

# 3M™ MicroTouch™ MT7 Software Diagnostic Utility User Guide

Read and understand all safety information  
contained in this document before using this product.



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## CHAPTER 1

# Overview

The 3M™ MicroTouch™ Software Diagnostic Utility (SDU) enables you to troubleshoot your 3M Touch Systems sensor and controller. The minimum system hardware configuration requirement to run the Software Diagnostic Utility (SDU) is a system running a 200 MHz processor with 32 Mb RAM with Windows XP or better.

The Software Diagnostic Utility (SDU) can run directly to the serial port or through the 3M MicroTouch MT7 Software driver.

	<b>Microsoft Windows XP/Vista/Windows 7</b>
Serial	Direct to port or through the MT7 Software driver
USB	Through MT7 Software driver
HID	Direct through Microsoft driver or MT7 software

The Software Diagnostic Utility (SDU) requires a keyboard and mouse.

## 3M Touch Systems Support Services

3M Touch Systems, Inc. provides extensive support services through our website and technical support organization. Visit the 3M Touch Systems website at <http://www.3Mtouch.com/>, where you can download touch software and drivers, obtain regularly updated technical documentation on 3M Touch Systems products, and learn more about our company.

Whenever you contact Technical Support, please provide the following information:

- Touch display size, part number and serial number
- Current driver version
- Operating system used
- Information on additional peripherals

Technical Support is available Monday through Friday 8:30 a.m. to 5:30 p.m. with limited call back service after 5:30 p.m. until 8:00 p.m. US Eastern Standard Time – 9 a.m. to 5 p.m. throughout Europe.

You can contact 3M Touch Systems, Inc. Technical Support (US only -- Eastern Standard Time) by calling the hot line, sending email or a fax.

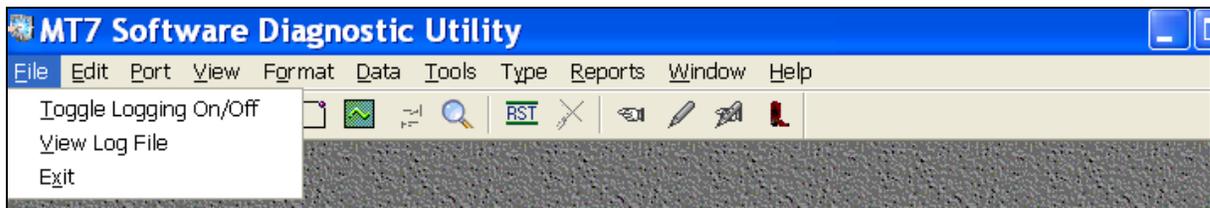
- Technical Support Hot Line: 978-659-9200
- Technical Support Fax: 978-659-9400
- Toll Free: 1-866-407-6666 (Option 3)
- Email: US-TS-techsupport@mmm.com

## Contact 3M Touch Systems

Contact information for all offices can be found on our website at:  
<http://www.3Mtouch.com/>

## CHAPTER 2

# File



### Toggle Logging On/Off

This option is a data collection function. You can log raw data from the sensor corners to troubleshoot sensor performance. This feature is most often used for automated testing, stray capacitance, and noise profiling..

When first opened, a dialog box will open and request a file name and location. You can log raw data in the background even when other non-logging tools are running.

To begin logging select File > Toggle Logging On/Off. A Log indicator is displayed in the lower right corner of the status bar whenever the log file is open. This appears in the lower right corner of the active window. Since everything writes to the same log file, only one tool should be actively logging.

### View Log File

Use this option to open the log file you created.

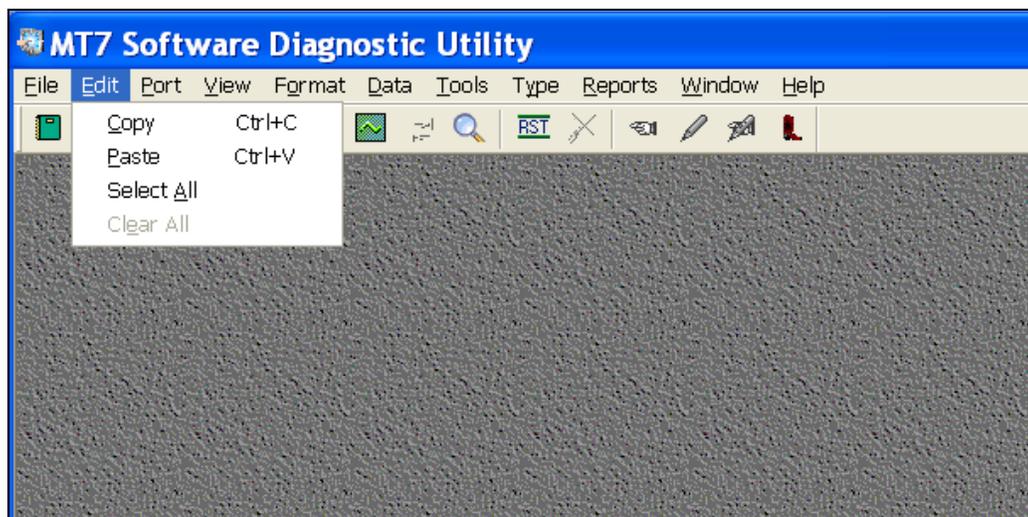
### Exit

Exit the Software Diagnostic utility.



## CHAPTER 3

# Edit



### Copy

In Terminal mode, the text buffer is copied to the clipboard.

In Draw mode, the screen image is copied to the clipboard. (Similar to Alt-PrintScrn)

The saved text or image can then be pasted into another file for record keeping.

### Paste

Pastes the copied text or image into another file for record keeping.

### Select All

Selects all *text* on the screen – this is not an image of the screen if in split screen mode.

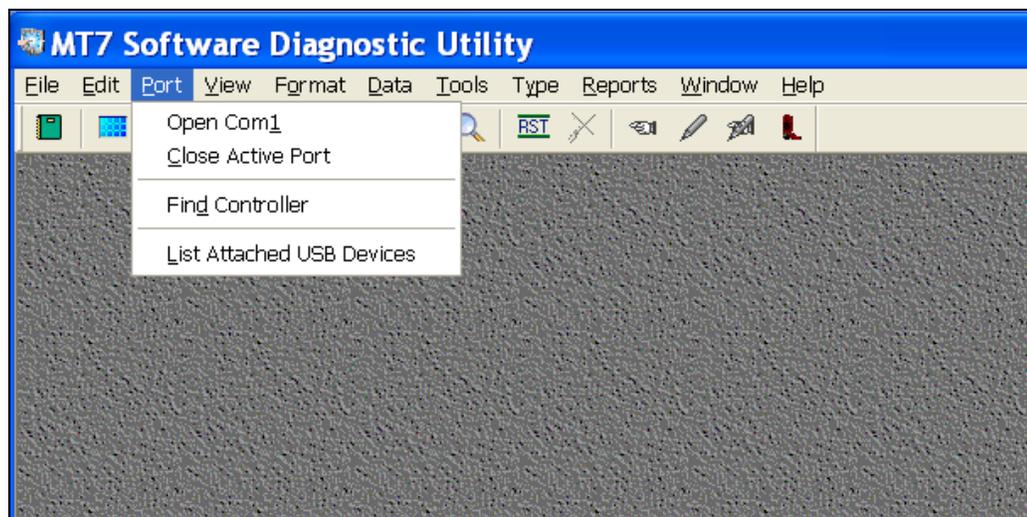
### Clear All

Clears the viewable screen -- any text or draw images.



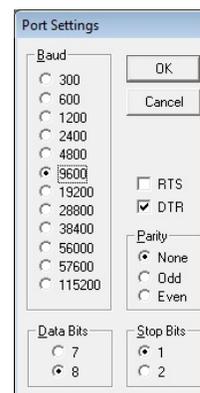
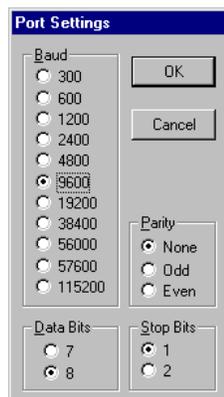
## CHAPTER 4

# Port



### Open Com 1

This option shows all available serial COM ports. Use this feature to select the touch controller serial COM port on the Host system. This feature is also used to report the communication parameter information for this port, i.e., Baud rate, Parity, Data Bits, and Stop Bits. The figure below shows standard 3M Touch Systems operating mode.



Use the menu radio buttons to select the desired Windows COM port. If the port is available, you can select the appropriate parameters.

If you get a “Can’t Open Port” message, it either means that there is no such port or that some other application (that includes MT7 Software) owns the port.

Depending on the firmware, the SDU will look for a touch driver and connect to it. If it is Serial, the COM Port status bar indicates which serial port and baud rate the driver is using.

If the SDU displays “Can’t Connect to Driver” and you know that there is a touch driver installed, there may be a version conflict.



If you check View/Options/General/Find Controller on Launch, the SDU will probe for the controller automatically when you start your system. The SDU displays driver details along with controller details in the “Poll” message box. (See Type/Poll)

The SDU prefers to connect to a MT7 Software driver. If you have a controller on another port not connected to the driver, you will have to select the port manually.

## Close Active Port

Close the active serial port.

## Find Controller

Searches for controllers and lists all attached controllers.



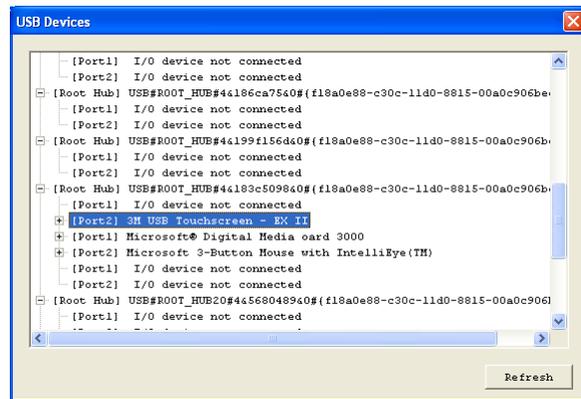
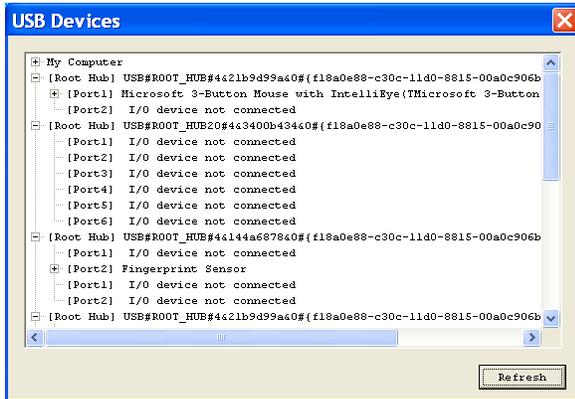
The Comm Port box indicates the type of controller found – either USB or serial. In some instances the search may be unsuccessful.

If you have more than one controller attached, you will see this screen – choose the controller you want.



### List Attached USB Devices

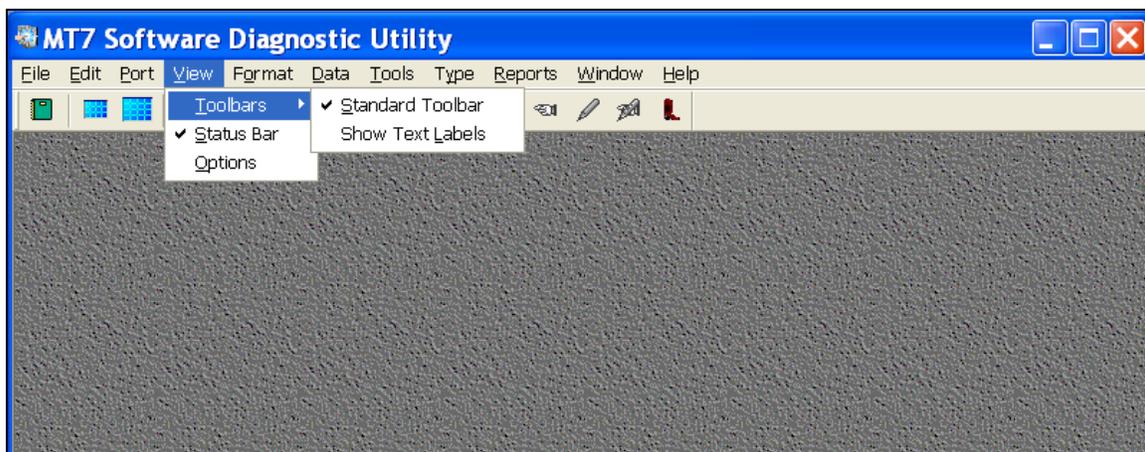
Provides a list of all USB devices attached to the system.





## CHAPTER 5

# View



## Toolbars

Adds or removes the visible toolbar.

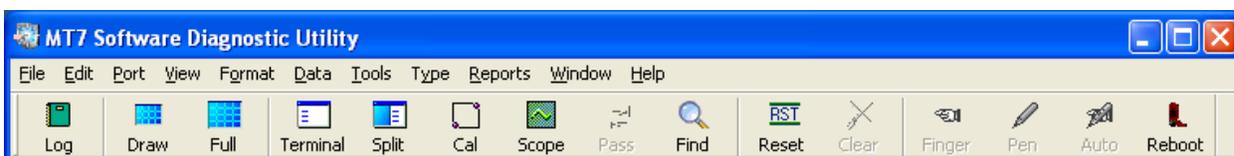
### Standard Tool Bar

Shows the icons for SDU options along the standard toolbar.



### Show Text Labels

Displays text labels under the SDU toolbar icons.



## Status Bar

Toggles the Status Bar on and off at the bottom of the active screen.



## Options

Options include General, Terminal or Draw.

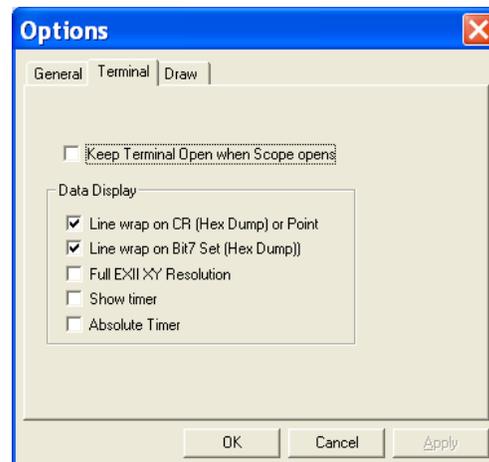
### General Options



**Find Controller on Launch** -- If checked, the SDU looks for a USB driver, a Serial driver, and then a touch controller on any available COM port. The SDU tries to identify the controller. If a controller is found, details are displayed about the driver or the COM port, and the controller.

**Add Linefeeds to log file text for readability** -- This option adds linefeeds (extra spaces) to the log file to increase readability.

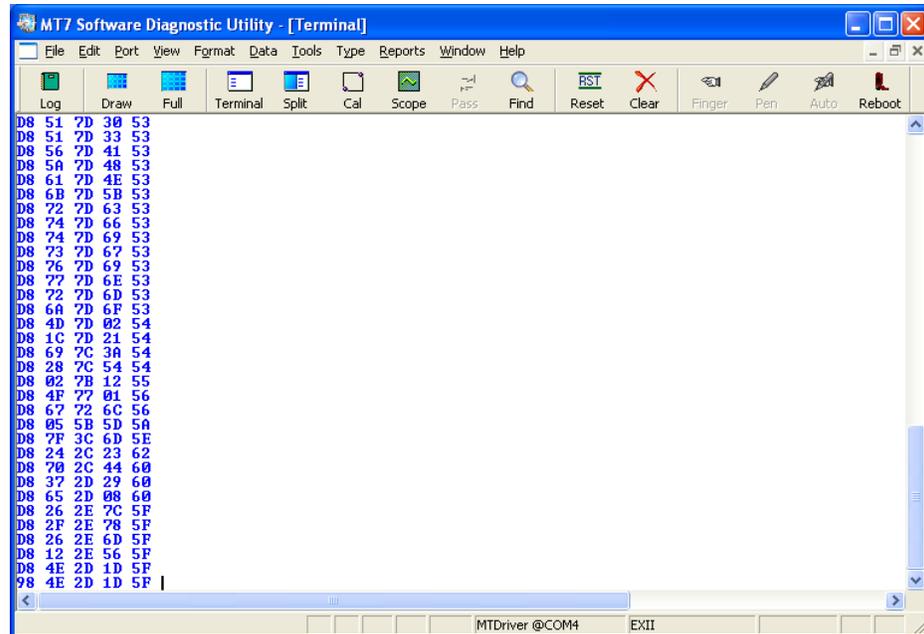
### Terminal Options



**Keep Terminal Open When Scope Opens** -- Enables you to split the screen window to show both Terminal and Scope views.

### Data Display

**Line Wrap on CR (Hex Dump) or Point** -- Customizes the way Terminal displays data. This is useful for breaking up the incoming Hex data into a more understandable format. Various packet formats often start with Bit 7 set and/or end with a carriage return (CR).



**Line Wrap on Bit 7 Set (Hex Dump)** -- Use this option to display the hex dump data in an easy to read format.

**Full EXII XY Resolution** -- Use this option to show the point data in format tablet in native EXII resolution.

**Show Timer and Absolute Timer** -- Changes the way data is displayed in the window.

## Draw Options



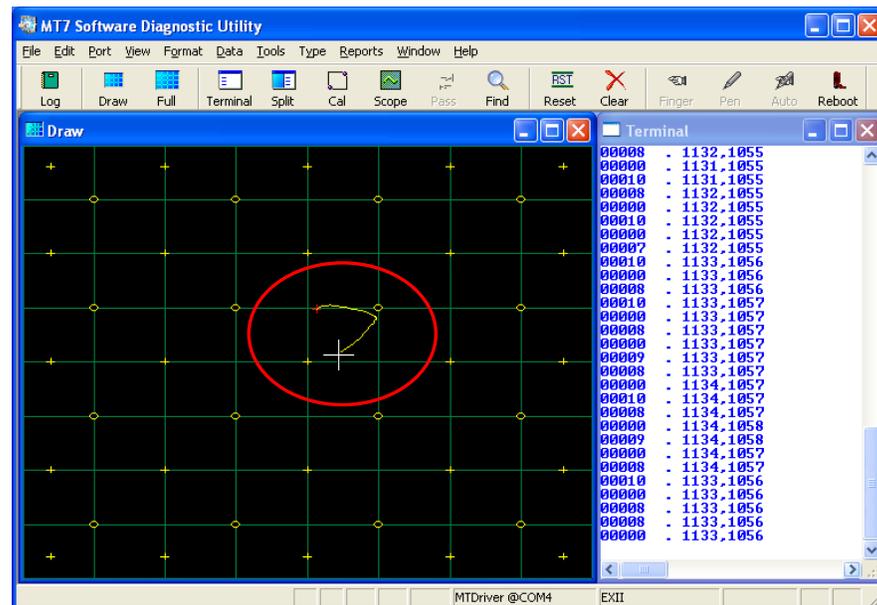
The Draw window is often used as a measure of accuracy. A good test pattern is essential. It can be customized to suit your application.

**Show Grid** -- The classic 8x8 line grid

**Show 25 point Targets** -- The standard 5x5 linearization points with  $\pm 1\%$  crosses on center

**Draw Dots** -- Shows only the points received, without line drawing to obscure data.

**Show Cursor** -- Shows cursor as a cross as shown in the figure below.



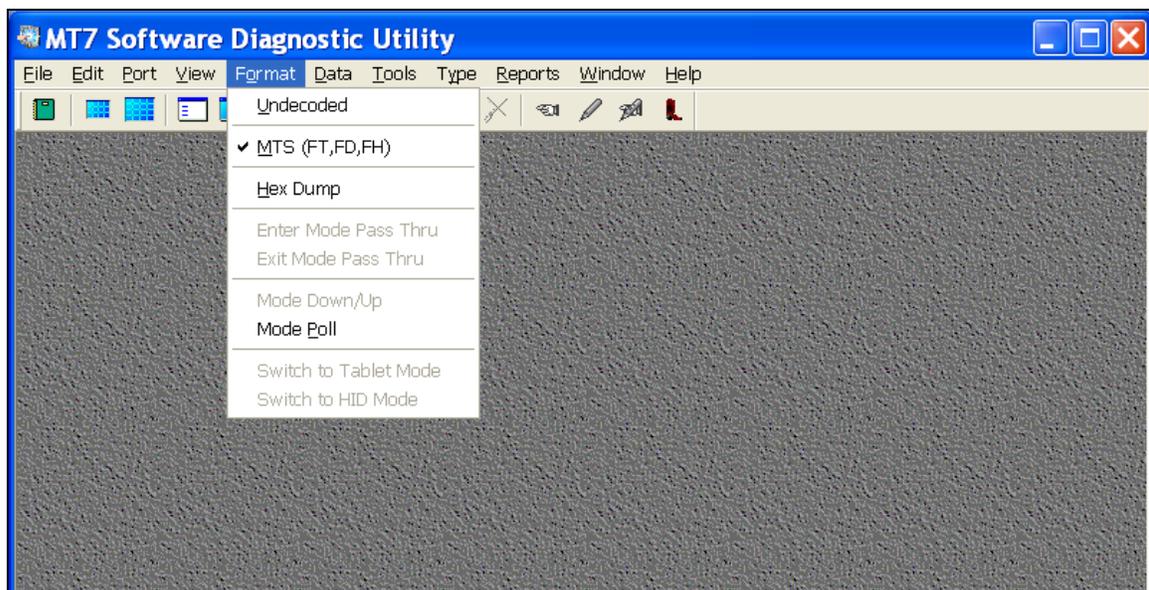
## 16 Point Prove Targets

**Show** -- The traditional MT7 Software 'prove' points with  $\pm 1\%$  ellipses on center.

**Extended Targets** -- Moves the  $\pm 1\%$  ellipses closer to the edge of the sensor.

## CHAPTER 6

# Format



These options affect the way Draw and Terminal windows display point data.

### Undecoded

Terminal shows non-printable ASCII characters as hex enclosed as: <00>. Used for line monitoring.

### MTS (FT, FD, FH)

Toggle different formats – Format Tablet is the default format (FT), Format Decimal (FD), and Format Hex (FH). Changing the Format does not send any commands or affect the way the controller actually sends data.

For USB controllers, there is support for a ‘standard’ format when MTS is selected and also Cal Raw and HEX dump.

## Hex Dump

Terminal displays all received data as pairs of Hex characters.

## Enter Mode Pass Thru

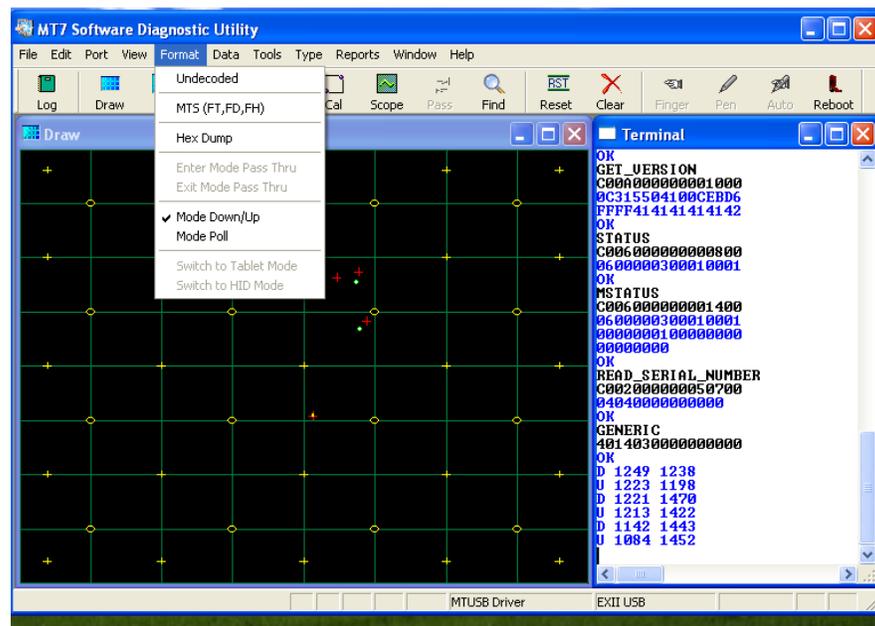
Reserved for DST touch systems

## Exit Mode Pass Thru

Reserved for DST touch systems

## Mode Down/Up

Reports touch down and lift off coordinates in USB only.



## Mode Poll

System query for touch polling data.

## Switch to Tablet Mode

Tablet mode is not available.

## Switch to HID Mode

Support for HID controllers only

## CHAPTER 7

# Data



## Controller Linearization Data

### X coefficients and Y coefficients

The number grids show what data is presently stored in the controller.

### Apply

Enables you to change settings

### Save to File

Send 25-point data from controller to compare linearization in field to factory data

### Read from file

Recreate issues from data settings collected in field

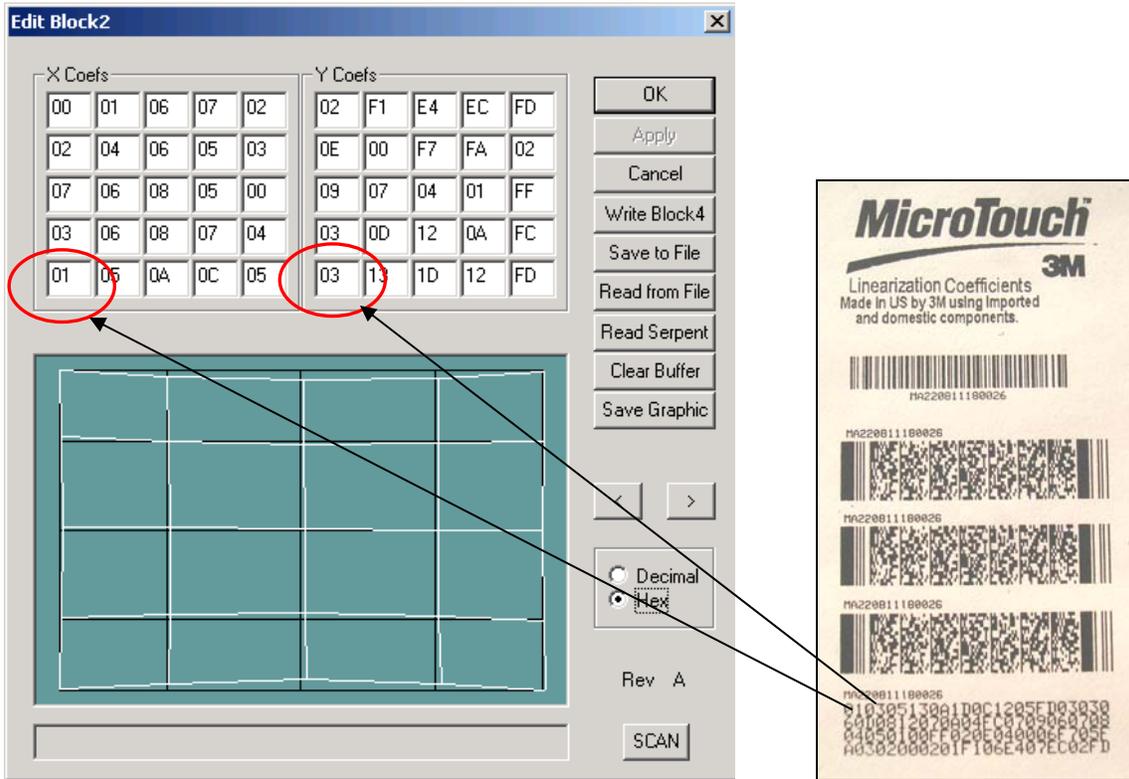
### Clear Buffer

Erases all data in the buffer. Must scan barcode again to restore calibration data

### Decimal/hex

Should default to hex mode

Use this to compare linearization data by hand to barcode settings from factory. Read the first two coordinates from hex to compare to barcode data to verify accuracy.



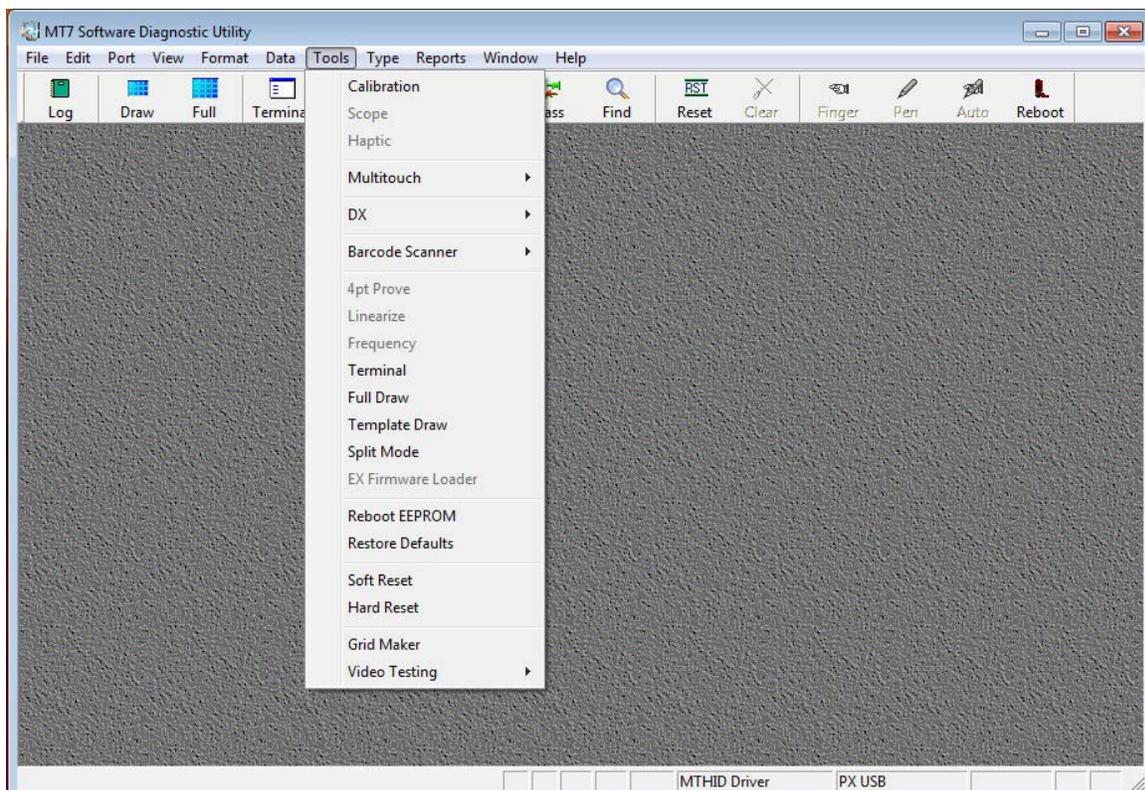
In hex mode, the X and Y coefficients correspond to the 2D bar code label.

### Cable Linearization Data

Show/load cable NOVRAM data stored.

## CHAPTER 8

# Tools



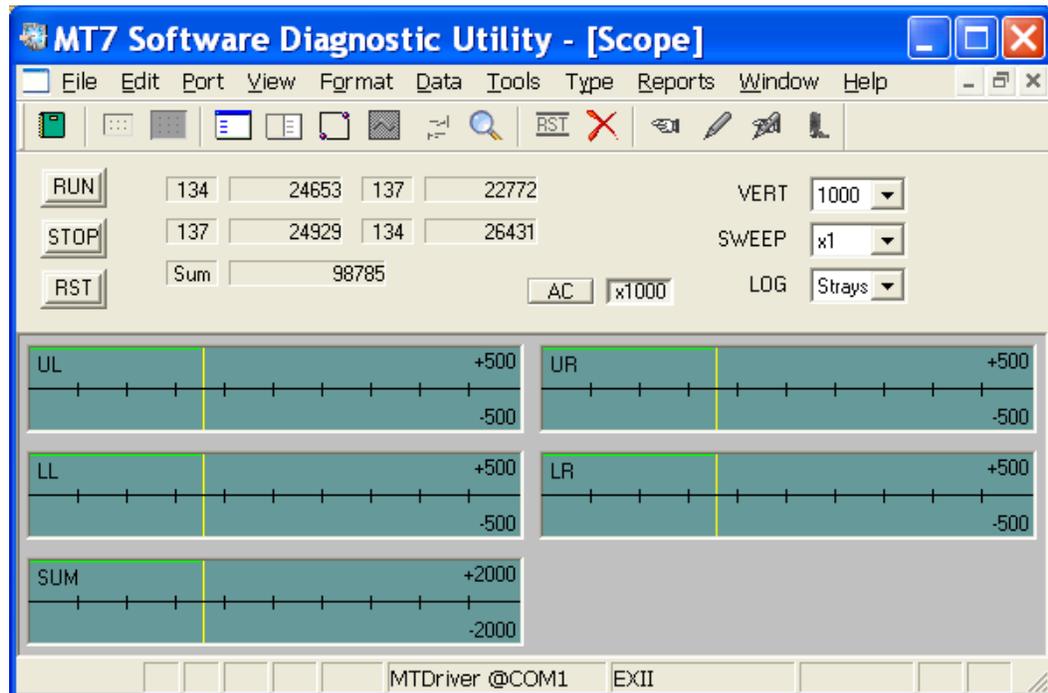
### Calibration

The traditional MTS extended calibration, always full-screen. This calibration will overwrite any previous 2 point calibration data. To cancel without calibrating, press escape.



If you have a Multitouch controller, the Calibration screen will have a white background rather than a black background. The functionality remains the same.

## Scope



Scope is the most common tool for troubleshooting your touch system. This utility presents Format Raw corner data graphically as would a four channel digital oscilloscope.

Without touching the screen, if the Scope option shows equal noise distribution, this indicates that something is happening over the entire screen or bezel issue. If the data is not distributed evenly across all four corners, this could indicate a corner issue.

## Run

Samples scope data.

## Stop

Stops sampling scope data.

## Sum

The SUM shows the noise. For example, with an EX controller, readings of less than 100 (without touching the screen) typically indicates a quiet system. While a reading of 300 typically indicates a noisy system.

## RST

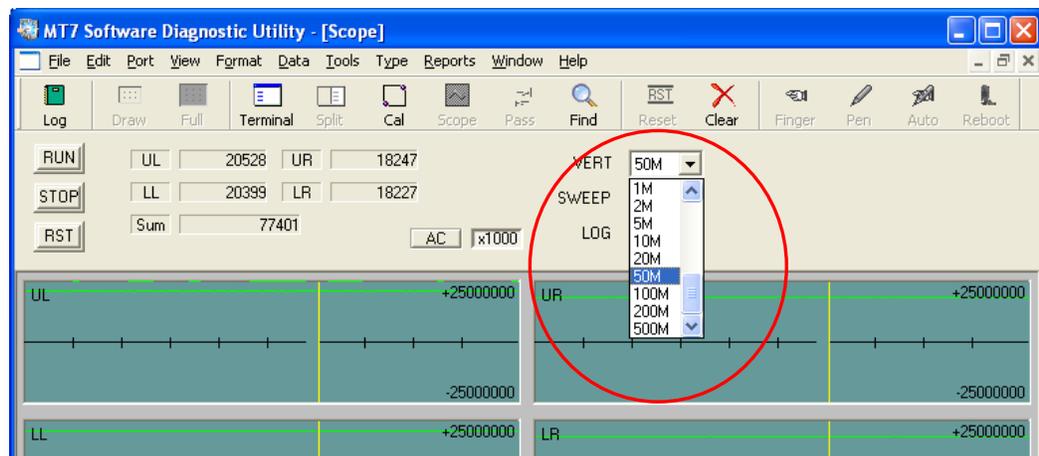
This option enables a soft reset of the controller.

## AC

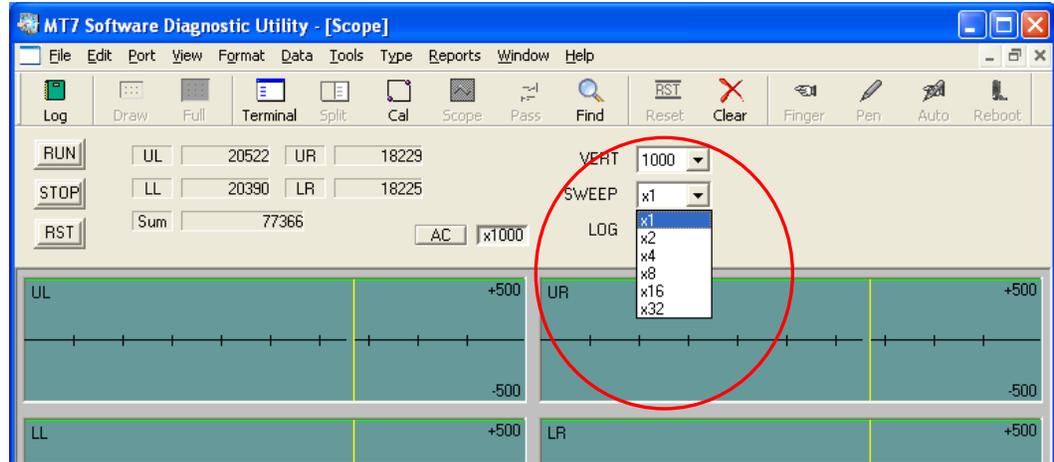
This option should be enabled. “On” displays the signals as offsets from 0. “Off” displays the signals as offsets from the stray values.

## VERT

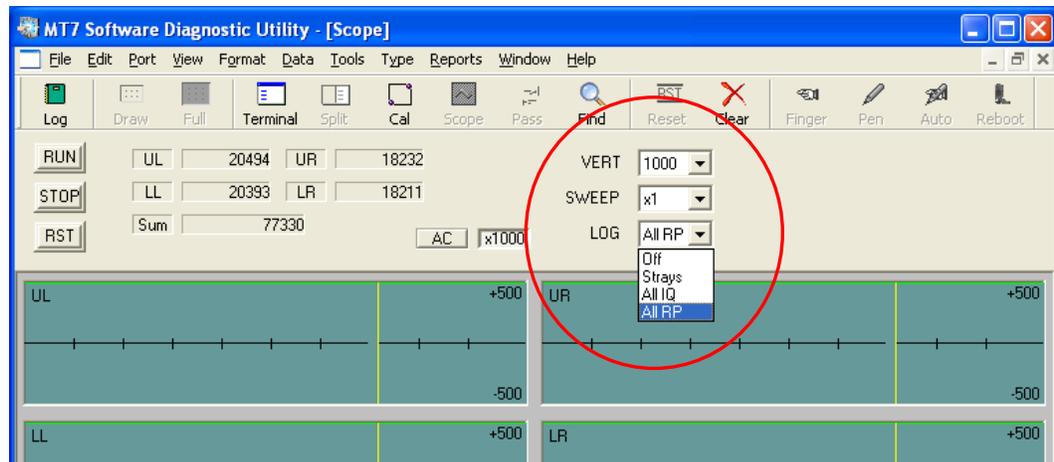
Vertical sweep is looking for noise – use the scale as needed for your test. It is common for touch sensing to be in the 10M range for an EX controller.



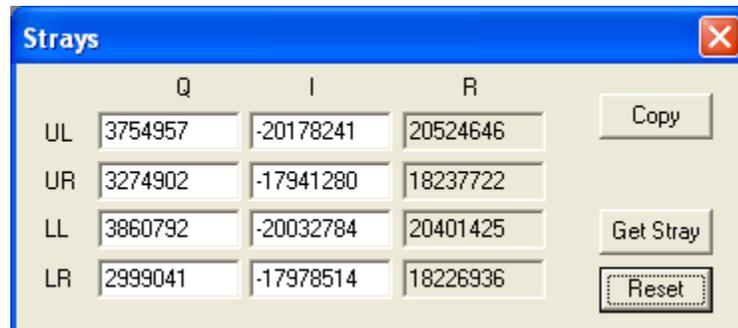
## Sweep



## Log

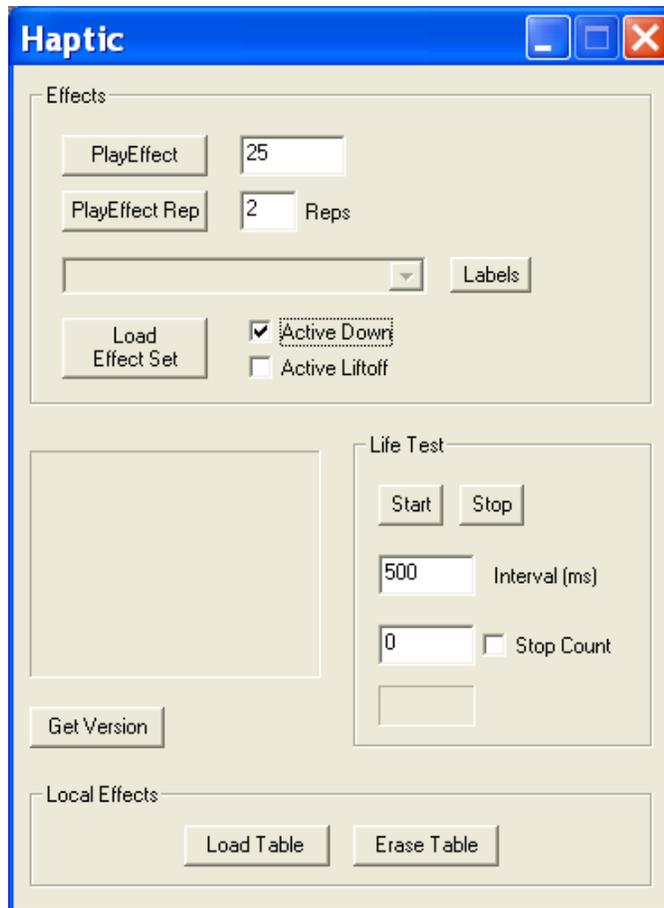


**For EX controllers**, you can select the Q and I quadrature drive and the R and P (Real and Phase) components for display. The four corners and the sum are displayed.



Strays are sampled only at the start of the sweep, so it is desirable to have a faster sweep rate sometimes.

## Haptic



Test working condition of the controller without the Effect Selector loaded to see if actuators are working.

### Play Effect

Number in box corresponds to effect number loaded in controller reference effect list in Chapter 8 of MCT Guide

### Play Effect Repeat

Repeat effect “n” times of effect number selected in “Play Effect”

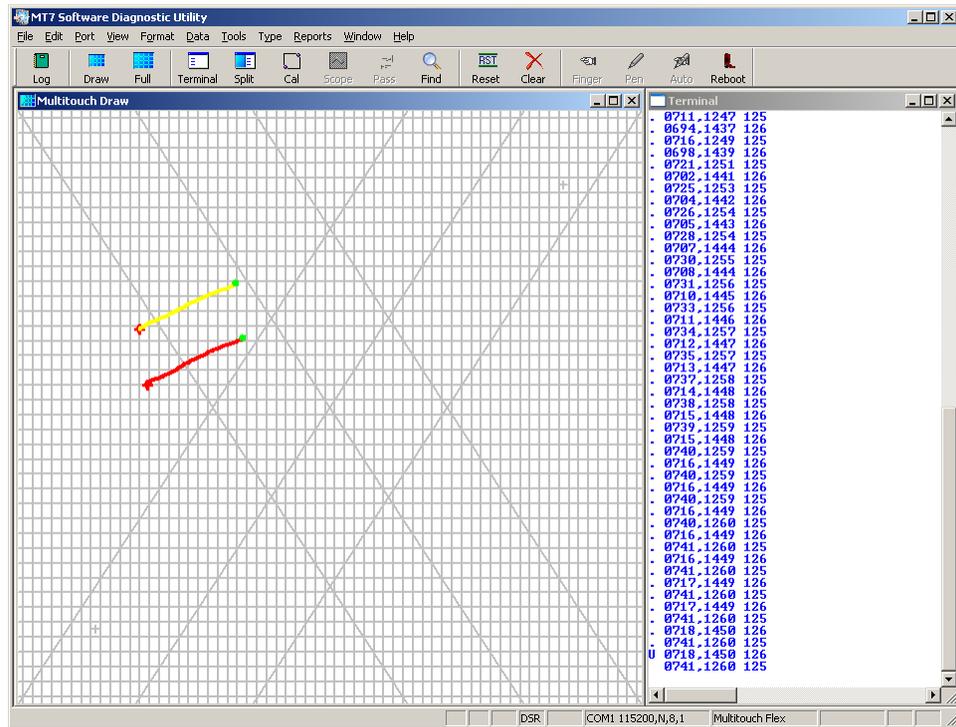
### Load Effect

See Field Applications Engineer (FAE) for files and descriptions.

## Multitouch

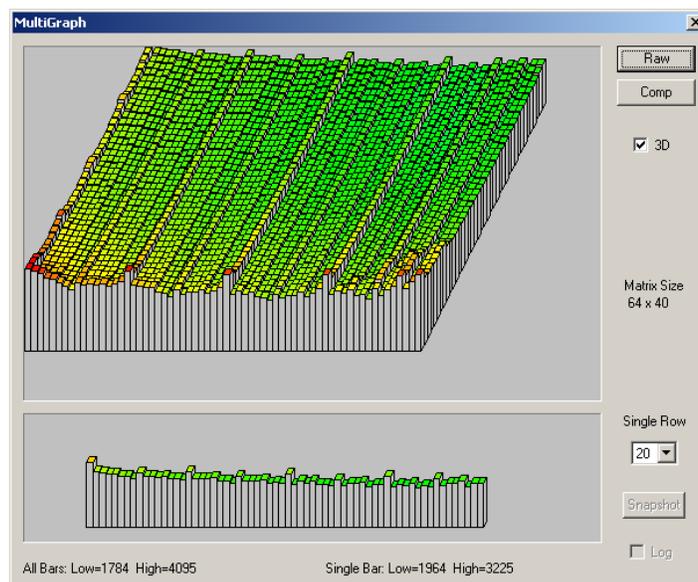
### Full Screen Multi Draw

This is the Draw screen supporting Multitouch. A different colored line is assigned to each finger contact.

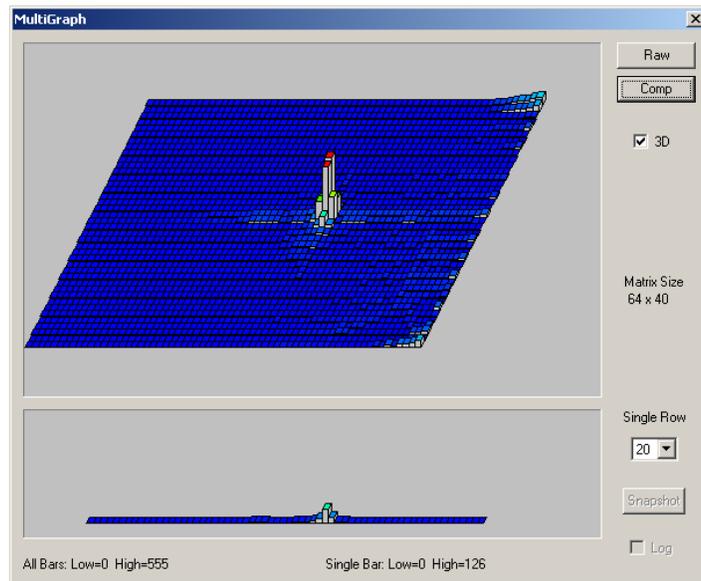


## Graph

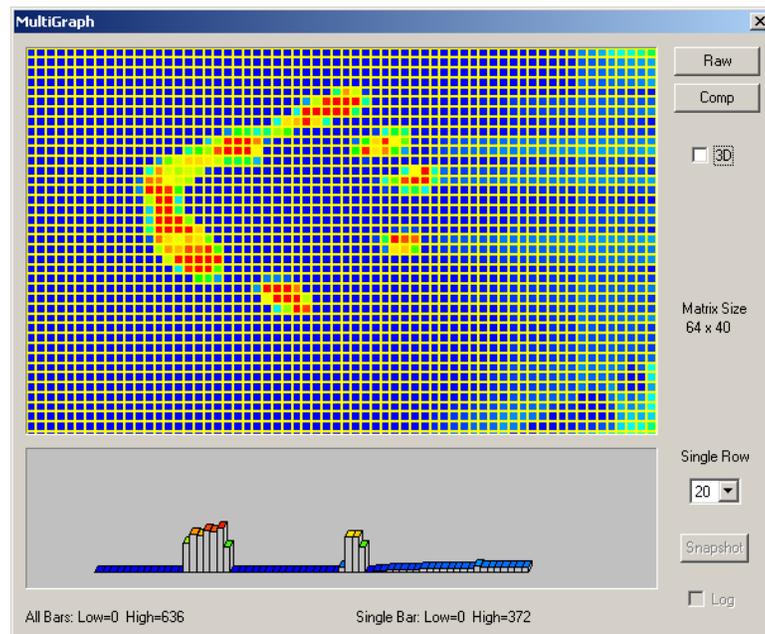
Press the RAW button to start the display of the ambient levels on the sensor's surface. Use the Single Row selector to show just one row at a time. A typical, normally operating screen is shown. It doesn't have to be even across the surface, and the actual results will vary with the integration. Obviously defective bars will show up as very low signals (height roughly half shown) in the Raw view.



Press the COMP button to start the display of the touch levels on the sensor's surface.

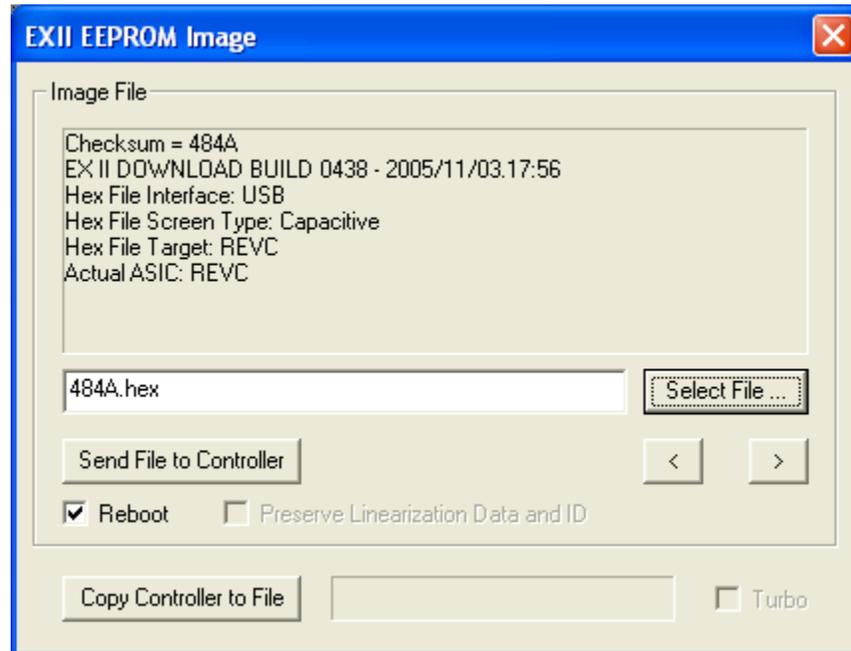


Uncheck the 3D box to get a 2D color-mapped view of either Raw or Compensated data. “COMP” shown with palm down on screen.

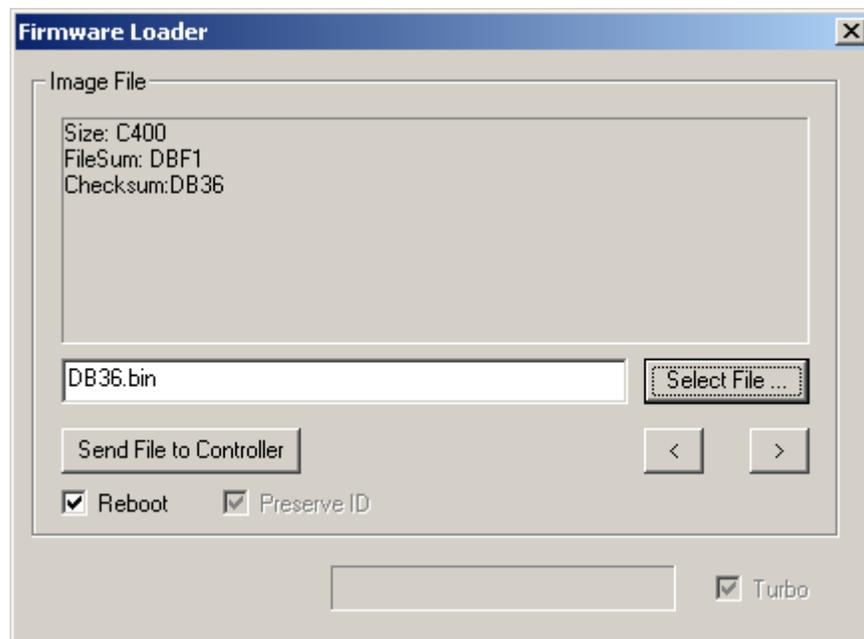


## Firmware Loader

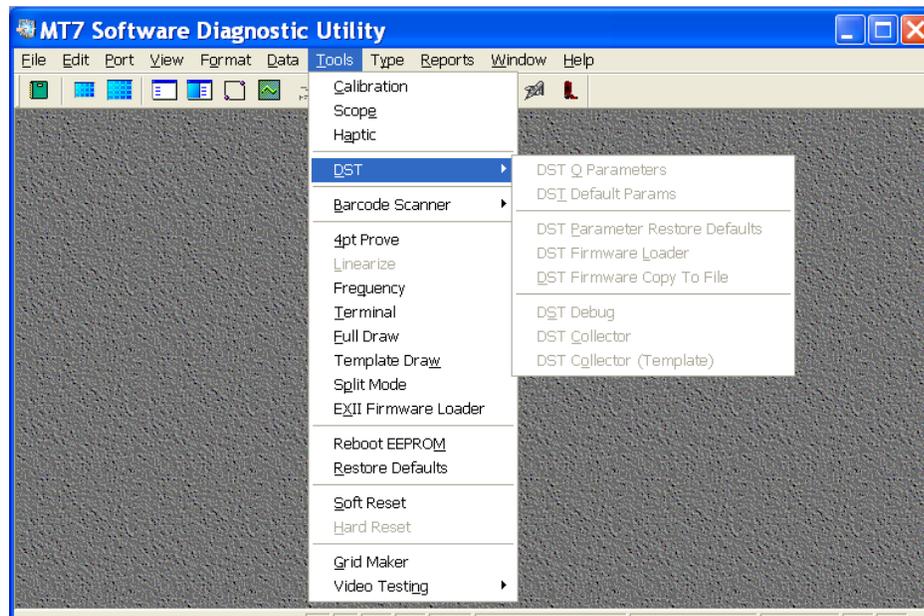
Press Select File to choose a binary image file (.bin) to load. This is only needed when testing new firmware from 3M Touch Systems.



When the file is selected, press “Send File to Controller”. The software interacts with the controller’s bootloader to load the new firmware. When complete, the software will reboot the controller.



## DST



### **DST Q Parameters**

Enables all DST Q-parameters to be saved to a text file

### **DST Default Parameters**

Enables updating default parameters on a controller. Requires a default parameter file

### **DST Parameter Restore Defaults**

Restores all parameters to default values

### **DST Firmware Loader**

Updates firmware on controller with one provided in a file

### **DST Firmware Copy to File**

Copies current controller firmware to a file

### **DST Debug**

Enables collection of Get D (tap) and Get N (noise) data.

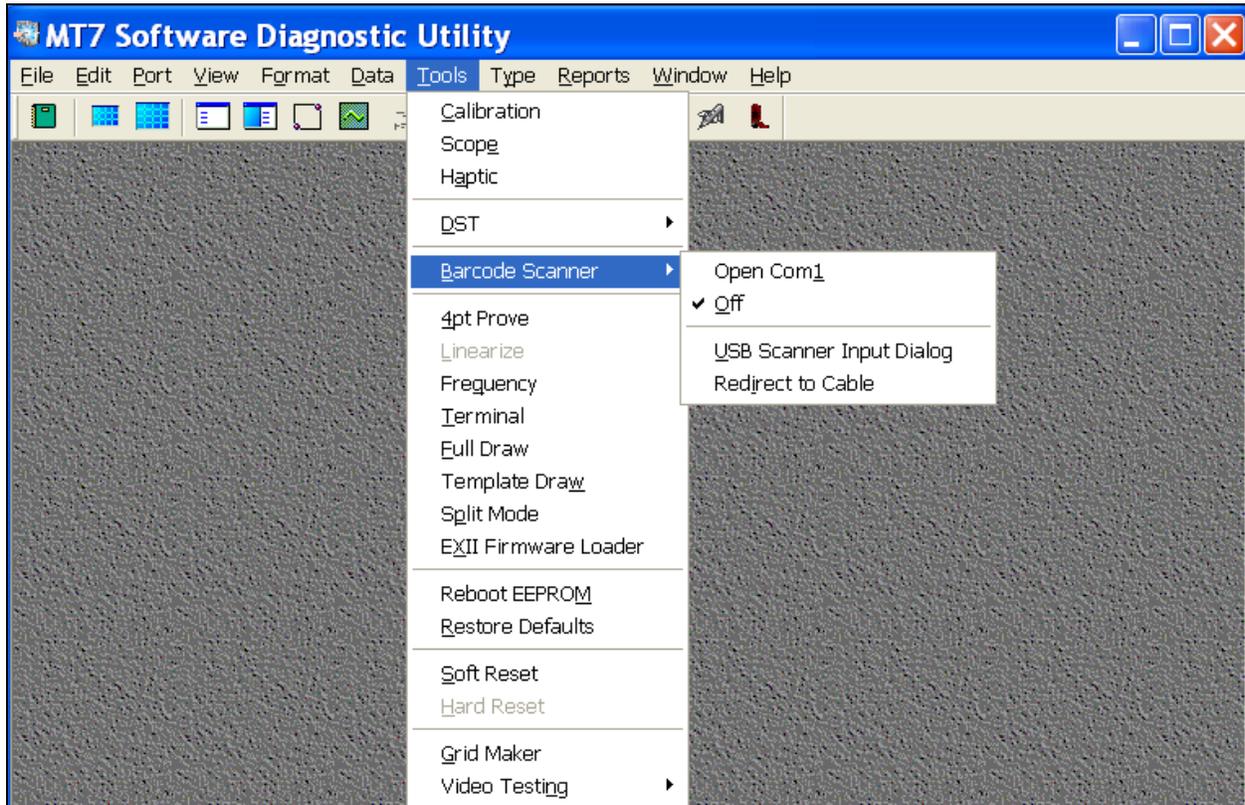
### **DST Collector**

Enables collection of detailed debugging data in full screen mode. Requires additional files

## DST Collector (Template)

Enables collection of detailed debugging data in window mode. Requires additional files

## Barcode Scanner



### Open COM 1

If you are using a serial barcode scanner, use this option to manually open the COM port if it doesn't open automatically.

### Off

This option disables the barcode scanner input and prevents any new data from downloading to the controller.

### USB Scanner Input Dialog

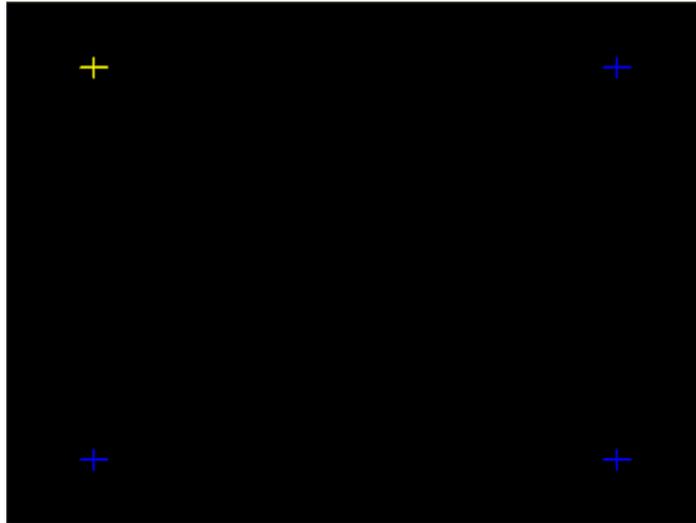
This option enables you to scan data into the controller. A barcode text box appears. Scan barcode label. Hex data from the scanner scrolls across box. The CLR button clears data from controller.

### Redirect to Cable

Use this option to redirect the barcode data to the cable NOVRAM.

## 4 point Prove

This option provides a quick scan of the 4 corners to ensure the 4 quadrants are operational. Touch once at each corner following the +.



## Linearize

This option enables you to perform a full screen 25 point linearization. You must use the Software Diagnostic Utility to turn on “Linearize” option. By default, this option is not active because all systems are linearized at the factory. For more information, contact Technical Support or your Field Engineer.

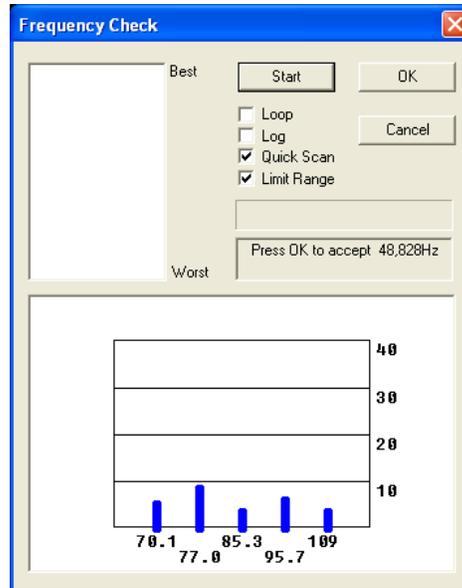
With certain controllers, you can perform a linearization to fine-tune your touch sensor. It should be performed only at the direction of 3M Touch Systems, Inc. Technical Support. Linearization consists of touching 25 targets on the screen followed by 16 additional points to determine specific point accuracy over the face of the display.

The EX II, CX, and SC500-series touch controllers support Linearization:

To test the accuracy of the linearization process, use the Draw program to draw some lines on the screen. Check that they are smooth, straight, and thin. You do not want lines to look keystoneed or curved.

To exit this program at any time during the process, press Escape.

## Frequency



This option adjusts the operating frequency of the touch controller. In general, you will not need to adjust the frequency. However, if you are experiencing problems with a jittery cursor, ragged lines, or random touch points, you may want to run the frequency option to check if there is noise in the system within the controller operating range.

Use the Frequency option to test the available frequency settings and determine the best frequency. The range of frequency settings and the default setting depends on your touch controller. You can set a new operating frequency, and then check the performance of the touch sensor at that frequency setting. The cursor should hold steady and smooth. If you see erratic or jittery cursor movement, adjust the frequency until your touch test produces acceptable results. A good test is to go to the Draw program and hold your finger steady on the sensor. If the resulting pattern is a crisp and clear single dot, you should have a good frequency.

It is recommended that you recalibrate the touch sensor after you run the Frequency option.

With an EX controller, the default frequency is 95.7. Always try to select either one down (85.3) or one up (109) when changing frequency. Run a quick scan, if values are under 10 you have a pretty clean system. Anything over 10 indicates a problem.

Restore defaults to reset values to the factory settings.

### Loop

Loop/Log looking for an event that is causing issues. This is the preferred tool for 'best' frequency selection and frequency spectrum scanning. You can let the scan loop continuously and log the results to a file. The results for each pass are presented in best to worst order. You are then prompted to accept or reject each pick. The continuous loop is intended to detect intermittent noise sources.

## Log

Tracks data in a log file so you can check for noise over a longer period of time.

## Quick Scan

Runs and single time through the frequency values range.

## Limit Range

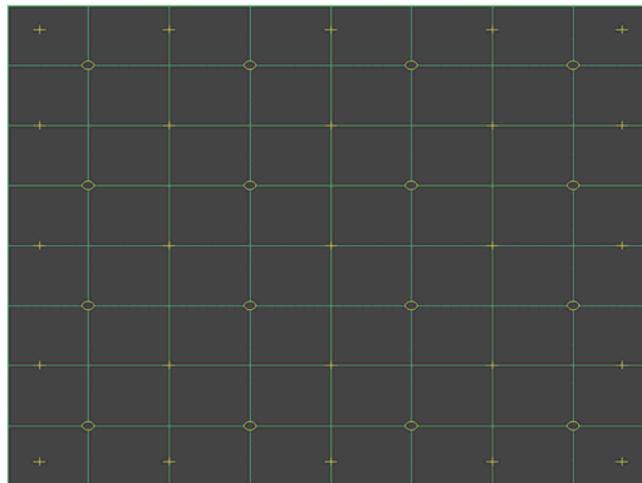
This option enables you to reduce the scan range to specific values.

## Terminal

This is the classic terminal mode offering decoding of different point output formats, as well as Hex dumps. Using the View > Options > Terminal menu, you can customize the appearance by adding a new line or space to the end of a point packet.

Use the Format menu to select the point output formats. Note that the Format menu choices don't tell the controller to output data in that format, they tell the SDU how to decode the format. Each point format has a different range to the data. The SDU displays touchdown points with a "D" and liftoffs with a "U" (up). Non printing bytes are shown in hex in brackets, for instance SOH, or 01 hex, is shown as <01>. A special indicator ("B") is used for the touch pen barrel button, when in Format Tablet.

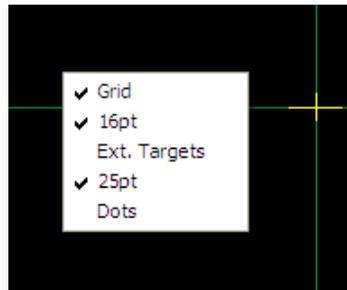
## Full Draw



The Draw program lets you test the operation of the touch sensor and pen by checking the accuracy and speed with which the system responds to your touch. To draw, simply touch the sensor and drag your finger or pen.

You can customize the appearance with the View > Options > Draw tab, or right click for a context menu. See View > Options > Draw for details of these options. Draw can be displayed full screen or partial, but not both at the same time. The SDU paints a red + on touchdown and a cyan o on liftoff. Since Draw keeps a buffer, you can alternate the view options like dots and lines, while not losing the displayed data, at least up to the limits of the buffer.

If you right click the mouse, an option menu appears that enables different views of the Draw screen.



These options include:

- Grid -- a uniform grid across the sensor
- 16 pt -- 16 evaluation targets across the screen
- Extended targets -- 16 points around the edge of the sensor
- 25 point -- hash marks where the sensor is linearized
- Dots -- does not link points in Draw format instead output raw single point data values as if liftoff had taken place

Since Draw is traditionally a full-screen keyboard-only application, there are several keyboard commands supported:

Space	Clear Screen
B	grid off (Blank)
G	Grid on
R	sends soft Reset to controller
S	toggle extended calibration points

Use the Format menu as required for displaying standard MTS formats, Cal Raw, or foreign controller formats.

Note that for Format Decimal, the default format for controllers, the factory standard mode does not indicate touch up or down. Draw will send an MT (mode status command) only once in order to turn on the up/down status header.

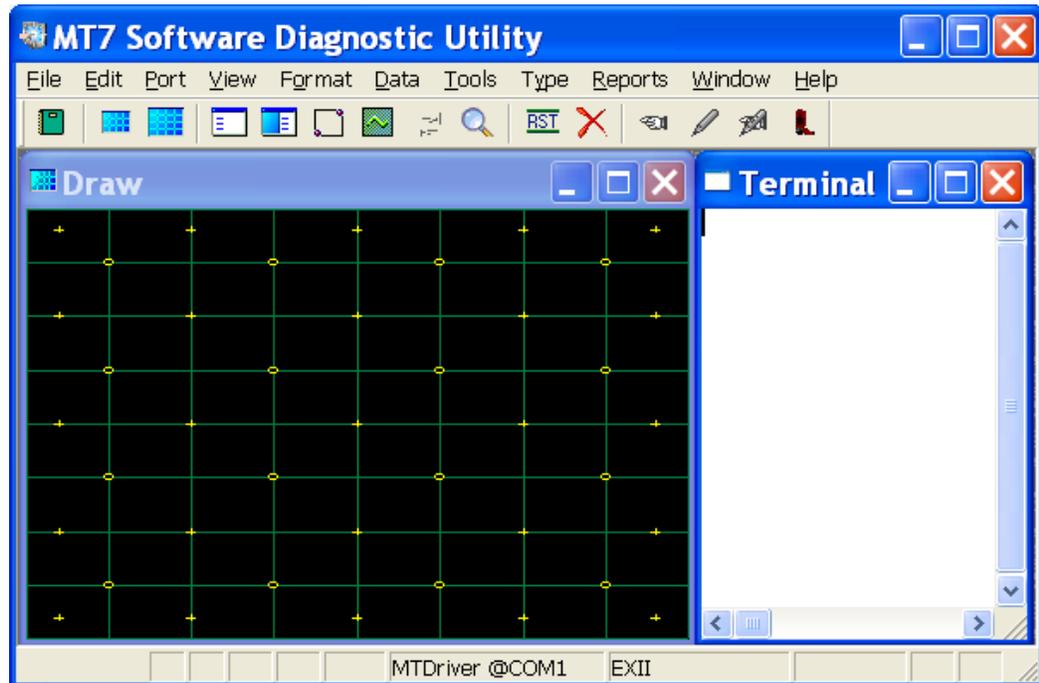
If you unplug a controller in this mode, the status mode will reset and Draw won't draw, but Terminal will show point packets starting with <01>.

## Template Draw

Draw template style. This shows a grid within a window instead of taking up a full screen.

## Split Mode

The Draw and Terminal screens are shown opened side by side (note that if you're using the traditional keyboard commands for Draw, keyboard input is directed to the active window).



## EXII Firmware Loader

This option enables you to load new firmware into the controller by clicking on “Select File”. You may then point to a new firmware hex file from 3M Touch Systems.

You can also save the existing firmware file from the controller into a new location on your computer. This is a useful option if you are testing new firmware and want to retain a copy of the existing firmware. This copies the existing firmware hex file to a location specified by you.

## Reboot EEPROM

This option enables you to reboot the controller's EEPROM.

## Restore Defaults

This option enables you to restore the controller factory default settings. Note that you must perform a calibration after restoring controller defaults.

## Soft Reset

This command initializes the hardware and the firmware, causes the controller to stop sending data, and recalculates the environmental conditions (for example, stray and offset values). The Reset command also cancels existing commands and returns the controller to normal operation.

## Hard Reset

This option will restore supplier factory configuration settings. If none exist, it will reset to 3M Touch System defaults.

## Grid Maker

This option enables you to create a grid pattern that can be printed and placed under the sensor for testing purposes when the sensor is not mounted to an LCD.

## Video Testing

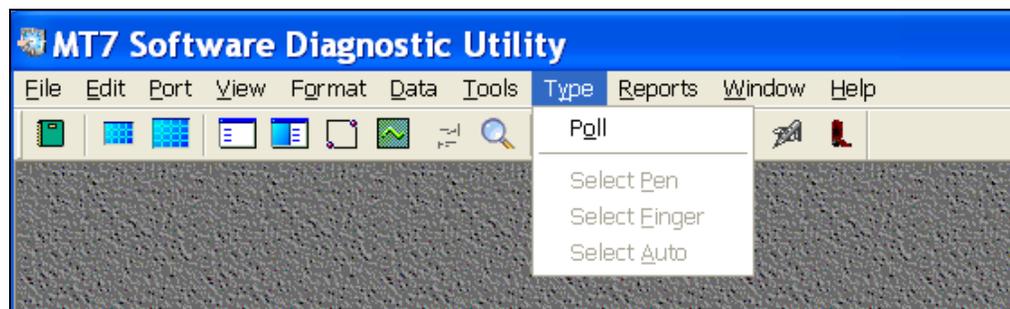
The color bars option allows you to verify the standard display colors in 1024x768 resolution.

### Color Cycle

This option shows full screen color samples in red, green, blue and white.

## CHAPTER 9

# Type



You can use the menu radio buttons to select the controller type manually. Some tools need to know the controller type in order function properly.

### Poll

Presents information for the currently attached controller and driver.

### Select Pen

Selects touch pen input.

### Select Finger

Select finger input.

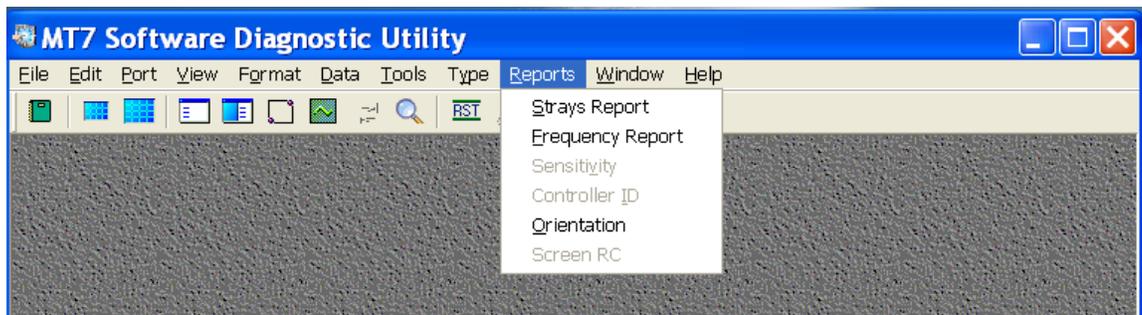
### Select Auto

Selects touch pen auto input.



## CHAPTER 10

# Reports



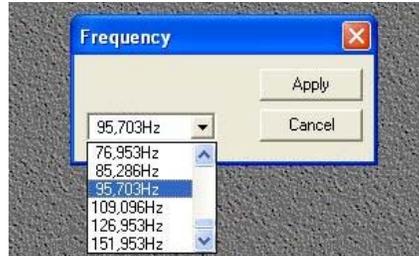
## Strays Report

For EX and CX controllers, this option measures the stray capacitance values at each channel. Use this report to provide system information to a Field Engineer or Technical Support. These values can also be used by advanced users when comparing multiple system integrations and trying to reduce stray capacitance.

A screenshot of the "Strays" report dialog box. The title bar reads "Strays". The dialog contains a table with four rows and three columns labeled Q, I, and R. Each cell in the table contains a numerical value. To the right of the table are three buttons: "Copy", "Get Stray", and "Reset".

	Q	I	R	
UL	17715803	-17326798	24780387	Copy
UR	15481655	-16830780	22868248	
LL	17072276	-18398388	25099069	Get Stray
LR	18952330	-18481878	26472072	Reset

## Frequency Report



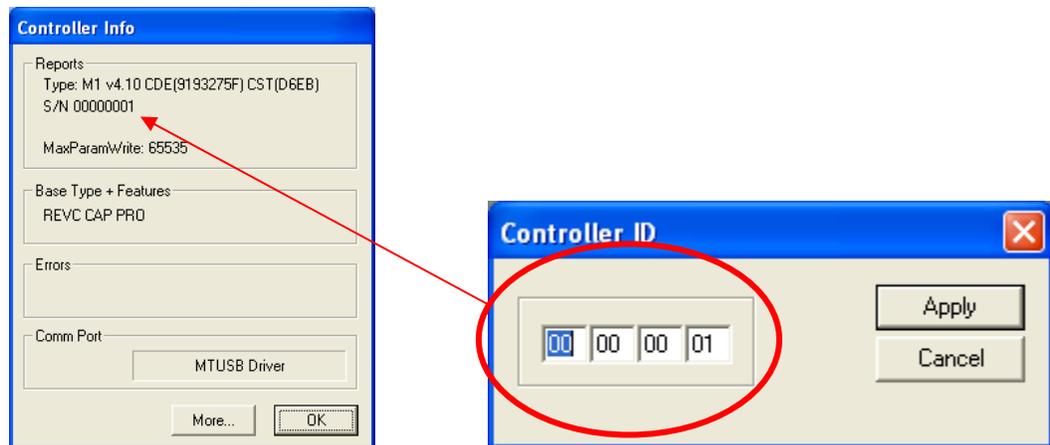
For EX controllers, the default choice for frequency setting is 95.7 kHz. If the display noise is high at this setting, you may try other frequencies to reduce the effects of noise on touch performance – 109 kHz and 76 kHz have been tested.

## Sensitivity

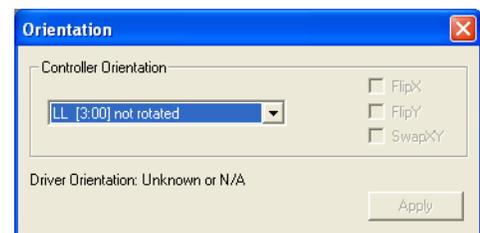
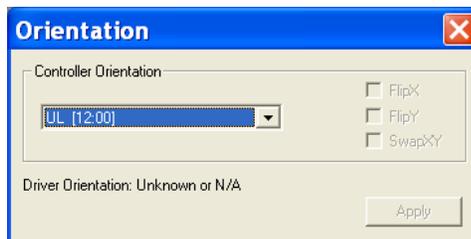
This option allows you to adjust the touch threshold of the system. By default, this option is not active since the optimal setting for each controller is established at the factory. For more information, contact Technical Support or your Field Engineer.

## Controller ID

This option enables you to check or set the Controller ID. This is required in multiple sensor system setup situations.



## Orientation



The standard screen orientation and tail exit is 3:00. A calibration can rotate the orientation for other tail settings.

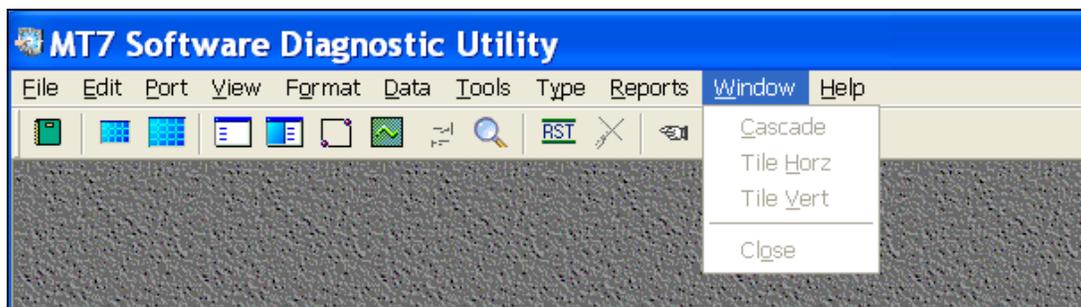
## **Screen RC**

This is a diagnostic tool used exclusively for SCxxx controllers.



## CHAPTER 11

# Window



### Cascade

Cascade open windows within the SDU

### Tile Horizontal

Tile open windows within the SDU horizontally

### Tile Vertical

Tile open windows within the SDU vertically

### Close

Close current window within the SDU

### Close all

Closes all open windows within the SDU.



## CHAPTER 12

# Help



### About MT7 SDU

This option provides version information to enable support personnel to determine whether you are using the latest version of this tool.

