



June 15, 2020

Peter Rose
Aviation Safety Inspector
Flight Standards District Office

RE; Hughes 300 Fuel Quantity Issues

Mr. Rose,

Per your request dated 6/15/20, the following is provided.

I have had only one Schweizer 269C-1 helicopter with a low fuel level caution light go in-op. That one is on A/C N2074C which has recently been repaired. The caution placard that was placed in N9021P was placed there by mistake, it was to be placed in N2074C, which in fact had a placard in it also. The mechanic put one in each helicopter. The low fuel light in 21P was functioning properly as was the fuel quantity gauge. The fuel quantity gauge in 269C-1 helicopters are very accurate and reliable. I have attached the HMI procedures for working on the low fuel level sender. The procedures we also employ in the event the low fuel level light is not working is always refuel the helicopter between flight periods and the periods are to be no longer than 1.5 hours. With 32 gallons of fuel on board and a burn rate of 12-15 gallons per hour (worst case) for 1.5 hour flights leaves at least 1 hour of extra fuel.

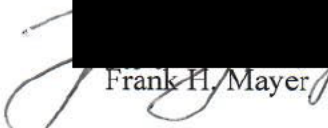
I have provided the responsibilities part of Eagle Aviation's Standard Operating Procedures for refueling the aircraft that indicates the PIC is responsible for fuel management before, during and after flight. Once the student solos, he/she is responsible for all aspects of the flight because they are now acting as the PIC.

The MMEL (copy attached) clearly states that having a low fuel warning caution light in-op is allowed if you have a procedure for monitoring fuel quantity. We use the gauge in the helicopter which was fully operational and accurate plus the hourly limit per flight period (1.5 hours).

When we received from the pilot that the low fuel warning light was in-op on 74C, we ordered a replacement sensor from Kinzie Industries. They sent the wrong one so another was ordered but because of the virus we have yet to receive it. On 74C, we were able to repair and adjust the one on it now so the low fuel warning is working.

I hope this answers all your questions and concerns. If you need anything else, please call me at [REDACTED]

Respectfully,
[REDACTED]

 Frank H. Mayer

From: Rose, Peter D (FAA)
Sent: June 15, 2020 10:12 AM
To: [REDACTED]
Subject: Hughes 300 Fuel Quantity issues

Mr. Mayer

If you would please, send me a statement of all your Low Fuel Quantity light system discrepancies for all of your Hughes 300 aircraft, your corrective actions or plans for corrective actions, the current revision/reference to the MMEL you used for continued airworthiness, when you discovered the discrepancies, etc.

Thank you



Peter Rose
Aviation Safety Inspector
Alabama/NW Florida
Flight Standards District Office
[REDACTED]

We strive to provide quality service in all we do. We value your feedback on our service and processes.
Click here to provide feedback: [REDACTED]



Eagle Aviation Academy, LLC

Standard Operating Procedures

FLIGHT OPERATIONS SAFETY PROGRAM

1.00 INTRODUCTION

1.10 BRIEF HISTORY

Eagle Aviation Academy, LLC is a privately held, women/disabled veteran-owned, small business (8a) headquartered at [REDACTED] Midland City, Alabama. Eagle Aviation Academy is comprised of former U.S. Army Aviation personnel with previous experience in all facets of demanding flight operations, maintenance providers and academic training requirements.

Eagle Aviation Academy currently is performing CFR part 61 and 141 flight training operations that support numerous specialized operations in support of the states of AL, MS, FL, GA and KY. We are currently under evaluation for our Part 141 Certification which should be completed by Early 2020.

Eagle Aviation Academy also conducts aerial surveys, wildlife nesting and irrigational surveys as well as timber surveys and drug management eradication.

Eagle Aviation Academy maintains its' aviation assets to FAA and OEM standards through the use of its' staff of full time A&P and IA certified personnel.

Eagle Aviation Academy is currently the sole operator of its owned and managed heliport.

1.2 PURPOSE OF THIS MANUAL

The regulations and procedures under which Eagle Aviation Academy, LLC operate are directive in nature and are designed to ensure safe, orderly, and efficient company. Each person connected with this operation is expected to fully comply with both the attitude and intent of these directives. It is recognized that all possible situations cannot be foreseen; therefore, unusual situations will be evaluated in light of the known circumstances and the judgment displayed by the persons involved. If these operating procedures appear rigid and are enforced as such, we regret any inconvenience, as these procedures are necessary to help ensure and maintain a safe flying environment for everyone involved. Here at Eagle Aviation, safety should be everyone's primary concern.

1.3 RESPONSIBILITIES AND REVISIONS

This revision of the Standard Operating Procedures (SOP) supersedes all previous editions. Additionally, students, pilots and staff members are responsible to incorporate changes into their SOP's as they are made available. A current copy of the SOP will be posted in the dispatch area.

Students, pilots and staff members of Eagle Aviation are required to comply with the regulations, policies, and procedures contained within this manual as well as the Federal Aviation Regulations (FAR's). Failure to comply with any of the above may result in disciplinary action including dismissal from training and / or employment.

Throughout the remainder of this manual, the term "student pilot" refers to a pilot who has not yet attained the Private Pilot's Certificate; the term "student" refers to anyone participating in a course of training at Eagle Aviation; the term "pilot" refers to students, instructors, staff, and anyone else piloting an Eagle Aviation helicopter.

2.0 DEPARTMENTAL RESPONSIBILITIES

2.1 ADMINISTRATION

2.1.1 PRESIDENT

The duties of the President encompass all aspects of the smooth operation of Eagle Aviation. Specifically, implementing and revising policies and procedures, strategic planning activities, managing school staff, coordinating compliance issues and requirements with various monitoring agencies, and developing, administering and revising information systems throughout the organization.

2.1.2 CHIEF OPERATING OFFICER

The Chief Operating Officer is responsible for the training, staffing and supervision of the dispatch staff. The Chief Operating Officer is responsible for the efficient operation of the helicopter fleet, in addition to maintaining the general upkeep of all facilities, building security, and telecommunication systems.

2.2 FLIGHT DEPARTMENT

2.2.1 CHIEF PILOT

The Chief Pilot is responsible for ensuring the quality of training in all areas of instructing and instructing staff. The Chief Pilot is a point of contact in area of certifying training records, stage-checks, and check-rides. He is also responsible for maintaining the highest quality of instructing personnel, instructing techniques and procedures. The Chief Pilot and his staff are responsible for writing and updating all training syllabi for flight and ground instruction. The Chief Pilot is the point of contact for FAA communications and air traffic control issues.

2.2.2 ASSISTANT CHIEF PILOT

The Assistant Chief Pilot assists the Chief Pilot with the management of the flight department. Specifically, they handle student / instructor allocation, student records and syllabi assignment, instructor changes, assurance of company policy compliance, and flight safety issues.

2.2.3 STAGE CHECK PILOTS

The Stage Check Pilots designated by the Chief Pilot are responsible for conducting periodic flight and ground evaluations of the students. The Stage Check Pilot is responsible for the completion of all documentation of student's stage check performance in the training record.

2.2.4 FLIGHT INSTRUCTORS

Eagle Aviation's Flight Instructors (CFI's) are responsible for conducting all flight instruction and ground briefings in accordance with Federal Aviation Regulations, Eagle Aviation policy and the Eagle Aviation syllabus. The CFI's are responsible for maintaining each of their student's training records in accordance with FAA and Eagle Aviation guidelines.

2.3 MAINTENANCE

2.3.1 DIRECTOR OF MAINTENANCE

The Director of Maintenance supervises all aspects of helicopter maintenance and repair. The Director of Maintenance's duties include organizing scheduled and unscheduled maintenance, staffing, parts inventories, helicopter logbooks, FAA compliance, quality control, and safety.

2.3.2 TECHNICIANAS

The Eagle Aviation A&P Technicians assure that the Eagle Aviation fleet is maintained to a superior level which meets or exceeds FAA standards and good maintenance procedures.

2.4 DISPATCH

2.4.1 DISPATCHERS

The dispatcher on duty at the front desk is primarily responsible for customer service and checking in and out of helicopters as well as the maintenance of student training records. Other duties include scheduling, flight following, and many other aspects of assuring flight safety. The dispatcher on duty has the responsibility to cancel or postpone a flight if there is a question as to its safe outcome.

3.0 SAFETY PROGRAM

3.1 PURPOSE

The goal of Eagle Aviation's Safety Program is to eliminate unsafe situations through superior training and education and detailed supervision. This will prevent accidents.

3.2 PHILOSOPHY

The philosophy of the safety program is identifying and eliminating unsafe situations which prevents injury or equipment damage.

Eagle Aviation staff will collect safety related information and disseminate this data to all students, pilots, and staff members in an effort to educate and apply safety procedures in order to create a safe work and flight environment where safety is a way of thinking and life.

6.3 SEVERE WEATHER

Flights into areas of severe weather will be avoided to the maximum extent possible. When flight is necessary into areas reporting thunderstorms, icing, turbulence, etc., then avoidance will be accomplished using visual means along with air traffic control assistance.

6.4 INSTRUMENT OPERATIONS

A. Flight under "Instrument Flight Rules" is permitted when:

1. The aircraft is FAA approved and equipped for instrument flight.
2. The crew is qualified and current for the type operation planned.
3. The flight is conducted in accordance with rules required by the FARs.

6.5 HELICOPTER OPERATIONS

Pilots should be aware of public opinion and shall conduct their activities in a safe and professional manner at all times. When the mission allows all flights shall be flown at a minimum of 500ft. AGL during the day and 1000ft. AGL at night.

Helicopters shall be operated to provide rotor (tail and main) clearance of 1/3 rotor diameter from any obstructions. An obstruction is defined as an object that, by its location, presents a hazard to helicopter operations.

6.6 CLASS B OPERATIONS AND REQUIREMENTS

Student pilots must have received training, instructor logbook endorsement, and ATC clearance prior to entering Class B airspace. During all operations in Class B airspace, all student pilots are encouraged to have in their possession a current Terminal Area Chart depicting that Class B airspace. A copy of any endorsements made by the instructor must be kept in the student's training record.

Student pilots are not permitted to enter any Class B airspace without the above requirements being met. Private pilots and higher should become very familiar with any Class B intended for use, prior to entering. The regulatory requirements for Class B operations are found in FAR 91.131.

6.7 RADIO COMMUNICATIONS

Proper radio procedure is essential to maintaining a safe and orderly flow of air traffic. All pilots are expected to know and practice radio communication requirements detailed in the FAR / AIM. Specific requirements for differing airspace are found in FAR PART 91.

6.8 REFUELING OF AIRCRAFT

The pilot in command shall be responsible for ensuring that the proper type and quantity of oil, and fuel are used in the helicopter. The PIC may delegate this duty to another qualified crewmember; however, the pilot in command still retains the responsibility.

Helicopter will not be refueled with the engines operating.

Turbine powered helicopters may be "Hot Refueled" provided:

1. Mission urgency is involved.
2. The pilot remains at the flight controls.
3. Proper helicopter grounding is accomplished.
4. An adequate fire extinguisher is readily available.
5. The nozzle operator is trained in "Hot Refueling" operations.

6.7 WEIGHT AND BALANCE

A. All aircraft will have a current operating weight and center of gravity recorded in the Aircraft Flight Manual.

B. It is the pilot in command's responsibility to ensure that the aircraft is properly loaded in accordance with the weight and balance data in the Flight Manual. The actual supervision of loading may be delegated, but the PIC is responsible for checking to see that the aircraft is properly loaded prior to departure.

Average passenger weights and standard weights of items may be used in accordance with published tables. This, however, does not relieve the pilot of obtaining the actual weights when, in his opinion, the actual weights are greater than average published tables.

Cargo will be loaded in such a manner as to not restrict the use of, or access to, any required normal or emergency exit. All cargo and baggage will be secured in such a manner as to prevent shifting under all normal operating conditions.

Baggage compartment weight limits shall not be exceeded.

3.114 RESPONSIBILITY FOR DETERMINATION OF AIRCRAFT AIRWORTHINESS (Pilots)

The final responsibility for determining aircraft airworthiness rests with the pilot in command. In addition to the preflight inspection, it is the pilot in command's responsibility to check the Aircraft Discrepancy

Record for the following items to determine the aircraft's condition prior to flight:

- A. Compliance with all AD's.
- B. That the planned flight will not exceed the time remaining for time/date maintenance requirements.
- C. That all inspection "due dates" hour or cycle limits are carried forward and not past due.
- D. That maintenance discrepancies have been corrected or, if allowed by maintenance, deferred. All Entries shall be signed by a certified mechanic approving the repair and returning the aircraft to service.
- E. That the discrepancies that have been deferred do not prevent the aircraft from being suitable for this flight or series of flights.
- F. That all required equipment and required certificates, manuals and licenses are on board.

3.115 AIRCRAFT DISCREPANCY RECORD

NOTES:

1. SEALING COMPOUND PR 1422B (TABLE 2-2, ITEM 2) IS USED TO SEAL SUMP PLATE.
2. STRUCTURAL ELECTRICAL BOND (GROUND) TO TANK IS REQUIRED (SECTION 16).

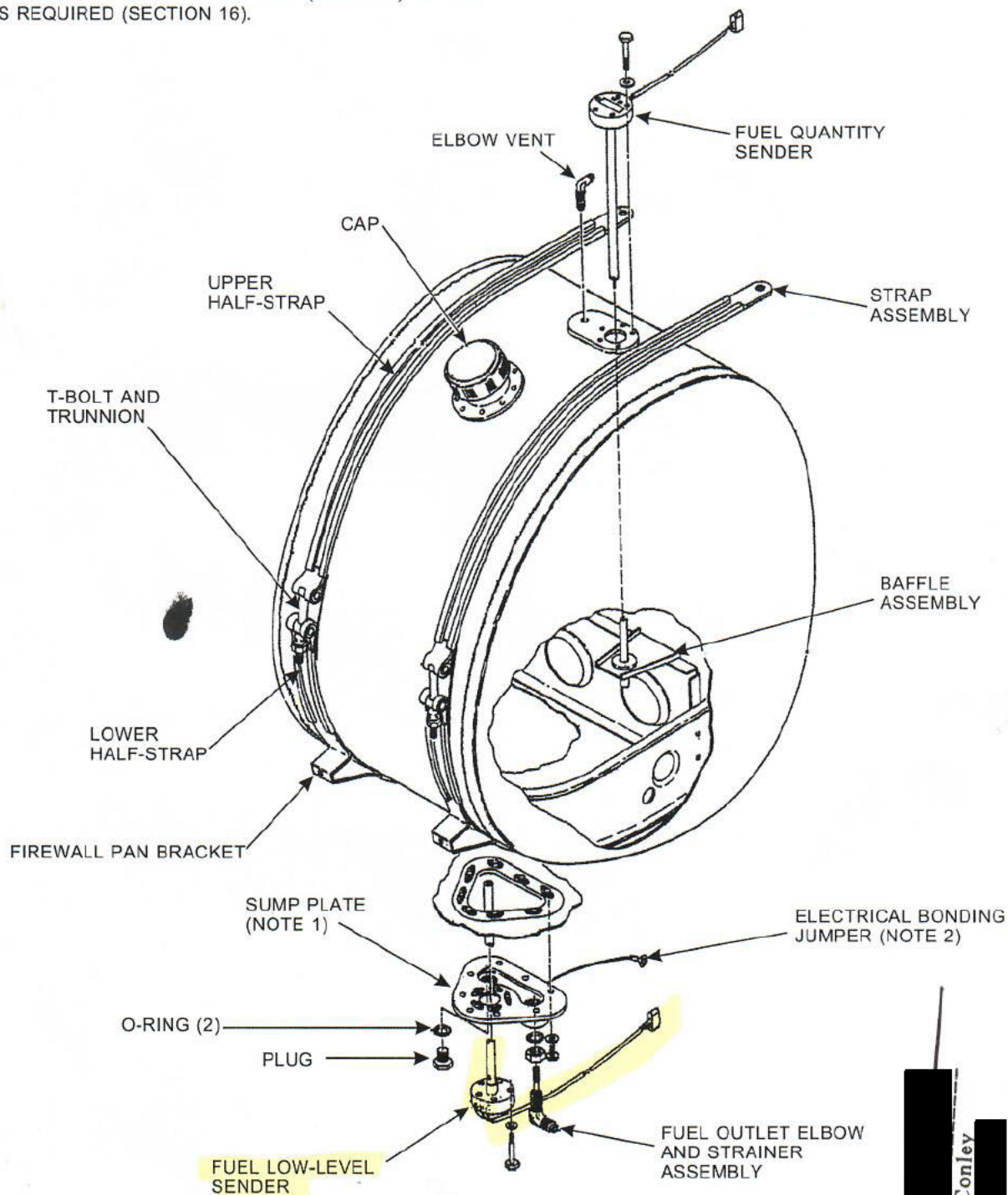


Figure 5-3. 33 Gallon Fuel Tank Assembly (Effective S/N 0106 & Subsequent)

29 May 20
TACH 2489.2
HOBBS 3114.3
N 2074E
how fuel warn inop

Jay R. Conley
3 Jun 20

- c. Remove fuel sender and gasket from mounting pad.
- d. Clean gasket and exterior metal surfaces of sender with solvent (Table 2-2, Item 46).

5-21. INSPECTION OF CAPACITANCE TYPE FUEL QUANTITY SENDER.

- a. Visually inspect for damage and corrosion.
- b. Check for loose or broken electrical wires.

5-22. INSTALLATION OF CAPACITANCE TYPE FUEL QUANTITY SENDER. (Fig. 5-3).

CAUTION

Handle the unit carefully. Do not damage probe.

- a. As required, clean surfaces of sender and tank with solvent MEK (Table 2-2, Item 2).
- b. Apply sealant (Table 2-2, Item 79) to both sides of gasket; install gasket on sender.
- c. Carefully insert sender probe into the tank through mount hole. Using a bright light, view end of probe through the filler neck and assure probe pass through support on baffle assembly (Fig. 5-3).
- d. Connect fuel quantity sender connector.

5-23. FUEL LOW CAUTION SYSTEM ACTUATORS.

5-24. GENERAL. The fuel low caution system is activated using a float switch in the 35.2 gallon fuel tank (Fig. 5-2) and a capacitance type sender in the 33 gallon tank (Fig. 5-3). The actuators are located in the sump plates on the bottom of these fuel tanks. The switch or low-level sender turns on the FUEL LOW caution light located on the instrument panel, when 1.75 to 2 gallons of fuel remains in the tank. The float type switch mechanically completes the electrical circuit when the float is bottomed in the float housing. The switch elevation in the tank is adjusted to activate the light when the minimum fuel quantity is reached in the tank. The capacitance type sender has no moving parts and consists of a sensor probe and an amplifier. The amplifier senses the change in the capacitance in the sensor probe and converts these values into a resistance that turns on

the caution light. The resistance signal is calibrated to activate when the minimum fuel quantity is reached in the tank.

5-25. INSPECTION OF INSTALLED FUEL LOW CAUTION SWITCH OR LOW-LEVEL SENDER.

Inspection of the installed switch or low-level sender will require the use of a bright light and mirror. See Figure 5-2 or 5-3 as applicable for actuator description and location.

- a. Inspect switch or sender for security, damage and corrosion.
- b. Check for broken, loose or damaged electrical terminals.
- c. Check for fuel leakage around mounting to sump plate.
- d. Perform operational check of fuel low-level caution system (Para. 5-26).

5-26. OPERATIONAL CHECK OF FUEL LOW SYSTEM. The following check is used for both of the standard 35.2 and 33 gallon fuel tank installations.

WARNING

COMPLY WITH ALL FUEL HANDLING SAFETY PRECAUTIONS WHEN PERFORMING THE FOLLOWING OPERATIONAL CHECK. PAY PARTICULAR ATTENTION TO THE FOLLOWING:

DO NOT PERFORM THE OPERATIONAL CHECK IN A HANGAR OR OTHER ENCLOSED AREA WHERE FUMES FROM FUEL CAN ACCUMULATE.

ENSURE THAT HELICOPTER IS GROUNDED THROUGHOUT THE CHECK.

DO NOT USE EXTERNAL POWER SOURCE DURING THIS OPERATIONAL CHECK. TURN HELICOPTER BATTERY POWER ON AND OFF ONLY AS DIRECTED.

NOTE

The fuel tank must contain more than three gallons of fuel before the operational check is begun.

- a. Use protractor to set helicopter attitude to 2° nose down (Take measurement at main rotor hub). The helicopter should be approximately level, laterally.

NOTE

The helicopter is leveled and adjusted to 2° nose down using the aft jack pads.

- b. Set BAT switch to ON. Check that FUEL LOW caution light on instrument panel is not lighted.

NOTE

If FUEL LOW caution light fails to illuminate in next step, check lamp for open filament, and/or check fuel low system wiring to determine the cause. Replace lamp or repair wiring as necessary (Section 14). Repeat the operational check. If the FUEL LOW caution light still does not light, replace the fuel low caution switch (Para 5-27) or adjust fuel low-level sender (Para. 5-29).

- c. Place plastic container under fuel drain on fuel strainer and begin draining fuel. When approximately two gallons of fuel remain in the tank, drain fuel slowly. Continue to drain fuel until FUEL LOW caution light illuminates; then stop draining fuel.

- d. Set BAT switch to OFF.

NOTE

The 269C-1 Pilot's Flight Manual states that approximately one gallon of usable fuel remains in the tank when the FUEL LOW caution light illuminates; this is a conservative amount. To provide a margin of safety, the remaining fuel quantity should be set as specified in the following.

- e. Drain remaining fuel in tank into an empty plastic

container. Measure fuel drained from tank after FUEL LOW caution light is illuminated. Quantity should be 1.75 to 2.00 gallons (includes unusable fuel).

If fuel quantity is less than 1.75 gallons or more than 2.00 gallons, adjust switch position (Para. 5-27) or recalibrate fuel low level sender (Para. 5-28) and repeat operational check.

- g. Secure drain valve on strainer.

- h. Refuel helicopter (Section 2).

5-27. ADJUSTMENT OR REPLACEMENT OF FUEL LOW-LEVEL CAUTION SWITCH IN 35.2 GALLON TANK ASSEMBLY.

- Remove fuel tank (Para 5-7).
- Remove sump plate and gasket from tank sump flange (Fig. 5-2).
- Loosen jam nut and remove fuel low caution switch from sump plate mounting.
- Install jam nut on replacement switch and install replacement switch on sump plate mounting.

NOTE

If access to the fuel low-level switch was made in order to adjust for the proper minimum fuel quantity warning indication, in place of the following step, loosen the jam nut and turn the switch up or down as required and tighten jam nut.

- Adjust switch to 1.85 inch initial setting (Fig. 5-2 Detail A) and tighten jam nut.
- Reinstall sump plate and gasket (Para 5-10).
- Pour approximately three gallons of fuel into tank.
- Inspect installed switch for fuel leakage.
- Reinstall fuel tank (Para 5-12).
- Perform check of switch operation (Para 5-26).

Jay R. Conley
3 Jun 20

5-28. ADJUSTMENT OF LOW FUEL CAUTION LOW-LEVEL SENDER IN 33 GALLON TANK.

Perform the following adjustments to the sender if the fuel quantity remaining in the tank is less than 1.75 gallons or more than 2.00 gallons. There are three adjustment screws on the base of the sender. The two outboard screws are potted and are not to be adjusted. The single center screw is not potted and is the screw that is used to make the adjustment. Access is gained to the screw through a hole in the firewall pan. In some installations a hole is not present and will have to be made. A locally procured button plug will be needed to fill the hole after the sender is adjusted. Fabricate the hole to match the diameter of the plug.

- a. Insure the fuel tank is completely empty. Pour exactly 2.00 gallons of fuel into the empty tank.
- b. Insure helicopter is in 2° nose down attitude and is approximately level laterally.
- c. Remove plug from hole in firewall pan to gain access to adjustment screw on bottom of fuel low-level sender.
- d. Turn sender adjustment screw just enough to illuminate FUEL LOW warning light, then back off slightly to turn light off.
- e. Repeat operational check (Para. 5-26).

NOTE

If fuel quantity can not be adjusted within the required limits (1.75 to 2.00 gallons), replace sender (Para. 5-29) and repeat operational check (Para. 5-26).

- f. Mix black sealing compound (Table 2-2, Item 147) according to manufacturer's instructions and apply to faying surfaces of access plug and hole in firewall pan; install access plug.

5-29. REPLACEMENT OF FUEL CAUTION LOW-LEVEL SENDER (33 GALLON TANK). (Fig. 5-3)

- a. Remove fuel tank (Para 5-7).

NOTE

If low-level sender is to be reinstalled match-mark orientation of fuel sender to ensure correct re-installation.

- b. Remove five mounting bolts and washers; remove fuel low-level sender and gasket from sump plate.
- c. Clean mating surface of replacement sender and sump plate on tank with solvent (Table 2-2, Item 46) or kerosene (Item 51).
- d. Apply sealant PR 1422B sealing compound (Table 2-2, Item 2) to both sides of gaskets. Observing orientation, install gasket and sender with five mounting bolts and washers. Tighten bolts evenly around, sufficiently to apply a slight compression of the gasket.
- e. Pour approximately three gallons of fuel into fuel tank.
- f. Inspect installed sender for fuel leakage.
- g. Reinstall fuel tank (Para 5-12).
- h. Perform check of sender operation (Para 5-26).

5-30. FUEL SHUTOFF VALVE.

5-31. GENERAL. (Fig. 5-1 or Fig. 5-1A). The fuel shutoff valve, mounted on the firewall pan below the fuel tank, is actuated by the fuel shutoff control (Section 4) on the instrument panel. Fuel flows from the fuel tank through the shutoff valve to the main fuel line.

5-32. REMOVAL OF FUEL SHUTOFF VALVE.

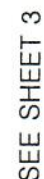
- a. Drain the fuel tank (Section 2).
- b. Disconnect short flexible hose from elbow at top of fuel shutoff valve (Fig. 5-1 or Fig. 5-1A).
- c. Disconnect elbow fitting and remove mounting nut from bottom of fuel shutoff valve.
- d. Remove cotter pin, nut, and washer securing shutoff control cable wire end to swivel in shutoff valve lever.
- e. Remove fuel shutoff valve from firewall pan.

Table 16-1. 24-Volt Electrical System Load Chart (Sheet 2 of 2)

EQUIPMENT	PART NO.	NO. OF UNITS	AMPS PER UNIT	LOAD CONDITIONS		
				DAY	NIGHT	
				CRUISE	TAKEOFF & LAND	CRUISE
Cyclic Stick Grip	269A4228-3	2				
Lamp	GE 327	10	0.40	0.40	0.40	0.40
Compass (With Light)	269A4604	1				
ENG OIL PRESS Indicator	P/O 269A4107	1	0.15	0.15	0.15	0.15
ENG OIL PRESS Sender	3060-00018	1				
Diode	1N599	2				
Lights Dimming Rheostat	269A4246-9	1				
Resistor (1 OHM, 55W)		2				
Fuel Low Caution Switch	269A4561	1				
*VHF Radio (ML360)	269A4940-1 (OPERATE)	1	2.8	1.2	1.2	1.2
	(STANDBY)		1.2			
Cigar Lighter	269A4851	1	3.0			
Running Time Meter	269A4833-3	1	0.05	0.05	0.05	0.05
Battery Relay	MS24166D1	1	0.30	0.30	0.30	0.30
FUEL LOW Caution Light	L3201AM	1	0.04			

N 2074e
low fuel warn

Model 269C-1 - Basic HMI



17-4

Issued: 14 Jul 1995
Revised: 8 Sep 1995

U.S. DEPARTMENT OF TRANSPORTATION

MASTER MINIMUM EQUIPMENT LIST

FEDERAL AVIATION ADMINISTRATION

AIRCRAFT:

269C, 269C-1

REVISION NO. ORIGINAL

DATE: 01/26/2017

PAGE NO.

28-1

MMEL TABLE KEYJASC
CODE &
ITEM NO.

ITEM

1. REPAIR CATEGORY

2. NUMBER INSTALLED

3. NUMBER REQUIRED FOR DISPATCH

4. REMARKS OR EXCEPTIONS

28. FUEL

JASC Code	Item	1	2	3	4	Change Bar
2810-01 ***	Auxiliary Fuel Tank	C	-	0	(O) May be inoperative provided: a) Flight is not predicated upon the use of the system, and b) Auxiliary tank fuel is considered in weight and balance computations.	
2841-01	Fuel Quantity Indicator	B	1	0	(O) May be inoperative provided: a) Fuel low level indicating system is operative, b) Flight is initiated with full main and Auxiliary tanks, and c) Maintain minimum fuel requirements per 14 CFR.	
2841-02	Fuel Low Warning Caution Light System	C	1	0	(O) May be inoperative provided procedures for monitoring fuel quantity are established and used.	