# SR5
# BDTA
# Technical
# Manual

**Money Controls**

## Contents

## Tables

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# 1.   Diary of changes

Issue 1.0 …………………………………………………………………..…6th April 2001

Issue 1.1 …………………………………………………………………..12th March 2002
  ➢ Applied TMWP v3.0.
  ➢ Added reference to TSP014 "SR5 BDTA **MechTool**™ Manual.
Issue 1.2 …………………………………………………………………..1st April 2002
  ➢ Last page disclaimer ammended
  ➢ Drawings changed to .jpg

Issue 1.3…………………………………………………………………...…..6th Sept 2002

  ➢ Modification to disclaimer.

## 2.   Introduction

The SR5 series of coin acceptors has been designed to be compatible with the standard 5" BDTA format currently used.

Through the development of Series Resonance technology, the SR5 incorporates the highest levels of discrimination and functionality.

The SR5 BDTA is a product mechanically compatible in respect of coin inlet and outlets with the C450 series.

As with all new Money Controls products other enhancements have been made to the SR5 series as well as the new sensing technology.

These include:-

> **ccTalk**® serial communication.        (see the current **ccTalk**® generic
                                                                                                        specification")
> Extended **Teach and Run™** options. (see TSP014 "SR5 BDTA **MechTool**™
                                                                                                        Manual")
> Coinless programming.
> Adjustable coin security.              (see TSP014 "SR5 BDTA **MechTool**™
                                                                                                        Manual")
> **MechTool**™ programmability.        (see TSP014 "SR5 BDTA **MechTool**™
                                                                                                        Manual")
> Improved sorter coin detection.

## 3.   Operation

Coin validation parameters are factory programmed for optimum acceptance of up to 12 different coins or tokens and therefore no field adjustment is necessary beyond **Teach and Run™** (see TSP014 "SR5 BDTA **MechTool**™ Manual").

However, the SR5 can now be programmed on site without the use of coins and for total flexibility, if a new coin is required, the Teach and Run™ function can be used to program all 12 coins

Coins are inserted into a top entry acceptor and roll past a set of Series Resonant sensors.  If the characteristics measured from the inserted coin match the stored window readings in all respects, then the coin is recognised as being true.  The accept gate will then open and the coin will pass through the accept sensor.  Once this happens the SR5 will send a predefined credit signal to the host machine which will correspond to the coin accepted.

If, on comparing the inserted coins characteristics, to all the pre-programmed parameters, the coin readings do not match, this coin will be deemed invalid, the accept gate will remain closed and the coin will travel through to the reject via the reject path.

# 4.   Electrical Connections
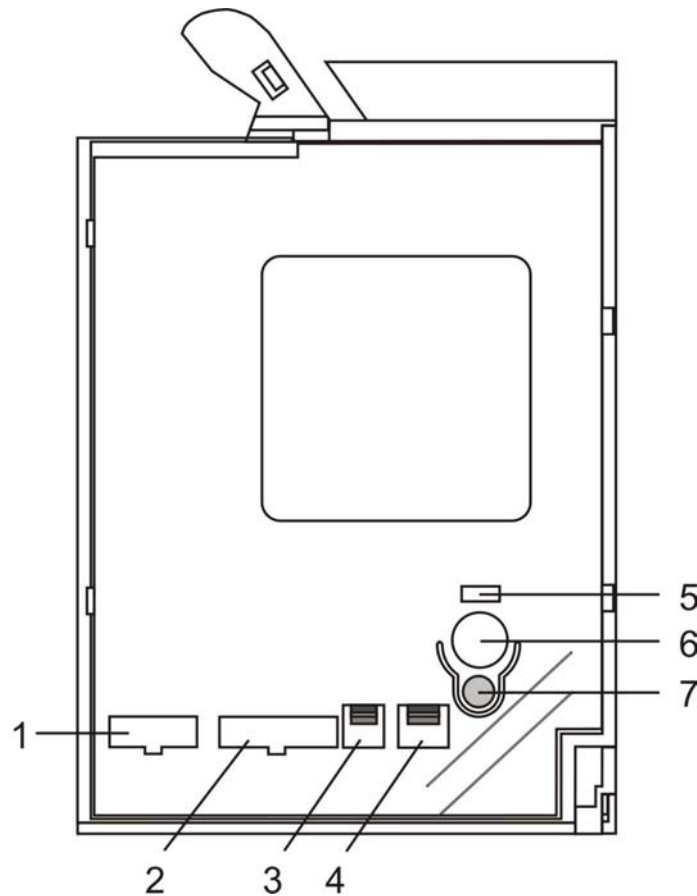


*Figure 1: SR5 BDTA Connector Side*


*Table 1: SR5 BDTA Rear Cover Details.*

| | | |
|---|---|---|
| 1 | Serial (**ccTalk**®) Interface | See the current **ccTalk**® generic specification for more details. |
| 2 | Parallel Interface | See section 6. |
| 3 | Sorter Override Connector | NOT USED. |
| 4 | Alarm / Jam Connector | See section 11. |
| 5 | LED Indicator | |
| 6 | Rotary Switch | See section 15. |
| 7 | Program Button | |

## 5.   Electrical Interface Requirements

*Table 2: Power Supply*

| | |
|---|---|
| Voltage: | 12V – 24V DC +/- 10% |
| Absolute: | Min 10V  Max 27V |
| Min / Max rise time: | 5ms / 500ms<br>(From 0V to within supply range) |
| Min / Max fall time: | 5ms / 500ms<br>(From within supply range to 0V) |
| Acceptor Power up time: | 200 ms from the application of a valid voltage supply.  A valid supply must be between the limits specified above. |
| Ripple voltage [ < 120Hz ]: | < 1 Volt |
| Ripple voltage [ > 120Hz ]: | < 100mV |
| Ripple voltage [ > 1KHz ]: | < 20mV |

*Table 3: Current Consumption*

| | |
|---|---|
| Typically: | 70mA |
| Maximum: | 1.0A |

# 6.     Parallel Interface

BDTA Industry standard interface.  Connector type: 16 pin DIL

*Table 4: Parallel Interface*

| PIN | FUNCTION | ACTIVE | Input (I) / Output(O) / Power(P) |
|---|---|---|---|
| 1 | Inhibit 4 | Low to Accept / High to Reject[1] | I |
| 2 | Inhibit 5 | Low to Accept / High to Reject[1] | I |
| 3 | Inhibit 2 | Low to Accept / High to Reject[1] | I |
| 4 | Inhibit 6 | Low to Accept / High to Reject[1] | I |
| 5 | Coin Return | Low (O/C NPN transistor)[2] | O |
| 6 | Inhibit All Coins | High to Accept / Low to Reject[3] | I |
| 7 | Accept 4 | Low (O/C NPN transistor)[4] | O |
| 8 | 0V | | P |
| 9 | Accept 6 | Low (O/C NPN transistor)[4] | O |
| 10 | Accept 2 | Low (O/C NPN transistor)[4] | O |
| 11 | Accept 5 | Low (O/C NPN transistor)[4] | O |
| 12 | Accept 3 | Low (O/C NPN transistor)[4] | O |
| 13 | Accept 1 | Low (O/C NPN transistor)[4] | O |
| 14 | Inhibit 3 | Low to Accept / High to Reject[1] | I |
| 15 | Inhibit 1 | Low to Accept / High to Reject[1] | I |
| 16 | +V Supply | | P |

[1] See section 7 for further details.
[2] See section 8 for further details.
[3] See section 9 for further details.
[4] See section 10 for further details.
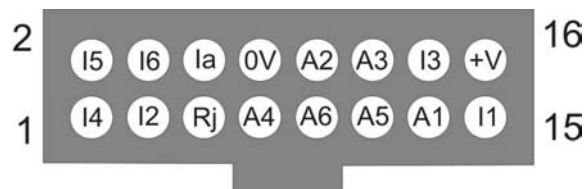


*Figure 2: Parallel Interface Pin Header*

## 7.  Inhibit 1 to 6 Inputs (Parallel Interface)

Each Inhibit pin controls two coins:-
Inhibit 1 controls coin 1 and coin 7          (Coin 1 – Bank 1: Coin 1 Bank 2).
Inhibit 2 controls coin 2 and coin 8          (Coin 2 – Bank 1: Coin 2 Bank 2).
and so on up to:-
Inhibit 6 controls coin 6 and coin 12         (Coin 6 – Bank 1: Coin 6 Bank 2).

Providing the corresponding bank of coins are enabled, (see TSP014 "SR5 BDTA **MechTool**$^{TM}$ Manual" for further details), a low (<1V), on an inhibit pin will enable the corresponding coin/s to be accepted, while a high (>4V) will cause the corresponding coin/s to be rejected.

Each Inhibit input has an internal 10K pull-down resistor fitted.  Therefore if the pin is not connected then coins will accept.

The hardware configuration for the Inhibits is shown below:
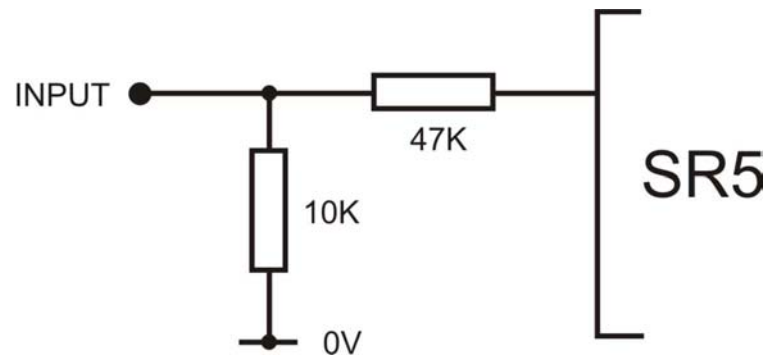


*Figure 3: Inhibits 1 to 6 Input*

*Table 5: Inhibit Input DC characteristics*

| Characteristic | Value |
|----------------|-------|
| V in Low (max) | 1V DC |
| V in High (min) | 4V DC |
| V in High (max) | 24V DC |

# 8.    Coin Return Output (Parallel Interface)

The Coin Return output, when used in conjunction with an escrow or other payout device, can be used to detect that the customer wishes to cancel the transaction and receive his money back.

Once the reject lever is pressed the output will become active (<1V), for the duration the reject lever is pressed.
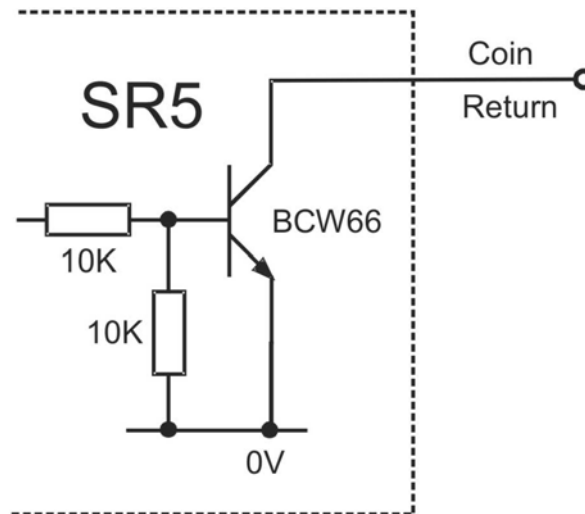


*Figure 4: Coin Return Output*

*Table 6: Coin Return Output DC characteristics*

| Characteristic | Value |
|---|---|
| Max V on | <0.8V at I max |
| Max V off | 24V |
| I max | 50mA |

## 9.  Inhibit All Input (Parallel Interface)

The Inhibit All input has an internal 10K pull-up resistor fitted.  If the pin is not connected then coins will accept.  This is assuming the corresponding bank of coins are enabled.  (See TSP014 "SR5 BDTA **MechTool**<sup>TM</sup> Manual" for further details).

The hardware configuration for the Inhibit All input is shown below:
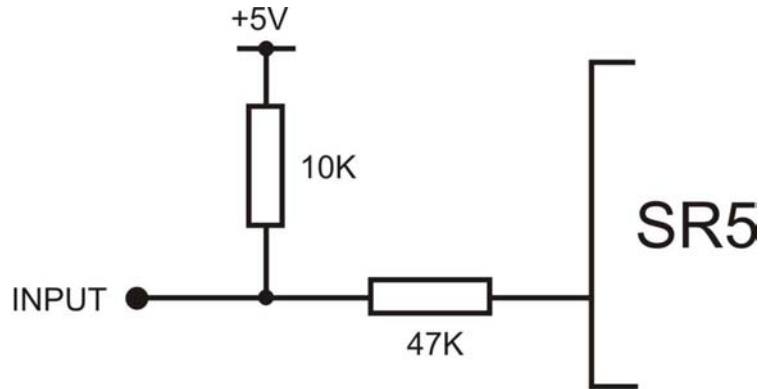


*Figure 5: Inhibit All Input*

*Table 7: Inhibit All Input DC characteristics*

| Characteristic | Value |
|---|---|
| V in Low (max) | 1V DC |
| V in High (min) | 4V DC |
| V in High (max) | 5V DC |

# 10. Coin Accept Outputs A1 to A6

Each coin accept output consists of an open collector NPN transistor whose emitter is connected to 0V.  On acceptance of a true coin the transistor is turned on for 100ms +/- 10%.

The host machine must look for valid credit pulses NOT LESS THAN 50ms. It is not sufficient to merely detect the edges of credit pulses. This 'de-bounce' will prevent credits being registered by the host machine as a result of any noise or false credit pulses being induced on the output lines.
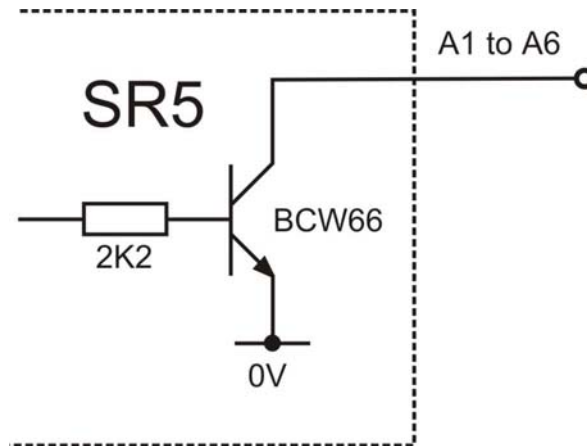


*Figure 6: Accept Outputs*

*Table 8: Accept output DC characteristics*

| Characteristic | Value |
|---|---|
| Max power dissipation per output | 200mW |
| Max V on | <0.8V at 20mA |
| Max V off | 24V |
| I max | 200mA |

## 11. Alarm / Jam Connector

Various error / alarm conditions can be detected by the SR5 BDTA and reported to the host machine (see Table 9).
This shows the fault condition, the output pin which is activated and the duration the pin is activated for.
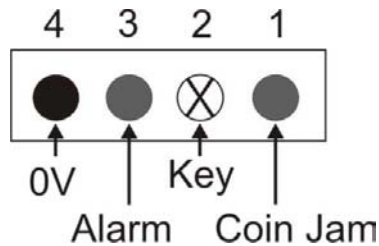


*Figure 7: Alarm / Jam Connector*

*Table 9: Alarm / Jam description table*

| Always ON [1] | ON when Alarm = ON [2] | Output Pin [3] | Duration |
|---|---|---|---|
| Validation timeout. | | Jam | 500ms |
| Coin too slow. | | Jam | 500ms |
| Credit sensor timeout. | | Jam | 500ms |
| | Sorter opto blocked. | Jam | 500ms |
| | Sorter opto timeout. | Jam | 500ms |
| | Credit sensor blocked. | Jam | 500ms |
| | Coin travelling backwards. | Alarm | 500ms |

[1] Always ON:              These conditions cannot be switched off.
[2] ON when Alarm = ON:     These conditions are only checked and reported if the Alarm ON was set when ordering or switched on via the **MechTool**[TM] feature.
[3] Output Pin:             This is the pin which is activated for each of the adjacent conditions.
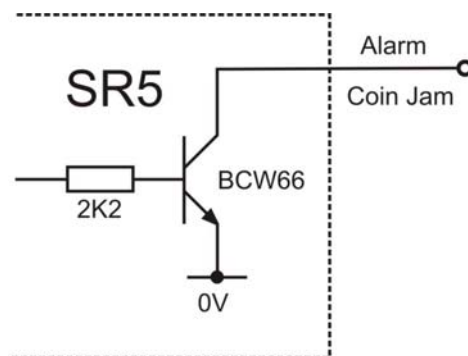


*Figure 8: Alarm / Jam Output*

*Table 10: Alarm / Jam Output DC Characteristics*

| Characteristic | Value |
|---|---|
| Max power dissipation per output | 200mW |
| Max V on | <0.8V at 20mA |
| Max V off | 24V |
| I max | 200mA |

# 12. Power-up Diagnostics

Various error conditions can be detected by the SR5 BDTA when it is first switched on and this can then be reported to the host machine via the Alarm output pin (see Table 11).
This shows the fault condition, the output pin which is activated and the duration the pin is activated for.
ALL of the conditions below will be active for as long as the fault condition is valid.

*Table 11: Power-up diagnostics description table*

| Always ON [1] | ON when Power-up Diagnostics = ON [2] | Output Pin [3] | Duration |
|---|---|---|---|
| Eeprom checksum test | | Alarm | $\propto$ [4] |
| | Validation area check | Alarm | $\propto$ |
| | Credit sensor check | Alarm | $\propto$ |
| | Sorter opto blocked [5] | Alarm | $\propto$ |

[1] Always ON:                                   This condition cannot be switched off.

[2] ON when Power-up Diagnostics = ON:           These conditions are only checked and reported if the Alarm ON was set when ordering or switched on via the **MechTool**[TM] feature.

[3] Output Pin:                                  This is the pin which is activated for each of the adjacent conditions.

[4] $\propto$:                                   Indicates the condition will be present until the fault is fixed.

[5] If a sorter is fitted.

# 13.  Credit Code Mode

## 13.1  6 Coin Mode

The credit code mode can be selected via the Rotary switch (see TSP014 "SR5 BDTA **MechTool<sup>TM</sup>** Manual").

This determines whether the SR5 is in 6 coin mode or 12 coin mode.  6 coin mode uses a single Accept output per coin and is therefore limited to 6 different credit codes, i.e. coins 9 to 14 repeat the same sequence.

*Table 12: 6 Coin Mode Accept Outputs*

| Coin | Accept 1 | Accept 2 | Accept 3 | Accept 4 | Accept 5 | Accept 6 |
|------|----------|----------|----------|----------|----------|----------|
| 1,9 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2,10 | 0 | 1 | 0 | 0 | 0 | 0 |
| 3,11 | 0 | 0 | 1 | 0 | 0 | 0 |
| 4,12 | 0 | 0 | 0 | 1 | 0 | 0 |
| 5,13 | 0 | 0 | 0 | 0 | 1 | 0 |
| 6,14 | 0 | 0 | 0 | 0 | 0 | 1 |
| 7,15 | NOT USED – NOT USED – NOT USED – NOT USED | | | | | |
| 8,16 | NOT USED – NOT USED – NOT USED – NOT USED | | | | | |

6 coin mode credit patterns (1 = Active, 0 = Inactive)

### 13.2  12 Coin Mode

In 12 coin mode a binary pattern is output on the Accept lines using A1, A2, A3 and A5.  A4 is used as a strobe to indicate a valid credit pattern.

*Table 13: 12 Coin Mode Accept Outputs*

| Coin | Accept 5 (MSB) | Accept 4 (Strobe) | Accept 3 | Accept 2 | Accept 1 (LSB) | Dec Value |
|------|------|------|------|------|------|------|
| 1 | 0 | 1 | 0 | 0 | 0 | 8 |
| 2 | 0 | 1 | 0 | 0 | 1 | 9 |
| 3 | 0 | 1 | 0 | 1 | 0 | 10 |
| 4 | 0 | 1 | 0 | 1 | 1 | 11 |
| 5 | 0 | 1 | 1 | 0 | 0 | 12 |
| 6 | 0 | 1 | 1 | 0 | 1 | 13 |
| 7 | NOT USED – NOT USED – NOT USED – NOT USED | | | | | |
| 8 | NOT USED – NOT USED – NOT USED – NOT USED | | | | | |
| 9 | 0 | 1 | 1 | 1 | 0 | 14 |
| 10 | 0 | 1 | 1 | 1 | 1 | 15 |
| 11 | 1 | 1 | 0 | 0 | 0 | 16 |
| 12 | 1 | 1 | 0 | 0 | 1 | 17 |
| 14 | 1 | 1 | 0 | 1 | 0 | 18 |
| 15 | 1 | 1 | 0 | 1 | 1 | 19 |
| 16 | NOT USED – NOT USED – NOT USED – NOT USED | | | | | |
| 17 | NOT USED – NOT USED – NOT USED – NOT USED | | | | | |

12 coin mode credit patterns
(only valid when Accept 4 is Active.  1 = Active, 0 = Inactive)

## 14. Serial Interface

*Note: The serial and parallel interfaces cannot be used together in the machine.*

The serial interface is used to program coin data and customer options.  It can also be used instead of the parallel interface to communicate with the machine.

Protocol: **ccTalk**® BACTA compliant implementation.

For further details on this section please refer to the current **ccTalk**® generic standard.

Connector type: 10 Way DIL (connector 1 on Figure 1: SR5 BDTA Connector Side).

Pin 1  -  DATA
Pin 2  -  0V            [Not used]
Pin 3  -  Not used
Pin 4  -  0V            [Not used]
Pin 5  -  /RESET
Pin 6  -  Not used
Pin 7  -  +12 Volts      [Power]
Pin 8  -  0 Volts        [Power]
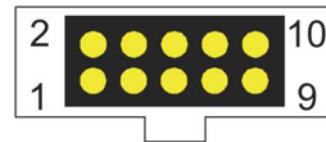Pin 9  -  /Serial Mode
Pin 10 -  Reserved



Figure 9: **ccTalk**® pin header

*Pin 9* is used to signal to the mech. that the serial interface is to be used rather than the parallel interface.  For serial mode, pin 9 = Low.

*Pin 5* is an optional hardware-reset line to the mech. and other peripherals on the bus.

*Note: Pins 2 and 4 are connected to 0 Volts.*

## 15. Rotary Switch Options.

The rotary switch is used to select the required **MechTool**$^{TM}$ function.

Below is a quick reference to the available functions.

For further details see TSP014 "SR5 BDTA **MechTool**$^{TM}$ Manual".

*Note: MechTool$^{TM}$ ON, must be specified when ordering, otherwise these features will NOT be available.*
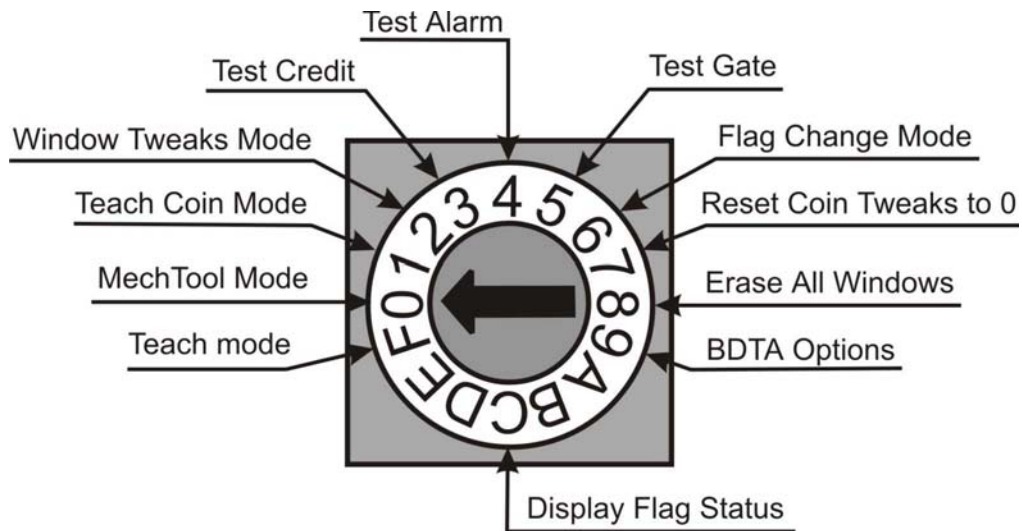


*Figure 10: BDTA **MechTool**$^{TM}$ Functions*

# 16. Servicing

Please refer to .

## 16.1 Removal and Refitting

Release the locking catches, fitted to the back channel, and carefully lift out the SR5 out. Once the machines harness becomes accessible, remove all the interface connectors.

Refitting the acceptor is the reverse of removal.

## 16.2 Cleaning

The coin rundown area should be cleaned regularly to ensure accurate validation of coins and tokens. Only a damp cloth should be used.

Under NO circumstances should any solvent, abrasive or foam type cleaner be used.

Access to the coin rundown is gained by opening the reject gate.

## 16.3 Accept Gate

To detach the accept gate, first carefully slide the gate spring (12) towards the rear of the SR5 and remove.  Pull the gate forward and downward to remove.

Re-fitting is the reverse of removal.
Take extreme care when re-fitting the accept gate spring.

## 16.4 Rear Cover

No User serviceable parts.

Access to all switches is achievable without removing the cover.  Therefore the cover should only be removed by approved service centres.

# 17. Fault Finding

The following information is presented for customers' guidance in rectifying a fault but does not cover all possible causes.

All acceptors with electronic faults should be returned to Money Controls Ltd. or to an approved service centre for repair.

| Symptom | Investigate | Possible Cause |
|---|---|---|
| Acceptor does not work (all coins reject). | Connector. | Poor contact. Loose wire. |
| | Power supply. | Not switched on. Incorrect voltage. Inadequate current. Rise time too slow. |
| | Inhibit inputs. | Acceptor inhibited. |
| | Accept gate. | Gate not free or dislocated. |
| | Accept channel. | Obstructed. |
| | Reject gate. | Not fully closed. |
| | LED is RED. | EEPROM checksum error[6]. SR Sensor faulty[7,8]. Credit sensor faulty[7,8]. Credit sensor blocked[7]. |
| | LED is YELLOW. | Remove the power and re-apply. The LED should be green. |
| Poor acceptance of true coins. | Power supply | Voltage less than 10V. (NB voltage drops when solenoid/s are activated). |
| | Accept gate. | Gate not free or dislocated. |
| | Connector. | Loose. |
| | Coin rundown. | Dirty. |
| | Bank select switches. | Both switches are DOWN and both banks are programmed with the same coins. |
| Coins stick or jam in acceptor. | Rundown. Accept channel. Accept gate. Reject gate. | Dirty or mechanical damage. |
| One of the true coin types always rejects. | Interface. | Damaged interface cable. |
| | Inhibit status. | Coin inhibited. |
| | Inhibit switch. | Switched to the ON position. |
| | Label. | Coin not programmed. |
| No accept signal. | Connector. | Loose or broken wire. |
| | Accept channel. | Dirty or obstructed. (acceptor time-out) |

[6] This condition requires the SR5 to be reprogrammed.

[7] These faults will only be seen if 'Power-up Diagnostics' is ON.

[8] These faults require to SR5 to be returned for repair.

# 18. Mechanical Specification

## 18.1 Position

The SR5 should be mounted within +/-2 degrees of the vertical in any plane.  It is intended for use in stationary environments.

## 18.2 Coin/Token Sizes

The accepted range of coin sizes are shown below:
This Graph is only intended as a guide.  If a coin is required that is close to the limits shown, please check with Money Controls Technical Services department first.
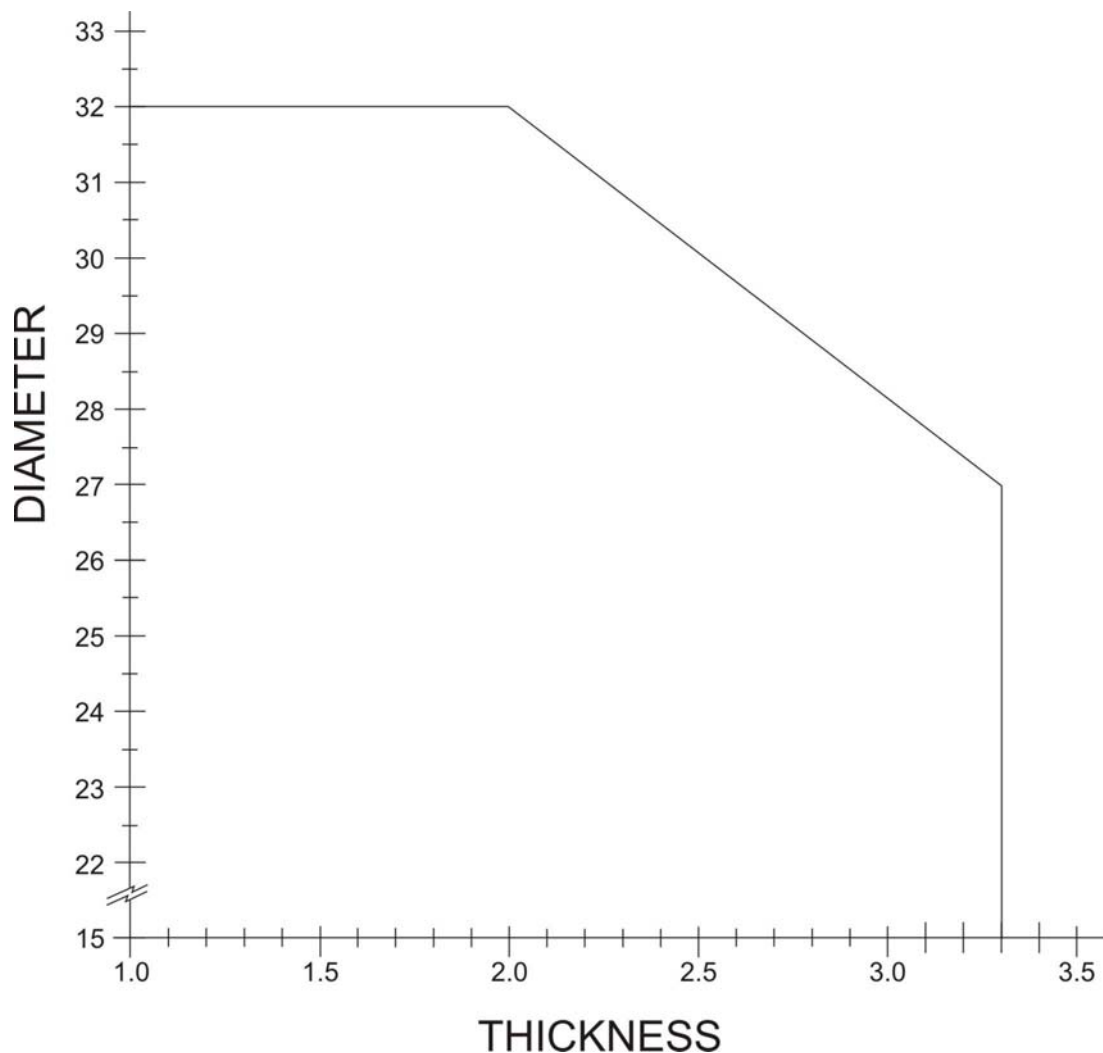


*Figure 11: SR5 Accepted Coin Dimensions Graph*

### 18.3  Specified EMC Performance

#### 18.31  EMISSIONS

This product is compliant with EMC test specification  EN55022; 1998

#### 18.32  IMMUNITY

This product is compliant with EMC test specification  EN55014-2; 1997

#### 18.33  SHOCK / VIBRATION IMMUNITY

This product is compliant with BS 2011 part 2.1.      [ IEC 68-2-27 ]

### 18.4  Environmental specification

*Table 14: Environmental Ranges*

| | |
|---|---|
| Operating temperature range: | 0°C to 55°C      10% to 75% RH non-condensing |
| Storage temperature range: | -20°C to 70°C   5% to 95% RH non-condensing |
| (Recovery time by the acceptor after a temperature step change is 1 hour per 20°C.  Maximum operating rate of change 20°C per hour.) | |

### 18.5  Material Flammability Rating

The major plastic part of the SR5 (the body) is rated as   UL94-V0

The other parts are rated as   UL94-HB
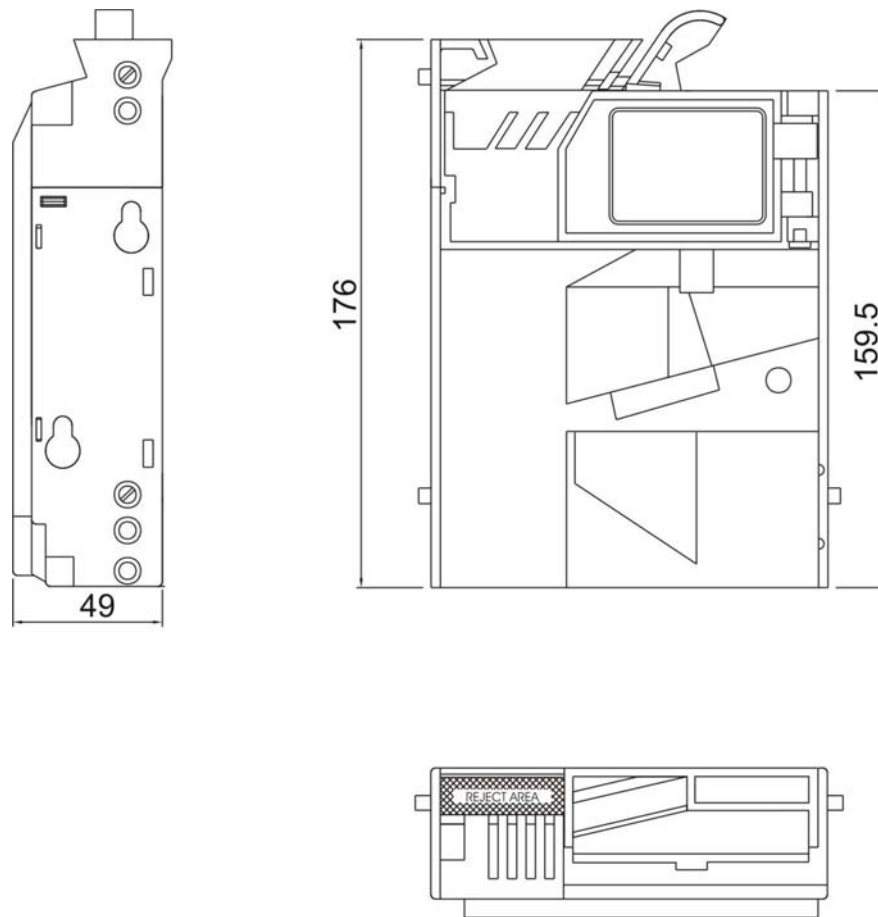
## 18.6  SR5 BDTA dimensions



*Figure 12: SR5 BDTA Dimensions*
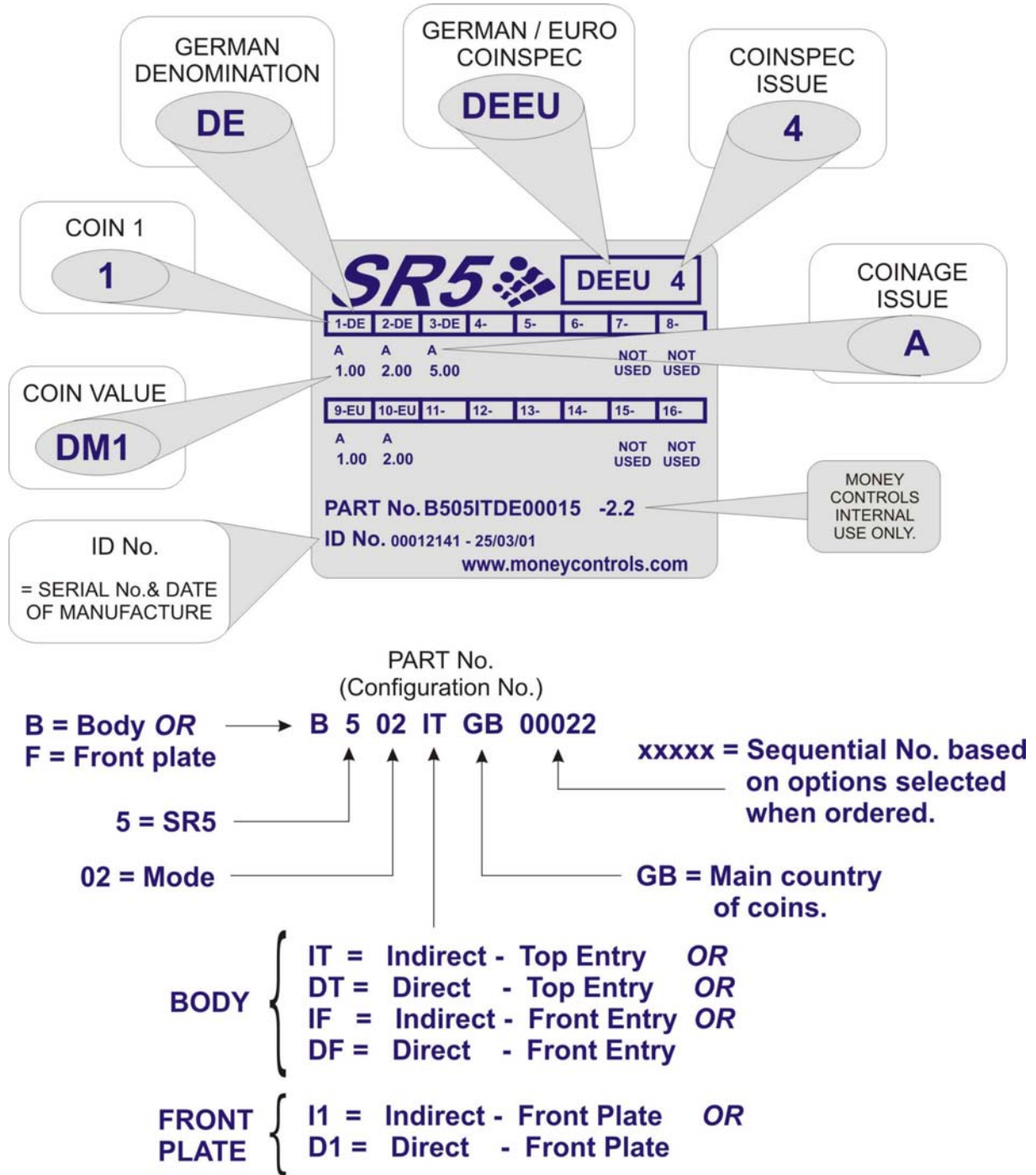
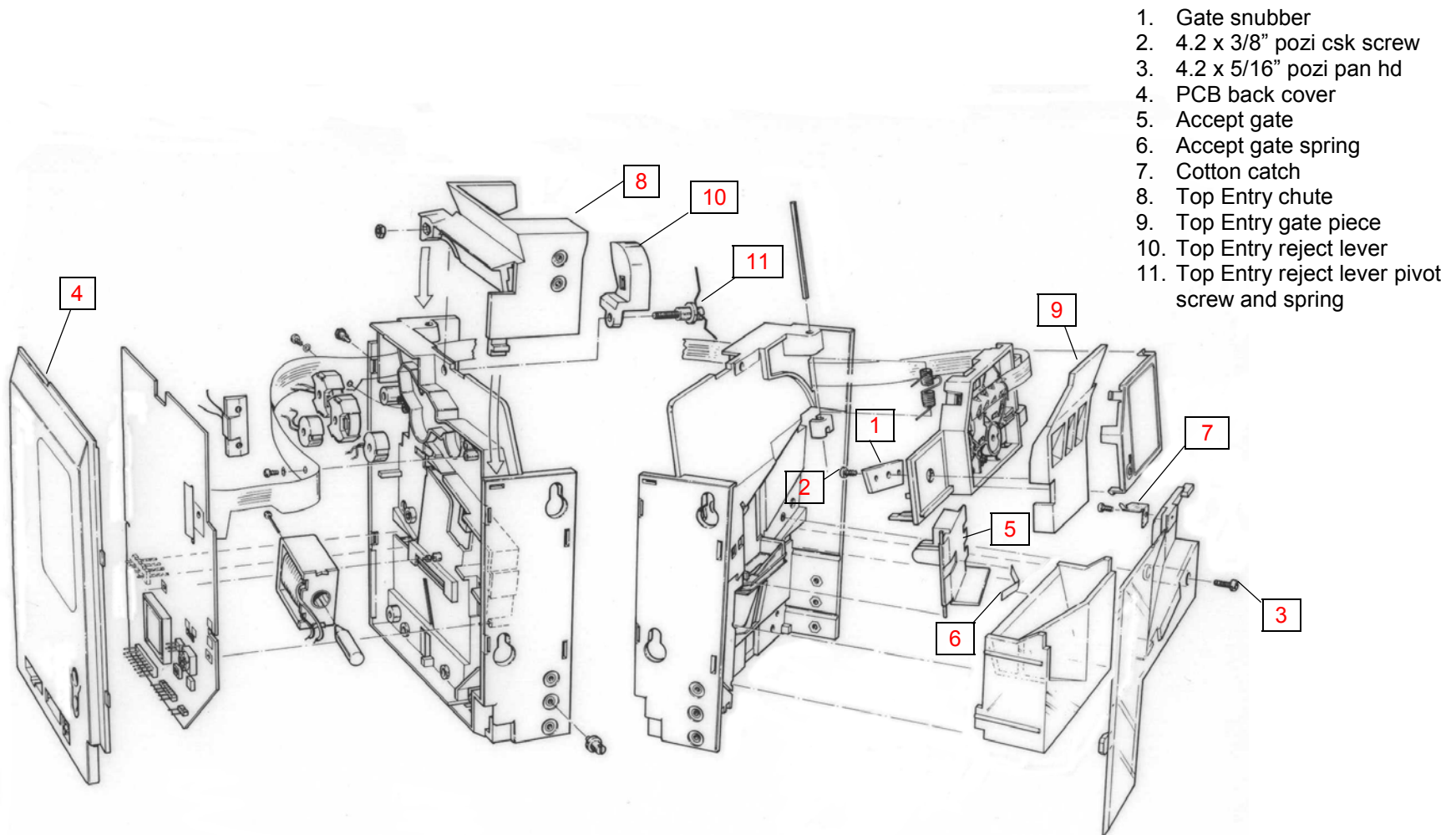## 19.  SR5 BDTA Label Details



*Figure 13: SR5 BDTA Label Details*

1. Gate snubber
2. 4.2 x 3/8" pozi csk screw
3. 4.2 x 5/16" pozi pan hd
4. PCB back cover
5. Accept gate
6. Accept gate spring
7. Cotton catch
8. Top Entry chute
9. Top Entry gate piece
10. Top Entry reject lever
11. Top Entry reject lever pivot screw and spring



*Figure 14: SR5 BDTA Exploded View*

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