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26 APR 1949

My dear Captain Holmes:

Forwarded, herewith, are Air Defense Board Memoranda No. 10-49 and 11-49 in further compliance with your letter BMS 173/49 of 28 February 1949. As will be noted, memorandum No. 10-49 gives the Department of the Navy concurrence in the proposal forwarded by your letter 497/49/1 of 30 March 1949 for a discussion of Combat Information Centre matters.

This information is furnished upon the condition that it will not be released to another nation without specific authority of the Department of the Navy of the United States; that it will not be used for other than military purposes, that individual or corporate rights originating in the information, whether patented or not, will be respected, and that the information be provided substantially the same degree of security afforded it by the National Military Establishment of the United States.

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COMMENTS AND REMARKS

Very sincerely yours

Thomas B. Inglis, Rear Admiral, USN  
Director of Naval Intelligence

*Callie... being...  
for...  
each...  
per...  
WAM*

W.A. Morgan  
By direction

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Enclosure.

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BRITISH JOINT SERVICES MISSION (NAVY STAFF)

1910 K. Street, N.W.

Washington, D.C.

B.W.S. 497/49/1

30th March, 1949.

DIRECTOR OF NAVAL INTELLIGENCE  
Pentagon Building

For a considerable time the Admiralty have had in mind the desirability of sending a Combat Information Centre Mission to discuss with the Navy Department many outstanding matters in this important sphere of common interest.

The attached paper has been prepared by the British Navy Staff in order to give the general background to the objectives which the Mission has in mind and is self-explanatory.

It would be appreciated if covering approval for this Mission to take place could be given in advance of information as to exact dates of the visit.

*J. Holmes*  
J. Holmes  
Captain, R.N.  
for Admiral  
British Joint Services Mission

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Indeed the power of offence has so greatly outstripped the power of defence, that it remains the major technical problem of the day to close this gap and redress this balance of power.

To the Royal Navy, it appeared possible that, with a heavy programme of re-equipment and modernisation, this gap might be closed on something approaching a ten to fifteen year time scale, but only at the expense of its requirements of the immediate future. At

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COMBAT INFORMATION CENTRE MISSIONI. INTRODUCTION.

The Admiralty have for some time been considering the despatch of a mission to consult with the United States Navy on matters concerning the future of Combat Information Centres in which there is perhaps a greater need for combined forethought, collaboration and planning than in any other sphere of common interest.

The composition of such a mission and its date of arrival are not yet known for certain but it is believed that, subject to United States approval, it will consist of some four naval officers and naval scientists and will be in the United States during the month of May.

In advance of any administrative arrangements to be made in connection with such a visit, it is desired at this stage to acquaint the Navy Department with a short back history of the development of thought and the various relevant considerations which have led up to the present Royal Navy policy regarding the modernisation of Combat Information Centres to meet the conditions of future naval warfare.

Such an exposition it is believed will set the scene for this mission and do much to narrow down, to manageable limits, the field of discussion of a subject which brings into debate every aspect of naval warfare from strategical and tactical doctrine to technical details. It should thus facilitate the arrangement of a programme of meetings and visits related more directly to the objectives which the mission has in mind.

II. GENERAL BACKGROUND.

The period since the end of World War II has been occupied by the Royal Navy in sober reflection upon the experiences of the past war, in taking stock of the problems which require solution for any future war and in measuring the extent to which the scientific and industrial resources of the country can be harnessed to the needs of future warfare at a time of great national economic distress.

These are worthy and indeed essential post-war preliminaries to peacetime progress; yet such a period cannot be prolonged indefinitely, if the British fleet is to be re-equipped within a reasonable time, having regard to the immense complexity of the equipment, which modern warfare demands and the ever increasing period required for experiment, development, production and fitting.

It has been quickly recognized both in the United States and in the United Kingdom that the development of high performance aircraft and submarines, upon the threshold of which we arrived as the war ended, has brought with it formidable and complex problems of defence to which, at present, adequate solutions neither exist nor appear on the close horizon.

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a time therefore when only a very small proportion of the national resources could be spared for the requirements of defence, the alternative issues broadly confronting the Royal Navy were either to embark upon a long term programme of modernisation with radically new and perhaps futuristic equipment by forsaking the present, or generally to improve equipment already in existence so as to keep the fleet in a limited state of preparedness for a limited time, even though such a programme would contribute only little towards closing the gap between offence and defence.

Had World War II been followed by the promised era of peace and a steady return to prosperity, the first course of action might have prevailed; as it is, however, the pressure of international events has driven the Royal Navy inexorably towards the second course.

It is against this background that modernisation policy has taken shape in the United Kingdom.

### III. PRINCIPLES OF FUTURE FLEET DEFENCE.

In considering the threat presented by the high speed jet bomber and high underwater speed snorkelling submarine, the crux of the problem is broadly common to both - that of providing detection, adequate in range and accuracy, to enable counter action to be taken in time to give good prospects of success.

In the absence of some radically new scientific advance, as yet unforeseen, it appears that the problem of defending a fleet in the future must be approached from two directions;

- (i) The detection difficulty must be solved on a technical and organisational basis, rather than purely scientifically, by placing our equipment in ships and aircraft remote in three dimensions from the unit to be protected,
- (ii) The existing processes by which combat intelligence and information are gathered absorbed, filtered, presented and acted upon, are overwhelmed by the requirements of modern warfare. They can and must be hastened and expanded by every device at our disposal.

It may be observed that the principle enunciated in (i) above is not new. It has, in fact, been applied tactically with great effect in the past. But it is the extension of this principle in order to provide cover out to distances hitherto un contemplated, combined with a radically new information system linking all units in a far-flung yet tactically cohesive and compact team which brings in its train many complex operational and technical problems.

As regards (ii), it is necessary in the interests of speed - and it appears, with techniques available, to be possible - to eliminate the human element at every stage except where the exercise of judgment is essential.

At a time, therefore, when it is desired greatly to extend the zone of coverage by placing ships and aircraft far afield, it is necessary, simultaneously and somewhat incompatibly, to devise a semi-automatic system which will feed information from all sources both within and without the ship to a central point, which will present it in a filtered and evaluated form to the Command, and which at the same time will carry combat instructions and results of computations to ships and weapons.

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It follows from the foregoing that the ability of a fleet to defend itself under modern conditions depends essentially and vitally upon success in applying every known scientific device to the task of bringing the communication and display systems which serve the Combat Information Centres to a new pitch of perfection.

Only by such methods is there any hope of being able to co-ordinate the use of all weapons at the disposal of the fleet and deploy them efficiently and effectively against the dangers which threaten it.

#### IV. THE COMPREHENSIVE DISPLAY SYSTEM.

The data display and evaluation network represents the nerve system of the future fighting organisation of a Task Force, and consequently it is not surprising that the attempt to devise a practical system has required an unusual amount of thought, discussion, and experiment to accompany the normal process of reconciling operational demands with technical possibilities.

In attempting to create a machine to replace the human brain - and indeed to improve upon it in respect of capacity and rapidity of action - it is realised that it can only be done at the sacrifice of much flexibility and versatility. Weight and space considerations alone demand that any scheme devised must be directly related and limited to stipulated and operational criteria, and to the estimated contribution which all Detection Devices and Weapon Control Systems make to the Defence System as a whole.

This has of necessity lead not only to much speculation upon the future employment of many devices, some still under development, but also the realisation of the need to anticipate years ahead tactical and even strategical doctrine, in order to determine the broad requirements of such a system. To some it may be a new manifestation of thought that the price to be paid for the necessary rapidity of action may be severe functional limitations imposed years previously by the designers of technical equipment.

Notwithstanding the numerous variable and unpredictable factors which beset the problem from the highest level to the smallest detail, an effort has been made by the Royal Navy to hammer into shape a concrete scheme from which to start development. After some two years of theoretical study and laboratory experiment a contract has now been placed for the "Comprehensive Display System", as it has been called, to be developed with a view to fitting in the British Fleet some five to seven years hence.

#### V. THE PRINCIPAL FACTORS AFFECTING THE PROBLEM.

In devising the comprehensive display system the following are the principal aspects which have been given consideration.

##### (A) THE TIME SCALE.

In technical planning a mean course has to be chosen somewhere between the two extremes of either developing new material before scientific experiment has been carried far enough or of pursuing perfection so far that modernisation and re-equipment is delayed for too long.

The principal factor which bears upon the determination of this mean course is the estimated likelihood of war. For reasons already discussed this project has been planned with the object of providing

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the fleet with a much improved system as early as possible at the expense of some of the more futuristic features originally conceived.

(B) OPERATIONAL CONDITIONS.

Allusion has been made to the need for - and the extreme difficulty in - estimating operational conditions many years in advance. Yet unless an attempt is made it is impossible even to begin the conception of equipment to replace the Brain.

(C) SOURCES OF INFORMATION.

All known and prospective sources of combat information have been studied in order to ensure that the System will compete with the required volume, accuracy in transmission and display, and security.

(D) COMMUNICATION SYSTEMS.

It has been customary in the past to consider communication systems in terms of morse and voice carried by radio. A thorough and basic study of all known methods of transmitting data is being made in order to arrive at the most appropriate system to meet future requirements in respect of security, volume, speed, accuracy and distance.

(E) DISPLAY SYSTEMS.

New Display techniques have been applied to the problem of presenting to the Command a cleaned up picture of the combat situation as accurately and as instantaneously up-to-date as is compatible with the requirements of flexibility and in a form which facilitates the semi-automatic deployment of all weapon control systems not only within the ship but also within the Task Force.

(F) WEAPON CONTROL SYSTEMS.

The objectives of the comprehensive display system include the provision of means not only to facilitate the rapid and efficient deployment of all weapons likely to be available in the fleet but also to marry them into a solid fighting team. The methods by which this is to be achieved, the type of combat orders to be conveyed, and the volume and accuracy of the data with which weapon control systems require to be fed have therefore been examined.

(G) THE CAPACITY OF THE SYSTEM.

Considerable thought has been given to the question of whether a different system is required for different functions. For instance should there be separate systems for air defence and submarine defence or can one system meet the requirements of the two either separately or simultaneously?

(H) OVER-CENTRALISATION.

It is always tempting to devise a scheme which is highly efficient on paper yet is so over-centralised that it depends upon each unit performing its functions correctly. Care must be taken therefore that the defences are not

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rendered impotent by either casualties or technical failure in any of the units which make up the team.

(I) FITTING.

It has to be recognized that wars are always fought with a very considerable percentage of ships and equipments which already exist. The need, therefore, to fit the Comprehensive Display System retrospectively in existing ships as well as those to be laid down has been borne in mind.

(J) TACTICAL COOPERATION WITH ALLIES.

It remains a corner-stone of Admiralty policy that all developments in the Royal Navy shall be carried out with the full knowledge of the United States Navy and that the necessary technical measures are taken to ensure that complete tactical cooperation between Navies is not only possible but efficient.

VI. OBJECTIVES OF THE MISSION.

It is the pursuance of the policy mentioned in (J) immediately above which has given rise to the proposal for a Combat Information Center Mission to visit the United States Navy.

It is recognised that the ability of ships of allied Navies to cooperate tactically depends almost entirely upon the efficiency of combined communications.

In the past, extempore communication arrangements between the United States Navy and the Royal Navy have been made possible by the exchange of equipment and the fact that the language and the Morse Code have been common media. The alignment of procedures, codes and call signs were comparatively minor obstacles to be overcome. From the earliest days of World War II ships of the two Navies were able to work together with an efficiency which quickly increased.

Now, however, the British, and presumably the United States, Navy is about to embark upon measures which have as their ultimate aim the complete elimination of voice and morse and the need of Codes, procedures and call signs. The versatile yet laborious human link is to be replaced by the instantaneous yet inflexible machine. The possibility of making hasty extempore communication arrangements which, on the outbreak of war, will bring together in common battle allied ships, whose Navies have failed to combine technical planning in peace, is therefore fading.

There are clearly many different scientific techniques that may be applied to the communication and display problem of the future. Equally, the considerations which need to be reconciled in order to arrive at the best overall system are both numerous and varied and range from high level philosophy on the employment of Navies in any future war, down to details of new laboratory techniques. In view of the extreme difficulties experienced in hammering into shape a concrete scheme for the Royal Navy alone, it would be surprising if full agreement on the whole range of problems could be reached with the United States Navy, whose requirements, in many cases, spring from different philosophies.

Yet the two Navies are faced with identical threats from the

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aeroplane and the submarine and are supported by identical scientific techniques. It would seem therefore that there must be an area of common viewpoint which could be exploited to provide at least some means of linking the two Navies together under future conditions of Naval warfare. For there are unlikely to be any possible extempore arrangements which could be made in the whole span of a war which would remedy failure to reach agreement at this early stage of Technical planning.

The degree of tactical cooperation between the two Navies which will be possible in the future is therefore directly proportional to our success in combining operational and technical planning both now and in the years to come.

The broad objective of the C.I.C. Mission can therefore be summarised as follows:-

- (1) To present to the United States Navy the philosophy and policy of the Royal Navy towards the future C.I.C. problem.
- (2) To present to the United States Navy the Royal Navy plans for the Comprehensive Display System and a new fighter interception equipment known as Type 984.
- (3) To present to the United States Navy the Royal Navy views upon communication systems necessary to support the Comprehensive Display System.
- (4) To learn from the United States Navy their own plans and philosophies on the above three subjects.
- (5) To compare the two viewpoints, to take note of the area of common ground and to appreciate the divergencies which will militate against tactical cooperation.
- (6) To recommend what measures could be taken to ensure that tactical cooperation remains possible.
- (7) To set up practical machinery for implementing (6).

#### VII. BROAD PROGRAMME OF MISSION.

In the light of the above the following broad programme is proposed for the Royal Navy C.I.C. Mission.

- (A) In Washington one week (approx).
  - (1) The presentation of the British Navy's present plans for future Combat Information Centres and Fighter Interception.
  - (2) The presentation of similar United States Navy's plans.
- (B) Period of Visits (3 to 4 weeks (approx)).

The Royal Navy Mission to spend this period

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visiting Laboratories and Firms who are engaged in work on Fighter Interception, Data Transmission Systems, Digital Computation and New Display Methods.

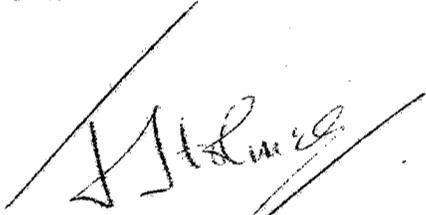
(C) In Washington one week (approx).

Combined discussions to take place in Navy Department to implement objectives 5, 6 and 7 above, culminating in final meeting attended by Senior Officers to give support to combined proposals.

In view of the extreme importance of the whole subject discussed above, it would be appreciated if the Navy Department would give approval in principle for this Mission to take place, in advance of more detailed discussions on the questions raised.

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It would be appreciated if covering approval for this Mission to take place could be given in advance of information as to exact dates of the visit.

  
J. Holmes  
Captain, R.N.  
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