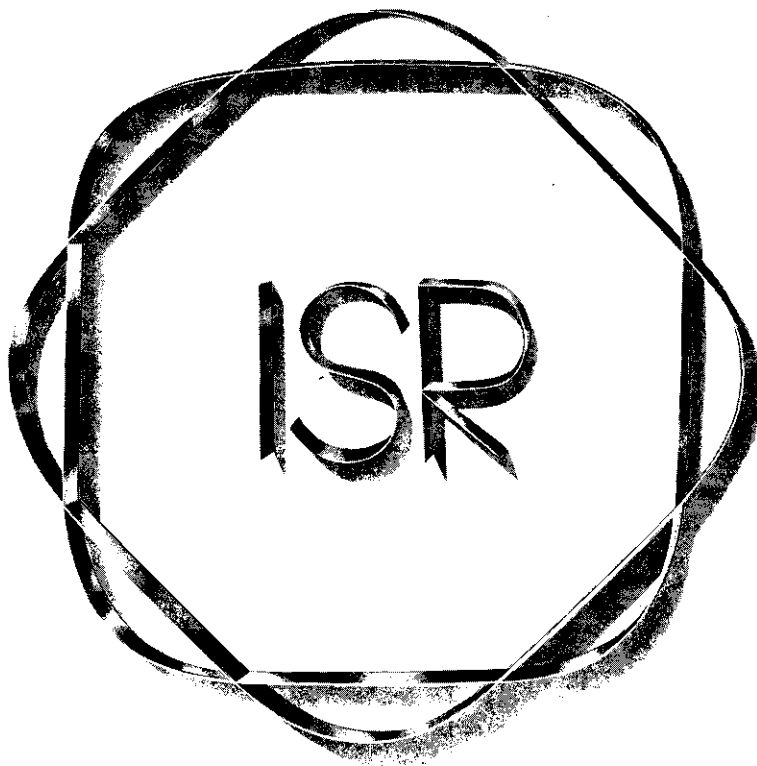




Inauguration 16 October 1971

Extracts from the speeches given on the occasion of the formal inauguration of the Intersecting Storage Rings. The ceremony was held in Hall 14 in the presence of about 1000 visitors and CERN staff. The principal speakers were Professor Victor Weisskopf and Ambassador François de Rose. Professor Werner Heisenberg inaugurated the ISR.

Professor W. K. Jentschke

The Director General of CERN Laboratory 1 opened the ceremony with a few words of welcome...

'It gives me great pleasure to welcome to our Laboratory the many distinguished visitors who have honoured us today with their presence at this ceremony of inauguration of the intersecting storage rings.

Professor Heisenberg, Ambassador de Rose and Professor Weisskopf are so well known to almost all of you that they need no introduction. We are happy to see also so many of our good friends from amongst the French and Swiss authorities, who by their generous collaboration made easier our task of building this new instrument. We are honoured by the presence of many eminent scientists, representatives of national Labora-

tories, people who have worked closely with us in the conception and realization of the project and the formulation of a scientific programme which has already started on the machine.

None of what we see here today would have been possible without the support of Europe's industries, who succeeded within the time limits in making what we wanted. Amongst our guests are representatives of the firms which contributed to the construction of the ISR. And finally we have the staff of the ISR Department, for whom no praise is too high, and the many other people who also played their part in the project. I am proud to find myself at the head of such a group of people.'

Professor K. Johnsen

The Director of the ISR Construction Department presented the project...

'Today is a great day for all of us who have taken part in the construction of the ISR. It is therefore natural to look back and let our minds dwell on the milestones we have past, and on the difficulties and pleasures we have had.

The real start of the history of colliding beam devices was in 1956 when the research group of the Mid-western Universities Research Asso-

ciation in the USA with Professor D.W. Kerst as its leader, put forward the idea of particle stacking in circular accelerators. Of course, people who worked with particle accelerators had dreamt earlier about the high energies one could obtain if one could only make particles collide with each other. This could, however, only be dreams with the particle densities available in accelerator beams at that time. The invention of particle stacking changed this drastically, and many laboratories began studying colliding beam devices during the latter part of the fifties. At CERN such work was carried out under the guidance of the late Professor A. Schoch.

The next important step forward was the coming into operation of the two large proton accelerators at CERN and Brookhaven in 1959/60, which not only produced higher energies than previous accelerators, but also higher beam densities than people had dared to hope. After this, simple evaluations demonstrated that storage rings added to the CERN proton synchrotron could become a research tool of great potential and we decided to concentrate considerable effort on practical design studies. At the same time we started European-wide — even partly world-wide — discussions about the physics interest in such instruments.

These discussions were very difficult because, with the knowledge then available, there were very good

reasons why people developed very divergent views. In particular both the project itself and the possible physics programme had many uncertainties that the detailed discussions could only partly clear up. Nevertheless, our Director-General, Professor Weisskopf, presented to the CERN Council the proposal to construct Intersecting Storage Rings based on a detailed design study issued in 1964. It looked to me as if the political bodies became attracted by the novel features of the project, by the uniqueness of such a device in the world and even by some of the daring aspects of storage rings. Our Member State governments authorized CERN to go ahead from 1 January 1966.

What had largely been a paper study suddenly became a reality. Much money was involved, much difficult work lay ahead. I shall never forget my feelings when in large rubber boots, I first inspected this site, so generously put at our disposal by the French government, after bulldozers in large numbers had gone to work.

I could accept responsibility for the construction because I had around me a very good nucleus of a design and construction team with Dr. K. Zilver-schoon as my closest collaborator. We had a powerful Parameter Committee of very knowledgeable accelerator physicists and engineers, and could go ahead at once, building up the staff needed, building up further knowledge, diving into the detailed design and approaching European industry with our problems.

A few special words are merited concerning our relations with industry. The novelty of our project meant that it was unfamiliar to industry in most of its aspects. On the other hand, the specialized know-how that industry had in relevant fields, was extremely important to us, in particular since we quite often found it necessary to work

at the limit of what present day techniques can give. Therefore, we had to create the right kind of relation and mutual confidence. It was our studies that crystallized out requirements, tolerances, etc., that had to be imposed. But there was no point in putting down impossible requirements, and here our close contact with the industries concerned put in the right kind of corrective. In some cases we had to give in to the hard facts presented by them, in other cases we could convince them that things they thought impossible were in fact possible. Altogether, we placed contracts for about 250 million Swiss francs for this project, and we have come out of this with excellent relations with our suppliers. The goods are here, and in general of the quality needed for such a difficult project.

Of course, everything did not happen according to the original planning. Sometimes things were late, or other difficulties were encountered. In such circumstances flexibility is required by everybody concerned. The staff of the ISR Department, showed the highest degree of team spirit, which became particularly visible during the final stages of the installation when many critical situations arose. Also the whole CERN Laboratory was behind us with continuous help during the whole construction period.

The first beam tests started by the end of October last year, a little ahead of schedule... the day for trying a circulating beam was 29 October, and what a day it became. I remember walking around the machine in the afternoon. Everything was there, clean and tidy but I could not believe that there would not be a hidden fault somewhere among those thousands and thousands of components. But it did work, and incredibly so. In a control room packed with people, anxiety radiating from their faces, we saw the first beam go straight in, we had life-

time tests and we stacked to considerable beam currents. It is on such occasions that it is nice to be in charge, not only because of the impression of being part of a success, but also because of the fantastic feeling of sharing what happens with a large number of other human beings who have been collaborators and whose faces show that they feel exactly as you — excited and pleased. During the whole construction period Professor Gregory had been our Director General but his term of office was coming to an end. We felt that it would be nice to give him at least one beam before he left, and we were very pleased that we succeeded, and that he could personally share the excitement with us.

It remained to produce the other beam so that we could collide protons. This had to wait until January, and we were able to share these exciting events with the new Director General, Professor Jentschke. On 27 January we registered the first ever observation of proton-proton interactions in colliding beams. What was being seen was equivalent to what a conventional accelerator could produce if it had an energy of at least 500 GeV. Such phenomena had never been produced before in a controlled fashion and on later occasions we went considerably higher. The joy was not less than during the night of the first beam tests. We could announce to the whole physics community and to the CERN Council that we had achieved what we had promised — a colliding beam device for protons.

It was only a month later that we were ready to receive the first experimental teams. The construction period was declared over on 1 March, some four months earlier than originally planned and the costs were within the foreseen budget of 330 million Swiss francs with a small margin.

This does not mean that we can sit

The two invited speakers at the inauguration, Ambassador de Rose (left) and Professor Weisskopf. They were photographed while taking a look at the ISR prior to the ceremony.

down and relax — we find ourselves busier than ever... but that is another story.

May I finish with a few words to the President of the CERN Council, Professor Amaldi, who represents the authorities behind this Organization for which we are privileged to work. I should like to express our appreciation for the confidence that we were given during the construction period. It has been an experience that will always be a pleasure to think back on. Our most sincere wish is that this instrument will now be given the opportunity to show its worth as a research tool. With the support we have had in the past, we look with confidence to the future.'

Professor V. F. Weisskopf

Former Director General of CERN...

'We are celebrating the end of a great mission. I was fortunate enough to be present when the idea was born and when the decision was taken to embark upon this tremendous project. The main originators of the idea were Professors Donald Kerst of Wisconsin and Gerard O'Neill of Princeton and Gösta Budker of Novosibirsk; the machine was designed and developed by CERN teams led by Professor Kjell Johnsen and Dr. Cees Zilverschoon. My only contribution to the project was to show some enthusiasm when I was Director General !

There were three personal reasons for this enthusiasm: firstly, a deep belief in the fundamental importance of our growing insights into the basic structure of matter; secondly, a deep conviction that the physicists of Europe can, and should, be not only on a par with other scientific communities but ahead at least in some aspects; thirdly, a deep sentimental attachment to CERN, this unique so-



CERN 384.10.71

cial and political experiment which brings together people from many different nations in a life full of intellectual creativity — and which happens to be located at one of the most beautiful spots on our planet.

In an advanced field of science such as high energy physics certain preconditions are necessary for the success of an idea and a project. One needs — intellectual strength of highest order; inventiveness and originality in the choice of questions to be asked of Nature; the application of the most advanced technical tools (even more, one must develop the available tools and invent new technology); most of all, courage and daring to go along untrodden paths and to use untried methods where there is always the possibility of failure. And one needs confidence that a task can be done in spite of the apparent difficulties — indeed, one must be attracted by those difficulties.

All these aspects were and are amply present in the ISR project. It is a new way of asking questions of Nature. It required, and it will require, new ideas, new instrumentation in order to read Nature's answers. Many people said in the past that it could not be done. It required the highest technological skill and innovations to a larger degree than the construction of previous accelerators; to quote just one example, the ISR contains the largest ultra high vacuum ever produced in the world. It needed foresight and both conservatism and daring, to achieve a machine the like of which has never been built before. But it was achieved after all: it worked the first time it was turned on. After only three months of running, it has given us most interesting and unexpected physical results. As Professor I.I. Rabi said, 'The ISR does not ask questions to Nature; it grabs Nature by its throat and forces her to speak !'

There are more reasons why one should be enthusiastic about the storage rings. It brings different kinds of physicists into close co-operation. CERN as a whole has brought together scientists from France, Germany, Italy, Britain, Scandinavia and many other countries to work at the same task. The ISR is bringing into closer touch two types of physicists — the experimental physicists and the machine builders, who have been too much separated in the past. The machine physicists have built accelerators, bubble chambers and other useful devices and the experimental physicists have then taken them over and 'used' them. At the storage rings the situation is different. Every experiment represents a changed and improved storage ring. One cannot 'use' the ISR without being deeply involved in its running. Therefore, the work at the ISR re-establishes the unity of instruments and experiments which is so important for a healthy development of our science.

These were some of the reasons for my enthusiasm. But there were people who thought that it would be too much of a risk; they said that only very few experiments could be done at such a machine. They said, 'The Americans did not build it, so it cannot be a good machine'. It was often difficult during the planning phase to keep up one's enthusiasm. I surely would have lost my own if there had not been other people who helped keep the idea alive. Fortunately, there were quite a number and a list of them would be too long, but I would like to mention three by name. One is Eduardo Amaldi and another is François Perrin, who have supported and defended the idea from the beginning. The third is Mervyn Hine without whose insistence, critical wisdom, push and energy we would never have arrived at a decision to go ahead. But those to whom we really

owe this marvel of an instrument are the builders — the Bonaudi's, Resegotti's, de Raad's, Fischer's, Schnell's, Van der Meer's — who, under the leadership of Kjell Johnsen and Kees Zilverschoon have done great work. They could not have succeeded without the constant help of the teams of extremely skilled engineers, mechanics and workers who were able to translate the ideas into practice. I cannot give all their names here but would like to mention Mr. Horisberger and the late Mr. Stierlin. In the name of Europe and of the physics community of the whole world we thank you all.

I wish to add a word or two of warning. We scientists in our small community in Europe are well aware of the value of fundamental science and of the value of this unique social and international experiment that is CERN. However, I fear that the public at large remains more or less unaware of this. It is the duty of CERN and of the European scientists to remedy this, a duty as important as research itself.

We live at a time when there are strong trends away from science, rationalism and the promotion of objective and rational research. CERN should be a mainstay against these dangerous trends but I do not think that we are or, at least, not as much as we could be. We must make much better use of CERN's dual role as a unique scientific and political institution. We must bring out the romantic quality of fundamental research and the romantic quality of international cooperation.

Perhaps we are a little spoilt by the success of CERN and by the fact that we have, after all, persuaded Governments to continue and to increase their financial support. This success will not last if CERN does not become a source of pride for a much greater proportion of the popu-

lation, an emblem of the new spirit that prevails or should prevail in Europe. But it is not only financial support that is in jeopardy, it is the new European culture — the new role that Europe should play in the culture of the future, as a link between the old and the new, between East and West, between the glories of yesterday and the great potential of tomorrow. To fulfil this role, Europe needs the spirit and scope of CERN on a much greater scale and in much greater evidence.

We can now be confident with regard to CERN's future, not only because of the success of the ISR, but mainly because the construction of the new 300 GeV accelerator is finally under way. This fact alone assures that Europe and CERN will ride on the crest of the wave in high energy physics.

When I talk about ISR, I am sincerely and frankly biased. I love this baby of ours and I believe that it represents the wave of the future. I am also sure that the new method of clashing beams — the ISR way — will be taken up again and again, on larger scales, in connection with the 300 GeV accelerator here at CERN, in Batavia, in Brookhaven, in Serpukhov, in Novosibirsk and at many other places. In Germany there is already a sister ring for clashing electron beams under construction.

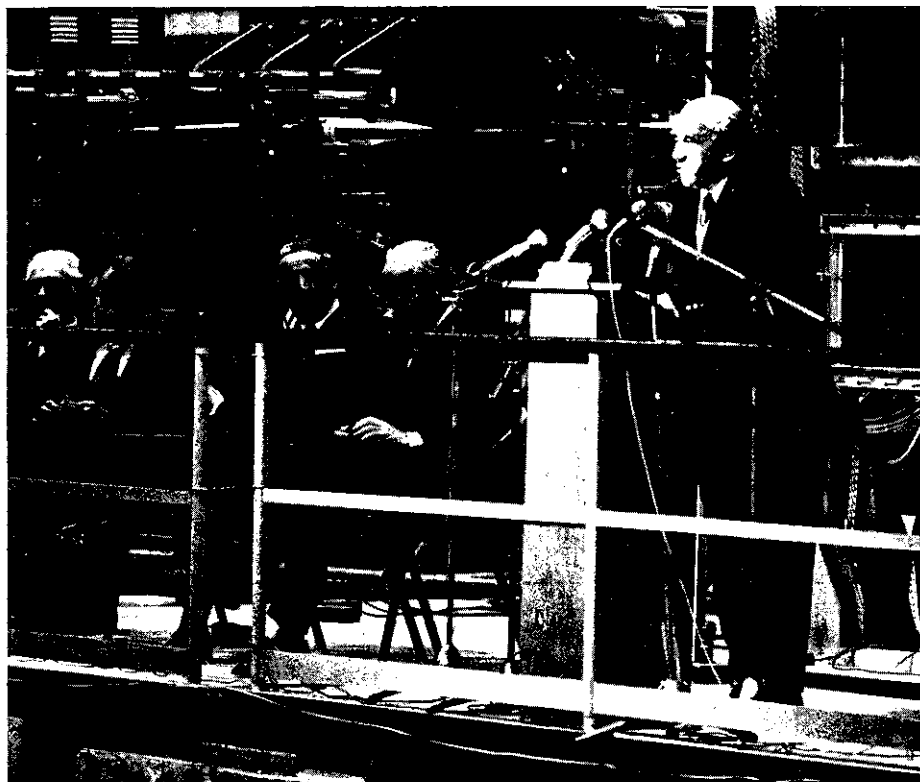
Let me end with a variation of a famous remark of Ernest Rutherford: 'Here at CERN we not only ride the crest of the wave, we made the wave.'

Ambassador F. de Rose

French Ambassador to the North Atlantic Council and former President of the CERN Council...

'In my association with CERN, there are three dates which stand out vividly in my mind. The first was twenty years

Professor Werner Heisenberg speaking at the ceremony when he inaugurated the ISR. To his left are Professor Jentschke, His Excellency M. Anthonioz, Professor Weisskopf and Professor Amaldi.



CERN 348.10.71

ago, when the countries of Europe agreed to examine the possibility of setting up an international institute for research.

The second was eleven years ago, when I was President of the CERN Council. We inaugurated the Proton Synchrotron, the most powerful accelerator then in operation in the world which brilliantly fulfilled the objective laid down by our governments — to provide European physicists with a research tool that would enable them to play a part in scientific progress comparable to that of their predecessors.

The third is this inauguration ceremony. In view of my association with CERN, and the fact that I am the only non-scientist to be speaking, I feel justified in recalling the reasons for CERN's exemplary success. After all, progress was not achieved by simply avoiding the difficulties that were encountered.

There was the difficulty of breaking fresh ground — an agreement had to be formulated on the basis of which thirteen countries could cooperate, in a field that, until then, had mainly been the concern of a few inspired men. There were the difficulties in convincing politicians, who did not have that priceless asset — a precedent to which they could refer. In scientific circles too, many people were seriously concerned that the adoption of an international programme might prove detrimental to the national programmes. There were difficulties in investing large sums of money in fundamental research, the profitability of which could hardly be assessed on the basis of economic terms. There were difficulties for governments in reconciling so many competing requests when any choice implied a bitter sacrifice.

Finally there were the new problems of the expansion of the site for

the machine we are inaugurating to-day. For the first time in history, a large laboratory is straddling the border between two countries. One has only to think of all the different types of problem that have been solved — of sovereignty, jurisdiction... — to realize how true it is that there is a mystique of CERN. I hope that these solutions will make the next stage easier — that of building the super-accelerator, which will be situated almost entirely in France.

I would like to express my thanks to all those who bore a responsibility in the making of CERN's future. There has been enthusiastic support for the idea that particles produced in Switzerland would be accelerated across the border at the speed of light and made to collide in France. This idea was most favourably received by General de Gaulle and his Government, and in Switzerland by the Federal and Geneva authorities. Also by Parliament and, in particular, by the then President of the Commission for Foreign Affairs, Mr. Maurice Schumann, who has maintained his keen support for the idea as Minister for Scientific Research and to-day as Minister for Foreign Affairs.

I am sure that the Mayor of Divonne, Minister M. Anthonioz, gave indispensable aid in enabling the CERN site to be extended into the Pays de Gex. His presence here to-day, despite the burden of governmental responsibility for the development of tourism in France, is proof that the interests entrusted to him are being fully met by CERN's present and future achievements.

I would also like to pay tribute to the efforts of Senator R. Ruet, Conseiller General, of President J. Saint-Cyr and of Mr. G. Dupoizat, Prefect, of the Department of the Ain. The communes of St-Genis and Preveysin — whose Mayors, Mr. P. Blaison and Mr. G. Laverrière, are with us — took the

The two Directors General of CERN during the construction of the ISR photographed before the ceremony. On the left is Professor Gregory, Director General from 1966 to 1970 who saw in the first stacked beam in October of last year. On the right is Professor Jentschke, Director General from the beginning of this year who saw in the first operation of both rings together and the first proton-proton collisions in January.

first steps in welcoming to the very ground where we now stand the machine we are inaugurating. Their Communes are also receiving the Super Proton Synchrotron. This gigantic machine will, in fact, occupy no less than a third of the communes. In a few years' time, they will rank first among their 38 000 sister communes in area devoted to scientific research.

CERN is forging ahead of the goal set by its founders. This is true from the geographical standpoint — after being the first international laboratory, it is now the first international institution with a site spreading into two countries. It is also true from the standpoint of its objective. At the outset its aim was to provide European scientists with research facilities equal to those existing in the most powerful countries in the world. But these storage rings are unique in the whole world. Is it not in keeping with the vocation of our continent, which for

long was the main centre of research activity, that we should place this machine at the disposal of scientists not only from our own countries but also from all countries in the world? The saying that science knows no boundaries will probably never again be illustrated in such a striking manner.

The success of the enterprise and its future, depend on establishing permanent contact between Geneva and the national centres to ensure a true community of men, ideas and equipment. This two-way system of communication had to be constantly maintained and the interpenetration between the research done here and the academic work of the Universities had to be as complete and permanent as possible. CERN had to be the opposite of an ivory tower, where a few privileged persons enjoyed a wonderful adventure, but were isolated from the rest of their colleagues.

This objective has been achieved since about two-thirds of those working in Europe on high energy physics research are collaborating with CERN; 80 % of the experiments here are carried out by visiting scientists and 20 % by the Organization's staff. With the storage rings this situation will be maintained — the first experiments were prepared by combined teams from no less than thirty-four Universities.

Another reason for success was the reliability of the expenditure forecasts, which as far as the Finance Ministries were concerned, built CERN's reputation as an Organization which, although its expenditure was considerable, revealed no hidden surprises. The machine we are inaugurating was completed slightly ahead of schedule and the initial cost was respected. One has only to remember that the task involved building an entirely new machine to realize that Professor Johnsen and his team achieved what elsewhere would be considered a masterly feat but at CERN is already a tradition.

With the ISR and the 300 GeV accelerator, our governments really looked far ahead since it is generally recognized that CERN will satisfy the needs of European research into the composition of matter up to the end of the 1970s and, with the improvement possibilities open to it, will continue to do so right up to the end of the century.

It is also an act of faith. In the present circumstances, this is of special importance as it reflects two trends of thought which question the attitude of society to scientific research. For some, the expenditure is out of proportion to our resources. Just as the major roles in space research fell to the two 'super-powers', so too, fundamental physics should be left to them. Europe would restrict its ambitions to the technological exploitation and to



CERN 388.10.71

the applications of fundamental discoveries made elsewhere.

This view, whilst tempting, clearly results from the failure to appreciate that Europe was the birth-place of modern science where human thought as we know it took shape. Our countries are not, however, the only ones involved in this adventure — scientific progress is not linked with a particular environment or culture. And to think that, at a time when this superior mode of communication between men of different cultures was acquiring a truly universal dimension contributing to the birth of a genuine world civilization, Europe would withdraw its participation! It is an invitation to abandon intellectual — and therefore cultural, political and economic — development. Such a policy would also be one in which we had everything to lose. Technology develops only where fundamental research thrives.

Others — their number is perhaps greater and their out-look more idealistic — feel that it is science as the source of technology which should be challenged. We are no longer living at the time when science was enveloped in an aura of holiness and it was believed that scientific progress would guarantee the happiness of mankind. The applications of science may compromise even the continuation of life on this planet: already the ravages of pollution stemming from the uncontrolled development of technology are such that a number of people — particularly the younger generation — contest science itself and suspect it of containing an inherent threat to our natural environment, to freedom and even to human life itself. It is precisely because this fear is a real one, and may be justified, that the role of CERN, devoted to fundamental science and based on international cooperation, acquires a new dimension and even greater respect.

With the inauguration of the Intersecting Storage Rings and the construction of the Super Proton Synchrotron, physicists must be more than ever conscious that they have received special treatment in competition with so many other sciences and with other needs of public importance. Just as privilege entails responsibility, so this special treatment carries with it certain duties. Firstly, the duty to remain faithful to the scientific ambition and to the political ideal which gave birth to this Organization; secondly, the duty to persevere along the path of its success.

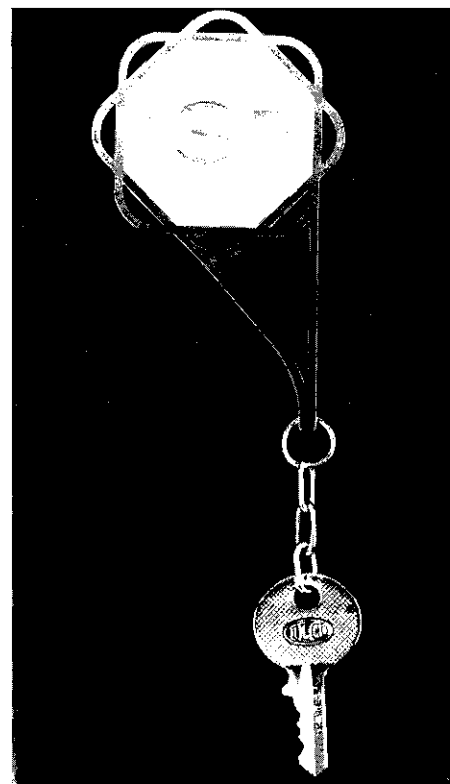
It is in this way that CERN will continue to illustrate and perhaps define the role of science in the society of tomorrow — science that is neither religion nor counter-religion neither panacea nor evil spirit, but a fundamental part of culture and the most powerful means by which the destiny of mankind may be transformed. It is gratifying that the contribution of the nations of Europe in this task is the fruit of an exemplary international co-operation entrusted above all to our younger generation.'

Professor W. Heisenberg

Nobel laureate for physics; delegate of the Federal Republic of Germany to the CERN Council from 1955 to 1964...

'I congratulate CERN, its physicists, engineers and organizers, on the completion of the Intersecting Storage Rings. I consider this a very important achievement in the history of CERN, a step towards the exploration of a new part of elementary particle physics which could be seen but hardly explored in the cosmic radiation. The storage rings will give CERN a leading position in international high energy physics for many years to come.

The key to the beam stopper which intervenes between the 28 GeV proton synchrotron and the Intersecting Storage Rings. It was this key, gold-plated for the occasion, which changed hands in the inauguration of the ISR. It now rests in state in a small box which has engraved on its lid a picture by the 19th century painter, Gustave Doré, which was designed to illustrate La Fontaine's fable 'The Two Goats'. The picture shows the goats in head on collision.



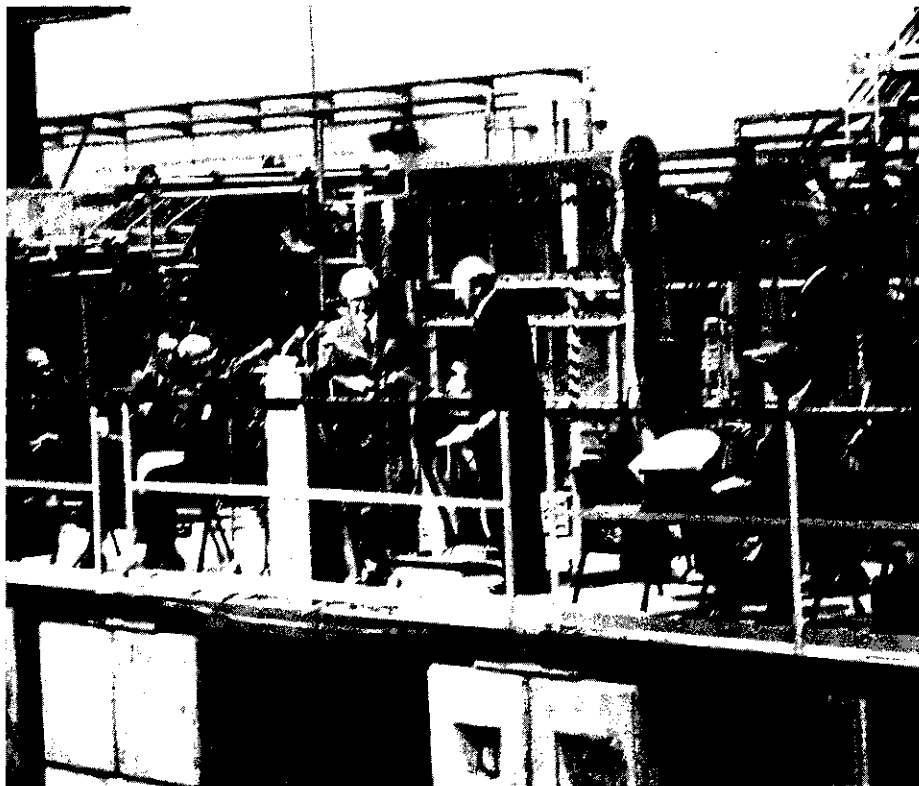
CERN 396.10.71

If the storage rings were a ship it would be appropriate to smash a bottle of wine or champagne on the bow of the vessel. But they are not a ship and it would be better to press a button, release a beam and thereby smash a number of elementary particles. But that could not be seen and would therefore not be very impressive. So we have decided on a less spectacular ceremony.

Here we have a key, a golden key which controls the transfer of protons from the Proton Synchrotron to the Intersecting Storage Rings. I have it here not only for our own protection but also in order to hand it to the President of the CERN Council, Professor Amaldi.

Let this key be a symbol of our hope that the Storage Rings will be the key to a thorough understanding of the world of elementary particles. As is the rule in physics, such a symbolic key should first be in the

The moment of inauguration. Professor Heisenberg hands the key to Professor Amaldi, President of the CERN Council and representing the European high energy physics community.



CERN 342.10.71

hands of the experimental physicists and only when they have done their work should it be handed back to the theoreticians. I give it to Professor Amaldi as an experimental physicist but in the hope that it will not be too long before your colleagues from the Storage Rings can symbolically hand it back to my colleagues, the theoreticians, with many good new results.'

Professor E. Amaldi

President of the CERN Council and representing the European high energy physics community...

'In receiving this key, I would like to stress the outstanding contribution to the life of CERN of all those who have already spoken and who are here to celebrate the most recent and, at the same time, one of the most

important, successes of the Organization: the commissioning of the Intersecting Storage Rings. I would like once more to express the gratitude of the Council to Professors Weisskopf and Gregory for their outstanding contribution, as Directors General, to the Intersecting Storage Rings project and to the present Director General of Laboratory I, Professor Jentschke, since it was under his direction that the machine first operated and provided its first scientific results. Also, for several years before his appointment, Professor Jentschke was Chairman of the Storage Rings Committee which established the scientific programme now being carried out at this machine.

The Council's warmest thanks go to those who took part in the design and construction of the storage rings. Above all, they go to Professor Johnsen, who competently and firmly, but also with typical Scandinavian composure and simplicity, brought this

exceptional enterprise to a successful conclusion to the entire satisfaction of the Council, Finance Committee, Scientific Policy Committee and the community of physicists. I ask Professor Johnsen to convey our appreciation to all his staff. The value of their achievement lies not only in the uniqueness of the storage rings, which enable a new field of high energy physics to be explored, but also in the perfect operation of the machine which can therefore be used to maximum effect by the physicists.

I would like to associate myself with Ambassador de Rose in expressing the Council's gratitude to the local authorities, and primarily to the French authorities on whose ground the storage rings are situated. I also thank the governments of France and Switzerland, who collaborated, between themselves and with CERN, in solving a long list of completely new problems arising from the fact that CERN's Laboratories spread into both countries.

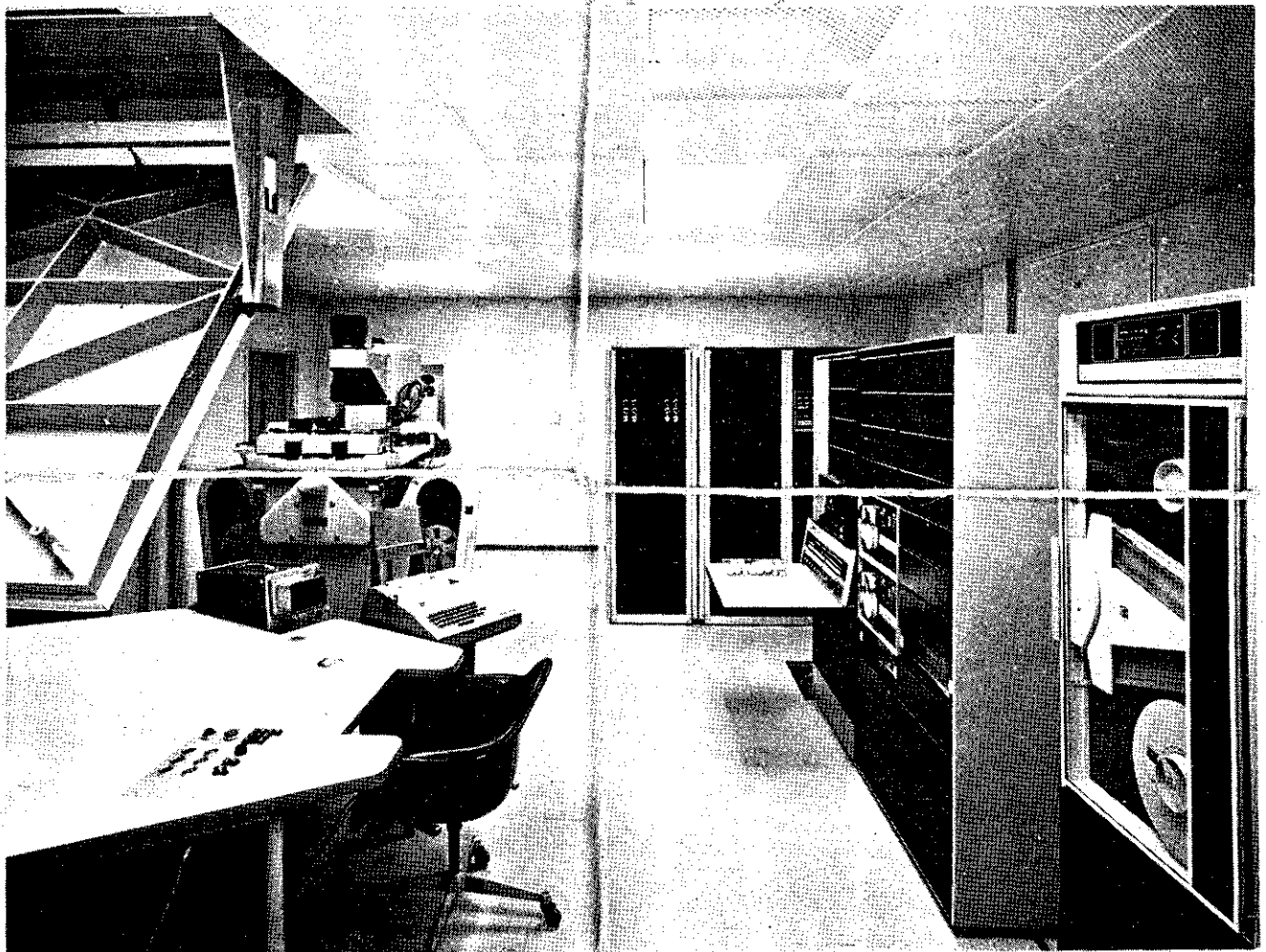
Finally, I would like to express on behalf of the Council, the Directors General, past and present, and all the research physicists both at CERN and in the national laboratories working in collaboration with our Organization, our profound gratitude to the governments of all the Member States. It was they who provided the Organization with the resources to build the ISR, which will enable European physicists to make a vital contribution to the development of high energy physics in the years to come, during which time another great CERN programme is taking shape — the construction of the 300 GeV accelerator.

Professor L. Alvarez at Berkely started. CERN took up the case. Here we have the SPIRAL READER, third generation.

SPIRAL READER SAAB. This delivery is for Danish-Swedish Spiral Reader Project, University of Stockholm, Institute of Physics, Vanadisvägen 9, Stockholm, Sweden.

Ask their Prof. G. Ekspong about it and then contact us: SAAB-SCANIA Industrial Systems Division, Fack, S-550 02 Jönköping 2, Sweden, Tel 036-11 97 80

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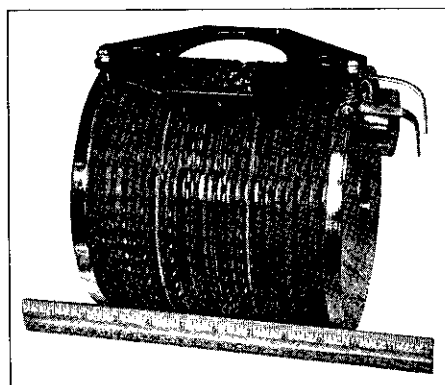
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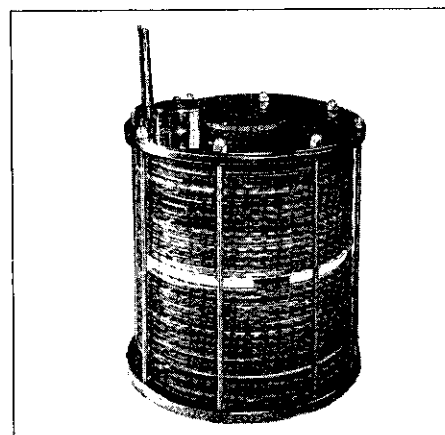
Whatever your requirements, low, or high-field systems, you can rely on the leader in superconductive materials, magnets and systems . . . Intermagnetics General Corporation.

For further information including the names and addresses of IGC European distributors and technical representatives, contact Paul Swartz, Vice President of Marketing and Sales, USA Telex No. 949-402, or write P.O. Box 711, Schenectady, New York 12305.



IGC Nb₃Sn solenoid with plate for horizontal or vertical mounting.

Quench Field: 110 kiloGauss
Bore: 45.8 mm
Outer Diameter: 19 cm
Length: 19 cm



IGC high homogeneity Nb₃Sn solenoid with radial access.

Quench Field: 127 kiloGauss
Bore: 45.8 mm
Outer Diameter: 20 cm
Height of Mid-plane Ports: 10.5 mm
Homogeneity: <1 part in 10^4 over 1 cm sphere
Time to 120 kiloGauss: Under 20 minutes

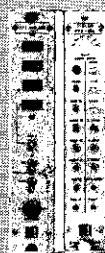
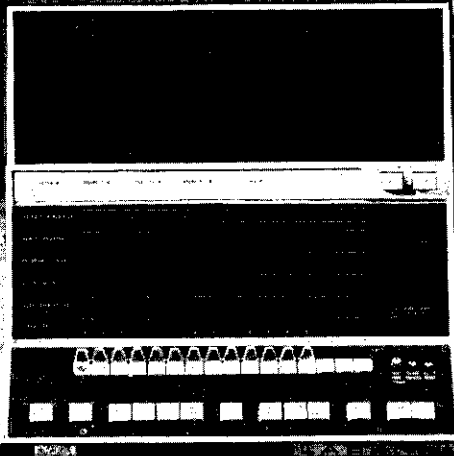
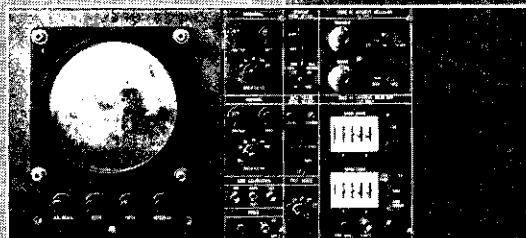
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A DISPLAY specialized toward nuclear spectrometry applications has been developed for the LABEN 70. This unit has integrated hardware/software capabilities for unidimensional and bidimensional spectra display with minimum core utilization.

*pulse height analyzers
time of flight units
counters
time sorters
multiplexers*



PEOPLE who know our data processing instrumentation will not be surprised to learn about the new LABEN 70 computer. It came as the natural outgrowth of our experience in designing an extensive line of multichannel analyzers, ADC's, time-of-flight coders, time sorters, multiplexers, and counters.

The LABEN 70 is not just a general-purpose computer. The chief difference is that it comes with special hardware input/output instructions, an application software package and interfacing facilities that combine to form A POWERFUL AND FLEXIBLE SYSTEM FOR DATA ANALYSIS IN NUCLEAR SPECTROMETRY.

LABEN 70 FEATURES

- Memory capacity: 4096 words expandable to 32,768 words
- Machine cycle time: 1.35 μ sec.
- 8 addressing modes and extended addressing
- All arithmetic registers addressable as memory locations
- Two index registers
- Standard multilevel priority interrupt system
- Up to 128 external distinct levels for 64 peripheral devices
- Data channel instructions for high-speed sequential input/output to or from memory in interrupt mode
- Memory protect with associated interrupt



LABEN software and hardware specialists will be happy to help you solve your problems and keep them solved.

After-sales service is alert and responsive. The LABEN 70 is supported by a service organization renowned for its speed and dependability.

AS OPTIONS, LABEN 70 has hardware multiply and divide. Memory parity, generation and check. Real time clock. Wired bootstrap. Power failure protection.

LABEN 70 SOFTWARE includes: MONITOR, the LABEN 70 operating system, ASA FORTRAN IV Compiler, BASIC Interpreter, Assembler and Extended Assembler, Mathematical subroutines. A full set of debugging and diagnostics programs. SPECIAL SOFTWARE PACKAGES have been developed to meet the various application requirements in the field of nuclear spectrometry.

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divisione della MONTEDEL - Montecatini Edison Elettronica S.p.A.
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WE HAVE THE HARDWARE, SOFTWARE, INTERFACES AND SYSTEM SUPPORT, WHATEVER YOUR DATA PROCESSING REQUIREMENTS. CONSIDER LABEN YOUR SINGLE SOURCE.

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Particle Multiplier (MM-1). For pulse counting or current measurement of electrons, ions, UV or x-ray photons, and energetic neutral atoms or molecules.

Guaranteed reactivatable. Delivered gain: 10^6 to 10^8 . Noise less than 1 count/minute at 10^7 gain. Dark current less than 10^{-13} amps at 10^7 gain. Gain stability at count rates in excess of 10^6 /second. Bakeable at 350°C . No ion feedback, non-magnetic. 1.5 sq. in. active surface area. (Model MM-2, miniaturized version of MM-1.)

Pulse Amplifier Discriminator (PAD-1).

Low power consumption. Charge sensitive input. Rise time: 3 nanoseconds. Adj. discriminator: 20:1 range. Rugged.

Miniature. (Model PAD-2 for pulse counting rates to 10^7 /sec.)

Regulated High Voltage Power Supply (HV-4R).

No vacuum tubes. Output: 500 v. to 6.1 kv. Reversible polarity. Noise less than 300 microvolts RMS. Drift less than .01%/hour, .02%/day.

Radioactive Gas Monitors

Our TRITON systems monitor gamma radiation, tritium, argon-41, carbon-14, chlorine-36, fluorine-18, krypton-85, radon-222, sulfur-35, xenon-133, and xenon-135. Features: 0.5 micron absolute filters, electrostatic precipitators, positive displacement pumps, gamma compensation to 5 mR/hour.

Triton 955. Exceptional sensitivity: $10\mu\text{Ci}/\text{M}^3$ full scale.

Triton 1055. Portable. Operates on rechargeable batteries.

Sensitivity: $50\mu\text{Ci}/\text{M}^3$ full scale.

Triton 755C. Suitable for rack mounting.

Sensitivity: $100\mu\text{Ci}/\text{M}^3$ full scale.

Tritium Calibrator (CL-1). For field calibration of Triton monitors. Accurate, rapid calibration in 3 to 5 minutes.

Remote Alarm (RA-1). Audible and visual. Powered from main instrument.

Operates up to 500 ft. from main instrument.

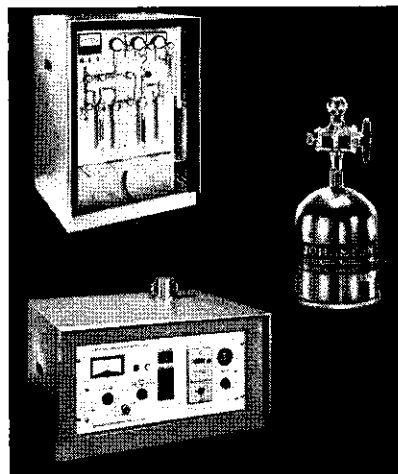
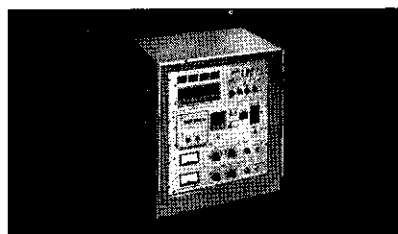
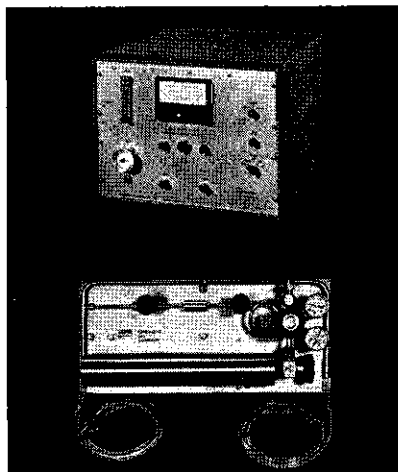
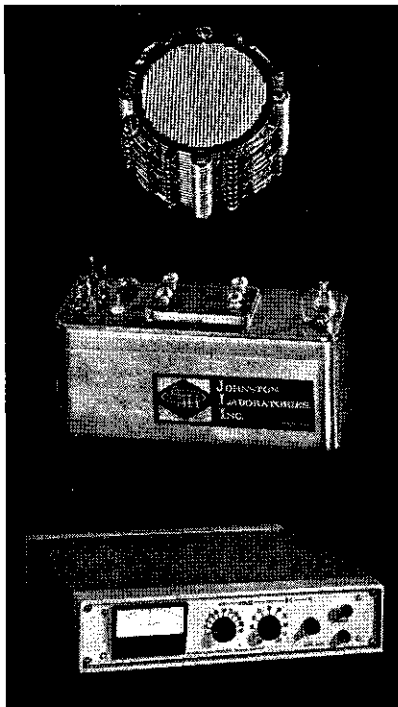
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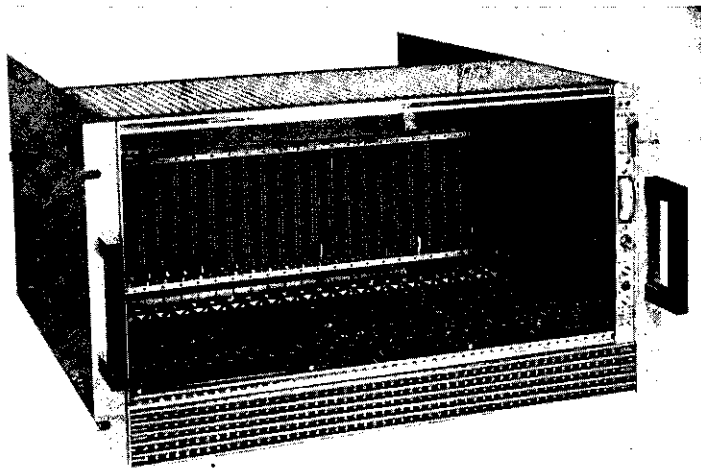
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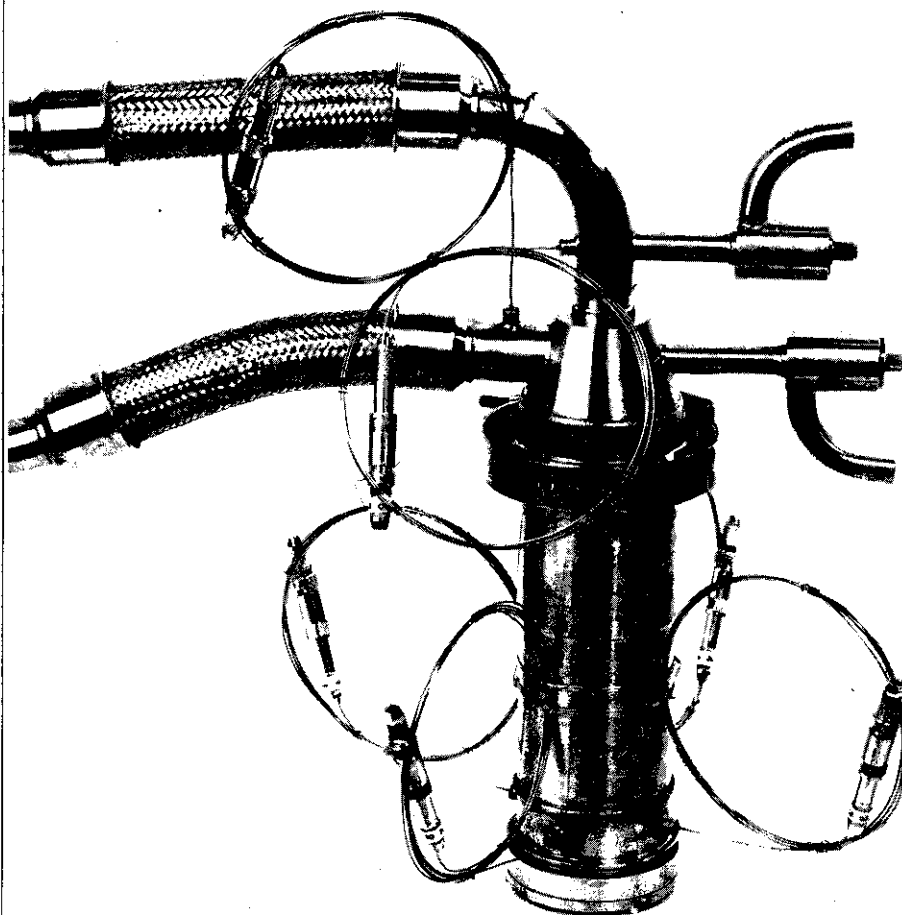
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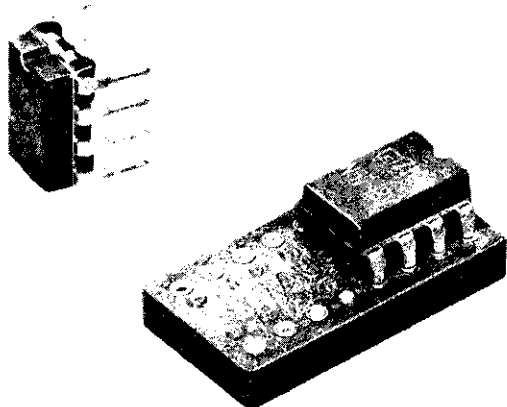
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Tél. : 359 - 46 - 00 TELEX : CERCA
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**Circuits intégrés
Signetics**

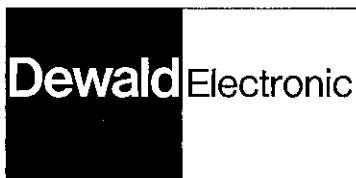
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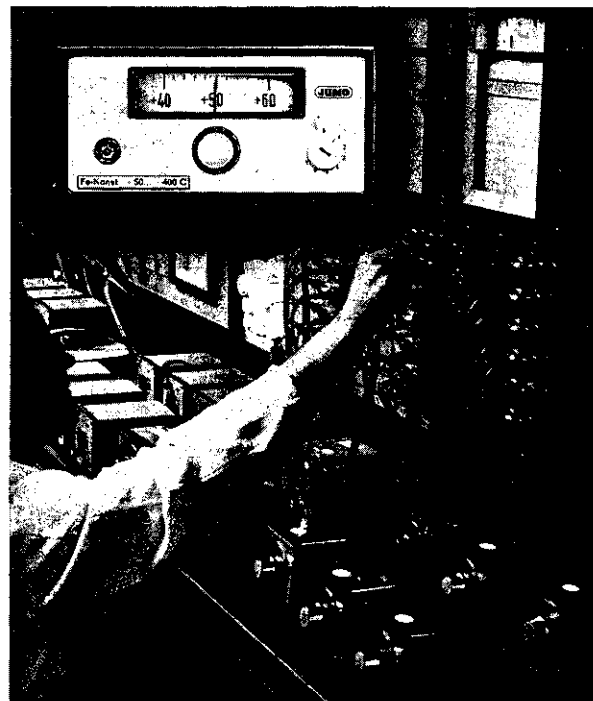
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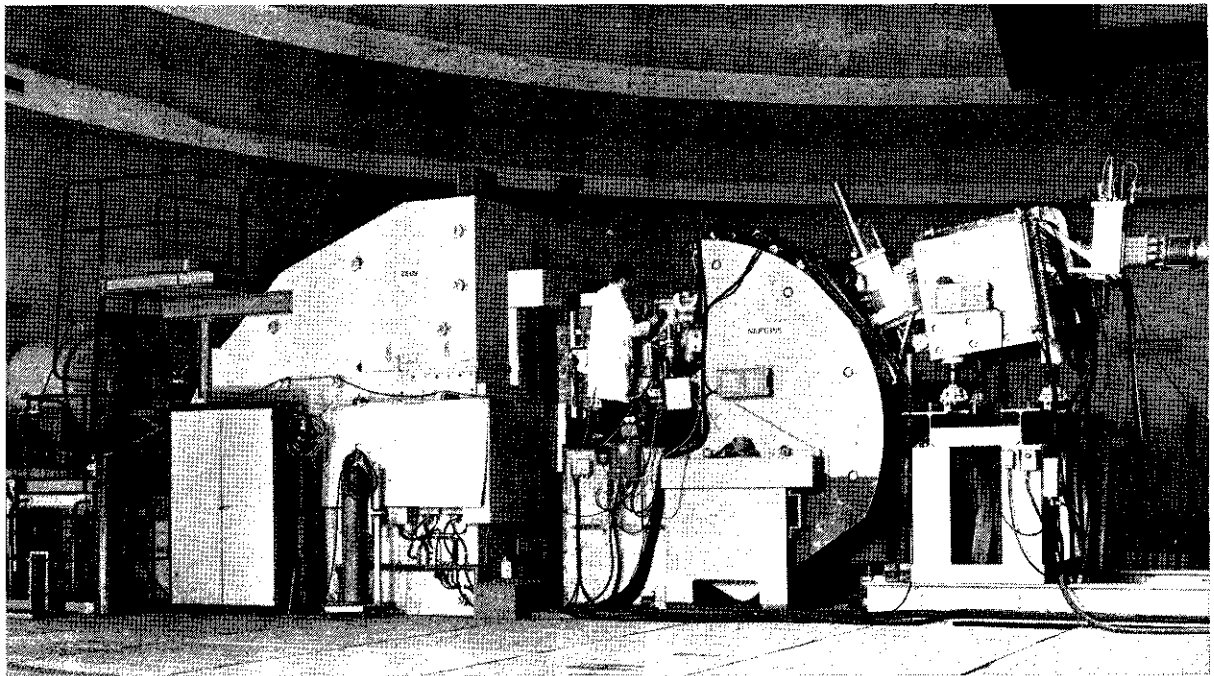
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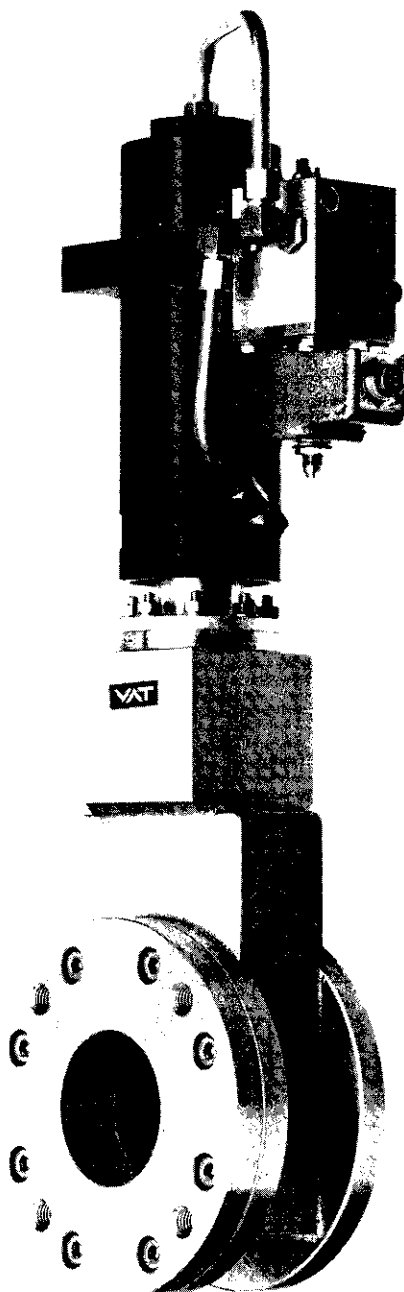
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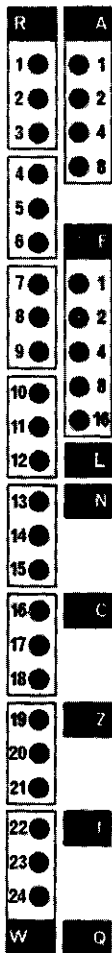
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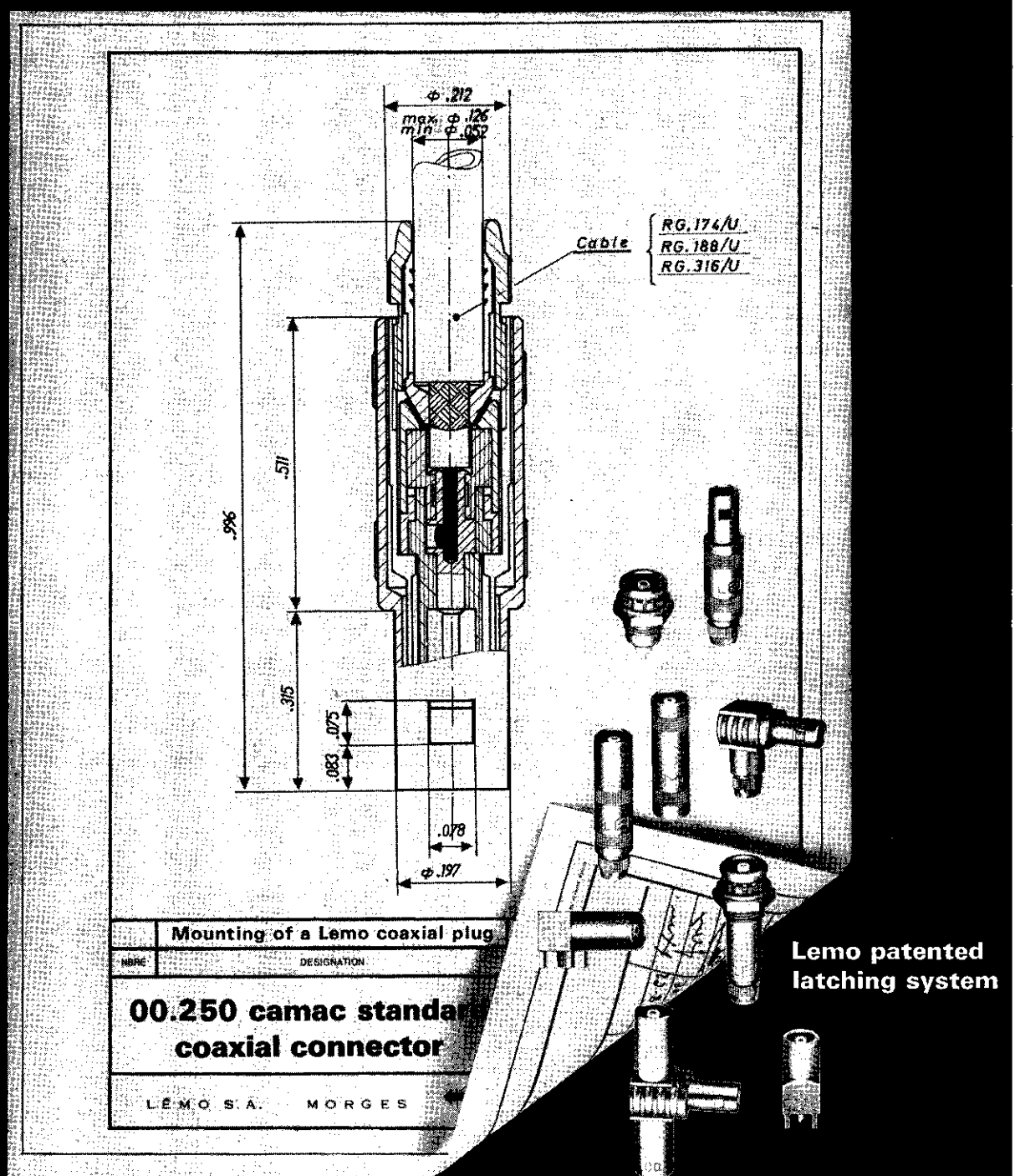
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Italy: ORTEC-Italia SRL - Via Monte Suello 19 - 20133 Milano
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Dalroad Industrial Estate, Dallow Road, Luton/Beds.
U.S.A.: ORTEC INC. - 100 Midland Road - Oak Ridge, Tenn. 37 830



General specifications

Composition

Shell : brass 59 A
Insulator : teflon PTFE
Contact : brass 59 A

Finish

Shell : nickel + chrome
RP + RPL types gold plated 3 microns
Contacts : nickel and 3 microns gold plated
Operating temperature range : -55° C +150° C

Electrical specifications

Characteristic impedance : $50 \Omega \pm 2 \%$
Frequency range : 0-10 GHz
Max VSWR 0 - 10 GHz : 1 : 12
Contact resistance : $< 8 \text{ m} \Omega$
Insulator resistance : $> 10^{12} \Omega$ under 500 V. DC
Test voltage (mated F + RA) : 3 KV. DC
Operating voltage (mated F + RA) : 1 KV. DC
Normal maximum cable diameter : $\cdot 126$
Special arrangement : $\cdot 157$

LEMO S.A.

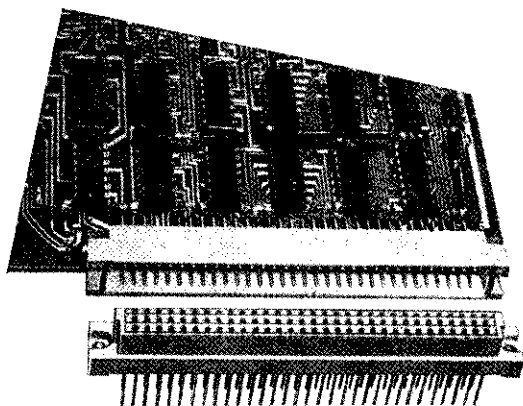
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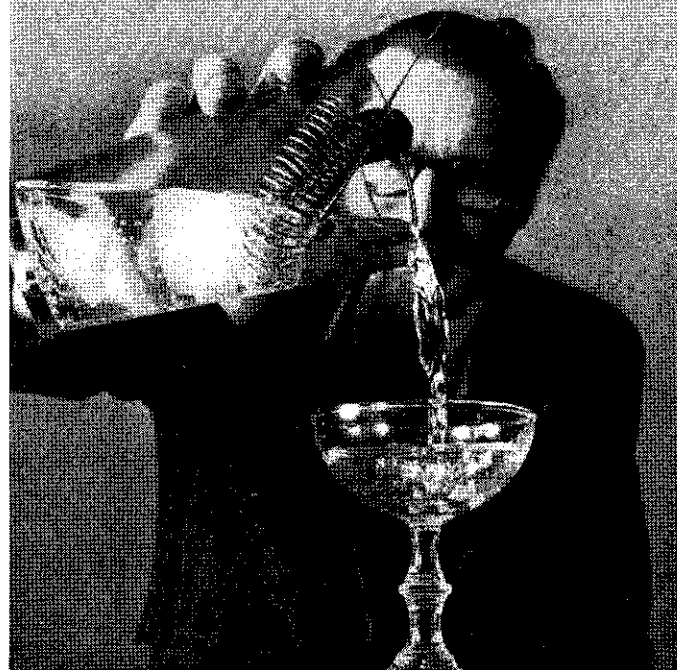
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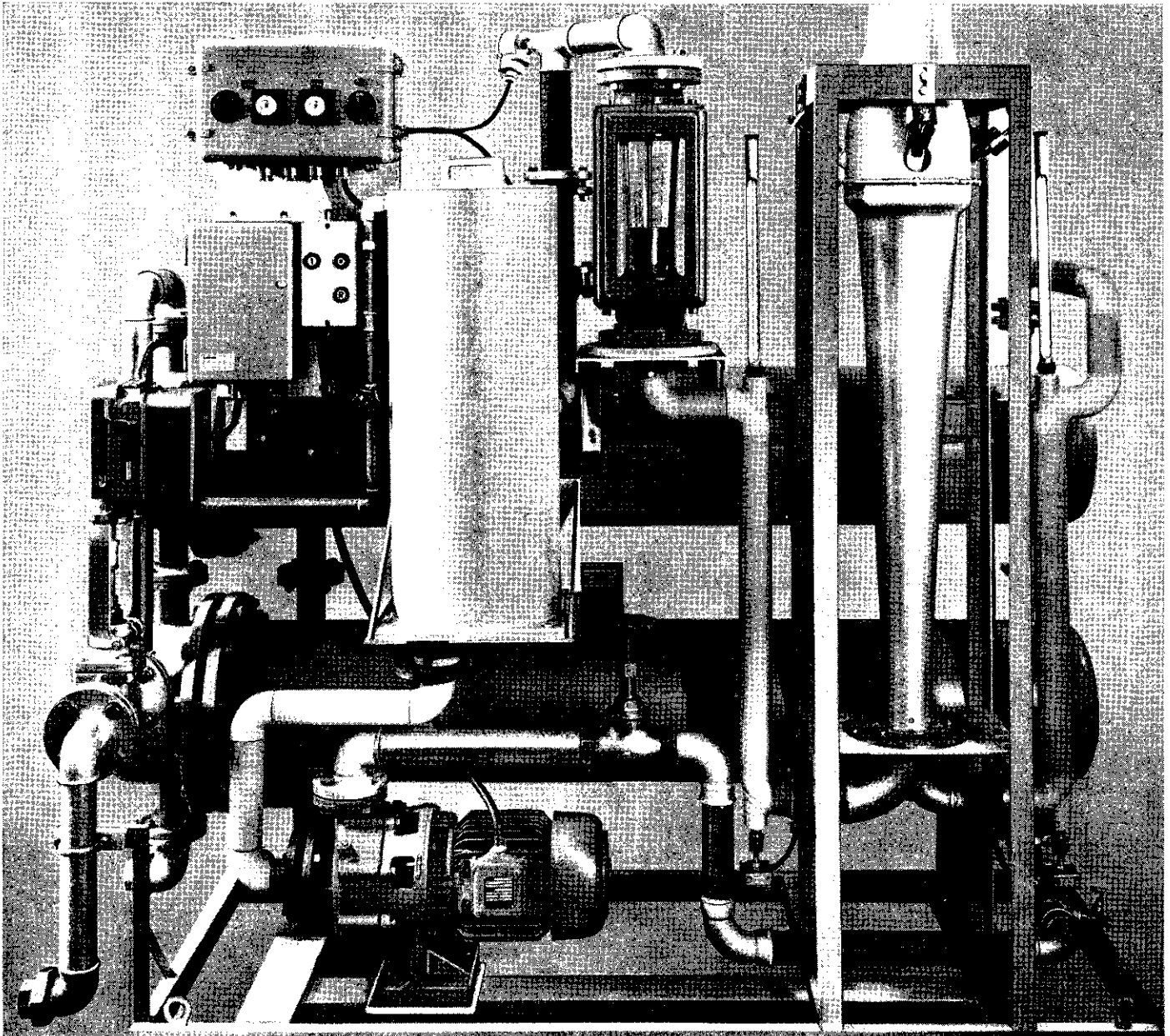
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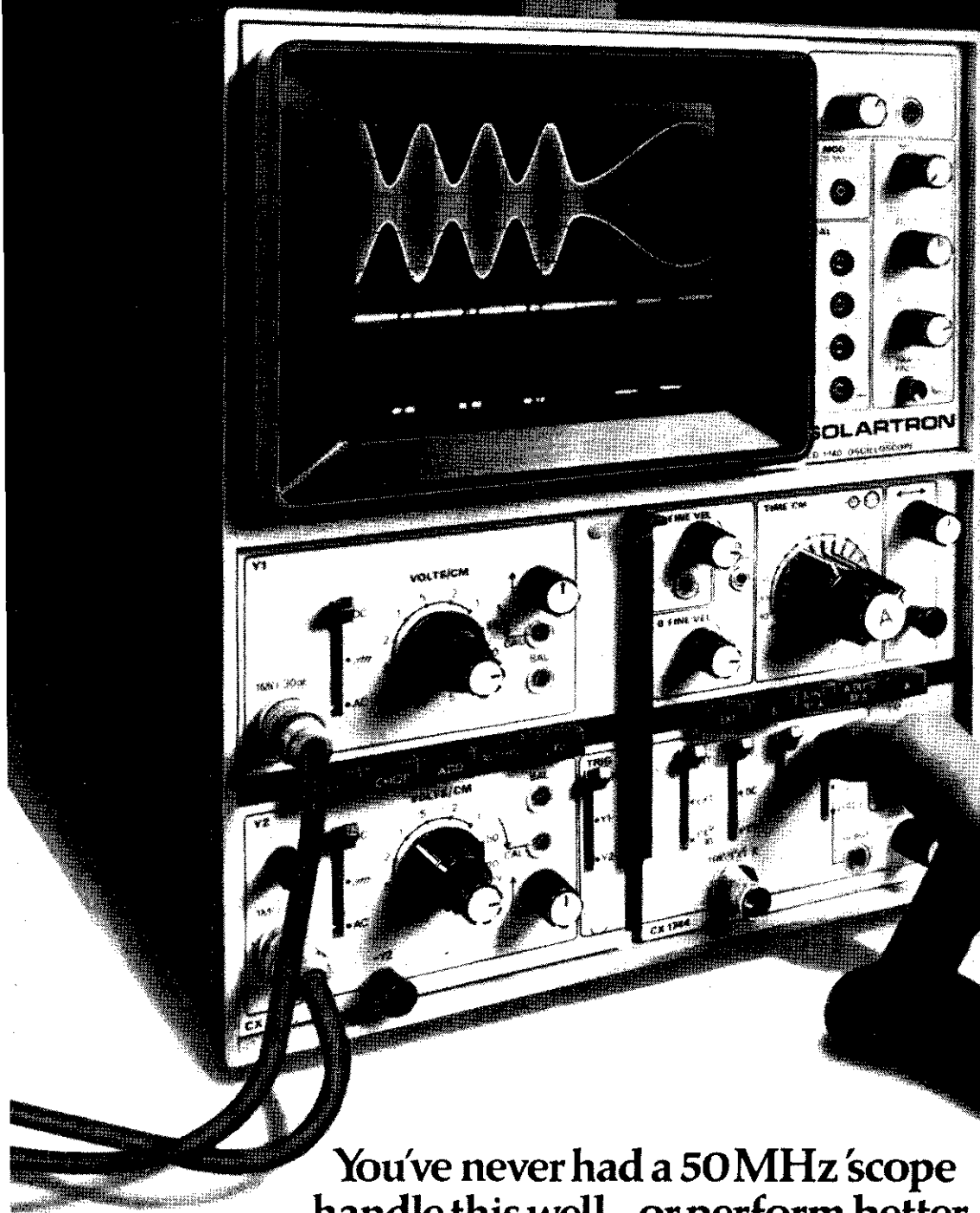
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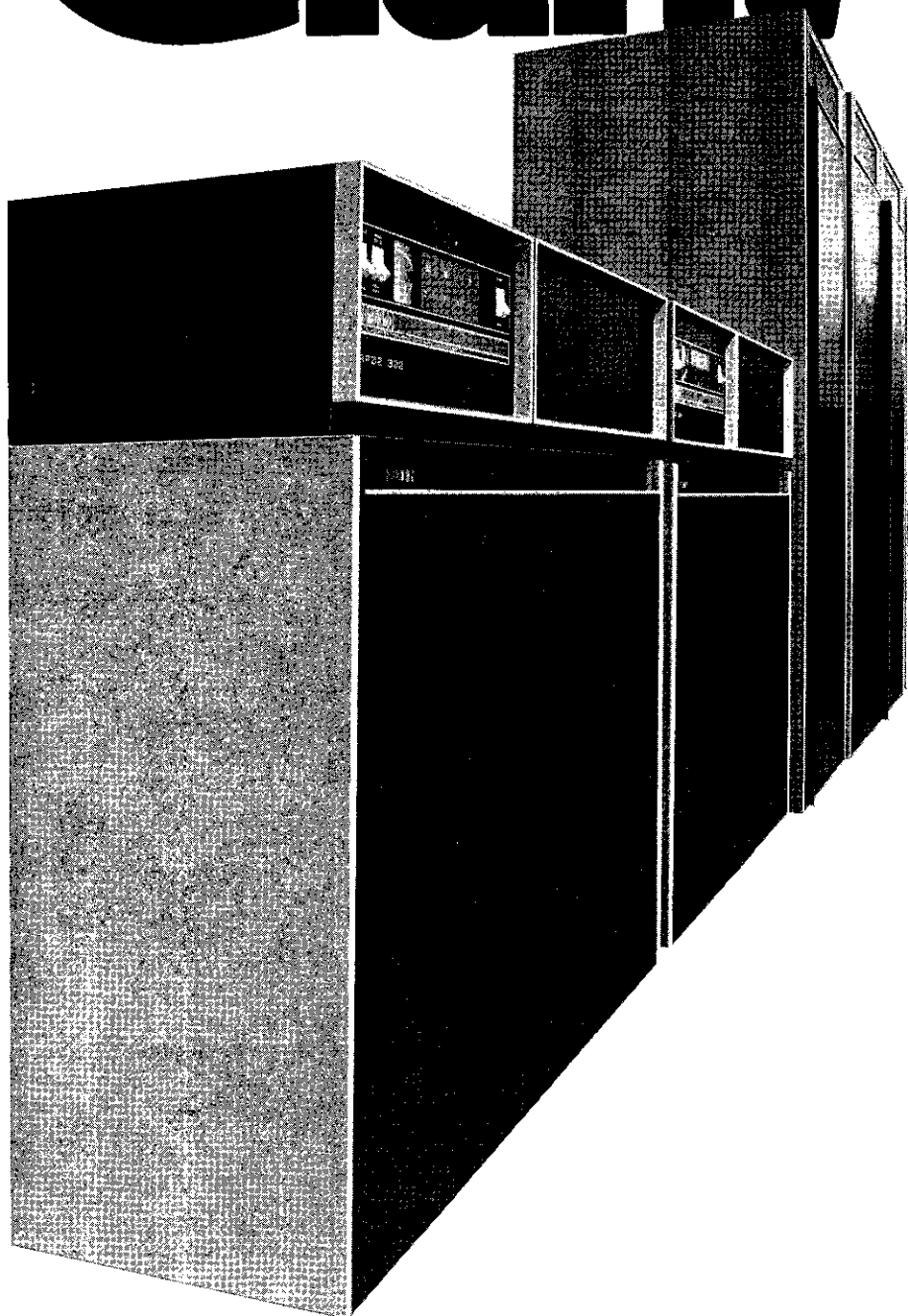
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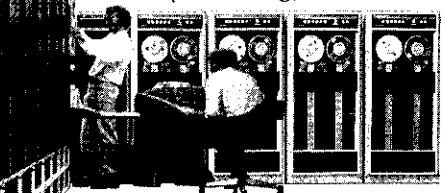
The Giant Ten



Digital Equipment's new family of big computers, DECSYSTEM-10. Each of the five systems (2nd shown) is a price/performance giant.

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DECSYSTEM-10 runs four functions: batch processing, multi-access



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All five systems run all four functions using the same operating system with the same job control commands. All are serviced by the same language processors COBOL, ALGOL, FORTRAN, BASIC, MACRO, and many others. The only thing that changes is speed and capacity.

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