Volume 25 issue 1

THE SLIPSTREAM

THE NEWSLETTER OF GREEN RIVER EAA CHAPTER 441 KENT, WA

January 2023

Next Meeting

Thursday, 26 January 7 PM

17618 S. E. 303rd PL, Kent

This Month's Program

Bruce Finney tells us all about the FlyQ application

Inside this Issue:

President's Column

Well, we're past the Solstice, which signals the (very slow, at first) transition away from cold and dark "Workshop season" towards the long and warmer days of "flying season". Not so fast, though: it was snowing at my house this morning. Oofda.

One of my vanpool colleagues told me that every year on about the 21st of December, he makes it a point to watch the film "Master and Commander', and he described a scene in which the crew of the ship was at "mess" and they all heard the rudder move and the ship moan as it responded. Everyone cheered. The doctor on board said something to the effect of "I'm sure something magical and mystically nautical just happened, but I do not know what it was". The answer he got was "Doctor, we're turning toward the sun!". indeed, we're now turning toward the sun.

For me, we've turned to "get the annual done" so we can actually fly when "flying season" arrives. Many evenings in cold hangars await me in the next few weeks.

Nevertheless, it will be good to get together again, back into a regular cadence of getting together to share our projects, our progress, and successes. Bring a friend. Also bring $20 to help build our treasury (Dues are due).

Fly safe.

Brian

Chapter Officers

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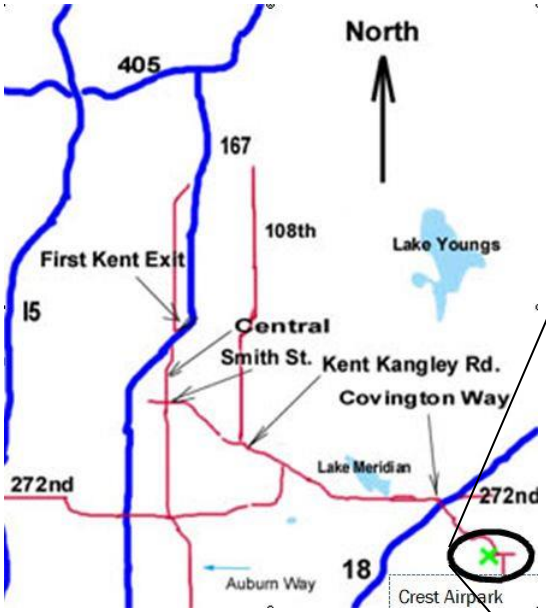
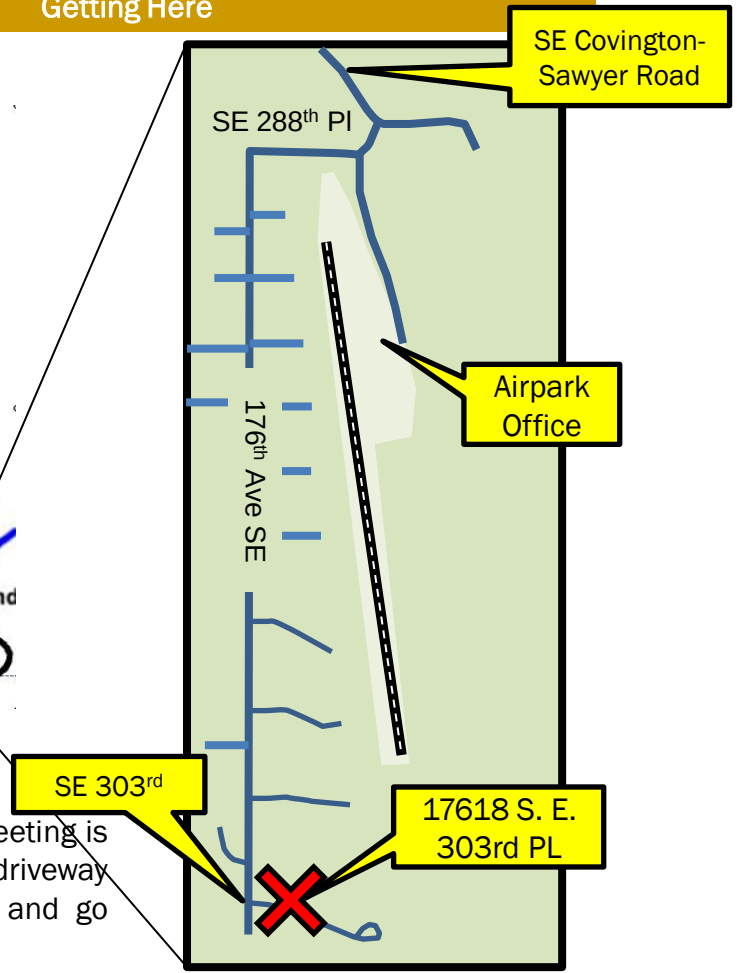
What did we talk about Last Month?

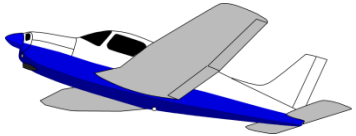
Christmas Party! See Page 4

Getting Here





Park along side of road at 303rd, meeting is at the second house. Walk down the driveway between the garage and the house, and go downhill to the hangar



Chapter 441 is fortunate to have two tech counselors. Feel free to call Brian (253)-369-0489 , or Dave Nason any time. You don't need to wait for some significant milestone in your project.

Remember, this is not an "inspection". The shop doesn't need to be cleaned for a visit. All are quite used to looking at pieces, parts, and assorted bits, and will be happy to answer questions, offer advice, and generally talk about projects, building, flying, or whatever.

Photos from the Christmas Party

EAA Homebuilder's Week

EAA will be holding the third annual online Homebuilder's Week on January 23-27, 2023. Experts from every corner of the homebuilt aircraft community (plus your humble newsletter editor) will bring their knowledge and information to builders everywhere through free and interactive webinars. Topics covered include workshops on sheet metal, welding, and wood; aircraft designs from a variety of industry leaders; part selection when building; buying secondhand; and more.

This five-day event coincides with the 70th anniversary of the first Experimental Aircraft Association meeting on January 26, 1953. Homebuilders Week will be a tremendous learning opportunity that celebrates our legacy of, as EAA founder Paul Poberezny often said, using hand and mind to create aircraft that allow us to enjoy the personal freedom of flight!

Visit EAA.org/HomebuildersWeek to review the schedule and sign up for a session.

Young Eagles Rebounds

The Young Eagles program has recovered from the pandemic. From a low of 8,006 Young Eagles in 2020, and 35,590 in 2021, 2022 saw over 47,400 participants.

LODA Requirement Eliminated for Homebuilts

With the President's signature to the 2023 National Defense Authorization Ace, an FAA policy that added hurdles for pilots who were seeking safety and flight review training in homebuilt and other experimental category aircraft has been fixed.

An FAA policy established in July 2021, required certain aircraft owners and flight instructors providing flight training in experimental aircraft to obtain a letter of deviation authority (LODA) in order to conduct flight training. This would include homebuilt aircraft owners seeking training in their own aircraft. The sudden FAA policy change caused a great deal of confusion and forced the agency to quickly adopt the LODA workaround to prevent the unintentional grounding of tens of thousands of pilots.

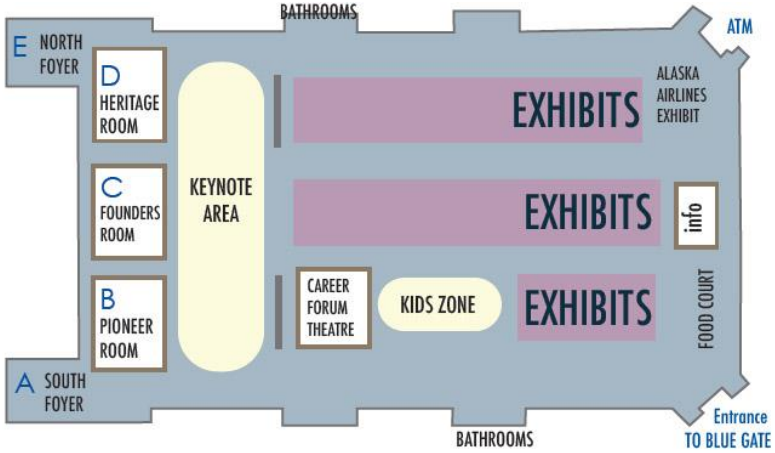
The bipartisan provision in the act, signed into law the 23rd of December, was backed by Reps. Sam Graves (R-Mo.), Rick Larsen (D-Wash.), and Kai Kahele (D-Hawaii) and Senators Jim Inhofe (R-Okla.) and Roger Wicker (R-Miss.). Owners of amateur-built aircraft and other experimental aircraft will once again be able hire a flight instructor for instruction, flight reviews, checkrides, etc., in their own or a borrowed aircraft provided that compensation is not being made for the use of the aircraft itself, without the need for a LODA.

For over three decades the Washington Aviation Association has been pleased to present the Northwest Aviation Conference & Trade Show at the Washington State Fair Events Center in Puyallup, Washington. It returns on February 25th and 26th.

This event has grown to over 75 hours of safety seminars and 122,000 sf of aviation displays with an annual attendance of over 10,000.

This event is an opportunity to support the Northwest aviation industry, share ideas, learn new skills, be a safer pilot and create relationships with businesses, aircraft owners, and pilots.

The event is at the Showplex Exhibit Hall, Washington State Fairgrounds in Puyallup. Saturday hours are 9:00AM to 5:30PM; Sunday is 10:00AM to 4:00PM. Admission is $10 a day, but there's free parking in the Blue Lot.



Well, they say one of the objectives of homebuilding aircraft is learning... So for the past two months, I have been doing exactly that... learning about dry sump oil systems. I didn't appreciate why race cars, snowmobiles, and other vehicles with large lateral g-forces use dry sump oil systems to ensure supply of oil to the oil pump until the dry sump system in my Yamaha Apex engine started to show large oil pressure fluctuations. I had been seeing some fluctuation in the digital display of oil pressure on the AEM engine display that I bought with the engine (Made by BD Turnkey Engines, it is a bespoke wiring harness intended to make the Apex snowmobile engine operate well in aircraft... different program in the ECU, wide-band O2 sensing for closed loop tuning of engine parameters, a nice digital display, etc.). But I didn't really worry too much, because it was just a digit flickering and the AEM didn't throw a fault.

Then, I got the GRT round dial display of AEM engine parameters working! Flush with success and joy over finally having the comforting round dials displayed on my PFD and being recorded by the GRT display, I took to the air. I was very happy with the round dials and noticed some small needle movement for oil pressure that I chalked up to the way the Apex oil pump works. Life was good.

(Continued on Next Page)

Here's a picture of the AEM engine display. Nice enough, and large, but mostly digital representation, so you don't get a good feel of things like how close you are to a limit or how large a fluctuation really is.

Shortly after I took this snap shot of the GRT screen while cruising back to Auburn from a grass strip down by Rochester, the oil pressure started fluctuating like it always had after cruising for a while. However, the merely fascinating digital flickering on the AEM display resulted in horrifyingly large swings of the analog needle in the round dial repeater display. Swings of 5 to 10 psi in a few seconds. I was near enough to Auburn to land there expeditiously.

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When I mentioned this episode on the Yamaha engine conversion FaceBook page, people were unsurprised. Turns out I was getting oil aeration in the oil delivered from the tank to the oil pump. Apparently, this has been a known issue for some time now. These Apex engine dry sump systems have fairly low amounts of total oil in the system (about 3 quarts, total, in mine---tank, cooler, and filter), which gets sucked out of the bottom of the engine very rapidly at high sustained RPMs and sent back to the oil tank along in a relatively savage way that results in a lot of air bubbles in the oil. The OEM Apex tank has one baffle in it to help separate those air bubbles from the oil as it drips to the bottom of the tank, but it gets overwhelmed when the engine is operated at the high sustained RPMs we see in cruise (7-8,000 is what people generally use) because snowmobiles usually don't see that for 30 minutes at a stretch. (Continued on next page)

Paradoxically, one solution is to reduce the amount of oil in the tank because filling it too high reduces the effectiveness of the baffle. Another solution is to get a much bigger tank to reduce the circulation rate for the oil. Race car guys use a $1,200 device that spins the bubbles out of solution on the way back to the tank… too expensive and heavy to be an option for me. The solution most people use is to add another baffle to the oil tank.

So, that is what I did. Not being a welder, I bought an aftermarket Apex oil tank from an outfit that said they would make one and add another baffle for free. It fit great and looked awesome with its shiny new aluminum exterior next to my grubby old engine. On the downside, it is built like a brick outhouse and weighs >2X the OEM tank (a little over 3 pounds versus 1.5 pounds for the svelte and stylish OEM tank).

Well, I started it up and saw oil pressure fluctuations on the ground. Did a bunch of ground engine runs logging the AEM engine data for analysis by the BD Turnkey Engines guy and determined the engine is working fine, but we agreed I still need to figure out how to solve the oil aeration issue before flying routinely.

Since I was changing out the tank right at 25 hours, I did my first oil change and discovered there was a metal screen in the oil tank that I didn't know was there so I didn't check it or clean it when I installed the oil tank that came with my firewall forward kit. OMG. It was almost completely clogged and had a significant amount of aluminum flakes trapped in it. The Yamaha conversion community told me it is pretty common to see aluminum flakes in these systems when you first put them together because of aluminum that flakes off when you install fittings. And, they all agreed this screen is a good thing to check at each oil change. The Blackstone Labs oil analysis showed everything to be expected at this point in my engine's charmed life, so that was good news.

(Continued on Next Page)

The other fascinating event at the 25-hour oil change was the discovery of lots of metal bits on the magnetic drain plug for my propeller speed reduction gearbox. I was alarmed, but the Yamaha Apex community said this was normal break-in wear on the brand new gearbox. The Blackstone Labs analysis of the gearbox fluid confirmed this as well.

My father passed away just before Christmas, so I've been distracted the past few weeks, but I'm hoping to get back full time into flight test after solving the oil aeration issue and seeing more consistently good flying weather! Happy New Year to everyone!

Chapter Member Activity: Potential Chapter 441 Online Forum – Edwin Sharp

Chapter President Brian Lee received this suggestion from Edwin for setting up an online forum for EAA Chapter 441.

Recently a couple of other organizations I'm part of have started using the Discord messaging platform to stay in better contact. As I look at how we tend to communicate as a chapter I started to think that this could be a good option for us also, so I wanted to provide some information to gage interest among the membership.

Discord offers a free service for invitation-only private message boards without ads or spam content where you can easily post text and pictures, and in my experience is quick and easy to start using in a group setting. Once a group board is setup, each user needs to be specifically invited via e-mail to join the group, which also involves creating a free Discord account, and users can also message each other within the platform. As a multi-platform system, Discord can be accessed via dedicated mobile apps or through a web browser.

The goal of this potential message board is to help us stay better connected between meetings and facilitate information sharing in a more dynamic and interactive way than our public-facing website can. To accomplish this, the message board would have several topic specific channels which all users can post to and access, and creating new channels is a fairly quick and easy process so the board can change and adapt as needed. One thing which is nice about the Discord platform is that it keeps track of any new posts which have come up on channels since you have last read them, so when you log on it's very easy to see if anything has been updated.

Setting up a message board is relatively easy and I would be happy to do so, but to actually be useful it needs to have people engaged in using it. It doesn't need everyone logged on all the time, but it does need at least a few people checking in often enough that we avoid it stagnating for months with nothing being posted.

The plan is to have this on the agenda for January's chapter meeting.

Edwin

Suggested Initial Channels:

- Announcements [Notifications for relatively short-term use]
- Resources [Links to useful things.]
- Suggestion
- Calendar
- General [Catch-all for areas that don't have specific channels]
- Help needed
- Tips and Tricks
- Trading Post [Buy / Sell / Loan / Trade / Request]
- Project updates
- Flight reports
- Young Eagles

Hi fellow EAA members,

I am currently selling my unfinished S-18 project. If you or someone you know who is interested, please contact me at:

Norm Pauk: Tel: 253-561-4801
Email: Npauk@msn.com

This Month

Last Month: Supermarine Seagull

The Supermarine Seagull was a British amphibious, military flying boat and the last to be built by the Supermarine company. Design started during the Second World War but it did not fly until three years after the war had ended and the project was cancelled without it being adopted for service.

Development:

In October 1940, the British Air Ministry issued Specification S.12/40 to Supermarine and Fairey for a catapult-launched, amphibian, reconnaissance and spotter aircraft to replace the Supermarine Walrus and Supermarine Sea Otter. An order for three prototypes of Supermarine's aircraft was issued in March 1943

There was an interruption in design due to the necessity of moving the Supermarine design office, after the bombing of the facility at Woolston. Further delays were caused by the extensive wind tunnel testing that was needed and the change from a Rolls-Royce Merlin to the more powerful Rolls-Royce Griffon. Also, the design specification was changed in 1944 to a new requirement, S.14/44 (later S.14/44/2) - the role of the aircraft being changed from ship-based reconnaissance and gunnery spotting to land-based Air-sea rescue. This change removed the four-gun turret the design had featured

Design:

The Seagull had an all-metal construction with a two spar parasol wing mounted on a pylon connecting it to the fuselage. The single engine, a Rolls-Royce Griffon drove contra-rotating propellers; radiators were mounted below the engine in the pylon. The rear of the pylon accommodated an observer's position with two windows. An eye bolt was fitted on the wing, behind the engine, so the aircraft could be easily lifted from the water by crane.

To Read More:

https://en.wikipedia.org/wiki/Supermarine_Seagull_(1948)
https://www.colettiscombataircraft.com/item/supermarine-seagull-asr/
http://www.aviation-history.com/supermarine/seagull.html
https://www.youtube.com/watch?v=-Adpc7okk_w

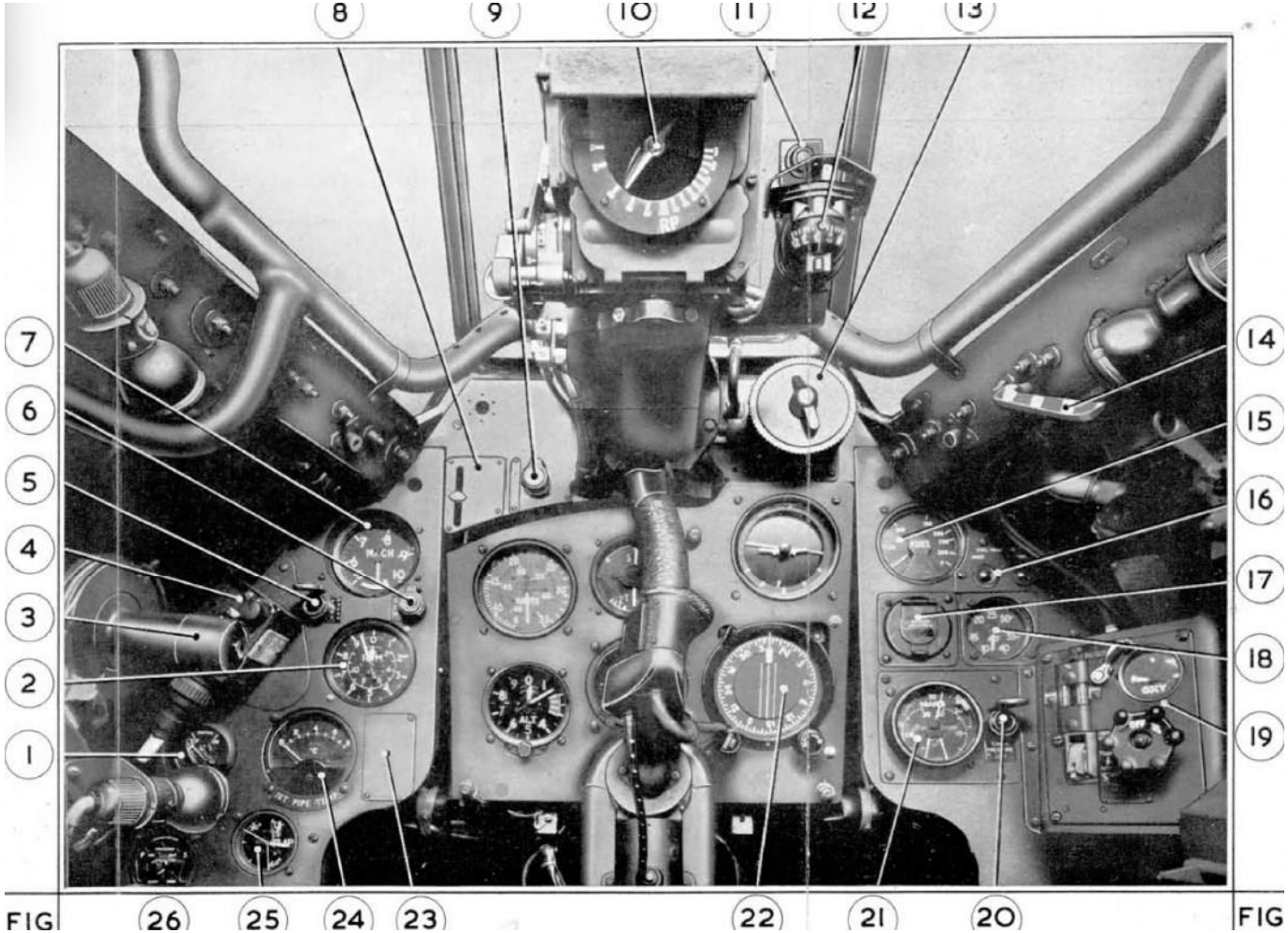
General characteristics

Crew: 3
Capacity: Up to seven survivors
Length: 44 ft 1.5 in Wingspan: 52 ft 6 in
Width: 23 ft 6 in (wings folded) Height: 15 ft 10.5 in on wheels
Wing area: 432 sq ft
Empty weight: 10,510 lb Gross weight: 14,500 lb
Powerplant: Rolls-Royce Griffon 29 V-12 liquid-cooled piston engine, 1,815 hp
Propellers: 6-bladed Rotol, 10 ft diameter contra-rotating propeller with Duralumin blades

Performance

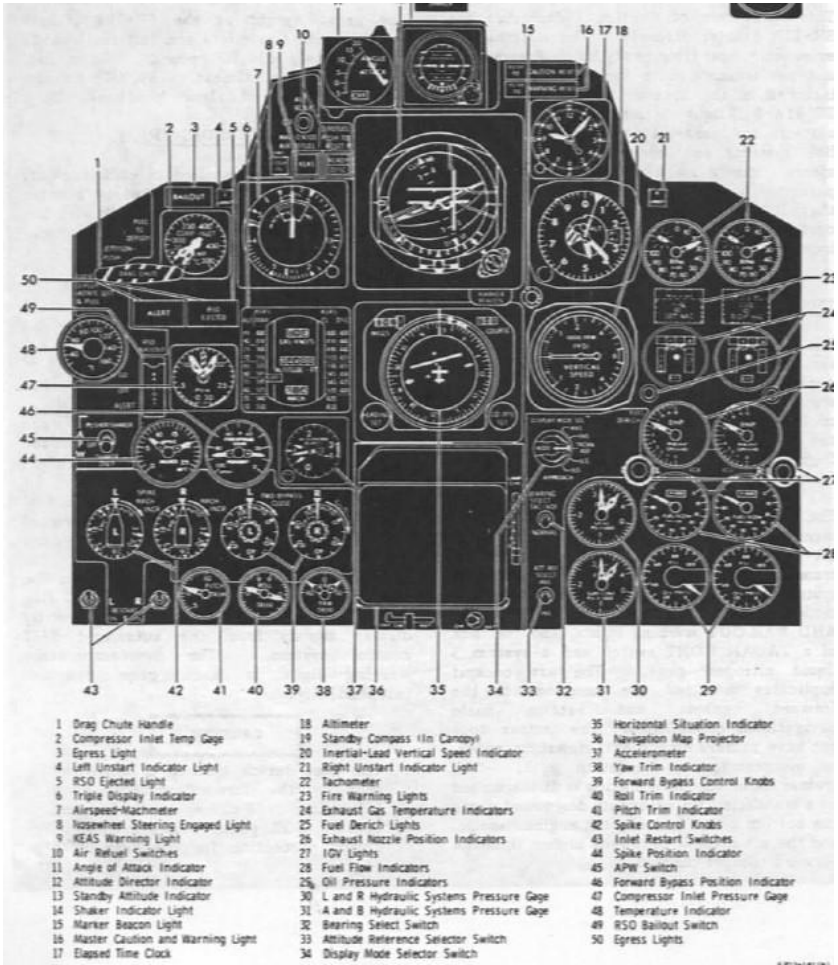
Maximum speed: 260 mph at 11,800 ft
Cruise speed: 131 mph Range: 875 mi
Service ceiling: 23,700 ft
Take-off run from deck: 312 ft with 31 mph wind over deck

This Month



Last Month: Lockheed SR-71

1 Manifold Temperature Switch
2 Landing and Taxi Light Switch
3 Suit Heat Rheostat
4 Cockpit Temperature Control and O'Ride
5 Face Heat Rheostat
6 Cockpit Temperature Control
7 Defog Switch
8 L Refrigeration Switch
9 Temperature Indicator Selector Switch
10 R Refrigeration Switch
11 Center of Gravity Indicator
12 Fuel Quantity Indicator
13 Fuel Crossfeed Switch
14 Liquid Nitrogen Quantity Indicator
15 Forward Transfer Switch
16 Emergency Fuel Shutoff Switches
17 Battery Switch
18 Emergency AC Bus Switch
19 Instrument Inverter Switch
20 Generator Bus Tie Switch
21 L and R Generator Switches
22 Fuel Dump Switch
23 Fuel Quantity Indicator Selector Switch
24 Fuel Boost Pump Light Test Switch
25 Pump Release Switch
26 Manual Aft Transfer Switch
27 Igniter-Purge Switch
28 Fuel Boost Pump Switches
29 Fuel Tank Pressure Indicator
30 Wet-Dry Switch
31 Brake Switch
32 Indicators and Light Test Switch
33 Fuel Derich Switch
34 Gear Signal Release Switch
35 Landing Gear Lever
36 Landing Gear Indicator Lights
37 Cabin Altimeter
38 Liquid Oxygen Quantity Indicator
39 Bay Air Switch
40 Cockpit Pressure Dump Switch



1 Drag Chute Handle
2 Compressor Inlet Temp Gage
3 Egress Light
4 Left Unstart Indicator Light
5 RSO Ejected Light
6 Triple Display Indicator
7 Airspeed-Machmeter
8 Nosewheel Steering Engaged Light
9 KEAS Warning Light
10 Air Refuel Switches
11 Angle of Attack Indicator
12 Attitude Director Indicator
13 Standby Attitude Indicator
14 Shaker Indicator Light
15 Marker Beacon Light
16 Master Caution and Warning Light
17 Elapsed Time Clock
18 Altimeter
19 Standby Compass (In Canopy)
20 Inertial-Lead Vertical Speed Indicator
21 Right Unstart Indicator Light
22 Tachometer
23 Fire Warning Lights
24 Exhaust Gas Temperature Indicators
25 Fuel Derich Lights
26 Exhaust Nozzle Position Indicators
27 IGV Lights
28 Fuel Flow Indicators
29 Oil Pressure Indicators
30 L and R Hydraulic Systems Pressure Gage
31 A and B Hydraulic Systems Pressure Gage
32 Bearing Select Switch
33 Attitude Reference Selector Switch
34 Display Mode Selector Switch
35 Horizontal Situation Indicator
36 Navigation Map Projector
37 Accelerometer
38 Yaw Trim Indicator
39 Forward Bypass Control Knobs
40 Roll Trim Indicator
41 Pitch Trim Indicator
42 Spike Control Knobs
43 Inlet Restart Switches
44 Spike Position Indicator
45 APW Switch
46 Forward Bypass Position Indicator
47 Compressor Inlet Pressure Gage
48 Temperature Indicator
49 RSO Bailout Switch
50 Egress Lights

Volume 3

Review:

The quest for vertical flight started at the beginning of Aviation. Runways were initially just grass fields in the outskirts of the city. As aviation progressed, the runways became longer with heavier aircraft while the real-estate shrank forcing the airport further from the convenience of the downtown central location. The idea was that if a smaller airplane could fly vertically and have a higher speed than a helicopter, the distributed downtown sites could service other nearby locations and feed into the primary big runways. They then could focus on longer cross-country and international flights.There are many now who are working on an electric airplane going from a central or distributed ports around the city to feed into the large and costly primary airport and for service to the surounding towns (eliminating the need for long drive times).

The Helicopter maximum flight speed is limited by the rotor(s) tips being in the super-sonic region. Huge deck angles (negative pitch) are required to have forward flight. This also means that the rotors need to provide greater lift to compensate for the lift lost due to forward flight. By going to tilt wing or tilt rotor, the rotor tip speed stays out of the supersonic region along with minimal loss of lift as thrust is provided by the wings as speed increases. This has led to the tilt wing and tilt rotor to get the higher aircraft speeds. We discussed the tilt wing last time.

Dufaux Tri-plane:

The earliest tiltrotor seems to be the Dufaux Triplane built in 1908 in Switzerland. The brothers Armand and Henri Dufaux had been working with early helicopter's and they took the knowledge gained from that experiment into a titl rotor design where they placed the engine between the tri-wings, enlarged the bi-plane horizontal stabilizer to about the same span as the wings. The engine propeller combination would rotate 180 degrees and provide forward, upward and rearward thrust. The aircraft was plagued with problems and never achieved flight.

Specifications:

Crew: 1 pilot
Length: 9.00 m (29 ft 6 in)
Wing area: 60.0 m2 (645 sq ft)
Gross weight: 660 kg (1,450 lb)
Powerplant: 1 × custom-built 20-cylinder , 90 kW (120 hp)

Volume 3 (Continued)

Focke-Achgelis Fa 265:

This project was designed to meet the needs of rapid response from a small un-improved area to meet the Allied bombers. Significant wind tunnel testing, gear box design. A full scale mock up was built to demonstrate but allied bombing destroyed the effort and was terminated in 1944.

Design:

The Fa269 was a mid wing powered by a single BMW801aircooled engine turning dual rotors at the wing tips. The rotors wuld be put horizontally for take-off and the retracted rearward to act as pushers

https://en.wikipedia.org/wiki/Focke-Achgelis_Fa_269
https://www.aviastar.org/helicopters_eng/focke_269.php
http://www.histaviation.com/Focke-Achgelis_Fa_269.html

General characteristics

Crew: 1
Length: 8.93 m (29 ft 3 in)
Wingspan: 10 m (32 ft 9 in)
Powerplant: 1 × BMW 801 14-cylinder radial piston
Performance

Maximum speed: 570 km/h (354 mph, 308 kn)
Armament: 2 x 30mm MK 108 cannon

Volume 3 (Continued)

Transcendental Model 1-G:

The experimental aircraft was a two rotor with three blades each. It was powered by a single Lycoming 0-290-A engine that used a shaft through the wing that ensured the rotors operating at the same rpm. Design work began in 1945 and ground hovering occurred in June 1954. It is the first known tiltrotor to fly. Untethered flight testing began in July 1954. The rotors where tiled in flight in December 1954 and by April 1955 flying was achieved to 120 mph with the rotors at 30 degrees. A total of 100 flight and 90 degree tilt before a control system failure resulted in a crash. The pilot escaped with minor injuries. The Transcendental 2-G was awarded an US Air Force contract and flew in 1956 before the contract was terminated.

https://en.wikipedia.org/wiki/Transcendental_Model_1-G
https://vertipedia.vtol.org/aircraft/getAircraft/aircraftID/353
https://www.youtube.com/watch?v=csgHo29w4kE

General characteristics

Crew: 1
Length: 26 ft 0 in Wingspan: 21 ft 0 in Height: 9 ft
Wing area: 63 sq ft (5.9 m2) Aspect ratio: 7:1
Airfoil: NACA 23015
Empty weight: 1,450 lb Gross weight: 1,750 lb
Fuel capacity: 14 US gal
Powerplant: 1 × Lycoming 0-290-A six-cylinder air-cooled horizontally-opposed piston engine, 160 hp
Main rotor diameter: 2 × 17 ft 0 in
Main rotor area: 454 sq ft

Performance:

Maximum speed: 160 mph as airplane, 120 miles per hour as helicopter
Endurance: 1 hour 30 minutes
Service ceiling: 5,000 feet

The most successful early tiltrotor was the Bell XV-3 and its descendants to the latest TiltRotor, which we will discuss in the next and hopefully final chapter.

RANS S-9 – Idaho: This was the first flight of the airplane. According to the witness, the airplane accelerated well,
and liftoff occurred about 300 to 400 ft down the runway. About 2 seconds after liftoff, the airplane pitched up to a
"fairly nose high attitude" of about 15° to 20°. When the airplane was at an altitude of about 150 ft and less than
halfway down the runway, it descended rapidly. The airplane landed hard and sustained substantial damage; the pilot
was seriously injured.
The pilot reported that the engine performed normally and that he intentionally attempted a steep climb to
ensure that he cleared trees at the end of the runway; however, due to the mid-wing configuration, he lost sight of the
horizon in the initial climb and then had difficulty judging his pitch attitude due to the lack of a cockpit attitude indicating
instrument. Ground personnel had radioed him about the excessive pitch attitude, and the pilot likely overcorrected.
(8/4/2017)

A note about "On the Wreckord":

The majority of aircraft accidents…homebuilts or no…are due to pilot error. However, "On the Wreckord" prefers to address accidents involving mechanical issues, whether spontaneous or due to builder or maintainer error. It's hoped that familiarity with mechanical issues for a variety of homebuilts might help us earlier detect problems with our own aircraft.

Wheeler Express – Oregon: The pilot/builder was approaching the airport for landing on a 3-mile left base leg at the conclusion of a cross-country flight. Shortly after being cleared for landing, witnesses observed the airplane make a steep left turn and dive toward the terrain. The airplane hit the ground in a near-vertical, nose-low attitude; the wreckage was consumed by a postcrash fire.

Examination revealed no mechanical malfunctions or anomalies that would have precluded normal operation of the airplane or engine.

The airplane was equipped with a 'cruciform' (mid-mounted horizontal stabilizer) tail. Several years before the pilot completed the airplane, the kit manufacturer disseminated a report to owners regarding the design and aerodynamic characteristics of the cruciform tail. It stated that the airplane's tail "may stall on approach and turbulent conditions or upon crossing another airplane's wake (or its own wake in a turn)" and that "rapid action must be taken to avoid diving straight into the ground."

(8/19/2017)

Glastar – Idaho: The pilot, who had no mountain flying instruction, planned to fly a friend's newly-purchased airplane from Idaho to Georgia. After he took delivery of the airplane at one airport in Idaho, he departed in the airplane for an airstrip situated about 38 miles to the northeast, at an elevation about 5,800 ft above mean sea level (msl). The aeronautical chart of the region depicted mountainous terrain between the two airports, with peaks ranging from about 6,700 to 8,700 ft msl.

While en route, the pilot entered a canyon and realized that the airplane was unable to outclimb the rising terrain. The pilot began a course reversal turn to escape the canyon, but during the turn, the airplane experienced an aerodynamic stall and impacted the ground.

The pilot's preparations for the flight were minimal, and he did not explicitly plan out the flight route or altitudes to ensure sufficient terrain clearance margins. The pilot did not reside in mountainous terrain, and had not taken any mountain-flying training courses. The pilot did not have or use any paper charts before or during the flight and did not program his intended flight route into his GPS device, which was equipped with a terrain database and terrain display and warning capability.

Prior to the accident, the pilot had only accrued about one hour in the accident airplane make and model. (9/2/2017)