

**Report of the Working Group to Consider Feasibility
of Introducing
MICR/OCR Technology for Cheque Processing**



**RESERVE BANK OF INDIA
DEPARTMENT OF BANKING
OPERATIONS AND DEVELOPMENT
BOMBAY 400 005.**

1983

Price Rs 6.50

Printed by Abhay Bhide at Shree Rajmudra, Prabhadevi Industrial Estate,
Savarkar Marg, Prabhadevi, Bombay-400 025
for the Reserve Bank of India, Department of Banking Operations and
Development, Central Office, Bombay

CONTENTS

<i>Chapter</i>	<i>Page No.</i>
I. Setting up of the Working Group – Terms of Reference	1
II. Cheque Processing in India – A Review	6
III. Cheque Processing in Western Countries	9
IV. Recommended System for Cheque Processing in India	13
V. Credit Clearing or GIRO – Concept, Utility and Modalities for Implementation	24
VI. Summary of Recommendations	26
 <i>Annexure</i>	
1. Cheque Encoding Techniques – MICR and OCR – A Comparative Study	30
2. Machines for Cheque Processing	31
3. Specifications for Cheque Forms Printing/Code Lines etc.	37
Specifications for Cheque Forms Printng/Code Lines etc. (Revised).	43

CHAPTER I

SETTING UP OF THE WORKING GROUP- TERMS OF REFERENCE

Preamble

1.1 Receiving cheques* for collection and credit of the proceeds to customers' accounts is one of the basic functions of banking. The cheques received for collection could be drawn on banks' own branches or on branches of other banks in the city or outstation branches of own bank/other bank. Depending upon the category a different procedure for cheque clearance is followed :

- (i) If the cheque deposited is drawn on an account maintained at the very branch, book adjustment takes place; if, however, it is drawn on an account maintained at one of the other branches of the same bank the cheque is sent to paying branch for disposal and adjustment of funds takes place through *inter branch* account.
- (ii) If cheque is drawn on other bank's branches, the clearance takes place through the system of clearing houses. The clearing houses are places where banks' representatives meet at pre-determined times, exchange cheques/drafts/payorders and other instruments and work out to receive/to pay figures, the net amount of which is adjusted in the books of Reserve Bank for the respective bank. Where Reserve Bank of India is not established, generally State Bank of India does the work. Detailed rules of clearing are drawn up and they are followed by member banks. At present there are 532 clearing houses in the country of which 11 are run by Reserve Bank of India and the rest by State Bank of India/ other banks.
- (iii) In respect of outstation cheques the collecting branch sends the cheques/drafts etc., to the paying branch by post with appropriate covering letter. The paying branch, on receiving the cheque, processes it and, if it is paid, sends payment advice also by post on receipt of which the cycle gets completed. If the cheque is drawn on outstation branch of another bank, the collecting branch at that centre arranges for its collection through local clearing or otherwise and on receipt of the proceeds arranges for its transmission through the same process. The accounting settlement between banks for these transactions takes place either through Head Office account or through specific arrangements between different banks. Some of the public sector banks have opened Regional Collection Centres in important cities, mainly at Bombay, Calcutta, Madras, New Delhi, Ahmedabad and Bangalore with a view to cut down the delay in collection of outstation cheques. Some other banks have opened Special Cells/Departments for the purpose.

* In this report, the word "cheques" has been used to include similar other instruments like drafts, payment orders, dividend/interest warrants, etc.

1.2 This system of cheque clearance is at present fully manual and was working satisfactorily when the volume of transactions was low and the number of bank branches small. During the last two decades and particularly after nationalisation of major commercial banks when there has been a large increase in banking transactions the system has come under serious strain. Figures in the following table showing number of cheques cleared in the clearing houses and the number of branches of commercial banks would indicate the dimensions of the problem :

Year	No. of branches of commercial banks as at end June	Average number of cheques cleared in the clearing houses per month (in thousands)	Amount cleared (Rs. in crores)
(1)	(2)	(3)	(4)
1969	8262	7726	2354
1970	10131	8656	2756
1975	18730	12302	5903
1976	21220	13625	6954
1977	24802	15889	8768
1978	28016	18414	10202
1980	32420	NA	NA
1981	35707	NA	NA
1982	39177	NA	NA

Note :— These figures show only inter-bank cheques, i.e. those covered under category (ii) above. Statistics relating to (i) & (iii) are not readily available.

1.3 It is also interesting to note that of the total number of cheques cleared in clearing houses almost 55 per cent are covered in four metropolitan cities at Bombay, Delhi, Madras and Calcutta and if we take into account all state capitals coverage would increase to about 65 per cent.

1.4 The large volume has given rise to problems of inordinate delay in the process of cheque clearance. The Sub-Committee on Collections appointed by the Working Group on Customer Service in Banks in the year 1975 which had studied the problem in depth had observed that collection of outstation cheques between branches of the same bank normally involved about 10 to 20 days, but, not infrequently, the period exceeded 3-4 weeks. Also this period was more if the transaction was between branches of two different banks. This delay has further aggravated with the passage of time. The Sub-Committee had further observed that the singlemost important factor affecting collection service of banks was the absence of rigid time discipline, generating compulsions of its own. To maintain this time discipline the work system has to be such that in given time the process has to be completed. Resultantly, if volume has increased and time has to be maintained, the banking system has to think of use of mechanisation, it was felt.

1.5 In respect of local cheques also, the delay has increased considerably again primarily due to large number of branches in cities and the absence of any modification in work procedure. However, thanks to steps taken by Reserve Bank of India in computerising the local clearing system at Bombay,

Delhi and Madras, there is some semblance of time discipline, although the basic problems regarding sorting and balancing of cheques still remain at the banks' level.

1.6 On an analysis of the problem the Working Group on Customer Service in Banks had recommended that the problem of collection of outstation cheques should be tackled at the national level. The eventual objective in this regard should be to develop a system and structure for national clearing for which purpose National Clearing Authority may be set up. Further the Working Group had suggested that the National Clearing Authority referred to above should also manage the clearing houses in the country.

1.7 The Working Group's concept of national clearing was to divide the country into four regional grids with headquarters at Bombay, Calcutta, Madras and New Delhi. Each regional centre will perform two functions; firstly acting as clearing house for intra-grid outstation cheques and secondly participation on behalf of the grid in national clearing of extra-grid outstation cheques. The Group had recommended that in the first phase National Clearing should be introduced only between the four metropolitan cities of Bombay, Calcutta, Madras and New Delhi. In the second phase, all the air connected centres should be brought within the purview of national clearing; subsequently, other centres may be hooked to national clearing, wherever necessary.

1.8 The Group had also recommended that collection business of banks, particularly cheques collection business is one area which was specially suitable for mechanisation/computerisation because of the large volume, repetitive tasks and largely routine nature of the business. The clearing operations at metropolitan and larger centres, they felt, should be mechanised as early as possible.

1.9 The Government of India have accepted the recommendations of the Working Group. Reserve Bank of India, at the instance of Government examined the feasibility of introducing National Clearing of outstation cheques and the modalities therefor. Since the National Clearing will be a mammoth operation it was felt that it will not be possible to have it without resort to computerisation. During the last 20 years, as part of their efforts to improve their services, banks in developed countries have been taking advantage of the developments in the electronics and data processing fields. There are instances where banks have sponsored research and development in adopting technological advances for the benefit of banks and their customers. One such instance is the development of Magnetic Ink Character Recognition (MICR) Optical Character Recognition (OCR) system for cheque processing, and it was then felt that the banking system in India should consider adopting MICR/OCR technology for cheque writing and use computerised sorting techniques so as to break new grounds in this area.

1.10 Before working out the details of mechanisation to support national clearing process it was considered necessary that a small Group should consider in detail the feasibility of introducing a system of either Magnetic Ink Character Recognition (MICR) or Optical Character Recognition (OCR) technology for cheque writing in the absence of which computerisation of cheque processing was not feasible. Accordingly, Reserve Bank of India appointed a Working Group with the following members :

**Dr. Y. B. Damle
(Convener)**

**Adviser, Management Services Department,
Reserve Bank of India, Central Office, Bombay.**

Shri V. P. Sawhney*	Joint Secretary, Government of India, Ministry of Finance, Department of Economic Affairs, (Banking Division).
Dr. K. Subramanian	Head, Finance Information Division, National Informatics Centre, Electronics Commission, Department of Electronics, Government of India.
Shri U. K. Sarma	Chief Officer, Department of Banking Operations and Development, Reserve Bank of India, Central Office, Bombay.
Shri C. K. Bapiraju	Chief Officer, Computer Division, State Bank of India, representing Indian Banks' Association.

1.11 Terms of Reference :

- (i) To study the feasibility of introducing MICR/OCR technology for cheque writing and recommend a suitable system for the purpose of introducing national clearing of out-station cheques.
- (ii) To work out the details regarding standardisation of cheque forms with reference to the size, quality of paper, printing specifications, etc.
- (iii) To draw out tentative schedules for introduction of the system.
- (iv) To consider other connected matters particularly those relating to the feasibility of introducing the ' Bank Giro ' system as a part of the National Clearing for quicker remittance of funds which also requires mechanisation.

Work Details

1.12 The Working Group held in all six meetings between December 1982 and July 1983. In view of the short time available the Group had to rely mainly on empirical views besides readily available data. Apart from the theoretical background about the computer technology possessed by some of the members, the Group also had the benefit of the first hand experience of the team consisting of Dr. Y. B. Damle, Convener and Shri C. K. Bapiraju member of the Group who visited a few countries where the MICR/OCR technology is in use and studied the system in operation in these countries and talked to the people connected with its operation.

Structure of the Report

1.13 The report consists of six chapters and three annexures as under :—

Chapter I	Preamble — Setting up of the Working Group, Terms of Reference etc.
Chapter II	Cheque Processing in India — A review.
Chapter III	Cheque Processing in Western Countries.
Chapter IV	Recommended system for cheque processing in India.

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Chapter V

**Credit Clearing or GIRO — Concept, Utility
and Modalities for Implementation.**

Chapter VI

Summary of Recommendations.

Annexures

1. Encoding techniques — MICR & OCR — A Comparative Study.
2. Machines for Cheque Processing.
3. Specifications for Cheque Forms/Printing/Code Line, etc.

Acknowledgements

1.14 The Working Group extends its most sincere thanks to Shri A. Ghosh, Deputy Governor, Reserve Bank of India who was kind enough to meet the members of the Group at the outset and discuss the approach and methodology for its work.

1.15 The Group is also grateful to Shri K. K. Misra, Director, Banking Division, Department of Economic Affairs, Government of India who attended the meetings of the Group and unhesitatingly placed his views on various issues involved.

1.16 The Group would also like to express its thankfulness to all the organisations who readily responded to its request for information and participated in the meetings convened by it. Particularly, our thanks are due to Shri P. S. Shivaram, General Manager, India Security Press, Nasik, with whom we had detailed discussions on printing of cheques with MICR encoding and the infrastructure needed.

1.17 We are also thankful to the Reserve Bank of India, Department of Banking Operations and Development and Management Services Department for the secretarial assistance provided to the Working Group. Particularly, we wish to place on record our sincere appreciation of the assistance rendered to the Group by Shri N. S. G. Rao, Deputy Director, Management Services Department, Shri G. R. Jayachandran, Deputy Chief Officer, Department of Banking Operations and Development, Shri G. M. Shetti, Assistant Director and Smt. Padmini Rao, O & M Officer, both of Management Services Department.

1.18 Rest of us in the Group would also like to make a special mention of the efforts put in by Dr. Y. B. Damle, Convener of the Working Group in preparation of the Report.

CHAPTER II

CHEQUE PROCESSING IN INDIA - A REVIEW

2.1 With the multifold increase in the volume of cheque collection business and number of branches of banks, the time taken for collection of cheques and their ultimate credit to the customers' accounts has been increasing. Of late, this delay has reached an alarming proportion especially in two areas, viz.,

- (i) the clearance of local cheques in metropolitan cities and
- (ii) the inter-city clearing

Of these again, the delay in inter-city clearing has assumed criticality where it takes anywhere upto 4 weeks to get cheques cleared. For local cheques the position is equally discouraging particularly in metropolitan towns where it could take 4 to 5 days to have the cheques cleared.

2.2 In cheque processing the key aspect that has to be taken note of is that the cheques have to move between branches. A cheque deposited at any branch has to go to the branch on which it is drawn where it is scrutinised for authenticity of signature, correctness of amount/date and other particulars. Thereafter it is debited to customer's account. Therefore, cheques that are received for clearance need to be sorted bankwise and branch-wise and then sent for clearance. This results in movement of large number of cheques between bank branches which is done either through courier or through the medium of post office. This process of sorting and physical movement is time consuming. Also the accounting work associated therewith is cumbersome. Again the process time is directly proportionate to the volume of cheques cleared and therefore with static work system the cycle time increases in direct proportion to the volume. The volumes having increased multifold, it will thus not be difficult to understand the enormous delay in the cycle.

2.3 Let us take a typical case. In Bombay city alone in local clearing something like 250 to 300 thousand cheques are dealt with every day. A bank like State Bank of India with its 92 branch net work in Bombay handles between 40 to 50 thousand cheques outward and same number inward ("i.e. on them") cheques. The typical operation is that at each branch of the State Bank of India the cheques drawn on other bank branches are sorted bankwise, listed and then sent to the the main branch where lists received from 92 branches are collated, the cheques are physically merged bankwise to prepare outward clearing to be presented in the Clearing House. The figures at this stage have to be balanced with branch-wise details and this entire process at the main branch has to be completed in about 2 to 3 hours to catch that day's clearance; if it is not possible to do so the clearing gets delayed by one day, which happens quite often.

2.4 As regards cheques drawn on the State Bank of India, in the clearing house around 40 to 50 thousand cheques are received everyday and are processed at the main branch. First this inward volume has to be balanced i.e. individual items are to be verified and their totals tallied with bank lists. Then the cheques are to be sorted branchwise, listed and then again balanced and thereafter sent to the different branches via courier.

2.5 This process of collecting about 40 to 50 thousand cheques from 92 branches, sorting them, presenting them in the clearing house and again receiving about 40 to 50 thousand cheques, balancing, listing, sorting them and sending them to the concerned branches has to be accomplished in a given time frame which, if cannot be maintained, results in delayed clearance. There are also problems of mis-sorting and unbalanced figures which give rise to huge uncleared balances which each bank maintains. We have observed that there are delays at branch level, main branch level, at clearing house level and also there is time lag in return clearing. All these result in local clearance delay anywhere upto 4/5 days in Bombay.

2.6 Recently in Bombay, Delhi and Madras, Reserve Bank of India has taken steps to computerise clearing house settlement and has taken the opportunity to rationalise work system, introduce staggered working, bring in larger use of micro-processors for totalling, balancing etc. This will reduce time delay considerably albeit it cannot and will not solve the problem fully.

2.7 As regards outstation cheques the problem is further aggravated as the movement of the cheques is through the medium of post. Typically, if there are 80 branches of a bank in Bombay and 60 branches in Delhi the process of cheque clearance between these two centres within the bank's own branches is as under :

A branch in Bombay will send by post cheques with a suitable covering letter to the branch at Delhi on which the cheque is drawn. On receipt of the cheque(s) at the concerned branch in Delhi, they will be scrutinised and paid if found in order. Then a payment advice is prepared and sent to the forwarding branch in Bombay, on receipt of which the customer gets the credit. The amount adjustment would be through inter-branch account. Thus, for 80 Bombay branches transacting with 60 Delhi branches not only there is a criss-cross communication, but also there are several inter-branch entries raised for reconciliation on which enormous resources are put in. Again the postal delays for movement of cheques and the payment advices, the time required at each office for processing etc. and generally casual attitude towards service have resulted into a delay of minimum of 3 to 4 weeks for whole process.

2.8 This is the case of clearance between branches of the same bank. If, however, two separate banks are involved in the process, the problem aggravates inasmuch as the collecting bank will send the cheques to a focal point branch of the other bank in the same city. Thus one more tier is added to the process, adding a further period of a week for the settlement. Some of the Public Sector banks have opened Regional Collection Centres in some of the important cities. It is reported that this has led to reducing the time taken for collection of outstation cheques to some extent, say, by about a week. Some other banks have opened Special Cells/Departments for the purpose. However, even now a number of banks send cheques direct to the drawee branches.

2.9 Apart from the delay caused to the customer, the above procedure also results in a large number of inter-branch entries raised in the books of banks under the above procedure. These need to be reconciled promptly. However, the unreconciled balances have accumulated and presently reached alarming proportions. In this context, introduction of a separate mechanism to reconcile such interbranch entries within each city has assumed relevance.

2.10 To summarise, the aspects that result in delay in cheque processing can be specifically identified as under :—

- (i) Physical sorting of cheques, bankwise and branchwise, before they could be dealt with; listing the cheques and also balancing the figures.**
- (ii) On receipt of “ on us ” cheques sorting them branchwise if received at a focal point and only thereafter distribution to branches.**
- (iii) The movement of cheques in limited time so as to remain within clearing discipline.**
- (iv) The accounting process of settlement between branches of banks and within banks is cumbersome and gives rise to a large number of inter-branch/inter-bank entries which have to be reconciled. As it is, reconciliation process is under strain and unsettled items give rise to concealed frauds. Particularly as the instruments go through the medium of post office they are susceptible to being intercepted by unscrupulous elements and altered to advantage. There have been such cases in the past.**
- (v) The very high volume of cheque movement which could be anywhere upto 1 to 1.5 million per day (Of these 50—55% are within metropolitan cities) for all the three categories of clearance referred to in Chapter I has to be dealt with which has become a task impossible to handle manually.**

2.11 This problem that we in India are now being confronted with has been faced by the Western countries particularly USA in early sixties where the explosion of cheque volume had to be met with by them. They then resorted to finding solutions by ‘technology’ application and developed a new process by standardising cheque forms, writing thereupon the bank/branch code number, account number and the amount in special computer readable ink (known as MICR) and developing computer supported machines to sort the cheques at a fast rate. At present the cheque sorting machines with speed ranging between 250/400 cheques a minute and 3000 cheques a minute are available and used in these countries.

2.12 This process of sorting and listing the cheques with the help of machines is typically called as “item processing” in USA. This has been further explained in detail in Chapter III. The above process with amendments as necessary to suit our environment, work situation and culture has to be used by us in order to overcome our problem. Also it will be necessary to adopt a system of settlement of accounts between banks akin to Federal Reserve Clearing System in USA or Bundes Bank Clearing System in West Germany.

CHAPTER III

CHEQUE PROCESSING IN WESTERN COUNTRIES

3.1 United States was the first country to go in for computerised processing and sorting of cheques to handle successfully the ever growing cheque volume. The MICR technology which was introduced in United States in the year 1959 for this purpose has been approved by American Bankers' Association, and since adopted by Canadian Bankers' Association, Committee of London Clearing Bankers and so on.

3.2 The essential process in mechanical sorting of the cheques is making the writing thereupon intelligible to computers. For this purpose the relevant particulars of the cheque such as bank number, branch number, account number and the amount has to be written at a specified area on the cheque forms with a special ink and in a style that can be read by a machine. The cheques are then fed to the electronic sorting machine viz. reader/sorter. The machine reads the MICR code line and automatically directs the cheques to individual pockets at high speed. It also lists the cheques deposited in each pocket. The cheques thus get physically sorted and also listed. Such a system, however entails the following pre-requisites, viz.

- (i) The cheque forms have to be of standard dimensions preferably of one or two specified sizes so that the machines can handle them. Cheques will also have to have a special paper quality which would enable them to stand the mechanical stress; they should have smooth grain to be able to pass through the roller mechanism efficiently. All the banks in United States, U.K., Canada, etc. have laid down the size specifications and paper specifications for cheque forms to be used. As for paper, they use 95 grammes per square metre thickness smooth grain paper. As regards size, whereas in United States 6 to 7 sizes are in use, in West Germany only one size is used. The various clearing houses have brought out booklets specifying cheque sizes, paper quality, printing specification, etc. and these are strictly followed by member banks.**
- (ii) On the cheque forms at a specified place which is usually $\frac{1}{4}$ " above the bottom edge, the distinctive features of the cheque such as Federal Reserve District no., bank no. branch no., account no., and amount have to be written in a format and ink which is intelligible to computer. For this, two systems are used.**

First system is known as Magnetic Ink Character Recognition (MICR). In this, the information is printed with special ink containing iron oxide. When the cheque comes under electrical field, this line gets magnetised and generates certain wave pattern which is readable by computer. The key element here is to use a specified type set (known as FONT) and ensuring proper writing of the identification data. There are two type fonts

in use, one known as E 13 B and the other CMC 7. The E 13 B font is used in USA, UK, Australia, Canada, Japan, Hongkong and Singapore whereas CMC 7 is used in France, Switzerland, parts of Sweden and a few Latin American countries.

The second method of writing of relevant line is known as Optical Character Recognition (OCR). Here, the computer reads the data with photo electrical scanning. OCR is a comparably new technology and is used in West Germany. We have made comparison of the two technologies viz., MICR and OCR and their comparative features are placed at Annexure I.

- (iii) The cheques of standard size with information recorded on them are processed and read by machines known as encoders/reader/sorters. The encoders are machines that help writing of any information in given field in the MICR or in OCR form. The reader/sorters are machines that read the encoded writing, sort the cheques physically and simultaneously list the cheques so sorted. Reader/sorters work at phenomenal speed or processing upto 3,000 cheques a minute; slower machines of sorting speed upto 400 cheques a minute are also available.

Item Processing in United States

3.3 We would now detail the typical 'item processing', cycle in United States both for local as well as for outstation clearing. In United States as also in all other Western countries, as stated earlier, cheques of standard sizes are used. When cheques are received from printing presses they are already coded in MICR with the city number, bank number and branch number. The account number is encoded when the cheque book is issued to a customer. Thus cheques issued to customers are already coded in computer readable format except for amount field.

3.4 When a customer deposits a cheque for credit to his account at a branch, all such cheques are passed through an encoder. This machine is manually operated and does two functions. It prints the amount in MICR font at proper place on the cheque so as to make the cheque completely readable by computer. Simultaneously a listing of cheques so processed with group totals/grand totals is available. In some of the encoders, it is simultaneously possible to place endorsement stamps and/or clearing stamp on obverse or reverse of the cheque. After this operation the branch is in a position to send the bunch of cheques duly encoded together with the list thereof to its focal point. This process can be done very fast; on an average, an operator on one machine can process 500 cheques per hour.

3.5 At the focal point branch, the cheques received from various branches are subjected to processing on reader/sorters. Before putting any lot on reader/sorters for processing, a lead card containing batch total is also placed; this helps in balancing the batch totals. The reader/sorters enable fast sorting of the cheques bank-wise and also generate bankwise list of cheques. By use of sorters of speed matching with the work volume, it is possible to do this work very fast.

3.6 It may also be mentioned that in U.S.A. cheques are returned to customers. Therefore they are microfilmed. The reader/sorters have an attachment which enable microfilming the cheques while they move on the sorter.

3.7 There are certain problems on these machines like mis-read, cheque-jams, rejects, etc., but by and large, the errors are less than one per cent. However, to overcome these problems there is a

procedure for on-line correction and also reject/re-entry facility including the facility for re-entry of cheques mutilated during processing. They generally use carrier-envelopes for this purpose. The cheques thus sorted bank-wise together with the lists are sent to the clearing house for adjustment.

3.8 In respect of outstation cheques, in the U.S.A. and West Germany it is the responsibility of the Federal Reserve Bank and Deutsche Bundes Bank respectively to arrange for inter-city and inter-zone clearance. For example, all the cheques received in New York for credit of customers' accounts but payable in California would be handed over by the New York banks to Federal Reserve Bank of New York. This bank will send them over to Federal Reserve Bank of San Francisco after sorting them Federal district/bank-wise. Federal Reserve Bank at San Francisco will present them in clearing at San Francisco to collect the proceeds, and then pass on credit to Federal Reserve Bank of New York. There is also a time discipline for return of unpaid items. By this process New York banks get credit from Federal Reserve Bank for all cheques drawn on California banks, say within 3 to 4 days. Similar practice is followed in West Germany. In London, however, since for the entire British Isles, clearing is at one place, outstation clearing problem does not arise.

3.9 Besides the cheque clearance, for inter-bank payment in U.S.A. following two methods are used.

- (I) Under the system known as CHIPS in U.S.A. (or CHAPS in U.K.) the inter-bank payments are made without resorting to any written documents in the form of cheques/bankers' orders. In this arrangement the member banks have a computer terminal linked to the main frame system at the Federal Reserve Bank. A payment to be made by bank A to bank B is advised by bank A through this terminal with relevant details. It goes to the terminal of bank B through the Federal Reserve computer system; in the process it gets validated and also accounted for like any other clearing entry. The beauty of this system is that it transmits the item at electronic speed and reduces the paper work associated with money transfer between the banks.
- (II) The second method widely used in West Germany, is credit clearing or bank GIRO. Credit clearing is basically a system which enables transfer of credits to accounts maintained at different banks. In cheque clearance the customer to whom money is due gets a cheque in his favour which he deposits in the banking system and waits for its payment. In credit clearing, where a credit voucher duly authorised comes from paying banker, the time element in settlement process gets reduced; the GIRO system is discussed in a separate chapter. It seems to have potential in India and would reduce cheque volume in due course sizeably. It may however be mentioned that in West Germany with rapid advancement of computer technology and communication system, the GIRO is being replaced by EFT (i.e. electronic funds transfer).

3.10 The model we have discussed above for cheque clearance in USA is based on cheque processing by individual banks, and at the clearing house the processing is confined only to outstation cheques. We have observed an alternate model in Hongkong where the responsibility for encoding of cheques for the amount portion, the sorting for each bank (bank-wise and branch-wise) and accounting adjustments lies with the clearing house. Here each bank branch delivers to the clearing house around 5 p.m. every day a batch of clearing cheques for that day together with covering lists;

while some banks encode their cheques, others do not. The clearing house has large number of encoders which encode the cheques where required, prove the totals, and then subject the cheques to sorting on fast sorters. By midnight, bankwise clearing figures as also bunches of cheques drawn on each bank are ready for delivery. Individual banks send their messengers to the clearing house from about 4 a.m. onwards, collect the cheques and forward them on to their branches for posting in ledger accounts. Thus, in Hongkong, clearing is accomplished overnight. The total service is, rendered by the clearing house who, we understand, charge banks at the rates varying from 3 cents to 5 cents per instrument for service. On a study of the system it seems that it has been possible for Hongkong to do this because of permissible labour laws, effective management, availability of upto-date machines and the very typical environment of the place itself, as also its smaller geographical expense. We learn that in Singapore too a similar system is used. It may please be noted that these places being geographically small, there is no outstation clearing problem.

CHAPTER IV

RECOMMENDED SYSTEM FOR CHEQUE PROCESSING IN INDIA

4.1 The System of Cheque clearing in India has come under severe strain on account of very high volume and therefore the time lag in the process has gone beyond tolerance limits. The specific reasons for such happenings have been identified in Chapter II and it is necessary to propose a system which could help overcome the problems. We have gone into various aspects at length with a view to finding feasible solution and have also studied the systems, procedures and extent of mechanisation/computerisation used overseas for tackling these problems. In this Chapter we analyse our requirements and propose an approach which would lead to the desirable.

4.2 With the growing number of cheques in circulation which have already reached a level that cannot be handled manually and with the prospects of their rapid growth on account of opening of more branches of banks and further spread of banking habits, etc., we envisage that the problem is going to multiply in years to come. Although no reliable data relating to number of inter-bank and inter-city cheques is readily available, on the basis of clearing figures (which show only interbank work load) a reasonable estimate can be made that presently in India somewhere around a million cheques are cleared every day. Of these, 50% to 55% are in the four metropolitan cities and another 10% to 15% between state capitals. The time delay in clearance of outstation cheques is anywhere upto 3 to 4 weeks and in stray cases it exceeds even a month. Local clearance is also not very satisfactory. In short, the customer service is suffering tremendously and to say the least, the banks' performance is rather sub-optimal in this area of work.

4.3 It is therefore necessary to take immediate steps to remedy this situation, and on overall considerations, we recommend that we have to change over to the 'Item Processing System' as adopted all over the world to be able to cope up with this problem. This system may have to be introduced in phases. In the first phase we should cover four metropolitan cities of Bombay, Delhi, Madras and Calcutta. In second phase it should be extended to *all* state capitals/important centres and thereafter in final phase we should move to 'GRID' concept as suggested by the Committee on Customer Service in Banks. Under this arrangement the country will be divided into four regional grids with headquarters at Bombay, Calcutta, Madras and New Delhi. Each regional centre will perform two functions; firstly, acting as clearing house for intra-grid outstation cheques, and, secondly, participating on behalf of the grid in national clearing in respect of extra-grid outstation cheques.

4.4 For changing over to the revised system and accomplishing quick cheque clearance, with the help of computers, specific decisions on various aspects as under, have to be taken. These are :

- (i)** Standardisation of cheque forms.
- (ii)** Determining and adopting an encoding technology viz., MICR or OCR and also determining specifications, fields, etc., for the identification line as also the 'font' to be used.

- (iii) Identifying machines that will be required for use by the banks in India and by clearing houses. Going into details of the feasibility of their getting manufactured in India, assessing quantity required, the cost including local and foreign exchange components and possible suppliers.
- (iv) Working out a detailed work system for this 'item processing' work and suggesting a phased implementation thereof.
- (v) Working out infrastructure required for implementing these proposals in a systematic manner.
- (vi) Working out time schedule for implementation.

4.5 We have gone into the details of each of the items, had discussions with concerned functionaries and studied the relevant literature. We have had the benefit of the knowledge gained by two members of the Group who visited West Germany, UK, USA and Hongkong for studying the systems. Accordingly, we have the following recommendations to make :

(1) Standardisation of cheque forms

- (i) Standardisation of cheque forms is a prerequisite of any mechanised cheque processing system. Standardisation is required not only regarding size but also for paper quality. The cheques should be printed on paper that will stand mechanical stress as well as enable smooth movement on machine rollers. World over, therefore, paper of 95 gms/sq. metre thickness with smooth grain is used. At present in India, we use paper of 85 gms/sq. metre thickness and our experimentation showed that our cheques cannot stand fast machine sorting. It would, therefore, be necessary as a first step for the banks to change to use of superior quality paper. We understand that such paper is available indigenously and that there would not be any difficulty in getting the required supplies. Cost-wise, it may lead to an increase by 30%, i.e., as against the present average cost of Rs. 75 to Rs. 80 per 1000 cheque forms, the manufacturing cost would be go to Rs.100/-per 1000 forms. However, with the standardisation in size the quantity of the paper will be rationalised leading to some saving. Also banks could consider doing away with the stubs i.e. counter-foils and provide space for entering details of cheques on front or back cover. This could reduce cost by 10% to 15%.
- (ii) As regards the size, whereas in USA cheques of 7 or 8 different sizes are used, in West Germany cheques of only one size are used. Lower the number of sizes, lesser the adjustments required on machines. Since the machines will have to be imported in the initial stages, we would like to have as minimal adjustments as possible on such machines. Also, from the point of view of uniformity in handling and processing we feel that in India we should have cheques in two sizes as under :
 - (a) Small size cheques of dimensions $6\frac{1}{2}$ " X $2\frac{3}{4}$ ". These forms could be used for Savings Bank Accounts, personal Current Accounts and Rupee Travellers Cheques, Gift Cheques etc.
 - (b) Large size cheques of dimensions 8" X $3\frac{2}{3}$ " could be used for Corporate Current Accounts, Bank Drafts, Dividend Warrants, etc.

(iii) As regards the colour, type of printing, insignia etc., detailed instructions have been worked out and are contained in Annexure 3. Bringing in use of standardised cheque forms is a long drawn process but unless it is accomplished, it will not be possible to resort to any mechanisation/computerisation. Considering this, and also the plan of implementation in phases to cover metropolitan cities of Bombay, Madras, Delhi and Calcutta in the first phase, it is felt that we may suggest to all the banks to start using the cheques of standardised sizes and quality in these four metropolitan towns by 1st January 1984. The cheque forms presently supplied to branches in these cities could be diverted by the banks to their upcountry centre branches and thus any wastage could be avoided. If banks start issuing cheques with the revised sizes and quality from 1st January 1984 we could hope that by July 1984 atleast 70% to 80% cheques in circulation at these metropolitan centres would be in the revised form. Arrangements will also have to be made to ensure that 'drafts' drawn on these city branches are of Standard size.

(iv) On the availability of the cheques of standard sizes and quality, we have interacted with the leading cheque printers in India. They are :

- (i) India Security Press, Nasik
- (ii) Security Printers of India Private Ltd., Kanpur.
- (iii) Calcutta Security Printers Ltd., Calcutta.
- (iv) Manipal Power Press, Manipal

All the printers were made aware of the requirements and quality specifications. It seems that they could provide the required supplies in time. India Security Press which supplies security forms including cheque books to Government departments and Reserve Bank and partially to State Bank Group are also in the process of gearing up their machinery and acquiring new ones which will enable them to supply required forms in due time.

(2) Printing of information on the instruments in computer intelligible language

As stated earlier, information such as RBI no. or clearing house no., bank no., branch no., account no., and amount will have to be printed on the cheques in computer intelligible language which is either MICR or OCR. Also, we have to specify the format of such information and the font to be used.

(i) The first question to be decided in this connection is choice of technology, i.e., MICR or OCR. We have gone into the comparative merits of both OCR and MICR systems and studied these at length. A comparative analysis of these two systems is placed at Annexure I. Basically, MICR uses ink containing iron oxide that gets magnetised when processed by computer. Therefore, in MICR system, extraneous writing on the cheque form or rubber stamping as also folding does not have impact on reading. Again MICR is a proven technology used in USA, UK, Australia, Canada, Hongkong, Japan and Singapore. The computer support software for MICR is fully developed and there is wide choice for MICR readable machines. As against this the OCR although is a later technology is more sensitive to human errors. Its advantage is that it can accept ALPHA characters. There are, however, certain constraints in use of OCR inasmuch as it being read by optical scanning, any extra marking on the instrument such as rubber stamping, human writing in the 'Read Band' can disturb the read functions. We, therefore, feel that we in India

should go in for MICR technology only. Also, the font preference is for "E 13 B" which is more popular one and used in USA and UK. This preference is based upon availability of large number of machines capable of processing it, and universality of its use.

- (ii) The printing of cheques with MICR encoding will have two aspects. As stated earlier the particulars such as clearing house number, bank number, branch number, account number and amount have to be printed in MICR on the cheques. Of these, at the printing press which supplies the forms, the first three fields viz., clearing house number, bank and branch code will be printed. The remaining two, viz., account number and amount, will have to be printed at the branch issuing/processing the cheques. Therefore, facilities for printing the first three fields on the cheques at the printing press have to be available. We had extensive discussions on this matter with the printing presses viz., India Security Press and Calcutta Security Printers. Both the presses have indicated that they are willing to go in for the machines required for this purpose. M/s. Calcutta Security Printers have a Swedish Collaboration and they are doing some work in the MICR area for export, albeit on a very small scale. As regards India Security Press, the General Manager had several meetings with us and also with M/s. Bradbury Wilkinson, renowned cheque printers in U.K., who are prepared to offer consultancy to India Security Press in this area. A proposal in this regard has already been submitted which is under scrutiny by the Government. Since India Security Press is the supplier for Government as well as Reserve Bank of India, it would be desirable that they acquire necessary equipments and expertise in as short a time as possible.

(3) Equipments required for cheque processing

- (i) As has been stated earlier, for cheque processing on the scale envisaged, suitable equipments as are used in USA, UK and other Western countries will be required. These equipments fall into two categories namely encoders and reader-sorters. An encoder is an electronic device which is available in the form of a compact table-top unit with a data entry facility whereby numeric data can be keyed in and such data will be encoded in a specified type set i.e. transferred on the cheque form in magnetic ink. Special features such as proof facility, endorsement, and bank stamping are also available. Whereas the encoders print required information in MICR font on the cheques, reader/sorters are able to read encoded information, process it and also physically sort the cheques based on the information read. It has been stated earlier that on each cheque we will have five different types of information such as clearing house number, bank number, branch number, account number and amount. While first three will be printed in MICR at the printing press itself, the remaining two viz., account number and amount will have to be encoded (i.e. printed in MICR) at bank branches. Of these two again, account number will be printed while issuing the cheque books to the customers. Amount in rupees will, however, be encoded for processing the cheques to be forwarded for clearing settlement. For this process the 'encoder machines' are required. These are desk top machines more like a combination of calculators and electrical typewriters, using E 13 B font. The amount or any other information of the code line can be encoded on these machines and simultaneously a listing of the cheques so encoded is made available with batch/grand totals. On certain of the encoders it is possible to simultaneously place endorsement or clearing

stamp on the reverse/obverse of the cheque. Encoders are manufactured by many reputed companies in UK/USA, the main amongst them are NCR, Burroughs, Altos, Olivetti, IBM, CDC and so on. The price of encoders in USA ranges between US \$ 1,700 and US \$ 3,500.

- (ii) On assumption that we have to introduce mechanised cheque processing in the first phase in four metropolitan cities of Bombay, Delhi, Calcutta and Madras where there are 2500 branches of commercial banks, the facility for encoding will have to be made available for these branches. It may not, however, be necessary to provide encoder at each of the branches inasmuch as such machines can be shared by a group of branches wherever convenient. Further, we recommend that Clearing House may provide facilities of encoding/sorting of cheques to the smaller banks/branches in respect of whom purchase of such machines on their own may not be economically feasible. On an average, we recommend that one machine should be supplied for a work load of about three to five hundred cheques. Although the output would depend upon the speed of individual operator, on a machine we could encode 300/400 cheques an hour. Keeping in view the time available in a clearing cycle and also the need for machine back up, etc., the above norm has been recommended. On this basis it is estimated that we would require between 900 to 1000 encoders to be used by branches of banks in these four centres. In the model we are proposing, it is also envisaged that facility will be made available at the clearing houses for encoding and sorting for such of the banks who do not have the machines. Taking this into account, at the four cities, therefore, around 80 to 100 encoders will have to be provided for the clearing houses. Thus the total requirements of the encoders for the clearing system in its first phase for the four metropolitan cities could be around 1000 units at an approximate cost of US \$ 2.5 million in foreign exchange.
- (iii) The second series of machines required are reader/sorters. These are the machines which read the encoded cheques, sort them bank-wise/branch-wise or as directed. These machines come in different forms and with different speeds. The faster machines that accomplish sorting at a rate of over 2000 cheques in a minute require support of large frame computer system. While the slower ones having sorting speed upto 400 cheques a minute can come as 'stand-alone' units or supported by micro-processor based systems. Considering our work-load and number of cheques processed, we are of the opinion that, to begin with, we should go in for slow speed sorting machines and have a combination of stand-alone and micro-processor based equipment. It is also considered desirable that major banks who have workload of above 10,000 cheques per day may go in for these units on their own, whereas facilities for sorting of cheques of smaller banks/branches whose work-load is less than 10,000 cheques, may be provided at the clearing houses. On this basis we feel that 50 to 75 reader/sorters of different speeds would be required the cost of which would work out to about US \$ 2 million in foreign exchange.
- (iv) Broad features of various machines available, their make and price ranges, etc., are given in Annexure 2. We have also gone into the question of availability of the equipment, servicing facilities and an eventual manufacture thereof in India. In view of the fact that this would be a continuing requirement, we cannot rely on imports ad-indefinitum. The major manufacturers of these equipments abroad are NCR, Burroughs, CDC, IBM

and Altos. We had discussions with the representatives/associates of these manufacturers about their capability and willingness to go in for manufacturing of these equipments viz., encoders and sorters in India in due course and also to provide service for imported units. Various companies have shown interest in undertaking manufacture of these machines and have submitted specific proposals in this regard which basically aim at starting manufacture of encoders in India in the next two/three years. Thereafter next phase would be manufacture of reader/sorters. On approval of the Report by Reserve Bank of India, proposals received from five companies in this regard would be forwarded to the Department of Electronics with a request to process them. Also, taking into account that none of these equipments are at present being manufactured in India, we will have to resort to import thereof for the first phase, during the next two years. We suggest that such import be permitted on the basis of actual user licences from such of the companies who agree to eventually manufacture these machines in India. The applications for issue of actual user licences, which would be cleared by the Chief Controller of Imports and Exports, could be routed through the concerned department of the Reserve Bank of India who will be looking after the implementation of this Report. The companies who have shown interest in supplying the initial requirements by importing them and providing necessary servicing facilities and also eventually take-up the manufacture of such units in the country in due course are as under :—

<i>Name of the Indian Company</i>	<i>The Company from which machines will be imported</i>
M/s. Tata Burroughs	Burroughs
M/s. Cash Register Co. of India Ltd.,	NCR
M/s. WIPRO Products Ltd.,	Altos
DCM Data Products	CDC
ORG Systems	Altos/Lundies

(v) Apart from the equipments, the system will require the import of MICR ribbons to be used on encoders and certain testing equipments for ensuring that MICR writing conforms to specified standards. On a rough estimate it appears to us that the total foreign exchange component of cost of the equipments etc., would run upto Rs. 5 crores i.e. US \$ 5 million approximately. Whereas we have broadly identified the various machines and manufacturers as detailed in Annexure 2, we would suggest that on the Reserve Bank of India accepting our recommendations, a Technical Committee comprising members from Department of Electronics, Reserve Bank of India, State Bank of India and Computer Maintenance Corporation may be set up to go into the final selection of the equipments to be imported. We recommend constitution of such a committee since, while the purchase of the equipments by individual banks would be at their discretion, we consider that there should be some standardisation/uniformity in the type of equipments acquired so that suitable indigenous maintenance/service capability could be established, in due course.

(4) Work Systems for Cheque Processing Application

(i) The computerisation of cheque processing will require to be supplemented by suitable work system design. It would be necessary to spell out a methodology that will have to

be broadly followed for achieving fast clearance of instruments; broad contours of the same are detailed hereunder :

- (a) Whereas the clearing houses presently established with computer facilities will continue to take care of local clearing, in respect of out-station clearing, the Reserve Bank of India will have to play a key role and provide necessary infrastructure and facilities for inter-bank adjustments and movement of cheques. The clearance of outstation cheques will have to be organised on the lines of USA/west germany where the Federal Reserve Bank provides this service to the banks. In the first phase when we will be introducing the system in metropolitan cities of Bombay, Delhi, Madras and Calcutta, the local banks would submit the outstation cheques to the Reserve Bank of India Clearing Department. They would then arrange for transport of the cheques overnight to the concerned centres by air, sort the cheques bankwise at receiving centre by using sorting machines and present them in the clearing. To illustrate, banks in Bombay would give all the cheques payable, say at Delhi, to the Reserve Bank of India clearing authority in Bombay by say about 5.00 p.m. every day. The clearing authority would send the changes by air to Delhi late in the evening. On receipt of the cheques at Delhi, the office of the clearing authority there would arrange to sort the cheques on machines installed thereat and present them for clearing settlement to concerned banks next day. A return time of one day would be permitted to member banks at Delhi and by the 3rd day cheques, if returned, would seek their way to Bombay. Barring these returns all other instruments will be deemed as paid. Thus, Bombay banks would get credit for the cheques on Delhi on the 4th day. Similar network would be established for criss-cross movements between these four cities thereby enabling outstation cheque clearing within 3-4 days.
- (b) Also, with the sorting facilities established in-house, bigger banks can use the clearing system effectively by organising suitable in-house arrangement for inter-branch cheque clearance. The cheques drawn on and collected by different branches of the same bank within the city could be processed on the machine and settlement lists generated indicating the net amount in favour or against each branch and entries passed in respect of the net amount only. A suitable return discipline could be stipulated for return of such cheques. This would be something like clearing house within the bank itself for its own branches. Such arrangement would bring down the number of entries in inter-branch account substantially.
- (c) The inter-bank clearance should also be extended to chequeless transfers on the lines of CHIPS. The payments to be made by one bank to another on account of remittances, large inter-bank settlements, etc., could be keyed-in on terminals installed in each bank which could be connected to the clearing house system. As this would need communication lines and till such time this facility is available, the data could be recorded on a computer compatible media, say a floppy disc, which could be taken to the clearing house. This would obviate the need to list and reconcile several entries and cut down the time taken in the clearing house to enter the data once again for processing in the Clearing house computer. The Reserve Bank of India clearing authority should expeditiously move in this area as it would bring down paper work and simultaneously expedite interbank payments.

- (d) The clearing authority may, within 6 months to a year of establishing the inter-city clearing, move towards establishing GIRO or credit clearing. The broad principles of GIRO and work procedure therefor are contained in Chapter V. It is felt that with the introduction of credit clearing, the payments would be expedited and the customer service improved considerably.
- (e) It may be recalled that at several forums, there has been a suggestion that banks should, in metropolitan centres and other major cities, open service branches or independent clearing departments which could be delinked from the main branches. Indian Banks' Association has also suggested to the banks, that banks should open such service branches located in close proximity of the clearing house which could exclusively handle the clearing work. Operations in these branches/clearing departments should be computerised. We recommend that banks take expeditious steps to establish such service branches. We would also request Reserve Bank of India to grant the necessary licence to banks for opening of such non-banking branches early.

(5) Infrastructural Arrangements

- (i) The Committee on Customer Service in Banks, when they raised this issue, had recommended setting up of a National Clearing Authority for undertaking this work. The concept of national clearing envisages that an independent authority be set up who would be fully responsible for this work. It would have independence of action and being not inhibited by legacies, old cultural constraints, etc., it could break new grounds to achieve the desirable. Whereas this concept is welcome, there are few other aspects that require to be gone into. Clearing is a basic activity of the banking institutions and its settlement process has direct impact on banks' balances with the Reserve Bank of India. A close linkage with Reserve Bank of India is, therefore, very necessary in the process. Also when we are attempting a large scale change in the cheque processing system that would have a far reaching impact on the banking system itself, we are afraid that in the implementation stage a number of small and big hurdles are likely to come up. For overcoming these and also leading the banks on the right path, authority of the Reserve Bank of India behind such an endeavour would be an absolute must. Whether an independent authority can bring about such a change in the banking scene, is a matter that leaves some doubts. Also, the time element in the process is an important aspect. An independent National Clearing Authority will have to be created by an Act of Parliament as it will have to be entrusted with statutory powers etc. and this could be a long drawn process inasmuch as detailed thinking on the structure, permissible business, financial and other powers, pattern of financing, etc., will have to be gone into before drafting the 'Act'.
- (ii) We have, therefore, gone into the details for both the alternatives at length and considering merits and demerits and also keeping in mind the time dimension for the exercise, we are of the view that as the reform that is being thought about is of a substantive nature, it would require strong support from the central banking authority. Therefore, to begin with, it would be advantageous to have this responsibility entrusted to the Reserve Bank of India. We would suggest that Reserve Bank of India should have a Department of

Clearing Management to be fully responsible for the function and implementation of this new methodology of cheque processing and take steps so that the procedure can be introduced, to begin with in major four metropolitan centres to cover over 50% of the national Clearing volume. This is the first phase of implementation and in the next phase when the procedure is to be extended to state capitals, organisation of 'grid' which the Committee on Customer Service in Banks had in mind should be considered. When we graduate to that level the work may have grown significantly and will perhaps call for a separate organisation. We, therefore, recommend that to begin with Reserve Bank of India should provide necessary infrastructure in the form of creation of a suitable Clearing Management Department. They could think of a separate authority after the scheme enters second phase when 'grids' are to be organised, i.e. say after 3 to 5 years of implementation. This department in Reserve Bank of India should be a Central Office department with its offices in the four metropolitan centres. The department should look after the local as well as outstation clearing arrangements at these centres and would need a staff of 20-25 officers and about 50-60 assistants including machine operators. etc., As regards space, the offices can utilise the existing clearing house premises; however, they would need to arrange for additional space particularly at Bombay.

(iii) The specific functions which the new Department should undertake are :—

- (a) To look after the work of clearing operations in the country and more specifically at Bombay, Delhi, Madras and Calcutta. This would encompass both local and outstation clearing. They should be responsible for running of the computer based systems at these centres.
- (b) To take steps as necessary to implement the recommendations of the Group such as undertaking dialogues with banks, Government Departments, employees unions etc. to clarify various points and to provide information relating to various matters and also seek co-operation and involvement of various parties. The Department should bring out leaflets and booklets on various aspects of the work for information and reference purposes. They should also organise seminars/workshops to bring about awareness about the system which is very essential for successful implementation.
- (c) The Department should issue directives with the approval of the concerned authorities in Reserve Bank relating to use of standardised cheque forms from specified date and months and monitor progress of implementation. The Department should also help banks in this process by interacting with printing press and by providing guidance on testing system, etc.
- (d) The Department should arrange for organising a committee of experts as stated in paragraph 4.5 (3) (v) for finalising the selection of equipment to be imported. This committee as stated earlier should comprise of officers of Department of Electronics, Reserve Bank of India, and the Computer Maintenance Corporation. It would be necessary for the Department to interact with Department of Electronics to bring about policy decisions relating to import of equipments and issue of licence for manufacturing of the same in India in a short time. The Department may also take part

in the process of issuance of actual user licences for the banks for import of equipments; this involvement will relate to certification of need for the equipment.

- (e) The Department should arrange for all the work relating to outstation clearing such as arrangements for air lifting the cheques and sorting at different centres and presentation in clearing. They should draw suitable return clearing discipline which should be followed by banks. The Department should finalise working arrangements with Banking Departments of Reserve Bank of India relating to passing of vouchers for credit/debit of bank accounts on account of clearing settlements.

These are some of the major functions that the Department will have to take up. A detailed list will have to be drawn up in due course. Generally, the Department would need to take up all the work that is required for introducing the cheque processing system in the country in a planned manner.

(6) The time schedule for implementation and other matters like premises, expenditure, etc.

- (i) Considering the criticality of the problem and also the ever expanding volume of cheque clearing in the country, we are of the opinion that we have to move expeditiously in this matter. We would, therefore, feel that working to a specific time schedule in implementing the revised system, at least in four metropolitan cities of Bombay, Calcutta Delhi and Madras by July 1984, would be an ideal target to go about. Although the task is a difficult one and meeting 1st July 1984 deadline would appear to be tall order, we are recommending it. In any case, the project should not be delayed beyond January 1985 and this could happen if we work with 1st July 1984 as target date.
- (ii) To achieve this objective, the essential step is to create infrastructure in Reserve Bank of India. We would recommend that the Department recommended by us may please be brought into being as soon as possible and be asked to start the work in right earnest.
- (iii) The first task of the Department would be introduction of standardised cheque forms in the four metropolitan cities. We would recommend that banks be asked to bring the standardised cheque books into use by 1st January 1984. Of course during early months, the customers would continue to use old cheque forms but we anticipate that by July 1984, 70-80% of the cheque forms in use would be in the revised form. In the initial stages, therefore, it may be necessary for banks to continue manual processing of non-MICR cheques simultaneously with machine sorting, although to a reduced extent. In due course, however, the machine would take over the total cheque processing work.
- (iv) The Department of Reserve Bank entrusted with the function of implementing the system, will also have to ensure that machines are brought in and installed by April-May 1984. They will, therefore, have to move fast with the Department of Electronics to finalise the selection and importation procedure. We understand that it should be possible to get the required number of imported machines by this date without much difficulty.
- (v) The problem in regard to space requirements particularly at Bombay would also need to be attended to on a priority basis. The Department should, in active consultation of Premises Department of Reserve Bank of India acquire a suitable area of about 10,000 sq. ft. for the purpose.

- (vi) As regards the cost for providing infrastructure, the Group feels that the infrastructural arrangements required at the Clearing House be provided by the Reserve Bank of India, whereas the operating cost could be shared by participating banks in proportion of the number of cheques cleared by them. As regards outstation cheques the actual expenses to be incurred by the Reserve Bank of India will have to be worked out and charged to banks; these charges will have to be on the basis of per instrument cost and not on the basis of amount of cheques cleared. It is expected that the cost would work out to somewhere between Re. 1 to Rs. 2 per instrument which is substantially lower than that charged at present. The banks would then be in a position to rationalise their service charge rate for cheque collection.**
- (vii) In respect of outstation cheques, since the credit will be given after clearance at the other centres i.e. on 3rd or 4th day of presentation, the Reserve Bank will not be required to place any funds for supporting function.**

CHAPTER V

CREDIT CLEARING OR GIRO — CONCEPT, UTILITY AND MODALITIES FOR IMPLEMENTATION

5.1 Credit clearing or GIRO is a concept developed by British postal system in 60s and has been operating successfully ever since. It has been adopted by West Germany and countries in the Continent. Recently, however, with the advent of sophisticated computer system and with fast and fidel communication network GIRO is being replaced by Electronic Funds Transfer or EFT.

5.2 Credit clearing was developed basically to expedite remittance of funds from one banking account to another. Traditionally, whenever any individual or corporate entity wanted to transfer a certain sum of money to another individual or corporate entity, they would issue a cheque in favour of that party. The receiver would then deposit the cheque in his banking account. The collecting bank would put the cheque through clearing system and wait for payment thereof before the proceeds are allowed to be used by the payee. This process is long drawn and results in delays in remittances.

5.3 Since the volume of cheques have been on the increase, the British Postal Service thought of an alternate mode which could be faster and titled it as 'Credit Clearing' or GIRO. Under the system whenever an individual or corporate entity wants to pay a certain sum of money to another individual, he conveys instructions to his bank by filling a standard form which is known as GIRO form. The form instructs the bank to pay a certain sum of money to the individual named therein by credit to his account maintained at one of the clearing bank branches anywhere at the centre/country. On receiving the GIRO form the bank would debit the party's account and validate the GIRO form. The GIRO form would then be presented to the bank which has to receive the payment in the clearing. It would then travel to the concerned branch of the bank and the transaction would be completed as soon as it is received at that branch because in this case there is nothing like return. In effect, therefore, half of the time-frame is eliminated. The accounting of GIRO slips is done through clearing system and the settlements between banks is also done together with other clearing adjustments. However, in the accounting the GIROs are given as credits as opposed to cheques which are debit items.

5.4 In banks, prior to introduction of GIRO and even now, there is a system of mail transfers or issue of drafts when remittances have to be made. Primarily, issue of mail transfers are restricted to branches of the same bank and for inter bank credit remittances there is no methodology other than issue of cheques and clearance thereof through clearing houses or special inter-bank arrangements. The GIRO has filled that void and has an impact on cheque volume.

5.5 GIRO can be found as efficient and useful when against one debit, number of credit items are to be raised. For example, if a company has to pay salaries of their say 200 officers, normally they would have to issue 200 cheques which would first be received by the concerned officers and

then deposited by them individually to the credit of their account with the banks where they maintain accounts. In GIRO system, the paying company would submit a list of payments to be made to their banker who in turn would release 200 GIRO slips and push them through clearing. This would in effect expedite the payments and also reduce the use of cheque forms which is a security document.

5.6 The design of GIRO forms is important. Usually they are made in quadruplicate. First and second copies of GIRO go for clearing, the third copy goes as advice to the party who has asked for payment to be made and the fourth one is retained as office copy as authorisation for debit of that account. On receipt in clearing the receiving party's account is credited on the basis of original copy where it serves as a voucher while the second copy is treated as an advice to the party whose account is credited.

5.7 In India there is large scope for introduction of GIRO inasmuch as the time required for return discipline has been increased due to expansion of branch network and on an average it takes 4 days for clearance, of which half the time is for 'returns' disposal. Again, because the cheques are not readily acceptable in society as a culture and therefore transactions made through medium of cheques are withheld till clearance of the cheques is advised by the banks. In this environment, because the GIRO is only a credit advice and there is no risk of returns therein, introduction thereof would popularise transactions through banking accounts. Also GIRO can prove to be of much use to corporate sector. In respect of outstation clearance too GIRO can play very useful role.

5.8 The concept of GIRO is however new to this country and particularly when cheques are yet to be very popular as a medium of payment there could be some apprehension about the Indian community accepting this means of banking transactions readily. We would, therefore, feel that whereas clearing authority has to take steps to implement and popularise the use of GIRO, the introduction thereof would require substantial amount of selling and education. We, therefore, suggest that six months or a year after implementation of computerised cheque processing the clearing authority should go into this area. Prior to that it would be necessary to work out detailed arrangements such as designing of GIRO forms and more particularly publicising the system. The IBA and other commercial associations/forums should provide a platform in this knowledge dissemination. This could be done by publication of articles in economic journals/newspapers, issue of leaflets on concept of GIRO and also educating bank staff in this regard. Only then a beginning could be made in this area.

5.9 As has been stated earlier, in West Germany because of technological advances, GIRO is being replaced by EFT. That perhaps is a step in moving towards a chequeless society. In India, although it seems to be a distant future, while designing GIRO system one should not lose sight of such a happening.

CHAPTER VI

SUMMARY OF RECOMMENDATIONS

1. With the growing number of cheques in circulation which have already reached a level that cannot be handled manually, and with the prospects of their rapid growth on account of opening of more branches of banks and further spread of banking habits, etc., we envisage that the problem is going to multiply in years to come. (4.2)
2. It is therefore necessary to take immediate steps to remedy this situation, and on overall considerations, we recommend that we have to change over to the 'Item Processing System' i.e. the process of sorting and listing the cheques with the help of machines, as adopted all over the world to be able to cope up with this problem. (4.3)
3. This system may have to be introduced in phases. In the first phase we should cover four metropolitan cities of Bombay, Delhi, Madras and Calcutta. In second phase it should be extended to all state capitals/important centres and thereafter in final phase we should move to 'GRID' concept as suggested by the Committee on Customer Service in Banks. (4.3)
4. Standardisation of cheque forms is a pre-requisite of any mechanised cheque processing system. (4.5)
5. Standardisation is required not only regarding size but also for paper quality. The cheques should be printed on paper that will stand mechanical stress as well as enable smooth movement on machine rollers. It would, therefore, be necessary as a first step for the banks to change to use of superior quality paper viz. of 95 gm/sq. metre thickness with smooth grain. (4.5)
6. Cost-wise, it may lead to an increase by 30%. However, with the standardisation in size, the quantity of the paper will be rationalised leading to some saving. Also banks could consider doing away with the stubs i.e. counterfoils and provide space for entering details of cheques on front or back cover. This could reduce cost by 10% to 15%. (4.5)
7. Since we are importing machines on which we would like to have as small adjustments as possible, and also from the point of view of uniformity in handling and processing we feel that in India we should have cheques in two sizes as under :
 - (a) Small size cheques of dimensions $6\frac{1}{4}'' \times 2\frac{3}{4}''$. These forms could be used for Savings Bank Accounts, personal Current Accounts and Rupee Travellers Cheques, Gift Cheques etc.
 - (b) Large size cheques of dimensions $8'' \times 3\frac{2}{3}''$ could be used for Corporate Current Accounts, Bank Drafts, Dividend Warrants, etc. [4.5(ii)]
8. We may suggest to all the banks to start using the cheques of standardised sizes and quality in the four metropolitan towns by 1st January 1984. The cheque forms presently supplied to branches in these cities could be diverted by the banks to their upcountry centre branches and thus any wastage could be avoided [4.5 (1)]

9. Arrangements will also have to be made to ensure that 'drafts' drawn on these city-branches by branches of banks all over the country are of Standard Size. [4.5(1)]
10. Information such as RBI number or Clearing House no., bank no., branch no., Account no., and amount will have to be printed on the cheques in computer intelligible language in MICR or OCR. We recommend that in India we should go in for MICR technology [4.5(2)]
11. The font preference is for "E 13 B" which is more popular and used in USA and UK. This preference is based upon availability of large number of machines capable of processing it, and universality of its use. [4.5(2)]
12. The printing of cheques with MICR encoding will have two aspects. At the printing press which supplies the forms, the first three fields viz., clearing house number, bank and branch code will be printed. Therefore, facilities for printing the first three fields on the cheques at the printing press have to be available. [4.5(2)]
13. Since India Security Press is the supplier for Government as well as Reserve Bank of India, it would be desirable that they acquire necessary equipments and expertise at as short a time as possible. [4.5(2)].
14. The remaining two viz., account number and amount will have to be encoded (i.e, printed in MICR) at bank branches. For this process the 'encoder machines' are required. [4.5 (3)].
15. It may not, however, be necessary to provide encoder at each of the branches inasmuch as such machines can be shared by a group of branches. On an average, we recommend that one machine should be supplied for a work load of about three to five hundred cheques. [4.5(3)].
16. Further, we recommend that Clearing House may provide facilities of encoding/sorting of cheques to the smaller banks/branches in respect of whom purchase of such machines on their own may not be economically feasible. [4.5(3)]
17. Total requirements of the encoders for the clearing system in its first phase for the four metropolitan cities could be around 1000 units at an approximate cost of US \$ 2.5 million in foreign exchange. [4.5(3)].
18. We are of the opinion that to begin with, we should go in for slow-speed sorting machines and have a combination of stand-alone and micro-processor based equipment. Major banks who have workload of above 10,000 cheques per day may go in for these units on their own, whereas facilities for sorting of cheques of smaller banks whose work-load is less than 10,000 cheques, may be provided at the clearing houses. On this basis we feel that 50 to 75 reader/sorters of different speeds would be required, the cost of which would work out to about US \$ 2 million in foreign exchange. [4.5(3)].
19. In view of the fact that this would be a continuing requirement, ~~we cannot~~ we cannot rely on imports ad-indefinitum. We suggest that such import be permitted on the basis of ~~actual~~ user licences from such of the companies who agree to eventually manufacture these machines in India. [(4.5(3)]
20. Apart from the equipments, the system will require the import of MICR ribbons to be used on encoders and certain testing equipments for ensuring that MICR writing conforms to specified standards. [4.5(3)].

21. On a rough estimate it appears to us that the total foreign exchange component of cost of the equipments etc. would run upto Rs. 5 crores i.e, US \$ 5 million approximately.
22. We would suggest that on the Reserve Bank of India accepting our recommendations, a technical committee comprising members from Department of Electronics, Reserve Bank of India, State Bank of India and Computer Maintenance Corporation may be set up to go into the final selection of the equipments to be imported. [4.5(3)]
23. The computerisation of cheque processing will require to be supplemented by suitable work system design. [4.5(4)]
24. With the sorting facilities established in-house, bigger banks can use the clearing system effectively by organising suitable in-house arrangement for inter-branch clearance. (4.5(4))
25. The inter-bank clearance should also be extended to chequeless transfers on lines of CHIPS. The Reserve Bank of India clearing authority should expeditiously move in this area as it would bring down paper work and simulataneously expedite interbank payments. [4.5(4)]
26. We recommend that banks take expeditious steps to establish Service Branches or independent clearing departments which could be delinked from the Main Branches and would exclusively handle the clearing work. Operations in these branches/clearing departments should be computerised. We would also request RBI to grant the necessary licence for opening such non-banking branches early. [4.5(4)].
27. The concept of National Clearing envisages that an independent authority be set up who would be fully responsible for this work. We are of the view that as the reform that is being thought about is of a substantive nature, it would require strong support from the Central Banking authority. We, therefore, recommend that to begin with Reserve Bank of India should provide necessary infrastructure in the form of creation of a suitable Clearing Management Department. A separate authority could be thought of after the scheme enters second phase when 'GRIDS' are to be organised, i.e, say after 3 to 5 years of implementation. [4.5(5)]
28. The specific functions which the new Department should undertake are :—
- (i) To look after the work of clearing operations in the country and more specifically at Bombay, Delhi, Madras and Calcutta. This would encompass both local and outstation clearing.
 - (ii) To take steps as necessary to implement the recommendations of the Group such as undertaking dialogues with banks, Government Departments, employees unions etc.
 - (iii) To issue directives with the approval of the concerned authorities in Reserve Bank relating to use of standardised cheque forms from a specified date and monitor progress of implementation.
 - (iv) The Department should arrange for organising a committee of experts for finalising the selection of equipment to be imported.
 - (v) The Department should arrange for all the work relating to outstation clearing such as arrangements for air lifting the cheques and sorting at different centres and presentation in clearing.

(vi) Generally, the Department would need to take up all the work that is required for introducing the cheque processing system in the country in a planned manner. [4.5(6)]

29. We feel that working to a specific time schedule in implementing the revised system, at least in four metropolitan cities of Bombay, Calcutta, Delhi and Madras by July 1984, would be an ideal target to go about. [4.5(6)]

30. We would recommend that the Department recommended by us may please be brought into being as soon as possible and be asked to start the work in right earnest. The first task of the Department would be introduction of standardised cheque forms in the four metropolitan cities. Banks may be asked to bring the standardised cheque books into use by 1st January 1984. [4.5(6)]

31. The Department should ensure that machines are brought in and installed by April-May 1984. [4.5(6)]

32. The Department should, in active consultation of Premises Department of Reserve Bank of India, acquire a suitable area of about 10,000 sq. ft. for its use. [4.5(6)]

33. The infrastructural arrangements required at the Clearing House be provided by the Reserve Bank of India, whereas the operating cost could be shared by participating banks in proportion of the number of cheques cleared by them. [4.5(6)]

34. As regards outstation cheques the actual expenses to be incurred by the Reserve Bank of India will have to be worked out and charged to banks; these charges will have to be on the basis of per instrument cost and not on the basis of amount of cheques cleared.

35. The clearing authority may, within 6 months to a year of establishing the inter-city clearing move towards establishing GIRO or credit clearing. [4.5(4)] Prior to that it would be necessary to work out detailed arrangements such as designing of GIRO forms and more particularly publicising the system. The IBA and other commercial associations/forums should provide a platform in this knowledge dissemination. [5.8].

Sd/-
Dr. Y. B. Damle

Sd/-
Shri V. P. Sawhney

Sd/-
Shri U. K. Sarma

Sd/-
Shri K. Subramanian

Sd/-
Shri C. K. Bapiraju

Bombay,
25th August 1983.

**CHEQUE ENCODING TECHNIQUES — MICR AND OCR —
A COMPARATIVE STUDY**

For writing significant information on the cheque to make it readable by computer two techniques are available. They are Magnetic Ink Character Recognition (MICR) and Optical Character Recognition (OCR). The brief details of these as also the relative merits thereof are discussed hereunder.

2. MICR was developed in United States in the year 1959 and has been used by American banks since early 1960. In MICR as well as in OCR, at a distance $\frac{1}{4}$ " above the bottom edge of instruments (i.e. cheques, drafts etc.) $\frac{5}{8}$ " width clear band is kept for writing relevant information in computer readable form, such as Federal Reserve no., bank no., branch no., account no., and amount. There are 45 characters kept for all this information. MICR printing is done in ink which contains iron oxide. The 'letter type' known as 'FONT' is also specified. When the instrument is to be read by computer it comes under electrical field in computer read area. Then the MICR printed characters get magnetised and generate a specific wave form for each number (i.e. from 0 to 9) and thus computer can identify and read the particular number. Since the reading is by magnetisation process, the colour of the cheque form, extraneous writing by ordinary ink, rubber stamping or moderate folding does not affect the read process. This technology however has limitations inasmuch as it can only take numerical information.

3. MICR encoding is used in USA, UK, Canada, Australia, France and Latin American countries. As regards the font there are two basic types viz. E 13 B and CMC 7. The latter one, viz. CMC 7, is used in France, Switzerland and some Latin American countries. All others use E 13 B. Computer equipment for reading MICR is fully developed and machines of different speeds and characteristics are available for reading MICR encoding.

4. Optical Character Recognition or OCR is another technique and is of recent origin. In this process, the printed information (in any ink) in the Read Band area of the cheque is recognised by measuring the brightness of the paper at each point in the specified area. In a way, therefore, it is similar to reading by human eye. However, because of the method of processing itself OCR reading is affected by background colour, overwriting or folding to an appreciable degree. On the positive side the reading is faster as it involves movement of a beam of light for reading purposes. West Germany is mainly the country where OCR technology is used for cheque processing. (Switzerland and part of Norway also use OCR). We had studied this process and felt that appreciable degree of discipline at national level is required to implement a process of this type. The cheques have to be cleaner with no overwriting in 'Read Band' area and folding has to be minimum or else rejections would be very high.

5. On balance it appears that in India when we are going in for computerised cheque processing for the first time and when the physical condition of instruments is not so very good, MICR seems to have a better chance for succeeding. There could be lower reject rate for MICR as it has larger tolerance to indiscreet use of cheques by public and also the machine support for this technology is wide and fully developed. E 13 B font which is recommended is widely used. It may also be noted that recently machines are being developed which would read E 13 B in OCR mode i.e. even if the cheques are printed in MICR the machine would read that font if required in OCR mode. This increases acceptance rate of the instruments.

MACHINES FOR CHEQUE PROCESSING

I) ENCODERS

<i>Sr. No.</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Particulars</i>	<i>Price*</i>
1.	NCR Corporation U.S.A. (M/s. NCR Co. of India Ltd.)	7740—1500	Proof Encoder, with Endorser/Bank Stamp Option.	US \$ 1700 F.O.B.
2.	Burroughs Corporation, U. S. A. (M/s. Tata Burroughs Ltd.)	S 300	Single Pocket Encoder with MICR/OCR Option. — Throughput of 1000— 1500 documents per hour.	US \$ 1895 F.O.B. (ex-works)
		S 600	Ergonomic Single Pocket Document Encoder with MICR/OCR Option — 4 encoding line options — 128 K Memory — Endorser — Audit Printer — Throughput 1000-2000 documents/hour	US \$ 5460 F.O.B. (Ex-works)
3.	Alta Technology Inc. (M/s. ORG Systems)	ALTA PA 1300	Single Pocket Encoder with MICR/OCR and endorser/ option — Throughput 1000-1200 documents/hour.	US \$ 5000 F.O.B.
4.	U. S. Manufacturer (M/s. WIPRO Products)	Not specified	Single Pocket Proof Encoder with Endorser — Autofeed option — Programmable dual discharge hopper — Max. throughput of 2400 documents/hour	US \$ 4500
5.	Takachiho Koheki Co. Ltd.,	CODE + PLUS	Encoder with modular features, autofeed, programmable, 22 dpm encoding speed.	US \$ 2500— 3500 F.O.B.

* Prices given are unit prices subject to revision based on quantity required.

II) READER-SORTERS

<i>Sr. No.</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Particular</i>	<i>Price*</i>
(a) Low speed Stand Alone Type				
1.	Burroughs Corporation, U. S. A. (M/s. Tata Burroughs Ltd.)	S 3000	Intelligent Reader Sorter and Processor with encoding/ endorsing, autofeed facility and built-in computer — 96K Memory — In-line correction facility — 2 floppy disc drives — data communication facility — 350 LPM line printer — 24 Pockets (6-36 pockets possible — Speed of 120-240 DPM — Directed fine sort Software	US \$ 54,000 F.O.B.
		S 6000	Intelligent Reader-Sorter with encoding/endorsing, autofeed facility and built-in computer — 256 K Memory 6 MB dual Floppy disc — 20 MB Fixed DISC — Magnetic Tape Drive — 600 LPM line printer — terminals — 12/24/36 pockets — Speed of 545 DPM — Software for multiple/fine sort and report generation.	US \$ 80,380
2.	Lundy Electronic & Systems INC. U.S.A. (M/s. ORG Systems)	Lundy L9695- 100 IMRS	Intelligent Reader-Sorter with built-in computer — Speed of 750-1000 DPM reader/sorter — 11 pockets	US \$ 68,000 F.O.B. (estimated)

<i>Sr.No.</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Particular</i>	<i>Price*</i>
3.	U.S. Manufacturer (M/s. WIPRO Products)	Not specified	Multi-Media Reader-Sorter — Sorting/listing upto 12 categories — Modular up-gradability — 12 pockets up-gradable in modules of 4 — Speed of 400 DPM This model can also be used in conjunction with a computer system.	US \$ 45,000
(b) High Speed Stand Alone Type				
1.	Burroughs Corporation, U. S. A. (M/s. Tata Burroughs Ltd.)	B 9190-2	Reader-Sorter with Ink Jet (Non-Impact) Endorser, — 24 pockets (Maximum 32 pockets possible) — Item processing software — Speed of 1625 DPM — Can be used in conjunction with any Burroughs System in the following series : B 1900, B 29/39/4900, B 59/69/7900	US \$ 102,590
2.	NCR Corporation, U.S.A. (M/s. NCR Co. of India Ltd.)	7750—6000	Intelligent Reader-Sorter with — Self-contained computer 128K 2950, — Dual Flex Disc — 90 LPM Line printer — high speed sort — Additional Pocket modules (in groups of 4)	US \$ 18,320 US \$ 2100 per module
		6780	High Speed Reader Sorter with Central Processor and line printer — 10-40 pockets — Speed of 1200—1400 DPM	Not furnished

<i>Sr.No.</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Particulars</i>	<i>Price*</i>
		7750-2500	Reader-Sorter with Proof Encoder, Endorser, Autofeed High Speed Pockets Optional : Cassette Recoder Additional Pockets (in modules of 4 upto total 24 pockets + 1 Reject)	US \$ 10095 F.O.B. US \$ 1430 F.O.B. US \$ 2100 Per module F.O.B.
(c) Reader-Sorter connected to Mainframe Computer				
1.	NCR Corporation, U.S.A. (M/s. NCR Co. of India Ltd.)	T 8259-1000 Computer plus 7750-3000 Reader-Sorter	DDPS Controller with 128K Memory, 10MB Disc, 90LPM Printer, Console CRT Operator Station with MICR Reader, Endorser, Autofeed. Several such units can be connected to above computer System. High Speed Reader/Sorting Additional Pocket Modules in groups of 4.	US \$ 19,100 US \$ 7,700 per unit US \$ 2,100 per module
2.	Burroughs (M/s. Tata Burroughs)	Dual B 2925 Computer (1MB each) and shared system processor Plus B 9190-2 (4 nos.)	Dual host mainframe Computer System — 2MB memory — 1 card reader — 2 line printers (2000LPM each) — 2 Magnetic Tape Drivers — 3 130 MB Disc Drives — 11 terminals Reader-Sorter with endorser, off line sort option) — 24 pockets — speed of 1625 DPM	US \$ 533,620 US \$ 102-590 per unit

<i>Sr.No.</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Particulars</i>	<i>Price*</i>
3.	Magnetic Peripheral Inc. U.S.A. (Subsidiary of Control Data Corpn.) (M/s. DCM data products)	Galaxy/21 micro-computer interfaced with following reader-sorter models (developed by Scan Data, U.K.)	Indigenous, mini-computer, upto 1 MB Memory, 4 floppy disc, 34/54/70MB capacity discs, upto 4 Tape Drives, and supporting upto 16 Terminals	(Estimated) Rs. 15,00,000 to Rs. 20,00,000 (depending on precise configuration)
		2660 (low speed)	Reader-Sorter with endorser, 600 to 830 dpm speed	US \$ 34,000.
		2670 (medium speed)	Reader-Sorter with endorser	US \$ /60,000
		2690 (high speed)	Reader-Sorter with endorser, 1000-1400 dpm speed	US \$ 91,000

III Other Machines

1. Machines for Encoding of Account Number

M/s. Bradma of India Ltd.,	Mode 1270 (to be suitably modified for printing in magnetic ink)	Hand Operated machine specially designed for cheque book imprinting; has page lifting attachment and counter.
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2. Testing Machines

Quality Testing Equipment for Encoders, Readers/Sorters, etc. required for which manufacturers are yet to be identified.

1. Evaluation of Media (required by printers)

(a) Comparator	portable magnifying device equipped with graphic arts MICR reticle
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* Prices given are unit prices subject to revision based on quantity required.

<i>Sr. No.</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Particulars</i>	<i>Price</i>
			— enables precise determination of horizontal character spacing, skew, presence of excess amounts of dirt and wood pulp, etc. and to some extent paper quality.	
		(b) Paper Gauge Micrometer	Used to measure the caliper (thickness) of paper.	
2.	Evaluation of Encoding/Reading Equipment Performance by Banks			
		(a) Print and layout gauge	for checking position, skew, alignment, character location, etc.	
		(b) Ink film thickness gauge		
		(c) Signal level tester		
		(d) Stereoscopic microscope		

SPECIFICATIONS FOR CHEQUE FORMS PRINTING/CODE LINE ETC.

1. Introduction

1.1 For successful implementation of the National Clearing, it will be necessary to standardise cheque forms and paper in use, the MICR font, and field specification of data in code line.

In this annexure we have attempted to lay down the specifications for cheque forms, printing, code line, etc. It may broadly be mentioned that :

- (a) We have recommended use of two sizes of cheque forms only
- (b) The paper quality and grain will have to be improved so that cheques can stand fast, sorting strain
- (c) The encoding will be done using MICR technology. We will be using E 13 B font for the purpose.

2. MICR

2.1 The use of a magnetic ink code line on a cheque and electronic sorting machines which read this line call for close co-ordination between the banks and their printers. It is necessary that cheques must be standardised by specifying minimum and maximum widths and depths of cheque forms to ensure that they will pass through automatic equipment. Placement of certain particulars on the cheque must conform to prescribed standards and in such matters as ink coverage on the code line, impression and others, the cheques must be printed in certain tolerances.

2.2 When a cheque is drawn on a bank where electronic sorting is in operation, in addition to bank and branch numbers, customer's A/c. No. and where required the cheque number will also be printed.

2.3 The customer's account number can be printed by the printer or the bank itself by using an imprinting machine centrally or in the branches.

2.4 The next step which does not involve printers is the completion of the code line by entry of the amount of the cheque and sometimes a code to identify the type of transaction.

2.5 The cheque serial number, customer's account number and transaction code are in what is known as 'domestic' (or "on us") field and banks are free within the limits of these fields to utilise numbers of their own choice and to arrange them in accordance with the requirements of their own system. Measurable limits of positioning and quality of printing are essential in order that the cheques will be consistent and acceptable to the sorting machines.

* This Annexure has since been revised. The revised version is placed at the end of this report.

2.6 In a typical electronic sorter, the cheque is carried past a magnet which magnetises the coded characters as they go by, commencing at the right hand edge of each character. Therefore, the position of the right hand edge of the code grouping is a vital standard. It is, therefore, important that the characters printed in magnetic ink should be in the same area on every cheque. They must be within certain tolerances and they must be of a size, shape and condition instantly and completely recognisable by the machine.

2.7 The adoption of MICR requires cheque designs and printing techniques acceptable to all sorting machines. Nothing on the face of the cheque should interfere with the visual or magnetic reading of the code line which must always be in the same position. All this requires a greater degree of standardisation.

2.8 More details about the size of cheques, placement of the code line, density of the ink film are available in the subsequent paragraphs.

3. Principles of cheque design

3.1 Principles

- (i) By a glance, we should be able to readily recognise the correct amount.
- (ii) It should be possible to determine the name of the bank at a glance.
- (iii) The signature of the drawer should be easily located.
- (iv) "Date" or "bearer", "amount in figures" and "signature" should be grouped together on the right hand side of the the cheque forms.

3.2 Defined standards

(i) Size

Maximum length and height of

all instruments $8'' \times 3 \frac{2}{3}''$

Minimum —,— $6 \frac{1}{4}'' \times 2 \frac{3}{4}''$

N.B. It is recommended that we may adopt the above sizes of cheques for the the following :

For current A/c cheques and drafts $8'' \times 3 \frac{2}{3}''$

For Savings Banks A/c cheques
and Travellers cheques $6 \frac{1}{4}'' \times 2 \frac{3}{4}''$

(ii) Bank/Branch Sorting Numbers

The numbers allocated are to be indicated at the top right hand corner of the cheque in type of not less than 10 points size. This printing is unnecessary for fully MICR pre-encoded cheques.

(iii) Paper

Base sensitised paper — 95 grams/sq. metre $\pm 5\%$. Where possible the grain of the paper should run parallel with the base of the cheque. Embossed designs in the paper not acceptable.

(iv) Clear Band

A clear band $5/8''$ deep and extending the full length of the lower edge of the cheque should be reserved for printing the magnetic ink characters.

3.3 Special Problems in Designs

- (i) Crossing should be conspicuous and be placed as close as possible to the centre of the cheque. The crossing should not encroach upon the 5/8" clear band.
- (ii) Any printing of customer's name for the personalisation of cheques should preferably be adjacent to or above the signature and should not encroach on the 5/8" clear band.
- (iii) Perforation should be on the top left or top edge of the cheque.

3.4 Precautions

- (i) The minimum length of the cheque should be 6½" and the bottom 5/8" along with entire length of the cheque should be kept free of any magnetic ink printing other than the prescribed characters.
- (ii) In no circumstances may E 13 B characters be printed on the code line in ink without the magnetic quality.
- (iii) Cheques must be so designed that drawers are discouraged from encroaching on the clear band with seals, signatures or other writing which will interfere with magnetic reading in this area. Rubber stamping on the clear band should be avoided.

3.5 Encoding

The length of the cheque is divided into fields. Printing in magnetic ink should be within the specified boundaries of these fields. The fields are from left to right.

- Auxiliary domestic field for cheque serial numbers (most banks may not print this.)
- City/Bank/Branch field.
- Domestic field
- Amount field
- Transaction code (may or may not be printed).

Depending on each Bank's requirement, these fields can be encoded by the bank's printer or the customer's printer.

3.6 Folding of cheques

Because of the high operating speeds of the electronic sorters, folds can cause jams in the paper movement. Creases through the magnetic ink characters may also cause rejection and therefore folding of cheques should be avoided.

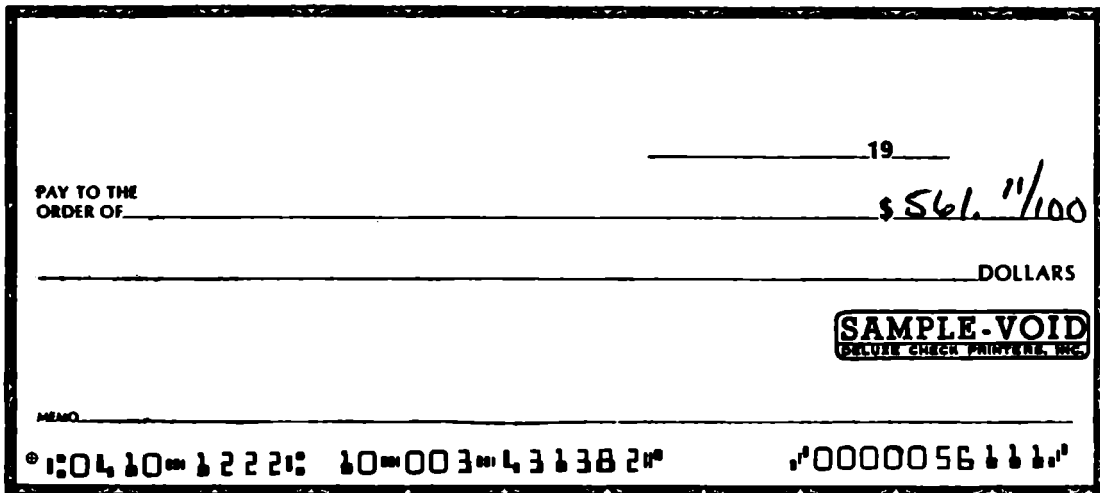
3.7 Borders and Background Tint

- (i) Borders can be printed in the 5/8" clear band as long as magnetic ink is not used.
- (ii) Normal background security designs in fugitive ink are acceptable but they should be on an unobtrusive nature.

3.8 Mutilations

Cheques which are mutilated or have attachments are liable to cause jams in sorters. Pins, adhesive tapes and stamps, heavy embossment caused by cheque writing machines, counterfoils should be removed.

4. Lay-out of Code line



4.1 Reference edges

Measurements concerning any element or space within the 5/8" band reserved for the MICR code line must be taken from right and bottom edge of the cheques. All horizontal dimensions are measured from the right edge and all vertical ones from the bottom edge.

4.2 The 5/8" Clear Band

The area in which MICR characters are to be printed measures a minimum of 5/8" from the bottom edge of the cheque and 6 1/4" from the right edge. No magnetic ink printing other than the prescribed characters should appear anywhere in this area.

4.3 The fields or areas of the code line

Top of the clear band is always 5/8" from the bottom edge.

Lower edge of the code line area should be 3/16" above the bottom edge of the cheque. The next 1/4" above provides the area where the code line appears. The remaining 3/16" remains clear.

4.4 The Amount Field

Boundaries : From 1/4" from the right edge of the cheque continuing left to 1 7/8" from that edge, the field is bracketed by two Amount Symbols.

The right edge of the Amount symbol appearing at the extreme right of this line must be 5/16" plus or minus 1/16" from the right edge of the cheque.

4.5 The Domestic Field

Boundaries : From 1 7/8" from the right edge of the cheque continuing left to 3 1/2" from that edge.

This field usually carries the transaction code and account number. The number of characters in an account number is limited by the number of digits to be used in a transaction code, the requirement of tolerance spaces between fields printed at different times and the number of digits which the equipment used to encode and read can handle in one field.

4.6 The City/Bank/Branch Field

Boundaries : From $3\frac{1}{4}$ " from the right edge of the cheque continuing to $5\frac{1}{8}$ " from that edge.

This part of the code line contains two groups of three digits each separated by a Dash Symbol. The left hand three digits refer to the City, the middle three digits refer to the bank and the right hand three digits refer to the branch.

The combined number is bracketed by a Bank/Branch Symbol 1* to the right and a Domestic symbol 11* to the left.

The right edge of the closing symbol of the Bank/Branch number may, therefore, be either $4\frac{15}{16}$ " \pm $\frac{1}{16}$ " or $4\frac{13}{16}$ " \pm $\frac{1}{16}$ " from the right reference edge.

5. Printing Tolerances

5.1 MICR printing is a matter of constant quality control. In matters of positioning the different fields, a gauge placed over a proof determined exactly the requirements of an area. In matter of size of characters and overall quality, a comparator provides an adequate check. To determine the proper amount of ink to ensure an acceptable reading by a sorting machine, a gauge may be used by printers which measures the amount of ink on the rollers. Printers should have a printing and lay-out gauge for checking position, skew alignment, character location, etc. This is simply a transparent screen which is placed over a cheque.

5.2 Tolerances in MICR

- (i) With the help of a viewer and its accompanying grid the various tolerance become measurable by the eye. The printing and lay-out gauge also provides visual check on positioning and in determining several tolerance requirements. The gauge also includes samples of MICR printer characters which are useful for comparison. When printing MICR characters the alignment of the bottom edge of any two adjacent numerical characters must not vary more than .007" within any one field. All fields must conform to the above limitation and still be within $\frac{1}{4}$ " area commencing $\frac{3}{16}$ of an inch from the bottom edge of the cheque. On the Dash and Domestic Symbols the same tolerance will apply to the horizontal center line of the character. The requirement for spacing between the MICR characters to conform to certain measurements can be checked on the transparent printing and layout gauge where a checking pattern permits visual verification. The ink is to be distributed uniformly within the outlines of each character. Conditions to be avoided include excessive squeeze-out, halo and other uneven deposits.
- (ii) Within the $\frac{5}{8}$ " band at the bottom of the cheque the MICR characters are printed, the following are the tolerances :
 - (a) Spots upto .003" \times .003" are acceptable in any number.
 - (b) Random spots upto .004" \times .004" are permissible if they are limited to one per character space and not more than five in any one field.
 - (c) On the back of the cheque and within the $\frac{5}{8}$ " band at the bottom, individual spots upto .006" \times .006" or equivalent area are permissible in any number.

6. Some important points

6.1 Use of Magnetic ink over the entire cheque

If magnetic ink is used all over the cheque the $\frac{5}{8}$ " clear band must be entirely free of all magnetic ink other than the encoded characters. If a form of receipt or other printing appears on the reverse side of cheques, it is essential that it should be kept away from the reverse of the $\frac{5}{8}$ " clear band on the face of cheques to avoid possible interference with the electronic reading of the code line.

6.2 Colours

At present four colours are available in addition to black-olive green, maroon, brown and deep blue. Preference is for black colour.

6.3 Perforations

Slit or slot perforations may be used but pin-hole perforations should be avoided as they cause clogging of the sorting machines through build-up of paper fluff. Where a voucher is attached to the cheque, it is preferable to locate it at the top or left side. Pin-wheel feed perforations should be removed from the right hand side of all documents prior to their entry into the banking system.

6.4 Border around cheques

If the whole cheque is printed in magnetic ink the border must be above the 5/8" clear band so that the magnetic ink in the border will not interfere with the scanning of the sorting equipment. If the border is printed in ordinary ink and is not excessively wide, it may appear in the $\frac{3}{16}$ " margin below the MICR line. No printing of any kind except light background printing as normally used with fugitive ink should encroach on the $\frac{1}{4}$ " band along which the MICR characters appear.

6.5 Paper

For fast, trouble free channelling through sorting machines, cheque paper must be smooth and have a high degree of rigidity. In case of sensitised paper a heavier weight of paper is required. Paper should always be cut with the grain running parallel with the base of the cheque as this greatly enhances the handling qualities.

SPECIFICATIONS FOR CHEQUE FORMS PRINTING/CODE LINE ETC.

1. Introduction

1.1 For successful implementation of the National Clearing, it will be necessary to standardise cheque forms and paper in use, the MICR font, and field specification of data in code line.

In this annexure we have attempted to lay down the specifications for cheque forms, printing, code line, etc. It may broadly be mentioned that :

- (a) We have recommended use of two sizes of cheque forms only
- (b) The paper quality and grain will have to be improved so that cheques can stand fast sorting strain
- (c) The encoding will be done using MICR technology. We will be using E 13 B font for the purpose.

2. MICR

2.1 The use of a magnetic ink code line on a cheque and electronic sorting machines which read this line call for close co-ordination between the banks and their printers. It is necessary that cheques must be standardised by specifying minimum and maximum widths and depths of cheques forms to ensure that they will pass through automatic equipment. Placement of certain particulars on the cheque must conform to prescribed standards and in such matters as ink coverage on the code line, impression and others, the cheques must be printed in certain tolerances.

2.2 When a cheque is drawn on a bank where electronic sorting is in operation, in addition to city, bank and branch numbers, customers a/c. no., transaction code and the cheque number will also be printed.

2.3 The customer's account number can be printed by the printer or the bank itself by using an imprinting machine centrally or in the branches.

2.4 The next step which does not involve printers is the completion of the code line by entry of the amount of the cheque.

2.5 The cheque serial number, customer's account number and transaction code are in what is known as 'domestic' (or "on us") field and banks free are within the limits of these fields to utilise numbers of their own choice and to arrange them in accordance with the requirements of their own system. Measurable limits of positioning and quality of printing are essential in order that the cheques will be consistent and acceptable to the sorting machines.

2.6 In a typical electronic sorter, the cheque is carried past a magnet which magnetises the coded characters as they go by, commencing at the right hand edge of each character. Therefore, the position

of the right hand edge of the code grouping is a vital standard. It is, therefore, important that the characters printed in magnetic ink should be in the same area on every cheque. They must be within certain tolerances and they must be of a size, shape and condition instantly and completely recognisable by the machine.

2.7 The adoption of MICR requires cheque designs and printing techniques acceptable to all sorting machines. Nothing on the face of the cheque should interfere with the visual or magnetic reading of the code line which must always be in the same position. All this requires a greater degree of standardisation.

2.8 More details about the size of cheques, placement of the code line, density of the ink film are available in the subsequent paragraphs.

3. Principles of cheque design

3.1 Principles

- (i) By a glance, we should be able to readily recognise the correct amount.
- (ii) It should be possible to determine the name of the bank at a glance.
- (iii) The signature of the drawer should be easily located.
- (iv) "Date", or "bearer", "amount in figures" and "signature" should be grouped together on the right hand side of the cheque forms.

3.2 Defined standards

(i) Size

Maximum length and height of

all instruments

8" × 3 $\frac{2}{3}$ "

Minimum —,—

6 $\frac{1}{2}$ " × 2 $\frac{3}{4}$ "

N.B. It is recommended that we may adopt the above sizes of cheques for the following :

For Current A/c cheques and drafts 8" × 3 $\frac{2}{3}$ "

For Savings Bank A/c cheques

and Travellers cheques

6 $\frac{1}{2}$ " × 2 $\frac{3}{4}$ "

(ii) Paper

Base sensitised paper — 96 grams/sq. metre \pm 5% . The grain of the paper should run parallel with the base of the cheque. Embossed designs in the paper are not acceptable.

(iii) Clear Band

A clear band 5/8" deep and extending the full length of the lower edge of the cheque should be reserved for printing the magnetic ink characters.

3.3 Special Problems in Design

- (i) Crossing should be conspicuous and be placed as close as possible to the centre of the cheque. The crossing should not encroach upon the 5/8" clear band.
- (ii) Any printing of customer's name for the personalisation of cheques should preferably be adjacent to or above the signature and should not encroach on the 5/8" clear band.
- (iii) Perforation should be on the top left or top edge of the cheque.

3.4 Precautions

- (i) The minimum length of the cheque should be 6 1/2" and the bottom 5/8" along the entire length of the cheque should be kept free of any magnetic ink printing other than the prescribed characters.
- (ii) In no circumstances may E 13 B characters be printed on the code line in ink without the magnetic quality.
- (iii) Cheques must be so designed that drawers are discouraged from encroaching on the clear band with seals, signatures or other writing which will interfere with magnetic reading in this area. Rubber stamping on the clear band should be avoided.

3.5 Encoding

The length of the cheque is divided into fields. Printing in magnetic ink should be within the specified boundaries of these fields. The fields are from left to right.

- Auxiliary domestic field for cheque serial numbers.
- City/Bank/Branch field.
- Domestic field (account number and transaction code)
- Amount field.

Depending on each bank's requirement, these fields can be encoded by the bank's printer or the customer's printer.

3.5 Folding of cheques

Because of the high operating speeds of the electronic sorters, folds can cause jams in the paper movement. Creases through the magnetic ink characters may also cause rejection and therefore folding of cheques should be avoided.

3.7 Borders and Background Tint

- (i) Borders, if necessary, can be printed in the 5/8" clear band as long as magnetic ink is not used.
- (ii) Normal background security designs in fugitive ink are acceptable but they should be of an unobtrusive nature.

3.8 Mutilations

Cheques which are mutilated or have attachments are liable to cause jams in sorters. Pins, adhesive tapes and stamps, heavy embossment caused by cheque writing machines, counterfoils should be removed.

A sample voided cheque form. The form is enclosed in a thick black border. At the top right, there is a line for the year, with "19" written above it. Below this, the amount "\$561. 11/100" is handwritten. To the left of the amount, the text "PAY TO THE ORDER OF" is printed. Below the amount, the word "DOLLARS" is printed. In the center-right, there is a rectangular stamp that reads "SAMPLE-VOID" in bold, with "CHECK PRINTERS INC." in smaller text below it. At the bottom left, there is a line for "MEMO". At the bottom, there are two rows of magnetic ink characters (E13B). The first row contains "104 10 1222 10003 43 38 2" and the second row contains "0000056 1111".

4. Lay-out of Code line

4.1 Reference edges

Measurements concerning any element or space within the 5/8" and reserved for the MICR code line must be taken from right and bottom edges of the cheques. All horizontal dimensions are measured from the right edge and all vertical ones the bottom edge.

4.2 The 5/8" Clear Band

The area in which MICR characters are to be printed measures a minimum of 5/8" from the bottom edge of the cheque and $6\frac{3}{8}$ " from the right edge. No magnetic ink printing other than the prescribed characters should appear anywhere in this area.

4.3 The fields or areas of the code line

The top of the clear band is always 5/8" from the bottom edge.

The lower edge of the code line area should be 3/16" above the bottom edge of the cheque. The next $\frac{1}{4}$ " above provides the area where the code line appears. The remaining $\frac{3}{16}$ " remains clear.

4.4 The Amount Field

Boundaries : From 1/4" from the right edge of the cheque continuing left to 2 $\frac{1}{4}$ " from that edge the field is bracketed by two Amount Symbols.

The right edge of the Amount Symbol appearing at the extreme right of this line must be $\frac{5}{16}$ " plus or minus $\frac{1}{16}$ " from the right edge of the cheque.

4.5 The Domestic Field

Boundaries : From 2 $\frac{1}{4}$ " from the right edge of the cheque continuing left to 3 $\frac{5}{8}$ " from that edge.

This field usually carries the transaction code and account number. The number of characters in an account number will be limited to 6 while the transaction code separated by a space will be of 2 digits.

4.6 The City/Bank/Branch Field

Boundaries : From 3 $\frac{5}{8}$ " from the right edge of the cheque continuing to 5 $\frac{1}{4}$ " from that edge.

This part of the code line contains 3 groups of three digits. The left hand three digits refer to the city, the middle three digits refer to the bank and the right hand three digits refer to the branch.

The combined number is bracketed by a Bank/Branch symbol to the right and a Domestic symbol to the left, allowing a space equivalent to one character between the domestic symbol and the left-hand digit of the combined number. This space may be to the left or the right of the domestic symbol depending upon the printing method used. The right edge of the closing symbol of the City Bank/Branch number may, therefore, be either $5\frac{1}{16} \pm \frac{1}{16}$ " or $4\frac{15}{16} \pm \frac{1}{16}$ " from the right reference edge.

4.7 Auxiliary Domestic Field

The field will contain the cheque serial number which can be a maximum of 6 digits. The alphabetic prefixes may be indicated anywhere else on the cheque, but in any case, not in the 5/8" clear band.

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