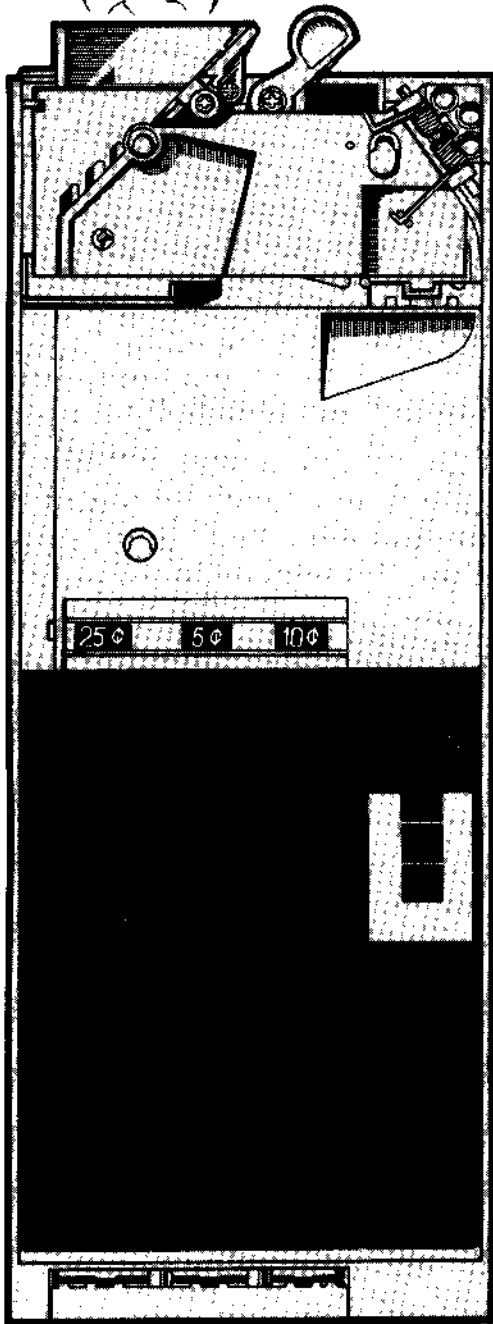


**CONLUX**

Single Price 3Tube Coin Changer



# USL-1 Series



## Service Manual

**CONLUX USA CORPORATION**

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## 1. OUTLINE

The USL-1 series is a single price electronic coin changer which accepts U.S. 5¢, 10¢, 25¢ and \$1 coins with vend price settings in 5¢ increments from 5¢ to \$3.15 and is capable of interfacing with \$1 Bill Validators.

### Warranty

CONLUX USA CORPORATION warrants all new equipment (coin changers and bill validators) sold by it to be free from defective material and workmanship. Conlux will repair or replace (at its option) any part of the equipment which proves to be defective in materials or workmanship within a period of twenty-four (24) months from the date of original shipment from Conlux USA. This warranty includes salt water damage for twelve (12) months only from the date of original shipment from Conlux USA.

Other conditions applying to this warranty are as follows:

1. This warranty will not apply to any equipment which has been, in Conlux's opinion, subject to: accident, abuse, misuse, neglect, improper installation, vandalism, or improper maintenance or repair by unauthorized service personnel; or is found to include parts other than genuine Conlux USA-supplied parts or options.
2. Conlux will not be responsible for any expense incurred by the purchaser incidental to the repair or replacement of equipment covered by this warranty.
3. Freight charges to send the equipment to Conlux or a Conlux-appointed Independent Authorized Service Center for warranty service will be the responsibility of the purchaser.
4. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES ORAL OR WRITTEN, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, WARRANTIES OF FITNESS OF PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF CONLUX. CONLUX NEITHER ASSUMES NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT, ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH THIS WARRANTY POLICY.
5. LIABILITY TO CONLUX USA AND ITS APPOINTED INDEPENDENT AUTHORIZED SERVICE CENTER IS LIMITED TO THE REPAIR OR REPLACEMENT, AT THEIR OPTION, OF DEFECTIVE PARTS WITHIN THE CONLUX USA PRODUCT(S) AND DOES NOT INCLUDE INCIDENTAL AND CONSEQUENTIAL DAMAGES.

**2. GENERAL SPECIFICATIONS** Specifications and design are subject to change without notice.

Items	USL-1 Series
Price Setting Range	5¢ ~ \$3.15 (5¢ increments)
Coins Accepted	U.S. 5¢, 10¢, 25¢, \$1 coins
Coins Paid Out	5¢, 10¢, 25¢ coins (automatic replenishment)
Coin Tube Capacity	5¢ coins -- approx. 70 coins 10¢ coins -- approx. 100 coins 25¢ coins -- approx. 80 coins
Change Payout	DC Solenoid (5, 10, 25¢ tubes)
Power Supply	AC 117V ± 10V, 60Hz
Insulation Resistance	20MΩ or greater
Operating Temperature Range	+5° F ~ 140° F
Rated Power Consumption	14W (Wait State) 40W (Operate State)
Weight	5 Lbs.
Function	Overprice Function, Inventory Function
Standard Feature	Bill Validator Harness

**3. DETAILED SPECIFICATIONS****1 Payout System**

1.1 Types of Change      5¢, 10¢, 25¢ coins (automatic replenishment)

1.2 Payout System      DC Solenoid

**1.3 Coin Tube Capacity**

5¢ coins — approx. 70 coins automatic replenishment

10¢ coins — approx. 100 coins automatic replenishment

25¢ coins — approx. 80 coins automatic replenishment

**1.4 Change Payout Method**

When the total amount of the coins accepted exceeds the vend price, change is paid out corresponding to the vend price.

(Overprice function)

1.4.1 The decision on the types and number of coins paid out for change is made in accordance with the availability of coins in the change tubes.

1.4.2 The payout order is 25¢ coins → 10¢ coins → 5¢ coins.

**2 Empty Signal**

2.1 If the quantity of coins in the 5¢ tube is lower than the predetermined number, the 5¢ out of change signal is sent.

**2.2 Empty Signal Sensing System**

Out of change sensing is accomplished by means of a L.E.D. sensor mounted in the bottom of the change tube and an empty quantity counter which stores the number of coins in the change tube in memory.

The out of change signal is sent when the following conditions exist.

When the L.E.D. senses there are no coins and there are fewer than 8 coins registered on the empty quantity counter.

### **3 Vend Signal**

3.1 When the number of accepted coins equals or exceeds the set vend price, a vend signal is sent to the vending machine.

3.2 After the vend signal is sent and the C.R.E.M. signal has been restored, the coin changer returns to the wait state. (If change is paid out, this occurs after payout.)

#### **3.3 Sales Method**

##### **3.3.1 Normal Mode**

Until the value of accepted coins reaches the vend price, the accepted coins will be returned when the coin return lever is pushed (escrow to vend). When the value of the accepted coins has exceeded the vend price, if there is a lack of change, the coin changer will not send a vend signal, and the accepted coins will automatically be returned.

##### **3.3.2 Forced Sales Mode**

The accepted coins can not be returned. When the value of accepted coins exceeds the vend price, a vend signal will be sent independent of the presence or absence of change.

### **4 Relation between Vend Price, Accepted Coins, and Change Paid Out**

#### **4.1 Sales with Accepted Coins Requiring no Change**

When the combination of accepted coins as one group equals the set vend price, a vend signal is sent for each group. (Normal and forced sales mode)

#### **4.2 Sales with Accepted Coins Requiring Change**

##### **4.2.1 When there is Change**

When the combination of accepted coins as one group exceeds the set vend price, a vend signal is sent for each group, and change is paid out according to the vend price.

(Normal and forced sales mode)

##### **4.2.2 When There is Insufficient Change**

•Normal mode → When the value of accepted coins exceeds the vend price, no vend signal is sent and the accepted coins are automatically returned.

•Forced sales mode → When the combination of coins as one group is accepted, a vend signal is sent for each group, and change according to the vend price is paid out under the assumption there is change.

### **5 Coin Rejection**

In the following cases, inserted coins are rejected.

(1)When the power is off (power failure).

(2)When the amount of the coins accepted reaches the vend price.

(3)During a vend operation, when change is being paid out, or when the power is first switched on (for approximately 2 seconds).

(4)When the C.R.E.M. signal is cut off.

(5)When the same number of coins accepted continuously reaches the following limits.

5 ¢ coins ...40 coins

10¢ coins ...20 coins

### **6 Escrow Function(Up To The Vend Price)**

6.1 All genuine coins that have been accepted are stored in the change tubes.

6.2 Pressing the coin return lever causes the escrow function to operate, returning the coins in the denominations which were accepted.

However, if a \$1 coin is accepted, 25¢, 10¢ or 5¢ coins will be returned instead of the \$1 coin.

★ When a \$1 bill validator (NB-10 series) is installed, these specifications change, as shown in the following table.

	Item Changed	Coin Changer Only	Coin Changer and \$ 1 Bill Validator Combination
1	Currency Used	5 ¢, 10¢, 25¢ and \$1 coins	5 ¢, 10¢, 25¢ and \$1 coins, and \$1 bills.
2	Escrow Function	See item 6.2	(Addition) A \$1 bill inserted into the bill validator is not returned when the return lever is pressed, instead, change is returned in combinations of 5¢, 10¢ and 25 ¢ coins.

(Note)

When the coin changer is out of 5¢ coins for change, the empty light is on and \$1 bill insertion is prevented.

## 4. MODEL NO.

The product model name is shown in the table below. Select the model which you require from this table.

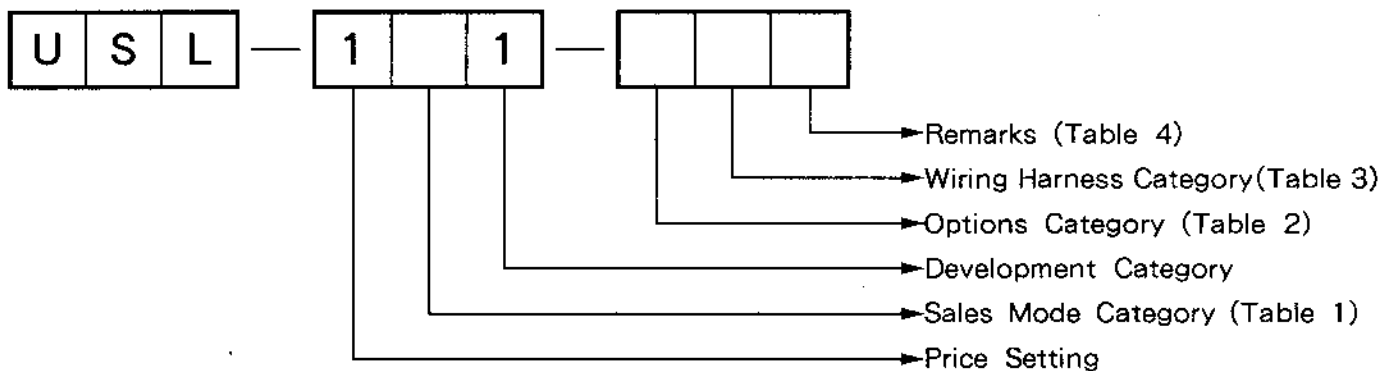


Table 1 Sales Mode category

	Normal mode	Forced sales mode
0	✓	
1		✓

Table 4 Remarks

L	Left Side Drain Spout
F	Front Drain Spout

Table 2 Option category

	Drain Tube	Attached Parts
0	✓	✓
2		

Attached Parts

L	Drain Spout (2) Rubber Elbow
F	Drain Spout Rubber Elbow

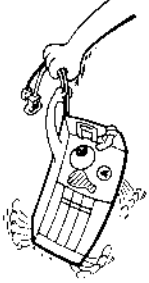
Table 3 Harness category

Harness type	Power supply harness	NB harness
0	Power supply harness (2)	
1	Power supply harness (4)	✓

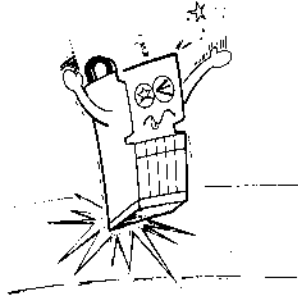
## 5. HANDLING AND INSTALLATION

### 5-1 Handling Instructions

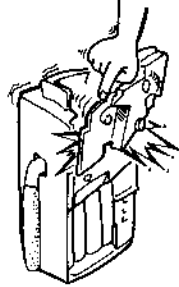
Do not carry the coin changer by the harnesses.



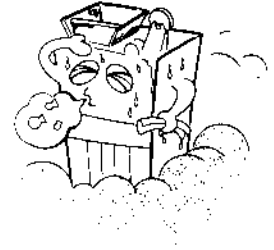
Do not drop the coin changer.



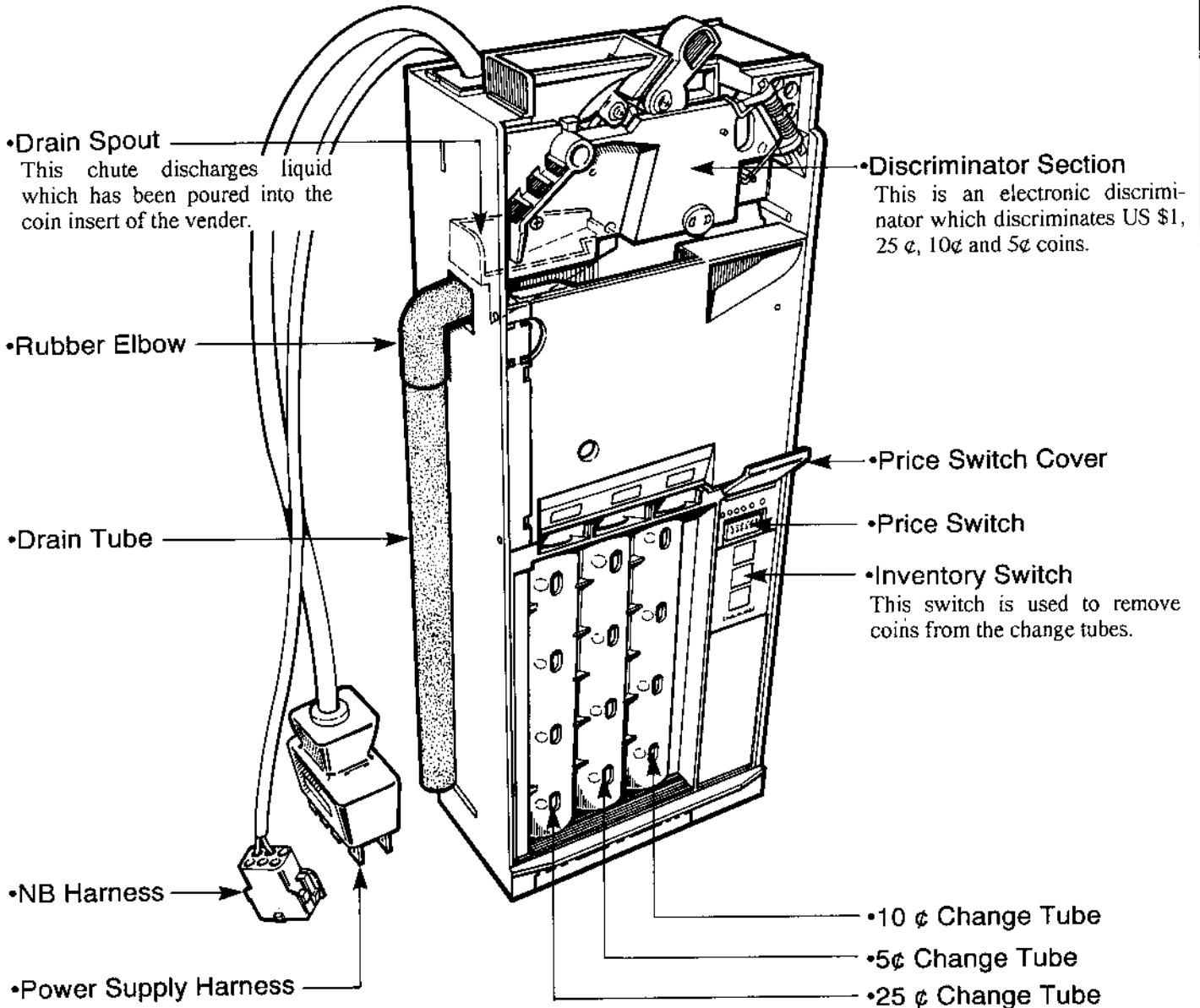
Handle the gate assembly gently when opening and closing by hand.



Store the coin changer in a dry, clean location.

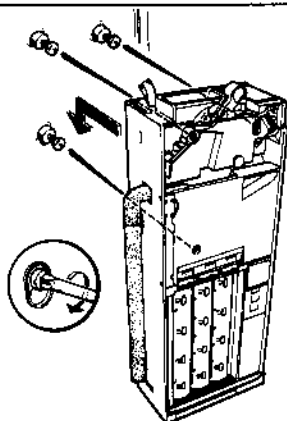


### 5-2 Names of The Parts and Their Functions



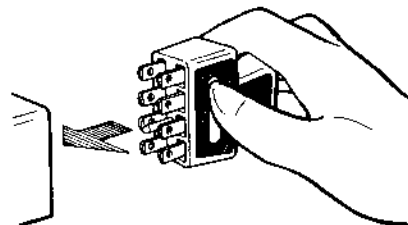
### 5-3 Installation Procedure

1. Attach the changer by aligning the key holes with the mounting screws on the vending machine, and fasten securely.



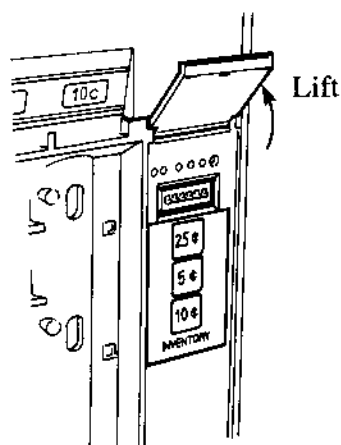
**NOTE:**  
THE DISCRIMINATOR  
CAN NOT BE REMOVED  
FROM THIS COIN  
CHANGER.

2. Plug the 8 pin Jones plug into the vending machine socket.

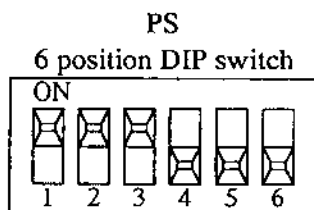


### 5-4 Vend Price Setting

The vend price is set by changing the combination on the Price Switch (PS) mounted on the change tube above the inventory switches. (Lift the price switch cover.)



The DIP switches have the following values.



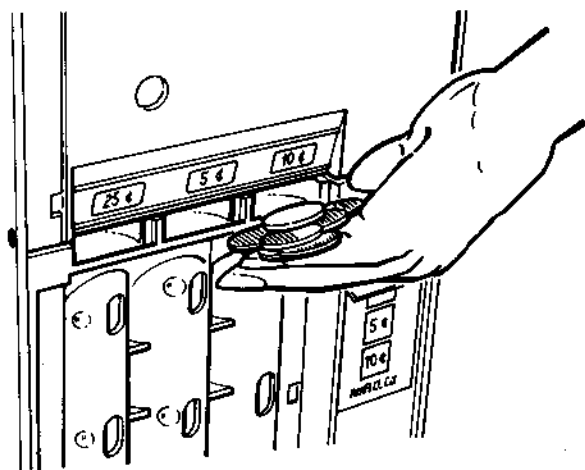
DIP Switch Label	Value
1	5 ¢
2	10 ¢
3	20 ¢
4	40 ¢
5	80 ¢
6	160 ¢

Example: To set the vend price at 35 ¢, turn on switches 1, 2 and 3 of the DIP switch.

$$5 \text{ ¢} + 10 \text{ ¢} + 20 \text{ ¢} = 35 \text{ ¢}$$

### 5-5 Loading The Change Tubes

•Loading 5¢, 10¢ and 25¢ Coins



Quarters  
25¢



Nickels  
5 ¢



Dimes  
10¢

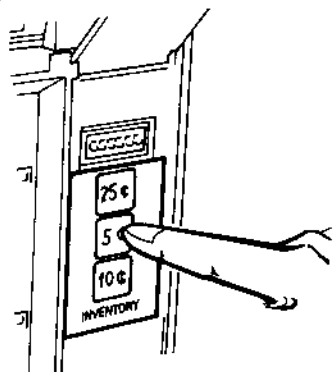


Note:

- ① If a coin drops in and stands on end, correct it.
- ② Be careful not to load bent coins.



### 5-6 Change Inventory



In Regard to the Coins Paid Out Manually

5 ¢ coins → When the 5¢ inventory switch is pushed, 5¢ coins are paid out automatically.

10¢ coins → When the 10¢ inventory switch is pushed, 10 ¢ coins are paid out automatically.

25¢ coins → When the 25¢ inventory switch is pushed, 25 ¢ coins are paid out automatically.

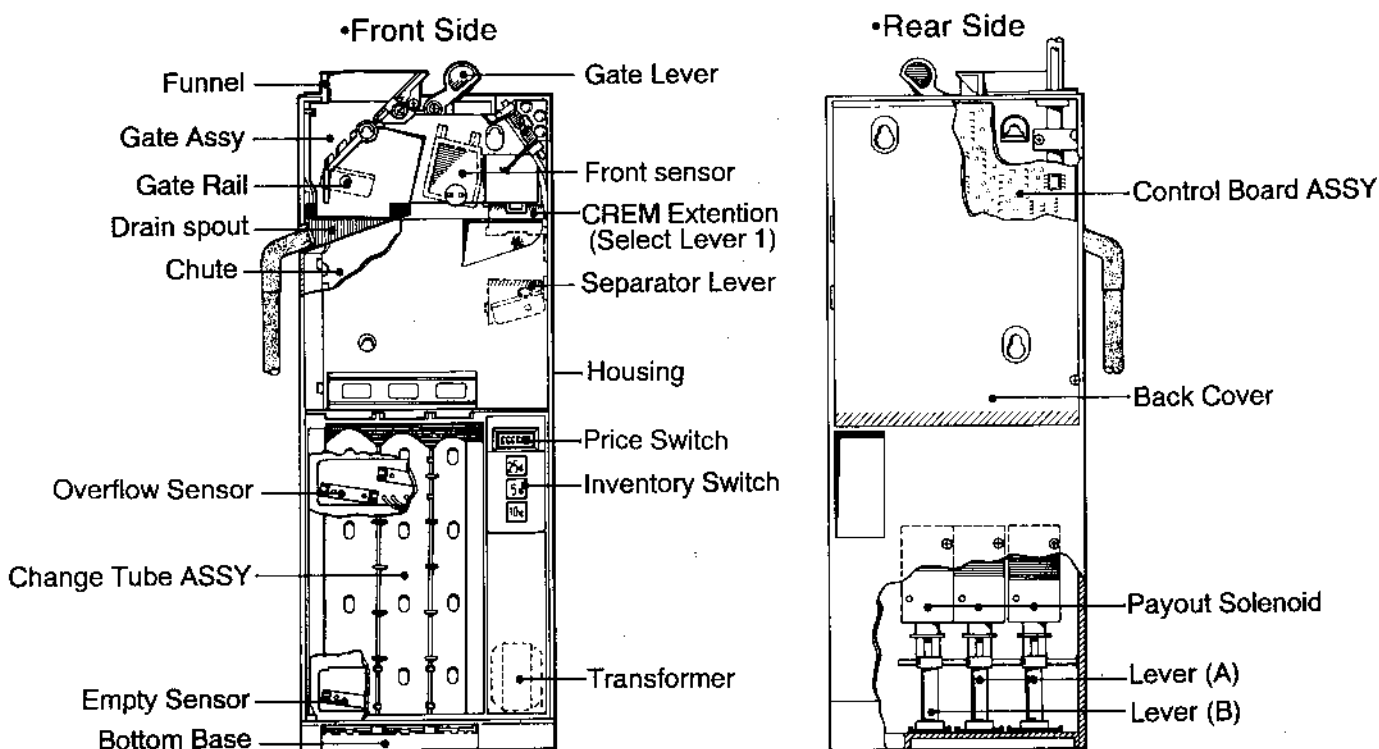
※ When the inventory switch is pushed ON, the payout solenoid operates. Pressing the inventory switch again will shut OFF the payout solenoid.

### 5-7 Vend Test

- ① Set the price switch to the desired vend price.
- ② Plug the 8pin Jones plug into the vending machine socket.
- ③ Load 20 → 5¢ coins in the change tube. The empty light on the vending machine should be off.
- ④ Insert different combinations of 5¢, 10¢ and 25¢ coins through the coin insert of the vending machine. The vend relay should energize each time the vend price is reached, and the coin changer should payout change if needed.
- ⑤ Insert 1 → 5¢ coin. Press the coin return lever, a 5¢ coin should be returned.
- ⑥ If a \$1 Bill Validator is installed, insert a \$1 bill. The coin changer will energize the vend relay and payout the correct change.
- ⑦ Operate the inventory switches to empty the change tubes.

## 6. CONSTRUCTION AND DESCRIPTION

### 6-1 Description of Parts



## 6. CONSTRUCTION AND DESCRIPTION

### 6-2 Flow of Coins

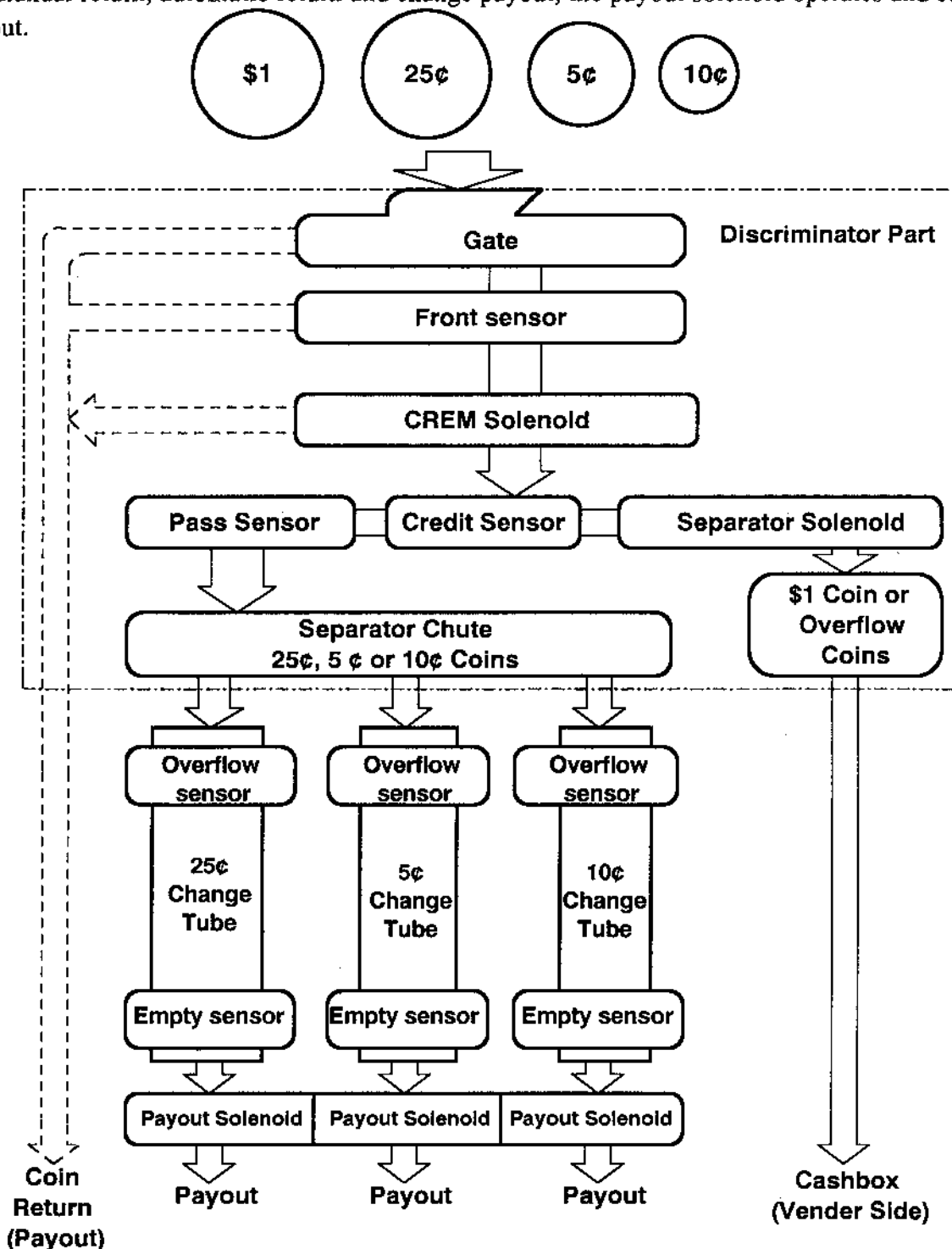
Coins are discriminated by the front sensor. When they are judged to be valid coins, the CREM solenoid operates and the coins are guided past the credit sensor which counts the coins.

In the case of \$1 coins, a separator solenoid operates at the same time. By means of a separator chute, the coins are guided to each coin tube and are stored for payout.

Defective coins are returned automatically. Those coins which have stopped in the gate can be ejected to the coin return chute by operating the return lever.

If the overflow sensor detects coins in a tube, those coins are guided to the cashbox in the vending machine.

During manual return, automatic return and change payout, the payout solenoid operates and each coin is paid out.

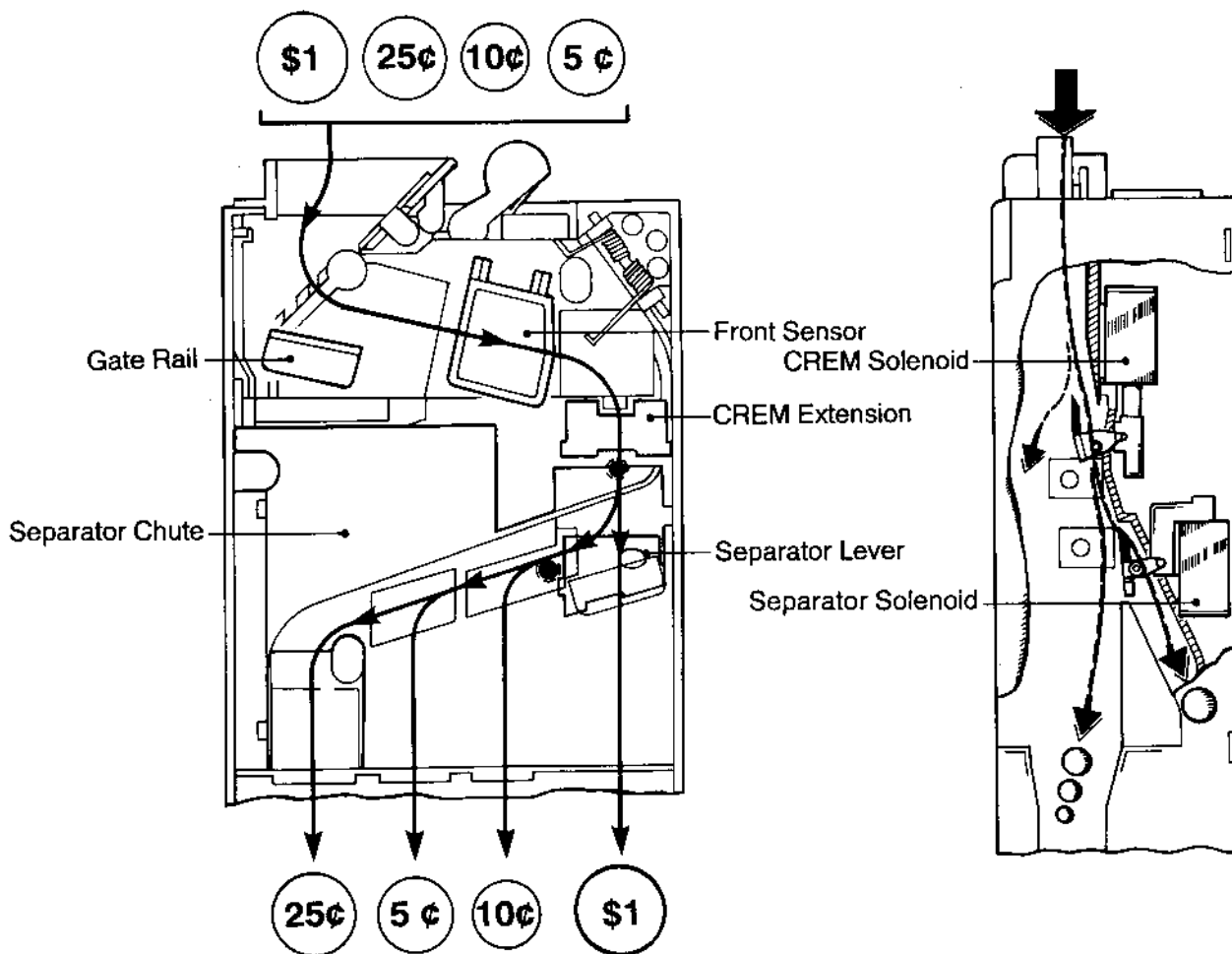


## 6-3 Discriminator Coin Paths

The electronic coin discriminator section judges whether 5¢, 10¢, 25¢ and \$1 coins are genuine or fake, separates them and credits the good coins.

Item	Content
Coins Accepted	U.S. 5 ¢, 10 ¢, 25 ¢, \$ 1 coins
Discrimination Method	Magnetic flux transmission-receiving system
Good/Bad Coin Separator Mechanism	Yes (CREM Solenoid operates when a coin is judged to be good.)
Coin Separator Mechanism	Yes (A solenoid separates \$ 1 coins from 5 ¢, 10 ¢ and 25 ¢ coins. The separator chute guides each coin to the correct coin tube.)
Anti Stringing	Yes (By the housing hook.)
Trouble Sensor Function	Yes (Jamming of coins between the front sensors and coin sensors.)

### Discriminator Coin Paths

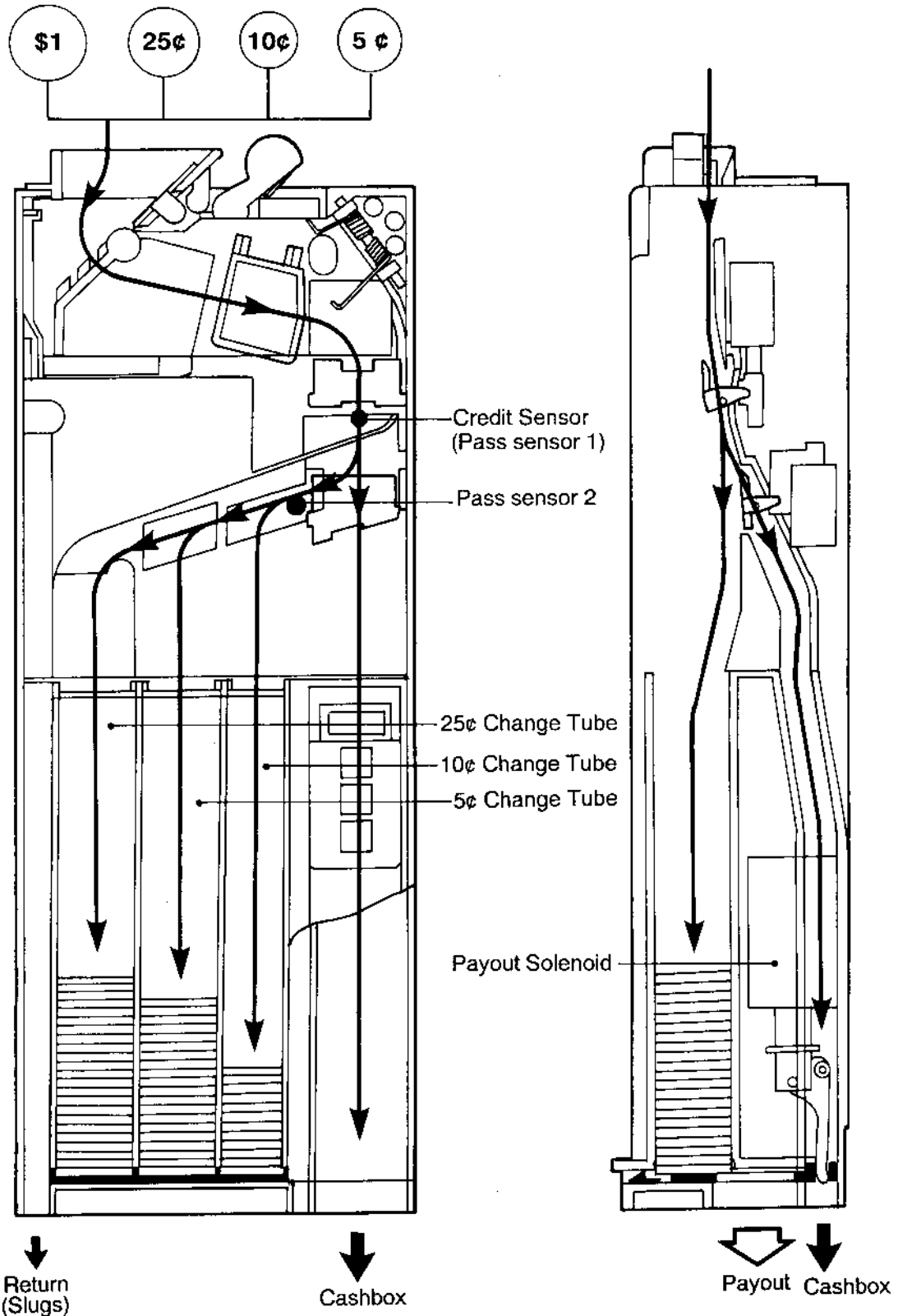


## 6. CONSTRUCTION AND DESCRIPTION

## 6-4 Coin Paths

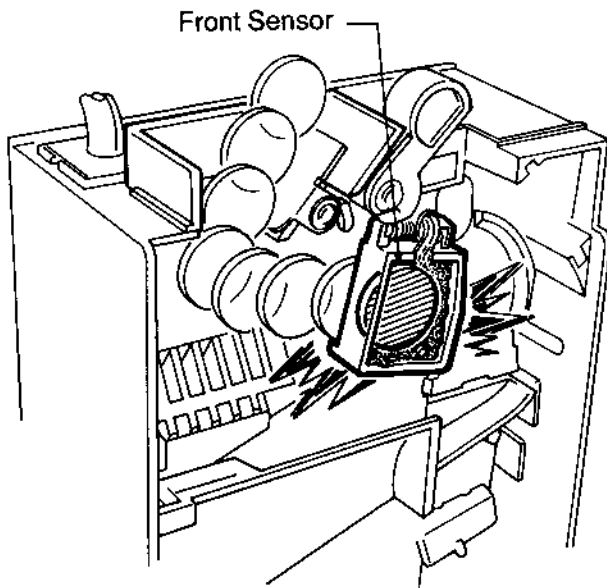
Coins which are accepted and pass the credit sensor are guided to the change tubes or cash box (\$1 coin).

If an overflow sensor detects coins in a tube, the detected coins are guided to the cashbox in the vending machine. The change paid out by payout solenoids, defective coins (including slugs), etc. are returned to the coin return cup of the vending machine.



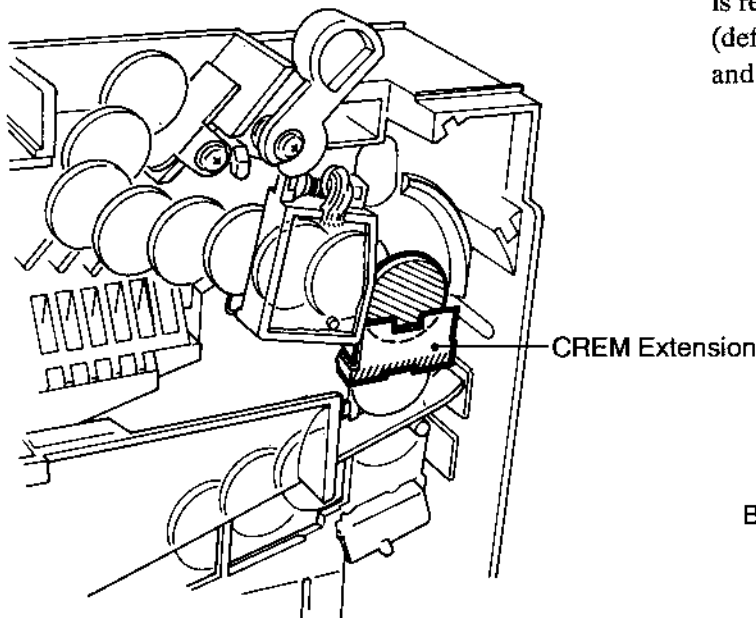
## 6-5 Discrimination Method

### 6-5-1 Discrimination by Metal Content and External Shape (Diameter)

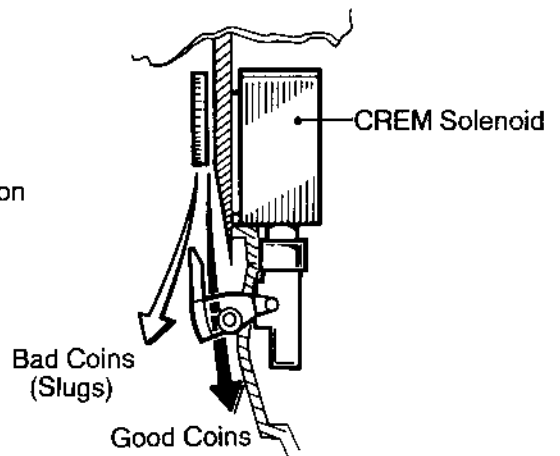


When coins pass between the front sensors, the metal content and diameter of the coins are checked and compared with the preset reference values of the control board. A coin is judged to be genuine only when these values match.

### 6-5-2 CREM Solenoid and CREM Extension

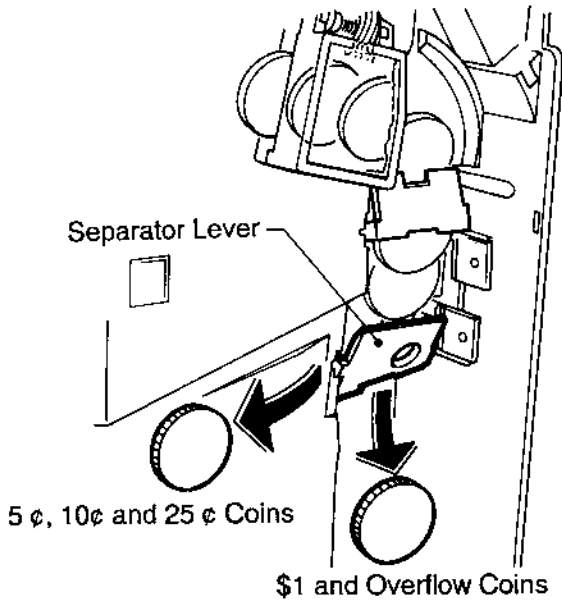


If a coin is judged to be good, the CREM solenoid operates, the CREM extension opens and the coin is received. If a coin is judged to be bad (defective), the CREM extension remains closed and the coin is guided to the return chute.

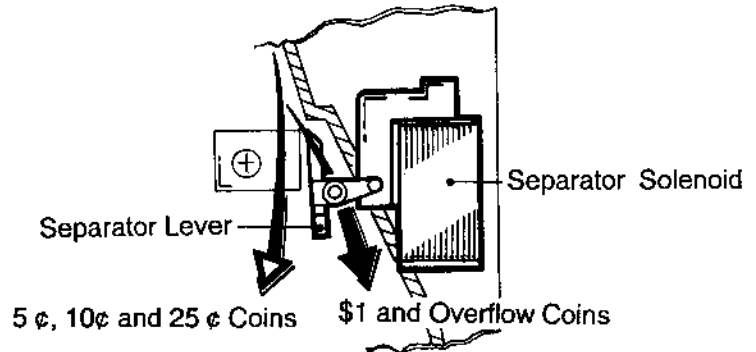


## 6. CONSTRUCTION AND DESCRIPTION

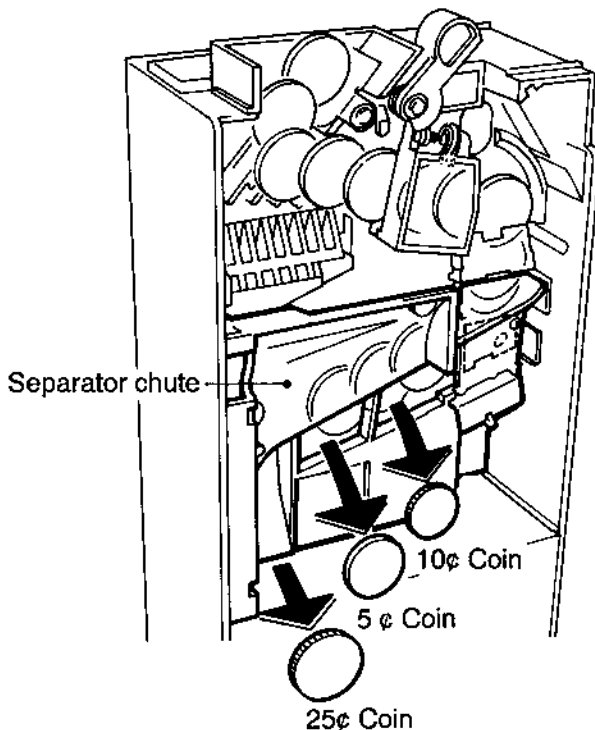
### 6-5-3 Separator Solenoid and Lever



When 5¢, 10¢ and 25 ¢ coins are accepted, the separator solenoid operates and a chute rail guides the 5 ¢, 10¢ and 25 ¢ coins into their respective coin tubes. \$1 and overflow coins drop to the cash box in the vending machine.



### 6-5-4 Separation of 5 ¢, 10¢ and 25 ¢ coins by the Separator Chute

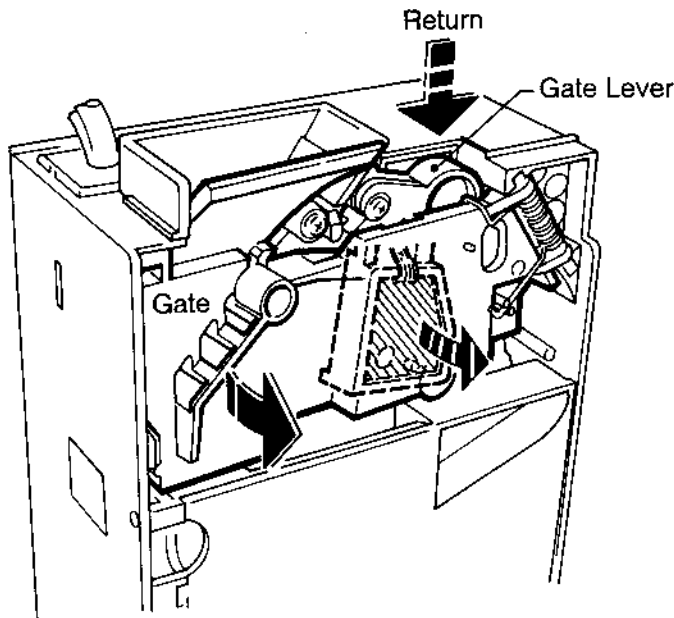


25¢ coins roll along the rail in the separator chute and are guided to the 25¢ coin tube.

5 ¢ and 10 ¢ coins roll along the same rail in the separator chute but drop off along the way and are guided into their coin tubes.

## 6-6 Operation of Switches, Sensors and Parts

### 6-6-1 Gate Lever Assembly and Related Parts

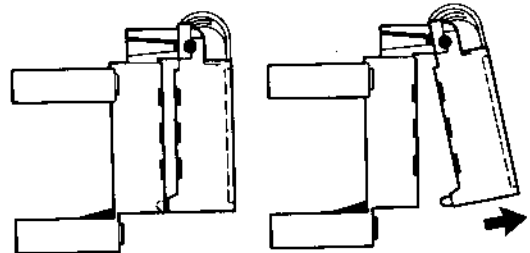


When the return lever on the vending machine is operated, it pushes the gate lever down and the gate opens.

If there are any defective coins, etc. stopped behind the gate, this operation causes them to be guided into the coin return chute. In addition, the movement of the front sensor causes the cancel signal to be sent. (escrow)

#### •The movement of the Front sensor

Normal Position    Gate Lever Depressed

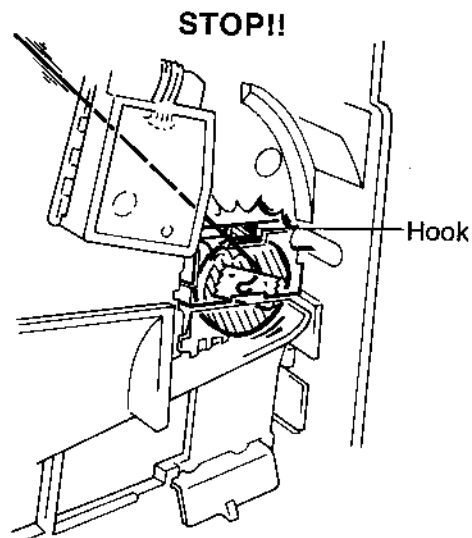
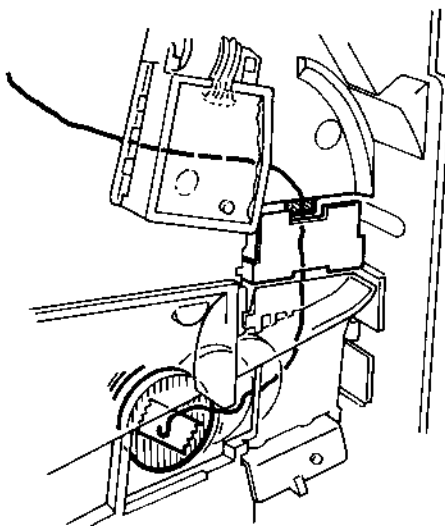


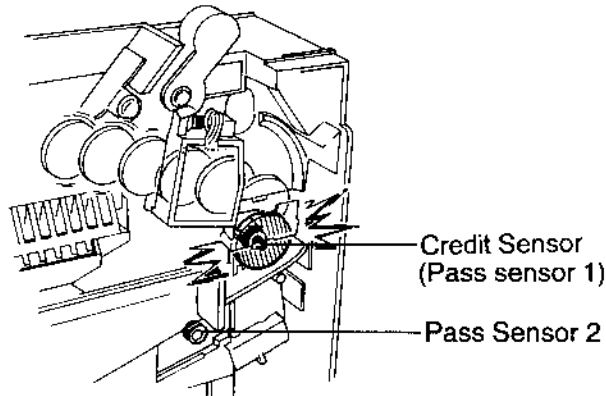
Cancel Signal OFF

Cancel Signal ON  
(Escrow)

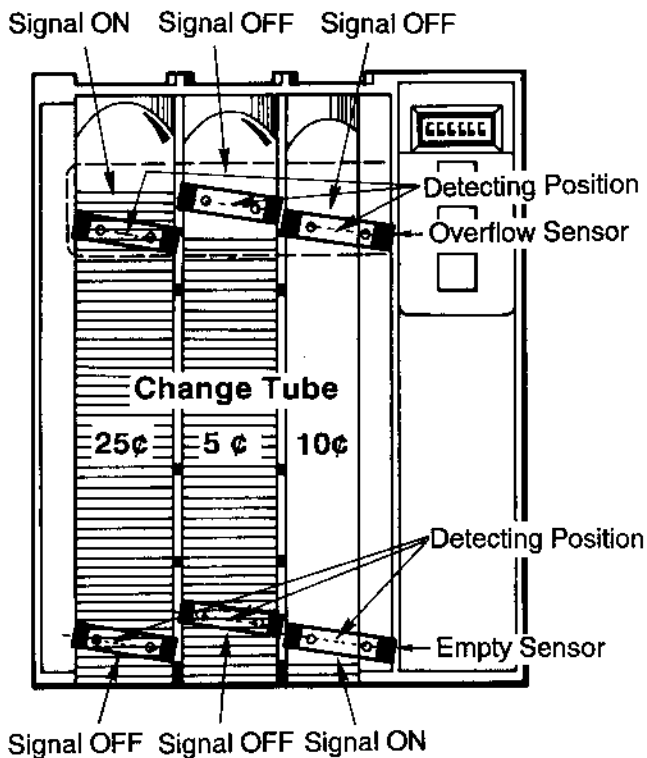
### 6-6-2 Anti Stringing Hook

The hook of the housing prevents stringing!



**6-6-3 Credit Sensor**

When a coin is determined to be genuine by the front sensor, it will be guided past the credit sensor and its value will be accumulated in the memory of the control board.

**6-6-4 Overflow and Empty Sensors****•Overflow sensor**

This sensor detects the full level of coins in the change tube.

If the tubes are judged to be full, the overflow signal is sent.

**•Empty sensor**

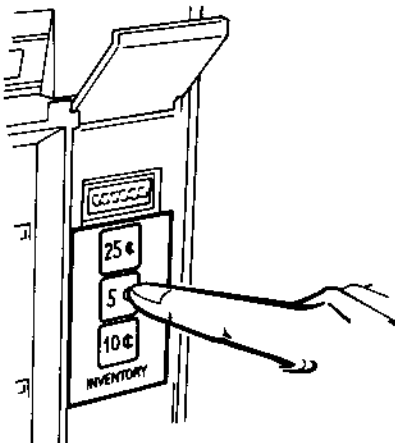
This sensor detects the presence of coins in the change tube.

The coin changer will determine the tubes to be empty when the coins are below the following levels.

5 ¢ coin change tube:  $15 \pm 3$  coins

10¢ coin change tube:  $15 \pm 3$  coins

25¢ coin change tube:  $11 \pm 3$  coins

**6-6-5 Inventory Switch**

The inventory switch is used to empty the coin tubes, refer to page 9 for pay out.



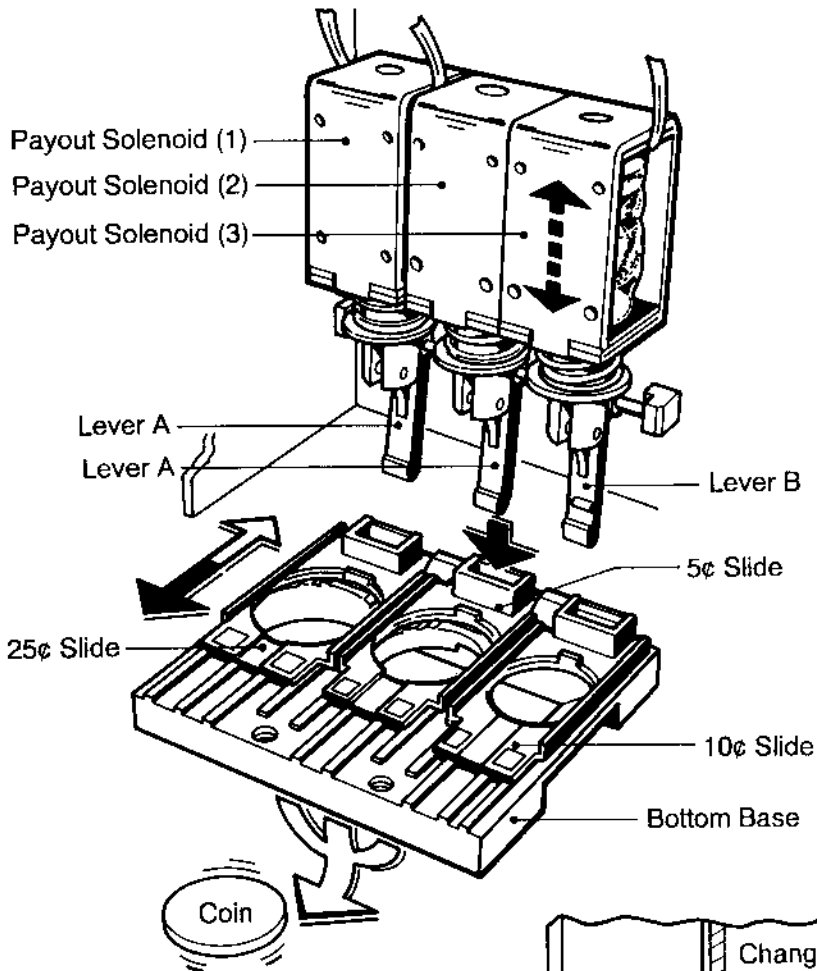
## 6-7 Payout System

The 3 payout solenoids are operated by the control board.

Voltage supplied to a payout solenoid produces an electromagnetic force which pulls the solenoid plunger inside the solenoid.

This movement compresses a spring and causes the lever (attached to the plunger) to push the change slide outward, underneath the change tube removing a coin from the tube.

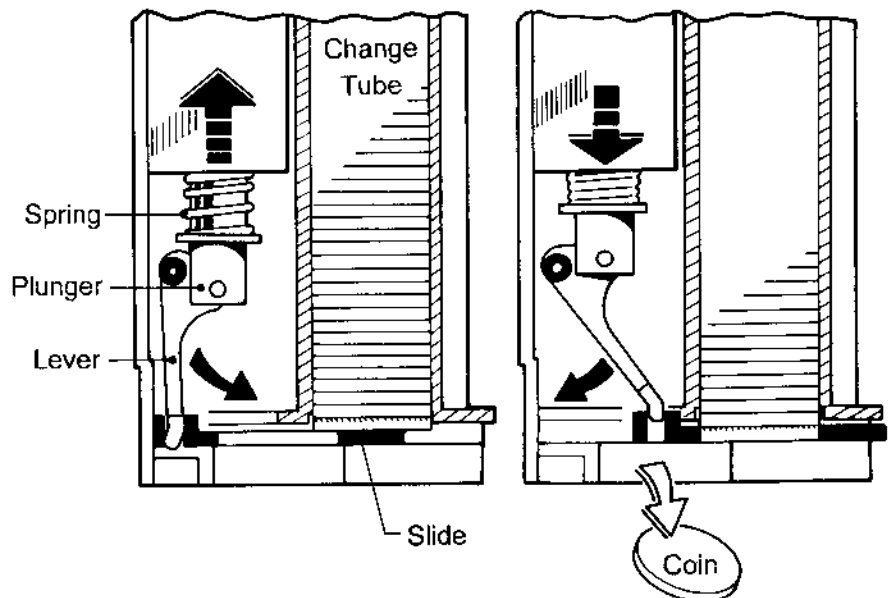
The voltage is then removed from the payout solenoid and the compressed spring forces the payout slide back to its original position and the coin is dropped from the payout slide through a hole in the bottom base.



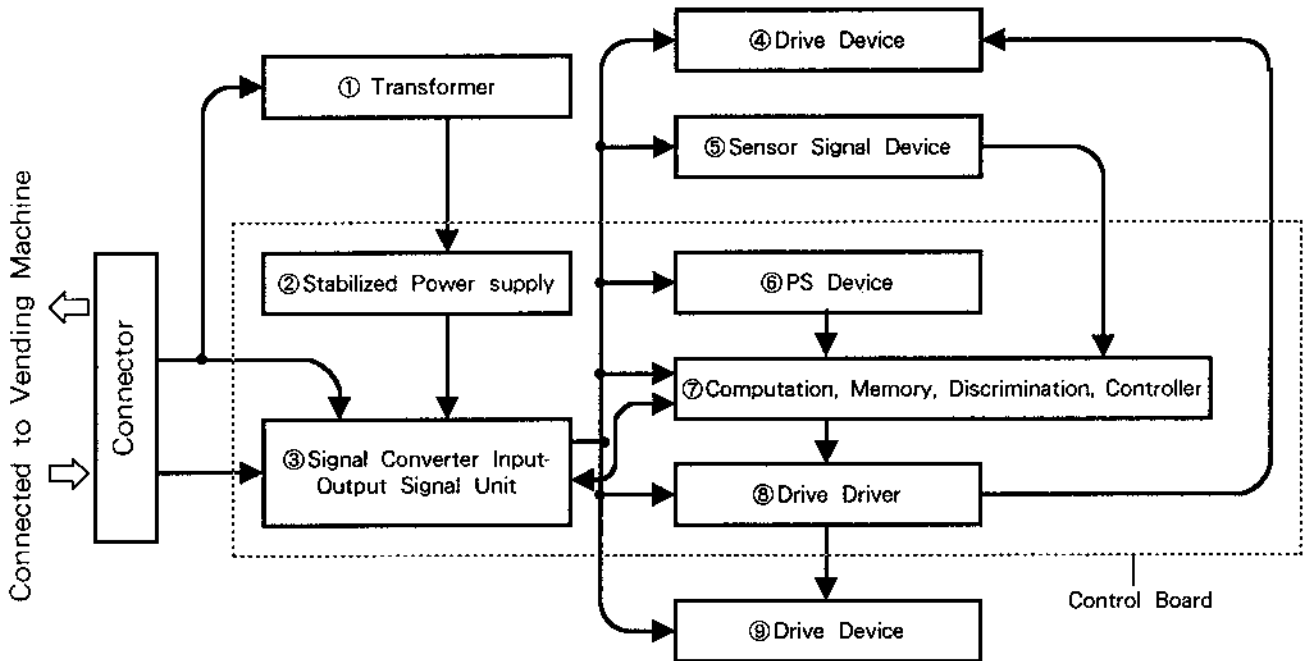
- 5¢ coin payout  
Payout is made by the operation of the payout solenoid (2). The payout operation is described above.

- 10¢ coin payout  
Payout is made by the operation of the payout solenoid (3). The payout operation is described above.

- 25¢ coin payout  
Payout is made by the operation of the payout solenoid (1). The payout operation is described above.



## 6-8 Signal Devices and their Functions

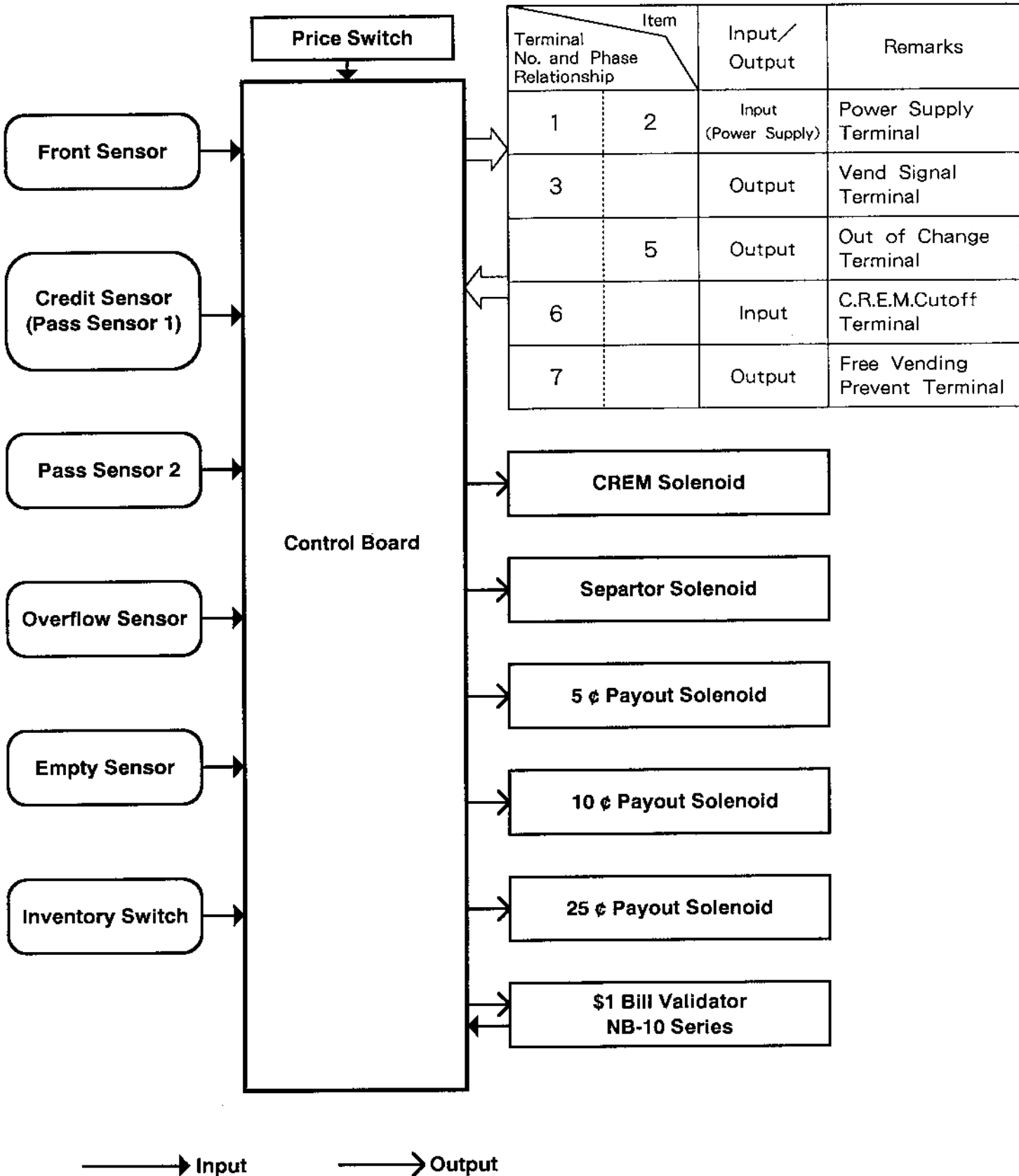


## •Explanation of Block Diagram

- Transformer ① reduces AC117V to AC27V.
- Stabilized power supply ② converts AC to 0V, 5V, 15V and 117V DC.
- Signal converter ③ and the input-output signal unit, convert signals from ⑧ and sends them to the vending machine as well as converting signals from the vending machine and sending them to ⑦.
- Drive device ④ drives the CREM solenoid and separator solenoid in accordance with signals from ⑧.
- Sensor signal devices ⑤ include the front sensor, credit sensor (sensor 1), sensor 2, inventory switch, overflow sensors and empty sensors. The signals from each sensor or switch are input to ⑦.
- The PS device in ⑥ is the price switch. Setting condition is input to ⑦.
- The computation, memory and discrimination controller in ⑦ processes the conditions in ⑥ and signals from ③ and outputs operation signals to ③ and ⑨.
- Drive devices ⑨ include the 5¢, 10¢ and 25¢ payout solenoids which are operated by signals from ⑧.

# 6. CONSTRUCTION AND DESCRIPTION

## 6-9 Input and Output Relationships as seen from the Control Board.



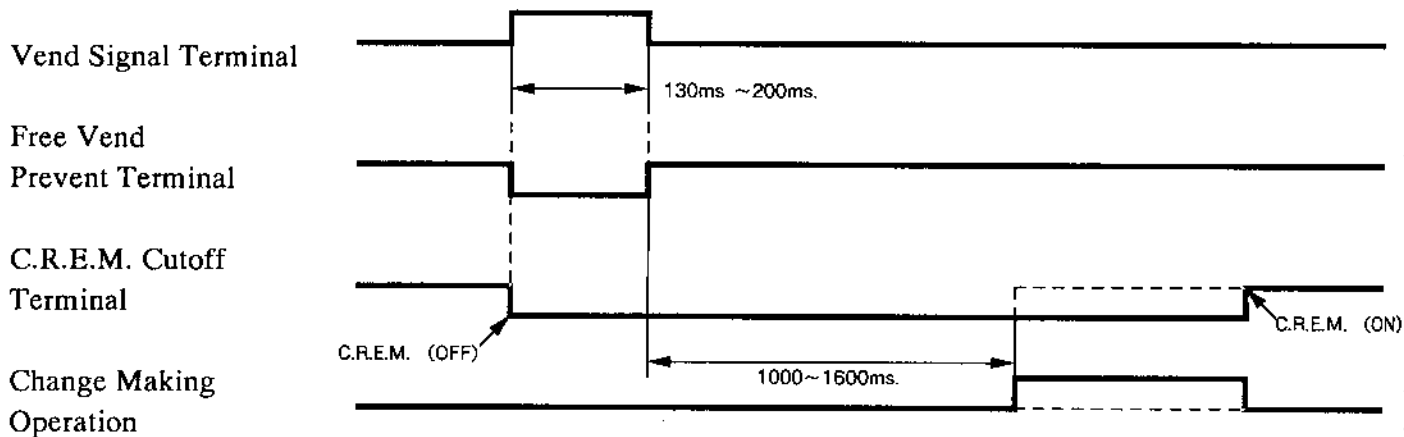
## 7. SIGNAL CONDITIONS AND WIRING DIAGRAM

### 7-1 Connection Terminal Signal Conditions

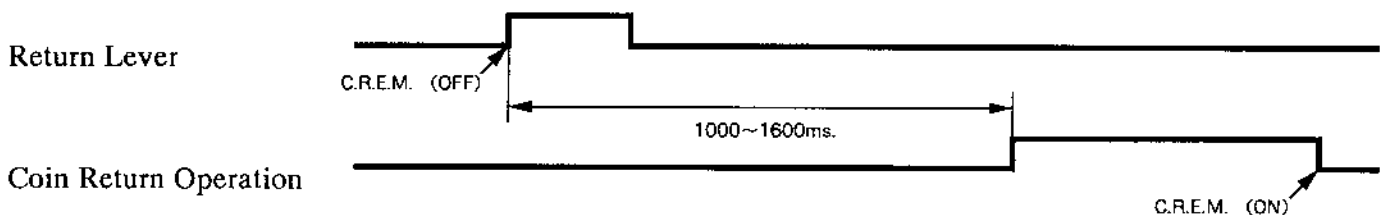
Terminal No. and Phase Relationship	Item	Input/Output	Power Supply Condition and Input Output Signal Condition	Remarks
1	2	Input (PowerSupply)	The vending machine side should supply AC117 ± 10V. at 60 Hz, at all times.	Power supply Terminal
3		Output	When the amount of the accepted coins reaches the vending price, the power supply at terminal 1 is output as a signal.	Vend Signal Terminal
	5	Output	The power supply at terminal 2 is output as a signal in the following cases. When coin insertion is prevented. When the coin changer is out of change.	Out of Change Indicator Terminal
6		Input	Normally, the power supply signal for the power supply at terminal 1 is supplied, but it should be cut off in the following cases. When all product is sold out. When a signal is output to terminal 3. When vending operations are ended.	C.R.E.M Cutoff Terminal
7		Output	Normally the power supply signal at terminal 1 is output, but it should be shut off when the vend signal is sent.	Free Vending Prevent Terminal

### 7-2 Time Chart

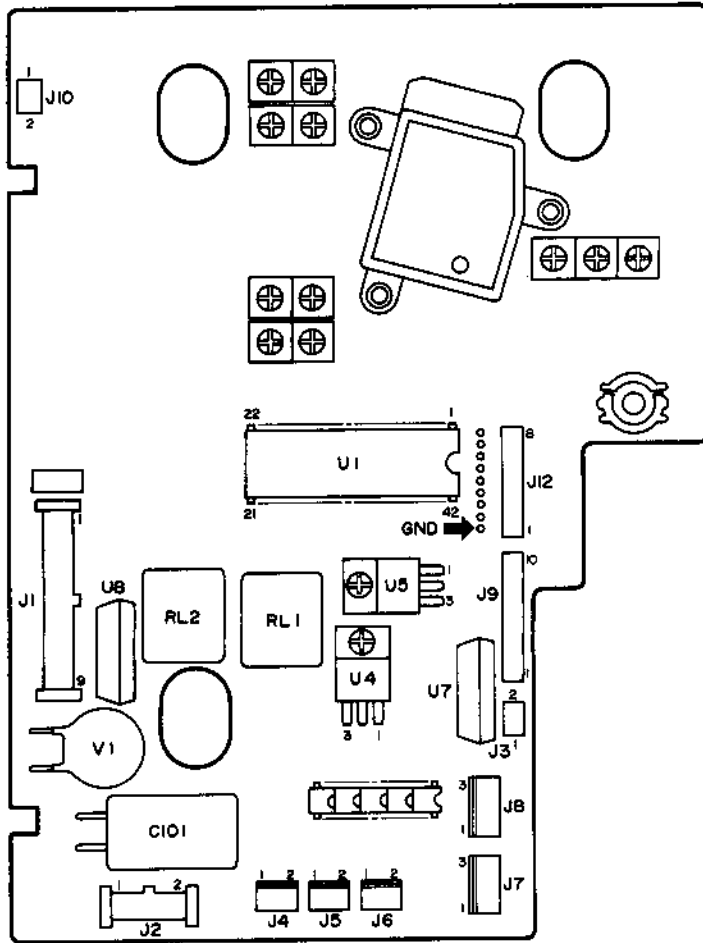
#### 1. Vend Operation



#### 2. Change Return Operation



## 7-3 Control Board Signal Condition



J3 2Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Black	Input	Power Supply Secondary Side	27VAC	27VAC	J3-2
2	White	Input	Power Supply Secondary Side	27VAC	27VAC	J3-1

J4 2Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Red	Output	117VDC	117VDC	117VDC	GND
2	Black	Output	Solenoid 1 (25 ¢)	0VDC	117VDC	GND

J5 2Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Red	Output	117VDC	117VDC	117VDC	GND
2	Black	Output	Solenoid 2 (5 ¢)	0VDC	117VDC	GND

J1 6Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Green	Input	CREM Cutoff	117VAC	0VAC	J1-5
2	Yellow	Output	Vend Signal	0VAC	117VAC	J1-5
3	Purple	Output	Free Vend Prevent	117VAC	0VAC	J1-5
4	Brown	Output	5 ¢ Out of Change	117VAC	117VAC	J1-6
5	Red	Input	Power Supply	117VAC	117VAC	J1-6
6	Blue	Input	Power Supply	117VAC	117VAC	J1-5

J6 2Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Red	Output	117VDC	117VDC	117VDC	GND
2	Black	Output	Solenoid 3 (10 ¢)	0VDC	117VDC	GND

J2 2Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Blue	Output	Power Supply	117VAC	117VAC	J2-2
2	Red	Output	Power Supply	117VAC	117VAC	J2-1

J7 3Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Red	Output	117VDC	117VDC	117VDC	GND
2	—	—	—	—	—	—
3	Black	Output	CREM Solenoid	117VDC	0VDC	GND

J8 3Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Red	Output	117VDC	117VDC	117VDC	GND
2	—	—	—	—	—	—
3	Black	Output	Separator Solenoid	117VDC	0VDC	GND

J9 10Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Brown	Output	5VDC	5VDC	5VDC	GND
2	Red	Output	Timing T0			GND
3	Orange	Output	Timing T1			GND
4	Yellow	Output	Timing T2			GND
5	Green	Input	Input Signal 2	0VDC		GND
6	Brown	Output	5VDC	5VDC	5VDC	GND
7	Red	Output	Timing T3			GND
8	Orange	Output	Timing T4			GND
9	Yellow	Output	Timing T5			GND
10	Green	Input	Input Signal 2	0VDC		GND

J10 2Pin Post

Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Black	Input	\$ 1 Bill Signal	0VDC	15VDC	GND
2	White	Output	15VDC	15VDC	15VDC	GND

J12 8Pin Post

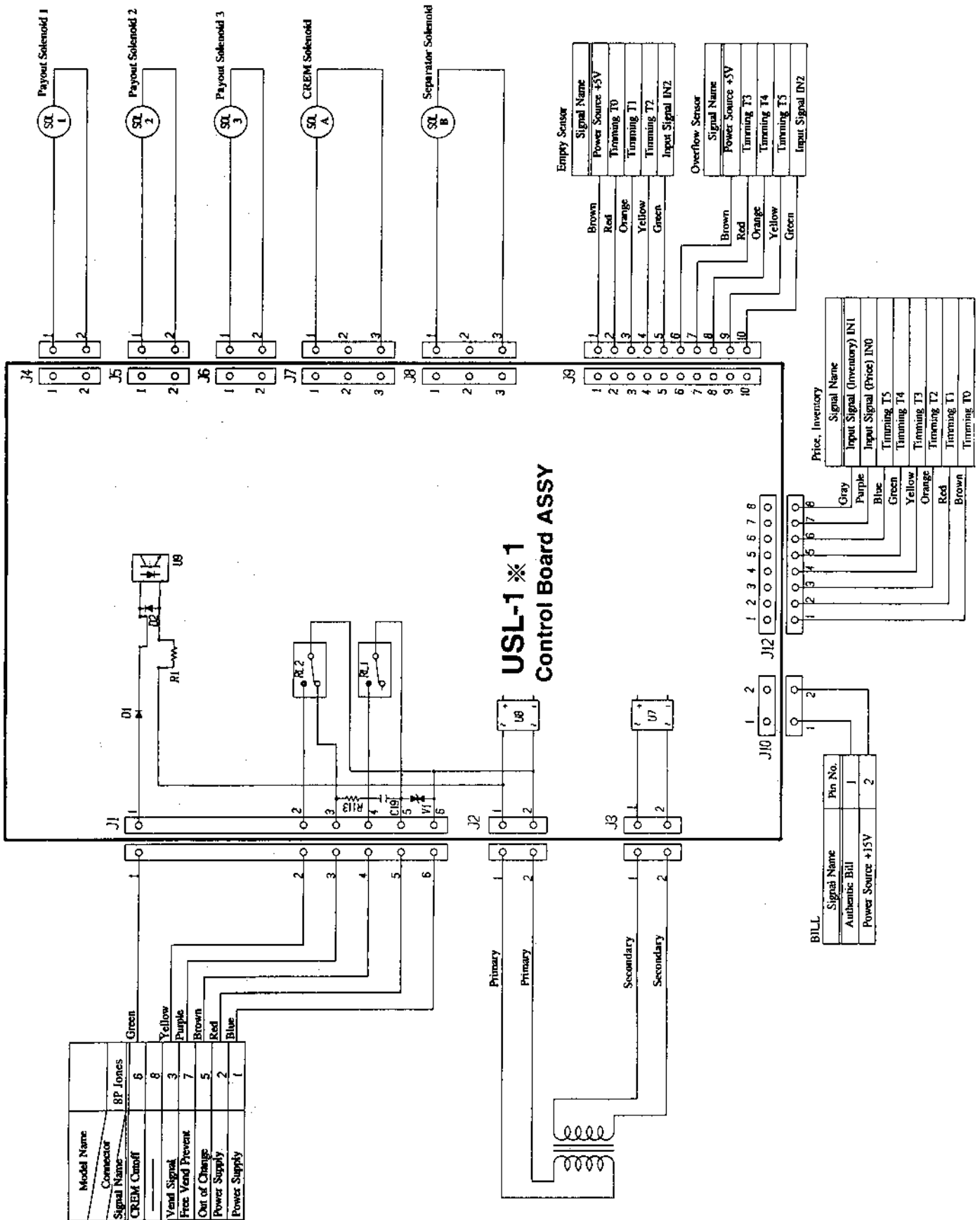
Pin No.	Wire Color	Input/ Output	Signal	Voltage(V) during Stand-by Position	Voltage(V) during Operation Position	M.P.
1	Brown	Output	Timing T0			GND
2	Red	Output	Timing T1			GND
3	Orange	Output	Timing T2			GND
4	Yellow	Output	Timing T3			GND
5	Green	Output	Timing T4			GND
6	Blue	Output	Timing T5			GND
7	Purple	Input	Input Signal 0	0VDC		GND
8	Gray	Input	Input Signal 1	0VDC		GND

Note:

1. Input/Output column conditions are viewed from the Control Board.
2. The column M.P. shows the standard measuring points.

# 7. SIGNAL CONDITIONS AND WIRING DIAGRAM

## 7-4 Wiring Diagram



Model Name	Connector	RP Jones	Signal Name
CREM Camoff	6	6	Green
Yend Signal	3	8	Yellow
Free Vend Prevent	7	3	Purple
Out of Change	5	7	Brown
Power Supply	2	5	Red
	1	2	Blue

Signal Name	Pin No.
Authentic Bill	1
Power Source +15V	2

Signal Name
Input Signal (Inventory) IN1
Input Signal (Price) IN0
Trimming T5
Trimming T4
Trimming T3
Trimming T2
Trimming T1
Trimming T0

**USL-1 \* 1**  
**Control Board ASSY**

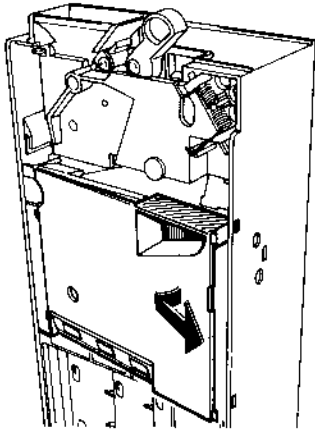
## 8. SIMPLE REPAIRS

The coin changer can become dirty from coins, dust, dripping water, foreign matter, etc. If they become extremely dirty, then good coin acceptance cannot be maintained.

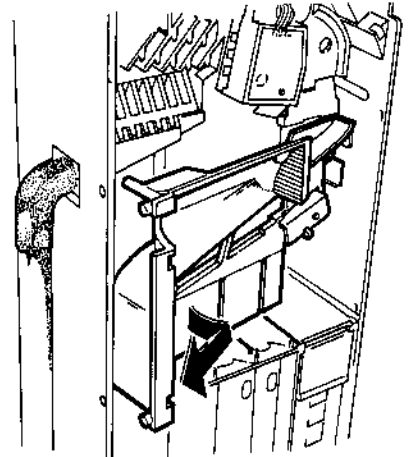
(The cleaning frequency may differ depending on the vending machine type and location.)

### ☆ Disassembly and assembly of chute cover and chute

- ① The chute cover can be removed by releasing the 2 locking tabs on the right side from the housing.



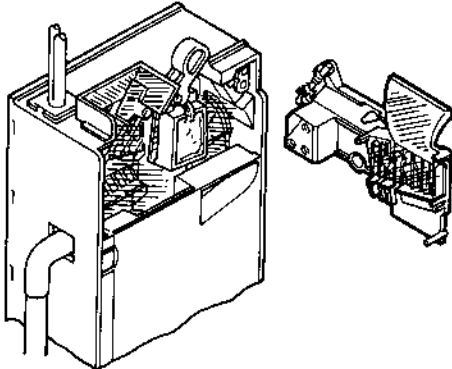
- ② The chute can be pulled out to the front after releasing the 2 locking tabs on the left side from the housing.



### ☆ Cleaning

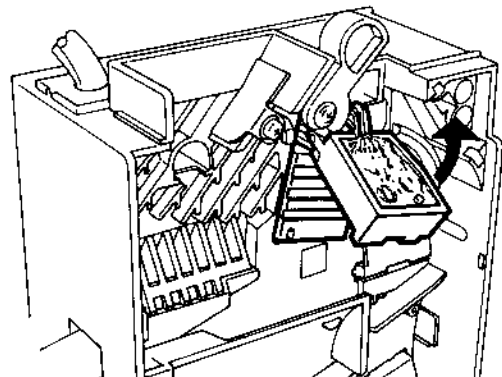
- ① Cleaning the gate

Open the gate assembly and use a dry cloth to remove any dirt from the coin path.



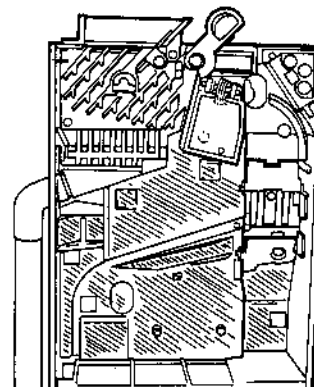
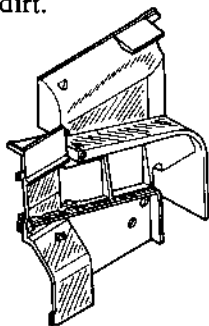
- ② Front sensor

Open the front sensor and use a soft cloth or a cotton swab to remove any dirt. The front sensor is a precision part of the coin changer, care is required when the handling.



- ③ Cleaning of chute and housing

- Use a dry cloth to remove dirt from the coin path at the rear of the chute.
- When cleaning the coin path of the housing, pay attention to the CREM and separator lever and other parts while wiping off any dirt.





## 9. TROUBLE SHOOTING

### •Measuring the Voltage

Connect the appropriate meter for the type of voltage being measured, as shown in the figure below, and measure the voltage. To measure voltage, use a digital multimeter. When checking continuity, be sure to switch off the power and disconnect the wire harness first.

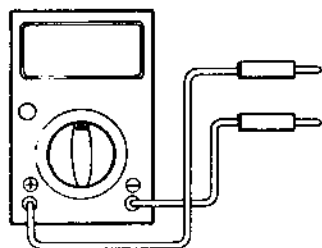
Check the following points before loosening the screws used to mount the coin changer in the vending machine.

- (a) Are the vend price settings correct?
- (b) Are there any abnormal tendencies in the installation condition of the vending machine?
- (c) Is the connector connecting the vending machine and the coin changer completely inserted?
- (d) Are there any abnormalities in the connector signal conditions?
- (e) Is there anything abnormal in the conditions of installation in the vending machine?
  - Is there any misalignment of the coin insert slot and payout slot?
  - Does the return lever of the coin changer operate correctly when the vending machine's return lever is operated?

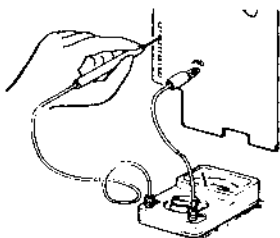
### •A Guide to the Diagnosis of Faults

Make level measurements at the inspection points as follows:

#### •AC voltage measurement

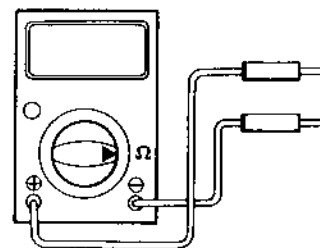


#### •DC voltage measurement



Connect minus terminal of the meter to the GND line, and plus terminal to measuring terminal.

#### •Continuity check



Be sure to disconnect the power supply before making the checks.

### •Contents

#### 9-1 Routine

- Ⓐ Power Supply Check
- Ⓑ Check the C.R.E.M. Cutoff Signal.
- Ⓒ Check the Price Switch.

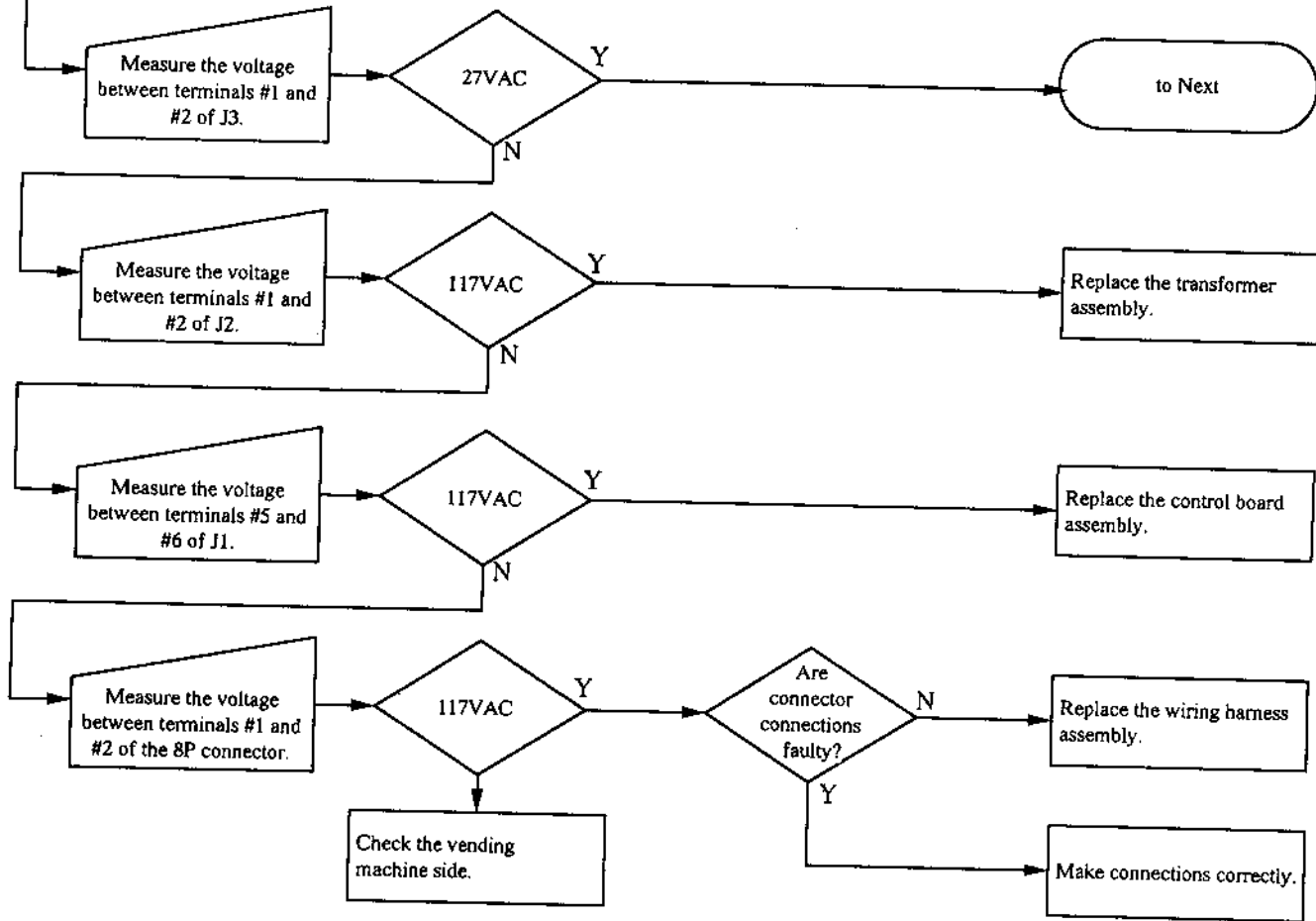
#### 9-2 Troubles

- ① The C.R.E.M. cutoff signal is input constantly.
- ② Coins are accepted even though the power supply is not on.
- ③ The out of change signal doesn't send out even though there is no 5 ¢ change.
- ④ Inventory switch (5 ¢, 10¢ and 25 ¢) does not operate.
- ⑤ The out of change signal send out even when 5 ¢ change is present.
- ⑥ The vend signal is output even though no coins are inserted.
- ⑦ Not all the coins have been accepted.
- ⑧ The vend signal is not output.
- ⑨ There is no change.
- ⑩ A lot of (a little of) change comes out.
- ⑪ Different change comes out when the inventory switch is operated.

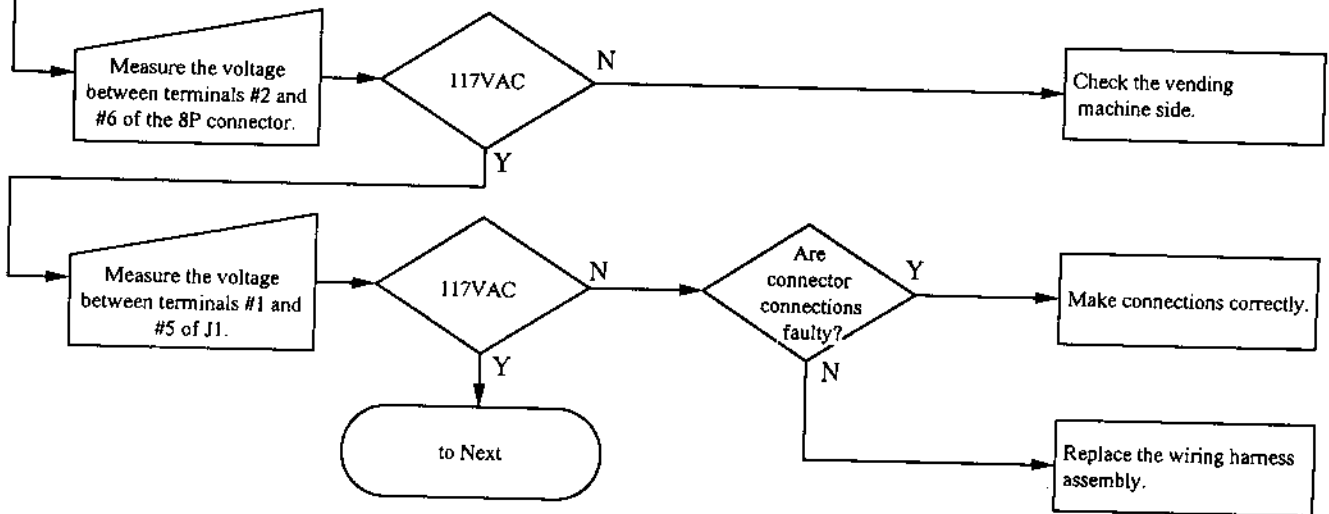
# 9. TROUBLE SHOOTING

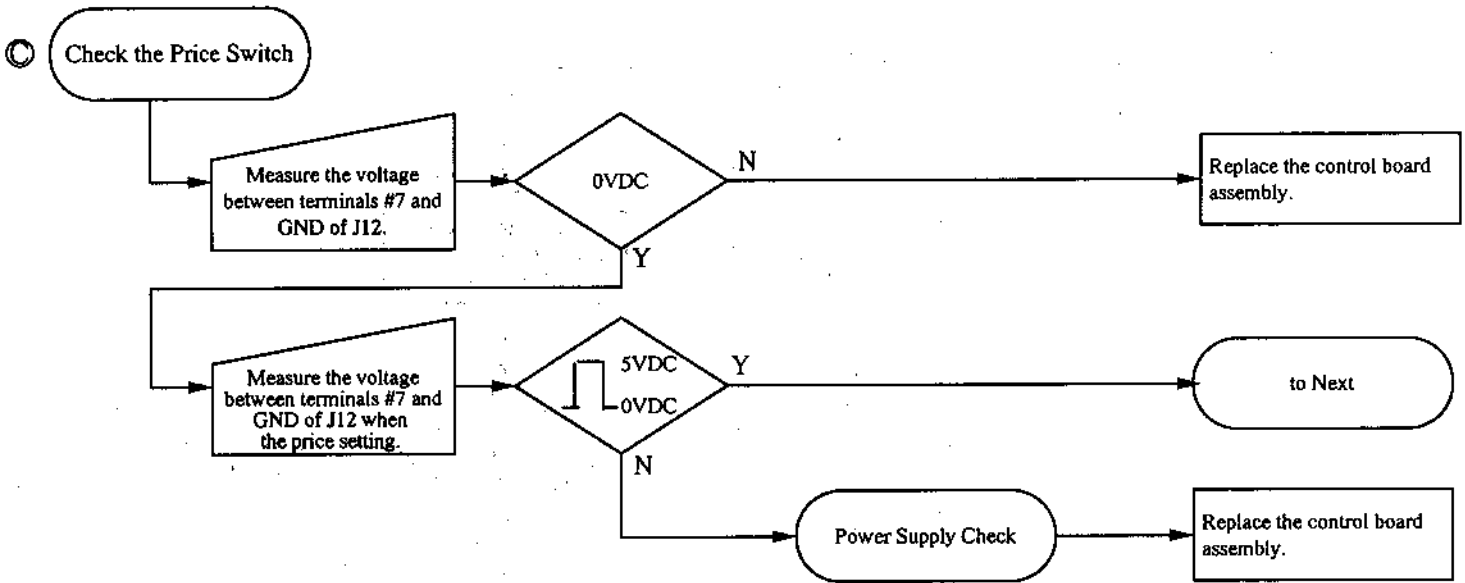
## 9-1 Routine

### Ⓐ Power Supply Check



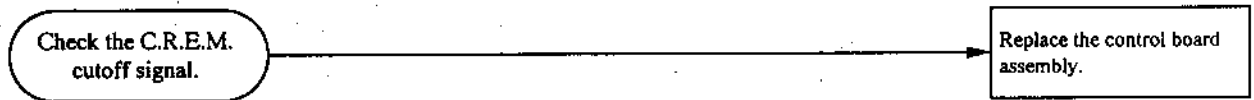
### Ⓑ Check the C.R.E.M. cutoff signal.



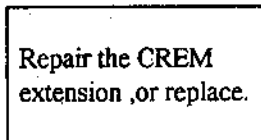


## 9-2 Troubles

① The C.R.E.M. cutoff signal is input constantly.

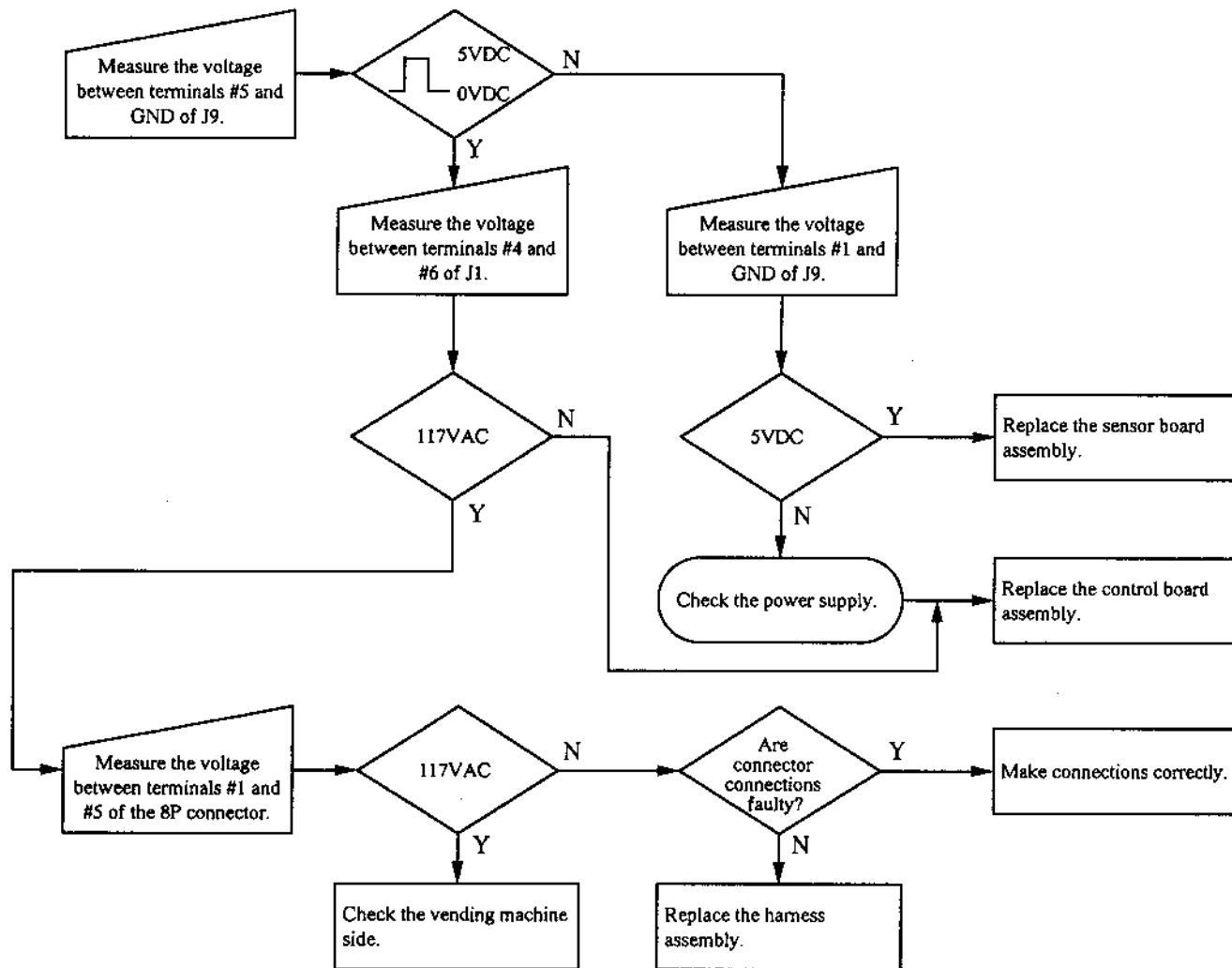


② Coins are accepted even though the power supply is not on.

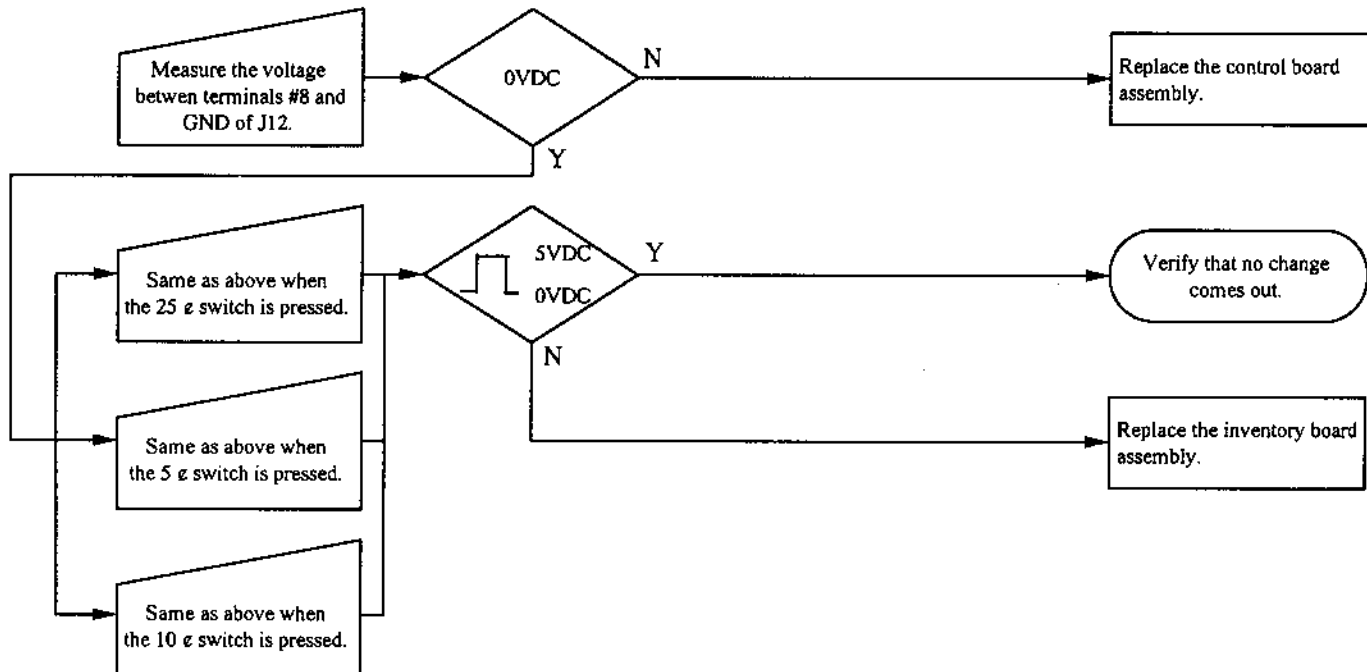


# 9. TROUBLE SHOOTING

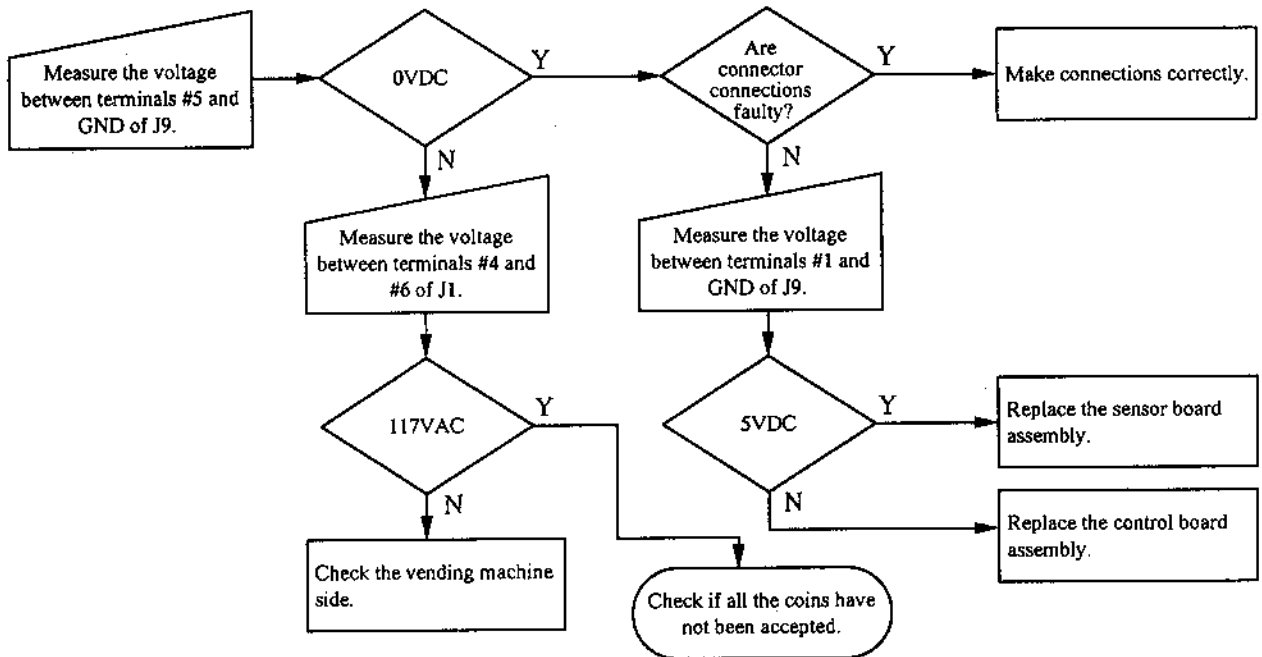
③ The out of change signal doesn't send out even though there is no 5¢ change.



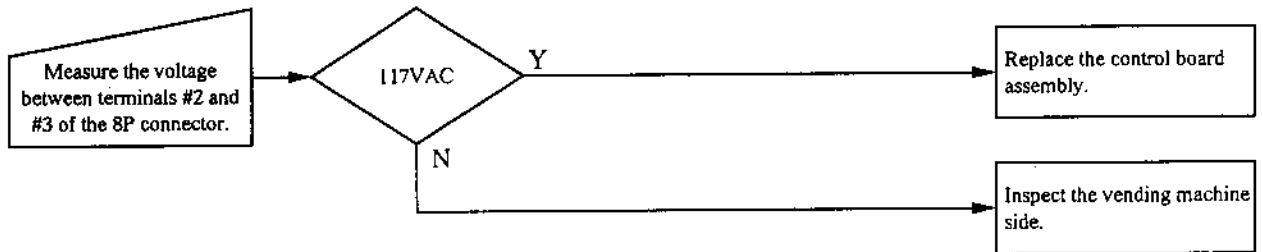
④ Inventory switch (5¢, 10¢ and 25¢) does not operate



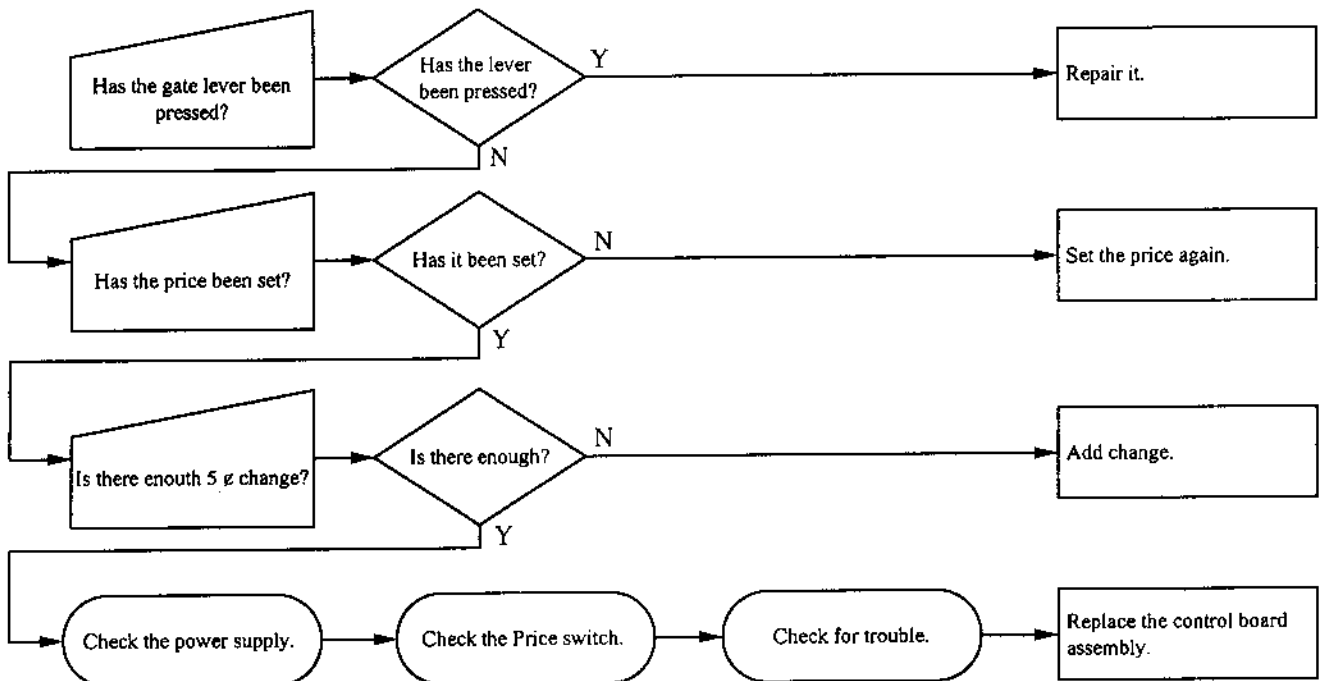
⑤ The Out of Change Signal send out even when 5 ¢ change is present.



⑥ The Vend signal is output even though no coins are inserted.

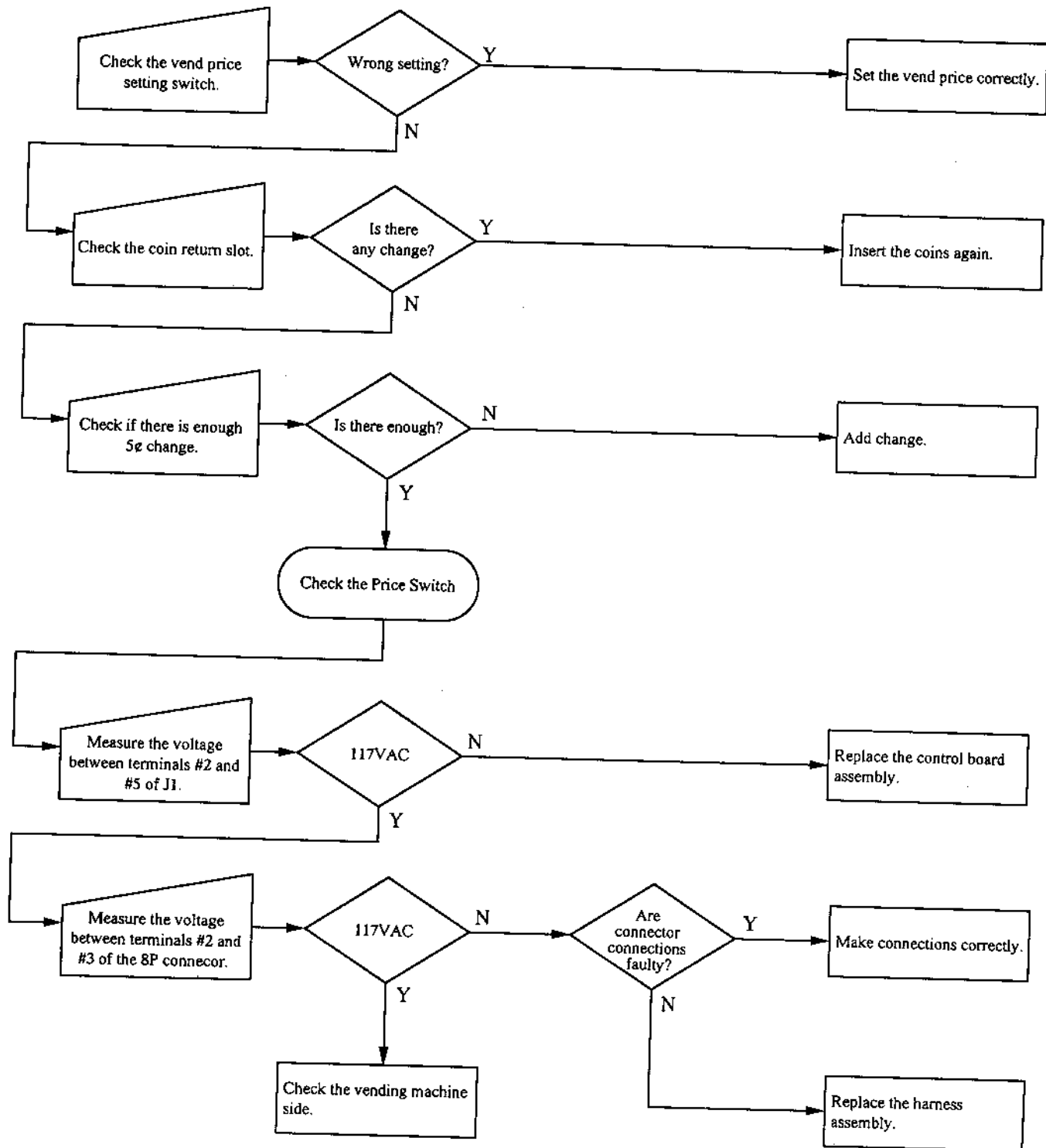


⑦ Not all the coins have been accepted.

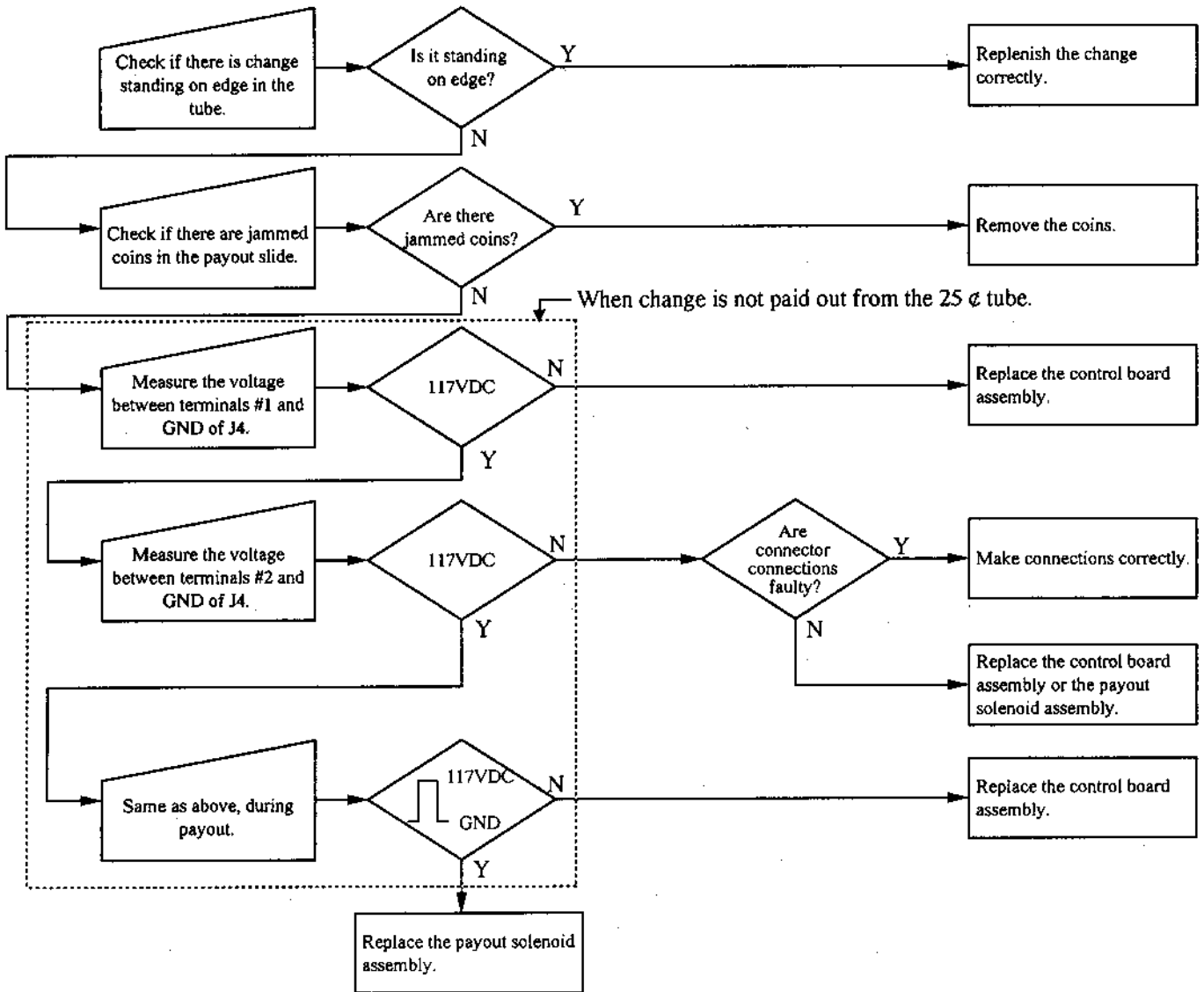


## 9. TROUBLE SHOOTING

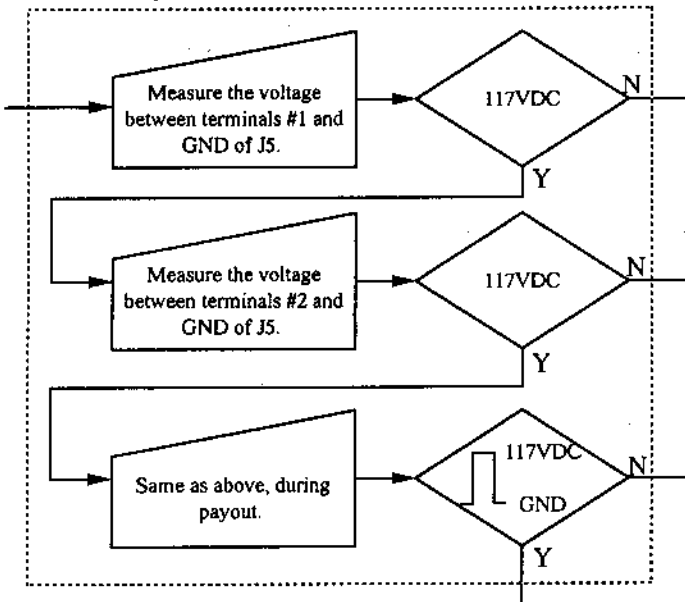
⑧ The vend signal is not output.



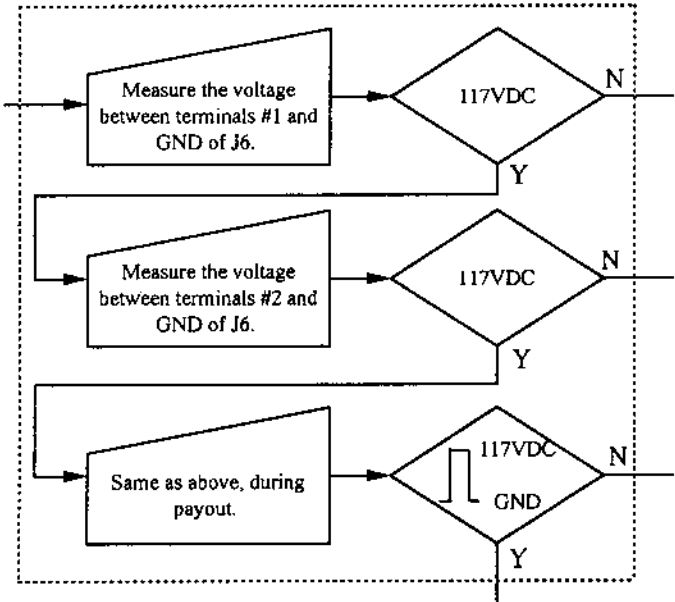
⑨ There is no change.



When change is not paid out from the 5 ¢ tube.

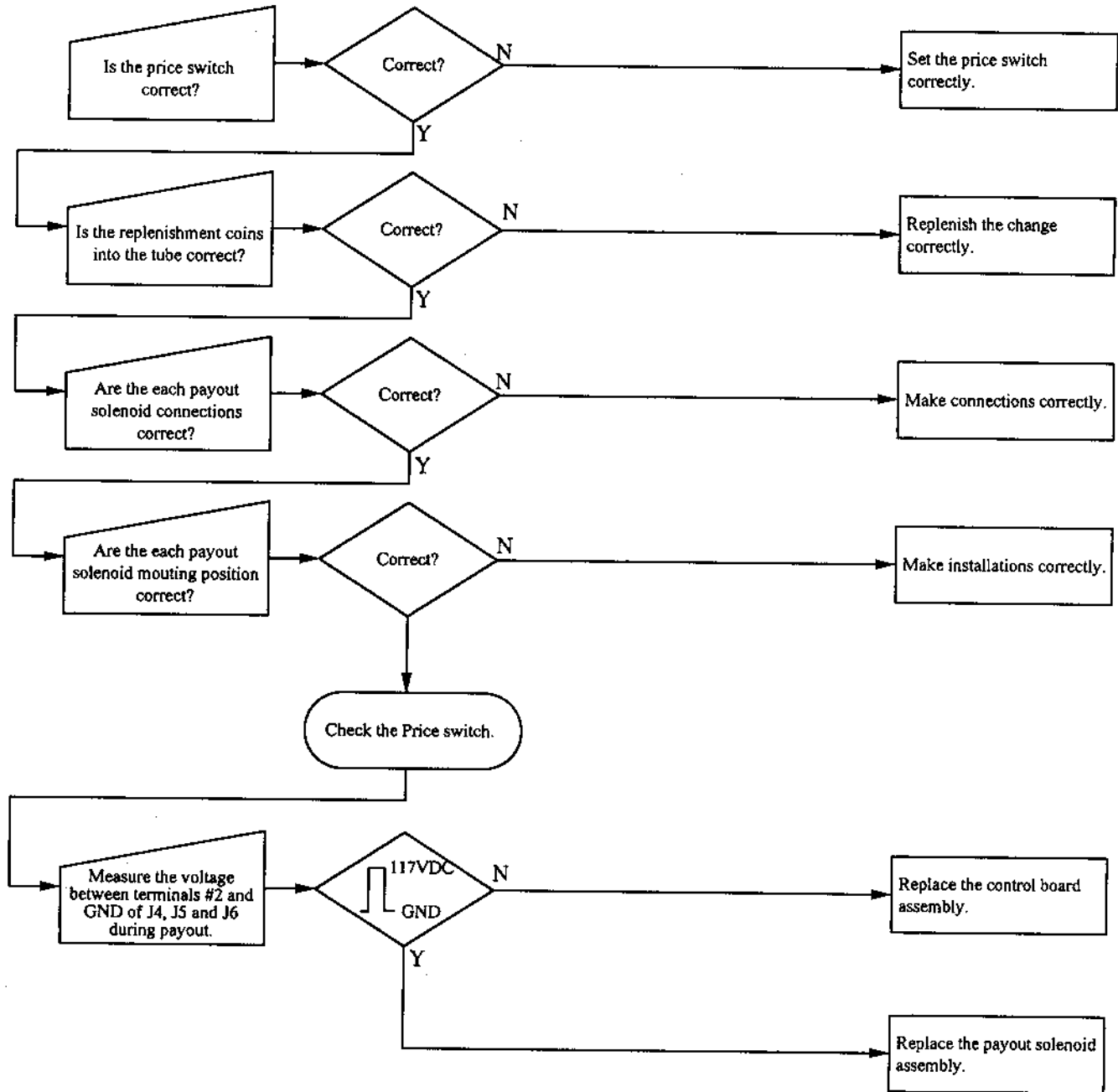


When change is not paid out from the 10 ¢ tube.



## 9. TROUBLE SHOOTING

⑩ A lot (a little of) change comes out.



⑪ Different change comes out when the inventory switch is operated.

Verify if excess  
(or insufficient) change  
comes out.



## 10. DISASSEMBLY AND ASSEMBLY PROCEDURE

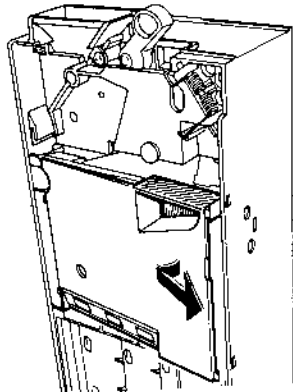
Disassemble the coin changer in the order written, assemble in reverse order.

### 1. Removal of the Chute Cover .

Release the 2 locking tabs on the right side of the chute cover from the housing. Pull the chute cover out and to the right to remove.

☆ **Assembly Precautions:**

Insert the left side tabs of the chute cover into the chute first, then press the right side tabs into the housing.



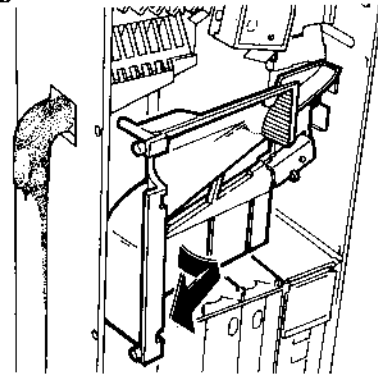
### 2. Removal of The Chute

Release the 2 locking tabs on the left side of the chute from the housing.

Pull the chute out and to the left to remove.

☆ **Assembly Precautions:**

Insert the right side tabs of the chute into the housing first, then press the left side tabs into the housing.

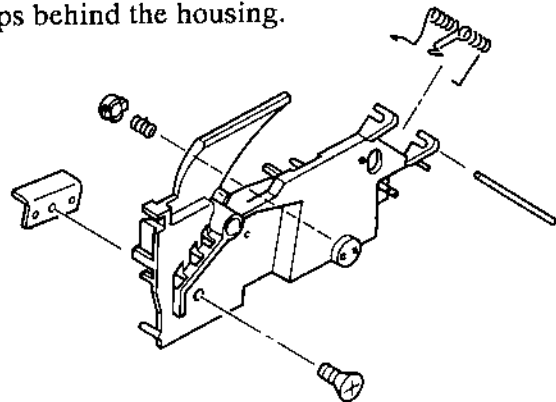
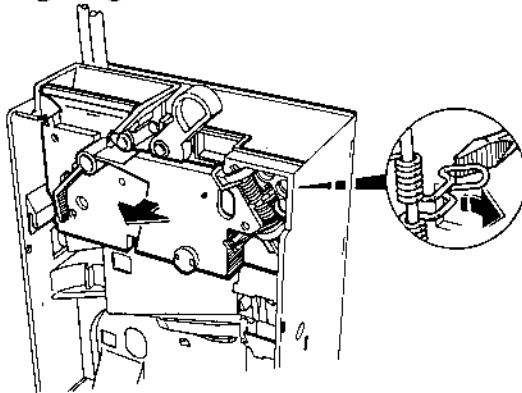


### 3. Removal of The Gate Assy

Release the gate spring by inserting a small screwdriver or scribe into the loop of the spring inside the housing, then pry the spring to the right and pull the gate out.

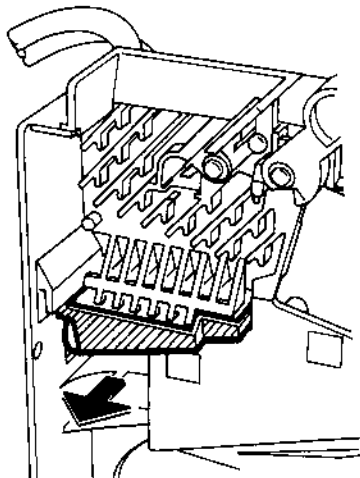
☆ **Assembly Precautions:**

When installing the gate, make sure the gate spring clips behind the housing.



### 4. Removal of The Drain Spout

Lift up on the bottom of the drain spout and pull the left side out first.

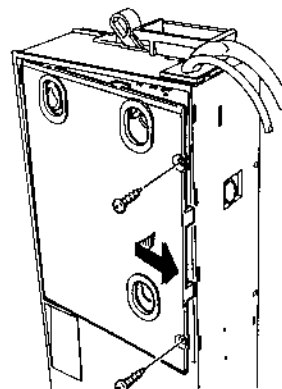


### 5. Removal of The Back Cover

Remove the 2 screws, pull the back cover out and to the right.

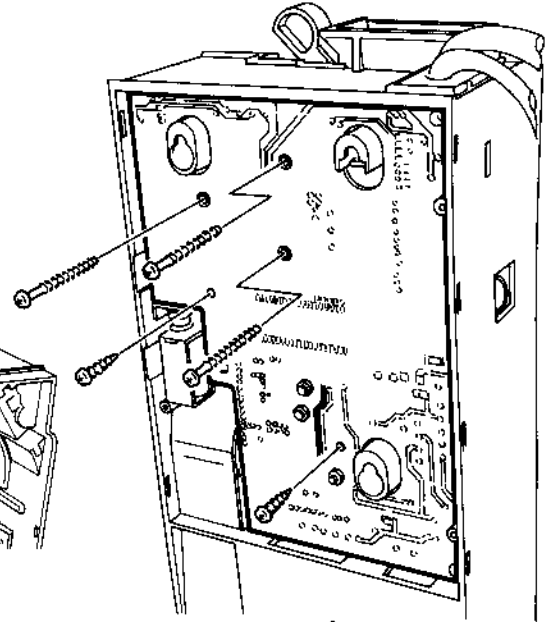
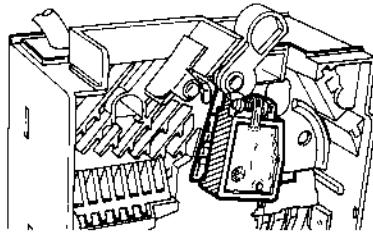
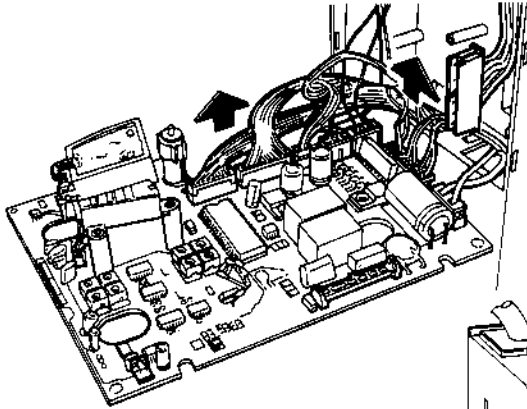
☆ **Assembly Precautions:**

Insert the left side tabs of the back cover into the side of the housing first.



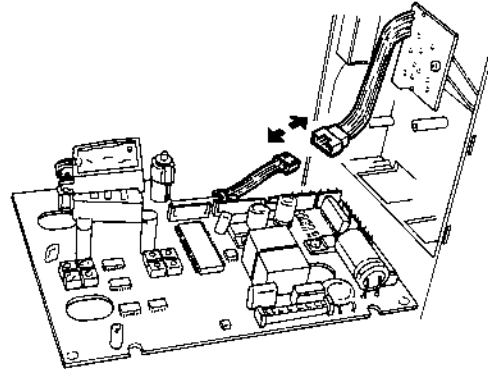
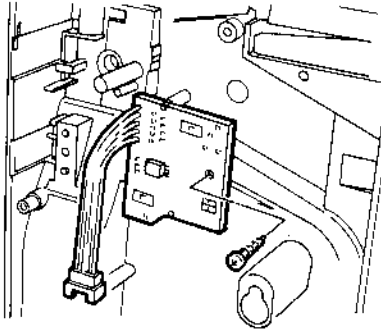
### 6. Removal of The Control Board

Remove the 5 screws attaching the control board to the housing. Gently push the front sensor through the housing and unplug the connectors.



### 7. Removal of The Pass Sensor Board (Old Type)

Remove the screw attaching the pass sensor to the housing.

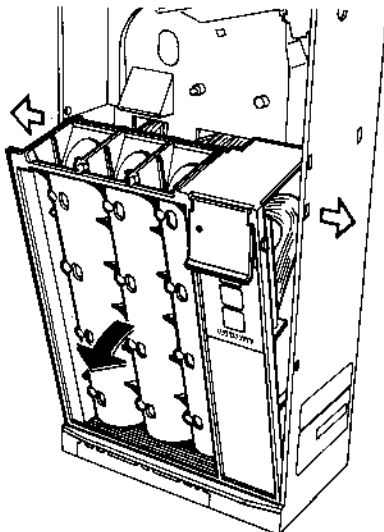


### 8. Removal of The Change Tube Assy.

Release the locking tabs on the left and right sides of the change tube assy from the housing, then pull out and up to remove.

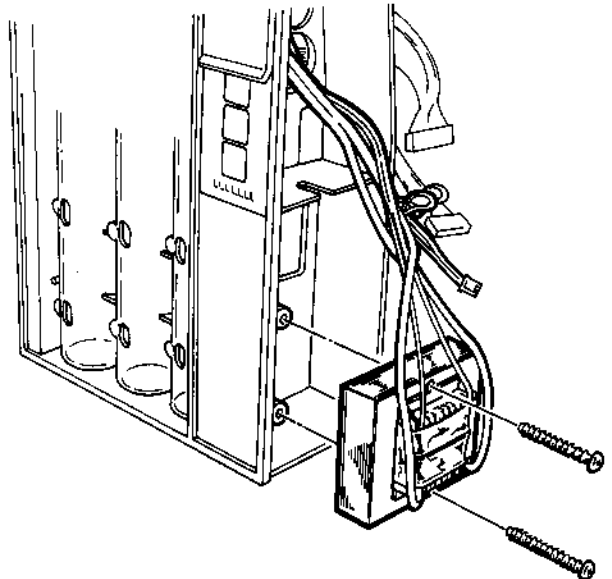
#### ☆ Assembly Precautions:

First, feed the wires through the housing, to the back side. Next insert the bottom of the change tube assy into the bottom of the housing, then the top.



#### ① Removal of The Transformer

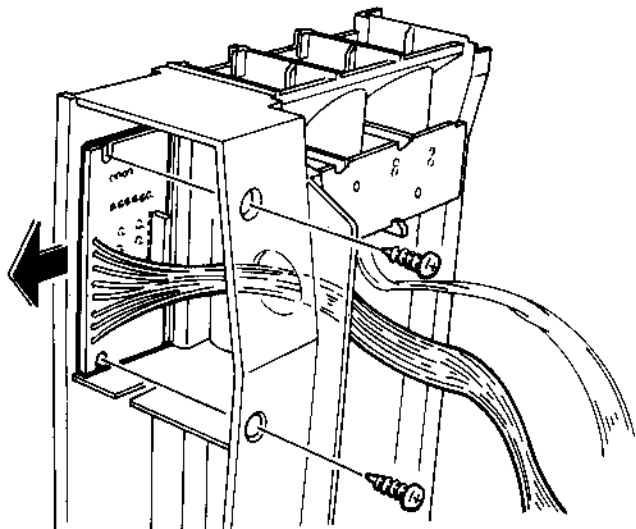
Remove the 2 screws attaching the transformer to the change tubes.



# 10. DISASSEMBLY AND ASSEMBLY PROCEDURE

## ② Removal of The Inventory Board Assy

Remove the 2 screws attaching the inventory board to the change tubes.

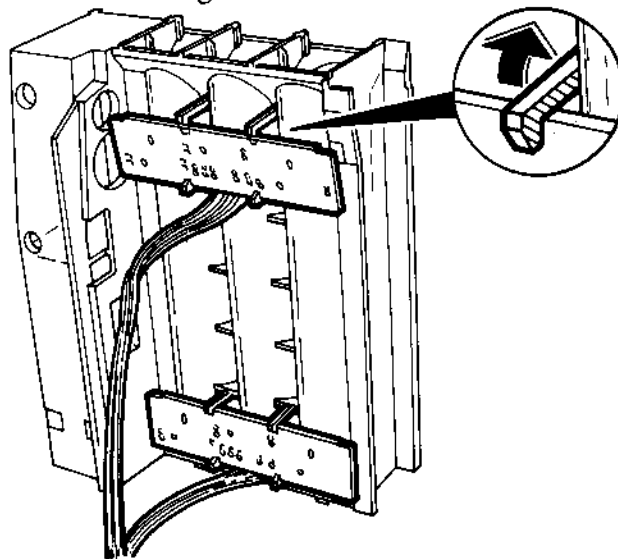


## ③ Removal of The Sensor Board Assy

Carefully cut the cable tie attaching the wires to the latch. Spread the latches apart to remove the sensor board assy.

### ☆ Assembly Precautions:

Be careful not to damage the L.E.D. sensors when installing.

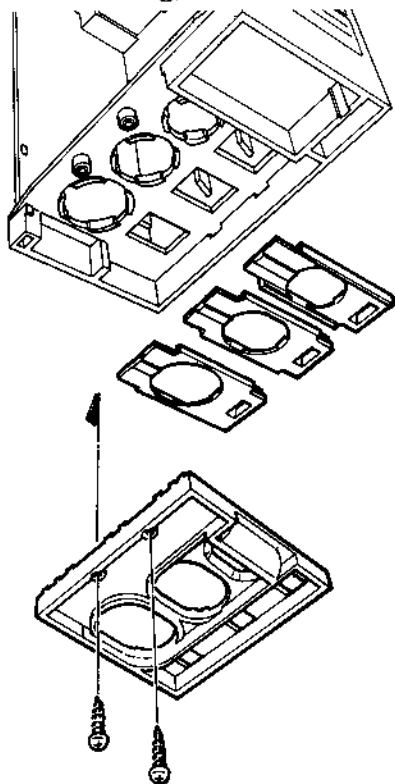


## 9. Removal of The Bottom Base and 5¢, 10¢ and 25 ¢ Slides

Remove the 2 screws attaching the bottom base to the housing, then remove the 5 ¢, 10¢ and 25 ¢ slides

### ☆ Assembly Precautions:

Insert the tabs of the bottom base into the back side of the housing, then the screws.



## 10. Removal of The Payout Solenoids

Remove the 2 screws attaching each solenoid to the housing.

### ☆ Assembly Precautions:

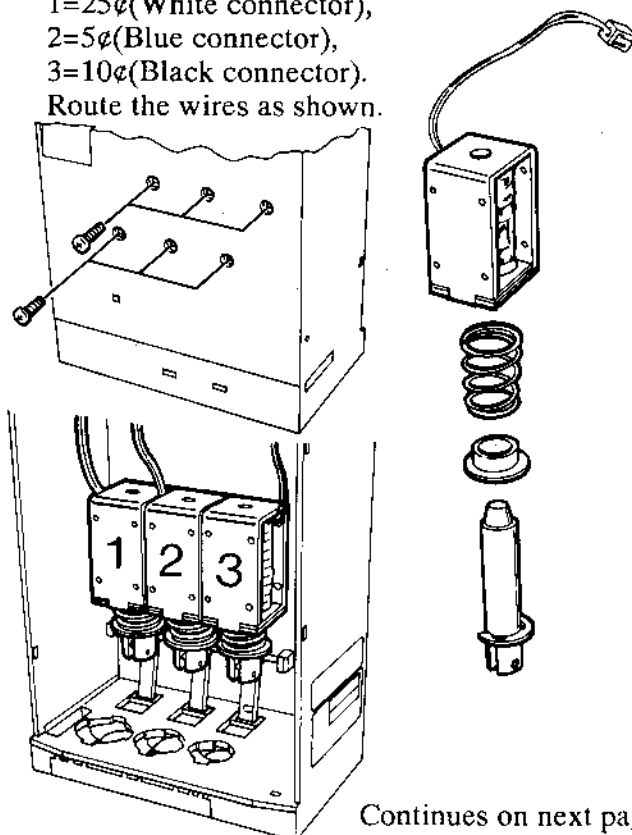
Install the payout solenoids in the correct locations:

1=25¢(White connector),

2=5¢(Blue connector),

3=10¢(Black connector).

Route the wires as shown.



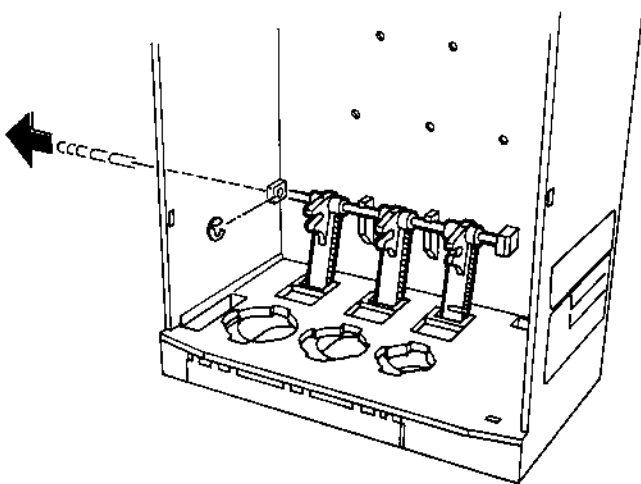
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**11. Removal of Levers(A), (B) and The Lever Shaft**

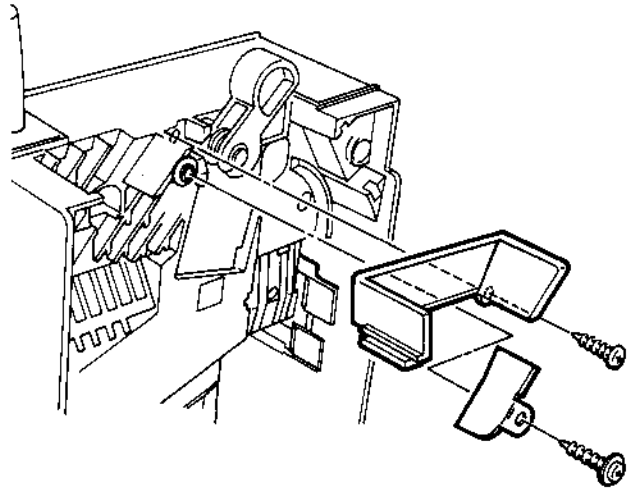
Remove the retaining ring from the left side of the lever shaft, then slide it out of the housing.

☆ **Assembly Precautions:**

Lever(B) must be installed in the 10¢ slot.

**12. Removal of The Funnel Guide and Funnel**

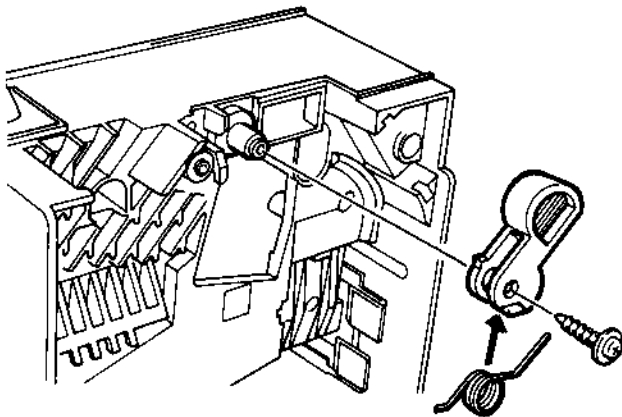
Remove the screw attaching the funnel guide, then remove the screw attaching the funnel to the housing.

**13. Removal of The Gate Lever and Spring**

Remove the screw attaching the gate lever to the housing, then release the lever spring from the housing with a small screwdriver.

☆ **Assembly Precautions:**

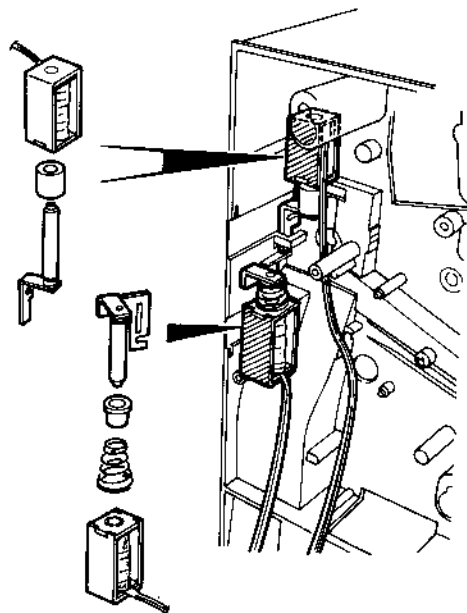
Insert the spring into the gate lever before assembling.

**14. Removal of The CREM and Separator Solenoids**

Remove the screws on the front side of the housing that attach the CREM and separator solenoids.

☆ **Assembly Precautions:**

Make sure that the solenoid arm engages the lever for correct operation.

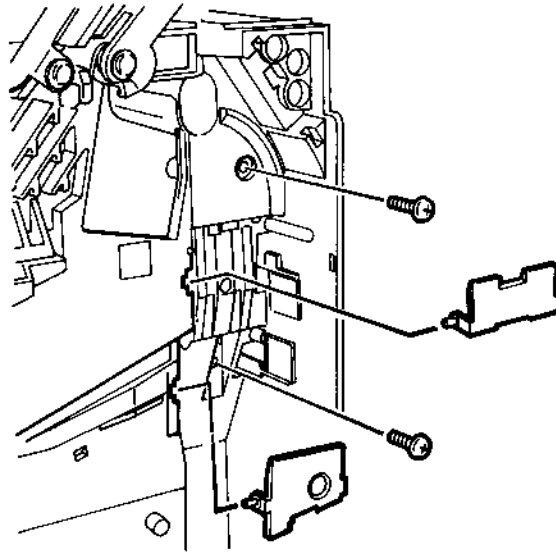


## 14-1. Removal of The CREM Extension and Separator Lever

Release the tab on the right side from the housing first, then remove.

### ☆ Assembly Precautions:

Insert the left side tab first, then push the right side in place.

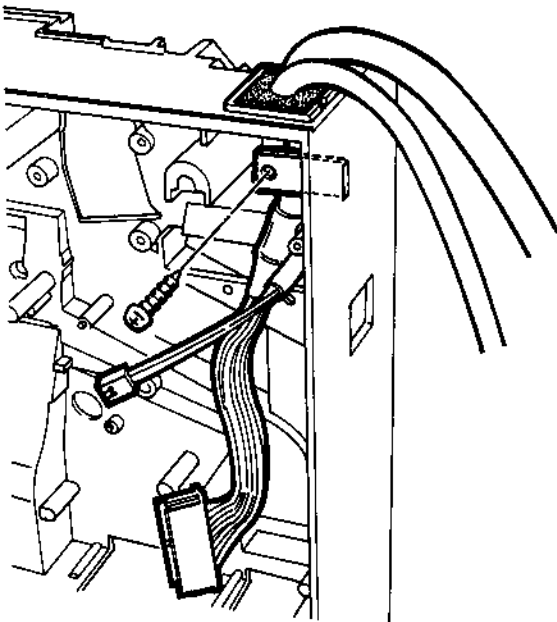


## 15. Removal of The Power Supply Harness Assy

Remove the screw attaching the harness guide to the housing, then remove the harness guide from the side of the housing. Pull the power supply harness assy and bushing from the top of the housing.

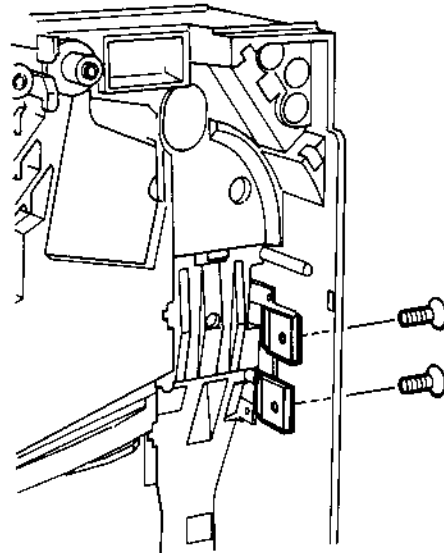
### ☆ Assembly Precautions:

Make sure the harness bushing is seated properly in the top of the housing.



## 16. Removal of The Route Plates

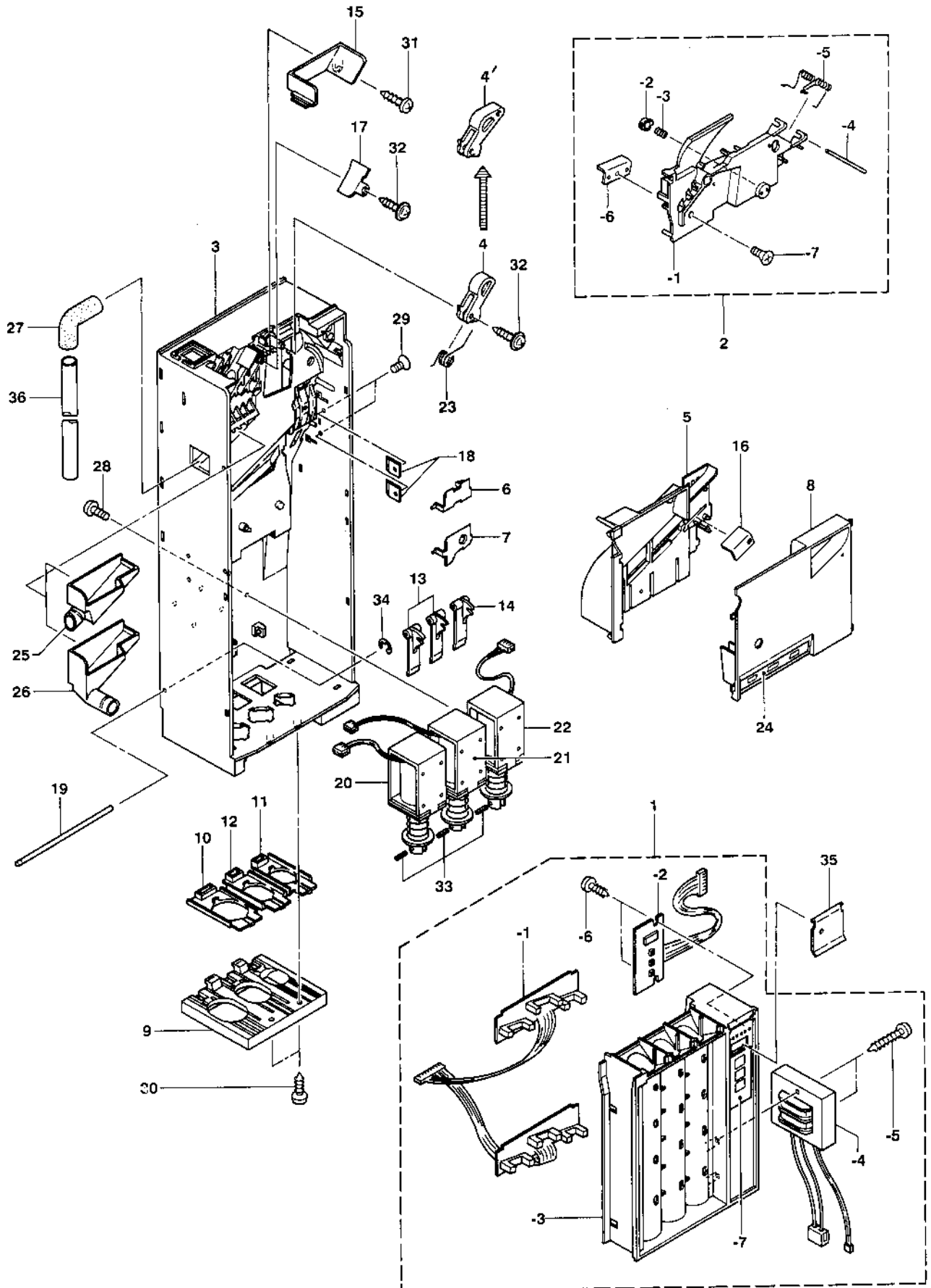
Remove the 2 screws attaching the route plates to the right side of the housing.



## 11. PARTS DIAGRAM AND PARTS LIST

## 11. PARTS DIAGRAM AND PARTS LIST

## 11-1 Changer(Front Side)



# 11. PARTS DIAGRAM AND PARTS LIST

USL-1

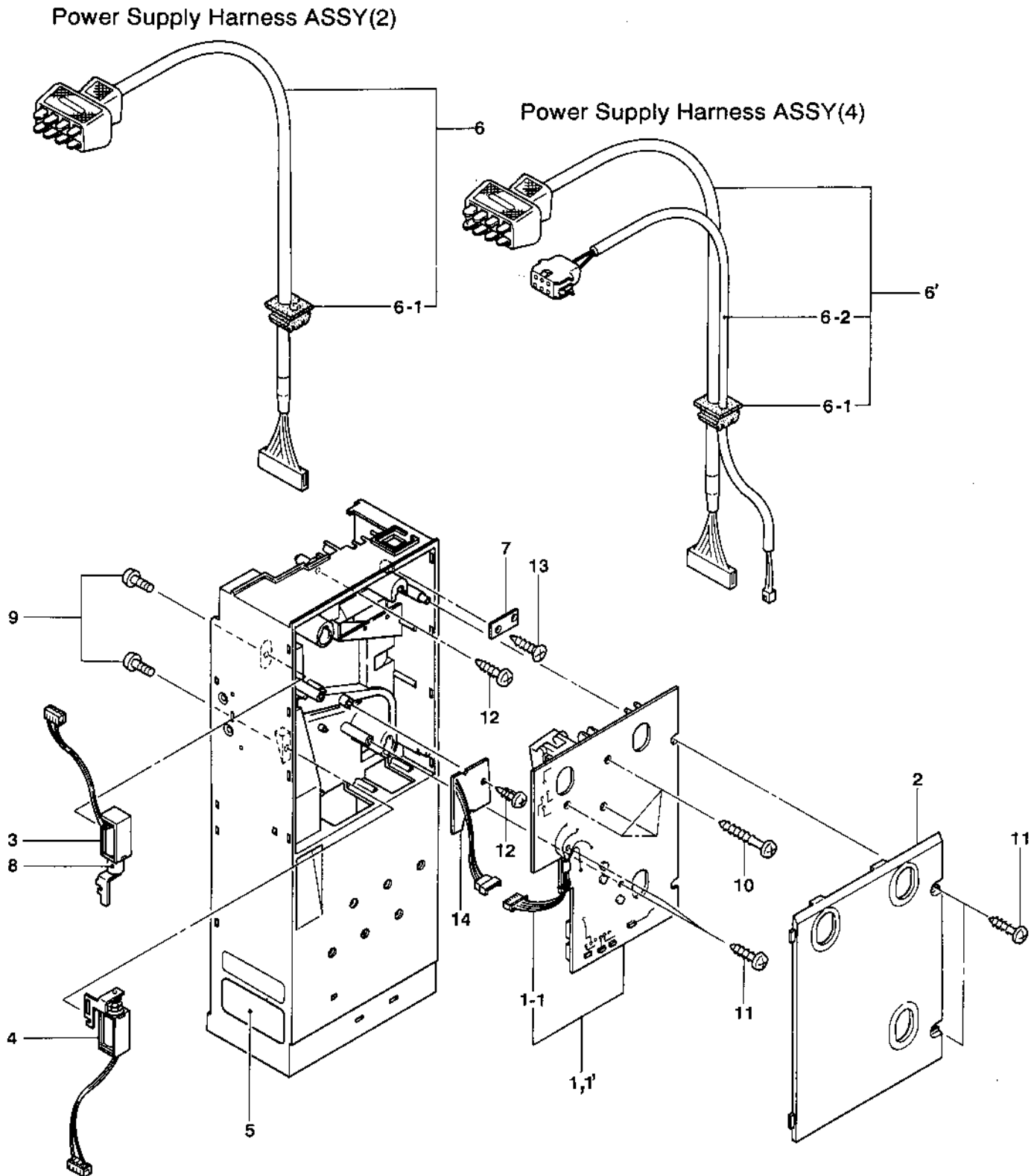
② '94-1

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INDEX NO.	PART NO.	DESCRIPTION	QTY	REMARKS
1	252101	Change Tube ASSY	1	
1-1	252203	Sensor Board ASSY	1	
1-2	252211	Inventory Board ASSY	1	
1-3	252413	Change Tube	1	
1-4	252714	Transformer ASSY	1	
1-5	904038	Self Tapping Screw	2	(+)Pan-head M3 × 20
1-6	904027	Self Tapping Screw	2	(+)Pan-head M3 × 6
1-7	252511	Inventory Seal (A)	1	
2	252102	Gate ASSY	1	
2-1	252402	Gate	1	
2-2	252424	Coil Case Cap	1	
2-3	367509	Cap Spring	1	
2-4	361503	Gate Pin	1	
2-5	252505	Gate Spring	1	
2-6	252502	Gate Rail	1	
2-7	902003	Screw	1	(+)Flat-head M3 × 4
3	252401	Housing	1	
4	252403	Gate Lever	1	← X Not Interchangeable
4	252431	Gate Lever(2)	1	
5	252406	Chute	1	
6	252407	CREM Extension	1	
7	252408	Separator Lever	1	
8	252412	Chute Cover	1	
9	252414	Bottom Base	1	
10	252415	25ϕ Slide	1	
11	252416	10ϕ Slide	1	
12	252417	5ϕ Slide	1	
13	252418	Lever (A)	2	
14	252419	Lever (B)	1	
15	252422	Funnel	1	
16	252501	Chute Rail	1	
17	252503	Funnel Guide	1	
18	361510	Route Plate	2	
19	252504	Lever Shaft	1	
20	252711	Payout Solenoid (1)	1	25ϕ(White Connector)
21	252712	Payout Solenoid (2)	1	5ϕ(Blue Connector)
22	252713	Payout Solenoid (3)	1	10ϕ(Black Connector)
23	362505	Gate Lever Spring	1	
24	252512	Tube Seal	1	
25	252420	Drain Spout	1	Side Type
26	252426	Drain Spout(2)	1	Front Type
27	252428	Rubber Elbow	1	Front & Side Type
28	900008	Screw	6	(+)Pan-head M3 × 6
29	902003	Screw	2	(+)Flat-head M3 × 4
30	904211	Self Tapping Screw	2	(+)Pan-head M3 × 10
31	904209	Self Tapping Screw	1	(+)Pan-head M3 × 8
32	904804	Self Tapping Screw with Washer	2	(+)Pan-head M3 × 6
33	907927	Spring Pin	3	ϕ 3 × 12
34	332509	Retaining Ring	1	ϕ 1.9
35	252427	Price Switch Cover	1	
36	252526	Drain Tube	1	1ft.

# 11. PARTS DIAGRAM AND PARTS LIST

## 11-2 Changer(Rear Side)





# 11. PARTS DIAGRAM AND PARTS LIST

USL-1

① '93-2

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INDEX NO.	PART NO.	DESCRIPTION	QTY	REMARKS
1	252201	Control Board ASSY (1) – Old Type	1	USL-101
1-1	252347	Pass Sensor Harness ASSY (2)	1	
1'	252233	Control Board ASSY (3) – New Type	1	USL-101
2	252421	Back Cover	1	
3	252701	CREM Solenoid	1	
4	252702	Separator Solenoid	1	
5	440561	Machine Nameplate (M)	1	
6	252310	Power Supply Harness ASSY (2)	1	
6-1	252507	Rubber Bushing	1	
6'	252336	Power Supply Harness ASSY (4)	1	USL-101-01
6-1	252507	Rubber Bushing	1	
6-2	220302	NB Harness ASSY	1	
7	252524	Harness Guide	1	
8	252520	Solenoid Collar	1	
9	900006	Screw	2	(+)Pan-head M3 × 4
10	904214	Self Tapping Screw	3	(+)Pan-head M3 × 30
11	904209	Self Tapping Screw	4	(+)Pan-head M3 × 8
12	904208	Self Tapping Screw	2	(+)Pan-head M3 × 6
13	904702	Self Tapping Screw	1	(+)Flat-head M3 × 8
14	252229	Pass Sensor Board – Old Type	1	

