

Roelke Flight Facts & Conjecture - *The Light Keeper's Legacy*

Written by Scott Meeker for Kathleen Ernst.

Created 15Oct2011. Updated 17Oct2011.

Flight Credentials at time of Roelke's September 1982 flight.

- Private Pilot License with Single Engine, Land Rating
- Third Class Medical Certificate
- Passed his Private Pilot's Flight Test with 53.4 hours flight time
- Qualified for VFR (Visual Flight Rules) flight, day or night.
- 87 hours of total flight time, 66 hours as PIC (Pilot In Command)
- 6 hours of night flight and less than 1 hour of simulated Instrument flight

Aircraft Information for plane used for Palmyra to Washington Island flight.

- 1978 Cessna Model 172N "Skyhawk" - four-seat, single engine, land aircraft
- Tail # N3477E ("Cessna November three four seven seven Echo")
- Lycoming 160 hp air-cooled engine with two blade fixed propeller
- 2 standard fuel tanks (1 per wing) holding 20 Gallons of usable fuel each
- Engine runs on 100 octane LL (low lead) grade aviation fuel



Over 30,000 Model 172 aircraft had been built by Cessna by time of Roelke's flight, (over 43,000 have been built to the present date, making it the most produced aircraft ever).

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Before Departing Palmyra

Filing a Flight Plan for a VFR flight would not have been required, but would have been advised during Roelke's training by his flight instructor. If Roelke filed a flight plan he would do so by calling the Green Bay FSS (Flight Service Station) at (414) 494-7417 and reading the following (after dash) information to someone there.

1. Type of Flight Plan – VFR (Visual Flight Rules)
2. Plane Number - November three four seven seven Echo
3. Plane Type/Equipment – Cessna 172 "slash Tango" (the latter indicates the plane has a Transponder with no altitude encoding capability)
4. Estimated TAS (True Air Speed in Knots) – 115 knots (132 MPH)
5. Point of Departure – Eighty-Eight Charlie (Palmyra Municipal airport)
6. Proposed Departure Time - 2100 Zulu (2 PM Central time)
7. Cruising Altitude – 3,500 feet
8. Route - Direct Badger, direct Manitowoc, direct Sturgeon Bay, direct
9. Destination - Whiskey India Four Seven (Washington Island airport)
10. Remarks – None
11. Estimated Time En Route – 1 hour 45 minutes
12. Fuel – 4 hours 45 minutes
13. Alternative Airport – Sierra Uniform Echo (Sturgeon Bay/Cherryland airport)
14. Pilot's Name & Address – Roelke McKenna, Palmyra, WI
15. Number of Persons on Board – One
16. Color of Aircraft – Blue over White

Weather Briefing

After filing his flight plan Roelke would ask the Green Bay FSS for the current and forecast conditions along his route for the time period of his flight. We could posit VFR conditions, low clouds along the Lake Michigan shore, and 10 knot winds from the southwest at 3,500.

Planned Route

After departing Palmyra, Roelke would climb to his cruising altitude while flying directly to the Badger VORTAC (located just north of the Waukesha airport). He'd then fly North-Northeast to the Manitowoc VOR/DME (located at the Manitowoc airport), then North-Northeast to the Sturgeon Bay VOR (located at the airport), then to Washington Island. Roelke would be flying at 3,500 feet MSL (Mean Sea Level). This is one of the specified VFR cruising altitude for 0-179 degree magnetic courses (i.e., east of north and south).

En Route to Washington Island

It should take Roelke 1 hour 45 minutes to fly the 175 nautical miles from Palmyra to Washington Island (using the route in the flight plan above). This assumes he is flying at 3,500 feet MSL, cruising at 115 KIAS (Knots of Indicated Air Speed), using 75% engine power. It would be cheaper to use 55% engine power, but the trip would take longer. With full tanks (40 gallons of usable fuel) and keeping a 45-minute fuel reserve, Roelke could fly 385 nautical miles at 75% power, so this trip is easily within the aircraft's range.

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En Route to Washington Island, Cont.

Add an hour for flight planning and filing, preflight inspection, cockpit set up, taxi out and engine run up, and for tie-down at the destination and his trip will have an elapsed time of less than 3 hours. By car, the trip would involve driving 234 miles, which would take 4 hours, 15 minutes (assuming no Milwaukee traffic snarls), plus an unknown amount of time waiting for the next ferry departure, plus 30 minutes for the ferry crossing (6+ hours).

Arriving at Washington island

Roelke will begin descending near the tip of the Door Peninsula in order to reach WI47's 1,656 foot (1,000 feet above the ground) TPA (Traffic Pattern Altitude) by the time he enters the left hand landing pattern for runway 22 (compass heading 220 degrees, which is almost straight southwest).

In doing so Roelke will pass over Northport, perhaps a ferry en route, Plum Island, and Detroit Harbor, after which he'll turn north in search of the airport. I posit that he'd be so focused on finding the airport and getting ready to land that he would not see Rock Island until he is on the left downwind leg for landing on runway 22.



Detroit Harbor, as seen from the air, marina in center left, ferry docks in upper right.

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As part of his descent and landing preparations, Roelke needs to do a number of things:

- Set his radio to channel 122.9, WI47's CTAF (Common Traffic Advisory Frequency), and listen for other aircraft announcing themselves at or near the airport.
- When no one else is broadcasting, Roelke should key his radio microphone (mic) and say: "Washington Island traffic, this is Cessna November Three Four Seven Seven Echo, five miles southwest, inbound for landing Two Two."
- Change the engine's fuel mixture from "lean" (cruise setting) to "full rich"
- Make sure the fuel selector is turned to "both"
- Slow to 85 KIAS (Knots Indicated Air Speed), then lower the flaps on the wings.
- Pull back on the throttle to reduce the engine's RPM's until the aircraft begins to descend at 500 feet per minute, as indicated on the VSI (Vertical Speed Indicator).
- Announce: "Washington Island traffic, Seven Seven Echo left downwind for Two Two."



Above is the Washington Island airport as it appears looking left and back from the left downwind approach to runway 22. The runway begins on the right side of the photo, just beyond the road, and runs upwards to the left. The deer emerge running from the woods on the right, cross the road, and spill onto the runway -- right where Roelke must land.

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Getting into Trouble

As Roelke flies the left downwind leg of the 22 pattern (i.e., parallel to the runway, flying in the opposite direction that he intends to fly when on final approach) he should look to the left to see if 22 is clear of aircraft and/or other obstructions. Instead, we posit that he gets distracted by the sight of Rock Island, which would then be visible to the right of the aircraft. I'd posit that doing so causes him to be late turning base, making for a longer final. This throws off his rate of descent, requiring him to speed up a little for the longer approach (the need to clear the trees at the approach end of 22 would influence this too).

- Turn 90-degrees left onto the "base" leg of the approach pattern and announce: "Washington Island traffic, Seven Seven Echo turning base for Two Two."
- Watch his airspeed, descent rate, and the runway, then turn left 90 degrees and make any necessary corrections so his aircraft is lined up with the runway, then announce: "Washington Island traffic, Seven Seven Echo on final for Two Two."
- The sun is now above and in front of the plane, coming through the windshield. The glare reduces how well Roelke can see the runway, and his instruments.
- Runway 22 is 1,840 feet long and there are trees near the approach end. In order to clear the trees, Roelke will end up using about 1,400 feet of the runway to land and bring the aircraft to a halt. To do this he will use "short field" approach settings: flaps "full down" (40 degrees) and an approach airspeed of 60 KIAS (70 MPH).
- As the aircraft is approaching the trees near the end of the runway, Roelke catches sight of movement ahead, and then recognizes that there are deer running from the trees in front of him toward the runway where he is planning to land.

Aborting the Landing

Startled by this unexpected development, Roelke decides to abort the landing and do a "go around". He begins to pull back on the yoke to lift the airplane's nose, and shoves the throttle all the way forward to get full power in order to begin climbing. However, because the mixture is still set to "Lean", the engine hesitates for a heart-stopping, "high pucker factor" moment. Roelke has a brief, but intense moment of panic before the engine recovers and the RPM's begin to increase. Because he has pulled back on the yoke, but the power has not yet come back up, the airspeed drops, and the stall-warning horn begins to sound.

Cessna 172's have a simple stall-warning device that makes a shrill sound starting at 5-10 knots (6-12 MPH) above the speed at which the wings will stall. In Roelke's situation, the stall would happen at about 40 KIAS (46 MPH). On a good landing the pilot hears the stall warning just as the aircraft's main wheels touch the runway.

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Hearing it any other time means the pilot needs to take immediate action to keep the aircraft flying or, if the stall has already happened, to recover from it by trading altitude for air speed. If the aircraft is near the ground or obstruction, then there may not be enough altitude left to make a recovery before crashing. Roelke would have practiced stalls and recovering from stalls during his pilot training. He would know that he is in an increasingly dangerous situation.

The aircraft is flying slowly (close to a stall), very near the ground and the deer. The natural reaction is to pull back on the yoke to make the aircraft "pull up". However, doing so without sufficient power from the engine will cause the plane's airspeed to decrease. If the speed drops too low, then the wings will "stall" (stop providing lift). A Cessna 172 will drop a minimum of 200 feet before a recovery from a stall can be made. On final approach there is rarely sufficient altitude left to recover, so if a stall does take place, then a crash is almost inevitable -- and will happen quickly.

Roelke *must wait* until the aircraft has gained enough speed to provide the lift needed to begin climbing, and then only climb as steeply as the necessity of maintaining a 60 KIAS (70 MPH) airspeed will allow.

Second Landing

So startled and distracted is Roelke that he forgets to announce on the radio that he is aborting his landing and departing 22 to the southwest.

- I'd suggest he climb up and head away from the airport for a few minutes to recover from the experience and figure out why the engine hesitated. The Cessna 172 Information Manual lists the following as potential reasons for "rough engine operation or loss of power: Carburetor Icing, Sparkplug Fouling, Magneto Malfunction, and Low Oil Pressure." None of these apply.
- After berating himself, and carefully going through his landing preparation checklist again (during which he will discover that the mixture set to "Lean"), he will re-enter the pattern and land successfully.
- After he is down he hopes that no one heard or observed his botched first attempt.

Potential Second Mistake

There is the potential at this point for Roelke to make another mistake: forgetting to call the Green Bay FSS and "close" his flight plan by telling them he has arrived at his destination. Failure to do so is a newbie mistake, and will cause the FAA to try to track you down using the information in your flight plan, to determine whether you arrived safe or are missing somewhere.