

IS THERE A MAINTENANCE POLICY?

BY

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In recent editions of the *Naval Electrical Review* there has been a running discussion arising out of an article entitled 'Somewhere Someone Wants a Letter', written by CREA E. A. Marsh (*Naval Electrical Review*, Vol. 24, No. 2, et seq). At the point of origin of this discussion, CREA Marsh seemed to be suggesting that the present system of maintenance in the E2 form depends to a large extent for its pertinency on an effective feedback loop containing recent information from the equipment/maintainer interface via the medium of Forms S.2021. The discussion that has developed from this article is becoming acrimonious; regrettably the nature of the ensuing discussion would seem to indicate that, in general, there is little Fleet-wide understanding of the philosophy, principles and policies of maintenance. In particular there seems to be a negative attitude towards the provision of feedback from the points of origin of much vital data.

Having then implied that the philosophy, principles and policies of maintenance exist and are capable of being misunderstood, it follows that a problem exists which appears to stem from a lack of communication and inadequate

dissemination of the components of such knowledge within the Service. Philosophy, principles and policies alike should be clearly defined and fully understood by all persons involved with the maintenance system, from the specification originators, through the designers to the resource providers, maintainers and operators. Each should be fully aware of the rules and the nature of the game which is being played. What then is the philosophy, the definition of purpose on which the design, provision and maintenance of machinery, systems and their associated spare gear are based? It would surely be reasonable to expect that somewhere there would be a design specification for the Navy's total maintenance system, a crystallization of philosophy and principles which could contain such statements as:

- (a) 'It is a principle that in time of peace it is mandatory to carry out all servicing and maintenance items listed in the Planned Maintenance Schedule for machinery and equipments fitted, in order to ensure that units of the Fleet are maintained at the highest possible state of readiness for operational use in time of war or such lesser state of conflict which may from time to time exist as the logical outcome of Government policy. The particular maintenance policy developed from this principle should ensure that adequate opportunities are created for use of the machinery and equipments in the training role in order that the operators may develop and then maintain the necessary skills at defined and predetermined levels of performance.'
- (b) 'It is a principle that the total servicing and maintenance of all naval machinery and equipments shall be capable of being carried out within the envelope of manpower, facilities, skills and other resources budgeted for the Royal Navy, the Royal Dockyards and other associated Ministry of Defence establishments. The policies developed from this principle should define the areas of authority and responsibility of participant components of the overall servicing/maintenance system and ensure as far as possible an equitable distribution of work between them.'
- (c) 'It is a principle that all machinery and equipments procured for Naval Service shall have been designed taking into account:
 - (i) The principles of ergonomics;
 - (ii) The need to have adequate, timely and continuing supply backing;
 - (iii) The need to limit numbers of men required for ship-borne billets;
 - (iv) The need to carry out servicing and maintenance operations at the environmental extremes likely to be experienced during the operational life of the ship in which it is intended to instal the machinery and equipment;
 - (v) The manpower skills, facilities, tools, test equipments and other resources likely to be available during the operational life of the ship in which it is intended to instal the machinery and equipment.'

Given that principles such as those above could be derived from a philosophical consideration of maintenance and then set out in meaningful form, it follows that coherent policies could be evolved to give practical day-to-day substance to the conduct of maintenance throughout the Naval Service. Thus from an examination of the principle underlying the need to limit the numbers of men required for ship-borne billets, it could be deduced that the current policy in some areas of maintenance becomes one of repair by replacement; alternatively in some other area the policy could be to invest in equipment reliability which would of course have an effect on a maintainability policy, assuming the existence of such a policy.

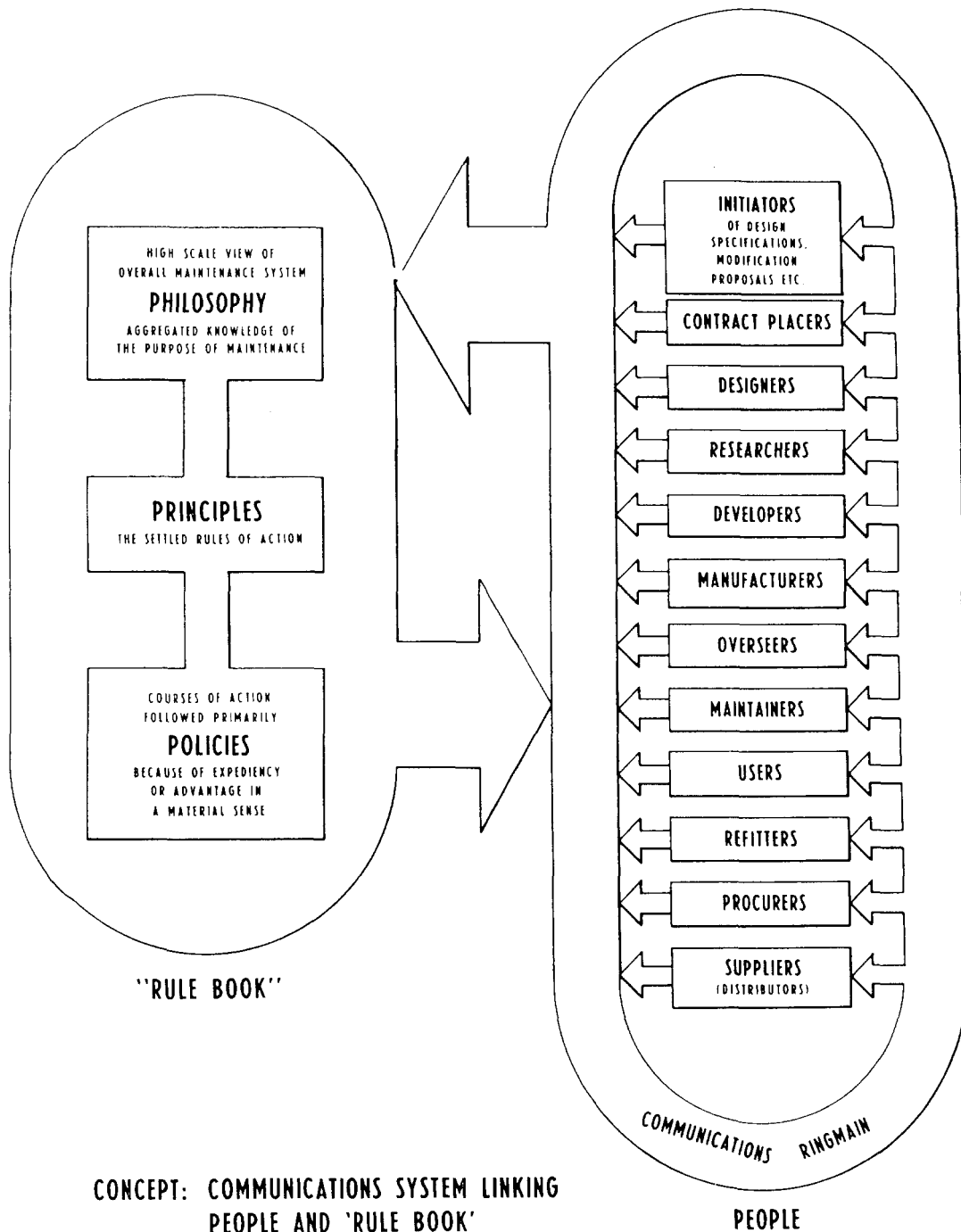
Regrettably there is little evidence of such clarity of purpose, of the existence

of any structure of philosophy, principles or policies relevant to an overall concept of maintenance within the Service other than the odd policy statements which appear from time to time in Defence Council Instructions. Even where such policy statements exist they frequently appear to be directed at only one sector of the population, say, the maintainers; in parallel with this implied problem the policy statements, where published, frequently and without apparent reason seem to conflict one with another and therefore hint at a lack of cohesion. This, perhaps inevitably, leads to an overall lack of credibility in top management and the system alike. This in turn becomes a reason for people not wishing to co-operate with top management and the overall maintenance system; hence there is a lack of motivation to contribute to the necessary communications in the form of Forms S.2021 and S.2022. It is therefore suggested that the lack of a widely promulgated Philosophy—Principle—Policy statement inclines people, particularly those in the Fleet, to imagine that their views and opinions are of no interest. The concept of a communication system linking the people thought to be involved and the 'rule book' is illustrated in FIG. 1.

From the discussion being conducted in the *Naval Electrical Review* it is clear that some people have opted out of any positive contribution to the development of the overall maintenance system. There is evidence of a passive willingness to provide information so long as its collection is the responsibility of others. This reinforces the suggestion made earlier that there is a lack of motivation to contribute to communications. It is also inferred from this attitude that there is little understanding of the vital need for feedback of information. This is most surprising when it is seen that these attitudes are held by people whose technical employment involves them in work on equipments and systems all of which have built-in feedback without which the system could not function. A real understanding of feedback would surely incline such people to acceptance of the principle that data can only be captured at source, as close as possible in terms of time and space to the point of origin. Combination of this with the principles that elements of data should only be recorded once and that the value of data is greatest when it is recent and pertinent therefore highlights the fallacy of the suggestion that teams of people should be sent out periodically on data-collecting forays. It is part and parcel of the routine task of everyone to capture, record and transmit such data as may be required for the continuing development of the overall fleet maintenance system.

It is therefore deduced that another aspect of the problem is that many of the people involved are unaware of the need for information feedback, which suggests that there is a general lack of education on this subject. So it can be seen that the existence of this aspect of the problem reflects back on the Training Establishments.

It is assumed that some notice is being taken of this overall discussion and it is hoped that some action will be taken by someone to bring about a situation where there will be a wider appreciation of the maintenance philosophy, principles and policies and a marked improvement in the general climate. This would encourage people positively to participate to a much greater extent in the system. When this happens there should be a greater flow of information into the communications ringmain. If the maximum benefits are to be wrested from this improved situation it will be necessary for the Service to have an information system capable of receiving, collating and disseminating the information to all interested parties in a systematic and timely manner. It is suggested that it will be essential that the information gatherers are themselves informed as to the uses to which their information is put. When this state of affairs is brought about it should become evident to, say, the E2 planners on board that someone, somewhere cares about their problems and moreover is prepared to do something and be seen to be doing something about those

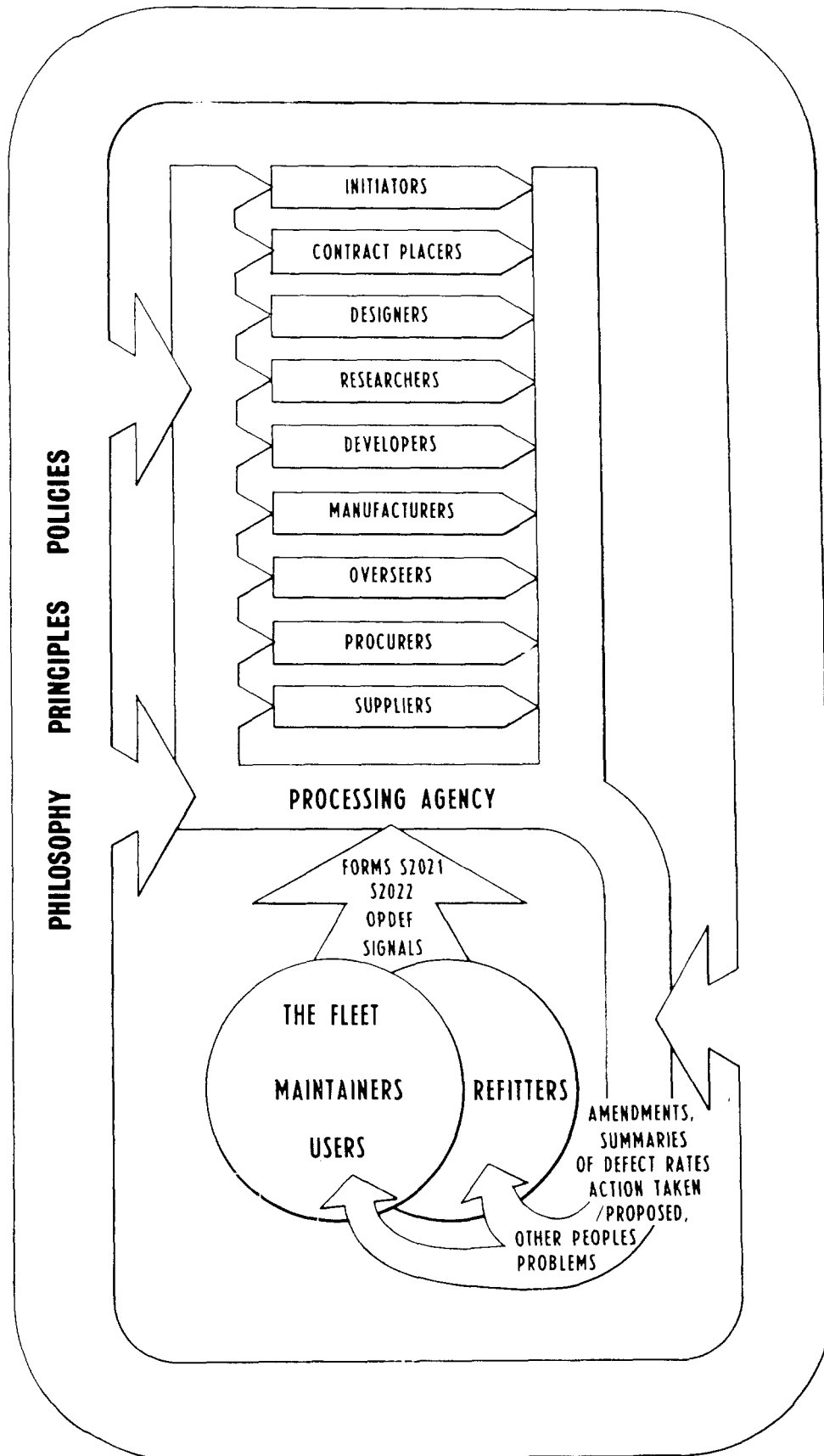


CONCEPT: COMMUNICATIONS SYSTEM LINKING
PEOPLE AND 'RULE BOOK'

FIG. 1

problems. It may then be that the Chief Petty Officer in the ship will appreciate that the half-hour of work that he delegates to a subordinate to amend the Planned Maintenance Schedule is in fact eliminating some 40 or 50 man-hours of work each month from his departmental task. The manner in which the communications concept could be developed is illustrated in FIG. 2.

It will be seen that the wheel of this discussion has now turned full circle. CREA Marsh started it turning with a plea for a greater volume of communications from the water front in order to arrive at a better planned maintenance schedule; better mainly in the areas of manpower and resource allocation. He attempted to show people how they themselves could contribute to the improvements thought to be needed and in so doing stirred up a hornet's nest because



DEVELOPMENT OF THE COMMUNICATIONS CONCEPT

FIG. 2

the people with whom he was attempting to communicate appear to want not to be involved. The arguments for involving these and all other people associated with the overall maintenance system have been developed earlier in this article. CREA Marsh was also hinting that the Planned Maintenance Schedules, a sub-system of the overall maintenance system, leave much to be desired in their context, format and general lack of relevance to the on-board maintenance situation. This possibility he began to appreciate through his employment in the Naval Manpower Utilization Unit.

In the course of carrying out part of the task of the NMUU, considerable use is being made of Servicing and Maintenance Schedules as a means of identifying some of the tasks necessary to achieve improved performance capabilities in *Leander* Class frigates. Each of the tasks so identified is then studied for the purpose of establishing standard methods, determining tool, test equipment and spares requirements, assessing skill levels and time factors, and identifying safety precautions and possible job constraints. All of this information is then written up in Job Information Card format; some 1100 of these Job Information Cards have already been provided in H.M. Ships *Scylla*, *Naiad*, *Argonaut*, *Danae*, *Arethusa*, *Achilles*, *Phoebe*, *Diomedes* and *Cleopatra* for use in the E2 system. The very fact that NMUU have this task is an indication of the intention to modify the traditional maintenance philosophy which has in turn brought about changes in principles and policies. Whereas in the past the maintenance system has been concerned with *what* should be done and *when* it should be done, this modification broadens and deepens the communication stream to accommodate *how* it should be done and *who* should do it.

This change of philosophy in turn has side effects to an extent that it would now seem to be a principle that greater attention is to be paid to planning/controlling work and the allocation of manpower and other resources. From this it has become a matter of policy to provide further information to management and workers alike as an integral part of the E2 system of Job Information Cards under the following headings:—

- Planned Maintenance Schedule No. and Item No.
- Maintenance Operation No. (not yet being used)
- Equipment Title
- Related Maintenance
- Relevant Handbooks
- Job Description
- Skill Required
- Numbers of Men Required
- Time Needed to Carry Out Task
- Safety Precautions
- Stores and Spares
- Tools and Facilities
- Additional Handbooks/BR References/Drawings
- Survey Criteria
- Setting-To-Work and Test Data
- Other (Managerial and Planning) Information
- Job Method.

Having thus reacted in one area to a modification of the albeit poorly expressed maintenance philosophy, if it is now intended that on-board management, manpower allocation/utilization and resource allocation/utilization are

to be improved, it becomes apparent after detailed examination of the present maintenance system that the Service is poorly served by the type of Planned Maintenance Schedule at present in use. For the purposes of planning and control, effective resource/manpower allocation and utilization, it is necessary to have knowledge of the following characteristics of the tasks or operations:—

- (a) Work content
- (b) Grade of manpower to be employed
- (c) Frequency of carrying out the operation.

The determination of the work content and assessment of grade of manpower are within the capacities and capabilities of people trained in work-study; information of this nature is currently being provided to certain areas of the Fleet on Job Information Cards, as already mentioned. The determination of the frequency of carrying out the tasks presents some difficulties since only part of the maintainers' work load is covered in the Planned Maintenance Schedules and some of what is specified is an unhappy mixture of prevention and cure; this is perhaps the result of an inadequate statement of principles and policies. Thus, the planning and control of work become difficult due to the lack of facts about the overall maintenance requirement.

When considering the frequency of carrying out the maintenance tasks it would seem that this characteristic could be broken down into the following factors:—

- (a) Preventive servicing
- (b) Corrective actions revealed by carrying out preventive servicing
- (c) Preventive maintenance
- (d) Corrective actions revealed by carrying out preventive maintenance
- (e) Corrective actions arising from failures, malfunctions or other defects, i.e.
 - (i) Breakdown maintenance, where there is some pattern of previous failures, etc.
 - (ii) Emergency maintenance, where there is no evidence of previous failures, etc.

From the above factors it can be seen that manpower requirements for preventive servicing and maintenance tasks could be calculated as they are directly proportional to the frequency at which the tasks are carried out. Man-hours could be calculated for each anticipated occurrence of corrective actions revealed by carrying out preventive servicing or maintenance but it would not necessarily be known how often the preventive actions would give rise to their respective corrective actions. Similarly, man-hours could be calculated for breakdown maintenance tasks although, again, it would not be known with any certainty how often they would occur. It can thus be seen that for managerial purposes, tasks could be scheduled as follows:—

- (a) Known tasks: where frequency, method, work content, grade of manpower, and resources have been established, i.e., preventive servicing and preventive maintenance.
- (b) Variable tasks: where the factors in (a) have been established but the frequency is variable, i.e., corrective servicing, corrective maintenance and breakdown maintenance.
- (c) Unknown tasks: where frequency, method, work content, grade of manpower and resources have not been established, i.e., emergency maintenance.

Given that the tasks were scheduled as above, it would be comparatively

PLANNED MAINTENANCE SCHEDULE STRUCTURE

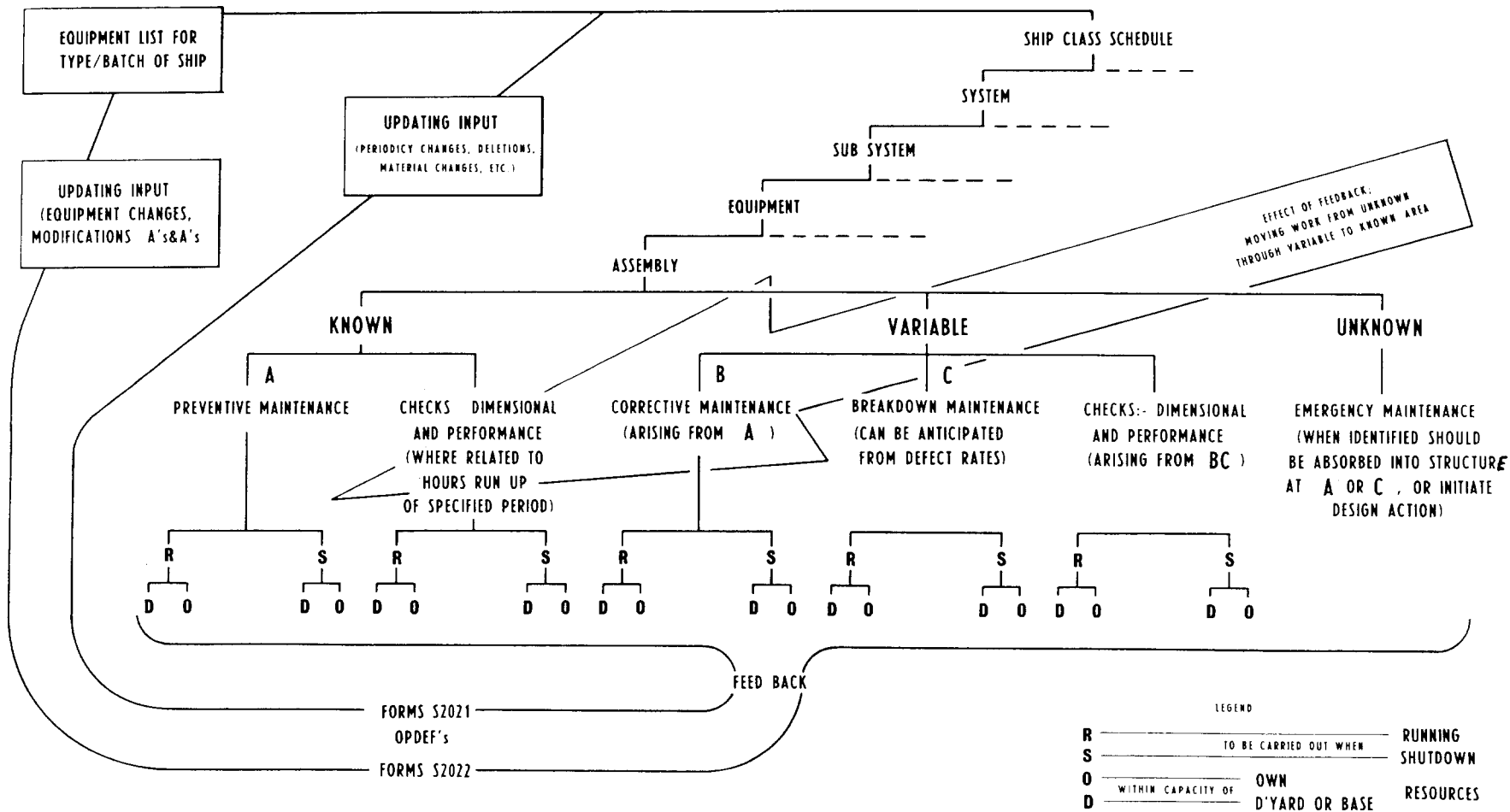


FIG. 3

simple for ships' managers to calculate manpower costs for the known tasks. The manpower costs for the variable tasks could be derived if information was available in the communications ringmain as to the probable incidence of corrective servicing, corrective maintenance and breakdown maintenance tasks. The remaining manpower costs, i.e., for the unknown tasks, are dependent on the establishment of ratios of manpower costs, known: variable: unknown, and making this readily available in the communications ringmain via the Data Processing Agency. These ratios could possibly be established by collation and analysis of the man-hours data already recorded on Maintenance Record Cards and Job Cards. Alternatively, they could be established by analysis of the outputs of a manpower accounting system, where such is installed and operating.

In the apparent absence of a detailed policy regarding maintenance schedules it is not at present possible to interpret the schedules in such a way that they can be used as a useful managerial tool in terms of manpower costs, manpower allocation and manpower utilization; it is not always possible for users to distinguish between the preventive (known) and corrective (variable) elements of a task, as in some cases both elements are combined in one servicing or maintenance item. If it is accepted that manpower is an integral part of the overall maintenance system, it can be seen that the maintenance philosophy has not yet been restated to take cognizance of this fact. It should surely be a principle that Planned Maintenance Schedules be written to some predetermined format taking into account the demands of, and on, machines and systems and the necessity to make effective use of manpower. A suggested blue print for a manager's maintenance schedule is shown in FIG. 3.

If it is correct to assume that the Royal Navy requires ships at sea to be capable of functioning at defined operational levels and serviced/maintained with the minimum numbers of men, then this could be expressed as a principle to be made known to all those concerned with the maintenance system. It would then be clear to everyone that the aim is to make use of the communications ringmain information to bring about frequent reviews of the Planned Maintenance Schedule together with timely modification action for the purpose of improving material reliability/availability and containing demands on manpower. This would be achieved by speedy identification of the 'unknowns' which, through schedule review and modification action would be moved through the 'variable' into the 'known' area, preferably to the point where the only requirement would be for servicing to be carried out within a dockyard without the need to shut down machines or systems. If such a situation could be brought about, ships need only be manned with sufficient people to operate the machines/systems and look after the people on board. Such a situation could only be brought about with the willing co-operation of all those concerned with the overall maintenance system. It must also be appreciated that maintenance schedules are not sacrosanct and unchangeable; they should reflect the many factors which should be the concern of the overall, essentially fluid maintenance system, e.g., equipment age, utilization rates, defect rates, maintenance philosophy and principles, current policies, manpower requirements and influences, etc.

This article is not aimed at any particular individual or any group of individuals. Its aim is to stimulate some thought and action by all those involved with the development, installation, maintenance and operation of the overall system of maintenance which could put an end to the hitherto internecine us/them squabbles. Let us have timely and adequate communication. Let us show ourselves to be all of one company. In this way we could introduce some clarity of purpose into our every-day affairs. Then and only then can we move away from the situation where people plead to be given some defect rectification tasks rather than dull, boring maintenance.