Providing America
Advanced Armaments for
Peace and War

ARDEC

THE ARMY'S ENHANCED PORTABLE INDUCTIVE ARTILLERY FUZE SETTER (EPIAFS)

PRESENTED TO THE NDIA FUZE SYMPOSIUM
APRIL 7, 2005

EXCALIBUR
XM982

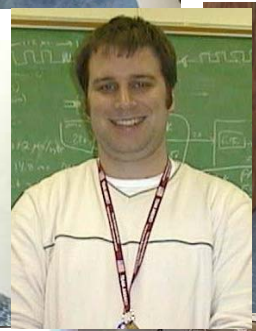
TOM WALKER

EPIAFS TEAM

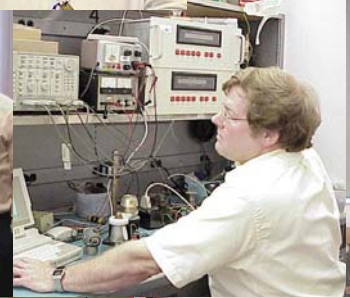
- Sponsor: PM-Excalibur LTC Cole
  - DPM: Chris Grassano
  - POC: Mike Burke
- System: Tom Coradeschi
- Platform Integration: Allison Marston
- User: Ft Sill
  - POC: Steve Pearson
- Software
  - Andy Leshchyshyn
  - Craig Freed
  - Fred Taverni
- Mechanical
  - George Eckstein
  - Jim Hartranft
  - Spencer Hum
  - Jr. Knisley
- Electrical
  - Debbie Calomiris
  - Len Goodman
  - Hai Pham
  - Fred Oliver
  - Mary Labib
  - James Wiltz
  - Tom Walker
  - Jerry Frazier

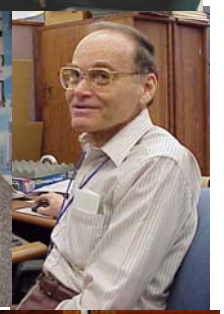











GPS satellite

Canards Steer Projectile

Trajectory Optimized for Range

Canards Deploy GPS Acquisition and Track

EPIAFS to Support Excalibur

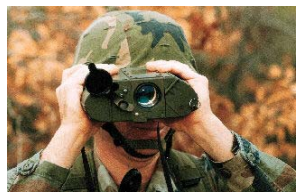
Target

EPIAFS
Gun/Target Locations
GPS Data, Keys & Precise Time
Power

LW155 w/TAD

FO

Targeting info



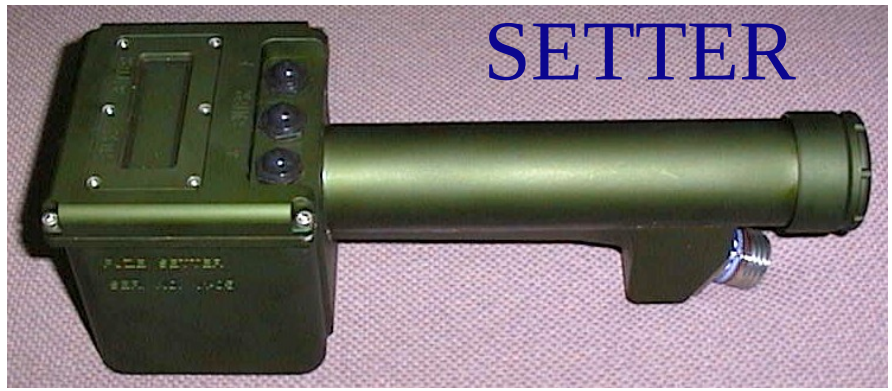
Fire Control

AFATDS

EPIAFS SYSTEM

- PLATFORM INTEGRATION KIT (PIK)
  - Single board computer
  - Interface circuit
- SETTER and Cable

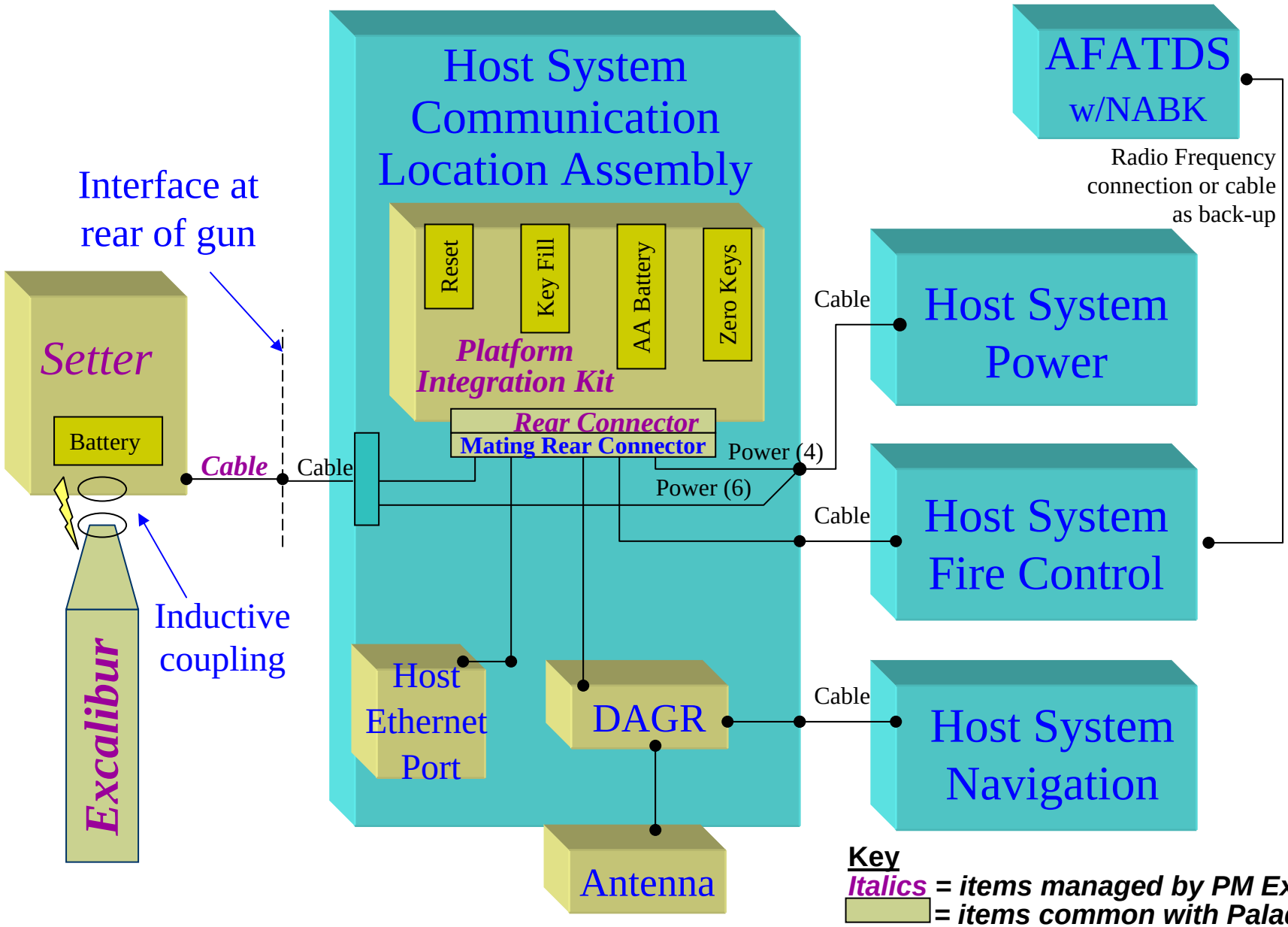
➢ EPIAFS utilizes DAGR



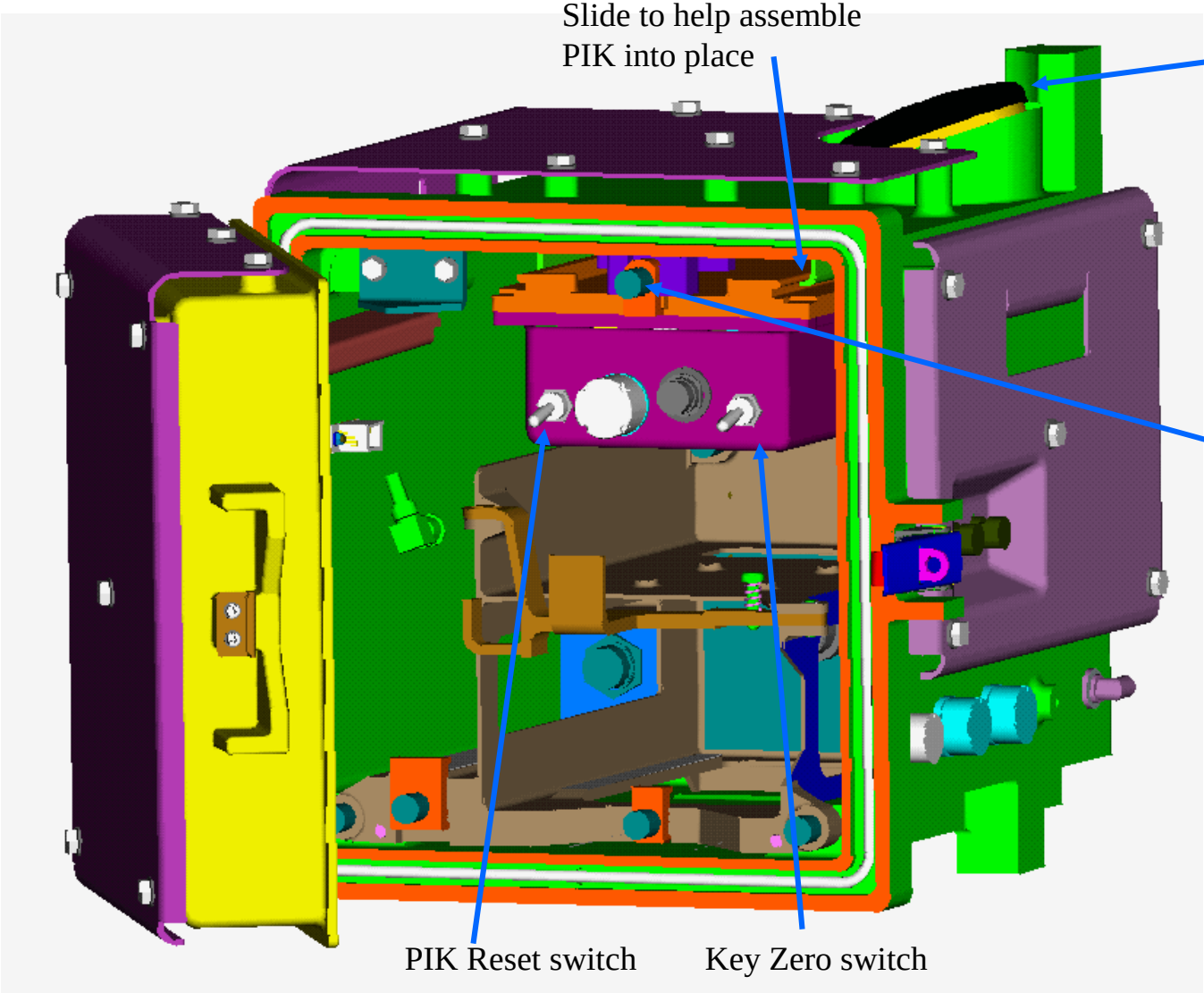
EPIAFS Host: M777E1

PIK goes here inside CLA

Excalibur System Integrated into JLW155

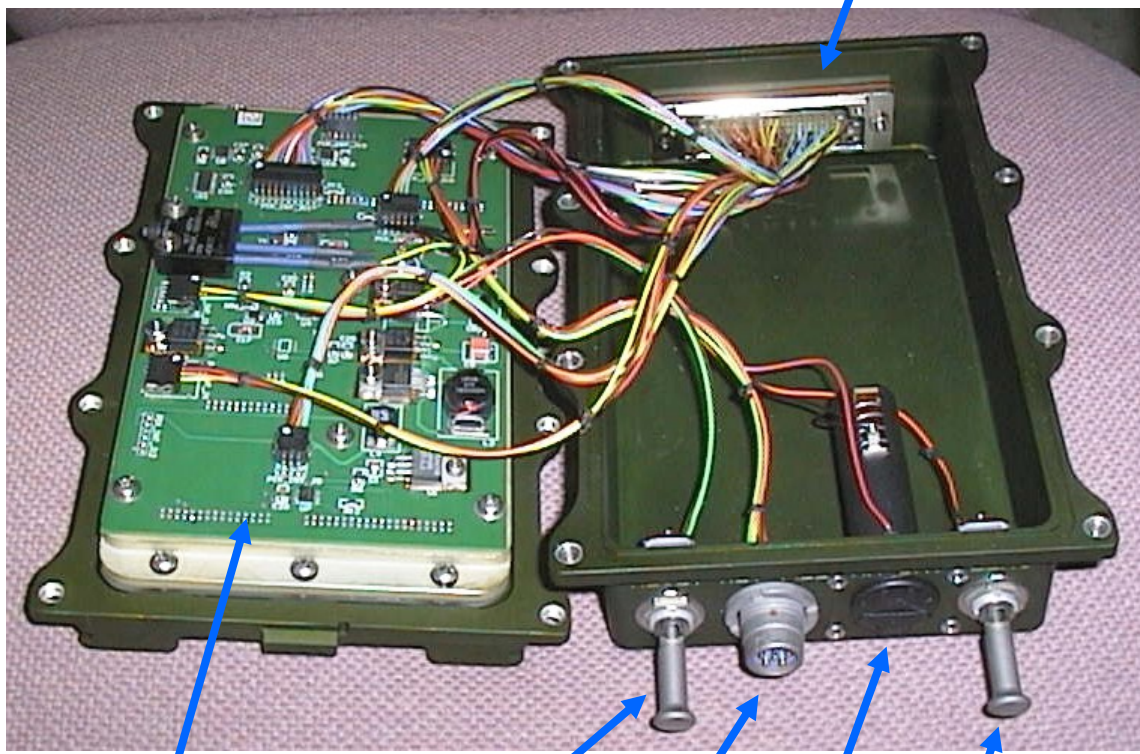


PIK in CLA with ‘Rack-and-Panel’ Connector

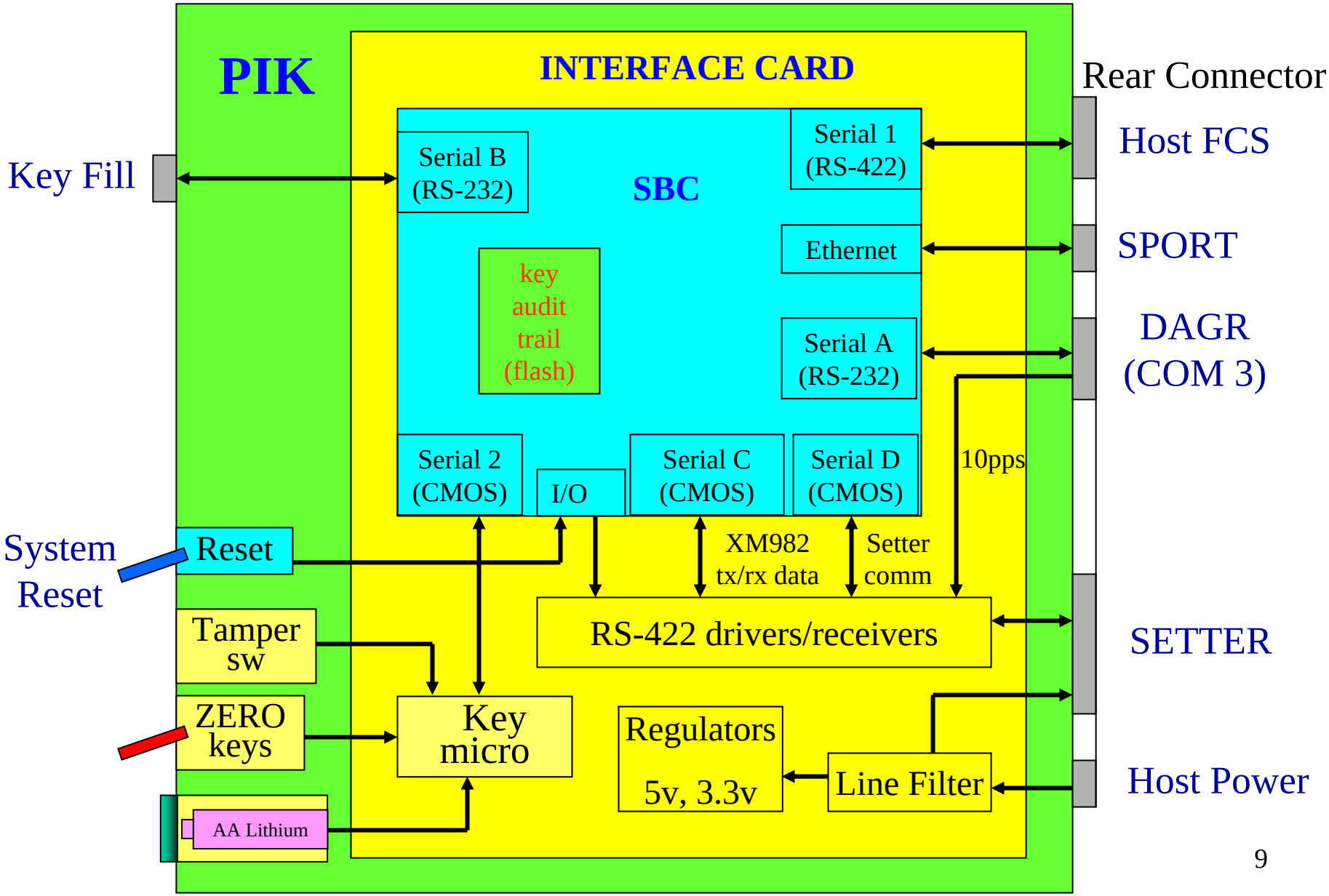


PIK FUNCTIONS

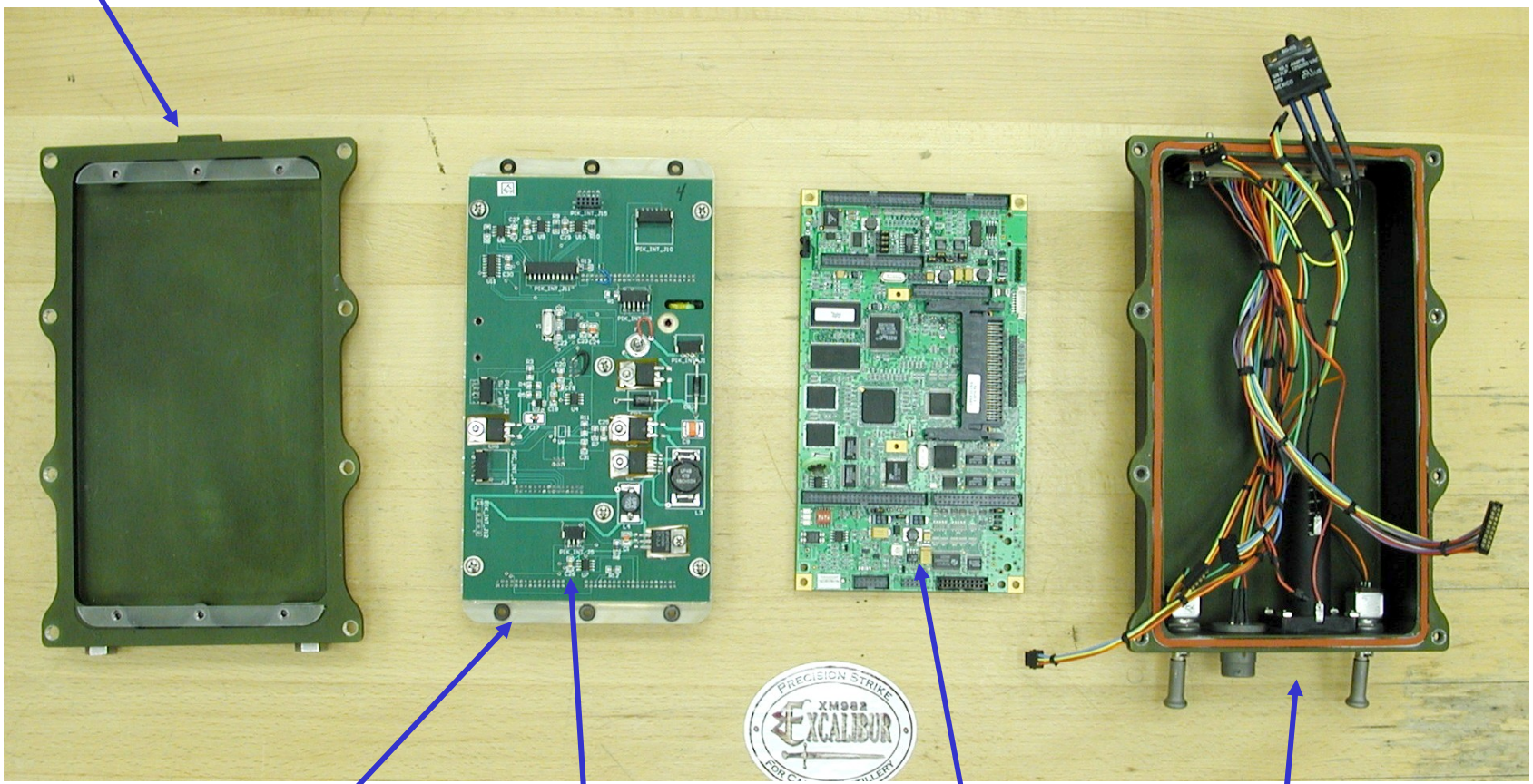
- Formats and sends all XM982 initialization data and TMP's through Setter
- Passes Standard Fuze Data to Setter
- Interfaces with Host system
- Interfaces with Key Loader
- Stores black GPS crypto keys and Audit Trail
- Interfaces with SPORT or MSD



PIK BLOCK DIAGRAM

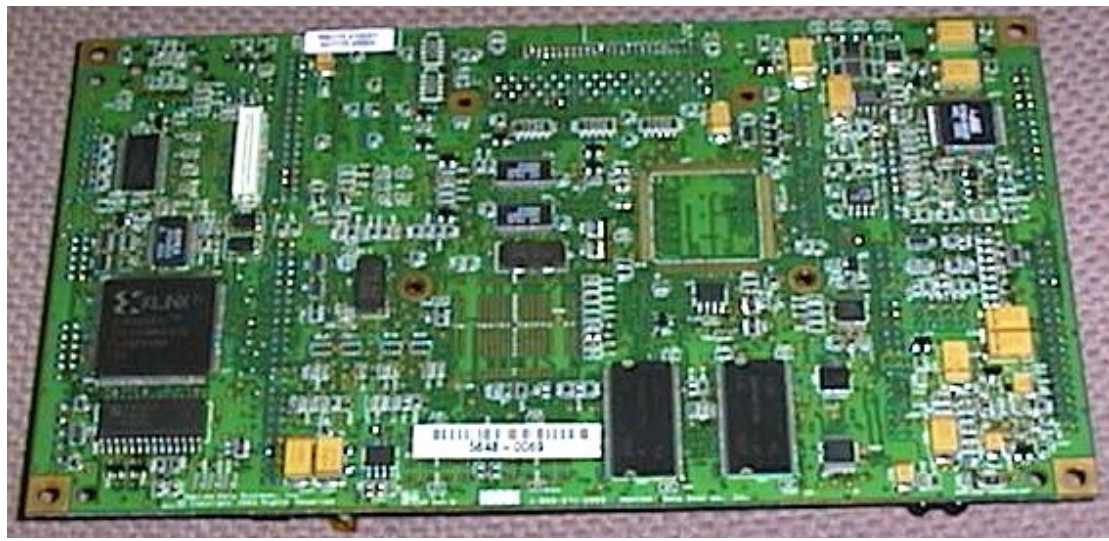


PIK Hardware



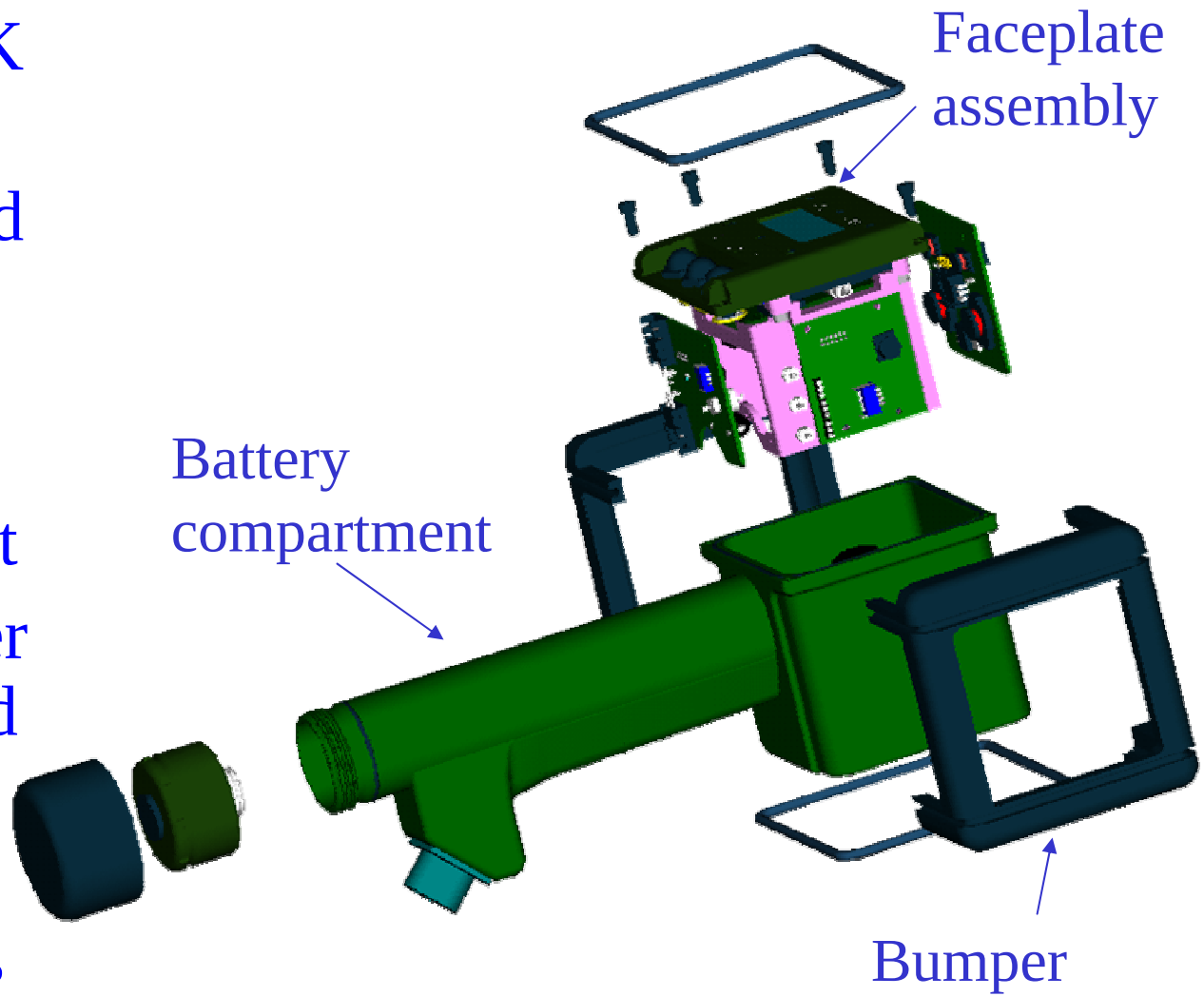
PIK SINGLE BOARD COMPUTER

- ADS “AGX” COTS
- low power
- 32M flash
- 32M DRAM
- 7 serial ports
- Ethernet
- 5”x7” size
- LINUX OS

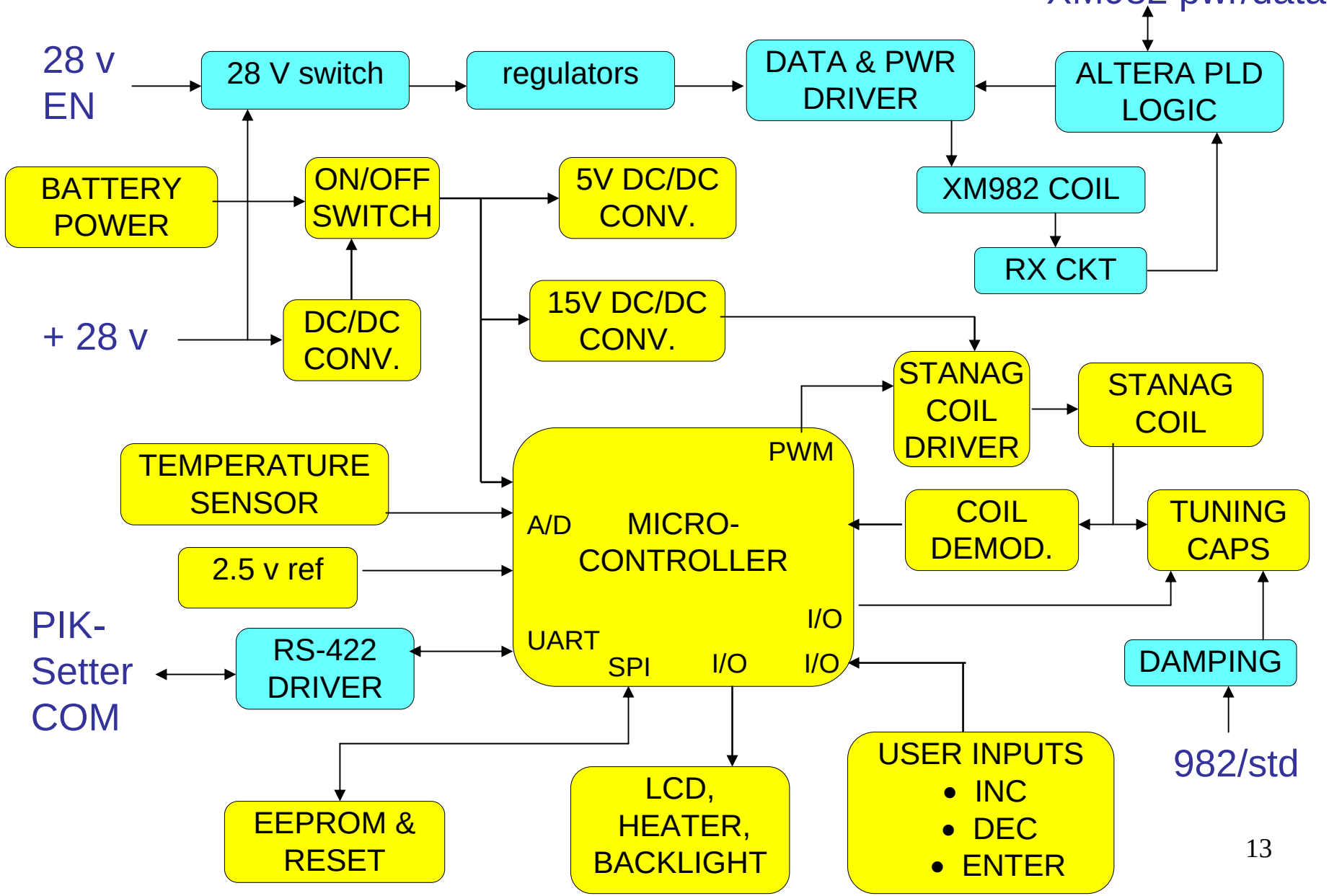


SETTER FUNCTIONS

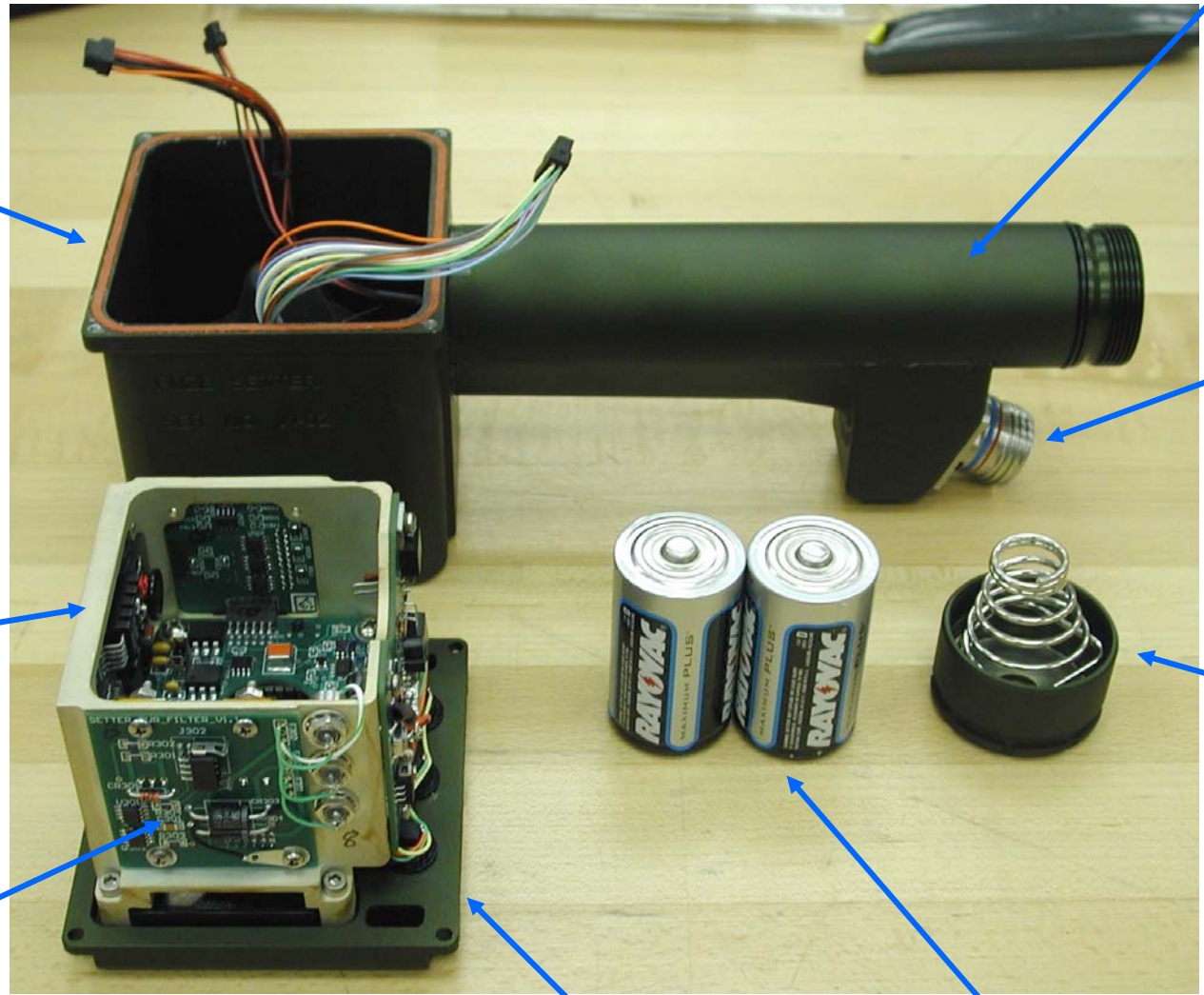
- Interface with PIK
- Interface with standard fuzes and XM982
- Convert XM982 data stream to power/data format
- Interface with user via 3 switches and LCD
- Un-cabled setting for standard fuzes



SETTER BLOCK DIAGRAM

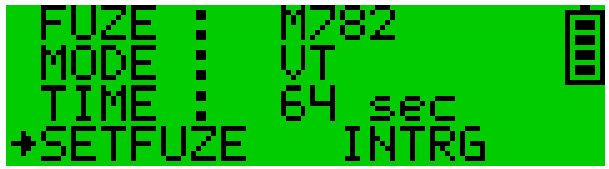


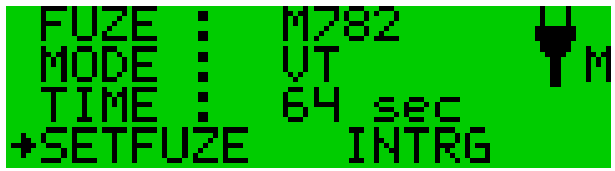
SETTER Hardware

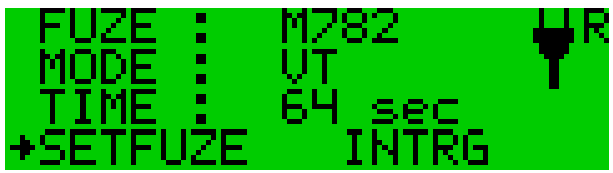


SETTER MODES

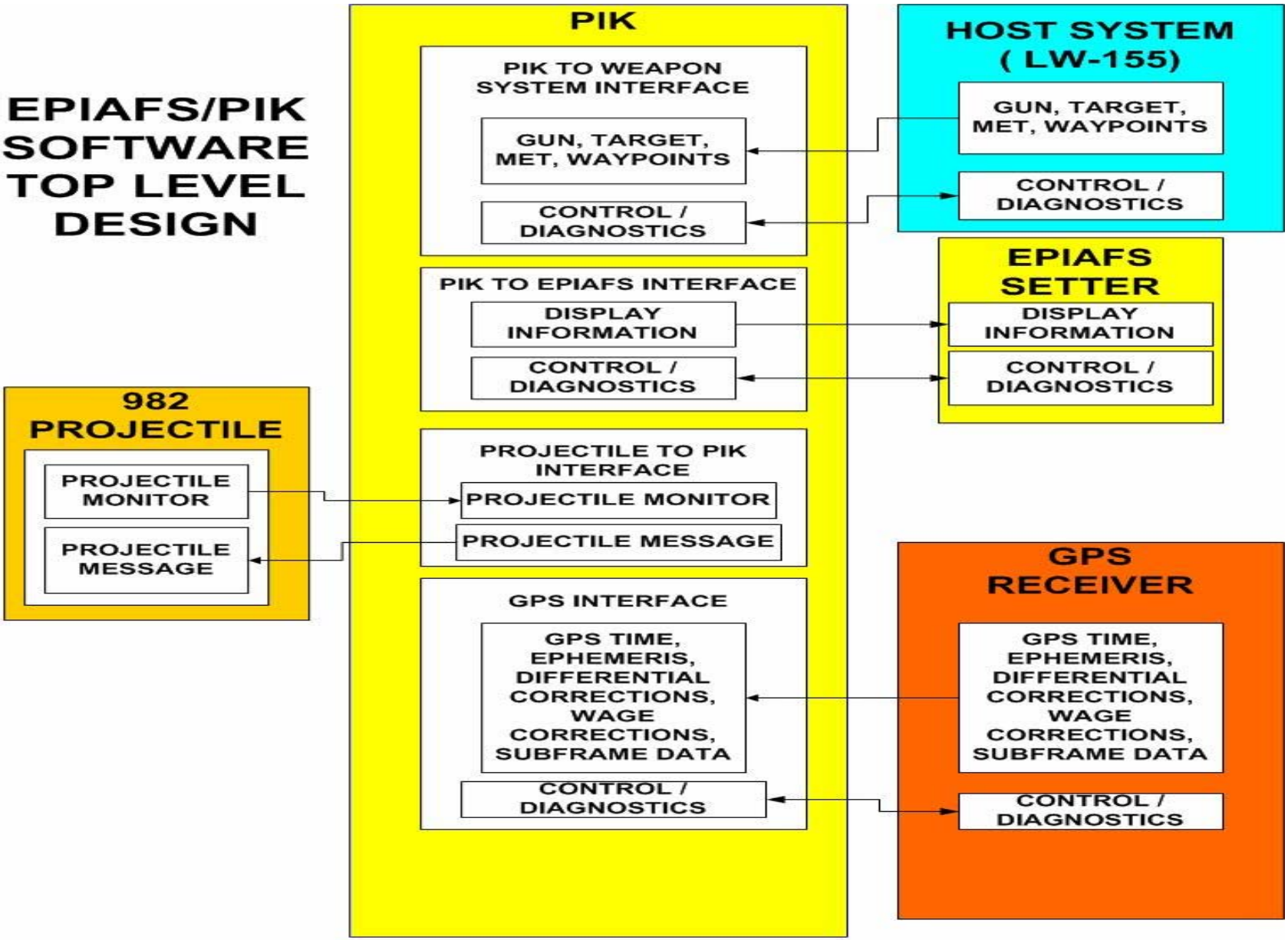
- Uncabled
  - Acts just like original PIAFS
  - Standard Fuze capable
- Cabled Manual
  - Same functionality as Uncabled
  - Receives power externally
- Cabled Remote
  - Receives commands from PIK
  - Standard and GPS Fuze capable







EPIAFS/PIK SOFTWARE TOP LEVEL DESIGN



EPIAFS Software Status

- PIK SBC
  - Written in C++
  - 23,500 lines of code
  - Field upgrade feature for PIK demonstrated
  - Transition from MPE-S to DAGR completed
  - Software approx 95% complete
    - Still need to implement additional diagnostic capabilities
- PIK Key Micro
  - Code written in C
  - Application completed
- SETTER
  - Written in C
  - 11,700 lines of code
  - Software approx 95% complete
    - Currently working on capability to field upgrade

EPIAFS POWER BUDGET

- PIK
  - SBC: 2 watts
  - Interface board: 1 watt
- SETTER
  - Standby mode: 1/4 watt
  - Set Std fuzes: 1 watt for 3 sec
  - Cold temp: + 4 watts (LCD heater)
  - Set XM982: + 90 watts for 10 sec

ACCOMPLISHMENTS

- EPIAFS SRR - June 2003
- EPIAFS brass-board complete - Nov 2003
- Brass-board inductive set GNU 1.0 - Dec 2003
- Convert EPIAFS design to utilize DAGR - Jan 2004
- EPIAFS PDR - Feb 2004
- EPIAFS Prototype hardware build begins - June 2004
- Modify coil driver for 606 ns data waveform - Sept 2004
- Set “digital only” GNU 2.0 - Sept 04
- EPIAFS Prototype inductive set GNU 1.0 - Nov 2004
- GNU 2.0 (data MSB first) pass digital-fail inductive - Dec 2004
- Setter Prototype LCD delivered - Dec 2004
- Receive GNU 2.0 (data LSB first) - Jan 2005
- EPIAFS Prototype inductive set GNU 2.0 - Feb 2005

PLANS

- Complete EPIAFS Prototype Build
- Test EPIAFS with JLW-155 DAGR and Talin
- Substitute H-Drive Coil Circuit
- Assist EPIAFS integration in JLW-155
- Environmental Test EPIAFS
- Update EPIAFS Design
- Fabricate EPIAFS Qualification Units
- Support JLW FQT