Davis Remmel

# *reMarkable Connection Utility*

All-in-One Offline Tablet Management

User Manual

reMarkable Connection Utility User Manual
Version r2020.003

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# *Preface*

You may have seen my work in the reMarkable tablet hacking community. I'm the one who added a microSD card to the tablet, then later installed a desktop GNU/Linux environment. My efforts focus on making the device usable in a general computing context.

This software, reMarkable Connection Utility (RCU), unshackles its users from reMarkable's proprietary cloud. The benefits are numerous: backups are low-level and full, personal notes never leave the owner's control, users may personalize their device, and the author is responsive to the needs of the community. These are things the manufacturer won't provide.

Unlike restrictive black-box software, RCU gives its users *freedom*. Under the terms of its license, the GNU GPLv3, users hold the freedom to use it for any purpose, read the source code, modify it, share it with whomever they wish, or even re-sell it—as long as they pass forward these same freedoms. This viral licensing forms a web of non-restrictive (*free*) software, leading the world toward transparency and trust, precipitating software *rights*.

If you are a privacy-minded individual who wants to support independent software development that represents the needs of the tablet's community, please buy RCU. The funds generated will support me through writing a non-proprietary handwriting recognition engine, eventually authoring "magic paper" software influenced by Dynabook.

I would greatly appreciate your purchase; thank you.

Davis Remmel
Author of RCU

# *ii* *Support Information*

This manual, and the RCU software, are available online from the official project page.

## ii.1 General Support

Customers of RCU's original author are entitled to some email support. The author will try his best to satisfy each customer. Please write an email using the following header fields. Please reference the PayPal transaction ID in the message body.

To: Davis Remmel <d@visr.me>
Subject: RCU Support

## ii.2 Getting Updates

Updates for RCU are announced via email to eligible customers; the program will not update automatically. People who buy RCU from the author will receive updates for one year. The program will never stop working; updates provide improvements, but a user can never be locked out of the software they own.

Recipients may unsubscribe from update announcements by sending an email to the author using the following header fields. Please reference the PayPal transaction ID in the message body.

To: Davis Remmel <d@visr.me>
Subject: Unsubscribe from RCU Update Announcements

## ii.3 Bug Reporting

For advanced users who can identify a fault with the program, please submit a bug report via email with the following header fields. In the message body, please include: (a) a description of what is seen when using the program, (b) what is expected to be seen when using the program, (c) steps to reproduce the problem, and (d) information about the operating system and RCU version number (found in the About Pane).

To: Davis Remmel <d@visr.me>
Subject: RCU Bug: *Short description of problem*

# 1 Introduction

RCU allows complete offline management of a reMarkable tablet, without the need to connect with the manufacturer's proprietary cloud.

## 1.1 Compatibility

| | |
|---|---|
| Hardware | RM100, RM102 (reMarkable 1) |
| Software[1] [2] | 1.8.1.1–2.3.0.16 |
| PC | FreeBSD 12.1, Ubuntu 18.04, macOS 10.13, Windows 10 |

## 1.2 System Requirements

RCU will likely run on any computer manufactured after 2005. It requires approximately 100 megabytes of disk space, and may use up to 250 megabytes of memory.

## 1.3 Running RCU

RCU may connect to a tablet by USB or Wi-Fi. During periods of data transfer, never disconnect the tablet; doing so may result in a corrupted transfer. It is possible to upload a Recovery OS with RCU, which provides an emergency SSH connection over USB and allows the user to take or restore backups.

RCU is distributed as a single binary package. It does not need to be installed and will run from any directory. Running RCU is as easy as double-clicking on its executable icon.

The program will run with a console window open. This will print debug information. If something goes wrong, please let the author know, giving the information in this console window.

## 1.4 Entering Recovery Mode

The tablet may be placed into a recovery/flash mode with this sequence. If necessary, RCU can make and restore backups without there being a functional operating system. This mode is also necessary to install the Windows *libusb* driver.

1. Turn the device off.
2. Hold the middle facial button while turning the device on with the power button.
3. Continue holding the middle facial button for five seconds. The display will not update, but it is on.
4. The tablet should appear on the PC as *SE Blank MERGEZ*. It is now in recovery mode.

When done, restart the tablet by holding the power button for 10 seconds; release, then press the power button to turn it on normally.

[1] This version is likely compatible with reMarkable 2 (except backup/restore) but is untested.

[2] RCU is tested less-frequently in proprietary operating systems.

## 1.5 Notes about GNU/Linux

In order to use the backup and restore functions in RCU, GNU/Linux hosts must grant read and write access to the tablet via *udev*. While in recovery mode, the tablet appears as a different USB device than normal operation.

Create a new udev ruleset at */etc/udev/rules.d/50-remarkable.rules*, as shown in Figure 1.1. Replace the *GROUP* attribute with a group belonging to the host's user. After creating this file, reboot the host computer.

```
SUBSYSTEM=="usb", ATTRS{idVendor}=="15a2", ATTRS{idProduct}=="0061", \
  MODE="0660", GROUP="yourgroup"
SUBSYSTEM=="usb", ATTRS{idVendor}=="15a2", ATTRS{idProduct}=="0063", \
  MODE="0660", GROUP="yourgroup"
```

Figure 1.1: */etc/udev/rules.d/50-remarkable.rules*

### Running on non-Ubuntu GNU/Linux

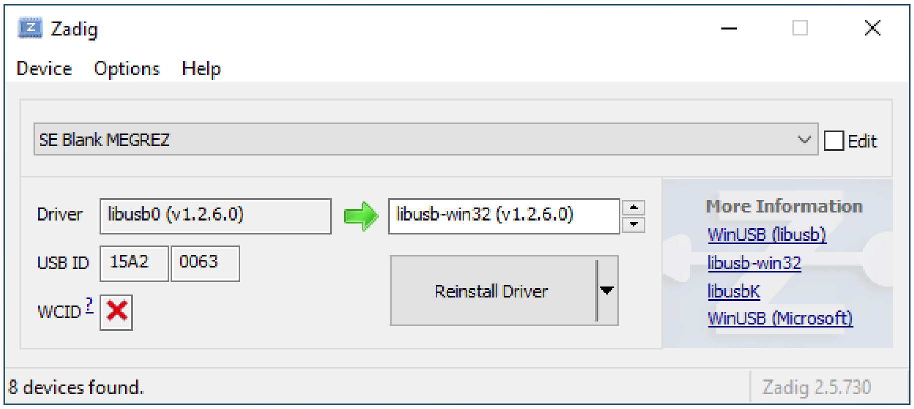
Officially, RCU is bulit for Ubuntu 18.04. However, other operating systems have been reported to work. The most-common problem that results is because PySide2 (Qt) targets a different version of *glibc*, forming symbol lookup errors.

A user that cannot run the Ubuntu-targeted binary may need to buld their own, or run the program from source. This is covered in Running from Source and Building a Release Binary.

## 1.6 Notes about Windows

RCU uses a USB interface library called *libusb*. In Windows, a driver must be installed to use the backup and restore features. Distributed with the RCU binary is a copy of Zadig, a utility that makes it simple to install this driver. First, the tablet must first be placed into recovery mode, which will appear as a new type of USB device.

1. Connect the tablet to a PC with USB.
2. Put the tablet into recovery mode by following the steps in Entering Recovery Mode.
3. Open Zadig
   a) From the *Options* menu, enable *List All Devices*.
   b) In the device list, select *SE Blank MERGEZ*.
   c) Set the driver target to *libusb-win32*.
   d) Click *Install Driver* and wait for it to complete.
4. Hold the tablet's power button for 10 seconds; release, and press it again to turn the tablet on normally.
5. Reboot the PC



SE Blank MEGREZ ☐ Edit

Driver libusb0 (v1.2.6.0) → libusb-win32 (v1.2.6.0)

USB ID 15A2 0063

WCID ? ✗

8 devices found.

Zadig 2.5.730

Figure 1.2: Installing the *libusb* driver for Windows

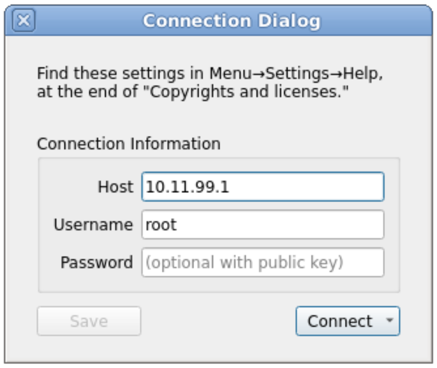
# 2 Basic Operation

RCU is organized into separate panes, each handling a dedicated task. Panes may be switched by clicking on their titles in the left sidebar.

## 2.1 Connection Dialog

When RCU is launched, it will show the Connection Dialog. The user must enter the information used to connect to their tablet. These configuration settings may persist by clicking the Save button. Clicking the Connect button will initiate a connection to the device[1] and load the Panes window.

Figure 2.1 shows the Connection Dialog window.



Find these settings in Menu→Settings→Help, at the end of "Copyrights and licenses."

Connection Information

Host 10.11.99.1

Username root

Password (optional with public key)

Figure 2.1: Connection Dialog

If a user finds themselves with an unresponsive tablet, they may place their device into a recovery mode by holding down the home button while pressing the power button. Expand the *Connect* button by pressing the arrow, then click *Enter Recovery OS* (Figure 2.2) to boot over USB.[2]

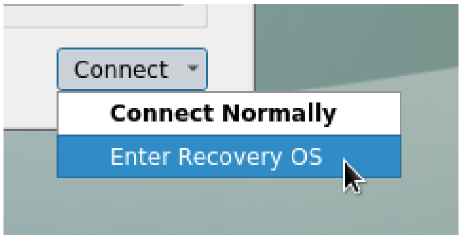


Figure 2.2: Enter Recovery OS

[1] RCU uses SSH for all its communication with the tablet.

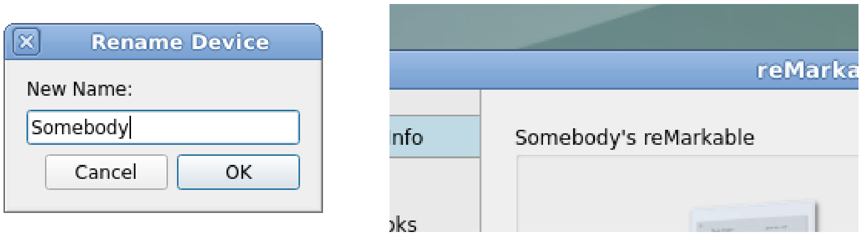
[2] If the tablet has previously loaded the recovery OS, clicking this menu item will enter the existing recovery session.

## 2.2 Device Info Pane

This pane shows the user basic information about their tablet, and allows the creation and restoring of tablet backups.

### Rename

An owner may sign their name to their tablet using the Rename button. This will change the the label from reading *Connected reMarkable* to *Name's reMarkable* in the Device Info Pane. This name will also be used as the author when generating PDF annotations.



New Name: Somebody

Somebody's reMarkable

Figure 2.3: Entering a new device name

### Backups

There are three backup types: OS-only, Data-only, and Full. Backups may only be taken or restored through a USB connection. Only Full backups may be used to restore a bricked device.

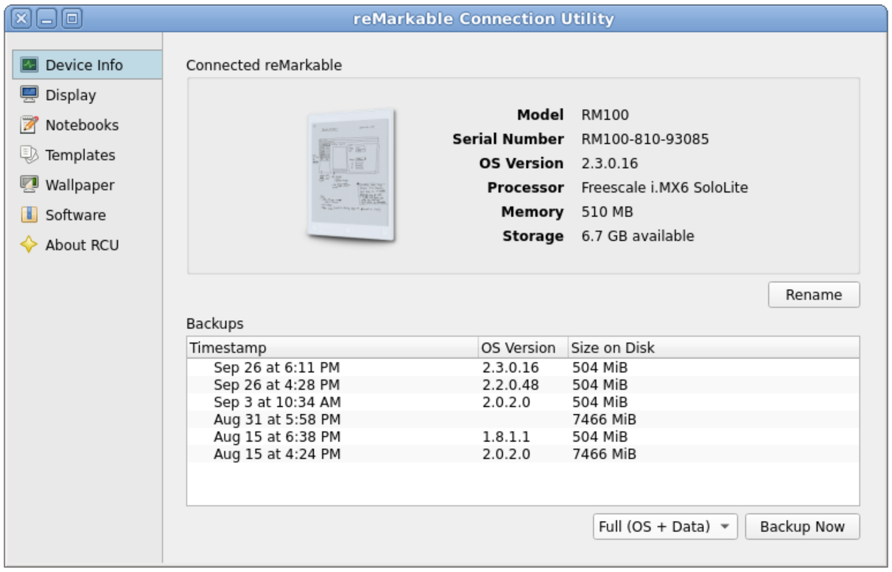
OS backups will restore the operating system partitions to the tablet's internal storage. These cannot be used to restore a bricked device. If a user applies an undesired OS update to their tablet, an OS backup may be used to downgrade to the prior OS without losing data. However, there can be no guarantee the data will remain compatible with the old OS image, such as when reMarkable's system software was updated from version 1 to 2. A copy of the bootloader is captured with an OS backup.

Data backups will restore the data partition, where documents reside, to the tablet's internal storage. They will not affect the operating system partitions, and are best used to revert a bulk of documents to an earlier state.

Full backups, as seen in Figure 2.5, may be used to restore a bricked device should the need ever arise. They require the most storage space on the client PC because they contain a complete mirror of the tablet's internal storage. A Full backup may be restored completely, or used to restore only the OS, or used to restore only the Data, or used to restore the bootloader.

The backups created in this pane are block-level, not file-level, meaning they may only be restored to the device as they were taken. Although it is possible for advanced users to extract individual files from these backups, RCU cannot. If a user finds themselves in this situation, they may refer to the Backup Archive Format.

A custom backup directory may be set by modifying the *share_path* variable in RCU's settings (see Release Notes for OS-specific locations).



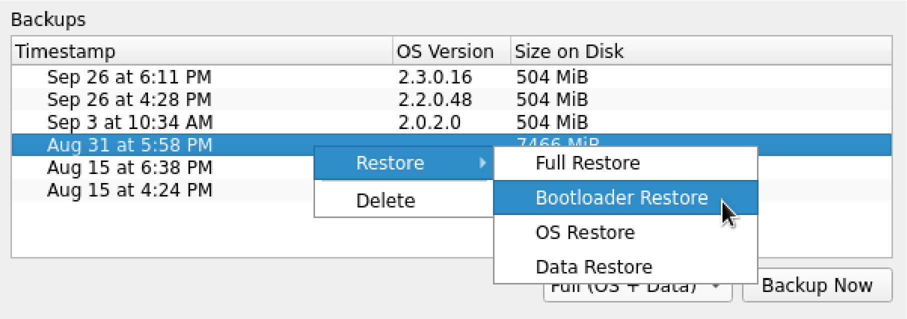
Connected reMarkable

| | |
|---|---|
| **Model** | RM100 |
| **Serial Number** | RM100-810-93085 |
| **OS Version** | 2.3.0.16 |
| **Processor** | Freescale i.MX6 SoloLite |
| **Memory** | 510 MB |
| **Storage** | 6.7 GB available |

Backups

| Timestamp | OS Version | Size on Disk |
|---|---|---|
| Sep 26 at 6:11 PM | 2.3.0.16 | 504 MiB |
| Sep 26 at 4:28 PM | 2.2.0.48 | 504 MiB |
| Sep 3 at 10:34 AM | 2.0.2.0 | 504 MiB |
| Aug 31 at 5:58 PM | | 7466 MiB |
| Aug 15 at 6:38 PM | 1.8.1.1 | 504 MiB |
| Aug 15 at 4:24 PM | 2.0.2.0 | 7466 MiB |

Figure 2.4: Device Info Pane



Backups

| Timestamp | OS Version | Size on Disk |
|---|---|---|
| Sep 26 at 6:11 PM | 2.3.0.16 | 504 MiB |
| Sep 26 at 4:28 PM | 2.2.0.48 | 504 MiB |
| Sep 3 at 10:34 AM | 2.0.2.0 | 504 MiB |
| Aug 31 at 5:58 PM | | 7466 MiB |
| Aug 15 at 6:38 PM | | |
| Aug 15 at 4:24 PM | | |

Figure 2.5: A Full backup may be restored completely, only the bootloader, only the OS partitions, or only the Data partition.

## 2.3 Display Pane

A user may capture screenshots of their tablet through the Display Pane. Press the Refresh button to preview the screen, then press the Save Screenshot button to record the image[3] to disk.

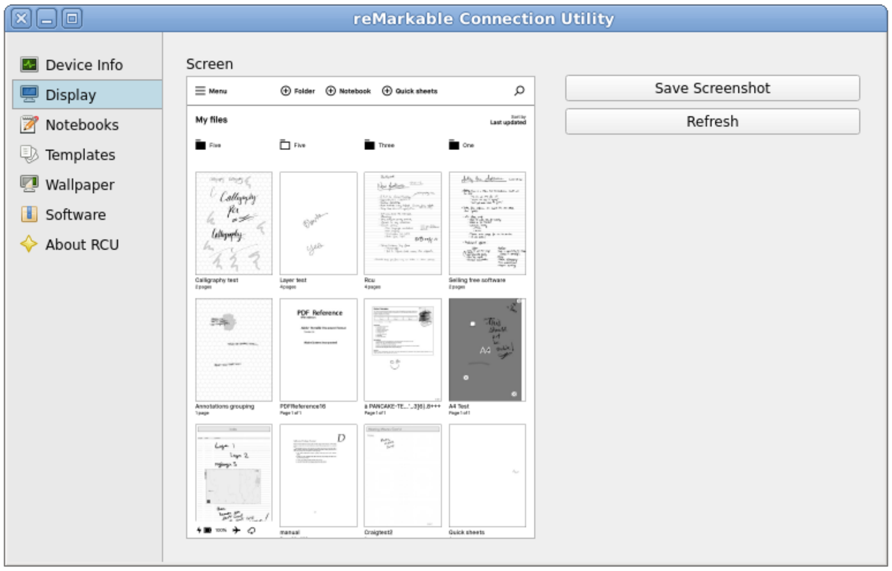


Figure 2.6: Display Pane

[3] Although the tablet's framebuffer encodes the image as 16-bit RGB (RGB565), it is saved to disk as an 8-bit grayscale PNG.

## 2.4 Notebooks Pane

Documents may be transmitted between a tablet and PC through the Notebooks Pane. The default download type is a reMarkable Notebook Archive (RMN) because it can perfectly restore notebooks and their templates[4].

Documents may be uploaded to the device as RMN, PDF, or EPUB files. Click the Upload button to select the file(s) to upload.

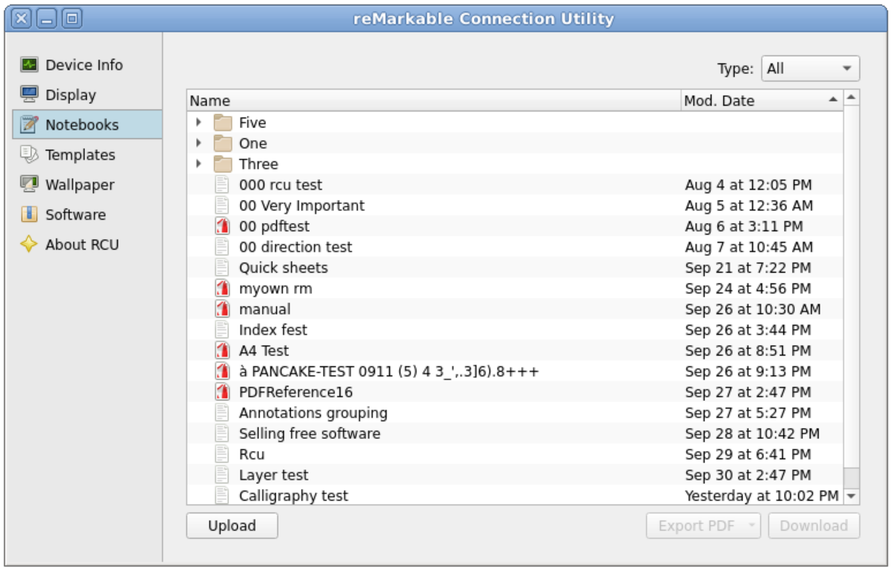
Documents may be downloaded from the device as RMN or PDF files. It is recommended to archive notebooks with the RMN format because they are lossless, containing all the information needed to recreate a PDF. When downloading a single file, it may be renamed before it is saved. When downloading files as a batch the user must select a directory to save them in. When exporting a batch, if identically-named files already exist in the target directory, they will be overwritten.

Various style options may be found inside the Export PDF menu by clicking that button's arrow. A user may change the ink colors, choose to export PDFs with semantic highlight annotations, choose to export PDFs with layers (named after each document layer on the reMarkable), and choose to open exported PDFs immediately.

Deleting documents is performed in the tree view through a contextual menu. Right-click on an item, then click Delete. The user is prompted for confirmation, then the document is permanantly deleted.

Documents may be re-organized by dragging and dropping them into the desired collections.

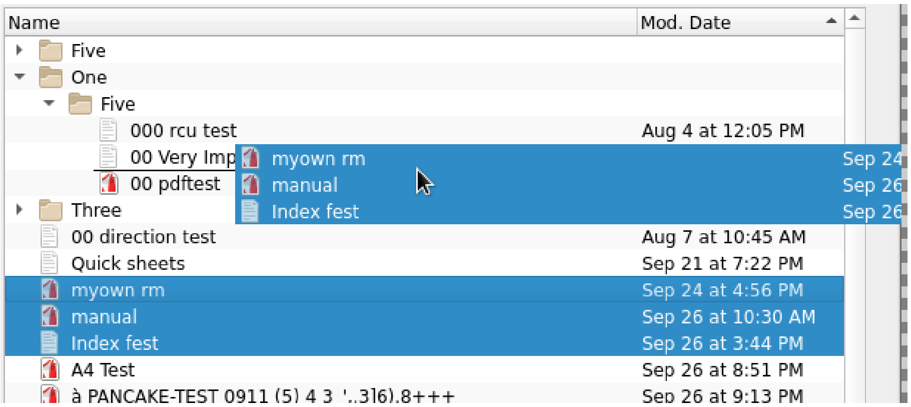
The Notebooks Pane will automatically refresh when changes are made on the tablet. If one thinks the view is not updating properly, they may press Ctrl+R or F5 to force a refresh of notebook data.



| Name | Mod. Date |
|---|---|
| Five | |
| One | |
| Three | |
| 000 rcu test | Aug 4 at 12:05 PM |
| 00 Very Important | Aug 5 at 12:36 AM |
| 00 pdftest | Aug 6 at 3:11 PM |
| 00 direction test | Aug 7 at 10:45 AM |
| Quick sheets | Sep 21 at 7:22 PM |
| myown rm | Sep 24 at 4:56 PM |
| manual | Sep 26 at 10:30 AM |
| Index fest | Sep 26 at 3:44 PM |
| A4 Test | Sep 26 at 8:51 PM |
| à PANCAKE-TEST 0911 (5) 4 3_',.3]6).8+++ | Sep 26 at 9:13 PM |
| PDFReference16 | Sep 27 at 2:47 PM |
| Annotations grouping | Sep 27 at 5:27 PM |
| Selling free software | Sep 28 at 10:42 PM |
| Rcu | Sep 29 at 6:41 PM |
| Layer test | Sep 30 at 2:47 PM |
| Calligraphy test | Yesterday at 10:02 PM |

Figure 2.7: Notebooks Pane

[4] Information about the RMN format may be found under Notebook Archive Format.



| Name | Mod. Date |
|---|---|
| Five | |
| One | |
| Five | |
| 000 rcu test | Aug 4 at 12:05 PM |
| 00 Very Imp | |
| 00 pdftest | |
| Three | |
| 00 direction test | Aug 7 at 10:45 AM |
| Quick sheets | Sep 21 at 7:22 PM |
| myown rm | Sep 24 at 4:56 PM |
| manual | Sep 26 at 10:30 AM |
| Index fest | Sep 26 at 3:44 PM |
| A4 Test | Sep 26 at 8:51 PM |
| à PANCAKE-TEST 0911 (5) 4 3 '..3]6).8+++ | Sep 26 at 9:13 PM |

Figure 2.8: Documents may be organized by dragging and dropping between collections.

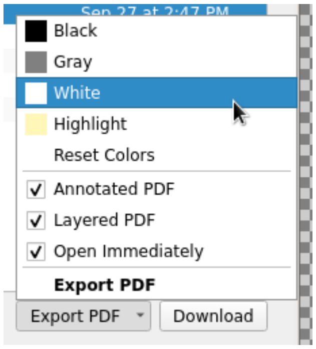


Figure 2.9: PDFs may be exported with various options, like ink colors and annotations.

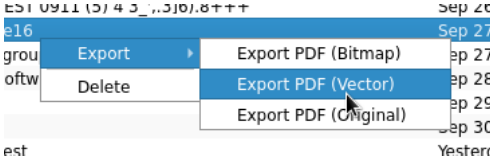


Figure 2.10: Bitmap, Vector, and Original PDF documents may be exported.

## 2.5 Templates Pane

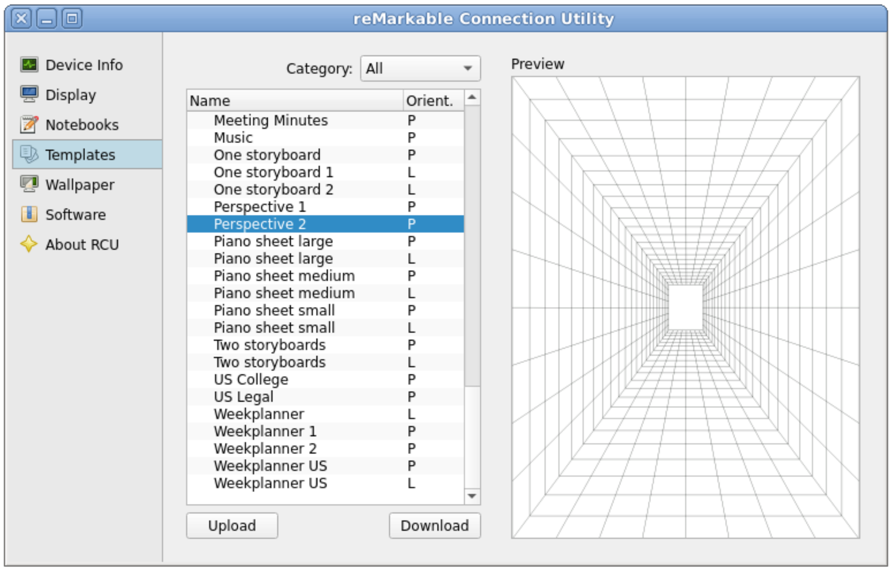
Users may add or remove their own templates in the reMarkable Template Archive (RMT) format. RCU will not accept templates in PNG or other image-based formats.[5] For information about how to make an RMT, please read the Template Archive Format. It is easy, being a tape archive (.tar) of an SVG and a JSON file.

Add a template to the tablet by clicking the Upload button, then selecting an RMT file.

Download a template from the tablet by selecting one in the list view, clicking the Download button, then choosing a filename to save.

Delete a template from the tablet through a contextual menu by right-clicking a template in the list view, then clicking Delete. After confirmation, RCU will permanantly delete the template from the device.

Template are installed to the user's home directory, in *~/.local/share/remarkable/templates*. Softlinks are created where the system templates are stored, in */usr/share/remarkable/templates*. A system update may remove these links, and the templates will not load in the tablet's interface. If the user previously installed custom templates using RCU, this situation will be detected, the program will alert the user, and the template links may be restored automatically.



Category: All

| Name | Orient. |
|---|---|
| Meeting Minutes | P |
| Music | P |
| One storyboard | P |
| One storyboard 1 | L |
| One storyboard 2 | L |
| Perspective 1 | P |
| Perspective 2 | P |
| Piano sheet large | P |
| Piano sheet large | L |
| Piano sheet medium | P |
| Piano sheet medium | L |
| Piano sheet small | P |
| Piano sheet small | L |
| Two storyboards | P |
| Two storyboards | L |
| US College | P |
| US Legal | P |
| Weekplanner | L |
| Weekplanner 1 | P |
| Weekplanner 2 | P |
| Weekplanner US | P |
| Weekplanner US | L |

Figure 2.11: Templates Pane

[5] A future update will allow the user to upload images in these formats directly.

## 2.6 Wallpaper Pane

Device wallpapers[6] may be changed for the Suspend and Poweroff screens. It is recommended these images have a resolution of 1404×1872 pixels, and must be in the PNG format.

The Suspend screen displays when a user presses the top (physical) button of the device. Users may update this wallpaper by clicking the Upload button (beneath the Suspend label), then selecting a PNG image.

The Poweroff screen displays when a user holds the top (physical) button of the device. Users may update this wallpaper by clicking the Upload button (beneath the Power Off label), then selecting a PNG image.

Images may be reset to the factory-defaults by clicking the Reset button.

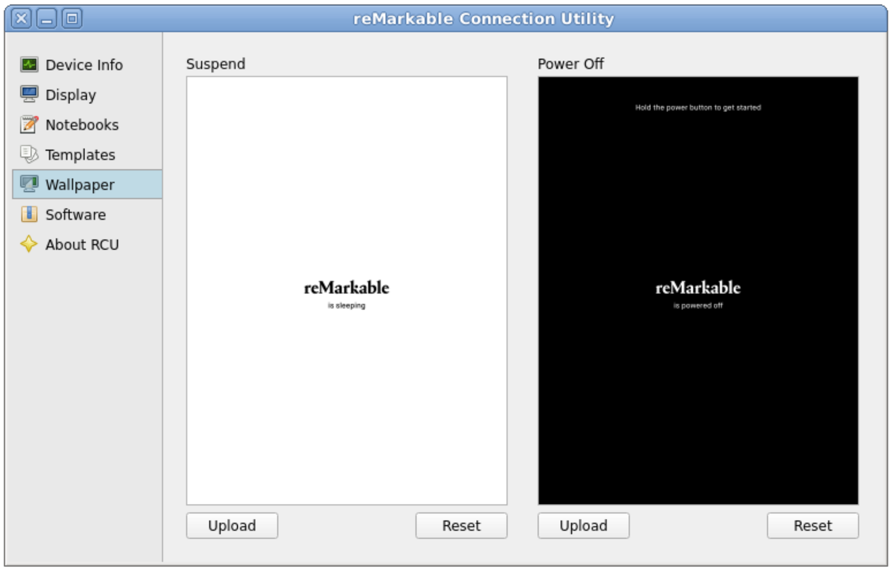


Figure 2.12: Wallpaper Pane

[6] These are sometimes called *splash images*.

## 2.7 Software Pane

Third-party software may be uploaded to the device in the reMarkable Software Package (RMPKG) format[7].

To install a software package, click the Upload button, select an RMPKG file, then wait for the install process to complete.

To remove a software package, select one in the list view, then click the Uninstall button and wait for the removal process to complete.

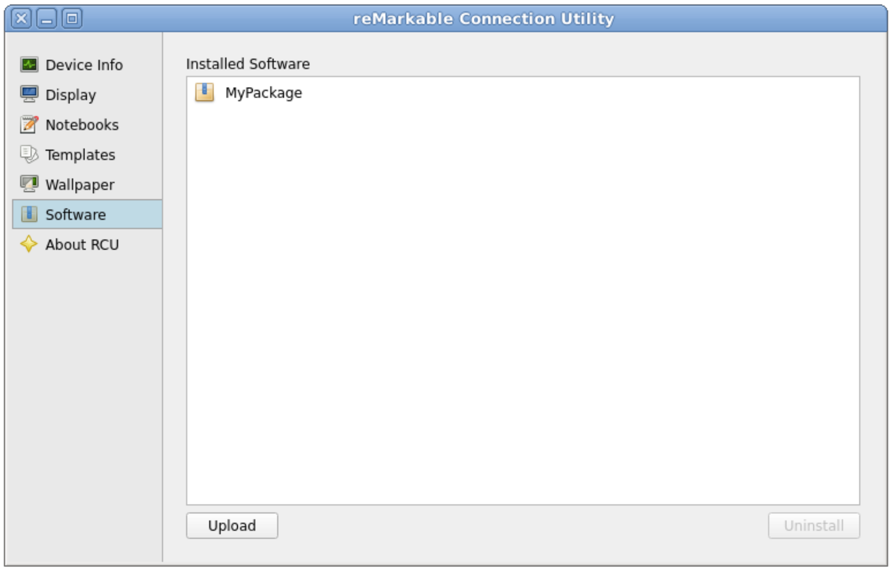


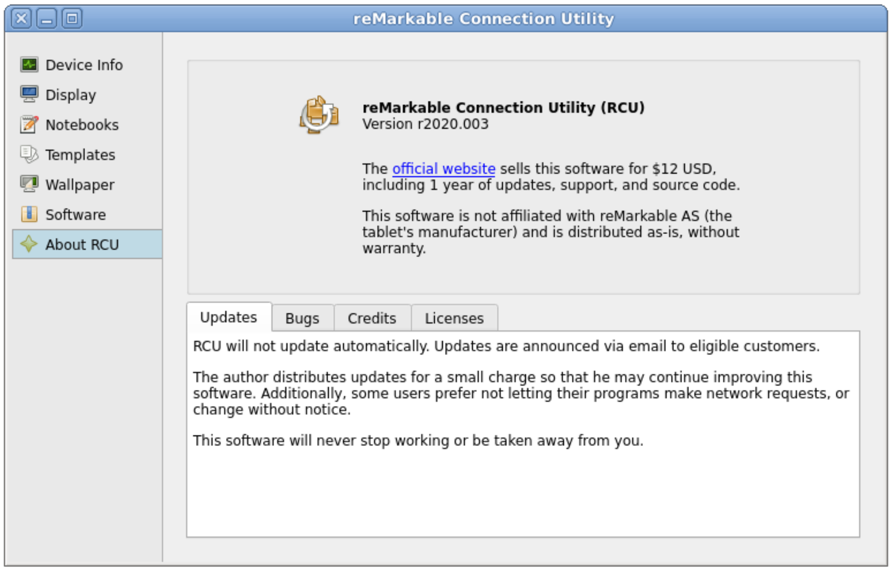
Figure 2.13: Software Pane

[7] For details about creating an RMPKG file, please read the Software Package Format.

## 2.8 About Pane

Information about RCU may be viewed in the About Pane. The information panel contains its version number. Credits to the software used to build RCU, and copies of their licenses, are also available.

By clicking the package icon image, a user may request RCU to contact the update server to check if they are running the latest version.



**reMarkable Connection Utility (RCU)**
Version r2020.003

The official website sells this software for $12 USD, including 1 year of updates, support, and source code.

This software is not affiliated with reMarkable AS (the tablet's manufacturer) and is distributed as-is, without warranty.

RCU will not update automatically. Updates are announced via email to eligible customers.

The author distributes updates for a small charge so that he may continue improving this software. Additionally, some users prefer not letting their programs make network requests, or change without notice.

This software will never stop working or be taken away from you.

Figure 2.14: About Pane

# 3 Developing with RCU

## 3.1 Running from Source

RCU requires a few pieces of software, listed below, when running directly from its source code.

- Python 3.6+
- Qt 5.14+[1]

Furthermore, a few Python dependencies must be installed, which are specified in *src/requirements.txt*. It is recommended to install dependencies within a *venv* environment.

- PySide2 5.14+
- Paramiko 2.7+
- pdfrw 0.4+
- PyInstaller 3.6

Once these software requirements are satisfied, execute *src/main.py* with the Python interpreter.

1. Download and extract the sources.tar.gz archive
2. Create a new Python venv (*python3.8 -m venv rcu-venv*)
3. Activate the venv (*. ./rcu-venv/bin/activate*)
4. Change into the source directory (*cd sources/rcu/src*)
5. Upgrade pip (*pip install –upgrade pip*)
6. Install the requirements (*pip install -r requirements.txt*)
7. Run the program (*python -B main.py*)

## 3.2 Building a Release Binary

For official releases, RCU's source is amalgamated with various other utilities into a single executable binary with PyInstaller. For convenience, this process has been automated as a GNU makefile.

To build a release image, execute *make* from a terminal. The resulting file will be an archive that includes a Python interpreter and all dependant libraries. Upon execution, this binary deflates to, and starts running from, a temporary directory.

To build the documentation, execute *make doc*. This will build the manual in PDF format[2].

[1] FreeBSD-only, since PySide2 is not available through *pip*

[2] Building the documentation requires *pdflatex*, which is not covered here.

## 3.3 Adding Custom Panes

The Pane Architecture of RCU is modular, so new panes may be added easily. To write a new pane, first create a new directory under *src/panes*, where the pane's source code will be stored. In that directory, create a file, *pane.py*, which will serve as the focal point of execution.

The *pane.py* file must contain a class for the pane, implementing the following requirements: (a) the pane must inherit from the *UIController* class[3], (b) it must provide the *name* and *ui_filename* class variables, and (c) it must initialize first through the parent class. An example is listed in Figure 3.1.

The pane must be accompanied by a Qt UI file, specified in the class variable *ExamplePane.ui_filename*. This UI file should be a widget with dimensions of 440×480 pixels, and not be re-sizable. This is exposed to the pane's class as *self.window* upon instantiation.

After adding the *pane.py* file, import it within *src/panes/__init__.py* (Figure 3.2). Once added, the pane will draw itself into RCU's main window.

For non-immediate tasks, it is recommended to use a *worker*. RCU's GUI runs on the main thread, and blocking this may provide a poor user experience. Workers may be executed in the thread pool, which return to the main thread via asynchronous callback. For examples of worker usage, please read the source code for one of the default panes.

[3] Find the UIController source code at *src/controllers/UIController.py*.

```
'''
pane.py
This is an example pane.

License: GPLv3 or later
'''

import log
from Worker import worker
from pathlib import Path
from controllers import UIController

class ExamplePane(UIController):
    name = 'Example Pane'

    # Dynamic path loading works when running from source
    # and binary.
    adir = Path(__file__).parent.parent
    bdir = Path(__file__).parent
    ui_filename = Path(adir / bdir / 'example.ui')

    xochitl_versions = [
        '^2\.2\.0\.[0-9]+$'
    ]

    @classmethod
    def get_icon(cls):
        ipathstr = str(Path(cls.bdir / 'icons' / 'emblem-documents.png'))
        icon = QIcon()
        icon.addFile(ipathstr, QSize(16, 16), QIcon.Normal, QIcon.On)
        return icon

    def __init__(self, pane_controller):
        super(type(self), self).__init__(
            pane_controller.model, pane_controller.threadpool)
        # Exposed now are self.model, self.window, and
        # self.threadpool.
        # ...
```

Figure 3.1: Example source code for *pane.py*

```
from .example.pane import ExamplePane

paneslist = [
    # ...
    ExamplePane
    ]
```

Figure 3.2: Example of importing *pane.py* in *src/panes/__init__.py*

# A

# Backup Archive Format

Backups are stored on disk next to RCU's preferences. This path varies depending on the operating system. Refer to the Locations Where Application Settings Are Stored section, in the QSettings documentation, to determine the specific system path. These paths are also listed in Release Notes.

Each backup archive is given a unique identifier, and a directory is created to store its contents. An example directory structure is listed in Figure A.1

```
backups
└─ 902b512b-8742-481d-b5f1-e185c0668e9f
   ├─ files
   │  ├─ mmcblk1boot0.bin
   │  ├─ mmcblk1boot1.bin
   │  └─ mmcblk1.bin
   └─ backup.json
```

Figure A.1: Example structure of a backup archive

The *backup.json* file contains metadata about the backup, and is used by RCU to populate the UI. In summary, this file contains the backup's ID, timestamp, device information, the device's partition table (the output of *fdisk -l*), and checksums of the dumped partitions.

OS backups store the bootloader, secondary boot partition (containing factory device information), the bootloader data partition, primary OS partition, and secondary OS partition. The primary OS may reside on *mmcblk1p2* or *mmcblk1p3*, flipping after every system update.

- /dev/mmcblk1boot0
- /dev/mmcblk1boot1
- /dev/mmcblk1p1
- /dev/mmcblk1p2
- /dev/mmcblk1p3

Data backups only store the data partition, which is mounted as */home/root*.

- /dev/mmcblk1p7

Full backups store the bootloader, secondary boot partition, and the entire contents of the eMMC (all partitions combined).

- /dev/mmcblk1boot0
- /dev/mmcblk1boot1
- /dev/mmcblk1

# B

# *Notebook Archive Format*

Notebook Archive (RMN) files contain the raw data files used by Xochitl, and a copy of all template used by that document in the Template Archive Format. They have an obvious structure, as seen in Figure B.1. This directory is a direct export from Xochitl's files, from the device at *~/.local/share/remarkable/xochitl*.

```
ExampleNotebook.rmn
├── 6bde82bd-f580-456b-8275-c853438707a6
│   ├── 5ae652c8-280b-4b00-9563-72f25f16ac29.rm
│   ├── 3e9610c9-7633-4964-8198-adc0d1968cea.rm
│   └── (...)
├── 6bde82bd-f580-456b-8275-c853438707a6.content
├── 6bde82bd-f580-456b-8275-c853438707a6.metadata
├── 6bde82bd-f580-456b-8275-c853438707a6.pagedata
├── Blank.rmt
└── Small Lines.rmt
```

Figure B.1: Example structure of a template archive

When saving a document it is preferred to use the RMN format over the PDF format because RMN files contain an exact copy of those notebooks. Therefore, a PDF may always be generated from an RMN archive.

Notebook archive files store all templates used in the document. When uploading an archive to a new device, these templates will be automatically installed if they didn't already exist.

# C

# *Template Archive Format*

Template Archive (RMT) files follow an easy-to-create format. Typically, reMarkable templates have been shared amongst the community as singular PNG images. However, this has a number of drawbacks, like being stuck with a static resolution and lack of metadata.

The RMT format solves these issue by bundling a vector image of the template, instead of a bitmap image, and includes template metadata in the archive. An example file structure of an RMT file may be seen in Figure C.1. The RMT file is a tape archive (TAR) file with the *.rmt* extension.

```
ExampleTemplate.rmt
└─template.json
└─template.svg
```

Figure C.1: Example structure of a template archive

The *template.json* file should contain, at minimum, a structure similar to Figure C.2. The *fileName* attribute should be a UUID and is necessary to prevent template collisions; if this is not explicitly specified, one will be generated by RCU.[1] The *categories* array may contain any of the following strings.

- Creative
- Grids
- Life/organize
- Lines

```json
{
    "categories": [
        "Creative"
    ],
    "iconCode": "\ue9d5",
    "landscape": false,
    "name": "Example Template",
    "fileName": "<UUID>"
}
```

Figure C.2: Example source code for *template.json*

The *template.svg* file should contain valid SVG data and have a viewport resolution of 1404×1872 pixels. For viewability with an e-paper screen, it is recommended not to have features smaller than 2 pixels.

When a template archive is uploaded, these files are not extracted to the default template location (*/usr/share/remarkable/templates*). Instead, they are extracted into the home directory, at *~/.local/share/remarkable/templates*. Upon upload, RCU will convert the SVG image to a PNG image to retain compatibility with Xochitl.

[1] Do not share with others RMT files which do not contain the *fileName* attribute, otherwise collisions may occur or there could be multiple versions of identical templates.

If the tablet receives an update that clears the system template directory, the templates will become unavailable from the interface. RCU may detect this condition and prompt the user to recreate these template links, in-effect restoring the templates (they do not need to be re-uploaded).

# D
# *Software Package Format*

Please download the RCU sources, then find the *rmpkg-sample* directory. This sample package contains lots of useful information about the package format in a practical way.

The RMPKG format is a self-contained executable. The easiest way to make this is with an ordinary shell script, appended with the application's binary payload (like a TAR). The package should expose the following flags.

- --*info*: Prints information about the package useful for anyone who stumbles upon it
- --*manifest*: Prints a manifest of any files touched by the package; used for detecting conflicting packages
- --*install*: Installs the package payload to the system
- --*uninstall*: Uninstalls the package payload from the system

# E Release Notes

## E.1 r2020.003

Released on October 3, 2020, this version addresses compatibility for system software 2.3.0.16, fixes bugs and annoying behavior, and introduces new export options.

### Compatibility

| | |
|---|---|
| Hardware | RM100, RM102 (reMarkable 1) |
| Software[1] | 1.8.1.1–2.3.0.16 |
| PC | FreeBSD 12.1, Ubuntu 18.04, macOS 10.13, Windows 10 |

### Important Notices

! This version changes the settings and data paths. To migrate old backups, copy the *backups* directory from the old data directory to the new one. The old data directories are:

FreeBSD, GNU/Linux: *~/.config/rcu*

macOS: *~/Library/Preferences*

Windows: *C:\HKEY_CURRENT_USER\SOFTWARE\rcu\rcu*

### Release Notes

- System software 2.3.0.16 compatibility
- Resizable UI, with Hi-DPI support
- New application data directory, user-setable in configuration file
  - FreeBSD, GNU/Linux

    Settings: *~/.config/davisr/rcu.conf*<br>
    Data: *~/.local/share/davisr/rcu*
  - macOS

    Settings: *~/Library/Preferences/rcu.plist*<br>
    Data: *~/Application Support/rcu*
  - Windows

    Settings: *HKEY_CURRENT_USER\SOFTWARE\davisr\rcu*<br>
    Data: *%APPDATA%\davisr\rcu*
- Faster startup/load time
- Automatic notebook view refresh (force with Ctrl+R or F5)
- Drag-and-drop document organization within the Notebooks Pane
- Save last-used directory for import/export operations
- Save notebook sorting method
- Upload to any collection (document folder)

[1] This version is likely compatible with reMarkable 2 (except backup/restore) but is untested.

- No longer requires Host to be an IP address in the Connection Dialog
- A port may be given in the Host field, separated with a ':' (colon)
- New Export PDF options
  - PDF annotations for highlights
  - PDF layers (OCG) for each document layer
  - Customizable ink colors
  - Auto-open exported PDF
- Fix Wallpaper Pane bugs
  - Removed "Powered Off" overlay text
  - Set to Original button works as-expected and will always keep a backup
- Fix rM Cloud compatibility bugs (delete, re-uploading old archives)
- Sanitize export filenames
- Compatibility with more GNU/Linux distros
  - Now requires libxcb as a dependency (install *libxcb-xinerama0*)
- Warning popup when the tablet is disconnected
- reMy, from which RCU gets its .lines parser, is now credited visibly in the About Pane
- Reduce logging verbosity
- Smoother lines when exporting vectors

### Known Bugs

- Some documents exported with a base PDF and Layers enabled may report in Adobe Acrobat as having a generic error, but otherwise render OK.
- Force-refreshing the Notebooks Pane doesn't work under macOS.
- No conflict check for RMPKGs
- No warning for RMPKG fault

## E.2 r2020.002

Released on September 6, 2020, this version addresses issues blocking users from running r2020.001.

### Compatibility

| | |
|---|---|
| Hardware | RM100, RM102 (reMarkable 1) |
| Software | 1.8.1.1–2.2.0.48 |
| PC | FreeBSD 12.1, Ubuntu 18.04, macOS 10.13, Windows 10 |

### Release Notes

- Fix "unknown document version" bug
- Fix improper handling of tall PDF documents
- Warn user when not taking/restoring backup from USB
- Set executable permission in macOS release archive
- Update manual with recovery mode instructions
- Update manual with Windows driver instructions

### Known Bugs

- No conflict check for RMPKGs
- No warning for RMPKG fault

## E.3 r2020.001

Released on September 5, 2020, this is the first released version of RCU.

### Compatibility

| | |
|---|---|
| Hardware | RM100, RM102 (reMarkable 1) |
| Software | 1.8.1.1–2.2.0.48 |
| PC | FreeBSD 12.1, Ubuntu 18.04, macOS 10.13, Windows 10 |

### Release Notes

- First release of reMarkable Connection Utility (RCU)
- Application will open with console window