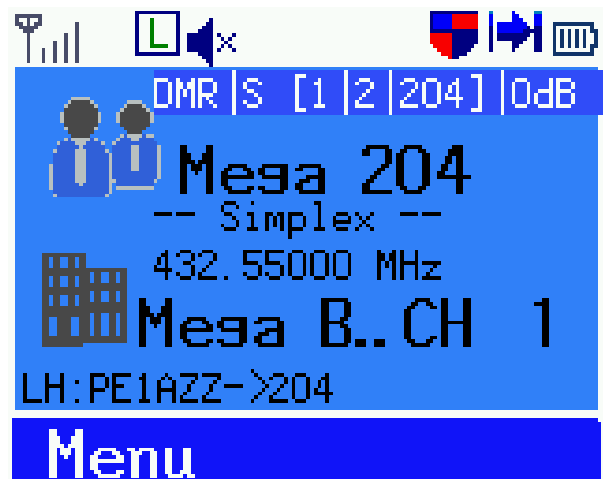


KD4Z Toolkit v4.0 Tutorial

For Custom firmware TYT / Retevis



FACEBOOK GROUP TYT KD4Z TOOLKIT:
[HTTPS://WWW.FACEBOOK.COM/GROUPS/KD4ZTOOLKIT/](https://www.facebook.com/groups/kd4ztoolkit/)

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For Custom firmware TYT / Retevis

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Overview

This tutorial will lead you through the installation, the configuration and how-to-use the KD4Z Toolkit v4.0 for Custom firmware for TYT and Retevis HAM-radio's, further named as *The Toolkit*.

It is more than a flashtool only. The Toolkit is, as the name referred to, a complete bundle of tools to maintain your radio, including updating custom firmware and the worldwide user database.

*This tutorial described the complete setup for the Virtual Box (Oracle) for Windows and OS X (Apple).
Versions / updates for other VM platforms and the native Linux version will be released soon.*

The KD4Z Toolkit is not the actual MD380Tools, it is, as the name said, a toolkit to flash the custom firmware and write the World-Wide user database into your radio.

The basic code (the “engine”) for the MD380Tools is the one-and-only Travis& Friends version, which is up-to-date to the latest available version (build) of GitHub. Warren added some nice-to-have features from other developers too, like the Enhanced Display and Snapshot code from Mike (DL2MF); not only added those functions, but integrated this functions into The Toolkit for easy use too.

But it is a lot more than “just another flashtool”. Warren Merkel (KD4Z) wrote a lot of scripts, combined those scripts in simple commands to use; and made, altered and added the best tools together to one simple-to-use toolkit: The KD4Z Toolkit, which contains:

- ✓ **Multi language** menus to navigate you through all the possibilities;
- ✓ **Safety**: build-in backup/restore to earlier versions:
 - Make a backup manually
 - Make automatically backups for 9 earlier versions
 - Go back to the latest known stable version
- ✓ **Snapshot** function which give you the ability to make screenshots from your radio-screen
- ✓ **Password Reset** utilities
- ✓ **Codeplug** “problem solver”
- ✓ **Tweaked Radio Display** and font for better readability
- ✓ Etc.... which we are going to explain ho-to-use in this tutorial

Almost forgotten: Yes, you can flash custom firmware and the World-Wide user database too with this Toolkit 😊 .

If you need help with setting up or with questions how-to-use, there is a large user-support group on Facebook too with a lot of experienced users who can help you.

Please read this tutorial from A to Z, it will give you the answers for 99% and helps you to get the most out of your radio and this Toolkit

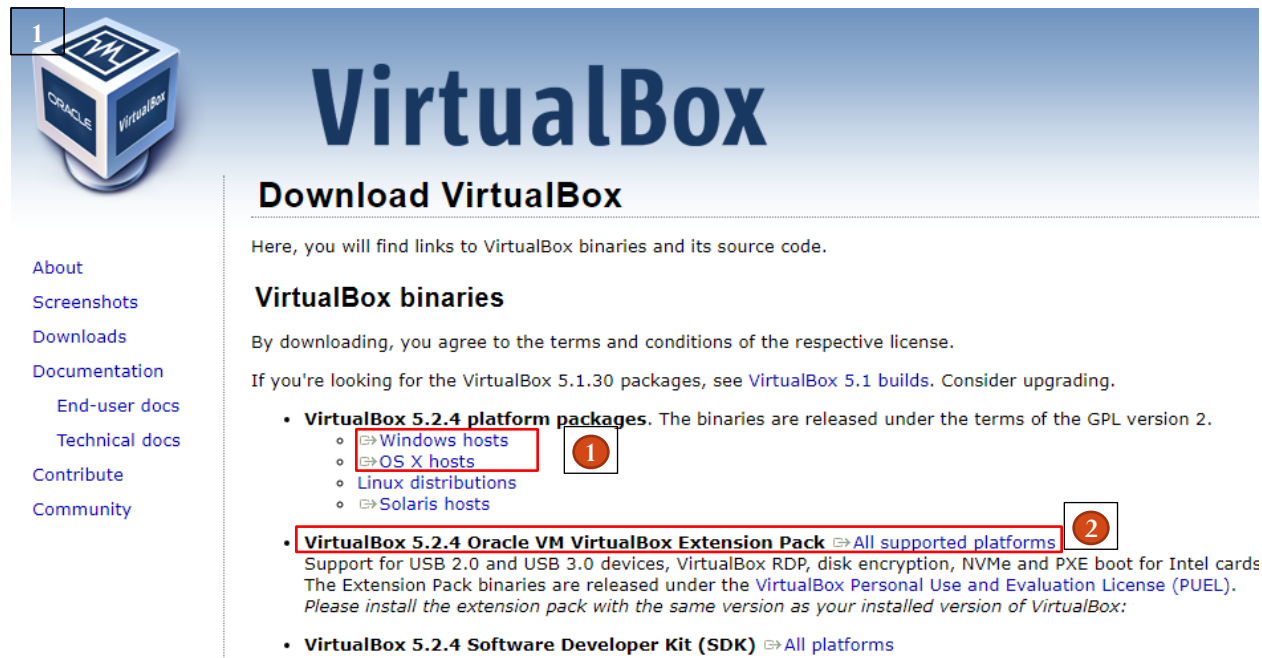
Installation KD4Z Toolkit v4.0 / MD380Tools

First time installation: Download and install the Virtual Box

You can download the latest version, which is mandatory for Toolkit v4, here (it's free 😊):

<https://www.virtualbox.org/wiki/Downloads>

Here's a screen picture from the download page:



VirtualBox

Download VirtualBox

Here, you will find links to VirtualBox binaries and its source code.

VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

If you're looking for the VirtualBox 5.1.30 packages, see [VirtualBox 5.1 builds](#). Consider upgrading.

- **VirtualBox 5.2.4 platform packages.** The binaries are released under the terms of the GPL version 2.
 - [Windows hosts](#)
 - [OS X hosts](#) **1**
 - [Linux distributions](#)
 - [Solaris hosts](#)
- **VirtualBox 5.2.4 Oracle VM VirtualBox Extension Pack** [All supported platforms](#) **2**
Support for USB 2.0 and USB 3.0 devices, VirtualBox RDP, disk encryption, NVMe and PXE boot for Intel cards
The Extension Pack binaries are released under the [VirtualBox Personal Use and Evaluation License \(PUEL\)](#).
Please install the extension pack with the same version as your installed version of VirtualBox:
- **VirtualBox 5.2.4 Software Developer Kit (SDK)** [All platforms](#)

1. Select the correct download: *Windows hosts* for a Windows PC; *OS X hosts* for an Apple.
2. To use the Toolkit, you need also the *Extension Pack* (all supported platforms), so download that one too
3. Install first the *VirtualBox* by following the instructions
4. After installing the VirtualBox, install the *Extension Pack*.
5. **NOW REBOOT YOUR PC**

Update existing VirtualBox

*Existing users has to upgrade their VirtualBox to
Version 5.2.4 r119785 (Qt5.6.2) or later;
Please note: upgrade the Extension Pack too*

If you already have an older version of VirtualBox installed, don't uninstall it before updating!

Just run the installer and it will update the existing version of VirtualBox, and keep your existing installed Virtual Machines (tytv3.ova). Be sure to download and install the newest available VirtualBox Extension Pack as well.

Download and install the KD4Z Toolkit v4.0 environment for the VirtualBox (all users)

To have all the new features available, both existing and new users, you have to install the new appliance
tytV4.ova

- Download the [tyt_kd4z_4.0.ova](#) file from here:

For the VirtualBox Appliance image file, use these links:

Single file download (Preferable; 1.2Gb):

https://drive.google.com/file/d/1YkPIsmj_vsoYK9ALaKGDNRVGZ70lvrI/view?usp=sharing

Multiple files download (if the one-file procedure fails)

Use the above link (preferable), or download all 6 links below. ****Don't do both Parts!**** - Use these links if you have trouble downloading the large file above:

[Part 1]

https://drive.google.com/file/d/1aPXwDEMSZufvzvma_q9uIF6AUV2i9crB/view?usp=sharing

[Part 2]

https://drive.google.com/file/d/16mPYbtyIrK49IlBqwmh7kqSf8y_D3aGY/view?usp=sharing

[Part 3]

https://drive.google.com/file/d/1C8P00s_QeP_GEr8_h80kxG8VEOFBU1aM/view?usp=sharing

[Part 4]

https://drive.google.com/file/d/1IvE_a_KtVgHf75UdY6qX4MBGCLfHb7Gg/view?usp=sharing

[Part 5]

<https://drive.google.com/file/d/11MhNJLfSrIkdpzov1irY3gQwJyC9Hlp5/view?usp=sharing>

[Part 6]

<https://drive.google.com/file/d/1Emr5QxVP0FBNi2LfRjAw3PELCtSjxUuR/view?usp=sharing>

For the part files, download each one. You will need to **use the 7-zip program** to extract them back into the actual OVA Appliance file.

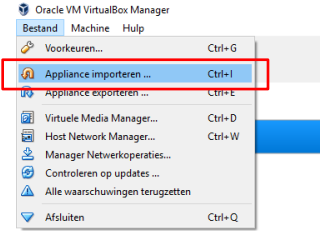
Get 7-Zip here: <http://www.7-zip.org/download.html>

Install 7-Zip, and then Right-Click on the first part file, find the 7-Zip menu, and choose the extract option. You will end up with a single, large ".OVA" file ([tyt_kd4z_4.0.ova](#)).

This file ([tyt_kd4z_4.0.ova](#)) is imported into the Virtual Box software (explained later).

- Launch Oracle VirtualBox and Import the *tyt_kd4z_4.0.ova* appliance file from the *File | Import Appliance* menu item.

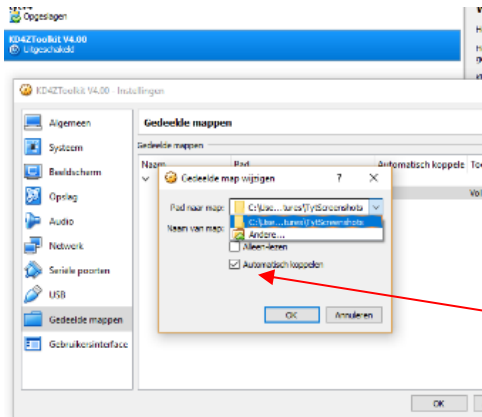
Don't start the tytV4 yet!



Prepare the “snapshot” functionality

KD4Z Toolkit v4.0 has some nice new features. One of them is to make screenshots from your radio (the “snap” function).

To make this function operational, we have to prepare the Toolkit so you can store the snapshots from your radio screen on your host.



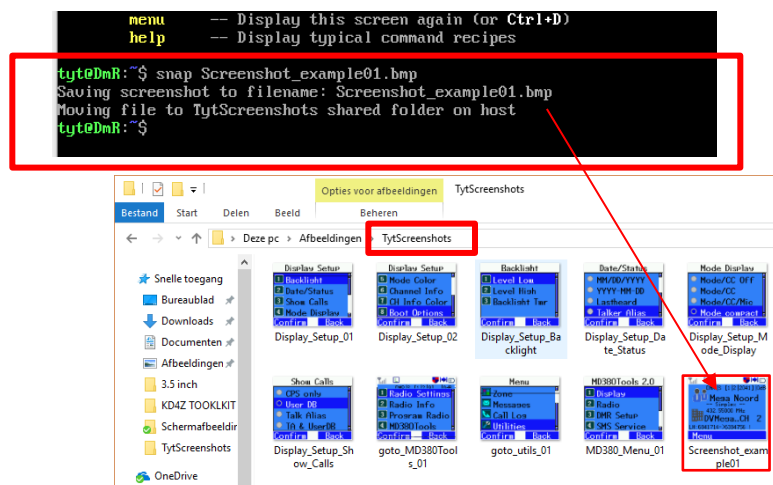
- On your host machine (Windows or OS X), make a folder with this name: *TytScreenshots*. Place the folder preferable in your Documents or Picture folder.

- Start, if not already open, VirtualBox and go to Settings → Shared Folders and navigate to the path you have defined to the TytScreenshots folder; select that same folder you just created. It will look like this when done, except ~~your~~ selected path will be shown. Be sure to put a check mark in the “Auto-mount” option.:

THE IMPORTANT PART IS: The “Folder Name” as seen in this configuration **MUST** be named “TytScreenshots” or the snap command inside the VM will not be able to find it.

What does used for? If you run the new snap command followed by the desired (and required) filename.

➔ Note that it must have a *.bmp* extension to be viewable. Then, go look in your TytScreenshots folder on your Host machine, you will find your bmp file is already there!



Now you've completed installing the VirtualBox including the KD4Z Toolkit and make full use of it.

The KD4Z Toolkit v4.0 explained

Some notes from Warren (KD4Z – Lead -Developer of The Toolkit):

Over the past year, I had intentionally not updated the 3.x VM image, as the internal Toolkit scripting has ability to fully update itself.

This has worked out very well, as I know it is a very large download. I wanted to avoid forcing the user to keep downloading large image files – just for updates.

As you already know, that design works quite well to that end. However, some of the new features I had in mind needed to be added using the root user.

The VM is designed to run everything as a non-privileged user in order to protect the user from breaking anything.

So, I collected my notes over the past 12 months, and rev'd up the VM image with those features in mind.

The KD4Z Toolkit Virtual Machine image is born!

Differences from the 3.x VM Image at a glance:

- ✓ The VM now has the Virtual Box Guest Additions installed: This adds much better mouse handling! Adds ability to create a shared folder to the Host machine for easy file transfer in or out. Adds the ability to scale the window size of the running VM.
- ✓ The VM now has an SSH server running on port 22. (Openssh server)
This allows you to “shell” into the VM. Mainly, this gives you the ability to scroll back the screen using your SSH terminal client such as Bitvise SSH Client.
Be aware that a shell session does not redirect the USB port, so you can't initiate any “flash” operations from the shell. You still have to run those operations from the normal VM console.
Also, the SSH server allows a SFTP client (like the one in Bitvise) to connect and make easy work of file transfer in or out of the VM using secure FTP. If you haven't heard of Bitvise, you should go check it out. It's FREE! <https://www.bitvise.com/ssh-client-download>
- ✓ The VM also has a normal FTP server running. You can connect directly to the VM from your host machine using your favorite FTP client such as Filezilla. (<https://filezilla-project.org>). You could use this feature to upload your codeplug file into the VM for use with the `rtdwrite()` command.
- ✓ The VM has a mini HTTP server running to serve up the screenshot directory. This allows you to browse to the IP address of the VM using a normal web browser.
The base directory is “screenshots”. This is the landing directory for the new “snap” screenshot command.
- ✓ Also, after a `glv` or `glvusers` command, the two freshly created `firmware.bin` and `user.bin` files will be available here.

So, you can simple download them using a web browser if you wish to use them with another flash tool such as **TyteraFlashToolv1.03NL**, a simple Windows flashtool which you can find in the files section (zipped file) of the Facebook group.

An introduction

The MD380Tools v2.0 which are used in this Toolkit is a compiled .bin file from the Travis & Friends GitHub site.

There are more flash tools and more custom firmware versions; those are NOT described or explained in this tutorial, nor will they be supported by the KD4Z Toolkit support group on Facebook.

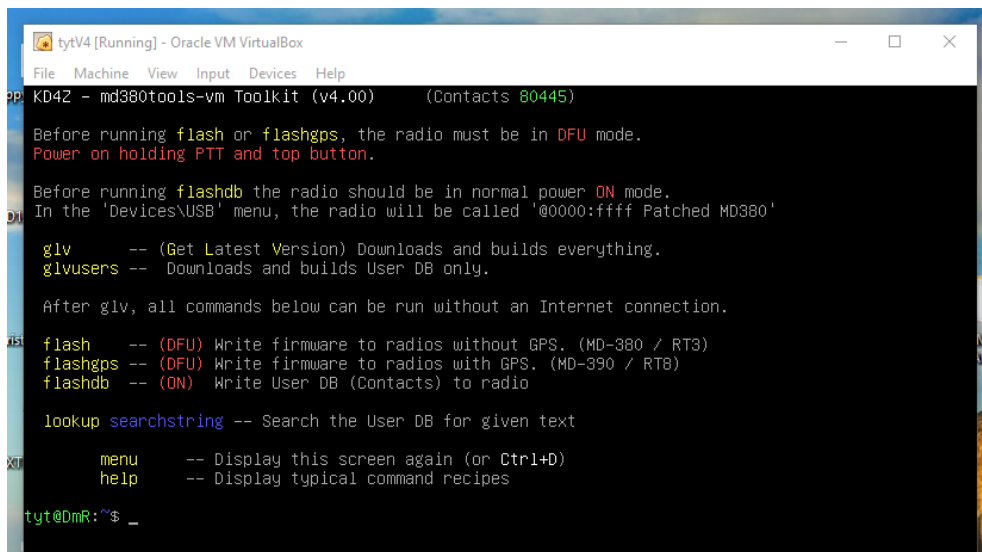
Warren has added some extra code for display- and font handling and added some code from second party developers too, like the snapshot feature and enhanced display features from Mike – DL2MF (Credits to Mike, buy him a cup of coffee).

In this part of the tutorial, we will lead you step-by-step to the main features of the custom firmware:

- ✓ How to flash the latest firmware to your radio;
- ✓ How to write the userDB to your radio;

Preparing

After installing the KD4Z Toolkit and started it up, you should see this screen:



```
tytV4 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
KD4Z - md380tools-vm Toolkit (v4.00) (Contacts 80445)
Before running flash or flashgps, the radio must be in DFU mode.
Power on holding PIT and top button.
Before running flashdb the radio should be in normal power ON mode.
In the 'Devices\USB' menu, the radio will be called '@0000:ffff Patched MD380'
glv -- (Get Latest Version) Downloads and builds everything.
glvusers -- Downloads and builds User DB only.
After glv, all commands below can be run without an Internet connection.
flash -- (DFU) Write firmware to radios without GPS. (MD-380 / RT3)
flashgps -- (DFU) Write firmware to radios with GPS. (MD-390 / RT8)
flashdb -- (ON) Write User DB (Contacts) to radio
lookup searchstring -- Search the User DB for given text
menu -- Display this screen again (or Ctrl+D)
help -- Display typical command recipes
tyt@DmR:~$ _
```

The upper-line shows you the version and the number of contacts in the world-wide user database (in this document: the userDB).

There are two commands which needs an internet connection (well, basically there is one and a “shortcut” for the userDB only), all other commands can be executed without internet, including flashing the firmware and writing the userDB!

The idea is for use at club meetings: you don’t need the internet to help your club members to flash/write the custom firmware or userDB.

First step after starting the Toolkit is to **Get the Latest Version (glv)** from the custom firmware and the userDB. Just type **glv** on the prompt line and the Toolkit will:

- ✓ Pull and compile the latest version of the KD4Z Toolkit;
- ✓ Pull from the GitHub sources the latest firmware-files and compile it to the latest version firmware;
- ✓ Pull the latest userDB onto your computer.

So, with just simple executing **glv**, you have it all!

If you only want to update the userDB, there is a shortcut: **glvusers**. This command only pulls the latest userDB to your computer without the latest firmware.

If you want, you can disconnect from the Internet now.

Flashing the custom firmware to your radio

Next step is to flash the custom firmware (aka experimental firmware) to your radio; you have to know if you have a GPS or a NON-GPS model.

This needs some explanation: The non-gps version is mostly referred by (model) MD380 (TYT) or RT3 (Retevis), the GPS version by (model) MD390 (TYT) or RT8 (Retevis).

This is not always the case: there are MD380 *with* GPS and MD390 *without* GPS! The same for Retevis RT3 and RT8. So be sure which ‘flavor’ you have, there are differences in the command (and firmware) for each flavor!

1. Connect your radio to the computer with the proper programming cable;
2. Switch your radio to an unused (or not programmed) channel and switch off any hotspot/repeater in the direct surroundings of your radio;
3. Put your radio in DFU mode: Switch OFF the radio; press PTT and the button directly above the PTT simultaneously and switch ON the radio; display stays black, but the LED on top of the radio should flash RED/GREEN;
4. Start flashing the firmware to you radio with this command from the prompt line (terminal window):
 - a. NON-GPS: **flash**
 - b. GPS models: **flashgps**
5. Flashing will start and you see the progress in your VM terminal window. When flashing is ready, wait 10 seconds and switch OF and ON your radio; ready.

Writing the userDB to your radio

This is equal for both non-GPS and GPS:

1. Connect your radio to the computer with the proper programming cable;
2. Switch ON your radio in normal operation mode;
3. Switch your radio to an unused (or not programmed) channel and switch off any hotspot/repeater in the direct surroundings of your radio;
4. If you didn’t already: start the Toolkit and execute **glv** (firmware & userDB) or **glvusers** (only userDB)
5. Start writing the userDB to your radio by typing in the terminal window command line: **flashdb + enter**; you radio screen should display *PC Program / USB Mode*. If the writing is completed, your radio should automatically reboot to normal operation mode. Finished!

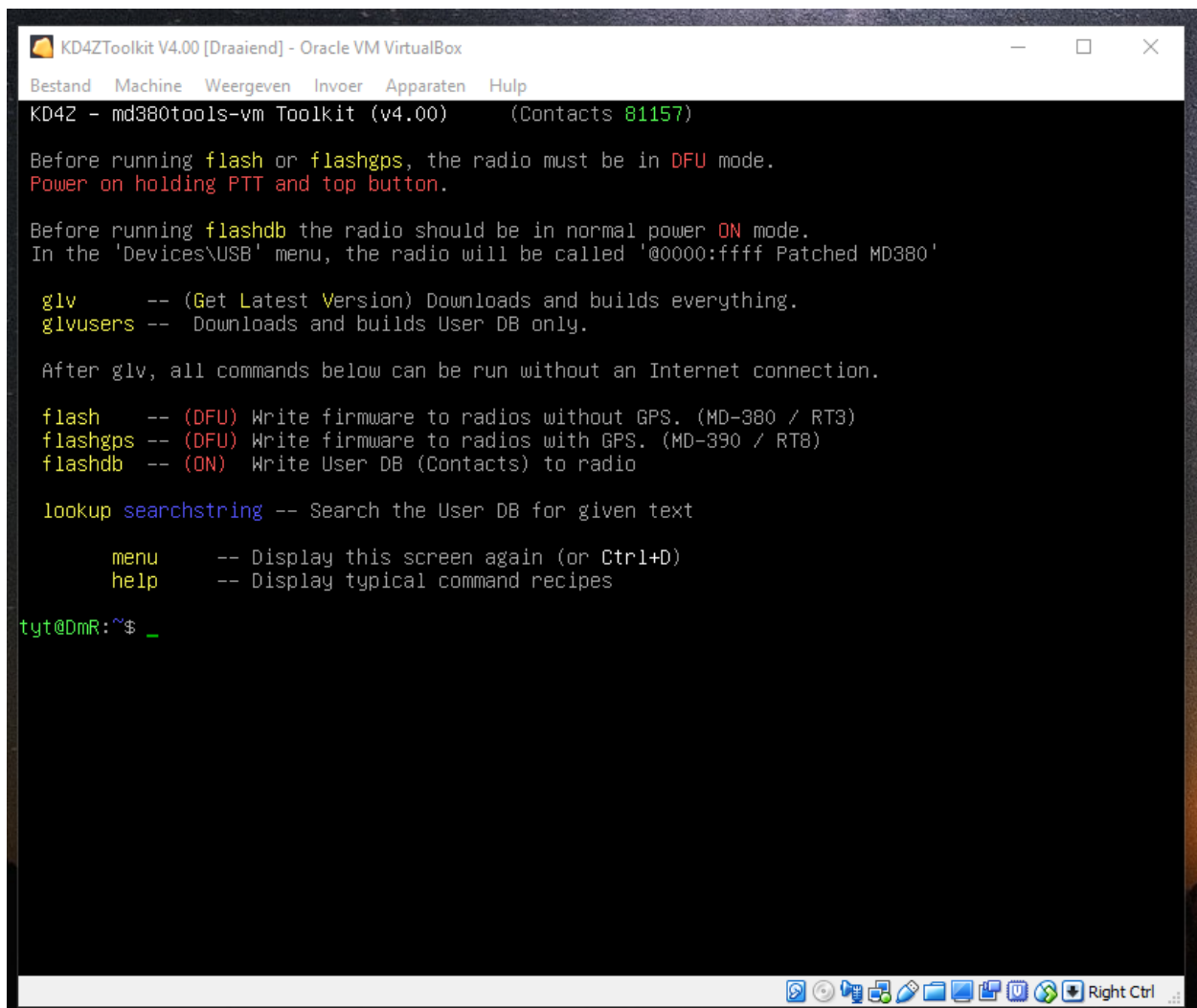
The KD4Z Toolkit, what's the difference with others?

The tools explained:

As explained, you can use the Toolkit for flashing the custom firmware and writing the userDB to your radio. For that, it is connected to the one-and-only source for “The Engine”: the Travis & Friends code.

But it is a real Toolkit. Warren did a great job to combine “The Engine” with some interesting developments, for example, the code written by Mike (DL2MF) for the Enhanced Display Options. And Warren tweaked the Display fonts and -presentation for a better readability on your radio screen.

But there's a lot more which we're going to walk through by the menu-system of the Toolkit:



```
KD4ZToolkit V4.00 [Draaiend] - Oracle VM VirtualBox
Bestand Machine Weergeven Invoer Apparaten Hulp
KD4Z - md380tools-vm Toolkit (v4.00) (Contacts 81157)

Before running flash or flashgps, the radio must be in DFU mode.
Power on holding PTT and top button.

Before running flashdb the radio should be in normal power ON mode.
In the 'Devices\USB' menu, the radio will be called '@0000:ffff Patched MD380'

glv -- (Get Latest Version) Downloads and builds everything.
glvusers -- Downloads and builds User DB only.

After glv, all commands below can be run without an Internet connection.

flash -- (DFU) Write firmware to radios without GPS. (MD-380 / RT3)
flashgps -- (DFU) Write firmware to radios with GPS. (MD-390 / RT8)
flashdb -- (ON) Write User DB (Contacts) to radio

lookup searchstring -- Search the User DB for given text

menu -- Display this screen again (or Ctrl+D)
help -- Display typical command recipes

tyt@DmR:~$ _
```

MENU SCREEN (SCREEN 1)

In this Menu screen are the commands for the Basic operations and they are self-explaining. It shows the power of the Toolkit: just one command instead of a bunch of Linux command line commands.

```
KD4ZToolkit V4.00 [Draaiend] - Oracle VM VirtualBox
Bestand Machine Weergeven Invoer Apparaten Hulp
KD4Z - md380tools-vm Toolkit - Recipes

MD-380 / RT3 / No GPS:          glv flash flashdb
MD-390 / RT8 / with GPS:       glv flashgps flashdb
Downloads and builds User DB only.: glvusers flashdb

Save / Restore build set:
  save setname
  restore setname or restore without setname for previous build
  restore X                -- Restore X numbered prior build ( X => 1 to 9)
  restore stable          -- Restore to known stable version

Recover Locked Radio:
  rdtpassreset            -- Clear Codeplug Password
  rdtblank                -- Force Blank Codeplug to Radio

Utility:
  snap filename.bmp      -- Create screenshot in 'screenshot' folder. Must be named .bmp
  rdtread codeplug.bin   -- Read codeplug out of radio into binary file.
  rdtwrite codeplug.rdt  -- Write codeplug to radio from RDT,DFU or BIN file.

  shutdown or reboot     -- Safely Shutdown or Reboot the Virtual Machine

  stats                  -- VM information menu
  tweaks                 -- Tweaks menu
  menu                   -- Back to main menu (or Ctrl+D)

tyt@DmR:~$ _
```

HELP SCREEN (SCREEN 2)

In the Help screen are some powerful extra's, most of them are self-explaining too. Worth to mention are:

Save / Restore build set

With those commands, you can make a backup ('snapshot') of your firmware and userDB before updating your radio. Use **save setname** to make that snapshot, where setname is any name you chose (within Linux conventions: use as an example the date for that name as 20180125 for 2018, January 25). Use **restore setname** to restore that set back to your radio.

The Toolkit makes automatically a snapshot every time you execute **glv**, which can be restored to the radio with just **restore**. Remember, this file is renewed every time you do a **glv**! A better workflow is to make a 'named' snapshot (save) every time before you use **glv** to update your firmware and userDB as described before.

If you ran into serious troubles, there's always an exit: use **restore stable** to write the latest and tested firmware build to your radio; this build could be some weeks or even months old, but your radio is working again and you can update it from hereon.

Recover a (locked) Radio

Another great tool.

If your Radio is asking for a password and the password is unknown, you can reset the password with this utility:

rdtpassreset

After using this utility, read your Radio's codeplug with the stock CPS program which came with your radio, connect the radio, do a 'read from radio' and replace the password settings with known password(s) or remove the password. Write the codeplug back to your Radio and you have control again.

It happens that your radio isn't responding to the reset utility too. As a last escape, write a complete blank codeplug to the radio with **rdtblank**. After doing so, read that blank codeplug with the stock CPS program which came with your radio, connect it and save that blank codeplug for future use. Replace the codeplug with a known working codeplug. Write that working codeplug back to your Radio and you have control again.

The **snap** function is explained in the [Prepare the "snapshot" functionality](#). (Download and install the KD4Z ..) of this tutorial.

Use **shutdown** or **reboot** for a save exit/reboot the VirtualBox Toolkit v4 environment.

```
KD4ZToolkit V4.00 [Draaiend] - Oracle VM VirtualBox
Bestand Machine Weergeven Invoer Apparaten Hulp
KD4Z - md380tools-vm - Tweaks

Option settings are controlled by file existence in the home directory.
These take affect during your next glv. * indicates tweakfile present.

Add setting: touch tweakfile Remove setting: rm tweakfile

Example: touch ~/filter.countries.enable

-- tweakfile list --
~/extra.data.disable Disable Extra Contact Data
~/filter.countries.enable Enable Country abbreviation
~/filter.us.states.enable Enable US State abbreviation
~/lang.nl Enable Dutch text
~/lang.pt Enable Portuguese text
~/lang.it Enable Italian text
~/lang.es Enable Spanish text
~/lang.de Enable German text
~/lang.fr Enable French text
~/lang.sl Enable Slovenian text

menu -- Back to main menu (or Ctrl+D)

tyt@DmR:~$
```

TWEAKS (SCREEN 3)

There are some handy tweaks too. This screen is self-explaining, but notice: the abbreviation setting is for known (not exotic) countries default set to ON. This is done because the userDB is growing rapidly and there is a sizing limit to that database.

The MD380Tools v2.0

A Step-by-Step walk-through the new possibilities

After completed flashing the custom firmware and writing the userDB, you have a ton of extra's which you not even see on high-end handhelds. So, let's explore the most used features (I don't go into the Developer menu's and features; if you want to use or understand those too, please search on internet (Google is your friend ☺) to explore them too).



First, go into your radio menu to **Utilities** and Confirm (all radio-screenshots are made with the KD4Z Toolkit utility **snap** ☺).



Here's your first new menu item: **MD380Tools**.

Select this item and Confirm to access all the MD380Tools functions.

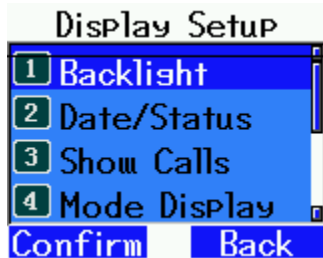
Display Setup

The advanced status line and channel information display feature does not have any prerequisites like enabling developer mode or netmon features.

After flashing the new firmware, the display setup menu contains four new options, giving you full control over these new features.



Now we see the first 4 options which you can select; first we are going to explore what's possible with the **Display Setup** features; the "specials" from Mike – DL2MF will be explained too in this part of the manual.



Backlight: select and confirm to set:

Level Low: set the desired value

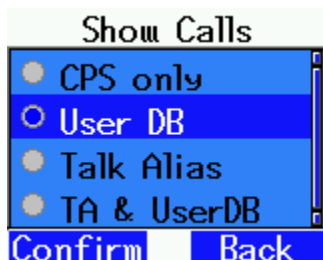
Level High: set the desired value

Backlight Tmr: set the timer (or Always) for Display ON



Date/Status

Set the date format or use the bottom line on your radio display to Lastheard or Talker Alias info (Who needs date/time on the radio screen?).



Show Calls: with this setting, you can choose which info is displayed by receiving a qso:

CPS Only: is the info from your **Codeplug**, mostly only the call; when receiving a non-programmed call: the DMR-ID

User DB: This is the most powerful setting: display shows the info from the userDB : →

Talker Alias: Shows whatever is sent as Talker Alias; this is showing the TA info, provided by some radio's or what is set in the Brandmeister Selfcare.

TA & UserDB: combination from both.



Select **Mode Display:**

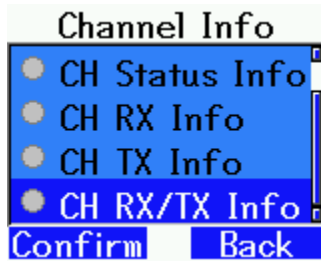


Select the option you want to use, Mode/CC will display operation mode and current ColorCode in the top status line. If you are using the Mic gain feature, you can optional display the current Mic gain setting in the top right corner of the advanced status line.

An additional nice and very useful feature is the Mode compact setting, offering a very compact display of all previous listed information in top of the channel, including color code (CC), current timeslot (TS) talk group (TG) and Mic gain (dB) into a very compact status indicator.



Next, select **Channel Info** Menu:



Channel info shows information of TS and TG below the selected channel and is being read from the codeplug settings of your radio. This provides more space for the channel name now, because most often this info has been added to the display name.

Depending on the setting of Mode display the selected options of the Channel info menu are dynamically arranged. When "Mode compact" was selected in Mode display, due to information like TS/TG/Tone being display in the top status line, the RX frequency of each channel is being automatically displayed too if CH Status info has been selected.

Full control and the most information you can get during operation is being provided, if you select:

- Mode compact - in mode display
- CH RX/TX Info - in channel display

Operating hints:

- Select Mode/CC/Mic option for comfortable operation status information
- Select Mode compact if you prefer CC/TS/TG status in a compact format like this: [1|1|91]
- Use CH RX/TX info when you are operating in other than your home area

When using scan mode, the TS / TG information is being read and displayed during scanning. The channel name from the stock firmware will be static, until scan stops at another channel when receiving a signal.

Radio Setup



This menu consists of 3 items:

Backlight: This is the same as describes earlier (Display Setup, Backlight, (yes, it is in two menu's); this one is legacy from the Travis version versus the Enhanced Display features from DL2MF). Don't use this option here.

Mic Bargraph: Switch ON/OFF the microphone bargraph

Mic gain: option to change Mic gain settings between 0db/Off, 3dB or 6dB. This might be helpful when operating via several repeaters, in different environments (like hotspots) or using external microphones.

DMR Setup

Set Talkgroup: normally the only way to enter a talkgroup is to create a channel and assign the contact containing the Talkgroup number. With Set Talkgroup you can temporary override of the used Talkgroup number.



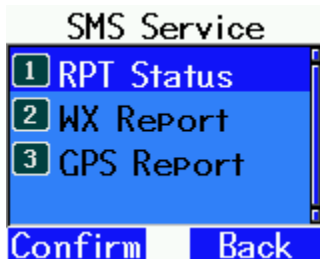
This allows you to manually type in the number of the Talkgroup you want without having to reprogram the radio.

NetMonitor: Enable or Disable the Netmon hotkeys that open things like Last Heard log and debug information. The different Netmon screens and functions are tied to the number keys. This does not remove the ability to use DTMF tones while transmitting.

Promiscuous: this setting allows the reception of all of the transmissions on a DMR slot (ie Slot 1 or 2 but not both). For example, if you are on Slot 1 and TG North America for example, and you want to hear all the activity on Slot 1 on your local repeater. you can turn this ON and hear all the activity. If it is turned OFF, you will only hear the programmed channel, North America. You must still have the correct color code programmed to hear anything. If the green light on your radio is turning on but you are not hearing anything, you may need to enable this. The other reason you may not hear audio could be because the activity is on the other repeater slot. There is also an option for programming a side button to toggle promiscuous mode. When promiscuous mode is enabled, it will be indicated on the main screen with an icon that looks like an eye.

Edit DMR ID Allow the editing of your actual DMR ID as set in the CPS software. This is the ID which you received when you registered your call sign. If this value is random or incorrect, you may be denied access to transmitting into the repeater.

SMS Setup



New SMS Service options:

You must enable Netmon (DMR Setup) to activate keyboard shortcuts, the assigned keys depend on your keyb mode selected.

It's recommend to select keyb mode "Modern" oder "Developer" to use SMS features most comfortable. SMS service will only replace single keys if the assigned function is being activated in SMS service menu.

Keyb mode: Modern

Option Key 1 - Repeater status - On/Off

Option Key 2 - Weather report - Off/RPT/GPS

Option Key 3 - GPS report - On/Off

Keyb mode: Developer

Option Key 7 - Repeater status - On/Off

Option Key 8 - Weather report - Off/RPT/GPS

Option Key 9 - GPS report - On/Off

Sample usage with keyb mode "Modern" selected:

- To request current available TG from your next repeater, simply go to your BM DMR repeater channel, press key 1 and wait for the reply message.
- To request a weather forecast for your area, simply go to your next BM DMR repeater channel, press key 2 and wait for the reply message.
- To request your latest submitted GPS position, simply go to your next BM DMR repeater channel, press key 3 and wait for the reply message.

Option settings are stored in radios SPI flash and are system wide and not channel specific settings!

When SMS features are activated, the assigned keys are being used to request a service SMS to the DMR network (red TX-LED flashing for 1/2 sec), SMS RX needs appropriate repeater coverage.

You must have a reliable HF connection in range of your repeater to receive the reply message complete, this takes depending on SMS content 2-3 seconds.

(Thanks to Mike (DL2MF) for this write up)

Keyboard Setup



Keyb Mode: select between Legacy (as in V1.0 from the MD380Tools), Modern (v2), MD-446 or Develop.

REMARK: Do NOT select MD-446 if you don't have that specific model, it has a limited keyboard. It is hard to navigate when you select this keyboard on other models than MD-446

Side Buttons: First select Top Pressed, Bottom Pressed Top Held or Bottom Held, then select the function for that button.

Scroll Mode: Select the scroll speed: Off, Fast or Slow.

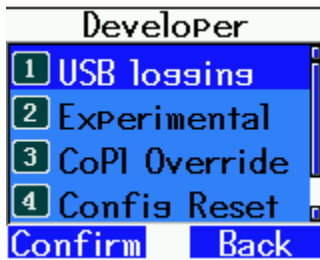
Tones Setup



M. Rogerbeep: This lower the frequency of the sound that the radio makes when keying up. Only used if talk permit tone option is enabled in radio settings.

Morse Output: This feature was added to assist visually impaired HAM operators. Enabling the options in this category will cause the radio to output in Morse code the menu text as you navigate the radio, speed of wpm is in this setting too. This does not transmit anything, it is explicitly for the operator using the radio.

Developer



USB Logging: Switch ON/OFF USB Logging

Experimental: Switch OFF/ON the Experimental mode.

CoPI Override: Contains options for different display formats for the text shown during the radio boot screen.

Config Reset: Reset al MD380Tools to the default settings.

Addendum 1: Installation notes for native Linux

(Toolkit version 3.xx only at the time)

Md380tools-menu

Menu subset of the md380tools-vm Virtual Machine

Warren Merkel, KD4Z

Installation instructions to install the KD4Z md380tools-vm scripting framework on bare metal Linux.

This is not a fork of the md380tools-vm project, but merely a subset.

You will be running exactly the same scripting framework, and will enjoy the automatic update features of the main VM type of installation.

If you would like to take advantage of the easy-to-use menu features of the md380tools-vm project, but would rather run the scripts natively in your preferred flavor of Linux, these steps will allow you to do just that.

If you are running MMDVM on a Raspberry Pi, you are almost ready to go!

PREREQUISITES:

You must have an existing installation of Linux. You can use a stand-alone Linux machine. Or you could run Linux inside a Virtual Machine of your own choosing. Or you can use Raspian running on a Raspberry Pi.

INSTALLING THE MD380TOOLS-MENU FRAMEWORK:

Start in a non-privileged user's home directory. (*Don't miss the space "tilde" at the end*)

```
cd ~
```

If you have already been using the md380tools, you might need to remove it first.

Depending on how it was installed, md380tools needs to be installed as a non-privileged user.

Some "pre-built" images for MMDVMHost and other md380tools VM images, install md380tools as "root".

Since we will be running as a non-privileged user here, we need to just remove it using super-user elevation.

When you run "glv", the md380tools and md380tools-vm folders will be completely removed.

This needs to be able to occur as a non-privileged user.

So, from your current user's home directory. (`cd ~` to get there) run this:

```
ls md380tools
```

If you see a bunch of files fly by in the listing, fine. We need to just remove them. This is the easiest way to clean house in case they are owned by the root user.

They will be put back each time you run glv anyway.

Run this command to remove the existing folder, if it exists. (If your Linux distribution doesn't have sudo, be sure to "su -" to become root first)

```
sudo rm -rf md380tools
```

If you didn't see the md380tools folder had pre-existed in your image, you will need to perform installation of md380tools prerequisites as described here:

<https://github.com/travisgoodspeed/md380tools#preparation-of-build-environment>

Be sure to perform these steps as well:

<https://github.com/travisgoodspeed/md380tools#additional-steps-for-linux-based-installations>

Don't forget this last important step as listed on the main md380tools page.

```
cd md380tools
sudo cp 99-md380.rules /etc/udev/rules.d/
```

You will need to log back in after running the above line, and before attempting to use the flash commands. You can wait to do this until the end of the instructions however. If you forget to do this, you will get an error when attempting to access the USB device.

If you see weird errors pop up during the **glv** (explained later), you might need to go back to the above links and make your you didn't skip a step!

Additional requirements for running md380tools-menu:

You will also need to install the zip and unzip programs. If you have apt-get installed, run this s root user or use sudo:

```
sudo apt-get install zip unzip
```

Otherwise, you will need to determine how to install the zip and unzip programs based on your particular Linux distribution.

Pull down the md380tools-vm scripts from github:

If you su'd to root user, exit now, back to your non-privileged user. (run the *exit* command or *Ctrl+D*)
Make sure you are in the user's home directory again with:

```
cd ~
```

Then, run these next three commands:

```
git clone https://github.com/KD4Z/md380tools-vm.git
mv .bash_aliases .bash_aliases.original
```

(Ignore the file not found message if you didn't have the aliases file already. This command will make a backup of your original, just in case you had something in there you want to keep)

```
cp md380tools-vm/root/.bash_aliases ~
```

(**don't miss that last space and "tilda"** at the end of the command above!) Note, this will overwrite your existing .bash_aliases file.

Now, we need to verify that the `.bash_aliases` script will get run from

```
.bashrc
```

With your favorite text editor (vi or nano for example), open the `.bashrc` file. Scan down looking for an `if []` construct like this:

```
if [ -f ~/.bash_aliases ]; then  
  ~/.bash_aliases  
fi
```

If you can't find it, scroll all the way to the bottom, and add all three lines into the `.bashrc` file. Be sure to enter it exactly as listed above, including the spaces and periods!

Save your changes, and exit the editor.

Fedora note:

If you are using Fedora, you might need to create a small bash script to redirect the SHA256 calculations to a different binary file than normal. Fedora seems to have removed the “shasum” program, and replaced it with multiple versions that calculate different size SHA hashes. Run this to check to see if you have (or are missing) the shasum binary file.

```
ls /usr/bin/shasum
```

If you see a message “no such file or directory”, then you need to follow these next simple steps to create a bash script replacement for the missing file. Otherwise, if you have the shasum binary file, skip to “Ready-Set-Go” section

You should also check to see if you have the sha256sum binary, as you will need it to be present!

```
ls /usr/bin/sha256sum
```

Hopefully, you will see a listing returned for this file.

As root user, use your favorite text editor, create a file named `/usr/bin/shasum`

You can use `sudo nano` or `sudo vi` for this. Add these two lines in the file and save it.

```
#!/usr/bin/bash  
/usr/bin/sha256sum $3
```

You will need to set this new file to be executable with this:

```
sudo chmod +x /usr/bin/shasum
```

That should now allow the md380tools scripts to run on Fedora. That bash script becomes a replacement for the missing shasum binary, and just redirects it to the newer sha256sum program.

One more thing! The current instructions for installing md380tools on Fedora are missing something quite basic! It appears that Fedora 26 (the current version as of this document) does not have Python installed by default. You will need to install Python too!

```
sudo dnf install python
```


Ready-Set-Go

Logout of your terminal by running the exit command:

exit

Login again or open a terminal window again.

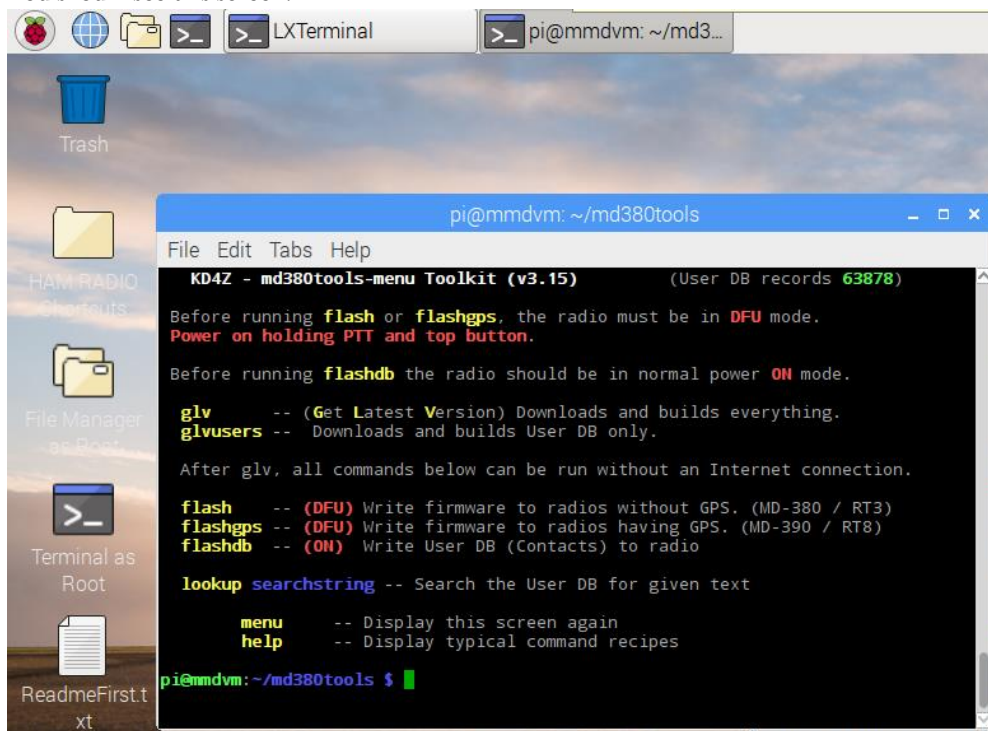
Run the main `glv` command in the KD4Z Toolkit: **glv**

You see a lot of scripts running and source code flying by!

When all of that is done, you will be left back at the Linux prompt. Remember, to display the menu again, at any time, run:

menu

You should see this screen:

A screenshot of a Linux desktop environment. The desktop background is a landscape with a blue sky and clouds. On the left side, there is a sidebar with icons for 'Trash', 'HAM RADIO Shortcuts', 'File Manager as Root', 'Terminal as Root', and 'ReadmeFirst.txt'. In the center, a terminal window titled 'pi@mmdvm: ~/md380tools' is open. The terminal displays the KD4Z Toolkit menu for version v3.15, showing instructions for using various commands like 'glv', 'flash', 'flashgps', 'flashdb', 'lookup', 'menu', and 'help'. The terminal prompt is 'pi@mmdvm: ~/md380tools \$'.

In this example, I installed the KD4Z Toolkit scripting in Russell's excellent *KB5RAB MMDVMHost* raspberry Pi image.

He already had the stock `md380tools` installed, but I wanted to have full use of the KD4Z Toolkit as well.

The commands are exactly as described in the installation documentation for the KD4Z/`md380tools-vm` project as described in this tutorial.

If you want to have the menu automatically display when the terminal window is opened, you can add this line at the end of your `.bashrc` script using your favorite editor. Don't miss the dot at the beginning of the filename.

If you have nano: (or use vi if you prefer):

```
nano .bashrc
```

Go all the way down to the end of the script, and add this line:

```
~/md380tools-vm/menuopts
```

Then save and exit with Control+X, press y, then press Enter.

Enjoy.

73 de KD4Z

Warren Merkel

revision 1.0 3 February 2017

revision 1.1 18 June 2017

revision 1.2 27 July 2017

Questions & Answers¹

Q: *Will this experimental firmware "brick" my radio? If it does get "bricked", what do I do?*

A: The MD-380/ MD-390 series radios are brick proof. That is, no matter what firmware you try to shove into it, works or not, you can always hold down the top programmable button with the PTT button, power up the radio, and it will be in DFU - Download Firmware Update mode. That means it will always be able to accept a firmware update, even if the radio seems to be bricked. So, no worries about trying the experiment firmware.

Q: *Where do I get the Toolkit?*

A: You need to install a Virtual Machine that contains a very tiny installation of Linux. An image has been created for you so it is easy to get going. You can run it on your Windows or Mac OS machine. No Linux experience is needed. Go to this page on github, and read the page all the way down. You will find links to PDF files that explain how to install and operate the VM.

[\[https://github.com/KD4Z/md380tools-...\]](https://github.com/KD4Z/md380tools-...)

Q: *I'm a Linux person, can I just install this stuff on Linux?*

A: Sure! Go to the github page mentioned above and find the additional instructions for Native Linux installation. The Toolkit is mostly BASH scripts so the installation is very quick and lightweight. Yes, it runs perfectly on any version of the Raspberry Pi that has a network connection.

Q: *I just updated my radio for the first time with the firmware from the Toolkit or some other place, and now my radio backlight doesn't stay ON for very long, or always stays ON.*

A: You need to go into the Utility/ MD380tools / Display / Backlight menu and select values for ALL THREE menu options found there. Set the Level Low to "Lowest", Level High to "Highest", and Backlight Tmr to some value like 10 sec. Then, you can go back in and experiment with the values for your own needs.

Q: *In the VM, I get Device Not Found when I run any of the flash commands.*

A: Many things can cause this issue:

1. Did you first install the Tyt CPS program and it's USB drivers.
2. Did you check to see if Tyt CPS can read and write to your radio WITHOUT the VM running?
3. Did you finish installing the VirtualBox Extensions. (And REBOOT)
4. Did you check to see if the radio shows up under the VM toolbar menu for Devices / USB and it is check marked

¹ If your question is not answered in this tutorial, put your question on the Support group for The Toolkit:
<https://www.facebook.com/groups/KD4ZToolkit/>

Q: I've got the VM installed, ran `flash/flashgps` and `flashdb`, and I still see ID Unknown on the radio when someone talks.



A: You need to go into radio menu Utility/ MD380tools / Display / Show Calls, and choose either option 2- UserDB or 4 -TA or UserDB

Q: I ran `flash/flashgps` and now my radio screen is all white and doesn't do anything.

A: Did you verify if your radio has the GPS option? Some radios have them even though they look like ones that don't have one...and vice-versa. Look inside at the label under the battery. Often it will have "GPS" listed if it does have a GPS. Figure it out, then put the radio in DFU mode again and choose flash for NON-GPS radios, or `flashgps` for radios that have a GPS. Under no situations do you have to go back to the stock OEM firmware to fix this. If your aren't sure about the GPS option, just try the other flavor of the flash command and make a note to use that option in the future--if it works out.

Q: I installed "XYZ's firmware from abc123whatever.com, and now my radio reboots as soon as I turn it on.

A: Use the Toolkit firmware only.

Q: I used `flash/flashgps/flashdb` as appropriate and my radio reboots as soon as someone starts talking.

A: Likely, your `flashdb` command got interrupted by radio activity. As a general rule, ALWAYS practice "safe-flashing" when running any of the flash commands. This includes: Turn your radio to an "Unprogrammed Channel" before flashing. If you have a hotspot, turn it off so the radio won't hear anything while receiving data during the flash operation. Yes, this IS AN ISSUE! When you are sure the radio will not receive anything or be near another transmitter during the flash, run both the firmware (`flash` or `flashgps`) AND the `flashdb` commands again. Your radio should be fine after that. I always keep an unprogrammed channel somewhere in my Zones for this very purpose.

Q: I ran `glv` and some sort of errors came up about not being able to connect to "github.com" or "dmr-marc.com"

A: You need to figure out why you don't have Internet connectivity in the Virtual Machine. From the command prompt, you can run: `ping www.google.com` If you get replies from google, you are good. Use Ctrl+C to cancel the ping command.

Q: Does the Toolkit support other radio models like the MD-2017 dual-band radio?

A: Not yet. Only use the Toolkit for MD-380, MD-380G, MD-390, RT-3, and RT-8 radios.

Q: I don't like "xyz" about the experimental firmware. Can I go back to the OEM firmware?

A: Yes, but I have no idea why you would want to. Currently there is NO reason to go back to the OEM firmware.

More FAQ items will be added as I remember the most often occurring questions that come up in the Facebook Group.

Document history, Credits and Disclaimer / Copyright

Document history

Version	Date published	Author	Remarks
1.0	Dec 29, 2017	RvR	First publishing
1.0a	Dec 29, 2017	RvR / WM	Corrected some typo's
1.0b	Dec 30, 2017	RvR / WM	Added install notes for native Linux (Toolkit v3.xx only!) from Warren Merkel
1.0c	Jan 03, 2018	RvR	Added explanation SMS-mode, written by DL2MF (Mike)
1.0d	Jan 05, 2018	RvR / WM	Added Q&A, written by Warren.

RvR = Rob van Rheenen | PD0DIB
WM = Warren Merkel | KD4Z

Credits

Special Credits goes to:

- ❖ Travis Goodspeed & Friends for their continuously work on the “*Engine*” (MD380Tools)
- ❖ Warren Merkel (KD4Z) for his work to make the KD4Z Toolkit; a real toolkit for users to maintain their radio and makes it easy to use all the nice features (and more ..)
- ❖ Mike (DL2MF) for the *Enhanced Display code* and a lot more nice features in the “Engine” which are part of this Toolkit.

And credits to

- ❖ All members from the Facebook group for their “helping each other” support to the user community.
- ❖ KD4Z Toolkit Facebook Team to support this Toolkit

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