

# “ECS-777” Automatic Change Dispenser That Meets the Needs of the markets

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## ABSTRACT

In recent years, the distribution industry has faced increasing difficulty in securing labor force, and self-checkout systems are actively employed to enhance efficiency, reduce labor costs, and minimize checkout waiting times. Change dispensers in such systems are operated by customers instead of the checkout staff. Therefore, easy operation, prevention of jamming of bills and coins, and safety in use are demanded more for present change dispensers than for previous ones. To meet these market needs, Fuji Electric has developed the “ECS-777” change dispenser and the “CST35” slim coin roll stocker.

### 1. Introduction

In recent years, in companies in the distribution industry such as supermarkets, the employment of automatic change dispensers that can count and dispense cash automatically has been increasing to ensure more strict cash management, save labor and minimize checkout time at the register.

Figure 1 shows the automatic change dispensers developed by Fuji Electric thus far. Since the release of its first coin change dispenser in 1993, Fuji Electric has been delivering change dispensers in various distribution industries including major general supermarkets. Since then, needs for the integration of coin and bill units and stricter cash management have been increasing. In 2006, we released the “ECS-07,”

which was capable of deposit confirmation operation\*1 and would be the prototype of the present change dispensers. Cumulative shipments of the “ECS Series” have reached approximately 110,000 units. Its ease of use and reliability are highly regarded in the market. Moreover, this series can link information with the optional coin roll (spare coins for change) stocker to achieve sophisticated cash management.

### 2. Changes in Market Needs and Specifications Demanded of Change Dispensers

In recent years, the distribution industry has found it increasingly difficult to secure a labor force so that managers are forced to hire checkout staff through outsourcing.

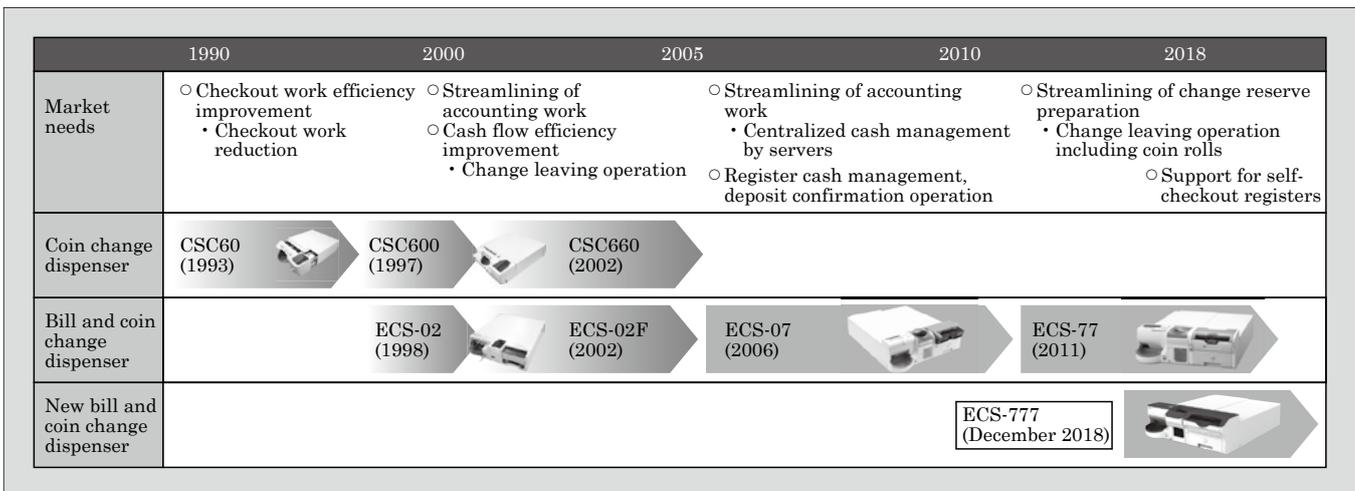


Fig.1 Automatic change dispensers developed by Fuji Electric

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\*1: Deposit confirmation operation refers to the operation where a change dispenser counts deposited money.



Fig.2 Semi-self-checkout register and automatic change dispenser using in self-checkout system

Under such circumstances, self-checkout systems using self-service machines such as self- or semi-self-checkout registers have been actively employed to enhance efficiency, reduce labor costs, and minimize checkout waiting time (see Fig. 2).

Unlike those used for conventional cashier-staffed checkout registers, automatic change dispensers used for self-checkout systems are operated by general customers instead of checkout staff. Therefore, demands for user-friendliness, resistance to bill and coin jamming, and safety in use are even higher.

### 3. “ECS-777” Automatic Change Dispenser

To achieve such a self-checkout system, Fuji Electric has developed the “ECS-777” automatic change dispenser on the basis of our main model “ECS-77” with more advanced functions (see Fig. 3).

Its development concept is to achieve a higher perfection level as an automatic change dispenser that can be used also for a self-service machines\*2 to enhance the efficiency of cash management jobs and support

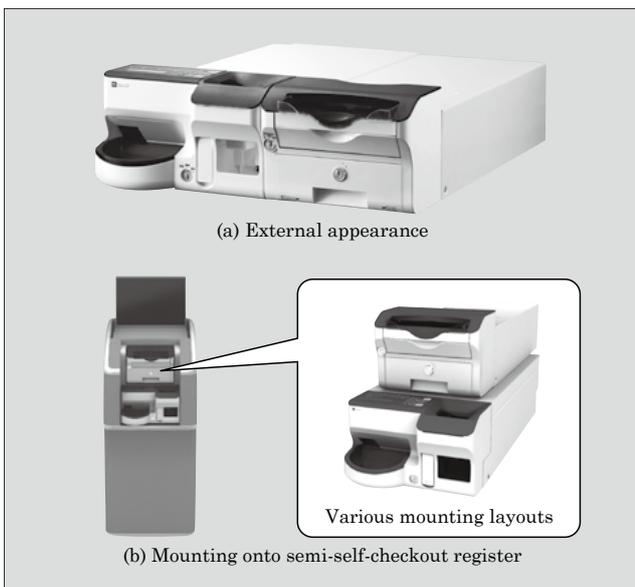


Fig.3 “ECS-777” automatic change dispenser

Table 1 Specifications of “ECS-777”

Item	Specification	
	Coin unit	Bill unit
Type	CSC777	CSB777
Deposit identification	Batch deposit, electronic identification	
Deposit port capacity	50 coins	25 bills (Japanese official bank note)
Acceptance speed	Approx. 6 coins/second	Approx. 4 bills/second
Discharge speed	Approx. 3 seconds/transaction (999 yen with minimum value of coins)	Approx. 3 seconds/transaction (9,000 yen with minimum value of coins)
Outlet port capacity	60 coins	20 bills
Storage box capacity	1 yen, 10 yen and 100 yen: Approx. 170 coins for each 5 yen and 50 yen: Approx. 160 coins for each 500 yen: Approx. 110 coins	1,000 yen: Approx. 250 bills Mixed storage box (2,000 yen, 5,000 yen and 10,000 yen): Approx. 100 bills 10,000 yen (collection box): Approx. 220 bills*
Automatic audit function	Provided	
Temporary storage unit	Provided**	
Collecting method	Outlet port and overflow port	Collection box and outlet port
Operation indicator	Storage status panel and operation switches	
Dimensions***	W270 × D600 × H130 (mm)	W220 × D600 × H130 (mm)
Mass	Approx. 16 kg	Approx. 19 kg
Operating power supply	100 V AC 50/60 Hz	
Power consumption	During operation (max.): Approx. 140 W, Standby: 20 W, Energy saving mode: Approx. 6 W	

\* Rechecked circulated notes

\*\* Only when deposit confirmation (prior deposit) operation is used

\*\*\* Excluding protrusions

smooth accounting at retail stores. We combined improved operability and high-quality design and pursued ease-of-use through intuitive operation. Table 1 shows the main specifications of the ECS-777.

#### 3.1 Improved usability

Self-checkout systems are operated by various users in a wide range of age groups, instead of trained checkout staff, to pay or receive cash. It would be best if even unfamiliar users could handle cash safely and securely through intuitive operation. To attain such a goal, we improved the usability of the ECS-777 on the basis of the following points (see Fig. 4):

- (1) Navigational guide with deposit support lamps

The deposit support lamps light up at the timing of payment so that the user can find the deposit ports

\*2: There are some limitations on the use with self-service machines.



Fig.4 Improved usability

quickly and continue operation.

(2) Improved bill insertion with bill guide

A bill guide controls the position of bills during transfer. Even an unfamiliar user can insert bills without the machine jamming.

(3) Improved coin handling with large-diameter coin outlet tray

The well-established large-diameter coin outlet tray of conventional models is employed to allow users to take the coins in their change easily.

(4) Dispensing support lamps to show remaining change

The dispensing support lamps directly illuminate the dispensed coins and bills to prevent users from forgetting to take their change.

### 3.2 Improved operation efficiency

The distribution industry has found it increasingly difficult to secure a labor force and it needs to minimize the labor required for operating change dispensers, such as replenishing and collecting coins used for change and troubleshooting. For the ECS-777, we improved various functions to improve the operation efficiency:

- (a) Audit function capable of automatic cash inventory
  - (b) Coin overflow function to reduce collection work
  - (c) Large-capacity bill collection box to reduce bill collection work
  - (d) Improved reliability to reduce downtime
- (1) Audit function capable of automatic cash inventory

The amount of cash (number of coins and bills) stored in the change dispenser is managed so that it always agrees with the amount counted by the dispenser. If, however, a badly defective coin or bill gets stuck, some cash in the dispenser may have to be taken out so that the machine can operate again. In such case, the counted amount may not agree with the amount actually stored in the machine. To ensure strict cash management and prevent such a problem, operators should re-count the cash when checkout staff changes at the end of the day. Additionally, in recent years, companies have increasingly performed a change-leaving operation, where the change reserve to be used the next day is left in the machine and the remaining cash is collected. In such a case, the change reserve should be re-counted.

With the ECS-777, the automatic audit function, which has been well-received in conventional models, has become more sophisticated to enable automatic cash inventory. The automatic audit function can automatically re-count the cash in the storage box without the need to temporarily take it out from the dispenser, resulting in a significant improvement in operation efficiency (see Fig. 5, operations A to C). In the class of change dispensers without requiring a special register stand, this automatic audit function is Fuji Electric's original one and is not found in other companies' products.

When, for example, the time required for cash inventory is 15 minutes per day, this function can save approximately 91 hours a year. When the hourly wage of an employee is 850 yen, the automatic audit function is effective in reducing cost by approximately 780,000 yen a year in an average store with 10 checkout registers.

(2) Coin overflow function for reducing collection work

During busy hours of a store with many transactions, the coin storage box of an automatic change dispenser sometimes becomes full. In such a case, automatic change dispensers temporarily stop working until the checkout staff collects the coins. For self-service

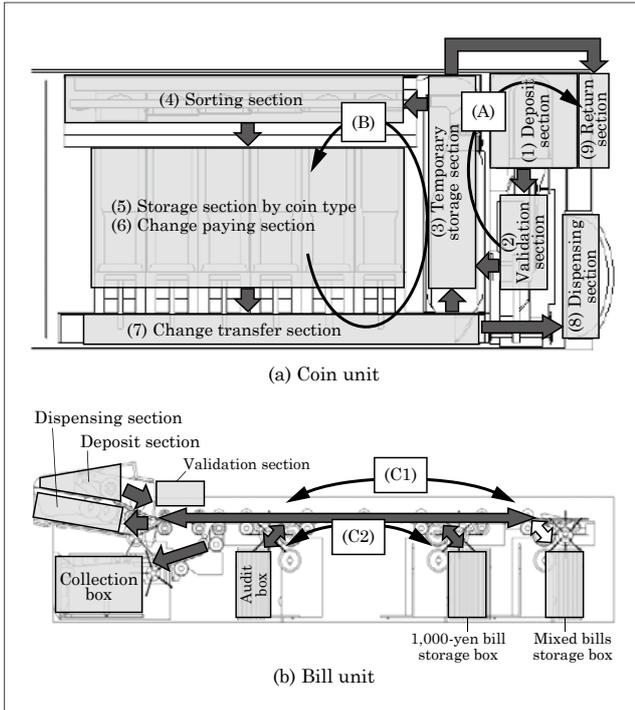


Fig. 5 Unit configuration of change dispenser and overview of automatic audit function

machines, it is necessary to minimize the downtime of the dispenser due to the coin storage box being full during busy hours.

Fuji Electric therefore developed a coin overflow function for the ECS-777 (see Fig. 6). This function collects coins in the storage box as overflow coins. This lightens the collecting workload of checkout staff and enables the machine to continuously operate without stopping.

- (3) Large-capacity bill collection box to reduce bill collection work

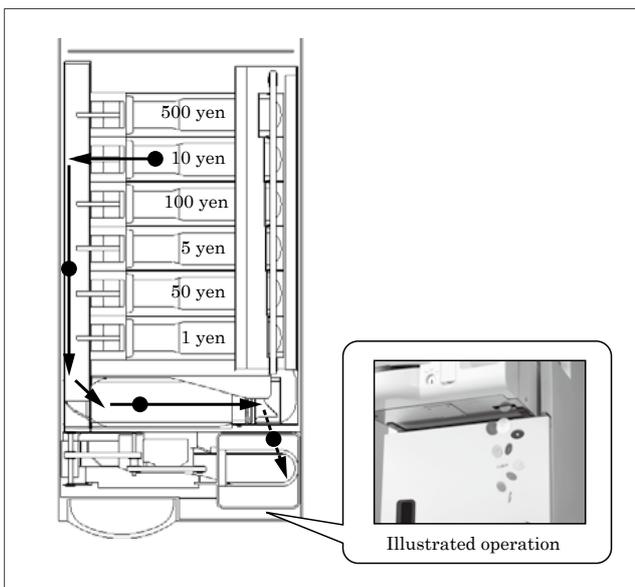


Fig. 6 Coin overflow function

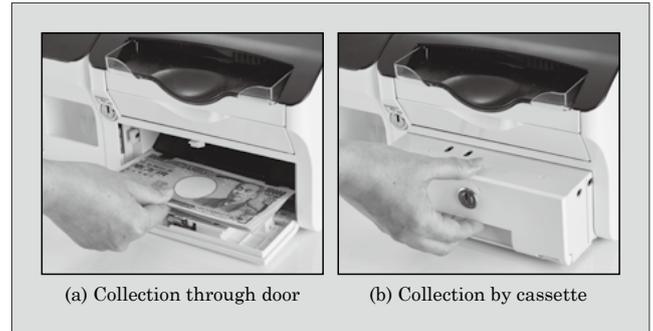


Fig. 7 Large-capacity bill collection box

As is the case with the coin overflow function, bills should be sent to a collection box when the storage box becomes full to minimize the downtime. The ECS-777 is equipped with a large-capacity bill collection box as shown in Fig. 7. The bill storage capacity has increased by 10% compared with conventional models, to 220 from 200. Such large-capacity design eliminates any worry about collection or replenishment until closing time (the bill storage capacity indicates the number of rechecked circulated notes\*3).

- (4) Improved reliability to reduce downtime

With the guide at the bill deposit port and position control with software, the ECS-777 has greatly improved the bill jamming rate compared with conventional models. This significantly reduces the downtime while lightening the workload of operators.

#### 4. “CST35” Slim Coin Roll Stocker

As shown in Fig. 3, self-service checkout operation often uses the coin unit and bill unit stacked vertically. Conventional coin roll stockers required a large installation area and so they could not be mounted on self-service machines in which units are supposed to be stacked vertically. To solve this problem, Fuji Electric developed the slim coin roll stocker “CST35” that can be mounted on self-service machines (see Fig. 8 and Fig. 9). Table 2 shows the main specifications of the CST35.

##### 4.1 Space saving design

The CST35 was designed to have the same width as the coin unit so that it could be mounted onto a self-service machine while maintaining the same coin roll identification functionality as that of conventional models. We greatly reduced the size of the internal electromagnetic lock mechanism compared with the conventional models and also miniaturized the control board by approximately 50% to achieve the industry’s smallest-class machine and save space.

\*3: Rechecked circulated notes are strapped bills that were circulated, returned to a bank and rechecked.

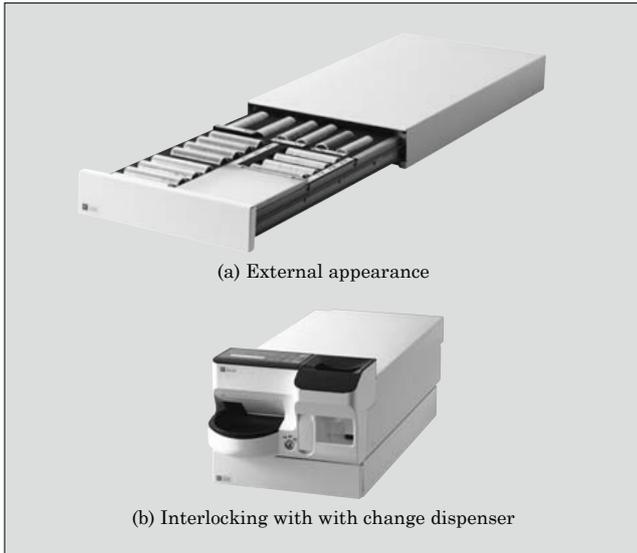


Fig.8 "CST35" slim coin roll stocker



Fig.9 Example of mounting onto semi-self-checkout register

Table 2 Specifications of "CST35"

Item	Specification	
Type	CST35	
Dimensions	W270 × D550 × H65 (mm)	
Capacity	500 yen coin roll	2 rolls
	50 yen coin roll	2 rolls
	100 yen coin roll	4 rolls
	10 yen coin roll	4 rolls
	1 yen and 5 yen coin rolls (shared)	2 rolls
	Storage box for gift certificates and other notes	Free space
Spare coin pocket		
Display	None	
Operation	Electromagnetic lock through POS connection	
Coin roll identification function	Electronic identification function*	
Interface	Notification to POS through change dispenser	
Mass	Approx. 8 kg	
Operating power supply	24 V DC (supplied from change dispenser)	

\* Excluding free space

#### 4.2 Power supplied from change dispenser and power saving control

We designed the internal control unit to save on power consumption and receive power supply from the change dispenser. This has achieved a simplified power supply system.

The power supply can now be controlled from the change dispenser. By operating the stocker with the power save mode of the dispenser, we reduced the standby power by approximately 80%.

#### 4.3 Coin roll management function and flexible tray layout

The CST35 has pocket-shaped storage trays to store coin rolls. Each tray is equipped with an identification function based on the combination of a magnetic sensor and an optical sensor. By not only counting the number of coin rolls being stored but also identifying the coin type of the roll, it prevents any discrepancy in the amount due to improper storage of coin rolls. Moreover, the CST35 can send information on the counted amount to the change dispenser. This allows strict cash management over the entire system including the change dispenser and coin roll stocker.

There is a tray as spare free space in the coin roll stocker. It can be used for objects that cannot be stored in the change dispenser such as deformed coins, torn bills or gift certificates received from customers, and this improves usability.

### 5. Postscript

This paper described the "ECS-777" automatic change dispenser that meets the changing needs of the market. The distribution market, where automatic change dispensers are used, includes companies having many different business types and styles and their demands have become diversified. Fuji Electric's change dispensers have been quickly responding to needs for the introduction of self-checkout systems in the market and lead the industry in the number of units mounted on self-service machines.

In the distribution industry, where cashless settlement is expected to increase, the amount of cash handling might possibly decrease. On the other hand, we expect to see growing needs for labor savings and automation of cash handling work. In order to further expand the use of automatic change dispensers, at Fuji Electric we will continue responding to the change in customers' needs and increase customer value by improving our customer service ability and product usability in the future. We will also focus on not only the Japanese market but also overseas markets to develop the business on a global scale.



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