



STANDARD OPERATING PROCEDURE

Ref:	SOP-0200-03-N-DEV
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Description:	SEC Starpoint Technical Information
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BY CONTACTING STARPOINT ELECTRICS LTD

sales@starpoint.uk.com

Tel: +44 (0)208 391 7700 or Fax: +44 (0)208 391 7760

Starpoint Electronic Counter





Starpoint Electrics Ltd.

Website: - www.starpoint.uk.com

Contact: - sales@starpoint.uk.com

Telephone: - +44 (0) 20 8391 7700

Fax: - +44 (0) 20 8391 7760

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Contents

Introduction

Conditions of Use

1. Temperature Range
2. Humidity
3. Operational Life
4. Handling
5. Warranty

Hardware Overview

1. Construction
2. Communications Interface
3. Interface Connector
4. LCD Display
5. Reset Line
6. Data Storage
7. Hardware Specification

Software Overview

1. Host Interface Operation
2. Command Format from Host
3. Command Response from SEC
4. LCD Display Interface
5. Software Watchdog Facility

Functionality

1. Power Up Sequence (SEC)
2. Power Up Sequence (Host)
3. Commands
 - a. <20> Request Status
 - b. <21> Request Market Type
 - c. <22> Request Last Error
 - d. <23> Request Version
 - e. <24> Reset Counter Value
 - f. <25> Request Last Command ID
 - g. <26> Request Fingerprint
 - h. <30> Set Number of Counters
 - i. <31> Set Market Type
 - j. <32> Set Counter Type
 - k. <40> Show Text
 - l. <41> Show Counter Value
 - m. <42> Show Counter Text
 - n. <43> Show Bit Pattern
 - o. <50> Counter Increment (Small)
 - p. <51> Counter Increment (Medium)
 - q. <52> Counter Increment (Large)
 - r. <54> Cycle Counter Display
 - s. <55> Stop Cycle
 - t. <5C> Self Test

Contents continued

- 4. SEC Response Codes
 - a. <60> Data Header
 - b. <61> Self Test
 - c. <62> NAK
- 5. Error Codes
 - a. 00 No Error
 - b. 01 Transmission Checksum Corrupt
 - c. 02 SEC Busy
 - d. 03 Invalid Data in Message
 - e. 04 Invalid Command
 - f. 05 EEprom Read/Write Error
 - g. 06 Fingerprint Requested When Not Set
 - h. 07 Firmware Checksum Failure
 - i. EEprom Bus Failure
 - j. 09 Receive Buffer Overflow
 - k. 80 Single EEprom Checksum Fail
 - l. 81 Double EEprom Checksum Fail
 - m. 82 Comm's Time Out
- 6. Portability

Security

- 1. Communications
- 2. Fingerprint

- Appendix 1 Example of Message Strings between Host & SEC
- Appendix 2 Interface Connector Pin Out
- Appendix 3 LCD Display Map
- Appendix 4 Interface Timing Diagram

Drawing G6D008-01-ZZZZ Mounting Details

Introduction

Designed for the Gaming & Amusement Industry, this document describes the operation of the Starpoint Electronic Counter (SEC). It details the general hardware configuration, the methods of operation and the software communication protocols required to use the unit.

The SEC is based around the Toshiba TMP87P808M 8 bit controller. The device has 4 Kbytes of Program ROM and 256 bytes of user RAM. The device is connected to a custom 7-digit LCD display (via a LCD driver device), an 8K bit serial EEprom and a serial link.

The SEC has available up to 31 counters (indexed as counter 0 to counter 30, (0 to 1E Hex) stored in a non-volatile EEprom device. Each counter can store values from 0 to 9,999,999, which can be displayed on a 7 digit, 7-segment LCD display. Each counter also has 7 text characters associated with it that can be displayed when the counters are cycled, enabling individual counter readings to be easily located and logged by the operator.

The text can be changed by the host machine, enabling the counter unit to be configured for different languages or different counter uses as it is moved from the host machine to another.

The counters are managed under host control via a clocked serial link. The host can use as many of the 31 counter as is required, the counter cannot be cleared to zero or decremented under normal circumstances. The lifetime of the unit is specified as a minimum of 9,999,999 single increments on any one counter.

During normal operation, the SEC will display the contents of the counter 0 (default) on the LCD display. The host can also control the LCD display directly, enabling text and counters to be shown in any user-defined order, or to show text messages from the host machine.

CONDITIONS OF USE

1. Temperature Range

The SEC will operate satisfactorily in the temperature range 5°C to 50°C provided there is an unrestricted airflow around the unit.

2. Humidity

The unit will operate in the range of 0% to 95% relative humidity.

3. Operational Life

The EEPROM is guaranteed from Toshiba as having a life in excess of 10 million read / write cycles. Tests have shown that the life may be as high as 16 million. Each counter will 'rollover' to 0000000 if incremented beyond 9,999,999. If this occurs, Bit 1 of the status register is set, this being an indication to the host that any one of the 31 counters has exceeded 10 million single increments, and the life of the SEC has expired beyond guaranteed usage. It is possible, using the counter increment instructions, to increment the counter by more than 1. The SEC tracks the contents of the counters, not the number of read / write cycles.

4. Handling

Whilst the SEC is housed within an anti-static plastic moulding, it is not recommended the unit be exposed to an adverse static environment as damage may occur to the integrated circuits.

It is not recommended to install or remove the SEC unit whilst the host machine is powered up, as this may lead to internal damage.

5. Warranty

A guarantee of twelve months from the shipment date is available for the SEC, subject to Starpoint's standard terms and conditions. This guarantee is offered irrespective of the number of operations of the unit during this period but subject to operation within the environmental conditions specified above. A unit, which may require return under the guarantee, should be returned direct to Starpoint or your local distributor.

HARDWARE OVERVIEW

1. **Construction**

Drawing G6D008-01-ZZZZ shows the SEC construction and panel mounting details.

2. **Communications Interface**

The clocked serial interface conforms to the Motorola SPI (Serial Peripheral Interface) standard. The SPI standard details 4 modes of operation, dependant on the clock polarity and phase, the SEC unit uses SPI mode 2. In this mode, the clock line (SCLOCK) idle state is HIGH (logic 1). To transmit, data is set up on the SIN line, the clock is taken low and then it is taken high again. The next data bit is set up on the SIN line, the clock taken low then high and so the transmission continues. (The data is clocked in, on falling edge, MSB is transmitted first). Once transmission is complete and the SEC has executed the command, the response can be clocked out. First the clock is taken low and then taken high again. The received data is sampled as the clock edge rises. This is repeated for all the data bits. Maximum clock speed at 50% duty ratio is 5KHz. Slowest clock speed is 100Hz. See Appendix 2 for timing diagram.

3. **Interface Connector**

Connection to the SEC is via a six-way Leotronics right-angled connector. The host connector should be a Molex KK 7720S 22-50-3065 or equivalent. The signal connections are shown in Table 1.

4. **LCD Display**

The LCD display is a custom device with limited Alpha characters, which is contained in Table 2.

5. **Reset Line**

A reset line is provided that forces a hardware reset of the TMP87P808M device. The reset should be asserted after power has been applied and unit power is stable to ensure a good reset, after which it should only be asserted if the operation of the SEC has become suspect and several retries on the communications link have failed, or instances of sparking may be suspected.

Operation of the reset line will not affect the counter values but will cause a clearance of the pending and current communications buffers.

Communication may commence 350mS after Power on Reset, or Hardware Reset.

6. Data Storage

Counter data is stored in the EEprom in the 24 bit binary format followed by an 8-bit checksum, making a total of 4 bytes. This data is then followed by a 2's complement copy of the same information and another checksum. Should data become corrupt, the SEC will use the two checksums to determine which of the copies is in error. The good copy will then be used to correct the error in the faulty copy.

Text data is stored as a string of 7 ASCII characters followed by a checksum. Text strings are checked every time they are displayed on the LCD display. Should a text string become corrupt, a bit is set in the status byte so the host can take action and resend the text at the next opportunity. Before any writes to EEprom are performed, each line of the EEprom interface bus is asserted and negated and the change of state is verified. Should a change of state not be seen, the SEC assumes an attempted fraud and will generate an error. Once the data lines are verified, the SEC performs a write/verify cycle to a known EEprom location. Only when this cycle is verified will the SEC proceed with writing a counter value to the EEprom.

Should any read from EEprom fail (due to fraud attempt, checksum failure etc.) the read is attempted a further 10 times before the SEC assumes the data really is corrupt. This way, spurious errors during read cycles are reduced. The same procedure is used during a write cycle - the location is read after the write has been performed and if the read is incorrect the location is written again until it reads correctly.

7. Hardware Specification

Maximum Supply Voltage	36v
Minimum Supply Voltage	8.5v
Quiescent Current	21mA

Reset, Data In & Clock Inputs

Maximum Low Level Input	3v
Maximum High Level Input	20v
Inputs are pulled high internally	5v
Inputs can be driven directly via open collector drivers	

Data Output

Maximum Output Current	100mA
Maximum Output Voltage	60v

Read/Write Clock Speed

Maximum	5KHz
Minimum	100Hz

SOFTWARE OVERVIEW

1. Host Interface Operation

Incoming characters from the data-in line are placed in a buffer, and then when the buffer is full the command is decoded and, if valid, executed. Outgoing messages are placed in the output buffer and then sent via the data-out line. Note that full duplex (simultaneous transmit/receive) is not possible and will result in data loss, so the host should ensure this does not occur. The Host Interface will clear the input buffers if an incoming transmission are not completed within 1 second.

2. Command Format From Host

Commands sent to the SEC consist of a variable length data packet consisting of data bytes: a command, a message ID, a data count, data (if applicable), and a checksum.

<CMD> <ID> <DCNT> --- <Data bytes if required>---<CS>	
CMD	Is a code that defines the type of message being sent.
ID	The index number of the message being sent. This number is generated by the host machine and starts at 00. It is incremented every time a new message is sent, up to a value of FF after which it rolls over to 00. This ID is used to determine which lost messages may require resending by the host.
DCNT	The number of data bytes following the DCNT byte. This value does Not include the checksum.
DATA	A sequence of data bytes, depending on the type of command.
CS	The checksum is the lower 8 bits of the sum of all the preceding bytes in the message, (CMD, ID, DCNT and any DATA bytes).

Note: ALL BYTES ARE SPECIFIED THROUGHOUT IN HEXADECIMAL.

3. Command Response from SEC

The SEC replies to the Command messages in a similar format except the CMD byte will be either on ACK (61) or a DATA header (60). Receipt of these responses signifies the command has been received correctly and the reply has been sent. If a NAK (62) is received this would indicate some corruption of the command message, the command and incremented ID should be resent.

Some examples of communication series are shown in Appendix 1.

The response by the SEC with a reply and ID serves to verify to the host the current valid message the SEC is dealing with. This is particularly useful if the host has sent a command prior to loss of power. By requesting the ID of the last command the next time the machine powers up, the host can verify that the last command has been dealt with correctly by the SEC, If data was requested at the last command before loss of power and not received the host should resend the command with a new ID and the SEC will reply.

If the host sends a repeat of a previous ID and the command was correctly executed, the SEC will acknowledge the message but will NOT execute it.

4. LCD Display Interface

ASCII data is coded into 7-segment character and written to the display buffer. The hardware then continuously displays the contents of the buffer on the LCD display and requires no further software overhead. The ASCII characters the SEC can display are shown in Table 2.

5. Software Watchdog Facility

The SEC monitors itself by an on-board watchdog facility, enabling it to detect software malfunction and deal with them accordingly

FUNCTIONALITY

1. Power Up Sequence (SEC)

On the first power up at manufacture the counters are all set to zero and a non-destructive flag set to prevent a clear on subsequent power ups. All counters in the EEprom have a sum check associated with them for security.

2. Power Up Sequence (Host)

Every time the host machine powers up and after initialization it should request the fingerprint of the counter. If this is different from the previously recorded fingerprint, the host should record the new fingerprint and that the counter has been changed. The host should set the number of counters and the text for the counters. The host should also check the ID of the last message that the SEC received. This will indicate if a reset occurred during execution of a command (e.g. increment counter). If this is the case, the host should take remedial action as required, e.g. either retransmit the last message or assume that it was completed successfully and take no further action.

3. Commands

The SEC will process one command at a time from the host system i.e. increment counters, display counter etc. whilst processing a command any receipt of a new command will receive a <NAK> and SEC Busy response. Once a complete command is received, the SEC will process the command and then send an appropriate response back to the host. If the command was completed successfully and no data was requested, an <ACK> message is sent back to the system. If the command requested any data, the data will be sent to the host, followed by a checksum byte, details of the reply are contained in the sub-section dealing with the individual command. If an error occurred when processing the command, or the command was invalid, then a <NAK> message is sent back to the host system. The data byte of this <NAK> message will contain data that indicates the nature of the error and the host can take appropriate action.

The specific commands that can be sent to the SEC are listed in this section.

For simplicity index numbers and check sums are shown as <ID> and <CS> respectively and are unique to the message at transmission time. Data bytes are shown as <D1> to <D8> as required in all cases <D1> is the MSB. The SEC responses are the correct response for the given command; an error response will be given if an error occurs in transmission or execution of the command. Execution times shown indicate maximum delay between end of message sent and start of message being received.

a. <20> Request Status

Message:		20	<ID>	00	<CS>	From Host
Response:	60	<ID>	01	<D1>	<CS>	From SEC

The command is sent by the host to request the current status information for the SEC. The SEC sends back a data byte containing the following information:

<D1> Bit Field	Description
Bit 0	Set if the counter display text has become corrupted. The host should resend the text.
Bit 1	Set if one or more of the counter values has rolled over (>9,999,999) and remains set.
Bit 2	Set if any writes to EEprom have failed for any reason.
Bit 3	Set if the SEC has repaired any of the EEprom counter values.
Bit 4	Set if the SEC main program integrity is suspect.
Bit 5	Set to indicate the SEC fingerprint is fixed.
Bit 6	Spare
(MSB) Bit 7	Spare

Execution time 15mS.

b. <21> Request Market Type

Message:	21	<ID>	00	<CS>		From Host
Response:	60	<ID>	01	<D1>	<CS>	From SEC

This command requests the Market Type from the SEC. Market types maybe used to identify different counter and text combinations between markets and may be used to value from 00 to FF (0 to 255 decimal). The SEC stores the market type but does not make any use of the value – it is only the host machine’s reference.

<D1>	Market
01	UK AWP Token (Cash in/out, Token in/out, Token refill)
02	UK AWP All Cash, Club & SWP (Cash in/out, Cash refill)
03-FF	Undefined

Execution time 15mS.

c. <22> Request Last Error

Message:	22	<ID>	00	<CS>				From Host
Response:	60	<ID>	01	<D1>	<CS>			From SEC

The last error code generated by the SEC will be transmitted to the host. See section 4.5 - Error Codes for a detailed list of what the codes mean.

<D1>	Description
00	No error
01	Transmission checksum corrupt
02	SEC busy
03	Invalid data in message
04	Invalid command
05	EEPROM read/write failure
06	Fingerprint requested when not set
07	Firmware checksum failure
08	EEPROM bus failure
09	Receive buffer overflow
80	Single EEPROM checksum failure
81	Double EEPROM checksum failure
83	Comm's time error

Execution time 15mS

d. <23> Request Version

Message:	22	<ID>	00	<CS>					From Host
Response:	60	<ID>	01	<D1>	<D2>	<D3>	<CS>		From SEC

The SEC will send an ASCII representation of its current software version. This will be three characters <D1><D2><D3> which represent two numbers and a letter – e.g. <30><32><45> is '02E'

Execution time 15mS

e. <24> Reset Counter Value

Message:	24	<ID>	01	<D1>	<CS>				From Host
Response:	60	<ID>	04	<D1>	<D2>	<D3>	<D4>	<CS>	From SEC

The host requests the current value of the counter specified by the byte <D1> from the host, in the range 0 to 1E. The current value of the specified counter is sent from the SEC to the host system in BCD format in data bytes <D1><D2><D3><D4> as follows:

Data Byte	Bits	Description
D1	7-4	Most significant (1 st) Digit (1,000,000's)
	3-0	2 nd Digit (100,000's)
D2	7-4	3 rd Digit (10,000's)
	3-0	4 th Digit (1,000's)
D3	7-4	5 th Digit (100's)
	3-0	6 th Digit (10's)
D4	7-4	7 th Digit (1's)
	3-0	Not Used

For example, if counter 0 shows as `1234567' on the display, the host machine would receive data <D1><D2><D3><D4> as <12><34><56><7X>, where X is undefined.

Execution time 20mS

f. <25> Request Last Command ID

Message:	25	<ID>	00	<CS>				From Host
Response:	60	<ID>	01	<D1>	<CS>			From SEC

The SEC sends the ID code of the previous command it received and executed from the host as data byte <D1>. This can be used by the host to determine if messages were missed during a power down cycle, for instance. Command ID codes should range from 00 to FF.

Execution time 15mS

g. <26> Request Fingerprint

Message:	26	<ID>	00	<CS>					From Host
Response:	60	<ID>	04	<D1>	<D2>	<D3>	<D4>	<CS>	From SEC

The SEC sends its stored fingerprint to the host. The fingerprint consists of a 32 bit (4 byte) binary code assigned to the SEC at manufacture. The host machine should also check the fingerprint has been set correctly. If the fingerprint has not been set, this command will return a <NAK> code with an error code of 06 – Fingerprint not set. This error code will also be returned if an attempt is made to increment the counters whilst the fingerprint is not set.

Execution time 15 mS

h. <30> Set Number of Counters

Message:	30	<ID>	01	<D1>	<CS>	From Host
Response:	61	<ID>	00	<CS>		From SEC

This command sets the number of counters that will be shown using the cycle counter command (code 54). The value <D1> can be set in the range 1 to 1F. If a value is specified outside of the range, a <NAK> message will be returned along with an error code 03 – Invalid data is command. Note that setting this value does not restrict the number of counter that the host can use in anyway.

Execution time 25mS.

i. <31> Set Market Type

Message:	31	<ID>	01	<D1>	<CS>	From Host
Response:	61	<ID>	00	<CS>		From SEC

The market type is used as an identifier to determine if the host needs to modify the counter text and the number of counters when the counter is moved from one machine to another. See section 4.3.2 for a description of the market types.

Execution time 25mS.

j. <32> Set Counter Text

Message:	32	<ID>	08	<D1>	<D2>	<D3>	<D4>
	<D5>	<D6>	<D7>	<D8>	<CS>		From Host
Response:	61	<ID>	00	<CS>			From SEC

The text for each counter can be set using this command - the text is stored in EEprom and will remain until changed. This text is shown on the LCD when the counters are displayed by the host using the show counter text commend <42>. The byte <D1> specifies the index of the counter text to set and may be in the range 0 to 1E. If a value is specified outside this range, this command will return a <NAK> message along with an error code 03 - Invalid data in command. The text string must be 7 ASCII characters long, the byte <D2> being the leftmost character on the display and <D8> being the rightmost character. Should the text become corrupted during SEC operation the SEC will set a bit 0 in it's status byte (see section 4.3.1) and the host machine should retransmit all the text strings on the next power up cycle.

Execution time 180mS.

k. <40> Show Text

Message:	40	<ID>	07	<D1>	<D2>	<D3>
	<D4>	<D5>	<D6>	<D7>	<CS>	From Host
Response:	61	<ID>	00	<CS>		From SEC

An ASCII text string is sent to the SEC, which is then displayed on the LCD display, enabling the SEC to be used as a messaging device. Note that the LCD display only has seven segments; the characters that can be displayed are limited.

Execution time 15mS.

l. <41> Show Counter Value

Message:	41	<ID>	01	<D1>	<CS>	From Host
Response:	61	<ID>	00	<CS>		From SEC

The SEC will display the current value of the counter specified in <D1> on the LCD display where <D1> is in the range 0 to 1E. If a value is specified outside this range, this command will return a <NAK> message with an error code 03- Invalid data in command.

Execution time 15mS

m. <42> Show Counter Text

Message:	42	<ID>	01	<D1>	<CS>	From Host
Response:	61	<ID>	00	<CS>		From SEC

The SEC will display the current text string of the specified counter in <D1> on the LCD display. Where <D1> is in the range 0 to 1E. If a value is specified outside this range, this command will return a <NAK> message with an error code 03- Invalid data in command.

Execution time 30mS.

n. <43> Show Bit Pattern

Message:	43	<ID>	07	<D1>	<D2>	<D3>
	<D4>	<D5>	<D6>	<D7>	<CS>	From Host
Response:	61	<ID>	00	<CS>		From SEC

The SEC will directly write the specified bit pattern in <D1> to <D7> to the LCD display driver, enabling patterns and animation's to be shown on the display. The host sends one bit pattern as a byte for each display position, <D1> being the leftmost character on the display and <D7> being the rightmost character on the display.

Execution time 15mS.

o. <50> Counter Increment (Small)

Message:	50	<ID>	02	<D1>	<D2>	<CS>	From Host
Response:	61	<ID>	00	<CS>			From SEC

The specified counter index <D1> is incremented by the value <D2>. <D1> should be within the range 0 to 1E. <D2> should be in the range 1 to 0F. If either <D1> or <D2> are outside the specified ranges, this command will return a <NAK> message with an error code 03 - Invalid data in command. The differing levels of increments (small, medium, large) are used to limit any counter corruption should the host machine generate an erroneous message packet.

Execution Time 50mS.

p. <51> Counter Increment (Medium)

Message:	51	<ID>	02	<D1>	<D2>	<CS>	From Host
Response:	61	<ID>	00	<CS>			From SEC

The specified counter index <D1> is incremented by the value <D2>. <D1> should be within the range 0 to 1E. <D2> should be in the range 1 to FF. If either <D1> or <D2> are outside the specified ranges, this command will return a <NAK> message with an error code 03 - Invalid data in command.

Execution Time 50mS.

q. <52> Counter Increment (Large)

Message:	52	<ID>	03	<D1>	<D2>	<D3>	<CS>	From Host
Response:	61	<ID>	00	<CS>				From SEC

The specified counter index <D1> is incremented by the value <D2><D3>, where D2 is the Low Byte and D3 is the High Byte of a 16-bit value. <D1> should be within the range 0 to 1E. <D2><D3> should be in the range 1 to FFFF. If either <D1> or <D2><D3> are outside the specified ranges, this command will return a <NAK> message with an error code 03 - Invalid data in command.

Execution time 50mS.

r. <54> Cycle Counter Display

Message:	54	<ID>	00	<CS>		From Host
Response:	61	<ID>	00	<CS>		From SEC

The SEC will display the text for counter 1 for 1 second, followed by the value of counter 1 for 3 seconds. This will repeat 3 times, and then counter 2 text will be displayed. This sequence will continue for the number of counters specified by the host, using the 'set number of counters' command. Finally, the display will return counter 0 text and value and then stop cycling, leaving the counter 0 value on the display. If the 'set number of counters' =1, then only the value of counter 0 is displayed.

s. <55> Stop Cycle

Message:	55	<ID>	00	<CS>		From Host
Response:	61	<ID>	00	<CS>		From SEC

The SEC will stop cycling through the counter values and show the value of counter 0 on the display (default display). This command overrides previous cycle commands and will stop the display cycling.

Execution Time 10mS.

t. <5C> Self Test

Message:	5C	<ID>	00	<CS>		From Host	
Response:	61	<ID>	00	<CS>		From SEC	
	OR	62	<ID>	01	<D1>	<CS>	From SEC

The SEC will perform a limited self-test function and the results will be returned to the host. If the self-test is successful, the SEC will return an <ACK> message. If the test fails for any reason, the SEC returned a NAK message, which includes an error code <D1> indicating the nature of the failure. (See section 5 in Functionality 'Error Codes' for Details).

Execution Time 80mS.

5. Error Codes

If an error occurs during communication with the SEC or during execution of a command, the SEC will send a NAK message packet back to the host, along with a single error code byte in the range 0 to FF. The host can also interrogate the SEC as to the cause of the last error with the 'Request Last Error' command (section 4.3.3). The last error is always recorded, no matter how long ago it occurred, the possible errors are:

a. 00 No Error

This is included for completeness. The last error will only be set to this value after manufacture and before any errors have occurred. Once errors have occurred, the last error value is never set back to no error.

b. 01 Transmission Checksum Corrupt

The transmission from the host was corrupted in some way, e.g. the transmitted checksum did not match the calculated checksum. The command will not be executed and the host should retransmit.

c. 02 SEC Busy

Either the last command is still being processed, or the data buffers are currently in use by the SEC. The first case occurs when a command is sent to the SEC whilst it is still processing the previous command, whilst the second case may occur if a command is sent to the SEC during a display cycle (button pressed). The command will not be executed and the host should retransmit.

d. 03 Invalid Data in Message

This error occurs when the SEC has been sent a valid command, but the data associated with it is corrupt or outside an acceptable range.

e. 04 Invalid Command

This error occurs when the SEC cannot decode the command byte of the message, or that command has been disabled.

f. **05 EEprom Read/Write Error**

This error occurs when the data written to the EEprom could not be read back and verified. The most likely cause of this error is EEprom failure.

g. **06 Fingerprint Requested When Not Set**

This error is generated when the host requests the fingerprint value but it has not been set. This error is unlikely to occur, as the fingerprint is set at SEC manufacture.

h. **07 Firmware Checksum Failure**

This error occurs when the SEC internal program has been corrupted in some way. The SEC will check its program integrity at every power up cycle.

i. **EEprom Bus Failure**

This error occurs when the SEC does not have control of the bus lines to the EEprom. Before a read or write is performed, each bus line is driven high then low to ensure it is not being shorted to supply or ground or any other bus line. This is to make sure there are no fraud attempts such as shorting out pins on the SEC PCB.

j. **09 Receive Buffer Overflow**

This error occurs when a packet is received that has a data count bigger than 12 bytes. As this would overflow the allocated buffer size, the incoming packet is truncated and this error is generated.

k. **80 Single EEprom Checksum Fail**

This error occurs when the counter data read from the EEprom has a checksum that does not match the calculated checksum. This may occur if the SEC is reset during a write cycle to the EEprom and data is corrupted, or it may happen as a result of failure of the EEprom device itself. The host should not re-transmit after this error, as the SEC can repair the data error from another (good) copy of the data in the EEprom.

i. 81 Double EEprom Checksum Fail

This error occurs when both copies of the counter data in EEprom have checksums that are incorrect. This is most likely due to a serious multiple failure of storage locations within the EEprom or fraud attempts and means the SEC can no longer be considered to operate reliably. A SEC that has generated this message should be replaced.

m. 82 Comm's Time Out

The command / data being transmitted has not been completed within the allocated time. All commands must be completed within 1 second of the first byte being sent - this includes the command and any data strings sent. If a time -out error occurs, the SEC will clear the input buffers and wait for a new transmission. The command will not be executed and the host should retransmit.

6. Portability

The SEC can be moved from one host to another to allow for replacement, spares etc. Moving from one host to another will not clear down any counter value information. If the SEC is moved between 2 hosts from different markets it should automatically be updated with information on the new market from the new host at the next host power up. The fingerprint should be checked by the new host on power up and logged accordingly. This way, counter frauds involving swapping counter units from machine to machine on a regular basis can be detected.

It is not recommended to install or remove the SEC unit whilst the host machine is powered up, as this may lead to internal damage.

SECURITY

1. Communications

Communications security is by the use of checksums for each command packet sent to the SEC. The checksum is an 8-bit sum of the other words that make up the command packet (i.e. CMD, ID, CNT and any data bytes), ignoring any carry bits. Should the SEC receive a command that has an incorrect checksum, it will ignore the command and send a NAK message back to the host machine.

2. Fingerprinting

Each SEC unit will be assigned a unique 'fingerprint' as a security code that allows each SEC to be identified. The SEC fingerprint is a 32bit binary number, allowing an unlimited number of individual fingerprints. The fingerprint can be read at any time by the host machine to determine if an SEC has been changed in the machine, allowing for frauds to be detected. Currently, the fingerprint is assigned during production test using a combination of software and special hardware. When the fingerprint is set, it cannot be modified or reset. The unique SEC fingerprint is recorded at manufacture and used for quality control, parts tracking as well as security.

Ordering Information

1. **Part Number for Ordering**

The part number D6C001-01-ZZZZ should be quoted when ordering the SEC.

2. **Standard Box Quantities**

The SEC units come in standard box quantities of 200 units

3. **Standard Lead Time**

The standard lead-time for the SEC units is 5 working days.

Appendix 1

Example of Message Strings between Host & SEC

Host	Direction	SEC
23 01 00 24	→	
	←	60 01 03 30 32 45 0B

Description

The host sends a <23> request software revision, <ID> = 01.
The SEC replies <60> data available, with 3 bytes to show revision '02E'.

Host	Direction	SEC
30 02 01 05 38	→	
	←	61 02 00 63

Description

The host sends <30> set number of counters to 05. With <ID> = 2
The SEC replies <61>. Acknowledge that command was OK.

Host	Direction	SEC
25 03 00 28	→	
	←	60 03 01 02 66

Description

The host request the last <ID> number using <ID> = 03.
The SEC replies <60> data available and sends last <ID> number.

Host	Direction	SEC
30 04 00 34	→	
	←	62 04 01 03 6A

Description

The host sends an invalid command string with <ID> = 04 i.e. set counter command without defining the counter number (no data). The SEC sends a NAK header with code 03 - invalid data.

Appendix 2

Interface Connector Pin Out

Pin	Signal Name	Type	Description
1	SOUT	Output	SPI Data Output Line
2	SCLOCK	Input	SPI Clock Input Line
3	SIN	Input	SPI Data Input Line
4	Reset	Input	SEC Reset (Low)
5	+12v	Input	DC Voltage Supply
6	GND	Input	0v Supply

Connector Type

SEC: - Leotronics 2502P060000

HOST: - Molex KK 7720S 22-50-3065

Appendix 3

LCD Display Map

<u>ascii</u>	<u>char</u>	<u>disp</u>	<u>ascii</u>	<u>char</u>	<u>disp</u>	<u>ascii</u>	<u>char</u>	<u>disp</u>
0x41	A	A	0x51	Q	Q	0x36	6	6
0x42	B	B	0x52	R	R	0x37	7	7
0x43	C	C	0x53	S	S	0x38	8	8
0x44	D	D	0x54	T	T	0x39	9	9
0x45	E	E	0x55	U	U	0x3A	:	:
0x46	F	F	0x56	V	V	0x3B	;	;
0x47	G	G	0x57	W	W	0x3C	<	<
0x48	H	H	0x58	X	X	0x3D	=	=
0x49	I	I	0x59	Y	Y	0x3E	>	>
0x4A	J	J	0x5A	Z	Z	0x3F	?	?
0x4B	K	K	0x30	0	0	0x40	@	@
0x4C	L	L	0x31	1	1	0x5B	[[
0x4D	M	M	0x32	2	2	0x5C	\	\
0x4E	N	N	0x33	3	3	0x5D]]
0x4F	O	O	0x34	4	4	0x5E		
0x50	P	P	0x35	5	5	0x5F	_	_

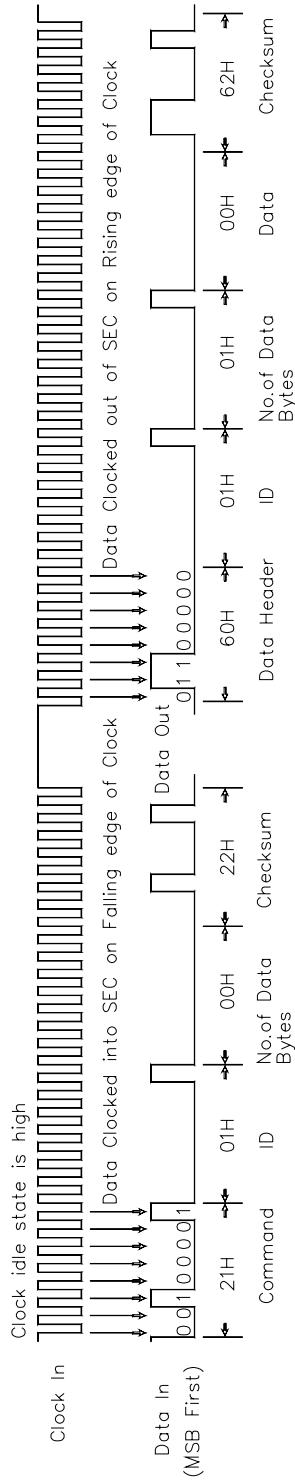
Appendix 4

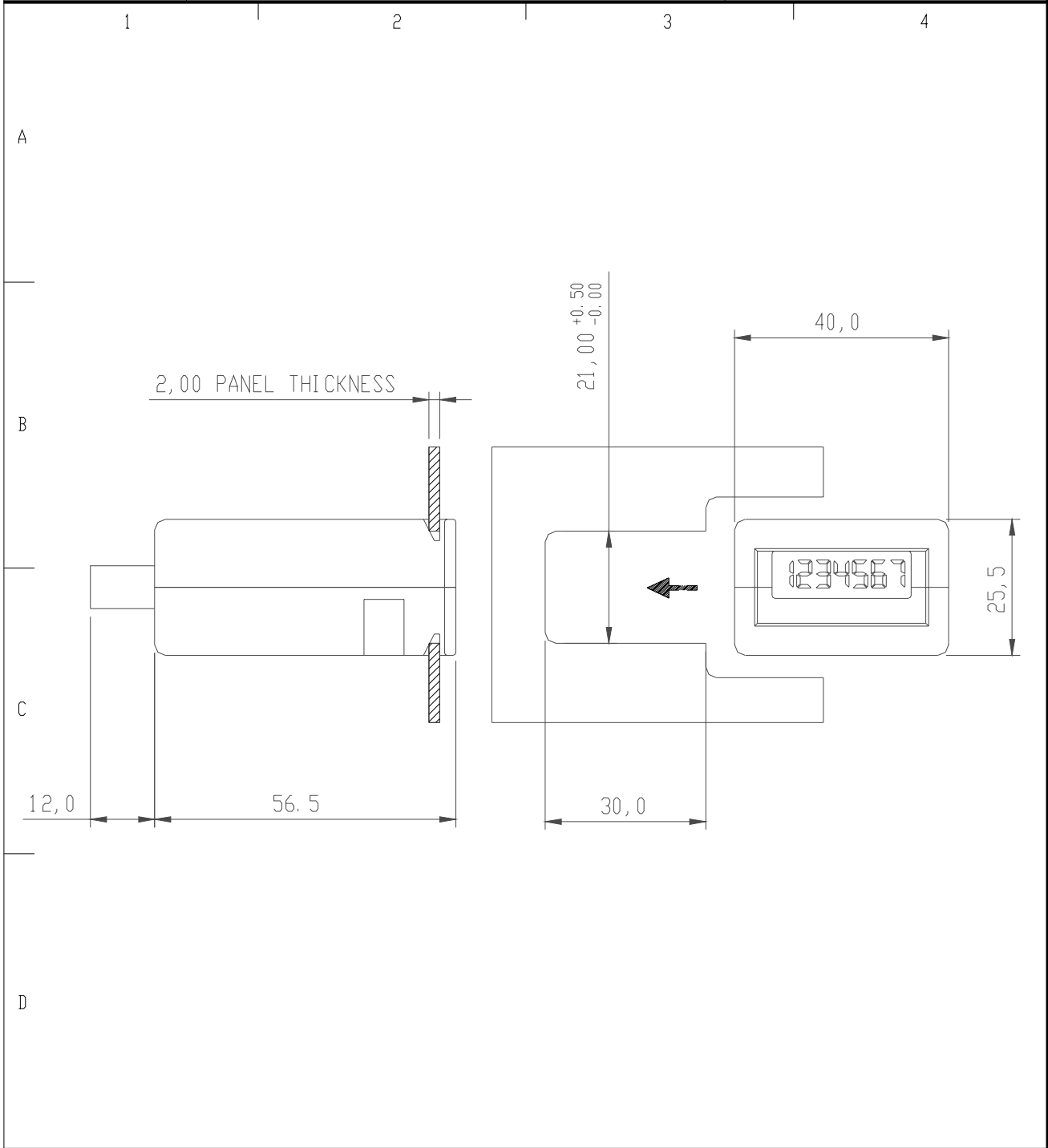
Interface Timing Diagram

Appendix 2
Interface Timing Diagram

SPI Mode 2

Example Shown is "Request Market Type" Command





UNLESS OTHERWISE STATED GENERAL TOLERANCE: - 1 DEC, PLACE ±0.40mm. 2 DEC, PLACES ±0.10mm. CONCENTRICITY 0.10mm. MAX. ANGULAR ± 30°	MATERIAL.	DRAWN AN			
	FINISH.	CHECKED SBE	27/05/02	DRAWN	01
		SCALE 1 : 1	DATE	MODIFICATION	
ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.		TITLE.	MOUNTING DETAILS		
STARPOINT KING GEORGE'S TRADING ESTATE DAVIS ROAD, CHESSINGTON, SURREY KT9 1TT - UK. TEL: +44 (0)20 8391 7700 FAX: +44(0)20 8391 7760 WEBSITE: www.starpoint.uk.com	USED ON. SEC	SHEET of			
	DRAWING No. G6D008	ISSUE. 01	SPECIFICATION ZZZZ		