Raspberry Pi 3 Boot to USB

This is taken from the following URL: https://www.raspberrypi.org/documentation/hardware/raspberrypi/bootmodes/msd.md

I have documented it here as I use this guide a lot, and I don't want to lose it :)

```
This tutorial explains how to boot your Raspberry Pi 3 from a USB mass storage device such as a
flash drive or USB hard disk. Be warned that this feature is experimental and may not work with
all USB mass storage devices.
<color red>USB Hard Drives seem particularly fussy.</color>
```

Program USB Boot Mode

Before a Pi will network boot, it needs to be booted with a config option to enable USB boot mode. Enabling this config option requires special start.elf and bootcode.bin files. These can be installed by using the "next" branch on rpi-update.

Go to the Downloads page and install Raspbian onto an SD card using Win32DiskImager if you are on Windows, or dd if you are on Linux/Mac. Boot the Pi.

First, prepare the /boot directory with experimental boot files

```
If on raspbian lite you need to install rpi-update before you can use it:

sudo apt-get update; sudo apt-get install rpi-update
sudo BRANCH=next rpi-update
```

Then enable USB boot mode with this code:

```
echo program_usb_boot_mode=1 | sudo tee -a /boot/config.txt
```

This adds program_usb_boot_mode=1 to the end of /boot/config.txt. Reboot the Pi with sudo reboot, then check that the OTP has been programmed with:

```
vcgencmd otp_dump | grep 17:
17:3020000a
```

Ensure the output 0x3020000a is correct.

If you wish, you can remove the program_usb_boot_mode line from config.txt (make sure there is no blank line at the end) so that if you put the SD card in another Pi, it won't program USB boot mode. You can do this with sudo nano /boot/config.txt, for example.

NOTE - If you use the SAME boot SD Card each time to make a bootable disk, you only need to perform the steps above ONCE

Prepare the USB storage device

Now that your Pi is USB boot-enabled, we can prepare a USB storage device to boot from.
Start by inserting the USB storage device (which will be completely erased) into the Pi.
Rather than downloading the Raspbian image again, we will copy it from the SD card on the Pi.
The source device (sd card) will be /dev/mmcblk0 and the destination device (USB disk)
should be /dev/sda assuming you have no other USB devices connected.

We will start by using Parted to create a 100MB FAT32 partition, followed by a Linux ext4 partition that will take up the rest of the disk.

```
sudo parted /dev/sda
```

```
(parted) mktable msdos
Warning: The existing disk label on /dev/sda will be destroyed
and all data on this disk will be lost. Do you want to continue?
Yes/No? Yes
(parted) mkpart primary fat32 0% 100M
(parted) mkpart primary ext4 100M 100%
(parted) print
Model: SanDisk Ultra (scsi)
Disk /dev/sda: 30.8GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End     Size    Type     File system  Flags
 1      1049kB  99.6MB  98.6MB  primary  fat32        lba
 2      99.6MB  30.8GB  30.7GB  primary  ext4         lba
```

Your parted print output should look similar to the one above.

Create the boot and root file systems:

```
  sudo mkfs.vfat -n BOOT -F 32 /dev/sda1
  sudo mkfs.ext4 /dev/sda2
```

Mount the target file system and copy the running raspbian system to it:

```
sudo mkdir /mnt/target
sudo mount /dev/sda2 /mnt/target/
sudo mkdir /mnt/target/boot
sudo mount /dev/sda1 /mnt/target/boot/
sudo apt-get update; sudo apt-get install rsync
sudo rsync -ax --progress / /boot /mnt/target
```

Regenerate ssh host keys:

```
cd /mnt/target
sudo mount --bind /dev dev
sudo mount --bind /sys sys
sudo mount --bind /proc proc
sudo chroot /mnt/target
rm /etc/ssh/ssh_host*
dpkg-reconfigure openssh-server
exit
sudo umount dev
sudo umount sys
sudo umount proc
```

Edit /boot/cmdline.txt so that it uses the USB storage device as the root file
system instead of the SD card.

```
  sudo sed -i "s,root=/dev/mmcblk0p2,root=/dev/sda2," /mnt/target/boot/cmdline.txt
```

The same needs to be done for fstab:

```
  sudo sed -i "s,/dev/mmcblk0p,/dev/sda," /mnt/target/etc/fstab
```

Finally, unmount the target file systems, and power the Pi off.

```
cd ~
sudo umount /mnt/target/boot
sudo umount /mnt/target
sudo poweroff
```

Disconnect the power supply from the Pi, remove the SD card, and reconnect the power supply. If all has gone well, the Pi should begin to boot after a few seconds.

sudo mkdir /mnt/target sudo mount /dev/sda2 /mnt/target/ sudo mkdir /mnt/target/boot sudo mount /dev/sda1 /mnt/target/boot/ sudo apt-get update; sudo apt-get install rsync sudo rsync -ax –progress / /boot /mnt/target

cd /mnt/target sudo mount –bind /dev dev sudo mount –bind /sys sys sudo mount –bind /proc proc sudo chroot /mnt/target rm /etc/ssh/ssh_host* dpkg-reconfigure openssh-server exit sudo umount dev sudo umount sys sudo umount proc

sudo sed -i "s,root=/dev/mmcblk0p2,root=/dev/sda2," /mnt/target/boot/cmdline.txt sudo sed -i "s,/dev/mmcblk0p,/dev/sda," /mnt/target/etc/fstab

cd ~ sudo umount /mnt/target/boot sudo umount /mnt/target # sudo poweroff

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