Improved Moveable Weapon Mount System for the CH-47 Helicopter

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DISTRIBUTION STATEMENT A: Approved for public release. Distribution is unlimited.
Background – M24E1/E2 Program

• The current machine gun mount for the CH47 is the M24 – a stationary bar mount that mounts in the door and window of the aircraft and accepts the M240H machine gun.

• A need arose for a new mount to eliminate some deficiencies that are present in the M24.
M24 Machine Gun Mount - Deficiencies

**Rigid Cradle**
- Cradle is Solid Steel
- Transfers Recoil Forces and Vibrations to the Mount and Aircraft.
- Recoil Forces Cause Gunner Fatigue, Especially During High-Fire Training

**Case and Link Collection**
- Only 200 Round Capacity
- Bag is Very Weak – Tears Easily
- Bag Interferes with Bar When Full

**Ammunition Container**
- Only 200 Round Capacity
- Ammo Can is Held in Place by Bungee Cord
- Ammo Easily Falls Out of the Can

**Fixed Position in the Door and Window**
- Puts Soldiers at Risk in Emergency Situations
- Makes Egress Difficult
- Makes Hot Refueling Difficult Without Removing the Mount
M24E1 User Evaluation
Machine Gun Mount

**Flex-Mount Cradle**
- Flexible Cradle Recoils with the Weapon
- Increases Accuracy
- Decreases Gunner Fatigue

**Lightweight Construction**
- Titanium Tube Construction
- Aluminum Ammunition Cans

**Improved Catch Bag & Frame**
- 450 Case & Link Max Capacity
- Reversible Zipper for: Inboard or Outboard Discharging

**Modular Design**
- Same Mounting Positions
- Improved Field-of-Fire
- Two Ammunition Can Choices:
  - Cradle Mounted
  - Cross-Bar Mounted
- Quick Change Ammo Can Config (4 Bolts & Mounting Bracket)

**Pivoting Cross Bar**
- Allows Easy Egress and Ingress
- Can Rotate into Aircraft While Weapon is Installed

**Cross-Bar Mounted Ammunition Can**
- 400-Round Capacity
- Anti-Siphon Spring
- Increases Gunner’s Field-of-View
- Decreases Weight of Weapon

**Cradle Mounted Ammunition Can**
- 400-Round Capacity
- Anti-Siphon Clip
- Faster Loading
- Decreases Ammo Can Swapping
M24E1 Machine Gun Mount
1) Pull Aft Hinge Pin

2) Pull Safety Pin
M24E1 Operation – Articulation

3) Slide Forward to Release
4) Swing Mount Inside Aircraft
M24E1 Operational Positions

Just a few simple steps to go from **Deployed** to **Open** to **Stowed**

Locking Pin
M24E1 vs. M24E2 Comparison

M24E1
- Rotates Into Aircraft

M24E2
- Rotates Into Aircraft
- Rotates Out of Aircraft

Key differences:
- **Actuator**
- **Main Hinge**
- **Pivot**
- **Smaller OD Forward Arm**
- **Handle**
M24E2 Helicopter Mount Design Features

**Case Collection System**
- Holds 450 Cases/Links
- Reversible Bag

**Lightweight Construction**
- Titanium Tube Construction
- Aluminum Construction:
  - Ammunition Can
  - Flexible Cradle

**Single-Piece Casted Pintle**
- Made of 15-5PH CRES Steel
- Eliminates Possibility of Weld Cracking and Corrosion
- Minimizes Manufacturing Complexity

**Unlocking Mechanism**
- Eliminates Additional Safety Pin
- Decreases Moving Parts
- Simple, Quick Operation for Outboard Swing

**Ammunition Feed Chute**
- Very Durable and Smooth Operation
- One Feed Chute For Every Ammo Can

**Main Knuckle**
- Capable of Inboard and Outboard Articulation
- Provides Maximum Door Clearance
- Ball-Handle Added for Ease of Use

**Cross-Bar Mounted Ammunition Can**
- 400-Round Capacity
- Decreases Firing Weight for Gunner
- Increases Gunner’s Field-of-View
- Additional Viewing Slots to Gauge Remaining Ammunition

**Small Diameter Cross Bar**
- Interfaces Directly with Locking Pin
- No Modification to Airframe
1) Pull Aft Hinge Pin

2) Compress Collar then Slide Rearward
3) Swing Mount EITHER:

- **Inside Aircraft**
  - Primarily used during Regular Egress or Hot Refueling

- **Outside Aircraft**
  - Primarily used for Emergency Egress
Testing - Simulated and Live-Fire

- Finite Element Analysis (FEA) used on Both M24E1 and M24E2
  - 8G Crash Loads
    - Positive and Negative X, Y, Z Directions
  - Recoil Loads Simulated
    - Help Predict Fatigue Life on Critical Parts

- Extensive Testing Performed at Picatinny’s Armament Technology Facility (ATF) to Prove:
  - Both Systems (M24E1/M24E2)
  - Both Ammo Cans (Cradle/Bar)
  - Flexible Mount
  - Blank Firing
Initial Testing and Verifications

- **Initial Flight Tests**
  - Performed at Fort Rucker, AL
  - Performed at Redstone Arsenal, AL
  - Testing Included:
    - Vibration
    - System Reliability
    - User Feedback

- **Operational Testing and User Feedback**
  - Fort Drum, NY
  - Fort Indiantown Gap, PA
  - Constantly on travel after Upgrades and Enhancements were made in order to test new performances and obtain first-hand Soldier feedback
Applicability to Other Systems

- Technologies used in the M24E1 and M24E2 Mount Systems could be tailored to bring additional capabilities to the Warfighter.

- Mount Systems are adaptable to other weapons and/or other aircrafts.

- V-22 Osprey

- MH-53 Pave Low
QUESTIONS?

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