

System	Bangkok Port System	Standard System
<p>Item</p>	<p>Due to the present dual structure in the PAT operation system, certain documents must be submitted to PAT in addition to the primary documents of container transportation. This results in an extra workload to prepare and compile documents for both PAT and customers, and obstructs the smooth flow of containers.</p> <p>Although shipping companies notify their customers of the open date and the cut-off date at the CY/CFS when receiving export containers, the cut-off date principle is, at present, not strictly observed by shippers/exporters. The container ships are kept waiting for these containers, extending ships' staying time.</p> <p>Pedestrians, private vehicles and trucks of shippers and consignees as well as cargo handling equipment are freely coming and</p>	<p>single body which has enough skilled personnel and equipment to be able to supply good service to customers.</p> <p>Unnecessary documents in the container terminal and between customers and the port management body have been reduced in order to promote efficient container flow. Computer systems have been effectively introduced into the documentation system.</p> <p>Since shipping companies always manage to keep to their sailing schedules and container terminal operators make efforts to exclude long-dwelling containers from container terminals, they force shippers/exporters to strictly observe the open date and cut-off date principle, which is decided in accordance with each freight conference rule.</p> <p>Within the container terminal, tractors and large-sized equipment are always running about. The terminal operator, therefore,</p>
<p>(3) Procedures and Documents</p>		
<p>(4) Others</p>		
<p>1) "Open Date" and "Cut-off Date"</p>		
<p>2) Traffic and Safety Control</p>		

Item	System	Standard System
	<p>Bangkok Port System</p> <p>going into each shipping agent's yard because traffic control is not carried out strictly in the PAT port area except on main roads. The situation is dangerous, and serious accidents are likely to occur. Furthermore, there are many accidents causing damage of cargoes and injury to persons, as the actual cargo handling work is not always carried out in a safe manner.</p>	<p>lays down traffic and safety rules in order to prevent accidents. The training system includes a safety education course.</p>

System Item	Bangkok Port System	Standard System
<p>2. Transportation and Custom Procedures</p> <p>(1) Door to Door Transportation</p>	<p>As most FCL containers are not directly transported to and from the PAT port area, the merit of door to door transportation is lost. One of the main reasons is the ETO monopoly on the transportation of cargoes including containers out of the PAT port area.</p>	<p>FCL containers are transported to and from the marine container terminal on the basis of door to door transportation. This contributes to effective container operations in the marine container terminal, where the dwell time of FCL containers is minimized. Transportation is executed by a plural number of transport companies, freely competing with each other.</p>
<p>(2) Customs Inspection</p>	<p>The entire cargo inspection is basically executed by customs officers. As for export containerized cargoes, however, the document inspection system is sometimes used to promote exportation.</p>	<p>The document inspection is very popular for both import and export containerized cargoes except for some import LCL cargoes.</p>
<p>(3) Customs Formalities for Containers themselves</p>	<p>The declaration of containers themselves can be collectively approved with an application for both importation and exportation. Although these containers are exempted from customs duties, their owners or administrators are required to post a cash bond or a bank guarantee.</p>	<p>The declaration of containers themselves can be collectively approved with an oral report and a container number list. In accordance with the Customs Convention on Containers, the containers are exempt from customs duties, and no bond is required in this case.</p>

System Item	Bangkok Port System	Standard System
(4) Bonded System and Bonded Transportation	<p>There are two kinds of bonded areas in Thailand;</p> <ol style="list-style-type: none"> 1) designated port areas and customs airports, and 2) the bonded warehouse in the PAT port area, bonded manufacturing warehouses and duty-free shops. <p>No other areas are permitted as such except for the new off-dock CY/CFS, which is presently being considered in order to ease the overflow of containers from Klong Toei Wharves.</p> <p>As for the bonded transportation of containers, it is permitted between the PAT port area and customers' sites where customs officers are assigned to check cargoes and documents. It is also permitted between the PAT port area and the bonded manufacturing warehouses including those in the Export Processing Zone.</p>	<p>It is understood that there are two kinds of bonded areas classified by their purposes. One is a place where cargoes are temporarily stored under the control of Customs so that the customs clearance can be executed conveniently, such as designated bonded areas and bonded sheds. The other a place where, from the economic viewpoint of promotion of foreign trade, cargoes are stored with the advantageous condition that customs clearance is granted with customs duties unpaid. These areas include bonded warehouses, bonded manufacturing warehouses and bonded display areas.</p> <p>The bonded transportation of containers is, as a rule, permitted among open ports, customs airports, bonded areas and customs offices whenever the declaration is approved.</p>

Appendix 3 Supplements to the Administration and Management by the P.M.B.

(1) Matters which should be decided by the Board of Port Commissioners and matters which should require the approval of the Government include:

1) Personnel Affairs

- (a) Appointment and dismissal of the Director General, the Deputy Director Generals, the Internal Auditors and the Directors of Units
- (b) Determination of major regulations concerned
- (c) Determination of salaries and rewards of the staff members
- (d) Approval of the appointment of the Port Advisors

* (a), (b) and (c) require the approval of the Government.

2) Financial Affairs

- (a) Decision of increase or decrease of capital
- (b) Determination of annual budget
- (c) Determination of loans
- (d) Decision of contracts higher than a specified amount
- (e) Approval of settlement of accounts
- (f) Determination of tariffs
- (g) Decision of acquisition or disposal of immovable assets higher than a specified amount

* (a), (b), (c) and (d) require the approval of the Government.

(e) is to be reported to the Government.

3) Management

- (a) Determination of port development plans
- (b) Decision of major changes of the P.M.B.'s obligations
- (c) Determination of major regulations concerned
- (d) Determination of the lessees and the contents of the terminal lease agreements

(2) Procedures for Preparing Draft Annual Budget

- 1) Each Unit makes draft budget of its own.
- 2) Each Unit submits its draft budget to the Financial Unit.
- 3) Arrangement by the Financial Unit (Ad hoc committee is arranged by the Secretarial Office of the Director General.)
- 4) The Financial Unit makes draft total budget.
- 5) Procedures for admission (the Financial Unit)

(3) Reasons Why the Financial Unit Should be in Charge of Contracts

- 1) Contracts should be controlled considering the annual budget.
- 2) It is desirable that a single section should be responsible for all contracts.
- 3) In order to secure the fairness of contracts, the section in charge of contracts should be different from the section in charge of design, cost estimation, supervision and inspection.

(4) Procedure of Contracts

1) Each Unit

- (a) determination of the contents of the contract
- (b) determination of design and specifications, cost estimation
- (c) preparation and submission of necessary documents to the Financial Unit

2) Financial Unit

- (a) collection and formal check of documents
- (b) implementation of bidding and other jobs necessary for selecting the contractor(s)

3) Decision Making

- (a) Determination of the contractor(s) is made by the Government or the Board of Laem Chabang Port Commissioners or the Director General

depending on the contract price.

4) Each Unit

(a) confirmation of fulfillment of the contract

(5) The Port Facilities

- 1) water facilities (waterways, anchorages, basins for turning and quarantine inspection)
- 2) protective facilities (breakwater, revetment, parapets)
- 3) mooring facilities (wharves including aprons, fenders and bollards, etc.)
- 4) port transport facilities (roads, parking lots, bridges, railways)
- 5) navigation aid facilities (navigation aids and signals and lighting and port communication facilities for the entry and clearance of ships)
- 6) cargo handling facilities (container yards, CFS, transit sheds and gantry cranes, etc.)
- 7) storage facilities (warehouses, open storage yards)
- 8) facilities for port management and services (port administration offices, warehouses for materials necessary for port management, other facilities necessary for port management including entrance gate and security fence, water pipes, electric wires, telephone wires, waste disposal facilities, etc.)
- 9) land for port facilities (land for facilities specified in each of the preceding items)
- 10) mobile facilities for port management and services (tugboats used for assisting docking and undocking ships, vessels and vehicles used for port management and services provided by the P.M.B.)

* Yards and roads include pavement, drainage, lighting and other necessary structures.

(6) Flow of the Construction and Maintenance of the Port Facilities

- 1) study, survey, examination

- 2) planning (including making implementation program)
- 3) budgeting
- 4) detailed design for implementation
- 5) cost estimation
- 6) bidding, contract
- 7) implementation of the work

- 1), 2) and 3): construction ----- carried out by the Planning Subunit
 maintenance ----- carried out by the Engineering Subunit
- 4): carried out by the Engineering Subunit
 (can be carried out by the private sector by contract
 under the supervision of the Engineering Subunit)
- 5): carried out by the Engineering Subunit
- 6): carried out by the Financial Unit
- 7): carried out by the contractor
 (supervised and inspected by the Engineering Subunit)

(7) Staff Members of Each Unit and Office

1) Office of Internal Audit.

Number of personnel: Total 2

- . At least 1 person should possess work experience of more than 20 years.
- . should possess audit experience in governmental agencies or state enterprises
- . should be able to carry out general internal audits well

2) Director General, Deputy Director General

Number of personnel:

Director General	1		
Deputy Director Generals (Technical, Management)	2	Total	3

- . should have work experience of more than 25 years in governmental agencies or state enterprises or as permanent governmental officers
- . should possess sufficient general knowledge, experience and judgment

- concerning port management
- . should not be members of any political party

3) Secretarial Office of the Director General

Number of personnel:

Rank A	1		
Rank B	2		
Rank D	3	Total	6

- . desirable to possess experience of administration of governmental or state enterprise organizations and some official committees (excluding the staff of Rank D)

4) General Affairs Unit

(a) Director of the Unit

Number of personnel:	Rank A	1
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(b) Correspondence, Documentation and Security

Number of personnel:

Rank B	5		
C	10	Total	15

- . desirable to possess experience of the following works in governmental agencies or state enterprises
 - control of official documents
 - personnel administration
 - administration of assets of the government or state enterprises
- . Personnel of the Security Subunit should work 24 hours on 3 shifts

(c) Public Relations

Number of personnel:

Rank B	2		
C	2	Total	4

- . required to possess extensive knowledge and ability of information

- collection and analysis concerning port activities
- . should carry out port sales activities at places other than the Port
- . desirable to understand English well

(d) Personnel

Number of personnel:

Rank B	1		
Rank C	2	Total	3

5) Financial Unit

(a) Director of the Unit

Number of personnel:	Rank A	1
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(b) Budgeting and Custody

Number of personnel:

Rank B	3		
C	2	Total	5

- . desirable to possess experience of budgeting and administration of assets in governmental agencies and state enterprises

(c) Accounting and Cashier

Number of personnel:

Rank B	3		
C	2	Total	5

6) Technical Unit

(a) Director of the Unit

Number of personnel:	Rank A	1
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(b) Planning

Number of personnel:

Rank B	3		
C	2	Total	5

- . should possess experience of planning in governmental agencies and state enterprises
- . required to possess ability of data collection and analysis and statistics processing

(c) Engineering

Number of personnel:

Rank B	4		
C	4	Total	8

- . 2 persons each (1 persons each of Rank B and Rank C) for civil engineering, architecture, mechanical engineering and electric engineering

7) Management Unit

(a) Director of the Unit

Number of personnel:	Rank A	1
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(b) Management

Number of personnel:

Rank B	3		
C	3	Total	6

- . should possess enough knowledge and experience of port administration and management

Marine Service

Number of personnel:

Rank B	2
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Appendix 4 Computer Information System

(1) Development of Information System

1) PAT's Computerization Policy

No computer system is presently used for port management and operation at Bangkok Port. The Port Authority of Thailand (PAT), however, has been planning the introduction of a computer system. PAT's computerization policy is summarized as follows:

(a) Objectives

- i) To use the computer for recording and reporting the data on the movement of all containers by means of an on-line, interactive system
- ii) To use the computer system for controlling the utilization of the space (yards) and large-sized equipment, ensuring that the maximum benefits will be achieved
- iii) To facilitate the printing of the bills and particulars of the containers as soon as the services are completed or as required
- iv) To provide data for management for making various reports
- v) To produce the Port Management Information System (PORTMIS)

(b) Outline of the Computer System in the Port Area

Fig. A.4.1 shows the entire computer and communication system in the port area. The following outlines the contents of the system.

i) Container space control

The container space is divided into East Quay and West Quay totaling 57 slots. It can be classified into 2 categories as follows:

① Large-size container slots

This can be divided into bays, rows and tiers totaling 2 areas (one area for East Quay, the other for West Quay). The control system shall use the serial numbers of the bays, rows and tiers.

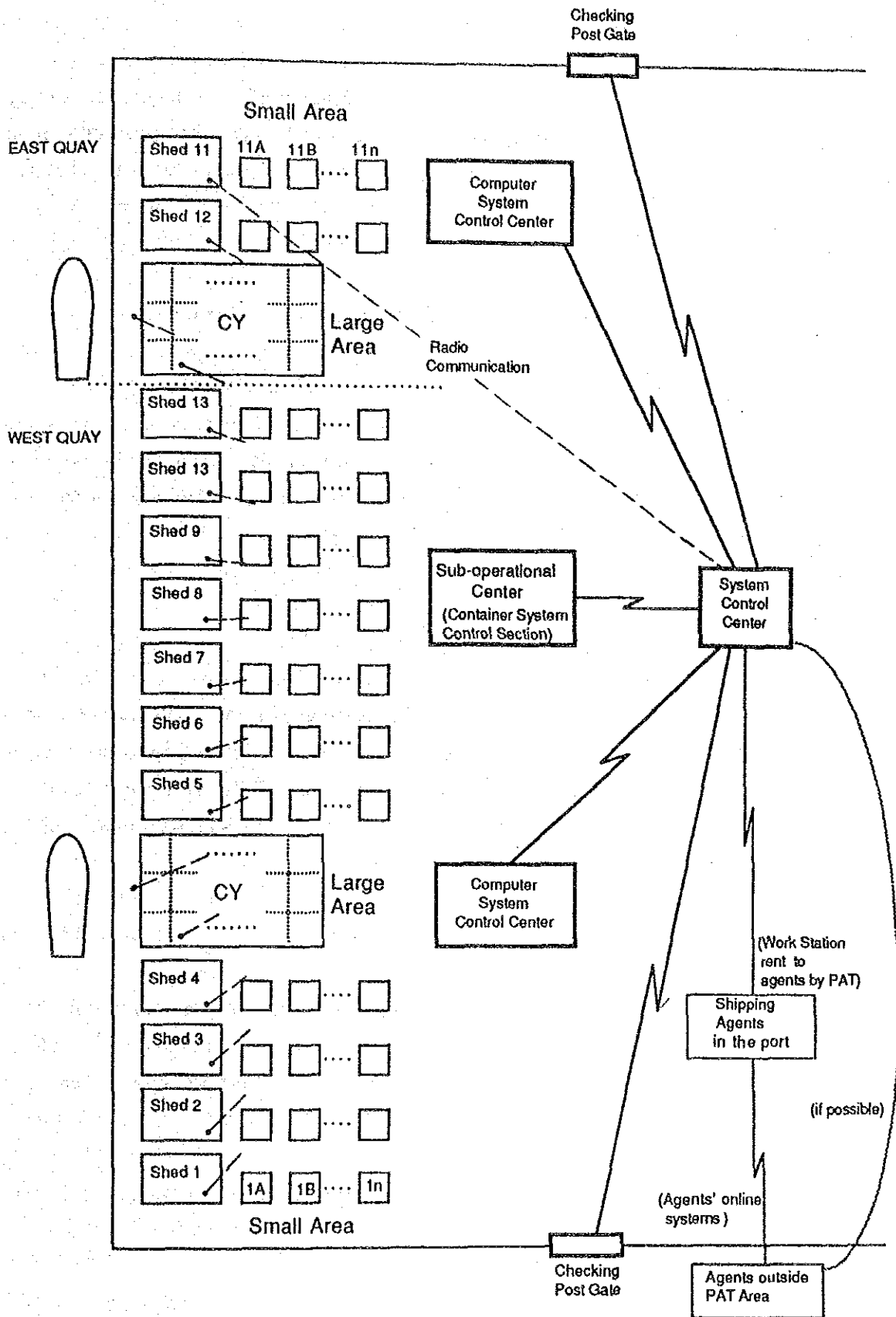


Fig. A.4.1 Concept of PAT's Computer System Plan

② Small-size container slots

This cannot be divided into the serial numbers of the bays, or rows, considering the area surrounding the transit shed and the new adjusted vacant space. The control system shall use the code numbers of the slots.

ii) Operational Area Control

This can be divided into 3 operation centers as follows:

① Sub-operational center

The container system control section, container division, will be used as the sub-operational center for recording and inspection of data and statistical reports. It shall be equipped with a work station and a printer.

② Container system control center (East Quay)

The container system control center (East Quay) at No. 12 Transit Shed shall be used for controlling 1) the containers at the container yard located in the East Quay area, 2) containers outside the Quay and 3) containers which are returned to ships. The East Quay control center shall be equipped with 3 work stations and a printer.

③ Container system control center (West Quay)

The container system control center (West Quay), on the upper floor of the PAT canteen, shall control the containers which are outside and those which are returned to ships. It shall be equipped with 3 work stations and a printer.

iii) Responsibility for the Control of Container Yard and Operational Area

① Large-size container slots

The officer at the station at the entrance and exit gate shall control

a container when the container is passing through the gate. The control center will direct the container movement via radio transceiver.

② Small-size container slots

The responsibility can be divided between the transit sheds or the container yards, whichever is nearer.

③ Gate control

The entrance and exit gates for the West Quay and East Quay shall be under the responsibility of the harbor service division.

iv) Data Control

① Sub-operational center

The officers at the sub-operational center shall divide the responsibility of each terminal according to the conditions of the container yards. The details can be recorded or fed through the terminal, and a report will be printed.

② Container system control center

The officer in charge of controlling the container system can request data for inspection or for making reports.

③ Shipping agents

The shipping agents which have their own container yards or operation units (space) within PAT will be able to install workstations for the inspection of data.

v) Data Communication

① Discharge

When a container is discharged from a ship, the PAT officer must report the serial number and details of the container by means of radio to the system control center for the container. The officer at the control center inputs and checks data including the serial number of the container.

② Haulage/Storage

When a container is moved at any place, the officer in charge of the space must report the movement by means of radio-transceiver into the system control center so as to adjust the data according to the actual facts at all times.

③ Gates

When a container is going outside the PAT area or returning into the area, the officer at the entrance/exit gate (West Quay and East Quay) must report the details to the appropriate control center, so the control center can update the data.

④ Loading

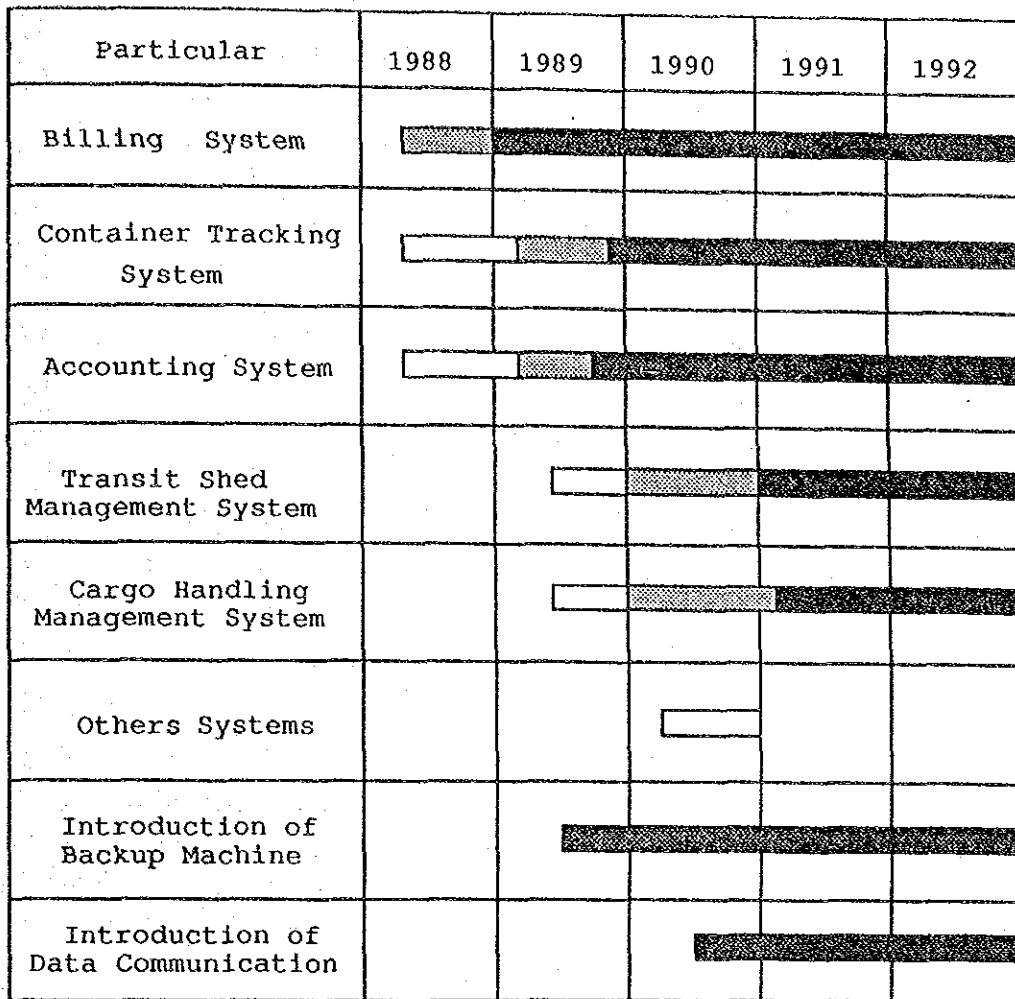
When a container is returned and loaded onto a ship, the PAT office must also report the details by means of radio-transceiver to the system control center.

(c) Computer System Development

The long-term computerization is divided into 3 Phases including the introduction of backup machines and data communication equipment. The development and installation schedule is shown in Fig. A.4.2.

i) Phase I

- Installation of all the billing system software
- Development of the container tracking system
- Development of part of the accounting system



Legend




-  : Study
-  : Development
-  : Introduction

Fig. A.4.2 Development and Installation Schedule

ii) Phase II

- Installation of the container tracking system
- Installation of the transit shed management system
- Installation of the cargo handling management system
- Introduction of backup machines

iii) Phase III

- Introduction of data communications equipment

(d) Systems and Sub-systems

The systems which are planned to be developed and installed are outlined as shown in Table A.4.1.

(e) Outline of Port Management Information System (PORTMIS)

PAT started the PORTMIS Committee in December 1986 to produce a Port Management Information System for organization, operation, statistics, documentation, tariff structure, finance, etc. The committee consists of 5 groups: Computerization Group, Financial Group, Tariff Group, Containerization Group, and Workshop.

Each group has the following duties, and they are presently engaged in studying and developing a new accounting code and tariff structure for financing by computer.

i) Computerization Group

- ① Provision of accounts for all financial documents
- ② Design of financial data base and output
- ③ Payroll/overtime/labor analysis for integration with FIS

ii) Financial Planning Group

- ① Analyze 1986/87 accounts on viability center basis
- ② Prepare monthly viability statement for board presentation
- ③ Analyze capital asset register over viability centers
(also prepare for computerization and indexing)
- ④ Capitalization and depreciation, extract items less than 5,000 baht, check asset lives with Ministry of Finance recommendations

Table. A.4.1 Outlines of PAT's Systems

System	Sub-System	Input	Output	Function
Billing System	Import Cargo	-Manifest -S/M -D/O -B/L	-Bill -Statistics	-Produce the invoice and bill
	Export Cargo Containers	-Code of Truck -Container list (in-out) -Tally sheet -Report of containers (go out from the port)	-Ticket like bill	
	Miscellaneous	-Vouchers of Overtime, Cargo handling, Activity of ship, etc.	-Invoices -Customers statement	
Container Tacking System (Design and Feasibility Study)		-Container list -Daily report of tally -Container Form 8 -Container Form 10c -Changes in fixed data	-Container list	-Control the movement of containers in every ship, both inside and in-out the port -Management of yard crane, cargo handling
Accounting System (under study)				-Produce the financial report -Data making of the on-line updated file and batch file
Transit Shed System (to be studied in the future)				-To use computer for controlling the cargo coming in and going out from the shed
Cargo Handling System (under study)				-In the future the data will pass to the Billing System automatically -Manage cargo handling in the terms of service and maintenance

Note: S/W, Statement of Measurement

⑤ Prepare bases for overhead allocation

iii) Tariff Group

① Tariff structure

iv) Containerization Group

① Container throughput statistics

② General Cargo tonnage analysis

③ Ship information

v) Workshop

① Job control and labour allocation

② Equipment availability and utilization

③ Overhead allocation

④ Costs and charges for user depot system to be implemented

2) Computerization Steps in the Container Terminal

(a) Computerization Steps in the Container Terminal

The volume of container cargo has been increasing with the remarkable development and progress realized in the field of integrated container transportation. This situation has forced port management bodies to construct larger and more complex container terminals as the connecting point between land and sea transportation, and port operators to handle enormous volumes of cargoes in container terminals speedily and accurately. To ensure smooth and efficient handling of an ever-changing volume of container cargoes with minimal personnel at minimal cost, the information processing function of the computer is indispensable.

It is possible, indeed, to keep track of each container and to execute every job manually in the container terminal. In this case, the "one-writing" system of office documentation is adopted, and sticker labels and magnetic boards which indicate container status are provided to make container yard plans and loading/discharging plans efficiently. However, with the increase of container volume the manual system tends to cause delays and mistakes during the container handling process. Generally, it is understood that the container handling capacity under a manual system is limited to about 60,000 TEU per year considering the needs of planning, managing and documentation.

As soon as the number of containers exceeds 60,000 TEU per year, it becomes necessary to introduce a computer system into the container terminal.

If the number of containers exceeds some 150,000 TEU per year in the next stage, it becomes necessary to install partially automatic yard equipment which is connected with the terminal computer system in order to increase efficiency. Completely automated equipment with no operator is generally not installed, however, because of the lack of safety and reliability of such equipment at present.

But with a further increase of container volume, fully-automatic yard

equipment controlled through the computer system may finally be installed to establish a completely automated container terminal.

Table A.4.2 shows the steps of computerization in the container terminal.

Table A.4.2 Computerization Steps in the Container Terminal

Step	Container Volume per Year (TEU)	Information and Business Operation	Cargo Handling Equipment Operation
1	— 60,000	Manual	Manual
2	60,000 — 150,000	Computerized	Manual
3	150,000 —	Computerized	Partly Automated
4		Computerized	Fully Automated

(b) Effects of Computerization

The following effects are expected to be achieved after installing a computer system in the container terminal:

i) Container Operation

- ① to increase the container volume and to instruct and recognize the stacking place of each container.
- ② to utilize the container yard capacity effectively and to make a yard bay plan in the container yard.
- ③ to supply empty containers quickly in accordance with the demands of shipping companies and to control the container inventory.
- ④ to grasp container information quickly and to keep in close contact with the related sections, users and customers.

ii) Documentation

- ① to standardize the documentation and to make a fixed form for

every routine operation.

- ② to make it easy for anyone who has been trained for a fixed period of time to deal with the documentation.
- ③ to cope with a large volume of documentation rapidly and accurately as the problems which occur under a manual system can be resolved.
- ④ to arrange the necessary personnel effectively in the long run and to shift them to more important jobs.
- ⑤ to access various kinds of analytic data and managerial statistics utilizing the data processing of the computer system.

3) Examples of Integrated Computer Information Systems

(a) SHIPNETS (Japan)

SHIPNETS (Shipping Cargo Information Network System) is a network system which connects freight forwarders, shipping companies and agents, sworn measurers and tally corporations, and performs the exchange of shipping cargo transaction data within the international trade environment. The SHIPNETS Center was established in April 1986. The users total 62 freight forwarders, 8 shipping companies and agents, 2 sworn measurers and 2 tally corporations as of the end of November 1987.

The scope of the system currently starts from the input of shipping instructions information by freight forwarders, in respect of export cargo, and extends to the output of B/L by shipping Companies and agents. The SHIPNETS Center continues its research aimed at the on-line inclusion of additional information, and at interfacing with other related systems: the theme remains the simplification of foreign trade procedures using the existing core of SHIPNETS as a base. The additional areas of information to be covered include vessel movements, shipping instructions from shippers, space bookings, freight payments, way bill transmissions and so forth.

The system is an on-line system through a computer center of Nippon Telegraph and Telephone Corporation (NTT). Each participant of the network system first establishes a user file (a mailbox) for his exclusive use at the computer center. To send and receive data, a sender party transmits the data to a receiving file (according to data type) in the relevant receiving file in his mailbox. The data is taken in, then edited, processed and accumulated by the individual in-house system of each participant.

Fig. A.4.3 illustrates the scope of SHIPNETS.

SHIPNETS works within a limited range of the four types of business. Other group of the port related bodies have been researching and developing new integrated information systems, namely, SC.NET (Shipper & Carrier

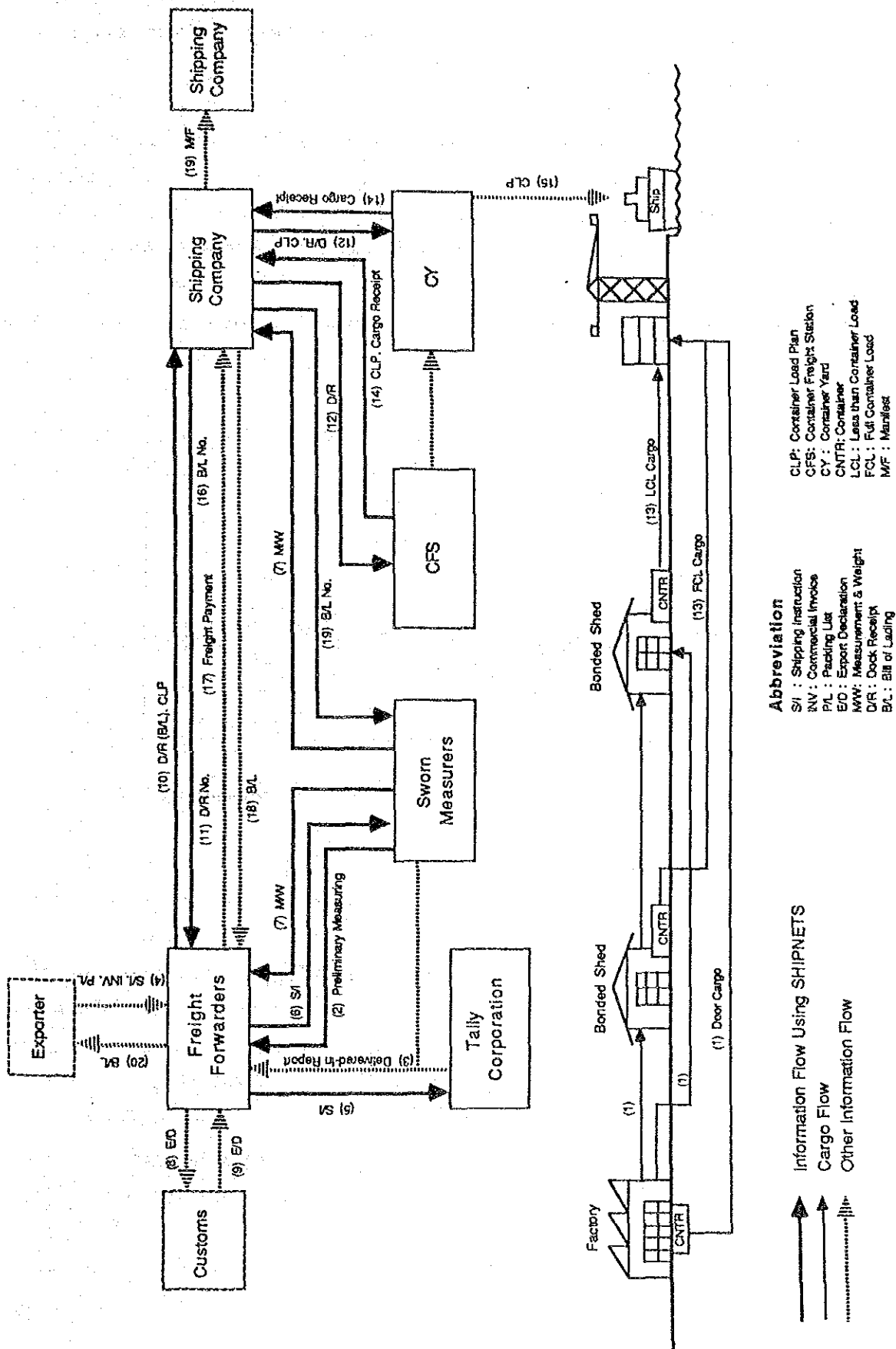


Fig. A.4.3 Scope of SHIPNETS (Container Cargo)

(b) SCAMPI (Seattle Port, USA)

The Port of Seattle's SCAMPI (Seattle Cargo Automated Marine Procedure Interface) System was developed with the Customs Service to electronically review shipping company manifest information and process Customs invoices (entries).

Working with U.S. Customs, the Port has created the most advanced computerized cargo clearance process available at any West Coast port. The SCAMPI System provides a new, direct interface between U.S. Customs and the Port, speeding the cargo to the market place.

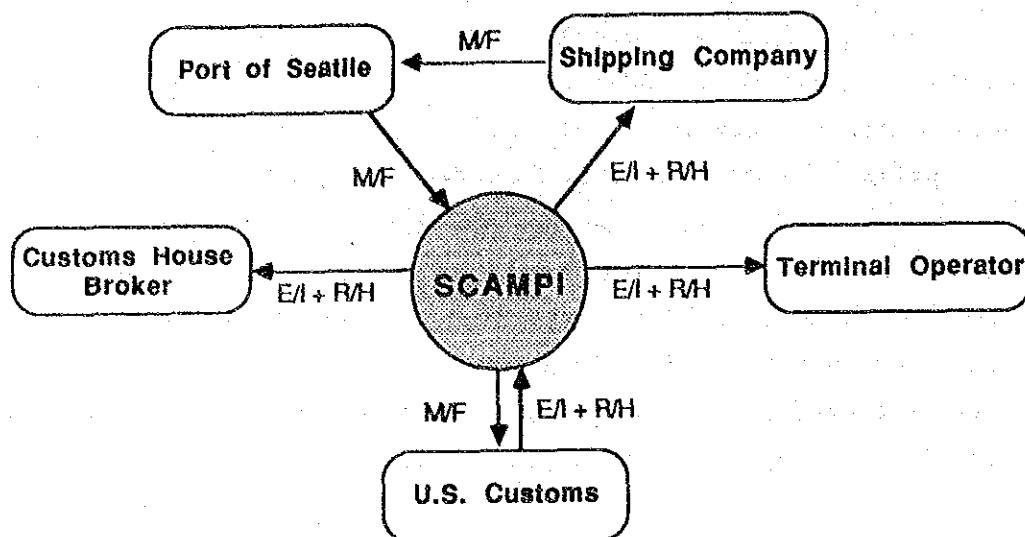
The Port of Seattle receives and enters shipping company manifest data into the Port's computer system three to five days prior to the vessel's arrival.

If Customs requires a physical examination, instructions will be issued to move the cargo to a container freight station so the examination can be completed.

If no physical examination is required, a general examination (released without physical inspection) is accomplished and cargo will be allowed to move to its destination.

SCAMPI is used by U.S. Customs and the majority of the shipping companies in Seattle. The users of this system have in their office a Port computer terminal, which provides immediate access to U.S. Customs hold and release information. When an examination is required, the shipping agent is immediately notified that a particular container is being held, and for what reason, in addition, an hourly telex is sent to terminal operators notifying them of all containers that are released or held for examination. This process has eliminated the need to physically transfer release documents from the U.S. Customs office to the operating terminal, speeding the movement of the cargo through the Port of Seattle.

Fig. A.4.5 shows an outline of SCAMPI.



M/F (MANIFEST DATA) :

originated by the shipping company and sent to the Port of Seattle for entry into the SCAMPI, and then available through SCAMPI to U.S. customs.

E/I (ENTRY INFORMATION) :

entered into the SCAMPI by U.S. customs.

R/H (RELEASE AND HOLD INFORMATION) :

sent by U.S. customs through SCAMPI to the customs broker, shipping company and the terminal operator where the cargo is to be unloaded.

Fig. A.4.5 SCAMPI System

(c) NACCS (Japan, for Air Cargo)

NACCS (Nippon Air Cargo Clearance System) was born after several years of joint research by the Ministry of Finance, other related governmental agencies and private sector firms. Air cargo flows in the airport through the hands of customs, air lines, warehouse operators, customs brokers, forwarders, air cargo agencies, banks and so forth. NACCS enables all the parties concerned to share and use various information jointly through an on-line computer system. In this sense, this system represents an epoch-making development in the use of computers in Japan as well as in the world.

This system started operations initially as an import system for air cargo into the New Tokyo International Airport, and its service was later extended to the Osaka International Airport. Then the system was applied to export air cargo and was eventually organized as an integrated system.

The integrated system was put into operation in January 1985. The number of users of the system are 2 customs, 52 airlines, 4 warehouses, 10 consolidators, 60 customs brokers, 16 air cargo agents, and 2 banks, totalling 146 parties and 641 terminals used, as of the end of January 1988.

The system is operated by the NACCS Operations Organization which is a corporation established as the NACCS operator authorized by the Minister of Finance under special legislation.

Fig. A.4.6 shows the scope of NACCS, and Figs. A.4.7 and A.4.8 show NACCS's procedures for import and export cargoes.

An integrated customs clearance information system for port operation has been studied under the instruction of the Ministry of Finance. Although an on-line system will probably be utilized for clerical chores such as customs declaration and tariff calculation considering NACCS's success, there still remain such issues as how much it will cost, what effects can be attained, to what extent the system can be extended, what size is necessary to realize the scale merit of the system and so forth.

The United States of America has made innovations in customs-related works laying focus on the following three points: i) Centralization of customs facilities; ii) Automated Commercial System (ACS)-Automated Manifest System (AMS), Automated Broker Interface (ABI), and Automated Cargo Clearance Entry Processing Technique (ACCEPT); and iii) Radio Preliminary Entry.

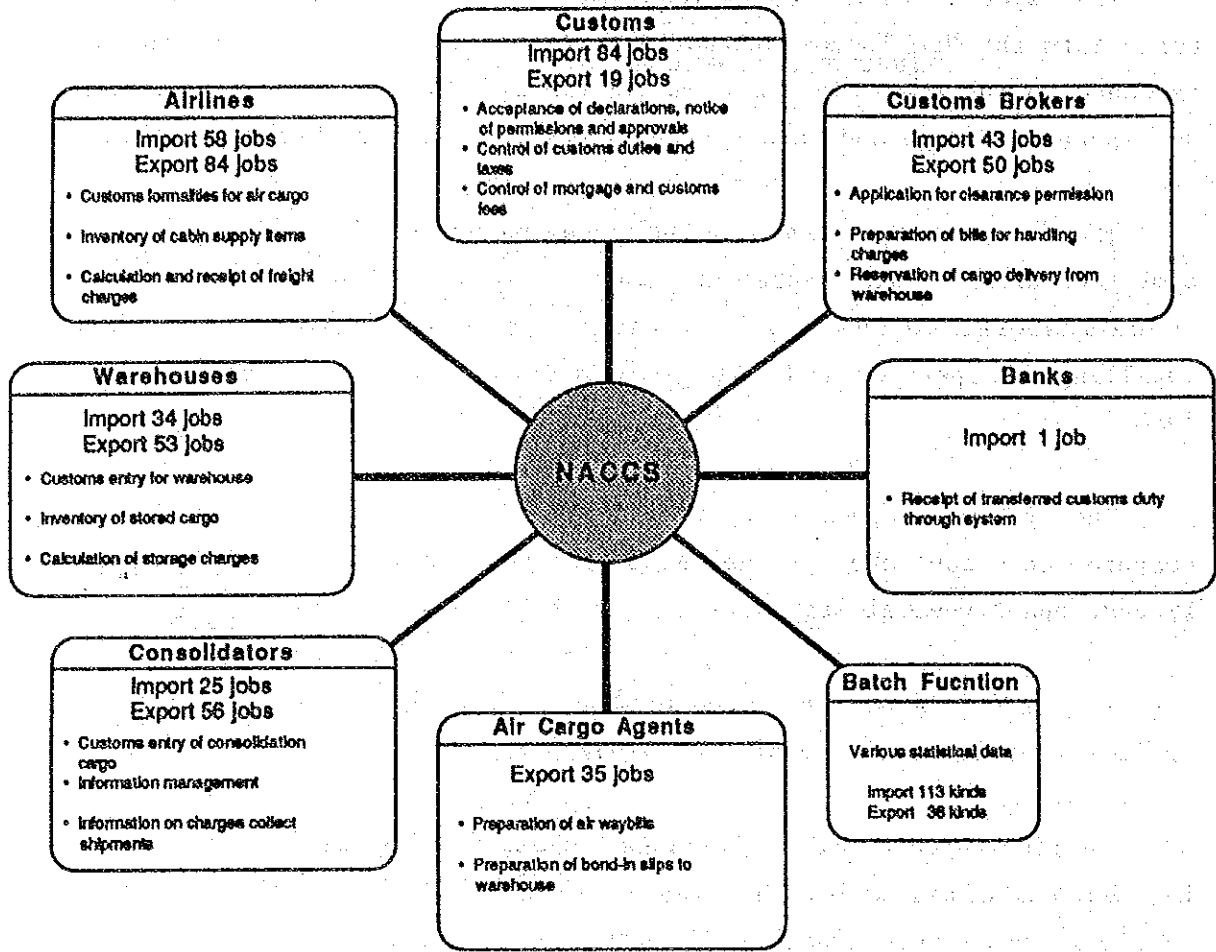


Fig. A.4.6 Scope of NACCS

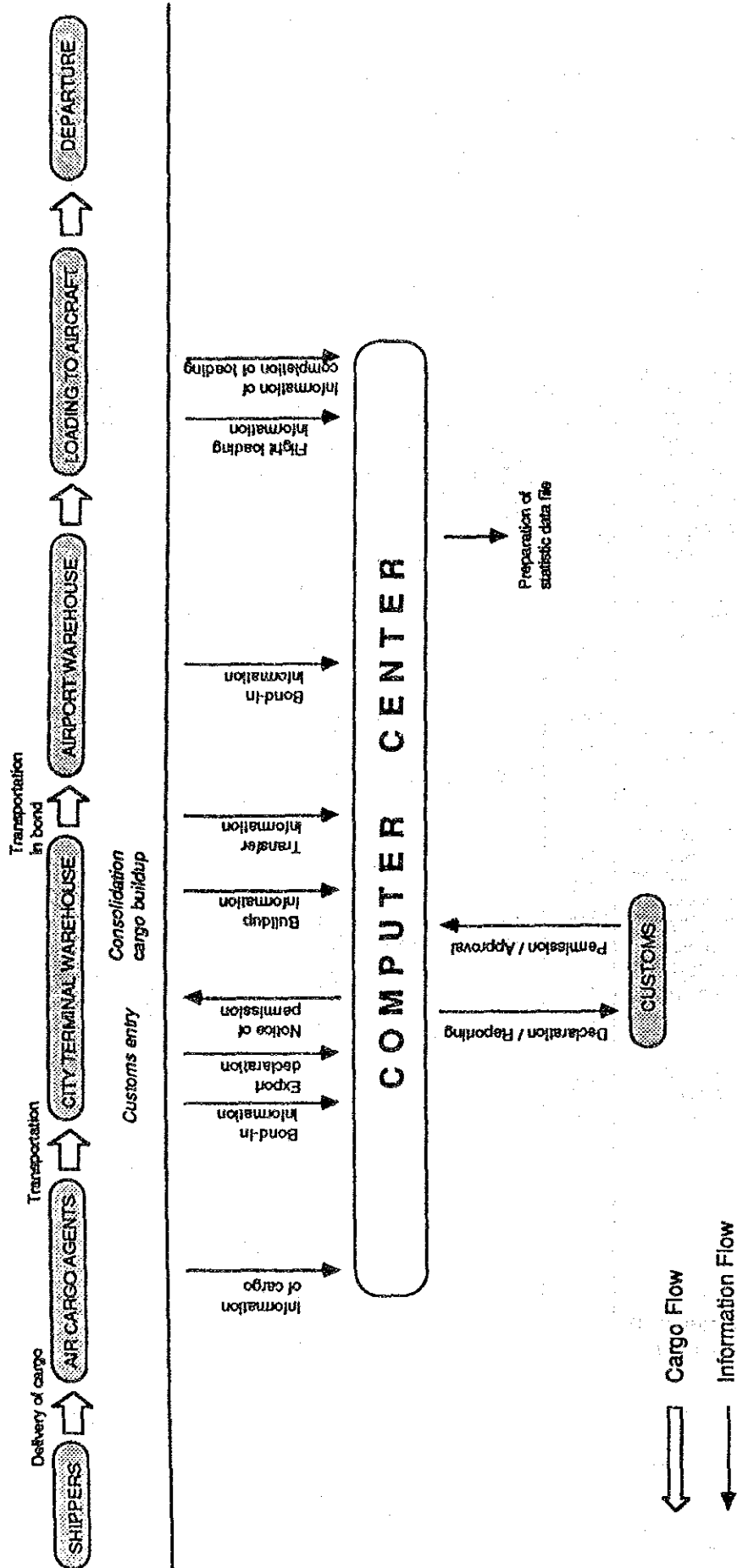


Fig. A.4.8 NACCS's Export Procedures

(2) Computer Systems in the Main Ports of the World

Table A.4.3 Computer Systems in the Main Ports of the World

(1)

Region/Port	Terminal	Operator	Functions of System
EUROPE			
Belgium Antwerp	Delwaide Dock -Seaport Terminal (berths 732-740)	Seaport Terminal NV	-Container administration -Stack Control -Ship loading / Discharge -Container repair -CFS -Invoicing
	-Hessenstie Container Terminal (Berths 716 - 730)	Hessenstie-Neptunus NV	-Ship planning -Container logistics, -Digital data transmission for Yard Operation
	-Noord Natie terminal (berths 616-624, 700-714)	Noord Natie CS	-
	Churchil Dock -Gylsen Container Terminal (Berths 420-428)	Stevedoring Company Gylsen NV	-Yard-related administration including reports (hard copy, telex or EDP system output) -EIR output -Ship's loading lists
	-Westerlund Terminal 414	Westerlund Corp. NV	-
	-Westerlund Terminal 1203-1211	Westerlund Corp. NV	-
	-Seaport Terminal (berths 478/474)	Seaport Terminals NV	Same as the system of the terminal at Delwaide Dock
	Sixth Harbour Dock -Gylsen Container Terminal (berths 332-344)	Stevedoring Company Gylsen SA	-
	-ACT Terminal (Berths 248-256, 300-314, 466-472)	ACT NV	-Container control
	Leopord Dock -Lopord Dock Container Terminal (berths 206-224)	Stevedoring Company Gylsen SA	Same as the systems the terminal at Churchill Dock
Denmark Copenhagen			-Cost control (stevedoring)
	Copenhagen Free Port Container Terminal (at Levenr Quay) " (at Kalkbaenderilobskaj)	Copenhagen Free Port & Stevedoring Co., Ltd. "	
France Le Havre			-ADEMAR (Operational data about clearance and operation on cargo) -AMX (Supply & store of material & spare parts) -Berth ship allocation -OINA (Operational data about ships at call) -TPH (information about the port for people or user)
	Quai de l'Atlantique	Compagnie Nouvelle de Maintenance (CNM)	-Equipment interchange reports -Load / Discharge lists -Yard activities connected to Ademar Plus (agents, customs, forwarders) system
	Quai de l'Europe	GMP	-EIR -Load / Discharge list -Yard activities -Stuffing / Stripping
	Quai Bougainville (Ocean Container Terminal)	SHMP, Perrigaut, Havre Ocean Terminal (HOT)	
Marseilles	Fos Container Terminal (Gravelcau Quay)	Mafoc, Eurofos, Delta	-Stack Management
	Fos - Brulo Tabac Quay	"	
	Mourepiane Container Terminal (Mirabeau Dock, Berths 154-157)	"	-Container stacking -Import / Export operations

Region/Port	Terminal	Operator	Functions of System
Italy Genoa	Genoa Container Terminal (Terminal 1) -Ponte Libia Terminal -Ponte Nino Ronco Terminal -Ponte Canepa Terminal -Calata Sanita Terminal (Terminal 2)	Seaport SPA-Port Service	-Container stacking and interchange -Loading lists -Container stacking and interchange -Loading lists
Trieste	Punto Franco Nuovo-Molo VII (berths 49-57)	Bate Autonomo del Porto di Trieste	-Container storage -Operational sequences -Administration
Netherlands Amsterdam	Combined Terminals Amsterdam VOF	Combined Terminals Amsterdam VOF	-Container control -Load / Discharge lists -Ship planning assistance -Stock reporting -Invoicing
Rotterdam	ECT Terminals -Princes Margriethaven (Home terminal) -prince Willem Alexanderhaven (Home terminal) Delta Terminal (Europahaven) Prinse Beatrixhaven	Europe Container Terminal B.V (ECT) BV Stevedore Company Quick Dispatch	-
	Waalhaven Pier & Terminal (Pier 2)	Multi-Terminals Waalgaven B.V	-Stock control -Container administration -Ship stowage
	Masshaven (North Side) (Muller Thomsen Terminal)	Muller Thomsen Rotterdam B.V	-
	Waalhaven Pier 7 Terminal	Multi-Terminal Unit Centre B.V	-Container control system for container yard
	Wilhelminakade Rijnhaven N.W	BV Verenigde Bedrijven Rotterdam Terminal-Felshaven	-
	Waalhaven Heyplaat terminal	Multi-Terminals Waalhaven B.V	-
	Seaport Terminal	Seaport Terminal BV	-Container stacking -Planning and listing -Depot control
	Bell Lines Terminal	Bell Lijn BV	-
	Transstorage Terminal	Transstorage BV	-Yard control
	Uniport Multipurpose Terminals	Uniport Multipurpose Terminals BV	-Terminal control -Stecking system -Gate control
Spain Barcelona	Muelle Principe de Espana Terminal Sector A	Mitima Layetana SA	-Ship operations -Gate control -Yard and warehouse operations -Customs clearance -etc
	Sector B	Tersuco SA	-Container movement -Accounts -Client communications
Sweden Gothenburg	Skandia Terminal Alusborg Terminal	Port of Gothenburg AB	-Traffic planning system (TRAPS) -Terminal information control system(TICS) -Container movements (Tracking)
Helsingborg	Skene Terminal	Skanelterminalen AB	-

Region/Port	Terminal	Operator	Functions of System
United Kingdom Felixstowe			-FCP80 (port database with online real-time interface to UK customs system and in-house ports system) -Cargo control -Equipment control
	Landguard Container Terminal	Felixstowe Dock & Railway Co.	-FCP80 direct trader input (DITI) system -Container control -Port entry system -Sales ledges -etc
	Dooley Container Terminal	"	See Landguard Terminal
	Walton Container Terminal	Walton Container Terminal Ltd.	-System linked into FCP80 (see Landguard Terminal)
	Trinity Container Terminal	Felixstowe Dock & Railway Co.	See Landguard Terminal
Liverpool	Royal Seaforth Container Terminal	Mersey Docks & Harbour Co.	-Container and documentation control system (CONICS)
London			-Placer (records of import and export containers)
	TILBURY DOCKS PLA Container Terminal (Berths 41, 43, 45)	Port of London Authority	-Full tracking system
	Northfleet Hope Terminal (River Berth)	Tilbury Container Services Ltd.	-Container terminal information -Monitoring and control system
	Northfleet Hope Terminal (Berth 39)	"	See the River berth terminal above
Southampton	Prince Charles Container Port (201,202)	BIDB	-
	Prince Charles Container Port (204,205,206)	Solent Container Services Ltd	-Container / Terminal control system
W. Germany Bremen/ Bremerhaven			-COMPASS -Port information system (Tally, stowedorage, transshipment, Port authority, ship-broker, forwarding agent, customs) -CT on-line (container logistics) -CUE (controlled unit export) -STORB (stock report)
	Container Terminal Bremerhaven (Nordhafen)	Bremer Lagerhaus-Gesellschaft	-Container disposition, administration, control and logistics
	Container Terminal Bremerhaven (River Quay(Stromkaeje))	Bremer Lagerhaus-Gesellschaft	-Container disposition, administration, control and logistics
	Bremen Terminal	"	-Container disposition, administration, control and logistics
Hamburg	Burchardkai Terminal	Hamburger Hafen-und Lagerhaus-AG	-Connected to Port of Hamburg Authority's DAKOSY system
	Eurokai Terminal	Eurokai KGaA	-Operational control -Yard control and automatic drive of stacking container -Container information system (container administration and communication) -Container stacking system -General cargo system
	Tollerort Terminal	Lager-und Speditionen - Gesellschaft	-Terminal operation
	Unikai Terminal	Unikai Hafensbetrieb GmbH	-Yard inventory control -Ship stability calculation -Load / Discharge lists -Receiving / Delivery lists -Optimization of Transstainer operations -Data transmission -etc

Region/Port	Terminal	Operator	Functions of System
AFRICA			
South Africa Cape town	Table Bay Harbour Container Terminal (602, 603, 604 & coastal)	S.A. Harbours	-Container tracking -Document control system -Planning
Durban	Durban Harbour Container Terminal (108, 109, 201 - 205)	S.A. Harbours	-Container tracking, planning
Port Elizabeth	Port Elizabeth Harbour Container Terminal (& coastal)	S.A. Harbours	-Container tracking, planning
ASIA			
China Huang pu Shang Hai	Berths Nos. 7 & 8	Huang Pu Port Affairs Bureau	-Statistics of loading and unloading operation -Container terminal operation management system -Loading / Unloading operation -Yard stacking control -CFS management -Yard / Gate activities -Billing system -Statistic system, etc
	10th District Berths Nos 4 & 5	Shang Hai Port Affairs Bureau	
	9th District Berths Nos 1 & 2		
Hong Kong Kwai Chung	Kwai Chung Terminal Berth 2 & 4	Hong Kong International Terminal Ltd. (KIT)	-Cargo and container tracking system -Vessel load / Discharge -Tractor monitoring -Data exchange -Transport fleet management -Accountancy -Spare part inventory
	Kwai Chung Terminal Berth 1 & 5	Modern Terminal Ltd. (MTL)	-On-line container and cargo operations
	Kwai Chung Terminal Berth 3	Sea-land Orient Ltd.	-Container parking system -Yard control -Status system -Vessel stowage
	Hong Hom Terminal	Whampoa Marine Terminals Ltd	Under setting
India Bombay	Indira Dock	Bombay Port Trust	None
	Ballard Pier Station	"	None
	Ballard Pier Extension	"	None
Madras	Bharathi Dock	Madras Port Trust	-Yard planning -Ship planning -Container tracking -Container billing -Statistics
Indonesia Jakarta	UTC Container Terminal	Tanjung Priok Port Administration	-Container tracking (CONTERM)
Malaysia Penang	Container Terminal	Penang Port Commission	-Container yard and berth systems -Container control package -Statistics -Bonded cargo billing and stock control -Container billing -NPP billing (bills of shipping agents, consignee, shippers for miscellaneous port services) -Ships billing -Outward billing -Tonnage bonus -Inventory management
Port Kelang	Container Terminal (Berth 9 & 10)	Kelang Container Terminal Co., Ltd.	-On-line container information system (CICS/VS)

Region/Port	Terminal	Operator	Functions of System
Philippines Manila	Manila International Container Terminal (North Harbour)	Manila International Port Terminal Inc.	-Operational statistics system -Port statistics -Port operators profile
	South Harbour Container Terminal (Pier 3, 5, 13, 15)	Metro Port Service Inc.	None -Billing -Arrastre and equipment monitoring
Pakistan Karachi	Berth No. 5 (East Warf), 6, 7, 23, 24	Karachi Port Trust	-Berth operation reporting system
Singapore Singapore	Tanjong Pagar Container Terminal	Port of Singapore Authority	-Assets allocation (berth, equipment, manpower) -Container handling information -Ship planning -Shipment and delivery -Inventory control / Purchasing
	Sembawang Wharves	"	-Billing -Shipment -Delivery
	Container Terminal (Pier 5 & 6)	Busan Container Terminal Operating Co.	-Stevedoring, container yard and CFS operations -Equipment maintenance and repair records -Accounting and billing -Finance -Maintenance and repair parts inventory
South Korea Busan	Queen Elizabeth Quay (Nos. 4 & 5)	Sri Lanka Port Authority	None
Sri Lanka Colombo	Jaye Container Terminal Berths 1 & 2	"	-Container terminal operations (Yard, ship planning) ("Jaye" operation system (JOS))
	Taiwan Kaohsiung	NO.1 Container Terminal (40)	Kaohsiung Harbour Bureau
	" (41)	"	
	" (42)	leased	
	" (43)	Kaohsiung Harbour Bureau	
	NO.2 Container Terminal (63)	China Container Terminal Corp.	
	" (64)	"	
	" (65)	"	
	" (66)	"	
	NO.3 Container Terminal (68)	Sea-Land	
	" (69)	APL	
	" (70)	Yangming	
	NO.4 Container Terminal (116)	Evergreen	
	" (117)	K-Line	
Keelung	Keelung Container Terminal (19, 20, 22, 23, 24, 25, 26)	Keelung Harbour Bureau	
	(Berth 10B)	"	
	(Berth 11B)	"	

Region/Port	Terminal	Operator	Functions of System
MIDDLE EAST			
Iran Bander Khomeini	Berth 13-17	Port and Shipping Organization	
Iraq Umm Qasr		State Enterprise for Water Transport	
Kuwait Shuwaikh	Shuwaikh Container Terminal (Berth 12 & 13)	Shuwaikh Container Terminal (SCT)	-Ships' manifests -Ship movement -Load / Discharge lists -Warehouse, container control -Finance
Oman Mina Qaboos	Mina Qaboos Container Terminal (Berth 4 & 5)	Port Service Corporation Ltd. (Semi Government)	-Container control -Statistics
Saudi Arabia Dammam	Dammam Container terminal (23-26)	Alirezo-Delta Transport Co.	-Administration -Cargo bookings -Customs -Vessel planning -Container tracking
Jubail	Jubail Container Terminal (Berth 15 & 16)	International Port Managers Pte., Ltd.	-Container yard information and control system
U.A.E Dubai - Port Rashid	Port Rashid Container Terminal (31-35)	Port Rashid Authority	-Mobile data system
Dubai - Jabel Ali	Jabel Ali Container Terminal (15 - 17)	Port Authority of Dubai Ali	-Container tracking, handling statistics -Invoicing -Vessel activity -Yard activity -Gate control
OCEANIA			
Australia Brisbane	BATL Fishermen Island Container Terminal No 1 & No 2 (Berth 4 & 5)	Brisbane Amalgamated Terminals Ltd.	-All terminal operations
Freemantle	Seatiner Terminal (Berths 4, 5, 11, 12)	Freemantle Terminal Ltd.	-Container control -Sequencing -Accounting
Launceston	Bell Bay Wharf (berth 5)	Port of Launceston Authority	(Berth 2: ANL computer system)
Melbourne	West Swanson Dock Terminal	Seatiner Terminal Ltd.	-Hazardous cargo system -Shipping information processing system -Equipment system -Importers enquiry list (MLIST) -Container control -Statistics -etc
	East Swanson Dock Terminal	Trans-Ocean Terminals	None
	Webb Dock Terminal (Berths 2,3,4,5)	Australian National Line	-Gate control -Stacking -Invoicing -Stowage lists -Ship stability

Region/Port	Terminal	Operator	Functions of System
Sydney	Port Jackson White Bay Terminal (Berths 3 & 4)	Seatiner Terminals Ltd.	
	Olebe Island Terminal	Olebe Island Terminals, Pty. Ltd.	-Container tracking and reporting
	Port Botany Northern Terminal (1, 2, 3)	Australian National Line	-On-lined to Melbourne head office
	Southern Terminal (4, 5, 6)	Container Terminals Australia Ltd., (CTAL)	-Yard planning and control
NEW ZEALAND Auckland	Ferguson Wharf Container Terminal	Auckland Harbour Board	-Boatharbour records -Debtors / Invoicing / Statistics -Stores inventory -ACIS (Auckland container information system) -Container terminal operations -Stack management -Ship exchange -Road / Rail exchange -Reefer monitoring -Client billing
	Bledisloe Sea Cargo Terminal (Berths 1 & 2)	Union Maritime Service Ltd.	None
	Bledisloe West Wharf		
Lyttelton	Lyttelton Container Terminal	Lyttelton Harbour Board	-Temperature monitoring -Container tracking -Invoicing
New Plymouth	Berth Blyde No 1 & No 2	Teranaki Harbour Board	None
Otago	Port Chalmers Container Terminal	Otago Harbour Board	-Container tracking -Accounts -Administration
Wellington	Thorndon Container Terminal	Container Terminal Ltd.	None
	Aotea quay		
Papua New Guinea Port Moresby	Container Terminal	Port Service PNG Pty Ltd.	None
NORTH AMERICA Canada	Pier C Container Terminal	Halterm Ltd.	-Yard control system
	Fairview Cove Container Terminal	Corecorp Inc.	-Dock location and inventory -Yard operations (loading lists, TIRs, rail departures etc) -Container movement history -Billing
Vancouver	Centerm	Casco Terminal Ltd.	-Inward / Outward cargo documentation -Billing -Statistics
	Ventern	Empire Stevedoring Co., Ltd.	-Container yard planning -Container inventory -Cargo control -EIRs -Billing -Equipment maintenance -Communications
	Lynnterm	Western Stevedoring Co Ltd	None
USA Baltimore	Dundalk Marine Terminal (Berths 7-10, 11-13)	Maryland Port Administration	Operated by each stevedore -Full-service equipment control
	South Locust Point Marine Terminal	Atlantic & Gulf Stevedores Inc.	-All container-related movements
	Sea-Land Terminal	Sea-land Service Inc.	

Region/Port	Terminal	Operator	Functions of System
Boston	John F. Moran Container Terminal	Massachusetts Port Authority (Mass Port)	-
	Conley Marine Terminal (Berth 17) (Sea-land Terminal)	Sea-Land Service Inc.	-
	Conley Container Terminal (Berth 11)	Massachusetts Port Authority (Mass Port)	-
Hampton Roads/ Norfolk	Norfolk International Terminal	Maritime Terminals Inc.	Virginia International Terminal Inc.
	Newport News Terminal (Pier C)	Port Authority Terminals Inc.	"
	Portsmouth Marine Terminal	Portsmouth Terminals Inc.	"
	Lambert's Point/Sewell's Point		Lambert's Point Docks Incorporated
	Sea-Land Terminal		
Houston	Barboura Cut Container Dock (Berths 1,2,3,4,5)	Port Houston Authority	-CONICS system for container tracking and billing (containerized cargo information, gate, inventory, etc)
	Care Shipping Terminal	Care Shipping Inc	-Documentation
Jacksonville	Blount Island Terminal & Talleyrand Docks and Terminal	Jacksonville Port Authority	-Container release status -Cargo information -Tracking -Billing
	Sea-Land Terminal	Sea-Land Service Inc.	-
New Orleans	France Road Container Terminal Berth 1	Sea-Land Service Inc.	-
	Berth 5, 6	New Orleans Marine Contractors Inc	-Terminal operations
	Henry Clay Avenue Wharf	Lykes Bros Steamship Co Ltd	-
	Nashville Avenue Wharf	Lykes Bros Steamship Co Ltd, Transocean Terminal Operators	-
	Jourdan Road Terminal (Berths 4 & 5)	Ceres Gulf Stevedoring Inc	-
New York/New Jersey	Port Newark/Elizabeth Port Authority Maritime Terminal (68, 70, 72, 74)	Atlantic Container Line	-
	" (51)	Maersk Container Service Inc.	-Equipment control
	Tripoli Street Terminal (78, 80, 82, 84, 86)	Maher Terminals Inc.	-
	Fleet Street Terminal (52, 54, 56, 58, 60, 62, 64, 66)		-
	Port Newark/Elizabeth Port Authority Maritime Terminal (80,88,90,92, 94, 96, 98)	Sea-Land Service Inc.	-
	" (53, 55, 57, 59)	Universal Maritime Service Corp.	-Inventory -Manifests -Container tracking
	Howland Hook Container Terminal	Howland Hook Marine Terminal Corp.	-
	Global Marine Terminal	Global Terminal & Container Service Inc.	-Gate control -Stowage plans -Loading lists -Container tracking -Container and equipment maintenance -etc
	Red Hook Marine Container Terminal (Pier 10, 11)	Universal Maritime Service Corp.	-Inventory -Manifests -Container tracking

Region/Port	Terminal	Operator	Functions of System
Philadelphia	South Brooklyn Marine Terminal	City of New York	-Container transactions tracking and inventory
	Tioga Marine Terminal	I.T.O. Corp. of Ameriport Inc.	-Compass system for gate control -BIRs -Container tracking
	Packer Avenue Marine Terminal	Lavino Shipping Co.	-Container accountability
Saint John (NB)	Brunterm Rodney Terminal	Brunterm Ltd.	-Container tracking
Savannah	Containerport	Georgia Port Authority	-Ship operations -Manifests -Load / Discharge lists -Customs -Inventory control -CFS Services -Billing -Container tracking etc
Long Beach	California United Terminal (Pier D, Berths 18-31 & Pier C, Berths 20-27)	California United Terminal Inc.	-
	ITS Terminal (Pier J, Berth 232, 233, 234)	International Transportation Service Inc., (ITS)	-Vessel operations -Inventory control -Gate control -Container movement / Tracking with remote data terminals on Rranstainers and yard cars
	Maersk Line Terminal (Pier J, Berths 243-244)	Maersk Line	-
	Pacific Container Terminal (Pier J, Berths 245-247)	Pacific Container Terminal Inc.	-
	Sea-Land Terminal (Pier O, Berths 227-228)	Sea-Land Service Inc.	-
Los Angeles	Long Beach Container Terminal (Pier A, Berths 6-10)	Long Beach container Co., Inc.	-
	APL Container Terminal (121 - 126)	American President Lines	-
	Matson Terminal (206 - 209)	Matson Terminals Inc.	-
	KSC Terminal (127-131)	Crescent Wharf & Warehouse Co.	-All inventory -Receipt / Delivery clearance -Customer billing -Maintenance and repair records
	Evergreen Terminal 1 (233 - 236)	Evergreen Marine Co., California Ltd.	-
	Evergreen Terminal 2 (Berth 87)	Evergreen Marine Co., California Ltd.	-
	Overseas Terminal (Berths 227- 232)	Overseas Terminal Co.	-MTMAS system
	Trapac Terminal (136 - 139)	Trans Pacific Container Service Corp	-
Oakland	Indies Container Terminal (216-219)	Stevedoring Services of America	-
	Sea-Land Terminal	Sea-Land Service Inc.	-
	TransBay Terminal (2-3)	International Transportation Services	-
	Maersk Line Terminal (4)	Marine Terminals Corp.	-
	Public Container Terminal (5, 6)	Stevedoring Services of America	-Inventory control
	Bay Bridge Terminal (10 - 12)	Maritime Service Inc.	-
	Matson Terminal (D.E.F)	Matson Terminal Inc.	-
7th Street Public Container Terminal (Berths G-J,O)	Marine Terminal Corp.	-Inventory control -Gate control	

Region/Port	Terminal	Operator	Functions of System
Portland	APL Container Terminal (Berths A-D)	American President Lines Ltd.	-Load planning -Preparation of container manifests
	9th Avenue Terminal	Marine Terminal Corp.	None
	Charles P Howard Terminal	Marine Terminal Corp.	-Maritime related operations
	Terminal 2 (205, 206)	Port of Portland	None
	Terminal 4 (406, 407, 408)	"	None
Seattle	Terminal 6 (John Falton Terminal) (603 - 605)	"	None
			-Cargo system (inventory, delivery, billing, statistics) -Chill facilities -CFS (report and inquiries about cargo between CT, CFS and warehouse) -Container system (inventory, movement, track information) -Equipment profile -Inland tracing system -Parking inventory -Preventive maintenance -Seattle customs automated manifest -Store inventory management -Traffic system -Warehouse system
	Terminal 5 (APL Terminal)	APL, Eagle Marine Services Ltd	-
	Terminal 18 (Seattle International Terminal)	Stevedoring Services of America	-
	Terminal 37	"	None
	Terminal 42	"	None
	Terminal 25	Seacon Terminal Inc.	-Container inventory -Gate control
	Terminal 46	International Terminal Co	-
	Terminal 30		-
	Tacoma	Terminal 4	Port of Tacoma
Terminal 7		"	-
Pierce County Terminal			-
Tacoma Terminal		Tacoma Terminals Inc	-
CARIBBEAN & CENTRAL AMERICA			
Honduras Puerto Cortes	Terminal de Contenedores Cortes (Berth 5)	Empresa Nacional Portuaria	-
	Kingston Container Terminal	Kingston Terminal Operators Ltd.	-Container tracking
Mexico Coatzacoalcas	SMT Terminal (Pier No.5)	Portuarios del Istmo de Tehuantepec (SPITSA)	-
	Lazaro Cardenas	Container Terminal	Port Authority
Puerto Rico San Juan	Puerto Nuevo Berths	Puerto Rico Maritime Shipping	-
	Isla Grande Terminal	"	-
JAPAN			
Kita Kyushu	Tanoura Container terminal		None
	Tachinoura Container Terminal		None

Region/Port	Terminal	Operator	Functions of System
Kobe	Port Island		
	Berth No. 1	Yamashita Shin Nihon Kisen (YSN)/ Japan Line (JL)	None
	Berth No. 2	"	"
	Berth No. 3	Nippon Yusen Kaisha (NYK)	-Container operations
	Berth No. 4	"	-Inventory control -Yard operation -Documentation
	Berth No. 5 (Berth No. 6)	American President Line (APL)	"
	Berth No. 7	Mitsui O.S.K. Line (MOL)/ John Swire & Sons (Japan) Co. (JS)	"
	Berth No. 8	MOL	"
	Berth No. 9	MOL	"
	Berth No. 10	YSL	-Container terminal operation
	Berth No. 11 (Berth No. 12)	NYK ("K" Line)	None
	Rokko Island		
	RC-1	Sea Land Service Inc. (SL)	"
	RC-2	SL	"
	RC-3	"K" Line (KL)	"
	RC-4	Maersk Line	"
	RC-5	"	"
	Rokko Island Heavy Cargo Berth (G, H, I)		
	Maya Pier No. 4		
	Nagoya	NCB Terminal	Six Japanese shipping lines
Kinjo Pier (wharf 76 & 77)			None
Osaka	Nanko C1	KL	"
	C2	MOL	"
	C3	KL	"
	C4	KL	"
	C5	Neptune Orient Line (NOL)	"
	C6	"	"
	Heavy Cargo Berths Nos. 2 - 4		
Shimizu	Okitsu Wharf No.2 (Berths 11 & 12) & Sodeshi Wharf No. 1 (Berths 6 - 8)	Shimizu Port Administration Bureau "	-Container inventory control -Ship planning system
Tokyo	Oh-1 Terminal Berths 1 & 2	KL	-Inventory -Receiving / Delivery -Ship planning -Statistics -Yard planning and operation -Data transmission -Yard gantry guidance and supervision
	Berth 3	Maersk Line	"

Region/Port	Terminal	Operator	Functions of System
Yokohama	Berths 4 & 5	MOL	-Stowage / Stacking planning -Gate control -Load / Discharge control -Marshalling / Shift control -Report generation -Documentation
	Berths 6 & 7	NYK	-Ship planning and calculation -Yard control -Cargo receipt and delivery -Inventory control -CFS cargo receipt and stowing -Documentation -Vessel trim -Logitudinal strength calculation -Terminal reports -Departure reports -Telex reports
	Berth 8	JL/YSL	-Ship stability calculation -Documentation -Container inventory -Spare parts inventory
	Shinagawa Public Terminal		
	Oomi Container Terminal	MOL/NYK	None
	Honmoku Pier D4	APL	
	Pier D5	MOL	-Yard control -Ship stowage plans -Container tracking
	Honmoku Container Terminal Berths No. 5 & 6	SL	
	Berth No. 7	NYK/Showa Lines	None
	Berth No. 8	KL	-Inventory
Daikoku Container Terminal Berth No. 1	YSL		
Berth No. 2	NYK	-None	

Source: National Magazine Co Ltd, Containerisation International Year Book, 1988
 ESCAP, ESCAP Port Computerization handbook, 1986
 Jane's, Containerisation Directory, 1988-93

(3) Computer Information System

The symbols used in this report for the operation activities are as shown in Table A.4.4.

Table A.4.4 Symbols for the operation

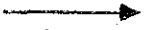


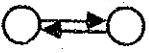





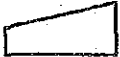


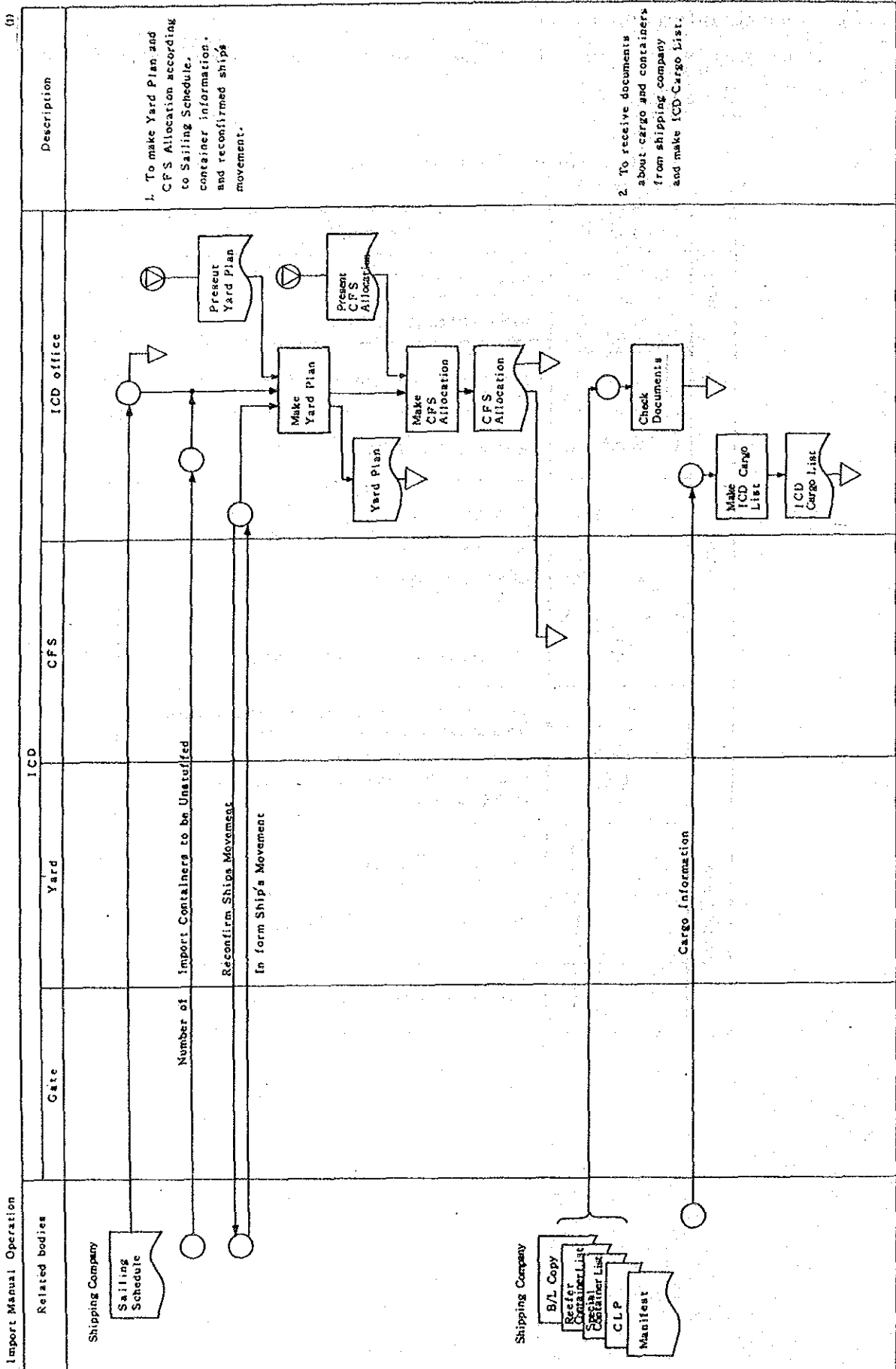
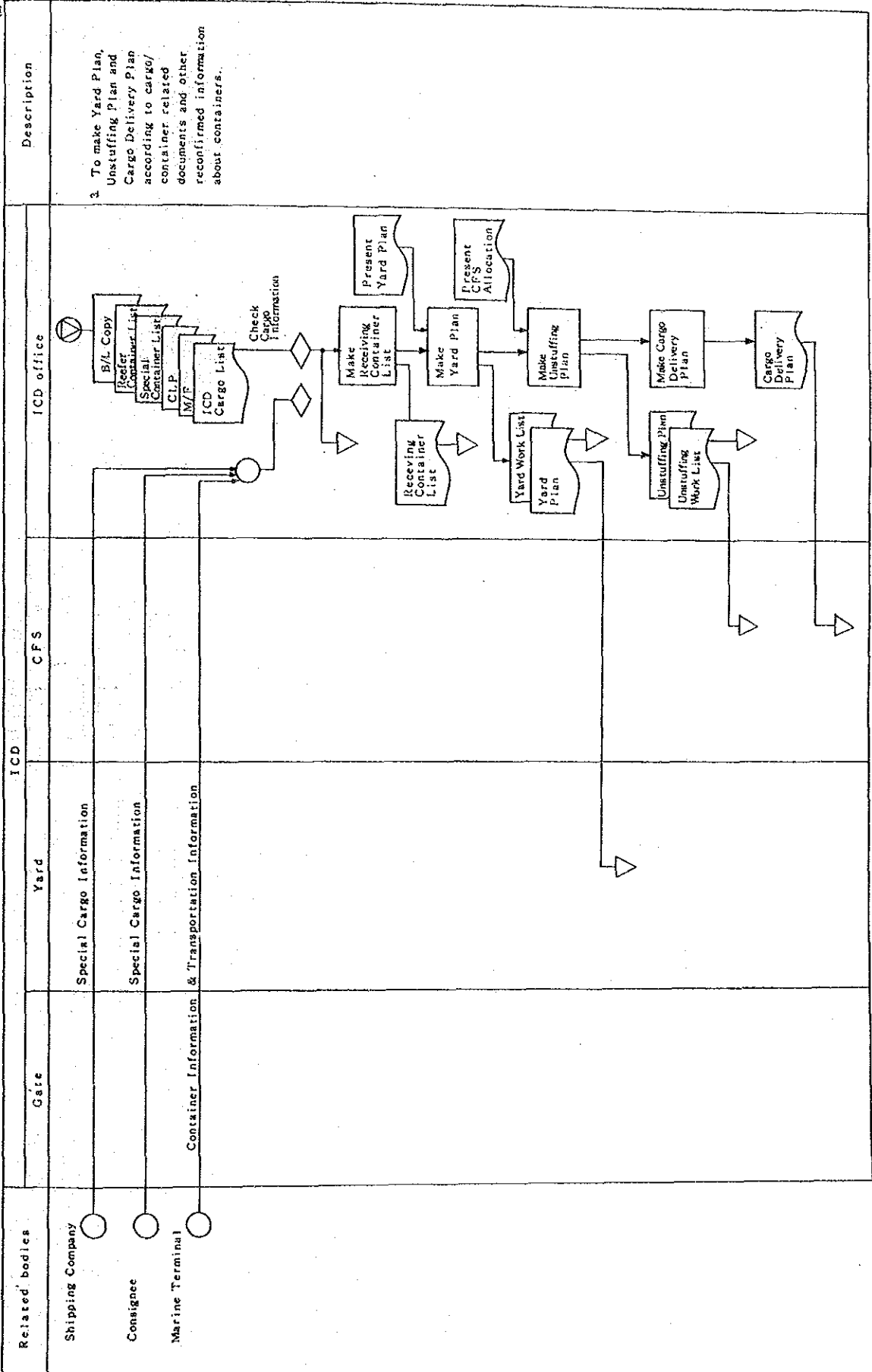
	Symbol	Description
Flow		Flow of information, documents, or operation
		Movement of cargo/containers
Work		Operation or processing of information/documents
		Exchanging or conveying of information
		Information transfer ○ : Source ● : Recipient
		Collation/checking of information, documents, cargo/container
		Storing of documents or cargo/container
		Continuation of operation or cargo/container movement to the same symbol on the following page
		Extraction of the stored information/documents or cargo/containers
Input/Output		Data input into key board
		Display information on the CRT display
		Hand written and computer- printed documents

Fig. A.4.9 Import Manual Operation

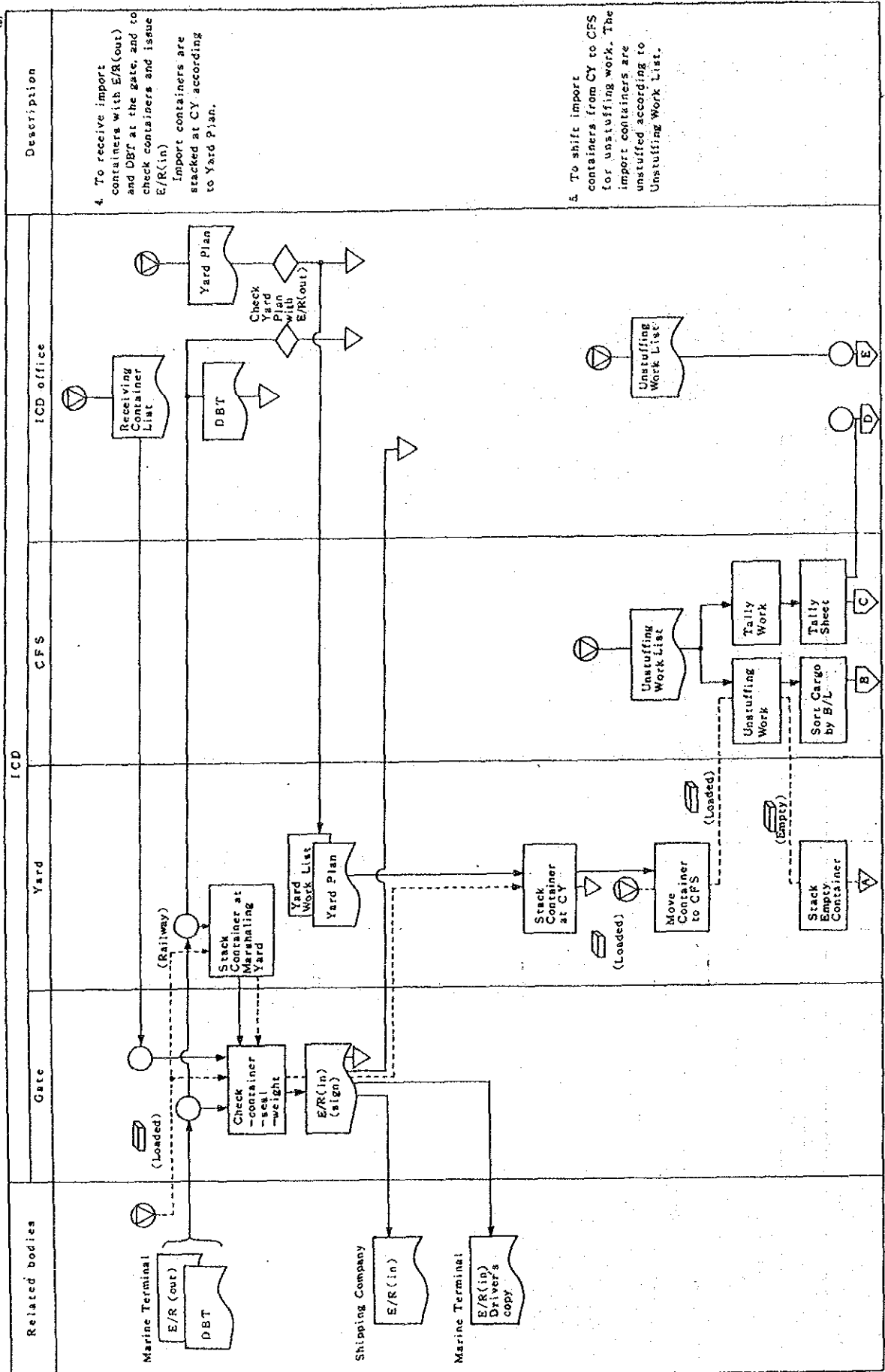


Import manual Operation



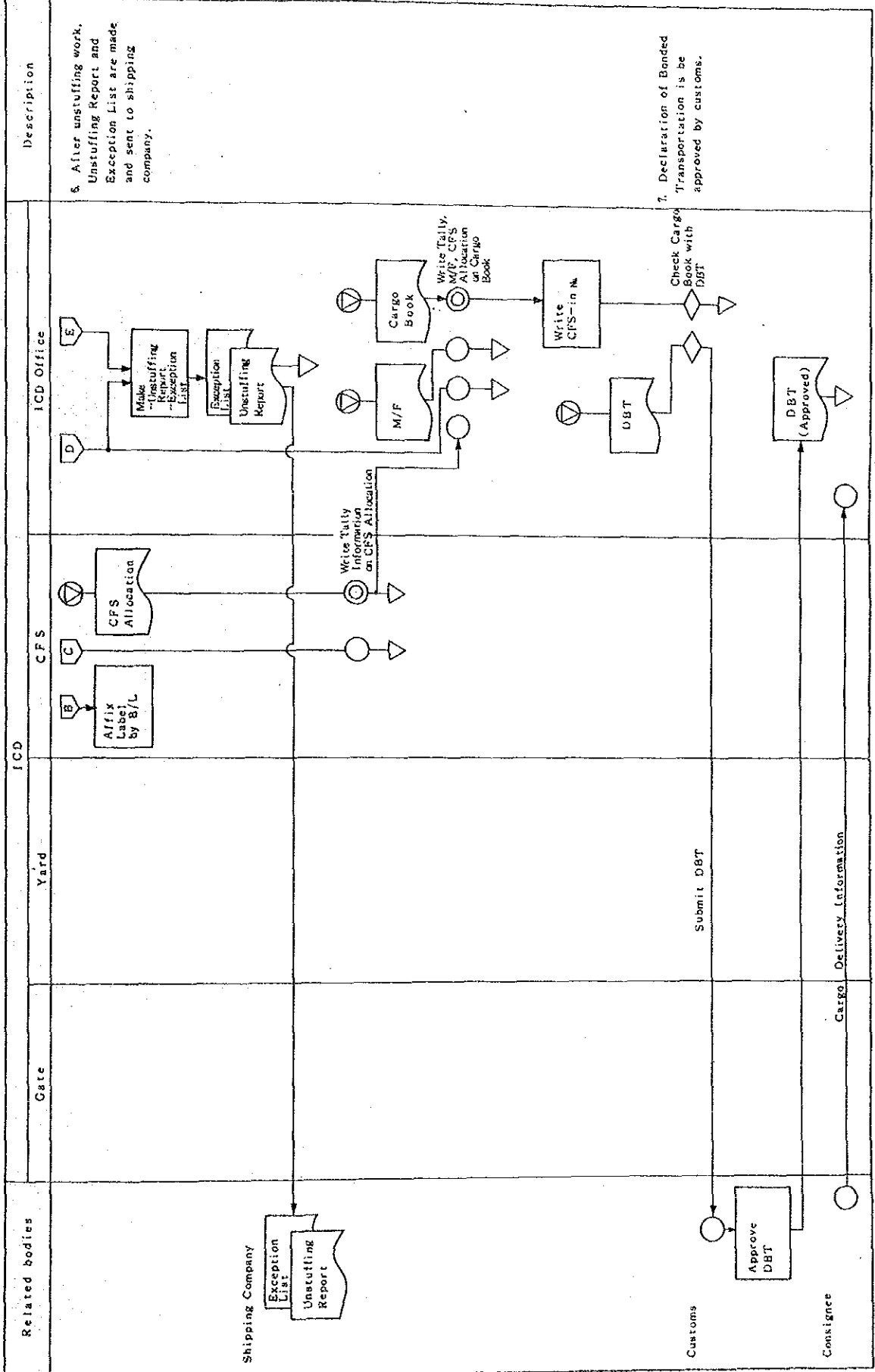
Import Manual Operation

(2)



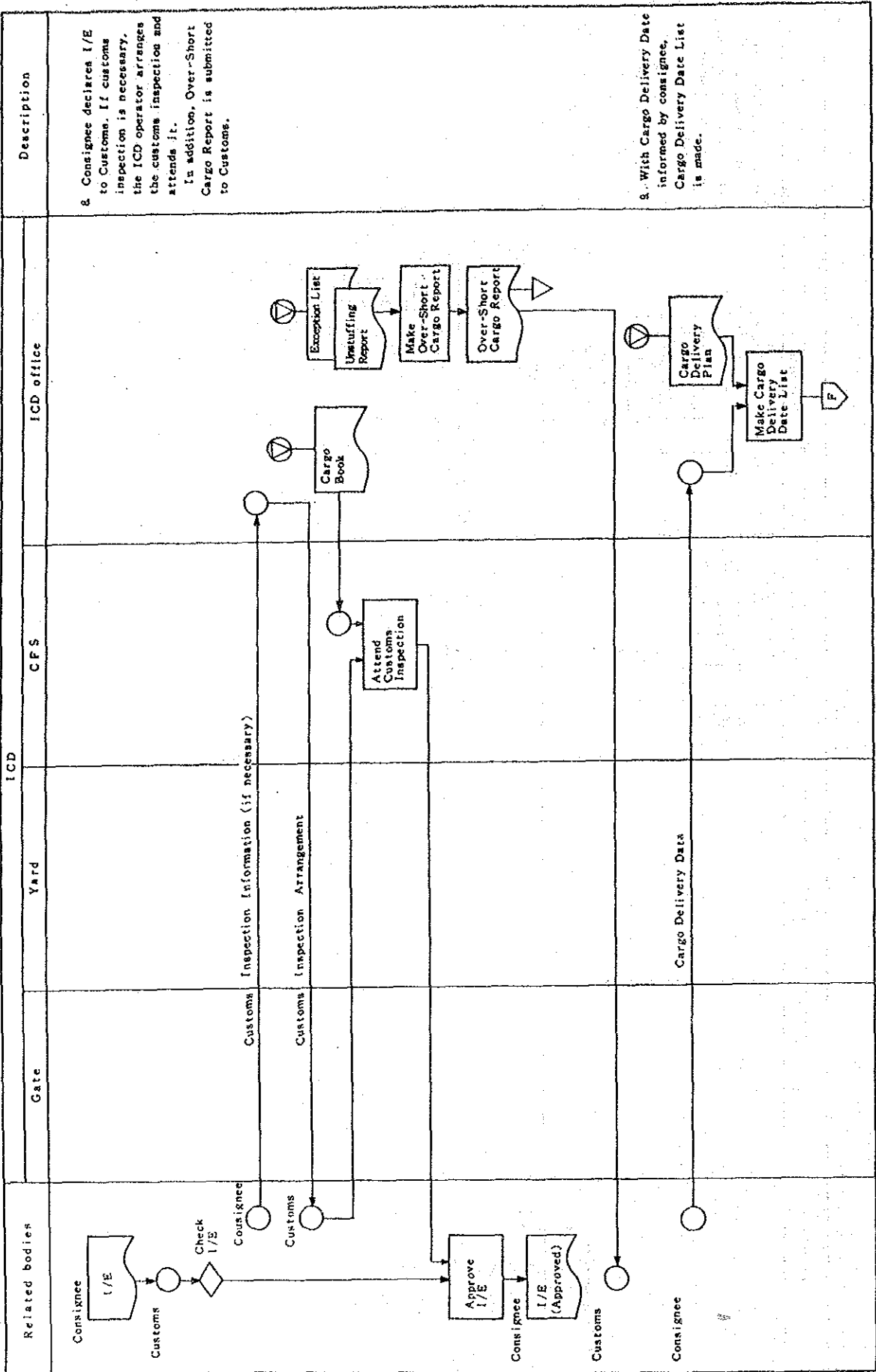
4. To receive import containers with E/R(out) and DBT at the gate, and to check containers and issue E/R(in) Import containers are stacked at CY according to Yard Plan.

5. To shift import containers from CY to CFS for unstuffing work. The import containers are unstacked according to Unstuffing Work List.



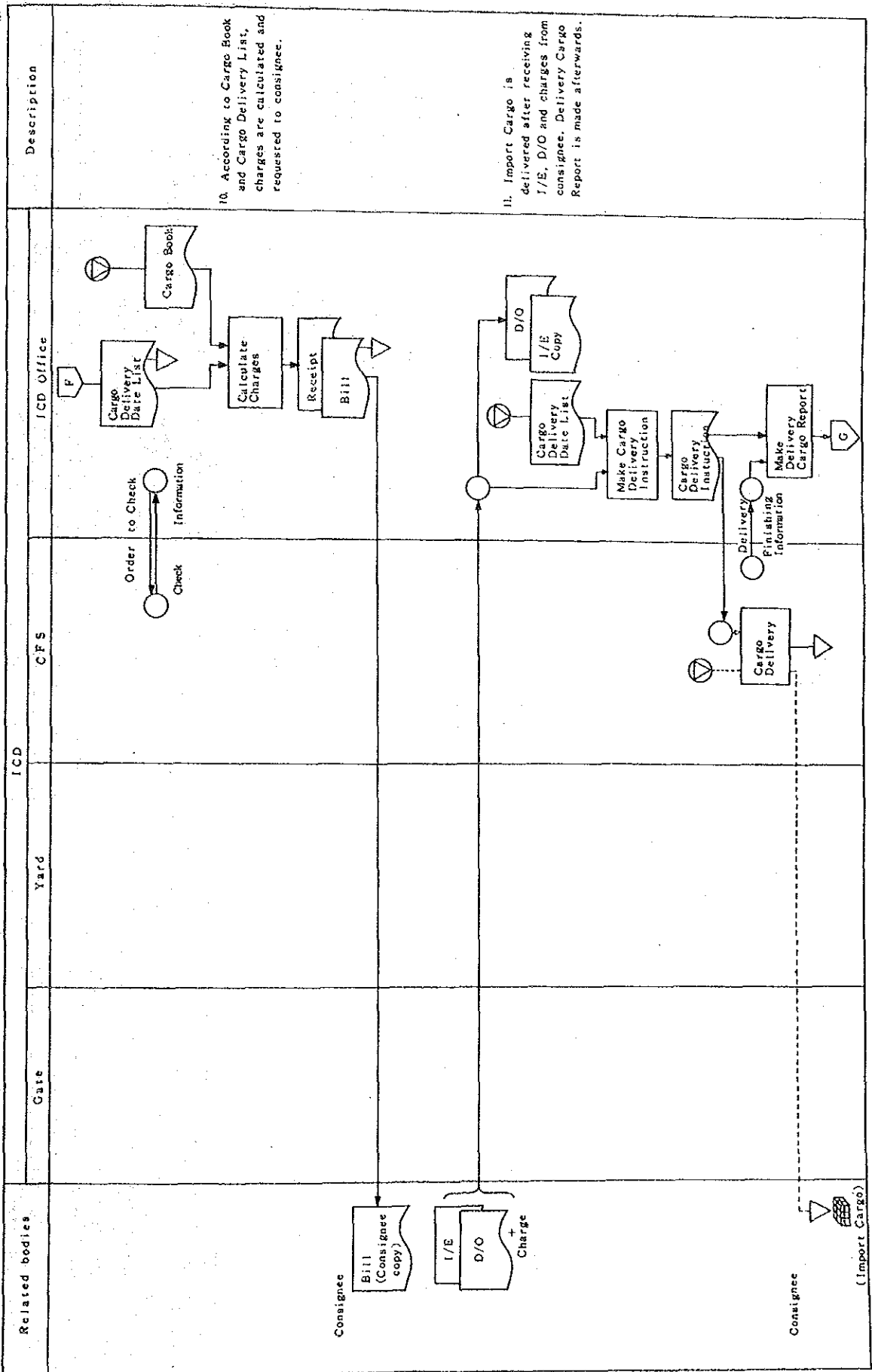
(3)

Import Manual Operation



8. Consignee declares I/E to Customs. If customs inspection is necessary, the ICD operator arranges the customs inspection and attends it. In addition, Over-Short Cargo Report is submitted to Customs.

9. With Cargo Delivery Date informed by consignee, Cargo Delivery Date List is made.



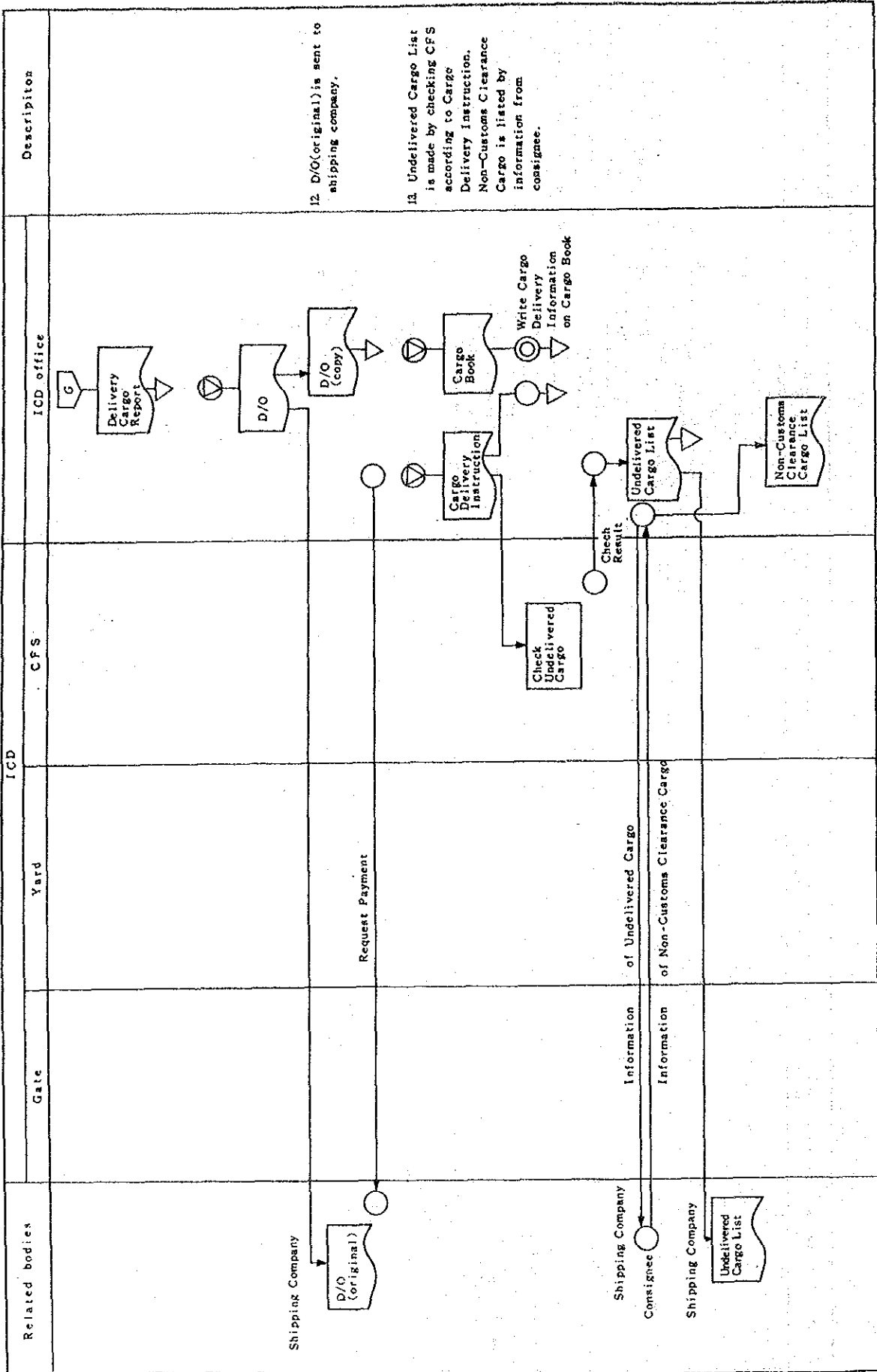
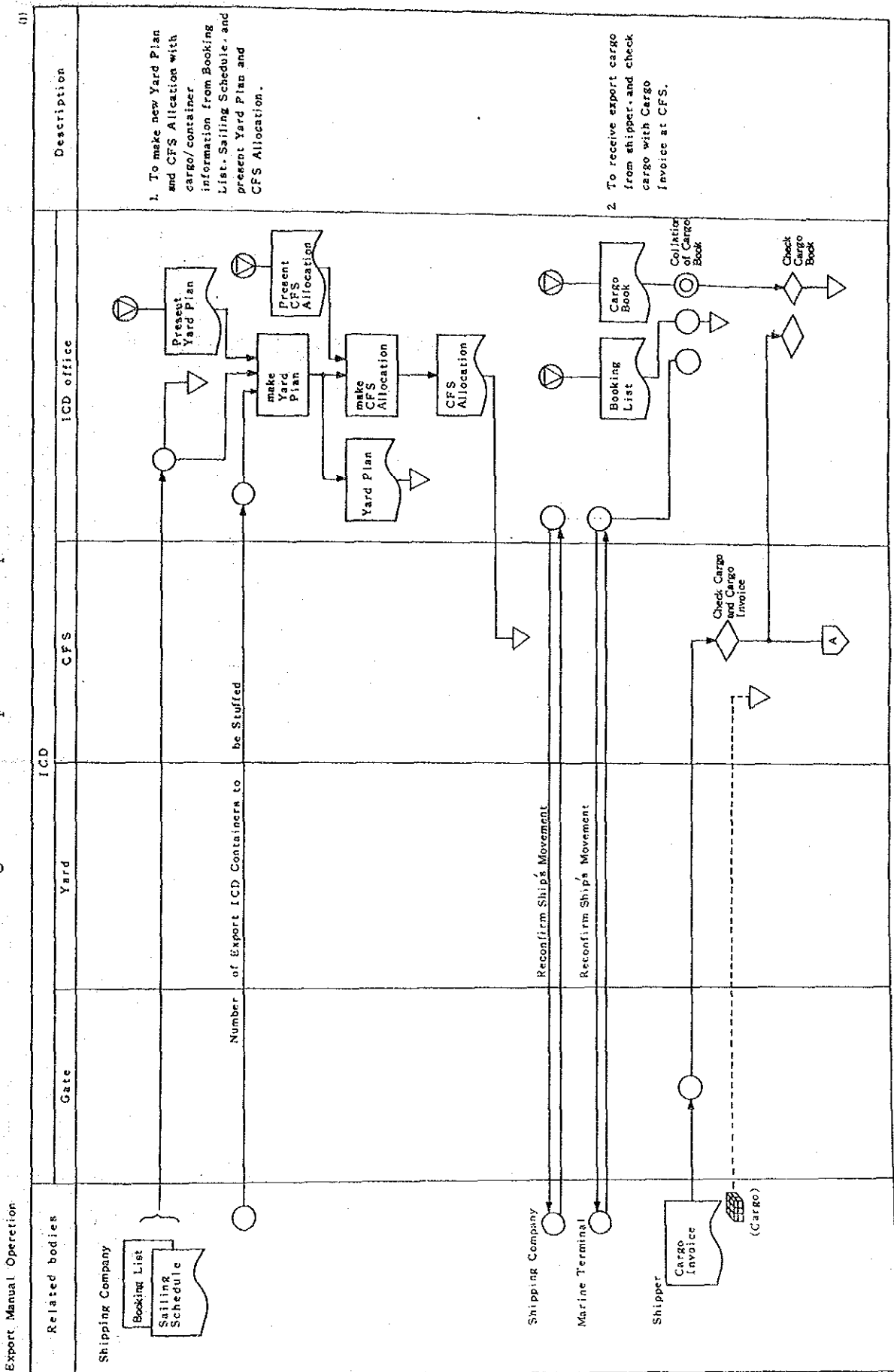
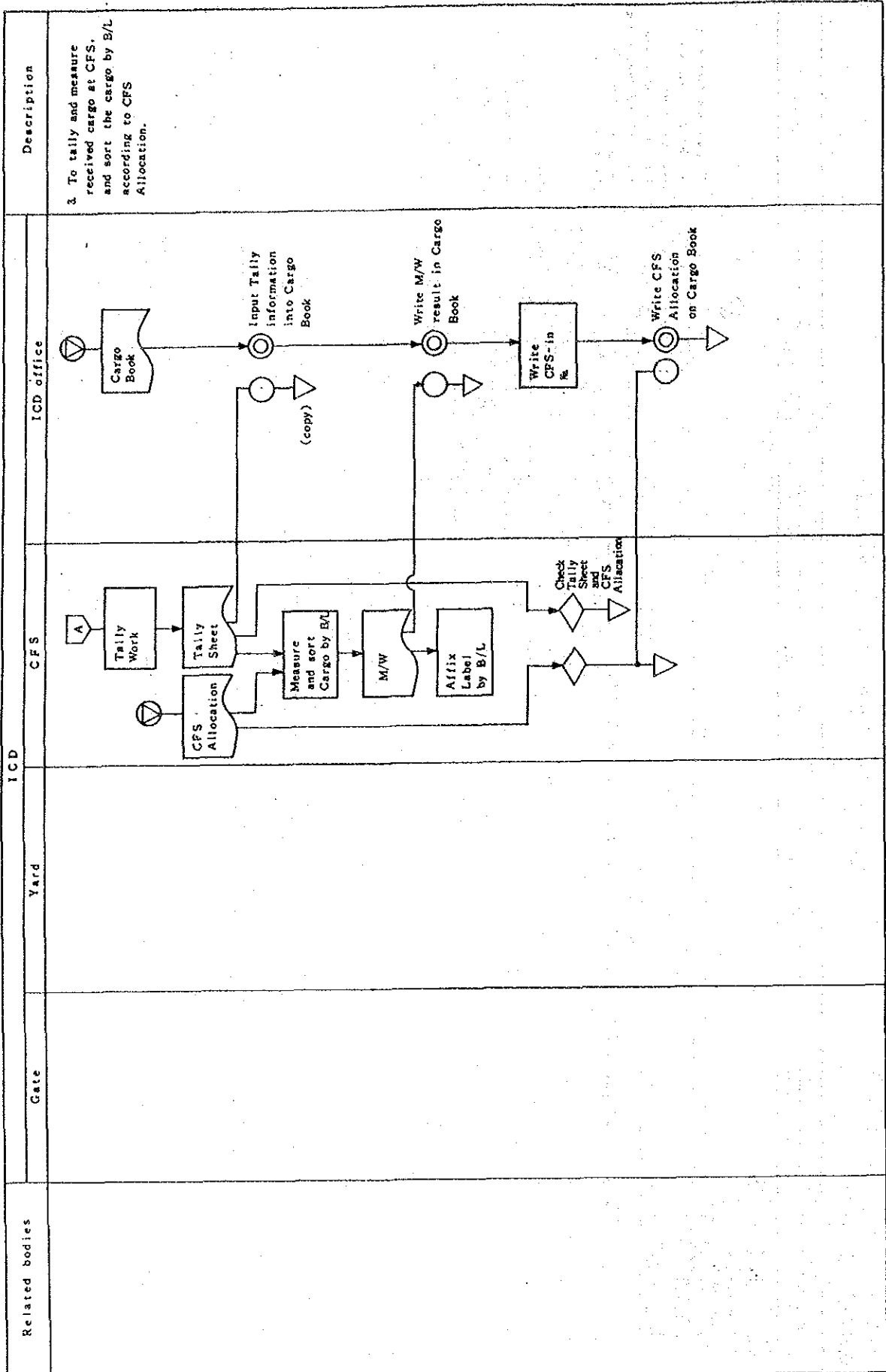
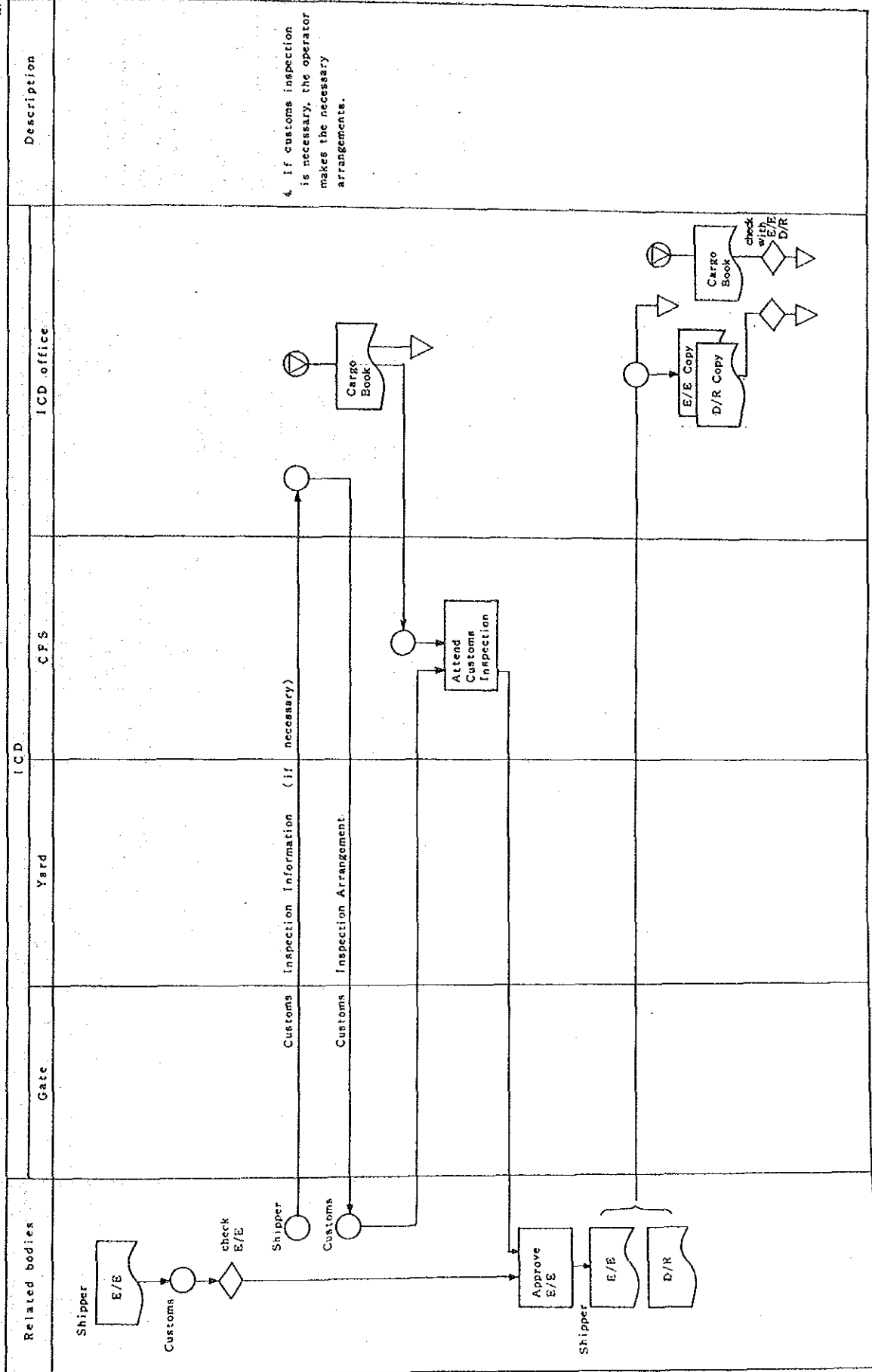
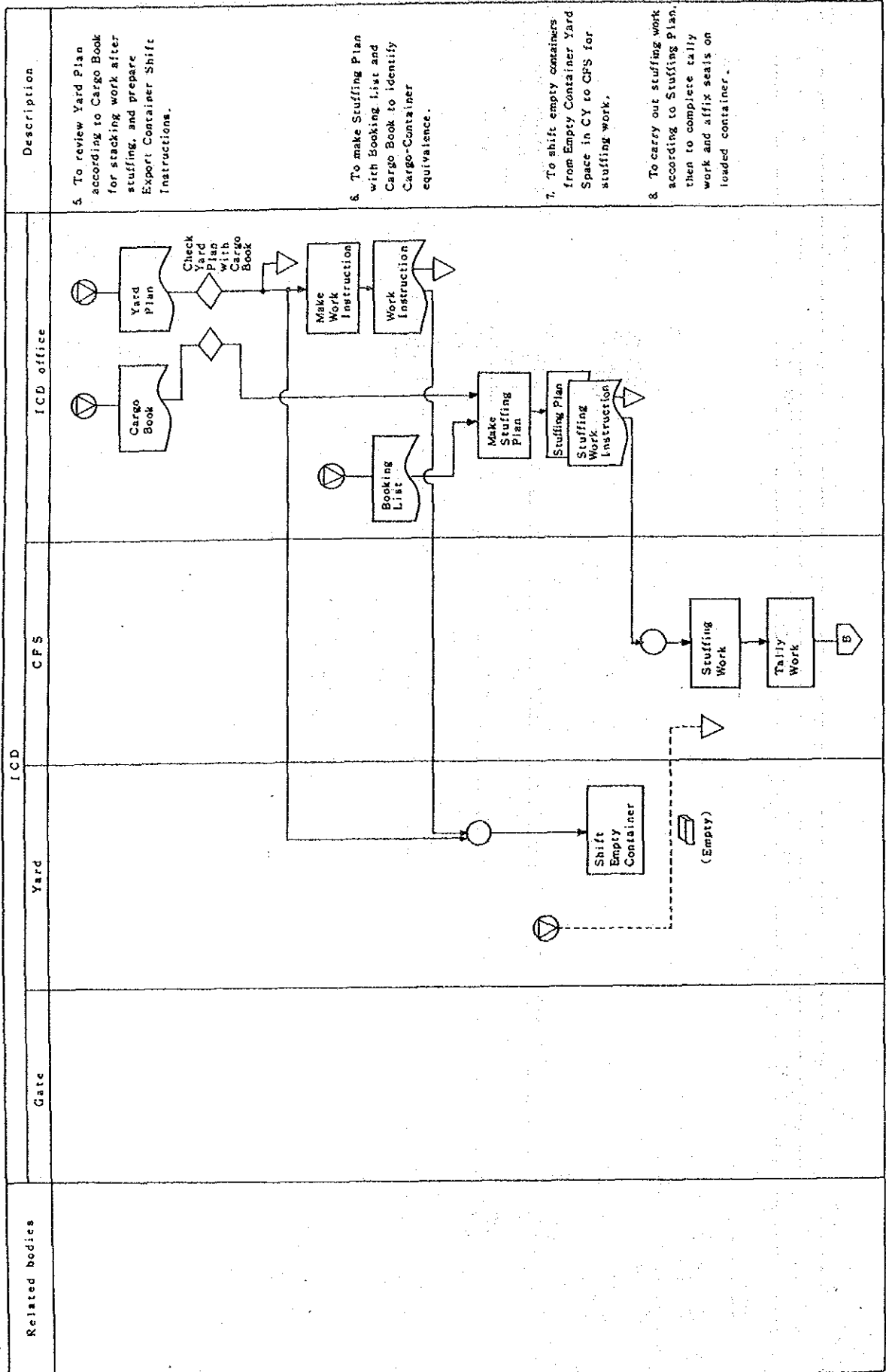


Fig. A.4.10 Export Manual Operation

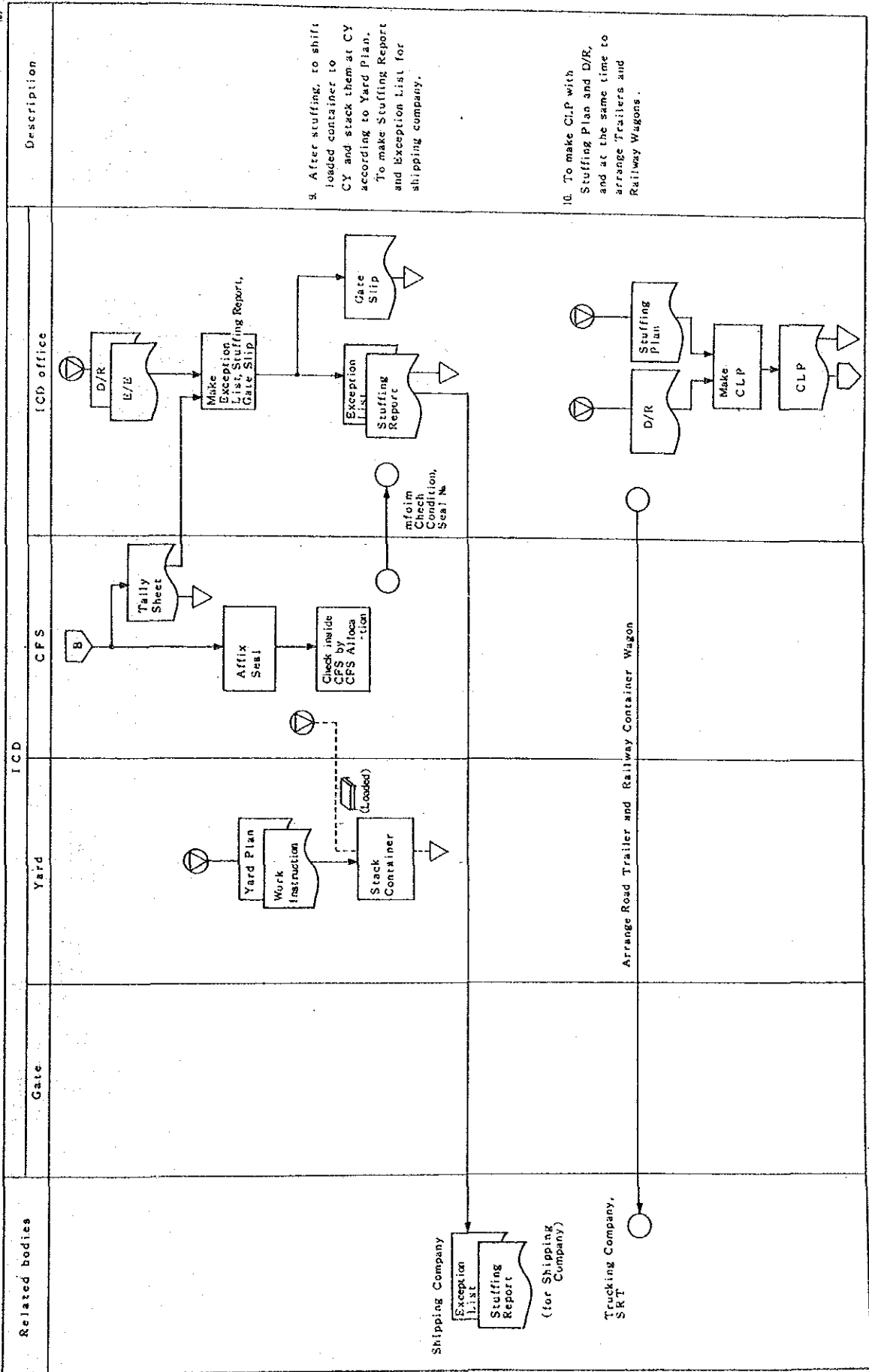






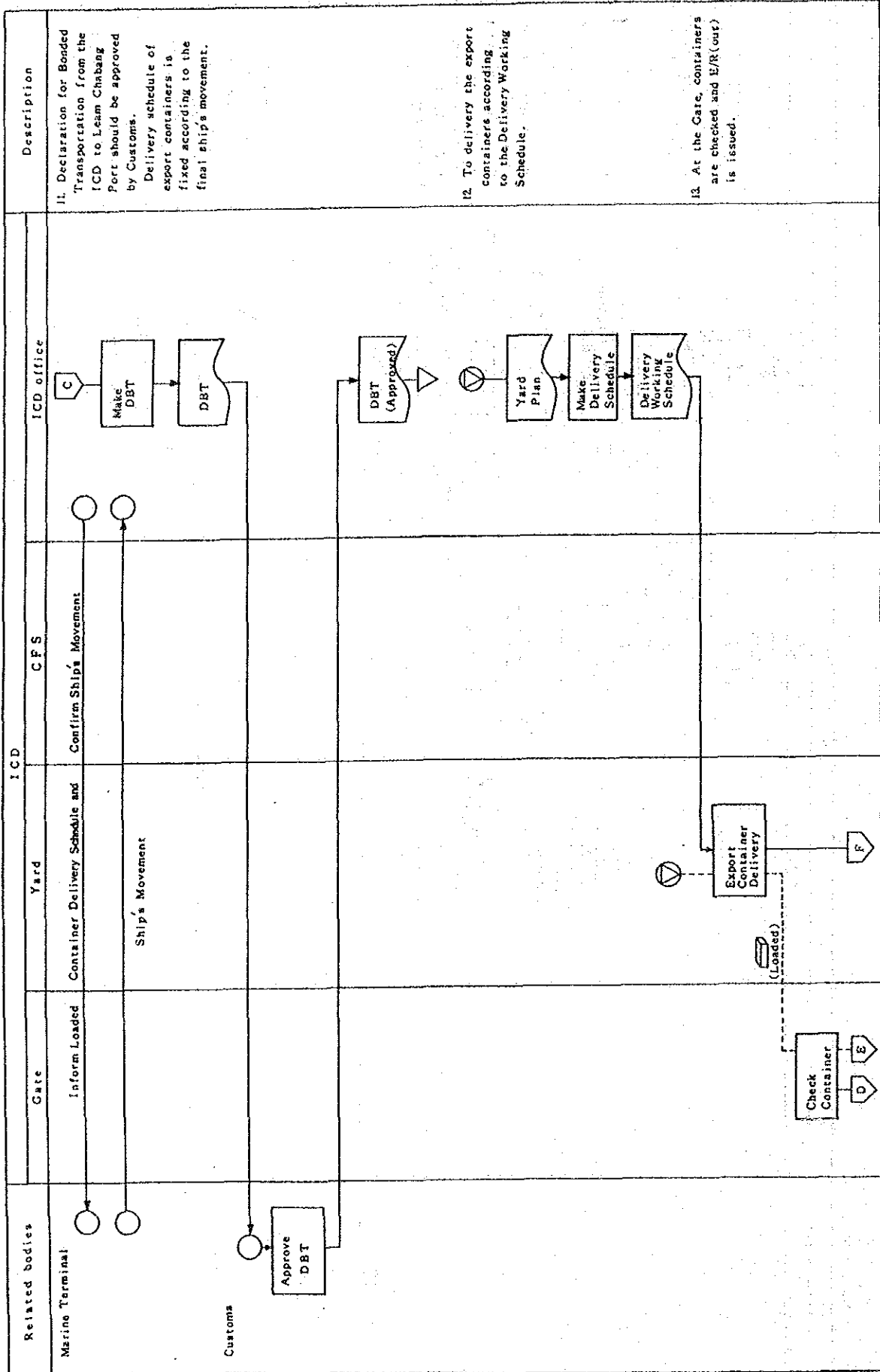


Export Manual Operation



Export Manual Operation

(6)



Export Manual Operation

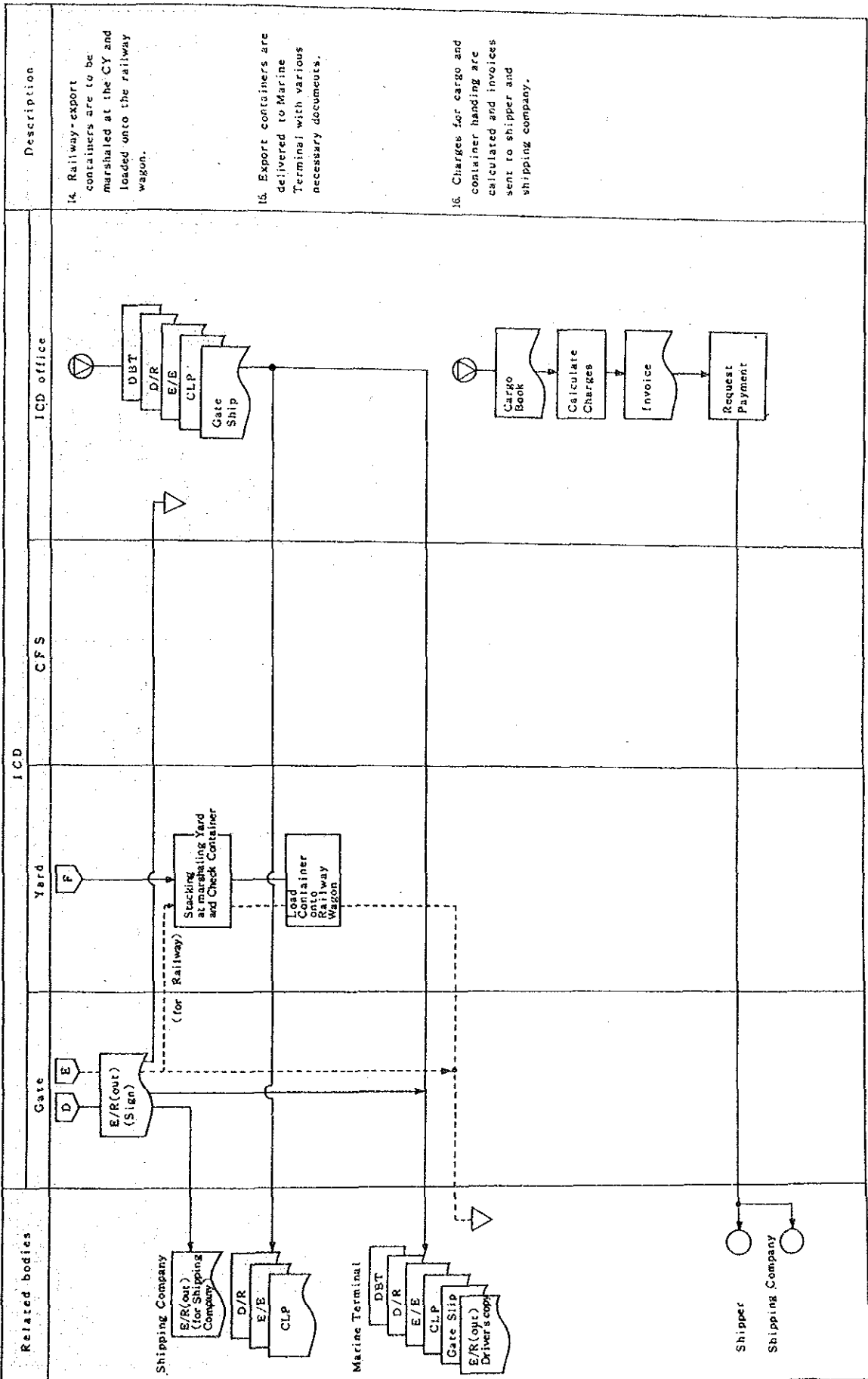
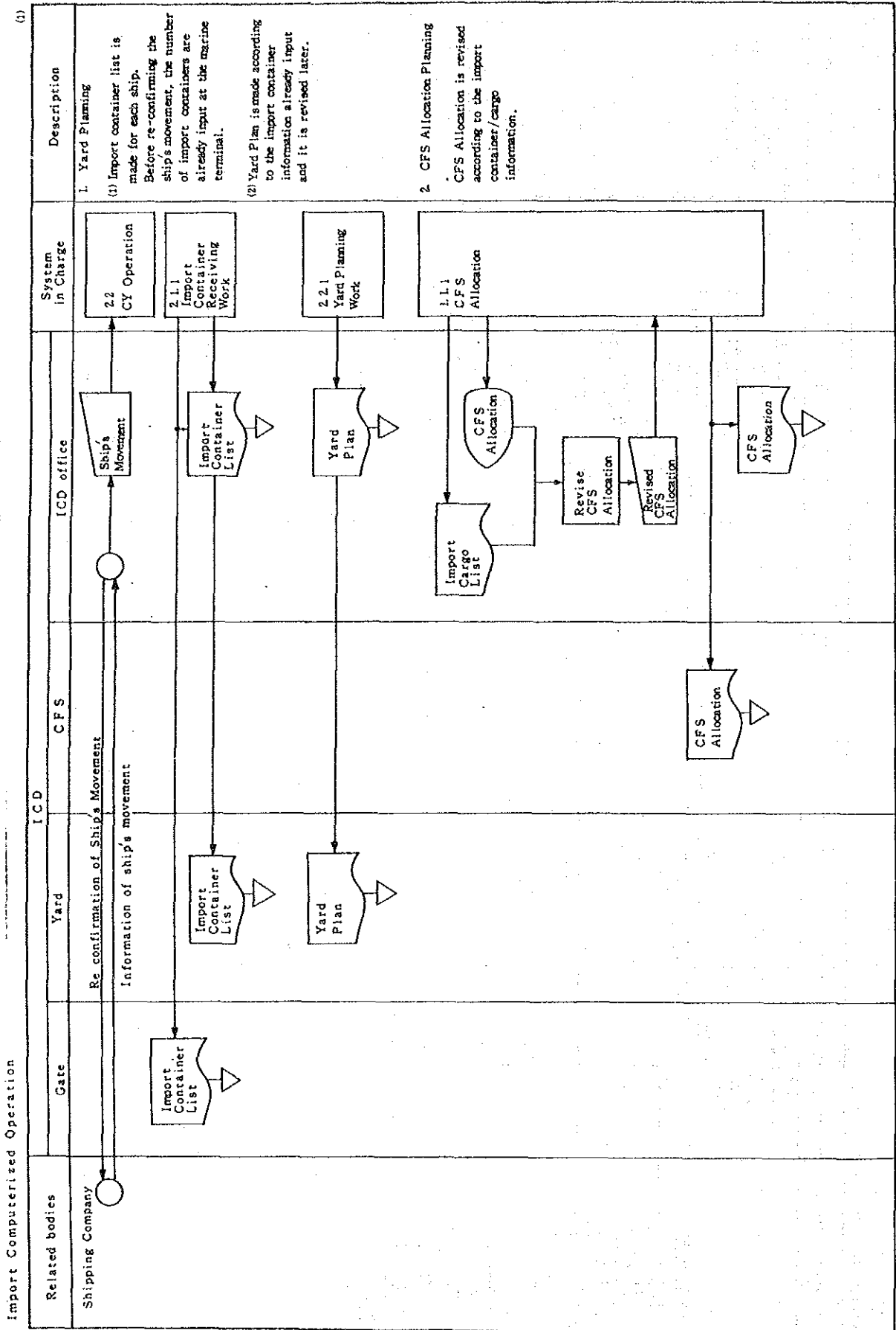
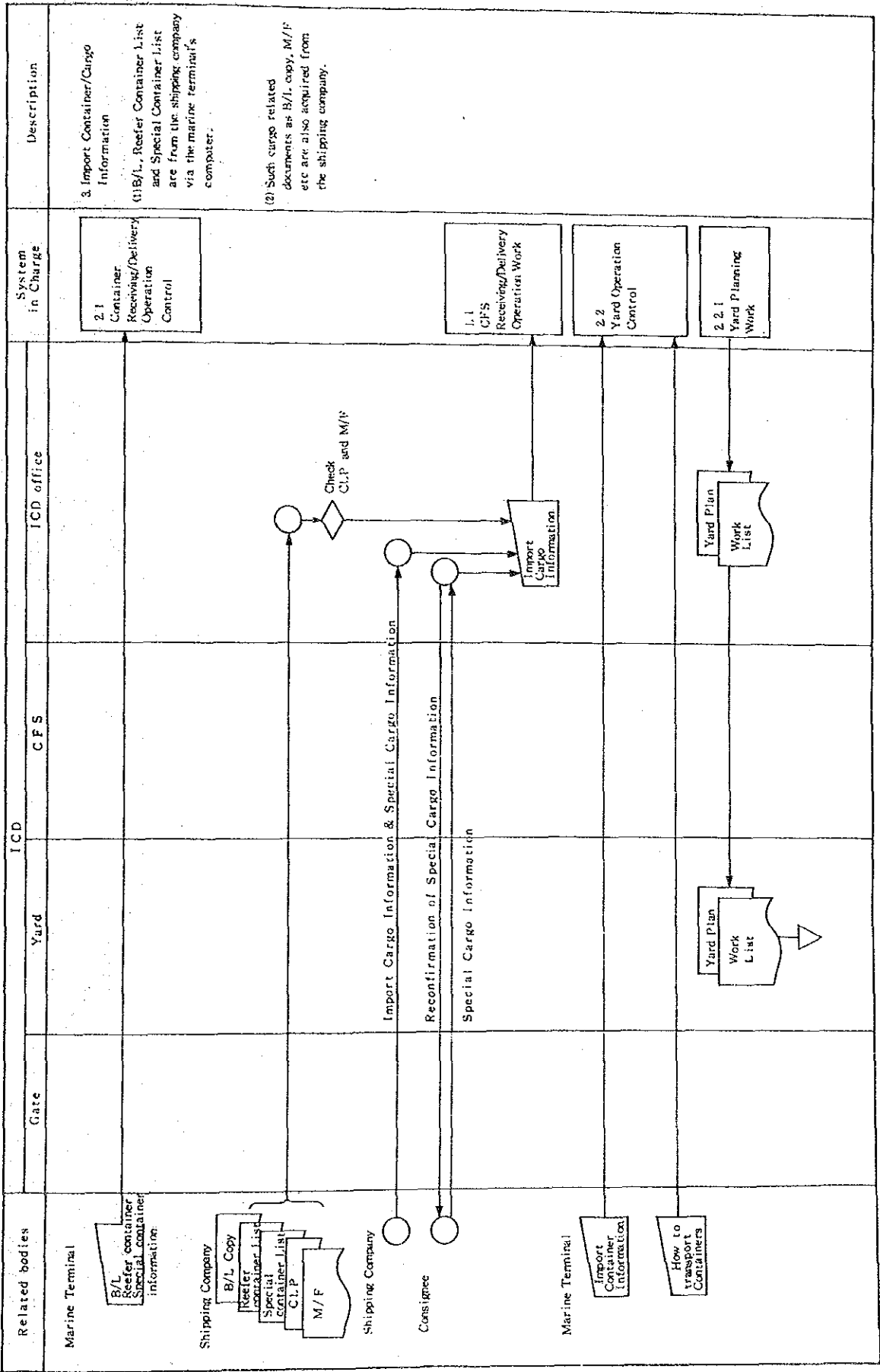


Fig. A.4.11 Import Computerized Operation

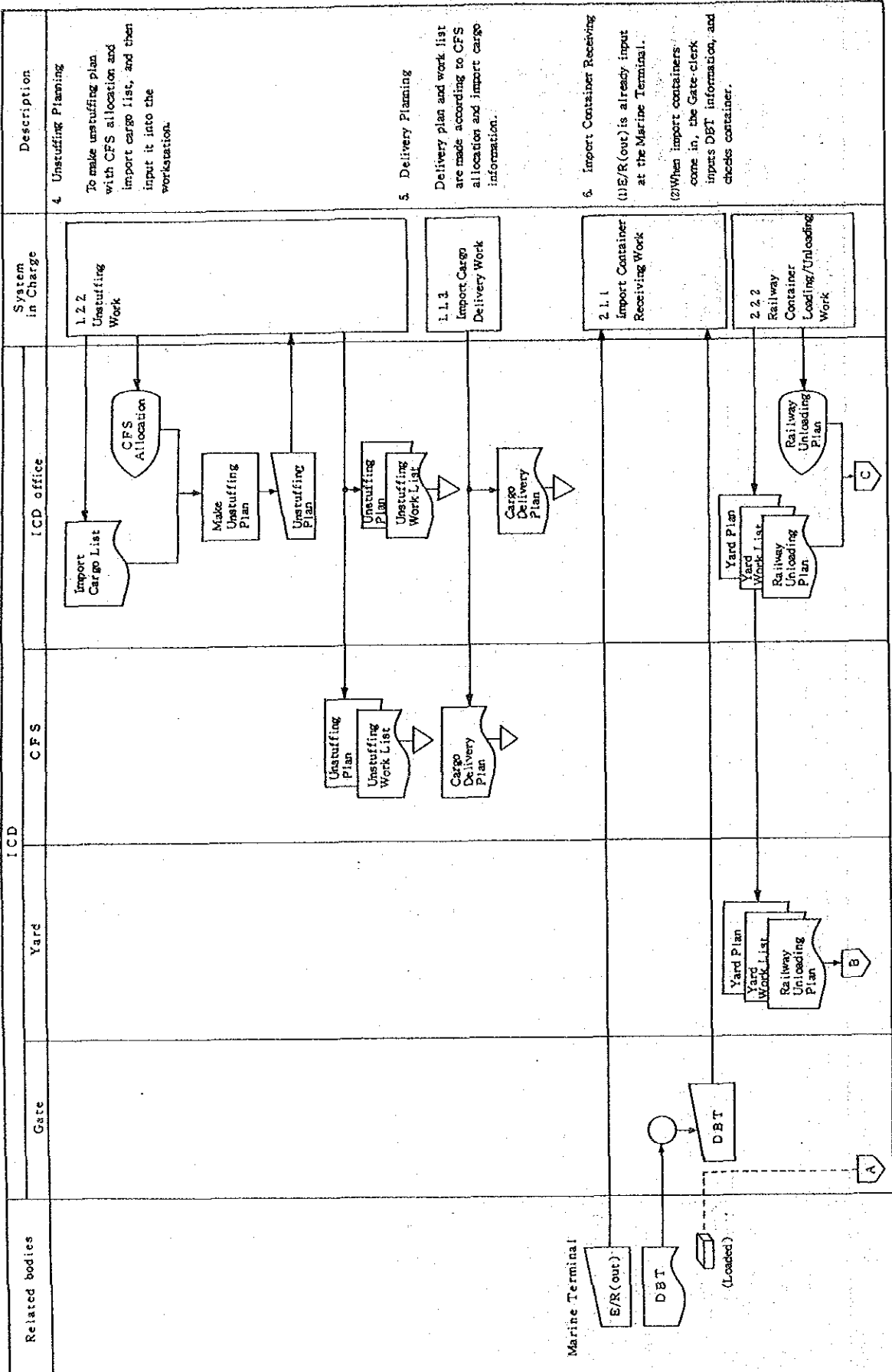


Import Computerized Operation

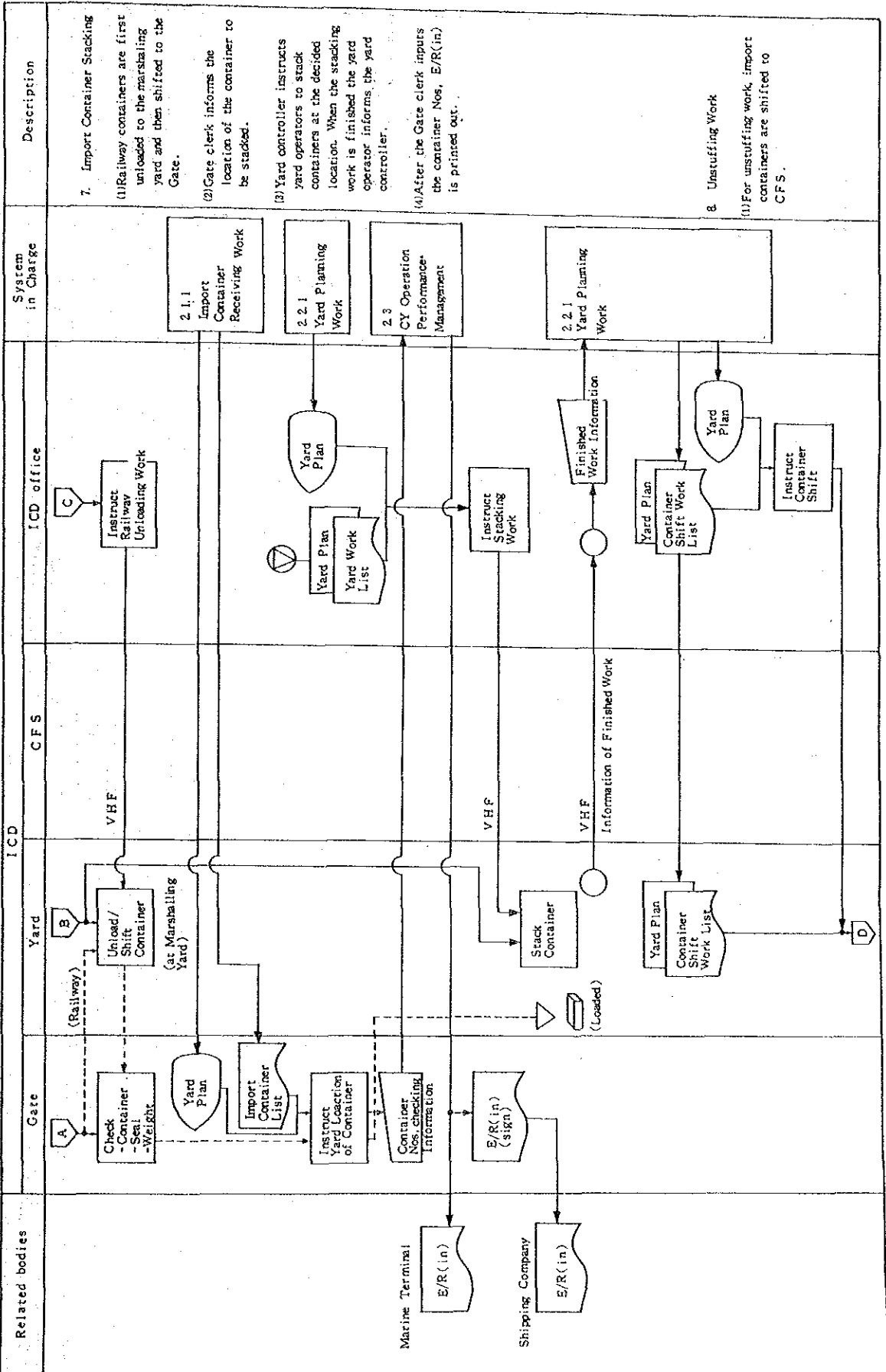


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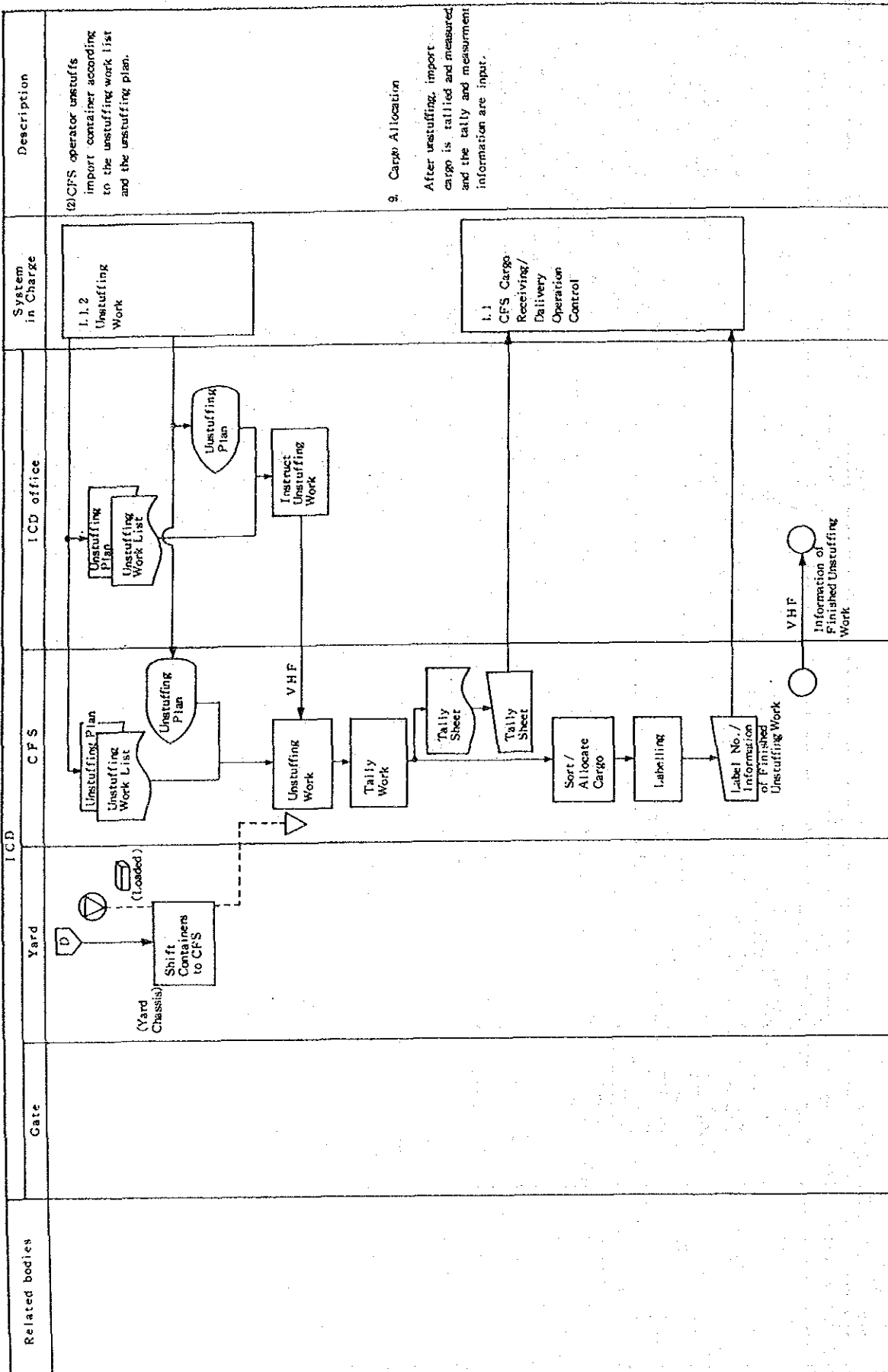
Import Computerized Operation



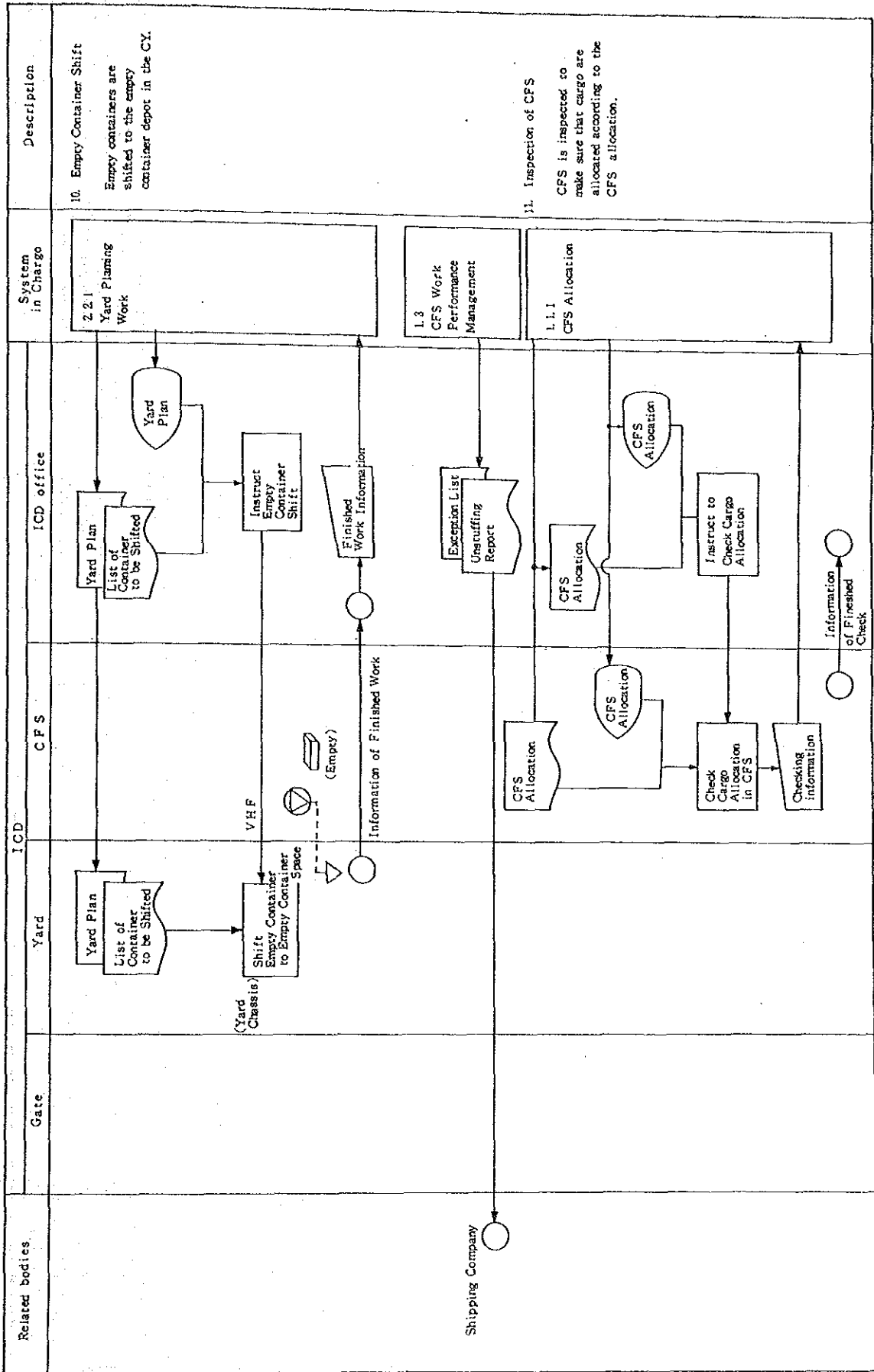
Import Computerized Operation



Import Computerized Operation



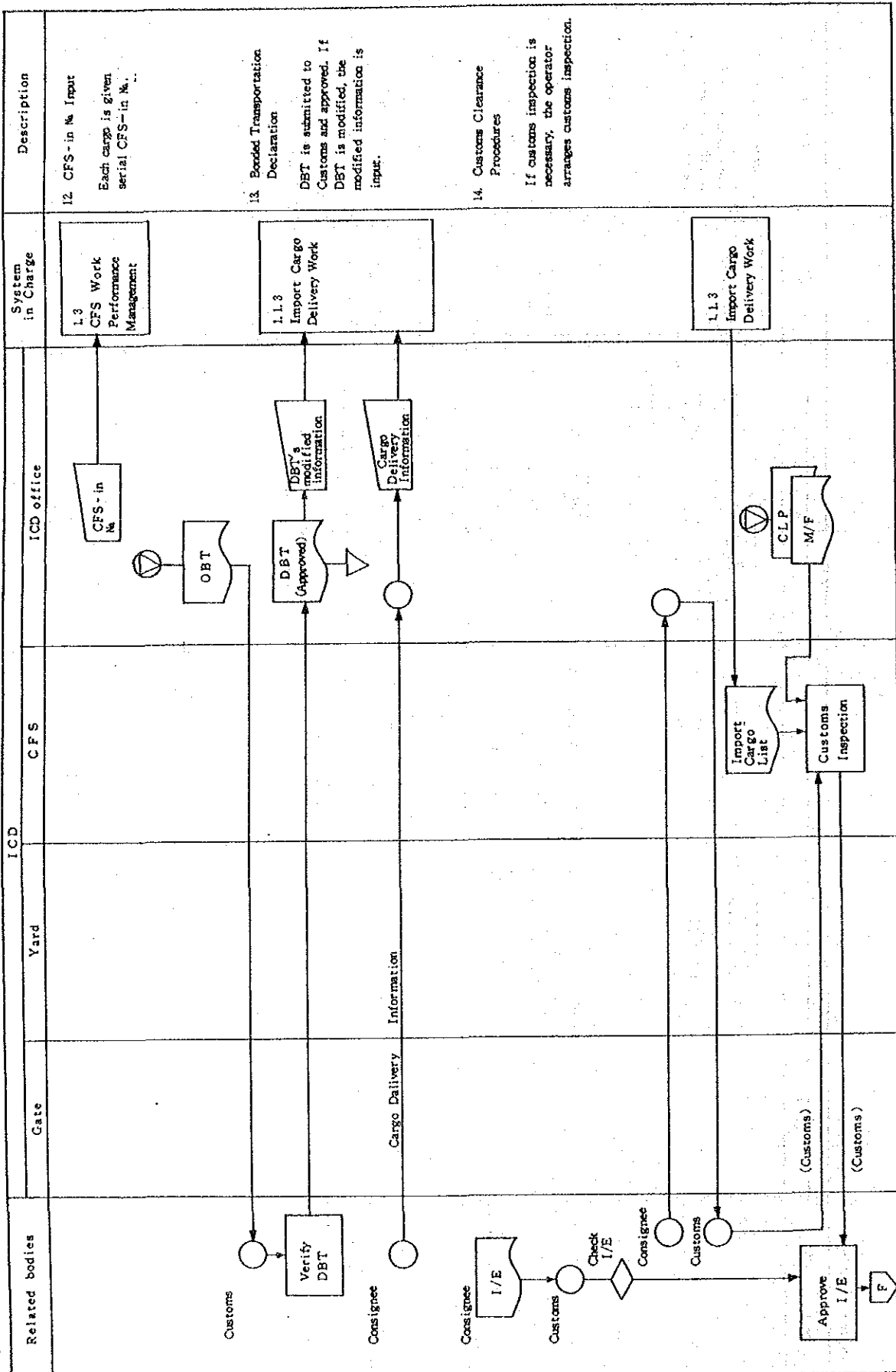
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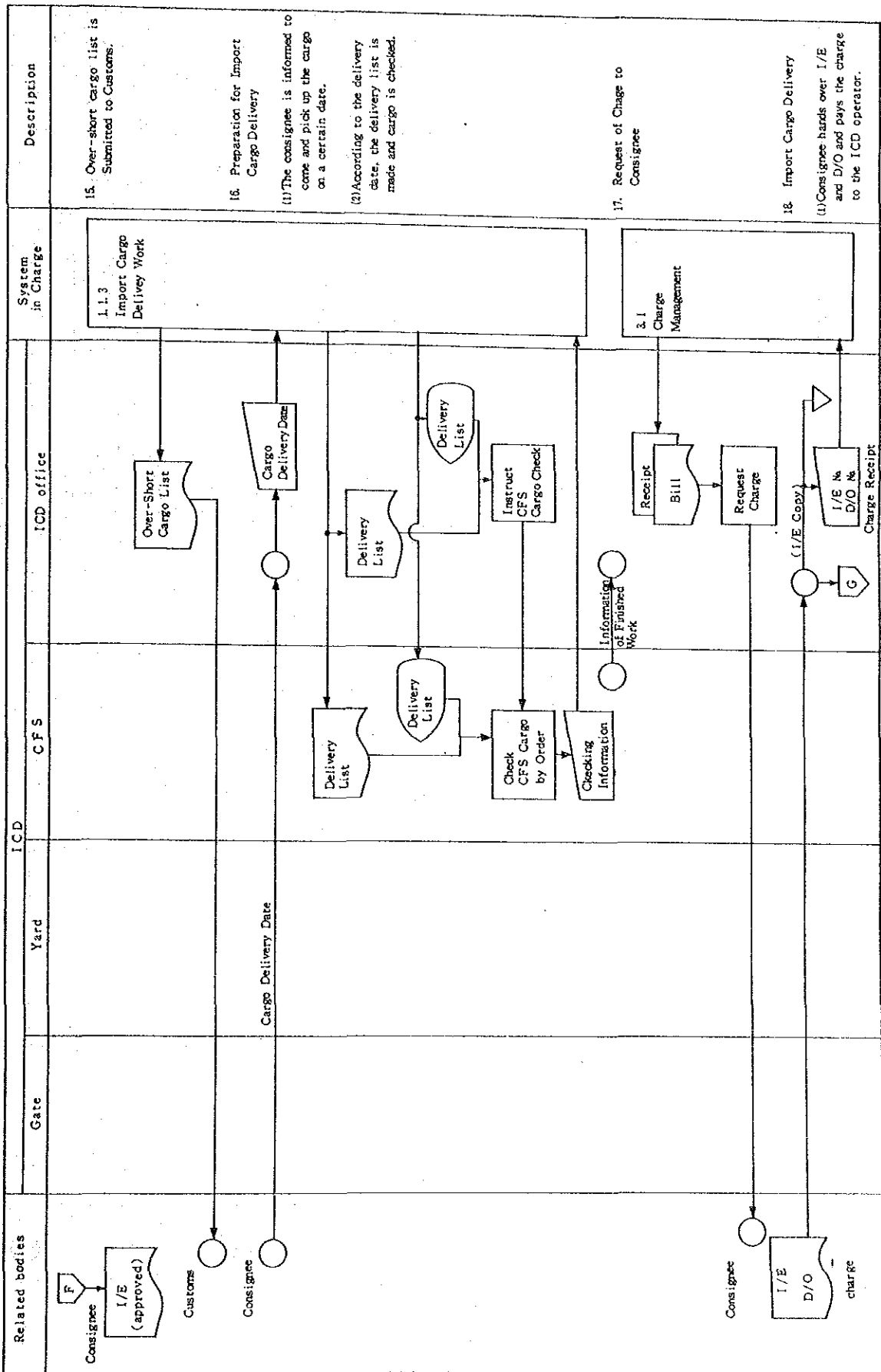
10. Empty Container Shift
Empty containers are shifted to the empty container depot in the CY.

11. Inspection of CFS
CFS is inspected to make sure that cargo are allocated according to the CFS allocation.

Import Computerized Operation

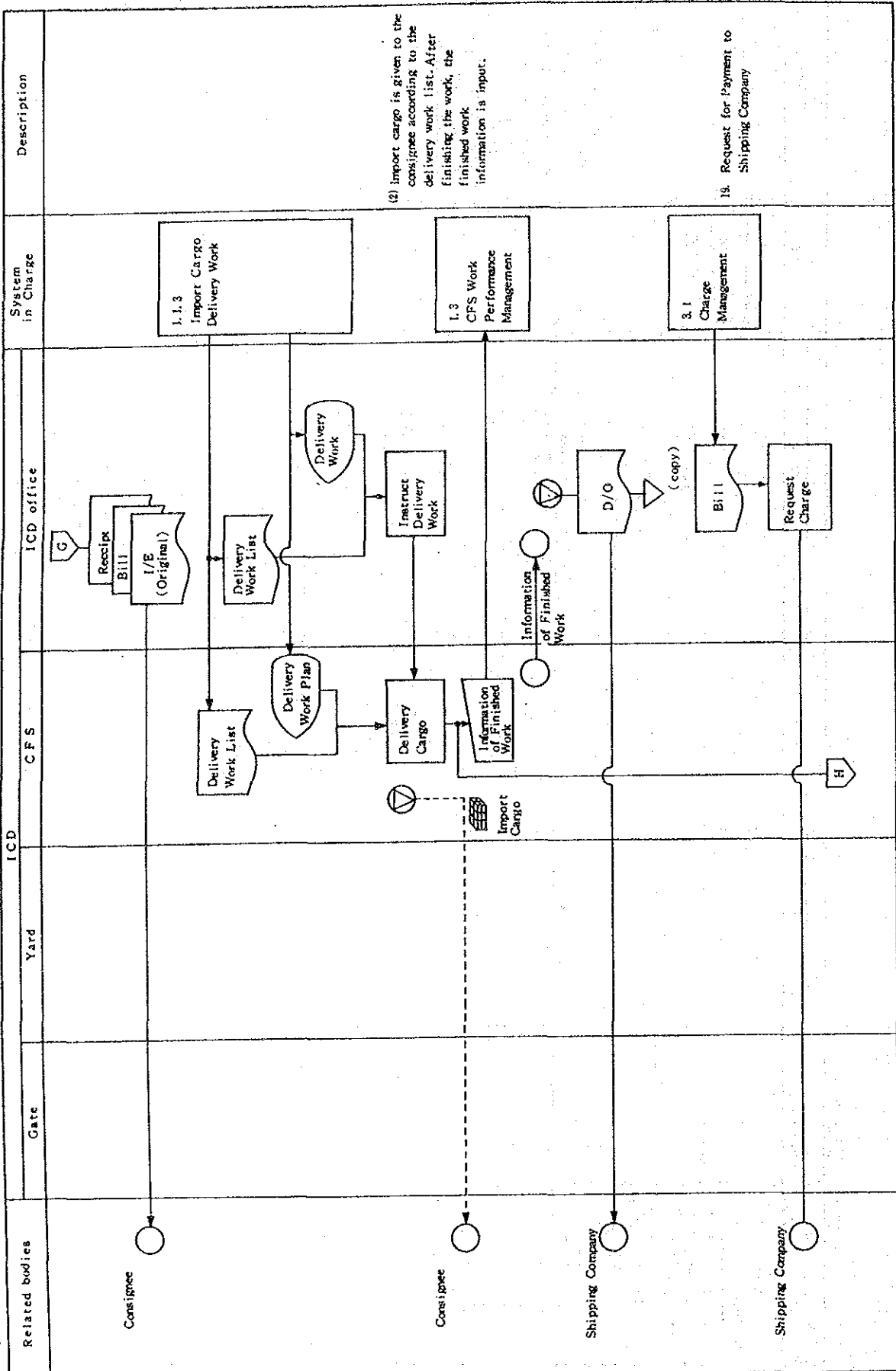


Import Computerized Operation



Import Computerized Operation

(9)



Import Computerized Operation

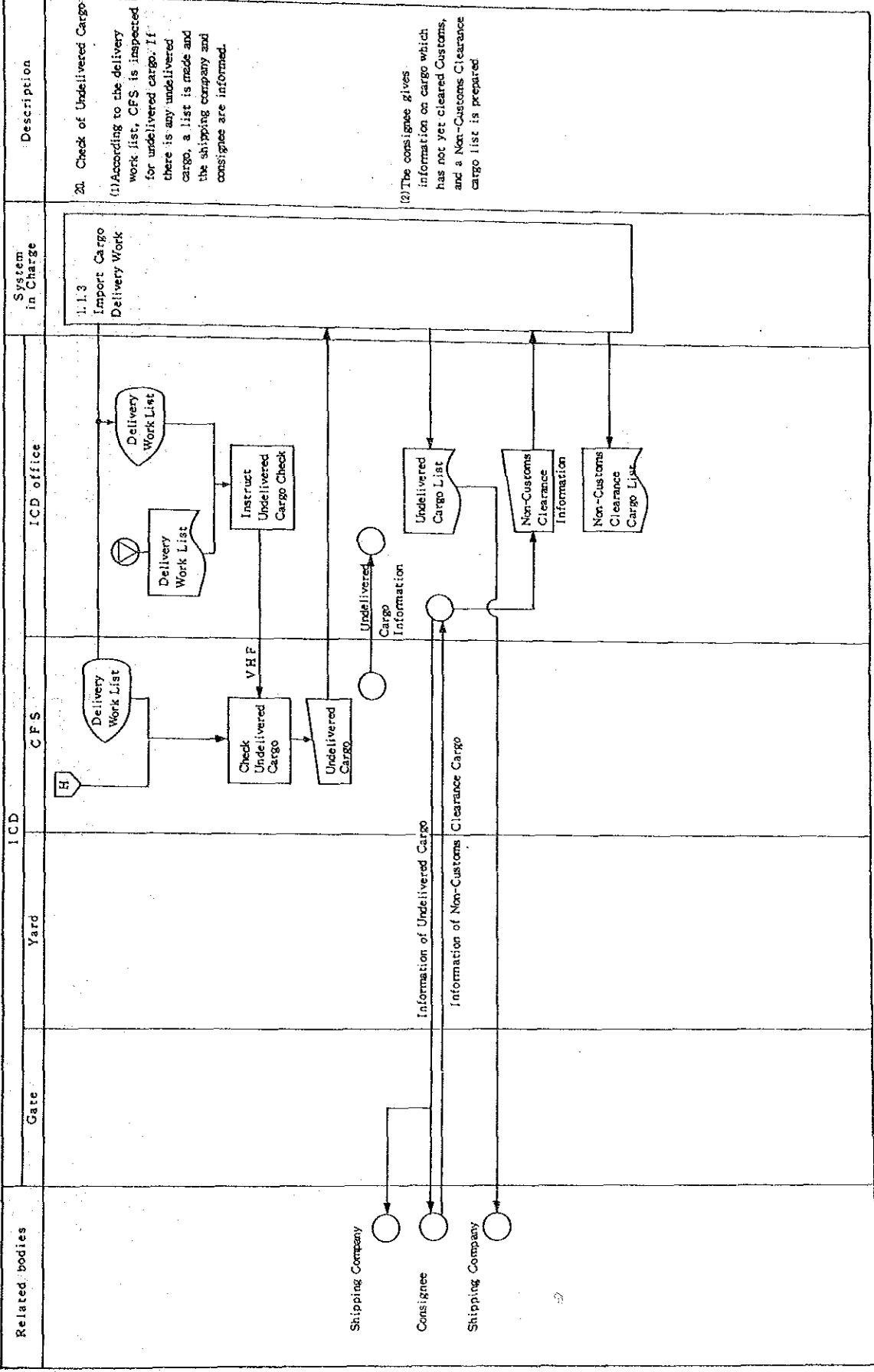
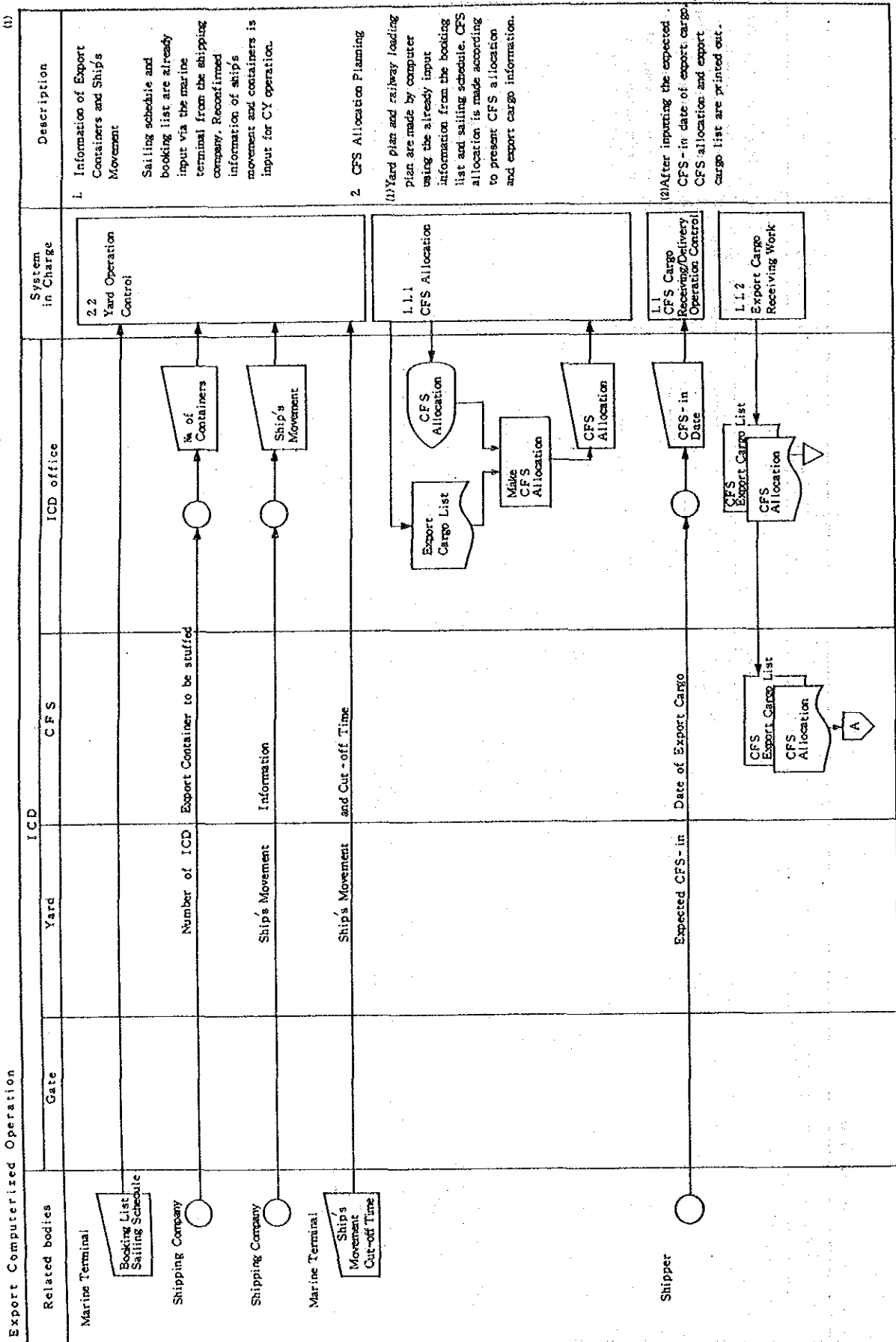
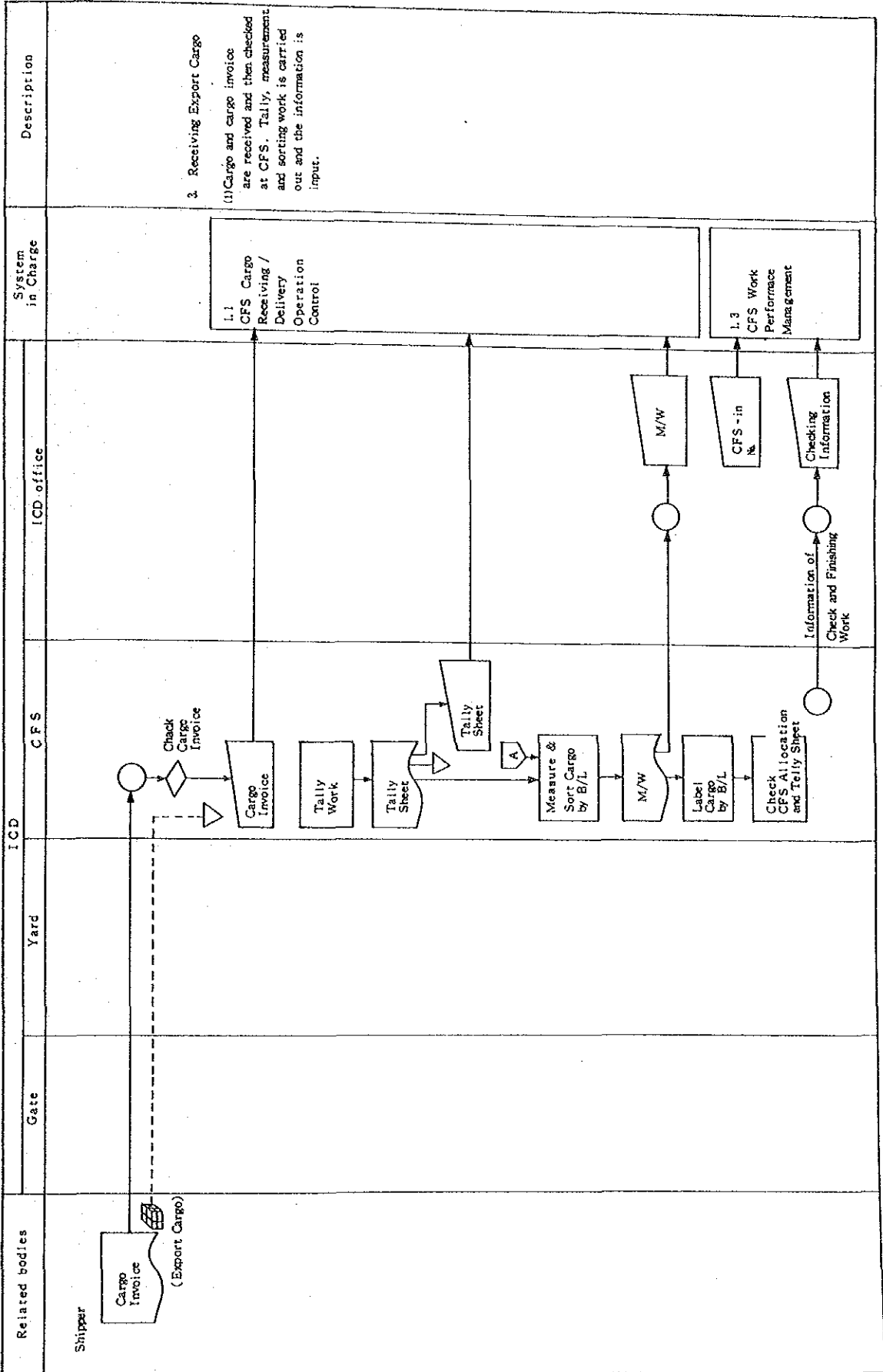


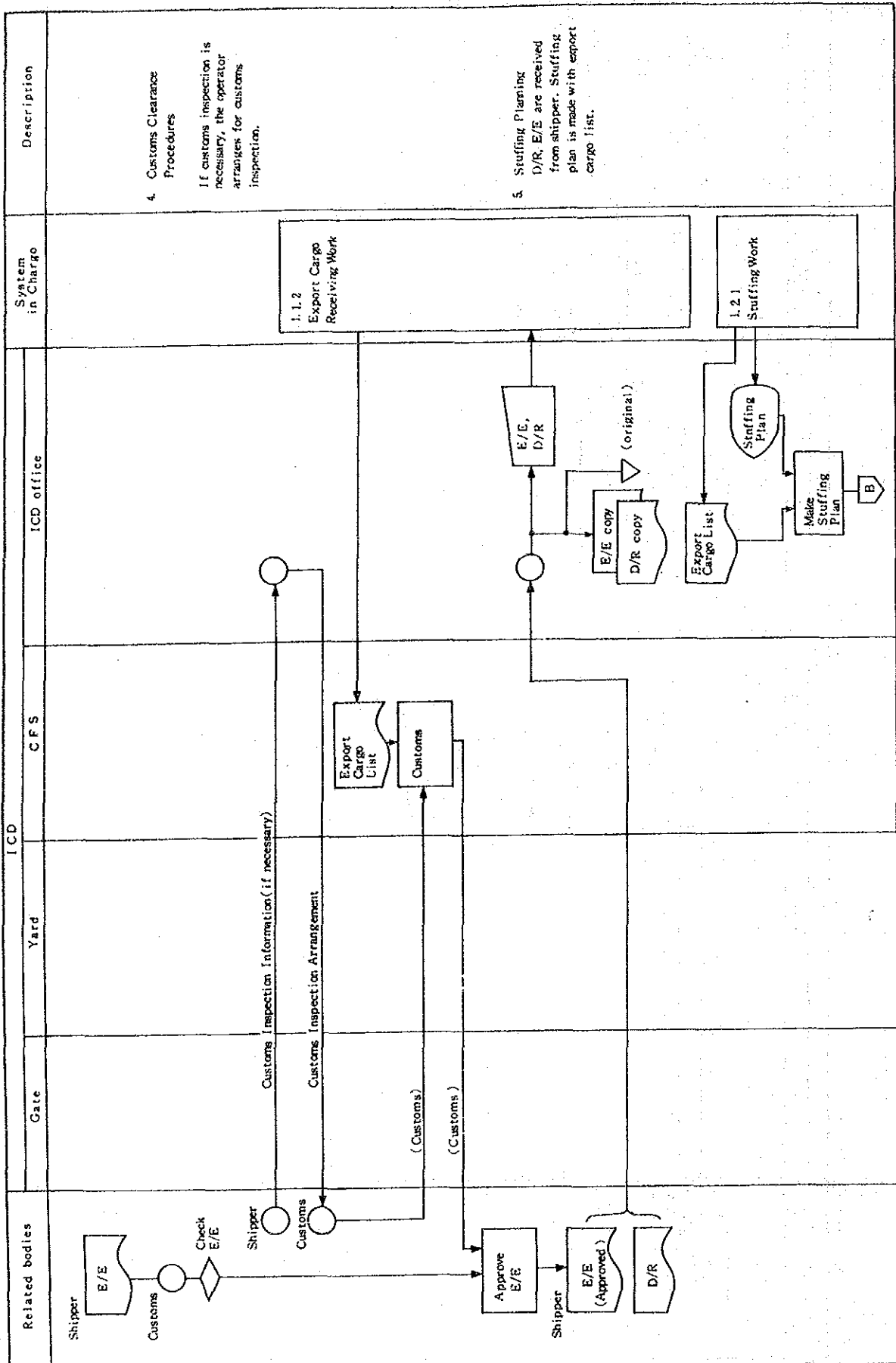
Fig. A.4.12 Export Computerized Operation



Export Computerized Operation

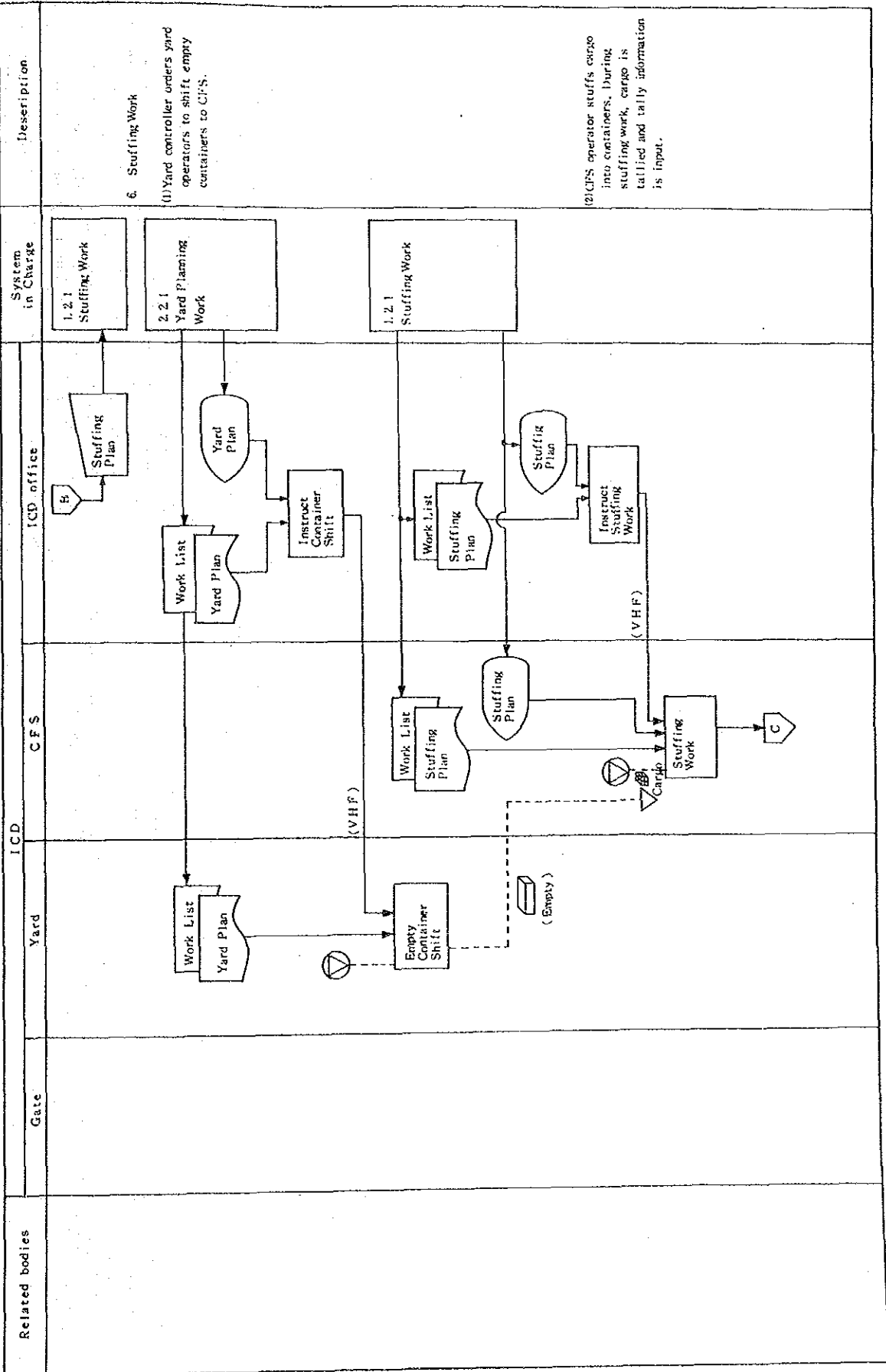


Export Computerized Operation

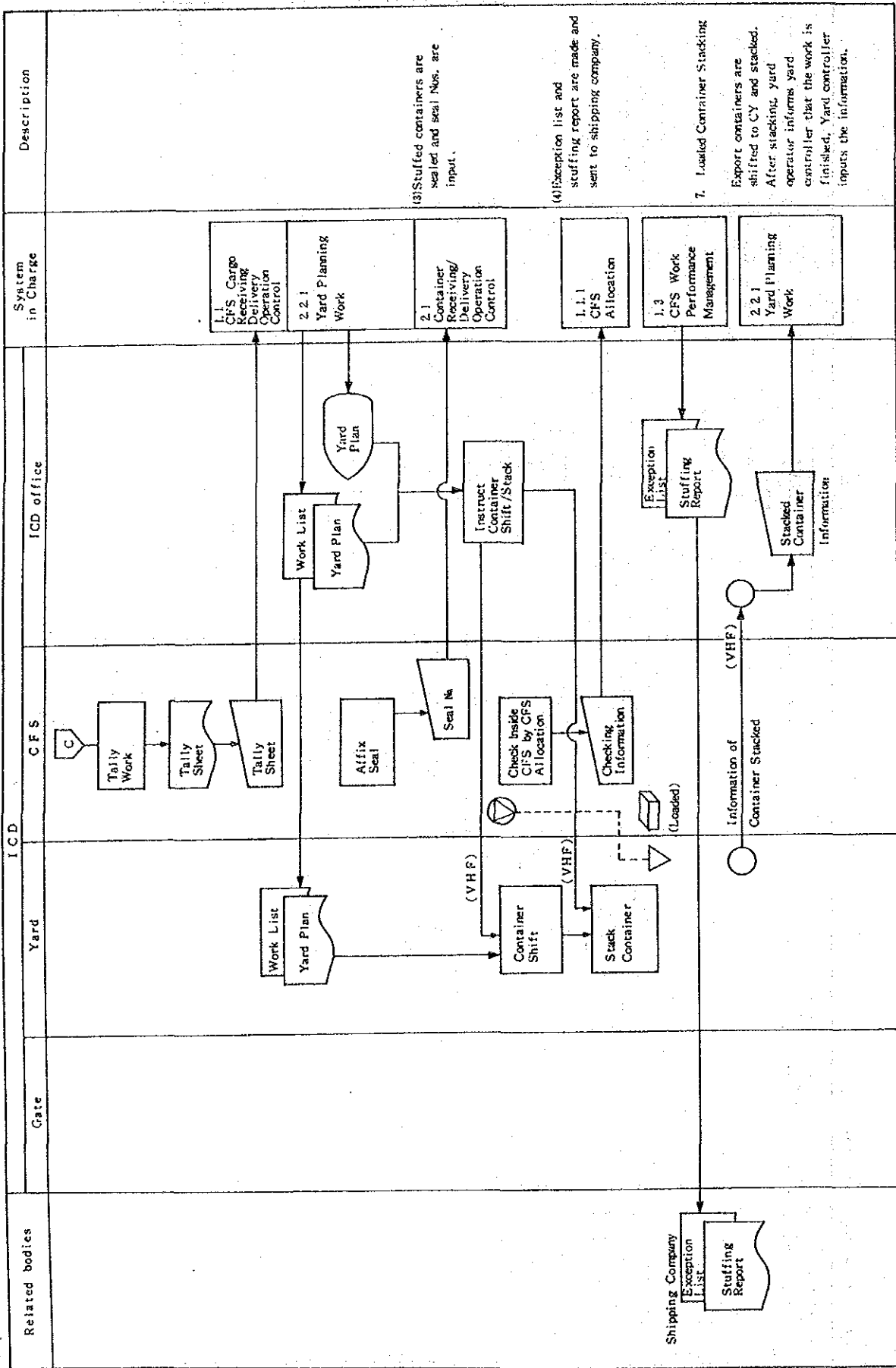


(4)

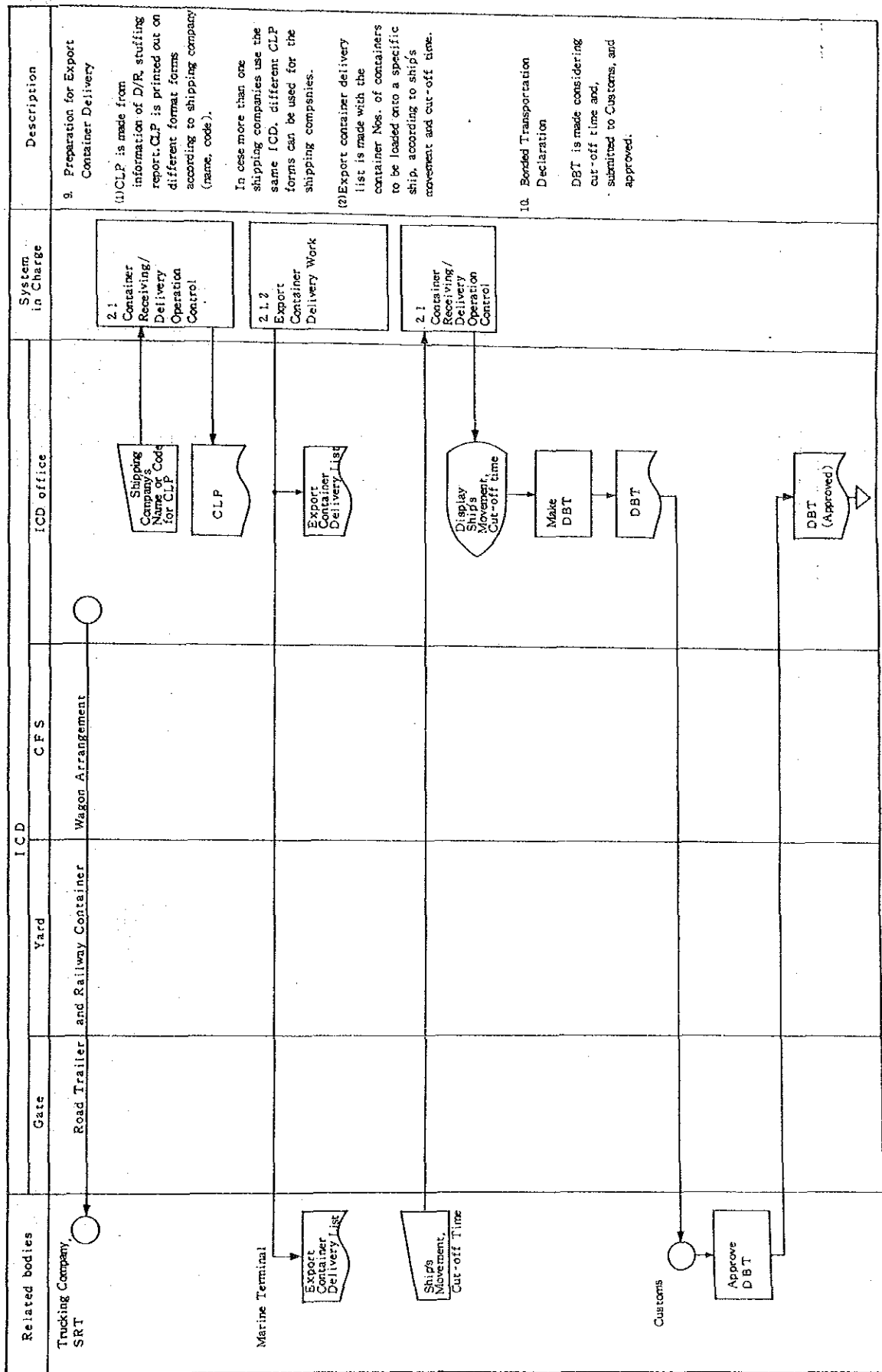
Export Computerized Operation



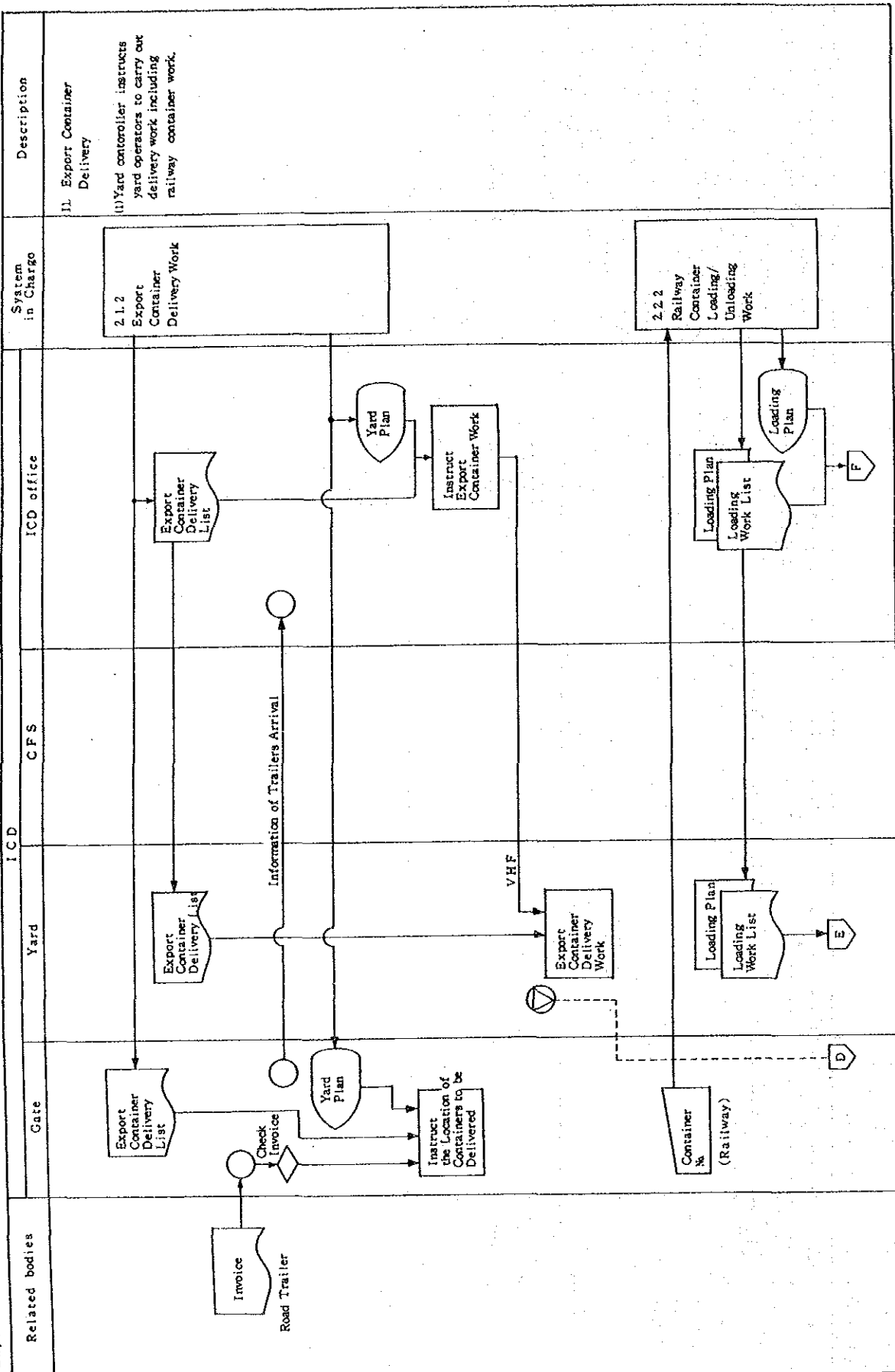
Export Computerized Operation



Export Computerized Operation



Export Computerized Operation



11. Export Container Delivery

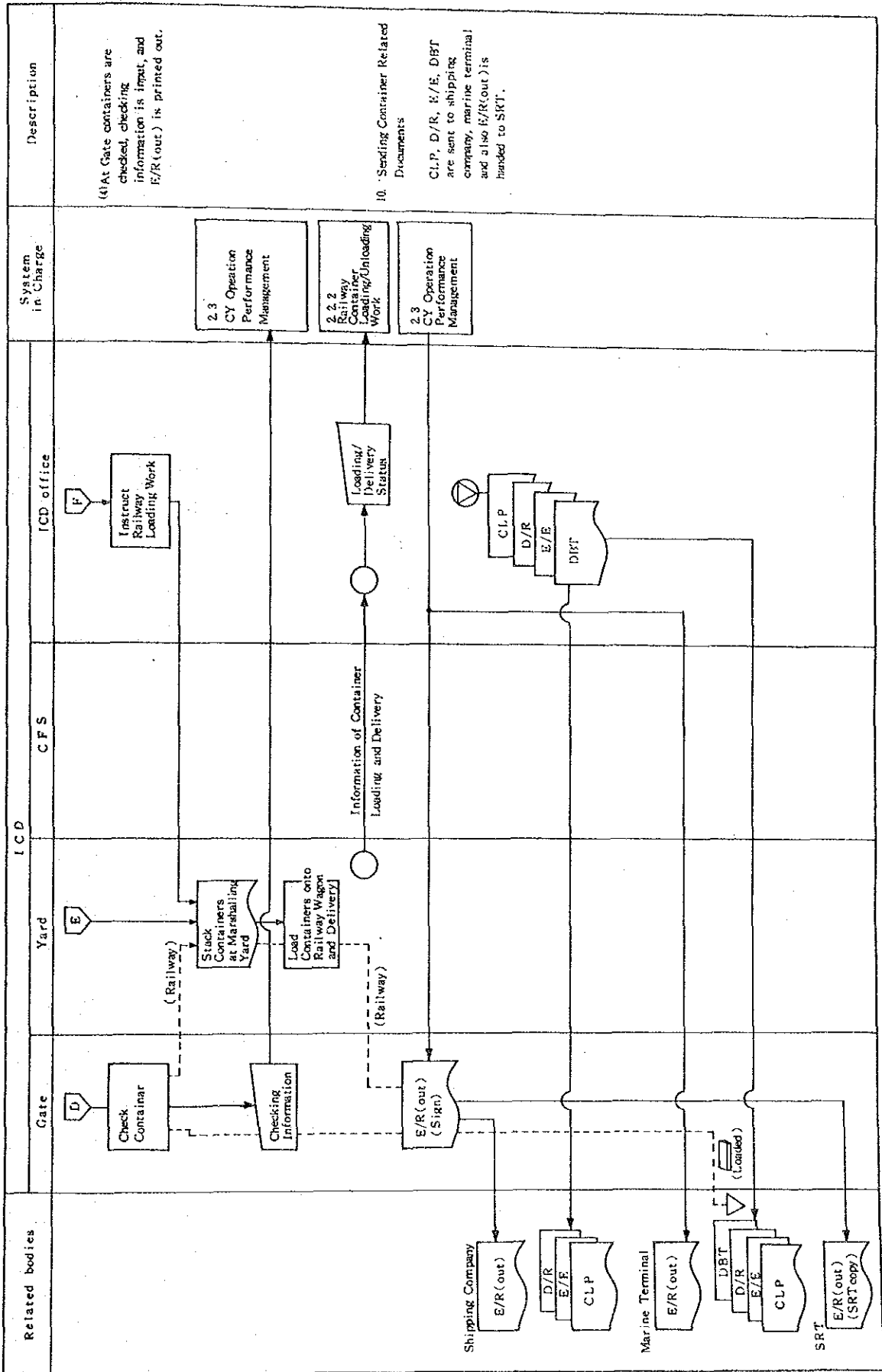
(1) Yard controller instructs yard operators to carry out delivery work including railway container work.

2.1.2 Export Container Delivery Work

2.2.2 Railway Container Loading/Unloading Work

Export Computerized Operation

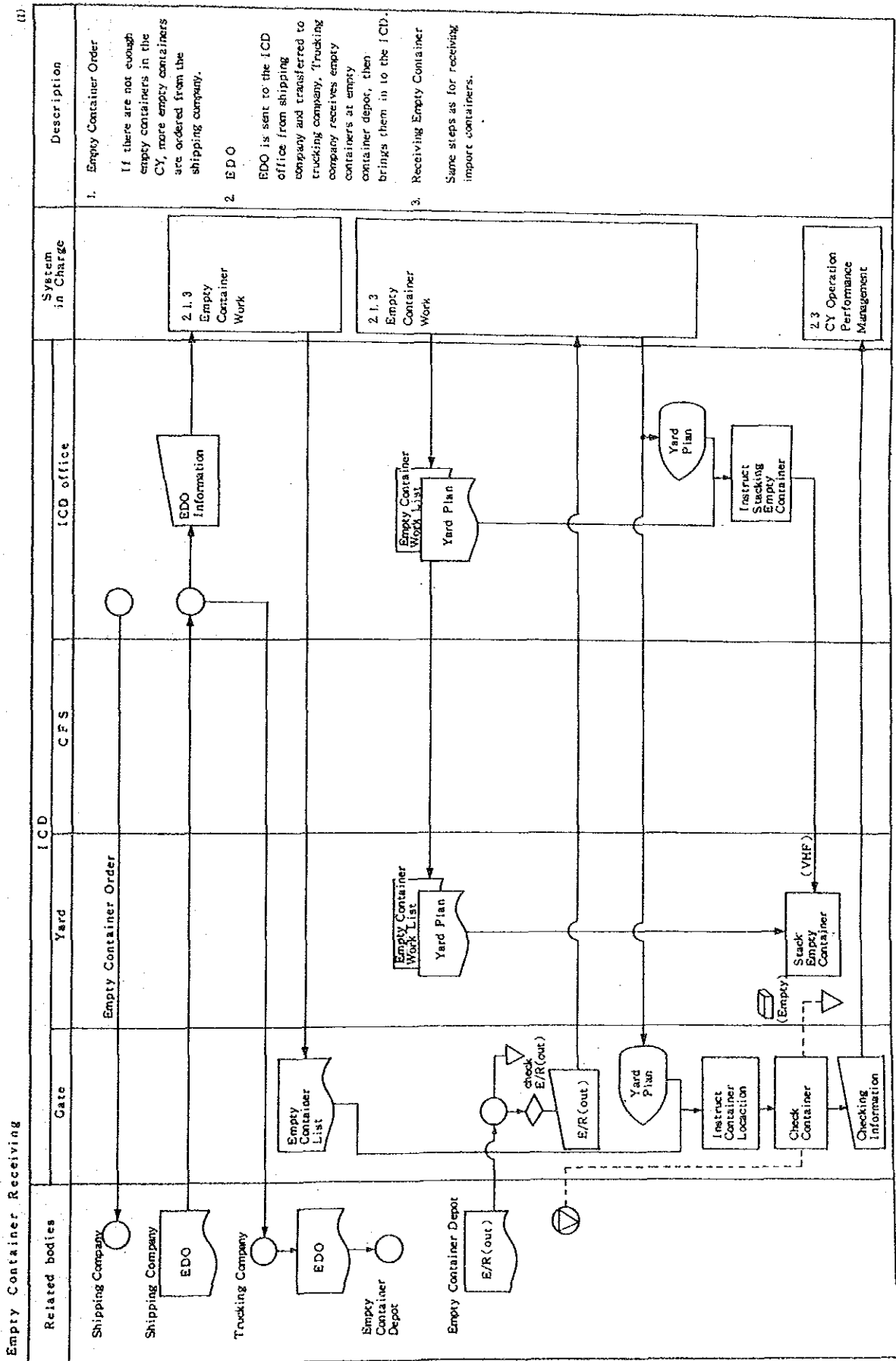
(8)



Export Computerized Operation (d)

Related bodies	Gate	ICD			Yard	CFS	ICD office	System in Charge	Description
<p>Shipper</p> <p>Shipping Company</p>							<p>3.1 Charge Management</p>	<p>11. Request Charge</p>	

Fig. A.4.13 Other Computerized Operation

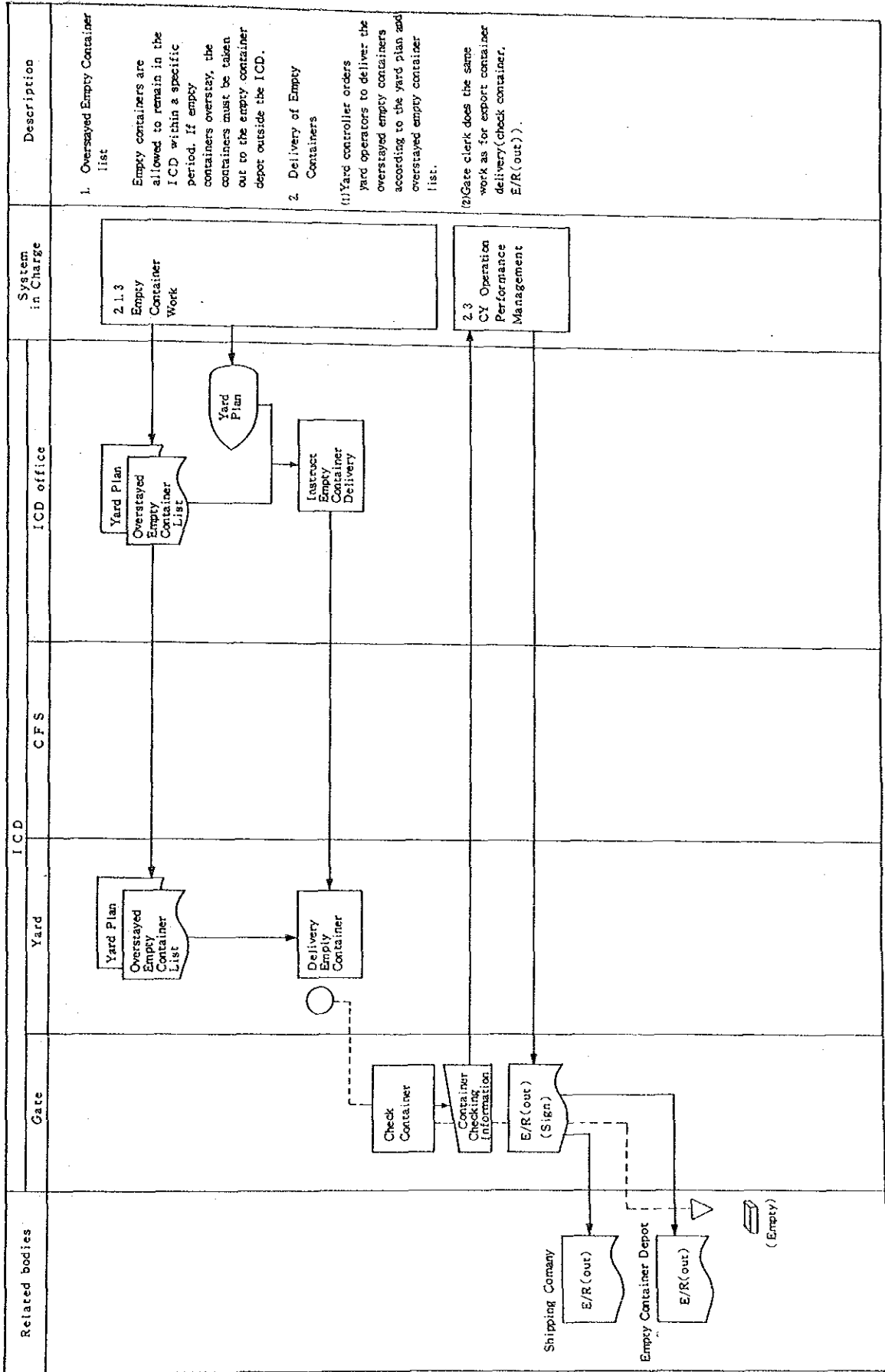


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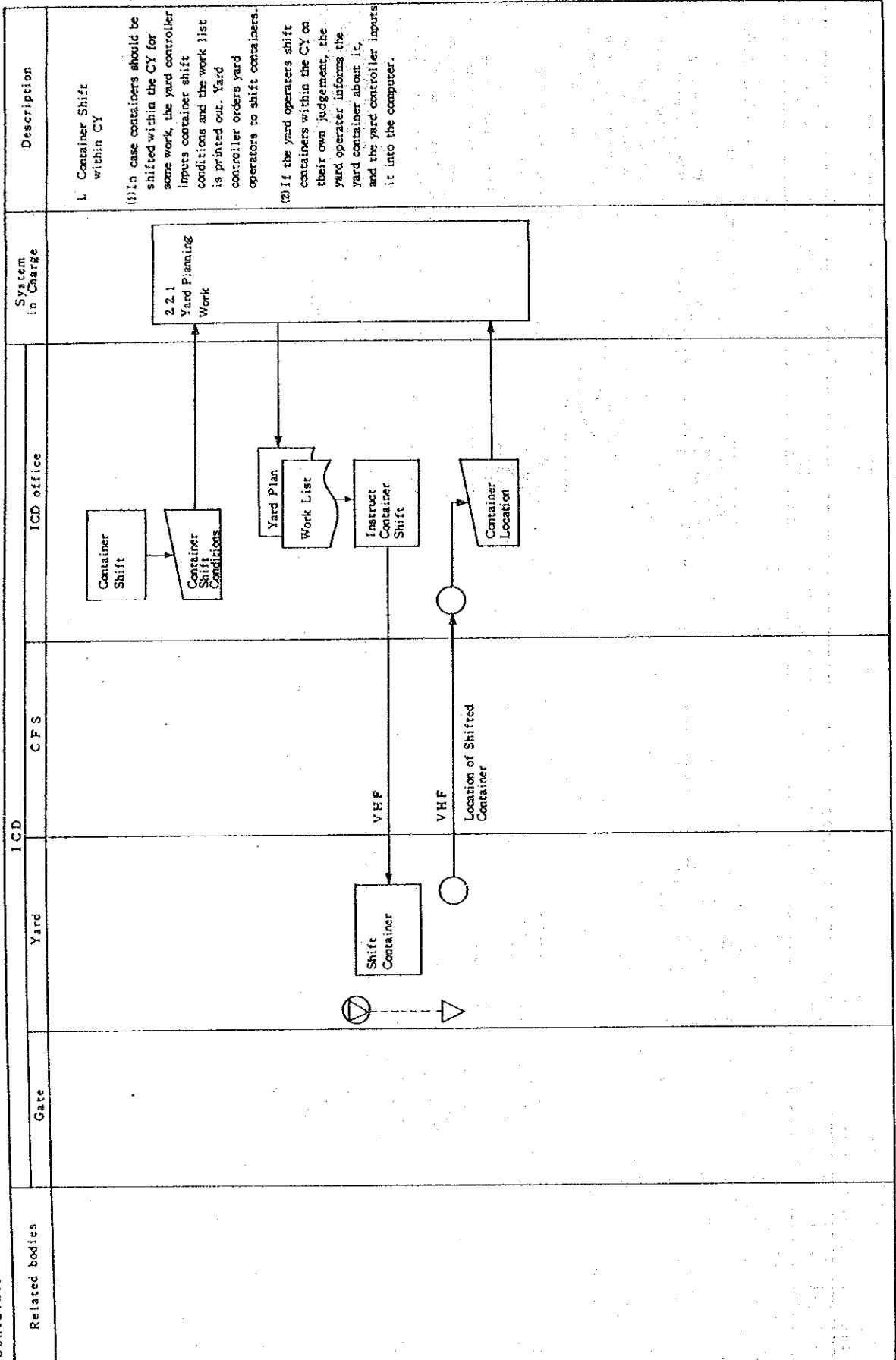
Empty Container Receiving					System in Charge	Description
Related bodies	Gate	Yard	ICD	ICD office		
<pre>graph TD; SC[Shipping Company] --> ER1[E/R (in)]; ECD[Empty Container Depot] --> ER2[E/R (in)]; ER1 --> G[Gate]; ER2 --> G; G --> ER3[E/R (in) (Sign)]; ER3 --> Y[Yard]; Y --> ICD; ICD --> CFS; CFS --> ICD_office[ICD office];</pre>					2.3 CY Operation Performance Management	

(1)

Empty Container Delivery



Container Shift Within CY



Appendix 5 Micro Forecast

(1) Exports

1) Rice

In Thailand's economic history, rice has been the principal crop, leading export and mainstay of the economy. However, since 1985 the Government of the Kingdom of Thailand has encouraged a shift from the production of rice to the production of other crops such as maize, beans and vegetables to avoid excessive rice production which would cause a reduction of the rice price. So a steep increase in rice production is not expected.

① Production

The Ministry of Agriculture & Co-operations estimates the target production volume of rice in 1991 as 21,370 thousand tons. Using this estimated volume, the annual growth rate of rice production is assumed to be 1.4%. In this study the growth rate of 1.4% is assumed to remain constant during the planning period.

② Consumption

The per capita consumption of rice is about 300 kg/capita, which has not changed for several years. So the per capita consumption is assumed not to change during the planning period. Using this estimated per capita consumption, the total future consumption of rice is forecast by multiplying the estimate by the projected population.

③ Exports

The estimated production, consumption and export volume of rice are shown in Table A.5.1.

Table A.5.1 Future Forecast of Rice Exports

		1991	1996	2001
A. Production	(1,000 tons)	21,370	22,930	24,580
B. Per Capita Consumption	(kg/capita)	300	300	300
C. Population	(Mil. persons)	57.20	61.09	65.24
D. Consumption (B*C)	(1,000 tons)	17,160	18,330	19,570
E. Exports (A-D)	(1,000 tons)	4,210	4,600	5,010

2) Maize

① Production

The Ministry of Agriculture & Co-operations estimates the target production volume of maize in 1991 as 4,880 thousand tons. Using this estimated volume, the annual growth rate of maize production is assumed to be 1.4%. In this study the growth rate of 1.4% is assumed to remain constant during the planning period.

② Exports

The export share of the production of maize is about 75%, and has not changed for several years. Assuming that this percentage will not change during the planning period, the export volume is forecast as shown in Table A.5.2.

Table A.5.2 Future Forecast of Maize Exports

		1991	1996	2001
A. Production	(1,000 tons)	4,880	5,230	5,610
B. Exports (A*C/100)	(1,000 tons)	3,660	3,920	4,210
C. B/A	(%)	75	75	75

3) Tapioca

A steep increase of tapioca production has occurred with the

conversion of forest to crop land. However, from the viewpoint of forest conservation, a further increase can not be expected.

Furthermore, under the tapioca trade agreement between Thailand and the ECC, tapioca exports to the ECC which account for about 70 or 80 percent of total tapioca exports will be limited.

Considering the above situation, the export volume of tapioca is assumed to remain at the present level. The forecast volume of tapioca exports is shown in Table A.5.3.

Table A.5.3 Future Forecast of Tapioca Exports

		1991	1996	2001
Tapioca (Pellets)	(1,000 tons)	6,120	6,120	6,120
Tapioca (Flour)	(1,000 tons)	430	430	430

4) Sugar and Molasses

Today the international sugar market is suffering from excessive supply. The Thai Government has decided to restrict sugar production. So a steep increase of sugar and molasses exports can not be expected.

Considering the annual trend in recent years, the future export volumes are estimated as shown in Table A.5.4.

Table A.5.4 Future Forecast of Sugar and Molasses Exports

		1991	1996	2001
Sugar	(1,000 tons)	2,200	2,200	2,200
Molasses	(1,000 tons)	830	830	830

5) Raw Rubber

The area under rubber cultivation totals roughly 10 million rai in Thailand, 95% in the South and the remaining 5% on the Eastern Seaboard. A programme has been initiated to start plantations in some Northeastern

provinces, including Nong Khai and Loei. It has produced encouraging results.

① Tappable Area

The tappable area by district is estimated based on interviews with MOAC staff as shown in Table A.5.5.

② Yield per Rai

Yield per rai rose from 60 kgs/rai in 1980 to 90 kgs/rai in 1986. Considering the annual trend in recent years, future yield is assumed as shown in Table A.5.5.

③ Production

The total future production of raw rubber is forecast by multiplying the tappable area by the yield per rai.

④ Consumption

Based on the actual consumption record, the future consumption is assumed as 100 thousand tons per year.

⑤ Exports

Future exports of raw rubber are estimated as shown in Table A.5.5.

Table A.5.5 Future Forecast of Raw Rubber Exports

		1991	1996	2001
A. Tappable Area	(1,000 rai)	9,710	10,580	11,490
Southern		(9,030)	(9,520)	(10,000)
Eastern		(580)	(740)	(920)
Northeastern		(100)	(320)	(570)
B. Yield per Rai	(kgs/rai)	114	120	120
C. Production (A*B/100)	(1,000 tons)	1,110	1,270	1,380
D. Consumption	(1,000 tons)	100	100	100
E. Exports (C-D)	(1,000 tons)	1,010	1,170	1,280

6) Other Agricultural Products

The export volume of other agricultural products is estimated considering the annual trend in recent years. The estimated volume is shown in Table A.5.6.

Table A.5.6 Future Forecast of Other Agricultural Products Exports

		1991	1996	2001
Exports	(1,000 tons)	1,156	1,309	1,473

7) Wood Products

The Government of the Kingdom of Thailand decided to prohibit log exports in 1977 for the purpose of forest conservation, and has been promoting processed wood exports. On the other hand, the export of the rubber wood is increasing.

Considering this situation, the export volume of wood products is assumed as shown in Table A.5.7.

Table A.5.7 Future Forecast of Wood Products Exports

		1991	1996	2001
Exports	(1,000 tons)	160	160	160

8) Marine Products

Exports of marine products are increasing by the expansion of the cultivation of shrimps and prawns, and it is assumed that this trend will continue during the planning period.

Considering the annual trend in recent years, future exports of marine products are estimated as shown in Table A.5.8.

Table A.5.8 Future Forecast of Marine Products Exports

	1991	1996	2001
Exports (1,000 tons)	330	440	550

9) Mining Products

Considering the annual trend in recent years, reserves of mining products, the National Development Plan and interviews with trading companies, the future export volume of mining products is estimated as shown in Table A.5.9.

Table A.5.9 Future Forecast of Mining Products Exports

	1991	1996	2001
Exports (1,000 tons)	3,440	3,800	4,300

10) Industrial Products

The future export volume of industrial products is forecast for two groups. One is the exports from Industrial Estates/Parks and the other is from the other areas.

① Industrial Estates/Parks

The operating area of Industrial Estates/Parks in 1987 is about 2,000 rai and the future operating area by district is forecast as shown in Table A.5.10 based on BOI applications and other information.

Exports from the Industrial Estates/Parks are assumed as 167 thousand tons per year based on the interview survey. Considering that the percentage of export promotion firms in the Industrial Estates/Parks will increase in the future, the future export volume from the Industrial Estates/Parks is estimated as shown in Table A.5.11.

② Other Areas

In the future, a steep increase of exports from other areas can not be expected because of the preparation of the Industrial Estates/Parks. So the future export volume from other areas is assumed based on the annual trend in recent years.

③ Exports

The future export volume of industrial products is forecast as shown in Table A.5.11.

Table A.5.10 Industrial Estates/Parks

Unit: rai

	1987	1991	1996	2001
BMA	984	1,736	2,136	2,346
Central	982	7,380	12,610	14,890
Eastern	0	830	2,650	3,600
Northern	0	350	930	1,160
Northeastern	0	80	300	380
Southern	0	120	480	600
Total	1,966	10,496	19,106	22,976

Source: IEAT, BOI

Table A.5.11 Future Forecast of Industrial Products Exports

Unit: 1,000 tons

	1987	1991	1996	2001
Industrial Estates/Parks	167	1,840	3,170	3,840
Other Areas	2,909	3,880	5,090	6,300
Total	3,076	5,720	8,260	10,140

(2) Imports

1) Iron & Steel

① Steel Consumption per Capita

Steel Consumption per capita in the future is estimated based on the correlation between GNP per capita and steel consumption per capita which is prepared using other countries' data.

② Consumption

Using the above estimated per capita steel consumption, the total future consumption of steel is forecast by multiplying the estimate by the projected population.

③ Production

The capacity of crude steel production is about 900 thousand tons. Assuming that the capacity will not change and the operating ratio will be 80% in the future, the future annual production of crude steel is estimated as 720 thousand tons.

④ Imports of Scrap

Steel scrap used for crude steel production almost completely depends on imports at present. Assuming that this situation will not change, the

import volume of scrap is estimated as shown in Table A.5.12.

⑤ Total Steel Imports

The future import volume of steel is estimated as shown in Table A.5.12.

Table A.5.12 Future Forecast of Steel Imports

	1991	1996	2001
A. Steel Consumption per Capita (kg/capita)	53	63	76
B. Population (Mil.persons)	57.20	61.09	65.24
C. Consumption (A*B) (1,000 tons)	3,030	3,850	4,960
D. Production (1,000 tons)	720	720	720
E. Imports of Scrap (1,000 tons)	800	800	800
F. Exports (1,000 tons)	570	859	1,068
G. Imports ((C-D)/1.3 + E + F) (1,000 tons)	3,150	4,070	5,130

Note) 1.3 is the conversion coefficient from crude steel volume to steel product volume

2) Chemical Products

Considering the annual trend in recent years, the production program of the Map Ta Put project and future economic factors, the future import volume of chemical products is estimated as shown in Table A.5.13.

Table A.5.13 Future Forecast of Chemical Products Imports

	1991	1996	2001
Imports (1,000 tons)	2,390	3,330	4,310

3) Wood Products

The policy of the Government of the Kingdom of Thailand encourages self-sufficiency in wood products. Considering this policy and the recent trend of imports, the import volume of wood products is estimated as shown in Table A.5.14.

Table A.5.14 Future Forecast of Wood Products Imports

	1991	1996	2001
Imports (1,000 tons)	520	520	520

4) Pulp and Paper

① Paper Consumption per Capita

Paper consumption per capita in the future is estimated based on the correlation between GNP per capita and paper consumption per capita which is prepared using other countries' data.

② Paper Consumption

Using the above estimated per capita paper consumption, the total future consumption of paper is forecast by multiplying the estimate by the projected population.

③ Pulp and Paper Production

Considering the present capacity, the present working ratio, BOI applications and other information, pulp and paper production in the future are estimated as shown in Table A.5.15.

④ Collection Ratio of Waste Paper

Considering the present ratio in Thailand and the annual trend of the ratio in Japan, the collection ratio of waste paper is estimated as shown in Table A.5.15.

⑤ Imports of Pulp and Paper

The future import volumes of pulp and paper are forecast as shown in Table A.5.15.

Paper Imports = Paper Consumption - Paper Production + Paper Exports

Pulp Imports = (Paper Production * 0.5/0.9 - Pulp Production
+ Pulp Exports) + (Paper Production * 0.5/0.75
- Collection Volume of Waste Paper)

Note-1) The contribution ratios of both pulp and waste paper to paper production are 50%.

Note-2) 0.9 and 0.75 are conversion coefficients to paper volume.

Table A.5.15 Future Forecast of Pulp and Paper Imports

	1991	1996	2001
A. Paper Consumption per Capita (kg/capita)	14	18	21
B. Population (Mil.persons)	57.20	61.09	65.24
C. Paper Consumption (A*B) (1,000 tons)	800	1,100	1,370
D. Paper Production (1,000 tons)	700	800	900
E. Pulp Production (1,000 tons)	350	400	450
F. Collection Ratio of Waste Paper (%)	30	35	40
G. Collection Volume of Waste Paper (C * E / 100) (1,000 tons)	240	390	550
H. Imports of Paper (1,000 tons)	250	530	760
I. Imports of Pulp (1,000 tons)	450	380	330

Note) H = C - D + Paper Exports

I = (D * 0.5 / 0.9 - E + Pulp Exports) + (D * 0.5/ 0.75 - G)

5) Fertilizer

① Cultivated Land

The cultivated land in 1985 is about 120 mil. rai and the future cultivated land is forecast as shown in Table A.5.16 considering the annual trend in recent years.

② Consumption per Rai

Fertilizer consumption per rai rose from 7 kg/rai in 1978 to 11 kg/rai in 1985. Considering the annual trend in recent years, future consumption per rai is assumed as shown in Table A.5.16.

③ Imports

At present Thailand has no fertilizer production plant and the planned project at Map Ta Put has been cancelled. So fertilizer consumption will continue to depend on imports during the planning period. The import volume of fertilizer is estimated as shown in Table A.5.16.

Table A.5.16 Future Forecast of Fertilizer Imports

	1991	1996	2001
A. Cultivated Land (Mil.rais)	128.21	136.06	143.91
B. Consumption per Rai (kg/rai)	14.7	17.6	20.6
C. Imports (A*B) (= Consumption) (1,000 tons)	1,880	2,390	2,960

6) Industrial Materials

The volume of industrial materials is forecast as shown in Table A.5.17 using the relation between import volume and export volume.

Table A.5.17 Future Forecast of Industrial Materials Imports

	1991	1996	2001
Imports (1,000 tons)	1,460	2,245	2,820

7) Other Imports

Other imports is forecast based on the annual trends in recent 5-10 years and interviews with trading companies. Table A.5.18 shows the future forecast of other imports.

Table A.5.18 Future Forecast of Other Imports

	1991	1996	2001
Imports (1,000 tons)	1,920	2,050	2,180

Appendix 6 Share at Laem Chabang Port and O/D of Container Cargo by Mode

(1) Share of Laem Chabang Port for O/D of Container Cargo Except Central (East) and Eastern Areas

Considering the container handling capacity of Bangkok Port is 720,000 TEUs/year, the container cargo volumes handled at Laem Chabang Port are 638,000 TEUs/year and 953,000 TEUs/year in 1996 and 2001. The share of Laem Chabang Port for the O/D of container cargo except the Central (East) and Eastern areas are shown in Table A.6.1 as 34.6% and 45.6% for export and import in 1996, and 46.0% and 55.9% for export and import in 2001.

(2) O/D of Container Cargo handled at Laem Chabang Port by Mode

Fig. A. 6.1 shows the flow of container cargo handled at the ICD and Laem Chabang Port. Assuming a portion of container cargo is directly transported to/from Laem Chabang Port by railway and coastal shipping, the volumes are calculated based on the O/D of LCL and FCL cargo. The railway ratios are 1% for the Central (North and West), 4% for the Northern and Northeastern areas and 25% for the Southern area. The results of the calculation are shown in Table A.6.2.

Table A.6.1 Share at Laem Chabang Port

<1996>

Unit: TEUs

Export/ Import	Total Volume	Bangkok Port	Laem Chabang Port			Share of Laem Chabang Port except Central (E) & Eastern Area (%)
			Total	Central (East) & Eastern	Other Area	
Export	714,000	378,600	335,400	135,400	200,000	34.6
Import	644,000	341,400	302,600	60,800	241,800	45.6 22.0
Loaded	492,500	261,100	231,400	12,200	219,200	
Empty	151,500	80,300	71,200	48,600	22,600	
Total	1,358,000	720,000	638,000	196,200	441,800	

<2001>

Unit: TEUs

Export/ Import	Total Volume	Bangkok Port	Laem Chabang Port			Share of Laem Chabang Port except Central (E) & Eastern Area (%)
			Total	Central (East) & Eastern	Other Area	
Export	871,300	375,100	496,200	176,100	320,100	46.0
Import	801,300	344,900	456,400	58,100	398,300	55.9 33.7
Loaded	682,100	293,700	388,400	16,100	372,300	
Empty	119,200	51,200	68,000	42,000	26,000	
Total	1,672,600	720,000	952,600	234,200	718,400	

Note: Newly manufactured container boxes in Thailand are assumed to total 70,000 TEUs in 1996 and 2001.

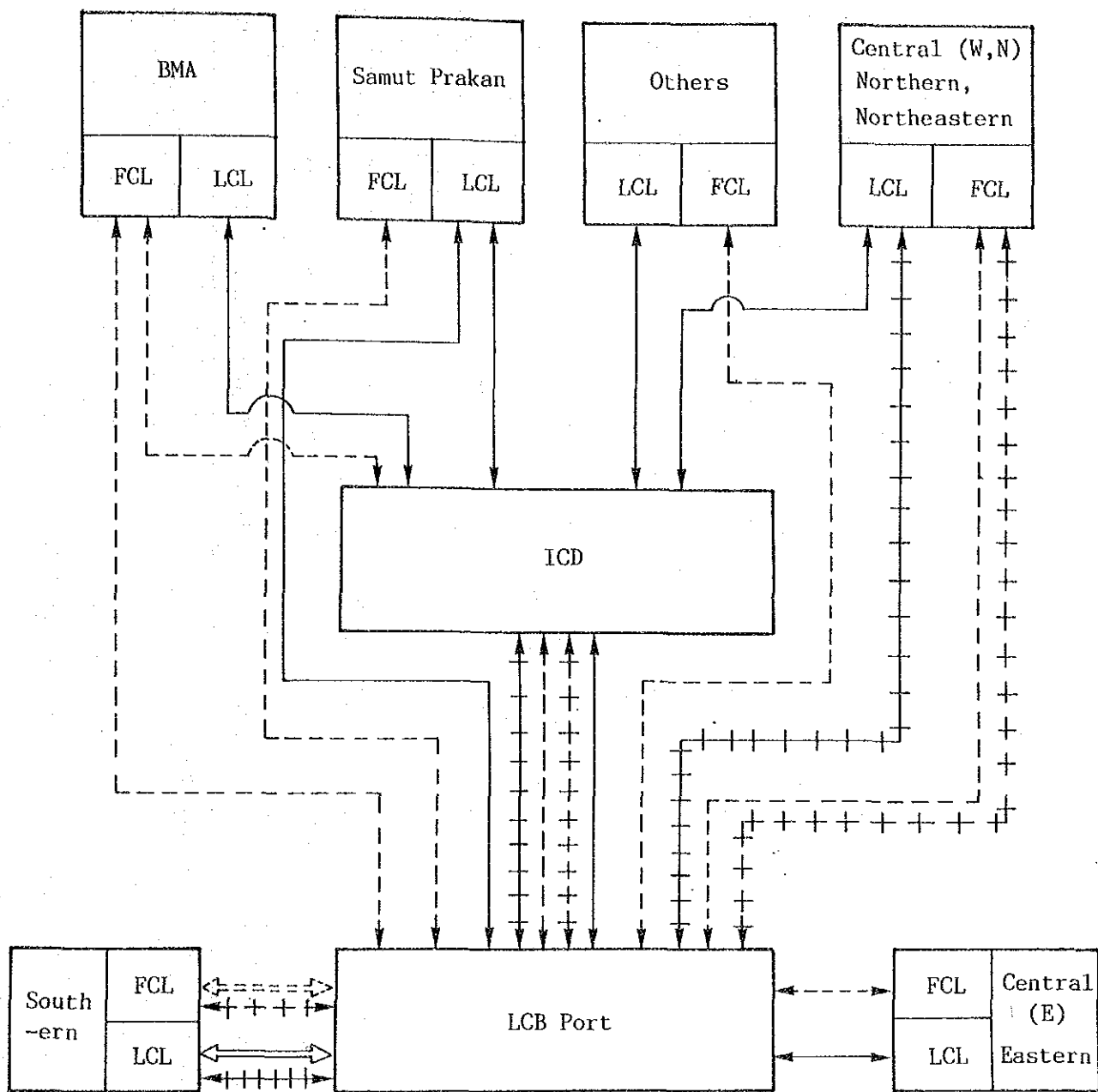


Fig. A.6.1 Flow Chart of Container Cargo

Table A.6.2 (1) O/D of Container Cargo handled at Laem Chabang Port by Mode

<Export>

(Unit: tons)

Year	LCL/FCL Mode	Bangkok	Central						Eastern	Northern	North eastern	Southern	Total
			Samut Prakan	Nontaburi Pathumtani	Samut Sakhon	North	West	East					
1996	LCL	78,400	60,800	61,700	24,600	34,200	6,800	25,300	115,600	29,500	8,700	16,900	462,500
	H.W.	78,400	60,800	61,700	24,600	33,900	6,700	25,300	115,600	28,300	8,400	4,200	443,700
	R.W.					300	100			1,200	300		6,100
	C.S.											12,700	12,700
1996	FCL	453,700	400,800	298,200	175,900	226,500	64,400	409,700	1,074,400	219,800	113,700	125,900	3,563,000
	H.W.	453,700	400,800	298,200	175,900	224,200	63,800	409,700	1,074,400	211,000	109,200	31,500	3,420,900
	R.W.					2,300	600			8,800	4,500	94,400	47,700
	C.S.												94,400
	Total	532,100	461,600	359,900	200,500	260,700	71,200	435,000	1,190,000	249,300	122,400	142,800	4,025,500
2001	LCL	114,900	104,300	98,100	41,700	56,700	11,500	34,900	156,700	47,400	14,100	27,400	707,700
	H.W.	114,900	104,300	98,100	41,700	56,100	11,400	34,900	156,700	45,500	13,500	6,900	677,100
	R.W.					600	100			1,900	600		10,100
	C.S.											20,500	20,500
2001	FCL	666,100	669,800	466,400	300,400	368,800	109,600	519,100	1,402,300	351,400	188,000	204,700	5,246,600
	H.W.	666,100	669,800	466,400	300,400	365,100	108,500	519,100	1,402,300	337,300	180,500	51,200	5,015,500
	R.W.					3,700	1,100			14,100	7,500		77,600
	C.S.											153,500	153,500
	Total	781,000	774,100	564,500	342,100	425,500	121,100	554,000	1,539,000	398,800	202,100	232,100	5,954,300

Note: H.W., R.W. and C.S. mean highway, railway and coastal shipping.

Table A.6.2 (2) O/D of Container Cargo handled at Laem Chabang Port by Mode

<Import>

(Unit: tons)

Year	LCL/FCL Mode	Bangkok	Central							Eastern	Northern	North eastern	Southern	Total
			Samut Prakan	Montaburi Pathumtani	Samut Sakhon	North	West	East						
1996	LCL	81,700	13,200	14,600	4,600	3,900	5,500	2,200	8,600	7,100	13,000	5,400	159,800	
	H.W.	81,700	13,200	14,600	4,600	3,900	5,400	2,200	8,600	6,800	12,500	1,400	153,500	
	R.W.				0	0	100			300	500	4,000	2,300	
	C.S.												4,000	
1996	FCL	1,462,700	316,300	91,300	61,600	68,200	84,900	24,800	110,400	114,300	192,800	89,500	2,616,800	
	H.W.	1,462,700	316,300	91,300	61,600	67,500	84,100	24,800	110,400	109,700	185,100	22,400	2,513,500	
	R.W.					700	800			4,600	7,700	67,100	36,200	
	C.S.												67,100	
	Total	1,544,400	329,500	105,900	66,200	72,100	90,400	27,000	119,000	121,400	205,800	94,900	2,776,600	
2001	LCL	123,000	23,000	24,700	6,300	6,900	8,200	2,500	10,400	10,500	18,200	7,900	241,600	
	H.W.	123,000	23,000	24,700	6,300	6,800	8,100	2,500	10,400	10,100	17,500	2,000	232,400	
	R.W.					100	100			400	700	5,900	3,300	
	C.S.												5,900	
2001	FCL	2,504,200	557,300	160,300	95,400	127,300	142,700	31,500	148,600	188,500	317,200	145,800	4,418,800	
	H.W.	2,504,200	557,300	160,300	95,400	126,000	141,300	31,500	148,600	181,000	304,500	36,500	4,250,100	
	R.W.					1,300	1,400			7,500	12,700	109,300	59,400	
	C.S.												109,300	
	Total	2,627,200	580,300	185,000	101,700	134,200	150,900	34,000	159,000	199,000	335,400	153,700	4,660,400	

Note: H.W., R.W. and C.S. mean highway, railway and coastal shipping.

Table A.6.2 (3) O/D of Container Cargo handled at Laem Chabang Port by Mode

(Unit: tons)

Year	LCL/FCL Mode	Bangkok	Central							Northern	North eastern	Southern	Total
			Samut Prakan	Nontaburi Pathumtani	Samut Sakhon	North	West	East	Eastern				
	LCL	160,100	74,000	76,300	29,200	38,100	12,300	27,500	124,200	36,600	21,700	22,300	622,300
	H.W.	160,100	74,000	76,300	29,200	37,800	12,100	27,500	124,200	35,100	20,900	5,600	597,200
	R.W.					300	200			1,500	800	16,700	8,400
	C.S.												16,700
1996	FCL	1,916,400	717,100	389,500	237,500	294,700	149,300	434,500	1,184,800	334,100	306,500	215,400	6,179,800
	H.W.	1,916,400	717,100	389,500	237,500	291,700	147,900	434,500	1,184,800	320,700	294,300	53,900	5,934,400
	R.W.					3,000	1,400			13,400	12,200	161,500	83,900
	C.S.												161,500
	Total	2,076,500	791,100	465,800	266,700	332,800	161,600	462,000	1,309,000	370,700	328,200	237,700	6,802,100
	LCL	237,900	127,300	122,800	48,000	63,600	19,700	37,400	167,100	57,900	32,300	35,300	949,300
	H.W.	237,900	127,300	122,800	48,000	62,900	19,500	37,400	167,100	55,600	31,000	8,900	909,500
	R.W.					700	200			2,300	1,300	26,400	13,400
	C.S.												26,400
2001	FCL	3,170,300	1,227,100	626,700	395,800	496,100	252,300	550,600	1,550,900	539,900	505,200	350,500	9,665,400
	H.W.	3,170,300	1,227,100	626,700	395,800	491,100	249,800	550,600	1,550,900	518,300	485,000	87,700	9,265,600
	R.W.					5,000	2,500			21,600	20,200	262,800	137,000
	C.S.												262,800
	Total	3,408,200	1,354,400	749,500	443,800	559,700	272,000	588,000	1,718,000	597,800	537,500	385,800	10,614,700

Note: H.W., R.W. and C.S. mean highway, railway and coastal shipping.

Appendix 7 Financial Analysis

Table A.7.1 Annual Cargo Handling Volume in the ICD

Year	Container Box										CFS Cargo	
	Lat Krabang ICD Total					I ICD					L/K ICD Total (4 ICD) (1,000 t)	I ICD (1,000 t)
	20' (TEU)	40' (FEU)	Total (TEU)	20' (TEU)	40' (FEU)	Total (TEU)	20' (TEU)	40' (FEU)	Total (TEU)			
1992	21,400	14,200	49,800	5,350	3,550	12,450					598.2	149.6
1993	27,500	18,350	64,200	6,875	4,588	16,050					770.5	192.6
1994	33,700	22,400	78,500	8,425	5,600	19,625					942.7	235.7
1995	39,800	26,550	92,900	9,950	6,638	23,225					1,115.0	278.8
1996	46,100	30,600	107,300	11,525	7,650	26,825					1,287.3	321.8
1997	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
1998	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
1999	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2000	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2001	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2002	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2003	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2004	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2005	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2006	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2007	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2008	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2009	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2010	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2011	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2012	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2013	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2014	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2015	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2016	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2017	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2018	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
2019	49,200	32,750	114,700	12,300	8,188	28,675					1,376.0	344.0
Total	1,300,100	865,350	3,030,800	325,025	216,338	757,700					36,361.7	9,090.4

Table A.7.2 Annual Cargo Handling Volume in the Marine Terminal

Year	Container Box						CFS Cargo	
	Laem Chabang Port Total (4 Berth)			I Berth			L/C Port Total (4 Berth) (1,000 t)	I Berth (1,000 t)
	20' (TEU)	40' (FEU)	Total (TEU)	20' (TEU)	40' (FEU)	Total (TEU)		
1992	147,000	97,500	342,000	36,750	24,375	85,500	748.4	187.1
1993	178,000	119,000	416,000	44,500	29,750	104,000	858.3	214.6
1994	210,000	139,000	488,000	52,500	34,750	122,000	968.2	242.1
1995	241,000	161,500	564,000	60,250	40,375	141,000	1,078.1	269.5
1996	273,000	182,000	637,000	68,250	45,500	159,250	1,188.0	297.0
1997	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
1998	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
1999	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2000	274,000	183,000	640,000	68,500	45,750	160,000	1,188.0	297.0
2001	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2002	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2003	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2004	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2005	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2006	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2007	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2008	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2009	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2010	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2011	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2012	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2013	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2014	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2015	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2016	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2017	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2018	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
2019	275,000	182,500	640,000	68,750	45,625	160,000	1,188.0	297.0
Total	7,373,000	4,897,000	17,167,000	1,843,250	1,224,250	4,291,750	32,165.0	8,041.3

Table A.7.3 Service Lives and Maintenance/Repair Cost Rates

(P.M.B.)

Facilities and Equipment	Service Lives (Years)	M/R Cost Rate (%)
Basin and Channel	-	0.5
Breakwater and Quay Walls	50	1
Landscaping	50	1
Drainage Facilities	50	3
Railway	50	3
Buildings	28	2
Pavement	28	3
Fence	28	3
Navigation Aids	28	2
Lighting Facilities	28	5
Plants *	28	5
Marine Control System	28	5
Harbor Craft	22	5
Gantry Crane	15	5
Weighbridge	11	5
Car	6	5

*: Water Purification Plant, Sewage Treatment Plant, Electric Station, etc.

(Terminal Operators)

Equipment	Service Lives (Years)	M/R Cost Rate (%)
Transtainer	13	5
Mobile Crane	13	5
Top Lifter	11	5
Fork Lift	9	5
Yard Tractor	9	5
Yard Chasis	9	5
Mini Truck	6	5
Messenger Car	6	5
Wireless Phone	6	5
Small Equipment	6	5

Appendix 8 Record of the Seminar

The Seminar on the Development of the Inland Container Depot for Laem Chabang Port was held at the Hilton International Hotel in Bangkok on March 21st, 1989.

The program of the seminar is attached as an annex.

The conclusions of the seminar are as follows:

1. The ICD project should be implemented by the government as soon as possible in order to be synchronized with the completion of Laem Chabang Port.
2. The port management body (P.M.B.) should be a public sector organization and should manage both marine terminals and ICDs.
3. Operations at the marine terminals and ICDs should be privatized.
4. The introduction of competition in the terminal operation is important and monopolistic conditions should be avoided.
5. One operator should operate only one marine terminal and one ICD as an integrated operator under a lease contract with the P.M.B..
6. Both traffic modes, road and railway, should be considered for container transportation between the ICD and Laem Chabang Port ensure flexibility.
7. The planned new highway network connecting the Bangkok area and Laem Chabang should be constructed as soon as possible.
8. It is necessary that the Royal Thai Government stipulate a land use plan for the area around the Lat Krabang ICD to stimulate container-related industries.

ANNEX

Seminar on the Development of Inland Container Depot
for Laem Chabang Port
March 21, 1989
Hilton International Hotel

March 21, 1989

- 9.00 - 10.00 Registration
- 10.00 - 10.15 Opening Address : Mr. Sribhumi Sukhanetr
Permanent Secretary
(Ministry of Transport and
Communications)
Mr. Tsutomu Saito, Resident
Representative of JICA Thailand
Office
- 10.15 - 10.45 "Laem Chabang Port Development Project"
Dr. Savit Bhotiwihok
- 10.45 - 11.00 Coffee Break
- 11.00 - 12.00 General Information on the Inland Container Depot
(ICD) Study
Study Team : Mr. Yutaka Sunohara
- 12.00 - 13.00 Lunch
- 13.00 - 13.30 Movie "Container Transportation"
Panel Discussion
- 13.30 - 14.00 - Topic 1 : Management System of the Port and the
ICD and Implementation of the ICD
Moderator : Lt. Pongsak Vongsamoot RTN. (PAT)
Presentator : Mr.K. Miyota (Team Leader)
Commentator : Mr. Payoongkich Chivamit (PAT)
Commentator : Mr. Nivat Changariyavong (BSAA)
- 14.00 - 14.30 - Topic 2 : Operation System of the Port and the ICD
Moderator : Mr. Pathai Metharom (OESB)
Presentator : Mr.K. Miyota (Team Leader)
Commentator : Mr. Payoongkich Chivamit (PAT)

- Commentator : Mr.J.T. Schmidt (Maersk Line)
- 14.30 - 14.45 Coffee Break
- 14.45 - 15.15 - Topic 3 : Land Transportation between the Port
and the ICD
Moderator : Dr. Suwat Wanisubut (OESB)
Presentator : Mr.K. Miyota (Team Leader)
Commentator : Mr. Banchar Vattanasin (DOH)
Commentator : Mr. W. Plymale (APL)
Commentator : Mr. Itthipol Sukharom (SRT)
- 15.15 - 15.45 - Topic 4 : Related Activities around the ICD Area
Moderator : Dr. Suwat Wanisubut (OESB)
Presentator : Mr.K. Miyota (Team Leader)
Commentator : Mr.Prateeb Chuntaketta (IEAT)
Commentator : Mrs. Charatsri Teepirach (DTCP)
- 15.45 - 16.00 Closing Address : Dr. Savit Bhotiwihok
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