# 2500 SERIES USER'S GUIDE – PART 2

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## Data Output Formats

The output format is the manner in which ASCII or binary characters are transmitted from the tablet to represent the position of the cursor, the operating mode and other information.

There are 32 possible output formats. Four are standard CalComp 9100 series formats, three are standard CalComp 2000 or 2200 series formats and one is a standard CalComp 4000 Wedge series format. These formats are used by many applications software packages. On power-up, the 2500 Tablet will default to the format specified in the soft switch settings.

**NOTE:** The 2500 Tablet will only respond to CalComp 9100, 2500 and 2000 series digitizer commands. Although it can emulate the data output formats of other manufacturer's tablets, it will not respond to other manufacturer's tablet function commands.

### *Format Definitions*

| | |
|---|---|
| **@** | "At" sign. In ASCII formats, it is a literal @ symbol (HEX 40) in the output. |
| **C (or Ca, Cb)** | Cursor Status Character. In ASCII formats, ***C*** represents a single character while multiple characters are expressed as ***Ca*** and ***Cb***. |
| **Cn** | Cursor Status Bit. In Binary formats, the highest number ***Cn*** is the most significant bit and ***C0*** is the least significant bit. |
| **Comma (,)** | Comma. In ASCII formats, it is a literal comma (HEX 2C) in the output. |
| **Carriage Return (<CR>)> in output format** | Carriage return. In ASCII formats, a literal carriage return (HEX 0D) in the output. |
| **Decimal Point (.)** | Decimal Point. In ASCII formats, it represents a literal decimal point (HEX 2E) in the output. |

| | |
|---|---|
| **Line Feed (<LF>)** | Line Feed. In ASCII formats, it represents a literal line feed command (HEX 0A) in the output. > in output format |
| **LPmm, LPI** | Lines per millimeter; lines per inch. |
| **M** | Mode Status Character. In ASCII formats, ***M*** is a single character representing the current operating mode. |
| **MSB, LSB** | Most significant bit; lease significant bit. |
| **N** | Near Proximity. In Binary formats, this bit is set when the transducer is out of proximity. |
| **P** | Pen (Cursor) Status. In ASCII formats, a character reading ***D*** when the stylus tip or any cursor button is depressed and ***U*** when the stylus tip or all cursor buttons are up. |
| **Space (<SP>)> in output data format** | Space Character. In ASCII formats, <SP> represents a literal space character command (HEX 20) in the output. Any spaces in the following output format tables not indicated by <SP> are for clarity only and are not part of the tablet output data. |
| **Sx and Sy** | Sign Character or Bit. In ASCII formats, a "+" for positive and a "-" for negative. In binary formats, a ***0*** bit for positive and a ***1*** bit for negative except for Formats 29 and 30 which use ***0*** for negative and ***1*** for positive. |
| **T** | Tablet Status. In ASCII formats, a single character reading ***A***. Included for CalComp 9100 compatibility. |
| **T0** | Tablet Status. If the first character of the tablet status characters is set to anything, but ***A***, T0 will be equal to the lower three bits of that ASCII character in formats 8, 15, 16 and 31. T0 will equal the lowest bit in formats 29 and 30. |
| **X or Y** | Data Digit. In ASCII formats, a numeric character representing coordinate data. The number of X or Y |

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symbols represents the allowable number of digits in any output.

**Xn or Yn** Data Bit. In binary formats, a bit representing coordinate data. The highest numbered ***n*** is the most significant bit.

***Model-to-Format Conversion***

| MANUFACTURER | MODEL | FORMAT NAME | 2500 FORMAT |
|---|---|---|---|
| CalComp | 2000 | ASCII | 0 |
| CalComp | 2000 | Binary | 28 |
| CalComp | 2000 | ASCII (Special) | 2 |
| CalComp | 2200 | Format 1 | 0 |
| CalComp | 2200 | Format 2 | 1 |
| CalComp | 2200 | Format 3 | 28 |
| CalComp | 4000 | ASCII | 1 |
| CalComp | 9100 | Format 1 | 4 |
| CalComp | 9100 | Format 2 | 5 |
| CalComp | 9100 | Format 3 | 6 |
| CalComp | 9100 | Format 4 | 7 |
| GTCO | DP5 | ASCII | 9 |
| GTCO | DP5 | Binary Low Resolution | 25 |
| GTCO | DP5 | Binary High Resolution | 23 |
| GTCO | MD7 | ASCII | 10, 11 |
| GTCO | MD7 | Binary | 28 |
| Hitachi | HDG1111 | ASCII | 12, 14 |
| Hitachi | HDG1111 | Binary Low Resolution | 28 |
| Hitachi | HDG1111 | Binary High Resolution | 27 |
| Hitachi | HDG1515 | ASCII | 12, 14 |
| Hitachi | HDG1515 | Binary Low Resolution | 28 |
| Hitachi | HDG1515 | Binary High Resolution | 27 |
| Houston Instruments | HI Pad | ASCII | 13 |
| Kurta | Series 1 | Format 1 | 28 |
| Kurta | Series 1 | Format 2 | 24 |
| Kurta | Series 1 | Format 3 | 26 |
| Kurta | Series 1 | Format 4 ASCII | 10 |

| | | | |
|---|---|---|---|
| Kurta | Series 2 | ASCII | 10 |
| Kurta | Series 2 | Binary | 24 |
| Numonics | 2200 | | 23 |
| Summagraphics | Bit Pad 1 | ASCII | 0 |
| Summagraphics | Bit Pad 1 | Binary | 28 |
| Summagraphics | 1103 ( Bit Pad 2) | ASCII | 0 |
| Summagraphics | Bit Pad 2 | Binary | 28 |
| Summagraphics | 1105 (Bit Pad 2) | ASCII | 8, 15, 16 |
| Summagraphics | Bit Pad 2 | Binary | 31 |
| Summagraphics | MM | ASCII | 0 |
| Summagraphics | MM | Binary (3-byte) | 29 |
| Summagraphics | MM | Binary (5-byte) | 30 |

***Output Formats***

| **FORMAT** | **RESOLUTION** | **ASCII OUTPUT** |
|---|---|---|
| 0 | <510 LPI; <21 LPM | XXXX, YYYY, C CR |
| | >509 LPI; >21 LPM | XXXXX, YYYYY, C CR |
| *1* | <510 LPI; <21 LPM | C XXXX YYYY CR |
| | >509 LPI; >20 LPM | C XXXXX YYYYY CR |
| *2* | ALL | @C Sx XXXXX Sy YYYYY CR |
| *3* | RESERVED | RESERVED |
| *4* | <1280 LPI; <51 LPM | T M C XXXXX YYYYY CR |
| | >1279 LPI; >50 LPM | T M C XXXXXX YYYYYY CR |
| *5* | <1280 LPI; <51 LPM | XXXXX, YYYYY, T M C CR |
| | >1279 LPI; >50 LPM | XXXXXX, YYYYYY, T M C CR |
| *6* | <1280 LPI; <51 LPM | C P XXXXX YYYYY CR |
| | >1279 LPI; >50 LPM | C P XXXXXX YYYYYY CR |
| *7* | 1000 LPI | SP XX.XXX, SP YY.YYY, T M C CR |
| | 100 LPM | SP XXXX.XX, SP YYYY.YY, T M C CR |
| | 10 LPM | SP XXXX.X, SP YYYY.Y, T M C CR |
| | OTHER | SP XXXXX., SP YYYYY., T M C CR |
| 8 | 1000 LPI | Sx XX.XXX, Sy YY.YYY, CbCa, T0 CR |
| | 100 LPM | Sx XXXX.XX, Sy YYYY.YY, CbCa, T0 CR |
| | 10 LPM | Sx XXXX.X, Sy YYYY.Y, CbCa, T0 CR |
| | OTHER | Sx XXXX., Sy YYYYY., CbCa, T0 CR |
| 9 | <510 LPI, <21 LPM | C XXXX SP YYYY CR |

| | | |
|---|---|---|
| | >509 LPI, >20 LPM | C XXXXX SP YYYYY CR |
| 10 | <510 LPI, <21 LPM | C XXXX YYYY CR |
| | >509 LPI, >20 LPM | C XXXXX YYYYY CR |
| 11 | <510 LPI, <21 LPM | XXXX YYYY C CR |
| | >509 LPI, >20 LPM | XXXXX YYYYY C CR |
| 12 | <510 LPI, <21 LPM | XXXX, YYYY, C CR |
| | >509 LPI, >20 LPM | XXXXX, YYYYY, C CR |
| 13 | ALL | C SX XXXXX Sy YYYYY CR |
| 14 | <510 LPI, <21 LPM | Sx XXXX Sy YYYY C CR |
| | >509 LPI, >20 LPM | Sx XXXXX Sy YYYYY C CR |
| 15 | ALL | Sx XXXXX, Sy YYYYY, CbCa, T0 CR |
| 16 | ALL | Sx XXXX.XXX, Sy YYYY.YYY, CbCa, T0 CR |
| 17 to 22 | RESERVED | |

***16-Button Cursor Output***

| | | ASCII FORMATS | | |
|---|---|---|---|---|
| | **BUTTON PRESSED** | **0, 2, 9, 10 AND 11** | **4, 5, 6 AND 7** | **12** |
| **PEN UP** | NONE | 0 | U | SP |
| **PEN DOWN** | 0 | 1 | 0 | 0 |
| | 1 | 2 | 1 | 1 |
| | 2 | 3 | 2 | 2 |
| | 3 | 4 | 3 | 3 |
| | 4 | 5 | 4 | 4 |
| | 5 | 6 | 5 | 5 |
| | 6 | 7 | 6 | 6 |
| | 7 | 8 | 7 | 7 |
| | 8 | 9 | 8 | 8 |
| | 9 | : | 9 | 9 |
| | A | ; | A | * |
| | B | < | B | # |
| | C | = | C | 0 |
| | D | > | D | 1 |
| | E | ? | E | 2 |
| | F | @ | F | 3 |

| | BUTTON PRESSED | 8, 15, 16 IN PROX | 8, 15, 16 OUT OF PROX | 1 RUN MODE | 1 OTHER MODES |
|---|---|---|---|---|---|
| **PEN UP** | NONE | 00 | 32 | 9 | 8 |
| **PEN** | 0 | 01 | 33 | 1 | 0 |
| **DOWN** | 1 | 02 | 34 | 3 | 2 |
| | 2 | 03 | 35 | 5 | 4 |
| | 3 | 04 | 36 | 7 | 6 |
| | 4 | 05 | 37 | 1 | 0 |
| | 5 | 06 | 38 | 3 | 2 |
| | 6 | 07 | 39 | 5 | 4 |
| | 7 | 08 | 40 | 7 | 6 |
| | 8 | 09 | 41 | 1 | 0 |
| | 9 | 10 | 42 | 3 | 2 |
| | A | 11 | 43 | 5 | 4 |
| | B | 12 | 44 | 7 | 6 |
| | C | 13 | 45 | 1 | 0 |
| | D | 14 | 46 | 3 | 2 |
| | E | 15 | 47 | 5 | 4 |
| | F | 16 | 48 | 7 | 6 |

**FORMAT 13**

| BUTTON DOWN | LINE TRACK (IST) | LINE TRACK | POINT | RUN |
|---|---|---|---|---|
| NONE | 3 | N/A | N/A | 3 |
| 0, 4, 8 OR C | 0 | 1 | 2 | 4 |
| 1, 5, 9 OR D | @ | A | B | D |
| 2, 6, A OR E | ‘ | a | b | d |
| 3, 7, B OR F | P | Q | R | T |

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***4-Button Cursor Output***

| | ASCII FORMATS | | |
|---|---|---|---|
| | **BUTTON PRESSED** | **0, 2, 9, 10 AND 11** | **12 AND 14** |
| **PEN UP** | NONE | 0 | SP |
| **PEN DOWN** | 0 | 1 | 1 |
| | 1 | 2 | 2 |
| | 2 | 4 | 3 |
| | 3 | 8 | 4 |

The following formats duplicate the first four buttons of the 16-button cursor output with the 4-button cursor:

**1, 4, 5, 6, 7, 8, 13, 15 and 16**

***Binary Formats***

| | (MSB) | | | FORMAT 23 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **0** |
| 1 | 1 | C4 | C3 | C2 | C1 | C0 | X15 | X14 |
| 2 | 0 | X13 | X12 | X11 | X10 | X9 | X8 | X7 |
| 3 | 0 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | Y15 | Y14 |
| 5 | 0 | Y13 | Y12 | Y11 | Y10 | Y9 | Y8 | Y7 |
| 6 | 0 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |

| | (MSB) | | | FORMAT 24 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 1 | M | C3 | C2 | C1 | C0 | X15 | X14 |
| 2 | 0 | X13 | X12 | X11 | X10 | X9 | X8 | X7 |
| 3 | 0 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | Y15 | Y14 |
| 5 | 0 | Y13 | Y12 | Y11 | Y10 | Y9 | Y8 | Y7 |
| 6 | 0 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |

| | (MSB) | | | FORMAT 25 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 0 | 1 | C3 | C2 | C1 | C0 | C4 | 0 |
| 2 | 0 | 0 | X5 | X4 | X3 | X2 | X1 | X0 |
| 3 | 0 | 0 | X11 | X10 | X9 | X8 | X7 | X6 |
| 4 | 0 | 0 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |
| 5 | 0 | 0 | Y11 | Y10 | Y9 | Y8 | Y7 | Y6 |

| | (MSB) | | | FORMAT 26 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 1 | N | 0 | M | C3 | C2 | C1 | C0 |
| 2 | 0 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| 3 | 0 | X13 | X12 | X11 | X10 | X9 | X8 | X7 |
| 4 | 0 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |
| 5 | 0 | Y13 | Y12 | Y11 | Y10 | Y9 | Y8 | Y7 |

| | (MSB) | | | FORMAT 27 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 1 | C4 | C3 | C2 | C1 | C0 | X15 | X14 |
| 2 | 0 | X13 | X12 | X11 | X10 | X9 | X8 | X7 |
| 3 | 0 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | Y15 | Y14 |
| 5 | 0 | Y13 | Y12 | Y11 | Y10 | Y9 | Y8 | Y7 |
| 6 | 0 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |

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| | (MSB) | | | FORMAT 28 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 0 | 1 | C3 | C2 | C1 | C0 | M | N |
| 2 | 0 | 0 | X5 | X4 | X3 | X2 | X1 | X0 |
| 3 | 0 | 0 | X11 | X10 | X9 | X8 | X7 | X6 |
| 4 | 0 | 0 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |
| 5 | 0 | 0 | Y11 | Y10 | Y9 | Y8 | Y7 | Y6 |

| | (MSB) | | | FORMAT 29 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 1 | N | T0 | Sx | Sy | C2 | C1 | C0 |
| 2 | 0 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| 3 | 0 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |

| | (MSB) | | | FORMAT 30 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 1 | N | T0 | Sx | Sy | C2 | C1 | C0 |
| 2 | 0 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| 3 | 0 | X13 | X12 | X11 | X10 | X9 | X8 | X7 |
| 4 | 0 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |
| 5 | 0 | Y13 | Y12 | Y11 | Y10 | Y9 | Y8 | Y7 |

Sx and Sy are 0 for negative output and 1 for positive in this format.

| | (MSB) | | | FORMAT 31 | | | | (LSB) |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **B7** | **B6** | **B5** | **B4** | **B3** | **B2** | **B1** | **B0** |
| 1 | 0 | 1 | 0 | 0 | T2 | T1 | T0 | N |
| 2 | 0 | 0 | 0 | C4 | C3 | C2 | C1 | C0 |
| 3 | 0 | 0 | X5 | X4 | X3 | X2 | X1 | X0 |
| 4 | 0 | 0 | X11 | X10 | X9 | X8 | X7 | X6 |
| 5 | 0 | 0 | 0 | Sx | X15 | X14 | X13 | X12 |
| 6 | 0 | 0 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |
| 7 | 0 | 0 | Y11 | Y10 | Y9 | Y8 | Y7 | Y6 |
| 8 | 0 | 0 | 0 | Sy | Y15 | Y14 | Y13 | Y12 |

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# BINARY FORMATS

## 16-Button Cursor Output

| BUTTON PRESSED | FORMAT 24, 26 AND 28 | FORMAT 27 AND 31 | FORMAT 29 AND 30 | FORMAT 23 AND 25 |
|---|---|---|---|---|
| NONE | 0 0 0 0 | 0 0 0 0 0 | 0 0 0 | 0 0 0 0 0 |
| 0 | 0 0 0 1 | 0 0 0 0 1 | 0 0 1 | 1 0 0 0 0 |
| 1 | 0 0 1 0 | 0 0 0 1 0 | 0 1 0 | 1 0 0 0 1 |
| 2 | 0 0 1 1 | 0 0 0 1 1 | 0 1 1 | 1 0 0 1 0 |
| 3 | 0 1 0 0 | 0 0 1 0 0 | 1 0 0 | 1 0 0 1 1 |
| 4 | 0 1 0 1 | 0 0 1 0 1 | 1 0 1 | 1 0 1 0 0 |
| 5 | 0 1 1 0 | 0 0 1 1 0 | 1 1 0 | 1 0 1 0 1 |
| 6 | 0 1 1 1 | 0 0 1 1 1 | 1 1 1 | 1 0 1 1 0 |
| 7 | 1 0 0 0 | 0 1 0 0 0 | 0 0 0 | 1 0 1 1 1 |
| 8 | 1 0 0 1 | 0 1 0 0 1 | 0 0 1 | 1 1 0 0 0 |
| 9 | 1 0 1 0 | 0 1 0 1 0 | 0 1 0 | 1 1 0 0 1 |
| A | 1 0 1 1 | 0 1 0 1 1 | 0 1 1 | 1 1 0 1 0 |
| B | 1 1 0 0 | 0 1 1 0 0 | 1 0 0 | 1 1 0 1 1 |
| C | 1 1 0 1 | 0 1 1 0 1 | 1 0 1 | 1 1 1 0 0 |
| D | 1 1 1 0 | 0 1 1 1 0 | 1 1 0 | 1 1 1 0 1 |
| E | 1 1 1 1 | 0 1 1 1 1 | 1 1 1 | 1 1 1 1 0 |
| F | 0 0 0 0 | 1 0 0 0 0 | 0 0 0 | 1 1 1 1 1 |

## 4-Button Cursor Output

| BUTTON PRESSED | FORMAT 24, 26 AND 28 | FORMAT 27 AND 31 | FORMAT 29 AND 30 | FORMAT 23 AND 25 |
|---|---|---|---|---|
| NONE | 0 0 0 0 | 0 0 0 0 0 | 0 0 0 | 0 0 0 0 0 |
| 0 | 0 0 0 1 | 0 0 0 0 1 | 0 0 1 | 0 0 0 0 1 |
| 1 | 0 0 1 0 | 0 0 0 1 0 | 0 1 0 | 0 0 0 1 0 |
| 2 | 0 1 0 0 | 0 0 1 0 0 | 1 0 0 | 0 0 1 0 0 |
| 3 | 1 0 0 0 | 0 1 0 0 0 | 0 0 0 | 0 1 0 0 0 |

## Operating Modes

The operating mode sets the conditions that must be satisfied before the tablet will transmit position to the host. One or more modes may be active concurrently.

### *Prompt Mode*

The host must transmit a prompt character to the tablet before a data point will be output. The default prompt character is "?". Prompting can operate in conjunction with any other mode.

### *Relative Output Modes*

A relative mode does not have a direct relationship between the tablet cursor position and the screen cursor position. The movements of the screen cursor will duplicate the tablet cursors' movement's right, left, up and down, but its exact position on the screen will depend only on where it was when the cursor was activated.

### *Delta*

The data output represents the change in the transducer's position since the last point was output rather than the absolute position of the transducer on the tablet. DELTA may be used in conjunction with ***Line***, ***Run***, ***Point*** or ***Track***.

### *Absolute Output Modes*

Absolute modes have a direct relationship between the tablet's active area and the screen display. If the cursor is moved from the lower left to upper right on the tablet, the screen's cursor will move from the lower left of the screen to the upper right.

| | |
|---|---|
| **HALT** | Tablet continues to accept commands, but no data will be output until a new mode is selected. |
| **LINE** | Tablet outputs position data continuously while the stylus tip or a cursor button is depressed. One additional point is output when the stylus or button is released. |
| **POINT** | Tablet outputs one data point each time the stylus tip or cursor button is depressed. |

| | |
|---|---|
| **RUN** | Tablet outputs data points continuously. This mode is called ***STREAM*** by some manufacturers. |
| **TRACK** | Tablet outputs data points continuously while the stylus tip or cursor button is depressed. Unlike ***LINE***, there is no extra point transmitted when the button is released. |
| **INCREMENT** | Data points are only output if the transducer has been moved for the required increment distance. The increment distance must first be set by the ***SET INCREMENT*** command. Increment may be used in conjunction with ***LINE***, ***RUN*** or ***TRACK***. |

## Troubleshooting

### *Diagnostic Tests*

When the tablet is powered on or upon reception of the software reset command, it runs diagnostic self-tests to ensure the tablet is functioning correctly. After these tests, the tablet sounds the utility tone and is ready for operation. If any test fails, the tablet sounds an error tone and the test indicator flashes. The corresponding indicator (#1-8) of the failed test will also light.

If the tablet fails the self-test, note which indicator is lit, write it down and contact your local GTCO CalComp by Turning Technologies representative or call 1-866-746-3015. A comprehensive description of the self-test and other diagnostic tests for the use of trained electronics technicians is included in this section. You may be asked to perform the tests and report the results to the service department.

### No Data

If no data is being received by the host, check the following:

- Is the tablet plugged in to a live receptacle and is its power switch on?
- Switch the power off and then on. Does the tablet pass the self-test?
- Check the fuses.
- Are all connections between the tablet and host tight?
    - Tablet to transducer?

    - Tablet to RS-232 connection?
    - Host to RS-232 connection?
- Is the RS-232 cable plugged into the correct communications port?
- Is the host computer turned on and ready to receive data?
- Is the tablet disabled? Indicators #7 and #8 will be lit if the tablet is disabled.
- Is the transducer in proximity?
- Are the soft switches set properly for the software you're using? Recheck the settings.
- Are the transmit and receive data lines configured properly? Check the host and software user's manuals for the right configuration. They can be reversed by setting Bank 5, switch 2.

**Garbled Data**

If data is transmitted, but garbled:

- Does the data output format of the tablet match the data format expected by the software?
- Are the baud rate, number of data bits, parity bits and stop bits set to match the host's requirements? Does it match the software's requirements? Check the operator's manuals for the host and software.

## Tablet Diagnostic Tests

### *Automatic Self-Tests*

At power up or software reset, the tablet runs the **ROM CHECKSUM**, **RAM READ/WRITE**, **NON-VOLATILE MEMORY CHECKSUM** and **RS-232 PINOUT** tests. If these self-tests are passed, the tablet sounds the utility tone and is ready for operation. If any test fails, the tablet sounds an error tone, the numbered block corresponding to the failed test lights and the TEST indicator light flashes.

Picking either the BANK or TEST blocks will take the tablet out of the failure mode, stopping the flashing indicator. The tablet will attempt to operate normally.

### *Diagnostic Tests*

The diagnostic tests designated as ***Runtime*** tests are basic tests which the untrained user can perform. They are the same as the automatic self-tests that the tablet runs on power up.  The ***Comprehensive*** tests are more detailed diagnostic tests meant for the use of trained factory or field service engineers.

**NOTE:** Specifications of the comprehensive tests are subject to change at any time and without notice.

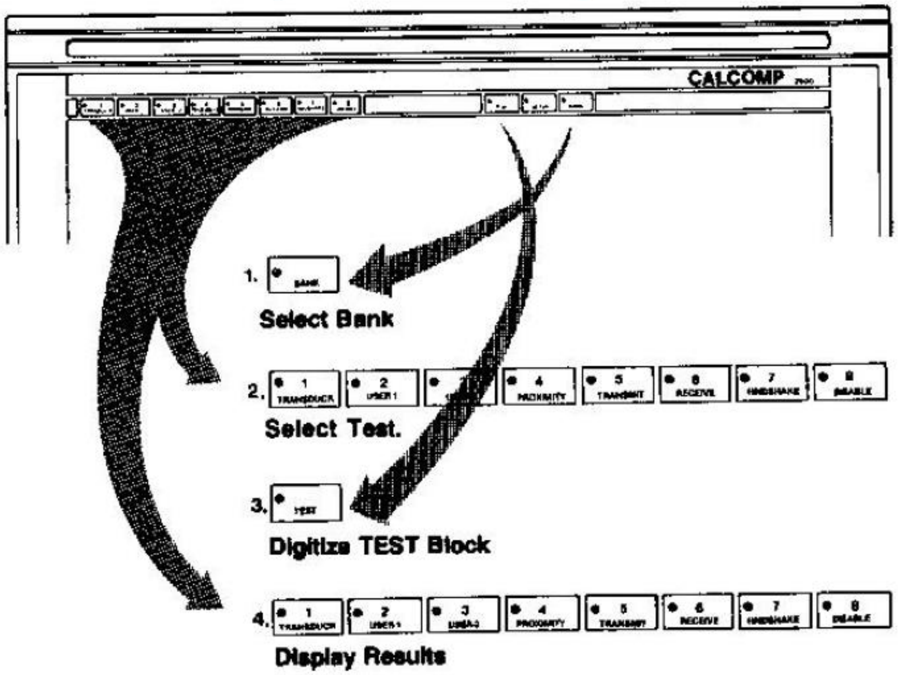
Tests may be run from the soft switch banks or by sending ESC % _ _ (b) CR commands from the host.  The output will only appear on the numbered indicator LEDs if the soft switches are used.  The output will appear on both the LEDs and on the RS-232 port if the ESC % _ _ (b) CR commands are used.

***Entering Test Mode***

To enter the test mode from the normal operating mode, select the **BANK** block to first enter **BANK SELECT** mode.  Then pick the numbered block that corresponds with the number of the test you wish to run.  Finally, choose the **TEST** block.  The results of the test will be displayed on the numbered indicators.

To run another test, pick **BANK** again and then the numbered block which corresponds with the next test, then **TEST**.

To return to normal mode, select the **TEST** block a second time, after you have seen the results of the selected test.




***Soft Switch Assignments in Test State***

The tablet uses the following switch assignments for running the tests from the soft switches.

**BANK 1:** Self-tests and RS-232 pinout indicators

Switch 1: Spare

Switch 2: RS-232 Pinout (Pin 2 voltage indicator)

Switch 3: RS-232 Pinout (Pin 3 voltage indicator)

Switch 4: Non-Volatile Memory Failure

Switch 5: ROM Checksum Failure

Switch 6: RAM Read/Write Failure

Switch 7: Spare

Switch 8 Spare

**BANK 2:** Model ID

**BANK 3:** Software ID

**BANK 4:** Analog to Digital Converter

**BANK 5:** Input

**BANK 6:** Grid Test

**BANK 7:** Checksum

**BANK 8:** Transducer Data

***Test Descriptions***

| | **RUNTIME OR SELF-TESTS** |
|---|---|
| **RS-232 PINOUT** | This is NOT a failure indicator. Indicator lights #2 and #3 correspond to pins #2 and #3 of the RS-232 connector. The indicator lights if -12 V is present on the pin. |
| **NON-VOLATILE MEMORY CHECKSUM** | All bytes of the non-volatile memory are added and compared to a Checksum. If they are not equal, the test is failed. Each time the memory is altered; a new Checksum is calculated and stored. |
| **ROM CHECKSUM** | The bytes of the ROM are exclusive-ORed. The test fails if the ending value is non-zero. |
| **RAM READ/WRITE** | The RAM is written with a checkerboard pattern, read and compared with write data. The test fails if the two do not match. Data needed by the system is moved so the entire RAM may be checked without destroying its contents. |

## COMPREHENSIVE TESTS

**MODEL ID**

The tablet model number (25120 or 25180) is output in consecutive ASCII characters on the numbered LEDs. To view the characters, press a cursor button or the stylus tip for each character. After the last character is displayed, the tablet returns to **BANK/SELECT**.

**SOFTWARE ID**

The software part number and current revision level are output in ASCII characters as in the MODEL ID test.

**ANALOG TO DIGITAL TEST**

Place the transducer on the active area during this test. The differential voltage between the Y-axis wires located by the transducer is output continuously on the LEDs as a binary number between 00 and FF (0 volts to 10 volts).

**INPUT TEST**

When a character is received, the tablet beeps and the numbered indicator LEDs form a binary ASCII display of the character. They hold the display until a new character is received. Exit the test by pressing a cursor button or the stylus.

**GRID TEST**

The grid wires are tested as the transducer moves across the tablet. This test requires the user to move the transducer from left to right along the X-axis and then from top to bottom along the Y-axis. The number of the wire being tested is output as a binary number (Y is biased by 80H) on the indicator LEDs. If the test encounters a bad wire, it stops counting. The last number output is the number of the bad wire. If the tablet passes the test, it beeps and returns to normal.

**CHECKSUM OUTPUT**

The checksum output should be zero.

**TRANSDUCER DATA**

The output is an eight-bit binary number followed by a CR and LF.

| | |
|---|---|
| **b0** | Pen/Button Down |
| **b1-b4** | Button Code, a four-bit indication of which |

| | |
|---|---|
| | button is pressed (cursor line status) |
| **b5** | Cursor Present |
| **b6** | 4-Button Cursor Present |
| **b7** | Reserved |

***Test Commands***

The diagnostic tests can also be activated from the host keyboard or user menu overlay with the command:

**ESC % _ _ (b) CR**

(b) is one to eight and corresponds to the soft switch test assignment. If a test is not self-terminating, send a character to the tablet to exit. The output is in ASCII or HEX on the display screen and in binary on the tablet LEDs.

**NOTE:** The tablet will not respond if ***ESC %*** _ is entered from the ASCII portion of the overlay. The blank box in the upper right corner of the menu activates the control sequence ***ESC%***_.

**ESC % _ _ 1 CR SELF-TESTS** Output is a 2-digit HEX number, corresponding to the binary output of the LEDs followed by a carriage return and line feed.

| | |
|---|---|
| **b0** | 0 |
| **b1** | RS-232 pinout indicator (pin 2) |
| **b2** | RS-232 pinout indicator (pin 3) |
| **b3** | Non-volatile Memory failure |
| **b4** | ROM Checksum failure |
| **b5** | Ram Read/Write failure |
| **b6** | 0 |
| **b7** | 0 |

**ESC % _ _ 2 CR MODEL ID** Tablet model number (25120 or 25180) followed by a carriage return and line feed, will be output to the host in ASCII characters.

**ESC % _ _ 3 CR SOFTWARE ID** Software part number and current revision level are output in ASCII characters followed by a carriage return and a line feed.

| | |
|---|---|
| **ESC % _ _ 4 CR ANALOG TO DIGITAL TEST** | Test results are output as a 2-digit HEX number between 00 and FF (0 volts to 10 volts). |
| **ESC % _ _ 5 CR INPUT TEST** | This test can't be run from the host because the first character of the input simultaneously exits the test. |
| **ESC % _ _ 6 CR GRID TEST** | The number of the wire being tested is output as a two-digit HEX number. The Y-axis is biased by 80H. |
| **ESC% _ _ 7 CR CHECKSUM OUTPUT** | Output is a two-digit HEX number followed by a carriage return and line feed. |
| **ESC% _ _ 8 CR TRANSDUCER TEST** | Data on the transducer port is output as a 2-digit HEX number followed by a carriage return and line feed. The test continues until a character is sent to the tablet. |

## Maintenance

### *Cleaning the Tablet Surface*

- Use a clean dry cloth to remove dust or dirt.
- Never apply an abrasive cleanser as it may scratch the surface. Soft cleansers may leave shiny spots on the tablet surface.
- Use only the cleaning materials listed below to clean the tablet surface:
  - Denatured alcohol
  - Mild soap and water
  - Isopropyl alcohol (rubbing alcohol)
  - VM&P naphtha
  - Freon

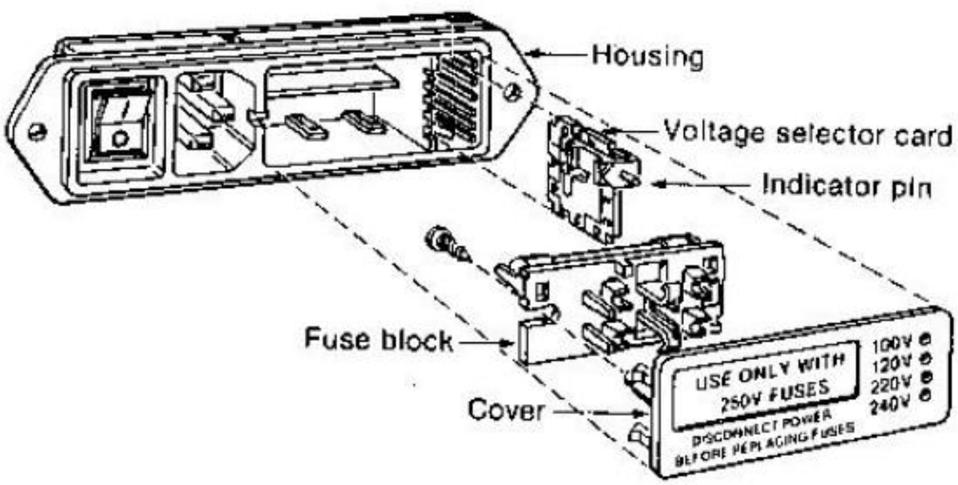
### *Periodic Maintenance*

The 2500 tablet requires no periodic adjustments.

## Changing the Operating Voltage

The tablet may be operated at 100-125 Volts AC or at 200-250 Volts AC.  If the operating voltage of the table is not the same as the operating voltage in your locale, follow the steps below to change it.

1. Disconnect the tablet from the line cord.




2. Insert a small flat blade screwdriver into the notch at the left of the fuse block cover. Gently pull the left end of the fuse block cover up and remove the fuse holder.

   Set aside cover/fuse block assembly for now.

3. Pull the voltage selector card straight out of its housing at the right, using the indicator pin as a handle.  (Needle nose pliers are a help here.)

4. Orient the selector card so that the desired voltage label is right side up.  Pull the indicator pin down to free it from the detent, turn it ¼ turn to the right and then slide it up and to the right as far as possible.

   Turn the pin another ¼ turn to make it point up or away from the voltage label and then slide the pin down into the detent at the top of the card.

5. Reinstall the selector card.  The printed side of the card must face the power cord connector and the indicator pin must point out.

***Changing the Fusing***

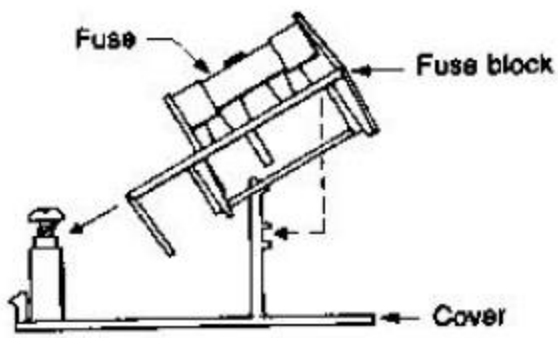
Tablets operating at 100-125V require one slow blow fuse rated at .25 A.

Tablets operating at 200-250V require two slow blow fuses rated at .125 A.

**To change the fusing:**

1. Loosen the Phillips screw on the fuse block one turn.

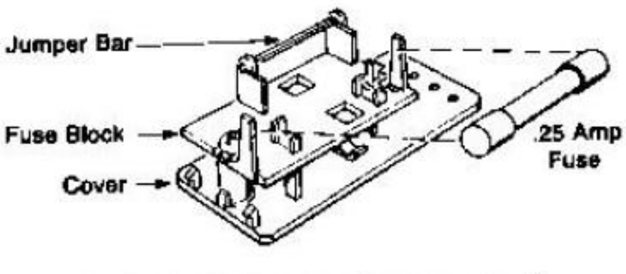
2. Remove the fuse block by lifting it free on of the screw, sliding it away from the screw and then lifting up.




**Fuse Block/Cover Assembly**

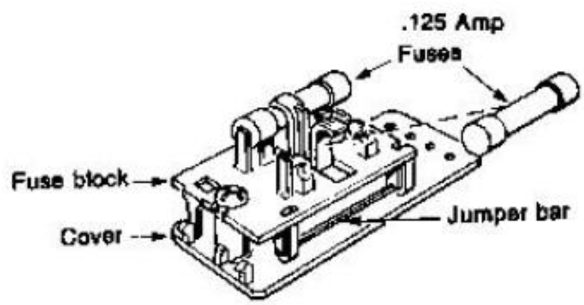
Invert the fuse block and reinstall it onto the pedestal.  Insert the proper fuses into the holders.  (Two fuses are required, although a dummy fuse may be used in the neutral lower holder.)

14557 N. 82nd St.
Scottsdale, AZ 85260
www.gtcocalcomp.com
866.746.3015 toll free
480.998.1751 fax




100-125 V Fusing Arrangement

200-250 V Fusing Arrangement




3. Reinstall the cover assembly. The indicator pin should now be visible in the 240V position.

   **NOTE:** For protection against the risk of fire or electric shock hazard, always replace fuses with the same type and rating of fuse.

## Communication Interface

The 2500 tablet is designed for asynchronous serial RS-232C transmission using RS-232C/CCITT V.24 signals. This version supports an eight-wire data and handshaking subset of RS-232C. The tablet is configured to function as Data Terminal Equipment (DTE). DTE assumes transmit on pin 2 and receive on pin 3. The tablet can also emulate a DCE device, which transmits on pin 3 and receives on pin 2. If the host is configured as DTE and uses handshake signals, a null modem should be used between the tablet and host.

| PIN NUMBER | ASSIGNMENT |
|---|---|
| 1 | Chassis Ground |
| 2(3) | Transmitted Data |
| 3(2) | Received Data |
| 4 | Request to Send Output |

| | |
|---|---|
| 5 | Clear to Send<br>Input, +12V pull-up |
| 6 | Data Set Ready<br>Input, +12V pull-up |
| 7 | Signal Ground |
| 8 | Received Line Signal Detect<br>Input, +12V pull-up |
| 9-19 | SPARE |
| 20 | Data Terminal Ready<br>Output |
| 21-23 | SPARE |
| 24 | Optional Power Input<br>when jumper W3 is installed |
| 25 | Power Ground |

## Accessories

To order any of the items below, either contact your GTCO CalComp by Turning Technologies distributor or call 1-866-746-3015.

| PART NUMBER | DESCRIPTION |
|---|---|
| **TABLETS** | |
| 25120-01 | 12” x 12” Tablet, RS-232 DTE w/110V Power Supply |
| 25120-02 | 12” x 12” Tablet, RS-232 DTE host powered |
| 25120-03 | 12” x 12” Tablet, RS-232 DTE w/220V Power Supply |
| 25180-01 | 12” x 18” Tablet, RS-232 DTE w/110V Power Supply |
| 25180-02 | 12” x 18” Tablet, RS-232 DTE host powered |
| 25180-03 | 12” x 18” Tablet, RS-232 DTE w/220V Power Supply |
| **CURSOR** | |
| 25034-01 | 4-Button Cursor |

| | |
|---|---|
| 25035-01 | 4-Button Cursor, Diamond Shape |
| 25036-01 | 16-Button Cursor |
| **STYLUS** | |
| 25093-01 | Stylus w/o Ink |
| 25094-01 | Stylus w/Blue Ink |
| 25097-01 | Stylus w/Red Ink |
| **MENU** | |
| 14756-1 | Menu Overlay |
| **USER'S MANUAL** | |
| 50293-01 | 2500 Series User's Manual |

## Specifications

| | |
|---|---|
| **PHYSICAL** | |
| **Model 25120** | 12" x 12" (30 cm x 30 cm) active area |
| Height | Minimum 0.545" (1.4 cm)<br>Maximum 2.5" (6.4 cm) |
| Depth | 16" (41 cm) |
| Width | 15" (38 cm) |
| Weight | 6.2 lbs. (2.8 kg) |
| | |
| **Model 25180** | 12" x 18" (30 cm x 46 cm) active area |
| Height | Minimum 0.545" (1.4 cm)<br>Maximum 2.5" (6.4 cm) |
| Depth | 16" (41 cm) |
| Width | 21" (53 cm) |
| Weight | 9.4 lbs. (4.3 kg) |
| **FUNCTIONAL** | |
| Resolution | Variable, user selectable up to 1280 LPI, 50 LPM |
| Accuracy | +/- .015 inch (.254 mm) in the active area |
| Jitter | +/- .5 least significant digit |
| Proximity | 0.75 inch (12.7 mm) +/- .25 inch |
| Speed | Variable, user selectable up to 125 coordinate pairs per second |
| **ELECTRICAL** | |
| Safety: | UL 478 and IEC 380 |
| Electromagnetic: | FCC Class B, International VDE-B |
| **ENVIRONMENTAL** | |

| | |
|---|---|
| Operating Temperature | 60° to 105° F; 15° to 40° C |
| Storage Temperature | -131° to 167° F; -55° to 75° C |
| Humidity Range | 0% to 95% non-condensing |
| Operating Altitude | Up to 15,000 feet ASL |
| Storage Altitude | Up to 50,000 feet ASL |

## Factory Settings

The 2500 tablet is shipped with the following parameters set in the soft switch banks. These settings will be invoked whenever the **RESTORE FACTORY SETTINGS** soft switch or menu block is selected.

| | |
|---|---|
| **BAUD RATE** | 9600 |
| **BEEPER** | Enabled |
| **COMMANDS** | Enabled |
| **CURSOR COMMANDS** | Enabled |
| **DATA BITS** | 7 |
| **DATA LINE ASSIGNMENT** | DTE (Transmitting on pin 2) |
| **DATA RATE** | 100 PPS |
| **ECHO** | Disabled |
| **FORMAT** | 0 |
| **HANDSHAKE** | Enabled |
| **INDICATOR ASSIGNMENT** | Tablet Status |
| **LINE FEED** | Enabled |
| **MARGIN DATA** | Disabled |
| **OPERATING MODE** | HALT |
| **OUT-OF-PROXIMITY DATA** | Disabled |
| **PARITY** | Even |
| **RESOLUTION** | 200 LPI |
| **STOP BITS** | 1 |

**Corporate Headquarters**
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# 2500 SERIES