

1. The central unit of the CDC 7600, consisting of central processor, memory, 12 peripheral computers and 15 input and output channels.

2. Section of ferrite memory containing 1024 words of 13 bits, of which one is a parity bit.

3. One of the wafers forming the memory in photo 2.

4. A logic circuit comprising several tens of components. The central processor consists of 28 000 of these circuits.

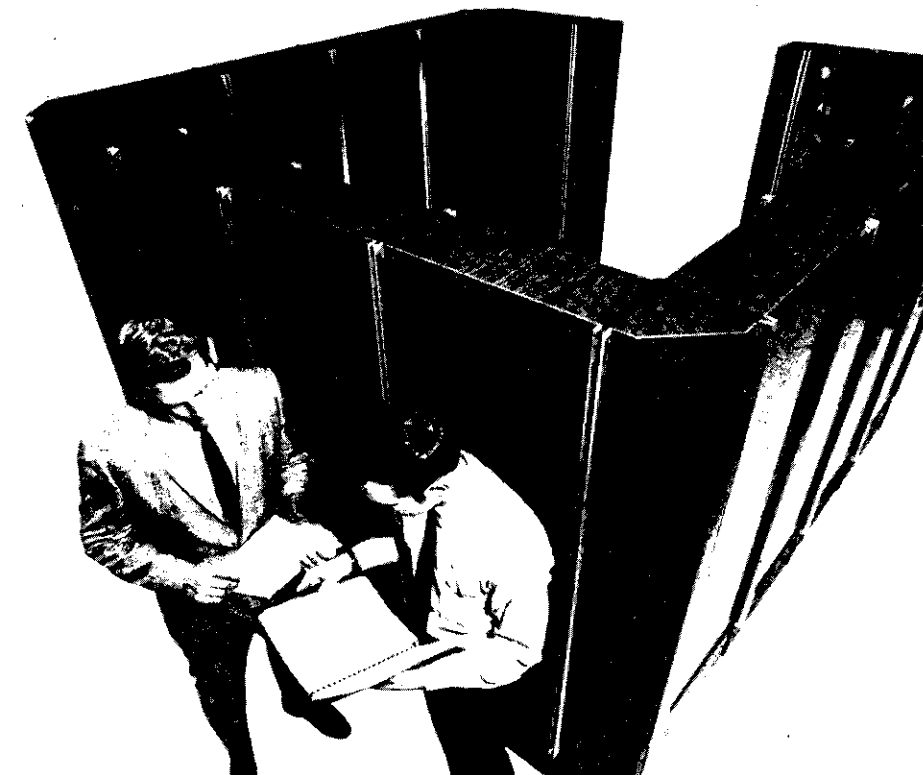
the other of 512 K words of 60 bits plus 4 parity bits. Input and output operations are carried out via small peripheral computers, with access to part of the small core memory. Unlike those on the 6600, these peripheral computers are independent, and up to fifteen of them may be connected, locally or remotely.

The 7600 is fitted with a maintenance control unit in the form of a peripheral computer which monitors the 7600 operation diagnosing malfunctions. This results in a significant improvement over existing maintenance methods.

The following table compares the main features of the central processors of the 7600 and 6600:

7600	6600
Word length:	
60 bits	60 bits
Main core memory:	
65 K words (3.9×10^6 bits)	131 K words (7.9×10^6 bits)
Full cycle: 275 ns	1000 ns
Transfer rate: 1 word/27.5 ns	1 word/100 ns
Large core memory:	
512 K words (3.2×10^7 bits)	
Full cycle: 1760 ns	
Transfer rate: 1 word/27.5 ns	
Instantaneous transfer rate of main disc:	
3.3×10^7 b/s	8.9×10^6 b/s

The CDC 7600 will be installed in a new building now going up on the ISR site, where almost all the Data Handling Division's computing facilities will be concentrated. Rather than the building



1.

being split into many sections for the various functions it will have a single hall. This will ease the difficulties of lay-out of equipment and, in view of the fact that the installation will be constantly changing, this arrangement offers the greatest flexibility. It also simplifies operating problems.

The installation of a complex of this scale presents considerable difficulties which have been studied for many months. All the 7600, 6600 and 6500 central processors will eventually be interconnected and must be clustered close together because of the restrictions on cable lengths for transmitting ultra-fast signals. In addition, there are cleanliness problems due to the fact that certain units (printers, card readers and card punches) produce dust, whereas others, like discs and tapes, are highly susceptible to damage by dust. These problems will probably be solved by installing the dust generating equipment in separate areas.

The computing service cannot be suspended while the transfer of the existing computers to the new building takes place. The 7600 will be the first to be installed in

the new building and it will gradually take the load off the existing centre until, after probably six months, a start is made on transferring the CDC 6500 and 6600 to the new centre with all their associated equipment. The transfer of the whole installation is currently planned to be completed by early 1973.

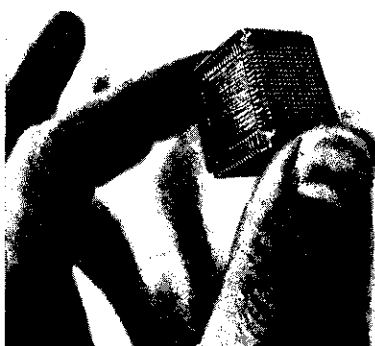
PS Shutdown

The annual shutdown of the 28 GeV proton synchrotron began on 15 November and will continue to the beginning of January 1971. As usual, the jobs to be done are too numerous to list individually and only some of the most important ones will be mentioned here.

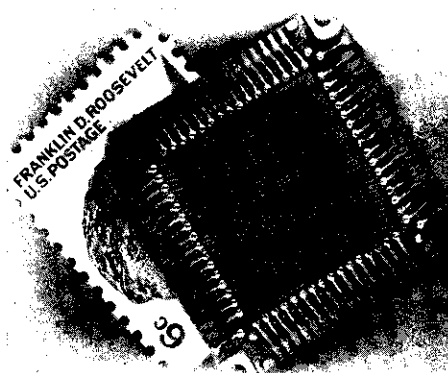
Linac

The work within the general framework of the improvements programme, which is aimed at increasing the pulse length of the linac from 20 to 100 μ s and preparing to feed the 800 MeV Booster, will be continued. This involves:

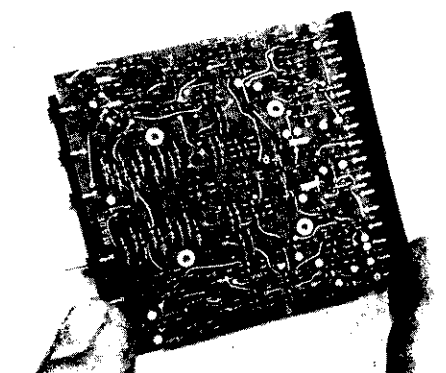
— modifying the compensation system,



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which will become servo-controlled, for the charge induced by the passage of the beam in the 500 keV accelerating column;

- modifying the main r.f. supplies to the three linac cavities, to the buncher and to the debuncher;
- modifying the r.f. circuit used to compensate the beam charge in the cavities;
- modifying the supply to the pulsed quadrupoles of the first accelerating cavity;
- installing the beam transport line from the linac to the Booster and the beam line for beam emittance measurements (see vol. 10, page 279) — a magnet will be replaced allowing the beam to be directed either towards the PS or towards the Booster, where it can be further deflected towards the emittance measuring beam line;
- reorganizing the linac control room.

PS ring

The work here involves some necessary maintenance and improvements particularly in readiness for coming higher intensity beams:

- fitting ion pumps in sectors 5 and 6 of the ring (sectors 1, 2 and 4 are already almost fully equipped) involving modifications to nine straight sections and the vacuum chambers in five magnets;
- modifying the vacuum chamber of fast ejection beam 74 (for which magnet 74 must be removed);
- replacing magnet 8, which has been seriously damaged by radiation, by a spare one (see vol. 10, page 227);
- trials on a method (which could reduce the number of magnets to be removed) in which the vacuum chamber is cut out of the magnet and refitted by welding again in situ;
- installing new straight sections (100, 1 and 8) to supplement the number of ion pumps, and changing the vacuum chamber in magnet 100;
- replacing a septum in straight section 43 for slow ejection studies and fitting a prototype electrostatic septum in straight section 66;
- many cabling jobs, particularly in anticipation of the installation of new dipoles, the new r.f. acceleration system and slow ejection system 16 (to supply the West Experimental Hall);

- construction of a building above straight section 45 for the fast kicker power supply which will control the transfer of the Booster beams into the PS;
- bringing Booster controls into the main control room.

Experimental halls

Two major changes are under way in the East Hall. First, the spectrometer beam-line for secondary particles from a hydrogen target in e7 is being removed. Two new beam-lines are to be installed for the future. One of them, e9n, will feed a target from which a hyperon beam-line will emerge (see vol. 10, page 281); the other, e9s, will feed a target for a neutral kaon experiment comprising a spectrometer and large proportional spark chambers. Second, the b18 secondary beam-line which supplied particles for tests on detection systems is being removed.

Nearly all the work to be done on the 2 m chamber, situated at the end of the East Hall, will consist of normal maintenance, mainly because of the limited amount of time available (six to seven weeks) in view of the necessary re-heating after the shutdown and the recooling before start-up. The main items to be overhauled will be the expansion system (with which ten million expansions have been carried out since the previous overhaul about two years ago), the compressors, the vacuum systems, the cooling system and the hydrogen refrigerator.

There are no changes in the North Hall and experiments with the 81 cm hydrogen bubble chamber will continue until the middle of 1971.

The main change in the South Hall relates to beam q9, used until now for medium-energy pions. An electrostatic separator will be added to it to allow it to be used to select negative kaons and medium-energy antiprotons. The experiment which will use this beam also requires a very flat platform, to take a large analysing magnet.

Bubble chambers

On 5 November the BEBC group celebrated the completion of the first pole of the superconducting magnet for the large European hydrogen bubble chamber. In all,

23 pancakes of the superconducting coil had been wound (that is a few more than the 20 required to construct a pole). In addition to CERN staff members involved in the project, there were also representatives of the main suppliers at the celebration.

On this occasion it was noted that the rewinding of one part of the pancakes (see CERN COURIER vol. 10, page 278), had been carried out in less than six weeks, thanks particularly to the efforts of the coil winding section. At this rate, the total of 40 pancakes will have been reached by the middle of December.

This little meeting was entertained by the showing of two films taken during the manufacture of the 66 km of superconducting strip by each of the firms sharing production (Siemens and Thompson-Houston). It was possible to make an interesting comparison between the different methods used by the two firms to produce items of essentially similar specifications. The superconducting strip is one of many examples in the construction of this chamber of the very effective collaboration which research workers and industry have established for solving difficult technological problems.

In the next phase, the two poles (weighing 100 tons each) will be transported to the hall of the chamber. The pancake stacks will then be placed in the cryostats (delivered to CERN some weeks ago) early in 1971.

About four million photographs, including 2.1 million in deuterium under double pulsing conditions, have been taken in 1970 with the 2 m chamber. This period of operation has been marked, not only by the use of deuterium and double pulsing, but also by the excellent quality of the photographs and by the fact that the chamber was able to receive low-energy particles (0.8 GeV). The latter two features were the results of modifications to the chamber carried out during the 1969 shutdown.

The total number of photographs taken in the 2 m chamber by the end of October had reached the figure of 3.5 million distributed over twelve experiments with which twenty-one European research