CHAPTER 4 BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4-1 Design Policy

The followings are basic design policy for this project.

(1) System Adaptability and Expandability

The AFIS has been used steadily for years in many countries. So, there is no need to change its functions. The AFIS hardware and software structure, however, must be redesigned to fit for the conditions requested by the RTPD. Furthermore, the system must be expandable to meet the increase of data base in the future.

(2) Measures Against System Down

For hardware, recovery time have to be shortened by the provision of quick detection of trouble locations and causes when trouble occurred.

For software trouble, sufficient tests should be carried out before the start of operations to stabilize the system functions, and the trouble diagnosis programs shall be provided and utilized to locate the troubles.

For data base trouble, the duplicated data files should be provided to secure the data base.

(3) Measures Against Power Failure

As a result of site survey, the power supply situation in Bangkok city was found to suffer from the voltage fluctuation and frequency fluctuation, and a possibility of power failure due to thunder storms was also found. As a protective measure against a brief power failure and the instability of the power voltage and frequency, the uninterruptable Power Supply System (UPS) should be provided.

4-2 Design Conditions

The following conditions should be incorporated in the system design.

(1) Data Base

1) Ten Fingerprint Card

- Maximum data base : 500,000 cards
- Initial data base at the time of matching operation on start : 300,000 cards
- Yearly additional data : 45,000 cards
- Yearly renewal number of criminal records : 10,000 cards
- Kinds of fingerprint cards to be registered:

  Out of fingerprints collected in Thailand, homicide, burglary, theft, sex offense, etc., are picked up.

- Number of fingers to be registered : 10 fingerprint/card
- Data to be deleted
  - . People over 60 years old
  - . People who have 10 year clear records after the last crime (change is possible in future)
  - . People who are confirmed dead
- Data conversion period for initial data preparation : One year
- Operation time of data conversion: 16h/day

2) Latent Fingerprints

- Data base after 10 years operation : 45,000 fingerprints
- Yearly additional data : 4,500 fingerprints

- Latent fingerprints which were not identified in the latent fingerprint inquiry are registered. Therefore, the registration will start in the second year of the system introduction.

- Deleted data; the following data are deleted. For the time being, it is none.
  - . the case is solved
  - . the period of prescription is over

(2) Fingerprint Inquiry Operation

1) Processing Capacity

- Latent fingerprint inquiry : 20 fingerprints/day
- Other crime inquiry : 30 cards/day

2) Start Time of Inquiry Operation

- Latent fingerprint inquiry : When the initial 10 fingerprint card data base (300,000 cards) is completed. (Start on the second year of the system introduction)
- Other crime inquiry : One year after the start of the latent fingerprint inquiry (the third year of the system introduction)

3) Turn Around Time (Time required from inquiry input to matching result output) : Within 24 hours

4) Operation Time After the Start of Inquiry Operation

- Input subsystem : 8 hours
  - . Inquiry input
  - . Data base additional registration input
  - . Change of the last crime data of the second convict
  - . Candidate fingerprint confirmation
- Matching subsystem : 24 hours
  - . Matching
  - . Registration

5) Operation Processing Mode

a) Ordinary mode

Matching process is carried out in the order of inquiry input.

b) Emergency mode

Priority processing is carried out by stopping temporarily the ordinary mode of matching and registration processor.

6) Others

a) The following checking is not carried out in this system: To check whether the newly accepted fingerprint card has already been registered in the data base or not. The previous manual checking is necessary before the newly accepted fingerprint card is processed.

b) Images of the candidate fingerprints listed as a result of the fingerprint matching process and the inquired fingerprint image are displayed on the same CRT.

(3) Electric Conditions of Hardware

1) Input Subsystem

Power Source Voltage	: AC 115V ±10%
Power Source Frequency	: 50 Hz ±1%
Consumption Power	: approx. 40 kVA

2) Matching Subsystem

Power Source Voltage	: AC 200V ±10%
Power Source Frequency	: 50 Hz ±1%
Consumption Power	: approx. 35 kVA

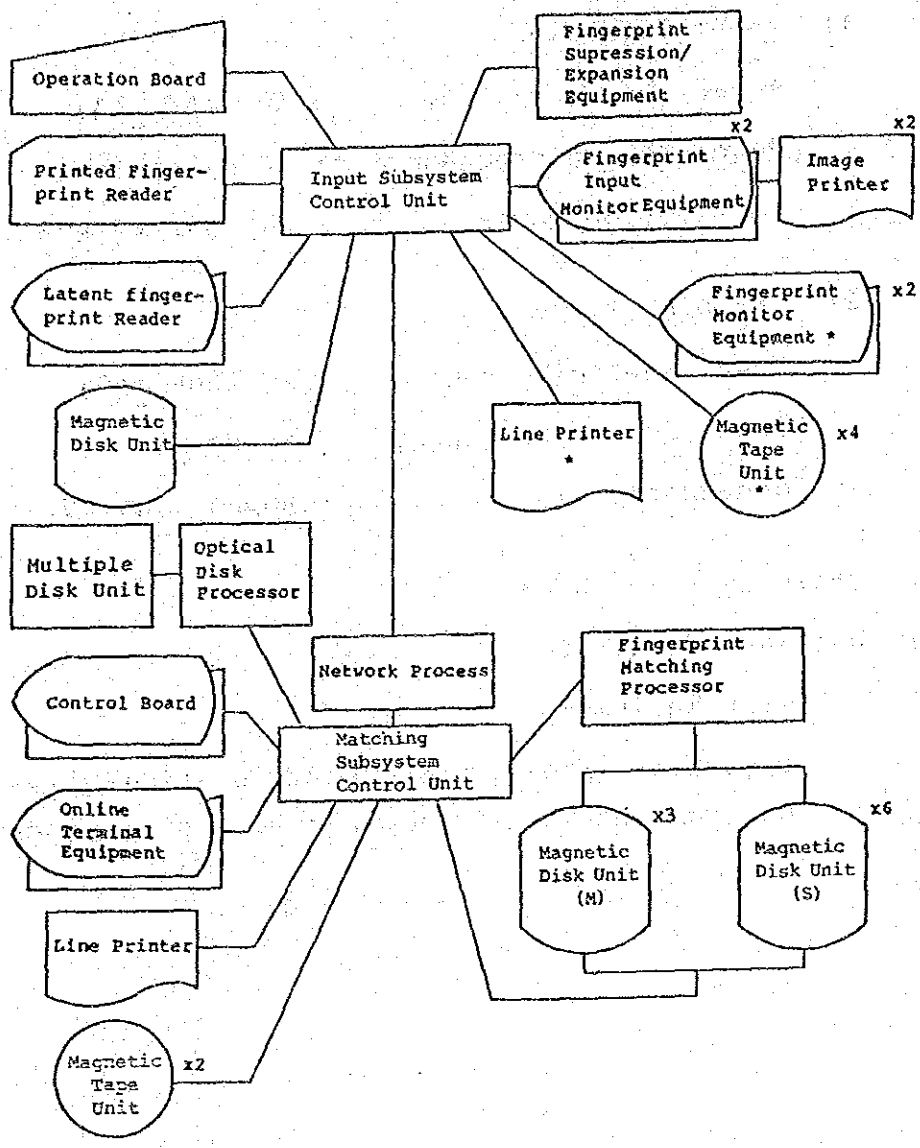
4-3 Basic System Design

(1) Hardware Structure

1) Main Equipment

Figure 4-1 shows System Configuration Block Diagram and Table 4-1 shows List of equipment.

Figure 4-1 System Configuration



* Use during the period of data conversion

Table 4-1 Equipment List

Sub-system	Description	Abbre-viation	Quan-tity	Functions
Input Sub-system	Input Subsystem Control Unit	ISCU	1	Controls each equipment of the input Subsystem.
	Console	CSL	1	Inputs and outputs messages to/ from input Subsystem.
	Magnetic Disk Unit	MDU	1	640 MB/Unit; Stores system programs, operation programs, fingerprint original image and minutiae data, etc.
	Printed Finger-print Reader	FR	1	Reads fingerprint cards (high speed)
	Fingerprint Input Monitor	FIM	2 (+2)*	Confirms/revises the finger-print images, inputs the additional information and displays the candidate fingerprint images
	Image printer	IPR	2	Outputs CRT picture of the fingerprint Input Monitor Unit.
	Fingerprint Data Suppression and Expansion Equipment	GFCE	1	Suppresses and expands the data
	Latent Fingerprint Reader	TLT	1	Reads Fingerprints expanded and traced and latent finger-prints. (speed: approx. three minutes per finger)
	Magnetic Tape Unit	MTU	[+4] *	Records data of converted fingerprint cards
	Line Printer	LP	[+1] *	Outputs the input additional information

* [ ] denotes additional equipment used during the period of conversion

Table 4-1 Equipment List (Cont'd)

Sub-system	Description	Abbre-viation	Quan-tity	Functions
Matching Sub-system	Matching Subsystem Control Unit	MSCU	1	Controls each equipment of the Matching Subsystem
	Console	CSL	1	Inputs instructions to the Matching Subsystem and outputs messages from the system.
	Fingerprint Matching Processor	FMP	1	Processes the matching fingerprints (high speed)
	Magnetic Disk Unit (M)	MDU (M)	3	1270 MB/unit. Stores fingerprint minutiae data base
	Magnetic Disk Unit (S)	MDU (S)	6	Stores system programs, operation programs and control data
	Multiple Optical Disk Unit	MOD	1	Stores fingerprint image data base (optical disk 32 sheet/unit)
	Optical Disk Unit	ODP	1	Controls the multiple optical disk unit
	Line Printer	LP	1	Outputs the operation processing statistics and data base contents
	Magnetic Tape Unit	MTU	2	Reads the converted fingerprint data
	On-line Terminals	OT	1	Displays the system processing status, inputs the start instruction to system processing
	Network Processor	NP	1	Connects the Input Subsystem and the Matching Subsystem, and makes high-speed data transmission

2) Equipment required for other operations

The following additional equipment is required for AFIS operations:

a) Variable magnifications fingerprint Printer : 1 unit

Latent fingerprints are magnified 5 times for printing on photographic paper

b) Optical disk cartridge : 32 disks

- Store fingerprint images
- Data capacity: 5GB/disk

c) Magnetic tape

The number of magnetic tapes required and their purposes are shown below:

Use	Number	Remarks
(1) Magnetic disk File-saving	475	• For recovery of master files in trouble • Saving data from magnetic disk to magnetic tape once a month
(2) Journal saving	90	• For recovery of master files in trouble • Saving daily processing status to magnetic tape
(3) Job logging	100	• For trouble cause analysis and statistic processing
Total	665	6250 RPI, 2400 feet

Note: (2) Magnetic tapes for Journal saving are also used for data conversion.

(2) Software

Table 4-2 shows software functions required to the system operation:

Table 4-2 Software Functions

Software	Outline of Functions
Fingerprint Data Conversion	Registers fingerprint minutiae data of the fingerprint cards filed to the fingerprint master files and also the fingerprint image data to the fingerprint image master files.
New printed Fingerprint Registration	Registers the fingerprint minutiae data to the printed fingerprint master files and at the same time the fingerprint images to fingerprint image master files
Printed Fingerprint Exchange Registration	Exchanges the clear fingerprint data of each finger with the registered fingerprint of the printed fingerprint master files and the fingerprint image master files
Latent Fingerprint Inquiries	Matching is made between the latent fingerprint and the printed fingerprint master files
Latent Fingerprint Re-inquiries	Latent fingerprint inquiries are made again, in case the latent fingerprint inquiry does not hit or in case errors are found in additional information
Other Crime Inquiries	Latent fingerprint master files (unsolved latent fingerprints) are matched with the ten fingerprint card data

Table 4-2 Software Functions (Cont'd)

Software	Outline of Functions
Latent Fingerprint Registration	Registers the unsolved latent fingerprintminutiae, when they did not hit in the latent fingerprint matching, to the latent fingerprint master files. Also registers the image data to the fingerprint image files.
Delete latent Fingerprint Inquired	In case the latent fingerprint hits in the matching process, and it is not required to keep it in the master file, deletes the inquired fingerprint.
Delete Printed Fingerprint Master Files	Deletes the printed fingerprint data in the printed fingerprint master files and fingerprint image master files. (Those data of people who are over 60 years old or who have no criminal records for a certain period of years after the last crime)
Printed/Latent Fingerprint Additional Information Renewal	Renews additional information or printed fingerprints and latent fingerprints already registered.
Fingerprint Image Confirmation	Displays in parallel on CRT the candidate fingerprint image and the inquired fingerprint image. Also displays additional information.
Operation Status Display	Displays on CRT the process progress status of the system (matching in wait, matching in process, matching finish, in confirmation, confirmation finish). Also stops or suspends processing.

Table 4-2 Software Functions (Cont'd)

Software	Outline of Functions
File Content Display	Displays on CRT the fingerprint data (minutiae and images) registered in various master files and the additional information.
Statistics Information Output	Outputs on the printer the number of processings by operations and input error information.
Trouble Diagnosis	Detects the location and cause when trouble occurs in hardware and software.
Data Base Maintenance	The following maintenance control is carried out. • Reads in the fingerprint data to the data base • Deletes the specified data from the data base • Maintains the data (saving) • Re-registers the data • Data base recovery • Renewal of data base additional information
Data Base Information Output	The following information on the data base is output: • Statistical Information (by fingerprint classification number, by kind of fingerprint and by sex) • Use rate by data base division regions • Number of poor quality fingerprints

(3) Master File Structure

Kind of Master File

1) There are two kinds of master files in this system: the fingerprint minutiae files for fingerprint matching and the fingerprint image files for fingerprint confirmation. Furthermore, the fingerprint minutiae files are classified into the printed fingerprint master files and the latent fingerprint master files.

Table 4-3 shows the content of master files:

Table 4-3 Master File Structure

Master File Classification		File Content
Fingerprint Minutiae File	Printed Fingerprint Master File	• Extracts the minutiae of all fingerprints from the fingerprint cards (maximum 191 points/finger) and registers data for use in latent fingerprint matching. • Searches with the kind of fingerprints or the pattern as the key.
	Latent Fingerprint Master File	• Registers the latent fingerprints by which the criminal were not detected as a result of latent fingerprint matching. This is used for the other crime matching. (maximum 63 points/finger) • Searches with the kind of fingerprints or the pattern as the key.
Fingerprint Image File		• This is used for confirming the match of the candidate fingerprint with the inquired fingerprint. Registers each fingerprint image of the fingerprint cards and the latent fingerprint images. • Searches with the individual ID number or the latent fingerprint registration number as the key.

2) Measures for Master File Trouble

Table 4-4 shows the measures to be taken for master file trouble:

Table 4-4 Measure for Master File Trouble

File	Measures for trouble
Fingerprint Minutiae File	Save the contents of the master file once a month. (Copy the magnetic disk to the magnetic tape) Furthermore, record on the magnetic tape the daily registration renewal status for the master file (called Journal Save)
Fingerprint Image File	Double the master files (two copies)

(4) Floor Layout of AFIS (tentative)

The Floor Layout of AFIS is shown in Figure 4-1.

(5) Commercial Power Supply and Air Conditioning

1) Required commercial power capacity shall be at least 200KVA for AFIS including the air conditioners and lighting fixtures. Electric wiring from Main distribution board in the power room to power distribution board in AFIS room shall be provided by the Thai side.

One power outlet to be fixed on the wall is required every $20m^2$ for maintenance of AFIS.

2) Un-interruptable Power Supply unit (U.P.S.)

The measurement of commercial power supply voltage shows that the fluctuation of voltage is over the limit. Therefore, it is necessary to provide the U.P.S. The data is shown in the Appendix.

3) Air-conditioner

The layout of the Air-conditioner is shown in Figure 4-1.

4-4 Project Implementation Plan

(1) Implementation Schedule

It is important to ensure the implementation schedule once agreed upon by the parties concerned. It is necessary that the consultant from a Japanese consulting firm should be assigned to ensure the smooth progress of the project.

After the approval of Exchange of Notes between the Governments of Thailand and Japan, the Japanese consulting firm shall conclude a consultant contract with the RTPD based on the procedures required for the Grant Aid Program.

The consulting services shall be covered the following works.

1) Preparation of the Specification for equipment and materials.

2) Preparation of Tender Documents.

3) Evaluation of Tender Proposals.

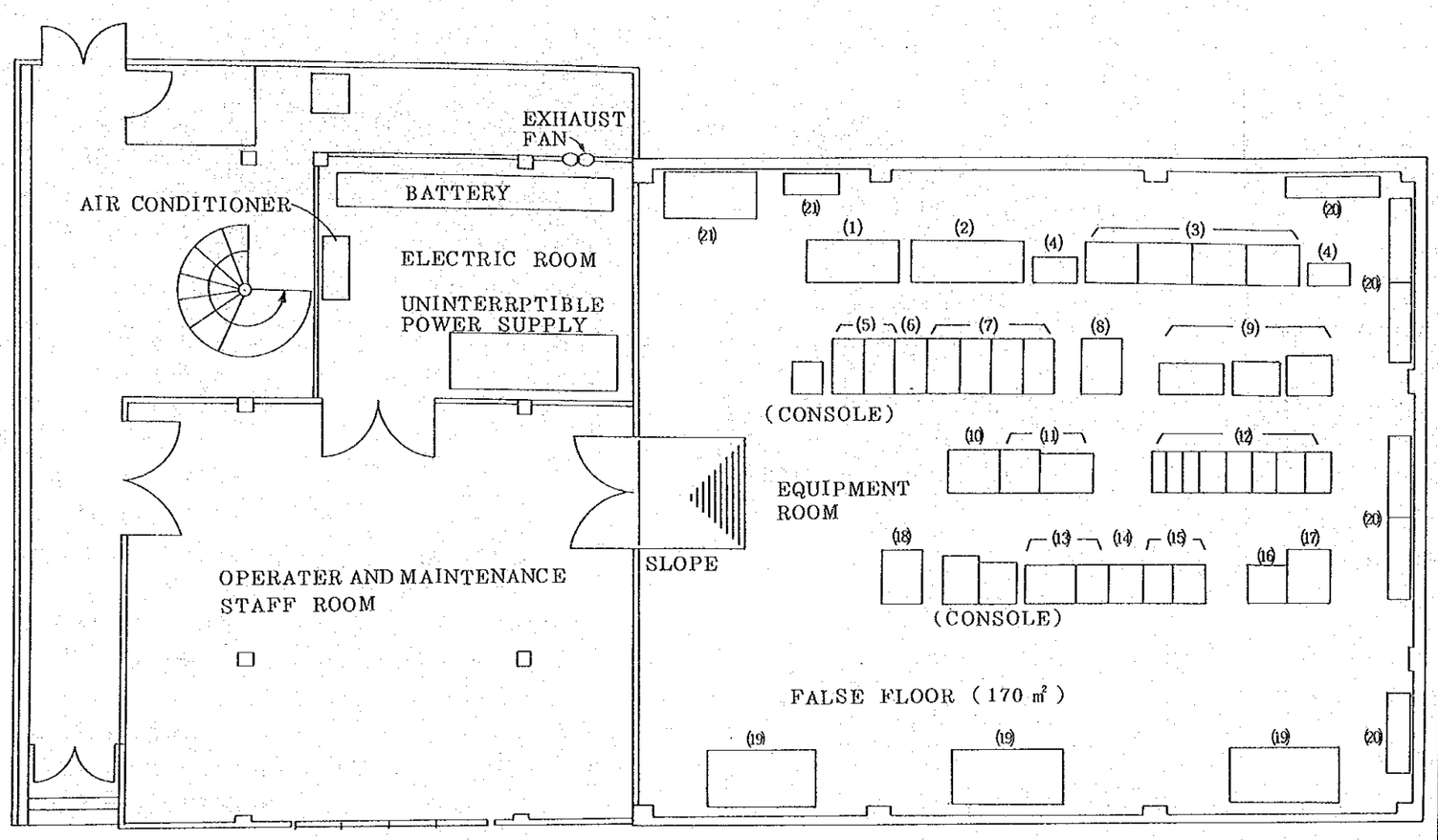
4) Selecting the Contractor.

5) To assist the preparation of Contract Documents.

6) To witness to the factory test for the major equipment.

7) To inspect the installation of the system.

8) To assist the Final Acceptance Test.



NOTE : OUTSIDE UNITS OF AIR CONDITIONER SHALL BE INSTALLED AT ROOF OF EQUIPMENT ROOM.

No.	DESCRIPTON
	INPUT SUBSYSTEM
(1)	GREY FINGERPRINT COMPRESION/EXPANSION UNIT
(2)	TRACED LATENT FINGERPRINT TERMINAL UNIT
(3)	FINGERPRINT INPUT MONITER
(4)	IMAGE PRINTER
(5)	INPUT SUBSYSTEM CONTROL UNIT
(6)	MAGNETIC DISK UNIT
(7)	MAGNETIC TAPE UNIT
(8)	LINE PRINTER
(9)	FINGERPRINT READER
	MATCHING SUBSYSTEM
(10)	ON-LINE TERMINAL UNIT
(11)	FINGERPRINT MATCHING PROSESSOR
(12)	MAGNETIC DISK UNIT
(13)	MATCHING SUBSYSTEM CONTROL UNIT
(14)	NETWORK PROCESSOR
(15)	MAGNETIC TAPE UNIT
(16)	OPTICAL DISK PROCESSOR
(17)	MULTIPLE OPTICAL DISK UNIT
(18)	LINE PRINTER
(19)	AIR CONDITIONER
(20)	MAGNETIC TAPE CABINET
(21)	POWER DISTRIBUTION BOARD

EQUIPMENT LAYOUT PLAN Fig. 4 – 1

(2) Scope of works

1) Responsibilities to be taken by the Thai side

a) The construction of the new building where the AFIS will be installed. In connection with the building, the fire alarm equipment, fire extinguisher and electric work shall also be provided.

b) The 1st floor of the existing building to be used for the AIFS operators and the U.P.S. shall be remodelled.

c) Electric wiring from Main distribution board in the power room to the power distribution board in AFIS room shall be provided.

d) The steel cabinets for magnetic tape (capacity 665 reels) shall be provided.

e) To bear commissions to the Japanese foreign exchange bank for banking services based upon the Banking Arrangement.

f) To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in Thailand and prompt internal transportation therein of the products purchased under the project.

g) To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in Thailand with respect to the supply of the products and services under the verified contracts.

h) To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contracts such facilities as may be necessary for the performance of their works.

i) To provide general furniture required for administrative purposes.

j) To bear all expenses necessary for the project other than those to be borne by Japan.

2) Responsibilities to be taken by the Japanese side

To provide the equipment of AFIS and the other related facilities.

a) Equipment of AFIS

Sub-system	Equipment	Abbre-viation	Quan-tity
Input Sub-system	Input Subsystem Control Unit	ISCU	1
	Console	CSL	1
	Magnetic Disk Unit	DKU	1
	Printed Fingerprint Reader	FR	1
	Fingerprint Input Monitor	FIM	2
	Image Printer	IPR	2
	Fingerprint Data Suppression and Expansion Equipment	GFCE	1
	Latent Fingerprint Reader	TLT	1
Match-ing Sub-system	Matching Subsystem Control Unit	MSCU	1
	Console	CSL	1
	Fingerprint Matching Processor	FMP	1
	Magnetic Disk Unit (M)	MDU (M)	3
	Magnetic Disk Unit (S)	MDU (S)	6
	Multiple Optical Disk Unit	MOD	1
	Optical Disk Unit	ODP	1
	Line Printer	LP	1
	Magnetic Tape Unit	MTU	2
	On-line Terminals	OT	1
	Network Processor	NP	1

b) Other related facilities

Equipment	Quantity
. Air Conditioner	: 1 lot
. Un-interruptable Power Supply System	: 1 set
. Power Distribution Board	: 1 set

(4) Implementation Schedule

The implementation schedule is shown in the Table below.

Implementation Schedule

	Contents \ Month	1	2	3	4	5	6	7	8	9	10	11	12	13
Grant Aid	Exchange of Note	▼												
	Consulting Contract	▼												
	Detail Design		▬											
	Tender Announcement			▼										
	Contract			▼										
	Manufacturing				▬	▬	▬	▬	▬	▬				
	Inspection of Equipment									▬				
	Installation work			Ocean freight							▬	▬	▬	
	Final Inspection													▬
Thai Side	Construction and Remodeling				▬	▬	▬	▬						

4-5 Operation and Maintenance Control Plan (tentative)

The following operation and maintenance control plan has been proposed to attain the planned objective for maximum utilization of functions by smooth operation of the system.

(1) Operation Plan

Table 4-5 shows the total system operation plan after the system is introduced:

Table 4-5 Total System Operation Plan (tentative)

Operation	1st year	2nd year	3rd year	4th year	.....	Remarks
(1) Registration of Maintained Fingerprint Cards	250,000					Maximum number of the printed fingerprint master files (500,000)
(2) Registration of Accepted Fingerprint Cards	50,000	50,000	50,000	50,000		
(3) Latent Fingerprint Inquiry		5,000	5,000	5,000		
(4) Registration of Latent Fingerprint		4,500	4,500	4,500		
(5) Other Crime Inquiry			7,500	7,500		

Note: Figures shown in Table are the yearly data volume

[Supplement Explanation]

① Extracts the specified 4 kinds of crime cards out of the maintained fingerprint cards after 1986 and registers them to the data base (250,000 in one year).

② In parallel with ① above, registers to the data base those specified 4 kinds of crimes out of the fingerprint cards accepted after January, 1991. Furthermore, renews the last crime data of the fingerprint cards already registered to the data base.

③ The acceptance of inquiry on the latent fingerprint starts in the second year of the start of operation (after completing 300,000 data base).

④ Registers the unsolved latent fingerprint after latent fingerprint matching to the latent fingerprint master file.

⑤ The other crime matching will start at the time when the latent fingerprints are registered in the latent fingerprint master file (in the third year).

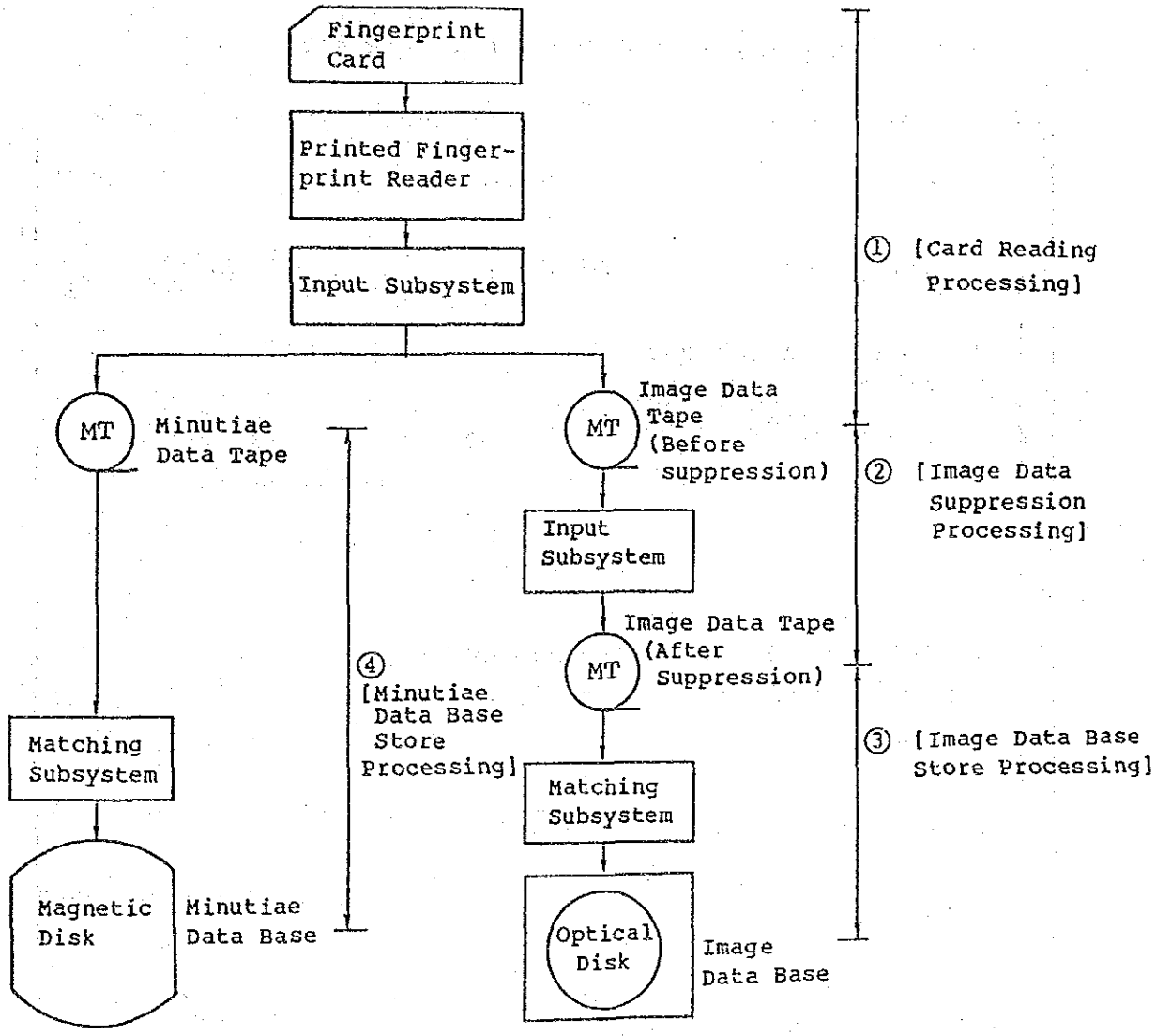
1) Operation plan in the 1st year (at the time of conversion)

a) The following equipment is used for data conversion.

- Printed Fingerprint Reader 1
- Fingerprint Input Monitor 4
- Magnetic Tape Unit 4
- Line Printer 1

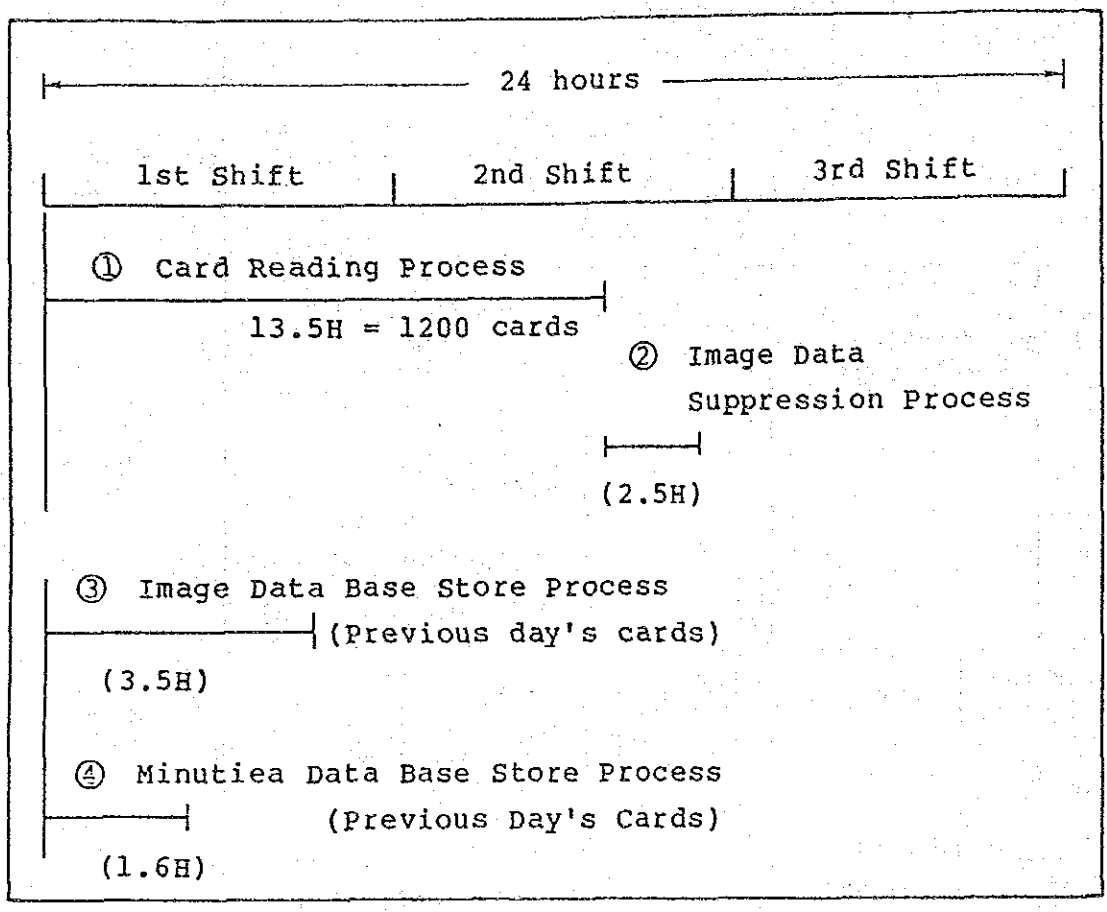
b) Table 4-6 shows the data conversion processing flow chart:

Table 4-6 Data Conversion Processing Flow



c) Table 4-7 shows Daily operation planning at the 1st year (tentative)

Table 4-7 Daily Operation Plan (1st year)



Supplemental Explanation:

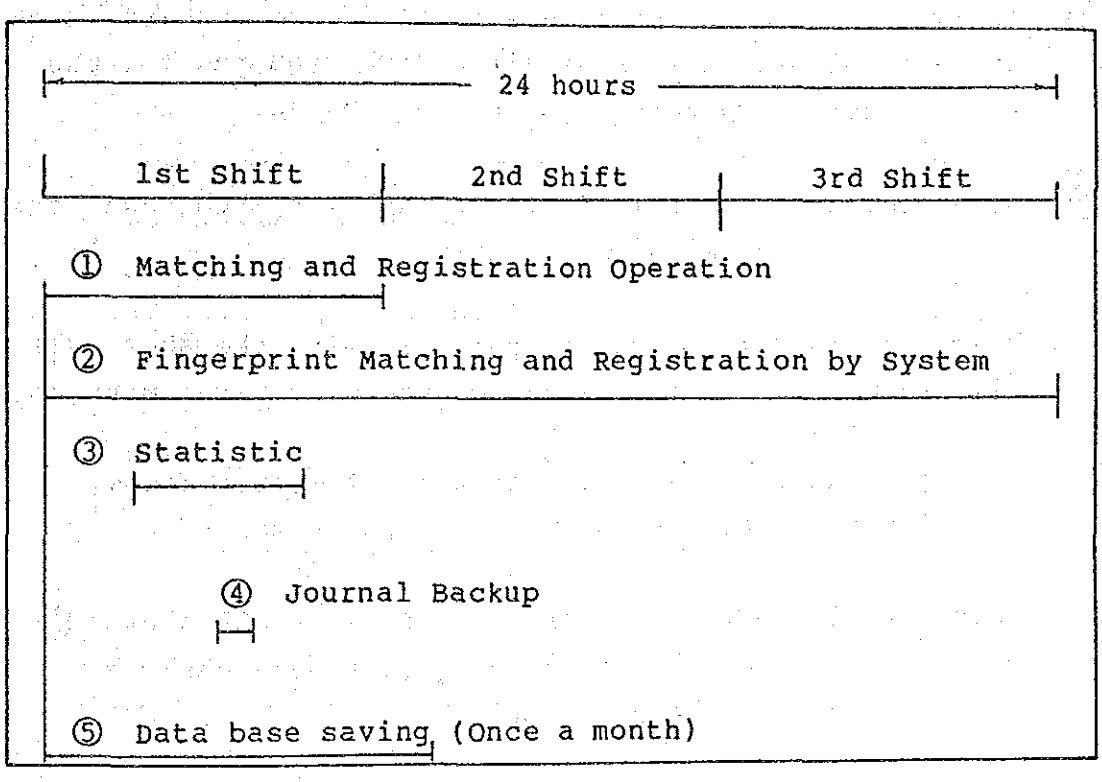
① and ② are executed by the Input Subsystem, Parallel Processing is not possible.

③ and ④ are executed by the Matching Subsystem, Parallel Processing is possible.

2) Operation plan for 2nd year and thereafter (tentative)

Table 4-8 shows Daily Operation Plan.

Table 4-8 Daily Operation Plan (After conversion)



Supplemental Explanation;

① Major operator's works:

- Input of new printed fingerprint for registration.
- Input of changes in the previous crime date by the second convict.
- Inquiry of the latent fingerprint and input of other crimes.
- Confirmation of latent fingerprint inquiry and the candidate fingerprint of other crime inquiry.

② Processing time of fingerprint matching and registration varies according to inquiry volume.

In principle, presence of operator is not required.

③ Daily statistic for major operator's works is carried out in parallel with the above ①. Time required for the work is estimated to be approx. 10 minutes.

④ As a preventive measure in the event of system down, the journal data is saved to MT daily.

This work is carried out in parallel with the above ①. Time required for this is estimated for several minutes.

⑤ As a preventive measure at the time of system down, minutiae data base is saved to MT once a month.

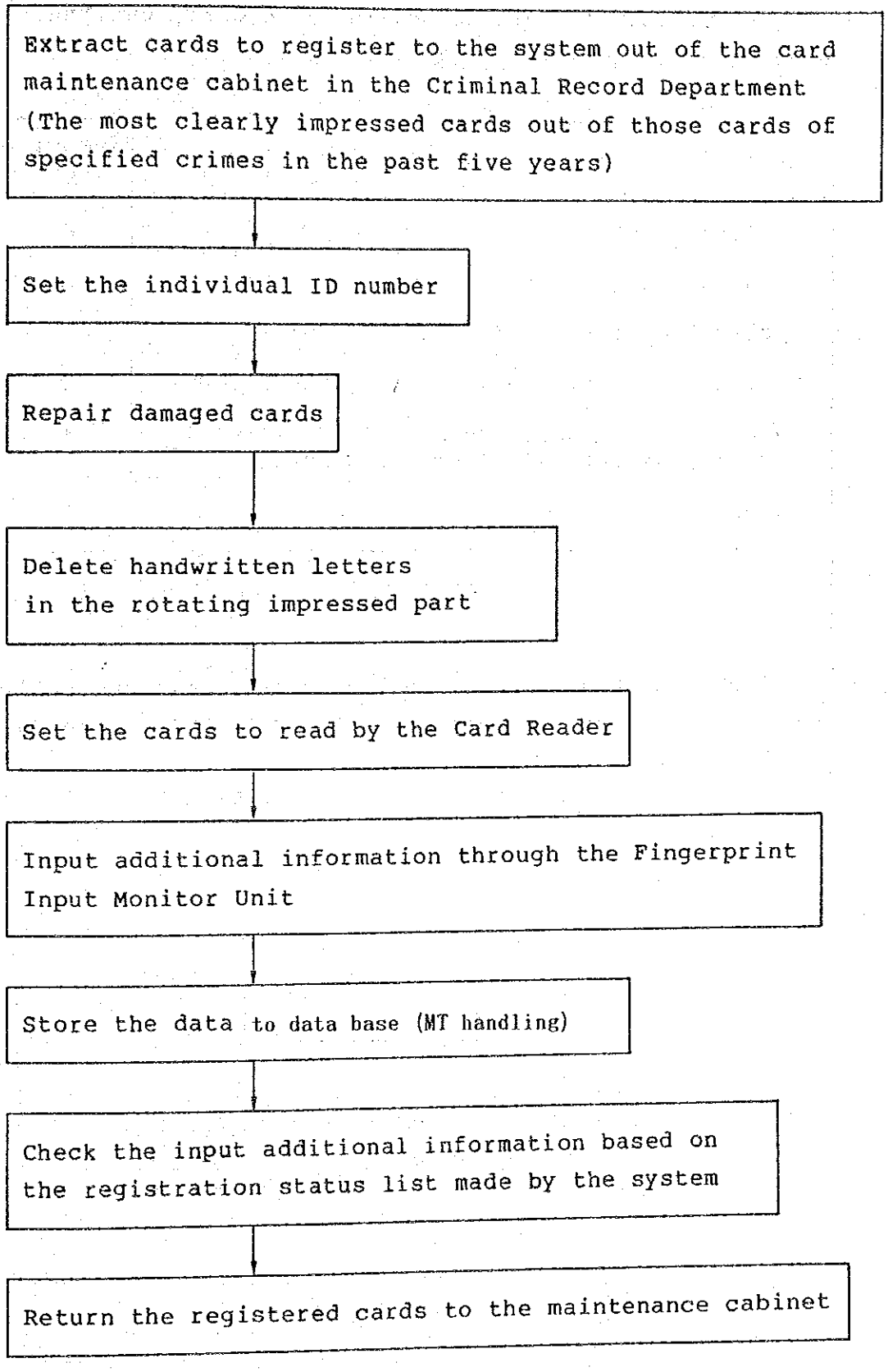
This work is carried out in parallel with the above ①. Time required for this work in 500,000 data base is estimated to be approx. 8 hours.

(2) Operation Staff

The following staffing plan should be made due to the large difference in the operation content in the 1st year (at the time of data conversion) and the 2nd year and after (start of fingerprint inquiry work).

1) 1st year (at the time of data conversion)

The following is the operation processing flow in consideration of the previous and after operation in addition to operation in the computer room at the time of data conversion.


Extract cards to register to the system out of the card maintenance cabinet in the Criminal Record Department (The most clearly impressed cards out of those cards of specified crimes in the past five years)
Set the individual ID number
Repair damaged cards
Delete handwritten letters in the rotating impressed part
Set the cards to read by the Card Reader
Input additional information through the Fingerprint Input Monitor Unit
Store the data to data base (MT handling)
Check the input additional information based on the registration status list made by the system
Return the registered cards to the maintenance cabinet

The following staff is necessary to carry out the above job in one shift (8 hours):

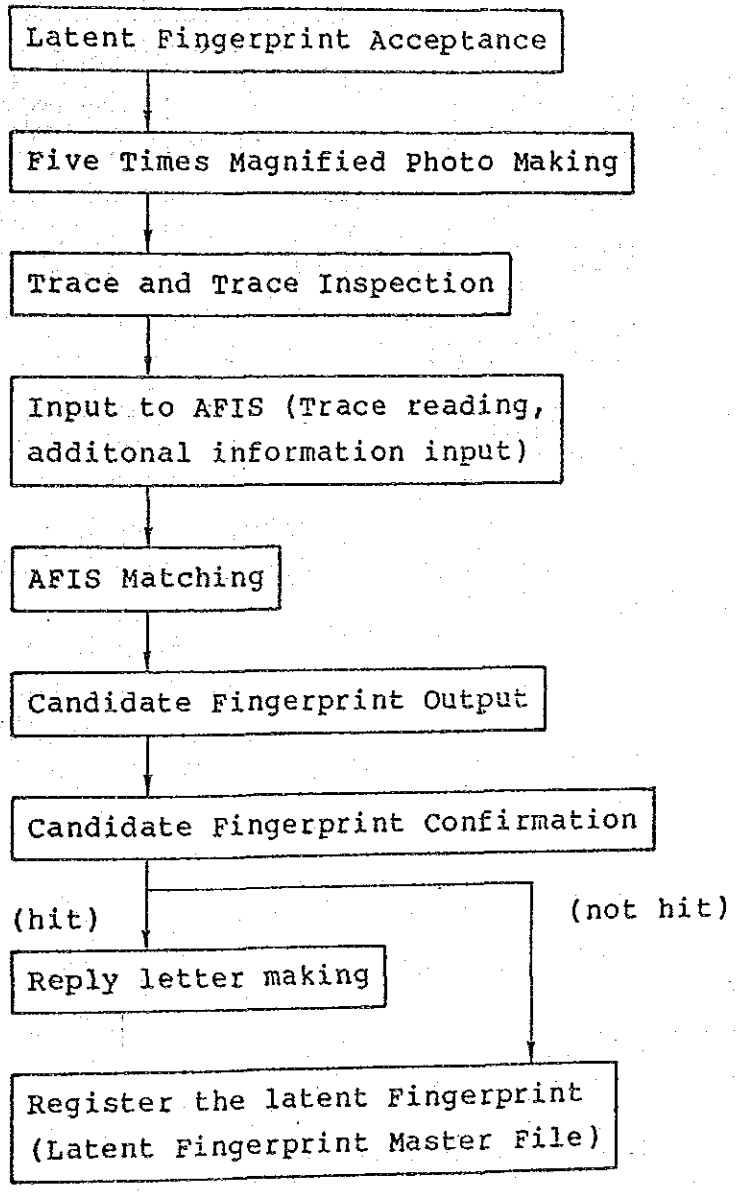
Staff Classification	Number of staff
Monitor Staff	6
Card Handling Staff	1
System Operator (MT Handling Console)	1
Card Extraction, Individual ID Number Setting	3
Damaged Card Repair, Delete Unnecessary Letters, Additional Information Check	3
Supervisor	1
Total	15

From the standpoint of health control, recommendable monitor staff working condition is One hour work and 30 minutes rest.

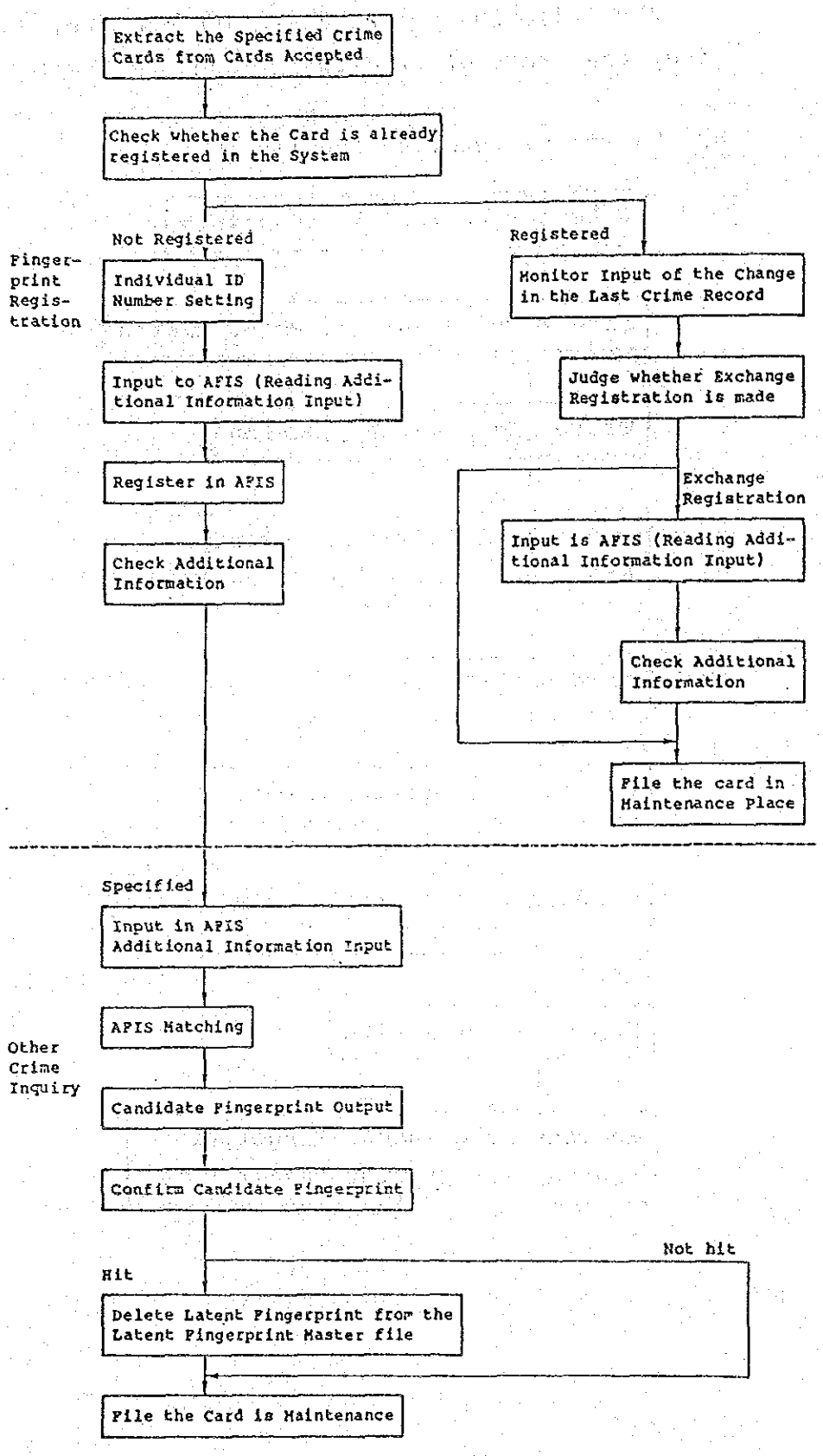
2) 2nd Year and Thereafter

The following is the operation processing work after the start of fingerprint inquiry operation.

a) Latent Fingerprint Inquiry



b) Fingerprint Registration, Other Crime Inquiry



The following staff is required to carry out the above work.

Staff Classification		Number of people
Other Crime Inquiry Latent Finger-print	• Trace and Trace Inspection	3
	• Near-hit Treatment (Confirm Candidate Fingerprint)	2
	• Inquiry Input	1
	• Inquiry Reception Record and Reply Making	1
Finger-print Registra-tion	• Individual ID Number Setting Additional Information Checking	2
	• Monitoring	2
	• Exchange Registration	2
Other	• System Operation Data Base Control } System Staff	2
	• Supervisor	1
Total		16

(3) Estimation of Maintenance Expense

Table 4-9 shows the yearly maintenance expense after the project is completed.

Table 4-9 Yearly Maintenance Expense

Contents	Expense (Baht)	
	First year	Second year and thereafter
Rental Expense for Data Conversion Equipment	1,300,000	0
Equipment Maintenance Expense	0	1,800,000
Other Related Facilities	0	160,000
Stationaries . Printer Paper . Printing Copies . Trace Paper etc.	20,000	120,000
Electric and Heating EXP.	700,000	700,000
TOTAL	2,020,000	2,780,000

(4) Technical Cooperation

It is necessary to give training to Thai operation staff for full understanding of how to use and operate each equipment for smooth system operation.

4-6 Estimated Expenses for the Implementation on the Thai Side

The total expenses for the implementation of Project on the Thai Side are estimated, as follows:

(1) construction of building for AFIS facilities

1,500,000 Baht

(2) modification of existing building for operation room

200,000 Baht

(3) electric wiring work for Power Dist. Board

300,000 Baht

Total	2,000,000 Baht (about 10,800,000 Yen)

CHAPTER 5 EVALUATION OF THE PROJECT

CHAPTER 5 EVALUATION OF THE PROJECT

5-1 The Expected Effects of the Project

When the installation of AFIS is completed and its operation begun, the following effects can be expected:

(1) Matching Latent Fingerprints

The latent fingerprints at crime scenes have been utilized to identify criminals by comparison with the fingerprints of suspects who emerge in the process of a criminal investigation. Therefore, the collected latent fingerprints could not be useful clues to support the investigation if there was no suspect. However, by using AFIS, the latent fingerprints and the filed fingerprints in the master file can be matched automatically in a short time period. Consequently, suspects can be arrested more easily.

(2) Identifying Criminals of Other Crimes

The master files in AFIS includes all the fingerprints of known violent criminals. When new fingerprints are registered in the master file, they are also matched with the latent fingerprints of unsolved crimes. The new fingerprints, should they "hit" with the fingerprints of certain unsolved crimes, would imply that the new criminal has committed other crimes.

This will help in the investigation of unsolved crimes.

(3) Improvement of the Number of Arrests

The above mentioned process will improve the number of arrests by utilizing latent fingerprints. In Thailand, latent fingerprints are not the main means of detecting a criminal. When a suspect is identified, the latent fingerprints are compared with the suspect's ten fingerprints to verify his guilt.

This is not, however, a criminal investigation method using latent fingerprints.

By introducing AFIS through the Project, latent fingerprints can immediately be compared with the fingerprints of known criminals in the master file.

(4) The Prevention of Crimes and the Conducting of Efficient Investigations

Since AFIS will make it possible to shorten the time required for fingerprint matching, the investigation period will also be shortened to a great extent. As a result, this will bring about the more effective utilization of investigation staff and funds, and prevent the same criminals from committing other crimes.

(5) The quick matching of latent fingerprints and the fingerprint cards of suspects

The fingerprint of suspects registered in the master file of AFIS are also recorded in a optical disk as images.

If necessary, these images can be matched with the latent fingerprints on the display screen.

(6) Matching Partial Latent Fingerprints

AFIS can automatically identify the minutiae of fingerprints and input them to the master file much more precisely than manual identification. Therefore, even a partial fingerprint, which used to be considered unusable, can be collated with the filed fingerprints, and thereby improve the criminal identification process.

5-2 Evaluation of the Project

By introducing AFIS through the Project, various effects can be expected, as mentioned above and those effects will contribute to the improvement of the number of arrests.

According to the study in Japan, the number of criminals identified by matching latent fingerprints can be expected to increase from 70 - 90 criminals at the present to 300 - 500 cirminals at the time of AFIS operation.

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

6-1 Conclusions

The objective of the Project is to provide criminal identification equipment to the RTPD and to modernize its investigation support system. Through completion of the Project, it is expected that the detection support system of the Scientific Crime Detection Division will be reinforced. The support system for all Thai police investigative activities will be further strengthened, and as a result, the RTPD can fulfill its responsibility to protect people's lives and property.

The new criminal investigation support system to be introduced in Thailand will include the following functions.

(1) AFIS will immediately identify the collected latent fingerprints by matching them with the fingerprints in the master file of criminals. If the latent fingerprints "hit" with certain fingerprints, the criminal can easily be identified and arrested.

(2) When the fingerprints of a new criminal are put into the master file of AFIS, some unsolved crimes could be settled by matching the new fingerprints with the latent fingerprints from unsolved crimes in the file.

(3) The above mentioned operation can be conducted immediately and precisely which will increase the efficiency of criminal investigations and decrease the number of crimes.

(4) Since the images of the filed fingerprints in the master file of AFIS are put into a optical disk, both images of the "hit" fingerprints and the latent fingerprint can be immediately matched on the display screen.

This will greatly improve the number of arrests by effectively utilizing the latent fingerprints.

As mentioned above, this Project is valid for implementation under grant aid from the Government of Japan. Furthermore, the Project will greatly contribute to the protection of people's lives and property in Thailand, and thereby bring a better relationship between Thailand and Japan.

6-2 RECOMMENDATIONS

(1) In order to operate AFIS effectively, the RTPD is requested to improve the management of fingerprint system as follows:

1) to innovate the Ten-fingerprint card such as putting ID number on each card, adopting proper format, etc. to conform to the Automated Fingerprint Identification System (AFIS).

2) to imprint clear fingerprint for the effective operation of the AFIS.

(2) The RTPD should provide the building facility for AFIS, to meet all the construction requirements as stated in Appendix 5.

(3) The RTPD is requested to train the personnel for the effective operation of AFIS.

(4) The RTPD is requested to assure the maintenance costs for the effective operation of AFIS.

APPENDIX

1. Minutes of Discussions

1-1 Basic Design Study

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
THE PROJECT FOR THE PROVISION OF IDENTIFICATION EQUIPMENT
IN
THE KINGDOM OF THAILAND

In response to the request made by the Government of the Kingdom of Thailand, the Government of Japan decided to conduct a basic design study on the Project for the Provision of Identification Equipment (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent the Basic Design Study Team headed by Mr. Tadatoshi NAITO, Assistant Director, Identification Division, Criminal Investigation Bureau, National Police Agency, from July 30 to August 18, 1989.

The Team had a series of discussions on the Project with the officials concerned of the Government of the Kingdom of Thailand, and conducted a field survey in Bangkok.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Bangkok, August 7, 1989

内藤忠利

TADATOSHI NAITO
Leader
Basic Design Study Team
Japan International
Cooperation Agency (JICA)

Pol.Maj.Gen. SOMBAT SOONTHORNVORN
Commander
Scientific Crime Detection Division
Royal Thai Police Department

ATTACHMENT

1. Title of the Project

The title of the Project is "The Project for the Provision of Identification Equipment."

2. The Objective of the Project

The objective of the Project is to provide the necessary identification equipment in order to improve the scientific investigation and then to assure maximum protection of life and property of the people.

3. Executing Agency for the Project

(1) Administrative Agency for the Project is the Royal Thai Police Department of Ministry of Interior.

(2) Operating Agency for the Project is the Scientific Crime Detection Division, the Central Investigation Bureau.

4. Project Site and Installation Plan

The equipment provided under the Grant Aid is to be installed at the Scientific Crime Detection Division (Building No. 10 of the Royal Thai Police Department), Henry Dunant Road, Bangkok. The tentative installation plan of the equipment is shown in Annex 1.

5. Request from the Government of the Kingdom of Thailand

(1) The equipment requested by the Government of the Kingdom of Thailand is listed in Annex 2.

(2) The Team will convey to the Government of Japan the desire of the Government of the Kingdom of Thailand that the Government of Japan takes necessary measures to cooperate in implementing the Project and provide necessary equipment within the scope of Japan's Grant Aid Program.

6. Japan's Grant Aid System

The Thai Side has understood the system of Japan's Grant Aid and the necessity of consulting services of a Japanese consulting firm for the implementation of the Project.

7. Necessary measures to be taken by the Government of the Kingdom of Thailand

The Government of the Kingdom of Thailand will take the necessary measures listed in Annex 3 on condition that the Grant Aid by the Government of Japan is extended to the Project.

8. Other Matters

(1) The Government of the Kingdom of Thailand will undertake to provide the necessary budget and personnel for the proper and effective operation and maintenance of the equipment provided under the Grant Aid.

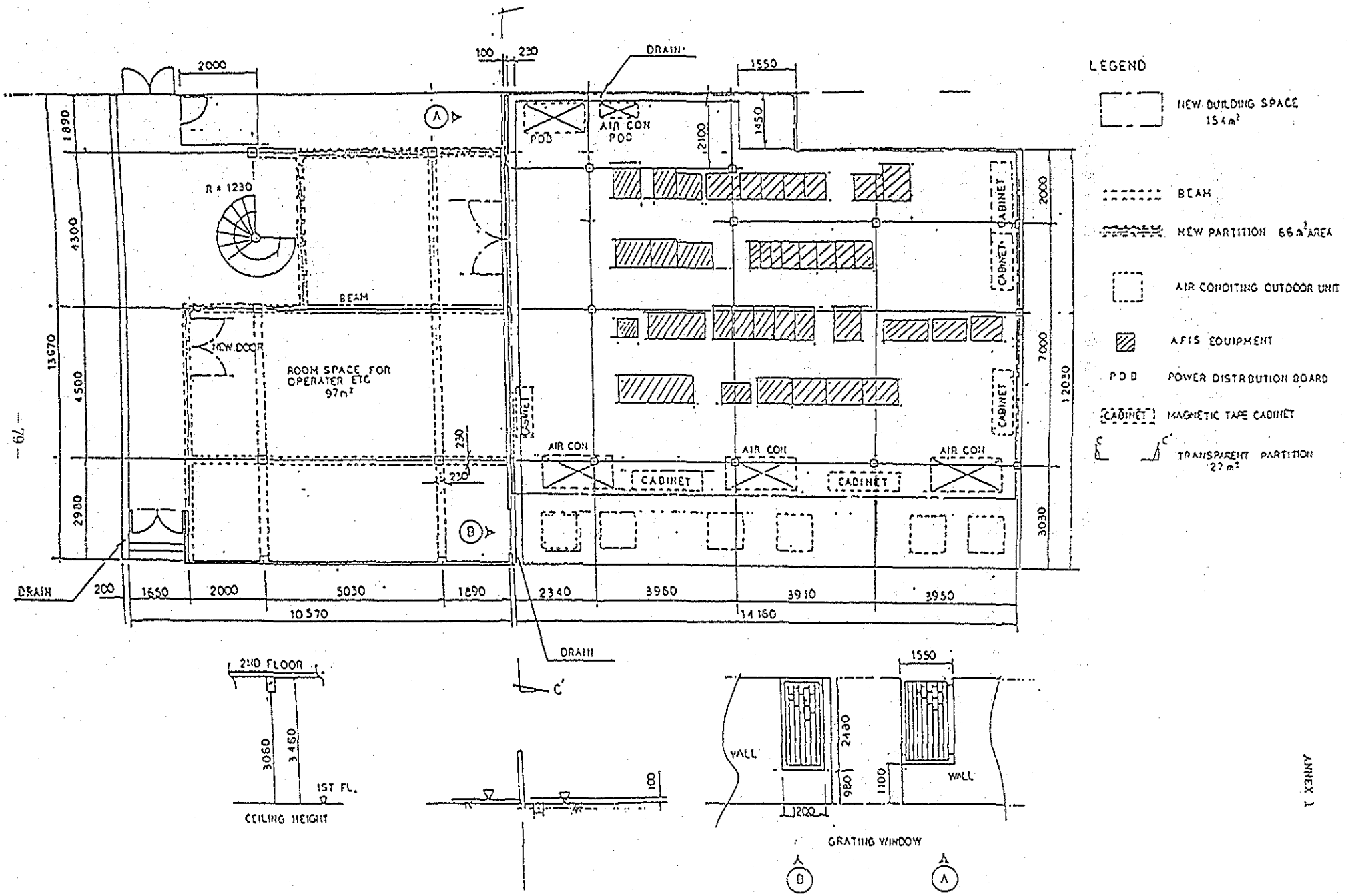
(2) The Thai side will take the necessary measures to ensure that the construction of the building for the equipment provided under the Grant Aid will be completed by the end of September, 1990, prior to the installation of the equipment.

(3) The Team has requested that the Thai side takes the necessary measures to improve the management of fingerprint system as follows:

(a) to innovate the Ten-fingerprint card such as putting ID number on each card, adopting proper format, etc. to conform to the Automated Fingerprint Identification System (AFIS).

(b) to imprint clear fingerprint for the effective operation of the AFIS.

(4) The Thai side has requested the team that the Government of Japan consider the dispatching of expert and providing training of the Thai officials concerned in Japan for the smooth implementation of the Project.


LEGEND
NEW BUILDING SPACE 154 m²
BEAM
NEW PARTITION 66 m² AREA
AIR CONDITING OUTDOOR UNIT
AFIS EQUIPMENT
P D B POWER DISTRIBUTION BOARD
CABINET MAGNETIC TAPE CABINET
TRANSPARENT PARTITION 27 m²
ROOM SPACE FOR OPERATER ETC 97m²
NEW DOOR
BEAM
AIR CON POD
AIR CON
CABINET
DRAIN
2ND FLOOR
1ST FL.
CEILING HEIGHT
WALL
GRATING WINDOW
ANNEX 1
— 79 —

ANNEX 2 EQUIPMENT REQUESTED BY THE GOVERNMENT OF THE KINGDOM OF THAILAND

"Automated Fingerprint Identification System" equipment which consists of:

- Input subsystem (inclusive of optical disk unit, etc.)
- Matching subsystem

etc.

ANNEX 3 MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE KINGDOM OF THAILAND

1. To prepare the facilities of electricity, lighting, and other incidental before commencement of installation work.

2. To maintain and use properly and effectively the equipment purchased under the Grant.

3. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

4. To ensure prompt unloading, tax exemption, customs clearance at port of disembarkation in Thailand and prompt internal transportation therein of the products purchased under the Grant.

5. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Thailand with respect to the supply of the products and services under the verified contracts.

6. To accord Japanese nationals whose services may be required in connection with the supply for the products and the services under the verified contracts such facilities as may be necessary for their entry into Thailand and stay therein for the performance of their work.

7. To provide general furniture required for the administrative purpose.

8. To bear all the expenses other than those to be borne by the Grant necessary for the Project.

1. Minutes of Discussions

1-2 Draft Report

MINUTES OF DISCUSSIONS

ON

THE BASIC DESIGN STUDY

OF

THE PROJECT FOR PROVISION OF IDENTIFICATION EQUIPMENT

IN

THE KINGDOM OF THAILAND

In response to the request of the Government of the Kingdom of Thailand, the Government of Japan decided to conduct a basic design study on the Project for Provision of Identification Equipment(herein after reffered to as "the Project") and entrusted the study to the Japan International Cooperation Agency(JICA).

JICA sent to the Kingdom of Thailand the basic design study team headed by Mr. Tadatoshi Naito, Assistant Director, Identification Division, Criminal Investigation Bureau, National Police Agency, from July 30 through August 18, 1989.

As a result of the study, JICA prepared a draft basic design study report and dispatched a team headed by Mr. Hidetsugu Shimazu, Assistant Director, Identification Division, Criminal Investigation Bureau, National Police Agency, to explain and discuss on the report with the relevant officials of the Government of the Kingdom of Thailand from September 24 through September 30, 1989.

Both parties had a series of discussions on the draft report and agreed to recommend their respective Governments that major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Bangkok, September 28, 1989

島津秀嗣

Hidetsugu Shimazu

Leader of the Basic
Design Study Team,
Japan International
Cooperation Agency

Sombat Soonthornvorn

Pol. Maj. Gen. Sombat Soonthornvorn

Commander
Scientific Crime Detection Division
Royal Thai Police Department

ATTACHMENT

1. The Thai side agreed in principle on the basic design proposed in the Draft Final Report.

2. The Thai side ensured the provision of the necessary budget for the works such as construction of new building, remodeling of existing building and maintenance and operation expenses for the Project.

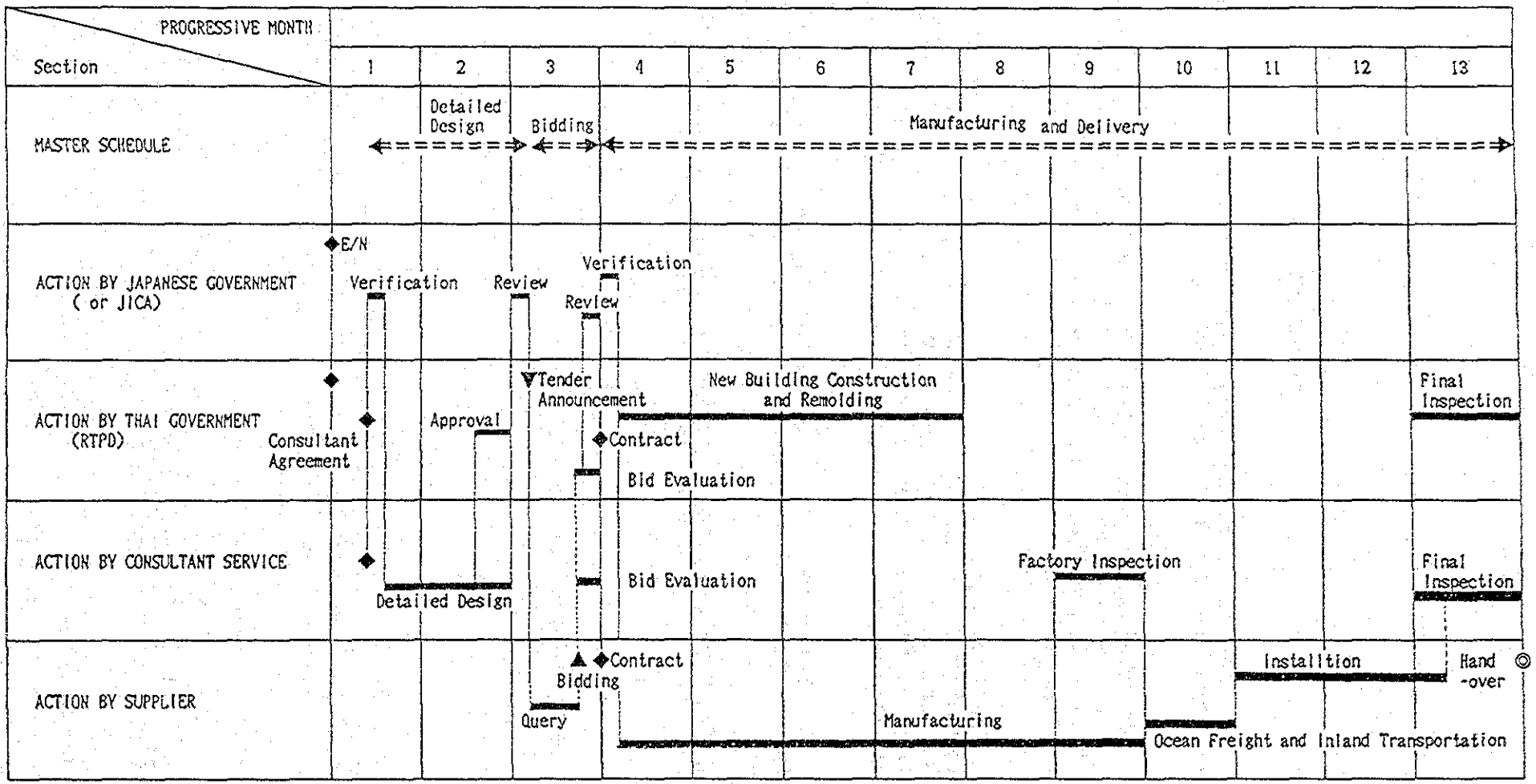
3. The Thai side has understood Japan's Grant Aid System and reconfirmed the necessary measures to be taken by the Government of the Kingdom of Thailand which are manifested in the "Minutes of Discussions" on the Project signed on August 7, 1989.

4. The Japanese side proposed the Implmentation Schedule for the Project and both parties agreed on this plan.

5. The Final Report(10 copies in English) would be submitted to the Thai side by the end of October 1989.

APPENDIX: Implementation Schedule

TENTATIVE IMPLEMENTATION SCHEDULE
FOR
THE PROJECT FOR PROVISION OF THE IDENTIFICATION EQUIPMENT



2. Member of the Study Team

2-1 Basic Design Study

Name	Assignment	Profile
NAITO TADATOSHI	Leader	Assistant Director. Identification Division. Criminal Investigation Bureau, National Police Agency.
OUCHI AKIRA	Coordinator	Grant Aid Division. Bureau of Economic Cooperation, Ministry of Foreign Affairs.
SHIMAZU HIDETSUGU	Crime Detection Supporting System	Assistant Director. Identification Division, Criminal Investigation Bureau, National Police Agency.
TATSUZAWA YUJI	Fingerprint Data Design	Assistant Director. Identification Division, Criminal Investigation Bureau, National Police Agency.
MASUBUCHI JIRO	Project Manager and Identification Equipment Planning	Security Electronics and Communications Technology Association.
IWATA ISAMU	System Design and Cost Estimation	Security Electronics and Communications Technology Association.
KIDA SATOSHI	Operation Planning	Security Electronics and Communications Technology Association.
AKIYAMA EISAKU	Equipment Planning (Power) and Architectural Design	Security Electronics and Communications Technology Association.

under line indicates Surname

2. Member of the Study Team

2-2 Draft Report

Name	Assignment	Profile
SHIMAZU HIDETSUGU	Leader	Assistant Director. Identification Division. Criminal Investigation Bureau. National Police Agency.
MATUDA NORIO	Coordinator	First Project Management Division. Grant Aid Project Management Department JICA.
MASUBUCHI JIRO	Project Manager and Identification Equipment Planning	Security Electronics and Communications Technology Association.
IWATA ISAMU	System Design and Cost Estimation	Security Electronics and Communications Technology Association.

Under line indicates Surname

3. FIELD SURVEY SCHEDULE

JULY 31 (MON)	* Courtesy call and meeting with Embassy of Japan and JICA THAILAND OFFICE * Courtesy call on the Royal Thai Police Department and the Department of Technical and Economic Cooperation
AUG 1 (TUE)	* Discussions with the Royal Thai Police Department based on Inception Report * Confirmation of the study schedule * Confirmation of the undertakings the Government of Thailand during the study
AUG 2 (WED)	* Discussions on the present condition of fingerprint processing (1) - the amount of ten fingerprint data - the quality of fingerprint cards - organizational structure and personnel * Study on local electric work companies * Study on construction materials
AUG 3 (THU)	* Discussions on the present condition of fingerprint processing (2) - the number of collected latent fingerprints - the number of latent fingerprint cards - the number of inquiry on the latent fingerprints - organizational structure and personnel * Study on local electric work companies * Study on construction materials

AUG 4 (FRI)	* Discussions on the initial data file - how to make individual fingerprint cards from ten fingerprint cards - format of the input file - capacity of the initial file
AUG 5 (SAT)	* Internal meeting of the study team
AUG 6 (SUN)	* Internal meeting of the study team
AUG 7 (MON)	* NPA -Exchange of Minutes of Discussions * Study on the project site (1) - capacity of electric power - voltage stability - air conditioning facility - possibility of radio jamming and flood damage
AUG 8 (TUE)	* NPA -Departure for Tokyo * Study on the project site (2) - floor load capacity - arrangements of machinery room, operation room and UPS
AUG 9 (WED)	* Study on the construction design - the construction materials - the delivery procedure of equipment - arrangements of resting room, custody room and office

AUG 10 (THU)	* Discussions on maintenance and operation of AFIS - how to collect latent fingerprints - the present record of fingerprint cards - maintenance of the computer system
AUG 11 (FRI)	* Study on maintenance of the existing computer system at: - KINGMONGKUTS TECHNICAL INSTITUTE - POLICE INFORMATION CENTER
AUG 12 (SAT)	* Internal meeting of the study team
AUG 13 (SUN)	* Internal meeting of the study team
AUG 14 (MON)	* Study on collecting latent fingerprints at the Provincial Crime Laboratory (CHONBURI)
AUG 15 (TUE)	* Collection and analysis of studied materials * Preparing the record of the proceedings
AUG 16 (WED)	* The final discussions with the Thai officials concerned * Drawing up the record of the proceedings * Data analysis
AUG 17 (THU)	* Courtesy call on the Royal Thai Police Department * Report to Embassy of Japan and JICA Thailand Office
AUG 18 (FRI)	* Departure for Tokyo

4. MEETING MEMBERS LIST

NAME	POSITION
ROYAL THAI POLICE DEPARTMENT	
POL. MAJ. GEN. SOMBAT SOONTHORNVORN	Commander of the Scientific Crime Detection Division (SCDD)
POL. COL. VISUDDHI SUVANNASUTDHI	Superintendent of the 2nd Sub. Div.
POL. LT. COL. TIAMSAK ASAVARAK	Deputy Superintendent of the 4th Sub. Div.
POL. LT. COL. PRAPATANA KONTHUNG	Deputy Superintendent of the 1st Sub. Div.
POL. MAJ. NITAYA BONGKOTKARANEE	Inspector of the Single Fingerprint Sec.
POL. MAJ. GEN. SOMSAK APHICHAREE	Commander C.R.D.
POL. COL. PRASARN CHAWACHEPTHA	Superintendent of the 3rd Sub. Div.
POL. LT. COL. SEMA LEKRATANA	Fingerprint Identification
POL. LT. COL PHAIROJ CHARNCHAMRI	Fingerprint Identification

2. EMBASSY OF JAPAN	POSITION
KUROKAWA YUJI	Counseler of the Embassy
KAMO YOSHIHIKO	First Secretary
INOMATA KOHJI	First Secretary
HIROHATA SHIRO	First Secretary
3. JICA	
SAITO BEN	Resident Representative Thailand Office of JICA
MIYAMOTO HIDEO	Thailand Office of JICA

Under line indicates surname.

August 9, 1989

5. REQUIREMENTS FOR BUILDING CONSTRUCTION

1. GENERAL

Basic design study team inspected the building where the Automated Fingerprint Identification System (AFIS) will be installed.

As the result of inspection, the team requests to the Royal Thai Police Department (RTPD) for the modification of existing building, the new construction of an annex building and the provision of facilities required in conjunction with the installation of AFIS.

In accordance with the Minutes, the Thai side shall take necessary measures for the construction of building where the equipment to be provided by the Grant Aid of The Government of Japan.

2. AFIS FLOOR LAYOUT PLAN

The study team propose that AFIS shall be installed in the annex building to be constructed because the existing building is not suitable considering the weakness of floor loading for AFIS and the inconvenience for the equipment layout due to small size of room space.

A tentative AFIS floor plan is shown in attached Figure and existing car parking shall be demolished.

3. OPERATOR STAFF ROOM

The existing first floor shall be used for the AFIS operation staff room.

Some building modification are necessary e.g. partition between the existing room and the annex building to be constructed. The transparent partition is recommendable.

The partition between entrance corridor and the operation staff room is also required.

4. REQUIREMENTS FOR ANNEX BUILDING

The followings shall be considered for the construction of the annex.

1) The annex shall be constructed by concrete roof and wall.

   No window structure is desirable to prevent the entrance of sunbeam heat, dust and gas etc.

2) The interior structure shall be fireproof and waterproof.

3) The annex shall withstand for great vibration.

4) The floor strength shall be more than 350 kg/m^2.

5) The ceiling height shall be more than 2.8 meters and ceiling material shall be sound absorption and heat insulation.

6) The floor surface shall be painted by dust proof material.

7) Approximately 500 Lux illumination at the height of 85cm from the floor level shall be required.

8) The entrance door size is minimum 1.8 meter width and 2 meter height.

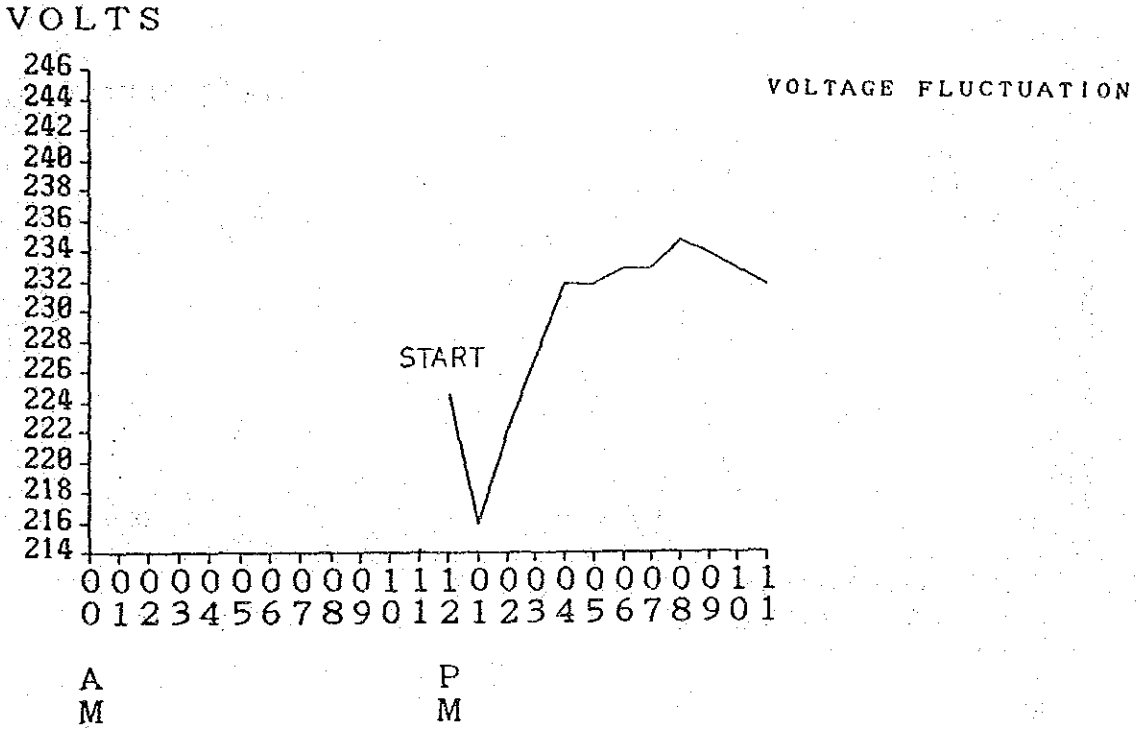
5. COMMERCIAL POWER

Required commercial power capacity shall be at least 200 KVA for AFIS including the air conditioners and lighting fixtures.

Electric wiring from Main distribution board in the power room to power distribution board in AFIS room shall be provided.

One outlet to be fixed on the wall is required every $20m^2$ for maintenance of AFIS.

DATA OF COMMERCIAL POWER VOLTAGE



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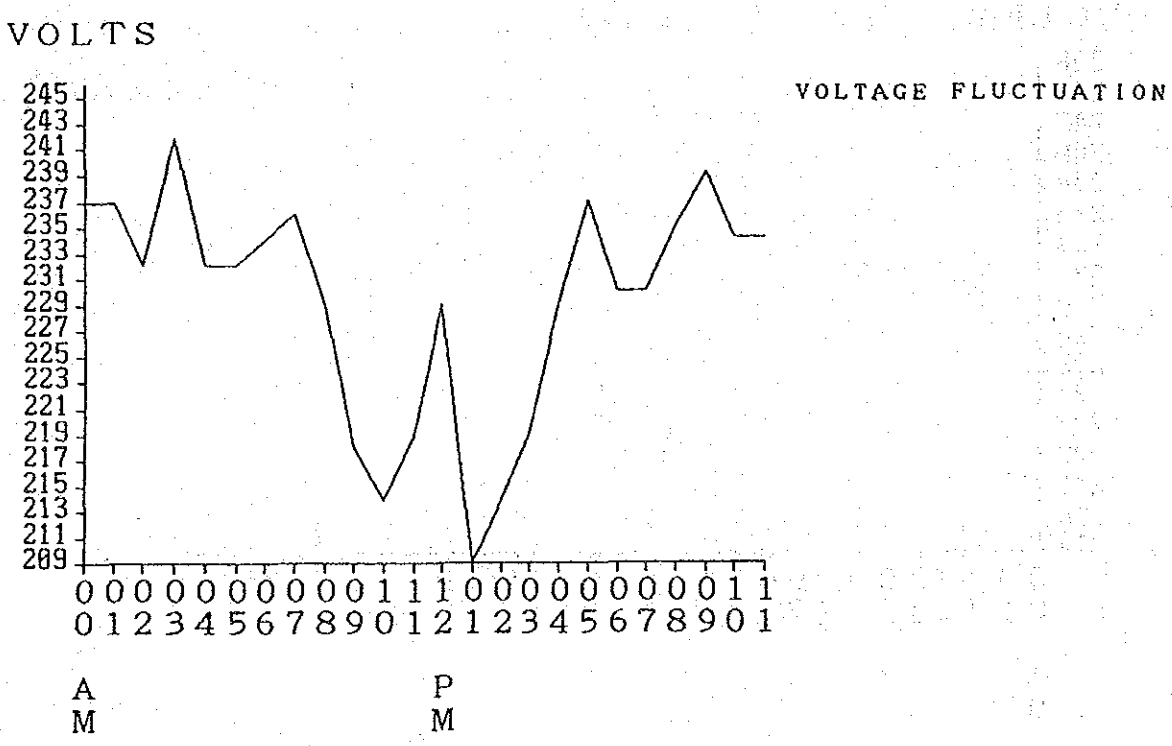

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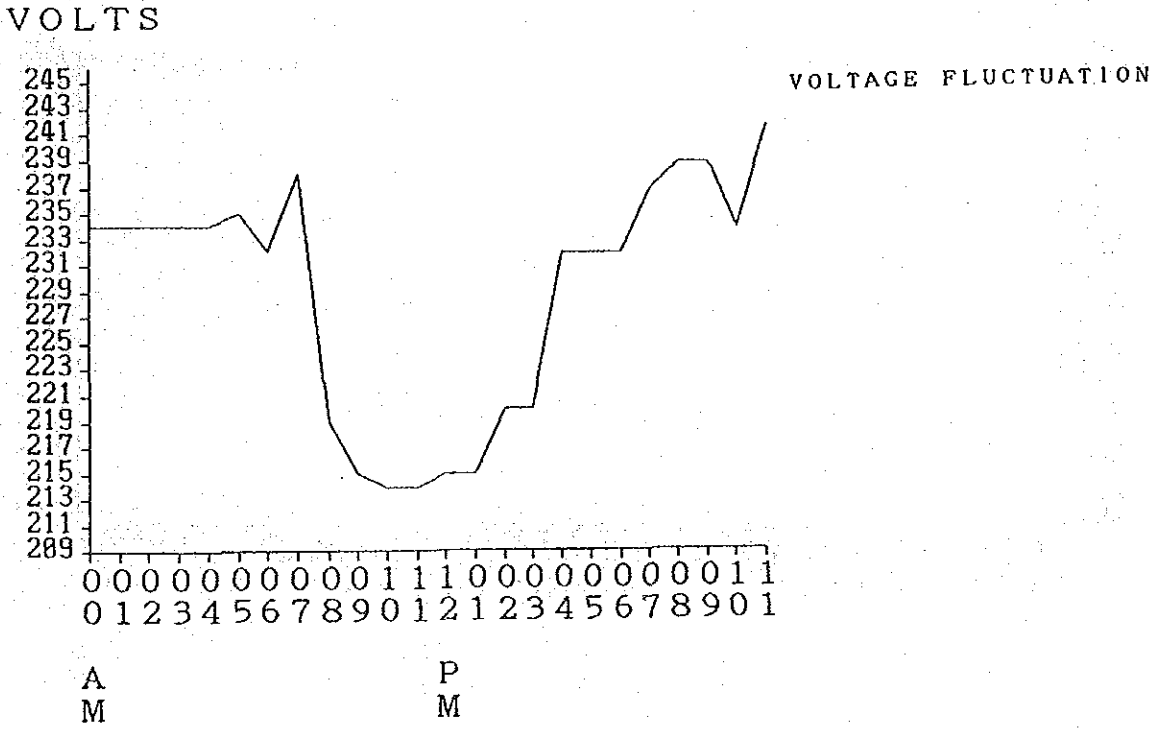

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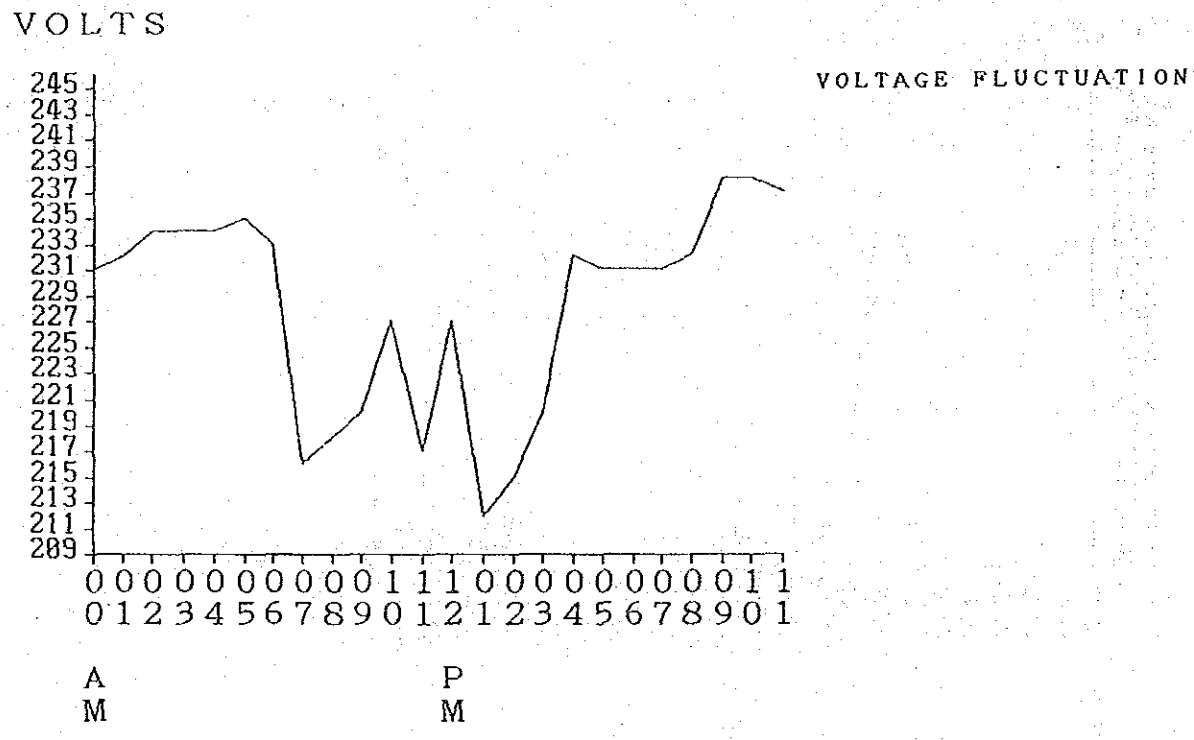

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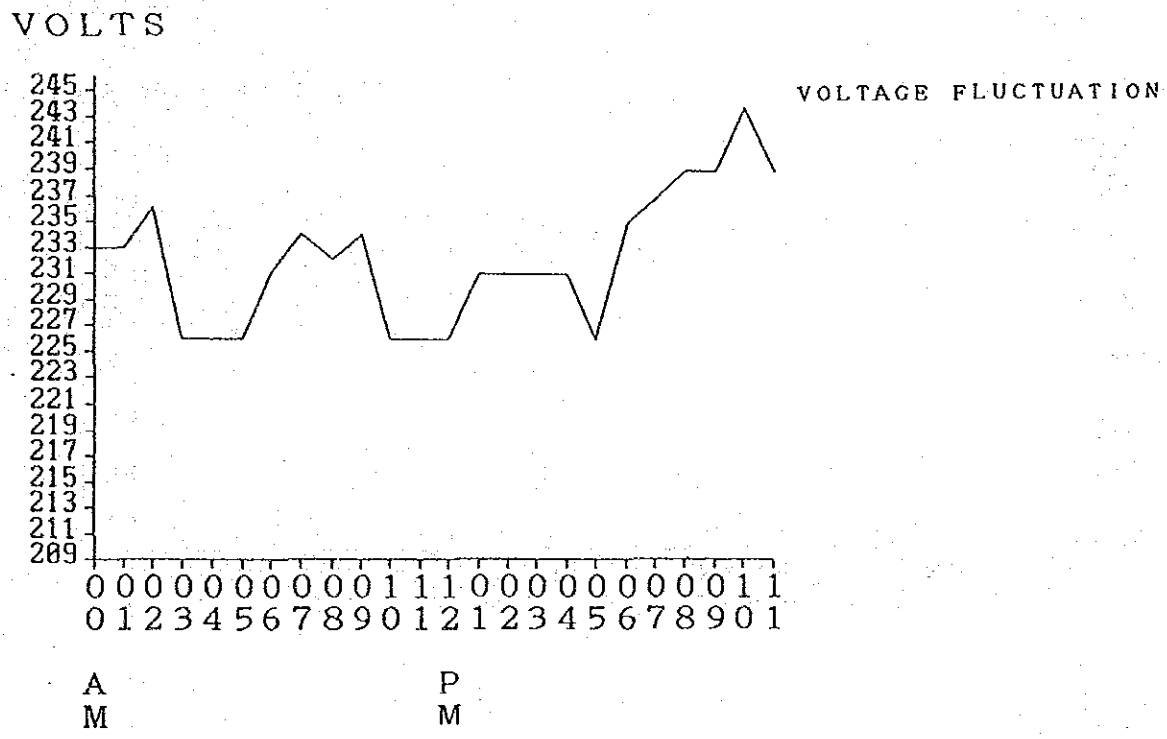

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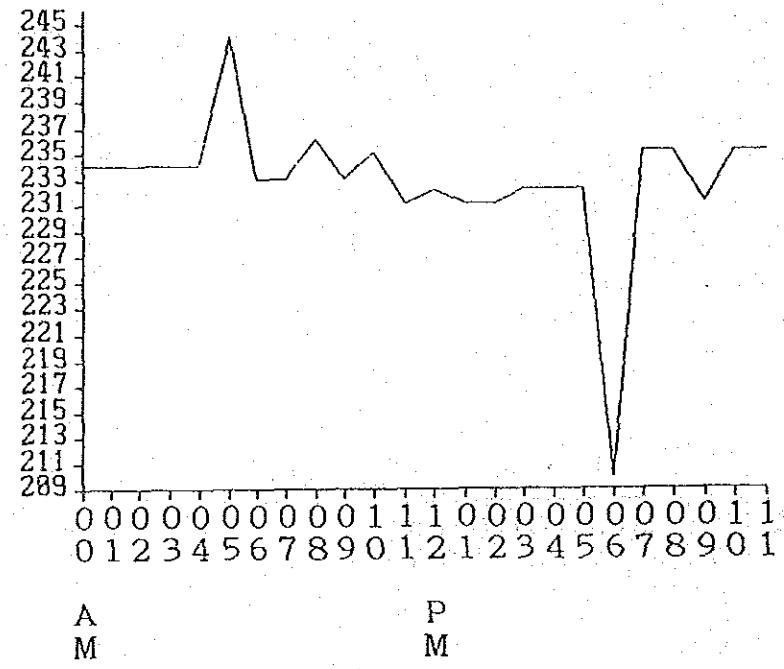
VOLTS



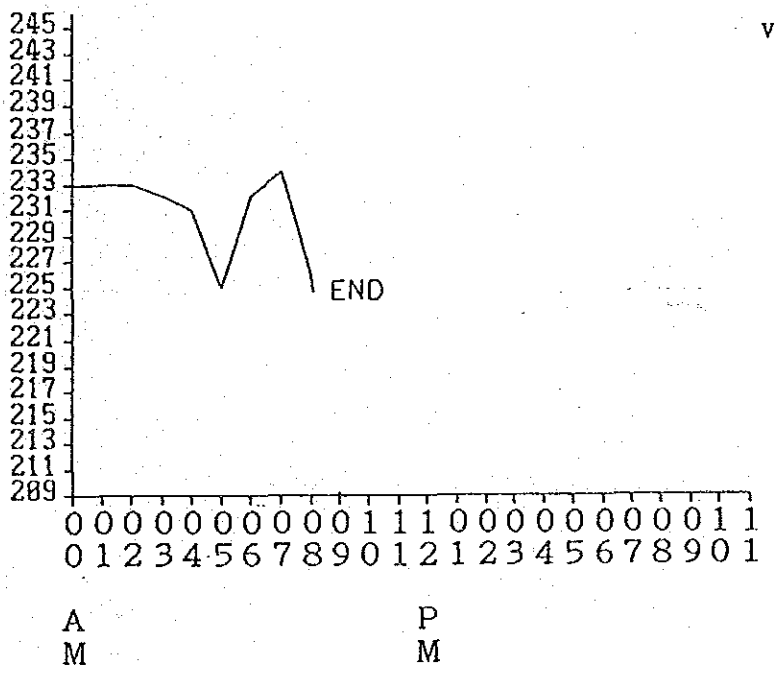
VOLTAGE FLUCTUATION

August 13, 1989

DATA OF COMMERCIAL POWER VOLTAGE

VOLTS

VOLTAGE FLUCTUATION



August 14, 1989