

# NACES Maint Review and updates

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***Warfighter Focused &  
Cost Conscious***

**Jose V. Santiago  
AECS ISSC  
June 11-12, 2019**





# Topics to discuss

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- AECS ISSC
  - Who are we?
- Naval Aircrew Common Ejection Seat (NACES):
  - Maintenance concept
  - Manuals related to NACES and purpose
  - Recent and future seat updates
- Recent NACES maintenance issues



# AECS ISSC

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- Aircrew Escape and Crashworthy Systems In Service Support Center:
  - Supports US Navy/Marine fleet aviation on Ejection and Crashworthy Seat Issues:
    - Funded by PMA-202 (Human Systems), PMA-265 (F/A-18) and PMA-273 (T-45)
  - PMA202 ISSC lead at Patuxent River
  - AECS ISSC lead located at FRC East Cherry Point
  - AECS ISSC team members located in seven locations in the continental US
  - Supplemented by 3 CSS support at the moment:
    - 2 Martin Baker Reps funded by production team
    - 1 local rep (non MBA) at Lemoore FRC/I level loft



# AECS ISSC

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- AECS ISSC Sites:
  - NAWCAD Patuxent River (CW Seats, Survival Kits).
  - FRC East Cherry Point (Core Team, Ejection Seats)
  - FRC SW North Island (Ejection Seats)
  - FRC SE Jacksonville (Ejection Seats/ALSS)
  - NAWCWD China Lake (Parachutes and Torso Harnesses)
  - NAWCAD Lakehurst (Support Equipment)
  - NSWC Indian Head (CADS/PADS)

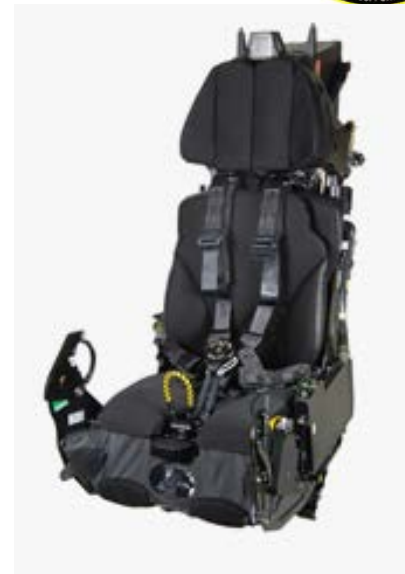


# Ejection Seat Products



NACES

MK-16



SJU-5/6



GRUEA-7



SJU-4/13/14





# Parachute Recovery Systems





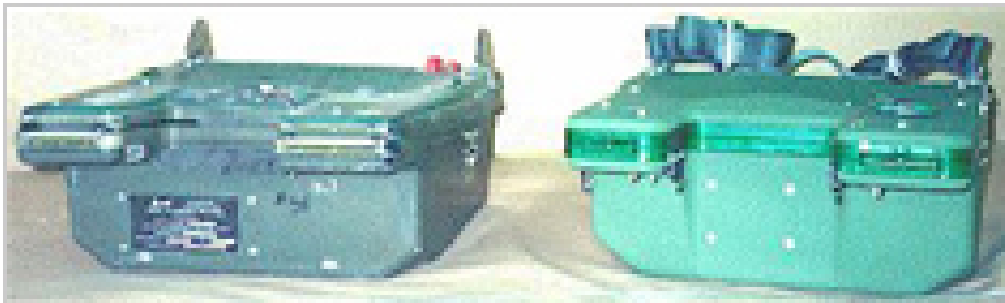


# Crashworthy Seating Systems





# Survival Kits







# AECS ISSC FUNCTIONS



- Fleet support
- Investigation of failed materials (EI's/HMR's and mishaps).
- Design improvements and issue TD's/Bulletins
- Optimize maintenance requirements and manual changes (TMSDR's or TPDR's)
- Supply support recommendations
- Our job is to **SUPPORT YOU!**



# NACES Maint Concept

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- Ejection Seat:
  - Organizational and Depot Level maintenance
  - Organizational level:
    - Remove and Install
    - Clean
    - Inspect
    - Check and test
    - Minor repair (if required)
- Parachutes and survival kits:
  - Organizational and I Level maintenance



# NACES related pubs and purpose

## Organizational Level:

- F/A-18:
  - A1-F18AC-IETM:
    - Legacy F/A-18A/B/C/D acft maint manual.
  - A1-F18EF-IETM:
    - F/A-18E/F and EA-18G acft maint manual.
  - Both IETMS are used only for on ACFT seat maint.
  - Scheduled maintenance and removal (14/28/84/728 days).
  - Periodic Maint Instruction Cards (PMICs).



# NACES related pubs and purpose

## Organizational Level:

- T-45:
  - A1-T45AB-160-000:
    - Used only for on ACFT seat maint and removal/installation.
    - Checklist
  - A1-T45AB-MRC-SERIES
    - Scheduled maint and removal (Daily/28/140/728 days).
    - Periodic Maint Instruction Cards (PMICs).



# NACES related pubs and purpose (F/A-18)

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- IETMS:
  - Removal of individual seat components:
    - Bucket and related components
    - Survival Kit
    - WB-55s
    - Main Beam
    - Catapult
    - Parachute
    - Drogue Canister (coming soon)
    - PDRM (coming soon)





## NACES related pubs and purpose (F/A-18)

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- A1-120-600 series (Checklist):
  - AC (A/B/C/D), SJU-5/6 and NACES
  - AE (A/B/C/D), NACES
  - EA (E/F and G), NACES
    - Recently updated
  - Removal/Inst by Disassembly/Assembly
- A1-120-650 series (Checklist):
  - AC (A/B/C/D), SJU-5/6 and NACES
  - AE (A/B/C/D), NACES
  - EA (E/F and G), NACES
  - Removal/Inst as a complete unit



# NACES related pubs and purpose (F/A-18)

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- A1-120-700 series (Checklist):
  - AC (A/B/C/D), SJU-5/6 and NACES
  - AE (A/B/C/D), NACES
  - EA (E/F and G), NACES
  - Removal/Inst of Survival kit and Seat Bucket



# NACES related pubs and purpose (F/A-18)

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- Purpose of Checklist:
  - Use of Checklist is MANDATORY
  - For -700:
    - To be completed by a two member team:
      - Safety Observer/helper
      - Working member (perform procedures)
  - For -600/-650:
    - To be completed by a three member team:
      - Safety Observer/QA/CDQAR (Controlling Guide)
      - Working member (perform procedures)
      - Tool handler/helper



# NACES related pubs and purpose

- Purpose of Checklist (cont):
  - BE PHYSICALLY THERE!
  - All personnel must be qualified/certified
  - Ensures the accomplishment of tasks in the correct sequence
  - Purpose is to eliminate the possibility of error or omission
  - NO INTERRUPTIONS (UNLESS IN AN EMERGENCY)
  - No partial work/checklist allowed



# NACES related pubs and purpose

- For on acft individual removal/installation of component or seat maint:
  - Use IETMS (F/A-18) or A1-T45AB-160-000 (T-45)
- NAVAIR 13-600-15-6-3:
  - NACES MRC deck (updated annually)
  - Provides the task/maint to perform the 728 day seat inspection
  - Detail instructions will refer to NAVAIR 13-1-36 (shop Maint)





# NACES related pubs and purpose

- NAVAIR 13-1-36:
  - NACES Seat Shop Maintenance and IPB
  - Updated annually
  - Detailed org level maint instructions for the seat removed from the acft
  - Not for seat maint on the acft -> Use IETMS.



# NACES related pubs and purpose

- NAVAIR 13-1-37 NACES Dearm/Arm Checklist:
  - Updated annually
  - To be completed by a three member team:
    - Safety Observer/QA/CDQAR (Controlling Guide)
    - Working member (perform procedures)
    - Tool handler/helper
  - Will add Torque stripe to seat bucket (USRM, seat initiator breech) fittings/connections



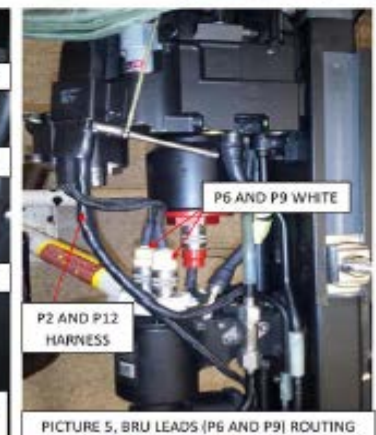
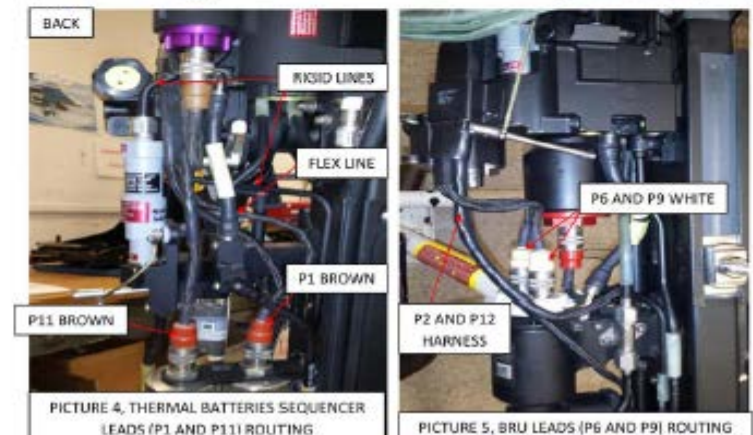
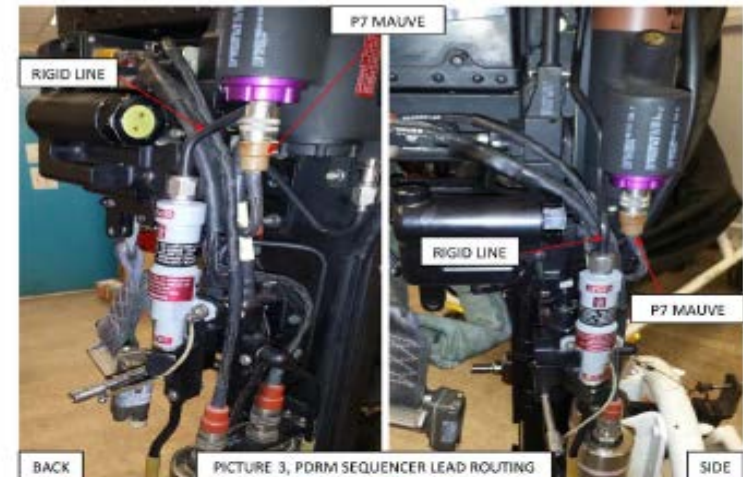
# NACES Maint Concept

- Ejection Seat:
  - Depot Level maint:
  - NAVAIR 13-1-44:
    - Components Sent to Depot/FRC
      - BRU (16 yrs)
      - Harness Reel (20 yrs)
      - Multi-Purpose Initiator (IMP, 14 yrs)
      - Catapult, Bucket & Main Beam send for cause (corrosion, damage, etc.), BCM



# Recent NACES Updates

- Enhanced Sequencer routing Procedures:





# Future Maint Updates

- Torque Stripe for connector/fittings:







# Recent SE Updates

- New Parachute Packing Press (PPP):

FRONT VIEW

**INDEX DESCRIPTION**

1. Mounting Block (Arbor Adaptor)
2. Table
3. Load Display
4. Load Cell Lead
5. Emergency Stop (RH/LH)
6. Document Box
7. Power switch, Electrical Socket
8. Combined Castors/Foot (4EA)
9. Load Regulator
10. Load Button
11. Access Doors
12. Reset Button
13. Operating Levers
14. Pneumatic Actuators
15. Arbor
16. Decals and Labels

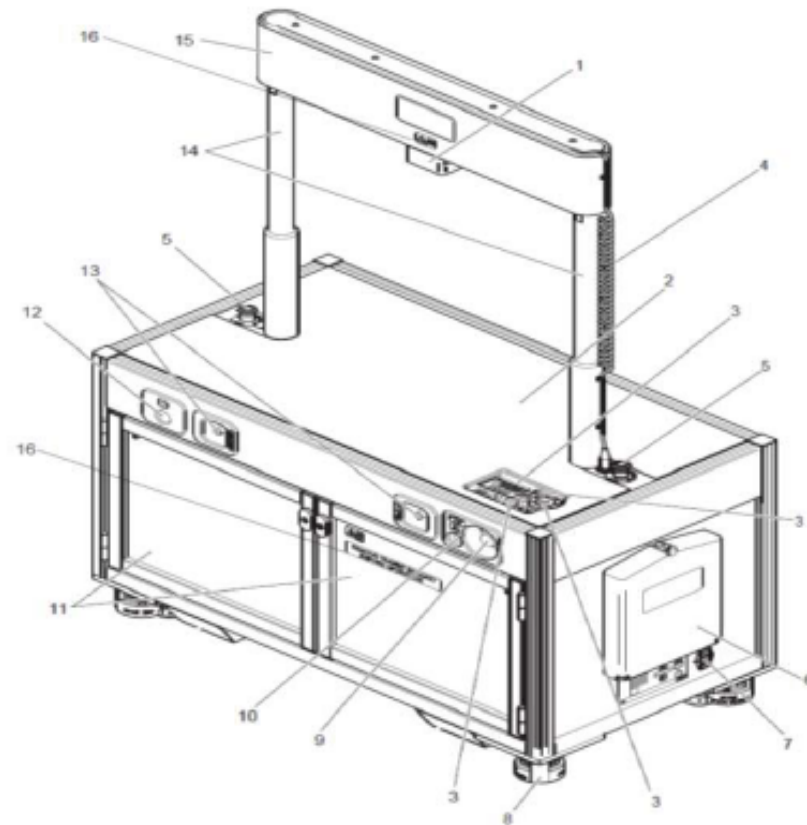
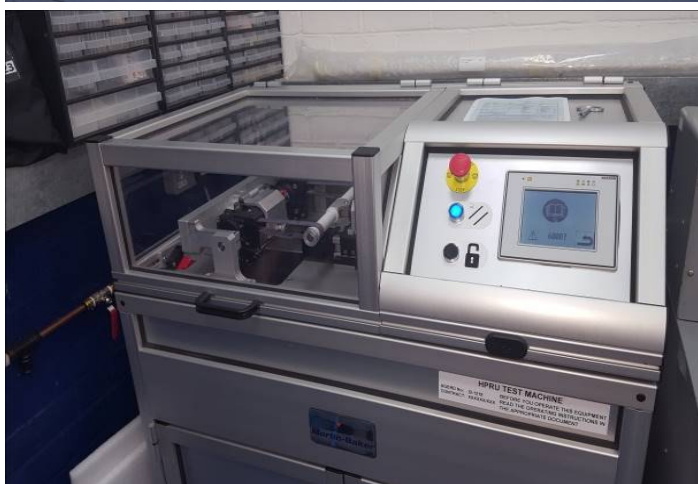


FIGURE 1, PARACHUTE PACKING PRESS (PPP)



# Future SE Updates

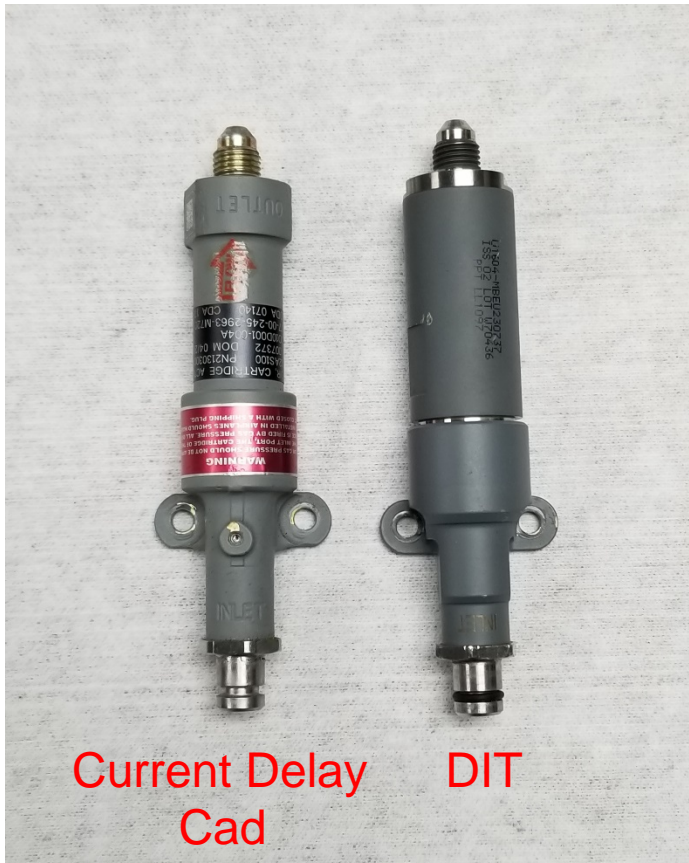
- New Harness Reel Tester:





# Future Seat Updates

- Digital Inline Timer (DIT) (WB54/55/56):
  - Effort to increase reliability and increase service life over current timers







# Future Seat Updates

- Digital Inline Timer (DIT) (WB54/55/56):
  - Minor installation/routing changes needed for T-45/FA-18 FWD seat



Chafing problem



Tie strap to avoid chafing



# Future Seat Updates

- Digital Inline Timer (DIT) (T-6 0.17/0.54):
  - No issues with installation/routing and electrical bonding test

Current 0.17 sec Delay CADs installed on Mounting Bracket



0.17 sec Delay DITs installed on Mounting Bracket



Figure 4, 0.17 sec delay installation (2), rear Ejection Seat (MKUS16LA/ MKUS16LB)

Current 0.17 and two 54 sec Delay CADs installed on Mounting Bracket



0.17 and two 0.54 sec Delay DITs installed on Mounting Bracket

Figure 11, 0.17 and two 0.54 sec delay installation, forward Ejection Seat (MKUS16LA/ MKUS16LB)

Current 0.17 sec Delay CADs installed



0.17 sec Delay DITs installed



Figure 5, 0.17 sec delay installation (2), rear Ejection Seat (MKUS16LA/ MKUS16LB)

Current 0.17 and two 0.54 sec Delay CADs installed



0.17 and two 0.54 sec Delay DITs installed



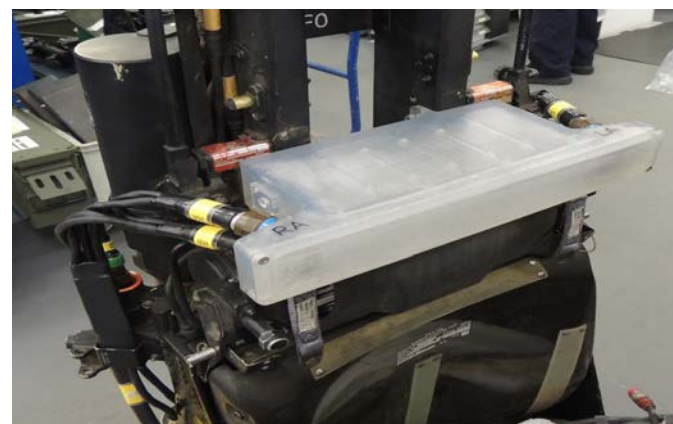
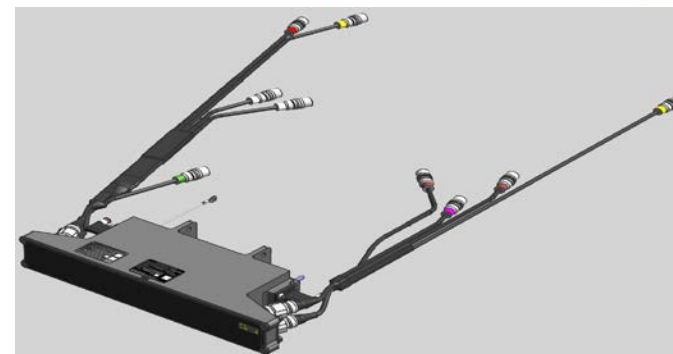
Figure 12, 0.17 and two 0.54 sec delay installation, forward Ejection Seat (MKUS16LA/ MKUS16LB)





# Future Seat Updates

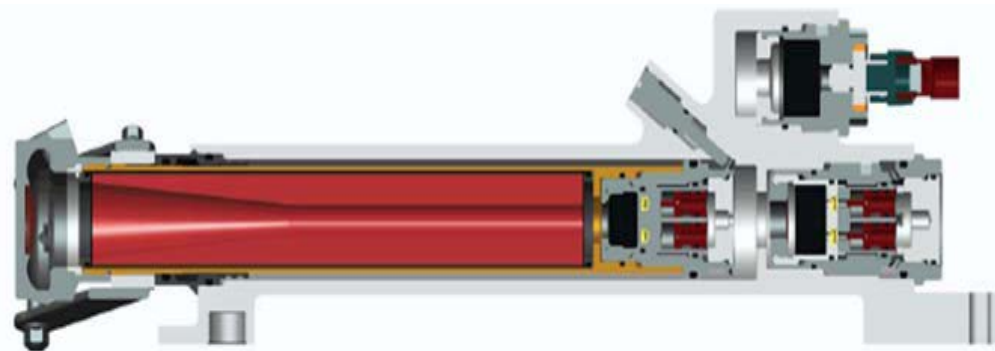
- Ejection Seat Sequencer:
  - Supportable
  - Detachable leads
  - New test set



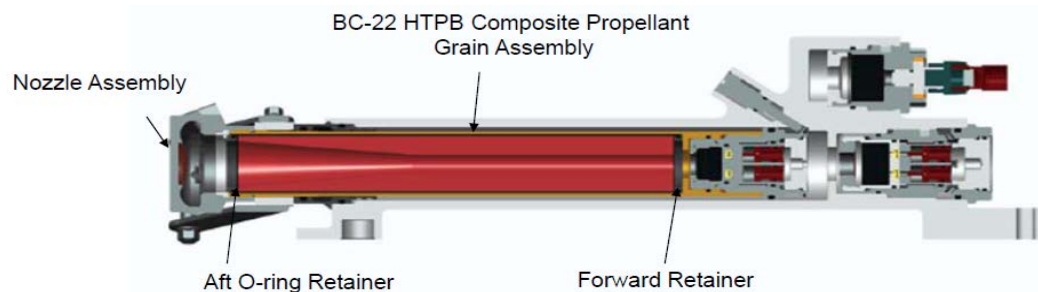


# Future Seat Updates

- MK-122 (PDRM) Improvement
  - Increase Service Life



Mk 122 Mod 0

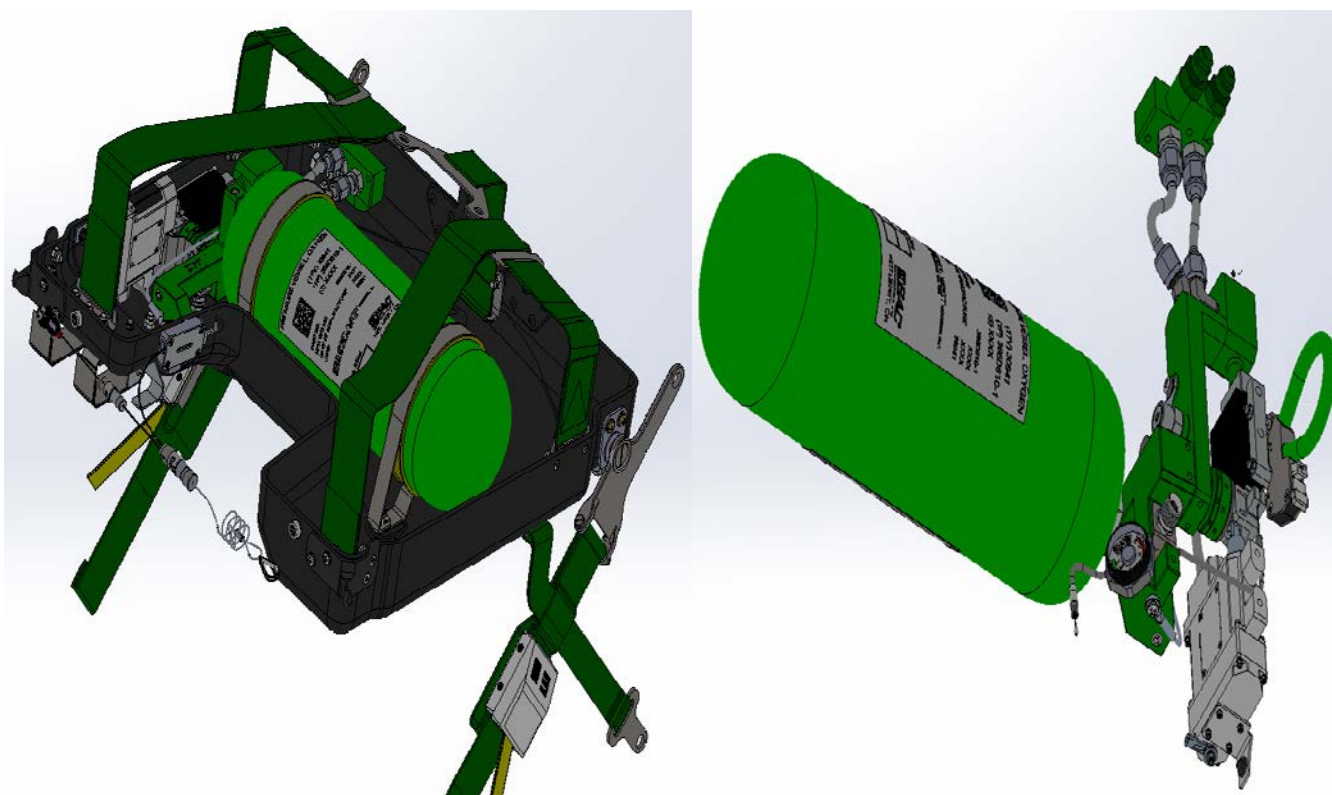


Mk 122 Mod 1



# Future Seat Updates

- EEOS
  - Increase Oxygen Supply, New Life Raft







# Future Seat Updates

- F-5 Ejection Seat Upgrade (Sept 2019):
  - Replaces NG seat with US16J
  - Enhance Ejection Capability





# Future Seat Updates

- F-5 Ejection Seat Upgrade (Sept 2019):





# Maintenance Issues

- Main Beam Dowel Pin Damage:
  - Pin damaged during Main Beam/Seat installation.
  - Total of 9 main beams damaged in the last 3 years.
  - Damaged caused by non-compliance with seat installation checklist.

**A1-F18EA-120-600**

**004 00**

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CKPT	REAR CKPT
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**CAUTION**

To prevent damage to main beam assembly, dowel pin and catapult breech, make sure dowel pin on upper cross beam of main beam assembly is aligned with catapult V-groove before installation.





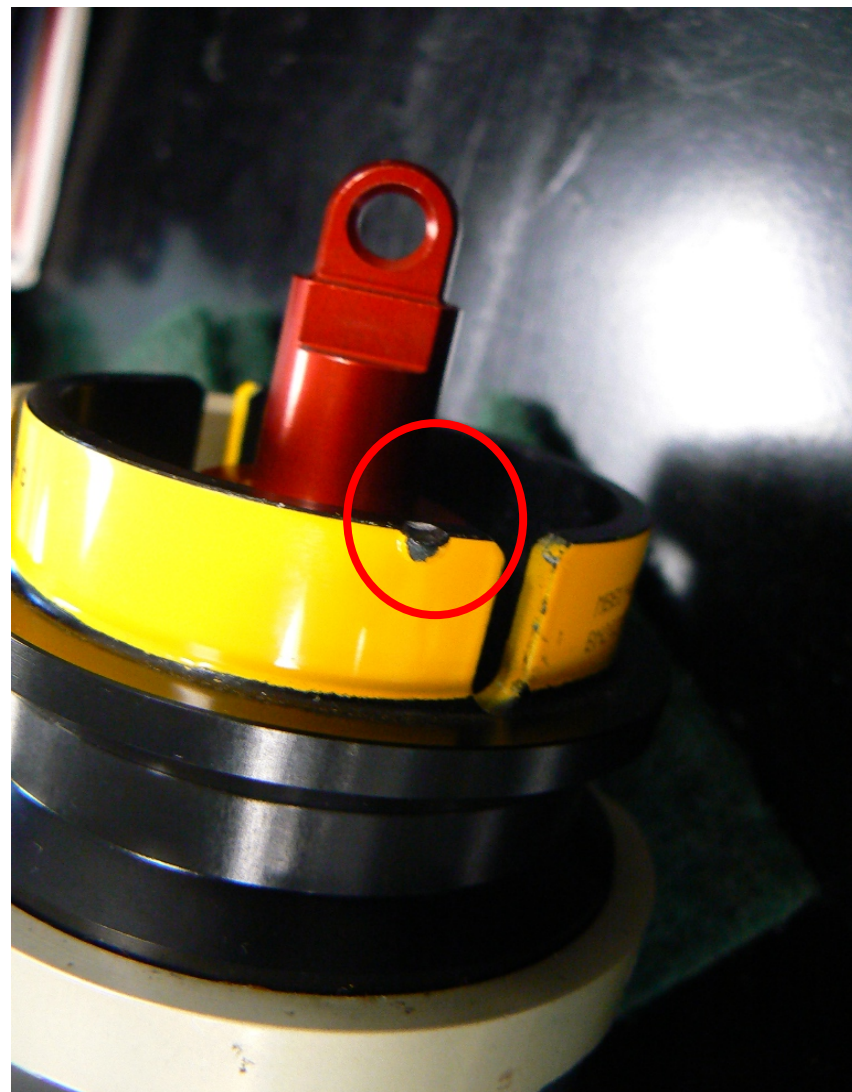
# Maintenance Issues

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- NACES BRU failures:
  - Many failures due to altitude test failure
    - Barostat capsule can be replaced at O-level
  - Contact AECS for assistance if item fails on TATS
  - Limited depot throughput and carcasses



# Maintenance Issues

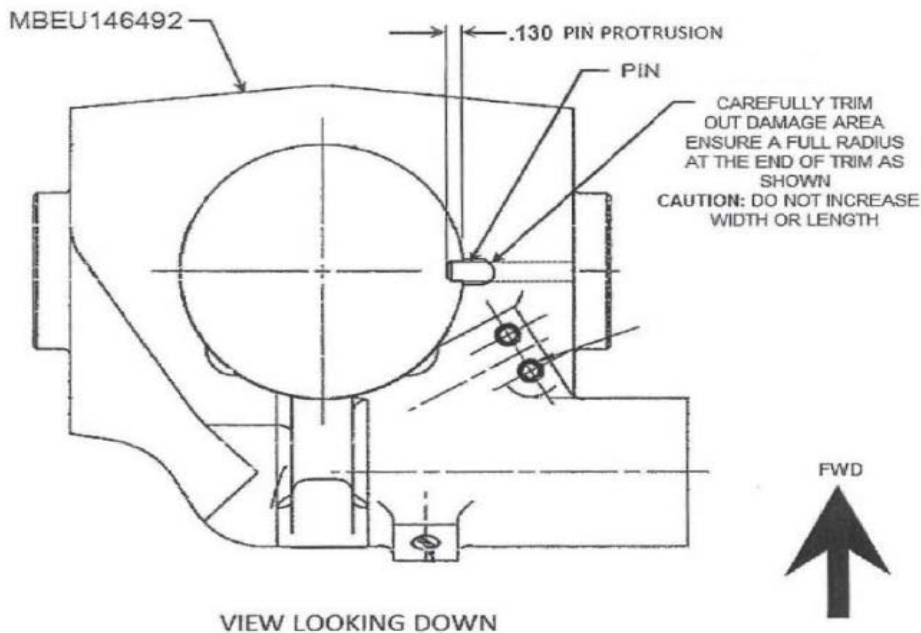




# Maintenance Issues

- Main Beam Dowel Pin Damage:
  - Depot repair in place.

## Main Beam Repair



## Main Beam Repair







# Maintenance Issues

- USRM Pipe discrepancies:

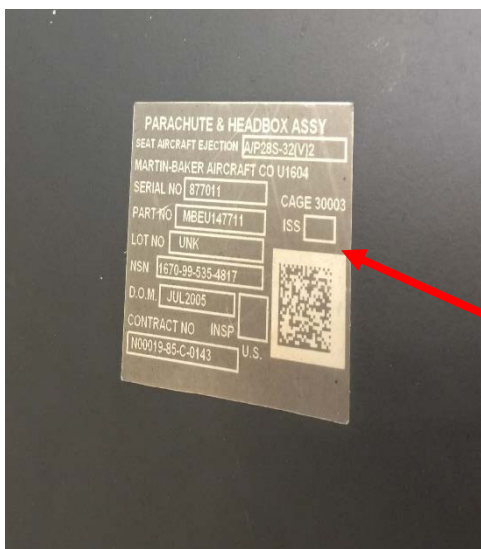
Connected but not torqued





# Maintenance Issues

## Incorrect Parachute Install

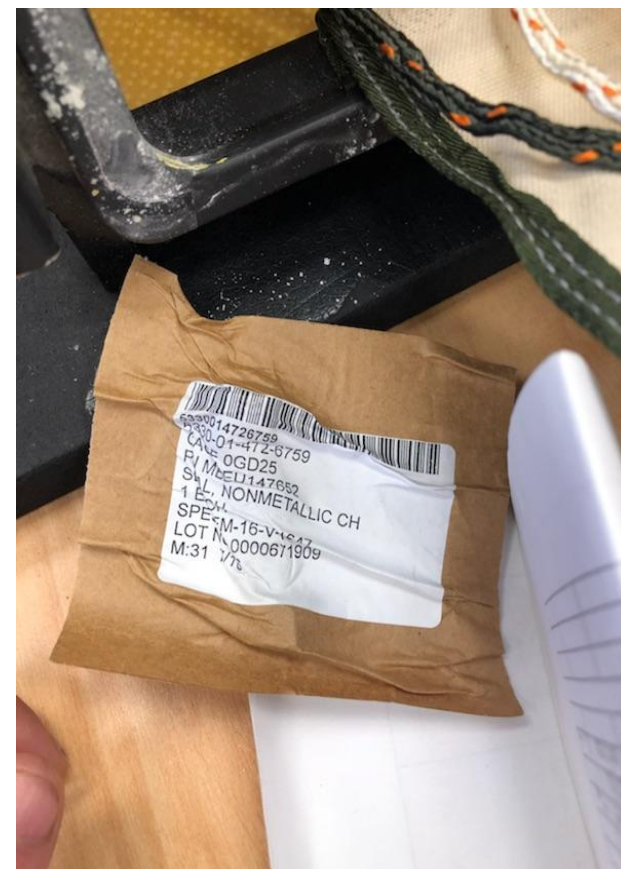
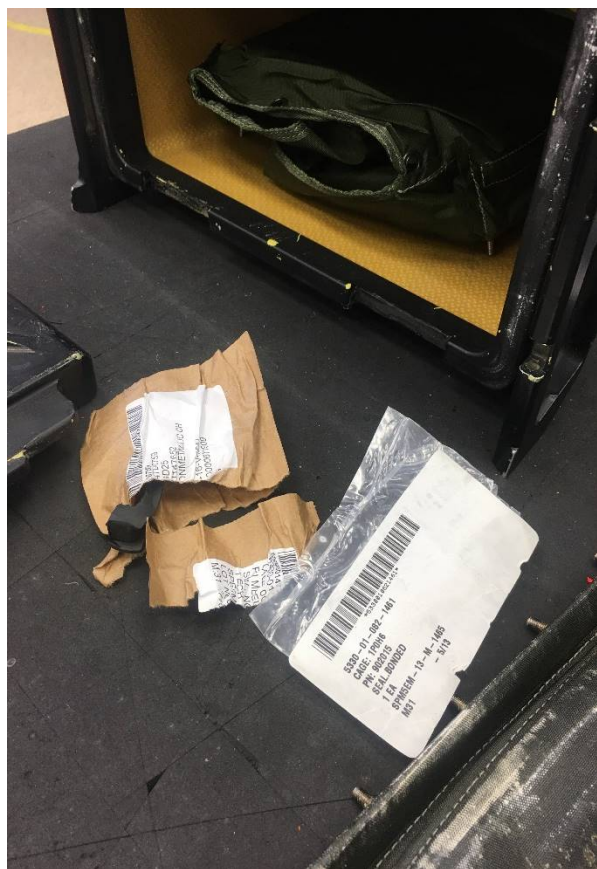






# Maintenance Issues

## Parachute FOD







# Maintenance Issues

## Expired MW19 installed

Site: PNCLAIMA

Requested Org Code : T91  
Requested Assy Cd : YPCY  
Requested Serno : MB0443

NALCOMIS  
Configuration Management  
Aircraft Equipment Report

Date : 29 SEP 2015  
Time : 12:48  
Req By: J. HILLES  
Page : 1 of 1

Crew Member : Equipment Not Assigned

982 FWD

Nomenclature	Part Number	Cont # / Lot#	DODIC	Serno	Quantity	Mfg Date	Install Date	Expire Date
PARACHUTE ASSY, PACKED	MBEU186027	UNKN		MB0443	01			
PARACHUTE AND KIT ASSY	MBEU185420			MB0443	01		29 Sep 2015	
PARACHUTE ASSEMBLY	MBEU171693	FA8617-06-D		E1098207	01	30 Jun 2011	28 Sep 2011	30 Jun 2021
HARNESS ASSY	MBEU179916	W27299		15-428-238	01	31 Jul 2015	18 Sep 2015	30 Sep 2021
CANOPY RELEASE ASSEMBLIES	CANOPY RELEASE	UNKN		MB0443LH	01		18 Sep 2015	
Sensing Release Unit Parachute Harness (MXU-74C 852AS117-3	UNKN			MB0443LH	01		18 Sep 2015	
PHSRU Battery	852AS102	0613		038185LH	01	30 Sep 2010	31 Dec 2013	30 Sep 2017
Electronics Package Assembly	852AS101-3	CAX11D005		038185LH	01	30 Apr 2011	18 Sep 2015	30 Apr 2021
IMPULSE CARTRIDGE (MW19)	851AS275	CAX09K008- MW19		36019	01	31 Oct 2009	27 Jul 2010	31 Aug 2017
CANOPY RELEASE ASSEMBLIES	CANOPY RELEASE	UNKN		MB0443RH	01		27 Apr 2015	
Sensing Release Unit Parachute Harness (MXU-74C 852AS117-4	UNKN			MB0443RH	01		27 Apr 2015	
PHSRU Battery	852AS102	1114		038224RH	01	30 Nov 2014	30 Mar 2015	30 Nov 2018
Electronics Package Assembly	852AS101-3	CAX11D005		038224RH	01	30 Apr 2011	27 Apr 2015	30 Apr 2021
IMPULSE CARTRIDGE (MW19)	851AS275	CAX09K008- MW19		36183	01	31 Oct 2009	27 Jul 2010	31 Aug 2017
PARACHUTE ASSY, AUXILIARY	MBEU185483	FA8617-06-D		E1087716	01	30 Apr 2011	28 Sep 2011	30 Apr 2021

*Handwritten notes:*  
EPA 852AS101-3 CBA16A001-01 049214  
BATTERY 852AS102 12/5 038185LH 01 31 DEC 2015 22 MAR 17 31 DEC 2017  
BATTERY 852AS102 04/14 049214 RH 01 30 APR 14 22 MAR 17 30 SEP 2021  
IMPULSE (MW19) 158400-1 REV R MSV14C005-001 025110 LH 01 31 MAR 14 22 MAR 17 30 SEPT 2024  
IMPULSE (MW19) 158400-1 REV R MSV14C005-001 025110 RH 01 31 MAR 14 22 MAR 17 30 SEPT 2024  
BATTERY 852AS102 04/14 049214 RH 01 30 APR 14 22 MAR 17 30 SEPT 2024  
BATTERY 852AS102 04/14 049214 RH 01 30 APR 14 22 MAR 17 30 SEPT 2024  
BATTERY 852AS102 04/14 049214 RH 01 30 APR 14 22 MAR 17 30 SEPT 2024

Site: JAXIMA

Requested Org Code : A9C  
Requested Assy Cd : YPCY  
Requested Serno : MB0443

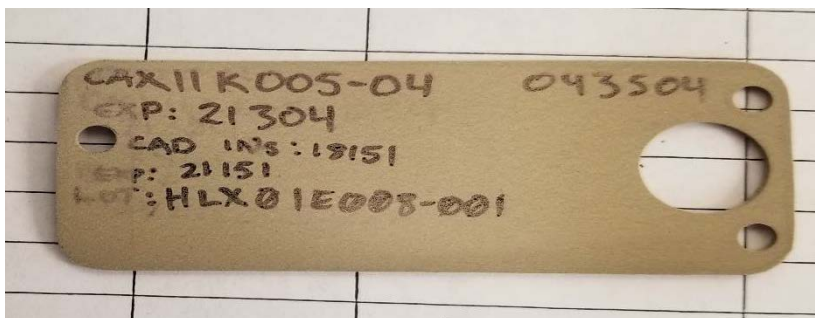
NALCOMIS  
Configuration Management  
Aircraft Equipment Report

Date : 31 MAY 2018  
Time : 12:37  
Req By: S. POOLE  
Page : 1 of 1

Crew Member : Equipment Not Assigned

811  
FRCSA  
NAS JAX

Nomenclature	Part Number	Cont # / Lot#	DODIC	Serno	Quantity	Mfg Date	Install Date	Expire Date
PARACHUTE ASSY, PACKED	MBEU186027	UNKN		MB0443	01			05 Oct 2019
PARACHUTE AND KIT ASSY	MBEU185420	FA8617-06-D		MB0443	01		29 Sep 2015	
PARACHUTE ASSEMBLY	MBEU171693	FA8617-06-D		E1098207	01	01 Jun 2011	28 Sep 2011	30 Jun 2021
HARNESS ASSY	MBEU179916	W27299		15-428-238	01	01 Jul 2015	18 Sep 2015	30 Sep 2021
CANOPY RELEASE ASSEMBLIES	CANOPY RELEASE	UNKN		MB0443LH	01		30 May 2018	
SENSING RELEASE UNIT PARACHUTE HARNESS ( 852AS117-3	UNKN			MB0443LH	01		18 Sep 2015	
PHSRU BATTERY	852AS102	0218		MB0443LH	01	01 Feb 2017	30 May 2018	28 Feb 2021
ELECTRONICS PACKAGE ASSEMBLY	852AS101-3	CAX11D005		038185LH	01	01 Apr 2011	18 Sep 2015	30 Apr 2021
IMPULSE CARTRIDGE (MW19)	851AS275	MSV14C005- MW19		005110LH	01	01 Mar 2014	22 Aug 2017	30 Sep 2024
CANOPY RELEASE ASSEMBLIES	CANOPY RELEASE	UNKN		MB0443RH	01		30 May 2018	
SENSING RELEASE UNIT PARACHUTE HARNESS ( 852AS117-4	UNKN			MB0443RH	01		27 Apr 2015	
PHSRU BATTERY	852AS102	0617		MB0443RH	01	01 Jun 2017	30 May 2018	30 Jun 2021
ELECTRONICS PACKAGE ASSEMBLY	852AS101-3	CAX11K005		043504RH	01	01 Oct 2011	30 May 2016	31 Oct 2021
IMPULSE CARTRIDGE (MW19)	851AS275	HLX01E0080 MW19		2461RH	01	01 May 2001	30 May 2018	31 May 2021
PARACHUTE ASSY, AUXILIARY	MBEU185483	FA8617-06-D		E1087716	01	01 Apr 2011	28 Sep 2011	30 Apr 2021





# Maintenance Issues

## Rigging Line Tray improper routing

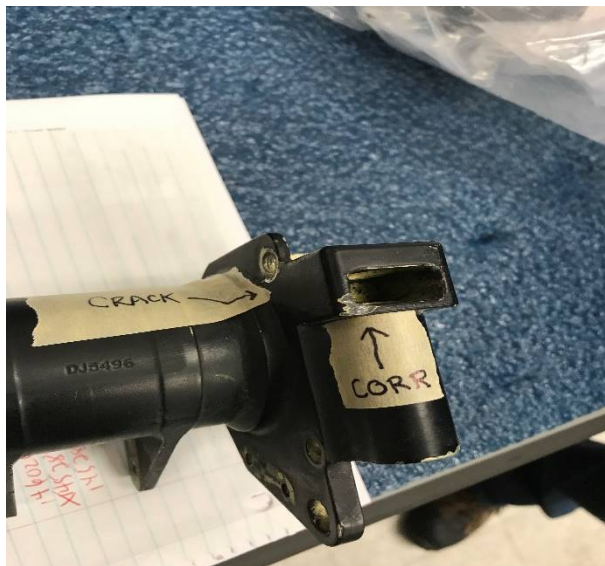






# Maintenance Issues

## Corrosion





# Questions?

