

CANON CAMERA HACKING FOR HDR

The purpose of this short note is to show you how to hack a Point and Shoot **Canon** camera (see appendix A), that isn't very HDR-friendly, and enhance it to be able to take any number of exposure brackets and/or enable its RAW capture (if it is limited to JPEGs only at purchase). Although this note is aimed at in-camera HDR bracketing creation, the hack provides you with far more power, eg focus bracketing and histogram display etc, and I encourage you to read the manual (see below) to fully appreciate the power of the hack.

The first question to answer is: why bother? Simply put, HDR is best carried out through RAW capture (ie 12-bit or 14-bit as opposed to JPEG 8-bit) and using the camera's auto exposure bracketing (ie AEB) functionality. Both these prerequisites are addressed if you have a DSLR, although with most EOSs you are still limited to three auto brackets.

If you have a Canon Point and Shoot camera, you may not have an AEB function or, in some cameras, even a RAW capture, despite the fact that ALL cameras take a RAW image, ie RAW is simply the data straight off the CCD before an in-camera JPEG is produced.

However, thanks to a dedicate group of hackers, you can now tweak your Canon Point and Shoot to take as many AE Brackets as you like. In my case I have a Canon G11, so I'm covered as regard RAW output; however, the G11's built in AEB function limits me to a three image auto bracket at a maximum exposure of 1 second¹. Thus I sometimes need to increase the ISO to ensure my middle bracket (at 0EV) is faster than 0.25 seconds, to ensure my slowest bracket, say at 2EV, is no more than 1 second. A higher ISO setting, especially on a Point and Shoot camera, means more noise; and more noise means noisier HDR tone mapping. For example, a 1 second middle exposure at ISO-100, needs changing to an ISO-400 setting for an AEB sequence.

To be fair, I usually find that three brackets is enough, ie -2EV, 0EV and +2EV; however, sometimes I would like to shoot, say, -4EV, -2EV, 0EV, 2EV and 4EV AEB sequence or a, -2EV, 1EV, 0EV, 1EV and 2EV sequence. The only way to achieve this in my G11, without the hack described in this note, is to take three AEBs with a suitable EV offset, manually touch the camera to adjust the EV offset, thus potentially moving it, and take an addition three brackets, finally discarding any duplicate brackets in the PC.

Now thanks to the free Canon Hack Development Kit (CHDK), I can take unlimited HDR images with my Canon G11 Point and Shoot and at any EV spacing I need, ie I can keep my ISO (and noise) low, at 80 on the G11, and don't have to ensure the slowest bracket is less than 1 second.

CHDK is a firmware enhancement that gets loaded into your camera's memory upon camera bootup (either manually or automatically). It provides additional functionality beyond that currently provided by

¹ The alternative to using the AEB functionality is to manually take the required HDR brackets, which you can do at any exposure, ie you are not limited to a 1 second maximum. Whilst this is perfectly possible, the downside is that you will likely introduce movement differences between the images, even on a tripod, and, of course, the capture process will be much slower.

the native camera firmware. Thus CHDK is not a permanent firmware upgrade: you decide how it is loaded (manually or automatically) and you can always easily remove it.

Finally, if any LVCC members wish to play around with the CHDK hack, I would be more than happy to personally help them and/or show them what my G11 is now capable of.

Setup (once only)

I will only outline the set up here, as each camera is slightly different and will require its own CHDK files. It is best you read about CHDK yourself.

The first step is to surf to <http://chdk.wikia.com/wiki/CHDK> . This is the home of the free Canon Hack Development Kit, where you can check if your camera is supported. Before you download the CHDK files for your camera, ensure you know your firmware version: the web site will show you how to find this.

For those of you who want a little more help, I recommend a book called *The Canon Camera Hackers Manual* by Berthold Daum. I have this book and would be happy to lend it to any LVCC member. The book comes with software to make loading the CHDK hack on to your camera very easy.

To give you an idea of how long it takes: I hacked my G11 in less than 10 minutes. The process is simply loading the required files on to a 4Mb or less memory card (it is important you not use a bigger card) and using this card every time you wish to access the enhanced capabilities of the CHDK hack. In other words, when you remove the enhanced memory card and put another one in, you will not have access to the CHDK world.

Usage

Rather than explain what you can do in CHDK, I encourage you to surf over to the web site and read all about CHDK, ie the user and installation guides are available from here:

http://chdk.wikia.com/wiki/CHDK_User_Manual and

http://images3.wikia.nocookie.net/_cb20100513055511/chdk/images/9/91/CHDK_Installation_Guide.pdf

Bottom line

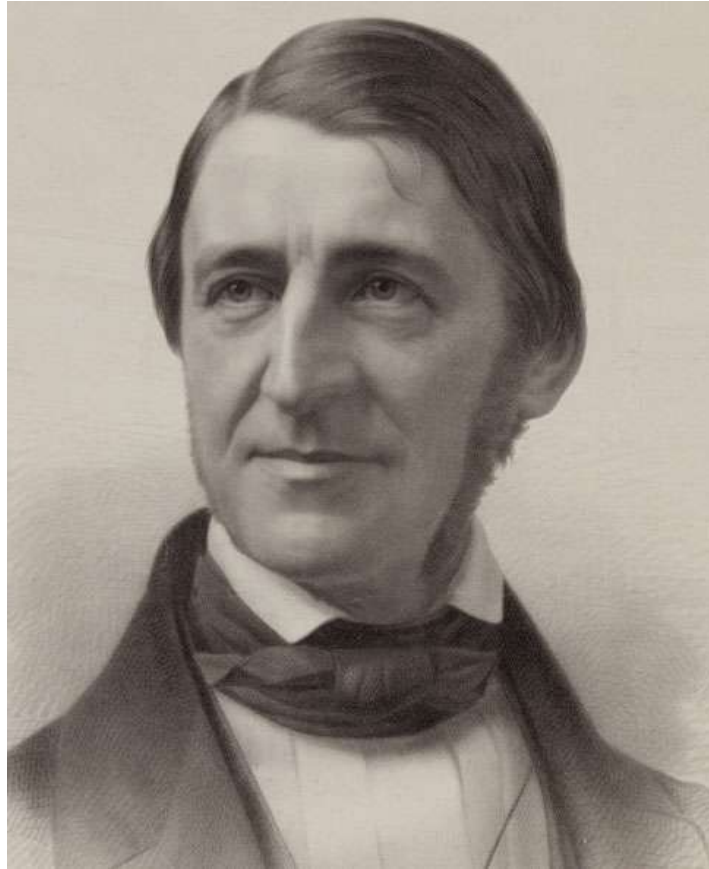
My first note on HDR explained how you could revisit your old (and new) RAW (and JPEG) images and create **virtual** brackets, either manually or through a Lightroom plug-in called Excessor. This note has shown you that if you have a Canon Point and Shoot (sorry non-Canon LVCC members) you can hack it to take as many RAW AEBs as you like; thus opening up the world of HDR without an expensive DSLR.

Garry George

26th March 2011

Appendix A: Canon Cameras covered by CHDK

A2000: A450: A460: A470: A480: A530: A540: A550: A560: A570: A590: A610: A620: A630: A640: A650:
A700: A710: A720: D10: S2: S3: S5: S90: G7: G9: G11: G12: SD30 (IXUS izoom): SD300 (IXUS 40): SD400
(IXUS 50): SD450 (IXUS 55): SD500 (IXUS 700): SD550 (IXUS 750): SD600 (IXUS 60): SD630 (IXUS 65):
SD700 (IXUS 800): SD750 (IXUS 75): SD770 (IXUS 85) (beta): SD780 (IXUS 100) (beta): SD790 (IXUS 90);
SD800 (IXUS 850): SD850 (IXUS 950): SD870 (IXUS 860): SD880 (IXUS 870): SD890 (IXUS 970): SD900
(IXUS 900): SD940 (IXUS 120) (beta): SD950 (IXUS 960): SD990 (IXUS 980): SD1000 (IXUS 70): SD1100
(IXUS 80): SX1 (beta): SX10: SX100: SX110: SX20: SX30 (beta): SX200IS: TX1:



All life is an experiment. The more experiments you make the better.

Ralph Waldo Emerson