



NAVSEA

WARFARE CENTERS

Indian Head EOD Technology Division

NAVAL SURFACE WARFARE CENTER

INDIAN HEAD EXPLOSIVE ORDNANCE DISPOSAL TECHNOLOGY DIVISION

CAD/PAD MIST CODR & EI

06/26/2018



ABSTRACT



- Provides a summary of recent mishaps related to CAD/PAD, Conventional Ordnance Deficiency Reports (CODR), and Engineering Investigations (EI) that were supported for USN and USMC. Status and key findings will be provided.



Photo by: Nicholas Schombs

MIST CODR/EER & EI Definition



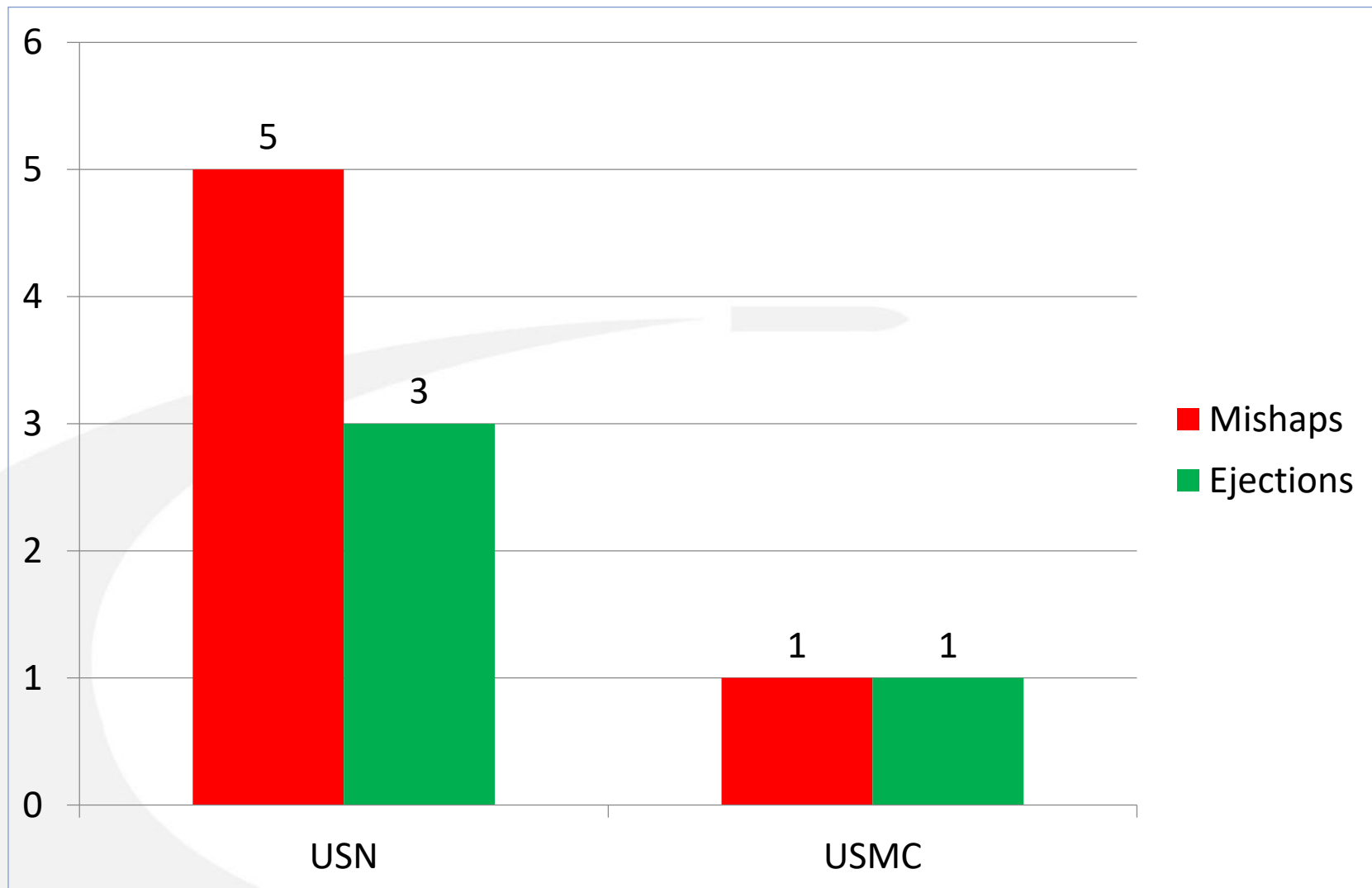
- What is MIST, CODR/EER and EI?
- The Mishap Investigation Support Team (MIST) is managed and funded by NAVAIR.
- The team consists of an escape systems engineer, a survival equipment specialist, and a CAD/PAD equipment specialist.
- The primary mission for MIST is to provide expert level support to the Naval Safety Center (NSC) and the Aircraft Mishap Board (AMB) on class “A” mishaps involving the escape systems.

MIST CODR/EER & EI Definition



- A Conventional Ordnance Deficiency Report (CODR) is a Naval message drafted by the end user describing fleet deficiencies for CAD/PAD devices.
- A Explosive Event Report (EER) is a Naval message drafted by the end user describing an explosive event for CAD/PAD devices.
- A Engineering Investigation can be opened on a CODR or a EER by the Fleet Support Team (FST) if we see the need for further action and investigation.

APR17 – MAY18 Class “A” Mishaps



CLASS “A” Mishaps USN/USMC



- 21 Apr 2017: (Philippine Sea) F-18E lost on approach to landing on carrier. Pilot ejected without injury prior to water impact. MIST was not activated.
- 01 AUG 2017: (Lemoore, CA) F/A-18F Aft cockpit, seat Parachute Deployment Rocket Motor ignited and burst through canopy. No ejection, MIST **activated** for ground mishap.
- 09 Aug 2017: (25 Miles South of Key West, FL) F-5N went down over water. Pilot ejected safely. MIST was not activated.

CLASS “A” Mishaps USN/USMC



- 12 Aug 2017: (Bahrain) F/A-18E departed runway during landing after a ship to shore divert due to an engine malfunction. Pilot ejected. No injuries. MIST **activated.**
- 01 Oct 2017: (Monroe County, TN) T-45C crashed on low-level training route. 2 fatalities. MIST **activated.**
- 14 Mar 2018: (Key West, FL) F/A-18F, while flying single engine, crashed on short final. 2 fatalities. MIST **activated.**
- 02 Apr 2018: (Djibouti) AV-8B struck the ground shortly after take-off. Pilot ejected safely. MIST **activated.**

AV-8 Mishap Djibouti



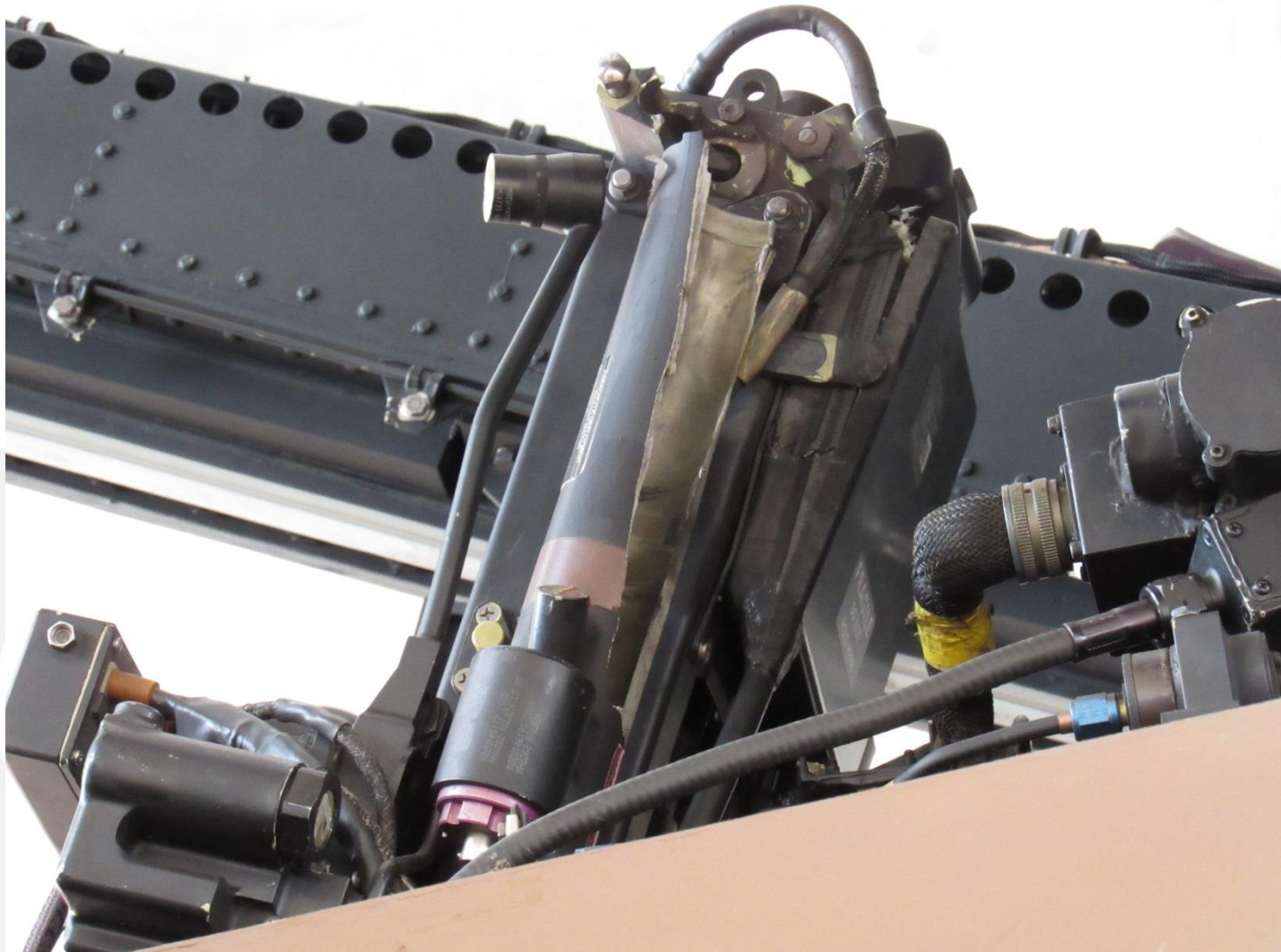
- On April 2, 2018, an AV-8 Harrier crashed during takeoff at Camp Lemonnier, Djibouti. The pilot ejected safely, MIST was activated. A preliminary investigation revealed all CAD/PAD devices in the escape system functioned as designed. The Naval Safety Center is still investigating the cause of this mishap.

Lemoore PDRM Mishap



- 01 Aug 2017 an F/A-18F aft seat PDRM auto ignited. MIST was activated and with the help of EOD, both PDRM's were removed and detonated on site. The main cause of this mishap was incorrect maintenance, storage, handling and disposal of the device. The stabilizer depleted resulting in autocatalytic ignition because of these four factors.
- Aircrew Bulletin (ACB) 1307 and 1308 were initiated, giving instructions for the fleet to remove all affected PDRM's and WB15's.

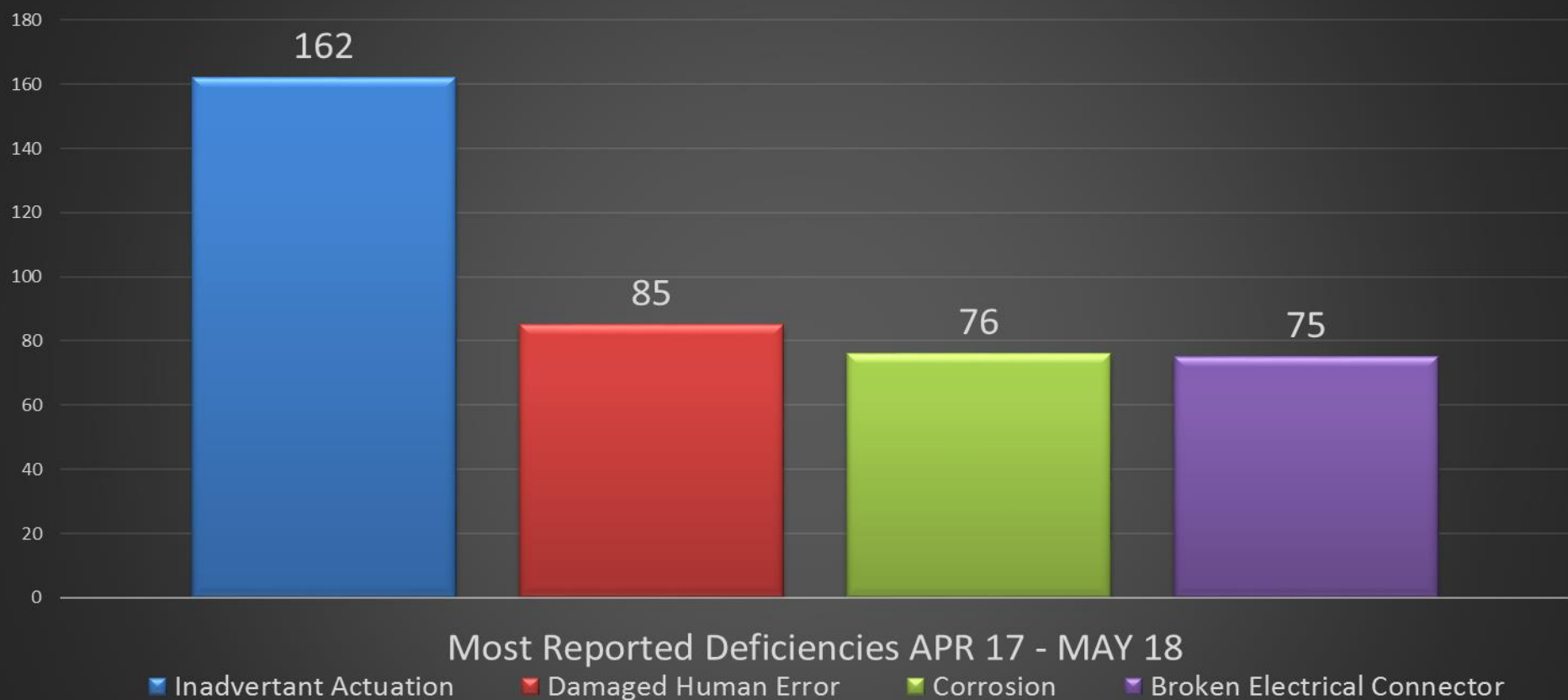
Lemoore PDRM Mishap



CODR Reporting



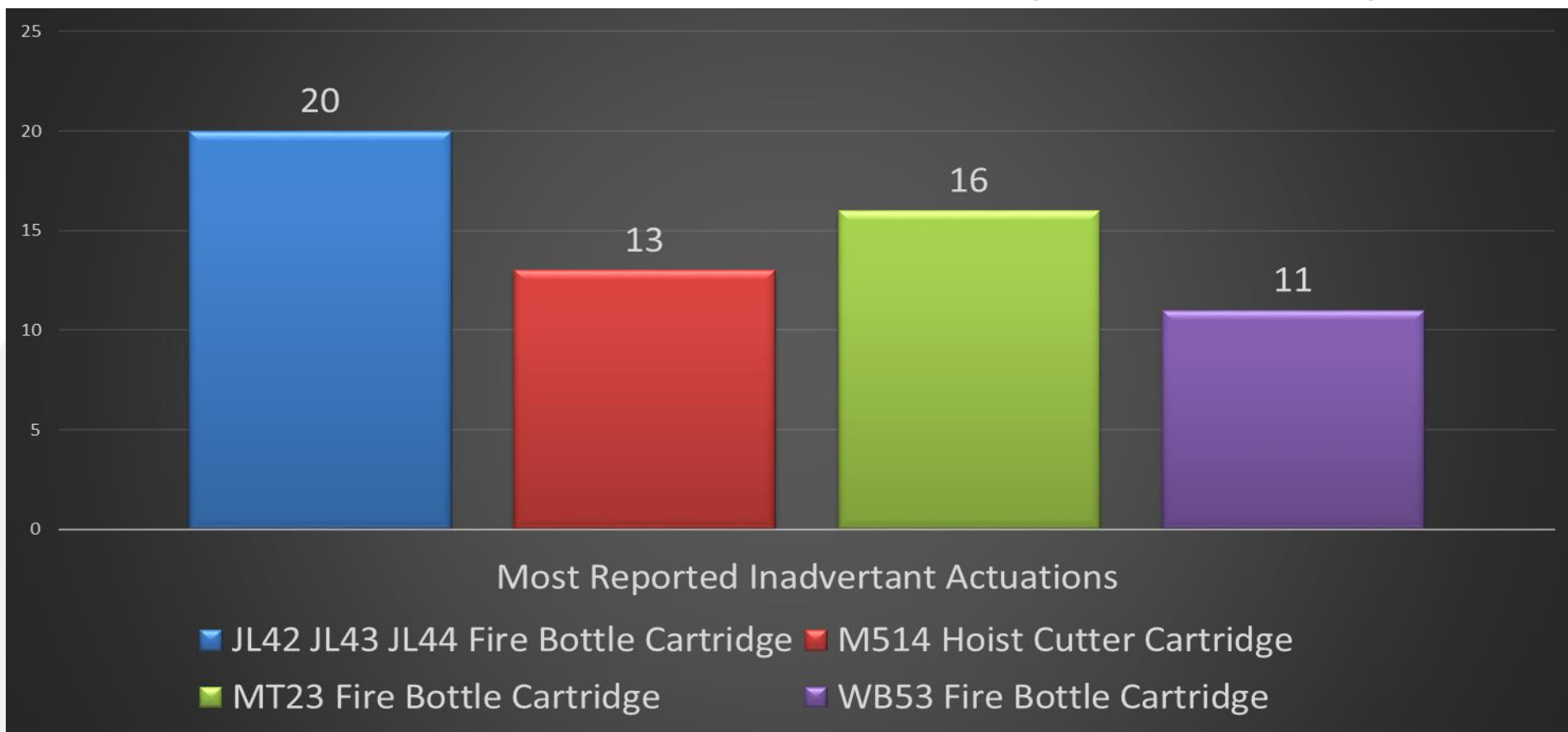
- Since April 1, 2017 to present there have been over 600 CAD devices reported and 15 PAD devices reported totaling over 1.1 million dollars worth of devices.



Inadvertent Actuations



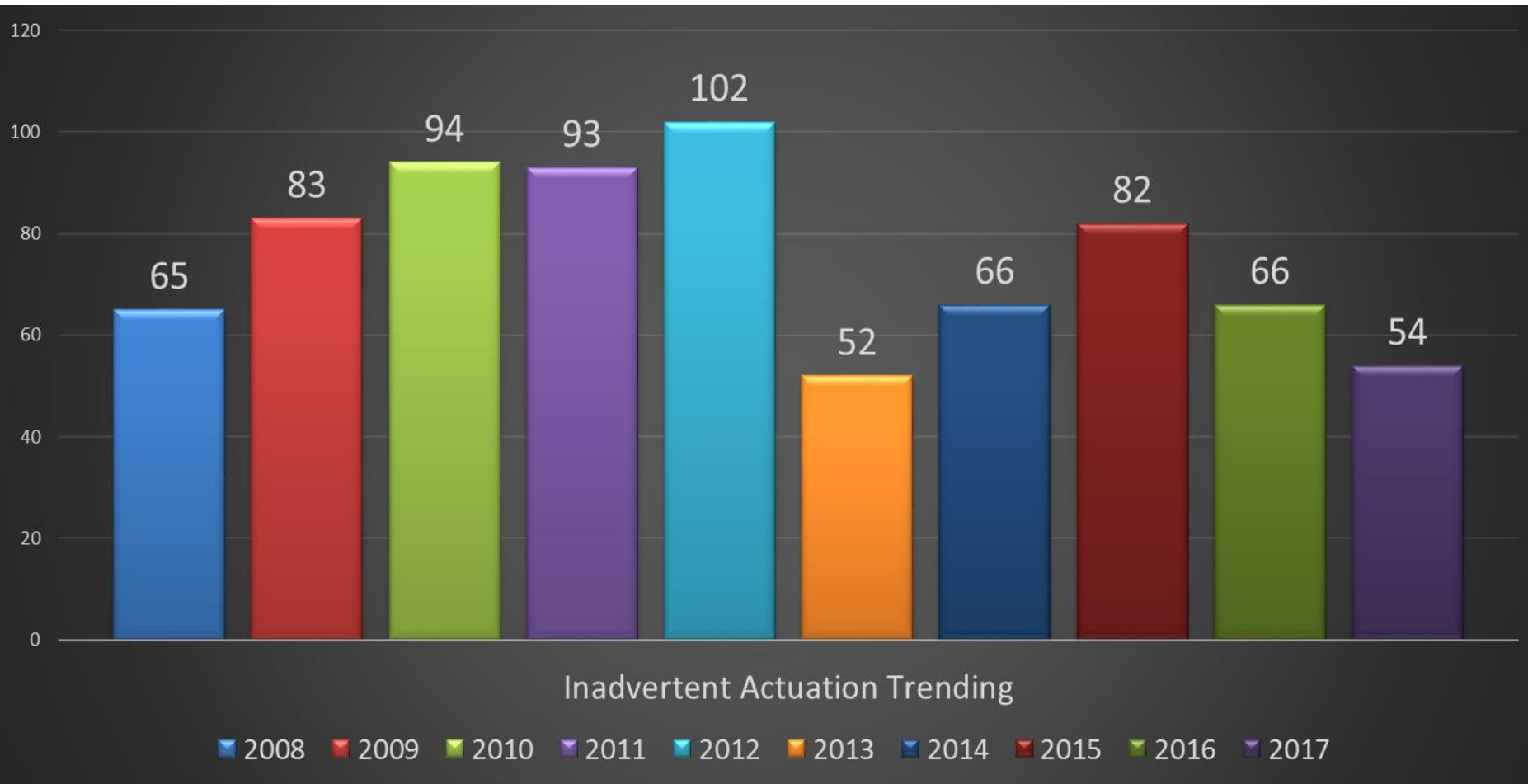
- The most reported DODIC's for inadvertent actuations are JL42, JL43, JL44, M514, MT23, and WB53. All of them, except the M514, are fire extinguisher cartridges.



Inadvertent Actuations



- Looking at the data for JL42, JL43, JL44, M514, MT23, and WB53 for ten years reveals some trending.



Inadvertent Actuations

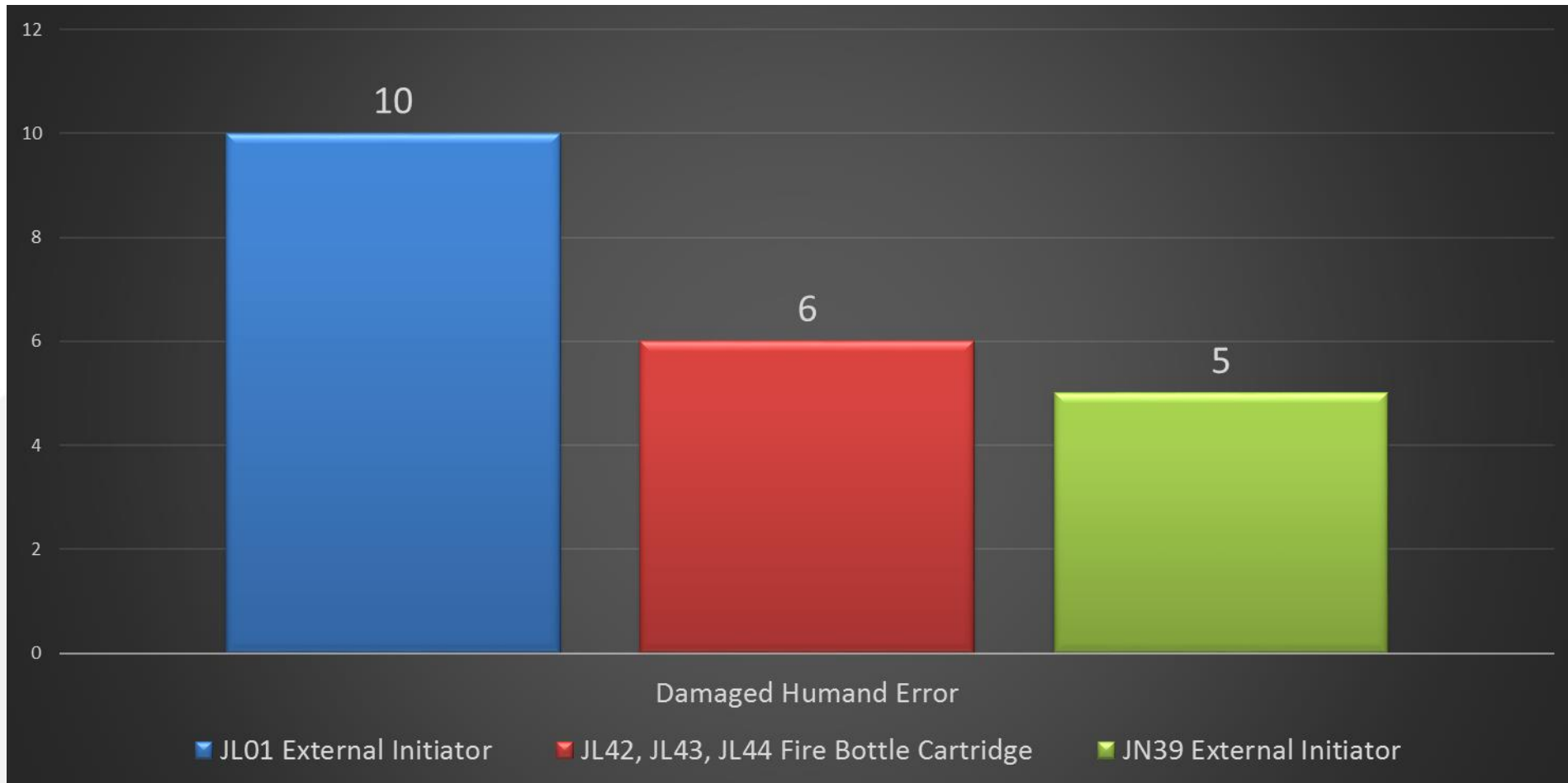


- We can see a rise in the late 2000's for Inadvertent Actuations. In 2013 that was mitigated by implementing online virtual training.
- In 2015 we can see a sudden spike in Inadvertent actuations. Seventeen of the 82 were directly related to one squadron's trouble shooting of a wiring discrepancy. If it was not for that squadrons wiring problem, we would have had another average year for Inadvertent Actuations.

Damaged Human Error



- The most reported DODIC's for "damaged human error" are JL01, JN39, JL42, JL43, and JL44.



Damaged Human Error

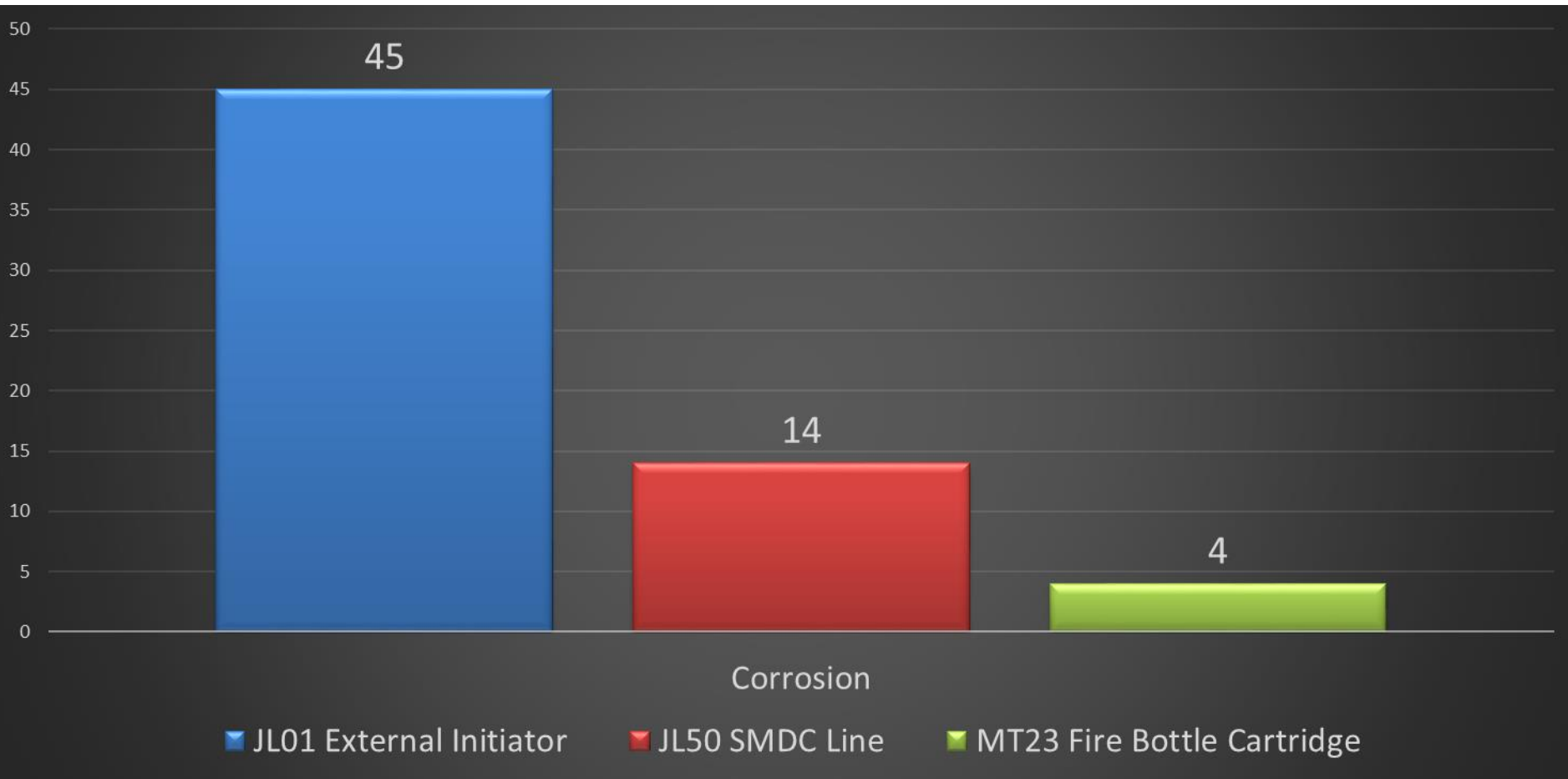


- The JL01 is always at the top of the list for Damaged Human Error. This is because maintainers are operating the device past its detents during the inspection process. Numerous warnings in IETM's and the 11-100-1.1 tell them of this. The JN39 has the same issue.
- The JL42, JL43, and JL44 are commonly damaged during installation. This is almost always because the engine was not removed for fire bottle replacement. IETM's only suggests removing the engine and is not a requirement.

Corrosion



- The most reported DODIC's for "Corrosion" are the JL01, JL50, and the MT23.



Corrosion



- There are numerous reasons why the JL01 is having a corrosion problem.
 - Human error during aircraft washing
 - Device location on aircraft
 - All metal device with inadequate weather resistance
 - Improperly maintaining the device
- Replacing the JL01 with the JN39 will remove those risks for corrosion.
- Working with PMA-275, we were able to decrease some of those factors by eliminating the special inspections for the JN39.

Corrosion

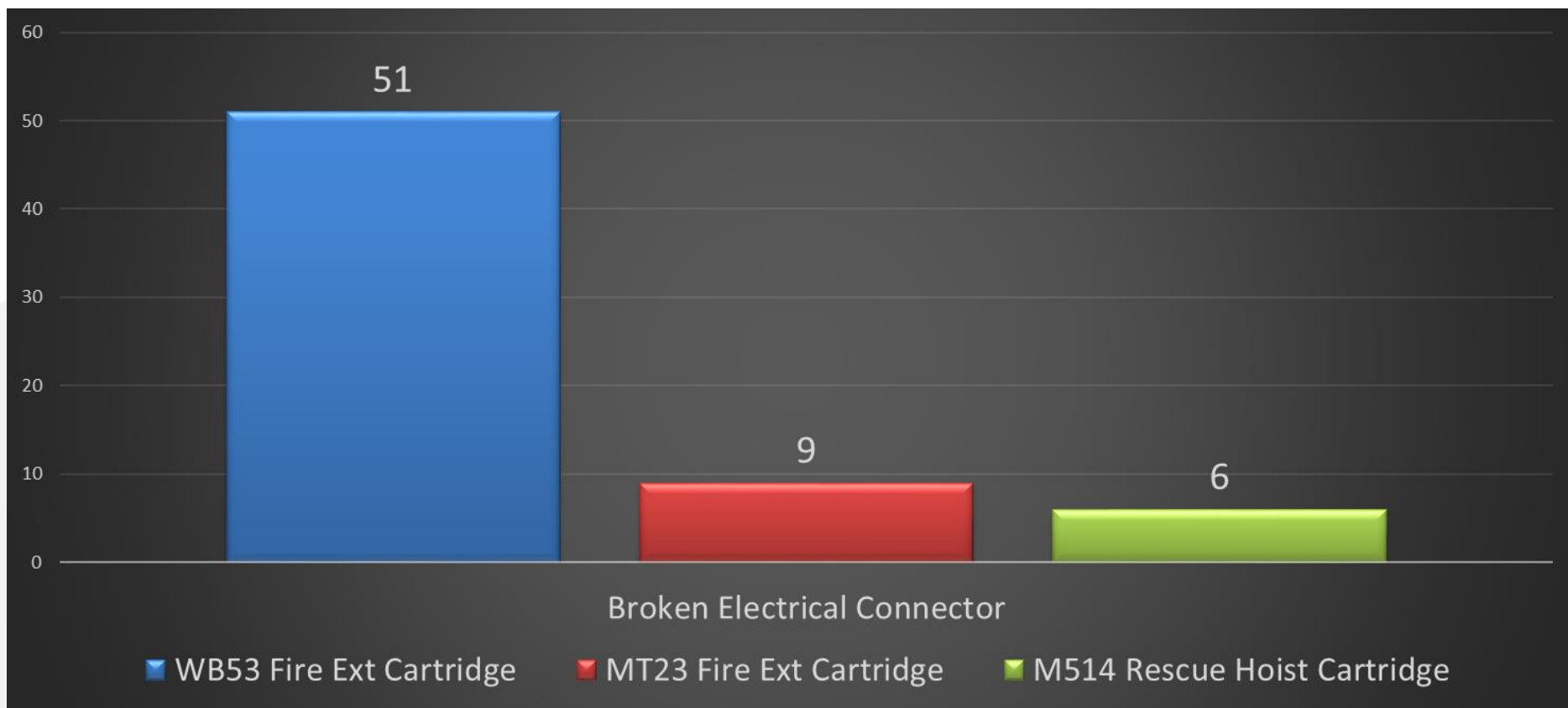


- The JL50 has seen 22 reports for corrosion since April 2017 and all of the reports have been from one command. Since we are seeing about 1.7 JL50 corrosion reports per month, we opened an Engineering Investigation.

Broken Electrical Connector



The most reported DODIC for broken electrical connector is the WB53 engine fire extinguisher cartridge. The WB53 makes up 68% of the devices reported in this category. We have opened an Engineering Investigation to further understand this failure.



Engineering Investigations



- Open
 - T-6 JL50 – Corrosion
 - T-6 JL50 – SMDC bent
 - H-60 WB53 – Broken electrical post
 - CH-53 MT23 – Failed to fire
 - MV-22 SS66 – Broken electrical connector
 - AV-8 XW36 – Loose rocket motor igniter
- Closed
 - T-6 JL50 – SMDC bent
 - F/A-18 CWDR – Chemical strip charred/burned
 - MV-22 JL02 – Failed to fire
 - F/A-18 MT30/31 – Oil Intrusion

Broken Electrical Connector



- Three Engineering Investigations (EI) have been opened to try to figure out the reason for the high number of WB53 reports. Out of the three EI's two were closed. One for non-receipt of the item and the other was closed because the electrical connector was missing. We are still waiting on receipt of the last recalled WB53.

JL50 SMDC Corrosion



- JL50 Shielded Mild Detonating Cord: During de-arming, Collateral Duty Quality Assurance Representative noted threaded fitting was difficult to turn. Upon closer inspection we noticed the threaded fitting was deteriorating from the inside. Holding at Squadron.
- The JL50 has seen 22 reports for corrosion since April 2017 and all of the reports have been from one command and averages to 1.7 reports a month for corrosion. Since this is only happening in one location, we think that this is either a corrosion issue, maintenance issue, or a publications deficiency.



JL50 SMDC Corrosion



- During a site visit to CNATRA Corpus Christi, wash procedures, post flights, spot checks, removals, and publications were all inspected.
- Galvanic corrosion was found inside/outside of the B-nut going to the acceptor. Although the environment is probable for corrosion, it is not the source of corrosion on this investigation.
- We did find inconsistencies with their wash procedures but this also is not the source of the corrosion.
- We could not find any moisture on post flight. We interviewed pilots and they stated that they are not seeing any source of moisture during flight.

JL50 SMDC Corrosion

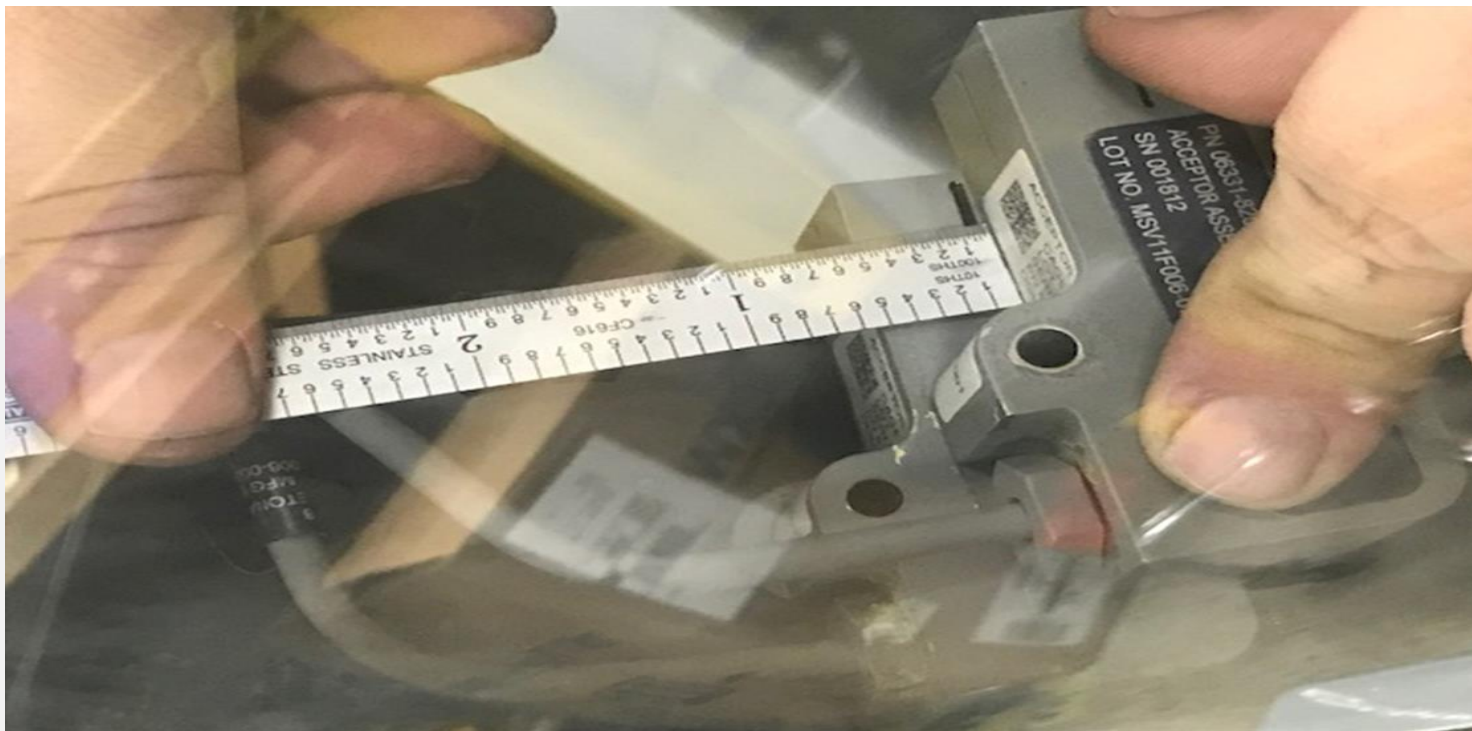


- There are three different places in the T-6 publications that describe how to install a JL50. All three have different verbiage for torques. One states 72 +/- 2 inch lbs, another states 70 to 90 inch lbs, and the last one states 80 +/- 10 inch lbs. Over torque creates micro fractures and can help accelerate galvanic corrosion.
- After inspecting all six JL50's that were in their Ready Service Locker, we decided to recall them for further inspection by a metallurgist.
- Pending review by the metallurgist, we might need to spot check a few aircraft in Pensacola and/or visit the manufacturer.
- Devices have been shipped and we are awaiting their arrival for further investigation.

JL50 SMDC Bent



- JL50 Shielded Mild Detonating Cord : While installing JL50 on aft canopy bow, the manufactured bends made it impossible to line up the acceptor without putting bends in the device. Device recalled for further examination.



WB53 Broken Electrical Connector



- WB53 Fire Extinguisher Cartridge: Ordnance technician was de-arming and shunting fire bottle CAD on aircraft. The ordnance technician noticed that the positive lead on the post rotated with the nut when turning left or right. Device has not arrived yet.

MT23 Failed to Fire



- MT23: While conducting backflow testing of the number two engine fire suppression system, the number two main fire bottle CAD failed to detonate when actuated by the test pilot. After landing the aircraft and shutting down, additional trouble shooting of the system showed no evidence of failure among the related electrical system. Device has been received and is waiting x-ray.

SS66 Broken Electrical Connector



- SS66 Fire Extinguisher Cartridge: Engine fire bottle CAD was received from manufacturer with a non-functional cannon plug. The cannon plug is seized and will not spin; CAD cannot be installed. Device has arrived and is currently being analyzed.

XW36 Loose Rocket Motor Igniter



- XW36 Rocket Motor Initiator: After removing XW36, it was discovered that the left hand end cap was spinning freely. Device has not arrived yet.

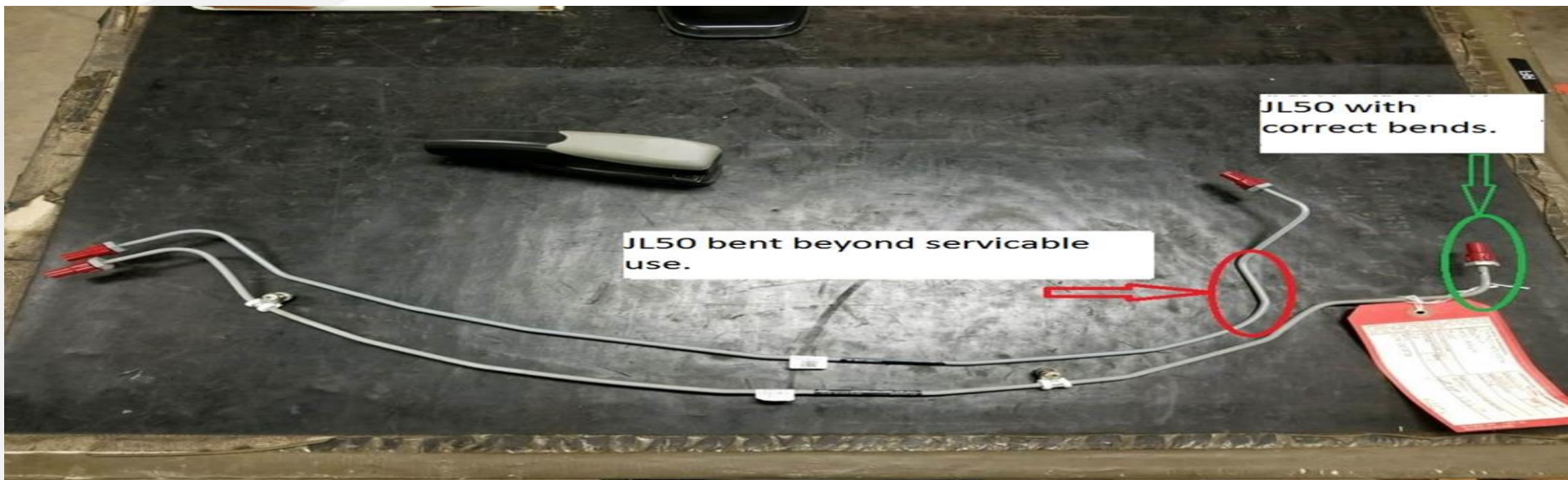


JL50 Bent



- **JL50 Shielded Mild Detonating Cord:**

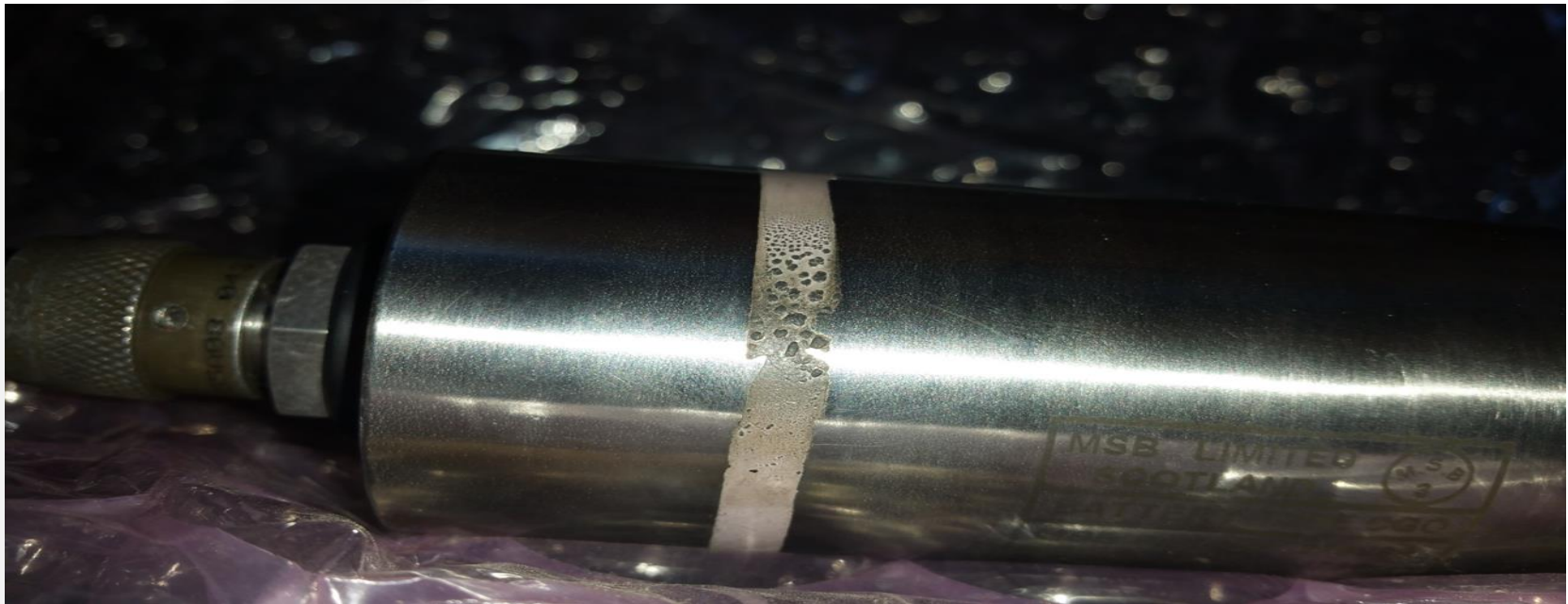
- Received bad from supply. Upon inspection prior to installation, noted the JL50 to be bent beyond serviceable limitations. In addition to the bending, exterior of JL50 exhibits scratching or scoring in the vicinity of the bent area. Cause of bending and exterior markings unknown.
- Final Disposition: Det cord was inspected and noted that the length of the JL50 was correct but was bent beyond design limitations. The shipping box did have significant damage. After inspecting packaging material, gray paint flakes were found in the barrier bag. Findings indicate that the JL50 was damaged during shipping and/or storage.



Thermal Battery Chemical Strip



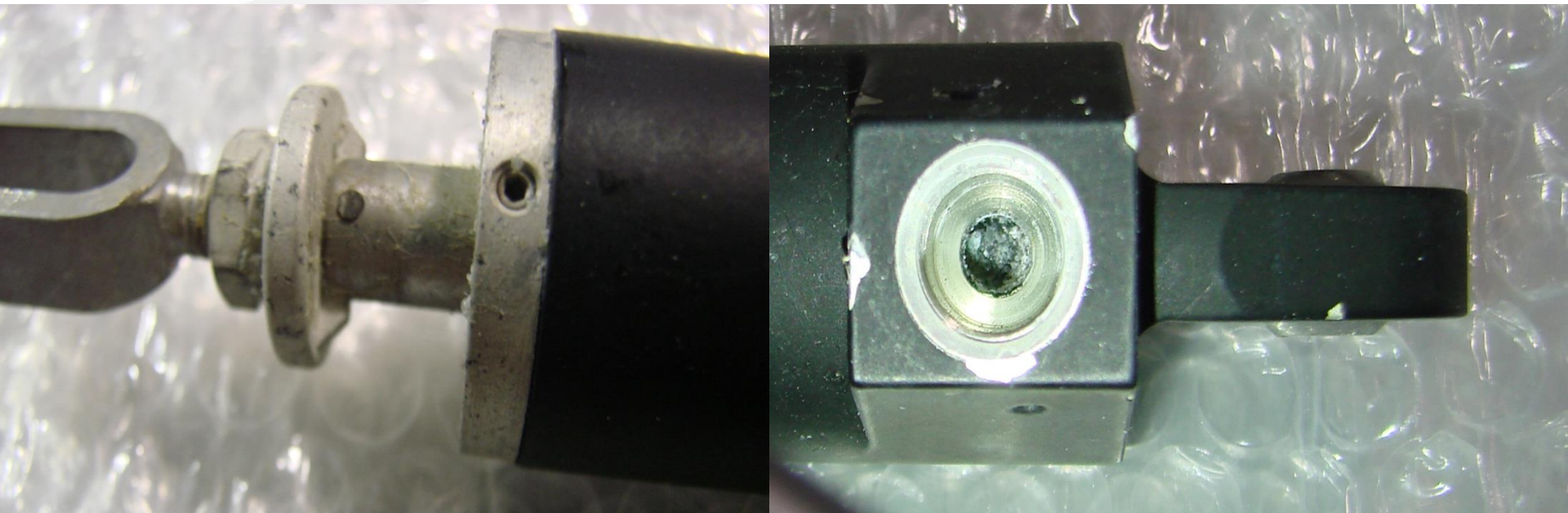
- CWDR Thermal Battery:
 - Plane captains were holding training on proper daily inspections. During the cockpit portion, they checked to make sure the seat was safe. During inspection, the plane captains noticed the sequencer expended unit indicator (doll's eye) was white and the thermal battery strip was blacken and charred.
 - CWDR Final Disposition: A radiographic inspection was conducted on the thermal battery and showed no evidence of the firing pins moving or any evidence of the cell stack activating at all. Thermal battery received an outside heat source and damaged the temperature sensitive indicator.



JL02 Failed to Fire



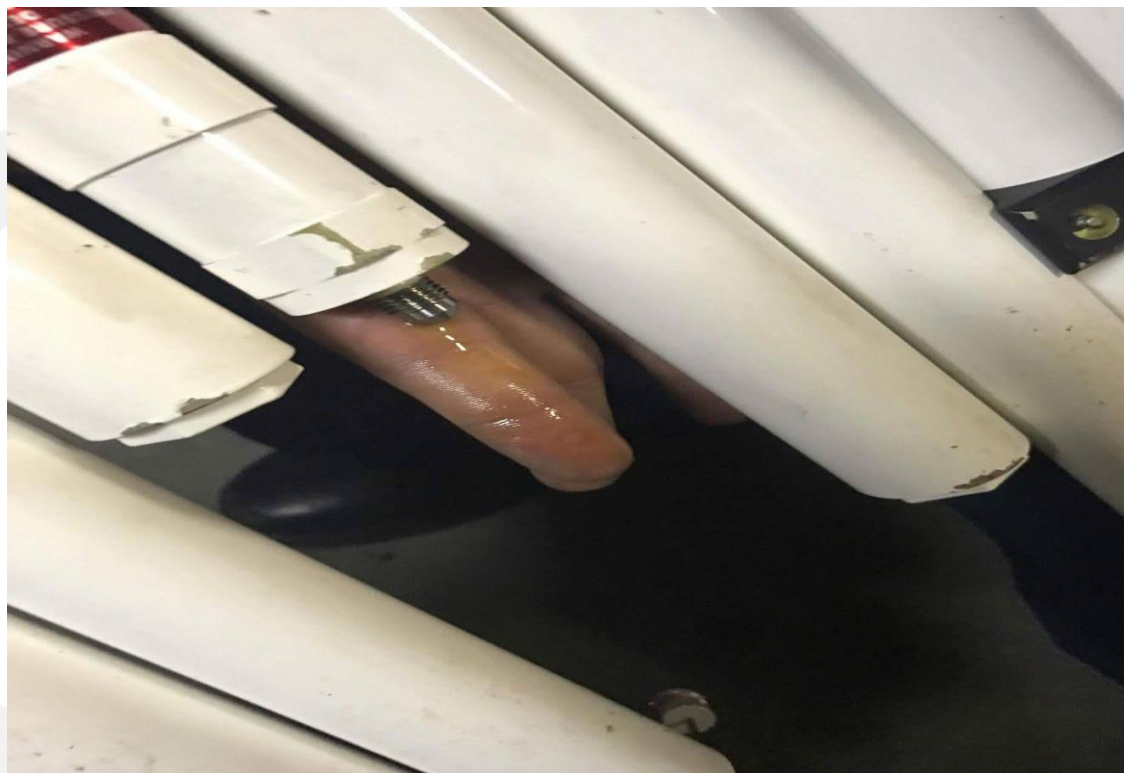
- JL02 Seat Initiator Cartridge:
 - Class “A” mishap involving an MV-22 Osprey off of the east coast of Australia. JL02 seat thruster cartridge did not actuate during mishap. CODR/EI requested by Aircraft Mishap Board.
 - JL02 Final Disposition: Thruster piston was fully extended and properly aligned. Thruster shear pin was sheared and explosive residue can be seen inside the TLX port. This evidence shows that the thruster worked as designed.



MT30 & MT31 Oil Intrusion



- MT30 and MT31 Underseat Rocket Motor (USRM)
 - Pac Fleet found oil in several USRM's and ballistic gas lines during a 728 day inspection.



MT30 & MT31 Oil Intrusion



- Indian Head E25 In Service Engineering Branch developed an emergency test plan and approved for use in four days. Testing provided insight on clogging, blockage and pressure loss.
- A decision was made by NAVAIR based on the results from testing to move forward with operations and be advised of a ACB to address the issue
- ACB 1290
 - To be completed on the next 84 day inspection.
 - Inspect for oil intrusion in/on the gas lines, USRM, Breech Assembly, and MT91 Initiator Cartridges. Clean if discovered.

CAD/PAD MIST CODR & EI



Questions?