AIRSPACE CONTROL DIVISION FOR THE NINETIES

(AIRSPACE CONTROL DIVISION RE-ORGANISATION)

INTRODUCTION

The current situation has swung the management emphasis at every level much too strongly into a monetary one, making 'savings' and 'profits' a paperwork exercise - 'a game of monopoly'. The emphasis should actually be on engineering the systems and products which customers need and will buy.

We have weakened those vital links between Engineering and Marketing, i.e. engineers have not been spending enough time in meaningful dialogue with Sales and Marketing, hence there has been a progressive weakening of this other key function of the company. Within Engineering itself there has been an increasing tendency in recent years towards the role of 'professional manager' whose own thinking takes on the character of a book-keeper rather than a planner, inspirer and designer of effective modern engineering.

Because engineering as such - good engineering - has stopped being the focus of attention, it has created a condition of despondency, boredom and general lack of motivation and drive, which is fairly general, but particularly evident in the lower echelons. This in turn leads to unnecessary and costly errors, a general slackening of approach, a loss of personal identity with Radar Systems and Products and with the Company. Work therefore takes longer than it need take and contains a disproportionate amount of false starts, re-work and wasted material and effort.

Most tragically, thinking is not engaged in (except in small isolated pockets) anywhere with anything like the commitment, intensity and effectiveness that is needed to ensure technological pre-eminence and significant profit. This means that a most impressive body of corporate talent and experience is being wasted and allowed to run down, both in its internal activities and also in the great network of contacts that it should be keeping active and healthy across the universities, research establishments, the armed forces, civil aviation authorities and all potential and actual competitors and customers worldwide.

Apart from engaging in the 'game of monopoly' hardly anyone is currently held personally responsible and accountable for his/her thought and action. Personal initiative is not being actively encouraged - just the reverse - whether in Engineering, Drawing Offices or Production. As a result there is a tendency to try to move everything remotely with paperwork rather than by immediate personal contact, causing a yet further slackening and withdrawal of interest and of genuine labour.

In this situation people soon stop trying to take corrective action because they sense (perhaps wrongly) that their comments and observations will be filtered out before they get sufficiently high in the management hierarchy for them to be noted and acted upon. The distance upwards which such messages may need to travel can appear 'never-ending' because of the unusually large number of levels in the management hierarchy. "No matter how many times I get promoted - I never seem any nearer the top of the pyramid".

Yet even so, there still exists a very good natured community in which most individuals have knowledge of and respect for the real talents and capabilities of their colleagues across the Division. They continue in good-humoured anticipation of a change of operating policy and methods, in the belief that when it comes the core capability will still be largely intact (a few of the best people have left).

The fact that most people could describe to me in considerable detail the real strengths of key people across engineering - with lots of supporting evidence from past projects - means a lot; and is most important.

It is my deeply considered view that a reduction of 30% in the time needed to produce almost any Radar System, large or small, is not an unreasonable target to aim for, with the huge cost reduction and competitive advantage that this could bring. But if it is to happen - and quickly - there would seem to be only one course available to ring the changes, namely a re-focusing of engineering and a major and dramatic strengthening of both the 'image' and the reality of engineering thinking and practice.

Provided that this is done - honestly and painstakingly - then it will be quite an easy matter to increase discipline across the site. Discipline is too lax and everyone knows that it is. We need to link this change with a whole-hearted strengthening of engineering thinking and practice such as I have outlined and will discuss in detail below.

The changes which I am recommending start by consolidating into a single Airspace Control Division. After that it is some of the 'rules of the game' that need to be changed rather than the people. With these changes will come the realignment of attitudes, insights and actions to what the marketplace actually needs. It should be noted that once a system becomes self-defeating it will defeat anyone and everyone. Then there is only one possible cause of action that will succeed, namely changing the system rather than tampering with it. So this is what I propose.

The New Management System

I propose the following as a means of injecting a new sense of identity, purpose, urgency, drive and enthusiasm - and in order to produce the 30% time reduction.

1. **Overall technical leadership.** Exploit to the full product oriented review meetings with engineers. It is crucial that the Department Manager shall remain visible and do everything in his power to help set the new vision, attitude and orientation.

2. **Top Level Implementation of Policy and Strategy.** Create a high level Systems Engineering Department for the whole of the Division to integrate the engineering, hardware and software of all departments meaningfully. This post must also have personal visibility and obvious engineering orientation as its principal criteria. It must give genuine engineering leadership of the kind which engineers admire and are happy to follow. With these twin criteria firmly established there will be no difficulty in it setting a very severe and demanding discipline on the total engineering effort.

3. **Market Intelligence.** Create a 'Centre of Intelligence' reporting into the Sales and Marketing Department which is to be the 'advance scout' for spotting significant movements in both civil and military thinking. This needs to be focused through one mind and requires a person who already has a high degree of acceptance both internally and externally. This centre of Market Intelligence will form a major element of the new Product Planning activity.

4. **Product Planning.** We have already started an in-depth study of the marketing/engineering interface with a particular emphasis on Marketing and Product Planning, as distinct from Sales - but also embracing the current procedures and practices for processing, accepting and/or rejecting bids. Many of the discussions tended to suggest that major improvements can and should be made in this area on both sides of this interface. A very heavy load is placed on Engineering working on bids that do not materialise. Much of the contact with very important potential customers seems much too remote and possibly ought to involve engineers more fully.

With hindsight it appears that several projects that have had most costly delays and produced very little profit for the Company could, should, have been handled differently and processed through a more intelligent and rigorously critical series of tests, checks and questions. On the one hand there is the need to protect Engineering from having to spend any unnecessary time themselves on Marketing and Sales work, whilst on the other hand it has proved all too easy for Engineering to find itself lumbered with contractual requirements which ought to have been avoided at all costs. It is this whole mechanism of selection and rejection which needs very careful study and a tightening of the procedure, together with the early stages of specification-drafting, finalising and agreeing through to detailed engineering specifications; with very strong sub-routines to ensure that everyone understands clearly what the words mean, and what the implications and consequences are likely to be in new problems, very costly and time consuming component developments and/or procurement - and the extent to which modular and standard proven systems and sub-systems can be deployed.

But quite apart from procedures and mechanisms for working together at this interface, it is very clear that Marketing and engineers need to find new and better ways of working together at a personal level so that there is less chance of any costly communications breakdown, and so that the special knowledge that each has rubs off more fully on to the other. Many of the Sales and Marketing people have themselves a good background in Radar Engineering, but in order to keep a finger on the pulse of the current Engineering problems and the real possibilities for technological advance that could be highly competitive it may well prove expedient for a series of product seminars to be held to keep the Sales and Marketing team up-to-date on technology whilst educating the engineers on the market requirement.

I have gained a very strong impression that many of the moves towards sensible degrees of standardisation, the formulating of proposals that would move the initiative for making profitable sales to MRSL (instead of trying to respond to enquiries or follow the lead of competitors), and for getting the Division designing and producing Radar systems which more closely suit its own character and total technological resource, need, (both individually and jointly) a more regular and intimate contact of Engineers and Marketing people and that the insights that will make it all possible - and highly profitable - will not gell unless and until this meeting of minds becomes firmly established.

5. **Systems Engineering.** It is intended to strengthen the Systems Engineering group by persons of the highest calibre. The especially demanding nature of this work requires that there shall be a second-in-command with very high mathematical and creative capabilities and that the entire team shall be second to none. This will provide the major boost to getting total Radar Systems engineered correctly at their most fundamental levels. It can and should be a 'Techniques Group' that parallels those for Signal Processing Techniques, Antenna and Microwave techniques and Transmitters and Power Systems. But it should also be the principal 'think tank' and have a regular infeed from Item 3. (Apart from this communications channel, Items 3 and 5 should be kept quite separate functions if each is to be at its most effective).

In addition the Systems Group will undertake to ensure that contracted subsystems and component reliability are met, and with overseeing and overcoming the many practical engineering problems of causing subsystems and components to interface adequately and correctly - a principal cause of very costly and embarrassing delays. This group will require engineers whose talents are both 'state of the art' theoretical and practical. Their effectiveness and worth will be judged primarily on the number and seriousness of engineering problems which they anticipate and avoid rather than on curative and corrective engineering.

6. **Major overall Project Management.** It is intended to substantially strengthen the Project Management function to ensure a much stronger influence across the whole of the Division for every project. This unit does not need to be large but it will have authority, being the principal agent for controlling and monitoring the behaviour of all Project Leaders. It will co-ordinate all project activities across the Division reporting directly to the Director. Whilst being the principal agent for ensuring productivity, timeliness and cost effectiveness it should have the equally important secondary function of relieving engineers of the major administrative burden of such matters.

The emphasis will be on providing a high standard of professional time/cost management, arranged in such a way that this function removes much of the top managerial burden and conflict from those whose first concern is to produce the most satisfactory technological breakthroughs and engineering details.

This reconstituted unit will be the principal tool which the Director has at his disposal to control the interfaces between all departments across the site and ensure that the gross margin is protected by maximising productivity.

7. **Project Teams for the Various Product Areas.** Engineering Project Teams will be strengthened in several ways. The Engineering Project Leader and the most crucial nucleus of his dedicated team shall continue to have responsibility for the development in his area right through design the cycle, and that they shall not be pulled out of this work until the task is completed to the agreed specification, of both functionality and reliability.

Externally the Engineering Project Leader will be aided, guided, monitored and sensibly pressurised on a day to day basis by the new Project Management function described above.

The Engineering Project Leader will now always be an Engineer first and foremost. By allowing the Finance Department representative to undertake the administrative/managerial services, a lot of additional attention can be given to getting the engineering right, and keeping it developing correctly thus overcoming one of the biggest causes of time delay and wasted money.

8. **Laboratory.** The laboratory area needs tidying up and a lot of the old and surplus equipment should be scrapped. In addition the "tasteless" pictures adorning the area have to be removed. I wish to take customers into the laboratory in future.

I have received many good proposals for how to make the laboratory truly modern, convenient and cost-effective. Everyone favours an arrangement whereby the labs and their principal users are housed in the one locality i.e. with desks very close to experiments: both for convenience of working and to improve both the discipline and the actual useage of the laboratory areas - which currently are far from satisfactory.

To further the improvement of the working discipline within these laboratories, it will be essential that the keeping of records by each engineer of all of the logic and other foundation content of their thinking is undertaken. This exceedingly severe intellectual discipline has the further advantages of both helping to train the mind and extend its range of achievements, and also making it very easy for other minds to pick up and interface with the thinking at any stage - even years afterwards where work was shelved for a period or suddenly needed again to be extended.

At the purely personal level what is needed is a proven ability (hopefully quickly proven) to work logically and with utmost care; an ability which is not necessarily encouraged and developed within universities and other educational establishments and which life itself does not cultivate in a modern highly protected society. In other words, we need to concentrate on the X factor that turns the gifted amateur into the outstanding professional - in order to reap all of the benefits of so doing. Such a trained mind can deduce problems and obstacles before they actually happen, is able to project and control imagination to a very high degree of proficiency, and to be totally honest in recognising and reporting the actual situation at any time.

The entire design and development process needs to be disciplined to quite a new order of self-monitoring and awareness such that a corresponding new order of simplicity can emerge as the end result.

Such a programme should include the picking up of the discarded Value Engineering Programme and making this work too. It should ensure that non-glamorous measures such as standardisation, rationalisation and efficient materials utilisation all become part of a new way of life.

9. **Drawing Office.** The newly constituted Drawing Office comprising all three units and the role of CAD will be closely monitored. A totally rationalised form of functional drawing and allied instructions for simplifying and improving the entire communications with the production unit, and with sub-contractors is required.

There is also a pressing need to rethink the role of the draughtsman and to maximise the integration of Draughtsman, Industrial Engineers and some of the Production Control people. Finding a new and proper identity for the draughtsman in modern high-technology industry is a very important problem; one on which we are currently working. It is imperative that their pride in their work is restored - quite properly - to the level which it enjoyed traditionally but with a different, and in some respects wider, span of responsibilities.

Computer Aided Design needs to be better integrated into the reconstituted drafting function and a determined effort is to be made to make new meaningful relationships with other functions and individuals from development engineer to workshop personnel.

10. **Strengthening Division Procedures.** Time delays due to incompatibilities - and possibly nonsenses - in some of the procedures (or ways in which they are interpreted) - will best be overcome by making one person accountable for so doing, i.e. one man to whom everyone could address their complaints. This would be the most effective and least costly way of stopping the recurrence of problems that currently repeat dozens or hundreds of times. There is no point in having the same quarrels and arguments over and over again; we need to break the ever recurring cycle. But it is better to treat this as a system tuning exercise - and an exercise in education for common sense, rather than trying to replace whole systems and routines connected with purchasing, ordering, modifications, etc.

This kind of 'tuning' can be operated progressively across all key areas of work, but does need some specialist help to move it successfully and energetically. It would certainly pay off in terms of time, cost and technology and should be central to the first year's improvement programme: starting with some of the most critically poised projects. It is proposed to appoint Mr. Beckett to undertake this urgent and important task.

11. **Design and Development Process.** The design and development process for Radar systems, subsystems and components needs to be strengthened - not only to reduce time scales but also to increase the certainty of producing satisfactory engineering that is cost effective and highly reliable.

Some of the key points that require attention have been outlined in connection with the proposals for the new Systems engineering function. Training at all levels in all the Groups, Project Teams, Laboratory, Drawing Office etc. is required and strengthening of Divisional Procedures is overdue. But the two most pertinent sections are those dealing with Product Planning and overall Project Management.

The first and primary duty of the new Overall Project Management function and the engineering and marketing people working on improved Product and Contract Planning, would be to formulate a design and development process that would avoid the pitfalls of the past, with particular emphasis on new procedures, to ensure that serious problems will be sensed and signalled up in plenty of time to either avoid them or prepare to deal with them effectively. The motto must be "No surprises".

The process must hold to a central criteria of visible interest in key engineering details, overcoming the current tendency for the engineering problems to be buried until they actually erupt.

The process must also contain within its own guiding mechanisms and code of practice the actual means whereby things people hope for now become a definite requirement. i.e. phrases such as "stop re-inventing the wheel" and "keep it simple" have to be turned into specific tests, requirements and constraints on action. i.e. the essence of the HOW has to be fed into the process as a definite operating mechanism that becomes mandatory - similarly with tools for ensuring cost effectiveness which were thrown out of an earlier Value Engineering programme because they were injected at the wrong point and then left merely to individuals' discretion.

The packaging of work for planning and control monitoring also needs to be handled differently to the current method. It can still be based on the PERT type of programme currently used but the milestones should have a much fuller physical meaning, so that it is quite obvious what people are steering towards and when they have actually achieved crucial points in the process.

12. **Modification Control**. The modification procedure is grossly misused without any sense of guilt, shame or unprofessionalism.

Everyone says that it is a matter of expediency to move quickly and then keep modifying, following a 'suck it and see' and 'evolutionary' approach. What is rarely said and stressed is "Get it right first time". With the new emphasis outlined above, together with the investment in computer aided design for mechanical, electronic and software engineers, this should become the norm.

Even the paperwork to introduce and control one change can be exceedingly costly. But far more devastating is the effect in causing queues and bottlenecks within the drawing offices, parts lists, computer records, production units, test, technical handbooks, etc.

It should be a matter of personal and team pride as to what engineering does go forward satisfactorily without modification - and this will be a key measure of the true stature and capability of people. I realise that this is a controversial issue since sometimes the apparent need for modifications is a function of the complexity, the novelty and distance beyond the proven and familiar, but none-the-less if we can recognise and train people to be more mentally proficient it should be possible to get it right first time in all but a few isolated cases.

13. **Career Structure**. The above proposals provide a valuable opportunity for reviewing and improving the arrangements for sensible progression and promotion of personnel - including the opportunity for finally obtaining very high level appointments that are centrally oriented, rather than a more generalised man-management or resource management slot. But obviously not everyone measures up to such a demanding specification, and in the main people have not been measured re their capabilities, actual and latent - and re their real attainments and achievements - and their actual worth to the company.

This is a disadvantage both from the man's point of view and from the company's. The engineer often feels aggrieved because he believes that his real contribution and potential has not been noticed - that it is not 'proven' by his holding a particular office or grade.

It will become a requirement to improve communications both upwards and downwards, this is to be combined with the fact that every manager shall become highly visible to his own staff and genuinely the boss of his own department.

Everyone needs a stronger sense of identity with his own job, with workteams, with people whom he may control, with his boss and whole line of command, with the ACD business and its calculated movement into the future - and with the Marconi Company. Towards this end it is intended this year to introduce a formal appraisal scheme for all staff.

Family Trees

In order to achieve these objectives, a Department re-organisation has been undertaken. The major change is in the decision to re-group into a single division again. With the current department size the economy of scale can best be achieved by having a single organisation, allowing investment in modern design methods and technology, with an overhead structure which will not create a financial burden.

The attached Family Trees are intended to focus the Departments' efforts on the way ahead, but without everyone's support the task cannot be achieved. We have demonstrated by our success in achieving the year end target that the goal is attainable; we now need to continue this drive and to re-double our efforts in forging ahead with a revitalised Airspace Control Division.

J. V. WINSTANLEY

8.3.88/016