

CAD/PAD Overview Storyboard



Proposed Menu Structure

CAD/PAD

Main Menu

CAD/PAD
Overview

Secondary Menu

Product

Program

Introduction
to CADs/PADs

Introduction

How CADs/PADs are Used

Organization

Where CADs/PADs are Used

Vision/Mission

CADs

History

PADs

Life Cycle Management

Sections



Introduction

CAD/PAD

- CAD = Cartridge actuated device
- PAD = Propellant actuated device
- CFA = CAD/PAD Program
NSWC Indian Head, MD

Introduction



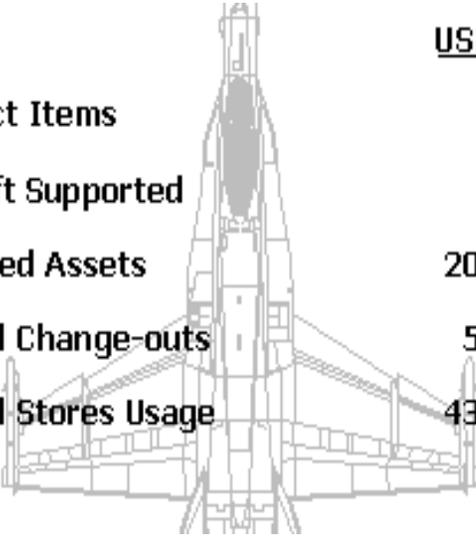
CAD/PAD

- CAD/PAD characteristics
 - Safety of flight
 - Direct impact on aircrew safety
 - Strict reliability and performance standards
 - Explosive
 - Unique requirements for:
 - Manufacture
 - Storage
 - Handling
 - Inspection
 - Disposal
 - Service life limited



Introduction

CAD/PAD



	<u>USNMC</u>	<u>USAF</u>	<u>Army</u>
Distinct Items	779	2,200	
Aircraft Supported	4,500	5,700	
Installed Assets	200,000	308,000	
Annual Change-outs	50,000	43,000	
Annual Stores Usage	435,000	*	

Note: Figures for Army not provided



How Used

CAD/PAD

- Aviation Life Support Systems

- Canopy jettison systems
- Ejection seats
- Fire extinguishing systems
- Flotation devices
- Parachutes



- Weapons Delivery Systems

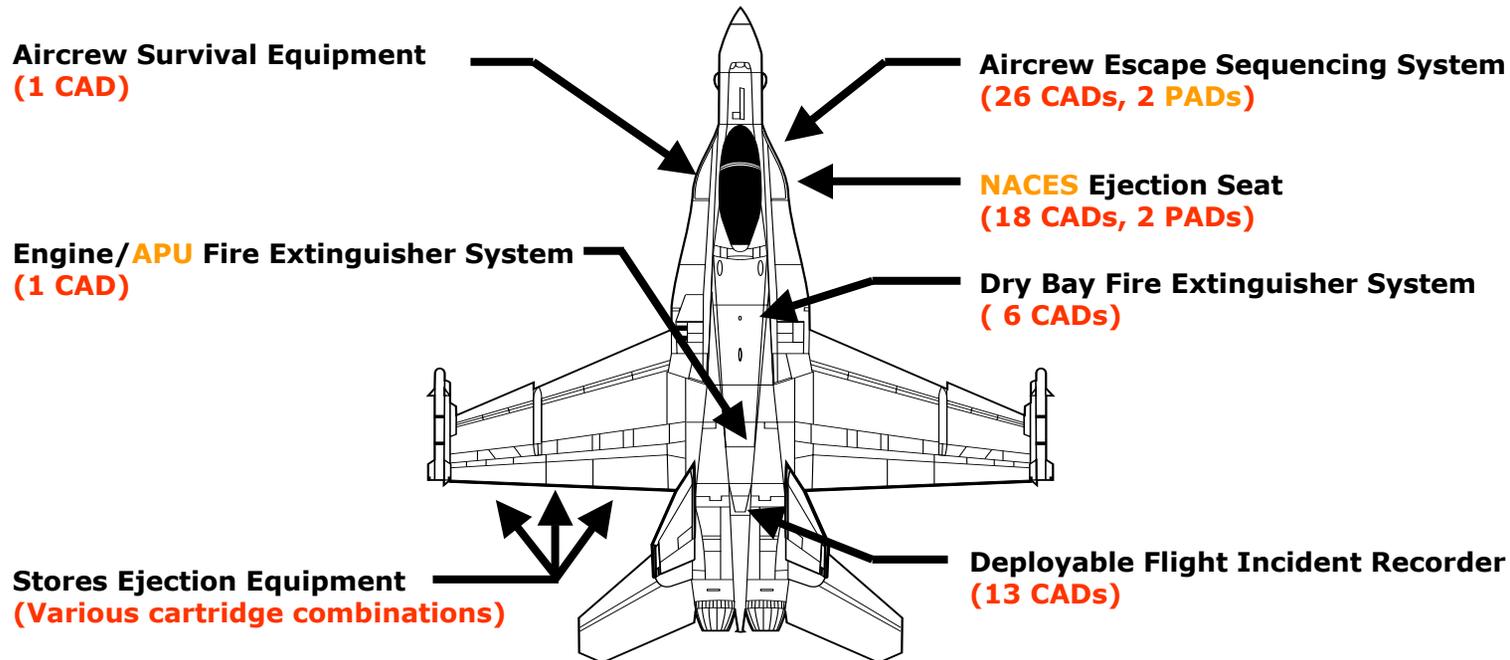
- Missiles
- Underwater mines
- Torpedoes
- Countermeasures





Where Used

CAD/PAD



NACES Ejection Seat



Where Used Pop-Up Text for Prev Pg

CAD/PAD

Aircrew Survival Equipment - This CAD releases the pilot's survival kit from under the ejection seat. The kit may contain food, water, weapons, radio beacon, life raft, survival guide, blanket, and radio.

Engine/Auxiliary Power Unit Fire Extinguisher System - An electrically energized CAD explodes, producing pressure and shock waves that rupture a diaphragm in the discharge outlet of the fire extinguisher. This releases the extinguishing agent from its tank.

Stores Ejection Equipment - CADs release energy to force open the ejection mechanism holding a bomb, mine, missile, or other stores from its rack or launcher. The exploded CAD provides enough force to overcome vacuum buildup and propel the bomb (or other stores) safely away from the aircraft.

Aircrew Escape Sequencing System - Gas-producing CADs supply pressure for actuating various components used in the sequencing system of the aircraft. These include canopy jettison, initiation of the underseat rocket motor, ejection of the seat, separation of the seat from the pilot, and deployment of parachutes.

NACES Ejection Seat - CADs ignite to build gas pressure within a telescopic catapult, which is a telescopic tube that separates to propel the seat from the cockpit. The catapult propels the seat " at an acceleration of 55' per sec in 180 milliseconds (ms). A solid propellant rocket motor, i.e., a PAD, attached to the underside of the seat ignites as the seat separates from the catapult barrel, accelerating the seat at approximately 10 Gs for a further 250 ms.

Deployable Flight Incident Recorder - The recorder deploys when the pyrotechnic release from CADs is initiated by pilot ejection or aircraft crash. Upon deployment, the recorder's radio beacon aids in recovery. Once recovered, the flight data stored in the recorder may be downloaded and evaluated by investigators to aid in determination of the cause of the mishap.

CADs



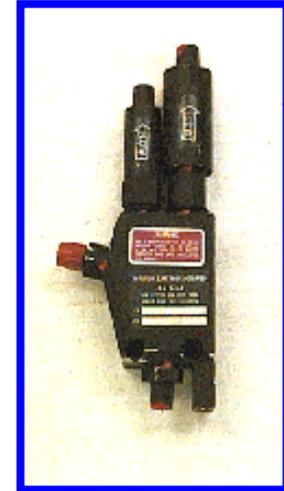
CAD/PAD



FLU-8 life vest flotation device



M193 fire extinguisher cartridge



JAU-13 initiator



CWDR thermal battery



4W69 parachute release cartridge



CCU-45 (MD65) stores release cartridge

12/30/2002

CAD/PAD Program Overview



FLU-8 life vest flotation device

The FLU-8 (FW98) automatically actuates upon immersion in water to inflate the aircrew's flotation device.

CWDR thermal battery

The CWDR supplies electrical power for operation of the sequencer on Navy Aircrew Common Ejection Seats (NACES). The sequencer controls the activation order of the components in the aircraft escape system. e.g., drogue deployment, aircrew/seat separation, and parachute deployment.

M193 fire extinguisher cartridge

The M193 has two spherical containers charged with fire extinguishing agent plus nitrogen to expel the agent. It releases the fire extinguishing agent into the area surrounding an aircraft engine in the event of fire.

4W69 parachute release cartridge

The 4W69 automatically releases the main parachute of the aircraft escape system upon immersion in saltwater.

JAU-13 initiator

The JAU-13 is a sealed-in type explosive device on the back of the ejection seat. It produces gas pressure to initiate the Wind Oriented Rapid Deployment (WORD) drogue release system and the 7,000 foot parachute actuator.

CCU-45 (MD65) stores release cartridge

The CCU-45 (MD65) receives an electrical signal, fires the ignition element, and releases gas pressure to ignite the main charge. When sufficient pressure develops, it activates the release mechanism for aircraft missile launchers and bomb racks.

PADs



CAD/PAD



MU 75 rocket motor



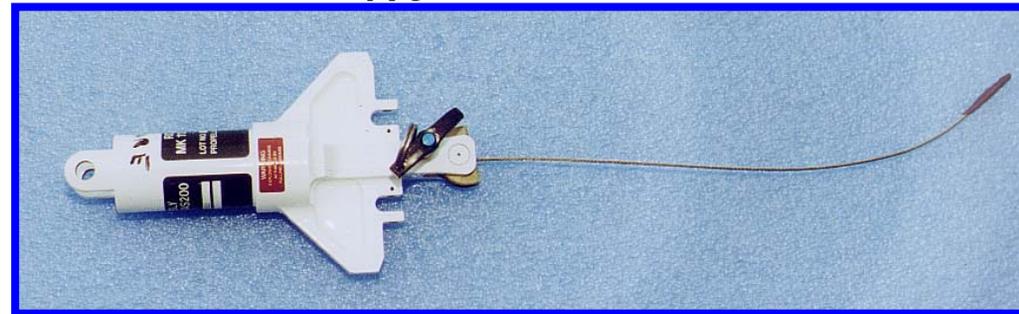
MK 122 parachute deployment rocket motor



MK 123 underseat rocket motor
12/30/2002



MK 109 canopy jettison rocket motor



MK 113 **WORD** rocket motor assembly
CAD/PAD Program Overview



MK 75 rocket catapult motor

The MU 75 provides power to separate the pilot from the ejection seat in certain aircraft. In aircraft with two seats, it separates the forward and aft seats.

MK 122 parachute deployment rocket motor

The MK 122 extracts and deploys the main personnel parachute on certain ejection seats during the ejection sequence

MK 109 canopy jettison rocket motor

The MK 109 provides the thrust required to propel the canopy safely out of and away from certain aircraft prior to activation of the ejection seat.

MK 123 underseat rocket motor

The MK 123 augments the upward thrust of the catapult in certain ejection seats. It provides the thrust required to attain sufficient altitude for safe parachute deployment. In aircraft with two ejection seats, the MK123 diverts the paths of the seats away from each other and the line of flight.

MK 113 WORD rocket motor assembly

The MK 113 Wind Oriented Rocket Deployment (WORD) motor and a drogue release mechanism, assists in the initial downwind deployment of personnel parachute during low velocity, low altitude ejections in certain aircraft.



Introduction

CAD/PAD

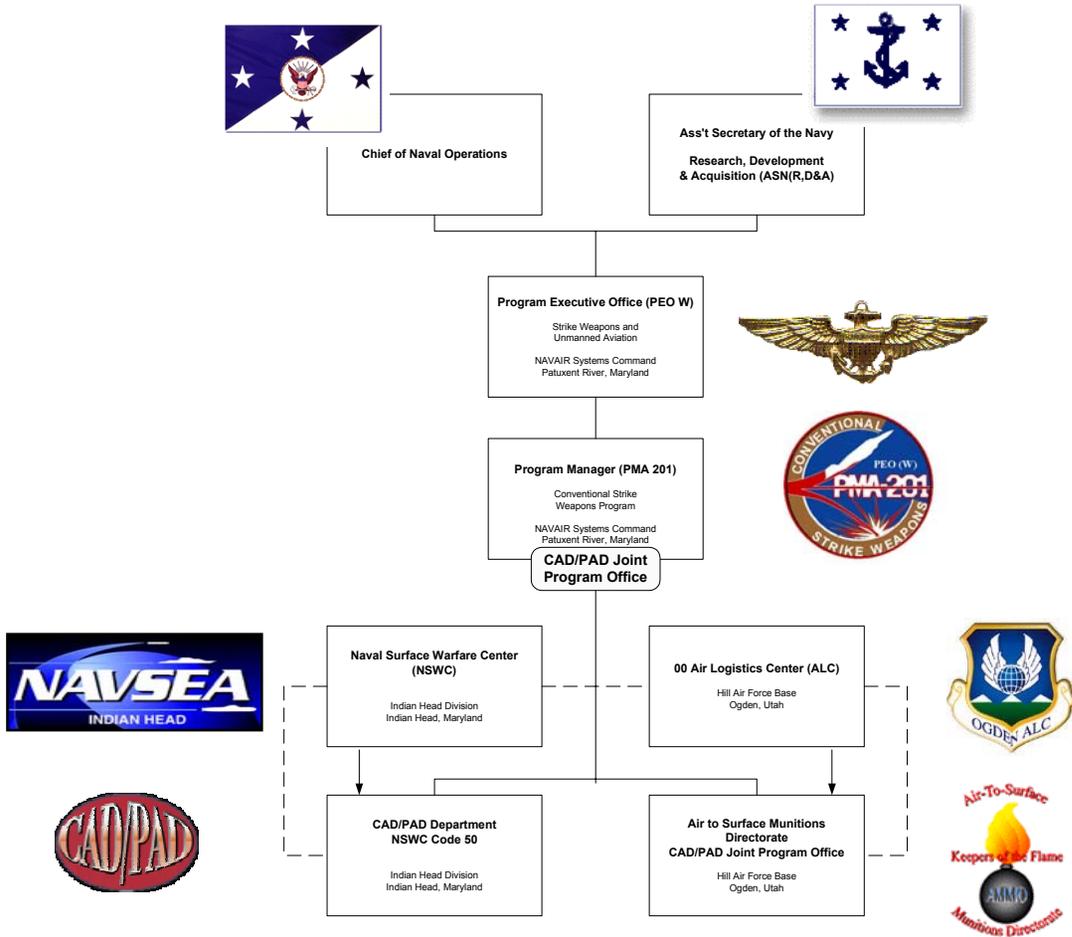
The CAD/PAD Program at **NSWC**, Indian Head, Maryland, is the only **DoD** capability for manufacturing, testing, maintaining, distributing, and disposing of CADs and PADs.





Organization 1

CAD/PAD



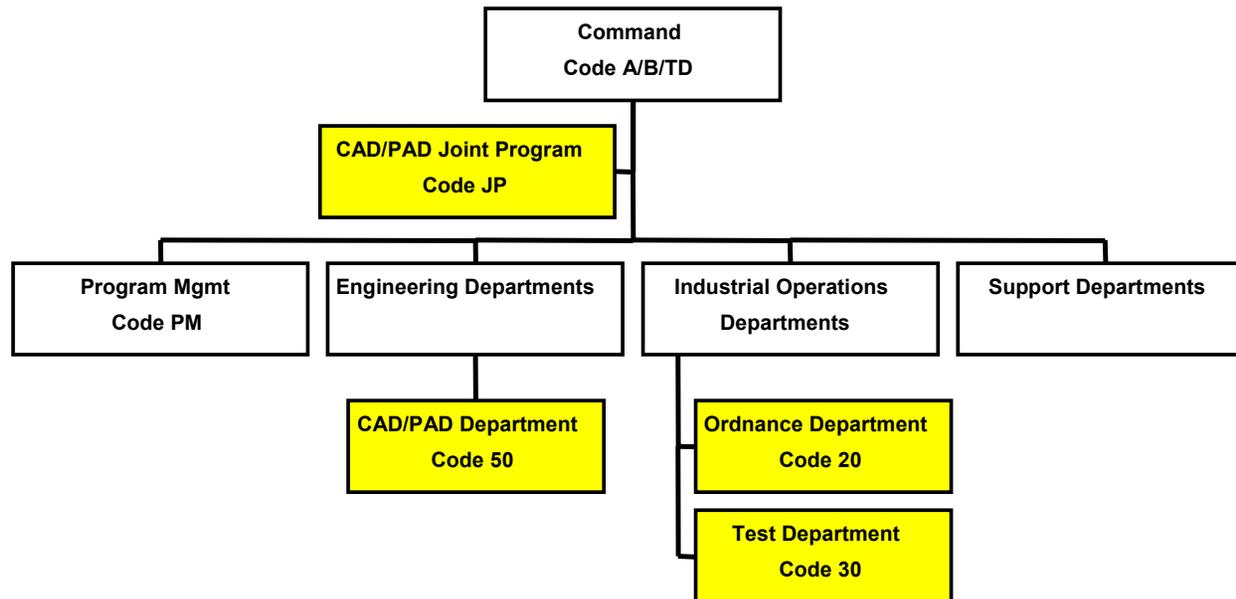
Related links:

[Current organizational chart with personnel assigned.](#)



Organization 2

CAD/PAD



Related links:

[Current organizational chart with personnel assigned.](#)

Vision/Mission



CAD/PAD

- **Vision**

- Advance the warfighter's operational capability through innovative CAD/PAD solutions, continuous improvement, increased customer satisfaction, and a healthier industrial base.

- **Mission**

- Deliver quality and cost effective products and timely Life Cycle Management to the warfighter. The CAD/PAD TEAM implements best practices, open communication, and government/industry partnerships.



History

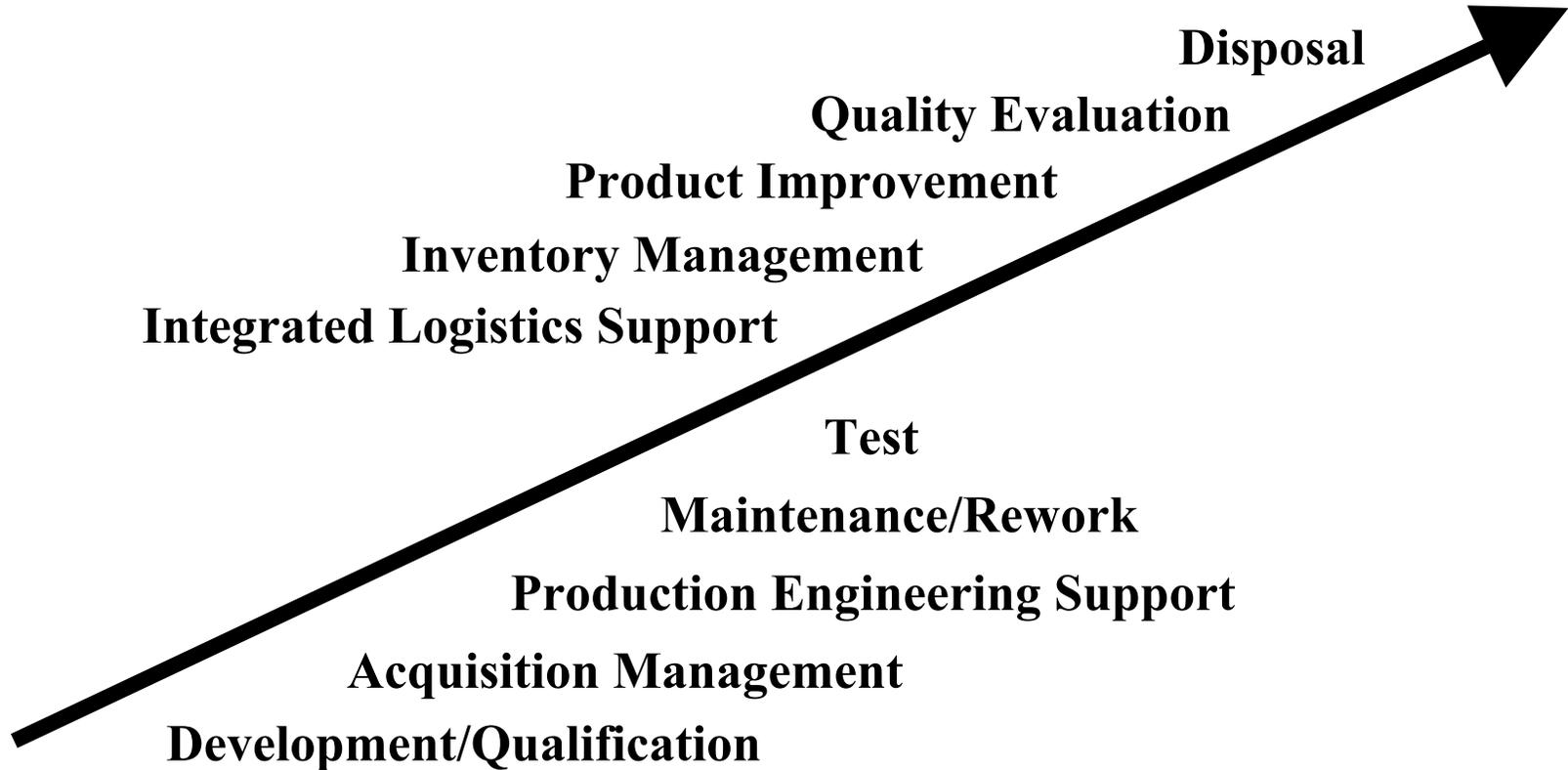
CAD/PAD

1966	Macon Naval Ordnance Plant, in operation from 1941-1965, transfers energetics functions to NSWC Indian Head
1973	Navy CAD/PAD program established at NSWC Indian Head, assuming roles from Frankford Arsenal, Philadelphia, PA, and NSWC Dahlgren
1975	CAD/PAD program expands to Joint level
1975-1982	CAD/PAD program expands its role in design, engineering, testing, acquisition, logistics, and Fleet support
1984	NAVAIR established APC-201. NSWC Indian Head staffed ADPM.
1989	First USNMC CAD/PAD ILSMT meeting
1991	Joint Ordnance Commanders Group establishes CAD/PAD subgroup



Life Cycle Management

CAD/PAD



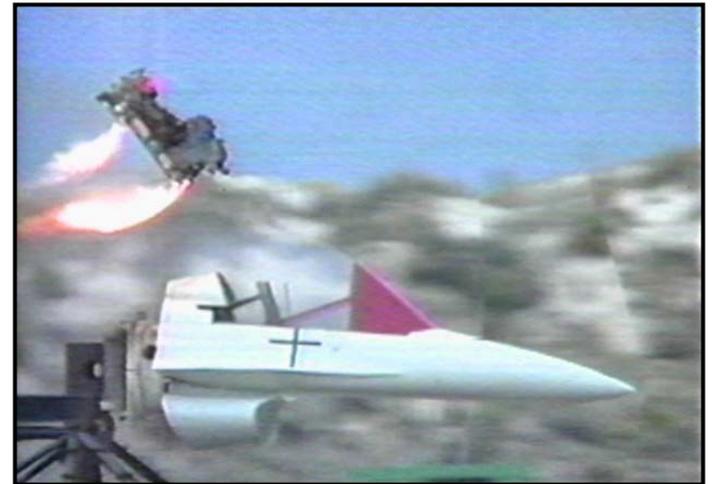
CAD/PAD Life Cycle Management

Life Cycle Management: Development/Qualification



CAD/PAD

- Administer and conduct product development and advanced technology programs.
- Participate in source selection.
- Conduct qualification and service release testing.
- Assess and prepare **TDPs**.
- Establish acceptance testing.





Life Cycle Management: Acquisition Management

CAD/PAD

- Decide whether to make or buy materials.
- Buy materials for CAD/PAD fabrication.
- Generate **PRs** for contract actions.
- Provide **TDPs** for contractors.



Life Cycle Management: Acquisition Management (cont'd)



CAD/PAD

- Prepare production plans and schedules.
- Manage the supply of **GFE/GFM**.
- Coordinate all **FAT** and **LAT** on incoming material.



Life Cycle Management: Production Engineering Support



CAD/PAD

- Provide engineering services:
 - In-service
 - Systems
 - Acquisition support
- Maintain configuration management systems.
- Evaluate ECPs.
- Conduct malfunction investigations.



Life Cycle Management: Production Engineering Support (cont'd)



CAD/PAD

- Investigate deficiency reports.
- Conduct engineering investigations.
- Maintain **TDPs**.
- Coordinate **GFE** and **GFM** acceptance test programs.
- Evaluate requests for waivers and deviations.





Life Cycle Management: Maintenance/Rework

CAD/PAD

- Provide **D-Level** maintenance for assigned CAD/PAD remanufacture programs.





Life Cycle Management: Testing

CAD/PAD

CAD/PAD testing includes the following tests:

- Service release.
- First article.
- Lot acceptance.
- Second source.
- Propellant stability.
- Recertification of **GFM**.





Life Cycle Management: ILS

CAD/PAD

- Provide all maintenance engineering.
- Conduct engineering investigations.
- Participate in mishap investigations.
- Manage the **VFS** system.



Life Cycle Management: ILS (Cont'd)



CAD/PAD

- Issue aircrew bulletins.
- Set service and shelf life limits and administer extensions.
- Conduct Fleet impact analyses.
- Maintain the technical manual.

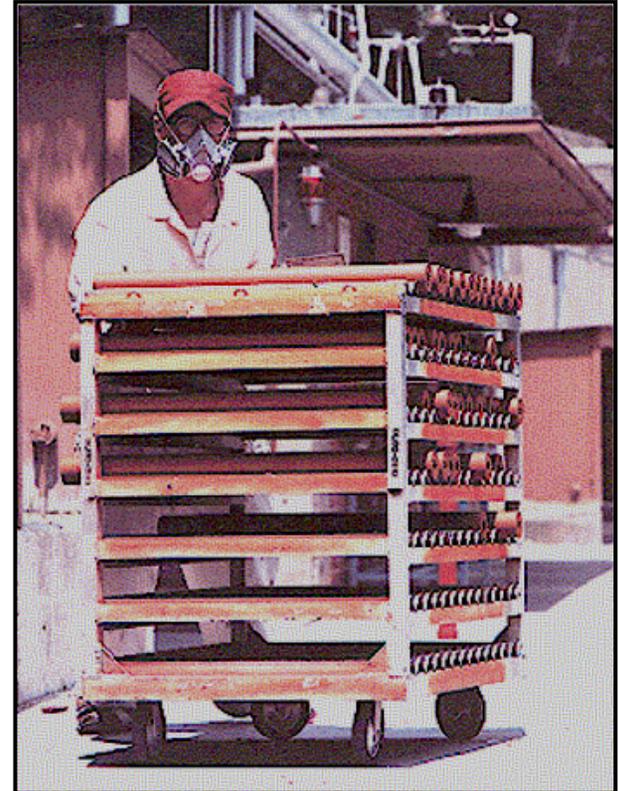




Life Cycle Management: Inventory Management

CAD/PAD

- Process orders, package, and ship CADs and PADs with 14-day turnaround.
- Manage stock levels.
- Receive CADs and PADs returned from the Fleet.
- Segregate returned items for repair, rework, or disposal.



Life Cycle Management: Product Improvement



CAD/PAD

Product improvement solves issues related to:

- Safety
- Toxic material replacement
- Environmental testing
- **HERO**



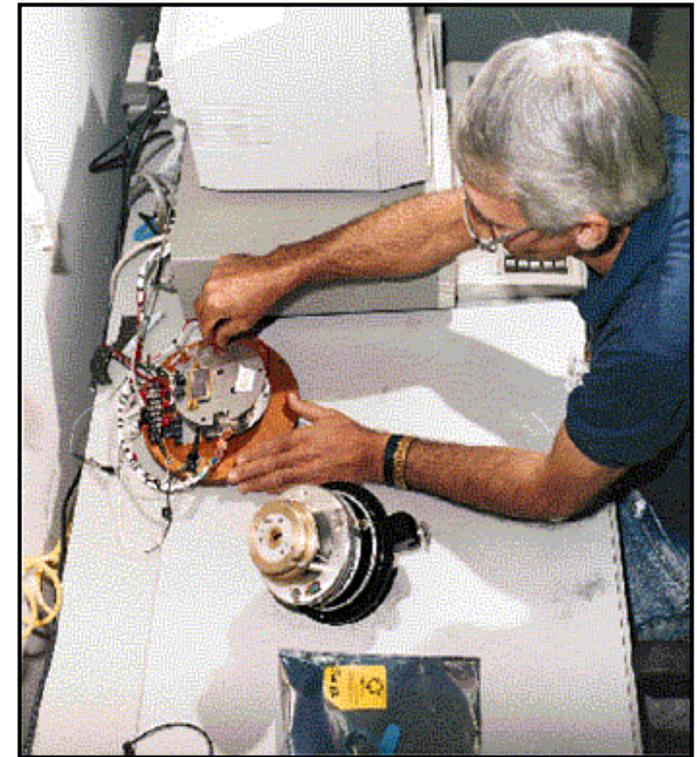
Life Cycle Management: Quality Evaluation



CAD/PAD

The CAD/PAD quality evaluation program includes the following tasks:

- Assess the safety, reliability, and performance of in-service items.
- Maintain a database of installed assets.
- Propose changes to shelf and service life.
- Review and approval service life changes requested by the Fleet



Life Cycle Management: Disposal



CAD/PAD

As part of disposal, we:

- Implement the **military munitions rule**.
- Maximize resource recovery and reclamation of assets.



Acronym Glossary



CAD/PAD

- ADPM–Need definition
- AEPS–Aircrew Escape System
- APU–Auxiliary power unit
- CFA–Cognizant field activity
- D-level–Depot-level
- FAT–First-article testing
- GFE – Government-furnished equipment
- GFM– Government-furnished material
- HERO–Hazards of Electromagnetic Radiation to Ordnance
- ILSMT–Integrated Logistics Support Management Team
- LAT– lot acceptance testing
- NACES–Navy Aircrew Common Ejection Seat
- NSWC–Naval Surface Warfare Center
- PR–Purchase request
- TDP–Technical Data Package



Definitions

CAD/PAD

- Military Munitions Rule – identifies when munitions become solid wastes potentially subject to hazardous waste regulation
- drogue—small parachute for stabilizing or decelerating the ejection seat