ScanTool

User Manual

Version 4.4 (Document update in progress)

Contents

[**1. Introduction 4**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734565)

[1.1 Overview 4](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734566)

[**2. CAN Bus Tools (CANBUS) 5**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734567)

[2.1 Capture 5](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734568)

[2.2 Send 5](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734569)

[2.3 Capture Files 5](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734570)

[2.4 Baut Rate 6](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734571)

[2.5 Filter and Mask 6](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734571)

[2.6 Auto Baud 6](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734571)

[**3. Vehicle Tools (VEHTOOL) 7**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734574)

[3.1 PID Scan 7](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

[3.2 PID Stream 7](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

[3.3 PID Gauges 7](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

[3.4 VIN 8](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

[3.5 Scan DTC 8](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

[3.6 Clear DTC 8](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

[**4. UTV Offroad Tools (UTVTOOL) 9**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

[4.1 Scan RZR DTC 9](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

[4.2 Clear RZR DTC 9](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

[**5. Testing (TESTING) 10**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

[5.1 OBD Sim 10](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

[5.2 MSG Spam 10](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

[5.3 Touch Deck 10](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

[**6. Tool Settings (SETTING) 11**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

[6.1 Memory 11](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

[6.2 About 11](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

[6.3 WiFi MAC 11](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

[6.3 Reset 11](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

[6.3 WiFi Reset 12](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

[6.3 Clock 12](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

[6.3 Dongle 12](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

[**7. Software Development 13**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

[7.1 IDE 13](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

[7.2 Adding Functions 14](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

[7.3 Hardware API 15](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

[**8. Hardware 16**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

[8.1 Components 16](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

[8.2 Schematic 16](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

Introduction

The ScanTool is a multi-purpose device designed to assist with data collection and other commonly used CAN Bus tools. All functions are organized into five pages. Each chapter will document the available page functions.



Figure - ScanTool

**2. CAN Bus Tools (CANBUS)**

Read out CAN Bus traffic to the LCD or serial out

Calendar

Description automatically generated

Figure – CANBUS Page.

2.1 Capture

LCD: Scrolls CAN Bus traffic across the screen from CAN0. Useful for detecting traffic and reading out data from non-vehicle traffic. Writing to the LCD is resource heavy and has a maximum write speed of approximately 1 message every 22ms. The screen can be paused by pressing and holding over the CAN Bus messages. The screen can be cleared by swiping up or down.

Serial: Read out CAN Bus traffic on serial out. Can be used with multiple terminal Apps. Arduino IDE is recommended for use. Fast enough to be used on a vehicle’s CAN Bus without dropping messages.

2.2 Send

Create, save, and edit custom CAN Bus message. Can be sent out once or on interval.

2.3 Capture Files

View, replay, and delete SD card recorded CAN Bus captures.

2.4 CAN Bus Baud Rate

Set CAN Bus baud rate for both ports.

2.5 Filter and Mask

Setup a custom filter and mask for both ports.

2.6 Auto Baud

Attempt to automatically find the connected baud rate.

[**3. Vehicle Tools (VEHTOOL)**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734574)

General vehicle diagnostic tools

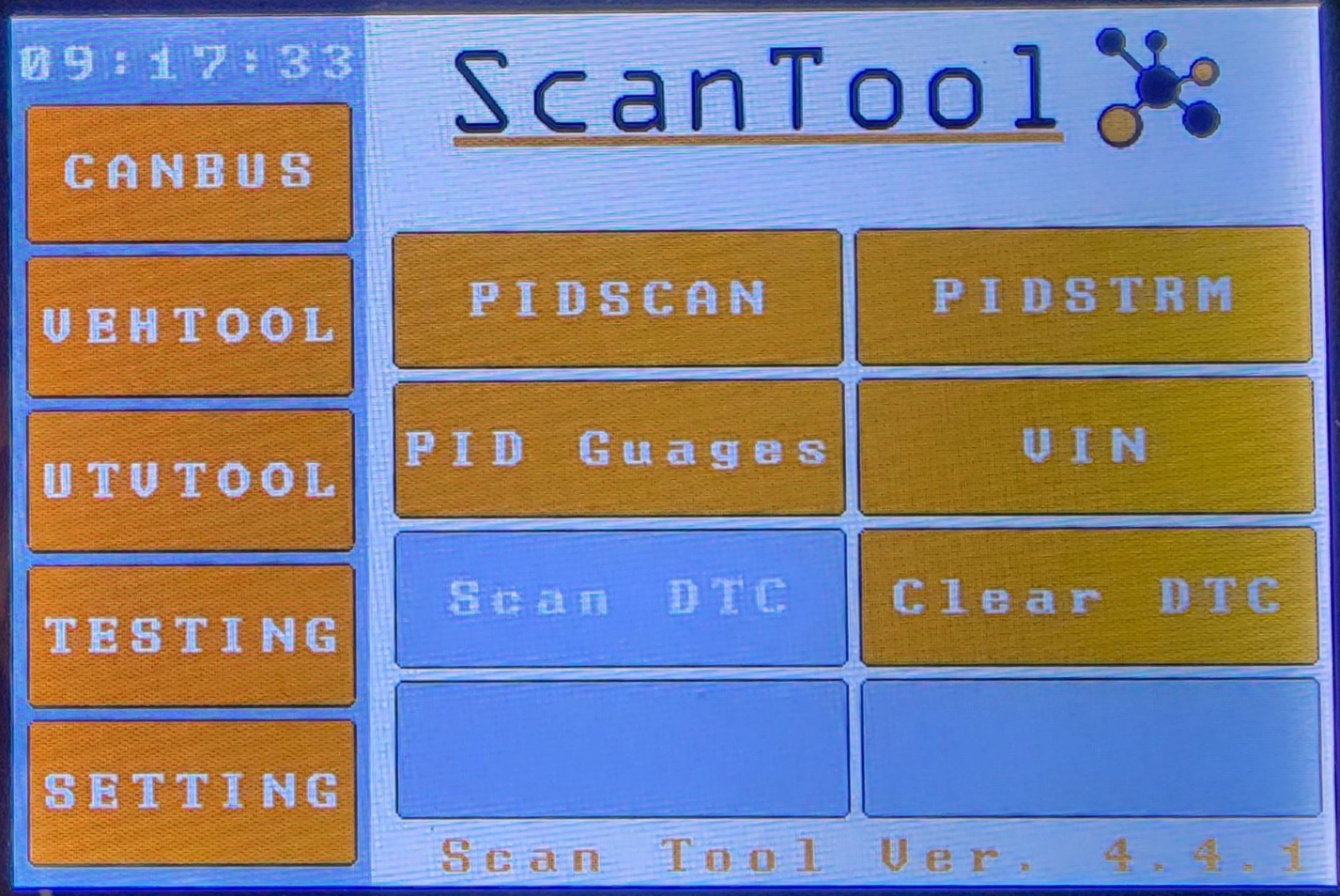


Figure - Vehicle Tool Page

[3.1 PID Scan](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

Scan for all available SAE vehicle PIDs. Results are saved to the micro SD card in a folder with the last 8 characters of the vehicle’s VIN. In the folder, file LOG.txt will be created and contain the full vehicle VIN and a CAN Bus recording of received PID messages. A list of vehicle PIDs will be saved in a PID.txt file.

[3.2 PID Stream](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

This function requires the user to first run PID Scan or an alert will popup informing the user it has not yet been run. PID stream provides the user with a scrollable list of available SAE vehicle PIDS. The user can select a PID and press the Stream PID button to obtain 5 samples of that PID saved to the LOG.txt file.

[3.3 PID Gauges](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

This was an experimental function that contains 4 gauges updated in real time when connected to a vehicle or ECU emulator.

[3.4 VIN](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

Displays the current connected vehicle’s VIN on the LCD screen.

[3.5 Scan DTC](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

This function is currently in development and will be included in a future release.

[3.6 Clear DTC](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734575)

Clear any DTCs stored in the vehicle’s ECU. Universal support for all vehicles.

[**4. UTV Offroad Tools (UTVTOOL)**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

Tools for offroad sport utility vehicles

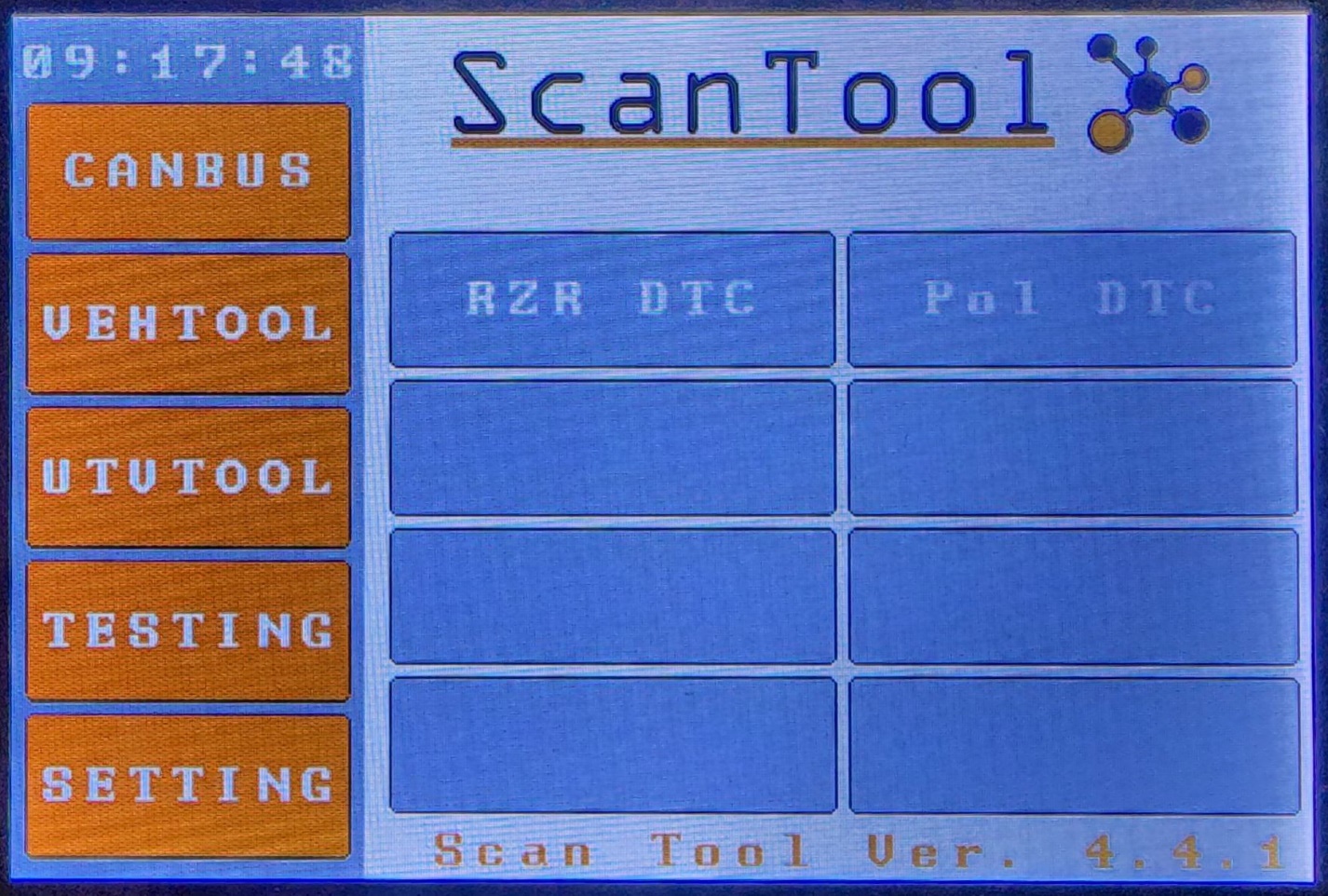


Figure - UTV Tools

[4.1 Scan DTC](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

Under development.

[4.2 Clear DTC](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

Under development.

[**5. Testing**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

The extra functions page is the ideal spot for quick scripted test functions.

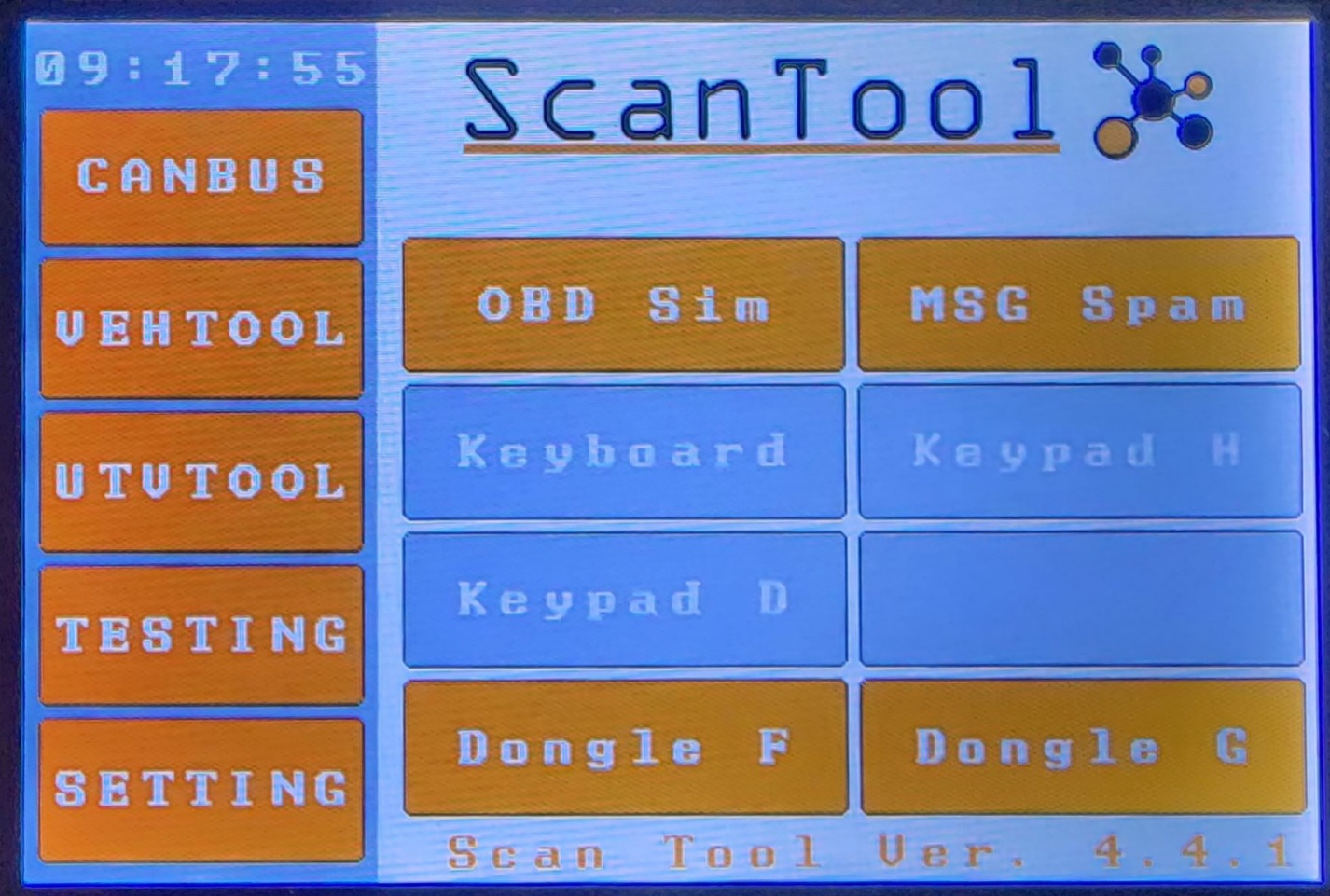


Figure - Extra Functions

[5.1 OBD](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578) Sim

CAN OBD by Cory J. Fowler.

[5.2 Message](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579) Spam

Network testing utility.

[**6. Tool Settings (SETTING)**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

Change global settings for the scan tool

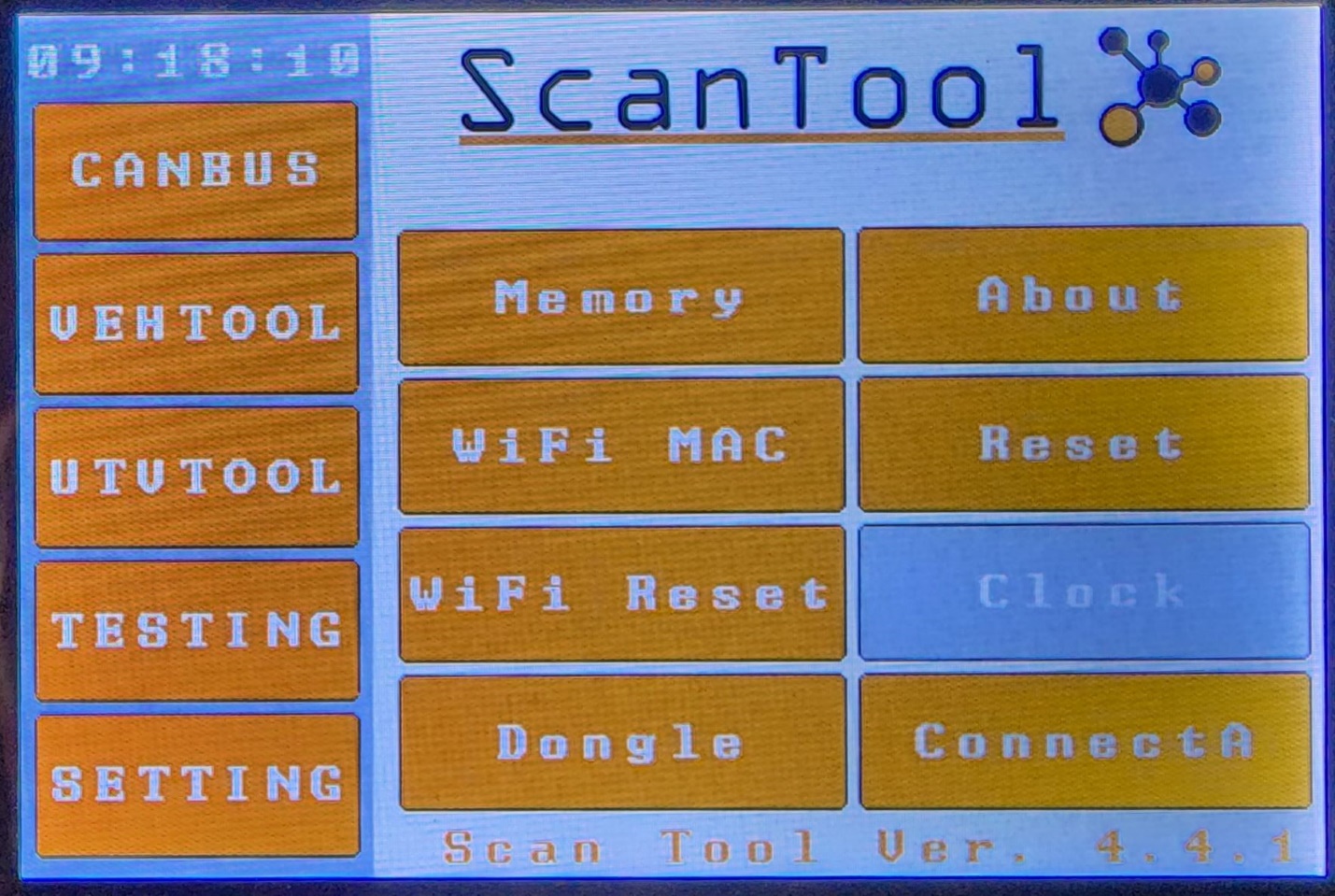


Figure - Tool Settings

[6.1 Memory](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

Display current used and available memory.

[6.2 About](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

Device information.

[6.3 WiFi](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580) MAC

Display MAC address for WiFi module and connecting dongle MAC.

[6.4 Reset](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

ScanTool MCU reset

[6.5 WiFi](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580) Reset

Send command to reset ESP8266.

[6.6 Clock](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

Set clock time and DST.

[6.7 Dongle](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580)

Connect dongle for remote WiFi Can Bus streaming.

[**7. Software**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577) **Development**

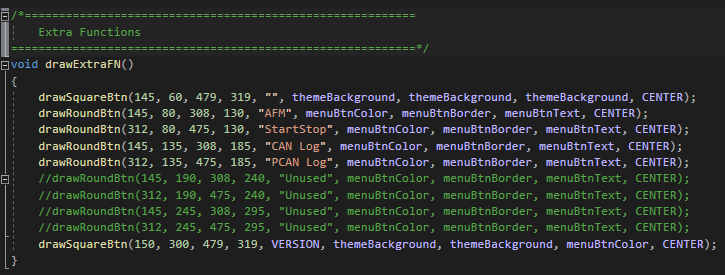
[7.1 IDE](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

The program was developed using Visual Studios 2018 with vMicro extension to interface the Duo directly from Visual Studios. Other software that can be used: Visual Studio Code with Platform IO extension or the Arduino IDE (Not recommended).

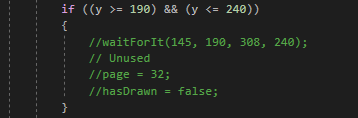
[7.2 Adding Functions](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734579)

Each page is preprogrammed to allow 8 functions and has an associated draw page and page buttons. Activating requires uncommenting code. Adding function to EXTRAFN page example:

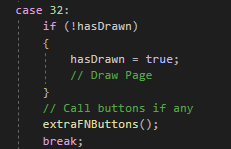
* Uncomment the button in the draw function:



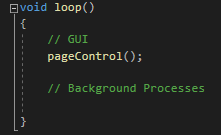
* Next uncomment the button in extraFNButtons(). Buttons of the left side of the LCD have even page numbers and buttons on the ride odd. Page numbers are preassigned, do not change.



* In this case page 32 is used. Find 32 in pageControl().



* Add any content you want drawn for your function in the if statement, it will only run once. The menu sidebar is only drawn one time at startup. Avoid drawing over it unless you plan to call the side menu again. Any function buttons you want continuously called add below the if statement. All functions should be non-blocking to allow background functions to run.
* Background processes can be called outside the GUI in the main loop.



[7.3 Hardware API](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734580) (Partial list)

Send CAN Bus messages:

can1. sendFrame(uint32\_t id, byte\* frame)

Receive CAN Bus messages:

can1. getFrame(buff& msg, uint32\_t& id, uint8\_t channel)

Set filter and mask:

can1. setFilterMask0(uint32\_t filter, uint32\_t mask)

can1. setFilterMask1(uint32\_t filter, uint32\_t mask)

Set baud rate:

can1. setBaud0(uint32\_t Baud)

can1. setBaud1(uint32\_t Baud)

Read in file:

sdCard. readFile(char\* filename, uint8\_t\* arrayIn)

Write to file:

sdCard. writeFile(char\* filename, String incoming)

sdCard. writeFile(char\* filename, int incoming, int base)

Delete file:

sdCard. deleteFile(char\* filename)

[**8. Hardware**](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734577)

[7.1 Components](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

* Arduino Due
* ESP8266 with breakout board
* CAN Bus transceivers Modules x2
* BuyDisplay 2.5: TFT LCP with shield ([Arduino 3.5"TFT LCD Touch Shield Serial SPI Example for Mega/Due (buydisplay.com)](https://www.buydisplay.com/arduino-3-5-tft-lcd-touch-shield-serial-spi-example-for-mega-due))
* Micro SD Card Module
* Barrel Jack for extern power
* DB9 and DB15 connectors
* Enclosure ([SL-68P Low Profile Enclosures for PCBs (polycase.com)](https://www.polycase.com/sl-68p)) (Used Dremel / drill / box cutter for cut outs)
* USB <= 1ft data cable.

[7.2 Schematic](file:///C:\Users\bvanpelt\Downloads\231170_UserManual.docx#_Toc4734578)

Diagram, schematic

Description automatically generated

Figure – Hardware Scematic