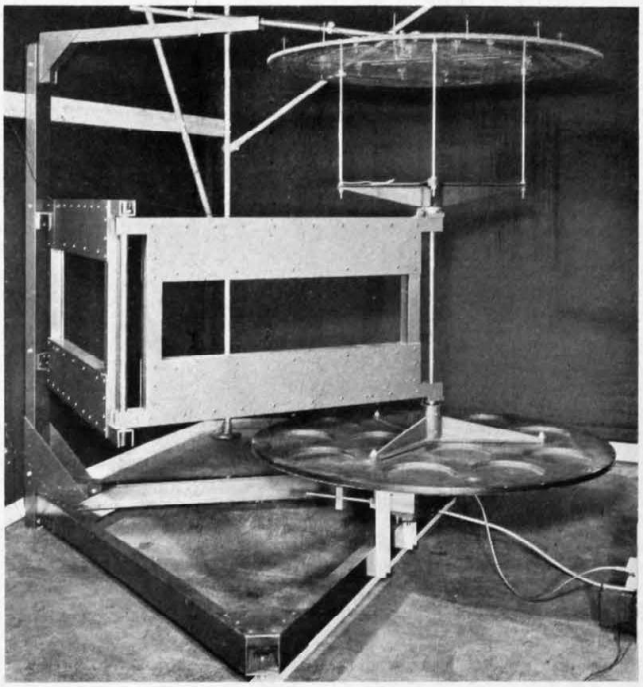
Universal Automobile Simulator

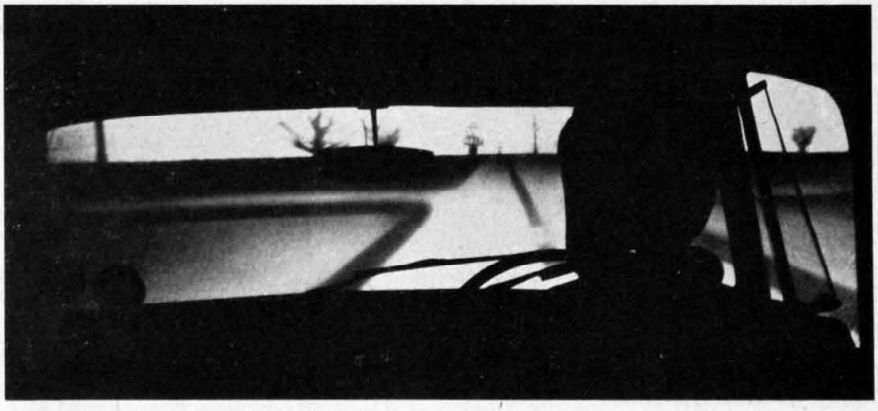
THE simulator is now well established as a training aid for applications when training at full scale is too expensive or dangerous—well-known examples are warships, aeroplanes, and nuclear reactors. A simulator has now been developed by General Precision Systems, Ltd., Aylesbury, Bucks, which is new in concept in that it incorporates the machine on which it is desired to instruct and simulates the response of the environment ; the gain in realism is fully exploited, since any individual machine can be mounted on the simulator.

The new simulator is intended to give learner drivers their first acquaintance with a motor car ; it can be predicted that with the simulator it will be possible to ensure that pupils know the functioning of clutch, brake, throttle, gear shift, and steering before entrusting them with a car on a road. It is also possible to use the simulator to develop drills and skills—for instance, releasing the hand-brake before starting, and changing gear without disturbing the course of the car. If the car is driven so as to touch the verge of the " road," an alarm sounds. A device measuring the time taken to apply the brake after a signal is illuminated can be incorporated. The simulator can be adapted to whichever car it is desired to teach, the only major alteration being to select a pedal position pick-off for the particular car.

The G.P.S. simulator is unusual in being basically a mechanical rather than an electrical analogue. The presentation of the environment is in the form of a projection of a transparent model on to a screen in front of the driver, the projection being from the opposite side of the screen. The light source is positioned opposite the driver's eyes, and the model landscape, made of transparent plastic, is moved below it by a drive unit. The velocity of the model is determined by the driver of the car ; the direction of movement is established very simply by linking the turntables carrying the front wheels by mechanical remote control to the drive unit. The speed of movement depends on the throttle pedal position and on the gear ratio selected by the instructor on his panel, the various ratios being established by friction drive to different sized drums. The drive unit is powered by an electric motor, the speed of which increases as the throttle is pressed and decreases as the brake pedal is pressed. Depression of the clutch lights a lamp on the instructor's panel, reminding him to change " gear " and allowing him to check that the pupil is disengaging the clutch at the appropriate moments. The pedal position pick-offs form a sub-assembly which is individual to a particular car model, and the different assemblies are readily interchangeable, being linked to the instructor's panel and the simulator proper by electric and, for the brake, Bowden cable.



The visual projection system: the transparent model is moved under the light source by a drive unit in contact with the bottom disc. The mechanical remote control visible in the foreground turns the drive unit in synchronism with the front wheels of the car



The appearance of the presentation as seen from behind the pupil

A "Victor" mounted on the simulator: the turntables supporting the front wheels can be seen. On the far side of the bonnet is a stop-clock displaying brake reaction time

The basic simulator, which is supplied with pedal assemblies for six popular cars, costs less than any four-wheeled car in England ; it normally runs off the mains supply, but a low-cost version will run off the battery of a 12V car.

A " Sim-L-Car " was demonstrated last week in London. As explained above it is intended to be used only *ab initio*, and so the simulation is not sufficiently refined to deceive the experienced driver. The finite size of the light source in the projector gives a faintly fuzzy image, and the image of the filament in the far side of the spherical envelope projects a second, fainter, image above the first ; at certain attitudes, the columns supporting the model appear as black shadows on the screen. Since the drive unit is turned by the front wheels of the car, the response of the simulator is that of a car with an infinitely short wheelbase, and hence extremely quick. Obviously, real tyre effects are not reproduced, but these imperfections are immaterial for the speeds used by pupils making their first acquaintance with a car.