WHAT WE ARE TRYING TO DO

Our first task is to thank those who have done good work in the past. Shri A. S. Raisade and Shri S. P. Parthasarathy, serving as Editor and Co-Editor till the last issue, have carried a heavy responsibility. In addition to promotion of good articles and editing, managing the publication of the periodical, looking after accounts and advertising revenue, dealing with legal requirements, dealing with postal regulations, meeting deadlines—these are some of the burdens that the Editors carry. In Bombay now, we have the promise of the HQ to carry some of this load. But let us acknowledge our indebtedness to those who have carried these responsibilities and, the Editor of the Journal, Prof. S. V. Rangaswamy, who continues to carry it. The ExCom has put on record its deep appreciation of Shri Raisade's excellent work over the years.

With the first issue coming out of Bombay, you will notice a few changes. A couple of interviews, to bring you items of news value. One deals with Government policies and executive decisions which are of interest to CSI members. The other deals with an EDP Manager's evaluation of the first Indian made business-oriented micro-computer system installed in Bombay (as far as we know).

There is a COBOL quiz, the first part appearing in this issue. We would like to publish more quizzes of this type, but they are not easy to come by; capable and painstaking members have to design them. We invite your cooperation in generating a continuous series of material of educational value of this type. This invitation is particularly aimed at members involved in teaching and training activities.

We will also use a new format for the "Literature Window." Our attempts in giving you bibliographic information will often focus attention on specific technical areas or specific sources of information, but we will try to maintain an overall balance in coverage.

You will notice a slightly increased emphasis on people who write. A small photograph, and a few lines on what they do and what they believe in. This is essential. Not for publicity for the authors, they usually have all the visibility they need; but for the sake of three-fourths of the membership who do not come to the annual convention in any given year. We believe they would appreciate getting to know those who take the trouble to think and write for the Communications. A fraction of CSI members are busy travelers. The rest do not meet the news-makers frequently. So, you will see more photographs in future.

Talking of thinking and writing for the Communication, this is a job for many people, including your Divisional representatives and Regional representatives. The Communications will not deny them pages, whether for their own writing or for the material they communicate for publication. If they provide CSI members with services in the way of Seminars, Workshops or Courses, we will publicise them and report on them. We invite each one of them to publish their year's programme now, to tell us what they are going to do till June 1979.

We will try to avoid writing too much ourselves. You can stand only so much of a man's bright thoughts. For any given man, there is not much guarantee that his thoughts will stay very bright if he starts writing on anything and everything.

Welcome to the Communications.
Having broadly spelt out in the July 1978 message the activities we should pursue during 1978-79, I would like to draw the specific attention of the EXECOM members in particular to a few aspects needing their time, effort and valuable thoughts.

LOGO

After year long deliberations about the logo the CSI should adopt, the March 1976 issue of the Newsletter described the logo as acceptable and it has since then been adopted. This logo though abstract, is very meaningful and encompasses a story apart from its elements making the letter "C" symbolize Computer Society of India, and every member should be proud of the Society's logo. All the office bearers of the CSI should use this logo in all their official correspondence as this would add status and importance to the Society's correspondence. Incidentally I was very happy to note that the Publication Committee has used the logo artistically and effectively on the cover page --- my gratitude to them.

REGIONS

In order that the activities of CSI are effectively coordinated, the areas of contact and operations of CSI has been grouped into four regions. Each Region should have a Committee consisting of the Regional representative, chairman of the chapters and councillors of the student branches as members. The Committee should also promote formalization of new chapters and student branches. I suggest that the regional committees have bi-monthly meetings and communicate their deliberations to the EXECOM. The four Regional Representatives should also make it a point to meet before or after an EXECOM meeting and exchange notes for more cohesive working of CSI.

DIVISIONS

The fields of interest of CSI have been grouped into four Divisions. The Divisional representative is the Chairman of the Division Manage-

ment Committee. I suggest that the Division Management Committees have bi-monthly meeting and communicate their deliberations to the EXECOM.

CHAPTERS

As of today, we have 16 chapters functioning. Of these, some of the chapters are very active and arrange regular lecture meetings, seminars, etc. Few chapters are on the other extreme end of the scale. While the minimum lecture/seminars per year would be five for each chapter, in their own interest each chapter should try and arrange at least one programme a month with a view primarily to get together all the members attached to the chapter which would go a long way in furthering the activities of each chapter.

I would like to mention here that at the last EXECOM meeting it was suggested that we may go slow in promotion of further chapters with a view to stabilize the activities of the chapters already in vogue. Further, it was also stressed that within the territorial limits of each chapter there should be a reasonable number of computer installations which would ensure adequate support for the chapter activities.

On 1st of July 1978 I visited the Pune Chapter on the occasion of their 1978 Conference, the theme being "Micro-processors and Mini-computers". The Conference was well arranged, largely attended and I could see lively faces, all enthusiastic, keen and eager to know and learn new things. The deliberations of the Conference were of a very high order and thought provoking. I really cherish to be in the midst of such environment and shall make it a point to visit as many chapters as possible during the current year.

In Pune, I took the opportunity to visit the Central Water and Power Research Station (CWPRS) at Dadarwadi where computers are being used for simulation studies on numerous river projects both national and international. The visit was an eye-opener to the small abortion of the intensive research and development work in the area of water power utilization and the use of computers for data logging, analysis and simulation.

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H. K. RANJJ,
Executive Secretary,
Retired from the Services.

President's Desk (Contd. from page 2)

In conclusion I would request every Region, Division and Chapter to send their reports on the monthly activities and also programmes for the future to the Editor of the Newsletter. It is an old saying that any system would be as good as the man behind the same and the Newsletter being the main system of communication amongst the CSI members, it is up to each and every member to get the maximum out of the Newsletter through personal contribution.

T. V. BALAN

14 August 1978
Small Business Computers—A Checklist

Further to our report on the Seminar on Desk top Computers, organized by the Bombay Chapter, we reproduce a checklist presented at the seminar:

The list given below describes some of the points to be considered while selecting or configuring small business computers (SBC). The points are classified for convenience into four broad (through overlapping) areas:

1. Hardware related factors
2. Software related factors
3. Growth related factors
4. Manufacturer related factors

A good reference to back up this material is "Auerbach on Small Business Computers" (Auerbach Publishers, Philadelphia 1973).

The various cost factors are not considered here.

1.0 HARDWARE RELATED FACTORS
1.1 Maximum on-line auxiliary memory size (cassettes, diskettes and floppy's).
1.2 Main Memory Map:
   A map of the break up of memory space and the maximum memory size available for user programs. What is the approx maximum program size (in high level language instructions) which can be accommodated in this available memory?

1.3 Typical Processing Times and Throughput:
   While memory cycle times, CPU speeds and I/O transfer rates are important, what is equally important in a non-parallel program system are the typical processing times for various basic operations of which any system flow is comprised. These will enable the purchaser to assess how much computer time will be used for the application he is planning.

   e.g. Copy cassette to floppy
   Copy floppy to floppy
   Sort
   Merge
   Floppy to print
   Compilation of high level language program (of say 500 instructions). Time to access and print/display a floppy record.

   These operations and their timings should be demonstrated to the purchasers' satisfaction.

   Typical bottlenecks are in printing and on-line file storage capacity.

1.4 Upgradability:
Can more memory and higher speed peripherals (printers) be added on when the volume of processing grows?

1.5 Data Entry:
What are the offline data preparation devices? Can transaction files be corrected offline? Is the procedure for doing this simple and fast? How many direct data entry devices can be connected on-line? Can direct data entry proceed concurrently with a normal run?

1.6 Interfaces with Larger Computers:
In case you have programs to be run on larger computers which require input data stored on SBC tapes/cassettes how will this be achieved?

1.7 Power/Failure Restart:
Power failures are more of a problem in out-of-Bombay locations. In case of a power failure, many SBCs have the capability of restarting a job after a stopping due to power failure. If your processing runs long this is a useful feature.

1.8 Environmental requirements:
One of the major advantages of SBCs over any equipment is their low space, power and air conditioning requirements.

1.9 Memory parity

1.10 Future (distants!?) plans of manufacturers to enable remote job entry device to remote data entry device. This involves:
   a) communications line/terminal interface
   b) protocol compatibility through software in the SBC

2.0 SOFTWARE RELATED FACTORS:
2.1 Description of application packages available and their suitability or adaptability to the requirements of your organization.

2.2 Run time efficiency of the packages.

2.3 What software implementation support will the supplier furnish? Cost and extent of such support. Charges and responsibilities of supplier for development of tailor made software.

2.4 Facilities for changing programs, and for developing new programs and incorporating them in the system. The more software changes the selection committee anticipates the more weight it should give to the extent with which programs can be changed.

   Utility routines should be supplied to debug and edit source code. Input/output handlers should be provided. Loader should be furnished to load all software supplied with the system and to load application programs. Important system software components also include assemblers, compilers, and operating systems.

2.4 Availability of high level language compilers and interpreters (COBOL, RPG II, BASIC).

2.5 Software facilities for retrieving master/transaction records by specifying the field e.g. part No., account No. etc.

2.6 Availability of utility programs to perform the following functions:
   Copy
   Sort/Merge
   Dump file etc.

3.0 MANUFACTURER RELATED FACTORS:
3.1 Maintenance installation assistance and assistance for planning in installation:
Warranty period (parts and labour)
Installation and maintenance covergae
Any preventive maintenance
Guaranteed response time to maintenance calls
Specified mean time between failures figures.
Period for which the manufacturer will guarantee maintenance support.

3.2 Training of staff in computer operation software and data entry.
Quality of training programmes and their duration.

3.3 Documentation:
Operating procedures
Software

3.4 Installation and Planning:
Suggested layout for the computer room
Electrical connection and environmental requirements
PERF for installation
Hardware/Software checkout and acceptance tests.

3.5 Availability of a compatible back up system near by.

3.6 Manufacturers financial standing, reputation and stability.

4.0 GROWTH RELATED FACTORS AND INTERFACES WITH OTHER DP FACILITIES:
4.1 In case it is not feasible to run certain programs or system on the SBC, and the input data required for this program or system is available on SBC files, how is the input data to be made available in a form acceptable to a service bureau computer (say floppy/cassette to magnetic tape conversion).

4.2 Is there any rental facility or buy back clause (in case of purchase)? If not, what happens if the system capacity is saturated before being written off?

4.3 Based on expected growth in transaction volume and applications, up to what period can the system handle the workload? In other words, what is the extent to which the initially purchased system can be upgraded?

4.4 In case conversion is planned for existing unit needed service bureau applications to SBC, what are the procedures for the conversion of files?

4.5 At some future point any time, it may be necessary to replace the SBC with a larger system. Are the high level programming languages recommended either subsets or complete versions of the standard version high level language on the larger systems? In other words, are the versions of RPG, FORTRAN or COBOL etc. industry compatible so that the same programs with minor modifications can be run either at service bureau or a larger in-house system to be acquired in future.

—R. J. FERNANDES
Chairman, Bombay Chapter
COBOL QUIZ
L. SALDANHA & V. M. DATAR

1. In the following seven questions PARAMETER NAMES are given. Indicate whether correct or incorrect?

(a) Correct
(b) Incorrect

2. PRINT-NAME-AND-ADDRESS-OF-CUSTOMER.

(a) Correct
(b) Incorrect

3. 1234.

(a) Correct
(b) Incorrect

4. END.

(a) Correct
(b) Incorrect

5. STOP.

(a) Correct
(b) Incorrect

6. ERROR-Routine.

(a) Incorrect
(b) Correct

7. READ/CARD.

(a) Correct
(b) Incorrect

8. The number of Divisions in a COBOL Program is:

(a) 0
(b) 1
(c) 2

9. LEVEL entries are permitted in

(a) any part of the WORKING-STORAGE SECTION
(b) any part of the DATA DIVISION
(c) any part of the FILE SECTION

10. CARD-REC.

(a) 09 CARD-CODE PIC 99.
(b) 99 RIGHT-VALUE-1 VALUE 1.3.5.7,
(c) 88 RIGHT-VALUE-2 VALUE 8.
(d) 78 NAME PIC X(18).

The above record description is:

(a) Correct
(b) Incorrect, because the 88 level cannot follow an 86 level.
(c) Incorrect, because only one 88 level is permitted at a time.

11. EMP-NAME.

(a) 03 INITIALS.
(b) 86 FIRST-INITIAL PIC X.
(c) 05 SECOND-INITIAL PIC X.

A part of a record description given above is:

(a) Correct
(b) Incorrect, because level 04 has been omitted.
(c) Incorrect, because EMP-NAME and INITIALS do not have a PICTURE Clause.

12. EMP-CODE.

(a) 09 DEPT PIC 99.
(b) 09 SERIAL-NO PIC 9(6).
(c) NUMBER REdefines EMP-CODE PIC 9(7).

A part of a data description given above is:

(a) Incorrect
(b) Correct

13. CHECK-REC.

(a) 02 CODE PIC 99.
(b) 88 RIGHT-CODE VALUE 30.75.80
(c) 78 THRU 100.
(d) 88 WRONG-CODE VALUE 1 THRU 10.

A part of a data description given above is:

(a) Incorrect because 88 level is repeated twice.
(b) Correct

14. DATA DIVISION.

(a) 01 PRINT-REC.
(b) 02 CODE PIC 9.
(c) 02 FILLER PIC X(15).

In PROCEDURE DIVISION:

(a) MOVE SPACES TO FILLER.
(b) Indicate whether this statement is correct

15. Some PROCEDURE DIVISION Statements are given in the following 8 questions. Indicate whether they are correct or incorrect.

(a) ADD A TO B GIVING C.
(b) Correct.

16. DIVIDE X INTO Y GIVING Z.

(a) Correct
(b) Incorrect

17. STOP.

(a) Incorrect
(b) Correct

18. PERFORM PARA-ADD 2 TIMES.

(a) Incorrect
(b) Correct

19. IF X GREATER THAN Y GO TO PARA-3 SUBTRACT Y FROM X GIVING Z.

(a) Correct
(b) Incorrect

20. MOVE A TO B C D.

(a) Correct
(b) Incorrect

21. MOVE STOCK STATEMENT FOR APRIL 1977 TO READING-LINE.

(a) Correct
(b) Incorrect

22. MULTIPLY PRICE INTO QUANTITY GIVING VALUE.

(a) Correct
(b) Incorrect

23. FRED has been defined as ACTUAL KEY.

Mark the correct PICTURE Clause.

(a) 77 FRED PIC X(7).
(b) 77 FRED PIC 9(7).
(c) 77 FRED PIC A(7).
(d) 77 FRED PIC 9X.

24. SEEK should always precede READ in the case of:

(a) Reading an Indexed Sequential File.
(b) Reading a Sequential File
(c) Reading a Serial File.

25. A WRITE Statement inserts the record in the next physical place available while writing to a file whose organisation is:

(a) Serial
(b) Sequential
(c) Indexed Sequential.

26. A customer master file on magnetic tape is being updated. The peripheral verbs which will be used in such a program would be:

(a) OPEN, READ, WRITE, CLOSE.
(b) OPEN, SEEK, READ, RWRITE, CLOSE.
(c) OPEN, READ, RWRITE, CLOSE.

27. FD CARD-FIle LABEL RECORDS OMITTED.

01 CARD-REC PIC X(80).
If a card is to be read from the above cardfile on cards, the statement should be:

(a) READ CARD-FIle.
(b) REaD CARD-REC.
(c) READ CARD-REC RECORD AT END GO TO CLOSE-PARA.
(d) READ CARD-FIle AT END GO TO CLOSE-PARA.

28. FD PRINT-FIle LABEL RECORDS OMITTED.

01 PRINT-REC PIC X(180).
If a line is to be printed, indicate the statement to be used.

(a) WRITE PRINT-FIle AFTER ADVANCING 1 LINES.
(b) WRITE PRINT-FIle.
(c) PRINT PRINT-FIle AFTER 1 LINES.
(d) WRITE PRINT-FIle.
(e) WRITE PRINT-FIle.

29. MOVE 8 TO COUNTER.

PERFORM READ-PARA UNTIL COUNTER IS GREATER THAN 28

READ-PARA.
ADD 2 TO COUNTER.
READ TAX-FIle AT END MOVE HIGH-VALUES TO TAX-ACC-NO.
ADD 2 TO KOUNT.
MOVE 1 TO KOUNT.

Assume the value of KOUNT is initially zero. Indicate how many times the READ-PARA will be performed?

(a) 15
(b) 14
(c) Indefinite
(d) 29

30. GRADE-TABLE.

03 GRADE OCCURS 9 TIMES.
05 CLASS-TYPE OCCURS 9 TIMES.
07 YEAR OCCURS 9 TIMES PIC 9.

It is desired to refer 1st grade in 9th class-type in the year 7. Which of the following usage will give the correct reference.

(a) GRADE (7, 9, 1)
(b) GRADE (1, 9, 7)
(c) CLASS-TYPE (7, 9, 1)
(d) GRADE (1, 9, 7)
(e) YEAR (7, 9, 1).

(To be continued in the next issue)
Why is DDP Technology Inevitable?

(From the Keynote Address by Dr. J. G. Krishnaya, Systems Research Institute, Pune, at the Pune Chapter Annual Convention in June 78)

1. Introduction

At every stage in its short history there have been dramatic changes in the computer scene, corresponding to greater user understanding of computer capabilities and to developments in the underlying fields of microelectronics, electromechanical peripherals and computer science. Thus there has been continuing progress towards greater cost effectiveness, speed and versatility of these machines. The cost of computing power has dropped by a factor of 100, for instance, since 1960.

An important result is the development of a wide range of machines enabling the availability of computing power at the doorsteps of smaller and smaller users. The use of behemoth-sized machines is out of fashion today; it is done only when there is a real necessity for a great concentration of processing power, as in nuclear physics.

A revolution has consequently occurred in large organizations. It takes the form of "distributed computing". Let us take a closer view at computing technology, to understand why distributed computing is now both economic and fashionable.

2. The Computer

A Computer consists of the following sub-systems: Central Processing Unit (CPU), Memory-organisations and Input-Output units.

The CPU, which consists of a control logic unit and an arithmetic and logic unit (ALU), controls the operation of the entire system by issuing commands to other parts of the system and by acting on the responses. It reads information from the memory, interprets instructions, performs operations on the data according to the instructions, writes the results back into the memory and manages the information between the different levels of memory or through the input-output ports. The operation it performs on the data could be arithmetic or logical.

The Memory organisation of a computer is hierarchical both in terms of speed and cost. Interacting directly with the CPU is the buffer memory which transfers information into the CPU at a high speed. The buffer may be as small as 1 register, or as large as 32 Kilo-Bytes. Below the buffer memory is the main memory which is larger and slower than the buffer (and costs much less per bit of information stored).

Below the main memory are the long-term storage units such as discs and tapes which are larger and slower still, and cost much less per bit of information stored.

We now note that the performance of the entire computer system is determined to a large extent by the speed and size of the buffer memory, whereas the system's "capacity" and its cost is determined by the size and speed of the main memory and the disc storage units.

2.1 Memory

The buffer memory has from the very beginning been made of solid state electronic circuits. Microelectronic technology has had the impact of "dualistic" and "monolithic" devices development in semiconductor technology which have further improved the performance of buffer memory. The last three years have been transformed in dependence on solid state. Earlier, only magnetic "core" memories were used and they required complicated support circuitry for read-size even for small blocks of memory, and they are costly. ICs (Medium-scale and Large) are being used for the main memory. One of the main differences is that the support circuits for memory in the case of ICs is primarily in the chips. I.e., the cost-per-bit and has also been declining steadily (See Fig. 1a).

Microelectronics as such has not penetrated into storage devices like magnetic disc and tapes. The reason—electrical and mechanical machinery in the disc and tape drives is the main source of cost, which is independent of the storage capacity. As a result we find an inverse relationship between cost-per-bit of storage and the memory size. For large memory systems, therefore, the cost-per-bit of microelectronic storage cannot compete with disc or tape. An important requirement of auxiliary (or permanent)

![MEMORY COMPONENT COST TRENDS](chart)

Fig. 1a. Since the early 1960s computer memory components have dropped rapidly in cost, and they promise to continue to drop into the mid 1980s. Memory no longer pay a penalty for system cost storage. Large Scale Integration has also enabled fabrication of random access memory (RAM) circuits with larger and larger components in one chip (See Fig. 1b). The "volatility" of all IC memory units (i.e., the fact that when power is turned off the data is lost) is a disadvantage, however.

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![SECONDARY STORAGE COST COMPARISON](chart)

Fig. 1b. Since the early 1960s computer memory components have dropped rapidly in cost, and they promise to continue to drop into the mid 1980s. Memory no longer pay a penalty for system cost storage. Large Scale Integration has also enabled fabrication of random access memory (RAM) circuits with larger and larger components in one chip (See Fig. 1b). The "volatility" of all IC memory units (i.e., the fact that when power is turned off the data is lost) is a disadvantage, however.

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![SEMICONDUCTOR CHIP COMPLEXITY](chart)

Fig. 1b. The steady increase in chip density and complexity over time is shown in relation to the wavelength resolution limits imposed by optical, electron-beam, and x-ray lithographic techniques.

![ACTUAL CHIPS CIRCULAR GUM](chart)

Fig. 1b. The steady increase in chip density and complexity over time is shown in relation to the wavelength resolution limits imposed by optical, electron-beam, and x-ray lithographic techniques.
2.2 Logic Circuits

These are distinctly different from memory circuits. In a micro-electronic memory, each memory cell retains one bit of information, and only a small fraction of the memory cells are being addressed at any particular time. Power consumption and heating are not a problem, therefore, with IC memories. In the processor unit, however, every circuit is in almost continuous operation. A logic circuit dissipates power and has a small but significant switching delay. Both the amount of power dissipated and the length of the switching delay are directly related to the impedance of the circuit, and the "power-delay product" therefore gives us an index of their performance.

The falling costs of LSI logic is shown in Fig. 3.

**Fig. 3.** The falling costs element gate of TTL and microprocessors is declining much more rapidly than the cost of assembled TTL logic.

### 2.3 Program Development and Software

The development of higher-level languages has made programming easier. However, they do themselves require a greater and greater share of the available computing power. Actually the declining hardware costs have accelerated the development of languages and support tools which allow the user to express his ideas in a more natural form.

Because of higher wage costs, the net cost of program development "machine language" actually went up between 1955 and 1970. In Assembly languages it decreased hardly at all. On the other hand, the comparable costs in Fortran and Cobol (the most-used high level languages) despite their heavy computing requirements, have dropped sharply. It is evident that the use of high level languages and advanced programming tools is essential to continued cost reduction. (See Fig. 4).

**Fig. 4.** The computer time (or cost) component now dominates in program development costs in the 1960's but is now dwarfed by programming and maintenance costs.

### 3. Mainframes vs. Minis

Once integrated circuits became available, and especially with MSI and LSI, it became possible to provide processors and memories of the same time much more cheaply effective than the conventional "mainframe" computers. These new computers compared as 32, 36, 48, and 64 bits in "mainframe" (LSI) computers. However, the use of large scale integrated design constraints limited addressing and accumulators in 1-4 MB, using "paging" and virtual memory schemes.

Minis offer an almost continuous spectrum of devices ranging in processing power, speed, software and cost (the PDP series for example runs from the 11/03 micro at about $1,000 to the 11/70 max at about $69,000). Inasmuch as the more powerful minis may be as powerful as some of the mainframe computers, even the distinction between the minis and mainframes is becoming increasingly blurry.

These fall at the low end of the minis, and are generally 8-bit machines and their entire CPU is located on one single chip of LSI. Recently 16-bit micros have become available and popular. Minis naturally do not have the versatility of the big computers and they are used mainly in dedicated (single purpose) applications. They can control the input-output operations on instruments or other relatively slow devices.

Minis with screens and keyboards are used as intelligent terminals for logging transactions at remote locations or even as stand alone "word-processing" computers carrying out automated-typewriter functions in offices.

### 3.2 Comparing Minis with Mainframes

The essential difference between the mini and the mainframe is probably similar to that between a Roman sportscar and large American limousine. Though their inherent functions are similar, the scale of operations, the reserve power, and the accessory functions are different and suited for different kinds of requirements.

Let us look at the CPUs of a typical mini and a typical large mainframe to bring out this comparison in clearer terms. This comparison does not take into account the software overhead which are somewhat greater with the mainframe.

We can see that for a 70-1 price differential we get only a 3.7 to 4 difference in main memory speeds. Using the buffer memory as basis for comparison, the bare 370/168 is 45 times as powerful as the 11/70. This figure will be further diluted by I/O speeds (which are similar), by the software overheads, etc. An overall throughput ratio of 101 to 20 is likely to be the most we could obtain in practical use for a 70-1 price differential.

### 4. Distributed Computing

This is an inevitable offshoot of the technological transformation described above. Many large organisations are basically decentralized in character and hence they require the information processing activity to be independently handled in each jurisdiction in order to increase their effectiveness of operations. With the availability of wide spectrum of computers, the individual units of a decentralised organisation may now use an independent computing facility suitable for their requirements, their timings, and the local volume and variety of files.

**Fig. 5.** A network may provide distributed access to central processing or distribution of processing capability itself.

4.1 Communications

The individual units of a large organisation using distributed computing would also need to communicate with each other in the form of data transmission.

With the availability of portable storage media like floppy discs and tape cassettes, it is now possible to have "off-line" communication between computers using courier or postal service. While the requirements are so pressing that on-line, real-time data communication is required, physical computer networking becomes a requirement. This however requires a sophisticated and ultra-reliable communication infrastructure (such as is available in USA and Europe).

The ease or difficulty with which each element can communicate with another will affect how much the data are manipulated before they are transmitted through the network. It will also determine how the local files are organised and how they are updated from incoming messages.
From Vijayan Bhawan

Brig. A. Balasubramanian, Officer on Special Duties, Dept. of Electronics, wrote us an email on the 16th July, 1979. Since this was an informal interview, it is reported here equally informally. We avoid quotes, because no precise notes were taken.

Mini-computer Licensing — Brigadier pointed out that the Licensing Policy has been spelt out. Applications were going to be reviewed.

He described the framing of this licensing policy as a liberalizing measure which will give recognition to system engineering houses. They would get a fixed foreign exchange allocation which they can use to the best of their ability. This, he pointed out, was better than licensing them for a pre-determined number of systems in each case.

Is it true that the small scale sector will get a preference? Yes. They plan to encourage small scale operations in areas where they are likely to succeed, say, on-line dedicated applications.

Will large houses be excluded? This is not practical, as the manufacture of general purpose systems calls for a high level of organization and investment.

Is it true we can import computers costing less than Rs. 5 lakhs without D.O.E. clearance? No. The Government's import policy clearly states that all computer imports need D.O.E. clearance. This is true for computer peripherals also (irrespective of their cost). Computer components, say, microprocessor chips are not covered under this clearance requirement, provided they satisfy other criteria spelled out in the import policy.

Computer imports saw some liberalization last year. Is it true that they will be reduced this year? Not true. Brig. said that applications for clearance of computers in excess of Rs. 25 lakhs undergo the close scrutiny of the Secretariat for Industrial approvals. This body looks into a variety of questions. How will this computer import contribute to increased production? Is it desirable? A few applications have taken some time to process due to such analysis being performed.

Increasing the exports of an export oriented company is not any more a good reason for importing a computer. We cannot overlook other issues in the interest of exports any more.

Have the regional computer centres under planning chosen their machines? Yes. Here they are.

RCC, Calcutta: Became operational quite some time ago. They are going to add 366 Kilobytes of memory 3 YUUs, etc., at a cost of Rs. 2.5 million to their Burroughs 6721.

RCC, Chandigarh: DEC 2650

RCC, Kanpur/Lucknow: DEC 1090

RCC, Pune: ICL 1904S

Can you tell us about the ICMC (International Computers Indian Manufacture) Licence? A letter of intent has been issued to them to manufacture one hundred computer systems of the type ICL 29041 to meet the requirements of Indian users. The industrial licence will be granted after ICMC is restructured as a 40 percent foreign equity company.

While writing this report, we notice a corrosion in our mind. Are these 26041? Or 26041? What exactly is the difference between them, assuming there is a difference?

Data Entry & the Deaf

The Public Relations Committee of the CSI (Chairman, Dr. D. P. Mehra), is considering a scheme to make available training facilities in key-punching (and, perhaps, other data entry operations) at one or more deaf-and-dumb schools. For the school-trained, irredeemably deaf persons such a scheme could offer job opportunities. Deafness is no handicap to a key-punching operator. Brigadier offered encouragement to this scheme and felt permission to import key-punches could easily be obtained if a CSI sponsored scheme found this profitable.

A few business houses have imported computers under an undertaking to export 200% of value in software. Are they keeping their word? It appears that they do. There does not seem to be any major default. Rs. 25 million worth of software was exported in 1977-78, approximately 25% to USA, 30% to Western Europe, and 35% to USSR.

Key punches. We cannot get them. What is being done about it? CMC has tested East German keypunches and found them good. Subject to an agreement on a reasonable price, these should be available soon. He said, that the price was to be discussed in July.

Applications have been cleared for import of used keypunches by certain parties under an obligation to market abroad their data preparation services. Even if the party could get punches for as little as $150, the export quantum would be tied to the original sales price of the key-punch (when it was new, say, $5,000).

Brigadier also pointed out that locally made keypunches were in fact available, even though they were not the printing type punches. Hand punches were available for numeric work.

Can we import direct data entry systems? Large scale data handling agencies (e.g. BRL) have been permitted to import key-to-lape systems. The DOE would like to see more such organisations acquire direct data entry systems so that their keypunches can be released to those who need cards for programme development work.

Mention was also made of Indian made data entry systems. It was a matter of satisfaction that they were getting to be available.

Can we get a list of medium and medium to large system cleared for import recently?

User System

Army HQ ICL 2600
Air India, Bombay UNIX 3226
Bannara Hindu University ICL 1904S
BHEL UNIX 3226
BHEL, Basava UNIX 3226
Bharat Bhelpuri UNIX 3226
Birla, Calcutta UNIX 3226
Glows, Bombay VARAN V77
ICM, Ahmedabad DEC 11/70
ICM, Bombay BHEL 681
ITI, Delhi ICL 2600
National Dairy Delf. Board ICL 2600
Amul
Radio Astronomy Centre, only
ISEE DEC 11/70
Regional Research Lab., Hyderabad
Reserve Bank, Bombay HONEYWELL 6640
Scooch University DEC 3260
VARAN V77
If there are any errors or omissions in the list above, readers are invited to write and correct us. This list was written down from memory.

Good Reading

The April 76 issue of Datamation carries an interesting item titled "Why IBM must withdraw from India in June". It is a signed communication by their Boston Bureau Manager, Vin McMellon, who had visited India prior to its publication.

McMellon, quotes a number of persons in Delhi, including an US Embassy trade official who says "the Government of India had not even afforded the courtesy of a written reply to its proposals (to bring India new technology)".

But McMellon has also heard the Indian side of the story and notes that "the Indian Embassy had not understood the 1972 offer of 269 technology was an insult—a proposal whose unsuspicious timing would freeze the image of IBM India to this day". He quotes Prof. M. G. K. Menon as saying that the 360 proposal was largely based upon old machines being imported and refurbished, while 370 machines were being introduced to the rest of the world. With catchy headings such as:

A dumping ground

Where is the 3001?

Assembly, not technology

Trouble with Indian taxes

Not only IBM; the communication makes very interesting reading.

There is also an item in the same issue (page 17) on how other developing countries are following up the Indian action in the matter of IBM. This item refers to the search for alternative sources of equipment to reduce the dependence on IBM as the sole supplier.
From the Chapters

BOMBAY CHAPTER

LECTURE ON "A MATHEMATICAL MODEL FOR A COMPUTER SYSTEM CONFIGURATION PLANNING" by DR. KISHOR R. TRIVEDI on JULY 14TH 1978

Given a fixed budget, technical and price information on a CPU, memory and peripherals, how does one choose an optimum configuration? How much memory? What speed drives? Dr. Trivedi has done theoretical work in this area and a student of his has implemented the model as a program on IBM 370/145. This was the subject of a paper presented by Dr. Trivedi at the IEEE transactions in June 1978.

The model is based on the treatment of the computer system as a network of queues. This leads to a constrained non-linear programming problem, the solution of which yields the optimum configuration. He explained that the feasible solution space for this optimization problem is convex. This ensures that any optimum found, will automatically be the global optimum. The model takes into account the fact that the computer system will normally work in a multi-programming mode. It can also be used to find the optimal DMP (Degree of multiprogramming, that is, how many jobs at one time) for a given configuration.

An observation that was made was that in low budget systems, memory accounts for a large fraction of the total cost; in large configurations peripherals consume a large fraction of the budget. The discussion following the lecture brought out a number of interesting points:

i) The model does not handle time-sharing systems, where response time as well as throughput have to be considered.

ii) Simulation is no substitute to a good model. Simulation finds the answer by an exhaustive search and is therefore likely to be very expensive. Dr. Trivedi claimed that the program based on his model requires only a few seconds of computer time to find an optimum configuration for a small budget.

iii) It turned out that the question about the model capturing the details of a real situation completely cannot be settled with any great finiteness. Any model makes some assumptions and validating the assumptions of a particular model is extremely difficult.

iv) One of the most difficult problems in modeling a system is in characterizing its workload.

Dr. Trivedi is Assistant Professor in Computer Science, Duke University, DURHAM; North Carolina, USA.

— Based on notes taken by Shri T. M. VIJAYRAMAN

TRIVANDRUM CHAPTER REPORT : JULY 1978

The Trivandrum Chapter entered into its third year of eventful existence. The following were elected to the committees for the year 1978-79.

(a) Executive Committee
Chairman
1. Shri R. Narayan, VSSC
2. Shri M. S. Krishna, KELTRON
3. Shri A. K. Pujari, Kerala University
4. Shri M. N. Rojan, Bureau of Economics & Statistics

(b) Nomination Committee
Chairman
1. Shri M. Bhiranamam, KELTRON, Trivandrum
2. Shri K. Thanapann Nair, Govt. of Kerala, Trivandrum
3. Dr. A. Vaidyanathan, Centre for Development Studies
4. Shri K. M. Narayan, VSSC, was nominated as the Editor of the Chapter News Letter.

The General Body Meeting of the Chapter was held at the institute of Engineers, building on July 6, 1978 after a technical session conducted at the joint symposium of the CSI, Trivandrum- Trivandrum.

Dr. C. G. Sukumaran Nair, VSSC, gave a talk on MAN, Computers & Inteligence. He dwelt at length on the state-of-the-art computer software in intelligent machines. The session was followed by a lively discussion by the participants.

Ahmedabad Chapter
New Office Bearers were elected for CSI Ahmedabad Chapter for the year 1978-79, they are —

Chairman
Dr. Mohan Kaul
Indian Institute of Management Ahmedabad

Vice-Chairman
Mr. Ashok C. Mehta
EDP Corporation Ahmedabad

Hon. Secretary
Mr. N. Diwanji
Cailco Mills, Ahmedabad

1st Secretary
Mr. P. S. Shah
Physical Research Laboratory Ahmedabad

2nd Secretary
Mr. Saxena
Space Application Centre Ahmedabad

Hon. Treasurer
Mr. Meo
Ahmedabad Electricity Co. Ltd.

U. C. Chopra
Mr. Chandrakant Parikh
Ashok Mills, Ahmedabad

Co-Ordinator Student-Activities
Dr. Kalkarni
Physical Research Laboratory Ahmedabad

Events

* 19-12 November 1978, Delhi: Apex Seminar of Computer Festival, Instut of Engrs, Write to: Organising Secretary, Computer Festival, Institution of Engrs, 8 Okhla Pool Road, Dean's House, 700 020.

* January 1978, Bangalore: Annual Convention of the CSI. Write to: Vinay L. Deshpande, CSI-78

C/o Processor Systems (P) Pvt. Ltd., 24 Richmond Road, Bangalore 560 022.

Letters

STODGY PEDANTS & SENIOR MANAGERS

Sir,

It was a nice to see the editorial by the outgoing editor, Mr. Raizada, and the new President’s election manifesto. In previous issues of the New letter, Mr. Raizada found the time from his busy career, which has taken him for long periods to foreign lands, to express concern at the possibility of “totalitarian control of the purely academical minded”, and Mr. Balan explained that “the stodgy pedants from the small handful of highly qualified and skilled computer scientists” had not served the “senior Managers in business and industry” well. I couldn’t agree with them more about the unfortunate nature of totalitarian control or about pedants being stodgy, though I could quibble about the fact that ‘Senior Managers’ appeared with leading capital while ‘computer scientist’ did not.

Like other academics, I should feel cauioned by this criticism. But as I am not in control of anything in CSI it could not be to my totalitarianism that Mr. Raizada has objected. (For the record, when we last met, Mr. Raizada accepted the cigarette I offered him. I have since given up smoking but that should not have prejudiced his attitude to me). And while it is true that pedants are boring, they are perhaps no worse than many people I know (not all members of CSI) who haunt company boardrooms.

Which gets me to the point that while we can all embark on missions of denial, let us not pretend that dark thoughts obliquely expressed will suggest a conspiracy of academics against whom the brave band of data-processing managers will ride to victory. It is easy to sacrifice complex reasons for awkward failures more difficult to admit that there are usually simple causes for them. If there are meddlesome academics, let us be told who they are. If not, let us have less of this pointless innuendo.

Mathai Joseph

BOMBAY

INSTANT CERTIFICATES

Sir,

The experience of the Regional Computer Centre, Poona would be of interest to those organisations that might need to recruit key-punch
operators. Nearly 150 applications were received for three posts of key-punch operators. All the applicants were called for a test as a criterion for pre-selection. Even though the advertisement clearly indicated that the candidate should have had two years experience on an automatic key punch, most of the applicants had never handled anything except a hand punch. A total number of 109 candidates took the test.

The test was designed to judge the speed and accuracy of punching, the objective being essentially elimination of the unsuitable candidates. The test consisted of a FORTRAN program, comprising 20 statements, to be punched in 20 minutes. Extra 10 minutes were given for verifying some of the cards punched, if the candidate claimed to know verification. Different types of statements were given in Sandor India, with more than 60 columns and with all types of characters (but valid as a part of a Fortran Program) were included.

It was originally intended to check the accuracy of punching on a computer by a character matching program, since verifying cards was not considered desirable. But most of the candidates could not punch more than 9 cards; and only two could punch all 20 cards in time. Those who punched more than 9 cards were considered for the job, and the highest speed achieved was 14 cards in 20 minutes.

The main purpose of writing this letter is to draw the attention of the computing community to the unhealthy practices prevailing in our country. There is a mushroom growth of private commercial establishments, who claim to train persons in key-punching but do nothing of the sort and fleece the society at large under false pretences. It would be worthwhile if the CSl could formulate a procedure of voluntary certification by which, the CSl could give its mark of approval only to those institutes, who are doing a reasonable job of training and have adequate equipment. We believe, that it is only a certificame of the kind suggested above that could eradicate the mushroom growth of these undesirable activities.

P. V. Kanat
P. G. Vartak

THIS MONTH'S AUTHORS

J. G. KRISHNAYA is Executive Director of Systems Research Institute, Pune. His current area of interest is in mini computer applications, especially when linked with microprogramming and graphics, hardware and DBMS software.

Mr. L. SALDANHA is a Systems Executive with ICL in Bombay. He has been in the computer field for the last nine years advising ICL customers on management applications. She has done considerable work in the area of statistical data base systems for which she recently undertook training in Europe.

V. M. DATAR is a Systems Executive in ICL Bombay. We could not get his photograph as he is away in Europe undergoing training in communication systems.

Indigenous Scene

(The following report is based on an interview with Anand Kumar, EDP manager, Sandor India, by S. V. Subramaniam EDP manager, Morarjee Mills)

Sandor India have been using a UR system installed at their manufacturing plant at Thane, Bombay. They have recently installed “Spectrum I”, a micro-computer manufactured by DCM. The reason for choosing a micro to supplement their UR activities was to manage work and provide better facilities to the users.

Anand Kumar said. The feeling in Sandor seemed to be that there was no proven Indian computer and imports involved too much hand. They decided, therefore, to go in for a micro. It has been about a month since delivery of the micro system, and efforts are space to get programs ready.

The systems that will be the first to be put on the micro will be Invoicing, Accounts receivables, Sales Statistics and Finished Goods Account. The programming effort is being shared between the manufacturers and the user. DCM is offering to program applications for users on a charge basis.

They expect to upgrade their system very soon to a “Spectrum II” consisting of 16K bytes of memory, 2 floppy disk drives (243 K bytes each) and 131 character dot matrix printer (120 characters per second). In addition there is a 30 character alphanumeric display with a keyboard for data entry. We saw the display and keyboard in operation and noted that it seemed ideal for this work. The software/utilities supplied by the manufacturer include the operating system, BASIC compiler (not interpreter), text editor, sort/merge, floppy to floppy copy etc. The system allows the user to create files on the floppy disk, program files as well as data files.

Though the Spectrum is not meant to replace their UR, the systems intended to be run are currently being processed by their UR unit. Data conversion is possible only by keying in the data, since there is no tape or card reader. However, the manufacturers have offered to carry out one time conversions of data cards at a charge. DCM has facilities in Delhi to copy cards onto floppy disks via paper tape.

The question of the language available was brought up. Anand Kumar said he would prefer his programmers to use COBOL, but was finding BASIC adequate for the tasks in hand. His programmers had undergone a short training course in Delhi, prior to starting work at his installation.

The UR unit at Sandor runs 2 shifts already and handles 6 lakh cards per year. The question came up if their UR activities would be replaced by the micro. Anand Kumar said that it was neither contemplated nor was it possible. He pointed out that the micro-computer’s main strength is in offering interactive data entry. It would be a waste to run such a system purely in the batch mode. He demonstrated to us an interactive program which collected and validated information from invoices. When detectable errors were made by the operator, they were instantaneously noted by the program which prompted the operator to re-key the field concerned.

Besides, there were limitations to the volume of data that could be stored on floppy disks. He said he would prefer a few more floppy disk drives than the system offers.

They seem to be planning to use micros for keeping local information in departments and to provide accounting aids. Anand Kumar did not expect integrated information systems to be developed on these machines.

ANAND KUMAR is a senior manager in Sandor India responsible for EDP, O&M and OR applications. He was associated with Vipro Corporation of America on petrochemical complexes and was associated with IBM India for twelve years before his current assignment.

16
Newware

(The Newsletter is always interested in new hardware and software that becomes available. We are contacting manufacturers/agents for this purpose. We invite them all to get in touch with us when they have news for our readers.)

DECSYSTEM-2020

Digital Equipment Corporation have introduced what they describe as the smallest and most inexpensive mainframe computer. We talked to Mike Shah, their resident manager in India to obtain details of the system. This system is fully software compatible with DEC 10s and DEC 20s and can run the time-sharing monitors of the 10s or that of the 20s, and can support 32 terminals subject to the availability of adequate memory.

The system, called Decsystem-2020, is packaged into a cabinet 5 ft. high, 2½ ft. wide and 3½ ft. deep and will sell at a basic system price of $150,000 (according to their advertisement brochure). It is reported to need only 1 kW of power for the CPU. The low power dissipation is interesting because it will make air conditioning easier. We asked for indications of prices in India and were told that the following system would cost roughly Rs. 25 lakhs before duty:

CPU,
2 Disks totalling over 120 Megabytes,
1 Line printer,
1 Card reader,
8 Video terminals,
192 K words (36-bit) memory.

It seems that similar systems have already been quoted in India.

The main reasons for its low price are said to be due to advanced packaging techniques, replacing core memory with semi-conductor memory and utilizing existing software.

An article in Business Week (March 27, 1978) can be consulted for further information. An informative advertisement also appears in this issue.

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FORTIETH ANNUAL CONVENTION OF COMPUTER SOCIETY OF INDIA
22-25 JANUARY 1979, HOTEL ASHOKA, BANGALORE-560 001.

PART I REGISTRATION

1. Name: ____________________________
   (in block letters, as preferred on the badge) Membership No. ____________

2. Organization: ______________________

3. Address: __________________________

4. Enclosed here with cheque / draft No. _______ drawn on __________________________
   for Rs. _______ (Rupees in words) in favour of "COMPUTER SOCIETY OF INDIA - 79"

5. Delegate Status
   [ ] Member
   [ ] Student Member
   [ ] Non-Member

6. BREAK-UP OF CHEQUE AMOUNT
   Registration fees ... ... Rs. _______
   Preprint Div. 1 Div. 2 Div. 3 Div. 4** ... Rs. _______
   Hotel* ... Rs. _______
   Train/Plane* (return journey) ... Rs. _______
   Total cheque/draft amount ... Rs. _______

7. Date: ____________________________

8. Registration fees for forms received up to 15 December 1978. 10 January 1979
   Student Member Rs. 50 Rs. 40
   Member 75 85
   Non-Member 150 160

   After 10 Jan. 79
   SORRY !
   No Registration

   The delegates quoting CSI membership number will only be treated as members.

9. Preprints of CSI 79 will be available for distribution at registration time at Rs. 10 per volume. One volume for each of four divisions. Please indicate number of volumes required for each division and include in cheque amount.

10. Please mail this registration form and the Cheque/Draft to:
    [Mr. D.B. Borah, Convener, Public Relations Committee, CSI-79
    C/o. ILC, 18/1, Cunningham Road, Bangalore-560 052]

    Phone: Office: 26025/70902, Res: 31573

* Please fill in Part II of this form and transfer amount from here.
** Div.1: Hardware Div. 3: Scientific Applications
     Div. 2: Software Div. 4: Business Management Applications

Delegate’s Signature ____________________________
PART II HOTEL/AIR—FIRST CLASS TRAIN BOOKING

Should you need Hotel accommodation in Bangalore and need help in arranging booking please fill in details below and include approximate charge in the cheque.

1. Name: [ ] [ ] [ ] [ ] [ ] [ ] Age [ ] Yes. [ ]
   (Please fill in your name)

2. ACCOMMODATION

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<th>Double</th>
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3. TRAVEL

REQUEST FOR AIR/FIRST CLASS TRAIN BOOKING

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4. Delegate's Signature.

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Tel. No.: 815344/811316 Telex: 011—2326
Education & Training Programme

One of the major commitments of CMC to users is in the field of education and training. This will include formal courses for users at management level as well as operational/implementation level. These courses will be tailored to meet the specific needs of the participants. In keeping with this commitment, CMC is happy to announce the course schedule for the period July 1978 – March 1979.

### SCHEDULE OF COURSES: JULY 1978 - MARCH 1979

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course Name</th>
<th>Fee per Candidate</th>
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<th>NEW DELHI</th>
<th>MADRAS</th>
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<td>Unit Record</td>
<td>1000</td>
<td>2 Weeks</td>
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<td>OCT 9, '78</td>
<td>—</td>
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<tr>
<td>2</td>
<td>1401 Programming</td>
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<td>a) Card</td>
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<td>800</td>
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<td>SEP 4, '78</td>
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<td>b) Tape</td>
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<td>400</td>
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<td>JUL 24, '78</td>
<td>NOV 3, '78</td>
<td>DEC 26, '78</td>
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<td>Introduction to Data Base</td>
<td>500</td>
<td>3 Days</td>
<td>DEC 4, '78</td>
<td>JAN 22, '79</td>
<td>DEC 18, '78</td>
<td>MAR 26, '79</td>
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<td>JAN 22, '79</td>
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<tr>
<td>8</td>
<td>Introduction to Teleprocessing</td>
<td>200</td>
<td>1 Day</td>
<td>(Bangalore-OCT 23, '78; Ahmedabad-NOV 6, '78)</td>
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For further details, please contact:

**Computer Maintenance Corporation Limited**  
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