

On-line Terminal Equipment for the Seat Reservation

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1. Introduction

JNR continues to expand its seat reservation system MARS since 1960 which has grown large enough to be capable of reserving 1.4 million seats per day. The central computer complex MARS 105, which is coupled to Telephone Reservation System and Integrated Travel Service System, can provide a wide variety of reservation services other than conventional seat inventory control. The terminal systems exceed 1,600 sets and an expansion scheme is now under way to meet the increasing demand for seat reservation.

It might be a powerful way for alleviating congestion at the booking windows to install additional agent sets of higher ability in the major stations. But at present, there is too little room to place them in these stations, so that installation of agent sets at the smaller stations is urgently needed. On-line reservation service instead of transaction relayed to the reservation centers by means of telephone will no doubt increase passengers' convenience and relieve congestion, but there arises an important problem of economy. One of the solutions is the use of an economized type of terminal equipment. The objectives of a desk-top agent set lie in cutting down not only the cost of equipment itself by reducing operating functions to a considerable extent, but also the appending communication cost by utilizing the existing telephone lines.

Another possible solution is introduction of vending machines to be operated by passengers themselves without any intervention of the railway personnel.

The following is an outline of the newly developed terminal equipment for the seat reservation service.

2. Desk-top Agent Set

To realize an economized type of agent set, man-machine problems such as the way of operation and substantial reduction of functions must be solved. The phase I test set was built in 1972 of which the operating functions were minimized. Input operation experiments and on-line tests were carried out to determine the operation time and the occurrence rate of the input errors, as well as to collect user's opinion through inquiries as to outside view, speed, and convenience. The phase II test set was built next year implementing the results obtained from the above evaluation tests and was also put to the

same evaluation. Improvements were satisfactorily made and the type was proved fit for practical use.

The second problem is in the characteristics of the communication lines. Conventional terminal equipment is connected to the central processor over exclusive lines. Therefore, one additional line must be provided every time a terminal is added to the system. The desk-top agent set was so designed as to permit utilization of the JNR automatic telephone exchange network, and to communicate with MARS central processor over a line which is to be switched from the telephone nearby just before communication. Thus high quality of the line for data transmission should be assured. (See Fig.1)

Special features of the phase II test set are as follows.

(1) Wider range of operating functions:

The class of services and the operating procedure are same as those of the prevailing N-type agent set. It has the advantage of not only meeting operator's convenience but also enabling common control by the reservation management program in the central processor.

(2) Communication control same as in N-type agent set:

The line from the set can be connected to the

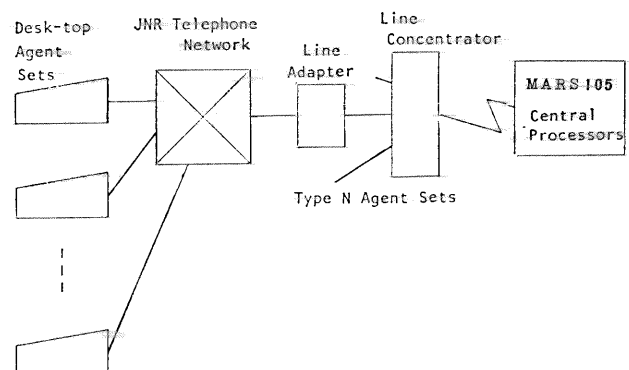


Fig.1 A Typical System Configuration

Table 1 Characteristics of the Desk-top Agent Set

Dimensions (mm)	435(width) 226(height) 620(depth)
Weight (kg)	29
Transmission Code	ISO Code 7units+1parity bit
Synchronization	Start-stop Synchronization
Transmission Speed	200bit/second
Signal Frequencies	Sending 1080 ± 100Hz Receiving 1750 ± 100Hz
Type of Printer	Line Printer
Printing Speed	1.5lines/second
Character Set	Kana Characters 45 Numerals 10 Alphabets 2 Symbols 7

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Table 2 Comparative characteristics between 2 types of vending machines

Kind of information	Type	Multiple		Single	
		Function	Operation	Function	Operation
Input information	Destination station	Up to 18 stations	○	A specified station	—
	Train name or/and train number	8trains	○	8 trains	○
	Boarding day	Reservation can be made one week in advance	○	The day of travel only	—
	Number of tickets	4 tickets at a time for adult or/and child	○	Only one for adult	—
	Fare	Corresponding to the destination station	○	Corresponding to the specified station	○
Kind of information required in the seat reservation ticket		(1) Issuing station or agent (2) Issuing date (3) Departure station ~ arrival station (4) Train name or/and train number (5) Boarding day (6) Green car (equivalent to the 1st class) (7) Car number and seat number (8) Fare (9) Departure time (10) Number of ticket (11) Issuing number			

○ mark signifies that the operation is to be made by client

existing N-type concentrators located near the primary outlets or regional centers. Thus the use of the agent set at more remote stations is possible.

(3) Input from the ten-key board:

Train names and station names are coded four decimal digits respectively. Train number, the number of seats and so forth are coded in the same manner as in N-type agent set. The contents of the input are displayed on 30 character LEDs.

Table 1 is a summarized characteristics of the set.

3. Seat Reservation Ticket Vending Machine

The vending machine is connected to the central processor over data communication lines, and is designed to be operated by passengers themselves without any intervention of the railway personnel.

In order to develop the necessary software, various factors were taken into account from the standpoint of railway administration as well as the users convenience; for example the commercial and operational regulations, the type and form of tickets, the procedure of their issuing, the construction and elements of the machine itself, etc.

The prototype machines were designed for either multiple or single operational function and were compared with each other in the evaluation tests. (See Table 2)

The single type machine was installed at Mito station on the Joban Line, and was connected to the

on-line system to be put to in-service test.

(1) Capacity of the vending machine

- (a) Kinds of operation Issuing, Testing, Summing up and Inquiry
- (b) Number of trains 8 trains (up trains of Tokiwa 1 to 4 and 8 to 11)
- (c) Section covered, selling period and number of tickets (from Mito to Ueno, the day of travel only, single for only one adult)
- (d) Fare Corresponding to the travel season and off season
- (e) Time required for issuing ticket Less than 19 seconds (3 seconds for printing and 16 seconds for internal handling)

The machine had sold about 8,100 tickets during 11-month trial period including both travel season and off season. Though minor troubles happened such as malfunction of electrical contact of push button for the train name and that of mechanical contact for the lamp showing "sold out", no major problem was encountered.

4. Conclusions

The newly developed on-line terminal equipment above described is expected to contribute to better reservation services. Further, a ticket vending system permitting use of credit cards is now under study anticipating the coming cashless era.

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