YEAR 2000 PREPARATIONS IN THE BANKING AND FINANCIAL SECTOR

DEPARTMENT OF INFORMATION TECHNOLOGY
RESERVE BANK OF INDIA

December 1998

FOREWORD

The world is heading towards the advent of the millennium. In modern day banking with heavy dependence on computers and communications, the date January 1, 2000 has come to signify a date with destiny. For, every one is familiar - at least by name - with the phenomenon that is variously termed as the Year 2000, Y2K, century date change or the millennium problem. The problem threatens to disrupt the systems that are dependent on computers and computer based processing. The banking and financial sectors could prove to be especially vulnerable, if the problem is not resolved before the end of this century.

In tune with the approach of the central banks in all countries, the Reserve Bank of India has focussed its attention on the problem and its ramifications. In particular, the Bank has devoted its energy towards ensuring Year 2000 compliance within the Bank and co-ordinating with the banks and financial institutions at different levels directly and through their Associations/Unions to ensure Y2K compliance well in time. This publication attempts to bring out the broad strategy adopted by the Reserve Bank in periodically monitoring and overseeing the progress made by the Financial Sector in achieving Y2K compliance. The efforts made by the Reserve Bank in co-ordinating with the Government of India, Indian Banks' Association, Associations of Trade, Commerce and Industry, SEBI, Insurance, Power, Telecom and Transport sectors for Y2K compliance have also been brought out. The Reserve Bank is also co-ordinating with the Bank for International

Settlements and other International Banks to update on the progress made in this area and share with them the Indian experience and efforts.

We hope this book would contribute significantly to a clear understanding of the efforts of the banking sector in meeting the problem and to give confidence to the participants in different economic activities in the stability and maintenance of the financial system.

Mumbai
December 1998

A Vasudevan
Executive Director

1. INTRODUCTION

1.1 The Year 2000 is a global challenge. Whether the financial industry has the ability to rise to this challenge and avoid serious difficulties as the date change occurs will be determined by the actions that individual firms and the financial community have taken and the steps they take between now and the eve of the Year 2000. It is the responsibility of management of each organisation to identify and address their Year 2000 risk exposures. To delay work on the issue harbours the risk as not all the code modifications, testing and other changes can be carried out at the last minute. It is equally important that contingency plans are drawn to ensure smooth functioning of the financial sector. Unlike most projects involving technology, the certainty of movement from 1999 to year 2000 makes it impossible to delay the finality of preparedness of all computers to meet processing needs of the next century.

1.2 Unfortunately, the Year 2000 issue is not always presented properly. Routine observations that the problem is exaggerated and not worthy of the attention dilutes the real dimension and the likely impact of non-compliance. Conversely, alarmist scenarios bring about unnecessary panic. Such extreme views often fail to provide the key to deal with the problem. With regard to the issue of Year 2000, each financial institution has to bear responsibility for its own systems. However, supervisors should be able to assess whether the steps being taken by financial institutions to achieve Year 2000 readiness appear to be reasonable and prudent. It is essential that senior management recognise that the Year 2000 is more than a technical issue and that they become involved in ensuring timely resolution of the problem. The financial institutions that have not yet begun the Year 2000 renovation process would find it difficult, if not impossible to change the internal systems and interface with others. Institutions that have not progressed sufficiently should quickly focus on identifying and renovating those systems that are deemed to be “mission critical”. All financial institutions, regardless of their level of preparedness, need prioritise work yet to be done and initiate a contingency planning process.

2. BROAD APPROACH TO THE PROBLEM

2.1 The wide range of Year 2000-related risks necessitates that the managements implement a targeted, multifaceted action plan to smoothly move over to the millennium. Addressing the Year 2000 issue consists of undernoted seven elements:

- Developing a strategic approach;
- Creating organisational awareness;
- Assessing actions and developing detailed plans;
- Renovating systems and equipment;
- Validating the renovation through testing;
- Implementing tested, compliant systems; and
- Contingency planning.

The Reserve Bank of India has adopted the definition of British Standards Institution for Year 2000 conformity. Accordingly, Year 2000 conformity shall mean that neither performance nor functionality is affected by dates prior to, during and after the year 2000. In particular

Rule 1 - No value for current date will cause an interruption in operation

Rule 2 - Date-based functionality must behave consistently for dates prior to, during and after year 2000.

Rule 3 - In all interfaces and data storage the century in any date must be specified either explicitly or by unambiguous algorithms or inferencing rules.

Rule 4 - Year 2000 must be recognised as a leap year.

Definition of 'Critical' Systems

The distinction is made between 'Critical' and 'non-critical' systems in respect of Year 2000 compliance. This is done to ensure that attention is focussed on those systems, which are likely to have the most disruptive impact should they not be Y2K compliant. The Reserve Bank of India has defined a system to be critical if its failure would:

- result in a substantial loss (either in money or goodwill of the organisation);
- have a significant impact on the operations of the institution; or
- adversely affect its customers/counterparties for an extended period of time (e.g. over 24 hours, but this could vary depending on the type of business).

This definition covers payments, accounting, treasury, risk management, front office, communications and operating systems directly supporting essential banking services.

2.2. Origin and Scope of the Problem

Since the earliest days of computer programming, in order to economise on computer memory two digits were used to represent the year in date fields (YYMMDD). Even as recently as the 1980s, few believed that the applications being developed by them would still be running in the year 2000. The Year 2000 problem exists because, at the turn of the century, a two-digit representation of the year will be interpreted in many applications to mean 1900, not 2000. Thus, at the century date change (or even before), a large number of computer systems, software programs and embedded chip devices currently in use will produce errors or malfunction -- unless the date or program logic is modified. Many calculations will either indicate that financial or accounting transactions have been open for nearly one hundred years or produce negative numbers. New files may not be recognised as the most recent data, causing current files to be erased or archived as old data.

The problem has the potential to affect both computers and the embedded processors built into all kinds of modern equipment. Mainframes are particularly vulnerable as individual components may be of widely different vintages and a single non-compliant component could affect the entire system due to linkages amongst different system components. Mini-computers and personal computers may also be affected. Additionally, telecommunications equipment often has built-in date features that must be identified, tested and corrected where necessary. When the readiness of pre-renovated systems is assessed, it is often the case that more systems than expected malfunction under simulated Year 2000 conditions. Due to the interconnectivity of systems, even applications that were originally designed to comply with the Year 2000 have been found to require certain modifications. With regard to embedded processors, any operation that functions using date-sensitive technology may be affected. Many applications whose functions do not appear to rely on dates may have processes that are date-sensitive. Embedded chips that are date-sensitive and non-Year 2000 compliant are installed in millions of systems worldwide. These chips are integral to a wide range of devices and systems, including Automatic Teller Machines (ATMs), medical pacemakers, heating systems, plumbing, electricity, transportation including rail engines and aircrafts, Airports, Air Traffic Control units and financial data transmission systems. Unexpected, undesirable results could occur in many contexts, e.g. bank vaults, lifts, etc. Identifying and renovating (or replacing) the chips that may cause disruptions may be an extensive, complicated and challenging endeavour for many organisations.

For financial market participants, the Year 2000 problem is critical. Financial Institutions rely heavily on automation to manage information. If automated applications fail to work properly, it will be difficult if not impossible to conduct business. While an isolated non-Year 2000 compliant line of

code should be relatively easy to repair, the number and complexity of date-dependent computer programs and embedded chips/controllers in use means that the remediation effort (fixing the programs) is very often a highly resource intensive process. Moreover, given the financial sector's reliance on various infrastructure providers (water, power, telecommunications, payment systems, securities exchanges, etc.), the readiness of these systems has enormous implications for the continued functioning of the financial system. Operators of these systems are faced with significant Year 2000 challenges; unfortunately, the readiness of many of these complex systems is less than certain. Mere assertions that computer applications are unaffected cannot be seen as adequate substitute for rigorous assessment, remediation and testing efforts that should be undertaken by financial market participants.

2.3. Impact on Financial Markets

The date-dependent calculations performed in a variety of financial transactions (e.g. ageing of information, calculating interest rates, etc.) expose a financial organisation to serious business disruption should they fail to be ready for the millennium change. For, applications vulnerable to Year 2000 problem affect all areas of the business: the front office, the middle and back offices, the customer delivery system, and management information and decision support systems. The task is particularly daunting for financial firms because it is not just internal to the organisation. Many organisations maintain automated linkages and interdependencies with correspondents and customers, both domestically and internationally. For larger institutions that provide a wide range of products in many countries around the world, many of these applications are interdependent and some are interactive in real-time processing environments. If applications are not able to work together properly, significant problems could develop. The interconnectedness of financial organisations is especially clear in the context of their reliance on the financial market infrastructure. Payment systems, settlement agents, clearing organisations, securities depositories, trading systems, exchanges and the various direct and indirect participants in these systems, as well as network providers, are intricately connected. An operational breakdown resulting from insufficient Year 2000 preparations by any one of them may have an impact on participants across systems. For example, a Year 2000-induced operational breakdown that results in delayed funds payments may cause significant liquidity pressures for market participants. To the extent that transactions with counterparties both within and outside that particular settlement arrangement are affected by these delays, there may be knock-on effects, which in extreme cases could have wide systemic implications.

Framework for Achieving Year 2000 Compliance

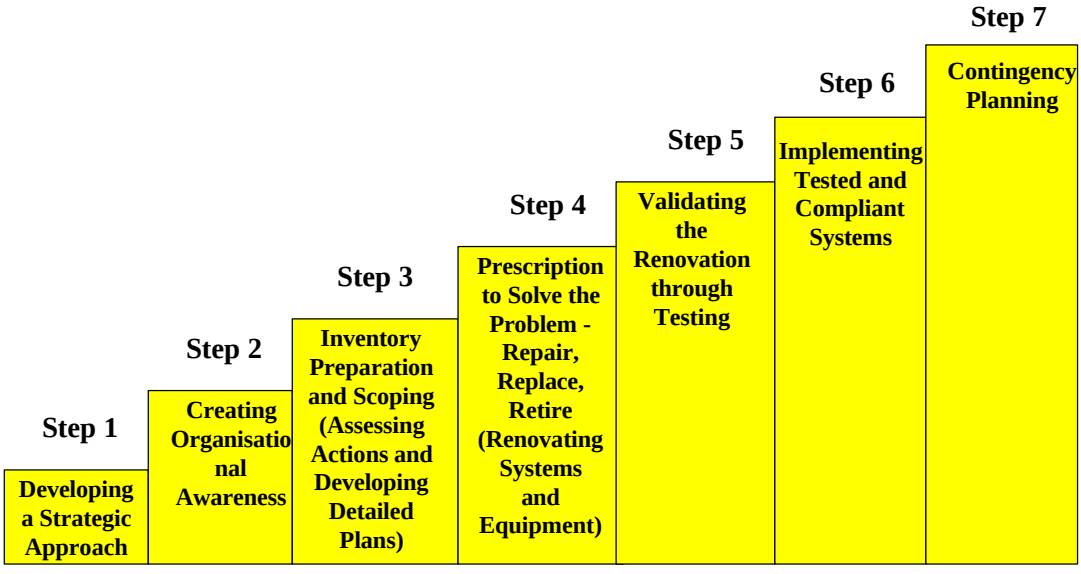

Figure - 2.1

2.4 A Framework for Achieving Year 2000 Compliance

Achieving Year 2000 compliance is simple in concept, yet for large organisations it is an enormous task. The primary goal is to minimise risk to the business. As with all large projects, the development of and adherence to a realistic timetable are major factors in achieving a successful outcome. The Basle Committee on Banking Supervision have provided guidance for banks. Banks in India have been encouraged to follow these international standards and the Reserve Bank of India will monitor adherence to them closely. Though targeted specifically for banks, other organisations may be able to use the following project outline as a starting point. Figure 2.1 gives pictorial form of the steps involved in the Framework for Achieving Year 2000 Compliance.

A Strategic Approach: Addressing the Year 2000 problem must be viewed as a strategic objective and must entail commitment from the highest levels within the institution. The RBI expects the Board of a bank to be involved in this process. The Year 2000 project core group that banks/entities set up have to develop an overall strategy that encompasses in-house systems, third-party service providers, suppliers, customers, counterparties and

auditors. A timetable would have to draft and estimate funding built into future budgets. The same principle has to be applied to various Central Office Departments and the Regional Offices of the Reserve Bank.

Awareness and Commitment: All staff members must be made aware of the implications of the Year 2000 problem and accept responsibility for addressing the problem in their areas of operations. Failure to establish awareness and commitment can lead to omissions, and inappropriate responses or, it could impact adversely on Year 2000 preparations being undertaken elsewhere in the organisation.

Inventory Preparation: An inventory must be taken of all hardware, software, embedded microchips (in cheque-proofing machines, security systems, elevators, etc) and customer and supplier interdependencies. The risk each one of them poses to the business need to be assessed and priorities accorded. In determining the systems that are critical to the operations, the banks and financial institutions should focus on what business functions they perform, and identify the various systems needed to support them. Strategies should be carefully considered, including the role of external parties, the methodologies for renovating programs and the need for additional resources. At the end of the assessment stage, a bank should have detailed plans for the entire project. The assessment stage should be revisited periodically, and certainly whenever an organisation's objectives, processes or external environment change.

Scoping: A critical step for addressing the Year 2000 problem is the assessment of all areas and activities affected by the millennium change and the development of corresponding detailed plans to address conversion of the affected systems. During the assessment phase, it is necessary to determine the size and complexity of the problem and magnitude of the effort necessary to address the Year 2000 issue. An adequate assessment includes consideration of relationships with third parties, including vendors whose products and services the institution uses, other financial institutions, clearing-houses and customers with whom it exchanges data electronically, and customers whose standing may be diminished by significant disruptions associated with the millennium change. The assessment must also go beyond information systems and include environmental systems that are dependent on embedded microchips (for example, security systems, vaults, telephones, faxes,

heating/cooling systems and elevators). This prioritisation will occur after a risk analysis of the various systems has been conducted. The action plan will differ according to the size and complexity of the financial institution. The institution must identify the required resources (personnel, budget and external resources) needed to implement the action plan. The action plan should outline which systems will be replaced, upgraded or otherwise modified and what the conversion process will entail. The action plan should also include a concrete timetable for meeting each element of conversion. This timetable will establish target dates against which to measure slippage in the implementation of the action plan. This timetable should include ample time for testing.

Prescription to Solve the Problem – Repair, Replace, Retire: This process involves modifying, upgrading, replacing, outsourcing or retiring the hardware and other peripherals, operating systems, applications that are not Year 2000 compliant. International regulators have generally chosen end 1998 as the date for completion of the renovation process. Banks in India are well into the renovation stage and indications are that renovation of critical systems will be substantially completed by end 1998.

Testing: Year 2000 testing for banks is of paramount importance because the tests must be conducted on all critical applications, yet the banking business must continue as usual. Industry analysts expect the testing phase to consume more than 50% of the time and resources devoted to the Y2K compliance process. The testing process should cover the hardware including equipment/embedded systems, operating systems, key software utilities - backup, software development tools, applications software, data bases, movement of data between systems, all interface software with the other banks and financial entities, customers, etc.

In order to make objective assessment of the compliance, test records form a critical data. It is important for the banks to look at the test records to conclude that adequate testing has been conducted. Record keeping for test results might become a crucial data in case of potential litigation issues. Test results should be analysed and compared against expected results. Any deviations in the test results should be assessed against the testing objectives laid down for that software component. This analysis should enable the acceptability or otherwise of the software component along with the identification of the residual useful life

of the target system.

Implementation: Once systems have been thoroughly tested in a separate test environment, they can be returned to production. This involves careful co-ordination to ensure that changes in one system do not affect the operation of other systems.

Contingency Planning: Financial institutions must develop contingency plans for the Year 2000 problem to prepare for possible computer disruptions. Renovation of systems and carefully planned testing inhouse or by vendor, in addition to the testing by independent service agency could reduce the possibility of computer disruptions materialising in the year 2000. However, despite every care and effort, computer disruptions could still take place. In making contingency plans, it should be noted that in the event of the Year 2000 computer disruption, back-up computer systems cannot be counted on because the technical structure of the back-up systems is likely to be exactly the same as the acting systems and will fail to operate properly for the same reason.

Computer disruption caused by the year 2000 problem is similar to a system failure of both the main system and its back-up caused by hardware / operating system / application software. The contingency plan for such a system failure is to shift operations from online business procedures to paper-based procedures, and the contingency plan for the Year 2000 system failure would likewise be to shift business operations to paper based procedures. Individual financial institutions and payment and settlement systems may put in place contingency plans for system failures of active and back-up systems, to keep up the operations going on.

When making contingency plans for the Year 2000 problem, it must be noted that system failure due to the Y2K problem differs from other system malfunctions or failures because disruptions would materialise simultaneously in many financial institutions, their counterparties and payment and settlement systems. In the new millennium, some financial institutions and payment and settlement systems that have not conducted sufficient Year 2000 tests to verify their computer systems may face system failures simultaneously. In such an event, online business procedures would have to be migrated to paper-based manual procedures. To adequately prepare for such situations, it is necessary to find out the points where paper based processing would establish appropriate disaster backup arrangements and

procedures in case of contingency so that operations of the financial industry are not disrupted.

3. STATUS IN THE RESERVE BANK OF INDIA

3.1 Creating Awareness

The central bank of the country has a major responsibility in not only creating an awareness of the strategic importance of the problem, but also work to ensure that the problem is resolved well in time. In order to bolster confidence in the functioning of the financial system, it has to provide information on the preparations and efforts being made to be ready for the millennium change. The central bank on its own would have to ensure that all its own operations are Y2K compliant.

Early in the year 1996, the Department of Information Technology, Reserve Bank of India had written to all its Offices/Departments and commercial banks emphasising the need to prepare detailed inventory of hardware, operating systems and software, scope the problem, decide on the prescription to solve the problem i.e. repair, replace and retire, undertake detailed testing and prepare contingency plans on the Year 2000 problem. This was followed up with circulation of reading material on different aspects of millennium problem viz. awareness, project planning, testing, contingency planning, etc., in particular those downloaded from the web sites of the FEDRESERVE, the Bank for International Settlements and the Bank of England, besides those received from vendors/corporate bodies. The Reserve Bank of India has circulated a book "Are we really Y2K compliant" by Prof. S. M. Padwal and Shri S. D. Page of National Institute of Bank Management, Pune, which discusses in detail each aspect of the Y2K problem. Presentations by Tata Consultancy Services and M/s Infosys to heads of the Central Office Departments and the Top Management of the RBI were arranged with a view to enlighten the participants on the magnitude and various dimensions of the Year 2000 problem and testing of the systems for Y2K compliance. A booklet titled "Year 2000 PC LAN Tools and TIPS" containing step by step instructions for testing of hardware, system software and a floppy containing the program for testing the IBM PC compatible Servers/PCs were forwarded to all our Regional Offices and Central Office Departments to undertake testing at their places of work. A booklet entitled "Year 2000 (Y2K) Compliance Issues", giving the Year 2000 (Y2K) Compliance Test Plan, Evaluating Systems for Year 2000 Compliance, Year 2000: the Millennium Rollover Practical Advice for Users of the Single UNIX specifications, the ISO solution to put an end to date chaos, a Summary of International Standard Date and Time Notation, ISO 8601 – Date and Time Representation, DISC PD 2000 – 1 – a Definition of Year 2000 Conformity Requirements and a booklet on "The Millennium Problem in

Embedded Systems" were circulated to regional offices and central office departments of the Reserve Bank. A copy each of this was also sent to IBA so that it could arrange to circulate them to banks.

The Reserve Bank of India had written to various organs of the Central Government - Finance, Telecommunications and Power requesting them to ensure Y2K compliance in embedded sector viz. Power, Communications, Transportation, etc.; Ministry of Finance has also been requested to take up the issue of setting up of a National Y2K Compliance Authority to ensure Y2K compliance by all public and private bodies. The Human Resources Development Department of the Reserve Bank of India has written to all banks and financial institutions to introduce sessions on the Year 2000 problem in all the training programmes conducted at their training establishments. Such programmes have already been introduced in all training establishments of the Reserve Bank.

The Indian Banks' Association (IBA) arranged presentations by State Bank of India and ANZ Grindlays Bank for the benefit of banks. The National Institute of Bank Management conducted series of workshops in association with the IBA for the benefit of the participants drawn from the commercial banks in creating awareness of the magnitude of Y2K issues. The IBA issued an advertisement on Y2K in the leading newspapers in the first week of September 1998 for creating public awareness on the Year 2000 problem. The IBA has sent posters to all its member banks for displaying at the branches for creating awareness amongst their customers.

3.2. Scoping of Problem and Developing Plans

A critical step for addressing the Year 2000 problem is the assessment of all areas and activities affected by the millennium change and the development of corresponding detailed plans to address conversion of the affected systems. The Reserve Bank of India has 23 Offices, 3 Training Establishments and 4 National Clearing Centres spread throughout the length and breadth of the country. The Reserve Bank issued a questionnaire to all RBI Offices/Departments/Training Establishments with a request to furnish the details of hardware, system and application software and its status regarding Y2K compliance. It has transpired that the Reserve Bank of India has about 2400 PCs, 100 Servers apart from IBM mainframes at four NCCs. The operating systems in use are MVS/XA, UNIX, Novell NetWare, Banyan Vines, Windows NT, DOS and Windows 3.11/95/98.

Application software are developed in-house or supplied by vendors. All the critical

Application Software developed in-house and supplied by vendor have been identified. The in-house developed application software are mainly the input based payment and settlement system, settlement of securities, foreign exchange management, investment, pay-roll and house-keeping packages, and statistical returns, etc. For all these applications project leaders have been identified and are on the job of making these application software Y2K compliant.

The interface software supplied to banks participating in high value clearing, inter-bank clearing, off-site monitoring returns, foreign exchange data, etc., have also been taken up for Y2K compliance. The major application software proposed to be outsourced are MICR Cheque Processing Software, Public Accounts Department Software, Central Accounts Section (CAS) application software, Currency Chest Accounting and related applications running at our Issue Departments. It will be ensured that excepting MICR cheque processing software all others are Y2K compliant by end of December 1998.

3.3 Monitoring Mechanism

The importance of timely preparations for the millennium change requires establishing the Year 2000 project as a strategic objective of the financial institution with a high degree of involvement by senior management. Keeping this in view, the Top Management of the Reserve Bank of India, in the meeting held on March 18, 1998, emphasised that the millennium problem should be tackled in right earnest by the Reserve Bank of India and Financial Sector. Accordingly a Working Group under the guidance of the Deputy Governor, Reserve Bank of India, was set up. Three Executive Directors together with the incharges of regulatory departments, the Indian Banks' Association, the National Institute of Bank Management and a few commercial banks where extensive computerisation has been made, are members of the Working Group. The organisational chart of the Working Group has been given in Figure - 3.1. Further, it was also decided that the Working Group would constitute sub-groups to monitor the compliance by (i) different segments of banking and financial institutions, and (ii) within the Reserve Bank of India. In order to have focussed monitoring, a Project Cell has been formed in the Department of Banking Supervision of the Reserve Bank of India, for monitoring Y2K compliance in the banking and financial sector. The organisational chart of Y2K Compliance Monitoring of Banking and Financial Sector by the Reserve Bank of India is given in Figure – 3.2. The responsibility of monitoring the Y2K compliance within the Reserve Bank of India was entrusted to the Department of Information Technology of the Reserve Bank of India. In order to monitor the progress

made by various Regional Offices, Chief General Managers have been advised to furnish the progress made in their monthly D.O. letters to the Governor, Reserve Bank of India. The Regional Offices and Central Office Departments of the Reserve Bank of India, have been advised to form a small sub-group to monitor the progress made in respect of Y2K compliance of all hardware and software. The organisational chart of the Y2K Compliance Monitoring in the Reserve Bank of India is given in Figure – 3.3.

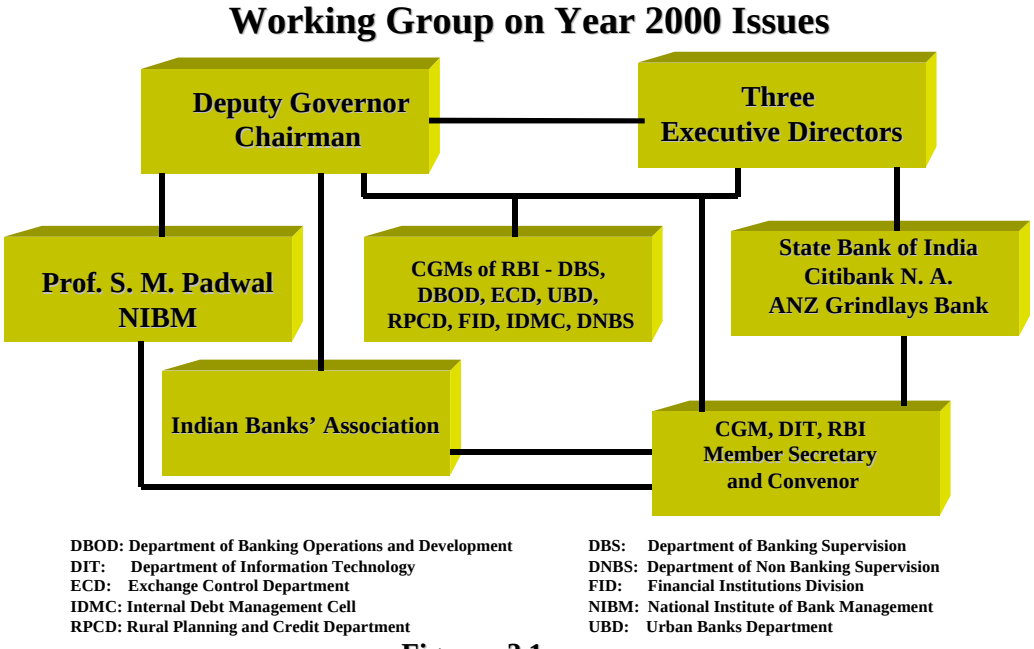

Figure - 3.1

The Department of Information Technology submits a report once in two months to the Top Management, bringing out system wise details on the progress made in solving the millennium problem. The senior officers visit each regional office to assess and advise on the steps to be taken to address the Y2K problem, which includes detailed testing. Details of up-to-date progress up to the end of September 1998 are given in Annexure-I.

Y2K Compliance Monitoring/Information Sharing in the Banking and Financial Sector by the Reserve Bank of India

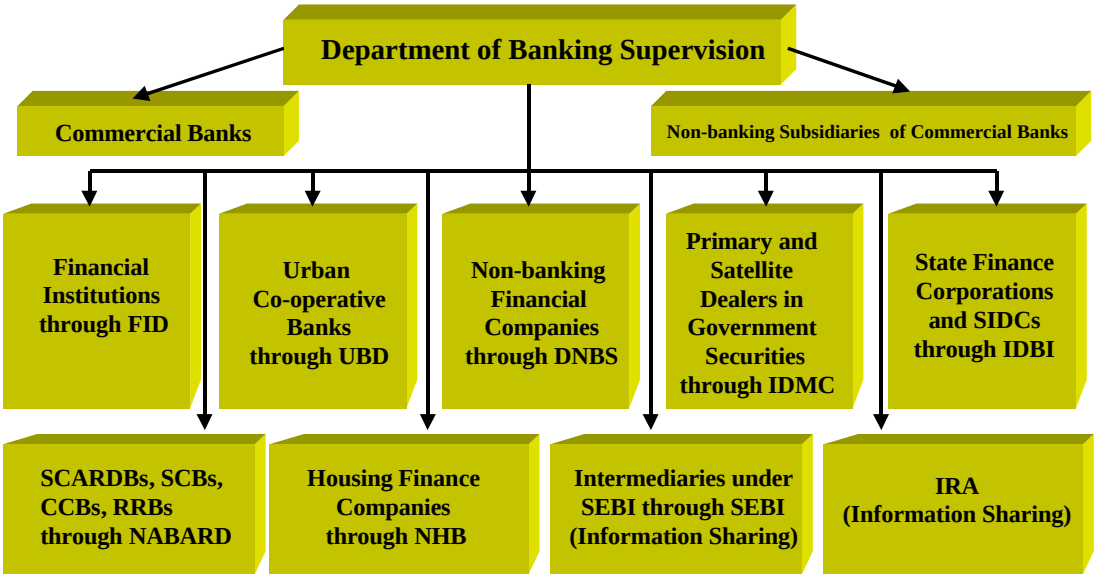

Figure - 3.2

Testing by outside Agency

The Reserve Bank of India has desired that after getting Y2K compliance in respect of hardware, operating systems and application software from different Departments/Regional Offices, in house or by the vendors, the Bank should get an outside agency to test the compliance of critical systems independently. Accordingly, it is proposed to carry out testing by external agency (agencies) from January 1999 onwards.

Y2K Compliance Monitoring in the Reserve Bank of India

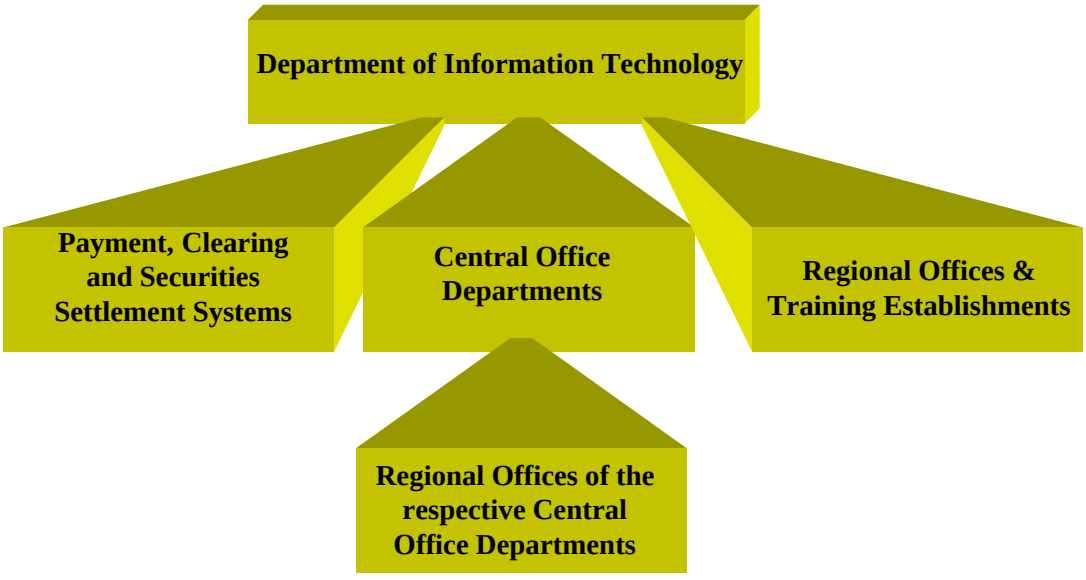

Figure - 3.3

ANNEXURE - I

COMPLIANCE IN THE RESERVE BANK OF INDIA

The hardware, operating systems and the critical application packages being used in the Central Office Departments and Regional Offices of the Reserve Bank have been analysed in this annexure for Year 2000 compliance. The compliance status of the major computer systems used in the Banking Departments, Public Debt Offices, MICR Cheque Clearing, Establishment and Accounting, Currency Management Applications, Electronic Payments, Department of External Investments and Operation's back office applications have been identified with target dates set for compliance.

Replacement of IBM mainframe systems in National Clearing Cells used for MICR cheque processing with fully Y2K compliant system has been taken up and will be completed by June 1999. While replacing the systems, care has been taken not to disturb the code line on cheques, the control documents and various outputs given to the banks along with processed cheques, so that they may not face any problem of interface. The packages developed in-house such as Delivery vs. Payment, Relief Bonds Scheme of the Public Debt Office, Electronic Clearing Service, Electronic Funds Transfer, Pay Roll, Accounting Software etc., are being made Y2K compliant by the internal teams. The target date for compliance excepting in the case of replacement of IBM mainframe systems and forex back office application packages is December 31, 1998. The latter will be done before June 30, 1999. Applications developed by vendors are being analysed and are being outsourced or appropriately upgraded to meet the compliance of year 2000 by the target date.

The Reserve Bank is in the process of replacing all its 80286/80386 PCs with the latest Y2K compliant machines. Further, instructions have been issued to all Departments/Offices in the Reserve Bank of India to utilise the non Y2K compliant 80486/Pentium Servers/PCs in non-date sensitive areas of applications. Offices/Departments have also been advised to purchase only Y2K compliant new systems in future.

All the applications software developed in-house are being made Y2K compliant and the target date fixed therefor is end of 1998. The applications software outsourced have been already awarded to the vendors for making them Y2K compliant.

As regards operating systems, offices have been advised to go in for Y2K compliant version of Novell NetWare, SCO UNIX, Windows NT, DOS, Windows 95/98, Banyan Vines, and HP-UX and their patches.

The Board of Directors of the Reserve Bank of India are taking keen interest in the efforts being made by the Reserve Bank of India in particular and the banking and financial sector in general to take care of the problem of Y2K.

Payment and Settlement Systems

The following Section gives the Y2K compliance status of payment and settlement systems, cheque clearing systems and securities settlement systems operated by the Reserve Bank of India.

Payments Systems: The Indian retail payments system consists of clearing systems for cheques managed by Reserve Bank of India and Commercial Banks.

MICR Clearing Centres managed by Reserve Bank of India: The mechanised cheque processing system adopting MICR technology for cheque clearing is in operation at the four metropolitan cities viz. Calcutta, Chennai, Mumbai (at Nariman Point and Bandra-Kurla Complex) and New Delhi. These are managed by the Reserve Bank of India. The IBM 4381 mainframe systems running MVS/XA together with the IBM 3890 Reader/Sorter Systems and CPCS 1.7 cheque processing application software currently being operational since 1987 at the four National Clearing Cells at Calcutta, Chennai, Mumbai (Nariman Point) and New Delhi are not Y2K compliant. The Reserve Bank has decided to replace the existing cheque processing systems with the state-of-the-art fully Y2K compliant systems. These fully Y2K compliant systems are scheduled to be operational by the end of June 1999.

The vendor has already started the process of making Y2K compliant, the HP 9000 Systems running HP-UX and BancTec 5700 Reader/Sorters with TPS cheque processing application software at MICR Clearing centre at Bandra-Kurla Complex in Mumbai. By end of December 1998 this system would be made Y2K compliant.

In the year 1994 the Reserve Bank of India recommended extension of the MICR

technology to centres having 100 or more bank branches with a daily cheque volume of 10,000 in clearing house. Accordingly, 26 centres were initially identified for introduction of MICR technology for cheque clearing. However, as of now only 10 centres are operationalised. Out of the 10 MICR centres, 9 have reported Y2K compliance. The remaining one will be Y2K compliant by end of December 1998.

Electronic Clearing Services (ECS) - Credit Clearing: The Electronic Clearing Service envisages substitution of paper instruments by electronic credits or debits. ECS Credit Clearing consists of large number of credits with a single debit as in the case of interest/dividend/commission payments by corporate bodies. The existing system is a semi automated system which uses the clearing house infrastructure to process and distribute credits spread over a large inter-bank/branch network. This is in operation at the four NCCs at Mumbai, Chennai, New Delhi and Calcutta apart from Ahmedabad, Hyderabad, Bangalore, Kanpur, Nagpur, Jaipur, Patna, Bhubaneshwar, Guwahati, Chandigarh, Thiruvananthapuram and Pune (managed by SBI). As per the existing file layout, settlement date (ddmmyy) is provided in the credit contra record (Record type 11). However, now the programmes have been modified to generate various reports to print the date as dd/mm/yyyy, and the same software has been running at various centres. In the proposed layout of credit contra record provision of settlement date as (ddmmyyyy) has been made. Accordingly all programmes have also been modified. Required changes in the documentation are being done.

Electronic Clearing Services (ECS)- Debit Clearing: The ECS Debit Clearing is a reverse of ECS Credit Clearing with multiple debits leading to a single credit over an Inter-bank branch network. Mahanagar Telephone Nigam Limited (MTNL) at Mumbai, Chennai and Calcutta has joined this scheme. A variant of ECS Debit Clearing termed RAPID (Receipt and Payment of Instruments/Documents) has been introduced in Mumbai. ECS Debit Clearing - RAPID is a system of giving mandate for specified amounts based on monthly demands from the company or agency participating in this service. The RAPID has been experimentally launched for Bombay Suburban Electric Supply Ltd. (BSES), Mumbai for payment of electricity bills. The Application Software has been made Y2K compliant. This scheme is in operation at Mumbai, New Delhi, Calcutta, Chennai, Ahmedabad, Bangalore and Hyderabad.

Electronic Funds Transfer (EFT)- Pilot Project: The setting up of large scale electronic funds transfer service is a critical requirement of modern payments system. At present, many banks offer Intra bank funds transfer services between their branches in different parts of the country through their internal data networks, telex and TT messaging services. However, an Inter-bank funds transfer mechanism is still in its infancy. A pilot project is in operation between Mumbai and Chennai. This process will cover all the public sector banks and subsequently will be thrown open to all the banks. A nation wide EFT service needs an effective delivery system, which can be provided by the proposed VSAT network. The EFT Application Software has been made Y2K compliant.

Floppy based Input Clearing: The Floppy based input clearing system is employed for clearing settlement relating to High Value clearing i.e. where the value of individual clearing instrument is at least Rs.1 lakh, Inter bank clearing and Return clearings in respect of High Value Clearing and of MICR Clearing. At non-MICR centres where the RBI is managing the clearing house the main clearing is also carried out under the Floppy Based Input Clearing System. As regards Inter City Clearing, the clearing instruments drawn on outstation banks (in the area of jurisdiction of MICR clearing centres) and presented in local clearing houses are realised through the inter city clearing system. With a view to introducing item wise settlement based on each clearing instrument presented, a decision has been taken to replace the existing software with a software which incorporates information on each clearing instrument. Floppy based input clearing software is being converted to meet the Y2K compliance. The Application Software will be made Y2K compliant before December 31, 1998.

Securities settlement system: The Delivery versus Payment System for processing the transactions in Government dated securities held in Subsidiary General Ledger (SGL) Account at Public Debt Office, Mumbai was made operational from July 17, 1995. In this new system, it is ensured that the delivery of securities and payment are made simultaneously to avoid the default risks of buyer not receiving the securities after making the payment and seller not receiving the payment after delivering the securities. The Application Software has been made Y2K compliant.

Application Software working in the Deposits Accounts Department (DAD-BASIS), Relief

Bonds Scheme in Public Debt Office and Public Accounts Department are being made Y2K compliant. Similarly, the back office operations of the SWIFT Software working in the Department of External Investments and Operations is being made Y2K compliant and is expected to be completed by December 31, 1998. The Application Software development work for the Central Accounts Section, Reserve Bank of India, Nagpur, is being developed by the vendor and it is expected to be completed by December 31, 1998.

BANKNET: The Reserve Bank of India operates the BANKNET, a X.25 Communication Network based on the low speed leased lines from Department of Telecommunications (DoT) and X.25 Switches, Packet Assembler Disassembler (PAD), Modems and Network Management System etc. The X.25 Switches and PADs are installed at NCC sites at Mumbai, Delhi, Calcutta, Chennai and Nagpur. There are also remote PADs installed at Bangalore, Hyderabad, New Delhi, Chennai, Calcutta Offices of the Bank and Central Office Building, B-K Complex, World Trade Centre, Bankers' Training College in Mumbai. This Network was established in early 1990 and majority of the equipment have become obsolete going by the present technology available and the network bandwidth requirements of the proposed Applications such as Electronic Funds Transfer - Retail, Real Time Gross Settlement System (RTGS), File Transfer, Messaging and Queuing, Electronic Mail etc. The Equipment, the System Software and Application Software installed for this network may not be Y2K compliant. This Network is used for Electronic Funds Transfer - Pilot Project, Electronic Mail, File Transfer, etc., using RBINet Mail and File Transfer Communication Software. The Reserve Bank of India is setting up the VSAT Network for Banking and Financial Sector. The proposed VSAT Network also supports X.25 Protocol, for which switching will be done by Switches being installed at HUB site Hyderabad. The proposed VSAT network will be predominantly a Transport Control Protocol / Internet Protocol (TCP/IP) network.

RBINet: The RBINet is using the four HP 9000 Business Class Servers running HP-UX 9.XX installed at four NCCs as its E-Mail Servers and DOS PCs and SCO UNIX machines used as Clients. We are considering migration to International/de-facto Standards like X.400/Simple Message Transport Protocol (SMTP), Message Oriented Middleware (MOM) on the proposed VSAT network.

4. STATUS IN THE BANKING AND FINANCIAL SECTOR

4.1 Banking and Financial Sector

Banks and financial institutions in India are well aware of the potential problems associated with the Year 2000. Even if a bank is able to ensure that its own systems are Year 2000 ready, it will not be enough since all its businesses partners and service providers (such as telecommunications and electricity suppliers) will also have to be fully Y2K compliant. It is important that all sectors of the community take adequate measures to address the Year 2000 problem and have contingency plans in place to deal with any difficulties that may arise due to non-compliance. In its role as bank supervisor, the Reserve Bank, issued a circular in mid 1996, on the Y2K problem mainly to create awareness among the participants in the financial sector. In September 1997, the Reserve Bank forwarded materials to all chief executives of commercial banks explaining the concerns and seeking feed back on the action initiated / proposed to be initiated at their end. Banks were advised to formulate an appropriate strategy and put in place a timetable to achieve Y2K compliance by the stipulated deadline. Letters were addressed to the head offices and home country supervisors of foreign banks functioning in India emphasising concerns of the Reserve Bank and the need for concerted action. A survey report on the status in the Indian Banking System has been compiled. India is one among the few countries that had responded to the BIS survey to facilitate publication/inclusion in their web site. BIS has included information furnished by the Reserve Bank in their consolidated survey report communicated world wide in April 1998. In July 1998 banks were advised to make an assessment of the state of Y2K readiness of their customers/correspondents particularly where significant disruption or loss could take place due to systems of the latter being non-compliant and take corrective action.

4.2 Non Banking Financial Companies

One of the features of Indian financial sector is the existence of a large number of Non-Banking Financial Companies (NBFC). These companies and large number of co-operative banks present logistic problems in surveillance and supervisory efforts. Our direct surveillance efforts have been restricted only to those NBFCs which are accepting public deposits. The Reserve Bank has advised all Non-Banking Financial Companies (NBFCs)

which have a net owned fund of Rs.25.00 lakhs and above for their year 2000 compliance. Major associations of NBFCs were also advised to keep their members apprised of the Y2K issue and the need for an effective strategy to tackle it.

4.3 Co-operative Banks

In respect of co-operative banks, the Reserve Bank would cover all the 1836 banks. The focussed attention is being paid on institutions, which have a larger deposit base (say Rs.50 crores) or are members of a local clearing house. In case of others the Associations of Urban banks have been asked to take lead in coordination with the RBI.

4.4 State Finance Corporations and State Industrial Development Corporations

Of the 18 State Finance Corporations (SFCs) and 28 State Industrial Development Corporations (SIDCs), 11 SFCs and 9 SIDCs are in the process of finalising their action plans for being compliant by March 1999. The Reserve Bank of India is in communication with the Industrial Development Bank of India (IDBI) for intensifying their proactive measure with these institutions.

4.5 Housing Finance Companies

The Reserve Bank of India is following up with the National Bank for Housing to proactively guiding and monitoring the compliance efforts of the Housing Finance and other companies registered and availing refinance from them.

4.6 Institutions Supervised by Securities and Exchange Board of India and Insurance Regulatory Authority

The Reserve Bank of India is sharing information with the Securities and Exchange Board of India (SEBI) and Insurance Regulatory Authority (IRA) regarding supervisory initiatives on Y2K. The intermediaries under the supervision of SEBI have been advised to reach a compliant position by December 1998, so that they are able to implement their systems by June 1999. A task force has been set up by SEBI to co-ordinate efforts and monitor progress by the institutions under their supervision.

4.7 General Post Office

The General Post Office Savings Bank accepts public deposits and participates in the cheque

clearing arrangement at several centres. The Reserve Bank has taken up the matter with the Director General (Posts), Ministry of Communication at the apex level to seek his commitment for action.

4.8 Utilities, Customers, etc.

Communications on the Y2K problems have gone from the Reserve Bank of India to the Securities and Exchange Board of India (SEBI), the Insurance Regulatory Authority (IRA), MICR Security Printers, manufacturers of security paper, specialised institutions like the Industrial Development Bank of India, the Industrial Finance Corporation of India, the Industrial Credit and Investment Corporation of India, the Unit Trust of India, etc. The Indian Banks' Association continues to interact with trade bodies and industry associations since commercial banks are required to ensure compliance of not only their own computer systems but also their interfaces with the customers and trade bodies. The Y2K status of the customer is a critical issue and is therefore to be considered a risk factor in loan sanctioning.

The commercial banks have been advised to gear up their efforts to assess, convert and thoroughly validate all systems and applications by December 31, 1998. Commencing October 1, 1998 the commercial banks have been advised to continuously validate their renovated systems through testing and identify alternative approaches if need be. They have been advised to validate interfaces/linkages with customers/ correspondents. Testing is required to be done with reference to minimum number of dates relevant for Year 2000 testing. Similar monitoring and compliance is extended to non-banking subsidiaries of commercial banks, financial institutions, primary co-operative banks. Each commercial bank has been advised to constitute an internal Core Group and the progress is to be monitored regularly by their top management and their boards. The Indian Banks' Association is conducting periodic reviews for the Y2K problem for the industry and co-ordinating with infrastructure agencies, trade bodies, etc.

A public awareness campaign has been initiated by the Indian Banks' Association (IBA) by inserting an advertisement in various newspapers highlighting the millennium problem and the need to resolve it well in time. It is stressed therein that trade, industry, commerce, government sector organisations and communication networks need to gear themselves up to

meet the Y2K challenge. Posters are being placed at appropriate places to draw attention of banks' customers and general public. Y2K compliance issues are made an essential input in in-house training programmes of banks. The RBI is monitoring the compliance in the banking industry through periodic reviews. The Working Group set up in RBI conducts bi-monthly reviews of the progress attained by the banking industry.

The Reserve Bank of India and the IBA have arranged several presentations on Y2K by Indian and other reputed cross border software organisations. Up-to-date information on Y2K related issues on internet available from BIS, FEDRESERVE and other countries including Bank of England is shared by the RBI with the banks. The cross border issues relating to upgrading of the systems for interface with SWIFT are being addressed. The banks permitted to maintain data abroad have been asked to ensure Y2K compliance vis-a-vis the foreign banks/entities. Branches of Indian banks are ensuring Y2K compliance keeping in view the requirements of those countries.

The following strategies are adopted for attaining the full compliance of year 2000 in the financial sector.

- Unaudited certification of compliance by commercial banks
- Verification of compliance efforts through onsite supervisory examination
- Statutory auditors to comment on the process followed by commercial banks for Y2K compliance
- Validation of contingency plans by commercial banks
- Commercial banks to give their compliance position on their web sites

The full compliance can be attained only after undertaking a comprehensive testing of all the systems, whether upgraded or replaced. The testing exercise is to be integrated in the action plan for Y2K compliance. An important precautionary step has been taken to see that the supervisory departments of the Reserve Bank would exercise pro-active supervisory pressures to address the problem whenever the supervisory teams visit banks. It has also been decided by the Working Group on Y2K issues that suitable penal measures akin to the idea given by the Bank of England would be considered with respect to those banks, which do not adhere to the Y2K compliance by March 1999.

4.9 Information Sharing

There has been a high level of co-operation among banks on Year 2000 issues. However, only few banks have made substantial efforts to help raise their customers' awareness on Y2K issues. This is disappointing because banks can influence their customers in this regard and this, in turn, would help reduce the potential for widespread Year 2000 problems. Banks are therefore urged to share information with their customers and to try to ensure that customers and counterparties are taking adequate measures to address Year 2000. This is especially important for the small and medium-sized business sector. Banks will need to consider the likely efforts of the century date change on their customers and counter parties when evaluating future business transactions with these entities. The Reserve Bank of India in fact encourages banks, and all major financial organisations to share their progress towards achieving Year 2000 readiness.

The latest status of compliance of Y2K by banks, their subsidiaries and financial institutions, etc., is given in the Annexure-II.

ANNEXURE - II

COMPLIANCE IN BANKS AND FINANCIAL SECTOR

Compliance in Banks and Non-banking Subsidiaries of Commercial Banks

Most of the banks in India use standalone PCs or Novell NetWare/UNIX LAN for computerisation. Some banks do have a few mainframe computers, which are used for computing purposes. These computer resources would have to be either upgraded or replaced to meet Y2K requirements. The existing computers not found to be Y2K compliant could be used for non-date sensitive applications. The computers in computing environment and sensitive to date have to be Y2K compliant. Mainframes in all cases are in the process of replacement as they have become quite old. These initiatives would mean additional cost to the banks but such investments are unavoidable.

The progress of the Y2K compliance of commercial banks and non-banking subsidiaries of commercial banks are given in Table – 1 and Table – 2 respectively.

Table – 1
Commercial Banks

Description	**Percentage of compliance by targeted banks**
Banks compliant	21.16
Banks expected to be compliant by 31-12-1998	56.74
Banks expected to be compliant by 31-03-1999	18.26
Banks whose compliance is expected by 30-06-1999	3.84
Total	100.00

Table – 2

Non-Banking Subsidiaries of Commercial Banks

Description	**Percentage of compliance by targeted institutions**
Institutions compliant	47.50
Institutions expected to be compliant by 31-12-1998	22.50

Institutions expected to be compliant by 31-03-1999	10.00
Institutions where compliance is being pursued	20.00
Total	100.00

Financial Institutions

The Y2K compliance efforts of the General Insurance Corporation of India, the Industrial Development Bank of India, the Life Insurance Corporation of India, the Industrial Credit and Investment Corporation of India and the National Bank for Agriculture and Rural Development are expected to spill over to 1999. The Y2K compliance position of Financial Institutions is given in Table – 3.

Table – 3

Financial Institutions

Description	**Percentage of compliance by targeted institutions**
Institutions compliant	41.67
Institutions expected to be compliant by 31-12-1998	16.66
Institutions where compliance is being pursued	41.67
Total	100.00

Primary Urban Co-operative Banks

Rigorous follow up measures were initiated with the co-operative banks. Table – 4 gives status of the Primary Co-operative Banks.

Table – 4

Primary Co-operative Banks

Description	**Percentage of compliance by targeted institutions**
Primary Co-operative banks not computerised	21.80
Primary Co-operative banks compliant	2.30
Primary Co-operative banks where compliance is being pursued	75.90
Total	100.00

Primary and Satellite Dealers in Government Securities

The Discount and Finance House of India, Securities Trading Corporation of India, Kotak Mahindra, CEAT Finance, Hoare Govett and Tower Capital are the dealers who have yet to report status to the Reserve Bank of India. The position of Primary and Satellite Dealers are given in Table – 5 and Table – 6.

Table – 5

Primary Dealers in Government Securities

Description	**Percentage of compliance by targeted institutions**
Institutions compliant	50.00
Institutions expected to be compliant by 31-12-1998	16.70
Institutions where compliance is being pursued	33.30
Total	100.00

Table – 6

Satellite Dealers in Government Securities

Description	**Percentage of compliance by targeted institutions**
Institutions compliant	22.20
Institutions expected to be compliant by 31-12-1998	22.20
Institutions where compliance is being pursued	55.60
Total	100.00

State Co-operative Apex Rural Development Bank, State Co-operative Banks, Central Co-operative Banks, Regional Rural Banks

Several institutions particularly in Punjab and Kerala are yet to put in place concrete action plans for renovation/replacement of non-compliant packages. The status in respect of above institutions are given in Table – 7 through Table – 10.

Table – 7

SCARDB

Description	**Percentage of compliance by targeted institutions**
Number of non-computerised banks	21.00
Number of banks compliant	26.30
Number of banks where compliance is being pursued	52.70
Total	100.00

Table – 8

State Co-operative Banks

Description	**Percentage of compliance by targeted institutions**
Number of non-computerised banks	13.80
Number of banks compliant	20.70
Number of banks where compliance is being pursued	65.50
Total	100.00

Table – 9

Central Co-operative Banks

Description	**Percentage of compliance by targeted institutions**
Number of non-computerised banks	25.10
Number of banks compliant	15.30
Number of banks where compliance is being pursued	59.60
Total	100.00

Table – 10

Regional Rural Banks

Description	**Percentage of compliance by targeted institutions**
Number of non-computerised banks	25.00
Number of banks compliant	12.80
Number of banks where compliance is being pursued	62.20
Total	100.00