

PREM 19/269

Part 1

Confidential File

The microelectronics industry.
 The position of INMOS.
 Proposed Advisory Committee on
 Microelectronics Development
 Programme

INDUSTRIAL
POLICY

At:
May 1979

Referred to	Date	Referred to	Date	Referred to	Date	Referred to	Date
24.5.79		29.5.80					
11.6.79							
13.7.79		30.4.80					
16.7.79		ends					
20.9.79							
12.11.79							
13.12.79							
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30.4.80							
7.5.80							
23.5.80							

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PART 1 ends:-

S/S Ind to S/S Trade 30.4.80

PART 2 begins:-

DES to CRAW 1.5.80

Published Papers

The following published paper(s) enclosed on this file have been removed and destroyed. Copies may be found elsewhere in The National Archives.

The Manpower Implications of Micro-Electronic Technology: report by Jonathan Sleigh, Brian Boatwright, Peter Irwin and Roger Stanyon
Published by HMSO (ISBN 011 361191 9)

Signed AWayland Date 27 April 2010

PREM Records Team



Secretary of State for Industry

DEPARTMENT OF INDUSTRY
ASHDOWN HOUSE
123 VICTORIA STREET
LONDON SW1E 6RB

TELEPHONE DIRECT LINE 01-212 3301
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30 April 1980

The Rt Hon John Nott MP
Secretary of State for Trade
Department of Trade
1 Victoria Street
London SW1

RHS

Dear John.

Since our discussion at E on Inmos, when you spoke so constructively, I have checked whether I was wrong in my assertion that the factory for GEC at Neston is nearly complete. I am now assured that the 100,000 sq ft main building is 90% complete with the roof on (although one end wall has been left unbuilt so that machinery can be moved in). A major effluent drain is being laid and this may have given you the impression that, with so much earthwork going on, there is still much construction to follow.

I am copying this letter to the Prime Minister, colleagues on E Committee and the Secretaries of State for Wales and Scotland.

Ken.

Ken

COPIES 1-1

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Ind 107

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Ref. A02008

PRIME MINISTER

INMOS

(E(80) 36)

BACKGROUND

The Committee agreed on 17th March (E(80) 10th Meeting) that an Industrial Development Certificate (IDC) should not be granted for INMOS's first production unit at Bristol. They agreed also that INMOS should be encouraged to site this plant at Cardiff, although the Government could not direct them to do so. You said that, if new facts emerged, the Secretary of State for Industry could bring the question again to E. Otherwise the decision would stand.

2. In his minute to you of 3rd April the Secretary of State for Industry referred to two developments:-

(i) INMOS had offered to consider putting an assembly and testing factory in Cardiff rather than Singapore - but his present paper says they have now decided that this would be uneconomic.

(ii) A possibility of participation by GEC following the collapse of their own collaborative venture with Fairchild's.

3. In his letter of 15th April, the Secretary of State for Employment argued that neither development justified reversing E's decision. He warned against letting things drift until INMOS could try to bounce the Government into a decision.

4. On 16th April the Secretary of State for Wales argued, in similarly strong terms, for sticking to the previous decision and for making an early announcement. He questioned the relevance of GEC's interest to the immediate issue. He was sceptical - and rightly so as it turns out - of the offer to switch from Singapore. The Secretary of State for Scotland's letter of 21st April strongly supports him.

5. In his present paper Sir Keith Joseph informs colleagues that following further discussions he is even more convinced that it would be a mistake to refuse an IDC for a first production unit at Bristol. You will recall that the main arguments were that because of the close link between designers and

CONFIDENTIAL

researchers, the first production unit had to be next to the technology unit at Bristol; that key people were already living in Bristol; that a Government intervention would offer INMOS an alibi for failure; and that there was a risk that the key entrepreneurs could withdraw. In addition Sir Keith now draws attention to two further possibilities, namely:-

- (a) that if an additional IDC were refused for Bristol, INMOS might try to build a smaller production unit at Bristol within the ambit of their present IDC.
- (b) That INMOS might seek to turn their operation into "a purely American venture based on the facilities already built at Colorado Springs at a cost of £20 million to the NEB".

6. You will want to explore the reality of these two possibilities. Squeezing up in Bristol would be difficult to defend: loss of the project to the USA would be the worst outcome. In the same context you may wish to probe the reality and meaning of the INMOS guarantees to "build their next United Kingdom production facility in the Assisted Areas".

7. As to GEC, Sir Keith Joseph will be meeting Sir Arnold Weinstock shortly before the meeting and will report the outcome. His provisional judgment is that a decision to let INMOS go ahead now would help the NEB in negotiations with GEC, even though such a decision would be unwelcome to the latter company.

HANDLING

8. You will wish to ask the Secretary of State for Industry to introduce his paper, explaining in particular what are the new facts and what is the latest GEC position. The Secretaries of State for Employment and Wales will want to put the counter arguments. In the discussion you will wish to cover the following points:-

- (i) What are the new facts?

Apart from the GEC interest, they appear to be the possibility that INMOS may go ahead in Bristol anyway, and the possibility of the withdrawal of the project to the USA. Otherwise the arguments are essentially those previously rejected by the Committee.

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(ii) What is the relevance of GEC's interest?

GEC may well take two or three months to reach a decision. In the meantime they would no doubt prefer no decision to be taken on the siting of the production unit, so that the options for them remain as open as possible. But since there is no guarantee that they will go ahead - or that INMOS's top people would be willing to stay with them - a delay could put the whole project at risk. The Committee may feel, therefore, that GEC's interest is irrelevant to the decision on an IDC for Bristol.

CONCLUSIONS

9. In the light of the discussion the Committee might be guided:-

either

(i) to confirm the decision not to give a further IDC for INMOS in Bristol and leave it to the company to decide what to do next;

or

(ii) to decide to grant a further IDC to INMOS in Bristol and defend the decision on whatever grounds appear most plausible;

or

(iii) to risk the continuing substantial costs of delay, and wait for GEC to reach their decision before coming to a final view.



(Robert Armstrong)

23rd April, 1980

by A Dwyer

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Oddi wrth Ysgrifennydd Gwladol Cymru The Rt Hon Nicholas Edwards MP *From The Secretary of State for Wales*

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22 April 1980

Prime Minister

INMOS

In E bundle

I have read the Memorandum by the Secretary of State for Industry on INMOS (E(80)36) and it is not clear to me what matter is to be discussed at E Committee on Thursday. The minutes of the E discussion on 17 March record that the committee invited the Secretary of State for Industry to report back "if new facts emerged in the course of his discussions with the company which invalidated the grounds on which their decision had been taken".

It seems clear from the Secretary of State's latest paper that no new facts have emerged. It was acknowledged at the last meeting that a strong case had been made out for not separating the manufacturing and research facilities, but it was argued that as the research facility had not been built the whole complex could be re-sited. It is now confirmed that work on the research unit has not started and is still in the design stage. It is surely not correct to suggest that at the last meeting at which we discussed this we decided "to split the research and production facilities". The decision was to refuse an IDC for a production unit at Bristol and it was left to INMOS to decide whether to split the operation or move the whole facility to a new location in a development area.

The possible interest of GEC does not seem to be a factor that affects the decision on the IDC.

I hope therefore that we can stick to the decision taken on 17 March.

/ I am copying this to the other members of E, to George Younger and to Sir Robert Armstrong.

J or

The Prime Minister
10 Downing Street
LONDON SW1

Nick



cc Aldegwald
NEW ST. ANDREWS HOUSE
ST. JAMES CENTRE
EDINBURGH EH1 3SX

Incl for

DL

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The Rt Hon Sir Keith Joseph MP
Secretary of State for Industry
Department of Industry
Ashdown House
123 Victoria Street
LONDON
SW1E 6RB

21 April 1980

Dear Keith,

INMOS

Thank you for sending me a copy of your minute of 3 April to the Prime Minister about the siting of the first Inmos production unit.

Like Jim Prior and Nick Edwards, I do not understand what possible bearing Inmos's review of its intention to undertake assembly and testing overseas has on our decision that an IDC should not be granted for a factory at Bristol. We are not looking for sops for the Assisted Areas: rather for the consistent application of regional policy under which it was our clear view that Cardiff should be preferred for the first production unit.

I am copying this letter to the Prime Minister, to members of E Committee, to the Secretary of State for Wales and to Sir Robert Armstrong.

Yours ever,

George

22 APR 1980



Ind 901.

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Oddi wrth Ysgrifennydd Gwladol Cymru

The Rt Hon Nicholas Edwards MP

From The Secretary of State for Wales

CONFIDENTIAL

16 April 1980

2
PRIME MINISTER
2 more letters about
INMOS. We are
arranging an early
discussion in E.

De Keik

MJ

16/4

INMOS

In your minute of 3 April you indicate that it has not been possible, because of two subsequent developments, to report progress on the actions regarding the location of the first Inmos production plant decided upon by E Committee on 17 March. Jim Prior has also now written urging that, whatever we do we should do it quickly. I strongly share his view.

Until more information is available I would not wish to comment on GEC possible interest except to say that I find it difficult to see how this would affect the decision in favour of Cardiff. I can certainly envisage that if GEC pursue their interest they will wish to know the Government's views on location and the extent to which Regional Financial Assistance is likely to be available. This could be highly significant to GEC's willingness to invest in the project.

The other development you referred to is in my view clearly totally irrelevant to the decision taken on the location of the production unit in Cardiff. If it proves that certain operations planned to be undertaken by low cost contractors in Singapore can be as economically carried out in a UK Assisted Area, this of course is to be welcomed. However I note a proper assessment is yet to be made of the commercial case for such a plant, and I confess to a great deal of scepticism about the whole concept.

/My reaction

The Rt Hon Sir Keith Joseph Bt MP
Secretary of State for Industry
Ashdown House



My reaction otherwise to the proposal is that it may reflect the fact that Inmos, having been given every opportunity, can produce no good reasons against the location in Cardiff of the first production plant.

I am sure we could not contemplate reversing a collective Ministerial decision that an IDC should be refused for Bristol and that Inmos production should be centred in Cardiff; a decision based not only on Regional Policy considerations but on evidence that it is an eminently suitable location because of the possibility that, at some later date, work planned for cheap labour in the Far East may become available.

It is really only necessary to state the proposition that Cardiff is suitable for a cheap assembly plant but not for a production or design unit to foresee the reaction that it would rightly produce, not just in Cardiff but throughout the assisted areas of Britain.

I am convinced that, from every point of view, a public announcement on Inmos location, reflecting the decision taken by E Committee on 17 March, should be made at the earliest date.

/ I am copying this letter to other members of E Committee, George Younger and to Sir Robert Armstrong.

J. C.

Neil

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16 APR 1980



Caxton House Tothill Street London SW1H 9NA

Telephone Direct Line 01-213 6400

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Rt Hon Sir Keith Joseph Bt MP
 Secretary of State for Industry
 Department of Industry
 Ashdown House
 123 Victoria Street
 LONDON SW1

15 April 1980

Dear Secretary of State.

INMOS

I have seen a copy of your minute to the Prime Minister of 3 April about the location of the first INMOS production unit.

I agree of course that the two new developments you mention should be pursued. I cannot see, however, that either could possibly justify a reversal of the decision taken by E Committee on 17 March not to grant an IDC for the Bristol factory. Nor do I think that location of the assembly and testing plant in Cardiff, if I am right in thinking that this would mean many fewer jobs than the 1,000 forecast for the production unit, would be much consolation to Cardiff for the loss of the latter. And I am particularly concerned that matters should not be allowed to drift to the point where INMOS will attempt to bounce us by claiming that an IDC is required at once if the whole project is not to be jeopardised, and enlisting support for this view by means of selective leaks. I hope, therefore, that if Ministers are to be asked to review the earlier decision we should do so very soon.

I am copying this letter to the other members of E Committee, the Secretaries of State for Scotland and Wales, and to Sir Robert Armstrong.

Yours sincerely
John Anderson.

(approved by the
 Secretary of State and
 signed in his absence)

16 APR 1960





PRIME MINISTER

INMOS

At its meeting on 17 March E Committee endorsed the conclusion, reached earlier by E(EA) Committee, that the NEB should subscribe £25 million for the second tranche of INMOS equity funding, and went on to discuss the siting of the first INMOS production unit. It was the majority view that Cardiff should be preferred and that an IDC should not be granted for a factory at Bristol. I was invited to explain the Government's views to INMOS; to explore with them the reasons for the delay in constructing the company's Technology Centre at Bristol; and to bring the matter before E Committee again if new facts emerged. The purpose of this minute is to report subsequent developments to colleagues.

I had been expecting that I would have been able to report progress to colleagues before the Easter holiday but this has not proved possible because of two relevant developments, both of which are not yet settled.

The first development is a proposal by INMOS that they might be able to help our concern about Cardiff by situating there a factory to undertake assembly and testing as an additional facility [?] not hitherto envisaged as being within the scope of the company's operations. On existing plans this would be undertaken by low-cost sub-contractors in Singapore, but the changing balance between plant and labour costs for this kind of operation means that it may be economic for INMOS itself to undertake the work in UK Assisted Areas,

/where ...

✓ by the Director
Mr Gaffin

Prime Minister ^{had 2} ^{BT}

To write.

ms.

R

3/4



where capital grants would be available. The initial results of the urgent study the company has made are encouraging but it is clear that a considerable amount of work still remains to be done before a proper assessment can be made of the commercial case for such a plant.

The other development is a totally unexpected possibility of obtaining some private sector participation from GEC. It is far too early to say whether this will firm up into a proposal.

However in view of these developments I have decided not to ask colleagues to consider the matter further until after the holiday. Even then I may not be able to give firm guidance on these possibilities but I have asked that the NEB should pursue both with some vigour. In the meantime I thought I ought to explain where we have got to on this very difficult subject. But I think I should warn colleagues that it may be necessary for me to invite them to review the decision on an IDC for the Bristol production unit before a definitive statement of GEC's position is available.

I am copying this minute to the other members of E, the Secretaries of State for Scotland and Wales, and to Sir Robert Armstrong.

K J

3 April 1980

Department of Industry
Ashdown House
123 Victoria Street

-3 APR 1950



7

CONFIDENTIAL

PRIME MINISTER

INMOS: GRANT OF AN IDC

Following our discussion in E Committee on Monday 17 March (E(80)10th item 2) I met Professor Barron and Mr Petretz of INMOS and Sir Arthur Knight. I explained to them the Government's preference for the first INMOS production unit to be built in an assisted area and the difficulties which stood in the way of revising the existing IDC to permit an expansion of their proposed production facilities at Bristol. I also explored with them the reasons for the supposed delay in constructing the technology centre at Bristol.

I learned of several facts which I had not previously appreciated, and the company described to me a new development in their thinking about production facilities. Mr Barron and Mr Petretz are exploring this urgently with their colleagues in the United States and hope to submit a proposal to me through Sir Arthur Knight and the NEB shortly. I think that the new facts and the company's possible proposal may enable us to view the application for a revised IDC in a new light. If the proposal eventuates I shall be submitting it to E Committee.

Since dictating these two paragraphs the situation has changed again - see the attached minute of a telephone call from Sir Arnold Weinstock.

Mr Barron and Mr Petretz emphasized to me in our talk the "fragility" of a new entrepreneurial team working on the frontiers of very advanced technology to catch a market.

Prime Minister Ind. P.D.
 The "SEC situation", if it
 really is a runner, is
obviously worth pursuing.

PL
 24/3

✓ Mr Lyham
 Mr Walker
 Mr Dennis
 Mr Wright (ed. MR)

CONFIDENTIAL

/Sir Arnold ...



Sir Arnold may or may not be right in his provisional assumption that the team could succeed if both relocated and taken wholly or partly into GEC. The idea is far too interesting to ignore. It is for the NEB, who thought - no doubt correctly at the time a few weeks ago - that there was no private participation available, to explore possibilities.

I am therefore asking Sir Arthur Knight to see Sir Arnold Weinstock.

I am not copying this minute to anyone at this stage.

KJ

K J

24 March 1980

Department of Industry
Ashdown House
123 Victoria Street

CONFIDENTIAL

NOTE OF A TELEPHONE CONVERSATION BETWEEN THE SECRETARY OF STATE FOR INDUSTRY AND SIR ARNOLD WEINSTOCK, CONCERNING INMOS

5.00pm 21 MARCH

1 Sir Arnold Weinstock telephoned the Secretary of State this afternoon to say that GEC were interested in exploring whether they might be involved in the INMOS project. Sir Arnold said that, as the Secretary of State knew, GEC were no longer comfortable in their relationship with Fairchild under their new owners, Schlumberger. Sir Arnold suggested that the present arrangements, with the prospect of the payment of a further £25 million by the Government, appeared to be an expensive venture for the Government. Moreover, if the INMOS entrepreneurs succeeded, it was likely that they would try to cash in on their shares. Sir Arnold suggested that it was only by GEC taking over the venture that a long term UK involvement in the project could be assured. He mentioned that GEC had a factory on Merseyside which would be suitable for the production of microchips as envisaged by INMOS. Sir Arnold also pointed to the fact that INMOS would have to build a market for their products, and GEC could provide part of this market.

2 In reply the Secretary of State said that he was very interested to hear Sir Arnold's views. By way of background the Secretary of State explained that he had raised with the NEB the question of the potential interest of private investors in the INMOS venture. However, he had been told that such interest did not exist yet. This seemed no longer to be so. The Secretary of State said that he would like to ask the NEB to talk to Sir Arnold.

3 The Secretary of State mentioned that he was not sure what view the INMOS entrepreneurs would take of Sir Arnold's proposal. They viewed themselves very much as a cottage industry. Sir Arnold entirely agreed that this sort of operation was a cottage industry, and he said that it would be treated as such within the GEC empire. However, he would ensure that bright people were put in under the entrepreneurs, to learn from them, with a view to taking their place if the entrepreneurs themselves cash in and moved out.

4 More generally, Sir Arnold suggested that the involvement of GEC was the only way in which the Government might limit its insurance premium on the project. He suggested that the Government might make the offer of further money conditional upon the involvement of GEC. The Secretary of State cautioned that the entrepreneurs had argued constantly that the venture would not succeed if Government imposed conditions upon it. The Secretary of State suggested to Sir Arnold that moving the project might cause the core talent to be lost. Sir Arnold commented that the only indispensable talent was that of Schroder; he was not in the UK but in the US operation, and would stay with the company because he had a strong financial interest in it.

5 In conclusion, Sir Arnold agreed that the Secretary of State should ask Sir Arthur Knight to get in touch with him.

Catherine Bell
 CATHERINE BELL
 PS/Secretary of State for Industry
 Rm 11.01 Ashdown Ext 3301
 21 March 1980

PS/Mins
 cc PS/Secretary o/r
 Mr Bullock
 Mr Lippitt
 Miss Mueller
 Mr Atkinson
 Mr Harrison
 Mr Leeming

CONFIDENTIAL



24 MAR 1960



*mid P.D.
Top copy returned to D.W.*

10 DOWNING STREET

PRIME MINISTER

17th March, 1980

One question this afternoon is whether or not INMOS first factory would function satisfactorily away from the Research Centre.

Two points :

1. This sort of question always depends on the circumstances of the particular case. Could No.10 function satisfactorily with -
 - a. the Private Office located at Maidenhead ?
 - b. the Cabinet Office located at Maidenhead ?
 - c. the Civil Service located at Maidenhead ?

2. A friend of mine who runs a big American micro-chip company did once tell me that the development of a new factory is a highly complex matter. Apparently the process is chemical rather than mechanical and the same equipment will not necessarily work in the same way in Stockport as in San Francisco. There is also a significant learning course in the production process.

For both these reasons there may well be great merit in having the factory and research in the same place for the first production unit in what is, in any case, a high risk venture.

DW

David Wolfson



Te has seen 14/3.

2 MARSHAM STREET
LONDON SW1P 3EB

My ref:

Your ref:

14 March 1980

Dear Secretary of State

INMOS

I have seen Nick Edwards' letter to you of 12 March.

As you know, I expressed the view that it would be wrong on the evidence to impose a location on INMOS against their commercial judgement.

But I really must support Nick Edwards' right to expect support from his colleagues if he believes that we are not being shown a full picture.

I simply can't accept that when we provide cash on terms that are well nigh indefensible for a project that is broadly unfundable that the beneficiaries of this largess should preach constitutional niceties to deny a Cabinet Minister facts that he is reasonably entitled to expect.

It shows an attitude of mind on the part of INMOS that I cannot accept.

I am copying this to the Prime Minister, members of E(EA) and E and to Sir Robert Armstrong.

Handwritten signature of Michael Heseltine

MICHAEL HESELTINE

(Dictated by the Secretary of State and signed in his absence)

Sir Keith Joseph

14 MAR 1950

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PRIME MINISTER

INMOS

(E(80)25 and 28; letter of ¹⁴~~16~~ March from Secretary of State for Industry's
Private Secretary)

BACKGROUND

The previous Government decided to provide up to £50 million of support, through the NEB, for INMOS, to manufacture 'standard' micro-electronic chips in this country. The first £25 million was provided immediately; the second tranche was to follow. The Secretary of State for Industry has now decided to recommend provision of the second £25 million. Your own view (Mr Lankester's letter of 5 March) was that this should be 'the absolute maximum under any circumstances'. E(EA) decided to cross-examine Sir Arthur Knight (Chairman of NEB) and Mr Barron (Chairman of INMOS). They did so last week. The Sub-Committee agreed to support the provision of the second £25 million. In doing so, they noted that it would not be possible (despite your reservation) to limit the Government's maximum exposure, which in the event of total failure and total unsaleability of assets could be as high as £100 million.

2. A major dispute then arose on the siting of the production facility, to be financed with this £25 million. The Secretary of State for Wales insisted on taking the matter to E. There was of course much political interest, when the company was first established, in the siting of INMOS. Although the work is not particularly labour-intensive, experience in the USA and elsewhere suggests that micro-electronics developments spin off new companies and generate new employment around them. It seemed important to steer INMOS towards a development area. The company succeeded, however, in convincing the NEB that it should be allowed to put its 'technology centre' (where all the research and development is done) in Bristol. An IDC for this was duly granted, and some of the company's highly-qualified staff have already moved to Bristol. Labour Ministers apparently thought that the company accepted a quid pro quo: that it 'intended' to site its first production unit in a development area. Mr Alan Williams, Mr Kaufman and

others certainly think so, and said this in a letter to the Times on 29 February and in an Adjournment Debate on 12 March. But the company say that there was 'fine print' in the agreement, and that they were not absolutely committed by the word 'intend' if later developments made this the wrong decision.

3. The company now wants to put the first production unit, involving about 1,000 jobs, in Bristol, alongside the permanent technology centre site. They base their case on a report done for them by PA Management Consultants, though the terms of reference were limited to purely financial issues, and apparently the Report - which we have not seen - did not cover the technical advantages of co-location. The company are now more convinced than they were two years ago that the production site must be co-located with the technology centre at Bristol despite the availability of regional grants at Cardiff. The design process is such that there is constant interaction between the designers and the manufacturers. Again, these arguments convinced the NEB (after a long debate) and the Department of Industry. They did not convince all the Ministers round the table at E(EA) when Sir Arthur Knight and Mr Barron were cross-examined. Since then, the company (Mr Barron and Mr Richard Petritz, the American entrepreneur who is the moving spirit) have been to see Lord Trenchard, to go through the formalities of an IDC application. The Secretary of State for Wales joined him. Lord Trenchard (whose views are reported in a letter of 14 March from Sir Keith Joseph's Private Secretary) believes that an IDC must be granted for the production facility in Bristol. Mr Edwards disagrees. His views are set out in his paper E(80)28, which he insisted on circulating in addition to the statement of his views in the report from E(EA) - circulated as E(80)25 - and in his letter of 5 March annexed to that report. The persistence with which he argues this case demonstrates his political concern about this matter.

HANDLING

4. I suggest you take the discussion in two stages: further support; and location.

Further Support

5. The eventual view at E(EA) was that this was a risky project, but that having decided to undertake it, and having put the NEB in charge, the Government should back the NEB decision. Sir Keith Joseph's personal view (taken after consulting 'a very wise man' in the industry - un-named) is that this is an insurance policy

which it would be unwise not to take out. Several Ministers were critical of the lack of any commercial discipline on the company. But they were told by Sir Arthur Knight that there was no prospect of raising the money from private sources until about 1982, when the first product could be demonstrated. In the end, E(EA) agreed unanimously that the project should be backed. They accepted, subject to your own views, that it would not be practicable to limit the Government's contingent liability to £50 million direct investment: if the project goes totally wrong, the total losses could be a lot higher. The chances of this happening, however, are fairly remote. You may wish to press Sir Keith Joseph on this point. The Chief Secretary was content to accept the risk.

Siting

6. The real issues arise here. The Secretary of State for Wales has put his own views on record. He has the support of Mr Heseltine (who may be late for this meeting because of a debate) and of the Secretary of State for Scotland, who has asked to be allowed to attend. Other Ministers felt that, having backed the NEB on a risky project, the Government should not make the task even more risky by failing to back them over the choice of site. To do so would give the company an alibi for failure.

7. The arguments for Bristol affect both the technology centre and the production unit. The technology centre (employing 400, mainly highly qualified staff) depends critically on the presence of a few key people: some of them are already settled at Bristol. The company believes strongly that it will lose some of these, and be unable to recruit the balance, if the technology centre is shifted from its present temporary quarters to Cardiff. The Secretary of State for Wales understandably believes that he can attract high-quality technologists and the designers to Cardiff. But all the evidence he quotes concerns production facilities for trans-national companies putting plants in Wales. There is nothing comparable to the technology centre yet on site in Cardiff. It is not self-evidently an attractive proposition for a British 'Silicon Valley'. If the technology centre stays at Bristol, there is then a strong case for co-locating at least the first production unit with it. The company argues that this case was understated last time, but as they gain experience of the design process, they become convinced that the two things go together. Most Ministers were prepared to accept this argument: Mr Edwards challenges it, but produces no real evidence.

8. The case for Cardiff is partly political, partly regional policy. The political argument is that a new venture of this kind would bring new hope at a time of steel closures. Although the numbers involved are fairly small, the spin-off effect could be considerable. The regional policy argument is that any additional jobs are worth having and if supported by public money should be steered if possible to Assisted Areas. But you will note that the production unit, at least, will employ mainly unskilled female labour, whom the firm will train on the spot. It will not make much of a difference to the problem of unemployed steel workers.

9. The arguments are thus fairly finely balanced, and it is not clear which way the Committee will go.

CONCLUSIONS

10. You will nevertheless want to record a final decision one way or the other: every day's delay costs an alleged £500,000 in lost production, and reduces the chance of the company breaking into the market. I suggest, therefore, that the conclusion should either be:

a. to approve the issue of £25 million second tranche assistance to the company; and to agree that an IDC should be given for construction of the first production unit in Bristol; (in this case, it should be possible to get the firm's agreement that all future production facilities should go to Assisted Areas.)

or

b. to agree the £25 million, to agree that the technology centre should remain at Bristol; but to insist (through the withholding of an IDC) that the production facility be sited in Cardiff;

or

c. to agree to the £25 million; but to insist that both the technology centre and the first production unit should go to Cardiff;

or



d. to withhold the second tranche of £25 million altogether
(thus in effect bringing the project to an end.)

ROBERT ARMSTRONG

*(approved by Sir Robert Armstrong
and signed in his absence.)*

14 March 1980

CONFIDENTIAL

2pps

DEPARTMENT OF INDUSTRY
ASHDOWN HOUSE
123 VICTORIA STREET
LONDON SW1E 6RB

TELEPHONE DIRECT LINE 01-212 3301
SWITCHBOARD 01-212 7676



Secretary of State for Industry

14 March 1980

Tim Lankester Esq
Private Secretary to the
Prime Minister
10 Downing Street
London SW1

Am. [unclear]

*g
r
4/1*

Dear Tim

INMOS: FACTORY LOCATION

My Secretary of State has circulated his paper "Inmos: Finance and Factory Location" E(80)23 in his capacity as Chairman of E(EA) Committee. The paper incorporates amendments suggested by the Secretary of State for Wales.

Since the paper was drafted the Minister of State, Lord Trenchard, has seen Mr Petritz and Professor Barron of INMOS as part of the normal consideration of the company's application for an industrial development certificate (IDC) for the first production facility at Bristol. Lord Trenchard was accompanied by the Secretary of State for Wales.

The purpose of the meeting was to ^{ask} INMOS formally why they could not build their first production facility in South Wales, the Assisted Area nearest to Bristol, bearing in mind that when the previous administration decided to issue an IDC for INMOS' technology centre to be located at Bristol, the NEB publicly announced that INMOS had "the firm intention of locating production units in an assisted area". After a lengthy period of questioning Lord Trenchard was satisfied that there were strong arguments for locating the first production facility together with the technology centre. He thinks it a pity that these arguments were not recognised 15 months ago when the location of the technology Centre was under consideration. But the three founders of the company were still feeling their way together on these issues in the early days of INMOS, and Lord Trenchard understands that the strong case for co-location of R&D and production has become increasingly accepted in this new industry.

/There ...



There remains the theoretical alternative of getting the company to move the technology centre to Cardiff and to locate the first production facility with it there. The INMOS Directors made it clear that they thought this would have a very adverse effect on their existing staff located in the US as well as in the UK; that they risked losing at least some of their key staff in Bristol as a result; and that the delay involved in the move would put at serious risk their future plans for launching their products on the market, where careful timing was absolutely crucial for success. Lord Trenchard considers that, although the precise effects of forcing such a move are arguable, the extra risk involved in what is already a very risky project is very difficult for the Government to accept. He is very conscious of the real benefits which re-location would bring to Wales if the project were in the event to be successful, but does not consider that the extra risk would be justified. A failed INMOS would bring no benefit to Wales.

On the other hand, if INMOS' first production facility proves to be successful, there will be good commercial arguments for locating the next facility elsewhere in the UK. The INMOS Directors have given a firm assurance that, if they are successful with the first factory, the next will be located in an Assisted Area. Lord Trenchard believes this undertaking has rather more substance than that allegedly given by the NEB to his predecessors.

In the light of this formal consideration of the application for an IDC and for the reasons set out above Lord Trenchard wishes to recommend that the IDC now be granted.

I am sending copies of this letter to the Private Secretaries to all members of E Committee and to the Scottish and Welsh Secretaries, and to David Wright.

Yours ever

Ian Ellison

I K C ELLISON
Private Secretary

14 MAR 1940

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hd pd.

Lepp

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Oddi wrth Ysgrifennydd Gwladol Cymru

The Rt Hon Nicholas Edwards MP

From The Secretary of State for Wales

CONFIDENTIAL

12 March 1980

De Reite

R M J

INMOS

We spoke about the refusal of Inmos to let Government Ministers see the PA Consultants report on alternative locations. I am afraid I do not share your view that the report is not relevant to our consideration of the issue and I think it incredible that Professor Barron who is seeking massive Government support should snub his nose at Ministers in this way. You tell me that as Inmos is a subsidiary of an independent body - the NEB - we have no legal power to make them show us the report; but I would have thought that Section 7 of the Industry Act which permits the Secretary of State to give the Board directions of a general or specific character as to the exercise of their functions would give us the necessary authority if we chose to use it.

The extraordinary attitude of Professor Barron on this matter makes me suspect that the Report may be more relevant than you believe. I don't think it is enough to be told that I can question Professor Barron on a report I have not seen.

You will be aware that Alan Williams is asking questions about the report and I suspect that he will pursue the matter further in his adjournment debate tomorrow night.

I think it unreasonable that we should be asked to contemplate granting an IDC in these circumstances.

I am copying this to the Prime Minister, other Members of E(EA); E and to Sir Robert Armstrong.

John Evans
Nick

The Rt Hon Sir Keith Joseph Bt MP
Secretary of State for Industry
Department of Industry
Ashdown House
123 Victoria Street
LONDON SW1



12 MAR 1960



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From The Secretary of State for Wales

From the Private Secretary

11 March 1980

Lan lan,

INMOS

R 123

We spoke earlier today about the new course of action proposed on Inmos leading to a discussion on 24 March. You told me that in the meantime the paper circulated by your Secretary of State (E(80)23) stood in abeyance. You said however that it might nonetheless be helpful to have my Secretary of State's comments on that paper so here they are:-

Paragraph 1, line 5 after "considered" insert "together with a letter from the Secretary of State for Wales which are"

Page 2, 1st paragraph delete from "many" at the end of the penultimate line to "staff would" in the last line and insert "some of the 60 staff that have already been recruited might".

Page 2, 2nd paragraph, line 4 after "development area." insert "they felt the decision was of great importance for the future of Regional Policy."

In the same paragraph delete from "while not" in line 8 to "indirect stimulus" in line 9 and insert "could make an important contribution to job creation in places seriously affected by industrial change." at the end of that sentence in line 10 insert "they pointed out that PA management consultants had identified attractive sites near Cardiff and elsewhere."

Page 2, last paragraph sub-paragraph (ii) last line delete "for example, South Wales." and insert "an assisted area".

/I am

I K C Ellison Esq
Private Secretary to the
Secretary of State for Industry
Ashdown House
125 Victoria Street
LONDON
SW1

R



/ I am copying this to the Private Secretaries to the Members of E
and to David Wright in Sir Robert Armstrong's office.

Tomson

Grayson

G. C. G. CRAIG



112 MAR 1930

*With the Compliments
of the
Secretary of State*

*Scottish Office,
Dover House,
Whitehall,
London, S.W.1 A 2AU*



cc AD
✓
hd Pst

SCOTTISH OFFICE
WHITEHALL, LONDON SW1A 2AU

The Rt Hon Sir Keith Joseph Bt MP
Secretary of State for Industry
Department of Industry
Ashdown House
123 Victoria Street
LONDON
SW1E 6RB

R-43
6 March 1980

Dear Keith,

INMOS

Alex Fletcher will be attending E(EA) this afternoon when the Committee will be considering this matter.

I have seen Nicholas Edwards' letter of 5 March, and there is no point in me repeating his arguments. I agree with everything he says. It is essential that this project go to an assisted area, and I am not concerned whether that area is in Wales or England or Scotland. But I am most deeply concerned at the prospect of our Regional Policy being seen to be in complete tatters. I have heard no convincing argument for building this factory at Bristol, and I think that if that is allowed to happen it will be seen (and quite properly seen) as the most damaging breach of faith.

I am copying this letter to the Prime Minister, to other Members of E(EA) and to Sir Robert Armstrong.

Yours sincerely,
George



- 6 MAR 1980

of A. Duguid

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Oddi wrth Ysgrifennydd Gwladol Cymru

The Rt Hon Nicholas Edwards MP

From The Secretary of State for Wales

CONFIDENTIAL

5 March 1980

Dear Keith

B. G.

The proposal that is being put to E(EA) to grant an IDC for the Inmos factory at Bristol, subject only to a formal enquiry about their choice of site, raises issues of great importance.

Colleagues should understand that what is at stake is the credibility of our Regional Policy. A decision to grant an IDC in this case for a Government financed factory will be seen as signalling the abandonment of IDC control. It is hard to believe that if an IDC is granted in this case one could ever be refused again. That is something that would cause grave concern throughout the assisted areas. The interpretation that IDC control is being abandoned will be reinforced by the fact that former Ministers have stated and will continue to state that an IDC for the research centre was only given on the understanding that the manufacturing units would be established in the regions.

The issue has a greater political significance even than that. The decision will be taken and announced at a time of industrial tension when the Nationalised Industries are being asked to undertake large scale demanning, when unemployment is rising and when there are understandable and widely held fears of a return to the thirties. I do not believe that it will be in Wales alone that the decision would be seen as an abandonment by Government of any serious attempt to attract new and more diverse industry to the area when jobs are being lost.

Certainly in Wales such a decision would have the most serious impact on the attitude of those who see their jobs at risk, and on the political reputation of the Government.

/In my view

The Rt Hon Sir Keith Joseph Bt MP
Secretary of State for Industry
Department of Industry
Ashdown House
123 Victoria Street
LONDON
SW1E 6RB

CONFIDENTIAL



In my view the commercial argument for permitting the development to take place at Bristol would have to be extraordinarily persuasive for the Government to grant an IDC in these circumstances. The arguments that have been presented by Inmos and the NEB do not seem in the least persuasive.

The evidence is very strong that when Inmos applied for an IDC for the technology centre the NEB gave a firm commitment to our predecessors that the production units - all four that Inmos had in mind at the time - would be located in the assisted areas. Eric Varley, Alan Williams and Gerald Kaufman, in their letter in the Times on 29 February, made it plain that the IDC for the technology centre was approved on that basis. There was no suggestion from Inmos at the time that they dissented from that arrangement - or, indeed that it was crucial for the first production unit to be cheek by jowl with the technology centre. On the contrary, representatives of Inmos explained to officials in my Department and to local authority officials in South Wales the positive advantages of separation. Our predecessors made public statements on this matter but so far as I am aware there was no suggestion from Inmos that there were any doubts about the matter.

If Inmos knew all along that it was essential for the first production unit to be located alongside the technology centre then they must have deliberately misled the NEB and our predecessors. If on the other hand it is only now that they have concluded that separation would prejudice the whole project it must raise doubts about their competence. Nothing in the papers I have seen suggests that the arguments for a reversal of the previous attitude are compelling. It is surprising to discover that the IDC application approved by our predecessors 15 months ago - with Inmos pleading great urgency - has apparently still not been acted upon. This reinforces my suspicion that the intention all along has been to secure the first production unit for Bristol, and that Inmos were less than frank - to put it mildly - with Government about their proposals. They were similarly less than frank with the very large number of local authorities in the assisted areas who responded - at considerable public expense - to the invitation to submit sites for consideration.

In submitting their present application there is, in my view, a clear onus on Inmos to demonstrate beyond doubt that they have assessed all possible locations in the assisted areas and found none to be suitable. The absolute minimum requirement, I would have thought, is for Inmos to report in detail on the short-listed assisted area sites. Until they do so I do not see how it can possibly be suggested that the application has been sufficiently substantiated.

/I understand

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I understand that Inmos have claimed that only Bristol offers an assurance of attracting the key personnel who are critical for the success of the project. The evidence put forward in support of this is, in my view, very shaky indeed. It really is absurd to suggest that Cardiff, and a host of other assisted area locations throughout the country, are not attractive to professional people. It is not the view taken by Ferranti for example who are going ahead with a high technology project at Cwmbran.

So far as I am concerned I am in no way persuaded that the site on offer to Inmos in Cardiff - which is already in public ownership and on which a start can be made immediately - is not eminently suitable for the first production unit. It is alongside an interchange on the M4 (giving all-the-way motorway access to Heathrow and Bristol); it is environmentally superb (as has been conceded by the consultants acting for Inmos); it is shared only with the important new Radio Chemical Centre development (who have had no difficulty whatsoever in recruiting key personnel); it is within walking distance of an attractive high-class residential area on the outskirts of the city; it is within 10 minutes by road of the city centre and the University; and within easy reach of a national park and areas of outstanding beauty. The alleged bias against Cardiff - and South Wales generally, as a good place to live and work in is totally at variance with the experience of scores of firms who have moved into the area.

The Memorandum suggest that Inmos should simply be asked why they cannot build the factory in South Wales, and that if they say in reply that the technology centre and production should be together - which will be their automatic response anyway - they will get the IDC. I cannot conceive of a more pathetically weak test to be applied to an issue of such importance. Indeed, if Inmos themselves had been asked to think up a test I doubt whether they would have produced such a weak one.

I take the view, therefore, that whilst Inmos and the NEB may have made out a case for the additional funds, they should be released only on condition that the first production unit is located in an assisted area.

If they choose a location in an assisted area outside Wales I could not object, but I think they will accept that if the development is to take place in an assisted area the Cardiff site is eminently suitable. Frankly the suggestion that the project would succeed

/in Bristol

CONFIDENTIAL



in Bristol but would fail in Cardiff is incredible. If that is the justification advanced it has serious implications for the future industrial development not just of South Wales but of the Regions generally. If we as a Government endorse such a view we will make infinitely more difficult the industrial recovery of such areas because it will be that much more difficult to direct high technology investment, foreign and domestic, into the regions.

/ I am copying this to the Prime Minister to other members of E(EA) and to Sir Robert Armstrong.

Jan over

Nick

15 MAR 1990

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FILE
CONFIDENTIAL

RH

Ind AD
cc: E(EA) Cttee:-

D Emp
D Envir
S.O.
W.O.
Dept Trade
Dept Energy

5 March 1980 Chief Sec

The Prime Minister has read the paper which the Minister of State for Industry has submitted to E(EA) Committee on INMOS. she has commented:-

"I hope we shall make it clear that £50 million is the absolute maximum under any circumstances. If INMOS is successful, it won't need more Government support. If it isn't, it must not have more."

If E(EA) decide to support the further £25 million funding which is proposed, no doubt your Department will ensure - in view of the Prime Minister's comment - that the Government's maximum exposure is limited to £50 million. This presumably has implications for the terms on which the parallel funding from the private sector is arranged.

I am sending a copy of this letter to Private Secretaries to members of E(EA) Committee and to David Wright (Cabinet Office).

J. P. LANKESTER

Ian K C Ellison Esq
Department of Industry

CONFIDENTIAL

MC



Minister of State

Department of Employment
Caxton House Tothill Street London SW1H 9NA
Telephone Direct Line 01-213 5949
Switchboard 01-213 3000

Incl. P37

David Rowlands Esq
Private Secretary
Lord Trenchard's Office
Department of Industry
Ashdown House
123 Victoria Street
London SW1

20 December 1979

Dear David

REPORT OF DE MANPOWER STUDY GROUP ON MICROELECTRONICS

*In Separate
Folder at Back
of file.*

This report was released yesterday and I attach a copy along with the press notice. Apart from its general interest and topicality it is relevant to the discussion of new technology at the next meeting of the NEDC on 9 January, when the Prime Minister will be in the chair.

Yours sincerely
John Taylor

J E TAYLOR
Private Secretary

12.
cc PS to the Prime Minister
PS Rt Hon Sir Geoffrey Howe QC MP
PS Rt Hon David Howell MP
PS Rt Hon Sir Keith Joseph Bt MP
PS Rt Hon John Nott MP
PS Rt Hon Mark Carlisle QC MP
PS Rt Hon George Younger TD MP
PS Rt Hon Nicholas Edwards MP

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December 19, 1979

MANPOWER IMPLICATIONS OF MICRO-ELECTRONIC TECHNOLOGY

A Department of Employment Study Group Report

The introduction of new technology should not cause large scale unemployment, says a Department of Employment Study Group report* published today.

In fact, "Manpower Implications of Micro-electronic Technology" emphasizes that it is failure to exploit the new technology which would have extremely serious consequences for employment and the economy generally, far more so than any consequences of applying the technology.

Because of widely publicised predictions that this technology would result in large scale unemployment, the Study Group judged it important to test the assumptions behind these forecasts. The Group also examined some of the factors which may slow down successful adaptation to the new technology.

The report concludes that in the long run technological change need not in itself lead to increased unemployment, but rather by raising productivity and reducing unit costs it will create opportunities for economic growth and hence employment. The creation of new products and services will also raise employment prospects.

There are two major fallacies in the assumptions on which predictions of large scale unemployment are based, says the report. The predictions often assume a static economy and that anything that is technically feasible will rapidly become economic reality. On the latter point the predictions tend to ignore the fact that although electronic components are relatively cheap, the cost of associated hardware and software is still considerable. This will lead to gradual rather than sudden application of the technology.

* "Manpower Implications of Micro-electronic Technology". HMSO, price £3.50

The Study Group has found that the pace of adaptation to micro-electronics in Britain is so far dangerously slow and there is a real risk of British industry falling behind its overseas competitors. There is still time to catch up. However, some of the long-term problems related to attitudes and the structure of British industry may hinder this process. Indeed micro-electronics will emphasize some of them but against this it can ease other economic problems, most notably low productivity.

On ways to speed up adaptation the report concludes that a massive public training programme would not achieve what might at first sight be expected. The main responsibility for training must be with industry itself. Industry is in the best position to identify its own needs and, with the Industry Training Boards, match its training requirements to those needs.

The report also concludes that successful adaptation to new technology in the future will largely depend on having an adaptable and flexible labour force able to acquire new skills in the face of rapidly changing requirements. The essential condition for this adaptability is that school leavers will need a higher degree of education.

Finally the report stresses that successful adaptation to new technology depends on co-operation between workers and management. It commends the TUC proposals for new technology agreements because they offer a constructive basis for negotiations. The report also stresses that it is essential to consult the workforce and provide full information from the earliest stages of innovation, but trade unions will have to respond by offering a greater degree of flexibility in such matters as demarcation practices.

Set up in July 1978, the Study Group was asked to "examine the manpower implications of micro-electronics up to 1990." The Group broadly adopted a case study approach to its work. It recognised that overall assessment of future employment levels was impossible and that a more realistic result could be achieved by looking at actual or potential technological developments and assessing the likely employment trends.

The cast studies have been wide ranging and have collected a considerable amount of evidence across a number of industries in both the manufacturing and service sectors. Over 60 companies were visited in Britain together with a number of companies in America and Japan.

The Study Group also had detailed discussions with professional and other institutions and trade unions. It has therefore been able to build up a considerable body of detailed knowledge about what is actually happening in the application of micro-electronics.

Press Office
Department of Employment
Caxton House
Tothill Street
London SW1H 9NA

Telephone: 01-213 7439

Outline of the Report

The Report is divided into four main parts. Part I sets out the economic background against which the debate on micro-electronics has to be conducted; Parts II and III examine the likely employment effects in manufacturing and the service sector respectively. Part IV describes some of the employment issues which may help to determine the rate of innovation and application.

In Part I the report sets out the background to the current debate in terms of what has happened to employment in Britain and overseas this century; and of the analyses put forward on both sides of the argument about the potential impact of technological change on employment levels. In particular it takes a critical look at predictions of massive unemployment.

Part II examines separately the likely employment effects of changes in manufactured products brought about by new technology, and of changes in production processes. It concludes that over the next 5-10 years the overall growth in demand for products as a whole will have a more significant effect on employment levels than will technological innovations in products and processes as such. The report accepts that there will be job losses in some areas of manufacturing, but maintains that these will not necessarily be reflected across the whole of the sector. There is considerable scope for new or technologically improved products to regain home and overseas markets 'lost' to competitors, with beneficial employment effects. For instance, there is a rapidly growing demand for electronic-based business equipment such as word processors, and for data and transmission equipment. In addition, the incorporation of microprocessors into industrial goods such as machine tools, instruments and processing machinery will make it possible for these high technology products to stimulate new market opportunities.

Within production processes, the use of micro-electronics in such systems as computer aided manufacturing and design offers considerable additional benefits to companies, besides directly boosting labour productivity. The major scope for using these systems will be in small and medium batch activities (such as engineering) rather more than in mass or continuous process production where a large degree of automation has already been achieved using pre-electronic means.

The report considers that major impacts on employment arising from the large-scale use of robots will not be felt until the 1990's. The report concludes that the important factor in determining employment levels over the next ten years will be whether industry uses new technology as a means of expanding output of new and existing products or simply as a means of cutting labour and other production costs.

An annex to Part II summarises case studies conducted by the Study Group in the following industries: automation and instrumentation products, domestic electrical appliances, textiles, machine tools, automotive products, and in the public sector, coal, steel and gas.

Part III examines the impact of new office technology in general and word processors in particular. It points to the considerable scope for introducing more equipment into offices but concludes that the establishment of comprehensive 'electronic office' systems is still some way into the future. It suggests that economic and behavioural factors will be considerable constraints on their general applicability and that the rate at which a fully digital public telecommunications system is installed will also affect the speed of their implementation. A number of cross-sector studies indicated that the theoretical productivity gains and large scale job displacement predicted to arise from the introduction of word processors are not, in many cases, realised in practice, and where job displacement occurs, the displaced staff are usually absorbed elsewhere. The Study Group came across no instances of job displacement arising from the introduction of word processors. A number of case studies were conducted in the service sector, covering banking, insurance, retailing, the railways, and the Post Office. The report accepts that there will be a loss of job opportunities in the lesser skilled clerical and typing areas over the next 5 to 10 years but expected growth in new and existing services is likely to result in offsetting job opportunities - for instance the banking industry expects overall employment levels to continue to increase for at least the next 5 years and to only stabilise sometime between 1985 and 1990. In areas such as the railways and the postal service, where overall numbers are expected to decline this will be in line with past trends, with little or no connection with micro-electronics; and in post office telecommunications, employment levels which have often been regarded as at risk are forecast to remain stable.

Part IV raises a number of employment issues which the Study Group believes should be the focus of the future debate on micro-electronics. It looks at various approaches to technological innovation; and it examines the major areas

of skill shortages which might be a constraint on innovation and how these might be alleviated. It looks at industrial relations aspects, and compares its findings with the views expressed in the TUC's report 'Employment and Technology' - in particular with the detailed proposals for New Technology Agreements. Part IV also analyses future training needs - both to meet the new requirements of technology and to retrain those whose skills have become redundant. It considers health and safety aspects of new technology. And finally it comments on the role of Government Policy in meeting the requirements of new technology.

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December 19, 1979

REPORT ON MANPOWER IMPLICATIONS OF MICROELECTRONIC TECHNOLOGY
STATEMENT BY EMPLOYMENT SECRETARY

"I welcome this report for the important contribution it makes to the debate on new technology.

"There is a need for informed public debate which is all the more acute because much of the discussion so far has played upon people's sense of insecurity about employment. Wild predictions have been made about the future employment levels resulting from new technology. If these were taken seriously and prompted people to react restrictively, they could do great harm by slowing down the pace of adaptation.

"The present report shows that, on a realistic approach, such predictions are ill-founded; and that new technology, so far from being a threat, offers new opportunities for economic growth and hence for employment. Indeed, the threat to future employment comes not from applying new technology, but from failing to apply it as fast as our overseas competitors. If we continue to lag behind, we will become prisoners of an outdated industrial system incapable of generating the jobs that we need.

"We simply have no choice but to adapt. The Government can help speed the process by spreading knowledge of what is possible and what is happening elsewhere. But only management can seize the initiative to change and they in turn can meet the challenge only if they have the cooperation of their employees. This is where consultation on the introduction of new technology is so important and where that part of the report which looks at ways of improving the rate of adaptation and overcoming the constraints on it seems to me particularly valuable. I hope that the micro-electronics debate will in future be directed towards these practical problems and how industry can solve them.

"I have asked Lord Gowrie, my Minister of State, to take special responsibility for the Department's interest in micro-electronics and to consider what further Government action is required by the recommendations in the report."

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Department of Employment
Caxton House
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London SW1H 9NA

Telephone: 01-213 7439



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BF 8.1.80
for NEDC mtg

10 DOWNING STREET

PRIME MINISTER

You might like to glance at this Tesco paper about the effect of micro technology on retailing in the next decade. I have acknowledged it on your behalf.

13 December 1979

Will need before
NEDC meeting
ms.

RETAILING
IN THE EIGHTIES
THE CHALLENGE
OF THE CHIP

Britain is now entering the second industrial age, powered by micro technology. The problem posed by this new revolution, as with that of the late eighteenth century, is not so much our technical capacity to introduce new systems, more our social ability to adjust to them.

As I see it, this could well prove to be the major challenge of the Eighties and our response to it could decide the prosperity, or otherwise, of our entire population. Unless, in fact, we can match social with technological skill then the advances achieved in one field will be lost in the other.

This is the central theme of this short paper prepared by Donald Harris, Director of Personnel & Computing of Tesco Stores (Holdings) Ltd. Its intention is to stimulate discussion, based on our own experience, of a subject that has been somewhat neglected in the current debate on micro technology: namely, of the relationship between people and machines that could well change their lives.

As such, I hope that it will prove both of interest and use.

Ian C. MacLaurin
Managing Director
Tesco Stores (Holdings) Ltd.

December 1979

Introduction

There is mounting anxiety that the last two decades of the twentieth century could witness the collapse of work and that the science fiction of less than ten years ago become fact. The cause for such anxiety turns on the explosive realisation of the likely impact of the micro processor on all levels of society. Nothing, it now seems, will escape its influence and the speed with which such an awareness has emerged reveals, dramatically, the accelerating tempo of change that is a feature of the modern world.

In the last eighteen months, a veritable sub-industry has developed concerned with examining the social and the economic implications of the ubiquitous 'chip' – some to doomwatch, others to indulge in wishful thinking. This short paper is concerned to do neither. But unless there is a realistic awareness of the practical, as opposed to the theoretical significance of the new technology and a consequent development of a realistic response to its introduction, the doomwatchers forebodings will be realised and the optimists hopes stillborn.

It is to provoke a discussion on the implications of micro-technology on the service industries in general, and retailers in particular that we have prepared this note.

History

The traditional computer was a cumbersome, high cost and energy voracious piece of hardware. Even as the first systems were being installed, however, parallel developments were taking place in the field of micro technology which, in less than three decades, would transform both the new discipline and its machines.

In 1948 the first electronic transistor was tested and by the early Sixties it was found that a small 'chip' of silicon, suitably treated, would behave like several transistors instead of just one – and the possibility of building an entire information circuit around a single chip was realised.

Today's micro computer has more computing capacity than the first, large electronic computer; it is twenty times faster; it has a larger memory; it is a thousand times more reliable; it consumes the power of a light bulb rather than a locomotive; and it occupies a 30,000th part of its volume.

And it is likely that the micro-technology will develop as fast over the next decade as it has done in the one just past. The present memory capacity of the chip is about 400/500 English words. A new generation of chips will memorise 1300 English words while IBM have recently announced that they are developing a 'memory bubble' capable of storing the equivalent of one million English words – on one square inch of semi-conductor material.

But it is not simply the capacity of the new systems that is impressive but also their price; a custom built micro processor of the near future could cost as little as £50 and, thus, be built for everyday applications. In short, price will be no bar to general usage.

It is not our capacity to develop such cost effective systems which is now in question, however, rather our ability to apply them with minimum social dislocation. There is a very real fear that our technical capacity is outstripping our ability for social adaptation and, as with the Industrial Revolution, we will inherit the problems of our own social inadequacy.

Chips With Everything

Possibly, the major short term impact of micro-technology will be on employment, though there are two, diametrically opposed schools of thought as to the system's likely effect. One holds that the 'chip' will create up to one million new jobs in the next five years; the other that in Britain alone it will be an important factor in doubling or even trebling unemployment by 1985.

While the differences of opinion themselves are important, it is the margin of difference that is most significant. If the former view is accepted, then the 'chip' could do much to reduce an unacceptably high level of unemployment; if the latter, then it could lead to serious tensions emerging in both the social and economic fields.

But how do the two schools arrive at their widely differing figures? For the optimists there is a belief that the potential of "intelligent electronics" will create a surge of new jobs demanding new skills not only in micro technology itself but also in business communications in the processing and manufacturing industries. For the pessimists, there is a view that the new systems must displace labour in a range of different fields, one study suggesting that without effective adaptation, micro systems will put between four and five million people out of work by 1985.

Here some examples are relevant. With the introduction of micro electronics, N.C.R. were able to halve their work force in five years with no loss of productivity; the Japanese TV industry reduced its manpower levels by 40 per cent whilst lifting its output by 25 per cent between 1972 and 1976; while Volkswagen and Volvo have robots working on their production lines and Fiat advertise their new Strada model as being: "Designed by computer. Silenced by laser. Built by robot."

And as with manufacturing, so with the service industries which now employ 57 per cent of Britain's workforce. In the office sector alone, the application of new systems has led the National Enterprise Board to report:

"In the next ten years, office information systems based on the micro computer and associated software and

integrated circuit technology will gradually replace the desk, the typewriter, and the filing cabinet. Their capacity to manipulate and transform information on demand will have a major impact on communication and information processing in organisations and the associated manpower costs."

Even as they wrote, however, the Board was being overtaken by events. By introducing the new micro systems Bradford Council have been able to reduce the number of their typists by 50 per cent; the Provident Financial group have been able to cut their full time typing staff by 37 per cent, their part time typists by 77 per cent; while the Friends Provident Insurance Company have installed a computer based system capable of processing a policy in three minutes, rather than three weeks – and expect the consequent staff saving of 40 per cent to pay for the cost of the installation itself.

Micro Chips & Macro Economics

The problems and opportunities created by the application of the new technology cannot be taken in isolation. The past two decades have witnessed the widening 'gap' between Britain and her major competitors, notably Germany and Japan, to the point where the Prime Minister can plead national poverty in re-negotiating E.E.C. terms.

Without the sort of dramatic turn-around that can be achieved by the introduction of micro technology, there is little hope of improvement, and of achieving essential growth in the years ahead. A recent forecast based on the Treasury economic model suggests that G.D.P. will fall in 1980; that inflation will continue to rise; that Britain's trading deficit could top the £5 billion figure over the next twelve months; and that even without the 'chip' unemployment will climb above the two million level by 1981.

Thus the irony: that the application of micro technology could well play a central role in reviving Britain's entire economic performance and, in the process, help to overcome many of the problems inherent in the introduction of the new technology itself.

The Right To Work

A National Opinion Poll survey of 1978 asked: "Do you enjoy work a lot, a little, or not at all?" Seventy-five per

cent of the sample replied: "A lot" whilst the survey also found that the majority of those interviewed would not give up work even if they had the opportunity of doing so without any loss of pay.

Work is more than an economic necessity. It meets a social need. The problem of work in tomorrow's world is two-fold: on the one hand, of people adapting to the changing nature of work itself; on the other, of sufficient jobs to go around.

The post-war years have marked a steady shift from manufacturing to service employment and there is now evidence of the emergence of a new generation of craft skills. In Tesco alone the demand for butchers and bakers has grown steadily over the past decade to meet the demands of consumers.

Even so, work is in short supply. Unemployment has stood around the 1.5 million mark for the past eighteen months. If the forecasts are right, the number of workless will continue to rise in the years immediately ahead not only as a result of Britain's weak economic performance; or even the introduction of the 'chip' but inexorably due to a 'bulge' in the workforce.

An extra 200,000 school leavers will be looking for their first job every year during the first half of the Eighties. Without new employment opportunities, a major increase in unemployment by 1985 will be generated. In addition during the next two years alone, it is inevitable that more women will enter the job market to compete for a diminishing number of vacancies.

Today, more than 2.5 million people work in the distribution industry; 32 per cent of them men, 68 per cent of them women. The role of working women (two thirds of them married) not only has direct relevance to the national economy but also to their domestic budgets. Many households now rely heavily on the second incomes provided by working housewives to balance their weekly budgets.

The Shop 'Chip'

In the last two decades, the development of the large store and the consequent application of the economies of scale to retailing have done much to reduce consumer costs. The move in the Eighties, already presaged by experiments with article numbering and computer linked checkouts, will be towards the increasing application of micro technology to lift the industry's level of efficiency and once again help to contain price inflation.

The application of new systems in retailing is likely to be three-fold: in stock control and warehousing with the

introduction of automated systems; in stores with the extension of article numbering and checkouts linked to computers; and in the application of information processing systems to the administrative sector which provides the essential support service for running a retail organisation.

It is impossible to forecast the exact impact of the new technology. This depends almost entirely on the speed with which the new systems are installed. It is certain, however, that all of Tesco's 50,000 staff will be affected by the application of micro systems in the Company within the next decade. Given this, the need is to devise a responsible policy to maximise productivity and minimise social dislocation.

In September of this year, Tesco Managing Director, Ian MacLaurin, warned a conference of retailers: "The infinitesimal 'chip' could bring to an end the long march towards the liberation of women unless we devise an effective strategy for its introduction. The option is to act now or wait until it is too late - though I doubt whether the present generation of liberated women will ever meekly return to duty at the kitchen sink. This is not to question their vital role as mothers or housewives. It is to wonder whether, having spent three generations encouraging half the population to discover its own abilities, they will be happy to accept a return to what so many women now regard as second class citizenship."

The post-war transformation of retailing, more especially of the development of convenience and fast foods, has played an important role in freeing women from "the tyranny of enforced activity" and yet this trend into the Eighties will present the industry with a challenge on at least two fronts: on the one side, as employers responsible for our work people; on the other, as shopkeepers who have to trade with the newly emancipated housewife every day.

It is essential, therefore, that the retailer responds intelligently to the problems that micro technology poses: the failure to do so being to the detriment of employees, consumers and the national economy at large.

The Human Factor

Tesco was one of the first retail multiples to invest heavily in computers and today has one of the most advanced privately operated computer installations in the U.K. Thus the Company has extensive and detailed experience of the new technologies. It is on this basis that it is now examining its policies for the introduction of micro systems.

In parallel with such an appraisal, the Board maintains a continuous dialogue with Union representatives. In April of this year Tesco was the first multiple to enter an

agreement with the Union of Shop, Distributive and Allied Workers which has meant that from June 1979, every retail entrant into the Company has become and remains a member of the U.S.D.A.W.

But this is not all. The agreement also reinforces the long-standing discussions that have taken place between the Union and Tesco at both national and regional levels on a range of issues including the introduction of the new micro systems.

In January, 1978, joint discussions began on the application of electronic point-of-sale equipment, both sides agreeing that the main concern of the Eighties will turn on micro systems.

As far as the Board is concerned, their approach to the problem was clearly defined in the Company Report of 1979: "It is only in a spirit of willingness to reach agreement by both sides that a sensible solution will be found to the problems of industrial relations, or as we prefer to term it, human relations."

Tesco believes that the over-riding need is to ensure that there will be no compulsory redundancy as a result of the introduction of advanced technology by devising an evolving manpower programme for implementation as and when the new systems are introduced. Such an approach is based on the underlying assumption that if the new systems do improve the company's performance, then all employees should share directly from such productive gains.

So much, however, is theory. In practical terms what steps can be taken to achieve such mutually agreed ends? The Company believe that there has to be a fundamental change in the attitude towards work, to the notion that there is something sacrosanct about the duration of the working week, about the length of annual holidays, about retirement ages.

In the last half century alone, the working week in the retail industry has fallen by roughly a fifth; paid holidays have been extended from two weeks in 1952, to three weeks in 1962, and to four weeks in 1974, whilst the average retirement age has fallen consistently for more than sixty years.

Tesco hold that this trend will continue. If micro systems do lift the levels of efficiency there will be a further reduction in the length of the working week; a further increase in the duration of annual paid holidays; a further lowering of the retirement age. In short, by the mid-Eighties there could be a marked improvement in the work load of all Tesco employees.

Such assumptions are based on the expected improvements to be achieved directly from micro systems and, given that such systems live up to expectations, the Company believe that such a manpower programme will safeguard the jobs of Tesco employees; will provide a more congenial work schedule for the entire workforce; and will improve promotional prospects throughout the Company as a result of the phased reduction of the statutory retirement age.

Mighty Micro

Such a programme relates only to a single Union, a single Company. Ultimately, however, companies and organisations must care not only for their present staff but for the whole employment pool, and constructive discussions must lead to the development of a comprehensive policy for employment in the 80's and 90's: a policy embracing education; training and re-training; and, above all else, attitudes to both work and play.

Shirley Williams, when Secretary of State at the Department of Education, warned a conference of educationalists: "Now we are on the edge of a new technological revolution and perhaps on the edge of a social revolution too, since technology does not simply pass by on the other side of the road, leaving human society unaffected.

"We will have to reconstruct our patterns of training and education, and our expectations of lifetime employment in the same job to cope with the consequences of rapidly changing technologies making demands for new skills and destroying the market for old ones."

Unless there is a constructive response to such a challenge, then the doomwatchers could be proved right.

And as with education, so with re-training. It is essential that in the years immediately ahead sufficient resources are made available to retrain people not only in the skills needed to handle the new generation of high technology equipment, but also for a new generation of work itself.

And finally, to leisure. It is now ten years since the Government published: 'Planning for Leisure' and even then its remit was too narrow, the demand for extra mural studies, for example, having increased four-fold in the last decade. Today there is an urgent need to provide a programme for social re-adjustment to complement the introduction of the new technologies.

In summary, therefore, the social challenge of 'The Chip' is all embracing. The promise micro-technology holds for the future is extraordinary - provided always that Britain has the will to grasp the opportunities it offers. The alternative, of neglecting what could prove to be Britain's last chance of building a prosperous future, is altogether too grave to contemplate.

Other occasional papers in this series:

The Retail Trade and the Planned Environment

The Retailer and Policy Note 13

Forward Planning and the Retail Trade

Retailing and the Inner City

Retail Planning for Tomorrow's World

The Industrial Building Allowance and the Retail Trade

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From the Office of the Managing Director
Ion C. MacLaurin.

Our ref: ICM/CH

11th December, 1979

Rt. Hon. Margaret Thatcher, M.P.,
10 Downing Street,
London,
S.W.1.

Dear Annie Muir,

I have pleasure in enclosing a copy of a short paper prepared by our Director of Personnel and Computing. The paper deals with the likely impact of new technologies not only upon retailing, but upon Britain's future employment structure in general. In our view this will be one of the most crucial issues of the Eighties and I must confess that, as a Company with 50,000 employees and a considerable investment in advanced technology, we are very concerned that, while so much attention is being focussed on the technological aspects of 'The Chip', comparatively little attention has been paid to the social implications of the new systems.

It was to provoke a wider discussion on this important topic that we published the enclosed which I hope will prove of interest to yourself and your colleagues.

*Yours sincerely,
Ion C. MacLaurin.*

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10 DOWNING STREET

THE PRIME MINISTER

12 November 1979

Original in GR.

Dear Prosser,

Thank you for your letter of 17 October in which you set out in full your Council's reasons for asking for reconsideration to be given to the location of the first factory to manufacture silicon chips for Inmos, a subsidiary of the National Enterprise Board. You have, I know, also raised this question with Mr. Younger, Secretary of State for Scotland, at a meeting on 25 October.

I appreciate that since setting out your original case for locating the Inmos factory in Clydebank, the town has suffered a number of serious blows, the closure of Singer being the most damaging. I am aware of the work which has now been put in hand to deal with the effects of these blows, and I earnestly hope that the Working Party set up by Mr. Younger can make recommendations which will encourage the regeneration of local industry and employment for the local community.

With regard to Inmos, however, you will be aware that this company has arrived at the list of possible locations already announced only after an exhaustive analysis of about 100 sites. It is the Government's policy to require the National Enterprise Board to operate on a commercial basis, and the NEB in turn allows its subsidiaries considerable freedom in all commercial decisions.

/ It would

It would be inconsistent with these policies for the Government to intervene in any way which would detract from the commercial judgement of Inmos in this matter, beyond reviewing, as Sir Keith Joseph has previously announced, the whole Inmos project before committing further funds to it.

Mr. Younger has indicated to you that the best opportunity for a viable future for Clydebank lies not in the direction of public or private enterprises in the town, but in the demonstration by the local community that it offers an attractive environment for investment. I fully endorse this view.

Yours sincerely

Margaret Thatcher

The Provost of Clydebank



Five

Incl
P.S.

10 DOWNING STREET

From the Private Secretary

20 September 1979

MICRO-ELECTRONICS

The Prime Minister has considered your Secretary of State's minute of 19 September and the enclosed note on the micro-electronics industry support programme. On the basis of this further advice, the Prime Minister is willing to agree that up to £55 million should be committed to this programme - and on the lines which Sir Keith proposes.

I am sending copies of this letter to the Private Secretaries to the Secretaries of State for Employment, Scotland and Wales, the Chief Secretary, Sir John Hunt and Sir Kenneth Berrill.

T. P. LANKESTER

Andrew Duguid, Esq.,
Department of Industry.



micro-electronics industries directly or indirectly on a substantial scale; whilst it is difficult to be sure that the figures are exactly comparable, it seems clear that the Japanese have allocated at least £500m to direct support of industry's research and development and investment in production facilities in micro-electronics; the West Germans currently have a 4-year support programme of DM 200m; the French one of FFR 500m. The American industry has in the past largely been supported by procurement through their defence and space programmes, though increasingly the US Government is moving into direct R & D support.

In the light of all this, and of the fundamental importance of micro-electronics to our industrial competitiveness, I have come reluctantly but firmly to the conclusion that we would be wrong to take the risk of leaving the industry from now on to fend for itself, but should continue with certain further support under MISIP for the next few years whilst our general economic policies start to take effect. But I believe that we can reduce the amount of support significantly below the £70m announced by our predecessors.

... The attached note reviewing the whole of MISIP explains that so far as concerns high volume "standard" components, £14m (out of an original allocation of £16m) is already committed, mainly to internationally mobile projects of multinationals - with in the majority of cases a significant element of UK design; this should result in investment of about £100m and production by 1983 of £350m a year. I do not therefore envisage further support in

/this ...



this area except perhaps if a particularly interesting internationally mobile project comes forward which would qualify for normal S.7 or S.8 support under our newly agreed, more rigorous, criteria.

A second area of MISF is support of the "infrastructure" industry, providing equipment used in the manufacture of micro-electronic devices and essential materials such as polycrystalline silicon, single crystal silicon, high purity liquid hydrogen (which can only be imported in very small quantities at a time) and gallium arsenide. Though important, this area is of lower priority than the actual micro-electronic devices ("standard" and "special") and little more than £0.5m (of an original allocation of £15m.) has been committed. It is here that we must seek the bulk of the saving.

This leaves "specials", where out of an original allocation of £33m, some £7½m is committed or nearly committed. The attached paper sets out in full the arguments why "standards" cannot always be used and we need an indigenous capability, British-owned if possible, for the design and manufacture of "specials", that is, circuits specially designed to meet a requirement of a particular customer.

I find the case persuasive. The techniques are going to need to be so pervasive and the cost of failure to be competitive will be so heavy that an insurance seems justified. So I do not think



it would be right to cut back so heavily on "specials" as in the case of "infrastructure" - not least because as Para. 16 of the attached paper shows, any significant reduction would fall on British firms whose profitability and liquidity are going to come under increasing pressure over the next few years.

Overall I am convinced that it would be rash to reduce the provision for MISP below about £45m deployed approximately as shown in paragraph 17 of the attached paper. But this is a bare minimum, and would cover little more than existing commitments and projects which the Department is already discussing with the companies concerned; it would leave only a very small margin for new "specials" projects coming forward, important infrastructure, or desirable internationally mobile projects, and I believe it would be right as the paper suggests to allow for such possibilities by setting the limit at, say, £55m instead of the bare £45m. I would undertake that the extra £10m would be called on only for exceptionally important projects, and would certainly plan to review progress and the continued need for the scheme every year, and whether it can be terminated and/or the financial provision be reduced - for example if it proves possible to make more use of the public procurement route, which as mentioned in my minute of 8 June is being studied by this Department. £55m would still be a reduction of more than 20% on the original target of £70m - for which, I must point out, full provision has been made in my Department's latest PES forecasts.



I hope that in the light of this you can agree to lift your ban on further commitments under MISP; this is now causing serious difficulty for firms such as Ferranti, whose investment and R & D programmes being worked up before the Election in the not unreasonable expectation of continued support, are now in limbo.

INMOS is proving difficult to resolve, and I shall report separately to you on this as soon as possible.

I am copying this minute to the Secretaries of State for Employment, Scotland and Wales, the Chief Secretary, Sir John Hunt and Sir Kenneth Berrill.

KJ

K J

19 September 1979

Department of Industry
Ashdown House
123 Victoria Street
London SW1



19 SEP 1979



19 SEP 1979



MICRO-ELECTRONICS INDUSTRY SUPPORT PROGRAMME (MISP)

The £70m provided for in public expenditure forecasts was intended to be deployed approximately as follows:-

- a) the manufacture of "standard" components in high volume (£16m allocated);
- b) the design and manufacture of components for specific sectors of the user industry and particular customers - "specials" (£33m allocated);
- c) the "infrastructure" industry which provides equipment used in the manufacture of micro-electronic devices, and essential materials (£15m allocated).

(The balance of £6m was not allocated, but held in reserve).

2 With regard to (a), £14m has already been committed - mainly to the projects of multi-national concerns which, without our support (much of it through S.7 regional assistance) would have gone to other countries. These projects should achieve investment of about £100m and production of about £350m a year by 1983. Further support is not therefore envisaged for the "standards" area, except perhaps if a particularly interesting internationally mobile project comes forward which would qualify for normal S.7 or S.8 support under our newly agreed, more rigorous criteria.

3 In the case of the "infrastructure" industry ((c) in para 1) only about £0.5m has been committed so far and projects are under discussion involving a further £1.0m. It would be very desirable to be able to provide support to:

- a) a few carefully selected areas of infrastructure where the UK is technically advanced and MISP support could enable

/the ...



the industry to provide the micro-electronics manufacturers with competitive equipment and to get a share of valuable overseas markets;

b) safeguarding the supply of some of the materials on which the micro-electronics industry is critically dependent.

But this area is of a lower priority, and a substantial reduction in planned expenditure could, if necessary, be made here.

4 The third area is "specials": here the argument is complex and needs to be set out at some length. The designer of an equipment or product incorporating micro-electronics (be it the control system for a rolling mill, a printing press, the fuel system for a motor car, a word processor, a washing machine, a computer or an electronic toy) usually has the choice between basing his system on a combination of standard circuits available "off the shelf" or on a circuit designed to meet his specific requirements and manufactured solely for him. Whilst the range and use of standards is growing rapidly, and there are those who believe that eventually they will be used for virtually everything, except highly specialised and demanding applications such as defence, this is certainly not the case at present, when there are certain requirements which it is technically impossible to meet by any combination of standard circuits. Although the "special" is, of course, more expensive, it offers many advantages: it can be designed to cope with more demanding conditions; because it can incorporate all the necessary functions on a single silicon chip, it needs less space and less power; and it makes the product in which it is incorporated unique, thus offering what may be a critical advantage in the market place. And even where standards can be used, a special circuit will frequently be needed at the interface with the rest of the system.

5 There is a large body of informed opinion which believes that for the foreseeable future standards will not displace "specials"

/and ...



and that if British system and equipment manufacturers are to be competitive they must be able to have ready access to "specials", that is circuits specially designed to meet their individual requirements.

6 There can be no certainty in these matters; but to base our policy on the hope that this school of thought is wrong would be to take a very considerable risk.

7 If we accept that it would be a prudent insurance to make sure that this "specials" design and manufacturing capability is readily available to British users, the next question is why it has to be in the UK and why those customers who want them should not get their special circuits designed by, say, American firms. It seems to be almost universally accepted by those involved that this is impracticable: the design of a special circuit needs to be optimized by a process of iteration between the supplier's design team and that of the user, quite often involving meetings once a week or more in the design stage and thereafter prototype circuits being tried by the user and then returned to the supplier for modification and reprocessing. It seems plain that this would be difficult, if not impossible, to do economically and effectively if the user and the supplier are any great distance apart. It must be acknowledged that Sir Arnold Weinstock does not wholly accept these arguments; he asserts that his designers and engineers can work with "specials" firms in the US. But he is very much the odd man out on this, and professional opinion in the industry including that of his own people in GEC, is firmly against him.

8 There are positive advantages in this capability being British-owned: a British company is likely to be more committed to British customers than an offshoot of a foreign company; and since "special" micro-circuit designs are often commercially highly sensitive, users have reservations about entrusting their designs to multi-nationals. DOI has received many representations from British users about their need for "secure access" to a British



controlled design and manufacturing capability for "specials".

9 In the case of military requirements, the Ministry of Defence would be very concerned on security grounds if they did not similarly have access to a British capability: indeed if it were not otherwise available, they would probably find it necessary to bear the cost of creating it. However it is obviously much more economical to have a capability which can serve the much larger civil needs as well as those of defence.

10 In fact, such a capability already exists, principally in GEC, Plessey and Ferranti, all of whom, though operating on a relatively small scale, have a considerable technical competence. That of GEC at present works primarily for users within the GEC organisation; Plessey and Ferranti supply a range of outside users at home and abroad. Ferranti assert that their capability could not have been achieved without Government support; their Managing Director has recently written to the Secretary of State saying that without continued support they would inevitably have to revise their plans fundamentally and greatly reduce the planned scope of their R & D and investment programmes. Plessey are certainly in the same situation, and without continued support their highly regarded Caswell laboratories would run down, and become simply a limited facility to meet the needs of their own equipment business. Even GEC's activities are on a larger scale than they would have been without support from public funds.

11 The basic reason for this state of affairs is that in the present stage of UK users' awareness of the competitive advantages of using micro-electronics, and in an increasingly competitive international market, the business does not generate adequate profits to justify investment in costly research and development projects and production facilities on the scale necessary to be internationally competitive. Plessey, whose overall group profits have for years been inadequate estimate that in the absence of Government support they will have a negative cash-flow (on their semi-conductor business) of more than £13m over the next



four years; Ferranti (whose overall profitability is considerably better) would nevertheless have a negative cash flow over the same period of some £14m on a substantially smaller turnover in semi-conductors. GEC will certainly invest to the extent required by the needs of their own equipment business; but otherwise will generally only invest where they can see very high profits.

12 Other Governments in addition to providing support for the development and manufacture of "standards" are supporting their "specials" industries for the benefit of the users: the French for example are concentrating on a single firm for "specials" to which they have allocated FFR 200m, considerably more than we envisage for Plessey, Ferranti or GEC. If in the absence of support, our existing capability is not maintained and developed it will not be able to meet the growing needs of a wide range of UK industries with the result that sooner or later the latter will fail to be internationally competitive; some may seek to set up an in-house processing capability (this is happening in some cases already because the capability is inadequate). But this is wasteful of resources particularly of scarce engineering manpower, and in any case is not likely to be a long-term solution. For as the technology world-wide advances into higher and higher levels of integration, the scale of investment needed, particularly in extremely advanced and expensive production machinery, is rapidly escalating and it is unlikely that the user companies would for long be able to keep up with the game. So they would finish up with relatively low technology, inefficient, in-house operations, and equally fail to be competitive.

13 If it is accepted that the capability is needed and that it will not be adequate in the absence of Government support, is there any better means of support than direct grants?

14 The use of public procurement is one possibility; much of the support given to the US industry (the world leader) has come by this route (though increasingly the US Government is moving

/into ...



into direct grant support of R & D), through their defence and space programmes; their huge computer industry has also contributed powerfully to the development of micro-electronics, it in turn being powered to a considerable extent by the demands of space and defence. A certain amount of development of British micro-electronic technology is already funded by MOD, and DOI will explore with them whether we are getting the maximum benefit from this, or whether there is scope for improving the transfer of technology from military to civil applications. But we must accept that our defence programme is not on a scale which could exert a comparable influence on the industry to that of the US. There are, however other areas where the public sector uses, or could use, products incorporating micro-electronics such as telecommunications, office equipment (including Prestel), and transport, and as reported in the Secretary of State's minute of 8 June, DOI is preparing proposals for a more constructive use of public procurement - in micro-electronics and other areas. But it will certainly take time to make significant progress, not least while there is pressure on public expenditure and purchasers are likely to concentrate on buying the cheapest and "safest" product to meet their requirements and to be reluctant to use their funds to support R & D of unproven products. And of course there is a vast range of products to which micro-electronics need to be applied if they are to be competitive and for which there is no public sector requirement. Nevertheless we shall pursue this line actively in collaboration with purchasing departments.

15 For the next few years, however, there is no satisfactory alternative to a continuation of support by means of 25% grants under the Micro-electronics Industry Support Programme. The majority will go into R & D projects, but part also into production equipment (R & D and production are very closely interlinked in this technology; the development of new circuits involves making them on the same plant as is used for eventual production, and the development of new production techniques makes possible the design of more advanced circuits). So if we are to preserve and develop our capability for "specials" it is not practicable to



cut back so substantially as in the case of infrastructure (para 3 above).

16 The following table shows the position on "specials" at the moment:

MISP support for "specials"
(£m)

<u>Company</u>	<u>Committed</u>	<u>Near-Committed</u>	<u>Under discussion</u>
Ferranti	0.742	6.2	5.0 *
Siliconix	-	0.69	-
Mullard	-	-	0.34 *
GEC	-	-	4.0
Plessey	-	-	11.1 *
	0.742	6.89	
		7.872	20.44
		28.072	

* What is under discussion is a programme of projects, mainly research and development, numbering 100 or more for each company.

We do not believe that we can achieve the objective of achieving the necessary capability of "specials" for less than the £28.072m above. Any significant reduction would fall on the British firms and contrast strongly with the fact that the greater part of the support so far committed under MISP has gone to foreign multi-nationals) - and that sum would only cover the projects of which we already know and would leave nothing in hand for any new ones which might come forward over the next year or two, however important or promising.

17 Overall, we believe the bare minimum required for the whole programme is £45m, deployed approximately as shown in the table below, which also shows for comparison what was previously planned and the amounts so far committed and nearly committed:-

CONFIDENTIAL
COMMERCIAL IN CONFIDENCE



8

	<u>Original Allocation</u>	<u>Committed or Nearly committed</u>	<u>Minimum Provision</u>
Standards	16	14.32	14.32
Specials	33	7.63	28.072
Infrastructure	15	0.55	0.55
Reserve	6	-	2.0
	<u>70</u>	<u>22.5</u>	<u>44.942</u>

The small reserve above would be available for desirable internationally mobile standards projects (one may come forward from Hitachi) and/or additional important infrastructure projects (in addition to one committed project, we have three others under discussion which would involve support of £0.98m), or new "specials" projects.

18 The reserve above is minimal; it might not even suffice to cover a single desirable internationally mobile project which would qualify independently of MISF under the normal (revised) rules for S.7 or S.8 assistance. To tie ourselves down so tightly would be very restrictive, particularly since the MISF is supposed to run for a further 4 years. It would be more prudent to set the limit at, say, £55m instead of £45m., a reduction of £15m on the original target of £70m - for which full provision has been made in the Department's latest PES forecasts. The extra £10m would be called on only for exceptionally important projects.

Department of Industry

18 September 1979

CONFIDENTIAL

A, C.C.Mr. Hoskyns
Mr. Wolfson

Subject



Ind Busy

10 DOWNING STREET

From the Private Secretary

16 July, 1979.

Dear Andrew,

Micro-electronics

The Prime Minister held a meeting this afternoon with your Secretary of State to discuss Government support for micro-electronics. Sir Kenneth Berrill, Mr. John Hoskyns and Mr. David Wolfson were also present. They had before them your Secretary of State's undated minute from last month, his minute of 13 July, the Chief Secretary's minute of 2 July, and Sir Kenneth Berrill's minute of 12 July.

The Prime Minister said that she remained far from convinced of the case for Government support for micro-electronics. She had very grave doubts about assisting the production of micro-electronic devices, and in particular the INMOS project. But she also questioned the support for applications. Her own view was that British industry was very ready to apply this technology, and that finance was not the constraint; where industry was not applying it, it was because of trade union opposition. The experience of the USA showed that industry would introduce micro-electronic technology without Government support, and there were many companies in the UK which were successfully doing so also. Sir Keith's proposal to continue spending money on the MAP, and even more so on the MISP, was inconsistent with his general approach of reducing public expenditure on industrial support.

Sir Keith replied that he too had doubts about the MISP, and also about the INMOS project. But he could not accept the Prime Minister's strictures about the MAP. Contrary to the Prime Minister's belief, UK companies were not applying micro-electronic technology on an adequate scale; and there was a real danger that industry would fall increasingly behind its main competitors overseas. The MAP was needed in order for industry to catch up. Moreover, the MAP was one positive measure which he wanted to retain against the variety of other schemes of assistance which he was intending to reduce or abolish. If the MAP scheme were stopped, this would be widely misunderstood. He did not accept that the continuation of this scheme was

/ inconsistent

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inconsistent with his general philosophy on public support for industry. There was already provision for the scheme, as there was also for the MISIP, and he had already found very sizeable public expenditure savings from within his programme. Sir Kenneth Berrill added his support for Sir Keith's approach.

The Prime Minister said she was still not convinced, and asked that:-

- (i) commitments on MAP should be limited for the time being to £25 m; before going over this figure, Sir Keith should present the Prime Minister with a review of what had so far been achieved under the scheme.
- (ii) there should be no further commitments under the MISIP for the time being; Sir Keith should first consult with Sir Arnold Weinstock on the value of this scheme, and then report back to the Prime Minister. Sir Keith should report back separately with proposals on INMOS.

I am sending copies of this letter to Alistair Pirie (Chief Secretary's Office, HM Treasury), Martin Vile (Cabinet Office), and Gerry Spence (CPRS).

How: en.

T. in Labour.

A.A. Duguid, Esq.,
Department of Industry.

PRIME MINISTER

MEETING WITH SIR KEITH JOSEPH ON MICRO-ELECTRONICS

I attach:

- Flag A Sir Keith's original note with which you were not very happy,
- Flag B Comments by the CPRS, which broadly support Sir Keith.
- Flag C Comments from the Treasury, also supporting him.
- Flag D A further note from Sir Keith setting out his case once more for an interventionist approach.

I also include Philip Virgo's booklet for the Conservative Political Centre.

J. S. [Signature]
p/ TPL

13 July 1979



PRIME MINISTER

MICRO-ELECTRONICS

Your private secretary's letter of 11 June indicated that you had doubts about the widely held view that British industry is not embracing micro-electronics technology as fast as its competitors, and wondered whether we could not leave it to the improved business environment to change the situation.

This was my first inclination - both on philosophic grounds and in order the more effectively to support the Chancellor. But I have been convinced:

- a) that we are lagging badly in awareness, application and production of micro-electronics;
- b) that our competitors are ahead, in some cases far ahead, and are spending large sums of public money accelerating their progress; and
- c) that the technology is so imminently pervasive that we should not risk our industries being destroyed by too leisurely an adaptation - despite the unfolding effects that we hope our budgetary and other measures will have - to the micro-electronic imperatives that the market will increasingly impose.

... I attach a further note setting out some of the evidence for these views.

/I ...



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2

The note also contains further information about the Micro-electronics Industry Support Programme. I agree with the Chief Secretary's suggestion that we should particularly support mobile international projects. But in addition, we need to encourage home companies like Ferranti and Plessey, significant for defence purposes and which have internationally reputable research and development facilities, to invest in more production facilities.

I must emphasise that our industry is not only behind but has to function without the often large support given by competitor countries: the USA via space and defence; the Japanese and our European competitors, through very substantial programmes. The support we are giving is modest by comparison though significant in our terms.

I notice that in his minute of 2 July the Chief Secretary, whilst generally supporting my proposals, expresses doubts about the possible use of public procurement. I agree that this is not easy but what I have in mind initially would not fall foul of the EEC nor would it mean additional public expenditure, since as I have indicated, I would use some of the funds already allocated to the Microprocessor Applications Project; and the objective would be to enable the public sector to operate more efficiently as the result of the expenditure.

I fully accept the Chief Secretary's suggestion that we should concentrate on projects offering really significant advantages; I shall of course keep the programme under close review and will

/be..



be only too ready to switch off support if it appears to be no longer necessary.

I am copying this minute to the Chief Secretary, Sir John Hunt and Sir Kenneth Berrill.

KJ

K J

13 July 1979

Department of Industry
Ashdown House
123 Victoria Street
LONDON SW1



1. MICROPROCESSOR APPLICATIONS PROJECT (MAP)

1.1 The great and pervasive importance of micro-electronics technology to all aspects of industry and commerce, as well as in education communications and the home, is almost universally accepted; there is much evidence that British industry (which for understandable reasons is lagging in innovation generally) is not applying this technology as fast as its competitors, whether to products or to manufacturing and other processes. The following paragraphs summarize the evidence.

ص 7

1.1.1. A number of multi-national micro-electronic device suppliers have told DOI that they find it easier to sell their advanced circuits produced in the UK to customers in Europe and the Far East than in UK.

1.1.2. The balance of trade is deteriorating steadily in equipment and products incorporating micro-electronics - such as computer peripherals and consumer electronics. There is little or no UK supply of calculators, digital watches, audio products, electronic cash registers, robots, machines for inserting electronic components automatically, numerical control systems for machine tools, micro-computers, word processors and other electronic office equipment, and T.V. games (in the last case the first micro-electronic circuits for this burgeoning market were designed and manufactured in UK., but the market here has been so poor that design has been transferred to the US). Many of these products are totally new, and only made possible by micro-electronics.

1.1.3. Authoritative international technical consultants have reported that UK industry's presence in the market for new micro-electronic-based products is far less visible than that of competitors. UK technical consultancies in the field find themselves doing more design work for European firms than for British.

1.1.4. A standard international reference book cataloguing all micro-electronic circuits on the market has sold 20,000 copies in the US, 3000 in Japan, 2,000 in Germany, 1,500 in France - and 350 copies in the UK.

1.1.5. Another pointer is the comparative percentage of electronic component usage accounted for by integrated micro-circuits: an EEC source gives the following figures:-

USA	-	24%
Japan	-	15%
Germany	-	14%
EEC	-	13%
UK	-	9-10%

1.1.6. A DOI analysis in early 1978, based on contacts with supplier and customer industries, widespread discussion with other knowledgeable sources and information gleaned from an EEC questionnaire concluded that at that time only 5% of British firms mainly those already in high technology areas such as defence and electronics were actively applying micro-electronics, 45% were aware



but not actively pursuing applications, whilst 50% were not sufficiently aware of the technical and commercial potential of micro-electronics to be able to assess the opportunities and threats to their own business.

1.1.7. In preparing material for the "Awareness" part of MAP DOI had great difficulty in finding more than a handful of examples of successful British applications to use as case studies; a similar exercise by MIT produced a wealth of examples.

1.1.8. The application of micro-electronics in motor vehicles to engine control (with substantial fuel savings) and to driver information has made little progress in the UK compared with the US, Germany, France and Japan.

1.1.9. The UK lags behind the competition in installation of numerically controlled machine-tools and robots, as the following table of numbers installed shows:-

(1977)

	<u>N/C machine tools</u>	<u>Robots</u>
Japan	7,000	<u>20,000</u>
USA	6,400	2,800
Germany	4,000	500
France	650	200
UK	1,000	100

1.1.10. The Advisory Council for Applied Research & Development (ACARD) set up a Working Party in 1978 to study the situation; the Working Party's report, endorsed by the Council (which like the Working Party has a number of industrialist members), was published in July 1978: it quoted the DOI analysis referred to in 1.1.6. above and endorsed its conclusion that the UK is lagging behind its competitors. Though both the DOI analysis and the ACARD report have been public for over a year, and there has been widespread discussion of the subject in the media, the general conclusion has not been challenged.

1.2.1. At the same time as the range and scale of applications is expanding the technology continues to advance opening up totally new applications and markets. Firms (particularly in the US) which have adopted the new technology are now developing the second or even third generation of new products. Typically the lead time for a first application is 2-3 years, but this shortens with experience. Firms which do not start to apply micro-electronics technology in the near future therefore are likely to find themselves up against competitors whose second or third generation micro-electronics-based product is substantially better and cheaper, or whose greater experience of micro-based manufacturing methods enables them to achieve higher quality output more efficiently and more economically. It may well be too late for the laggard firm to retrieve its competitive position which is liable to deteriorate ever more rapidly.



1.2.2. The MAP is a "crash" programme intended to prevent this happening; time is not on our side. There is a real danger that by the time the Government's new macro-economic policies succeed in transforming the risk/reward relationship and changing industry's attitude to innovation, the international competitive position of British industry may have deteriorated irretrievably.

1.2.3. It is for this reason that the next couple of years are considered critical and it is on this period that the MAP is focussed. Awareness is improving; training facilities are being expanded; but direct project support to encourage companies by means of 25% grants to press ahead with specific applications of micro-electronics to their products or their processes is also an essential element. It is intended to cover some 1,000 - 1,500 projects strategically disposed throughout industry: anything on a significantly smaller scale would be unlikely to have the necessary seminal effect.

2. MICRO-ELECTRONICS INDUSTRY SUPPORT PROGRAMME (MISP)

2.1 MISP complements MAP. It is intended to ensure that:

- (a) UK users of integrated micro-electronic circuits have ready and secure access to the latest technology and design and manufacturing capability for the devices they need;
- (b) the UK obtains a reasonable share of the rapidly growing market in Europe and elsewhere for these devices.

2.2. To achieve this, together with an appropriate capability in infrastructure (special plant and materials) and certain associated discrete (as opposed to integrated) circuits, DOI with the Sector Working Party estimated would require investment of some £240M, and that some £70M of Government support would be needed to achieve this: much of the support is destined for internationally mobile projects by international companies, and MISP support has already been successful in getting a number of important projects located here. Without such support much of this investment would certainly be attracted to countries other than the UK whose Governments are offering similar support with the same objective: the great bulk of the £13M so far committed under MISP is for such internationally mobile projects.

2.3 The £70M referred to above is not wholly "additional" expenditure; as much as possible of the investment will be steered to Assisted Areas and therefore much of the support is likely to be provided as normal regional assistance under S.7 of the Industry Act and fall within that category of public expenditure. £8.8M of the £13M already committed falls in this category.

B

cc Mr Hoskyns

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Qa 04191

To: PRIME MINISTER
From: SIR KENNETH BERRILL

Microelectronics

1. On Monday next you are to have a meeting with Sir Keith Joseph to discuss Microelectronics. You asked for comments before that meeting from the Treasury and the CPRS, and the Chief Secretary subsequently put in his views. In large part we in the CPRS agree with the views put forward by the Secretary of State for Industry and the Chief Secretary, though we would wish to put the discussion in a wider context. In what follows we set out briefly the position as we see it.

2. In an ideal world Governments would not need to intervene to help private industry develop and exploit new technologies. But on past experience of their reaction to technical change British industry is not the fastest out of the starting blocks. The microelectronics race is one which we just cannot afford to lose and we are already several years behind our main competitors. Despite their lead most of those competitors have decided that they, too, cannot just leave everything to the market. The German Federal Ministry for Research and Technology is increasing its expenditure in this field at a rapid rate. Expenditure to help with the application of advanced electronics to industry is rising from DM 14m. in 1978 to DM 23m. in 1980. They are increasing expenditure too on their Information and Documentation Programme which, through a new technology centre in Berlin and through local advisory centres, aims to help small and medium sized firms with R & D and with employee training in advanced electronics tailored to the particular needs of the individual company.

Details please

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3. We also agree with the Chief Secretary that one of the most encouraging events of recent months has been the way in which the TUC, the Post Office Engineering Union and APEX have recognised that Britain cannot opt out from the microelectronics revolution: indeed, we cannot even afford to try to take it slowly. It would be most unfortunate if this momentum were to be lost by any suggestion of lack of commitment to microelectronics on the part of the Government - given the strategy of increasing United Kingdom productivity generally and of promoting employment in new industries.

4. The CPRS would also agree that in a period of severe constraint on public expenditure the order of priority should be -

I. Helping individual United Kingdom firms to discover how micro-electronics can be applied in their particular products and processes (the Microprocessor Applications Project - MAP).

II. Helping to create in the United Kingdom a design, development and production capacity in microelectronics (the Microelectronics Industry Support Programme - MISP).

III. Having some production capacity under British control (e. g. GEC/Fairchild and Inmos).

NO

5. The case for a MAP type scheme is clear and the German example shows the extent to which our competitors have accepted it. The possible uses of the new electronics are widespread and all pervasive. Many firms are vaguely aware of the possibilities but need to be helped to make these ideas concrete in their particular area and helped to train their staff.

*As by various
universities
technical
colleges.*

6. The case for support for microelectronics manufacturers (MISP) is more complex (though once again the Germans are doing it). Part of the case rests on the needs of defence (integrated circuits were developed first for the US Minuteman project). In the high technology defence/aerospace/computing industries, more and more of the systems are being incorporated

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in the chip. If the United Kingdom is to remain in the front rank in these areas some Government assistance in the design and production of semi-conductors is still necessary.

7. The case for having some production capacity under British control is largely one of security of supply. This could be achieved either by majority holding in the private sector (GEC/Fairchild) or by public ownership (Inmos). The case for continuing Inmos is weaker than for MAP and MISP. The creation of Inmos has already had some catalytic effect on the private sector, and in the medium term could well become sufficiently successful to be sold off as a going concern. Sold now its value would necessarily be less. But clear decisions on whether to close it now or continue and sell later should be taken soon since continued uncertainty will mean great difficulty in recruiting and holding skilled staff, and the possibilities of a successful outcome will wither.

Who said?
Enigma?

8. But apart from those issues raised by the Secretary of State for Industry and the Chief Secretary, the CPRS believes that the Government needs to discuss microelectronics in a wider context. The potential market for microelectronic equipment is very large and growing very rapidly, but the interesting point is the breakdown of this market. No less than 60 per cent of sales are expected to be in 'information goods' (communications equipment, office equipment, data processing). It is not for nothing that the French talk of Information Technology rather than of microprocessors. Approaching advanced electronics in terms of information technology creates a new perspective and the MAP/MISP/Inmos group of policies appears as only one part of the required response. If we have bottlenecks on the widespread use of the new 'information technology', our success in the microelectronics field is bound to be severely limited.

9. Such a broader 'information technology' perspective brings out other areas than MAP/MISP/Inmos where Government policy could be crucial in the United Kingdom's struggles in the microelectronics race:

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*Le...?
Ask G.C.C.*

(a) the crucial importance of having an adequate communications network inside the United Kingdom (and hence the vital role of the Post Office):

(b) the international dimension - the importance of the United Kingdom having adequate access to radio frequencies and satellites:

(c) the many domestic and international issues in the fields of privacy, copyright, compatibility in data transmission, etc. in which the Government has an important role:

(d) the scope for the public sector using the new information technology to improve the efficiency of its administration.

10. In the view of the CPRS, all this is at present very far from well organised. It is not looked at as a whole, it is not dealt with at sufficiently high level, and the bottlenecks are not being removed quickly enough. Many Departments of State are involved as sponsors for industries, as potential users, as negotiators in international fora (e.g. radio frequencies). We would press for an interdepartmental examination of these wider issues and their relationship to the problems of microelectronics.

11. I am sending copies of this minute to the Secretary of State for Industry, the Chief Secretary, and to Sir John Hunt.

KB

12 July 1979



12 JUL 1979



10 DOWNING STREET

MR. LANKESTER

Micro-electronics meeting
16 July. The Prime Minister
agreed that Sir Kenneth Berrill
and John Hoskyns should be
invited, which I have done.
I assume you will be circulating
the briefing?

es.

5 July 1979



10 DOWNING STREET

PRIME MINISTER

Microelectronics meeting
with Sir Keith Joseph,
Monday 16 July

Would you like Sir Kenneth
Berrill and John Hoskyns to
attend this meeting?

Yes please
no
C.S.

4 July 1979



DEPARTMENT OF INDUSTRY

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T Lancaster Esq
No 10
Downing Street
LONDON
SW1

Your reference

Our reference

Date

3 July 1979

Dear Tim,

MICROELECTRONICS ETC

We spoke briefly about this subject and you said you would welcome a look at the Stanford Research Institute draft summary of a position paper they are preparing for us.

2 The main things that emerge from this SRI review are :

- (i) VLSI will be the dominant technology of the 1980's and industry should be taking this into account now. This is not happening in the UK.
- (ii) To be effective in tomorrow's world, it is essential to concentrate national resources on the long-term goal of becoming a world leader in a specific area of application. At present Britain is a world leader in nothing.
- (iii) The economic and cultural infrastructure is a key determining factor. Britain's infrastructure is not conducive to exploiting the opportunities of micros.
- (iv) Governments have a role in -
 - (a) Directing high level R and D (eg the VLSI programme programmes of France, Germany and Japan - these include strategic use of circuits in key sectors such as computers, telecommunications, or capital goods not just production of circuits for their own sake.
 - (b) Acting on the resources side (eg training etc).
 - (c) Making the infrastructure more conducive.

3 What about means? On the MAP side, why not

- (a) Convert Project support into a special fund for stimulating start ups and small firm growth in micro applications - the

UK version of Californian venture capital. It is no use saying this is for the City or someone else in the financial world. This is not happening now and time is of the essence.

- (b) As regards world leadership, why not concentrate all efforts on exploiting our slim lead in Teletext/Viewdata by a combination of means eg fiscal incentive (VAT zero rating on this item of information dissemination), public procurement and development especially for use as an educational aid?
- (c) As regards application to processes, this is of vast scope (eg practically every company in the UK could improve its methods of management and of production). Should there not be a special approach to the City etc to introduce a micro audit for every investment project they consider. Where very large investments are under consideration or some risky ones, could not the Government provide a guarantee for City finance (eg a Government/City partnership to help British industry help itself to raise productivity and quality on a large scale with the aid of micros?
- (d) Training. Boost support for DoI efforts here under MAP and extend scope to schools, universities etc. Also tax exemption for expenditure by persons attending training courses. This facility is available to everyone in USA, Germany and Japan who can offset expenditure on any type of training or learning they take up once at work.

4 Enough is enough but as you can imagine we feel it should not be impossible to frame a package to meet the crucial needs of industry without conflicting with the Californian philosophy!

Best wishes.

Jonathan Solomon

J H M SOLOMON

A STATUS REPORT ON MICROPROCESSOR TECHNOLOGY
AND ITS IMPLICATIONS FOR THE UNITED KINGDOM

INTERIM DRAFT SUMMARY

June 1979

Prepared by:

Michael A. Placko

Prepared for:

DEPARTMENT OF INDUSTRY
United Kingdom

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BACKGROUND

This is an interim draft summary of a position paper being written for the Department of Industry. The paper focuses on the status of microprocessor technology and its utilisation in the United Kingdom, as compared to the United States, Japan, and other Western European countries. Because of the timely nature of the subject matter it was felt that this summary would be of value to the Department of Industry.

For the purposes of the paper, no distinction is intended between the terms "microprocessor" and "microcomputer", although, in a technical sense, one exists. Furthermore, microprocessor technology and microelectronics technology can be considered synonymous.

SUMMARY

THE MICROPROCESSOR REVOLUTION

The "microprocessor revolution" has received a great deal of public attention in the United Kingdom during the past year, more so than in the United States, or Japan, the acknowledged technology leaders. Through the fundamental development of the transistor and the subsequent development of photolithographic and semiconductor process techniques the world of electronics has become dominated by microelectronics. Dramatic improvements in functional density, processing speed and power consumption have been coupled with equally dramatic reductions in cost, making advances in this technology unique in today's world economy. There is no reason to believe that these trends will not continue into the future. The microprocessor has become the layman's embodiment of microelectronics and, as such, it represents the most profound aspects of the electronic future. It can be viewed as the fusion of electronics and computing, as we know them today, into the intelligent electronics of tomorrow.

Whether developments in microprocessor technology represent a revolution or an evolution is academic. What deserves critical attention are the potential impacts of the technology. The addition of intelligence to electronics through the use of programmable microprocessors has added enormous potential to the applications of electronics. It has significantly increased the control and flexibility of electronics, while at the same time exercising a positive influence on product cost and size. The diversity of emerging applications is astonishing - from office automation to personal computing, from automobile and aircraft control to industrial automation. The most profound implications of the technology lie in its future applications, in the impact it will have on both producers and users of microprocessor-based products.

TECHNOLOGY AND INDUSTRY OVERVIEW

Little doubt exists that the rapid pace of advances in microelectronics will continue during the coming decade. Both photolithography and semiconductor manufacturing techniques are being refined today to achieve submicron-feature sizes, or very-large-scale-integration (VLSI), where resolution finer than the wavelength of light is required. Realisation of VLSI will apparently not be inhibited by insurmountable physical barriers during the 1980s. If there are any limiting factors they are due to the complexity of the devices that can in actuality be produced at extreme densities. New architectural concepts and design methodologies, as well as advances in computer-aided design techniques, will be required to develop VLSI microprocessors containing a million elements.

VLSI technology should mature in the mid 1980s. Attesting to this are specific government commitments to the development of VLSI techniques in the U.S., Japan, France, and West Germany. The resulting VLSI technology drive has the potential to split the semiconductor industry into standard, high-volume manufacturers and specialised, vertically-integrated system manufacturers - there is already evidence of this in the industry. Both types of companies will draw on the potential of VLSI in different market segments to produce intelligent microelectronic devices for the late 1980s.

Through VLSI, microprocessor technology (both hardware and software) will mature and stimulate even more rapid applications growth. It will move beyond the state of straightforward electromechanical replacement to the innovative application of microcomputing power throughout the spectrum of industrial and consumer products.

Therefore, it is crucial that industry and government in the U.K. recognise the quantum step that VLSI represents for microelectronics. Any actions intended to further microelectronics and its applications in the U.K. should be predicated on the evolution of the technology - past and future.

BRITAIN TODAY

The U.K. is not well-positioned in the world semiconductor industry. Although companies like Plessey, Ferranti, and GEC satisfy some specialised domestic requirements, no U.K. manufacturer plays a significant role in the \$5 billion world integrated-circuit market. This native industry does provide, however, a limited technology base for U.K. applications, most notably in defence electronics and custom telecommunication products. Commercial research and development in microelectronics technology is currently much more modest in the U.K. than in leading U.S., Japanese, and Western European companies. The pursuit of limited markets has probably been the dominant single factor inhibiting growth in this industry.

Research and development associated with microelectronics in the U.K. university system has been largely restricted to applied technology, with perhaps the exception of computer-aided-design. There are many examples of state-of-the-art research being conducted at centres in Cambridge, Manchester, Newcastle, and so forth. However, there has been a historic lack of technology transfer, with little realisation of university research in profitable products. Further, British universities graduate comparably fewer engineers and technologists than either West Germany, Japan, or the U.S. Increased synergy between the academic community and industry would improve the U.K.'s technical posture.

The existing application of microprocessors in U.K. industry covers a broad spectrum, but it is only beginning to reflect the product potential and changes in manufacturing techniques anticipated in the 1980s. In some instances, like the Prestel system or selected telecommunication products, the state-of-the-product is quite advanced. In others, such as automobiles or other transportation vehicles, the microprocessor has yet to penetrate product as it has in other countries. Using microprocessors in new products is meeting with less resistance than their introduction into existing British products. The number of specific applications being seriously considered by industry has dramatically increased during the past year, primarily because of the various Department of Industry programmes to stimulate utilisation of microprocessors. However, except in a few U.K. companies, the very large or the technology-intensive, microelectronics engineering resources are insufficient to respond to an increasing awareness of the microprocessor's potential. There also appear to be difficult-to-isolate socio-economic factors in the U.K. infrastructure inhibiting technology penetration - inhibiting innovation and change.

BRITAIN TOMORROW

Microelectronics could be the pivotal technology enabling the U.K. to establish a competitive position in future world markets. The world electronics market, alone, should approach \$350 billion per year by 1990. Its growth is in great measure due to advances in microelectronics, coupled uniquely with significantly decreasing costs. The future growth of other major sections of industry will also be effected by microelectronics. For example, future energy systems will rely heavily on microprocessors to optimise fuel consumption - enabling consumers to bear rising unit prices without sacrificing their standard of living. This is especially relevant to the U.K. in light of North Sea oil developments.

National objectives can be achieved through focus on high-leverage applications of the technology. The Japanese, for instance, have carefully directed development of their computer industry to position themselves in the world market. A critical element in their decade-old programme has been microelectronics technology. The U.K. could similarly exploit her technology base to secure a positive balance of trade, for example. While the domestic market ensures a degree of stability, the international market provides the export potential needed to pay for imports. The U.K. needs to stimulate promising industries to use microelectronics in competitive products for world markets, to overcome current industrial lethargy and obsolescence.

Access to technology and engineering resources is critical to the development of microprocessor-based products. The U.K. semiconductor industry has only minimally satisfied this demand to date, and the demand is growing rapidly. Due to the capital-intensive nature of the industry and the dominant technical and market positions of international competitors, it is doubtful that the U.K. could become a major semiconductor supplier in the near future. However, both native and foreign-based companies located in the U.K. can provide an effective base for transferring technical know-how into product. In this technology human resources are as critical as capital: designers, engineers, software specialists, managers, and workers. Unfortunately, the U.K. lacks world-ranking technical institutes and, in effect, engineering is a "neglected profession". The U.K. faces a continuing shortage of trained personnel at every level. If rapid developments in microprocessor applications are to proceed, extensive improvements in the educational system and in employment incentives are called for.

Improving productivity is one of the principal processes underlying economic growth. Industrial automation is certain to improve productivity in manufacturing, largely through the use of microprocessors.

Industry in Japan currently invests more than ten times the capital per worker in manufacturing automation than in the U.K. The transition from heavy industry to high-technology and service industries is a related area of concern in the U.K. that will be stimulated by microprocessor technology. The software industry is one growing industry keyed to the future of microprocessing. It is representative of evolving labour-intensive support industries that could provide future employment and revenue opportunities for the U.K.

The apparent conflict between productivity and employment is a major issue in the U.K. today, where automation is quite often viewed as a job-killer. Rather than reducing the number of workers, processes can be made more efficient or less costly, improvements can be made in the value-added, or new jobs can be created through new products and services. Most of the employment question relates to the problem of transition, i.e. the loss of existing jobs. The degree of displacement is, at this point, a matter of design choice rather than inevitable development. In the long term it will be important to consider the character of many jobs; the option to improve working life is there.

Government, industry, labour, and academia are all taking an active role in public debate over the future of the technology and the implications it holds for the U.K. This concern is not unique, but the public visibility and the variety of participating interest groups are. Many other nations, including most of the EEC countries, have completed or are conducting studies of microelectronics. Japan is most notable in its substantial investment in its high-technology electronics and computer industries through the entire 1970s.

France and South Korea have been actively fostering their national semiconductor industries. The West German government is continuing to be a major funding source for related research and development. The United States is unique in its lack of any coordinated large-scale government endeavours. There is reason to believe, however, that the rising capital requirements of research, development and production, and increasing foreign competition will compel governments to take an active role in the technology in the future. The commonality of concern with microprocessor technology at the national level indicates the importance of this technology in the future world economy.

CONCLUSIONS

One of the critical elements in tomorrow's world economy will be intelligent electronics, best exemplified by the microprocessor. The technology will continue its dramatic progress through the next decade. By the mid 1980s the technology will take a quantum step with the emergence of VLSI, significantly changing the semiconductor industry. It is vital that future planning take this into account, especially the implications for products and production in the late 1980s.

Britain today possesses isolated examples of successful utilisation of the technology and in most broad sectors has a reasonable base from which to grow. However, there is no single industry where the U.K. enjoys a position of world leadership based on technology. In fact, critical skills and resources in microelectronics are insufficient to satisfy today's demands, let alone the growing demand of the near future. The U.K.'s current position vis-a-vis the technology is one of potential, not achievement.

Britain's future objectives must include developing high-leverage applications of microprocessors. A variety of commercial and national objectives can be achieved through exploitation of the technology, coupled with pursuit of world markets. Success dictates commitment to long-range goals, requiring relatively high near-term capital investments and recognition of risk. In all probability, if the U.K. doesn't vigorously embrace this technology, her position in the world economy, and even her social vitality, will be seriously impaired.

Lastly, the complex infrastructure surrounding development of microprocessor-based products and their subsequent profitability needs to be carefully examined and improved. The socio-economic implications of the "microprocessor revolution" are destined to be as profound in the U.K. as in the rest of the world. Britain will not be immune to its effect on productivity,

employment, education, and the standard of living, among others. A great deal of the current debate has the tone of resistance - as if resistance was constructive. It is time for the analytic foundation of the continuing debate to shift from the issue of whether to proceed to a focus on how to best move ahead. Perhaps the greatest impact of the microprocessor will be measured in terms of its role in the transition from an industrial society to Barron's "information society", or as we call it, the future world knowledge society.



PRIME MINISTER

cc Mr Hoslegns

MICRO-ELECTRONICS

In his letter of 11 June your Private Secretary said that you would welcome comments from the Treasury and the CPRS on the proposals by the Secretary of State for Industry for continuing public expenditure in support of the manufacture and application of micro-electronics.

2. If the supply side of the economy were working efficiently there would be a very strong case for leaving it to the private sector companies concerned to take the initiative in developing, manufacturing, and applying new devices promptly and effectively. However, in deciding on this, we have to consider what weight to give to the widely held opinion that in practice British industry is sadly lacking in its awareness of the potential impact of micro-electronics. As you know, this was the finding of the 1978 study by the Advisory Council on Applied Research and Development.

*On which
based?*

3. There seems no doubt that if British industry does not respond quickly and effectively our relative competitiveness will suffer seriously. The introduction of micro-electronics will have pervasive effects throughout the economy - in, for example, manufacturing industry and process control equipment, consumer durables, shop and office equipment, and the entertainment industry. If our manufacturers are slow or inefficient in the application of these devices they will lose out to their overseas competitors. As it is, the other main industrial countries are already highly active in the development of micro-electronics, and apparently ahead of us. No doubt this is in part due to the initiative of their private sectors. But it appears that in most countries,

Government support, by various routes, is having a considerable influence on both the development and the application of micro-electronic devices.

4. Against this background, I believe that the Secretary of State is right to conclude on balance that the objections to some Government intervention by way of public expenditure are outweighed by the risks of standing back and leaving it entirely to private sector initiatives. We would benefit from having strong and growing companies capable of manufacturing the devices and I accept that, where necessary, we should be ready to give some financial inducements to attract internationally mobile investment here and to stimulate existing activities. I think it is probably even more important that we should be willing to do something to encourage applications. Our record as a country has not always been impressive in the exploitation of new technology and, in this instance, it is vital that a very wide variety of companies, large and small, should be made to realise the significance of the changes which are coming and that they should act upon them promptly.

5. In considering this, I think that you should also take into account the views of the TUC - something which the Secretary of State does not mention in his paper. Their recent report on Employment and Technology focussed on the so-called micro-electronics revolution. In general they seem to be taking a positive and responsible line, recognising the need of the trade union movement to meet the challenge and the changes that are coming. It is important that they should continue to do so and that they should feel that this Government is fully alive and sensitive to the social and employment strains which the introduction of micro-electronics will bring. There is some risk that if we were to abandon these two schemes they would regard that as hostile to them - particularly if we decide that NEB must withdraw from Inmos. I am not of course arguing that the TUC's views on this expenditure are in any way decisive. But I do not think that we should forget them when reaching our decision.

6. I have also considered the public expenditure implications of continuing support. I understand that the Department has now tabled realistic options which should enable us to reduce the Industry programme broadly in line with the very substantial cuts we planned in Opposition (mounting to over 40% in 1983-84). There would be room in the remaining programme for continuing expenditure on the two micro-electronics support programmes and so, subject to our decisions on the Survey, I am satisfied that the public expenditure costs should be manageable.

7. The Secretary of State proposes to tighten the criteria for project support under the Applications Scheme. I think that there is a good case for doing likewise with the Industry Scheme. In line with his ideas for the Selective Investment Scheme, which has somewhat similar objectives, we could concentrate expenditure on internationally mobile projects and those offering very significant advantages. But we would keep out of marginal cases - for example, those allegedly offering some acceleration of expenditure; and assistance to subsidiaries of holding companies which are themselves financially strong. I assume that the Secretary of State will vet individual proposals himself and keep this expenditure under close review. In this way we will have the opportunity to switch off support if this turns out to be justified.

8. In principle I am attracted by the idea of giving more support by use of public procurement. But before deciding on this we need to know much more about how it would operate in practice. In particular, it will be important to take account of two constraints. First, our EEC and other international obligations place restrictions on helping British industry through public procurement. Secondly, we need to weigh the advantages of help through public procurement against the need for the public sector to get good value for money in its procurement activities and against the possibility of additional public expenditure costs which might arise from any change in direction. I note that the Secretary of State says that savings from restrictions on the Applications Scheme

could be diverted to provide a public procurement stimulus. But I question whether these relatively small savings would be sufficient to make any significant impact, or indeed whether we would want to surrender them for this purpose. I should be grateful if the Secretary of State could take account of these points when he puts forward his proposals for a more constructive use of public procurement, in micro-electronics and more generally.

9. I am sending copies of this minute to the Secretary of State for Industry, and to Sir Kenneth Berrill and Sir John Hunt.

W.J.B.

JOHN BIFFEN
2 July 1979

3 JUL 1979



CONFIDENTIAL

2nd Sol. / vls



10 DOWNING STREET

From the Private Secretary

11 June 1979

c Hill
CO
CPRS
AC Miss Stephens
Mr Hoskyns
Mr Wolfson

Micro-Electronics

The Prime Minister was grateful for your Secretary of State's recent minute on micro-electronics, but she has asked me to say that she has considerable doubts about the approach which he is proposing to follow. In particular, she has doubts about the need for the Microprocessor Applications Project, at least in its present form: she has questioned the assumption that British industry will not embrace this technology as rapidly as its competitors; even if this is the case, she wonders whether it would not be better to rely on improving the general business environment rather than pumping in Government money. The Prime Minister would like to have a meeting with Sir Keith Joseph to discuss this whole area of policy, and we are getting in touch with you to arrange a meeting after the Prime Minister returns from Tokyo. In preparation for that meeting, the Prime Minister would be grateful for any comments from the Treasury and the C.P.R.S..

I am sending copies of this letter to Martin Hall (H.M. Treasury), Martin Vile (Cabinet Office) and Gerry Spence (C.P.R.S.).

T. P. LANKESTER

Andrew Duguid, Esq.,
Department of Industry.

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vls



PRIME MINISTER
MICRO-ELECTRONICS

*cc Mr Wilson
Mr Hooley
Sri Lanka
Before any further
work on
would be done
for about
1 1/2 hours
me.*

CONFIDENTIAL

Prime Minister
1
I thought you would like
an early note on this
subject. Are you content
with Sri Lanka Joseph's
approach; or would you like
it discussed in E Committee?
R

Your Private Secretary's letter of 24 May asks for a note on current support of micro-electronics, including INMOS. This has been delayed because I have been reviewing the situation for myself. 8/6


The first point to be made is that there does seem to be almost universal acceptance that micro-electronics technology is of crucial importance to our future industrial and economic performance and our competitive position in world markets. In its way it is likely to be of the same sort of importance as was the steam engine with the difference that (a) it will be even more pervasive and (b) we are not in the forefront of its development. Because we are not in the lead, like Avis we have to try harder.

Against this background our predecessors announced last year two major schemes, the Microprocessor Applications Project (MAP) and the Micro-electronics Industry Support Programme (MISP), to which were allocated respectively £55 million over three years and £70 million over five years. The first, as its name implies, is aimed at encouraging British firms to apply microprocessors (and other micro-electronic devices). The second is intended to encourage the development and manufacture of micro-electronic devices themselves within the UK. Both schemes are described more fully in the attached notes.

Flag A

I have considered carefully the necessity for using the taxpayers' money in this way and whether there is not scope for using the route of public procurement rather than that of direct support. Had we been

/in ...



in power for the last five years, I have no doubt that we would have moved decisively in this direction. I still believe that there is scope to do so and my Department is preparing proposals for a more constructive use of public procurement (not only in micro-electronics). But since our predecessors had not developed this approach vigorously, we must accept that it will take time before we can look for significant results.

MAP

!!!
 Who said?
 The case for continuing with the MAP is that without it British industry will not embrace the technology as rapidly as its competitors. There is a fair amount of evidence that awareness of the technology varies widely in industry and even where there is awareness little action is taken - in marked contrast to what is happening particularly in Japan and America, but also increasingly in other European countries.

apart from the fact that the readiest market for the devices developed in the US and Japan is for applications close at hand, the reasons why British industry has moved slowly in this as in other areas of innovation are not far to seek. The general environment in which business has operated for many years past has been hostile to risk taking and has not provided rewards for success commensurate with the penalties of failure; managers have been so preoccupied by the need to keep their business going from day to day in spite of all the difficulties imposed by Trade Union attitudes, pay policies and other forms of state interference that they have not had the time, even if they had the inclination, to think ahead. In some cases also lack of venture capital has been a handicap.

NO - The lack of
 /Our ...
 return on it not

agreed
 subject of
 the meeting



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Our policies are designed to change the environment within which industry operates and encourage initiative and risk-taking; but I have to accept that the necessary transformation cannot be achieved quickly.

Of course competition will eventually drive British firms to apply micro-electronics - or drive them out of business; but I am persuaded that because of the pace at which the competition is advancing there is a real risk of the latter happening widely before our general policies can take effect. This would have far-reaching consequences for British industry and for our already diminishing share of world markets.


*No
not in
the text*

In these circumstances I have concluded that the MAP - which has been warmly welcomed by industry and aroused much interest - should be allowed to continue on broadly its present lines. Nearly a quarter of the £55 million total is already committed, but I hope to be able to reduce somewhat the total amount of money allocated to project support (Part C of the scheme) by setting an upper limit on the cost of projects eligible for support with a view to concentrating it on small and medium sized firms. I would hope that it would be possible to use the savings resulting to provide a further stimulus to the public procurement route.

MISP

This programme complements the MAP. It is intended to ensure that the UK has the necessary design, development and production capability to ensure that micro-electronic devices required by British users are available; this includes both the manufacture of high volume standard

/products ...




products and the capability to design and supply special circuits to meet users' particular requirements.

There are two reasons why this is important; first imports of electronic components generally and of integrated circuits in particular have been taking an increasing share of our market, and unless this trend can be reversed, the implications for the balance of payments of the expected rapid expansion of demand for these devices would be considerable; second and more important, experience has shown that to get the maximum technical and economic advantage, users of micro-electronic devices need to have ready access to, and be able to interact closely with, local circuit design and manufacturing facilities. This point was made in the report of Ian Lloyd's group on information technology; they said (in relation to INMOS, but the point is of general validity) "early access to the latest chip technology and reliable supplies are more important to British chip users than lower prices for large volumes of obsolescent foreign products".

To this end the Department of Industry worked out in close consultation with industry a five year strategy. It involved both encouraging established multinationals to set up design and production facilities in the UK or expand existing ones to serve not only the domestic market but also that in Europe, and developing the capability of UK suppliers of special (as opposed to mass-produced standard) micro-electronic devices required by particular users, and also developing the so-called "infra-structure" industry supplying equipment and special materials needed by the producers of micro-electronic devices.

/Support ...




Support (by means of grants of up to 25% or loans of up to 50%) is only given to bring about something which would not otherwise happen: it is by no means an automatic subsidy of what firms would do in any event.

The programme has already achieved a number of successes: the GEC/Fairchild project would not have come to the UK but for Government support; ITT, who manufacture in the US, the UK and Germany, decided because of the support available to make the UK their world centre for the development and production of memories; National Semiconductors, one of the top US firms, has recently agreed to set up a major new operation in Scotland with our support.

In one way or another most of our competitors, recognising the importance of this industry, provide substantial support. In the case of the US, this comes indirectly from the Government through the Defence and Space programmes and the demands of the computer industry. In Japan there is substantial direct support to industry, and both the French and West German Governments are supporting their industries on a substantially bigger scale than are we.

The need for this arises from the very heavy initial investment required in this business, the rapidity with which the technology is advancing, and the fact that world prices for the devices seldom reflect their true cost. These factors are particularly important in the context of the indigenous British suppliers who have a reasonable capability, particularly in "special" circuits, which has been created and maintained - in the economic climate to which I have referred above - only by Government support over a period of years: in the

/absence ...



absence of Government support, they would not be able to afford the necessary investment.

Of the £70 million allocation over five years, some £13 million is already committed and a further £17 million is earmarked for Plessey and Ferranti, both of which have important high-quality operations which it is undoubtedly important to preserve as "centres of excellence". That leaves £40 million for the remaining four years of the programme, and a number of other projects are already in the pipe-line.

Whilst as you know I am in principle strongly opposed to support of this kind, I accept that against the background of substantial Government support (whether direct or indirect through purchasing) in competitor countries we have little option but to continue with MISF if we are to have the capability in this country to supply the needs of user industries and to achieve a reasonable share of the rapidly expanding world market for these products as well as reducing what would otherwise be an increasing dependence on imports.

Needless to say, the maintenance of this programme and of MAP, both of which I believe to be justified, will not prejudice my Department making a substantial contribution to public expenditure savings.

INMOS

I come finally to INMOS. This is not a central part of our strategy for the industry, though if successful (and it is undoubtedly high risk) it would contribute significantly to UK micro-electronic production by the early 80s. The NEB are already contractually committed to INMOS to the extent of £25 million, and the Board attaches great

/importance ...



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importance to the project, so it will need careful handling. I think therefore that it is right to consider INMOS's future within the context of NEB's activities as a whole, and particularly those concerned with the new high technologies based on micro-electronics.

I shall be putting a paper to colleagues on my conclusions about the role and functions of NEB before the end of this month, and you can be assured that I shall be examining very closely the question whether INMOS has any real future.

I am copying this minute to Geoffrey Howe and Sir John Hunt.

KJ

K J

June 1979

Department of Industry
Ashdown House



A

MICROPROCESSOR APPLICATIONS PROJECT (MAP)

1 There is little argument about the importance for the economic future of any industrialised nation of the timely and effective application of micro-electronics to virtually the whole range of industrial processes and products, as well as to offices, transport and the home.

2 Stimulated by the demands of the computer and aerospace industries (the latter largely Government funded), the technology has advanced with startling rapidity in the US (and more recently Japan). In these countries too the technology has most rapidly found widespread application in other industries, and as a result their products incorporating micro-electronics are starting to preempt world markets: obvious examples are consumer durables and entertainment equipment, shop and office machinery, toys, manufacturing machinery and process control equipment.

3 DOI's analysis of the UK position early in 1978, based on its contacts with both supplier and customer industries, advice from research establishments, universities and trade associations, and an industry questionnaire originated by the EEC, concluded that:-

5% of firms were active in micro-electronic applications.

45% were aware but not actively pursuing applications.

50% were not sufficiently aware to be able to assess the opportunities and threats presented by micro-electronics to their business.

4 In July 1978 a sub-committee of the Advisory Council on Applied R&D which included industrial members, reporting on Applications of Semi-conductors, did not differ from the DOI assessment - which though published more than a year ago has not been challenged. Other studies and reports have confirmed the broad conclusion that much of UK industry is seriously lacking in awareness, and this is true even of some companies within large groups in the electrical/electronic industry. Size of company does not seem to be a decisive factor: much depends on the attitude of individual managers and technologists.

MAP

5 Against this background, MAP was introduced in 1978 to assist UK industry over the difficult introduction period for micro-electronics technology, say the first three years. Its main elements are:-

MAP(A) (i)	<u>General Awareness</u>	- A national programme of 1-day workshops: support of seminars, conferences etc.
	Allocation £3m	
	Committed £1m +	



- (ii) Training
Allocation £6m
Committed £1m +
- A crash programme over 2-3 years to increase the number of people being re-trained in industry in micro-electronics. By agreement with DES and MSC to be taken over by them when possible.
- MAP(B) Feasibility Studies
Allocation £2m
Committed £0.75M +
- Short-term assistance to "first time" firms to determine the value or otherwise of the technology to their business. Very much tailored towards the smaller manufacturing firms.
- MAP(C) Project Support
Allocation £43m
Committed £9m
- 25% selective grants to encourage industry and ease the technical and financial risks to firms undertaking micro-electronics projects (especially for the first-time or at a significantly greater level of complexity).
- 6 Undoubtedly, left to its own devices and in its own time, British industry would have to apply micro-electronics technology and some of the more progressive firms are already doing so without MAP support. But the majority are not and the problem which the MAP is designed to tackle is the small scale and slow pace of general take-up. With lead times for applications commonly around two to three years there is every risk that many firms will be unable to react fast enough to survive if they wait until the competition is visible. Investment in development and new designs has been falling steadily in the UK for many years - example, instrument industry (a prime micro-electronics area): 1970 development expenditure 5% of sales - 1977/78 3% of sales; strongest competitors US and Germany 6% of sales throughout the period.
- 7 Lack of finance is not generally a reason for slow progress; plain lack of awareness undoubtedly is, together with an economic and fiscal environment which for many years has not been conducive to innovation. Hence the essence of the MAP is the use of public funds to create awareness and by means of subsidy induce companies to take action which they would not otherwise do. Public purchasing can play a part in selected areas such as defence, education, health and social services, and property services (energy saving) but is not applicable over the broad range of industries where the public sector is not a significant customer.
- 8 Stimulated by a 25% grant a project may proceed which would not otherwise, on a faster timescale (the most usual situation) to meet the market, or enhanced in some way. Support limited to the 25% level ensures that only sensible projects are put forward by firms since their own money is at risk, though even so the Department weeds out about half of the potential cases put forward; there is also of course a substantial gearing effect in terms of the DOI contribution. In the absence of MAP support the converse would apply.



Some projects would not proceed at all, some would go ahead on a more protracted timescale, perhaps missing the main market, and some would fail just because they had been carried out on a shoe-string.

9 All parts of the Scheme have made an excellent impact in the 10 months since its announcement and some 1000 projects are within the system under Parts B and C. MAP has been well received by senior industrialists many of whom have spoken warmly in public in its favour stressing amongst other factors the need for UK Government support to match that currently being provided by Governments in most other advanced countries. This could readily be confirmed by discussion with industrialists in both supplier and user industries. The Department is supporting a research project by the Policy Studies Institute which will study the progress of innovation in this field, and the impact of MAP.

CONCLUSION

10 There is a good deal of evidence that most of British industry is responding slowly to the opportunities and threats of micro-electronic applications, particularly in comparison with the US and Japan. Competition will eventually drive British firms to apply micro-electronics - or drive them out of business; there is a real risk of the latter because it will take time before the Government's policies can produce a more encouraging and rewarding environment for innovation. Given the all-pervasive nature of micro-electronics and the fact that its rapid application to manufacturing results in more competitive products even if they do not incorporate micro-electronics, failure to adopt this technology at much the same pace as our competitors would have far-reaching consequences for British industry generally and for our diminishing share of world markets. The MAP is a short-term programme aimed at accelerating the take-up of micro-electronics by creating awareness, providing technical training, and stimulating applications in companies by paying up to £2,000 towards feasibility studies and by provision of a 25% subsidy for approved projects.



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MANUFACTURE OF MICRO-ELECTRONICS
SUPPORT BY THE DEPARTMENT OF INDUSTRY

Background

1 By 1985 the world micro-electronics market will be approaching £10 billion per annum and equipment dependent on micro-electronics will have a value ten times greater. Systems using this equipment will have a value greater still.

2 The future importance of integrated circuit semi-conductor technology, as distinct from discrete component semi-conductor circuit technology, became obvious during the late 1960s and early 1970s. At that time UK-owned semi-conductor companies had been unable to compete in a world-wide price war and had very reduced semi-conductor operations which were unable to develop into the new integrated circuit technology on a world competitive scale.

3 The Department of Industry embarked on a Micro-electronics Support Scheme, aimed at injecting £10 million into these companies (GEC, Plessey and Ferranti), in order to maintain a UK technological capability in this new technology but accepting that the support could not help develop a UK industry capable of competing on the world market for high volume, standard, general purpose micro-electronics. This Scheme closed last year; the UK companies are left with some technological capability in all the key parts of micro-electronics, and ability to meet the needs of UK user industries for special designs, and to export as well, but no capability for high volume manufacture for the world standards market.

4 A number of US subsidiaries manufacture here, some providing a special design capability but most undertaking manufacture of a limited range of standard products of their parent companies. There is an increasing negative balance of trade in these standard products.

Strategy

5 During 1977/1978 the Department, in collaboration with the industry and its trade association and with the help of the Computers, Systems and Electronics Requirements Board (CSERB), the Electronics Research Council (ERC) and the Electronics Components Sector Working Party, worked out strategy proposals for this sector in industry, for the next five years. This strategy was announced by the SWP early in 1978.

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6 The strategy objectives were:

- (1) to develop in the UK a capability for high volume manufacture of general purpose, standard micro-electronic integrated circuits to compete on the world market. The object was to exploit the export market, reduce imports, give UK user industries early access to developing products and provide technology transfer, both ways;

The strategy concluded that this was most likely to be successful if established multinationals were encouraged to start or expand manufacture here; ITT, National Semiconductor, General Instruments, Motorola and Mullard (Phillips) have plans, or are already doing so. Collaboration with a UK-owned company was also thought to be worth encouraging and the GEC/Fairchild project is an example of this;

- (2) to develop the UK capability for design, test and manufacture of micro-electronic products needed to meet the special requirements of individual user companies (custom designs) or particular sectors of industry (industry specific designs). This capability has to be indigenous, and UK-owned companies were expected to figure strongly here (Ferranti and Flessey have prepared plans for it, GEC is doing so) but US companies could also contribute (National Semiconductors and General Instruments, for example). Independent design houses could contribute too;
- (3) to encourage an infra-structure industry to support (1) and (2) above. This is the industry which will supply special plant (eg, electron beam, ion implantation, high purity ventilation), materials (eg, silicon, high purity gases), computer aided design and test equipment and other special services. The strategy was to encourage particularly those areas where an indigenous capability was essential (some materials, for example) or where the UK already had an advanced capability (electron beam, CAD or ion implantation, for example) which could be developed to exploit both home and export markets;
- (4) to encourage the UK manufacture of certain discrete semi-conductor devices which are a necessary part of a total micro-electronics capability (hybrids, micro-wave and bubble memory devices for example).

The strategy concluded that the achievement of these objectives on a scale that would be right for the UK would require investment of at least £240 million over the next five years.



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The Micro-electronics Industry Support Programme

7 In pursuit of this strategy the Department announced in July 1978 the Micro-electronics Industry Support Programme (MISP). This offered £70 million support over a five year period, which, with industry making the major contribution to the total programme, was expected to generate the required investment of £240 million. (This £70 million does not include the £50 million earmarked for INMOS by the National Enterprise Board: INMOS is not an essential element in the strategy, though it is not inconsistent with it). MISP support would not normally exceed 25%, or at most 50% of total project costs.

The Case for Government Support

8 For the objective of creating a major high volume world standard production capability (para 6(1) above) the argument must be based mainly on whether support is needed to attract sufficient inward investment from established multinationals. Multinationals have the option of expanding at home or overseas. At present, many of them believe that they need a significant foothold in Europe, with proximity to its markets. The UK is particularly attractive to the US companies because of the common language and the UK, in common with West Germany, France and, to a lesser extent, Italy, can also offer a good technical and scientific environment in which to work.

9 However, all these countries and others such as Southern Ireland, offer support of various kinds to encourage inward investment. In this situation there will be some level of support which will tip the balance in favour of one country rather than another. Despite the inbuilt attractions of the UK it does look as if this investment will go elsewhere unless some support is on offer. For example, MOSTEK found the support offered by Southern Ireland to be the decisive factor for them; UK support persuaded ITT to make the UK rather than Germany or the US their world centre for standard memories: £2M of support will result in annual production of £40M in the early 1980s; Fairchild made it clear that they would not set up their joint project with GEC in the UK in the absence of Government support; £2.8M of MISP support (plus normal RDG's) is expected to lead to annual output of £50M of memories and microprocessors by 1983; National Semiconductors have compared the relative attractions of West Germany, the UK, Southern Ireland or expansion at home and have decided on a major expansion in Scotland because of the support offered. Experience suggests that the support needed varies according to the circumstances of each company but averages about twenty-five percent.

/10.



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10 The case for support for a manufacturing and design capability for custom and industry specific products (para 6(2)) is different. This activity is not one to attract much inward investment for it does not open up major world markets; its potential is mainly to serve home and European user industries. For this reason the main suppliers are UK-owned companies.

11 At present many potential user industries are not aware of the benefits of this class of micro-electronics and can survive for a while with obsolete technology; hence the micro-electronics industry cannot, in the short term, recover their R & D and investment costs through the price of their products, particularly in competition with directly or indirectly subsidised foreign suppliers. This situation should change in the coming years and the volume of demand will rise but the capability required needs to be built up now.

12 Without support two of the three main companies in this class of business - Flessey and Ferranti - would probably not be able to develop their business and the third - GEC - would probably reduce its operations to meet primarily in-house needs. All of them would only accept outside work very selectively, for high volume customers. The UK user industries would lose access to an effective custom or industry specific design and production service, except from a few of the multinationals who would also be very selective in choosing only high volume customers. Until therefore user industries recognise and are prepared to pay for the value of special micro-electronics, support for the suppliers is needed to keep them in the business until the market adjusts itself.

13 The case for support of the other parts of the strategy - the infra-structure industry and certain discrete semi-conductors (6(3) and (4)) follows from the first two. There are some infra-structure activities, easy and certain access to which is crucial to the manufacturing industry; certain special materials can be difficult to obtain reliably (or at all) from overseas. The expectation that there will be a major customer industry in the near future to consume these products will, in some cases, be sufficient to generate the investment needed without Government support but there will be other cases where market pull is not likely to be sufficient; liquid hydrogen, high purity silicon, some so-called 'III-V' materials, could be in this category.

14 In the same way there are certain peripheral but crucial discrete devices, eg some high power devices, bubble memories, acoustic wave devices and displays. In both cases Government support may be needed to ensure security of supply in good time to meet the needs of the suppliers of micro-electronic devices and systems.

/Summary



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COMMERCIAL IN CONFIDENCE

Summary

15 The case for support may be summarised as follows:

- (1) The development of the indigenous device manufacturing industry complements the action being taken under the Microprocessor Application Project to accelerate the adoption of micro-electronic devices over the whole range of products and processes. This will generate greatly increased demand for micro-electronics devices which if met largely from abroad would have serious balance of payments implications, and mean that British users did not have ready access to the latest technology.
- (2) The business environment in the UK is not currently sufficiently conducive to the creation of the investment required to achieve the strategy without Government support.
- (3) Without support inward investment, a big factor in the strategy, will be attracted elsewhere by the support offered by other Governments.
- (4) So long as user industries remain insufficiently aware of the benefit of special micro-electronics there will not be a profitable business for UK suppliers of these products. Without support our capability to supply these products will wither: the absence of this local capability would weaken the competitive position of the users.
- (5) In view of the importance of this industry, Governments of other industrialised countries give substantial support either directly or (in the US) through defence and space procurement. In view of the high investment required in R & D and plant and the rapid advance of the technology, the risks are high; British firms can hardly be expected to match their foreign competitors without comparable support.

7 June 1979

FILE

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10 DOWNING STREET

From the Private Secretary

24 May 1979

6/7/679

Microelectronics

I would be grateful if you would let me have a note which I could show the Prime Minister on current support to the manufacture of microelectronics. The note should set out the background to the decisions to support INMOS and the various projects in the private sector. It should set out the case for and against continuing with the existing support, and in particular in relation to INMOS. Please could you let me have this note by Friday, 1 June. *extended to 7 June*

I am sending a copy of this letter to Martin Hall (HM Treasury) and to Martin Vile (Cabinet Office).

J. P. LANKESTER

Andrew Duguid, Esq.,
Department of Industry.

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