Fuel Duke (and Baron) Shutoff Valve Overhaul Instructions

The documentation in the Duke maintenance and parts manual is unhelpful and in some cases wrong about how to overhaul the shutoff valves located in each wheel well. The overhaul parts for the valves are readily available and the actual overhaul takes only a few minutes. The preparation, removal, replacement, and rigging take a bit longer.

Parts Actually Required

The parts list below is partially wrong. Below is a table of parts from the earlier Duke manual, the later Duke manual, and the parts you actually need.

Old Manual	New Manual	You Need This	Comments
	HE-1863 Gasket	HE-1863 Gasket	Gasket on face
HE-1372 Seal	HE-1372-1 Seal	2x HE-1372-1 Seal	White nylon follower
MS29513-13 O-Ring	MS29513-13 O-Ring	2x MS29513-13 O-Ring	Seal on Followers
MS29513-16 O-Ring		MS29513-16 O-Ring	Valve core seal
MS29513-23 O-Ring	MS29513-23 O-Ring	MS29513-23 O-Ring	Between halves around front bearing
MS29513-23 O-Ring			
	97075-1 Quad Seal		NOT 97D75-1 and 97075 is not required either.
	MS29513-25 O-Ring		Outlet end

Preparation

The removal and replacement of the valve is best down with empty fuel tanks. There are some mechanics, who say that it is possible without emptying the tanks, but I haven't done it that way and they admit that you will get fuel on you. My suggestion is that you drain the fuel tanks before embarking on the job.

Tools Required

1" Open End Wrench

7/8" Open End Wrench

3/8" Open End Wrench

3/8" Nut Driver

Medium Phillips screwdriver

Medium Flat blade screwdriver

Very large (wide) flat blade screwdriver

Safety Wire Pliers and wire

Soft Scotchbrite

5/16" Allen Wrench

Vaseline

Procedure

Removal

Drain the fuel or not (see above). We'll assume you drained the fuel.

Loosen and remove 4 fuel fittings at the closest flare fitting to the valve. The fitting behind the valve goes to the engine. The fitting with all the t's on it is from the fuel tanks (comes out the side of the valve). The fitting that comes out the top of the middle of the valve is the crossfeed source (ie brings fuel from the other side). It will be important to know which fitting goes to what when we get to reinstalling the valve and verifying that it is right.

Remove the overtravel tube from the outboard end of the valve.

Remove safety wire and screws holding the face on the valve. This exposes the gear wheel.

Remove the offcenter screw. Removal of this screw will allow the gear wheel to rotate freely.

Remove the cable fitting at the inboard end of the valve.

Remove the four bolts and nuts that hold the valve bracket to the wing. 3/8" open/box end and nut driver usually do the trick here.

Pull the valve back and out to draw it off the drive cable. The gear will rotate.

Overhaul

Remove the safety wire and 3 screws from the back of the valve.

Remove the back of the valve leaving the pipe fitting in place. This exposes an o-ring and the rear bearing as well as the ports of the valve core. The hole seen in this valve core receives fuel from the respective inlet (tanks or crossfeed) and fuel flows toward you into the pipe in the backplate (just removed).

Loosen the hex cap screw in the center of the gear on the front of the valve. To lock the gear in place either use a spanner with 1/8" pins into the two holes for this purpose or place the offcenter screw back in place. In my case someone had used Locktight on the screw and it was not coming out. If that is the case use a torch to heat the screw.

Do not try and pry the gear up. Turn the hex cap screw so that it protrudes about 1/8" above the gear face. Tap lightly with a heavy rubber mallet on the head of the screw while holding the valve in your hand. The bearing and the valve core will exit the rear of the valve. Be careful not to lose the single ball bearing and spring that is under the gear (which causes the detents). Adjust the cap screw as needed to get the gear off the valve core and the valve core out of the valve body.

Inside the bore of the valve body you will see two nylon valve followers possibly protruding from the two inlets in the middle valve body.

Remove the fittings from the Crossfeed inlet and the Fuel Tank Inlet to the valve. Inside there will be a brass core that will screw out using a large screwdriver. Beneath the brass core is a washer. Beneath that is a spring, and finally there is a nylon follower (which might be easier to push out through the valve bore.

The valve is now sufficiently disassembled.

On reassembly lubricate all o-rings and moving parts with Vaseline.

Put new o-rings in each of the two new valve followers. Place the followers into the valve (I found it easiest to it from inside the valve bore. Align the cutout with the bore and push the followers all the way in. Re-install the spring, the washer, and the brass gland, but don't screw the gland down yet or you'll push the nylon followers into the bore.

Replace the o-ring in the valve bore.

Replace the o-ring around the bearing in the middle of the valve.

Replace the valve core into the valve bore.

Rotate the valve core until the hole in the inside of the valve bore is pointed down to 6:00 (not toward any inlet.

Place the spring into the hole at 12:00 in the valve body. Place the ball bearing on top of the spring.

Note that the gear has an arrow on it which points toward the active outlet. Note also that the valve core has two roll pins which engage holes in the gear to allow it to torque the valve core.

Position the gear so that the red arrow points to 6:00 (where the tank inlet is at 9:00 and crossfeed inlet is at 12:00. Align the gear onto the roll pins. The countersunk hole for the limit screw (the offcenter hole) will be at 9:00.

Press the gear on to the roll pins with an arbor press. There will be nearly no clearance between the back the of the gear and valve body below it and the back bearing will be flush with the back of the valve body.

Replace the hex cap screw and tighten to 5 ft/lbs. Using the allen wrench rotate the valve through 360 to verify smooth operation and engagement of each of the detents.

Replace the o-ring near the back bearing. You do this after pressing the body together to avoid damaging the new o-ring with the arbor press.

Reattach the back of the valve (with the outlet port on it) with the three screws. Safety wire the screws.

Tighten the brass cores in the two inlet ports so they compress the springs and followers onto the valve core.

Replace the plumbing fittings on the two inlets.

Reinstalling the valve

Have someone hold the fuel selector lever in the airplane in the "Off" position.

Position the valve in the off position.

The drive cable protruding from the sheath should be relatively short (it extends outward when the inside lever is moved to Crossfeed and On).

Note the twist of the control cable and position the valve on the control cable and rotate the entire valve to wind it on to the control cable. Do this until the brass fitting on the control cable sheath is close to the valve and can be threaded on. Tighten the brass fitting. If the arrow on the gear deviates from the 6:00 position, loosen the brass fitting, rotate the entire valve one or two turns in either direction, and re-tighten the brass fitting. Do this until, when the fitting is tight, and the handle is held in the off position, the arrow is pointed perfectly downward.

Have the person in the cockpit rotate the valve through all three position, positively feeling the detents and noting that the detents occur when the internal valve control is pointed to a selection (off, crossfeed, and on).

Replace cover with new gasket and install with 4 screws.

Safety wire the 4 screws

Position valve in wheel well and connect plumbing fittings.

Install the 4 bolts to hold the bracket in place

Install and tighten the over-travel tube opposite the control cable.

Safety wire the over-travel tube fitting and the control cable fitting together.

You Need This	Qty Needed per valve	Cost from Rapid (Dec 2011)	
HE-1863 Gasket	1	$14.75	For front of valve
HE-1372-1 Seal	2	$67.20	Nylon Valve Follower
2x MS29513-013 O-Ring	2	$0.75	Seal for Followers
MS29513-16 O-Ring	1	$1.73	Core Seal behind Gear
MS29513-023 O-Ring	1	$.48	Between valve halves
MS29513-025 O-Ring	1	$.67	Rear of Valve

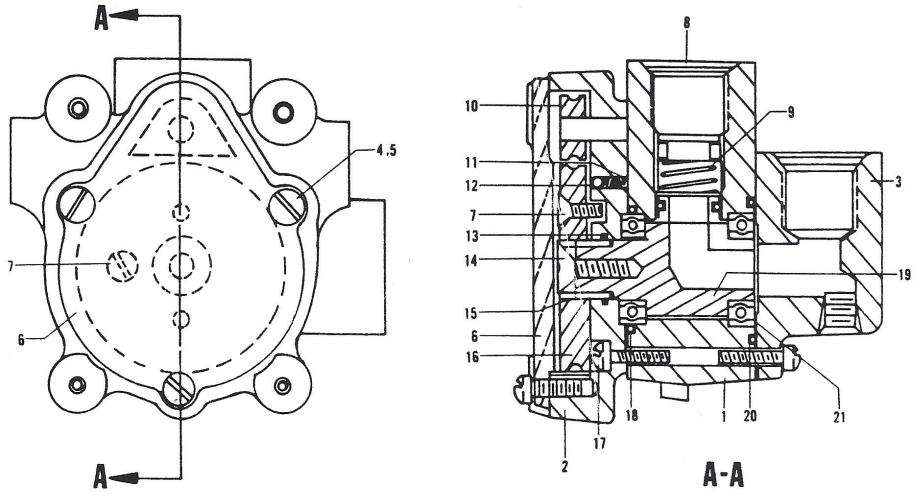
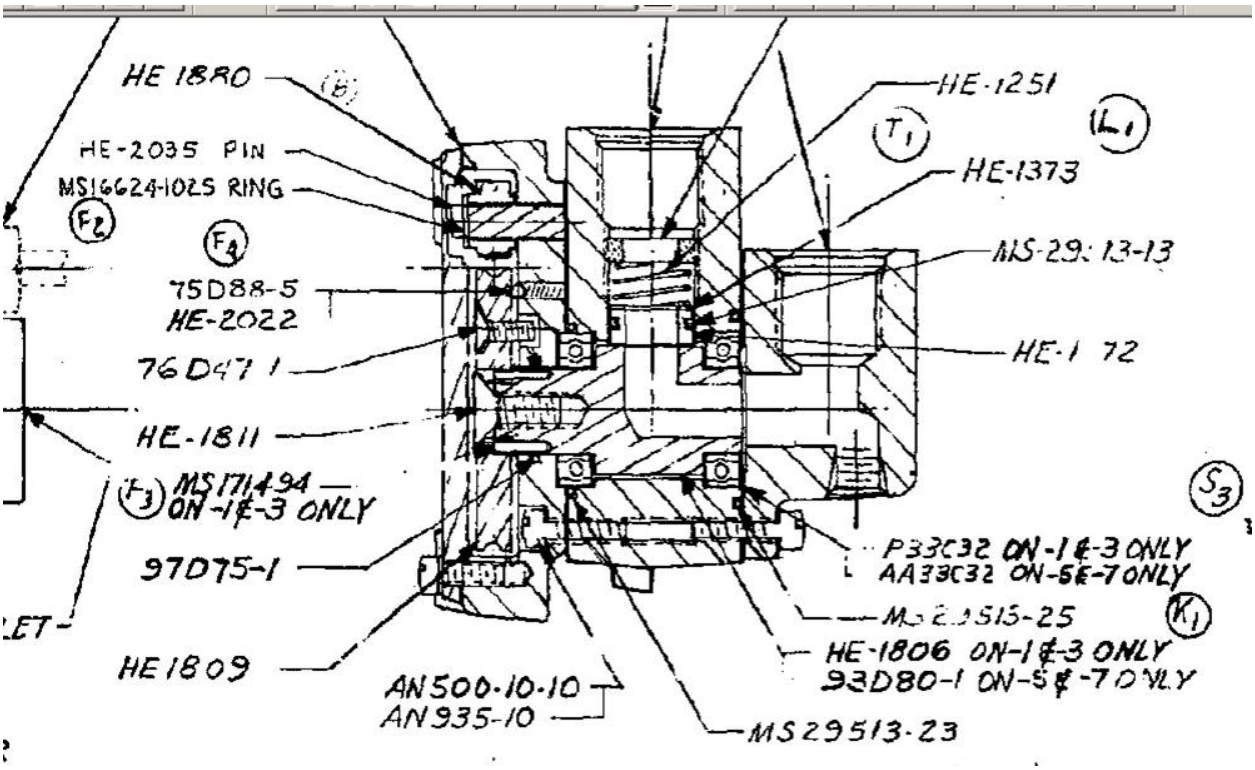


FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
289	60-920000-171	FUEL SYSTEM INSTL	NP	
	HE780-1	. VALVE ASSY,FUEL SELECTOR LH	1	
	HE780-3	. VALVE ASSY,FUEL SELECTOR RH	1	
- 1	HE1804	. . BODY.	1	
- 2	HE1803	. . BOX,GEAR.	1	
- 3	HE1805-1	. . SUMP /LH ONLY/.	1	
	HE1805-3	. . SUMP /RH ONLY/.	1	
- 4	AN500A10-10	. . SCREW	6	
- 5	AN935-10	. . WASHER.	6	
- 6	HE1728-2	. . COVER	1	
- 7	NK507-8-6	. . SCREW,STOP.	1	
- 8	HE1810	. . GLAND	2	
- 9	HE1251	. . SPRING.	2	
	HE1373	. . WASHER.	2	
	HE1372	. . SEAL.	2	
	MS29513-13	. . O RING.	2	
- 10	HE1880	. . SLIDER.	1	
- 11	HE107	. . SPRING.	1	
- 12	5/32 IN DIA	. . BALL,STEEL.	1	
- 13	MS29513-16	. . O RING.	1	
- 14	HE1811	. . SCREW	1	
- 15	79-022-094-0375	. . PIN,ROLL.	2	
- 16	HE1809	. . GEAR.	1	
- 17	AN500-10-10	. . SCREW	4	
	AN936A10	. . WASHER.	4	
- 18	MS29513-23	. . O RING.	1	
- 19	HE1806	. . ROTOR	1	
- 20	MS29513-23	. . O RING.	1	
- 21	B538	. . BEARING	2	


HE 1880
HE-2035 PIN
MS16624-1025 RING
F2
F4
75D88-5
HE-2022
76D47 1
HE-1811
F3
MS171494
ON-1E-3 ONLY
97D75-1
HE1809
AN500-10-10
AN935-10
MS29513-23
HE-1806 ON-1E-3 ONLY
93D80-1 ON-5E-7 ONLY
MS29513-25
P33C32 ON-1E-3 ONLY
AA33C32 ON-5E-7 ONLY
S3
K1
HE-1372
MS-29513-13
HE-1251
T1
L1