

TECHNICAL NOTE

AN INEXPENSIVE RANDOM-ACCESS PROJECTOR FOR RAPID PRESENTATION OF PICTORIAL IMAGES¹

Schedule-induced attack studies with pigeons that have utilized rear-view projected images of a conspecific as a target have employed carousel and slide-tray type of projectors (Flory and Ellis, 1973; Rashotte, Katz, Griffin and Wright, 1975). Although these projectors, with appropriate logic circuitry (e.g., GAF ESP 2000, Kodak RA900), can provide random access to 80 to 100 pictorial images, they are expensive to purchase (\$900 to \$1025) and to maintain when used daily. A projection lamp with an expected life of 100 hr, for example, costs \$11.60. In addition to being bulky, noisy, and hot when continuously operated, the commercially available projectors do not provide reliable placement of the image on a screen and require a minimum of one or more seconds between successive slide presentations. This latter feature is particularly undesirable, in that it precludes the possibility of programming a change from one stimulus to another immediately following a specified response on a target and it eliminates the possibility of using the projector to simulate target movement. The projector described below eliminates these problems and still permits instantaneous random access to 12 images. This is accomplished by utilizing the 12 independent optical systems from an Industrial Electronics Engineers (Series 0080) Inline Display Unit.

To ensure precise alignment of and convenient access to the optical components, the lenses and socket assembly from a Series 0080 Inline Display Unit, were remounted in a 9.6 by 16.0 by 21.3 cm aluminum and wood housing (Figures 1 and 2). As indicated in these figures, the socket assembly and bulbs were mounted in holes in the rear plate and secured by two socket assembly clips. Slots were cut in the top and bottom interior surfaces of the housing to accommodate the lenses and opaque, black light stop, and a hinged door provided easy access to the projector components. For best results, the entire interior surface should be painted flat black.

Twelve, 35-mm colored positive transparencies of a pigeon (cut to a size of approximately 1.0 by 1.5 cm) were taped to the front of condensing lens 2 and then individually rear-view projected on a Polacoat plastic diffusing screen covered with a piece of seamless Scotch Brand Magic transparency tape. With this arrangement, the details of all 12 projected images were

focused when the front of the projector was approximately 24 cm from the screen. Images could be refocused at other distances by moving the objective lens (objective distance) and fine focusing could be accomplished by adjusting the distance between the objective lens and the screen (image distance). A separate filter for each projection cell could be mounted readily on the light stop and a different set of 12 transparencies could be projected simply by changing condensing lens 2 on which the transparencies were mounted. The maximum usable area of each 35-mm transparency was a circle 15 mm in diameter.

The socket assembly (\$3.50, part #21712-1), condensing lens 1 (\$3.00, part #10467), condensing lens 2 (\$3.60, part #10468), objective lens (\$2.70, part #10469), and spring socket assembly clips (\$0.30, part #14065-01) for a Series 0080 Inline Display Unit can be purchased from I.E.E., Inc., 7720-40 Leona Avenue, Van Nuys, California 91405. Total cost of the I.E.E. components, #1886 bulbs (\$0.73) with an expected life of 3000 hours at 6.3 V, and small parts for a projector is \$24.00; the projector requires approximately 3 hr to construct.

The projector has been used successfully for a year in schedule-induced attack studies in which one rear-view projected image was presented and in other studies in which a pigeon tracked a rear-view projected image of a conspecific between two 11.5 by 15.3 cm adjacent screens (8.5 cm, center-to-center), each illuminated by a projector. In this latter case, an image of a conspecific was presented on one screen and the alternate screen was rear-view projected with a white light. The targets were matched for luminance at approximately 1 ft-L and the screens were the only sources of illumination in the chamber. Each attack on an image immediately turned it off and illuminated that screen with white light. Simultaneously on the adjacent screen, the white light was extinguished and the identical image was projected. Responses on a screen illuminated with white light had no scheduled consequence. Figure 3 includes cumulative and event records for a White King pigeon concurrently exposed to a fixed-time (FT) 90-sec food schedule, with a 17.5-sec protective contingency, and the target alternation procedure described above. Each downward deflection of the cumulative recorder pen corresponds to a 10-sec food delivery. In general, target responses occurred immediately after food removal and continued through at least one-half of the interval. Event record "A" shows the sixth food presentation from that session as well as target responses and changes in the position of the pictorial image that followed that presentation. In this, as well

¹This research was supported in part by United States Public Health Service Grants RR07143 and R01 MH25514-01 to Northeastern University. The authors thank Jim Palmer for his technical assistance.

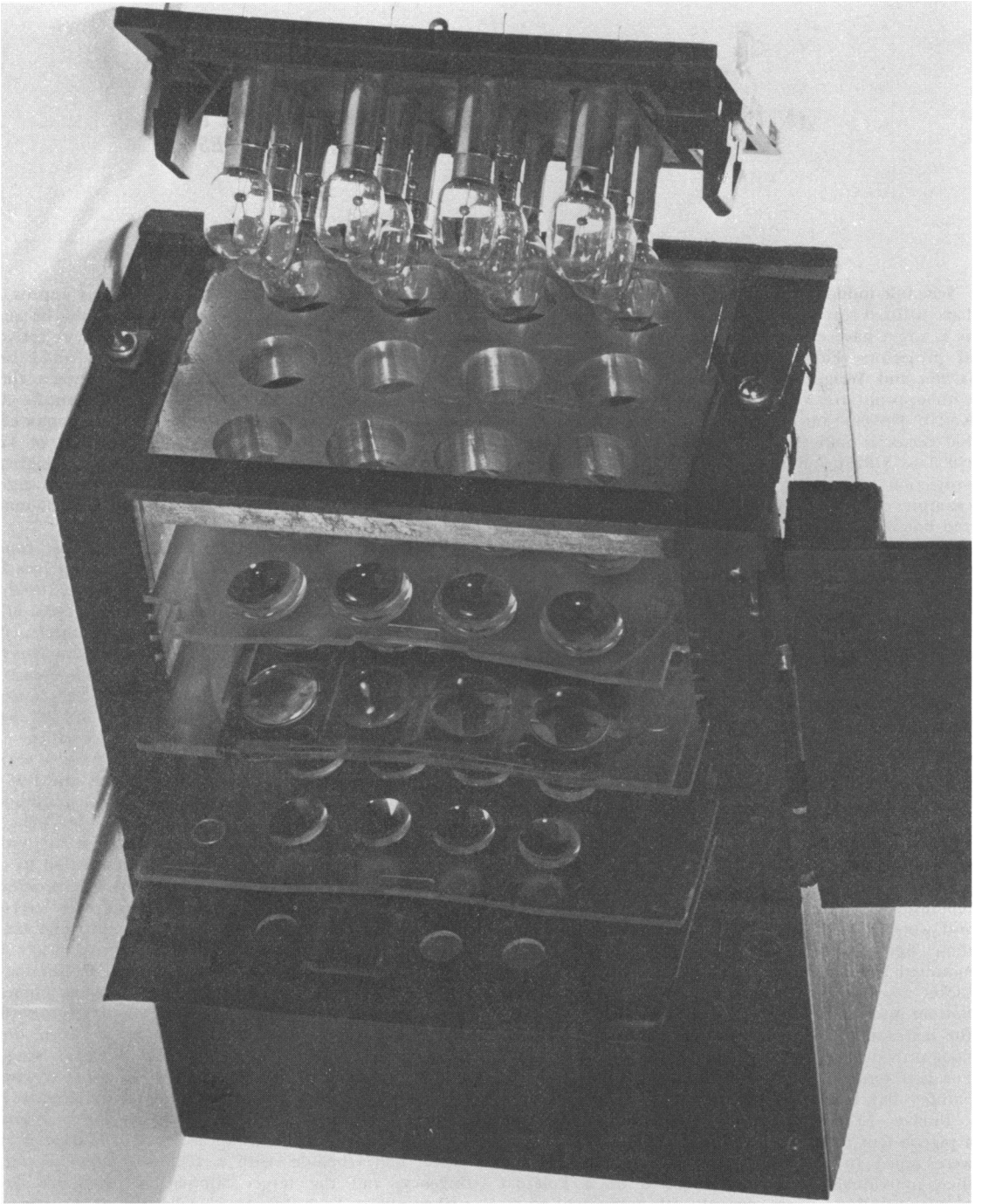


Fig. 1. Photograph of random-access projector.

as in other inter-food intervals of the session, the subject reliably tracked the pigeon image from side to side. The minimum time between successive target changes was less than 1 sec and there was an average

of fewer than one extra follow-through response on the white screen.

In addition to being useful for studying pictorial target control of schedule-induced behaviors (e.g.,

16	TRANSPARENCIES		12
15	TOP AND BOTTOM 3/4" WOOD		2
14	BRACKET ALUM (REAR PLATE)		1
13	KNOB	HARDWARE	1
12	HINGE	HARDWARE	1
11	DOOR 1/8 THK MASONITE		1
10	SOCKET ASSEMBLY	IEE, INC. #2172-1	1
9	LIGHT STOP		1
8	OBJECTIVE LENS	IEE, INC. #10469	1
7	CONDENSING LENS 2	IEE, INC. #10468	1
6	CONDENSING LENS 1	IEE, INC. #10467	1
5	G.E. BULB	#1886	12
4	16 SLOTTED HD. WOOD SCREW	HARDWARE	10
3	SPRING SOCKET ASSY CLIPS	IEE, INC. #4085-01	2
2	1/8 THK. MASONITE		1
1	10-32 x 3/4 LG. SOC. HD. CAP SCREW	HARDWARE	4
	FIND NO.	DESCRIPTION	PART NO. QTY.

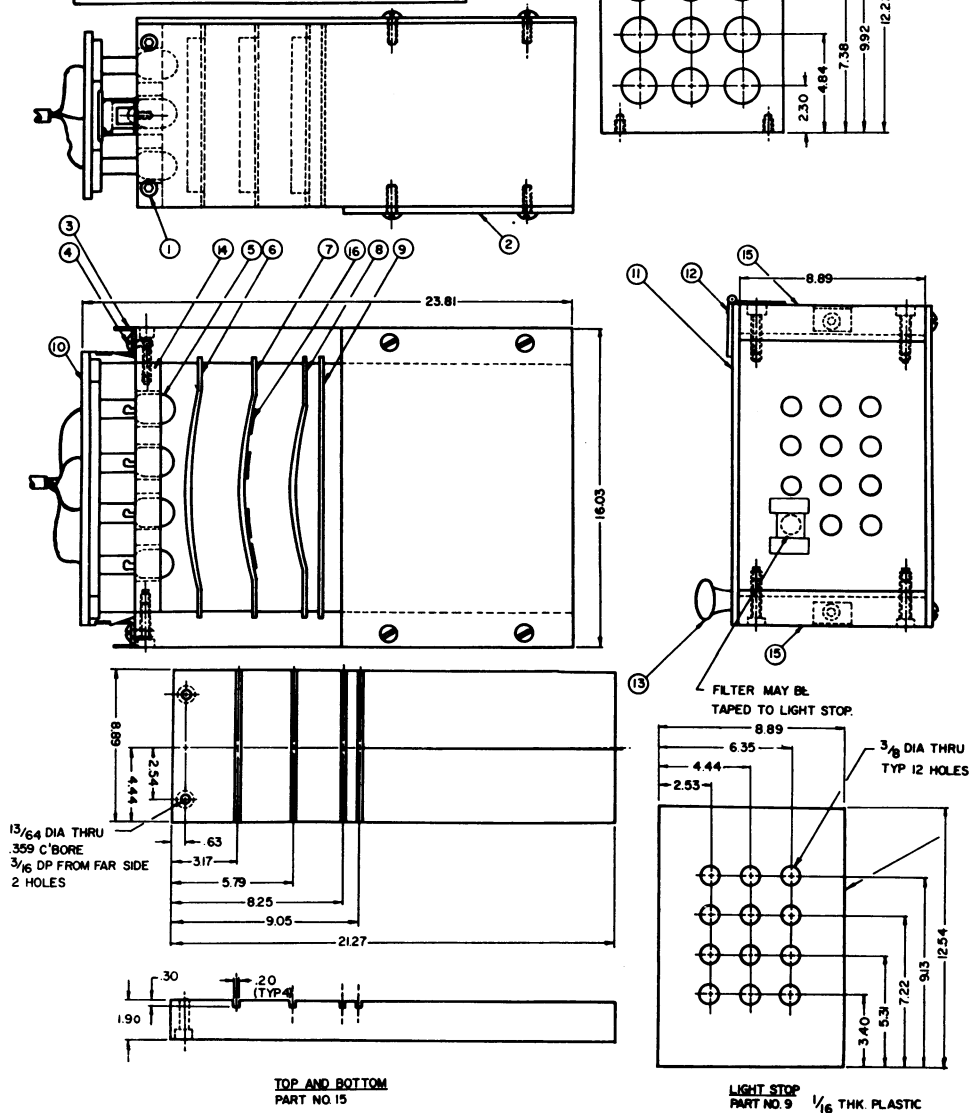


Fig. 2. Schematic diagram of random-access projector including diagram of light stop. For clarity, door is omitted in top and front views. All dimensions are in centimeters.

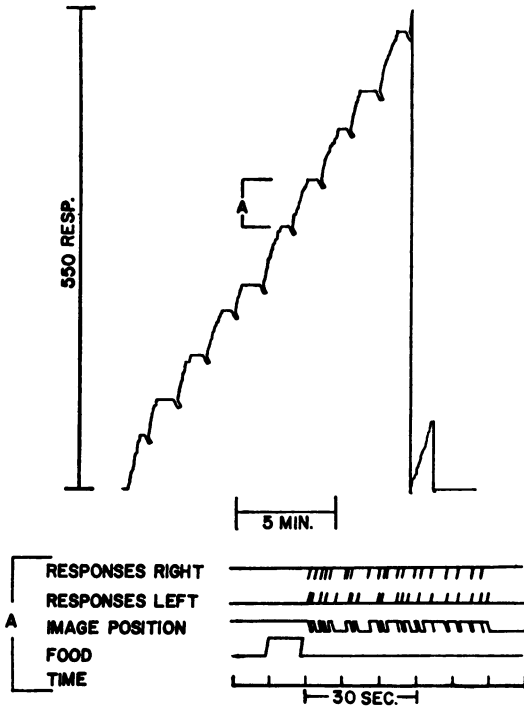


Fig. 3. Cumulative target responses on both targets as a function of session time (minutes). Each downward deflection of the pen corresponds to a food presentation. Event record "A" (below) shows the sixth food presentation of that session as well as the target responses and changes in the position of the pictorial image that followed that presentation.

Looney and Cohen, 1974), this inexpensive, random-access projector would be valuable for studying pictorial control of other behaviors such as operant responding (e.g., Butler and Woolpy, 1963; Thompson, 1964), sign-tracking, imprinted responses, and reproductive behavior (Lambe and Erickson, 1973).

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