

HELI FAB

MASTER INSTALLATION INSTRUCTION MANUAL

FOR

S76 AUXILIARY FUEL TANK INSTALLATION

STC SR00763DE

DOCUMENT NUMBER

HF-S76-I-9

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LOG OF REVISIONS

If revisions are required to this document, the entire document will be updated and re-released. As such, all pages will be at the revision level annotated in the table below.

<i>REV</i>	<i>DATE</i>	<i>DESCRIPTION</i>	<i>PAGES AFFECTED</i>	<i>DRAFTED BY</i>
IR	09/17/2013	Initial Release		KDS
A	09/29/2014	Add installation kit definition based on FAA MIDO request.	1 thru 13	KDS
B	12/30/2014	Add S-76D installation kit. Combine step 4.3.31 and 4.3.32. Add additional step 4.3.16 and remunerate steps as required. Correct numbering typographical errors in steps 4.1.1 thru 4.3.13. revise wording on steps 4.3.21, 4.3.27, 4.3.28, 4.3.29,4.3.30 , and 4.3.33	1 thru 12	KDS

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1. INTRODUCTION / DESCRIPTION

This document specifies the installation procedures for Helifab's S76 auxiliary fuel tank installation STC SR00763DE. The auxiliary fuel tank installs in the baggage compartment and has a useable fuel volume of 62 gallons.

Five mechanical installation drawings and an electrical wire routing diagram along with this document define the installation procedures. Table 2 gives a tabular view of the drawings required for installation.

Table 1
Top Level Installation Part Number(s)

Top Level Installation Part Number	Description
HF-S76-I-9-1*	62 gallon auxiliary fuel tank installation for installation in S-76A, S-76B, S-76C, and S-76D up to and including serial number 761036. This installation includes the following equipment: <ul style="list-style-type: none"> • Auxiliary fuel tank assembly • Auxiliary tank vent system • Auxiliary tank quantity indication and controls system • Auxiliary tank float valve system • Auxiliary tank decals • Optional battery box relocation
HF-S76-I-9-2**	62 gallon auxiliary fuel tank installation for installation in S-76D serial number 761037 and subsequent. This installation includes the following equipment: <ul style="list-style-type: none"> • Auxiliary fuel tank assembly • Auxiliary tank vent system • Auxiliary tank quantity indication and controls system • Auxiliary tank float valve system • Auxiliary tank decals • Optional battery box relocation

*Use Installation Kit Part Number HF-S76-I-9-1A

**Use Installation Kit Part Number HF-S76-I-9-2A

Installation kit PN HF-S76-I-9-1A and -2A consists of all required installation documents per the latest FAA approved revision of Helifab master drawing list HF-S76-MDL-2800-0004 and parts listed in the drawings in table 2 except for the following items.

- Consumable material (adhesives, sealants, cleaning agents, edge-filling compounds, etc.)
- Parts identified as "Optional" in the respective drawing parts lists unless specifically ordered by part number.
- Standard hardware (AN, MS, NAS, etc.) whose length must be determined upon installation.

**Table 2
Installation Drawing Matrix**

Installation PN: HF-S76-I-9-1	Drawing Number	Title	Note
Required	HF-S76-I-3	Aux Fuel Tank Float Valve Installation	
Required	HF-S76-I-4	Aux Tank Quantity Indicator and Controls Installation	
Required	HF-S76-I-5	Aux Fuel Tank Decals Installation	
Required	HF-S76-I-6	Aux Fuel Tank Assembly Installation	
Required	HF-S76-I-7	Aux Fuel Tank Vent Installation	
Required	HF-S76-E-4	S76 Aux Fuel Tank Wiring Diagram	
Optional	HF-S76-I-8	Battery Box Relocation	(1)

(1) Relocation of battery backup box installed to STA 215 is optional at the installer's discretion. Relocation of the existing battery box may be accomplished for ease of maintenance with the auxiliary fuel tank installed. Batter Box Relocation detailed in drawing HF-S76-I-8 is applicable only to HF-S76-I-9-1 installation.

2. LIST OF ABBREVIATIONS AND ACRONYMS

DER Designated Engineering Representative
 FAA Federal Aviation Administration
 IAW In Accordance With
 PN Part Number
 STC Supplemental Type Certificate
 EMI Electromagnetic Interference
 EMC Electromagnetic Compatibility

3. REFERENCE DOCUMENTS

1. Helifab Drawing HF-S76-I-3, Rev A dated 12/30/2014 or later FAA approved revision.
2. Helifab Drawing HF-S76-I-4, Rev A dated 12/30/2014 or later FAA approved revision.
3. Helifab Drawing HF-S76-I-5, Rev A dated 12/30/2014 or later FAA approved revision.
4. Helifab Drawing HF-S76-I-6, Rev A dated 12/30/2014 or later FAA approved revision.
5. Helifab Drawing HF-S76-I-7, Rev A dated 12/30/2014 or later FAA approved revision.
6. Helifab Drawing HF-S76-I-8, Rev A dated 12/30/2014 or later FAA approved revision.
7. Helifab Drawing HF-S76-E-4, Rev A dated 12/30/2014 or later FAA approved revision.
8. Helifab Document number HF-S76-FMS-2800-0004, Rev 1 or later FAA approved revision.

4. ACCOMPLISHMENT INSTRUCTIONS

Follow all the installation instructions provided in the required drawings listed in table 1, and relocate existing battery box on STA 215 bulkhead IAW Helifab drawing HF-S76-I-8 if desired for ease of maintenance with the auxiliary fuel tank installed.

After installation is complete IAW the drawings listed in table 1, perform the following calibration procedures and ground tests. Indicate successful completion of each section in Table 2

NOTE:

After each ground test section is completed, inspect auxiliary tank installation for leaks.

4.1. Fuel Probe Calibration (with Ahlers Aerospace, Inc. 114 Series Fuel Probe):

The fuel probe requires calibration prior to its first use. The fuel probe has external adjustment potentiometers that sets the output signal for an “Empty” tank and for a “Full” tank. Once these are set, no further adjustments are necessary. The fuel probe also incorporates an EZ-Cal feature, which uses a push button switch and an LED to greatly simplify the calibration process. The calibration is performed in the following manner and may be repeated at any time. Refer to figure 1 which depicts the top of the probe and its markings.

- 4.1.1. Rotorcraft attitude must be 0° in both pitch and roll.
- 4.1.2. Turn rotorcraft main electrical power on.
- 4.1.3. Add 1.08 gallons (1 gallon and 10.3 oz.) to the completely empty auxiliary fuel tank.
- 4.1.4. Push and hold the momentary switch labeled “PUSH TO ADJ”. The LED labeled “OVER FULL/EMPTY” must be off. If not, turn the potentiometer labeled “ADJ. EMPTY” counter-clockwise until the LED turns off.

ATTENTION:

If empty adjustment is rotated too far in the counter-clockwise position the LED will come on. In the case of over-adjusting, rotate pot clockwise until the LED goes out.

- 4.1.5. While holding the switch down, adjust the potentiometer labeled “ADJ. EMPTY” clockwise until the LED just lights. Release the switch and the LED will go off.
- 4.1.6. Ensure the aux fuel quantity indicator reads 0 lb.
- 4.1.7. Fill the auxiliary fuel tank until fuel just starts to overrun the fuel filler and install the fuel cap.
- 4.1.8. Push and hold the momentary switch labeled “PUSH TO ADJ”. The LED labeled “OVER EMPTY/FULL” may momentarily blink but must remain off. If not, turn the potentiometer labeled “ADJ. FULL” clockwise until the LED turns off.
- 4.1.9. While holding the switch down, adjust the potentiometer labeled “ADJ. FULL” counter-clockwise until the LED just lights. Release the switch and the LED will go off.
- 4.1.10. Weigh one gallon of fuel used to fill the auxiliary tank and multiply the weight of one gallon of fuel by 62 gallons to determine the weight of fuel in the auxiliary tank. Ensure quantity indication gauge indicates the weight of fuel calculated above $\pm 6\%$ of the total weight.
- 4.1.11. Defuel the auxiliary fuel tank in at least 4 increments until gauge zero is obtained. For each increment, verify that the auxiliary fuel quantity indicator indicates the actual weight of fuel remaining in the auxiliary fuel tank $\pm (8.4\text{lb.} + 4\%$ of the remaining useable fuel). For example, if for the first increment it is calculated that 45 gallons remain in the auxiliary fuel tank the auxiliary fuel tank quantity gauge should indicate:

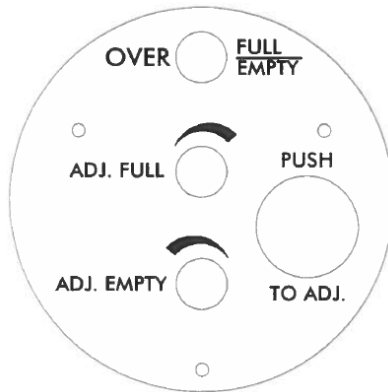
(45gallons * actual weight of fuel per gallon determined in step 4.1.10)
± (8.4lb. + 0.04 * 45 gallons * actual weight of fuel per gallon determined in step 4.1.10)

4.1.12. Calibration is complete.

NOTE:

The LED does not light once the switch is released.

Figure 1
Top of Probe Markings



4.2. Function Tests

The following function tests are used to verify proper operation of the equipment.

- 4.2.1. Turn rotorcraft main electrical power on. The auxiliary fuel tank should be full of fuel from step 4.1.7.
- 4.2.2. Ensure the existing main tanks contain 550 lb. or less of fuel each.
- 4.2.3. Actuate the fuel shutoff valve switch / annunciator and verify the switch indicates "OPEN".
- 4.2.4. Verify that fuel is being transferred from the auxiliary fuel tank to both existing main tanks by observing the main and auxiliary fuel tank quantity indicators. The main tank quantity indicators should both rise at approximately the same rate. The fuel quantity indicated in the auxiliary tank should decrease.
- 4.2.5. Actuate auxiliary fuel tank shutoff valve switch and verify the switch indicates "CLOSED".
- 4.2.6. Fill main tanks completely full and ensure the auxiliary fuel tank contains at least 100 lb. of fuel.
- 4.2.7. Actuate the fuel shutoff valve switch / annunciator and verify the switch indicates "OPEN".

- 4.2.8. Observe main fuel tank and auxiliary fuel tank quantity gauges, no change in fuel levels should be observed.
- 4.2.9. Actuate auxiliary fuel tank shutoff valve switch and verify the switch indicates "CLOSED".

4.3. EMC Tests

The purpose of the electromagnetic compatibility test is to ensure that the auxiliary fuel tank installation does not cause interference with any existing aircraft system function, and that existing systems do not cause any interference with the tank installation.

A nav test set capable of generating VOR, ILS, and DME signals is required for these tests. For all test sets used in the following tests, indicate the test set model, serial number and calibration date in the blanks below.

Manufacturer	Test Set Model Number	Test Set Serial Number	Calibration Date
_____	_____	_____	_____
_____	_____	_____	_____

- 4.3.1. Turn rotorcraft main electrical power on.
- 4.3.2. Ensure auxiliary quantity indication system is functioning and aux fuel shutoff valve switch is in the closed position.
- 4.3.3. Take note of the initial quantity reading on the auxiliary fuel tank indicator and monitor the indicator and shutoff valve position while performing the following tests. If the quantity indication changes during any of the following test, troubleshoot the offending device and repair as necessary.
- 4.3.4. Transmit on all communication radios in the aircraft for a minimum of 10 seconds at the lowest, highest and mid-range frequencies (i.e., for standard aircraft comm. radio use 118.00, 126.9, and 135.95MHz). Verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.
- 4.3.5. Place all pulse type radios (ATC Transponder, DME, Weather Radar, etc.) in their normal mode of operation for a minimum of 10 seconds and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.
- 4.3.6. Operate all aircraft lighting (position lights, strobe lights, etc.) for a minimum of 10 seconds and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.
- 4.3.7. Operate all aircraft environmental systems (if installed) for a minimum of 10 seconds in each mode of operation and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.

- 4.3.8. Operate the aircraft engine(s) for a minimum of 30 seconds and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.
- 4.3.9. Transmit on each aircraft VHF COMM radio for a minimum of 10 seconds on each of the following frequencies and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position. (121.150, 121.175, 121.200, 131.250,131.275,131.300 MHz)
- 4.3.10. Transmit on each VHF (FM) radio on all programmed frequencies for a minimum of 10 seconds and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.
- 4.3.11. Operate all “L” band (ATC Transmitter, DME, Satcom, TCAD/TCAS, etc.) and all High Frequency (ACARS, AFIS, Flightfone, etc.) equipment and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.
- 4.3.12. Operate all navigation equipment (VOR, GPS, ILS, etc.) for a minimum of 10 seconds and verify the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.
- 4.3.13. List any other rotorcraft systems deemed necessary that are not denoted above. Operate each system and verify that the aux fuel tank quantity indication remains as noted in step 4.3.3 and aux fuel shutoff valve remains in the closed position.

System Name / Function	Indicate Pass/ Fail
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- 4.3.14. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify both pilot and copilot HSI and ADI indications remain constant with no indications of interference.
- 4.3.15. Engage autopilot and operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify autopilots remain engaged and show no indications of interference. Disengage autopilot upon completion of this step.

- 4.3.16. Set heading bugs on co-pilot and pilot HSIs to aircraft heading. Engage HDG and ALT modes on co-pilot and pilot FD mode selectors. Verify pitch and roll command bars in view and centered on both HSIs. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that the command bars are unaffected. Upon completion return both FD mode selectors to SBY
- 4.3.17. While aircraft engine(s) are operating, operate the aux fuel tank shutoff valve from closed to open and open to closed position, observe engine instrumentation and verify that there is no indications of interference.
- 4.3.18. While aircraft lighting systems are operating, operate the aux fuel tank shutoff valve from closed to open and open to closed position, observe aircraft lighting systems and verify that there are no indications of interference.
- 4.3.19. While aircraft environmental systems are operating, operate the aux fuel tank shutoff valve from closed to open and open to closed position, observe aircraft environmental systems and verify no indications of interference.
- 4.3.20. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify no interference is detected in the communication headsets.
- 4.3.21. For rotorcraft equipped with EFIS and/or electronic altitude and/or airspeed indicators, test the altitude and airspeed indicators for interference using a pitot/static calibration kit acceptable to the rotorcraft manufacturer. Using the calibration kit, set the altitude at 8,000 feet with airspeed of 100 knots. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that EFIS displays and indications remain steady with no indications of interference.
- 4.3.22. Park the rotorcraft in location where GPS antennas receive GPS signal. Turn on the GPS navigation system and verify satellite lock. Input at least two waypoint locations into the GPS navigation equipment. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that the navigation information and GPS location show no signs of interference.
- 4.3.23. Set up nav test set and tune to marker beacon frequency. Select the 400Hz output on the nav test set and verify "O" is indicated on the outer marker beacon indicator(s). Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that marker beacon indication remains steady with no indications of interference.
- 4.3.24. Set up nav test set and tune to marker beacon frequency. Select the 1300Hz output on the nav test set and verify "M" is indicated on the middle marker beacon indicator(s). Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that marker beacon indication remains steady with no indications of interference.
- 4.3.25. Set up nav test set and tune to marker beacon frequency. Select the 3000Hz output on the nav test set and verify "I" is indicated on the inner marker beacon indicator(s). Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that marker beacon indication remains steady with no indications of interference.
- 4.3.26. Tune co-pilot and pilot nav receivers to the nav test set VOR test frequency

- 4.3.27. Set up the test set and select the VOR output. Set the VOR course on the test set to the aircraft heading on the HSI.
- 4.3.28. Adjust co-pilot and pilot OBS (or CRS) until course arrowhead is in line with the aircraft heading. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that co-pilot and pilot CDI indication is steady with no indications of interference.
- 4.3.29. Set the VOR course on the test set to a heading of 180 degrees and direction to "TO". Adjust the co-pilot and pilot OBS (or CRS) until the course arrowhead is at 180 degrees. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that co-pilot and pilot CDI indication is steady with no indications of interference.
- 4.3.30. Set the VOR direction to "FROM" and verify the VOR bearing pointer on HSI is pointing to 360 degrees. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that co-pilot and pilot CDI indication is steady with no indications of interference.
- 4.3.31. Set co-pilot and pilot nav receivers to the test set ILS frequency and tune the test set to the ILS frequency. Select 0 degree LOC deviation and 0 degree GS deviation. Verify the co-pilot and pilot CDI is centered and the GS bar is at 0 (centered) on the HSI. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that co-pilot and pilot CDI and HSI indications are steady with no indications of interference.
- 4.3.32. Set up the test set and select the DME output. Set range to 100 nautical miles. Set the co-pilot and pilot DME indicator frequency to match the test set frequency. Verify the co-pilot and pilot DME indicates 100 nautical miles. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that co-pilot and pilot DME indications are steady with no indications of interference.
- 4.3.33. Tune the co-pilot and pilot ADF to local NDB or radio station and note direction indicated on ADF bearing pointer. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify that co-pilot and pilot ADF bearing indications are steady with no indications of interference.
- 4.3.34. Actuate the auxiliary fuel tank shutoff valve, quantity indicator, and quantity indication probe circuit breakers and verify that co-pilot and pilot ADF indications are steady with no indications of interference.
- 4.3.35. List any other rotorcraft systems deemed necessary that are not denoted above. Operate the aux fuel tank shutoff valve from closed to open and open to closed position and verify each system functions as intended with no noted interference.

System Name / Function	Indicate Pass/ Fail
_____	_____
_____	_____
_____	_____

4.4. Electrical Bonding Test

4.4.1. Check resistance between fuel filler neck (the component that the fuel cap mates with) and the grounding angle on STA 215 bulkhead (reference drawing no. HF-S76-I-6 grounding strap [item #24] installation). Resistance must be 1ohm or less.

5. GROUND TEST CHECKLIST

Indicate whether each test was passed or failed in the table below. If any test was failed, the failure cause shall be corrected and retested.

**Table 2
Ground Test results**

ITEM	PASS	FAIL
Fuel Probe Calibration, IAW Section 4.1		
Function Tests, IAW Section 4.2		
EMC Tests, IAW Section 4.3		
Electrical Bonding Tests, IAW Section 4.4		