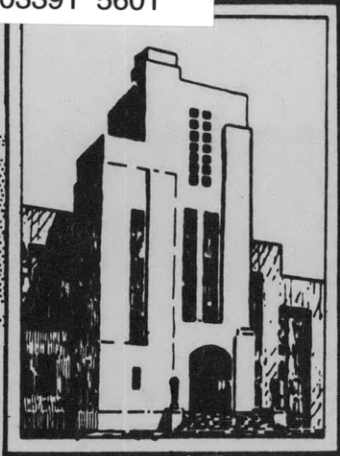


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DEPARTMENT OF THE NAVY
DAVID TAYLOR MODEL BASIN

HYDROMECHANICS

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STRUCTURAL
MECHANICS

○

APPLIED
MATHEMATICS

THE VIIIth INTERNATIONAL TOWING TANK CONFERENCE

(La VIII Conferencia Internacional de Canales
de Experimentación Naval)

MADRID, September 15 - 23, 1957

Information Bulletin

published by

Ministerio de Marina

Canal de Experiencias Hidrodinámicas, El Pardo

Madrid

November 1957

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**Information Bulletin
published by
Ministerio de Marina
Canal de Experiencias Hidrodinámicas, El Pardo
Madrid
November 1957**

The edition of this Information Bulletin is dedicated to all those individuals and groups of individuals who have cooperated in one form or another in the organization and development of this Conference, and is addressed especially to the official bodies and to the Spanish ship-building and shipping companies, both State and private, who by their contributions have helped to finance this Conference.

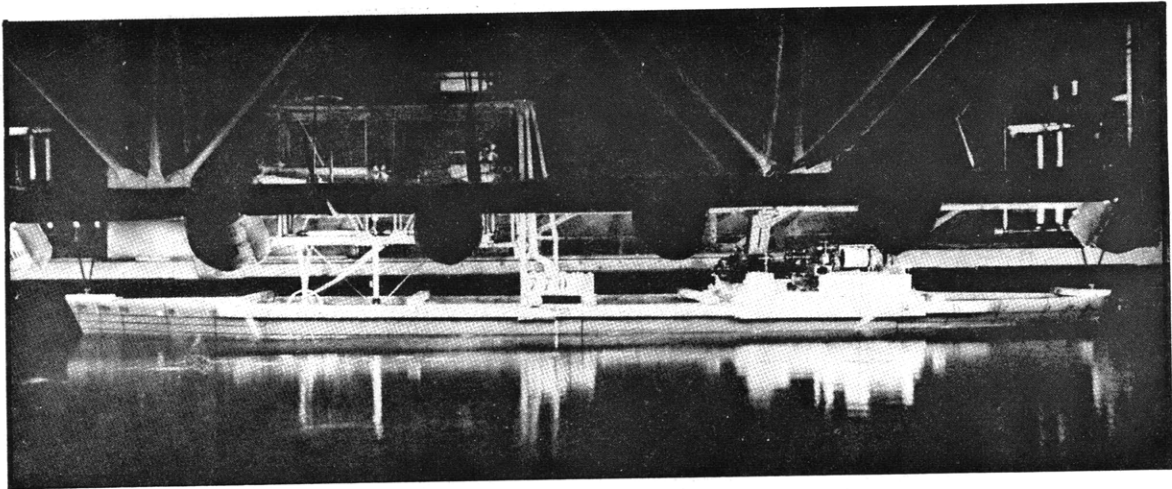
Translated by E.N. Labouvie, Ph.D.

April 1959

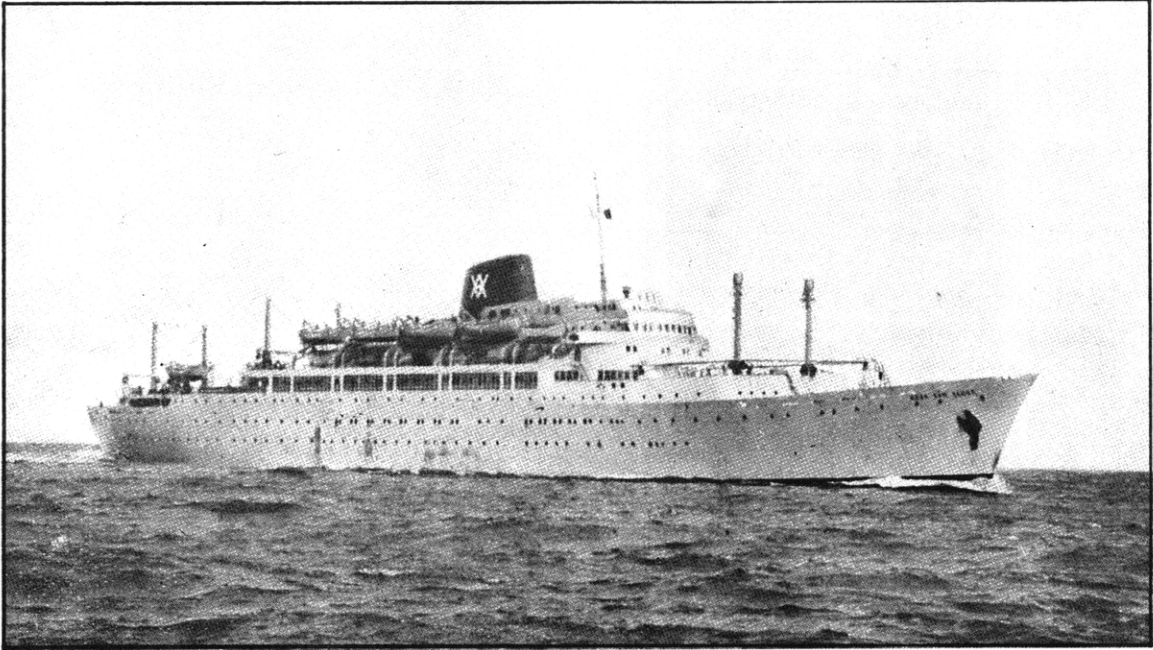
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The model test, the first stage in the construction of a ship.



The ship, the full-scale end product of what was once a small model, undergoes its tests at sea.

THE VIIIth INTERNATIONAL TOWING TANK CONFERENCE

Apart from a few additions, the following text is a reproduction of the Bulletin of information published in No. 268 of the Journal "Ingenieria Naval."

By way of illustrating the various transactions of the Conference, this bulletin includes a photographic review which is more complete than that which appeared in the above journal.

Preparations are being made for the publication of the technical reports of the Conference in their entirety.

ABSTRACT

This is a summary of the proceedings of the VIIIth International Towing Tank Conference held in Madrid, Spain, September 15 - 23, 1957.

THE VIIIth INTERNATIONAL TOWING TANK CONFERENCE

The VIIIth International Towing Tank Conference took place in Madrid, September 15 - 23, 1957. This Conference was held in Madrid following an invitation tendered on orders of His Excellency the Minister of the Navy, by the Director of the Madrid Model Basin (Canal de El Pardo) at the close of the previous Conference in Copenhagen in 1954, an invitation which was unanimously accepted by the plenary assembly of that Conference. The Madrid Conference was conducted in accordance with a pre-arranged program, and all its transactions - both the technical sessions and the social functions - took place in a most brilliant setting. The Conference was outstanding, not only for the level and range of the discussions of the various topics investigated but also for the importance of the decisions reached, some of which have a truly transcendent significance in relation to the specialized technical research carried out in the various experimental model basins.

The following report represents a succinct review of the development of the Conference, beginning with a brief description of the organizational work which preceded the Conference and constituted a truly important task, in view of the international scope of the Conference.

1. ORGANIZATION

Since this Conference represents an organization which operates on a permanent basis, the technical preparations for these meetings are carried on during the entire time between one Conference and the next, in accordance with a program of research projects determined by the last preceding Conference. Various technical committees are assigned the task of carrying out these investigations in addition to those of a more individual nature undertaken by individual researchers among the members of the Conference. The general organization is entrusted to an International Permanent Committee which works in close contact with the Organizing Committee of the country where the Conference will be held, and determines the program of the technical sessions and the general outline of the Conference. The development and details are entrusted to the above-mentioned Organizing Committee.

The Madrid Conference, whose honorary chairmanship was graciously accepted by His Excellency The Chief of State, was directed by the following committees:

AN HONORARY COMMITTEE, presided over by The Honorable The Minister of the Navy, included the following members:

The Honorable The Minister of Industry.
The Honorable The Minister of Education.
The Honorable The Minister of Commerce.
The Honorable The Minister of Foreign Affairs.
The Honorable The Minister Secretary of the President.
The Honorable The Undersecretary of the Merchant Marine.
The Honorable The Undersecretary of Industry.
The Honorable The Undersecretary of Education.
The Honorable The Undersecretary of Foreign Affairs.
The Honorable The Undersecretary of Commerce.
The Right Honorable the Mayor and President of the Municipal Government of Madrid.
The Honorable The President of the General Council for Scientific Research.
The Honorable Admiral, the Navy Chief of Staff.
The Honorable Admiral, the Chief of Central Jurisdiction of the Ministry of the Navy.

THE ORGANIZING COMMITTEE was composed of the following members:

Chairman: The Honorable Don Juan Antonio Suanzes Fernández, Inspector General of the Corps of Naval Engineers of the Fleet.

Vice-Chairman: The Honorable Don Jesús Alfaro Fournier, Deputy Inspector General of the Corps of Naval Engineers of the Fleet.

Chairman of the International Standing Committee: The Most Excellent Don Manuel López-Acevedo Campoamor, Director of the Canal De Experiencias Hidrodinámicas at El Pardo (Madrid Model Basin).

Voting Members:

Don Carlos Angulo, Administrative Officer of the Central Maritime Office.

The Honorable Don Eduardo Aznar Conte, Director of the Central Maritime Office.

The Most Excellent Don Leopoldo Boado Endeiza, Director General of Navigation.

The Most Excellent Don Ignacio Díaz de Espada Mercader, President of the Association of Naval Engineers.

Don Pedro Díaz de Espada Mercader, Technical Director of Fisheries and Codfish-Drying Plants of Spain.

The Most Excellent Don Enrique Dublang Tolosana, Director of Marine Military Constructions and Industries.

The Honorable Don Aureo Fernández Avila, Vice-President of the Cadiz Shipyards.

Don Miguel García Ortega, Member of the C.T.A. of the Juan de la Cierva Foundation.

The Most Excellent Don Carlos Godino Gil, Director of the Institute of Technology for Naval Engineers.

Translator's note: Certain liberties were taken in translating Spanish titles and official designations of position in order to make these conform more nearly to American usage.

The Honorable Don Jose M. ^a González-Llanos Caruncho, President of the Shipyards and Ship Repair Depots of the Northwest.

The Right Honorable Don Juan Claudio Güell, Count de Ruiseñada, President of the Transatlantic Company.

The Honorable Don Alvaro Guitián Vieito, Rear Admiral, Naval Staff.

Don Antonio Matos Lecuona, Euskalduna Shipbuilding and Repair Company.

Don Luis Méndez-Vigo Rodríguez de Toro, Licensed Petroleum Monopoly Company.

Don Fernando Merry del Val, Director of the Spanish Petroleum Company.

The Honorable Don Augusto Miranda Maristany, President of the Spanish Shipbuilding Society.

The Honorable Don Angel Riva Suardiáz, President of the Shipyards of Cantabria.

The Most Excellent Don Fernando Rodrigo Jiménez, President of Naval Constructions and Industries.

The Honorable Don Jesús M. ^a Rotaache Rodríguez-Llamas, President of the Empresa Nacional Bazan.

The Honorable Don Rafael Rubio Martínez-Corera, President of the Ybarra Company.

The Honorable Don Pedro Sans Torres, Vice-Admiral, Vice-Chief of the Naval Staff.

The Honorable Don José Sirvent Dargent, Director of the National Institute of Industry.

The Honorable Don Manuel Soto Redondo, President of the Levant Naval Union.

The Honorable Don Manuel Súnico Castedo, Managing Director of Fisheries.

The Most Honorable Don Luis Urquijo Landecho, Marquis de Bolarque, President of the Spanish Shipbuilding Company.

Don Ramón Zubiaga Aldecoa, Technical Director of Naviera Aznar.

Secretary General:

The Most Excellent Don Antonio González de Guzmán, Secretary General to the Board of Directors of Marine Military Constructions and Industries.

Technical Secretary:

Don Luis Mazarredo Beutel, Engineer, Canal de Experiencias Hidrodinámicas, El Pardo.

Treasurer:

Don Andrés Medina Peinado, Secretary-Treasurer of the Canal de Experiencias Hidrodinámicas, El Pardo.

THE PERMANENT INTERNATIONAL COMMITTEE

The chairman of this Committee appointed at the close of the previous Conference in 1954 was Mr. López-Acevedo, Director of the Canal de El Pardo (Madrid Model Basin); Mr. Mazarredo, an engineer attached to El Pardo, served as Secretary. Representing the various geographical areas, the following individuals were members of the committee:

Dr. J.F. Allan, Director of the Ship Division of the National Physical Laboratory, Teddington, Great Britian.

Major General of the Engineers E.G. Barrillon, former Director of the Bassin d'Essais des Carènès (Paris Model Basin), France.

Dr. K.S.M. Davidson, Director of the Experimental Towing Tank, Stevens Institute of Technology, Hoboken, U.S.A.

Prof. G. Kempf, Dr. Eng., Director of the Hamburgische Schiffbauversuchsanstalt (Hamburg Model Basin), Germany.

Dr. F.H. Nordström, Director of the Statens Skeppsprovninganstalt, Göteborg, Sweden.

This committee convened for a previous meeting at San Sebastian in September, 1956 to plan the program of technical sessions and to lay down the general outlines of the Madrid Conference.

During the last two months, because of the death of Dr. J.F. Allan in June 1957, Dr. G. Hughes, also of the National Physical Laboratory of Teddington assumed the responsibility of representing Great Britain on the Permanent Committee.

THE EXECUTIVE COMMITTEE

Within the above-mentioned Organizing Committee an Executive Committee was established to which was delegated the responsibility of developing definite plans and carrying out all organizational tasks. This committee, which discharged its arduous duties with great enthusiasm and efficiency, was presided over by General Alfaro and was composed of Messrs. Angulo, Dublang, Gonzales de Guzman, López-Acevedo, Matos, Mazarredo, Medina, Miranda, and Rodrigo.

The expenses of the Conference were covered by the contributions made by the official bodies and by the shipbuilding enterprises and shipping companies, both State and private, listed as follows.

Official bodies:

The Ministry of the Navy.

The Ministry of Industry.

The National Institute of Industry.

The Juan de la Civerva Foundation.

Shipbuilding enterprises:

Empresa Nacional Bazán.

Empresa Nacional Elcano, Astilleros de Sevilla.

Sociedad Española de Construcción Naval.

Unión Naval de Levante.

Astilleros de Cádiz.

Compañía Euskaldun de Construcción y Reparación de Buques.

Astilleros Luzuriaga.

Astilleros del Cadagua.

Astilleros Tomás Ruiz de Velasco.

Talleres del Astillero.

Astilleros de Corcho Hijos.

Astilleros del Cantábrico.

Astilleros y Talleres del Noroeste.

Hijos de J. Barreras.

Enrique Lorenzo y Compañía.

Shipping and fishing companies.

Shipowners (94) belonging to the Central Maritime Agency.

Federación Española Sindical de Armadores de Buques de Pesca.

Pesquerías y Secaderos de Bacalao de España.

The number of invitations sent out to urge participation in the technical deliberations as delegates or observers amounted to 117. As a result, 93 persons attended as delegates and 6 as observers.

The following 21 countries were represented at the Conference: Germany, Austria, Belgium, Brazil, Canada, Denmark, Spain, the United States, Finland, France, Great Britain, Netherlands, India, Italy, Japan, Norway, Portugal, Russia, Sweden, Turkey, and Yugoslavia, to which should be added one observer sent to represent the F.A.O. (Food and Agriculture Organization), an organ of the United Nations. For unexpected reasons, the representatives of Argentina, Australia, and Poland, which had also been invited, were unable to attend.

2. OPENING SESSION

On the morning of September 15, 1957, the Conference started with a solemn opening session held in the Ceremonial Hall of the central building of the General Council for Scientific Research. The session was presided over by The Honorable The Minister of the Navy; seated with him as presiding officers of the assembly were: The Honorable Don Juan Antonio Suanzes and The Honorable Don Jesus Alfaro The Chairman and Vice-Chairman of the Organizing Committee; The Honorable Don José Ibáñez Martín, President of the General Council for Scientific Research; and the Chairman and the Members of the Permanent International Committee present in Madrid, Messrs. López-Acevedo (Spain), Major General E.G. Barrillon (France), Dr. K.S.M. Davidson (U.S.A.), Dr. G. Hughes (Great Britain), and Dr. H.F. Nordström (Sweden).

After the Conference had been declared open, the first address was delivered by the Chairman of the Permanent International Committee, Mr. Manuel López-Acevedo, who spoke as follows:

“With this opening ceremony, the Conferencia Internacional de Canales de Experimentación Naval, or ‘International Towing Tank Conference’ as it is known under its present official designation in English, inaugurates today its eighth convention.

“On this occasion, there falls to our country the great honor, which we appreciate deeply, and in due measure of having entrusted to us the task of organizing the preparatory work of the Conference and now that it is upon us, the great pleasure for every Spaniard of offering hospitality to the distinguished men and women who are attending this Conference.

“Due to the organized mechanics which calls for the Director of the Model Basin of the country where the Conference is held to preside over the International Organization, it has become my privilege to discharge this honorable duty during the three years which have elapsed since I received, in September of 1954, at the close of the previous Conference at Copenhagen from the hands of Dr. Nordström, the chairmanship of this Conference.

“Justified, therefore, in using this expression, it is in my capacity as Chairman of the Permanent International Committee that I devote my opening remarks to most cordially welcoming to Spain the foreign delegates and the distinguished persons accompanying them who honor us with their presence, many of whom have come to our country for the first time and some from far-away countries.

“With these opening words, I also wish to salute the authorities presiding over this meeting and to express to them in the name of this International Organization our sincerest feelings of appreciation for the high honor which they bestow upon us by their presence at this opening session, feelings of appreciation which I take the liberty of asking The Honorable The Minister of the Navy, to accept and respectfully transmit to His Excellency The Chief of State, who by graciously assuming the honorary chairmanship of this Conference has rendered it as splendid an event as possible.

“Moreover, it is my most pleasant duty to take advantage of these opening remarks to express, likewise in the name of the International Organization over which I preside, our most grateful thanks to the members of the Organizing Committee who, with enthusiasm, vigor, and great effort, have worked together so effectively in the preparation of this Conference, as well as to assure the official bodies and the State and private navigation and shipbuilding enterprises how much we appreciate their patronage and the generous support which they have cheerfully given in order to make it possible for us to hold this eighth Conference in Madrid.

“I must also mention with sincere gratitude the name of the former Minister of the Navy, Admiral Moreno, who issued the invitation extended in Copenhagen in 1954 to hold the Conference which is now being inaugurated.

“It is not necessary to speak of the work carried on between Conferences since it constitutes the real essence of the Conference. The enthusiasm, tenacity, and intelligence with which the Technical Committees have worked during the past three years since the previous Conference, as well as the individual contributions of the delegates, constitute the basis on which the success of the Conference is founded.

“Finally, I must devote a few very special words to my colleagues in the Permanent International Committee to express my appreciation for their cooperation and the wise counsel with which they aided me at every moment during the long period of my chairmanship.

“It has been traditional at previous Conferences to exercise a certain restraint in the speeches made, and to afford a wide range to the work sessions. As far as the latter are concerned, it suffices to read the program of the present Conference to realize that this time again the pleasant and effective tradition will be maintained. As for the former, I shall endeavor by being brief not to break the tradition on my part either.

“I shall confine myself to giving you first a brief review of the previous Conferences and the principal objectives of our organization, which will serve to enlighten especially that segment of our Spanish audience which is unfamiliar with these. This will be followed by a succinct summary of that which has a particular bearing on the Conference which is now getting underway.

“The International Towing Tank Conference in its present structure is a permanent organization whose work goes on, on a continuous basis, and which, in meetings such as this one, gives itself an account periodically, ultimately every three years, of what has been accomplished and what is to be accomplished in the future.

“There had been four previous International Conferences of Towing Tank Superintendents before World War II, starting with the year 1933, which were held in this order: The Hague, London, Paris, and Berlin. The original idea of these meetings was to provide for coordination of the investigations of the various model basins, the initiative having been taken by the Italian J. De Meo. The forerunner of these meetings, although not bearing the same name, was without doubt the convention convened in Hamburg in 1932 by Prof. Kempf, which adopted as its theme the topic ‘Hydrodynamic Problems of Ship Propulsion.’ The outbreak of the Second World War interrupted these Conferences, and the Conference which was to have taken place in Rome was never held. After the war had ended, the Conferences were resumed once more, starting with the Conference held in London in 1948 and followed at intervals of three years by those held in Washington, Scandinavia, and now in Madrid.

“The size of the Conference has increased considerably. Starting out with some 20 delegates which were gathered around a table during the years preceding World War II, the number of participants increased to approximately one hundred at the last two Conferences and the present one; i.e., it has increased to five times that many. This increase is due to the construction of new model basins or similar research centers in countries which did not have any before, and to the growing number of persons interested in the problems being discussed at our conventions. For all these reasons, this increase in size was inevitable despite the fact that this is a Conference where the attendance at the technical sessions is closed and limited to specialists only.

“As it was feared that the increase in numbers, a certain and inevitable greater diversity of its elements, and the natural turnover in participants might dilute the ideas which

inspired the setting up of these conferences, particular attention was devoted to the task of avoiding this development and this task was added to those other tasks which the Permanent Committee has to cope with.

“In contrast to other conventions, our meetings are characterized by the fact that we are not merely concerned with the exchange of information based on the presentation of scientific reports; rather than that, it is a prescribed rule of action that the discussions should result in agreements and decisions which either terminate a project undertaken or designate the work to be accomplished during the period intervening between the present and the next conference.

“Generally speaking, the purpose of our International Organization is spelled out concisely in the words in which it has been defined in the broad outlines developed by the Permanent Committee at its meeting in San Sebastian last summer:

“ ‘To promote the improvement of ship model research in all its aspects, and to arrive at agreements regarding basic procedures and methods of presentation of test results in published form.’

“This concise definition involves two main objectives:

“ The one, concerned with improvement, consisting of incorporating into the technique of model testing, as it is carried on in our model basins, those advances which in the full knowledge of its specific problems result from our own research as well as from that carried on in related fields.

“The other, with the accent on coordination, whose primary goal is to place at the disposal of the various model basins, while standardizing their use, methods for the execution of tests and for the presentation of data so that the results obtained in the various model basins may be directly comparable and transferable from one to the other as far as possible; thus an effective effort of collaboration may be achieved among all of them which will facilitate the study and resolution of problems which they have in common.

“It must be observed that this coordination, over and beyond the frontiers and languages, is not confined to the sphere of the model basins themselves. The model basins are centers whose principal purpose and activity are intimately and directly related to, or more properly speaking, *dedicated to* the improvement of so tangible and concrete an industrial product as a ship. Accordingly, this coordination must achieve its maximum effectiveness when, passing beyond the walls of the model basins, it makes itself felt in the drafting rooms and technical offices of the shipyards. There the model, the ship's embryo born in the model basin, reaches its state of adulthood and continues on. Then we follow its progress when, having become a reality, it is ploughing the seas, gathering systematically and investigating under the technical criterion which may apply in each case, the data which the operation of the ship may yield.

“These words, which are equally directed to engineers and shipbuilders, might be rounded out by saying that although the topics which in successive days will be the subject matter of the investigations of the Conference refer to specific problems that directly concern

the model basins, and although a few of the problems, due to the attire in which they are clothed by specialization and the inevitable scientific language used might seem to relate more to theoretical lucubrations than to problems concerning the actual ship we are in all these cases concerned with the fundamental problems of resistance, propulsion, and the behavior of the ship at sea.

“Of these problems, or at least of some of them, we have no doubt considerable knowledge, but there is still a great deal that we don't know as yet. Based on the present state of our knowledge, the investigations of many of these problems may, on account of the complexity of the phenomena involved, be entered upon only by means of model tests as carried out in our model basins. The clarification by means of constructive discussion of those points which are still obscure, the study and discrimination of the causes to which discrepancies between the results of observations on the actual ship and the deductions made from the model tests may be attributed, etc. etc.,—these are the problems to which these conferences are devoting their attention.

“Let us now concern ourselves particularly with the one which is being inaugurated today.

“Twenty-one countries are represented at this Conference, five more than were represented at the preceding one. Let us extend a cordial welcome to its delegates, and let us hope that they will collaborate with one another in a productive manner.

“As we look over the benches in front of us, we see many familiar faces of earlier conferences and we are very happy indeed to see them again. On the other hand, we note with deep feelings of sorrow the absence of persons to whose presence we had become very much accustomed and whom we shall no longer see in our midst.

“Dr. Allan passed away last June the 8th, a few months after the death of his wife; Dr. and Mrs. Allan had never failed to attend any of our Conferences for many years. Dr. Allan, the Superintendent of the Ship Division of the National Physical Laboratory at Teddington was, for our present Conference, the British representative on the Permanent Committee and the Chairman of the Technical Committee responsible for Topics 1 and 5. Only one month had elapsed since this earlier death when Dr. Gawn, the Superintendent of the Admiralty Experiment Works at Hasler, passed away on last July 10th; Dr. Gawn had been the Chairman of the Technical Committee No. 3. Most outstanding and active members of the International Conference, both of these men had worked very diligently on the preparation of the Conference which we are inaugurating today. Having left completed their respective assignments, there falls to this Conference at Madrid the honor of receiving, with sad feelings, their last contributions to our organization.

“Other losses which were also felt most keenly were those of Prof. Lindblad of Chalmers University, who died on Feb. 18, 1956, and that of Prof. Hogner of the University of Stockholm, who passed away on Aug. 1 of this year. Both of these eminent personalities of our profession had been members of the Swedish delegation at previous conferences.

“I believe that I am expressing the feelings of the Conference in general if I extend to the British and Swedish delegations our most sincere expression of condolence on the loss of those distinguished members and good friends of all of us. The Spanish Organizing Committee and I personally join wholeheartedly in this expression of sympathy on the loss of these dear friends and old colleagues.

“Likewise most keenly felt is the absence from the present Conference, although for purely temporary reasons, thank God, of General Brard, Dr. Gebers, Prof. Kempf, Mr. Kent, Prof. Schoenherr, Mr. Wigley, and Prof. Yamagata. Among these I must take special note of the absence of Prof. Kempf, since it is the first time he has been absent from meetings of this kind after many years of outstanding service to the Organization. Prof. Kempf, because of his age, has been retired for several years from the duties of his position as Director of the Hamburg Model Basin, within whose walls he spent many years that were so productive for our profession. We hope that he will continue to devote his active attention to the work of our conferences.

“Turning now to the topics which are to be discussed in the technical sessions of the Conference, these are entitled as follows:

“Topics 1 and 5: Scale Effects on Propellers and on the Coefficients of Propulsion.

“Topics 2 and 4: Frictional Resistance and Turbulence Stimulation.

“Topic 3: Comparative Tests on Propeller Cavitation

“Topic 6: Behavior of Ships in a Seaway.

“Topic 8: Forces and Moments on Ships in a Seaway.

“Topics 1 and 5 as well as 3 no doubt are bound to suffer in the quality of their presentation at this Conference because of the handicap incurred by the death of their respective chairmen.

“Topics 2 and 4 will doubtlessly produce the major part of the discussion, as in previous Conferences. There is no need to emphasize their importance and transcendence because there is wrapped up in them the fundamental problem entrusted to the model basins, for solution. It is difficult to prognosticate what decision the Conference will take on this topic. The caution with which the previous Conferences proceeded in regard to a topic of such importance indicates not only its complexity but also the conscientious study which the Conference wishes to carry on before arriving at its decisions.

“Topic 6 is being brought up at this Conference following the symposium devoted especially to this problem, recently held in Wageningen. It is to be hoped that the discussions held there have developed fully the decisions which are to be arrived at here.

“Topic 8, finally, had not been included in the initial program of this Conference but was added following an agreement reached by the Permanent Committee at its meetings in San Sebastian last summer; although from the standpoint of this Conference this topic is only concerned with the experimental technique to be developed in the model basins for the measurement of the forces, and not with subsequent calculations of the structural resistance, it no

doubt constitutes an important subject at the present time; for nowadays the increase in the dimensions of ships above and beyond values which no one would have suspected even a short time ago is creating entirely new problems for the Classification Societies, and so far we know of no direct basis for solving these problems.

“I wish and hope most fervently that this Conference will produce a fruitful discussion of all these topics, and I conclude my remarks by extending once again a most cordial welcome to all delegates and friends by expressing the wish that during their stay in Spain they may feel entirely at home, and that on their departure they may take with them pleasant memories of their visit.”

Following this address, the Honorable Don Juan Antonio Suanzes, the Chairman of the Spanish Organizing Committee, took the floor and made the following speech:

“Having been properly designated by The Honorable The Minister of the Navy, who exercises jurisdiction over the Canal de Experiencias de Madrid (Madrid Model Basin), to act as Chairman of the Organizing Committee of the VIIIth International Conference whose opening session we are now celebrating, it is in this capacity that I feel called upon to salute and welcome the delegates of the twenty-one countries who honor us with their presence, and to pay tribute also to the others who were gracious enough to accompany them.

“In the work of organization and in the endeavor to facilitate your important tasks and to make your stay in Spain as pleasant as possible, the Navy was joined not only by our shipbuilders and naval engineers, who are the primary beneficiaries of the advancements in the science which you are fostering, but also by other related scientific and professional organizations and corporations. It is precisely our professional affinities which permit us to speak the same language and to work together toward the same objectives and ideals and finally in the service of the common good, which represents one of those areas in which feelings of mutual respect, mutual friendship, and mutual understanding between persons and countries may best be cultivated. In this respect as in all others, and following the traditions which we cultivate and of which we are proud, it is our most fervent and sincere wish that during the time you are in our midst you may consider yourselves as being in your own country and in your own homes, and you may be sure that we shall be more than satisfied if we succeed in making you feel that way about us.

“During your stay here in Spain I hope that you may be able to realize fully the tremendous effort which is being made in our country in all areas and in the face of very great difficulties, in order to expand our economic structure and to improve the living conditions of our people. At the beginning of the modern industrial era, Spain was impoverished and exhausted after an expansive effort to discover, to civilize, and to populate new lands, which had exhausted a great deal of her energy. This situation continued for years, and today we are endeavoring to make up for lost time as rapidly as possible. Being what we are and thinking the way we do and by our hard experience and the lessons drawn therefrom, you may be absolutely certain that the Spanish evolution will constitute an eminently positive factor in the harmony among nations.

“In the above-mentioned evolution, particular attention was devoted to the development of our Merchant Marine forced upon us by our needs, our geographical location, and our traditions. There is no need for going into detail, but I may point out to you that, although our tonnage afloat at present amounts to approximately 1,400,000 gross registered tons, our present programs in the stage of active development and already contracted for, are for the most part, of the order of 800,000 tons, and in the next ten years or less, we shall have passed beyond the figure of 2 million tons afloat after having scrapped the over-age and uneconomical ships of the present fleet, which now run into large members, unfortunately.

“We are trying to make sure that the characteristics of the vessels under construction are as modern, efficient, and homogeneous as possible, and most frequently we are dealing with series of identical ships of 8, 10, and up to 15 units, as is the case with regard to the series of tankers of 20,000 dead-weight tons which are either in service or under construction and which are the forerunner of another series of eight ships of 32,000 tons. In these aspects and as a matter of interest, I ought to point out to you that in our country and perforce of the law, all ships of a new design which enjoy the protection of the State and, more characteristically that of the reputation of the Navy, are tested in the Canal at El Pardo (Madrid Model Basin) as a safeguard for efficiency.

“Before concluding my remarks, I should like to sound a warning which I consider useful, especially for those who do not know our country from previous experience. One of the most outstanding characteristics of Spain and perhaps one of the indices of its wealth is that within its absolute unity there exists an extraordinary variety of soils and regions. This variety extends not only to its economic productions and aspects, but also to its physical, geographical, and climatic characteristics and the characteristics of its people. As a result, one may assume that one comes to know Spain only through the direct knowledge of its different regions or at least the most characteristic ones, and it is this circumstance which one must keep in mind, particularly with respect to the impressions that you will gather during the days of your short stay in our midst.

“Bidding you welcome once again and wishing you the best of success in your work and in the important subjects which you are going to discuss, which we take absolutely for granted in view of the scientific and professional talent that is represented here and recognized the world over, I beg of you to pardon us for any organizational shortcomings that you may be able to perceive or notice, ascribing them perhaps to our slowness or inability to adequately interpret the wishes of the country, those of the Chief of State, the Government, and specifically those of the Minister of the Navy, who is honoring us with his chairmanship and who welcomes you with the consideration and affection which you deserve, both personally and by virtue of your high status.”

Following this address, Dr. K.S.M. Davidson, Member of the International Standing Committee, arose to speak in the name of the foreign delegates as follows:

"I have been asked, on behalf of your guests, the foreign delegates to the VIIIth International Towing Tank Conference, to express to you our collective thanks for your courteous greetings. I do so very gladly.

"For some of us, the less intelligent of us, perhaps, this is our first visit to Madrid. For some of us, I may add, it is almost our first warm sunshine this season. The brief taste we have had of both, since we arrived yesterday, has only seemed to whet our appetites. We are looking forward, with keen anticipation, I assure you, to more of them in the days ahead. And I am very certain we will not have had enough of either when our time is up, all too soon, and we have to leave.

"We are sorry, very sorry, that you find our ranks depleted, by tragic losses that we have sustained. Only within the last several months we have lost, in quick succession, the most distinguished of our senior members. I venture to mention this, here, and now, because they were old friends whom we would so much have liked you to meet - we believe you would have enjoyed them - and because, as each of them told me when I last saw him, they were so counting on having been with us. It is a great pity they could not be.

"I mention it for another reason also. There will be an added zest to this Conference. We must try to offset their loss by greater efforts on our part, and to forge new plans for carrying on without them. So they would be the first to agree; the world is for the living. And more and more, it is for the young.

"It seems to me entirely fitting that we should be asked to face this challenge in Spain, a country rich in history, which, too, has been asked to face challenges in recent times and has marched ahead.

"But I suspect, being but human, that we will not let our responsibilities weigh too heavily on us, or grow too serious. And, I would add, I think it would be a great pity if we did. For here we are, in sunny Spain, with very kind hosts, and all arrangements made for our pleasure. We would have to be very dull people, indeed, if we did not succumb to all the charms in store for us.

"Once more, sir, may I tell you how very happy we are to be here."

Finally, the session closed with a few short remarks by The Honorable The Minister of the Navy, Admiral Abarzuza, who began by saying that it was a great honor for him to preside over the solemn opening session of the Conference, adding:

"The Spanish Navy could not fail to participate in these functions since it endeavors, in line with the policy laid down by our Chief of State and his Government, to support and encourage all those institutions which are dedicated to scientific research to maintain the Model Basin at El Pardo at full efficiency as far as its means permit; in the latter are tested not only the designs of warships but also those designs destined for the Merchant Marine as well; hence, thanks to the research of our engineers, our shipowners may order units with the most economical forms and characteristics possible.

"I am certain, my dear foreign delegates, that during the intervals between the sessions you will have an opportunity to confirm the results of the preoccupation of the Generalissimo and the Government with our industrial progress and you will be able to observe how the results of this policy are improving the living standards of our people every day.

"In the name of the Chief of State and the Government, I declare open the VIIIth International Towing Tank Conference."

After this session was over, cocktails were served in the same building of the Council for Scientific Research, with the Board of Directors of Marine Military Constructions and Industries playing host.

3. WORK SESSIONS

All the work sessions were held in the Institute of Technology for Naval Engineers, whose director generously placed at the disposal of the Conference as many rooms and services as were necessary.

The general sessions were conducted in the great hall which is set aside to serve as a museum, and the meetings of the Standing Committee and of the Technical Committees were held in various other rooms of the Institute.

Although at former Conferences English was the only official language, the Madrid Conference declared German, Spanish, French, and English to be official languages for the oral discussions; to this end, the assembly hall was provided with suitable installations for simultaneous translation into these four languages. For the written communications the exclusive use of English was maintained, for practical reasons, and for the same reasons the Reports of the Conference will also be published in this language.

The subjects to be discussed at the Conference were taken up in sessions which began on Monday, September 16th, and continued throughout the rest of the week. These sessions were held in the customary form of the previous conferences: After a few short introductory remarks by the Chairman of the session, the Chairman of the Technical Committee responsible for the subject to be discussed, who acts as moderator and follows the instructions given by the Committee, summarizes briefly the principal points of the latter. Then the subject comes up for discussion. The discussion comprises two parts: First, a "formal discussion" based on the written papers presented takes place, in which only the authors of these take part; the second part consists of an open and "informal" discussion in which all the delegates may take part. The session ends with a summary of all that has been discussed, presented by the Secretary; then the session is closed by the Chairman of the meeting.

Bearing in mind that the transactions of the meetings are to be recorded in English, it was agreed that it was most convenient to appoint English-speaking persons as Secretaries. As far as the chairmanships were concerned, an attempt was made to distribute them among the various participating countries, rotating them with respect to those of previous conferences.

In accordance with the program laid down in advance, the various subjects came up for discussion in the following order:

Monday, Sept 16th - Topic 3: Cavitation on Propellers. Until shortly before the opening of the Conference, Dr. R.W. Gawn, the Director of the Admiralty Experiment Works in Haslar (England), who died last July, has been the Chairman of the Technical Committee. The contribution which Dr. Gawn had already completed was presented by Prof. W.P. Van Lammeren, the Director of the Wageningen Model Basin (Netherlands). Chairman of this session was Dr. Eng. E. Castagneto, the Director of the Rome Model Basin, and the Secretary was Prof. L.C. Burrill of King's College, University of Durham (England).

Tuesday, Sept. 17th - Topics 2 and 4: Skin Friction and Turbulence Stimulation. This session was presided over by Prof. L. Troost, Head of the Ship Division of the Massachusetts Institute of Technology, Cambridge (U.S.A.), with Dr. F.H. Tood, Supt. of the Ship Division of the National Physical Laboratory, Teddington (England), acting as moderator, and Dr. H. Hughes of the same establishment as Secretary.

Wednesday, Sept. 18th - Topic 6: Seagoing Qualities of Ships. General E.G. Barrillon, former Director of the Bassin d'Essais des Carènes (France), presided over this meeting and Dr. J.D. van Manen of the Wageningen Model Basin (Netherlands), and Mr. W.P. Walker, Director of the William Denny & Bros. Shipyards, Dumbarton (England), acted as moderator and secretary, respectively.

Thursday, Sept. 19th - Topic 1 and 5: Scale Effects on Propellers and Self-propulsion Factors. As in the case of Topic 3, Dr. J.F. Allan, Supt. of the Ship Division of the National Physical Laboratory, who died in the first days of last June, had been the Chairman of the Technical Committee until shortly before the Conference. The paper which Dr. Allan had likewise completed was presented to the Conference by Mr. A. Silverleaf, who is attached to the same National Physical Laboratory. Chairman of the meeting was Prof. G. Weinblum of the Institute für Schiffbau (Shipbuilding Institute), Hanburg (Germany), and Mr. J. Hadler of the David Taylor Model Basin, Washington (U.S.A.), acted as secretary.

Friday, Sept. 20th - Topic 8: Forces and Moments Acting on a Ship in a Seaway. Prof. C.W. Prohaska of the Laboriet for Hydro-og Aerodynamik, Copenhagen (Denmark), presided over this meeting, and Prof. E. Lewis of the Stevens Institute of Technology (U.S.A.), and Mr. W.A. Crago, Director of the Model Basin of Saunders-Roe Ltd., East Cowes (England), acted as moderator and secretary, respectively.

It is not possible to give an account in these notes of the development of the discussions; they will in time become known in every detail when the Reports of the Conference are published. Suffice it to say that the deliberations on all the subjects were most lively and interesting, as is borne out by the fact that for the "formal discussion" part alone, 58 written communications were presented, and in the open discussion following, most of the delegates participated, some of them making very extensive contributions. With the exception of three written communications received too late, all the others arrived in sufficient time to be

duplicated and distributed among all the delegates before the Conference; therefore the subjects could be discussed after the delegates had read them and had quietly reflected upon them.

The agreements made as a result of these deliberations will be set forth later on and will give a rather clear idea of the range and direction of the discussions and of the most important points touched upon in the course of the latter.

On Sept. 19th, once the discussion of Topics 1 and 5 was completed, the Conference proceeded to the election of the members of the Standing Committee for the new period intervening between now and the next conference. Similarly, on Sept. 20th, after the discussion of Topic 8 had been completed, the elections of the officers of the various Technical Committees for the same period of time took place. The results of both elections, decided on by acclamation, will be announced later.

Saturday, Sept. 21st. - This day was set aside for meetings of the Standing Committee and of the Technical Committees; these were devoted to examining the records of the sessions held and to editing the summaries and agreements which were to be presented for the consideration of the general assembly at the two final sessions.

Monday, Sept. 23rd. - General Session of the Conference. This session was presided over by the Chairman of the Conference, Mr. M.L. Acevedo, Director of the Madrid Model Basin at El Pardo, who was assisted by the Secretaries, Mr. W.P. Walker, Director of William Denny & Bros., already mentioned before, and Mr. L. Mazarredo, an engineer at the Model Basin at El Pardo.

The Assembly reviewed the summary report edited by the Standing Committee and discussed the various proposals set forth in this report. These proposals included certain standards for governing the general lines of operation for the Organization, and the recommendation that the IXth Conference should be held in France. Both proposals were approved unanimously.

The nominations for membership in the various Technical Committees and in the new Standing Committee submitted on previous days were confirmed after adding to those for the Standing Committee the nomination of Mr. W.P. Walker as Honorary Secretary.

After discussing the question of Topics to be dealt with at the next Conference, it was agreed among other things that Topics 6 and 8 as taken up at the present Conference should be combined under a single Committee.

There was unanimous agreement that the Conference should express their deepest condolence to the families of those departed from our midst: Dr. J.F. Allan, Dr. R.W.L. Gawn, Prof. A. Lindblad, and Prof. E. Hogner. It was likewise agreed that a telegram extending our greetings should be sent to Prof. Kempf and another one to M.J. de Meo, the initiator of these Conferences, the latter telegram taking the form of a cordial reply to his own message received at the opening of the Madrid Conference.

Final Technical Session. This session took place in the afternoon of Sept. 23rd. and was presided over by Captain H.E. Saunders of the Bureau of Ships (U.S.A.), those acting as secretaries being the same as for the preceding general assembly.

Once this session was opened, the moderators of the various subjects which had come under discussion presented the decisions and recommendations which the respective Technical Committees were proposing. After considerable discussion which gave rise to various modifications, the decisions and recommendations were approved in the form indicated in the following section.

Thereupon, Mr. Acevedo returned to occupy the Chair once more, in order to express in the name of the outgoing Standing Committee as well as in his own behalf his deepest appreciation to all who by their work had contributed in one form or another to the success of the Conference, especially to the Chairmen of the Technical Committees, as well as to the Chairmen, Moderators, and Secretaries of the various sessions for their arduous labors which they had carried on so tenaciously, intelligently, and efficiently. Finally, Mr. López-Acevedo transmitted the Chairmanship of the Conference to Mr. Maillard, the Associate Director of the Basin d'Essais de Paris (Paris Model Basin), who assumed charge of the Chairmanship of the new Standing Committee in the absence of General Brard, the Director of the Paris Model Basin. In a few words, Mr. Maillard greeted the delegates and extended to them in advance his most cordial welcome to France when the IXth Conference will be celebrated there.

4. DECISIONS AND RECOMMENDATIONS

TOPICS 1 AND 5 - Scale Effects on Propellers and Self-propulsion Factors

1. The Conference is of the opinion that during the time which has elapsed since the last assembly, considerable progress has been made toward a better appreciation of the problems of propulsion.

2. In order to follow up this progress in our knowledge, the Conference recommends the following:

a. To reduce the number of methods presently used in the execution and analysis of self-propulsion tests. To this end, each establishment should prepare and submit to the Committee detailed information on the methods used. This information will serve to formulate a minimum number of standards which may be recommended by the Committee for general international use.

b. Likewise, each establishment should prepare and submit similar data with respect to the methods presently used for carrying out open water propeller tests. In this manner the Committee will be able to recommend standard methods for this type of tests.

c. All tank establishments should prepare and submit to the Committee similar data on the methods used for estimating ship performance and for comparing full-scale trial results with predictions based on model experiments. In this manner, the Committee will be able to recommend standard methods for such tests, too.

d. In formulating the standard methods, the Committee will have to take into account the pertinent recommendations made by other Committees, especially those of the Committee for Topics 2 and 4.

e. The investigations on the scale effect on propellers are yielding promising results and should be continued with all intensity. Some recent investigations have made quite obvious the importance of turbulence stimulation for the determination of the propeller characteristics; however, it is considered that the present means of turbulence stimulation call for improvement.

f. The methods presently used for the determination of fullscale wake factors are not altogether satisfactory. The methods proposed for the wake correction by the scale effect should be investigated most carefully, applying them to the results of the model-ship correlation.

g. The thrust deduction theory is the object of important investigations, both experimental and theoretical. These investigations should be pursued vigorously.

h. In the field of propulsion, the importance of the propeller-rudder interaction is recognized. It is recommended that the studies concerning this general problem be continued.

i. The study of the importance of the fluctuations of thrust and torque must be continued.

3. The Committee should consider the influence which the scale effect on the thrust deduction factor and wake factor is bound to exercise on the roughness allowances, following the adoption of the new model-ship correlation line ITTC 1957.

Finally, it should be noted that the suggestion of this Committee that "it is desirable to establish standard values for kinematic viscosity of fresh and sea water, preferably in tabular form" has been transmitted to the Committee in charge of Topic 7.

TOPICS 2 AND 4 - Skin Friction and Turbulence Stimulation

1. Most of the delegates were in favor of adopting a formula by means of a single line which would be generally steeper than the ATTC line of 1947* in the zone of low Reynolds numbers, but close to it at high Reynolds numbers.

2. The Conference has considered the line defined by the formula

$$C_F = \frac{0.075}{(\log R_n - 2)^2}$$

which the Committee proposes to regard as fulfilling the conditions indicated above.

In Table I, the values resulting from this formula are compared with those corresponding to the ATTC, line of 1947 and with those which result from the application of Proposal I contained in the report of the Committee.

*The ATTC line of 1947 was the line approved by the American Towing Tank Conference in 1947 which is defined by the Karman-Schoenherr formula

$$0.242/\sqrt{C_F} = \log (R_n C_F).$$

TABLE 1

log R_n	Values of $C_F = 35$		
	ATTC Line of 1947	Skin Friction Committee Proposal I	Proposed New Formula
6.0	4.410	4.810	4.688
7.0	2.934	2.934	3.000
8.0	2.072	2.072	2.083
9.0	1.531	1.531	1.531
10.0	1.173	1.173	1.172

3. The Conference has also considered the following reasons for which the Committee believed that this line might be adopted:

- a. For R_n values higher than 10^8 , the formula yields values which come very close to Proposal I of the Committee, for which the Conference expressed a certain preference.
- b. The "discontinuity" which Proposal I implied for $R_n = 10^7$ is being avoided.
- c. In comparison to the ATTC line of 1947, there results a steeper line in the entire Reynolds number range of the model.
- d. In the range of low Reynolds numbers, there results a line less steep than the one corresponding to Proposal I.

4. In view of all this, the Conference decided that the line defined by the formula

$$C_F = \frac{0.075}{(\log R_n - 2)^2}$$

should be adopted as the "ITTC line of 1957 for the ship-model correlation" although it should be understood clearly that this line ought to be regarded merely as a temporary solution of this problem to be applied in the practical investigations of engineering.

5. The Conference recommends that the research concerned with all the problems related to these subjects should be pursued for the purpose of:

- a. improving the model-ship correlation;
- b. determining the roughness allowances;
- c. clarifying the form effect (on frictional resistance); and
- d. discussing and improving the techniques of measurement, including turbulence stimulation and the effects of tank boundary interference.

TOPIC 3 - Cavitation on Propellers

1. Since the new investigations on the effect of the tunnel boundaries presently under way are not yet completed, we shall have to proceed with caution in using the values K_T and K_Q

as a function of J as obtained in tunnel tests.

For the observation of the phenomena of cavitation, it is considered preferable to carry out the tests by applying the identical thrust and torque coefficient as deduced from tunnel tests (whether open-water or self-propulsion tests) rather than by applying the identical coefficient of propeller advance.

2. The suggestion was approved that a series of standard propellers be constructed for open-water tests and that each model basin then build the same series in a size suitable to its own installation, a series which will be useful for purposes of the empirical calibration of the tunnel.

3. In view of the opinions expressed in regard to the limitations imposed on the propeller tests by the slotted-wall test sections, the Conference agrees that the basic research on this problem should be pursued.

4. It is agreed that one or two model basins should concern themselves with the execution of systematic investigations on the effect of the air content on the phenomena of cavitation.

5. It is recommended that the Committee consider the effects of the unequal flow distribution. The technique used in carrying out such tests should be given particular attention.

6. It is important to collect data which permit us to compare cavitation tests carried out in the tunnels with the results of full-scale tests.

The Conference agreed to adhere to the following four recommendations approved at the last conference as regards problems on which research ought to be continued:

7. It is necessary to determine more accurately the tunnel boundary interference. To this end, the Committee will arrange for the cooperative tests which it considers to be appropriate. Special consideration will be given to the task of achieving a closer coordination between open-water and tunnel tests.

8. All the participating model basins will test the same propeller, using the same method of measuring the water velocity. During these tests the pressure on the propeller shaft will be the atmospheric one.

9. The Committee will have to consider the presentation of some results using different parameters, among them the cavitation number which takes the air content into account.

10. The properties of the water that may have a possible connection with cavitation will have to be considered, among them the existence of nuclei and entrained air.

11. Finally, the Conference is agreed that the Committee should hereafter be given the name "Committee on Propeller Cavitation."

(This decision has found expression in the heading above.)

TOPIC 6 - Seagoing Qualities of Ships

1. The Conference holds the opinion that, as far as this subject is concerned, particular attention should be given to self-propulsion tests in rough water and to the spectral methods of analysis to insure progress in the immediate future.

2. On this basis, the Conference makes the following recommendations:

a. To exchange persons and information on test techniques in waves; this information should include the analysis of systems of regular waves and spectra of confused seas which might be generated in the various model basins.

b. To carry out comparative towing and self-propulsion tests in waves with geometrically similar models properly scaled.

c. To develop satisfactory nondimensional methods of presenting data for the direct use of designers for wave systems which are propagated both in the direction of advance of the ship and in oblique direction.

d. To compile data relative to the behavior of ships in a seaway and the structure of actual seaways which enable us to give model tests a realistic significance.

e. To develop theoretical methods suitable for design and the evaluation of experiments.

Among the above decisions and recommendations adopted by the VIIIth Conference, the one which is no doubt outstanding and lends special significance to the Madrid Conference is the agreement regarding Topics 2 and 4 that adopts as the model-ship correlation line the ITTC line of 1957, which is defined by the formula

$$C_F = \frac{0.075}{(\log R_n - 2)^2}$$

Although this agreement does not constitute the final scientific solution of the problem concerned (as brought out in the original text), the adoption of this line culminates a prolonged stage of years of indecision during which, in conference after conference, the duality of using either the traditional Froude method in its original entirety (i.e., in conjunction with the coefficients of friction of R.E. Froude) or else in combination with the coefficients of friction as estimated by the Schoenherr formula, had come to be used as an official agreement. This indecision on the part of the International Conference, of wavering between two methods leading to results which in general were appreciably different although internally justified by the considerations repeatedly set forth at successive conferences, obviously constituted an inconvenient position toward the outside and one which, while inevitably lacking the moral force for agreement, created a favorable atmosphere for the appearance of discrepancies which might have made it seem preferable to use neither the one nor the other of the two propositions.

Hence, the accord now reached in Madrid which does away with this indecision establishes first of all a sound basis for coordination. Moreover, this accord signifies positive

progress, not only because it abandons the coefficients of R.E. Froude, which are inadmissible from the standpoint of the formulation of mechanical similarity, but also because, with respect to the Schoenherr formula, for instance, which until now has been used mostly by the more advanced sectors, it constitutes an improvement since it corrects certain defects of correlation to which this formula gives rise. On the other hand, given the proximity of results obtained by it (for the most common model size) as compared to those obtained by the Schultz-Grúnow formula, it is very probable that, if the users of the latter are animated by a certain spirit of coordination, as would be desirable, they will have no objection to freely accepting the new ITTC line of 1957 for all purposes. Finally, with a view to what might be the future development, it should also be noted that the new line is equivalent to using the Hughes formula in connection with a factor which is practically independent of R_n , although this factor does not take into account the variation in form and although its value (approximately 1.12) is rather small compared with the values obtained when the Hughes line is taken as the basic line of friction.

5. COMMITTEE APPOINTMENTS

STANDING COMMITTEE OF THE CONFERENCE

Chairman: General R. Brard (France)
Captain M.L. Acevedo (Spain)
Prof. W.P. van Lammeren (Netherlands)
Prof. J.K. Lunde (Norway)
Captain H.E. Saunders (United States)
Dr. F.H. Todd (Great Britain)

Permanent Secretary: Mr. W.P. Walker (Great Britain)

COMMITTEE FOR TOPIC 1 AND 5: Scale Effects on Propellers and Self-propulsion Factors

Chairman: Dr. H. Edstrand
Dr. F. Gutsche
Mr. J. Hadler
Mr. Krivtsoff
Mr. L.P. Maillard
Mr. R.N. Newton
Prof. E.V. Telfer

COMMITTEE FOR TOPICS 2 AND 4: Skin Friction and Turbulence Stimulation

Chairman: Prof. C.W. Prohaska
Captain M.L. Acevedo

Dr. G. Hughes
Dr. M. Kinoshita
Dr. L. Landweber
Mr. A.J.W. Lap
Prof. K. Wieghardt

COMMITTEE FOR TOPIC 3: Propeller Cavitation

Chairman: Prof. H.W. Lerbs
Prof. L.C. Burrill
Dr. J.D. van Manen
Prof. L. Mazarredo
Mr. L. Pehrsson
Mr. A. Silverleaf
Mr. A.J. Tachmindji

**COMMITTEE FOR TOPICS 6 AND 8: Seagoing Qualities of and Forces and Moments on Ships
in a Seaway**

Chairman: Dr. M. St. Denis
Dr. O. Grim
Dr. H. Kato
Mr. E. Lewis
Mr. K.F. Tupper
Mr. G. Vossers
Mr. Voznessensky

COMMITTEE FOR TOPIC 7: Presentation of Resistance and Propulsion Data

Chairman: Captain H.E. Saunders
Dr. E. Castagneto
Mr. J.M. Ferguson
Mr. H. Lackenby
Mr. S.T. Mathews
Dr. H.F. Nordström
Prof. S. Silovic

6. SOCIAL FUNCTIONS

To round out the day-by-day work sessions, various social functions took place in honor of those in attendance at the Conference, which contributed to generating a spirit of fraternization among all these.

As was pointed out in the beginning, on Sunday, Sept. 15th, after the opening ceremony, the Board of Directors for Marine Military Constructions and Industries treated the Conference participants to cocktails, which were served in the same central building of the Council for Scientific Research.

In the afternoon of Monday, Sept. 16th, arrangements were made to visit the National Autotruck Company in Barajas, where the delegates were received and accompanied on their visit to the factory by the Director, Mr. Ricart, and engineers under his authority; the foreign delegates seemed to be quite impressed by the importance and perfection of the installations visited. Back in Madrid, they were received in the building of the National Institute for Industry by its Director, The Honorable Don Juan Antonio Suanzes (who also served as Chairman of the Organizing Committee of the Conference). In his company and with others connected with the Institute, the delegates paid a leisurely visit to the Permanent Exposition, where they showed a great deal of interest for Spain's industrialization plans, many of which have already become reality. Thereafter, the guests were treated to cocktails at the same Institute.

On Tuesday evening, Sept. 17th, a dinner was served at the Fenix Hotel, followed by a folklore show which greatly contributed to everyone's enjoyment. The dinner tendered by the Shipowners of Spain was presided over by The Honorable Don Eduardo Aznar, Director of the Central Maritime Office, who addressed a few words of welcome to the delegates at the end of the banquet.

At noon on Wednesday, Sept. 18th, a reception took place at the Madrid City Hall where, in the name of the Mayor of Madrid who was away from the Capital, the delegates were received and formally welcomed by the Deputy Mayors, Don José Soler and the Marquis de Grijalba. On the afternoon of the same day, a visit was undertaken to the Museo del Prado (El Prado Museum).

On Friday, Sept. 20th, the delegates visited the Naval Museum, where under the guidance of Mr. P. Vela, its Assistant Director, they were able to admire the great historical value of its exhibits, their special attention, especially that of the delegates of the New World, being invited to some of its most famous jewels. Thereafter, they were received by The Honorable The Minister of the Navy, Admiral Abárzuza, attended by the highest officials of the Ministry, who also served cocktails to their guests. Later that afternoon, the delegates visited the Canal de Experiencias Hidrodinámicas at El Pardo, where they were again attended by the Navy authorities and by the Director and the engineers of the Model Basin, whose installations naturally deserved the most particular attention of the delegates. The Model Basin entertained its visitors with a tea and concert presented by the Infantry Band of the Navy Ministry.

On Sunday, Sept. 22nd, an excursion was made to El Escorial. After visiting the monastery in the morning, the delegates assembled at noon for a dinner served at the Hotel Felipe II upon the invitation of the Spanish Shipbuilders. This dinner was presided over by The Honorable Don Augusto Miranda, President of the Spanish Shipbuilding Society, who at the end of the banquet addressed his cordial greetings to the delegates, emphasizing the close ties uniting

the activities of the Towing Tanks with those of the shipbuilders. Dr. F.H. Todd, Supt. of the Ship Division of the National Physical Laboratory at Teddington, replied briefly expressing his appreciation in the name of the foreign delegates for the warm reception accorded them.

Later in the afternoon, the delegates visited the Valle de Caídos (Valley of Fallen)* and then went to a nearby estate, where they were entertained at a lively rural festival. Some typical numbers of Spanish folklore were translated into many languages, with the active participation of several of the delegates.

On Monday, Sept. 23rd, the closing banquet was held at the Castellana Hilton Hotel, at the invitation of the Minister of the Navy and the Organizing Committee. In the absence of the Minister of the Navy, who was away from Madrid on official duties, the Banquet was presided over by The Honorable Admiral Don Santiago Antón, Navy Chief of Staff, in the name of the Navy Minister. At the close of the banquet, the Chairman of the Conference, Mr. Lopez-Acevedo, addressed himself especially to the foreign delegates with the following words:

“The final minutes of the VIIIth Conference are now drawing quickly to a close. When this dinner is over, all the proceedings of the Conference – technical meetings and social functions – will be finished. Certainly, tomorrow some of you will meet again on the excursion to Sevilla, but this will be another matter and apart from the cause which has brought us into close and constant contact for a week here in Madrid.

“I know without doubt that all you delegates have had to work rather hard, and some of you, at times, extremely hard. Since, however, we all are enthusiastically dedicated to the work which we are doing, perhaps the task has not exhausted you too much. Moreover, I hope that in the spare time, you will all have found some opportunities to divert yourselves, and perhaps, as was shown yesterday, to discover that some of you possess hidden talents for the enjoyment of quite unexpected activities.

“I don’t know if your stay in Madrid has been as agreeable for you as we had wished and, of course, as it was for us. Our intentions to make the Conference a fruitful and happy one for you have been the best of all. Possibly, in the extrapolation from the intentions range to the real facts range, a scale-effect has existed, and real facts have not been as perfect as our intentions. Please consider the latter and forgive the deficiencies.

“We all and I personally wish that in going back to your countries you will carry with you the pleasantest possible recollections of Spain. I desire that all of you have a good journey and the best of health and luck until we meet again in Paris in 1960.

“To this, I very heartily offer my toast.”

Thereafter, speaking in Spanish, Mr. J. Brown, Director of the Shipyard of Messrs. John Brown & Company, of Clydebrook (Great Britain), expressed with all sincerity the satisfaction and appreciation of all the foreign delegates for the success of the Conference and for all the courtesies shown them. He was followed by General E.G. Barrillon of the French Navy, a

*Translator’s Note: War Memorial and Mausoleum erected in 1941 by Generalissimo Franco and dedicated to the Spaniards killed during the Civil War. See Time magazine, Vol. LXXIII, No. 4, of Jan. 26, 1959.

Member of the Standing Committee of the Conference, who spoke along similar lines. Thereafter, the wife of Dr. F.H. Nordström (Sweden) spoke a few words of appreciation on behalf of the wives of the delegates, followed by the wife of Dr. St. Denis (United States) who, speaking at length in Spanish, expressed their gratitude once more.

Finally, Admiral Antón arose and addressed a cordial farewell speech to the foreign delegates and, in the name of His Excellency The Chief of State, declared the VIIIth International Towing Tank Conference closed.

A lively ball concluded the farewell banquet.

EXCURSION TO SEVILLE

In order that the foreign delegates so inclined might gain an impression of the present-day shipbuilding industry in Spain, arrangements had been made for a trip to Seville and Cadiz. To this end, a Superconstellation was chartered, which was graciously placed at our disposal by the Iberia Company; however, the time at the disposal of some of the delegates was so short that the trip to Cadiz had to be canceled and the excursion had to be reduced to a visit to Seville and its shipyards.

A small group of delegates, accompanied by Messrs. González de Guzmán and Mazarredo, gathered together for this trip and left Madrid on the morning of September 24th.

In Seville, they were received by Don José López Ocaña, Director of the Elcano Shipyards located there, and by plant engineers to whom The Honorable, Don Jesús Alfaro, Managing Director of the Company, had entrusted the entertainment of the delegates since he was unable to be present in person. The shipyards as well as the city made a deep impression on the delegates, the former by their modern installations, the latter by its wonders of bygone days. In the evening they were the guests of the Empresa Nacional Elcano (National Elcano Company) at a dinner at the Hotel Andalucía, where they were entertained by a folklore show. At the close of the dinner, Prof. W.P.A. van Lammeren expressed his appreciation in the name of the delegates, and Mr. López Ocaña, who presided over the banquet, replied briefly.

On the following day, after visiting the Cathedral and the Alcázar, the delegates boarded the plane for the return trip to Madrid where they arrived late in the evening.

7. LIST OF DELEGATES ATTENDING THE CONFERENCE

This information bulletin included a photograph of the delegates, but for various reasons not all those who attended the Conference appear in the picture. The complete list of the 93 delegates and 6 observers is as follows:

GERMANY:

Amtsberg, Prof. Dr. Ing. H., Technische Universität, Berlin

Grim, Dr. Ing. O., Hamburgische Schiffbau-Versuchsanstalt, Hamburg

Gutsche, Dr. Ing. F., Schiffbau Versuchsanstalt, East Berlin

Henschke, Dr. Ing. S. O. W., Schiffbau Versuchsanstalt, Berlin Oriental
Horn, Prof. Dr. Ing. F., Technische Universität, Berlin
Lerbs, Prof. Dr. Ing. H.W., Hamburgische Schiffbau Versuchsanstalt, Hamburgo
Schuster, Dr. Ing. S., Ing. S., Versuchsanstalt für Wasserbau und Schiffbau, Berlin
Sturtzel, Prof. Dr. Ing. W., Versuchsanstalt für Binnenschiffbau, Duisburg
Weinblum, Prof. Dr. Ing. G., Institut für Schiffbau, Hamburgo
Wieghardt, Prof. Dr. Ing. K., Institut für Schiffbau, Hamburgo

AUSTRIA:

Kretschmer, Dr. Ing. L., Schiffbautechnische Versuchsanstalt, Vienna

BELGIUM:

Aertssen, Prof. G.S.J., Universidad de Gante
Demoen, Ing. R., Compagnie Maritime Belge, Amberes

BRAZIL

Andreoni, Eng. A., Instituto de Pesquisas Tecnologicas, Sao Paulo
Pastorino, Eng. L.A. (Observador)

CANADA:

Mathews, Mr. S.T., National Research Council, Ottawa
Turner, Mr. E.S., National Research Council, Ottawa

DENMARK

Prohaska, Prof. Dr. Tech. C.W., Laboratoriet for Teknisk Hydro-og Aerodynamic, Copenhagen
Harvald, Dr. Tech. S.H., Laboratoriet for Teknisk Hydro-og Aerodynamic, Copenhagen

UNITED STATES OF AMERICA

Abkowitz, Prof. M., Massachusetts Institute of Technology, Cambridge
Breslin, Dr. J., Stevens Institute of Technology, Hoboken
Brooke, Mr. H., Convair, A. Division of General Dynamics Corp., San Diego, California
Davidson, Dr. K.S.M., Stevens Institute of Technology, Hoboken
De Prima, Prof. Ch. R., California Institute of Technology, Pasadena
Eisenberg, Mr. P., Office of Naval Research, Washington
Hadler, Mr. J., David Taylor Model Basin, Washington
Landweber, Dr. L., State University of Iowa, Iowa City
Lewis, Mr. E.V., Stevens Institute of Technology, Hoboken
Saunders, Capt. H.E., USN, Bureau of Ships, Washington
St. Denis, Dr. M., David Taylor Model Basin, Washington
Tachmindji, Mr. A.J., David Taylor Model Basin, Washington

Troost, Prof. L., Massachusetts Institute of Technology, Cambridge
Tulin, Mr. M., Office of Naval Research, Washington
Wehausen, Prof. A.R., University of California, Berkeley
Wright, Capt. E.A., USN, David Taylor Model Basin, Washington
Wu, Prof. T.Y., California Institute of Technology, Pasadena
Grady, Capt. J.W., USN, en representación del CINCNELM, USN (Observador)

FINLAND:

Jansson, Prof. J.E. Finland Institute of Technology, Helsinki

FRANCE:

Barrillon, Ing. General E.G., Bassin d'Essais des Carènes, Paris
Dieudonné, Ing. General J., Institute de Recherches de la Construction Navale, Paris
Maillard, Ing. L.P., Bassin d'Essais des Carènes, Paris
Perrachon, M.J., Compagnie Auxiliaire de Navigation, Paris

GREAT BRITAIN:

Barnaby, Mr. K.C., John I. Thornycroft and Co., Ltd., Woolston, Southampton
Brown, Mr. J., John Brown & Company, Clydebank
Burrill, Prof. L.C., King's College, University of Durham, Newcastle
Burt, Mr. F.S., Admiralty Research Laboratory, Teddington
Crago, Mr. W.A., Saunders Roe Ltd., Isle of Wight
Emerson, Mr. A., King's College, University of Durham, Newcastle
Havelock, Prof. Sir Thomas, H., King's College, University of Durham, Newcastle
Honor, R.N.C., Mr. A.F., Admiralty Experiment Works, Haslar.
Hughes, Dr. G., National Physical Laboratory, Teddington
Lackenby, Mr. H., British Shipbuilding Research Association, Londres
Moor, Mr. D.I., Experiment Tank, Vickers Armstrong Ltd., St. Albans
Newton, R.N.C., Mr. R.N., Admiralty Experiment Works, Haslar
Silverleaf, Mr. A., National Physical Laboratory, Teddington
Smith, Dr. S.L., British Shipbuilding Research Association, Londres
Telfer, Prof. E.V., actualmente en Norges Tekniske Högskole, Trondheim (Noruega)
Todd, Dr. F.H., National Physical Laboratory, Teddington
Walker, Mr. W.P., William Denny & Bros, Ltd., Dumbarton

NETHERLANDS:

Gerritsma, Ir. J., Delft Technological University, Delft
Lammeren, Prof. Dr. Ir., W.P. van, Ned. Scheepsboukundig Proefstation, Wageningen
Manen, Dr. Ir. J.D. van, Ned. Scheepsboukundig Proefstation, Wageningen

INDIA:

Kulkarni, Mr. P., Central Water and Power Research Station, Poona

ITALY:

Castagneto, Dott. Ing. E., Institute Nazionale per Studi e Esperienza di Architettura Navale, Roma

Di Bella, Prof. A., Universitat di Genova, Génova

Parilli, Ing. General G.N.A., Progetti Navi del Ministero Difesa Marina, Roma

JAPAN:

Kato, Prof. K.H., Universidad de Tokio, Tokio

Kinoshita, K.M., Hitachi Shipbuilding & E.Co., Ltd., Osaka

NORWAY:

Lunde, Prof. J.K., Skipsmodelltanken, Trondheim

PORTUGAL:

Ferreira, Cap. Frag. A., Agregado Naval (Observador)

Taborda, Com. Eng. Nav. V., Lisboa (Observador)

U.S.S.R.:

Firsoff, M.G.A., Instituto Kryloff de Investigaciones Navales, Leningrado

Sretensky, M.L.N., Academia de Ciencias, Moscú

Voznessensky, M.A.I., Instituto Kryloff de Investigaciones Navales, Leningrado

Woit, M.S.S., Academia de Ciencias, Moscu

SWEDEN:

Edstrand, Dr. H., Statens Skeppsprovninganstalt, Gotemburgo

Lindgren, Civ. Ing. H.B., Statens Skeppsprovninganstalt, Gotemburgo

Nordström, Prof. Dr. H.F., Statens Skeppsprovninganstalt, Gotemburgo

Pehrsson, Chief. Eng. L., Karlstads Mekaniska Werkstad, Kristinehamn

Stephanson, Tekn. Lic. T., Karlstads Mekaniska Werkstad, Kristinehamn

TURKEY:

Nutku, Prof. A., Teknik Universitesi, Estambul

YUGOSLAVIA:

Sentic, Dipl. Ing. V.A., Brodarski Institute, Zagreb

Silovic, Prof. Ing. S., Brodarski Institute, Zagreb

F.A.O. (Food and Agriculture Organization, Organismo de la O.N.U.):

Traung, Mr. J.O., Fishing Boat Section (Observador)

SPAIN:

Acevedo, Cor. Ing. M.L., Canal de Experiencias Hidrodinámicas, El Pardo
Civera, Ing. F., Empresa Nacional Elcano, Madrid
Crespo, Prof. Ing. R., Escuela Técnica Superior de Ingenieros Navales, Madrid
Díaz Rijo, Prof. Ing. M., Canal de Experiencias Hidrodinámicas, El Pardo
Esteve, T. Cor. Ing., C.E.P., Dirección de Construcciones e Industrias Navales Militares, Madrid
Fernández Avila, Prof. Ing. A., Consejo Superior de Investigaciones Científicas, Madrid
Gil, Ing. G., Dirección General de Construcciones e Industrias Navales, Madrid
Martin, Prof. Ing. F., Sociedad Española de Construcción Naval, Madrid
Martin, Prof. Ing. R., Empresa Nacional Bazán, Madrid
Mazarredo, Prof. Ing. L., Canal de Experiencias Hidrodinámicas, El Pardo
Pardo, Prof. Ing. A., Canal de Experiencias Hidrodinámicas, El Pardo
Soto, Prof. Ing. M., Union Naval de Levante, Madrid
Vollbrecht, Dipl. Ing. E., Empresa Nacional Bazán, Madrid
Zubiaga, Ing. R., Naviera Aznar, S.A., Bilbao
Bruna, Prof. Ing. L., Astilleros de Cádiz (Observador)

PHOTOGRAPHIC REVIEW

OPENING SESSION



The Chairman of the International Standing Committee, Mr. López-Acevedo, during his address.

Seated from left to right: Dr. G. Hughes (Great Britain); Sr. Ibáñez Martín, President of the General Council for Scientific Research; General J.A. Suanzes; Admiral Abarzuza, Minister of the Navy; General E.G. Barrillon (France); Dr. K.S.M. Davidson (United States); Dr. H.F. Nordström (Sweden); and General J. Alfaro.

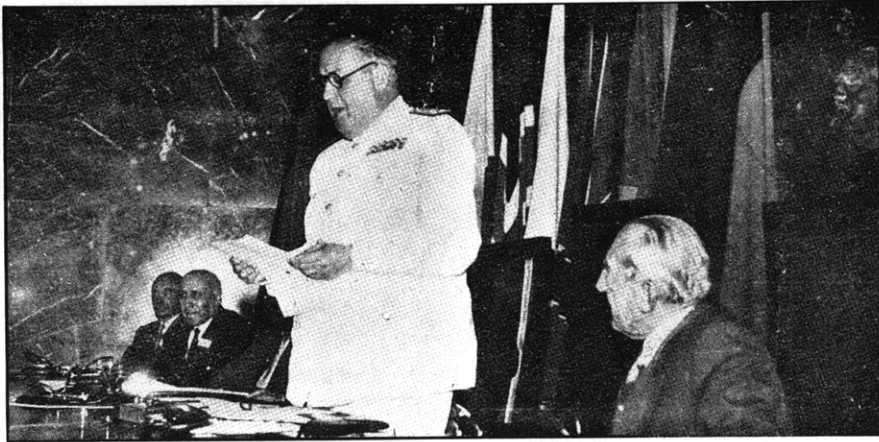


The Chairman of the Spanish Organizing Committee, The Honorable Don Juan Antonio Suanzes, during his address.



Member of the International Standing Committee, Dr. K.S.M. Davidson speaking in the name of the foreign delegates.

OPENING SESSION



The Honorable The Minister of the Navy, Admiral Abarzuza, declaring the Conference open.



In the foreground: Admirals Garcia Freire and Guitián, and Messrs. Rodrigo, Díaz de Espada, Dublang, and González de Guzman.



In the foreground; Mr. Newton and Dr. Todd. Farther back, Mr. Mathews.



In the foreground; Mr. Burt, Sir Thomas Havelock, and Prof. Weinblum.

OPENING SESSION



In the foreground: Dr. Landweber,
Prof. Wiegardt, and Dr. Harvald.
Farther back: Dr. Breslin and
Prof. Troost and Prof. Abkowitz.



In the foreground: Messrs. Medina,
Bertrand, Ruiz Jiménez, Rubio, and
Soto.



In the foreground: Dr. Lerbs.
Behind: Mr. Walker.
Farther back: Messrs. Gil and
Diaz Rijo.



In the foreground: Prof. Stürtzel
and Prof. van Lammeren and
Engineer Gerritsma.



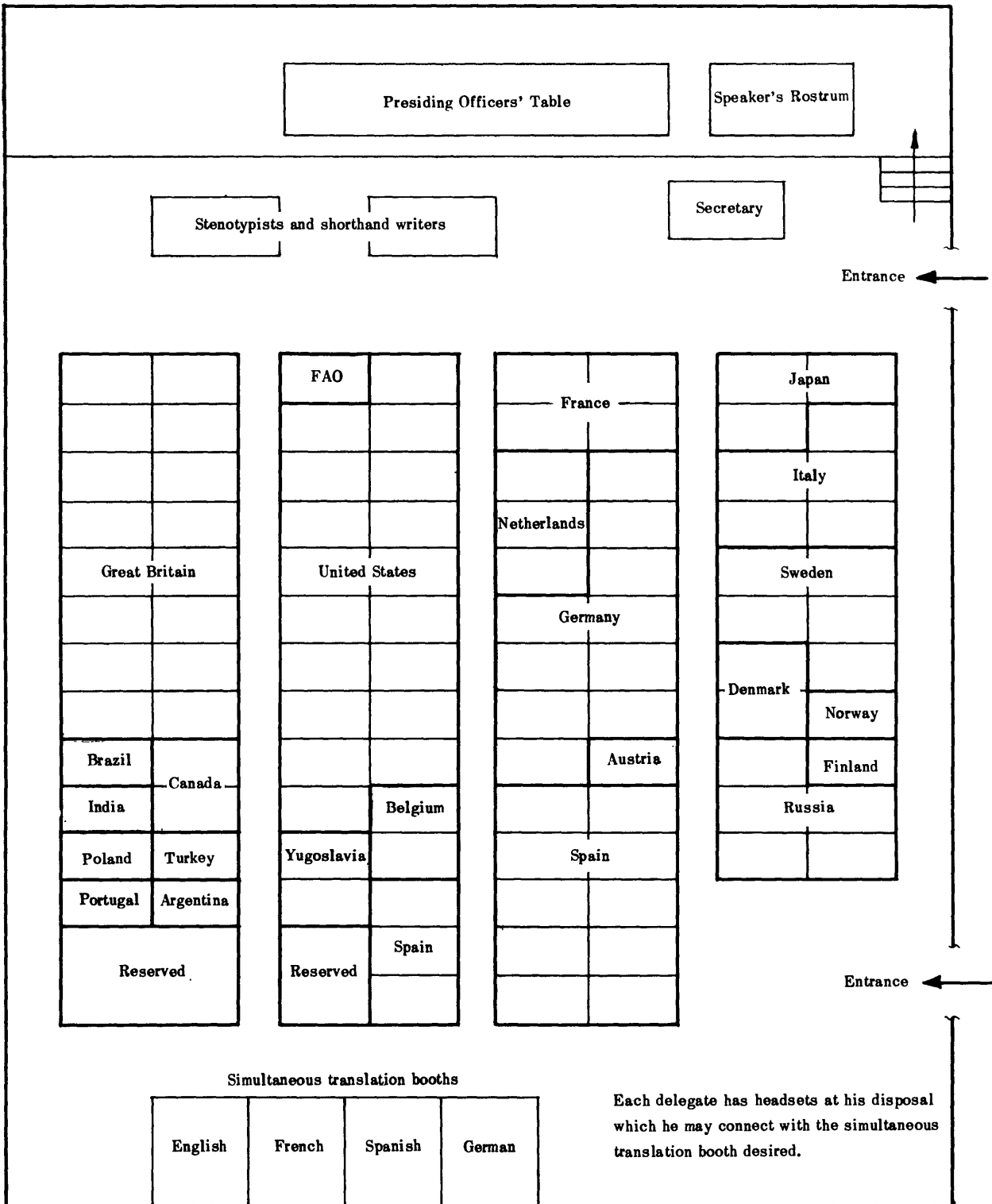
In the foreground: Mr. Brown.
Farther back: Prof. Wu.



In the foreground: Dr. Kretschmer
and Prof. Amtsberg.
Farther back: Mr. Pehrson and
Dr. Gutsche.

TECHNICAL SESSIONS

Seating arrangement of the delegates and services provided in the Conference Room.



TECHNICAL SESSIONS



General view of the Conference Room. In the center foreground; the Spanish delegation.



Dr. Davidson, Capt. Saunders, and Capt. Wright, of the United States delegation, and Mr. Traung, of the F.A.O.



Messrs. Maillard and Perrachon, and General Dieudonné, of the French delegation.



Prof. Horn, of the German delegation. Mr. Gerritsma and Dr. van Manen of the Netherlands delegation.



Messrs. Barnaby, Newton, Lackenby, and Walker, of the British delegation.

TECHNICAL SESSIONS



Prof. Di Bella, of the Italian delegation. Dr. Edstrand, Mr. Lindgren, Prof. Nordström, and Mr. Pehrson, of Sweden;

Farther back: Mr. Jansson, of Finland, and Prof. Prohaska, of Denmark.



Prof. Aertssen and Mr. Demoen, Belgian delegates. Mr. Sentic and Prof. Silovic, Yugoslavian delegates.

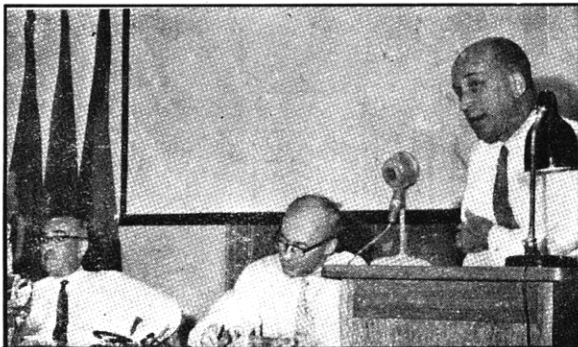
Delegates Participating in the Discussion.



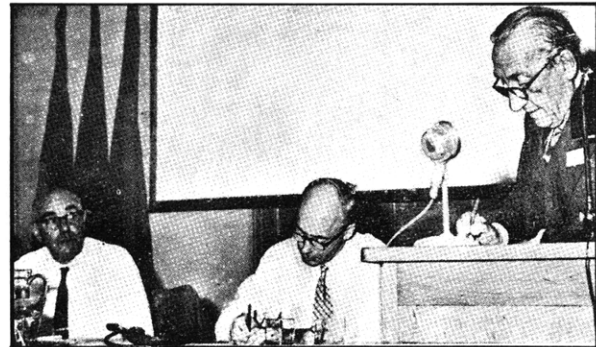
L. Troost (Cambridge, Mass.);
on either side: F.H. Todd and
G. Hughes (Teddington).



J. Hadler (Carderock, Washington).

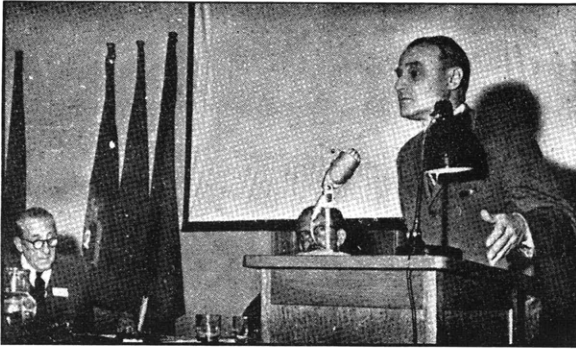


C.W. Prohaska (Copenhagen).

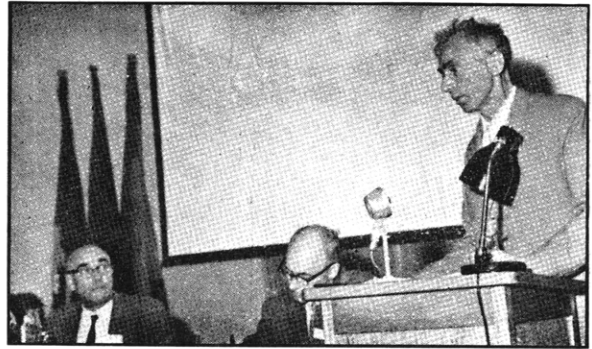


E.G. Barrillon (Paris).

TECHNICAL SESSIONS



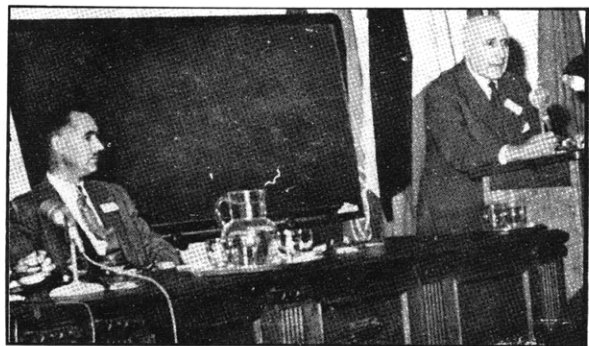
K.S.M. Davidson (Hoboken, New Jersey).



E. Castagneto (Rome).



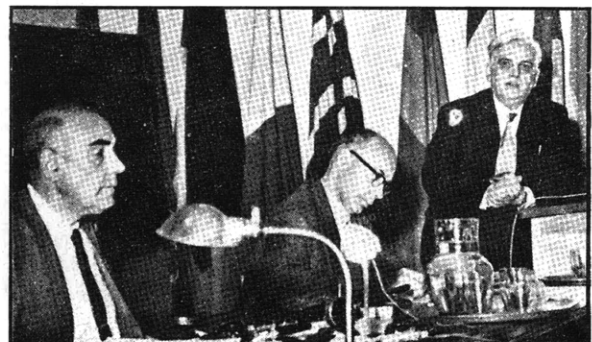
S. Schuster (Berlin).



M.L. Acevedo (El Pardo).



W.P. van Lammeren (Wageningen).



E.V. Telfer (London).

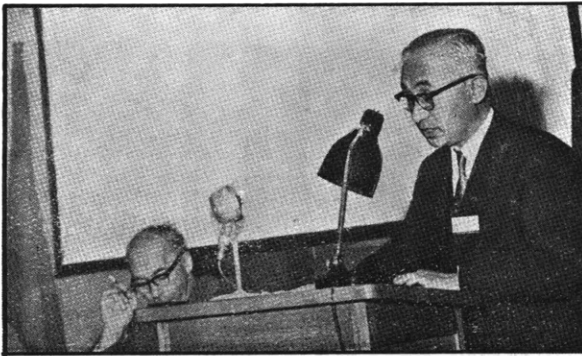
TECHNICAL SESSIONS



H. Edstrand (Goteborg).



R.N. Newton (Hasler).



M. Kinoshita (Osaka).



M. Voit (Moscow) with Prof. Weinblum (Hamburg) acting as interpreter.

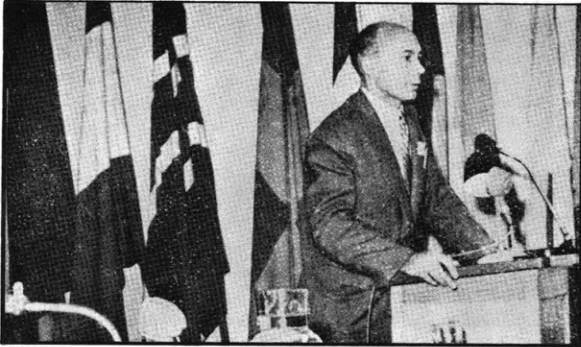


H.E. Saunders (Washington).
In the foreground: L. Mazarredo (El Pardo), Secretary of the Conference.

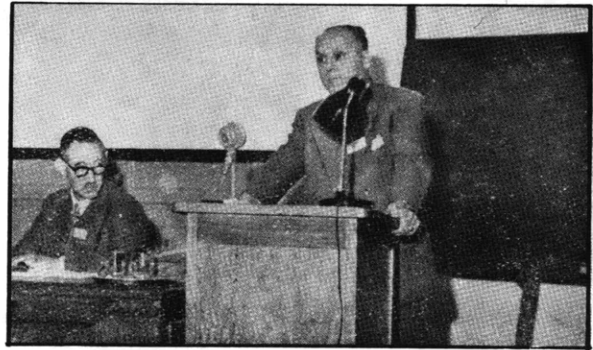


H. Lerbs (Hamburg).

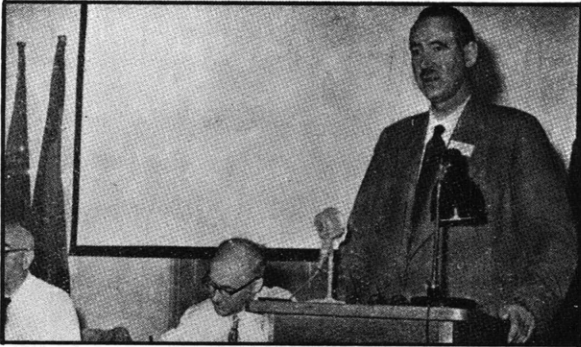
TECHNICAL SESSIONS



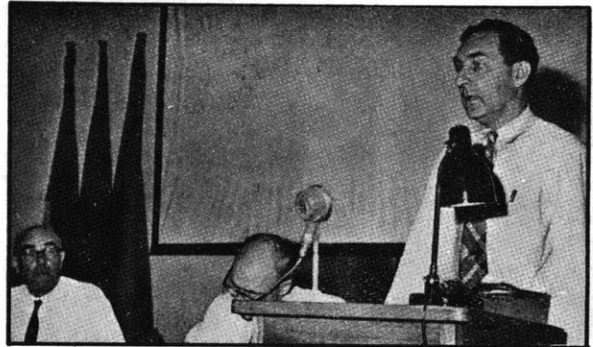
G. Hughes (Teddington).



F. Gutsche (Karlshorst, East Berlin).



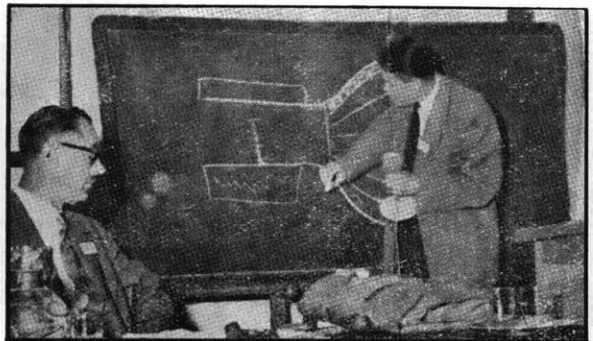
L.C. Burrill (Newcastle).



L. Landweber (Iowa).



T.Y. Wu (Pasadena).



J.D. v. Manen (Wageningen).

Reception at the I.N.I.



The president explains the activities of the Institute to the delegates. With Mr. Suanzes: Dr. Davidson and Professor Nordström. On the right: General Alfaro and Mr. González de Guzmán.

Visit to the Naval Museum



In the foreground: Professors Nutku, Telfer, and Pardo.

Reception in the Ministry of the Navy.



The Minister receives the delegates. In the foreground: Mr. Vollbrecht; farther back: Prof. Wieghardt.



The Minister with the Director of the David Taylor Model Basin, Captain Wright, USN, and Mrs. Wright

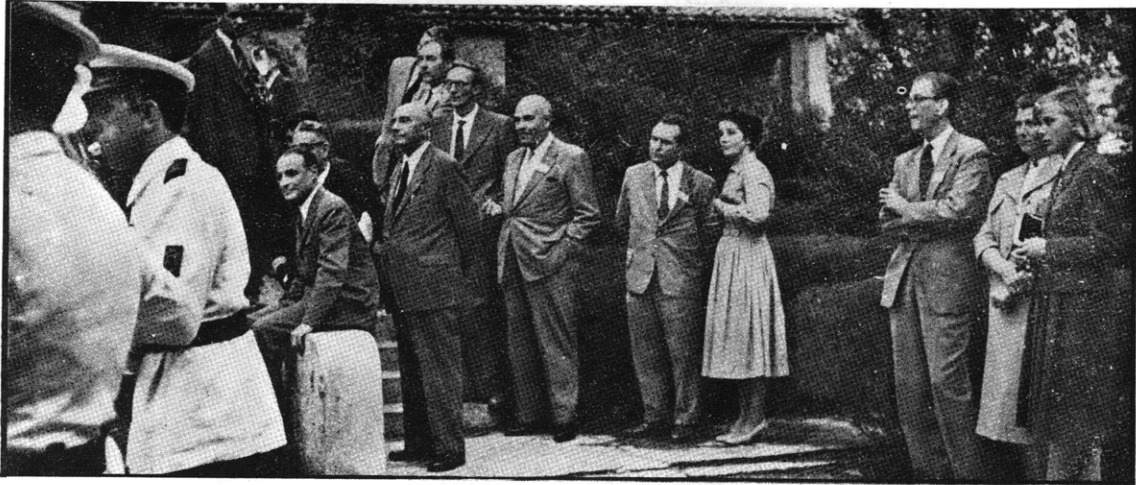


From left to right: Commander Nuñez, Admiral García Freire, and General Alfaro.



General Parilli in conversation with Admiral Benito.

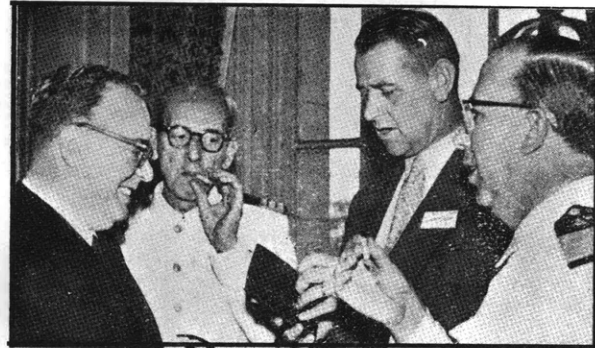
VISIT TO THE MADRID MODEL BASIN



This photo shows among others: Dr. Davidson, Capt. Velón, Dr. St. Denis, Professors Wieghardt and Troost, Dr. and Mrs. Schuster, and Mr. Traung and family.



Prof. Horn with Mr. Acevedo, the Director of the Madrid Model Basin.



Prof. van Lammeren with Messrs. Parga, Corominas, and Marino, Naval Engineers.

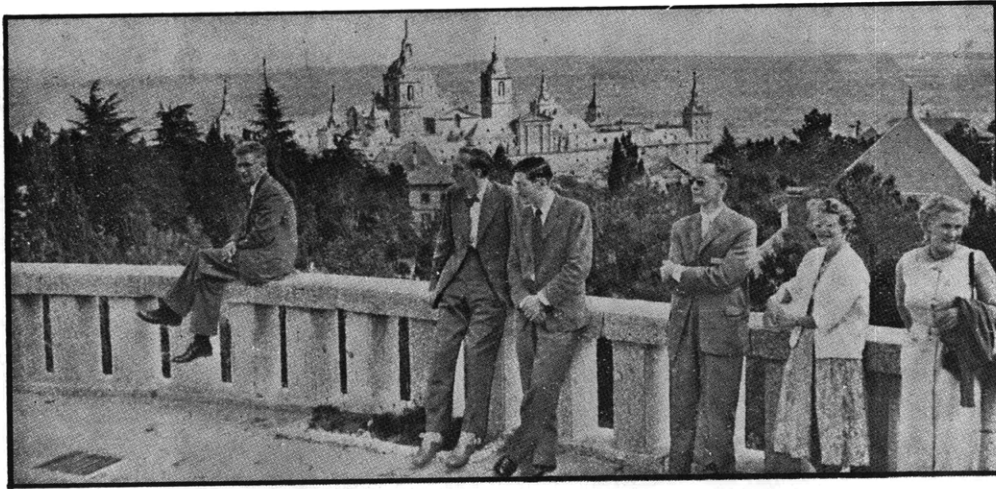


Mr. Zubiaga in conversation with Mr. Emerson and Mr. Moor.



From left to right: Mr. Jansson, Dr. Kinoshita, Mr. Pehrson, and Mr. Mathews.

EXCURSION TO EL ESCORIAL



A group of delegates on the terrace of the Hotel Felipe II.
From left to right: Dr. Todd, Prof. Wiegardt, Mr. Silverleaf, Mr. Lewis,
Mrs. Walker, and Mrs. Burrill.

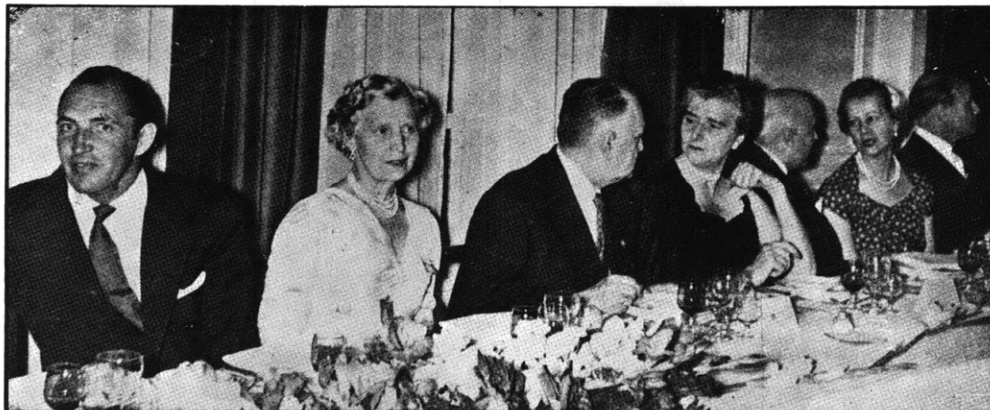


Dinner in the Hotel Felipe II tendered by the Spanish shipbuilders.
Mr. Miranda, President of the Spanish Shipbuilding Society,
speaking at the close of the banquet.

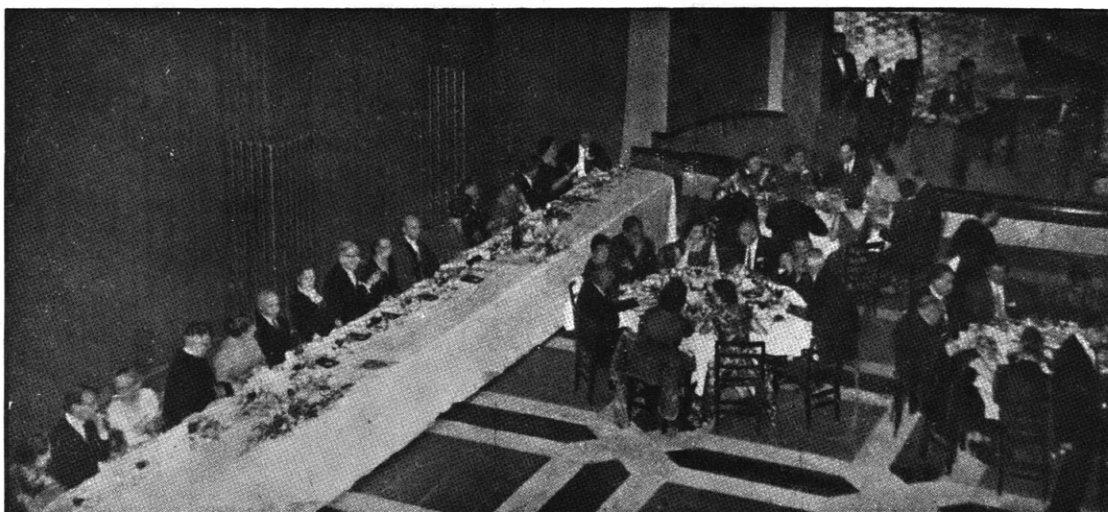


Dr. Todd, Supt. of the Ship Division of the National Physical Laboratory
(Teddington), replies to the toast of Mr. Miranda.

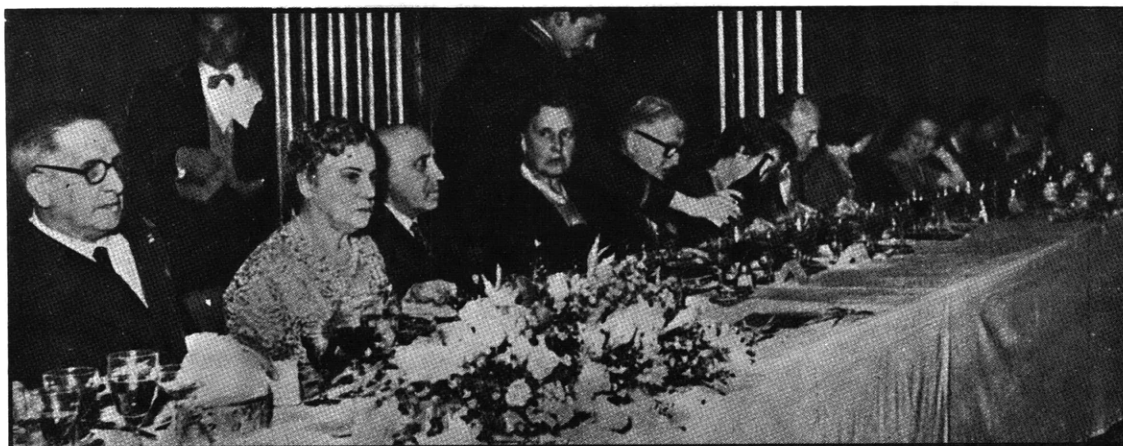
SHIP-OWNERS BANQUET AND CLOSING BANQUET



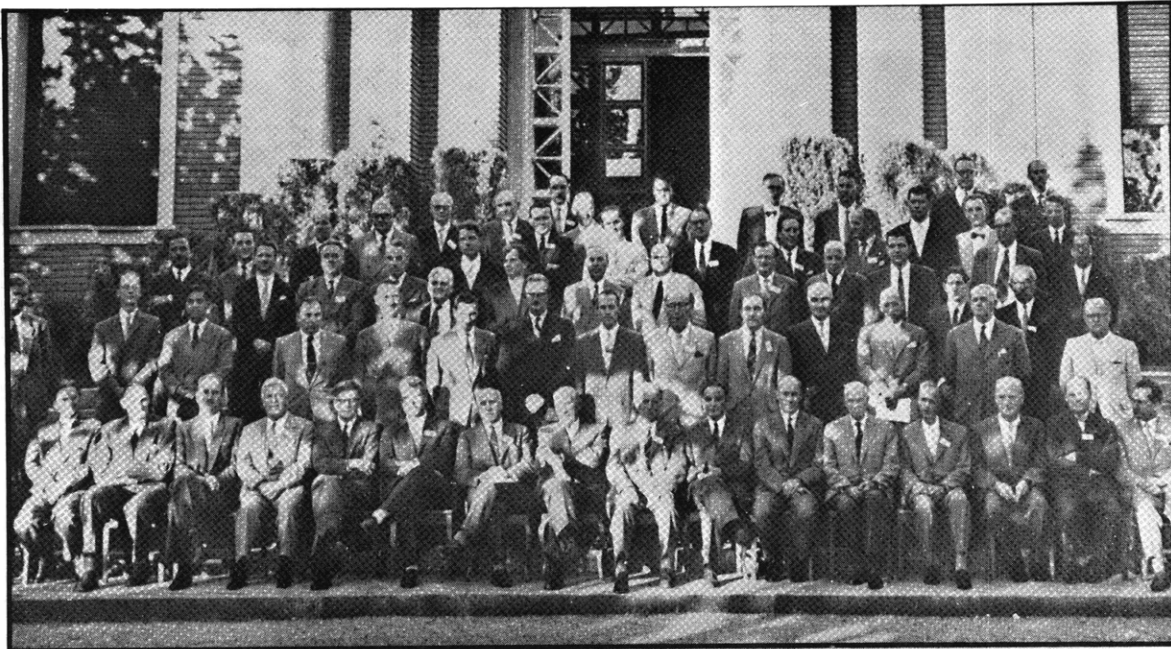
Banquet at the Hotel Fénix tendered by the ship-owners. At the head table: Mr. Aznar, Chief of the Central Maritime Office.



Closing Banquet at the Hotel Castellana Hilton tendered by the Ministry of the Navy and the Organizing Committee. View of the dining hall during the banquet.



In the absence from Madrid of the Minister of the Navy, Admiral Antón, Navy Chief of Staff, presides over the closing banquet, as representative of the Minister.



GROUP OF DELEGATES

Front row (seated):

Mr. D.I. Moor (not shown), Experiment Tank Messrs. Vickers-Armstrong, Ltd., St. Albans (Great Britain).
Prof. S. Silovic, Brodarski Institut, Zagreb (Yugoslavia).
Mr. R.N. Newton, Admiralty Experiment Works, Haslar (Great Britain).
Prof. J.K. Lunde, Skipsmodelltanken, Trondheim (Norway).
Capt. H.E. Saunders, Bureau of Ships, Washington (U.S.A.).
Dr. F.H. Todd, National Physical Laboratory, Teddington (Great Britain).
Engineer L.P. Maillard, Bassin d'Essais de Carenes, Paris (France).
Mr. M.L. Acevedo, Canal de Experiencias de El Pardo.
General E.G. Barrillon, Bassin d'Essais de Carenes, Paris (France).
Prof. H.F. Nordstrom, Goteborg (Sweden).
Dr. K.S.M. Davidson, Stevens Institute of Technology, Hoboken (U.S.A.).
Dr. G. Hughes, National Physical Laboratory, Teddington (Great Britain).
Prof. F. Horn, Berlin (Germany).
Dr. E. Castagneto, Inst. Nazionale per S. e E. di Architettura Navale, Rome (Italy).
Prof. H.W. Lerbs, Hamburgische Schiffbau Versuchsanstalt, Hamburg (Germany).
Dr. H. Edstrand, Statens Skeppsprovningens Anstalt, Goteborg (Sweden).
Dr. S. Schuster, Versuchsanstalt fur Wasserbau und Schiffbau, Berlin (Germany).

Second row:

Dr. S.H. Harvald, Lab. for Teknisk Hydro-og Aerodynamik, Copenhagen (Denmark).
Mr. E.V. Lewis, Stevens Institute of Technology, Hoboken, N.J. (U.S.A.).
Mr. P. Kulkarni, Central Water and Power Research Station, Poona (India).

Dr. M. St. Denis, David Taylor Model Basin, Washington (U.S.A.).
 Prof. L.C. Burrill, University of Durham, Newcastle u. Tyne (Great Britain).
 Mr. L. Mazarredo, Canal de Experiencias Hidrodinamicas, El Pardo.
 Mr. W.P. Walker, Messrs. W. Denny & Bros. Ltd., Dumbarton (Great Britain).
 Mr. J. Hadler, David Taylor Model Basin, Washington (U.S.A.)
 Prof. G. Weinblum, Institut fur Schiffbau, Hamburg (Germany).
 Dr. L. Landweber, State University of Iowa, Iowa City (U.S.A.).
 Prof. A. Nutku, Teknik Universitesi, Istanbul (Turkey).
 Prof. C.W. Prohaska, Laboratoriet for Teknisk Hydro-og Aerodynamik, Copenhagen (Denmark).
 Gen. A. Parrilli, C, Progetti Navi del Ministero Difesa Marina, Rome (Italy).
 Dr. L. Kretschmer, Schiffbautechnische Versuchsanstalt, Vienna (Austria).

Third row:

D.V. Esteve, Direccion de Construcciones e I, Navales M, (Madrid).
 Dipl. I.V. Sentic, Brodarski Institut, Zagreb (Yugoslavia).
 Eng. A. Andreoni, Instituto de Pasquisas Tecnologicas, Sao Paulo (Brazil).
 Mr. A. Pardo, Canal de Experiencias Hidrodinamicas, El Pardo.
 Mr. J. Brown, Messrs. John Brown & Co., Clydebank (Great Britain).
 Prof. E.V. Telfer (below) Inlaterra (actually in Norges Tekniske Hogskole, Trondheim) (Norway).
 Mr. Voznessensky (above), Instituto de Construcion Naval, Lenigrad (U.S.S.R.).
 Mr. Firsov, Inst. de Construc. Naval, Leningrad (U.S.S.R.).
 Prof. A. Di Bella, Universitadi Genova, Genoa (Italy).
 Mr. F.S. Burt, Admiralty Research Laboratory, Teddington (Great Britain).
 Prof. H. Amtsberg, Technische Universitat, Berlin (Germany).
 Mr. K.C. Barnaby, Messrs. J.I. Thornycroft & Co., Ltd., Woolston (Great Britain).
 Mr. A.J. Tachmindji, David Taylor Model Basin, Washington (U.S.A.).
 Mr. A. Silverleaf (below), National Physical Laboratory, Teddington (Great Britain).
 Dr. K.M. Kinoshita (below), Hitachi Shipbuilding & E. Co., Ltd., Osaka (Japan).

Last row:

Eng. L.A. Pastorino (Brazil).
 Com. E.N.V. Taborda, Lisbon (Portugal).
 General J. Dieudonne, Institut de Recherches de la Construction Navale, Paris (France).
 Prof. G.S.J. Aertssen, Amberes (Belgium).
 Mr. M. Tulin, Office of Naval Research, Navy Dept., Washington (U.S.A.).
 Mr. M. Diaz Rijo (above), Canal de Experiencias Hidrodinamicas, El Pardo.
 Engineer R. Demoen, Compagnie Maritime Belge, Amberes (Belgium).
 Mr. W.A. Cargo, Messrs. Saunders-Roe, Ltd., Isle of Wight (Great Britain).
 Dr. J.D. van Manen (above), Ned. Scheepsbowkundig Proefstation, Wageningen (Netherlands).
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