

1. Ensure you have a copy of the new EEPROM file ready to go on the desktop machine. This should be the same serial number as the old one. This will ensure the cape license can be reapplied later if it has been previously.

2. SSH to FPP instance

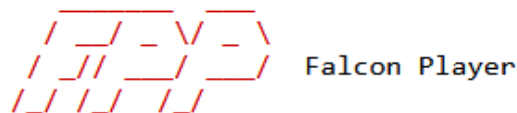
Help -> SSH Shell

Log in as `fpp/falcon` (assuming default user id/password)

```
← → ↻ 172.19.84.153:4200
rpi-px16 login: fpp
Password:
Linux rpi-px16 6.1.21-v7+ #1642 SMP Mon Apr  3 17:20:52 BST 2023 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
```



This FPP console is for advanced users, debugging, and developers. If you aren't one of those, you're probably looking for the web-based GUI.

You can access the UI by typing "http://fpp.local/" into a web browser.

```
Last login: Wed Jul 10 20:43:03 AEST 2024 from 172.19.84.152 on pts/0
fpp@rpi-px16:~ $
```

3. Change to root user

`sudo su -`

```
fpp@rpi-px16:~ $ sudo su -
root@rpi-px16:~#
```

4. Instantiate the EEPROM device. This will load the driver etc (it gets unloaded by FPP after reading @ boot). Different command per platform due to i2c bus being different.

a. For BeagleBone

`echo "24c256 0x50" > /sys/bus/i2c/devices/i2c-2/new_device`

b. For Raspberry Pi

`echo "24c256 0x50" > /sys/bus/i2c/devices/i2c-1/new_device`

(Here I am checking the system kernel log to ensure it was instantiated. This occurred 511 seconds after boot up.

```
root@rpi-px16:~# echo "24c256 0x50" > /sys/bus/i2c/devices/i2c-1/new_device
root@rpi-px16:~# dmesg | grep 24c256
[  9.866327] at24 1-0050: 32768 byte 24c256 EEPROM, writable, 1 bytes/write
[  9.866380] i2c i2c-1: new_device: Instantiated device 24c256 at 0x50
[ 10.705533] i2c i2c-1: delete_device: Deleting device 24c256 at 0x50
[ 23.632928] at24 1-0050: 32768 byte 24c256 EEPROM, writable, 1 bytes/write
[ 23.633552] i2c i2c-1: new_device: Instantiated device 24c256 at 0x50
[ 24.853717] i2c i2c-1: delete_device: Deleting device 24c256 at 0x50
[ 511.713364] at24 1-0050: 32768 byte 24c256 EEPROM, writable, 1 bytes/write
[ 511.713448] i2c i2c-1: new_device: Instantiated device 24c256 at 0x50
root@rpi-px16:~#
```

5. Read back the first 5 bytes of EEPROM to validate. It typically should start with FPP02, and the device type if anything has been written at all.

a. For BeagleBone

```
dd if=/sys/bus/i2c/devices/2-0050/eeprom bs=1 count=16 | hexdump -C
```

b. For Raspberry Pi

```
dd if=/sys/bus/i2c/devices/1-0050/eeprom bs=1 count=16 | hexdump -C
```

```
count=16 | hexdump -C
```

```
root@rpi-px16:~# dd if=/sys/bus/i2c/devices/1-0050/eeprom bs=1 count=16 | hexdump -C
16+0 records in
16+0 records out
00000000 46 50 50 30 32 00 72 50 69 2d 50 58 31 36 00 00 | FPP02 rPi-PX16..|
00000010
16 bytes copied, 0.00346962 s, 4.6 kB/s
root@rpi-px16:~#
```

6. Make a backup of the current contents if desired

a. For BeagleBone

```
dd if=/sys/bus/i2c/devices/2-0050/eeprom of=~/.eeprom-backup.bin bs=1
```

b. For Raspberry Pi

```
dd if=/sys/bus/i2c/devices/1-0050/eeprom of=~/.eeprom-backup.bin bs=1
```

```
root@rpi-px16:~# dd if=/sys/bus/i2c/devices/1-0050/eeprom of=~/.eeprom-backup-20240710.bin bs=1
32768+0 records in
32768+0 records out
32768 bytes (33 kB, 32 KiB) copied, 6.22072 s, 5.3 kB/s
```

7. Zero out the eeprom completely. This may take a couple of minutes, they aren't fast.

a. For BeagleBone

```
dd if=/dev/zero of=/sys/bus/i2c/devices/2-0050/eeprom bs=1
```

b. For Raspberry Pi

```
dd if=/dev/zero of=/sys/bus/i2c/devices/1-0050/eeprom bs=1
```

```
root@rpi-px16:~# dd if=/dev/zero of=/sys/bus/i2c/devices/1-0050/eeprom bs=1
dd: error writing '/sys/bus/i2c/devices/1-0050/eeprom': File too large
32769+0 records in
32768+0 records out
32768 bytes (33 kB, 32 KiB) copied, 106.685 s, 0.3 kB/s
root@rpi-px16:~#
```

Note: as per above, it errors out when trying to write the 32769th byte as the eeprom is not that big. That's completely expected.

8. Double check it's zero bytes.

a. For BeagleBone

```
hexdump -C /sys/bus/i2c/devices/2-0050/eeprom
```

b. For Raspberry Pi

```
hexdump -C /sys/bus/i2c/devices/1-0050/eeprom
```

```
root@rpi-px16:~# hexdump -C /sys/bus/i2c/devices/1-0050/eeprom
00000000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
*
00008000
root@rpi-px16:~#
```

The output should be identical to this. One line of 00 00 00 and then a * followed by 00008000 – this means the rest of the lines match exactly to the one prior.

9. Get FPP to detect the cape. It shouldn't (and give a header mismatch is the FPP02 isnt there)

`/opt/fpp/src/fppcapedetect`

```
root@rpi-px16:~# /opt/fpp/src/fppcapedetect
Copyng eeprom /sys/bus/i2c/devices/1-0050/eeprom -> /home/fpp/media/tmp/eeprom.bin
Using /home/fpp/media/tmp/eeprom.bin
EEPROM header miss-match
root@rpi-px16:~#
```

10. Reboot (either type reboot, or use the FPP ui)

```
root@rpi-px16:~# reboot

Session terminated, killing shell...
```

11. When FPP starts, the Cape Info page should say that an unprogrammed EEPROM was detected.

12. Attempt to reload the EEPROM using the UI, preferably using the one backed up, or one generated off my site.

EEPROM Install

Your cape appears to have an unprogrammed physical EEPROM installed. Select a downloadable EEPROM image or a local file to program the EEPROM:

Vendor: Cape/Hat: Version:


No file selected.

13. If the reload using webUI fails,

- Follow steps 2 through 11 to clear it out again
- After FPP reboots, log back in to FPP using steps 2 & 3,
- Attach the eeprom using step 4,
- Then continue from 14 below.

14. Copy the eeprom file directly to the FPP instance. On your Win10/11, Mac or Linux desktop, open a Terminal & change into the directory where your EEPROM file lives. Copy this to the FPP instance using scp. Replace the IP address and eeprom.file with the filename, and hit enter, then enter the fpp password (falcon) when asked

`scp eeprom.file fpp@ipaddress:~`



```
Windows PowerShell
PS C:\Users\mjunek> scp rpi-px16-eeprom.bin fpp@172.19.84.153:~
Raspbian GNU/Linux 11
Falcon Player OS Image v2023-12
fpp@172.19.84.153's password:
rpi-px16-eeprom.bin 100% 32KB 2.0MB/s 00:00
PS C:\Users\mjunek>
```

15. Write the EEPROM file to the EEPROM device. Replace eeprom.file with the filename you uploaded. This may take two minutes again like the erase.

a. For BeagleBone

```
dd if=/home/fpp/eeprom.file of=/sys/bus/i2c/devices/2-0050/eeprom bs=1
```

b. For Raspberry Pi

```
dd if=/home/fpp/eeprom.file of=/sys/bus/i2c/devices/1-0050/eeprom bs=1
```

```
root@rpi-px16:~# dd if=/home/fpp/eeprom-backup-20240710.bin of=/sys/bus/i2c/devices/1-0050/eeprom bs=1
32768+0 records in
32768+0 records out
32768 bytes (33 kB, 32 KiB) copied, 106.927 s, 0.3 kB/s
root@rpi-px16:~#
```

16. Check FPP cape detect finds the cape

```
/opt/fpp/src/fppcapedetect
```

Note: you may get a signature invalid. This is OK. That just means it's unlicensed.

```
root@rpi-px16:~# /opt/fpp/src/fppcapedetect
Copyng eeprom /sys/bus/i2c/devices/1-0050/eeprom -> /home/fpp/media/tmp/eeprom.bin
Using /home/fpp/media/tmp/eeprom.bin
Found cape rPi-PX16, Version 1.05, Serial Number: 10fc3b60a91e
- eeprom location is valid
- extracted file: /tmp/fppcuDptfxa/tmp/cape-info.tgz
- signature verified for key ID: fp
root@rpi-px16:~#
```

17. Reboot.

```
root@rpi-px16:~# reboot
Terminated

Session terminated, killing shell...
```

18. Check the Web UI now shows it all good to go.



The screenshot shows the FPP web interface with three tabs: 'About' (selected), 'EEPROM Signature', and 'EEPROM Upgrade'. Below the tabs, the 'About Cape/Hat' section displays the following information:

Name:	rPi-PX16
Version:	1.1
Serial Number:	10fc3b60a91e
Designer:	Hanson Electronics
Licensed Outputs:	16 ('lp' key)
Output Driver:	DPIPixels
EEPROM Location:	Physical

At the bottom, it states: "16 port hat for Raspberry Pi, including DMX output | EEPROM Date: 2024-06-26T19:15:32+10:00". To the right, the 'Vendor Name' is Hanson Electronics, the 'Vendor URL' is <https://www.hansonelectronics.com.au/>, and the 'E-mail' is hanselec@gmail.com. The Hanson Electronics logo is also visible.