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**THE FIRST TEN YEARS' ACTIVITY
OF THE
NATIONAL DEFENCE RESEARCH COUNCIL TNO
1947-1957**

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INTRODUCTION

In May 1957, the Central National Council for Applied Scientific Research in the Netherlands TNO celebrated its 25th anniversary, the occasion being marked by the publication of a commemorative volume, entitled '25 Years TNO'.

This volume contained a contribution by His Excellency, Ir. C. Staf, the Minister of War and of the Navy, conveying the defence departments' views on the TNO, while in another article the President of the National Defence Research Council TNO gave an account of the work done by his organization on behalf of national defence.

The 25th anniversary celebrations of the Central National Council coincided with the commemoration by the National Defence Research Council of the first ten years of its activity in the field of applied scientific research on behalf of national defence.

In order to give wider publicity to what is being done in this field in the Netherlands, the two articles mentioned above have been reprinted with the Central Council's permission, and are presented, together with further details concerning the National Defence Research Council, in this brochure.

31 December 1957

NOTE:

The three letters TNO are the first letters of the dutch words 'Toegepast Natuurwetenschappelijk Onderzoek', which mean Applied Scientific Research.

The term TNO is used as a short name for the National Research Council as a whole. The three letters RVO are derived from the dutch word 'Rijks-VerdedigingsOrganisatie' which means Organization for National Defence. The term RVO-TNO is used as a short name for the National Defence Research Council, being a part of the National Research Council.

THE DEFENCE DEPARTMENTS AND THE TNO

by IR. C. STAF

Minister of War and of the Navy

It is only natural that in considering the work of the TNO, the defence departments should have the National Defence Research Council TNO principally in mind, for it maintains closer relations with this branch of the TNO than with any of the organization's other special branches. Nevertheless, the National Defence Research Council TNO would not be able to do the work it does, were it not for the assistance and co-operation it receives from its fellow-organizations.

It has now become an axiom that research in aid of defence should be a matter of government concern, though we are still left with the question: how far should the government go in this respect? Should all military research be concentrated in the hands of the defence departments of the Army, Navy and Air Force or is another managerial system - one operating in close co-operation with, but independently of, the armed forces - more appropriate? As may be known, in the Netherlands the latter form of organization has been chosen, though I shall not be going into all its various details here. In my view, we have made the right choice, for there is a world of difference between the organization and methods adopted in the armed forces and those adopted in the world of science. The armed forces are organized on the principle of stringently centralized authority, and so far-reaching a centralization of command would be unacceptable in the field of scientific research. Practice has taught us that men of research work to the best advantage when operating in small, independent groups, and when they possess a certain measure of freedom and independence - and not when they work exclusively to order, along lines laid down in some rigidly defined commission. Furthermore, the justification for the existence of a research institution does not lie solely in certain needs which are felt to be essential and for which a solution must be found by way of research or development; it lies also - and not in the last place - in the need for free and independent research. This is not only in order that a contribution may be made to the constant advance of technical development, but also in order that, by exploring new territory, the apparatus of

science may be maintained at a proper level of efficiency and may perform its function of producing 'availability-utility'.

It must not, however, be concluded from this, that the armed forces should have no hand in research or development themselves. The fact that research in aid of defence would be fruitless if there were not close contact with the armed forces (who decide what is required, and who have to employ the resultant products of research), is sufficient indication in itself that these forces should have their own experts. For this reason, various liaison committees have been appointed, as the need for them arose in specific fields. At the same time the science bureaux of each of the three branches of the armed forces contribute their share towards arriving at a solution to the many problems encountered by performing scientific research of their own, since there will always be questions which, for various reasons, are better dealt with and solved within the framework of their own organization. In this respect, mention may be made particularly of the Armed Forces Electronics Laboratory. In addition, it should be mentioned that there must also be co-operation with industry, which in many cases takes over the work of further development, when the research stage has come to an end.

In the foregoing paragraphs I have already listed some of the requirements which, in my view, a research organization working on behalf of defence should meet; such requirements, for instance, as independent functioning and close consultation with the armed forces and industry - since, after all, before one can arrive at an opinion on anything, one ought to know first of all what requirements the object of one's opinion has to fulfil.

A further requirement is that there should be continuity in research in view of the lengthy period of investigation most projects entail. This need for continuity implies, among other things, that a research organization should be on a solid financial footing, and I think we can say that this requirement is being met in the Netherlands. Here, in this country, we have discovered a middle path between financially warranted research and a selection of projects in this field which a small country finds itself called upon to carry out. It is necessary to act according to economic principles in the armed forces sector, too, and to apply scarce means in such a way that they yield the greatest output. After it has been decided what portion of the funds available to the armed forces should be allocated to research, this same economic principle should again be applied to the choice of projects upon which one is to embark. The Board of the National Defence Re-

search Council TNO (known, for short, as the RVO-TNO) on which the delegates of the Minister of War and of the Navy have seats, and which I should like to refer to as our 'permanent research council', should indicate the policy to be followed in this matter, those research and development projects being selected that offer the most likelihood of yielding fruitful results. From the financial viewpoint, another important consideration is that, where certain equipment is concerned, in the process of research and development it is the building of a prototype that involves the greatest financial outlay, so that mistakes made in earlier phases can result in heavy financial losses at the prototype stage.

Research, too, is having to face a shortage of academically (or technically) trained staff, so that I consider it important that those engaged in research should also devote part of their time to the training of experts for the future. At the present juncture, it is necessary to lay more emphasis on such training than was ever before the case. The knowledge and learning of various research workers provide solid foundations for this - but also for essential and fruitful contacts with the universities and technological institutes.

Nowadays, research can no more be looked upon as a purely national affair than can defence. This is why we must attach great importance to scientific contacts and - where feasible - to co-operation with our partners in defence abroad - here I am thinking particularly of our fellow-members of the North Atlantic Treaty Organization (NATO) and of the West European Union (WEU).

The importance of such contact and co-operation is not restricted to the exchange of data, experience gained and also perhaps the exchange of industrial research workers; it covers in addition the possibility of a certain division of functions to avoid duplication and - what is more important - in order to be able to extend the field of research. In the case of a small country such as the Netherlands, there is a further consideration as well and that is that larger research projects can be embarked upon, if one works in co-operation with other countries, than would be possible if we were to tackle the work alone.

After the above outline account of the general requirements a research body ought to fulfil according to our practical experience, the question logically follows as to whether this is the case with the organization we are concerned with here. In my opinion the RVO-TNO does indeed meet the needs of the

armed forces, and the Netherlands cannot but be grateful that in the field of defence it has a research institution at its disposal which, though built up and run with limited means, has won so excellent a reputation for itself in the world. In this connection, I must not omit to mention that at the end of 1954 the American Government let its eye fall on the RVO-TNO, when it was considering the matter of establishing a research centre in Western Europe for SHAPE, the headquarters of the NATO forces in Western Europe*. That the choice did actually fall on the Netherlands RVO-TNO is not to be attributed solely to the international reputation enjoyed by this research body and by the men of science who stand at its head, but also to its organizational form, which is midway between that of a purely governmental department and that of a private laboratory run on commercial lines.

The work of the RVO-TNO has been linked up with international defence in a further way, too; here I am thinking particularly of the participation by individual research workers in international consultations within the framework of NATO and WEU, which consultations cover many spheres of military co-operation.

Finally, I should like to draw attention to a matter which, though not directly related to any opinion of the defence departments regarding the work done by the National Defence Research Council TNO, should, nevertheless, not be lost sight of, when considering the relationship between the military and non-military sections of the community. And that is that the knowledge, energy and money devoted to military research yield benefits which are not confined to the armed forces alone. The great majority of projects sooner or later yield direct or indirect benefits for civil research, development and industry - indeed, for the entire civil community.

* The SHAPE Air Defense Technical Center.

TNO AT THE SERVICE OF NATIONAL DEFENCE

by PROFESSOR DR. G. J. SIZOO

President of the National Defence Research Council TNO

Applied scientific research provides a nation with the means whereby it can maintain its position in the struggle for economic survival. It is only to be expected that a nation will not, however, leave these means unused in the struggle for power or in the defence of its national existence. In every phase of civilization's development the methods and means of warfare and defence have accordingly been correlated with the existing state of technical science in the civil and social sector.

Prior to the first world war, technical development in industry had given society mass production, mechanized precision manufacture, and the internal combustion engine. As far as warfare was concerned, this resulted in the mechanization and motorization of military equipment.

Technically, the situation at the beginning of the second world war was little different from the situation at the end of the first world war. Tank, aeroplane, submarine, machine-gun, torpedo, radio communication formed the equipment with which the second world war began; all had undergone further development, but they had nevertheless all been available at the end of the first world war. That the science of war should have made a new call on technical science and industry to supply it with new means of defence and attack was to be foreseen. But this time that call went further, that is to say, it made demands on applied scientific research as well.

Not only was the entire capacity of industry, including that of its research and development laboratories, called in to assist the war effort, but a call was made on scientific research as well, particularly on the Allied side, and, as a result, the war was to a large extent decided by weapons other than those with which it was begun. In this process, recently explored fields of physics - electronics, atomic and nuclear physics - were 'industrialized' at a pace previously undreamed of and combined and interwoven with mechanical, electrical, chemical and thermal techniques which had already been available or had been brought to a more advanced stage of development.

Chemistry and bacteriology were not only engaged in the preparations made for possible chemical and biological warfare (which fortunately never materialized); they were also employed to an equal extent in solving countless problems concerning equipment and personnel. The same was the case with medico-biological and pharmacological research work. A new form of research developed, known as 'operations research', teams of scientists, often highly varied in their composition, were attached to the troops to look wherever they could for situations and problems which would lend themselves to scientific treatment. Mathematicians as well as electronic calculating machines were employed to solve such problems. Physiology and psychology lent their help in the work of selecting and training personnel and in adopting machines to human capability.

During the war this full-scale mobilization of scientific research for the war effort often had to be effected by *ad hoc* forms of organization. After the war, however, everyone was fully alive to the fact that we were not concerned here with a temporary state of affairs. Precisely as a result of the developments outlined above, the work of the modern army has become so interwoven, in all its different sectors, with scientific aids and methods, that it could not possibly be kept intact and maintained at a proper level of efficiency nowadays, if it did not have a separate department for military research. Accordingly, a great deal of attention was paid in many countries to the question of the most appropriate organizational form to be adopted for this sector of military activity. Then, after the Liberation, when this question came up for treatment in the Netherlands in connection with the rehabilitation of the armed forces, we turned more or less automatically to the Central National Council for Applied Scientific Research TNO, an organization which had, after all, been specially set up by the relevant Act of Parliament 'to ensure that applied research in the natural sciences should be put to the common good in the most appropriate manner' - a definition which may certainly be taken to embrace national defence as well.

Military research - modest in its scope, but important in its significance - had already been conducted prior to the second world war, i.e. in the Ministry of War's Physics Laboratory, set up in 1927 under the auspices of the Physical Weapons Commission, and in the Central Laboratory of the Headquarters of the General Staff, under the direction of the Chemical and Allied Weapons Commission. On the occupation of the Netherlands

by enemy forces, the first mentioned laboratory 'went underground', continuing to carry on its work in the Laboratory of the General Post Office at The Hague, while the second withdrew to England. When liberation came, there also existed - in addition to the rudiments of these two laboratories - the nucleus of the Chemical Laboratory of the Artillery Establishments, which had been camouflaged during the Occupation and had continued to operate as part of the TNO, being known as the 'Poortlandlaan Laboratory'. Thus, whereas, after the war, we were able on the one hand to carry on with what we already had, it became clear on the other hand that the advances made in technical science now called for a broader, more widely-embracing form of organization.

Consultations on the matter with the Executive Committee of the Central National Council TNO, in which consultations the secretary of the Physical Weapons Committee, Lt. Col. S. J. van den Bergh, played an energetic rôle, resulted in the Executive Committee's approaching the Prime Minister, Ir. W. Schermerhorn, (at the time, also the Minister of War) with a recommendation to set up a special branch of the TNO for scientific research on behalf of national defence. The Prime Minister lent a ready ear to this recommendation, with the result that a National Defence Research Council TNO was, indeed, set up by joint ministerial order of July 6, 1946, issued by the Ministers of War and of the Navy, its statutes being approved by a Statutory Order in Council, dated October 18, 1946. On July 12, 1947, the Executive Committee of the new council, whose members had in the meantime been appointed by H.M. the Queen, was installed in office by the Minister of War, His Excellency, A. H. J. L. Fiévez, acting also on behalf of the Minister of the Navy, after which the new council was able to embark on its actual work.

It was now immediately concerned with the still extant Physics Laboratory of the Ministry of War and with the Central Laboratory of the Headquarters of the General Staff, which laboratories were officially transferred to the TNO as from January 1, 1948, from which date onwards they became known as the Physics Laboratory RVO-TNO and the Chemical Laboratory RVO-TNO respectively. As from January 1, 1949, the former Chemical Laboratory of the Artillery Establishments was also transferred to the RVO-TNO's administration, being known henceforth as the Technological Laboratory RVO-TNO. Thus, in the year in which the TNO is celebrating its 25th anniversary, the RVO-TNO itself can look back on a ten-year period of activity.

If one compares the way military research has been organized in the Netherlands with the situation in other countries, one sees that the form of organization chosen is unique, in the sense that the RVO-TNO forms part neither of any civil service department nor of the apparatus of the armed forces, as a body corporate, taking the form of a public corporation, it occupies an independent position vis-à-vis both the civil service and the armed forces, while, at the same time, it is organized in such a manner as to be closely linked up to both and, by virtue of its aims and purpose, entirely at their service in every department of its activity. Furthermore, contact with the civil sectors of applied scientific research is assured by virtue of its bonds with the Central National Council TNO. In view of the experience gained during the past ten years, one is justified in concluding that this unique form of organization offers great advantages. On the one hand, the relative independence and the civil structure of the RVO-TNO make it possible to create that atmosphere in which research work thrives best, in which co-operation, based on voluntary co-ordination, prevails over rank in the establishment, where free initiative and powers of scientific invention can develop most fruitfully, and where continuity in research is not unduly interrupted by fluctuations in military affairs and by changes in staff. On the other hand, the contacts resulting from the Council's structure provide guarantees that the research work does not set out down paths which would lead it away from its real object, which is to promote the interests of the armed forces.

These contacts are made first and foremost on the Board, on which two delegates - one of the Minister of War and one of the Minister of the Navy - have seats, in addition to the four non-military 'ordinary' members. At the same time, these two military delegates, together with the chairman (one of the ordinary members), comprise the Executive Committee. Responsible, on the one hand, to their Minister for the carrying out of the research policy decided upon by him and for the use to which public funds are put, their military function, on the other hand, requires of them that they should put before the RVO-TNO the military problems appropriate for research work and that they should promote the interests of the three branches of the armed forces in like measure. When practical experience showed that the diversified character of the problems and interests involved made this task too vast and too complicated a one for two officials alone to tackle, the Ministers remedied this situation by appointing four deputy delegates, who take part in all the activities of the Board and the

Executive Committee on an equal footing with the other delegates. At present, the situation is such that both the Staff side and the Equipment side of each of the three armed forces are able, via these six officials, to bring their influence to bear within the RVO-TNO in a harmonious fashion. As far as research policy is concerned, this is decided upon by the Minister of Defence on the basis of annual proposals made by the Board of the RVO-TNO, which proposals, after consultation with the Joint Committee of the Chiefs of Staff, and after the Material Board for Navy, Army and Air Force has furnished its views on them, are laid before the Minister in the form of a working programme.

While the well-balanced promotion and co-ordination of the interests of the three sections of the armed forces have been guaranteed in this way in the top management the same principle has been applied with regard to research itself, by setting up various different liaison committees on which representatives of the defence departments concerned have seats. It is the job of these committees to follow the progress of research, to compare it with military interests and problems and to advise the Board as to the direction research should take.

For the research work the RVO-TNO undertakes - either on its own initiative or to specific commissions received from the armed forces - it has primarily at its disposal five institutions of its own. These are: 1) the Physics Laboratory RVO-TNO; 2) the Medical Biological Laboratory RVO-TNO; 3) the Chemical Laboratory RVO-TNO; 4) the Technological Laboratory RVO-TNO and 5) the Institute for Perception RVO-TNO.

The work of the Physics Laboratory lies mainly in the field of technical physics in which electronics play a dominant rôle. It is particularly concerned with the armed forces' requirements as regards detection and communication and accordingly covers - besides basic physics research on these problems - research and development work on radar, asdic, visual signalling, electronic calculation and so on.

The Medical Biological Laboratory concerns itself with problems related to protection against, and treatment of, the effects of radio-active, chemical and biological weapons. Its work consequently comprises radio-biological, bio-chemical, pharmacological and bacteriological research. The combination and interweaving of these distinct fields give this laboratory a unique character, compared with other research centres in the Netherlands working in the medical biological field.

The Chemical Laboratory, continuing to pursue its original work, is con-

cerned chiefly with problems of a material nature to do with defence and protection against chemical weapons.

The Technological Laboratory, likewise linking up with its original task, carries out research on gunpowder and explosives, also functioning in various other fields as an inspection and development laboratory for the armed forces.

The Institute for Perception, which began as a working party on perception, carries on research on sensory perception and observational psychology and on those subjects generally which have to do with man confronted with his technical environment - a confrontation which acquires an extremely pregnant and precarious character in all manner of branches of the military profession. This institute also occupies a unique position in the world of scientific research in the Netherlands by reason of the constitution of its scientific staff, which includes physicists, engineers, medical specialists and a psychologist.

As far as the RVO-TNO is concerned, the need for it to possess its own research laboratories and institutes springs from the consideration that certain research work cannot be given to others to perform in view of the need for secrecy, while other projects do not fit in with the work being done in the civilian sector owing to their specifically military character. There are, however, numerous other matters - for instance, to do with nutrition, clothing, maintenance of equipment, mechanical structures etc. - where this consideration does not apply or does not apply, at least, in like measure. As regards matters of this sort, the RVO-TNO derives advantage from the fact that it forms part of the central TNO organization, the different branches of which are also able to carry research in these fields. In such cases the RVO-TNO commissions its fellow-organizations to carry out research work on its behalf, some of which commissions are of a general and permanent character, while others are of an incidental character. This means that, in principle, the entire TNO machinery lies at the disposal of the armed forces while the various interests involved nevertheless continue to be co-ordinated by reason of the fact that all contacts are made via the RVO-TNO. Where necessary, the RVO-TNO also goes to university or industrial institutes for co-operation, assistance or advice. By making good use in this way of the available research facilities in the Netherlands, the RVO-TNO organization seeks to perform its function as the Central Defence Research Council operating on behalf of the ministry and the armed forces, in the most efficient manner possible.

Research on behalf of defence is still specifically concerned with defence matters, but this does not mean that the benefits ensuing from the results achieved remained confined to the defence sector alone. One has only to think of the importance radar, asdic, penicillin and DDT - all of them products of defence research - have assumed for shipping and civil air transport, for fishing, therapy and hygiene. Similar examples, though less spectacular, can also be found among the work we are doing in the Netherlands.

Lifeboat emergency rations of extremely highly-concentrated nutritional value and originally devised for the Royal Netherlands Navy are now also being used on a wide scale to equip life-saving rafts in the merchant marine at home and abroad. When specifications for paint, devised on scientific lines for the Army, reduce the number of types of paint employed by a half, this does not only mean a saving for the armed forces; the knowledge and experience gained also yield benefits for the paint industry. In the RVO-TNO, basic research on the influence of radio-active radiation on the living organism specifically aims at discovering prophylactic and therapeutic means of combating severe injury from radiation during wartime. That useful results for clinical work in times of peace should also ensue from such research is not a matter of mere theoretical supposition - it has been proved by fact. Problems concerning observation and perception, concerning the adaptation to technical apparatus of the human beings who have to handle them, are, it is true, special problems, peculiar to the military profession; nevertheless, their counterparts exist in various sectors of civilian life, so that the solutions found to them in the military field are of value to the civilian community as well.

These examples could be supplemented by others. The RVO-TNO has striven to bring about co-operation and an exchange of data with scientific research in the civilian sectors, everywhere where national defence issues permitted. This is also evidenced by the fact that the results of research work undertaken have been printed in a considerable number of publications, and further by the fact that several persons working on RVO-TNO research projects have obtained their doctor's degree. The attention that these publications have in many cases attracted in scientific circles abroad as well as at home, forms a proof of the quality of the work done and the importance of the results achieved.

If, in looking back over the first ten years of its work, the RVO-TNO shares the pleasure and satisfaction felt on the occasion of the TNO's 25th anni-

versary, its prime reason for doing so lies undoubtedly in the fact that in that ten-year period the need to defend our national existence by military means - which means it has endeavoured, by its own contribution, to maintain in a state of preparedness - has not arisen. It is, in addition, a source of further satisfaction to the organization that its research work has not been without its benefits for the civilian community in times of peace, even though in a less direct manner than in the case of its parent and its sisterorganizations.

THE BOARD OF THE RVO-TNO

MEMBERS	FUNCTION	DATE OF APPOINTMENT
Prof. Dr. G. J. Sizoo	President	1947
Commodore E. J. Gallas	Delegate of the Minister of the Navy	1956
Col. Ir. L. W. C. Adank	Delegate of the Minister of War	1957
Commander H. P. Muller	Deputy delegate of the Minister of the Navy	1951
Col. Ir. C. A. Bijlaard	Deputy delegate of the Minister of War	1956
Lt.Col. Ir. G. J. Schot	Deputy delegate of the Minister of War	1956
Col. L. W. Proost	Deputy delegate of the Minister of War	1957
Prof. Dr. Ir. H. I. Waterman	Vice-President	1947
Dr. L. Neher	Ordinary member	1949
Jhr. Dr. Ir. C. T. F. van der Wijck	Ordinary member	1951

SECRETARY

Mr. P. F. Tanja	Secretary of the National Defence Research Council TNO	1948
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Meetings of the Board and Executive Committee of the RVO-TNO are attended by the following representatives of the Central Council TNO:

Ir. Z. Th. Fetter	President of the Central Council TNO
Ir. J. W. J. Beek	Secretary-General of the Central Council TNO
P. L. Ek	General Treasurer of the Central Council TNO and Treasurer of the RVO-TNO

HEAD OFFICE

Address	22, Wassenaarseweg, The Hague
Telephone	The Hague (01700) - 185007/9
Telegraphic address	ERVEOR, The Hague
President	Prof. Dr. G. J. Sizoo
Director of Physics Research	Prof. Ir. J. L. van Soest
Secretary	Mr. P. F. Tanja
Inspector	L. C. Baron van der Feltz

RESEARCH INSTITUTIONS RVO-TNO

PHYSICS LABORATORY RVO-TNO

Address	Vlakte van Waalsdorp, The Hague
Telephone	The Hague (01700) - 777940
Director	Ir. IJ. Boxma
Deputy Director	Ir. S. Gratama
Assistant Director	Ir. M. W. van Batenburg

MEDICAL BIOLOGICAL LABORATORY RVO-TNO

Address	139, Lange Kleiweg, Rijswijk, Z-H. (South Holland)
Telephone	Delft (01730) - 20330
Director	Prof. Dr. J. A. Cohen
Assistant Director	Dr. C. van der Meer

CHEMICAL LABORATORY RVO-TNO

Address	137, Lange Kleiweg, Rijswijk, Z-H. (South Holland)
Telephone	Delft (01730) - 20330
Director	Drs. J. van Ormondt
Assistant Director	Dr. P. A. Jonquière

TECHNOLOGICAL LABORATORY RVO-TNO

Address	137, Lange Kleiweg, Rijswijk, Z-H. (South Holland)
Telephone	Delft (01730) - 20330
Director	Ir. A. J. der Weduwen
Assistant Director	Dr. E. W. Lindeijer

INSTITUTE FOR PERCEPTION RVO TNO

Address	5, Kampweg, Soesterberg
Telephone	Huis ter Heide (03403) - 444
Director	Dr. M. A. Bouman

OPTICS UNIT RVO-TNO

Address	12, Kanaalstraat, Delft
Telephone	Delft (01730) - 24950
Leader	Prof. Dr. A. C. S. van Heel

FORMER FUNCTIONARIES

DELEGATES OF THE MINISTER OF THE NAVY

Rear-Admiral J. B. Meyer	1947-1949
Vice-Admiral J. J. C. C. Bennik	1949-1950
Vice-Admiral (ret.) A. S. Pinke	1950-1955
Commodore A. M. Valkenburg	1955-1956

DELEGATES OF THE MINISTER OF WAR

Major-General Ir. J. Govers	1947-1950
Major-General L. Ezerman	1950-1951
Colonel Ir. P. H. van der Trappen	1951-1952
Colonel Ir. J. C. Kok	1952-1955
Colonel Ir. C. A. Bijlaard	1955
Major-General Ir. M. Brinkgreve	1955-1957

DEPUTY DELEGATES OF THE MINISTER OF THE NAVY

Lieutenant Commander K. H. R. D. J. van Doornick A.Czn.	1947-1948
Lieutenant Commander L. Stam	1948-1951

DEPUTY DELEGATES OF THE MINISTER OF WAR

Colonel L. Ezerman	1947-1950
Colonel Prof. Dr. Ir. G. Otten	1950-1953
Major-General (ret.) Prof. Dr. Ir. G. Otten	1953-1956
Commodore C. W. A. Oyens	1956-1957

ORDINARY MEMBERS

Prof. Jhr. Dr. G. J. Elias	1947-1951
Prof. Dr. G. Holst	1947-1949

Prof. Dr. H. R. Kruyt	President of the Central Council TNO	1947-1953
Ir. A. de Mooij A.Czn.	General Treasurer of the Central Council TNO and Treasurer of the National Defence Research Council TNO	1947-1952
Ir. A. J. der Weduwen	Deputy Secretary of the National Defence Research Council TNO	1947-1948
Prof. Ir. J. L. van Soest	Director of the Physics Laboratory RVO-TNO	1948-1957
Ir. J. Piket	Assistant Director of the Physics Laboratory RVO-TNO	1948-1955

IMPORTANT DATES IN THE HISTORY OF THE RVO-TNO

1946 - July 6

Joint Order of the Ministers of War and of the Navy establishing the National Defence Research Council TNO, and fixing the date of its establishment as *July 1, 1946*.

1946 - October 18

Statutory Order-in-Council No. 58 conferring royal approval on the National Defence Research Council Statutes and fixing July 6, 1946 as the date on which said Order-in-Council should come into force.

1947 - July 12

Meeting of the Board of the Central Council TNO, under the chairmanship of Professor Dr. H. R. Kruyt, at which meeting the Board of the National Defence Research Council TNO was installed in office and at which an address was delivered by the Minister of War, His Excellency A. H. J. L. Fiévez, speaking also on behalf of the Minister of the Navy, His Excellency, J. J. A. Schagen van Leeuwen.

1947 - October 1

Founding of the Medical-Biological Institute RVO-TNO, established in the premises of the Pharmacological Laboratory of the State University of Leyden.

1948 - May 22

Resolution passed by the Board of the Central Council TNO providing for the transfer of the Poortlandlaan Laboratory TNO to the National Defence Research Council TNO and fixing *January 1, 1949* as the date for this transfer. The laboratory, established in the premises of the Technological Institute at 134, Juliana-laan Delft, hereby acquired the name of 'Technological Laboratory RVO-TNO'.

1948 - June 9

Ministry of War Order No. 298, transferring the management of the Central

Laboratory of the former General Headquarters to the National Defence Research Council TNO as from *January 1, 1948*. The Laboratory, established in the premises of the Technological Laboratory at 134, Julianalaan, Delft, hereby acquired the name of 'Chemical Laboratory RVO-TNO'.

1948 - August 5

Ministry of War Order No. 297, transferring the management of the Ministry of War Physics Laboratory to the National Defence Research Council TNO as from *January 1, 1948*. The laboratory, established on the *Vlakte van Waalsdorp*, The Hague, acquired the name of 'Physics Laboratory RVO-TNO'.

1949 - May 15

Founding of the Perception Team RVO-TNO, established in the premises of the Natural Science Laboratory of the State University of Utrecht.

1951 - May 16

Removal of the Perception Team RVO-TNO to the premises of National Air Medical Centre at Soesterberg.

1951 - July 7

Official opening of the extension to the Physics Laboratory RVO-TNO on the *Vlakte van Waalsdorp* by the president of the RVO-TNO in the presence of the State Secretary of War, His Excellency, Mr. F. J. Kranenburg.

1953 - May 1

The Medical Biological Institute RVO-TNO transferred to the new laboratory building in Lange Kleiweg, Rijswijk.

1954 - January 1

The Medical Biological Institute RVO-TNO at Rijswijk became known as the Medical Biological Laboratory RVO-TNO.

1954 - January 29

Official opening by H.R.H. Prince Bernhard of the wing in the laboratory building at Rijswijk allocated to the Medical Biological Laboratory RVO-TNO.

1954 - December 14

Agreement between the Netherlands and the American Governments and contract

between the American Government and the National Defence Research Council RVO-TNO, entrusting to the latter body the establishment and maintenance of the Shape Air Defense Technical Center.

1956 - May 1

Status of Institute conferred upon the Perception Team RVO-TNO known henceforth as the Institute for Perception RVO-TNO.

1956 - July 6

Removal of the Technological Laboratory RVO-TNO to the new laboratory building in Lange Kleiweg, Rijswijk.

1957 - February 8

Removal of the Chemical Laboratory RVO-TNO to the new laboratory building in Lange Kleiweg, Rijswijk.

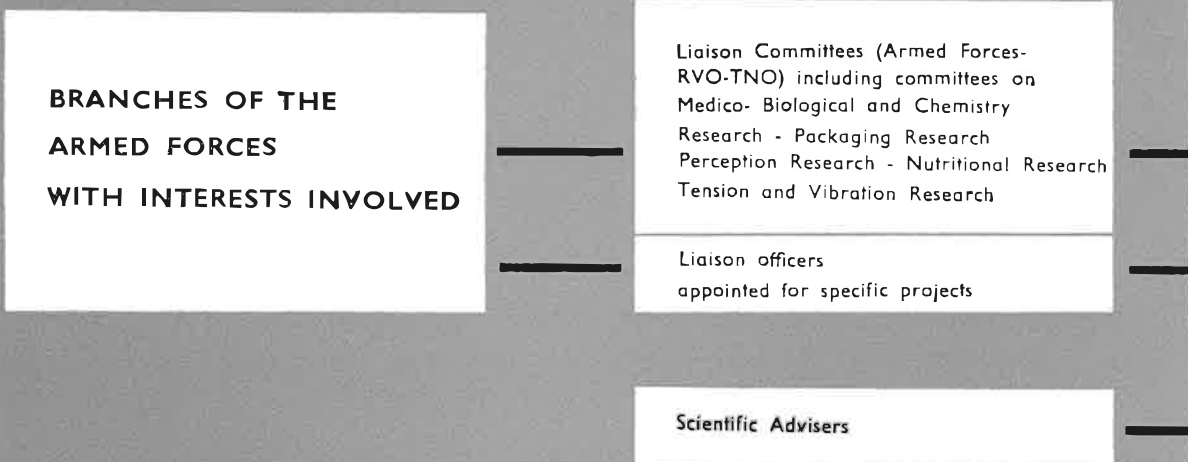
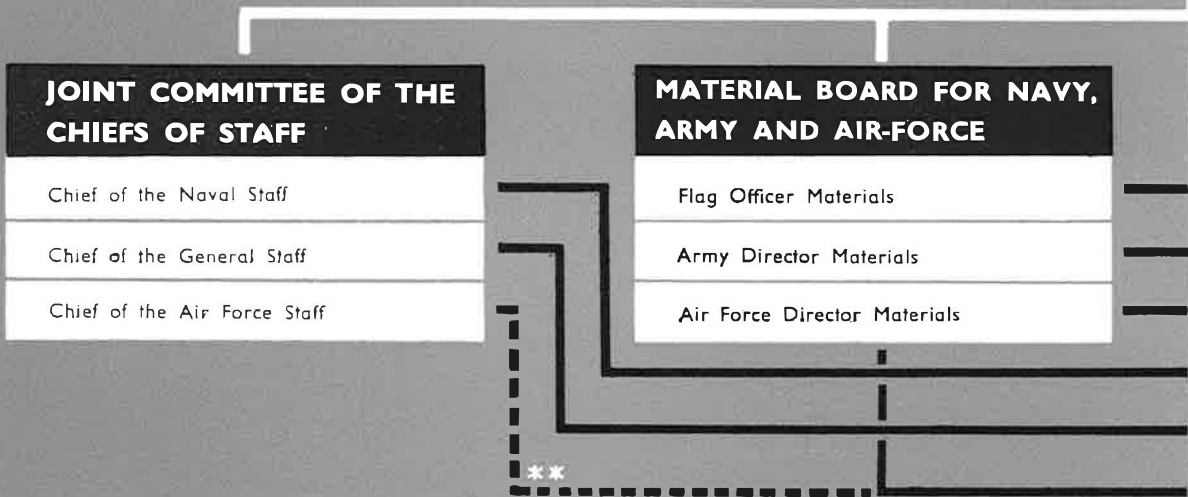
1957 - April 17

Official opening by the Minister of Defence, His Excellency, Ir. C. Staf, of the complex of laboratories in the Lange Kleiweg at Rijswijk housing the Medical Biological, the Chemical and the Technological Laboratories of the RVO-TNO and known from henceforth as the 'Prince Mauritsgebouw'.

1957 - May 2

Gathering of the entire staff of the National Defence Research Council TNO in 'Amicitia' in The Hague, to celebrate the 25th anniversary of the TNO Organization and the completion of the RVO-TNO's first ten years of work.

MINISTER OF DEFENCE
(NAVY —)



* Functions linked together by a double line are performed by the same individual

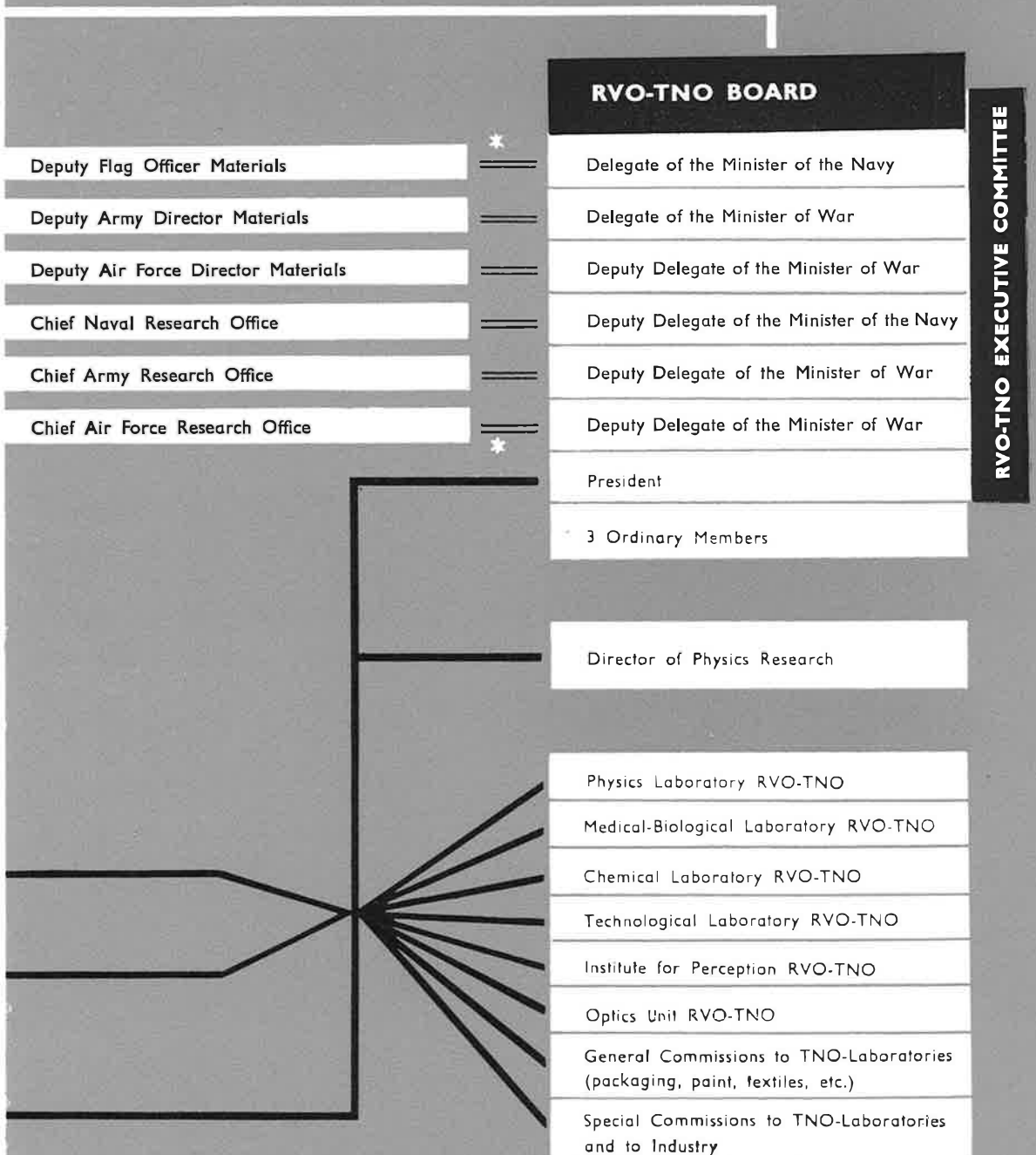
** The Air Force Scientific Bureau forms part of the AIR FORCE DIRECTORATE of MATERIALS ORGANIZATION and has also direct contact with the CHIEF OF THE AIR FORCE STAFF.

Organization

BEHALF OF NATIONAL DEFENCE

DEFENCE

WAR)



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