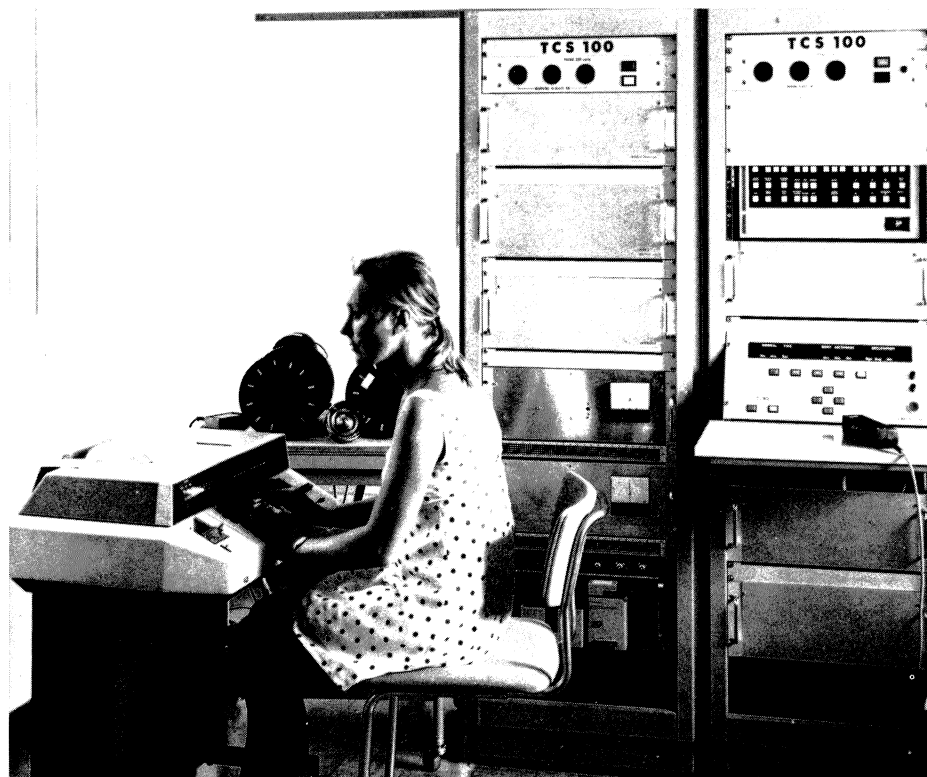


The control system was thoroughly checked before being sent off and the photograph shows the typing in of a test programme in the ESO laboratory at CERN.



CERN 110.8.73

It is a control system which is to be fitted to the 1 m photometric telescope. The system is believed to be the most advanced so far built and to give the astronomer an ease and precision of control never before achieved.

Designed by people whose background is of computers and machine control, it is not surprising to find that the system differs markedly from tradition. The astronomer has the tendency to think about how to make his controls fit the telescope he has engineered; the control engineer how to adapt the telescope to the control system he sees right for the job.

The particular model being fitted to the 1 m photometric telescope is really an off-shoot of the design for the ESO 3.6 m reflector which is being designed at CERN. So good have the test-bed results been that it has also been decided to fit a similar system to the Schmidt telescope at La Silla at the same time as its mechanical drive

problems are sorted out and a third example to the 1.5 m Danish telescope now under construction.

The drive motor employed for each of the telescope axes is a complicated device containing several windings which allow the motor to remain locked in position or rotate over a speed range of a million to one. This motor drives the 1 m directly through a worm gear. For the 3.6 m which will be driven through helical gears, it is proposed to avoid back lash by using two motors set back to back. On the shaft of the motor is a generator and digitiser connected to a standardized interface unit linking the drive with the computer. Reference position for the telescope is preset and the instrument will take up this position on switching on.

Once the correct siderical time has been typed in, the system is ready to go. In the memory are coordinates of stars as quoted in the catalogues or

fed in by the astronomer for a series of observations, together with the necessary astronomical corrections for relating these co-ordinates to the stars' actual position. A simple instruction and the dome will open at the optimum place while the telescope swings round to point towards the star indicated, the computer compensating continuously for the earth's rotation. The astronomer can then adjust the setting by hand through the computer's speed control. For major movements of the telescope the instrument is automatically brought up to the safe maximum speed and then decelerated regularly as the telescope nears its target. If the astronomer wants to check on background light he has only to indicate how far the telescope should be off-set and the computer will remember what position to come back to after the measurement.

The system for the 3.6 m will certainly be much more elaborate and it is planned to connect the central computer, in the memory of which will be stored the co-ordinates of a large number of stars, to all other telescopes of the Observatory with computerized control systems.

The telescope is fully protected against computer failure — the nightmare of the chap who doesn't really trust electronics — and the astronomer can override the system at any time. A nice detail is a circuit breaker which operates at a precise angle of tilt and which prevents the telescope from being driven outside its safe limits. It consists essentially of a ball bearing carried in a conical pot. At a certain angle of tilt regardless of the rotational position the ball rolls out disconnecting the circuit — simple but effective.

6600 moves house

In the March issue (page 72) we described the manoeuvres initiated by

Wim Klein extracted the nineteenth root of a 133 digit number in his head in 8 minutes. He is photographed with his mental wheels turning as he checks his result (below on the right) against the huge number strung out along the top of the blackboard.

the Data Handling Division to bring all the central computers into the new computer centre (building 513). These manoeuvres were necessary in order to avoid interruption to the computing service and have recently involved the move of the CDC 6600.

The work in moving the various sections of the 6600 began on 6 September when the peripheral equipment (including magnetic units, card readers and punches, printers, etc.) was disconnected. These units are installed on the CDC 6400 B, which is taking up some of the 6600 part of the CERN SCOPE workload. Subsequently, in the old computer centre (building 510), the dismantling of the four sectors of the 6600 and their transport for reassembly in building 513 in the immediate vicinity of the CDC 7600 computer got underway.

At the end of October, it will be the turn of the CDC 6500 to be dismantled

so that its peripheral equipment can be transferred to the 6600, which will become operational in its new home at the beginning of November.

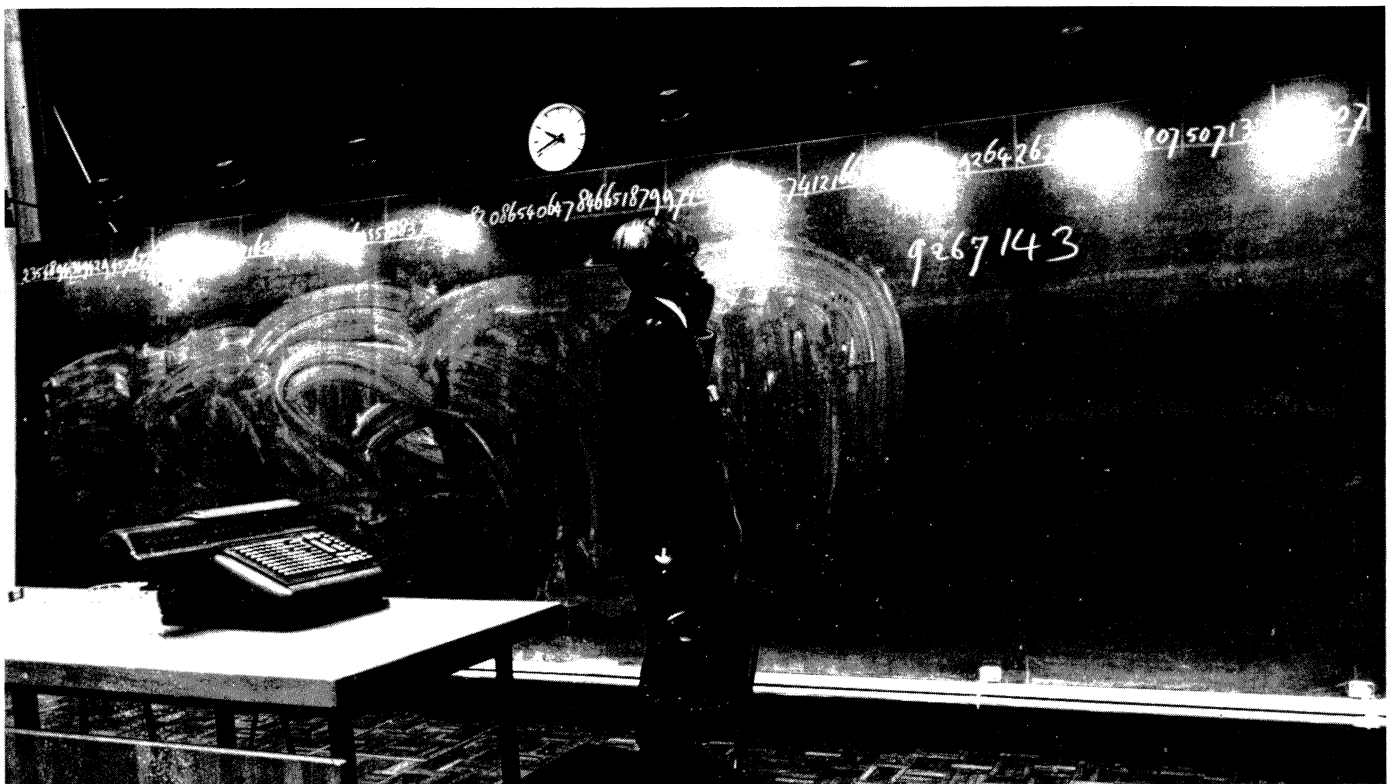
Another related move from the old to the new computer centre is that of 40 000 magnetic tapes, each packed in a tin giving roughly the shape and weight of a cheese. This began in the middle of September.

Human computer in action again

It has become something of a tradition to close the lecture series organized for the Summer Vacation Students with a display of mental arithmetic agility from CERN's human computer — Wim Klein. This year, on 5 September, an additional touch of spice was added to the proceedings by Klein's response to a mathematical challenge.

The challenge, accompanied by a financial inducement, was reported from Mexico where a mathematician had worked out the nineteenth root of a 133 digit number completely in his head in 30 minutes. Klein offered to attempt to beat this in front of his student audience. In fact the audience was supplemented by many other people from CERN so that over 200 assembled to witness the event in the Main Auditorium.

The first step was to compile the 7 digit number which would be the nineteenth root, the first digit necessarily being a '9' so as to ensure that the nineteenth power would have 133 digits. Six 'digit submission forms' were passed into different parts of the audience. One person, witnessed by one other, selected a digit to correspond to the digit place indicated on his form and then typed his choice into a computer terminal specially installed in the Auditorium.



CERN 17.9.73