

MIL-STD-1760 DIGITAL LAUNCHER FOR NAVY/MARINE CORP 2.75-INCH ROCKET SYSTEM



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Abstract		
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Marine Aviation Situation

- **Marine Corp Helicopter Upgrade Program**

AH-1W  AH-1Z

UH-1N  UN-1Y

- 4 Bladed Rotor
- Common Drive Train
- New Cockpit Avionics
- MIL-STD-1760 Weapons Communications



Current Navy/Marine Corp 2.75-Inch Rocket System

- **19 Tube - LAU-61C/A**
- **7 Tube - LAU-68 D/A**
 - Power is the only signal sent to launcher
 - Single or ripple fire
- **6 Basic Warhead Types**
 - Point Detonating Fuzed Warheads
 - Pre-Set Time Delay Fuzed Warheads
- **1 Motor Type**

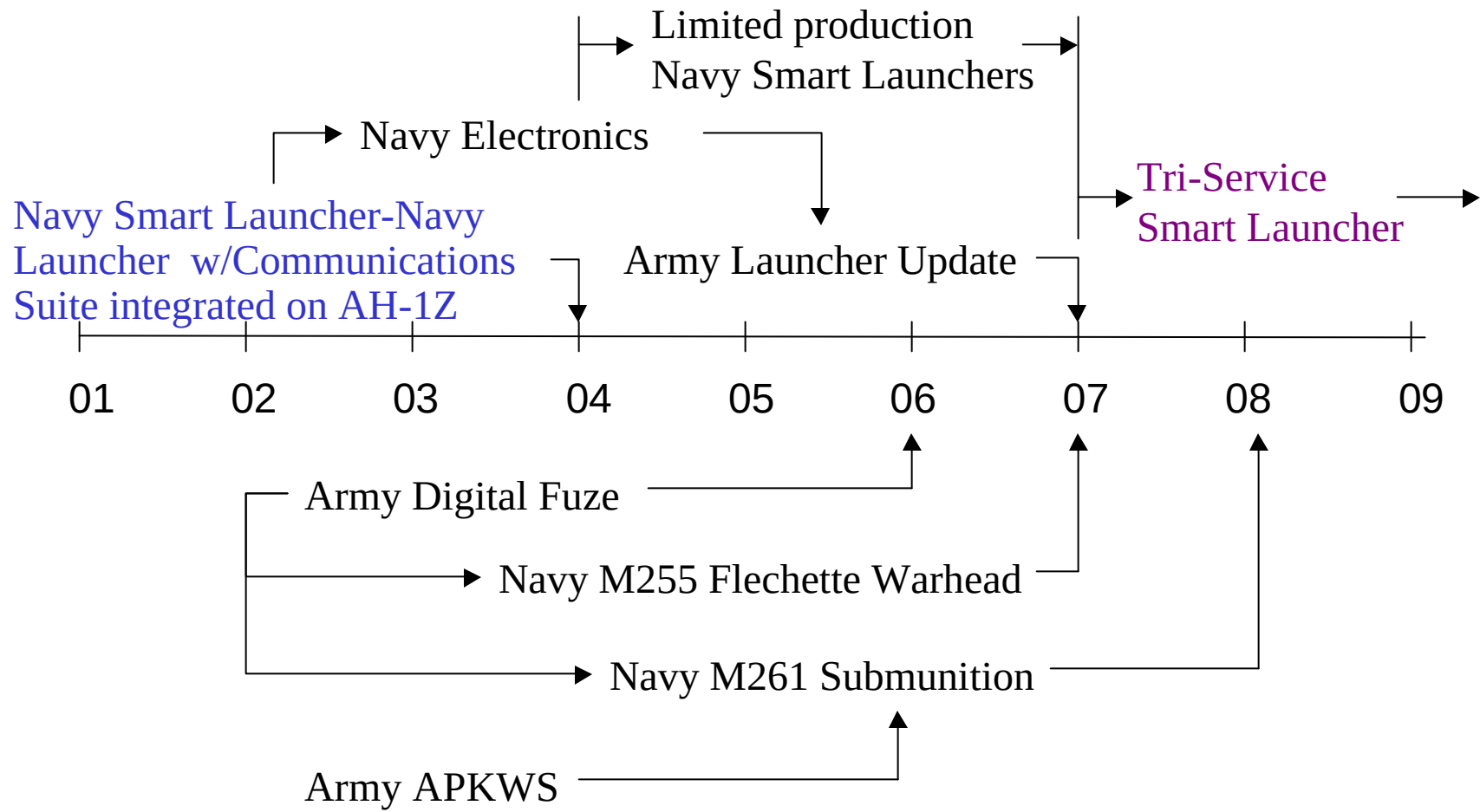


Marine Corp Rocket Situation

- New High Capability Attack Helicopter
- Limited Capability Rocket System
- Navy/Marine Corp Launcher limits Weapon System Capability
 - Remote Set Fuze Warheads not useable
 - Future guided rockets require communications
- NAVAIRSYSCOM Defense Suppression Systems - PMA-242
 - Initiates program to improve Rocket Launcher



Navy/MC 2.75-Inch Rocket Digitization Roadmap



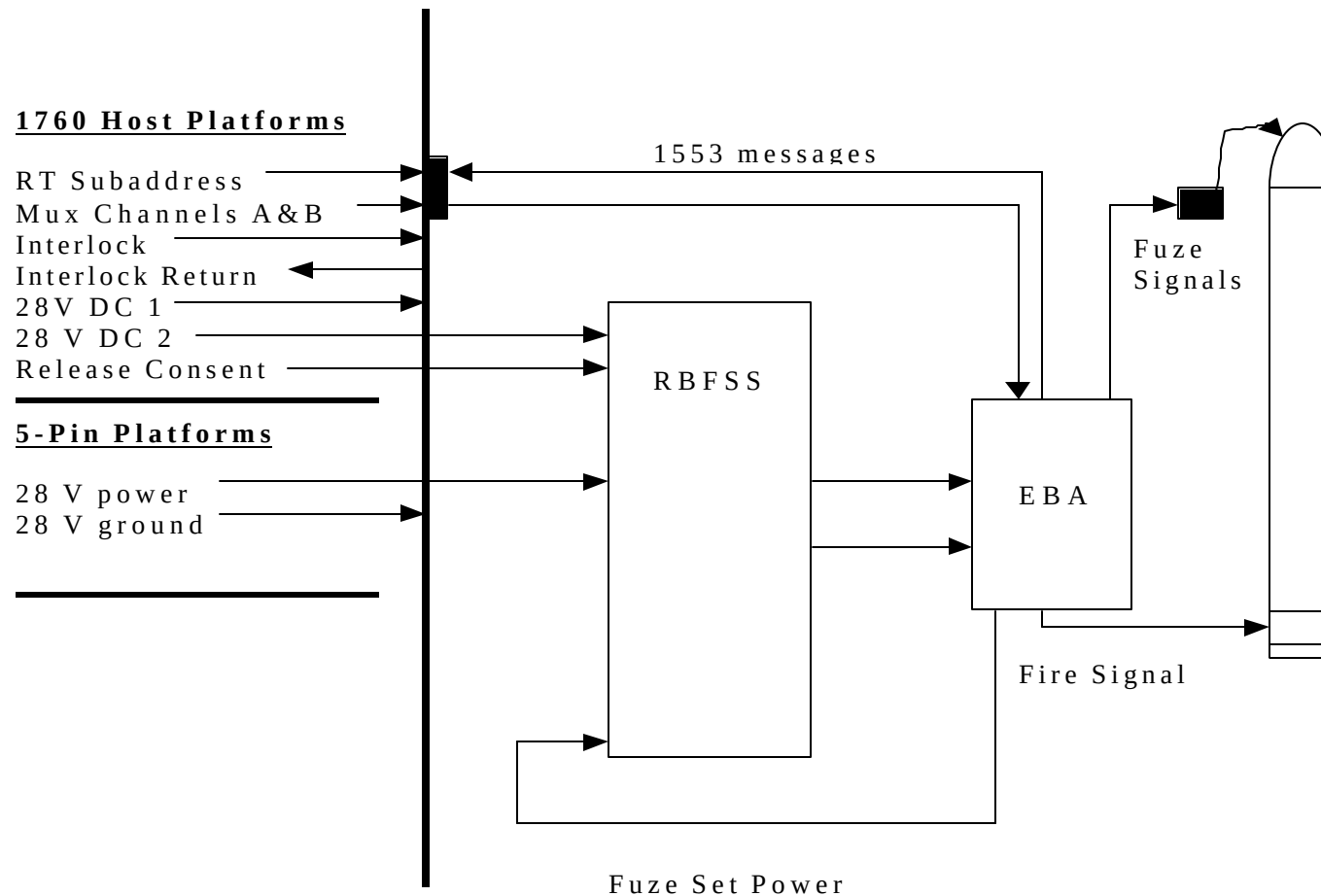


Smart Launcher Concept of Operation

- **MIL-STD-1760 Mode**
 - Digital Two-Way Communications
 - Platform sends commands
 - Launcher responds
 - BIT Status
 - Rocket Inventory
 - Fuze set signal
 - Rocket Motor fire signal
- **5-Pin Mode**
 - Launcher provides rocket motor fire signal



Smart Launcher Functional Diagram



RBFSS – Remove Before Flight Safety Switch
EBA – Electronic Board Assembly



Smart Launcher Features

- **Digital Electronic Board Assemblies**
 - Conformally mounted in the LAU-61 Skin
- **MIL-STD-1760 Connection**
 - Forward of pylon interface
- **5-Pin Connector**
 - Aft of pylon interface
- **Warhead Fuzing Connection**
 - Army Style Forward Bulkhead Connectors
- **Remove Before Flight Safety Switch**



Smart Launcher Physical Layout

- Navy LAU-61 D/A

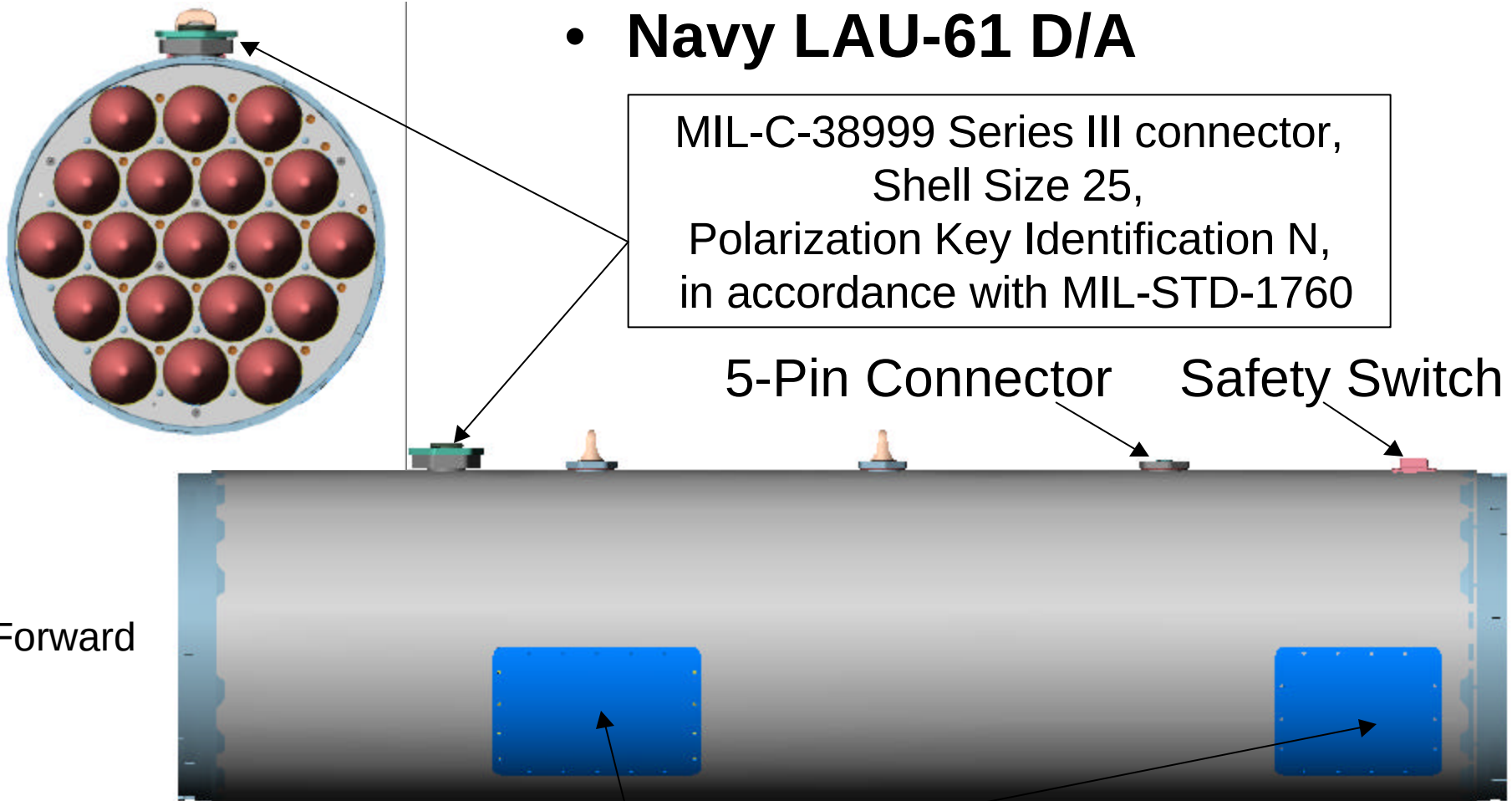
MIL-C-38999 Series III connector,
Shell Size 25,
Polarization Key Identification N,
in accordance with MIL-STD-1760

5-Pin Connector

Safety Switch

Forward

Electronic Board Assemblies





Smart Launcher 5-Pin Operating Modes

- **5-pin Mode**
 - Fires a single rocket for each trigger pull
 - Predetermined order to maintain jettison weight balance
 - No fuze setting capability



Smart Launcher 1760 Operating Features

- **Built In Test (BIT)**
 - Provides operational status of launcher
- **Inventory Function**
 - Provides a list of rocket types loaded in launcher
 - Must be input through maintenance equipment or platform
 - Host platform deducts fired rockets from initial inventory



Smart Launcher 1760 Operating Features

- **Continuity Check**
 - Measures resistance of rocket motor igniter circuit
 - Determines presence of fireable rockets
 - Conducted
 - as part of inventory request
 - after each firing



Smart Launcher 1760 Operating Features

- **Warhead Fuzing**
 - Supports M439 and M433 Analog Time Delay Fuzes
 - upgradable to Digital Setting Protocols
 - Aircraft Mission Computer calculates fuze set time
 - Launcher generates fuze setting signal
 - Each tube independently settable



Smart Launcher 1760 Firing Modes

- **Sequential Single Fire**
 - Each trigger pull
 - provides a Fuze Set Signal
 - fires one rocket
 - Predetermined order
 - maintains jettison balance



Smart Launcher 1760 Firing Modes

- **Selective Single Fire**
 - Gunner selects tube to fire
 - Each trigger pull
 - provides a Fuze Set Signal
 - fires one rocket
 - Provides gunner with recommended tube selection to maintain jettison balance



Smart Launcher 1760 Firing Modes

- **Selective Ripple Fire**
 - Gunner selects tubes to fire
 - Each trigger pull
 - provides Fuze Set Signals
 - fires all selected rockets
 - 60-100 millisecond delay between rockets
 - Provides gunner with recommended tube selections to maintain jettison balance



Smart Launcher 1760 Firing Modes

- **Ripple All Fire**
 - Each trigger pull
 - provides Fuze Set Signals
 - fires all rockets in launcher
 - 60-100 millisecond delay between rockets



Demonstration

- **Ground Launched rockets in April 2000**
- Modified LAU-61 D/A
- Controlled by Laptop running MIL-STD-1553 Aircraft Emulator
- Successfully demonstrated all Smart Launcher 1760 Modes





Control Screen

Untitled - Diatest

File Edit View System RT Select Help

File Edit View System RT Select Help

Launcher Status

Country: Type: No Update

Green = Standby
Black = Empty
Yellow = Selected
Red = Abnormal

Weapon Selection

Weapon	Available	Mode
	400	Rapid
Rocket Launcher	12	Ripple
Next Rocket	Auto 1	Manual 0

Rocket Range (Km.)

1	☐	1.0
2	☐	1.5
3	☒	2.0
4	☒	2.5
5	☒	3.0
6	☐	3.5
7	☐	4.0
8	☒	4.5
9	☐	5.0
10	☒	1.0
11	☐	1.5
12	☐	2.0
13	☐	2.5
14	☐	3.0
15	☐	3.5
16	☐	4.0
17	☒	4.5
18	☒	5.0
19	☐	6.0

☒ Set Fuse Time



7 Shot Ripple Firing at Yuma





Conclusions

- Digital control systems can be successfully integrated into legacy weapon systems.
- The addition of Digital Control to the Navy 2.75-Inch Rocket System will significantly upgrade it's capability
- In-Flight Demonstration of the Navy Smart launcher is planned for 2003