COUNTING VISITS TO NATURAL AREAS

User handbook for the Radio Beam Counter

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Swedish Environmental Protection Agency

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Foreword

The Swedish government has focused attention on outdoor recreation as a cornerstone of nature conservation, and there is growing awareness of its significance for human well-being. Knowledge about visits and visitors to natural areas provides an important basis for the planning and management of such areas. For that reason, the Swedish Environmental Protection Agency in 1999 launched a project for counting visits to natural areas which included tests of electronic counting equipment. The project is part of the Agency programme entitled ”Protect – Preserve – Present”, whose purpose is to improve the management and utilization of protected natural areas.

This booklet provides an overview of various types of visitor counting equipment. Otherwise, it is largely a handbook for use of the Radio Beam Counter, based on the tests carried out and the experience acquired during the course of the project. Large parts of the information and guidance contained in the booklet are also applicable to the counting of visits to natural areas, generally. The text has been written by Ingemar Ahlström, who also carried out the practical work of the project. The project leader was Per Wallsten.

It is the hope of the Swedish Environmental Protection Agency that this handbook will provide a better basis for the work of counting visits to all of Sweden's natural areas, from remote national parks to outdoor recreation areas in urban settings.

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December, 2005

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Summary

Knowledge of visiting patterns is an important basis for the planning and management of natural areas, not least with regard to protected areas such as nature reserves and national parks. Sweden's new conservation policy, which places increased emphasis on outdoor recreation, increases the need for reliable data for planning.

One example is provided by a study of visits to Fulufjället National Park which was conducted in 2001 by Etour, a tourism research institute, on behalf of the Swedish Environmental Protection Agency. Interest in counting visits to natural areas has increased in Sweden and other countries, and in recent years there have been several international conferences on the subject.

The Swedish Environmental Protection Agency has been conducting a project known as Counting Outdoor Recreation since the late 1990s. It has included a review of the various types of equipment on the market, and tests of equipment such as the Radio Beam Counter.

Principles for taking counts

For counting visits to natural areas, there are various kinds of equipment which operate according to different principles. Basically, however, they all consist of an electric circuit, a sensor which detects passersby, and a counting device. They can also be connected to a ”logger” which records, stores and sorts the data.

One category of sensor involves the use of an electromagnetic beam which is interrupted or reflected when someone passes through it. This includes:

- optical sensors based on invisible infrared or laser beams
- ultrasound sensors
- radio transmitters and receivers.

There are also seismic sensors which react to the pressure of car tyres, footsteps, etc. In addition, there are inductive sensors which create a magnetic field that reacts to the presence of metal; these can be used to count snowmobiles, for example.

Radio Beam Counter

The Radio Beam Counter consists of a transmitter and a receiver which can be separated by a distance of up to twenty metres. When someone or something passes through the radio beam, the interruption is recorded in a data logger which can be programmed to conduct counts for various time intervals (hours, days, etc.). Since radio waves can pass through materials such as plastic and thin wood, it is easy to camouflage the equipment. It can be placed in boxes or behind thin walls, for example. The starting time and the interval are programmed, and the data can be transferred on site to a portable computer, or the logger can be taken to a stationary computer for data transfer. The data are summarized in the form of both line charts and tables, and it is possible to focus on specific counting periods. The data files can be converted to Excel documents for processing and display in other formats.

Site selection

The selection of counting sites and care in setting up equipment are decisive for the validity of the results. If possible, counters should be placed at locations where visitors are likely to pass by in single file. There should also be good conditions for setting up and concealing the equipment. It may be taken for granted that the setup process will take longer than anticipated. The work can be facilitated with preliminary inspections, good setup tools and ”useful gadgets”. There are simple routines for testing the equipment’s function and reliability. A weather log can be useful for evaluating the results; for example, it can help to explain why relatively few visitors turned up on days when special events were arranged.

Key Terms

Counter. Mechanical or electronic device for registering and counting people, animals, vehicles, etc. which pass by a given location. A counter may include several components, but the usual configuration consists of a transmitter and a receiver or reflector. Unless otherwise specified, the term ”counter” in the following pages refers to equipment consisting of both a receiver and a transmitter.

Logger. A small apparatus which can be programmed to record and store data.

Sensor. The component that registers the signals which activate the counter.

Introduction

Sweden's new nature conservation policy, with its greater emphasis on outdoor recreation, involves heavy demands for planning and management. An important aspect of the new policy is the production of basic data on the frequency and patterns of visits to natural areas. To thoroughly assess a pattern of visits to a recreational area within a national park, for example, requires a great deal of work. It is not enough merely to count the number of visitors. It is also necessary to determine their distinguishing characteristics, where they come from, how, when and why they come, their patterns of movement within the area, and their impressions of their visits.

Developing answers to such questions was the purpose of a research project conducted at Fulufjället National Park during year 2000. The study was commissioned by the Swedish Environmental Protection Agency and carried out by Etour, a tourism research institute.

Interest in counting and analysing visits to natural areas has increased both in Sweden and internationally. In 2004, Finland hosted the second international conference on the theme of "Monitoring and Management of Visitor Flows in Recreational and Protected Areas". In connection with that conference, the Nordic Council of Ministers arranged a joint Nordic-Baltic workshop on "Visitor Information Needs and Monitoring Results".

Counting visitors with technical equipment has been conducted previously in Sweden, but there has been no systematic effort to develop methods and test various kinds of equipment. Together with the Uppland Foundation and the Tyresta National Park Foundation, the Swedish Environmental Protection Agency in 1997 launched a project entitled "Counting Outdoor Recreation" with a survey of the market for equipment which is suitable for counting visits to natural areas. At that time, there was no suitable equipment available on the Swedish market. But the work of counting visits to national parks, for example, had long been carried out in the United Kingdom and the United States, where several manufacturers had developed equipment based on the use of infrared light. For use in Sweden, such equipment must be CE approved and meet the requirements of the European Union's Directive on Electromagnetic Compatibility (EMC). This complicates the import of U.S. counting equipment, which must undergo a process of CE approval and preparation of manufacturers' declarations.

This report begins with an overview of various types of equipment for counting visits to natural areas. That is followed by a description of the functions and operation of the Radio Beam Counter, which the Swedish Environmental Protection Agency has found to be most suitable for use under a variety of natural conditions. During the course of the project, the Radio Beam Counter has been tested for several years under varying conditions. It has also been used by municipalities, county administrative boards, environmental organizations, etc., and the experience of equipment operators has been drawn upon in preparing this report.

Although this handbook is based on experience with use of the Radio Beam Counter, much of it is also applicable to other types of counter, including those that employ infrared light. Among the relevant sections are those relating to site selection, installation, maintenance and testing reliability.

I. Counting visits to natural areas.

Why count visits to natural areas?

In recent years, outdoor recreation has become an increasingly important aspect of nature conservation. In a government position paper on the new policy of comprehensive nature conservation (En samlad naturvårdspolitik, 2001/02:173), particular emphasis is placed on the importance of outdoor recreation in densely populated areas, including its value as a resource in promoting public health. Another component of the new policy is to make nature reserves and national parks more accessible to visitors – a development of great significance to those elements of the tourist industry that are based primarily on nature experiences, for example.

For such purposes, planning and management require a solid basis of information, not least with regard to visitor patterns and frequency. But in order to take advantage of the benefits of visitor counts, it is necessary to allocate sufficient time for planning and implementation, and also for processing the data and following up the results.

There are several reasons for counting visits to natural areas:

- It is necessary to determine visitor frequency over time and space in order to provide the necessary information to prevent wear on natural features and to minimize conflicts between the various interests that make use of a given area.
- Knowledge of visiting patterns is needed to provide a basis for maintenance and for planning the dimensions of facilities within the area.
- That knowledge is also important for setting priorities with regard to both budget planning and measures for the construction, operation and maintenance of facilities.
- Data on visiting frequency and patterns are important for evaluating the effectiveness of public information, marketing and other measures relating to nature conservation, outdoor recreation and tourism.
- Data on visiting frequency are also important as a basis for political decisions concerning, for example, physical planning and resources for tourism, outdoor recreation and nature conservation.

Counting equipment

Function

A basic technical system for counting visits to natural areas consists of three components:

- batteries to supply electricity
- a sensor that responds when anyone or anything passes by the apparatus, and then sends a signal to a counting device
- a counting device which tallies the number of passersby; there are several different types of device, including mechanically driven counting wheels that advance one unit for each signal from the sensor, and digital counters with or without displays.

A complete system also includes:

- a logger which can be programmed to record, store and sort the data from the counting device during a specified period.. The data can be read directly from the apparatus or transferred to a computer for subsequent processing.
- software for the logger
- computer and software for processing the data and presenting the results.

Sensors

Sensors used in counting equipment can be of various types. Those included in systems that employ infrared light, lasers, ultra-sound and radio signals are often calibrated so as not to respond to passing leaves, birds, waving branches and the like.

Optical sensors

Optical sensors consist of a light transmitter and receiver. When the beam of light between them is interrupted or reflected back from a passerby, a signal is sent to the counting mechanism. With all systems based on optical sensors, there is a risk that the transmitting lens and/or reflector may be obscured by dust, dirt, moisture or snow, which can affect its function and therewith the validity of the data. Functionality can also be affected by falling snow and heavy rain which may interfere with the light beam.

Optical sensors operate according to one of three alternative principles:

- *Direct-sensing unidirectional light.* Both the transmitter and re-

Passersby are recorded when the beam of infrared light between the counter and the reflector is interrupted.

ceiver are located in the same unit, but with separate lens openings. The transmitter's light beam is reflected back from the object to the receiver. Normally used for distances of five metres or less.

- *Reflected light.* For this type, as well, the transmitter and receiver are located in the same unit. But the transmitter's light beam is returned from a reflector. Enables effective distances of up to 35 metres. Longer distances require precise calibration; for that purpose, some models are equipped with a precision sight.
- *Transmitter and receiver in separate units.* The transmitter's light beam is directed to a receiver positioned opposite. This type of system permits long recording distances; but as with the foregoing alternative, great calibrating precision is required. Such systems use separate batteries for the transmitter and receiver, or an electric cable connecting the two.

Optical sensors differ according to the type of light to which they respond:

- *White visible light* is easily disturbed and may be affected by atmospheric moisture, rain and falling snow. Therefore, it is commonly employed indoors – in doorways, for example.
- *Infrared light (IR).* All light sensors included in market-ready equipment designed for counting visits to natural areas use infrared light, which is somewhat more difficult to calibrate than white visible light. Infrared light is invisible and there are two different kinds that are used in counters.

  With active infrared light, the transmitter emits a light beam which returns from a reflector to the receiver's sensor. The transmitter and receiver are located in the same unit. When the light beam is interrupted, the receiver is activated and records a passage. Other systems work according to the same principle, but without a reflector; the transmitter and reflector are separated and the light beam passes between them.

With equipment based on passive infrared light (PIR), the transmitter emits a light beam which is reflected to the receiver by passing objects, so-called direct sensing. Passive infrared light may also be calibrated to react if a passing object has a temperature that differs from the ambient temperature. Equipment using passive infrared light is relatively small, and is comparatively easy to install since the light beam does not have to be calibrated to a receiver or reflector. In general, direct sensing is less precise than other methods, partly because the light reflected to the receiver is weaker. Equipment with passive infrared light is best suited to situations calling for small units that can be quickly set up, and where great precision is not required.

- *Laser transmitters* have very long operational ranges, and a narrow laser beam is more effective than infrared light in penetrating snow, rain and atmospheric moisture, as well as dust and moisture on a sensor lens. A laser beam can be either invisible or red-coloured; the latter forms a sharp red dot on any passing object. But since laser light is experienced by some people as disturbing or unpleasant, it is less appropriate than other alternatives for counting visitors. It can also damage the retina of anyone who happens to look directly into the transmitter lens. Great precision is required in calibrating the transmitter to the receiver.

Ultrasound

Ultrasound. Counters which use ultrasound operate according to the same principle as those based on infrared light. The transmitter emits a narrow wave of high-frequency sound, either to a separate receiver or to be reflected directly from passersby. The counting mechanism is activated when the sound wave is interrupted or reflected. Counters using ultrasound do not function at low temperatures as well as those based on infrared light, and signal strength can be affected by changes in air temperature.

Radio transmitters

Radio transmitters. Counters with radio transmitters operate according to the same principle as those using light or sound. The transmitter emits a concentrated beam of radio signals to a receiver. When the beam is interrupted, the strength of the radio signal changes and the receiver's sensor is activated. An advantage of radio signals is that they pass through materials such as plastic and thin layers of wood, an attribute which makes it relatively easy to hide the equipment.

Seismic sensors react to pressure.

Seismic sensors

Seismic sensors consist of a hose or pressure plate which reacts to pressure or vibration, and is connected to a counting device. The sensitivity of the sensor can be adjusted to whatever is to be counted. A pressure plate and counting mechanism can be buried for concealment. Seismic sensors can be affected by changes in the ground, as when it becomes colder. It can also be difficult to calibrate the equipment precisely, and to calculate the size of the pressure plate needed to register passersby accurately. Hose sensors are used to count passing vehicles.

Inductive systems

Inductive systems consist of a counting device which is connected to a copper cable that is covered by earth or snow and reacts to metal. When, for example, a snowmobile passes through the magnetic field of the copper cable, an impulse travels from the sensor to the counting mechanism.

Collecting data

Essentially any type of sensor can be connected to a counting device and a logger for processing of the data that is recorded. The data can then be read directly from a display on the counting device, or transferred to a computer for printing and processing. Simpler models of infrared equipment, for example, have a cumulative counting device in the transmitter/receiver which can be read at the beginning and end of each counting period. With more advanced equipment, it is possible to program counting periods in units of hours, days, weeks, etc.

II. Use and Operation of Radio Beam Counter

Product description

The Radio Beam Counter consists of a radio transmitter, receiver, logger, software, cable for connecting the logger to a PC computer, battery-check magnet, operational test, and screwdriver. The receiver measures 120 x 120 x 85 mm and is equipped with two indicator lamps, one for battery checks and one for calibrating the transmitter. The transmitter measures 120 x 80 x 55 mm and has one indicator lamp, for battery checks. The receiver of Model RBx3 has a display for direct reading of recorded data and can be complemented with a logger. Counting mechanisms can be attached to an underlying base through the built-in screw channels or with fixing lugs which enable both vertical and horizontal mounting. The lugs are attached with bolts to the built-in channels.

The Dual Radio Beam Counter can determine the direction in which visitors pass by. But its counting device is larger and requires more battery power. This model consists of two connected receivers and produces very rapid transmission signals which make it possible

Transmitter and receiver with logger connected.

to measure the brief time difference between interruption of the two parallel radio waves. The transmitter and the receivers are powered by external battery packs.

Also available is a counter designed for two data loggers which is able to distinguish between horses and humans, for example. This can also be accomplished by using two parallel counters with different settings of the RV2 function; separate passing objects can then be distinguished by interpreting the recorded data (more on this below).

A planned new version of the counter will make it possible to calibrate the receiver specifically for pedestrians or horses by shifting a wire in the counting device between two different contacts. A forthcoming model of receiver will be equipped with a more powerful antenna that will enable greater operational distances.

Operation

Travelling between the transmitter and receiver is a radio signal that can be likened to a beam of light. When an object passes through the radio beam, the receiver is activated by the change in signal strength. The counter cannot distinguish what sort of object has passed (however, see below) or in which direction; only the number of passersby is recorded. The receiver is calibrated to ignore leaves, birds and other objects that pass through the radio beam, including narrow objects such as ski poles.

Radio waves can pass through materials such as thin layers of plywood and other wood, plastic and the like, but not through metal. The strength of the radio signal is weakened when it passes through materials such as wood and plastic, as a result of which it may be necessary to somewhat reduce the distance between transmitter and receiver. Signal strength is not weakened, however, when it passes through polycarbonate plastic with a thickness of up to four millimetres. Thus, the maximum distance between transmitter and receiver is not affected by that material.

Otherwise, the front of the receiver should be placed as close as possible to any intervening material in order to minimize the effects of reduced signal strength. In the case of plastic (which may not be more than four millimetres thick), signal strength is weakened slightly if the front of the receiver is not practically touching the plastic. In general, maximum signal strength is attained by placing the front of the receiver 14.2 mm (one wave length) from intervening material.

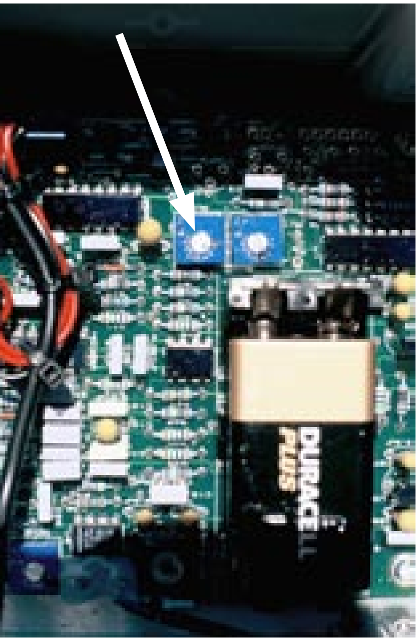
The counter is able to function in conditions of severe cold and hard wind. But the strength of the radio signal can be affected by moisture. For that reason, counting equipment should not be placed near materials that absorb moisture, or in such a way that frontal surfaces can be subjected to rain, meltwater or snow.

Radio Beam counters are available for two maximum operating distances, eight or twenty metres. The 8-metre version has been designed specifically to filter out electrical interference from mobile telephone systems, and is therefore particularly well-suited to urban settings. The latest model has an improved interference filter which prevents the 8-metre version from being affected by mobile telephones even if they are placed close beside it. Under normal circumstances, neither the 8-metre nor the 20-metre version of the counter is affected by motor vehicles passing nearby.

Setting the signal duration

In later models of the Radio Beam Counter, from year 2002 onward, the receiver includes a function that makes it possible to regulate the duration of the signal pulse. It is preset at one second on Model RB 2000. A visitor walking by passes through the radio beam in about one-half of a second. Anything that interrupts the signal for longer than one second is not recorded. This means, for example, that horses and cars are not recorded, because they interrupt the signal for longer than one second (provided they are not moving very fast).

This function is labelled ”RV2” and is located on the receiver’s circuit board. It takes the form of a blue square and an adjusting screw with a round white collar and an indicator notch. (There are also two similar blue squares, RV1 and RV3, whose settings cannot be changed.) Signal duration can be increased to a maximum of five seconds. The adjusting screw can be turned clockwise from the starting position with a small screwdriver. When the notch points one-quarter of the way from the minimum to the maximum setting, the signal duration is about 1.5 seconds. Halfway between, i.e. with the indicator notch pointing straight up, corresponds to about 2.5 seconds.


With the RV2 function, the transmitter’s signal pulse can be adjusted, for example to exclude horseback riders from the count.

The signal duration of the Model RBX3 receiver is preset at five seconds; this means that everything which interrupts the signal for five seconds or less is recorded. The adjusting screw can be turned counter-clockwise to reduce the signal duration. A setting at about ”10 o’clock” is a good starting point if the intent is to count only people on foot or on bicycles, while excluding those on horseback. The maximum and minimum values are at angles which correspond roughly to ”5 o’clock” and ”8 o’clock”, respectively.

These parts are quite small, so it is useful to have a magnifying glass at hand when making adjustments, at least the first time. Use a screwdriver that fits the groove snugly so as not to damage it. Since the circuit board is coated with varnish, RV2 may be a bit stiff the first time it is adjusted.

Record the setting for RV2 in the ”Comments” section of the ”Confirmation” window, or write it on a bit of masking tape on the receiver as an aid to memory. It is important to know the signal duration when the data are interpreted.

Data logger

Connected to the receiver is an internal logger which is programmed to count and store data. The logger has two indicator lamps, but only the green one is related to the Radio Beam Counter. It is possible to special order a receiver which is adapted for connection to an external logger; this eliminates the need to open the receiver in order to retrieve the data.

Changing the logger battery

The data logger is delivered with a long-life battery installed. With continuous use of the counter, the battery usually lasts for two or more years. Before changing the battery, the logger must be turned off, and any data transferred to a computer or other storage medium. The logger uses a 3.6 volt 1/2 AA lithium battery, for example Sonnenscein SL-750, Tadrian TL-2150/S or Saft LS-3/LS 14250.

To change the battery:

1. Check to ensure that the logger is turned off and the green indicator lamp is not blinking.
2. Remove the ”screws” and cover.
3. Align the battery with the +/– markings in the battery holder. When it is correctly in place, the green lamp lights up for a few seconds.
4. If the green lamp does not light up, remove the battery and try again.
5. Check to ensure that the cover gasket is in good condition.
6. Fasten the cover tightly in place.

Batteries and magnet

The transmitter and the receiver are each powered by a 9-volt alkaline battery (6LR61 alt. R6) of type Duracell M3 or equivalent. Under normal conditions, such a battery lasts more than 100 days. A lithium battery such as Ultralife U9VL can last up to 250 days. The counter's manufacturer recommends lithium batteries for conditions of severe cold.

All models of Radio Beam counter can be equipped with external battery packs containing six AA batteries, one set of which can power a counter without display for over a year. Battery life is related to visitor frequency – the greater the number of visitors, the greater the demand on the battery. The 9-volt battery in the Model RBX3 receiver with display has a shorter operational life, since the display is activated for several seconds every time a passage is recorded.

The most recent version of RBX3 has a more energy-efficient display which shows the figures continuously. It also has a new battery holder which makes it possible to use two AA lithium batteries (e.g. Sonnenschein SL-360S) that last more than a year. The RBX3 transmitter is now powered by the same type of battery as the receiver.

Care is advised when removing the cover, so that the battery pack does not fall out or tear loose the thin connecting wires. Foam rubber or similar material can be wedged in above the battery pack for greater stability. The battery indicator lamp is set so that the counter continues to operate for a short while after the lamp indicates that battery power is no longer sufficient. Data stored in the receiver's memory are retained even if the battery is exhausted or removed.

The magnet that is used for checking transmitter-receiver alignment and battery level is in the shape of a thick round button. Horseshoe magnets cannot be used. The magnet delivered with the counter has a strength of 700 gauss, which should be specified as the minimum strength if additional magnets are ordered from other suppliers.

Software

Software for the Radio Beam Counter is available only for PC computers, not for Macintosh. A later version, available only in English but somewhat easier to use, can be downloaded from: http://www.geminidataloggers.com/downloads.

Instructions and help menu

The GLM computer program includes a help menu with detailed information on various subjects, including adjustment of settings and handling data. In addition, the Swedish Environmental Protection Agency has printed a concise set of instructions on self-adhesive paper that can be applied directly to Model RB 2000, for example to either side of the receiver or to the inside of the specially designed protective cover (see photo). The instructions explain how to adjust the settings, to check operational functions, and to transfer data to a PC computer. Some minor changes have been made to the counter since the instructions were printed. On newer models, the transmitter's battery-check lamp has been moved from the top of the counter to the side, and the battery holder has been improved.

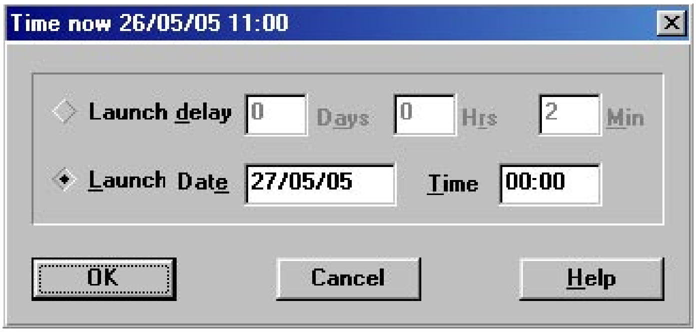
Programming The Counter

The following description and screen-dumps refers to the GLM program. The latest logger programme, Tinytag Explorer, is a slightly different from this version, but the functions are principally the same (the main difference being that you no longer need to "Connect" to the logger before setting up or downloading the logger, as in step 2 below). The logger is programmed for the factors that apply in each particular situation: the name of the data file; when the counting period is to begin; and the counting interval.

Programming the logger

The logger can be programmed either from the pull-down "Logger" menu or by clicking the appropriate button in the toolbar. The logger can be connected to the receiver when it is programmed. In the following instructions, the figure ">" means "continue to".

1. Remove the cover from the logger's cable connector and insert the cable contact with the slot facing upward.
2. Start the program, Gemini Logger Manager, and click the "Connect" button.
3. Click on the "Go" button; this opens the first programming window. Note: If the logger is on (the green indicator lamp is blinking), it must be turned off with the stop button or from the "Logger" menu before it can be reprogrammed.
4. Write the name of the data file, max. 24 characters, in the first programming window.
5. Specify the counting interval in hours/minutes/seconds. The counting interval is the basic unit of time for which the count is recorded and presented, e.g. number of passing visitors per hour. In that case, the interval would be set at 1 hrs., 0 min., 0 sec. The choice of counting interval is based on the purpose of the count and the anticipated number of visitors. At locations where few visitors are expected, it may be sufficient to know how many pass per day and the degree of variance during a week. In some cases, one may wish to obtain detailed information on variations in visiting patterns, in which case the interval could be set at 15 minutes, for example. In most cases, an interval of one hour is used. The maximum number of recorded passages per interval is 255; any passersby beyond that number are not recorded. If it is likely that more than 255 visitors will pass by within an hour, a shorter interval should be used in order to ensure an exact count.



6. In the field, the following programming sequence should be used in most cases: Start Logging > Options > General Options > General > Whole minute.
7. As the next step, the manufacturer recommends "Delayed Start", which makes it possible to specify the date and time that the counter starts – at midnight of a certain day, for example. Click on the button "Delay" to display the setup window.
8. With "Delayed Start", the counter can be programmed to start after or precisely at a specific time. Select "Launch Date" and fill in the date and time where indicated in the window. It is best to set the start time at the exact beginning of an hour, e.g. 00:00 if the counting is to start at midnight. This makes it easier to interpret the data. Click "OK", then "Start".
9. The count can be programmed to stop according to one of three alternatives:
   - After a certain number of time periods/readings.
   - When the logger's memory is full. The available memory is indicated in the "Confirmation" window before the logger is disconnected. This setting is the easiest to program.
   - Continuous operation. The logger keeps recording until the memory is full, then starts counting again by writing over previously recorded data.

   It is good idea to note when the logger's memory is likely to be full so that the data can be collected in good time. Otherwise, there is a risk of losing data when the logger stops counting or begins a new counting cycle by writing over previously recorded data.
10. The settings are confirmed and the logger can be disconnected when the computer program displays the appropriate message at the lower edge of the setup window. But first check to make sure that the counting interval is correct.
11. Personal observations and other information can be entered in the "Comments" area. But to save them, it is necessary to print the "Launch Confirmation" window which cannot be opened later. The title is stored in the logger, however.
12. Fasten the cover over the logger's cable connector, and check to ensure that the green indicator lamp blinks double every fourth second. This indicates that the programming is complete and the logger is in sleep mode. A single blink every four seconds indicates that the logger has begun counting.

Setting up the counter

Site selection

Care in the choice of counting site and in setting up the equipment are of decisive importance for the outcome of a visitor count. Site selection is a two-step process: The first step is to find a location that is as representative as possible, given the purpose of the count. The second step is to select the exact position for the counting equipment. If possible, it should be at a place where visitors must follow each other in single file. This minimizes the risk of counting error in the event that two or more persons walk abreast or close together. The risk of such counting errors can also be reduced if the

The equipment is not easy to detect inside the camouflaged case concealed under the tree branches on the left.

equipment is set up so that the radio beam crosses the road or path at a 45° angle, thus increasing the likelihood of registering the space between passersby who walk abreast.

The counter should not be set up at places where visitors may be likely to pause, for example near information displays, viewpoints, or trail intersections with signposts. It is also important to choose locations where the equipment can be concealed, and not only to reduce the risk of theft or vandalization. If it is noticed by passersby and they stop moving or approach the equipment to inspect or touch it, the radio beam may be additionally interrupted or the settings changed, thus altering the results. It is therefore advisable to choose a location where visitors must concentrate on something else or where their attention is drawn in another direction – for example, near boardwalks, stiles, eye-catching natural features, or uneven ground that poses a risk of stumbling. Along jogging paths or ski trails, the equipment can be placed on a slope or other section that demands extra effort or attention.

It is not always easy to find a suitable location which meets the requirements for distance between components or conditions for setup and camouflage. It is usually necessary to reconnoitre in advance and choose several possible alternatives. It may also be assumed that setting up, programming and camouflaging the equipment will take longer than one prefers to believe. If the counter is located at a much-frequented place, it is advisable to perform the setup early in the morning or at some other time when the number of visitors is minimal. This reduces the need to explain what one is doing, as well as the risk that the counter will be noticed.

Preparing the site and mounting the equipment

There are five basic considerations which guide the setup of the counter:

- what is to be counted
- the distance between transmitter and receiver
- mounting possibilities
- unobstructed path of radio beam between transmitter and receiver
- possibilities for camouflaging the equipment.

What is to be counted?

A basic question to resolve before setting up and programming the counter is: What is to be counted? Are all visitors to be included, or shall some categories be excluded and how is that to be accomplished? As previously noted, later models of the Radio Counter make it possible to exclude horses, elks (moose) and cars, for example. If, on the other hand, the task is to count horseback riders and exclude pedestrians, the counter can be set up at a height of 210-220 centimetres above the ground to register horses of normal size.

With two parallel counters and use of the RV2 function, it is possible to distinguish between horseback riders, pedestrians, joggers and bicyclists. The signal duration of one counter is set at five seconds to record all passersby. The shorter original setting is maintained for the other counter, or changed to about one second. This has the effect of excluding horses, since they interrupt the radio signal for a longer time. The number of horses is derived by comparing the different figures of the two counters.

One can experiment to determine the correct time setting for RV2. In order to avoid the need for real horses, it is for example possible to use a dummy of thin particleboard or the like, about 180 centimetres long and covered with aluminium foil. The equipment is activated for about fifteen minutes while the dummy ”horse” is paraded back and forth a number of times to determine the correct signal duration. The setting is easier with Model RBX3, which shows the results directly in the display. (See ”Setting the signal duration”, p. 20.)

If the task is primarily to count pedestrians, the radio beam should be about waist height, or slightly over one metre above ground. This is also a good height for counting bicyclists. Of course, this may lead to the exclusion of small children; but placing the beam too low may result in double counting of adults due to each of their legs being counted separately.

Range

The counter with the longer range of 20 metres (with the new unit) provides greater freedom in choice of location. The manufacturer specifies 20 metres between transmitter and receiver as the maximum distance for reliable reception. That distance has worked well under favourable conditions. Rain, fog and heavy snow tend to weaken signal strength somewhat, since radio signals can be affected by atmospheric moisture. It should therefore be kept in mind that changes in the weather can result in poorer reception than at the time the equipment is set up.

Adjustments

The antenna is located on the inside of the receiver’s front cover. Optimal reception is achieved when the front covers of the transmitter and the receiver are squarely facing each other. The radio beam between the transmitter and receiver must be completely unobstructed. There must be no tree branches that could be blown by the wind into the path of the radio beam. Branches may also be bent downward under the weight of snow, and during summer vegetation can shoot up from the ground to the height of the radio beam in just a few weeks.

1. Check battery function on the transmitter and receiver by holding the magnet over the battery-check lamp. On early RB 2000 models, the transmitter's battery-check lamp is red, and the receiver's green. On the RBx3, both lamps are green.
   If an indicator lamp does not light up, it probably means that the battery is dead or is not making proper contact in the battery holder. The holder on early models was somewhat flimsy and the battery could shift out of position, during transport for example. The battery can be made to sit more firmly by bending the holder's metal contact strip slightly downward. In poor light, it can also be difficult to see the plus (+) marking that indicates battery alignment. Viewed from the front, the plus pole is to the left in the battery holder. The holder has been improved on later models.

Battery power is sufficient and the settings are functional when the red indicator lamp does not light up.

2. Set up the transmitter so that it points directly toward the planned location of the receiver.
3. Aim the receiver at the transmitter with the cover hinges downward.
4. Hold the magnet over the indicator lamps. When reception is good, the red lamp is off and the green lamp is lit. When reception is inadequate, both the green and red lamps are lit. Aim the receiver at the transmitter and move it up and down, and from side to side, to find the optimal position so that only the green indicator lamp is on. If the red lamp shines steadily

or flickers due to poor reception, it is probably due to a weak signal or too great a distance between transmitter and receiver. Also, the greater the distance, the greater the precision required for calibration. Signal strength can be tested by blocking a small portion of the receiver's front cover with one hand. The hand should be about ten centimetres from the cover, not touching. If the red lamp remains off, reception is good. On Model RBX3, it is the red lamp that blinks when reception is good; the faster it blinks, the better the reception.

The transmitter's placement on a utility pole is a form of camouflage.

5. Set up the receiver so that the radio beam is at the correct height where it crosses the path. Make sure that the front sides of the transmitter and receiver are aimed directly at each other by checking their alignment with the magnet. Test the signal by having someone interrupt it with a hand or by walking through it to see if the red indicator lights up. As noted, the red lamp on Model RBX3 blinks when reception is good; to test that model, it is necessary to walk through the radio beam and then check the display.

Mounting

There are two different ways to mount the transmitter and receiver:

- Through the mounting holes in the base, or with the fixing lugs at the corners. This method is suitable for flat surfaces such as walls, plank fences, etc.
- On plywood or similar material which is slightly larger than the apparatus, so that it protrudes about one centimetre above and below. Holes are drilled at the midpoint of the protruding margin, through which the unit can be attached with wood screws to a tree, utility pole, etc. By using long screws, it is possible to adjust the vertical angle. If a tree is leaning ”backward”, for example, the bottom screw can be drawn tight, while the one on top is adjusted with some sort of shim between the tree and the mounting board. If the fixing lugs are used – or if spacers are used when mounting with the built-in holes – a strap can be slid between the apparatus and the mounting board, then drawn tight around a tree or pole. The apparatus can also be attached to a thicker board equipped with an angle iron or other device by which it can be hung or mounted sideways.

Receiver with display in a specially designed case.

A casing of military green polycarbonate, designed specifically for concealing the equipment, is available by special order. The casing can be opened at the front and sides, and it can be moved both vertically and sideways for easier alignment. The casing is suitable for all models of transmitter and receiver, including those with displays. Further information about the casing is available from

The transmitter can be concealed between a double sign such as this.

Transmitter well-hidden behind strips of birch bark.

the firm, Friluftsplanering, via the following e-mail address: ingemar.ahlstrom@telia.com.

Connecting the logger

- The cable from the receiver is connected to the logger's two-contact socket, the one without a metal cap. The slot in the end of the cable should be facing the front of the logger in order to fit into the socket. Tighten the cable so that it makes good contact and only about one millimetre of the fitting is left protruding. It should be easy to screw in without forcing.
- The logger is fastened with the velcro strap, the indicator lamps facing upward.
- Make sure that the cable is not pinched when the casing is fastened shut.

Camouflaging the counter

Since radio signals pass through materials such as plastic, masonite, plywood and thin boards, there are many ways to conceal the equipment. With a little ingenuity, camouflage can be adapted to a variety of surroundings. For example, a receiver or transmitter mounted on a birch tree can be camouflaged with strips of birch bark placed in front of the apparatus.

The military green casing acts as camouflage if the apparatus is set up in a wooded area, especially if it is mounted on the trunk of a tree (preferably a spruce or other dense evergreen). A few sprigs placed around the casing soften its contours and augment the camouflage effect. Equipment can also be concealed in various types of container which look like something else; these may not be of metal, however, as that would block the radio signal.

A dummy cable and receiver in a plastic box with lock. Passersby think that it is electrical equipment associated with the pump house.

A thick branch and a dry pine branch arranged to camouflage the equipment from the people approaching from the left.

Also, false signs of various kinds can be used to divert attention from equipment – but obviously not any sort of sign that would cause passersby to pause at them. When a counter is placed behind some sort of material, the front should be as close as possible. Preferably, it will not be possible for rain or meltwater to run down between the apparatus and the material in front. Materials that absorb moisture should be coated with silicon spray. When a transmitter or receiver is placed behind a shield, the radio signal is weakened to a degree which varies with the type and thickness of the material. In that case, it may be necessary to reduce the distance between the transmitter and the receiver.

If the transmitter and receiver are facing each other across a path, it may also be necessary to augment the camouflage. By walking back and forth along the path, it is possible to develop some idea of how likely the equipment is to be spotted, and what needs to be done to conceal it better. The foliage can be made more dense by bending and tying down some branches, or by strategic placement of some detached branches. Branches can be arranged to obstruct direct view of the equipment.

Maintenance

Regular maintenance of the equipment and collection of the data are important for the reliability of the count. On each occasion, the setting and battery function should be checked. If a check of the receiver settings indicates that its alignment with the transmitter is correct, this also confirms that the transmitter is operational. But it does not necessarily mean that the strength of the transmitter's battery is adequate, as it continues to supply electricity for awhile after the battery-check lamp indicates that it is dead. It is therefore necessary to check the transmitter battery, as well.

In addition to plenty of time, much else is required when a counter is to be set up in the field.

The calibration of the transmitter to the receiver and the stability of the mounts should also be checked at each maintenance. The two units may be in communication with each other even if one of them has shifted out of position. Ensure, as well, that the radio signal cannot be blocked by branches blown into its path, or may soon be blocked by the growth of bushes or other vegetation.

Useful tools, etc.

Quite a few items need to be brought along when setting up and maintaining the equipment. The setup process is easiest if as much as possible is done in advance – e.g. mounting the counter in the casing, attaching the fixing lugs or board, etc. It is always more difficult to perform such tasks in the field.

The following may be regarded as a checklist with related tips:

- Prepare the transmitter and receiver for mounting with the brackets or some alternative.
- Magnet and reserve magnet: If a small magnet is being used, it can be placed at the bottom of an empty 35-mm film canister in which the remaining space is filled with a bit of cloth. This makes it easier to hold onto the magnet, even when wearing gloves, or to find if it is dropped or misplaced. Magnets can also be painted a light colour for greater visibility.

- Casing with mounts.
- Steel wire or plastic-coated wire fasteners.
- Mounting bolts, nuts and lock washers.
- Fresh batteries.
- Awl for starting screw holes in wood.
- Flat and recessed-head screwdrivers with long shafts. A long shaft is needed to reach the screws through the counter's built-in channels, or if the screws must extend through the thickness of a mounting board. If the apparatus is mounted in a box or the like, the magnet can be placed on the tip of a flat-head screwdriver in order to reach the battery and indicator lamps for testing.
- Wood screws of various lengths. Recessed heads provide the best leverage and are relatively easy to work with in poor light conditions.
- Strong twine in natural colour for such purposes as binding branches which obstruct the radio beam or may do so when the wind blows, augmenting camouflage with detached branches, etc.
- Strap for mounting on poles, etc.
- Cap key (socket) wrench on a long shaft for reaching nuts and bolts of the protective casing. The bolts delivered with the casing are size M10.
- Knife for such tasks as carving a flat surface for mounting on trees.
- Cutting pliers.
- Pruning shears for cutting branches to be used for camouflage or which obstruct the radio beam.
- Small saw.
- Silicon spray.
- Torch (flashlight).

Some of these items are essential, others are not but may facilitate the setup process. Even if careful preparations have been made, it is useful to have the necessary equipment for alternative or emergency solutions. It may not, for example, be a good idea to mount the transmitter directly on a tree as originally planned. In such a case, a mounting board and strap along with some extra nuts and bolts will come in handy.

Collecting & saving data

Reading data from the display

Model RBX3 has a display which shows the total cumulative count. The display window is activated when the magnet is held over the green indicator lamp. To reset the counter to zero, the magnet is first held over the green lamp, then over the display. If one forgets to bring the magnet, a reading can be taken by walking through the radio beam; this activates the display window for seven seconds, showing the accumulated total (including the ”activating” walk-by).

The latest (2005) version of Model RBX3 displays the figures continuously, so there is no need for a magnet or an extra walk-by through the radio beam. If the RBX3 is used without a logger, readings must be taken regularly at equal intervals and at the same time of day in order to obtain exact data for comparisons over time. The same regularity is necessary if the data are to be compared with those from counters at other locations.

Transmitting data from logger to PC

Data from a logger can be transferred to a stationary PC computer, or to a portable PC in the field. In the latter case, be sure to check the battery level in advance. If it is raining or snowing, the data transfer should not be conducted without cover. When opening the receiver cover, do not let it fall down of its own weight, as this may damage the hinges.

When the receiver cover is opened and lowered, the radio contact is broken because the antenna in the cover is pointing toward the ground. On early versions of Model RB 2000, this results in extra counts. That can be avoided if the transmitter is first ”turned off” by covering it with aluminium foil, an operation that should be performed from the side so as not to interrupt the signal. With this method, there is only a risk of the odd extra count.

Otherwise, one can keep one's hands away from the front of the receiver while removing the cover, so that the radio beam is not interrupted. The shorter the time the cover is open while the logger is on, the smaller the risk of extra counts. Transferring the data – including opening and closing the cover, and switching the logger off and back on – results in 2-5 extra counts if the process is carried out quickly.

For later models with the RV2 function, it is not necessary to cover the transmitter with aluminium foil. Standing in front of the receiver to remove the logger results in no additional, or at most only one, extra count.

On counters with displays, it is easy to see if the data-transfer process has resulted in any additional counts.

Connecting the logger to a PC

- Draw the screws out a good ways so that the cover can be lowered all at once without resistance. During this procedure, try to avoid placing hands or any other part of the body in front of the receiver in order to prevent extra counts.
- Quickly loosen the metal clamp that connects the cable to the logger. It is not necessary to disconnect the cable between the logger and the counter when downloading on site, although that may be easier.
- Loosen the metal hood on the logger's other cable connection and insert the connecting cable from the PC's serial outlet (IOIOI). Ensure that the slot in the end of the cable contact is facing upward and properly connected to the logger.

Transferring data from the logger

- Open the computer's GLM program and select "Connect" from the "Logger" menu, or the "Connect" button in the toolbar.
- Select "Stop" to stop the count. This terminates the counting period, and a new period must be programmed in order to resume counting. Do NOT click "Stop" if the current counting period is to continue without interruption. Data from the most recent counting period is stored in the logger until it is reprogrammed for a new period, i.e. after the "Stop" command has been entered.
- Click on the "Offload" button or make the corresponding selection under "Logger" in main menu.

Saving the data

- If the GLM window is closed and the data have not been saved, a dialogue window is opened with the message: "You have not saved this data. Do you want to do so now." Click "Yes". If the count is not stopped, the cumulative data can be saved in the same file upon transfer at the close of subsequent periods, so that all data from the entire sequence of counting periods is gathered in one file. The alternative is to save the data from each counting period in a separate file with a separate name, for example "Path 1. . . Path 2. . . Path 3", etc., with each file incorporating the data of its predecessor to compile a cumulative total for the entire sequence of counting periods.

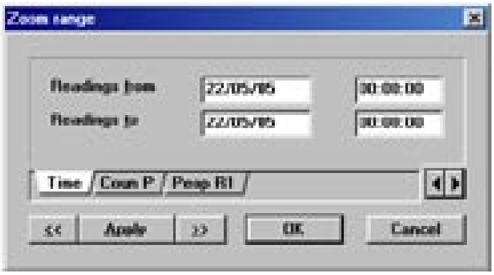
Collecting the data in the field. Remember to check the computer's battery status first.

- With version 2.2 of the computer program, data are saved automatically in the folder ”D:/Program/Gemini data loggers”. From there, the file can be moved to a folder of one's own choosing, in ”My Documents”, for example. With version 2.8, the file can be saved directly in a folder of one's choice.
- The combined names of the entire ”save path”, including the data file and all relevant folders, may not exceed 80 characters. This means that the file cannot be saved in a subfolder that is many levels removed from the main folder. For example, one could save the file in ”My Documents” and then move it one step to the desired folder. In the earlier version (2.2) the file name may contain a maximum of eight characters.
- Wait until the computer indicates that the logger may be disconnected before doing so.

Processing the data

Displaying data

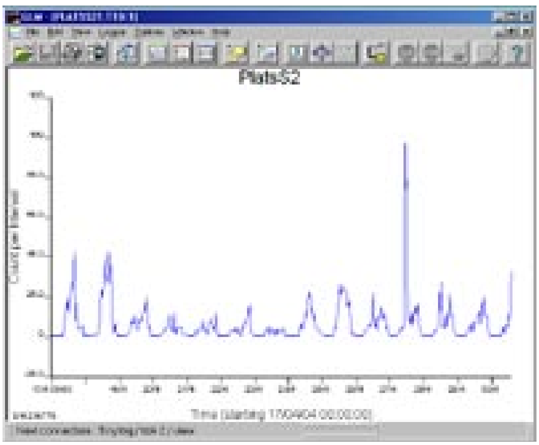
When the GLM file opens, the stored data for the entire measuring period are displayed in the form of a diagram. The data can be processed in various ways by selecting "View" or by clicking the buttons in the toolbar. Specific areas of the diagram can be magnified by selecting them with the cursor and holding down the mouse button. Data for selected time periods can be displayed in table form by selecting "Readings view". The limits of the time period are specified with the menu item "View/Zoom Range" or with the "Zoom Range" button in the toolbar.

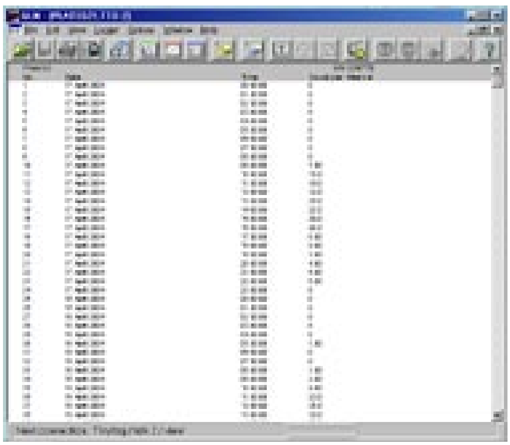


The precise limits of a section to be magnified are entered here.

Zooming in the diagram automatically magnifies the same section of data in the table, and vice versa. To return to the previous magnification level or to see the entire data range, select "Zoom back" or "Zoom 100%", respectively, from the "View" menu or with the corresponding buttons in the toolbar.

The X (horizontal) axis of the diagram may sometimes show a minus value. In that case, drag the baseline of the zoom window so that it coincides with the X axis. One can also right-click on either axis to position the X axis at "0"; but this alters the scale of the Y axis so that the diagram is flattened. This applies only to the diagram for the entire counting period, not for magnified subsections of the diagram. To set the latter at "0", proceed as with the X axis (see first two sentences of this paragraph).

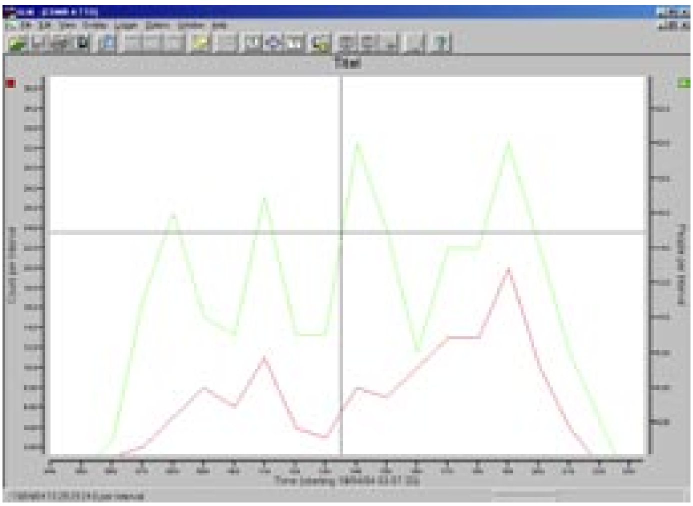




Multiple counting periods in a single diagram

Multiple counting periods of the same length can be combined in one diagram.

- Open a diagram
- Open another diagram to be combined with the first
- Select " Overlay graphs". A new diagram is displayed, incorporating the two sets of data which can now be directly compared. The magnification level can be increased or reduced as described above.
- The vertical Y-axis of the diagram can be displayed at various scale levels, depending on the maximum values recorded during the counting period. In order for the data from the separate periods to be comparable, the axes of the combined diagram must all be on the scale determined by the period with the highest recorded value. Adjust the scale by right-clicking both Y-axes, then specify the appropriate level under "Zoom Range". If this results in a minus value for an X-axis and a baseline of "0" is preferred, that can be arranged by entering "0" for both Y-axes.



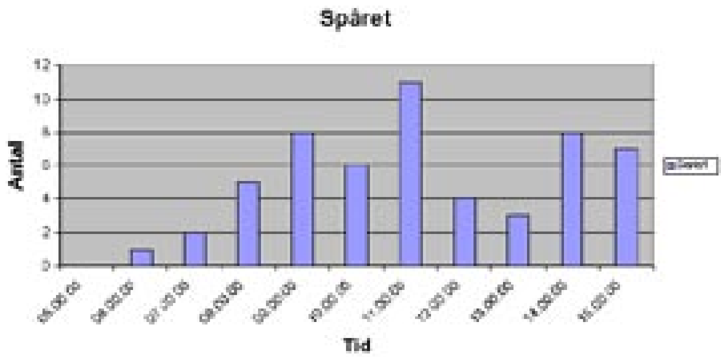
With the "Overlay graphs" function, it is possible to compare the results from several sites during the same period.

Printing

For printing out a table, the left margin, type size and page breaks can all be adjusted by selecting " General" from the "Options" menu.

Exporting data

The data can be exported to other programs, for example Excel, for presentation in other diagram formats or for processing in other ways. This is done by copying the table while in the ”Readings view” mode, then pasting it into an Excel or other document. A diagram cannot be copied directly to Excel or any other program.



Tables can be copied to an Excel document for processing.

Testing the counter's reliability

The counter's reliability can be tested by comparing direct on-site observations with the data recorded by the counter. The direct observations are noted on a form with spaces for observation period, counting intervals, and type of event. In order for the two sets of data to be comparable, it is essential for observers to synchronize their timepieces with the computer's clock when the logger is programmed.

One way to do this is to use a mobile phone's digital clock, which is easy to set more or less exactly in time with the computer's clock. It usually requires many observations over a lengthy period to provide a sufficient basis of comparison for evaluating the counter's reliability. But it is possible to shorten the process by walking, running or bicycling repeatedly through the radio beam. If each type of activity is carried out within a specific period – one for walking, one for bicycling, etc. – it is possible to assess the counter's ability to distinguish between them.

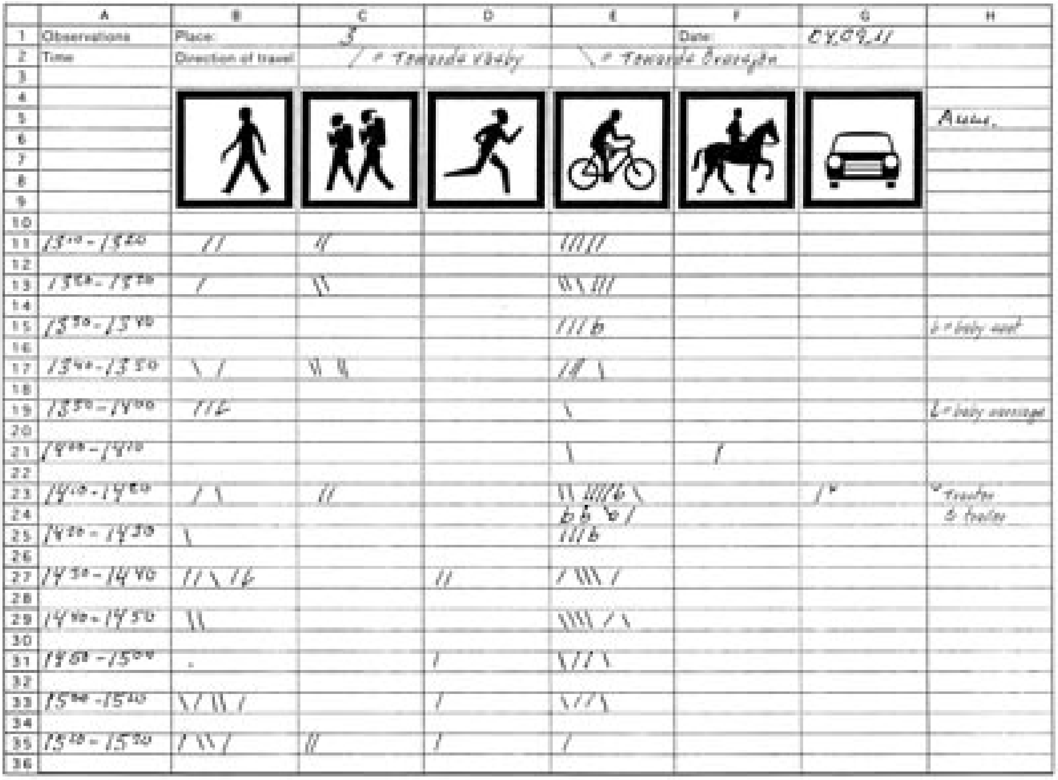
One can also check to see whether the counter records, for example, a passing bicyclist only once or more than once (arms, wheels, etc.). The same question arises with reference to ski or walking poles.

To more easily keep track and make note of how many times one moves back and forth through the radio beam, the logger can be programmed for short time periods – ten or fifteen minutes, for example. Of course, it is also necessary to record others who pass by the counter during the trial period. With the observational data, it is possible to calculate a correction factor for the data recorded by the counter. Appendix X provides an example of an observation form that can be used for reliability tests, which need not be carried out on site. The form is intended for use as an original for copying.

A weather diary can be helpful in the analysis of errors or unexpected results to determine if they might be related to strong winds, severe cold, heavy rain or dense snowfall. Weather data can also help to determine the extent to which visitor frequency patterns are affected by weather conditions. Appendix X provides an example of a form that can be used to record weather conditions.

Notes on the form in Appendix X, page 41

The observations were made in the Järvafältet Nature Reserve, located just north of Stockholm. The counter was set up so that the radio beam crossed a road at waist height of an average-size adult male. The logger was programmed for the short interval of ten minutes, which facilitates tracing the cause of any counting errors that may occur.



Weather Diary Year 2004 **Month** July

Dat	Temp	Sunny	Mixed	Cloudy	Overcast	Rain	Snow	Sun/Rain	Sun/Snow	Thunder	Fog	Wind 0	→	→	➞
1	22												x		
2	18		x									x			
3	17			x									x		
4	23		x			17:00				x				x	
5															
6															
7															
8															
9															
10															
11															

The slope of the counting mark indicates the directions in which passersby were moving. The second symbol from the left (two walkers) indicates that two or more individuals passed abreast or close together, posing a risk that the counter was not able to distinguish them separately. Each mark in that column represents one individual. In this case, the only instances recorded were groups of two.

A comparison of the data on the observation form and those recorded by the counter found that the counter had failed to register the odd passerby during some of the ten-minute intervals. This occurred when individuals passed abreast and, in a few cases, when several bicyclists passed by at the same time.

In the period from 13:40 – 13:50, the counter recorded only seven of the ten passersby that were directly observed. The difference can probably be ascribed to the four individuals who passed two abreast, and two bicyclists who passed abreast (as noted by the two marks close together in the bicycle column). These six individuals were recorded by the counter as three.

The risk of this type of error can be reduced if the radio beam crosses the path at a 45-degree angle. In this case, that probably would have at least resulted in the two bicyclists being recorded separately.

On no occasion did the counter record more bicyclists than the number observed, indicating that the cyclists' arms were not being counted separately.

Troubleshooting

The following are some examples of potential problems and possible causes.

The green indicator lamp does not blink after the logger is programmed.

- The logger was disconnected too soon.
- Starting time is not set correctly.

The red and green indicator lamps of the receiver are steadily lit, even though the settings appear to be correct.

- The transmitter battery power is low or exhausted. Test the battery.
- Distance between transmitter and receiver is too great.
- The transmitter and receiver are not aligned.

Neither of the indicator lamps of the receiver shines when the battery is tested.

- The transmitter battery power is low or exhausted

Unexpectedly high count of or almost 255, which is the maximum value for any given counting period.

- Someone or something has interrupted the radio signal continuously or repeatedly for a long time. This can occur with early models which lack the RV2 function.
- The transmitter or receiver has shifted position, breaking radio contact between them. This is another problem that may occur with early models that lack the RV2 function.
- A branch or other object has swung back and forth through the radio beam.
- Some event may have attracted many visitors who moved back and forth or gathered at the counting site.
- Transmitter battery power too low. Excess counts usually occur at night, when battery power declines due to falling temperature.

These kinds of error can be corrected with the Excel program, for example by substituting the average count of other periods for improbably high counts in exceptional periods. The average count and other statistics for a specific period are given in the ”Info View” window.

The counter shows a figure of ”0” for a given time period, even though it is certain that some visitors passed by.

- Error in programming the logger, so that the count was never begun. Check the logger’s green indicator lamp: double blink = ready, counting not started; single blink = counting in progress. If the lamp does not blink at all, the logger has not been programmed. Check also the programmed settings in the ”Info View” window, under ”Tools” in the main menu.
- The cable to the receiver is not properly connected to the logger. The slot must fit properly and it should be easy to tighten the metal clamp.
- The transmitter or receiver has shifted out of position. This problem occurs only with models which include the RV2 function.
- The distance between the transmitter and the receiver is too great. For later models with the RV2 function, however, this may also result in excess counts.
- Something has continually interrupted the radio signal. Applies only to models with the RV2 function.
- Battery power is low or exhausted.
- The duration of the RV2 pulse is too short. Check to ensure that the setting for RV2 is not the minimum (farthest to the left).

The time period is shown in a table as short of a full hour, e.g. 17.59.41 instead of 18.00.00, etc.

- Incorrect setting. Ensure that ”Whole Minute” is selected under ”Start Logging” in the ”General Options” window, which is opened from ”Options/General” in the main menu.

Cannot transfer data to Excel program.

- One may have attempted to copy and paste a diagram. It is the table that is transferred.

User tips

A number of users of the Radio Beam Counter were interviewed during the early months of 2005 in order to draw upon their experience with the equipment. Among their practical tips were the following:

- The receiver can be attached with screws to the inside surface of the back panel of a four-sided wooden tube whose front panel is made of thin wood (varnished plywood or the like). The back panel is hinged so that it can be lowered in order to read or collect the data.
- Bring some ready-formed shims or wedges to adjust the vertical angle of the apparatus when mounting to a leaning surface such as a tree.
- Practice setting up and programming the equipment before going into the field. Allow plenty of time for setup at the counting site.
- Leave a small note on or beside the counter, with information for the curious which explains who set up the equipment, perhaps its purpose, and a contact telephone number.
- If it is difficult to conceal the equipment adequately, a stone or other object can be painted to divert the attention of passersby.
- A separate laser sight can be used to calibrate the receiver to the transmitter.
- If there are plans for frequent counts at the same site, setup and programming of the equipment can be made easier and faster if permanent mounts are contrived and left in place.
- A reserve magnet can be left on site, holding itself fast to a nail head or a small piece of metal.
- Note the date of the last battery change on a bit of masking tape attached to the apparatus.

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Outdoor recreation has been assigned greater importance in Sweden's new policy for nature conservation. Attention is to be drawn to the values of protected areas, which are to be made more accessible to the general public. It is therefore necessary to develop better knowledge of visitor frequency and patterns as a basis for the planning and management of nature conservation.

In connection with its project, "Counting Visits to Natural Areas", the Swedish Environmental Protection Agency has tested technical equipment for that purpose. This booklet reviews experience with the use of the Radio Beam Counter, the only counter for such purposes that is based on radio signals.

The booklet provides practical tips on such matters as how to select appropriate set-up locations for counters, as well as various methods for mounting and camouflaging the equipment. There is plenty of room for creativity and one's own ideas. The booklet also offers guidance on how to calibrate and program the equipment, and how to process and interpret the data.

Counting visits to natural areas is a relatively undeveloped aspect of nature conservation. The aim of this booklet is to encourage increased use of visitor counting in the work of conservation. The booklet is intended primarily for use by individuals at county administrative boards, municipalities, conservation organizations and silvicultural associations who are responsible for planning and managing natural areas

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