AJ 5.9

Magic Lantern for 5Dmk2 @ 2.0.9

Magic Lantern - 5D Mark 2

Magic **L**antern is software written by enthusiasts to extend Canon camera's functionality!

How?
- ❖**ML** It is packaged up as a 'Firmware Update'
- ❖Then uploaded into RAM from the CompactFlash card

Magic Lantern was originally developed by Trammell Hudson for the 5D2 to overcome some of the shortcomings of its software.

→ **This version** of Magic Lantern was **developed by** Antony Newman (**AJ**)

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How do I get Magic Lantern working?

[1] Get the latest version ZIP of the AJ version of Magic Lantern from the 'Wiki'
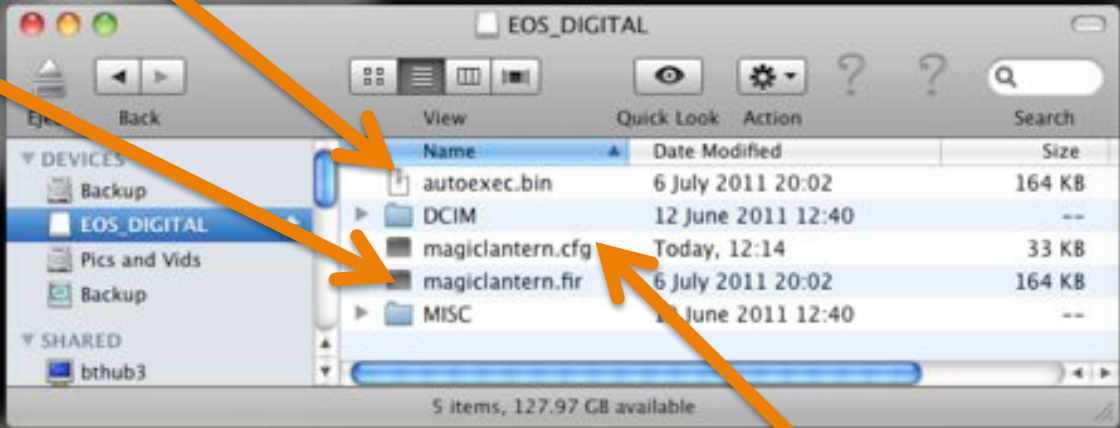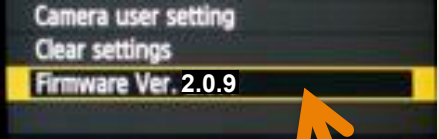❖http://magiclantern.wikia.com/wiki/

Supported cameras
5D Mark II ✏Edit
- AJ builds of Magic Lantern for 5D Mark II firmware 2.0.9 (**AJ 5.9**)

[2] Copy magiclantern.fir and autoexec.bin onto your Canon formatted Compact Flash.

[3] Switch on your Camera in the 'M'anual mode.

Camera user setting
Clear settings
Firmware Ver. **2.0.9**

EOS_DIGITAL

Name	Date Modified	Size
autoexec.bin	6 July 2011 20:02	164 KB
▶ DCIM	12 June 2011 12:40	--
magiclantern.cfg	Today, 12:14	33 KB
magiclantern.fir	6 July 2011 20:02	164 KB
▶ MISC	11 June 2011 12:40	--

▼ DEVICES
Backup
EOS_DIGITAL
Pics and Vids
Backup
▼ SHARED
bthub3

5 items, 127.97 GB available

[4] Use Canon menu to upload firmware into RAM.
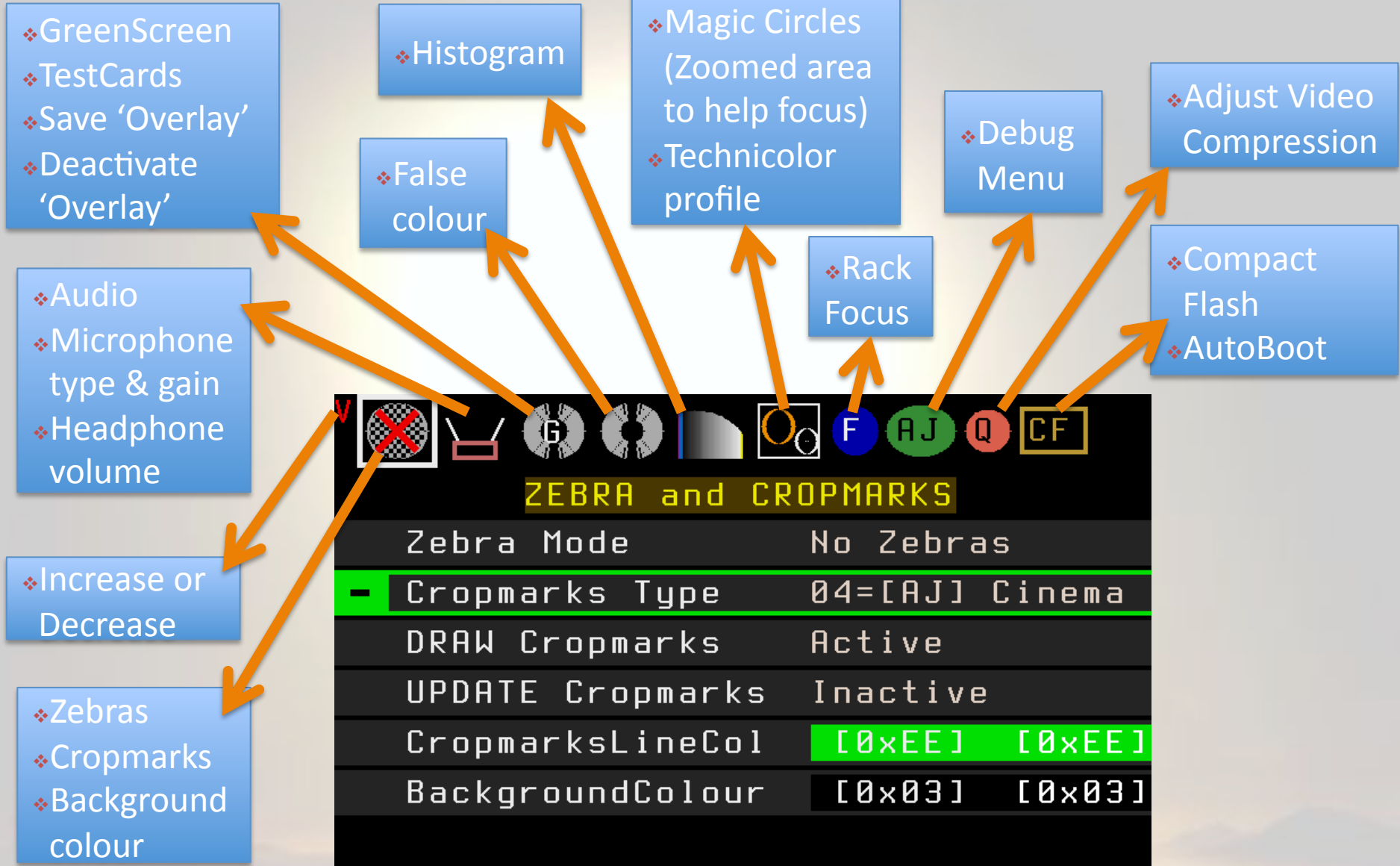Note: Remove battery to 100% delete ML from RAM!

The magiclantern.cfg file is created when you save the current configuration.

[5] 'Magic Lantern 5.x' appears. 'LiveView' activates -> That's it!

❖Live View
❖Canon Menu
❖AJ Menu

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AJ Menus

- ❖GreenScreen
- ❖TestCards
- ❖Save 'Overlay'
- ❖Deactivate 'Overlay'

- ❖Histogram

- ❖Magic Circles (Zoomed area to help focus)
- ❖Technicolor profile

- ❖Debug Menu

- ❖Adjust Video Compression

- ❖False colour

- ❖Rack Focus

- ❖Compact Flash
- ❖AutoBoot

- ❖Audio
- ❖Microphone type & gain
- ❖Headphone volume

- ❖Increase or Decrease

- ❖Zebras
- ❖Cropmarks
- ❖Background colour

```
                    ZEBRA and CROPMARKS

    Zebra Mode              No Zebras
 -  Cropmarks Type          04=[AJ] Cinema
    DRAW Cropmarks          Active
    UPDATE Cropmarks        Inactive
    CropmarksLineCol        [0xEE]      [0xEE]
    BackgroundColour        [0x03]      [0x03]


 X[000-720] Y[070-370] Safe=off   <[AJ] Cinema Wide 2.35>
```

Zebras and Cropmarks

Zebras : What are they? (Ans) Feedback on the Screen Overlay
- Any **Brightness** detail > **Maximum**, is recorded at = max level,
  And you **loose all** detail (and **can never recover it!**).
  Red 'Checker-board' is used to indicate 'Over-exposure'

- Any **Brightness** detail < **Minimum** is **lost**.
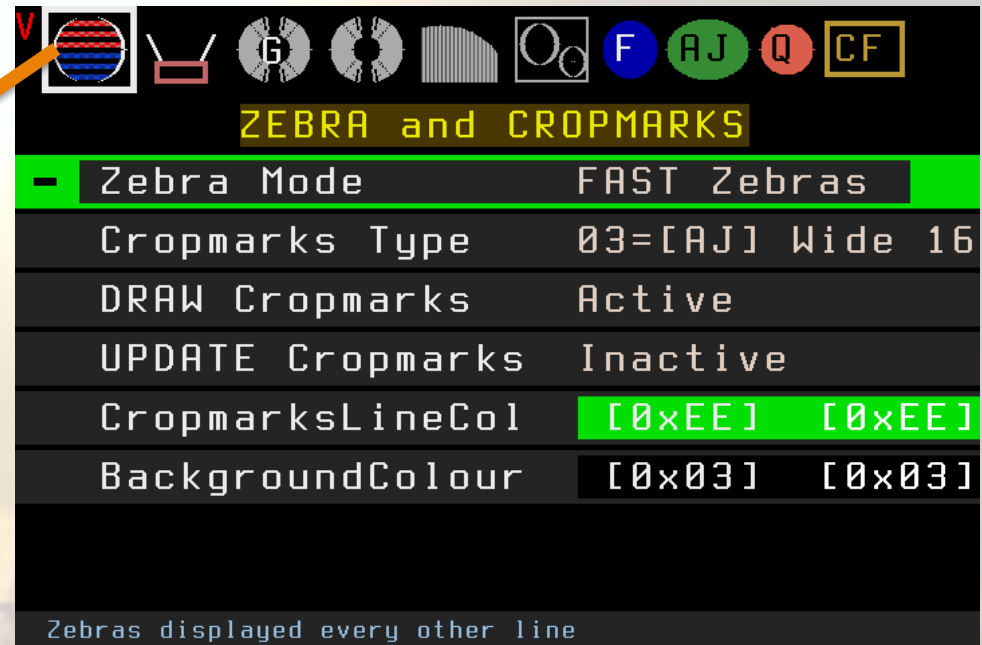 Blue 'Check-board' is used to indicate 'Under-exposure'

Zebras can be:
- OFF   - Do Nothing
- Fast   - Only display hatching
             on every other line
- Slow   - Use a solid Fill

Note 1: Use 'Fast' Zebras as:
- 'Slow' takes more CPU power.
- 'Slow' will hide Cropmarks!

Note 2: 'False Colours' (later menu) are a more advanced way of checking exposure

ZEBRA and CROPMARKS

—	Zebra Mode	FAST Zebras
	Cropmarks Type	03=[AJ] Wide 16
	DRAW Cropmarks	Active
	UPDATE Cropmarks	Inactive
	CropmarksLineCol	[0xEE] [0xEE]
	BackgroundColour	[0x03] [0x03]

Zebras displayed every other line

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Zebras and Cropmarks

FYI: This is the 'Slow' Zebra icon
(Every line is hatched in the Overlay)

CROPMARKS : **What are they?**
(Ans) Framing information displayed
over the picture (an 'Overlay').
❖It is NOT recorded with Movie.
❖Appears as an onscreen rectangle
❖Optional 'Safe' lines

ZEBRA and CROPMARKS

Zebra Mode		SLOW Zebras
Cropmarks Type		01=[CB] Wide 16
DRAW Cropmarks		Active
UPDATE Cropmarks		Inactive
CropmarksLineCol		[0xEE] [0xEE]
BackgroundColour		[0x03] [0x03]

X[004-708] Y[040-400] Safe=off <[CB] Wide 16 : 9   >
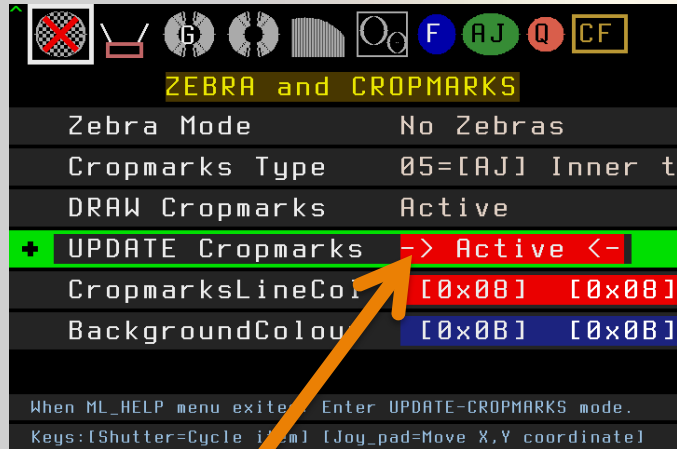
❖A full list can been
'cycled' through from
the AJ Menu.

❖This list is also at the
bottom of the ML
Config file.

```
focus.rack-speed = 4
#==Cropmark_Name====== s Saf vXv ^X^ vYv ^Y^
!Full Screen            0 000 000 720 000 425
![CB] Wide 16 : 9       0 000 005 710 040 400
![CB] Cinema Wide 2.35  0 000 005 710 070 370
![AJ] Wide 16 : 9       0 000 000 720 040 400
![AJ] Cinema Wide 2.35  0 000 000 720 070 370
![AJ] Inner test1       1 100 100 620 040 400
```

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Zebras and Cropmarks

UPDATE Cropmarks = **Active**

X=0, Y=0

Exit Menu -> Update mode

X=720, Y=0

ZEBRA and CROPMARKS

Zebra Mode	No Zebras
Cropmarks Type	05=[AJ] Inner t
DRAW Cropmarks	Active
+ UPDATE Cropmarks	**-> Active <-**
CropmarksLineCol	[0x08] [0x08]
BackgroundColou	[0x0B] [0x0B]

When ML_HELP menu exite Enter UPDATE-CROPMARKS mode.
Keys:[Shutter=Cycle item] [Joy_pad=Move X,Y coordinate]

[022,190]

INT
INT
1/50   f14.01250   37cm

X=0, Y=425

X=720, Y=425

Cropmark Update Mode

❖Exit ML_Menu -> Now it update mode

❖<SHUTTER> cycles between:
  TOP_LEFT   of cropmark
  BOTTOM_RIGHT   of cropmark
  OPTIONAL_SAFE_LINE   of cropmark

❖Details of Cropmark item are displayed
  in real time. Eg TopLeft [X=022, Y=190]

Keys:
+) <SHUTTER>: Cycle item
+) <Joy Pad>: Change X,Y of Item

To exit this mode
-> select Menu
-> 'UPDATE Cropmarks' -> Inactive.

AUDIO

❖ The 5D2 has a small **INT**ernal microphone ('fun' quality)

❖ For high-fidelity sound →use an **external microphone**.
For the minimum signal hiss (ie best Signal to Noise), it's low level signal should be amplified before connecting to the 5D2.

RØDE → Optional External Amplifier → 5D2 Analogue Gain → 5D2 Digital Gain → 5D2 **Recorded**
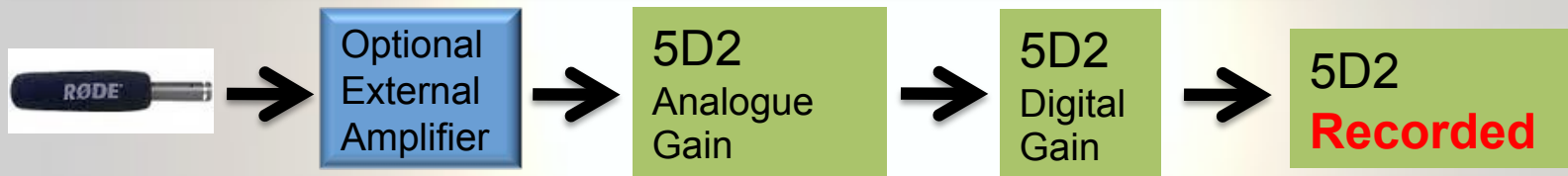
```
V
   AUDIO
-  L&R Analog Gain    10 dB     00
   L Digital Gain     6 dB      01
   R Digital Gain     12 dB     02
   Microphone Input   A>L=INT R=INT  03
   Headphone Volume   6         04
   Audio o2gain       -0 dB     05
   Audio Loopback     Active    06
   INT                             -10 06
   INT                                 12
TOT_(L or R)_GAIN = ANALOG_GAIN + DIGIT_GAIN (def=0)
```

Set using Loudest signal:
① Set External Amp gain (eg 20 dB)
   <it's Amp is better than the 5D2>
② Set 5D2 Analogue gain next
   <Make sure signal does not clip!>
③ Finally set the 5D2 Digital gain
   <Doesn't add any recorded quality>
   <Useful for Headphone monitoring>

Q = Video Compression

VIDEO COMPRESSION BIT-RATE

+ Off/ CBR/ VBR	OFF	
CBR	100 %	
VBR (Q-scale)	- 8 [Default]	
_RECORDING	No	
_CF_FREE_SPACE	128.63 GB	
_Rec_Bitrate	no info	

Override Data rate used to store movies.
ConstantBitRate (uses '%') / VariableBitRate (Qscale)

❖ This is Informational!
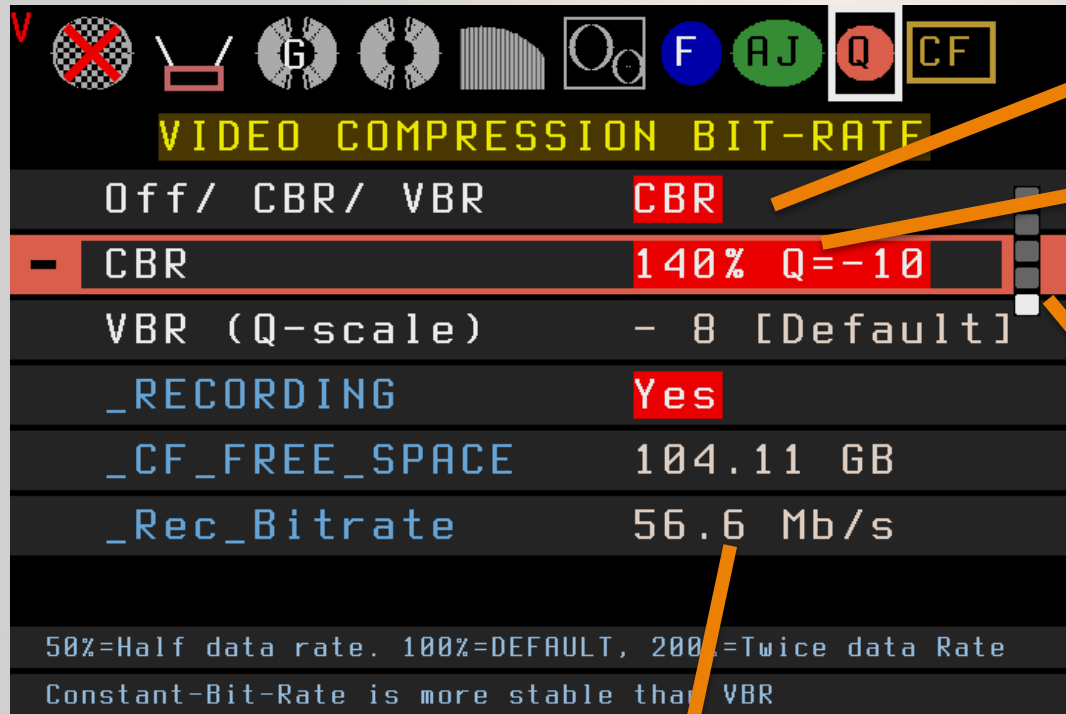❖ You are not allowed to change settings when Recording.

❖ When recording is started, this field is cleared.
❖ After the CF reports its size has reduced (which may take some time), the approximate bit rate is updated into this field.

CBR (Constant Bit Rate) = DryOs limits the data rate when writing movies to CF to this value.

Canon's default is to use a CBR of around 48Mb/sec to ensure that most CFs can keep up.

VBR (Variable Bit Rate) = DryOs attempts to maintain a certain 'Quality' of image.
WARNING: Actual data rate fluctuate and may stop recording if the write buffer runs out!

Q = Video Compression

VIDEO COMPRESSION BIT-RATE

Off/ CBR/ VBR	CBR
– CBR	140% Q=-10
VBR (Q-scale)	– 8 [Default]
_RECORDING	Yes
_CF_FREE_SPACE	104.11 GB
_Rec_Bitrate	56.6 Mb/s

50%=Half data rate. 100%=DEFAULT, 200%=Twice data Rate
Constant-Bit-Rate is more stable than VBR

❖Constant Bit Rate active.

❖New CBR ceiling is 140% DryOs maximum.
❖Current Quality=-10 (only shows when recording)

DryOs 'Write Buffer' is running out! (Doesn't help if you are Recording and doing a screen dump at the same time :).
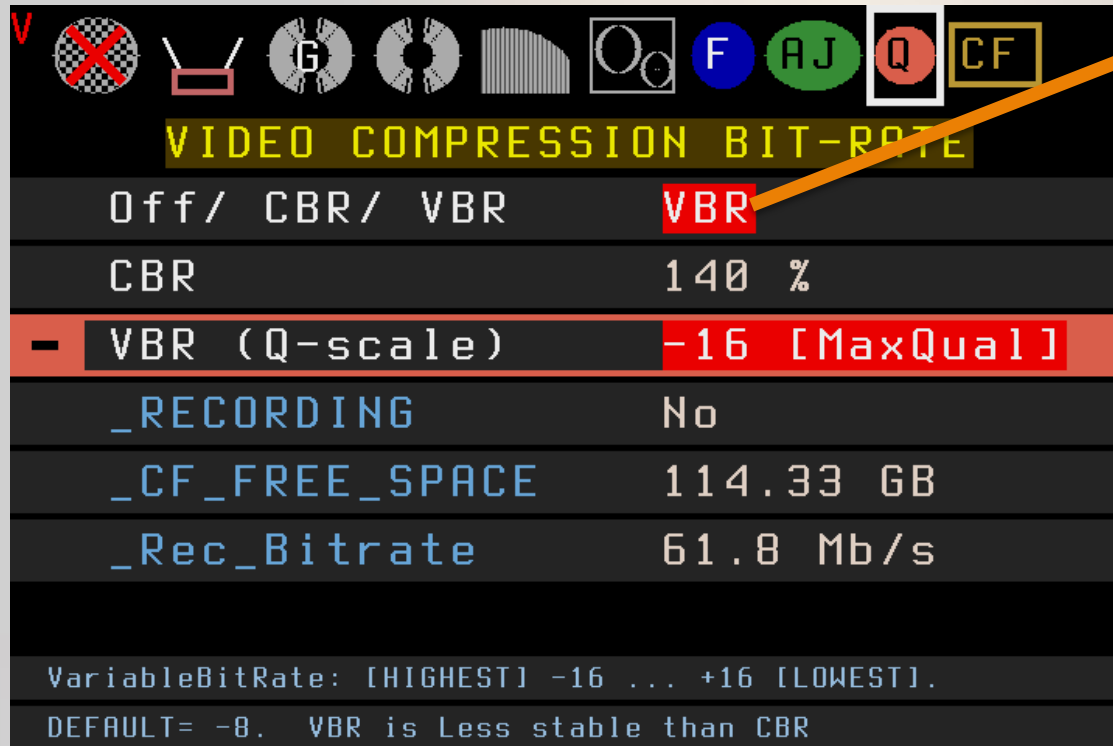
Note 1: CBR > 100%
❖Should record more detail.
❖When there is little image detail, the encoder will 'max out' (as it did in this example with Q=-10. When there is maximum image detail, Q=-16).

Note 2: CBR < 100%
❖Records Less detail
❖Longer record time (each clip has a file system limit of 4GB).
❖Set to 10% with the lens cap on when only sound is required.

Q = Video Compression

```
VIDEO COMPRESSION BIT-RATE
Off/ CBR/ VBR          VBR
CBR                    140 %
VBR (Q-scale)          -16 [MaxQual]
_RECORDING             No
_CF_FREE_SPACE         114.33 GB
_Rec_Bitrate           61.8 Mb/s

VariableBitRate: [HIGHEST] -16 ... +16 [LOWEST].
DEFAULT= -8.  VBR is Less stable than CBR
```

❖Variable Bit Rate active.

Quality-Scale
❖   -16   = Max Quality
     -8   = Default Quality
    +16   = Low Quality

Note: VBR is LESS stable than CBR.

(Guess which one I use)

FIRST TIME RECORDING:

After switch on, the **first** recording performs Canon 'initialisation'.

This may cause the DryOs to **run-out-of-steam** (even without ML cranking up the bitRate!)

CF = Compact Flash

The top level of each CF should have the following ML files **copied** to it:
- autoexec.bin
- magiclantern.fir
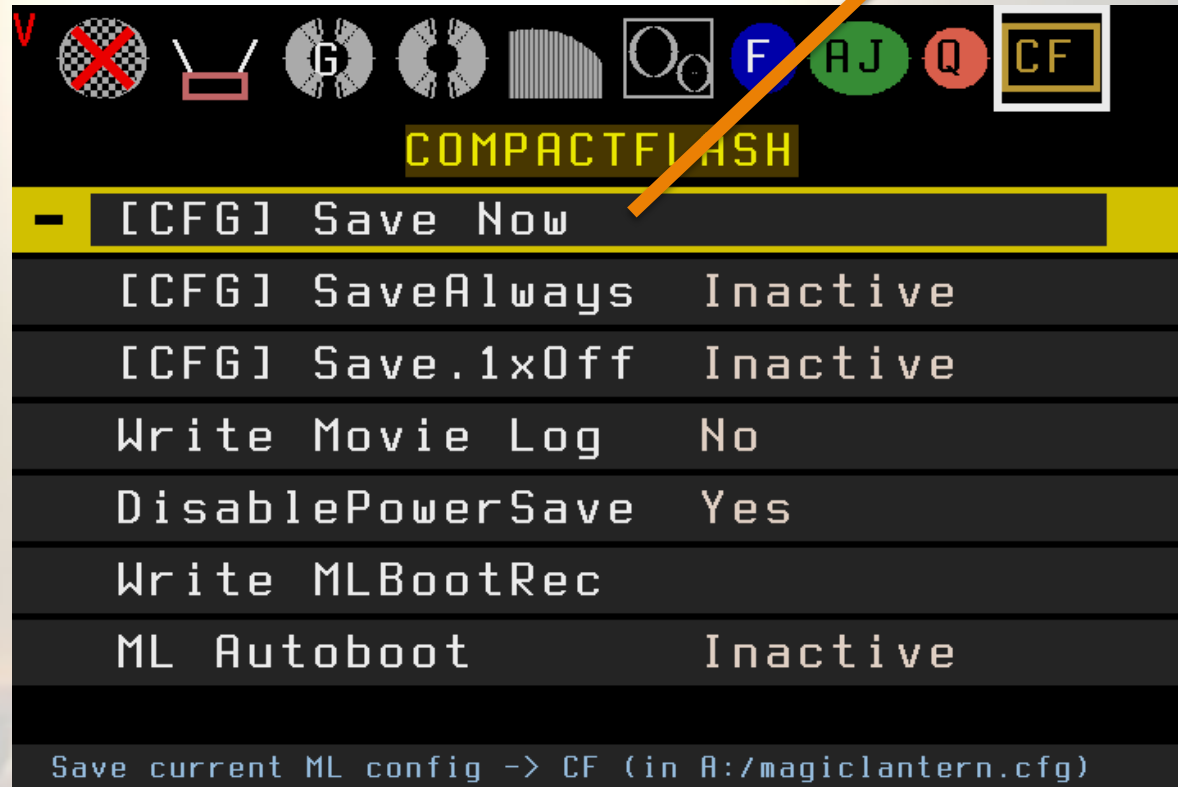
The following file is **created** when ML config is saved:
- magiclantern.cfg

The Canon 'DryOs' (it operating System) fragments the CF over time.
- **Periodically format** your CF's to get the fastest 'writing rates' from them.

<Select> to save current ML ConFiG settings to CF

```
                                        CF

              COMPACTFLASH

  -  [CFG] Save Now

     [CFG] SaveAlways      Inactive

     [CFG] Save.1xOff      Inactive

     Write Movie Log       No

     DisablePowerSave      Yes

     Write MLBootRec

     ML Autoboot           Inactive


  Save current ML config -> CF (in A:/magiclantern.cfg)
```
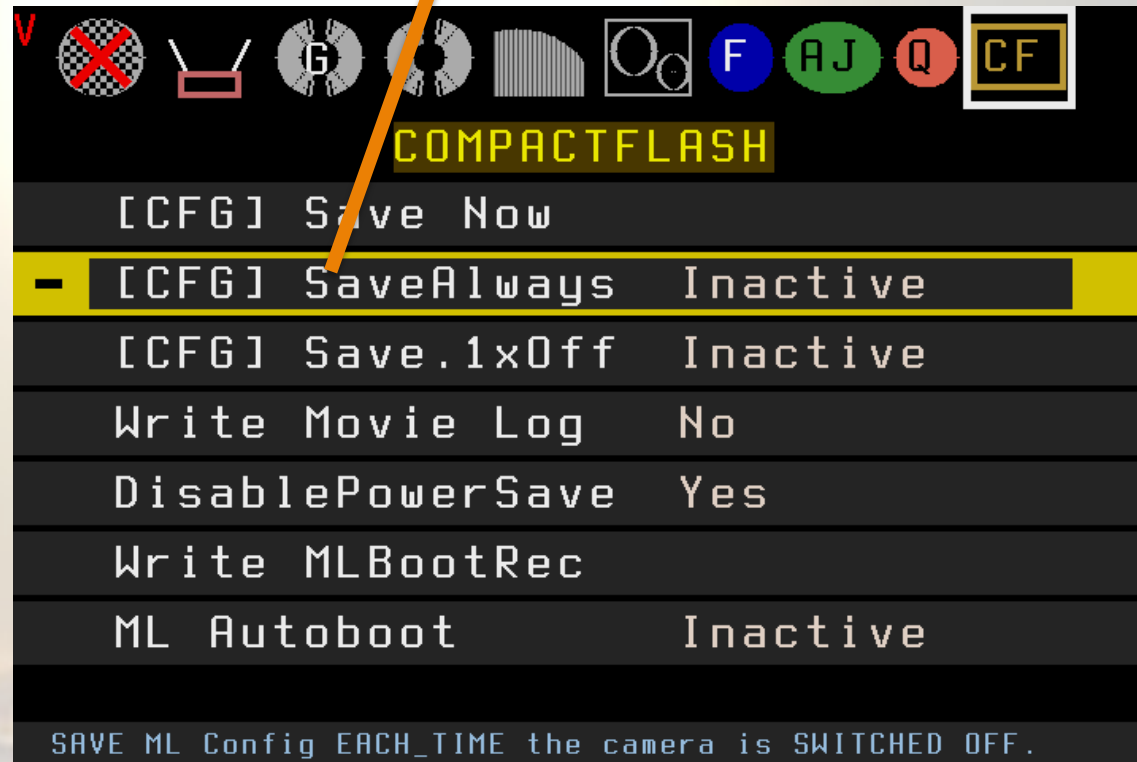
CF = Compact Flash

CF Trivia:

The fastest cards that the 5D2 support are 'UDMA7'.

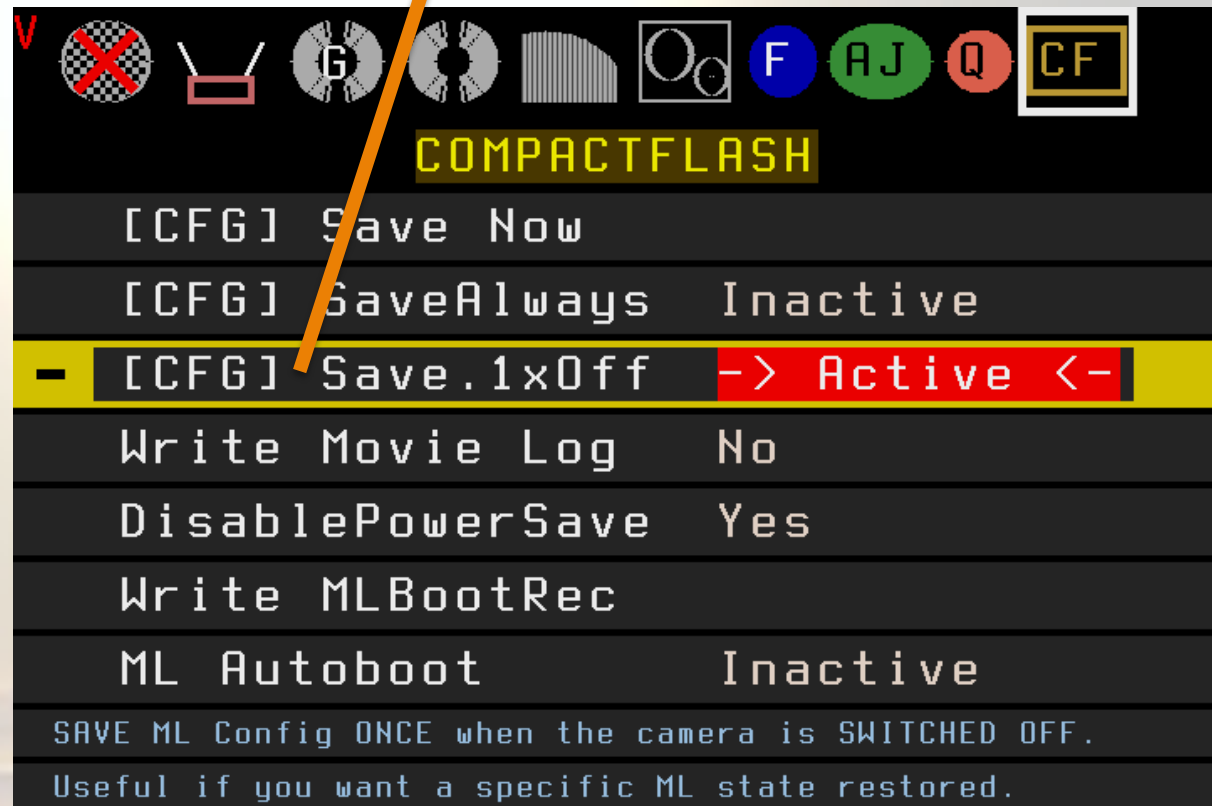❖When this option is Active, **EVERY** time the camera is switched off => the current ML Config is saved to CF.


```
              COMPACTFLASH
     [CFG] Save Now
  -  [CFG] SaveAlways    Inactive
     [CFG] Save.1xOff    Inactive
     Write Movie Log     No
     DisablePowerSave    Yes
     Write MLBootRec
     ML Autoboot         Inactive

SAVE ML Config EACH_TIME the camera is SWITCHED OFF.
```

CF = Compact Flash

When ML starts up, this field is Always set to Inactive.
When set to Active, and the camera is switched off => the current ML Config is saved to CF.
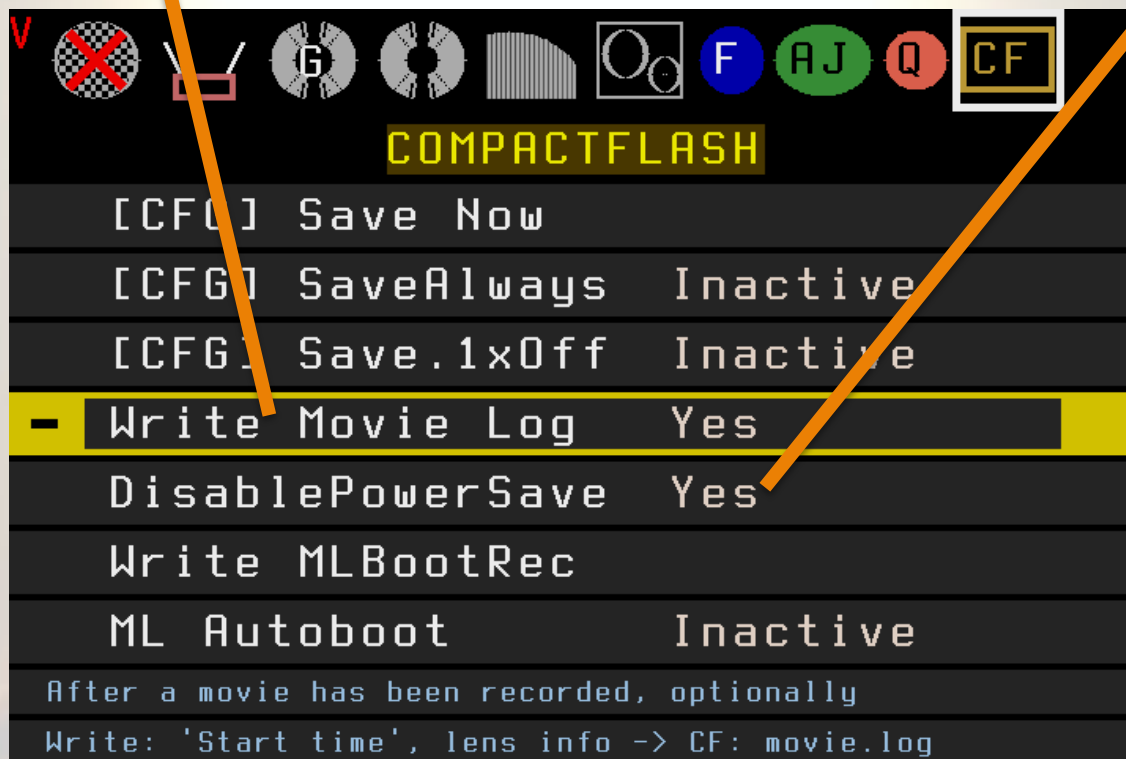
COMPACTFLASH

[CFG] Save Now
[CFG] SaveAlways   Inactive
[CFG] Save.1xOff   -> Active <-
Write Movie Log   No
DisablePowerSave   Yes
Write MLBootRec
ML Autoboot   Inactive

SAVE ML Config ONCE when the camera is SWITCHED OFF.
Useful if you want a specific ML state restored.

CF = Compact Flash

When this is Yes, details of each movie recorded are written to a file called **movie.log** at the top level of the CF.

The Canon DryOs default is to intelligently turn off your camera when not in use.
This option is used to override (ie disable) this feature.

```
COMPACTFLASH

 [CFG] Save Now
 [CFG] SaveAlways    Inactive
 [CFG] Save.1xOff    Inactive
- Write Movie Log    Yes
 DisablePowerSave    Yes
 Write MLBootRec
 ML Autoboot         Inactive
After a movie has been recorded, optionally
Write: 'Start time', lens info -> CF: movie.log
```

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CF = Compact Flash
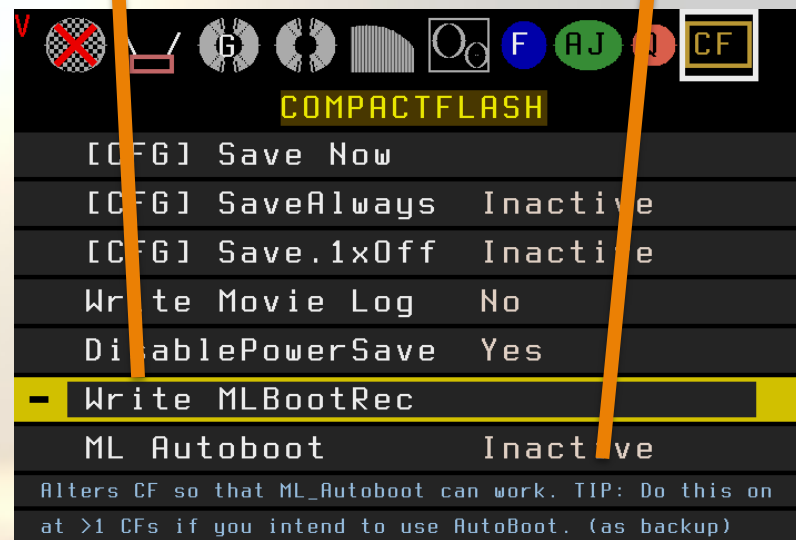
There are **two** ways of 'launching' Magic Lantern.

① Using the Canon Firmware Download menu.

② Or to reconfigure the Canon DryOs (ie make a change in the Non-volatile memory) so that when the camera is switched on next, it AutoBoots from the CF.

For AutoBoot to work, a MLBootRec must be written to the CF currently inserted (and ML code be on the CF!)

TIP: If you are going to use Autoboot -> get an Old CF, setup a MLBootRec on it, copy ML onto it. This is to cover you just incase there is a CF / ML issue that corrupts your 'only' CF .. (as you need ML to run to disable Autoboot!).

❖Write the MLBootRecord to the current CF. (**Must** be done before ML AutoBoot is active!)

❖When Active, and the camera is switched on, the Canon DryOs will boot directly into ML.

```
COMPACTFLASH
[CFG] Save Now
[CFG] SaveAlways      Inactive
[CFG] Save.1xOff      Inactive
Write Movie Log       No
DisablePowerSave      Yes
— Write MLBootRec
ML Autoboot           Inactive
Alters CF so that ML_Autoboot can work. TIP: Do this on
at >1 CFs if you intend to use AutoBoot. (as backup)
```

FIN