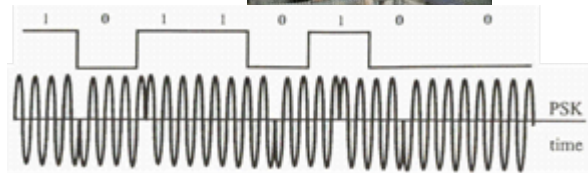


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## Micro Pulse Laser Designation (MPLD) System

- 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

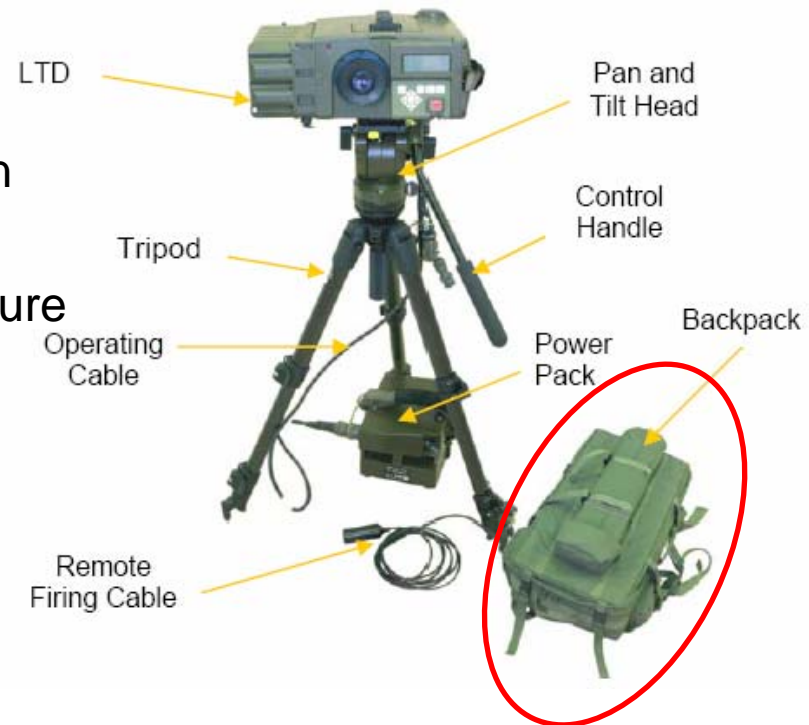


USMC Portable  
Lightweight Designator  
Rangefinder

# 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 $\mu$ 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

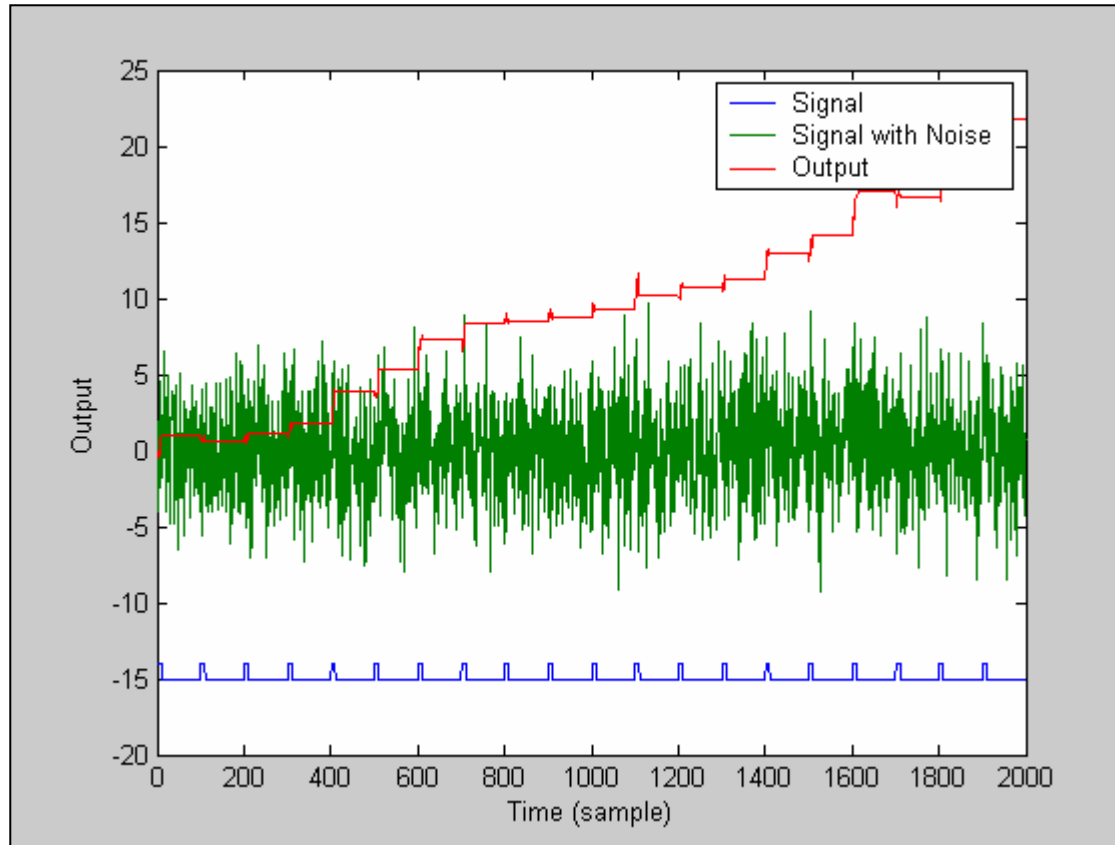
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- Objective: To design a laser seeker that uses high-rate low amplitude pulses for guidance and determine what weapon systems can utilize the technology
  - Current laser codes: 20Hz , 50-100mJ pulses
  - Common Laser Range Finder (CLRF): 10Khz, 1.2 $\mu$ J pulses
- Advantages:
  - Gives designation capability to all current rangefinder users
  - Switch to 1.54 $\mu$ 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



# Integrating Micropulses

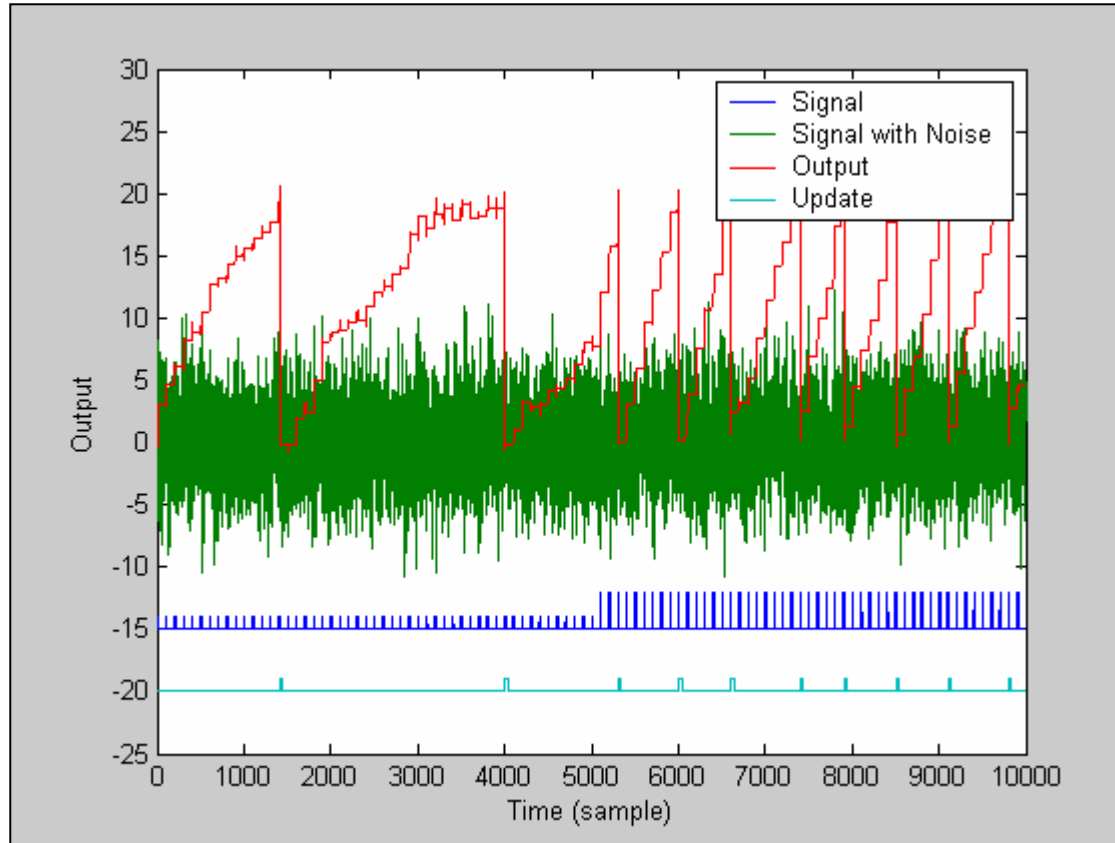
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Like GPS, integration of the signal+noise using the proper code (PRF) allows us to pull the signal out of the noise.

# 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

# Q&A

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# Questions?