

CHAPTER 2 DAY TO DAY TRAFFIC HANDLING

2.1 BASIC IDEA

Most of DOH roads are inter-city freeways. With the exception of Bangkok metropolitan area and some of other core cities and their environs, traffic volumes are low and do not cause natural congestion. Under such circumstances, there seems no need to introduce any traffic control measures to prevent natural congestion. Therefore, the focus of attention should be placed on providing for drivers, roads conditions and traffic conditions.

On the other hand, DOH roads in the Bangkok metropolitan area and in some core cities, are considered more as intra-city roads, and natural congestion is expected near city centers. Therefore, traffic management in those areas should involve preventive measures for natural congestion by planning efficient road networks and spreading traffic volume appropriately.

In order to implement traffic management mentioned above, the following two systems are recommended. Each system is described in the following sections.

- 1) Smooth operation system
- 2) Safety measures system

2.2 SMOOTH OPERATION SYSTEM

This system provide information on economic advantages in taking either the subject route or an alternative route for long/middle distance trips. Drivers will receive information about advantage they can get by choosing the alternative route. As a consequence, traffic can be properly assigned to each route and natural congestion, which is otherwise expected, can be prevented beforehand. The basic idea of this system is described in Figure 2.1.

Such information is given to drivers at the branching point of the subject route and the alternative route. Therefore, prediction of traffic conditions of both the subject route and the alternative route is required at the branching point.

There are two major ways to predict future traffic conditions and travel time.

- 1) Using a traffic counter at the branching point.
- 2) Direct measurement of travel time using a device mounted on a car.

Compared to 1) above, method 2) is more accurate but not as practical since it requires a car traveling on both routes regularly. Thus, method 1) is recommended for this system.

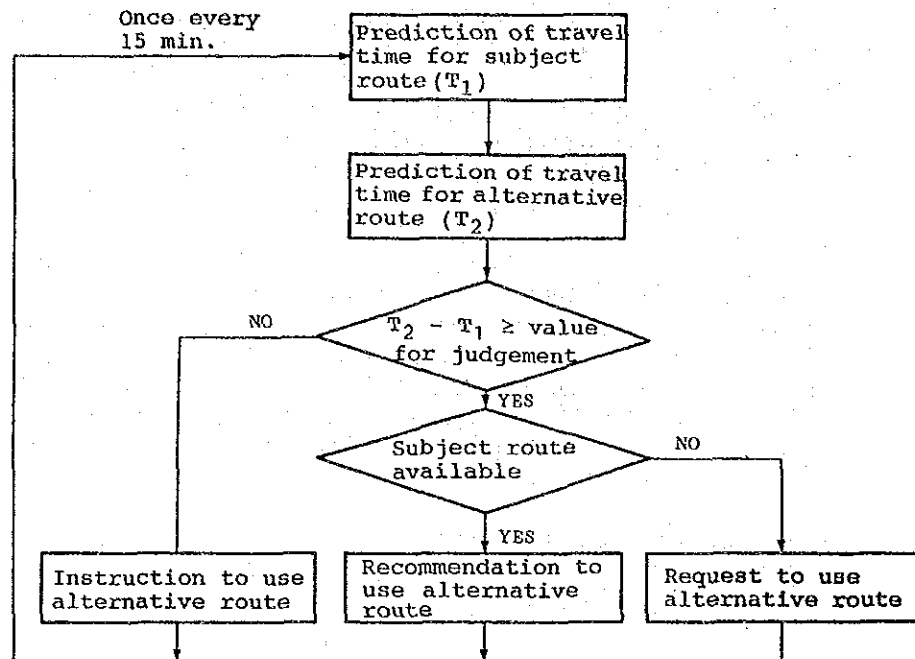


Figure 2.1 Smooth Operation System

2.3 SAFETY MEASURES SYSTEM

This system is introduced to ensure traffic safety at those points having some structural problems or those points where an accident can cause great problems. This system aims to prevent traffic accidents by keeping proper travel speed and distance between traveling vehicles.

Figure 2.2 describes the basic idea of this system. The points where this system can be effective is the super highway connecting Bangkok metropolitan area and the Don Muang Airport.

The information for drivers are to be provided by a newly designed sign board. The sign board should be designed to be able to accommodate speed-check function if necessary, to be used for speed control by police.

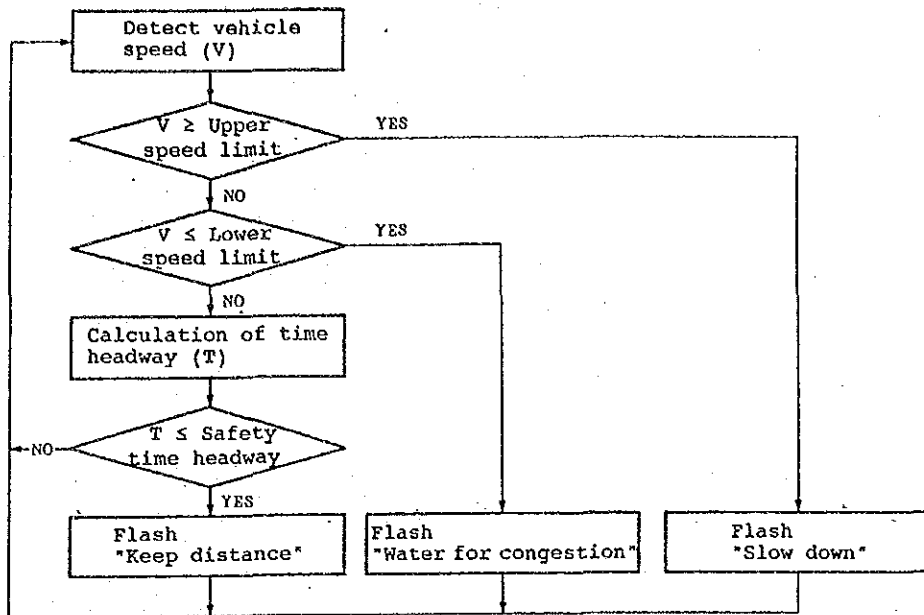


Figure 2.2 Safety Measures System

CHAPTER 3 EMERGENCY TRAFFIC HANDLING

3.1 BASIC IDEA

The basic idea of Emergency Traffic Handling is to minimize the effect of unexpected event such as an accident and to ensure the minimum traffic processing capacity. Possible cases of unexpected events include the following.

- 1) Traffic accident
- 2) Disabled vehicle
- 3) Road damage
- 4) Abnormal weather
- 5) Traffic congestion due to 1) - 4) above.

In an emergency, traffic needs to be processed by switching from the subject route to the alternative route. The drivers are notified of the emergency by the road information board provided before the branching point, and take the alternative route as necessary.

It is more desirable if the information about the alternative route can be conveyed to drivers by pictorial signs on the road information board before the branching point. However, if the road information board cannot have such pictorial signs, the alternative way of explaining the other route to drivers is to give out leaflets which are prepared in advance.

Figure 3.1 describes basic procedures of traffic handling in an emergency. Among the possible cases of unexpected events aforementioned, "3) Road damage" has been excluded since its occurrence is very rare.

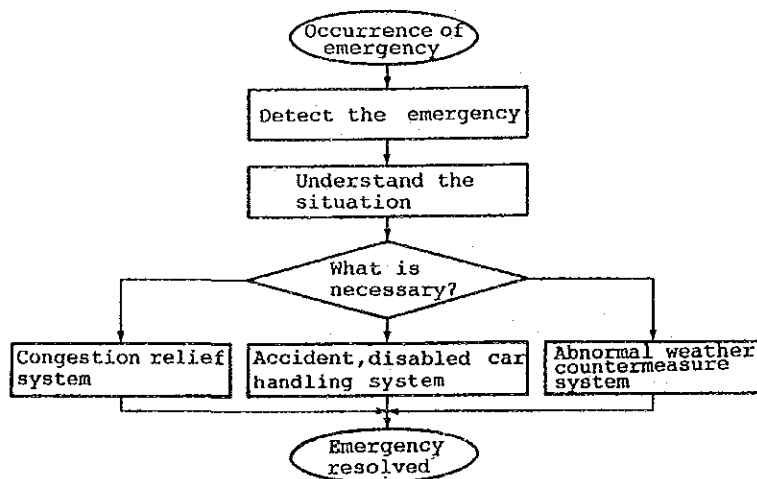


Figure 3.1 Emergency Traffic Handling

In order to implement such an emergency traffic handling, the following three systems are recommended. Each system is described in the following sections.

- 1) Congestion relief system
- 2) Accident, disabled car handling system
- 3) Abnormal weather countermeasure system

3.2 CONGESTION RELIEF SYSTEM

This system aims at relieving and resolving traffic congestion caused by accidents, etc. The basic procedures are described in Figure 3.2. Further description is given below referring to Figure 3.2.

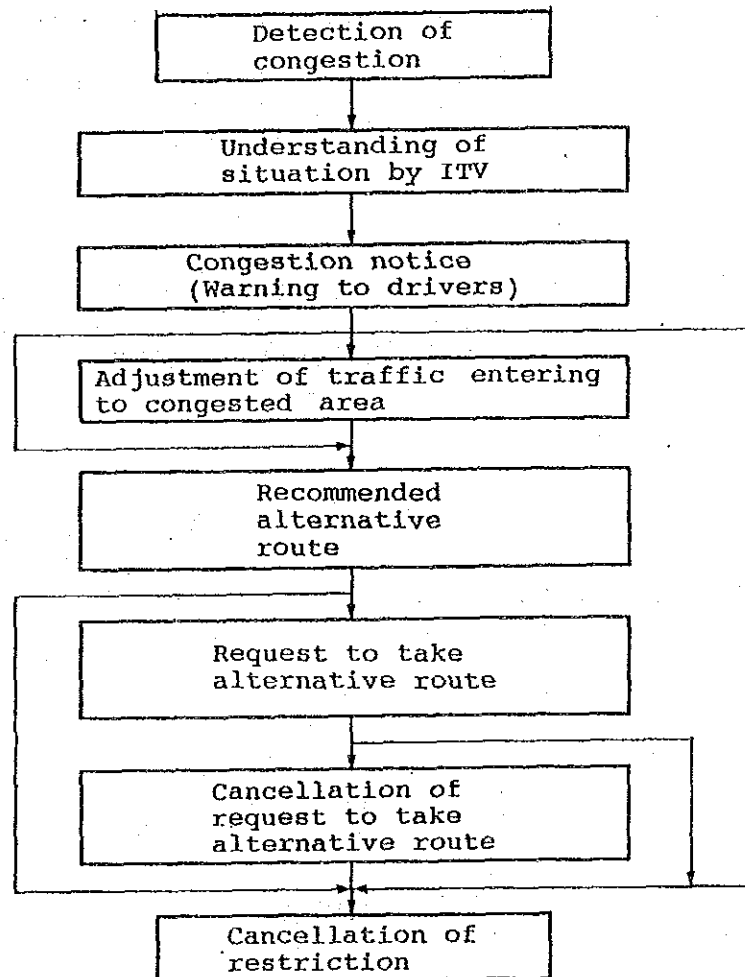


Figure 3.2 Congestion Relief System

(1) Detection of Congestion

There are two ways to detect congestion:

- 1) Direct method
- 2) Indirect method

In the direct method, congestion is detected by each vehicle's travel behavior. This method can detect congestion in a short time with greater accuracy. However, this method requires detectors to be installed at every vehicle-length distance and is not practical. On the other hand, the indirect method detects congestion from traffic flow. This requires a longer time, but the detection data is small and cost is much cheaper; therefore it is more practical. In this report the indirect method is adopted for this system.

The indirect method can be further divided into two methods by the difference in the way of detecting abnormal behavior of following cars caused by abnormal vehicle operation.

a) Flow Rate Comparison Method

Regularly checking the traffic volumes at adjoining points either at longitudinal (upstream and downstream of one lane) or transverse (1st lane, 2nd lane, 3rd lane) positions on the road.

b) Occupancy Comparison Method

Detecting congestion by road occupancy using detectors. Unfortunately each method has some shortcomings. The flow rate method cannot detect chronic congestion. The occupancy method can detect chronic congestion but accuracy is not reliable. Therefore, it is recommended that both methods are concurrently employed to cover disadvantages of each method.

(2) Congestion Notice

This notice is to make the driver aware of congestion and to convey it by the following methods.

- 1) By car radio through regular broadcasting
- 2) By a road information board

(3) Adjustment of Traffic Entering Congested Area

When congestion is expected to be resolved in a short time, entering traffic to the congested area is adjusted temporarily by the following means.

- 1) Road information board
- 2) Crossing gate (to cut off traffic)
- 3) Alarm, loudspeaker
- 4) Traffic signal

(4) Recommendation to Take Alternative Route

This is the main feature of this system and to prevent further congestion by recommending an alternative route at the branching point. Drivers are left to make their own judgement to take the subject route or the alternative route. The information necessary to make such a judgement is provided by road information boards, etc. How to calculate the timing for such recommendation is given in Figure 3.3.

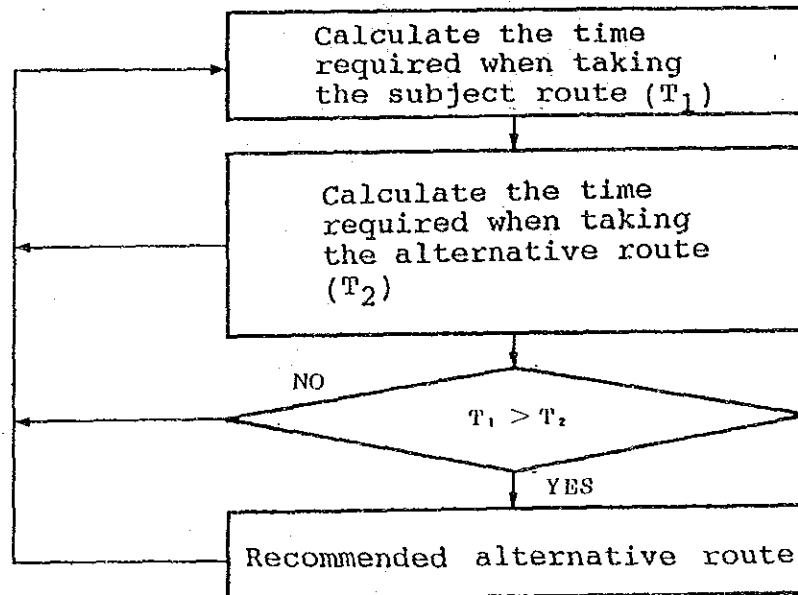


Figure 3.3 Recommendation for Alternative Route

(5) Request to Take Alternative Route at Branching Point

When traffic is congested beyond the branching point for the subject route and the alternative route, the subject route will be closed and drivers will be requested to take the alternative route to prevent confusion at the branching point and delay in reaching the branching point. It is important not to fully-open the subject route after the initial congestion is resolved. A sudden rush of traffic into the subject route could cause renewed congestion. Therefore, the recommendation to take the alternative route should be maintained for a while.

3.3 ACCIDENT DISABLED CAR HANDLING SYSTEM

This system is for understanding the condition of an accident or disabled car and implement lane restriction and traffic restriction accordingly. The congestion relief system described in the previous section may be activated if necessary.

Figure 3.4 describes basic procedures involved in this system.

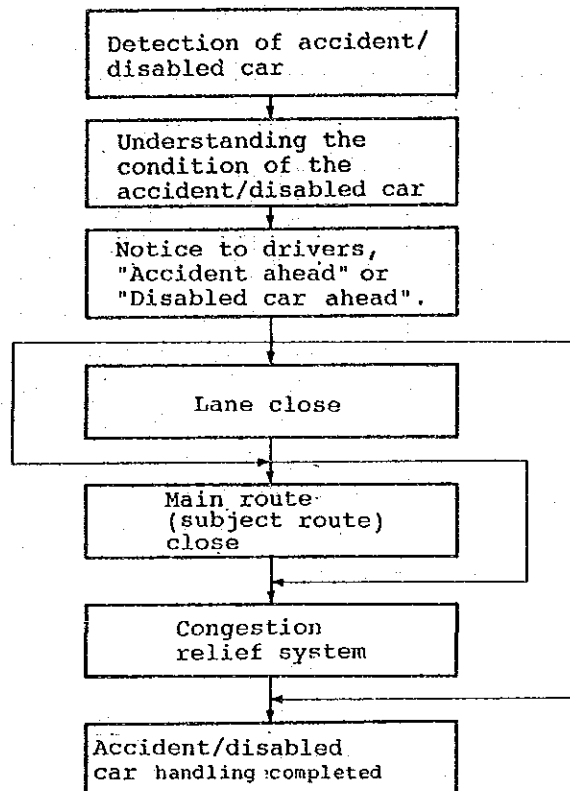


Figure 3.4 Accident/Disabled Car Handling System

The following means are used to detect and understand the condition of accident/disabled car.

- 1) Traffic counter
- 2) Emergency phone
- 3) Fire detector
- 4) Road patrol
- 5) ITY
- 6) Transmitter

However, in the following cases, the subject road will be closed.

- A. When someone is killed in the accident.
- B. When multiple accidents occur.
- C. When the accident/disabled car is carrying hazardous material.
- D. When the accident/disabled car is on fire.

3.4 ABNORMAL WEATHER COUNTERMEASURE SYSTEM

This system is a countermeasure for traffic problems caused by weather factors such as wind and rain. The expected weather conditions which may affect DOH roads are as follows:

- 1) Fog
- 2) Rain
- 3) Wind

Figure 3.5 outlines basic steps involved in Abnormal Weather Countermeasure System.

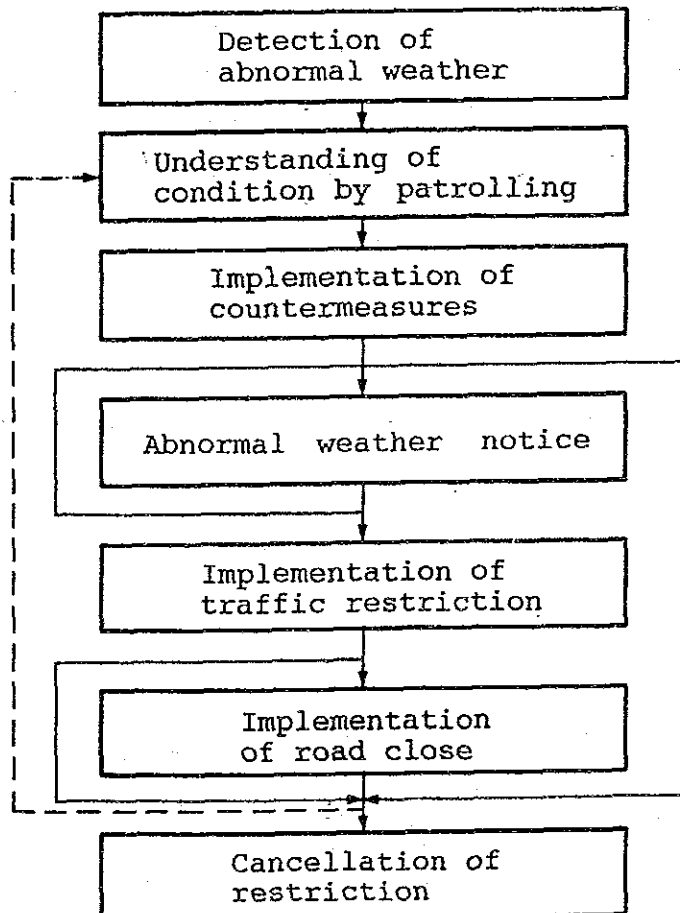


Figure 3.5 Abnormal Weather Countermeasure System

PART 4
GUIDE SIGN BOARD
DESIGN MANUAL

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CHAPTER 1 OBJECTIVES OF SYSTEM

Guide Sign Board Design System, herein after the system, is designed in such a way that the DOH staff can easily design to make guide sign boards by a aid of microcomputer. The system provides size of board and size of character as well, in replying input data on the highway class, kinds of board and characters to be presented in the guide sign board.

Since this users manual describes operational characteristics in detail especially in input data and their output layouts for daily use, it is desirable for users to operate the system according to this manual, and to master the effective utilization.

CHAPTER 2 SYSTEM FUNCTION

2.1 SYSTEM FUNCTION

The system, judge input data and calculate in the system in replying to the input data, and provides informations to design guide sign board easily as follows;

- A. Height of Board.
- B. Width of Board.
- C. Width and Clearance of Thai Character.
- D. Width and Clearance of English Character.
- E. Width and Clearance of Number Character.
- F. Clearance between Character Items, if any.
- G. Clearance between Character and Arrow, if any.
- H. Clearance between Character and Right Edge of the Board, if any.

As the system provides the above information, any users can draw the figures of the guide sign boards by means of referring to figures shown in this manual and the DOH specifications on guide sign board.

Table 1 Relation among Highway Class, Board Size, and Character Size by Board Type

Board Type		Highway Class (1 - 10)	Board Size (mm)	Character Size			
				Thai	Eng.	Dist	Arrow
A	1	1	1800 min * 600	S		S	
	2	2	1800 min * 750	L		L	
	3	1,2,3,5,6,8,10	1800 min * 750	S	S	S	
	4	4,7,9	1800 min * 900	L	L	L	
B,C	1	1	2100 min * 600	S			S
	2	2	2400 min * 750	L			L
D,E	3	1,2,3,5,6,8,10	2100 min * 750	S	S		S
	4	4,7,9	2400 min * 900	L	L		L

- Note 1) Size of Thai Character S ; 200 mm in height
 L ; 250 mm do.
 2) Size of English Character S ; 100 mm do.
 L ; 125 mm do.
 3) Size of Distance Number S ; 200 mm do.
 L ; 250 mm do.
 4) Size of Arrow S ; 300 mm in length (see Figure 4)
 L ; 350 do. (see Figure 4)

2.2 DESIGN CONDITION

For the system design, the following design condition and/or assumptions are considered in reference to the DOH standard on guide sign board.

- A. Width of board is decided by the widest one, when two or more number of board are installed on one pole.
- B. Width of board is made round by every 50 mm.
- C. Maximum number of character is limited within thirty characters for Thai and English, and three characters for distance number.
- D. Maximum width of board is limited in 3000 mm.
- E. Type of Character for Thai, in which are normal and thinner characters, is independently decided by one board in case of two or more boards in one pole.
- F. Thinner characters are used in case of exceeding the minimum width of board, while normal characters are used in capable of setting within the minimum board width for Thai.
- G. English and number character have only normal type of characters.
- H. Character width and clearance are used eighty percent value of normal characters for thinner characters.

2.3 ENVIRONMENTS FOR SYSTEM OPERATION

The system can be operated in the following hardware and software environments;

- 1) Micro Processor System ; EPSON Personal Computer
- 2) Printer ; Line Printer
- 3) Operating System ; MS-DOS
- 4) Language ; BASIC

CHAPTER 3 SYSTEM OPERATIONS

3.1 OPERATION FLOW

System operation is designed such that any users can easily operate the system for operation is terminated by the set of boards installed in one pole, and users can try again when there are any mistake due to input data as below;

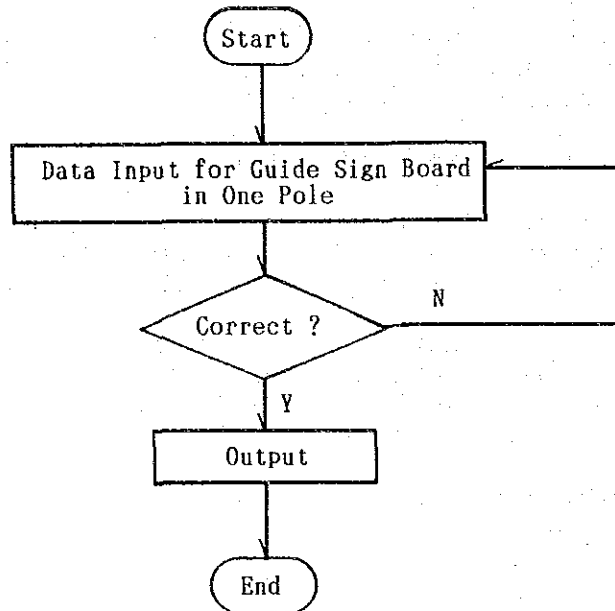


Figure 1 System Operation Flow

System operation flow according to the above figure is explained as follows;

Data input are necessary for the following items;

- A. Board combination (number and kind of board as shown in Figure 2, select board combination and input)
- B. Highway class (select highway class and input subject to DOH classification in 1 to 10 which guide sign board will be installed)
- C. Necessity of English (in highway class 1 and 2, input whether English expression is necessary or not in Y/N)
- D. Data to be presented in board (due to the combination and type of board, following data should be input),

- Thai characters for all types of boards.
- English characters for X-3 and X-4 types where x means A to E in Figure 3.
- Distance number for type A-9 boards where 9 means 1 to 4 in Figure 3,

After inputting the necessary data for the sets of boards on one pole, the system judge input data whether they are correct and sufficient or not. When they are correct, the system begins designated processing and calculation and provides the correct output. While no sufficient data were input, the system terminated the processing. So then, users are requested to input data again from the beginnings.

When the correct data are input, the system provides the following output;

- A. List of input data for any case and boards.
- B. Figure on width and total height of a set of board on one pole on the display screen.
- C. Necessary data to describe board in detail by one board as follows;
 - Type of board (A-1 to E-4).
 - Height of board (600 to 900 mm).
 - Width of board (1800 to 3000 mm).
 - Total width of Thai characters.
 - Thai character and its width and clearance.
 - Clearance between a set of characters and edge of board.
 - Total width of English characters if any.
 - English character and its width and clearance if any.
 - Total width of number characters if any.
 - Number character and its width and clearance if any.

1 ; Type A	XXXXXXXXXXXX	35
2 ; Type A * 2 Boards	XXXXXXXXXXXX	35
	XXXXXXXXXXXX	42
3 ; Type A * 3 Boards	XXXXXXXXXXXX	35
	XXXXXXXXXXXX	42
	XXXXXXXXXXXX	65
4 ; Type B + Type D	XXXXXXXXXXXX	↑
	← XXXXXXXXXX	
5 ; Type C + Type E	↑ XXXXXXXXXX	
	XXXXXXXXXXXX	→
6 ; Type D + Type E	← XXXXXXXXXX	
	XXXXXXXXXXXX	→
7 ; Type B + Type D + Type E	XXXXXXXXXXXX	↑
	← XXXXXXXXXX	
	XXXXXXXXXXXX	→

Figure 2 Board Combination

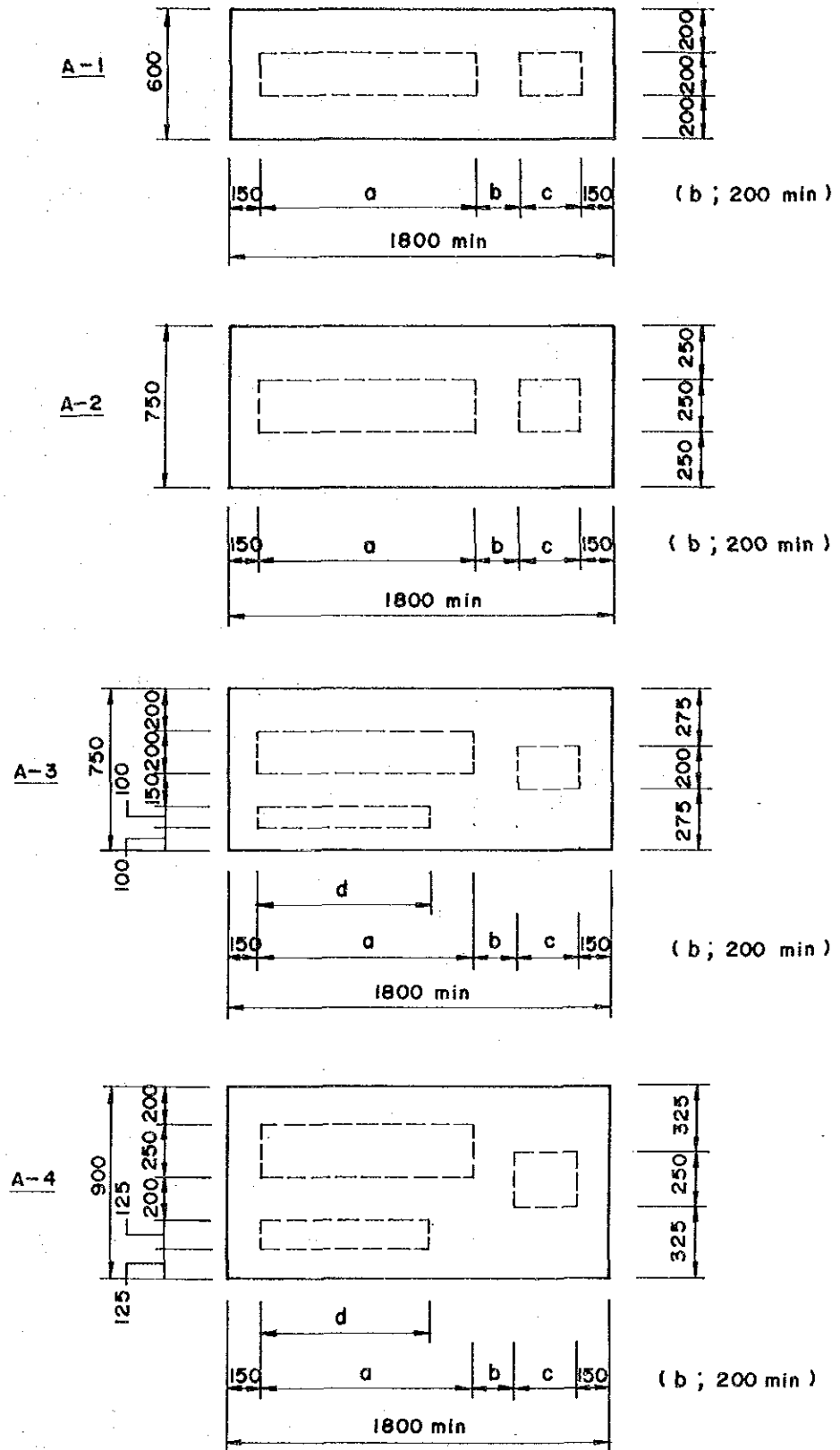


Figure 3 Character Allocation for Guide Sign Board (1)

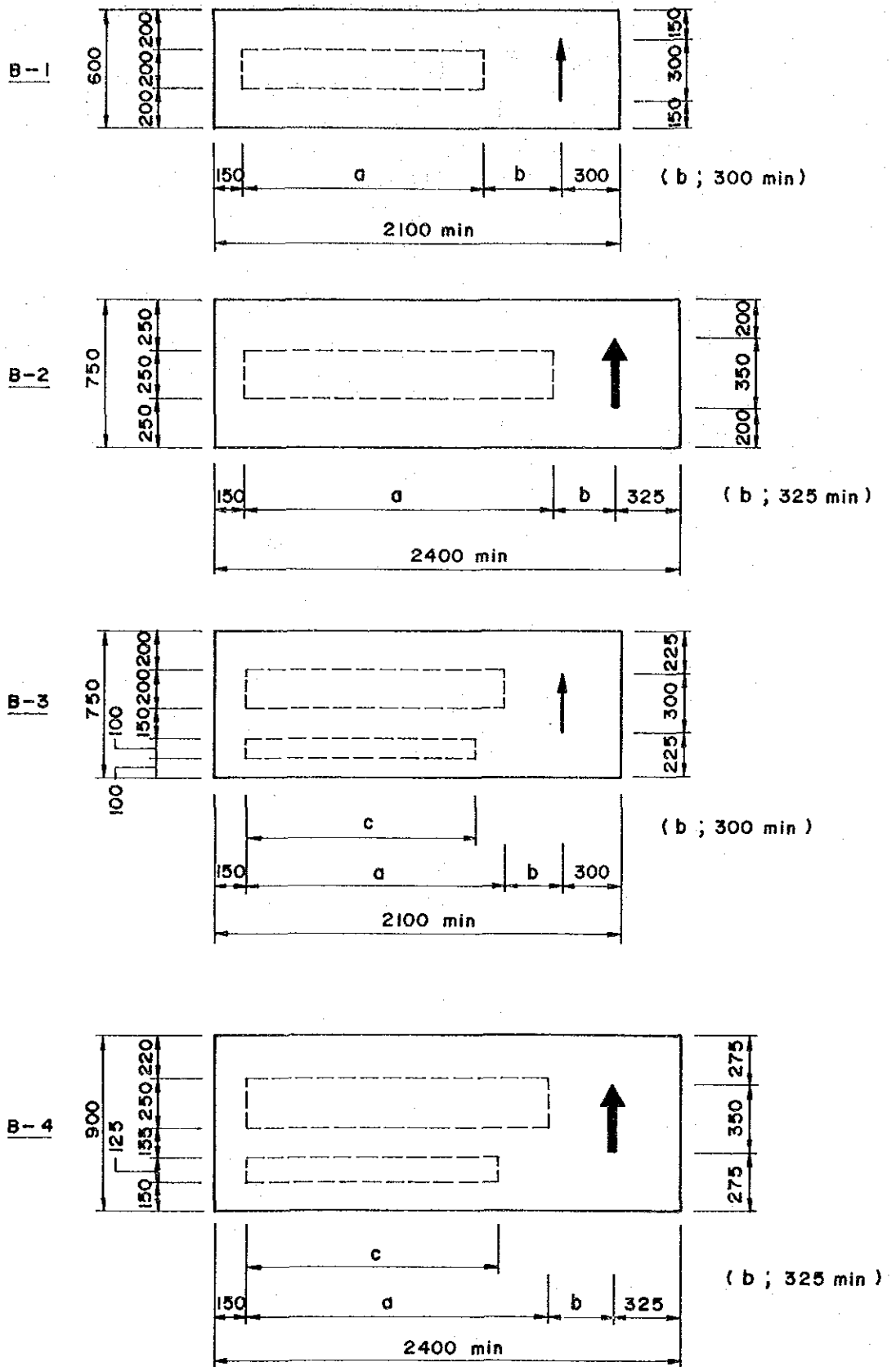


Figure 3 Character Allocation for Guide Sign Board (2)

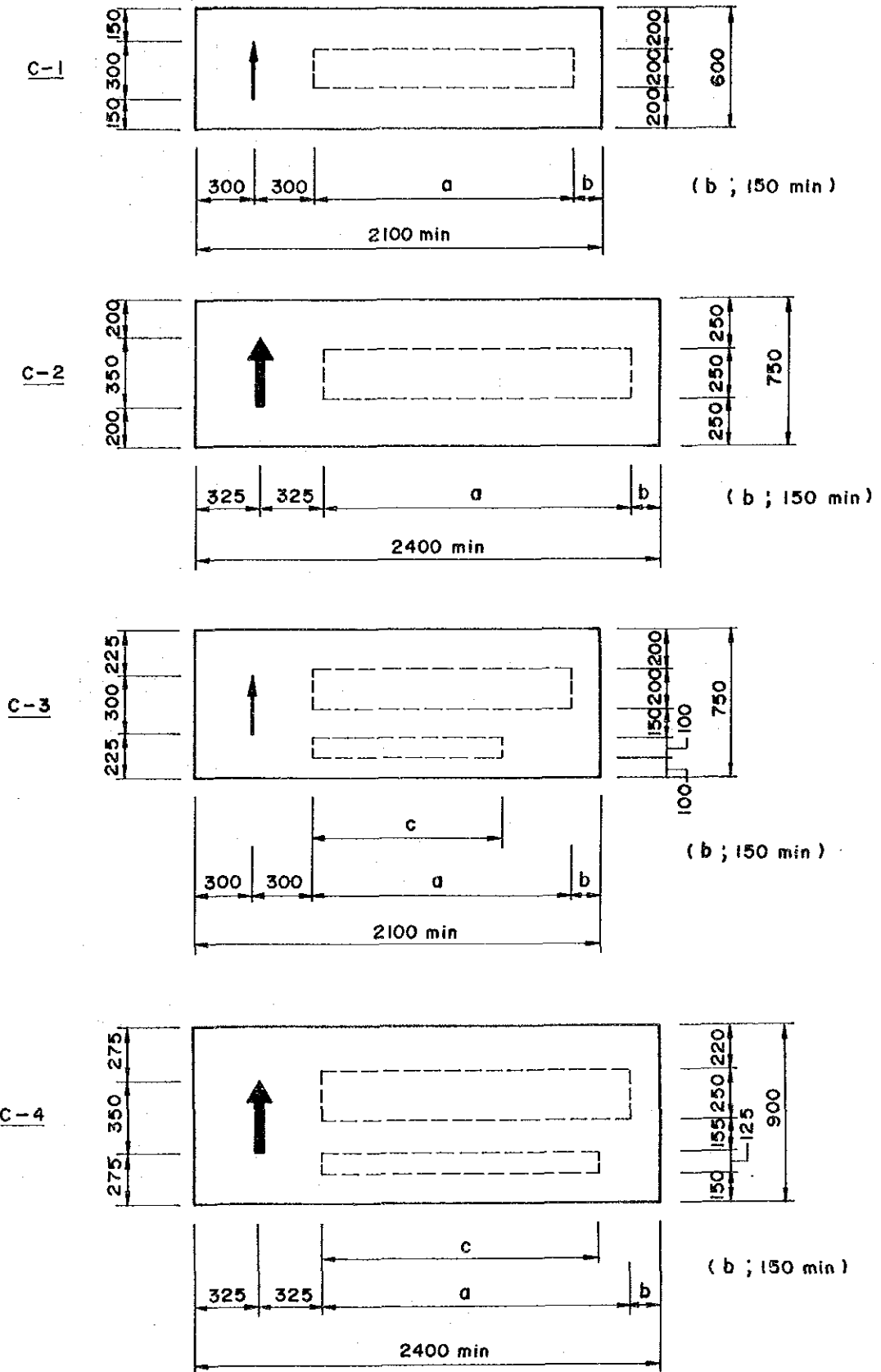


Figure 3 Character Allocation for Guide Sign Board (3)

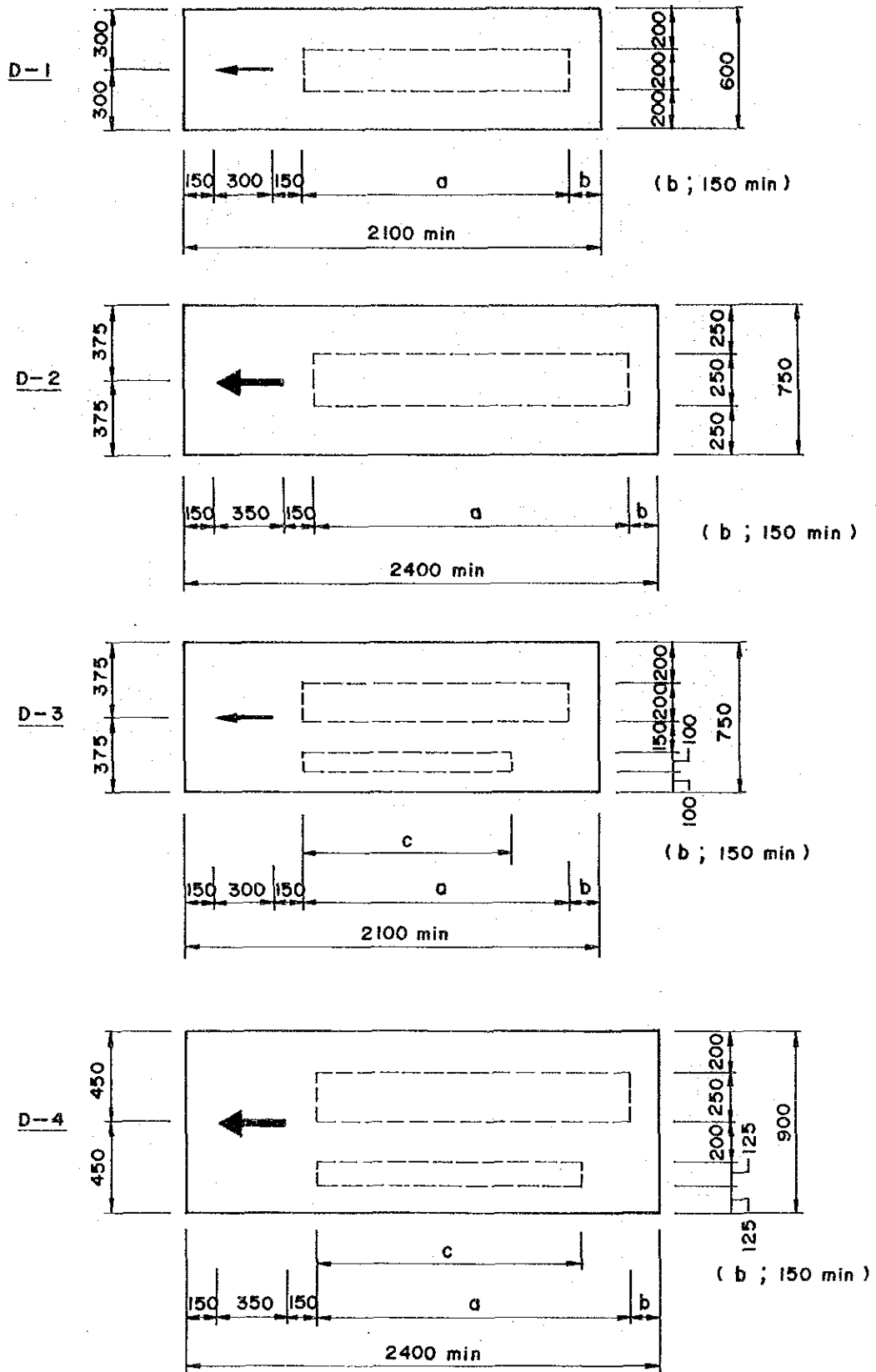


Figure 3 Character Allocation for Guide Sign Board (4)

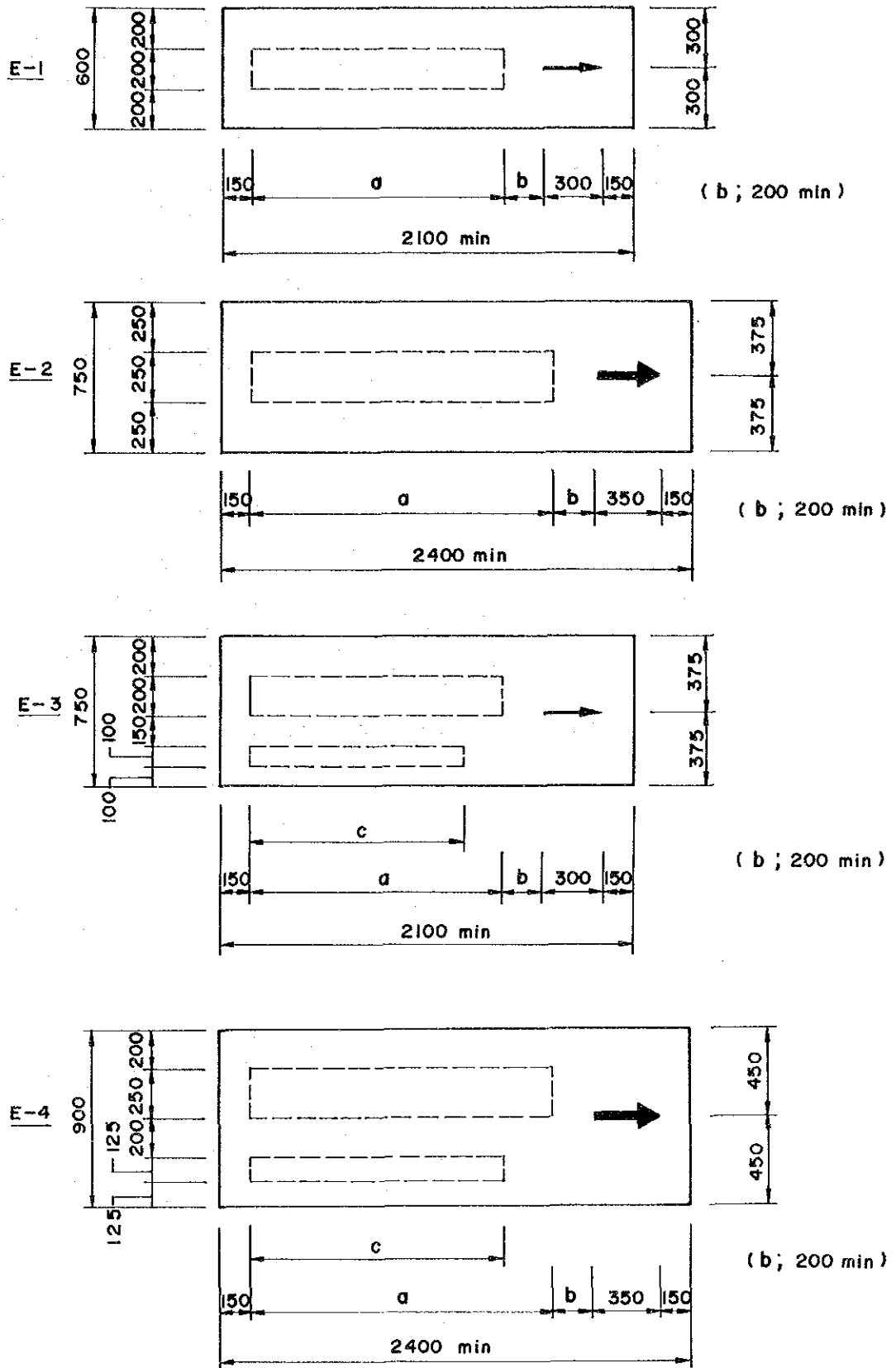
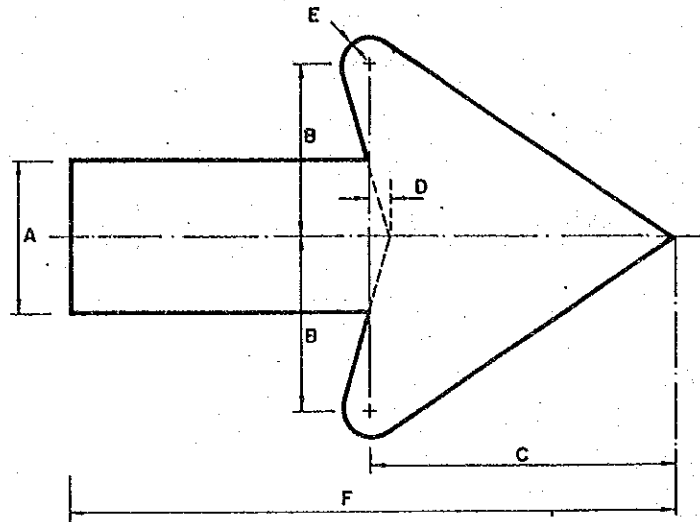


Figure 3 Character Allocation for Guide Sign Board (5)



Size of Arrow	Length (mm)					
	A	B	C	D	E	F
S	75	85	150	10	15	300
L	90	105	180	10	15	300

Figure 4 Size of Arrow

3.2 INPUT OF DATA

Users can input data on the display screen on the following procedures;

Screen 1

Input Board Combination <u>9</u>

Input code of board combination from Figure 2.

Screen 2

Input Board Combination <u>9</u>
Input Highway Class <u>99</u>

Input highway class according to DOH standard (1 - 10).

Screen 3

Input Board Combination <u>9</u>
Input Highway Class <u>99</u>
With English (Y/N) <u>X</u>

In case of being highway class 1 or 2, input the necessity of English in Y or N.

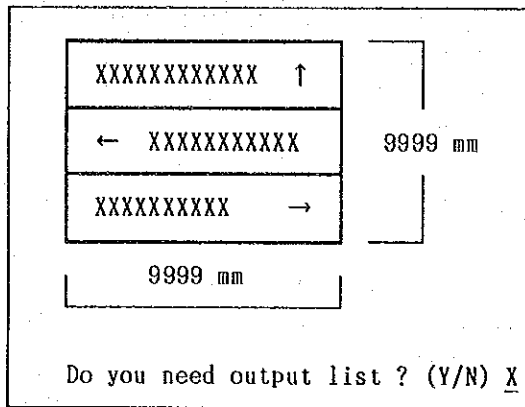
Screen 4

Board No.1	
Input Thai	<u>XXXXXXXXXXXXXX</u>
Input English	<u>XXXXXXXXXX</u>
Input Distance	<u>999</u>
Board No.2	
Input Thai	<u>XXXXXXXXXXXXXX</u>
Input English	<u>XXXXXXXXXX</u>
Input Distance	<u>999</u>
Board No.3	
Input Thai	<u>XXXXXXXXXXXXXX</u>
Input English	<u>XXXXXXXXXX</u>
Input Distance	<u>999</u>

Input Thai, English and distance as necessitated according to board type and the number of board.

3.3 OUTPUT

After being input a set of correct data, the system provides the following output on the display screen as Screen 5

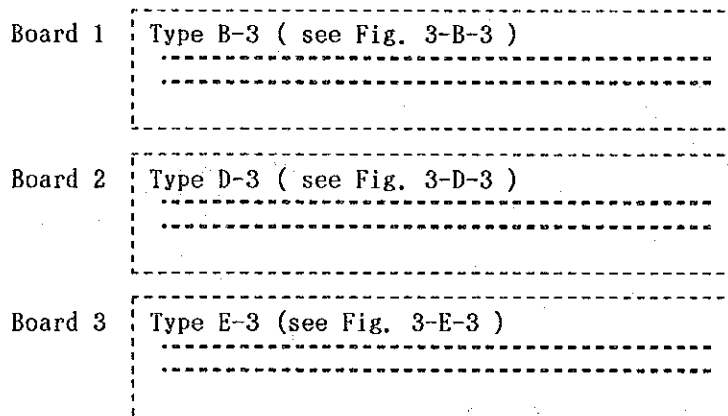


Width and height of a set of boards are shown on the display screen. When output is correct, select Y for output in detail on the printer. When output is not good for the designated sign, press N for to terminate and to try again the system.

When pressing Y on the above screen, list of input data are printed on the printer as follows;

Board combination,
 Highway Class,
 Necessity of English if any,
 Thai character by board,
 English character by board if any,
 Distance by board if any.

Continuing the above output list, detail output list for character allocation by board will be printed on the printer by board type as follows;



Output contents of each type of board are in detail as follows;

Type A-1 (see Fig. 3-A-1)							
Height of Board	:	600	mm				
Width of Board	:	999	mm				
Width of Thai (a = 999 mm in total)							
Character		X	X	X	X	X	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----
Clearance between Thai and Distance (b = 999 mm)							
Width of Distance Number (c = 999 mm in total)							
Number		9	9	9	9	9	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----

Type A-2 (see Fig. 3-A-2)							
Height of Board	:	750	mm				
Width of Board	:	999	mm				
Width of Thai (a = 999 mm in total)							
Character		X	X	X	X	X	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----
Clearance between Thai and Distance (b = 999 mm)							
Width of Distance Number (c = 999 mm in total)							
Number		9	9	9	9	9	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----

Type A-3 (see Fig. 3-A-3)							
Height of Board	:	750	mm				
Width of Board	:	999	mm				
Width of Thai (a = 999 mm in total)							
Character		X	X	X	X	X	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----
Clearance between Thai and Distance (b = 999 mm)							
Width of Distance Number (c = 999 mm in total)							
Number		9	9	9	9	9	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----
Width of English (d = 999 mm in total)							
Character		X	X	X	X	X	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----

Type A-4 (see Fig. 3-A-4)							
Height of Board	:	900	mm				
Width of Board	:	999	mm				
Width of Thai (a = 999 mm in total)							
Character		X	X	X	X	X	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----
Clearance between Thai and Distance (b = 999 mm)							
Width of Distance Number (c = 999 mm in total)							
Number		9	9	9	9	9	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----
Width of English (d = 999 mm in total)							
Character		X	X	X	X	X	-----
Width (mm)		999	999	999	999	999	-----
Clearance (mm)		999	999	999	999	999	-----

Type B-1 (see Fig. 3-B-1)
 Height of Board ; 600 mm
 Width of Board ; 999 mm
 Width of Thai (a = 999 mm in total)
 Character X X X X X X -----
 Width (mm) 999 999 999 999 999 999 -----
 Clearance (mm) 999 999 999 999 999 999 -----
 Clearance between Thai and Arrow (b = 999 mm)

Type B-2 (see Fig. 3-B-2)
 Height of Board ; 750 mm
 Width of Board ; 999 mm
 Width of Thai (a = 999 mm in total)
 Character X X X X X X -----
 Width (mm) 999 999 999 999 999 999 -----
 Clearance (mm) 999 999 999 999 999 999 -----
 Clearance between Thai and Arrow (b = 999 mm)

Type B-3 (see Fig. 3-B-3)
 Height of Board ; 750 mm
 Width of Board ; 999 mm
 Width of Thai (a = 999 mm in total)
 Character X X X X X X -----
 Width (mm) 999 999 999 999 999 999 -----
 Clearance (mm) 999 999 999 999 999 999 -----
 Clearance between Thai and Arrow (b = 999 mm)

Width of English (c = 999 mm in total)
 Character X X X X X X -----
 Width (mm) 999 999 999 999 999 999 -----
 Clearance (mm) 999 999 999 999 999 999 -----

Type B-4 (see Fig. 3-B-4)
 Height of Board ; 900 mm
 Width of Board ; 999 mm
 Width of Thai (a = 999 mm in total)
 Character X X X X X X -----
 Width (mm) 999 999 999 999 999 999 -----
 Clearance (mm) 999 999 999 999 999 999 -----
 Clearance between Thai and Arrow (b = 999 mm)

Width of English (c = 999 mm in total)
 Character X X X X X X -----
 Width (mm) 999 999 999 999 999 999 -----
 Clearance (mm) 999 999 999 999 999 999 -----

Type C-1 (see Fig. 3-C-1)

Height of Board ; 600 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Right Clearance (b = 999 mm)

Type C-2 (see Fig. 3-C-2)

Height of Board ; 750 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Right Clearance (b = 999 mm)

Type C-3 (see Fig. 3-C-3)

Height of Board ; 750 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Right Clearance (b = 999 mm)

Width of English (c = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Type C-4 (see Fig. 3-C-4)

Height of Board ; 900 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Right Clearance (b = 999 mm)

Width of English (c = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Type D-1 (see Fig. 3-D-1)

Height of Board ; 600 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
-----------	---	---	---	---	---	---	-------

Width (mm)	999	999	999	999	999	999	-----
------------	-----	-----	-----	-----	-----	-----	-------

Clearance (mm)	999	999	999	999	999	999	-----
----------------	-----	-----	-----	-----	-----	-----	-------

Right Clearance (b = 999 mm)

Type D-2 (see Fig. 3-D-2)

Height of Board ; 750 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
-----------	---	---	---	---	---	---	-------

Width (mm)	999	999	999	999	999	999	-----
------------	-----	-----	-----	-----	-----	-----	-------

Clearance (mm)	999	999	999	999	999	999	-----
----------------	-----	-----	-----	-----	-----	-----	-------

Right Clearance (b = 999 mm)

Type D-3 (see Fig. 3-D-3)

Height of Board ; 750 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
-----------	---	---	---	---	---	---	-------

Width (mm)	999	999	999	999	999	999	-----
------------	-----	-----	-----	-----	-----	-----	-------

Clearance (mm)	999	999	999	999	999	999	-----
----------------	-----	-----	-----	-----	-----	-----	-------

Right Clearance (b = 999 mm)

Width of English (c = 999 mm in total)

Character	X	X	X	X	X	X	-----
-----------	---	---	---	---	---	---	-------

Width (mm)	999	999	999	999	999	999	-----
------------	-----	-----	-----	-----	-----	-----	-------

Clearance (mm)	999	999	999	999	999	999	-----
----------------	-----	-----	-----	-----	-----	-----	-------

Type D-4 (see Fig. 3-D-4)

Height of Board ; 900 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
-----------	---	---	---	---	---	---	-------

Width (mm)	999	999	999	999	999	999	-----
------------	-----	-----	-----	-----	-----	-----	-------

Clearance (mm)	999	999	999	999	999	999	-----
----------------	-----	-----	-----	-----	-----	-----	-------

Right Clearance (b = 999 mm)

Width of English (c = 999 mm in total)

Character	X	X	X	X	X	X	-----
-----------	---	---	---	---	---	---	-------

Width (mm)	999	999	999	999	999	999	-----
------------	-----	-----	-----	-----	-----	-----	-------

Clearance (mm)	999	999	999	999	999	999	-----
----------------	-----	-----	-----	-----	-----	-----	-------

Type E-1 (see Fig. 3-E-1)

Height of Board ; 600 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Clearance between Thai and Arrow (b = 999 mm)

Type E-2 (see Fig. 3-E-2)

Height of Board ; 750 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Clearance between Thai and Arrow (b = 999 mm)

Type E-3 (see Fig. 3-E-3)

Height of Board ; 750 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Clearance between Thai and Arrow (b = 999 mm)

Width of English (c = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Type E-4 (see Fig. 3-E-4)

Height of Board ; 900 mm

Width of Board ; 999 mm

Width of Thai (a = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

Clearance between Thai and Arrow (b = 999 mm)

Width of English (c = 999 mm in total)

Character	X	X	X	X	X	X	-----
Width (mm)	999	999	999	999	999	999	-----
Clearance (mm)	999	999	999	999	999	999	-----

3.4 OPERATION EXAMPLE

For users convenience, operation example is presented according to the assumption as follows;

Input Data; Board Combination = 7, which objective sign board is shown in Figure 5.
Highway Class = 3.

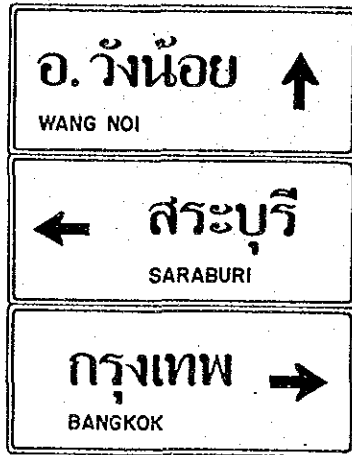


Figure 5 Objective Sign Board for Example

Users input data on the display screen on the following procedures;

Screen 1

Input Board Combination 7

Input 7, which is a code of board combination from Figure 2.

Screen 2

Input Board Combination 7
Input Highway Class 3

Input 3, which is highway class according to DOH standard (1 - 10).

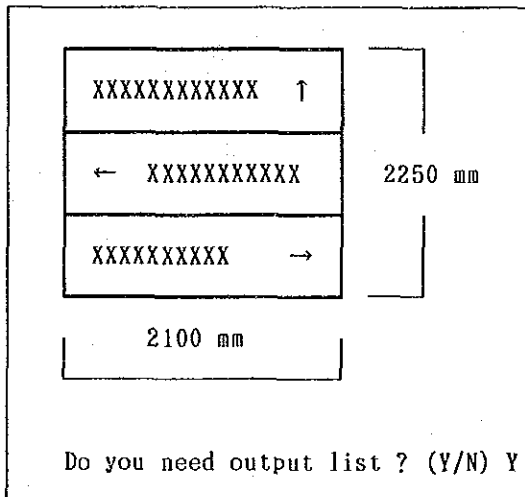
Screen 3

Board No.1	
Input Thai	อ.วังน้อย
Input English	WANG NOI
Board No.2	
Input Thai	สระบุรี
Input English	SARABURI
Board No.3	
Input Thai	กรุงเทพฯ
Input English	BANGKOK

Input Thai and English which should be described in the boards in one by one.

When input data are correct, the system provides the following output on the display screen;

Screen 4



Width and height of a set of boards are shown on the display screen. Press Y for output in detail on the printer. When users wants to get hard copy, press the function key to copy.

The system begins to print out the following list on the printer, and users can draft character allocation for guide sign board in reference to Figure 3 and Figure 4.

* Input Data *

Board Combination = 7

Highway Class = 3

Character Board 1 Thai ; อ.วังน้อย

English ; WANG NOI

Board 2 Thai ; สระบุรี

English ; SARABURI

Board 3 Thai ; กรุงเทพมหานคร

English ; BANGKOK

* Detail of Board 1 *

Type B-3 (see Fig. B-3)

Height of Board ; 750 mm

Width of Board ; 2100 mm

Width of Thai (a = 1082 mm in total)

Character	อ	ว	ง	น	อ	ย
Width (mm)	136	60	118	110	126	136
Clearance (mm)	50	20	20	60	60	50

Clearance between Thai and Arrow (b = 568 mm)

Width of English (c = 612 mm in total)

Character	W	A	N	G	N	O	I
Width (mm)	88	83	66	67	60	66	16
Clearance (mm)	6	18	24	0	0	24	24

* Detail of Board 2 *

Type D-3 (see Fig. D-3)

Height of Board ; 750 mm

Width of Board ; 2100 mm

Width of Thai (a = 780 mm in total)

Character	ส	ร	บ	ุ	ร
Width (mm)	138	120	114	138	120
Clearance (mm)	30	30	60	30	

Right Clearance (b = 720 mm)

Width of English (c = 661 mm in total)

Character	S	A	R	A	B	U	R	I
Width (mm)	68	83	66	83	67	68	66	16
Clearance (mm)	18	18	18	18	24	24	24	

* Detail of Board 3 *

Type E-3 (see Fig. E-3)

Height of Board ; 750 mm

Width of Board ; 2100 mm

Width of Thai (a = 910 mm in total)

Character	ñ	ᨾ	ᨿ	ᩃ	ᩆ	ᩈ
Width (mm)	136	120	110	40	138	146
Clearance (mm)	30	20	50	60	60	

Clearance between Thai and Arrow (b = 540 mm)

Width of English (c = 607 mm in total)

Character	B	A	N	G	K	O	K
Width (mm)	67	83	66	67	64	70	64
Clearance (mm)	18	18	24	24	18	24	

3.5 ERROR MESSAGE

Whenever any wrong data were input, the system display the error message on the screen as follows;

" WRONG DATA INPUT, TRY AGAIN "

Users are requested to input the correct data from the beginnings.

Table 2 Ascii Code and Size of Thai Character

Character	Ascii Code	Basic Size	Character	Ascii Code	Basic Size	Character	Ascii Code	Basic Size
ก	161	68	ก	179	105	จ	199	59
ข	162	56	ข	180	72	ฉ	200	72
ฃ	163	56	ฃ	181	73	ช	201	71
ด	164	70	ด	182	68	ฌ	202	69
ด	165	70	ด	183	69	น	203	68
ด	166	67	ด	184	61	น	204	72
ด	167	55	ด	185	63	บ	205	68
ด	168	67	ด	186	69	ป	206	68
ด	169	60	ด	187	68	ต	207	60
ด	170	55	ด	188	73	ด	208	57
ด	171	55	ด	189	72	ด	210	60
ด	172	105	ด	190	73	ด	211	60
ด	173	103	ด	191	73	ด	224	20
ด	174	68	ด	192	67	ด	225	65
ด	175	68	ด	193	66	ด	226	20
ด	176	63	ด	194	68	ด	227	20
ด	177	68	ด	195	60	ด	228	20
ด	178	110	ด	197	68	ด	230	65

Table 3 Ascii Code and Size of English Character
(unit ; mm for 100 mm height)

Character	Ascii Code	Size	Character	Ascii Code	Size
A	65	83	O	79	70
B	66	67	P	80	66
C	67	67	Q	81	70
D	68	67	R	82	66
E	69	58	S	83	68
F	70	61	T	84	61
G	71	67	U	85	68
H	72	68	V	86	76
I	73	16	W	87	88
J	74	61	X	88	68
K	75	64	Y	89	85
L	76	61	Z	90	68
M	77	76	Blank	160	60
N	78	66			

Table 4 Ascii Code and Size of Number Character
(unit ; mm for 100 mm height)

Character	Ascii Code	Size	Character	Ascii Code	Size
.	46	30	5	53	78
0	48	80	6	54	80
1	49	20	7	55	80
2	50	80	8	56	80
3	51	78	9	57	80
4	52	78			

Table 5 Clearance for Thai Character
(unit ; mm for 100 mm height)

			Back						
			B1	B2	B3	B4	B5	B6	B7
Front	F1	Normal	10	15	25	30	30	35	30
		Thin	8	13	22	26	26	31	26
	F2	Normal	10	15	25	30	30	35	50
		Thin	8	13	22	26	26	31	44
	F3	Normal	15	20	30	30	40	45	35
		Thin	13	17	26	26	35	39	31

Ascii Code of Thai Character for;

F1 ; 46, 161, 162, 164, 166, 167, 168, 172, 173, 174,
175, 177, 178, 180, 181, 182, 183, 184, 186, 188,
190, 192, 193, 194, 195, 197, 199, 203, 205, 206,
208, 210.

F2 ; 170, 171, 176, 187, 189, 191, 200, 202, 204.

F3 ; 169, 179, 185, 201, 224, 225, 226, 227, 228.

B1 ; 167, 199, 210.

B2 ; 168, 176, 195, 208.

B3 ; 46, 161, 162, 164, 170, 171, 172, 173, 178, 179,
180, 181, 182, 184, 188, 189, 194, 197, 200, 202,
205, 206, 224, 225.

B4 ; 169, 177, 183, 185, 186, 187, 190, 191, 201, 203,
204.

B5 ; 174, 175, 192.

B6 ; 166, 193.

B7 ; 226, 227, 228.

Table 6 Clearance for English Character
(unit ; mm for 100 mm height)

		Back		
		B, D, E, F, H, I, K L, M, N, P, R, U	C, G, O, Q, S X, Z	A, J, T, V W, Y
Front	A, L, T, V, W, Y	18	18	18
	B, D, G, O, P, Q, R, S	24	18	18
	C, E, F, K, X, Z	18	18	12
	H, I, J, M, N, U	24	24	12

Table 7 Clearance for Number Character
(Unit ; mm for 100 mm height)

		Back		
		1, 5	2, 3, 6, 8, 9, 0	4, 7
Front	1	26	26	20
	2, 3, 5, 6, 8, 9, 0	26	20	20
	4, 7	20	20	7

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