# SURFACE-LIT ACCUTAB™ USER'S GUIDE

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## Parts Checklist

- ✓ AccuTab Series or Surface-Lit AccuTab Series digitizing tablet
- ✓ AccuTab controller
- ✓ Power supply
- ✓ Transducer (cursor)
- ✓ Computer interface cable with 9-pin connector
- ✓ 9- to 25-pin adapter
- ✓ TabletWorks CD

**NOTE:** AccuTab controller is the small enclosure attached to the back of the tablet that contains the electronics that drive the digitizer.

## What You Will Need to Use AccuTab

- ✓ Computer with an RS-232C communication port
- ✓ Graphic application software that accepts digitizer input

## Care and Handling

- To clean the tablet, GTCO CalComp by Turning Technologies recommends using any non-abrasive cleaner that is appropriate for cleaning kitchen counter tops.
- To clean the cursor body, use a mild cleanser. Do not spray the cleanser directly on the cursor, instead dampen a soft cloth with a mixture of water and the cleanser.
- Clean cursor reticles with alcohol.

**NOTE:** Excessive cleaning can dissolve the filled black cross hair on a reticle.

## Installing AccuTab

The following instructions provide information on how to put the AccuTab system together and attaching it to the computer.

### *Mounting a Large AccuTab Tablet*

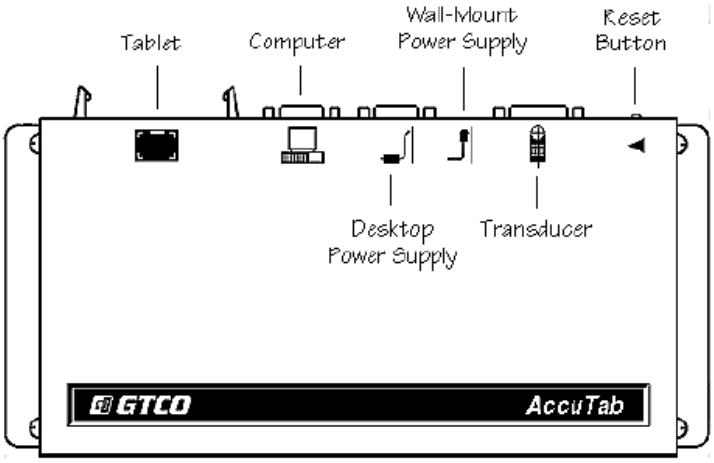
The AccuTab can be placed on a table, desk or drafting table. Alternatively, you can mount a tablet on a workstation stand available from a variety of manufacturers. Instructions will be packed with the stand. GTCO CalComp by Turning Technologies also provides Universal Mounting Brackets, as an option, that allow the digitizer to be mounted to virtually any

pedestal. Contact GTCO CalComp by Turning Technologies at 1.866.746.3015 or email us at gtco.support@gtcocalcomp.com for price and availability.

**NOTE:** Do not drill holes in any GTCO CalComp by Turning Technologies tablet.

***Connecting to Your Computer***

GTCO CalComp by Turning Technologies provides an RS-232C cable and a 9-pin to 25-pin adapter with each AccuTab system. Connect the cable between the port designated by the computer icon on rear panel of the Controller shown below. Use the 9- to 25-pin adapter if the computer has a 25-pin RS-232C connector. AccuTab interfacing in the Advanced Operating Information section contains more information on RS-232C interfacing.




***Connecting the Transducer***

Three standard transducers are available for the AccuTab:

- 4-button cursor
- 16-button cursor
- 16-button illuminated cursor

Attach the transducer to the transducer jack on the rear panel of the controller pictured on the previous page.

### *Attaching the Power Supply*

Determine which power supply you have and follow the corresponding instructions. The AccuTab controller is designed to allow a variety of power supplies to be used. Connect only one power supply to the controller. Contact GTCO CalComp by Turning Technologies for information on supplies other than those listed below that can be used with AccuTab.

The **DP-PS12** power supply is supplied for use in North America and other locations with 120 volt line voltage. Attach the 9-pin power supply cable to the jack designated by the desktop power supply icon on the rear panel of the controller pictured above.

The **DP-UPS power supply** can be used with input voltages of 90-260 volts AC and 50-60Hz. Connect the appropriate power cord to the IEC connector on the power supply and attach the output power cable to the 9-pin jack designated by the desktop power supply icon on the rear panel of the controller pictured above.

### *Applying Power to AccuTab*

With the wall mount power supplies, the AccuTab powered on as soon as the unit is plugged into the outlet and the power switch on the Controller is turned ***ON***. If you have a desktop supply, turn on the power supply switch. The AccuTab performs a self-test and responds with a series of tones when powered up.

When you apply power, you should instantly hear four short "***Success!***" tones and simultaneously see the cursor lights on the transducer flash four times. This response indicates that the AccuTab is functioning properly.

If you hear any tones before the "***Success!***" tones or if you do not hear the four "***Success!***" tones or if the lights on the transducer do not flash four times, there is a problem. Carefully review the installation step-by-step and correct any errors. If there is still a problem, go the ***Troubleshooting*** section of the manual.

### *Connecting and Using the Surface-Lit Option*

To connect and operate the lighting option:

- Attach the power cord with the connector on the front of the ballast box (fan enclosure) located along the back of the tablet and then plug the power cord into a wall outlet.

- The on/off power and dimmer control switches for the lighting are on the control module found along the right side of the tablet. Set the power switch to the ***ON*** position.
- The light level is adjustable to three levels: ***LO***, ***MED*** and ***HI***. Select the level that is most appropriate for your task, taking into consideration the material you are lighting through and user comfort.

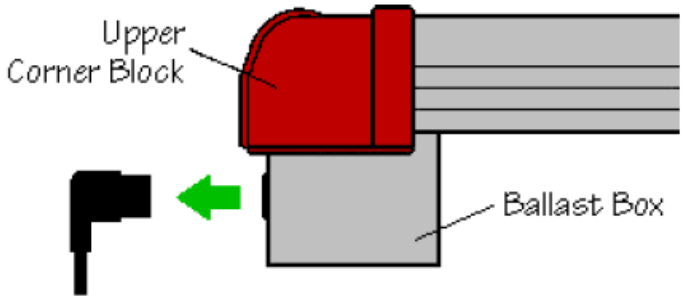
**NOTE:** A relatively stable AC power source is required for the illumination system to function at maximum performance. If the light intensity of the Surface-Lit AccuTab flickers periodically, it's most likely due to a heavy electrical load being placed on the circuit, such as a compressor or fan motor. This problem can be eliminated by using a separate circuit, line conditioning equipment or a UPS power supply.

***Replacing Light Bulbs on the Surface-Lit AccuTab***

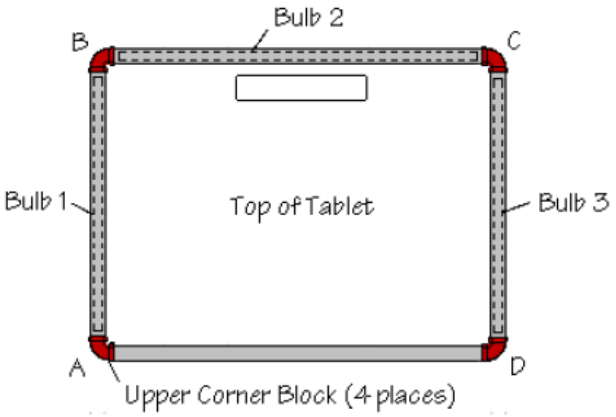
The expectancy life of a light bulb is approximately 2,000 hours of continuous use (a bulb will illuminate at about 50% intensity after that time). Contact the GTCO CalComp by Turning Technologies Technical Support Team to find out more about how to receive replacement bulbs.

**To install a replacement light bulb(s):**

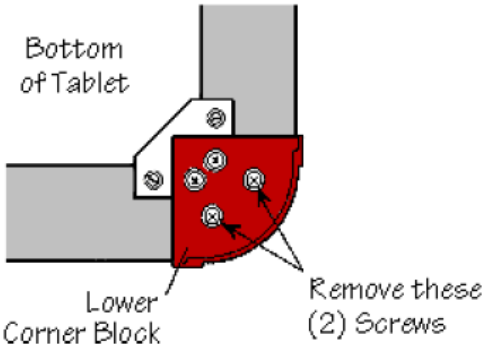
1. Position the tablet parallel to the floor with the top side up. Unplug the power cord from the ballast box.



2. Identify which upper corner blocks you will need to remove:
   - To replace bulb 1, remove A and B.
   - To replace bulb 2, remove B and C.
   - To replace bulb 3, remove C and D.

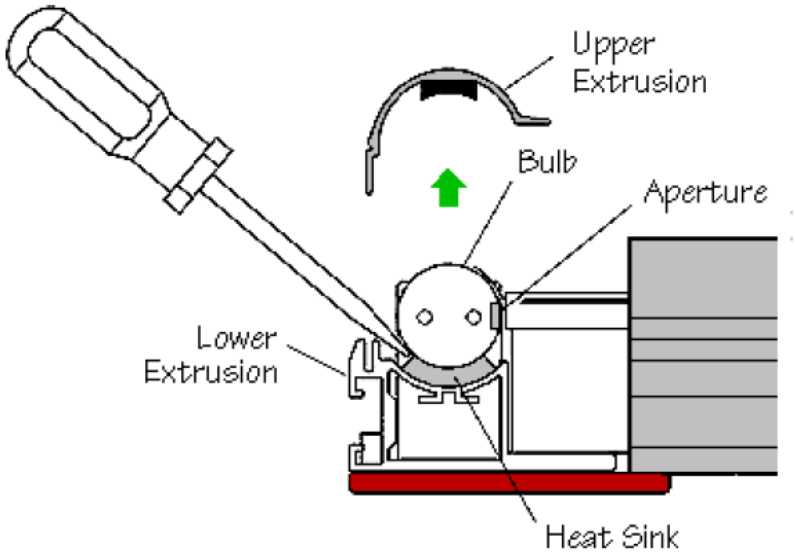



3. Using a Phillips screwdriver, remove the appropriate upper corner blocks by discharging the two screws indicated. (To prevent the upper corner block from falling and possibly being damaged, keep one hand on it while removing the two screws.)

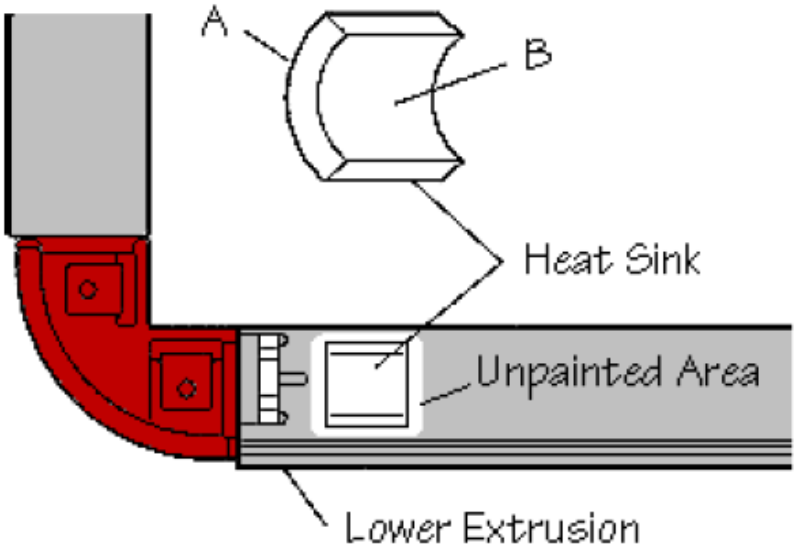



4. Using a flat-blade screwdriver as shown, gently pry the bulb up at one end and then remove it completely. Use of excessive force could shatter the bulb.
   - If the heat sink stays attached to the bulb, remove any adhesive that it leaves behind in the unpainted area on the lower extrusion (see figure in Step 5).
   - If the heat sink remains attached to the lower extrusion, remove it using a pair of pliers and then discharge any adhesive that it leaves behind in the unpainted area on the lower extrusion (see figure in Step 5).

Dispose of the bulb and heat sink.




5. Clean the unpainted area on the lower extrusion thoroughly with isopropyl alcohol. Dry the area completely and remove adhesive liner A from the new heat sink supplied. Place the heat sink on the lower extrusion exactly as shown and press down on it firmly. (The heat sink must be placed within the clean unpainted area on the lower extrusion.) Remove adhesive liner B from the heat sink.



6. Install the new bulb with its aperture facing toward the center of the tablet (see figure in Step 4). (The aperture is the 1/4" wide clear window that runs the length of the bulb.) Press down on each end of the bulb until it snaps into place and until the bulb makes contact with the adhesive on the heat sink.

7. Replace the upper extrusion. Make sure that the ends of the upper extrusion align with the ends of the lower extrusion.

8. Discharge the upper corner blocks. Do not over tighten the screws.

***Configuring Your Computer***

Apply power to the computer. Configure the graphic application software to operate with AccuTab. Many application programs provide configuration information for specific digitizers. If the GTCO CalComp by Turning Technologies AccuTab digitizer is not listed, you can use the configuration for GTCO CalComp by Turning Technologies Digi-Pad Type 5 or Type 5A (T5/T5A), CalComp 9100/9500 or Summagraphics Microgrid III.

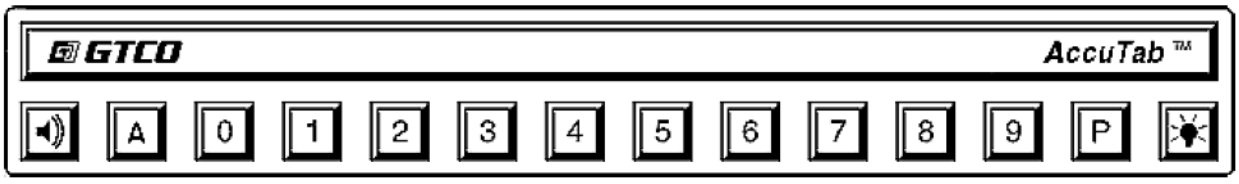
If necessary, install the appropriate digitizer driver(s) from the Digitizer Driver CD supplied (AutoCAD, Windows and mouse drivers are included). Insert the diskette into drive A or B. From the DOS prompt, type ***a:\install*** or ***b:\install*** and then follow the onscreen instructions.

**NOTE:** Install only the drivers that are necessary for the AccuTab to work with your application software.

***Mounting Transducer Holders***

Each transducer comes with a holder. Remove the protective paper, exposing the adhesive layer on the bottom of the holder. Place the holder in a convenient location on the tablet, outside the marked active area.

## Using the AccuSet Menu




**Use the AccuSet Menu to:**

- Configure AccuTab for specific application programs
- Use the Custom Configuration Menu
- Control the alarm
- Reset the AccuTab
- Control the Illuminated Cursor lamps

***Configuring for Specific Application Programs***

You can use the AccuSet Menu to quickly change the AccuTab's operating characteristics to match those required by different application programs running on the computer.

***To configure AccuTab for use with specific application programs:***

1. In Table 1, find the application program you'll be using with AccuTab. Please note the corresponding *AccuSet Code*.
    - If your application program is not listed in Table 1, find the configuration settings that apply to your application program in Table 2 and use that AccuSet Code.
    - If an appropriate AccuSet Code is not listed in Table 2, then use the Custom Configuration Menu to set up the AccuTab.

2. Select the

block on the AccuSet Menu. This lets the AccuTab know you are about to set a new configuration. You will hear one short beep.

   **NOTE:** The proximity light will turn on only when the transducer is over a AccuSet Menu block that is a valid selection (for example, the proximity light will not turn on over a digital block until the

block has been selected).

3. On the AccuSet Menu, select the two digits of the AccuSet Code for your application program. You will hear one short beep after the first digit. Then, following the second digit, you will hear the four short "Success!" tones informing you that the AccuTab has reset itself to the new configuration. The proximity light on the transducer will also flash four times.

   To cancel a menu selection before it is complete, digitize a point in the tablet's main active area. Three long beeps will indicate that the AccuSet selection process has been aborted. The proximity light on the transducer will also flash three times.

4. Run the corresponding application program on your computer.

   **NOTE:** Hardware flow control is not supported by the AccuTab Controller. If you have an application that requires this option, contact GTCO CalComp by Turning Technologies for alternatives.

**Flow Control**

Flow control is the process of regulating the traffic or flow of data between two RS-232C devices. Flow control prevents the transmission and subsequent loss of data if the receiver is not ready to accept it. Examples of devices that use flow control are: a printer to signal buffer full; a modem to indicate carrier detect; and a time-shared computer that services multiple users on a time-available basis.

***There are two kinds of flow control:***

- ***Software flow control*** is often implemented over communication links where only a 3-wire cable is used (Transmit Data, Receive Data, Ground) or over telephone lines. The sending device (such as the AccuTab) will immediately stop sending data when it receives an ASCII XOFF character (CTRL-S, hex 13). Transmission will resume when it receives an ASCII XON character (CTRL-Q, hex 11). Character flow control will work with the straight through cable and the null modem cable.

- ***Hardware flow control*** is not commonly used with digitizers and is therefore not supported by the AccuTab Controller.

Flow control may not be needed when a terminal or digitizer is directly connected to a single-user computer. Most digitizing application software does not use flow control of either kind.

***Table 1: AccuSet Menu Codes for Selected Application Programs***

| Program | Company | AccuSet Code |
|---|---|---|
| ARC/Info PC | ESRI | 03 |
| AutoCAD | Autodesk, Inc. | 01 |
| GTCOTEST | GTCO CalComp | 01 |
| IBM GFIS | IBM | 55 |
| IDRISI | Clark University | 53 |
| Imagine 8.X | ERDAS, Inc. | 04 |
| Micro Lynx Plus | Lynx GeoSystems | 54 |
| Microstation PC | Intergraph Corp. | 02 |
| TOSCA | Clark University | 53 |
| generic | GTCO CalComp | 05 thru 17 |
| generic | CalComp | 18 thru 39 |
| generic | Summagraphics | 40 thru 52 |

***Table 2: Configuration Details for AccuSet Menu Codes***

**NOTE:** Max = 100 coordinates/second  lpi = lines per inch  lpmm = lines per millimeter

| Code | Commun. | Output Options | ASCII Options |
|---|---|---|---|
| 01 | 9600,N,8,1 | GTCO Binary, 1000 lpi, Cont, 100 | |
| 02 | 9600,N,8,1 | GTCO Binary, 1000 lpi, Cont, 12 | |
| 03 | 9600,N,8,1 | GTCO ASCII, 1000 lpi, Point, Alarm | PB, SP, CR, LF |
| 04 | 4800,N,8,1 | GTCO ASCII, 1000 lpi, Point, Alarm | PB, CR, LF |

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| | | | |
|---|---|---|---|
| 05 | 9600,N,8,1 | GTCO Binary, 2000 lpi, Cont, 100, Alarm | |
| 06 | 9600,N,8,1 | GTCO Binary, 4000 lpi, Cont, 100, Alarm | |
| 07 | 9600,N,8,1 | GTCO Binary, 100 lpm, Cont, 100, Alarm | |
| 08 | 9600,N,8,1 | GTCO ASCII, 1000 lpi, Cont, 50, Alarm | PB, SP, CR, LF |
| 09 | 9600,N,8,1 | GTCO ASCII, 1000 lpi, Line, 50, Alarm | PB, SP, CR, LF |
| 10 | 9600,N,8,1 | GTCO ASCII, 1000 lpi, Line Incr, 50, Alarm | PB, SP, CR, LF |
| 11 | 9600,N,8,1 | GTCO ASCII, 1000 lpi, Cont Incr, 50, Alarm | PB, SP, CR, LF |
| 12 | 9600,N,8,1 | GTCO ASCII, 2000 lpi, Point, Alarm | PB, SP, CR, LF |
| 13 | 9600,N,8,1 | GTCO ASCII, 2000 lpi, Cont, 50, Alarm | PB, SP, CR, LF |
| 14 | 9600,N,8,1 | GTCO ASCII, 4000 lpi, Point, Alarm | PB, SP, CR, LF |
| 15 | 9600,N,8,1 | GTCO ASCII, 4000 lpi, Cont, 50, Alarm | PB, SP, CR, LF |
| 16 | 9600,N,8,1 | GTCO ASCII, 100 lpmm, Point, Alarm | PB, SP, CR, LF |
| 17 | 9600,N,8,1 | GTCO ASCII, 100 lpmm, Cont 50, Alarm | PB, SP, CR, LF |
| 18 | 9600,N,8,1 | CalComp ASCII 1, 1000 lpi, Point, Alarm | |
| 19 | 9600,N,8,1 | CalComp ASCII 1, 1000 lpi, Line, 50, Alarm | |
| 20 | 9600,N,8,1 | CalComp ASCII 1, 1000 lpi, Cont, 50, Alarm | |
| 21 | 9600,N,8,1 | CalComp ASCII 1, 1000 lpi, Line Incr, 50, Alarm | |
| 22 | 9600,N,8,1 | CalComp ASCII 1, 1000 lpi, Cont Incr, 50, Alarm | |
| 23 | 9600,N,8,1 | CalComp ASCII 2, 1000 lpi, Point, Alarm | |
| 24 | 9600,N,8,1 | CalComp ASCII 2, 1000 lpi, Line, 50, Alarm | |
| 25 | 9600,N,8,1 | CalComp ASCII 2, 1000 lpi, Cont, 50, Alarm | |
| 26 | 9600,N,8,1 | CalComp ASCII 3, 1000 lpi, Point, Alarm | |
| 27 | 9600,N,8,1 | CalComp ASCII 3, 1000 lpi, Line, 50, Alarm | |
| 28 | 9600,N,8,1 | CalComp ASCII 3, 1000 lpi, Cont, 50, Alarm | |
| 29 | 9600,N,8,1 | CalComp ASCII 4, 1000 lpi, Point, Alarm | |
| 30 | 9600,N,8,1 | CalComp ASCII 4, 1000 lpi, Line, 50, Alarm | |
| 31 | 9600,N,8,1 | CalComp ASCII 4, 1000 lpi, Cont, 50, Alarm | |
| 32 | 9600,N,8,1 | CalComp ASCII 4, 1000 lpi, Line Incr, 50, Alarm | |
| 33 | 9600,N,8,1 | CalComp ASCII 4, 1000 lpi, Cont Incr, 50, Alarm | |
| 34 | 9600,N,8,1 | CalComp ASCII 4, 2000 lpi, Point, Alarm | |
| 35 | 9600,N,8,1 | CalComp ASCII 4, 2000 lpi, Cont, 50, Alarm | |
| 36 | 9600,N,8,1 | CalComp ASCII 4, 4000 lpi, Point, Alarm | |
| 37 | 9600,N,8,1 | CalComp ASCII 4, 4000 lpi, Cont, 50, Alarm | |
| 38 | 9600,N,8,1 | CalComp ASCII 4, 100 lpmm, Point, Alarm | |
| 39 | 9600,N,8,1 | CalComp ASCII 4,100 lpmm,Cont 50, Alarm | |

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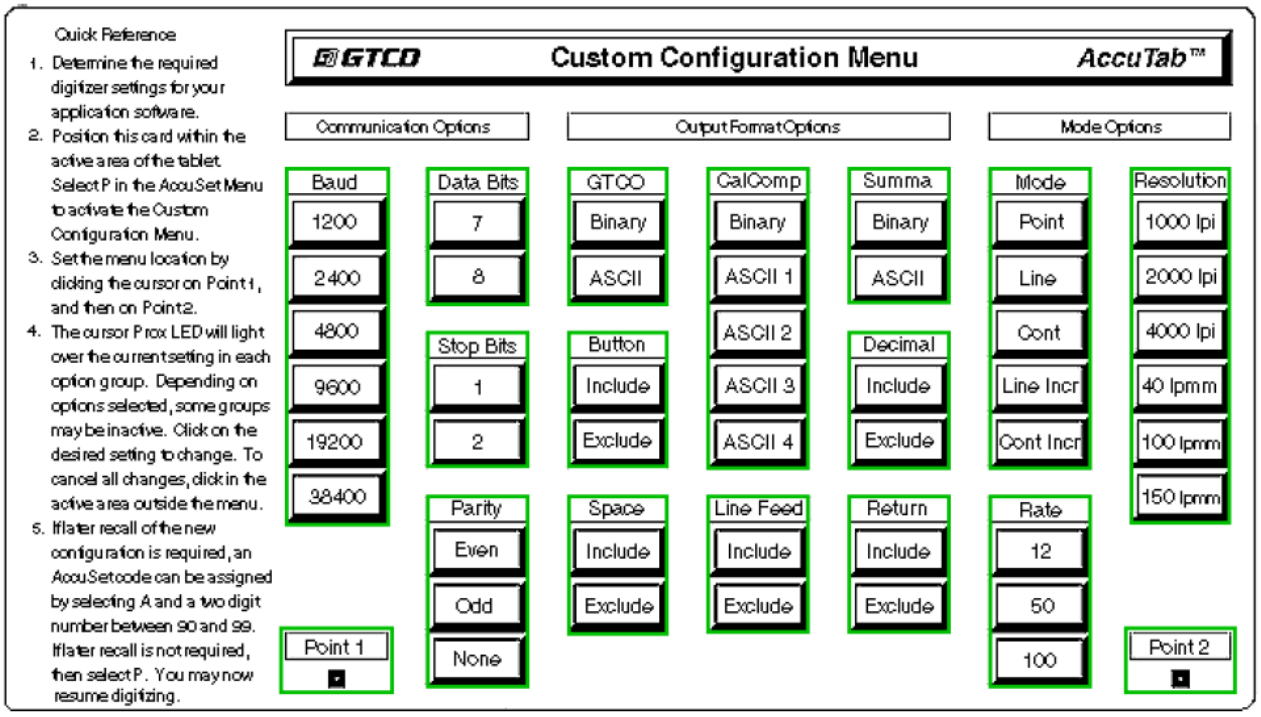
| | | | |
|---|---|---|---|
| 40 | 9600,N,8,1 | Summa Binary, 1000 lpi, Cont, 100, Alarm | |
| 41 | 9600,N,8,1 | Summa Binary, 2000 lpi, Cont, 100, Alarm | |
| 42 | 9600,N,8,1 | Summa Binary, 4000 lpi, Cont, 100, Alarm | |
| 43 | 9600,N,8,1 | Summa Binary, 100 lpmm, Cont,100, Alarm | |
| 44 | 9600,N,8,1 | Summa ASCII, 1000 lpi, Point, Alarm | DP, CR, LF |
| 45 | 9600,N,8,1 | Summa ASCII, 1000 lpi, Line, 50, Alarm | DP, CR, LF |
| 46 | 9600,N,8,1 | Summa ASCII, 1000 lpi, Cont, 50, Alarm | DP, CR, LF |
| 47 | 9600,N,8,1 | Summa ASCII, 1000 lpi, Line Incr,50,Alarm | DP, CR, LF |
| 48 | 9600,N,8,1 | Summa ASCII, 1000 lpi, Cont Incr,50,Alarm | DP, CR, LF |
| 49 | 9600,N,8,1 | Summa ASCII, 40 lpmm, Point, Alarm | DP, CR, LF |
| 50 | 9600,N,8,1 | Summa ASCII, 40 lpmm, Cont, 50, Alarm | DP, CR, LF |
| 51 | 9600,N,8,1 | Summa ASCII, 2000 lpi, Cont, 50, Alarm | CR, LF |
| 52 | 9600,N,8,1 | Summa ASCII, 4000 lpi, Cont, 50, Alarm | CR, LF |
| 53 | 9600,N,8,1 | GTCO ASCII, 1000 lpi, Cont, 100, Alarm | Pb, Sp, CR, LF |
| 54 | 9600,N,8,1 | GTCO ASCII, 40 lpmm, Point | Pb, CR, LF |
| 55 | 9600,O,7,2 | GTCO ASCII, 1000 lpi, Cont, 200, Alarm | Pb, CR |

90-99 User configuration storage locations

## Introduction to the Custom Configuration Menu

The AccuTab with its Controller uses the Custom Configuration Menu to control baud rate, data format and other operating characteristics.




### *Using the Custom Configuration Menu*

If your application does not have an AccuSet Menu Code or if a different configuration is required, then use the Custom Configuration Menu to format AccuTab. The Custom Configuration Menu replaces the 24 switches associated with the older Type 5A Controller.

Configurations you set up can be stored in any of ten user-definable AccuSet locations (codes 90 through 99) for recall at a later time. This allows the AccuTab to be easily switched between applications.

***To configure AccuTab with the Custom Configuration Menu:***

1. Place the Custom Configuration Menu card (included with the system) in the active area of the tablet. The entire menu must be in the active area. (Hold the menu in place to keep it from moving during the configuration process.)

2. Select the menu block at the right end of the AccuSet Menu. The proximity light on the transducer will flash slowly, indicating that the Custom Configuration Menu mode is now ready to receive Alignment Point 1.

3. You must notify the Controller where the Custom Configuration Menu card is located on the tablet. Select Alignment Point 1 (small blue square) in the lower left corner of the card. The proximity light on the transducer will flash rapidly, indicating that the system is waiting to receive Alignment Point 2.

4. Choose Alignment Point 2 (small blue square) in the lower right corner of the card. The LED will only light up if passed over an active menu block on the Custom Configuration Menu (or is moved off the menu card into the active area of the tablet).

If the invalid alignment points are selected or if the Custom Configuration Menu is not entirely in the active area, the menu mode will be aborted. This is indicated by three long beeps from the alarm and three long flashes from the proximity light on the transducer.

5. Configure the AccuTab by selecting the function blocks that correspond to the settings you want.

6. Review the configuration to ensure that the proper settings have been selected. Pass the transducer down each group of options; the proximity light will turn on when the transducer is over the active choice.

7. After making the selections, two options are presented: 1) save as a temporary configuration or 2) save the configuration in a user-definable location for later recall.

    - ***To Save the Configuration Temporarily:*** Select on the AccuSet Menu. You will hear four "Success!" tones and see four proximity light flashes when you successfully save a configuration. The configuration is saved in a temporary location, where it will be retained even if the unit is powered off

or reset. However, if another AccuSet code is entered, this temporary configuration is lost and cannot be recalled without configuring the AccuTab again.

- ***To Save the Configuration in a User-Definable Location:*** Choose and then a two digit value ranging from 90 to 99 on the AccuSet Menu. You will hear four "Success!" tones and see four proximity light flashes when you successfully save a configuration. Saved configurations allow you to switch between applications quickly. Locations 90-99 retain configurations even if the AccuTab is turned off or reset.

8. The configuration set up is now complete. Remove the Custom Configuration Menu and store it in a safe place for future reference.

**Configuration parameters for the AccuTab are divided into three separate categories:**

- **Communication Options**
- **Output Format Options**
- **Mode Options**

***Communication Options***

- **Baud:** The rate, in bits/second, at which characters are transmitted across the RS-232C serial interface. Choices are: 1200, 2400, 4800, 9600, 19200 or 38400.

- **Data Bits:** Data bits represent the actual data being sent from one device to another. Both devices must be set for the same number of data bits. Choices are: Seven (7) or Eight (8).

- **Stop Bits:** Each character has one or two stop bits, which tell the receiving device that a character is complete. The number of stop bits usually does not matter. Setting for two stop bits instead of one may overcome a mismatch in parity or data bits. Choices are: One (1) or Two (2).

- **Parity:** One bit can be allocated for parity (parity is a simple error-detecting scheme). Both devices (sending and receiving) must be set for the same parity –

either odd parity or even parity – or they must be set for no parity. Choices are: None (N), Even (E) or Odd (O).

***Output Format Options***

- **GTCO:** Selects GTCO-compatible formats. See *Advanced Programing Information* for greater detail on GTCO format structure. Choices are: Binary or ASCII.

- **CalComp:** Selects CalComp-compatible formats. See *Advanced Programming Information* for greater detail on CalComp format structure. Choices are: Binary, ASCII 1, ASCII 2, ASCII 3 or ASCII 4.

- **Summa:** Selects Summagraphics-compatible formats. See *Advanced Programming Information* for greater detail on Summagraphic format structure. Choices are: Binary or ASCII.

ASCII formats can be modified by including or excluding a button code, decimal point, carriage return or line feed, depending on whether GTCO, CalComp or Summa formats have been selected.

- **Button:** Defines whether the Pushbutton (Pb) value is included in the ASCII output report. This option is available only with GTCO formats. Choices are: Include or Exclude.

- **Space:** Defines whether the Space (Sp) character (hex 20) is included in the ASCII output report as a delimiter between the X and Y coordinate values. This option is available only in GTCO formats. Choices are: Include or Exclude.

- **Decimal:** Defines whether the period character (hex 2E) is included in the ASCII output report between the units and tenths digits. This option is available only in Summagraphics formats. Choices are: Include or Exclude.

- **Return:** Defines whether the Carriage Return (CR) character (hex 0D) is included in the ASCII output report as a terminator. This option is available in GTCO and Summagraphics formats. Choices are: Include or Exclude.

- **Line Feed:** Defines whether the Line Feed (LF) character (hex 0A) is included in the ASCII output report as a terminator. This option is available in GTCO, CalComp and Summagraphics formats. Choices are: Include or Exclude.

***Mode Options***

- **Mode:** Defines how output reports are sent from the digitizer. Choices are: Point, Line, Continuous, Line Incremental or Continuous Incremental.

- **Rate:** Determines how fast output reports will be transmitted from the digitizer. Choices are: 12, 50 or 100 reports per second.

- **Resolution:** The smallest reported value returned by the digitizer. Choices are: 1000 lpi, 2000 lpi, 4000 lpi, 40 lpmm, 100 lpmm or 150 lpmm.

***Controlling the Alarm***

***There are two ways to toggle the alarm on or off:***

- Select the block on the AccuSet Menu.
- Use the below remote commands.

***Controlling the Alarm Using Remote Commands***

An alarm (audio tone) is provided so AccuTab can inform you of certain conditions. The alarm can be enabled or disabled by the AccuSet Menu or commands.

**To hear only critical tones, turn the alarm off:**

***AccuSet Menu:*** Select the menu block
***GTCO Commands:*** Send command AD.

**To hear all tones, turn the alarm on:**

***AccuSet Menu:*** Select the menu block
***GTCO Commands:*** Send command AE.

When you move the cursor over the block on the AccuSet Menu, the Proximity indicator (red) will light if the alarm is currently enabled.

***Resetting AccuTab***

***There are four ways to reset AccuTab:***

- Enter AccuSet code 00 on the AccuSet Menu.
- Press the reset button on the rear panel of the Controller.
- Turn power off and on.
- Send remote commands described in the ***Advanced Operating Information*** section.

When one of these events occurs, AccuTab will revert to the configuration that was last defined. Any remote commands that were active before the result will be lost.

***Controlling the Illuminated Cursor Lamps***

***To toggle the Illuminated Cursor's lamps on or off:***

- Select the block on the AccuSet Menu.
- Lamps will automatically turn off if the cursor remains motionless for about 15 minutes. To turn the lamps on again, just move the cursor.

***Transducer Lights***

Different transducers have a variety of indicator lights on them. This section describes what the indicators notify about the operation of the AccuTab.

- Proximity Indicator (**red**): Standard on all transducers and is on when the transducer is within the tablet's active area. Conversely, it is off when the transducer is outside the active area. Under most conditions, the AccuTab will not generate coordinate formats when the transducer is outside the active area.

  This indicator is also used to communicate status information to you when you're using the Custom Configuration Menu or AccuSet Menu.

- Point/Line Indicator (**green**): Available on the 16-button cursor only and tells you which digitizing mode is in use. If Point Mode is active, the light is off. If Line Mode or Continuous Mode is active, the light is on.

- Status Indicator (**yellow**): Available on the 16-button cursor only (not available on the Illuminated Cursor). This indicator is controlled by remote commands. Application programs can turn the status indicator on and off by sending the appropriate commands.

## AccuTab Tones

AccuTab produces an *alarm* in the form of audio tones to inform you of various events. The table below describes the kinds of tones you may hear while operating the digitizer.

| Length | Number of times | Meaning |
|---|---|---|
| Short | Four at power up | Diagnostics passed |
| Short | Four | Successful end of menu mode |
| Short | Once | Transducer switch pressed |
| Medium | Three | Menu mode aborted |
| Continuously on | At power up | Diagnostics failed |

Short = 1/16 second  Medium = 1/4 second  Long = 1/2 second

## Troubleshooting Guide

GTCO CalComp by Turning Technologies wants your experience with AccuTab to be a successful one. If you ever encounter a problem, please follow the steps below:

1. **Install properly first.**

   This troubleshooting guide assumes you have already correctly installed AccuTab according to the detailed instructions in the *Installing Your AccuTab* section. If you have not followed the step-by-step instructions in that section, do so now.

2. **Follow the troubleshooting flowcharts and other instructions that follow in this guide.**

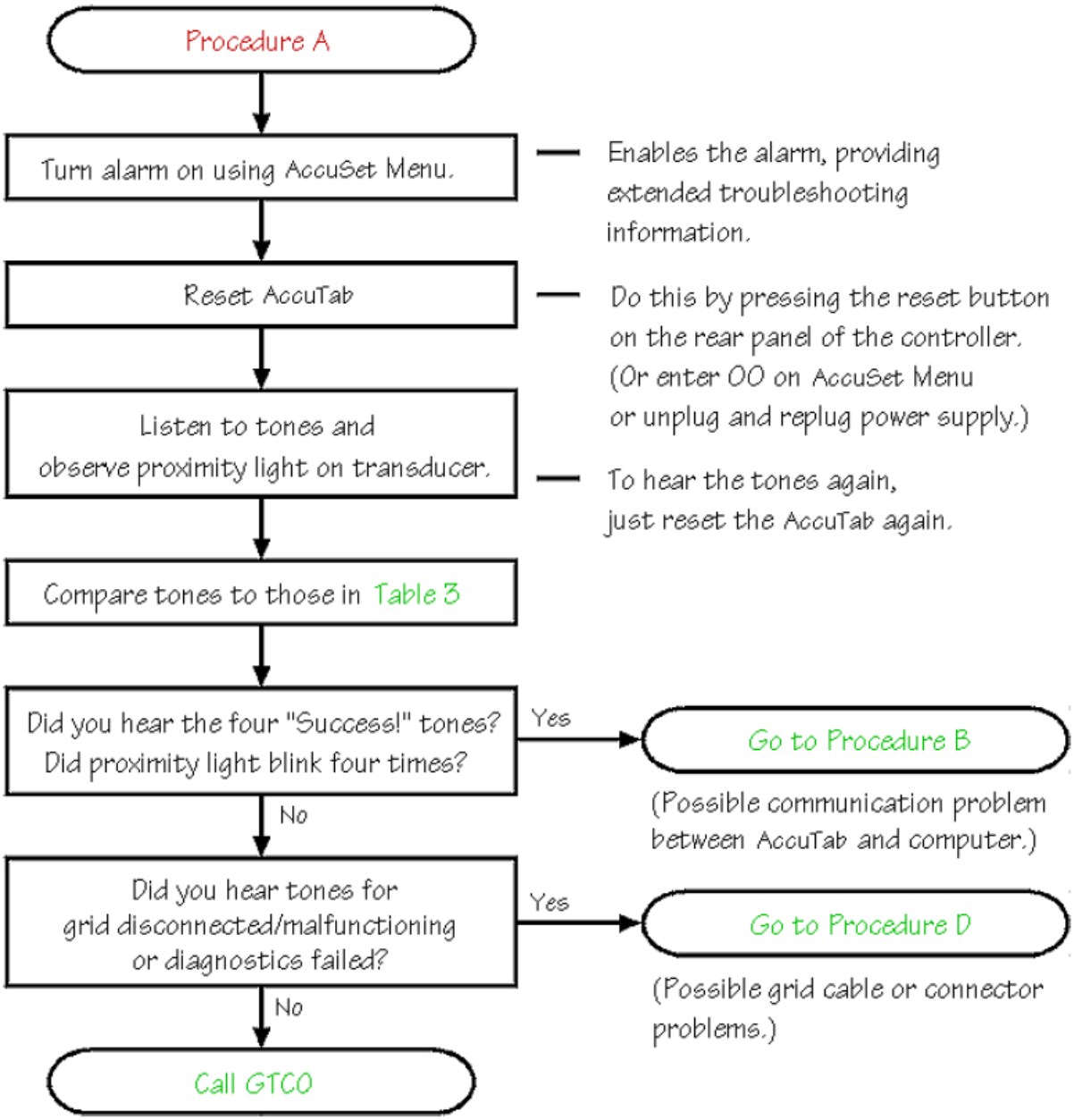
   Record any unusual observations. Your notes will be useful if you need assistance from the GTCO CalComp by Turning Technologies Technical Support Team.

3. **If your system still does not work.**

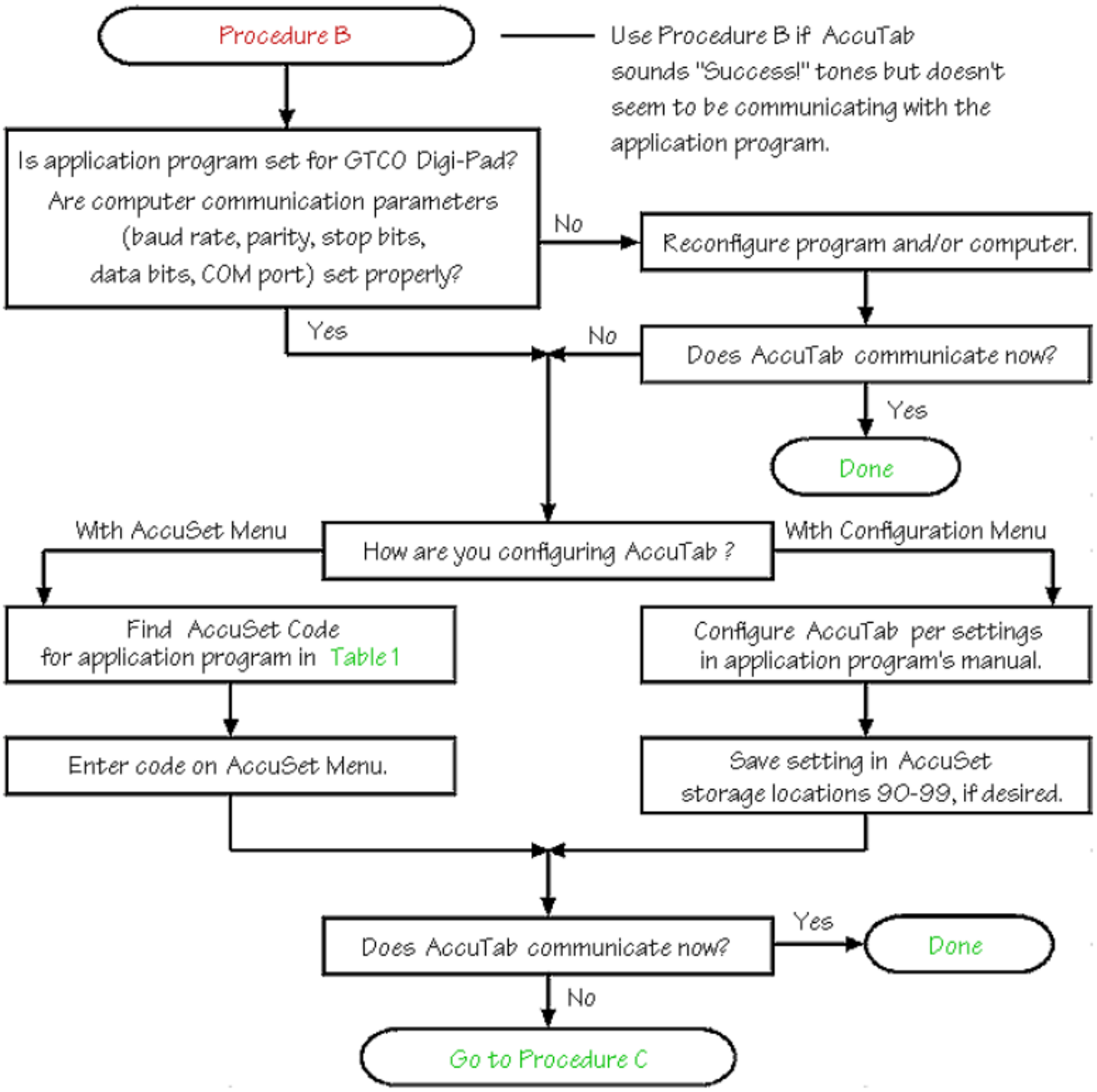
   Call GTCO CalComp by Turning Technologies Technical Support at 1-866-746-3015 (in the U.S. or Canada) or email us at gtco.support@gtcocalcomp.com. Outside the

U.S. or Canada, contact your local GTCO CalComp by Turning Technologies office or dealer. Be prepared to discuss the observations you made while troubleshooting.

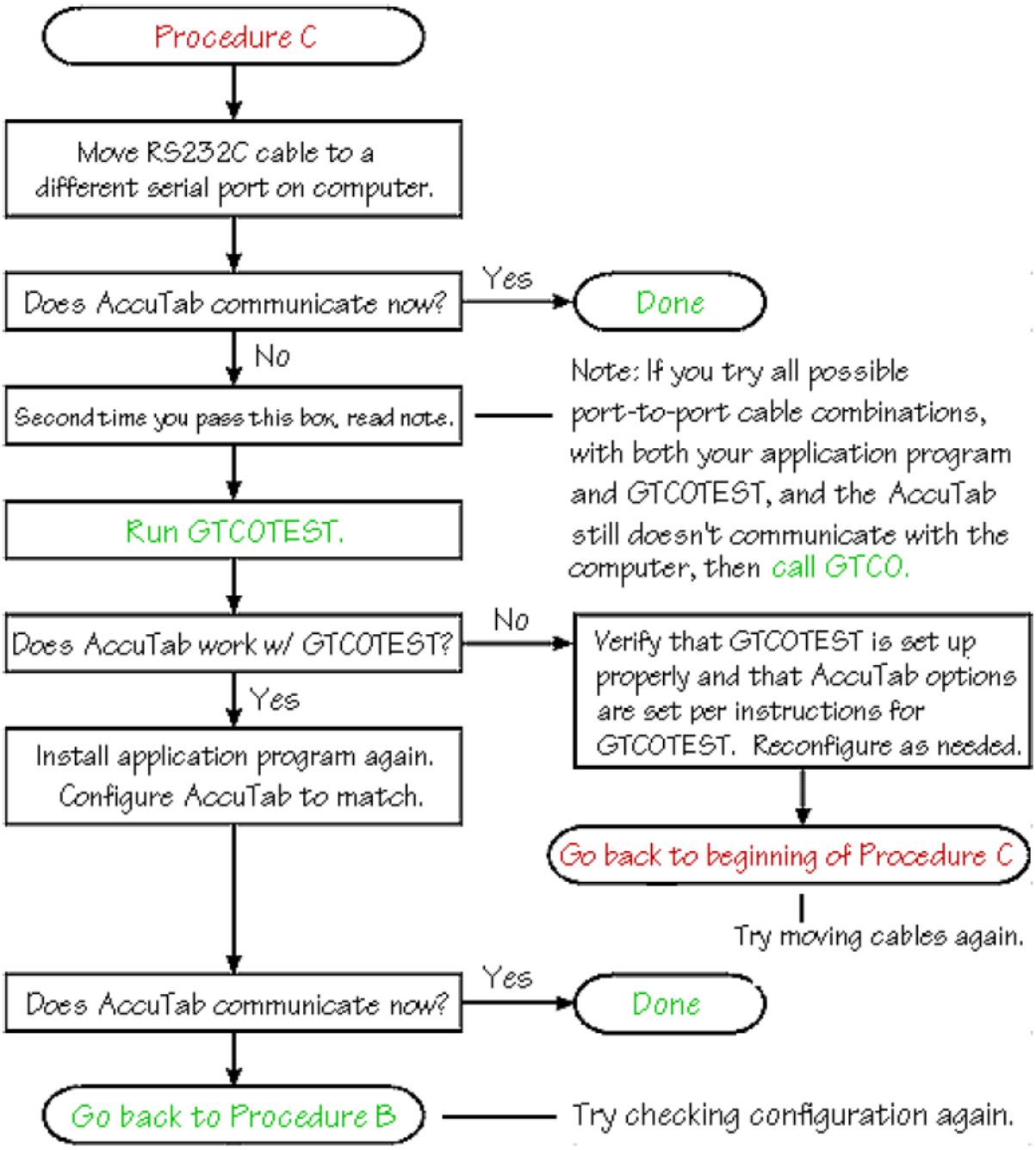
***Procedure A: Begin Troubleshooting***



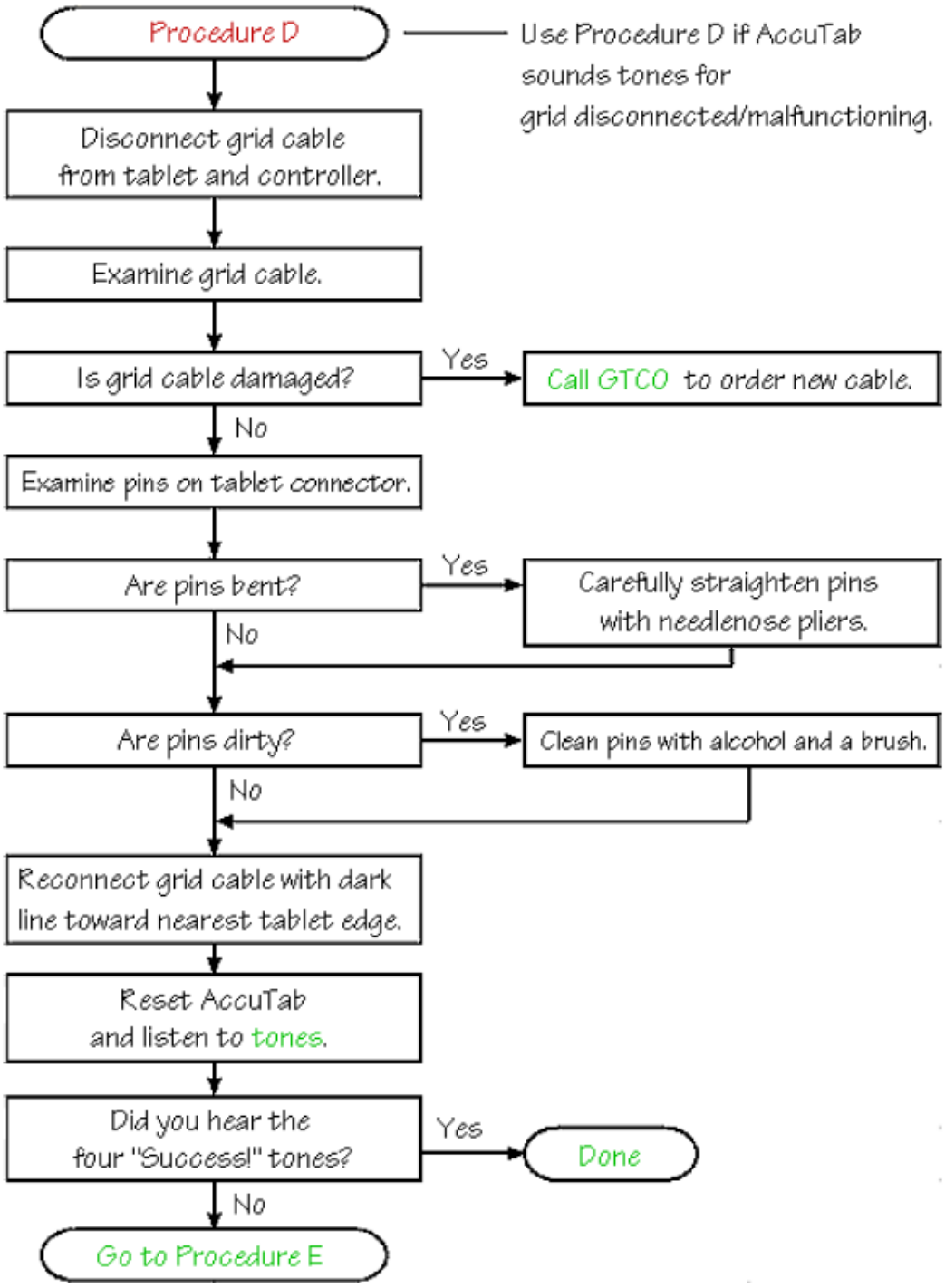
***Procedure B: Troubleshooting***



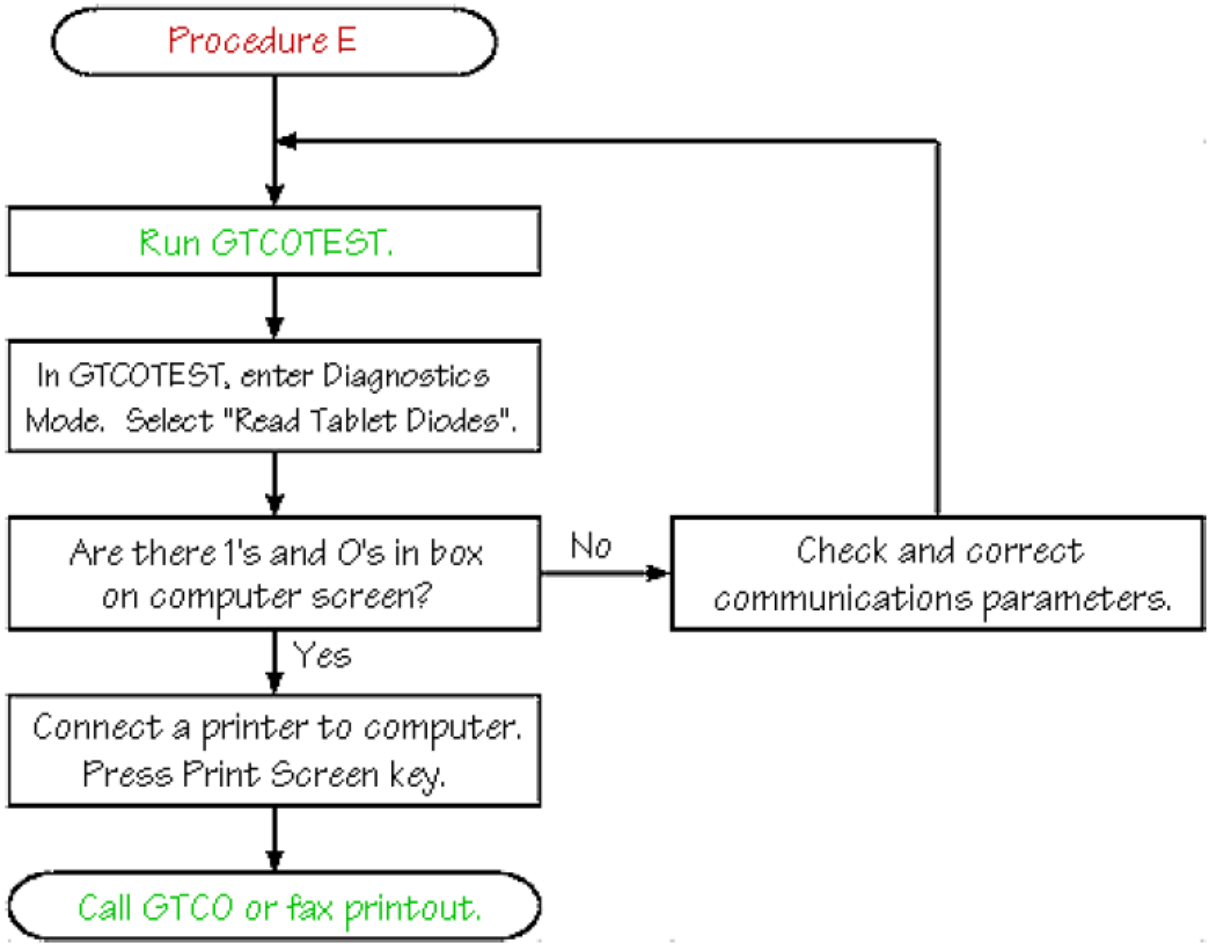
***Procedure C: Troubleshooting***



***Procedure D: Troubleshooting***



***Procedure E: Troubleshooting***



***Using GTCOTEST***

GTCOTEST is a program that runs on your PC. It can be used to perform communication and diagnostic tests on an installed AccuTab. GTCOTEST is provided on the diskette you received with the system.

1. Select AccuSet Code 01 on your AccuTab (9600, N, 8, 1, GTCO Binary, 1000 lpi, Cont, 100).
2. To run GTCOTEST, insert the TabletWorks CD in the CD-ROM drive. GTCOTEST will work only if no Wintab drivers are installed. From the DOS prompt, switch to the folder on the CD that contains the gtcotest.exe files. Type *gtcotest* and follow the onscreen instructions.
3. Once GTCOTEST's third screen has been reached, the pull-down menu headings will read: *Communications*, *Diagnostics*, *Setup* and *Check Output*. Select *Read Switches* in the diagnostics window. Communication has been established if 0's and 1's appear in the display box.
    - If GTCOTEST displays the *Serial input timeout* error message, try selecting another COM port in the Communications window.
    - If GTCOTEST displays the *Cannot open COM port* error message, try selecting another COM port in the Communications window. (Each PC serial port has a physical address that corresponds to a specific COM port. If there is only one serial port installed in the computer, it will be assigned as COM1regardless of its physical address. GTCOTEST examines only the physical address.)
4. Once communication is established, select the *Read Tablet Size* and *Read Version* options, making a note of the responses. This can easily be done with your print screen key if a printer is connected to your computer.
5. Choose *Check Output* and then select *High Res Binary*.
6. Place the transducer in the active area on the tablet.
7. If everything is working properly, you should see data displayed on your computer screen in the following format: **P XXXXXX YYYYYY**
   where P = pushbutton code
   XXXXXX = X coordinate data
   YYYYYY = Y coordinate data

8. When you move the transducer around the active area, the X and Y coordinate data should change. When you press different cursor buttons, the pushbutton code should adjust.

9. If GTCOTEST indicates that the digitizer is functioning properly, check your software application setup and AccuSet code for accuracy. If you have any questions about your results or need help running GTCOTEST, contact our Technical Support Team at 1-866-746-3015.

***Technical Information***

The AccuTab digitizer's design provides the highest level of data integrity including coordinate resolution, measurement accuracy and data stability – supported by high reliability and system compatibility.

AccuTab incorporates a digitizing technique called *Forward/Reverse Scan Averaging*™, which factors out errors resulting from slight changes in the angle and height of the digitizer cursor. This technology improves accuracy even at the edge of the tablet's active area (the location where most digitizers lose accuracy). The AccuTab will maintain its original data integrity over the long term without the need for periodic recalibration, adjustments or maintenance.

The point-sensing grid (located inside the tablet) is the single most important determinant of AccuTab's accuracy. To achieve the extremely tight tolerances required for the AccuTab, its grid is photographically printed and chemically etched on a composite glass-fiber substrate. This critical component is manufactured in a large scale, high-precision, printed circuit board print and etch production facility owned and operated by GTCO by Turning Technologies.

The performance of every AccuTab is verified on a high-precision automated measurement fixture. A report generated by this system is included with the AccuTab. GTCO by Turning Technologies guarantees that each AccuTab will maintain its performance for five years.

The AccuTab is compatible with all leading hardware and software, including class one compatibility with ESRI's ARC/INFO software.

## AccuTab Specifications

| | | | | |
|---|---|---|---|---|
| **Dimensions/Weight** (AccuTab) | **Active Area** | **Footprint** | **Weight** | **Avg. Ship Wt.** |
| | 24” x 36” | 32.75” x 46” | 26 lbs. | 45 lbs. |
| | 36” x 48” | 44.5” x 60” | 40 lbs. | 71 lbs. |
| | 42” x 60” | 52.5” x 68” | 55 lbs. | 104 lbs. |
| **Dimensions/Weight** (Surface-Lit AccuTab) | **Active Area** | **Footprint** | **Weight** | **Avg. Ship Wt.** |
| | 20” x 24” | 31” x 36” | 50 lbs. | 70 lbs. |
| | 24” x 36” | 35” x 48” | 68 lbs. | 90 lbs. |
| | 36” x 48” | 47” x 63” | 102 lbs. | 130 lbs. |

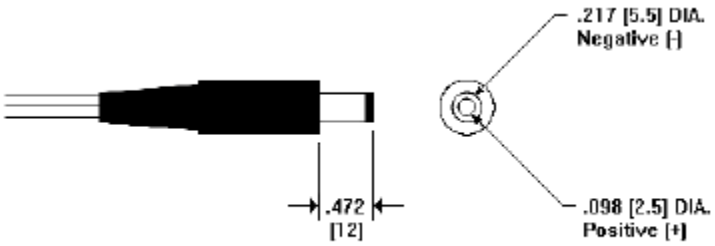
| | |
|---|---|
| **Technology** | Patented electromagnetic |
| **Resolution** | Up to 4000 lpi or 150 lpmm real resolution |
| **Absolute Accuracy** (certified) | ±0.005 in / ±0.127 mm (Standard)<br>±0.002 in / ±0.051 mm (Standard)<br>±0.003 in / ±0.076 mm (Standard)<br>±0.0075 in / ±0.190 mm (Standard) |
| **Repeatability** | 1 LSB (least significant bit) |
| **Proximity** | AccuTab: 1.0” (25.4 mm) nominal<br>Surface-Lit AccuTab: 0.5” (13 mm) nominal |
| **Self-Diagnostics** | Automatic testing, drive electronics and microprocessor |
| **Operating Modes** | Point, line, continuous, line incremental, continuous incremental and remote request |
| **Baud Rate** | Up to 38,400 |
| **Power Supply** | 100/120/220/240 VAC, 50/60 Hz |
| **Operating Temperature** | 41 to 115°F/5 to 46°C |
| **Humidity Range** | 10 to 95%, noncondensing |
| **Storage Temperature** | 0 to +150°F/-18 to +68°C |
| **Altitude Range** | 0 to 10,000 ft./0 to 3,077 m |
| **Certifications** | UL, CSA, FCC-B, VDE-B, CE |
| **Cursor Switches** | Elastomeric keypad, rated life over 1 million actuations |
| **Output Formats** | GTCO T5/5A Binary and ASCII, CalComp 3400, Summagraphics |

***Sources of Power***

GTCO CalComp by Turning Technologies provides a standard wall-mount power supply, the **DP-PS12**, for use in the U.S.A with the AccuTab Controller. If you want to use another wall mount power source due to different input power requirements, it must supply the following output voltage:

**+9 VDC at 1.0 Ampere.**

The following figure shows the dimensional specifications and the polarity of the power connector.




As an alternative source of power, GTCO CalComp by Turning Technologies also offers the capability of using the DP-UPS for 110 VAC or 90-260 VAC operation. If you want to use another power source with the 9-pin subminiature-D connector provided on the AccuTab Controller, it must supply the following voltages:

**+5.0 ± 0.1 VDC at 1.0 Amperes**
**+12 ± 1.0 VDC at 100 Milliamps**

Ripple on all voltages must be less than 30 millivolts. Your power supply will need a female 9-pin subminiature-D metal shell connector (mates to 9-pin male D connector, indicated by the desktop power supply icon, on the AccuTab Controller). The table below shows the pin functions for this connector. The power cable must be shielded, with the shield connected to the metal connector shell at the AccuTab end and connected to earth ground at the power supply end.

**Table: Power connector**

| Pin | Function |
|---|---|
| 1 | +5 Volts DC |
| 2 | +5 Volts DC |
| 3 | Not used |
| 4 | +12 Volts DC |
| 5 | Not used |
| 6 | Not used |
| 7 | Power ground |
| 8 | Power ground |
| 9 | Chassis ground |

## Advanced Operating Information

### *AccuTab Interfacing*

***Important: The following information is not required for normal AccuTab operation.***

Connecting AccuTab to a computer is usually straight-forward (see ***Installing AccuTab*** section in this manual). If you do not have a typical interfacing situation, the information in this section will help you set up the AccuTab and connect it to another device.

The AccuTab is equipped to communicate via RS-232C, a widely used serial interface between computers and peripherals. RS-232C is a (more or less) standard interface, and cables and connectors are available from a variety of sources. Most computers and peripherals either have an RS-232C interface or can be equipped with one.

### A mini-tutorial on RS-232C interfacing

This section provides basic information about RS-232C communications. There are three areas to consider when using RS-232C:

- Character format and baud rate
- Cabling
- Flow control

### *Character Format and Baud Rate*

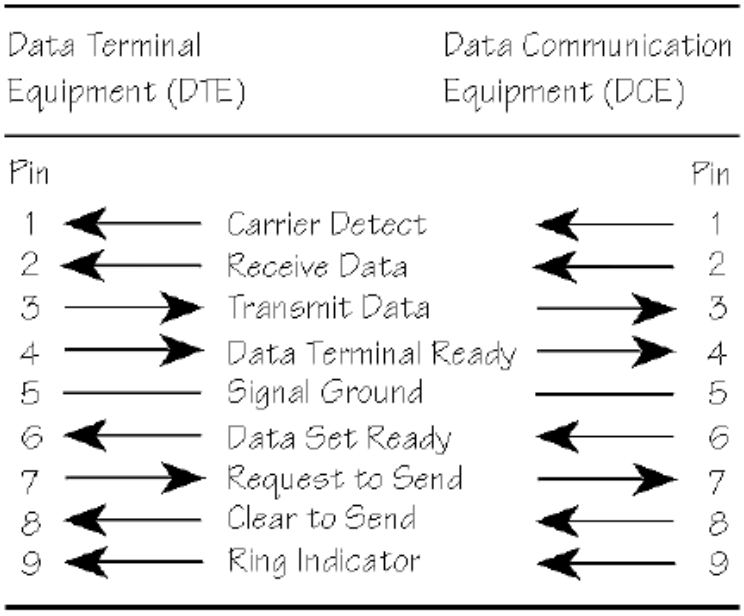
Character format and baud rate govern how bits are assembled to form characters the speed of transmission. Both the AccuTab and the computer must have identical formats and rates. These parameters are discussed in the ***Introduction to the Custom Configuration Menu*** section.

### *Cabling*

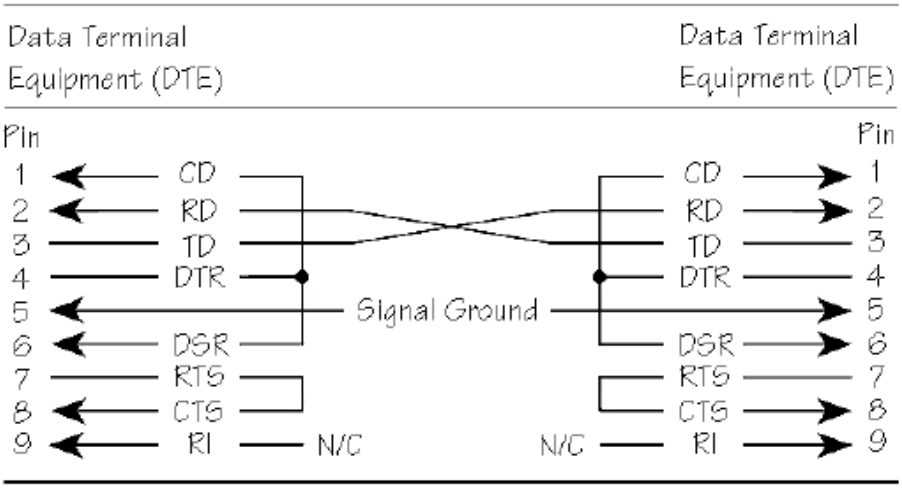
Cabling carries the data from one device to the other. A majority of RS-232C cables have either male 9-pin or 25-pin subminiature D connectors on their ends to match female connectors on the equipment. The Digi-Pad is supplied with a 9-pin-to-9-pin serial cable and a 9-pin-to-25-pin adapter.

Data Terminal Equipment (DTE), such as printers, digitizers and computers, usually (but not always) transmit data on Pin 2 and receive data on Pin 3. Data Communications Equipment (DCE), such as modems, generally transmit data on Pin 3 and receive data on Pin 2. Thus, connecting a terminal (DTE) to a modem (DCE) may be as simple as connecting them with a

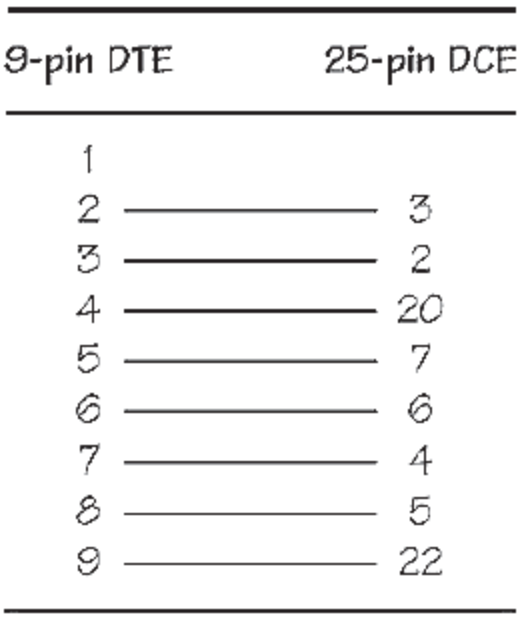
straight-through cable that is wired pin-to-pin (i.e., 1 to 1, 2 to 2, etc.). This figure shows such a cable. The AccuTab Controller is typically connected in this manner using the cable supplied by GTCO CalComp by Turning Technologies.




Connecting DTE to DTE, or DCE to DCE, may require a different strategy to get the data on the correct wires. The below figure shows a cable that can work in this situation. It is called a null modem cable and it fools both devices into thinking they are talking with the right kind of receiver. This cable routes Pin 2 to Pin3 and Pin 3 to Pin 2.



Your computer may have a 25-pin RS-232C connector, rather than a 9-pin connector. If so, use the 9- to 25-pin adapter supplied with the AccuTab. The figure below shows how this adapter is wired internally.




**Flow Control**

Flow control is the process of regulating the traffic or flow of data between two RS-232C devices. Flow control prevents the transmission and subsequent loss of data if the receiver is not ready to accept it. Examples of devices that use flow control are: a printer to signal buffer full; a modem to indicate carrier detect; and a time-shared computer that services multiple users on a time-available basis.

***There are two kinds of flow control:***

- ***Software flow control*** is often implemented over communication links where only a 3-wire cable is used (Transmit Data, Receive Data, Ground) or over telephone lines. The sending device (such as the AccuTab) will immediately stop sending data when it receives an ASCII XOFF character (CTRL-S, hex 13). Transmission will resume when it receives an ASCII XON character (CTRL-Q, hex 11). Character flow control will work with the straight through cable and the null modem cable.

- ***Hardware flow control*** is not commonly used with digitizers and is therefore not supported by the AccuTab Controller.

Flow control may not be needed when a terminal or digitizer is directly connected to a single-user computer. Most digitizing application software does not use flow control of either kind.

## Remote Commands

**NOTE:** The following information is not required for normal AccuTab operation. If you are programming for the AccuTab product line, the details will be helpful.

AccuTab can receive commands from other devices through its RS-232C port. Commands cause the AccuTab to change the way it operates, to use certain coordinate formats and to do other things as directed by you or by an application process.

Commands offer another way to control AccuTab operation besides the Custom Configuration Menu. Certain AccuTab functions can be carried out only through commands.

If you are developing your own application software, be cautious about using commands in your program. An interruption in power to the AccuTab or a ***Reset*** will cause it to discard any command changes it has received. This could leave your program confused about what the AccuTab is doing. A full system reset would then be needed to get the AccuTab and computer coordinated again. A prudent programmer will limit command and control of an AccuTab.

**The AccuTab responds to three kinds of commands:**

- GTCO AccuTab standard commands (with some omissions and additions)
- CalComp emulation commands
- Summagraphics emulation commands

# GTCO CalComp by Turning Technologies AccuTab Command Summary

## *Functional Control Commands*

| | |
|---|---|
| Reset | RS |
| Select Point Mode | PT |
| Select Line Mode | LN |
| Select Continuous Mode | CN |
| Select Line Incremental Mode | IC |
| Select Continuous Incremental Mode | CL |
| Select Remote Request Mode | RM |
| Read Current Coordinate | hex 02 |
| Set Increment Value | IV |
| Send Coordinates 0,0 When Transducer Is Out of Active Area | OP |
| No Output When Transducer Is Out of Active Area | IP |
| Set Digitizing Rate | Rx |
| Change Mode Character | MC |
| Enable Echo Mode | EM |
| Disable Echo Mode | hex 0F |

### Alarm, status indicator and cursor illumination commands

| | |
|---|---|
| Enable Alarm | AE |
| Disable Alarm | AD |
| Tone Pause | T0 |
| Sound Tone | T1 |
| Sound Tone | T2 |
| Sound Tone | T3 |
| Sound Tone | T4 |
| Turn Status Indicator or Cursor Illumination On | ON |
| Turn Status Indicator or Cursor Illumination Off | OF |

**Format selection commands**

| | |
|---|---|
| ASCII Format Output | AS |
| Binary Format Output | BI |
| Select English Measurement Scale | IN |
| Select Metric Measurement Scale | MT |
| Low Resolution | LR |
| High Resolution | HR |
| Highest Resolution | H1 |
| Pushbutton Include | PI |
| Pushbutton Exclude | PE |
| Space Include | SI |
| Space Exclude | SE |
| Carriage Return Include | CI |
| Carriage Return Exclude | CE |
| Line Feed Include | LI |
| Line Feed Exclude | LE |

**Diagnostic commands**

| | |
|---|---|
| Transmit Version Number | VR |
| Display Tablet Active Area Size | SZ |
| Read Tablet Diodes | RD |

***Functional Control Commands***

**Reset** Code: **RS**

The ***Reset*** command will reset the Controller to the last known configuration, clearing all previous commands sent to the Controller. If a SuperSet Menu configuration has been selected, the Reset command will reset the Controller to the SuperSet Menu value.

| | |
|---|---|
| **Select Point Mode** | Code: **PT** |
| **Select Line Mode** | Code: **LN** |
| **Select Continuous Mode** | Code: **CN** |
| **Select Line Incremental Mode** | Code: **IC** |
| **Select Continuous Incremental Mode** | Code: **CL** |

**Select Remote Request Mode** Code: **RM**

**Read Current Coordinate** Code: hex 0**2 (Ctrl-B)**

The Read Current Coordinate causes AccuTab to output a coordinate while it is in Remote Request Mode. This command can be sent to the AccuTab only when it is digitizing and only when Remote Request Mode has been selected by command RM. The Read Current Coordinate command will be ignored if AccuTab is in Command Mode. Please note that this command is not two ASCII characters. It is the one-byte-long STX character, CTRL-B (hex 02). AccuTab responds to the Read Current Coordinate command by transmitting one format.

**Set Increment Value** Code: **IV**

In Line Incremental and Continuous Incremental modes, the AccuTab outputs a coordinate when the transducer is moved beyond a certain incremental distance in either the X or Y direction. The default increment is 0.01". The Set Increment Value command allows the user to select the distance which the transducer must move to initiate coordinate output. It works as follows:

1. Enter Command Mode by sending a CTRL-A.
2. After receiving the > prompt, send IV and a <CR> (hex 0D).
3. The Controller will respond with a <.
4. After receiving the <, send a three-digit string ranging from 000 to 999. This string represents an increment value of 0.000 to 0.999 inch.
5. When the Controller receives the last character it will respond with a > prompt and await the next command.

**Send Coordinates 0,0 When Transducer is Out of Active Area** Code: **OP**
**No Output When Transducer is Out of Active Area** Code: **IP**

Certain situations require that the AccuTab be able to send a coordinate when the transducer is out of the active area. Command OP permits coordinates to be sent under this condition. Since valid coordinates are not available when the transducer is out of the active area, coordinates 0,0 are substituted in the format. When this command has been executed, digitizing modes operate normally, whether the transducer is in the active area or not. Command IP returns AccuTab to the default condition, in which coordinates are sent only when the transducer is in the active area.

**Set Digitizing Rate** Code: **Rx**

Coordinates can be sent from AccuTab at rates from 5 to 100 coordinates per second. The second character in this command sets the rate, as shown in the table below. Actual rates are limited by the communication baud rate and coordinate type you have selected. The rates shown here are, therefore, maximum rates.

| **Rate Commands** | | | | | | |
|---|---|---|---|---|---|---|
| **Digitizing rate, formats/second** | 12 | 100 | 100 | 5 | 10 | 50 |
| **Digitizing rate command** | R1 | R2 | R3 | R4 | R5 | R6 |

**Change Mode Character** Code: **MC**

Some applications may have a predefined meaning for the SOH (CTRL-A) character used to invoke Command Mode. If so, invoking Command Mode may cause your system to do something else. You can set the AccuTab so that a character other than SOH is used to begin Command Mode. Here is how to make the substitution:

1. Enter Command Mode.
2. Send MC, followed by a <CR>. Super L III responds with the prompt message: ENTER NEW COMMAND MODE CHARACTER:
3. Enter the desired mode change character. The new mode character can be any character except ESC (CTRL-[, hex 1B), <CR> (CTRL-M, hex 0D), CAN (CTRL-X, hex 18), VT (CTRL-K, hex 0B), XON (CTRL-Q, hex 11) or XOFF (CTRL-S, hex 13).

Now, when you want to enter the Command Mode, send the new character. All other command operations remain unchanged.

**Select English Measurement Scale** Code: **IN**
**Select Metric Measurement Scale** Code: **MT**

Invoking these commands causes AccuTab to scale coordinates in the desired measurement system. The digitizer measures in only one scale at a time. See ***Measurement Scales*** for additional information on how scale selection affects coordinate data.

**Enable Echo Mode** Code: **EM**
**Disable Echo Mode** Code: hex 0**F (Ctrl-O)**

These commands control echoing by the AccuTab. When enabled, echoing transmits each received character back to the sending device.

***Format Selection Commands***

**ASCII Format Output** Code: **AS**
Command causes coordinates to be transmitted in ASCII. ASCII coordinates can be modified by the Low/High/Highest Resolution, Pushbutton, Space, Carriage Return and Line Feed commands and by menu settings.

**Binary Format Output** Code: **BI**
Command causes coordinates to be transmitted in binary format. Binary coordinates can be modified by the Low/High/Highest Resolution commands and by menu settings.

**Low Resolution** Code: **LR**
Command modifies ASCII and binary formats. If ASCII formats have been selected, the Low Resolution command causes the least significant digit to represent 0.01 inch or 0.1 millimeter, depending on whether English or metric scale has been selected. Both X and Y portions of each ASCII format will be four digits long if in English scale or five digits long if in metric scale.

If the binary format is selected, the least significant bits represent 0.005 inch or 0.1 millimeter, depending on whether English or metric scale has been selected.

**High Resolution** Code: **HR**
Command modifies ASCII and binary formats. If ASCII formats have been selected, the High Resolution command causes the least significant digits to represent 0.001 inch or 0.025 millimeter, depending on whether English or metric scale has been selected. Both X and Y portions of each ASCII format will be six digits long.

If binary formats have been selected, the least significant bits represent 0.001 inch or 0.025 millimeter, depending on whether English or metric scale has been selected.

**Highest Resolution** Code: **H1**
Command modifies ASCII and binary formats. If ASCII formats have been selected, the Highest Resolution command causes the least significant digits to represent 0.0005 inch or 0.01 millimeter, depending on whether English or metric scale has been selected. Both X

and Y portions of each ASCII format will be six digits long.

If binary formats have been selected, the least significant bits represent 0.0005 inch or 0.01 millimeter, depending on whether English or metric scale has been selected.

| | |
|---|---|
| **Pushbutton Include** | Code: **PI** |
| **Pushbutton Exclude** | Code: **PE** |
| **Space Include** | Code: **SI** |
| **Space Exclude** | Code: **SE** |
| **Carriage Return Include** | Code: **CI** |
| **Carriage Return Exclude** | Code: **CE** |
| **Line Feed Include** | Code: **LI** |
| **Line Feed Exclude** | Code: **LE** |

These commands control the presence of the corresponding characters in ASCII formats. Pushbutton codes and where they appear in coordinates are described in the ***Advanced Programming Information*** section. When included, the space is an additional character separating the X and Y components of the coordinate data. When included, the LINE FEED is an additional character following the <CR>.

***Alarm, Status Indicator and Cursor Illumination Commands***

| | |
|---|---|
| **Enable Alarm** | Code: **AE** |
| **Disable Alarm** | Code: **AD** |

These commands enable or disable the audible alarm. When enabled, a short tone will sound when a transducer switch is pressed. When disabled, the alarm will not sound in response to transducer switch presses, but it may be sounded by remote commands and will be active during diagnostics and in the menu modes.

| | |
|---|---|
| **Sound Tone** | Code: **T1** |
| **Tone Pause** | Code: **T0** |

The Sound Tone command allows a remote device to sound the AccuTab's audible alarm. Tone Pause provides a pause between tones. Tones and pauses are in 0.25 second intervals. Tone commands are not affected by the Disable Alarm command.

**Turn Status Indicator or Cursor Illumination On** Code: **ON**
**Tone Status Indicator or Cursor Illumination Off** Code: **OF**
These commands control the state of the yellow status indicator on the 16-button cursor or the cursor lamps on the illuminated cursor.

***Diagnostic Commands***

**Transmit Version Number** Code: **VR**
Command causes AccuTab to determine and transmit the version number of the firmware currently installed.

**Display Tablet Active Area Size** Code: **SZ**
AccuTab automatically determines the size of the attached tablet's active area when it is turned on or reset. This command can be used to send the information to another device. The size is encoded as four digits: two digits representing vertical size in inches followed by two digits representing horizontal size in inches. For example, the 36" x 48" AccuTab sends the digits 3648 in response to this command.

**Read Tablet Diodes** Code: **RD**
Diagnostic command causes the AccuTab to examine the attached tablet and send the results to another device for display. A "1" means a diode is present and a "0" means a diode is missing.

***Programming Example: To Send Version Command and Display Results***

This QBASIC program interacts with AccuTab in Command Mode. In this example, the program activates Command Mode, sends the VR command and displays the resulting firmware version transmitted by the AccuTab.

1. Configure AccuTab for 9600, N, 8, 1, GTCO ASCII and Point (AccuSet 03).
2. Enter and run this QBASIC program:

```
'*******************************************************************************
'*         SEND VERSION COMMAND (VR) AND DISPLAY RESULTS                       *
'*               BY GTCO CORPORATION                                           *
'*******************************************************************************
CLS                                     'CLEAR SCREEN
OPEN "COM1:9600,N,8,1" FOR RANDOM AS #1 'CONFIGURE & OPEN COM1
PRINT #1, CHR$(1);                      CablingCabling SEND <CTRL A> WITHOUT <CR>
     DO
     D$ = INPUT$(1, #1)                 'GET CHARACTER FROM COMPORT
     LOOP UNTIL D$ = ">"                'WAIT FOR ">" PROMPT
     PRINT #1, "V";                     'SEND "V" WITHOUT <CR>
     D$ = INPUT$(1, #1)                 'WAIT FOR "V" TO BE ECHOED
     PRINT #1, "R"                      'SEND "R" WITH <CR>
     D$ = INPUT$(2, #1)                 'WAIT FOR "R" AND <CR> TO BE ECHOED
     LINE INPUT #1, VR$                 'GET STRING FROM COMPORT
     PRINT VR$                          'PRINT STRING
     PRINT #1, CHR$(27);                'SEND <ESC> WITHOUT <CR>
END
```

This program will produce a line on the screen similar to this:

```
GTCO STANDARD FIRMWARE VERSION ABX.X
```

***CalComp Emulation Commands***

AccuTab recognizes a subset of the CalComp 9500 command set. Space does not permit a detailed description of CalComp commands. However, most of the commands in this subset have equivalent AccuTab commands. For further information about the operation of those commands, please refer to the AccuTab command or function description in the ***GTCO CalComp by Turning Technologies AccuTab Command Summary***.

**NOTE:** CalComp commands must be terminated with a <CR>, which is not shown in the codes listed here. Commands can be strung together by substituting an @ character for the <ESC>% sequence after the first command and postponing the <CR> until the end of the multiple command string.

**Disable/Enable Echo** Code: **ESC%En**

Where n=0 to 3 (0 and 2 disable echo, 1 and 3 enable echo). If n is not included in the command, echo is toggled on or off from its previous state.

(Equivalent to Enable Echo Mode, EM and Disable Echo Mode, hex 0F.)

---

**Disable/Enable Echo** Code: **ESC%En**

Where n = 0 to 3 (0 and 2 disable echo, 1 and 3 enable echo). If n is not included in the command, echo is toggled on or off from its previous state.

(Equivalent to Enable Echo Mode, EM, and Disable Echo Mode, hex 0F.)

---

**Set Increment Run Mode** Code: **ESC%IR**

(Similar to Select Continuous Incremental Mode, CL, except that one coordinate format is sent when the transducer button is pressed or released.)

---

**Set Incremental Track Mode** Code: **ESC%IT**

(Equivalent to Select Line Incremental Mode, IC.)

---

**Set Incremental Line Mode** Code: **ESC%IU**

(Similar to Select Line Incremental Mode, IC, except that one additional coordinate format is sent when the cursor pushbutton is released.)

---

**Set Resolution (English)** Code: **ESC%JRn1,n2**

**Set Resolution (Metric)** Code: **ESC%JMn1,n2**

Where n1 = 1 to 2540 lpi or 1 to 100 lpmm; and n2 = 0 to 6, representing location of decimal point in format 4 (0 implies decimal point to right of least significant digit; 1 to 6 designate number of digits to right of decimal point). Not meaningful in other formats.

(Similar to Low Resolution, LR; High Resolution, HR; Highest Resolution, H1; Select English Measurement Scale, IN; Select Metric Measurement Scale, MT.)

---

**Set Origin** Code: **ESC%Jh**

Where h = location of origin selected from this list: LL = lower left; LR = lower right; UL = upper left; UR = upper right; C = center.

---

**Set Line Feed** Code: **ESC%Ln**

Where n = 0 to 3 (0 or 2 excludes Line Feed, 1 or 3 includes Line Feed). If n is not included in command, Line Feed is toggled on or off from its previous status.

(Equivalent to Line Feed Include, LI; Line Feed Exclude, LE.)

**Set Point Mode** Code: **ESC%P**
(Equivalent to Select Point Mode, PT.)

**Set Prompt** Code: **ESC%Qh1h2**
Where h1 = prompt character and h2 = optional resend character.
(Similar to Select Remote Request Mode, RM, and the Read Current Coordinate command, hex 02.)

**Cancel Prompt** Code: **ESC%Q**
Cancels prompt mode. (Same as selecting any digitizing mode except Remote Request.)

**Set Run Mode** Code: **ESC%R**
(Equivalent to Select Continuous Mode, CN)

**Set Track Mode** Code: **ESC%T**
(Equivalent to Select Line Mode, LN.)

**Set Line Mode** Code: **ESC%U**
(Similar to Select Line Mode, LN, except that one additional coordinate format is sent when the cursor pushbutton is released.)

**Set Cursor LED #2 and #3** Code: **ESC%Vn**
Where n = 0 to 3 (0 and 1 turn green LED off and on respectively, 2 and 3 turn yellow LED off and on respectively; for Illuminated Cursor, 2 and 3 turn cursor lamps off and on respectively).
(Similar to Turn Status Indicator On, ON, and Turn Status Indicator Off, OF.)

**Reset** Code: **ESC%VR**
(Equivalent to Reset, RS.)

**Send Tablet Size** Code: **ESC%VS**
(Similar to Display Tablet Active Area Size, SZ; response is upper right corner coordinate based on current resolution and origin.)

**Set Data Rate** Code: **ESC%Wn**
Where n = 1 to 100, representing number of coordinates per second, subject to baud rate limitations.
(Equivalent to Set Digitizing Rate commands R1 through R6.)

**Set X Increment Value** Code: **ESC%Xn**
**Set Y Increment Value** Code: **ESC%Yn**
Where n = 0 to 65,535, the increment expressed in terms of the number of counts at the current resolution.
(Similar to Set Increment Value, IV, which expresses the increment in 0.001 inches.)

**Set Data Proximity** Code: **ESC%Zn**

Where n = 0 for output when out of proximity and 1 for no output when out of proximity.

(Similar to Send Coordinate 0,0 When Transducer Is Out Of Active Area, OP, and No Output When Transducer Is Out Of Active Area, IP, except that the last valid coordinate is sent.)

---

**Change Format** Code: **ESC%^n**

Where n = 4, 5, 6, 7 or 23:

n = 4, 5, 6, 7 for CalComp ASCII formats 1, 2, 3, 4 respectively

n = 23 for CalComp binary format

(Equivalent to selection of CalComp format options on the Custom Configuration Menu.)

---

**Tone** Code: **CTRL-G** (hex **07**)

(Equivalent to Sound Tone, T1.)

---

### *Summagraphics Emulation Commands*

AccuTab recognizes a subset of the Summagraphics UIOF command set. Space does not permit a detailed description of Summagraphics commands. However, most of the commands in this subset have equivalent AccuTab commands. For further information about the operation of those commands, please refer to the AccuTab command or function description in the ***GTCO CalComp by Turning Technologies AccuTab Command Summary***.

| | |
|---|---|
| **Reset**<br>(Equivalent to Reset, RS.) | Code: **ESCZ** |
| **Binary Format**<br>(Equivalent to Binary Format Output, BI.) | Code: **ESCMB** |
| **ASCII Format**<br>(Equivalent to ASCII Format Output, AS.) | Code: **ESCMA** |
| **Line Feed Toggle**<br>(Similar to Line Feed Include/Exclude, LI/LE.) | Code: **ESCML** |
| **Decimal Point Include**<br>**Decimal Point Exclude** | Code: **ESCd1**<br>Code: **ESCd0** |
| **Set Delimiter**<br>Where n = new delimiter character for ASCII formats; default is ",". | Code: **ESCDn** |
| **Stream Mode**<br>(Equivalent to Select Continuous Mode, CN.) | Code: **ESCM0** |
| **Point Mode**<br>(Equivalent to Select Point Mode, PT.) | Code: **ESCM1** |

**Switch Stream Mode** Code: **ESCM2**
(Equivalent to Select Line Mode, LN.)

**Prompt Mode** Code: **ESCM3**
(Equivalent to Select Remote Request Mode, RM.)

**Send New Report** Code: **ESCG**
(Equivalent to Read Current Coordinate, hex 02.)

**Resend Last Report** Code: **ESCg**

**Increment Mode** Code: **ESCInnn**
Where n = 000 to 255, representing increment size in counts.
(Similar to Select Continuous Incremental Mode, CL, followed by Set Increment Value, IV.)

**LED Off** Code: **ESCL10**
(Equivalent to Turn Status Indicator Off, OF.)

**LED On** Code: **ESCL11**
(Equivalent to Turn Status Indicator On, ON.)

**Set Report Rate** Code: **ESCRn**
Where n = 0 to 9 (0 = 1, 1 = 2, 2 = 5, 3 = 10, 4 = 30, 5 = 60, 6 = 85, 7 = 100, 8 = 100, 9 = 100 coordinates per second, subject to baud rate limitations).
(Equivalent to Set Digitizing Rate, R1 to R6.)

**Proximity Transmission** Code: **ESCW0**
(Equivalent to No Output When Transducer Is Out Of Active Area, OP.)

**Proximity Transmission** Code: **ESCW1**
(Similar to Send Coordinate 0,0 When Transducer Is Out Of Active Area, IP, except that the last valid coordinate is sent.)

**Sound Annunciator** Code: **ESCA**
**Sound Annunciator** Code: **ESCYn**
Where n= 1 to 4 (1 = low tone, 4 = highest tone, but AccuTab has only one tone).
(Equivalent to Sound Tone, T1.)

**Relocate Origin** Code: **ESCFn**
Where n = 0 to 5 (0 = lower left, 2 = center, 3 = upper left, 4 = lower right, 5 = upper right).

---

**Resolution** Code: **ESCCn**
Where n = 0 to 6 (0 = 200 lpi, 2 = 1000 lpi, 4 = 2000 lpi, 1 = 10 lpmm, 3 = 40 lpmm, 5 = 80 lpmm, 6 = double set resolution).

(Similar to combinations of Low Resolution, LR; High Resolution, HR; Highest Resolution, H1; English, IN; Metric, MT.)

---

**Variable Resolution** Code: **ESCPab**
Where a = X or Y (axis) and b = 0001 to 1016 (resolution in lpi).

---

**Confirm Resolution** Code: **ESCa**
(Similar to Display Tablet Active Area Size, SZ; response is upper right corner coordinate based on current resolution in current format.)

---

***Command Mode Basics***

**To enter Command Mode:**

Send an ASCII CTRL-A (hex 01) character to AccuTab. When AccuTab receives the CTRL-A, two things happen:

- Digitizing stops and new coordinates are not generated. If Command Mode is invoked during transmission of a coordinate, that coordinate transmission will be completed.
- AccuTab sends a “>” (hex 3E) as a prompt to the commanding device. AccuTab is now ready to accept commands.

A **command** consists of two *upper case* ASCII letters or numbers followed by a delimiter. The delimiter lets the AccuTab know the command is complete. There are two kinds of delimiters:

- <CR> (carriage return, hex 0D): indicates end of current command and more commands will follow. If the command just sent is valid, it will be carried out. The AccuTab then sends another > prompt and awaits the next command.
- <ESC> (escape, hex 1B): indicates end of current command and no more commands will follow. If the command is valid, it will be carried out. Then AccuTab will exit Command Mode and return to Digitizing Mode.

If you are entering several commands, end each one with a carriage return delimiter. After each <CR>, the AccuTab carries out the command and sends a new command prompt. After the last command or if you are entering only one command, use an <ESC>. The Escape delimiter takes you directly back to Digitizing Mode.

If the command entered is not recognized as a valid command, it will be ignored and AccuTab will send a "?" (question mark). If the delimiter following an invalid command was an <ESC> (indicating your desire to leave Command Mode), AccuTab stays in the Command Mode, awaiting a valid command.

A command may be aborted before entering a delimiter by sending a CTRL-X (hex 18). The AccuTab then ignores the preceding one or two characters and responds with a new prompt.

**To Leave Command Mode:**

Send an <ESC> (hex 1B). The <ESC> may follow a command code or it can be sent in response to the Super L III's prompt. AccuTab returns to digitizing, now operating according to the commands sent to it.

***A Hint for Programmers***

Here is the most efficient method for sending commands:

1. Send the CTRL-A and wait until the Controller responds with the prompt >. A loop that retrieves one byte at a time from the serial port and checks for the > is best.

2. Send the command one character at a time. The Controller will respond by echoing each character. Waiting for the character to be echoed will ensure that the Controller has received the character and is waiting for the next one.

3. Once the command is complete, send a <CR> or <ESC> (hex 1B) to exit command mode.

4. If you send a <CR>, go into a loop and grab one byte at a time until a > prompt is received. Then continue sending commands as described in step 2.

**Advanced Programming Information**

**NOTE:** The following information is not required for normal AccuTab operation.

If you are programming for the AccuTab product line, the topics listed below will be useful:

- Coordinate Formats
- Measurement Scales
- Digitizing Modes
- Controlling the Alarm Using Remote Commands
- Programming Examples

These topics refer to commands that put AccuTab in a different operating state. The ***Remote Commands*** section contains detailed information about remote commands.

Command emulations for CalComp and Summagraphics digitizers are invoked automatically when a particular format is selected via the Custom Configuration Card or the AccuSet Menu selection. However, only AccuTab commands are referenced in this section.

**Coordinate Formats**

Coordinate format refers to the way AccuTab encodes XY coordinate information before it sends the data out through a communication interface. The AccuTab and your application program must speak the same coordinate "language" for information to be properly transferred.

***You have three basic format choices to make:***

- GTCO versus CalComp or Summagraphics emulation
- Binary versus ASCII coordinates
- Coordinate resolution

The topics below describe the formats available and show you how to select them. If you are developing your own software, these sections will also help you choose a format that suits your needs.

**Binary Formats**

Binary formats encode coordinate information compactly. Binary coordinate formats are shorter than ASCII formats, transmit faster and take up less space if stored. On the other hand, binary formats cannot be directly displayed on a terminal or printed-they must be converted first into displayable characters.

Binary formats use the high order bit in each byte as a synchronization bit. The first byte in each format has its high order bit set to 1. The remaining bytes have their high order bits set to 0. The application program must examine the high order bit of each byte to determine when a format begins.

AccuTab can produce two kinds of binary formats: one is compatible with GTCO AccuTab and CalComp digitizers, and the other is compatible with Summagraphics digitizers. They are quite different and are described separately in the following topics.

- GTCO/CalComp Binary Format
- Summagraphics Binary Format
- Low Resolution Binary Format
- Cursor Button Codes in Binary Format

### *GTCO/CalComp Binary Format*

This six-byte format is compatible with the GTCO AccuTab high resolution binary format. It also emulates the CalComp binary format. Table 4 shows the structure of this format at the bit level.

### *Table 4: GTCO/CalComp High Resolution Binary Format*

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| | *Sync* | *Cursor button code* | | | | | *X data high order bits* | |
| **Byte 1** | 1 | C4 | C3 | C2 | C1 | C0 | X15 | X14 |
| | | *X data mid order bits* | | | | | | |
| **Byte 2** | 0 | X13 | X12 | X11 | X10 | X9 | X8 | X7 |
| | | *X data low order bi* | | | | | | |
| **Byte 3** | 0 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| | | | *Proximity* | *X and Y highest order bits* | | | *Y data high order bits* | |
| **Byte 4** | 0 | X17 | 0=in | Y17 | X16 | Y16 | Y15 | Y14 |
| | | *Y data mid order bits* | | | | | | |
| **Byte 5** | 0 | Y13 | Y12 | Y11 | Y10 | Y9 | Y8 | Y7 |
| | | *Y data low order bits* | | | | | | |
| **Byte 6** | 0 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |

**To set up the GTCO/CalComp Binary Format:**

***Custom Configuration Menu:***

1. Select GTCO Binary or CalComp Binary (under Output Format Options).
2. Choose the desired resolution (under Mode Options).

***GTCO Commands:***

1. Send command **BI** for Binary format.
2. Send command **IN** for English or command **MT** for metric measurements.
3. Send command **HR** for 1000 lpi/40 lpmm, command **H1** for 2000 lpi/100 lpmm or command H1 for 4000 lpi/150 lpmm resolution.

***Summagraphics Binary Format***

This eight-byte format is compatible with the Summagraphics 2000 lpi UIOF format. Table 5 shows the structure of this format at the bit level.

**NOTE:** This format will not support 4000 lpi on 36" x 48" or larger tablets.

**To set up the Summagraphics Binary Format:**

***Custom Configuration Menu:***

1. Select Summa Binary (under Output Format Options).
2. Choose the desired resolution (under Mode Options).

***Table 5: Summagraphics Binary Format***

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| | *Parity* | *Sync* | | | | | *(Tablet ID)* | *Proximity* |
| **Byte 1** | | 1 | 0 | 0 | 0 | 0 | 0 | 0 = in |
| | | | | *Cursor button code* | | | | |
| **Byte 2** | | 0 | 0 | C4 | C3 | C2 | C1 | C0 |
| | | | *X data low order bits* | | | | | |
| **Byte 3** | | 0 | X5 | X4 | X3 | X2 | X1 | X0 |
| | | | *X data mid order bits* | | | | | |
| **Byte 4** | | 0 | X11 | X10 | X9 | X8 | X7 | X6 |
| | | | *Sign X* | *X data high order bits* | | | | |
| **Byte 5** | | 0 | Sx | X16 | X15 | X14 | X13 | X12 |
| | | | *Y data low order bits* | | | | | |
| **Byte 6** | | 0 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |
| | | | *Y data mid order bits* | | | | | |
| **Byte 7** | | 0 | Y11 | Y10 | Y9 | Y8 | Y7 | Y6 |
| | | | *Sign Y* | *Y data high order bits* | | | | |
| **Byte 8** | | 0 | Sy | Y16 | Y15 | Y14 | Y13 | Y12 |

***Cursor Button Codes in Binary Formats***

Cursor button codes are always included in binary formats. You can define certain pushbuttons on your transducer to represent information that is relevant to your task. For example, the buttons on a 4-button cursor could represent four line widths or four colors. By examining the button code in the format, the application program can use this information appropriately.

Binary formats include five bits which encode the button. The bits transmitted in the format depend on the button pressed. Table 7 and Table 8 show which bits will be sent.

***Table 7: Cursor Button Codes for 4-Button Cursor***

| Button pressed | GTCO | | CalComp | | Summagraphics | | |
|---|---|---|---|---|---|---|---|
| | Binary | ASCII | Binary | ASCII | Binary | ASCII1 | ASCII2 |
| None | 00000 | 0 | 00000 | U | 000000 | 00 | 0 |
| Yellow | 00001 | 1 | 00001 | 0 | 000001 | 01 | 1 |
| White | 00010 | 2 | 00010 | 1 | 000010 | 02 | 8 |
| Green | 00100 | 4 | 00100 | 2 | 000100 | 04 | 2 |
| Blue | 01000 | 8 | 01000 | 3 | 000011 | 03 | 4 |

***Table 8: Cursor Button Codes for 16-Button Cursors***

| Button pressed | GTCO | | CalComp | | Summagraphics | |
|---|---|---|---|---|---|---|
| | Binary | ASCII | Binary | ASCII | Binary | ASCII |
| None | 00000 | 0 | 00000 | U | 00000 | 00 |
| 0 | 10000 | 0 | 10000 | 0 | 01110 | 14 |
| 1 | 10001 | 1 | 10001 | 1 | 00001 | 01 |
| 2 | 10010 | 2 | 10010 | 2 | 00010 | 02 |
| 3 | 10011 | 3 | 10011 | 3 | 00011 | 03 |
| 4 | 10100 | 4 | 10100 | 4 | 00101 | 05 |
| 5 | 10101 | 5 | 10101 | 5 | 00110 | 06 |
| 6 | 10110 | 6 | 10110 | 6 | 00111 | 07 |
| 7 | 10111 | 7 | 10111 | 7 | 01001 | 09 |
| 8 | 11000 | 8 | 11000 | 8 | 01010 | 10 |
| 9 | 11001 | 9 | 11001 | 9 | 01011 | 11 |
| A | 11010 | : | 11010 | A | 01101 | 13 |
| B | 11011 | ; | 11011 | B | 01111 | 15 |
| C | 11100 | < | 11100 | C | 00100 | 04 |
| D | 11101 | = | 11101 | D | 01000 | 08 |
| E | 11110 | > | 11110 | E | 01100 | 12 |
| F | 11111 | ? | 11111 | F | 10000 | 16 |

## ASCII Formats

ASCII is a commonly used method for encoding text. ASCII coordinate formats can be directly displayed on most printers and terminals, and can be easily handled by BASIC programs. On the other hand, ASCII coordinate formats are longer than binary ones, so they take longer to transmit and they occupy more space when stores in memory.

Table 9, Table 10 and Table 11 show the range of ASCII formats available on the AccuTab. Besides the GTCO formats, emulations are provided for CalComp (in four variations), and Summagraphics ASCII formats. All the formats are influenced by the resolution currently in effect (higher resolutions require an additional digit of X and an additional digit of Y).

Depending on the format, you can also choose to include or exclude certain optional characters (cursor button code, space, decimal point, carriage return and line feed).

**To set up basic ASCII Formats:**

***Custom Configuration Menu:***

1. Select GTCO ASCII, CalComp ASCII 1-4 or Summagraphics ASCII (under Output Format Options).
2. Select an English or metric resolution (under Mode Options).

***GTCO Commands:***

1. Send command **AS** for ASCII format.
2. Send command **IN** for English or command MT for metric measurements.
3. Send command **LR** for 100 lpi/10 lpmm, command **HR** for 1000 lpi/40 lpmm or command **H1** for 2000 lpi/100 lpmm resolution.

Then, you still have more decisions to make regarding the optional characters. Each of the optional characters can be selected by using the **Tablet Configuration Utilities** or by **Remote Command**. Check Tables 9, 10 and 11 to determine which optional characters can be included in the format you have selected.

**To include a Cursor Button Code, Space, Decimal Point or Line Feed in an ASCII Format (where permitted):**

***Custom Configuration Menu:*** Select the "Include" option for the corresponding character.

***GTCO Commands:***

- Send command **PI** to include the Cursor Button Code character.
- Send command **SI** to include the Space character.
- Send command **CI** to include the Carriage Return character.
- Send command **LI** to include the Line Feed character.

**To remove a Cursor Button Code, Space, Decimal Point or Line Feed in an ASCII Format (where present):**

***Custom Configuration Menu:*** Select the "Exclude" option for the corresponding character.

***GTCO Commands:***

- Send command **PE** to exclude the Cursor Button Code character.
- Send command **SE** to exclude the Space character.
- Send command **CE** to exclude the Carriage Return character.
- Send command **LE** to exclude the Line Feed character.

***Table 9: GTCO ASCII Formats***

| | |
|---|---|
| 100 LPI | C **X X X X** <SP> **Y Y Y Y** <CR> <LF> |
| < = 1016 lpi | C **X X X X X** <SP> **Y Y Y Y Y** <CR> <LF> |
| > 1016 lpi | C **X X X X X X** <SP> **Y Y Y Y Y Y** <CR> <LF> |

| | |
|---|---|
| C = Optional cursor button code | <SP> = Optional space |
| **X** = X coordinate | <CR> = Optional carriage return |
| **Y** = Y coordinate | <LF> = Optional line feed |

***Table 10: CalComp ASCII Formats***

| | | |
|---|---|---|
| ASCII1 | < = 1016 lpi | **T M C X X X X Y Y Y Y Y <CR>** <LF> |
| - | > 1016 lpi | **T M C X X X X X Y Y Y Y Y Y <CR>** <LF> |
| ASCII2 | < = 1016 lpi | **X X X X X , Y Y Y Y Y , T M C <CR>** <LF> |
| - | > 1016 lpi | **X X X X X X , Y Y Y Y Y Y , T M C <CR>** <LF |
| ASCII3 | < = 1016 lpi | **C P X X X X Y Y Y Y Y <CR>** <LF> |
| - | > 1016 lpi | **C P X X X X X Y Y Y Y Y Y <CR>** <LF> |
| ASCII4 | 1000 lpi | **<SP> X X . X X X , <SP> Y Y . Y Y Y , T M C <CR>** <LF> |
| - | 100 lpmm | **<SP> X X X X . X X , <SP> Y Y Y Y . Y Y , T M C <CR>** <LF> |
| - | 10 lpmm | **<SP> X X X X . X , <SP> Y Y Y Y . Y , T M C <CR>** <LF> |
| - | Other | **<SP> X X X X X . , <SP> Y Y Y Y Y . , T M C <CR>** <LF> |

| | | | |
|---|---|---|---|
| **T** = Tablet status (always "A") | | **<CR>** = | Carriage return |
| **C** = Cursor button character | | <LF> = | Optional line feed |
| **X** = X coordinate | | **<SP>** = | Space |
| **Y** = Y coordinate | | | |
| **P** = Pen character ("U" = up, "D" = down) | | | |
| **M** = Mode status character ("I" = incremental, "U" = line, "R" = run-continuous, "T" = track, "P" = point) | | | |

***Table 11: Summagraphics ASCII Formats***

| | | |
|---|---|---|
| Format 1 | < = 1016 lpi | **S X X X X X , S Y Y Y Y Y , C C , T <CR>** <LF> |
| .. _ | > 1016 lpi | **S X X X X X X , S Y Y Y Y Y Y , C C , T <CR>** <LF> |
| Format 2 | 1000 lpi | **S X X . X X X , S Y Y . Y Y Y , C C , T <CR>** <LF> |
| .. _ | 40 lpmm | **S X X X X . X X X , S Y Y Y Y . Y Y Y , C C , T <CR>** <LF> |
| .. _ | 10 lpmm | **S X X X X . X , S Y Y Y Y . Y Y , C C , T <CR>** <LF> |
| .. _ | Other | [defaults to Format 1] |

| | | | | | |
|---|---|---|---|---|---|
| **S** | = Sign | | **<CR>** | = | Carriage return |
| **X** | = X coordinate | | <LF> | = | Optional line feed |
| **Y** | = Y coordinate | | **C C** | = | 2-character cursor button code |
| **T** | = Tablet ID (always "0") | | **.** | = | Optional period |

### *Cursor Button Codes in ASCII Formats*

When the cursor button code is included in an ASCII format, the character transmitted in the format depends on the button pressed. Table 7 and Table 8 show which character will be sent. Instructions in the previous sections show how to include or exclude the cursor button character in certain of the ASCII formats.

### Measurement Scales

You can choose either English or metric scaling for the coordinates you digitize. AccuTab applies the required conversion factor before constructing a coordinate format for output.

The numbers appearing in coordinate formats depend on resolution. Table 12 shows how the resolution settings affect the data in coordinate formats.

**To set the measurement scale:**

***Custom Configuration Menu:*** Select a resolution in the "Resolution" column of Mode Options.

***GTCO Commands:***

1. Send command **IN** for English or command **MT** for metric measurements.
2. Send command **LR** for 100 lpi/200 LPI/10 lpmm, command **HR** for 1000 lpi/40 lpmm or command **H1** for 4000 lpi/150 lpmm resolution.

Metric example: The distance between two points is 2032 counts in the 40 lpmm binary format. Each count represents 0.025 mm (from Table 12). Then, 2032 counts x 0.025 mm/count = 50.8 mm.

***Table 12: Measurement Scales***

| | | | | |
|---|---|---|---|---|
| **English resolution** | **100 lpi** | **200 lpi** | **1000 lpi** | **2000 lpi** |
| Least significant digit equals | 0.01 inch | 0.005 inch | 0.001 inch | 0.0005 inch |
| **Metric resolution** | | **10 lpmm** | **40 lpmm** | **100 lpmm** |
| Least significant digit equals | | 0.1 mm | 0.025 mm | 0.01 mm |

lpi = lines/inch lpmm = lines/millimeter

## Digitizing Modes

Digitizing mode refers to the method AccuTab uses to determine when to output a coordinate format. Six digitizing modes are available, but only one can be used at a time:

- Point Mode
- Line Mode (sometimes called Switched Stream Mode)
- Continuous Mode (sometimes called Stream Mode)
- Line Incremental Mode
- Continuous Incremental Mode
- Remote Request Mode

Table 14 will help you compare digitizing modes.

***Table 14: Results of Active Area and Pushbutton Changes in Digitizing Modes***

| Digitizing mode | Action caused by entering active area | In active area: Action action caused by pushbutton | | Action caused by leaving active area | Other action | Command |
|---|---|---|---|---|---|---|
| | | Off to on | On to off | | | |
| **Point** | No action | Send one format | No action | No action | | PT |
| **Line** | No action | Send many formats | Stop sending formats | No action | | LN |
| **Continuous** | Send many formats | Causes no change: send many formats | | Stop sending formats | | CN |
| **Line incremental** | No action | Send one format | No action | No action | Send one format at increment if button pressed | IC |
| **Continuous incremental** | Send one format | Send one format | No action | No action | Send one format at increment | CL |
| **Remote request** | No action | No action | No action | No action | Send one format on request | RM |

***Table 13: Rate Commands***

| | | | | | | |
|---|---|---|---|---|---|---|
| **Digitizing rate, formats/second** | 12 | 100 | 100 | 5 | 10 | 50 |
| **Digitizing rate command** | R1 | R2 | R3 | R4 | R5 | R6 |

***Point Mode***

In Point Mode, one coordinate is sent when a transducer button is pressed. Output occurs only when the transducer is in the active area.

To select Point Mode:

***Custom Configuration Menu:*** Select the Point option under Mode.

***GTCO Commands:*** Send command **PT**.

***Line Mode***

In Line Mode, coordinates are sent as long as a transducer button is pressed. Output occurs only when the transducer is in the active area.

**To select Line Mode:**

***Custom Configuration Menu:*** Select Line Mode.

***GTCO Commands:*** Send command **LN**.

**To set the rate at which coordinates are sent in Line Mode:**

***Custom Configuration Menu:*** Select 12, 50 or 100 under Rate.

***GTCO Commands:*** Send command **Rx** (where x = 1-6), as shown in Table 13.

Note that digitizing rate is also dependent on the communication baud rate and format type you have selected. The rates shown in Table 13 are therefore maximum rates.

Surprisingly, if your system seems to respond slowly to digitizer input, it may be because the digitizer coordinate output rate is set too high. This may occur when a program buffers excess coordinate data, thus causing a time delay.

***Continuous Mode***

In Continuous Mode, coordinates are sent continuously, at the specified output rate. Output occurs only when the transducer is in the active area. Output occurs continuously, whether or not a transducer button is pressed.

**To select Continuous Mode:**

***Custom Configuration Menu:*** Select the "Cont" option under Mode; select 12, 50 or 100 under Rate.

***GTCO Commands:*** Send command **CN**; to select a rate, send command **Rx** (where x = 1-6), as shown in Table 13.

***Line Incremental Mode***

In Line Incremental Mode, one coordinate is sent when the transducer is moved farther than a preset increment and a transducer button is pressed. Default increment is 0.01". Output occurs only when the transducer is in the active area.

**To select Line Incremental Mode:**

***Custom Configuration Menu:*** Select the "Line Incr" option under Mode.

***GTCO Commands:*** Send command **IC**; to set a new increment value, send command **IV** and at the prompt, send three digits representing the new increment in units of 0.001".

***Continuous Incremental Mode***

In Continuous Incremental Mode, one coordinate is sent when the transducer is moved farther than a preset increment or a transducer button is pressed or released. Default increment is 0.01". Output occurs only when the transducer is in the active area.

**To select Continuous Incremental Mode:**

***Custom Configuration Menu*** Select the "Cont Incr" option under Mode.

***GTCO Commands:*** Send command CL; to set a new increment value, send command IV and at the prompt, send three digits representing the new increment in units of 0.001".

***Remote Request Mode***

In Remote Request Mode, one coordinate is sent when the Controller receives a Read Current Coordinate command (CTRL-B).

**To select Remote Request Mode:**

***Custom Configuration Menu:*** Not available.

***GTCO Commands:*** Send command **RM**.

**Controlling the Alarm Using Remote Commands**

An alarm (audio tone) is provided so the AccuTab can inform you of certain conditions. The alarm can be enabled or disabled by the

Menu or commands.

**To hear only critical tones, turn the alarm off:**

***AccuSet Menu:*** Select the Alarm menu block

***GTCO Commands:*** Send command **AD**.

**To hear all tones, turn the alarm on:**

***AccuSet Menu:*** Select the Alarm menu block.

***GTCO Commands:*** Send command **AE**.

When you move the cursor over the Alarm block on the AccuSet Menu, the Proximity indicator (**green**) will light if the alarm is currently enabled.

## Programming Examples: Reading and Displaying AccuTab Formats

The following example QBASIC programs will allow you to experiment with reading and displaying AccuTab formats:

- To read high resolution binary formats
- To read ASCII formats

### Programming Example: To Read High Resolution Binary Formats

1. Configure AccuTab for 9600, N, 8, 1, GTCO Binary and Continuous (AccuSet 01).
2. Enter and run this QBASIC program:

```
'*************************************************************************
'*              READ AND DISPLAY HIGH RESOLUTION BINARY FORMAT           *
'*                            BY GTCO CORPORATION                        *
'*************************************************************************
CLS                                              'CLEAR SCREEN
OPEN "COM1:9600,N,8,1" FOR RANDOM AS #1          'CONFIGURE & OPEN COM1
DO
 D$ = INPUT$(1, #1)                              'GET ONE BYTE
 IF ((ASC(D$) AND 128) >= 128) THEN              'WAIT FOR SYNC BIT
    PB = (ASC(D$) AND 60) / 4                    'EXTRACT PUSHBUTTON CODE
    XHIGH1 = (ASC(D$) AND 3) * 16384             'EXTRACT X HIGH ORDER BITS
    XHIGH = (ASC(INPUT$(1, #1)) AND 127) * 128   'EXTRACT X MID ORDER BITS
    XLOW = (ASC(INPUT$(1, #1)) AND 127)          'EXTRACT X LOW ORDER BITS
    XDATA = XHIGH1 + XHIGH + XLOW                'FINAL DECIMAL X DATA
    YHIGH1 = (ASC(INPUT$(1, #1)) AND 3) * 16384 'EXTRACT Y HIGH ORDER BITS
    YHIGH = (ASC(INPUT$(1, #1)) AND 127) * 128   'EXTRACT Y MID ORDER BITS
    YLOW = (ASC(INPUT$(1, #1)) AND 127)          'EXTRACT Y LOW ORDER BITS
    YDATA = YHIGH1 + YHIGH + YLOW                'FINAL DECIMAL Y DATA
    PRINT PB, XDATA / 1000, YDATA / 1000         'PRINT RESULTS
 END IF
LOOP
```

### Programming Example: To Read ASCII Formats

1. Configure the AccuTab for 9600, N, 8, 1, GTCO ASCII and Continuous (AccuSet 53).
2. Enter and run this QBASIC program:

```
'*****************************************************************
'*                    READ AND DISPLAY ASCII FORMAT              *
'*                      BY GTCO CORPORATION                      *
'*****************************************************************
CLS                                          'CLEAR SCREEN
OPEN "COM1:9600,N,8,1" FOR RANDOM AS #1  'CONFIGURE & OPEN COM1
DO
 LINE INPUT #1, D$                           'GET FORMAT
 PRINT D$;                                   'PRINT FORMAT
LOOP
```

## General Product Information

### *Radio and Television Interference*

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Reorient or coil cables.
- Consult the dealer or an experienced Radio/TV technician for help.

**NOTE:** Any cables the user adds to the device must be shielded to be in compliance with the FCC standards. Any unauthorized modification to this device could result in the revocation of the end user's authority to operate this device.

**Bescheinigung des Herstellers/Importeurs**

Heirmit wird bescheinigt, dass der/die/das

AccuTab

(Geraet, Typ, Bezeichnung)

im Uebereinstimmung mit den Bestimmungen der

Vfg 1046/1984

(Amtsblattverfuegung)

Funk-Entstort ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Geraetes angezeigt und die Berechtigung zur Ueberpruefung der Serie auf Einhaltung der Bestimmungen eingeraumt.

GTCO CalComp by Turning Technologies, Inc.
(Name des Herstellers/Importeurs)

Dieses Geraet wurde einzeln sowohl als auch in einer Anlage, die einen normalen Anwendungsfall nachbildet, auf die Einhaltung der Funkentstoerbestimmungen geprueft. Es ist jodoch moeglich, dass die Funkentstoerbestimmungen unter unguenstigen Umstaenden bei anderen Geraetekombinationen nicht eingehalten werden. Fuer die Einhaltung der Funk-entstoerbestimmungen seiner gesamten Anlage, in der dieses Geraet betrieben wird, ist der Betrieber verantwortlich. Einhaltung mit betreffenden Bestimmungen kommt darauf an, dass geschirmte Ausfuhrungen gebraucht werden. Fuer die beschaffung richtiger Ausfuhrungen ist der Betrieber verantwirtlich.

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

## Limited Warranty for AccuTab

GTCO CalComp by Turning Technologies, Inc. warrants these products to be free from defects in material and workmanship under the following terms. Complete and return the enclosed warranty registration card to ensure that your products are covered with this warranty.

**Coverage**

Parts and labor are warranted for two (2) years from the date of the first consumer purchase for the digitizer tablet, controller, transducers and tablet accessories. Power supply and cables are also warranted for two (2) years. This warranty applies to the **original consumer purchaser only**.

Within the European Union, the warranty period is two (2) years, as mandated by the EU. Contact your local dealer or distributor for additional warranty information.

Warranty is only valid if original consumer's purchase or lease date is less than or equal to six months from the original GTCO CalComp by Turning Technologies sale date. This information will be captured by the system serial number and confirmed by the reseller's purchase order.

A nominal Warranty Handling Fee will be charged after the first 90 days of use and calculated from the date of original consumer purchase. This payment may be made by Visa, MasterCard or American Express. A copy of the sales receipt or invoice will be required for warranty verification.

**Conditions**

Except as specified below, this warranty covers all defects in material or workmanship in the products. The following are not covered by the warranty:

1. Any product on which the serial number has been defaced, modified or removed (if applicable).
2. Damage, deterioration or malfunction resulting from:
    a. Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature, unauthorized modification for any purpose, unauthorized product modification, or failure to follow instructions supplied with the product.
    b. Repair or attempted repair by anyone not authorized by GTCO CalComp by Turning Technologies.
    c. Any damage in shipment of the product (claims must be presented to the carrier).
    d. Any other cause which does not relate to a manufacturing defect.
3. Any product not sold or leased to a consumer within six months of GTCO CALCOMP BY TURNING TECHNOLOGIES original sale date.

GTCO CalComp by Turning Technologies will pay all labor and material expenses for covered items, but will not pay for the following:

1. Removal or installation charges.

2. Costs for initial technical adjustments (setup), including adjustment of user controls.
3. Certain shipping charges. (Payment of shipping charges is discussed in the next section of this warranty.)
4. Packaging costs. (Customers should keep their boxes.)

**Warranty Service Procedures**

1. To obtain service on your GTCO CalComp by Turning Technologies product, contact the Technical Support Department to receive a Return Material Authorization Number (RMA#) and shipping instructions by calling: 1-866-746-3015.
2. Ship the product to GTCO CalComp by Turning Technologies with the RMA# marked clearly on the outside of the box. Without a clearly marked RMA# on the shipping box, GTCO CalComp by Turning Technologies reserves the right to refuse the shipment.
3. Although you must pay any shipping charges to ship the product to GTCO CalComp by Turning Technologies for warranty service, GTCO CalComp by Turning Technologies will pay the return shipping charges for ground shipment. Other shipping options are available at an additional fee.
4. Whenever warranty service is required, the original dated sales invoice (or a copy) must be presented as proof of warranty coverage and should be included in shipment of the product. Please also include your name, address, telephone number, fax number, email address and a description of the problem.
5. If GTCO CalComp by Turning Technologies determines that the unit is not defective within the terms of the warranty, the consumer shall pay the cost of all freight charges, as well as any repair charges.

***Technical Support***

Web-based Technical Support is available free of charge at: www.gtcocalcomp.com, where current driver releases, as well as comprehensive technical support, troubleshooting, Technical Bulletins and FAQs can be found.

Telephone Technical Support is available free of charge to the original consumer for a period of 90 days from the date of purchase of the product. Please contact our Technical Support Department at: 1-866-746-3015 or fax your request to: 480.998.1751.

**Disclaimer of Unstated Warranties**

The warranty printed above is the only warranty applicable to this purchase. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. Assuming the warranty above stated is otherwise applicable, it is expressly understood and agreed that GTCO CalComp by Turning Technologies sole liability whether in contract, tort, under any warranty, in negligence or other shall be for the repair or replacement of the defective parts and under no circumstances shall GTCO CalComp by Turning Technologies be liable for special, indirect or

consequential damages. The price stated and paid for the equipment is a consideration in limiting GTCO CalComp by Turning Technologies liability.

**Notice**
Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights, which vary from state to state, or province to province.

To obtain service on your GTCO CalComp by Turning Technologies product, call our Technical Support Department at: 1-866-746-3015 or fax us at (480) 998-1751. We can also be contacted through our website at www.gtcocalcomp.com (in US); at EUOffice@gtcocalcomp.com (in Germany); at infos@calcomp.fr (in France).

**Important!**
All products returned to GTCO CalComp by Turning Technologies for service must have prior approval in the form of a Return Merchandise Authorization Number (RMA#), which can be obtained by calling the Technical Support Department.

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# ACCUTAB™

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