DFA NEWSLETTER

DUKE FLYERS ASSOCIATION, LLC

Welcome to the second quarter newsletter.

The DFA completed a leadership reorganization, our website continues to improve, we are adding another parts supplier and at 'T' minus two months, the 2020 Fly-in has been cancelled. Our website site moved to a different server and now includes a tool for paying DFA dues. Bob Hoffman has provided another great chapter from his Duke operating manual about cowl flaps, we dug up a couple of great maintenance tips and the "There I Was In My Duke" section of our newsletter has a story relevant to weather in July. And you'll find the answer to the last mystery part as well as a new one to ponder.

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	jgorman@gormanrupp.com	Treasurer	(419) 512-3963	OH
Ab Fuoss	aefuoss@comcast.com	Member/Transport	(410) 294-6922	MD
Gary Bongard	kgbventure1@aol.com	Member/Tech	(612) 281-5158	MN
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 the DFA and will coordinate all issues. Ray owns Pilot Steel, a manufacturing company in Kentucky. Al Uhalt is retired USAF and a flight instructor. He is sharing duties with Ray. Jeff Gorman performs as the Treasurer of the DFA and is with Gorman-Rupp Pump Company in Ohio. Ab Fuoss is retired in Maryland, drives a truck and coordinates all DFA ground transportation requirements. Gary Bongard operates businesses in South Dakota, Florida and Minnesota including the manufacture of carbide faced lifters for aircraft engines. Gary 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 B-757 captain and long-time Duke Approved School owner and instructor. He resides in Kentucky and provides training and operational insight to members. Kingsley Hill is a Technology Executive in New Jersey and manages information technologies including the DFA website. Kevin Dingman is a retired F-16 instructor and current B-737 captain, writes for Twin & Turbine magazine 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 continues to be remodeled and improved after its move to a new server. It's a great place to exchange information about owning, operating, maintaining, and flying the Beechcraft Duke. The site now 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 of Duke items

Existing members should click on 'Renew' next to "(Your name) Signed in" on the sign-in page to renew 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. A forgot-password link and a search function are also now in place. Please navigate around the new DFA website to become familiar with content, services, information, links and contact information. Expired and inoperative links are being deleted, but 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

This year's Duke Flyers Association Membership Fly-in has been cancelled. The committee is considering a training event this fall in Owensboro, KY and postponing the annual Fly-in until spring—to be held in Fort Collins, CO as previously announced. More on the fall and spring events in the next newsletter or on the DFA website. From our Fly-in host Jerry Doyle:

I am troubled by the second wave of Coronavirus cases hitting the country. I am fearful with only 10 weeks until the fly-in, that we are facing another round of closures that will mostly likely destroy any chance of a good event.

Firewall Forward is committed to the Fly-In, but if everyone is stuck in their hotel rooms because of additional closures and we cannot experience any of the sights of Northern Colorado, it will be a big expensive waste of time and money for all those that wish to participate.

I want nothing more than a **QUALITY** event where everyone enjoys their experience.

Therefore, I am proposing we push the event back to the spring of 2021.

PARTS

(2) Generators	(2) Tach Generators	(2) Engine cores	(2) Starters
(2) Magnetos	Complete interior and potty	(2) Flap motors	(2) Landing gear motors
Vertical stab and rudder	Cowl flap actuators	A/C Door actuator	Horizontal stab
Electric fuel boost pump	Turbocharger	Flaps and flap motor	Oil cooler (new)
Nose gear uplock pins	Landing gear motor	Windshields	

Gary and Bob can provide a more complete list of available parts. Gary will ship from his facility at the Sturgis, SD Airport (49B) via UPS. If FedEx is required, he will need to run into Rapid City (KRAP) which is about 30 miles and 45 minutes. Bob Hoffman will ship from Sanders, KY and New: Stacie Smith stacie95683@gmail.com ships from CA--- contact Jim (916) 275-8546 or Mark (916) 870-1150. Some parts are also available from Aircraft Systems in Rockford, IL.

TRAINING & OPERATIONS

Duke specific POH, IFR, and pressurized piston twin procedures and techniques

Bob Hoffman has spent the last couple of years writing a comprehensive operating manual for the Beechcraft Duke. The entire manual should be finished by the **2021** DFA Fly-in and available for purchase. The following is a short excerpt from Bob's manual. The following Cowl Flap System chapter is also available in its entirety from the DFA website: http://www.dukeflyers.org

Duke Cowl Flap System

Introduction

The Duke's Lycoming TIO-541 engines are cooled by fuel, engine oil, and air flow over and around the cylinders and accessories. The engine cowling, baffles, and cowl flaps are all components of the air-cooling system. Engine baffles are installed in the top of the engine compartment to build pressure between the cowling and engine cylinders. This forces airflow down and through the engine cylinders and oil cooler fins. Cooling air flows down and aft through the lower engine compartment providing accessory cooling before exiting the lower nacelle. Cowl flaps are engine cooling devices when extended, further increasing airflow through the engine compartment by decreasing air pressure in the lower aft nacelle.

System Description

Cowl flaps are installed on the bottom aft portion of each engine nacelle and consist of a 20" x 20" door which is secured to the lower nacelle. When closed, the door is flush with the bottom of the nacelle; when fully open, the door's trailing edge extends 11.4 inches below the nacelle. A hinge at the door's midpoint, aft of the forward hinges, provide an attach point for the cowl flap actuator. The actuator is electrically controlled from the flight deck by switch(s) located on the pilot's left lower side panel.

System Components

Cowl Flap Door

The cowl flap is a hinged door measuring 20" x 20" and is attached to the lower nacelle. When fully closed, the door is flush with the lower nacelle--when fully open, the trailing edge of the door extends 11.4 inches below the nacelle.

Cowl Hinges

Three hinges secure the door to the bottom of the engine nacelle: two forward, and one at the midpoint of the door structure.

Cowl Flap Actuator

An electric motor housed within the actuator drives a rod which in turn opens and closes the cowl door. The top of the actuator is secured to the engine nacelle structure, the bottom to the door midpoint hinge. The actuator incorporates two internal limit switches which, when reached, remove power from the motor when the actuator rod is fully extended or retracted.

Electrical Power

In Dukes SN P-4 to P-61, the actuator(s) receive power from the left power bus through a single 5A circuit breaker, and SN P-62 to P-594 from the respective left and right power bus through individual 3A circuit breakers. Cowl flap CB's are located on the Co-Pilot's right Upper Side Panel, bottom two rows; they are labeled Engine & Fuel Systems. Circuit breakers are the push- to-reset type and may be reset one time on the ground and reset one time when airborne only if critical for continued flight.

Cowl Flap Control

Cowl flap controls are located on the pilot's left lower side panel. The controls consist of two, three position switches labeled: OPEN-OFF-CLOSED. The aft position is OPEN, center is OFF and forward is CLOSED.

Cowl Flap Indication

Position indicators are not provided. The cowl flap actuator(s) require approximately

14 seconds to fully OPEN or CLOSE. Limit switches remove power at the full open and full closed positions. Timing actuator action is a technique used to achieve intermediate cowl flap positions. When positioned fully CLOSED, the trailing edge of the door is nearly flush with the bottom of the nacelle. When fully OPEN, the door is deflected approximately 30 degrees below the nacelle. Selecting the COWL FLAP switch(s) from CLOSED to OPEN for seven seconds, thence OFF, will position the door to the 15 degree position, colloquially known as the TRAIL position. TRAIL may be confirmed when the cowl flap(s) begin to become visible beneath the nacelle. Intermediate door position(s) may be achieved using this technique.

Limitations

The manufacturer publishes no limitations regarding the use of cowl flaps. Likewise, cowl flaps are not listed in the aircraft equipment list or the FAA type certificate data sheet. Cowl flaps are NOT required to be selected OPEN / CLOSED for a specific flight operation.

Normal Operation

The Beech factory training center, and all major training providers since 1968, have advised cowl flaps CLOSED for takeoff--Cowl flaps are used as a high-altitude cooling tool. Fuel is the engine's primary cooling medium during takeoff and climb, thus negating cowl flap usefulness below FL180. During extended climbs above FL180, cowl flaps assist in keeping cylinder head and oil temperatures within acceptable operating perimeters.

Ground Operations

Generally, cowl flaps should be OPEN during all ground operations without regard to outside air temperature. This technique prevents localized hot spots around the engine accessories and associated wiring. During extreme cold conditions, however, operators in the northern latitudes typically keep the cowl flaps CLOSED on the ground to facilitate oil warming.

Takeoff and Climb

Cowl flaps should be CLOSED for every takeoff and climb and incrementally OPEN in the climb to maintain cylinder head temperatures below 205° C, or oil temperatures below 104° C. With or without intercoolers, these engine parameters should not be reached, even on the hottest day, until climbing through +/- FL180.

Cruise, Descent, Approach and Landing

Since air flow provides sufficient cooling during these phases of flight, and to help prevent shock cooling during descent, cowl flaps will normally be CLOSED during cruise, descent, approach and landing,

Performance

Cowl flaps on a Duke are enormous. The increased wetted area of fully extended cowl flaps increase induced drag. This induced drag increases takeoff distances, significantly decreases single and two engine climb performance and decreases cruise true airspeed.

Normal Takeoff

The manufacturer's Normal Take-off performance charts list cowl flaps OPEN. Performance chart ASSOCIATED CONDITIONS must not be interpreted as limiting. For instance, NORMAL TAKE-OFF charts list only paved, level, dry surfaces. The fact that wet or sloped surfaces are not listed does not preclude a take-off from a wet or sloped surface. Likewise, the NORMAL TAKE-OFF chart considers "TAKEOFF POWER SET PRIOR TO BRAKE RELEASE", which in no way limits an operator from conducting a rolling or standing takeoff.

Obstacle Takeoff (P-4 to P-246)

The manufacturer's Obstacle Takeoff charts, under ASSOCIATED CONDITIONS, list the cowl flaps CLOSED. The chart also lists flaps set to APH (15 degrees).

Single Engine Climb

The manufacturer's Single Engine Climb chart, Associated Conditions, lists the cowl flaps OPEN. Independent flight testing confirms that single

engine climb performance increases 150 feet per minute when the cowl flaps are **closed**.

Two Engine Climb

The manufacturer's two engine climb charts assume the cowl flaps OPEN. Operator experience indicates two engine climb performance increases over charted data with the cowl flaps CLOSED.

Cruise

The manufacturer's Cruise Control charts state: "Cowl flaps full OPEN reduce true airspeed by approximately 10 knots." This data was derived at an average cruise weight of 6,125 lb. Independent flight test data, however, (FL250/ +6,500 lb. /cowl flaps OPEN) resulted in true airspeed penalties well in excess of 10 knots. The Lycoming Operator's Manual and Service Instruction publications provide operators with specific guidance not found in the AFM/POM. Operators should consider Lycoming guidance regarding cylinder, oil, and turbine inlet temperatures controlling for maximum service life.

Emergencies

The EMERGENCY section of the AFM/POM lists two procedures related to cowl flap operation:

ENGINE FAILURE AFTER LIFT-OFF OR IN FLIGHT / Secure inoperative engine: Cowl Flap - CLOSED.

MAX GLIDE (FORCED LANDING) Feather the propellers, retract the wing flaps, landing gear and (CLOSE) cowl flaps.

Maintenance

The maintenance manual advises cowl flap actuator be overhauled "on condition." The Illustrated Parts Catalog lists the cowl flap actuator as P/N 96-380021-15, alternately, P/N 102-389013-1. Operators report cowl flap actuators are easy to troubleshoot, disassemble and overhaul. Parts such as brushes, bearings, armatures, etc. are available through aerospace parts providers. (Electromech Technologies, Wichita, KS).

Lycoming Service Instruction 1094D, March 24, 1994:

For maximum service life, maintain the following recommended limits for continuous operations:

- Engine power setting -- 65% of rated or less
- Cylinder head temperature -- 400F/204C, or below
- Oil temperature -- 165F/74C – 220F/104C
- Turbine inlet temperature - maintain 100F/38C rich of the maximum allowable: 1650F/899C minus 100F/38C = 1550F/861C

Common service difficulties

- Cowl flap stuck in retract or extend position due to jammed or failed internal limit switch(s)
- Electric motor failure due to failed internal components

Finally, cowl flaps should not remain OPEN for cooling in cruise flight. High cylinder head and / or oil temperatures are symptomatic of worn engine baffles, failing ignition components, fuel metering, or internal engine issues. Pilots should control high temperatures with any means possible, including higher fuel flows, increased air flow, lower manifold pressure, or by selecting a lower altitude. Persistent cylinder head temperatures above 205C or oil temperatures above 104C in cruise flight (65% power) should be discussed with your maintenance provider.

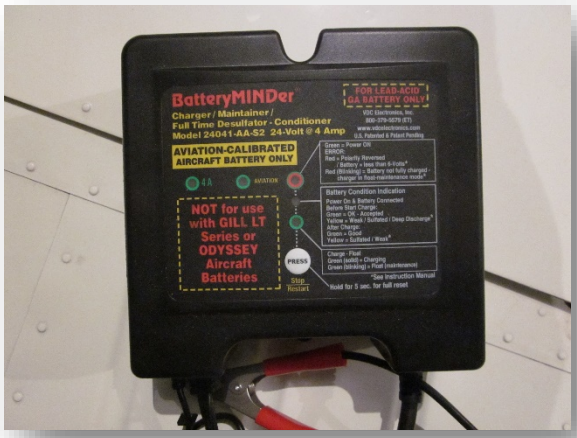
DUKE MAINTENANCE

News, tips and good practice procedures

Keeping your Duke's battery fully charged

From our old friend, gone but not forgotten--Dane Scag

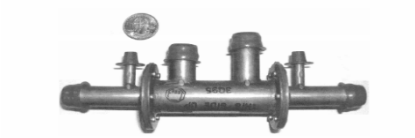
Some owners may not know of the simple way to keep our 24-volt battery fully charged. Plugging in an external source at the external power receptacle does not connect to the battery. One option is to remove the left engine nacelle cover to connect directly to the battery. A better way, and it should only take a few minutes for the mod, is to locate the hot wire leading to the front baggage compartment dome-light. Be careful, this wire is always hot! Splice on a short length of wire to the light fixture hot terminal. If you want to get fancy, crimp on a 2-wire female connector. Change the fuse in the left engine rear nacelle from 5 amps to 10 amps. It's hidden high up the front bulkhead under the right-hand relay. If you know nothing about electrical circuits, ask your tech to do this. Now connect a 24-volt, aircraft battery tending device (such as the Battery Minder) and you are set.



Keep your battery fully charged

Manifold check valve procedure: (this is easy to do but more complicated to write!)

And from Raytheon Aircraft:



Pre-flight:

1. Start the left engine in accordance with the POH. After start, confirm that the left red ball in the instrument air source gauge is out of view and that the right red ball remains.
2. Start the right engine in accordance with the POH. After start, confirm that both the left and right red balls in the instrument air source gauge are out of view.

Post-flight, engine shut down:

1. Shut down the left engine in accordance with the POH. After shutdown, confirm that the left red ball in the instrument air source gauge is in view and that the right red ball is out of view.
2. Shut down the right engine in accordance with the POH. After shutdown, confirm that both the left and right red balls in the instrument source gauge are in view.

Adherence to this procedure will ensure that from the prior shutdown to the next start-up, both sides of the manifold check valve will be functionally checked without putting the strain of additional start cycles on the engine and starting system.

THERE I WAS, IN MY (TURBINE) DUKE

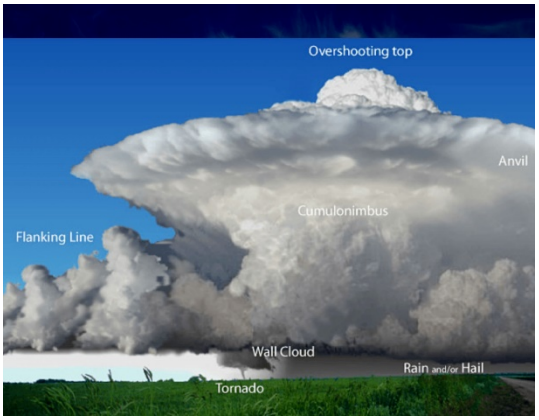
Hair-raising, or fun, Duke travel or systems stories

Summarized and reprinted from Rick Perfect's (Duke P-583) story in the April, 2009 DFA Newsletter:

Give yourself a minimum of forty miles between two cells

I got a briefing, filed and we departed KFLL for KRDG at approximately 5:30 pm. The Turbine Duke has tremendous performance characteristics and will climb in excess of 3000 fpm early on in the climb which helps to achieve great fuel economies at altitude. The Shadin, however, was indicating that we would have just 10 gals at our destination if we didn't start moving in a more northeasterly direction--- I was falling prey to "get-there-itis." I was aware of two large cells over Orlando and as we got closer there was a path between them direct CRG, but ATC denied the request. Looking westerly, more cells were building in the typical chain-like pattern and moving toward ORL. The on-board NEXRAD had not updated for over 45 minutes, so we weren't getting any information on the GNS530. The distance between the CB and the two other large cells appeared to be over 10 NM. In order to avoid stopping in Norfolk for fuel we decided there was enough space between the CB and the other two. As it turned out, this was not a good plan. We failed to realize that with tops at FL270 and bases at 5000, there was a tremendous amount of energy in this beast. The CB we flew into looked harmless on the on-board radar and it was south west of the other two cells. By the time we flew through the gap and clipped the CB, it had grown to FL290. We were struck by lightning early in the CB induced descent and there was some small hail. The following is an excerpt from the NTSB report:

"The altimeter began to unwind rapidly and I tried to correct the altitude change with up elevator pressure as well as additional power. This corrected the situation momentarily, but the downdraft continued and I feared that I would compromise the elevators if I continued to apply the pressure necessary to maintain altitude. I relaxed the pressure and pulled the torque on both engines to idle, to introduce drag to slow the descent. At this point we were losing approximately 4-5 thousand feet per minute and the aircraft began to roll left. My memory from that moment forward is blurred; but I am certain that the aircraft entered a downward spiral to the left at a roll of greater than 100 degrees and a near vertical descent."



Extreme turbulence, hail, icing, wind shear, tornadoes, lightning, loss of lift, engine failure

"The artificial horizon tumbled and I thought that we would not recover. The artificial horizon righted itself briefly and then tumbled again. It righted itself one more time and I reacted with right aileron and rudder and we rolled level. As it rolled level, I once again applied up elevator and power in an attempt to arrest the descent. The airspeed began to decrease to normal and the aircraft remained level....."

The data retrieved from the Shadin recorded two airframe exceedances. The first was 268 kts for 26 seconds. The second was 300 kts for 13 seconds. The stall horn and the airframe exceedance alarm were going off simultaneously throughout the descent as we were pushed downward by the powerful downdraft. We were measured by ATC at one point in the descent at 12,000 ft/min. The whole event took about 1 minute 20 seconds to descend from FL270 to 14,000.

The airframe sustained structural damage to both of the wing's upper skins, the right elevator/stabilizer was bent 2/3rds from the root, the outboard aileron hinge had broken free and all the covers for the bathtub fittings had been blown off. The mechanics at American Aviation stated that in their opinion, had we been in any aircraft other than a Beechcraft, we would not have survived.

The FAA and NTSB were very supportive and after the teleconference debriefing with the NTSB and Southern Florida ATC. Although it had been my decision, the NTSB felt that the controller should have warned us that we were entering a level 6 echo. If I had been aware of the severity of the conditions within the cell, I would have opted for landing in Norfolk to fuel. This incident/accident was a result of something for which I swore I would never fall prey. The simple rule of waiting a few hours or even overnight, if conditions don't look or feel right, can make all the difference for a flight. Lessoned re- learned--- Now I wait! (Editor's note: civilian, military and part 121 consensus is 20 miles minimum spacing from a cell—on the upwind side. Therefore, spacing between two cells should be a minimum of 40nm.)

NEW MEMBERS
(Since Jan., 2019)

Mike Shepard, TX	Michael Breland, WA	Chris Morton, MT
Robert Brown, AZ	John Lock, FL	Troy Nothrup, NB
Keno Brown, TX	Dan Connell, FL	Timothy Danish, LA
Gary Dyer, NV	Jim VanBuskirk, CO	Chad Johnson, TX
Powel Sanders, AR	Christopher Roan, SD	Thomas Logan, CA
Marshall Egan, ID	Kevin McLaughlin, CA	Samuel Jackson, GA
Clyde Hillier, ON, CA	K. Karim, IL	Tony Desantis, TN
Kirk Chambers, AB, CA	Jay Landwerlen, IN	Tommy Corbin, TX
Jeff Gilmore, TX	Remy Dulay, FL	John Truelson, TX
Eric Choate, CA	Robert Michl, Austria	Edward Westerd, VA
Matthew Modleski, IN	Kent Hoops, IN	Will Yandell III, TN
Isaac Nasar, NJ	Jay Williams, OK	Tommy Stoneman, TX
Lief Anderson, FL	Ben Follas, TN	Guy Cappuccino, MD
Jerry Doyle, CO	Frank Rivas, FL	Dave Schmidtmen, PA

LINKS

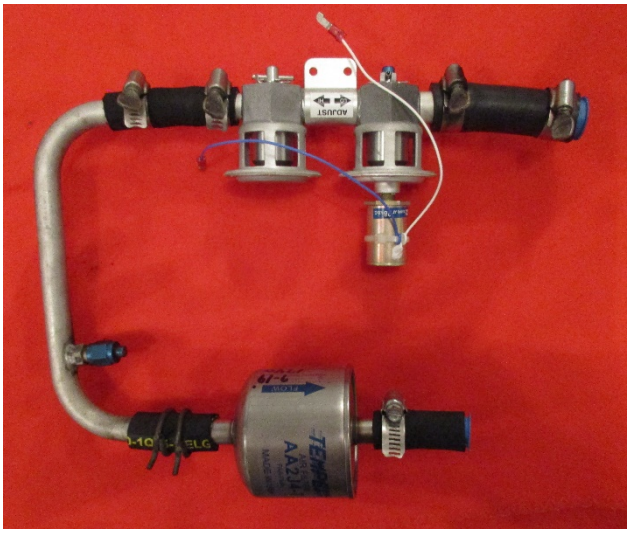
Kevin's recent articles from Twin & Turbine magazine:

April T&T:	http://twinandturbine.com/article/dont-quote-pilots-ballplayers-say-will-listen/
May T&T:	http://twinandturbine.com/article/dont-quote-pilots-ballplayers-say-will-listen/
June T&T:	http://twinandturbine.com/article/loneliest-number-piloting-planes-planetary-pandemic/
Free Subscription to T&T:	https://secure.villagepress.com/subsignup/signup/index/format/empty/offer/11/oc/11/
DFA Website:	http://www.dukeflyers.org/DFA-11/index.php
Parts:	kgbventure1@aol.com stacie95683@gmail.com BE60pilot@aol.com

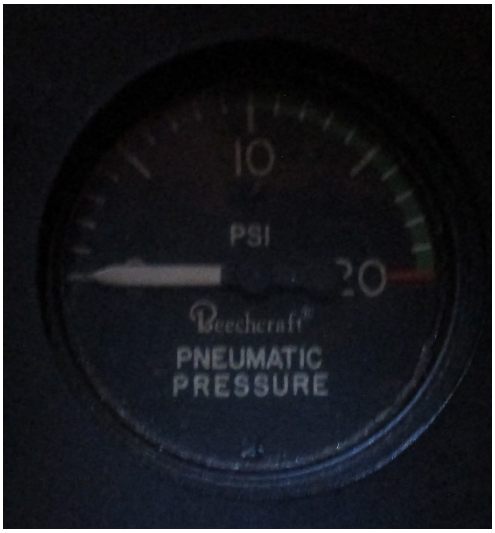
STUMP THE DUMMY / WHAT IS THIS PART?

The part from the previous newsletter was a windshield heat ***controller***. It is located under the glare shield, front left side, attached to the pressure bulkhead. It is one of two components that typically cause the windshield heat to fail. The other typical failure point is the windshield heat ***inverter*** which is located near the aircraft battery.

OUR NEXT MYSTERY COMPONENT:



Where are these parts installed in your Duke?



When it fails, you get this!

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. Or, if you have an interesting system, parts or procedural question or learned something new about your Duke, submit it for the *Stump the Dummy/ What is this Part* section. Plus, we are always looking for next year's DFA Fly-in venue, guest speaker and a host—be a participant in your DFA and find a location, speaker and/or become a host!

Thank you,

Kevin R. Dingman
Kevin R. Dingman, editor
Dinger10d@gmail.com