

animated reflections

Montreal's loss is the West Coast's gain as Wally Gentleman, one of Canada's most talented special effects designers and cameramen, follows the sun and his fortunes to B.C. Below, he describes a front projection system for self-mating animated cartoon characters which he developed recently for Disada Productions.

by Wally Gentleman

Many years have passed since I first advocated, through the pages of earlier issues of *Cinema Canada*, the possibilities of Front Screen Projection at the miniature screen size level for techniques such as standard cartoon cel animation rostrum cinematography. At that time a pioneering application of the system was made possible through the sprayed application of the contents of an aerosol bomb of Reflectolite to a piece of art board serving as a reflective screen. Commercially sold by the 3-M Company, Reflectolite was considered a boon to homeowners who were advised to spray the solution to the trunks of trees on their property that might present a potential night hazard to those drivers seeking to find their garage entrances after a night out on the town.

The principle was that the light from the headlights of their cars, on striking the patches of Reflectolite on the tree, would be returned from those spots at a far greater intensity than the beams of light incident upon them. From the bleary eyeline of the driver the spots of Reflectolite would be very bright since his eyes, very approximately, would be near the level of the car headlight source. The paint having a reflectance value of, at that time, 200 times brighter than that which would be reflected from a tree painted with a flat white paint, would

flash a timely reminder of the possibilities of a dented fender.

Having previously experimented (as a logical extension to in-camera visual effects) with a high grain beaded projection screen in exploring the possibility of front screen projection through a semi-surfaced mirror placed at 45 degrees to the camera-object lens axis, it seemed highly probable that the tiny plastic spheres suspended within the 3-M medium would perform the function of returning rays of light incident on them to the source with far greater optical efficiency; and so it proved to be. The tests conducted then, both with live artists and cel mounted cut-outs demonstrated a practical application that was to culminate in the huge 120 by 50 foot screen mosaic and plate projection of **2001: A Space Odyssey**.

Many uses have been found for the 3-M high-grain screen material. It has steadily improved from the early days of aerosol bomb encapsulation to cans of the prepared solution for brush or spray application in different colors. The material lends itself to much creative enterprise. An actor wearing a waistcoat of it will appear to have a hole through him through which the background is seen. Hands can be coated for a mysterious glow or eyes can be made to flash different colors when the material is imbedded in contact lenses. The material used for general motion picture work is an adhesive-backed roll marketed under the name of "Scotchlite". It is a reflex reflecting material bearing the number 7610 High Intensity Reflective sheeting. It now has a reflectance exceeding by 600 times that of a flat matte white surface. This virtue allows for consid-

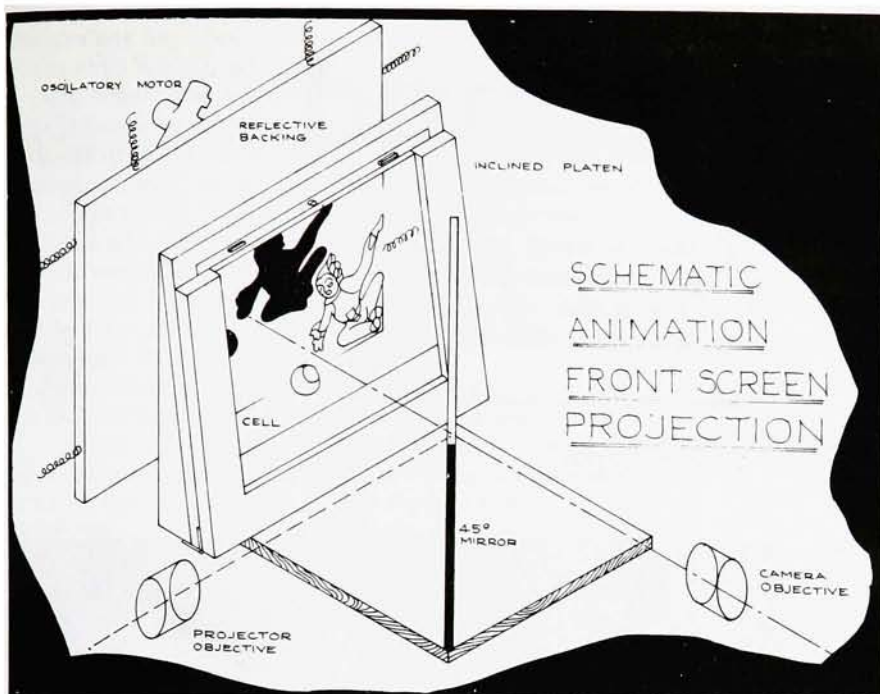
erable flexibility in the choice of a diaphragm setting for front screen process work and the choice invariably leads to more aperture closure for a greater depth of field.

It has also led to process projection work that utilises low intensity light sources and it has become feasible to supply a photographic background to an action via a simple Carousel slide projector. The continual improvement of Kodak photographic motion picture film, the higher ASA ratings and finer grain raw stock have all moved toward creating better opportunity for process activities via the 3-M reflecting material.

Another opportunity to confirm the versatility of the method was found when Disada Productions Ltd. of Montreal was contracted to produce a quality film combining live-action and full personality animation while respecting a modest budget. There are many ways of producing photographic mattes to permit immediate or subsequent image combination, some calling for highly exotic mechanisms and processes of varying complexity often radical in cost of time, labor and materials. To circumvent the latter, a front projection apparatus was commissioned by the Disada Studios by its President, Peter Adamakos. It consisted of a stop-frame 35mm process projector, an evaporated metallic-coated front surface mirror of 50 percent transmission, 30 percent reflectance and a 28 x 20 inch rectangle of 3-M material mounted to a background of 3/4 inch plywood suspended on a nylon elastic.

All this assembly was rigidly contained in a framework of bolted Dexion

Wally Gentleman, veteran cameraman, is president of Speac, a special effects company. Among his credits are many of the effects in 2001: Space Odyssey. An active member of the Society of Filmmakers, serving as president for several years, he has recently moved from Montreal to British Columbia.



for the utmost stability and erected in an entirely black painted room to eliminate any spurious reflections of objects in the glass and mirror surfaces of the apparatus.

It was to be expected that when the camera was framed to field a standard animation cel the source light of the projector would be seen in the immediate centre of the frame. By laying back the vertical platen fifteen degrees this reflection was eliminated completely. The slope also assisted the positioning of the cel bearing the cartoon subject on the top peg bar. Each cel for photography had to be pressed flat by gating the two glass platen surfaces into close contact. This normal action for cel photography was doubly important for the front projection cel photography since any ripples in the cel surface brought about inconsistent areas of reflection of the projection source light. It was also found that only the best quality manufacture in cel fabrication was permissible since any striation, scratches or such major imperfections were immediately evident as cast shadows on the background, picture projected via the mirror through the cel.

The quality of the reproduction was preserved through the use of 35mm original cinematography of the live backgrounds carefully exposed at a 2 to 1 lighting ratio with the full knowledge that the reproduction process to 16mm would entail a contrast

increase to the original. The pre-edited film in its entirety was committed to a carefully color-balanced print step-printed by Film Opticals (Québec) Ltd. to ensure ultimate registration to circumvent any possible movement of the background picture against the intended foreground action.

Under the supervision of William Byers, head of Disada Productions' Technical Department, rotoscoping of the background for determination of the points in the scene where animated characters were to be located was arranged by replacing the reflective screen background with a fixed pane of glass equipped with regular Acme animation pegs. The glass was set in the precise plane that the reflective background material was to be suspended so that the projected image for rotoscoping was the exact size as that positioned for combination photography. The difference in perspective distortion of the animated character and the background by reason of the inclined platen was checked and remedied in execution by pegging a field guide to the platen pegs and an identical field guide to the rotoscope glass panel where the difference due to distortion was easily perceived from the rear cast shadow of the platen guide.

The lighting of the cel was made from directly overhead. Again, the inclination of the platen from the vertical was exploited to catch the light of a 2K directed downwards upon it

through a lamp polarizing filter. By rotating another optical polarizing filter set on the camera lens, it was possible to balance the lighting of the animation cel against the front-projected background and to control diffusion haze. The slight color shift occasioned by the use of the polarized filter and mirror plus glass panels was adjusted by a color-corrected filter addition in the light path of the stop-frame projector. For a half second of exposure per frame, the wattage of the projection light rested at a low 150W.

The combination of slow camera speed and a high grain screen in close proximity to the cartoon cel permitted an exceedingly sharp shadow of the animated cel to be cast onto the reflective screen. Correspondingly, the camera lens could be diaphragmed for a maximum depth of field to hold the cartoon cel and the rear projected background for maximum resolution.

By this means no backing had to be applied to the cel cartoon image to provide additional masking, and background and foreground were simultaneously exposed while taking advantage of the quality inherent in a print-down process from a 35mm original to a 16mm original negative.

Consideration was given to the possibility that the grain structure of the 3-M material would be discernible in the finished copy due to such close-up photography, and provision was made to eliminate the possibility. The reflective screen was held in suspension but permitted one inch of travel latitude in a north, south, east, and west direction. No tolerance was permitted in a forward or backward vertical plane. A variac controlled electric motor was attached to the hanging screen and by this means the entire screen was entered into single plane oscillation during the period of frame exposure. The resultant image blur of the screen grain would, itself, eliminate the grain structure without affecting the resolution of the picture image.

A further advantage of the system was the possibility of immediate visual checks between foreground artwork and background action, as the cinematography was in progress. It was also of good advantage to dupe the entire film rather than attempt to intercut laboratory dupes with the combination scenes exposed on the process projection set-up. The photographic unity was preserved from titles to end credits. □