REPORT FOR THE HEARING
delivered in Case 13/84 *

I — Relevant legislative provisions

The contested decision, Commission Decision No 83/521/EEC (Official Journal 1983, L 293, p. 24) was adopted within the framework of Regulation (EEC) No 1798/75 of the Council of 10 July 1975 on the importation free of Common Customs Tariff duties of educational, scientific or cultural materials (Official Journal 1975, L 184, p. 1) as amended by Council Regulation (EEC) No 1027/79 of 8 May 1979 (Official Journal 1979, L 134, p. 1), and of Commission Regulation (EEC) No 2784/79 of 12 December 1979 laying down provisions for the implementation of Regulation No 1798/75 (Official Journal 1979, L 318, p. 32).

The purpose of those regulations is to ensure the implementation by the Community of the Florence Agreement drawn up under the auspices of the United Nations Educational, Scientific and Cultural Organization (Unesco), as supplemented by the Nairobi Protocol, approved by Council Decision No 79/505/EEC of 8 May 1979 (Official Journal 1979, L 134, p. 13).

The key provisions of the relevant regulations are as follows.

Article 3 of Regulation No 1798/75, as amended, reads as follows:

'(1) Scientific instruments and apparatus not included in Article 2 and imported exclusively for non-commercial purposes may be admitted free of Common Customs Tariff duties provided:

...

(3) For the purposes of this article:

A scientific instrument or apparatus shall mean any instrument or apparatus which, by reason of its objective technical characteristics and the results which it makes it possible to obtain is mainly or exclusively suited to scientific activities ...'.

Title III of Regulation No 2784/79, laying down provisions for the implementation of Regulation No 1798/75, contains the following specific provisions with regard to Article 3 of the latter regulation:

'*Article 5*

(1) For the purposes of the first indent of Article 3 (3) of Regulation (EEC) No 1798/75, the "objective technical characteristics" of a scientific instrument or apparatus shall be understood to mean those characteristics resulting from the construction of that instrument or apparatus or from adjustments to a standard instrument or apparatus which make it possible to obtain high-level performances above those normally required for industrial or commercial use.

Where it is not possible to establish clearly on the basis of its objective technical characteristics whether an instrument or apparatus is to be regarded as a scientific instrument or apparatus, reference should be made to the general uses in the Community of instruments or apparatus of the type for which duty-free admission is

* Language of the Case: English.

requested. If this examination shows that the instrument or apparatus in question is used mainly for scientific purposes, it shall be deemed to be of a scientific nature.'

According to Article 7 of the same regulation, the decision on duty-free importation is to be taken by the competent national authorities if the information at its disposal enables it to assess whether or not the instrument or apparatus is scientific. In the absence of such a decision, the application for exemption is to be forwarded to the Commission which must then seek the view of the Member States and, in the event of an objection, refer the matter to a group of experts composed of representatives of the Member States who meet within the framework of the Committee on Duty-Free Arrangements in order to examine the application.

If the examination undertaken by the Commission shows that the instrument or apparatus for which duty-free admission has been requested is not to be regarded as scientific, Article 7 (6) of the regulation provides that the Commission shall adopt a decision declaring that the said instrument or apparatus does not fulfil the conditions required for duty-free admission. Commission decisions are to be notified to all Member States within two weeks.

II — Facts and written procedure

The applicant contests the validity of Commission Decision No 83/521/EEC of 12 October 1983 (Official Journal 1983, L 293, p. 24) establishing that the apparatus described as 'Cyber 170-720 and 170-750' may not be imported free of Common Customs Tariff duties. This application arises out of the judgment of the Court of 17 March 1983 (Case 294/81 *Control Data Belgium NV SA* v *Commission* [1983] ECR 911) concerning the validity of Commission Decision No 81/692 of 10 August 1981 (Official Journal 1981, L 252, p. 36), finding that two computer systems supplied to the free universities of Brussels were ineligible for duty-free treatment. In its judgment of 17 March 1983, the Court declared the decision void because 'neither the statement of the reasons on which the decision at issue is based nor the Commission's argument before the Court have made it possible for the Court to find that when the Commission adopted the decision it applied clear criteria which were in accordance with the Community regulations and that in doing so it had sufficient regard for the particular objective characteristics of the two computers in question' (paragraph 31 of the Judgment). The Court did not consider the question whether Cyber computers should be considered as scientific instruments or apparatus, but referred the matter back to the Commission to be reconsidered.

The Commission adopted Decision No 83/521 of 12 October 1983, which confirmed that importation of the apparatus in question, namely the so-called 'Cyber 170-720 and 170-750' computers installed at the Joint Computing Centre of the two free universities of Brussels, could not take place free of Common Customs Tariff duties.

Case 294/81 was brought by Control Data Belgium NV SA, which has recently merged with another Belgian affiliate of the Control Data group; the name of the Belgian enterprise is now Control Data Belgium Inc. which has assumed all the rights and obligations of its predecessor.

The decisive recitals in the preamble to the decision are worded as follows:

'... in order to make such reassessment and pursuant to the provisions of Article 7 (5) of Regulation (EEC) No 2784/79, the Commission has on several occasions convened a group of experts consisting of representatives of all Member States within the framework of the Committee on Duty-Free Arrangements;

... in the course of its examination the group paid close attention to those objective technical characteristics which, according to the user, show that the computers in question are scientific apparatus; ... these characteristics can be described as follows:

(i) word-orientated hardware, the smallest addressable unit being a word of 60 bits,

(ii) floating point arithmetic,

(iii) simple and double precision of 60 and 120 bits respectively,

(iv) individual functional units of the Cyber 170-750 enabling the system to perform complex operations at high speed,

(v) instruction sets adapted to scientific languages,

(vi) particular effectiveness of distributed (multi-processor) architecture;

... with respect to these characteristics, it appears that the first two are in no way specific to the computers in question but are found in all advanced computers, the floating point arithmetic technology being found even in pocket calculators. As to the third characteristic, the maximum precision values obtainable with these imported computers can, in those extremely rare cases where such precision may be necessary, also be achieved by computers with a small number of bits per word (e. g. 32 and 64) by means of appropriate software. As to the fourth characteristic, neither the use of individual functional units nor the performance of complex operations at high speed can be considered as being requirements specific only to scientific computation. Furthermore, comparable performance to both the Cyber systems under consideration is obtainable from other competitive computers, with the Cyber 170-720 fitting into the lower speed category, while the 750 belongs in the middle-high speed category. With respect to the fifth characteristic, the manufacturer has provided that the instruction sets can also be used with languages particularly suited to commercial purposes, such as Cobol, Very/Update, Form, CRM, DAL, etc. As to the sixth characteristic, it should be noted that multi-processor computer architectures are also provided by other suppliers of high-performance systems, hence it is not unique to the Cyber computers;

... as it appears from the observations made, the imported instruments do not have the required objective characteristics making them specifically suited to scientific research, it is *ad abundantiam* considered opportune to examine the provisions of Article 5 (1) (2) of Regulation (EEC) No 2784/79 and to examine the purposes for which in general the instruments for which duty relief was requested at the importation are used in the Community;

... the computers can be used in a number of areas, it is the applications software which makes this possible;

... the computers in question were not designed in order to be mainly or exclusively suited to scientific activities, neither are they particularly inappropriate for work in the commercial or industrial sector nor are they particularly incompatible with commercial language programmes;

... the aforesaid expert group has identified that the Cyber 170-750 and 170-720 can be used in a multi-purpose way with particular programs running concurrently;

... information provided by the applicant showed their intention of using these computers partially for purely administrative work and partially for technical operations but gave no indication as to the library of programs which could demonstrate their use for purely scientific research as opposed to technology for commercial aims; ... the use to which the apparatus is put in this particular case, even if it had been for scientific activities only could not alone confer upon it the nature of scientific apparatus;

... reference to the general uses in all the Member States of apparatus of this type has shown that they are not mainly used for scientific purposes;

... the totality of these particulars demonstrates that the computers in question cannot be considered as scientific instruments; ... the duty-free admission of the apparatus in question is not justified.'

By an application lodged at the Court Registry on 10 January 1984, the applicant instituted the present proceedings. Upon hearing the report of the Judge-Rapporteur and the views of the Advocate-General, the Court decided to open the oral procedure without any preparatory inquiry but requested that the parties be accompanied by an expert at the oral procedure.

III — Conclusions of the parties

The *applicant* claims that the Court should:

1. Declare Commission Decision No 83/521/EEC void;

2. Order the Commission to pay the costs.

The *defendant* contends that the Court should:

1. Dismiss the application;

2. Order the applicant to pay the costs.

IV — Submissions and arguments of the parties

1. *Question whether the decision was adopted out of time*

(a) The *applicant* argues that Decision No 83/521 was adopted out of time since it was adopted on 12 October 1983, that is, more than six months after the judgment of the Court in Case 294/81 on 17 March 1983. The applicant relies on Article 7 (7) of Regulation 2784/79 which states as follows:

'If, on the expiry of a period of six months from the date on which the application was received by the Commission, the latter has not adopted any decision under paragraph 6, the instrument or apparatus in question shall be deemed to fulfil the conditions required for duty-free admission.'

The applicant states that the purpose of the time-limit laid down in the provision is to prevent administrative delay damaging

Community institutions of learning. It argues that Article 7 (7) creates an irrebuttable presumption that the equipment is eligible for duty-free treatment if the Commission does not issue a decision promptly. In the applicant's view, legal certainty as to the status of the equipment is achieved on the expiry of the period. The Commission could have prevented the detriment suffered by the applicant by ensuring that a provisional refund was made (subject to a bank guarantee) or it could have produced a decision within six months of being seised of the matter. It chose to do neither, and Decision No 83/521 was therefore adopted out of time.

With regard to the two cases relied upon by the Commission as authority for its proposition that it was free to decide within a reasonable time, the applicant notes that the period of time found 'reasonable' by the Court in *di Pillo* v *Commission* (Joined Cases 10 and 47/72 [1973] ECR 763) was seven weeks, whereas in *Lorenz* v *Germany* (Case 120/73 [1973] ECR 1471) the Court selected two months, adopting the periods prescribed by Articles 173 and 175 as the periods within which the Commission is required to act. It also points out that in both cases, no specific period was prescribed in the regulations. In the case of duty-free treatment of scientific instruments, six months is provided as a period within which the Commission must act, after which the equipment shall be deemed eligible for duty-free treatment. If the Commission's argument that where a matter is remitted to it by the Court it is subject only to a reasonable period is accepted, the applicant considers six months a reasonable period.

(b) The *Commission* states that the six-month time-limit imposed by Article 7 (7) of Regulation No 2784/79 cannot be applied directly to the situation, obviously not envisaged by the Community legislator, where a decision has been declared void by the Court and where a new decision has to be taken. In the Commission's view a new decision has to be taken within a reasonable time. In the present case the time taken by the Commission to adopt a new decision, namely seven months from the judgment declaring the previous decision void, was reasonable in all the circumstances. This concept of a reasonable time-limit, in the absence of a specific period laid down by the rules, is confirmed by the Court in its judgments of 11 December 1973 (Case 120/73 *Lorenz* v *Federal Republic of Germany* [1973] ECR 1471, at p. 1481) and of 12 July 1973 (Joined Cases 10 and 47/72 *di Pillo* v *Commission* [1973] ECR 763, at p. 770).

The new decision involved careful consideration of the reasons which had led the Court to make its judgment, as well as extensive consultations with experts, both within the Commission and from the Member States. Moreover, it was the first time that a decision of the Commission in this field had been declared void by the Court. The consequences had therefore to be weighed with particular care. Finally, the Commission contends that the period actually taken for making the decision, less than seven months, was of the same order of magnitude as the period of six months fixed by the regulation for the adoption of a decision on an application by a Member State. The Commission also points out that although the decision does not refer to it, there was, following the judgment of the Court, a new request by Belgium to the Commission to invoke the procedure provided for in Article 7 of Regulation No

2784/79. This request was contained in a letter dated 7 April 1983 which was received by the Commission on 12 April 1983. After consulting its group of experts the Commission finally adopted the decision on 7 October 1983, that is to say six months from the date when the new request from Belgium was received. Even, therefore, within the terms of the application, the decision was adopted within the time-limit provided in Article 7 (7) of Regulation 2784/79.

2. *Substance*

I — *First submission: failure to appreciate the concept 'scientific instrument or apparatus'*

(a) The *applicant* claims that the section of the decision dealing with the objective technical characteristics were defective both as to the facts and as to the relevant legal criteria. The decision did not accurately state Control Data's contentions; its technical rebuttal contained gross and manifest errors, responded to arguments not made, failed to consider whether the equipment was better at scientific applications than general business applications, and followed inappropriate criteria (whether the equipment was unique and what competitive equipment could do). As a whole, the technical rebuttal did not fairly examine and comment upon the totality of the case made by Control Data.

The applicant is of the opinion that the case should be decided on the basis of the objective technical characteristics considered as a whole. It maintains that the physical features of the Cyber computers which render them particularly suitable for scientific application as opposed to commercial applications are the following.

(i) *Distributed (multi-processor) architecture*

The applicant contends that the construction of the Cyber computers in question is unlike that of nearly all other computers and that their configuration makes them particularly suitable for scientific work. Cyber computers are distinctive in having a central processor whose only function is to process data which is in the memory. The central processor of the Cyber computers is insulated from external interrupts. It has no input/output functions and is simply a huge calculating engine. Input/output functions are handled by the peripheral processors. Several computers have multiple input/output processors for a variety of design reasons. The applicant maintains that the Cyber computers are distinctive not in having multiple processors, which is not unusual and does not make a computer specially suited to scientific purposes, but rather in having a central processor which concentrates on calculations alone, insulated from the outside world. The important architectural feature is the freeing of the central processing unit from external 'real time' interrupts (real-time computer operations deal with actual facts in the outside world as these occur: banking operations, airline reservations, manufacturing of chemicals and a series of processes in a highly automated plant). Normal computers provide one or several kinds of interrupt for the central processing unit. The absence of an interrupt is an inconvenience for the user

engaged in real-time operations. However, that which the Cyber is excellent at — high-speed, high-precision numerical calculations — benefits from the absence of an interrupt, since the central processing unit's effectiveness in calculation is thereby exploited to the full.

(ii) *Orientation towards unusually long 'words' and precision*

In Cyber computers, the smallest possible unit of information is a 'word' of 60 'bits'; such long words make it easy to do scientific calculations quickly and efficiently, since a very large or complex value can be recorded accurately in a single unit of information, which can then be manipulated in a single step, with resulting gain in accuracy and speed. By contrast, the processing or manipulation of the same number in a system orientated towards shorter word lengths would take longer and could be less precise: the number would need to be spread over a string of words which would involve extra time and very many computational operations. Doing a moderately complex experiment could involve hundreds or thousands of extra computing steps, more time, a greater risk of error and inefficient use of equipment. Moreover, since the individual items of data handled by general business users can be recorded in far fewer than 60 bits, the long word length of the Cyber computers in question represents serious inefficiency for users who are not engaged in complex mathematical calculations.

The applicant states that the type of computers made by Control Data and by another company, Cray, are the only computers orientated towards exceptionally long words, 60 bits long in the case of Control Data and 64 bits long in the case of Cray. No other computers were designed and built specifically to handle long words and the very large or complex numbers which can be recorded in them.

(iii) *Non-orientation towards characters*

Commercially orientated computers usually record and address information in basic units of 8 bits known as 'characters'. An 8-bit character can contain a simple number or a letter or a punctuation mark. Since Cyber computers have unusually short characters (6 bits) the range of symbols they can represent is necessarily four times smaller than the range available in an 8-bit character machine. Moreover, the Cyber 170-750 is absolutely incapable of addressing individual characters within a word.

(iv) *Floating point arithmetic*

When Cyber computers were first made, they were unique in being built around a floating point unit. The applicant maintains that by mentioning the IBM 704, the Commission demonstrates that Control Data computers were indeed unique in being built around a floating point unit and that their exceptional facility in floating point operations is helped by their design. The 704 was successor of the 701, IBM's first attempt to produce a computer for scientists. In the 701, there was no floating point feature in the central processor, so floating point operations were done by software. This was very inconvenient and inefficient, so a floating point unit was added to the existing hardware, producing the 704. Today it is the Cyber computers'

orientation towards long word lengths, coupled with its facility in floating point operations, which makes it unusual. Even today, in a number of general business computers the floating point unit is an optional extra, whereas in Control Data computers the floating point feature is central to their architecture.

(v) *Instruction sets adapted to scientific languages*

Any computer can perform a set or range of instructions or basic commands, and no other instructions. The range of internal steps which the Cyber computers can perform is very much smaller than the range available in so-called general business computers; of the available instructions in the Cyber computers most deal with calculations rather than comparing and manipulating characters. This specialization reflects, in the applicant's opinion, the general orientation of Cybers towards rapid and accurate mathematical operations, and is not inconvenient for the scientist, but is inconvenient for the general business user who requires many data-moving activities.

The applicant does not deny that its equipment can handle Cobol and other non-scientific languages, but maintains that it does so less efficiently than computers orientated towards general business purposes and that its equipment is especially efficient in handling the Fortran scientific language.

(vi) *Speed*

Several features of the Cyber computers combine to permit rapid and accurate results to extremely complex mathematical and logical operations; such speed makes possible certain kinds of scientific research involving millions of computing steps.

(vii) *Individual functional units*

The fact that separate sections of the central processor specialize in different mathematical steps enhances the Cyber computers' facility in performing the computational needs of scientists.

The *applicant* goes on to state that the submission made by the Commission in the present proceedings approaches the question of the eligibility of the computers quite differently from Decision No 83/521. It maintains that much of these submissions are legally irrelevant in that the Commission's case can be no better than Decision No 83/521, which is irretrievably defective. The applicant nevertheless commented on the further arguments advanced by the Commission in its pleadings as follows.

1. *Fundamental error as to the orientation to long word lengths*

A fundamental contention of the applicant is that its computers were unique (along with those of Cray) in being orientated towards exceptionally long words, and were indeed being built around this concept. Decision No 83/521 expressly denied this contention. The Commission in its submissions in the present case confirms its accuracy by stating as follows: 'Certainly, the 60-bit word length . . . is a distinct feature of the Cyber

computers and clearly shows that they were designed for high-precision numerical computation'. The applicant argues that the decision should be annulled on this ground alone.

2. *Some scientists could use non-Cyber computers*

The applicant concedes that there are scientists who would be adequately served by a minicomputer such as the DEC VAX (the machine cited by the Commission). It is not specially adapted to high-speed numerical calculation, but not all scientists need such a machine. However, since it is only a 32-bit machine, the basic precision it offers cannot be as great as a 60-bit machine. It states that a 60-bit machine will always be more efficient in handling very large numbers than a 32 or 16-bit machine. In addition, because of its small size, both its memory and the layout of its data channels are simplified and limited by comparison to those of a Cyber computer, so that many multiple calculating operations are not possible. The applicant argues that it is inconceivable that the execution of advanced scientific calculations by a Cyber computer could be 'readily matched' by any minicomputer.

For the purpose of this case, all parties agree that minicomputers are not 'mainly suited . . . to scientific activities', whereas the Commission agrees that Cyber computers were designed with high-precision numerical computation for scientists in mind, and the applicant contends that Cyber computers are 'mainly suited' for such applications.

The applicant concedes that the Commission is correct in claiming that other features of the computer, such as graphics, might be helpful to a scientist. But it contends that no user other than a scientist requires high-speed numerical calculation of exceptional precision. An in-built facility for performing high-speed, high-precision, numerical calculations is a distinguishing mark of the very few computers which offer it as scientific in orientation.

The applicant contests the Commission's reference to compilation as a desirable feature of a computer. It submits that the compiler is in effect the program which is prepared by the manufacturer to convert a user's program into specific machine operations for the computer to perform. It states that every large computer has compilers, in the same way as every computer has a central processor.

3. *Comparison of the IBM 3081 and the computers in question*

The applicant considers that the existence of another computer well-adapted to scientific calculations does not affect the question of whether Cyber computers are adapted to scientific calculations. In the alternative, it claims that the Commission is wrong in stating that the IBM 3081 is better than a Cyber 750 in actual use for scientific purposes. It disputes the Commission's contention that the IBM 3081 is better at doing Fortran operations than the Cyber 170-720 or the 170-750 and relies on a statement by an expert, Dr Jackson, in rejecting the table on which the comparison with the Cyber computers is based. Dr

Jackson describes an attempt to compare machine efficiency through dividing Kilo Whetstones per second by millions of instructions per second as 'misconceived' and states that IBM itself rejects such a methodology totally. He further states that it is only through a benchmark test, running a real example of an operational program used by a scientist, that comparisons can be made. He further points out that IBM computers such as 3081 always do operations in Cobol (the commercial programming language) much more efficiently than Fortran operations, whereas the reverse is always true for Cyber computers.

4. *Advantages for scientific applications said to involve disadvantages*

The applicant maintains that a compiler is in fact the means (provided 'inside' the computer by the manufacturer) by which a user's program is converted into operations by the machine. The compiler is prepared only once by the manufacturer. The user is never concerned with it. The applicant uses the analogy of a car with an extremely complicated starting motor; if the driver needs only to turn a key to start the car, the complexities of the ignition mechanism are irrelevant to him.

The orientation towards numbers of Cyber computers is enhanced by having 6-bit characters rather than the usual 8. However, because Cyber characters have only 6 bits, the computers cannot distinguish between capital letters and small letters. No scientist, preoccupied with getting the correct result to a complex calculation, is likely to worry whether the computer prints out 'result' or 'RESULT' before the critical figures. An insurance company, by contrast, would be concerned if it could only send out computer-printed letters in block capitals.

5. *Hardware and software*

The applicant contests the Commission's conclusion that it is software rather than hardware which enables a computer to be used for scientific activities. Once more using the vehicle analogy, it states that the skill of the driver can compensate for but not alter the basic structure of the vehicle and its aptness for delivering goods or for racing. Computer hardware which is orientated to 6-bit characters, which cannot address the short characters in which such data as names and addresses are stored and which cannot be used for writing a letter or for other word-processing functions, cannot be described as 'perfectly appropriate' for commercial activities. The absence of an interrupt and the absence of decimal arithmetic represent further drawbacks for general-purpose commercial users.

6. *Sales literature*

Acknowledging its embarrassment, Control Data states that its efforts to convince non-scientific users of the suitability of Cyber equipment for general business purposes has had limited success. The list of users who actually possess the 750 or 720 computers confirms this. Control Data has developed a significant share of the market for computers with high-accuracy, high-speed 'number-crunching' abilities, and such computers are overwhelmingly used by scientists in the private or public sectors.

(b) The *Commission* maintains that the Cyber computers, even though they have certain characteristics which are of advantage in precision numerical compilation are also general or multi-purpose computers. Certain features incorporated into the Cyber computers which the applicant labels as 'scientific' characteristics are facilities aimed at numerical computation. Moreover, these features — in particular long words and associated floating point facilities — are by no means the only ones which are either essential or desirable for computers applied in scientific/technological activities. Other desirable features would be, for example, compilation, symbol manipulation, and graphics.

The Commission recalled that the Court itself does not have to decide whether or not the Cyber computers are scientific apparatus. In considering whether to uphold or reject the application, the Court has rather to decide whether the Commission, when it adopted the decision, 'applied clear criteria which were in accordance with the Community regulations and [whether] in doing so it had sufficient regard for the particular objective characteristics of the two computers in question' (Case 294/81 *Control Data NV SA* v *Commission* [1983] ECR 911, paragraph 31 of the grounds of judgment, at p. 933).

As regards the particular characteristics claimed for Cyber computers and enumerated in the decision, the Commission gave the following commentary:

(i) *Word-orientated hardware and precision*

In the fourth and fifth recitals in the preamble to Decision No 83/521, the Commission was dealing in a necessarily summary fashion with two distinct, albeit linked, characteristics — word orientation and the precision attainable with 60-bit units. It recognizes that the Cyber computers have the particular hardware characteristic of being unable to handle units less than 60 bits but maintains that this can be overcome by appropriate software. Moreover, whether a computer system is word-orientated or not hardly matters from a precision point of view. The significant factors are the dimensions of the data paths and the relevant computational units. Though other computers do not inherently have long words, the internal architecture can be arranged to produce long word data paths where these are required. Such an approach can be seen in the IBM 360/370 series (byte-character-orientated) computers and subsequent derivatives, e.g. the IBM 3081. For the high-performance models, data paths and computational units of comparable dimensions to the long double word of the Cybers are provided on performance grounds.

The orientation towards long words, coupled with the non-orientation towards characters, results in serious deficiencies for the scientific usage of the Cyber computers. A key area in this usage is the compilation of high-level language programs (e.g. Fortran) into the lower-level instructions to be subsequently executed by the computer. The compiler which achieves this is itself a program, run on the computer when required during the development of a user's program. During compilation there is almost no floating point calculation, the bulk of the program involves the manipulation of non-numeric data similar to that in commercial data processing. The compiler

program assembles machine instructions and some of these will be quarter and half-word instructions.

The Commission recognizes that the 6-bit character is a serious limitation on the usefulness of the Cyber computers in handling textual information in upper and lower, and that this could be a detracting factor for commercial computer users. However, it argues that it could also be seen as a deficiency for certain aspects of scientific computing. For example, the documenting/listing of scientific programs and the presentation of the programs in the most easily understood form is therefore difficult to achieve.

(ii) *Floating point arithmetic*

The Commission states that the Cyber computers were not unique in being built around a floating point unit. It cites, for example, the fact that IBM marketed the 704 computer in 1956 with built-in floating point hardware. It states that the 704 was amongst the first commercially available computers to offer floating point hardware. Contrary to what is stated by Control Data, the 704 was not the existing 701 hardware with an added floating point unit. To mention the 701 was quite unnecessary and irrelevant. The 701 computer introduced in 1953 had an electrostatic (Williams tubes) internal memory. The 704, which became available some three years later, was quite a different computer, using magnetic core memory, a larger instruction set and was equipped with index registers. The incorporation of the floating point hardware was part of the design, not a feature which was subsequently added to it. Moreover, it maintains that the present Cyber computers' floating point characteristics involve certain disadvantages. The Cyber computers use a logic for handling floating point which is different from almost all other computers. This is called pre-normalization rather than the conventional post-normalization. A consequence of this is that numerically identical values can be represented differently in the machine. Cyber compilers must be carefully written to avoid incorrect results when comparing floating point values. The Cyber floating point unit is inconsistent on the accuracy of the results. For some operations, 48 bits of precision are provided, for others, only 47 bits.

(iii) *Individual functional units*

The Commission points out that with regard to peripheral processors the applicant claims that 'it is not suggested that having peripheral processors renders a computer scientific in orientation'. In the Commission's view this is precisely the essence of the argument made with regard to architecture/distributed processing.

The decision makes a general point that individual functional units cannot be considered as being a requirement specific only to scientific computation, which in no way comments on the capabilities of the separate specialized units of the Cyber 170-750 CPU in performing computational functions. This comment is made because other computer systems have individual functional units of various kinds which enable them to perform complex operations at high speed, though not necessarily for scientific computation. The Commission

cited by way of example special units for instruction look-ahead, associative stores, and so on.

(iv) *Instruction sets adapted to scientific languages*

While the Commission concedes that there can be little doubt that the Cyber computers are better at handling scientific languages than commercial ones it states that the key point to be addressed is whether this equipment is especially efficient in handling the Fortran scientific language. It maintains that it is the combination of the hardware and the system's software which determines the effectiveness of a computer as a Fortran executing system. To measure this effectiveness, Fortran benchmark programs were developed by the United Kingdom National Physical Laboratory and were used to produce a data base of performance figures for a wide range of computer systems. According to the Commission these figures show that while Cyber computers are efficient in the execution of Fortran programs they are not extremely efficient when compared with other high-performance general-purpose computer systems (for example, the IBM 3081). The purpose of this table of comparison was to rebut the applicant's claims that the Cyber computers are especially efficient in handling the Fortran scientific language. It is not asserted that the IBM 3081 is 'better' than the Cyber computers, even though such a conclusion might be drawn from the performance figures given in the table.

With regard to the criticism of this method in Dr Jackson's statement, it notes, with regard to Mips (Millions of instructions per second) that the text associated with the table does not claim published academic justification and does note the approximate nature of the Mips figures. Nevertheless, Mips figures are still used in the computer community to give a guide to processor speeds and provide an acceptable comparison measure.

Turning to KWis (Kilo Whetstone instructions per second) the figures here are much more carefully determined and hence provide a more directly comparable set of measurements. The Kilo Whetstone performance measurement technique has been the subject of considerable academic publication and scrutiny. It is used as the basis for performance measurement comparison in the UK Central Computer and Telecommunications Agency, responsible for the procurement of computers for United Kingdom government departments. It maintains that Dr Jackson's comments on the Kilo Whetstone approach are completely unjustified. He has no basis for asserting that 'the Whetstone is no longer regarded as a reliable indicator of speed'. Moreover, concerning slow machines with buffer memory, there is no evidence to show that this effect is large enough to influence the KWis figure to any significant extent.

In conclusion, even if the figures involving Mips are ignored, it is still quite evident from the KWis figures that the Cyber computers are not extremely efficient in the execution of Fortran programs when compared with other high-performance general-purpose computer systems.

(v) *Distributed (multi-processor) architecture*

The Commission states that the running of a Cyber computer in a batch processing mode, which certainly results in a minimizing of central processing unit interrupts, is no more applicable to scientific usage

than to commercial usage. Batch was the key mode of operation for general-purpose computers in both areas at one stage of computer evolution. However, the Commission observes that more recent practice has been to run computers in a multi-programmed, time-shared mode to achieve the running of a number of programs concurrently. In this event, the Cyber CPU will be interrupted as it switches from one job to another, whether scientific or otherwise. Furthermore, the Cyber central processing unit will also receive interruptions from the outside world by the peripheral processing units handling interactions from users who may be either scientific or otherwise.

Interactive terminal usages could be considered to be an important requirement for many scientific applications and certainly for the university environment. The lack of interrupt facilities on a central processing unit means that the Cyber computers are not as efficient as they might be for this aspect of scientific computing. Moreover, high-speed precision numerical calculation is only one kind of 'scientific' usage of a computer. Examples of other usage would be development of programs and data capture.

(vi) *Computer hardware and software*

The Commission underlines the fact that the distinction between hardware and software, in particular applications software, is of fundamental importance in this case and maintains that this distinction was accepted by inference by the Court in its judgment of 17 March 1983 (Case 294/81 *Control Data NV SA* v *Commission* [1983] ECR 911). It submits that it is the software and in particular the applications software which enables a computer to be used for scientific activities. In the present case it is only the hardware which has been submitted for duty-free entry. According to the Commission this hardware is perfectly appropriate, with the right software, for commercial and industrial activities. Indeed, it maintains that it is not inherently better suited to scientific activities than a number of general-purpose computers.

(vii) *Commercial documentation*

The Commission maintains that the documentation put out by the applicant itself to describe the different possible uses of Cyber computers seeks in effect to convince potential buyers of the multiple uses of the equipment in question. The documentation referred to claimed abilities rather than aspirations. All the assertions made in the publicity documentation of Control Data stressing the multiple uses of the equipment are contrary to the applicant's contention that the Cyber computers are mainly suited to scientific activities.

II — *Second submission: use in the Community of like equipment*

(a) The *applicant* maintains that the Commission's review of the general uses in the Community of the equipment in question fails to respond to Control Data's evidence; it fails to state explicitly whether use in a high-technology enterprise is to be regarded as counting for or against scientific status; it states the facts about the use made by the free universities of the two computers inaccurately (only one computer was used for administrative purposes) and unfairly (the percentage was very small and the practice has now been discontinued). It considers that there is no technical

distinction between the use being made of computers in a university or in a company engaged in profit-orientated high-technology research. According to the applicant, the expression 'scientific purposes' within the meaning of Regulation No 2784/79 falls to be interpreted only in the event that a piece of equipment imported by a university is not clearly specially adapted for scientific research. In its view, the Commission seems to consider that it is only if universities are in the majority among the owners of equipment in the Community that duty-free treatment may apply. There is no such implication in the language of the regulations, and every reason (other than for the raising of revenue) why there should be no such implication.

(b) The *Commission* interprets the expression 'scientific purposes' to mean the purpose of the 'acquisition of knowledge for the common good'. Article 5 of Regulation No 2784/79 refines this very general definition in the context of the duty-free entry system by making a distinction between 'scientific' as opposed to 'industrial' or 'commercial' uses. The Commission does not contend that use in a profit-making environment necessarily counts against scientific status for an instrument but that the use by an industrial or commercial firm, whose principal objective is the making of profits rather than the acquisition of knowledge for the community at large, has to be examined particularly carefully before it can be admitted as being 'scientific'. The Commission's assessment of the use of the Cyber computers in the Community was based on information received from a number of national administrations. The Commission deduces from the applicant's own table that, out of 13 Cyber 750s installed in the Community, 5 are being used for scientific purposes and, out of 33 Cyber 720s, 14 are being so used. It therefore concludes that the applicant's table itself supports the Commission's assessment, at the time of the decision, that the Cyber computers were not mainly used for scientific purposes in the Community. The Commission recognizes that the Cyber computers form part of a group of high-performance computers brought onto the market in recent years with a particular clientele in mind. It states that while this clientele includes researchers who handle complex mathematical formulae, it also includes meteorologists, military experts, and oil companies, all of whom use the computers for applications which can in no sense be described as scientific.

T. F. O'Higgins
Judge-Rapporteur