and will therefore automatically correct for situations where transmitters have been left on by accident prior to fit.

4.2 Listening to the outputs

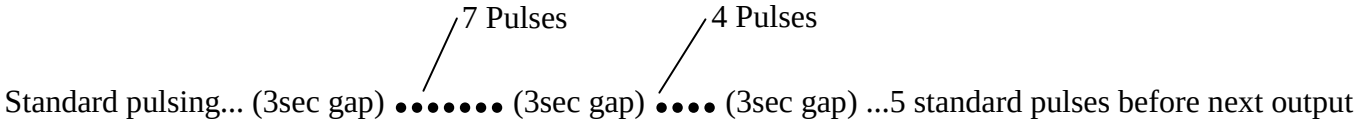
Listening to the output sounds a lot worse on paper than it is in reality, so read to the end of the instructions to get the overall picture and then have a go. If you get stuck phone Wildtech for assistance on **027 672 4856 or 06 877 1563**

Overall scheme

During normal operation the day counter outputs start exactly every 10 minutes, based on the turn on time (even if the time of day has been set). i.e. If you turn on at 15:39:13, the next output sequence will start at 15:49:13 etc....There are 11 outputs, each output has two components tens and units (see detailed scheme below).

Detailed scheme

Using the first output for days since change of state as an example



To interpret the days;

1. Wait for the 3 second gap.
2. Count the pulses.
3. Wait for the three second gap
4. Count the pulses.
5. Wait for the three second gap.
6. Write down the two numbers obtained.

Following that five standard pulses (at either 30, 48 or 80ppm) will be heard before the next output (for duration in days of last incubation state) comes in exactly the same format.

4.2 Recording the information

When recording information in the field it is recommended that you write down what you hear and work out the answers afterwards or when you get back to base, trying to convert on the fly is not a good idea in my experiance. Using a Kakapo "Egg Timer" just after turn on with the time of turn on set to 1pm as an example the following should be recorded.

48ppm/8,5/3,5/5,2/5,2/5,2/5,2/5,2/5,2/5,2/5,2/8,2

48 is the pulse rate for incubating and the comma separated numbers are the tens and units for each output, some of the numbers are pre-initialised values. After the first full 24 hour day the outputs should be quite different and more so after 8 days.

4.3 Working out the number of days

The example above gives the following result, 8 pulses followed by 5 pulses for days since change of state.

To obtain the true decimal values for the number of days it is necessary to subtract 2 from each individual number. This yields **6** and **3**. The first number is the number of tens and the second number the number of units, therefore the final answer is **63 days since the start of incubation**.

The number of days output immediately after turn on is relaying the software version. For Kakapo "Egg Timer" V6.3 transmitters this should be 8,5 i.e. Version 6.3.

If a bird is incubating when the transmitter is fitted the "Egg Timer" will not switch out of the initial incubating state. If this happens the day counter will count up from the initialised value 8,5 representing the software version until the bird convinces the transmitter that it is not incubating. If however the time was set at the time of turn on then the software version will be cleared at the end of the first partial day as described earlier. In either case the timing can not be relied upon since the transmitter was not able to detect the start of incubation.

Note

The maximum number output is 256 days. In such a case the output for days will give 27 pulses followed by 8. After 256 days the counter roles over and restarts from 1. Only the most determined non breeders are expected to test this feature.

4.4 Working out the activity

The example above gives the following result, 5 pulses followed by 2 pulses (the default activity for the transmitter after turn on). To obtain the decimal value for the duration of activity in lots of ten minutes it is necessary to subtract 2 from each individual number. 5,2 with 2 subtracted from each number gives 3 then 0. 3 is the number of 10s and 0 is the number of units (i.e. the bird was active for 30 lots of 10 minutes or 300 minutes ie 5 hours) you'll end up getting quite good at your six times tables.

4.5 Working out the number of weeks remaining

The example above gives the following result, 8 pulses followed by 2 pulses.

To obtain the true decimal values for the months remaining it is necessary to subtract 2 from each individual number. This yields **6** and **0**. The first number is the number of tens and the second number the number of units, therefore the final answer is 60 weeks remaining.

5.0 Mortality

The transmitters will also output the number of days since the start of mortality. Mortality "latches" and will be activated after 24 hours of zero movement. The timing output gives the number of days since the last movement.

The **time since death** output will keep counting every day until the transmitter is turned off and restarted. The mortality pulse rate is set at 80 pulses per minute. All outputs are frozen at start of mortality except for days since change of state and battery weeks of life remaining.

It should be noted that death may not necessarily result in zero movement of the transmitter, the carcase can be moved intermittently, presumably by scavengers for a number of days (and in some cases in the region of 2 weeks). Consequently mortality cannot be relied upon as a true measure of time since death.

If a mortality signal is heard with no number outputs the transmitter is likely to have a hardware fault that (may go away) but is more likely to become chronic and result in transmitter failure. In such a case it is recommended that the transmitter be replaced immediately. However other forms of management may also be appropriate depending on the circumstances. Eg choosing to mark the nest of a known incubating bird rather than disturbing it so that it can be found in the event the transmitter fails.

5.1 Listening to the number output

The output format in mortality is similar to that in normal operation the only difference is that all the pulses will sound fast. The start of the output sequence will be at the same time as normal. **If you get stuck leave your transmitter going** and phone Wildtech for assistance on **027 672 4856 or (06) 877 1563**.

When in mortality the days since change of state output will tell you how many days since mortality started. If the day counter was giving 2,9 then the time since death (or more accurately the time since the transmitter stopped moving) would be 7 days.

Note

The maximum number output is 256 days. In such a case the output for days would have given 27 pulses followed by 8. After 256 days the counter roles over and restarts from 1. However mortality pulse rates are approximately double the standard output pulse rates. Consequently it is unlikely the output will get to 256 days before the transmitters battery goes flat if the transmitter is in it's last year of use.