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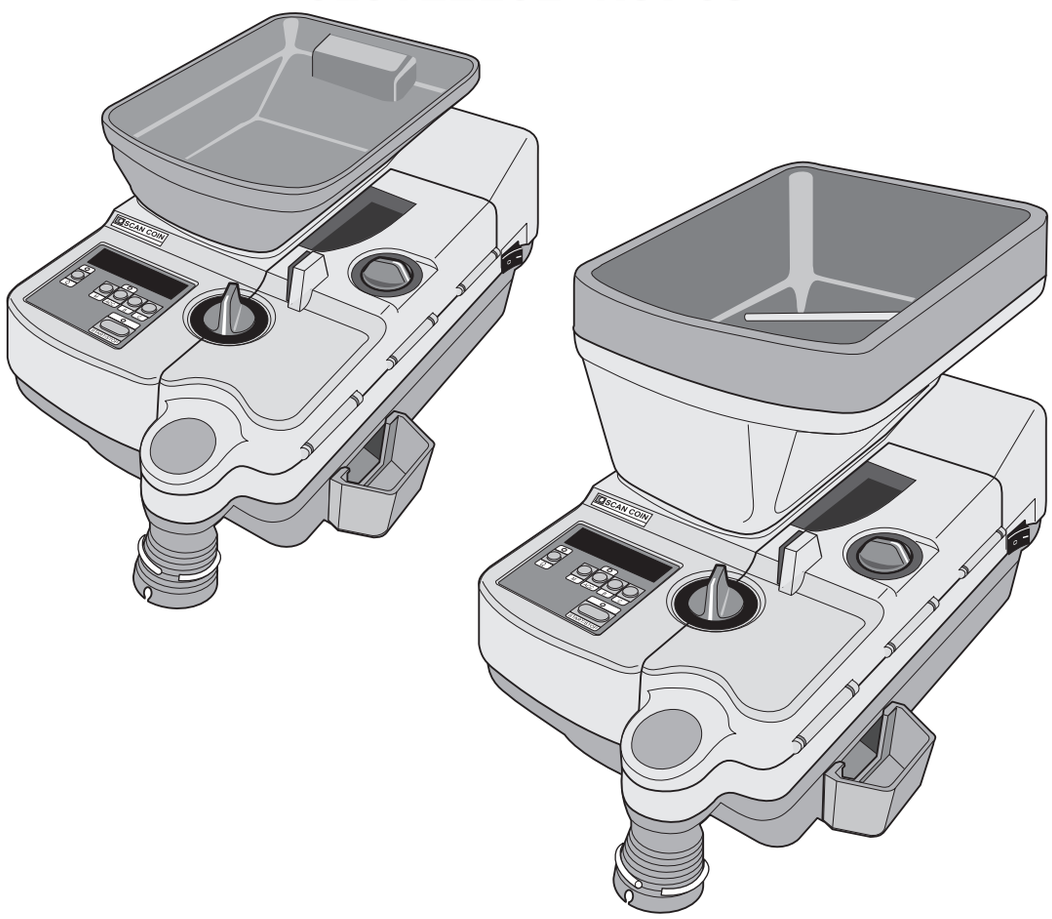
SUZOHAPP & ARPEGE

SC-350/SC-360
Coin Counters
Technical Handbook

019722101- Rev 05



SCAN COIN

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SC 8220 – User's Guid e – 101-5004174 Rev. 05

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1 General Information

SUZOHAPP reserves the right to revise and improve its products as it sees fit. This publication describes the product at the time of publication and may not reflect the product at all times in the future.

1.1 Declaration of Conformity

We, SUZOHAPP, declare under our sole responsibility, that the product in this manual, to which this declaration relates, is in conformity with the following standards or other normative documents:

EN 60 950-1:2006 + A11, EN 61000-6-1:2007 and EN 61000-6-3:2007 following the provisions of Directive:

- Low Voltage Directive 2006/95/EC;
- EMC Directive 2004/108/EC.

1.2 FCC Standard

FCC Part 15 (2008): Radio frequency device, subpart B: Unintentional radiators. Class B equipment.

1.3 Environmental Compliance

Note! If the equipment contains batteries or accumulators, dispose these separately according to local requirements.

WEEE Directive (valid in the EU only)

Waste Electrical and Electronic Equipment Directive 2002/96/EC.

Equipment marked with this symbol must be treated separately and in accordance with the local legislation that requires proper treatment of, recovery and recycling of used electrical and electronic equipment.

Contact your SUZOHAPP representative for further details.

1.4 Responsibility

The supplier of the equipment accepts no responsibility for injury or damage to personnel or equipment, if the equipment is altered in any way or used in a manner for which it was not intended at the time of delivery.
If the conditions for use of the equipment are changed, the supplier must be contacted or the declaration of conformity is invalidated.

1.5 About this Document

This technical handbook is valid for SC-350 and SC-360.
It provides information required by qualified personnel to carry out repairs, maintenance and servicing.

Throughout this manual the instructions given apply to both machines unless otherwise stated.

1.6 Revision History

Revision	Major Changes
05	Template updated. Coin diameter and thickness ranges corrected.
04	Added new logos for SUZOHAPP and SCAN COIN on the front page and changed from SCAN COIN AB to SUZOHAPP on page 1.
03	Coin diameter range changed to 37.5 mm 5.3 “Functional” on page 13 Updated 3.7 “Accessories and Options” on page 10
02	Updated with new PSU board and Declaration of Conformity.
01	Added WEEE directive. Template updated.

1.7 Abbreviations/Acronyms

Abbreviation	Description
AC	Alternating Current
AUX	Auxiliary
BDO	Bag Draw-Off
CPU	Central Processing Unit
DC	Direct Current
DMM	Digital Multi Meter
ESD	Electrostatic Discharge
LED	Light Emitting Diode
PSU	Power Supply Unit

1.8 Related Documents

Document	Document number (Main number)
User's Guide	019223-xxx
Service Manual, including: • Technical Handbook • Spare Parts List	019721-101 • This document • 019624-101

1.9 Software Version

This document describes machines with software versions:

- v. 4.03 for SC-350
- v. 4.03 for SC-360

2 Safety Precautions

2.1 Hazard Notices

This handbook contains hazard information which **must be regarded by all users**.

The hazard information is presented as a warning or a caution, as follows:

WARNING!
Warnings indicate a potential hazard to the health and safety of users. They clearly state the nature of the hazard and how to avoid it. They appear at their points of application in this handbook, but with different illustrations.

Caution! Cautions indicate a potential hazard to the physical integrity of the machine, but not a danger to personnel. They clearly state the nature of the hazard and how to avoid it. They appear at their points of application in this handbook. They look like this notice, but with different illustrations.

Note! The servicing information and instructions contained in this technical handbook are for use by qualified personnel only. Any unauthorised attempt, by unqualified persons, to service or repair the machine, will nullify the equipment warranty.

2.2 Installation, Service and Maintenance

WARNING!
Risk of electric shock
High voltage inside the machine may be fatal for anyone in contact with it. Always switch OFF and disconnect the machine from mains supply before disassembling.

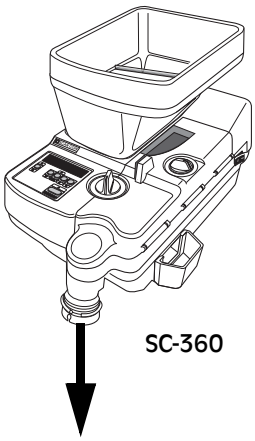
Caution! Electrostatic discharge (ESD) may damage the electronic components. All electronic circuit boards in the machine are sensitive to ESD.

To prevent damage from ESD, **always** observe the following precautions:

- Always wear a suitably grounded wrist wrap – make it first on, last off.
- An unboxed or unbagged board is an unprotected board!
- Keep non-conducting materials (for example sleeves, ties, scarves) away from electrostatic safe work areas.

2.3 Operation

WARNING!
Risk of tipping!
The machine may fall over during bagging. Always make sure that the bag can rest on a shelf. Maximum weight to avoid tipping is 10 kg (22 lbs).

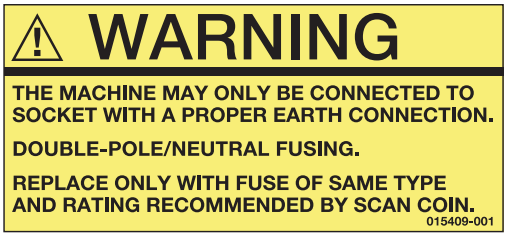


WARNING!
Risk of jamming!
This machine contains moving parts and sharp edges. Always be careful. Do not touch the components inside the machine while it is running.

WARNING!
Risk of impaired hearing!
Use ear protectors while the machine is running.

2.4 Warning Labels

The following warning labels are attached to the machine.

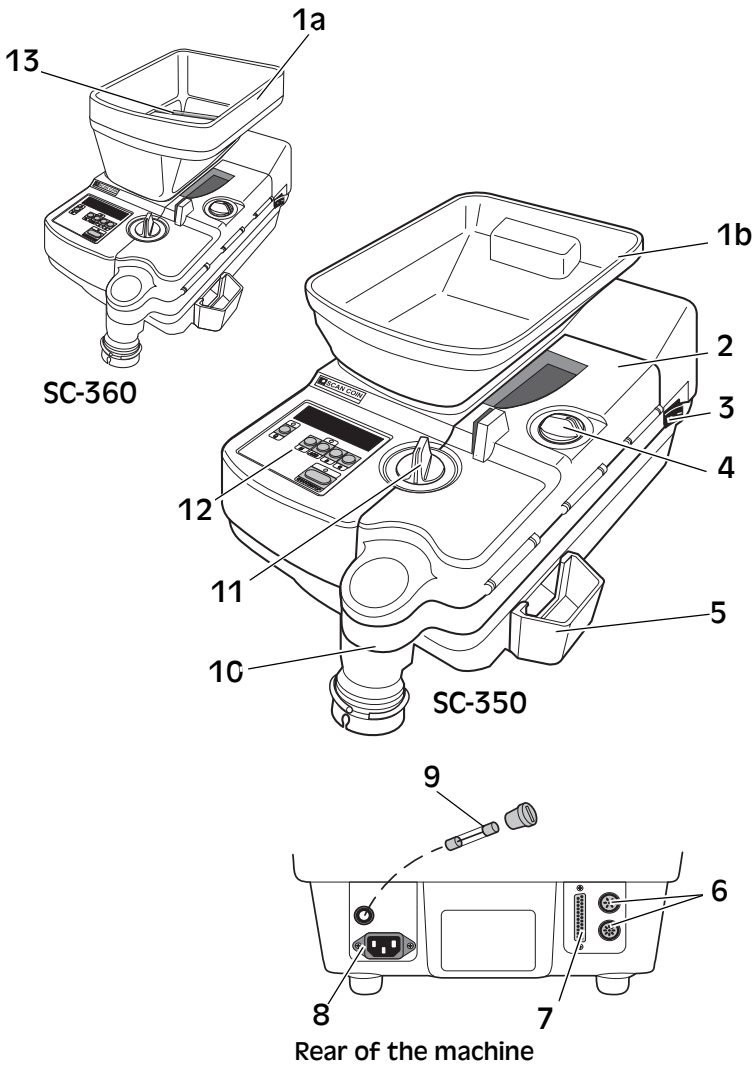


3 Introduction

3.1 General

The SC-350/360 are universal, compact desktop machines for counting coins and tokens.

The SC-350 has a manual coin tray and the SC-360 has an automatic one.

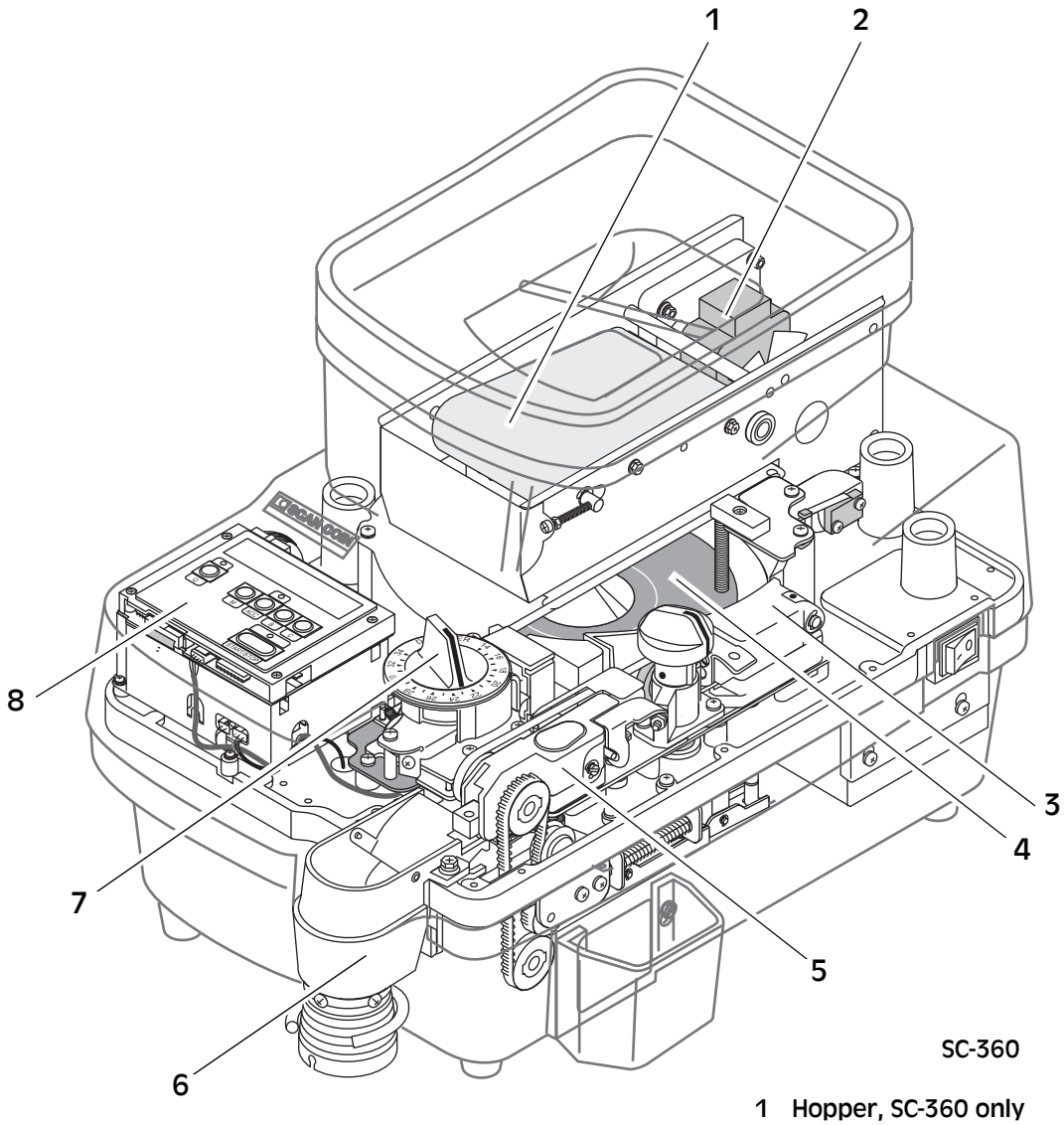


1 a Coin tray SC-360
b Coin tray SC-350
2 Inspection lid
3 On/Off switch
4 Thickness selector
5 Reject cup
6 RD/AUX connections
7 Serial interface connection
8 Power cord/Mains Inlet
9 Fuse
10 Coin outlet
11 Diameter selector
12 Control panel
13 Coin diverter
Caution!
Do not use as a lifting handle.

3.2 Controls and Operation

Refer to the *User's guides* for information.

3.3 Main Components



SC-360

1 Hopper, SC-360 only
2 Hopper motor, SC-360 only
3 Thickness unit
4 Coin disc
5 Feed unit
6 Coin chute
7 Diameter unit
8 Control panel, CPU, PSU

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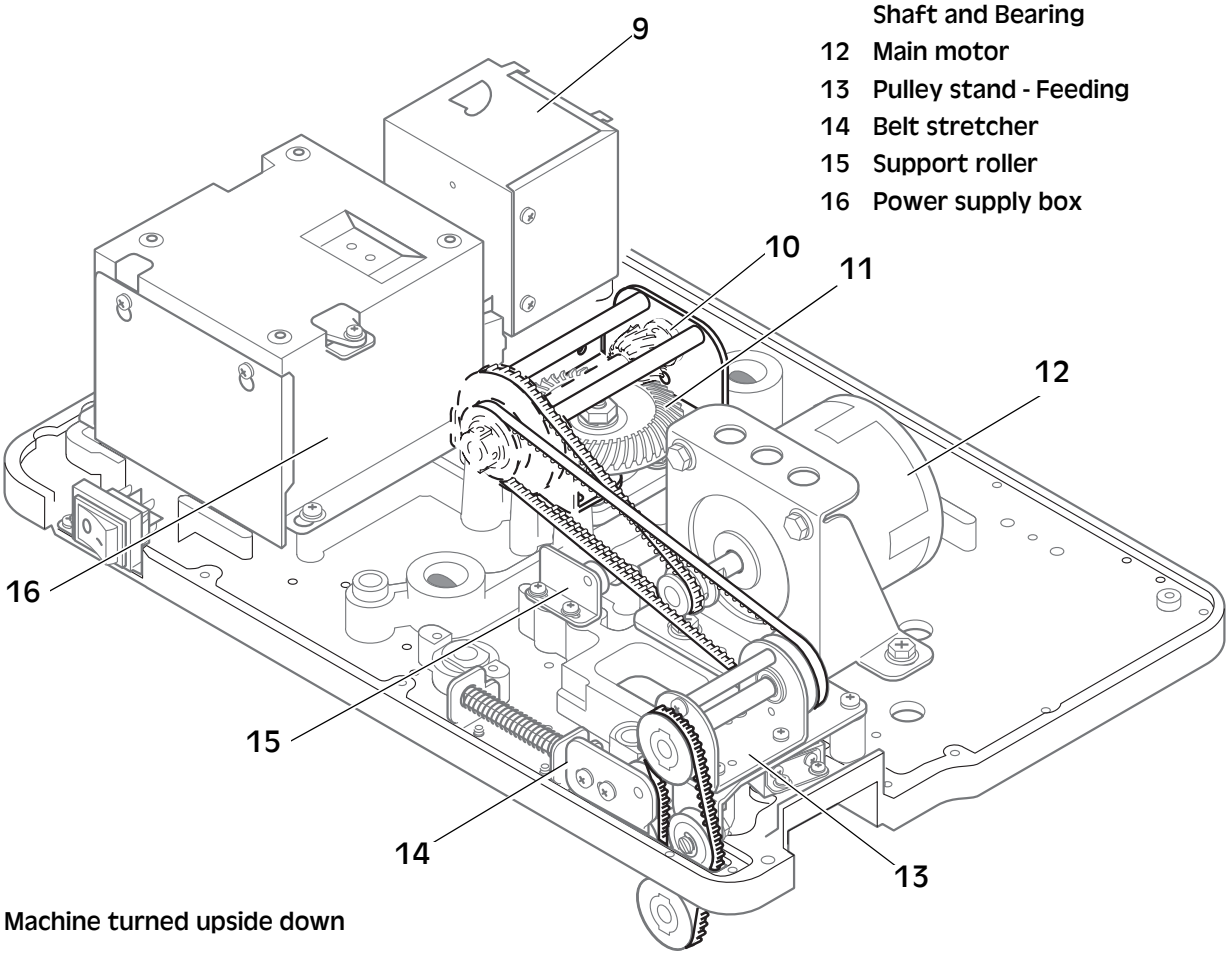


9 Serial Interface & RD/AUX box
10 Pulley stand - Coin disc drive
11 Gear - Coin disc drive
Shaft and Bearing
12 Main motor
13 Pulley stand - Feeding
14 Belt stretcher
15 Support roller
16 Power supply box

Machine turned upside down

3.4 Positional References

Unless stated the contrary, positions and directions such as left, right, upper, lower, clockwise and counterclockwise are given with respect to the machine when viewed from the front.

3.5 Modes of Operation

Refer to the *User's guides* for information.

3.6 Computer Communication

The SC-350/360 can communicate with many computer controlled applications. A serial interface is fitted at the rear of the machine.The machine can be used in many ways, for example:

- As a dispenser (SC-350/360):

  The machine is used for dispensing coins. A cashier uses a computer to control the machine so that it delivers the correct amount of coins to each customer.

- In a cascade:

  Several machines are connected in a cascade arrangement to form a fast and efficient coin sorter. Each machine is connected to a central computer and sorts only one coin denomination. The computer carries out the accounting work by producing receipts or by updating a database.

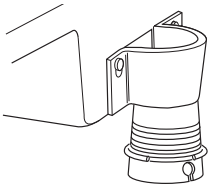
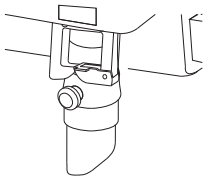
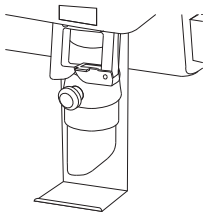
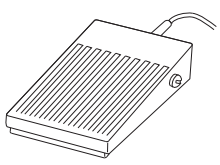
- As a massive coin counter:

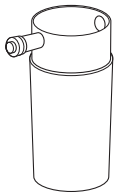
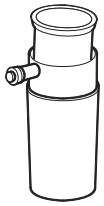
  Several machines are connected in a parallel arrangement to form a coin sorter of considerably increased capacity. Each machine is connected to a central computer which controls the operation of the massive coin counter and carries out the accounting work by either producing receipts or by updating a database.

3.7 Accessories and Options

All electrical accessories are plugged into sockets on the back of the machine.

Accessories

Accessory	Description
RD 8 012547-003 	**Remote customer display** Extra display showing the number of coins counted (the same as normally shown on the display of the machine).
BA 5 002726-004 	**Bagging attachment** Bag holder replacing the coin cup.
BG 1 010686-000 	**Bag guide without shelf** Mounted on the coin outlet. For small paper and plastic bags.
BGS 1 002959-000 	**Bag guide with shelf** Same as BG 1 but with a shelf for the bag to rest on. **Note!** **Only available until 2013-01-01**
FC 3 015317-001 	**Foot control** For starting and stopping the machine.

Accessory	Description
IH 1 002525-000 	Insert holder for TI 1 Mounted on the coin outlet.
TI 1 002703-XXX 	Tubing insert Various sizes depending on the coin diameter. Used together with IH 1.

4 Installation

4.1 Installation Requirements

a) The machine must be placed on a stable horizontal surface.

b) Ensure that the environmental requirements are met when installing the machine, see "Environmental" on page 13.

c) Do not place the machine close to any radiators.

d) Do not place the machine in direct sunlight as reflections from the sunlight will make it impossible to read messages displayed on the screen and may also cause the internal temperature of the machine to rise above an acceptable level.

e) Allow some free space around the machine to enable the air to circulate.

WARNING!
Risk of electroshock
The machine is of partly metal construction and must therefore always be earthed to the supply. Ensure that the plug on the supply lead is earthed and that the supply source is earthed. This is a requirement for this type of equipment and if not adhered to will contravene the international standards of Health and Safety in the work place.

Although this machine has been tested for electromagnetic compatibility and vibration characteristics, it is recommended that no equipment which generates a high level of electromagnetic interference (EMI) or vibration is placed close to this machine.

Caution! **The machine must be protected by a fuse or a circuit breaker in the power supply feed.**

For AC voltage input, see "Environmental" on page 13.

5 Technical Data

5.1 Physical

Description	Model	Value
Width	SC-350/360	295 mm
Height	SC-350 SC-360	250 mm 380 mm
Depth	SC-350/360	480 mm
Weight	SC-350 SC-360	17.5 kg (38.6 lb) 19.5 kg (43.0 lb)

5.2 Environmental

Description	Value	
Operating temperature	15-35°C	
Operating humidity	30-80% R.H.	
Noise level (operation)	81 dB (A)	
Power requirements: - Voltage - Frequency - Consumption	 220-240 VAC 50 Hz 0.7 A	 110-130 VAC 60 Hz 1.4 A

5.3 Functional

Description	Value
Counting rate, maximum	3,000 coins/min., coin diameter 15.0 mm
Coin diameter range	14.0–34.0 mm max. 23.0 mm range
Coin thickness range	1.0–3.6 mm max. 2.6 mm range
Display	6 digit
Batch range	5-1,000,000

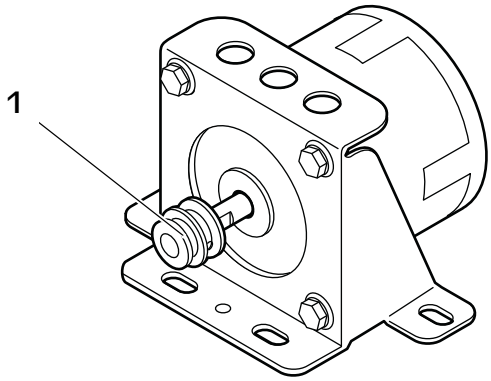
6 Technical Description

6.1 Mechanical Description

Coin disc

The coin disc is driven by the main motor via a drive belt and a gear assembly. On the motor shaft there is a double pulley (1) for 50/60 Hz.

The minor diameter is for 60 Hz and the other for 50 Hz.



1 Double pulley

Diameter cam

The diameter cam is mounted on the shaft of the diameter selector and fitted edge-to-edge towards the left sorting slide guide.

Turn the diameter selector to select the **diameter** of the coins to be counted. The left sorting slide guide is then moved in parallel (horizontal linear motion) with the fixed right slide guide to set the correct coin diameter gap.

Thickness cam

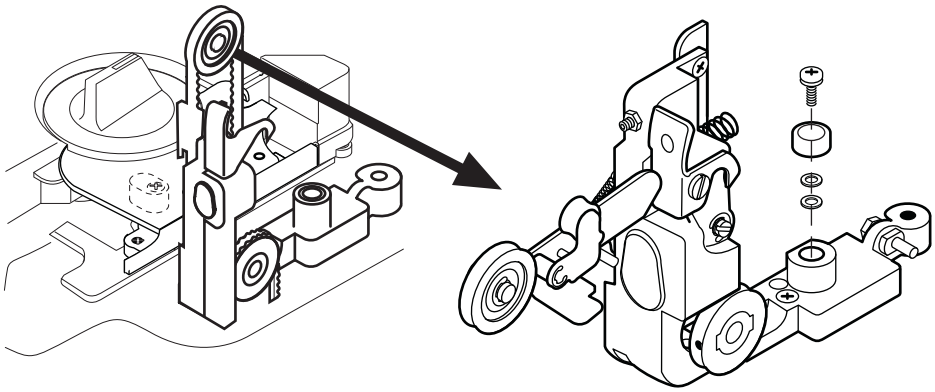
Turn the thickness selector knob to select the **thickness** of the coins to be counted. The block is moved in parallel motion (vertical linear motion) with the coin disc to set the correct coin thickness gap. The feeding unit is also moved in the same way as the thickness unit.

Hopper unit - SC-360

The hopper unit is driven by a motor. If the coin level on the coin disc reaches up to the coin level sensor the hopper motor will stop, it will start again when the coin level falls below the coin level sensor.

Feed mechanism

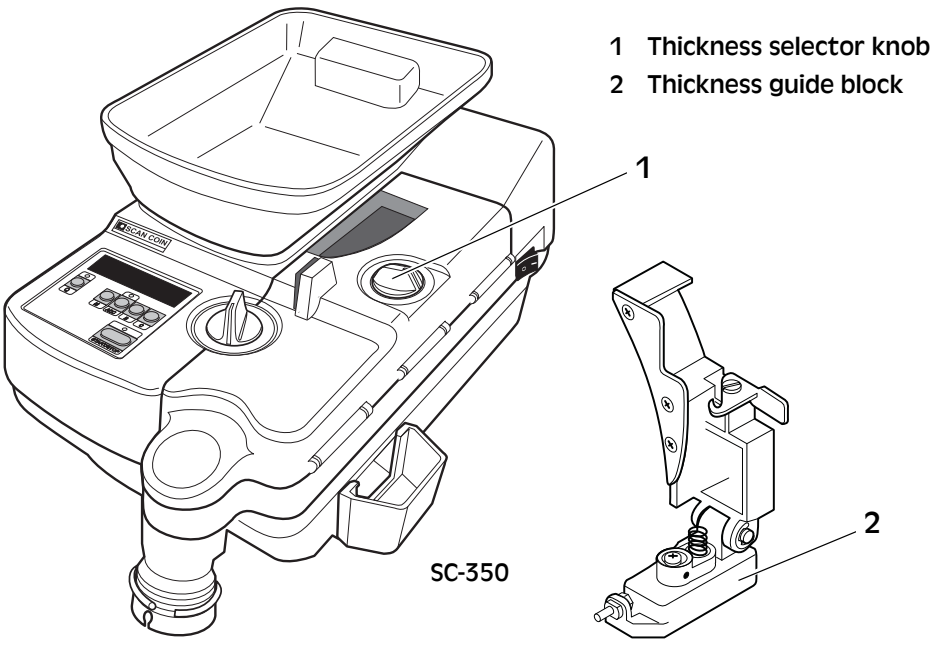
The feed mechanism is driven by the main motor via three drive belts. The feed unit could easily be removed when it is attached to the chassis with only one screw, see "Feed Unit - Removal" on page 51.



Thickness selector and thickness guide block

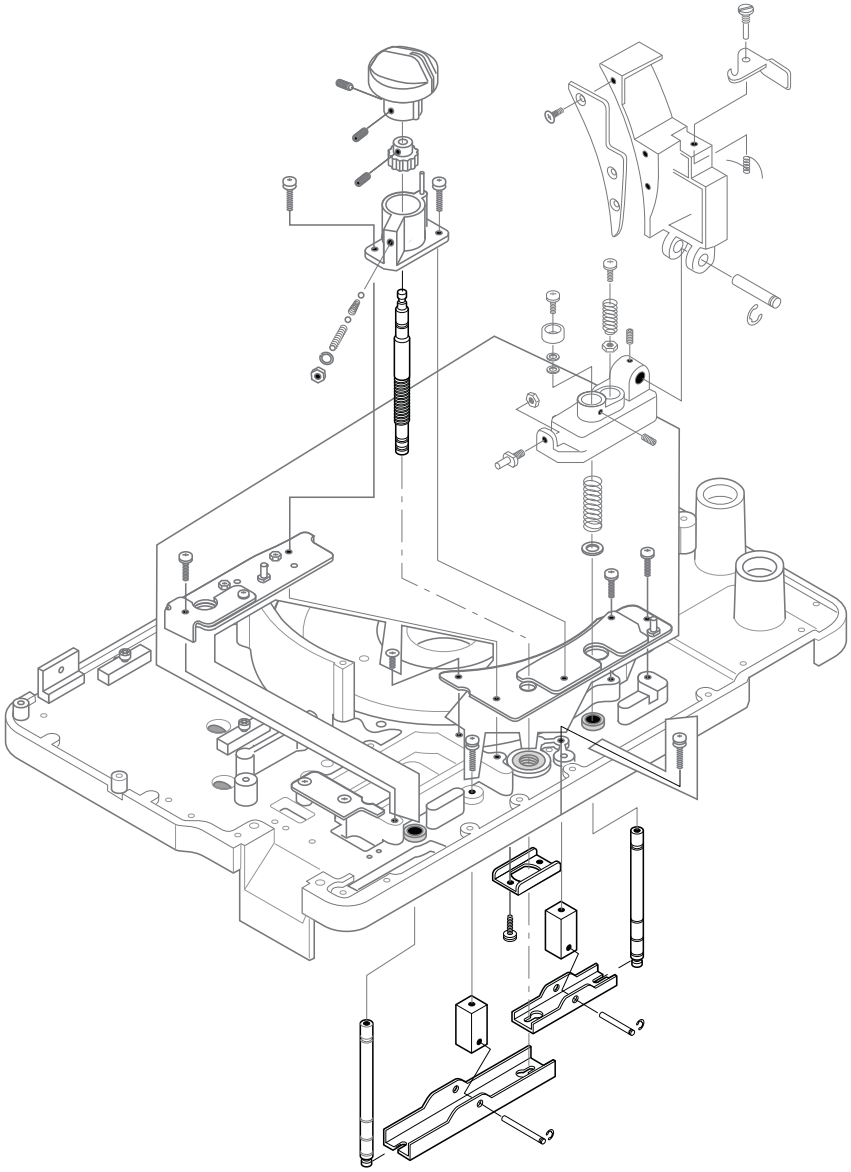
Turn the thickness selector knob (1) to select the thickness of the coins to be counted. The thickness guide block (2) is moved via the swing unit, see "Swing mechanism" on page 16, in parallel motion (vertical linear motion) with the coin disc to set the correct coin thickness gap.

The thickness unit could easily be dismounted since it is attached to the chassis with only one screw, see "Thickness Unit - Removal" on page 54. To adjust the parallelism, see"Thickness guide block - Parallelism" on page 73.
The feed unit is also moved in the same way via the swing mechanism), when turning the thickness selector knob.



Swing mechanism

The swing unit controls the motion of the thickness unit and the feeding unit. When turning the thickness selector knob the thickness unit and feeding unit is moved via the swing unit in parallel (vertical linear motion) with the coin disc to set the correct coin thickness gap.



6.2 Electronic Description

The electronics consist of:

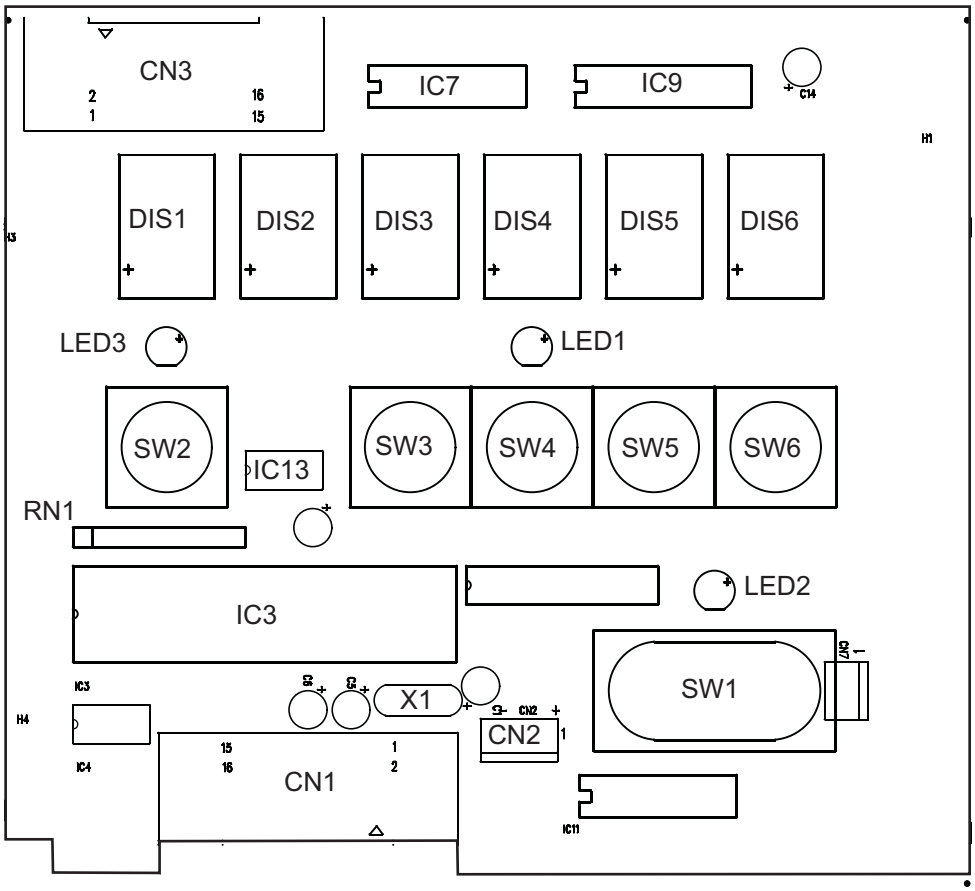
- a central processing unit (CPU) board,
- a power supply unit (PSU) board located under the CPU board,
- a serial interface SI 2, for connection of a PC,
- an RD/AUX interface to enable some of the accessories to be connected.

6.3 CPU Board

The CPU board is controlled by an 8-bit micro controller, IC3.

An 11.0592 MHz crystal supplies the micro controller with its clock frequency.

All inputs and outputs are ESD protected. Some outputs have filters to reduce the amount of electromagnetic emissions.



Reset logic

Operating principle:

- P0.6 of CPU (pin 33) detect POWER FAIL. The POWER FAIL is provided to pin 33 from pin 14 of IC2C.
- Voltage +24 VAC is detected via R10. R11 and Z6 controls the hold peak at 3.9 V.
- Should POWER FAIL be detected (no 24 VAC), the output pin 14 of IC2C will change to low which will be detected by P0.6 of the CPU.
- Reset signal to CPU (pin 9) is handled by IC 3 pin no 8.

Non-volatile memory

The IC4 is a serial EEPROM which forms the non-volatile memory.

If the power supply fails, the micro controller automatically stores important information in IC4.

When the power supply returns the micro controller, the IC3 reads stored information from the IC4 and restores the machine to the state before the power failed.

Coin sensor

The coin sensor is connected to the micro controller IC3 via CN2.

Signal pulses from the coin sensor are processed by the micro controller IC3. Pulses shorter than 1 ms are rejected as false.

Coin level sensor (for SC-360 with automatic coin hopper)

The coin level sensor controls the coin level on the rotating disc and is connected to the micro controller via a filter.

If the coin level falls too low, the micro controller sends a start signal to the hopper motor, to enable more coins to pass to the rotating disc.

Safety switch

The safety switch on the inspection cover monitors if the lid is open. The switch is connected to CN3 at the PSU board. If the lid is open, the connection between IC10 pin 2 and IC8 pin 13 is open. The green LED above **Start/Stop** starts to flash.

The micro controller IC3 (IC1) monitors this connection via IC13 pin 10.

The micro controller automatically controls:

- lid open = stop,
- lid closed = start.

Keys

The keys on the control panel are controlled by the CPU board. All debouncings are handled by the software.

Display

The display is a six multiplexed seven segment display unit of the common anode type. The anodes are powered by Darlington transistors T1-T6. The segments are powered by MOSFET transistors T8-T15.

The green indicators LED1-LED3 above **Q**, **ACC** and **Start/Stop** are powered by the other decimal point connections.

Each of the six display units is lit for about 270 µs, which gives a cycle time of about 1.7 ms.

To avoid display flicker these are updated in the order DIS1, DIS3, DIS4, DIS5, DIS2, DIS6.

Outputs

The extra port circuit is connected to the micro controller. This port is updated between the time one display is switched off and the next one is switched on. This is done by the micro controller IC3 sending the port information on the P2 bus.

At the same time the negative clock signal (-CLK) goes low immediately.

6.4 PSU Board and Transformer

Transformer

The primary winding of the transformer is supplied with either 110 V AC or 230 V AC depending on the supply voltage used.

The secondary winding supplies 24 V DC. If the solenoid is activated this voltage drops to about 20 V, with the open circuit voltage at this point being about 30 V.

Fuses

A fuse for the 24 volt line is located on the PSU board. A main fuse is located in the mains socket.

Caution! **If a machine unintentionally is connected to a higher mains voltage this will not only cause the fuse on the PSU to blow, it will also cause a 36 V zener diode on the small AUX interface board to blow.**

The motor has a thermal fuse that is activated when the motor is overloaded. The fuse cuts the power to all units except the transformer.

Caution! **The machine must be disconnected from the power supply for about 20 minutes to enable the fuse to return to its normal position.**

Regulators

The IC1 is a switched regulator generating +5 V for the CPU board. A reference voltage of 1.25 V is located on the IC1 pin 8.

Triacs

The PSU board has three triacs:

- SCR1 switches on the hopper motor.
- SCR2 switches on/off the main motor in its forward direction.
- SCR3 switches on/off the main motor in its reverse direction.

The opto switches OP1 OP2 and OP3 control the triacs. They ensure that no noise is generated by the triac.

Miscellaneous

The transistor T1 activates the solenoid which is connected to the PSU board via the CPU board.

6.5 Serial Interface

The serial interface board is fitted on the rear of the machine. It generates the signal levels needed for communication according to RS232C.

On the IC1, pin 2 there should be +10 V, and on pin 6 about -10 V.

The board also has ESD protection components.

6.6 RD/AUX Interface

The RD/AUX interface board is fitted on the rear of the machine.

- A FC 3 or a BDO sachet machine can be connected to CN1.
- An RD 6, can be connected to CN2.

Refer to "Accessories and Options" on page 10.

External start

The **External start** (-ExtSrt) is located on the CN3, pin 16.

Full batch indication (FBI)

The FBI is located on the CN3, pin 4.

The FBI is normally high. If the machine is set for the BDO sachet machine, FBI goes high when a full batch has been reached.

Coin feed

TrayOn is located on the CN3, pin 8.

This signal goes high when the level of coins on the coin tray is low.

External coin pulse

Coin pulse (CoinP) is located on the CN3, pin 6.

One pulse is generated for each coin passing the coin detector. The pulse is high during 7 ms, and the distance between the pulses is at least 7 ms.

An external unit, for example a remote customer display (RD 6), can count these pulses and show the **number** of counted coins. This works up to a coin speed of 4,000 coins/minute. The machine can store up to 250 coin pulses at a higher speed for a short while. If this value is exceeded, the external unit will show an incorrect number of coins.

Resetting a remote display

External reset (-ExtRst) is located on the CN3, pin 2.

This signal goes low for a short time to reset a remote customer display. This mode must be enabled in the set-up.

7 Set-up

7.1 Master Reset

This option resets:

- All program values are set to their default values.
- All registers, except the statistics and service interval registers, are set to zero.
- The batch stops are set to their default values: 20, 40, 50, 1000, 2000, 4000 and 5000.

To reset:

a) Press **Q**, **M**, **B** and **Start/Stop** at the same time, while switching **On** the machine.

b) When the display changes from showing "888888"s to a blank display, release **Q**, **M**, **B** and **Start/Stop**.

c) Press and hold **C**. The display shows "r E S A L L".

d) Release **C**. The display shows "888888" and then "r E S E E".

Protection of master reset

It is possible to protect the master reset with a password. For further details see "Entering Password" on page 35.

7.2 How to Enter, Change and Exit Set-up

a) Press down **Q** and **M** while switching **On** the machine.

b) When the display changes from showing "888888", release **Q** and **M**.

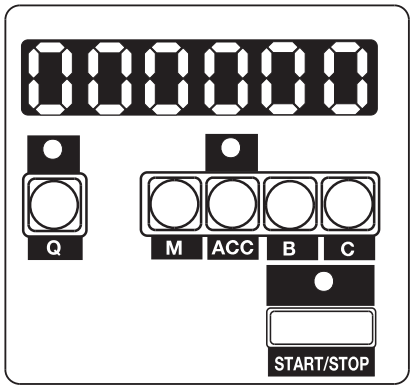
The machine is now in the set-up mode.

c) Step through the set-up pages (1 - 8, see below) with **Q**.

d) Press the key below the value to be changed (set-up pages 2 - 8).

0 = disable and **1** = enable, if not stated otherwise.

e) Press **Start/Stop** to exit the set-up.



Set-up functions (pages 1-8)

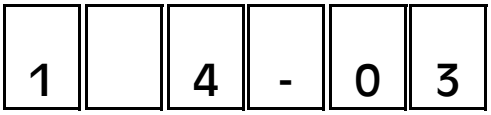
Page	Set-up function
1	Software version and memory checks, see 7.3 on page 24.
2	Reverse sequence for motor and solenoid, see 7.4 on page 25.
3	Miscellaneous functions #1, see 7.5 on page 27.
4	Adjustments to external devices, see 7.6 on page 28.
5	Keypad settings, see 7.7 on page 28.
6	Computer communication, see 7.8 on page 29.
7	Miscellaneous functions #2, see 7.9 on page 30.
8	Adjustment of the sensitivity of CH 45, see 7.10 on page 31.

7.3 1 - Software Version and Memory Checks

Software version

Press **Q** until the number "1" is shown at the far left of the display. The software version is shown on the rest of the display.

Example:



The software version is 4.03.

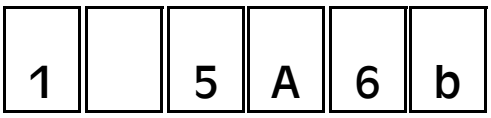
Memory address space

Press **M**. The hexadecimal value of the program memory check sum added to the memory address space is displayed.

Program memory check sum

Press **ACC**. The hexadecimal value of the program memory check sum is displayed.

Example:



The program memory checksum is the hexadecimal value 5A6b.

EEPROM contents check sum

Press **B**. The hexadecimal value of the EEPROM contents check sum is displayed.

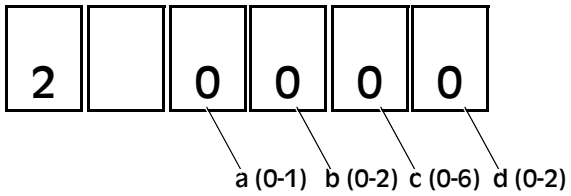
Highest stack address

Press **C**. The hexadecimal value of the highest stack address used is displayed.

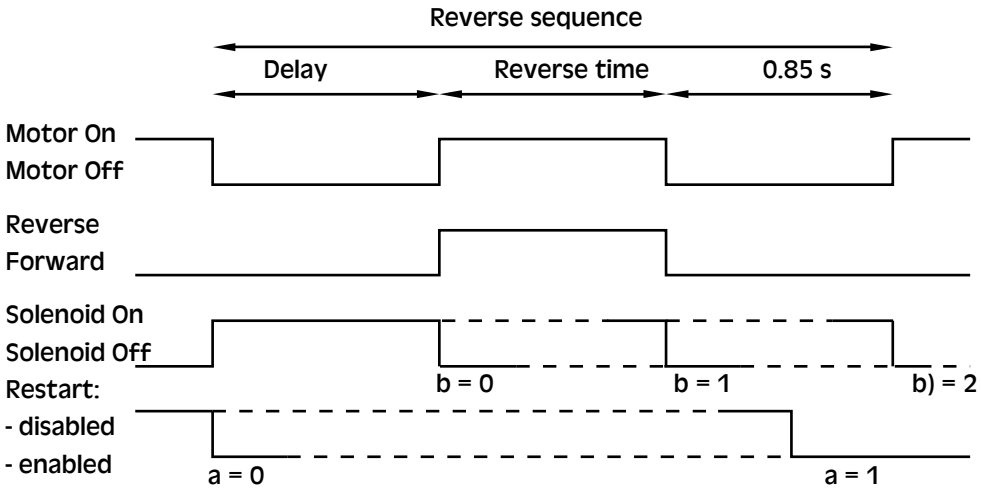
7.4 2 - Reverse Sequence for Motor and Solenoid

Press **Q** until the number "2" is shown at the far left of the display. The display also shows four other numbers which are detailed below:

Example (default setting):



The diagram below shows how the different values of (a) and (b) affect the machine.



(a) 0-1 Restart

Restart options	
0	"Fast" restart enabled. Possible to restart the machine when the reversing sequence is in progress (default).
1	"Fast" restart disabled. Not possible to restart until the reversing sequence has been completed.

(b) 0-2 Solenoid

Determines for how long time the solenoid remains active once the machine has stopped. When set to **1** or **2** the solenoid is active for a longer period of time. Avoid this if the machine is being used to count small quantities (up to 20 coins) at a high repetitive speed.

Solenoid	
0	On for 600 ms (default).
1	On until the motor has reversed.
2	On until the reversing sequence has ended.

(c) 0-6 Delay period and reverse period

Determines how long the delay will be after the solenoid no longer is active, before the motor reverses. It also determines for how long the motor reverses.

By altering this number it is possible to compensate for some mechanical changes that occur during the lifetime of the machine.

The delay can be set in smaller steps in program version 4.00 and on, see "7 - Miscellaneous Functions #2" on page 30.

Delay (solenoid)		Reverse (motor)
0	1000 ms (default)	50 ms (default)
1	500 ms	50 ms
2	1000 ms	150 ms
3	500 ms	150 ms
4	1000 ms	400 ms
5	500 ms	400 ms
6	The motor is not reversed, only the solenoid is activated, as if b)=0 above. Other values for b) do not affect the solenoid.	

(d) 0-2 Reversing sequence

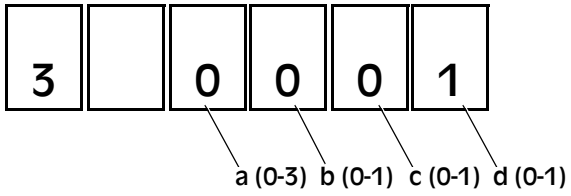
Determines the characteristics of the automatic reversing sequence. A lit up decimal point indicates that the automatic reversing function is selected. If the function is not selected, the machine runs until it stops.

Reversing sequence	
0	The motor runs for 5 s, reverses slightly and then runs for another 5 s before stopping (default).
1	The motor runs for 3 s, and then does a normal stop sequence.
2	This is a continuous sequence where the motor runs for 5 s, reverses slightly and restarts.

7.5 3 - Miscellaneous Functions #1

Press **Q** until the number "3" is shown at the far left of the display.

Example (default setting):



(a) Miscellaneous

Miscellaneous	
0	Every coin is counted as one coin pulse (default).
1	Every coin pulse is counted as five coin pulses.
2	Later versions than 3.0: **Q**-function is changed. Only a temporary batch stop can be used. When pressing **Q**, the number of counted coins and the temporary batch are zeroed. A new temporary batch can be set. If the machine is used as a coin dispenser, this reduces the number of times to press the keys.
3	From 3.03 and on: **Q**-function is changed. Only batch counting is available and the first one (=1) of the preset batch stops (=1) is used. It is **not possible** to change the batch stop with **Q**. This function is useful when the same batch stop is used all the time, or when there is a need to avoid changing the batch stop by mistake.

(b) C and B+C

C has the added function of **B+C**. The function is enabled also when the machine is running.

(c) C, M and ACC+C

C, **M** and **ACC+C** are enabled when the machine is running.

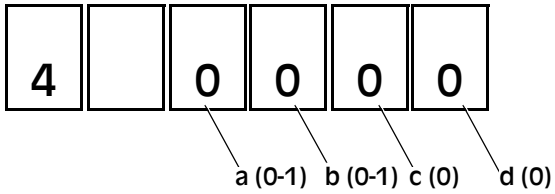
(d) Reversing function

Switches the automatic reversing function **On** (=1) or **Off** (=0).

7.6 4 - Adjustments to External Devices

Press **Q** until the number "4" is shown at the far left of the display.

Example (default setting):



Note! Only **one of** (a) or (b) can be set to **1**.

(a) SC-350/360 and cascade

Adjusts the external start for use with several SC-350/360 machines connected in a cascade arrangement.

(b) SC-350/360 and BDO sachet machine

Adjusts the external start for use with the BDO sachet machine.

(c) Not used

Should always be set to 0.

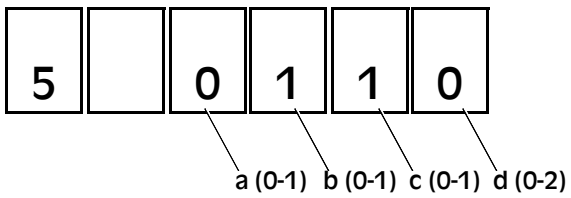
(d) Not used

Should always be set to 0.

7.7 5 - Keypad Settings

Press **Q** until the number "5" is shown at the far left of the display.

Example (default setting):



(a) Stops the machine during batching

When (a) = 1, the machine can be stopped during batch counting by pressing **M**. The machine cannot be restarted by an external start when a complete batch has been reached.

Available only with BDO sachet machine and set-up for external start.

(b) Zeroes RD (accessory) when C is pressed

(b) and (c) work independently.

(c) Zeroes RD (accessory) when M is pressed

(b) and (c) work independently.

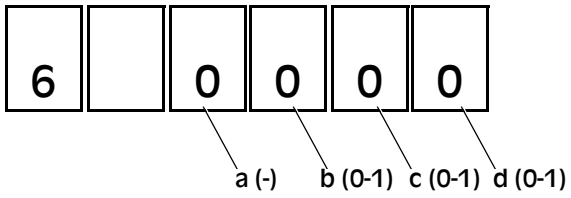
(d) Adjusts Start/Stop-function

Start/Stop function	
0	The machine starts and stops when the **Start/Stop** key is pressed (default).
1	The machine starts when **Start/Stop** is released and stops when **Start/Stop** is pressed.
2	The machine starts when **Start/Stop** is pressed for at least 1 second and stops when **Start/Stop** is pressed for less than 1 second.

7.8 6 - Computer Communication

Press **Q** until the number "6" is shown at the far left of the display.

Example (default setting):



(a) Not used

(b) Debugging control programs

Disables the time out function of the machine. This function is used for debugging control programs. (b)= 0 for normal machine operation.

(c) One character via the serial port

Sends only one character via the serial port every time the CTS changes from inactive (-12 V) to active (+12 V). Makes it easier to implement PC control programs under Windows.

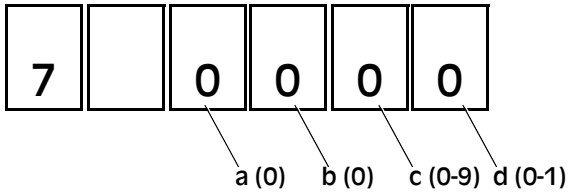
(d) Disables the handshake signals

Disables the handshake signals for serial port communication.

7.9 7 - Miscellaneous Functions #2

Press **Q** until the number "7" is shown at the far left of the display.

Example (default setting):



(a) and (b) Not used

(c) Fine tuning of reverse period

Fine-tuning of the length of the reverse period, see "2 - Reverse Sequence for Motor and Solenoid" on page 25.

Reverse (ms)			
0	0 (default)	5	50
1	10	6	60
2	20	7	70
3	30	8	80
4	40	9	90

Useful when using the BDO sachet machine.

(d) Batch in steps of 1,000 (1")

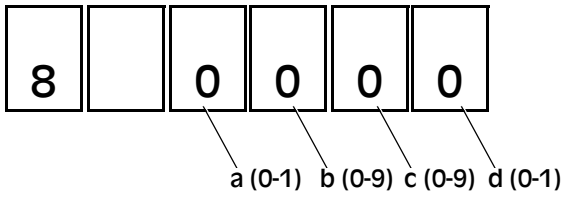
(d) = 1, all batch quantities will be set in steps of 1,000. This affects both normal and temporary batch quantities. Batch quantities up to 1 million can be set.

7.10 8 - Adjustment of Sensitivity of Hopper (SC 360)

This function sets the time delay between the stop of the flow of coins and the restart of the hopper.

Press **Q** until the number "8" is shown at the far left of the display. The display also shows four other numbers which are detailed below:

Example (default setting):



(a), (b) and (c) Time delay settings

The time delay is set by (a), (b) and (c) and varies between 0 and 1990 ms.

Time delay (ms)	a	b	c
0	0 (default)	0 (default)	0 (default)
10-90	0	0	1-9
100-990	0	1-9	0-9
1000	1	0	0
1010-1090	1	0	1-9
1100-1990	1	1-9	0-9

d) Not used (=0)

7.11 Accessing Statistics Registers

To get information about the use of the machine, use the following functions:

a) Press and hold **Q** and **ACC** at the same time, while switching the machine **On**.

b) When the display changes from showing a row of "8"s to "S t A t", release **Q** and **ACC**.

The machine is now in the **statistics** mode.

Total number of times the motor has started and reversed: Hold down **M**. The display shows "S t A r t" and then the number of times that the motor has started and reversed since the last time the value was reset.

>>>

>>>

Note! A normal start, without counting any coins, adds 2 to the register (1 start + 1 reversal).

Total number of coins counted by the machine:
Press and hold **ACC**. The display shows "C o i n" and then the number of coins counted since the last time the value was reset.

Total number of solenoid brakings:
Press and hold **B**. The display shows "S o I" and then the number of solenoid brakings since the last time the value was reset.

Reset:
To reset any of the above statistics, press **C** when the display is showing the statistical value.

Example: To zero the total number of solenoid brakings:

a) Press and hold **B**.

b) When the display shows the number of solenoid brakings, press and hold **C** while continuing to press **B**.

c) When the display changes to show "0", release **B** and **C**. The total number of solenoid brakings is zeroed.

- Press **Start/Stop**. The machine is no longer in the statistics mode and is ready for normal operation.

7.12 Service Intervals

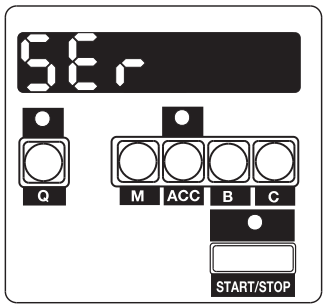
Note! This function is available in program version 3.05 and on.

When the machine is due for servicing the decimal point to the far left of the display flashes. It is possible to continue using the machine.

To enable/disable the servicing function:

a) Press and hold **Q** and **B** while switching **On** the machine.

b) The display shows "S E r" to indicate that the service interval information is accessible.



>>>

>>>

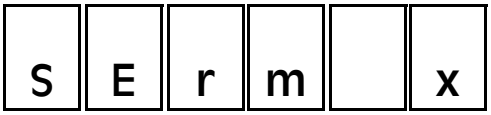
If there is a decimal point in the lower right hand corner of the display, the service limit is reached.

Note! This function is only available in program version 4.00 and on.

The set-up of the service intervals can be protected by a password.

The display shows “SErm x“ to indicate that the service interval information is accessible.

Example (default setting):



m	Normal position m is blank, but a “d” will show in the demonstration mode.
x	x is the current service interval mode.

Note! If a password is set, the display will show “P. ---”. Enter the password to continue. If the password is correct, the display will show “SEr x”. If incorrect, the machine will return to normal operating mode.

3 - Number of coins counted

a) To display the number of coins counted since the last reset, press **M**.

b) To zero the number of coins counted press **M** and **C** at the same time. If the decimal point to the far left was flashing, the flashing stops.

4 - Service interval

To display the number of coins, in millions, that are counted before the machine is due for service press **Q**.

5 - Setting the service interval

a) Press and hold **Q**.

b) Select the required interval (in millions of coins) by pressing **M**, **ACC**, **B** and **C**.

c) Release **Q** when the required service interval is displayed.

Note! The highest interval that can be set is 3,999 million (“3999” on the display).

6 - Service interval mode

The set-up can be in one of four modes:

- **Mode 0 - Flashing decimal point**

  When the machine is due for service, the decimal point at the far left of the display flashes. This mode is displayed as "SEr 0" in the service interval menu.

- **Mode 1 - Service message**

  When the machine is due for service, a service message is displayed after switching **On**. After the message the number of coins counted since the last run is presented. To acknowledge the message, press **C**. The decimal point at the far left of the display starts to flash.

  The service message "CALL For SErvicE" will be displayed.

  This mode is displayed as "SEr 1" in the service interval menu.

- **Mode 2 - Service message with machine disabled**

  When the service limit is passed by 50% or more, it is no longer possible to acknowledge the message. To make the machine work, clear the number of coins counted or change mode.

  This mode is displayed as "SEr 2" in the service interval menu.

- **Mode 3 Service message with machine disabled**

  When the service limit is passed by 100% or more, it is no longer possible to acknowledge the message. To make the machine work, clear the number of coins counted or change mode.

  This mode is displayed as "SEr 3" in the service interval menu.

Changing mode

Select the wanted mode by pressing **C**. The display will toggle between "SEr 0" → "SEr 1"→ "SEr 2"→ "SEr 3" →"SEr 0" etc.

7 - Service interval demonstration mode

For demonstration purposes the service interval can be set to 100.

Note! Before setting the "Service interval demonstration mode", clear the batch register by pressing **B** and **C** together.

a) Press and hold down **Q.**

b) Press and hold down **Start/Stop**. The display toggles between "SErd" and "100". The service interval is set to 100.

c) Release **Start/Stop**.

d) Release **Q.** The display now shows "SErd x ".

8 - Disabling service interval

To disable the service interval, set the interval to zero, see "Service Intervals" on page 32.

If the service interval is set to 100 (demonstration mode), you must change one of the digits in the service interval and then change it back to zero.

9 - Exiting the service interval menu

a) Press and hold **Start/Stop**.

b) When the machine returns to the normal operating mode, release **Start/Stop**.

c) If a password is set, the display will show "P. - - -". Enter the password to continue.

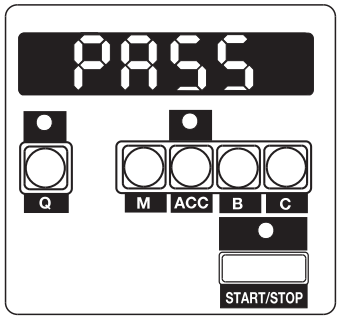
- If the password is correct, the display will show "SEr x".
- If incorrect, the machine will return to normal operating mode.

7.13 Entering Password

a) Enter the password by pressing **ACC**, **B** and **C**.

b) Press and hold **Start/Stop** after entering the password.

- If the password was entered correctly the display shows "PASS".
- If the password was entered incorrectly the display shows "FAIL".



c) Release **Start/Stop**.

7.14 Password Menu

By using a password, it is possible to protect the set-up, the master reset and the service interval menu.

Selection of password

It is possible to protect different functions by selecting a password:

Password	Description
000	No password is set (default)
001-499	Protection of service interval
500-999	Protection of set-up, master reset and service interval
909	Corrupted password

Note! To avoid problems with passwords, it is recommended that each country has its own password for all SC-350/360.

Entering password menu

a) Press and hold **Q**, **ACC** and **C** while switching **On** the machine.

b) When the display changes from showing "888888", release **Q**, **ACC** and **C**.
   - If the display shows "P. 000" no password is set.
   - If the display shows "P. - - -" a password is required.

c) Enter the password by pressing the three keys **ACC**, **B** and **C**.

d) Press and hold **Start/Stop** after entering the password.
   - If the password was entered correctly the display shows "PASS".
   - If the password was not entered correctly the display shows "FAIL". Returns to normal operating mode.

e) Release **Start/Stop**.

Note! If the machine does not accept the programmed password or if password "909" is displayed, the CPU board is damaged and needs service.

Setting password

After entering the password menu:

a) Enter the three digit password using **ACC**, **B** and **C**.

b) Press **Start/Stop**.

c) The display shows “ConFIr”.

d) The password must be confirmed by re-entering it with **ACC**, **B** and **C**.

e) Press and hold **Start/Stop** after entering the password.

- If the password was entered correctly the display shows “PASS”.
- If the password was not entered correctly the display shows “FAIL”. No change of password will be stored.

f) Release **Start/Stop**.

Disabling password

Set the password to zero (000), as described above.

Exiting the password menu

a) Press and hold **Start/Stop**.

- If no password is set, the display shows “noPASS”. Release **Start/Stop**. The machine returns to normal operating mode after a few seconds.
- If a password is set, the display shows “ConFIr”. Release **Start/Stop**.

b) Confirm the password by re-entering it with **ACC**, **B** and **C**.

c) Press and hold **Start/Stop** after entering the password.

- If the password was entered correctly the display shows “PASS”. Returns to normal operating mode.
- If the password was not entered correctly the display shows “FAIL”. The password menu is not exited.

d) Release **Start/Stop**.

7.15 Summary

Note! MS is the mains power switch.

Keys	Function
B	Shows the number of coins counted since the last batch stop.
B+C	Resets the number of coins counted since the last batch stop.
C	Resets the number of coins counted.
C+MS	Switching the automatic reversing on and off.
ACC	Shows the number of coins stored in the memory.
ACC+C	Resets the memory.
M	Adds the number of coins shown on the display to the memory.
Q	Shows selected batch stop. When pressed repeatedly; choice of batch stop size.
Q+M...C	Setting of a temporary batch stop.
Q+MS	Reprogramming of the pre-set batch stops.
Q+B+MS	Setting of the service interval.
Q+ACC+MS	Statistics mode.
Q+ACC+C+MS	Configuration of password.
Q+M+MS	Additional set-up.
Start/Stop	Starts or stops the machine, or leaving the set-up or other configurations.
Start/Stop+ Q+M+B+MS	Master reset.

Text shown on display

Text	Explanation
15. 009456	Example of alternating numbers on the display. The decimal point after 15 means millions and means that 15 should be put together with the other number, 15009456.
1. 250´	Example of the setting of the first batch stop which is 250,000.
5. 2500	Example of the setting of the fifth batch stop which is 2,500.
888888	Display test.
CALL For SErvicE	The machine has reached the service limit.
Coin	Number of coins counted, statistics register.
ConFIr	Confirmation of previously entered password.
FAIL	The wrong password has been entered.

Text	Explanation
noPASS	The password has been removed.
P. ---	Input of the password.
P. 000	The password is set to 000, that is there is no password.
P. 123	Example of password for the service interval menu only.
P. 876	Example of password for the service interval and the set-up menu.
PASS	The correct password has been entered.
rES EE	Problems with the memory has been detected when starting the machine. The memory is reset.
rESALL	The master reset has been activated.
SEr	The service interval menu.
SEr 0	The service interval menu, mode 0.
SEr 1	The service interval menu, mode 1.
SEr 2	The service interval menu, mode 2.
SEr 3	The service interval menu, mode 3.
SErd and 100	The service interval (SEr) has been set to demonstration mode (d) and 100 coins.
SErd 0	The service interval has been set to demonstration mode and mode 0.
SErd 1	The service interval has been set to demonstration mode and mode 1.
SErd 2	The service interval has been set to demonstration mode and mode 2.
SErd 3	The service interval has been set to demonstration mode and mode 3.
So1	Number of solenoid brakings, statistics register.
StArt	Number of starts and reverses of the motor, statistics register.
StAt	The statistics menu.
StOP 0	Automatic stop is off.
StOP 1	Automatic stop is on.

8 Disassembly and Assembly

WARNING!
Risk of electric shock
Follow the safety precautions.

Note! Some screws have nuts and/or washers. Be careful not to loose them when removing the screws.

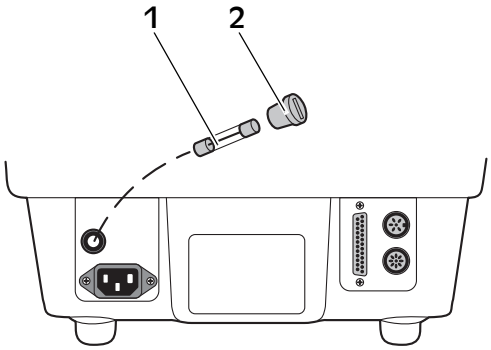
Note! Assembly is the reverse of disassembly, if not stated otherwise.

8.1 Exchanging Fuses

a) Turn the fuse holder (1) a quarter of a turn counter clockwise.
b) Exchange the fuse (2).

Caution! The use of incorrect fuses could result in damage to the machine.

c) Replace the fuse holder.



1 Fuse, 2 A
2 Fuse holder

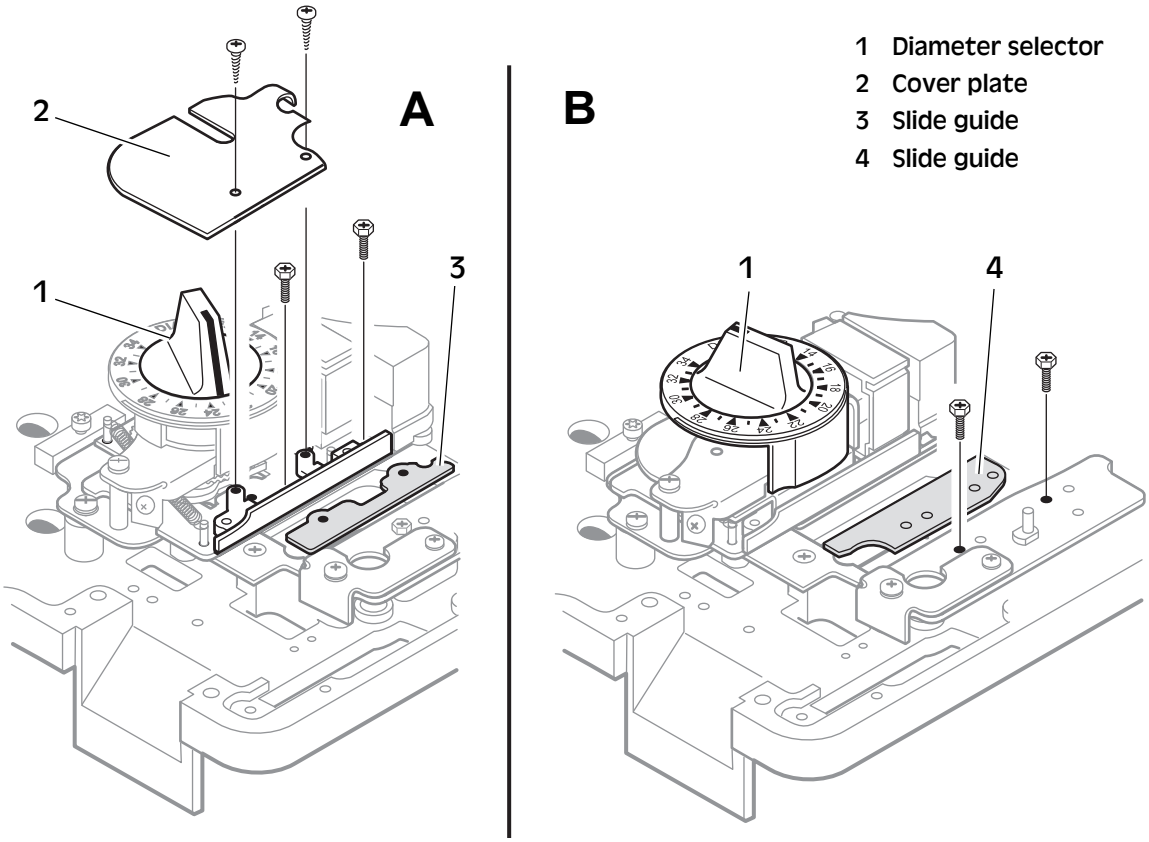
8.2 Coin Guides - Removal

Left coin guide, Fig. A

a) Set the diameter selector (1) in position 34 mm (max.).
b) Open the inspection cover.
c) Raise the feed mechanism.
d) Remove the cover plate (2), two screws.
e) Remove the slide guide (3), two screws.

Right coin guide, Fig. B

a) Set the diameter selector (1) in position 34 mm (max.).
b) Open the inspection cover.
c) Raise the feed mechanism arm.
d) Remove the slide guide (4), two screws.
How to remove plates: 8.24 “Plates - Removal” on page 62.



8.3 Covers - Removal

Top Cover

Note! The illustrations show the SC-360, but the procedure is the same for the SC-350.

a) Remove the plastic caps and the two screws (1) on the left hand side of the machine.

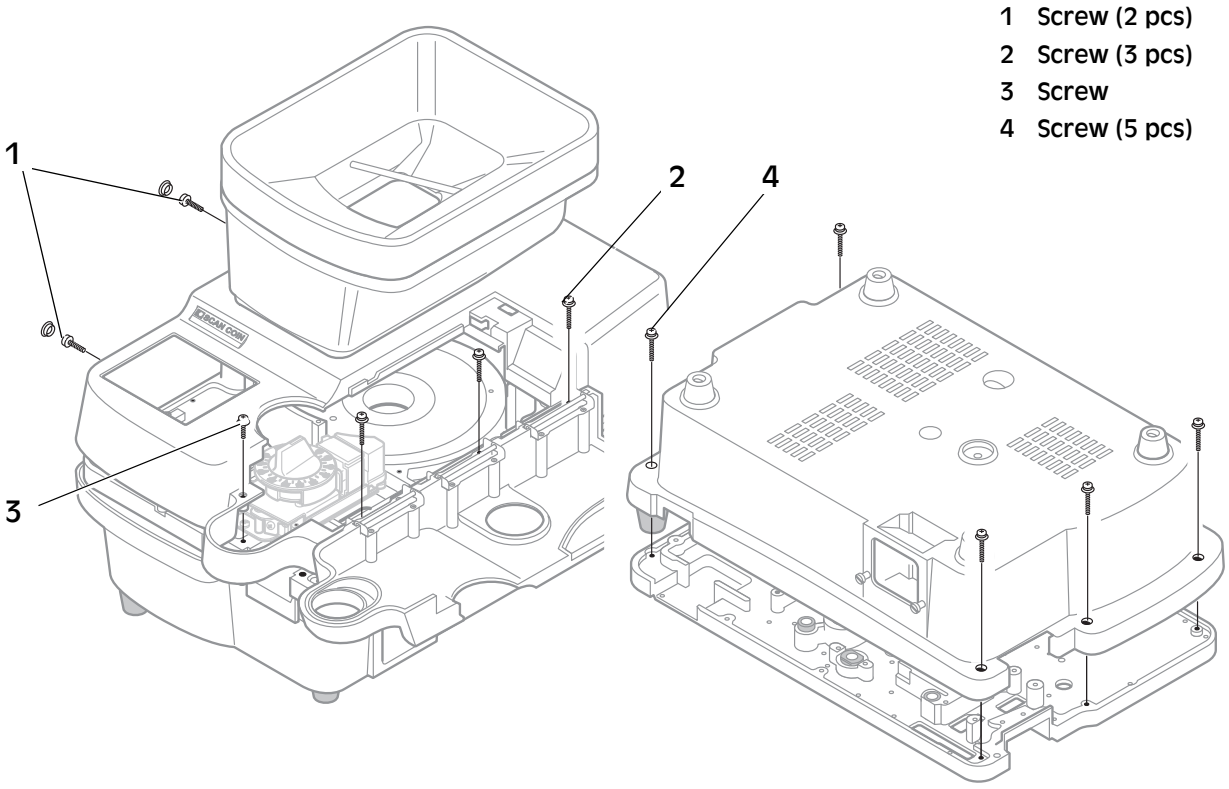
b) Open the inspection cover.

c) Remove the three screws (2).

These screws also hold the hinges for the inspection cover (big screw heads).

d) Remove the screw (3), positioned to the left of the coin chute.

e) Remove the top cover.



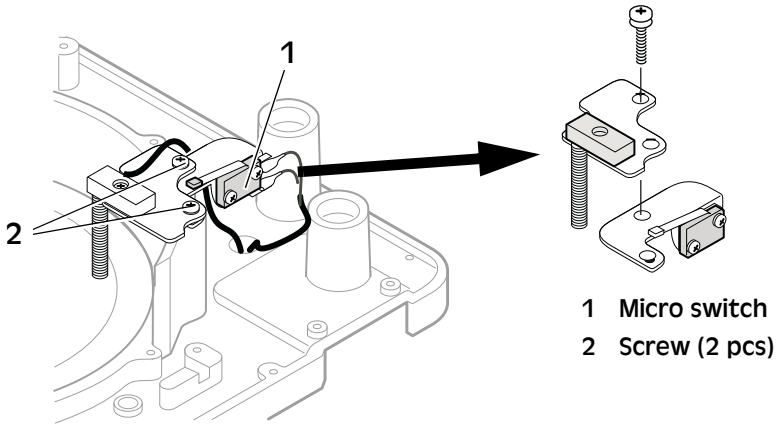
Bottom cover

a) Turn the machine upside down and remove the five screws (4).

b) Remove the bottom cover.

8.4 Lid Switch - Removal

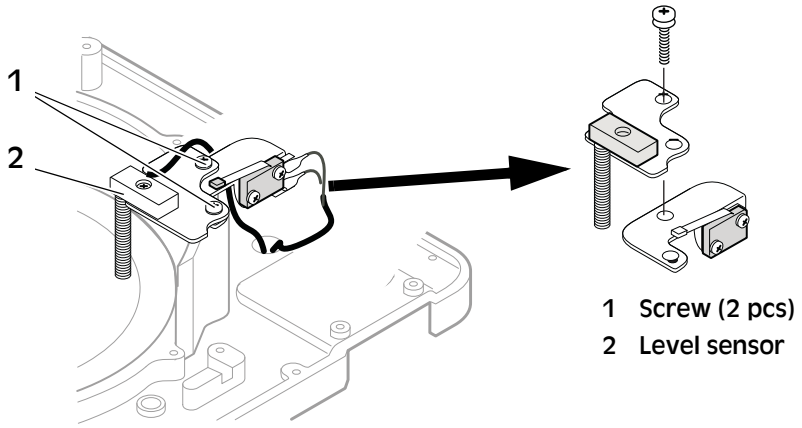
a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.
b) Disconnect the micro switch (1) from the connectors.
c) Remove the screws (2) and the bracket with the micro switch.



1 Micro switch
2 Screw (2 pcs)

8.5 Level Sensor - Removal

a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.
b) Disconnect the level sensor (2) from the cable.
c) Remove the two screws (1) and the bracket with the level sensor.

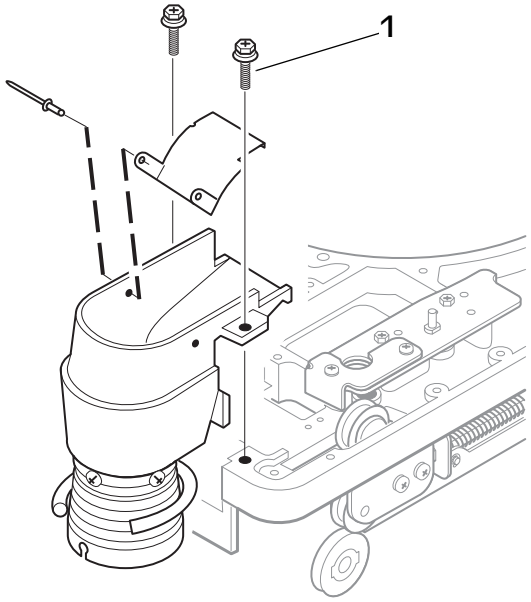


1 Screw (2 pcs)
2 Level sensor

8.6 Coin Chute - Removal

a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.

b) Remove the two screws and the coin chute.



1 Screw (2 pcs)

8.7 Hopper Unit - Removal

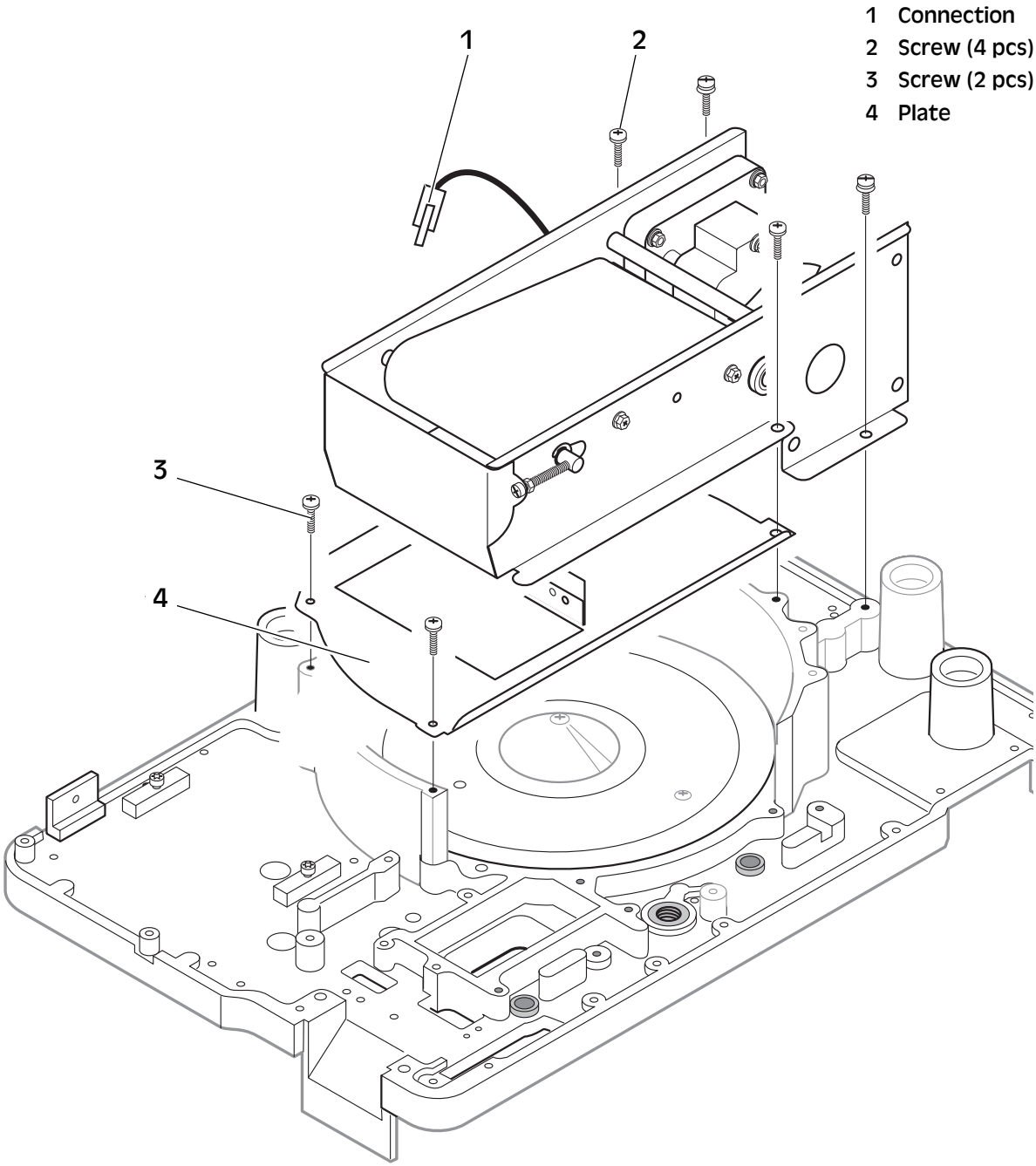
a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.

b) Disconnect the connection (1) from the motor.

c) Remove the four screws (2).

Note! The two screws (3) in the front and the plate (4) are only necessary to remove if the coin disc needs to be removed.

d) Remove the hopper unit.



8.8 Hopper Belt - Removal

a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.

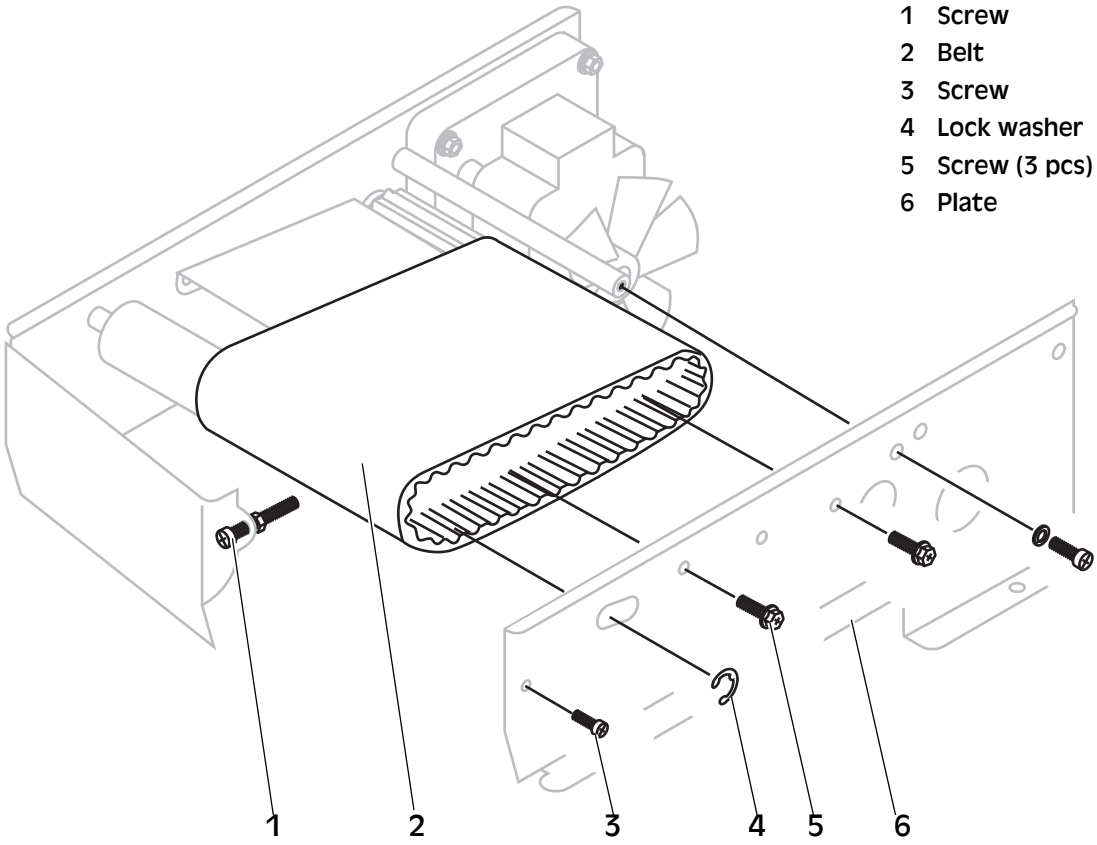
b) Remove the hopper unit, see 8.7 “Hopper Unit - Removal” on page 45.

c) Remove the screw (3) and the three screws (5).

d) Loosen the screw (1)

e) Remove the lock washer (4) and the plate (6).

f) Remove the belt (2).



8.9 Hopper Motor - Removal

a) Remove the top cover, see "Covers - Removal" on page 42.

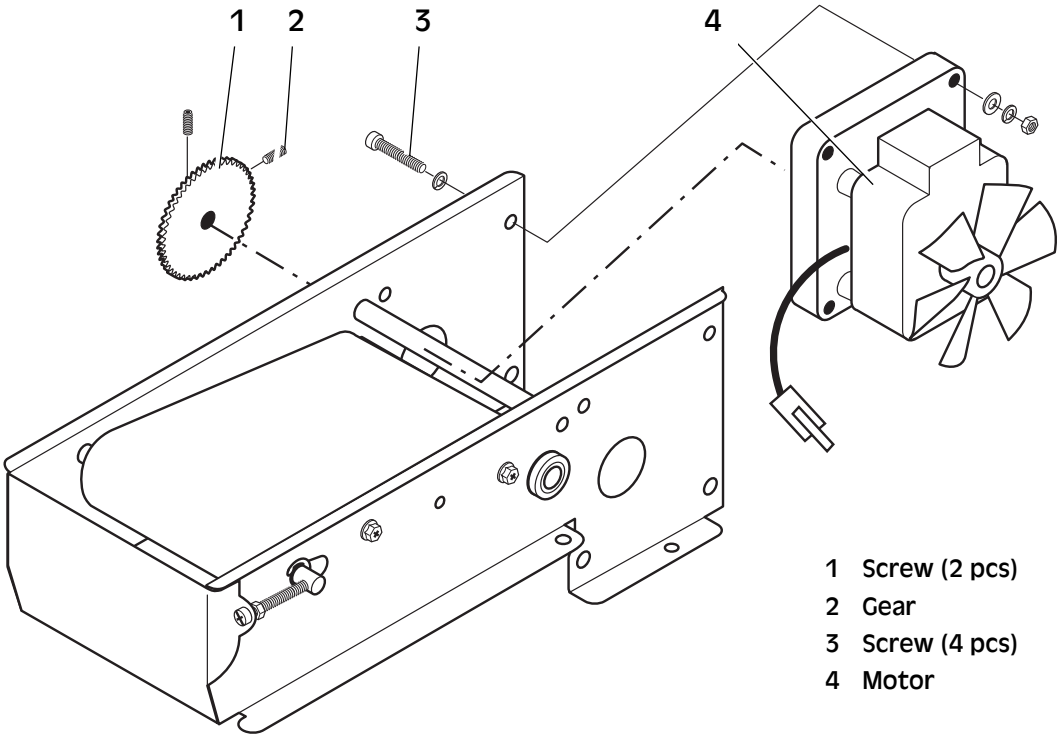
b) Remove the hopper unit, see "Hopper Unit - Removal" on page 45.

c) Loosen the two screws (1).

d) Remove the gear (2).

e) Remove the four screws (3) with washers and nuts.

f) Remove the motor (4).

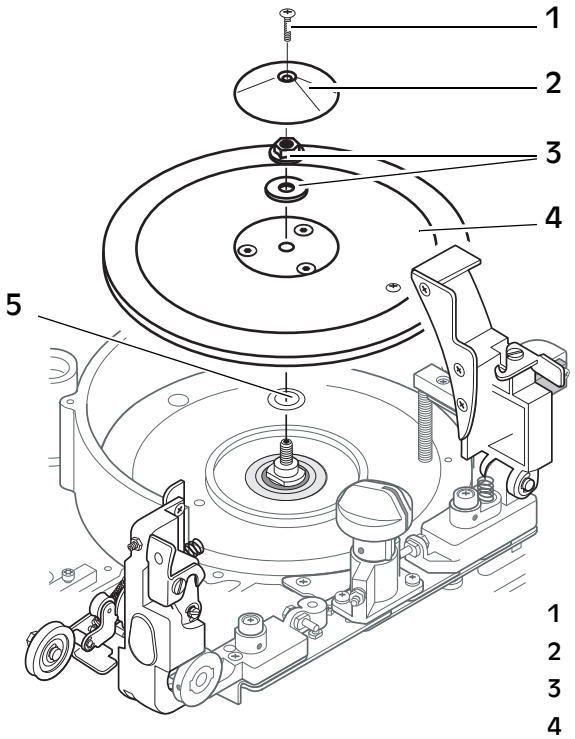


1 Screw (2 pcs)
2 Gear
3 Screw (4 pcs)
4 Motor

8.10 Coin Disc - Removal

a) Remove the top cover, see "Covers - Removal" on page 42
b) Remove the coin hopper unit, see "Hopper Unit - Removal" on page 45
c) Remove the diameter selector unit, see "Diameter Selector Unit - Removal" on page 50
d) Raise the feed mechanism and the thickness guide block.
e) Remove the screw (1) and the cone (2).
f) Remove the nut and washer (3).
g) Remove the coin disc (4).

Note! The shim (5) under the disc.



1 Screw
2 Cone
3 Nut and washer
4 Coin disc
5 Shim

8.11 Coin Disc Drive - Removal

a) Remove the covers, see 8.3 "Covers - Removal" on page 42.
b) Remove the coin disc, see 8.10 "Coin Disc - Removal" on page 48.
c) Turn the machine upside down.
d) Remove the drive belts (1).
e) Remove the four screws (2).

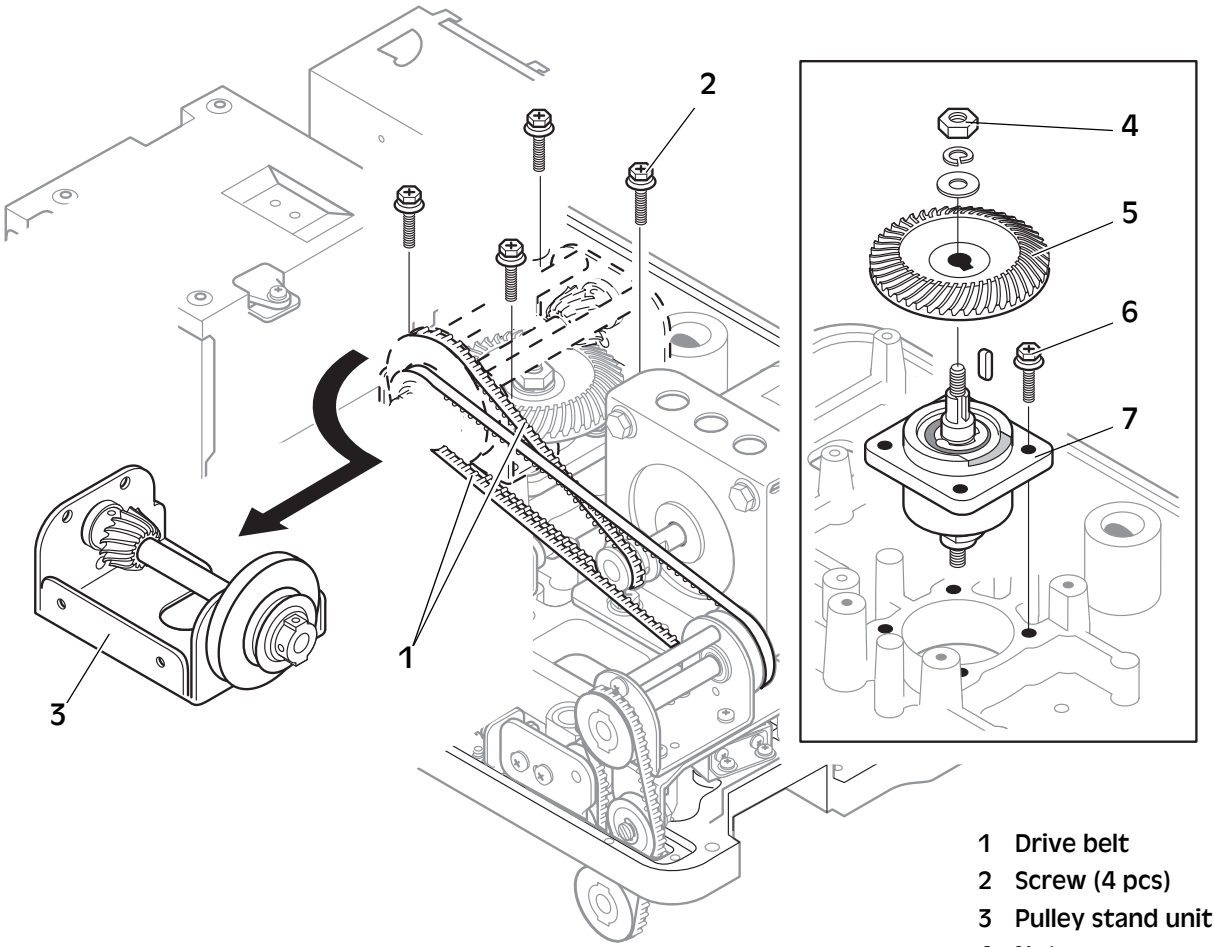
f) Remove the pulley stand unit (3) by turning it a quarter of a turn counter clockwise.

Note! When loosening the nut (4) the gear (5) must be locked from rotating.

g) Remove the nut (4) and remove the gear (5).

h) Remove the four screws (6).

i) Remove the disc shaft unit (7).



1 Drive belt
2 Screw (4 pcs)
3 Pulley stand unit
4 Nut
5 Gear
6 Screw (4 pcs)
7 Disc shaft unit

8.12 Diameter Selector Unit - Removal

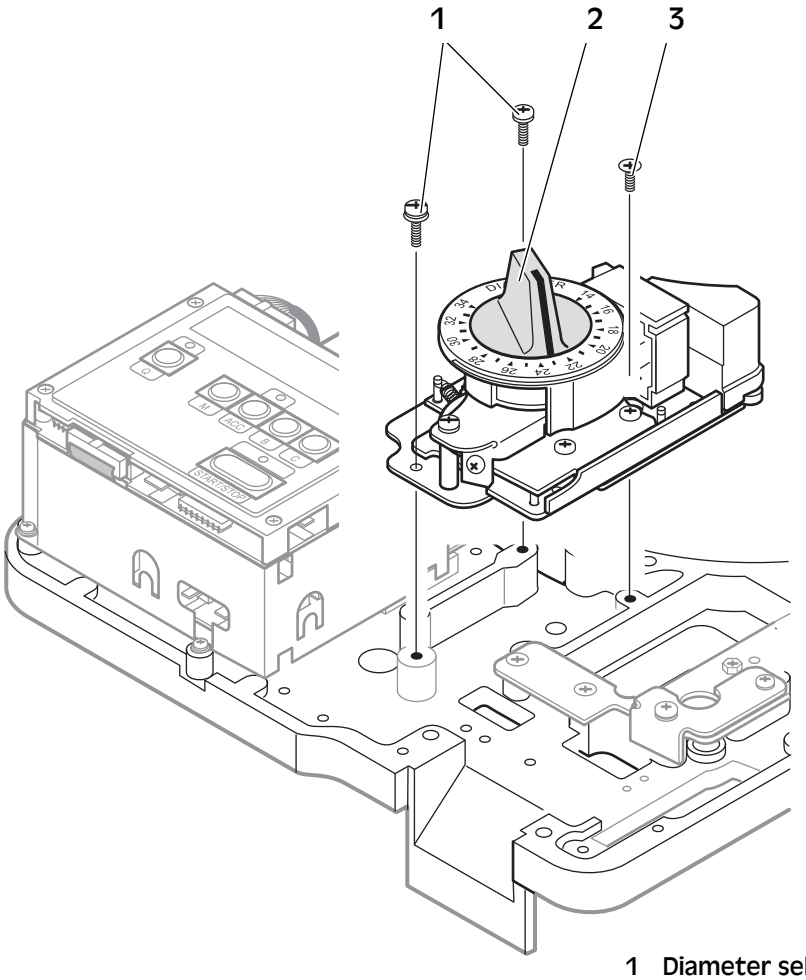
a) Remove the covers, see 8.3 “Covers - Removal” on page 42.

b) Raise the feed mechanism.

c) Set the diameter selector (2) to approx. 23 mm to get access to the screw (3) and remove it.

a) Remove the two screws (1).

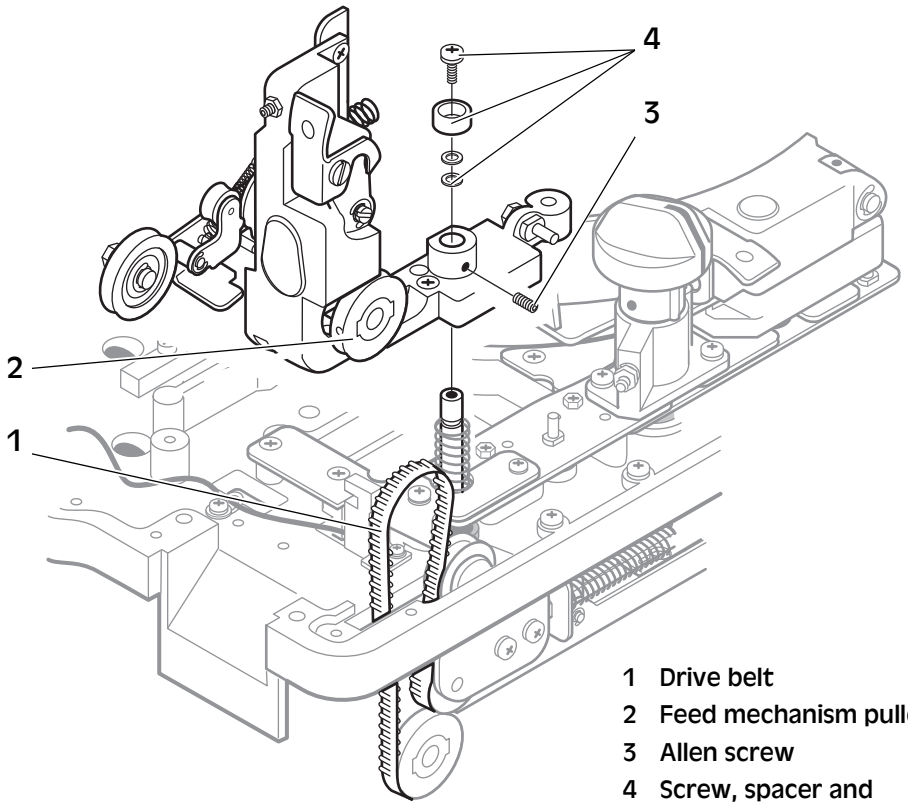
b) Remove the unit.



1 Diameter selector
2 Screw
3 Screw (2 pcs)

8.13 Feed Unit - Removal

a) Open the inspection cover.
b) Remove the drive belt (1) from the feed mechanism pulley (2).
c) Tighten the 2 mm Allen screw (3).
d) Remove the screw, the spacer and the washers (4).
e) Loosen the Allen screw (3) and remove the feed mechanism.



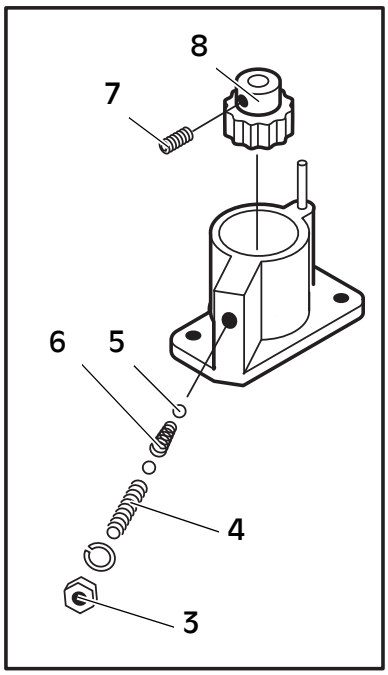
1 Drive belt
2 Feed mechanism pulley
3 Allen screw
4 Screw, spacer and washer

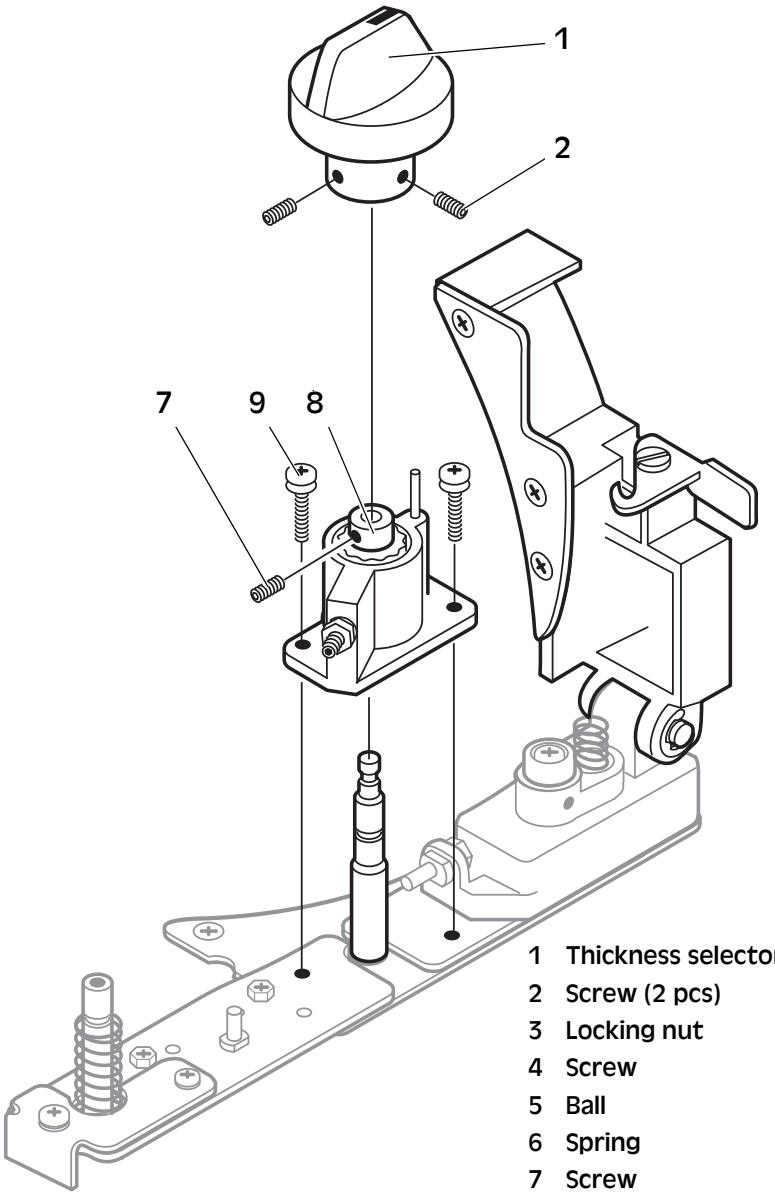
8.14 Thickness Selector Unit - Removal

a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.
b) Raise the thickness guide block.
c) Set the thickness selector (1) in position 3.6 mm (max.)
d) Loosen the two screws (2) using a 2.5 mm Allen key.
e) Remove the knob (1).
f) Loosen the locking nut (3) and loosen the screw (4).

Note! Beware of the two balls (5) and the spring (6) inside the unit.

g) Loosen the screw (7) using a 2 mm Allen key.
h) Lift off the insert (8) from the axle.
i) Remove the two screws (9) and lift off the unit.

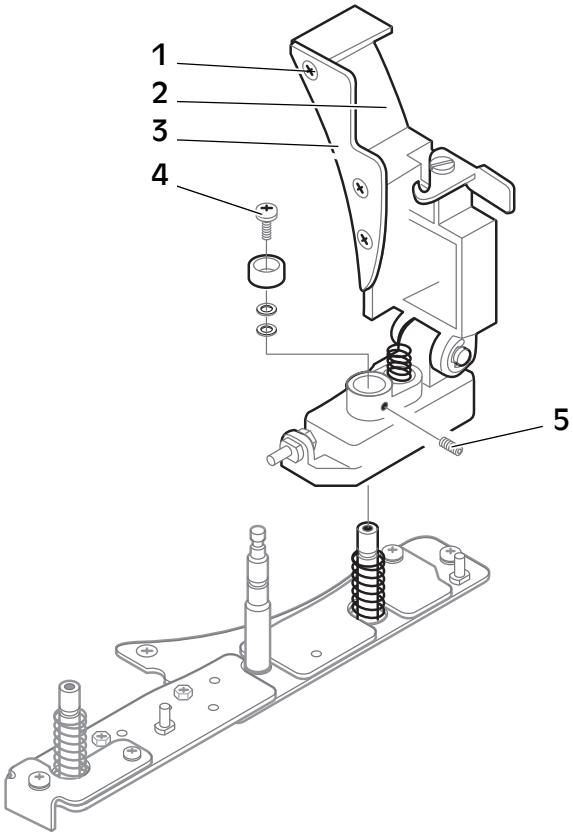




1 Thickness selector
2 Screw (2 pcs)
3 Locking nut
4 Screw
5 Ball
6 Spring
7 Screw
8 Insert
9 Screw (2 pcs)

8.15 Thickness Unit - Removal

a) Open the inspection cover.
b) Raise the thickness guide block (2).
c) Tighten the 2 mm Allen screw (5).
d) Remove the screw (4), the spacer and the washers.
e) Loosen the Allen screw (5).
f) Remove the thickness unit (2).



1 Screw (3 pcs)
2 Thickness guide block
3 Guide plate
4 Screw
5 Allen screw

8.16 Thickness Guide Plate - Removal

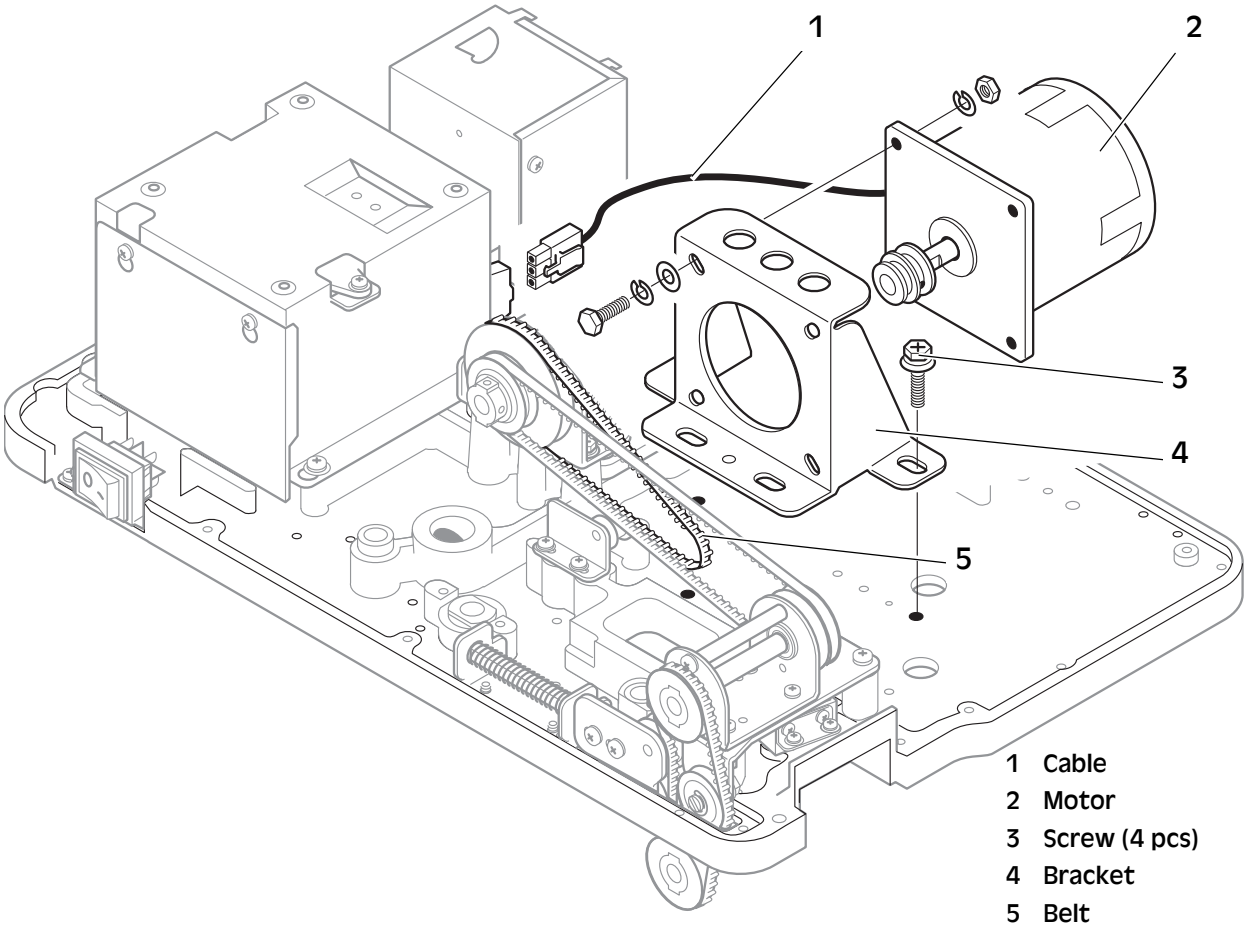
Note! Refer to fig. above.

a) Open the inspection cover.
b) Raise the thickness guide block (2).
c) Remove the three screws (1).
d) Remove the guide plate (3).

8.17 Motor - Removal

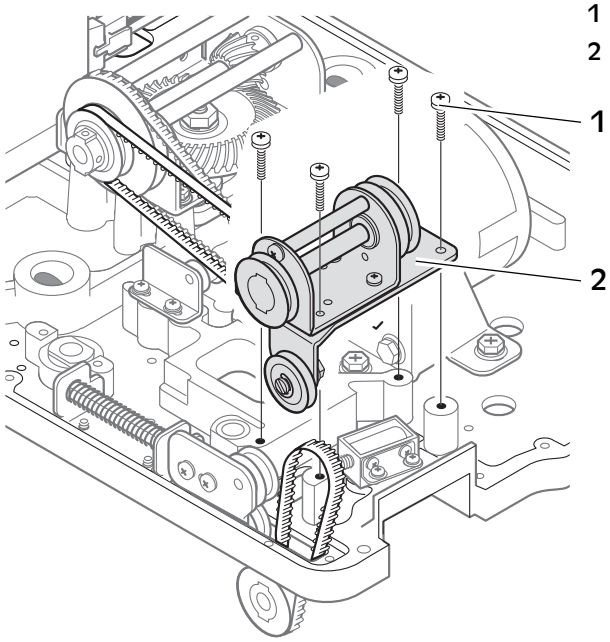
Equipment required	10 mm block key PH Screwdriver

a) Remove the top cover and the bottom cover, see 8.3 "Covers - Removal" on page 42.
b) Turn the machine upside down.
c) Disconnect the cable (1) from the mains power supply box.
d) Remove the belt (2).
e) Remove the four screws (3).
f) Remove the motor (4) and the bracket (5).



8.18 Pulley Stand, Feed Unit - Removal

a) Remove the covers, see 8.3 “Covers - Removal” on page 42.
b) Turn the machine upside down.
c) Remove the drive belts.
d) Remove the screws (1) and the pulley unit (2).



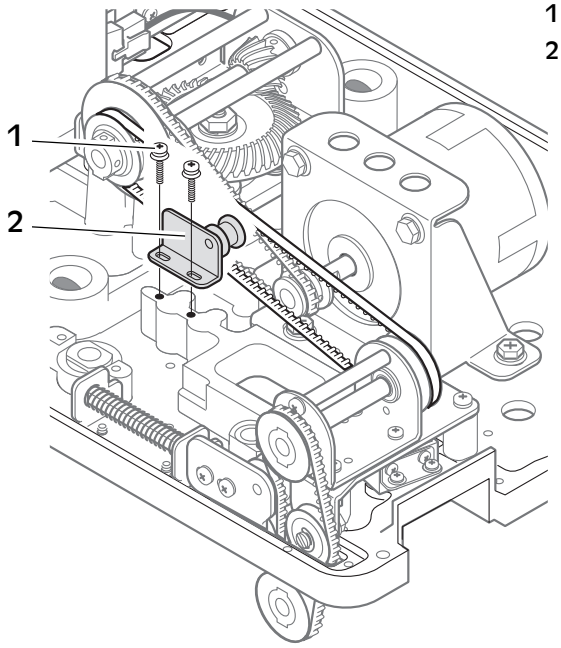
1 Screw (4 pcs)
2 Pulley unit

8.19 Support Roller - Removal

a) Remove the covers, see 8.3 “Covers - Removal” on page 42.

b) Turn the machine upside down.

c) Remove the screws (1) and the support roller (2).



1 Screw (2 pcs)
2 Support roller

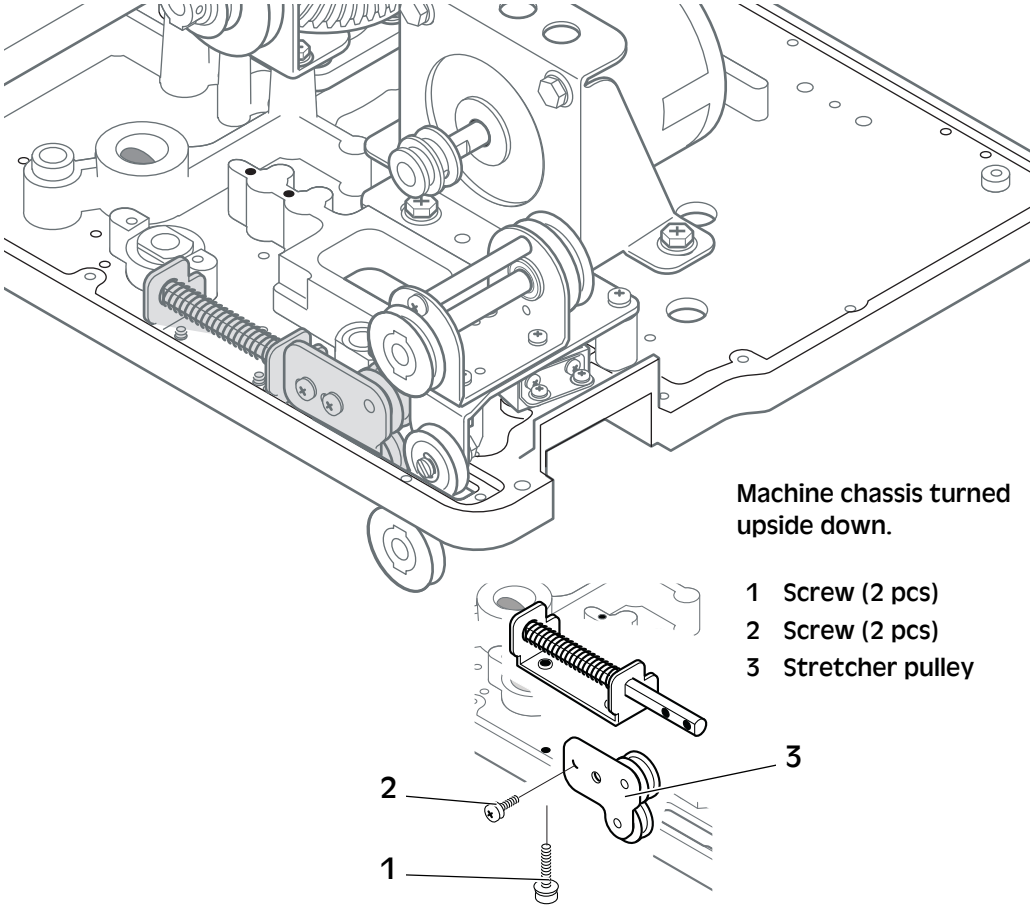
8.20 Belt Stretcher Unit - Removal

Belt stretcher

a) Remove the covers, see 8.3 “Covers - Removal” on page 42.
b) Remove the two screws (1).
c) Remove the belt stretcher unit.

Belt stretcher pulley

a) Remove the two screws (2).
b) Remove the belt stretcher pulley (3).



8.21 CPU and PSU Board - Removal

See Caution! “Electrostatic discharge (ESD) may damage the electronic components. All electronic circuit boards in the machine are sensitive to ESD.” on page 4.

a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.

b) Remove the control panel cover (1), four screws.

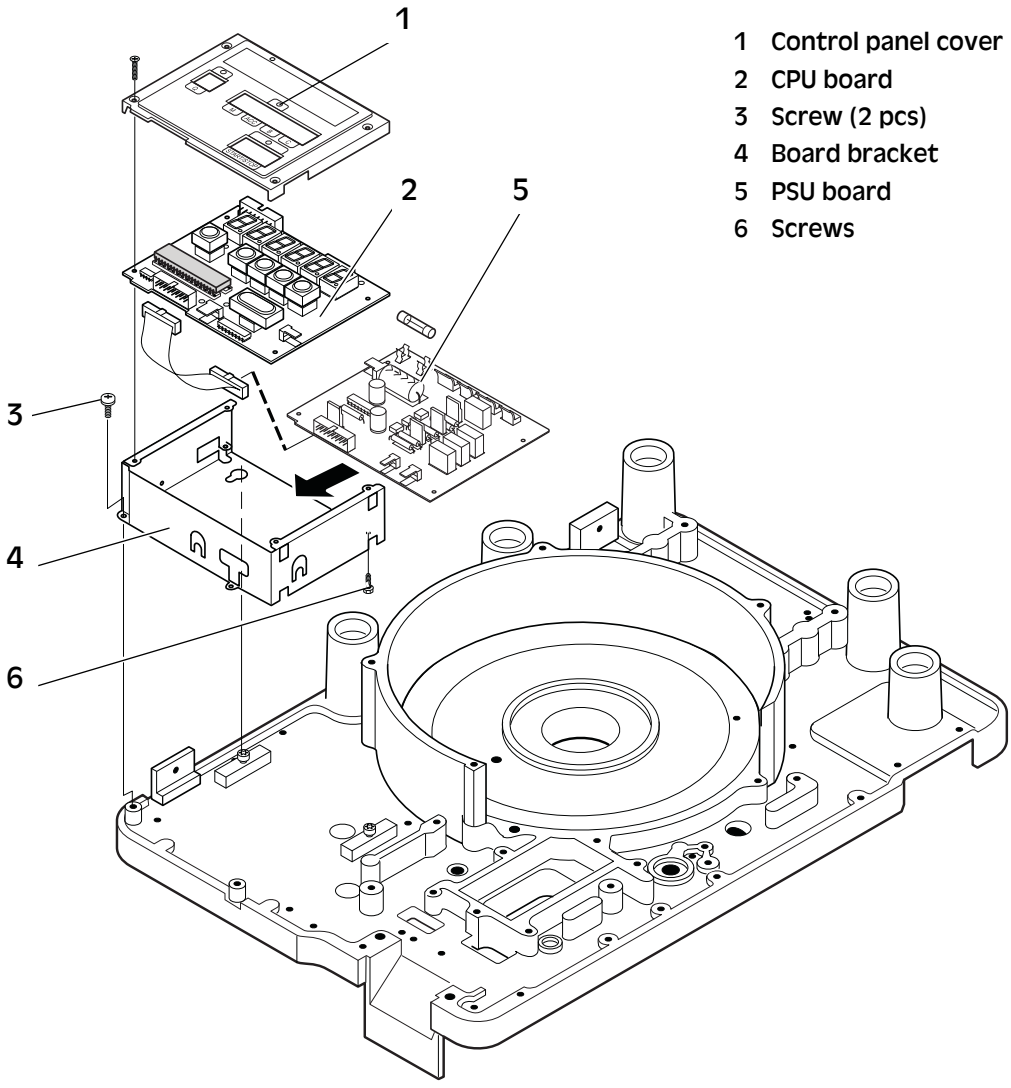
c) Disconnect the board connectors and carefully lift the CPU board (2).

d) Remove the two screws (3) at the front.

e) Pull the board bracket (4) towards you and then lift it.

f) Turn the bracket upside down and remove the screws (6).

g) Disconnect the board connectors and remove the PSU board (5).



1 Control panel cover
2 CPU board
3 Screw (2 pcs)
4 Board bracket
5 PSU board
6 Screws

8.22 Solenoid - Removal

Equipment required	PH Screwdriver

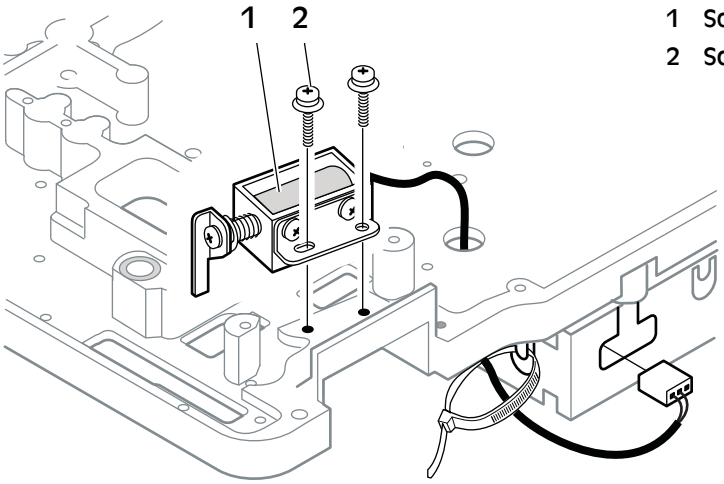
a) Remove the top cover and the bottom cover, see 8.3 “Covers - Removal” on page 42.

b) Disconnect the connector from the CPU board.

c) Turn the machine upside down.

d) Remove the pulley stand, see 8.18 “Pulley Stand, Feed Unit - Removal” on page 56.

e) Remove the screws (2) and the solenoid (1).



1 Solenoid
2 Screw (2 pcs)

8.23 Count Sensor - Removal

Equipment required	PH screwdriver

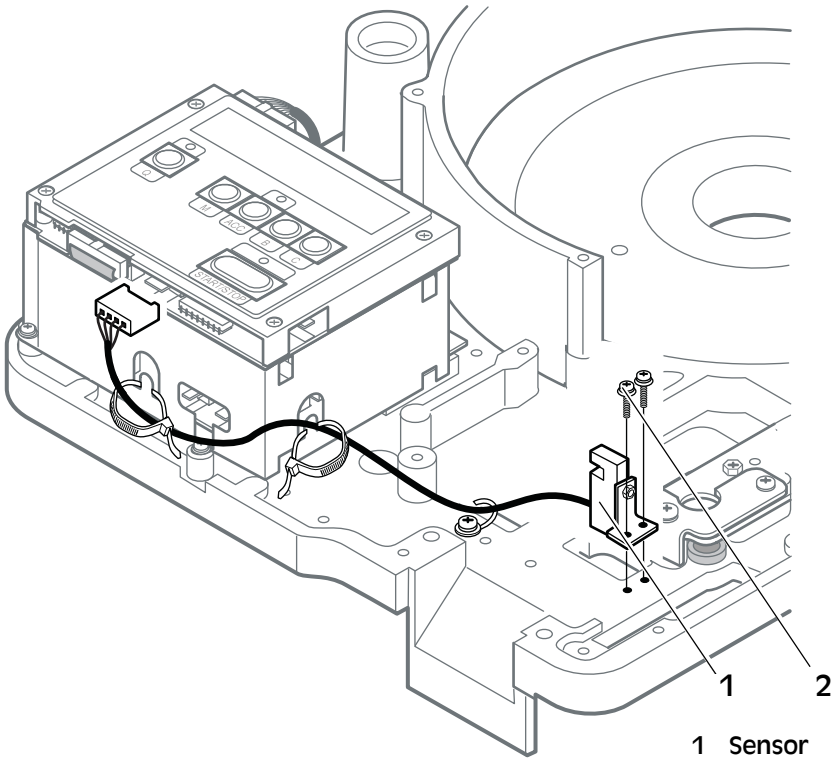
a) Remove the top cover, see 8.3 “Covers - Removal” on page 42.

a) Remove the feed mechanism, see 8.13 “Feed Unit - Removal” on page 51.

a) Remove the coin outlet, see 8.6 “Coin Chute - Removal” on page 44.

b) Disconnect the connector from the CPU board.

c) Remove the screws (2) and the solenoid (1).



1 Sensor
2 Screw (2 pcs)

8.24 Plates - Removal

a) Remove the feed unit, see 8.13 “Feed Unit - Removal” on page 51.

b) Remove the thickness selector, see 8.14 “Thickness Selector Unit - Removal” on page 52.

c) Remove thickness unit, see 8.15 “Thickness Unit - Removal” on page 54.

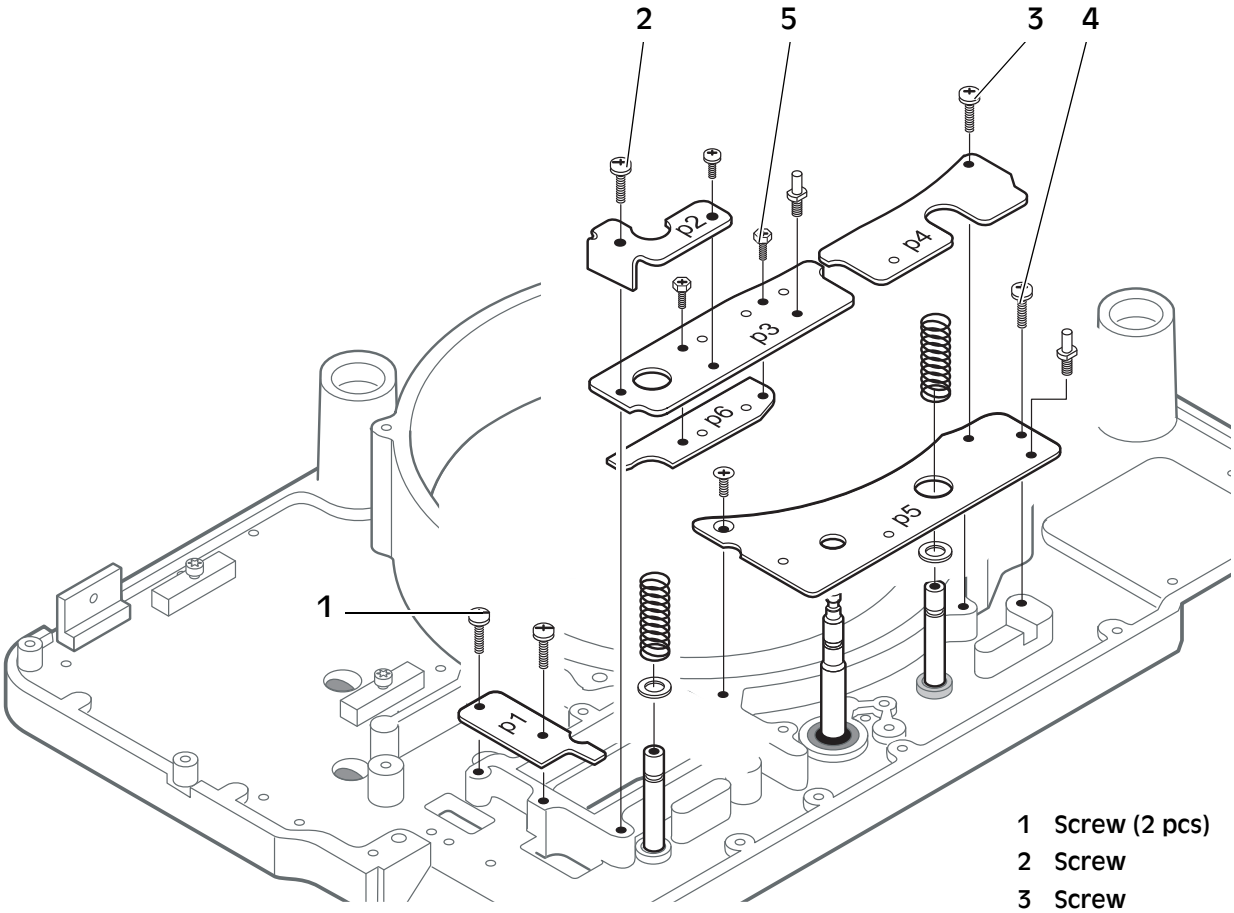
d) Remove the screws (1) and remove the plate P1.

e) Remove screws (2) and remove the plates P2, P3.

f) Remove the screw (3) and remove the plate P4.

g) Remove the screws (4) and remove the plate P5.

h) Remove the screws (5) to separate the plate P6 from P3.



1 Screw (2 pcs)
2 Screw
3 Screw
4 Screw
5 Screw

9 Troubleshooting

9.1 Display is Blank at Switch On

- Check the mains supply cable and the main fuses.
- Check for short-circuits on the PSU/CPU boards, or between the cables and the chassis.
- Use a DMM to measure the PSU voltage, see "PSU Board Circuit Diagram" on page 98.
- The green LED on the PSU board, visible through the vent holes, indicates if there is +5 V supply.

  LED not lit up: No supply. Exchange the PSU board.

  LED lit up: Supply. Exchange the CPU board.
- The automatic thermal power supply cut-off function has been activated. The power supply has been overloaded. Turn **Off** the machine. Leave it to cool off for 2-3 minutes. Restart.

  Exchange the PSU if the machine is cold and the display still goes blank.

9.2 Motor Stops

- Check the mains supply cable.
- Ensure that the motor and its axis can rotate freely.
- The motor has an automatic thermal cut-off function that has been activated. The motor winding has been overheated (140°C/284°F ± 5%).

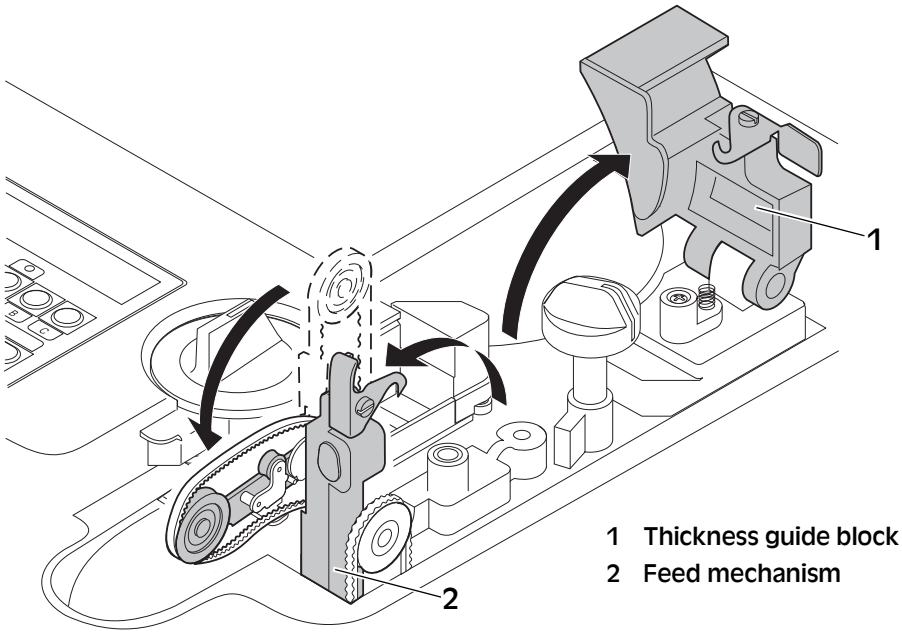
  Turn **Off** the machine and let it cool down for 15 minutes or more (depending on room temperature) to a temperature below 132°C/269°F and then restart.
- If the machine is cold but the motor still does not work, exchange the motor.
- Check triac SCR2 on the PSU board ("PSU Board Circuit Diagram" on page 98). Replace it as required.

9.3 Removing a Coin Blocking the Coin Exit

a) Switch **Off** the machine and disconnect the mains lead from the supply socket.

b) Open the inspection cover.

c) Raise the feed mechanism (2) and the the thickness guide block (1).



1 Thickness guide block
2 Feed mechanism

d) Carefully remove the coin blocking the coin exit.

e) Replace the thickness guide block and the feed mechanism.

f) Close the inspection cover.

Note! The machine will not operate if the inspection cover is open.

9.4 Small Coins not Off-sorted

If small, thin coins are not off-sorted, check the position of the coin rails (left and right), see "Coin Rail System" on page 75.

9.5 Good Coins Off-sorted

Check the coin diameter tolerances. Adjust the coin rails (left and right), see "Coin Rail System" on page 75.

Check the coin rails. Replace them if worn, see "Coin Guides - Removal" on page 41.

9.6 Frequent Coin Jams

Damaged coins, counterfeits or foreign coins may jam due to size and/or shape, even if the machine is correctly adjusted.

Ensure that the coins move smoothly on the coin track, from the coin disc to the coin bag.

- Replace all worn parts.
- Make all mechanical adjustments properly, see "Adjustments" on page 71.

9.7 Miscount

If there is the correct number of coins (one batch) in the bag, but the display shows the wrong number, see "Frequent Coin Jams" on page 65.

If coins have not been counted, and the bag contains the wrong number of coins:

- Check the sensor adjustments and the connections.
- If the adjustments and connections are correct, replace the sensor.

9.8 Batch Count Incorrect

If there is an extra coin in the bag:

- Check that the solenoid is not blocked or damaged.
- Ensure that the electronic timing is correctly set, see 7 "Set-up" on page 22

9.9 Faulty Electronics

- Wrong settings. Enter the set-up mode and check. Alter the settings as required.
- Possible high interference or fluctuation on the mains supply set-up.
- Damaged/faulty EEPROM. Exchange the CPU/PSU boards.

10 Periodic Maintenance

WARNING!
Risk of electroshock! Follow the Safety precautions!

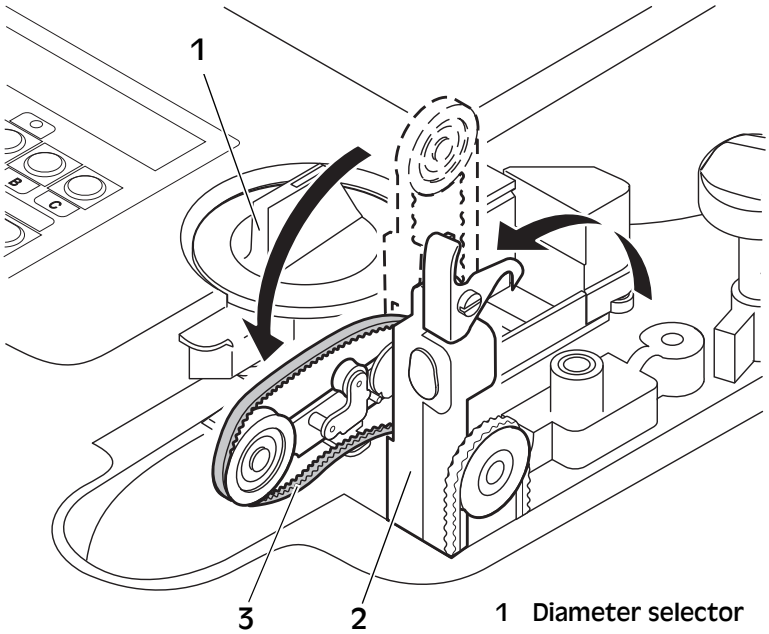
Caution! **Do not attempt to oil or lubricate any parts in the machine. All bearings are pre-lubricated and will be damaged if any lubricant is added.**

Note! Some screws have nuts and/or washers. Be careful not to lose them when removing the screws.

If not stated otherwise, re-assembly is the reverse of disassembly.

10.1 Exchanging the Feeding Belt

a) Set the diameter selector (1) to 34.0 mm (max.).
b) Open the inspection cover.
c) Raise the feed mechanism (2).
d) Remove the old out-feed belt (3) and exchange it for a new one.
e) Replace the feed mechanism and the out-feed belt.
f) Close the inspection cover.
g) Reset the diameter selector to the desired position.



1 Diameter selector
2 Feed mechanism
3 Out-feed belt

10.2 Cleaning

Caution! **Only use cleaning materials and implements which do not scratch.**

Clean the machine daily to prevent from accumulation of dirt, since this may cause too many coins to be rejected.

Wipe the coin sensor with a soft brush or cloth.

Use a vacuum cleaner to remove dust from the rotating disc.

10.3 Cleaning the Coin Track

Clean the coin track at regular intervals to ensure high counting performance.

a) Open the inspection cover.

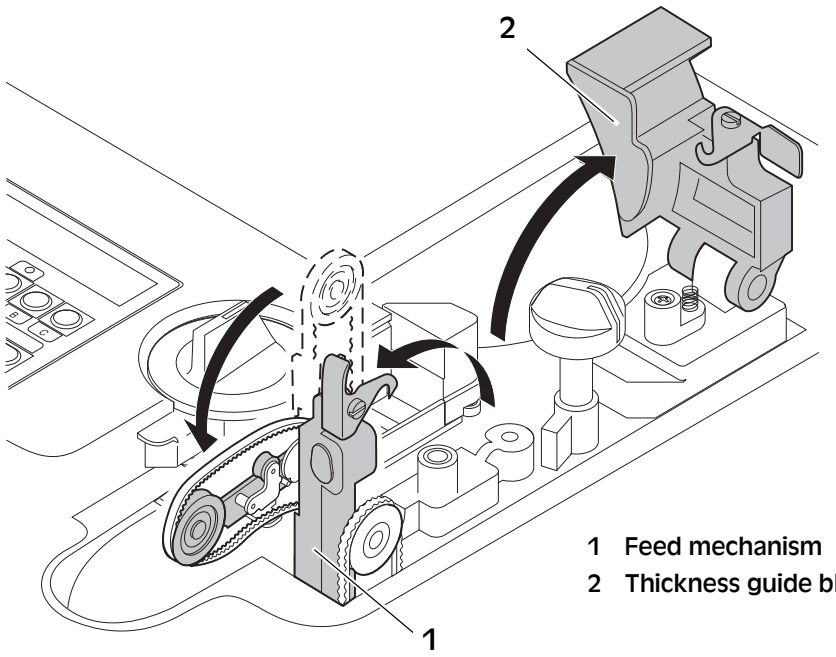
b) Raise the feed mechanism (1).

c) Raise the thickness guide block (2).

d) Clean the coin track with a brush, or the plastic scraper provided with the machine.

e) Fit the thickness guide block and the feed mechanism.

f) Close the inspection cover.



1 Feed mechanism
2 Thickness guide block

10.4 Cleaning the Feeding Belt

The feeding belt may require cleaning from time to time.

a) Remove the belt, see "Exchanging the Feeding Belt" on page 66.

b) Clean the belt with a paper towel soaked in alcohol or other mild degreaser.

c) Fit the feed mechanism and the feeding belt.

d) Close the inspection cover.

10.5 Exchanging Motor Drive Belt

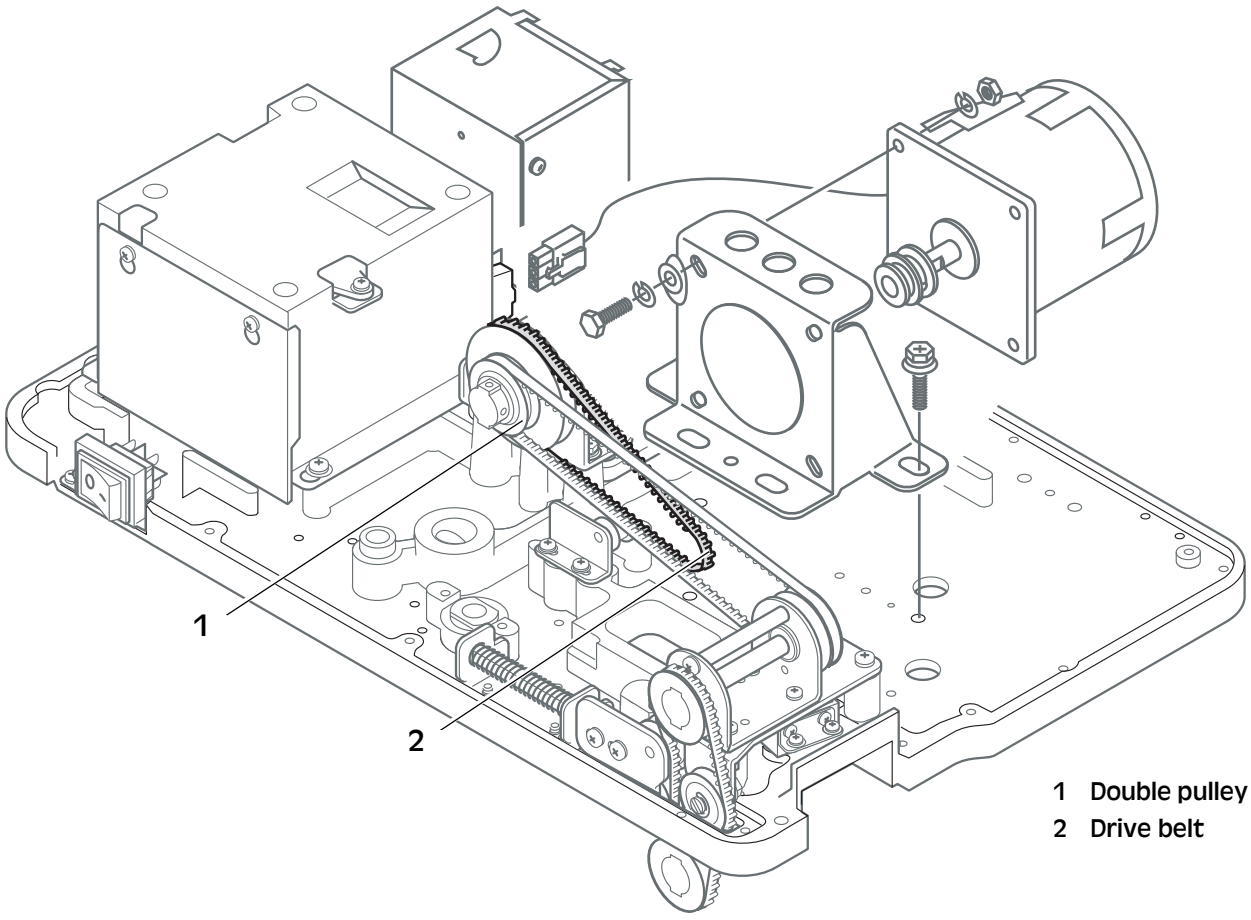
a) Remove the covers, see "Covers - Removal" on page 42.

b) Turn the machine upside down.

Note! Note the position of the drive belt on the double pulley (1).

c) Replace the old drive belt (2).

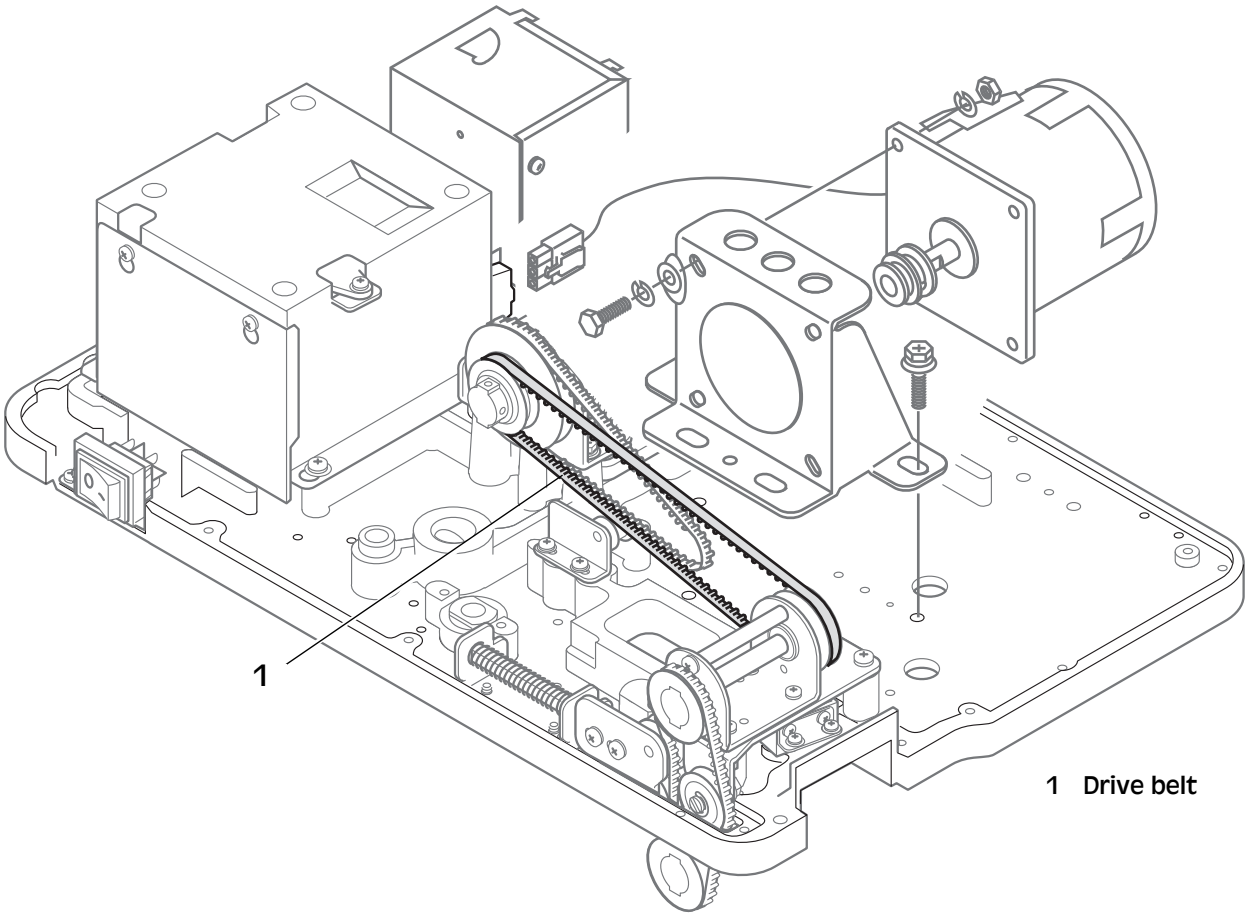
d) Put back the covers.



1 Double pulley
2 Drive belt

10.6 Exchanging Belt - Pulley Stands

a) Remove the covers, see "Covers - Removal" on page 42.
b) Turn the machine upside down.
c) Replace the old drive belt (1).
d) Put back the covers.



1 Drive belt

10.7 Exchanging Belt, Pulley Stand - Feed Unit

a) Remove the covers, see "Covers - Removal" on page 42.

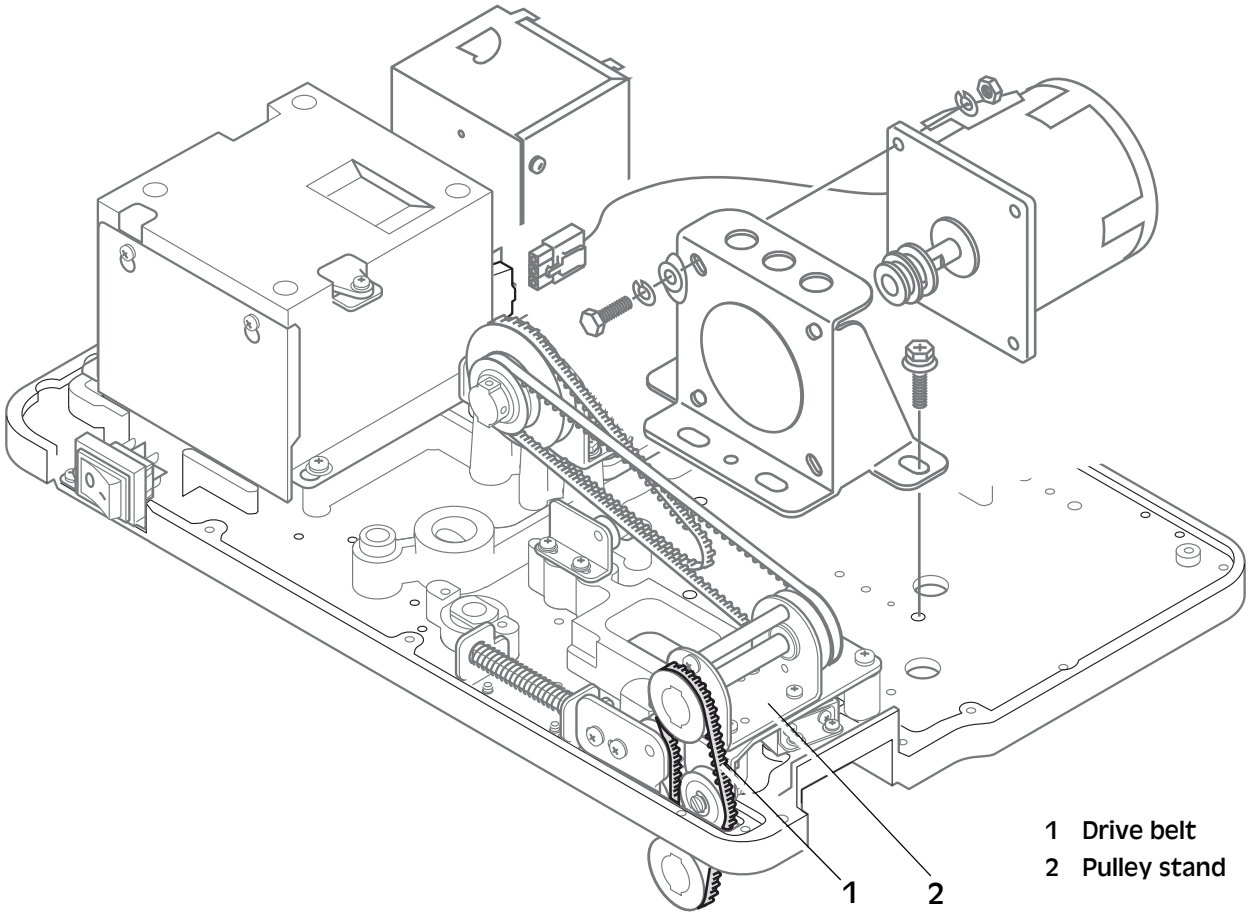
b) Turn the machine upside down.

c) Remove the pulley stand (2), see "Pulley Stand, Feed Unit - Removal" on page 56.

d) Replace the old drive belt (1).

e) Replace the pulley stand.

f) Replace the covers.



1 Drive belt
2 Pulley stand

11 Adjustments

Note! It is important that all mechanical functions are adjusted correctly to enable proper functionality of the machine.

The parts described in this section must be adjusted **together and in the order** they appear.

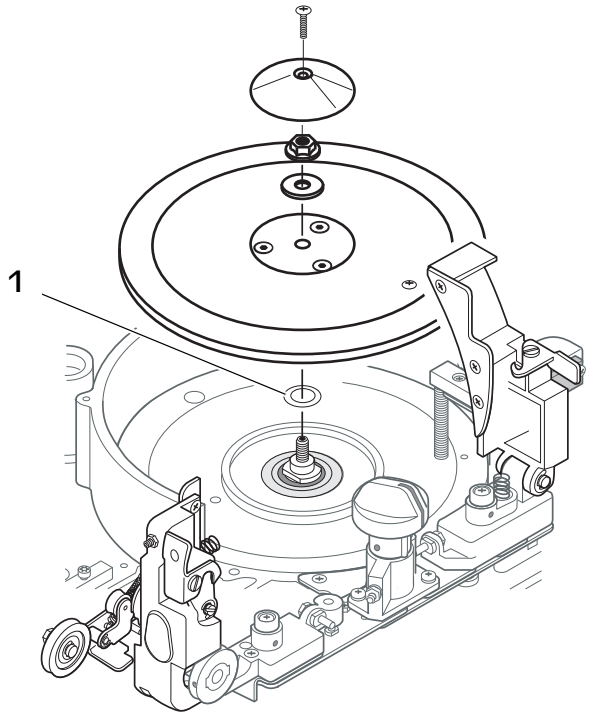
When all adjustments have been completed, replace the covers and test run the machine.

11.1 Coin Disc

The coin disc should be in level with the coin track or not more than 0.1 mm above it.

a) Remove the coin disc, see "Coin Disc Drive - Removal" on page 48

b) If needed level up the coin disc with shims (1).



11.2 Thickness Guide Block

The thickness guide block has two adjustment possibilities:

- height position
- parallelism (in parallel with the coin disc)

Thickness guide block - Height position

Set the thickness selector to the position “twelve a clock”. This position corresponds to the adjustment for the thinnest coin and the gap between the disc and the block should be 1 mm.
If not, adjust the height as follows.

a) Open the inspection cover.

a) Set thickness selector to the position twelve a clock.

b) Tighten the locking screw (1).

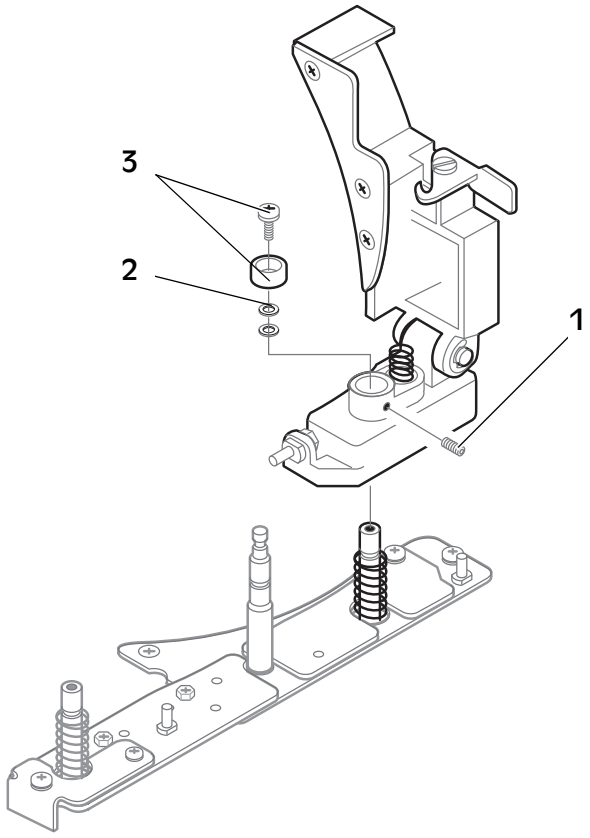
c) Remove the screw and the spacer (2).

d) Insert the washers (3).

Note! The same number of washers must be inserted at the coin feed unit as well.

e) Replace the screw and the spacer (2)

f) When the correct position (1 mm gap) is achieved, lock with the locking screw (1).



1 Locking screw
2 Screw and spacer
3 Washer

Thickness guide block - Parallelism

Adjusting the thickness guide block so that it is parallel to the coin disc. The thickness guide block locks into an eccentric nipple (2), and by turning this nipple the gap between the guide block and the coin disc can be adjusted.

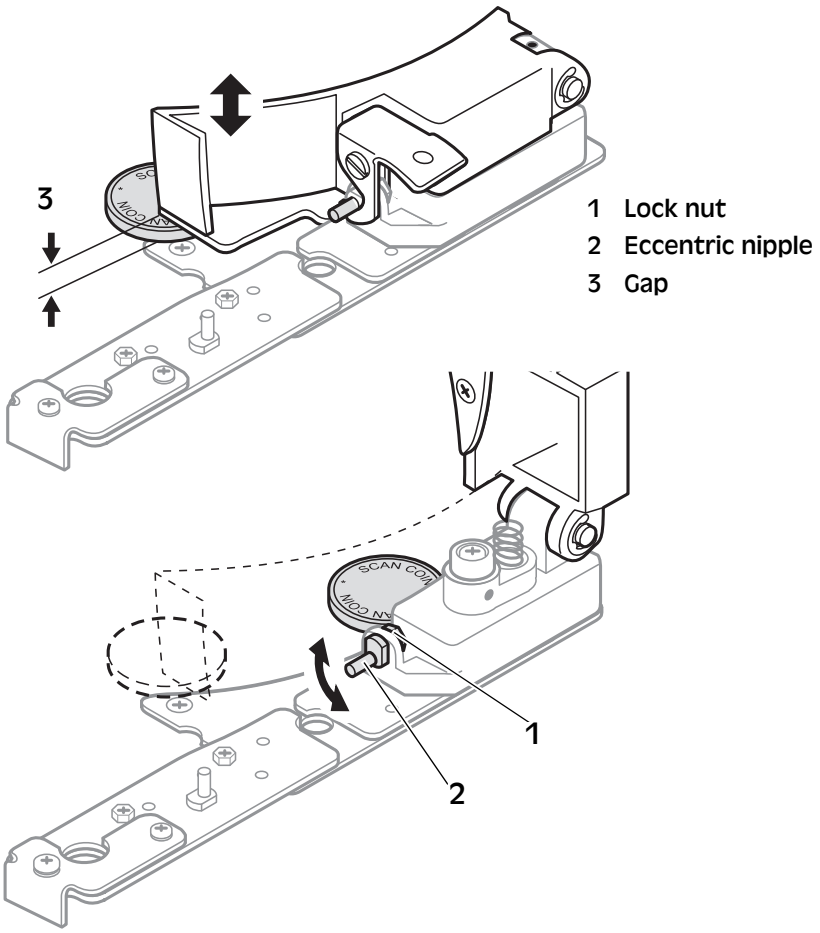
a) Open the inspection cover.

b) Raise the thickness guide block arm.

c) Loosen the lock nut (1) and turn the eccentric nipple in desired direction to adjust the gap (3) between the guide block and the coin disc.

d) Tighten the lock nut.

e) Lower the thickness guide block and test with a coin if the gap (3) to the coin disc is parallel to the guide block.
If not repeat steps a) - c).



1 Lock nut
2 Eccentric nipple
3 Gap

11.3 Height Adjustment of the Coin Feed Belt

The coin feed belt should be able to feed the thinnest coin. The belt assembly will automatically adjust to a correct level when turning the thickness knob, but it must be synchronised with the thickness guide block.

a) Open the inspection cover.

b) Tighten the locking screw (4).

c) Remove the screw and spacer (1).

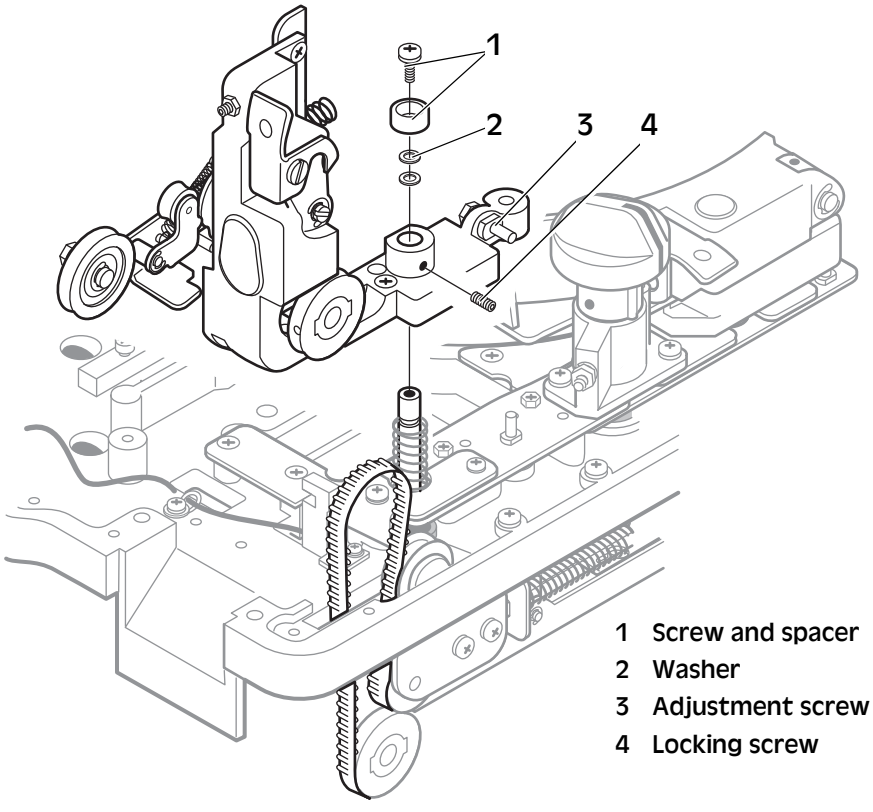
d) Insert the washers (2).

Note! The same number of washers must be inserted at the thickness guide block as well.

e) Replace the screw and spacer (1)

f) Loosen the locking screw (4).

If the belt is in a too low position it will influence the counting speed.



1 Screw and spacer
2 Washer
3 Adjustment screw
4 Locking screw

11.4 Feeding Belt Pressure

Note! Refer to fig. above.

The feeding belt pressure can be adjusted with the adjustment screw (4). The coin feed belt should grip and feed the thinnest coin.

11.5 Coin Rail System

When it comes to the coin track there are two aspects which have to be considered:

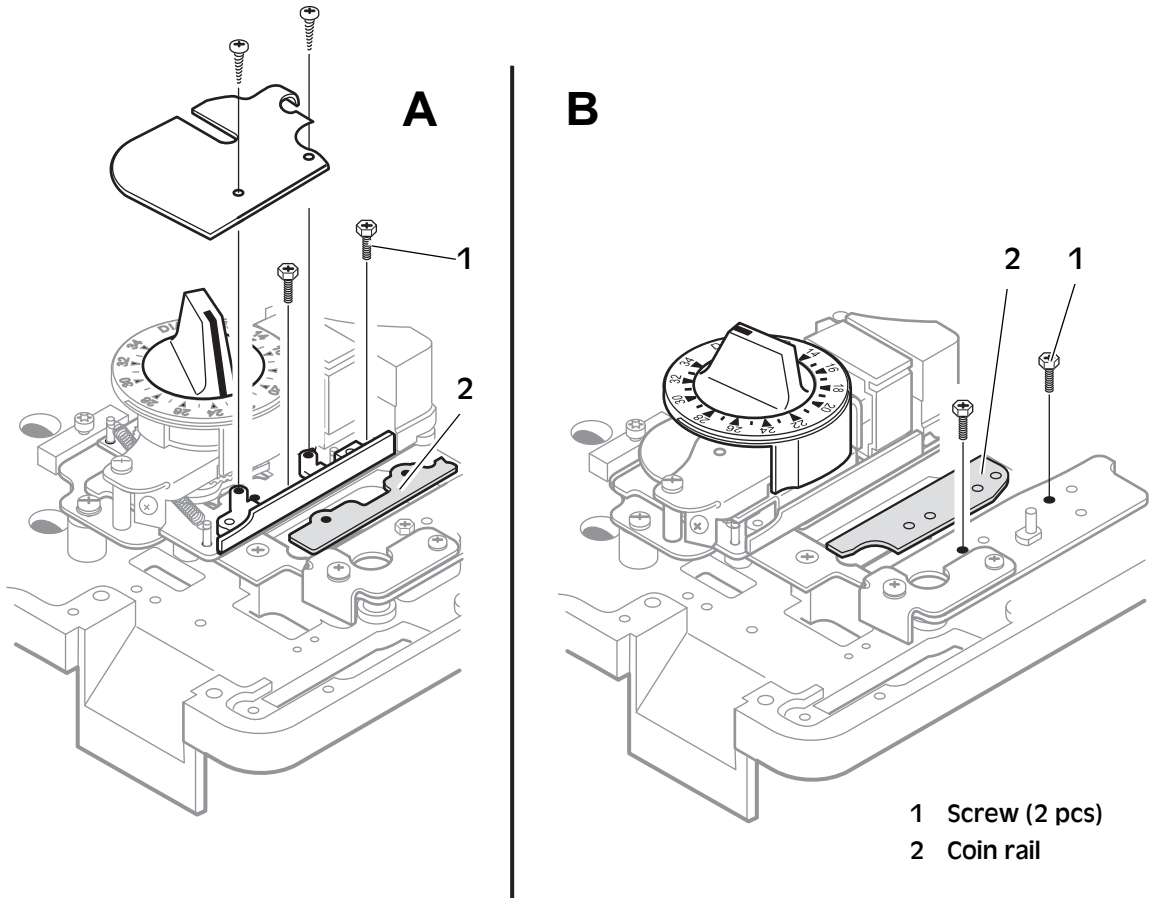
- parallelism
- degree of sorting accuracy - the width off the sorting rails

Left and Right Sorting Rails.

To remove the plate that covers the screws for the left sorting rail, see "Coin Guides - Removal" on page 41.

The left and right sorting rails are adjustable. The factory setting is a width of 1.2 mm. If adjustment is necessary, undo the two screws (1) on each side and adjust the coin rails (2) to the desired position.

- **A** - left sorting rail
- **B** - right sorting rail

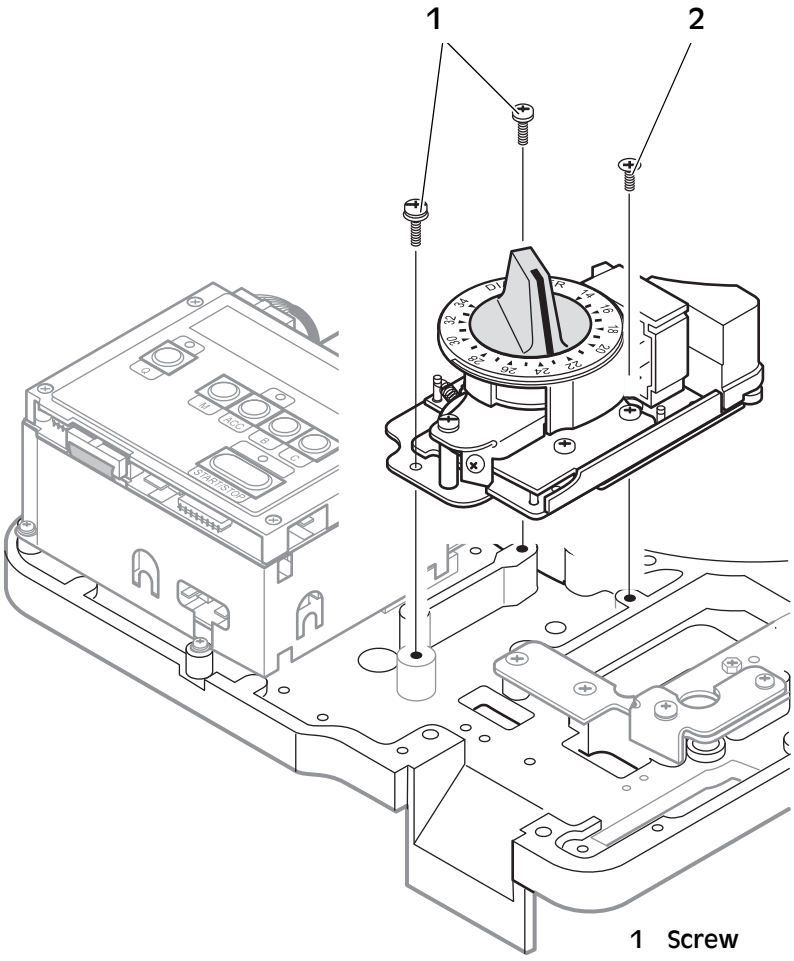


Parallelism

The aberration of the coin tracks parallelism should not be greater than 0.1 mm.

Loosen the diameter selector unit, see "Diameter Selector Unit - Removal" on page 50.

Loosen the screws (1) and (2). The selector unit can now be moved slightly. Make sure the rails are parallel (use two identical coins) and tighten the three screws.



1 Screw
2 Screw

12 Computer Communication

12.1 Serial Interface

The communication is carried out via an RS232C interface where SC 350/360 is classified as Data Terminal Equipment (DTE). The data format is 9,600 baud, 8 bits, no parity bit and one stop bit.

SC 350/360 works as a slave, that is only the computer can take the initiative to perform any data exchange with the machine. The exchanges are controlled by hardware handshaking signals. The required cable connections are:

Signal name	SC 350/360 pin no.	Signal direction	Computer (PC) pin no. (25-pin)	Computer pin no.(9-pin)
Shield	1	<------>	1	-
TxD	2	------->	3	2
RxD	3	<-------	2	3
CTS	5	<-------	4	7
Ground	7	<------>	7	5
RTS	20	------->	5	8

12.2 Protocol Structure

Note! In the following protocol descriptions two logical operators are used, + for arithmetic addition and ^ for logical AND.

All messages have the following principal structure:

Computer (PC)	SC-350/360
-------->	ESC (message start)
-------->	Command
<------>	Data (direction depends on command)
<------>	Check sum (direction depends on command)
<--------	Receipt: - ACK (if check sum is correct) or - NAK (if check sum is incorrect)

If the data is a binary number, the most significant byte (character) is sent first. If the data is a text string, the first character of the string is sent first. A text string always ends with a NULL character.

>>>

>>>

The check sum for received characters in a message is derived as follows:

The addition of every hexadecimal character value, except those for the message start (ESC), forms the sum. The check sum is then the sum ^255.

If any of the fault conditions listed below occurs, the computer should wait for at least 250 ms from the time that the last character was received before re-sending the message:

- The computer receives an incorrect check sum.
- The machine has sent NAK.
- The machine sends “invalid data”.
- The machine does not respond within 250 ms.

The machine accepts all messages when counting except the message that sets a new batch quantity.

Note! Messages associated with registers should be used with care during coin counting. Under normal circumstances the counting register should not be reset while counting is in progress.

12.3 Logging On

Note! In the following protocols there are two operators: + and ^, where + is arithmetic addition and ^ is logical AND.

Before any communication can occur between the computer and the machine, the machine has to be “logged on”. This is achieved by sending the following message:

Computer (PC)	SC-350 / SC-360
-------->	ESC
-------->	“Q”
-------->	“F”
-------->	(“Q” + “F”) ^ FF_{16}
<--------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.4 Logging Off

When communication between the computer and the machine has finished, the machine should be "logged off". This puts the machine into the same state as when it is switched **On**. This is achieved by sending the following message:

Computer (PC)	SC-350/360
------>	ESC
------>	"Q"
------>	"Q"
------>	("Q" + "Q") ^ FF_{16}
<------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.5 Reading Revision State for Software and Protocol

Programs communicating with the SC-350/360 should always execute this message to ensure compatibility. The revision states for the software program and protocol are sent as four 8-bit numbers.

Example:
If the SC-350/360 would have a software revision state of 10.15 and a protocol revision state of 2.09 then the following communication would take place:

Computer (PC)	SC-350/360
------>	ESC
------>	"P"
------>	"R"
<------	Ex: 10
<------	Ex: 15
<------	Ex: 2
<------	Ex: 9
<------	(10 + 15 + 2 + 9) ^ FF_{16}
<------	ACK

Future software and protocol revisions may not be fully compatible and are only guaranteed to support the following three messages:

- ESC, "Q", "F"
- ESC, "Q", "Q" and
- ESC, "P", "R".

12.6 Reading Program Information

The machine sends a number of text strings containing program information of a general nature. After the last text string, a closing NULL message is sent.

Computer (PC)	SC-350/360
------->	ESC
------->	"P"
------->	"I"
<-------	$String_1$
<-------	NULL
<-------	$String_2$
<-------	NULL
.....	.....
<-------	$String_n$
<-------	NULL
<-------	NULL
<-------	($String_1$ + NULL + $String_2$ + NULL + ... + $String_n$ + NULL + NULL +) ^ FF_{16}
<-------	ACK

12.7 Reading Counting Register

The machine sends the number of counted coins as a 32-bit number. This message does not affect the register.

Computer (PC)	SC-350/360
------->	ESC
------->	"R"
------->	"C"
<-------	CountRegister (CR)
<-------	(CR ^ FF00,0000$_{16}$ + CR ^ FF,0000$_{16}$ + CR ^ FF00$_{16}$ + CR ^ FF$_{16}$) ^ FF$_{16}$
<-------	ACK

12.8 Reading Memory Contents

The machine sends the contents of the memory as a 32-bit number. This gives the same information as pressing **ACC**. The message does not affect any register.

Computer (PC)	SC-350/360
------->	ESC
------->	"R"
------->	"A"
<-------	Accumulator (AR)
<-------	(AR ^ FF00,0000$_{16}$ + AR ^ FF,0000$_{16}$ + AR ^ FF00$_{16}$ + AR ^ FF$_{16}$) ^ FF$_{16}$
<-------	ACK

12.9 Transferring the Number of Counted Coins to Memory

The number of counted coins is added to memory and the display is reset to zero. This is the same as pressing **M**.

Computer (PC)	SC-350/360
------->	ESC
------->	"A"
------->	"A"
------->	("A" + "A") ^ FF$_{16}$
<-------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.10 Reading the Number of Counted Coins

Revision 1.xx of the protocol:

The machine sends the number of counted coins since the last zero reset as a 16-bit number. If batch counting is disabled, zero will be transmitted. This gives the same information as pressing **B**. The message does not affect any register.

Computer (PC)	SC-350/360
------->	ESC
------->	"R"
------->	"V"
<-------	BatchValueRegister (BVR)
<-------	(BVR ^ $FF00_{16}$ + BVR ^ FF_{16}) ^ FF_{16}
<-------	ACK

Revision 2.xx of the protocol:

The machine sends the number of counted coins since the last zero reset as a 32-bit number. If batch counting is disabled, zero will be transmitted. This gives the same information as pressing **B**. The message does not affect any register.

Computer (PC)	SC-350/360
------->	ESC
------->	"R"
------->	"V"
<-------	BatchValueRegister (BVR)
<-------	(BVR ^ $FF00,0000_{16}$ + BVR ^ $FF,0000_{16}$ + BVR ^ $FF00_{16}$ ^ + BVR ^ FF_{16}) ^ FF_{16}
<-------	ACK

12.11 Reading Batch Quantity Value

Revision 1.xx of the protocol:

The machine sends the current batch quantity value as a 16-bit number. If batch counting is disabled, zero is transmitted. The batch quantity value is the temporary quantity of the machine. The message does not affect any register.

Computer (PC)	SC-350/360
------->	ESC
------->	"R"
------->	"L"
<-------	BatchLimitRegister (BLR)
<-------	(BLR ^ $FF00_{16}$ + BLR ^ FF_{16}) ^ FF_{16}

Revision 2.xx of the protocol:

The machine sends the current batch quantity value as a 32-bit number. If batch counting is disabled, zero is transmitted. The batch quantity value is the temporary quantity of the machine. The message does not affect any register.

Computer (PC)	SC-350/360
------->	ESC
------->	"R"
------->	"L"
<-------	BatchLimitRegister (BLR)
<-------	(BLR ^ $FF00{,}0000_{16}$ + BLR ^ $FF{,}0000_{16}$ + BLR ^ $FF00_{16}$ ^ + BLR ^ FF_{16}) ^ FF_{16}
<-------	ACK

12.12 Setting a New Batch Quantity

Revision 1.xx of the protocol:

The computer sends the new batch quantity value as a 16-bit number. The machine reads this as a temporary batch quantity. Batch counting is disabled if the batch quantity value is zero.

Computer (PC)	SC-350/360
------->	ESC
------->	"W"
------->	"L"
------->	BatchLimitRegister (BLR)
------->	("W" + "L" + BLR ^ $FF00_{16}$ + BLR ^ FF_{16}) ^ FF_{16}
<-------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

Revision 2.xx of the protocol:

The computer sends the new batch quantity value as a 32-bit number. The machine reads this as a temporary batch quantity. Batch counting is disabled if the batch quantity value is zero.

Normally, batch quantities over 60,999 are rounded to 60,999. If the machine is set-up for batch quantities in steps of 1,000, all batch quantities are rounded to nearest smaller thousand, for example 250,600 is rounded to 250,000. Batch quantities over 1099,000 are rounded to 1099,000.

Computer (PC)	SC-350/360
------->	ESC
------->	"W"
------->	"L"
------->	BatchLimitRegister (BLR)
------->	("W" + "L" + BLR ^ $FF00{,}0000_{16}$ + BLR ^ $FF{,}0000_{16}$ + BLR ^ $FF00_{16}$ + BLR ^ FF_{16}) ^ FF_{16}
<-------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.13 Resetting Counting Register to Zero

The machine resets the display. This message does the same as pressing **C**.

Computer (PC)	SC-350/360
------>	ESC
------>	"C"
------>	"C"
------>	("C" + "C") ^ FF_{16}
<------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.14 Resetting Memory Contents to Zero

The machine resets memory contents to zero. This message does the same as pressing **ACC** and **C** at the same time.

Computer (PC)	SC-350/360
------>	ESC
------>	"C"
------>	"A"
------>	("C" + "A") ^ FF_{16}
<------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.15 Resetting Number of Counted Coins to Zero

The machine resets the number of counted coins to zero. This message does the same as pressing **B** and **C** at the same time.

Computer (PC)	SC-350/360
------>	ESC
------>	"C"
------>	"V"
------>	("C" + "V") ^ FF_{16}
<------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.16 Reading Machine Status

The machine sends a status message which consists of 8 bits and is made up as follows:

Status = $B_7B_6B_5B_4B_3B_2B_1B_0$
where:

- B_0 = "1" if the machine is counting coins, otherwise "0".
- B_1 = "1" if the batch quantity value has been reached, otherwise "0".
- B_2 = "1" if the machine had been counting coins when the inspection door was opened, otherwise "0".
- B_3 = "1" if it is time to clean the machine, otherwise "0".
- B_4 = "1" if the coin disc sensor is detecting coins, otherwise "0".
- B_5 = "1" if the machine is set to batch counting mode, otherwise "0".
- B_6 = always "0".
- B_7 = always "0".

Computer (PC)	SC-350/360
------>	ESC
------>	"R"
------>	"S"
<------	Status
<------	Status ^ FF_{16}
<------	ACK

12.17 Disabling Keypad

This message disables the keys on the keypad that affect the machine. The external start (foot control) is not affected.

Computer (PC)	SC-350/360
------>	ESC
------>	"D"
------>	"K"
------>	("D" + "K") ^ FF_{16}
<------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.18 Disabling Keypad Except for Start/Stop

This message disables all the keys on the keypad that affect the machine except for **Start/Stop**. It is only possible to stop the machine by pressing **Start/Stop**. The external start (foot control) is not affected.

Computer (PC)	SC-350/360
------->	ESC
------->	"D"
------->	"k"
------->	("D" + "k") ^ FF_{16}
<-------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.19 Enabling Keypad

This message enables all the keys on the keypad.

Computer (PC)	SC-350/360
------->	ESC
------->	"E"
------->	"K"
------->	("E" + "K") ^ FF_{16}
<-------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.20 Starting Machine

This message starts the machine.

Computer (PC)	SC-350/360
------->	ESC
------->	"M"
------->	"1"
------->	("M" + "1") ^ FF_{16}
<-------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.21 Stopping Machine

This message stops the machine.

Computer (PC)	SC-350/360
------>	ESC
------>	"M"
------>	"0"
------>	("M" + "0") ^ FF_{16}
<-------	ACK (if check sum is correct) or NAK (if check sum is incorrect)

12.22 Program Example

Below is an example of a short and simple program, written in Pascal, that can be used for communication between SC 350/360 and a computer. It is however necessary to add routines for time-out and check sum control.

Note! All settings on page six of the SC 350/360 set-up ("6 - Computer Communication" on page 29) should hold the value zero (the default value) for this program to run.

```
{————————————————————————————————————————
Program..... :    exampel1.pas
Project..... :    SC360
Date created..... :    960415 by MJ
This version ..... :    1.1
Description ..... :    Example of software for a computer con-
trolling a
connected SC360.
Note:
1   For simplicity the handshake lines are not used in this example.
2   No check sum implemented.
Ver history:V1.1: Added code for version 2.00 of protocol
————————————————————————————————————————}

program example 1;
uses crt;

const
{ COM1: RS232 port address }
    RXTX = $3F8;    { $2F8 if COM2: is used }
    ACK  = 6;
    NAK  = 21;
    ESC  = 27;

var
    dummy,
    checkSum        : integer;
    key             : char;
    protocol        : integer;
```

```
procedure InitComm;
{  Set baudrate to 9600, 8 bits, no parity, 1 stop bit }
var i : integer;
begin
    i := 1843200 div 9600 div 16;
    port[RXTX + 3]  := $80;
    port[RXTX + 1]  := hi(i);
    port[RXTX]:= lo(i);
    port[RXTX + 3]  := 3;
    port[RXTX + 4]  := $A;
    while odd(port[RXTX + 5]) do
    begin
            dummy := port[RXTX];
            delay(10);
    end;
end;  { InitComm }

procedure Tx(data : integer);
{ Transmit a character on serial channel }
begin
    while port[RXTX + 5] and $20 = 0 do;
    port[RXTX] := data and $FF;
end;  { Tx }

function RxWait : integer;
{ Waits for a character from serial channel }
begin
    while not odd(port[RXTX + 5]) do;
    RxWait := port[RXTX];
end;  { RxWait }

procedure Tx2(data : integer);
{ Transmit a char on serial channel + Calculate check sum }
begin
    Tx(data);
    checkSum := (checkSum + data) and $FF;
end;  { Tx2 }

procedure TxCommand(c1, c2 : char;
    sendCheckSum : boolean);
{ Transmit command (no data) on serial channel }
begin
    Tx(ESC);
    checkSum := 0;
    Tx2(ord(c1));
    Tx2(ord(c2));
    if sendCheckSum then
    begin
            Tx2(checkSum);
            dummy := RxWait;
    end;
end;  { TxCommand }
function ReadNumber(n : integer) : real;
{ Read n bytes from serial channel }
var
    number: real;
    i       : integer;
begin
```

```
    number := 0;
    checkSum := 0;
    for i := 1 to n do
            number := number * 256 + RxWait;
    dummy := RxWait;
    ReadNumber := number;
end;  { ReadNumber }

procedure Revisions;
var
    tmp    : integer;
    sw,
    prot   : real;
begin
    TxCommand("P", "R", FALSE);
    checkSum := 0;
    tmp := RxWait;
    sw := tmp + RxWait / 100.0;
    protocol := RxWait;
    prot := protocol + RxWait / 100.0;
    dummy := RxWait;
    tmp := RxWait;
    writeln("Software revision: ", sw:4:2);
    writeln("Protocol revision: ", prot:4:2);
end;  { Revisions }

procedure ReadCountReg;
begin
    TxCommand("R", "C", FALSE);
    writeln(ReadNumber(4):11:0, " coins counted.");
    dummy := RxWait;
end;  { ReadCountReg }

procedure ReadAccReg;
begin
    TxCommand("R", "A", FALSE);
    writeln(ReadNumber(4):11:0, " coins in accumulator.");
    dummy := RxWait;
end;  { ReadAccReg }

procedure Setbatch(limit : longint);
begin
    TxCommand("W", "L", FALSE);
    case protocol of
            1 : begin
                    Tx2(limit div 256);
                    Tx2(limit mod 256);
            end;
            2 : begin
                    Tx2( limit div 16777216);
                    Tx2((limit div 65536) mod 256);
                    Tx2((limit div 256)   mod 256);
                    Tx2( limit mod 256);
            end;
    end;  { case protocol }
    Tx2(checkSum);
    dummy := RxWait;
end;  { Setbatch }
```

```
procedure Commands;
begin
    writeln;
    writeln(”Commands:”);
    writeln(”1  <==> M - key”);
    writeln(”2  <==> C - key”);
    writeln(”3  <==> ACC+C - key”);
    writeln(”8  Set batchlimit to 25”);
    writeln(”9  Set batchlimit to 75”);
    writeln(”0  Set batchlimit to 0”);
    writeln(”C  Read coins counted”);
    writeln(”A  Read accumlator”);
    writeln(”R  Start machine”);
    writeln(”S  Stop machine”);
    writeln(”L  Lock keyboard except STOP-key”);
    writeln(”U  Unlock keyboard”);
    writeln(”H  This command list”);
    writeln(”esc  Quit program”);
    writeln;
end;  { Commands }

procedure DoAction(key : char);
begin
    case key of
            ”1”         : TxCommand(”A”, ”A”, TRUE);
            ”2”         : TxCommand(”C”, ”C”, TRUE);
            ”3”         : TxCommand(”C”, ”A”, TRUE);
            ”8”         : Setbatch(25);
            ”9”         : Setbatch(75);
            ”0”         : Setbatch(0);
            ”C”, ”c”    : ReadCountReg;
            ”A”, ”a”    : ReadAccReg;
            ”R”, ”r”    : TxCommand(”M”, ”1”, TRUE);
            ”S”, ”s”    : TxCommand(”M”, ”0”, TRUE);
            ”L”, ”l”    : TxCommand(”D”, ”k”, TRUE);
            ”U”, ”u”    : TxCommand(”E”, ”K”, TRUE);
            ”H”, ”h”    : Commands;
    end;  { case key }
end;  { DoAction }

begin  { Main program }
    InitComm;
    TxCommand(”Q”, ”F”, TRUE);{ LogIn }
    Commands;
    Revisions;
    repeat
            write(”Enter command: ”);
            while not keypressed do;
            key := readkey;
            writeln(key);
            DoAction(key);
    until key = #27;
    TxCommand(”Q”, ”Q”, TRUE);{ LogOut }
end.  { Main program }
```

>>>

12.23 Electrical Connections

There are four connections at the AUX connector (CN1) which should be used for the BDO sachet machine. For details, see "Electrical Block Diagram" on page 93. The connections are:

GND	Return path for the other signals.
+5 V	Max. load ±50 mA.
FBI	Full batch indicator. This signal is the same as batch condition mentioned above. Do not apply a voltage below 0 V or above 5 V to this terminal. The circuit consists of an HC-output (74HC14) in series with a 560 Ω resistor.
-ExtSrt	External Start, active low. This signal is the same as #6 mentioned above. Do not apply a voltage below 0 V or above 5 V to this terminal. Input with Schmitt trigger action. The input has a pull up resistor of 1.6 kΩ connected to +5 V. The input is not TTL compatible.

General

The behaviour of the motors in SC 350/360 do not affect the batch condition.

The behaviour of the solenoid does not affect the capacity of the machine.

These modes of operation must be enabled in the set-up.

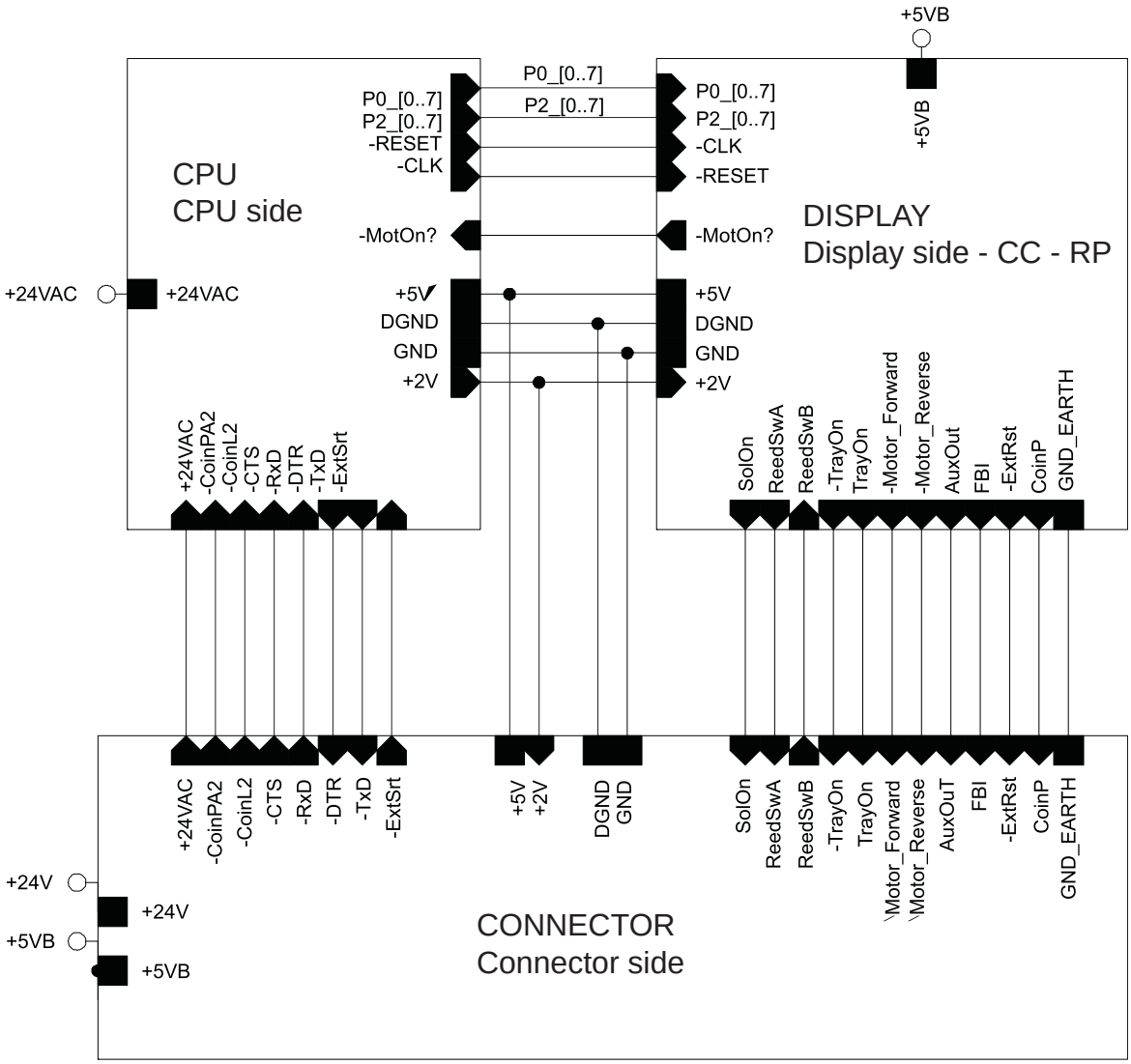
12.24 ASCII Table

In the table below are the ASCII codes used as characters in the protocol. The ASCII codes are provided in decimal and hexadecimal form.

NULL	0	0_{16}	**D**	68	44_{16}	**Q**	81	51_{16}
ACK	6	6_{16}	**E**	69	45_{16}	**R**	82	52_{16}
NAK	21	15_{16}	**F**	70	46_{16}	**S**	83	53_{16}
ESC	27	$1B_{16}$	**I**	73	49_{16}	**V**	86	56_{16}
0	48	30_{16}	**K**	75	$4B_{16}$	**W**	87	57_{16}
1	49	31_{16}	**L**	76	$4C_{16}$	**K**	107	$6B_{16}$
A	65	41_{16}	**M**	77	$4D_{16}$			
C	67	43_{16}	**P**	80	50_{16}			

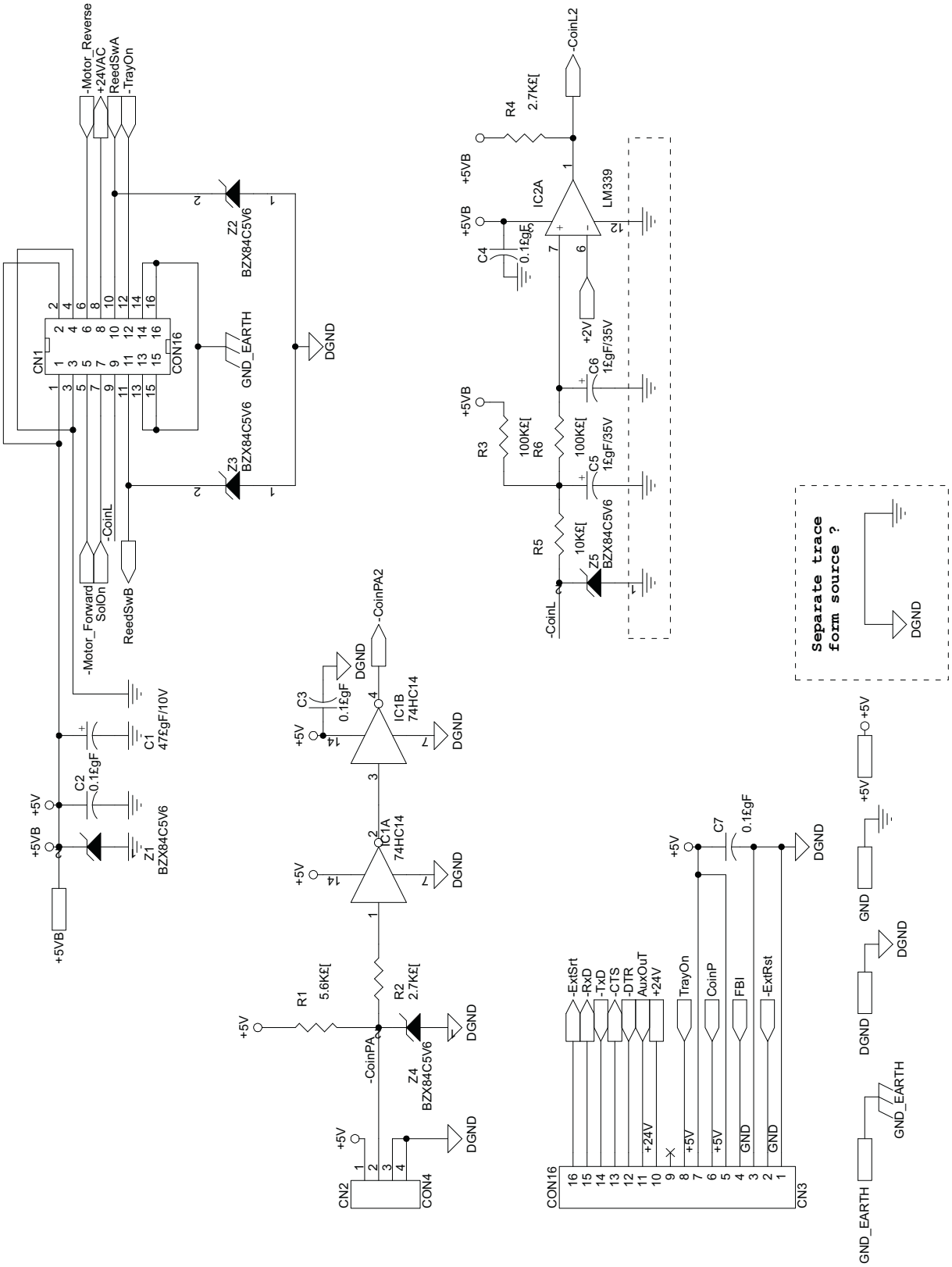
13 Interconnection Diagram

13.1 Electrical Block Diagram

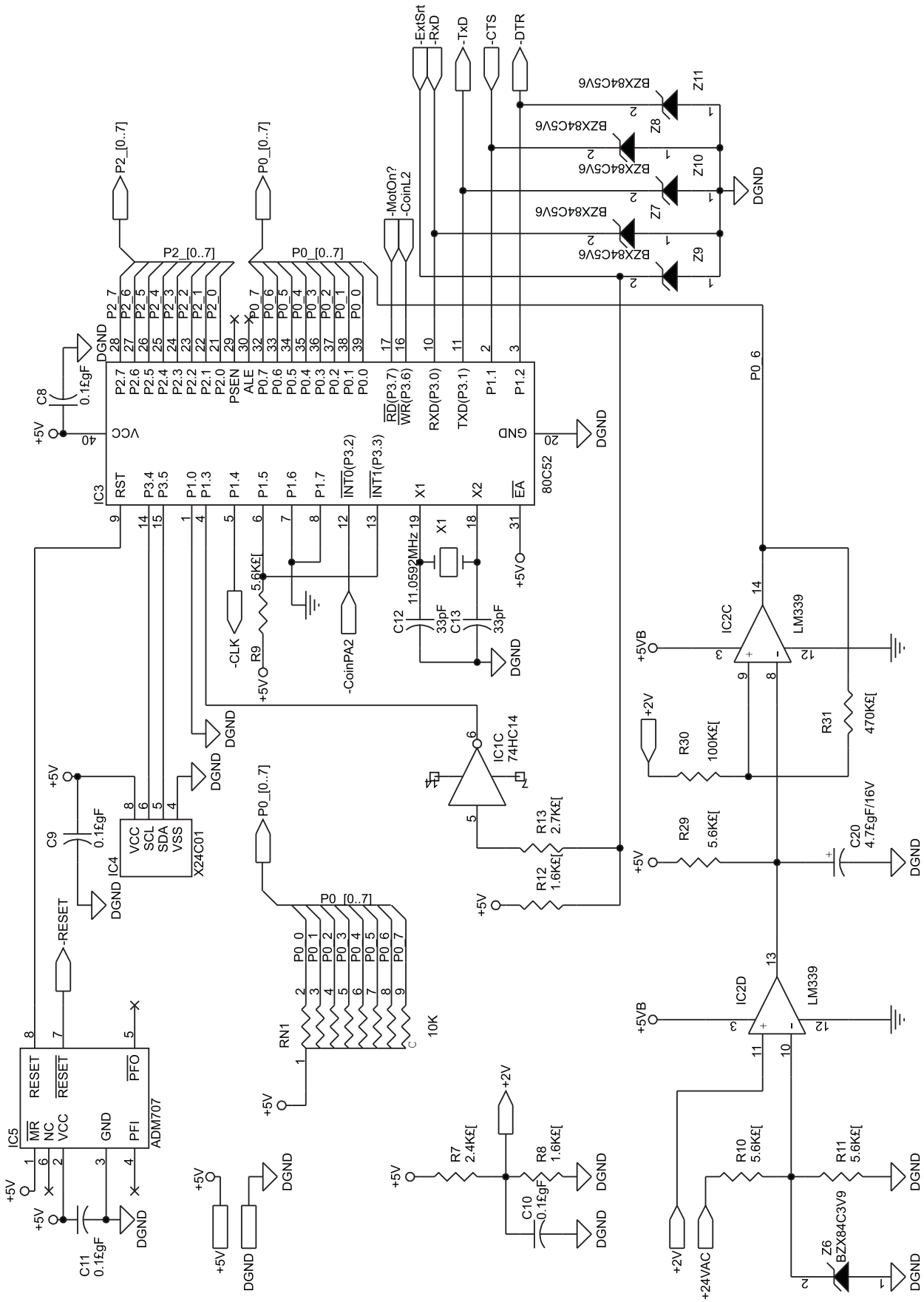


>>>

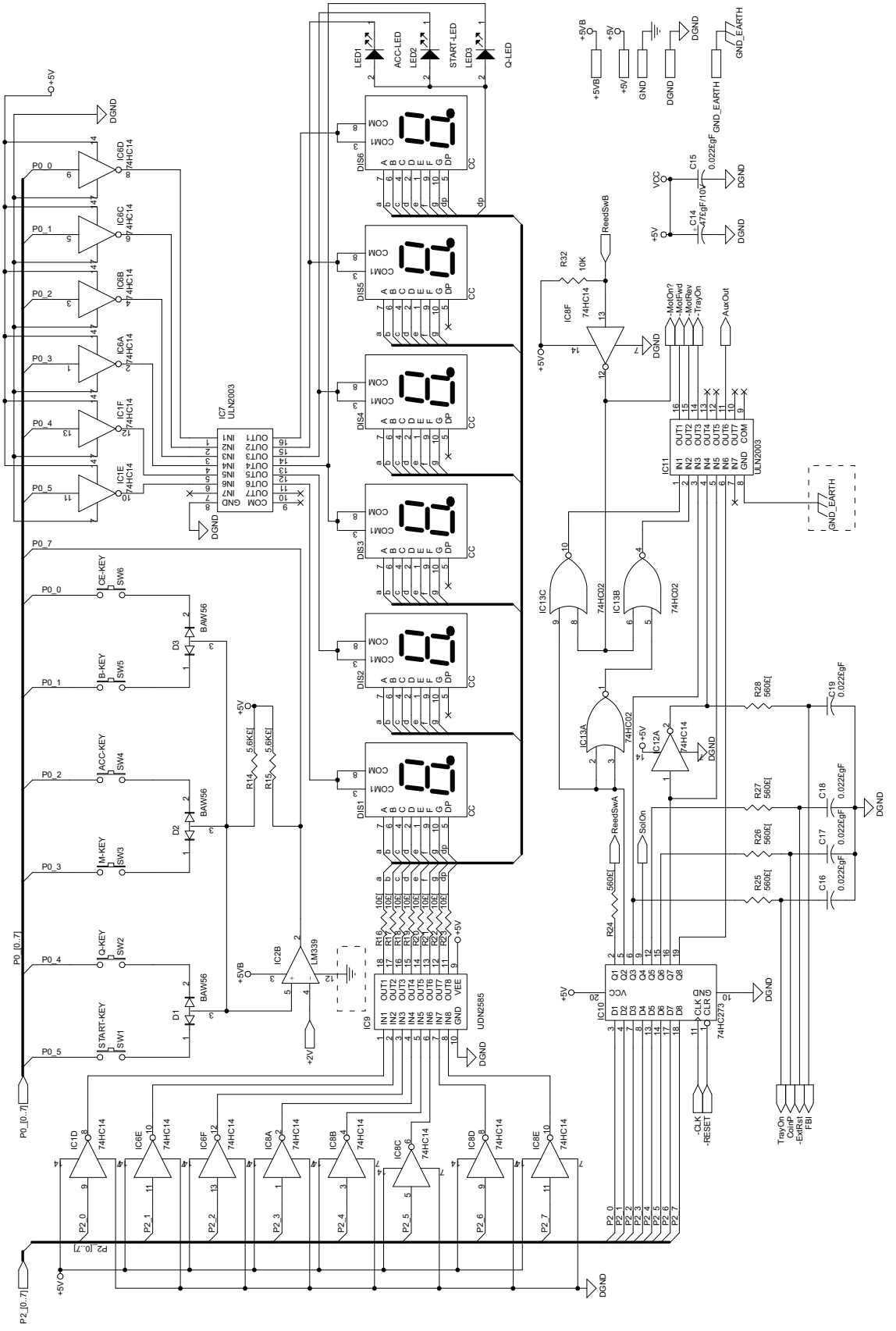
13.2 CPU Board Circuit Diagram - Connector



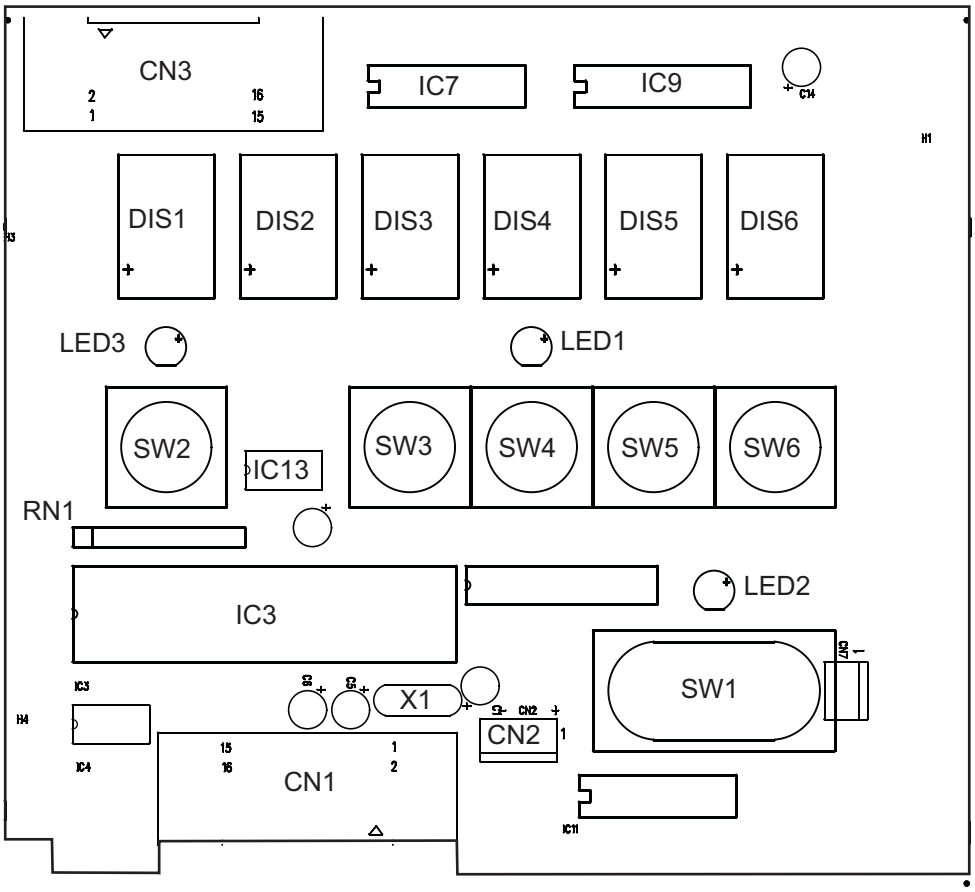
13.3 CPU Board Circuit Diagram - CPU



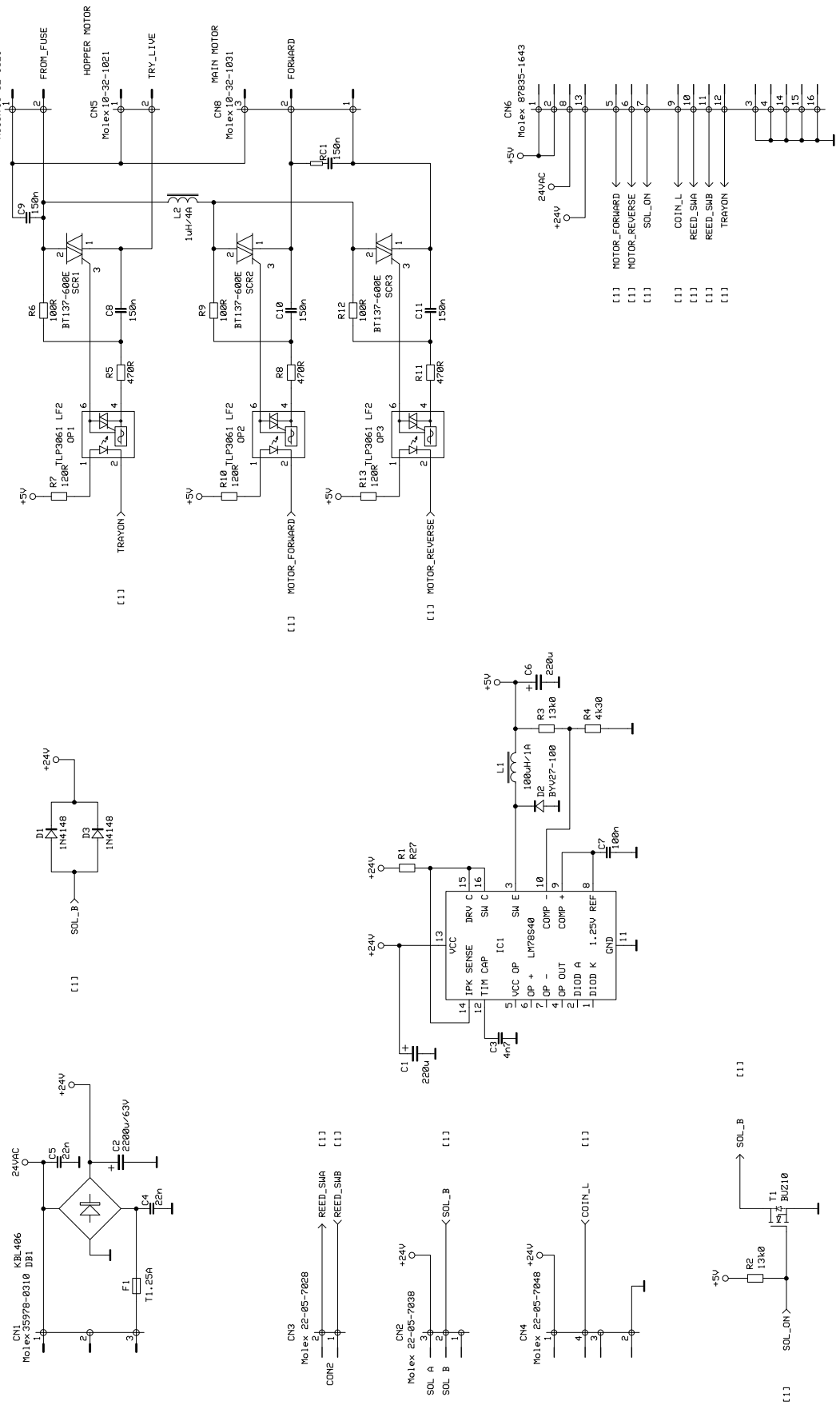
13.4 CPU Board Circuit Diagram - Display/Keys



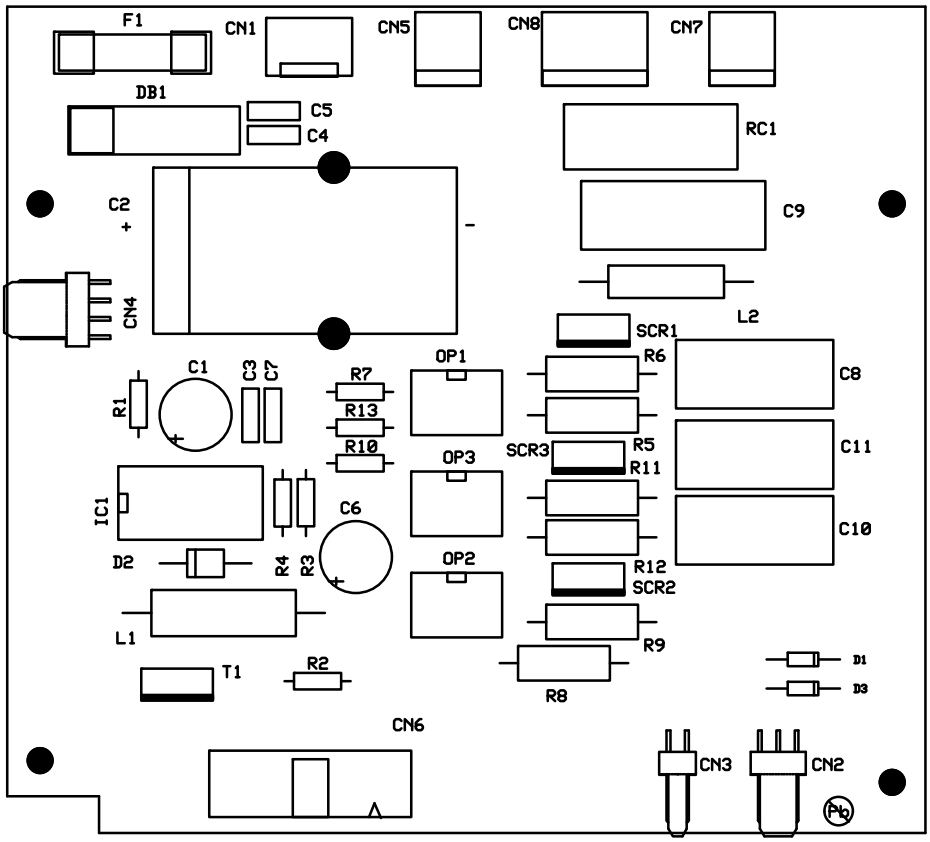
13.5 CPU Board Layout



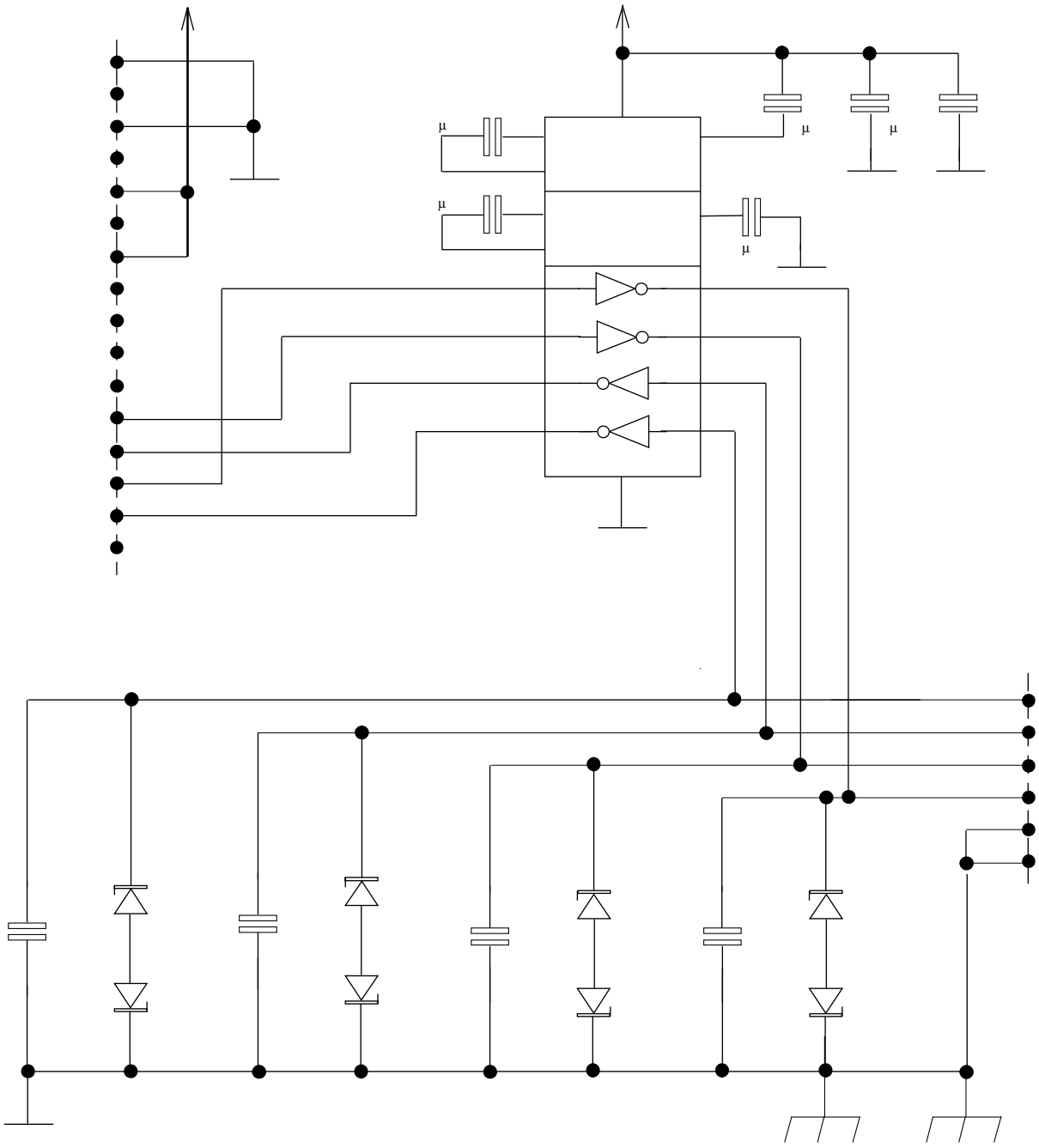
13.6 PSU Board Circuit Diagram



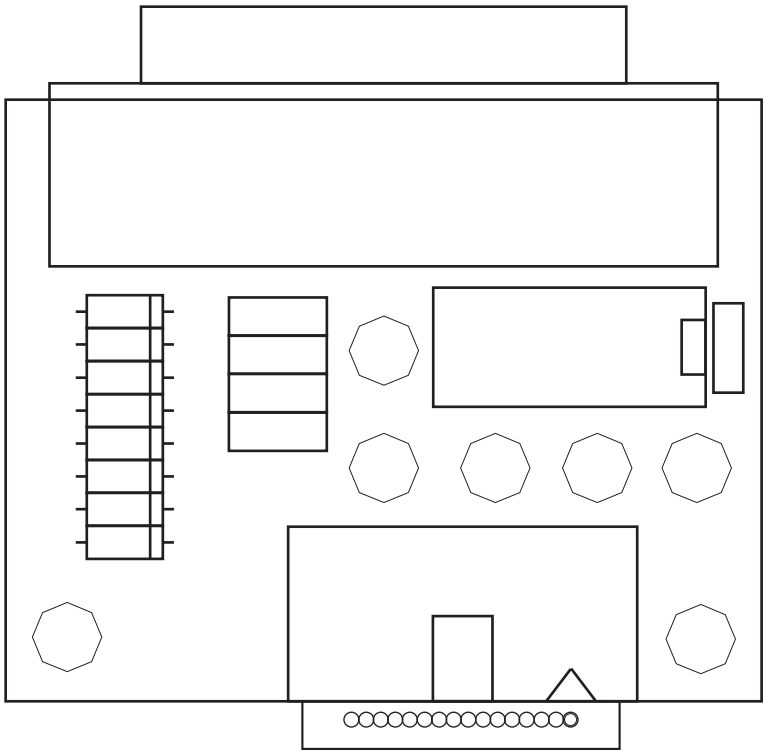
13.7 PSU Board Layout



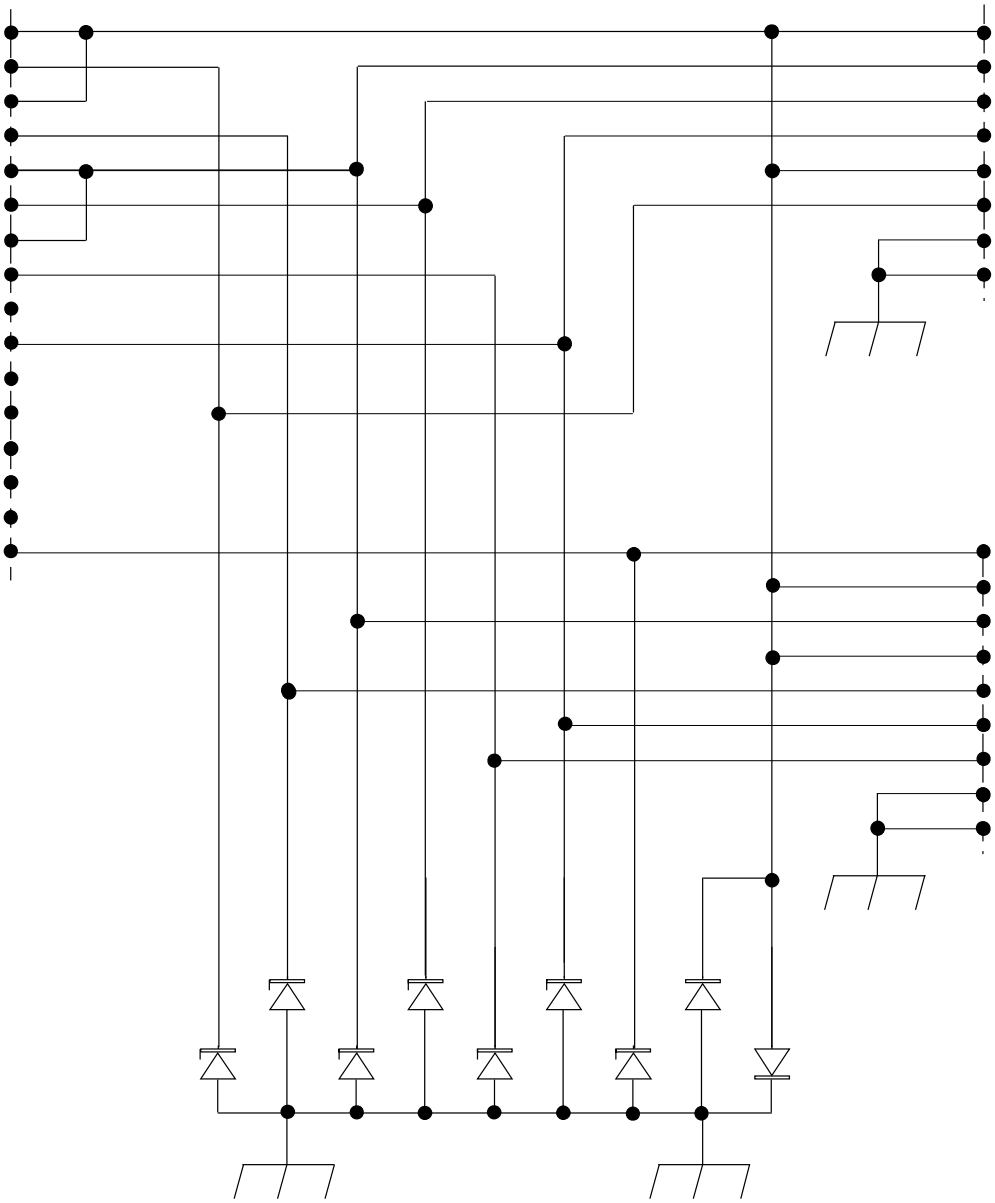
13.8 Serial Interface Board Circuit Diagram

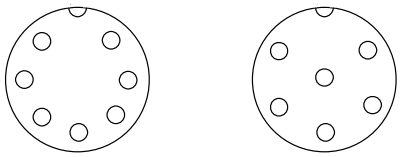


13.9 Serial Interface Board Layout

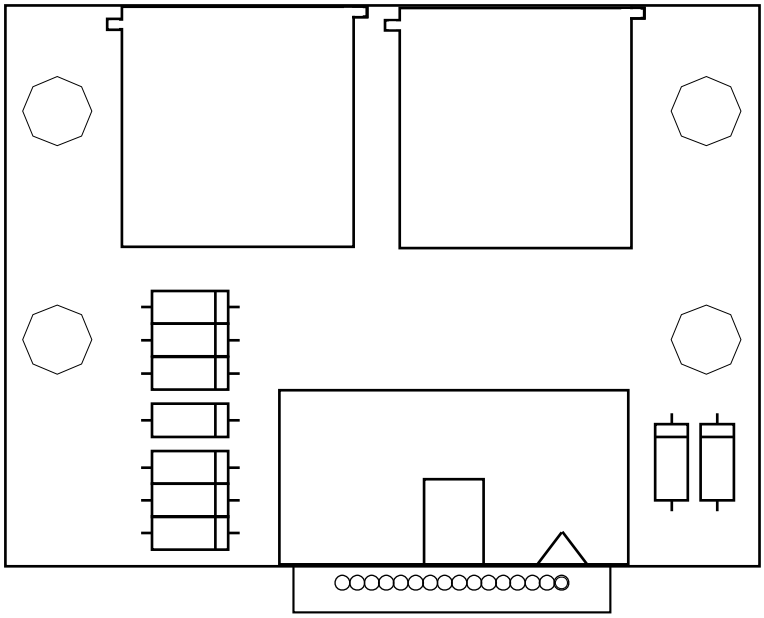


13.10 RD/AUX Interface Circuit Diagram





13.11 RD/AUX Interface Board Layout



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