DFA NEWSLETTER

DUKE FLYERS ASSOCIATION, LLC

Welcome to the Q2 (second quarter) newsletter.

Ray asks that all members take note of the information in the Annual DFA Fly-In section below, in particular the deadline for reserving a hotel room and the registration form for our Fly-In scheduled for September 8th through 11th in Dayton, OH. If you plan to attend, please verify your membership is current then fill out the attached registration form and mail it. In this quarters Duke Maintenance section, Patrick Koprowski discusses servicing, maintaining and pre-flighting our oleo struts—including several landing gear related gotchas. Patrick also added a troubleshooting note for those having unwanted propeller feathering on landing roll. Bob Hoffman has provided more in the Training & Operations section, this time it's tips, tricks and traps for the Century IV. And we continue with his sub-section titled Training Maneuvers—this quarters suggested maneuvers dovetail on his autopilot discussion. In the There I Was In My Duke section you will find a story about a landing gear failure due to an oleo strut issue. And under Stump The Dummy/What Part Is This Part, you'll find the answer to the last mystery part and a new one to contemplate.

YOUR DFA VOLUNTEER LEADERSHIP TEAM

Your Leadership Team consists of the following, long-time DFA members:

Ray Assmar	Ray.Assmar@pilotsteel.com	Chairman	(270) 684-8030	KY
Al Uhalt	cobd@earthlink.net	Vice Chairman	(719) 574-1111	CO
Jeff Gorman	jeff.gorman@gormanrupp.com	Executive Director	(419) 512-3963	OH
Ab Fuoss	aefuoss@comcast.com	Member/Transportation	(410) 294-6922	MD
Patrick Koprowski	bestaviationpat@gmail.com	Member/Maintenance	(303) 829-6577	CO
Kent Rhude	krhude@charter.net	Member/Advisor	(989) 916-5559	MI
Bob Hoffman	BE60pilot@aol.com	Member/Training	(859) 653-1803	KY
Kingsley Hill	Kingsley@siva.com	Member/Website/IT	(908) 234-0972	NJ
Kevin Dingman	Dinger10d@gmail.com	Member/Newsletter	(269) 492-8620	MI

Ray Assmar is at the head of DFA and coordinates all DFA issues along with his wife Susan. Ray and Susan own and operate Pilot Steel, Inc. a manufacturing facility in Kentucky, and volunteer with Angel Flight Mid America and Airdrop. Their Duke is serial number P-555. Al Uhalt is retired USAF and a current SEL, SES, and Glider CFII and MEI. He shares duties with Ray and is the owner of P-548. Jeff Gorman performs as the Executive Director of the DFA and is with Gorman-Rupp Pump Company in Ohio. Ab Fuoss is retired in Maryland, drives an 18-wheeler, and coordinates all DFA ground transportation requirements. Patrick Koprowski is the owner of Best Steel, a structural steel erector and also owns Best Aviation Services, LLC, an aircraft maintenance company—both in Colorado. He owned, operated and maintained P-127 for 17 years and now owns Turbine Duke P-488. Patrick is our adviser on Duke maintenance and technical issues. Kent Rhude of Rhude Investments in Michigan acts as an advisor to the DFA. Bob Hoffman is a retired Northwest and Delta Airlines MD-80 and B-757 captain and a long-time Duke Approved School owner and instructor. He resides in Kentucky and provides piston and turbine Duke initial and recurrent training as well as operational insight to DFA members. Kingsley Hill is a Technology Executive in New Jersey and manages information technologies including the DFA website. He owns P-170. Kevin Dingman is a retired F-16 instructor/examiner, retired American Airlines MD-80 and B-737 captain, current Part 135 Citation III & VII pilot, volunteers for Wings Of Mercy, writes for Twin & Turbine magazine, owns P-101 and lives in Michigan. Kevin compiles the DFA newsletter.

DFA WEBSITE

http://www.dukeflyers.org/DFA-11/index.php **or** http://www.dukeflyers.org

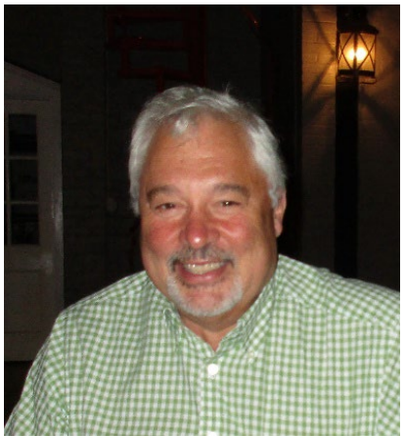
The DFA website is a great place to gather and exchange information about owning, operating, maintaining, and flying the Beechcraft Duke. The site includes the following content, news, shopping and action pages:

- Benefits of Membership and renewal options
- An active Bulletin Board/ Pilot Forum
- Regular Newsletter with Tips and News
- DFA annual Fly-in information
- Contact with Fellow Duke owners, pilots, and mechanics
- DFA maintains a stock of some hard-to-find parts
- A Commerce page for buying and selling Duke items
- Links to free magazine subscriptions

Existing members should click on 'Renew' next to "(Your name) Signed in" on the sign-in page to renew/verify your membership. You may use a credit card or a PayPal account. If you would like to know when your membership expires or pay for an additional membership term, click on the screwdriver/wrench icon next to your name, then click on 'renewal page' from the drop-down menu. If you find your dues to be in arrears, please submit your payment IAW the 'renewal page' instructions. Please note that a current membership is required in order to attend the DFA Fly-In. Also, remember that ads on the commerce page expire after 45 days. A forgot-password link, Fly-in registration link and a search function are also available. Please navigate around the new DFA website in order to become familiar with content, services, information, links and contact information. Expired and inoperative links will be deleted, and please send an email via the website or directly to Kingsley if you find errors, bad links, inaccurate content or if you have questions.

ANNUAL DFA FLY-IN

Pilot Steel, Inc.



Ray Assmar
DFA Chairman

From Ray:

This year's Duke Flyers Association Membership Fly-In is from Thursday September 8th through Sunday the 11th in Dayton, OH. I will be coordinating all activities and can be reached at the number and email address on page one of this newsletter. Ron Eifert is our POC at the Dayton Convention & Visitors Bureau. He can be reached at (937) 226-8284 and reifert@daytoncvb.net. The event FBO is Stevens Aerospace & Defense Systems located at the East end of taxiway November. Our Stevens POC is Lisa Gorman at (937) 231-6576 Cell, (937) 454-3508 Office and Lgorman@stevensaerospace.com. The Stevens ramp/line POC is Robert Schafer at (937) 454-3400 Office, (513) 907-4040 Cell and Rschafer@stevensaerospace.com. Please call 130.6 when inbound and announce your ETA. After parking, check-in at the line office and give them your forecast departure time/date and fuel requirements. Failure to do this may cause an extensive delay upon your departure. Ramp space is plentiful, but hangar availability is very limited. The Stevens Tech Service Rep (maintenance) POC is Jim Brackman at (937) 454-3484 Office, (937) 248-1525 Cell and Jbrackman@stevensaerospace.com. The event hotel is Courtyard Dayton North located at 7087 Miller Ln., Dayton, OH. DFA has reserved 15 double-bed and 5 king-bed rooms at $129 each. For reservations call (937) 890-6112 no later than 8/09/2022 and identify yourself as being with the Duke Flyers Association, or use the link on the DFA website, also NLT 8/09/2022. If you have trouble getting a reservation, or our block of rooms is sold-out, call our POC, Tammy Carter at (937) 309-3168 or email at Tammy.carter@highgate.com. Rental cars are available from Enterprise-- POC is Andrew Harping at (937) 898-5003 and Andrew.J.Harping@erac.com. Our Saturday night guest speaker is retired USAF fighter pilot John 'Bosco' Bostic. Additionally, DFA member Brad Newman, president and owner of Tiffin Aire, will have a presentation about the Duke propeller and de-ice systems, including an explanation of Lycoming Service Instruction 1462A regarding uncommanded propeller feathering.

ANNUAL DFA FLY-IN (continued)

John 'Bosco' Bostic
Retired USAF Fighter Pilot

John has a Bachelor of Science degree from Murray State University and a Master's in Public Administration from Troy State University.

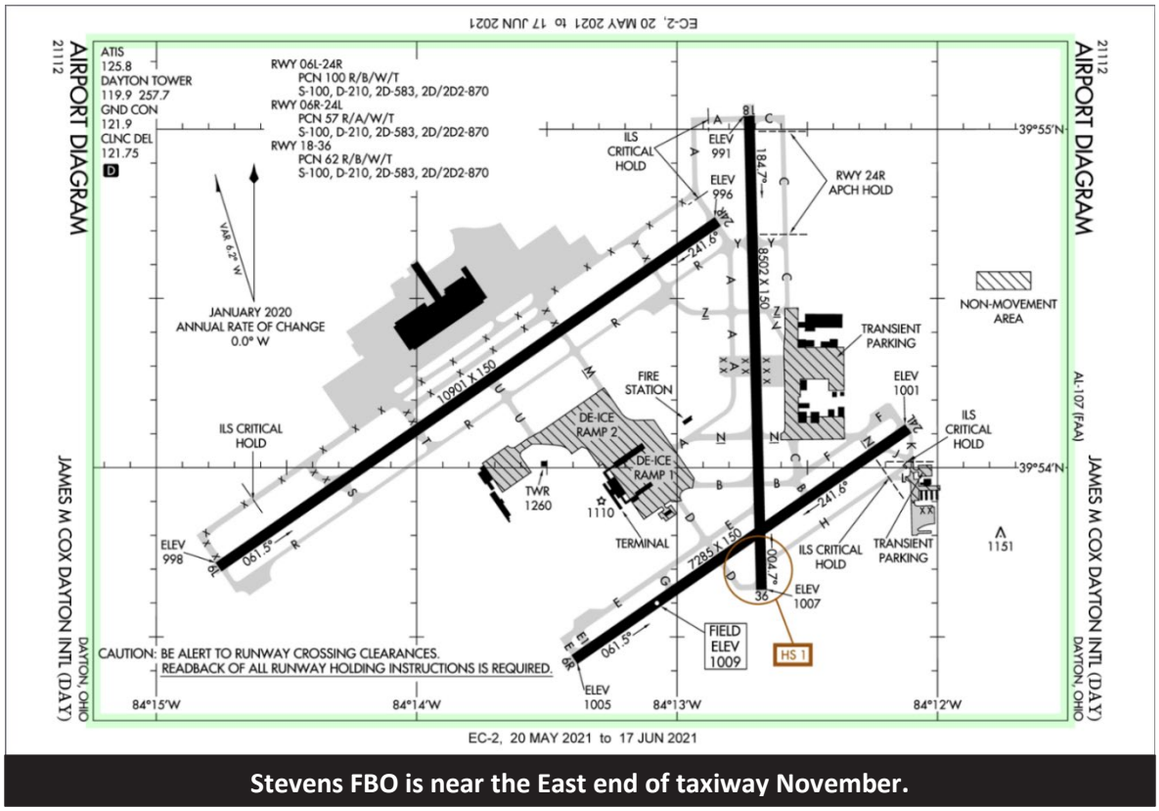
Bosco retired from the Air Force with 3,300 hours in the T-37, T-38, F-4, F-15 and F-16 including a tour with the Thunderbirds. He is also a retired airline pilot with over 10,000 hours flown in DC-9, B-727, B-747. He is an instructor pilot with over 2,000 hours in general aviation aircraft and is a warbird pilot with time in the B-17, B-24, B-25, F-4U Corsair, PT-17 and T-6.

His USAF experience includes:
F-4 fighter pilot, instructor pilot and weapons officer.
F-15 fighter pilot, weapons officer and test pilot.
F-16 USAF Thunderbirds Air Demonstration Team: #5 – Solo

John is the 1984 recipient of the Omar N. Bradley Spirit of Independence award and was awarded the USAF Distinguished Flying Cross for Extraordinary Achievement. John is a Kentucky native and currently resides in Florida.

After his presentation he will field questions.

DFA member Richard Swaffer has been working closely with Garmin on certification of the Garmin autopilot for Dukes and will present news and updates. DFA member Brad Newman from Tiffin Aire will discuss the Duke de-ice and propeller systems, including Lycoming SI 1462A. Bob Hoffman will discuss the Duke fuel system, flight controls, emergency descent and answer Duke training and system questions. Please fill out the attached Fly-In registration form completely, including the yes/no questions regarding your desire to attend the listed extra-curricular events (golf and Friday dinner). Kevin Dingman hopes to play golf at Cassel Hills on Friday with a 10 am T-time and invites you to join him. The 6 pm dinner on Friday will be at Jay's Seafood (www.Jays.com) and will be attended by DFA committee members and the guest speaker. All DFA members are invited to join as well. Circle 'yes' on the Fly-In registration form in order to attend this dinner.



Stevens FBO is near the East end of taxiway November.

SUGGESTED PERSONAL TIME OUTINGS

Address for using Lyft / Uber / Taxi Cab:

Stevens FBO: 3500 Hangar Drive, Vandalia, OH (937) 226-3401
Event hotel: Courtyard Marriott, 7087 Miller Lane, Dayton, OH (937) 890-6112 (7 miles)
Cassel Hills Golf Course: 201 Clubhouse Way, Vandalia, OH (937) 890-1300 (4 miles)
Friday 6 pm dinner Jay's Seafood, 225 E. 6th Street, Dayton, OH (937) 222-7547 (12 miles)
Air Force Museum: 1100 Spaatz St., Dayton, OH (937) 255-3286 (16 miles)
Wright Cycle Company: 22 S. Williams St., Dayton, OH (937) 225-7705 (13 miles)
Aullwood Audubon Center: 1000 Aullwood Rd, Dayton, OH (937) 890-7360 (4 miles)
Charleston Falls Preserve: 2535 Ross Rd, Tipp City, OH (937) 335-6273 (7 miles)
Designers Fashion Outlet: 259 N. 4th St, Tipp City, OH (937) 500-8232 (9 miles)
Wright 'B' Flyer at KMGY: 10550 Springboro Pike, Miamisburg, OH (937) 885-2327 (25 miles)

Itinerary

Thursday, September 8, 2022	
2:00 pm – 5:00 pm	Member arrivals, distribution of name tag lanyards, welcome packets and itinerary.
4:00 pm - 6:00 pm	Transportation to Courtyard will be provided hourly by DFA. The late-arrival phone number for DFA transportation is Ab Fuoss (Mule) at (410) 294-6922. Place your fuel order with Robert at Stevens.
7:00 pm – 9:00 pm	Meet-and-Greet at the hotel, first floor, Meeting Room A with heavy appetizers and open bar
7:00 am – 11:00 pm	Hospitality Suite, Meeting Room A to include gift bags, sodas and snacks
Friday, September 9, 2022	
9:00 am – 4:00 pm	Member arrivals, distribution of name tag lanyards, welcome packets and the itinerary. Call Ab (Mule) Fuoss at (410) 294-6922 for transportation to hotel.
9:00 am	Breakfast on your own (cook to order at Courtyard Marriott – free for DFA – 2 persons each room)
10:00 am	Social events day: Air Force Museum (16 miles), Audubon Center (4 miles) Wright Cycle Company (13 miles), Cassel Hills golf (4 miles), Wright 'B' Flyer (25 miles)
6:00 pm	Dinner on your own or Jay's Seafood with DFA committee and speakers.
7:00 am – 11:00 pm	Hospitality Suite, Meeting Room A with gift bags, sodas and snacks.
Saturday, September 10, 2022	
7:00 am	Breakfast on your own (cook to order at Courtyard Marriott – free for DFA – 2 persons each room)
8:00 am	DFA annual business meeting (itinerary to be provided)
9:00 am	Shopping, lunch, Air Museum, Wright Cycle Company, golf, Fashion Outlet, etc.
9:00 am – 12:00 noon	Technical presentation on the Duke propeller and de-ice system including SI 1462A by Brad Newman of Tiffin Aire and others TBD
12:00 noon	Lunch provided by DFA • Coordinate with Robert at Stevens Aerospace for fuel and departure time. • Reserve seats and times with Ab Fuoss for a ride to Stevens FBO.
1:00 pm – 3:00 pm	Training: Power Point by Bob Hoffman: fuel, flight controls, emergency descent and questions.
6:00 am – 5:00 pm	Hospitality suite is Meeting Room A
5:00 pm – 6:00 pm	Social hour in Meeting Room A and arrange for transportation to Stevens FBO for Sunday departures.
7:00 pm – 9:00 pm	Catered evening dinner (business casual). Guest speaker is retired USAF Fighter Pilot 'Bosco' Bostic.
Sunday, September 11, 2022	
6:00 am – 9:00 am	Breakfast on your own (cook to order at Courtyard Marriott – free for DFA – 2 persons each room).
7:00 am – 12:00 noon	DFA ride to airport (departures on the hour: prior coordination with Ab Fuoss required)
7:00 am – 5:00 pm	Depart at your leisure

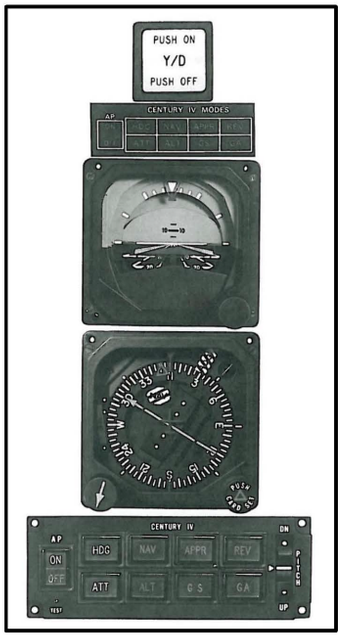
TRAINING & OPERATIONS

Duke specific POH, IFR, and pressurized
Piston & Turbine procedures and techniques

Bob Hoffman is writing a comprehensive operating manual for the Beechcraft Duke. Some sections of the manual will be available at the 2022 DFA Fly-In including: Flaps, Cowl Flaps, Pneumatic Pressure System, Fuel System and Brakes. Contact Bob to coordinate any sections you may desire. Here is Bob's training contribution for this quarter:

DUKEPILOT™ - HOFFMAN AVIATION, INC.

DUKEPILOT™ - HOFFMAN AVIATION, INC.
Century IV Tips and Traps



Hoffman Aviation Services, Inc.
5220 Knox-Lillard Road
Sanders, KY 41083
Phone 859-653-2149 • BE60Pilot@aol.com

Century IV AP / FD & Yaw Damper System

Introduction

The Edo-Aire Mitchell Century IV Flight Director / Autopilot Flight system, now supported by Century Flight Control Systems, Inc. in Mineral Wells, Texas, is in my opinion the most capable and desirable of the several analog autopilot / flight director systems offered in the 1973 to 1980 Beechcraft Duke production run. Every factory installed Century IV included the flight director, auto trim and yaw damper option. This system offers a near perfect match of simplicity, capability and performance, to enhance flight control while decreasing pilot workload.

This discussion is based upon two documents which are widely available on line, and the Supplemental Type Certificate (STC) for the Century IV AP/FD and Yaw damper, located in the aircraft flight manual.

- ✓ The first document is Tom Clements' excellent "Autopilot Operating Tips for the Beechcraft Duke". This discussion, published in 1990 and reprinted in a 1996 Duke Flyers News Letter, is the definitive source for Century IV operation, offering the learner a clear and concise understanding of the Century IV capabilities and limitations. Duke aviators should first review this paper before widening their Century IV knowledge.
- ✓ The second document is the March 1981 "Century IV Autopilot Flight System Pilot's Operating Handbook", found online at centuryflight.com. This free forty-seven-page manual contains general operating techniques for the Autopilot / Flight Director / Yaw Damper and Trim Systems. The manual addresses a generic airframe, is written by engineers, and contains technical data not found in other documents.
- ✓ Finally, the Airplane Flight Manual Supplement for the Century IV AP/FD and Yaw Damper system. These documents must be included in the AFM, which in turn must onboard the aircraft. The flight manual supplement addresses specific Beech Duke / Century IV operating techniques for various phases of flight.

System Description

The Century IV is an integrated autopilot / flight director system. One computer provides data to both the flight director command bars and to the autopilot servos. The flight director commands are presented by a single cue, V-bar display, incorporated in an air driven ADI. The flight director/autopilot control panel is located on the pedestal, while a remote mode annunciator panel is installed adjacent to the ADI to assist in monitoring automatic switching functions of the Century IV. The Century IV system includes two trim systems: an auto-trim system which electronically senses trim requirements when the autopilot is ON, and a Command / Automatic Trim system allowing the pilot to "command" trim when hand flying the aircraft. The Century IV system does not provide altitude preselect capability.

Servicing

Century Flight Control Systems, Inc. in Mineral Wells, Texas continues to support the Century IV systems and its components. All parts of the system can be serviced or repaired at the factory in Mineral Wells, Texas, or through factory authorized service centers.

Limitations

Not Limiting

The Century IV autopilot and yaw damper installed on the Beech Duke affords an operating envelope well within the Duke normal operating range. Unlike the Bendix King KFC 250 flight control system and some newer digital autopilots, the Century IV possesses no maximum altitude limitation. Additionally, the Century IV system is the ONLY autopilot/flight director approved for the Duke capable of flying a FULLY auto-coupled Category I approach AND missed approach procedure.

Preflight

Instrument Air Pressure System Check

The Century IV system is dependent upon inputs for the captain's air driven ADI, consequently, it is absolutely essential that the pilot conduct an instrument air pressure system check prior to each flight. Failure to accomplish this check may allow a failed elastomeric shuttle valve to go undetected. A failed shuttle valve may, in turn, result in a complete loss of instrument air upon failure of an engine, or pressure pump on the same side. Flight at night or in instrument conditions MUST be avoided if this check is not completed. See the FAA Approved Flight Manual Supplement P/N 60-590000-25 for the function check procedure.

Command Trim & Auto Trim Function Check

Command trim and auto trim function checks are part of the Century IV AP/FD function check procedure outlined in the Approved Flight Manual Supplement. If the pilot intends to use the command trim function, the system MUST be function checked prior to flight. Likewise, if the pilot intends to use the autopilot, the auto trim function check MUST be conducted. A trained and proficient Duke pilot can easily conduct this function check procedure in less than one minute.

Operating Tips – The Good

Pitch Sync

An overlooked feature of the Century IV system, and a real workload enhancer, is the Pitch Sync button located on the control wheel. When the autopilot is engaged, pressing the Pitch Sync button causes both roll and pitch servos to disengage; the pitch mode to on the programmer will cycle to ATT, and the pitch command knob will automatically rotate to match the pitch change by synchronizing the autopilot with the pitch attitude of the aircraft. Rather than selecting ATT on the programmer and adjusting the pitch command knob UP or DOWN, the pilot need only depress the pitch sync button, allowing the pilot to manually adjusting pitch UP or DOWN to the desired attitude. When the desired attitude is achieved, releasing the pitch sync button reengages both the roll and pitch servos.

Localizer & Glideslope Automatic Arm & Couple

One of the most useful Century IV capabilities is the ability to intercept a final approach course and automatically capture the glideslope. Automatic approach coupling is discussed in Operating Tips, the Pilots Handbook, and the AFM Supplements. A trained and proficient Duke pilot behind a coupled Century IV system, may be authorized to conduct Category I approaches to as low as 1800 RVR.

Go-Around

A seldom used but useful tool is the Go-Around mode. Pressing the GA button on the autopilot programmer, or the GA button located on the outboard side of the left throttle, positions the command bars and the aircraft pitch attitude to seven degrees. This function is useful when conducting auto-coupled missed approach procedures, or when initiating an altitude change in cruise flight.

Master Autopilot Disconnect and Trim Interrupt

A large, red spring loaded to OFF button, located on the pilots left forward control wheel activates the master autopilot disconnect and trim interrupt functions. When the pilot depresses the button, the Century IV and yaw damper will disconnect, and as long as the button is depressed, power to the electric trim system is interrupted. Releasing the button will restore power to the trim system, however, the autopilot and yaw damper must be reengaged for further use. A common technique is to disconnect the autopilot and yaw damper with the master disconnect button prior to landing. This ensures the yaw damper is disconnected prior to landing.

Command / Automatic Trim

Command / Automatic Trim is identical to autopilot Auto-Trim function except electric pitch trim is activated by the pilot when the autopilot is disengaged. The Command / Automatic Trim switch is installed on the pilots left control wheel and includes three distinct functions: Autopilot disconnect, DOWN trim, and UP trim. Pressing DOWN on the A/P OFF bar disconnects the autopilot and arms the trim. Pressing FORWARD and DOWN on the bar activates DOWN trim. Pressing DOWN while PULLING aft on the bar activates UP trim. Pilots should use caution not to inadvertently engage the A/P Disconnect bar when the autopilot is engaged.

Operating Traps – The Bad

Pneumatic Air

The Century IV system is dependent upon a functional pneumatic air system. The pilot MUST understand the limitations of the pneumatic air system and know how to conduct the function check procedure outlined in the AFM Supplement.

Go-Around Command

Inadvertent activation of the Go-Around button on the autopilot programmer, or the GA button on the left throttle will command a seven-degree UP pitch attitude. This command, if unnoticed or uncorrected may cause an unwanted altitude excursion.

Command / Automatic Trim Bar

Inadvertent activation of the A/P Disconnect bar will cause the autopilot to disconnect.

Manual GS Capture

When on an ILS localizer or LNAV/VNAV/LPV intermediate segment, and above or below the glideslope, the aircraft will immediately climb or descend to capture the glideslope when the GS button on the mode control is depressed. The system will capture from above if the glideslope needle is less than 80% "DOWN". Consequently, care must be taken to anticipate pitch changes associated with GS button activation.

No Altitude Preselect Function

Unfortunately, the Century IV system does not offer an altitude preselect option. Pilots who operate multiple aircraft with differing flight management systems seem to find fault with this shortcoming. However, those pilots who exclusively operate aircraft with Century IV systems, make vertical navigation awareness a flight deck management priority. Example: The author operated 16K hours in airline operations, behind a Century system without altitude preselect, and without an altitude excursion.

Summary

Review Tom Clements' "Autopilot Tips, The Century Pilot's Handbook and the AFM Supplements. Know how to conduct an instrument air pressure check, autopilot / flight director and auto-trim function check as outlined in the AFM. Develop flight proficiency in conducting auto-coupled ILS/LPV approaches and auto-coupled missed approaches. Finally, integrate the use of the pitch sync button and go-around button on the throttle, into your vertical flight management toolbox.

Once proficient in its use, the Century IV, AP/FD system is very capable and can substantially relieve pilot workload.

Maneuvers

Third Quarter proficiency goals: (focus on autopilot/FMS use)

2 ea. -Day VMC, ILS approaches— AP coupled, to mins then, on autopilot-- published missed and hold
2 ea. -Day VMC, LNAV approaches – AP coupled, to mins then, on autopilot-- published missed and hold
1 ea. -Day, VMC, (any non-ILS)—AP to manual Circle-To- Land, T&G, Stop & Go or low approach
2 ea. -Day, VMC visual approaches—no GS, no VNAV, no PAPI/VASI, T&G, Stop & Go or FS

DUKE MAINTENANCE

News, tips and good practice procedures

By Patrick Koprowski

Oleo strut servicing, maintenance, operation and preflight inspection

WARNING: Do not power-wash your nose or main landing gear wheels, brakes, oleo struts or braces.

I thought it best to start off with the power-wash gotcha. A Duke owner was bitten in the hinny a few years ago when the MLG was power-washed which removed enough lubrication (MIL-G-7711 / Aeroshell 5) from the retract fittings to cause a MLG extension failure—you can guess the result. Another gotcha is strut extension height/length: The NLG needs to be 4 1/16" – 4 5/16" and the MLG should be 3". The main reason is propeller clearance (optimally about 10") but boarding step height and visibility over the nose are also considerations. Also, review the AFM regarding taxing with a low or flat strut—it says don't do it. Even a low, or flat tire can lessen prop clearance to a precarious, potentially expensive, height. And if there is too much or too little strut extension, **do not** try to adjust the height yourself. The pressure in the MLG struts is around 300 psi with the struts extended and more when bearing the weight of the aircraft. Either way, it's a two- person job and the pressure/extension height is very difficult to modulate. The last gotcha is the tendency we may have to defer minor fluid leaks—typically engine oil on the bottom of the cowling or lower side of the flaps, aft of the engines (often from the crankcase vent). Even minor fluid in the area of the struts or brake caliper should not be ignored nor deferred. The following is a brief discussion about our air-oil shock struts or Oleo-Pneumatic shock struts—colloquially called Oleo Struts.

The original design for the oleo-pneumatic shock-absorbing strut was patented by British manufacturing conglomerate Vickers Armstrong in 1915. It was derived from the recuperative gear design of the Vickers gun, controlling recoil by forcing oil through precisely sized orifices. And in 1926, the Cleveland Pneumatic Tool Company designed and introduced its own oleo strut, one of the first purpose-designed for airplanes. Aircraft oleo struts absorb the shocks of landing and taxing by using the same orifice/metering pin arrangement as the Vickers gun. In the Duke, it is this pin/orifice combination and 8 ply vs 12 ply MLG tires that allows for the difference in max landing weight of 6,775 pounds for the B60 vs 6,600 for the 60 and A60.

The compression stroke of the shock strut begins as the aircraft wheels touch the ground; the center of mass of the aircraft continues to move downward, compressing the strut and sliding the inner cylinder into the outer cylinder. A metering pin is forced through an orifice and, by its variable shape, controls the rate of fluid flow at all points of the compression stroke. At the end of the downward stroke, the compressed nitrogen is further compressed, limiting the compression stroke of the strut.

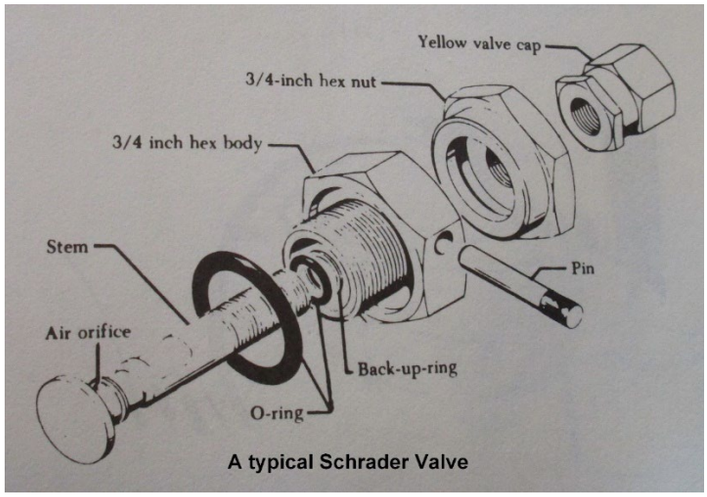
The extension stroke occurs at the end of the compression stroke as the energy stored in the compressed nitrogen causes the aircraft to start moving upward in relation to the ground and wheels. At this point, the compressed nitrogen acts as a spring to return the strut to normal. It is at this time that a snubbing or damping

effect is produced by forcing the fluid to return through the restrictions of the snubbing device. If this extension were not snubbed, the aircraft would rebound rapidly and tend to oscillate up and down due to the action of the compressed nitrogen. For efficient operation of the oleo struts, the proper fluid level and nitrogen pressure must be maintained. To check the fluid level, the shock strut must be deflated and in the fully compressed position. Deflating a shock strut can be dangerous unless servicing personnel are thoroughly familiar with high-pressure (Schrader) valves.

Typically, a fluid leak will be discovered during the preflight walk-around. You may see a wet spot on the ground below the brake caliper or the remains of a drop hanging from the bottom of the strut or brake caliper. The liquid is likely hydraulic fluid and will be red or black. It's possible this fluid may be leaking from the brake caliper itself or the oleo strut. Both cases warrant further inspection, diagnosis and repair before flight. Assuming proper fluid level, the oleo strut nitrogen charge can be evaluated through strut extension height as listed above. This distance is measured by the amount of shiny-silver strut exposed. Additionally, this exposed portion of the strut should be periodically cleaned and lubricated with a soft, clean rag dampened with MIL-H-5606 hydraulic fluid--- and nothing else.

The red, MIL-H-5606 in our oleo struts should be R&R (removed and replaced) at an interval of about ten years—perhaps equate it with two or three intervals of wing bolt inspection/replacement. Briefly, this R&R is accomplished by jacking the aircraft, releasing the nitrogen pressure, removing the entire Schrader valve, then with a second jack, compressing the strut to push the old hydraulic fluid out the empty, Schrader valve attachment hole in the top of the strut. Technicians have reported that when changed, the normally bright red fluid is often black. It's a good idea to capture the old hydraulic fluid so as to allow inspection and analysis for metal flakes or chips (go to blackstone-labs.com and see the below story *There I Was In My Duke*). And from the

discussion above, you should know to NOT attempt this fluid change yourself. Lastly, to get you up to speed with your mechanics nomenclature related to fill valves on oleo struts and landing gear retraction lubrication fittings, they are called **Schrader valves** for gasses, invented by August Schrader in 1891, and **Zerk fittings** for grease, invented by Oscar Zerk in 1929.



A typical Schrader Valve

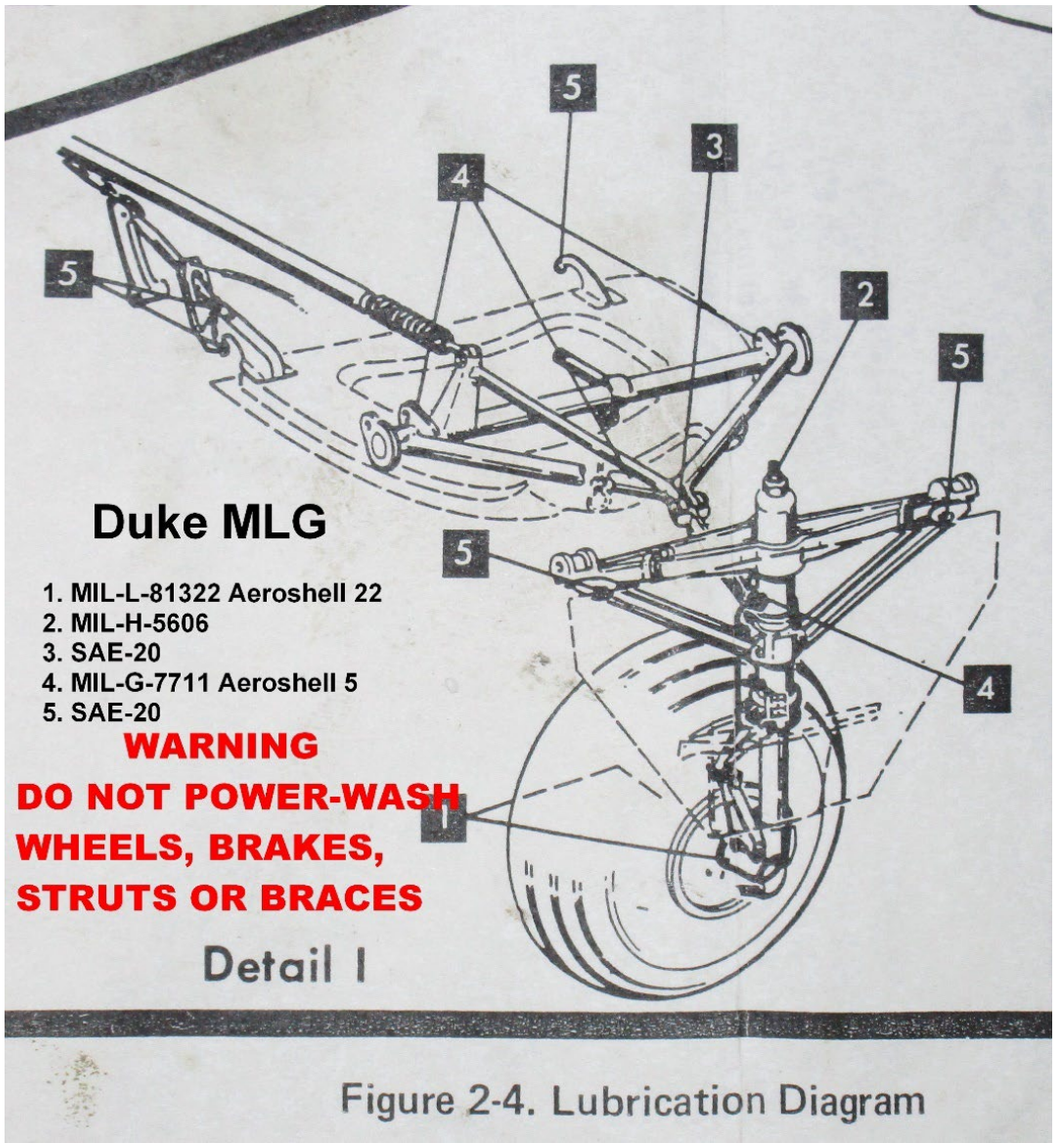


Figure 2-4. Lubrication Diagram

Lycoming Service Instruction 1462A may reveal the cause of uncommanded feathering

Note: Several Duke Flyers have reported uncommanded propeller feathering on landing roll. Troubleshooting should include the propeller itself, the propeller governor and conducting Lycoming SI 1462A. Recent reports indicate the quickest and least expensive first step may lie in the Service Instruction, so start there: Conduct this SI when: 1. Sluggish propeller action is noted, 2. The engine does not hold RPM during cruise, climb or descent, or 3. Whenever the propeller is going into feather during the landing roll with reduced throttle setting. This Service Instruction will be discussed at the Fly-In. See you there.

THERE I WAS, IN MY DUKE

Hair-raising, or fun, Duke travel or systems stories

This is P-134. In 2015 the right MLG collapsed on landing at KSJC. While not caused by an oleo strut issue, the following recount of a Beechcraft Duchess gear collapse was in fact due to poor strut maintenance.

This story from John Treanor:

From an incident in 2009 involving a Beechcraft 76 Duchess:

When the landing gear was lowered during a practice stall, the right MLG light did not illuminate. Emergency gear extension was attempted but the indication did not change. There was also no change when the aircraft was maneuvered in an attempt to free the right MLG.

The instructor briefed his student to fly an ILS approach to 500 ft, at which point the instructor took control and did a fly-by of the tower-- ATC confirmed that the right main landing gear was not extended. During the subsequent approach and landing flare, both engines were shut down and the propellers feathered. After touchdown the pilot held the right wing up as long as possible, and the right-wing tip eventually contacted the ground, swinging the aircraft to the right; the aircraft then came to rest on the side of the runway.

Disassembly of the strut revealed internal corrosion had inhibited movement of the internal piston. This corrosion had limited its free movement. Although this had not prevented gear retraction, it had 'hung up' during the subsequent attempts at gear extension; and this prevented the strut from fully extending. Following the previous takeoff, it was likely that it had extended only around three quarters of its maximum length at retraction and this had caused the wheel to trail aft of its normal position, and in this position, the wheel contacted the wheel-well.

NEW MEMBERS

(Since March, 2022) Like with ATC: If you have not been acknowledged, say something!

Adam Yancey, TN	Nils Hantelmann, AE	Lester Alvin, TX
Michael Henderson, TN	Fuentes JohnGlen, VA	Patrick Jeski, MI
Marty Naegelin, TX	Keenan Leatherwood, TX	Bradley Newman, OH
Alexandru Farc, KY	Charles Winfree, TX	Kambis Ebrahimi, DE
Ron Duitsman, IL	John Dietzler, CO	Kevin Elliott, ND

LINKS

Free Subscription to T&T magazine (Twin & Turbine):
https://secure.villagepress.com/subsignup/signup/index/format/empty/offer/11/oc/11/

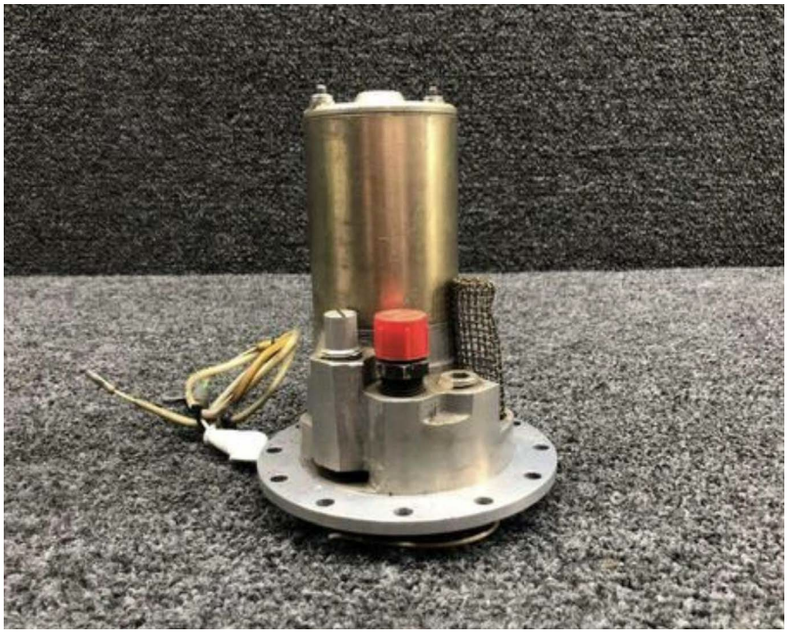
Free Subscription to KingAir magazine:
https://secure.villagepress.com/subsignup/signup/index/format/empty/offer/198/oc/198/

DFA Website: http://www.dukeflyers.org/DFA-11/index.php

STUMP THE DUMMY / WHAT IS THIS PART?

The component from the previous newsletter was the hydraulic fluid reservoir (for wheel brakes). It contains red, MIL-H-5606 hydraulic fluid and is located in the nose baggage compartment, aircraft left, aft of the baggage door. The quantity measuring dipstick is marked with an 'Add' and a 'Full' line. And like fuel, it's a mandatory pre-flight item for every flight.

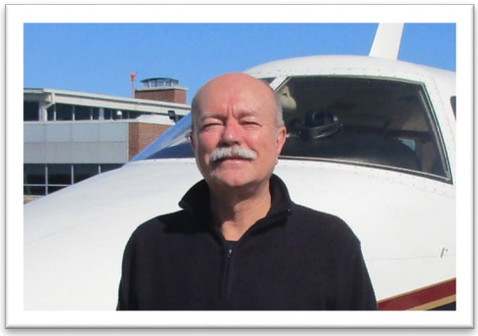
Our next mystery component:



Where is this part installed in your Duke?

REQUEST OF DUKE FLYERS

If you have a Duke story, please submit it for the *There I was, In My Duke* section of the newsletter. And if you have an interesting system, parts or procedural question, or learned something new about the Duke, submit it for the *Stump the Dummy/What is this part section.* Also, if you are a new member and didn't see your name in the New Member section this time or last, send me an email telling me your first and last name (please use all caps so that I spell it correctly) and in which state you reside—I'll add it to the next newsletter. And lastly, we are always looking for a venue for the DFA Fly-In, a guest speaker and a host. Be a participant in your DFA and suggest a location, a speaker and/or become a host. The DFA Committee has been working diligently on this years Fly-In—please try to attend. Renew your membership, fill out and mail the attached form with your registration fee, make your hotel reservation and we'll see you in September.



Thank you,

Kevin R. Dingman

Kevin R. Dingman, editor
Dinger10d@gmail.com

Duke Flyer's Association

Dayton, Ohio Fly-In Registration

September 8th - 11th, 2022

***= required field**

***Members name:**_____

***My membership expires (from DFA website)**_____
(Current membership is required to attend the Fly-In)

***Guest name(s):**_____

_____

_____

Your Address: _____

_____

***E-mail address:**_____ **and *Cell phone** _____

Your arrival date, time, and aircraft info:_____
(i.e. 8th, 1500L , N7510D – Duke, P-101)

***Desire to attend (please circle one for each):**

Friday 10 am Golf: Yes/No

Friday 6 pm dinner at Jay's Seafood: Yes / No

Registration Fee: $250.00 per person
Payment MUST accompany registration
***Make check payable to: Duke Flyers Association**
***Mail to: Pilot Steel, Inc.**
2301 Triad Drive
Owensboro, Kentucky 42301