English Edition

AN 8000

Payout units

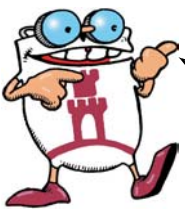
Technical Information

General Contents

Continued... +

+ Continued...

Date: June 21, 2004
English Edition



AZKOYEN MEDIOS DE PAGO HEREBY PRESENTS THE MARKET WITH ITS AN 8000 SERIES PAYOUT UNITS, WHICH ARE DESIGNED TO PROCESS SALES IN AUTOMATIC VENDING MACHINES.

1. AN 8000 Payout Units: Models and Protocol

AN 8000 PAYOUT UNITS: MODELS, PROTOCOLS AND CONNECTIONS

MODEL	PROTOCOL	TYPE OF CONNECTION		POWER SUPPLY
MULTI-PROTOCOL	*EXECUTIVE*	Molex 15-pin and Molex 9-pin		24 VAC
	MDB	Minifit 6-pin		24 VDC - 34 VDC
	BDV	AMP 9-pin		24 VDC
MDB	*MDB*	Minifit 6-pin		24 VDC - 34 VDC
MIXED	*4 PRICE LINES*	Molex 15-pin		110 VAC 220 VAC 24 VAC
		Jones 8-pin		
	MDB	Minifit 6-pin		24 VDC - 34 VDC

1.1 Executive Protocol

For more detailed information, consult the "Executive Protocol" standard.

This protocol is designed for operating in those machines that have a Control Card (V.M.C. – Vending Machine Control) governed by a microprocessor.

The payout unit must have a connecting cable bundle with the V.M.C. through which there is permanent dialogue between the two systems using a "language" that is called "executive." All messages are sent by means of this dialogue in order to correctly process all sales.

The functions of a payout unit with the Executive protocol installed in a machine are validating, appraising and classifying the coins introduced into the machine. It is the payout unit that decides, according to the accumulated credit, whether or not to allow the machine to dispense product.

In a machine in which a payout unit with the "executive" communication language has been installed, the payout unit is the "master," meaning that it is the main element and its decisions supersede those of the V.M.C.

Any peripheral equipment to be installed in the machine, such as credit card readers, must depend on the payout unit and not on the V.M.C.

AN 8000 Multi-protocol Payout Unit

1.2 Price Line Protocol

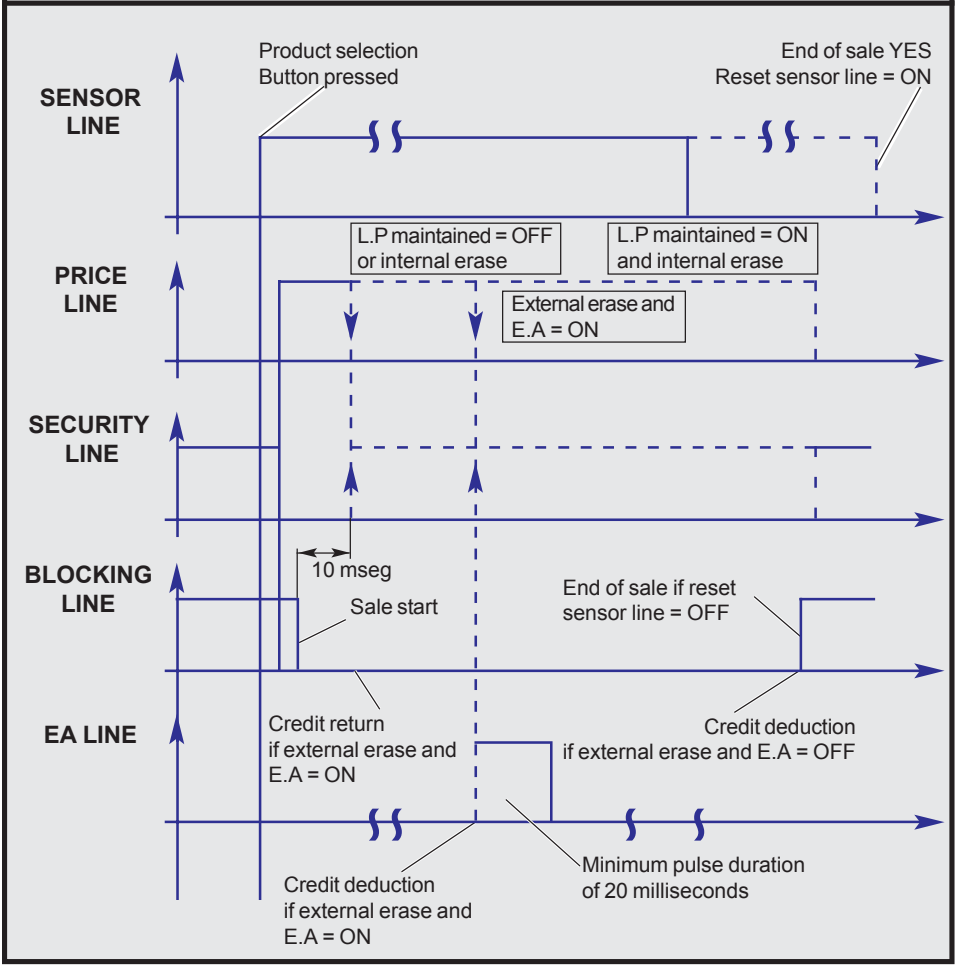
This protocol is designed for being installed in so-called "electromechanical" machines, meaning those machines that do not have a Control Card or, in case they do have a control card, the machine is not governed by a microprocessor.

This kind of payout unit is known as a Price Line payout unit. If a payout unit with four price lines is installed, there can be four different prices on the machine.

The functions of these kinds of payout units are validating, appraising and classifying the coins introduced into the machine. They also decide if the machine should carry out the sale or not, given that it is the payout unit that knows the accumulated credit and the price of the requested product. The payout unit is even responsible for starting up the product extractor motor or motors of the machine, thereby "powering" them during the entire sales process.

AN 8000 Mixed Payout Unit

FUNCTIONAL DIAGRAM OF THE PRICE LINES



1.3 MDB Protocol

For more detailed information, consult the "MDB/ICP Protocol, Version 2.0" standard.

This protocol, like the **Executive** protocol, is designed for operating in all machines that have a Control Card (V.M.C. – Vending Machine Control) governed by microprocessor.

The main difference between the **Executive** protocol and the **MDB** protocol is that the former uses a communication language with the V.M.C. known as the "Executive Language," and the latter uses the "MDB Language."

These payout units are simpler than the **Executive** payout units, they also have a control card and the power supply voltage is direct current supplied through the machine's power supply.

With the **MDB** language, the "master" is no longer the payout unit, but rather the Control Card of the machine. Any peripheral equipment to be installed in the machine will be controlled by the V.M.C.

The **MDB** payout unit can be considered simply as a validator and a classifier with four returner tubes. All of these functions depend on the V.M.C. of the machine.

AN 8000 MDB Payout Unit

1.4 BDV Protocol

For more detailed information, consult the "BDV 001 Protocol" standard.

The **BDV** protocol is a communication protocol series similar to the **Executive** protocol. The payout unit is connected to the machine using an AMP 9-pin, mate-n-lock male connector. The payout unit is powered and the bi-directional communication lines are established through this connector.

This protocol differs from the **Executive** protocol in that the following parameters are controlled by the machine:

- ✓General coin blocking.
- ✓ Out-of-change blocking.
- ✓ Programming tube minimums.
- ✓ Maximum credit and maximum change.
- ✓ Maximum credit on pre-paid card.
- ✓ Service mode.
- ✓ Prices.
- ✓ Accounting.

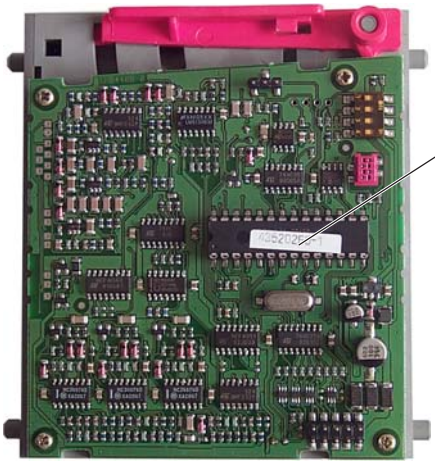
The sales and classification process of the coins are managed by the payout unit.

AN 8000 Multi-protocol Payout Unit

2. Features

✓ Coin admission using the **AZKOYEN**, L66S electronic selector, which includes the latest advances in anti-fraud systems.

L66S Selector



Selector Memory

✓ Return of up to four different kinds of coins that can be programmed by the user.

✓ Auto-filling of the change tubes.

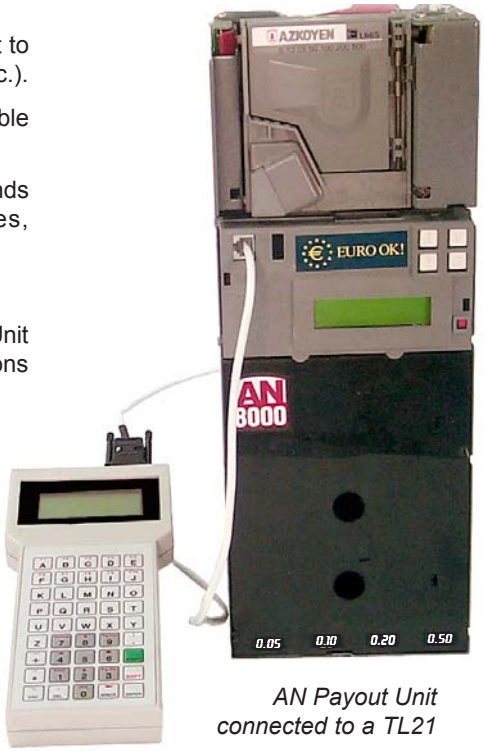
✓ Programmable maximum return.

✓ Accepts up to 32 different coins.

Returner tubes

✓ Payout unit programming through an alphanumeric screen (LCD display) with two lines of 16 characters each using 4 multi-function keys.

- ✓ Includes an RS-232 port for data output to peripheral equipment (psion, printers, etc.).
- ✓ Permanent clock-calendar programmable by the user.
- ✓ Total accounting system: number and kinds of coins, amount and kinds of sales, incidences, etc.
- ✓ Automatic diagnosis program.
- ✓ It allows on-site programming of Payout Unit parameters and Selector software versions via PC or a TL21 Programmer.



AN Payout Unit connected to a TL21

3. Dimensions and Capacities

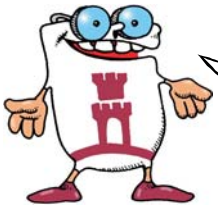
3.1 Payout unit dimensions

3.2 Coin dimensions. Capacities.

The diameter of the coins that can be returned from each one of the returner tubes is determined by the diameter of the individual tubes. The measurements of the coins that can be returned from each tube are the following:

TUBE	Min. Ø - Max. Ø (mm)	Max. Thickness (mm)	COIN (Euro)	Capacity
A	17 to 26	1.2 to 3.2	**5 cts**	70
B	20.3 to 30.2		**10 cts**	65
C	17 to 23.2		**20 cts**	60
D	25 to 32.5		**50 cts**	35

4. Use conditions and Legislation



NOTICE

THE MANUFACTURER OF THIS MACHINE HEREBY DENIES ALL RESPONSIBILITY FOR ANY BREAKDOWNS OR DAMAGE CAUSED BY THE FAILURE TO COMPLY WITH THE CONDITIONS AND LEGISLATION DESCRIBED IN THIS MANUAL.

4.1 Electrical characteristics and wiring

4.1.1 Common Connections

All of the **AN 8000 Payout Units** have two connectors and a ground wire in order to be connected to the machine. These two connectors are the following:

SMD 6-pin RS-232 Connector

This service connector located on the coin classifier is used for serial communications, for both transmitting accounting to the exterior as well as for downloading parameters.

The selector is also remotely programmed through this connector.

SMD 6-Pin Connector

Minifit 16-pin Connector

This connector is actually an interface in order to be able to connect the cable bundle corresponding to the type of protocol with which the Payout Unit is going to operate.

The different kinds of cable bundles available are shown in **«Appendix 2. Compliments and Accessories»**

Minifit 16-way Connector

4.1.2 Executive Protocol

Power Supply

✓ 24 Vac +/-10%

✓ Nominal power: <5W

✓ Average consumption of less than 150 mA

Molex 15-pin Connector

This connector is for the 24 VAC power supply to the payout unit. It only has three wires: the blue and brown coloured wires are connected at the voltage indicated on the specifications plaque of the pay-out unit, and the brown-black wire, which illuminates the "out of change" light, when applicable.

Molex 15-pin Connector

Colour	Function
Brown	24 VAC phase
Blue	Neutral
Brown/Blue	Illuminates out-of-change light

Molex 9-pin Connector

This connector allows communication between the machine control card (VMC) and the payout unit control card.

It has five cables for communication with the machine.

Molex 9-pin Connector

Pin - Out	Colour	Function
1	Yellow	Tx +
2	Brown	Rx -
3	White	Rx +
4	Green	Tx -
9	Black	Screen

4.1.3 MDB Protocol

There are two different kinds of connectors. The connector to be used depends on the kind of machine in which the Payout Unit is going to be installed.

Power Supply

- ✓ 24 VDC +/- 10% or 34 VDC +/- 10%
- ✓ Nominal power: <5W
- ✓ Average consumption of less than 150 mA

Mini-Fit 6-pin Connector

This connector is used to supply power to the payout unit and to communicate with the Control Card of the machine. It has five wires: two for the power supply and three for communications.

Pin - Out	Colour	Function
1	Pink	Positive (+)
2	Grey	Negative (-)
3		
4	White	TX
5	Green	RX
6	Yellow	GND

Mini-Fit 6-pin Connector

4.1.4 Price Line Protocol

Power Supply

- ✓ 110 VAC +/- 10%, 220 VAC +/- 10% and 24 VAC +/- 10%
- ✓ Nominal power: <5W
- ✓ Average consumption of less than 150 mA

Molex 15-pin Connector

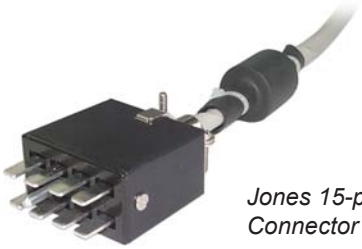
This connector is used to supply power to the payout unit and to communicate with the Control Card of the machine.

Pin - Out	Colour	Function
1	Brown	Power supply voltage phase (110, 220 or 24 VAC)
2	Blue	Neutral
3	Orange	Price line 1
4	Yellow	Price line 2
5	Green	Price line 3
6	Violet	Blocking line
7	Grey	Security line
8	White	Erase line
9	Brown/Blue	"Exact change" light
10		
11		
12		
13		
14	Black	Price line 4
15		

Molex 15-pin Connector

Jones 15-pin Connector

This connector is used to supply power to the payout unit and to communicate with the Control Card. It has 14 wires for supplying power and for communicating with the machine.



Jones 15-pin Connector

Pin - Out	Colour	Function
1	Brown	Power supply voltage phase (110, 220 or 24 VAC)
2	Blue	Neutral
3	Red/Blue	Price line 1
4	White/Blue	Price line 2
5	Brown/White	"Exact Change" light
6	Violet.	Blocking line
7	Blue/Black	Price line 3
8	Orange/Black	Price line 4

4.1.5 BDV Protocol

Power Supply

- ✓ 24 VDC +/- 10%
- ✓ Nominal power: <5W
- ✓ Average consumption less than 150 mA

AMP 9-pin Connector

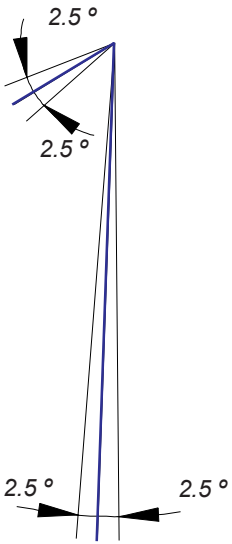
This connector is used to supply power to the payout unit and to communicate with the Control Card of the machine.

AMP 9-pin Connector

Pin - Out	Colour	Function
1	Grey	Ground
2	Red	VDC
3		
4		
5	Yellow	Tx +
6	Green	Tx -
7	White	Rx +
8	Brown	Rx -
9	Black	Screen

4.2 Maximum operating inclination

In order for the AN 8000 payout unit to operate correctly, it must not exceed a maximum inclination of 2.5º on any of the front or side axes.



Maximum inclination

4.3 Temperature and relative humidity

- ✓ Operating temperature from 0º C to +55º C.
- ✓ An appropriate relative humidity is considered between 35% and 95% without condensation.

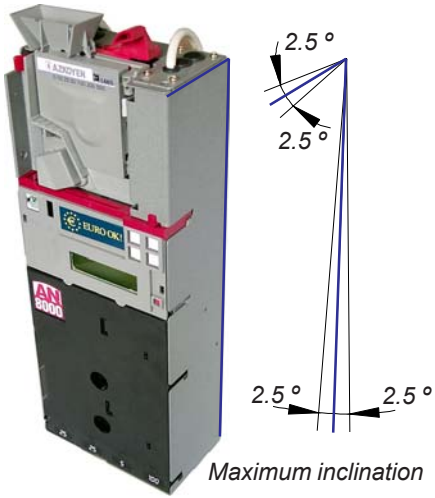
5. Installation and adjustment

Installing the payout unit in the machine

1. Verify that the voltage at which the payout unit is going to be connected corresponds to the voltage indicated on the specifications tag.

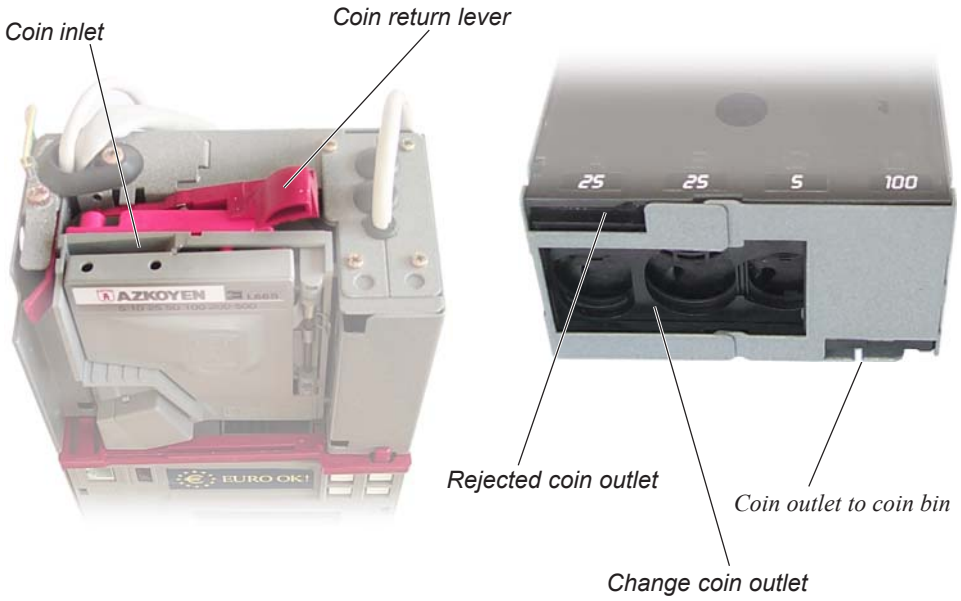
2. Place the payout unit on the three pins or fastening bolts of the machine, which must extend a minimum of 3 mm with respect to the machine frame.

3. Connect the power supply and communications cable bundles and connect the ground cable. After these points, check that the payout unit is positioned vertically. In order for it to operate the best, ensure that the maximum deviation of its position in any direction does not exceed 2.5º.



Maximum inclination

4. Verify that the paths that the coins follow during admission, rejection and collection do not have any problems with positioning. Also, verify that the coin return lever is free and in a normal position so that when this function is necessary from the exterior the selector is not prevented from opening completely.



5. Proceed to power up the payout unit.

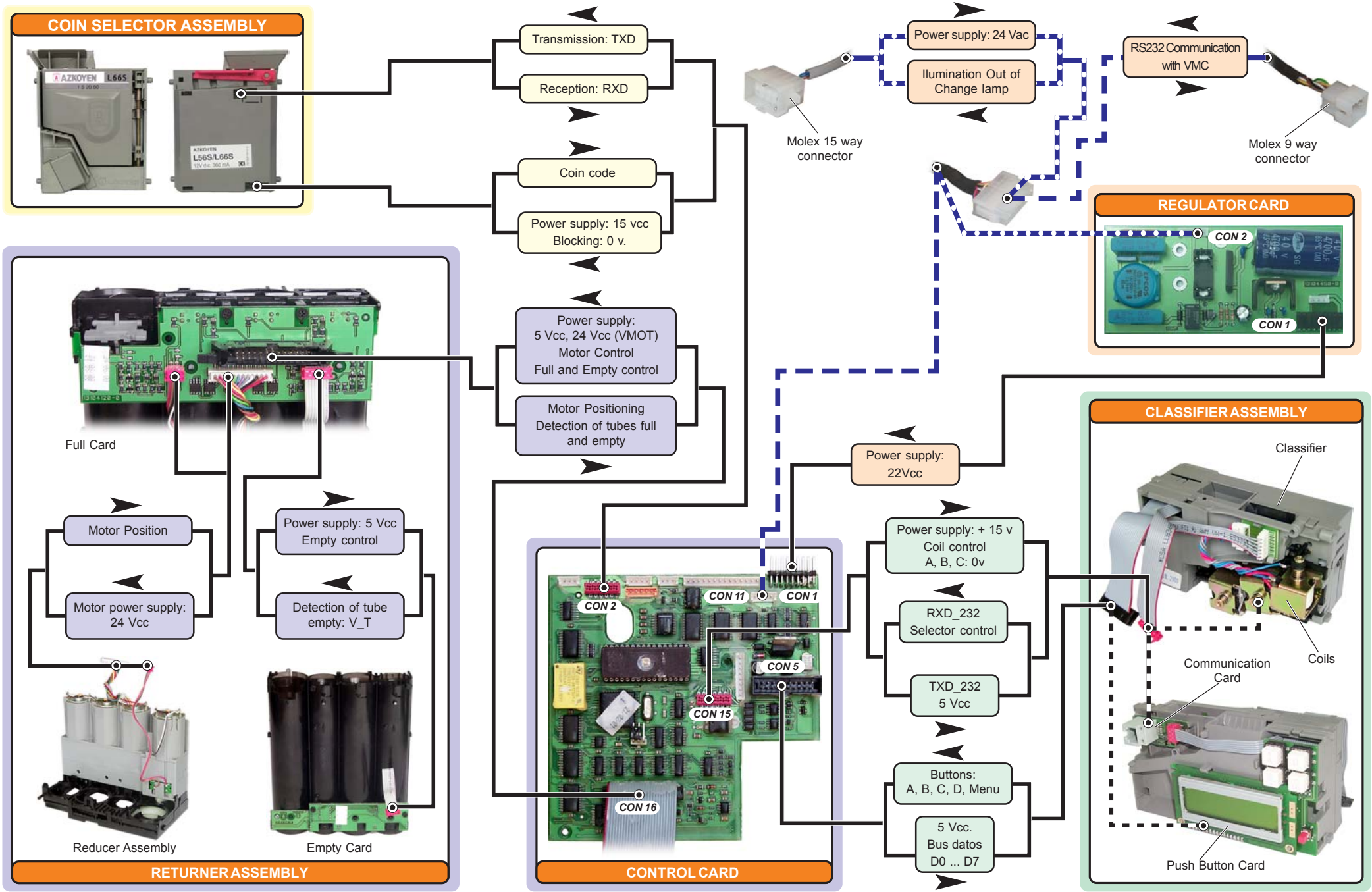
6. Fill the returner tubes with coins. In order to carry out this process, see point **«Programming; 002 Fill returner tubes»**.

The minimum number of coins recommended for each tube is the following:

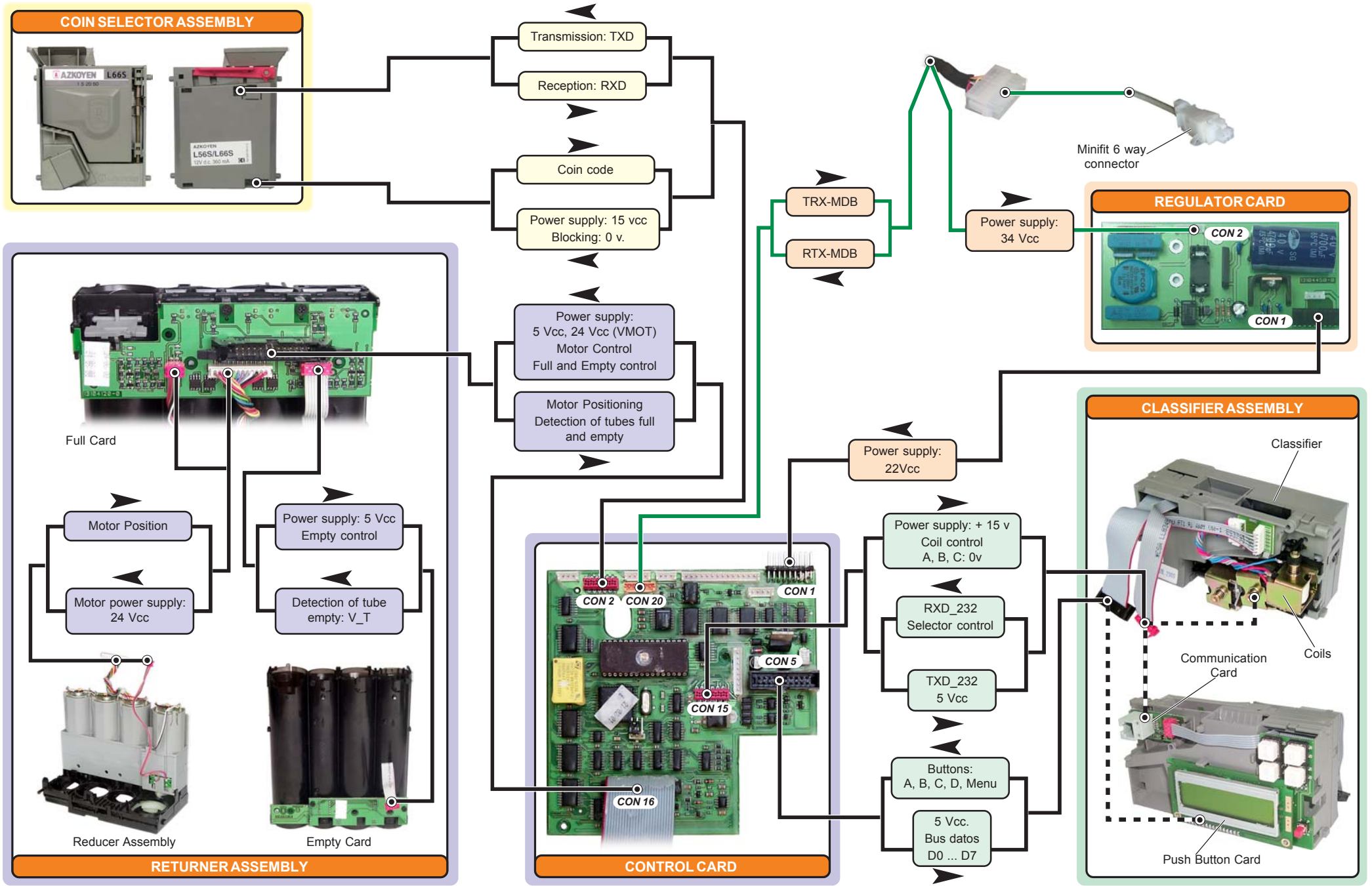
TUBE	Coin (Euro)	Minimum Quantity
A	**5 cts**	8
B	**10 cts**	8
C	**20 cts**	8
D	**50 cts**	6

7. Verify that the machine operates correctly by ordering a service. Likewise verify that the coin return works correctly.

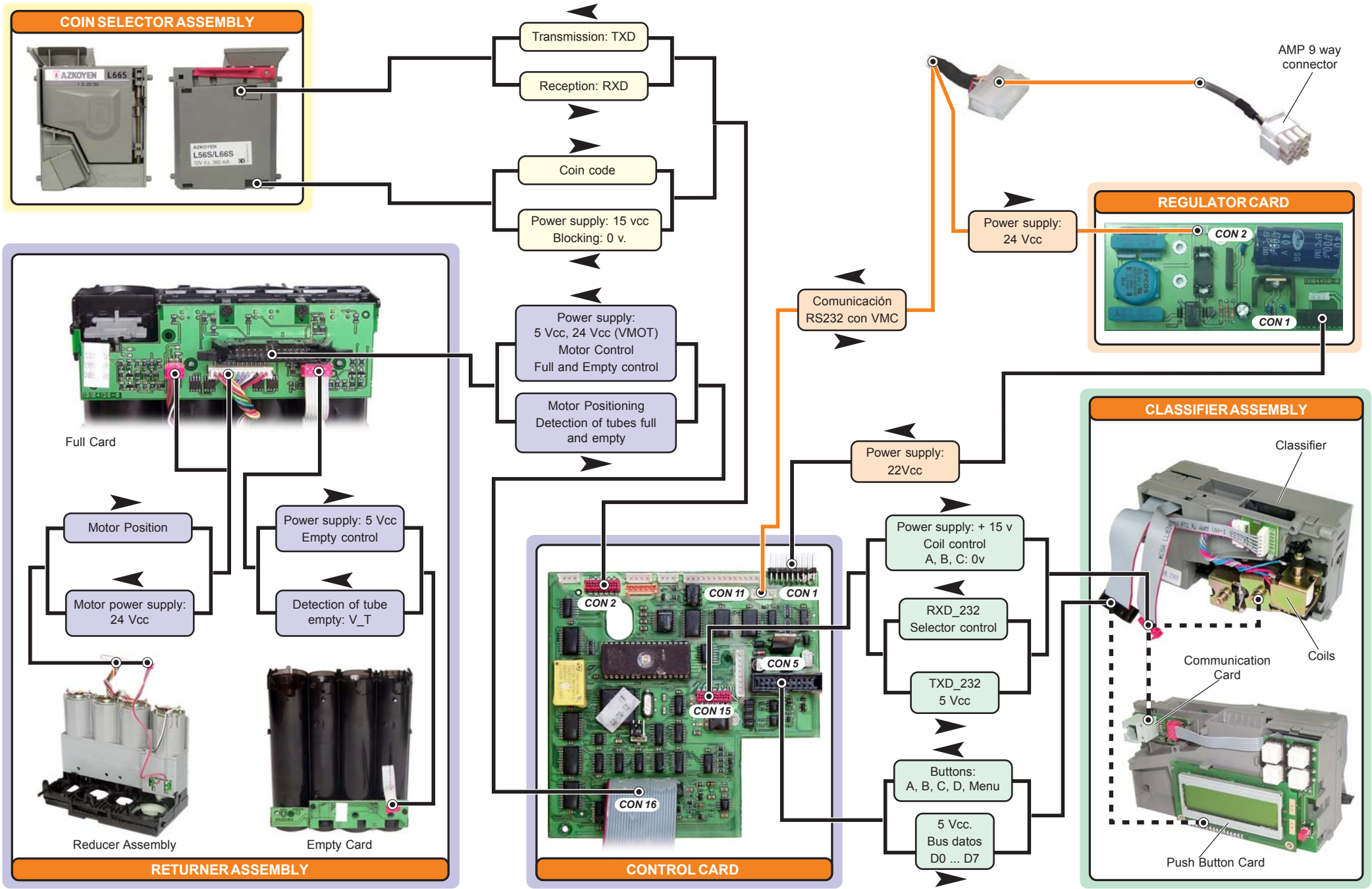
6. AN 8000 Multi-Protocol Block Diagrams: Executive Protocol



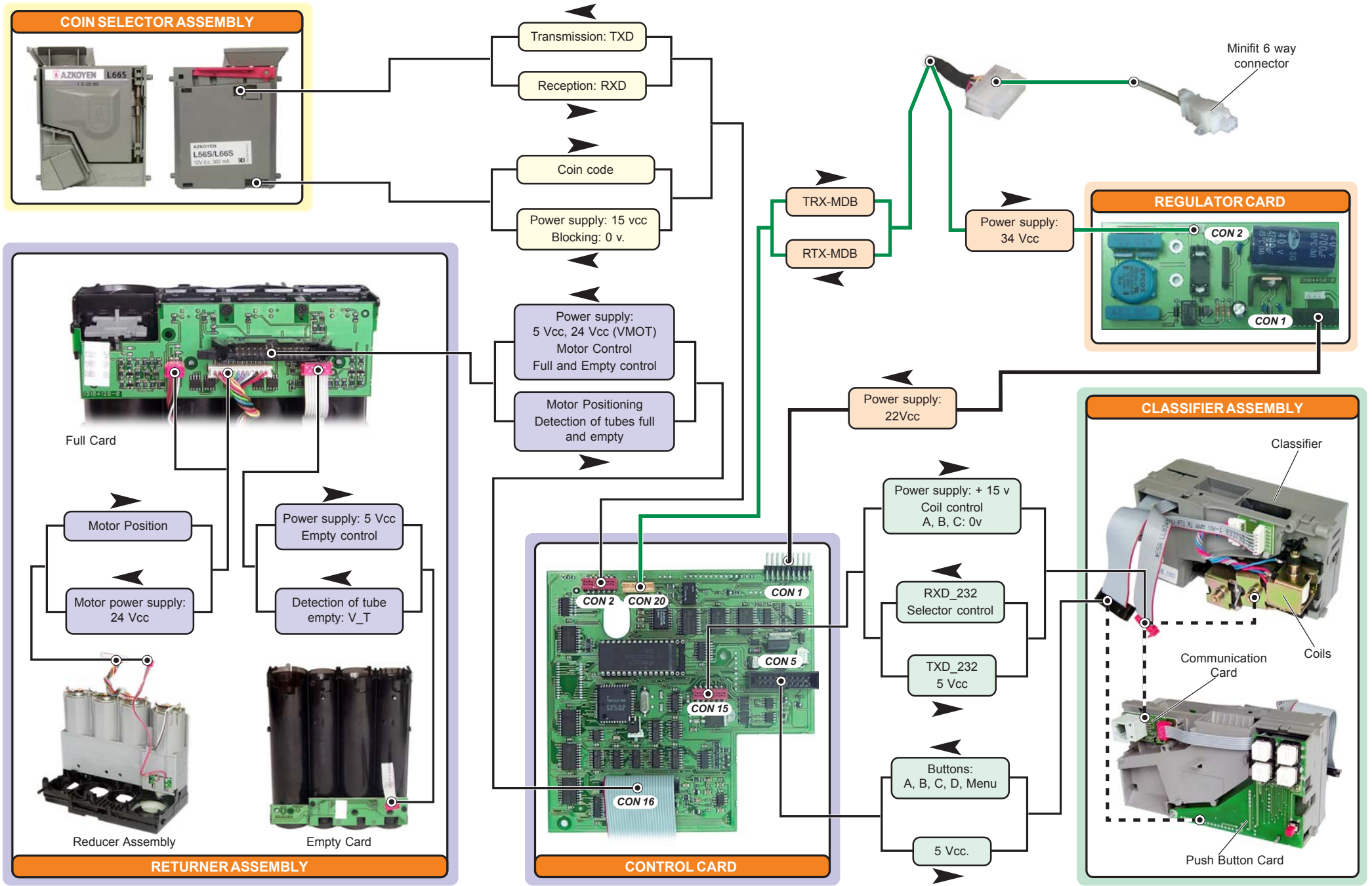
7. AN 8000 Multi-Protocol Block Diagrams: MDB Protocol



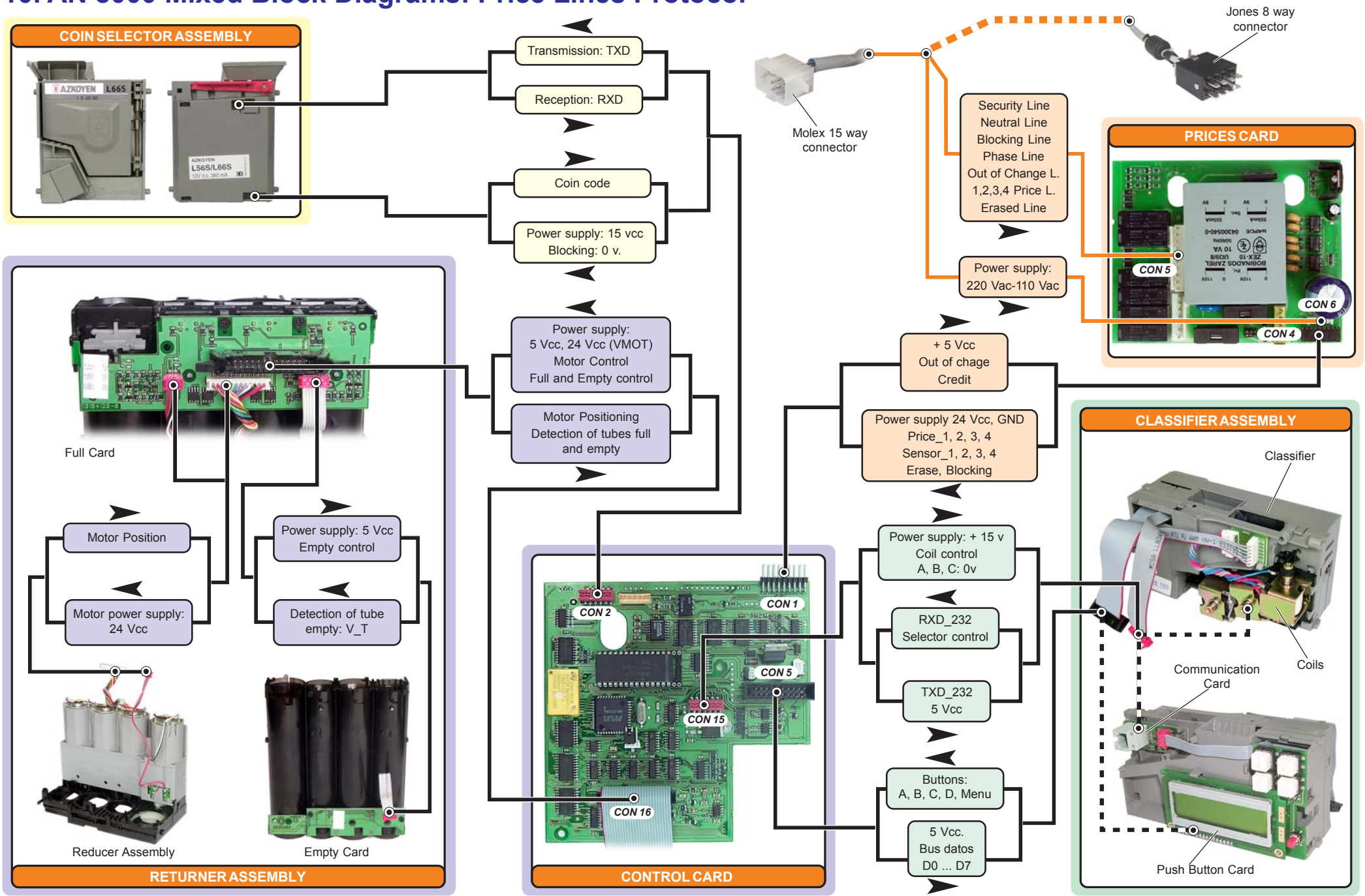
8. AN 8000 Multi-Protocol Block Diagrams: BDV Protocol



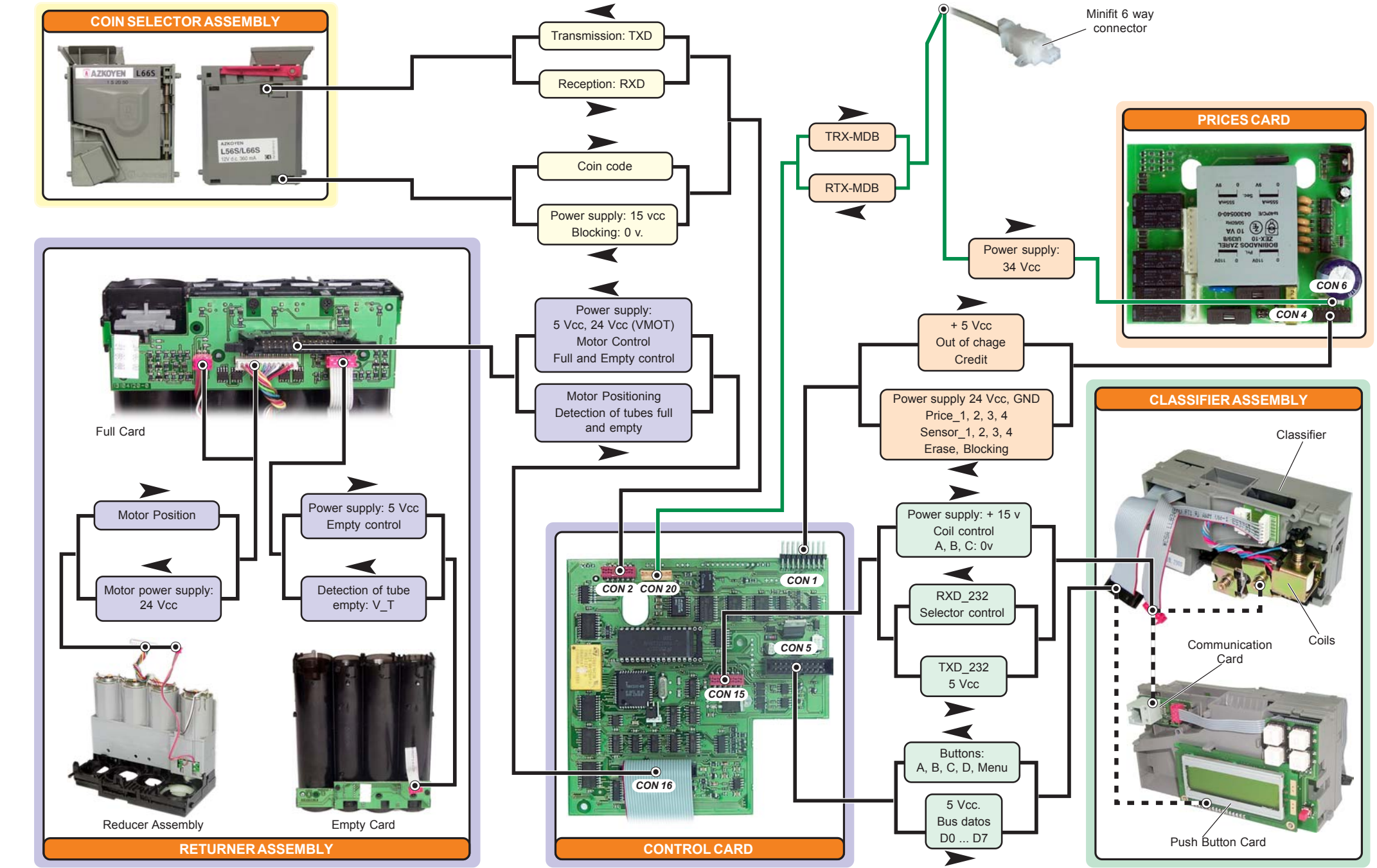
9. AN 8000 MDB Block Diagrams



10. AN 8000 Mixed Block Diagrams: Price Lines Protocol



11. AN 8000 Mixed Block Diagrams: MDB Protocol



12. Classifier assembly

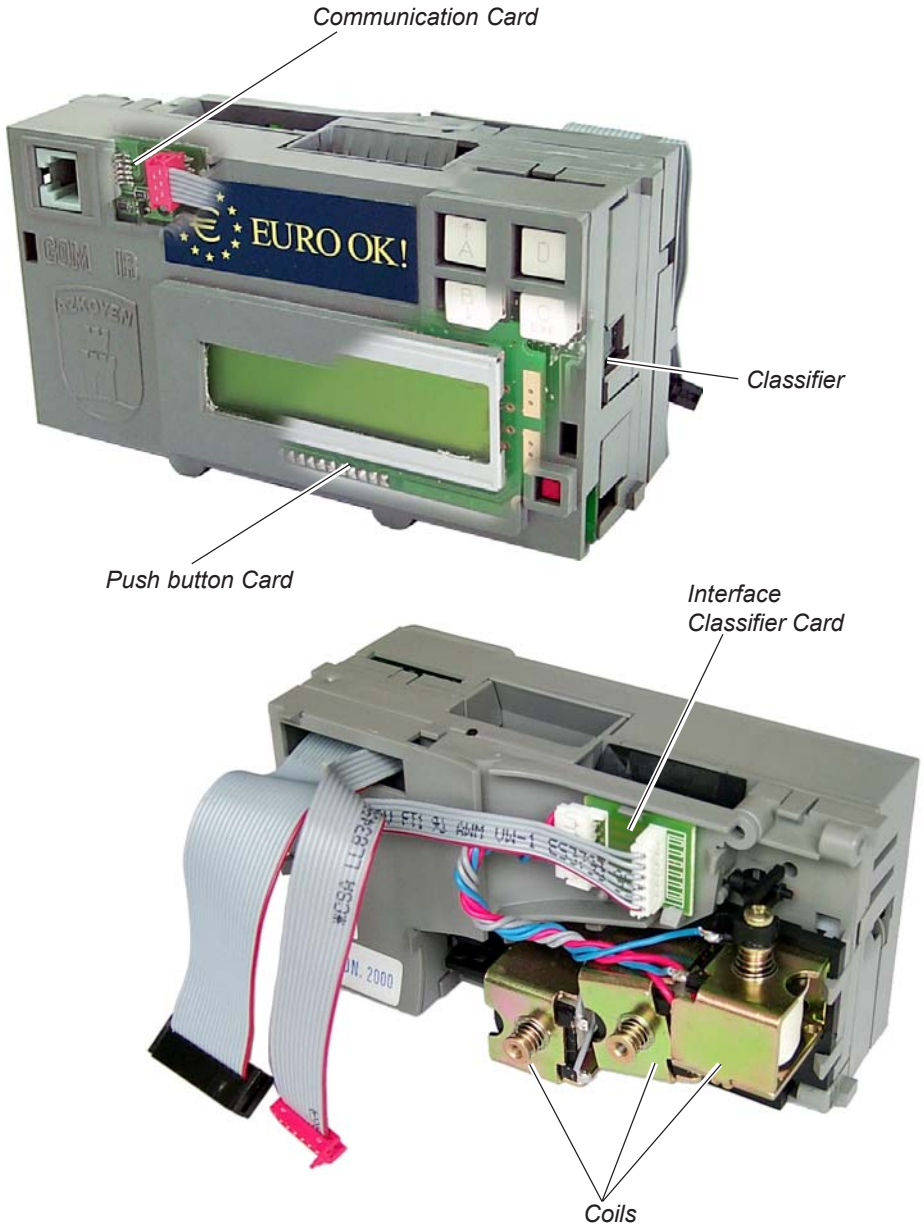


Figure 1. *Classifier assembly*

12.1 Classifier

Function

The function of the classifier is to direct all coins that leave the selector to their respective destinations:

- ✓ The change coins are sent to the returner tubes.
- ✓ The admitted coins that are not used for change are sent to the coin bin.
- ✓ The coins rejected by the selector are sent for return.

Description

It is made up of three electro-magnets, the cores for which are connected to the corresponding knives. Said knives are in charge of routing the coins to their respective destinations.

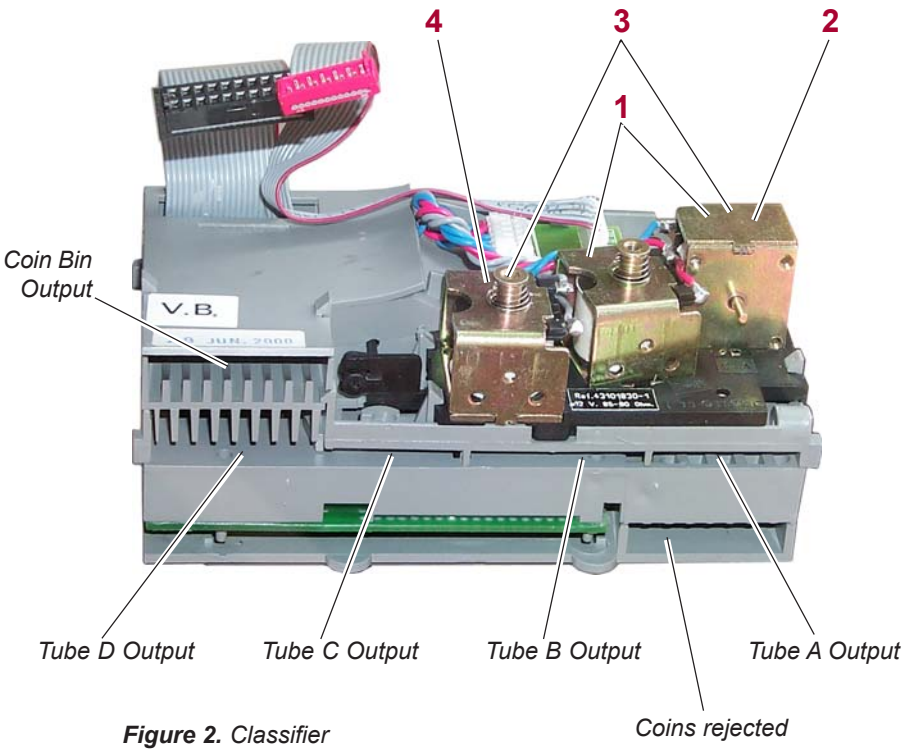
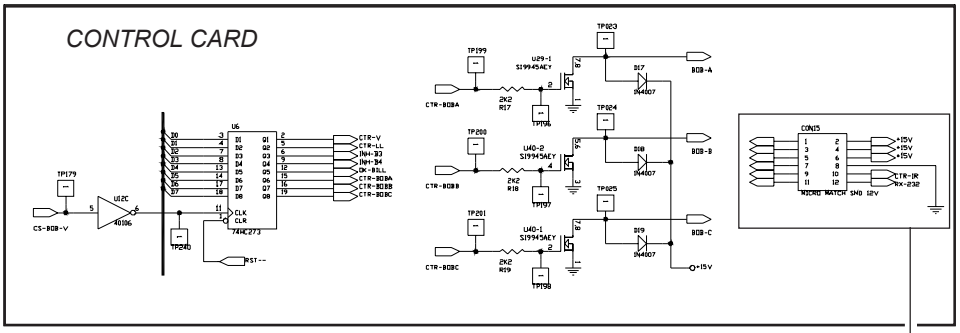


Figure 2. *Classifier*

1 *Classifier Coils, (tube **C**)*
2 *Classifier Coils, (tube **B**)*
3 *Classifier Coils, (tube **A**)*
4 *Classifier Coils, (tube **D**)*

Operation



The coils are controlled from the control card.

The data bus (D5, D6, and D7) applies to unit U6 (74HC273). Using signal level "1" on pin 11 (clock), this bus is transferred to the output (Q6..Q8).

The U6 outputs are active when they are at level "1", and they are applied to the adjuster of the corresponding n-MOS transistors located at U29 and U40. These transistors directly control the classifier coils, sending them the negative signal.

The classifier coils remain connected at +15 V at one of their ends.

COILS

Figure 3. *Operation*

12.2 Communications card

Function

The function of the communications card is to serve as the interface in the selector programming process.

Description

It is composed of a printed circuit on which a 6-way Jack is mounted.

Operation

Through the input Jack, the RX-232 (payout unit reception) and the TX-232 PROG (payout unit transmission) communications lines are connected, which come from the programmer and the destination for which is the selector. The communications signals go to the control card through the "CON15" connector and are processed at the U21 (MAX 202), which has the mission of adapting them to RS-232 transmission levels (+12v…-12v).

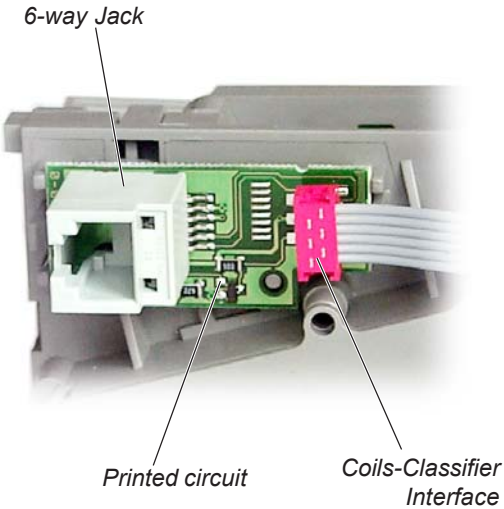


Figure 4. *Communications Card*

When payout unit programming is entered (keeping the red key pushed for a few moments), the communications port between the programmer and the selector is left open.

In order to communicate to the selector that programming is going to take place, its power is cut. The selector then sends back a burst of impulses as confirmation, and afterwards selector programming begins.

In order to produce the power cut, the programmer directly polarises T1 on the communications card, and at the same time pin 5 of the U31B (CTR-XSEL) on the control card goes to level 0 and pin 6 to level 1, cutting power to T301-1 and T300. As a result, the selector is left without power. The Control Card controls the power supply using the "CTRPWSEL" signal applied at pin 4 of the U31B.

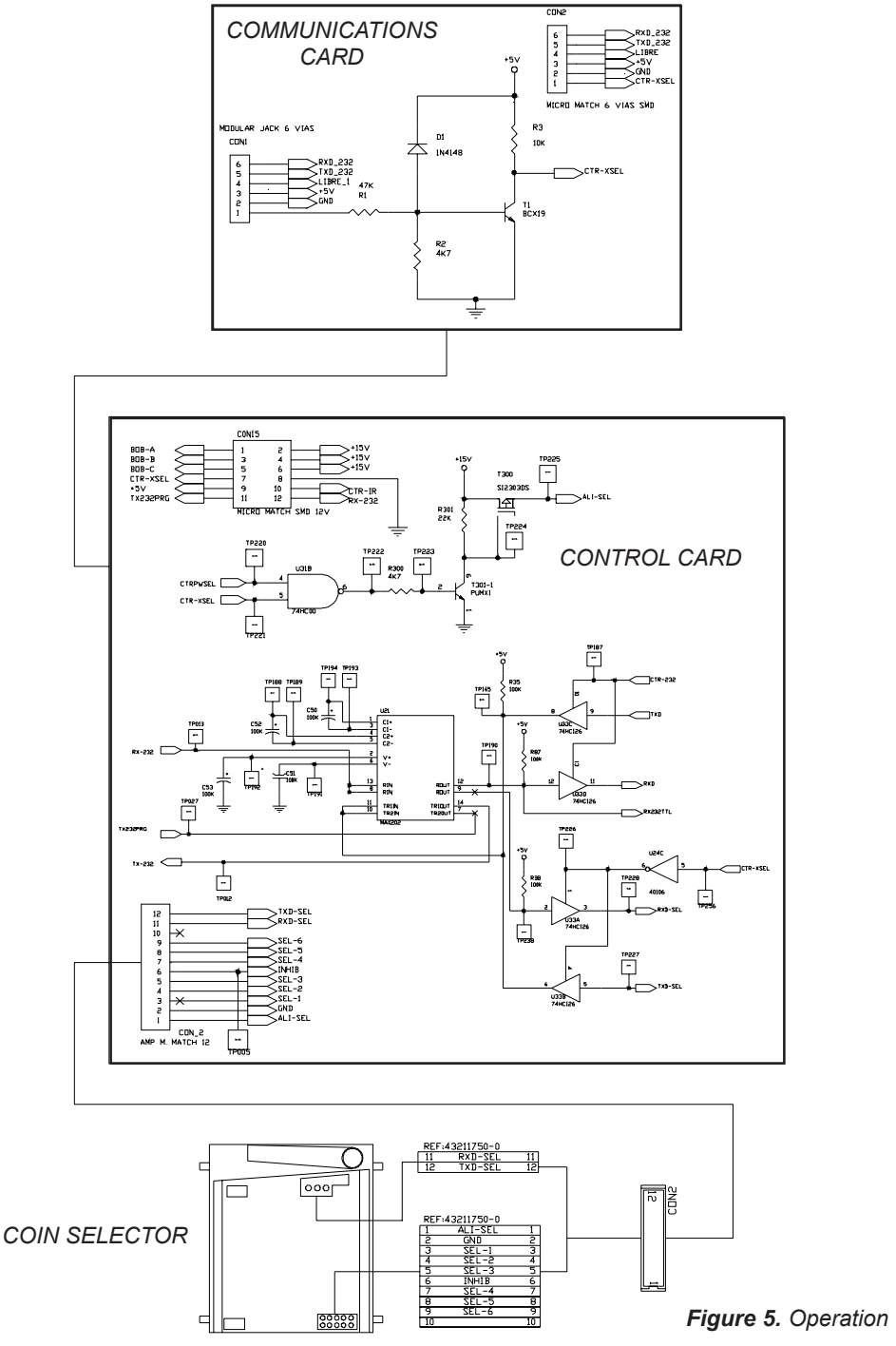


Figure 5. *Operation*

12.3 Push button card

Function

- ✓ Payout unit and selector programming.
- ✓ Manual emptying of the returner tubes.

Description

It is made up of four push buttons mounted on a printed circuit card.

In model **AN 8000 MDB** this card do not have display.

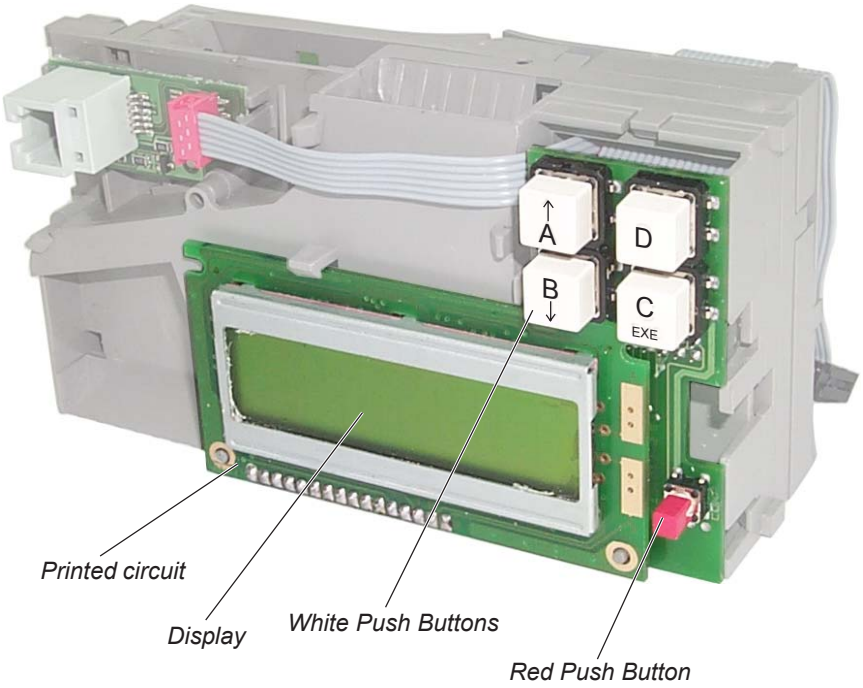


Figure 6. *Push button card*

Operation

The signal corresponding to each push button is sent to the U17 (74hc251) of the control card, which is a multiplexer circuit. This signal appears through pin 6 at level 0 and incorporates to the data bus as D0. The keypad reading process is enabled with level 0 at pin 7 (strobe).

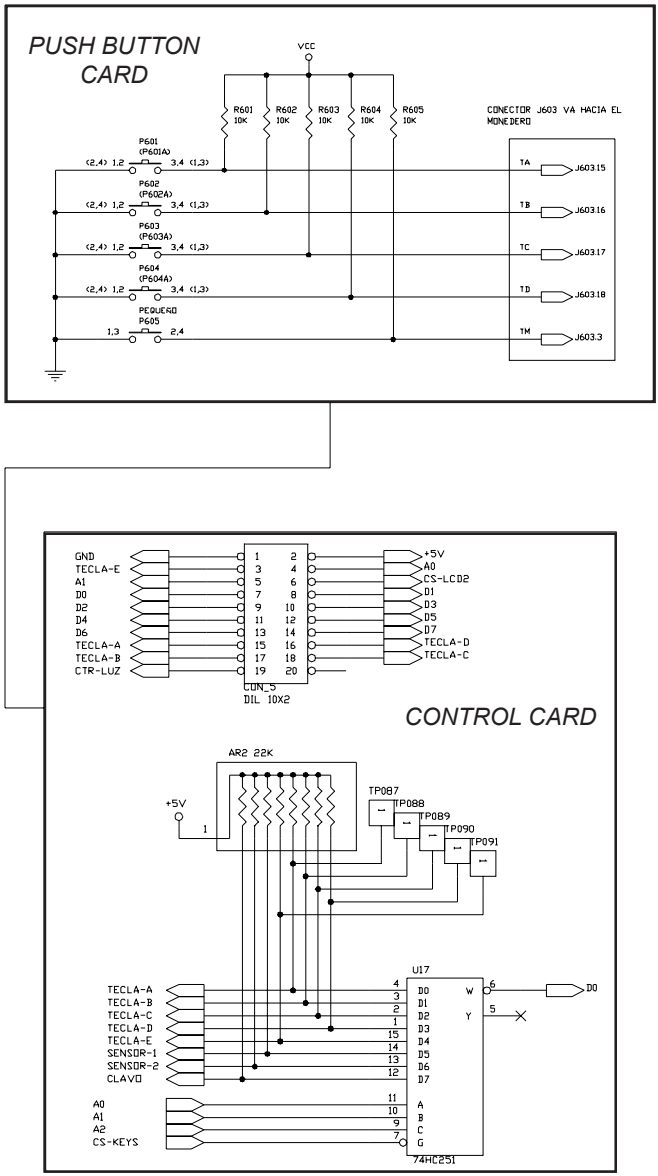


Figure 7. *Operation*

13. Returner tubes assembly

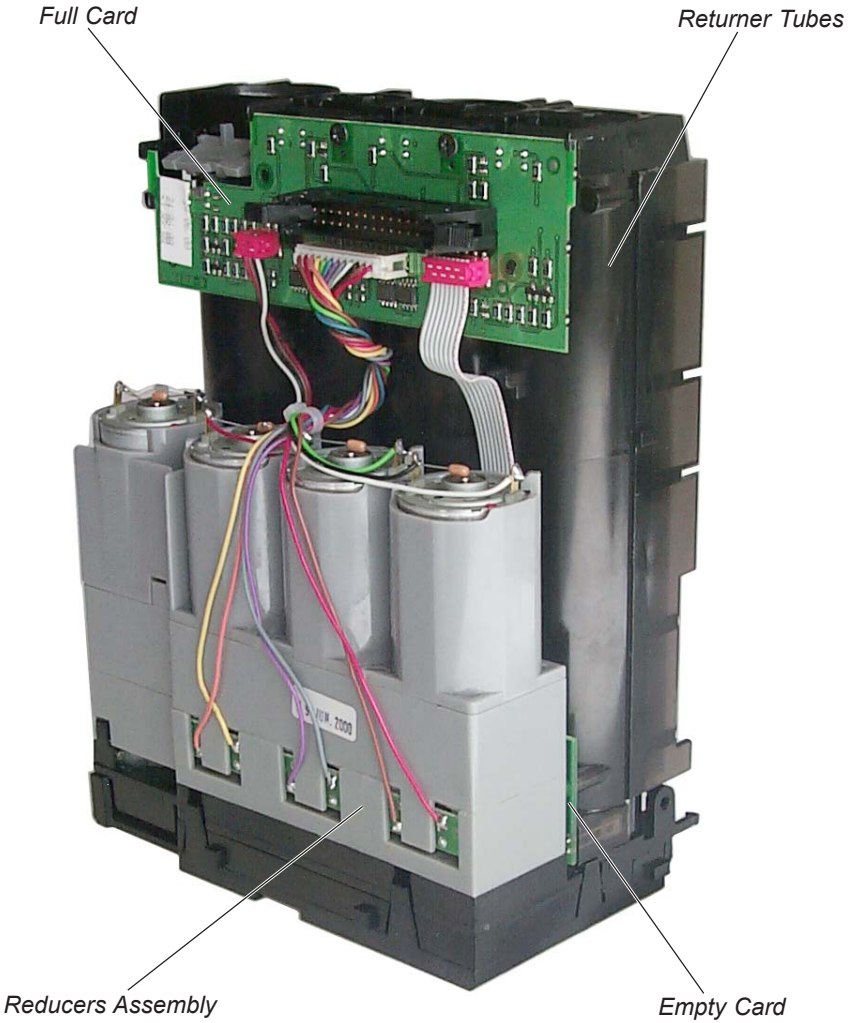


Figure 8. *Returner tubes assembly*

13.1 Reducer assembly

Function

It returns the change coins and accounts for them.

Description

It is made up of four 24VDC motors with their corresponding reducers and a knife system for extracting the coins.

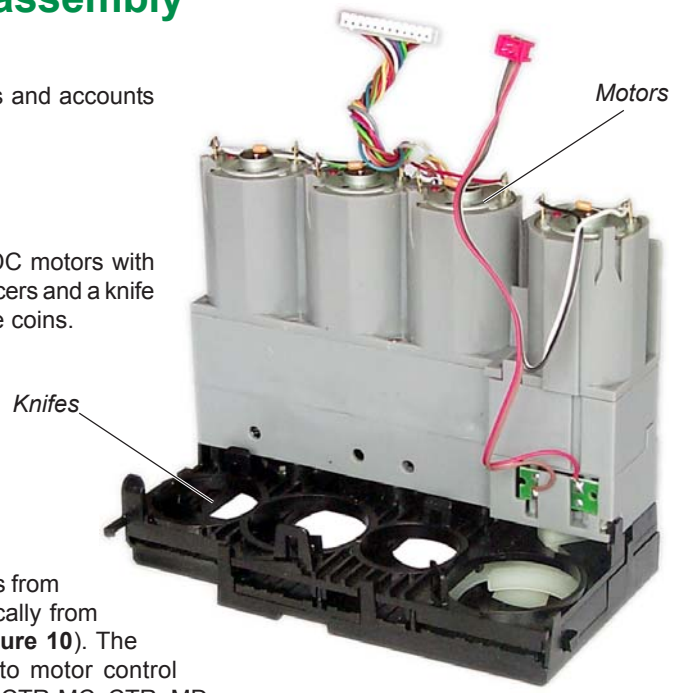


Figure 9. *Reducers Assembly*

Operation

The operational order starts from the control card, specifically from the U14 (74HC273) (**figure 10**). The outputs corresponding to motor control are: CTR-MA, CTR-MB, CTR-MC, CTR- MD, and AGUA. Through a level 1 signal on pin 11 (clock), the data bus is transferred (D0...D7) to the output (Q0...Q7).

As a security measure in order to prevent liquid entry from causing short-circuits and activating any motor, the AGUA signal has been entered, which is complimentary to the rest of the CTR's so that, in the idle position, this signal is at level 1, which blocks the motors (**figure 10**, water circuit schematic) while the CTR-MT signal is absent.

The motor energising circuits are on the full card. There are four equal circuits (**figure 10**), and each one is made up of an energising part and another braking part.

The operating circuit for activating and braking Motor A is the following:

When CTR_MA goes to level 1, the T702 is saturated, causing T704-1 to be cut, and as a result, transistor U02-1 is saturated as long as the CTROL_MT signal is activated. Motor A then starts to operate.

In order to deactivate the motor, the CTR_MA signal goes to level 0. As a result, transistor U02-1 cuts the power supply. When the power supply to the motor is stopped, it continues to rotate on its own inertia, generating an electromotive force. This is the moment when the braking circuit acts. Transistor T703_1 cuts the power supply, and it directly polarises the adjuster for the U01-1 transistor, and in this way the electromotive force generated by the motor is short-circuited by said transistor.

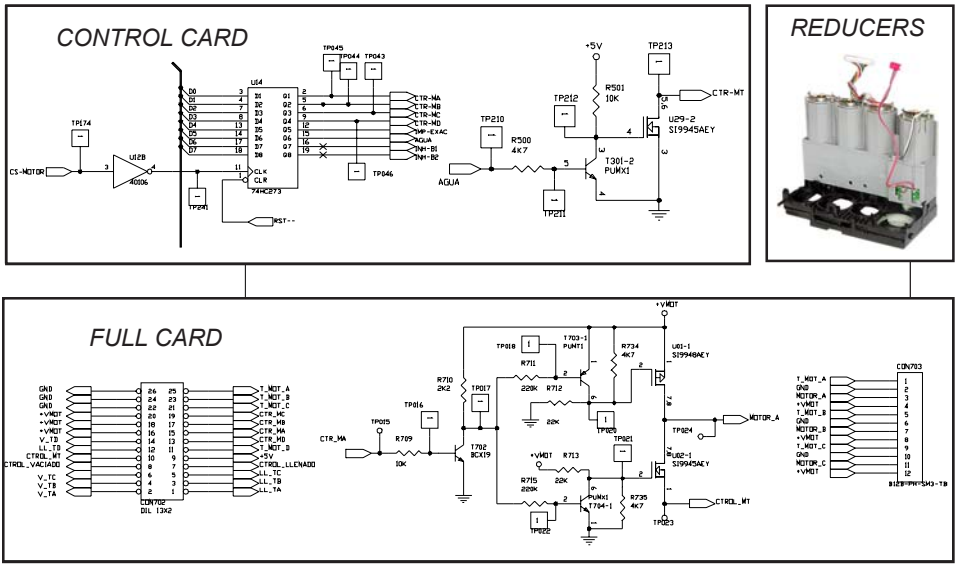
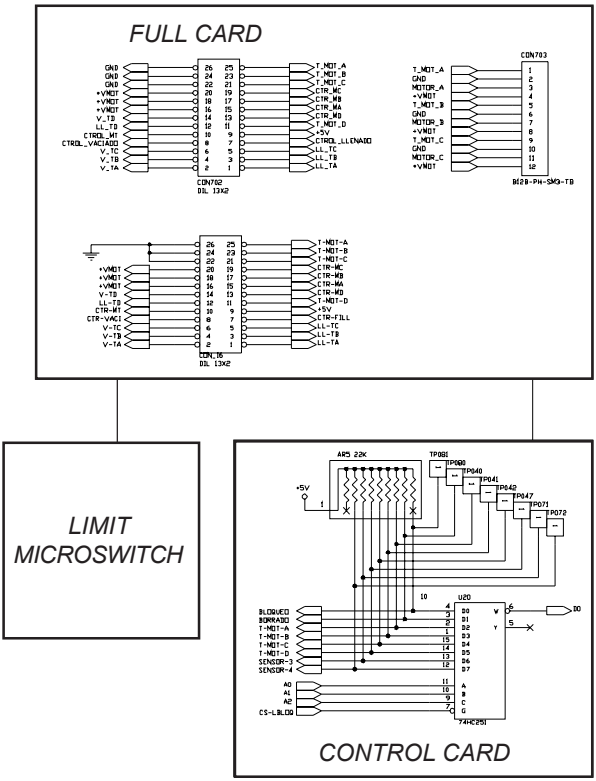


Figure 10. *Operation*

The dispensed coins are controlled through a limit microswitch incorporated by each one of the reducers. For each 360º turn that a reducer makes, it activates a limit microswitch, and it sends a level 0 signal to the U20 (74HC251), which is a multiplexer circuit located on the control card. The limit microswitches are read when pin 7 is at level 0.



13.2 Full card

Function

It has a dual function:

- ✓ It controls when the tubes are full, informing the control card so that coins are not sent to the corresponding returner tube.
- ✓ It serves as the interface card between the reducer assembly and the control card.

Description

It is made up of a card located physically in the upper tube area, which has 4 infrared light-emitting photodiodes and 4 phototransistors, one pair (photodiode-phototransistor) per tube, and their respective transistors for full control. It also incorporates the components necessary for operating the reducer assembly.

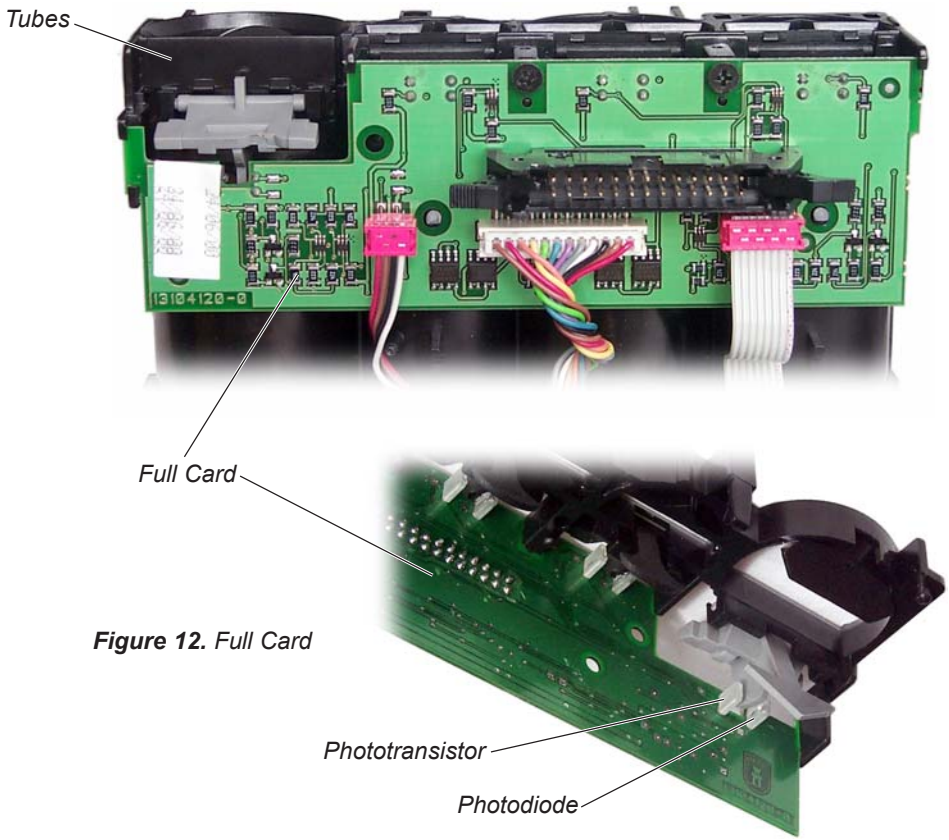


Figure 12. *Full Card*

Operation

The 4 photodiodes are connected in series and they are powered by 5VDC. Their power supply is controlled through the "CTROL_LLENADO" signal coming from transistor T10 on the control card, which in turn is governed by the U6 (74HC273, pin 5). Unnecessary consumption is thus avoided when coins are introduced that do not go to the returner tubes.

When a coin is introduced that does go to a returner tube, the photodiodes receive power, and the infrared beam corresponding to the tube where the coin is directed is interrupted by the rocker-arm that goes between the photodiode and the phototransistor for that tube. At that moment, the 5V power supply to the transistor is cut, and as a result the LL_X signal (X=A, B, C, D) goes to level 0.

The "LL_XW signal is sent to the multiplexer circuit U4 (74hc251) located on the control card, which, when it is enabled at level 0 by pin 7, is incorporated to the data bus as D0.

When the corresponding tube is full, the infrared beam will remain interrupted permanently, and when a coin is introduced, it will be sent to the coin bin.

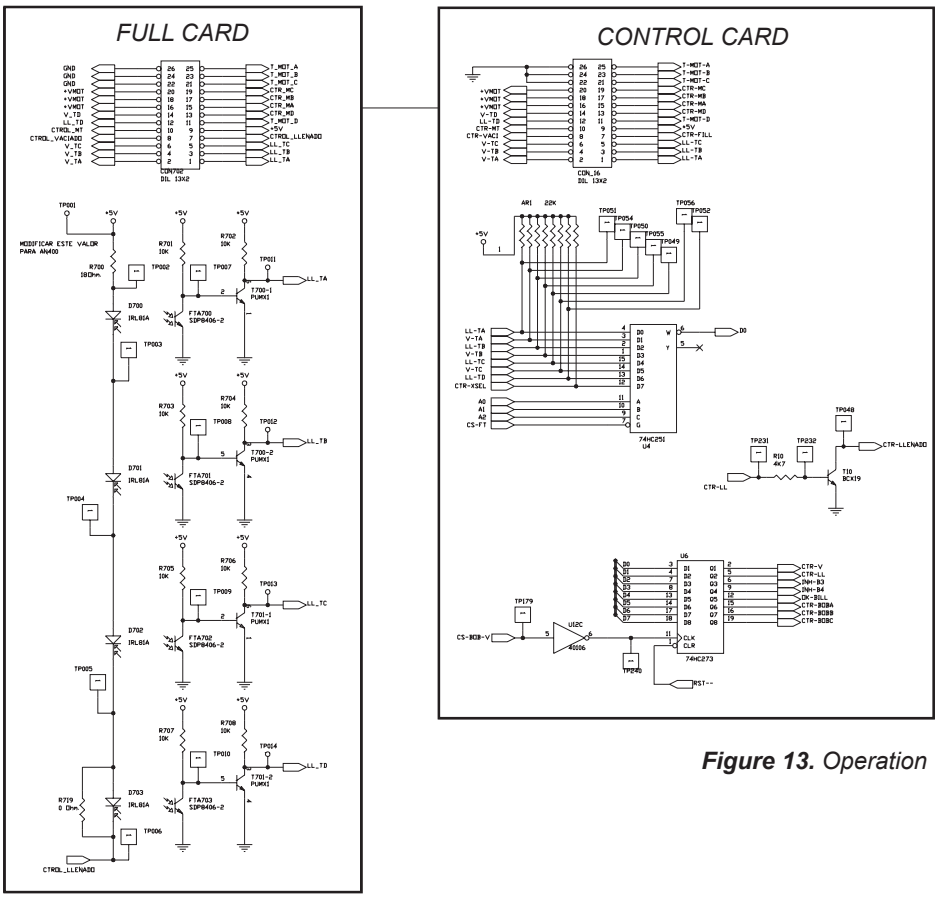


Figure 13. *Operation*

13.3 Empty card

Function

The empty card is in charge of controlling the minimum level of coins in each tube.

Description

It is made up of two printed circuit cards located physically in the lower tube zone, which hold four photodiodes and four phototransistors.

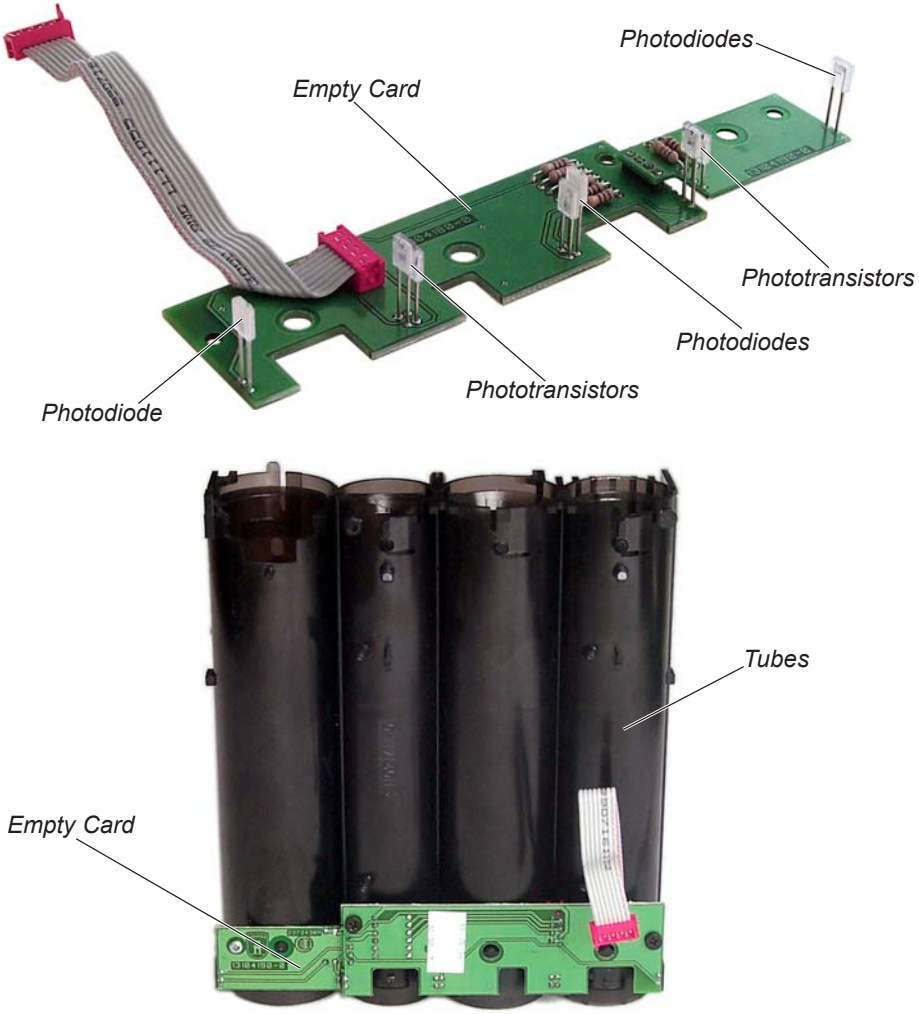


Figure 14. *Empty Card*

Operation

The power supply to the photodiodes is individual, using a 100-Ohm serial resistor applied with 5VDC.

In order to reduce consumption while the payout unit is not admitting any coins, the "CTROL_VACIADO" signal leaves the photodiodes without power. Said signal comes from transistor T14 located on the control card, which in turn is governed by the U6 (74HC273, pin 2).

When the coin level falls below the physical level where the photodiodes are located, the corresponding phototransistor is saturated, and a V_TX signal (X=A, B, C, D) at level 0 is sent to the multiplexer circuit U4 (74hc251) located on the control card, which, when enabled at level 0 by pin 7, is incorporated to the data bus as D0.

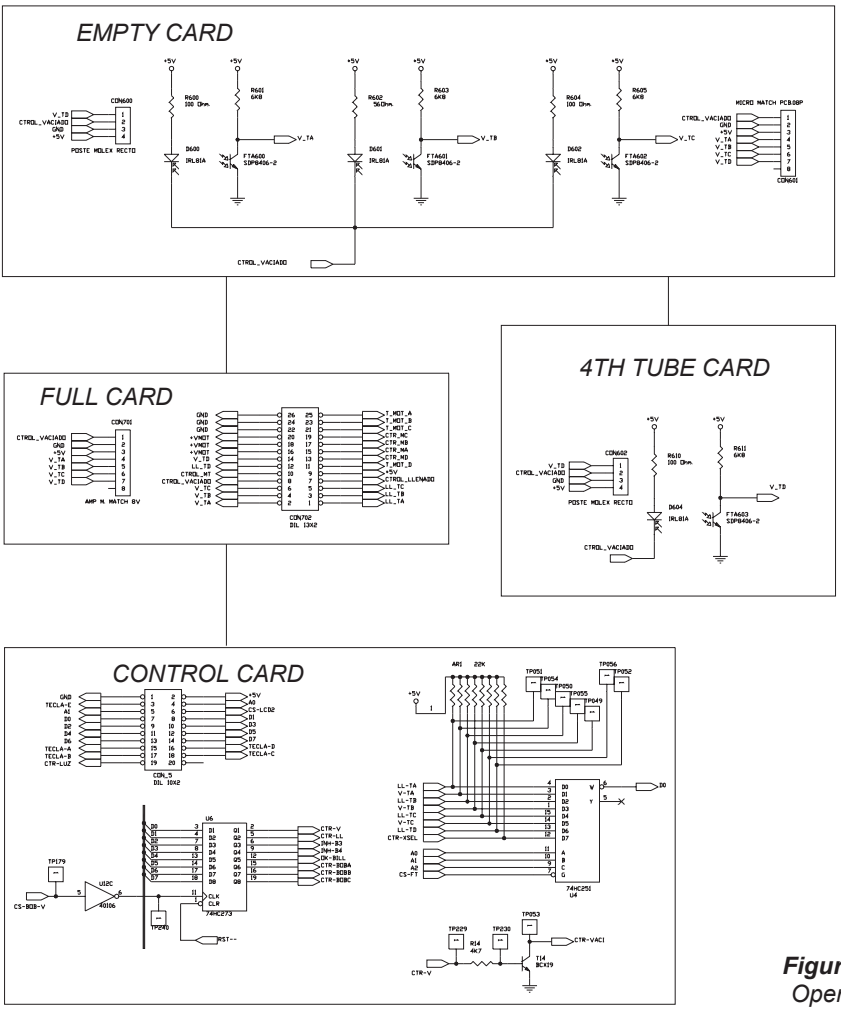


Figure 15. *Operation*

14. Regulator circuit

Function

The function of the regulator circuit is to convert the 34VDC to 22VDC that will serve as the power supply to the payout unit.

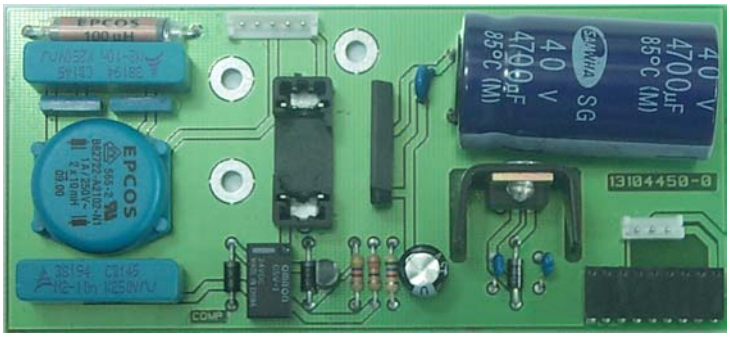


Figure 16. *Regulator circuit*

Operation

This card can be supplied with 24VAC or 34VDC power. When it operates with 34VDC power, said tension goes through the rectifier bridge, arriving at the control circuit input (LM317), which is adjustable through resistors R2 and R3. The output tension that it supplies is 22VDC.

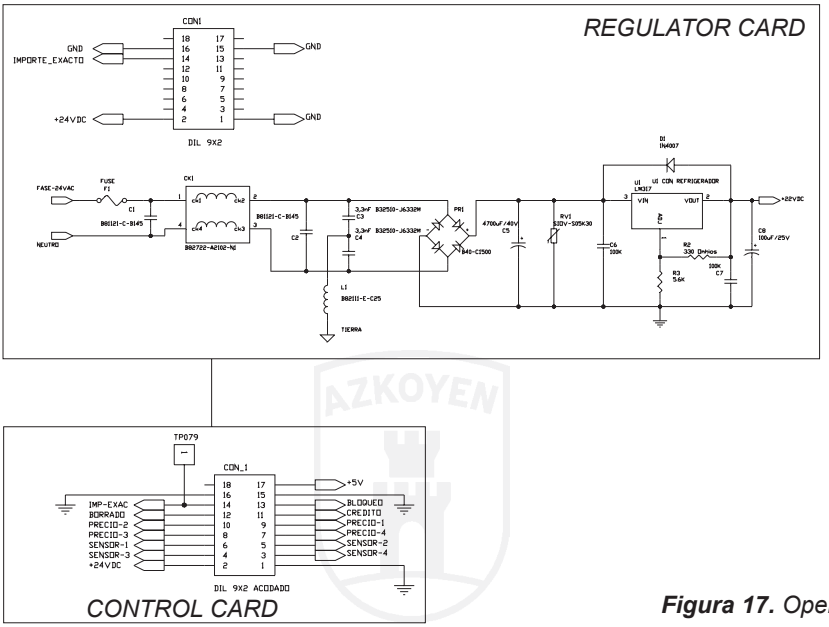


Figura 17. *Operation*

15. Prices Card

Figure 18. *Prices Card*

15.1 Function

Its function is double:

- ✓ Power supply.
- ✓ Entrances / Exits

Poweer Supply Function

It turns the power supply of entrance, in 24 Vcc necessary for the operation of the control card, to it has two circuits according to is the protocol of operation **MDB** or **Line of Price**.

MDB

This circuit is able to regulate a voltage of entrance from 34 Vcc to 24 Vcc. and to turn it 22 Vcc necessary for the operation of the card control.

The circuit in charge to make this regulation is U10 (LM317) whose polarization this fit so that A provides 22Vcc with a current of 1,5 A.

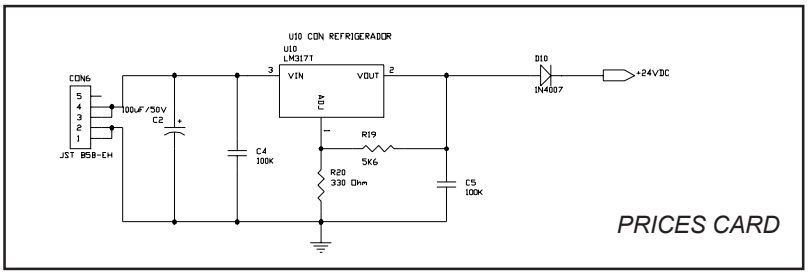


Figure 19. *U10 Circuit (MDB)*

Price Lines

Can work with a voltage of entrance of 220 Vac or 110, depending on the position of bridges JP1 and JP2, (to see figure 20, bridges to 220 V and 110 V.)

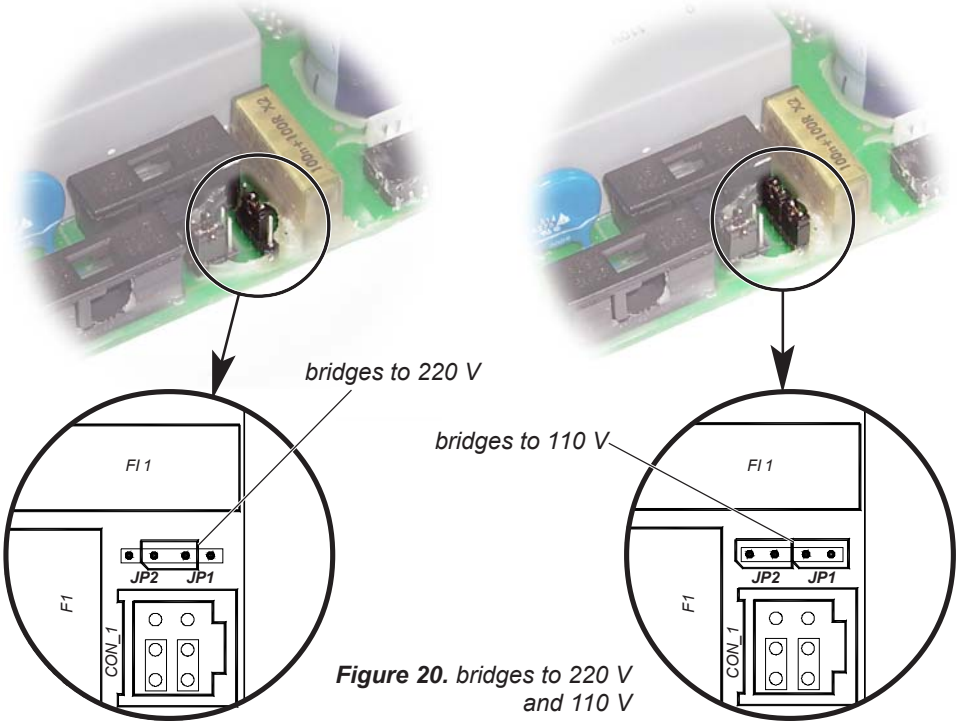


Figure 20. *bridges to 220 V and 110 V*

The used transformer is made up of two both primary 110 primary windings and secondary so that working to Vac is connected in two parallel and when it works to 220 Vac are connected in series. Both secondary they are united in series providing 18 Vac and one power of 10 VA, this voltage is rectified and next leaked by the C3 condenser.

The circuit of feeding to the primary one of the transformer is protected by means of a fusible F1 of 1 A. and a varistor V10 that absorve tips superior to 275 Volts

In order to annul or to attenuate electrical noises is a filter RC.

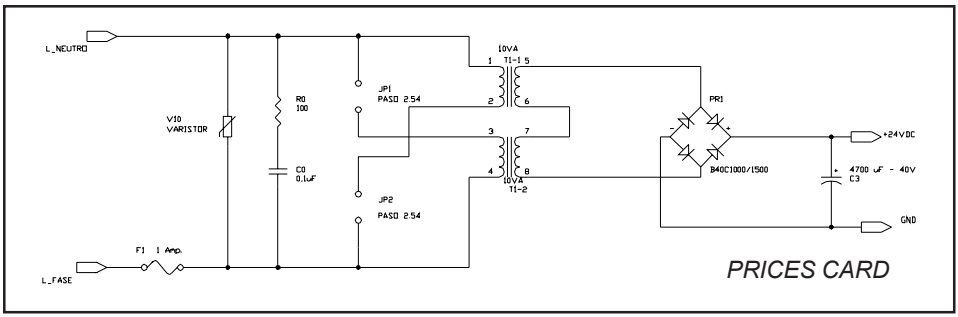


Figure 21. *Power supply Circuit*

Entrances/Exits Function

Entrances

The entrance signals, come from the machine in which we connected the payout unit, and are considered to begin the accomplishment of a service. These lines are the following ones:

All the received signals of entrance, are sent to optoacoplators circuits, for this way, galvanically to separate the machine of the payout unit and next these signals pass by means of the CON4 to the card control.

- ✓ **BLOCKING LINE** : By means of this line the machine indicates to him to the payout unit that allows the admission of currencies. It is received by means of a line of phase and is sent to the card of control by means of the signal **"BLOCKING"**.
- ✓ **PRICE LINE** : This line has double function, serves as Entrances and Exits simultaneously, when it works as entered receives the information of the selection made by means of a line of neutral by the corresponding line number and it is sent to the card of control by means of **"SENSOR"** signal.
- ✓ **ERASE LINE**: By means of this line the machine informs to the payout unit of the conclusion of the service is received by means of a line of phase and envia to the card of control by means of **"ERASE"** signal.

All the lines of entrance are protected by means of varistors against occasional surges coming from the machine.

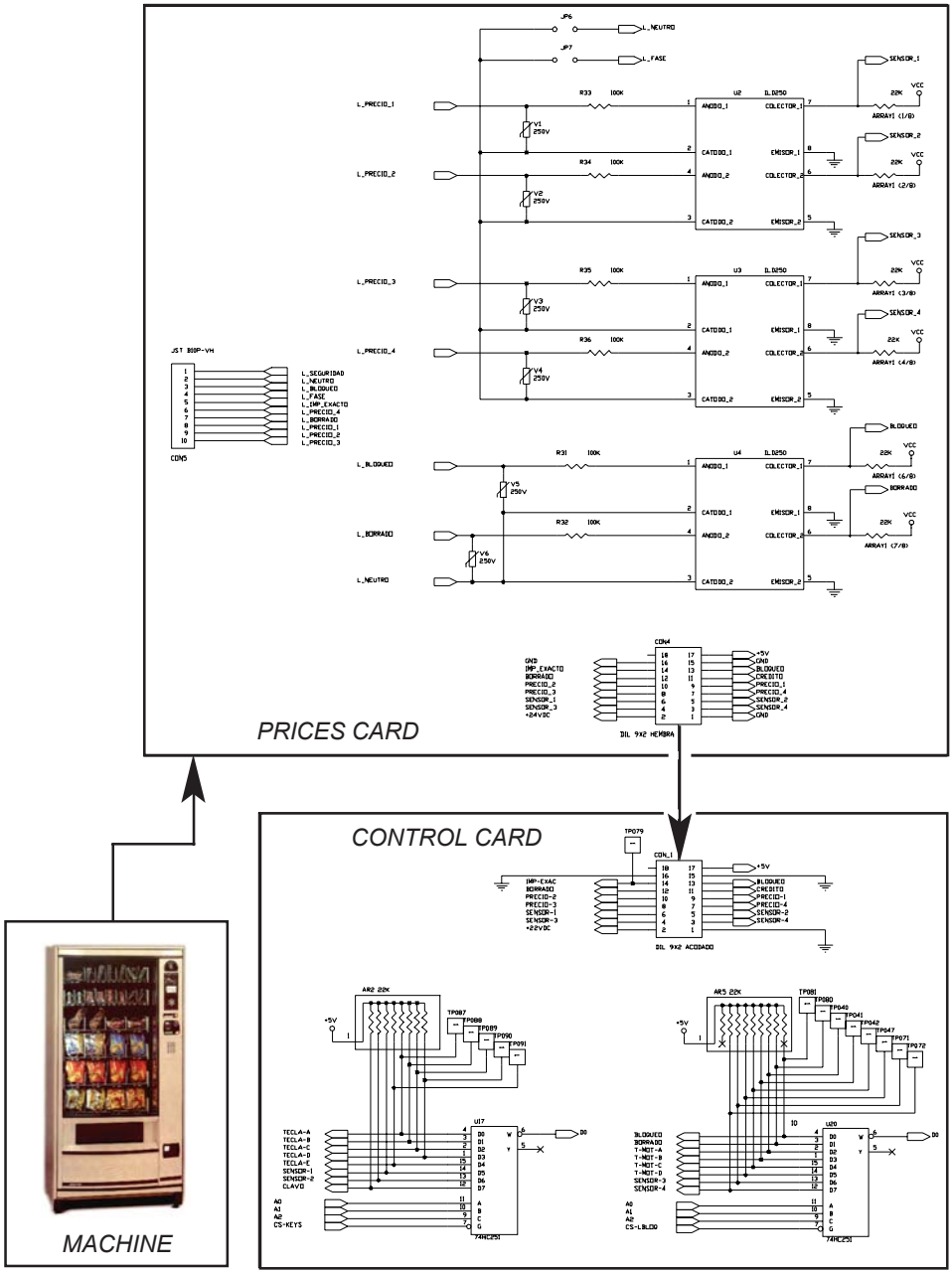


Figura 22. *Entrances*

Exits

The exit signals are those that come from the payout unit and are the answer to the request of a sale.

They are sent by means of relays galvanically to separate the payout unit of the machine.

- ✓ **PRICE LINE :** Working like exits, **"PRICE"** activates with the signal coming from the card control, when the sale begins. It appears as line of phase by the corresponding line number and is applied directly in the machine for the accomplishment of the sale.

  The circuit corresponding to the lines of price this prote'ge' against possible short circuits that can be produced in the machine, by means of a 6 A. fuse (F2).

- ✓ **SECURITY LINE :** This line envia with **phase** and is the inverse one of the line of prices, is to say estara present whenever not it this some line of prices.

- ✓ **OUT OF CHANGE LINE**: One activates with signal **"OUT OF CAHNGE"**. This line envia with **neutral** when the payout unit detects lack of changes that assure the return.

- ✓ **CREDIT LINE :** One activates with signal **"CREDIT"** and its operation is the one of a commutator that remains activated while credit exists.

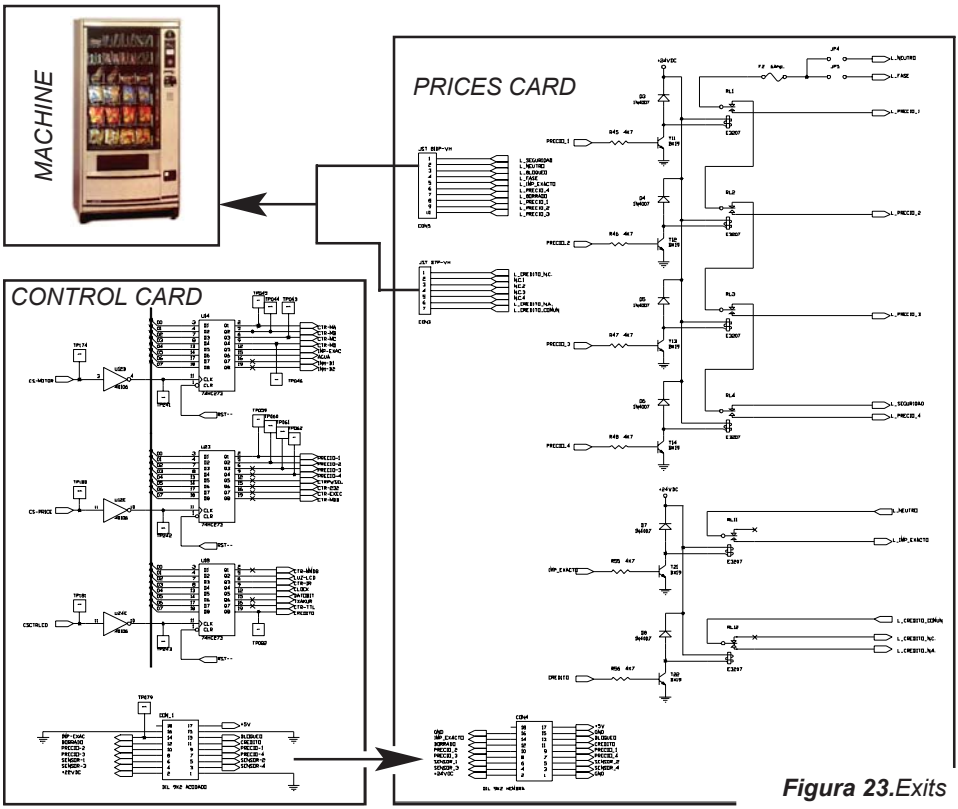


Figura 23.*Exits*

15.2 The meaning and definition of the various Price Lines

"Line" is the name given to the information sent by the payout unit to the machine in which it is installed, or from the machine to the payout unit, by means of changes in the value of the electrical phase voltage.

Button (or sensor) line

This line goes from the machine to the payout unit. It is activated when a machine button has been pressed, meaning when a product has been requested from the machine.

Price line

This line goes from the payout unit to the machine. When the payout unit receives a sensor line, it verifies whether or not it has received the sufficient amount of money to complete the sale, and if so, it activates the price line relay corresponding to that sensor line. The extractor motor of the product will thus receive power to operate.

When a button is pressed on the machine, for that brief instant during which the switch is closed, the following things occur:

- ✓ As it can be seen in the drawing, the circuit is closed between the payout unit phase line and the machine neutral, whereby a small electric current circulates (limited by the internal resistor of the payout unit). The current is not sufficient enough to start up the motor, but it is enough so that the payout unit can detect that a product from that selection has been requested (sensor line).
- ✓ The payout unit immediately verifies if sufficient credit has been introduced in order to be able to dispense that selection, and if so, it closes the relay, which starts up the product extractor motor of the machine (price line).

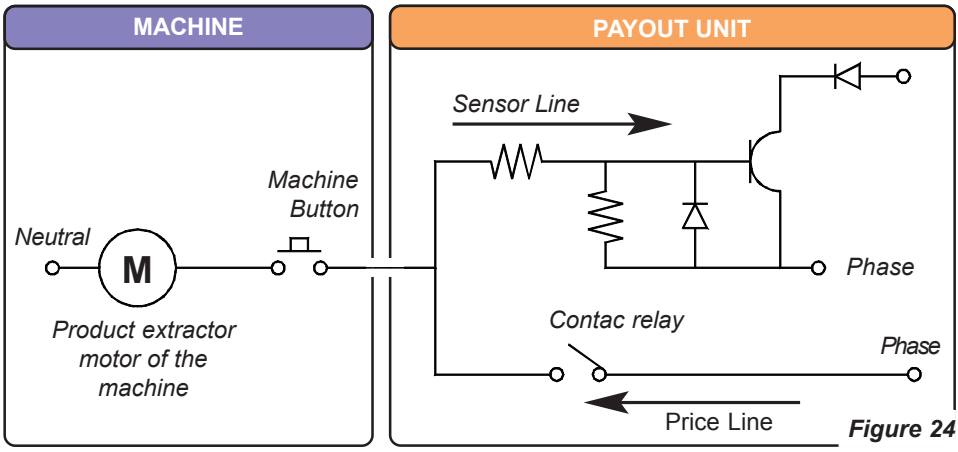


Figure 24

Blocking line

This line is a signal from the machine to the payout unit. It allows the machine to indicate to the payout unit whether it is in the process of selling product or if it is idle.

The machine sends a phase signal to the payout unit when it is idle and zero volts when it is completing a sale. In order for the payout unit to admit coins, it needs to have a phase signal on the blocking line.

Internal erase

If internal erase is programmed at the function **«240 SERVICE MODE»** this means that the payout unit charges the sale when it detects that the blocking line has disappeared. It therefore charges the sale immediately after the machine starts to dispense the product.

External erase

If external erase is programmed at the function **«240 SERVICE MODE»** then the payout unit waits to charge the sale until the machine has completed the sale and again sends the phase signal through the blocking line.

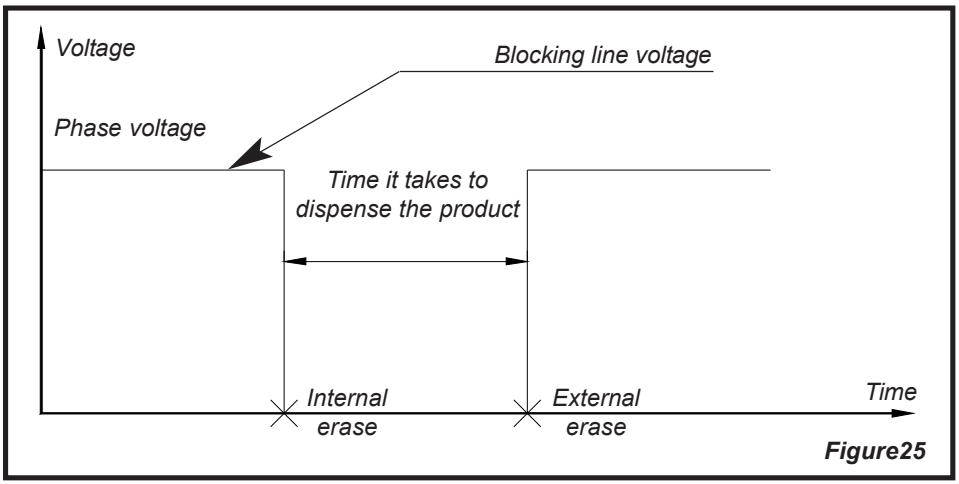


Figure25

Maintaining, or not, the price line

At the function **«240 SERVICE MODE»** it can be programmed to maintain or not maintain the price line. If it is programmed to maintain the price line, this means that the payout unit will send the price line (relay closed) for the entire time that it takes to dispense the product.

If it is programmed not to maintain the price line, the relay will remain closed only for an instant (milliseconds), just enough time to initialise the sale.

Programming one mode or another depends on whether or not the machine is capable of operating its product extractor motors.

If external erase is programmed, then this allows the price line to be maintained or not.

Security line

This is a signal from the payout unit to the machine. It allows the payout unit to indicate to the machine whether or not it can transact a sale. In order for the machine to transact sales, it needs to receive a phase signal through the security line.

If, due to a breakdown, a price line relay remains closed, as a protection system, the payout unit is prepared so that the machine cannot receive the phase signal through the security line cable.

There are machines that do not take into account the security line. In this case, the security line of the payout unit would remain free and could not be connected to any machine cable.

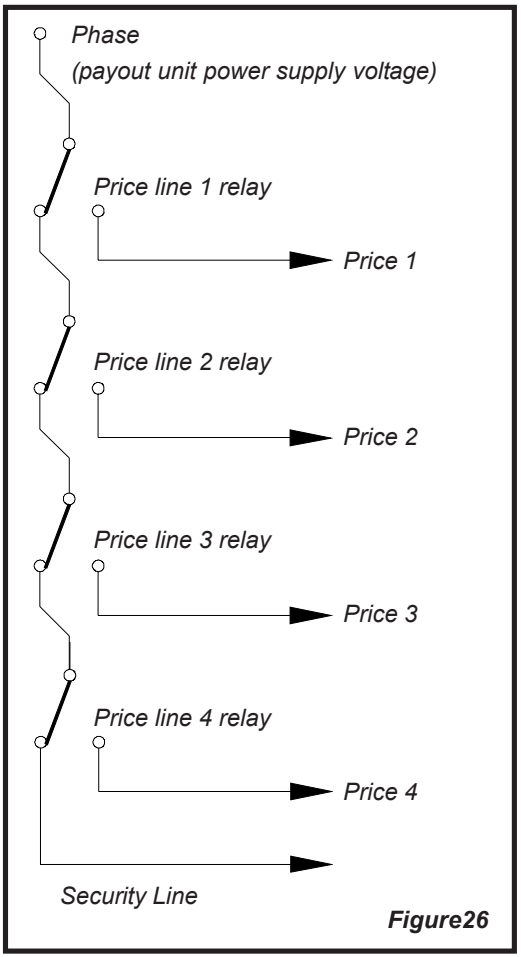


Figure26

EA Line

Some machine models, especially those designated for the sale of cold beverages, may be provided with a product output detector.

When an **AN 8000** series payout unit is installed in a machine with a product output detector, the payout unit receives the information sent by that detector through the EA line. In the event that the machine does not have a product output detector, the EA line of the payout unit must programmed OFF (**«240 SERVICE MODE»**). On the contrary, the machine would provide the product, but the payout unit would not charge the sale.

Out of change

When the payout unit is in an out-of-change situation, it is capable of illuminating a light on the machine indicating that exact change is needed. It therefore has a cable that can be connected to one of the phase lines of the machine light. The light must use the same voltage as what is used to power the payout unit.

16. External communications

It has serial communications that take place between the payout unit and the machine.

Communications are carried out by galvanically separating the payout unit circuit from the machine circuit. To do so, it uses an optocoupler circuit, ILCT 6 (U41).

Communications are enabled through the "CTR-MDB" signal, allowing transmission (TRX+MDB) and reception (RTX-MDB) between the payout unit and the machine.

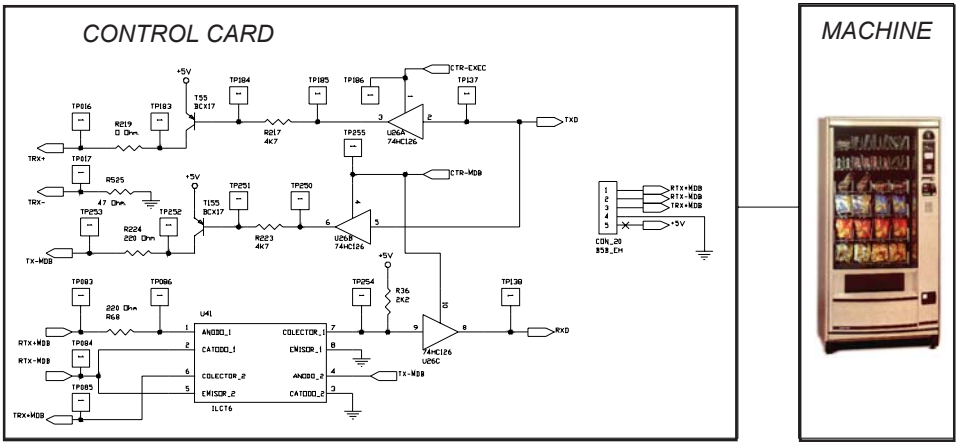


Figure 27. *External communications*

17. Control card

The schematic corresponding to the circuit in charge of executing the instructions contained in the payout unit program is the one indicated in the **figure 29**, where U1 (80C31) is the microprocessor circuit in charge of executing the program contained in the Eprom memory (U3).

Circuit U2 (74hc273) is the circuit that converts the data bus into the lower part of the address bus. U3 is the Eprom memory with a 512-k capacity (MDB), which contains the payout unit's operating program. U55 is a 2k EEprom memory whose function is to save information from the returner tubes and classification and activation of the Euro.

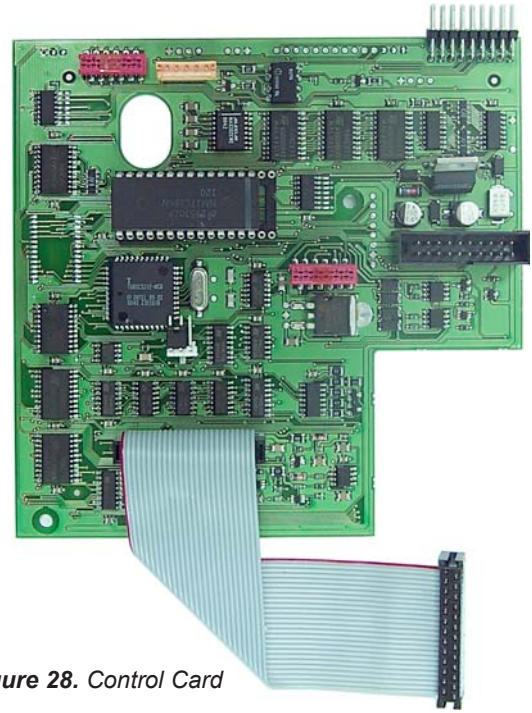


Figure 28. *Control Card*

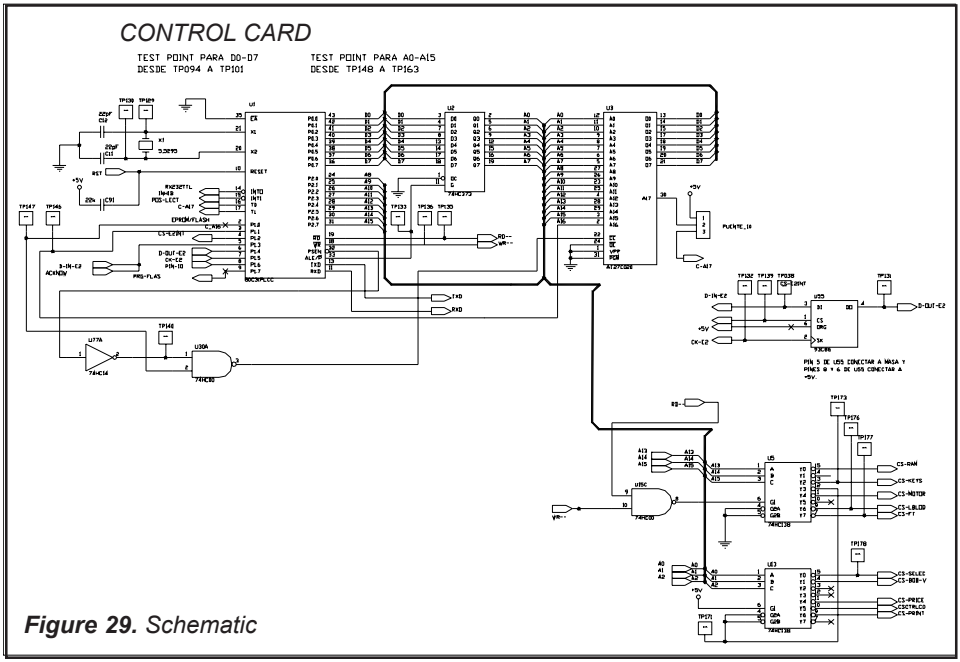


Figure 29. *Schematic*

18. Reset circuit

The function of the reset circuit is to reset the control card under the following circumstances:

- ✓ When the payout unit is connected for the first time.
- ✓ When the program does not execute correctly.
- ✓ When the power supply falls below 12V.

Operation

The circuit in charge of performing these functions is the U32 (LM555), which operates like a timer.

When the power supply is connected to the payout unit, level 1 appears at pin 3 on the U32, and it begins to reset the time corresponding to the C6 condenser charge of 1M through resistor R80. If the program does not execute correctly, the TXAKUR signal does not appear, and the C2 is charged until the U12D swings to level 0. As a result, this level 0 is applied at pin 2 of the U32, causing a reset. If a fall in the power supply below 5V occurs at the R73, the C3 discharges and level 0 appears at pin 2 of the U32, causing a reset.

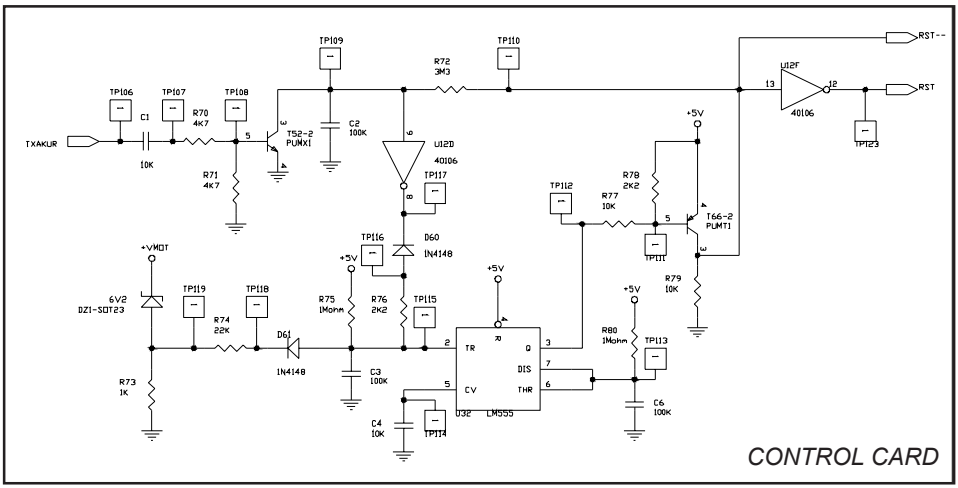


Figure 30. *Operation*

19. Coin Selector

Figure 31. Coin Selector

Function

The function of the coin selector is to admit the coins for which it has been programmed and to reject the rest.

Operation

The **L66S** series is characterised by its communication with the machine. It allows the machine to make the decision about whether or not to admit a coin and make the decision about the destination of the coin. The communications mode is described below:

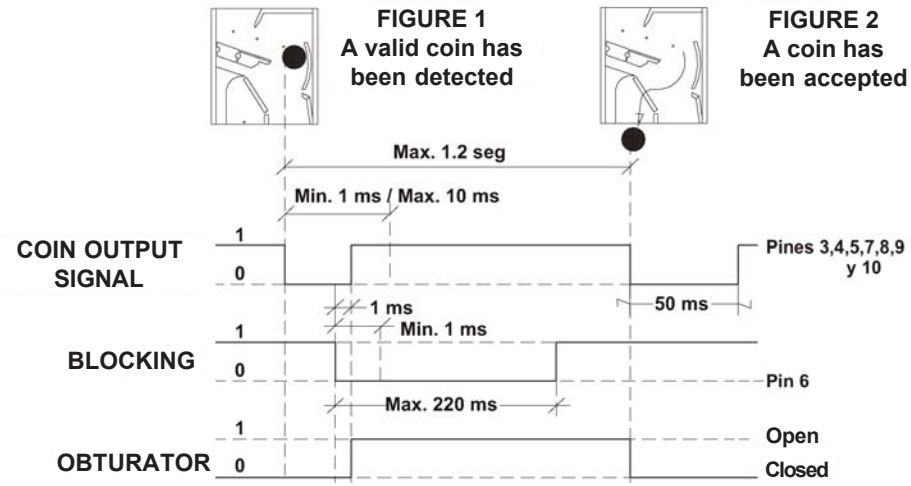


FIGURE 1 shows the moment at which the coin has passed through all of the sensors that are used to analyse it, and the selector initiates communications with the machine:

The communications cycle consists of transmitting, for 10 milliseconds, the code for the identified coin so that the machine can decide on its admission or rejection and, after verifying the status of its returner tubes-payout units, manage the classifier in order to direct the coin to the appropriate place. In order for the coin to be admitted, the machine must set the blocking line (pin 6) to 0 before the end of the 10 milliseconds used for transmitting the coin code. If this does not happen, the selector will reject the coin. If the machine sets blocking to 0 while the selector is transmitting, then the selector will cease transmission, and it will open the obturator so that the coin is accepted. This is also the ideal time for the machine to order the classifier to move and give it time to get into position.

In **FIGURE 2**, the coin can be seen leaving the selector, cutting the light beam from the output photocell. The selector determines that the acceptance cycle has concluded when this light beam is re-established. It will then deactivate the obturator (close it) and transmit the code of the already accepted coin for 50 milliseconds so that the machine accounts for it. The classifier will remain activated for 200 to 300 milliseconds after the selector detects the coin output in order to ensure that the coin properly leaves for the selected destination. In the event that a fixed 5-way classifier is used, this time must be increased to 350 to 400 milliseconds.

19.1 Operational diagram of the L66S selector

1

A coin is introduced into the **L66S** selector.

2

The microphone measures the sound emitted by the coin when it hits the metal anvil.

3

The passage of the coin is detected when it goes through the infrared light beam set up between the photodiode and phototransistor of **photocell 1**.

4

When the coin passes between the **coils with a ferrite core,** it changes the magnetic field that the coils generate according to the particular thickness and material composition.

5

The coin completes the parameter measurement cycle when it cuts the infrared light beam set up between the photodiode and phototransistor of **photocell 2.**

6

The microprocessor compares the data obtained from the measurements with those measurements that were previously programmed during one of the manufacturing processes. In this way, it verifies the validity or invalidity of the introduced coin.

Correct → Legal currecy of course

7

After determining that the coin is legal tender, the microprocessor verifies the blocking made with the **microswitches.**

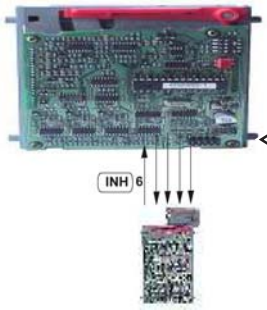
OFF

8

If the selector has an **electronic anti-wire device**, the microprocessor will verify its status before continuing with coin admission, and it will reject the coin in the event that any kind of wire is detected.

Closed

9



After determining the authenticity of the introduced coin and verifying the non-existence of any blocking or fraud by wire, the selector will initiate **communications with the machine.** This communication is based on the selector transmitting the code for the identified coin through the corresponding pins while it waits for machine confirmation by reading the blocking line (the machine must set the blocking line at "0" for a time span of 1 millisecond, at least, if it decides to admit the coin).

INH=0

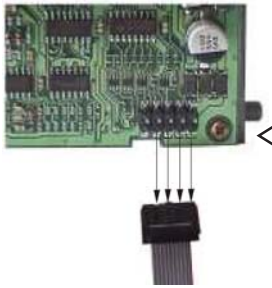
10

The selector activates the coil, which opens the **obturator** so that the admitted coin leaves correctly.

11

Output of the coin is detected when it cuts the infrared light beam set up between the photodiode and phototransistor of **photocell 3.**

12



The selector transmits the code of the admitted coin to the machine through the corresponding pins for a time span of 50 milliseconds.

INH=1

Open

ON

Different

Coin Return

Power supply

The power supply that enters the selector is 15VDC. The selector has a control circuit, LM 7805, that converts the tension to 5 VDC in order to supply the different circuits.

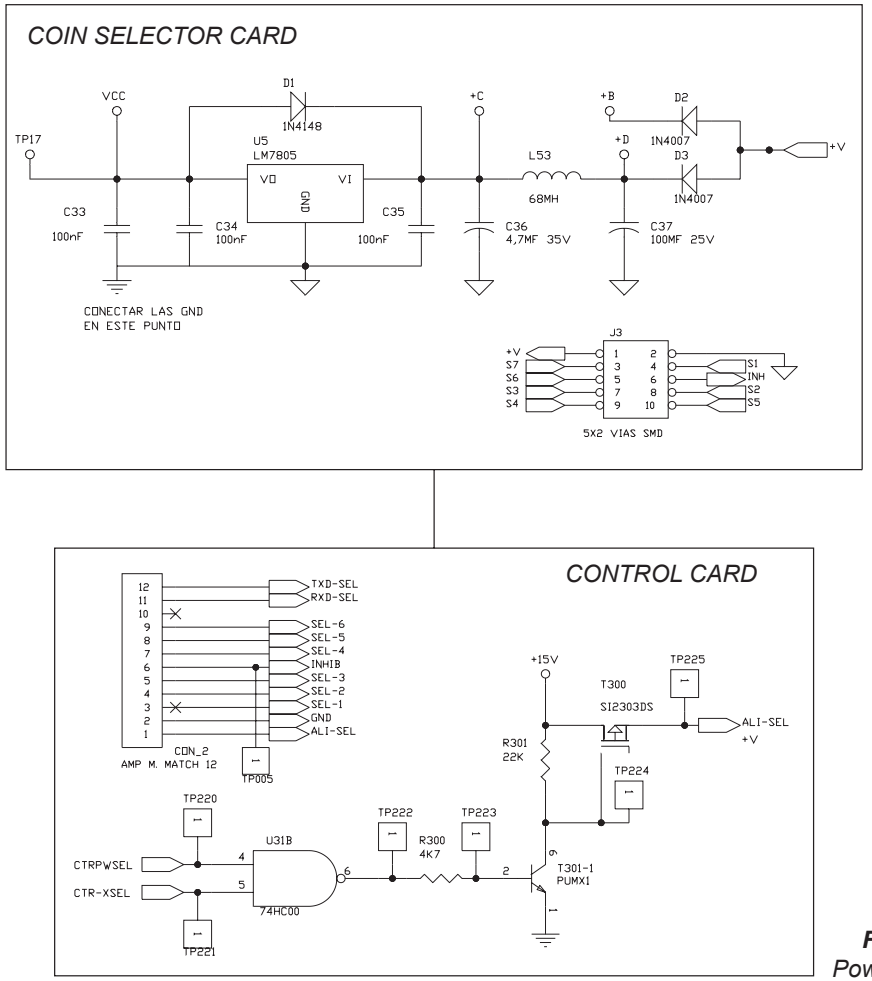


Figure 32. *Power supply*

Outputs

The U1 (74hc259) is a decoder whose function is to activate the corresponding output transistor. The output transistors operate on open-collector mode, and when they are polarised they send level 0. The coin codes are sent to the U10 (74hc240), which is in an inverter controlled by the "CS-SELEC" signal.

The T8 is activated by the selector obturator.

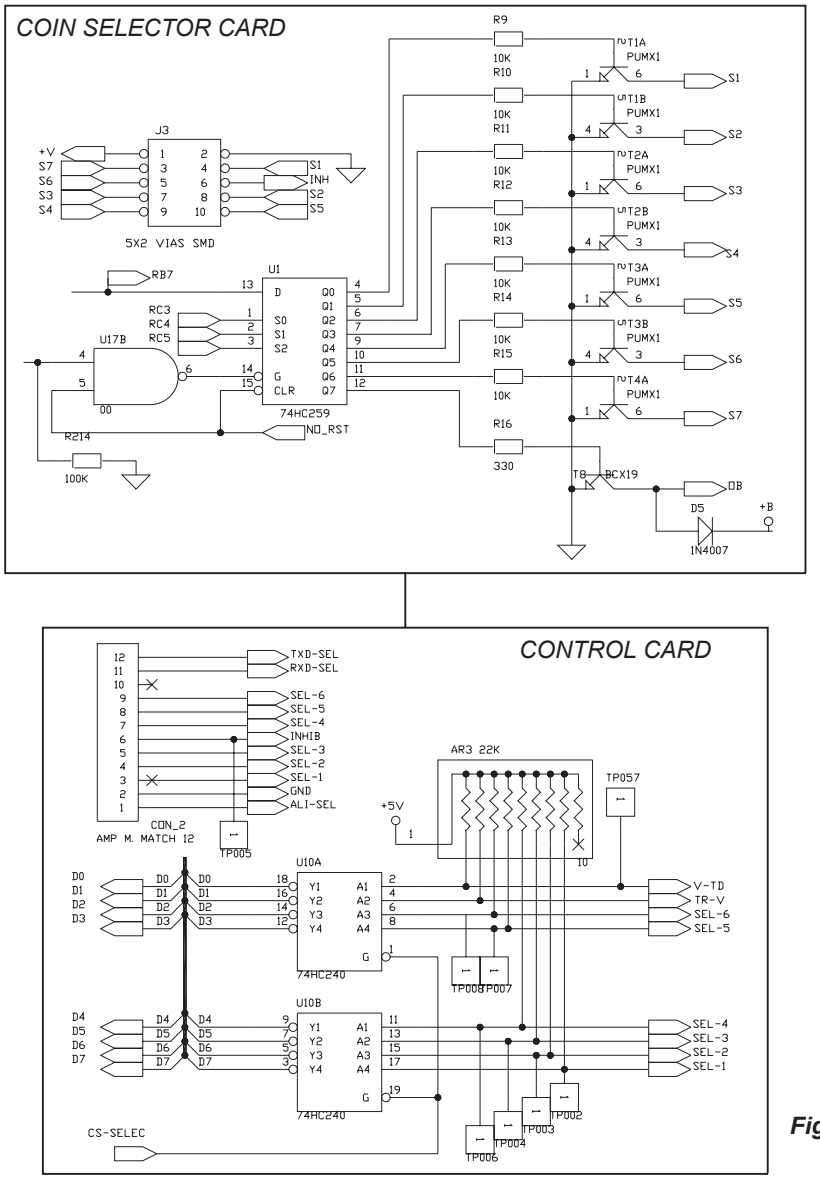


Figure 33. *Outputs*

20. Breakdowns and possible solutions

When the payout unit displays a breakdown message, the **"red key"** must be pressed and held for a few seconds in order to enter programming and reset the breakdown.

20.1 Breakdowns detected by the payout unit.

The **AN 8000** series payout units are capable of detecting a series of breakdowns, thereby indicating a message on the display. A list of these breakdowns is given below, as well as their possible causes.

MESSAGE ON DISPLAY	POSSIBLE CAUSES
MOTOR A FAILURE MOTOR B FAILURE MOTOR C FAILURE MOTOR D FAILURE	✓ Jammed coin. ✓ Motor damaged. ✓ End-of-travel micro-switch of the motor does not work correctly. ✓ Damaged payout unit board.
ERROR LINE OF BLOCKADE	out unit has not been connected. ✓ Payout unit cable bundle has cut cables or the contact is bad. ✓ Damaged payout unit board.
MAX ADMISSION	✓ More money is being admitted into the payout unit than what is programmed as the maximum admission at the function **223, "MAXIMUM CREDIT ALLOWED.**
PAY OUT LIMIT	✓ This message appears when the payout unit needs to provide more change than what is programmed as the maximum change at the function **417,"MAXIMUM CHANGE."**

MESSAGE ON DISPLAY	POSSIBLE CAUSES
PAY OUT INHIBIT	✓ This message appears when a user attempts to recover the money introduced and mandatory sale has been programmed at the function **240, "SERVICE MODE."**
VMC NOT RESPOND TO ACEPT DATA VMC NOT RESPOND TO COMAND STATUS VMC NOT RESPOND TO CREDIT VMC NOT RESPOND TO VEND COMMAND	✓ These four messages are commands that the payout unit sends to the control board of the machine. When they appear on the payout unit display, it is because good communication does not exist between the payout unit and the control board. This may be due to the fact that either the control board of the machine or the payout unit are damaged. It also may be due to problems in the wiring between both elements.
PROGRAM ERROR	✓ This occurs when the parameters are loaded into the payout unit at the function **18, "PROGRAMMING VIA PC,"** and the operation is not performed correctly. It may be due to the fact that the programming files are corrupt or due to hardware problems in the payout unit.

20.2 Breakdowns not detected by the payout unit

A wide variety of breakdowns may occur that the payout unit is not capable of detecting and indicating on the display. Some of these possible breakdowns and their causes are listed below:

The display does not illuminateand no coin is admitted.

- ✓ The payout unit does not have power because the machine where it is installed is disconnected.
- ✓ The payout unit is not connected correctly to the machine or it is being powered at the incorrect voltage.
- ✓ The 0.8-ampere fuse has blown.
- ✓ The display is damaged.
- ✓ The control board is damaged.

All coins that are introduced are rejected.

- ✓ The payout unit is out of service, and a breakdown message can be read on its display. The breakdown must be corrected and the payout unit reset.
- ✓ At the function **130, "ADMITTED COINS,"** the payout unit has been programmed not to allow any coins.
- ✓ The payout unit does not have change and it has been programmed at the function **418, "ADMITTED COINS WHEN OUT OF CHANGE,"** to reject all coins when it is "out of change." In order to know if it is in an "out of change" situation, see the functions **143, "TUBE COUNT,"** and **415, "PROGRAMMING MAXIMUMS AND MINIMUMS IN TUBES."**
- ✓ The connecting cable bundle between the selector and the payout unit is disconnected or damaged.
- ✓ The selector installed in the payout unit is incorrect. Compare its reference number with the "Variables sheets" of the parts list.
- ✓ Coin selector damaged.
- ✓ Payout unit control board damaged.

All coins of a certain amount are rejected.

- ✓ At the function **130, "ADMITTED COINS,"** the payout unit has been programmed not to allow that specific coin.
- ✓ Coin or coins blocked via the micro-switches of the coin selector.
- ✓ The selector installed in the payout unit is incorrect.
- ✓ The selector is damaged.

The coins must be introduced various times in order to be admitted.

- ✓ The coin selector is dirty and must be cleaned (see maintenance.)
- ✓ Selector damaged.

Some or none of the change coins are classified, even when the tube is empty.

- ✓ That coin or no coins are not programmed as change coins (see **414, "PROGRAM CLASSIFICATION).**
- ✓ The tube full photocell corresponding to that coin is damaged.
- ✓ It may be that the accounting of coins for a tube or for all of them does not correspond to the real number of coins existing in the tube(s). See the accounting for the coins in the tubes at the function **143, "TUBE COUNT."** If it is not correct, erase the RAM memory at the function **097, "ERASE RAM."**
- ✓ Payout unit control board damaged.
- ✓ From the function **415, "PROGRAMMING MAXIMUMS AND MINIMUMS IN TUBES,"** a maximum of coins has been programmed that is too low.

When the coin return button is pressed, the coins are not returned.

- ✓ At the function **240, "SERVICE MODE,"** mandatory sale has been programmed. In this case, when the coin return button is pressed, *"Return not allowed"* can be read on the payout unit display.
- ✓ Coin selector damaged.
- ✓ The payout unit control board is damaged.

None of the change coins are returned.

- ✓ If the payout unit is out of service and *"Breakdown of motor A, B, C or D"* can be read on the display, then see the section on breakdowns detected by the payout unit.
- ✓ The corresponding tube is empty, and at the function **414, "PROGRAM CLASSIFICATION,"** that coin has not been programmed as a change coin.
- ✓ It may be due to the fact that the coin accounting for that tube does not correspond to the real number of coins that exist in it. It may be that the tube is full of coins and due to an error or because the RAM memory has been erased **(097, "ERASE RAM")**, the coin accounting for that tube reads zero coins. See coin accounting in tubes at the function **143, "TUBE COUNT."** If it is not correct, extract all coins from the tube and re-introduce them at the function **002, "FILL RETURNER TUBES."**
- ✓ The payout unit control board is damaged.

No change coin is returned.

- ✓ If the payout unit is out of service and *"Breakdown of motor A, B, C or D"* can be read on the display, then see the section on breakdowns detected by the payout unit.
- ✓ The returner tubes are empty and at the function **414, "PROGRAM CLASSIFICATION,"** no coin has been programmed as change.
- ✓ "Multiple sale" has been programmed at the function **240, "SERVICE MODE."**
- ✓ It may be due to the fact that the coin accounting in the tubes does not correspond to the real number of coins existing in the tubes. It may be that the tubes are full of coins and that, due to an accounting error or because the RAM memory has been erased **(097, "ERASE RAM")**, the coin accounting for the tubes is zero. See coin accounting for the tubes at the function **143, "COIN COUNT."** If it is not correct, extract all coins from the tubes and reintroduce them at the function **002, "FILL RETURNER TUBES."**
- ✓ The payout unit control board is damaged.

The 0.8 ampere fuse has blown.

- ✓ The payout unit is being powered at a voltage that is above the nominal operating voltage.
- ✓ The payout unit control board is damaged.

The credit is not erased after serving the product.

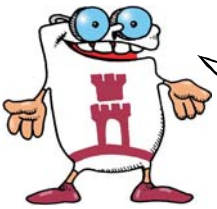
- ✓ Some of the prices are programmed at zero.
- ✓ The payout unit control board is damaged.

21. Maintenance and cleaning

L66S Selector

Of the various modules that make up the payout unit, the only one that requires specific cleaning is the Selector module.

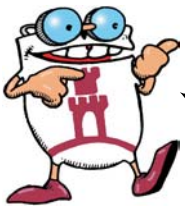
The maintenance required by the Selectors is determined by the dirt that coins bring in and that may cause the optical elements and/or the microphone to become obstructed.



THE FACT THAT A COIN HAS TO BE INTRODUCED VARIOUS TIMES IN ORDER TO BE ACCEPTED IS AN UNMISTAKABLE SIGN THAT THE SELECTOR HAS ACCUMULATED DIRT ON ITS OPTICAL SENSORS OR ON THE MICROPHONE, THEREFORE REQUIRING CLEANING.

There are two cleaning procedures.

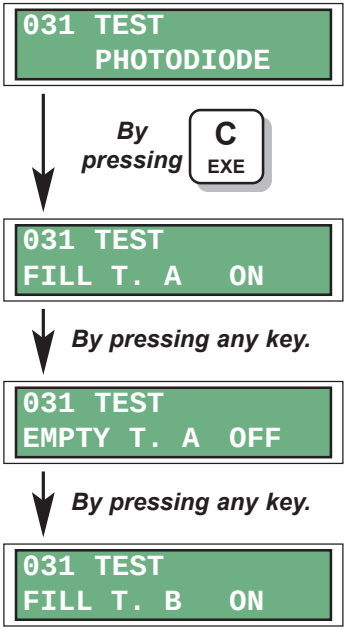
- ✓ **Cleaning at the machine:** If the selector is going to be used immediately after the cleaning, it is essential to use 96º ethyl alcohol, given that it only takes 5 minutes to dry at room temperature.
- ✓ **Cleaning in the shop:** For cleaning in the shop, use KH7 detergent (commercial detergent), which facilitates the cleaning and is more effective. It subsequently requires rinsing with a damp cloth and then drying for 12 hours at room temperature.



PRODUCTS THAT CONTAIN BENZENE HYDROCARBONS CANNOT BE USED, BECAUSE THE CAUSE THE RAPID DEGRADATION OF THE PLASTIC, THEREBY CAUSING IRREPARABLE DAMAGE. mOREOVER, DO NOT SUBMERGE THE SELECTOR IN ANY KIND OF CLEANING LIQUID, GIVEN THAT THE MICROPHONE WILL BE DAMAGED.

✓ **Cleaning method:** Disconnect the power supply to the selector. A fine bristle, vegetable fibre (never metallic) brush moistened with alcohol or KH7 detergent can be used for cleaning. The areas to clean are those where the coins circulate. Mainly clean the diameter measurement photocells and the exit photocells until the phototransistors are completely clean. It is also necessary to clean the microphone housing, the anvil and the metallic plate.

Moreover, whenever the returner tube module is cleaned, verify the correct operation of the optical element housed in the returner tubes at the function **031, "TEST PHOTODIODES."**



The correct operation of the detectors of the maximum and minimum coin levels in the tubes can be checked using this function.

In the idle status, the full detectors must show the message *ON*. If they are full or an opaque object blocks them, they will show *OFF*.

As regards the empty detectors, they will show *OFF* if there are no coins and *ON* if there are coins or an opaque object blocks them.

NOTES

AZKOYEN Medios de Pago S. A.
Avda. San Silvestre s/n
31350 Peralta (Navarra) - SPAIN
Telf: 948 709 709 - Fax: 948 709 707
www.azkoyen.com

Edited June 2004