

English



BANKNOTE READER BT-11



User's Manual



Note

WARNING

Read these instructions carefully before using the appliance:

ⓘ This symbol means there are more detailed explanations on this subject elsewhere in the manual.

Ⓟ This symbol means that the text in question refers to programming.

⚡ This symbol indicates very important information.



This symbol means that the material **should not be thrown away with domestic waste**



This symbol means that the material is **recyclable**

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1. General description

This document aims to provide the necessary information for proper handling and operation of the BT11 banknote reader, and for solving simple problems. However, for more complex problems, you should contact your nearest Jofemar technical support service.

This BT11 banknote reader is available on this different model:

- With MDB protocol, quite common in vending machines, tobacco and snacks.

1.1 Banknote reader structure

The BT11 banknote reader consists of a reading head that reads the banknote and validates it against a set of patterns it has stored in memory. Should the banknote be recognised, it is sent to a stacker used for storing the banknotes.

The standard front cover of the banknote reader has several status LEDs, 10 of them are blue and 4 are red, which show the reader's activity at all times as well as possible failures. There is a special model with 10 red LEDs and 4 yellow LEDs. In the rest of this manual, every time there is a mention to the LED colour it is referred to the standard front cover.

1.2 Mechanical characteristics of the banknote reader

- Easy access to internal parts without the need for special tools.
- Top security stacker.
- Easy to dismantle.
- It can work in escrow mode, so the banknote is held back so it can be returned to the customer until a sale is made.
- Integrated stacker system with interchangeable cassettes and lock, using same, different key and master key possibility.
- Stacker capacity is 200, 375 or 500.
- Wheel-based banknote transportation system, avoiding unreliable conveyors.
- Special jam sensor.
- The banknote reader can be mounted right side up or upside down.
- Maximum banknote dimensions: 159x74mm (6.259x2.913 inch) with standard cover, but it could be increased up to 80mm (3.150 inch) width by using a special cover.
- Minimum banknote dimensions: 62x120 mm. (2,441 x 4,724 inch)
- Weight of the banknote reader: 960gr (2.12 lb.) without stacker or 1450gr (3.22 lb.) with stacker 200, 2000gr (4.41lb) with stacker 375, and 2250gr (5 lb.) with stacker 500.
- Minimum acceptance about 95% for banknotes in good condition.
- Retention of patterns: minimum 10 years.
- Half time among calibrations: 3 months depending on the atmosphere use.

1.3 Dimensions of the banknote reader

| BT11 Model | DIMENSIONS (mm) | | |
|------------------|-----------------|-------|--------|
| | Width | Depth | Height |
| With stacker 200 | 93.5 | 139 | 272.5 |
| With stacker 375 | 93.5 | 143.7 | 272.5 |
| With stacker 500 | 93.5 | 158.7 | 272.5 |

| BT11 Model | DIMENSIONS (in) | | |
|------------------|-----------------|-------|--------|
| | Width | Depth | Height |
| With stacker 200 | 3.68 | 5.47 | 10.73 |
| With stacker 375 | 3.68 | 5.65 | 10.73 |
| With stacker 500 | 3.68 | 6.24 | 10.73 |

(See Figure 2 and Figure 3, 4 and 5 in appendix)

1.4 Electronic characteristics of the banknote reader

- 18 optical sensors exploring the complete light spectrum for more reliability.
- Magnetic sensor to check additional security features in euro banknotes.
- Standard MDB banknotes reader.
- Validates banknotes in any of four possible positions.
- Flash memory for easy program updating.
- Banknote patterns can be re-programmed via a PC
- Operating temperature range: -10 to +60 °C (14F-140F)
- BT11 MDB Banknote reader:
 - Input voltage range: 20 ... 42 Vcc.
 - Maximum peak current 1.8 Amp.
 - Consumption with power supply to 32V: Waiting bills 110mA. Accepting bills 245mA.
- It can store up to 48 different banknote face patterns.
- Security level (high acceptance/high security) can be selected by user.

2. Banknote reader status LEDs

This reader has 14 status LEDs organised by pairs, 10 of them are blue and the other 4 are red. When one led is said to be on, it means a pair since the hardware of the reader cannot turn a single led on, so there are 5 blue LEDs and 2 red. Every time left or right is mentioned in this manual it will refer when the reader is with the bill entrance up (and the stacker down).

When the reader is turned on it always follows the next sequence until it is ready to accept banknotes.

- The 5 blue LEDs are set on simultaneously and then off.
- The 2 red LEDs are set on simultaneously and then off.

Once the reader is initialized, the blue LEDs follow one of the different cadences established by Jofemar that can be selected by the dip switches **Ⓚ**.

If only one blue LED is on, in the left end of the line, it means the reader is in programming position.

The reader has 4 red LEDs in the middle of the cover that blink when there is a problem with the reader. It stays blinking until the problem is solved.

| Number of blinks | Meaning |
|------------------|--|
| Permanently on | No communication |
| 1 | All banknotes inhibited by the machine |
| 2 | Banknote jammed |
| 3 | Sensor error |
| 4 | Stacker full or jammed |
| 5 | Stacker not detected |
| 6 | Main motor failure |
| 7 | Storage memory error |
| 8 | Sensors setup error |

When a banknote is rejected, once it rejected, the red LEDs will blink a number of times, which will depend on the reason for the rejection. The numbers of blinks mean the following:

| Number of blinks | Meaning |
|------------------|---------------------------------------|
| 1 | Banknote not recognised |
| 2 | Banknote inhibited by host machine |
| 3 | Banknote inhibited by banknote reader |

3. Using dip switches

After removing the stacker, inside of the banknote reader you can find 8 dip switches used to carry out changes in the way the reader works.

The next tables explain the various options and relevant modes of operation that can be set with the dip switches.

(See Figure 6)

3.1 Normal operation (communication with machine)

Ⓟ The reader is in normal operating mode when switches 7 and 8 are OFF. With this selection MDB communication takes place between the banknote reader and the machine to which it is connected. Selecting switches 1, 2 and 3 choose one of the available LED lighting combinations for the front of the reader as shown in the following table:

| LEDs | | | MANUAL | PC | EXPLANATION |
|------|-----|-----|--------|-----|--|
| SW1 | SW2 | SW3 | SW7 | SW8 | |
| OFF | OFF | OFF | OFF | OFF | Burst of 2 blue LEDs |
| OFF | OFF | ON | OFF | OFF | Gradient power-on sequence for each blue LED |
| OFF | ON | OFF | OFF | OFF | Sequence of blue LEDs in motion while they are all on and intensity gradient |
| OFF | ON | ON | OFF | OFF | Blue LEDs in motion converging toward the centre |
| ON | OFF | OFF | OFF | OFF | Burst of blue LEDs |
| ON | OFF | ON | OFF | OFF | Blue LEDs in motion |
| ON | ON | OFF | OFF | OFF | Simultaneous dawn of all blue LEDs |
| ON | ON | ON | OFF | OFF | All blue LEDs on at half intensity |

The dip switches that do not appear in the previous table have no effect in achieving the configuration explained. Putting the switches in these positions indicated is enough.

3.2 Reader behaviour when a jam is detected

The following configurations of switches allow you to choose how the banknote reader should behave when there is a jam. To configure either one of them, the banknote reader should be off. Select the suitable switch configuration, turn on the reader and wait until all blue LEDs are on. You can then turn off the reader, as the setting is saved in the EEPROM.

Once it is saved, you can return to the configuration of switches in normal operation that you had decided, with switches 7 and 8 OFF.

Stack, resettable error: When a banknote is jammed, it attempts to stack it without validating it so the reader can be back in service. In this situation, the only way to verify the truthfulness of a user claim is to rely on the machine audits to see if there are any uncounted banknotes in the stacker

| | | | | |
|-----|-----|-----|-----|-----|
| SW1 | SW2 | SW3 | SW7 | SW8 |
| OFF | OFF | ON | ON | OFF |

The other configuration is **don't stack, resettable error:** In this configuration the banknote remains in the position where it was stuck. This way you can verify that there has been a problem when you remove the stacker. This way, the reader is out of service until the jammed banknote is removed. In this situation, you can verify the truthfulness of a user claim just by opening the stacker and seeing if there is a jammed banknote.

| | | | | |
|-----|-----|-----|-----|-----|
| SW1 | SW2 | SW3 | SW7 | SW8 |
| OFF | ON | OFF | ON | OFF |

3.3 Bill group acceptance

Dip switches 4 and 5 (BILL GROUP ACCEPTANCE) are used to inhibit or enable whole groups of banknotes that have been previously loaded into the banknote reader. When any of the dip switches are in OFF the group is accepted, while it is ON, the group is inhibited. If you want to inhibit a specific banknote (not a group of banknotes) you have to use inhibition with a different combination of dip switches, explained in the next item, 'Testing and programming'.

3.4 Bit time adjustments.

Dip switch number 6, MDB ADJUST is used to adjust bit times in communication. It can be used in cooperation with technical support service to install the BT11 on special machines.

3.5 Testing and programming

Ⓢ To enter programming mode and communication with a PC, dip switch 8 must be ON and dip switch 7 to OFF. This combination of switches is mandatory if you want to connect the reader to a computer with the needed software installed. You don't need to set this combination for any other situation unless it is specifically mentioned on this manual

| | |
|-----|-----|
| SW7 | SW8 |
| OFF | ON |

3.6 Bill inhibition and software information

To access the banknote inhibition options turn the reader off and choose the following dip switch setting:

| | | | | |
|-----|-----|-----|-----|-----|
| SW1 | SW2 | SW3 | SW7 | SW8 |
| OFF | OFF | OFF | ON | OFF |

Once it is on, the blue LED on the left flashes 3 times after the boot sequence (all blue LEDs at once and then the red LEDs again). From this time on a bill can be inserted to inhibit or uninhibit it.

Once removed, if the red LEDs flash, the banknote with that value has been inhibited. To uninhibit a bill repeat the process, if the blue LEDs on the left flash once, it means that the bill is accepted again.

On both occasions, if the banknote reader does not turn the relevant LED on, it means that it has not recognised that banknote.

Once you have applied an inhibition to a banknote or removed it, return the dip switches to normal operating position.

While awaiting the bill to be inserted to either inhibit or uninhibit, the reader will be indicating the software and bill pattern version installed by LEDs blinking following the next sequence:

- Pattern version is indicated by the number of times the central blue LED blinks, meaning that if you have installed the 5th version of the patterns, the LED will blink 5 times.
- The software version of the reader is shown by both blue and red LEDs blinking once using binary code (See figure 7):
 - The blue LEDs indicate the software version installed on the reader. The least significant bit is the LED on the left.
 - The red LEDs indicate the sensor software version installed. The least significant bit is also the one on the left.

3.7 Sensor calibration

① To calibrate the banknote reader using dip switches, they should be configured as follows:

| | |
|-----|-----|
| SW7 | SW8 |
| ON | ON |

Once powered, after the boot sequence, all LEDs will remain activated for about 10 seconds, after that there is a stacker movement and only the central blue LED remains on. At this point you insert the calibration banknote. The calibration process consists of two phases, (more information on the calibration phases is on chapter 5.1 Sensor calibration).

If the calibration is successful, all blue LEDs will stay on until you turn the reader off. If calibration is not successful the red LEDs will stay on until you turn the reader off and restart the calibration process.

After proper calibration, return the dip switches to normal operating position.

3.8 Front LED lighting control without MDB communication

This option is only valid when the reader is in a demonstration or in an exhibition and you just want to show how the reader looks like while working. While this option is set enabled, the reader WILL NOT work since there is no communication between the reader and the machine.

| | | | | |
|-----|-----|-----|-----|-----|
| SW1 | SW2 | SW3 | SW7 | SW8 |
| ON | OFF | OFF | ON | OFF |

To configure this option, first turn the reader off. Select the switch combination and turn the reader on. After the boot sequence if all blue LEDs remain on it means that the configuration has been successfully loaded. To turn this option off, repeat the same procedure, if all red LEDs remain on after turning the reader on, it will mean that the reader will be working as normal.

Once the required option is set up, the reader has to be turned off again and position the dip switches in the combination that they were before.

If this option is enabled the reader will not work, it will remain showing the LEDs sequences indicated by the dip switches.

3.9 Secure scrow mode

A damaged note will not make the reader function properly. The secure scrow mode adds an extra validation which increases the reader's effectiveness, providing a more secure refund in case the note is not validated, avoiding jams or any damages to the note that is refunded.

This mode is available from software version BT11MD11 onwards and all the readers have this mode enable by default.

The dip switch combination for modifying this mode is as follows:

| | | | | |
|-----|-----|-----|-----|-----|
| SW1 | SW2 | SW3 | SW7 | SW8 |
| ON | ON | OFF | ON | OFF |

The reader needs to be off, and this combination set. Once the reader is switched on if all the blue LEDs remain on it will indicate that the secure scrow mode is enabled. On the other hand, if red LEDs remain activated it will indicate that the mode is disabled. After choosing how the reader is going to work, turn it off and return the dip switches to the normal operating position, (see section 3.1).

4. Technical information

4.1 Machine programming options

The BT11 banknote reader implements the MDB protocol, which can be used with a large number of machines, both manufactured by Jofemar and by other manufacturers.

However, the machine to which it is going to be connected must have a program that supports an MDB.

The functionality of leaving the last note in escrow position before making the sale is available only if the firmware of the machine supports this capacity.

For the banknote reader to work properly, most Jofemar machines require that the following operation options be modified:

- Maximum return: The value should be at least the value of the biggest banknote you want to use.
- Inhibited banknotes: Those banknotes you wish to accept should not be inhibited.

4.2 BT11 MDB communications connection

The connections between the BT11 banknote reader and the machine are carried out via a MOLEX 39-01-2060 connector. (See Figure 8 .Connector's front view). The connections for this connector are:

| N1 | Colour | Function |
|----|--------|--------------------|
| 1 | White | Vcc (Power supply) |
| 2 | Brown | Ground |
| 3 | — | Not connected |
| 4 | Green | Master Rx/D |
| 5 | Yellow | Master Tx/D |
| 6 | Grey | Common Rx/D/TxD |

5. Maintenance procedures

5.1 Sensor calibration

Every so often to use of banknote it may be necessary to re-calibrate the sensors. This process adjust the reading of the note to get a better acceptance. Before carrying out this process it is convenient to make a process of cleaning the sensors and observe if the acceptance of notes improves. If it does not improve, then proceed to the calibration of the sensors.

To do this you need a calibration note with special characteristics given by Jofemar (Cod:2200022 to be used with the front bezel bigger than 69 mm (2.72 in) and Cod. 2200077 to be used with 67 and 69 mm (2.64 and 2.72 in) font bezels).

There are three methods to calibrate the reader:

- Using the dip switches (See section 3)
- Using the PC's software for reprogramming the bill reader.
- Removing and placing the stacker while the bill reader it is switched on.

Calibrating the reader by using the dip switches is explained in section 3. This method should be used with new control cards provided by Jofemar or when the calibration by removing the stacker does not work.

Calibrating the reader by using the PC software you have to follow the instructions given by the software.

Calibration by removing the stacker is done following these steps.

While the reader is in normal conditions the stacker should be removed. The reader's red LEDs will then blink five times, indicating that there is no stacker.

Once the stacker is placed in position again the reader will verify that the stacker is on its right position. Then and for 10 seconds the 3 central blue LEDs and the 2 red LEDs will be on. If a calibration note is introduced during this time, the reader will proceed to calibrate the sensors. When the calibration is done, if the reader goes back to the normal cadence of the blue LEDs it will mean that the calibration was a success.

The calibration process is divided in two phases. The steps required are:

- Introduce the calibration note.
- The reader will automatically start the calibration process.
- The first phase consists on a number of readings that the reader does on the calibration note. Once is finished the note will be expelled.
- All blue and red LEDs will be on indicating that the first phase is over. They will remain on for 5 minutes or until the note is introduced again.
- Once the note is introduced in the reader, the second phase will start.
- In the end of the phase, the reader will expel the calibration note.

If the note is not inserted for the next 5 minutes after the first phase is over, the reader will consider that the calibration is over, but it won't be a correct one and it will be necessary to do it again.

If the calibration note gets stuck during calibration, after removing it, all the LEDs will be on, and once the note is introduced again, the phase where the note was stuck will start again.

5.2 Programming banknote inhibition

① another maintenance banknote reader procedure is banknote inhibition programming. The section on the dip switches has a brief description on how to position these to inhibit banknotes.

5.3 Updating the program

The banknote reader control card is equipped with a flash memory that allows you to update the banknote reader program without the need to replace a memory chip or disassemble it.

Program updating should be carried out via an EasyNote with the latest software to update.

5.4 Updating patterns

The stored patterns contain the information which the banknote reader needs to check against the data from the sensors to determine whether the banknote that has been inserted is valid or not and to determine its value.

This information is also recorded in the control card flash memory, so it can be updated without the need to replace a memory chip or disassemble the banknote reader. Storage of patterns in flash memory allows you to update the information should a new banknote or a new forgery appear. Pattern updating should be carried out via an EasyNote with the latest pattern files.

5.5 Cleaning the banknote reader

The BT11 banknote reader has been designed to operate properly in a wide range of external conditions. However, depending on the setting, it might be necessary to clean its mechanisms every so often. It is recommended that the banknote acceptance area be cleaned. This should be done with the utmost care to make sure no water falls on the control card or sensors.

☞ before cleaning the banknote reader, disconnect it from its power supply.

☞ to clean the banknote reader head press the opening tabs and move the head towards the back, as shown in Figure 9, in annexes.

☞ you should clean the banknote reader with a clean.

☞ **WARNING:** Do not use corrosive products (such as turpentine, alcohol, petroleum, solvents, etc.) as this could result in permanent damage to the banknote reader.

5.6 Removing banknotes from the stacker

In order to collect the banknotes in the stacker, do the following:

1. Remove the stacker by pressing the metal shaft downwards (Figure 10).
2. Move the stacker towards the back and use the key to open the lid of the banknote storage compartment.

For a proper functioning of the reader, the stacker should remain closed at all times; also the key shouldn't be on the key hole, because this may interfere with the normal functioning of the reader.

6. Troubleshooting

The following table will help you diagnose the most common banknote reader failures. It describes a series of anomalies, their possible causes and the steps to take in solving them or at least in determining the possible cause of it. Take a look at these failures before contacting our technical support service.

| PROBLEM | POSSIBLE CAUSES | SOLUTION |
|---|---|---|
| A given type of banknote is rejected and the red LED blinks twice rejecting the banknote. | Banknote inhibited by the machine. | Check that the maximum return value set in the machine is sufficient to accept the banknote and that there is sufficient change in the tubes. |
| A given type of banknote is rejected and the red LED blinks three times. | Banknote inhibited by the banknote reader. | -Uninhibit the banknote. -See test and programming |
| Banknotes are not accepted and status LEDs are off. | The BT11 has no power supply, or the power supply is incorrect. | Check that power supply voltage is within limits. |
| Banknotes not fully accepted, they are all rejected with a final strike of the stacker | Stacker is full or there is a banknote badly kept. | Move away the stacker and verify that it is not full, there isn't a banknote badly kept or there isn't a banknote jamming the entrance of the stacker |
| Red Led continuously. It doesn't accept any note. | The machine doesn't support the banknote reader. | Update the software on the machine |
| Blue LED in one of the ends of the line is the only one on | Switch 8 ON. | Set correctly the switches. |

Recycling

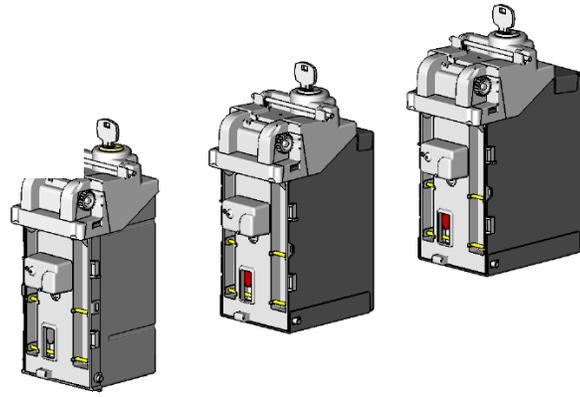


When disposing of any packing materials or old equipment, check with your local authorities for information on recycling. Do not throw away any electronic circuit with domestic waste, as many materials used for their components are recyclable. Please consult your local authorities about recycling information. When the customer wants to throw out the equipment, Jofemar has established a waste management system with an Integrated Management System. Check for information on recycling.

7. Appendix



Figure 1: General view of the banknote reader.



Stacker 200

Stacker 375

Stacker 500

Figure 2: Possible stackers for BT11 banknote reader

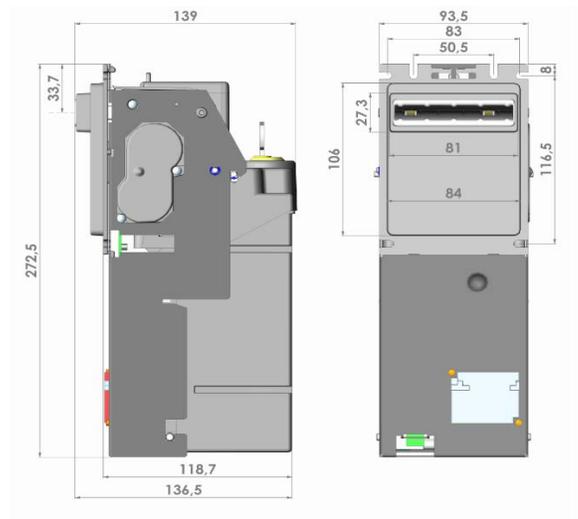


Figure 3: Reader with Stacker 200 (measures in mm)

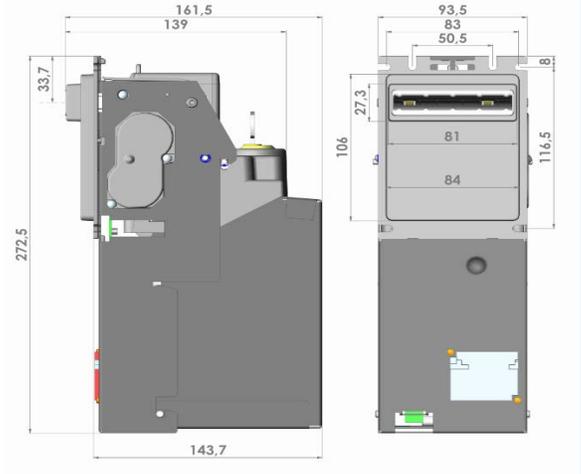


Figure 4: Reader with Stacker 375 (measures in mm)

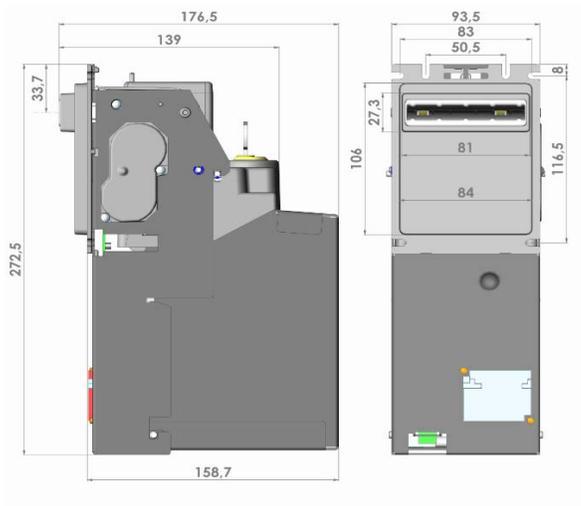


Figure 5: Reader with Stacker 500 (measures in mm)

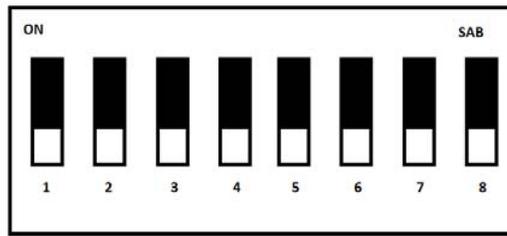


Figure 6: Switches in OFF position.



Figure 7: Image of the readers cover showing the MDB software and sensor software version. In this case it is the 8th version of the MDB software and the 3rd version of the sensors.

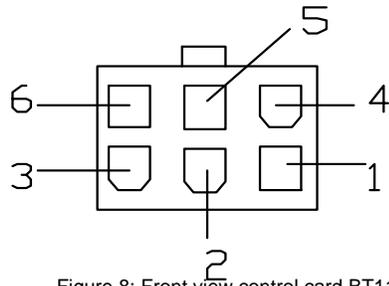


Figure 8: Front view control card BT11 MDB



Figure 9: Tab to be pushed to clean the readers head.

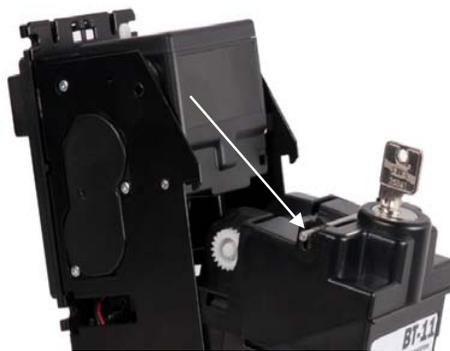


Figure 10: Metal shaft to be pushed to remove stacker

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Reserves the right to introduce improvements
in this model arising from its continuous
research without prior notice.

