

The Small Bird Perch Scale: a Remote Weighing Apparatus

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The North Carolina Zoological Park maintains a varied bird collection. In recent years we have included a collection of native North American Wood Warblers. Little is known about the long term husbandry of these birds. Since the science of captive warblers is still in its infancy, there are many informational gaps that must be filled.

One important area that deserves concentration is body weight. Aside from helping to detect illness, compiling monthly weight data serves to establish a set of baseline information. This data record can be used for a variety of purposes and to answer a variety of questions. Gaining as much information as possible from the captive warbler population will aid in developing appropriate husbandry protocols to ensure long term captive propagation in zoological collections. A desire to

contribute to the husbandry of captive warblers stimulated the North Carolina Zoo to develop a remote weighing device specifically for very small birds. Primarily the scale was developed to record as many weight values as we wanted without handling the delicate specimens.

By researching available products we were able to purchase, assemble and modify a system that is reliable, accurate, and easy to use. This scale will work for all small perching birds not just the Wood Warblers we initially designed it for. The zoo also obtained components for a larger range scale which has not been assembled. Total cost for the perch scale is moderate. Equipment prices were near six hundred dollars. However, the benefits outweigh the price tag. We can reliably and accurately weigh birds without having to catch, touch, or otherwise disturb

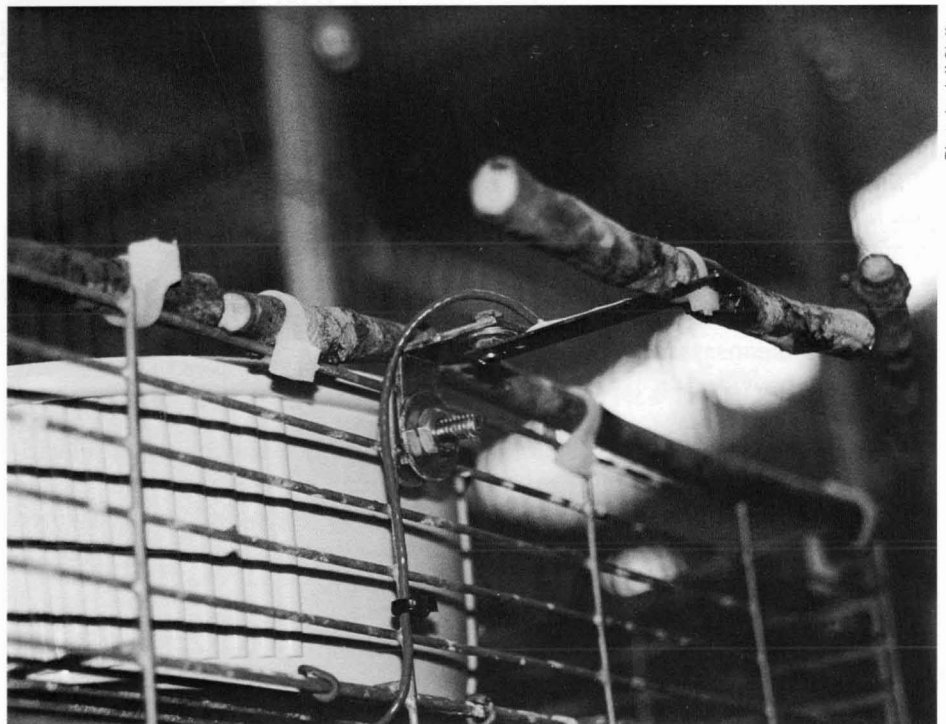


Photo by Jeff Claffy

Close-up view of weighing platform mounted to the diet platform.

them. Using this equipment we have been consistently monitoring the weight of: American Redstart (*Setophaga ruticilla*), Common Yellowthroat (*Geothlypis trichas*), Prothonotary Warbler (*Protonotaria citrea*), Northern Parula Warbler (*Parula americana*), and Louisiana Waterthrush (*Seiurus motacilla*). In a few cases we have weight records spanning three years without having handled the bird solely for obtaining a current weight.

All the required parts were bought from a local scale distributor and hardware store. It is possible that a different combination of products from other manufacturers would work just as well and may cost less.

Minimally, the apparatus consists of three components: a miniature beam sensor, a display, and a perch. Before a scale dealership is contacted, attempt to learn the technical jargon. A stick or dowel becomes the actual perch the bird will use. The mini sensor is a very specific type called a Planar Beam Sensor, which falls under the category of a load cell. When the perch is attached to the miniature beam sensor a "Load Cell Based Weight Platform" is created. This means that you have provided a place for the bird to land mounted on a load cell.

Load cells are contained in virtually all electronic scale systems and there are many types. Everything from cars and trucks to the ingredients at a cookie factory are measured with load cells. Basically, the Planar Beam Sensor is a type of force transducer that uses a strain gauge to change weight (downward force) into an

electrical signal. When a strain gauge becomes stressed it experiences a measurable change in electrical resistance. Gluing the strain gauge to the strain element, in our case the little metal bar, forms the load cell.

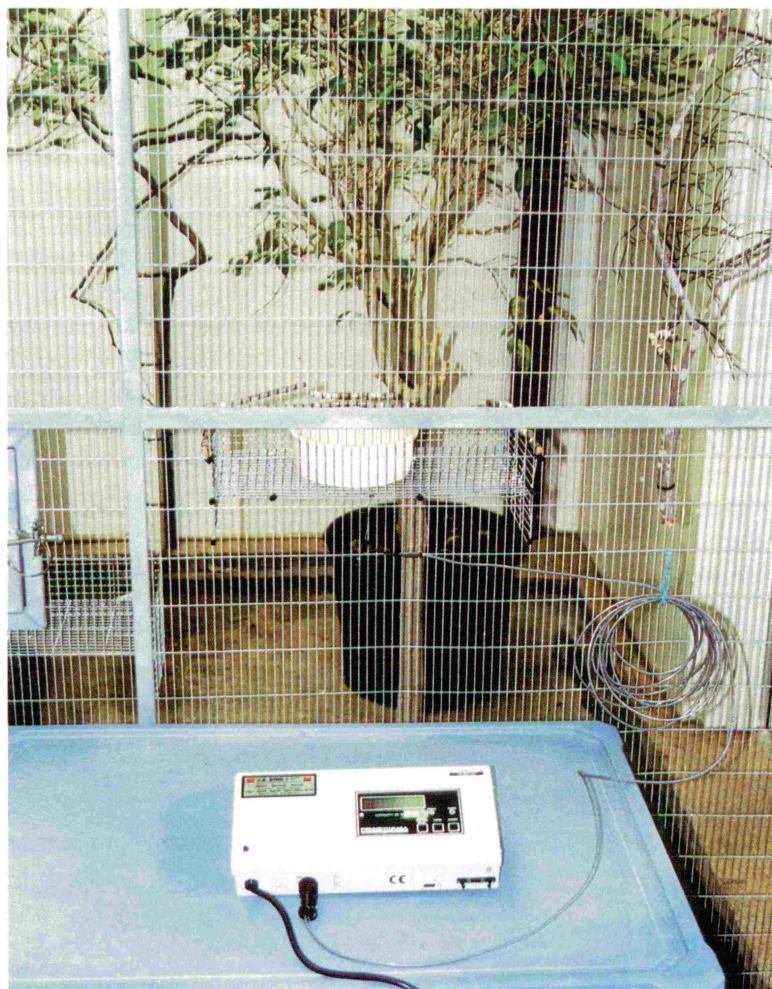
The last component is the display or digital indicator. An indicator deciphers the change in electrical resistance experienced by the load cell due to a stress such as a bird perching. It determines when a stress occurs by constantly monitoring the electrical signal to and from

grams. [There is also a sensor available that has a maximum load rating of 5 lbs. with an accuracy of ± 0.20 grams] The beam sensor is a small strip of metal approximately $3/8"$ wide by 3" long. Each end of the strip has a small hole drilled through it. There is a delicate lead wire attached to one end. Under all of the solder at this end is the strain gauge. The lead wire is connected to a standard 25 ft. cable which serves to attach the weighing platform to the digital indicator. Longer cables can be ordered at \$3.00 per extra foot.

By far the hardest part of setting up the system is finding the appropriate fastening hardware. An assortment of very small fasteners will be needed. We used stainless steel hardware to prevent rusting. After assembling the entire remote weighing device, we encountered one last obstacle. Converting the digital indicator from its 1lb./oz. setting to a metric display proved challenging. The instruction manuals were too difficult for a lay person to understand. To their credit the manufacturer does provide a helpful technical support line. Be sure to have read and attempted to comprehend the instruction manual before calling.

Pennsylvania Scale Company is the manufacturer of the digital indicator we purchased

[Model #7400M]. The zoo bought a very basic indicator but it has a several features that we may never utilize. The ability to connect the indicator directly to a printer or a computer are two features we have yet to benefit from. O'Haus Scale Company also sells a digital indicator [model #15S] which fulfills the same purpose.



Installed remote weighing apparatus.

the platform. Changes in the electrical signal are proportional to the amount of stress and are converted into a number that is displayed as the weight.

The sensor we used is a Rice Lake Weighing Systems Planar Beam Sensor [Model # RLS1101 2 lb.]. The sensor has a maximum load rating of 2 lbs. and is accurate to ± 0.10



Immature American Redstart perched on the weighing platform.

The assembly process is very easy. Use the pre-drilled holes on opposite ends of the planar beam sensor. On one end attach a small perch with a nut and bolt or a small electrical cable tie. At the remaining end, secure an "I" shaped mounting bracket using nuts, bolts, and washers. Firmly secure the mounting bracket on a vertical surface, such as the cage wire, in an area the birds frequent on a regular basis. Insure the actual perch lies in a horizontal position. We elected to mount the device to an elevated feed platform. Lastly, take the 25 ft. cable from the mini beam sensor and attach it into the digital indicator thus connecting the weighing platform to the display. You will also need a standard 110 volt AC outlet to supply power.

There are also several tips we would like to offer to anyone attempting to replicate this system.

1) The lead wire of the planar beam sensor is very delicate. Treat the cable gingerly and route it securely in a safe area. **2)** When assembling the weighing platform, be sure to keep the surface where the wire is soldered onto the metal strip facing upwards. Otherwise, your weight measurements will be Negative. **3)** Feed the planar beam sensor through the cage wire before attaching any perches or the mounting

bracket. Do this because the electrical connecting cable has a large plastic fitting on the end which hooks into the indicator. The fitting is too large to fit through small cage wire. **4)** Attach a perch at a right angle to the mini beam sensor. Keep the perch length as short as possible. Long perches and perches mounted parallel to the metal beam give inaccurate readings. **5)** However, birds were more likely to land on the perch scale if it was mounted in a manner that made it appear like part of a much longer perch. Therefore, mount and align the new scale at the end of an existing perch to make it resemble one long continuous perch. **6)** Keeping birds on the scale for the brief instant required for a reading can be tricky. We have figured out two methods. Surely there are more techniques such as training the birds to target:

Method One is to move a food bowl containing favored items to the outside of the cage panel. The bird will sit on the perch figuring out how to obtain the food.

Method Two is to place a favored food item in an empty petri-dish and cover it with a 2nd inverted petri-dish. The birds see the food but still can not get it. Reward the birds with the food item when weights are obtained.

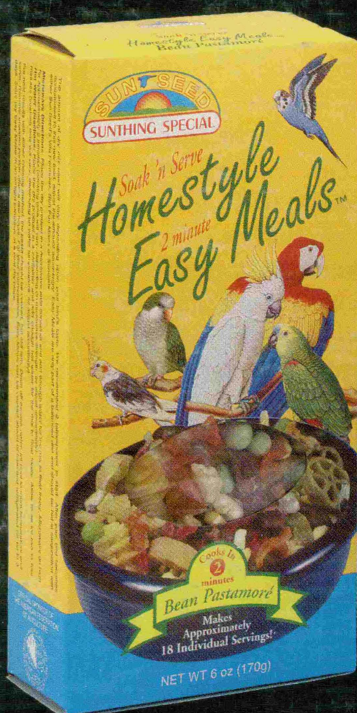
The perch scale for small birds is an easy proposition if you have the time to spend in the initial assembly. Benefits to our collection outweighed the cost of \$600.00. We routinely weigh, with acceptable accuracy, birds as small as our native North American Wood Warblers who range from 6 to 10 grams.

For additional information and more pictures about the perch scale see the web site: <http://www.riverbanks.org/aig/tidbits.html> hosted by The Riverbanks Zoological Park & Botanical Garden for the AZA Avian Scientific Advisory Group. Lastly I must thank Keeper II Stan Allford who patiently worked out the kinks and bugs of the remote weighing apparatus. ➤

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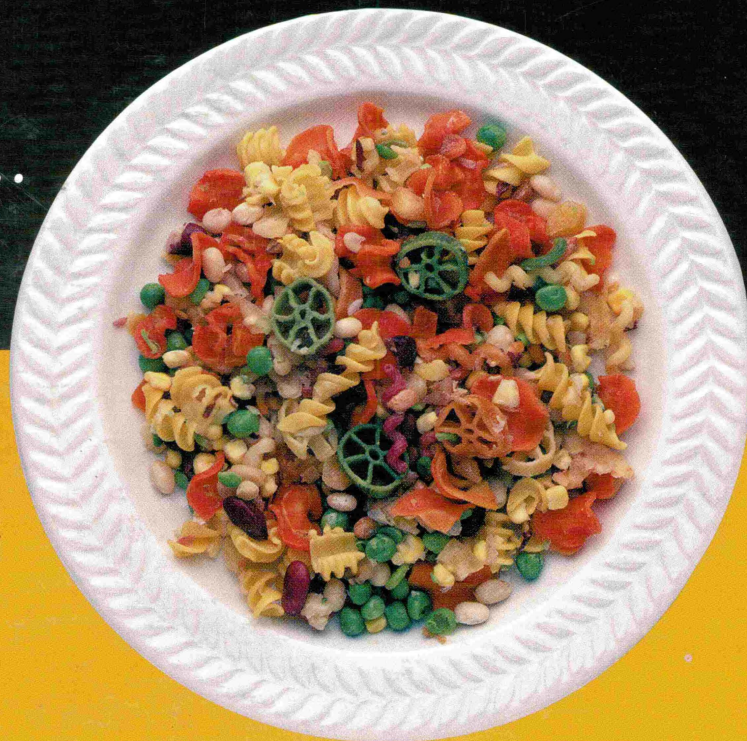


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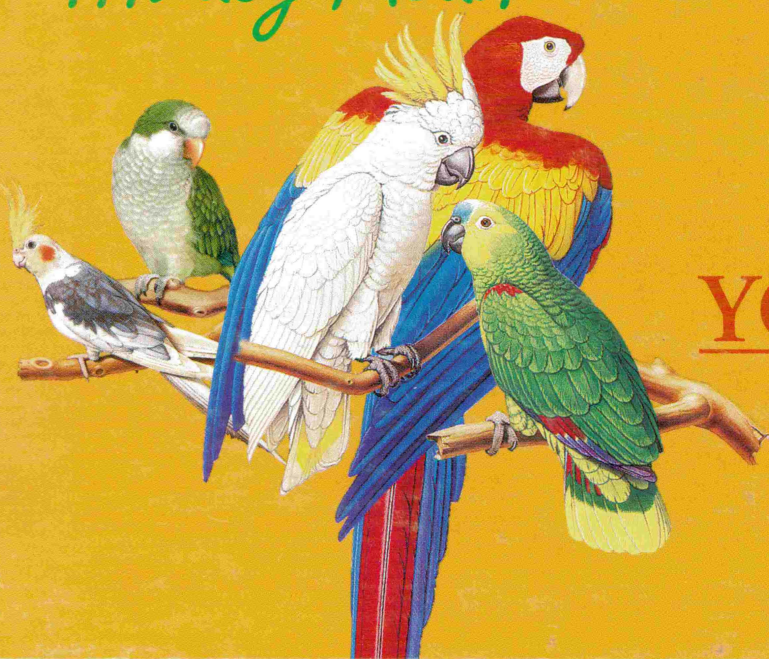
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