 Kilgore, TX	TYPE: Software Upgrade Procedure	NO: FCT-1378	REV: E
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READ THIS FIRST

This procedure for updating the firmware on the R8xxx has more steps than the standard method. Please read through the following procedure carefully before attempting to upgrade firmware. **This upgrade requires the use of a 4 GB (minimum) or 8 GB (recommended) USB drive.** The drive will be completely overwritten; **all data on the USB drive will be lost so it is recommended that a new drive be used.**

***** Tech support (903) 985-8999 Option 2, 2 *****

Purpose

This procedure upgrades the communications system analyzer software utilizing the "OS, FPGA, and Application Combo" method. R8xxx updates may be applied only to systems that match the version number listed as part of the update name. The downloaded ZIP file has the following nomenclature:

R8000_Update_AABBCCDD_to_EEFFGGHH.zip

AABBCCDD represents the System version number to be upgraded from as reported on the **Settings** button, About screen but in hexadecimal form.

EEFFGGHH represents the System version number to be upgraded to that will be reported on the About screen after the upgrade process is complete.

To read the version number from the file name understand that the decimal points have been removed and each of the four dot-delimited segments is represented by a two-digit zero-padded hexadecimal value.

Example: Version "1.2.15.0" becomes "01020F00" in the name of the upgrade ZIP file so an update from 1.2.15.0 to 1.2.16.0 will read:

R8000_Update_01020F00_to_01021000.zip


Once you verify that you have the correct upgrade for your unit, then verify you are using the correct procedure. Using a ZIP tool open the update file to view the top level. If at the top level you see a file with the name "rufus-2.17.exe", then this IS the correct procedure to use for this update. If you do NOT see a file name with "rufus," please contact technical support for help; see the product website SUPPORT page:

freedomcte.com/freedom-support/

This procedure must be performed in its entirety for the update to apply correctly.

It is recommended to read over the entire procedure before starting the process.

This upgrade requires the use of a 4 GB (minimum) or 8 GB (recommended) USB drive. Larger size USB drives can be used. The drive will be completely overwritten; all data on the USB drive will be lost.

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This procedure uses a third-party, open-source utility, Rufus (v.2.17), to write the downloaded drive image (ISO file) onto the USB drive. This software is released under the *GNU General Public License (GPL) version 3*. A copy of the executable is included in the downloaded ZIP file.

Upgrade Procedure Overview (Details to follow at STEP 1 on page 4)

- USB Drive Setup on PC
 - Download ZIP file and extract contents to PC
 - Open Rufus utility, configure and burn ISO image to USB drive
 - Verify upgrade USB drive readiness and eject from PC
- Instrument Upgrade
 - Start R8xxx upgrade process
 - Follow onscreen instructions
 - The USB will be plugged in and removed twice during upgrade
 - Remove USB drive; finish upgrade and cleanup

Conventions Used

Soft Key - Vertical and horizontal buttons along the edge of the communications system analyzer LCD screen.

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WARNING

PERFORM THESE STEPS WITH THE COMMUNICATION SYSTEM ANALYZER POWERED BY AN UNINTERRUPTABLE POWER SUPPLY (UPS). IF POWER IS LOST DURING AN UPDATE, IT IS POSSIBLE TO DAMAGE THE ANALYZER IN A MANNER THAT REQUIRES FACTORY REPAIR.

WARNING


THIS PROCEDURE REQUIRES A USB THUMB DRIVE WITH CERTAIN SECURITY FEATURES DISABLED (FOR EXAMPLE, PASSWORD PROTECTION). THE COMMUNICATION SYSTEM ANALYZER IS NOT CONFIGURED TO SUPPORT SUCH SECURITY FEATURES.

NOTE

THESE INSTRUCTIONS DESCRIBE UNPACKING A .ZIP FILE USING WINDOWS BUILT-IN ZIP FILE EXTRACTION. IF ANOTHER TOOL IS USED, SOME ACTIONS FOR THE PROCEDURE MAY NEED TO BE ADJUSTED.

WARNING

WHEN REMOVING A USB DRIVE FROM A COMPUTER, IT IS USUALLY CRITICAL TO USE A "SAFELY REMOVE HARDWARE" FEATURE TO PREVENT CORRUPTION OF FILES COPIED TO THE DEVICE.

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USB Drive Setup on PC

STEP 1: Download and Extract the USB Files

Download:

From the product website UPGRADES page

www.freedomcte.com/upgrades/

click the link labeled

R8XXX update <current version> to <new version>

to download the following file:

R8000_Update_AABBCCDD_to_EEFFGGHH.zip

Extract:


See Appendix A for help extracting the contents of the ZIP archive file.

The ZIP file contains two files:

- **R8000_Update_AABBCCDD_to_EEFFGGHH.iso** (image for USB drive)
- **Rufus-2.17.exe** (utility to burn the ISO file to USB drive)

Copy or extract these two files to a location of your choice **on the PC** and navigate to that location.

***** DO NOT PLACE THESE FILES ON THE USB DRIVE *****

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STEP 2: Burn the ISO File to the USB Drive.

NOTE: The Rufus utility will only run on Microsoft Windows. If you are using a different operating system, you will need to find and use an equivalent tool to burn the ISO file to the USB drive.


NOTE: It is recommended that a NEW (unused) USB drive be used for the upgrade process; see Appendix C for USB drive recommendations. If the USB drive has been used for an update in the past, it is recommended that it be re-formatted with "full format", not just "quick format".

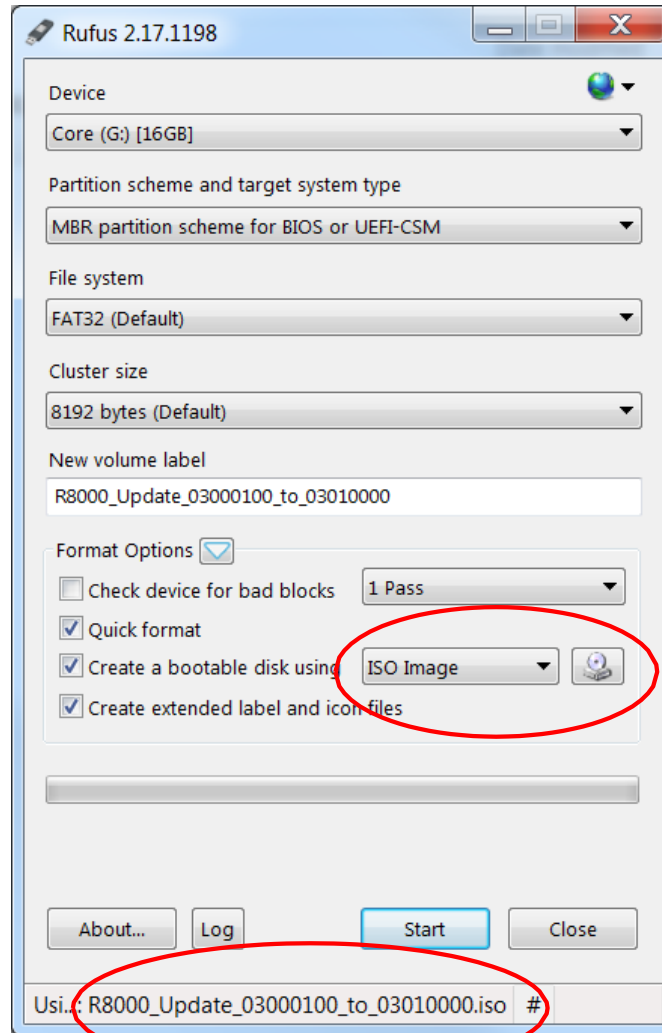
Open:

Plug the USB drive into the PC

Double-click on the "Rufus-2.17" file to start the Rufus utility. Depending on your operating system, you may be asked to allow the utility to run or to let it check for updates. Answer "YES" to run, but "NO" to check for updates.


The following window will appear:

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Configure:

- Device: Select the USB Drive you want to use for the upgrade
- Partition scheme and target system type: Select **MBR partition scheme for BIOS or UEFI-CSM**
- File system: Select **FAT32**
- Cluster size: Select **Default (The size may vary based on drive size)**
- New volume label: can be anything but will be ISO file name when selected
- Format Options:
 - [Unchecked] Check Device for Bad Blocks
 - [Checked] Quick Format

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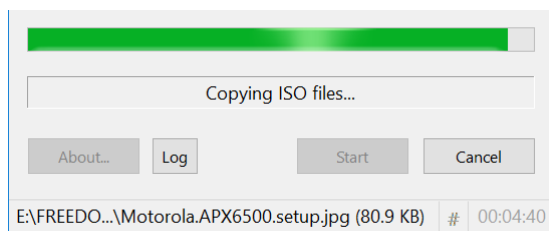
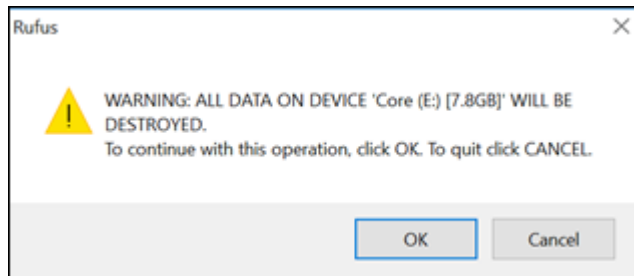
- **[Checked]** Create a bootable disk using **ISO Image**
 - Click the disk icon and select the update file just extracted from the ZIP: **R8000_Update_AABBCCDD_to_EEFFGGHH.iso**
- **[Checked]** Create extended label and icon files

IMPORTANT: Make sure the selection for "Create a bootable disk using" is **ISO Image** then "Click" the disk icon (to right of **ISO Image**) and select file: **R8000_Update_AABBCCDD_to_EEFFGGHH.iso**

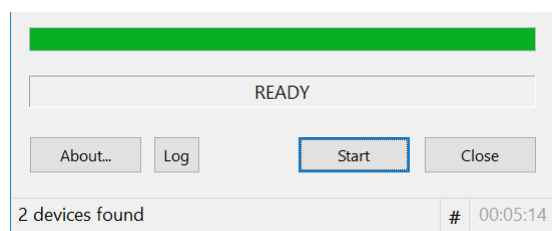
NOTE: Your Rufus application window should look like the image above with file name difference for version changes.

Burn:

After verifying all settings are correct, click **Start** to burn the ISO image onto the USB drive. You will be prompted to confirm you want to erase all files on the USB drive and replace them with the upgrade files.




In Progress...



...Complete.

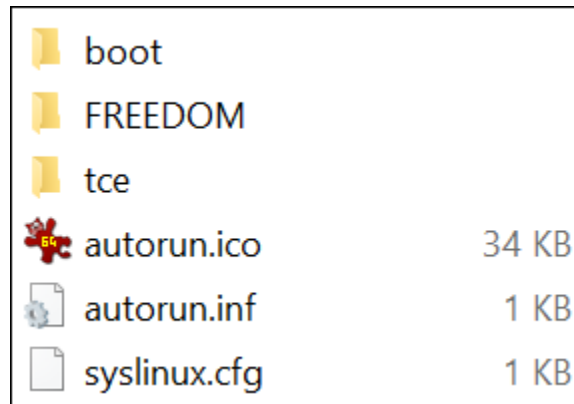
Click **Close** to exit Rufus utility.

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STEP 3: Verify the Update USB Drive and Eject.

Verify:

Open the USB drive in File Explorer to view its contents. The USB drive root directory should look like the following image:



NOTE: A few more directories may be seen at this level, like "FOUND.000" and "System Volume Information". These will not affect the update.

NOTE: This USB is being built as a "bootable" USB. Some PCs or Laptops may have security software to prevent the creation of a bootable USB. If your PC has this software or if you are using a "secure" USB you may need to build this USB on a non-secured computer/USB drive.


Eject:

Use "Safely Remove Hardware" controls to when ready to remove the USB drive from the computer. Details on how to do this vary by operating system and desktop configuration. For non-Windows operating systems, this is sometimes referred to as "unmounting" or "ejecting" the media. Refer to **Appendix B** for some examples how to "Safely Remove Hardware" on a PC that has one of several Microsoft Windows operating systems installed.

Unplug the USB drive from the PC. USB drive preparation is complete. Proceed with instrument upgrade.

CAUTION: In this state, the USB drive is a bootable drive that should only be used to upgrade an R8XXX. DO NOT boot from this drive on a PC. This may result in data loss on the PC.

NOTE: After use, this USB drive should be formatted to make it non-bootable and safe to use for other purposes.

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Instrument Upgrade

1. Power up the analyzer using the green **Power** button.
2. Wait approximately one minute for the analyzer boot sequence to complete. While the product is booting a "Loading Configuration File... Please Wait" message is shown in the product display status bar. Do not proceed to the next step until the message disappears from the status bar.
3. Insert a USB drive prepared using the "USB Drive Setup on PC" procedure into an available USB port located on the side or front of the analyzer.
4. Wait about 30 seconds to allow the analyzer to identify the USB drive.
5. Press the blue **Settings** button located on the analyzer front panel.
6. Press the "**About...**" soft key.
7. Verify that the current "System" version is the one to be upgraded from (i.e. the decimal form of AABBCDD).
8. Press the "**Search for Updates**" soft key.

- a. An "Action Required" message panel is shown.

If the message panel is not shown, either the analyzer does not recognize that the USB drive is installed, or the USB drive preparation described in the "USB Drive Setup on PC" section was not successful. In some cases, using a different brand or model of USB drive may be helpful.


- b. IF the screen indicates that an Update was found, then Press the "Continue" soft key to proceed with the update process.

NOTE: From this point forward the most important instructions are shown on the R8xxx display. Do not remove the USB drive until prompted then only reconnect the USB drive when prompted again. Follow the onscreen instructions exactly. The following text is supporting information.

- c. Wait for a second "Action Required" message panel to be shown after the update files have transferred from the USB drive to the analyzer.

During this time, the standard operating menu is visible. While it may appear that the system is not processing the update, there is no need to navigate away from the settings screen or to press additional controls.

IMPORTANT: USB drive light activity ceases prior to completion of the transfer. Do not assume that the transfer has failed if the second panel does

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not appear immediately after the drive appears inactive.

If the panel fails to appear, a file on the USB drive is corrupt, or could not be processed, a red status bar ": code = <x>" message appears.

The update procedure must be restarted if the transfer fails. It may be sufficient to re-run the "USB Drive Setup on PC" procedure using files previously obtained from the web site, but it may be necessary to download the files again if they are corrupted. In some cases, use of a different brand or model of USB drive may be helpful.

- d. Unplug all USB devices from the analyzer when told on screen.
- e. Press the "**Continue**" soft key to apply the update.
- f. The analyzer automatically reboots twice and then displays an "Upgrade in progress..." message. Wait as the system software upgrade continues. It is important to follow any on-screen instructions. **DO NOT POWER DOWN UNIT** unless instructed by on-screen prompts.

The following section is unique in this upgrade.

Please proceed step-by-step to avoid confusion or errors.


9. A prompt appears requesting that the USB drive be reinserted. Plug the USB into the unit at this request. An "Ok" button is displayed. Press the **Enter** button on the front of the unit to continue.
10. The unit will reboot into Linux and copy the update to the unit.
11. A prompt will appear indicating the USB drive should be removed. The unit will auto-detect that the USB drive is gone and will reboot.

This concludes the unique instructions.

12. The screen will display an "Upgrade in progress..." message.

If there is an FPGA configuration device update in this release the unit will display information about the firmware update and display a percentage indicating its progress. The process takes about eight minutes. During this phase, all indicators on the system will light up. When finished, on-screen instructions will tell the user to "Hold" down the **Power** button until the unit turns off. Once the unit is off, press the **Power** button to turn the unit back on. The upgrade will then proceed as normal.

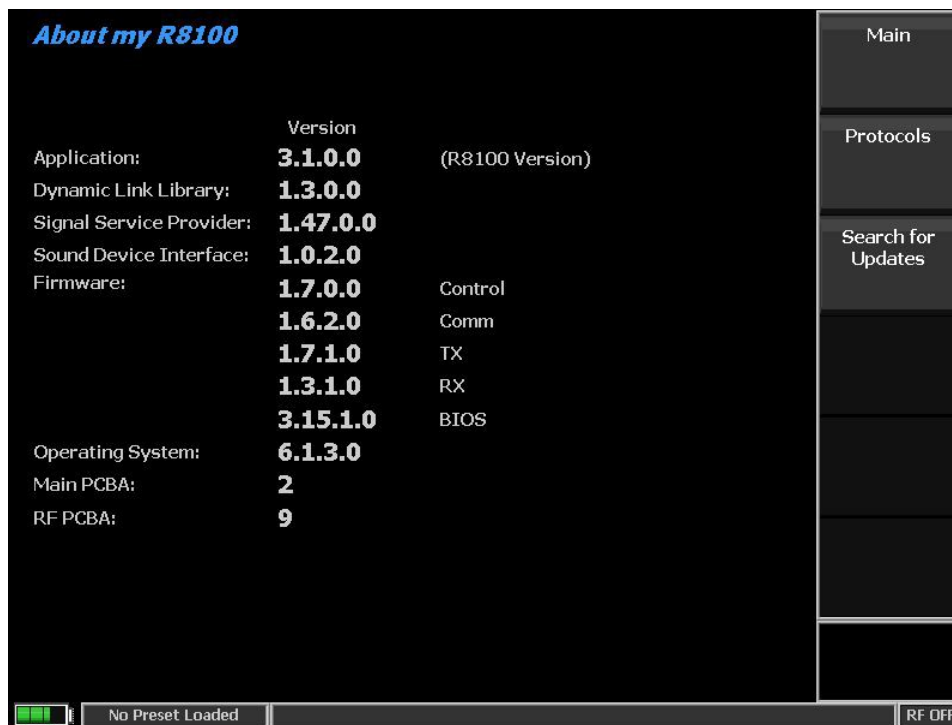
13. Wait for the system software upgrade to complete. The unit reboots during this process. The product has finished rebooting and the upgrade is complete after

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the analyzer displays the standard user interface and resumes normal operation.


While the product is resuming operation, a "Loading Configuration File... Please Wait" message is shown in the product display status bar. Do not proceed to the next step until the message disappears from the status bar.

14. Press the blue **Settings** button.
15. Press the "**About...**" soft key.
16. Verify that the "System" version has changed to <new version>.
17. Press the "**Versions**" soft-key and review the list of versions. The list below is just an example; your BIOS and PCBA numbers may vary based on instrument hardware:



NOTE: If any version number is "0.0.0.0", an additional reboot may be required to return the unit to normal operation.


18. The upgrade is complete.
19. You may use the USB to upgrade multiple instruments.
20. Once you are done with the USB drive, place it in the PC, right click the drive, and format it. This step will allow you to use the drive for other purposes.

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If you should need technical assistance before, during, or after this upgrade, please call our Technical Support hotline at (903) 985-8999 and select Option 2 "Product Support" followed by Option 2 "Technical Support." (Option 1 will connect you with our Service Department if you need calibration or repair services.)

For urgent support:

- West: Doyle Wofford +1 (602) 721-5889
- East: Barry Webster +1 (410) 852-4267
- Asia: Keith Yeo +65 (9155) 1168
- Latin America: Jose Julio +55 11 949 703 643

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Appendix A: Extracting Files from a ZIP Archive

The procedure for extracting files from the .zip file varies from system to system, particularly when a third-party archive/unarchive tool is installed, but for reference, several .zip extraction scenarios using a built-in Windows file extraction tool are documented below:

Windows 10 / Windows 8.1


- Select "R8000_Update_AABBCCDD_to_EEFFGGHH.zip" by clicking it once. A Compressed Folder Tools "Extract" menu ribbon should appear but if "Extract all" is not visible then click the "Extract" menu tab to reveal it.
- Click "Extract all" in the "Extract" menu ribbon.
- When an "Extract Compressed (Zipped) Folders" pop-up appears, modify the path that appears in an edit box below "Files will be extracted to this folder." Select a folder location on the PC where the files will be used in the next step.
- Check "Show extracted files when complete", then click the "Extract" button at the bottom of the pop-up window.

Windows 7


- Either right-click "R8000_Update_AABBCCDD_to_EEFFGGHH.zip" and select "Extract all...", or, double-click the .zip file and click "Extract all files" on the task ribbon beneath the title bar. Alternatively, use "File" | "Extract all..." from the command menu next to the title bar. The <Alt> key toggles visibility of the command menu.
- When an "Extract Compressed (Zipped) Folders" pop-up appears, modify the path that appears in an edit box below "Files will be extracted to this folder." Select a folder location on the PC where the files will be used in the next step.
- Check "Show extracted files when complete", then click the "Extract" button at the bottom of the pop-up window.

Windows XP

- Double-click "R8000_Update_AABBCCDD_to_EEFFGGHH.zip" to reveal "Folder Tasks" in the explorer window.
- If "Folder Tasks" appears, click "Extract all files". Alternatively, use "File" | "Extract All..." from the command menu.
- When the "Compressed Folders Extraction Wizard" appears, click the "Next" button.

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- In the window called "Extraction Wizard", click the "Browse" button and select a folder location on the PC where the files will be used in the next step.
- Press the "OK" button.
- Press "Next" (to extract the files to the USB drive).
- Ensure that the "Show extracted files" checkbox is checked. Press the "Finish" button.

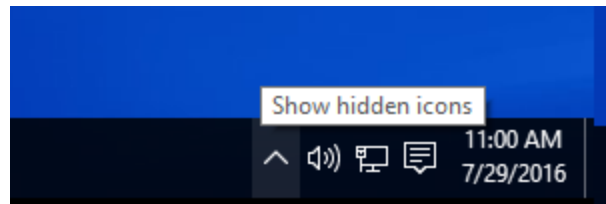
 Kilgore, TX	TYPE: Software Upgrade Procedure	NO: FCT-1378	REV: E
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Appendix B: Safely Remove Hardware Examples

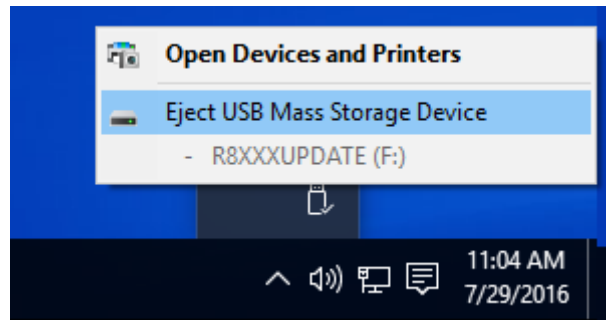
Examples of safe removal of USB storage are provided below, but the procedure can vary significantly per installed operating system and desktop configuration.

Windows 10

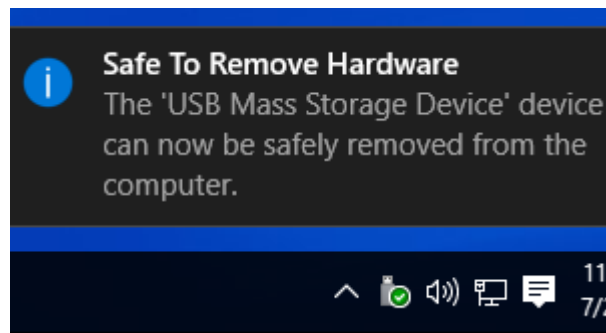
As needed, move the mouse pointer over a "Show hidden icons" widget, then click the icon to expose the "Safely Remove Hardware and Eject Media" icon.



Move the mouse pointer over the "Eject USB Mass Storage Device" widget for the drive letter of the USB media, then click it.

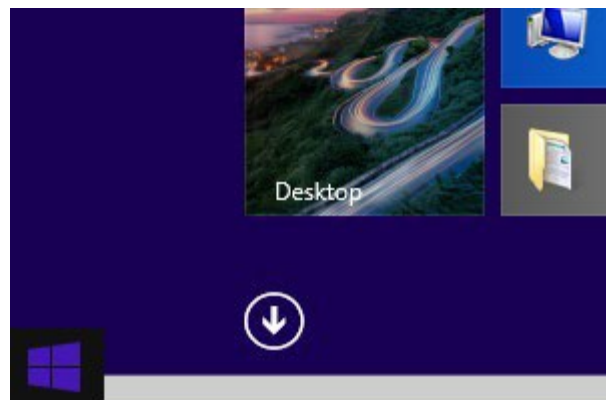



Wait for a "Safe To Remove Hardware" notification near the "Safely Remove Hardware and Eject Media" icon.



Windows 8.1

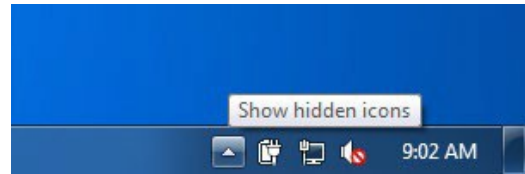
On Windows 8.1, an extra step may be needed to show the start bar where the system tray is found. Either use the keyboard Windows key to select a desktop with a start bar or swipe the mouse pointer to the lower left corner of the desktop to reveal a Windows button that, when clicked, acts like the keyboard Windows key.



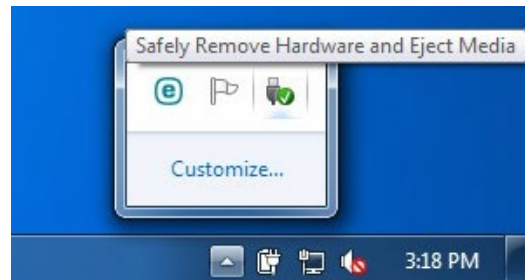
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Windows 7 / 8.1

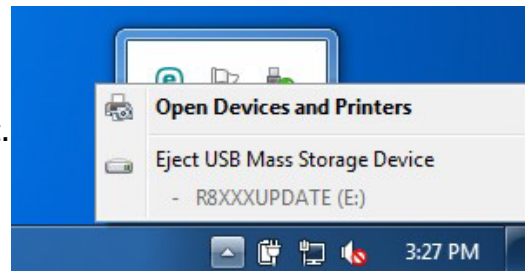
As needed, move the mouse pointer over a "Show hidden icons" widget, then click the icon to expose the "Safely Remove Hardware and Eject Media" icon.



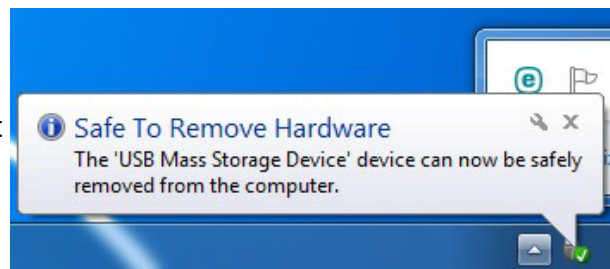
Move the mouse pointer over the "Safely Remove Hardware and Eject Media" icon, click it to expose an "Eject USB Mass Storage Device" widget.



Move the mouse pointer over the "Eject USB Mass Storage Device" widget for the drive letter of the USB media, then click it.



Wait for a "Safe To Remove Hardware" notification near the "Safely Remove Hardware and Eject Media" icon.




Windows XP

As needed, move the mouse pointer over a "Show hidden icons" widget, then click the icon to expose the "Safely Remove Hardware" icon.



Move the mouse pointer over the "Safely remove Hardware" icon, click it to expose a "Safely remove USB Mass Storage Device" widget.




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Move the mouse pointer over the "Safely remove USB Mass Storage Device" widget that mentions the drive letter of the USB media, then click it.

Wait for a "Safe to Remove Hardware" notification near the "Safely remove Hardware" icon.



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Appendix C: Troubleshooting and Recommendations

While many USB drives that meet the required specifications may work, the following drives have been found to work well:

- SanDisk Cruzer Glide 16GB
- SanDisk Ultra 32 GB USB 3.0
- ONA 16AA016
- DataStick Pro 8GB by Centon

The following drives have been noted to cause issue when used in this procedure:

- Memorex 32GB
- PNY 16GB USB 3.0

If an update failure is encountered when using a particular USB drive, possible resolutions are:

1. Try recreating the update on the USB drive using a **full drive format** (not quick formatting).
2. Try applying the update using a different make of USB drive (see list above for recommendations).

A notable error message that may be encountered during an update, "No Caching Mode Page Found", may often be remedied by attempting the above resolutions.

E – Misc. improvements	D. Bulgrien	C. Cox	8/30/2023	0426
D – Misc. fixes/improvements	D. Bulgrien	M. Mullins	7/13/2022	0406
C – Misc. fixes/improvements	D. Bulgrien	M. Mullins	9/10/2021	0375
B – Appendix C	M. Humphries	M. Humphries	11/9/2020	0323
A – Initial Release	M. Mullins	M. Humphries	10/30/2020	0322
Revision – Change	Requested By	Approved By	Rel. Date	ECO#