AH-1W M197/M89
ENVIRONMENTAL KIT

NAVAIR Medium Caliber Aircraft Guns
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OVERVIEW

• Background and Purpose of Kit
• Kit Description and Installation
• BTL Testing
• Flight Test
• Production
• Summary
BACKGROUND

- Dirt and rocks caused high amount of Gun/Feeder stoppages during Desert Storm, Somalia, OEF, and continues to be a problem during OIF.

- Rock/Dirt intrusion remains primary cause of degraded AH-1W Gun Systems in OIF, more than 60% of AH-1W’s have inoperable Gun Systems during Hi-Tempo Operations.
PURPOSE OF KIT

- Prevent rock/dirt/sand intrusion.
- Increase AH-1W Gun System reliability in austere conditions.
- Decrease maintenance man-hours.
- Increase Gun/Feeder service life.
- Regain Aircrew confidence in system.
DESCRIPTION OF KIT

• Covers most open areas on the Gun that are not required for operation.
• Consists of four stainless steel debris shields.
  – Rotor Cover
  – Housing Cover
  – Drive Motor Cover
  – Feeder Cover
• Requires a few consumables for mounting.
DESCRIPTION OF KIT
INSTALLATION

• Installed by O-Level in less than two hours.
• I-level tracking and procurement
• Does not affect current maintenance or operating techniques.
• Used as required in austere environments.
• Blade Tape used to cover remaining critical openings on the Gun and Feeder.
ROTOR COVER
• Rotor Cover mounts in the Main Bearing such that the holes in the cover are aligned with the barrel holes in the Rotor.
• The Cover is attached with 12 Bolts and 12 washers
• The Bolts are torqued to 250 - 300 in-lbs.
HOUSING COVER

• Forward top mounts under Unlocking Cam safety wire.
• Forward sides mount over Gun Housing Bolts, retained by a washer and cotter pin.
• Aft sides are safety wired to aft Gun Housing alignment roll pins.
• Shield is flush with Gun End Plate Clamp.
• Fits all types of Gun Housings.
DRIVE MOTOR COVER
DRIVE MOTOR COVER

• Mounts under Drive Motor.
• Uses four screws and pre-existing unused threaded holes in Gun Housing.
• Molds against side of Gun Housing.
• Provides half inch of clearance for ejection of brass and live rounds.
FEEDER COVER
FEEDER COVER

• Mounts to the Feeder using forward Mount Pin and Feeder Round Guide screw.
• Covers bottom of Gun Rotor Assembly.
• Extends upward and molded to cover side of Gun Housing.
• Grooved to clear the Feeder Sprocket.
• Does not interfere with ammunition feeding.
M197 BLADE TAPE

- Cut pieces to size, cover openings on lower Housing Assembly Elliptical Cam Path.
- Leave gap on bottom Elliptical Cam Path opening to allow lubrication and drainage.
- Cut pieces to size, cover lower Housing Assembly Clearing Cam Path.
- Placed tape over the opening above the main bearing, beneath the electrical contact and other unprotected areas on the upper housing.
- The opening between the feeder shield and the lower housing should be covered with tape.
M89 BLADE TAPE
M89 BLADE TAPE

- Six pieces, cut 1¼ square inch, covers six openings on Feeder Clutch Housing.
- A strip of tape should be placed behind the stripper gear on the clutch.
  - Covers critical Rotating Vane and Clutch Actuator that controls ammunition feeding to the Gun.
- Blade tape should be used on all openings on the back and side of the feeder.
BTL TESTING

• Sand and Dust Testing
  – Mil-Std-810
  – Schmidt 3.5 cu ft Sand Blaster at ~8 ft from Housing
    • >150 µm silica sand blown at 900 cfm with a concentration of up to 50 g/ft^3
    • Sand Blast environment was considered more harsh than reality
  – Dusted by hand prior to firing and from stand during firing
  – Thermocouple data taken
  – 500 baseline rounds, 1100 sand and dust rounds
BTL TESTING

Sand and Dust Results

• No temperature increase

• Dust related jams reduced:
  – Single race bearing and seals
  – Additional Blade Tape
BTL TESTING

• Cold Test
  – Mil-Std-810
  – Low Temp Test (-50 deg F)
  – 24 hour soak
  – No adverse effect, 100 rnds fired

• Salt Fog
  – Mil-Std-810
  – 5% Salt Solution for 350 hrs including wet and dry cycles
  – Post rinse with deionized water
  – Minor gun maintenance followed by 100 rnds fired
FLIGHT TEST

• China Lake (VX-9)
  – 2 Flight days attempted firing appx. 180 rounds in dust conditions
  – Gun jammed; unrelated to Kit performance

• Yuma (MAWTS-1)
  – 2 Kits tested (1400 and 1100 Rounds)
  – Daily FARP and Dust conditions
  – Kitted Guns survived Sand Storm (Brown out) that incapacitated non-kitted guns
PRODUCTION

• ECP
  – First Article: 50 Kits, 10 Spares and 5 Trainers
  – Cost: ~$650/Kit
  – Production Drawings

• Manufacturing
  – 304 Stainless Steel Sheet w/ Black Oxide Finish
  – Hydroform For Housing Cover and Motor Cover
  – Stamping for Rotor Cover
  – Bending for Feeder Cover
SUMMARY

• The AH-1W Gun System is the ultimate defense for Aircrew flying combat missions. When operable, the system has multiple uses and is extremely deadly. The Environmental Kit will significantly increase the AH-1W Gun System reliability and reduce maintenance hours by decreasing Gun and Feeder jams caused by rock, dirt and sand intrusion.
QUESTIONS?