

MR NORGROVE

6 March 1987

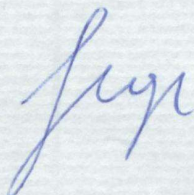
DRAFT SPACE PAPER FROM BNSC

Here is the draft paper as submitted to the DTI. It does not yet have DTI Ministers' comments. At his request, and with Timothy Walker's agreement, I have copied it to Brian Unwin.

We now have a proper menu of choices which range from Option 1 (stay with the present programme) to Option 5 (increasing the annual spend as originally proposed to £300 million by 1989/90). Between these ranges Gibson has shown what can be achieved by annual expenditure increments of £50 million units. In essence he tells us that sticking with options 1 or 2 do not really get us anywhere in space. (Note the veiled threat in "no need for BNSC as subordinate department - small co-ordination unit sufficient").

Option 3 (annual spend £200 million) and Option 4 (annual spend of £254 million as suggested by Fairclough) are both realistic plans for staying in space and I suspect that the final decision will rest between these. Option 3 is a UK spend rate comparable to the Netherlands and makes a national programme possible while option 4 would allow us to be significant players in the polar platform.

I have not conveyed your view about the PM meeting Gibson to Timothy Walker because I thought you should see the draft first. He may well be in touch with you on Monday about this.



GEORGE GUISE

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To: PS/Secretary of State

cc PS/Mr Pattie
Sir Brian Hayes
Mr A MacDonald
Mr A RussellFrom: Roy Gibson - BNSC
Room 818 MT

211 0389

6 March 1987

NATIONAL SPACE PLAN

Attached is a paper which I hope responds to Secretary of State's request for analysis of options (your minute of 27 February refers). It incorporated modifications arising from our discussion on 5 March.

2 I should like to emphasise three points:

- the paper represents my personal view of priorities and, although I have tried to do justice to the views of the partners in BNSC, it does not have the backing of the Management Board; and
- if Ministers decide to allocate sufficient additional space money to justify setting up BNSC as a subordinate department, I would hope that this organisational decision could be taken at the same time. I repeat, however, that I would recommend an interim period before full PES transfer so as to allow time to seek an accommodation with DES regarding SERC and NERC funding arrangements.
- you will notice that there is no specific mention of HOTOL in the options. We are hoping that out of the ESA negotiations a 3-4 ESA programme will emerge on next generation launcher technology. This would embrace HOTOL and other rival systems. I believe that, given the two highest options, we could accommodate this modest programme - but not, of course, any subsequent development programme.

R Gibson

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THE NATIONAL SPACE PLAN: OPTIONS

Note by the Director General of the
British National Space Centre

INTRODUCTION

It is suggested that the following points are important in considering options for the UK's future space activities:

- (i) The urgency in reaching a decision on UK space funding is due to the fact that ESA's 13 Member States are currently negotiating the details of a new set of programmes (Space Station/COLUMBUS; Ariane 5; Hermes; telecommunications, earth observation etc) based on an agreement in principle reached at the ESA Ministerial Council in January, 1985. UK's role in space will be determined in the coming weeks. Europe is poised to make decisions and it will be virtually impossible to join these programmes at a later stage; and certainly impossible to retain the value to UK industry. The next and crucial round of negotiations takes place on 19/20 March 1987.
- (ii) European Space Agency (ESA) is crucial to any UK programme, but it is like a club: the more you use it, the better value you get for your subscription.
- (iii) Those who profit most from ESA membership have a national programme which
 - allows judicious preparation of European programmes consistent with their national ambitions and objectives; and
 - exploits approved ESA programme by funding
 - . scientific, earth observation and other experiments (not paid for by ESA budget)
 - . ground facilities, to give a privileged position in acquiring and enabling commercial exploitation of data from spacecraft.
- (iv) As a rule of thumb it may be assumed that the national programme should not fall below 50% of the contribution to ESA - ie 2/3rds ESA: 1/3rd national.
- (v) Arrival of Spacelab (an ESA laboratory constructed to fly with the U.S. Shuttle) and now, much more, Space Station make it essential for the various elements of a national space plan

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to be consistent, and to provide a balance between building an infrastructure and its utilisation.

(vi) The National Space Plan must satisfy the needs of the UK as a whole, not only of its four founder members.

(vii) The UK private sector has already made substantial investments in space. Once Government's attitude is known, there are excellent prospects for an even greater commitment. This next phase of space activities will be marked by a switch of funding away from classical satellite construction (which we have largely mastered) to the development of more sophisticated techniques for sensors, mobile communications, image processing. There are now more than 200 companies with a capability and interest in space activities; and many of them would become directly or indirectly involved in the programme.

(viii) In the descriptions of the options, the term "non-ESA programme" is used rather than "national programme", to emphasise that, although the initiative will be clearly identified with the UK, some of the proposed projects involve cooperation with other countries.

(ix) The COLUMBUS Space Station programme is a single ESA programme intended to provide Europe's contribution to the US led international Space Station. The UK has done very well out of Phase B (definition phase) of COLUMBUS programme, and a recent study which identified considerable value to potential UK users was endorsed at a recent Royal Society Conference attended by industrial and commercial users as well as scientists.

(x) The UK has chosen to put 2/3rds of its COLUMBUS funding into the Polar-orbiting Platform which will be a logical continuation of our interest in earth observation and offer the best chances of commercial exploitation.

(ix) In assessing priorities in the options contained in this paper, preference has been given to the areas which have proved successful and beneficial in the past, and which exploit our present industrial strengths (eg all forms of communications by satellite and observation of the earth's surface). New areas are recommended only where the prospects for successful exploitation are assessed as good, or when it is important that UK industries share in the new technologies to be developed.

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DG BNSC'S ESTIMATE OF TOTAL EXPENDITURE ON SPACE R&D IN UK - 1986

CIVIL - £108M (through BNSC)

DTI	£64m
MOD (incl MET OFFICE)	£15m
SERC	£28m
NERC	£ 1m

MOD - £4M*

MOD RAE Research Programme	£ 4m
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PRIVATE SECTOR - £26M

Satellite Communications and Navigation	£ 6m
Earth Observation	£ 1.5m
Preparation for Spacelab Space Station experiments	£ 1m
Launch Systems	£ 2m
Ground Facilities	£ 2.5m
Technology	£ 13m

TOTAL - £138M

*In addition, MOD spent £126 on procurement of space-related equipment, as follows:

Communication satellites and ground segment	£100m
(of which SKYNET = £78m)	
Ship terminals	£ 15m
Land Forces satellite receivers	£ 4m
Ground station operating costs	£ 7m

£138

126

264

How does this compare with other countries?

Is it the private sector which is leading -

26m

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COSTED OPTIONS

The following 5 pages propose how funding for the BNSC could most effectively be distributed in 1989/1990, ie the third year of the present PES period in five cases:

- no increase in present expenditure (£119)
- as proposed in the Space Plan (£302)
- three intermediate points. (£150m, £200m and £254m)

Page 5 shows the amount of currently approved funding is already committed.

In each option there is a summary of the principal ESA and non-ESA activities which could be retained from the Plan (and to what effect), and which activities would need to be dropped. The overall effect of the option is then briefly described.

The utilisation of the additional funding in each of the five options is illustrated in the graphic on page 11.

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FUNDING ALREADY COMMITTED

In each of the coming three years, approximately £98M is already committed. These commitments are common to all the 5 options.

They consist of:-

ESA - Mandatory programme

- General Budget (16%)* (ESA overheads & basic infrastructure)	15	£M
- Space Science Programme (16%) (programmes such as Space Telescope, Giotto, Hipparcos etc)	22	
	<u>37</u>	
- Satellite Communications	2	
- Earth Observation & weather satellites	13	
- Contribution to ESA Launch Site	4	
	<u>19</u>	
- Satellite Communications	2	
- Earth Observation incl. National Remote Sensing Centre	3	
- Space Station utilisation study	1	
- Research in industry, universities & at BNSC Establishments at RAE & RAL	10	
- Development of Meteorological Instruments	4	
- University scientific group payloads	13	
- Satellite Platform Technology	9	
	<u>42</u>	
	£98M	

TOTAL COMMITTED

NON-ESA

* Member States contribute to the Mandatory Programme according to GNP. Percentage contributions to optional programmes are agreed between participating Member States.

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OPTION 1 - PRESENT LEVEL: £119M in 89/90

Expenditure (cash) £m	87/88	88/89	89/90
Current Allocation	112	113	119
Committed (see page 5)	98	98	98
Available	14	15	21
Additional requested	4	3	NIL

Use of available £21M in 89/90

ESA (£77m) -	Future telecoms programme - mobile communications	(20%)	£m
-	Advanced telecoms systems and technology programme	(16%)	13
NON-ESA (£42m) -	UK remote sensing data centre, for use with already approved ESA remote sensing satellite.		3

ESA New programme would be restricted to communications in which we already have competence. Even these would have to be restricted below our usual percentage, losing us the European lead we have established.

No future involvement in ESA earth observation, depriving UK of ability to exploit the potential value added services in which we have made a promising start, based on our European lead in meteorology, which we should also lose.

Not in the Space Station and not even enough funds to become a user for commercial or scientific purposes.

No involvement in future launches, losing Ferranti its lead in guidance systems now used both by Ariane and Japanese launches.

NON-ESA Only existing obligations in national programme could be met, plus the earth observation data centre (although this would depend on obtaining the additional funds in the two preceding years).

This would effectively write the UK out of ESA and complementary national space.

No need for BNSC as subordinate department - small co-ordination unit sufficient.

DGCAAC

OPTION 2 £150M - in 89/90

Expenditure (cash) £m 87/88 88/89 89/90

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Current allocation	112	113	119
(of which Committed	98	98	98)
Additional requested	18	27	31
Total	<u>130</u>	<u>140</u>	<u>150</u>
Available for commitment	32	42	52

This would permit:

ESA (£100m)

- . Future telecommunications programme (20%) and Advanced telecoms systems and technology programmes (16%)
- . 13% in two next Earth Observation satellite programmes
- . 4% in COLUMBUS (mainly to maintain contact with Space Station programme)
- . 6% in Space Station experiment preparations (in order to retain possibility of becoming active user of Space Station)
- . 2% in ARIANE 5 (to continue Ferranti supply of guidance system)

NON-ESA (£50m)

- . UK data centre for ESA's first earth observation satellite.
- . £3M - earth observation and Space Station experiment seeding money.

This option would give a continued but reduced, participation in ESA's satellite telecoms (excluding data relay satellite) and earth observation programmes. Overall it would amount to an average of 8% - half GNP, and would allow UK no leading role in the new ESA programmes.

The only increase in the national, non-ESA, programme would be the UK data centre for the ESA earth observation satellite.

Difficult to see this as other than prolonging the agony.

DGCAAC

- 7 -

*In ESA satellite programmes a contribution of at least 10% is required to obtain technologically advantageous work.

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OPTION 3 £200M in 89/90

Expenditure (cash) £m	87/88	88/89	89/90
Current allocation	112	113	119
(Of sum Committed	98	98	98)
Additional requested	42	64	81
Total	154	177	200
Available for commitment	56	79	102

It would permit:

ESA (£130m)

- Future telecoms programme (33%) and Advanced telecoms systems and technology programme (16%) (but still nothing for Data Relay Satellite System).
- 13% in next two Earth Observation satellites (but not the third one planned)
- 10% in COLUMBUS - we would negotiate to retain two thirds of this on Polar Platform, because of its relevance to earth observation, but we would have to relinquish UK leadership of it.
- 6% in Space Station experiment preparations and 2% in Ariane 5 as in Option 2.

NON-ESA (£70m)

- An effective UK earth observation data centre for commercial value added users and £6M on new sensor developments of interest to commercial, defence and scientific users.
- £9m for Satellite platform technology to maintain the UK industrial competence.
- The option would give an average of 10% participation in ESA programmes - very unbalanced overall - and the UK would retreat relative to other Member States. Our status would be roughly akin to that of the Netherlands.
- At this level it begins to be possible to start a national programme. It would be deprived of one of BNSC's most important proposals: joint flight opportunities for UK payloads in communications, navigation, earth observation, science and technology, such as in the RADARSAT (Canada/UK/US) programme.
- Moreover it would not be feasible to fund the UK Centre for Polar Platform Operations, which is a very important possibility fully in line with UK's emphasis on practical applications such as earth observation.

DGCAAC

OPTION 4 £254m

Expenditure (cash) £m	87/88	88/89	89/90
Current allocation	112	113	119
Committed	98	98	98)
Additional requested	67	104	135
Total	179	217	254
Available for commitment	81	119	156

(Of which

This would permit:

ESA (£154)

- Data Relay Satellite System (19%) in addition the two telecoms programmes in Option 3
- ESA's next earth observation programme (ERS-2) (20%) and in the second one (13%) (but nothing for the third one)
- almost 14% in Columbus, allowing retention of Polar Platform leadership
- 3% in Ariane 5 - guidance and associated components.
- 5% in Hermes - to win crucial technologies which will otherwise go to the CS technologies of direct relevance to next generation launcher and to aircraft development (very important to UK industry, eg GEC Avionics)...

NON-ESA (£100m)

- A reduced (compared to the Plan) but balanced programme is possible, covering telecommunications, earth observation and national flight opportunities (eg RADARSAT).
- A good technology support programme.
- A start on the UK Centre for Polar Platform - essential for maintaining leadership in utilisation of platform.

The main casualty would be the new satellite test facilities. They would in any event require both private sector and MOD additional funding but although highly desirable these facilities cannot be given sufficient priority at this level of funding.

This option, would give an average of 12% participation in ESA programmes (well behind Italy's supposed contribution, but adequate to maintain the influence necessary to ensure a cost effective and user-oriented programme). It reduces UK's longer term ambitions in ESA's earth observation programme, but this is counter-balanced by retention of leadership in the Polar Platform. The other cuts from the Space Plan (Option 5) will mean a slower build-up of the national programme, but, with the exception of the satellite test facilities, it would allow a coherent and realistic build-up of UK space capabilities and give high incentive to the private sector to commit to it.

It would necessitate a decision on the proposal for BNSC to become a subordinate department.

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OPTION 5 SPACE PLAN

Expenditure (cash) £m	87/88	88/89	89/90
Current allocation	112	113	119
Committed	98	98	98)
Additional requested	89	139	183
Total	201	252	302
Available for commitment	103	154	204

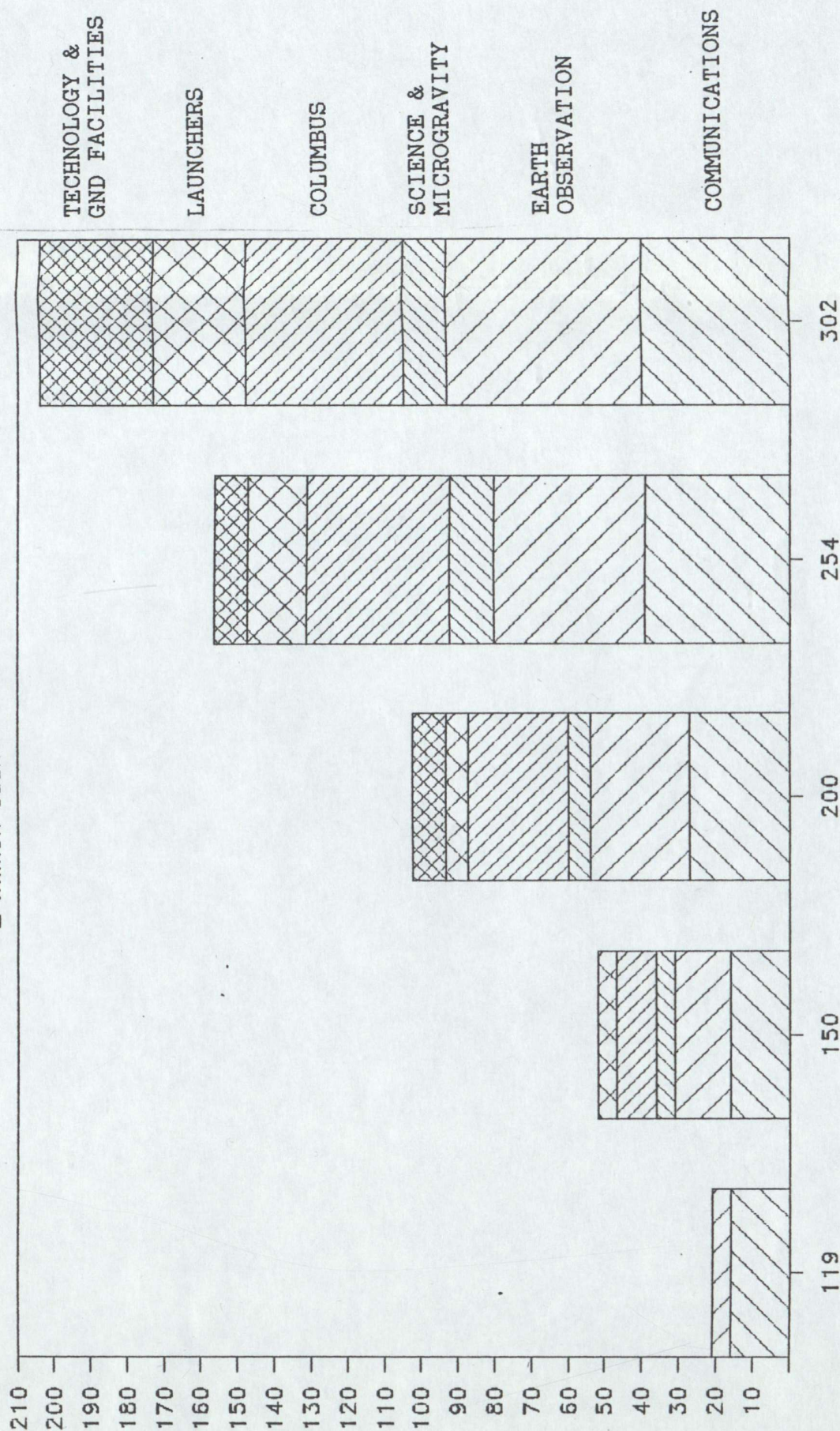
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The Plan was drawn up in the middle of 1986. Since then slippages due to difficulties with the US Shuttle and Ariane programmes have had an effect which has been offset by the recent depreciation of the £; so the figures in the Plan remain realistic.

In this exercise to devise other and cheaper options, no further description of the Plan is included, and this option is simply retained as a benchmark.

BNSC PROGRAMME 1989/90

£ million cash



ADDITIONAL EXPENDITURE

RECOMMENDATIONS

Choosing Option 1 (maintaining level of £119M) would in my view be more honest than Option 2 (£150M), because the additional funding would not allow a coherent and balanced programme, although it would allow some limited new starts in ESA projects.

Option 3 (£200M) is the first which permits a start to the essential build-up of the national-non-ESA-programme, but the gaps it would leave are serious, and it would definitely not enable the UK to catch up. It must be regarded as a conservation option.

Putting aside an understandable sympathy for Option 5 (£302M - Space Plan), it must be admitted that Option 4 (£254M) secures most of the Plan's essential points, though the recommended build-up of the non-ESA (national) programme would be significantly retarded.

Option 4 would re-galvanise UK industrial and university space activities, and allow us to increase our commercial and scientific effectiveness in this field in Europe and beyond, whilst building up a space programme tailored to our country's needs and objectives.