



*Providing America
Advanced Armaments for
Peace and War*



THE ARMY'S INDUCTIVE FUZE SETTER FOR EXCALIBUR

PRESENTED TO THE NDIA FUZE SYMPOSIUM
APRIL 9, 2003

TOM WALKER
CCAC FUZE DIVISION

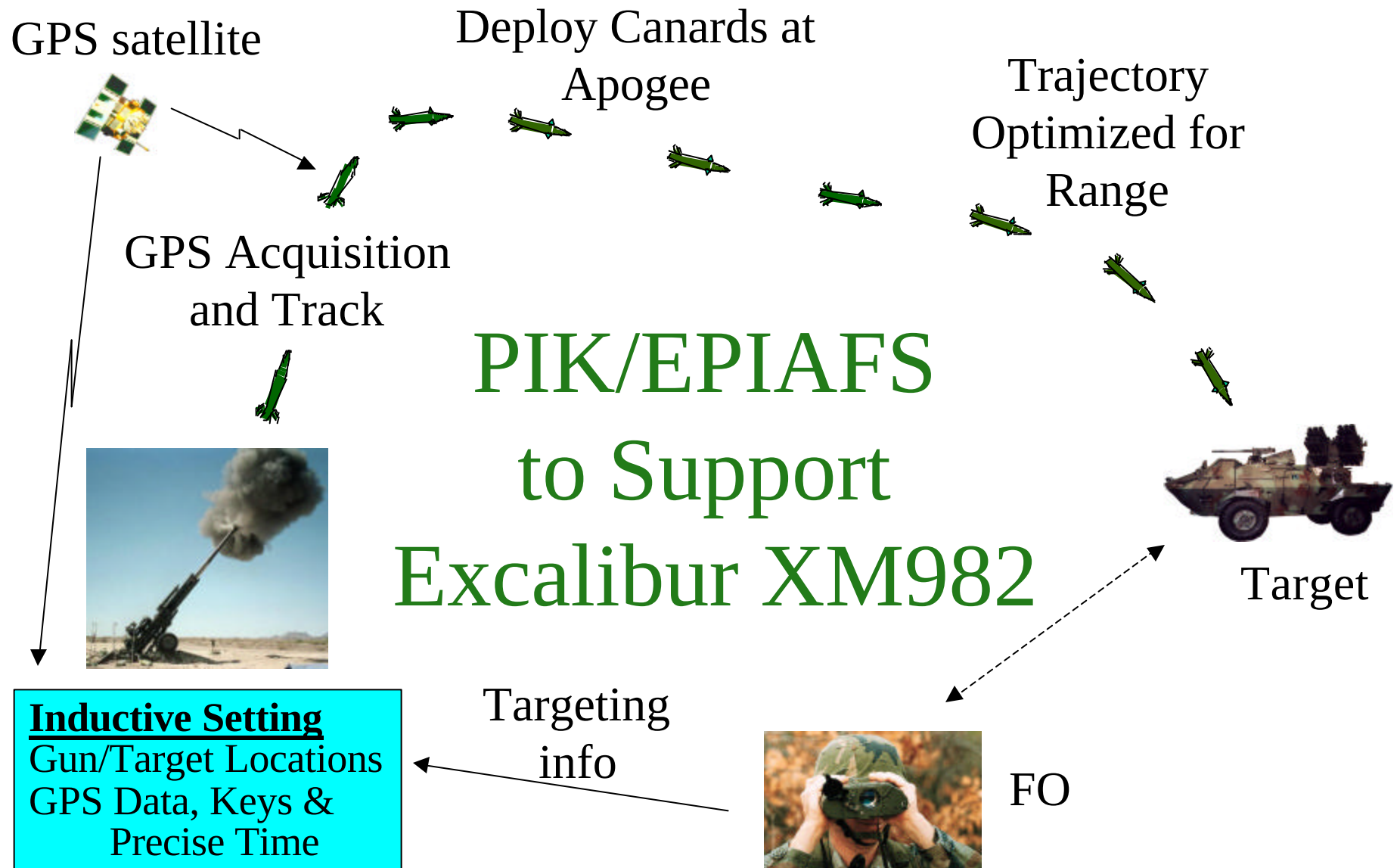


Tank-automotive & **A**rmaments **COM**mand

- Sponsor: Mike Burke
- System: Allison Marston
- User: Ft Sill
- Software
 - Andy Leshchyshyn
 - Craig Freed
 - Mike McCall
 - Dave Gerstman
- Mechanical
 - George Eckstein
 - Jim Hartranft
- Electrical
 - Hai Pham
 - Len Goodman
 - Fred Oliver
 - Mike Irwin
 - Jerry Frazier
 - Tom Walker

SETTER TEAM





➤ Add GPS capability to M1155 PIAFS

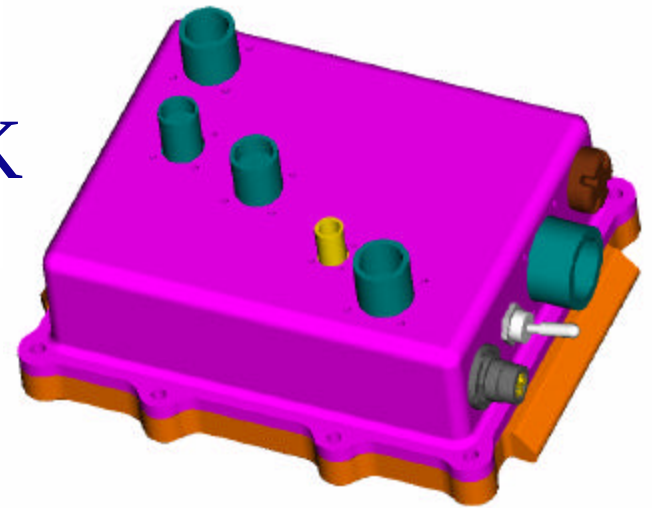
FUZE SETTER SYSTEM

L1/L2 ANTENNA

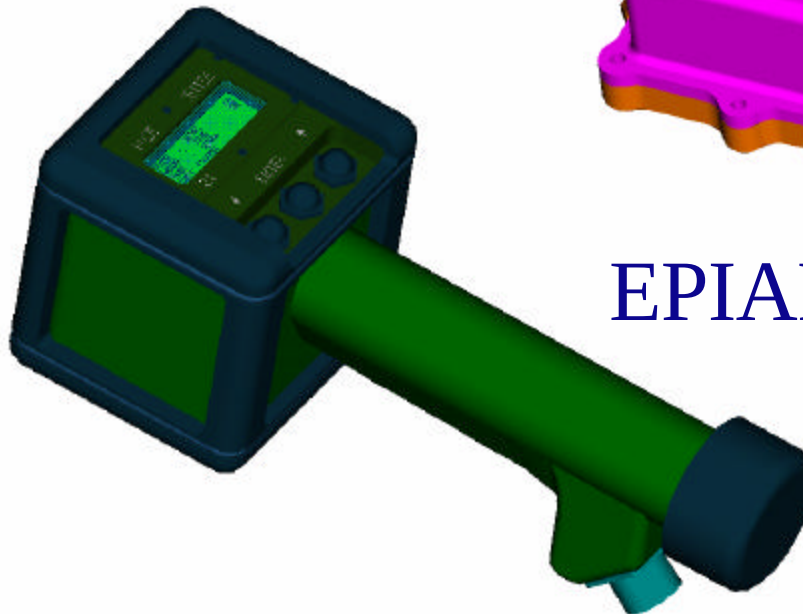


- Platform Integration Kit (PIK)
 - Single board computer
 - GPS receiver & antenna
 - Auxiliary circuit
 - Cables
- EPIAFS
- L1/L2 Antenna

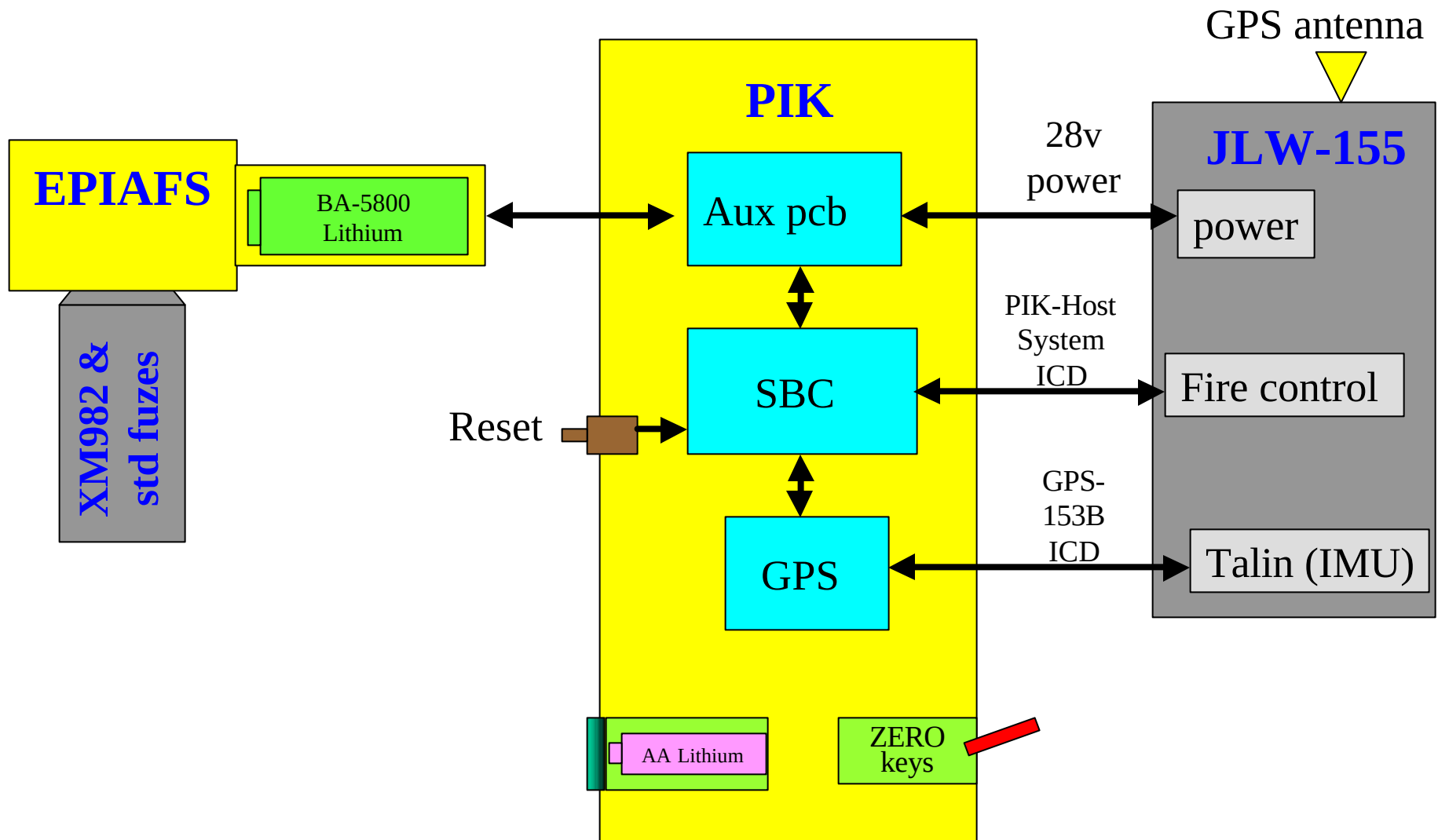
PIK



EPIAFS



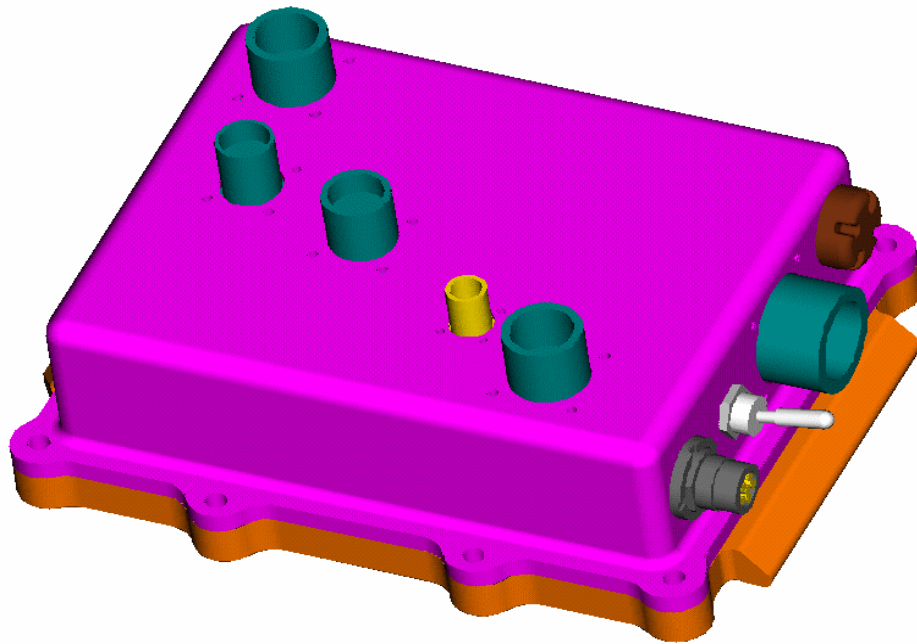
FSS BLOCK DIAGRAM



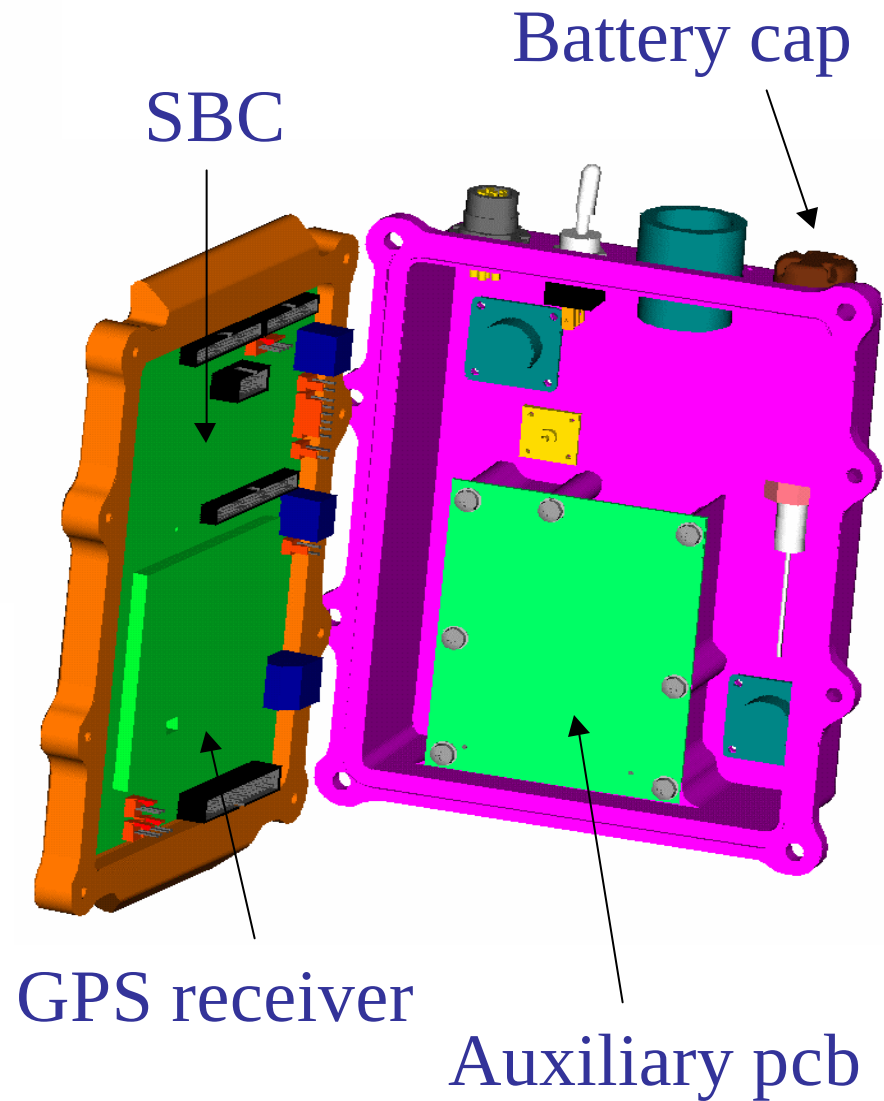
JLW-155



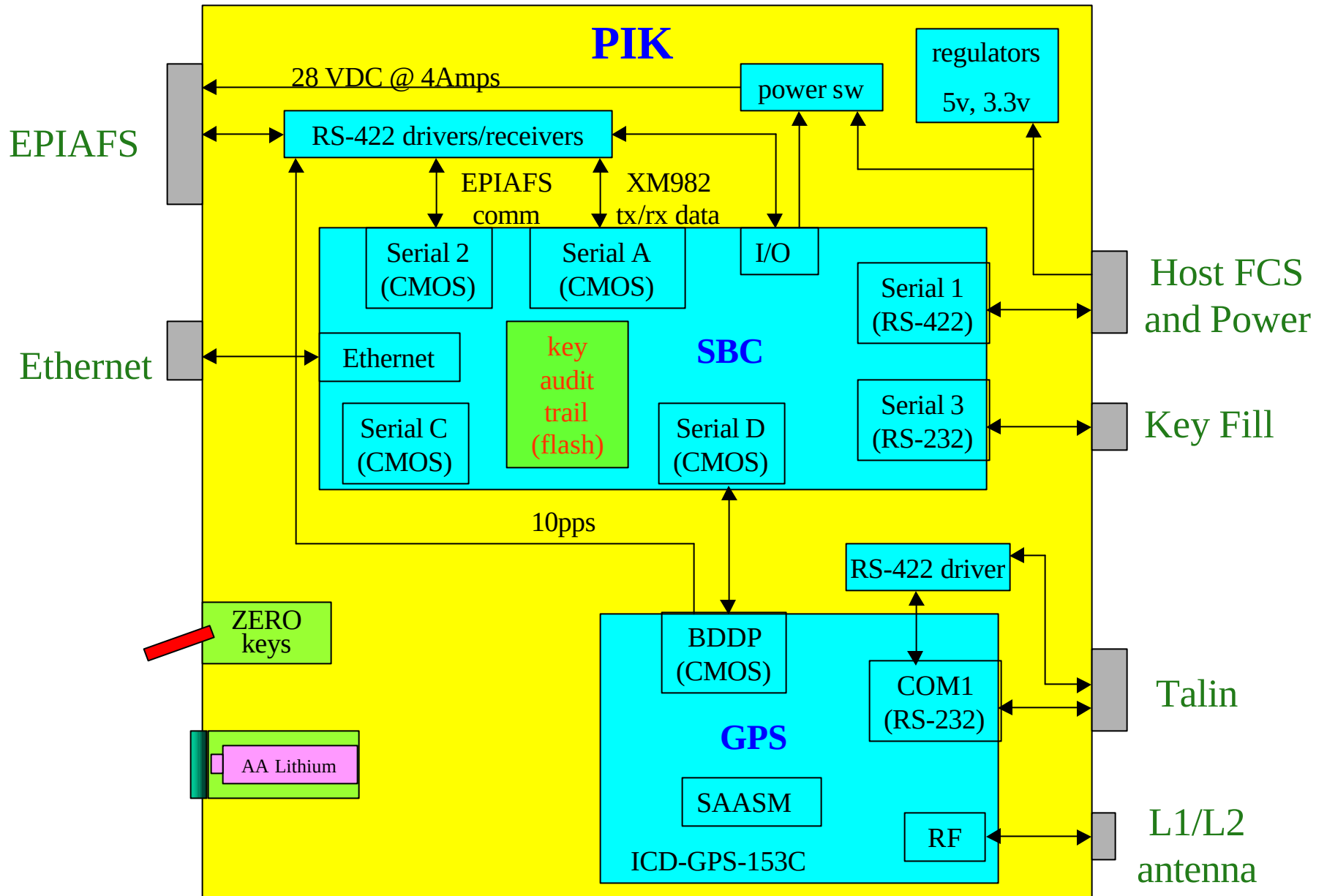
PIK



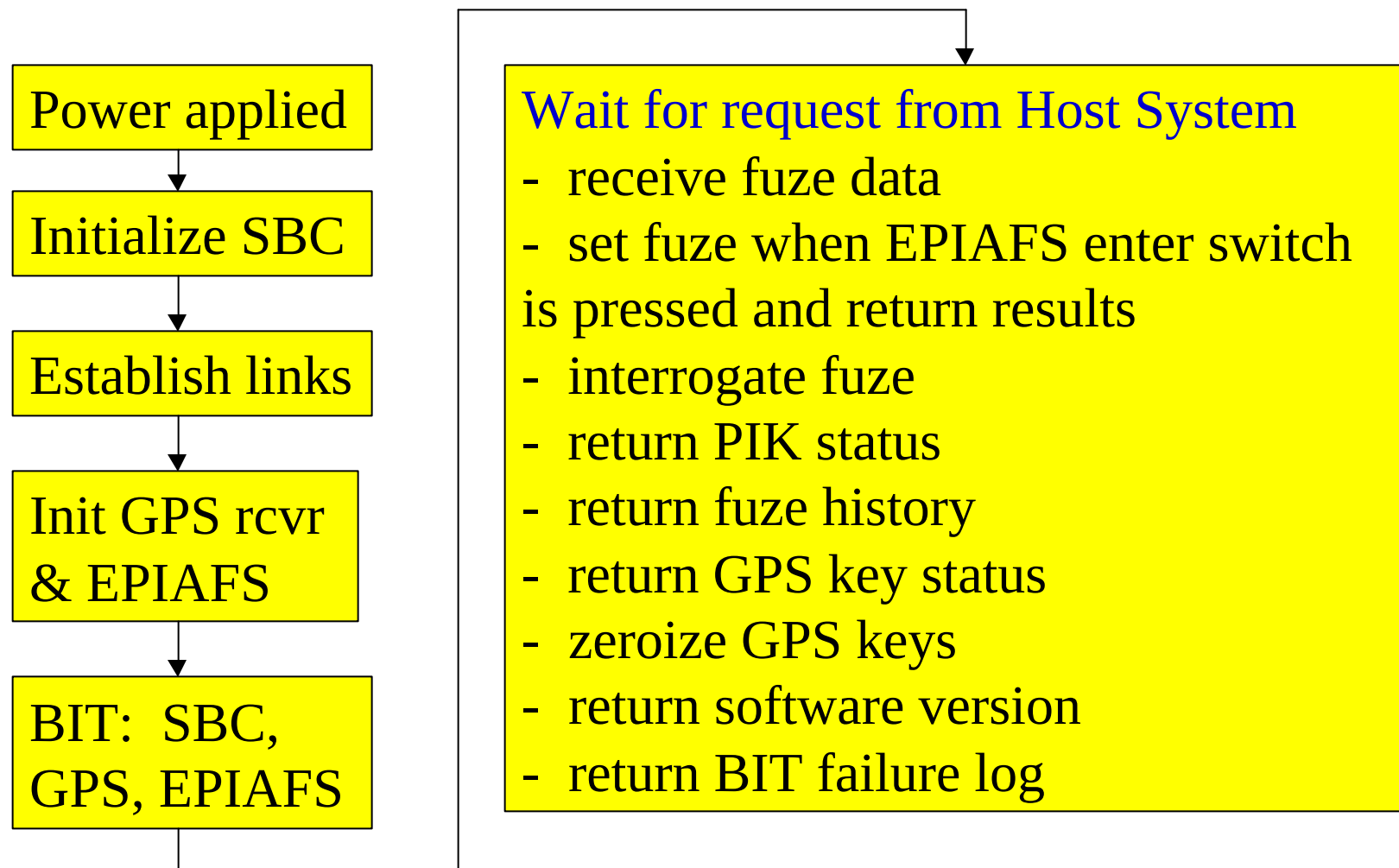
- 6 lbs
- 9"x7"x4" size
- 3 watts
- Lithium AA battery



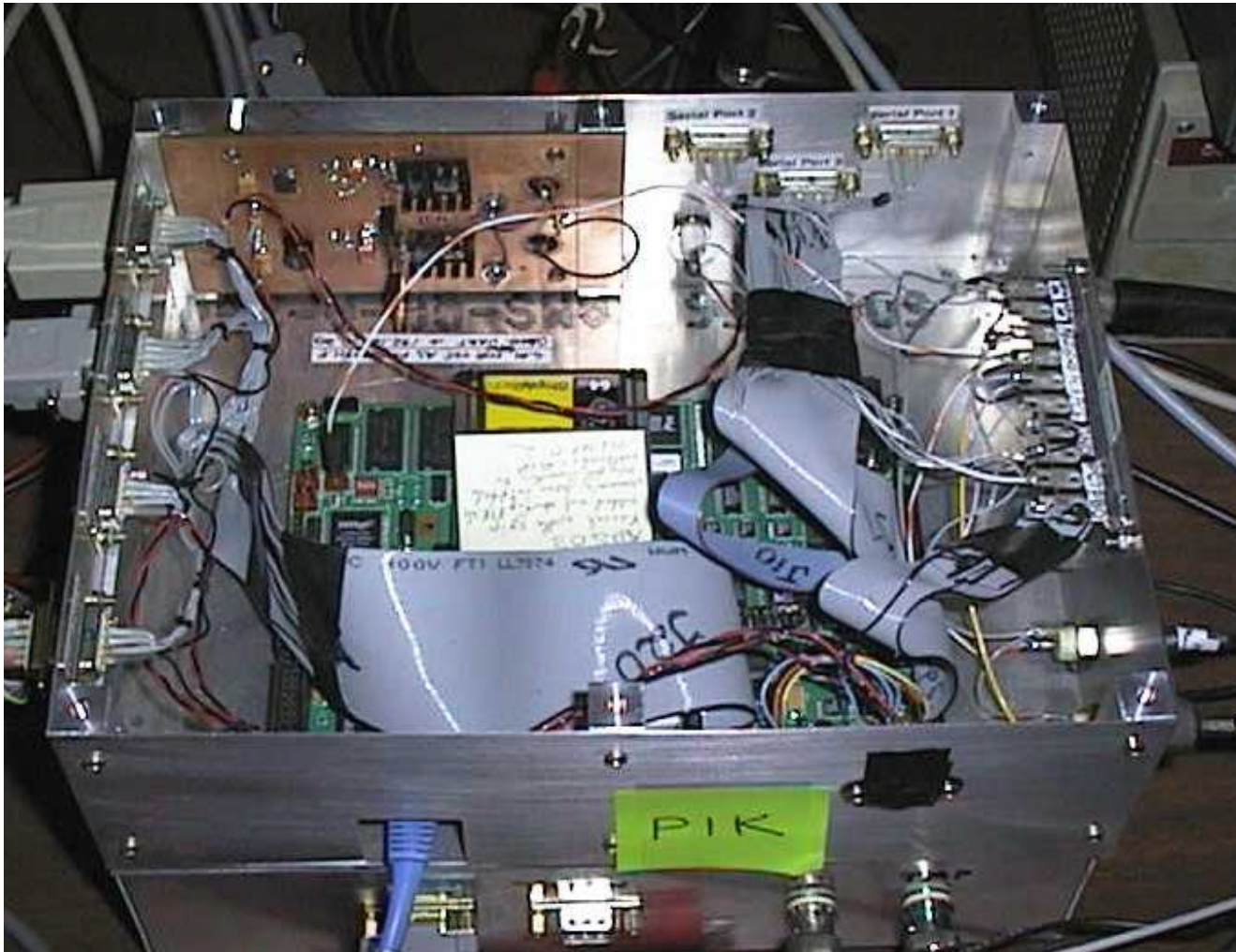
PIK BLOCK DIAGRAM



PIK ALGORITHM



PIK SINGLE BOARD COMPUTER



- COTS: ADS “Graphics Master”
- 3 watts
- 32M flash
- 32M DRAM
- 7 serial ports
- Ethernet
- 5”x7” size
- LINUX OS

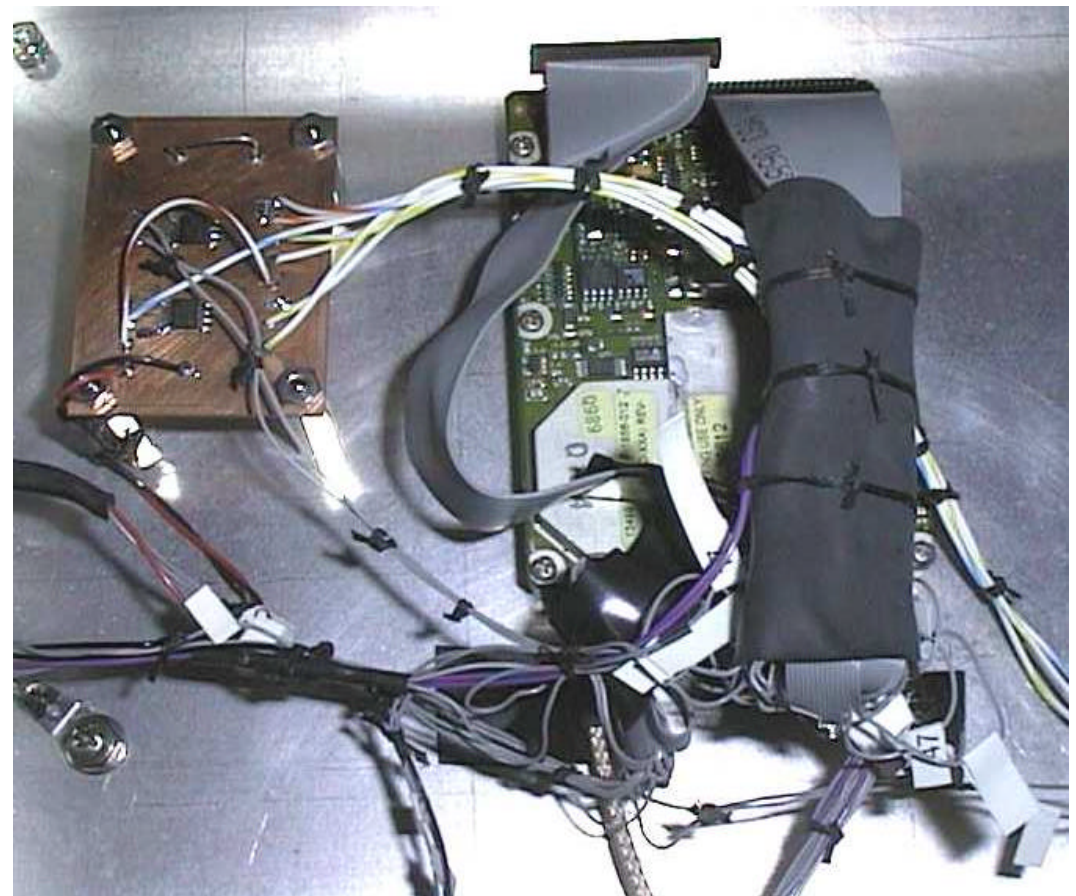
PIK GPS RECEIVER

- Rockwell Collins “MPE-S”
- SSI GRAM with SAASM
- 12 channel, L1/L2
- ICD-GPS-153C
- 1 pps & 10 pps
- 3.3 volts, 3 watts
- 3.5”x2.5”x0.6” size

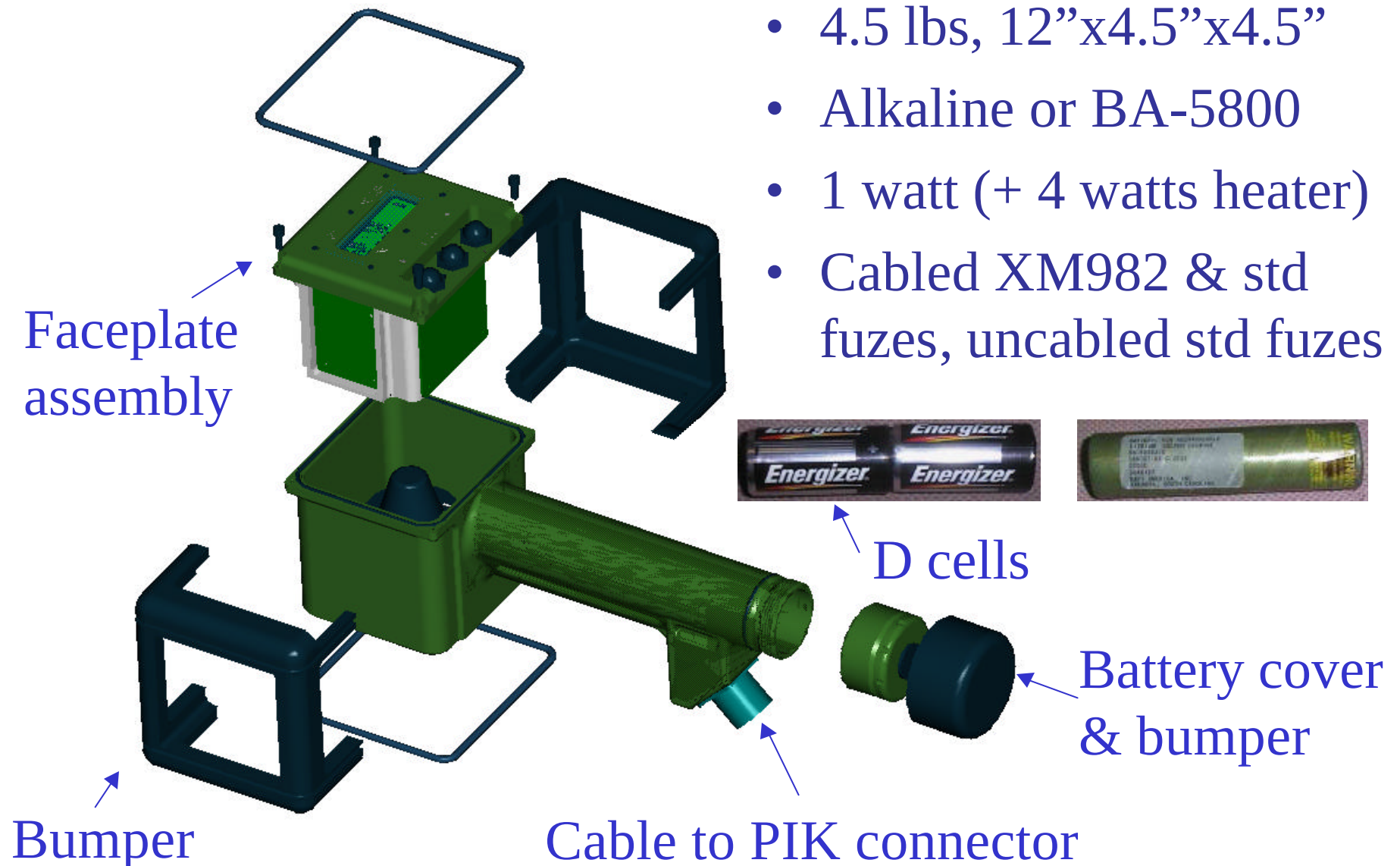


Antenna

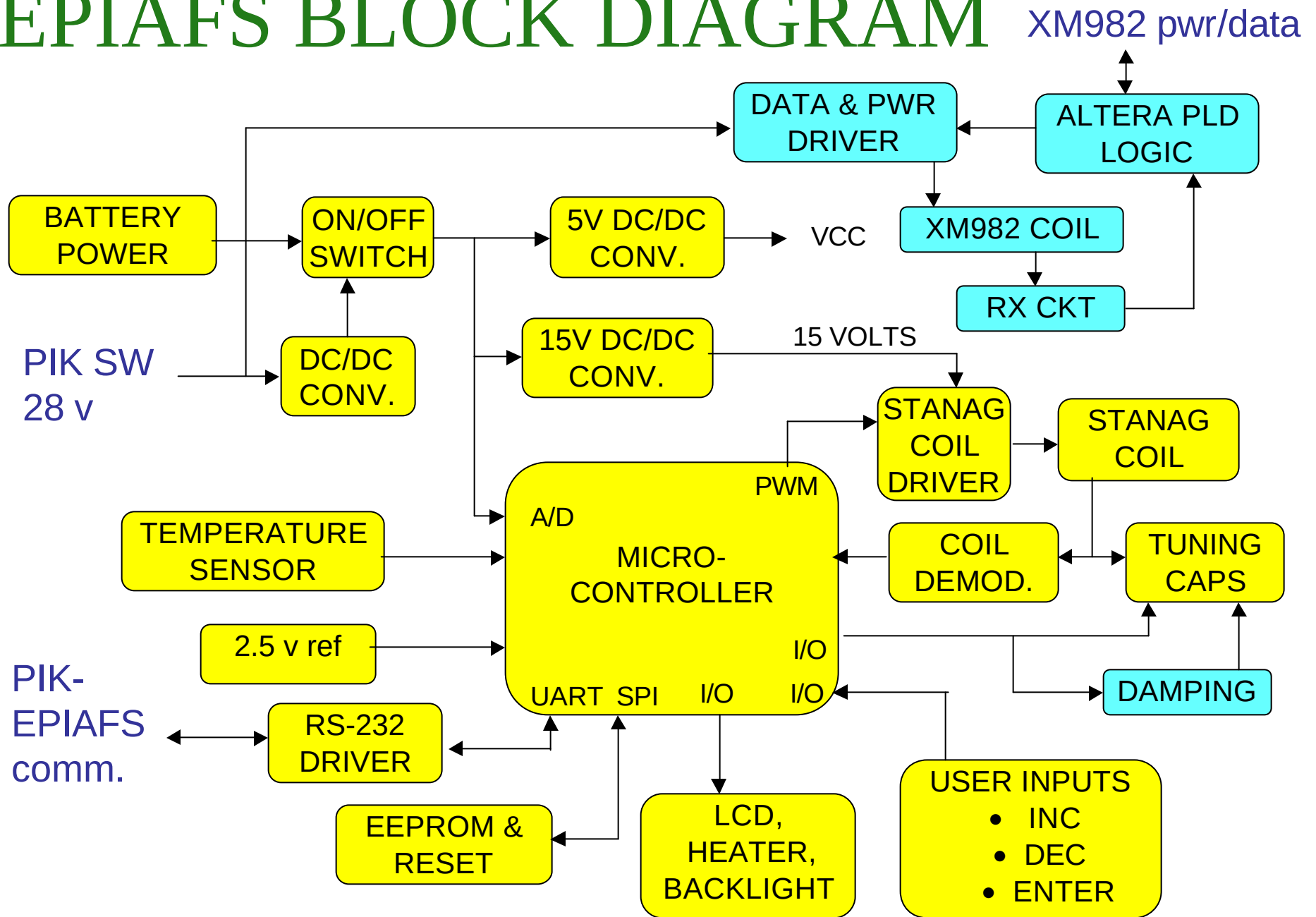
- 3.5”diam
- 0.7 lbs



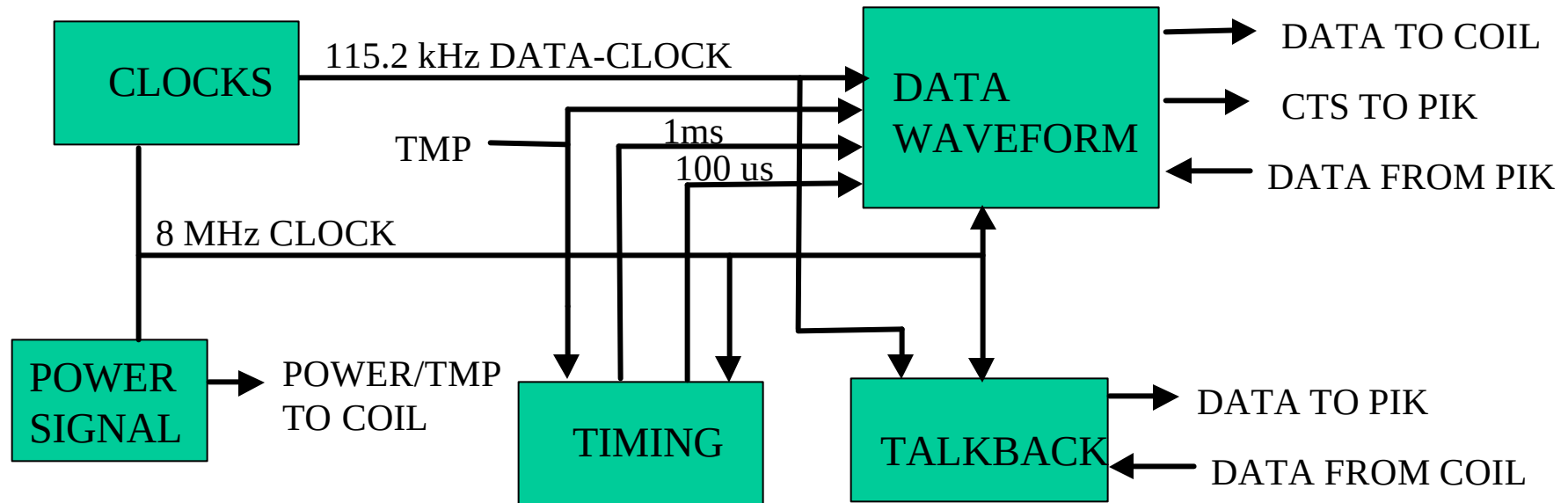
EPIAFS Exploded View



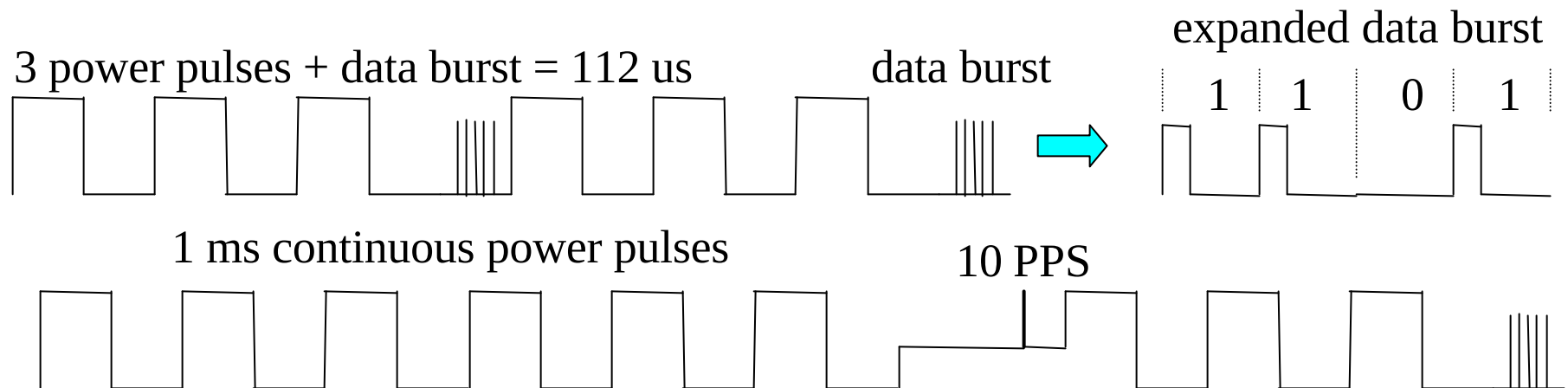
EPIAFS BLOCK DIAGRAM



EPIAFS XM982 DATA CIRCUIT



XM982 TX/RX data format



FSS POWER CONSUMPTION

- Fuze setting off (GPS functional for Talin): 3 watts
- Fuze setting enabled
 - standby: 8 watts (13 watts cold)
 - set std fuze 3 sec : 9 watts (14 watts cold)
 - set Excalibur 3 sec: 95 watts (100 watts cold)
- EPIAFS uncabled
 - standby: 0.4 watt (4.4 watts cold)
 - set std fuze 3 sec: 1 watt (5 watts cold)



PIK DEMO

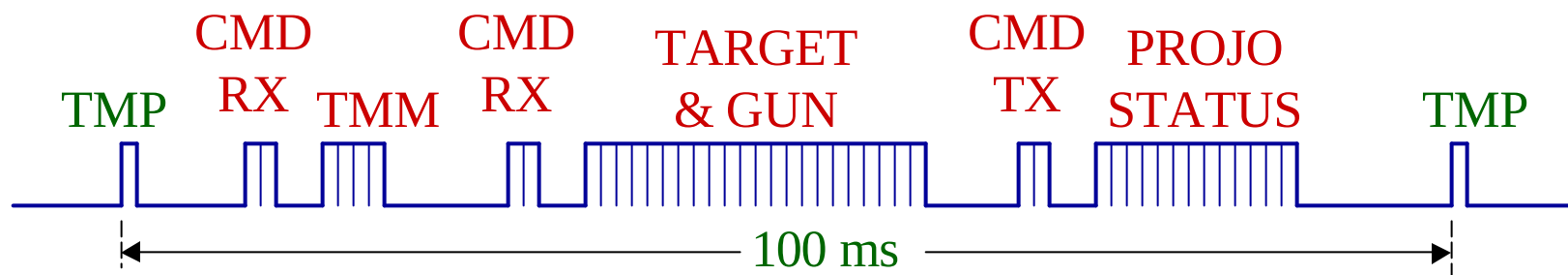


PIK - PROJECTILE DATA MESSAGES

- Time Mark Message (TMM) and Projectile Control
- TMM and Crypto Keys
- TMM and Target & Gun Data
- TMM and Ephemeris (min. 4)
- TMM and Almanac
- TMM and Subframe Data
- TMM and Projectile Control
- TMM and Final Projectile Status Request

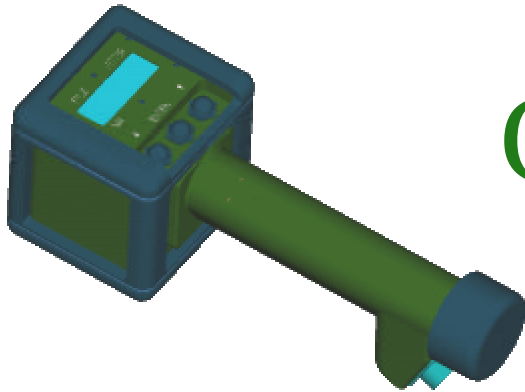
EXAMPLE 100 ms PIK TO PROJECTILE MESSAGE FRAME

- Sense when Time Mark Pulse arrives
- Read Time Mark Message from GPS receiver
- Send Time Mark Message to Projectile
- Send Target and Gun data to Projectile
- Request a Status Message from Projectile
- Receive and Process the Projectile Status

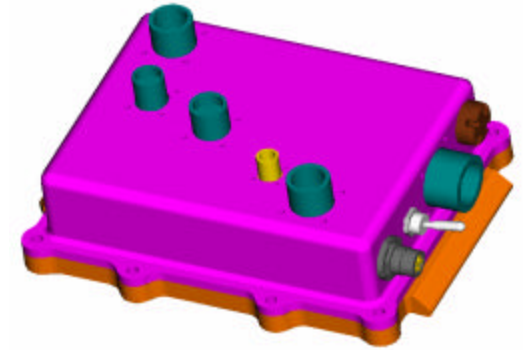


PLANS

- Finish baseline EPIAFS software
- Complete testing PLD design
- Integrate PLD with coil driver circuit
- Design & build 12v reg and 24v switch
-  • Demonstrate PIK/EPIAFS brass-board
- Update PIK & EPIAFS design
- Convert EPIAFS software to new micro
-  • Deliver prototype setters
- User human factor evaluations
- Assist PIK integration in JLW-155
-  • Test PIK with prototype Raytheon GNC



CONCLUSION



- PIK Demonstration
 - XM982 data and power inductive interface
 - Initialized projectile simulator
 - Validate PIK baseline software
 - First interface with Talin
- Host & XM982 interface testers
- Draft ICD's
- FSS Prototype packaging