**cctalk
bus**

SR3 Type 2 Serial Protocol

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Issue 1.5

Revision History

Issue	Date	Comments
1.0	25-01-2001	First Issue
1.1	11-05-2001	Minor updates
1.2	21-06-2001	Minor updates
1.3	12-09-2001	Header 210, Modify sorter paths… These are stored in RAM not EEPROM
1.4	15-04-03	Added TSP number Modified Headers and Footers
1.5	30-06-04	Modified footer

Contents

Introduction

The SR3 coin acceptor can operate entirely in serial mode with all conventional control and status functions implemented in the serial protocol.

The serial protocol is **cctalk**, now a standard for the money transaction industry.

Full details of the protocol can be found in the following document, available from the customer services department of Money Controls…

'cctalk Serial Communication Protocol - Generic Specification - Issue 4.0'

The generic specification explains the history and design philosophy of the protocol, the message structure and a complete list of commands covering different types of money transaction peripherals.

Listed below are the command headers available to SR3 and any product-specific features which you need to know about.

Implementation on SR3 Type 2

The protocol conforms to cctalk b96.p0.v12.a5.d0.c7.m0.x8.e0.i0.r4

In other words…
- 9600 baud
- open-collector
- +12V nominal supply
- +5V data pull-up
- supply sink
- connector type 7
- slave device
- 8-bit addition checksum
- no encryption
- cctalk minor release 0
- cctalk major release 4

Device Address

All SR3's leave the factory with **address 2**.

The address is stored in EEPROM and can be subsequently changed with serial commands. Unless you have an application requiring more than one coin acceptor on the serial bus, it is strongly recommended you leave the address alone. The default addresses for hoppers and bill validators have been made different and will not clash with the coin acceptor.

If the address has been changed to an unknown value then you will either have to search all through the entire address space (2 to 255) with the 'Simple poll' command until an ACK is returned or send the 'Address poll' command with the broadcast address.

Electrical Connections

Only 3 wires are required for the interface between an SR3 and the host machine.

```
(1)  +12V
(2)  –
(3)  0V
(4)  /DATA
```

Pin 2 is not used and should be left unconnected.

The bi-directional data line operates at 9600 baud, 1 start bit, 1 stop bit and no parity bits. There is no option to select a different baud rate.

The data pin on SR3 is pulled up to +5V via a **10K resistor** and should be driven with an open-collector transistor.

Inhibits and Overrides

SR3 can accept **12 different coins.** There are 12 inhibit bits used in the 'Modify inhibit status' command allowing any combination of coins to be accepted or rejected.

There is support for 8-way routing with a 7-way override.

At power-up or reset, all coins are inhibited and all sorter overrides are removed.

Coins cannot be accepted until a non-zero inhibit mask is sent to the mech.

Credit polling

Coin credits are obtained by polling the coin acceptor at regular intervals using the 'Read buffered credit or error codes' command. Up to 5 credits or errors are stacked in the return buffer.

The return data is 11 bytes in length.

[event counter]
[result 1A] [result 1B]
[result 2A] [result 2B]
[result 3A] [result 3B]
[result 4A] [result 4B]
[result 5A] [result 5B]

A & B are formatted as [credit code] [sorter path] or [0] [error code] depending on the logged event. See Table 2 in the generic specification for a list of error codes.

Note that the event counter wraps from 255 to 1, not 0.

A suitable polling interval is anywhere between **100ms and 900ms**. If other cctalk peripherals are on the bus then these may have to be polled as well.

SR3 has a *credit poll watchdog* feature whereby if the mech is not polled for 1s or longer then the device auto-inhibits and does not accept any more coins. When polling resumes, the auto-inhibit is lifted. This feature prevents coin swallowing in the event the host machine serial link goes down.

Sorter Operation

SR3 can operate without a sorter, or in 4-way and 8-way routing configurations. A sorter drive connector allows sorters from different manufacturers to be connected.

This table shows how the different modes relate to each other. Route codes 'A' and 'a' are equivalent with a 4-way sorter, 'B' and 'b' etc.

cctalk Route Code	cctalk Override Bit Position	8-way Route Number	4-way Route Letter
1	0	1	D
2	1	2	C
3	2	3	B
4	3	4	A
5	4	5	a
6	5	6	b
7	6	7	c
8	-	8	d

Serial Teach

Coins can be taught using the 'Teach mode control' and 'Request teach status' commands. This method involves the insertion of a small sample of representative coins (typically 8) but the process can be controlled entirely over serial.

Calibration

SR3 implements 'calibration' which is the Money Control's system for remote coin programming. Using this method, a new coin set can be programmed into SR3 without inserting any of the coins themselves.

Remote coin programming uses the 'Upload window data' and 'Download calibration info' commands.

Further details of calibration are not given in this document. If you are interested in remote coin programming then contact Money Controls for the latest policy and support equipment.

Command List

The following table shows all the cctalk commands available for customer use on SR3. More details can be found in the generic specification.

Any [data bytes] are shown in decimal.

MDCES = Multi-Drop Command Extension Set. These commands are only used when peripheral addresses are unknown.

Header numbers are shown in descending order.

*** SR3 has 52 serial commands ***

Header	Function	Returned Data and Comments
254	Simple poll	ACK returned. All cctalk peripherals should reply to a simple poll - use this command for testing the comms link.
253	Address poll	MDCES support
252	Address clash	MDCES support
251	Address change	MDCES support
250	Address random	MDCES support
249	Request polling priority	[1] [200] = 200 ms
248	Request status	[0] = 'OK' [1] = 'Flight deck open'
247	Request variable set	Nothing of interest
246	Request manufacturer id	'Money Controls'
245	Request equipment category id	'Coin Acceptor'
244	Request product code	'NXS'
243	Request database version	[0] if no calibration support, otherwise new coin sets can be remotely programmed.
242	Request serial number	Supported. Range 0 to 16,777,215. This is an internal electronic serial number and may be different to the batch serial number on the label. The serial number is unique on SR3 and may not be modified by conventional means.
241	Request software revision	'NXS-V1.04' or a subsequent revision.
240	Test solenoids	Bit 0 = Accept gate Bit 1 = Sorter flap 1 Bit 2 = Sorter flap 2 Bit 3 = Sorter flap 3 Pulsed for 500ms
238	Test output lines	Bit 0 = A1 Bit 1 = A2 Bit 2 = A3 Bit 3 = A4 Bit 4 = A5 Bit 5 = A6 Bit 6 = Tri-colour LED to Green Bit 7 = Tri-colour LED to Red Pulsed for 500ms
237	Read input lines	For low level diagnostics only. 2 bytes returned… [Byte 1] Bits 3:0 = Mode Switches 4 to 1 Bit 4 = Teach Switch Bit 5 = Security Switch Bit 6 = Master Inhibit Bit 7 = Not Used (0) [Byte 2] Bit 5:0 = Inhibit Switches 6 to 1 Bit 7:6 = Not Used (0)

236	Read opto states	Bit 0 = Credit opto Bit 1 = Reject opto
233	Latch output lines	Bit 0 = A1 Bit 1 = A2 Bit 2 = A3 Bit 3 = A4 Bit 4 = A5 Bit 5 = A6 Bit 6 = Tri-colour LED to Green Bit 7 = Tri-colour LED to Red (0 = latch off, 1 = latch on)
232	Perform self-check	Supported. Refer to table 3 in the generic specification.
231	Modify inhibit status	[inhibit 1] [inhibit 2] Support for 12 coins. 0 = inhibited, 1 = enabled Inhibits are stored in RAM and are lost at power-down or reset. The power-up state is 'all coins inhibited'.
230	Request inhibit status	Supported.
229	Read buffered credit or error codes	Supported. 5 event buffer. This is the only command which can be used to obtain coin credit information.
227	Request master inhibit status	Supported - Reads the state of the master inhibit line
226	Request insertion counter	Supported The counter is stored in RAM and is cleared at power-down or reset.
225	Request accept counter	Supported The counter is stored in RAM and is cleared at power-down or reset.
222	Modify sorter override status	Bit 0 = override route 1 (0 = override) Bit 1 = override route 2 Bit 2 = override route 3 Bit 3 = override route 4 Bit 4 = override route 5 Bit 5 = override route 6 Bit 6 = override route 7 Bit 7 = { not used) Overrides are stored in RAM and are lost at power-down or reset. The power-up state is 'no overrides'.
221	Request sorter override status	Supported
216	Request data storage availability	[0] [0] [0] [0] [0] EEPROM storage is NOT available for customer use.
213	Request option flags	Bit 0 = credit code format (0 = position)

212	Request coin position	Supported Returns position of coins with specified parallel (i.e. 1 of 6) credit code.
210	Modify sorter paths	[coin position] [path] coin position : coin 1 to 12 path : route 1 to 8 Sorter paths are stored in RAM and are lost at power-down or reset.
209	Request sorter paths	1 path returned
202	Teach mode control	[coin position] Specify 1 to 12 for the coin. If the teach mechanism has been disabled for security reasons then the 'teach error' code is returned.
201	Request teach status	Supported
197	Calculate ROM checksum	4 byte ROM checksum returned
196	Request creation date	Supported
195	Request last modification date	Supported
194	Request reject counter	Supported The counter is stored in RAM and is cleared at power-down or reset.
193	Request fraud counter	Supported The counter is stored in RAM and is cleared at power-down or reset. Note : Fraud coins can only be counted if they are factory pre-programmed into the coin acceptor and marked as 'bad'
192	Request build code	8 character ASCII string representing major build options. May contain spaces.
185	Modify coin id	Supported 6 x ASCII characters e.g. GB100A It is not recommended that factory settings are changed unless a new coin set is being programmed.
184	Request coin id	Supported 6 x ASCII characters e.g. GB100A
183	Upload window data	Supported Various security options limit the scope of this command.
182	Download calibration info	Supported No customer parameters.
173	Request thermistor reading	Supported
170	Request base year	'2000'
169	Request address mode	[84] Address is stored in EEPROM and may be changed serially (non-volatile).
4	Request comms revision	[1] [4] [0] cctalk level = 1 specification = 4.0

3	Clear comms status variables	Supported
2	Request comms status variables	Supported
1	Reset device	Supported - performs a 'software reset'.