ANNEX 9 CLEARING OF DRAFTS AND CHECKS

Clearing of Drafts and Checks

1. Clearance and Clearing Houses

1-1 Use of Drafts and Checks

In today's capitalist society, most businesses use drafts and checks as means of payment because of convenience compared to cash payment. A draft or a check is drawn by a company under an agreement on checking account transaction made between the company and its bank, and after circulation in the form of endorsement, it is finally cleared by collecting the amount from the company's checking account at the bank. For this reason, the checking account is also referred to as the typical demand deposit or deposit currency in contrast to cash currency. Deposit currency ordinarily exists as an amount credited to a bank's account, and once it is realized as a check or draft, it is circulated (becomes negotiable) and transferred as means of payment for business and other transactions.

The amount of drafts and checks in circulation vary greatly among countries, depending upon the development stage of the corporate system and payment practice in a particular country. Japan, for instance, is said to prefer cash currency compared to the U.S. and the UK, but drafts and checks are widely used as a principal means of payment among businesses, as well as individuals in part.

Drafts and checks are securities entitling their bearers to demand payment on the amounts indicated on them. To exercise the right to receive the payment, the bearer is required to present his draft or check. More precisely, there are various requirements to be met in presentation for payment, somewhat different between the check or the draft, without which the bearer cannot receive payment. In the case of a check, its payer (drawee) qualified to pay upon presentation of the check is limited to banks and other financial institutions. On the other hand, the draft is drawn on a third party and mostly paid by financial institutions. Thus, both drafts and checks are generally presented to financial institutions for payment.

It should be noted, however, that drafts and checks are seldom presented directly by their bearers at paying banks. In most cases, they are deposited at banks that have business transactions with the bearers or are collected through them upon request. In

consequence, presentation of drafts or checks and their payment are usually made through financial institutions.

After presentation, drafts and checks have to be collected so far as they are drawn on a different bank, while they are paid upon demand when they are drawn on a different branch of the same bank. Historically, the need for the clearing house arises in a country as credit transactions increase with economic growth and result in a large number of drafts and checks circulated throughout the country. It gives birth to the system to make quick collection on drafts and checks among financial institutions.

1-2 Clearing Houses

The origin of the clearing house is not accurately known. The oldest one on record is the London Bankers' Clearing House, which is said to have been established in around 1773. At that time, there were 30 private banks in London, which appointed "clearers" who regularly visit other banks to collect payment on checks and drafts drawn on them. One day, several clearers got together and agreed to meet at a public house, Five Bells, located in Dow Court, Lombard Street, to exchange drafts and checks to be collected from each other's banks. Later, a clearing room was established in one room of the pub, called the Bankers' Clearing House.

Around 80 years after the establishment of the London clearing house, modern clearing houses were born and flourished in other countries. In New York, a plan to establish a clearing house modeling after London was started in around 1830. In 1853, the number of banks almost doubled from 24 to 57 due to the gold rush in a frontier and a need for a quick and simple collection and payment system heightened as ever. And the New York Clearing House was established under cooperation of 52 banks. The move was followed by other areas, including Boston (in 1856), Philadelphia (1858), and Chicago (1865).

Concurrently, European countries began to have clearing houses: including Vienna, Austria, in 1864; Paris, France, in 1872; Berlin, Frankfurt, Dresden, and Leipzig between 1883 and 1884. All of them generally followed the London clearing house's model.

In Japan, the first clearing house was founded in Osaka, in 1879, followed by Tokyo (1887), Kobe (1897), Kyoto (1898), Yokohama (1900), and Nagoya (1902). Today, there are more than 180 clearing houses throughout the country.

1-3 Clearing Houses and Presentation for Payment

Originally, clearing houses have been established to meet market demand for handling increased circulation of drafts and checks. Today, clearing houses firmly root in Japan, which presence is guaranteed by law. In fact, clearing houses in Japan must be designated by the Minister of Justice and are authorized to impose a special legal effect in their operation under the Bills of Exchange and Promissory Notes Act and the Check Act.

The designated clearing house system was first adopted by the Austrian check act in 1906 for the purpose of giving legal guarantee for presentation of checks for payment at the clearing house. Japan introduced the system in 1911. Then, in 1933 when the present the Bills of Exchange and Promissory Notes Act and the Check Act were enacted in response to the signing of the Unified Draft and Check Convention, provisions covering the designation of clearing houses were incorporated into the two acts.

Under the acts, presentation of a draft or a check at a clearing house is deemed to have a legal effect as presentation for payment. This reflects public recognition that clearing houses are facilities indispensable in settlement of negotiable securities.

Although classified as negotiable securities, drafts and checks play different roles in the market, as well as differences in time and place of presentation.

Checks are essentially an instrument to make payment instead of cash and thus are characterized as securities for payment. They become always payable at sight and require prompt payment. For this reason, time of presentation for checks is 10 days after the date of issue. They are also payable after the time of presentation unless the request for payment is canceled, provided that the payer is limited to banks and other financial institutions.

On the other hand, drafts function as credit instrument. Their circulation period is relatively long and their due date (date of maturity) varies greatly. The bearer of the draft is entitled to receive payment from a drawer (in the case of a promissory note) or an underwriter (in the case of a draft of exchange) upon presentation. Unless the draft or the note is presented, the drawer or the underwriter is not obliged to pay. Time of presentation is 3 days starting from the date of maturity and covering subsequent 2 business days, except for payment at sight. The Bills of Exchange and Promissory Notes Act authorizes payment at the payer's place or a third party's place. If a financial institution is designated as a place of payment, it is also deemed to be the payer. In reality, however, all drafts are drawn and circulated by designating financial institutions as place of payment under the uniform draft form system. Thus, drafts are presented to financial institutions for payment, just like checks.

1-4 Suspension of Transactions

If payment against a draft or a check presented through the clearing process is rejected, it threatens the foundation of credit transaction if the situation is left intact. Drafts and checks can be circulated with confidence, solely relying upon credit created by their drawers or issuers (ability to pay). When a draft or a check bounces, it presents a risk of damaging public confidence of the issuer or the drawer. Unless the risk is removed by excluding the person in default from credit transactions, it will adversely affect sound circulation of drafts and checks.

Suspension of transactions is operated as an official rule of the clearing process to exclude bad drafts and checks from circulation in order to avoid the above risk. Today, the suspension system is one of the most important functions of clearing houses, in addition to clearance of drafts and checks.

The suspension system is generally called the dishonor system. The drawer of a dishonored check, the issuer of a dishonored commercial draft, or the underwriter of a dishonored draft of exchange (the final payer) is prohibited from checking account and loan transactions (not including loans for preservation of credit) for 2 years. In essence the suspension system is designed to exclude the final payer, who does not perform the duty to honor a draft or a check without a just reason, from bank transactions for a certain period of time. More important, it is based on regulations of clearing houses,

not established under the law, and thus it is considered to operated by private and voluntary regulations. As a result, suspension of transactions at clearing house A is applied to all the banks participating in the clearing house, but not to other clearing houses and member banks.

1-5 Businesses of Clearing Houses

This section outlines major activities of clearing houses, particularly focusing on those in Japan. Businesses conducted by clearing houses, which are described in clearing house regulations in detail, are summarized as follows:

(1) Clearing of drafts and checks

(2) Operation of the suspension of transactions system

(3) Collection and distribution of statistical data

Clearing houses distribute the amount of draft clearings, the numbers of dishonored drafts and checks, and data on persons subject to suspension of transactions.

(4) Other related businesses

Many clearing houses clear instruments, in addition to drafts and checks, for convenience of participants, which are roughly classified into two types. The specified instrument clearing service covers the clearing related to the instrument exchange under the domestic exchange system, and the exchange of clearing slips effecting settlement, such as dividend.

The ordinary instrument clearing service handles instruments other the specified instruments, that do not effect payment transactions.

1-6 Participants in Clearing Houses

Financial institutions participating in activity of clearing houses are called "participant banks" under clearing house regulations. Participant banks can be classified into various types according to the type of participation in clearing house, as follows:

Participant banks
- Menber banks
  - Regular member banks
  - Associate member banks
  - Special mamber banks
- Non-member banks

(1) Regular member banks

They are banks which obtain membership with right to manage clearing houses and participate directly in the clearing process. The Tokyo Clearing House defines regular member banks to be "limited to banks having their head office or branch in Tokyo." An eligible bank meeting requirements submit application to the board of directors for approval, and upon payment of a membership fee, it is registered in the member list and officially obtains membership.

A regular member bank loses its membership for any of the following reasons, in addition to general reasons such as voluntary resignation and liquidation or suspension of business:

1) In the event the bank fails to pay the debit balance of clearing under clearing house regulations;
2) In the event the bank fails to pay for a dishonored and returned draft; or
3) In the event the bank is dismissed from membership by resolution of members' meeting due to failure to pay its share of expenses or breach of clearing regulations.

(2) Associate member banks

Associate membership is granted to banks, other than member banks, which meet specific requirements and obtain approval of the board of directors by submitting an application and paying a membership fee. Membership requirements are set forth in consideration to the size of the clearing facility and the efficiency of clearing operation, not discriminating a particular financial institution according to the type of business. For instance, the Tokyo Clearing House expects its associate member bank to clear or collect an average of over 3,000 checks or drafts per day.

Associate member banks are required to settle the clearing balance through funds transfer from or to their checking accounts at the central bank (Bank of Japan), which thus constitute another requirements for membership. Finally, some clearing houses maintain membership requirements for machine-assisted processing of drafts and checks.

An associate member bank loses its membership under the same rules applied to the regular member bank.

(3) Special member banks

Special member banks are the Bank of Japan and post offices (which handle money order business). Their status is not clearly defined in clearing house regulations, but they are at least eligible for the following special treatments:

1) Sharing of cost for clearing house operation
2) Exempt from collateral requirement for clearance
3) Special treatment on clearing procedures as exemption from clearing house regulations

(4) Non-member banks

Banks that are neither regular member nor associate member can participate in the clearing house process if they meet specific requirements, through a regular member or associate member bank. Just like the regular and associate member banks, a bank must submit an application to the board of directors for approval, and obtain qualification to request clearance for non-members by paying a membership fee. This arrangement is useful for banks that do not have a head office nor a branch in the district served by the clearing house through which they wish to clear drafts and checks.

The non-member bank loses its qualification under the same rule applied to associate member banks. In addition, peculiarity of the clearing through a trustee bank results in disqualification when the non-member bank fails to pay an amount to cover a deficit in its checking account at the trustee bank.

1-7 Management of Clearing Houses

In Japan, clearing houses are not an independent legal entity. Rather, they are operated by bank associations in their localities (mostly established as foundation or corporation). For instance, the Tokyo Clearing House is operated by the Tokyo Bankers' Association (corporation) which specifies, in its articles of incorporation, "the Establishment and Operation of the Tokyo Clearing House" as one of its business objectives. Thus, operation and management of each clearing house in Japan is governed by resolutions of the board of directors and/or the general meeting of the members of the bankers' association concerned.

Notably, the most important aspect of the clearing process is that a joint task involving a large number of participants is smoothly carried out under the agreement among banks in the bankers' association. At the same time, however, the fact that important decisions related to operation and management of the clearing house are made by a single organization, namely the bankers' association, seems to incur some conflict with the spirit and principle of the clearing house which is solely governed by its member banks.

1-8 Development of Standard Forms of Draft and Check

As the numbers of drafts and checks paid through clearing procedures increase, their efficient processing becomes a major concern for participants. While automation holds the key to streamlining the clearing process, its success relies on the ability to establish unified standards for drafts and checks in terms of their forms.

In Japan, drafts have originally been drawn using various commercial forms or original forms created by individual companies. In 1965, the National Federation of Bankers' Associations introduced a unified form for drafts which would be distributed by banks, in addition to the adoption of strict rules for suspension of transactions for dishonor. In 1968, the federation decided to standardize the form used for checks, and amended clearing house regulations throughout the country by 1970. As a result, unified forms of draft and check have been adopted and began to be distributed by financial institutions.

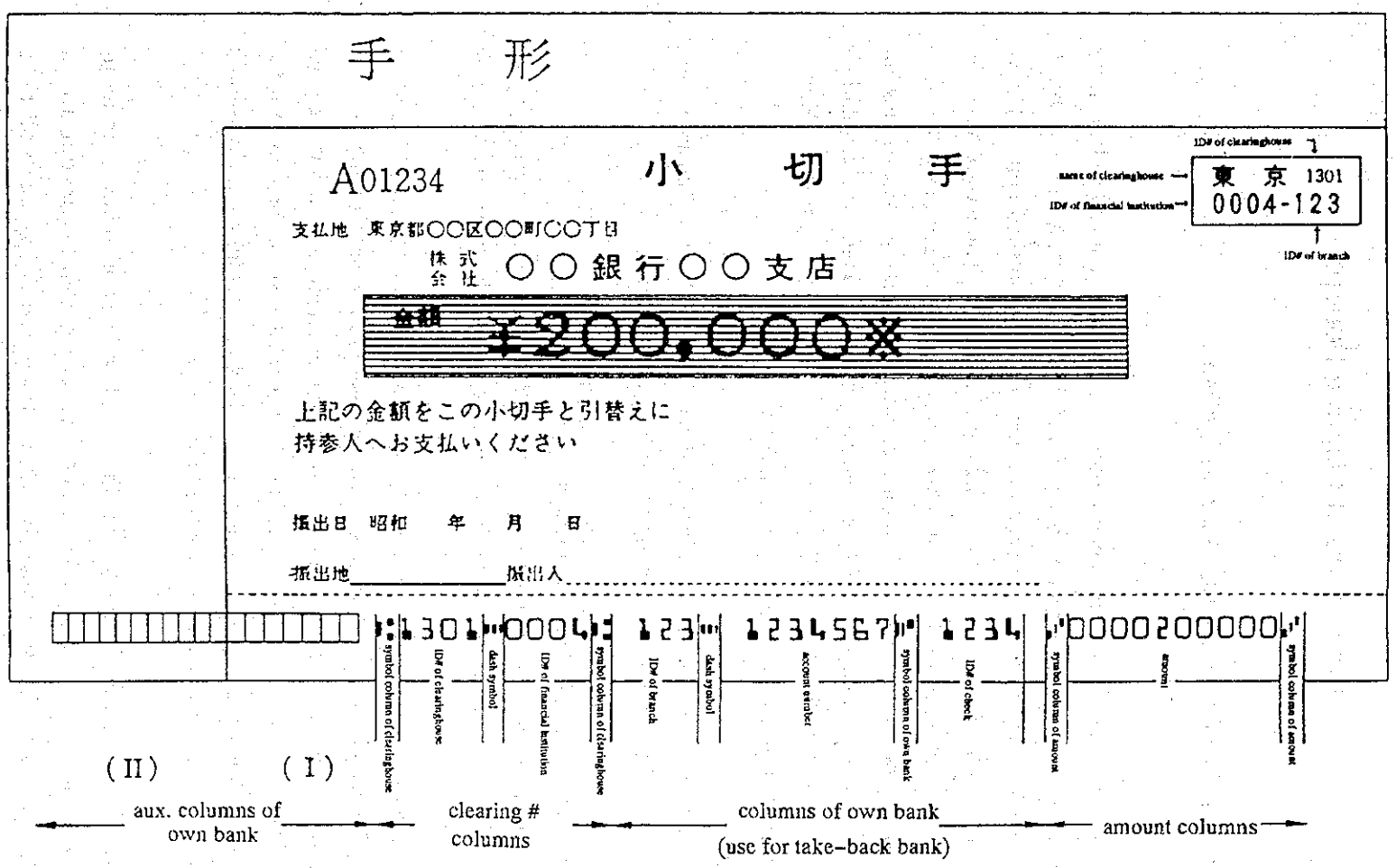
Significant characteristics of these unified forms are found in securing of the "clear band" – a space for magnetic ink character recognition (MICR) – and the adoption of paper quality suitable for machine processing. Today, these new features are effectively used to help automate the clearing process including sorting.

The MICR system is an automatic check processing system developed under the leadership of the American Bankers' Association. It is divided into two types according the difference in font type, "E13B" used by the U.S. banking industry and "CMC7" mostly adopted in Europe. Japan uses the latter. Numbers 0 to 9 and various special characters are printed on the clear band of drafts and checks. They are read and sorted by the reader sorter at a high speed, and data read by the reader are processed by computer.

In 1970, the National Federation of Bankers' Associations decided to assign reference numbers to drafts and checks from the viewpoint of streamlining the draft clearing and collection process. Each reference number consists of 4 digits for the name of the clearing house (number), 4 digits for the unified code number for the bank and 3 digits for the unified code number for the branch.

Sample standard forms of draft and check are shown below.

Sample Forms of Draft and Check is shown in the next page.



Note: Field I (7 spaces) in aux. columns of own bank is for carry-back bank, and field II (rest space, check only) is a use for take-out bank.

2. Procedures at Clearing Houses

2-1 Principle of Draft and Check Clearing System

Regulations of clearing houses in Japan require participating banks to clear drafts and checks payable by other participating banks (e.g., Tokyo Clearing House). As its history shows, the clearing process has been developed as a simplified and collective mechanism to settle a large number of drafts and checks, and it is common interest for participating banks to clear all the drafts and checks received from their customers on a daily basis through the mechanism. At the same time, such practice constitutes the foundation of maintaining and operating the clearing system. Thus, the regulations reflect the intent of clearing houses to make the "all-clearing" principle into a mandatory rule to be followed by participating banks.

However, there must be some exception to the rule, and clearing houses permit direct collection by participating banks under the following circumstances:

1) In the event a member bank fails to attend at the clearing process;
2) In the event a member bank fails to pay an amount covering a deficit in the clearing balance within a specified time limit, resulting in carry-back of the clearance;
3) In the event a draft or a check is mistakenly delivered to a member bank that is not the paying bank and is returned, then is presented again to the paying bank; or
4) In the event a non-member bank fails to pay an amount against a deficit incurred through clearance for non-members effected by a trustee bank, and the trustee bank retrieves drafts drawn on the non-member bank (not including a dishonored draft) and returns them to the non-member bank.

Under any of the above circumstances, the member bank is relieved from its obligation to clear through its clearing house and can collect the due amount directly. It should be noted, however, that such situation often reflects that the paying bank faces difficulty in continuing its business, except for the case of a mistakenly delivered draft or check in 3) above. Thus, the member bank withdraw from the clearing house before or when any of the above circumstances arises.

A major problem related to the clearing process occurs when a time draft passes its presentation period (3 business days after due date). Unless it is apparent that it will occur at the time of payment or collection, both the Bills of Exchange and Promissory Notes Act and the Check Act permit extension of a legal presentation period due to force majeure. Force majeure means an external event which prevents presentation of a draft or a check for payment and which cannot be avoided under reasonable control, including an act of God, strike, riot, and blockade of the area where the clearing house or the bank located, but not including an accident involving the bearer or its designee appointed for presentation or protest. If any of the above events considered to constitute force majeure occurs, the local clearing house or the bankers' association will generally agree on special arrangement related to the clearing process.

2-2 Record on Credited Drafts

The member bank must record important particulars of drafts to be presented to the clearing house for clearing, so that it can respond promptly to an inquiry from any bank which has collected them from the clearing house.

Neither the laws nor the clearing house regulations specify a particular method of recording to be followed by member banks, and each bank can decide on its own. Previously, banks used a draft register to record the type of draft credited, a serial number and amount of the draft or check, the place of payment, the name and address of the drawer (or underwriter for the bill of exchange), and the due date (or the date of issue), and the receiver. However, the wide use of the office processing equipment has replaced the register with microfilm record. Since the credited draft can be photographed to make a complete record on both sides including the signature, the method offers a significant advantage over the register.

The record on credited drafts is useful for various purposes. For instance, if any difference in amount between credit and debit exchanges occurs for a draft, it will be settled by collating the draft collected by the paying bank and the record at the crediting bank. The record offers a significant advantage in the case of a theft or a loss of the cleared draft on the way from the clearing house. It is not rare that a member bank loses cleared drafts in the course of transporting them from the clearing house, or from

its clearing center to branches. Or such event occurs when a non-member bank brings back drafts from a trustee bank. In this case, prompt measures are required in light of the fact that the clearing process is limited by time, and the record at the crediting bank becomes an important evidence.

In this case, the clearing house notifies the crediting banks, which have to promptly inform particulars of the credited drafts (including dishonored drafts) in order to prevent the slowdown in funds transfer between checking accounts concerned.

2-3 Affixation of Clearing Stamp

The member bank must affix a clearing stamp on drafts, checks and other securities to be presented for clearing. The clearing stamp constitutes the receipt in the clearing process. While a bearer is required to sign on a draft or check in the case of direct collection, the clearing stamp eliminates the need for the signature by serving as a prima facie evidence of receipt.

A sample standard and form for the clearing stamp is shown below:

1)	Information to be indicated	: The name of bank, clearing date (year, month, day), word "Cleared." Including but not limited to crediting branch, unified code number for the financial institution, logo mark.
2)	Size	: Less than 30mm high x 35mm long
3)	Color	: Not restricted
4)	Form	: One form for each bank
5)	Stamping position	: Back side of each draft or check
6)	Other	: The clearing stamp must be notified to the clearing house as well as other member banks.

2-4 Indication of Crediting Bank and Branch

The member bank must indicate the names of the crediting bank and branch (participating in the clearing process) on the front side of drafts, checks and other securities to be cleared, by using a special crossing stamp and other medium. In practice, the special crossing stamp seems to be always used for this purpose. The requirement to indicate the names of the crediting bank and branch is designed to

ensure smooth clearing by allowing quick identification of the origin of each draft or check.

The most important element of the clearing process is to identify the branch to return a dishonored draft or check. One exception is a draft or check received by a branch that does not participate in the clearing house. Such draft or check has a special crossing stamp at the branch and is then presented to the clearing house through a branch serving as a clearing center or dishonored draft receiving center. In this case, the name of the clearing center or the dishonored draft receiving center may be omitted to save time for restamping.

2-5 Clearance Procedures

The clearing houses in Japan clear drafts and checks for specified hours in the morning of each business day. Member banks send their staff to a local clearing house to delivery credited drafts, receive drafts payable, confirm an account current, and compute and settle the clearing balance.

A typical work flow from the receipt of drafts, checks and other securities (hereinafter collectively referred to as "drafts") to actual presentation to the clearing house is described according to various stages as follows.

(1) Procedures at the crediting branch

A branch records all the drafts to be credited and affixes the clearing stamp and the special crossing stamp. As for microfilm record, some banks have their clearing centers take photograph of credited drafts, which then send microfilms to respective branches.

Then, credited drafts are classified according to the paying bank and record the number of drafts and their amounts on a subsidiary journal slip (form not specified). The subsidiary journal slip is designed to facilitate the subsequent processing work at the clearing center and is attached to the corresponding draft after classification.

(2) Procedures at the clearing center

Drafts which have been through the above procedures at each crediting branch are collected by a mail car and send to the clearing center(s) of each bank, which tabulates and sorts drafts from all the branches to be presented for clearing on the next business day.

1) Sorting and summation by paying bank

The clearing center checks drafts collected from crediting branches against subsidiary journal slips accompanying them, sorts them according to the paying bank, and computes the total amount of subsidiary journal slips to obtain the number of drafts to be delivered to each paying bank, and their amount due.

2) Preparation of the summary table of clearance

Based on the number of drafts and the amount due obtained for each paying bank, a summary table of clearance for each paying bank (in a specified form, duplicate) is prepared. The original table is delivered to the paying bank, accompanied by the listed drafts. The duplicate is kept by the crediting bank as evidence. Note that for a bank to which there is no draft to credit, the "zero" table indicating zero in the number of drafts and the amount columns is prepared and distributed.

3) Determination of the total amount of crediting

Based on the summary table of clearance, the total number and amount of credited drafts are computed to determine the total amount of drafts to be credited to other banks through the clearing process. The amount is then entered on the credit side of a clearance schedule and a clearing balance sheet. The clearance schedule is used to perform credit and debit exchanges for the clearing process and to compute the clearing balance. The clearing balance sheet is designed to report data to the clearing house and forms the basis of clearing procedures.

(3) Procedures at the clearing house

Staff of member banks who participate in the clearing process are called the

clearers. Member banks are solely responsible for acts of their own clearers in connection with clearance. The clearer's jobs are summarized as follows.

1) Distribution of credited drafts

The clearer of each member bank comes to the clearing office by a specified starting time and distributes drafts that have completed the crediting procedure on the previous day to clearers of paying banks.

At the same time, the clearer submits the completed clearing balance table to the clearing house to report the total amount of drafts credited. The clearing house confirms attendance of its member banks on the basis of clearing balance tables submitted and identifies the total amount of drafts to be cleared on the day. Then, the clearing house returns clearing balance tables to member banks.

2) Inspection of received drafts

Concurrently with distribution of drafts to be cleared, the clearer checks drafts received from other member banks, e.g., whether the original summary table of clearance is attached to drafts received, and it indicates the correct number and amount of the drafts. In practice, the number of drafts is checked due to limited time available for the clearing procedure.

If any difference is found between the number of drafts received and the figure indicated on the summary table of clearance, the clearer requests the crediting bank for re-inspection. If the different is confirmed, the summary table of clearance is to be corrected accordingly. Care should be taken to make correction on related tables, including the duplicate summary table of clearance, the clearance schedule, and the clearing balance table.

Concurrently with inspection on the number and amount of drafts, the clearer of the receiving bank checks to see whether each draft bears the clearing stamp and whether any draft to be presented to other bank is present. Note that affixation of the clearing stamp is one of the most important jobs for the crediting bank, the receiving bank is not required to check presence of the stamp. Nevertheless, inspection is customarily done by each receiving bank in consideration to the

importance of the clearing stamp. If the absence of the clearing stamp, a unclear stamp or an incorrect date is found, the clearer requests prompt correction. If found after the clearing procedure, the receiving bank may request correction at that time.

Misrepresentation (or mix-up) of drafts is somewhat inevitable for the clearing house that has a large number of member banks, partly because of an increasing number of banks having similar names. In any case, it is desirable to find it at the time at initial inspection at the clearing house. Misrepresentation is often settled through funds transfer among the crediting bank, the misrepresented bank and the legitimate receiving bank, rather than on-spot correction of clearing balances of the banks concerned.

3) Computation of clearing balance

Upon completion of the above inspection procedures, the clearer checks if the number of summary tables received is equivalent to the number of member banks participating in the clearing process, less 1 representing the clearer's bank. Then, the total number of drafts received and the total amount due are calculated from the summary tables of clearance and entered on the credit side of the clearance schedule. Finally, the request for funds transfer to settle the clearing balance, depending whether the net plus or net minus is obtained, is prepared and submitted with the clearing balance table to the clearing house.

(4) Final clearance and transfer request procedures

The clearing house, upon receipt of the clearing balance table filling out both the credit and debit sides, as re-submitted, computes the total number of drafts on the debit side and the amount due, and clearing balances for the credit and debit sides separately for final clearance.

1) Principle of balancing

In the clearing process, a credited draft presented by a bank is surely received by other bank, so that it is credited on the crediting bank on one hand and debited on the receiving (paying) bank on the other. The same result is obtained for the

clearing balance. Thus, in aggregate, the number of drafts, the amount due, and the clearing balance must always be balanced.

2) Correcting the difference in clearing balance

In practice, however, credit and debit sides obtained at the end of the clearing process are not always balanced due to miscalculation or miscount. This is often the case at clearing houses that are participated by a large number of banks. To find the difference in clearing balance promptly, there are various check points including the following:

a) To check the total number of drafts on the original summary tables of clearance. If any one is missing, the difference in clearing balance is likely to exist.
b) To check the summary table of clearance for calculation accuracy. Miscalculation in the table constitutes one of major causes for the difference in clearing balance.
c) To check the duplicate summary table of clearance to re-count the number of credited checks and the amount due.
d) To collate the original summary table clearance held by the receiving bank with the duplicate table held by the crediting bank, both the number of drafts and the amount due.
e) Finally, the clearing house checks the summary tables of clearance and the clearance schedules submitted by all the member banks.

3) Request for funds transfer to settle the clearing balance

Upon the final settlement, the clearing house prepares the final settlement table of clearance, stamps the request for funds transfer to settle the clearing balance submitted by each member bank, and submits all of them to the settlement bank (the central bank). The settlement bank transfers funds among accounts of the member banks at the deadline of funds transfer to settle the clearing balance (mostly 1:00 p.m.), then prepares a report on funds transfer with marking "Completed" and returns it to each clearing house. The clearing house distributes copies of the report to its member banks to complete the clearing procedure on the day.

3. Sorter/computer-Assisted Clearing Procedures

3-1 Proliferation of Sorter/computer Processing Systems

Recently, the above procedures at the clearing house are increasingly handled by using sorter/computer processing systems for various reasons:

1) Since 1965, bank services have been computerized at an accelerated pace, including those involving other banks such as the clearing process, which are increasingly automated under cooperative efforts among banks.
2) Unification of business protocols has progressed to an extent to allow highly automated payment transactions, including unification of standards and forms for drafts and checks, the establishment of unified code numbers for different financial institutions, and the agreement on various arrangements required to introduce the MICR (Magnetic Ink Character Recognition) system.
3) Increases in the number of drafts cleared each day and the number of member banks have exerted pressure on processing capacity of clearing house facilities, demanding automation from the interest of streamlining the clearing process.

In particular, the MICR system was first introduced in 1971 and has become pervasive among clearing houses throughout the country. It should be noted, however, that the MICR system does not change the intrinsic nature of the clearing process itself. Traditionally, member banks attended at their clearing house at specified time and physically delivered and exchanged securities to be cleared. Now, member banks deliver the securities to the clearing house during the night on the previous day, which sorts them according to their receiving bank by the sorter/computer, and tabulate and credit them by computer, including securities cleared through manual processing.

Introduction of the MICR system has brought about the following benefits:

<Major impacts of the MICR system on the clearing process>

1) Simplification of the crediting and crediting process
2) Minimized occurrence of the difference in clearing balance
3) Speed-up of the clearing process has helped streamline checking account

transactions, while covering a wider service area for each clearing house.

4) Accelerated automation of checking account transactions at member banks
5) Saving in manpower and time compared to the traditional face-to-face clearing process
6) Minimized growth of clearing expenses compared to the increase in workload
7) Elimination of physical restraint to participate, thereby to attract and accept new membership

3-2 Crediting Method

While preparation work before delivery to the clearing house remains unchanged, e.g., the record of credited drafts, the affixation of clearing stamp, and indication of the crediting branch by special crossing stamp, the crediting method at the clearing house is different, depending upon whether or not voucher used for the procedure is machine readable.

(1) Clearing house-sorted drafts

Unlike the traditional clearing process, drafts that are encrypted with unified codes according to issuing financial institutions and print the amount due under the MICR system are delivered by crediting banks to the clearing house, without sorting them according to receiving banks. Since these drafts are sorted automatically by the sorter/computer at the clearing house, they are generally referred to as "clearing house-sorted drafts."

The clearing house-sorted drafts are delivered to the clearing house between 4:30 p.m. on the previous business day and any of the following time limits:

Regular business days	9:00 p.m.
Day before the end of each month	9:30 p.m.
End of each month	10:30 p.m.

The delivered drafts are accompanied by the following documents.

1) Delivery list (form may be determined by each crediting bank)

The list indicates the amount due on each credited draft, the number of drafts and the total amount due per batch, batch's serial number, the name and the unified code number of the crediting bank, and the date of clearance. The list may be in the form of computer output, with entries in the same order as those on drafts.

2) Subsidiary credit slip for clearing house-sorted drafts

The slip indicates the total number of drafts and the total amount due per batch, and a serial number of the batch.

3) Tabulation slip for clearing house-sorted drafts

It contains the total number of clearing house-sorted drafts and the total amount due, and the total number of batches.

(2) Delivery of bank-sorted drafts

Voucher not machine readable, such as drafts without the unified code for the financial institution, is sorted by the crediting bank according to receiving bank and sealed in a clearing bag, which is then deposited in a designated locker at the clearing house by 8:00 a.m. on the next business day. The bag also contains the following slips:

1) Total credit slip for bank-sorted drafts (form B)

The slip contains the total number of bank-sorted slips and the total amount due according to issuing bank.

2) Tabulation slip

It is used when there are two or more clearing bags for the same bank and records the number of drafts and the amount due contained in each bag.

(3) Reporting of data

Both the clearing house-sorted drafts and the bank-sorted drafts are computed together to obtain the clearing balance. Member banks are required to report to the clearing house basic data on bank-sorted drafts, together with the total number of credited drafts, by using the following documents:

1) Total credit slip for bank-sorted drafts (form C)

It contains the total number of bank-sorted drafts and the total amount due for each receiving bank and MICR print them. Form A is retained by the crediting bank.

2) Report slip for bank-sorted drafts

The slip records the total number of bank-sorted drafts and the total amount due.

3) Summary table of credits for clearance

The table contains the total numbers of clearing house-sorted drafts and bank-sorted drafts, and their amounts due, as well as grand totals.

The report is made between 4:30 p.m. on the previous business day and any of the following time limits:

Regular business days	10:00 p.m.
Day before the end of each month	11;00 p.m.
End of each month	midnight
First day of each month	10:30 p.m.

3-3 Processing at Clearing Houses

(1) Reception

The clearing house, upon receipt of the sorted drafts and the data reporting slips above, enters time into a "roll call list of crediting banks," and checks the following particulars about the sorted drafts:

1) To check that the first batch is accompanied by the total credit slip for bank-sorted drafts (form B), and that the number of batches recorded on the slip agrees with the actual number of batches containing drafts.
2) To check that each batch is accompanied by the subsidiary credit slip for clearing house-sorted drafts and the delivery list, and that they contain the accurate name and unified code number of the crediting bank, and the date of clearance.

3) To check the data reporting slips to confirm that the number of total credit slips for bank-sorted drafts recorded in the report slip for bank-sorted drafts agrees with the actual number of total credit slips, and that the number of bank-sorted drafts and the amount due in the summary table of credits for clearance agree with those in the report slip for bank-sorted drafts.

Upon confirmation of the above, the clearing house affixes the reception stamp on the total credit slip for bank-sorted drafts (form A) or the summary table of credits for clearance (form A), and returns them to each bank.

(2) Sorter/computer processing

MICR printed drafts are read by the sorter that sort them according to participating bank on the basis of unified code number for each financial institution. At the same time, MICR recorded data are recorded on magnetic tapes, and the read-out result is printed out to be used as proof.

In addition to drafts, the sorter reads the tabulation slip for clearing house-sorted drafts and the subsidiary credit slip for clearing house-sorted drafts, which are then collated with corresponding drafts.

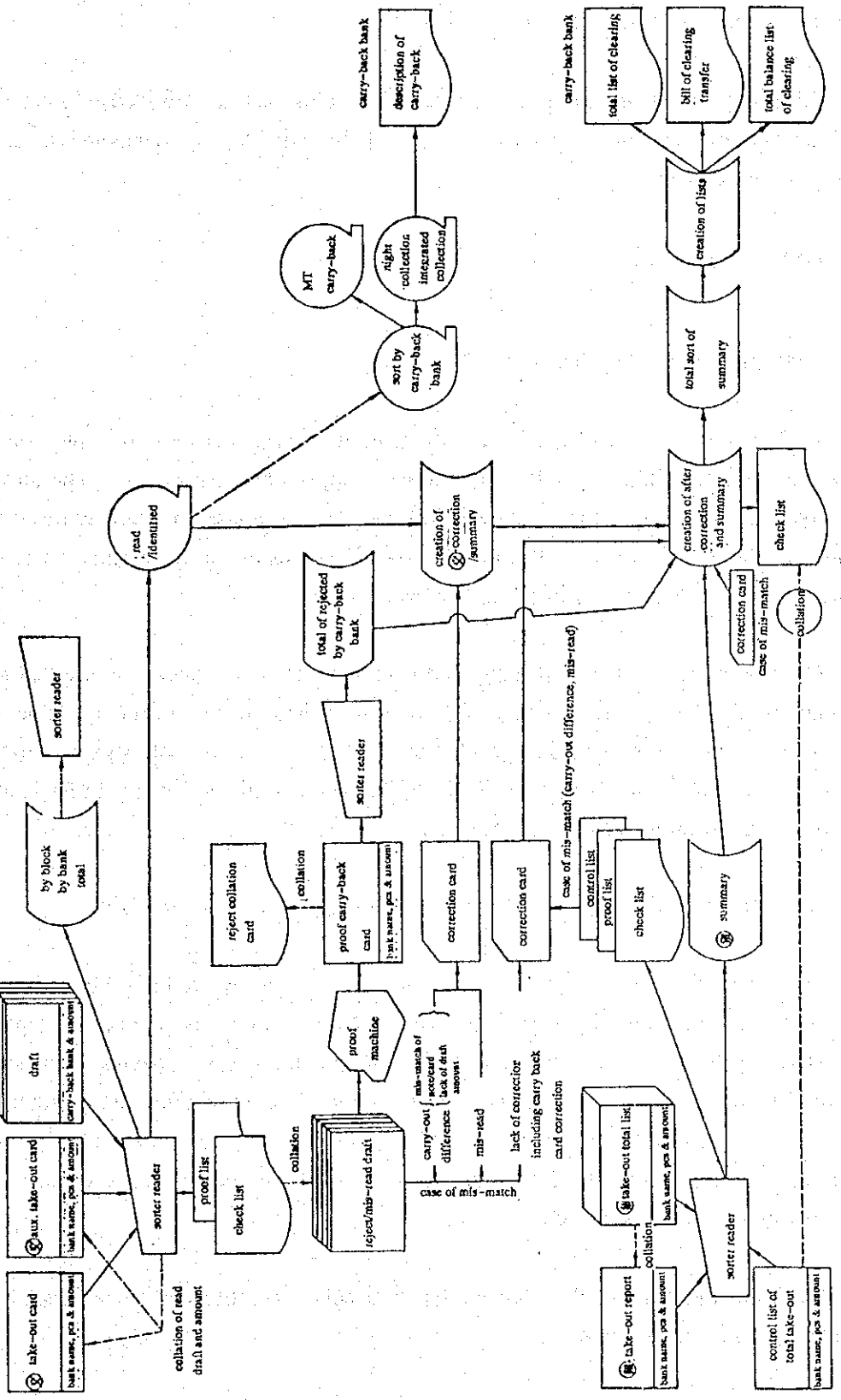
The magnetic tapes recording the above data are sorted by computer according to debit banks, which are printed on the debit exchange list.

Then, the summary table of clearance on the day recording credit and debit exchanges to be cleared, the clearing balance, and the number of drafts credited by each bank and the total amount due is prepared.

Based on the above data, the request for funds transfer to settle the clearing balance, be it net plus or minus, is prepared.

A general outline of the sorter/computer processing system is illustrated as follows.

FLOW OF SORTER COMPUTER PROCESSING



(3) Deposition of debit exchange in locker

Clearing house-sorted drafts sorted for each debit bank are divided into batches of appropriate size, and together with the above outputs, are deposited in each member bank's locker.

3-4 Outgoing Process

(1) Collection of debit exchange

Each member bank collects debit drafts from its own locker located in the safe of the clearing house between 8:00 a.m. and 9:30 a.m. on the clearing day. The locker can be opened only when the key owned by the clearing house and the key owed by each member bank are used. The member bank receives the clearing house's key by presenting the "clearer certificate" and opens its locker.

Clearing house-sorted drafts taken out from the locker are checked to see that the actual number of batches agrees with that recorded on the summary table of clearance. Bank-sorted drafts are checked to see the number of bags is correct against the accompanied slips, and that the bags are originated in crediting banks recorded in the summary table of clearance.

(2) Request for funds transfer for final settlement by means of magnetic tape

Funds transfer to settle the clearing balance is effected by crediting and debiting checking accounts carried by member banks at the central bank (Bank of Japan). The clearing house prepares the final list of settlement, and after affixing its official stamp, submits it to the Bank of Japan. At the same time, it prepares a magnetic tape recording the requests for funds transfer on behalf of member banks and submits it to the Bank of Japan for funds transfer. Generally, the procedure is completed by 10:00 a.m. on each business day.

Based on the request, the Bank of Japan effects funds transfer among member banks' accounts at 1:00 p.m.

(3) Inspection and final processing after collection

The member bank checks the number of drafts collected from the clearing house, presence of drafts drawn on different banks, and basic data, as follows:

1) To check that the actual number of drafts agrees with the number of clearing house-sorted drafts recorded on the summary table of clearance.
2) To check that the number of credited drafts in the total credit slip for bank-sorted drafts (form A) agrees with that in the summary table of clearance.
3) To check that the total number of bank-sorted drafts in the total credit slip for bank-sorted drafts (form B) agrees with that in the summary table of clearance.
4) To check that aggregate data recorded on the tabulation slip agree with those in the total credit slip.

If any difference is found, it is notified to the clearing house in the case of clearing house-sorted draft and to the crediting bank in the case of bank-sorted draft for appropriate corrective measures.

ANNEX 10 STRUCTURED DESIGNING OF SOFTWARE

Annex 10 Structured Design of Software

1. Outline

Based on the preliminary design of application and network system, the work described in this Chapter is carried out as a part of preliminary design of structure of the software.

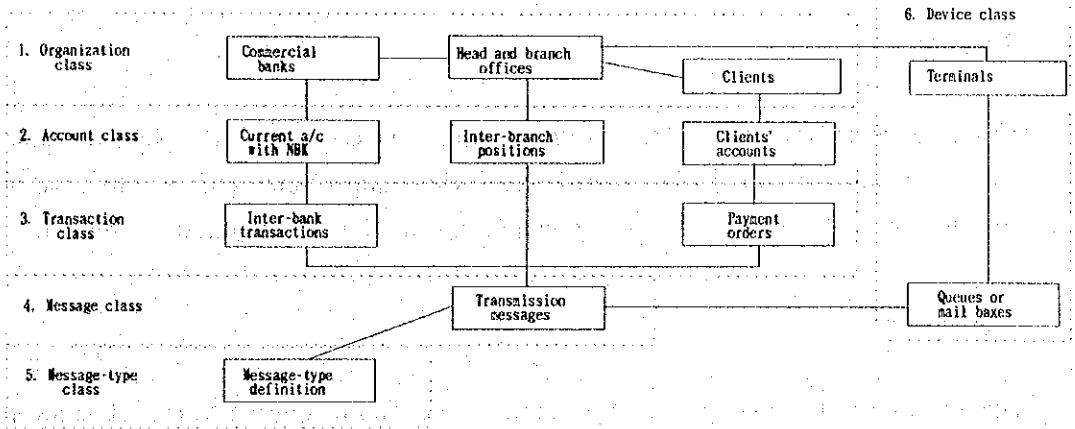
- Preliminary design of data structure — Prescription of data structure and operation as abstract expressions of systems
- Structured analysis of subsystem software — Description of data operation, block diagram and product composition for each subsystem

These works are intended to ensure the followings:

- Information for the requirement on the computer platform (a set of hardware and base software)
- Conceptual information to be inherited to the design of database and processes in the implementation project in future

(1) Preliminary design of data structure

In this design, systems are expressed using six classes and data belonging thereto. A data structure is equipped with behavior and operations as its elements, and exercises its power over analysis and design in the initial stage. An outline of the data is as shown below.



(2) Structured analysis of subsystem software

According to this design, the electronic payment system is divided into the following seven subsystems.

- NBK-Net	NBK current deposit system
- Remittance operation system	Message preprocessing and intra-bank payment processing
- Message switching subsystem	Message handling system
- Regional node subsystem	Distribution and collection of messages in the region and message transfer
- RCC substituted input subsystem	Concentrated input from substitution terminals and diskettes
- Dedicated terminal subsystem	Dedicated payment terminals system
- Operation Day interface subsystem	Data exchange with branch banking system

2. Design of Data Structure

(1) Data of existing systems

Analysis of the existing conditions is important for the design process. According to the results of the survey which was carried out twice this time, it is understood that there are the following classes and the data in the existing payment system.

- Organization class

This class describes the persons or organizations concerned with the payment system. The data belonging to this class are the NBK Head and Branch Offices, the head and branch offices of commercial banks, client companies and the computer center, etc.

- Account class

This class describes the entities of accounts. The data belonging to this class are the correspondence accounts of commercial banks with NBK, the correspondence accounts mutually possessed between banks, and client accounts for remittance.

- Transaction class

  This class describes the transactions handled by the payment system. The data belonging to this class are request for remittance and funds transfer vouchers.

The details of each class and data are described in the next clause.

(2) Data structure of the electronic payment system

In this clause, the data structure for the electronic payment system are designed based on the data analysis. Here, data structure required for system construction are designed focusing on the concept of computer networks. The result of this analysis can be used for database design, and partly for process design in future. The detailed parts of the description may be altered at the stage of detail specification, so it will be necessary check them again in each subsequent phase.

1) Outline of classes

First of all, the outline–purpose, attributes and operation–of each class required for the electronic payment system are prescribed in this section, and then the data belonging to each class are listed.

(a) Organization class

This class indicates the organizations connected with the electronic payment system, and is designed in order to enable control not only of the structural arrangement of the payment system, but also of the form of the participation in the payment network.

a) Attributes

The major attributes of the organization class are as follows.

- Classification of organizations	Data code indicating what the organization is. (Central Bank, commercial bank, client, etc.)
- Organization code	Number and symbol peculiar to the organization

– Organization name	Official name, abbreviation or name commonly used inside the system
– Location	
– Contact person	
– Telephone number	
– Facsimile number	
– Telegraph number, if any	(Telegraphs still occupy an important position as a means of communication in this country.)
– Parent organization	used for controlling vertical relationships with head offices, regional head office, branch offices, etc.
– Method of access to network	Approved method of access to payment network
– Network address	Message addresses
– Substituted communication transfer terminal address	Substituted terminal addresses which are available for organizations without network addresses, or alternative address in case of trouble
– Charge method	Method of collecting charges for network use
– Fixed amount of charge	Fixed portion of charges, if any

b) Operation

The contents of operation applied to the organization class are as follows.

- Registration
- Alteration and revision
- Alteration of status (activities suspended, accounts closed, activities reopened, accounts reopened)
- Registration canceled

c) Data

Data belonging to the organization class are as follows.

- NBK
- NBK bureaus and branch offices
  Each NBK organization including RCC
- Commercial banks
- Commercial bank branch offices
- Clearing service bodies
  PR and Clearing House
- Clients: Companies and individuals
- Data processing service bodies: Bishkek/Osh CC

(b) Account class

This class is established and used for controlling the attributes and balance of the general accounting subjects and accounts related to the payment system.

a) Attributes

Classification	Application and division of accounts (current account, settlement account, General ledger account, client account, etc.)
Account number	
General ledger number	Title or number of General ledger to which this account belongs
Account title	
Account holder	
Controller	Person who controls these ledger and accounts
Date opened	Opening date of this account
Date closed	In case this account is closed
Status	Status of this account
Previous balance	Balance from previous term, month and day etc.
Receipt and payment	Turnover of present term, month and day
Current balance	
Interest rate	Interest rate for deposit and overdraft
Interest	Products and interest amount

b) Operation

The operation required for the account class is as follows.

- Registration
- Alteration and revision
- Alteration of status (accounts suspended, accounts reopened)
- Updating balances
- Interest calculation
- Registration canceled

c) Data

Data belonging to the account class are as follows.

- Current accounts with NBK
- Intra-bank positions
- Clients' account
- Net position entities
- Correspondence account

(c) Transaction class

The transaction class indicates and controls the transactions occurring in the payment system, mainly by means of client requests for remittance and inter/intra-bank payment instructions.

a) Attributes

The major attributes of the transaction class are described in 10-2-1-2.

b) Operation

The operation required for the transaction class is as follows.

- Generation

- Revision and alteration
- Cancellation
- Journaling
- Reference(For updating account class and preparing sub-ledgers)

c) Data

Possible data belonging to the transaction class are as follows.

- Inter and intra-bank transfer transactions
- Customer transfer
- Journal entry records

(d) Message class

The message class covers the data for information transmission used by the users or for the communications among subsystems in the payment system. The messages among users are logically sent from those who prepare messages to recipients. On a computer network, the messages are sent from originating terminals to addressed terminals.

a) Attributes

The major attributes of the message class are described in 10-2-1-2.

b) Operations

The operations required for the message class are as follows.

- Producing
- Queuing (Put operation to waiting queues)
- Approval
- Correction
- Cancellation
- Deletion
- Transfer

- Logging
- Archive

c) Data

Possible data belonging to the message class are as follows.

- Fund transfer message
- Inquiry message
- Response to inquiry
- Free-formatted message
- Broadcasting message prepared by users
- Error notification message
- System operation message
- Network monitoring message
- Combination of messages (for file transfer)

(e) Message type class

This class describes and controls the types of messages handled in the electronic payment system and the method of handling. After establishing this class, it becomes possible to increase the number of message types or change the method of processing in the network without changing programs. As a result, the system flexibility is improved.

a) Attributes

The major attributes of the message type class are as follows.

Message type	
Message generation system	Subsystems which are allowed to generate messages
Final processing system	Systems which bear final responsibility for processing data in messages
Indication of reports from data processing systems	Necessity of reporting completion of data processing
Method to report processing	

Address of processing report	Addresses for reporting completion of data processing
Indication of Acknowledgment from recipients	
Necessity of receipt notification	
Limit time until receiving reply	

b) Operations

The operations required for the message type class are as follows.

- Creation
- Alteration
- Deletion

c) Data

Data belonging to the message type class is message type definitions.

(f) Device class

This class is used for controlling terminals, devices and systems, both physical and logical, connected to the electronic payment system network. The control by this class has two purposes; one is to secure exact transfer messages, and the other is to maintain and inspect devices and machines.

a) Attributes

The major attributes of the device class are as follows.

Types of devices	Substance of devices(Re. "Data belonging to this class")
Device number	
Name of device	
Place of installation	
Configuration	
Specifications	
Network address	Logic address on the computer network

Method of connection	Method of connecting devices to the network
Method of communication	Method to put and get messages
Communication protocol	
Telephone number	
Manufacturer	(The followings are for physical devices and
Dealer	facilities.)
Contact person	
Date of next checking	
Date of acquisition	
Cost of acquisition	
Life span	
Method and rate of depreciation	
Accumulated amount of depreciation	
Present book value	

b) Operation

The operation required for the device class is as follows.

- Creation
- Updating
- Deletion

c) Data

Data belonging to this class are as follows.

- Computer systems connected to the electronic payment system:

  NBK-Net
  Fund-transfer processing system
  Message switching subsystem
  Node subsystem
  Commercial bank host system, if any

- Terminal systems installed in NBK:
- Terminal system in each commercial bank:
  Computer systems equipped with either the dedicated terminal subsystem or the

"Operation Day" interface subsystem

- Logical devices:

  Logical communication ports possessed by computer systems for securing high-performance communication functions

- Message queues, etc. used for inter-process communication:

  Mailboxes and others used for communication among users

- Logical circuit ports:

  Both ends of logical communication circuits generated for realizing multiplexed communication

3. Design of Subsystem Software Structure

Hereafter, the outlined structure of each subsystem is described. The result of this work will be the basis of determining the computing platform in designing hardware configuration as well as the detailed specification of software.

At first, the characteristics of each subsystem are examined in order to find the conditions for selecting computer platform.

Subsystems	Theme	Characteristics
NBK-net	Transaction processing	Updating database is to be done and must be completed independently by each transaction. Recovery from any type of trouble is required on a real-time basis. That is, the principle of transaction processing is strictly applied.
Fund-transfer processing subsystem	On-line, real-time processing	Message processing, accumulation, and request control are to be done on real-time basis.
Message switching subsystem	On-line, real-time transfer	Message switching - receive, store and forward - is required on real-time basis. Recovery must be done immediately, but can be done by using log records. Recover must be done immediately.

Regional node subsystem	On-line & batch transfer	On-line real-time communication for message transmission with message switching subsystem and terminal related subsystem with communication facility in good condition. Also on-demand communication for file transfer is required for another terminal related subsystems.
RCC substituted input subsystem	On-line & batch entry & transfer	On-line data entry through keyboard and batch entry through diskette or tape drive. These data are to be received by the regional node subsystem on a real-time basis.
Remittance dedicated subsystem	Data entry On-line or batch transfer	Data entry is done trough keyboard, and data are to be transmitted on either real-time basis by transaction or on-demand basis by file with one or more messages.
Operation Day interface subsystem	Batch processed batch transfer	Batch processing to convert remittance data into transmission file for the use of the payment system. Also batch transmission is to be done by such file.

By the above characteristics, the conditions on each subsystem are found as follows:

(Subsystems)	(Conditions on the subsystems)
NBK-net	Application programs which issue requests to update database records are to be monitored by middle-ware that facilitates load balancing and fault tolerance on the software. A method to control transaction cycle and commitment must be applied. Database management system is expected to control all the information, but not mandatory in the real-time processing if the performance has the priority.
Fund-transfer processing subsystem	Transaction cycle is also applicable in order to synchronize the journaling, completion of gross settlement on NBK-net, and delivery of messages to the addressee.
Message switching subsystem	Stable communication is mandatory. This can be achieved at the software level, together with the hardware level, by implementing dynamic testing and rerouting of the circuits. Synchronizing logging and message transmission is required in order to ensure the status of messages.

Regional node subsystem	Depending on the condition of communication circuits, special program will be required to collect data from these offices of commercial banks under poor condition. Stable communication with message switching system is mandatory, for the guarantee of status of messages.
RCC substituted input subsystem	Data entries through both user interface devices and storage devices are to be done. This subsystem will have the following style of software: On-line data entry using user interface functions Batch processing for the data from storage devices Real-time transmission of these data to regional node subsystem
Remittance dedicated subsystem	As on the RCC substituted input system, this subsystem also has on-line data entry through user interface devices. Transmission of data to regional node subsystem will have two options, that is: Real-time transmission via the stable communication circuits On-demand, batch transfer via unstable circuits
Operation Day interface subsystem	This is a batch-styled software, as on-line processing is done by the banking system, Operation Day. Transmission will also be batch transfer on on-demand basis.

By the above characteristics and conditions for the subsystems, the conditions for the software structure and computer platform (a set of hardware and basic software) can be found.

(Subsystems)	(Conditions on the software structure and platform)
NBK-net	Strict connection among application software, middle-ware, resource managers (mainly DBMS), and operating software is required. Application processes must be bearable in unexpected cases of updating accounts records. Platform must be capable enough to accommodate these functions.

Fund-transfer processing subsystem	Strict connection among application software, middle-ware, resource managers (mainly communication controller), and operating software is required. Application processes must be bearable in unexpected cases of transaction processing request to NBK-net. Platform must have enough capacity to control a large volume of communication and message processing in the system.
Message switching subsystem	Strict connection among application software, middle-ware, resource managers (mainly communication controller), and operating software is required. Application processes must be bearable in unexpected cases of communication to other subsystems. Platform must have enough capacity to control a large volume of communication.
Regional node subsystem	Strict connection among application software, resource managers (mainly communication controller), and operating software is required. Application processes must be bearable in unexpected cases of communication to message switching subsystem. Also sophisticated technique is expected for the communication to terminal related subsystems. Platform must have enough capacity to control a large volume of communication and data entries.
RCC substituted input subsystem	Ordinary data entry functions and batch process functions are needed. Platform must be equipped with LAN facilities.
Remittance dedicated subsystem	Ordinary data entry functions are needed. Sophisticated technique in both on-line and batch mode are expected for the communication to the regional node subsystem. Small platform will be enough for these software.
Operation Day interface subsystem	Ordinary batch processing is needed. Sophisticated technique in batch mode is expected for the communication to the regional node subsystems. Platform should be selected in conjunction with Operation Day.

Followings are the consideration specific to each subsystem.

(1) NBK-Net

(a) Characteristics of subsystem NBK-Net

This system is a typical transaction processing system which instantly updates per transaction the balance of the current deposit accounts in NBK possessed by commercial banks. In order to guarantee the results of the processing of each transaction, four conditions i.e. atomicity, consistency, isolation and durability must be satisfied. For this purpose, special consideration should taken during software design. Concretely, auxiliary functions should be prepared so that the requirements for transaction processing arising inside the network may be promptly and exactly controlled to secure the updating of databases. To realize these functions, it is also possible to design this subsystem on an application basis. The use of existing products (TP monitors) is sufficient for examination, however, the scale of development and the required technical level are taken into consideration.

(b) Data operation

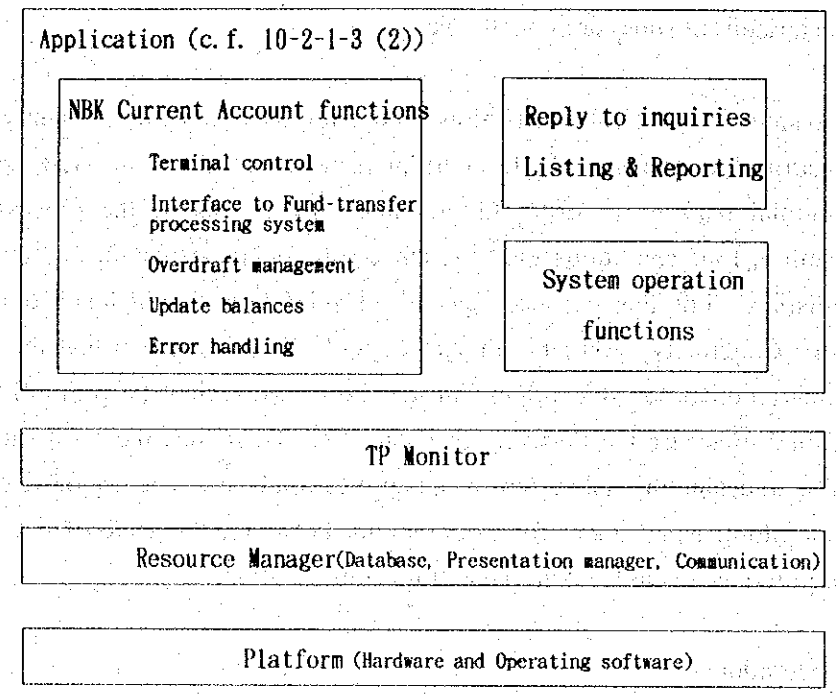
The following is an example of the data operation for the messages from Fund-transfer processing system.

- Get operation on the device class
- Reference operation on the transaction data
- Reference operation on the organization
- Update operation on the account data
- Producing journal entity
- Put operation on the device data for reply

(c) Software structure

The software structure for the guaranteed transaction processing is as shown in the figure below.

Software structure of NBK-Net



(2) Fund-transfer processing system

(a) Characteristics of the subsystem

This subsystem is the kernel of the payment system. Transaction cycle is applicable in order to synchronize the journaling, completion of gross settlement on NBK-net, and delivery of messages to the addressee. These functions need to be controlled by middle-ware, communication controller, and operating software, so that the subsystem is bearable to troubles while messages are under processing.

(b) Data operation

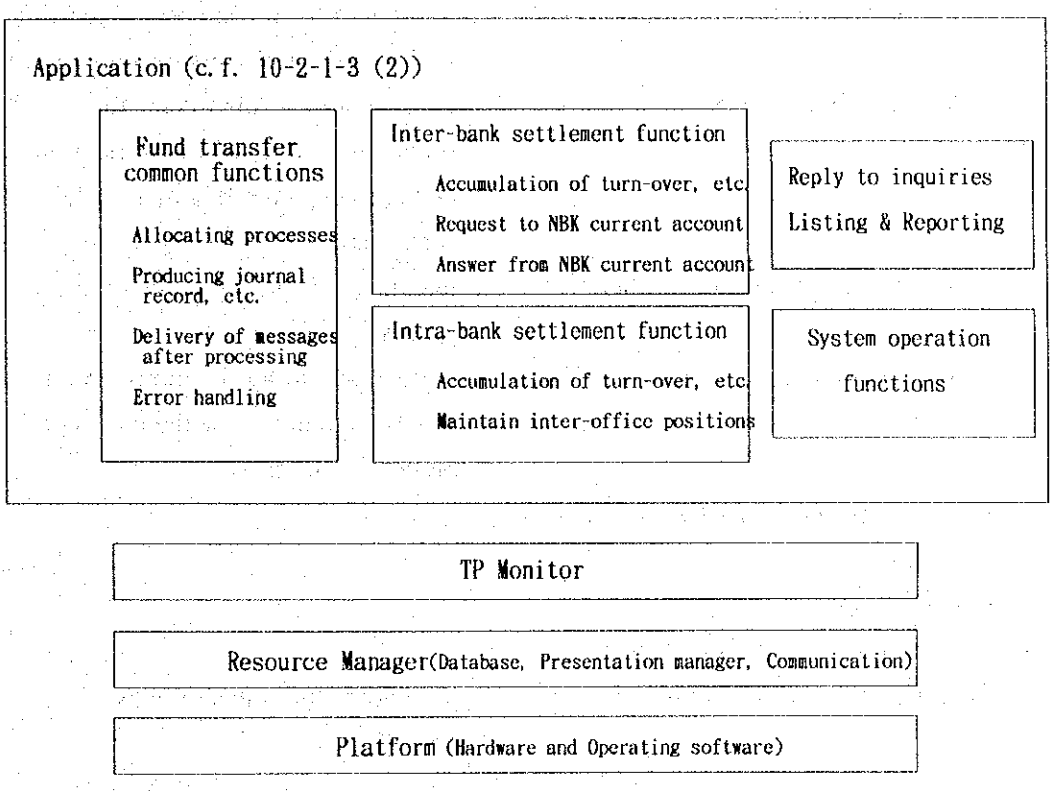
The following is an example of the data operation through this subsystem.

- Get operation on the device class
- Reference operation on the message
- Reference operation on the organization, both sender and addressee
- Reproducing transaction record from message, if necessary
- Accumulation of positions for branch offices, in case of intra-bank transaction
- Producing journal entity
- Put operation on the device class for the delivery of messages

(c) Software structure

The software structure designed to ensure message processing is as indicated below.

Software structure of Fund-transfer Processing Syste



(3) Message switching subsystem

(a) The functions and services of this subsystem are as follows.

– to connect to Regional node subsystem group	connection secured during on-line services
– to connect to host subsystem group	connection secured during on-line services
– to control message processing methods	
– to receive messages from the above said subsystems:	to receive both business and operation messages
– to accumulate received messages	
– to check received message processing methods	
– to prepare for message transmission	to prepare for transmission according to the method of message processing
– to transmit messages	to request host subsystems for processing, to transmit notification and reports to the Regional node subsystem
– to control status of transmitted messages	to control according to the message processing method
– to understand unexpected situations	to understand the situations which cannot be handled by the message processing method
– to edit special messages and error messages	
– to edit report messages	
– to analyze operation messages	
– to present network status	to indicate the status of network operation

As this subsystem resides at the center of the computer network, stable communication to other subsystems is mandatory. Synchronized logging and message transmission is required in order to ensure the status of messages. Therefore, application processes must be bearable in unexpected cases of communication to other subsystems.

(b) Data operation

The following is an example of the data operation through this subsystem.

- Get operation on logical device
- Refer to message and then message-type and the organization data
- Put messages to the logical device (queues or mailboxes)
- Creation of an error message, in case of unexpected situation
- Update the definition of terminals, organization, message-type, etc.

(c) Supervision of message status

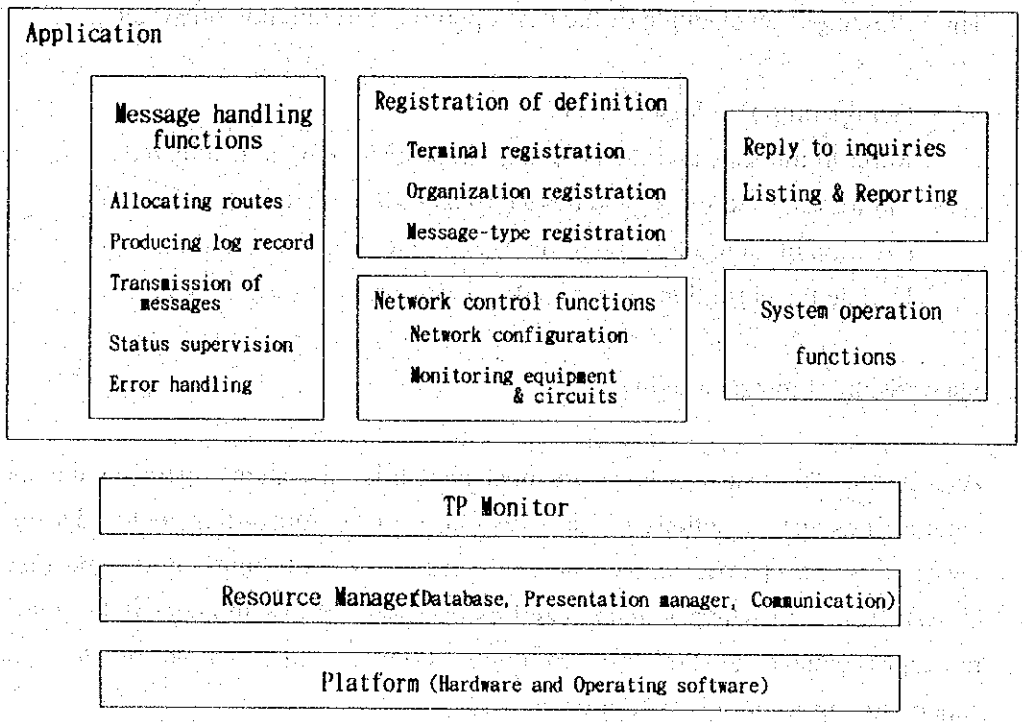
As a part of the measures taken for obstacles, this subsystem supervises the status of entered messages. Actions for supervision are taken according to the definition of message types. (Refer to the clause describing the attributes of the message type class.) The item which is recognized as necessary at this moment is the remittance messages entered to the cash common system. An example of this message supervising procedure is as follows.

- Prepare a table for control in the auxiliary memory. The key shall be composed of the transmission terminal ID and the serial number on the terminal.
- If supervision is required for the entered message, the subsystem registers the message key to the above control table, and sets the status during supervision.
- If supervision is instructed to the message obtained, the subsystem retrieves the control table and set the status to "processing completed".
- If this retrieval fails, a system error message is generated and entered to the position instructed by the message type(of the error message).

(d) Software structure

The software structure of the message switching subsystem is as indicated below.

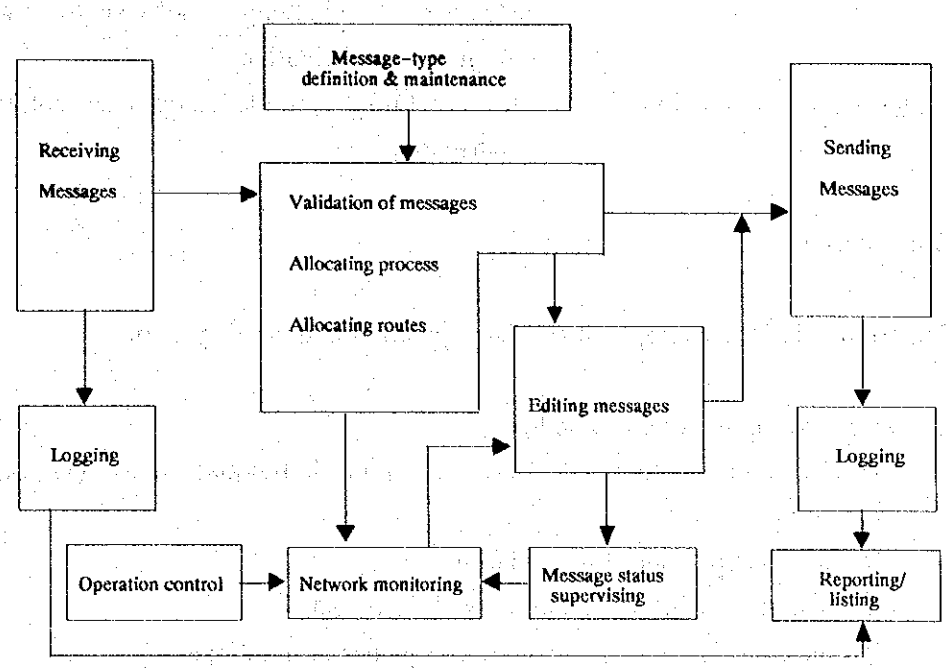
Software structure of Message Switching Subsystem



(c) Flow of software control

The flow of the software control is as indicated below.

Control flow of Message Switching Subsystem



(4) Regional node subsystem

(a) Subsystem functions

-connect this subsystem to the terminal subsystem group	to connect this subsystem to the terminal subsystems installed in the main and branch offices of commercial banks via both public telephone and telegraph circuits
-collect source data	to collect data from terminal subsystems
-split a file into messages	Transfer between this subsystem and terminal subsystems under poor connection is carried out per file, and transfer between this subsystem and others is carried out per message
-validate messages	to validate messages mainly at the header portion
-return response messages	to respond whether a message has been s accepted or rejected
-'store and forward' transmission	to ensure send/receive operation

-monitoring network equipment	to supply the network control function of Message switching subsystem with monitoring information
-inter-operative functions	to perform remote log-in, software distribution, etc.

(b) Data operation

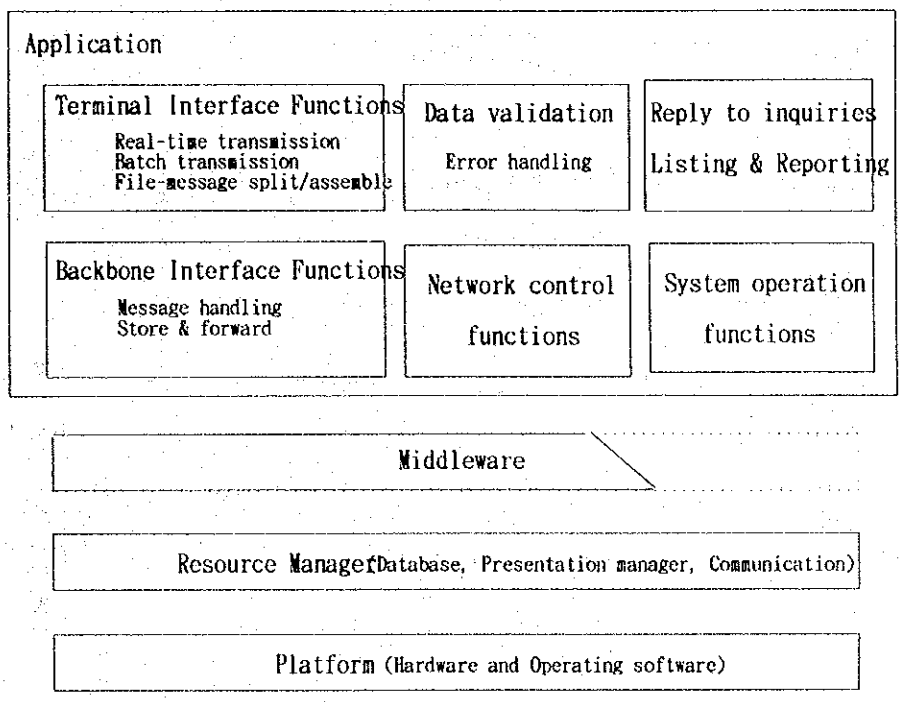
The following is an example of the data operation in this subsystem.

- Get operation on logical device
- Disassembling combined messages into individual ones (Re-producing operation)
- Refer to the messages for validation
- Refer to the organization and message-type data
- Put messages onto the logical device (queues or mailboxes)
- Producing messages if necessary
- Update the definition of organizations, terminals, and message-types upon request

(c) Software structure

The software structure of the message switching subsystem is as indicated below.

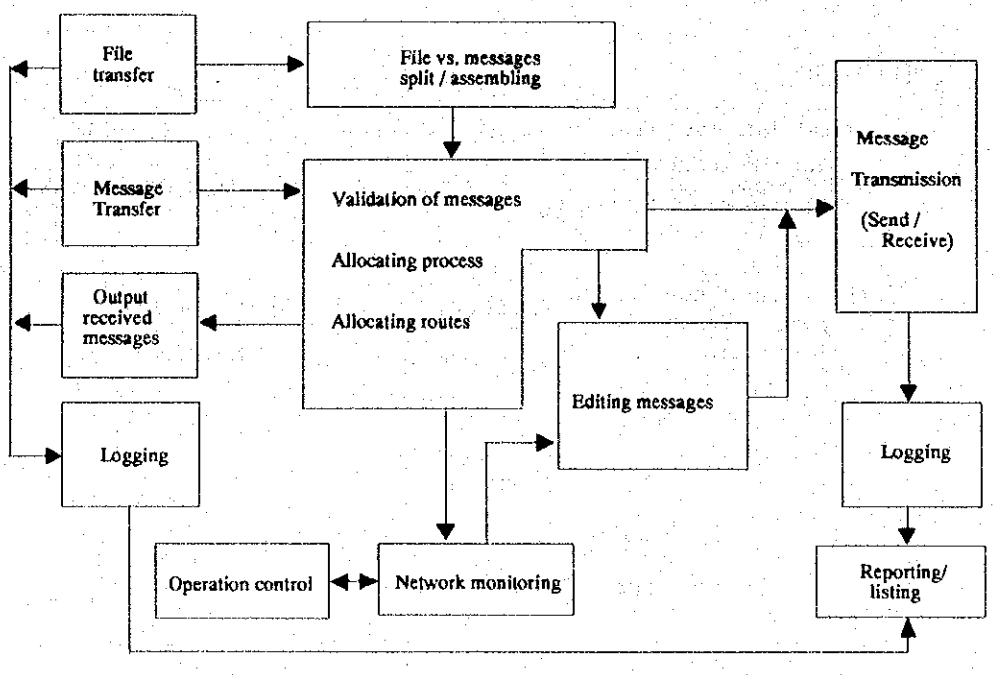
Software structure of Regional Node Subsystem



(d) Flow of software control

The flow of the software control is as indicated below.

Control flow of Regional Node Subsystem



(c) Functions and information commonly possessed with a message switching system

The Regional node subsystem requires coordinated operation that maintains a close relationship with the message switching system and other node systems. The following information can be possessed commonly with the message switching system.

- Information on network structure
- Information on network type definition
- Information on network operation and obstacles
- Situation of messages in mutual transfer

Communication and operation by means of messages, i.e. functions for mutual operation can be coordinated. For this purpose, common possession of software at a certain level by the both systems is recommended. Middle-ware for transaction processing and standard systems for network control correspond to this sort of software. However, functions for mutual operation for network control are under development at present, and common use of TP monitors as the middle-ware is

recommended at the beginning.

(5) Remittance dedicated terminal subsystem

(a) Characteristics of the system

Data entry is done trough keyboard, and data are to be transmitted on either:

Real-time transmission via the stable communication circuits
On-demand, batch transfer via unstable circuits

Sophisticated technique in both on-line and batch mode are expected for the communication to the regional node subsystem. But small platform will be enough for these software.

(b) Data operation

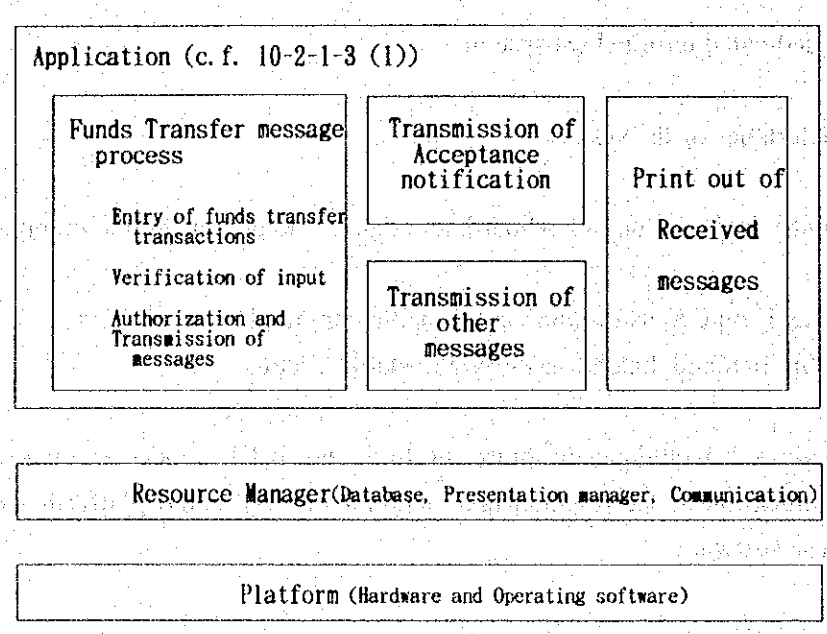
The following is an example of the data operation in this subsystem.

- creating transaction data via user interfaces
- creating message data during authorizing transaction data and simultaneously generate message data
- to put message data to(the queues of) logical devices
- to get message data from logical device data
- to refer to the message data for validation
- to put received messages on the printing device together with the results of validation

(c) Software structure

The software structure of this subsystem is as indicated below.

Software structure of Remittance Dedicated Terminal Subsystem



(6) "Operation Day" Interface subsystem

(a) Characteristics of the subsystem

Ordinary batch processing will translate banking data to the remittance messages. As is seen on the Remittance dedicated terminal subsystem, sophisticated technique in batch mode is expected for the communication to the regional node subsystems but platform will not be bigger than the personal computers.

If the users of this subsystem need function to receive messages from the Regional node subsystem, it can be obtained by replicating receiving function of Remittance dedicated terminal subsystem. Users' requirement should be examined when implementing this subsystem.

(b) Data operation

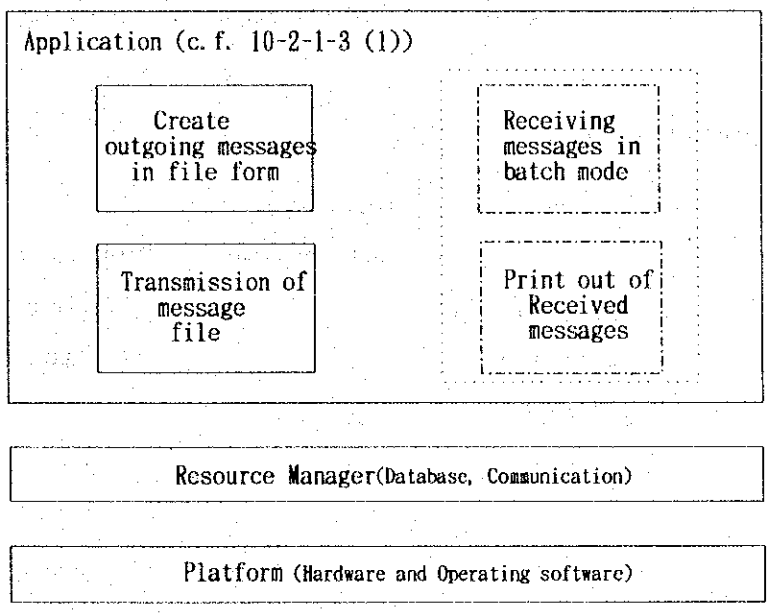
The following is an example of the data operation in this subsystem.

- to get transaction data from "Operation Ready" via files interfaces, and simultaneously create message data
- to put message data to (the queues of) logical device
- to get message data from logical device, if receiving function is added
- to put received messages on the printing device together with the results of validation

(c) Software structure

The software structure of this subsystem is as indicated below.

Software structure of Operation Day Interface Subsystem



(7) RCC substituted input subsystem

(a) Characteristics of the system

This subsystem is the same as the Remittance dedicated terminal subsystem except the followings:

- On-line transmission only, because of the same location as the Regional node subsystem
- Data entry via diskette or tape devices is added, in order to accept off-line data collection

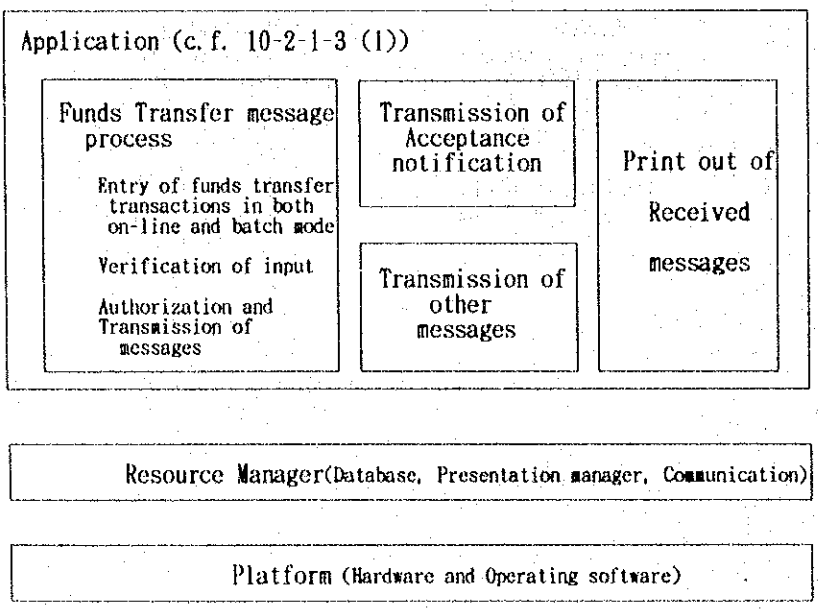
(b) Data operation

Refer to the Remittance dedicated terminal subsystem.

(c) Software structure

The software structure of this subsystem is as indicated below.

Software structure of RCC Substitution Input Subsystem



ANNEX 11 EXAMPLE OF HARDWARE CONFIGURATION

Annex 11 Example of Hardware Configuration

1. General

At the end of the section preliminary design of hardware, an example of hardware configuration is presented. The hardware in this example is incorporated on the basis of an open systems architecture, as shown in System selection standards. As this hardware structure is based on the open system and is expected to bring the following merits to this country, this architecture has been adopted.

- Multiple-vender configuration is possible without being bound by specific manufacturers.
- There are numerous types of products to which this hardware can be applied.
- It is possible to construct optimum subsystems for each function.
- Major manufacturers in this industries have been deploying competition for development. Thus, the progress of basic technologies in this field as well as the shipment of new products can be also expected in the future.
- Improvement of the ratio of price to performance is remarkable.
- The possibility of reassembling per component ensures that this hardware and architecture will be acceptable for long-term use.
- Substantial development of the characteristics particularly required for the electronic payment system, such as load dispersion, fault tolerance, presentation function, etc., can be observed.

2. Difference between Plan A and Plan B

The examples of composition shown in Plan A and Plan B are based on the estimated volume of transactions in 2000. In 2000, Plan B is formulated to satisfy amounts of data and transaction load 2.2 times higher than those of Plan A. Therefore, configuration for Plan B has more capacity in main memory and disk storage.

3. Composition work

The specifications of each component are decided and the composition of the whole network is carried out based on the hardware so far described. The outlined hardware composition through this work, the component specifications of each subsystem according to Plan A and component specifications of each subsystem

according to Plan B are shown in Figure 10–23, Table 10–13 and Table 10–14, respectively. Also sample lay–outs are shown on Figure 10–24 and Figure 10–25.

4. Expansion in the future

The platforms adopted in these examples are provided with excellent expandability in both small–scale and large–scale systems. If any shortage of capacity or processing ability occurs, it is solved by purchasing necessary quantities of processing devices and peripheral equipment prescribed by the architecture according to the necessity. Particularly for the RCC–substituted system, it will be necessary to adjust the number of terminals and processing devices through examining the conditions of application.

According to the estimated situation in 2000, the composition of Plan A has some allowance in its disc capacity. Therefore, by enlarging the processor memory for the Fund–transfer processing system and message switching system, the disc capacity will be able to correspond to a value of 2.5 times larger than the transaction load. Although the composition of Plan B has a little allowance in its processor capacity, the discs for the Fund–transfer processing system are close to the limit. (Taking into consideration the work areas of databases and dynamic backup areas, the safety value of pure data storage areas will be around the half of the disc capacity.) These processors will need auxiliary memory devices in the following year.

SAMPLE OF HARDWARE CONFIGURATION : PLAN A

ITEMS	QTY	Processor Type/Spec.	Cache Prime/Second	Main memory	Internal Disk	External disk (type)	Back up
1. Remittance Operation System							
Server systems	2	RISC 75MHz (149MIPS)	32KB/1MB	128MB ECC	2GB	4.4GB x dual (Disk array)	8mm tape
Secondary server systems	2	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	5	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
2. NBK-NET							
Server system	1	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Server system	1	RISC 60MHz	32KB/1MB	96MB	1GB		
Client systems	5	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
3. Message Switching System							
Server systems	2	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Secondary server systems	2	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	6	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Intelligent Hub	1						
4. Bishkek Node System							
Server systems	2	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Secondary server system	1	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	8	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
Telephone modems	8						
Telex controller	1						
5. Osh Node System							
Server systems	2	RISC 60MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Secondary server system	1	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	6	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
Telephone modems	5						
Telex controller	1						
6. Other Node Systems							
Server systems	2	RISC 60MHz	32KB/1MB	96MB	1GB	4.4GB single (Disk array)	8mm tape
Secondary server system	1	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	3	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
Telephone modems	3						
Telex controller	1						
7. Development System							
Server system	1	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Client systems	10	RISC 67MHz	32KB	64MB	1.1GB		
Printers	2						
Router	1						
8. Office Systems							
Terminal System	1	Intel DX2/66MHz (or equivalent)	/256KB	8MB	350MB		

SAMPLE OF HARDWARE CONFIGURATION : PLAN B

ITEMS	Number of Systems	Processor Type/Spec.	Cache Prime/Second	Main memory	Internal Disk	External disk (type)	Back up
1. General Processing System							
Server systems	2	RISC 75MHz (149MIPS)	32KB/1MB	256MB ECC	2GB	4.4GB x dual (Disk array)	8mm tape
Secondary server systems	2	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	5	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
2. NBK-NET							
Server systems	2	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Client systems	8	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
3. Message Switching System							
Server systems	2	RISC 75MHz	32KB/1MB	256MB	2GB	4.4GB single (Disk array)	8mm tape
Secondary server systems	2	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	6	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Intelligent Hub	1						
4. Bishkek Node System							
Server systems	2	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Secondary server system	1	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	8	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
Telephone modems	8						
Telex controller	1						
5. Osh Node System							
Server systems	2	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Secondary server system	1	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	6	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
Telephone modems	5						
Telex controller	1						
6. Other Node Systems							
Server systems	2	RISC 60MHz	32KB/1MB	96MB	1GB	4.4GB single (Disk array)	8mm tape
Secondary server system	1	RISC 67MHz	32KB	64MB	1.1GB		
Client systems	3	RISC 40MHz	16KB	32MB	426MB		
Printers	2						
Routers	3						
Telephone modems	3						
Telex controller	1						
7. Development System							
Server system	1	RISC 75MHz	32KB/1MB	128MB	2GB	4.4GB single (Disk array)	8mm tape
Client systems	10	RISC 67MHz	32KB	64MB	1.1GB		
Printers	2						
Router	1						
8. Office Systems							
Terminal System	1	ntel DX2/66MH (or equivalent)	/256KB	8MB	350MB		

ANNEX 12 Security Management

ANNEX 12 Security Management

"Security" in computer systems is to protect or guard computer systems from various hazards threatening their sound and uninterrupted operation, particularly securing operational safety in terms of (1) confidentiality, (2) integrity, and (3) availability, and to devise any means to achieve the objectives.

(1) Confidentiality

The state where information stored in a computer system is not accidentally or intentionally disclosed or divulged to a third party. The computer system lacks confidentiality if the stored information is easily accessible without authorization.

(2) Integrity

The completeness and accuracy of data stored in a computer system. The lack of integrity includes accidental conversion of data to unintelligible ones during the transfer on a communication line, and the state where data can be created, modified or deleted through unauthorized access.

(3) Availability

The state where a computer system can be used whenever desired. The availability of the computer system is affected by system failure and other troubles to prevent its continuous usage.

In sum, "security controls (computer security)" are the act of identifying what part or function of a computer system (the subject of protection) should be guarded against what type of threat (hazard), and how (security measures), with an ultimate objective of achieving and maintaining security of the computer system and its operation.
The subject of protection as well as hazards vary widely and can exist and occur in a variety of combinations, which require different security measures.

1) Subject of protection

The "subject of protection" that computer security measures deal with, in a direct sense, encompasses all the components of computer systems ranging from operating staff, hardware, software, and data.
It should be noted, however, that these system components are not an ultimate subject of protection. In fact, they are designed to provide functions, services, and information through normal operation, which, together with economic benefits achieved through them, should constitute a more important and real subject of protection.

2) Hazards

Major "hazards" threatening computer security are classified into natural disasters (such as earthquakes, typhoons, and lightning), malfunctions (such as accidents and troubles), and human-related incidence (e.g., error and crime). To be more comprehensive and specific, these hazards should be viewed from the standpoint of "actual threat," i.e., what type of adverse effect (phenomenon) each of them possibly has on the computer system.
Adverse effects (phenomena) include "destruction," "falsification," "leakage," "unauthorized use," "error," and "negligence" which creates the following "threats" to computer security.

(a) Examples of Actual Treats

a) Deletion, alteration, divagation, copying, theft, and loss of important data due to negligence or willfulness;

b) Destruction of data due to malfunction of a computer or bugs in a computer program;

c) Tampering of a computer program, theft or unauthorized browsing of information, and authorized modification of data through unauthorized access to a data input/output device;

d) Eavesdropping and data tampering on a communication line; and

e) Unauthorized browsing of information, and theft and unauthorized alteration of data by gaining access to an

unauthorized user terminal or by unauthorized connectivity with a terminal.

3) Security Measures

(a) Classification of security measures

There are a variety of measures to protect computer systems from the above threats. They are roughly classified into (a) physical measures, (b) administrative measures, and (c) technical measures. Note that this classification is not necessarily exclusive from each other, but often used interchangeably. Some measures can be classified as administrate or physical.

a) Physical measures

As its name implies, physical measures deal with protection of data and computer facilities from various hazards by reinforcing and upgrading physical facilities including buildings and equipment. Note that access control measures in the form of an improved security system including security guards are sometimes included in this category.

b) Administrative measures

These measures are designed to improve computer security by reinforcing and upgrading computer systems operation and maintenance resources. Administrative measures range from the establishment of regulations and standards for systems operation, data management, hardware maintenance and inspection, and access control, to education, training and enforcement of such regulations and standards, and implementation of internal audit on security measures (systems audit) to be conducted by an organization separate from the data processing department, and optimization of personnel management.

c) Technical measures

Technical measures consist of efforts to improve security from hardware and/or software aspects of computer systems. Typical measures in this category include access control and encryption technologies to prevent divagation of information by an unauthorized person, and unauthorized data alteration and intentional destruction, and the installation of backup machines.

(b) Functions of security measures

The primary function of computer security measures is to minimize risks associated with computer systems operation by implementing physical, administrative, and technical measures in a required or desirable combination.
For the purpose of computer security, the risk represents a danger of a threat turning into actual loss. Note that the risk is considered to be an expected loss and can be expressed by the following formula:
R (expected loss) = P (probability of occurrence of loss) * L (latent loss)

From the viewpoint of risk-related control functions, internal control functions as computer security measures as classified into a) deterrent, b) prevention, c) detection, and d) restoration.

a) Deterrent

To minimize possibility of exposure to risks related to error, accident, crime, and etc. by implementing specific measures. The deterrent function extends to discourage a potential intruder to the computer system by making presence of security measures known to the public, while keeping their contents and mechanisms confidential. Naturally, its psychological effect to remind the potential intruder of a danger or difficulty involved in such act or to allow him to visualize possible consequence is expected to work well on human with rationality and common sense, and by no means applicable to natural disasters.

By the same token, effective deterrent functions against errors and accidents are intrinsically different from those against intentional misconduct. While the former should focus on improvement of human skills, attentiveness, and awareness, the latter entails measures to reduce the level of expectation (reward) that motivates such misconduct.

b) Prevention

The prevention function staves off any act leading to the expected loss from being completed and deals with a wide range of risks including natural disasters. With its broad coverage, the prevention function can be accomplishes by applying a multi-faceted approach in the form of physical, administrative and/or technical measures as well as hardware and software. If designed well, therefore, it is proven to be the most effective security function in many cases.

The physical prevention function covers physical aspects of computer systems, such as computer center buildings and installations. It can be implemented in a highly diverse form according to a specific purpose, e.g., the functions to protect against earthquakes, fires, floods, and illegal access, to minimize their adverse effect, if occurred, so that a serious consequence such as systems breakdown can be prevented, and/or to avoid malfunctioning or interference with individual equipment.

Administrative prevention, on the other hand, deals with improved personnel management, innovative organizational setups, the establishment of standards and procedures, and their proper enforcement.

Finally, technical prevention involves incorporation of measures to prevent system failure, error, crime, and other hazards into computer systems. Primary examples are the access control feature to block unauthorized access, the checking function to prevent malfunction due to input error, and the duplexing of system configuration for the purpose of avoiding system failure.

c) Detection

While it is highly desirable to prevent any trouble, e.g., error, accident, and illegal access, before it actually takes place, it is not always the case. Once happened, the trouble must be found and dealt with as early as possible, and the ability to detect a trouble accurately and quickly is critical. Essentially, the detection function is expected to play two principal roles: a) detection of any risk of trouble and its occurrence, and b) dissemination of detected information for timely activation and operation of security measures and functions.

It should be noted that the detection function itself does not necessarily warrant appropriate measures to be taken against a trouble. For instance, even if the access control function picks out and record an unauthorized access, it does not lead to effective security controls unless appropriate preventive measures are taken to stop or terminate the access. Thus, the detection function should preferably be designed and operated in good coordination with the prevention or recovery function, so that these functions are incorporated into the system in an integrated manner. For instance, if an incorrect password is entered, the detection function is expected to record the entry and give alarm to the system, and the prevention function is actuated to cut off a session.

d) Restoration

Any security measures must have the ability to recover from actual loss caused by any hazard. As mentioned in "Failure Management", the recovery function should be integrated into systems design, including its effective linkage with the prevention and detection functions. Also, security measures should be designed by setting priority for each type of job or task performed by the system.