

LASER RANGE FINDING
AND
GAME BOY PRINTING

DEFCON 20 HHV

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GRAND IDEA STUDIO

LRF-to-Game Boy Printer

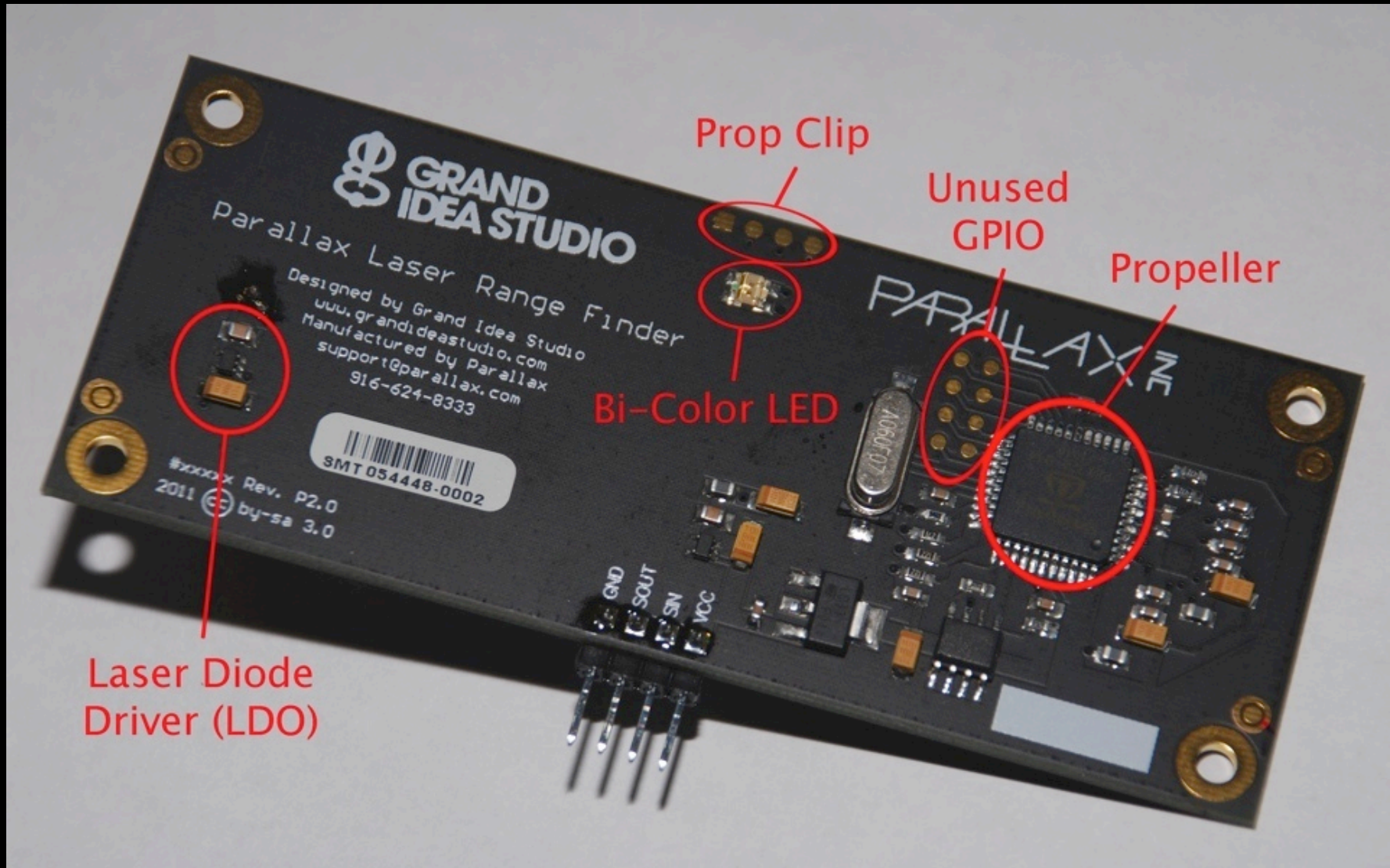
- Parallax Laser Range Finder module (#28044) meets old school Nintendo Game Boy Printer
- Inspired by furrtek's GBP reverse engineering
- Write-up @ <http://forums.parallax.com/showthread.php?136293>



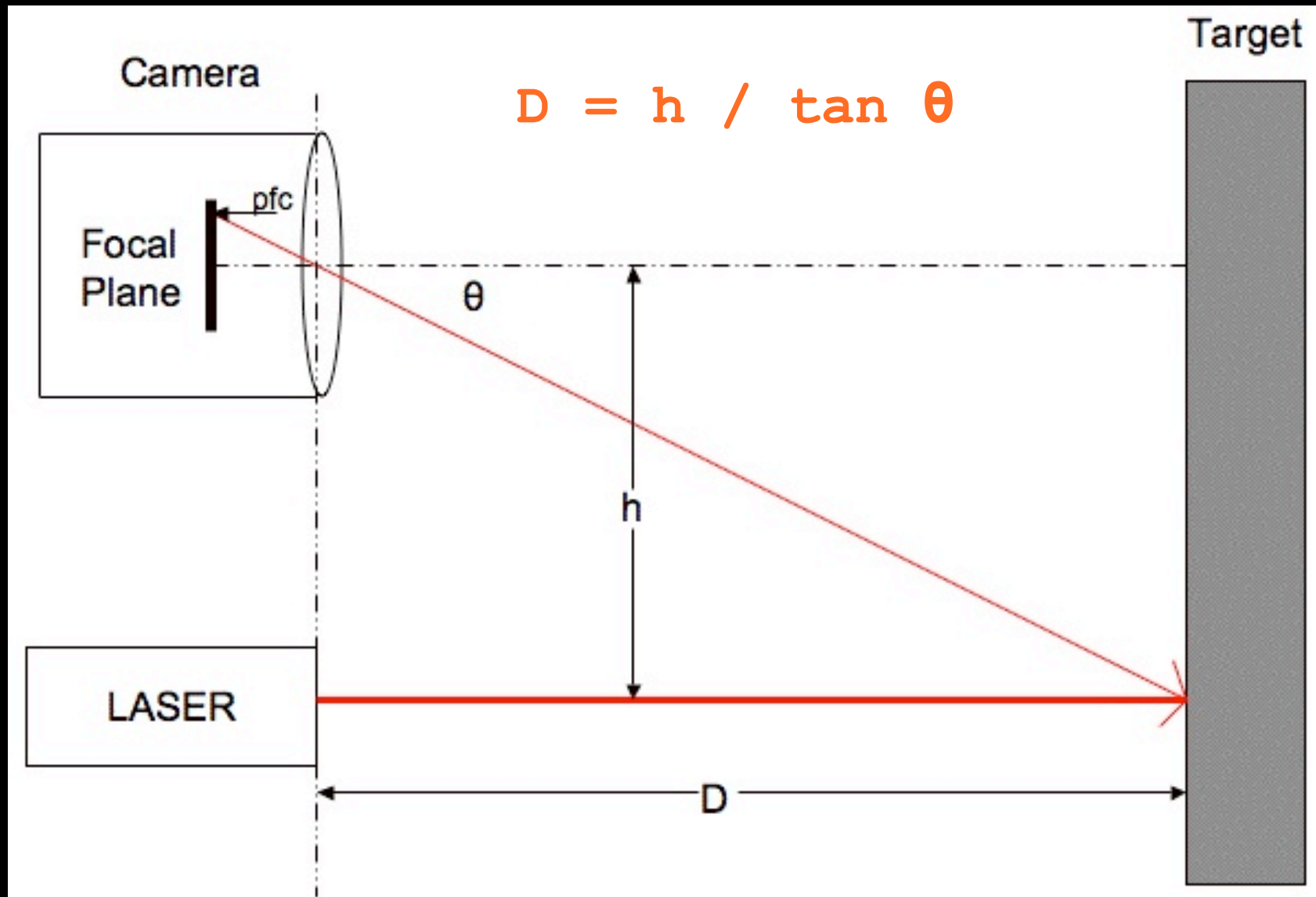
LRF Module: Front



LRF Module: Back



RAF Module: Triangulation

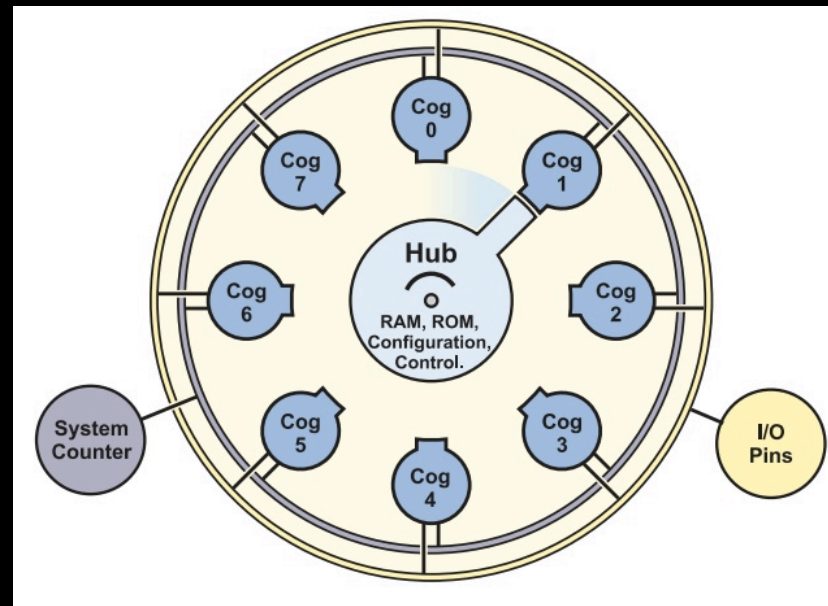


http://sites.google.com/site/todddanko/home/webcam_laser_ranger/laser_ranger_drawing.gif



LEF Module: Cogs

- Spin Interpreter (Cog 0)
- Auto-Baud Detection (start-up only)
- Full-Duplex Serial (JDCogSerial)
- Floating Point (F32)
- I2C for OVM7690 SCCB communication (pasm_i2c_driver)
- OVM7690 Frame Grabber (on request)



LRF-to-GBP: Details

- LRF: 160 x 128 greyscale image @ 8bpp
- GBP: 160 x ∞ @ 2bpp
- Modified version of original LRF firmware
 - Only need camera interface, frame grabber, and serial communication functionality
 - LRF grabs single frame when button pressed
 - Frame processed and sent to GBP via SPI
- Created Game Boy Printer Interface object for Obex (Spin): <http://obex.parallax.com/objects/814/>



LRF-to-GBP: Image Processing

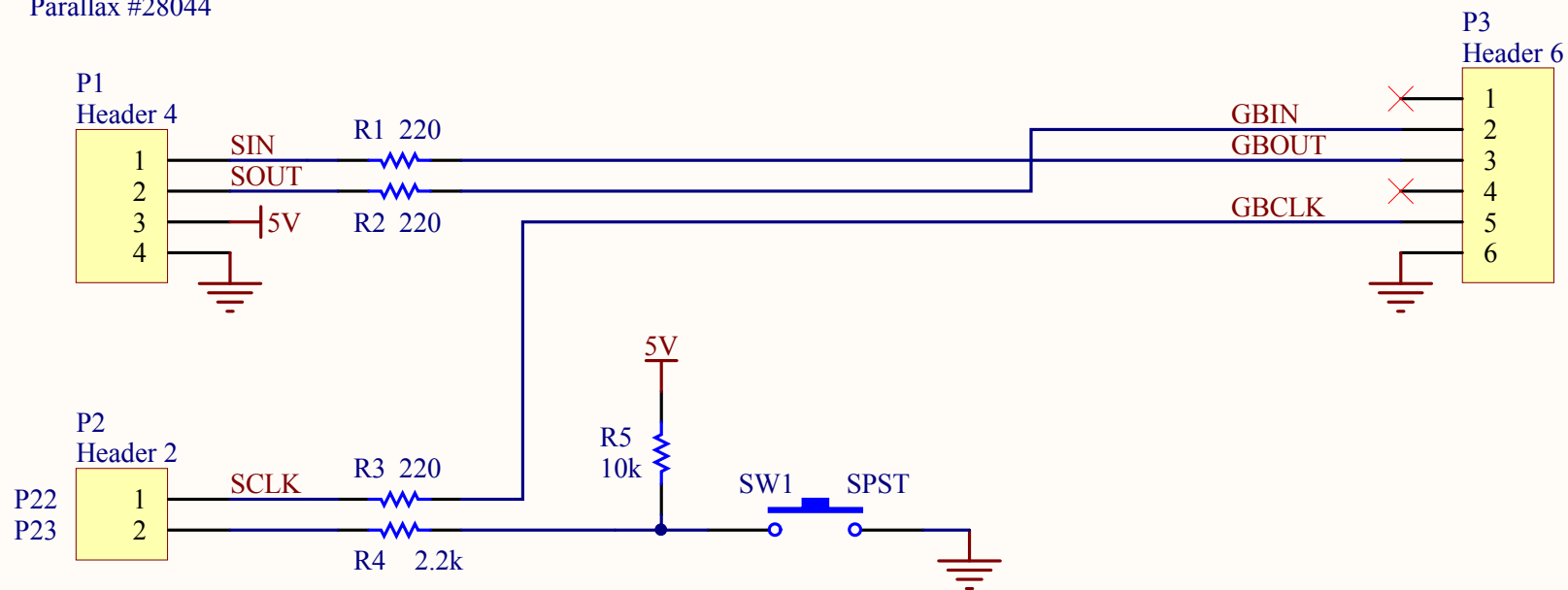
- Need to rearrange all the pixels and downsample
 - LRF frame stored in a linear format
 - GBP expects image data in a series of tiles (blocks)
- Each tile = 8 pixels * 8 pixels
- 20 tiles horizontal per band
- 2 bands per buffer
- 640 bytes per transaction



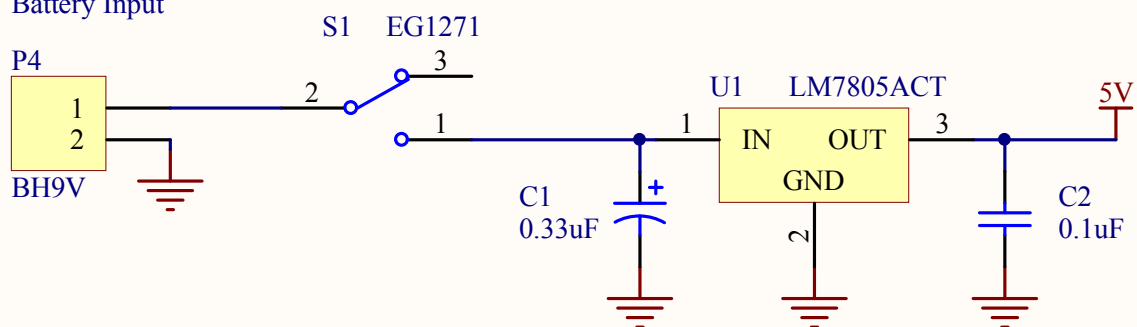
LRF-to-GBP: Schematic

Laser Range Finder Module
Parallax #28044

Gameboy Link Connector



Battery Input



LRF-to-GBP: Front



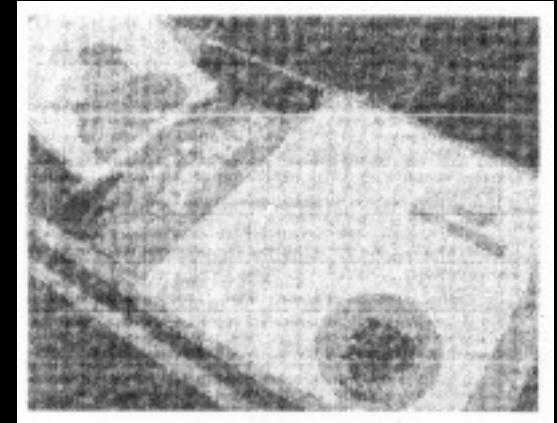
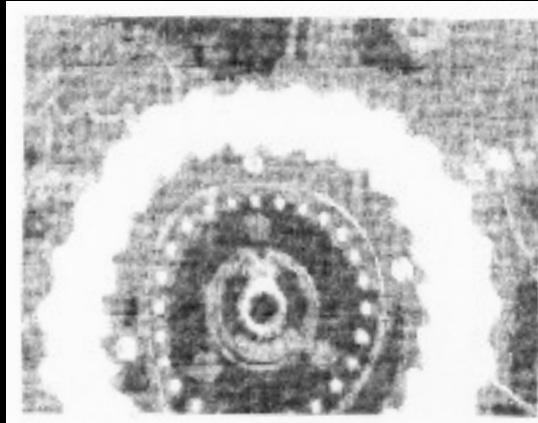
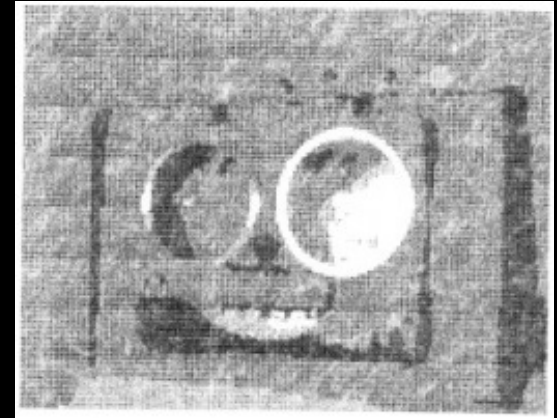
LRF-to-GBP: Back



LRF-to-GBP: Demonstration



RAF-to-GBP: Results



END OF TRANSMISSION