THE NAVY AND MARINE CORPS AVIATION SAFETY MAGAZINE

Approach

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CRUCIAL LESSONS LEARNED

Survival Gear Advice

SPLIT-SITE DEPLOYMENT TIPS

IDENTIFY AT-RISK AVIATORS

1094-0405

Risk Management

AVIATION GROUND MISHAPS

\+ MORE

Aviation Safety

Anthropometric Analysis

Mission analysis, decision-making and degraded assertiveness in a training environment


FOLLOW PROCEDURES * FOLLOW PROCEDURES * FOLLOW PROCEDURES * FOLLOW PROCEDURES *
THE LEADING CAUSE OF AVIATION GROUND MISHAPS OVER THE LAST DECADE HAS BEEN THE FAILURE TO FOLLOW PROCEDURES.
Lives are at stake if procedures are not followed!
WARNING! AUTOMATIC INFLATOR ASSEMBLY INSTALLED DO NOT USE ABOARD AIRCRAFT

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VOL.64, NO.3

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COMMANDER'S LETTER

REAR ADMIRAL F.R. "LUCKY" LUCHTMAN

Fellow Naval Aviators,

By the time this edition of Approach Magazine hits the fleet, I'll be wrapping up a 33-year career in the greatest Navy in the world! It has been an incredible honor to serve alongside the men and women who have answered the call to wear the cloth of our nation.

The last two-plus years as your safety advocate have been the highlight of my career. From the very first day I climbed into a cockpit, I have been continually impressed with the dedication and hard work exhibited by Naval Aviation professionals focused on excelling in demanding and sometimes dangerous environments. I will admit that as a junior officer I was addicted to the thrill of flying tactical aircraft from the world's most powerful aircraft carriers. I will also admit that, as time advanced, the thrill of flying took a back seat to the relationships I've been privileged to be a part of. It's those relationships that fueled my passion to do everything in my power to keep Sailors and Marines safe and my sole motivation for driving change here at the Naval Safety Command. I can't think of a better way to wrap up my career than serving as your safety advocate.

We have made significant changes to our structure with the stand-up of the Naval Safety Command. You are at the heart of every decision we make toward establishing an improved Safety Management System to ensure the Naval Enterprise has the ability to safely operate and is operating safely.

I will turn over the Naval Safety Command to Rear Admiral Christopher Engdahl. As a former Expeditionary Strike Group Commander, he is absolutely the right person for the job to lead our efforts supporting the CNO's Get Real, Get Better initiative. From a professional perspective, he brings a wealth of experience across multiple warfighting communities. He is also a close, personal friend, and I know he will serve our Sailors, Marines, Civilians and their families with a sense of purpose and commitment.

Your Naval Safety Command will continue learning and sharing best practices in its new roles and responsibilities. My wife, Maria, and I wish you all the best in your future endeavors! Fly, Flight, Lead, Win!

U.S. Navy photo courtesy of Boeing Defense

U.S. Navy photo by Mass Communication Specialist 2nd Class John Bellino

Illustration by Catalina Magee

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U.S. Navy photo by Mass Communication Specialist Seaman Jackson Adkins

FRONT COVER: Lt. Jonathan Lim, from Northville, Michigan, pilots an MH-60R Seahawk from the "Saberhawks" of Helicopter Maritime Strike Squadron (HSM) 77, while assigned to USS Shiloh (CG-67), June 16, 2021. Portions of image altered for security purposes. U.S. Navy photo by Mass Communication Specialist 1st Class Rawad Madanat.

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U.S. Navy photo by Mass Communication Specialist 3rd Class Jeff Sherman

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U.S. Marine Corps photo by Lance Cpl. Rachaelanne Woodward

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BACK COVER: Lt. Corey Rollins performs the startup sequence of an MH60-S Seahawk helicopter assigned to the "Fleet Angels" of Helicopter Sea Combat Squadron (HSC-2) before a live gun training exercise, June 15, 2021. U.S. Navy photo by Mass Communication Specialist 2nd Class Eric Shorter.

HUMAN FACTORS
BEYOND THE FLIGHT STATION

By Lt. Nick Morris, Patrol and Reconnaissance Squadron VP-10

From day one of introductory flight training, aviators are taught a rudimentary version of human factors analysis known as “IMSAFE.” The acronym, which stands for illness, medication, stress, alcohol, fatigue and eating is a quick ditty that challenges us to think about our current physical and mental state before taking to the air.

As we move to our fleet squadrons, aviators are introduced to risk management (RM), which provides a framework for mitigating risk by identifying hazards. We also participate in Human Factors Councils (HFCs), which are designed to identify at-risk aviators and assist aviators in dealing with issues that might adversely affect their ability to safely operate aircraft.

For too long, the focus has been squarely on the aviator; it’s time we pay appropriate attention to other members of the squadron who play significant roles in the safe operation of our mission aircraft. According to a published review of the Navy’s aviation safety program, more than 80% of mishaps are attributable to some sort of human error, so squadrons can afford to leave no stone unturned when it comes to identifying human factors that could contribute to mishaps (O’Connor, O’Dea, 2007).

In a recent safety bulletin sent to all East Coast squadrons, the commander of Naval Air Forces Atlantic noted an uptick in preventable aviation ground mishaps attributable to human error. Just as we don’t want stressed, tired or chronically underperforming aviators at the controls of aircraft, we must be vigilant in preventing fatigued or overstressed maintainers from conducting a towing evolution on a crowded flight deck or conducting engine turns in the middle of the night.

Photo courtesy of Boeing Defense

U.S. Navy photo by Lt. j.g. Michael Pahissa

Even our medical, administrative and intelligence professionals, who do not directly handle aircraft, play a role in the command climate and culture that shapes the backdrop of squadron operations. Ask your squadron aviation safety officer (ASO) about the Department of Defense Human Factors Analysis and Classification System, and you will see everybody plays a role.

A typical P-8A squadron consists of about 260 personnel, of which 120 are aviators. The HFCs for aircrew began in the late 1990s as a means of identifying and mitigating the human factor risk inherent to flight operations. However, the other 140 maintenance and combat support personnel were not required participants in any type of human factors program until the rollout of the Command Resilience Team Human Factors Council (CRTHFC) as part of the Navy's Culture of Excellence initiative in late 2020. The mission of the CRTHFC is "to develop an environment in which all Sailors are trained and motivated to navigate life events effectively" and "assist their Shipmates through periods of stress or difficulty while also being attentive to their personal well-being." (NAVADMIN 318/20)

Aviation commands have a tremendous head start on the rest of the Navy with more than 20 years of conducting HFCs and thousands of fleet ASOs, who are trained in human factors analysis by the School of Aviation Safety. Then-Chief of Naval Personnel Vice. Adm. John Nowell Jr. noted "Commands already utilizing these existing non-punitive processes are encouraged to continue to do so and leverage the tools provided."

With only minor modifications, aviation units can effectively include their entire command in the human factors process. By instruction, the HFC and CRTHFC are staffed differently, but each team has valuable insight to gain from the other. HFC teams can provide best practices from years of experience, while the CRTHFC teams may have insight on Navy resources like the Resilience Toolkit, which is not used during traditional aviation HFCs.

Every aviator has seen the classic charts showing mishap statistics over time that demonstrate how initiatives like the Naval Air Training and Operating Procedures Standardization program, the Naval Aviation Maintenance Program, RM and crew resource management have driven mishap rates to all-time lows. This initiative has the potential to be a defining program through which the whole naval aviation enterprise can make meaningful headway into preventing 80% of mishaps caused by human error. Now, no pilot, naval flight officer, aircrew member, maintainer or support professional is left out of the equation.

Before your next quarterly HFC, get to know your command resiliency team and find out how you can make your human factors processes the best they can possibly be.

"More than 80% of mishaps are attributable to some sort of human error."

[1] O'Connor, P. & O'Dea, A. (2007). The U.S. Navy's aviation safety program: a critical review. International Journal of Applied Aviation Studies, 7(2), 312-328.

Mission analysis, decision-making and degraded assertiveness in a training environment

By Capt. Matthew Tate, HMLA-169

It was a relatively standard midsummer Tuesday in southern Japan. Temperatures were in the high 80s with high humidity and relatively clear skies. As the section lead, my mission was to ferry aircraft and personnel from Misawa, Japan, to Okinawa, Japan, over a three-day cross country. The plan was to depart Misawa on Friday and arrive at Marine Corps Air Station (MCAS) Futenma on Okinawa by Sunday. On Sunday morning, and what should have been the last day of the trip, bad weather prevented us from transiting any farther south than Nyutabaru Air Base in Southern Japan. On Monday, when we attempted to depart, we experienced a maintenance issue that delayed us another full day. Because of the weather and maintenance delay, it was now Tuesday and the beginning of a three-leg day that would have ended with the aircraft and aircrew back on deck in Futenma.

The flight brief occurred the previous Thursday afternoon due to an early departure from Misawa on Friday and planned long crew days with multiple long legs and fuel stops. At the start of each day, we briefed by exception, including a quick review of our route, planned layovers and weather. This day's agenda was a relatively short one-hour flight from Nyutabaru Air Base to Tanegashima, Japan, followed by legs to Amami and then MCAS Futenma.

The flight departed at about 8 a.m., just after Nyutabaru Air Base opened, and exited the airspace to the southeast over the water. Our planned and briefed flight altitudes were 1,000 feet above ground level (AGL) over land and populated areas and 500 feet AGL over water. Once our feet were wet, we worked around the airspace of Miyazaki, located about 10 nautical miles south of Nyutabaru and then rejoined the coast and continued on course to our destination. At the time, we had positive communications with Kagoshima Radar, who provided visual flight rules (VFR) flight following. About 10-20 nautical miles south of the airspace, Kagoshima Radar gave us a switch to Kanoya Approach for continued VFR flight following. Due to our altitude at about 500 feet AGL and moderate terrain between the flight and Kanoya, we could not establish communications with approach and decided to continue en route without VFR flight following.

Continuing on our route, I took the flight down over the open water to fly low level while following the coastline south. I intended to introduce tactical flying to my co-pilot to make him more comfortable flying low and over water. Our squadron regularly trains to scenarios where a surface-based radar threat would drive our tactics to a low-altitude regime similar to what we could experience conducting expeditionary advanced base operations. I did not verbalize my intentions to my wingman or let them know the change in altitude or deviation from the flight path. Internal to the cockpit, I reset the radar altimeter warning to 50 feet, which I verbalized to my co-pilot. I also instructed him to come down to fly at 100 feet AGL and maintain 120 knots, our standard transit airspeed. The Huey followed us down to 100 feet AGL, and we continued en route southbound, following the coastline.

While following the coastline, we came around a small peninsula and saw a gap about 200 meters wide between the mainland and what we thought was an uninhabited island off the coast. I instructed my co-pilot to fly between the opening, and he steered the aircraft on that course. As we approached the island, it became clear there was a small port on both sides of the channel. Simultaneously, the co-pilot and I were surprised to see power lines appear about halfway up the windscreen. Although he was the pilot at the-controls, and without a verbal warning, I reached down and pulled aft cyclic in an attempt to avoid the wires. This action aligns with our standard operating procedure that if time does not permit a directive call, then the nonflying pilot should come on the controls to save the aircraft. I remember feeling the cyclic grip buzzer and the "G" warning annunciation indicating that we were in an over-G condition and instinctively pushed the nose forward to reduce the severity of the maneuver. At this point, we were leveled out and had lost about half of our airspeed.

The aircraft now had a noticeable once-per-revolution vertical rocking. I instructed my co-pilot to turn directly to Kanoya Air Base, the nearest airfield and one with which I was familiar. I then gave him a steer and magnetic heading to fly, pulled out the pocket checklist and reviewed the warnings, cautions and advisories we received. Cockpit indications told me that we experienced a G Limit Caution of 2.6 for one second – the Naval Air Training and Operating Procedures Standardization (NATOPS) limit is 2.5 G's – followed by a Rotor RPM High Warning of 110.7% for one second, and Main Rotor Gearbox Pressure Low Caution of 24.9 pounds per square inch for two seconds.

As I read through the pocket checklist, I realized there was no landing criteria associated with the Main Rotor Gearbox Low or Rotor RPM High. Both conditions returned within limits once we returned to straight and level flight. For the G Limit Caution, the pocket checklist states, "Reduce the severity of the maneuver. If unusual vibrations, land immediately, otherwise land as soon as practical." Was the once-per-revolution vertical rocking an unusual vibration?

With unclear information and about 25 nautical miles out from the nearest airport, I decided unusual vibration or not, this was different than how the aircraft was flying before the incident and decided we needed to land. I instructed my co-pilot to turn toward a farmer's field at one o'clock and less than half a mile away. I was trying to explain to my co-pilot how I wanted him to set up for the landing and where to land but was having difficulty conveying the point; we conducted a standard control change, and I landed from the aft seat.

Shutting down and egressing from the aircraft, we stayed up on the Auxiliary Power Unit to maintain communications with the Huey, which stayed overhead and operated as an on-scene commander. Once we established solid communication over a cellphone, they departed and landed at Kanoya Air Base, about 20 nautical miles west and a 45-minute drive from the landing site. Upon initial inspection of the aircraft, there were no signs that we impacted the wires; however, the main rotor cuffs all had signs of delamination, damage and excessive flapping, most likely due to the sudden over-G and the subsequent reduction in G's while rotor RPM was fluctuating.

U.S. Navy photo by Mass Communication Specialist 3rd Class Benjamin Ringers

The incident occurred about 27 minutes after departing Nyutabaru and nine minutes after that, we conducted our emergency landing in a Japanese farmer's field. The crew was recovered the next day, and maintenance Marines were flown in to repair the aircraft. One week later, after receiving support from multiple adjacent units across the 1st Marine Aircraft Wing, the helicopter flew out of the farmer's field and returned to MCAS Futenma.

As a result of poor mission analysis and decision-making, this incident resulted in a mishap. The mission that day was to ferry aircraft and personnel home to MCAS Futenma. As the flight lead, my poor decision put the safety of the crew and aircraft at risk, which ultimately ended with mission failure. There could be many tactical reasons to push a flight into this regime, but in training, it should only be done on approved terrain flight ranges with proper planning and briefing. The tactical environment requires the same attention to detail and planning processes we follow in a training environment. In the absence of time or ability to conduct the same level of detailed planning, a flight should be flown at altitudes and airspeed to afford the crew proper reaction time if they encounter an obstacle.

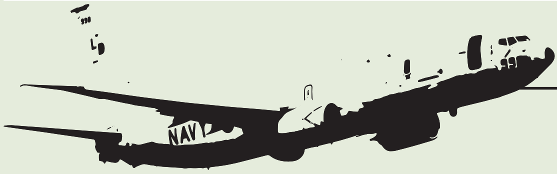
Finally, as an instructor and experienced company-grade pilot in the ready room, my decisions set a poor example for less experienced pilots.

During this event, no crew member spoke up to express concern about our flight regime that day. In my opinion, my position and qualifications degraded assertiveness from the rest of the crew in the section. I do not believe they thought my decision was wrong and said nothing, but rather they saw my example and believed what we were doing was normal and acceptable. Military aviation breeds unique challenges regarding natural power imbalances because of rank, qualifications and experience.

To overcome this, flight leaders need to set the example in our mission analysis and decision-making to build an environment where every member knows what right looks like and feels empowered to speak up when things go wrong.

Split-Site Deployment

Without Splitting Safety



By Lt. Nick Morris, VP-10

It is becoming increasingly common for P-8A squadrons to conduct “split-site” deployments, where the main body of the squadron is thousands of miles away from another large detachment site. Some expeditionary communities are intimately familiar with operating using this distributed deployment model, but the Maritime Patrol and Reconnaissance (MPRA) community still has much to learn.

VP-10 recently conducted a deployment with five aircraft based in the 7th Fleet area of responsibility (AOR) and two aircraft based in the 4th Fleet AOR.

It was not uncommon for one or both main sites to support multiple additional detachments: at one point, the squadron’s seven aircraft and 12 crews were divided between Japan, Sri Lanka, the Philippines, Australia, Guam, U.S. minor outlying islands and El Salvador all at the same time. Think about everything that makes a squadron tick. The operations department is staffed to promulgate the squadron’s flight schedule. Now split the staff in two, three or four to write multiple schedules for each theater. Consider the maintenance department, with manning designed to support a squadron deployed to one location. Now split them among six concurrent detachment sites.

Sometimes, there are enough bodies for multiple shifts and sometimes there is a single person qualified to do a certain job for an entire theater. Next, consider the training department, tasked to maintain readiness and manage upgrading throughput.

Using the split-site model, a quarter of the squadron’s aircrew may go several months without conducting the aircraft’s primary mission because they are supporting alternate theater objectives.

The Naval Air Training and Operating Procedures Standardization (NATOPS) department manages jackets, administers quarterly tests and promotes standardization. What happens if the NATOPS officer is 6,000 miles and a 15-hour time difference away from the office? Everything that makes the squadron great is divided up into smaller segments and hampered by manning shortages, time zone differences and communication challenges.

Aviation safety officers (ASOs) reading this might think about all the safety requirements on their plate. Monthly Enlisted Safety Committee and Aviation Safety Council meetings, quarterly Human Factors Councils and Safety Investigation Board (SIB) training, periodic safety stand-downs – all these are conducted several times during a typical MPRA deployment.

A typical MPRA squadron has only a Safety/NATOPS department head, one ASO, one ground safety officer and one safety petty officer. How can such a small team of people effectively contribute to the squadron's safety program when they can only be in one place at a time?

The short answer is they can't. If ASOs are not flying with their entire squadron, keeping a finger on the pulse of daily operations, feeding aviators` HAZREPs and lessons learned from the fleet and maintaining a presence in the spaces, ASOs can't be at their most effective.

Dividing the squadron into smaller and smaller pieces has a clear outcome of increased risk. Assuming squadrons are unable to change the operational requirement to execute missions across multiple theaters, they must implement controls to mitigate that risk. VP-10's approach is to assign multiple personnel to key billets so a presence can be maintained in both AORs. We have two trained command security managers, two trained legal officers and two trained ASOs, to name just a few. It is incumbent on each squadron tasked to operate across multiple sites to determine the staffing required to maintain critical programs across AORs.

This means making tough decisions about where to direct the squadron's manpower, and subsequently some billets may be gapped for months at a time.

It has been invaluable to have a fully qualified ASO at each site. Monthly safety training is conducted at each main deployment site to refresh aircrew knowledge and provide updates on the latest information from the fleet. This training can be focused on hazards specific to each AOR. VP-10 has prioritized designating two independent and fully staffed standing SIBs. Having two ASOs allows the safety department to conduct in-person, site-specific training, ensuring each SIB is ready to respond immediately if a mishap occurs.

A squadron on a split-site deployment with only one ASO would undoubtedly have a difficult time responding appropriately to a mishap.

As the P-8A deployment model shifts from a large central hub with occasional small detachments to distributed operations across the globe, squadron leadership will be faced with hard decisions about how to staff programs and assign personnel. While MPRA aviators have much to learn from the expeditionary aviation communities, it is my hope, as the transition to a distributed deployment model continues, commanders prioritize staffing the ASO billet appropriately to promote a positive safety culture no matter where our aviators are deployed.

"Dividing the squadron into smaller and smaller pieces has a clear outcome of increased risk."

U.S. Navy photo by Mass Communication Specialist 2nd Class John Bellino

Size Matters

By Lt. Cmdr. Maggie Johnson, Naval Test Wing Atlantic (NTWL), Doug Hamilton (NTWL), Glenn Paskoff, Naval Air Systems Command (NAVAIR) and Kelly Bordeaux (NAVAIR)

Illustration by Catalina Magee

"Anthropometrically, it really matters."

We are talking about qualification and certification of U.S. naval aircraft escape systems and the aircrews' size and weight as it relates to the capability of ejection seats, parachutes and harnesses working when you need them to work.

Size matters. We will discuss not only why it matters, but where aircrew and leadership can find their qualified and certified weight limit for their aircraft, address waiver rumors – spoiler alert: it's ambiguous – and recommend a way forward so aircrews are informed and have the best chance of survival if presented with an ejection, bailout or crash scenario.

Broadly speaking, the majority of our naval aircraft escape systems were designed, tested and qualified with consideration for an aircrew population within the 5th and 95th percentile (136-213 pounds nude weight) and further certified for nude weights between 103 and 245 pounds, a weight range in which most potential aircrew reside. Lower weight (103-135 pounds) and heavier weight (214-245 pounds) aviators are at higher risk of injury, per NAVAIR M-3710.1. Certifying and fielding a system to function within the 5th to 95th percentile leads to restrictions of very light and very heavy weights within the population. The end result is the escape system is not suited, or designed, tested and qualified, for aircrew members who fall outside this weight range.

This article focuses on the upper weight limitations and not the anthropometric measurements, which may be considered more static. Additionally, based on the variety of escape systems within the fleet, we will generalize across communities. Specific type/model/series (T/M/S) data is included for perspective.

The guiding anthropometric documents include: OPNAVINST 3710.37A, NAVAIR 3710.9, NAVAIR M-3710.1, CNAF M-3710.7 and the T/M/S NATOPS flight manual, all of which contribute to the policy regarding anthropometric compatibility within your T/M/S. During accession, body weight and anthropometric measurements are taken to determine anthropometric compatibility with potential T/M/S. Beyond the initial anthropometric measurement, there is no organizational reassessment, with the exception of CNATRAINST 3710.37D, which prescribes the process for maintenance and oversight, through the semiannual physical fitness assessment, to monitor body weight. While this directive applies to Chief, Naval Air Training, it provides the framework for a process that is sound and practical. Upon leaving the training command, it falls upon individual aircrew and squadrons to maintain awareness of the limits and manage compatibility once within the aircraft community. This spans the career of the individual aircrew and could cover a very long period – a period in which body size, and more so weight, likely will change.

COMNAVAIR Certified Crewmember Weights for Ejection Seat Aircraft

AIRCRAFT (1)	EJECTION SEAT (s)	NUDE WEIGHT (lbs)
S-3	ESCAPAC IE-1	136 - 213
F-5E/F/N	Northrop Improved Rocket	132 - 201
EA-6B	GRUEA-7	140 - 204
T-6A/B	Martin-Baker US16LB	103 - 231
T/AV-8B	SJU-4/13/14	136 - 213
F-16	ACES II	140 - 211
F/A-18A/B/C/D (BUNO 164068 and prior (pree-lot 13)	SJU-5/+6	136 - 213
F/A - 18 ++	SJU-17B(V)1/A (NACES)	136 - 213[2]
F/A - 18C/D (BUNO 164196 and up)	SJU-17A(V) 1/A, 2/A, 9/A SJU-17B(V) 1/A, 2A, 9/A (NACES) NAV	136 -213[2]
F/A-18E/F and EA-18G	SJU-17B(V)1/A,2/A,9/A (NACES)	136 - 213[2]
F-35	Martin-Baker US16E	136 - 245
T-38A	Northrop Improved Rocket	132 - 201
T-38C	Martin-Baker US16T	103 - 245
T-45A/C	SJU-17A(V) 5/A,6/A	136 - 213[2]

Note 1: For specific weight limitations and additional warnings, refer to individual aircraft NATOPS flight manuals.
Note 2: Hazard Risk Assessments have been conducted by COMNAVAIRSYSCOM on the risks associated with ejection of aircrew below and above the certified weight range.

See F-18 and T-45 NATOPS for specific limitations.

TABLE 1

COMNAVAIRSYSCOM Certified Crewmember Weights for Rotorcraft Seating

AIRCRAFT	SEATING	NUDE WEIGHT (lbs)
AH-1W	Pilot/Co-Pilot	103 - 245
AH-IZ	Pilot/Co-Pilot	140 - 214
UH-IN	Pilot/Co-Pilot	103 - 245
	Troop	103 - 245
UH-IY	Pilot/Co-Pilot	140 - 214
	Troop	107 - 204
V-22	Pilot/Co-Pilot	107 - 214
	Troop	140 - 204
H-46	Pilot/Co-Pilot	140 - 214
	Cabin Crew	107 - 204
	Troop	103 - 245
H-53E	Pilot/Co-Pilot	140 - 214
	Cabin Crew	107 - 204
	Troop	140 - 204
H-60	Troop/Gunner	140 - 204
SH-60B	Pilot/Co-Pilot	140 - 204
SH-60F	Sonar Operator	140 - 204
	Pilot/Co-Pilot	140 - 204
	Sonar Operator	140 - 204
HH-60H	Pilot/Co-Pilot	140 - 204
MH-60R	Pilot/Co-Pilot	140 - 204
	Sonar Operator	140 - 204
MH-60S	Pilot/Co-Pilot FLEA [1]	140 - 204
	Pilot/Co-Pilot FLEA [2]	107 - 204
	AMCM [3] Aft Facing Sents	140 - 204
VH-60N	Pilot/Co-Pilot	107 - 204
	VIP	140 - 204

Note 1: Fixed Linear Actuator (FLEA)
Note 2: Variable Linear Actuator (VLEA), VLEA seats allow for EQUIPPED weight of the occupant to be set.
Note 3: Airborne Mine Countermeasure (AMCM)
Note 4: Individual seat weight restrictations are not identified for TH-57 aircraft. Refer to T/M/S NATOPS for specific restrictions.

TABLE 2

Let's look at the specifics from the guiding documents. The 3710.37A instruction provides chief of naval operations' overarching guidance for anthropometric accommodation in naval aircraft. Notably, "the minimum and maximum nude body weights allowed for those entering naval aviation flight training are 103 pounds and 245 pounds respectively.

Those found to be anthropometrically incompatible, or outside of weight limits, are referred to the Bureau of Naval Personnel or Commandant of the Marine Corps (ASM) for disposition. Furthermore, 3710.37A refers to a waiver process for aircrew that fall outside of this certified range and circles back to references that no longer exist. Practically speaking, the waiver process is ambiguous.

NAVAIR 3710.9 and M-3710.1 ensure fully equipped aircrew can physically fit and operate their assigned aircraft crew stations. The instructions also establish the technical standards for each T/M/S based on the design and qualification data.

Tables 1 and **2** provide specific weight ranges found in M-3710.1.

While this article focuses on ejection and parachute risks, rotary and other non-ejection seat aircraft have upper and lower weight limits as well, based on stroking capabilities (impact absorption) of the seat and crash worthiness of the aircraft. Crashworthy seats are also designed and tested to a specific weight range. Exceeding the lower and upper weight limits can result in severe spinal injury or loss of life.

Let's declutter the scope and focus on CNAF 3710.7, NATOPS General Flight and Operating Instruction Manual, which is most direct, stating in the graphic below:

8.3.2.17 Anthropometric Requirements

Applicants and designated flight personnel shall meet the anthropometric standards per OPNAVINST 3710.37 series and be within the minimum and maximum nude weight range of 103 and 245 lbs, inclusive. Refer to NAVAIRINST 3710.9 series for specific aircraft cockpit anthropometric measurement limitations.

WARNING

Any person flying in an aircraft whose nude body weight is outside of the COMNAVAIRSYSCOM-certified crew member weight range is at increased risk of serious injury or death during ejection or hard/crash landing.

The above infers that to fly outside these weight limitations requires a waiver from the commander of Naval Air Forces.

Your T/M/S NATOPS may also provide information and limits specific to the aircraft's escape system. In some T/M/S NATOPS, the limits are not covered, such as the E-2 for example. In these cases, the limit goes back to the general NATOPS.

But how critical are these weight limits, and why should we care beyond the initial measurement that allowed you to select your aircraft? The hazards and nuances associated with the safe escape process can best be appreciated if examined at every stage.

Safe Escape

Aircrew weight and aircraft envelope play dominant roles in determining clearance from the aircraft during ejection. In the event that a higher weight aircrew ejects, the ejection seat and drogue chute need to clear the aircraft tail(s).

Figures 1a (160 knots equivalent airspeed, or KEAS) and **1b** (600 KEAS) depict an overlay of the T-45 on top of the ejection sled testing photo presenting ejections that represent roughly the same time frame in the ejection sequence. As airspeed increases, the trajectory of the seat and drogue flatten out, and as the aircraft catches up, there is a higher likelihood the drogue becomes entangled with the tail structure.

This risk becomes significant for airspeeds above 450 knots and aircrew outside the authorized upper weight limits. Note the proximity of the drogue chute to the tail. This condition would likely be worse for an aviator ejecting from the aft seat. (NAVAIR 4.1.6, 2011)

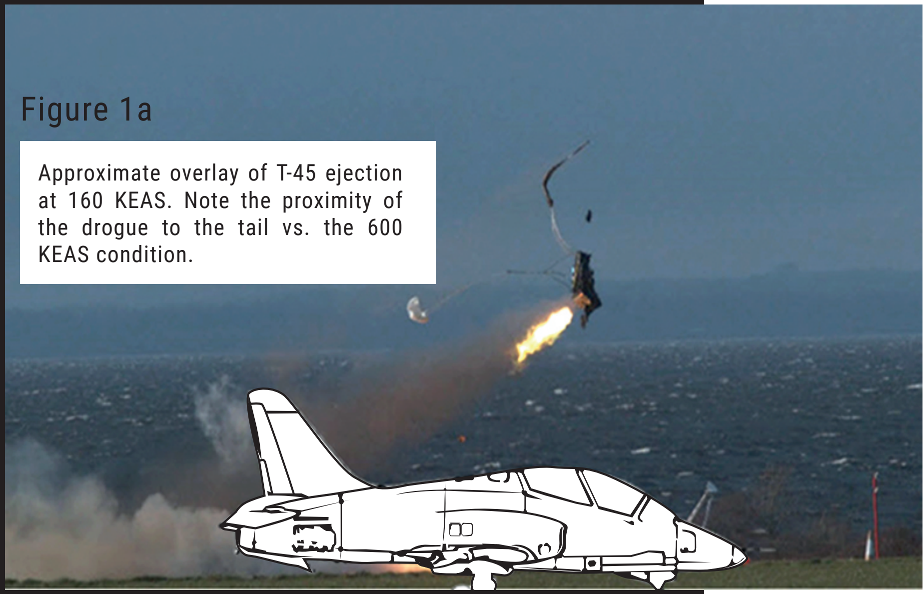


Figure 1a

Approximate overlay of T-45 ejection at 160 KEAS. Note the proximity of the drogue to the tail vs. the 600 KEAS condition.

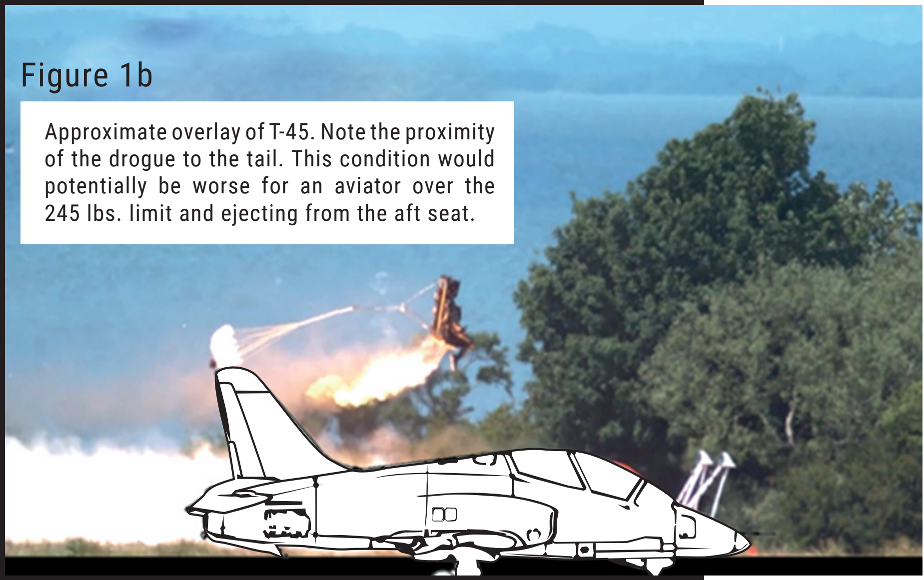


Figure 1b

Approximate overlay of T-45. Note the proximity of the drogue to the tail. This condition would potentially be worse for an aviator over the 245 lbs. limit and ejecting from the aft seat.

Opening Shock

Following safe escape from the aircraft, whether ejection or bailout, a properly functioning parachute survival ensemble is required for aircrew survivability. This system's major components include the main parachute and aircrew harness, both of which are tested to withstand opening shock forces while supporting aircrew within certified weight limits of 103 to 245 pounds.

Data supports that the parachute ensemble system will work within this range. Beyond 245 pounds, higher stress to the material and seams of the parachute and suspension lines during opening shock may result in chute degradation or failure.

This not only applies to ejection seat parachutes, but to the Thin Pack family of parachutes, such as on the E-2C/D, P-3 and C-130. For example, an E-2C/D pilot weighing 245 pounds with 55 pounds of flight gear, the winter configuration, will have a total suspended weight of 300 pounds. This weight corresponds to a maximum measured load during the qualification program of 3,150 pounds. If that same pilot were to weigh 290 pounds and experience the same conditions, the maximum measured load would increase to 4,070 pounds, which is beyond the safety standard. Additionally, this weight is higher than any load ever measured on the Thin Pack family of parachutes.

Naval Air Systems Command (NAVAIR) engineers recall the highest recorded load tested was 3,800 pounds in an overstressed test and the parachute was catastrophically damaged. (NAWCWD TM 8451, 2004)

Parachute Descent

After opening shock, the parachute is designed to control the speed during descent. The higher weight under parachute is a direct linear model. Using the Navy Aircrew Common Ejection Seat as an example, the descent rate for a 245-pound aircrew, equipped with the standard 74 pounds between the seat kit and flight gear, would be 24 feet per second.

Figure 2 helps to demonstrate how a 103-pound person would descend at a rate of 17 feet per second, which is 7 feet per second slower percentagewise, compared to the maximum authorized aircrew weight of 245 pounds. (NAVAIR 4.1.6, 2011)

The increased parachute descent rate for heavier aircrew translates into an exponentially increased risk of injury upon landing.

As shown in **Figure 3**, a 290-pound person would experience a vertical descent rate of 25.3 feet per second with a corresponding 30% risk of injury, both of which are substantially higher than the 24 feet per second and 22% otherwise experienced at the authorized maximum 245 pounds.

These calculations have no horizontal, or surface wind, component; the presence of which will increase overall descent rate.

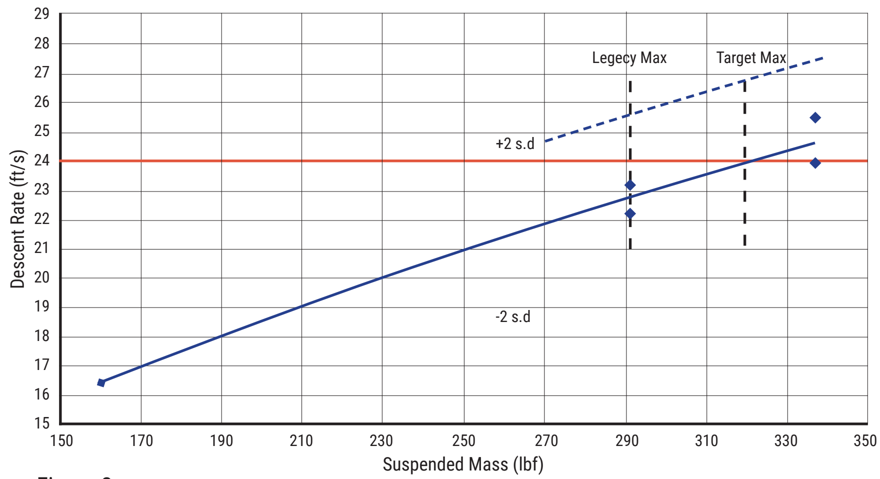


Figure 2

Figure 2 - GQ5000 parachute decent rate at sea level, as a function of suspended mass (demonstrated through test)

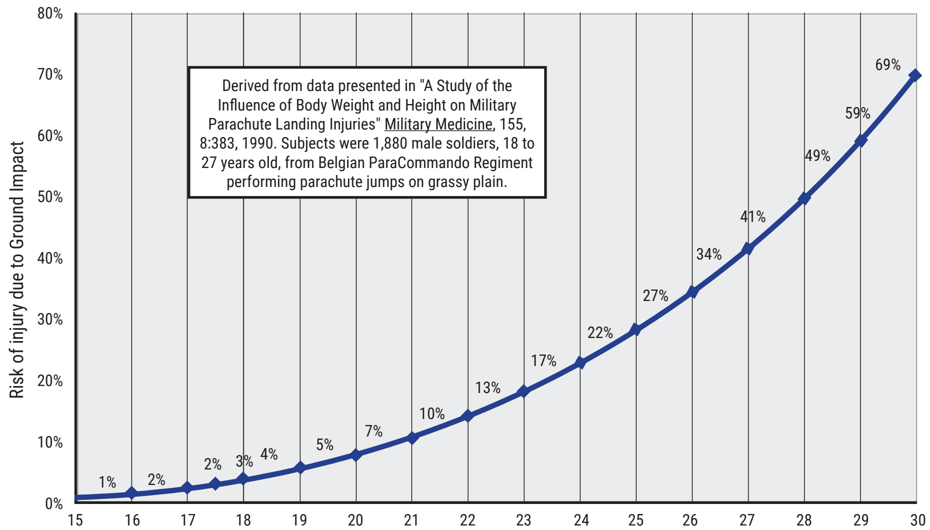


Figure 3

Conclusions.

Once you think about the sequencing, time frame and all the nuances that need to work with confidence and reliability, you begin to understand the remarkable nature of the safe escape or crashworthy event. Within the size and weight criteria, our systems are designed and qualified, or further certified, to accommodate, there is confidence that ejection, bailout or crash will result in a successful outcome. Outside of these limits, the outcome is less certain. Use the seats and chutes if you need to – your decision to eject or bailout should not waver based on this article, but you owe it to yourself to meet your end of the design criteria limits for the aircraft you fly in, and do your part to stay within those criteria.

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U.S. Navy photo by Mass Communication Specialist 3rd Class Jackson Adkins

A QUIET PLACE

ANONYMOUS AUTHOR

The flight of Greyhawk 622 on Aug. 31, 2020, began like any other routine training mission at VAW-120, the fleet replacement squadron (FRS) of the Hawkeye and Greyhound community. This particular training mission was a combination of front-end (pilot) and back-end (naval flight officer or NFO) events with a pre-standardization or practice Naval Air Training and Operating Procedure Standardization (NATOPS) check flight for the pilot as part of the category + refresher syllabus, and an aircraft familiarization flight for the sensor operator (SO), who was a recent staff check-in. The flight would also double as proficiency flights for the co-pilot and mission commander (MC), who were both experienced FRS instructors. The crew conducted a standard flight brief at 12:30 p.m., including a discussion of the flight route, planned approaches at Atlantic City (KACY), New Jersey, emergency procedures (EPs), crew resource management (CRM) and risk management (RM). Lacking in the brief was any discussion on arresting gear availability at KACY or at any other airfield along the flight route. This omission, combined with overall complacency that included only the carrier aircraft plane commander (CAPC) reviewing the aircraft discrepancy book before flight, was the beginning of the holes lining up in the safety Swiss cheese model.

The man-up of the aircraft was uneventful. The pilots conducted the exterior walk around while the NFOs performed the interior preflight. None of the crew noted any discrepancies during their inspections. The crew then conducted a standard engine start, taxied to the runway and were quickly airborne en route to Atlantic City. The back end of 622 did not have working weapons system stations and only four functional radios, so the mission for the NFOs was minimal outside familiarization and currency in the aircraft.

The practice approach plan was to conduct one area navigation approach and two instrument landing system (ILS) approaches at KACY before returning to Chambers Field (KNGU) located on Naval Station Norfolk, Virginia. The first two approaches were executed without any issue. It was on the final ILS approach that the flight went from routine to an emergency situation.

Just before the final approach fix, the HYD COMB LEVEL caution light illuminated in the cockpit. The Hawkeye's hydraulic power requirements are supplied by two independent 3,000-pound per square inch systems: the combined hydraulic and the flight hydraulic systems. The flight system supplies power to the primary flight controls, Automatic Flight Control System and pressure-operated hydraulic isolation valve. The combined system also supplies power to the primary flight controls and to the rest of the hydraulically operated subsystems. Both hydraulic systems operate automatically via engine power and have built-in redundancy to prioritize supplying hydraulic fluid to the flight system if either system is lost. If both systems are lost, the flight controls will be unpowered.

At this point, a number of events happened: the pilots notified the NFOs, executed the missed approach, switched to departure and continued with a clearance back to KNGU and a climb to 6,000 feet mean sea level (MSL).

Meanwhile, in the back of the aircraft, the MC located the emergency procedure (EP) in the precautionary checklist and told the pilots he could read it aloud when they were ready. On the climb-out, the crew began running through the EPs. A few moments in, the pilots noted the combined HYD gauges began dropping and within less than a minute, the gauges were at zero. The SO was sent forward to check the Combined HYD reservoir and reported it was indicating low but not empty. At this point, the crew had completed the EPs for hydraulic level caution, hydraulic system failure-combined and hydraulic level caution checklist (FLT or COMB). Since all the EPs ended with "Land as Soon As Possible," the crew discussed where to land the aircraft. The aircraft was currently on a southwest heading back to KNGU. Since multiple landing safety systems are affected by a loss of combined hydraulics, the crew wanted to find a suitable airfield with arresting gear rigged. KACY was discussed as a possibility; however, the status of the gear was unknown. The MC said he believed Dover Air Force Base, Delaware, had gear, although we later discovered this was an incorrect assumption. Wallops Field (KWAL) was also mentioned as a field with arresting gear along the current flight route. Based on the crew's desire to land at a familiar field with gear rigged by the time of arrival and an LSO to assist, the decision was made to fly the aircraft dirty back to Chambers Field for an arrested landing. This decision was made despite multiple EPs stating to land as soon as possible and there were closer suitable fields available. The crew discussed this decision, and every member said they were comfortable making the flight back to KNGU.

The crew now focused on getting the aircraft back to Norfolk rather than keeping their attention on the present emergency. Adhering to the EPs would have kept the aircraft near KACY to set up for an arrested landing. Instead, the aircraft was left in the landing configuration with gear down, flaps at 20 and max rudder at 20 more than 150 miles from KNGU. Once the decision was made to return to home field, the crew never readdressed the soundness of this decision. The crew became focused on working the fuel and configuration for getting back to KNGU, when they should have executed the EP as stated and put the aircraft down as soon as possible. No emergency was declared, and no further checks of the hydraulic reservoirs were made during the transit. All the Swiss cheese holes now aligned.

About 90 miles from Chambers Field, the co-pilot reached out on the VAW-120 base frequency to let the squadron know the situation and to request arresting gear be rigged with an LSO on standby. Approximately 25 miles southwest of Wallops Field, the pilots noted a HYD FLIGHT LEVEL LOW light in the cockpit. The pilot immediately turned the aircraft toward Wallops, declared an emergency over the Wallops Tower frequency and requested a straight-in arrestment on Runway 04. The MC quickly updated the VAW-120 duty officer on the emergency, and relayed the crew's intent to divert to Wallops for a field arrestment. Less than a minute after the HYD FLT LEVEL LOW light illuminated, the cockpit flight hydraulic gauges dropped to zero. When this light illuminated, the aircraft was at 6,000 feet MSL on a heading toward KWAL. The pilot tested the controls, found they were unresponsive and informed the crew they no longer had flight controls. Moments later, the CAPC made the call for the crew to bail out and the aircraft aggressively nosed over to a 20-30 degree nose-down attitude. As airspeed increased, the aircraft leveled out and then climbed as the pilot attempted to pull the main entrance hatch jettison handle. Unable to reach the jettison handle with the inertial reel locked, the pilot was forced to derig his seat to jettison the main entrance hatch as the aircraft started to level out again. The NFOs reported the door was out and the CAPC called for them to exit the aircraft. Both NFOs and the pilot derigged their seats and exited the aircraft with the SO leaving first, followed by the MC and pilot. The CAPC remained with the aircraft and reported the bailout over the radio as the aircraft went through two more oscillations in attitude. Upon level off, the CAPC derigged and bailed out of the aircraft.

All four aircrew members had good chutes and successfully landed without significant injury and the aircraft crashed in an unpopulated field. The MC and the pilot landed near each other in a cornfield, while the SO landed within a mile of them in a wooded area. The CAPC landed in another field several miles away from the rest of the crew. Civilian first responders picked up the crew and the Coast Guard transported them to Portsmouth Naval Medical Center for evaluation.

There are two major lessons learned when this series of events is viewed through the lens of the CRM Threat and Error Management model. First, the routine nature of the flight led to the threat of complacency. The crew should have prepared for this threat through mission analysis, using the brief to discuss key divert information and the need for all crew members to review the aircraft discrepancy book. Second, the crew made an error when they decided to not land at the nearest suitable field despite clearly being stated in multiple EPs. The crew could have also referenced CRM skills such as decision-making and assertiveness to amend the decision to not immediately land the aircraft. By not using sound decision making, the crew soon found themselves in an undesired aircraft state while transiting 160 miles to KNGU with one functioning hydraulic system. Despite internal reservations by the MC about whether it was the correct decision to return to KNGU, the MC did not communicate these thoughts to the rest of the crew; thereby eliminating an opportunity to safely land the aircraft.

In reviewing the actions of the 622 crew, there was a clear breakdown of CRM, which emphasizes the need to frequently review and assess the seven critical skills both individually and as a crew. Furthermore, as revealed using the Threat and Error Management model, crews should be aware of the threats of complacency, overconfidence, lack of assertiveness and the effects they can have on a crew`s decision-making capability. Strict adherence to NATOPS procedures and an emphasis on proactive and assertive CRM are a must on all flights, no matter how routine they may seem.

Editor`s Note: This article is written based on the personal experience of the crew.

"Strict adherence to NATOPS procedures and an emphasis on proactive and assertive CRM are a must on all flights, no matter how routine they may seem."

Pages 16 and 17 bottom photos: U.S. Navy photos by Mass Communication Specialist Seaman Megan Alexander

What's the 'Prop'lem?

By Lt. J.J. Reyes, VAW-125

MISSING SYMPTOMS AND MAKING THE PROPER DIAGNOSIS

Tiger 62 inside 604 had just completed a quick cabin pressurization confidence hop and was returning to our home field, Marine Corps Air Station Iwakuni, Japan, within the Yamaguchi prefecture. We were operating with a minimum crew. I was the squadron's most junior carrier aircraft plane commander (CAPC) flying in the left, a second pilot/electronic control officer with one deployment under his belt in my right, and our experienced maintenance officer (MO) operating in the back as the mission commander (MC).

The aircraft was finally working after a string of functional check flights (FCFs) and recurring pressurization issues, and it was good to have the bird back in the mix. We made a smooth right turn toward the initial for runway 02 when our right engine RPM gauge suddenly "X-ed" out, which was then accompanied by an audible change in propeller pitch and a light show of R PCMU (propulsion control and metering unit) rollups* both advisory and caution.

Note: *"Rollups" denoted by an asterisk (*) are followed by amplifying information in parentheses in the Advisory, Caution and Warning System (ACAWS). Example: R PCMU* (PROP GOV FAIL)*

Among these lights was PCMU* (R PROP SYNC FAIL, R PROP BETA FAIL, R PROP GOV FAIL and R PROP CHAN FAIL). We immediately put the right power lever to max and began a climbing right turn, requesting to hold at 6,000 feet near the field. The right propeller was obviously out of sync with the left as we broke out the pocket checklist (PCL).

The first procedure we reviewed was the PROP GOV FAIL/BUG (Back-up Governor) emergency procedure. The very first step reads, "**1. Note exact engine RPM.**"

With our right RPM gauge X-ed out, we were unable to properly execute the first step. We decided to continue with step two and keep the right "Power Lever Max" to guard against any potential propeller fluid issues. At max, the right engine's shaft horsepower (SHP) and compensated turbine measured temperature (CTMT) read and reacted relatively normally, and no fluid was seen leaking from the right propeller or nacelle.

Reaching our approved holding altitude, we kept the left propeller at idle and the right to max in order to remain level and stay at a manageable airspeed for configuration changes or a precautionary shutdown. We soon found that maintaining level altitude with one engine at max and the other at idle was impossible, and we had to accept a small climb. Approach immediately noticed this and gave us block 6K to 10K, for which we were grateful. All the while, my co-pilot continued to comb through the PCL to figure out how to handle a situation where RPM was an unknown.

"OUR SITUATION WAS NOT COOKIE-CUTTER, AND WE HAD TO MAKE A DECISION WITHOUT A KEY PIECE OF INFORMATION."

We reviewed the Advisory, Caution and Warning System (ACAWS) white pages, reading each caution and advisory individually. The biggest takeaways from the white pages were from the PCMU* (PROP GOV FAIL) meaning and action section. The meaning section states **"If the alert was caused by a loss of propeller speed signals, the RPM gauge may no longer be available."** The action section recommends referring to the Prop Gov Fail/BUG Emergency Procedure (EP). This procedure was the most in line with our case: RPM gauge X-ed out and PCMU* (PROP GOV FAIL) caution.

However, within the EP, the actions all depend on knowing the propeller RPM: **"If RPM increases above 104% then decays to below 102% ...," or "… if BUG operation is confirmed (stabilized RPM between 102.0-104.0%),"** etc.

We attempted adjusting our airspeed and taking the power lever back off of max temporarily to see what effect it would have. The SHP and CTMT looked relatively normal, and although aural differences were noticed, they were difficult to distinguish between what we thought the BUG would normally sound like versus any other propeller malfunction. We needed to know our RPM. Our situation was not cookie-cutter, and we had to make a decision without a key piece of information.

At this point, we've aviated, navigated and communicated as a crew; it was time to radio out to the squadron duty officer on base frequency for a second opinion. Our executive officer (XO) went out on the base frequency to get updates regarding our situation and recommended that if the engine is giving sufficient and relatively normal thrust, consider taking a short field arrestment with it still online.

U.S. Navy photos by Lt. J.J. Reyes

We discussed this internally at length, and one primary concern arose between the three of us: Can we trust the engine to remain online and predictable during the approach? The worst case scenario we envisioned was the engine bogging down on final where we'd be low, slow and dirty because we couldn't properly diagnose if we had a variable-pitch actuator (VPA) seal failure or fluid issue. However, the symptoms generally pointed to one thing: The engine was operating on BUG, a back-up method of engine and propeller governing. This mode is relatively predictable and, as long as you avoid rapid power lever movement to avoid RPM/thrust variations, it is reasonably manageable.

Among the crew, the question remained: Can we, with 100% certainty, say this is BUG? Our thoughts went back two weeks prior when our squadron mates secured an engine experiencing fluctuating RPM on a return to base from a mission after the third instance of significant RPM decay. Maintenance discovered severely degraded VPA seals post-flight, which explained the RPM fluctuation. The nature of their emergency was different. They had obvious RPM fluctuations and off-speeds leading them to the relatively new "Propeller Offspeed/VPA Malfunction EP" which was incorporated in the Sept. 15, 2020, edition of the Naval Air Training and Operating Procedure Standardization (NATOPS).

In this case, they could properly execute the first step, which, as most other propeller EPs state, "**1. Note exact engine RPM.**" After that, several options exist based on RPM and its stability. The crew's situation degraded, and they made the decision to put the aircraft in a known state: single engine with, ideally, a feathered propeller. **"Put the aircraft in a known state"** - this was our other option. My co-pilot and I had both completed our NATOPS standardization checks (STANX) recently, where single-engine EPs are simulated and practiced throughout multiple points in the pattern and approach. We were also together on some recent FCFs where both engines are shut down intentionally and restarted, one at a time, for maintenance. We were about as proficient as you can get in a fleet squadron, flying single-engine aircraft where no simulator is available.

The crew agreed that due to the lack of RPM not allowing us to confidently say we are just on BUG and not some other propeller malfunction, we would put the aircraft in a known state and shut down the right engine. This was communicated to the XO on base, and he trusted our decision.

We declared our emergency with approach and tower and set up for a precautionary shutdown. Pointed at the field in the appropriate configuration, we executed the Engine Fire/Failure/Shutdown in Flight procedure. The right side of the aircraft became quiet as I looked down and now saw 0 RPM instead of the red X, and my co-pilot saw – yes, a feathered prop! We finished the remaining shutdown checklist, post-shutdown checklist and reviewed the single-engine landing checklist. The tower informed us the gear was rigged and ready for a runway 20 recovery, which was a switch from the

U.S. Navy photo by Lt J. J. Reyes

active, and cleared us to land as priority traffic.

We successfully executed a field arrestment and were able to taxi back single-engine with fire trucks and emergency vehicles in trail. Support from outside of the aircraft was superb. Our approach and tower controllers were fantastic in giving us space to troubleshoot, but also interjecting where it mattered to keep normal operations flowing around us. The Marine Corps arresting gear personnel were professional and expeditious. We spent no more than three minutes on the runway getting out of the wire and off onto a taxiway. Not too long after, the gear was reset in battery and runway clear to catch a large-force exercise returning from the working area.

Our maintenance discovered the cause of the X-ed out RPM and associated cautions was due to broken and worn fixed targets on the propeller bulkhead used to measure RPM. A review of the flight data during the malfunction showed that our R propeller RPM indicated close to 103%, which confirmed the right propeller was being properly governed by BUG. Thus, the recommendation to keep our engine online and recover could have been a correct course of action.

That day, we exercised the phrase that prefaces all of our NATOPS, regardless of platform: **"No manual can address every situation completely or be a substitute for sound judgment. Operational situations may require modifications of the procedures contained herein."** RPM is paramount in identifying propeller health during most propeller-related emergencies in the Hawkeye. Our procedures derive action only after this information is determined. We made decisions without key information, which still resulted in the safe recovery of the aircraft and crew. This recovery was accomplished through sound crew resource management (CRM) and more specifically, through the execution of the seven essential skills with communication, decision-making and assertiveness standing out as the most important that day.

Communication between the three of us in the aircraft was efficient and clear. The co-pilot managed the emergency checklists from the right seat while our MC backed us up, ensuring we did not miss steps. Once we settled in the aircraft, we reached out to continue communication to our base frequency to invite more minds into the cockpit to see if we were missing anything. Fortunately, plenty of people were available to help, including the XO, our most senior pilot. He backed us up on what we had already executed and made helpful suggestions to better characterize the nature of our malfunction. He ultimately made his recommendation to land with the engine online.

The root of my decision-making after thorough communication and EP review was weighing the knowns versus the unknowns. I knew that the right engine had adequate thrust but didn't know the true issue or its stability. The other option was shutting off the motor to achieve the known of operating single engine with a feathered propeller. The unknown for this case would be the ever-present potential of a propeller that fails to feather and reduces controllability.

Each option had its benefits and drawbacks. Do I keep both engines online and accept an unknown propeller malfunction, or do I shut it down and accept the risk that comes with it? Comparing both scenarios revealed the known that I was most comfortable with – operating single-engine. The E-2/C-2 community instills confidence in flying the aircraft single engine through the fleet replacement squadron, annual STANXs and FCFs; we were proficient.

The recent propeller malfunction in our squadron also influenced my decision to mitigate an unpredictable situation by taking it to a known state. I made the decision to trade one known for another by leveraging confidence in our training and experience.

The crew was waiting for my response after hearing the XO's recommendation. As the newest CAPC, the stress of going against his guidance weighed on me, but I had made my decision. With assertiveness, I told the crew my intentions. They both agreed this was the best course of action. I went back on the radio and said I wanted to shut down the engine. Without skipping a beat, he said "Roger that! Let us know what else you need."

The XO trusted our decision and what we saw in the cockpit. He provided assistance, but did not micromanage the situation, which allowed us to operate in what we thought was the safest course of action. Hindsight being 20/20, either course of action would have led to a safe recovery, but good communication, decision-making and assertiveness allowed the crew to reach a sound conclusion we were comfortable with.

Emergencies happen, and not all of them fit inside the confines of NATOPS. When you reach dead ends in the PCL, leverage the knowns and confidently make a decision after thorough communication with all involved – if time allows. Even when you can't see all the symptoms, you can still use CRM and sound decision-making to make an accurate diagnosis and safe recovery!

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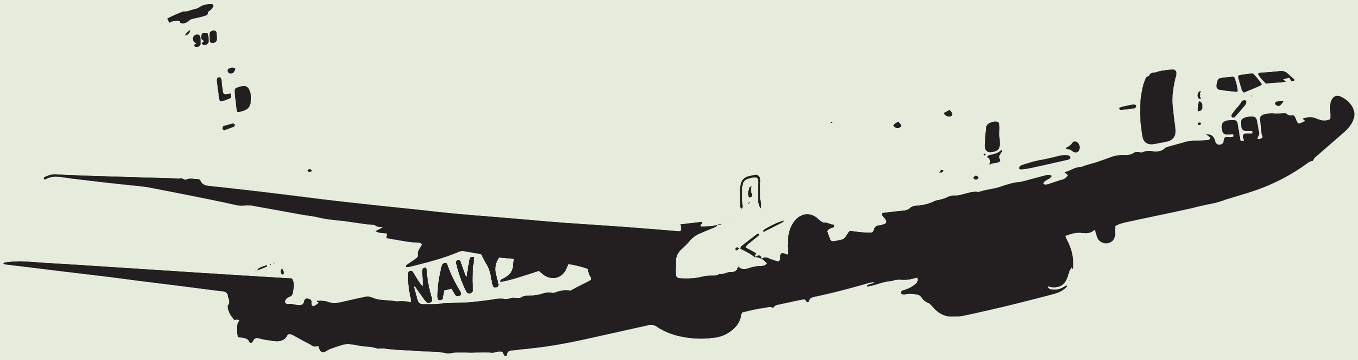
E-2D PCL (NAVAIR 01-E2AAG-1B)



Call Sign MARS Radio

By Richard Duncan, retired CWO3 Rich Courtney and retired Air Force Master Sgt. Michael Abitz

From day one, naval aviators are taught to aviate, navigate and communicate. This trilogy spells out a philosophy and culture for the successful completion of a mission set. The last of the three is sometimes impacted negatively when external influences conspire to deny the ability to communicate outside of the airframe.

That's where Military Auxiliary Radio System (MARS) operators come in. MARS radio, authorized under Department of Defense (DOD) Instruction 4650.02, is comprised of more than 35 Federal Communications Commission-licensed amateur radio operators listening to DOD-assigned frequencies for aircraft and ships to offer their help. The licensed operators complete an extensive training course before becoming a MARS radio operator. There is no cost to DOD members using the MARS service, either for official or morale purposes.

The MARS radio began during the Vietnam conflict to provide phone conversations and messages to boost the morale of military personnel stationed in the conflict zone. Today, MARS radio also sends official and morale calls to aircraft and ships with operational phone-patch connections. Operators can contact any government aircraft, helicopter or ship with high-frequency radio capability at any time. MARS radio operators also provide backup communications for Air Force One and Air Force Two. MARS radio is available on two DOD-operated high frequencies and is listed in the pilot's information handbook.

The system is staffed from 10 a.m. to 6 a.m. Greenwich Mean Time, 365 days a year. Much of the work is official phone patching between aircraft or ships to ground facilities, such as base operations, maintenance and port control, medical facilities, diplomatic and custom clearances, selective call tests and of course, calls home to loved ones to let them know how their military service members are doing.

The MARS often provides the latest meteorological aerodrome reports or terminal aerodrome forecasts to aircrews by accessing it from the internet. Aircrews can also request to speak with a forecaster at a military weather facility through the phone patch system. Operators can also provide a radio check for the aircraft, either airborne or on the ground.

Once a MARS radio operator establishes contact with a user, the operator will ask for a general location, such as the state or general geographic region, so the MARS radio station can turn its beam antennas to gain a better signal.

If the station is having reception problems, each is equipped with internet chat software linking all stations on the net, or a network control station might assign another station with better reception to respond to the request. Depending on how well the signal is propagating, stateside stations can communicate with aircraft or ships in the western Pacific, Europe or Africa.

For more information, visit the MARS radio website at www.marsradioglobal.us, where you can also find email and telephone contact information.

U.S. Navy photo by Mass Communication Specialist 3rd Class Jeff Sherman

IT'S GETTING HOT IN HERE

By Lt. Levi Loschen, VFA-147

•••

TO SET THE SCENE, WE WERE IN MONTH ONE OF DEPLOYMENT. TRANSITING ACROSS THE HOT AND HUMID TROPICAL PACIFIC OCEAN. OUR HOME SHIP, OR "MOM," WAS WORKING BLUE WATER OPS, OVER 400 NAUTICAL MILES AWAY FROM THE NEAREST DIVERT OF WAKE ISLAND, AN ATOLL IN THE CENTRAL PACIFIC OCEAN. IF THERE WAS ANY EMERGENCY, THE ONLY PLACE TO GO WAS USS CARL VINSON (CVN 70). I WAS LEADING OUR MOST SENIOR DEPARTMENT HEAD ON A BENIGN UNIT-LEVEL TRAINING FLIGHT AT SUNSET. BOTH BEING RELATIVELY NEW TO THE PLATFORM, MY WINGMAN AND I HAD ROUGHLY 350 HOURS IN THE F-35C LIGHTNING II. HOWEVER, MY WINGMAN HAD CLOSE TO 2,000 HOURS TOTAL TIME COMPARED TO MY 600.

U.S. Navy photo by Chief Mass Communication Specialist Shannon E. Renfroe

While working simulated bombing tactics on a maritime vessel over 100 miles from Mom, my cockpit got eerily quiet. I knew what was about to happen.

The “whoop whoop” of a warning sounded and in my helmet display the words “IPP FAIL” flashed. The IPP is the F-35’s Integrated Power Package. It fills the roles of an auxiliary power unit for engine startup and an emergency power unit to provide power for flight controls and avionics in case of generator loss. It also provides pressurized air for the environmental control system (ECS), providing cabin temperature control, cabin pressure, air and liquid cooling for avionics, mission systems and flight controls, and the onboard oxygen generating system, to name a few. In other words, the IPP has a pretty hefty load for one small system.

After assessing cockpit indications, I stepped through the immediate action items: emergency oxygen “ON,” descend below 17,000 feet mean sea level (MSL). My wingman backed me up on the bold face and we worked through the remaining checklist items step by step.

I attempted an IPP reset without success. Without the IPP, critical components like flight control actuators and the vehicle management computers will begin to overheat. They are only specified to operate for 30 minutes without cooling. As such, we needed to press on with the checklist, which calls for opening the emergency ram air door. The ram air system provides forced air cooling to the flight critical components so long as the cooling envelope is maintained 250-350 knots calibrated airspeed (KCAS) and 10,000-17,000 feet MSL. Shortly after selecting ram, a caution alerted me to degraded cooling to the horizontal tail actuators. If these actuators overheat, they can fail. Losing one leads to controllability issues. Losing both would lead to a departure from controlled flight.

I immediately informed my wingman and we began stepping through the checklist for the cooling degrade. It was at this point that a relatively benign situation began turning into a more complex, compound emergency.

To manage my quickly filling bucket, my wingman and I split the tasks on the radio. I worked with Marshal to hold overhead. My wingman worked with the carrier air traffic control center’s (CATCC) F-35 representative, advising him of all the warnings, cautions, and advisories I was looking at and the steps I had completed.

Still 40 miles from Mom, one of my two flight computers started to overheat and the applicable caution asserted. Before I could communicate it to my wingman, both computers failed. The F-35C flight computers or integrated core processors (ICPs) control a vast majority of the F-35C’s communication, navigation and identification (CNI) functions. With a failure of both ICPs, I lost all datalinks, all but one radio, most navigational aids (NAVAIDS), radar altimeter and all mission systems. Taking stock of the systems I had available, all I found was my backup radio, a tactical air navigation system, my cockpit displays, the head-up display and my IFF.

I tried to tell my wingman what was going on, but after no response I found my one remaining radio was stuck in receive mode only. With the sun setting, there was little daylight left. Using standard no radio (NORDO) signals, I rocked my wings and my wingman moved to parade formation. I passed the “can’t talk,” but “can hear” hand signal. I tried to pass a note on my knee board card telling him what had overheated and shut off, but my wingman could not see the writing on the note. Scrambling for a way to communicate, I held up my checklist book and then passed the page number with simple hand signals for the cautions that were beginning to populate.

At this point, we were still 20 miles from Mom. I was hot and sweating profusely since the IPP was still failed and not providing any ECS functions. My aircraft was starting to overheat more rapidly than expected. The importance of remaining calm and executing good crew resource management (CRM) cannot be understated and was even briefed in depth pre-flight.

A sunset that looked like something out of a Bob Ross painting helped with that.

As we arrived overhead Mom, the sun had set and it was now nighttime in the middle of the Pacific. I had now lost the ability to pass any updates to my situation to my wingman. I passed the lead over to my wingman and maintained parade formation as he coordinated our recovery back to Mom.

During the hold overhead Mom, my inertial navigation system began to degrade and my backup oxygen began to deplete. With no pressurization and my O2 running out, I was stuck between the proverbial rock and a hard place. Do I take my mask off at 17,000 feet cabin altitude and keep the jet as cool as possible, or get below 10,000 feet to mitigate hypoxia, but lose cooling and risk losing flight controls? Considering the symptoms experienced during my indoctrination NASTP training, I decided to drop the mask and keep the jet flying as long as possible.

A conversation that was happening behind the scenes and unbeknownst to me was the pull forward discussion. At the time of going NORDO, per the F-35 aircraft carrier recovery matrix, we were not in a pull forward scenario, and I was to wait the 45 minutes for the next recovery. The F-35C representative in the CATCC, an experienced pilot, but relatively new to the F-35C, made a good call and brought another more experienced pilot in to assist with the compound emergency.

A shout out to the three book readers, two in the carrier’s air traffic control (ATC) facility and my wingman-turned-lead. They determined that with degraded cooling, unexpected communication, navigation issues, and the onset of nightfall, I should land ASAP and made the call for a pull forward.

VMCs were specified to fail, which would result in a loss of controlled flight. Since I was only about two minutes from landing and flying form at night, I followed the Aviate, Navigate, Communicate mantra and just kept it coming and did not break out the book.

My lead did an excellent job of dropping me off at the perfect on-and-on start. Hearing “paddles contact you’re on glide slope,” I almost forgot I was flying in the middle of the Pacific with an aircraft that was potentially minutes away from a catastrophic failure. Shout out to the wave team there that night for talking me right into the three wire. Thanks paddles!

Ultimately, I recovered safely aboard the ship with no further issues. Post-flight maintenance revealed a failure of the polyalphaolefin (PAO) pump controller. The PAO is the liquid cooling agent used to cool a majority of CNI and mission systems. This failure caused the IPP to enter a preventive shutdown mode and prevented a restart when commanded. It also resulted in increased heating to the systems cooled by the liquid loop since the pump was no longer circulating PAO fluid, causing the ICPs to fail prematurely resulting in a loss of the CNI functions.

> **“There were some very good lessons learned for the squadron, the F-35C community and naval aviation.”**

The deck gladly obliged and quickly made the transition.

As we commenced our approach from the emergency ram cooling envelope, the heat and humidity really started pouring into my cockpit. It felt like Pensacola on a sticky summer night. Over my radio stuck in receive, I could hear the conversation between the landing signal officers (LSOs) and my lead. The LSOs asked if I could configure normally, what my radio status was and what NAVAIDs were available. By flashing my lights for yes, I acknowledged everything.

I was able to configure normally and slow to on-speed. After configuring, a flight control cooling warning asserted. This warning indicated air cooling had failed to the flight control computers also known as the VMCs – I was now on a 30-minute timer before the

It started with a solid pre-flight brief. We covered blue water emergencies and the importance of staying calm and working together to get back safely to Mom. Second, solid knowledge is the foundation needed for safe operations. The brain trust on the deck was able to correctly deduce that the aircraft needed an emergency pull forward, despite minimal communication from me.

Finally, good CRM is paramount. Even if you fly a single seat aircraft, your “crew” can include your wingman, your rep, ATC, paddles and any other agency that can provide assistance.

Effectively communicating verbally between all players with calm, collected radio calls and using non-verbal communication like rocking the wings, hand signals, improvised passing of page numbers and light flashes helped save the day!

YOUR SURVIVAL GEAR IS IMPORTANT

By Aircrew Survival Equipmentman Senior Chief Randi M. Zetterlund,

Naval Safety Command

Marine Corps Capt. Ryan M. Perez prepares for takeoff in a CH-53E Super Stallion at Marine Corps Air Station Miramar, California, June 15, 2021.

U.S. Marine Corps photo by Lance Cpl. Rachaelanne Woodward

Properly fitted and maintained survival gear will help save your life. So why aren't aviators dedicating more time to ensuring their survival gear is fitted correctly and ready for use before and after each flight as required by the Naval Air Training and Operating Procedures Standardization (NATOPS) manual and Naval Air Systems Command series manuals?

Aircrew survival equipmentmen (PRs) and Flight E technicians schedule maintenance on your survival gear, but those inspections are not daily. You are the one depending on the correct fit and performance of all your gear, not only in the event of a mishap but also during normal flight operations. It should not be a challenge for PRs and Flight E technicians to schedule survival gear fittings with aviators.

Often, pre- and post-flight procedures are not performed or performed incorrectly. Is this due to a lack of training or lack of caring? How many aviators know how to conduct proper pre- and post-flight procedures? How many aviators have noticed an issue with their gear, but they are too busy to address it before the flight and will "get it fixed later"?

Not following required procedures can lead to a host of issues that can severely affect the mission, potentially causing the loss of an aircraft, or worse – a loss of life.

Damaged life preservers from improper vest stowage Oct. 13, 2021
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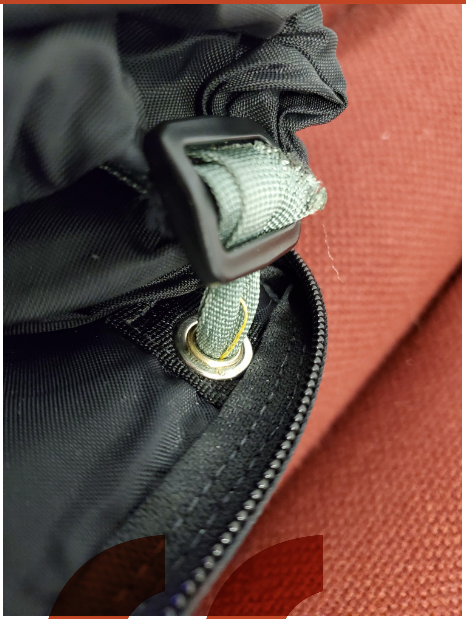

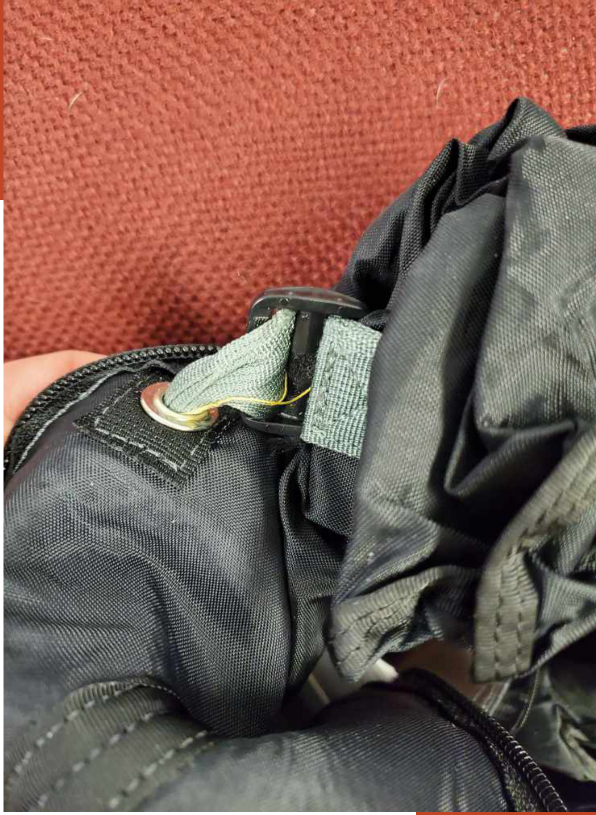

Some examples include oxygen mask problems during flight which can lead to breathing or communication issues, survival items falling off the vest and creating foreign object debris hazards on the flight line or jamming flight controls in the aircraft, or night vision devices not working correctly. Be aware of how to properly stow your survival gear. Do not use your life preserver to hang up your survival vest. This damages the life preserver, resulting in improper functioning, which can lead to potential injury or loss of life.

There are also broader implications. Too many times, aviators who don't perform post-flight procedures after every flight are asking for replacement survival items or a top-off for their helicopter aircrew breathing device bottle as they walk out to the aircraft. Technicians are cutting corners because they are pressured to get aviators out to the aircraft in a timely fashion.

Do you know what properly fitted or optimally fitted flight gear should look and feel like? Your flight gear is not supposed to cause pain or discomfort. Incorrectly fitted flight gear can have severe consequences to the individual not only in the case of an ejection or bailout but also during normal flight operations. For example, your oxygen mask is not supposed to leak, regardless of your face shape. If your mask leaks, you have an improperly fitted oxygen mask and can contribute to loss of mask pressure, loss of oxygen concentration at the mask and increased demand on the concentrator. Survival gear is designed to protect aviators in case of ejection or bailout and provide support during parachute opening shock. If your flight gear is fitted incorrectly, it could cause chronic and acute health issues. If you are involved in a mishap, improperly fitted survival gear can potentially cause severe injury or even death.

Take the time, talk to your PRs/Flight E technicians and let them know if your gear does not feel right or causes you pain or discomfort. Take the time to understand what you are supposed to do for your pre- and post-flight procedures, stowage and handling. Above all, ask questions. Take the time. Your survival gear is important, and it could save your life.

"Survival gear is designed to protect aviators in case of ejection or bailout and provide support during parachute opening shock."

Petty Officer 2nd Class Vanessa Thomas inspects aircrew survival gear at Naval Air Station Fallon, Nevada, March 29, 2021.

U.S. Navy photo by Petty Officer 2nd Class Ryan Breeden

U.S. Navy photo by Mass Communication 3rd Class Jason Waite

THE 'NIGHT MARE' ENGINE

Lt. Conor Cross

By Lt. Conor Cross, HSM-35

The MH-60R Naval Air Training and Operating Procedure Standardization (NATOPS) Flight Manual defines a compressor stall as "an aerodynamic disturbance of the smooth airflow pattern through the engine" often attributed to distortion of or damage to the mechanical components of the engine compressor. Cockpit indications include a "rapid increase" in turbine gas temperature (TGT), a "hang-up or rapid decrease" in the rotation speed of the gas generator turbine, or a "loss of power."

Perhaps the most discussed indication of a compressor stall in the MH-60R community, though, is the sound the stall produces. This sound, described by NATOPS as "barely audible to muffled explosions," is modeled in simulators and by instructor pilots alike as a repetitive "popping" sound. It is a sound no one hopes to hear outside of training, but is a sound now familiar to aircrew members of Helicopter Maritime Strike Squadron 35, Det. 2 Night Mares.

> The NATOPS flight manual cannot always precisely describe how emergencies will manifest, and simulators cannot always model the subtleties of each occurrence."

On March 10, 2021, the Det. 2 Night Mares embarked on USS John Finn (DDG-113) and were conducting operations in the 7th Fleet area of responsibility before concluding a four-month deployment. The flight schedule that day had HEX 40 flying for nine hours supporting the parent ship's transit through foreign waters and high winds that threatened to gust beyond limitations for shipboard recoveries. This impending weather forced HEX 40 to return to the ship early for shutdown. As the pilot in command that night, I accepted strong port winds that were just inside limits for recovery even with a ship that stood nearly dead in the water to minimize headwinds. With my co-pilot at the flight controls in the left seat over the flight deck attempting to land, we heard a single loud "pop" similar to a distant gunshot.

None of us in the three-man crew immediately recognized the sound. I asked my crewman over internal communications if he had dropped his water bottle. My ears located the sound to his position in the cabin and I imagined him having dropped a metal insulated water bottle onto the deck from his seat, but he had not. A few moments later, we heard the sound again, this time for three repetitions. I glanced under the night vision devices (NVDs) at the flight display and noticed no unusual indications. We all acknowledged the sound and our uncertainty of its origin. Our primary focus throughout these moments remained outside the aircraft through the NVDs as my co-pilot continued hovering over the flight deck. On the third and final occurrence, the popping sound was louder and much more rapid. Additionally, I noticed a bright flashing light in my peripheral vision. I took the controls and immediately landed the helicopter on the deck. After landing, my co-pilot said he saw a spike in the TGT and my detachment OIC, who was watching from the ship's helicopter control tower, announced over the radio that we had experienced engine compressor stalls on the No. 1 engine. From his vantage point, he saw flashes of flames from the left-side engine exhaust cowling.

A post-flight review of video footage from the ship's flight deck camera revealed a bright blaze of fire from the engine exhaust attending each audible engine "pop" — more conspicuous evidence of a compressor stall than what cockpit indications provided. After shutdown, the maintenance team immediately began in-depth troubleshooting on the malfunctioning engine with guidance from maintenance publications and advice from our home guard squadron and HSM-75, the MH-60R squadron embarked aboard USS Theodore Roosevelt (CVN-71). The maintenance included, but was not limited to:

1. Visually inspecting the engine inlet and actuating system linkage assembly for any foreign object jamming, looseness, inlet blockage, bonding or damage.
2. Checking for proper travel of the actuator rod in the hydromechanical control unit, the component that provides gas generator control and protects against compressor backpressure and stalls by manipulating variable geometry vane position and the anti-ice start/bleed valve.
3. Disconnecting, inspecting and reconnecting the anti-ice start/bleed valve.
4. Using a borescope to inspect the compressor and combustion sections of the engine.
5. Performing a hot section engine cleaning.

Det. 2 found no apparent mechanical culprit of compressor stalls within the engine after a day-and-a-half of around-the-clock troubleshooting and a flight scope download of the aircraft's maintenance data showed no aircraft limitations were exceeded during flight. We rationalized that the stalls must have resulted from a disturbance of air caused by strong port winds gusting around the ship's superstructure before entering the engine compressor. Two days later, another compressor stall on the flight deck under much more benign wind conditions disproved this theory and a second thorough inspection of the engine only revealed a small crack in the engine combustion section — an unlikely cause of the compressor stalls. Squadron maintenance leadership recommended engine replacement as the safest course of action.

Upon return from deployment, technicians at the intermediate level maintenance facility conducted a thorough inspection of the engine. Although a conclusive cause of the compressor stalls could not be definitively determined, the technicians did discover the fuel manifold assembly was "significantly loose at all connections" and speculated that the compressor stall event resulted from substantial fuel leaks at the manifold. The maintenance publications do not direct an inspection of the fuel manifold in the compressor stall troubleshooting procedure, nor did any detachment maintenance personnel ever observe any external evidence of fuel leaks on the aircraft. In retrospect, an engine replacement was the most prudent operational level maintenance corrective action that could be taken, especially in a deployed status.

The NATOPS flight manual cannot always precisely describe how emergencies will manifest and simulators cannot always model the subtleties of each occurrence. I hope that shared personal experience can help others remain alert for indications of compressor stalls and to trust the pilot and maintenance procedures that were put in place for our safety. Ultimately, strictly adhering to NATOPS and performing maintenance "by the book with the book open" enabled Det. 2 to safely execute its mission.

NATOPS References

MH-60R NATOPS A1-H60RA-NFM-000 (IC 35), Commander, Naval Air Systems Command, 8 March 2021, 12-8.

MH-60R NATOPS A1-H60RA-NFM-000 (IC 35), 12-8.

MH-60R NATOPS A1-H60RA-NFM-000 (IC 35), 12-8.

MH-60R NATOPS A1-H60RA-NFM-000 (IC 35), 2-10.

A BASHING NEW YEAR

By Lt. Grant Foley, Lt. Eli Kipp, Lt. j.g. Chase Farrell, Lt. John Mohr and Lt. Miguel Smith, VQ-3

As aviators, generally the last thing you want happening is taking birds down the cores of all engines, yet that's exactly what happened.

U.S. Navy Boeing E-6B Mercury
U.S. Air Force photo by Greg L. Davis

Commonly referred to as TACAMO, or take charge and move out, the Navy's heavily modified Boeing 707 aircraft, eight per two operational squadrons, are key chess pieces in our nation's strategic nuclear deterrence mission. Our day-to-day mission is to stand alert out of our West Coast home, Travis Air Force Base, California. We do this 24/7 year-round and have done so since our inception in the aftermath of the Cuban missile crisis, providing the commander in chief with a survivable, reliable and endurable platform to direct American nuclear forces.

While preparing to execute our mission in January, we were loaded with more than 140,000 pounds of fuel, the ideal amount for us to accomplish our planned 12-hour flight. The weather was a perfectly clear visual meteorological conditions day except for the runway being wet from early morning showers. During our preflight risk management process, we checked all of our usual preflight wickets to include the infamous Bird Aircraft Strike Hazard (BASH) report, which noted moderate. Having identified nothing noteworthy for the day, we proceeded with our preflight checklist.

Our cockpit consisted of our aircraft commander, two second pilots and two flight engineers (FE). Taxi was uneventful with the automated terminal information service calling BASH low. We lined up on runway 21R with 10,000 feet of usable runway remaining. Cleared for takeoff, the flight engineer set takeoff thrust, and our 96,000 pounds of thrust quickly propelled us past 80 knots. All systems and gauges were reporting normal, our V1 was set at 126 knots and our runway path remained clear. V1 is the speed by which time the decision to continue flight if an engine fails has been made.

At V1, the aircraft commander announced "Birds," and we watched as a nearly invisible flock of baseball-sized birds took flight from their position on the runway. The birds darted in all directions, trying to avoid us as our jet passed through them. Our ears could not identify any immediate bird strikes, and no one saw impact. We continued. Mere seconds later at our rotation speed of 152 knots, we smelled the telltale characteristic of burning birds. Refusing takeoff was out of the question; we had only 5,000 feet of runway remaining, as our gross weight was 330,000 pounds and the runway was wet.

On climb out, we "hawked" the engine flight instruments and saw no negative performance, effectively ruling out our consideration of having to conduct an emergency landing. From there on, we flew with minimum required thrust to preserve the integrity of engines, always assuming the worst. Each dry lake bed we passed was, in good humor, pointed out as a great place to ditch. Thankfully, none were required.

We credit good crew resource management by the aircraft commander, second pilots and FEs to continue the flight safely. Cool heads once again prevailed in an extremely critical phase of flight. Our risk management training proved invaluable in allowing us to conduct our no-fail mission.

Rear Adm. John Meier, right, commander, Naval Air Force Atlantic, awards Naval Helicopter Aircrewmen 1st Class George Parsons III, assigned to Helicopter Sea Combat Squadron (HSC) 9 the Navy and Marine Corps medal, Dec. 1, 2020.

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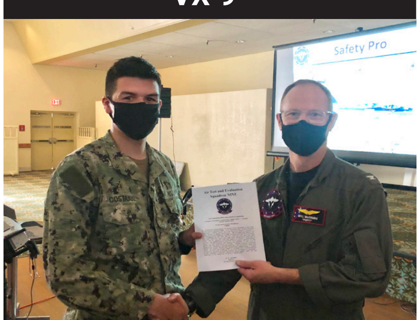
Aviation Electronics Technician Airman John Costanzo, VX-9



In February 2022, Aviation Electronics Technician Airman John Costanzo discovered a safety hazard and took positive steps to correct it before injury or damage could occur. While preparing a VX-9 aircraft for evening flight schedule, Costanzo noticed a different squadron's aircraft fuel door left open while taxiing for takeoff. He expeditiously notified the other squadron's plane captain of the hazard to alert aircrew and return the aircraft to the line to secure the fuel door prior to flight. Costanzo displayed exceptional attention, professionalism, and initiative above and beyond his normal duties and effectively communicated a safety issue. His actions led to a successful flight event while mitigating the risk of injury to personnel or damage to aircraft. Costanzo is a valued member of the Vampire Maintenance team and was awarded the squadron's selection as Safety Pro.

Aviation Electrician`s Mate Second Class Hannah Azpiazu, CVN 70

Photographer: LT Benjamin Kosek

While deployed aboard USS Carl Vinson (CVN 70) during nighttime flight deck operations, AE2 Azpiazu conducted a final check inspection on CLAW 502. During this inspection she noticed a significant hydraulic fluid leak in the starboard wheel well. Azpiazu immediately alerted the Plane Captain to signal the shutdown of the engine and notified maintenance control of the discrepancy to restrict the aircraft from further operations until an in-depth inspection could be performed. Upon further inspection of the engine, it was discovered that a leak had formed in the hydraulic system manifold. Azpiazu's leadership and attention to detail while performing her inspection of 502 prevented a potentially catastrophic airborne failure of the hydraulic system and aircraft.

Aviation Support Equipment Technician Third Class Jeremy Santiago, CVN 76

On July 7, 2021, Aviation Support Equipment Technician Third Class Jeremy Santiago responded to a forklift trouble call in Hangar Bay 3. Upon arrival, he noticed smoke coming from the forklift. He opened the engine compartment cover, noticed excessive white smoke coming from the parking brake solenoid and immediately disconnected the battery, securing the power source. He directed another Sailor to report the class C fire to Damage Control Central. While the Sailor notified Damage Control Central, he had another Sailor stand watch while he retrieved a carbon dioxide bottle and extinguished the fire. His actions prevented the possibility of a larger casualty due to the forklift being in the vicinity of the supply mountain and the Hazardous Material storage and Issuing Office. Santiago's superb initiative and dedication has proven to be instrumental in keeping his shipmate's safety a No.1 priority, earning his selection as USS Ronald Reagan's (CVN 76) Safety Pro of the Month.


FOLLOW PROCEDURES * FOLLOW PROCEDURES * FOLLOW PROCEDURES * FOLLOW PROCEDURES *
THE LEADING CAUSE OF AVIATION GROUND MISHAPS OVER THE LAST DECADE HAS BEEN THE FAILURE TO FOLLOW PROCEDURES.
Lives are at stake if procedures are not followed!


HAND
HOLD