A NEW TYPE OF COLLABORATION

THE HORIZON PROGRAMME

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ABSTRACT

The article describes the role of the Joint Project Office by using some examples taken principally from the platform level, which illustrate the difficulties of this joint venture.

Introduction

The United Kingdom, France and Italy have decided to combine in the design and construction of an anti-aircraft frigate (FIG. 1), destined to replace or to

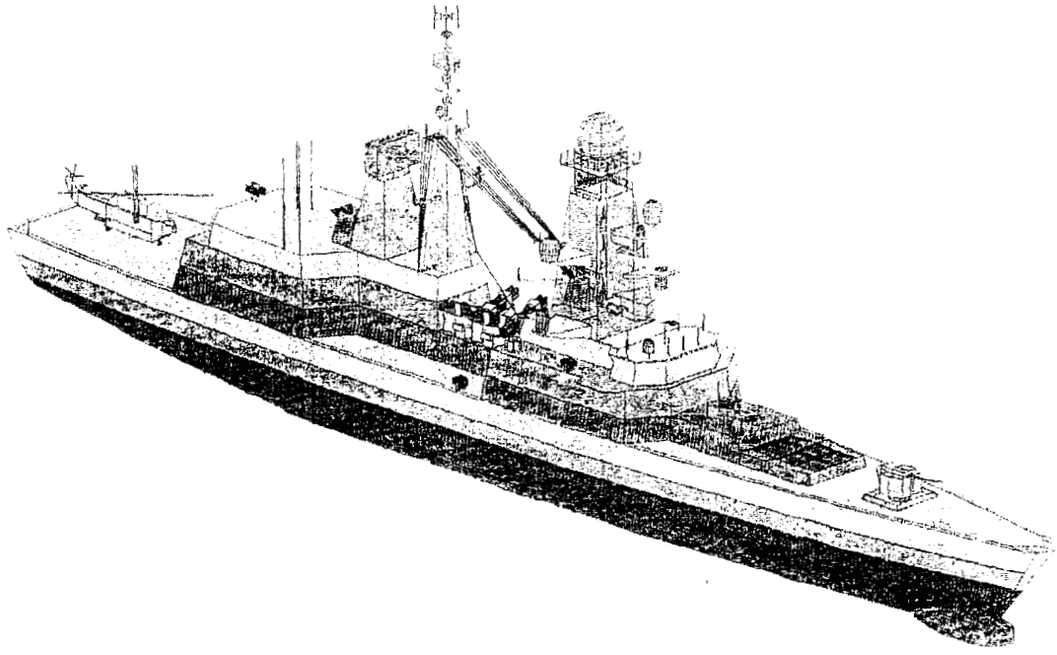

FIG. 1—PROJECT HORIZON—ANTI-AIRCRAFT FRIGATE

complement at the start of the next century, certain ships that are in service in each of their respective navies:

The Royal Navy's Type 42s.

The French Navy's SUFFREN and CASSARD class frigates.

The Italian Navy's DORIA and AUDACE class frigates.

Fundamental principles of the programme

International collaboration always requires a lot of effort, incessant enthusiasm and strong willpower to succeed. A major concern is how best to utilize existing resources by sharing costs, notably during the development phase. Nations can no longer afford to spend large amounts of money on major new equipments that are essential if a modern navy is able to confront threats that may arise during the first quarter of the 21st century. Bringing together each country's capabilities is an ambitious gamble, each party possessing its own history and age old *savoir-faire*, but this is the only way of succeeding.

Up to now, all of the naval collaborations that have existed have, for one reason or another, been tainted with failure. There are various reasons for this, as a first class warship is an extremely complex project from an operational, technical and industrial point of view.

The 'way ahead' strategy is the result of long and difficult discussions, out of which have come diverse points of view as each party's culture and personal interests are different. Collaboration:

- Favours the common good over individual interests.
- Finds a way of establishing an efficient management structure, both at government and industrial levels.

The basis of collaboration

The Tripartite Staff Requirement (TSR)

The document that forms the foundation of the HORIZON programme is the TSR and this was signed, by the 3 Chiefs of Naval Staff, on the 18 December 1992. The frigates roles will be:

Primary

Anti-air warfare (against aircraft and missiles of all types) and for exercising command over a group of ships. An anti-aircraft missile system will be developed by another tripartite collaboration.

Secondary

Anti-submarine and ship warfare, with the capability on occasion to operate alone

The Joint Project Office (JPO)

After 3 years of lengthy discussions, the 3 Defence Ministers agreed on how the strategy would be implemented. A trilateral memorandum of understanding was signed in July 1993 and the JPO for the 3 involved nations was set up in London (FIG. 2). A supplementary technical arrangement concerning the frigate's definition phase was signed by the 3 ministers on 11 July 1993. As a result the JPO, as a single integrated team, took on the responsibility of all technical, financial and contractual aspects of the project on behalf of the 3 nations.

Since its creation, one of the main tasks of the JPO has been to take part in meetings involving some 65 working groups who are responsible for elaborating on the technical documentation which is necessary for further discussion groups. As well as integrating with work that is already in progress, the JPO has brought different working groups together. Furthermore, with its tri-national status, the

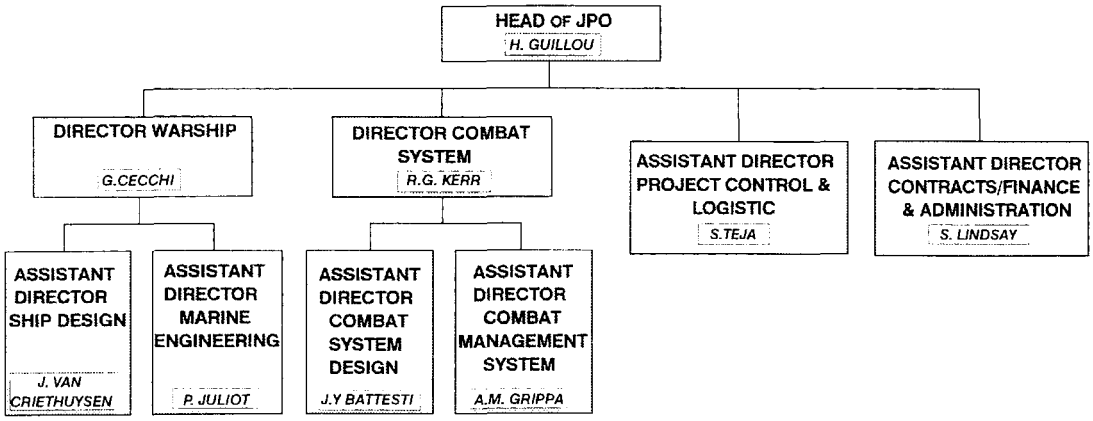

FIG. 2—JPO ORGANIZATION

office can often propose compromises which individual nations cannot arrive at because of their own national interests.

The co-location of the JPO and Operational Requirement Staff Team, which is made up of 2 naval staff representatives per country, ensures that through a direct and continuous dialogue there is a clear unambiguous interpretation of the common needs of the 3 navies.

Outline of the JPO organization

The Joint Indicative Design (JID) study

A pilot study, made up of government representatives from the 3 nations, was created at the start of 1993. It was created to:

- Check on the project's feasibility.
- Estimate the cost of the frigate.
- Establish a specification that is acceptable to the 3 nations.

The first version of the pilot study, called JID, was achieved in the summer of 1993 and was submitted to each nation for comment. On the basis of these comments the JPO established a series of complimentary studies to:

(*a*) Examine the options in a more detailed way.

(*b*) Manage the problem of variants.

(*c*) Find a consensus on the development programme.

The JPO is putting these studies to the main contractor, to serve as a reference for all invitations to tender.

It seems appropriate to mention that JID, as its name indicates, is an indicative idea that proposes a solution that is acceptable to all 3 nations as a basis for discussion. In any case, there is no imposed definition, the main contractor has the power to change things considerably in order to find and apply its own solution.

A second version of the JID, will take into consideration the approved results of the complimentary studies.

The IJVC

The HORIZON programme's Prime Contractor (PC) will be an international consortium called the IJVC (International Joint Venture Company). The IJVC members are:

UK —GEC Naval Systems (leader of a team comprising Yarrow Shipbuilders Ltd and British Aerospace Defence, with the support of Yard and Vosper Thornycroft).

France —DCN International.

Italy —Orizzonte SpA (a joint venture—50/50 between Finccantiere and Finmeccanica).

Industrial organization

The first stage of the programme will be concerned with defining the warship and deciding on how to develop the combat system. The next stage will concentrate on holding detailed studies and constructing the first three first of class, one per nation.

The IJVC will be the programme's PC for the development and construction of the frigate. The objective being to make the IJVC responsible for the whole warship's performance, including the combat system.

Contracts for the definition of the principle parts of the combat system will be let separately by the Authority. These include the:

- Integrated communication system.
- Electronic warship system.
- Combat management system.

After this initial stage, it is the participant's intention that the IJVC will then act as the warship PC/delegated Authority for phase 2 onwards .

It is appropriate to emphasise that the essential aim of collaboration is to save a substantial amount of money. As a result, no share of the work will be forced on anyone and the benefits/profits will not be divided to achieve this. Nevertheless, as a whole, the programme's work will be equally divided as far as costs are concerned. At the same time, the JPO will aim to ensure that all 3 nation's industries are given work that is of equal quality.

Complex issues

In order that the collaboration is efficient and profitable, it is essential to maximize the amount of common interest in the warship's development. However, there remains the potential for differing points of views in the following:

(*a*) The choice of equipment, particularly the combat system, for logistical and development problems.

(*b*) Finding a common way ahead. Once there is an agreement on 'common' issues, there will still be a large number of possible different technical solutions.

(*c*) Defining the interior lay-out according to the composition of the crew and naval customs, which vary depending on the country in question.

The choices can be further complicated by the fact that each nation's navy has developed its own traditions and procedures, which it has been doing in its own way for years. What may seem to be a perfectly acceptable solution by one navy, can be seen as dangerous by another. Each navy has its own way of using identical equipment(s) which, due to their geographical conditions and zones, require different means of utilization. As far as the combat system is concerned, defining a joint specification on its acquisition necessitates an agreement on its detailed functional needs, which are evidently influenced by solutions which each navy is already familiar. In other words, the 'non-national' syndrome should not be under-estimated, especially in the security sphere.

Shape of the hull

The hull's shape gives the naval architect the maximum scope. In the frigate's case, a pilot study to decide upon the new generation hull's shape has been established by JID. At the centre of the debate is the relative importance of 2 factors:

- Handling the ship.
- Fuel consumption.

As far as the handling is concerned, a hull with a high prismatic co-efficient and well defined waterline in the shape of a 'V' is desirable. For fuel consumption, a lower prismatic co-efficient , with a more rounded hull in the shape of a 'U' is preferable. The 'X3' shape chosen is a compromise that allows for perfectly good handling, without compromising on fuel consumption too much.

Interior lay-out

One of the most difficult problems to solve, as far as the decks are concerned, is to limit the number of different lay-outs needed. This problem was solved by agreeing on a certain amount of common space, which could then be divided up depending on each nation's specific needs. The internal partitions have little, if any, effect on the rest of the frigate's design. For instance, one such area concerned the galleys, dining and recreation spaces which are all situated on the same deck. Both the pilot study of the ship's lay-out, implemented by JID and a study into the feasibility of technical specifications concerning the crew's needs, shows clearly how national culture can have a direct influence (FIGS. 3,4&5):

- The RN want a NAAFFI shop that sells sweets and drinks, but no barber shop.
- The French envisage a bakery that is much larger than that required by the RN.
- The Italians are the only ones that expect a pizza oven!

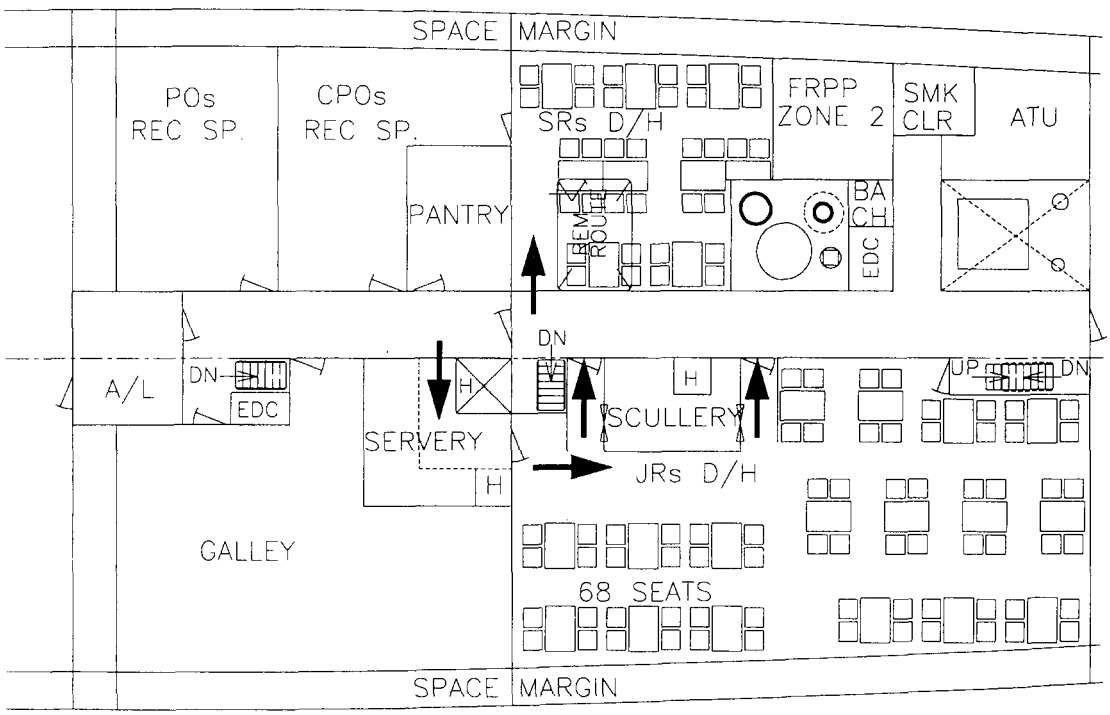

FIG. 3—UK GALLEY AND RATINGS DINING ARRANGEMENTS

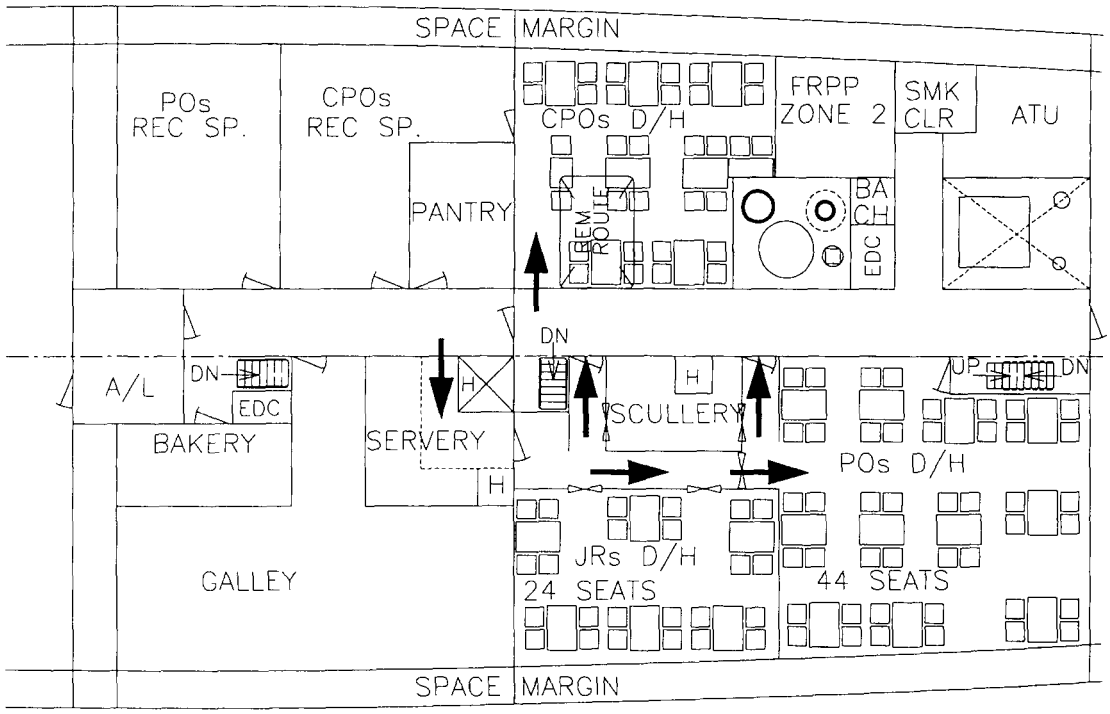

FIG. 4—FRENCH GALLEY AND RATINGS DINING ARRANGEMENTS

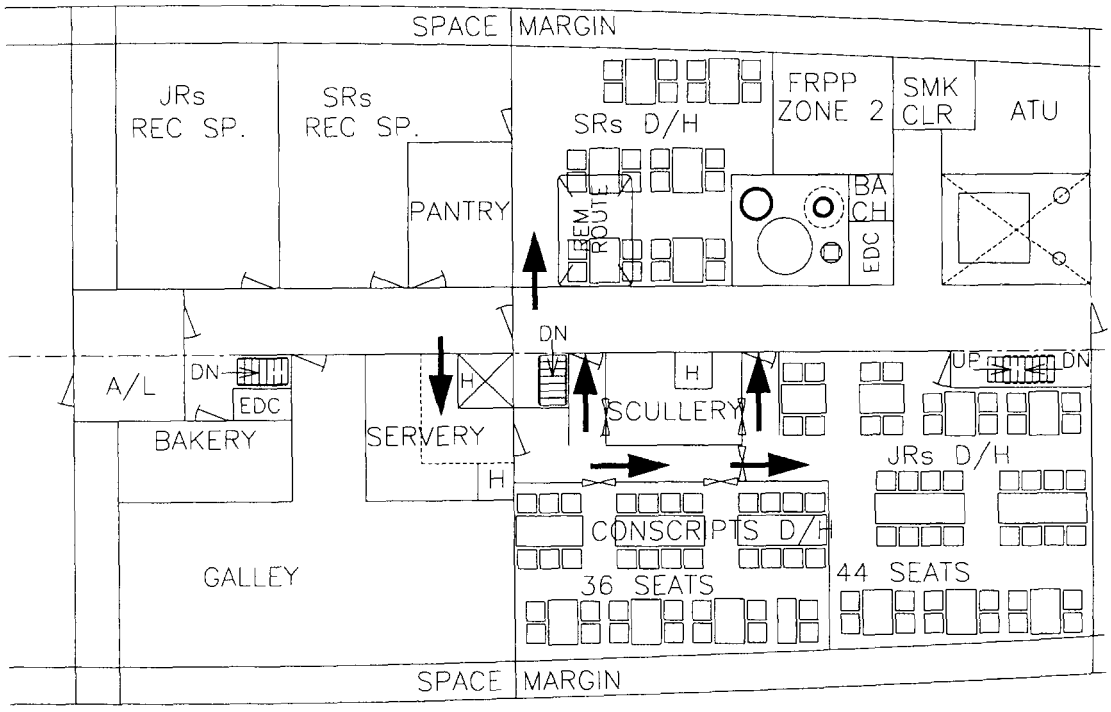

FIG. 5—ITALIAN GALLEY AND RATINGS DINING ARRANGEMENTS

Propulsion

The different solutions, that are being examined at the moment, for the ship's propulsion train all have 2 prop- shafts, both of which are driven by a gas turbine, with either an electric or diesel as a supplement. Even if the two main propulsion options have now been agreed, the same cannot be said for the equipment that is to be used.

One example of this is the choice of the gas turbine. 2 of the 3 partners, Great Britain and Italy, have gas turbine manufacturers in their respective countries and as a result have a wealth of experience of these machines already in service. Hence, making logical decisions that are clearly marked by national interest can give rise to different points of views when it comes to making such decisions.

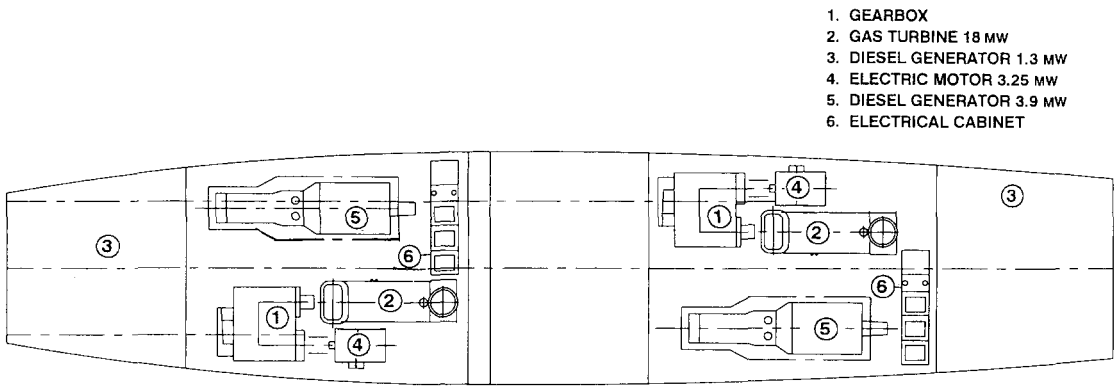

FIG. 6—OPTION CODLAG

On examining the Combined Diesel Electric and Gas (CODLAG) design (FIG. 6), which is associated with a 18MW gas turbine and an electric motor that can generate 3.25MW per shaft. 3 means of converting from high to low voltage were offered:

(*a*) Static converter proposed by France.

(*b*) A diesel tandem-generator proposed by the UK.

(*c*) A transformer proposed by Italy.

It can be seen that in terms of planning or fitting out electrical systems, (costs and feasibility alike), each solution will have its drawbacks and advantages. The difficulty lies in quantifying the risks associated with each solution. Each nation will identify the same risks , but will assess them differently.

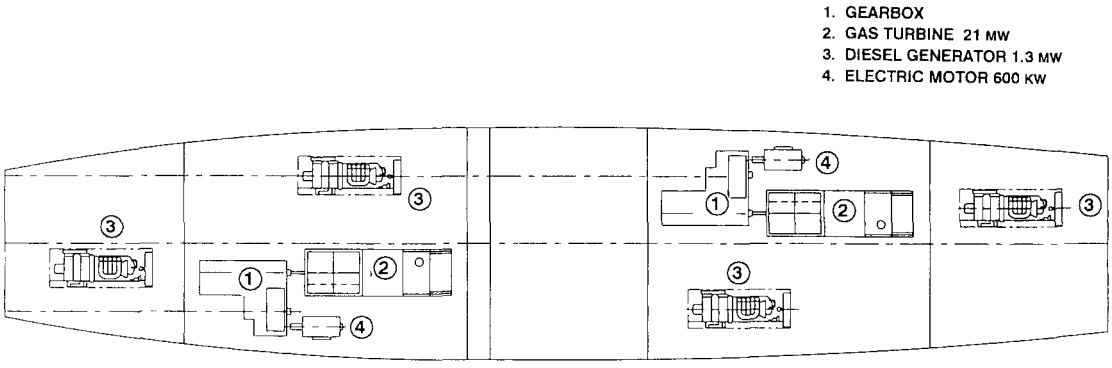

FIG. 7—OPTION CODLOG

Another propulsion design accepted by the 3 parties, also gives rise to interpretation and discussion. This option is the Combined Diesel Electric or Gas (CODLOG) (FIG. 7). Designed with a 21MW Inter-Cooled Regenerative gas turbines and 0.6MW electric motors and equipped initially, at the preliminary stage, with a fixed blade propeller connected to a reversible hydraulic coupling. Another option would use a controllable pitch propeller. This has its advantages, but one of the parties involved had experienced problems with such a design in the past. Whereas the other 2 parties liked the idea, as it offered greater competition.

Further difficulties are encountered during the building of the frigates in each country. For example, whether or not to use a raft for mounting the main machinery. In fact, as the result of a pilot study it is difficult to justify such a piece of equipment on economic grounds, when all the profits are based at the production level and hence are the responsibility of the manufacturer who is not actually part of the discussions that are in progress.

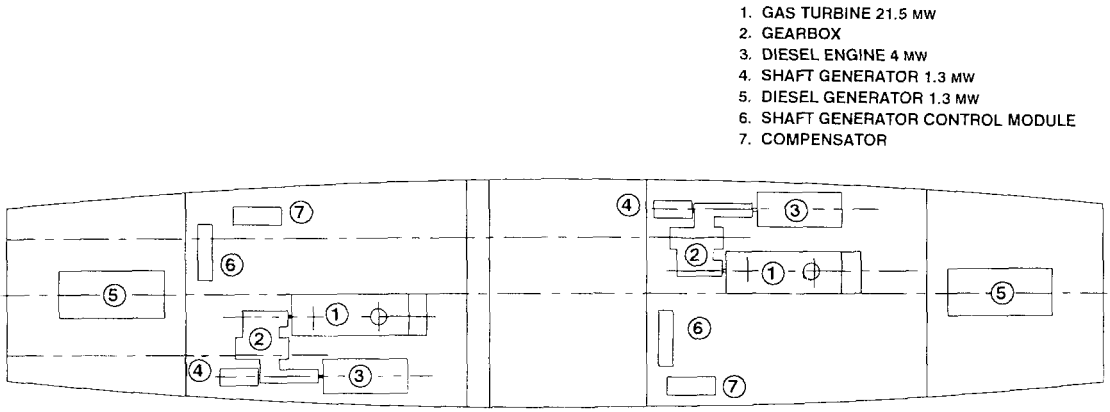

FIG. 8—OPTION CODOG

This quick overview would not be complete without mentioning the Combined Diesel or Gas (CODOG) option (FIG. 8), with its 21.5MW gas turbine and a 4MW diesel engine and is CODLAG's competitor. This proposal is backed by Italy and is meant to be cost effective as it reduces running costs. By connecting up a shaft driven alternator to the main gearbox there is an increase equivalent to 2 diesel alternators and also removes the need for a high voltage generator.

It is evident from these examples that even with an identified process—here the propulsion system—can give rise to a multitude of different interpretations and solutions. These will depend on each nation's:

- Own experiences.
- Existing logistics.
- Potential national manufacturers.
- Technical conservatism.

Conclusion

It is essential to realise that collaboration is the only way for governments to equip with a weapon that is as complex as a modern warship. The way that defence and naval chiefs have given it their backing shows this very clearly. Despite everything, their commitment can be often thwarted by the technical environment, national customs and conflicting interests. It is clear that, on a technical level, collaboration must be synonymous with compromise as well as with sharing costs and work. But it can also, or **must**, be an exceptional opportunity to compare solutions, methodologies, practical experiences etc., as well as being a means of enrichment and way to profit from the best elements of each nation.

Some obstacles may be easily detected:

- National practices.
- Industrial potentials and strategies.
- Technical specifications.
- Traditions.
- Habits.

Others may be more difficult to identify and control:

- Language.

- Work practices.
- Project management.
- Tackling and solving problems.

The HORIZON programme is a complete collaboration and for this very reason it represents an ambitious project since it has chosen the most hazardous route. Nevertheless, it is also the most advantageous route in terms of technical and economical solutions. On this subject, it seems appropriate to emphasise the fact that the greatest savings are not only made during the definition and construction stages of the programme, but also in logistic support and optimum use of test facilities.

Creating a JPO which is totally integrated and where common interest prevails is a rare aid, moreover an indispensable tool needed to overcome fundamental difficulties that any international collaboration may encounter.