



UNITED STATES LEAGUE of SAVINGS INSTITUTIONS 111 EAST WACKER DR. / CHICAGO, ILLINOIS 60601 (312) 644-3100

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REVIEW OF CURRENT AUTOMATED SUPPORT FOR THE CAJA CENTRAL

AND BOLIVIAN SAVINGS AND LOAN ASSOCIATIONS

By

John H. Magill, Ph.D.

Consultant for the

U.S. League of Savings Institutions

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I. INTRODUCTION

The conclusions and recommendations of this report depend on a single assumption - the survival and future financial viability of the Bolivian Savings and Loan System and the CACEN. In the absence of that assumption recommendations about future computer requirements make no sense.

Bolivia is currently undergoing a severe financial crisis, as the peso has devalued from 20 to the dollar in 1980 to as high as 160.000 to the dollar in early 1985. Inflation has been estimated as high as 116,800% per year. Most of this has occurred during the past twelve months, from March 1984 to February 1985, when the official rate of exchange went from 200 per US\$ dollar to 50.000 per US\$ dollar and the parallel market went from 2.000 per US\$ dolla. to a current 120.000 per US\$ dollar.

This has obviously had a catastrophic impact on the savings and loan system, as the total assets of the system in real terms declined to only 10% of their 1982 value in less than two years. Lending has virtually ceased and earnings suffered equally. Savings and loan associations have not been the only financial institutions affected by the situation, as activity in the formal financial institutions (including banks and credit unions) has declined dramatically and most financial transactions have moved into the streets.

This situation cannot long endure, however, with the eventual outcome viewed either optimistically or pessimistically. Pluralistic, relatively liberal and relatively democratic societies cannot long survive an extended period of financial crisis of this magnitude. The society will gradually gain control over inflation or the democratic government will fall either to a military government that will maintain many of the private, pluralistic aspects of the economy and society or to a leftist dictatorship that will abolish them entirely.

This report assumes that the latter will not occur: that there will be a general stabilization of the Bolivian economy, that inflation rates will be brought within a manageable range, and that private financial institutions (including the savings and loan associations and the CACEN) will again become viable, if they can be sustained during the current period of crisis.

This study was conducted between February 24 and March 10, 1985. The original scope of work called for the design and installation of a project management and inventory system for a specific subproject -- water and sanitation in three remote Bolivian towns -- of the Caja Central de Asociaciones de Ahorro y Prestamo para la Vivienda (CACEN). By the time I arrived, however the water project had been postponed. Discussions with the U.S. League resident advisor and project personnel indicated that such a scope of work would have been premature in any case, given the current financial and administrative crisis in the system. Instead, it was agreed that the study should focus on developing an understanding of the current status and problems of computer uses in the Bolivian Savings and Loan System, and on suggesting medium and long-term strategies for improving information support to the system.

During the two-week period I visited all of the savings and loan associations in Bolivia that used any form of automated data processing, interviewing the managers and responsible data processing personnel. I also interviewed the major vendor support personnel for the NCR equipment in Oruro and Santa Cruz, the Pertec System in Cochabamba and the Apple system in La Paz. Finally, I interviewed all managers and department chiefs of the CACEN. The list of managers interviewed is as follows:

CAJA CENTRAL

Sr. Ernesto Wende	President of the Caja Central
Sr. Eduardo Frias	Manager of Operations
Sr. Antonio Reyes	Assistant Manager for Operations
Sr. Jose Claire	Chief of Auditing Department
Sra. Maria Teresa Alvarado	Chief of Planning Department
Sr. Jaime Cajas	Manager of Accounts
Sr. Jorge Ayllon	Chief of Savings and Loan Project

Savings and Loan Associations

Sr. Carlos Cardozo	Manager of Mutual La Paz
Sr. Carlos Grandchant	Manager of Mutual La Primera
Sr. Alvaro Monasterios	Assistant Manager for Finance, Mutual La Primera
Sr. Felix Sanguenza	Manager of Mutual El Progreso
Sr. Manuel Parada	Manager of Mutual Guapay
Sr. Alfonso Flores	Manager of Mutual La Promotora

This report is divided into two sections. Section One covers the current automated systems and problems of the individual savings and loan associations. Section Two discusses the problems and needs of the CACEN itself.

II. THE SAVINGS AND LOAN ASSOCIATIONS

A. General Background

The move to computerized data processing in the savings and loan associations occurred in 1982, when assets stood at an all-time high of US\$ 86.000.000, the number of accounts was increasing rapidly and the system appeared capable of withstanding the (viewed in retrospect) relatively low rates of inflation and devaluation. Five of the twelve associations (Mutual La Primera, Mutual La Paz, Mutual El Progreso, Mutual La Promotora and Mutual Guapay) have purchased and installed, or are installing, basic savings and loan accounting systems. The others have manual accounting system.

Each association has a different brand or model of equipment, as illustrated below:

<u>Association</u>		
Mutual La Primera	Wang 220 MP	Wang and contract employee
Mutual La Paz	Three Apple IIIC	Latindata
Mutual El Progreso	NCR 8250	NCR
Mutual La Promotora	Pertec 3200	SEINCO
Mutual Guapay	NCR 9020	NCR

This report is divided into sections. Section One covers the current automated systems and problems of the individual savings and loan associations. Section Two discusses the problems and needs of the CACEN.

Without exception, the systems have been custom developed and programmed by the importer. NCR used programs from the Mutual Pichincha in Ecuador as a basis for developing the system for Mutual Guapay, and, presumably, Mutual El Progreso, although these are not the same programs.

The systems developed for each Mutual have the same basic components: a savings system, a loan system and an accounting system. The Mutuales La Primera and La Paz have need for a fixed-term deposit program.

B. The Individual Associations

1. Mutual La Primera, La Paz

This Association has had a history of disappointing attempts at automation. Recognizing the need to automate their 50,000 accounts they contracted a system development project from Burroughs and 10 years ago. After nearly two years they still did not have a workable system and abandoned the effort. In 1979 they entered into a rental agreement with Wang for a small, potentially multiuser system. Wang programmers developed the basic programs, and the association has contracted a programmer to continue development work.

Only the accounting system is on the computer, and the General Manager and Financial Manager are dissatisfied with that. It takes three hours to print a five-page balance sheet. Budgets are very difficult to prepare and the information needed for management decision making is nonexistent, according to the finance and general managers. The entire system should be redesigned.

The Association is currently programming the loan portfolio program on the WANG and has a need for a fixed-term deposit program.

The savings program is handled by three NCR bookkeeping (posting machines). At the end of each day the daily transactions are sent to a local service bureau for batch processing. The service bureau periodically provides a master client list, posts interest to accounts and provides an accounting record. IBM equipment is used.

In summary, the Mutual La Primera uses a WANG 220MP for accounting, three NCR posting machines for handling savings passbooks, a service bureau with IBM equipment for savings account processing, and processes loans, manually.

The system is inadequate for both the present and future needs of the Association. Of greatest concern is that the fragmented processing of the different systems does not provide top management with adequate or timely information for decisionmaking. It is very difficult, if not impossible, to summarize positions or make investment and loan decisions from information generated by the system. In addition, if transaction volumes increase with the new rules for savings deposits the batch processing system will not be adequate to handle the increased volume and monthly postings.

The Wang itself is a very limited machine, with only 132K of main memory, one 5 megabyte fixed disk and one 5 megabyte removable disk and three 64K floppy disk drives. It can only support one terminal in its present configuration (up to 6 stations could be used if an option board were installed). It is very slow, of ancient architecture, and could not adequately handle potential savings and loan transaction volumes with a 50,000 record client base.

The Mutual La Primera rents the Wang and owns the three NCR posting machines (approximate monthly costs are as follows):

\$ 150	for Wang rental
\$ 120	for service bureau processing
\$ <u>80</u>	NCR maintenance
\$ 350	per month

With semiannual posting runs for the savings program of \$80 each (a total of \$160 per year), the total data processing costs (exclusive of personnel and programs) is approximately \$4,360.

La Primera has 50,000 accounts of which 15,000 are currently archived. Transaction volume has dropped to about 63 transactions per day.

Although current volumes and finances would not normally justify such a recommendation, in this case I recommend that the Mutual La Primera obtain an integrated loan-savings-accounting package on a new, single computer system. I strongly recommend that this not be the NCR 8250 being proposed to them by the local NCR representative.

In order of preference, there are several options that the Mutual La primera should consider.

- a. Purchase the program and computer in use in the Mutual La Promotora in Cochabamba.
- b. Share a computer with the CACEN using the program of the Mutual La Promotora.
- c. Purchase the NCR 9020 and program from the Mutual Guapay-Santa Cruz.
- d. Purchase NCR 9020 and programs from Mutual Guapay and share the computer with Mutual La Paz.
- e. Purchase the NCR 8250 from the Mutual El Progreso in Oruro and install the savings, loan and accounting programs used in the Mutual Guapay on that machine.

The Mutual La Primera should evaluate these options and select the one that gives the greatest current value, potential for expansion, flexibility in program design and ability to adopt new modules if needed. La Paz based support is less essential because distances and travel between possible support locations (Cochabamba) and La Paz are small.

2. Mutual La Paz, La Paz

The Mutual La Paz is developing a system using three Apple IIIC standalone microcomputers sharing a single 10 megabyte Corvus hard disk. Additional hard disk capacity can be added by "daisy-changing" additional units. There is only one access path to the hard disk drive, however, regardless of how many drives are added. The total cost of the hardware to date, is approximately \$21,000.

Programming has been done by the importing company, Latin Data, a subsidiary of the company Holguin. According to the manager and person in charge of the system, the installation has been very slow, with considerable delays in programming. At the present time the "savings" system is operating in parallel with two Burroughs L6100 bookkeeping machines. The accounting system is also operational. The "Loan" package is not yet operational. The programs have some distinct idiosyncracies, such as printing negative signs before all liability and equity accounts on the balance sheets, and expense items on the financial statements. This appears to be the result of the fact that Latin Data is "learning" how to program financial accounting systems on this project.

Mutual La Paz has a total of 16,500 accounts, of which approximately 7,000 are active. They currently process about 80 transactions per day.

While their system will support the current level of activity, I do not believe that it is adequate or well suited to a substantially larger volume of activity. The inherent slowness of 8-bit microcomputer systems and the limited single-path disk access channel are not suited to large volume transaction processing and reporting. Already the Mutual La Paz has found that daily backups are taking two hours per day (compared to 15 minutes per day in the Mutual La Promotora and Guapay).

3. Mutual El Progreso, Oruro

In 1982 the local NCR representative in Bolivia conducted a review of the data processing needs of the Mutual El Progreso and, based on that review, sold the association an NCR 8140 microcomputer. This was a very small computer, with a single workstation, 64K of memory (expandable to 128K) and two diskette drives. The cost for this was \$43,000, including programming. This cost appears very high for the equipment.

One year later programming had not been completed and the system could not handle the transaction volume. Because of the obvious lack of capacity of the equipment, NCR replaced it with a used NCR 8250, three terminals and two printers at no extra cost to the association. This computer has 128K of main Memory, a fixed disk of 10 megabytes and a 10 megabyte removable disk. The programs, written in BASIC, were transferred from 8140 to the 8150.

Today the system supports the "savings" program and the association's accounting, but the "loan" package is not working satisfactorily. The Association is extremely critical of NCR support and programming. Current problems include:

- a. The system will only accept 9 digits when they need 12.
- b. The system calculates cents (centavos) when these should be rounded and dropped.
- c. Does not accurately calculate insurance premiums.
- d. Does not accurately calculate interest penalties.
- e. Does not accept more than one payment per month--does not allow additional payments.
- f. Does not calculate principal payments correctly when a partial payment is made.
- g. Handles late payments incorrectly.
- h. Does not calculate depreciation or negative current period results properly; it adds rather than subtracts them.

As the Manager printed out, NCR has been working on programming this system for more than three years, and it still does not work properly.

It is obvious that, at this time, the system does not meet the needs of Mutual El Progreso.

Other observations:

- a. The Computer environment is very poor in El Progreso. Dust covers everything and the machine is not periodically cleaned. This should be corrected.
- b. The system of backup is inadequate and poses a great risk to the Association. In effect, the system only has available the current status of accounts and the previous two days' balances and transactions, as they are using a three-disk rotating system of backups. Other records are kept on paper. A better way to handle backups would be to purchase additional removable disks, have a weekly and monthly closing onto separate disks, and maintain transaction backups on a daily basis.

5. Mutual Guapay, Santa Cruz

The Mutual Guapay purchased an NCR 9020 computer in 1982 for the local NCR representative. This is a much newer computer design than the model in Oruro. It has 512K of main memory, two 5 megabyte fixed disks, and two 5 megabytes removable disks, 5 terminals and one 120 line-per-minute printer. The total cost for all equipment and programs was \$60,000.

The Mutual Guapay has 22,500 clients, but very few of these are currently active. Current transaction volume is about 40 transactions per day, compared to 400-500 in 1982.

The Mutual Guapay has been very dissatisfied with NCR programming. Originally NCR prepared a workplan with December 1983 as the completion date for the system. "Savings" took 90 days to develop, but one and a half years later the Mutual Guapay initiated a legal suit against NCR to force completion of the loan and accounting programs. Programmers have to come from La Paz, and response has been very slow. Response from the technical office in Santa Cruz has also been slow. One terminal has been out of operation for 15 days, and the technicians have been unable to fix it. On the day we visited the office a technician from NCR was scheduled to fix the terminal at 3:00 in the afternoon; by 7:00 he had still not arrived.

The system currently has four major problems:

- a. It only handles 9 digits, when 12 are needed.
- b. It needs to be able to round cents and drop them.
- c. It enters a loop at record number 80 in the interest penalty initialization program.
- d. It does not calculate interest penalties properly.

In spite of the fact that this system and the system in Oruro were both developed by NCR, they are totally different systems. There is no justification for this, as both were developed at about the same time.

The Mutual Guapay wishes to sell the equipment. In my opinion they should do so, and consider the system developed for Mutual La Promotora in Cochabamba as a substitute.

6. Mutual La Promotora, Cochabamba

This Association has a computer system based on a new generation of "Super micro" technology. It was purchased from, and is supported by, a local Cochabamba company, SEINCO. Four other similar computers are installed in Cochabamba, and the company keeps two backup units to support clients in the event of equipment problems.

The computer is a PERTEC 3200, one of a growing family of multiuser computers based on the Motorola 68000 processor. This is the fastest and most powerful microcomputer processor available on the market today. The model in La Promotora has 256K of main memory, a 26 megabyte hard disk a 1 megabyte floppy disk drive, two printers and three terminals. The current cost for this configuration is about \$22,000, and it is ideally suited to this size of savings and loan operation. The system can be expanded easily to nearly 8 megabytes of main memory, 60 megabytes of on-line hard disk storage and as many as 30 terminals. Thus, it can grow with an institution and could serve large savings and loan operations as well.

The Mutual La Promotora should have purchased the system with a 40 megabyte cartridge type drive instead of the 1 megabyte floppy.

The programming for this system was the most professional and well-designed of the system I reviewed. It was written in a modular format by the importing company, SEINCO, in an advanced BASIC. The programs are parameter driven with on-line menus to facilitate making changes to the parameters. Thus, qualified people can make changes to the interest rates, posting periods, number of digits accepted and other such items easily and quickly.

The system uses an excellent backup procedure consisting of annual, semiannual, monthly and weekly backups of the data files. Daily backups are only of the daily transactions. The data files on the hard disk always represent the current situation. It is easy to recreate the current data base from an earlier week's balance and subsequent transaction backups.

The Mutual La Promotora has been satisfied with the performance of the hardware and software and with the support and programming provided by SEINCO.

For these reasons I considered this to be the best and most practical data processing system for the savings and loan associations in Bolivia.

7. Other Considerations

- a. The associations that have NCR equipment have not been satisfied with the programming or technical support provided by the local NCR representative. The programs have not performed satisfactorily, systems have not been sized properly, maintenance support is poor, and the system is very inflexible. I do not recommend further purchases of NCR equipment in this situation.
- b. The various associations are not sharing information on their computer selections and systems. For example, the Mutual Guapay wants to sell its NCR 9020 and has asked the NCR representative to help. At the same time, Mutual La Primera is looking for a computer and has considered a proposal from NCR for an older model 8250 that would run Guapay's software. But La Primera was unaware that Guapay wanted to sell its equipment. (This also represents an act of bad faith on the part of the NCR representative). Consultation among the associations might also have reduced the number of different types of machines in the system.
- c. Data could be transmitted from any of the machines to the Caja computer over telephone lines. However the volume of data is so low that it is really not necessary to incur the cost involved in modifications to hardware, purchase of modems and telephone line charges.

8. General Recommendations

- a. The individual associations should not invest in new equipment on systems at this time. Until savings and loan

volumes and profitability increase, associations that do not have data processing should not attempt to automate, and the other associations should not acquire new or different equipment. The only exception to this is the Mutual La Primera which (?)

- b. Standardization of equipment is not necessary, but it is desirable. If any of the other associations (other than La Promotora) can sell their equipment and realize enough income from that sale to purchase the system used by La Promotora in Cochabamba, they should do so. This system was the most impressive, professionally designed, reasonably priced and properly sized of the systems reviewed.
- c. The computer programs should be audited to make sure they are performing the operations and calculations correctly.
- d. If the financial situation improves, the CACEN and the associations should attempt to negotiate a single contract with a single vendor to obtain uniformity, lower costs, and improved support.

III. PLANNING AND DESIGNING AN INFORMATION SYSTEM FOR THE CAJA CENTRAL

A. Current Situation

The CACEN currently has two small microcomputers - an Apple II and an Apple IIe. The Apple II, which has two 140k floppy disk drives and 64K of memory was purchased in 1982. The Apple IIe, with 128K of Memory and dual 140K disk drives, was purchased in 1984. The system has two dot matrix printers.

Most of the applications performed on the two computers use either VISICALC (on the Apple II) or Multiplan (on the Apple IIe). For the most part the applications consist of financial analysis, forecasting

and reporting functions. Some accounting and a small fixed assets inventory data base are being developed, but the computers do not really support the day-to-day operations of the CACEN.

Activities performed by the computers include:

- Monthly preparation of consolidated Balance Sheets and Financial Statements.
- Monthly loan portfolio analysis
- Quarterly financial analysis of each association
- Quarterly interest rate factor calculation
- Quarterly financial analysis of CACEN
- Cash Flow Analysis of the system
- Study and statistics of loan and savings markets and promotion
- Analysis of unit prices of water project materials.

The small memory and disk capacity and slow speed of the Apple computers will be increasingly limiting factors as the CACEN attempts to develop additional and more sophisticated data bases and applications. Already many of the existing programs are encountering problems with memory and diskette limitations.

Equally important, the nature of individual standalone microcomputers (any individual standalone microcomputer) with local data storage is not compatible with the long range needs of the CACEN for integrated data bases, shared files and multiple user access to data bases. These computers helped the CACEN to become familiar with computer assisted decision support activities, but are not adequate to meet current needs.

B. Organizational Responsibilities and Structure

The CACEN acts as both a regulatory agency and "trade association" for Bolivia's Savings and Loan System. As a regulatory agency it is responsible for auditing the associations and making sure they are in

compliance with existing Bolivian laws. As a trade association it acts to promote the growth and viability of the system -- negotiating external credits, representing the associations before national government agencies and ministries and helping to plan strategies and programs. Neither the regulatory nor the "trade association" functions can be performed well without adequate information support.

The CACEN is divided into seven major departments:

Gerencia	Responsible for the overall administration of the CACEN and its programs.
Asesoría General	Legal Advisor.
Subgerencia de Operaciones	In charge of the active projects of the CACEN, including the water and sanitation project, rural development project and savings and loan projects.
Departamento de Planificación	Responsible for maintaining statistics on the savings and loan system and for using the data to analyze trends, forecasting liquidity and cash flow, and planning new programs and strategies.
Auditing Department (Departamento de Auditoría?)	Responsible for auditing the savings and loan associations
Contable General	Responsible for maintaining the CACEN's accounting and personnel systems
Insurance	Responsible for registering and administering the CACEN's insurance programs

C. Current Problems and Observations

During interviews with various staff members of the CACEN the following problems were identified:

1. The current equipment is too limited to perform the functions required by the CACEN. Both in terms of main memory and diskette capacity the computers are not capable of handling the mass of data that should be stored on the balance sheet, financial statements and statistics of the associations. As a result, analyses that should be performed are not.
2. Because of machine limitations, the data on the associations are not being completely entered, and are being entered in separate blocks instead of as an integrated data base. Some data are being entered twice for separate applications.
3. Normal reporting for the statistical system is static -- focusing only on this month's data. This, again, is due to machine limitations. Data necessary to perform growth and forecasting applications would have to be rekeyed in a different format.
4. There are no backups for either the program used by CACEN personnel or the data itself. This is a very dangerous situation. Again, this is largely due to the fact that machine limitations discourage backup.
5. For the most part the staff only know how to use Visicalc or Multiplan. Most of the future applications desired for the CACEN would require data base and operational program skills as well as spreadsheet knowledge.
6. Because the data base is fragmented among the separate applications, it is difficult to develop new applications using the data in different formats.

7. Different applications define the same data in different ways. In particular, the consolidated balance sheet program and the financial analysis of the associations program define assets, liabilities, income and expenses differently, even though data for both come from the same source documents. Because of this, the data have to be entered twice. In a well designed system the data would be entered only once, and specialized application programs would reorganize it to fit the different needs (if, in fact, they should be different).

In summary, the current equipment is inadequate for an expanded information system in the CACEN. In addition, considerable planning should go into the design and development of a new system to assure that it is efficient, effective and meets the needs of all components of CACEN management and departmental units.

Other observations relevant to the current applications of the CACEN computer applications include:

1. Fixed assets inventory. The data base that has been modeled has several problems:
 - a. It is not coded properly. It should have a code for classes of items such as chairs, calculators, desks, etc. so that like items can be grouped in reports.
 - b. It is easier to sort and select on codes such as 1, 2, 3, or a, b, c, than on words such as Contable General, Asesoria General, etc. The words would be replaced by codes.
 - c. The key letter code for items does not help either identify or locate them. This code should be dropped.
 - d. This is more a data base than a Visicalc or Multiplan application.

2. The difference between what is stored on the computer and what comes out on reports is not well understood. On a computer application you want to eliminate all redundancy in the data base. If all loans to associations have the code CACEN in front of them you do not have to have that in the data base. The report function can be programmed to print it in front of each loan number. The same applies to the fixed assets program: if a "Departamento de Planificacion," that phrase does not have to be on every record for an item that is located in that department. The computer can be programmed to print the department when needed.

3. At the present time there is no way to assess the profitability of the insurance program. Because recordkeeping is divided between two departments, it is not possible to tell how many policies are active, what the exposed risk of the CACEN is, or how the different programs have performed.

D. A Summary of the Application Needs of the CACEN

During the period from February 25 to March 8, 1985, I interviewed the various managers and departments chiefs of the CACEN to explore information problems and needs. The following list of potential application requirements, divided by departments is a summary of those interviews.

Department of Operations

1. Water and Sanitation Project Management. Under this project the CACEN would lend funds to three cooperatives to develop potable water and sanitation systems for Guayaramerin, Villazon and Bermejo. The CACEN would centrally purchase basic construction materials and "sell" them to the projects as needed.

Support for this project requires a basic project management system and an inventory system. The project management system should track disbursements, costs and physical progress against original plans. It should provide immediate feedback on delays and cost overruns.

The inventory system needs to be able to track and value project inventory items in three separate warehouses for the three separate projects. It must be capable of tracking about 3,000 separate items at both historical and current prices, with frequent current price changes.

2. Rural Development Project. Through this project the CACEN disburses funds to the associations to support rural housing construction. There have been five loans to cooperatives or groups, and approximately 92 loans to individuals.

Automated support to this system would consist of a small project management program to track progress in the construction and completion of works, and in the basic accounting functions controlling disbursements to and collections from the associations.

3. Savings and Loan Project. This project attempts to track monetary and financial trends in the Bolivian Society and the associations, use that data to plan strategies to attract savings and increase loans, and evaluate the success of savings mobilization and loan promotion efforts.

At the present time these calculations are being performed with Visicalc, using a combination of data gathered specifically for this analysis and a subset of the monthly data reported by the associations. The association data is entered specifically for

this program. In reality, these should be part of a data base system, drawing on data from a central master file of association data.

4. Control of Disbursements and Collections. The CACEN makes loans to its member associations and collects payments from them. This should be supported by a small tracking and accounting program that would track outstanding balances, payments and delinquencies. The program would have to track, at a minimum:

Number of the Agreement
 Number of the Document
 Number of the Association
 Name of the Association
 Objective of the loan
 Source of financing
 Total amount of the loan
 Number of the disbursement
 Amount of the disbursement
 Accumulated amount of disbursements
 Date of the agreement
 Date of the various disbursements
 Other financial dates
 Interest Rate
 Period of the loan
 Repayment schedule (including periodicity and amount)

Department of Planning

This department is responsible for maintaining data on the various associations, and using that data to make forecasts, analyze the financial condition of the associations and prepare regular statistics on the status of the movement. This department is the heaviest user of the Apple computers. }

As mentioned earlier, only a portion of the data available from the savings and loan associations is entered on the computer. Even that is divided among separate applications and stored as an integral part of specific spreadsheet applications. This means that it is very difficult to take the data and use it for a new application: it usually must be reentered for each new application.

This is the major system for the CACEN, and it needs to be substantially revised and improved. In specific, it should:

- be designed as an integrated, non-redundant data base;
- have a single set of programs to enter and edit the data;
- have singularity of data -- that is, the data should only be entered once and stored in one location in the data base;
- have separate programs to extract data subsets for use in specific spreadsheet and analysis programs.

The data base for this system would logically consist of several separate data sets, including:

- Monthly balance sheet, financial statement and statistical data on the associations for the past five years.
- Year-end summary balance sheet, financial statement and statistical data on the associations since the beginning of the system, in 1986.
- Relevant national accounts data on interest rates, inflation rates, exchange rates and others, selected and maintained in a consistent fashion for analysis.
- Market statistics on banks, credit unions and other competitors.
- Weekly liquidity and transaction statistics for the associations.
- Other data as identified in a review that would be conducted at the time the system was designed.

These separate data sets would be maintained as an integrated data base. Programs would be developed to extract subsets of data from the various

data sets according to the needs of specific analyses. All users would have access to the same data, which would increase reliability and validity.

Accounting Department

The accounting department has begun to experiment with some programs on the Apple II, but has not gone very far because of machine limitations a lack of continuous access. The chart of accounts has been developed and there is a program provided by the importer, Casa Holguin, but it has not been implemented.

Among the various applications identified as potential automated systems are:

1. The basic accounting for the CACEN. This system currently has about 250 transactions per month, compared to about 3 times that number before.
2. System to control disbursement to and collections from the associations (mentioned in the section on operations).
3. Fixed assets inventory system to keep track of the furniture, equipment and furnishings of the CACEN. A model of this data base has been developed, but some of the coding should be changed before it is programmed.
4. Inventory system for purchase and warehousing of office supplies.
5. Personnel recordkeeping, to keep track of employee time cards and calculate payroll information. This can be handled manually, so would not be a high priority for implementation.

Auditing Department

This department has the responsibility of auditing all of the associations and agencies on a regular basis. The agencies haven't been audited for two or three years. Last year approximately nine of the twelve associations were audited.

The audit department has no current plans to use the computer, although it does use the same monthly report data that is entered into the computer. It appears that, if the data is entered completely and correctly, the auditing department should be able to make use of specialized programs to conduct pre-audits of the associations and to check the mathematical accuracy of the monthly reports.

E. A Long-Range System Architecture for the CACEN's Information System

A long range architecture for the CACEN's central information system would contain five basic systems:

1. Planning System. Would contain the data and programs necessary for analyzing the status, trends, market position, competitiveness and liquidity of the savings and loan system.
2. Accounting and Administrative System. Would contain the data and programs for maintaining the accounting for the CACEN, fixed asset inventory, check writing, loans and collections to and from the associations.
3. Insurance System. Would integrate the now separate processing of issuing policies and accounting.
4. Personnel Management System. Would support all aspects of the personnel system, including personnel data, time card control, vacation, sick leave and other benefits, and payroll.

5. Project Management System. Would include program for tracking and monitoring major projects, such as the water and sanitation project and rural housing development project. This would also include an inventory control program.

Not all of these systems are of equal priority or urgency. The first system that should be developed is the planning system, as the major work of the CACEN in regulating and supporting savings and loan growth depends on that system. The second system developed should be the accounting and administrative system. The third system should be the insurance system. The project management system should only be developed if the water project is implemented, and the personnel system should be deferred.

F. Programming Considerations

To the extent possible, the system developed for the CACEN should use existing software and applications rather than custom programming. The major needs of the CACEN in the planning systems fall into areas supported by standard software. These include:

- a. Data Base management or file management programs
- b. Statistics and forecasting programs
- c. Spreadsheet applications

Likewise, many of the inventory and other administrative applications are essentially simple data base applications. These will require programming assistance to establish the data bases and link the standard software.

Other areas will require custom programming or package modifications. These include the insurance system (which will require an integration of the list of policies made with accounting and current status of policies) and a backup and archival program.

Custom programming, including the design and establishment of the planning system, should be performed by a Bolivian programming company that has demonstrated a proven capability to the CACEN. Additional consulting support provided through the USAID/US League project could help in the design and evaluation of the system development, but should not attempt to provide the programming.

All programs should be the property of the CACEN, and the CACEN should have full access to all program source codes.

All systems should be developed in a modular format, so that additional capabilities can be added easily. The central data management programs could require the continued support of the programming company for modification or enhancements, but they should be developed so that the use of the data in those systems (including reports and subsequent analyses) can be developed by CACEN personnel.

Basic Configuration proposed for the CACEN

Based on the above considerations, the CACEN needs a multi-user system that can handle up to 10 user terminals, with relatively large file handling capabilities and a fast processing speed. It should be a "scientific" type of computer, used primarily for mathematical computations and statistical analysis, rather than a traditional "data processing" oriented computer. The type of equipment I recommend, based on the equipment that is available and is supported in Bolivia, is as follows:

- 1 Central processor (preferably based on the Motorola 68000 architecture) with 1.5 - 2.0 megabytes of main memory, 45-55 megabyte hard disk, cartridge tape backup system and UNIX operating system

- 5 Terminals (1 in Planning, 1 in Accounting, 1 in Insurance, 1 console, and 1 shared terminal) (Note: it might be possible to use the Apples as terminals to the computer)

- 2 200-character per second printer (again, it might be possible to use existing printers on the system)

There are two brands of computers in this category that are currently being imported in Bolivia: the NCR TOWER, imported by the local NCR representative, and the PERTEC 3200, imported by SEINCO in Cochabamba. Because of the experience of the savings and loan associations with NCR, there is justification for skepticism about further dealings with this company.

There are probably sufficiently compelling benefits and advantages of the PERTEC 3200 system supported by SEINCO in Cochabamba to justify non-competitive procurement of that system under AID regulations. AID guidelines for USAID/Mission sole source contracting and procurement permit such procurement, up to a level of \$100,000 at Mission discretion for the following reasons:

1. Needed for compatibility with existing equipment.
2. Unique features required by the system.
3. Local support and maintenance is clearly superior or unique.

G. File Size Consideration

During this consultancy some minimum file size estimates were developed to illustrate minimum configuration requirements. Accurate file descriptions and capacity requirements would have to be developed during an external design phase.

The major systems that will determine disk storage requirements are the Planning and Insurance Systems. The Planning System currently uses about 140,000 bytes of data for each month's balance sheet and financial statement data, and as much as 60,000 bytes for other statistics, savings, loan and transaction data.

The system should maintain year-end data for every year of the system's history, and monthly data for each month of the past five years. The result would be two on-line data bases as follows:

1. Annual Data File, 20 years X 200,000 bytes = 4,000,000 bytes
2. Monthly Data File, 5 years X 12 months X 200,000 bytes =
12,000,000 bytes.

A weekly transaction file for the association, to be used in assessing trends and liquidity and to plan short-term strategies, would be much smaller, about 25,000 bytes.

Data file requirements for the Insurance System are much more difficult to estimate because of the current depressed status of the system and the fact that the savings insurance program is relatively new, yet could have significant volumes. The system should be designed to hold about 100,000 records, with approximately 20 data items per record. With 4-byte integer numbers, this file would require about 8 megabytes of storage.

As a result, these systems alone can be expected to require some 25 megabytes of on-line hard disk storage.

AID attempts to force everyone to choose from a limited number of "approved" micro computers, although project funded computer purchases are generally exempted from this requirement. Use of any of these in this case would be a total misapplication of technology. The needs and requirements of the savings and loan system and the CACEN cannot be met by the undersized standalone Micro computer systems on the official "approved" list. Breaking up the work so it could fit on these machines would exacerbate rather than resolve the information system problems of the system. Even the IBM PC-AT is not a responsible proposal at this time. The systems required are relatively large, multiuser, integrated and interdependent systems. Standalone microcomputers or small capacity hard disk system are not a responsible feasible approach to addressing these system problems.

1. If funds can be made available, CACEN should upgrade its computer equipment sufficiently to permit it to perform its responsibilities in monitoring and supervising savings and loan activities, analyzing data on the performance of the system, and planning rational development strategies. Any system purchased should have the capability of filling all of the identified needs of CACEN.
2. The Auditors for CACEN should conduct a test of each of the computer systems to make sure that programs are making calculations correctly.
3. CACEN should develop the Mutual Guapay computer development contract as a standard contract.
4. CACEN and the Associations should begin planning now for a more rapid velocity of data and information. The movement to monthly interest compounding and posting is just one example of how things will speed up. There may eventually be a need for multiple savings instruments with very short compounding periods -- even daily. In addition, decision-making time will be shortened, so having current data will become even more important.
5. CACEN needs liquidity and movement of funds data more frequently at least weekly. The best current option for obtaining this data is weekly telephone calls on Monday mornings for the past week's data.
6. CACEN needs to develop more sophisticated financial and trend analysis of the system. Profitability, season variations in demand and liquidity, month-to month changes in major ratios and volumes need to be calculated and reported. In general, the current reports need to be streamlined -- less volume of data and

- more critical data, reported in summary form, addressing important management decisions, in addition to the dumps of balance sheet and financial statements that are being produced now.
7. AID should provide participant training, perhaps in Puerto Rico, for (1) computer auditing, (2) advanced spread sheet techniques specific to the spreadsheet program acquired, (3) financial analysis and financial planning.