Magic Lantern 0.2 for Canon 550D, firmware 1.0.9 User's Guide

http://magiclantern.wikia.com/550D

January 26, 2011

Magic Lantern is an open (GPL) framework for developing enhancements to the amazing Canon 5D Mark II and 550D/T2i digital SLRs. Magic Lantern is being developed by a small team, helped by a very enthusiastic and respectful user community.

Initial version by Trammell (the author and lead of Magic Lantern project)

Main developer for 550D branch: Alex

Crypto tools and 550D/1.0.9 port by Arm.Indy

Code review and insights by AJ

Patches by piersg, nandoide, stefano, trho, deti, tapani, phil

Card tools by Pel, Zeno, lichtjaar

Cropmarks by CameraRick, Robert, bwwd, turbinicarpus

Tutorials by sawomedia, Renny, Jeremy, Daniel, Dod3032, MediaUnlocked, 3615geek, CineDigital.tv, jeveuxdoncjevilme

Thanks to all the users who provided feedback and reported bugs!

Special thanks for people who donated in order to help the development of Magic Lantern; your help is very much appreciated!

Also, thanks to the CHDK team and all the contributors and donors for the 5D2 Magic Lantern!

Magic Lantern is being developed by independent film makers in our spare time and at risk to our beloved cameras. We hope that it saves you time and aggravation on set, and we'd appreciate your support. You can help by donating via PayPal, or through equipment donations. You can also contact me (Alex) via email. Thanks!

Contents

Features

- GUI menus: press the ERASE button to display them, SET/DISP to change values
- Bit rate control (QScale parameter) for the H.264 encoder
- Exposure aids: zebra stripes, false color, spotmeter, histogram
- Focus peaking
- Rack focus
- Stack focus (Live View only)
- Cropmarks (16:9, Cinemascope, Fisheye)
- Intervalometer (classic or HDR)
- Silent pictures in LiveView mode
- Trap Focus: camera takes a picture when something comes in focus
- Remote release with either the LCD face sensor or audio trigger
- Onscreen audio meters
- Manual audio gain, selectable input source, disable AGC and digital filters
- Display time remaining during video recording
- Debug functions (display CMOS temperature, screenshot, logging)
- Fine tuning for ISO and shutter speeds; also ISO 25600
- Kelvin white balance
- Clean LiveView display without any overlays (selectable)
- On-demand auto tuning for ISO, shutter & kelvin white balance
- Quick access to some useful settings like HTP, ALO and contrast
- Extra info displays: lens data, focus distance, DOF, shutter count, clock

Known issues

- Stack focus only works in Live View, after going through Play mode first. Sometimes, rack & stack focus simply refuse to work, and you need to restart your camera.
- After closing ML menu, screen may not redraw automatically (half-press the shutter or press `MENU` to trigger a redraw)
- Sometimes the menu gets overwritten by Canon's drawing routines, or flickers.
- Camera may become unstable if you change modes while ML menu is active.
- Audio monitoring works, but breaks USB, HDMI and maybe other functions. For this reason, you may find pairs of builds with `AudioMon` or `NoAudioMon` in their names.
  - If you need audio monitoring and don't care about broken stuff, use the `AudioMon` builds.
  - If you don't need audio monitoring, use the `NoAudioMon` builds.

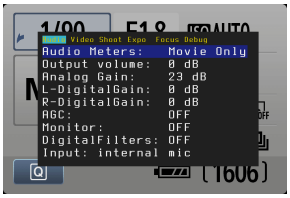
Important notes

- If you have a bootable SD card and have the `DISKBOOT` flag set in the camera (which the installer does), and you do not have an `AUTOEXEC.BIN` file on the card the camera **WILL NOT BOOT!** It will hang and not wake up until the battery is removed.
- If you encounter a "locked up" camera, **quickly remove the battery**. Otherwise the ARM might be in a tight-loop and get very hot, very quickly. Your battery will run down and your LCD might show some discoloration.
- When in doubt, remove the battery and reboot.
- **And, remember that this software can damage or destroy your camera.**

Menu options

Press ERASE button to show the menu. Use arrows to navigate, `SET` to change values forwards and `DISP` to change values backwards.

Audio



Video:Ryan's T2i Tips and Reviews - Onboard Mic vs. ATR-3350 Lav vs Rode VideoMic

Audio tweaks.

Audio Meters: ON / OFF / MovieOnly Draw the audio meters or not. The `Movie Only` settings enables audio meters in movie mode only (default).

Output volume (dB) Gain to external audio - currently this is the A/V jack (?) so not audible on just the camera

Analog Gain (dB) Gain applied to both inputs in the analog domain - intended as mic-type preamp, but always preferable to digital gain (unless you want different gain or run out of analog).

L-DigitalGain and R-DigitalGain (dB) Digital gain applied separately to the L and R channel.

AGC: ON/OFF Enable/disable Automatic Gain Control. Turn this to OFF to prevent hiss noise when recording silence.

Monitor: ON/OFF It's ported from 5D2 code, so it should be tested to see what it does. In the code it says it enables or disables loopback mode (what's this?!)

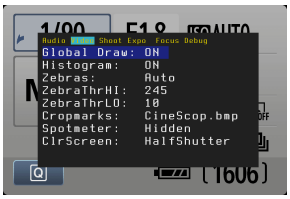
DigitalFilters: ON/OFF Enable/disable digital audio filters (High Pass Filter, Low Pass Filter and stereo emphasis)

Input Input source:

- **internal mic**
- **int Left ext Right**
- **external stereo**
- **int Left ext Balanced** (internal Left + Right from both external pins as balanced audio)
- **Auto int/ext**: camera detects if a mic is plugged in. Int is dual mono, ext is stereo. Does not work yet.

"Balanced audio allows for very long cable runs without interference. Usually balanced mics have three pin XLR connectors and it is very easy to out together an XLR to Canon mic input cable. Balanced allows us to use such pro mics with our little Canons and this is a very welcome surprise for audio guys." (source)

Video



Video overlays: histogram, zebras, cropmarks, spotmeter, focus peaking, false color.

Global Draw: ON/OFF Enable/disable drawing extra graphics elements (zebra, cropmarks, histogram, spotmeter, audio meters, ML shooting info).

Tip: use this to quickly turn them off.

Hist/WaveFrm: ON/OFF Shows the distribution of image brightness with:

- a histogram plot (toggle with `SET`)
- a waveform plot (toggle with `Q`)

The brightness is considered to be equal to the luma (Y) channel of the LiveView image. Colorspace is YUV.

Zebras: ON/OFF/Auto, lo_level..hi_level Enable/disable zebra stripes, which indicate overexposed or underexposed areas.

Auto setting: zebras are disabled while recording.

Keys:

- `SET`: toggle between `ON/OFF/Auto`
- `DISP`: change threshold for underexposure
- `Q`: change threshold for overexposure

Brightness values are between 0 and 255.

False color This is an aid for evaluating the exposure. See this thread for details.

- **Plain C**: full resolution, maybe a bit slow.

- **Lo-res C**: half resolution, faster.
- **ASM (AJ)**: ASM code by AJ, ported from 5D2. Very fast, but a bit buggy.

To get the correct palette, go to LiveView, then Play, make sure you have an image, then back to LiveView.

This function can be triggered by a shortcut key:

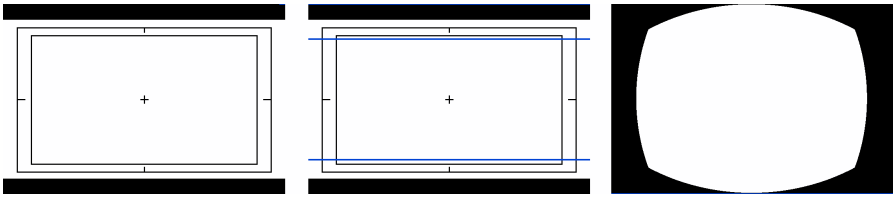
- flash button in Movie mode
- DOF preview button in Photo mode

Use `Q` to enable/disable the shortcut key.

Cropmks(x/n) Select cropmarks (cycle between them).

There are 3 predefined cropmarks in the zip archive:

- HD with Title & Action Safe (from CameraRick)
- Cinemascope
- Fisheye for stills framing with Samyang/8mm.



If you use custom cropmarks, place them in `CROPMKS` folder on your SD card and give them short 8.3 names. The number in paranthesis `Cropmks(x/n)` shows the selected cropmark number and the number of detected cropmarks. You can place at most 9 cropmarks on the card.

An exclamation mark (!) displayed in the menu means there was an error loading the cropmark image.

Get more cropmarks created by Magic Lantern users here

See Cropmarks for how to create custom cropmarks. Tip: use `Debug->Screenshot` to get a bitmap with the correct palette.

Press `Q` to enable cropmarks in Playback mode.

Spotmeter: ON/Percent/IRE Measure brightness in the center of the frame, and display it as a percentage or IRE value.

ClrScreen: OFF/HalfShutter/Always

- **HalfShutter**: Hold the shutter half-pressed, or the `*` button, or DOF preview for around 1 second, and this will clear all the overlays from the Live View display (audio, zebra, crops, shutter speeds...). It allows you to compose the picture without any extra distractions.

  This works best when autofocus is assigned to the `*` button (from Custom Functions, set CFn.9 to 1: `Shutter/AE lock button = AE lock/AF`).

  Tip: also use it for cleaning up unwanted Magic Lantern garbage left on the screen.
- **Always**: In this mode, all the overlays are erased from the screen (100% clean display). Zebras & friends are still available when you enter the Q menu, and then disappear.

Focus Peak: ON/OFF, threshold, color_mode Experimental focus peaking.

See Focus assist and discussion thread.

- `SET`: toggle ON/OFF
- `Q`: adjust percentile threshold, between 0.1% and 5%.
- `DISP`: select color mode
  - one of `R,G,B,C,M,Y` (a single color)
  - `cc1`: color coding 1 (show edge detection threshold as color, a single color for the entire frame; warmer = higher)
  - `cc2`: color coding 2 (show edge detection threshold as color for every pixel)

Known bugs:

- it's easily fooled by contrast (or lack of it)
- it may display red markers even if there's nothing in focus

Implementation details:

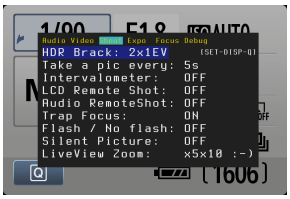
- Only horizontal edges are detected.
- Only adjacent pixels which fit in an int32 are considered.
- Threshold method: percentile (0.1% ... 5%).
- Vertical downsampling: always 2
- Horizontal downsampling: 2 when recording, else 1.

LiveView Zoom: x5 / x10 / :-)

Control the zoom feature in LiveView. Change `x5/x10` settings with `DISP` and toggle `:-)` with `SET`.

- `x5`: only `x5` zoom will be available (disables `x10` zoom)
- `x10`: only `x10` zoom will be available (disables `x5` zoom)
- `x5x10`: both settings available (Canon default)
- `:-)` Enable zoom in Face Detection mode

Shoot



Functions for stills shooting.

HDR Brack AE Bracketing for HDR images and timelapses.

Select number of images with `SET` and step size with `DISP`. To turn this off quickly, press `Q`.

In `M` mode, this function does shutter bracketing. In the other modes it does exposure compensation bracketing.

HDR images can be taken with:

- ML remote triggers: LCD face sensor & audio trigger.
- ML intervalometer (for HDR timelapse)
- Press the shutter. In this case, the first image will have the middle exposure (without EV compensation), and the 2-second self-timer will be used. Also, this mode only works with 3 images or more.

For each HDR picture set, Magic Lantern also writes a bash script for stacking the exposures with **enfuse**. The scripts are stored in `DCIM/###CANON` and are named after the first picture in set, e.g. if the HDR sequence is created from `IMG_1001.JPG ... IMG_1005.JPG`, the HDR script will be named `HDR_1001.SH` and the resulting HDR image will be saved as `HDR_1001.JPG`.

To run the HDR scripts on the computer, move the scripts and the JPGs in the same directory and run (for example):

```
bash HDR_1001.SH
```

or, for processing all the images at once:

```
for f in $(ls *.SH); do bash $f ; done
```

On Windows, you can use Cygwin or MSYS to run the scripts.

Don't forget to delete the scripts from the card; the camera won't delete them!

Take a pic every X seconds / Record Y seconds, pause X seconds

Change the intervalometer settings (first setting appears in photo mode, second appears in movie mode).

Intervalometer: ON/OFF

Video:T2i Timelapse

Start/stop intervalometer.

- In photo mode, it takes a sequence of photos with a fixed delay.
- In movie mode, it takes a sequence of small videos
  - When `HDR Bracket` is active, each movie will be exposed according to the bracketing settings, and the duration of the movie will be multiplied by number of exposures.
  - To use the intervalometer in movie mode, make sure `Silent Picture` is `OFF`.

Tips:

- shoot in manual mode and switch the lens to MF.
- for power saving, cover the LCD sensor with something.
- to save the shutter count when doing timelapses, enable `Silent Picture` or use the intervalometer in Movie mode.

LCD Remote Shot: OFF/Near/Away Start/stop remote shutter release mode with the LCD sensor.

- **Near**: To take a picture, put your hand near the LCD sensor.
- **Away**: Picture is taken when you get your hand away from the sensor.

This is useful for avoiding camera shake without extra $$$, especially if you don't have a sturdy tripod.

To use it, select one of P,S,A,M modes, turn OFF Live View, and make sure "LCD auto off" is enabled (in the Canon menu, wrench 1).

If self-timer is on, this function will disable it.

Audio RemoteShot: ON/OFF Start/stop remote audio trigger. To take a picture, make some loud noise, for example, clap your hands.

Audio threshold can be set from `magic.cfg` by changing `audio.release.level` (default 700), or by adjusting the audio volume.

You can also start movie recording with this feature.

In photo mode, you can combine this option with the self-timer (may be useful for group or self pictures).

Be careful: this may trigger the shutter from the sounds made by camera (like focus beep or liveview switch).

You can stop the intervalometer and remote shooting modes either frrom ML menu, or by pressing `PLAY` or `MENU`.

Trap Focus: ON/OFF You hold the shutter half-pressed; camera takes a picture when something comes into focus.

This works if the lens is set to Manual focus (MF) and outside Live View. It does not work with lenses without chip.

Flash / No flash: ON/OFF This will toggle flash setting (on/off) after each photo. Works only in P,A,S,M modes. The effect is somewhat similar to Fuji's Natural Light with Flash mode.

Don't forget to pop up the flash :)

Silent Picture / Silent Pic HiRes / Slit-scan Pic

This can take pictures in LiveView mode without moving the mirror. When enabled, it saves uncompressed YUV422 frames from the LiveView buffer when you press the shutter halfway.

- Make sure you don't have autofocus assigned to half-shutter press (put it on * or turn it off)

Modes:

- `Silent Picture`: simple, low-resolution. Image resolution is usually around 1 or 2 MPix, and depends on the current mode (zoom or not, recording or not, and movie resolution). Details here.

- `Silent Pic Hi-Res`: emulates high-resolution by taking a matrix of small silent pics, in zoom `x5` mode. You need to have the camera on a tripod and the scene should be almost stationary (a pic is taken in a few seconds). Useful for timelapse.
- `Slit-scan Pic`: this takes distorted images like these. This mode is basically an extreme jello effect which can be used in creative ways.

Keys:

- `SET`: toggle modes (normal or hi-res)
- `DISP/Q`: toggle between:
  - `Single/Burst` in normal mode
  - available matrix sizes (which give the image resolutions) in Hi-Res mode.
  - timing (number of clocks to skip after each line) in Slit-scan mode. The internal clock has 25fps and the image buffer is updated at 12.5fps => use `1ln/2clk` or `1ln/4clk` for best results.

Silent picture setting is applied to intervalometer and remote triggers when used in LiveView mode.

Images are saved in `DCIM/1xxCANON/`, named after last picture/movie taken without this function.

To convert a 422 image to JPEG on the PC, use 422-jpg.exe (Windows and Wine) or 422-jpg.py (all platforms, you need to install Python). Double-click it, then select a single 422 file, or click Cancel and select a folder with 422 files. You can also use this program in command-line.

TODO:

- avoid that horizontal cut in pictures (vsync doesn't help)

Bulb Timer: 1s...3600s

Very long exposures with Bulb mode and ML timer. Only works with remote triggers and intervalometer. You should select `M` mode and `BULB` setting from Canon UI before using this.

Tip: you can cancel the exposure earlier by half-pressing the shutter button.

Expo

Adjusting the exposure parameters. Most of these settings only work in Manual (photo and video), and some of them work in P, Av and Tv too.

ISO Custom steps for ISO. Possible values:

0 (Auto), 100, 110, 115, 125, 140, 160, 170, 185, 200, 220, 235, 250, 280, 320, 350, 380, 400, 435, 470, 500, 580, 640, 700, 750, 800, 860, 930, 1000, 1100, 1250, 1400, 1500, 1600, 1750, 1900, 2000, 2250, 2500, 2750, 3000, 3200, 3500, 3750, 4000, 4500, 5000, 5500, 6000, 6400, 7200, 8000, 12800, 25600.

To get ISO values higher than 6400, turn on ISO Expansion from Custom Functions (CFn 1). To get ISO lower than 200, turn HTP off. In video mode, ISO only goes up to 6400. These is also true without ML.

In manual exposure modes (photo and video), press the `Q` button on this entry to set the ISO value automatically.

- When LiveView is active, a binary search algorithm is used; the search criteria is a good balance between overexposure and underexposure; search resolution is 1/8EV. If the contrast is very low, the histogram will be centered.
- When LiveView is off, ISO is set using the Auto ISO feature from Canon firmware, in 1EV steps.

Shutter Custom steps for shutter speed. Possible values:

1/30, 33, 37, 40, 45, 50, 53, 57, 60, 67, 75, 80, 90, 100, 110, 115, 125, 135, 150, 160, 180, 200, 210, 235, 250, 275, 300, 320, 360, 400, 435, 470, 500, 550, 600, 640, 720, 800, 875, 925, 1000, 1100, 1200, 1250, 1400, 1600, 1750, 1900, 2000, 2150, 2300, 2500, 2800, 3200, 3500, 3750, 4000.

In manual exposure modes (photo and video), press the `Q` button on this entry to set the shutter value automatically.

- When LiveView is active, a binary search algorithm is used; the search criteria is a good balance between overexposure and underexposure; search resolution is 1/8EV. If the contrast is very low, the histogram will be centered.

- When LiveView is off, the shutter value is computed with the help of Auto ISO feature from Canon firmware, in 1EV steps. This feature is still experimental and sometimes it does not work.

WhiteBalance Kelvin white balance. Range: 1700 ... 10000.

In LiveView, press the `Q` button on this entry to set the WB temperature using the center color as reference gray. The measurement area is 200x200 pixels, centered.

WBShift G/M Green-Magenta white balance shift. Range: G9 ... 0 ... M9. Useful for fluorescent lighting.

Contrast Adjusts the contrast of the current picture style. Range: -4...4.

`WARNING 1`: this will modify your current picture style.

`WARNING 2`: this was not tested with custom picture styles loaded with the EOS Utility (and it might have negative effects)!

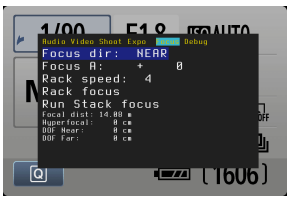
Light Adjust: OFF/ALO strong/HTP Select the light adjustment algorithm:

- OFF
- Auto Lighting Optimizer (strong)
- Highlight Tone Priority.

Brack

Bracketing was replaced by `HDR Bracket` feature from the `Shoot` menu, and it is no longer available. The source code is still there, you can enable it from Makefile and create a custom build.

Focus



Video:Magic Lantern for Canon 550D - Rack Focus Tutorial

Focus dir This is the direction the lens moves when pressing the camera's Zoom Out button to set the focus start and end points.

Focus A This is end point of rack focus. To set, focus the lens with the Zoom Out button, then press "Set".

Rack Focus Triggers the rack focus operation that moves between the start and end focus points. After the move is complete pressing again reverses the move.

Run Stack focus This selection will shoot a series of photographs with varying focal distances. You can also call this "focus bracketing". It is used in macro photography to assemble sharper final images by merging photos where each has a different focus point.

To configure focus step and number of photos, use the hidden settings `focus.step` and `focus.count`.

The following items are display only:

Focal Dist The distance to the focal point. Value is returned by most newer Canon lenses. If the lens does not report any distance information, 0 will be displayed and the DOF calculations will not be correct.

See also Focus distance.

Hyperfocal The hyperfocal distance is the point of focus where everything from half that distance to infinity falls within the depth of field. This is the largest depth of field possible for the current f-number.

DOF Near The nearest distance in which objects appear in focus.

DOF Far The farthest distance in which objects appear in focus.

See also the description from the 5D2 ML User Guide.

How rack focus works

Now that you know what the buttons are about, here is how you make it work:

1. After opening the focus menu, pick the end point of your rack focus, focusing manually with your lens on that point.
2. Next on the Focus Menu, select the direction you will have to focus to in order to find the start point. If the start point is a closer focus, pick `Near`, if it a farther away focus point, pick `Far`. (Remember, you are simply telling camera which direction to go to find the start point.)
3. Next, scroll down to `Focus A`. You need to zero this setting out, before going on. Press `Set` to zero it out.
4. Once that is completed you will use the `Zoom Out` or `Half Shutter` button to move the focus point to your start point.

5. Next select the time period of the pull, by scrolling down to rack speed. The lower the number, the longer the rack will take. It is recommended for testing purposes to start around 20.

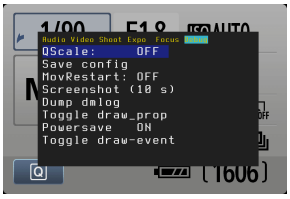
6. Next, start movie recording (you can do that while ML menu is active).

7. Once the camera is recording, scroll to `Rack Focus`. To start the rack focus, press `Set`. You should see the rack focus commence and complete its cycle.

8. To return to the beginning point, you can press `Set` again to return to that point, once again.

Note: the rack focus command may "stutter" while racking with some lenses, causing overshoot or undershoot of the desired position. This feature is still under development and should be more mature in a later version.

Debug



QScale Controls the H.264 QScale parameter, which affects video bitrate. Lower values mean higher bitrates. OFF disables QScale control.

When QScale is enabled, camera records in VBR mode (variable bitrate). When QScale is OFF, the bitrate is (more or less) constant (CBR mode).

See Bit rate page for details.

Default range is [-1 ... -16]. This can be changed from config file, but qscale is restricted to negative values only, due to limitations in config file parser.

QScale setting is saved, overrides Canon setting, and it does not take effect if you change it during recording. It will take effect at next movie.

Save config Save current settings to `MAGIC.CFG`.

MovRestart: ON/OFF While this setting is on, movie recording will restart automatically, unless stopped by you.

Draw palette Tests the 8-bit bitmap palette, which is used for video overlays. See VRAM.

Screenshot (10 s) Print screen after 10 seconds (it saves a BMP file). Only the bitmap overlays are included in the screenshot (i.e. no live view image).

Dump dmlog Saves a log which contains DebugMsg output. See Debugging Magic Lantern page.

Toggle draw_prop Display property changes in real-time. See Properties.

Toggle draw_event Display GUI events in real-time. See GUI_Events/550D.

Toggle mem_spy Display memory addresses which change, but not those which change like mad. Useful for detecting interesting addresses inside the camera RAM (like sensor & button locations).

Start address and size is selected with the hidden settings `debug.mem-spy.*` (see `debug.c` for details). You can also display only "small" or "boolean" values.

Trying to spy the camera_engine addresses seems to cause trouble (camera freeze). Probably it's not safe to read data from those areas.

Powersave Disable the powersave so that the LiveView never shuts off.

WARNING – this can cause problems with your sensor!

DO NOT LEAVE THE CAMERA ON CONTINUOUSLY!

Some items from this menu may not be available in release builds; you can uncomment them from `debug.c` and create a custom `autoexec.bin`.

Boot

Settings related to the Magic Lantern boot process.

Write MBR Try to make the card bootable, by writing the two labels (EOS_DEVELOP and BOOTDISK) to the MBR. Does not work yet.

Autoboot: ON/OFF Toggle the `DISKBOOT` flag in the NVRAM by calling `bootdisk_enable()` / `bootdisk_disable()` (these are registered by camera FW as eventprocs with names `EnableBootDisk` and `DisableBootDisk`).

If you disable Autoboot, Magic Lantern won't boot any more (you will have to reinstall it).

If you do not have access to the menu, you can use the hidden setting `magic.disable_bootdiskf` for this.

This menu may not be available in release builds, because these settings are potentially dangerous.

Features which are not in menu

Movie logging

Magic Lantern will write out a metadata file for the each movie to `MOV_1234.LOG` (numbered after the movie), as well as a timestamp every time any of the parameters is changed during recording. Log files are placed in the same folder as the movies: `DCIM/100CANON/`, `101CANON` etc.

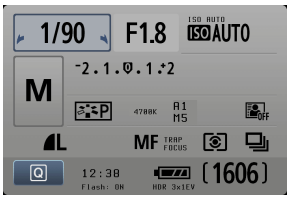
Time remaining display

When recording a movie, ML will display a small time counter in the upper right corner, which shows the estimated amount of recording time remaining on the card.

Unlike Canon's timer which assumes constant bitrate, ML timer assumes variable bitrate and works even if QScale is enabled. However, due to variations in bitrate, the estimated value will fluctuate a lot, and this is normal.

Extra info displays

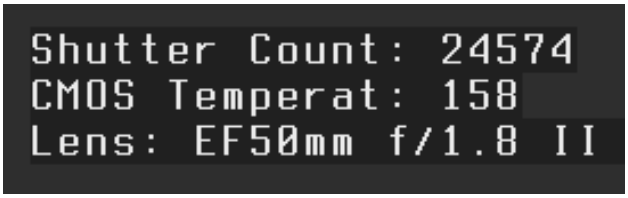
Main shooting screen (outside LiveView)



- Clock (bottom of screen)
- ISO value in finer increments (above Canon's ISO display)
- Trap Focus status (near MF icon)

- Kelvin temperature (in the white balance box)
- WB shift values for BA and GM
- Flash setting (under clock)
- HDR setting (under battery icon)

MENU->DISP



- Shutter counter. Only counts pictures taken, not LV switches or quick focus attempts.
- CMOS temp: temperature of the CMOS sensor (EFIC temperature), in raw units. Before, this was in the Debug menu.
- Lens name

LiveView

- Aperture, shutter, ISO
- Spotmeter: brightness percentage from the center of the frame. Computed as average value of Y component from YUV LiveView buffer over a very small area.
- Lens focal length and focus distance: see Focus_distance
- Exposure compensation (codenamed AE)

Configuration file

The configuration file (`MAGIC.CFG`) lets you tweak various hidden settings using a simple text editor (Notepad, gedit, vi...), and is also used to save Magic Lantern configuration from the GUI menu.

Saving settings

From the Magic Lantern menu, choose Debug -> Save config. Your config file will be overwritten with current Magic Lantern settings. Comments from the file will be removed!

Hidden settings

These settings can not be changed from the ML menu, so they are documented here:

```
# if set to 1, disable the bootdisk flag.
# This does the same thing as Debug->Autoboot menu item.
# Only for advanced users!!!
magic.disable_bootdiskf = 0

# Delay between clearing the overlay in Clear Preview mode
clear.preview.delay = 500

# Stack focus step size and frame count
focus.step = 100
focus.count = 5

# Limits allowed for qscale control.
# Since negative values are not allowed in config file,
# put the absolute values here. Qscale can have only negative values.
h264.qscale.max.neg = 1
h264.qscale.min.neg = 16

# Threshold for audio trigger
audio.release.level = 700

# Delay between two sub-pics in hi-res silent pic mode
silent.pic.sweepdelay = 350
```