

CEN22LA189 – Flight Planning Information

Accident Date: 04/30/2022

Accident Site Location: Blanket, Texas

Airplane Registration: N47JB

Airframe: Raytheon Aircraft Company A36 (serial number E-3207)

Engine: Continental Motors IO-550-B (serial number 683025)

1. The pilot's preflight planning information (courtesy of ForeFlight and the pilot):

KGVT to KBWD
Sat Apr 30, 11:00 AM CDT

Send To MapShareDeleteShow Map

DIST
195 nm

ETE
1h21m

ETA (CDT)
12:20 pm

FLIGHT FUEL
22 g

WIND
14 kts head

NavlogBriefing0 Files0 New Msg

OVERVIEW

ETD
04/30/2022

ETA
11:00 AM

Time (CDT)
11:00 AM

Departure
KGVT

TakeoffInfo

Destination
KBWD

LandingInfo

Alternate
Optional

Aircraft
N47JB (BE36)

Performance Profile
23MPI/2300 RPM or FT Rich (Default)

ROUTE

Route (Filed and Expected)
CQY

Routes >

Altitude
8,000

Advisor >

Flight Rules
IFR

PAYLOAD

PAYLOAD (LBS)	COUNT	AVG. WT.	TOTAL
Persons	2	160	320
Cargo			50
Total Payload			370

FUEL

Fuel Policy
Maximum Fuel

FUEL ALLOCATION

	LBS	GAL
Start 0 gal available	444	74
Flight Fuel	131	22
Taxi Fuel	13	2
Fuel to Destination	118	20
Fuel at Landing	313	52
Alternate Fuel	0	0
Reserve Fuel	60	10
Extra Fuel	253	42

WEIGHTS

	LBS
Zero Fuel Weight 666 lb available	2,984 / 3,650
Ramp Weight 472 lbs available	3,428 / 3,900
Taxi/Takeoff Fuel	13
Takeoff Weight 235 lbs available	3,415 / 3,650
Fuel to Destination	117
Landing Weight 602 lb available	3,298 / 3,900

DESTINATION SERVICES

FBO
Brownwood Regional

122.8 UNICOM / \$4.99/gal

Change FBO >

FLIGHT LOG

Fuel at Shutdown (g)
0

Times
Optional

Edit >

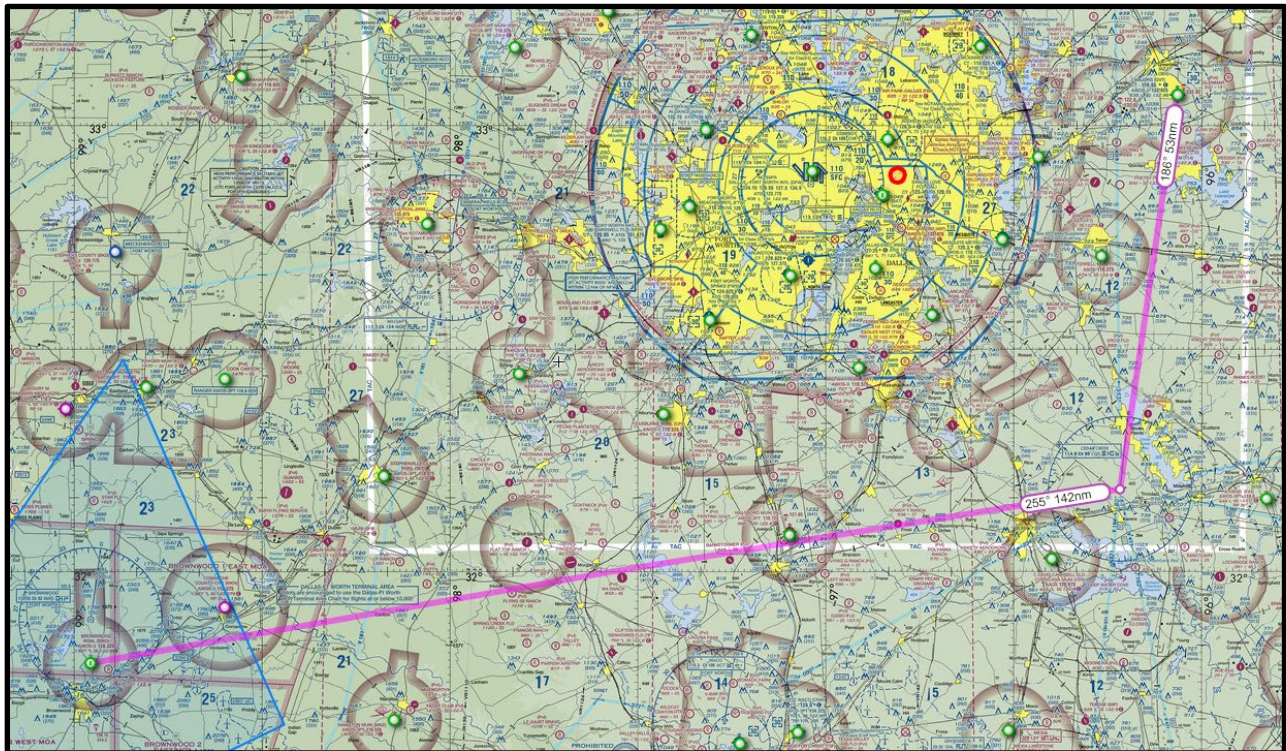
Add Next FlightCopyDelete

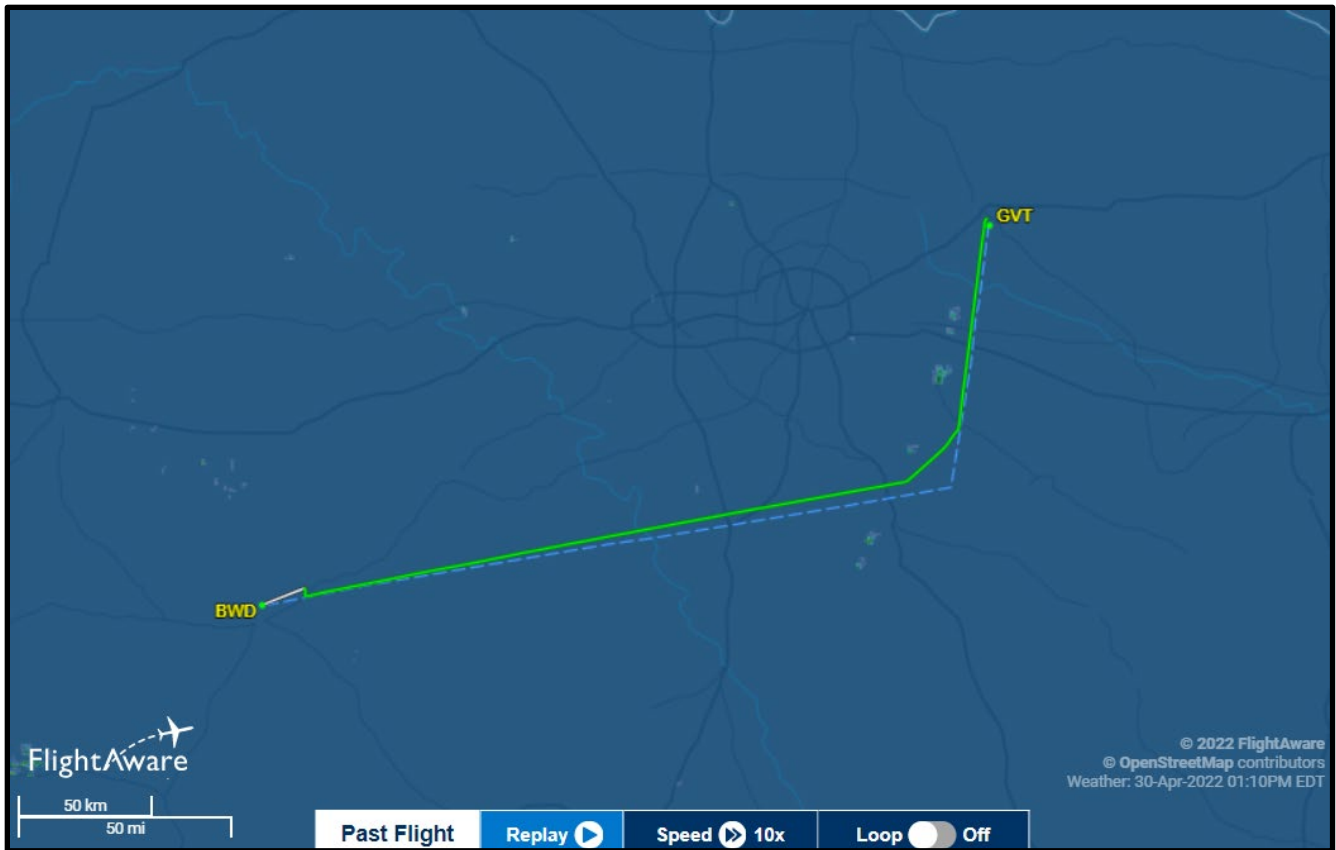
Filed
ETD Apr 30, 11:00 AM CDT

2. The meteorological data for winds aloft (courtesy of the NTSB):

RAOB: 1800UTCHRRRSOUNDING.CSV // lat											
Data Type: CSV Integrated data levels: 33											
Lat: N Lon: W Elev: 528 meters											
Level	Height (ft-MSL)	Pres (mb)	T (C)	Td (C)	RH (%)	DD/FF (deg/kts)	CAT	LLWS	Icing - Type	WAVE/x---W---turb-- nm fpm max	
1	1732	952	25.5	2.3	22	19/14					
2	1762	951	24.2	0.5	21	18/14			LIGHT		
3	1852	948	23.5	1.2	23	18/15					
4	2033	942	22.9	-0.2	22	18/16					
5	2306	933	21.9	-0.5	22	18/17					
6	2673	921	20.5	-1.0	24	18/17					
7	3230	903	18.9	-1.3	25	18/17					
8	3826	884	17.0	-2.0	27	19/17					
9	4528	862	15.3	-5.0	24	19/17					
10	5277	839	13.6	-6.5	24	19/16					
11	6178	812	12.2	-10.0	20	18/15	XTR				
12	7177	783	12.4	-2.5	35	261/11	MDT				
13	8287	752	11.9	-3.3	34	248/17					
14	9552	718	9.9	-14.2	17	245/16				2.86 682 LT-MD	

3. The entire flight route (courtesy of SkyVector and FlightAware):





4. Flight planning calculations (courtesy of E6BX and the A36 POH/AFM):

The airplane was traveling from GVT, via the CQY VOR, to BWD. The airplane was cruising at 8,000 ft MSL. The total distance for this route is about 195.1 nautical miles. The pilot reported that the airplane had about 40 gallons of fuel during the preflight (6 gallons of that is unusable per the A36 POH/AFM, so only 34 gallons is available for the flight). The pilot reported about 2 gallons would be used for the taxi. The pilot reported about 10 gallons would be used for reserve fuel purposes.

Winds aloft historical records indicate the temperature at 8,000 ft MSL was 11.9°C. The A36 POH/AFM provides performance charts that provides power settings for various altitudes and temperatures. According to the ForeFlight screenshot provided by the pilot, the flight planning software was using a power setting profile of 23 in HG, 2,300 RPM, and 20°C rich of peak. This corresponds to the “recommended cruise power settings” chart in the A36 POH/AFM. According to that chart, fuel burn at 8,000 ft MSL at 2°C is 14.3 gallons per hour with a true airspeed of 167 knots. At 22°C, the fuel burn rate is 13.8 gallons per hour with a true airspeed of 167 knots. Using those values, an estimated fuel burn of 14 gallons was calculated for 11.9°C.

A. GVT to CQY.

The distance between GVT and CQY is about 54 nautical miles.

According to the A36 POH/AFM, taxi and takeoff fuel usage is about 2.2 gallons.

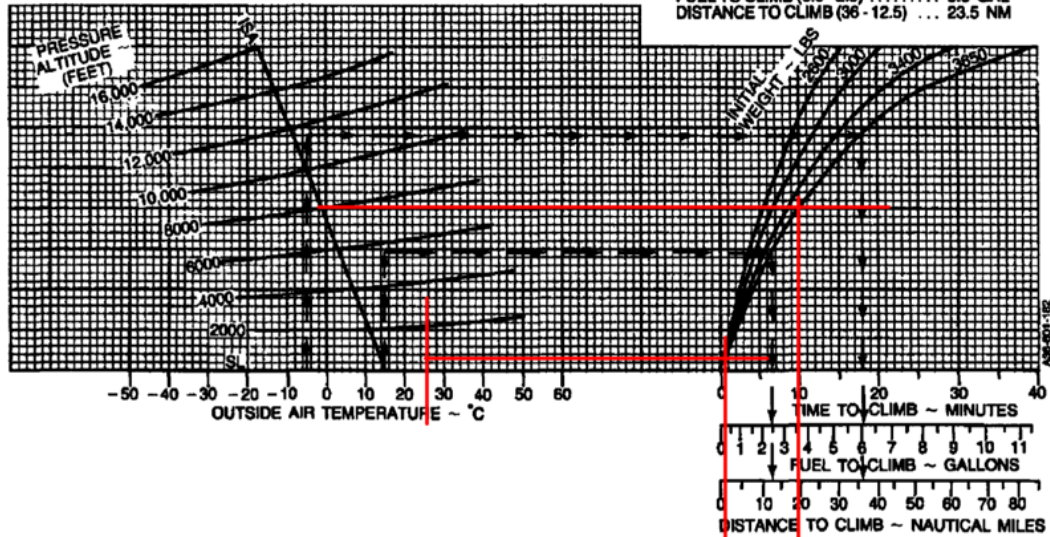
Using the A36 POH/AFM cruise climb chart, the climb from GVT to 8,000 ft MSL would have taken about 10 minutes, used 3.5 gallons of fuel, and the airplane would have traveled about 20 miles, so that would leave about 34 nautical miles remaining for the cruise leg to CQY. For planning purposes, it would be to fly over CQY and then travel west to the destination of BWD.

TIME, FUEL, AND DISTANCE TO CRUISE CLIMB**CLIMB SPEED: 110 KNOTS ALL WEIGHTS**ASSOCIATED CONDITIONS:

POWER FULL THROTTLE, 2500 RPM
 FUEL DENSITY... 6.0 LBS/GAL
 MIXTURE FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY ALTITUDE (E-3145 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
 COWL FLAPS ... AS REQUIRED

EXAMPLE:

OAT AT TAKEOFF 15°C
 OAT AT CRUISE -5°C
 AIRPORT PRESSURE ALTITUDE 5663 FT
 CRUISE PRESSURE ALTITUDE 11,500 FT
 INITIAL CLIMB WEIGHT 3650 LBS
 TIME TO CLIMB (18 - 6.5) 11.5 MIN
 FUEL TO CLIMB (6.0 - 2.5) 3.5 GAL
 DISTANCE TO CLIMB (36 - 12.5) 23.5 NM



B. CQY to BWD.

The distance between CQY and BWD is about 142 nautical miles.

There are no descent charts published in the A36 POH/AFM, so for flight planning purposes, cruise performance is used until over the top of the destination airport.

Based on the flight planning profile used by the pilot, the flight leg from CQY to BWD would have taken approximately 56.8 minutes and consumed approximately 13.2 gallons.

Online E6B Computer / E6B Emulator
World's most popular E6B Calculator, Interactive E6B Emulator

Heading, Ground Speed, & Wind Correction Angle

Course :	261
True Air Speed :	167
Wind Direction :	248
Wind Speed :	17
Wind Correction Angle :	-1
Heading :	260
Ground Speed :	150

Flight Time for Distance & Ground Speed

Distance :	142
Ground Speed :	150
Flight Time :	00:56:48

Fuel Consumption for Flight Time

Flight Time (min):	56.8
Fuel per Hour :	14
Required Fuel :	13.25

Illustration

C. Flight totals.

Taxi/Takeoff at GVT: ~2.2 gallons

Climb: ~3.5 gallons

GVT to CQY: ~3 gallons

CQY to BWD: ~13.2 gallons

Calculated fuel usage for the flight: ~21.9 gallons

The flight planning software used by the pilot calculated a fuel usage amount of 22 gallons for the flight and 81 minutes of flight time. Using the values obtained from the A36 POH/AFM, the flight time was calculated as 79.7 minutes.

If the pilot utilized the maximum cruise, the fuel burn would have been around 15.4 gallons per hour, 3.2 gallons on the first leg, and 14 gallons on the second leg, that comes to a total of 22.9 gallons for the flight.

As previously reported, about 10 gallons would be needed for reserve fuel purposes per the pilot.

Starter

Do not engage starter for more than 30 seconds in any 4-minute time period.

FUEL LIMITS

APPROVED ENGINE FUELS

100LL (blue)

100 (green)

FUEL CAPACITY

Total Capacity 80 gal

Total Usable 74 gal

FUEL MANAGEMENT

Do not take off when Fuel Quantity Gages indicate in Yellow Arc or with less than 13 gallons in each main tank.

Maximum Slip Duration. 30 seconds

OIL SPECIFICATION

Use MIL-L-22851 Ashless Dispersant Oils meeting the requirements of the latest revision of Teledyne Continental Motors Corporation Specification MHS-24B or current applicable Teledyne Continental Service Bulletin. Refer to Section VIII, HANDLING, SERVICING AND MAINTENANCE, for a list of approved oils.

NUMBER OF PROPELLERS

One

Propeller rpm is controlled by a governor which regulates hydraulic oil pressure to the hub. A control lever (blue knob) on the pedestal allows the pilot to select the governor's rpm range.

If oil pressure is lost, the propeller will go to the full high rpm position. This is because propeller low rpm is obtained by governor-boosted engine oil pressure working against the centrifugal twisting moment of the blades.

HARTZELL

Refer to supplement HPA36-2 for airplanes equipped with a Hartzell propeller.

FUEL SYSTEM

- The engine is designed to operate on aviation gasoline grade 100LL (blue) or grade 100 (green). However, the use of grade 100LL (blue) is preferred.

FUEL CELLS

The fuel system consists of a rubber fuel cell located in each wing leading edge. The fuel capacity consists of two 40-gallon cells (37 gallons usable.) A visual measuring tab is attached to each filler neck of each individual cell. The bottom of the tab indicates 27 gallons of usable fuel in the cell, and the detent slot on the tab indicates 32 gallons of usable fuel in the cell. The engine-driven fuel injector pump delivers approximately 10 gallons of excess fuel per hour, which bypasses the fuel control and returns to the cell being used. Three fuel drains are provided, one in each fuel cell sump on the underside of each wing, and one on the fuel selector valve inboard of the left wing root. These points should

- be drained before the first flight of the day.

FUEL DRAINS

The fuel system is drained at 3 locations: one under each wing just outboard of the fuselage, and a system low spot drain in the bottom of the fuel selector valve (accessible through a small door on the underside of the fuselage near the left wing root). These fuel drains are snap-type valves which are actuated by pushing up and twisting on the valve and then releasing when the desired amount of fuel has been drained. The drain may be locked open. The three fuel drains should be sampled daily before the first flight.

FUEL QUANTITY INDICATION SYSTEM

Fuel quantity is measured by float-operated fuel level sensors located in each wing tank system. These sensors transmit electrical signals to the individual indicators, which indicate usable fuel remaining in the tank.

ALTITUDE COMPENSATING FUEL PUMP

Early airplanes (E-1946, E-2104, E-2111 thru E-3144, not in compliance with Raytheon Aircraft S.B. 28-3052) are equipped with an altitude compensating engine-driven fuel pump. This pump automatically leans or enriches the engine's fuel mixture as the airplane changes altitude.

Later airplanes (E-3145 and after, and prior airplanes in compliance with Raytheon Aircraft S.B. 28-3052) require manual adjustment of the mixture as the airplane changes altitude.

Leaner engine mixtures can be set by pulling the mixture lever aft from the full rich position while maintaining the EGT within its limits.

AUXILIARY FUEL PUMP

The auxiliary fuel pump is a dual-speed, dual-pressure, electrically driven, vane-type pump. The pump, located below the pilot's seat, is controlled by a single three-position switch. The

switch is located on the pilot's subpanel to the left of the landing gear handle. The pump is used to perform the following functions:

LO POSITION

1. Minor vapor purging
2. Increase fuel flow

HI POSITION

1. Normal start, priming
2. Extreme vapor purging
3. To provide fuel pressure in event of engine-driven pump failure.

AUXILIARY FUEL PUMP SWITCH

The auxiliary fuel pump switch is placarded OFF-LO-HI. The LO position is used to supply a low boost to the fuel flow during all flight conditions.

The HI position is used for priming the engine during cold starts and also to provide an alternate source of fuel pressure in the event the engine-driven fuel pump fails. HI boost must not be used during flight unless the engine-driven fuel pump has failed. The increased pressure of the HI boost will over-drive the fuel control unit producing abnormally high fuel flows which, in turn, will cause engine roughness. In some cases, engine combustion may cease.

Normal takeoffs and landings are made with the auxiliary fuel pump in the OFF position.

FUEL TANK SELECTION

The fuel selector valve handle is located forward and to the left of the pilot's seat. Takeoffs and landings must be made using the tank that is nearest full. ■

The pilot is cautioned to observe that the long, pointed end of the handle aligns with the fuel tank position being selected. The tank positions are placarded adjacent to the respective LEFT MAIN, RIGHT MAIN or OFF detent. The OFF position is forward and to the left. A stop (lock-out) button prevents inadvertent selection of the OFF position. To select OFF, depress the stop button and rotate the handle to the full clockwise position. Depression of the lock-out stop is not required when moving the handle counter-clockwise from OFF to LEFT MAIN or RIGHT MAIN. When selecting the LEFT MAIN or RIGHT MAIN fuel tanks, position handle by sight and feel for the detent. ■

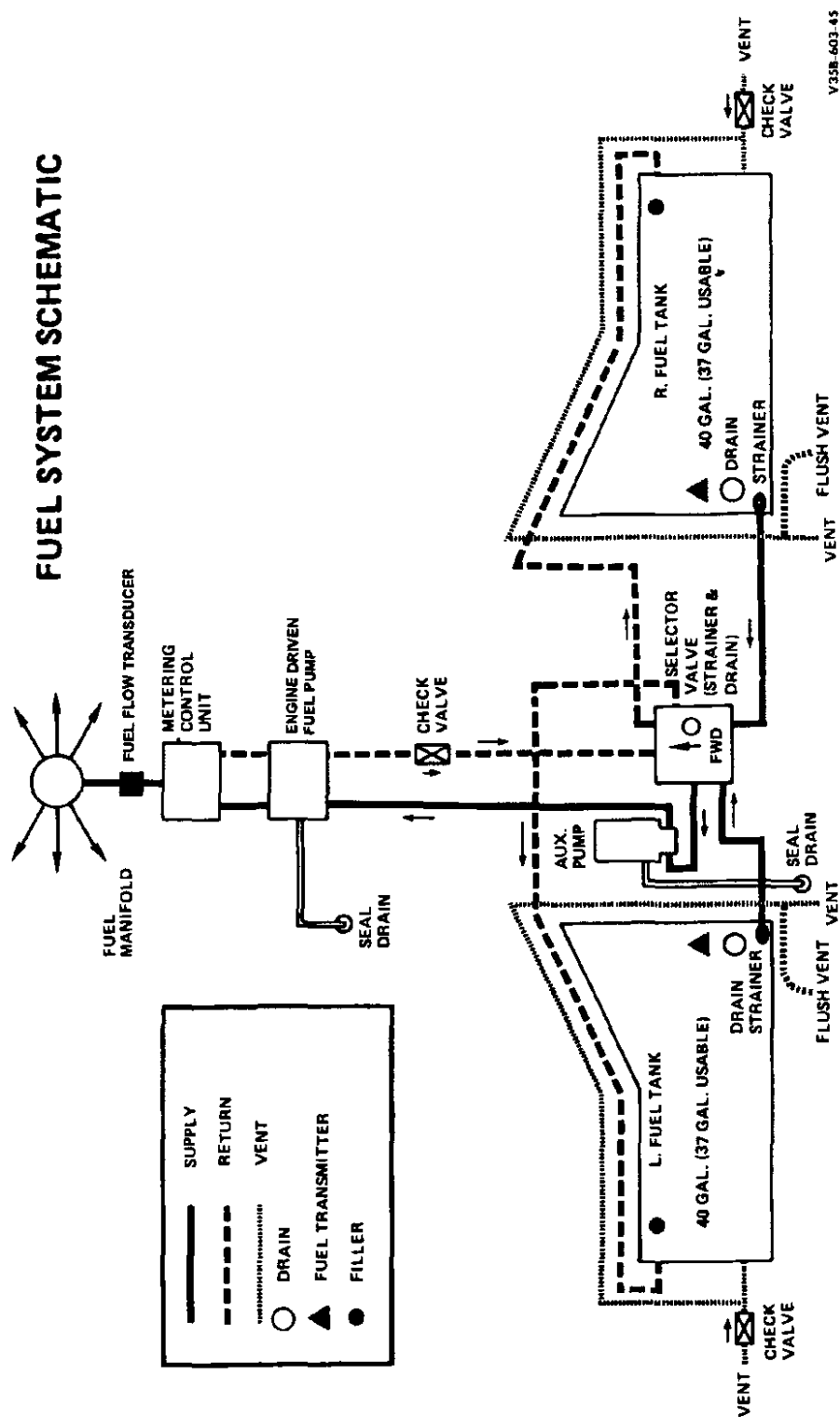
WARNING

Position selector valve handle in detents only. There is no fuel flow to the engine between detents (indicated by red arc).

If the engine stops because of insufficient fuel, refer to Section III, EMERGENCY PROCEDURES, for the ENGINE FAILURE IN FLIGHT procedures.

FUEL REQUIRED FOR FLIGHT

It is the pilots' responsibility to ascertain that the fuel quantity indicators are functioning and maintaining a reasonable degree of accuracy and to be certain of ample fuel for a flight. Takeoff is prohibited if the fuel quantity indicators do not indicate above the yellow arc. An inaccurate indicator could give an erroneous indication of fuel quantity. A minimum of 13 gallons of fuel is required in each tank before takeoff. The caps should be removed and fuel quantity checked to give the pilot an indication of fuel on board. The airplane must be approximately level for visual inspection of the tank. If it is not certain that at least 13 gallons are in each tank, fuel shall be added so that the amount of fuel will not be less than 13 gallons per tank at takeoff. Plan for an ample margin of fuel for any flight.



V358-603-45

RECOMMENDED CRUISE POWER SETTINGS

20°C RICH

23.0 IN. HG (OR FULL THROTTLE) @ 2300 RPM
CRUISE RICH MIXTURE
3400 LBS

OF PEAK EGT

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR- SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA - 20° C (ISA - 36° F)	SL	-3	27	23.0	81.6	13.8	158	150
	2000	-7	20	23.0	84.2	14.0	158	154
	4000	-11	13	23.0	86.9	14.5	158	159
	6000	-14	6	23.0	89.7	15.0	158	164
	8000	-18	-1	22.4	89.0	14.8	156	166
	10,000	-22	-8	20.7	82.7	13.8	148	163
	12,000	-26	-16	19.2	77.1	12.9	141	160
	14,000	-31	-23	17.8	73.2	12.2	133	155
	16,000	-35	-30	16.4	69.2	11.5	124	150
STANDARD DAY (ISA)	SL	17	63	23.0	79.0	13.2	153	150
	2000	13	56	23.0	81.4	13.6	153	155
	4000	9	49	23.0	83.9	14.0	153	160
	6000	6	42	23.0	86.5	14.4	153	165
	8000	2	35	22.4	85.8	14.3	150	167
	10,000	-2	28	20.7	80.0	13.3	143	163
	12,000	-6	20	19.2	75.1	12.5	135	159
	14,000	-11	13	17.8	71.5	11.9	127	154
	16,000	-15	6	16.4	67.9	11.3	117	147
ISA + 20° C (ISA + 36° F)	SL	37	99	23.0	76.5	12.8	148	151
	2000	33	92	23.0	78.7	13.1	148	155
	4000	29	85	23.0	81.0	13.5	148	160
	6000	26	78	23.0	83.4	13.9	148	165
	8000	22	71	22.4	82.8	13.8	145	167
	10,000	18	64	20.7	77.3	12.9	138	163
	12,000	14	56	19.2	73.0	12.2	130	158
	14,000	9	49	17.8	69.8	11.6	121	152
	16,000	5	41	16.4	66.6	11.1	109	142

SVC0439

NOTES:

1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

FUEL MANAGEMENT

POOR TECHNIQUES

Poor fuel management is often the cause of aircraft accidents. Some airplane accident reports have listed such poor fuel management techniques as switching to another fuel tank after the before takeoff runup was completed, and then experiencing engine problems on takeoff. Other reports tell of pilots switching fuel tanks at a critical point on the approach to a landing and inadvertently selecting an empty tank when there is not enough time to compensate for the subsequent loss of power. Flying low during day crosscountry, or moderately low at night, can be hazardous if a fuel tank runs dry. Too much altitude may be lost during the time it takes to discover the reason for power loss, select a different fuel tank, and restart the engine. Pilots should be thoroughly familiar with the airplane fuel system and tank switching procedures. Furthermore, it is an unsafe technique to run a fuel tank dry as a routine procedure, although there are exceptions. Any sediment or water not drained from the fuel tank could be drawn into the fuel system and cause erratic operation or even total power loss.

FUELING THE AIRCRAFT

The aircraft should be on level ground during all fueling operations, since filling the tanks when the aircraft is not level may result in a fuel quantity less than the maximum capacity. Rapid filling of a fuel tank, without allowing time for air in the tank to escape, may result in a lower fuel quantity. Some single engine aircraft that allow simultaneous use of fuel from more than one tank have fuel tanks with interconnected vent lines. If the tanks are filled with fuel and the aircraft allowed to sit with one wing lower than the other, fuel may drain from the higher tank to the lower and subsequently out the fuel vent. This will result in loss of fuel. This fuel loss may be prevented by placing the fuel selector in a position other than "both".

Some Cessna single-engine airplanes have long, narrow fuel tanks. If your airplane is so equipped, it may be necessary to partially fill each tank alternately, and repeat the sequence as required to completely fill the tanks to their maximum capacity. This method of fueling helps prevent the airplane from settling to a wing-low attitude because of increased fuel weight in the fullest wing tank.

It is always the responsibility of the pilot-in-command to ensure sufficient fuel is available for the planned flight. Refer to the airplane operating handbook for proper fueling procedures.

UNUSABLE FUEL

Unusable fuel is the quantity of fuel that cannot safely be used in flight. The amount of unusable fuel varies with airplane and fuel system design, and the maximum amount is determined in accordance with Civil or Federal Aviation Regulations (CARs or FARs). Unusable fuel is always included in the airplane's licensed or basic empty weight for weight and balance purposes. Unusable fuel should never be included when computing the endurance of any airplane.

FUEL PLANNING WITH MINIMUM RESERVES

Airplane accidents involving engine power loss continue to reflect fuel starvation as the primary cause or a contributing factor. Some of these accidents were caused by departing with insufficient fuel onboard to complete the intended flight. Fuel exhaustion in flight can mean only one thing - a forced landing with the possibility of serious damage, injury, or death.

A pilot should not begin a flight without determining the fuel required and verifying its presence onboard. To be specific, during VFR conditions, do not take off unless there is enough fuel to fly to the planned destination (considering wind and forecast weather conditions), assuming the airplane's normal cruising airspeed, fly after that for at least 30 minutes during the day, or at least 45 minutes at night.

Departure fuel requirements are a little different when operating under IFR conditions. Do not depart an airport on an IFR trip unless the airplane has enough fuel to complete the flight to the first airport of intended landing (considering weather reports and forecasts) and fly from that airport to the planned alternate airport, and afterwards still fly at least 45 minutes at normal cruising speed.

FLIGHT COORDINATION VS. FUEL FLOW

The shape of most airplane wing fuel tanks is such that, in certain flight maneuvers, the fuel may move away from the fuel tank supply outlet. If the outlet is uncovered, fuel flow to the engine may be interrupted and a temporary loss of power might result. Pilots can prevent inadvertent uncovering of the tank outlet by having adequate fuel in the tank selected and avoiding maneuvers such as prolonged uncoordinated flight or sideslips which move fuel away from the feed lines.

It is important to observe the uncoordinated flight or sideslip limitations listed in the respective operating handbook. As a general rule, limit uncoordinated flight or sideslip to 30 seconds in duration when the fuel level in the selected fuel tank is 1/4 full or less. Airplanes are usually considered in a sideslip anytime the turn and bank "ball" is more than one quarter ball out of the center (coordinated flight) position. The amount of usable fuel decreases with the severity of the sideslip in all cases.