Next WingNuts Chapter Meeting: ***Sat. Dec 10, 2022 12:00 PM – Christmas Banquet will be held in Glen's Hangar***

Next VMC Club Meeting: ***Tues. Dec 27, 2022 6:00 PM - Hunter International Air-Field***

WINGNUTS PLANE TALK

Chapter 1321 / South Middle Tennessee

Our Chapter Home Page: https://chapters.eaa.org/eaa1321

Merry Christmas

And

Best Wishes for the New Year

NOTE: Our Chapter Website continues to be improved! Mike Bishop has built on what Robert Heller had started. He has been able to finesse the content, most notably adding a section for pictures of our member's aircraft. Including an interesting feature that allows additional pictures to be linked to your aircraft's picture!!!!

You can see an example by clicking on the picture of Mike Bishop's PA 12, additional pictures of him flying the NYC Corridor, etc will appear

So, if you have additional interesting pictures of your aircraft in interesting locations, etc supply them to Mike and he will get them linked to your picture.

Please pass on your thanks to Robert and Mike for persevering in figuring out how to update it!!! If anyone has thoughts on what else should be included on our site let Mike or I know!!

INSIDE THIS ISSUE

PRESIDENTS CORNER:

Merry Christmas everyone, wow it's that time of the year already and I'm looking forward to our Christmas Banquet next Saturday. It is always a great time when we can get together with family and friends, and you all have been great friends.

This will be my last Presidents Corner column because as you all know Craig Bixby will be leading us as President starting in January. I have enjoyed serving this chapter for the past few years with Scott LeVeque as Vice President, Jim Tjossem as Treasurer, and Paul Reding as Secretary.

One thing I've learned is it takes everyone to make a group like ours work. It takes those that hold the elected positions, those that take the voluntary positions, and those that help whenever there is a need. But the most important position is you the membership. If it weren't for you there wouldn't be anything to lead, so thank all of you throughout the years to make this a terrific group. In a way I'll miss not leading this chapter, but I know Craig will take us in the right direction. I'll still be around as Vice President serving you and helping Craig when he needs me. Well enough for now. I'll probably will have more to say at the Banquet.

See ya all Saturday,

Glen Smith

President

Secretary's Minutes from the 11/12/22 Meeting

Chapter 1321 Met at Hunter Field on November 12, 2022, presided over by President, Glen Smith

Meeting Discussions

The Christmas Banquet: Chapter supply Ham and Chicken.

Craig and Lori will coordinate the dishes to bring for the pitch in

Chapter Business Cards have been purchased. They are on the table in the clubhouse. Pick some up for your wallet so you can pass one out during chance encounters with people interested in EAA

Keep Russ Sandstead in your thoughts concerning his health issues

Mike Bishop becoming Young Eagles Coordinator

Our Member List is missing several people's EAA Membership Numbers

Chapter Name Tags are offered for sale at $5.00 **(see below)**

Members Discussions

Dan Ford gave a update on building Zenith 701

Tom Lewis talked about recovering the tail of his ultralight cub

Pete Larson gave an update on replacing the gear on his Mustang II

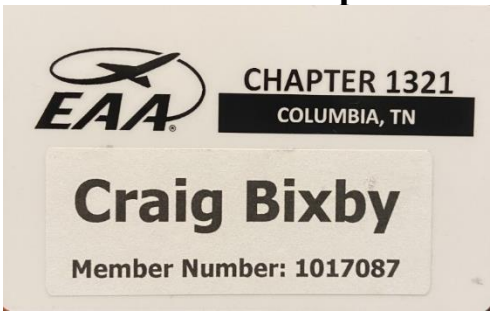
Glen Smith explained he found crushed Intake Tubes as the cause of his decreased Engine RPM's

Upcoming Chapter Schedule

Christmas Party at 12 PM in Glen's Hangar, held in lieu of our December Meeting on the 12/10.

VMC Club will meet Tuesday Dec 27th at 6 PM

Reminder about Chapter Name Tags



To receive yours,

Email Craig Bixby at n3165e@hotmail.com with your name and EAA Member Number. He will print up your Name Label

Pay your 5 dollars to Jim Tjossem

Editors Note: Last month we discussed off-field landings and the importance of selecting a suitable area to land, then selecting a suitable landing field within that area using the letters* SSSSW *as a guide

Surface, Size, Surroundings, Slope, Winds

Reminder, Gravity never loses! The best you can hope for is a draw!

This month we'll continue the discussion with the following topics:

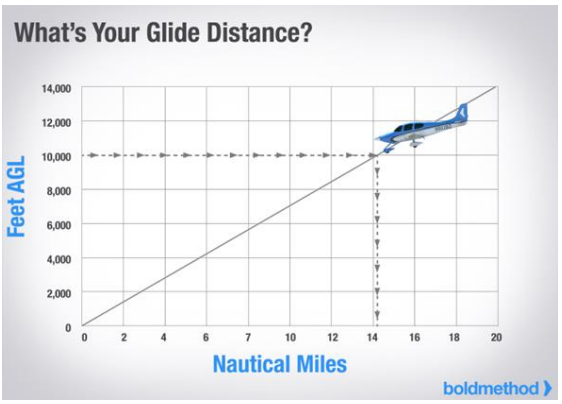
Evaluating your field selections as you descend
Planning the approach with wind, obstacles, and local terrain in mind
Executing the approach and landing

Outlandings:

By Adam Woolley

As, you saw from last month's article there are many things to be taken into account when choosing your Landing Field

Time and Height are the keys to judging if a field is within reach and thoroughly checking out your field selections



As you are descending you

Should Notify Someone
First, squawk 7700. That will light up ATC's radar scopes. At that point, they'll start tracking you and getting emergency response ready.

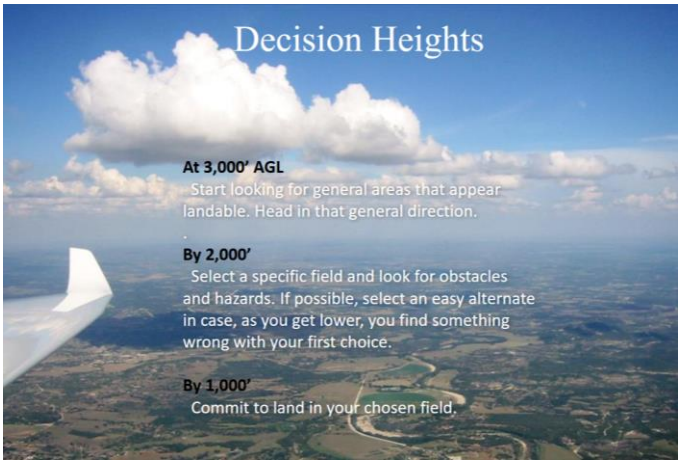
Talk to ATC. If you don't have the local frequencies use the universal emergency guard frequency of 121.5. 121.5 If none of that works, you can always try the universal Flight Service frequency of 122.2.

Should continue to evaluate and reevaluate your field selections

NOTE: It is better to select a field that allows the usual left hand circuit, rather than one that would required the less normal right hand circuit.

Use the following Decision Heights in making your final field selection

Note: Out of the 10 fields you originally saw, there are 5 useable



At 3000', begin narrowing down your choices.

At 2000', it's time to start narrowing them down further

At 1500', it is the time to select the best option and a nearby backup field

Start planning your pattern

Use every opportunity while flying the approach to inspect the landing area and look for obstacles or other hazards.

At 1000' on downwind to your chosen field

Beware of previously unseen obstacles

If room in the to avoid them, adjust your pattern and landing point

If not, Change your approach to your backup field

NOTE: The secret to getting into the field is to use the same, consistent pattern every time.

This consistency helps establish an awareness of appropriate glide angles and can be used at the home field or in the event of an off-field landing.

Remember, the altimeter is useless. Fly the approach and assess the progress by recognizing and maintaining the angle that puts the aircraft at the intended landing spot safely

As you are preparing for a power-off landing, there are two things you need to consider to make your landing survivable.

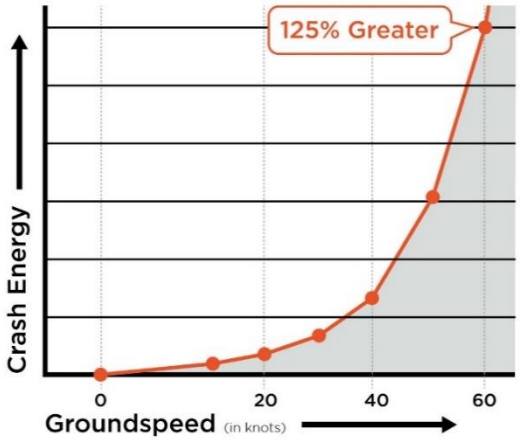
First, you need to keep the cockpit and cabin as intact as possible by using dispensable parts of the plane, like the wings, landing gear and bottom of the fuselage to slow you down during landing.

And second, you need to prevent your body from hitting the inside of the cockpit during touchdown, by making sure your seat belt is tight.

Speed and Energy

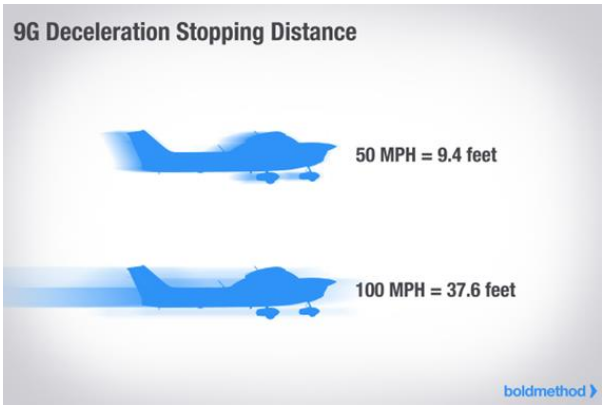
Most GA airplanes are designed to protect you at up to 9 Gs of forward acceleration.

In an off-airport landing, even relatively small changes in groundspeed can have major implications for crash survivability.



Energy increases with the square of speed. A 60-knot landing is only 50 percent faster than a 40-knot landing, but involves 125 percent more energy.

Look at these examples:

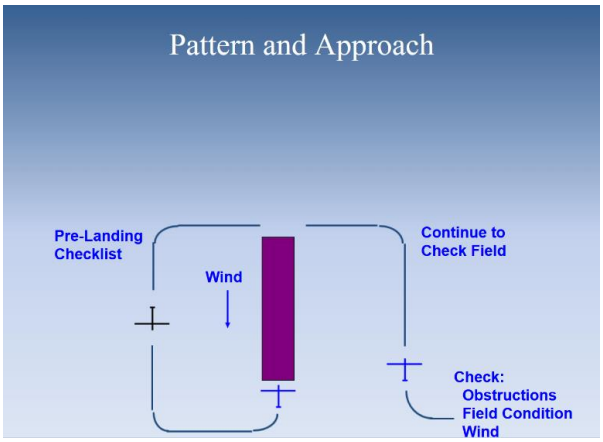


If you're flying at 50 MPH, the required stopping distance at a 9 G deceleration is about 9.4 feet.

And if you're flying at 100 MPH, the required stopping distance at a 9 G deceleration is about 37.6 feet.

Think about that for a minute: 37 feet isn't a lot of required stopping distance in a survivable crash. In fact, it's just a little bit longer than the fuselage length of your plane.

The recommended approach procedure is to fly the following legs in the pattern:



- Crosswind leg on the downwind side of the field
- Upwind leg
- Crosswind leg on the upwind side of the field
- Downwind leg
- Base leg
- Final approach

This approach procedure provides the opportunity to see the intended landing area from all sides.

The length of the selected field is likely to be shorter than your home field
This may result in a tendency to fly the downwind leg too close to the field

Apply the same technique as you do at your home strip

Divide the Landing Area, into the

Aim point

Touch down point

NOTE: The field you've chosen for your Emergency Landing will probably be smaller than your home field

You should consider aiming at whatever mark is closest to the beginning of useable field length

Ie. If it is a fence, aim just inside the fence

In extreme circumstances the aim point would be the fence itself, the round out would begin over the fence, and the touch down just inside the fence line

Aircraft Configuration For Off-Airport Landings

What should you do with flaps when you're landing off-field? Flaps let you fly at slower speeds before stalling, which is obviously a good thing. But they also significantly decrease glide distance.

You need to be very careful about adding flaps too early in your setup for an off-field landing. Otherwise, your best-laid plans will go out the window, and you'll end up landing somewhere you really don't want to be, as opposed to somewhere that's a decent landing spot.

Landing gear position is another thing you need to be thinking about.

There's no hard and fast rule on using them, but if you have retractable gear, you have a few more choices to make.

If you're touching down on something soft, like a plowed field, landing with your gear down means there's a reasonable chance your gear will dig into the dirt and flip your plane.

But if you're landing on a hard surface, putting your gear down helps cushion your touchdown, as well as decelerate your plane all the way to a complete stop.

Touching Down Off-Airport

As you touch down, remember the words of the legendary pilot Bob Hoover: "If you're faced with a forced landing, fly the thing as far into the crash as possible."

After you've come to a complete stop, there are two things you want to do quickly. If you have time, activate your ELT so search and rescue can find you. And second, get your passengers and yourself out of the plane.

Executing a good power-out landing comes down to flying the plane all the way to a complete stop, picking the best landing spot you can, and letting ATC know about your situation. Do all three, and you'll have a landing you can walk away from.

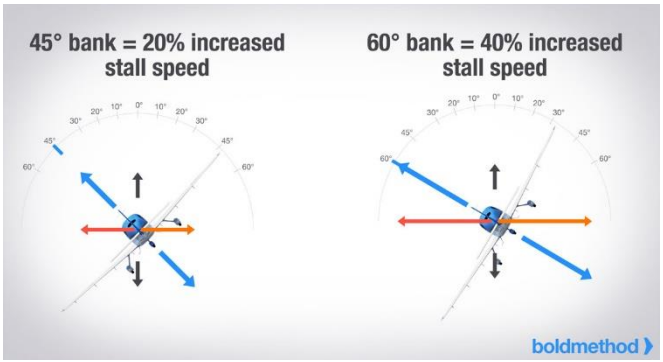
Emergency Landing Considerations

When a prang seems inevitable, endeavor to strike the softest, cheapest object in the vicinity, as slowly and gently as possible. Advice given to RAF pilots during WW II

If you're faced with a forced landing, fly the thing as far into the crash as possible. Bob Hoover

Controlling Attitude And Sink Rate

When you're landing off-airport, the most critical mistake you can make is not controlling your aircraft attitude and sink rate.



Steep bank angles before landing should be avoided. When you're in a steep bank, your stall speed is significantly higher.

The aircraft should touch down with the least possible impact and forward speed

If a hidden obstruction is encountered, or a ground loop occurs, less damage is likely.

In soft soil and high crops the ground run will be short

Misjudging the height may result in overshoot

If, the aircraft is going to over-shoot and run into the far fence or some similar obstruction, **initiating a ground loop may perhaps avoid or reduce personal injury**

Obstacles at the approach end of the filed reduces size of the field by 8 times the height of obstacle

Hone your skills first

The first thing you absolutely must do prior to going off airport is to develop your skill set on an actual airport. Runways have stripes....learn to land precisely that stripe, and keep the airplane there, throughout the landing/takeoff roll. Every time.

Learn to choose your touchdown spot and train to land precisely on that spot, not twenty feet down from that spot, and certainly not ten feet short of it. Every time.

Learn to fly your airplane at a comfortable slow flight speed down the runway center, just offset from the centerline, while ten feet off the ground, and looking at the runway for imperfections (most runways have them).

Start this process at altitude by learning to fly precisely and consistently in slow flight, plus 5 mph, minus 0 mph, every time. Use the flaps...it's what they're for. Get proficient at this in the air at altitude before you try it close to the ground.

I included links to a few good internet sources

https://wingsandwheels.com/blog/post/land-outs-they-happen
https://chessintheair.com/landing-out/
https://youtu.be/CXImj2rGkf8
https://www.boldmethod.com/learn-to-fly/navigation/if-your-engine-fails-how-should-you-pick-your-off-field-landing-on-a-spot/
https://gliding.world/index.php/gliding-the-basics/4-18-the-landing

The Aviation Consumer

Vacuum Pump-411: Continually Improving

By Rick Durden

While glamorous glass cockpits are probably the wave of the future, in the real world the vast majority of airplanes still sport round-dial panels with gyros spun by air pumps that either suck or blow.

We tend to collectively call them vacuum pumps turned by the accessory drive of the engine, that almost invariably in flight.

We only seem to pay attention to the air pump in our airplane when it fails—and unless we have a low vacuum annunciator light on the panel, we may not notice for some time, which can have ugly implications.

After a spate of loss of control accidents blamed, at least in part, on failures of air pumps, a lot of attention was paid to that accessory and much effort went into improving their reliability. From what we can see, the efforts were successful, at least in part.

As aircraft owners, what can we do to extend the life of our vacuum pump and what are our options when it's time for replacement?

Background

Vacuum pumps were developed in the late 1930s—prior to that air-driven gyros were spun by suction from a venturi attached to the side of the fuselage.

A vacuum pump provides more suction than a venturi could provide.

The first pumps were "wet," the interface between the carbon vanes and the interior of the metal housing or stator of the pump was lubricated by oil.

Wet pumps proved reliable, usually lasting through TBO of the engine.

The downside to that was they were relatively expensive and because some small portion of the oil lubricating the vanes constantly exhausted overboard with the air being pulled through the pump, they left a fine mist on the belly of the airplane.

While the amount was often small there was a perception they were messy and some owners paid for an add-on air-oil separator to return the exhausted (and potentially contaminated) oil to the engine—something we don't recommend.

"Healthy dry air pump, left, showing graphite vanes angled in carbon rotor.

Dry air pumps debuted in the 1960s and effectively put wet pumps out of business. Lighter and about half the cost of wet pumps, dry pumps use vanes that are made of graphite.

The vanes move freely in the slots of the central rotor and are held against the stator by as the rotor spins.

Lubrication for the pump is created by the wearing of the graphite vanes as they slowly erase themselves and leave a fine layer of dust between the vanes and stator.

Since the air pumps get very hot in operation, the use of carbon or graphite rotor and graphite vanes keeps the pump dimensionally stable with temperature changes—and they are excellent for operating efficiency.

The downside is that the thin rectangular vanes (usually six), will eventually wear down to the point where they are too small to stay in position.

One will then break into pieces and the pieces will rapidly destroy the rest of the vanes (and rotor), causing catastrophic failure of the pump.

Because of the nature of the design, there is no warning of impending failure—**vacuum pressure does not drop as the vanes wear.**

Besides the issue with vanes breaking due to wear, the pumps are also susceptible to damage from a small piece of foreign material or any liquid.

In our interviews of pump makers and maintenance shops, **a common theme we heard about dry pump life was the need to do some preventive maintenance to allow them to last as long as possible.**

Use care when washing the airplane and engine, make sure no liquid gets into the pump—it will turn the graphite dust to paste fairly quickly and destroy the pump.

Teflon tape should not be used on pump fittings, pieces break off and get into the pump.

The vacuum system filters should be replaced at the annual or at 500 hours (main filter) and 100 hours (other filters) of service, whichever comes first.

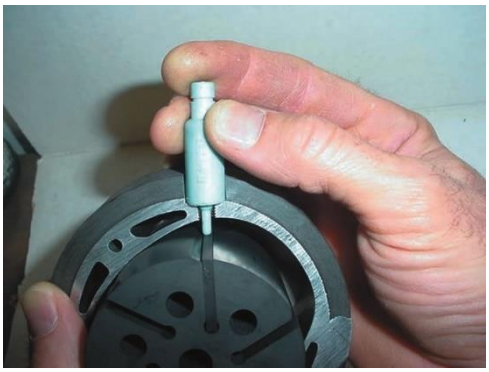
If the filters get plugged, the pump has to work harder and fails sooner

We learned that one of the most common cause of pump failure is FOD from the vacuum system hoses located under the instrument panel. One shop stated they often see 30- and 40-year-old airplanes that have never had the vacuum system hoses behind the panel replaced.

If you suddenly start having air pumps fail, the problem probably lies in the system, not with the pump. **So, when you change the failed pump, it may be a good idea to change the hoses and replace the filter!!**

One of aviation's old wives' tales is that you'll wreck your vacuum pump if you move the prop backward. Fortunately, that's not true.

Vacuum pumps come in two sizes, and are referred to as 200- or 400- series. A 200-series pump will run two gyros—that's it. If your airplane has anything more than that, such as an inflatable door seal, copilot gyros and/or de-icing boots, a 400-series pump is necessary.



One of the smartest safety developments in the world of dry air pumps has been the viewing port invented and patented by Aero Accessories for its 200-series Tempest line of air pumps.

Removing a small screw allows you to insert a special tool and measure how long the vanes are—and how far they've worn down.

A published wear guide describes when it's time to take the pump out of service and have it overhauled or replaced.

The patent has been licensed to other manufacturers so if you are buying a 200-series dry rotary vacuum pump, new or overhauled, it should be one with a wear indicator port. While it will not protect against pump failure due to FOD, it will let you know when it's about to wear out and fail.

New or Overhauled?
Wet and dry air pumps can be overhauled by specialty facilities or most manufacturers. In general, overhauled units are less expensive than new ones, but come with a shorter warranty.

One Last Thought
No matter what sort of pump you have spinning the gyros, we think it's wise to have some type of satisfactory backup that will allow you to keep the airplane upright when the pump goes out—because at some point, it will.

Vacuum Back-Up Systems

Which Back-Up Is Best? - Aviation Consumer

The system should pull your fat from the fire after an inflight vacuum failure and address the aircraft-on-ground (AOG) problem of a weekend failure stranding you at some God forsaken pea patch with the closest replacement pump three days away. There are many Vacuum Solutions with as many different price ranges.

Precise Flight
Makes the cheapest and most cost effective standby vacuum that we know of. The Precise Flight SVS system taps the pressure differential in the engines intake manifold and makes a vacuum source out of it.

And like the fast-slow-fast wipers of the 1950s-if you don't remember, ask your grand dad- these **systems work well at low power settings but hardly at all under full power, where the vacuum differential in the manifold isn't great enough.**

What this means is that if you have a pump failure at some mid-altitude, say 8000 feet, you'll need to reduce power to generate enough vacuum to run the gyros. And that might mean descending so the available power is sufficient to maintain altitude, but at a slow cruise speed.

You'll get still more vacuum when you begin the descent for an approach, with reduced power.

The downside of this system is that you might not have the altitude to give back due to weather or terrain. Further, this system isn't recommended for turbocharged engines, although owners install it nonetheless.

From a mid-teens cruise altitude, you'll need to descend quite some distance to keep the gyros happy.

Pros: Cheap, easy to install, reliable.
Cons: Minimal vacuum; requires slow cruise and/or descent; not recommended for turbocharged aircraft.

Aero Advantage
Advancing up the vacuum-only food chain, the choices get expensive by a factor of two.

The Aero Advantage dual-chamber pump is the new kid on the block and looks quite promising.

The pump drives two pump chambers through a single shaft. If one chamber fails, the other will deliver full vacuum for at least 20 to 50 hours, making this pump a true back-up system requiring no additional plumbing.

However, installation is not a simple bolt-up. You have to run wiring into the cockpit for an indicator light warning that one of the chambers has failed but reversion to the second chamber is automatic. The pump retails for about $750 and we think you should plan on about $1000 total to install it.

Pros: Automatic, self-contained back-up; cost effective price; will run a second vacuum-powered AI; reasonable rebuild costs.

Cons: Won't fit every airplane; if you're a stickler for legal detail, you'll need a spare pump if the Aero Advantage fails on a trip and you want to fly home IFR.

Aero-Safe Guardian

The Guardian system has been around for years and represents a simple solution to a simple problem: its nothing but a conventional dry pump married to an electrical motor. When the engine-driven pump fails, you simply switch on the Guardian system and you're back in business.

As back-ups go, the Guardian isn't cheap, at $1995 for a vacuum version and $2095 for a pressure version, plus $200 to $300 in installation costs.

Pros: Full vacuum at the flip of a switch; STCs apply to most aircraft; plenty of vacuum to run a back-up AI; you can fly home IFR with a failed engine-driven pump.

Cons: Relatively expensive to buy and somewhat complex to install. Weight is 8.5 pounds, making this the heaviest of the back-up options

There are many additional systems that you can read about using the Link to the article above.

Recommendations

Thinking practically here, the back-up requirement ought to match the airplanes capabilities and its mission. If you own an Archer or a Cessna 172, say, and fly the mildest of IFR, the Precise Flight SVS induction vacuum system will be hard to beat valuewise.

It performs well, is quick to install and will get you on the ground following a pump failure. For the Saturday-morning AOG solution, budget another $300 or so and carry a Rapco or Tempest pump in the baggage compartment. Total invoice: under $1000, an excellent value, in our estimation.

For a high-performance aircraft flown in serious IMC, the choices are more complex. If budget allows, we like the electric gyro approach because it provides an always-erect attitude display operated by an independent power source.

Adding it all up, the best-value middle ground appears to be the Aero Advantage dual chamber pump. For $1000 or so, it provides full-capacity back-up and, depending how squeamish you are, it has a self-contained AOG solution; fly home on the second chamber after a failure.

Otherwise, carry a spare pump for another $300. For another $700, you can add a second vacuum AI and cover all the bases for a little more than $2000. In our view, this provides the most permanent, in-panel capability for the least amount of money.

Cold Start Procedure
Stay Inside and Have an Irish Coffee

Flying Magazine has printed a follow up to their article about the Spruce Goose that was in last month's Newsletter. So, thought I would share it

Inside the 'Spruce Goose'

For the record, the *Spruce Goose* wingspan bests the C-5 by approximately 97 feet, and the tail of the wooden behemoth is over 100 feet tall.

You enter on the cargo deck and the ceiling is high above you. It is almost like stepping into a cathedral. The aircraft smells different from the other restorations I have been aboard—it took me a moment to realize I was smelling the wood.

Looking down the Spruce Goose's wing. The round shape to the left is the oil tank. At its thickest, the wing is 11 feet high, making it easy for a person to walk down the wing to tend to an engine in flight.

The flight deck is above the cargo hold, accessed through a circular staircase.

The first thing struck me about the left side of the cockpit was the throttle quadrant—eight levers in all.

Hughes was known for eccentricities but he did like his comforts—there are built-in coffee urns on the flight deck

The arrangement of the instrument panel is confusing by today's standards. Most of the aircraft I have flown are post-1967 designs with the standardized placement of the so-called six pack: airspeed on the top row, far left; the attitude indicator then altimeter; then on the second row, left to right, the turn coordinator/slip skid indicator, heading indicator, and vertical speed indicator.

The flight engineer's station is located aft of the pilots' seats on the starboard side of the fuselage. It is a wall of dials stacked 11 high and eight across next to panels of annunciator lights and switches. The dials measure manifold pressure, tachometer, oil temperature and pressure, fuel pressure, cylinder head temperature, and fuel flow—that's how you keep track of eight engines.

Use the link to read the entire article

https://www.flyingmag.com/inside-the-spruce-goose/?utm_campaign=Newsletter%20-%20Flying%20Mag%20Daily&utm_medium=email&_hsmi=233210157&_hsenc=p2ANqtz-98fGDs75T6mEInwo0jhBKoHbzPG7f9sMJ9DZYgzofeIUrwrP57MojYwRQ-0uVzjqYuPdjFYO2zJf9MvdyVGbElRwz0fQ&utm_content=233210157&utm_source=hs_email

TAF Dissected

Here's the ultimate decoder ring for this valuable planning tool that every aviator should be referencing for nearly every flight.
By Tim Vasquez

The Terminal Aerodrome Forecast, TAF, is a staple of aviation weather, known to almost every pilot. In this article we'll take an inside look at this tool in a more readable format than you're probably used to.

Initially the United States was slowest to adopt TAF, using it sparingly for its large international airports and military bases. Elsewhere the U.S. continued using the old terminal forecast format, FT, which hung around until 1995 when they were finally phased out.

A Sample TAF

As we discuss TAFs, we'll refer to this example pulled from the Aviation Weather Center website at aviationweather.gov, which is a great source to get the data.

You may already know how to decode this example, but read on and I guarantee you'll pick up some new information.

```
KIWD 142320Z 1500/1524 24009KT P6SM SHRA BKN045
  FM150200 28012G21KT P6SM SHRA OVC021
```

Location Identifier

Our TAF starts out with the location identifier, KIWD, more properly the "ICAO indicator," a four-letter code that shows the location of the forecast. In this case KIWD is Gogebic-Iron County Airport in Ironwood, Michigan. United States

TAFs are valid at the airport and five statute miles around it, while the 5–10-mile range is a donut-shaped area officially considered to be the "vicinity" of this location.

Location identifiers in the United States are officially published in a document known as FAA Order 7350.9, Location Identifiers. You can also visit sites like Airnav, which aren't official listings but are built on databases from the FAA's National Flight Data Center.

Technically, the FAA only maintains a system of three-letter identifiers. To get the ICAO form, the FAA instructs us to put a "K" before the identifier in the Lower-48 states. Alaska and Hawaii have a system of separate ICAO identifiers that begin with "P" and you'll need to make sure you have those sorted out before taking your airplane up north for the ultimate hunting or fishing trip.

If your flying takes you overseas, you'll need to turn to ICAO Doc 7910, Location Indicators, issued four times a year. But most briefing services have a copy of the document if you need information from it.

Time Group

```
KIWD 142320Z 1500/1524 24009KT P6SM SHRA BKN045
  FM150200 28012G21KT P6SM SHRA OVC021
```

All TAFs start with a date and time group, expressed in Universal Coordinated Time (UTC), also known as Zulu time from the old phonetic military time system, hence the "Z." In our example we see the time is "142320Z." This means the forecast was issued on the 14th of the month at 23:20 UTC.

The time group may not seem like much, but you should get into a habit of checking this whenever using a TAF.

The next block of data is the valid time, which tells us the range of time the entire forecast covers. This is given as a ddhh/ddhh group, where the first group is the beginning date and hour, and the second group is the ending date and hour.

In the United States these typically span 24 hours.

```
KIWD 142320Z 1500/1524 24009KT P6SM SHRA BKN045
  FM150200 28012G21KT P6SM SHRA OVC021
```

In our example, "1500/1524" tells us that the forecast spans the entire day of the 15th. This is only a 24 hour forecast.

Wind Data

Our next block of data gives us the wind. This is provided in the form dddffKT or dddffGggKT, where ddd is the direction in degrees, ff is the sustained wind speed in knots, and gg is the wind gust.

```
KIWD 142320Z 1500/1524 24009KT P6SM SHRA BKN045
  FM150200 28012G21KT P6SM SHRA OVC021
```

Direction in METAR and TAF reports are always relative to true north. When talking to the tower, remember that you will get a magnetic direction from them instead.

If you're accustomed to METAR observations, you know that the wind speed is a two-minute average at observation time in the U.S., while the gust represents the maximum wind observed over the previous 10 minutes.

But the TAF is slightly different as it's written to express a wind that is representative across the entire time group.

> If the wind speed is seven knots or greater, the forecaster is obligated to provide a direction.
>
> If the speed is below that figure and a prevailing surface wind cannot be determined, the forecaster will use VRB for the direction.
>
> Calm winds will always appear as "00000KT."

Visibility

Prevailing visibility, by definition, is the maximum visibility that exists across at least half of the horizon. Visibility, of course, is the greatest distance at which an object can be seen and identified. Simple enough; we just need to know which units to use.

U.S. TAFs express prevailing visibility in statute miles, adding "SM"

```
KIWD 142320Z 1500/1524 24009KT P6SM SHRA BKN045
  FM150200 28012G21KT P6SM SHRA OVC021
```

Visibilities greater than six miles cannot be reported in a TAF, so when you see "P6SM" that means visibility ranges from "good" to "clear as a bell."

Weather Type

Anytime weather or an obstruction to vision is present, the forecaster must specify it immediately after the visibility. You may be well familiar with these codes already; such as the SHRA in our example which indicates rain showers.

```
KIWD 142320Z 1500/1524 24009KT P6SM SHRA BKN045
  FM150200 28012G21KT P6SM SHRA OVC021
```

Following is the Complete Code Listing

WEATHER & OBSTRUCTIONS TO VISION

Intensity or Proximity	Descriptor	Precipitation	Obscuration	Other
- Light	**MI** Shallow	**DZ** Drizzle	**BR** Mist	**PO** Well-developed dust/sand swirls
Moderate (no qualifier)	**BC** Patches	**RA** Rain	**FG** Fog	
	PR Partial (covering part of the aerodrome)	**SN** Snow	**FU** Smoke	**SQ** Squalls
+ Heavy (or well developed, in the case of funnel clouds)		**SG** Snow Grains	**VA** Volcanic Ash	**FC** (Funnel Cloud(s) (tornado or waterspout))
	DR Low Drifting	**IC** Ice Crystals	**DU** Widespread Dust	
	BL Blowing	**PL** Ice Pellets	**SA** Sand	**SS** Sandstorm
VC In the vicinity	**SH** Shower(s)	**GR** Hail	**HZ** Haze	**DS** Duststorm
	TS Thunderstorm	**GS** Small hail and/or snow pellets	**PY** Spray	
	FZ Freezing	**UP** Unknown Precipitation in automated observations		

One code that may be seen on the TAF but not in METAR reports is VC, "vicinity." This is used for fog, thunderstorms, or showers.

You can assume the forecaster believes there is at least a 50 percent chance of the phenomena occurring in the vicinity of the station and it will be present for at least half the time period.

Sky Condition

Sky condition is handled much like in the METAR report.

```
KIWD 142320Z 1500/1524 24009KT P6SM SHRA BKN045
  FM150200 28012G21KT P6SM SHRA OVC021
```

In our example, BKN045 indicates that there is 5/8ths to 7/8ths cloud cover at 4500 feet.

This altitude is always above ground level (AGL), using the airport as a reference height, and is listed in hundreds of feet.

Cloud types are never given, **with the exception of CB, for cumulonimbus, which will be suffixed to the layer height.**

If multiple cloud layers are present, keep in mind each layer is always specified as the sum of that layer's coverage plus all layers below it, as seen from the ground.

If we add a small patch of cirrus to the sky condition above, we will get BKN045 BKN250, but this dramatically overestimates the amount of cirrus actually present.

So the TAF does not work well for summarizing all the layers you'll see at cruise altitude, but is meant strictly to provide a picture of how the sky will look from the runway.

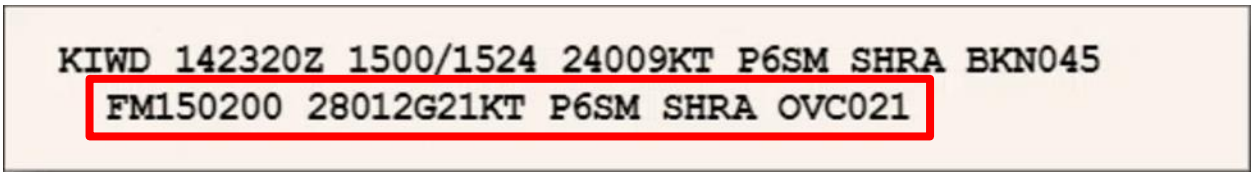
It's a good idea to always look for the potential for actual ceilings to go much lower, especially where intense precipitation limits the vertical visibility or where rain-cooled air is forced to ascend. These processes can't always be forecast well.

In the worst weather you will sometimes see VV instead of a layer amount group. This is vertical visibility, which is used when weather or an obstruction to vision restricts the visibility. This value effectively provides the ceiling height. FM And TEMPO

It would sure make life simple if the weather at your destination stayed exactly the same for the duration of the TAF. But that's rarely the case.

To accommodate transitions in the weather, meteorologists divide the forecast into blocks of time and separate them using the FM, or "from" marker.

This has the form FMddhhmm, where dd, hh, and mm are the day, hour, and minute that begin the next forecast block.



The old forecast block is discarded and the new forecast information takes effect until we reach the next FM marker.

TEMPO is another marker that might be seen, which indicates a "temporary fluctuation" in the current forecast block. A TEMPO group is used when there is a high likelihood (over 50 percent) of the conditions occurring, and which also lasts less than an hour. The format used here is TEMPO ddhh/ ddhh, where the first ddhh group is the date and hour for the beginning of the fluctuation, and the next group is when it ends.

PROB, "probability" is another marker. It is encoded just like TEMPO except that a percentage probability is appended to the PROB marker. The forecaster can only use a PROB group past the first eight hours of the forecast.

The National Weather Service only uses PROB30; if it's less than that it's deemed too unlikely, and if it's more than that, a TEMPO group is more appropriate.

Some Odds And Ends

Some TAFs might report wind shear. In the United States, only the layer from the surface to 2000 feet AGL is considered. This is not reported in thunderstorms, since low level wind shear is always assumed to be present.

EAA Homebuilders Week returns in January

Weeklong online series coming January 23-27, 2023

Updated schedule and presentation information, as well as registration details, is available at EAA.org/HomebuildersWeek.

Necessity is the mother of invention…

True no matter whether doing a home project, working on a car, or your airplane

Aircraft Preventive Maintenance

Editors Note: Last month we began a discussion about the procedures for:

Removing, installing, and repairing Tires

Disconnecting the Brake Caliper
Removing, disassembling, inspecting, the Wheel
Proper aligning of the Tire and Tube
Reassembling Tire on the Wheel

This month, we will discuss the remaining tasks required to complete the removal, installation, and repairing of tires:

Servicing (Repacking) the Wheel Bearings – which is another Preventative Maintenance item we are allowed to perform
Installing the Wheel and Tire Assembly on the Aircraft
Reconnecting the Brake Caliper

Service Wheel Bearings (Consists of cleaning, inspecting, and greasing).

Cleaning the Wheel Bearings

Clean with the recommended solvent, such as varsol, naptha, or Stoddard® solvent.

Do not use gasoline or jet fuel.

Soaking the bearings in solvent is acceptable to loosen any dried-on grease.

Bearings should be brushed clean with a soft bristle brush and ***dried with Low Pressure compressed air.***

Never use air at such a high pressure that would cause the bearing to spin

The high-speed metal to metal contact of the bearing rollers with the race causes heat that damages the metal surfaces.

The bearing parts could also cause injury should the bearing come apart.
Always avoid steam cleaning of bearings. The surface finish of the metals will be compromised leading to early failure.

Inspecting the Wheel Bearings

Check for defects that would render them unserviceable, such as

- Cracks, flaking, broken bearing surfaces
- Roughness due to impact pressure or surface wear, corrosion or pitting
- Discoloration from excessive heat
- Cracked or broken bearing cages
- Scored or loose bearing cups or cones that would affect proper seating on the axle or wheel.

Figure 13-65. *Spalling is a chipped away portion of the hardened surface of a bearing roller or race.*

Figure 13-64. *Galling is caused by rubbing of mating surfaces. The metal gets so hot it welds, and the surface metal is destroyed as the motion continues and pulls the metal apart in the direction of motion.*

Figure 13-70. *Etching and corrosion is caused when water, and the damage caused by water, penetrates the surface treatment of the bearing element. It appears as a reddish/brown discoloration.*

If any discrepancies are found, replace the bearing with a serviceable unit.

Click the Link to good Video on Wheel Bearings

Wheel bearing maintenance. - YouTube

Bearing Handling and Lubrication

Handling of bearings is of the utmost importance.

Bearings should be lubricated immediately after cleaning and inspection to prevent corrosion.

Contamination, moisture, and vibration, even while the bearing is in a static state, can ruin a bearing.

Use the lubricant recommended by the manufacturer. Such as, Aeroshell 5

A. Bearing Grease

CAUTION: DO NOT MIX AVIATION WHEEL BEARING GREASES WITH EACH OTHER. IF USING OTHER APPROVED GREASE, COMPLETE REMOVAL OF CONTAINED GREASE AND BEARING CLEANING IS REQUIRED. REPLACEMENT OF PREVIOUSLY LUBRICATED FELT GREASE SEALS IS ALSO REQUIRED.

Greasing the Bearing

Figure 13-45. *Packing grease into a clean, dry bearing can be done by hand in the absence of a bearing grease tool. Press the bearing into the grease on the palm of the hand until it passes completely through the gap between the rollers and the inner race all the way around the bearing.*

Place a small amount of the approved grease on the palm of the hand.

Grasp the bearing with the other hand and press the larger diameter side of the bearing into the grease to force it completely through the space between the bearing rollers and the cone.

Gradually turn the bearing so that all of the rollers have been completely packed with grease.

NOTE: A pressure bearing packing tool is recommended to ensure any contaminants are removed from inside the bearing that may have remained after cleaning

Reinstall the Bearings into the Wheel

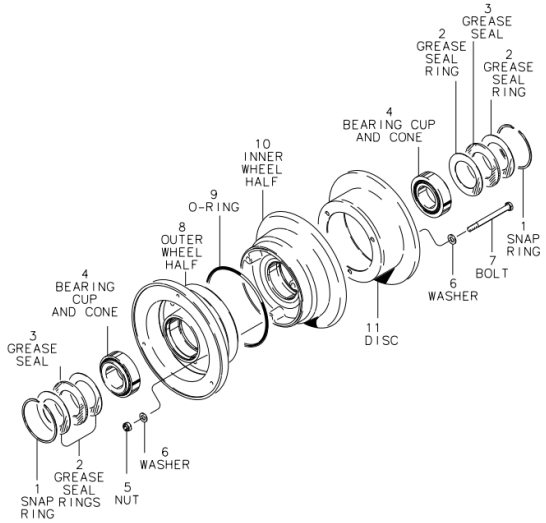


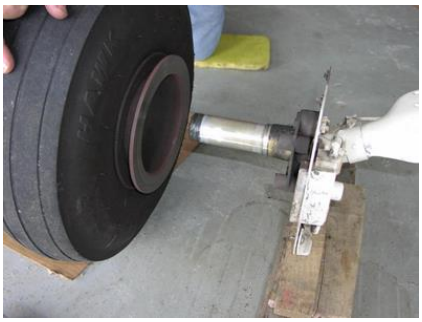
Figure 4 - Typical Main Wheel Assembly

Ensure proper sequence of spacers, washers, shims, grease seals

NOTE: IF, they are not in proper order the Wheel may not slide onto the Axle

Click the Link to view a good Video on installing bearings into the Wheel Assembly Aircraft Main Wheel Assembly - Grumman Style - YouTube

We are finally ready to install the Wheel and Tire Assembly on the Axle



Slide the wheel carefully onto the axle

Be careful Not to Scrape the Axle Bearing Races

Ensure wheel is properly seated

Thread the axle nut onto the axle

Install and torque the Axle Nut in accordance with the manufacturer's maintenance procedures.

It is important that the axle nut be tightened properly

NOTE:

If the nut is too loose, the bearing and wheel assembly may have excessive movement.

The bearing cup(s) could loosen and spin, which could damage the wheel.

There could also be impact damage from the bearing rollers which **leads to bearing failure**

An over-torqued axle nut prevents the bearing from properly accepting the weight load of the aircraft.

The bearing spins without sufficient lubrication to absorb the heat caused by the higher friction level. **This too leads to bearing failure.**

In the event there are no Manufacturer's Procedures

Here is the "Best Industry Practice"

Initially the Wheel Bearings need to be Pre-Loaded

While rotating the wheel and tire (In the normal Direction)

Tighten the axle nut until rotation is very stiff this will seat the bearings

Then loosen axle nut until you can feel a slight in and out movement of the wheel on the axle

While rotating the wheel and tire retighten the axle nut until the bearing binds slightly

Then back the nut off until the nearest castellation in the nut and the cotter-pin hole in the axle line up

NOTE: Once the cotter pin is installed

It's not uncommon to find the nut a bit loose reducing preload on the bearings

Too loose obviously isn't good, but too tight isn't good either

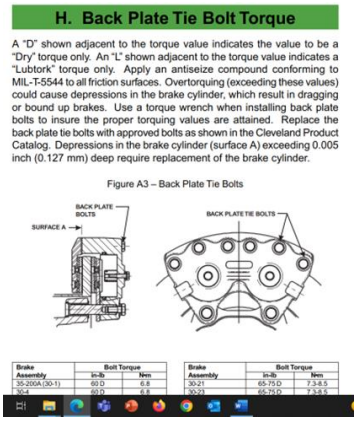
Usually there is no more than 1/8 of a turn to play with

The basic idea is to strike a balance between the two extremes to Pick the most appropriate alignment of the holes

Check to see that the installed cotter pin does not interfere with the

- Valve stem
- Hub Cap
- Any other part of the wheel and tire Assembly

Reattach the Brake Caliper



H. Back Plate Tie Bolt Torque

A "D" shown adjacent to the torque value indicates the value to be a "Dry" torque only. An "L" shown adjacent to the torque value indicates a "Lubtork" torque only. Apply an antiseize compound conforming to MIL-T-5544 to all friction surfaces. Overtorquing (exceeding these values) could cause depressions in the brake cylinder, which result in dragging or bound up brakes. Use a torque wrench when installing back plate bolts to insure the proper torquing values are attained. Replace the back plate tie bolts with approved bolts as shown in the Cleveland Product Catalog. Depressions in the brake cylinder (surface A) exceeding 0.005 inch (0.127 mm) deep require replacement of the brake cylinder.

Figure A3 – Back Plate Tie Bolts

Brake Assembly	Bolt Torque In-lb	Bolt Torque Nm
35-200A(30-1)	60 D	6.8
30-4	60 D	6.8

Brake Assembly	Bolt Torque In-lb	Bolt Torque Nm
30-21	65-75 D	7.3-8.5
30-23	65-75 D	7.3-8.5

Ensure Torque is to Manufacturers Requirements

Next month we'll discuss Preventive Maintenance for Servicing Shock Struts. Beginning with a review of the operation of a typical Pneumatic/Hydraulic Shock Strut

What About Paper Charts?

Featuring Elaine Kauh

Subscriber question:

"Just curious: Can you still buy paper charts?" — Willey R.

Elaine:

FBOs and flight schools don't order many charts these days, but if you just need a current version of a local VFR sectional, IFR chart or Chart Supplement book, it's worth checking to see if they have it.

The more reliable source is through outlets like Sporty's Pilot Shop, My Pilot Store, or even Amazon.

Paper can be a great way to view charts not included in your Electronic Flight Bag subscriptions.

There's nothing like a paper chart to learn all the minute details that can be harder to examine in the digital version.

Besides for training, Why else would you want paper charts?

A sectional is a battery-free backup if your EFB runs out of juice.

You could also use them for airplane rides. Many passengers find the paper sectionals to be a fun way to follow landmarks on a scenic flight.

If you're flying youth at a Young Eagles event, handing the kid a sectional and pointing out where you're going will definitely pique the interest level.

NOTE: And It's OK if the charts are expired, so save the ones you have.

Editor Note: Maybe a better question would have been, Is a pilot Required to have paper charts in the aircraft? See the two references below---

FAA

AC 91-21.1D, states it's legal for FAA Part 91 GA piston aircraft pilots to use the iPad with current data as a paper chart replacement. Aimed at Part 91 operators, VFR or IFR EFBs can be used in all phases of flight in lieu of paper when: **The EFB is the functional equivalent of the paper material**

AVIATION CONSUMER

Part 91 pilots are not required to have current, or any, charts on board. However, they are required by Part 91.103 to become familiar with all available information concerning a flight prior to departure. A current chart or annual chart service that provides updates is, in our opinion, an easy way to comply.

So, It appears that paper charts are not required by Regulation. But, it may still be a good idea for you to have a paper chart available if something should happen to your Electronic Device

AVIATION LEGENDS

J.W. “Corkey” Fornof, A Legendary Movie Pilot

Editor Note: An article in one of Flying Magazine’s Newsletters peaked my interest in the career of Corkey Fornoff. In addition to the Flying Magazine Article, I researched the following Information from several sources on the internet

Movie pilot J.W. “Corkey” Fornof has flown thousands of hours performing aerial film stunts that probably looked crazy to the untrained eye. However, his impeccable record shows a career-long commitment to safety at all times.

He has flown over 3,000 low level aerial performances, in nine different types of aircraft, from a T6, P51 Mustang, F8F Bearcat, Pitts Special, Bellanca Super Viking, Christen Eagle, to the world's smallest jet, BD-5J. He has logged 17,000+ hours in over 300 different types of aircraft.

John William Fornof, Jr. was born in New Orleans, Louisiana. The first of four children born to Gloria and J.W. "Bill" Fornof, a U.S. Navy Pilot.

After his father returned from the Korean War, he acquired a Cadillac/Oldsmobile dealership and moved the family approximately 55 miles southwest of New Orleans to Houma, LA

Corkey was taught the automobile business from the ground up at a very young age. He spent his time cleaning the used cars and as a mechanics helper in the service department.

With the success of the dealership, his father purchased a F8F Bearcat and started flying airshows on the weekends. It was on the airshow circuit that Bill Fornoff and Bob Hoover struck up a friendship.

Corkey traveled the circuit with his father, cleaning the airplane and learning skills. He proved his interest in aviation by rebuilding a T6 from the ground up. After several lessons he soloed the SNJ/T6 in 6.7 hours. “With my father and Bob Hoover as my mentors that airplane taught me an awful lot,” he said. “I flew it coast to coast and border to border following Bob Hoover and Dad, cleaning up their airplanes.”

In 1967 after logging just 67 hours, Corkey flew his first aerobatic airshow at Spaceland Airpark for a charity event sponsored by NASA Astronauts.

He was invited to fly a P51 by Pete Conrad and Neil Armstrong who acted as his plane Captains. The show was narrated by Frank Borman and Shorty Powers, the voice of NASA.

Bill along with son Corkey, formed the first civilian high performance aerobatic team in late 1969 flying Grumman F8F Bearcats

Sadly, Corkey’s father was killed in June 1971 when the wing failed on his Bearcat during their performance at a Naval Air Station in Rhode Island.

Corkey, became the team leader of the World's First Civilian Jet Aerobatic Team in 1973, Flying BD 5's. Bobby Bishop, flew right wing and Ed Mahler, the left wing

Corkey's Involvement With Movies

Fornof has been involved in on-screen aerial stunt flying, not only as the pilot, but also on the teams that coordinated every mission. He has been seen flying in movies such as the James Bond thrillers License to Kill and Octopussy, Mission: Impossible II, Six Days Seven Nights, The Phantom, Face/Off, plus many others

Working with directors and producers to assist with their on-screen vision takes methodical planning, knowledge and a visionary. Knowing the aircraft, its limitations and your own limits to capture a scene in a safe environment is indispensable.

As a stunt pilot and aerial coordinator, Corkey designed the stunts he flew and delivered on numerous aerial action shots! Such as:

In James Bond's "Octopussy" he Flew a BD 5 Through a Hangar

Click link for a video clip

https://www.youtube.com/watch?v=iJ8CHpyu8Uk

Corkey's work on a movie sometimes involved multiple scenes, such as in James Bond's "License to Kill"

In one scene he flew an aircraft while a man was lowered from a helicopter and wrapped a thick wire around the tail with the intention of disabling the plane and towing it through the air.

In another, he transferred a stuntman from inside of the aircraft, onto a tanker truck and crash landed the plane through rocks in dangerously thin air with temperatures soaring to 118°.

In yet another, James Bond was trapped under water, He shot a Harpoon into the float of an aircraft piloted by Corkey and was subsequently pulled to safety!!!

In the 1997 movie "Face/Off," starring Nicholas Cage and John Travolta, Fornof rolled a Jetstar through the closed doors of a hangar at 70 mph destroying the set and nailed the money shot. This stunt left no options for take 2!

In other movies he……

Transferred a stunt woman from the float of the plane onto a running horse, timing had to be precise and with impeccable trust and teamwork.

Stunt flying is rarely a walk in the park. While working on 'Six Days Seven Nights,' a Harrison Ford movie shot on the Hawaiian island of Kauai he had "One of the closest calls I ever had"

If, you haven't seen it, The movie begins with Ford and his female companion making an emergency landing during a thunderstorm along a secluded beach. During the landing roll they hit some rocks, which collapses the gear.

https://www.youtube.com/watch?v=VKWNtD_L0M8

The script called for the stars to haphazardly attach a set of WWII floats to their crashed airplane.

https://www.youtube.com/watch?v=w9I49alsES8

The director then wanted Corkey to fly the plane with all that junk attached. "I told him the airplane really wouldn't fly like this. But, against my better judgment, he talked me into testing it."

"I had a nice takeoff run," Fornof said. "I had an area I could set down in if it wasn't going the way I wanted to. I took off with all this garbage, and it amazed me because the airplane shot right up to 60 knots.

https://www.youtube.com/watch?v=DXCZKglGP68

I got airborne, but the second I went to adjust power to climb power, it just started sinking. It took full power to just get it to 60 knots and anything less than full power, it wouldn't fly."

Realizing the airplane wasn't going to climb properly, "I was going to put it back down in the bay there, and all of a sudden, there were waterskiers and sailboaters that came out from everywhere," he said, "so there wasn't a safe place to put it.

So now I'm heading out to open sea and whitecaps in the ocean. "Seaplane is a bad name for seaplanes. They should call them lake airplanes, river airplanes, but not sea, seaplanes because they are not made for the sea." So, I'm not about to set it down there, because it would come apart.

Without a safe place to divert, he did the only thing he could and began a long slow climb.

"I relied on good old' Pratt and Whitney, and left it at 100 percent takeoff power, at 60 knots causing the engine to heat up quick. "I could barely climb 50 feet per minute. By making gradual turns and then climbing a little bit he headed north up the coast. After traveling 15 miles he hit 600 feet.

"I could smell the metal burning and all the redlines were far exceeded. I just prayed the old Pratt and Whitney would hold together," he said. "We crossed the ridge at about 600 feet going back into the lagoon and the river at Lihue and it took full power to maintain 60 knots downhill.

After I landed and had pulled the power back just a little, It just seized. It was literally glowing red and the paint on the cowling had blistered

Fornof's body of work could fill a book, and in fact, it will soon, as **he is currently working on his biography, "My Life Is a Movie**"

Use the Links to additional information

http://www.nycaviation.com/2011/10/in-the-cockpit-with-corkey-fornof-hollywood-stunt-pilot/17762

https://www.aopa.org/news-and-media/all-news/2013/june/pilot/pilots-corkey-fornof

https://www.flyingmag.com/a-legendary-movie-pilot-shares-a-lifetime-of-great-stories/?utm_campaign=Newsletter%20-%20Weekend%20Roundup&utm_medium=email&_hsmi=217624635&_hsenc=p2ANqtz-_GfxXEh2z6eVX0WHMC6WVm7ltRydvj2indEIoJhg6dBHTHNb6gRwZSetzkdsEehoNckjIyG9VHgtjYFQbI0L-2zqGhjg&utm_content=217576251&utm_source=hs_email

Click for Videos Aero-TV Corkey Fornof -- Continuing The Legend (Part 1)
https://www.youtube.com/watch?v=a-5ZIERHJpI

Aero-TV Corkey Fornof -- Continuing The Legend (Part 2)
https://www.youtube.com/watch?v=bJRDjND7Tlo

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Plane Dealing (Want-Ads, Lost & Found & Notices)

Interesting and Useful Websites:

NOTE: You may have to copy and paste the address into your browser if the link doesn't work

If anyone knows of other interesting websites let me know and I will add them to the list

Our Chapter Home Page: **https://chapters.eaa.org/eaa1321**

http://www.eaa.org/eaa

FAA Safety Team FAASTeam https://www.faasafety.gov/

FAA Safety Briefing Magazine | Federal Aviation Administration

Weather and Flight Planning Sites:

https://www.lmfsweb.afss.com/Website/home#!/

FltPlan.com Free Services

Charlie's AVIATION WEATHER & RESOURCE CENTER www.avweather.com

SkyVector Aeronautical Charts www.skyvector.com

AirNav.com www.airnav.com

FlightAware www.flightaware.com

Miscellaneous Links To Check Out:

http://www.avweb.com/

http://aero-news.net/

http://tailwheelersjournal.com/

www.whywefly.org

www.barnstormers.com

Travel:

http://www.socialflight.com/search.php
www.funplacestofly.com
www.placestofly.com
www.wheretofly.com
www.100dollarhamburger.com
www.airjourney.com