CERN COURIER

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European Organization for Nuclear Research

Comment

Contents

Cover photograph

The monster on the cover lives at CERN in the small workshop of the Nuclear Physics Division. Contrary to first impressions, it is a quite harmless machine busy here machining a piece of plexiglass for a counter experiment on the proton synchrotron. This acute observation of the gruesome aspect of some workshop equipment was made by Mr. A. Bondi who exhibited the photograph at the CERN Photo Club exhibition at the end of November 1966. Three other examples of the work exhibited can be seen on page 9.

With the first issue of this new volume, we introduce a new assistant editor, a new presentation and a broader policy for CERN COURIER.

The assistant editor, Bernard Bauer, has recently joined CERN from OCORA (Office de Coopération Radiophonique), Paris. He was born and educated in Geneva and worked for 2 ½ years with Radio-Genève before moving to Paris. Among other work in the CERN Public Information Office, mainly in the field of Press Relations, he will be concerned with the preparation of general articles and news for CERN COURIER.

Our new presentation, designed by Paul Kappeler of Geneva, takes over from the style which has been used for the past five years. We hope that it proves visually more attractive, encouraging more people to read our pages.

With the 'broader policy' the intention is to bring in more news of the life of CERN which is not directly scientific or technical and, as mentioned above, this will be mainly the province of the assistant editor. Over 6000 copies of CERN COURIER are distributed each month, the readership being divided almost equally between CERN staff and visitors, and people outside CERN. The external readership is mainly interested in the scientific work of CERN and this interest has dominated CERN COURIER policy in the past, often to the exclusion of news of internal interest. It will still predominate, but more attention will be given to internal topics. It is not intended to reduce the quantity of scientific news and we hope that our external readers will appreciate the reason for some increase in parochialism.

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CERN, the European Organization for Nuclear Research, was established in 1954 to '... provide for collaboration among European States in nuclear research of a pure scientific and fundamental character, and in research essentially related thereto'. It acts as a European centre and co-ordinator of research, theoretical and experimental, in the field of sub-nuclear physics. This branch of science is concerned with the fundamental questions of the basic laws governing the structure of matter. CERN is one of the world's leading Laboratories in this field.

The experimental programme is based mainly on the use of two proton accelerators — a 600 MeV synchro-cyclotron (SC) and a 28 GeV synchrotron (PS). At the latter machine, large intersecting storage rings (ISR), which will allow experiments with colliding proton beams to be carried out, are under construction. Scientists from many European Universities and national Laboratories as well as from CERN itself take part in the experiments and it is estimated that some 700 physicists outside CERN are provided with their research material in this way.

The Laboratory is situated at Meyrin, Canton of Geneva, Switzerland. The site covers approximately 200 acres about equally divided on either side of the frontier between France and Switzerland. The staff totals about 2300 people and, in addition, there are over 360 Fellows and Visiting Scientists.

There are thirteen member States participating in the work of CERN. The contributions to the cost of the basic programme, 172.4 million Swiss francs in 1967, are in proportion to their net national income. Supplementary programmes cover the construction of the intersecting storage rings and preliminary studies on a proposed 300 GeV proton synchrotron for Europe.

33rd Session of CERN Council

The Session was held at CERN on 14 and 15 December under the chairmanship of Mr. J. H. Bannier.

Progress report

The Director General, Professor Gregory, introduced the progress report of the CERN Departments for 1966 by recalling the work that CERN has been authorized to undertake by the Council :

(*a*) To continue research in increased collaboration with European physicists ;

(*b*) To implement an extensive programme of improvements to the existing Laboratory facilities ;

(*c*) To build intersecting storage rings at CERN and to continue studies on the proposed 300 GeV accelerator.

Current research

The proton synchrotron has suffered an increase in lost time (33.2 %) due mainly to the power supply breakdown at the beginning of the year and also because operation of the machine has become very elaborate to meet the demands of the experimental programme. For example, three fast ejection systems are now available and a slow ejection system has been brought into operation and used for experiments for the first time. At the injector, a duoplasmatron ion-source and new accelerating gap have been used with great success resulting in injected beams of over 100 mA (beams of 135 mA have been accelerated to 50 MeV). Also, at the beginning of the year, multi-turn injection was commissioned. The improved performance of the injector contributed to an increase in the average intensity of the accelerated beam to 8.92×10^{11} protons per pulse (7×10^{11} in 1965). The most intense beam ever recorded at the PS, 12.6×10^{11}, was achieved during the year.

Despite the lost time, an extremely successful programme of physics was completed. At the Berkeley conference (see CERN COURIER vol. 6, page 193) the quality of the contributions from CERN predominated in both theory and experiment. Selecting a few topics : Excellent results have come from experiments using polarized targets and the calibre of the work of Professor Abragam and his colleagues at Saclay on these highly refined instruments has been of great value to CERN. A measurement of the rate of decay of the long-lived K meson into two neutral pions has been made for the first time in an experiment involving scientists from Rutherford Laboratory, Aachen and CERN. The eta meson experiment on charge symmetry, perhaps the most publicized result of the year (see CERN COURIER vol. 6, page 171) brought into play several of the long-term developments in CERN's experimental facilities — spark chambers in a magnetic field, the Hough-Powell Device for automatic picture measurement and the CDC 6600 computer. The improved missing-mass spectrometer continued its observations on boson resonances. The muon storage ring, after a very successful initial run, is ready to measure the g minus 2 value for the muon to a new level of accuracy (see CERN COURIER vol 6, page 152). The CERN 2 m hydrogen bubble chamber took over 1 million pictures in experiments with K meson, pion, proton and anti-proton beams ; the majority of the pictures went to outside Laboratories and universities of whom there were 24 collaborating in the experiments. The 81 cm chamber was in operation filled with hydrogen or deuterium and results using the chamber have contributed particularly towards a better understanding of annihilation phenomena. The CERN heavy liquid bubble chamber was used for two important and difficult experiments during the year before being moved into position for the new series of neutrino experiments scheduled to begin in March 1967.

The 600 MeV synchro-cyclotron has had a very busy year, particularly during the PS breakdown when there was an increased demand for experimental time. A programme of improvements is being carried out for the machine and a healthy physics programme is under way especially in the field of nuclear structure physics. A lot of work has gone into preparations for the ISOLDE (isotope separator on-line) project which is scheduled to begin experiments in 1967.

Improvement programme and ISR

Work on the first stage of the programme of improvements for the PS and its experimental equipment is going well. This covers such items as the new PS magnet power supply, three new radio-frequency accelerating cavities and the heavy liquid bubble chamber, Gargamelle, being constructed at Saclay. The study concerning the possibility of a new injection scheme for the PS is almost complete.

The first year of construction of the intersecting storage rings has seen much of the preparatory site work completed and a start has been made on the excavation work for the ring tunnel. Studies of the various components of the project have continued throughout the year to finalize design.

300 GeV

Progress towards the proposed European 300 GeV accelerator was again one of the most interesting topics on the agenda of the Council. Since it is relevant to much of what follows, it is useful to mention again the timescale which it is hoped will be achieved for the decisions on the project : June 1967 — presentation of all the final documents to Council and from there to European governments ; December 1967 — approval of the Convention, selection of a site, agreement in principle to build the accelerator. Construction work could then begin in 1969 and the machine would be ready for operation in 1976.

Brief reports were made by Dr. Hine on the work involving CERN, and Professor Amaldi on the work of ECFA (European Committee for Future Accelerators). At CERN, the accelerator study group continues to review the design of the proposed machine in close collaboration with Working Group 2 of ECFA which is looking at machine design and utilization. An addendum to the initial design report, incorporating all the latest developments in machine technology and describing possible improvements which would make the machine a better instrument for physics, will be produced. The site surveys have accumulated considerably more information and a revised version of the first site report will be prepared for the Council Meeting in June 1967.

Professor Amaldi restricted himself to an outline of the intensive work going on in ECFA and, though much of the work is in an advanced state, did not present

The nine sites remaining under investigation as possible centres for the proposed 300 GeV Laboratory are as follows :

Austria	*Göpfritz*
Belgium	*Focant*
Federal Republic of Germany	*Drensteinfurt*
France	*Le Luc*
Greece	*Aspropyrgos*
Italy	*Doberdo*
Spain	*El Escorial*
Sweden	*Uppsala*
United Kingdom	*Mundford*

any conclusions. ECFA itself now involves over 50 European physicists, many of them from a younger generation than the committee which produced the 'Amaldi Report' where the 300 GeV accelerator was first recommended. In addition, Working Group 2 has set up five subgroups (beams and components ; representative experiments ; bubble chambers ; high energy detectors ; general aspects) involving an additional 66 physicists, also mainly young people. Professor Amaldi remarked that he was very impressed with the enthusiasm of the scientists in the Universities and national Laboratories of many countries, who were adding hard and detailed work on problems connected with the proposed accelerator to their normal duties. The first draft of the final report will be prepared for a meeting of ECFA on 20 February and it is hoped to present the report to the Scientific Policy Committee about the beginning of May and to the Council in June.

Convention

Following the decision of Council in June 1966, a letter concerning the Convention for the 300 GeV Laboratory was sent to the governments of member States in September. It requested decisions on two points — should the new Laboratory and CERN have a single Convention, and, if so, should this be a modified version of the existing CERN Convention ? Most delegations were able to indicate the approval of their governments for a single Convention adapted from the existing Convention.

Formal preparation of such a Convention will now begin. A preliminary version, based on general guidance given by the Committee of Council, which was in fact sent to governments to help them in their decisions, already exists as a basis. Preparatory work will be done by the Committee of Council and the CERN Administration, in particular to clear outstanding issues of policy. A small Working Group, including two legal experts (one from UK and one from France), will be set up. The aim is to present a draft to the Council in June and the final Convention to the governments of member States in September.

Site

The selection of a site for the accelerator will obviously be one of the most difficult decisions. The President of Council put forward a possible procedure to help ensure that the final site selection was reached in as fair and unbiased a way as possible. He suggested the formation of a panel of referees, with one representative from those member States not putting forward sites — Denmark, Holland, Norway and Switzerland. To prevent undue bias from having two representatives from the Scandinavian countries and also since Dr. Bjerrum from Norway acts as consultant on geological problems during the site surveys, the panel will have three members — J. K. Bøggild (Denmark), J. H. Bannier (Holland), A. Chavanne (Switzerland). (J. Martin from the French delegation has already dubbed them 'The three wise men'.) Their job will be to supervise the formulation of the site report to be presented in June and to accompany this report by an as objective as possible assessment of merits and demerits. With the report and assessment, it is hoped that each member State will be able to present a short list of three sites out of the nine still under investigation. By September, when a special Council Session may be convened, the three most favoured sites should emerge, giving time to come to the final decision in December.

Several delegations warned that, because of a variety of problems facing governments, the timescale, particularly on the agreement to participate in the project, seemed too optimistic. The President of Council stressed that, nevertheless, the Council and its delegated representatives should work hard to attempt to achieve the proposed time-table without anticipating difficulties which might occur.

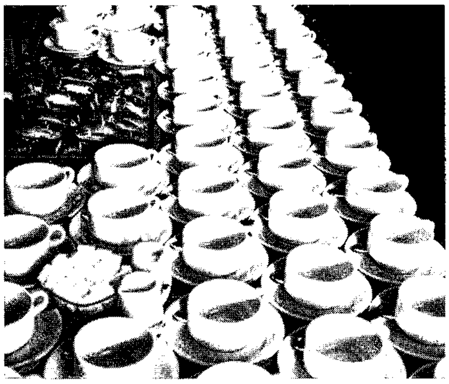
Budget

A firm estimate for the budget to cover the basic programme of CERN in 1967 was fixed at the December Council meeting in 1965 as 166.7 MSF (million Swiss francs). Applying to this figure a 'cost

Photographs taken during the Council Session at formal and informal moments.

CERN/PI 183.12.66

CERN/PI 224.12.66



CERN/PI 213.12.66

CERN/PI 240.12.66

CERN/PI 233.12.66

variation index' of 3.4 % to take account of the movement of prices since the estimate was made, the budget for 1967 was agreed as 172.4 MSF. This cost variation index of 3.4 %, which is calculated in accordance with a formula agreed by the Council, is the lowest to be applied since the Council began using this method of accounting for price increases.

The thirteen member States contribute to the cost of the basic programme as follows :

Austria (1.90 %)
Belgium (3.56 %)
Denmark (2.05 %)
Federal Republic of Germany (23.30 %)
France (19.34 %)
Greece (0.60 %)
Italy (11.24 %)
Netherlands (3.88 %)
Norway (1.41 %)
Spain (3.43 %)
Sweden (4.02 %)
Switzerland (3.11 %)
United Kingdom (22.16 %)

In accordance with the 'Bannier procedure', budget figures for the next three years were approved by the Council: firm estimate for 1968 — 194 MSF; provisional determinations for 1969 — 213.3 MSF, and for 1970 — 228.5 MSF (all at 1967 prices).

The figures for the Intersecting Storage Rings project were agreed (at 1967 prices) as follows: 1967 — 71.5 MSF, 1968 — 82.4 MSF (firm estimate), 1969 — 80.4 MSF (provisional) and 1970 — 72.3 MSF (provisional). All member States with the exception of Greece are participating in this supplementary programme. In addition, 4.42 MSF was authorized for continuing the preliminary studies of the proposed European 300 GeV accelerator.

Finally on financial matters, the Council agreed to reduce the debts owed to the Organization by Yugoslavia and Greece. The contribution of Spain was considered by the Council and it was accepted that 'special circumstances' applied to the contribution and, as is allowed for in the CERN Convention, it was agreed to reduce by 20 % the contribution of Spain calculated on the basis of net national income.

Serpukhov collaboration

At its session in December 1965, the Council approved the initiative of the then Director General, Professor Weisskopf, in pursuing the possibility of collaboration between CERN and the Institute for High Energy Physics at Serpukhov in the Soviet Union. The Institute is at an advanced stage of construction of a 70 GeV proton synchrotron which for many years (until the probable construction of the proposed 200 GeV accelerator in the USA) will be the highest energy accelerator in the world. (For a description of the project see CERN COURIER vol. 6, page 69.)

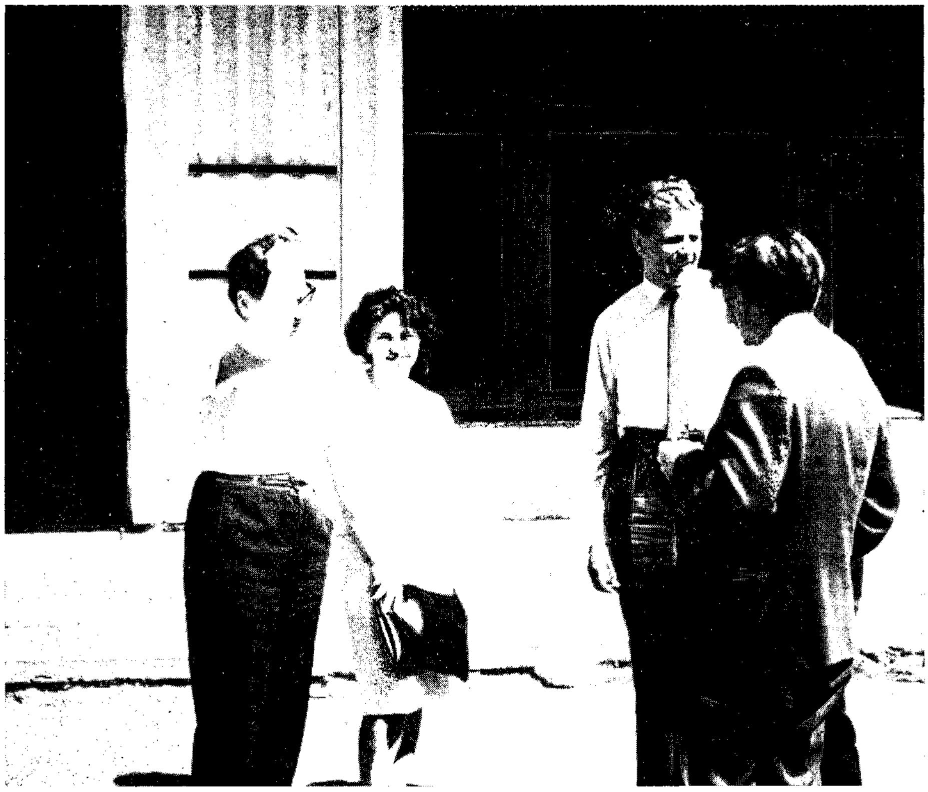
During 1966, further contacts between CERN and Serpukhov, including a visit by Professor Gregory to the USSR in May, enabled the Director General to present to the Council a much clearer and more detailed picture of how the collaboration might be implemented.

The Scientific Policy Committee and many Council delegates at meetings throughout the year and at the Council Session itself, supported the advantages of achieving this collaboration. The Council approved the possibility of collaboration and authorized the Director General to move to a new stage in the negotiations directed towards establishing a convention between CERN and the USSR State Committee for the Utilization of Atomic Energy. Mr. Bannier said that the Council has 'great hopes' for the future of this collaboration.

Mr. Bannier

As reported in the December 1966 issue of CERN COURIER, the Council appointed as President of the Council Dr. G. Funke (Sweden) to succeed Mr. J. H. Bannier (Netherlands), who was not eligible for re-election having served as President for three years. The Council Session ended with tributes from H.E. Mr. J. Giusti del Giardino (Italy) and the Director General in appreciation of the work of Mr. Bannier during his term as President.

Mr. Bannier studied physics at the University of Utrecht and moved initially into education, becoming Assistant Director for Higher Education in Holland where he



CERN/PI 222.12.66

The Director General, third from the left, pictured outside the main administration building at Serpukhov during his visit in May 1966. With him are several members of the Soviet Laboratory staff including the Director, Professor A. A. Logunov on the extreme left.

Below : Mr. Bannier (left), retiring President of the Council, with his successor Dr. Funke.

helped to set up the Netherlands Organization for the Development of Pure Research (ZWO). He became Head of this Organization in 1948 and was thus one of the delegates to the meeting, organized by UNESCO in 1951, which led to the formation of the original European Council for Nuclear Research (from which CERN derives its name). He was President of the preliminary Council in 1952-53 and represented his country in the CERN Council from its first Session.

In the ensuing years, Mr. Bannier played an important part in the affairs of the CERN Council but before mentioning some of his major achievements it is worth recording, as further indication of the effort and enthusiasm he has contributed to European science, the work he has done at the same time for other organizations. These include the European Southern Observatory (ESO) where he was elected President of the Finance Committee, and the Netherlands-Norway research reactor project. He represented Netherlands at the Intergovernmental Conference for Space Research, and was appointed a member of the UNESCO International Committee for Natural Sciences.

He served as President of the CERN Finance Committee from 1958-1960 and it was in this Committee that the method of planning CERN budgets which he instigated — the 'Bannier procedure' — was worked out. It recognizes the fact that the long-term nature of many of the major projects at CERN requires an assurance of financial provision for several years in the future. It would be much more difficult to plan a steady, rational development of CERN without the 'Bannier procedure'. The procedure involves the Finance Committee, at the end of each year, recommending to Council, budget figures for four years — a figure for the next year, a firm estimate for the following year, which will only be changed under special circumstances, and provisional figures for the following two years, which are by no means fixed but which serve as a guide-line to the governments of member States and the planners at CERN.

Mr. Bannier was elected President of the Council at the end of 1963 and has been in office at a time when some most important decisions have confronted the

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member States — such as the improvement programme, the intersecting storage ring project and the preliminary work towards the proposed 300 GeV. He has shown great skill, flexibility and resolution in guiding the Council through these decisions. Professor Gregory spoke of his 'clear, wise analysis of these problems' and praised Mr. Bannier's concern for human relations which have won him many friends in the Council and in CERN.

Finally, at his last Council Session as President, Mr. Bannier proposed the programme described above for preparing the Convention and selecting the site for the 300 GeV Laboratory. This contribution to the solution of a very complex problem was a fine climax to his term of office. We hope to see Mr. Bannier still at the heart of CERN affairs for many years to come.

New film on CERN

For some time recently, a visitor who had not previously been warned before entering a laboratory, office or experimental hall at CERN might wonder whether he had landed by mistake on a film set! Cameras, lights, wires and cables often occupy a large part of the available space.

Since November 1966, the Swiss film producer Guido Franco has been preparing a new film about CERN. The first shots have been taken and the film is intended to be finished in time for the June Council Session.

Why should there be a new film about CERN when one already exists (called 'Matter in Question') which gives a good picture of our Organization and of how its work is carried out? 'Matter in Question' was made in 1960. In seven years many things have changed: the research facilities have been altered and extended, new equipment has been built, many physicists have left CERN and others have taken their place, the work of the organization has advanced and the activities at CERN, though they remain basically the same, have become more ambitious as more and more discoveries during these seven years have increased the challenge of our work. These are some of the reasons which prompted CERN to have a new film made. Several film producers in the member States were contacted and finally the offer from Guido Franco was accepted. We met Guido Franco and put a few questions to him:

For several weeks you have been working on the production of a new film about CERN. We should like to know above all what reasons induced you to offer to make this film and what interests you most particularly about a subject like CERN?

G. Franco: What interests and intrigues me about a subject like CERN is that it concerns a typical phenomenon of our modern age. I suppose that if I had lived in the Middle Ages for example, I would have been interested in the construction of cathedrals. If I had been an ancient Egyptian, I would have been passionately interested in the building of the pyramids, and I think that today it is the resources required by science which are a most essential characteristic of our time and must therefore interest the artist.

CERN is a rather complex organization, unique or almost unique of its kind. It does not in fact produce anything material, by which I mean nuclear power, the launching of a missile, etc. One could say that CERN produces ideas, advancing our knowledge. How have you tried to get hold of this rather particular atmosphere of CERN, and how do you plan to put it onto film?

G. Franco: First, let us be clear, the film has not yet been made. We are still at the stage of taking our first shots and we have not yet got things cut and dried. That said, the fact that CERN does not produce anything material, does not seem to me an obstacle to making a film. On the contrary, I think it will be possible to make this film just as well as if it were about a centre producing atomic energy and I hope, even better. It is obviously a complex problem. We shall tackle it in many ways but to give you some idea, I am inclined to say that we are going to make a film which will be about half-way between a documentary and a news-reel — on the one hand we shall show certain concrete things and try to explain them, and on the other hand we shall delve into what CERN really is and try to grasp its distinctive qualities and its originality.

You have already made a number of films. In particular a documentary about Tunisia which recently provoked rather strong reactions from the Tunisian public, and some time ago you also made a documentary on the building of the Grande Dixence Dam. What are the main differences which you find between the latter film, for example, and the one you are now making at CERN?

G. Franco: The differences are obvious. In the case of the Grande Dixence, we were filming the construction of something very definite from the economic point of view, something destined to produce electric power. Furthermore, the construction of a dam is something which can be followed very clearly, the thing being produced has visible dimensions, whereas in the case of the film about CERN, if I asked the scientists to give me 100 grams of pions or kaons, this would certainly create some problems for them to produce and for me to film. Here, the reality of the things being studied cannot be seen by the human eye. We have to take account of this and find a suitable way round it.

Apprentice Training

Five apprentices were enrolled at CERN last year — two in design office work, one as laboratory assistant and two in administration. This modest start in apprentice training is in the nature of an experiment to see what sort of contribution CERN can make in this field. The scheme is being supervised by the Training and Education Section who are working in full collaboration with the Careers Guidance Office in Geneva.

The apprentices, starting at the age of about 15, will normally spend three to four years at CERN, according to their field of studies. They have been placed under the guidance of Apprentice Supervisors, namely: Mr. Albrecht, Coet and Reymermier for those in designing, Mr. Fivez and Thurian for those in administration, Mr. Roberts for the laboratory assistant. Due to the variety of disciplines involved in the training of the latter, several other specialists in CERN have agreed to collaborate in this supervisory task.

At the end of their stay, the apprentices may pursue their education further at a technical or commercial higher college to the level of full technicians, secretaries, ... If not, they can move into work in industry, other laboratories or administrations. It is not intended that the trained apprentices necessarily stay or return to CERN.

Especially for the type of education required by a physics laboratory assistant, the wide range of disciplines involved in supporting sub-nuclear physics experiments, provide what is possibly a unique concentration of skills at CERN. There are specialists available in many subjects and CERN may be able to provide valuable training facilities for young people from Geneva as well as from the surrounding French Departments, and later possibly from wider afield.

Visits in 1966

Almost 10 000 people came to CERN during 1966 to tour the Laboratory. The exact figure, 9392, represents a small increase of about 2 % compared with 1965. It indicates the steady interest in CERN by people from a variety of backgrounds in the majority of the member States and even from other continents.

The majority of these visitors were shown around the equipment in use at CERN and met some of the scientists, during the guided tours organized on Saturdays. There were also 193 VIP visitors including many well-known physicists and senior politicans from several of the member States.

The Press has also shown considerable interest in CERN. 101 journalists from newspapers, journals, radio and television were received by the Public Information Office during the year and shown around the Laboratory.

Concerts at CERN

The CERN management has decided that, in 1967, it will take over the organization of concerts of classical music, previously done by the CERN Music Club. This decision was taken partly because of the difficulties encountered by the Music Club, particularly with regard to finance owing to the rather small number of people attending the concerts in the past.

At the end of 1965, the CERN Music Club changed its name to the Record Club as a result of the reduction of its activities. The Club now concentrates on managing a Record Library and organizing concerts of recorded music in the lunch hour.

The management, acknowledging the cultural value of such events, will carry on the organization of the live concerts with certain changes of policy. In particular, the Geneva studio of the Swiss Broadcasting Service will co-operate very closely with CERN in the choice of artists and programmes and will record the concerts which will be given in the CERN auditorium. Radio-Geneva in return will contribute to the cost of the concerts.

Four have been arranged for this year :

6 April, the Michel Corboz Vocal Ensemble will interpret works by a number of composers including Debussy, Ravel, Poulenc, Hindemith and Monteverdi.

27 April, Ayla Erduran (violin) and Roger Aubert (piano) will play three sonatas by Brahms.

18 May, Brigitte Buxtorf (flute) and Catherine Eisenhoffer (harp) will present a programme including works by Frederick the Great, Bach, Inghelbrecht, Roussel and Debussy.

1 June, works by Schubert, Hindemith and Schumann will be interpreted by Stéphan Romascano (violin), Ron Golan (viola), Edgar Fischer (violincello) and Denise Dupont (piano).

It is hoped that this programme will satisfy the most demanding music-lover. That in any event is the wish of the CERN management whose aim is to bring CERN into fuller participation in the musical life of Geneva and, in general, in all events which involve an international organization such as CERN in closer contacts with its host city.

Photo Club exhibition

From 18 to 27 November 1966, the CERN Photo Club organized an exhibition at CERN as it does each year. The exhibition consisted of 138 photographs, the work of twelve members of the Club.

Three of these photographs are reproduced on the opposite page and the cover photograph of this issue was also selected from the exhibition. These were chosen not only for their artistic merit but also for their qualities which would lead to good reproduction in our journal. They are not the prize winners in the exhibition itself who are listed below in the different categories, including colour slides :

Beginner :	Mrs. Goidadin (general subject), Mr. Vandoni (portrait)
Free :	Mr. Frigo (general subject and portrait)
Series :	Mr. Høgaasen (general subject)
Colour :	Mr. Schneuwly (landscape), Mr. Saladin (general subject).

People in CERN who would like to know more about the activities of the club should contact Mr. A. Malmusi.

1. A popular subject for people living in a city surrounded by mountains. This photograph, taken by Mr. H. Høgaasen, is of the side of the Grand Capucin (on the right) in the Chamonix area of France.

2. Mr. O. Mendola found this picturesque flight of steps in the little medieval village of Pérouse about 30 km from Lyon on the Geneva-Lyon road.

3. This view of plane trees stripped of their leaves was taken last winter by Mrs. C. Goidadin at the edge of the lake in Geneva near Eaux-Vives.

1.

2.

3.

1. *A rear view of a matrix of 72 criss-crossed counters, made by the University of Geneva group, to measure the number of charged decay-products, mainly pions, of heavy mesons searched for in the missing-mass spectrometer experiment. The counters themselves are hidden by the black plastic sheet.*

2. *A new plastic scintillation counter with its light-guides. The passage of a charged particle through the counter produces a flash of light which passes down the specially designed light-guides with little loss in intensity. It is then converted into an electronic signal using photo-multipliers.*

Computers

CERN has decided to purchase a CDC 6400 computer which will become CERN's large, secondary computer (see CERN COURIER, vol. 6, p. 90). It has the great advantage that it is fully compatible with the existing CDC 6600. The machine is scheduled to be shipped to CERN early in April and it is hoped to have it installed by 1 May. It will replace the CDC 3800 which is at CERN on rental contract but it has been decided that the 3800 will stay appreciably longer than a couple of months overlap with the arrival of the 6400.

Colloquia

Three colloquia have been arranged for February. On 2 February, Professor Silvestri will talk about large scale electrical power production by nuclear reactors; on 16 February, Dr. Goodman from the World Health Organization will talk about the biological properties of immunoglobulins; on 23 February, Professor Piciotto will talk about the search for extra-terrestrial particles in the Antarctic snow.

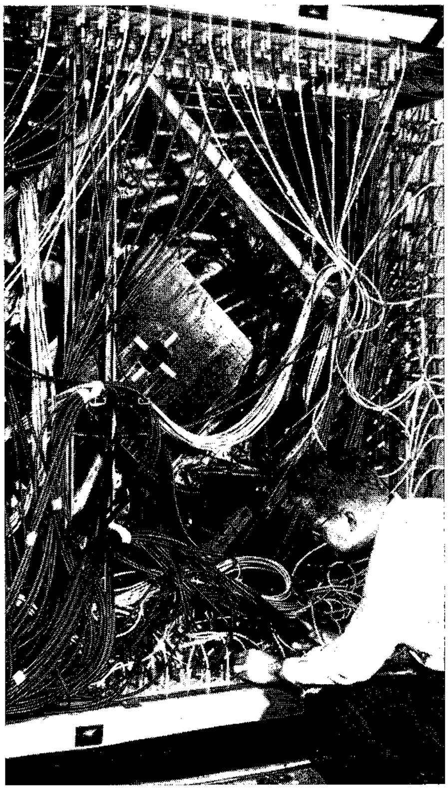
Used in 1966

The operation, maintenance and works section of the SB Division (Technical services and buildings) assembled at the end of 1966, the figures for general consumption at CERN during the year.

The main figures concern the consumption of electrical power which was less than in 1965 — 86,864,684 kWh as opposed to 94,733,242 kWh. This reduction was due mainly to the three months shut down of the PS. The total electrical power consumed at CERN in 1966 represented about 1/11 of the total consumed in the whole Canton of Geneva.

The amount of cooling water used was 4,022,230 cubic metres; the amount of fuel-oil 4,586 cubic metres. The circulation of 1,507,303 tons of hot water distributed about 34,010 x 10^6 kilocalories to the site.

Last but not least, we have a figure obtained from another source: 983,740 cups of coffee were served during 1966 to help about 2500 Cernites find the energy necessary for their work.



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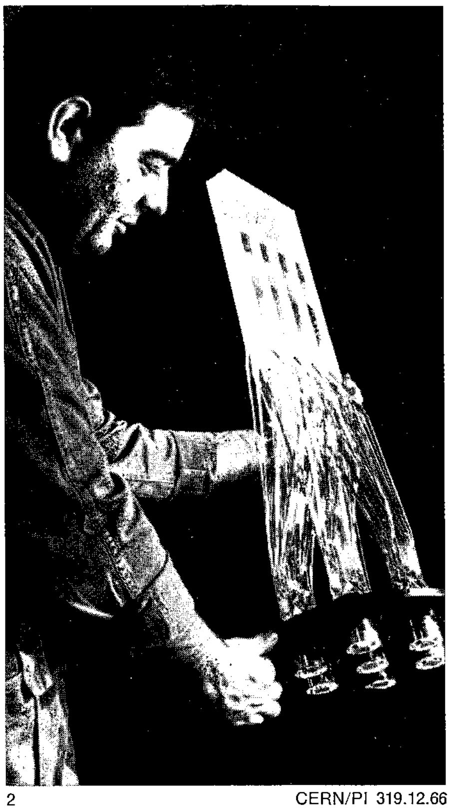

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Professor Preiswer[k and Professor Kowarski]
60th birthdays

Two of the founder members of CERN are celebrating their sixtieth birthday: Professor Peter Preiswerk on 16 January; Professor Lew Kowarski on 10 February. Both had considerable influence in shaping CERN into the type of Laboratory it is today.

Professor Preiswerk

Professor Preiswerk (photograph top right) was born at Basle, Switzerland, in 1907. He went to the University there and to the University of Berlin, where he heard lectures from many of the great physicists, such as Nernst, Planck, von Laue, Schrödinger and Bothe, who were there at that time. He returned to Basle and received his Doctorate in 1933.

The following year, he moved to the laboratory of Madame Pierre Curie, and became a collaborator of Frédéric and Irène Joliot, who had just discovered artificial radioactivity. He worked later with H. V. Halban on slow neutron physics. Among the papers they published was one which reported that neutrons reach thermal equilibrium in hydrogenous substances, and another that neutron resonance absorption is dependent on the velocity of the neutrons. This research later became significant in the field of the application of nuclear power.

At the end of 1936, Professor Preiswerk returned to Switzerland, to the Eidgenössische Technische Hochschule (ETH) in Zurich, to build one of the first cyclotrons to be constructed in Europe, and later he published a great number of papers on nuclear spectroscopy. He lectured at the ETH on Experimental Physics from 1946, and received the title of Professor in 1950.

In December 1950, he was present at the meeting of the Commission of Scientific Cooperation of the European Cultural Centre, when the creation of a European high-energy physics Laboratory was discussed. At this meeting, he suggested two possible sites for the Laboratory — one near Geneva (in the French Free Zone), and one in Alsace near Basle, giving preference to the first. Professor Preiswerk then played an important role in bringing this Laboratory into reality. He was one of the handful of experts, who were called together by Professor Auger in 1951, to coordinate the thinking of the

k, Professor Kowarski

scientists in the interested European countries and to fix the aims and the nature of the new organization.

With the setting up of the interim organization of CERN he became Deputy Leader of the Laboratory Group with a Planning Office in Zurich, and a member of the Executive Group. From 1954, he was Director of the Site and Buildings Division, responsible for the planning and installation of the site and the construction of the buildings to house the synchro-cyclotron, the proton-synchrotron and the laboratories.

When the first construction period was over he moved to the SC Division in 1958 and in 1961 became Leader of the Nuclear Physics Division, a position he still holds. This Division is responsible for carrying out, in co-operation with scientists from outside CERN, the high-energy physics and nuclear structure research programmes at the two CERN accelerators, using electronic counter and nuclear emulsion techniques.

Professor Kowarski

Professor Kowarski (photograph bottom right) was born in St. Petersburg (now Leningrad). In 1923, he began his studies in Belgium and continued them in France where he qualified as a chemical engineer in 1928 at the University of Lyon. For the next nine years he was technical secretary and then research engineer in an industrial firm 'Le Tube d'Acier' and at the same time did research in biochemistry at a hospital laboratory, in molecular physics (for which he received a doctorat ès sciences under Prof. Jean Perrin) and in nuclear physics, acting as part-time personal secretary to Prof. Joliot at the Laboratoire Curie and the Collège de France.

In 1937, he began full time research in Prof. Joliot's laboratory and in 1939 with H. V. Halban and Joliot performed the crucial experiments which proved that neutrons were emitted in the fission of uranium. Six months later, they produced the first proven nuclear chain reaction.

When war broke out, Halban and Kowarski took the world's entire stock of heavy water (which they had received from Norway for their experiments) and their important experimental records to England. Continuing their research at Cambridge University they produced the first strong evidence of the feasibility of a controlled nuclear reactor. Four years later, when the first nuclear reactor outside the USA was started in Canada, Professor Kowarski was in charge of design and construction.

After the war, he returned to France to become Director of the scientific services of the Commissariat à l'Energie atomique where he was in charge of building the first two French reactors — Zoe and EL 2. He was advisor to the French delegation to the United Nations Commission on the control of atomic energy. When the idea of CERN germinated, Professor Kowarski was party to the first informal discussions and then to the formal development of the Organization. He was chosen as Director of the Laboratory Group in 1952 responsible for planning the site, administrative methods, finance, workshops, etc. In 1954 when the permanent Organization came into being, he moved to Geneva as Director of the Scientific and Technical Services Division and supervised the formation of such activities as electronics, track chambers, cryogenics, health physics, workshops and computers.

In 1961, the Data Handling Division was formed with Professor Kowarski as leader, to cope particularly with the growing use of computers and of measuring devices for bubble chamber and spark chamber film. (One of these devices, 'Luciole', was initiated by Prof. Kowarski himself and he has also been involved in the development of the Hough-Powell Device.) Now, he has a special position supervising the long-term development of data-processing in high energy physics and the closely related problems of communication and collaboration between central Laboratories such as CERN and outside groups.

Among other activities, he has remained interested in nuclear affairs as scientific adviser to ENEA (European Nuclear Energy Agency) where he played a large part in launching the Dragon reactor project. In 1964, he was awarded the 'Officier de la Légion d'Honneur'. At the beginning of 1966, he became Professor at Saclay and now lectures regularly in Paris.

We offer our congratulations to both these founder members and wish them many more happy and fruitful years in science.

CERN/PI 157.12.66

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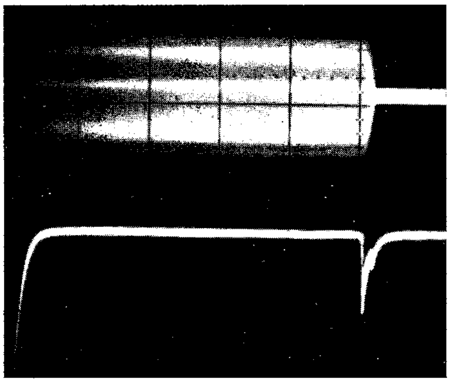
News from abroad



An oscilloscope photograph, taken in the control room at the Daresbury Laboratory on 2 December, showing the first acceleration of electrons to high energy in Nina. The top trace is taken from a pick-up electrode in the machine which sends out its signal each time the electron beam passes. The trace starts on the left when the electrons are injected and moves across the screen to the right, each graticule division in the horizontal direction being equivalent to 2 ms. The pick-up electrode therefore indicates that electrons were orbiting the machine for about 10 ms. In this time the magnetic field rose to a value near that required to hold 4 GeV electrons in the ring. The lower trace comes from a scintillation counter which sends out a signal when charged particles pass through it. On the left the trace dips when electrons are lost from the beam while injection is in progress. It then remains steady until, after about 10 ms at an energy near 4 GeV, another dip records a high energy spill of electrons from the beam.

Nina in action

The electron synchrotron, Nina, at the Daresbury Nuclear Physics Laboratory, UK, produced its first high energy beams on 2 December 1966. The following day the design energy of 4 GeV was reached and an energy of 4.5 GeV was achieved on 5 December.

Nina joins two other electron synchrotrons, DESY at Hamburg, Federal Republic of Germany, and CEA at Cambridge, USA, as the major electron circular machines in the world. (A similar machine is under construction at Erevan in Armenia.) Within the UK itself, it is complementary in its physics potential to the proton synchrotron, Nimrod, at the Rutherford Laboratory. It is also complementary in its siting, in the north-west of England to serve particularly the northern universities, such as Manchester, Liverpool and Glasgow, whereas Nimrod is more conveniently positioned for the southern universities such as London, Bristol and Southampton.

The decision to build Nina was taken in 1962 and work began on the site in November 1963. In order to have the machine ready for physics as quickly as possible the machine designers drew heavily on the experience of CEA and DESY and succeeded in constructing and commissioning the machine in a very short time. Teams are already setting up their experiments in the experimental hall and it was hoped to provide them with their first photons in January.

Nina is an alternating-gradient synchrotron with a ring 70.2 m in diameter with 40 magnet units and 5 radio-frequency accelerating stations. Each magnet unit is 3.3 m long separated by straight-sections alternately of 1 m and 3.5 m. The longer straight-sections give easy access to the beam for experiments. The design energy is 4 GeV but the magnet and power supply system is capable of perhaps as much as 5.3 GeV. Injection is from a 40 MeV electron linear accelerator, which will also be able to inject positrons if desired at some later date. One of the most important design features is that it should be possible to accelerate currents in excess of 1 μA and possibly up to 10 μA. If this can be achieved it will make the beam intensity in Nina considerably higher than in any other electron synchrotron in the world.

The results coming from CEA and DESY have already shown that the field of particle physics to which Nina will contribute is full of interest. The experimental programme will cover such topics as the study of the structure of the nucleon (pioneered on the Mark III Stanford electron linear accelerator), the study of resonances and short-lived particles (where beams of electrons and photons can have some advantages over the conventional beams at proton accelerators) and refined tests of quantum electrodynamics.

The Director of the Laboratory is Professor A. Merrison, now Professor of Experimental Physics at Liverpool University, who was a well-known experimenter at CERN in its early days. We congratulate Professor Merrison and his staff on their achievement and wish the Laboratory a very successful future in particle physics research.

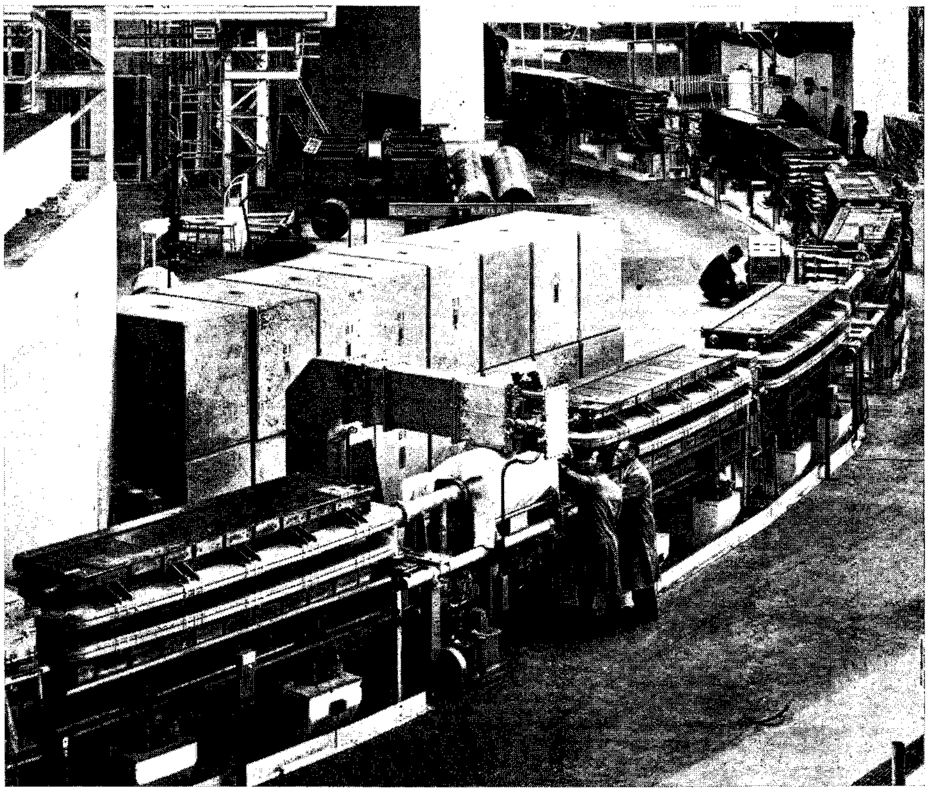
Weston wins

The decision on the site for the proposed USA 200 GeV accelerator was announced on 16 December. From more than 200 sites, 85 were investigated by the National Academy of Sciences to arrive at a short list of six in April 1966 (Ann Arbor, Michigan ; Brookhaven ; Denver, Colorado ; Sierra foothills, California ; Madison, Wisconsin and Weston, Illinois). From these, the US Atomic Energy Commission selected Weston a suburb of Chicago, not far from the Argonne National Laboratory where there is a 12.5 GeV proton synchrotron (ZGS).

The decision placates the Mid-Western States who have complained of the brain-drain within America to the centres of big science on the East and West coasts. The site has 6800 acres of flat land and is about 50 km south-west of the Chicago airport which is served by planes from many cities in the USA and from Europe. This accessibility to scientists from throughout the USA was no doubt another factor in the decision.

The Atomic Energy Commission plan to ask for $10 million for continuing design work in 1968 (the initial design study was

The magnet ring of Nina where it passes through the experimental hall. Almost in the centre of the photograph can be seen one of the radio-frequency accelerating cavities with its wave-guide. When the machine is in operation this section of the ring is surrounded by shielding to keep the radiation produced in the ring, down to acceptable levels in the experimental hall.



done at Berkeley, California) and for money for the actual construction of the machine at an unspecified later time.

Experiments at Stanford

Experiments began at the end of November 1966, at the Stanford Linear Accelerator Centre using the 20 GeV linear accelerator. This was six months ahead of the original schedule. Electron beams with an energy of 10 GeV were achieved for the first time in May 1966 and since then the available energy has been increased so that beams in the energy range 10 to 18 GeV can be used in the experiments.

At present, about half the operating time is given to the physics programme and the other half to improving the performance of the accelerator itself. By mid-1967 it is intended to give 90 % of the operating time to the experimental programme.

Gravity

The preliminary results of a highly refined experiment carried out by Stanford University physicists F. C. Witteborn and W. M. Fairbank were announced at the end of December. They have succeeded in measuring the effect of gravity on electrons, the lightest of all the particles.

The difficulty of the experiment however does not lie in the light weight of the particle but in the fact that the force that the electron feels due to gravity is very much weaker than the electromagnetic force that it feels from other charged particles. The force on an electron due to the gravitational field of the whole earth is equaled by the force on an electron due to another electron at a distance of about 5 m by virtue of their electric charges, and this electromagnetic force grows more powerful the nearer the charged particles are together. Thus, to look at the effect of gravity it is necessary to shield the electron as far as possible from all electromagnetic fields including those from the material used in the experiment itself.

The electrons emerged from a cathode positioned at the bottom of a verticle copper tube 5 cm high which served to shield the particles from external fields. A large superconducting magnet formed a 'magnetic bottle' for the electrons in the centre of the tube. Most of the electrons emerged from the cathode with velocities too high to be measured but a few were moving slowly enough for the time that they took to spiral up to the top of the tube to be measured with an accuracy of about 2 %. The gravitational force could then be determined from the flight times of these slow electrons and by measuring the electric field required to prevent a slow electron from accelerating.

The experimenters now hope to look at the effect of gravity on positrons (anti-electrons) and a positron source is being developed. The problem here is to obtain positrons with sufficiently low energies and the source consists of a radioactive positron emitter followed by gas to slow down the positrons before they enter the copper tube. If measurements on anti-matter prove feasible, they will be a test of the idea, beloved of science fiction writers, that anti-matter may fall up instead of down in a gravitational field.

Cosmotron

On 30 December 1966, the world's first proton synchrotron to contribute to particle physics — the Cosmotron at Brookhaven National Laboratory, USA — was closed down. The machine began operation in 1952, and was capable of a maximum energy of 3 GeV. With the advent of the 33 GeV machine at Brookhaven in 1960, the high energy physics experiments went more and more to the bigger machine. The Cosmotron thus became the first major accelerator to suffer from the recommendation in the Ramsey Report of 1963 that 'accelerators which become relatively unproductive' be closed down.

Quite recently however there has been increasing use of the Cosmotron for nuclear structure research and considerable efforts have been made to persuade the US Atomic Energy Commission to provide the money for continued operation. It is still possible that this will come about. The machine is not yet being dismantled and we may not have heard the last of the Cosmotron.

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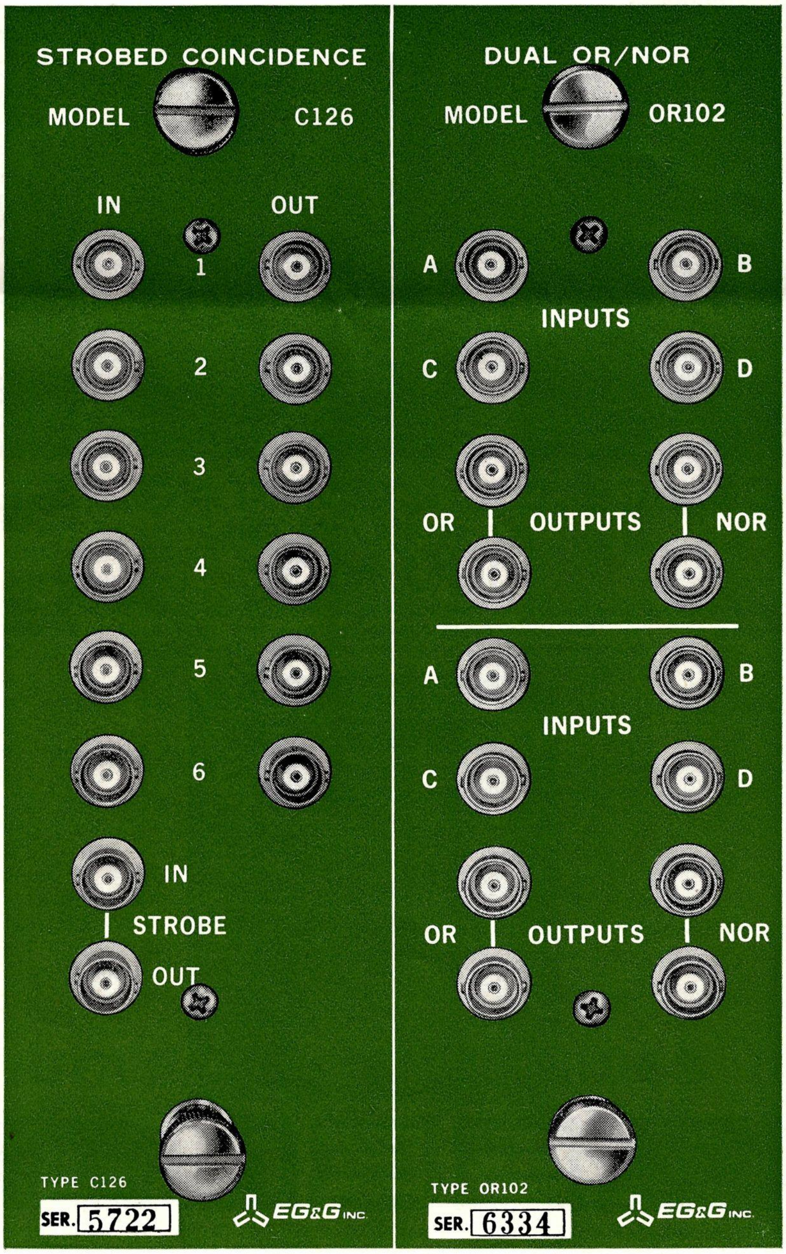

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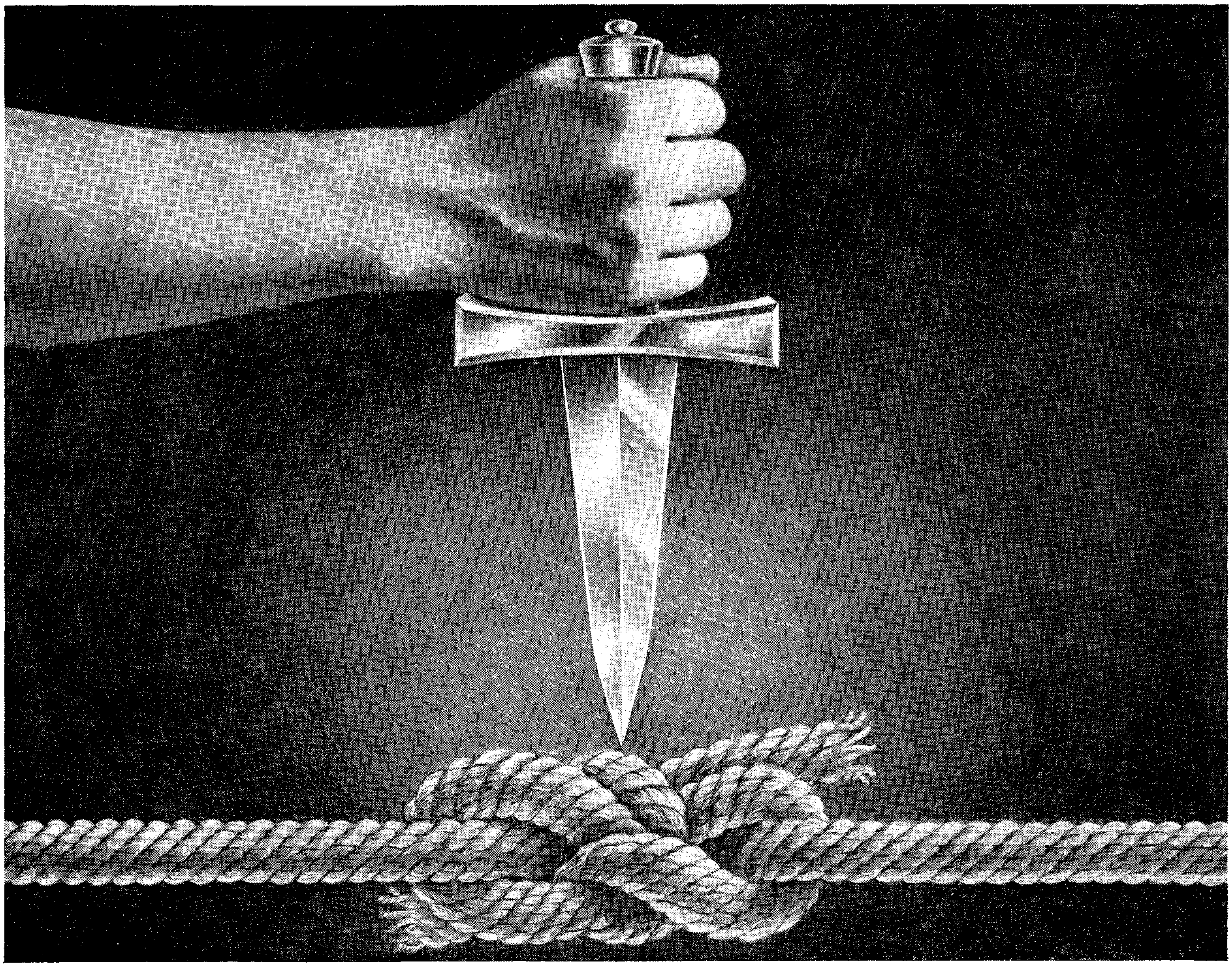

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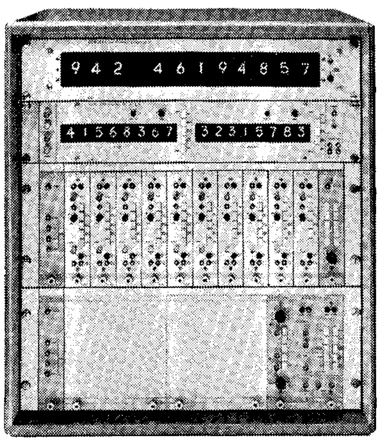

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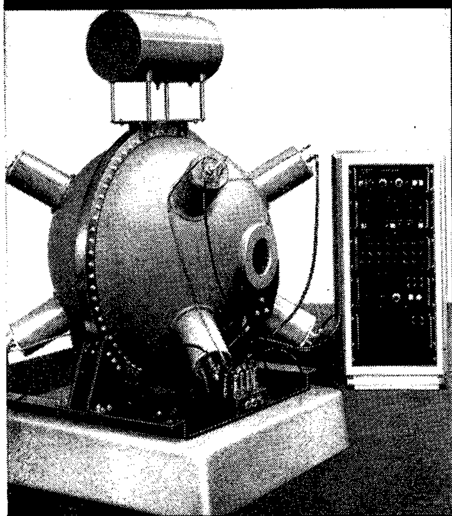

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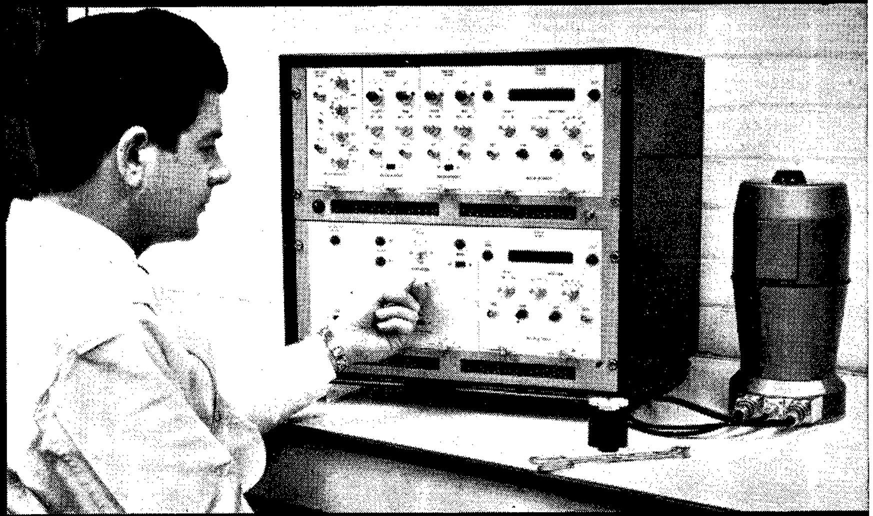

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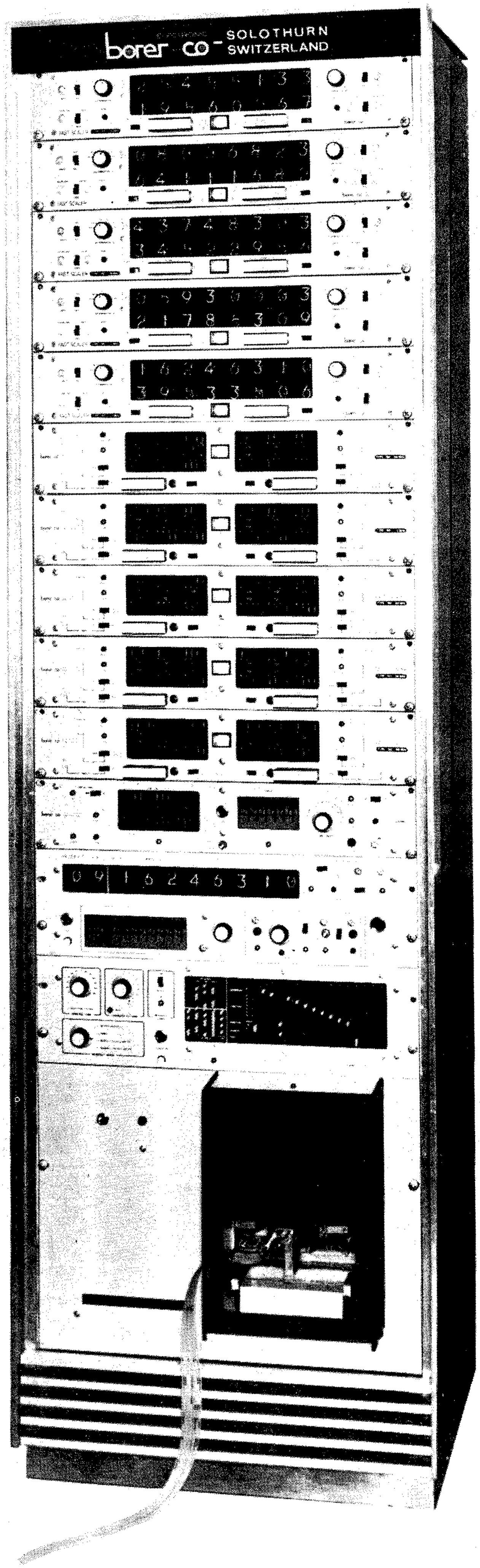

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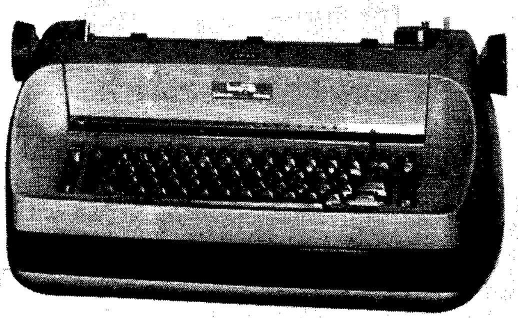

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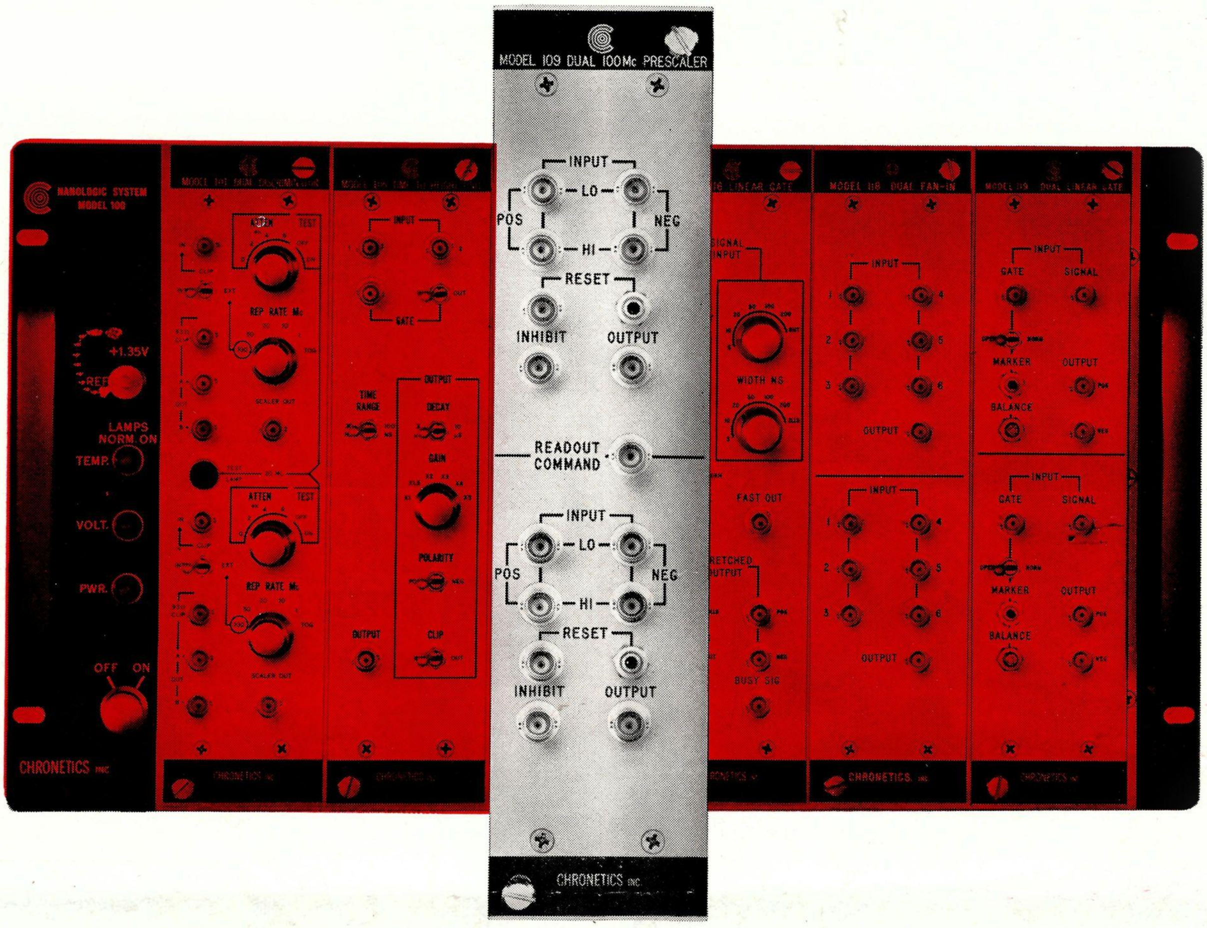

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