

DATE: **August 23, 2023**

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RE: T-Rex/Flotilla Service Tool User Guide

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The purpose of this guide is to outline the features and functionality of our new Karcher Software Suite.

### Main screen



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### Automatic Updates

If an update is available the application will automatically detect this and prompt the user to download the newest version. User can either install the update now or defer it until later. If the user decides to defer it an “Update” button will appear at the top-right corner of the window.

### Download Documentation

The application gives the user the ability to download all relevant firmware, documentation, and drivers needed with a single button within the interface as shown below. Once a user clicks on this button a prompt comes up instructing the user to choose an appropriate place on their computer to name and save the files. Make sure to use this feature to assure that the latest firmware and documentation are being referenced.

## User Sign In

User sign in is not required for general use, however some advanced functionality is locked behind this option.

Currently the implementation allows for four levels of access based on how the user signs in to the application. The levels are Basic, OEM, Factory, and Engineering. Without any sign in the mode defaults to Basic and some functionality is hidden. The default user and password for the OEM user are 'oem' for both fields. Similarly for Factory mode the default log in for both fields is 'factory'. The only outlier mode is engineering mode which has all functionality unlocked. The default username and password for this mode is 'lab' in both fields.

When in 'Lab Mode' the user is able to change machine-critical information such as DMC configurations, as well as use the Phoenix CLI tool and CAN Spy tool. These tools should remain locked behind engineering access so that the user does not accidentally change anything on the machine that would alter intended functionality.

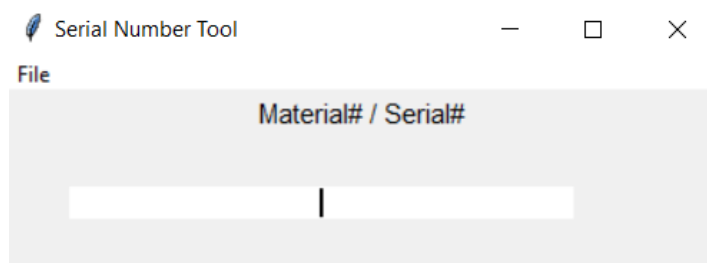
## T-Rex Specific Operations

### Connecting to/Programming the machine

Programming the T-Rex machine works the same as with previous software. Please refer to the Updating Firmware section of the "Field Service Programming Instructions" for the T-Rex version (Deluxe or Kira) that is being used.

### Serial Number Tool

When clicking the 'Serial Number Tool' button on the main screen a new window will appear that lets the user program a Serial Number onto the machine. Serial number should be entered as a string of numbers with no spaces or dashes such as '10121010000001'.



### CAN Interpret Tool

When clicking the 'CAN Interpret Tool' button on the main screen a new window will appear that will display any errors or lockouts that are currently active on the T-Rex Machine. Example screen

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shown below. When an error is active on the machine the relevant error will flash yellow until it has been cleared.

CAN Interpret Tool							
UIDs							
00-NoUniqueIDError	32-BrushMotorOpenCircuit	01-BrushMotorOverHeat	02-BrushMotorOverCurrent	03-BrushMotorShort	04-BrushMotorLowFET	05-BrushMotorHighFET	06-BrushInternalMCErr
07-BrushUnknownMCErr	08-BrushExtTempSenseErr	33-BrushHighVoltProtectErr	09-SideBroomOverHeat	0A-SideBroomOverCurrent	0B-SideBroomOpenCircuit	0C-SideBroomShort	0D-SideBroomLowFET
0E-SideBroomHighFET	0F-SideBroomInternalMCErr	10-SideBroomUnknownMCErr	11-SideBroomExtTempSenseErr	12-BrakeManuallyReleased	13-DriveMotorShort	14-DriveMotorLowFET	15-DriveMotorHighFET
16-DriveMotorInternalMCErr	17-DriveMotorUnknownMCErr	18-BrakeDetectErr	19-DriveMotorExtTempSenseErr	1A-DriveMotorOpenCircuit	1B-DriveMotorOverHeat	1C-VacuumMotorShort	1D-VacuumMotorLowFET
23-PressureSwitchTrip	24-ActOverCurrent	25-DriveMotorDMCOverTemp	26-BrushMotorDMCOverTemp	27-SideBroomDMCOverTemp	28-VacuumDMCOverTemp	29-TractionDMCFETTempErr	2A-BrushDMCFETTempErr
2B-SideBroomDMCFETTempErr	2C-VacuumDMCFETTempErr	2D-SerialNumMissing	2E-LithiumCANCCommErr	2F-TooManyErrors	30-ContactorWeldErr	31-ContactorOpenErr	32-BattDeadNoFunction
3D-BothDMCConnectionFailure	3E-GeneralBMSAlarm	3F-BatteryHighVoltage	40-BatteryLowVoltage	39-PreChargeError	3A-DMC1ConnectionFailure	3B-DMC2ConnectionFailure	3C-HMICANTimeout
45-BatteryHighDischargeCurrent	46-BatteryHighChargeCurrent	47-BatteryMissing	48-BatteryInternalBMS	41-BatteryHighTempDischarge	42-BatteryLowTempDischarge	43-BatteryHighTempCharge	44-BatteryLowTempCharge
4E-ChargerF002	4F-ChargerF003	50-ChargerF004	51-ChargerF005	4A-ChargerF002	4B-ChargerF003	4C-ChargerF004	4D-ChargerF005
5E-ChargerE001	5F-ChargerE002	60-ChargerE003	61-ChargerE004	5A-ChargerE002	5B-ChargerE003	5C-ChargerE004	5D-ChargerE005
A0-ChargerE009	A1-ChargerE010	A2-ChargerE011	A3-ChargerE012	6A-ChargerE002	6B-ChargerE003	6C-ChargerE004	6D-ChargerE005
A8-ChargerE017	A9-ChargerE018	AA-ChargerE019	AB-ChargerE020	A4-ChargerE021	A5-ChargerE022	A6-ChargerE023	A7-ChargerE024
AB-ChargerE025	AC-ChargerE026	AD-ChargerE027	AE-ChargerE028	AC-ChargerE029	AD-ChargerE030	AE-ChargerE031	AF-ChargerE032
BB-ChargerE033	BC-ChargerE034	BE-ChargerE035	BF-ChargerE036	BC-ChargerE037	BD-ChargerE038	BE-ChargerE039	BF-ChargerE040
BB-ChargerE041	BD-ChargerE042	BE-ChargerE043	BF-ChargerE044	BC-ChargerE045	BD-ChargerE046	BE-ChargerE047	BF-ChargerE048
CB-ChargerE050	CC-ChargerE051	CE-ChargerE052	CF-ChargerE053	CD-ChargerE054	CE-ChargerE055	CF-ChargerE056	CG-ChargerE057
CB-ChargerE050	CC-ChargerE051	CE-ChargerE052	CF-ChargerE053	CD-ChargerE054	CE-ChargerE055	CF-ChargerE056	CG-ChargerE057
DD-ChargerE068	DE-ChargerE069	DF-ChargerE070	DF-ChargerE071	CC-ChargerE064	CD-ChargerE065	CE-ChargerE066	CF-ChargerE067
86-SideBroomANINLimit	87-BrushMotorPWMLimit	88-BrushMotorLimited	89-BrushMotorTempHigh	95-ThrottleNeutral	83-SideBroomMotorPWMLimit	84-SideBroomMotorLimited	85-SideBroomMotorTempHigh
8E-DriveMotorTempHigh	8F-DriveMotorANINLimit	90-VacuumMotorPWMLimit	91-VacuumMotorLimited	8A-BrushMotorANINLimit	8B-DriveMotorPWMLimit	8C-DriveMotorReversalLimit	8D-DriveMotorForwardLimit
Lockouts							
E-STOP	Key Switch	Door Interlock	Bag Presence	Brake Release	Reserved	Operator preence invalid state	Fault State
AC power to charger	Low Battery	Dead Battery	Stalled Actuator	Bag Full	Brake Disconnected	Error State	Missing Battery CAN Messages
Missing Serial Number	Contactor Welded	Contactor Coil	Contactor Pre-Charge	Contactor Open	Maintenance Required	CAN Timeout	CAN1 Timeout
Bitmask Error Field							
Brush Overload	Brush Stall	Brush Call for Service	Side Brush Overload	Side Brush Stall	Side Brush Call for Service	Drive Brake	Drive Over Call for Service
Drive Stall	Drive Overload	Vacuum Call for Service	Actuator Stall	Vacuum Stall	Vacuum Unknown	PCB Temperature	Unknown
Transportable error/Missing Bag	Battery Low	Battery Dead	Throttle Neutral Warning	Low Battery Warning	Serial Number	Call for Service	Error Corrected
Brush warning	Side Brush Warning	Change Path	Service Soon	Battery Charge			

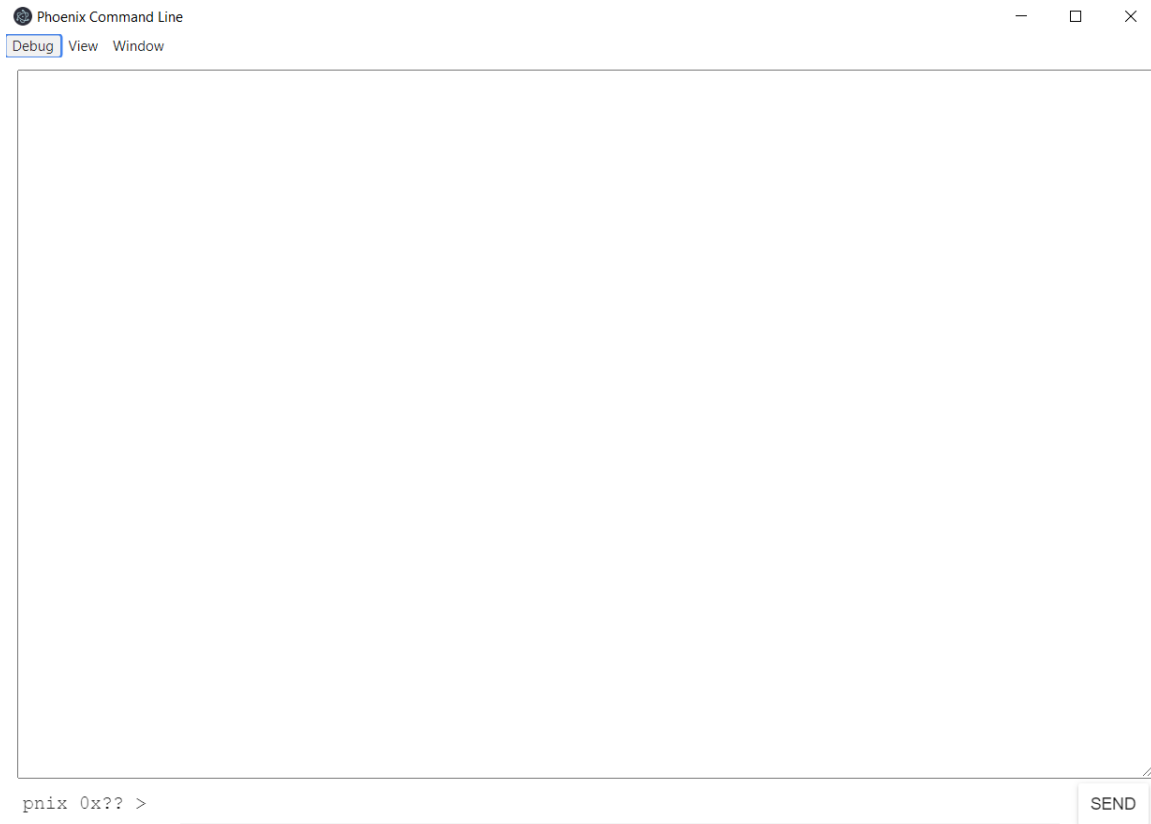
### CAN Spy

This functionality is currently hidden behind 'Engineering' access. Access is granted by logging in with 'lab' in both username and password fields. When clicking on the 'CAN Spy' button a new window is launched. This window allows users to spy on the CANbus messages. This will mainly be used for diagnostic purposes for Engineering.

### CLI Window

This functionality is currently hidden behind 'Engineering' access. Access is granted by logging in with 'lab' in both username and password fields. When clicking on this icon the Phoenix Command Line Interface is launched. This is primarily to be used by Engineering for diagnostic purposes.

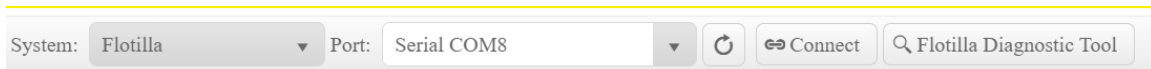
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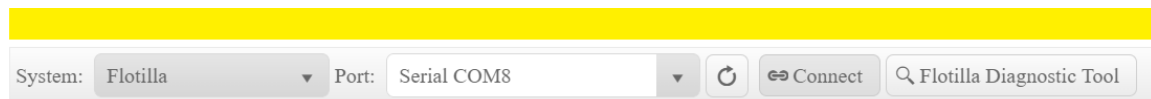
### **Flotilla Specific Operation**

#### **Connecting to/Programming the machine**

Make sure that all other USB devices are disconnected from the computer to ensure that we do not connect to something that is not a Flotilla machine. Most computers will have a few options under the 'Port' drop-down menu. Check which ports are listed without any machine attached to determine which ones are NOT the Flotilla machine. Plug in the Flotilla machine USB and power cord and observe that a new Port is added to the drop-down list. This is the Flotilla machine port and we should select that new port in the drop-down list.



Click the 'Connect' button to open communication with the Machine for programming.



Click the 'Update Software' button to bring up the programming interface.

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Update Software

Software Update

×

File:

C:\Users\us60k20188\Documents\Flotilla Firmware\manifest.json

✓

 Controller Application

✓

 HMI Application

✓

 HMI Flash #1

Start

Cancel

Click the folder icon to open the file explorer, and navigate to and select the 'manifest.json' file that has been provided. Make sure that all options are selected as shown above. Next, hit the 'Start' button to begin programming the Flotilla device. Wait until all three sections are complete before moving on as any interruption will cause the device to fail programming and we will have to try again.

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Software Update

×

File:

C:\Users\us60k20188\Documents\Flotilla Firmware\manifest.json

☒ Controller Application

Complete

☒ HMI Application

Complete

☒ HMI Flash #1

Complete

Start

Close

### Flotilla Diagnostic Tool

The Flotilla Diagnostic tool has been provided to help diagnose any possible failures or issues the machine is having. Launch the tool by hitting the 'Flotilla Diagnostics Tool' button as shown below. NOTE: If we do not hit 'Disconnect' on the main application window before opening and clicking 'Connect' on the Flotilla Diagnostic Tool we will encounter an error telling us to disconnect from all other applications. This is because the machine cannot connect to more than one tool at a time.

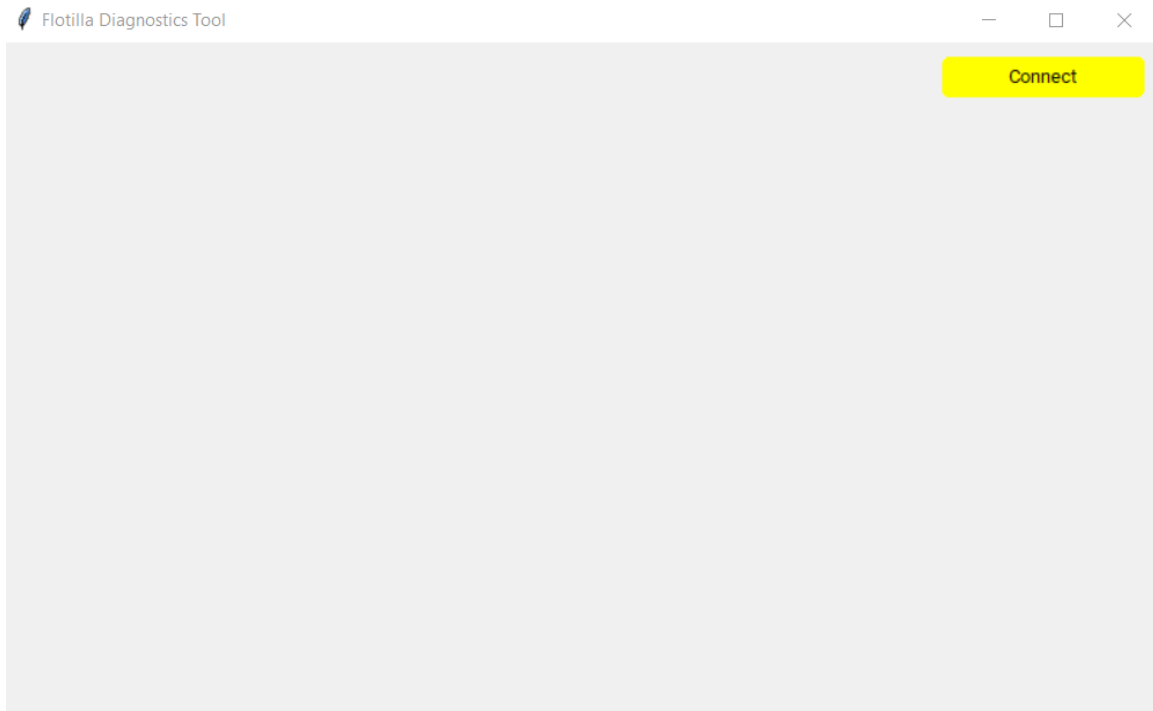
System: Flotilla Port: Serial COM8

↺ Connect

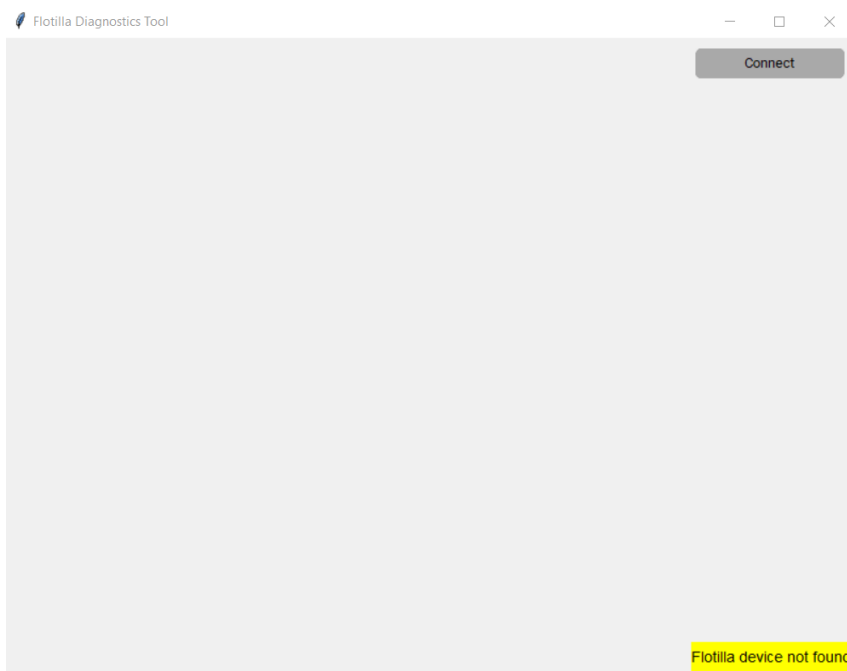
Flotilla Diagnostic Tool

Once a Flotilla machine has been plugged into the USB port on the computer we can click the 'Connect' button on the application to open the main screen.

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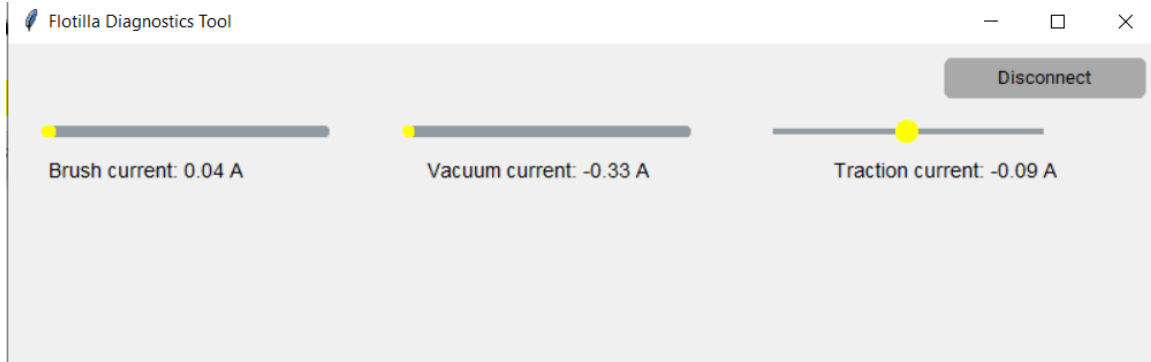


If no machine is found an error message will show on the bottom-right of the screen indicating that either the machine is not plugged in, or there is an issue with the board and it may need to be replaced or reprogrammed. This error message is shown below.



Upon successful connection to a Flotilla machine, we are greeted with another screen that will show the current draw readouts of the three motors in Amps as shown below. This is useful to determine if the motors are getting the appropriate power. The traction motor has both a forward and reverse direction, so the bar is centered to allow for representation of either direction. Left is reverse and right is forward.

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If an error is active on the machine, it will appear highlighted in yellow in the middle of the screen. If no error is present on the screen, it can be assumed that the machine is reporting no errors. An example of an error present is shown below.

