

CERN Courier Archive: 1972

A LOOK BACK TO CERN COURIER VOL. 12, JULY/AUGUST 1972, COMPILED BY PEGGIE RIMMER

CERN

CDC 7600 passes acceptance tests

On 8 July, CERN's new, large, central computer, a CDC 7600, passed its acceptance tests. This required 30 consecutive days of operation on CERN's normal computing workload. Over those 30 days the computer was "down" due to faults for less than 10% of the time and, with a few minor reservations, it was then accepted by CERN. Since then, the performance has continued to improve.



Part of the large hall of the new computer centre. It houses the CDC 7600 (seen in the upper left-hand corner) and a CDC 6400, which serves as a front-end machine channelling computing to and from the 7600. (Image credit: CERN 135.8.72.)

● Compiled from texts on p232.

Black holes at CERN



The world of astrophysics has recently rocked to the news of the possible identification of a "black hole", a collapsed star where

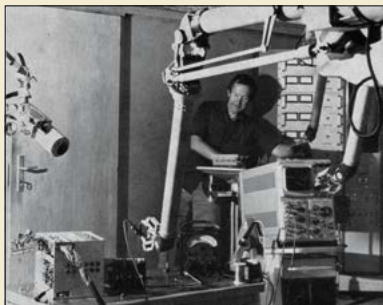
the gravitational pull is so strong that no signals can escape. Not to be outdone, we have identified seven black holes at CERN. Though of less immediate physics interest, CERN's black holes are still impressive. They are the shafts being dug on the site of the new accelerator, the Super Proton Synchrotron. Some of the shafts are now so deep that the work under way at the bottom is lost in the gloom.

● Compiled from texts on p238.

Above: 45-m underground, work begins on cutting a tunnel between two shafts on the SPS site. In this tunnel the "Mole" will be assembled to burrow around the 7-km circumference of the machine. Seeing the light, construction workers watch the camera pointed to the top of a shaft. (Image credit: CERN 60.8.72.)

Some like it hot

Experience in remote handling techniques is being gathered in the Proton Synchrotron PS Division, with a new advanced type of "teleoperator" known as Mascot. The interest in remote handling techniques at CERN and other high-energy physics laboratories is to develop expertise, should it prove necessary to use remotely controlled robots to work in "hot" regions around the accelerators, where radiation levels can



prevent human intervention or make it extremely difficult.

Already at the PS there have been occasions when work in and around the vacuum chamber had to be done in relay, so that no single person absorbed more than the maximum permitted dose. This problem will become much worse as the beam intensity goes up a factor of five using the Booster.

Robots have been fertile material for science-fiction writers for a very long time, but it is only in the past 25 years that their development has really got off the ground (leaving aside the pre-programmed type such as the famous Jaquet-Droz automata). Much of the stimulus came from the nuclear industry, and the Argonne Laboratory was the scene of a great deal of the pioneering work. Space programmes are another obvious user, with the possibilities of doing things like sending teleoperators to dig up bits of Mars. Another user is the oil industry, where interest centres on sending teleoperators to the bottom of the sea to exploit oil fields at great depths.

In these examples, the teleoperator is mainly used to extend man's normal handling abilities into hostile environments. However, there is also the potential of greater power, greater finesse, and of transmitting exceptional manipulative skills over great

The teleoperator Mascot in action, checking one of its own pulses. Movements of the operator are followed by the slave unit. (Image credit: CERN 99.8.72.)

distances. Advocates of teleoperators speak of the possibility, by the end of the century, of a heart surgeon in South Africa (where the more voluble seem to reside) carrying out refined surgery on a patient in Canada by operating a miniature slave manipulator via a satellite telemetry link. Just as the computer has extended man's brainpower, the teleoperator could extend man's physical power.

● Compiled from texts on pp239–240.

Compiler's Note



The computer-centre equipment shown is well known to have had the computing power of a smartphone or two, at a multi-million-dollar cost that needed the approval of CERN's

Finance Committee. Less recalled are the real estate, life-support systems and running-in time required by those behemoths.

As for running-around times, the Super Proton Synchrotron Mole spent two years digging the 7-km tunnel. In 1985, three Moles started excavating the 27-km ring for the Large Electron-Positron collider – Europe's largest civil-engineering project prior to the Channel Tunnel – and completed the work in three years. Started in 1988, the triple-bore 51-km Channel Tunnel was constructed by 11 Moles in six years.

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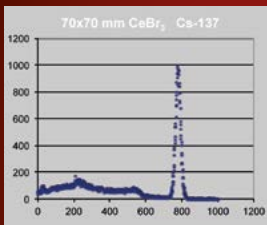
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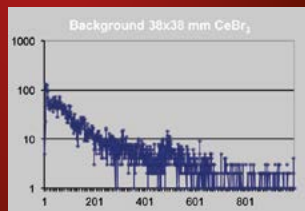


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