

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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## 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.

## MEMORANDUM

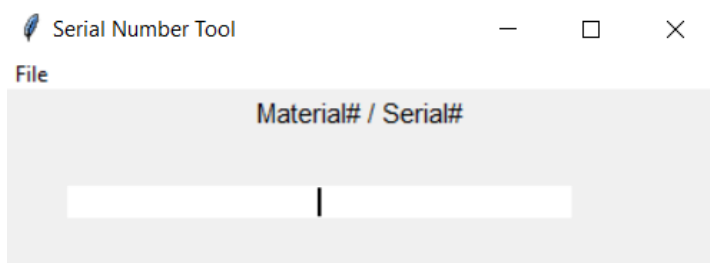
### T-Rex Specific Operations

#### 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’.



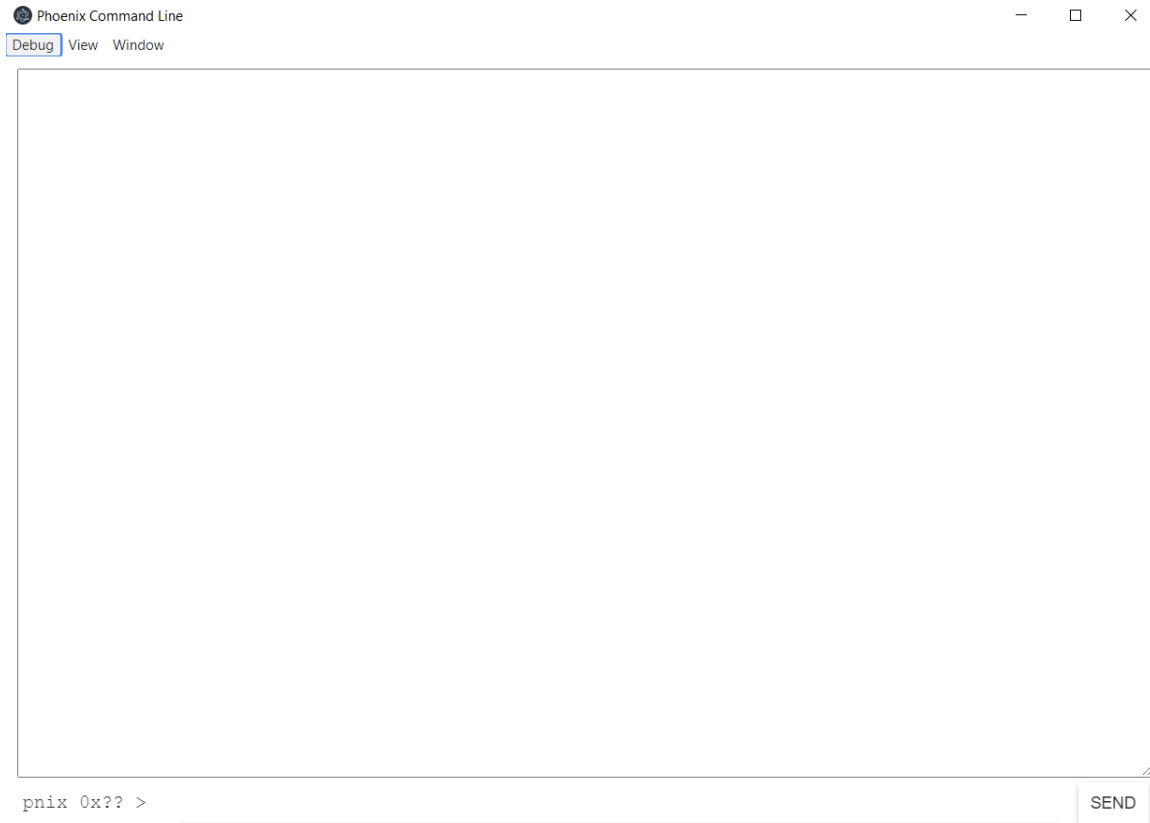
#### CAN Interpret Tool

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.

CAN Interpret Tool							
UIDs							
00-NoUniqueError	32-BrushMotorOpenCircuit	01-BrushMotorOverHeat	02-BrushMotorOverCurrent	03-BrushMotorShort	04-BrushMotorLowFET	05-BrushMotorHighFET	06-BrushMotorInternalMCErr
07-BrushMotorUnknownMCErr	08-BrushMotorExtTempSenseErr	33-BrushMotorHighVolProtectErr	09-SideBroomMotorOverHeat	0A-SideBroomMotorOverCurrent	0B-SideBroomMotorOpenCircuit	0C-SideBroomMotorShort	0D-SideBroomMotorLowFET
0E-SideBroomMotorHighFET	0F-SideBroomMotorInternalMCErr	10-SideBroomMotorUnknownMCErr	1-SideBroomMotorExtTempSenseErr	04-SideBroomMotorHighVolProtectErr	12-BrakeManuallyReleased	13-DriveMotorShort	14-DriveMotorLowFET
15-DriveMotorHighFET	16-DriveMotorInternalMCErr	17-DriveMotorUnknownMCErr	18-BrakeDetectErr	19-DriveMotorExtTempSenseErr	35-DriveMotorHighVolProtectErr	1A-DriveMotorOpenCircuit	1B-DriveMotorOverHeat
1C-VacuumMotorShort	1D-VacuumMotorLowFET	1E-VacuumMotorHighFET	1F-VacuumMotorInternalMCErr	20-VacuumMotorUnknownMCErr	21-VacuumMotorOverCurrentErr	36-VacuumMotorHighVolProtectErr	22-VacuumMotorOpenCircuit
23-PressureSwitchTrip	24-ActOverCurrent	25-DriveMotorDMCOverTemp	26-BrushMotorDMCOverTemp	27-SideBroomMotorDMCOverTemp	28-VacuumMotorDMCOverTemp	29-TractionMotorDMCFETTempErr	2A-BrushMotorDMCFETTempErr
1-SideBroomMotorDMCFETTempErr	2C-VacuumMotorDMCFETTempErr	2D-SerialNumMissing	2E-LithiumCANCommErr	2F-TooManyErrors	30-ContactorWeldErr	31-ContactorOpenErr	80-BattDeadNoFunction
81-BagMissing	82-BattDeadTransportOnly	37-CANTimeout	38-OperatorPresence	39-PreChargeError	3A-DMC1connectionFailure	3B-DMC2connectionFailure	3C-HMICANTimeout
3D-BothDMCconnectionFailure	3E-GeneralBMSAlarm	3F-BatteryHighVoltage	40-BatteryLowVoltage	41-BatteryHighTempDischarge	42-BatteryLowTempDischarge	43-BatteryHighTempCharge	44-BatteryLowTempCharge
45-BatteryHighDischargeCurrent	46-BatteryHighChargeCurrent	47-BatteryMissing	48-BatteryInternalBMS	4A-ChargerE002	4B-ChargerE003	4C-ChargerE004	4D-ChargerE001
4E-ChargerE002	4F-ChargerE003	50-ChargerE004	51-ChargerE005	52-ChargerE006	53-ChargerE007	54-ChargerE008	55-ChargerE009
56-ChargerE010	57-ChargerE011	58-ChargerE012	59-ChargerE013	60-ChargerE014	61-ChargerE015	62-ChargerE016	63-ChargerE017
58-ChargerE009	5F-ChargerE010	60-ChargerE011	61-ChargerE012	62-ChargerE013	63-ChargerE014	64-ChargerE015	65-ChargerE016
A0-ChargerE017	A1-ChargerE018	A2-ChargerE019	A3-ChargerE020	A4-ChargerE021	A5-ChargerE022	A6-ChargerE023	A7-ChargerE024
A8-ChargerE025	A9-ChargerE026	AA-ChargerE027	AB-ChargerE028	AC-ChargerE029	AD-ChargerE030	AE-ChargerE031	AF-ChargerE032
B0-ChargerE033	B1-ChargerE034	B2-ChargerE035	B3-ChargerE036	B4-ChargerE037	B5-ChargerE038	B6-ChargerE039	B7-ChargerE040
B8-ChargerE041	B9-ChargerE042	BA-ChargerE043	BB-ChargerE044	BC-ChargerE045	BD-ChargerE046	BE-ChargerE048	BF-ChargerE049
C0-ChargerE050	C1-ChargerE051	C2-ChargerE052	C3-ChargerE053	C4-ChargerE054	C5-ChargerE055	CE-ChargerE056	CF-ChargerE059
C8-ChargerE060	C9-ChargerE061	CA-ChargerE062	CB-ChargerE063	CC-ChargerE064	CD-ChargerE065	CE-ChargerE066	CF-ChargerE067
D0-ChargerE068	D1-ChargerE080	D2-ChargerE084	D3-ChargerE085	95-ThrottleNeutral	83-SideBroomMotorPWLmlt	84-SideBroomMotorLimited	85-SideBroomMotorTempHigh
86-SideBroomANILimit	87-SideBroomPWLmlt	88-BrushMotorLimited	89-BrushMotorTempHigh	8A-BrushMotorANILimit	8B-DriveMotorPWLmlt	8C-DriveMotorReverseLimit	8D-DriveMotorForwardLimit
8E-DriveMotorTempHigh	8F-DriveMotorANILimit	94-DriveMotorPWLmlt	90-VacuumMotorPWLmlt	91-VacuumMotorLimited	92-BattDeadAllfunction	93-BattCharging	
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
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
Missing Bag	Battery Low	Battery Dead	Throttle Neutral Warning	Low Battery Warning	Serial Number	Call for Service	Error Corrected
Traction Speed LSB	Traction Speed MMSB	Traction Speed MSB	Brush warning	Side Brush Warning	Change Path	Service Soon	Battery Charge

## MEMORANDUM

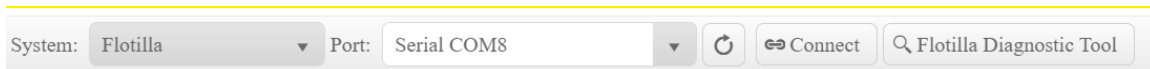
This functionality is currently hidden behind 'Engineering' access. Access is granted by logging in with 'lab' in both username and password fields. When clicking on this icon the Phoenix Command Line Interface is launched. This is primarily to be used by Engineering for diagnostic purposes.



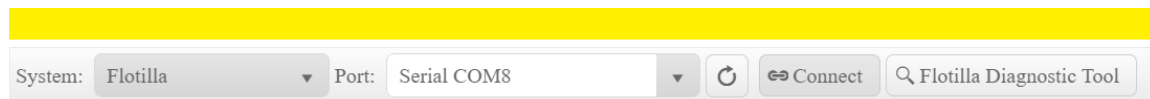
### Flotilla Specific Operation

#### **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.

## MEMORANDUM

Update Software

Software Update

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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.

## MEMORANDUM

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.

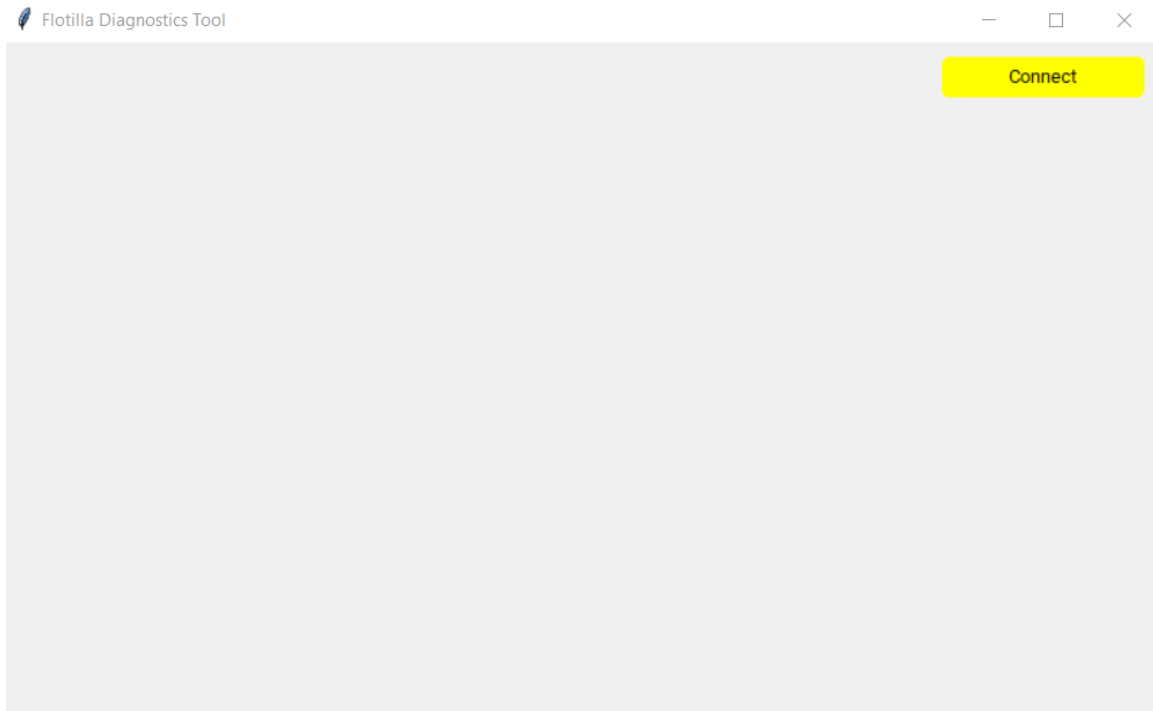
System: Flotilla Port: Serial COM8

↺ Connect

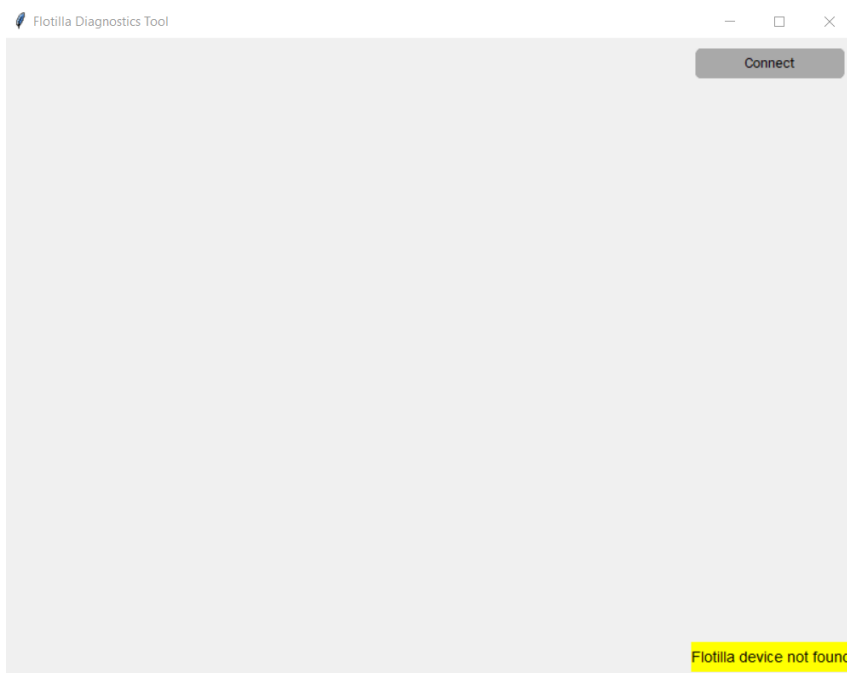
🔍 Flotilla Diagnostic Tool

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.

## MEMORANDUM

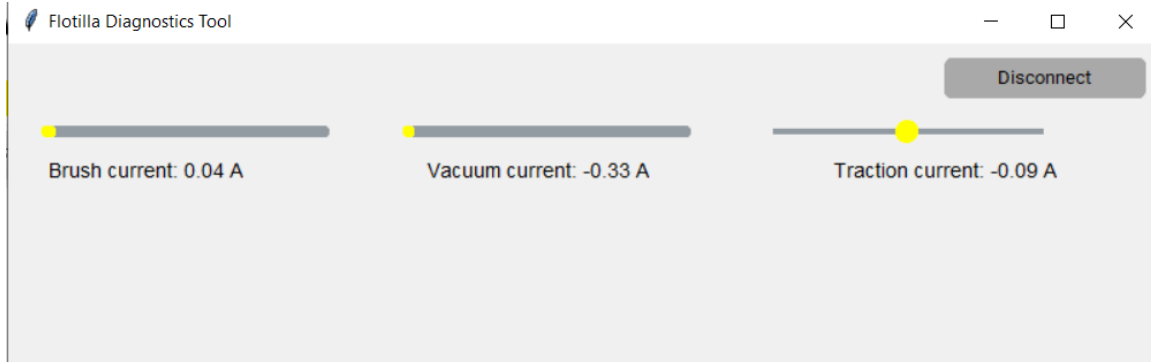


If no machine is found an error message will show on the bottom-right of the screen indicating that either the machine is not plugged in, or there is an issue with the board and it may need to be replaced or reprogrammed. This error message is shown below.

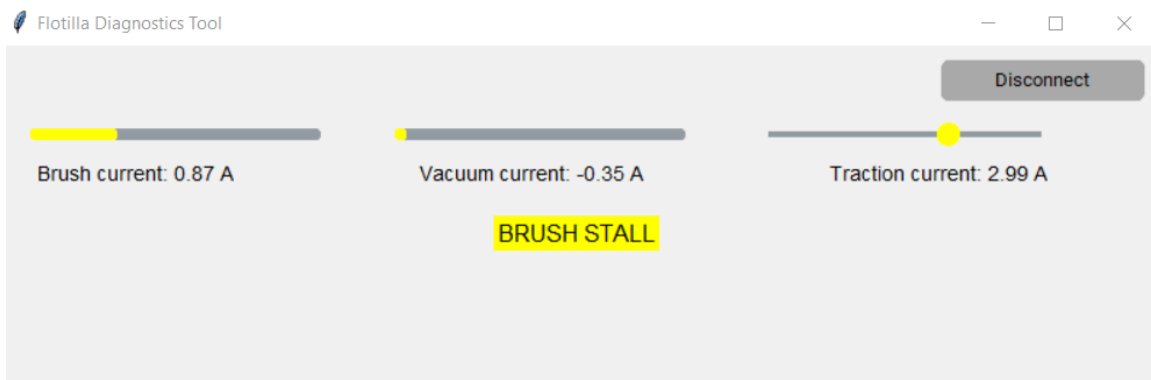


Upon successful connection to a Flotilla machine, we are greeted with another screen that will show the current draw readouts of the three motors in Amps as shown below. This is useful to determine if the motors are getting the appropriate power. The traction motor has both a forward and reverse direction,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

## MEMORANDUM



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.



### Questions

What tools and functionality do we want each level of user to have?

Are there any other features that need to be added?