## Astronomy, Hydrodynamics and Stamps

What have these to do with each other? Well, according to Mr. Dumoulin of the ESO Sky Atlas Laboratory in Geneva, very much indeed. In order to ensure a very uniform background density on the glass copies of ESO Schmidt plates, he uses a special machine, a so-called tray-rocker, to develop these plates. As the name implies, it is really a tray that rocks and rotates so that the developer floats across the plate, from one side to another. In the hope of improving the process, advice was sought from the Ecole Polytechnique de Lausanne where Messrs. Bruchat, Boillat and Giraud undertook a detailed study of the movements of the developer as a function of tray geometry, rocking and rotating rate, etc.

The results were encouraging and later a visit was paid to the ESO Sky Atlas Laboratory by two representatives of a well-known Swiss firm that prints official stamps for eight countries. One step in the production is the extremely critical development of a 30 x 50 cm glass plate which serves as a master copy for the printing of large stamp sheets. After an impressive demonstration of the ESO technique, it appears that European astronomy may help improving the quality of future European stamps. So, who said that astronomy has no practical implications on society?

Mr. B. Dumoulin with the tray-rocker in the ESO Sky Atlas Laboratory in Geneva.

## ESO Invents New Method to Stabilize a Large Telescope

The principle of the ESO computerized telescope control system, developed by the Controls Group, has been extensively tested on La Silla on the photometric and Schmidt telescopes respectively. A summary description of this system is given in Technical Report number 6 of May 1975.

The main effort during the test period at the factory was therefore devoted to the development of the computer-controlled servodrives of the two telescope axes. The mechanical structure, which supports the mirrors of the 3.6 m telescope, is in terms of servo-engineering a complex combination of interacting masses and springs, giving rise to instabilities.

The very high requirements set by the astronomers are not easily satisfied. The accuracy with which the instrument needs to be set at the object of interest, the smoothness and precision of the motion as well as the stability of the telescope and its resistance to external influences, such as windforces, are only some of the problems that must be solved. At the end of the testing period, a satisfactory solution for these problems was found and implemented, and a novel way to stabilize the telescope, using accelerometers, was developed. This work is documented by Technical Report number 7 (in print).

The efficiency of the damping principle is apparent from the figure. This shows the acceleration of the horseshoe after a disturbing force of 20 kp has been suddenly imposed at the top of the telescope tube. The upper curve is a recording without acceleration feedback and the lower curve with acceleration feedback.

This solution, in which the drive motors are also used to dampen the oscillations of the telescope caused by external forces, has been possible because of the use of spurgears. These gears, as opposed to the traditional wormgear, working in both directions and having low friction, give a "direct access" to the structure.

The actual installation of the control system on La Silla is scheduled to begin in May 1976.