



# 420 Series RS232 Encoder for Keypad Applications - Installation Instruction

Storm 420 Series Encoders allow interfacing between a Storm keypad and host system using the RS232 communications protocol. This model will also drive a 4 line x 20 character LCD display. For additional information download the 420 Encoder Application / Engineering Manual from [www.storm-interface.com](http://www.storm-interface.com)

### SPECIFICATIONS

Input Power ..... 5V dc  $\pm$  0.25 V, regulated supply  
 RS232 Output ..... (via 6 pin Molex 2.54mm (.100") Pitch KK®)

Overall Size W 89mm x L 66mm x H 32mm  
 Mounting Centres at 73.5mm x 43.2mm  
 Temp Rating -20 deg C to +70 deg C

Drives Powertips 80 Character LCD Display  
 (uses Hitachi HD44780U LCD-II Controller/Driver)

Direct connection for underpanel fixing ..... 12, 16, 20 way Storm Keypads  
 Ribbon Cable needed for top panel fixing 4, 12, 16 way Storm Keypads

### Display Controls :

On host system : Ctrl + L - clears the display, Ctrl + C toggles cursor on and off

| Keypad Connector (on reverse of pcb) |                     |   |                    |   |   |   |   |   |   |   | ✓ = pin connection made |   |   | Direct connection to rear of keypad ? |   |  |
|--------------------------------------|---------------------|---|--------------------|---|---|---|---|---|---|---|-------------------------|---|---|---------------------------------------|---|--|
| KEYPAD TYPE                          |                     |   |                    |   |   |   |   |   |   |   |                         |   |   |                                       |   |  |
| 20 WAY BACKLIT                       | ✓                   | ✓ | ✓                  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓                       | ✓ | ✓ | ✓                                     | ✓ | YES  |
| 20 WAY NOT BACKLIT                   | Fit polarising pin  | ✓ | ✓                  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓                       | ✓ | ✓ | Fit polarising pin                    | ✓ | YES  |
| 12 / 16 WAY BACKLIT                  | Fit polarising pin  | ✓ | ✓                  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓                       | ✓ | ✓ | Fit polarising pins                   | ✓ | YES—fit polarising pins to positions 1,12 and 13   |
| 12 / 16 WAY NOT BACKLIT              | Fit polarising pins | ✓ | ✓                  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓                       | ✓ | ✓ | Fit polarising pins                   | ✓ | YES  |
| 4 WAY BACKLIT                        | Fit polarising pin  | ✓ | Fit polarising pin | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓                       | ✓ | ✓ | Fit polarising pin                    | ✓ | NO—separate cable required - See Note 1 below<br>STD version needs 5 way cable<br>BACKLIT version needs 7 way cable<br>Fit polarising pins as required |
| 4 WAY NOT BACKLIT                    | Fit polarising pins | ✓ | ✓                  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓                       | ✓ | ✓ | Fit polarising pins                   | ✓ |  |

| Encoder Pin            | 1                | 2         | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11                  | 12         | 13        |
|------------------------|------------------|-----------|----|----|----|----|----|----|----|----|---------------------|------------|-----------|
| R = ROW,<br>C = COLUMN | LED CATHODE      | TAMPER IN | R1 | R2 | C1 | C2 | C3 | C4 | R4 | R3 | R5<br>FUNCTION KEYS | TAMPER OUT | LED ANODE |
| To Keypad              |                  |           |    |    |    |    |    |    |    |    |                     |            |           |
|                        | PIN 1 ON REVERSE |           |    |    |    |    |    |    |    |    |                     |            |           |

NOTE 1—Connections for 4 way keypads

| ENCODER PIN | TO | KEYPAD PIN | STD | BACKLIT |
|-------------|----|------------|-----|---------|
| 2           |    |            | NC  | 1       |
| 11          |    |            | 1   | 2       |
| 5           |    |            | 5   | 6       |
| 6           |    |            | 4   | 5       |
| 7           |    |            | 3   | 4       |
| 8           |    |            | 2   | 3       |
| 13          |    |            | NC  | 7       |

**RS232 OUTPUT**  
 DTR  
 GND  
 NC  
 RTS  
 RX  
 TX (Pin 1)

**JUMPER SETTING  
 CONTROLS BACKLIT  
 KEYPAD LED COLOUR**

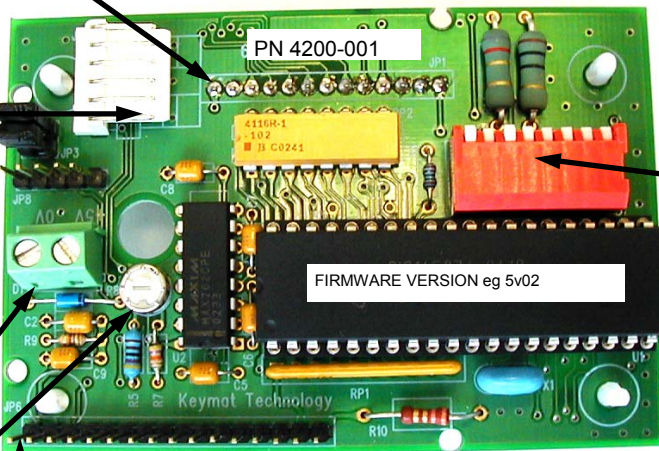
RED

GREEN

JP8 FACTORY USE ONLY

**Input Power  
 Terminals**

**LCD Display  
 Contrast  
 Adjustment**



LCD Display Connector, 16 pins, 0.1" square pins

| Pin    | 1   | 2   | 3  | 4  | 5  | 6 | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15 | 16 |
|--------|-----|-----|----|----|----|---|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
| Symbol | Vss | Vdd | Vo | RS | RW | E | DB0 | DB1 | DB2 | DB3 | DB4 | DB5 | DB6 | DB7 | A  | K  |

**Configuration Switches**

### ORDERING DETAILS

Stock No 4200-00[X] Item RS232 Encoder

[X] denotes packaging variant

free downloads from [www.storm-interface.com](http://www.storm-interface.com) :-

420 Encoder Application/Engineering Manual  
 Test Software

Mounting Details Page 1 of 4  
 420-XX-08KT Rev 3 Oct 2013



Whilst every effort is made to ensure details are correct at time of print, specifications are subject to change without notice.



FM39602



[www.storm-interface.com](http://www.storm-interface.com)

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Fitted to 4, 12 or 16 WAY KEYPAD

| Configuration Switch Settings           | 1  | 2  | 3   | 4   | 5   | 6   | 7   | 8   | Installation Checklist |
|---|----|--|-----|-----|-----|-----|-----|---|------------------------|
| 4 Way Keypads                           | ON | CHARACTER ECHOING SELECTOR<br>ON = ECHO ON<br>OFF = ECHO OFF | OFF | ON  | ON  | ON  | OFF | BAUD RATE SELECTOR<br>OFF=9600 BAUD<br>ON=1200 BAUD |                        |
| 12 and 16 Way Telephone Layout Keypads  | ON |  | OFF | OFF | OFF | OFF | ON  |   |                        |
| 12 and 16 Way Calculator Layout Keypads | ON |  | OFF | ON  | OFF | OFF | ON  |   |                        |
|   |    |  |     |     |     |     |     |   |                        |

| Installation Checklist                     |
|--|
| ✓ Keypad                                   |
| ✓ Encoder , configuration switch set       |
| ✓ Panel Fixing prepared                    |
| ✓ +5V regulated supply                     |
| ✓ RS 232 cable with 6 way Molex socket     |
| ✓ Ribbon cable keypad to encoder if needed |
| ✓ LCD and 16 way ribbon cable if needed    |
| ✓ Polarisising pins fitted to encoder      |

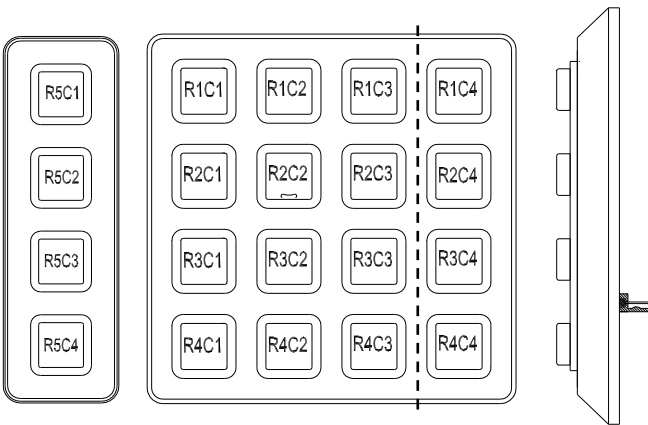
### ROW / COLUMN DESIGNATIONS (KEYPADS FRONT VIEW)

For Example R1C2 = Row 1 Column 2. NB : A 20 way keypad is treated as 4 way + 16 way.

4 Way Front View

12 / 16 Way Front View

Side View



### PIN-OUT FOR 4, 12 and 16 WAY MATRIX KEYPADS

4 WAY KEYPAD (NO BACKLIGHT) CONTACT CONNECTIONS (REAR VIEW)

|            |           |
|------------|-----------|
| PINS       | • • • • • |
| PIN NUMBER | 5 4 3 2 1 |

CONTACT MATRIX

| PIN | ROW / COLUMN |
|-----|--------------|
| 1   | R5           |
| 2   | C4           |
| 3   | C3           |
| 4   | C2           |
| 5   | C1           |

4 WAY BACKLIT KEYPAD CONTACT CONNECTIONS (REAR VIEW)

|            |               |
|------------|---------------|
| PINS       | • • • • • • • |
| PIN NUMBER | 7 6 5 4 3 2 1 |

CONTACT MATRIX

| PIN | ROW / COLUMN |
|-----|--------------|
| 1   | LED POWER    |
| 2   | R5           |
| 3   | C4           |
| 4   | C3           |
| 5   | C2           |
| 6   | C1           |
| 7   | LED POWER    |

12 / 16 WAY KEYPAD (NO BACKLIGHT) CONTACT CONNECTIONS (REAR VIEW)

|            |                 |
|------------|-----------------|
| PINS       | • • • • • • • • |
| PIN NUMBER | 8 7 6 5 4 3 2 1 |

CONTACT MATRIX (NO BACKLIGHT)

| PIN | ROW / COLUMN     |
|-----|------------------|
| 1   | R1               |
| 2   | R2               |
| 3   | C1               |
| 4   | C2               |
| 5   | C3               |
| 6   | C4 (16 WAY ONLY) |
| 7   | R4               |
| 8   | R3               |

12 / 16 WAY BACKLIT KEYPAD CONTACT CONNECTIONS (REAR VIEW)

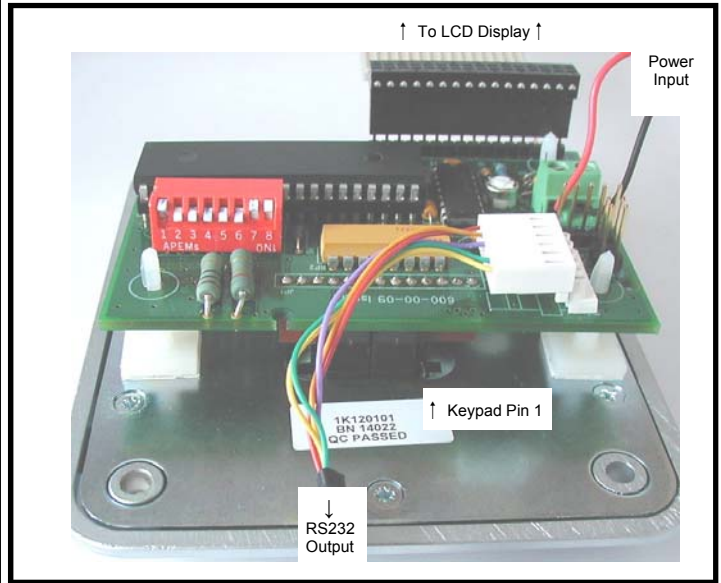
|            |                      |
|------------|----------------------|
| PINS       | • • • • • • • • • •  |
| PIN NUMBER | 10 9 8 7 6 5 4 3 2 1 |

CONTACT MATRIX (WITH BACKLIGHT)

| PIN | ROW / COLUMN     |
|-----|------------------|
| 1   | LED POWER        |
| 2   | R1               |
| 3   | R2               |
| 4   | C1               |
| 5   | C2               |
| 6   | C3               |
| 7   | C4 (16 WAY ONLY) |
| 8   | R4               |
| 9   | R3               |
| 10  | LED POWER        |

### TYPICAL INSTALLATION

(rear view, encoder direct connection to keypad, LCD display used)



### ASCII CODE TABLES

4 WAY KEYPAD ASCII CODES

| ROW / COLUMN | R5 |
|--------------|----|
| C1           | 11 |
| C2           | 12 |
| C3           | 13 |
| C4           | 14 |

NOTE 1 : These codes are non-printing ASCII device control codes. The application software will need to assign usage

NOTE 2 : The COMMON pin on a 4 way is termed ROW 5 to be consistent with applications using 4 function keys.

12 / 16 WAY TELEPHONE KEYPAD ASCII CODES

| ROW / COLUMN | C1 | C2 | C3 | C4 |
|--------------|----|----|----|----|
| R1           | 31 | 32 | 33 | 61 |
| R2           | 34 | 35 | 36 | 62 |
| R3           | 37 | 38 | 39 | 63 |
| R4           | 2A | 30 | 23 | 2E |

12 / 16 WAY CALCULATOR KEYPAD ASCII CODES

| ROW / COLUMN | C1 | C2 | C3 | C4  |
|--------------|----|----|----|-----|
| R1           | 37 | 38 | 39 | 1B  |
| R2           | 34 | 35 | 36 | 0C* |
| R3           | 31 | 35 | 33 | 05  |
| R4           | 7F | 30 | 0D | 2E  |

\* = Form Feed Code to give CLEAR function

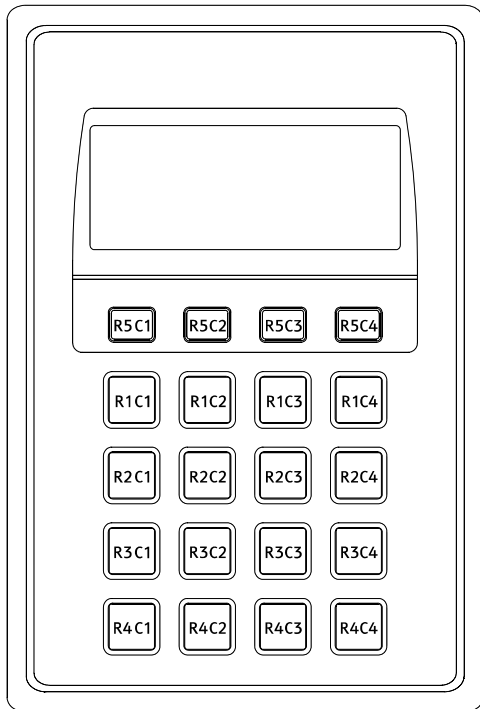
Fitted to INTEGRATED 20 WAY KEYPAD AND DISPLAY

| Configuration Switch Settings                                 | 1   | 2                              | 3  | 4   | 5   | 6  | 7   | 8   | Installation Checklist |
|---|-----|--------------------------------|----|-----|-----|----|-----|---|------------------------|
| Integrated 20 Way Keypad and Display - Telephone Layout       | OFF | CHARACTER ECHOING SELECTOR     | ON | OFF | OFF | ON | OFF | BAUD RATE SELECTOR<br>OFF=9600 BAUD<br>ON=1200 BAUD |                        |
| Integrated 20 Way Keypad and Display - Calculator Layout      | OFF |                                | ON | ON  | ON  | ON | OFF |   |                        |
| Note : Remove Jumpers from JP3 and JP4 in this configuration. |     | ON = ECHO ON<br>OFF = ECHO OFF |    |     |     |    |     |   |                        |

- ✓ Integrated 20 way Keypad
- ✓ Encoder , configuration switch set
- ✓ LCD and 16 way ribbon cable if needed
- ✓ Panel Fixing prepared
- ✓ +5V regulated supply
- ✓ RS 232 cable with 6 way Molex KK socket
- ✓ 13 way ribbon cable keypad to encoder if needed
- ✓ Polarising pins fitted to encoder

### ROW / COLUMN DESIGNATIONS ( KEYPAD FRONT VIEW)

For Example R1C2 = Row 1 Column 2. NB : A 20 way keypad is treated as 4 way + 16 way.



### ASCII CODE TABLES

| Row / Column  | Telephone Layout |       | Calculator Layout |       |
|---|------------------|-------|-------------------|-------|
|   | Character        | ASCII | Character         | ASCII |
| R5C1  | ▲                | 11    | ▲                 | 11    |
| R5C2  | ▲                | 12    | ▲                 | 12    |
| R5C3  | ▲                | 13    | ▲                 | 13    |
| R5C4  | ▲                | 14    | ▲                 | 14    |
| R1C1  | 1                | 31    | 1                 | 31    |
| R1C2  | 2<br>ABC         | 32    | 2                 | 32    |
| R1C3  | 3<br>DEF         | 33    | 3                 | 33    |
| R1C4  | A                | 41    | ENTER             | 1B    |
| R2C1  | 4<br>GHI         | 34    | 4                 | 34    |
| R2C2  | 5<br>JKL         | 35    | 5                 | 35    |
| R2C3  | 6<br>MNO         | 36    | 6                 | 36    |
| R2C4  | B                | 42    | CLEAR             | 0C    |
| R3C1  | 7<br>PQRS        | 37    | 7                 | 37    |
| R3C2  | 8<br>TUV         | 38    | 8                 | 38    |
| R3C3  | 9<br>WXYZ        | 39    | 9                 | 39    |
| R3C4  | C                | 43    | ?                 | 05    |
| R4C1  | *<br>CLR         | 2A    | *                 | 7F    |
| R4C2  | 0                | 30    | 0                 | 30    |
| R4C3  | #<br>ENT         | 23    | #                 | 0D    |
| .   | ENTER            | 2E    | CANCEL            | 2E    |
| ANTI-TAMPER OPEN CIRCUIT  |                  | 07*   |                   | 07*   |
| * = CODE REPEATS EVERY 10 SECONDS WHILST CONDITION REMAINS ACTIVE |                  |       |                   |       |

### PIN-OUT FOR 20 WAY KEYPAD

20 WAY KEYPAD  
CONTACT CONNECTIONS  
(REAR VIEW)

|            |                                 |
|------------|---------------------------------|
| PINS       | • • • • • • • • • • • • • • • • |
| PIN NUMBER | 13 12 11 10 9 8 7 6 5 4 3 2 1   |

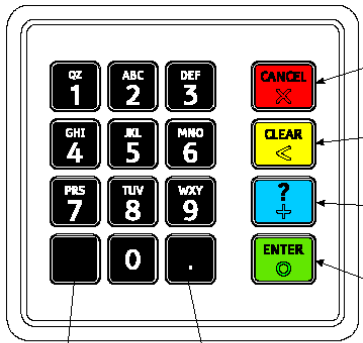
#### CONTACT MATRIX

| PIN | ROW / COLUMN |
|-----|--------------|
| 1   | NOT USED     |
| 2   | TAMPER IN    |
| 3   | R1           |
| 4   | R2           |
| 5   | C1           |
| 6   | C2           |
| 7   | C3           |
| 8   | C4           |
| 9   | R4           |
| 10  | R3           |
| 11  | R5           |
| 12  | TAMPER OUT   |
| 13  | NOT USED     |

Fitted to 6000 SERIES PINPAD

| Configuration Switch Settings   | R3                | 1   | 2  | 3  | 4   | 5  | 6   | 7   | 8   | Installation Checklist  |
|---|-------------------|-----|--|----|-----|----|-----|-----|---|---|
| 6000 Series Pinpad - Basic Layout   | fitted            | OFF | CHARACTER ECHOING SELECTOR<br>ON = ECHO ON<br>OFF = ECHO OFF | ON | OFF | ON | OFF | OFF | BAUD RATE SELECTOR<br>OFF=9600 BAUD<br>ON=1200 BAUD | <ul style="list-style-type: none"> <li>✓ Keypad</li> <li>✓ Encoder , configuration switch set</li> <li>✓ Panel Fixing prepared</li> <li>✓ +5V regulated supply</li> <li>✓ RS 232 cable with 6 way Molex KK socket</li> <li>✓ 13 way ribbon cable keypad to encoder if needed</li> <li>✓ Polarisng pins fitted to encoder</li> </ul> |
| 6000 Series Pinpad - UK Layout  | Remove before use | OFF |  | ON | OFF | ON | OFF | OFF |   |   |
| 6000 Series Pinpad - USA Layout   | Remove before use | OFF |  | ON | ON  | ON | OFF | OFF |   |   |
| Note : R3 may need to be removed depending on the configuration required. |                   |     |  |    |     |    |     |     |   |   |

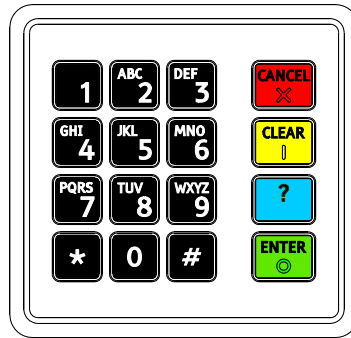
### BASIC LAYOUT



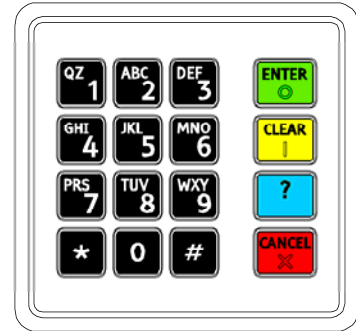
**BLANK KEY**  
No Key Code with Standard Firmware

Key Code = Decimal Point

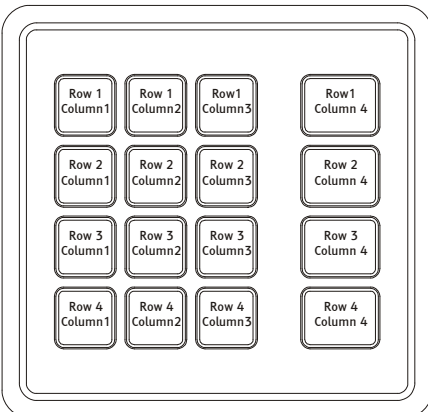
### UK LAYOUT



### USA LAYOUT



### ROW / COLUMN DESIGNATIONS



### PIN-OUT FOR 16 WAY MATRIX PINPAD

CONTACT CONNECTIONS  
(REAR VIEW)



CONTACT MATRIX

| PIN | ROW / COLUMN |
|-----|--------------|
| 1   | NOT USED     |
| 2   | TAMPER       |
| 3   | R1           |
| 4   | R2           |
| 5   | C1           |
| 6   | C2           |
| 7   | C3           |
| 8   | C4           |
| 9   | R4           |
| 10  | R3           |
| 11  | NC           |
| 12  | TAMPER       |
| 13  | NOT USED     |

### ASCII CODE TABLES

| Row / Column             | Basic Layout |                                  |         | UK Layout |                                  |       | USA Layout |                                  |       |
|--------------------------|--------------|----------------------------------|---------|-----------|----------------------------------|-------|------------|----------------------------------|-------|
|                          | Marking      | Base Key                         | ASCII   | Marking   | Base Key                         | ASCII | Marking    | Base Key                         | ASCII |
| R1C1                     | 1 QZ         | Black                            | 31      | 1         | Black                            | 31    | 1 QZ       | Black                            | 31    |
| R1C2                     | 2 ABC        | Black                            | 32      | 2 ABC     | Black                            | 32    | 2 ABC      | Black                            | 32    |
| R1C3                     | 3 DEF        | Black                            | 33      | 3 DEF     | Black                            | 33    | 3 DEF      | Black                            | 33    |
| R1C4                     | CANCEL       | Red with raised Cross            | 0D      | CANCEL    | Red with raised Cross            | 0D    | ENTER      | Green with raised circle         | 1B    |
| R2C1                     | 4 GHI        | Black                            | 34      | 4 GHI     | Black                            | 34    | 4 GHI      | Black                            | 34    |
| R2C2                     | 5 JKL        | Black with Homepip               | 35      | 5 JKL     | Black with Homepip               | 35    | 5 JKL      | Black with Homepip               | 35    |
| R2C3                     | 6 MNO        | Black                            | 36      | 6 MNO     | Black                            | 36    | 6 MNO      | Black                            | 36    |
| R2C4                     | CLEAR        | Yellow with raised vertical line | 7F      | CLEAR     | Yellow with raised vertical line | 7F    | CLEAR      | Yellow with raised vertical line | 7F    |
| R3C1                     | 7 PRS        | Black                            | 37      | 7 PQRS    | Black                            | 37    | 7 PRS      | Black                            | 37    |
| R3C2                     | 8 TUV        | Black                            | 38      | 8 TUV     | Black                            | 38    | 8 TUV      | Black                            | 38    |
| R3C3                     | 9 WXY        | Black                            | 39      | 9 WXYZ    | Black                            | 39    | 9 WXY      | Black                            | 39    |
| R3C4                     | ?            | Blue with raised Plus            | 05      | ?         | Blue                             | 05    | ?          | Blue                             | 05    |
| R4C1                     |              | Black                            | No Code | *         | Black                            | 2A    | *          | Black                            | 2A    |
| R4C2                     | 0            | Black                            | 30      | 0         | Black                            | 30    | 0          | Black                            | 30    |
| R4C3                     | .            | Black                            | 2E      | #         | Black                            | 23    | #          | Black                            | 23    |
| R4C4                     | ENTER        | Green with raised circle         | 1B      | ENTER     | Green with raised circle         | 1B    | CANCEL     | Red with raised Cross            | 0D    |
| ANTI-TAMPER OPEN CIRCUIT |              |                                  | 07*     |           |                                  | 07*   |            |                                  | 07*   |

\*= CODE REPEATS EVERY 10 SECONDS WHILST CONDITION REMAINS ACTIVE.  
TO RESET—DISCONNECT POWER FOR 30 SECONDS.

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