Stan/Eval Newsletter
CIVIL AIR PATROL
UNITED STATES AIR FORCE AUXILIARY
105 S. Hansell Street
Maxwell AFB, AL 36112

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Engine Failure

Engine failures are an emergency we got on our Private Pilot check ride and often on a Form 5 check ride (OK simulated engine failure, not the real thing). Engine failures are something we need to be prepared for every time we fly. Engine failures come in at least two flavors: bad and really bad. A bad engine failure is losing the engine with enough altitude that we have time to pick an airfield, go through the checklists, try to restart the engine, and some time to think about what we are going to do. A really bad engine failure is just after takeoff or on final for landing. In this case, we must react quickly and appropriately without the luxury of pulling out a checklist and thinking too much about it. We only have time to react, and we must react appropriately. No second chances.

The most important thing to do when an engine fails in flight is to immediately push the nose down and maintain best glide. Everything else is secondary.

Let's consider a bad engine failure where we have enough altitude to be able to pull out the checklist and go through the engine out drill including attempting a restart. If its daytime and there are some places to land, even off airport, we will probably walk away from it even if we bend some metal. As Bob Hoover would say, land at as slow an airspeed as possible and hit the softest thing you can find. Losing an engine at night or in IFR, even at altitude, is a very scary event. Yeah, we can go through the checklist, maybe even call ATC for some help, but unless we are in gliding distance of a lighted airport, it may not end well. The best we can do is try and stack the odds in our favor. At night, a lit road may be all we have and maybe not that. If you are lucky enough to be in a G1000 equipped aircraft, you can use the terrain feature to improve your chances. Synthetic vision can also help but there is no magic here. Stick to the basics and when close to the ground get your airspeed as low as possible and brace for impact. Don't ever lose control (stall) of the airplane.

How about a really bad engine failure where you don't have much time to react? We all need to be ready for a loss of power on takeoff. Although the event is rare, it can be fatal. We can reduce the risks associated with an unexpected loss of power by planning for it before takeoff. The procedure should be briefed as part of our takeoff briefing even if we are solo so that we are both physically and psychologically prepared. A sudden loss of power at low altitude will preclude using a written checklist as there will be no time. Make sure you have memorized this part of the checklist and can execute it under stress. This is something Check Pilots should be verifying on check rides.

The brief should include as a minimum which way we should turn when the unexpected happens. You don't want to start looking for a landing site after the engine has failed. You want to already know where you will go when the failure occurs. Brief the minimum altitude you will need to turn back to the airport, if at all. The direction of the wind will be a factor in which way you turn. If the failure occurs at low altitude (how low?), you will be severely limited in how far you can turn. A good rule of thumb is to land straight ahead if possible. Only attempt a turn back to the airport if you have reached your predetermined altitude and a turn back is prudent.

MISSION BRIEF

1. Mission Objective
2. Destination, WX, Route, Alt, ETE
3. NOTAMS
4. Crew Coordination & CRM
5. Sterile Cockpit Procedures
6. Cockpit Layout
7. Intercom & Radio Usage
8. Seats, Seatbelts, Doors
9. Emergency Action & Equipment

Engine Failure Immediately After Takeoff (example)

1. **Airspeed**
   76 KIAS (Flaps Up)
   70 KIAS (Flaps Down)
2. Mixture Control — Idle Cut-Off
3. Fuel shut-off valve — Off
4. Magnetos Switch — Off.
5. Wing Flaps — As req (Full Recommended)
6. Stby. Batt Switch — Off
7. Master (Alt & Bat). — Off
8. Cabin Door — Unlatch
9. Land — Straight Ahead

The most important action to take upon sudden engine failure is to push the nose down. Intuitively, we might think that the loss of power will automatically lower the nose but that isn't enough. You must aggressively push the nose down to the proper attitude especially if you have passengers in the back. Otherwise, you will go into a mush in just a few seconds with a stall not far behind. Practicing this at altitude demonstrates how necessary this is. At a safe altitude configure the a/c for Vx and a climb attitude, pull the power, count three seconds to simulate the surprise factor, and then push the nose forward to maintain flying speed. You may be surprised by how much forward pressure it takes to keep from stalling. You will also learn why taking off and pitching for Vx is not a good idea unless you are taking off from a short field.

The least important action would be to call on the radio or to squawk 7700.
Don't even think of it!!! Fly the airplane first!!!

Much has been written about the impossible turn which refers to trying to turn back to the airport after an engine failure. It takes a lot of altitude to be able to successfully turn back to the runway. You can try this at a safe altitude with an imaginary runway in the sky but the results may be misleading and woefully optimistic. It's hard to simulate the surprise factor and pilots react very differently when descending near the ground with the stall horn going off. The Navy conducted a study ("The Feasibility of a Turnback from a Low Altitude Engine Failure During the Takeoff Climb Out Phase" Brent W. Jett) of the impossible turn and showed that a bank of 45 degrees was the most effective bank to perform a turn back but that there was little difference in the results using 30 to 45 degrees of bank.

Instructor pilots should emphasize the following points when teaching how to handle engine failures after takeoff:

- The takeoff briefing must include possible landing sites upon engine failure.
- The minimum altitude needed for a turn back to the airport if no other option is prudent.
- It's critical that we be psychologically prepared for engine failure.
- The necessity of aggressively pushing the nose down to maintain flying speed.
- Memorization and execution of the engine failure on takeoff checklist

An engine failure on final is also a really bad time. It is critical to immediately pitch to best glide. If your flaps are down, you will glide a lot better by retracting them. Only leave them down if you are near touchdown. Immediately assess whether you can make the runway, and if not, figure out your best option. Again, landing as slowly as possible wherever you land is going to improve your chances of survival. Kinetic energy is related to the square of the airspeed, so a few knots make a big difference. Low on final also raises the possibility of colliding with obstacles such as power lines, approach lights, trees, and other surprises. Do what you can to avoid them.

Winds of change (Maj M. Banner)

Wind shear is a sudden change in wind speed and/or direction in a short distance. It can be in a vertical or horizontal direction. Vertically- and horizontally sheared winds can occur at all levels of the atmosphere and is of particularly concern while on short final for landing and climb out after takeoff. Low-level wind shear (LLWS) refers to wind shear below 2,000 feet AGL along the final approach path or along the takeoff and initial climb out path. LLWS is associated with thunderstorms, tornados, fast moving cold fronts, squall lines and low-level jet streams. The most violent type of wind shear is induced by convective activity associated with thunderstorms, i. e., very small areas of rapidly descending air (1 mile diameter) known as microbursts are associated with descending vertical speeds greater than 6,000 feet/minute. Downdraft energy of microbursts can exceed the climb capability of many aircraft predisposing to in-flight loss of control (LOC-I). Microbursts from a thunderstorm while on final approach can cause a low-level headwind-to-tailwind shear resulting in performance decreasing effects, i. e., sudden losses of airspeed, altitude and lift (Table 1). For example, on 2 August 1985, with thunderstorms in the local area, a Delta Airlines Lockheed L-1011 TriStar encountered a microburst while on short final at Dallas-Fort Worth International Airport resulting in a headwind-to-tailwind LLWS. Subsequently, the aircraft impacted the ground resulting in 137 fatalities. (Fig. 1)

Fig 1.

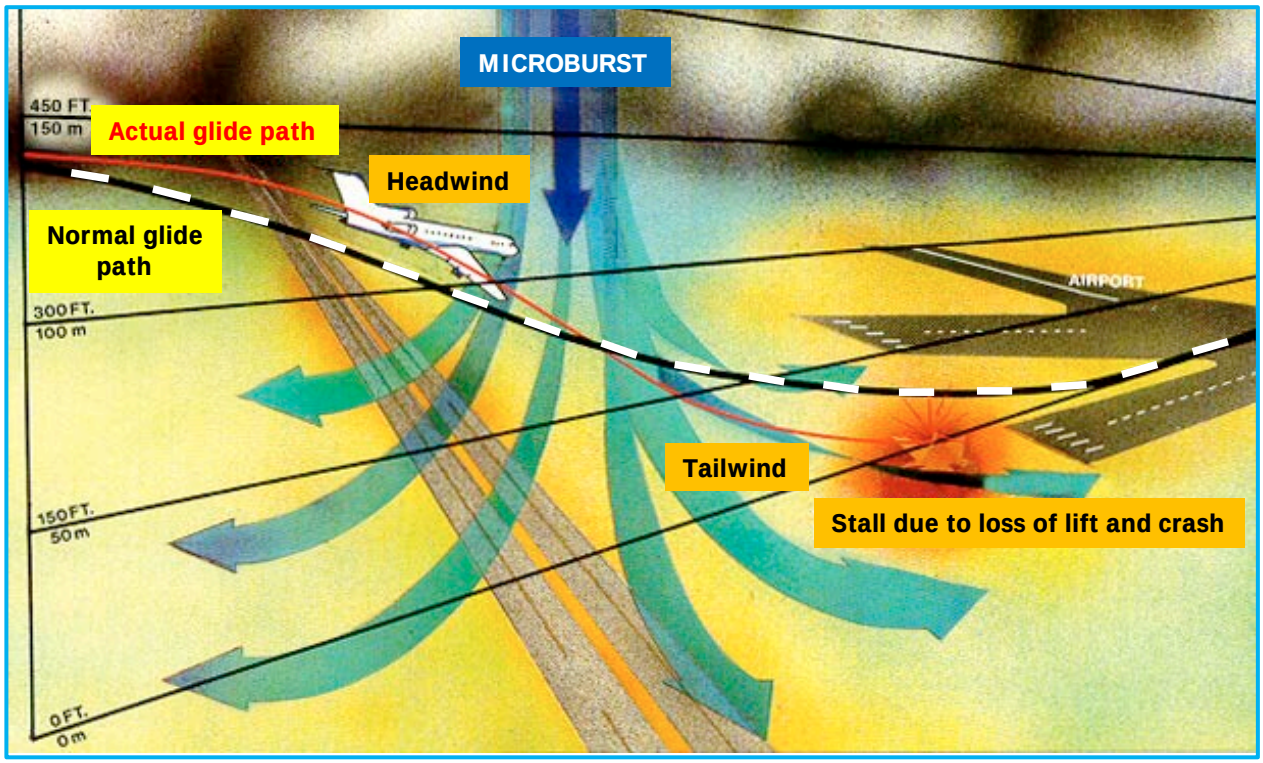


Table 1. Headwind-to-tailwind LLWS – Effects on flight performance

CHANGES	PILOT RESPONSE ACTIONS
• Indicated airspeed decreases	• Power – Increase
• Pitch attitude decreases	• Fly up to glideslope
• Aircraft tends to sink	• Need to decrease rate of descent
• Groundspeed increases	

A headwind-to-tailwind LLWS while flying on short final is particularly dangerous because the pilot has reduced power and lowered nose in response to the headwind while descending on approach. The airplane is in a power-low and a nose-low configuration when the tailwind shear occurs, making recovery difficult to impossible when the aircraft is near the ground on final approach to landing (Fig 2). Although in a power-high and nose-up attitude following takeoff, similar adverse effects can result from flying into a headwind-to-tailwind LLWS on departure (Fig. 3).

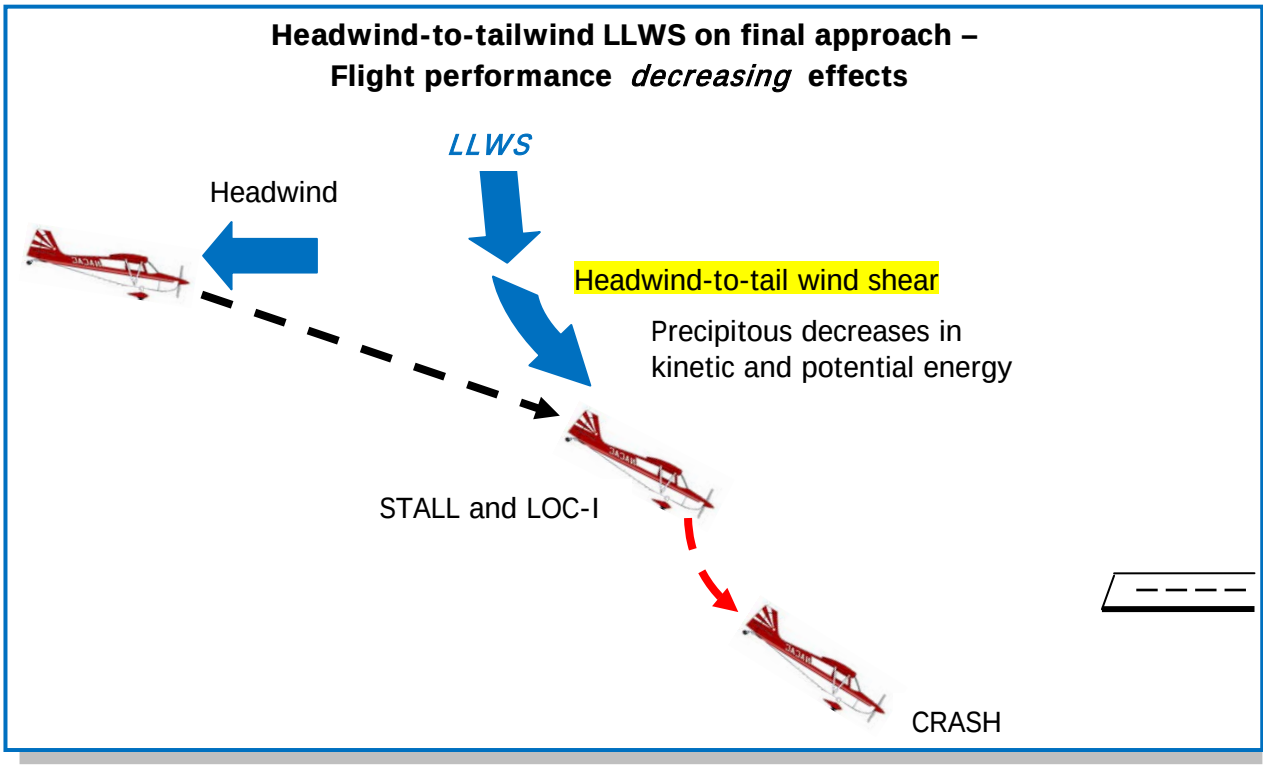
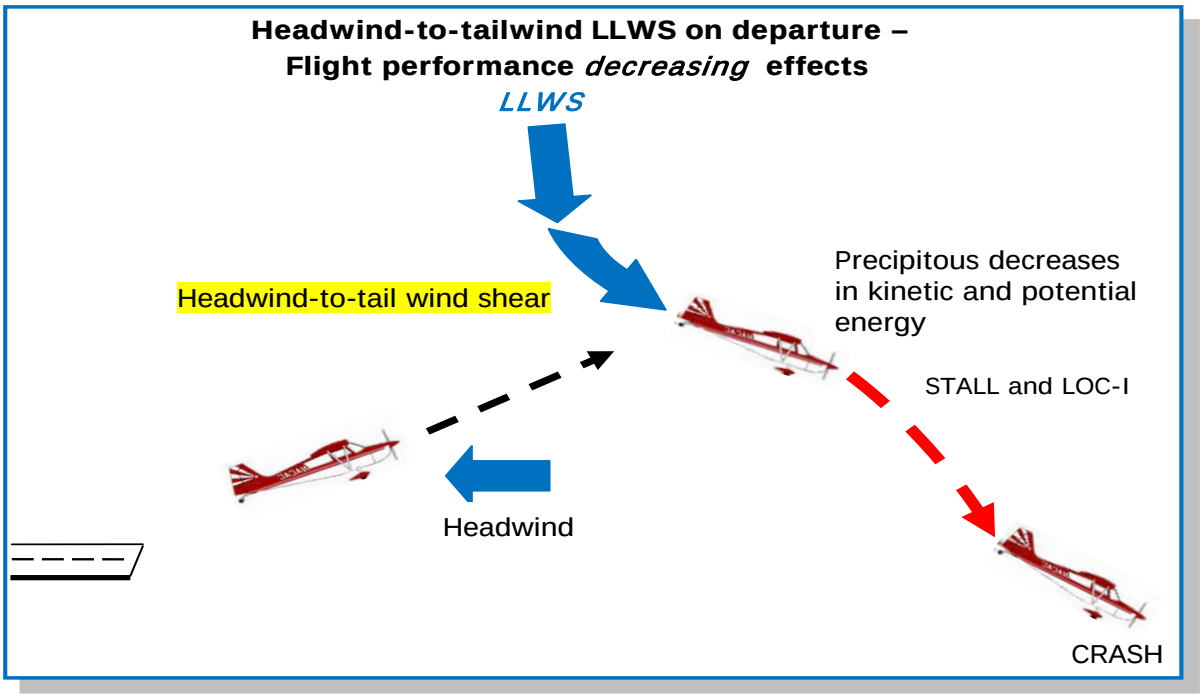


Fig 2. Initially, the airplane is flying into a headwind and descending on the glide slope. As the airplane enters a LLWS core zone, wind direction suddenly shears from a headwind-to-tailwind, resulting in precipitous decreases in kinetic energy/airspeed and potential energy/altitude (performance decreasing effects). LLWS is considered significant when indicated airspeed fluctuations of 15 to 20 KIAS occur on final.

Consider the following Terminal Airport Forecast (TAF) for a landing airport: 021530Z 31011KT 2SM BKN008 RA TCU WS015/13035KT. The information at the end of the TAF, "WS015/13035K", means LLWS is forecasted at 1,500 feet AGL, from 130 degrees at 35 knots. Suppose the pilot intends to fly the ILS 29 approach at the airport. The wind speed and direction are 310 degrees (20 degrees right of course) and 11 knots respectively. As the pilot flies over the outer marker at 1700 feet and descends through 1500 feet, there could be a sudden headwind-to-tailwind shear from 310° to 130° (180° difference) at 35 knots and possibly resulting in a fatal crash (Fig. 2).

Fig. 3 Following takeoff, the airplane is flying into a headwind and ascending. As the airplane enters the LLWS core zone, wind direction suddenly shears from a headwind-to-tailwind.



LLWS awareness and risk management (RM)

To manage the risks of LLWS you must be situationally aware of acute and violently changing wind conditions like LLWS at the destination or departure airport, especially when thunderstorms and fast moving frontal systems are in the local area. Some airports, like Orlando International (KMCO) for example, have integrated wind shear detection systems composed of a Low-Level Wind Share Alert system (LLWAS), Terminal Doppler Weather Radar (TDWR) and Weather System Processor (WSP) to alert pilots of the presence of hazardous wind shear and microbursts in the vicinity (Aeronautical Information Manual, chap 7). When inbound for landing or prior to takeoff, assess the METAR, TAF and cockpit moving map weather. Also, query ATC about recent PIREPS for LLWS conditions. The Tower should alert you to any known windshear. If you must land at the originally intended destination airport, remain alert for LLWS early in the approach phase and be prepared to initiate a missed approach at the first signs of wind shear indicated by rapid changes in airspeed. When hazardous LLWS conditions are likely to occur consider flying to another airport to land and, if departing, delaying takeoff until the winds change for the better.

CAP's Canine Volunteer Partners Take to the Air (2ndLt D. MCCrossan)

Aircrew from across Civil Air Patrol (CAP) California Wing Group 2 spooled up February 5, 2022, to support a long-standing partner of CAP, California Rescue Dog Association (CARDA). CARDA's mission is to train, certify, and deploy highly qualified search dog teams to assist law enforcement and other public safety agencies in the search for lost and missing persons. CARDA is the largest and most dispersed of the three search dog groups in California that are direct resources of the State of California Office of Emergency Services (Cal OES). CARDA provides its services to all public service agencies at no charge.

In the first such training mission prior to the pandemic, units across the San Francisco Area came together in a well-choreographed operation of aircraft and pilots: Captain Karen Hollerbach of Sq 188 piloted the Sq 44 Concord plane, Capt Michael Gross of Sq 10 Palo Alto flew the Sq 188 Oakland plane, and Sq 10 Palo Alto Capt Anthony Stieber along with Capt John Heldt piloted both planes at Sq 80, San Jose. CAP hosted nine handlers on multiple orientation sorties for their experienced (and some not so experienced) canine fliers. The goal of the training mission was to familiarize both handlers and dogs and prepare for future search missions supported by CARDA.

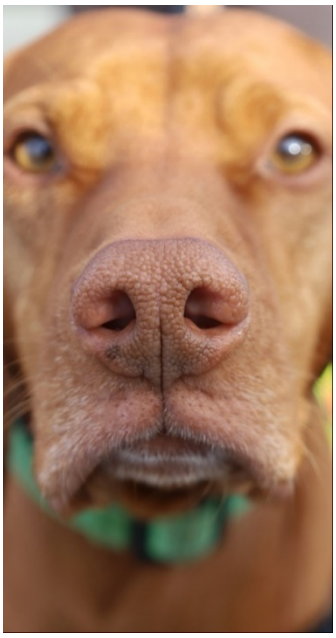
Trained specialist dogs are a familiar sight to many CAP Emergency Services ground team search missions when working alongside local emergency services personnel. Operating in an area search or specific target search role, these unique animals come into their own with their highly developed tracking skills.

As he made his way to board the warmed-up Cessna 182 of Sq 44 on the Concord ramp with his eager four-year-old ‘Zoom’ search dog, Jerry Del Rio shared some insights from working with CARDA on search missions. “We get called out to all kinds of search locations, some of them very remote, in the northern part of the state. Endurance is a key requirement for both dog and handler.” “Our dogs and handlers do train regularly with other emergency services departments, and many have flown in helicopters. The smaller fixed wing aircraft flown by CAP create a new experience for many of these dogs. We need to know that they’re ready and prepared for their search mission when they land.”

On the ground, CAP members had lots of questions for the CARDA volunteers on the training mission. “One of the most common questions we hear is: are all breeds of dogs equally suited to this search role?” added Cheryl Patelzick, with her three-year-old Ridgeback mix ‘Hope’. “Most breeds are capable of the requirements our missions demand. Cheryl added: “While most dogs are trainable, certain breeds do of course bring their own strengths, for example herding dogs in an area search and there are some breeds, like the terriers, that are ultra-focused on the target.”

All agreed that the training flights provided by CAP across Northern California were invaluable in preparing dogs and handlers for the tasks, and specifically helping some with passing their required Mission Ready certification for Cal OES. One newbie was a 10-month Kelpie mix puppy Yindi, with her CARDA handler Kathy Gaughen. “This is the best time to start the dog’s training, although we do sometimes bring dogs into the program that are a little older, but generally before age two”.

As the Sq 44 training flights wrapped up, Jerry when asked about the biggest takeaways from the training event, responded: “CAP volunteers were out here today supporting fellow-volunteers in CARDA, in support of the shared public safety mission: when the next real search arrives, we know we’ll both be ready.”



Trained specialist dogs like *Hope*, pictured here on a training mission at Sq 44, Concord, CA on February 5, 2022, often work alongside local emergency services personnel such as the County Sheriff's department. Operating in an area search or specific target search role, these unique animals come into their own with their highly developed tracking skills. Some can trail a scent up to 96 hours old. *(2d Lt David McCrossan, CAP Sq 44 PAO)*

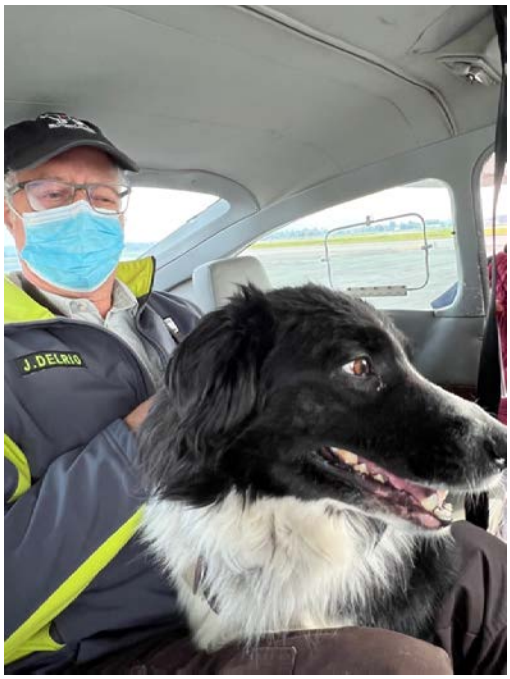
An eager CARDA search dog *Zoom* and mission pilot Capt Karin Hollerbach of Sq 188 bonded before the excitement of the training flight at Sq 44, Concord on February 5, 2022 *(2d Lt David McCrossan, CAP Sq 44 PAO)*

CARDA handler Jerry Del Rio with search dog *Zoom* undergo a preflight briefing with mission pilot Capt Karin Hollerbach of Sq 188 for a training flight at Sq 44, Concord on February 5, 2022 *(2d Lt David McCrossan, CAP Sq 44 PAO)*

Newbie to the training mission was a 10-month Kelpie mix puppy Yindi, with her CARDA handler Kathy Gaughen, bringing 17 years of experience in searches, briefing for a training mission at Sq 44 CAP Concord, CA "This is the best time to start the dog's training". *(2d Lt David McCrossan, CAP Sq 44 PAO)*

10-month Kelpie mix puppy *Yindi* watches intently as a CAP Cessna 182 departs on a training mission for California Rescue Dogs Association (CARDA) at Sq 44, Concord on February 5, 2022. *(2d Lt David McCrossan, CAP Sq 44 PAO)*

Mission pilot Capt Karin Hollerbach of Sq 188 checks fuel levels between sorties on a training mission for California Rescue Dogs Association (CARDA) at Sq 44, Concord on February 5, 2022. *(2d Lt David McCrossan, CAP Sq 44 PAO)*



CARDA handler Jerry Del Rio with search dog *Zoom* prepare for a training flight at Sq 44, Concord on February 5, 2022: "We need to know that the search dogs are ready and prepared for their search mission when they land. That means they need to be comfortable and undistracted by the experience of flying in a CAP plane. This training helps them maintain their focus and be mission ready." *(2d Lt David McCrossan, CAP Sq 44 PAO)*

CARDA handler Cheryl Patelzick with search dog *Hope,* stretch their legs with mission pilot Capt Karin Hollerbach of Sq 188 after a training flight at Sq 44, Concord on February 5, 2022 *(2d Lt David McCrossan, CAP Sq 44 PAO)*

CARDA handler Ivan Gallo boards a training flight at Sq 188, CAP Oakland, CA on February 5, 2022. *(1st Lt Alexei Roudnev, CAP Sq 188)*

CARDA handler Ivan Gallo demonstrates the calm and focused temperament of his search dog with mission pilot Capt Michael Gross at Sq 188, Oakland, CA February 5, 2022. *(1st Lt Alexei Roudnev, CAP Sq 188)*

CARDA handler Miyuki Onnagawa boards a training flight at Sq 188, CAP Oakland, CA on February 5, 2022. *(1st Lt Alexei Roudnev, CAP Sq 188)*

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