

PRIME MINISTER

NIMROD AEW

You noted a number of supplementary questions as you went through the Nimrod report (Flag A). The MOD have now provided answers to these (Flag B). They are not very revealing. But one thing which they do bring out more strongly than ever is that there was no shortage of monitoring. But the monitoring wasn't much use, because nobody actually did anything when deadlines slipped and target dates were missed. The overall picture is one of drift and lack of any feeling of personal accountability, none of the Defence Secretaries or Ministers of Defence Procurement concerned taking a strong grip on the problem.

Other points which emerge are:

- (i) both MOD and the company seem to have been at fault on the 'ground moving target' filter. The company failed to produce a system that worked adequately over sparsely populated land without it. But the MOD should probably have recognised the need for it from the beginning.
- (ii) the decision in 1979 to go ahead with Nimrod was taken between Mr. Pym and a (rather reluctant) Sir G. Howe. Other Ministers do not appear to have been consulted. The decision was taken even though there were recognised to be major development problems, and even though the American E3A was preferred by the military and cost no more, on grounds of industrial/employment policy and prestige!
- (iii) the August 1980 progress report was a very smug document ("the basic soundness of the programme and our ability to complete it with the CPD and within the confidential cost estimate are not in doubt").

- (iv) the decision to continue the project in April 1983 was taken on the basis of a report which revealed serious slippages, setbacks in the Avionics Programme, management difficulties at Marconi Avionics and a 24 per cent real increase in estimated costs since 1974.
- (v) it seems that payments in respect of development work were suspended at the time when you saw Mr. Levene last July and remained so, but production payments continued. — *production ? what?*

WHAT TO DO?

You need to decide what to do about the mess which has been revealed. You suggested that you might talk to Robin Nicholson. But he is already at his new job. We might show the papers to his successor - Fairclough - and get his opinion. I suppose that the basic question to put to him is: should the scale and seriousness of the technical problems have been spotted earlier?

A further possibility would be to have some more formal inquiry to find out what went wrong and draw some lessons. This could be done by a retired senior civil servant or (as Peter Warry suggests) by the Efficiency Unit. The problem is that any such inquiry would leak. And its results might cause the Government political problems: the affair does not reflect well on the Government's decision-taking or management of defence (though all three of the Defence Secretaries involved have since resigned).

The rather sparse lessons drawn in paragraph 4 of the Defence Secretary's original report could be expanded and developed into new guidelines or a management code for major projects. This could be done by someone within the Government machine but not directly associated with the more disastrous aspects of Nimrod, eg. Mr. Levene.

You may like a preliminary discussion with me, David Norgrove and Peter Warry to agree on some proposals. You might then talk to the Defence Secretary and the Chief Secretary.

Agree:

- (i) to show the papers to the new Government Scientific Adviser;
- (ii) internal discussion with No. 10 staff to decide how you want to proceed;
- (iii) meeting with Defence Secretary and Chief Secretary.

The Policy Unit have prepared a note.

CDP

*Robi 1/10s could give
the best schedule of all
no.*

C D POWELL

11 April 1986

SL3APE

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MR POWELL

11 April 1986

NIMROD AEW

The project seems to have fallen down on four counts:

1. totally unrealistic expectations of what could be achieved at the outset;
2. apparent inadequacies in the project specification even after this was meant to have been agreed in 1979;
3. contractual arrangements that rewarded delay and increased costs by providing a cost plus mark up; and
4. failure to take appropriate action when monitoring must have shown that the project was going way off course.

Investigating the failings is worthwhile because otherwise the real (as opposed to superficial) changes necessary to avoid a recurrence of NIMROD may not be identified. For example, MOD intend to appoint a single project manager for future projects: this is useful but the problem would appear not to be a lack of knowledge that things were going wrong, but a failure to take timely preventative action, or to propose the project be abandoned before more good money followed bad.

Ministers and officials duration in posts is usually shorter than the time it takes for the consequences of their actions to emerge. By conducting the occasional post-mortem people will be discouraged from seeking easy short term solutions in the hope that they will not still be in the job when the chickens come home to roost.

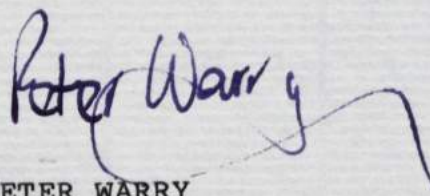
But such a post-mortem should not be a PAC-type enquiry into whether all of the i's had been dotted and all the t's

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crossed, but an investigation into whether reasonable advice was offered and sensible decisions taken. If an enquiry were held it should be strictly internal and conducted by an official from, say, the Treasury, or the Efficiency Unit. Provided it was kept low-key and was broadly part of the normal functions of the official, then any leak ought to be containable. The investigation would be to find out how and when things went wrong, and to recommend how this could be avoided in the future.

Many of the failings on the NIMROD project have already been addressed, for example contract procedures are now more commercial. But it could be worth considering two changes:

1. To avoid unrealistic projects ever being started, ad hoc panels of independent experts should be asked to advise on viability.
2. To ensure action is taken when projects encounter serious delays or cost escalation, there should be an automatic referral to MOD and Treasury Ministers if, at any stage during a large project, costs incurred or time taken exceeds more than, say, 50% of planned levels for that stage. (All large projects have critical path plans prepared identifying dates by which the individual items should be completed). Such a condition should be built into all new contracts so as to permit cancellation without compensation.



PETER WARRY

B

Previously seen 11.4.86
of Sir R. Ibbotson

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MO 26/7/3

10th April 1986

Dear Charles,

NIMROD AEW

Thank you for your letter of 5th April about the Nimrod AEW project. Here is the additional information for which you asked.

(i) 1978 proposal for 'ground moving target' filter. The 1978 GAV proposal of which a 'ground moving target' filter formed a part was made to give the MSA a full overland capability (including densely populated areas): the company were left in no doubt that this was beyond the approved Staff Requirement and that we did not wish them to proceed to provide it. The specification did, however, call for the detection of targets over water and areas overland such as the Northern Flank of NATO which are sparsely populated, and it is in order to help overcome the developed system's shortcomings on this original requirement that GAV will now have to develop the filter.

(ii) 1979 submission to Defence Secretary. I attach copies of:

a. the submission made to the Defence Secretary on 4th July 1979 by the Chief Scientific Adviser (Professor Mason);

b. the Defence Secretary's consequent letter of 6th August 1979 to the Chancellor of the Exchequer; and

c. the Chancellor of the Exchequer's reply of 7th September 1979.

Charles Powell Esq
10 Downing Street

[i.e. it was settled between Mr. Pym & Sir G. Howe without other Ministers being consulted]



- / (iii) CA's Project Review, August 1980. I attach a copy of the progress report tabled by Director Nimrod for Controller Aircraft's Project Review on 29th August 1980: paragraph 50 is the source of the reference you cite from the chronology. *
- / (iv) 1983 Decision. I attach a copy of the submission made on 21st April 1983 by the Acting Chairman of the Defence Equipment Policy Committee.
- (v) 1983 suspension of progress payments. Further payments to GAV were withheld in October 1983, pending the submission of "get well" proposals. The proposals eventually secured went well beyond the Department's contractual rights and, with the approval of Mr Pattie, the progressive release of the sums withheld was directly associated with the implementation of those proposals, of which the move to an incentive basis of contract formed only a part.
- (vi) Negotiation of incentive contracts. This question appears to be based on misunderstandings. The contract specification dated February 1981 relates to the cost-plus contract and was not a satisfactory basis for an incentive contract. Moreover, there was no change in 1984 from the cost-plus basis. What happened in 1984 was that, following Mr Pattie's intervention in October 1983, GAV were instructed to submit incentive price proposals. Paragraph 19 of my Secretary of State's minute indicates the course of subsequent events.
- (vii) The Defence Secretary's conclusion of December 1984. It was at a meeting with his officials on 19th December 1984 that Mr Heseltine reached the view that the aim should be to terminate the existing contract with GAV at the earliest technically possible moment. He did not consult Ministers of other Departments at that stage because a viable basis for achieving this aim had not at that time been established. The then Defence Secretary was not, therefore, in December 1984 taking a decision to terminate the existing development contract, but determining the basis on which it could be terminated. The executive implementation of this aim took some time and effort to negotiate and its outcome was reflected in the proposals Mr Younger put to OD colleagues in February 1986. [15 months]
- (viii) Payments to GAV. Following the agreement between Mr Levene and Lord Weinstock in May 1985 that the MSA development programme should be placed on an incentive basis, payments in respect of that work against the existing contract were indeed suspended, as from July 1985, the earliest date which could be negotiated. These payments remained suspended until the risk-sharing



arrangements agreed in February 1986 were put in place. However, expenditure on production contracts continued to be incurred, albeit reined back to the lowest possible level consistent with maintaining the viability of the programme, until the risk-sharing arrangements were agreed. In addition, development and production work continued with BAe - though again at a minimum level.

I am copying this letter to the Private Secretaries to the Chancellor of the Exchequer, the Secretary of State for Trade and Industry and the Attorney General, and to Sir Robert Armstrong.

*Yours sincerely,
John Howe.*

(J F HOWE)

SECRET

Reference

CSA/552/79

CN 37 of 37 copies

Secretary of State (through Minister of State)

INTERNAL MOD SUBMISSION
OF 1979

ASR 400 (FIRST REVISE) - NIMROD AEW Mk 3

1. The purpose of this submission is to seek your approval of the continuation of the Nimrod Airborne Early Warning (AEW) programme to meet ASR 400 (1st Revise) at an extra-mural development cost of £201.6M and intra-mural cost of £7.6M (at September 1978 prices), following re-endorsement by the DEPC at its meeting on 13th June.

Background

2. In January 1975 the ORC endorsed ASR 400 for the replacement of the RAF Shackleton AEW aircraft and, at that time, the preferred operational solution was UK participation in a NATO AEW force based on the Boeing E3A aircraft. However, when in March 1977 the Alliance again failed to approve the funding arrangements, the UK, no longer prepared to accept the risk of a gap in the UK's AEW capability, decided to proceed with Nimrod AEW as a contribution in kind to a NATO force, should one eventually be formed. A programme for 11 aircraft utilising existing Nimrod airframes was approved.

3. In December 1978 CA reported to the DEPC that development and initial production were proceeding satisfactorily, but some seven months had been lost, mainly due to industrial unrest, and a substantial real cost increase was expected. This increase has now been assessed as £75M, and necessitated resubmission of the project to Central Committees. These changes, together with the decision now taken to establish the NATO force, have led to a thorough reassessment of the UK position. Meanwhile approval has been given for essential expenditure to continue on the Nimrod AEW programme.

Threat and Concept of Operations

4. Current concern about air defence serves to reinforce the importance of AEW as an essential element needed to extend existing radar cover and to provide additional early warning and better continuity of radar tracking particularly at low levels. The air threat against targets in the United Kingdom and the EASTLANT/ACCHAN (ie primarily the Soviet BACKFIRE bomber and possibly the shipborne FORGER) has not changed substantially since ASR 400 was approved,

except for a forecast increase in jamming power and the possible introduction of new stand-off missiles with very small echoing areas. Whilst these developments will make the AEW task more difficult (and may eventually require ECCM improvements), in general terms the current assessment is that Nimrod AEW's capability to provide early warning and interceptor control against the threat expected until at least the end of the next decade remains substantially unchanged from that assessed in 1977, though the environment will become increasingly hostile.

5. On the concept of operations, the UK has agreed, in principle, to proposals under which both the Nimrod and the NATO E3A aircraft will operate under a single NATO AEW Force Commander, who will task the fleet centrally on behalf of all three Major NATO Commanders (MNCs). Nevertheless in drafting their concept, the MNCs recognised the desirability of operating Nimrod in the manner and areas for which it is optimised, and our own planning assumptions continue to be based on a need to maintain simultaneously and continuously a minimum of two patrols for seven days at a range of 300 nautical miles from a Main Operating Base and two at 700 nautical miles from the nearest land base. However, two particular aspects of the operational concept, basing and interoperability, have been clarified in greater detail during the past two years, and this accounts for part of the increased costs now identified.

ORC Consideration

6. At its meeting on 6th June 1979, the ORC accepted that the operational case for an AEW force remained unarguable and, while expressing concern about a number of problems (referred to in paragraphs 8 to 10 below), agreed that the Nimrod AEW should continue to meet the threat likely to be posed in the 1980s and, with further improvements, in the 1990s. They noted also that the AFD would do everything possible to minimise any prospective gap in operational capability likely to derive from the phasing out of the Shackletons and the gradual build up of the Nimrod AEW force.

Project Status

7. The development and introduction into service of Nimrod AEW is a major undertaking involving two principal contractors and many sub contractors. Staffing levels at BAe are acceptable, but there has been an abnormal amount of unrest over pay differentials, and this has affected timely progress of the project. Whilst labour relations at Marconi Avionics have been good, there have been difficulties in recruiting the required number of design staff, although this problem should be corrected early in 1980.

8. That apart, CA does not regard Nimrod AEW as more unusual than other complex programmes and considers that good progress has been made. He is confident that design concepts are soundly based, and that the competence of the firms involved is not in doubt. The development problems still to be resolved should not, however, be underestimated. Specific reference is appropriate to those of particular operational significance.

a. AEW Radar Frequency. Although considerable care was taken originally in selecting the radar frequency for Nimrod AEW, difficulties are now foreseen in getting French agreement to the necessary international clearance because of potential

[i.e. until the late 1980s.]

[Already in 1979]

[Contractor, Aircraft]

interference in some propagation conditions with European TV relay systems. The most practical solution is to lower the band of the radar operating frequency by a limited amount and introduce sector frequency control for peacetime operations. This could in turn introduce some interference with Rapier and Type 993 and solutions to this are being examined. Unfortunately such modifications are unlikely to be available before the seventh production aircraft, and extra costs are assessed as £AM. In the interim period training over the Southern North Sea and the SW approaches will be severely restricted.

b. Electronic Warfare Support Measures (EWSM). In view of the threat from Soviet jammers, EWSM has been regarded as a very important part of the Nimrod AEW overall capability amounting essentially to a primary sensor. The intention is to use the same American Loral equipment in both Nimrod AEW and Nimrod MR aircraft, but protracted contract negotiations have precluded fitting before the second or third production aircraft. No particular technical problems are expected but it is disappointing in operational terms.

c. ECM Resistant Communications System (ERCS). Future needs for an ECM Resistant Communications System go beyond just Nimrod AEW and are separately covered in NASR 891. UK policy is to rely on US development of their Joint Tactical Information System (JTIDS) and in due course seek agreement for UK production of JTIDS Class 2 terminals for installation in Nimrod AEW, Tornado F2 and other appropriate aircraft. Currently there is considerable internal US debate on JTIDS, particularly between the USAF and US Navy, and there is also at least two years work (in addition to technical development) to demonstrate frequency compatibility with other users and to gain NATO adoption of the JTIDS standards. Although we have purchased early development models of the JTIDS terminals from America for system development, the Nimrod ERCS programme will spread over six years, and the first operational system is not expected before the end of 1985. For comparison the USAF and NATO E3A aircraft will use initially a current Hughes Improved Terminal (HIT) in anticipation of frequency clearance and in the knowledge that it will require retrospective modification to achieve interoperability with the finally developed US JTIDS terminals.

d. Reliability and Maintainability. An issue of particular concern in the reassessment has been that of reliability and maintainability of the Mission System Avionics (MSA). ASR 400 called for a Mean Time Between Failure (MTBF) of 36 hours and a Mean Time Between Mission Failure (MTBMF) of at least 100 hours. It is now accepted that such a requirement for MTBF is impossible in systems of this complexity. Whilst industry believes that it could achieve 12 hours MTBF and 100 hours MTBMF, RAF experience suggests that figures of three hours and 45 hours, rising to perhaps six hours and 60 hours with the planned reliability growth programme are more realistic assumptions. Whilst these changes in failure rates affect both costs and operational effectiveness, as expressed by System Warning Probability (SWP), the latter has been affected also by realisation that earlier calculations had assumed ideal servicing conditions with, for example, no waiting time for diagnosis of faults or non-availability of spares. Thus current assessments of SWP for the planned Nimrod force of 11 aircraft have lowered from 90% to 75% for each of the four single patrols

and from 65% to 32% if all four patrols were maintained simultaneously. The AFD is considering what measures might be used to regain the previously accepted SWP. Possibilities include the conversion of two more aircraft at a cost of about £40M, the use of in-flight refuelling or modifications to reduce turn round times. Reports are expected early in 1980.

Timescales

9. The original Agreed Target Dates (ATD) and Confidential Policy Dates (CPD) were:

	<u>ATD</u>	<u>CPD</u>
Training Release	March 1981	May 1982
Initial CA Release	October 1982	April 1984

10. Taking account of the problems already referred to the current assessment is

	<u>ATD</u>	<u>CPD</u>
Training Release	February 1982	December 1982
Initial CA Release	January 1984	November 1984

Costs

11. The new estimated total costs for 11 Nimrod AEW aircraft at September 1978 economic conditions are £447.1M extra-mural and £7.6M intra-mural. The extra-mural total consists of £201.6M development and £245.5M production and about £100M will have been spent or committed by the end of June 1979. These figures represent a £75M real cost increase, of which £16M is attributable to development and the remainder to extra production and spares costs. An analysis of these cost increases is annexed. Provision for Nimrod AEW in LTC 79 is adequate at a total of £481M.

Other Procurement Options

12. The cost increases, programme delays and the NATO decision now taken on an E3A force made it appropriate to re-examine other options in deciding whether or not to recommend continuation of Nimrod AEW. Realistically the only possible option is the originally preferred E3A, and it remains in operational terms an attractive alternative.

13. The first NATO aircraft is now due to be delivered in February 1982 (almost a year before the first Nimrod with a Training Release in December 1982) and the last by April 1985. It would be reasonable to assume that the major part of any UK requirement for the E3A could be met by mid 1984 and that, with less need for retrofit programmes than Nimrod, the previously foreseen advantages of an earlier improvement and expansion of the RAF AEW capability remain. As proposed for the NATO force, the E3A lacks EWSM; but this could be fitted to RAF aircraft, and there is no question that such an aircraft would still, in all but points of detail, adequately satisfy the ASR. Indeed in certain respects such as overland capability and greater radar power (giving longer initial detection ranges, higher fuel load and a 25/30% greater endurance) the E3A is superior to Nimrod. It is also considered that the larger aircraft would be able to carry more spares and a servicing crew, thus permitting more comprehensive in-flight system maintenance to obtain higher operational availability.

14. Further, because the E3A is currently in production and the remaining development required to bring it to the standards for NATO (or RAF) use is very much less than that remaining to be done on Nimrod, the E3A would, once cost and delivery dates had been negotiated, be at less risk than Nimrod to increases in target costs and slippages in target delivery dates. For all these reasons, the military arguments for E3A remain attractive, and moreover the main objection, that of NATO uncertainty, has been resolved. But these considerations need also to be weighed against the likely cost of a change and of its industrial consequences, seen in the current circumstances compared with early 1977.

15. So far as costs are concerned, it is not possible to produce firm estimates without detailed negotiations with the US to determine the number of E3As required to provide an equivalent capability and the method of their procurement. As negotiations would inevitably raise considerable industrial and political speculation, no such action has been taken pending this submission. From the information that is available on the procurement of the E3A for NATO, it has been possible to make a preliminary cost estimate. The assumptions are that nine E3As would be required, that the UK would have to meet the capital costs in full (since it is unlikely that NATO partners would now accept higher attributions of AEW costs), but that currently programmed NATO support facilities would be shared and spares would be increased proportionately for a NATO fleet size of 27. On these assumptions, and with an allowance for fitting EWSM, costs would be of the order of £340M at 1978 economic conditions and £2 to the £. Since by the middle of 1979, the commitments on Nimrod will be of the order of £100M the position on cost is, broadly speaking that there is unlikely to be any significant difference between the overall cost of procuring E3As and the remaining expenditure (including contingencies) to be incurred on Nimrod. The budgetary position as between the two possibilities is also seen as evenly balanced.

16. In industrial terms, there are now some 5,000 people directly employed on the Nimrod programme and cancellation would have serious repercussions. Perhaps half of those could expect, as skilled men, to find employment fairly readily elsewhere, though there could be no certainty that they would be redeployed in support of other defence projects or, indeed, that they would remain in the British aerospace industry. Nor at this late stage could we expect agreement to re-open the NATO E3A offset arrangement in order that the UK should be beneficiaries of them. In these circumstances there would be a substantial loss of industrial morale and MOD's credibility would be in question, given the circumstances of the original decision to go ahead with Nimrod, the significant expenditure already invested in the programme and the substantial technical progress that has been achieved.

17. In summary, therefore, the E3A in operational terms remains an attractive alternative to Nimrod given its performance capability, its earlier availability, its status as a lower risk programme and its prospects of providing higher operational availability in terms of System Warning Probability. In these respects the position is substantially unchanged as compared with early 1977. On the other hand the Nimrod will also meet the operational requirement, and whilst there is less certainty about timescales and likely costs than with

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the E3A, the project is not regarded as being uniquely of higher risk or less soundly based than other major and complex development programmes. Apart from difficulties associated with industrial unrest and the current universal shortage of certain specialists, progress has been good and there is confidence in the design concept and the competence of the firms involved. Substantial resources and money have been invested in the programme and a change to the E3A now would have widespread repercussions. Justification for such a change would have to rest on the military considerations only, since the industrial, foreign exchange and political arguments are against it, and on present cost assessments it is unlikely that there is a decisive advantage either way.

18. In these circumstances the predominant view which has come out of a very detailed reassessment is that the balance lies with continuing the Nimrod AEW programme. Further, it is considered important that support for the Nimrod programme should be seen as full and clear, since any suspicion of hesitation or doubt could seriously undermine industrial morale, commitment and enthusiasm leading to a most difficult project management situation; and there would also be international implications. For these reasons it is recommended that no approach should be made to the US for further information about E3A; but you will wish to note that the E3A will remain automatically for a limited period as a fallback option, against the unlikely event of Nimrod encountering major difficulties.

Publicity and Parliamentary Interest

19. You will be aware that Mr Wellbeloved, the former US of S(RAF), has been raising questions about the future of Nimrod AEW both in the House and in the Press. In a written answer to his question of 11th June 1979 he was told that the Government did intend to proceed with Nimrod and that the first aircraft was expected to enter service in the early 1980s. Although a further Parliamentary statement is not essential, the recent speculation in newspaper articles may be affecting industrial recruiting for the programme. If you agree, further publicity outside Parliament could be helpful.

Conclusion

20.. I would be grateful for your agreement to the continuation of the Nimrod AEW programme to meet ASR 400 (1st Revise) at an extramural development cost of £201.6M and an intramural development cost of £7.6M (at September 1978 prices). Subject to this agreement, CA will be seeking shortly in the normal way approval to commit the additional £167.4M required to bring the total production authority to £245.5M.

21. Finally, at the DEPC, the Treasury representative argued that a decision on whether to continue with Nimrod AEW or not was of sufficient importance to bring to the attention of Ministers collectively. Subject to your views on this, the Defence Secretariat are ready to submit a draft of a minute which might be sent notifying your colleagues of your decision on this submission.

Rm
CSA [Chief Scientific Adviser]

4th July 1979

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Analysis of Cost Increase

1. The increase of £75M (at September 1978 ECs) has three main components: £42M for revision of project costs £23M for changes in estimates of spares and support costs and £10M of additional contingencies.

Project Cost Increase

2. Project cost increase consists of:

a. Contractor Re-estimation. MAV's cost estimates have increased by £8M in development and by £10M in production following more detailed assessment of the work involved. The production cost increase has also had a marginal effect on the cost of spares.

b. Additional Work and Specification Changes. Following more detailed MOD(PE) examination, a number of changes have had to be made to the specification and additional work areas have been identified. The major elements are expanded interoperability requirements, an enhanced reliability growth programme and the purchase of a system evaluation rig. In total these add £8M.

c. Radar Frequency Change. The radar frequency band must be modified to avoid commercial interference. The cost is £4M.

d. "1st Revise" Items. A number of additions were made to ASR 400 when it was revised in March 1977 and until recently it had not been possible to cost them. The cost is now estimated at £10M.

e. Government Furnished Equipments. The cost of some items of GFE have contributed a real increase of £3.5M.

f. Major Servicing and Embodiment Loan. There has been debate between the finance staffs of the AFD and PE about the attribution of expenditure on the major servicing of the Nimrod MR1 aircraft before conversion to AEW and of the cost of embodiment loan items. Agreement has been reached that the major servicing costs of £3.5M should count as AEW programme costs but doubts remain on whether the embodiment loan items are refitment of those removed from the original MR Mk 1 or new items particular to the AEW role. No cost estimates for Embodiment Loan items are included but if a programme charge is agreed it is likely to be around £2M.

g. Saving on Air Vehicle Programme. A saving of £5M has been made in the air vehicle programme following more detailed examination.

3. MSA Spares and Support Requirements. The basis of the earlier allowance of £25M for MSA spares was 65% of the MSA production cost. In addition £9M was allowed for Special Test Equipment (STE) and a Software Support Facility. MSA production costs have increased resulting in a consequent increase in spares costs of £4.7M. The requirement for spares has increased also by £3M to take account of the MIBF now accepted for the MSA. Spares costs increase by a further £15.3M to support changes in basing concept and deployment commitments: the overall total increase in spares and support is thus £23M.

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4. Contingency Allowance. The remaining contingency for the project has been increased by £10M to retain the original figure of £60M. This now represents 13% of the total estimate.

SECRET UK EYES B

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*Letter from Mr. Pym
to Sir E. Howe*

6th August 1979

Dear Geoffrey,

You will remember that in March 1977 our predecessors announced their decision to proceed with the development and production of 11 Nimrod AEW aircraft for the Royal Air Force. That decision was taken at a moment when our NATO European Allies had once again failed to reach a decision on whether or not jointly to subscribe to the procurement of an Allied force of Boeing E3A AEW aircraft. It had been made clear in the preceding discussions that the British were fully prepared to join such a force: indeed, it represented the preferred solution to the United Kingdom's operational requirement for AEW. However, the failure to agree on Allied procurement posed for this country a real risk of a gap appearing in the AEW cover which is essential to the air defence of the UK and the Fleet, and which is at present provided by Shackleton AEW aircraft. These aircraft need replacing as they are reaching the end of their service lives and as their radar capability is being rapidly overtaken by advances in the threat. At the time of the decision it was made clear that, should the Alliance procure a (reduced) force of Boeing aircraft, then the British Nimrod force would constitute a contribution in kind to the Alliance's AEW capability.

In December 1978 NATO did in fact agree to procure 18 Boeing aircraft which together with the 11 RAF Nimrods

/ represents ...

The Rt Hon Sir Geoffrey Howe QC, MP

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2

represents an AEW capability broadly equivalent to the 27 Boeings originally envisaged. In parallel, development and initial production of Nimrod has been proceeding. Apart from industrial disruption last winter over pay differentials, technical progress has been good. It has, however, become clear that the original estimate of the cost of the programme (£372m at 1979 PESC levels) has to be increased by about £75m to a revised total of £447m. This is a substantial increase and I have accordingly considered very carefully whether or not in the circumstances - and in particular given that NATO have decided to procure the E3A - to continue with the project.

It is certainly open to us to procure the E3A ourselves and if we did so then we should be getting the aircraft which we originally preferred to Nimrod (though the latter fully meets the British requirement) and one which is being largely developed and currently in full production, poses much less risk than does Nimrod of slips in the timescale and increases in cost, once these had been negotiated with the Americans. On the other hand, we have already invested over £100m in the Nimrod programme and on our best estimate of the E3A there is now not much difference between the sums of money that remain to be spent on the two programmes, even after allowing for the residual uncertainties which certainly do affect Nimrod. Further, cancellation at this stage would come as a severe blow to industry which has made a considerable effort to build up the resources required to undertake the programme. Finally, Nimrod AEW is a programme to which we gave support when in Opposition and have quite recently indicated our continuing commitment to it.

As I have said, on these grounds the balance of advantage seems to me to lie with continuation and my officials have, accordingly, sent over to yours a detailed statement produced at my request setting out the background to the problem, where we now stand and what the various considerations that bear upon the decision are in detail, together

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3

with a formal request for approval of the revised sums of money involved. I believe, however, that this is an issue on which you personally would wish to take a view: hence my writing to you. I would be happy to discuss it with you if you wish.

Answer
John W

Francis Pym

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Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

7 September 1979

Mr Francis

Thank you for your letter of 6th August about Nimrod AEW.

I note what you say about the substantial real cost increases which have been identified on this programme. I hope that every effort will be made to improve estimation on projects of this kind. Major cost increases create severe resource problems.

In this case, I am however inclined to agree that on the evidence available at present the best course would be to stick with the Nimrod programme. A switch to the Boeing E3A aircraft would not, on current estimates and excluding sunk costs on Nimrod, produce significant future savings. I should myself have preferred us to obtain a new E3A quotation before making up our minds, but I can see that this would have certain disadvantages. However the Nimrod/E3A choice is clearly very finely balanced and any further significant real increase in Nimrod costs would probably necessitate at least an exploratory approach to the Americans. If, for example, it were decided that 11 Nimrods would not in the event be sufficient, and that extra aircraft would be necessary, at a cost of some £20m each, a full re-assessment of the E3A alternative would in my view be essential to establish whether a corresponding increase in the numbers of aircraft would be required, and to discover the precise costs.

I should like therefore to ask you to ensure that particularly close attention is paid over the next few months to cost and other developments on the Nimrod

/programme



programme and that any major changes are brought to your attention quickly. If we were in the event forced to opt for a US purchase, as I accept would not on today's evidence be justified, much of the expenditure on Nimrod would I imagine be rendered nugatory, and it is therefore important that any new evidence of adverse developments should be monitored and assessed at once.

Since I agree with your recommendation I do not think I need take up your offer of a meeting at this stage. But I should be grateful if you would ensure that Treasury officials are brought up to date again at the end of the year, and perhaps again six months after that.

A handwritten flourish consisting of a single, sweeping line that starts with a small hook and ends in a tail.

A handwritten signature in cursive script, appearing to read "Geoffrey Howe".

(GEOFFREY HOWE)

CAPR 4/80

NIMROD AEW MK 3PROGRESS REPORT - AUGUST 1980

[Paras 1-21 del'd abt
 with the aircraft. The
 passage on the Avionics
 stocks at par. 22]

INTRODUCTION

1. This report covers progress on the Nimrod AEW programme since the May 1980 review.
2. CA's submission to the Minister of State advising him of recent programme changes was accepted on 16 May, subject to Treasury approval. Subsequently the Treasury advised that the Chancellor of the Exchequer had reluctantly agreed that the project should continue on the basis of the revised confidential cost estimate (£517M), but had expressed concern that the estimate might be optimistic and requested a detailed breakdown inclusive of contingencies. AUS(Air)PE's response advised the Treasury that we were satisfied that programme contingencies were adequate, pointing out that we expected all the allocated contingency to be spent in due course and that, at this stage, foreseeable calls on the total unallocated contingency of £30.7M amounted to some £11.5M. Treasury have since accepted as satisfactory the assurances given.
3. At the Programme Review Board in July, D/Nimrod formally advised the companies that their revised programme (NIM/AEW/036) had been accepted by CA and by Ministers and re-emphasised the serious view taken of the slippage and the importance of achieving the revised milestones leading to Training Release. The companies for their part recognised that renewed efforts must be made to maintain the new programme to time and within cost.
4. An Exchequer and Audit Department Reference Sheet was received in early August which poses questions about cost, delivery dates, reliability and System Warning Probability. Draft replies are being prepared.

PROGRAMME STATUS

5. Two major programme achievements took place in July. On the 16th, a formal 'switch-on' ceremony marked the completion of the commissioning and integration phase of the MSA (BO) development rig at MAV Radlett. Later the same day, DB1 made a successful first flight from BAe Woodford. By early August, DB1 had already flown sufficient hours to clear the aircraft for participation in Farnborough 80.
6. Delays in the delivery of airframe components, summarised in para 15 below, have until recently restricted BAe's ability to utilise to the full their aircraft assembly resources. In consequence, the build of

DB2 has been set back and there is a high probability that the next significant milestone, DB2 Off-track, will not be achieved by the agreed target date of week 42 (mid-October); the prospective slip could be 6-8 weeks, which compares with DAP's earlier confidential estimate of 11 weeks. Delays on DB2 can now only be minimized by concentrating manpower on that aircraft, and there will inevitably be some repercussion on DB3's build programme. Although there was a significant recovery of slippage on DB1 between Off-Track and First Flight, it will be much more difficult to repeat that achievement on DB2 and DB3 because of the more complex MSA installation task on these aircraft.

7. The cardinal milestones remain unchanged, ie:

	<u>ATD</u>	<u>CPD</u>
a. Delivery of first aircraft to Training Release standard	Apr 82	Mar 83
b. Initial CA Release	Feb 84	Nov 84
c. Delivery of last aircraft	-	End 85
d. Final CA Release	Not yet programmed	

Unless specified to the contrary, all other dates in this report are agreed target dates (ATDs). The target programme is illustrated in Annex A.

DEVELOPMENT FLIGHT TRIALS

8. Since the last Review the companies have issued NIM/AEW/028 describing their joint ground and flight trials. This document, together with detailed trials specifications and flight plans, will enable RSRE and A&AEE to plan the integration of their activities with the companies' trials. In addition, with the issue of NIM/AEW/038 which lists the Special-to-Type Test Equipment (STTE) to be located at EAe Woodford for the support of development and production aircraft and sets out the joint management arrangements for the STTE facility, the companies have satisfactorily resolved a number of uncertainties affecting the planning of a particularly critical aspect of the programme. The cost of the enhanced STTE is within the provision earmarked for that purpose.

9. A&AEE have indicated that, taking account of their existing commitments and the effect of manpower cuts, they may not have the resources to carry out the 10 months of trials programmed to take place in 1983 prior to Initial CA Release. Alternatives have been proposed and D/Nimrod will review the situation with Chief Superintendent A&AEE on 20 August to determine whether these are acceptable or increased priority should be given to the Nimrod task. It should be emphasised that the issue of an Initial CA Release is not in question.

Comet Trials

10. Comet XW 626 completed its refit programme and was delivered on schedule to RAE Bedford for Phase 2 trials on Friday 13 June. Notwithstanding the inauspicious date, familiarization and acceptance at RAE Bedford were completed rapidly and the Establishment is to be congratulated on this achievement. Flight trials to date indicate that improvements incorporated into the radar during the aircraft downtime were successful and radar performance is markedly superior to that shown during Phase 1 flying.

11. Improvements to the diffuser and oil scavenge pump in the Comet AAPU will permit reliable operation of the X1 radar up to 30000 ft altitude; during Phase 1 flying an altitude limitation of 20000 ft had applied.

12. Comet XW 626 has been allocated priority for RAE Bedford's strained industrial resource. D/Nimrod, DLRA and RSRE staffs have however rationalised other radar trials programmes at Bedford and, providing RAE Bedford's industrial staff remain at the present level, we can be confident that the XW 626 Phase 2 trials will proceed without hindrance.

CTA Trials

13. At the end of July, the CTA had flown 30 sorties (160 hours) and a great deal of useful information had been gathered; the results so far are encouraging, with all communications equipments proving to be very reliable. A possible system problem in Link 11 operation has been identified and is under investigation.

DB1 Trials

14. By 1 August, DB1 had flown 6 sorties totalling 21 hours. The aircraft flight envelope is being explored progressively and initial results are very satisfactory, bearing in mind the limited range of weight and CG position used to date. While stalling behaviour resembles that of other Nimrod Mk's, directional stability appears to be superior. No flutter problems have been revealed at speeds up to MO.78. A minor vibration apparently originating at the rear of the aircraft has been observed and is under investigation.

AIR VEHICLE PROGRAMMEDevelopment

15. Critical-component shortages on DB2 were cleared in June but there remain some 440 shortages on this aircraft, 300 of which are essential for the transfer to Hatfield. On DB3, with some 770 shortages in all, non-availability of critical items is still causing slippage. DAP staff are continuing to monitor the situation weekly.

16. BAe are now able to deploy maximum resources to complete the assembly of DB2. Nevertheless, a significant intermediate milestone, Power On, which was forecast for late July (2 months late to plan) has not been achieved and may well be as much as 3 months late in the event. It is unlikely that BAe can recover more than half of the Power On slippage before the planned Off Track date of week 42 (mid October), and the subsequent ground trials period of 12 weeks will not offer significant scope for further recovery to enable DB2 to be transferred to Hatfield on time. Due to the concentration of effort on DB2, the assembly of DB3 is progressing slowly at this stage and its Power On milestone is forecast to slip by a similar amount to that on DB2.

Radomes

17. BAe have advised that the flight clearance for aircraft fitted with radomes to the current design will reflect indicated airspeed limitations of 215 knots below 2000 ft above ground level and 225 knots between 2000 ft and 5000 ft. BAe's recommendation, which differs somewhat from that which had been expected and reported to the last Review, is being examined by the Project Office prior to formal advice being passed to AFD. Meanwhile, work on Kevlar reinforcing techniques is proceeding.

FIN 1012 IN Platform

18. Deliveries to BAe are more than adequate to support both Mk 2 and Mk 3 programmes.

ATE

19. Contract action on the First-L for 2nd line support of the FIN 1012 platforms is in hand. HQSTC have concluded that it would not be cost-effective to prolong the life of the Nimrod MR Mk 1 ATE for 2nd line testing of those Mk 1 Air Vehicle LRUs which are retained in Nimrod Mk 2 and 3: manual test equipment will be bought for this purpose.

Production

20. Although manufacture of the major elements of the conversion kits is progressing satisfactorily, that of detail parts continues to be a cause for concern. BAe had declared that, once problems on DB2 were overcome, parts availability should cease to be a significant problem for subsequent aircraft. It is clear that this hope has not been realised and progress on DB3 is being monitored closely to ensure that parts shortages are resolved in time to match the build schedule for the first production aircraft.

21. Three production aircraft (P1-P3) are in work at BAe. Progress in general is satisfactory, with the new rear fuselage being fitted to P1 whilst work on P2 and P3 is limited to stripping and major servicing.

MISSION SYSTEM AVIONICS PROGRAMMEMSA Hardware Development

22. Integration has progressed well during the quarter, and system testing is proceeding following the formal switch-on by CA on 16 July. Commissioning of flight trials models has commenced and most B1 LRUs have been delivered to BAe at Woodford.
23. New factory accommodation at Hemel Hempstead is approaching completion but construction delays have put back the occupation date. This has delayed formal qualification testing and reliability rig work, but all essential testing will be completed prior to Training Release.
24. Modifications to overcome previously reported cross-talk problems within the 4080M computer have been incorporated. Manufacturing and test difficulties have resulted in some hardware shortages but programme effects have been minimised by careful scheduling.
25. Deliveries of Tactical Displays from Decca are not being maintained following the Racal take-over, and Miv have been unable to establish a firm delivery programme for outstanding development models or for Service models. DGAWLS has written to Racal's Chairman expressing MOD(PE) concern.

Mission System Software (MSS)

26. Work on the MSS is progressing to plan and the specification for Service Model Software (SMS1B) has been frozen. Problems on the MAV bureau machines used in software development have been overcome with only minor effects on the development programme.
27. A study (reported last quarter) has proceeded to determine the most economic way of increasing computer store reserves. Conclusions and a report are expected by the end of September.
28. The independent audit of the MSS development programme by RSRE is planned to take place during the last quarter of 1980. RSRE are gaining experience, before undertaking the AEW task, by carrying out a software audit of another, smaller, project.

EWSM

29. Loral development model shipping dates have been set back. The new dates should not affect the planned programme, but will reduce the time available to clear any EWSM sub-system design problems before delivery of Service Model MSA commences.

MSA Production and Service Spares

30. The programme of Service Model release for manufacture is continuing. Spares are now largely defined and are being incorporated into production planning. A suggested economy of one Flyaway Pack has been abandoned and contract action is in hand for all outstanding unit spares.

Services Test Equipment (STE)

31. The definition of the 3 outstanding STE facilities has been completed and they are now on contract. Possible minor additions are being considered as a result of Built In Test Facility (BITF) analysis.

Service Software Maintenance

32. The MAV study of required facilities for software maintenance is well underway and the report is expected by the end of August.

Frequency Allocation

33. Work on design of the modification to change the radar frequency band is proceeding well and options for embodiment of the modification with minimum aircraft downtime are being examined. The complementary study of a single frequency marginally outside the existing band is now approaching the report stage.

Interoperability

34. The AFD Link 11 message list for Initial CA Release is still under discussion at Link 11 Working Party. A current interest is the proposed addition of aircraft engagement command functions, which DMCP sees as a necessary feature for AEW when operating with a Naval Task Force.

35. The draft Air Defence Steering Committee (ADSC) Interoperability Specification is now under discussion by Naval and AFD OR staffs in a Sub-Panel of the AFD Air Defence Co-ordination Committee (ADCC). ADCC will advise ADSC of any changes they consider advisable, and the operational status of the Specification.

36. The Board of Directors of NAFMO have accepted in principle that the NATO E3A and NAEGIS ground stations will need to be updated at some future date to NATO Link 16 Standard so that full interoperability with Nimrod AEW is possible.

ERCS

37. There is some uncertainty about the US intent to fund the Full Scale Development of ERCS, but it is hoped this will be resolved shortly. Discussions are proceeding on the best approach for the ongoing UK programme and re-submission to ORC/DEPC.

38. The MAV report on the current phase of the integration study is imminent and the next stage is now being defined.

RELIABILITY AND MAINTAINABILITYMSA

39. The MSA Reliability and Maintainability Specification has been further discussed with AFD and the Contractor, but agreement has not

yet been reached. In view of the importance of reliability achievement it is highly desirable that a specification acceptable to both parties, and achievable within the programme, be formally agreed during the coming quarter.

40. An initial MAV report on the proposed Engineering Test Program (ETP) was received in July and APD comments on it passed to the Contractor. A Company presentation to PE and APD on their ETP design philosophy and proposed development programme was given on 1 August; this will be followed by a full report including formal cost and timescale estimates and a statement of expected performance in September.

Air Vehicle

41. Studies continue with HQSTC to assess modifications to improve Air Vehicle reliability, maintainability and turnaround time. The first outcome has been an improvement to the integrity of the nose under-carriage hydraulic system. A Service trial is also underway on a simplified check for the presence of water in fuel, and early agreement is expected to the introduction of 'carry-on' liquid oxygen packs to dispense with the in-situ recharging procedure; both these measures will add to our confidence of meeting the target for the scheduled servicing element of turn-round time.

UPDATED ELECTRICAL GENERATING SYSTEM

42. Following successful completion of the 60 KVA Compact Constant Frequency Generator (CCFG) demonstrator programme carried out by Lucas Aerospace, DA Mech has advised that it is feasible to develop a 90 KVA CCFG to meet the need to update the AEW electrical generating system. After examination of other potential solutions to the requirement, this option has been selected and BAe have been tasked with a Project Definition study to provide a DPCP covering the development and procurement of an updated electrical system incorporating the CCFG. In parallel, D Eng D is managing Rolls-Royce work to improve the Spey engine gearbox to match the CCFG. The BAe DPCP is scheduled for submission in October 1980 so that, subject to a satisfactory proposal being received, approval for full development can be given.

DYNAMIC AND MISSION SIMULATORS (ASR 618)

Mission Simulator

43. It is intended to bring forward full communication facilities into Phase 1 of the Mission Simulator, provided this can be done without compromising delivery dates. To accommodate the possibility that the Simulator building may not be available in time at the MOB, contingency plans are being prepared to retain the Simulator at MAV Radlett for up to 18 months.

Dynamic Simulator

44. A second draft of the DA Nav specification has been circulated for comment. Identification of the required aircraft parts is proceeding: these will be offered as GFE and a large proportion of them should be obtainable from Service sources. For some at least of the items which are new build for Nimrod AEW, the simulator programme will require the diversion of deliveries intended for the aircraft programme.

PROGRAMME COSTS

45. The MOD(PE) estimate for development and production now stands at £516M at Sept 79 economic conditions, as compared with £513M at the last CAPR and with the figure of £517M approved by Minister and the Treasury. Details are at Annexes B to E. The additional £3M is due to the provision made for the slippage in the CPD to March 1983, as reported at the last CAPR.

46. The main change within the total estimate since the last Review is that the MOD(PE) budgetary estimate for the Compact Constant Frequency Generator (CCFG) has risen by some £1.5M in development and £2.3M in production; this has been partially offset by reductions in the cost of airframe aspects of EWSM and the balance has been met from allocated contingencies. The increase in CCFG costs has therefore not affected the overall project estimate.

Contingencies

47. Allocated contingencies stand at £37.2M (£19M development and £18.2 production), a reduction of £3.2M since the last CAPR caused mainly by the need to meet increased generator costs. Unallocated contingencies stand at £30.7M (£8.1M development, £22.6M production), an increase of £3M because the cost of the CPD slippage has for the present been put to the unallocated contingency. We expect to be in a position in October/November to seek approval for a transfer of unallocated contingency funds from production to development: this will probably be in the order of £10M. The latter figure takes account of increases anticipated in the updated MAV DCP, which is now expected in early September. The updated BAe DCP was received in July; initial analysis indicates that it does not contain any unexpected increases in the firm's estimates for design and development of the Air Vehicle.

Moratorium

48. At the time of writing, guidelines for the application of the moratorium on Defence expenditure are being defined and it is not yet possible to provide a firm assessment of their effect on the Nimrod AEW programme.

CONTRACTS

49. Discussions are still in progress with BAe with a view to introducing an incentive price contract. A further meeting between Contracts staff and BAe took place on 8 July at which an outline

proposal for a pricing arrangement covering both development and production work was put to the company; BAE's response, expected in early August, has not yet been received.

CONCLUDING REMARKS

50. Overall progress of the AEW programme during the past three months has been encouraging and the major achievements signified by the MSA rig 'switch-on' ceremony and DBI's first flight have given a significant boost to the morale of all concerned in the programme. Both companies are working hard and enthusiastically and, although some slippage of immediate milestones is foreseen, the basic soundness of the programme and our ability to complete it within the CPD and within the confidential cost estimate are not in doubt.

D/Nimrod
18 August 1980

Director of the Nimrod Project.

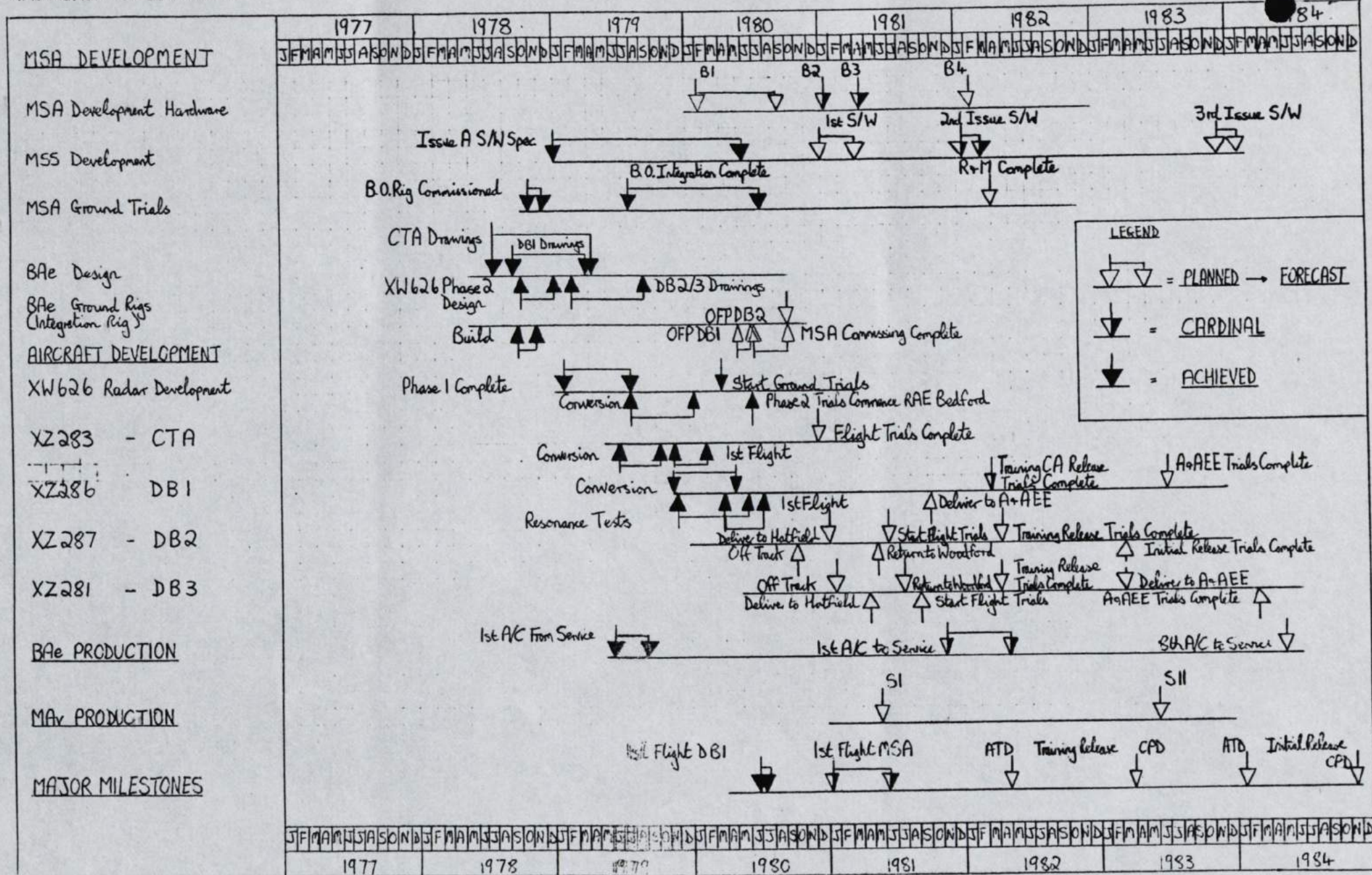
Annexes:

- A. Overall Target Programme
- B. Development Cost Table
- C. Production Cost Table
- D. Development - Major Milestones and Expenditure Estimates
- E. Production - Major Milestones and Expenditure Estimates

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 NIMROD AEW MK3 - OVERALL TARGET PROGRAMME

NIMROD AEW CAPR 4/80
 ANNEX 'A'

MANAGEMENT IN CONFIDENCE



MANAGEMENT IN CONFIDENCE

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414

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NIMROD AEW : APR 4/80

ANNEX 5

NIMROD AEW MK 3 DEVELOPMENT COST TABLE

EX VAT EXCLUSIVE

1	2	3	4	5	6		8	9	10	11
					REAL VARIATION FROM: COL 4 TO:					
PROJECT AREA	DIRECTOR	FINANCE DELEGATED BY D/NIMROD AT 9/79 ec's	MOD(PE) CURRENT ESTIMATE AT 9/79 ec's	ALLOCATED CONTINGENCY ELEMENT IN COL 4	LTC 80 AT 9/79 ec's	PREVIOUS EST AT CAPR 2/80 AT 9/79 ec's	L of L or FIXED PRICE	FIRM'S BOOKED COSTS EXPENDITURE TO 31.3.80	FIRM'S ESTIMATE TO COMPLETION AT 9/79 ec's	PAYMENTS TO 31.3.80
1. AIR VEHICLE CONVERSION	D/NIMROD	90,898	85,025	9,422	- 317	NIL	47,801	29,163	58,803	24,541
2. AIRCRAFT NAVIGATION EQUIPMENT AND ATE	DA/NAV	1,267	1,378	220	NIL	NIL	1,120	N/A	1,156	345
3. MISSION SYSTEM AVIONICS (MSA)	DLRA	119,132	130,886	8,977	+ 2,963	NIL	89,973	62,325	95,475	60,112
4. ELECTRONIC WARFARE SUPPORT MEASURES (EWSM)	DLRA	7,225	7,609	269	NIL	NIL	N/A	N/A	N/A	5,504
5. IFF INTERROGATOR/CRYPTO	DA/RADIO	1,081	1,142	118	NIL	NIL	1,098	920	1,242	690
6. UNALLOCATED CONTINGENCY	D/NIMROD	-	8,101	NIL	+ 8,101	+ 3,000	-	-	-	-
TOTAL	-	219,603	234,141	19,006	+ 10,747	+ 3,000	139,992	92,408	156,676	91,192

NOTE: Column 3: Delegations issued up to 2 July 1980 are included.
N/A = NOT AVAILABLE

Treasury approval for Development is £234,141K at 9/79 economic conditions. DEPC approval for Development is £228,860K at 9/79 economic conditions.

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693

NIMROD AEW MK3 PRODUCTION COST TABLE

EX VAT EXCLUSIVE

1	2	3	4	5	6		7	8	9	10	11
PROJECT AREA	DIRECTOR	FINANCE DELEGATED BY D/NIMROD	MOD(PE) CURRENT ESTIMATE AT 9/79 ec's	ALLOCATED CONTINGENCY ELEMENT IN COL 4	REAL VARIATION FROM: COL 4 TO:		L of L or FIXED PRICE	FIRM'S BOOKED COSTS EXPENDITURE TO 31.3.80	FIRM'S ESTIMATE TO COMPLETION AT 9/79 ec's	PAYMENTS TO 31.3.80	
					LTC 80 at 9/79 ec's	PREVIOUS EST AT CAPR 2/80 at 9/79 ec's					
1. AIR VEHICLE CONVERSION	DAP	81,854	103,164	8,478	- 1,948	NIL	33,793	20,062	76,669	17,406	
2. AIR VEHICLE SPARES AND GSE		6,600	7,789	708	NIL	NIL	N/A	N/A	N/A	N/A	
3. AIRCRAFT NAVIGATION EQUIPMENT AND ATE	DAEP/DA/NAV	2,530	2,840	301	+ 132	NIL	N/A	N/A	229	44	
4. MISSION SYSTEM AVIONICS (MSA)	DLRA	118,210	138,710	8,678	- 2,023	NIL	71,533	5,751	N/A	3,899	
5. ELECTRONIC WARFARE SUPPORT MEASURES (EWSM)	DLRA	5,200	5,202	NIL	NIL	NIL	N/A	N/A	N/A	1,111	
6. IFF INTERROGATOR/CRYPTO	DA RADIO	1,213	1,582	NIL	NIL	NIL	544	81	1,287	158	
7. UNALLOCATED CONTINGENCY	D/NIMROD	-	22,573	NIL	+ 22,573	NIL	-	-	-	-	
TOTAL	-	215,607	281,860	18,165	+ 18,734	NIL	105,870	25,894	78,185	22,618	
DEVELOPMENT AND PRODUCTION TOTAL	-	435,210	516,001	37,171	+ 29,481	+ 3,000	245,862	118,302	234,861	113,810	

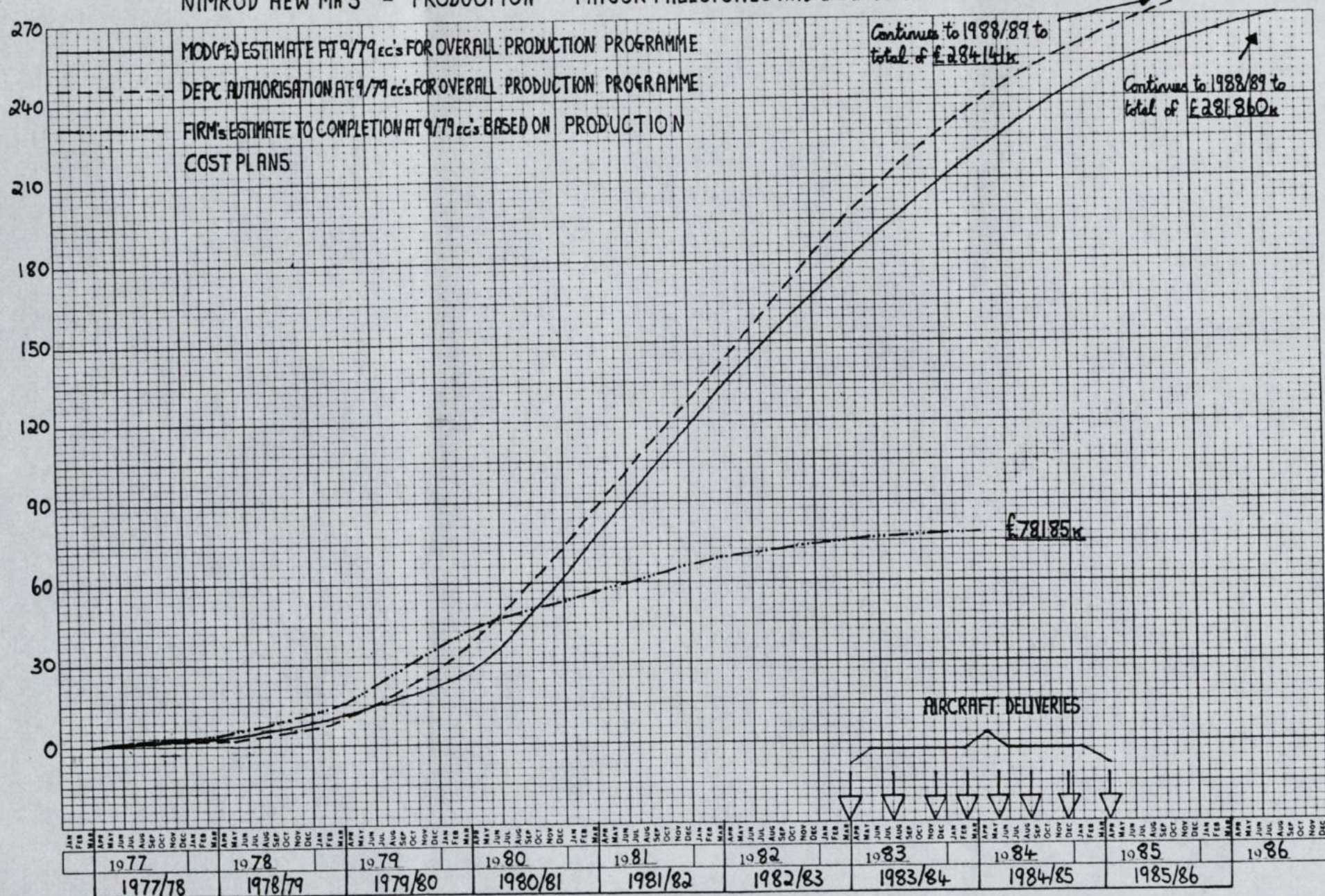
NOTE: Column 3: Delegations issued up to 2 July 1980 are included.
N/A = Not available

Treasury Approval for Production is £221,860 at 9/79 economic conditions. DEPC approval for Production is £234,141 at 9/79 economic conditions.

NIMROD AEW Mk3 - PRODUCTION - MAJOR MILESTONES AND EXPENDITURE ESTIMATES

NIMROD AEW - CAPR 4/80 ANNEX 'E'

£M

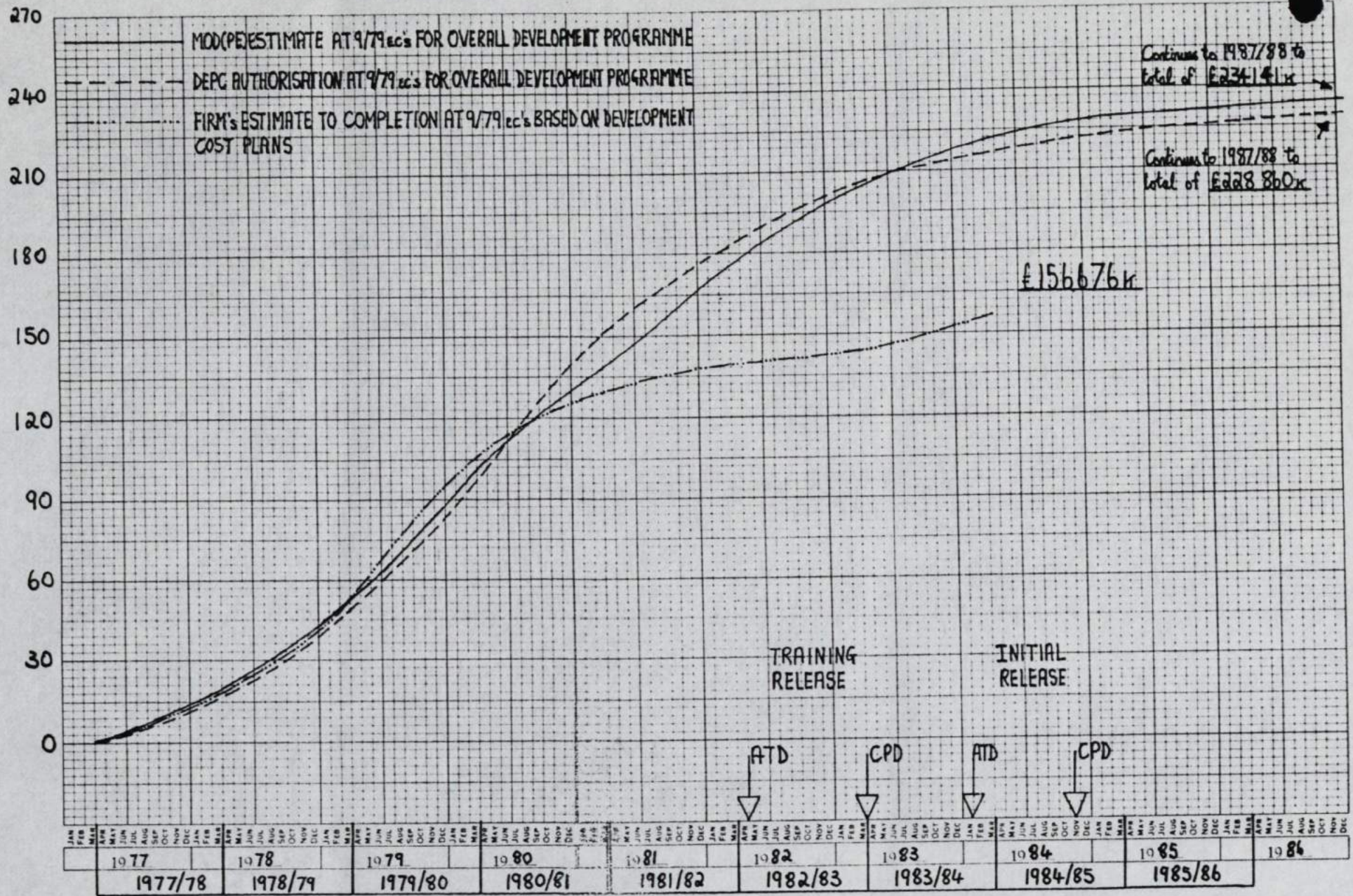


Charteris Graph Data Ref. 4008 100 Equal Divisions x 10 Years (months imprinted)

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NIMROD AEW Mk3 - DEVELOPMENT - MAJOR MILESTONES AND EXPENDITURE ESTIMATES

£m



100 Equal Divisions x 10 Years (months imprtised)

Chartwell Graph Data Ref. 4008

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AUS(AS)
AUS(SO)(Air)
AUS/Air(PE)
D/Nimrod
Nimrod F&S

ASR 400 (1st Revise) - NIMROD AEW Mk 3

1. In September 1979, Ministers approved the continuation of full development for Nimrod AEW following a real increase in cost of over 20% and some slippage in the programme. On 2 May 1980 in his CA 4/3, CA reported to the then Minister of State a 3 month slippage in the Confidential Policy Date (CPD) for first delivery to the RAF to March 1983: this had been caused by the 1979 national engineering strike. Since then, following further slippage in the programme it has been necessary to seek re-endorsement by Central Committees. In doing so, the opportunity has also been taken to consider the inclusion of Air-to-Air Refuelling (AAR) as part of ASR 400 (1st Revise).

PROGRAMME SLIPPAGE

2. The current CPD forecasts are as follows:

Training Release	December 1983
First Aircraft Delivery	April 1984
Initial CA Release	July 1985

The In-Service Date, based on the CPD for delivery to the RAF of the first production aircraft with Training Release, has consequently slipped from March 1983 to April 1984. Most of the slippage has occurred over a fairly short period, caused by setbacks in a number

of areas in the Mission Systems Avionics (MSA) programme. This programme, in common with BAe's associated air vehicle activities, was from its inception compressed and arranged to match ambitious aircraft delivery dates. Despite the advanced technology involved no fundamental weaknesses in the concept have so far emerged, but key areas of the programme have suffered repeated setbacks.

3. The development, production and on-board commissioning of the radar transmitter have been the main areas contributing to the delays. Problems with the transmitter, its mounting plinth and sub-systems have necessitated the development of new design solutions which have had to be proven and quality control improved. These defects have led to prolonged MSA commissioning periods on the development aircraft DB2 and DB3. In addition, the radar microwave receiver has needed extensive redesign to overcome manufacturing difficulties and much additional effort has been incurred by the need to increase computer core store capacity as the software developed. There have also been difficulties with crosstalk noise in the main computer, software for the communications control processor and design of the Build-in Test Facility. Finally, delivery of the aircraft MSA racks for the first production aircraft has been subject to a series of frustrating setbacks.

4. The technical problems have not been helped by management difficulties at Marconi Avionics, the MSA contractor. To resolve both the technical and management difficulties, CA has carried out a thorough review of the MSA programme with senior GEC/Marconi management. A revised programme has been agreed which tackles the technical problems and has now been presented, jointly with BAe, as a coordinated aircraft programme offering the most practicable route of recovery to a stable situation. In addition there have been management changes at both M Av and MRSI (a sub-contractor for the transmitter). CA is content that there is no reason to expect any major shortfall in meeting the new programme milestones.

AIR-TO-AIR REFUELLING

5. AAR was originally included in ASR 400 to meet the possible need for the aircraft to operate at greater ranges or for longer patrol times, and to extend the ferry times if required. Although excluded from ASR 400 (1st Revise) as an economy measure, the basic need remained. Experience with the NIMROD MR Mk 2 in the Falklands demonstrated that the capability can be installed relatively inexpensively and that the operational benefits far outweigh the cost. AAR has been shown to confer an enhanced degree of operational flexibility in terms of operating ranges and patrol times. It alleviates the practical problems of ensuring satisfactory availability and reliability, which are inevitable with systems of such complexity, since it allows a serviceable aircraft to be kept on station should its replacement be delayed by inserviceability or for operational reasons. Initial studies have been carried out into the feasibility of AAR in NIMROD AEW Mk 3 based on the successful NIMROD MR Mk 2 modification; and satisfactory assessments of long-term integrity and interaction with the AEW radar have established the feasibility of installing this capability.

COSTS

6. The current estimate of extramural programme costs is £760.7M at LTC 83 economic conditions, VAT inclusive (£330.2M development, £430.5M production) within which is included £5.3M for AAR (£2.3M development, £3.0M production). Intramural costs for development are estimated at £14.4M.

7. Programme slippage has resulted in increased costs of £14.3M. The current estimate of £760.7M constitutes a real increase of 3.4% over the previous Central Committee approval (June 1979), and a real increase of some 24% since the project was initially approved for full development in 1977. There is a shortfall of £35.1M in LTC 83 provision which will be addressed during Estimates/LTC 84.

CENTRAL COMMITTEE CONSIDERATION

8. Both the ORC and DEPC have re-endorsed the programme, together with the inclusion of AAR. The Committees were content that the necessary action has been taken to correct the difficulties which led to the programme slippage and that there is no reason to expect that the revised programme cannot be met. The ORC noted that action was in hand to overcome a possible shortfall in the track capacity of the main computer and software, although the proposal was subject to the forthcoming Committee discussion on the JTIDS requirement for NIMROD AEW. On costs the DEPC, noting that the total real increase in the estimate for full development had increased by 24% since the DEPC initially approved the programme in 1977 and that the total project contingency stood at 24% of uncommitted expenditure (of which some 10% remained unallocated), asked to be kept informed of any further real increases in costs.

RECOMMENDATIONS

9. You are invited to approve the continuation of the Nimrod AEW Mk 3 programme with a revised confidential ISD of April 1984; and to note the revised estimate of total cost of £775.1M (including intramural costs) at LTC 83 economic conditions, VAT inclusive (a real increase of 3.4% since the project was last approved by Minister which includes provision of £5.3M for AAR).

21st April 1983

K. C.
(K C MACDONALD)
Acting Chairman DEPC