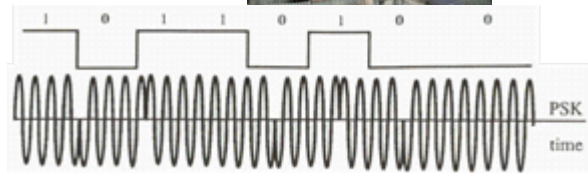


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Micro Pulse Laser Designation (MPLD) System

- Designator Use:
 - Mark targets for engagement by laser guided weapons
 - Mark targets for identification by pilots and ground forces equipped with laser spot imaging equipment
- USMC Designator: Portable Lightweight Designator Rangefinder (PLDR)
 - Procurement in FY07
 - Fielding in FY08



USMC Portable
Lightweight Designator
Rangefinder

Ground Designator Shortcomings

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- Ground Designators are:
 - **Too Damn Heavy!** PLDR system weighs 28 lbs
 - **Expensive!**
 - Costs are typically \$60-80K
 - Battery refresh is also a consideration
 - **Dangerous!**
 - Eyesafe range is 20+km direct exposure
 - Reflections are an issue
 - Difficult to train due to safety issues
 - **One Race Ponies!**
 - Designators do little else other than mark targets and measure range (limited use due to eye hazard)



USMC Portable
Lightweight Designator
Rangefinder

Get Rid of Designators?

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Option: Get rid of designators, who needs them when we have GPS guided weapons?

- GPS weapons require accurate targeting
 - Vector 21B + DAGR provides target location, but has these problems:
 - Azimuth
 - Azimuth
 - Azimuth
 - PSS-SOF can provide very accurate targeting but:
 - Need computer
 - Need accurate up to date maps
 - Need features to pick out in images
- What about...Jammers, Urban Canyons, Inside Buildings?



Vector 21B "CLRF"
Rangefinder

Get Rid of Designators?

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Option: Most aircraft have designation capability – why not just use aircraft?

- You still need to get the pilot's eyes on the target
- Most laser guided weapons are air delivered, but this is due (in part) to the limitations of the ground designator
- If there was a covert, eye safe, lightweight laser designator, wouldn't we develop laser guided artillery and mortar rounds?



Delivery of Paveway-III

“New” Designator?

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- Vector 21B
 - Eyesafe 1540nm 10km laser rangefinder
 - Excellent Optics
 - Integrated Digital Magnetic Compass and Vertical Angle sensor
 - Interfaces with DAGR
 - <\$20K
 - <8 lbs (including tripod)
- Is it possible to use this as a ‘Designator’?



Quick PLDR and Vector 21B Comparison

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Laser Energy	50-100 mJ	1.2 μ J
Laser Wavelength	1064nm	1540nm
Laser Output Rate	10-20 Hz	10 kHz
Covert?	No	Yes
Eyesafe?	No	Yes
Weight	28 lbs	<8 lbs

Project Technical Description

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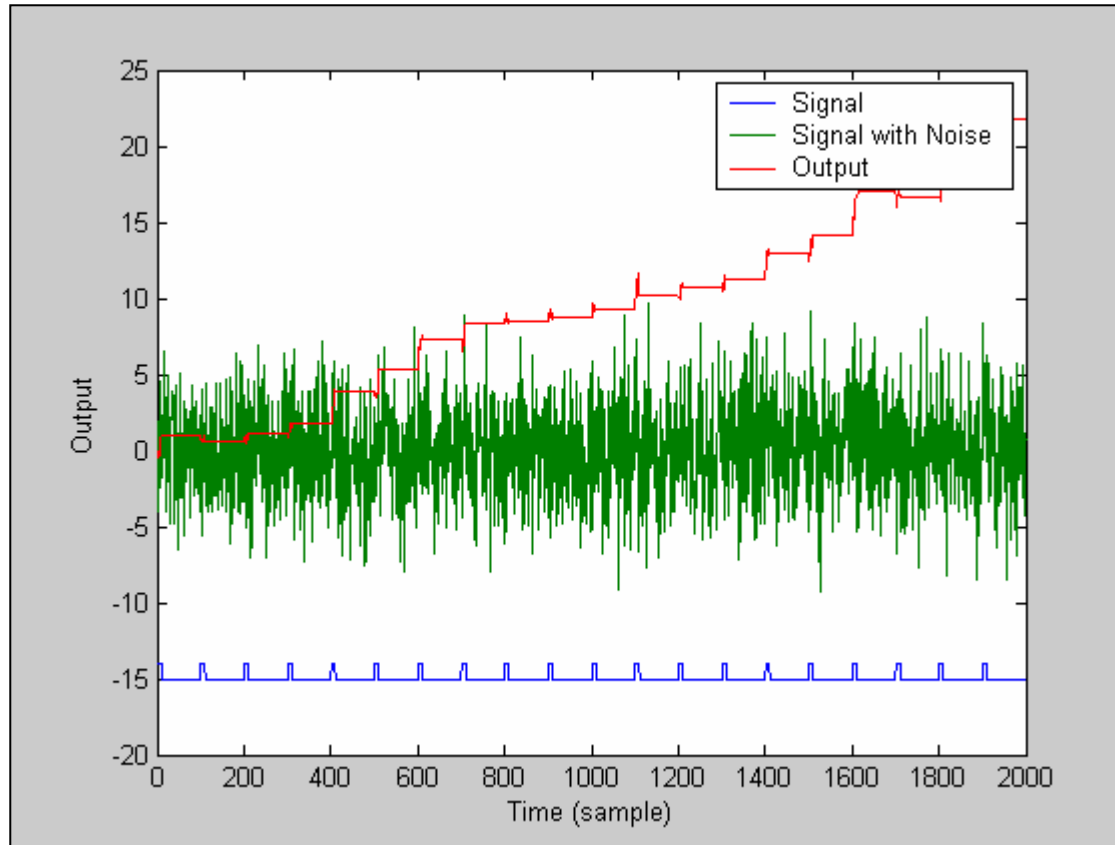
- Objective: To design a laser seeker that uses high-rate low amplitude pulses for guidance and determine what weapon systems can utilize the technology
 - Current laser codes: 20Hz , 50-100mJ pulses
 - Common Laser Range Finder (CLRF): 10Khz, 1.2 μ J pulses
- Advantages:
 - Gives designation capability to all current rangefinder users
 - Switch to 1.54 μ m wavelength
 - Less atmospheric attenuation
 - Detector sensitivity 2X
 - Eye safe
 - Higher pulse rate
 - Pulses lower energy - more covert (like GPS)
 - Data rate increases when closing on the target



Micro Pulse Laser Designation (MPLD) System

Integrating Micropulses

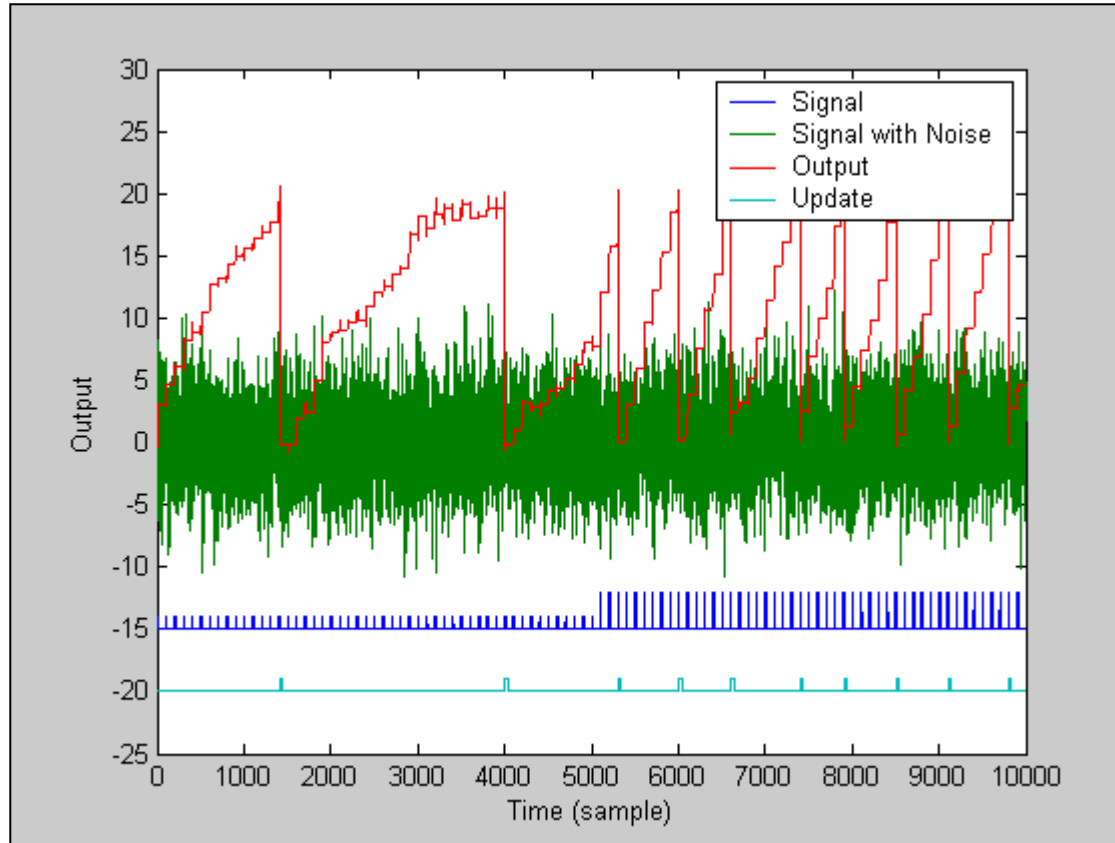
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Like GPS, integration of the signal+noise using the proper code (PRF) allows us to pull the signal out of the noise.

Integrating Micropulses

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With a constant signal to noise, the data rate will increase as we close on the target. This is needed to reduce miss distance and occurs naturally!

FY08 Plans/Progress

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- Analyzed shortcomings of existing laser designation systems
- Selected existing USMC laser range finder (CLRF) as the candidate designator
 - <4 lbs. vs. 28 lbs. for USMC PLDR (new acquisition FY07)
- Bench technology development and demonstration (ongoing)
 - Laser 'lock' range
 - Mortar guidance strategy
- Conduct Modeling and Simulation (ongoing)
 - 81mm Aerodynamic Analysis
 - Lens ray tracing
 - Matlab micropulse S/N analysis
- Conducted Trade Analysis on entire laser designation system
 - Developed new detector scheme which utilizes COTS developed for the telecommunications industry
 - Superior to existing quad-detector technology which is only used for military applications
 - Much lower cost and available immediately

- FY09 Plans
 - Develop and test breadboard and analyze range performance
 - Begin development of mortar guidance section based on FY08 Aero Analysis
 - Test different seeker field of views, aperture size, and other system parameters
 - Work with selected vendor on ‘productionizing’ design
 - Seeker exits FY09 at TRL3, guidance section exits FY09 at TRL2

Questions?