TECHNICAL NOTE

A DEVICE FOR MEASURING FOOD-MAGAZINE
BEHAVIOR IN THE PIGEON

Standard pigeon feeders *e.g.*, LVE model #1347 and Gerbrand's model B do not make provision for the measurement of eating behavior. While duration of food presentation can easily be determined from timing equipment that controls the duration of feeder operation, this duration may be considerably longer than the length of time the pigeon is actually eating, because it does not indicate when the pigeon starts and stops eating. An accurate determination may be advantageous for two basic reasons: (1) the information about eating *per se*, *e.g.*, latency from key peck to eating and its duration, may be important. (2) An accurate determination of eating allows for a greater degree of control over eating through the arrangement of reinforcement contingencies, *e.g.*, reinforcement of the eating posture to maximize eating time by terminating food presentation when the pigeon's head is withdrawn from the hopper; maintaining a constant duration of eating during each feeding cycle by presenting the feeder until the pigeon has actually eaten for some pre-determined fixed period of time.

Fig. 1. Modified LVE model #1347 pigeon feeder with photocell.

This apparatus is designed and built to sense the presence of the pigeon's head in a modified LVE model #1347 pigeon feeder. A photocell (Clairex type 504) is mounted on the outside of the front lip of the feeder, approximately 0.5 in. (1.3 cm) above the opening for the grain in the bottom part of the feeding compartment. When the standard 24-v dc feeder lamp provided with the feeder illuminates the grain as the feeder is activated, light from the lamp passes through a 0.25 in. (0.6 cm) hole located on the front lip of the feeder, illuminates the photocell mounted on the outside of the front lip, and activates the photocell circuit.

The photocell is wired to a solid state circuit, which is schematically diagrammed in Fig. 2. During a feeder cycle, light from the 24-v dc feeder lamp hitting the photocell causes its resistance to decrease. This makes the base to emitter junction of Q1 more negative, and causes Q1 and, consequently, Q2 to turn off. Q1 and Q2 are connected in this manner (a Darlington configuration) to provide increased gain to drive RY1. When the pigeon's head breaks the light path from the feeder lamp to the photocell, the photocell resistance increases, causing Q1 and Q2 to turn on and RY1 to be energized. RY1 is used to drive electromechanical and solid state recording and scheduling systems. The sensitivity of the photocell circuit is regulated by a variable resistor, (R1 in Fig. 2), which is used to adjust the bias level of Q1.

Ambient light produced by the feeder lamp does not interfere with the reliable sensing of the pigeon's head.

Figure 3 illustrates the frequency of latencies from the response key to the feeder for a pigeon on a continuous reinforcement schedule during one 30-reinforcement session. The figure also shows frequency of

Fig. 2. Solid state circuit driven by photocell.

Fig. 3. Frequency of "head withdrawal time" and "time to feeder" for one pigeon during one session.

head withdrawal time periods, *i.e.*, periods during which the pigeon did not have its head in the food magazine after it had once placed it there, in spite of the fact that the feeder was still activated. A study of the "head withdrawal time" and "time to feeder" shows that the time the pigeon's head is actually located in the feeder varied considerably from one trial to another when the feeder was activated for 5 sec.

When accurate information about the pigeon's location obtained by the modified feeder is combined with a determination of the actual amount of food consumed during an experimental session, a much more complete picture of the pigeon's eating behavior can be obtained.

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