Microsoft Flight Simulator

Learn To Fly

Advanced Lesson 1

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SAFE
SOCIETY OF AVIATION AND FLIGHT EDUCATORS

STUDENT JAYNE

Pilot IRL and Course Designer

Microsoft Flight Simulator

Advanced Lesson 1

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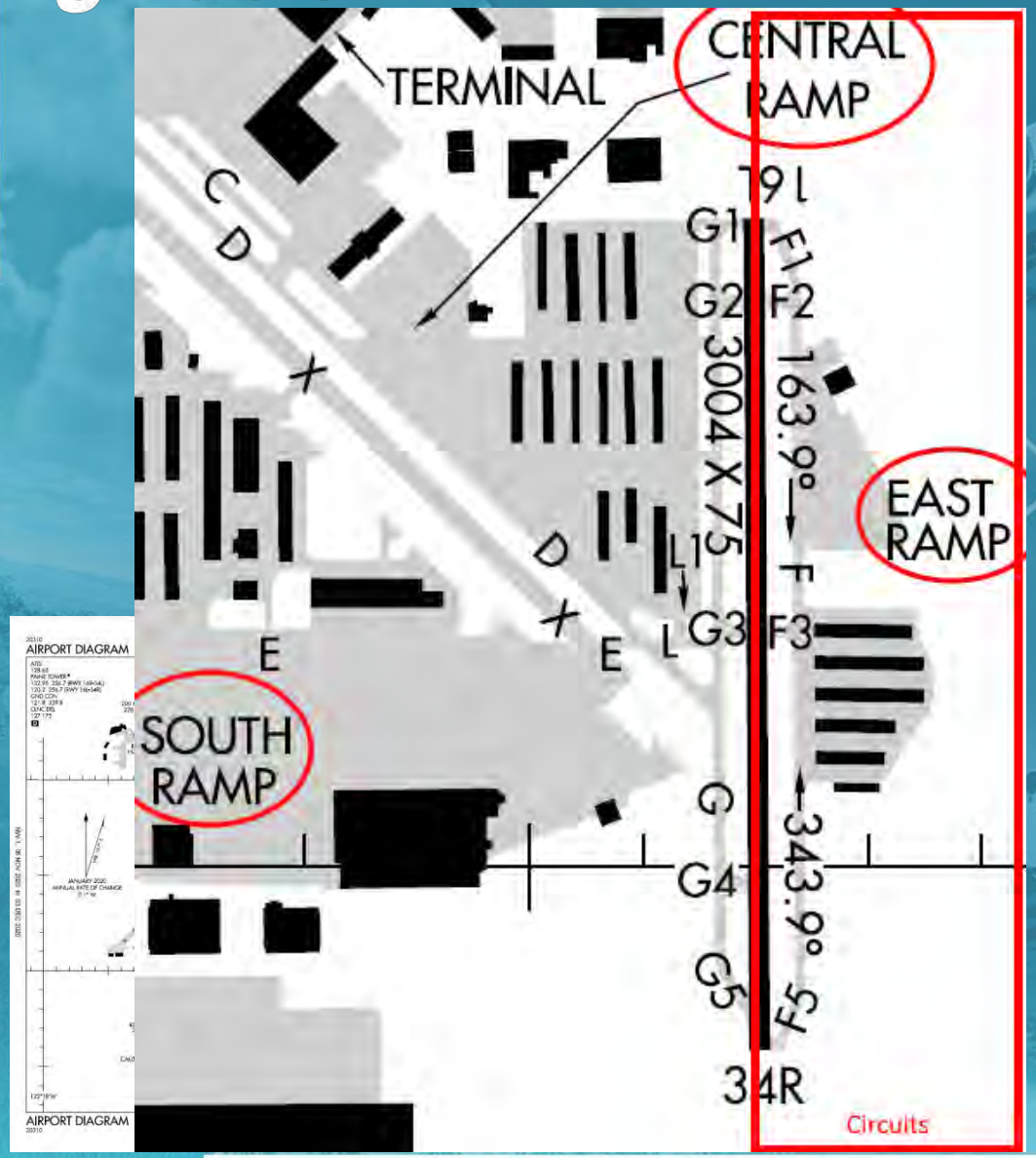
Flight Preparation

Ensure you grab your student training materials kit with the links in chat.
Includes your new checklists.

One link for a group of materials:
!studentkit3
!ChecklistG36
!material -URL for online material online



Previous

Homework

1. Use an amphibious plane and leave from a runway, then land on water.
2. Practice circuits at a seaplane base.
3. Test yourself on a smaller lake.. determine the wind and go for it.

How did it go?

Problems?

Suggestions?

Observations?

Today's Lesson:

Bonanza G36 LESSON PLANS
(Advanced Series)

Lesson Plan #1 (Dual) Class Time 1.0 hours

Introduction to the Bonanza G36

GENERAL

This lesson is a ground brief and air exercise for the experienced student. The student should be aware of the Pilot Operating Handbook, Aircraft documentation and flight authorization. The flight should be stimulating for the student without any abrupt maneuver.

MOTIVATION

To confidently handle a new, more powerful airplane.

REFERENCE

(1) Aeroplane Flight Training Manual
(2) Pilot's Operating Handbook (Bonanza G36 POH)

TOPICS

(1) Introduction to the airplane and it's systems.
(2) Engine handling in all phases of flight.
(3) A focus on MP and RPM settings.

ForderLearnToFly.com Private Pilot Training (Flight Simulator)

Lesson Plan #1 (Dual) Air Time 1.0 hours

AIR EXERCISE

(1) Student performs the external check, start check and after start check.
(2) Student taxis and departs to the practice area.
(3) Instructor assists student in cruise configuration.
(4) Student returns to the airport.
(5) Instructor demonstrates touch and goes with go around.
(6) Student practices pattern work with a go around.
(7) Student lands the plane and taxis to parking.

POST FLIGHT

(1) Review Lesson, re-brief as necessary.
(2) Assign reading for next lesson.

!IFRKit (in chat)

Microsoft Flight Simulator

Advanced Lesson 1

ForderLearnToFly.com

Transition to a High Performance Single Airplane

New Skills to learn:

1.When to use the blue lever for engine control.

2.How to configure the airplane in all phases of flight.

Lesson Briefing

Learn A New Airplane:

- Transitioning to a higher performance airplane means learning a lot of new things.
- Our objective today is to get familiar with the Bonanza G36 and test fly it.

Transition to a high performance airplane.

Cessna 172 to Bonanza G36

The Avionics are the same (G1000) so you can concentrate on where everything is, proper procedures and “the blue knob”

This airplane gives you faster cruise and seats 6 people.

Introducing the Beechcraft G36 Bonanza

Introduced in 1945, the six-seater has been in production longer than any other aircraft in history. With this long record under its belt, the aircraft has seen use in civil and military roles. This is a great aircraft to fly if you're looking to land at remote strips.

Facts and Figures

1,656kg

5

18,500ft

920nm

176 KTAS / 326 km/h

December 1945

Did you know?

The bonanza lineage is traceable all the way to back 1945 with the G36 (2006-Present) featuring a glass cockpit update.

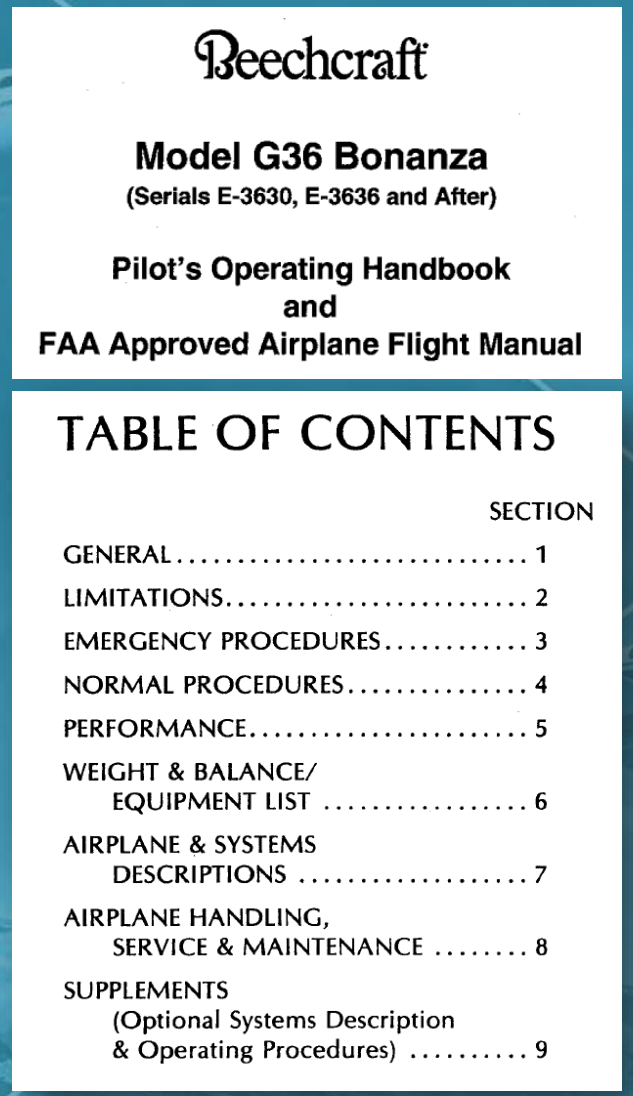
New things in our checklist include retractable gear, higher altitudes, propeller de-ice and air-conditioning with a digital climate control. Aileron-trim and TOGA capable. Low wing.

1. **Obtain the Pilots Operating Handbook (POH)**

It has everything you need to learn the new airplane.

Designed by the airplane manufacturer with appropriate information for proper care and handling.

For our simulator studies, we can find one on the Internet that is close enough.



Beechcraft

Model G36 Bonanza
(Serials E-3630, E-3636 and After)

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

TABLE OF CONTENTS

2. Learn the vital speeds (V speeds) such as take off, landing and cruise speeds.

AIRSPEEDS FOR SAFE OPERATION (3650 LBS)

All airspeeds quoted in this section are indicated airspeeds (IAS) and assume zero instrument error.

Closed [BRACKETS] in this section denotes Warning, Caution and Advisory alerts or miscellaneous annunciations which appear on the PFD and MFD.

Maximum Demonstrated Crosswind Component	17 Kts
Take-off Speeds:	
Flaps UP (0°)	
Rotation	73 Kts
50-ft	84 Kts
Flaps APPROACH (12°)	
Rotation	67 Kts
50-ft	77 Kts
Best Angle-of-Climb (V_X)	84 Kts
Best Rate-of-Climb (V_Y)	100 Kts
Cruise Climb	110 Kts
Turbulent Air Penetration	141 Kts
Maximum Speed with Utility Door Removed	166 Kts
Landing Approach	
Flaps DOWN (30°)	79 Kts
Flaps UP (0°)	90 Kts
Balked Landing Climb	80 Kts

AIRSPEED INDICATOR DISPLAY

COLOR CODED SPEED RANGE STRIP OR MARKING	KIAS RANGE	SIGNIFICANCE
Red Strip	20 - 61	Low Speed Awareness
White Strip	61 - 124	Full Flap Operating Range Lower Limit = Stall speed with flaps down at maximum weight. Upper Limit = Maximum speed permissible with flaps fully extended.
White Triangle	154	Maximum Speed for approach flaps
Green Strip	68 - 167	Normal Operating Range Lower Limit = Stalling speed with flaps up at maximum weight. Upper Limit = Maximum Structural Cruise Speed
Yellow Strip	167 - 205	Caution Range. Approved for smooth air only. Upper Limit = Never Exceed Speed. Maximum speed for all Operations
Red & White Strip	> 205	High Speed Warning

3. Get or Make a Checklist for all phases of flight. !checklistG36

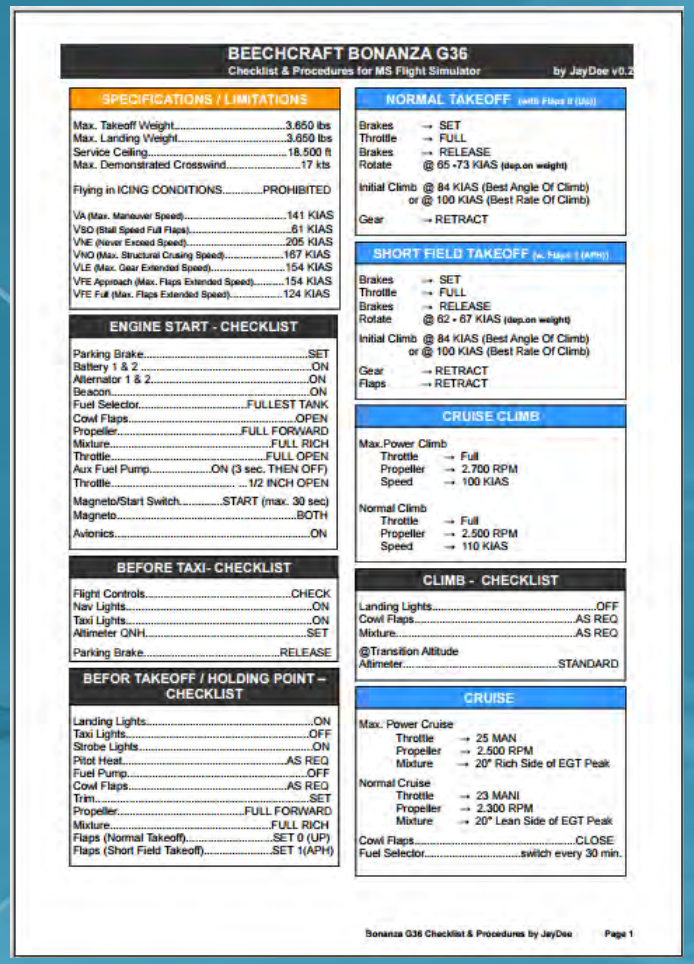
Print them and laminate them so they last and they are nearby without using electronic devices.

Practice them again and again so reaching for the right switches and levers are quicker.

BEFORE TAKEOFF (RUNUP)

1. Parking Brake . . . . . SET
2. Seat Belts and Shoulder Harnesses. . . . . CONFIRM BUCKLED
3. Engine Instruments. . . . CHECK WITHIN OPER. LIMITS
4. Flight Instruments . . . . . CHECK
5. Throttle . . . . . 1700 RPM
6. Propeller . . . . . EXERCISE (to obtain 200 to 300 RPM drop)
7. Magnetos . . . . . CHECK INDIVIDUALLY
   a. Variance between individual magnetos should not exceed 50 RPM.
   b. Maximum drop should not exceed 150 RPM.
8. Alternator 2 and Bus Tie . . . . . CHECK
   a. Throttle . . . . . ≥ 2000 RPM
      [BUSES TIED] - Extinguished
      Voltmeter 2: 27.5 - 29.0 VOLTS
      Loadmeter 2: POSITIVE LOAD
   b. Throttle. . . . . 1000 - 1200 RPM
      [BUSES TIED] - Illuminated
9. Standby Attitude Indicator. . . . . ERECT
   a. Standby Battery . . . . . CHECK IF DESIRED (See OTHER NORMAL PROCEDURES)
   b. STBY PWR LED . . . . . EXTINGUISHED
   c. Flag . . . . . PULLED

Make your own from the POH



BEECHCRAFT BONANZA G36
Checklist & Procedures for MS Flight Simulator — by JayDee v0.2

SPECIFICATIONS / LIMITATIONS

Max. Takeoff Weight	3.650 lbs
Max. Landing Weight	3.650 lbs
Service Ceiling	18.500 ft
Max. Demonstrated Crosswind	17 kts
Flying in ICING CONDITIONS	PROHIBITED
VA (Max. Maneuver Speed)	141 KIAS
VSO (Stall Speed Full Flaps)	61 KIAS
VNE (Never Exceed Speed)	205 KIAS
VNO (Max. Structural Cruising Speed)	167 KIAS
VLE (Max. Gear Extended Speed)	154 KIAS
VFE Approach (Max. Flaps Extended Speed)	154 KIAS
VFE Full (Max. Flaps Extended Speed)	124 KIAS

ENGINE START - CHECKLIST

Parking Brake	SET
Battery 1 & 2	ON
Alternator 1 & 2	ON
Beacon	ON
Fuel Selector	FULLEST TANK
Cowl Flaps	OPEN
Propeller	FULL FORWARD
Mixture	FULL RICH
Throttle	FULL OPEN
Aux Fuel Pump	ON (3 sec. THEN OFF)
Throttle	1/2 INCH OPEN
Magneto/Start Switch	START (max. 30 sec)
Magneto	BOTH
Avionics	ON

BEFORE TAXI- CHECKLIST

Flight Controls	CHECK
Nav Lights	ON
Taxi Lights	ON
Altimeter QNH	SET
Parking Brake	RELEASE

BEFOR TAKEOFF / HOLDING POINT – CHECKLIST

Landing Lights	ON
Taxi Lights	OFF
Strobe Lights	ON
Pitot Heat	AS REQ
Fuel Pump	OFF
Cowl Flaps	AS REQ
Trim	SET
Propeller	FULL FORWARD
Mixture	FULL RICH
Flaps (Normal Takeoff)	SET 0 (UP)
Flaps (Short Field Takeoff)	SET 1(APH)

NORMAL TAKEOFF (with Flaps 0 (UP))

Brakes	→ SET
Throttle	→ FULL
Brakes	→ RELEASE
Rotate	@ 65 -73 KIAS (dep.on weight)
Initial Climb	@ 84 KIAS (Best Angle Of Climb) or @ 100 KIAS (Best Rate Of Climb)
Gear	→ RETRACT

SHORT FIELD TAKEOFF (w. Flaps 1 (APH))

Brakes	→ SET
Throttle	→ FULL
Brakes	→ RELEASE
Rotate	@ 62 - 67 KIAS (dep.on weight)
Initial Climb	@ 84 KIAS (Best Angle Of Climb) or @ 100 KIAS (Best Rate Of Climb)
Gear	→ RETRACT
Flaps	→ RETRACT

CRUISE CLIMB

Max.Power Climb		
Throttle	→	Full
Propeller	→	2.700 RPM
Speed	→	100 KIAS
Normal Climb		
Throttle	→	Full
Propeller	→	2.500 RPM
Speed	→	110 KIAS

CLIMB - CHECKLIST

Landing Lights	OFF
Cowl Flaps	AS REQ
Mixture	AS REQ
@Transition Altitude Altimeter	STANDARD

CRUISE

Max. Power Cruise		
Throttle	→	25 MAN
Propeller	→	2.500 RPM
Mixture	→	20° Rich Side of EGT Peak
Normal Cruise		
Throttle	→	23 MANI
Propeller	→	2.300 RPM
Mixture	→	20° Lean Side of EGT Peak

Cowl Flaps ..... CLOSE
Fuel Selector ..... switch every 30 min.

Bonanza G36 Checklist & Procedures by JayDee — Page 1

Or find one on the Internet (this one from JayDee with permission)

What do we have in the Bonanza G36?

Beechcraft

Model G36 Bonanza
(Serials E-3630, E-3636 and After)

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

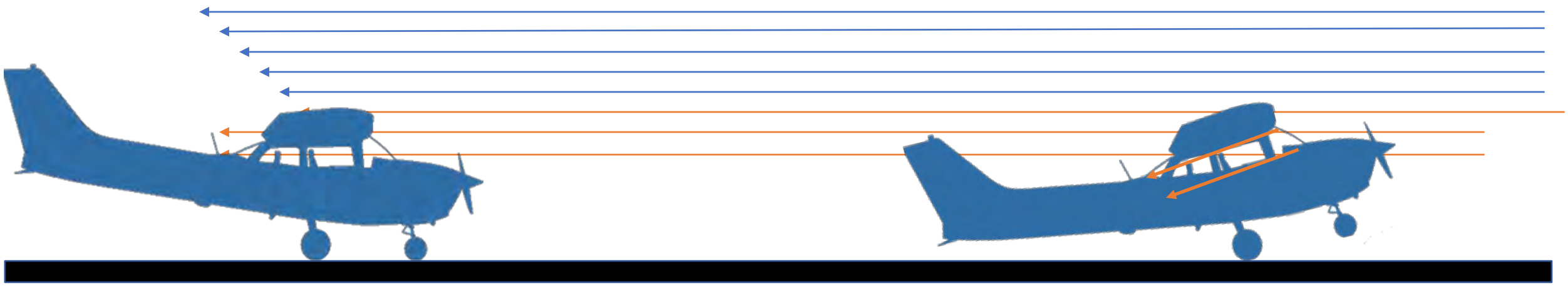
A **constant-speed propeller** is one where the pilot sets the desired engine speed (RPM), and the blade pitch is controlled automatically without the pilot's intervention so that the rotational speed remains constant. The device which controls the propeller pitch and thus speed is called a **propeller governor** or **constant speed unit**.

Propeller Control	Used to control the RPM setting of the propeller governor. Movement of the control results in an increase or decrease in prop RPM.
Propeller Governor	Regulates the RPM of the engine/ propeller by increasing or decreasing the propeller pitch through a pitch change mechanism in the propeller hub.
Tachometer	Displays the rotational speed of the propeller in revolutions per minute (RPM).
Throttle Control	Used to control power by introducing fuel-air mixture into the intake passages of an engine. Settings are reflected by readings on the manifold pressure display.

Fixed Pitch Wing:

The **wing** of an airplane has a fixed pitch. As we rotate during takeoff, we are changing the pitch of the wing to the relative airflow or the Angle of Attack (AOA).

We are taking a bigger bite out of the oncoming air. But of course, it slows down our airplane and we trim for recommended climb speed.



Fixed Pitch in a Propeller: (Cessna 172)

Each propeller blade is really a mini-wing, but instead of producing lift, it produces horizontal thrust. It uses the same aerodynamic laws to do this.

Fixed pitch propellers like in the Cessna 172 cannot be altered and is designed for the most common operation in long flights… **cruise configuration.** It is also designed to operate from sea-level to about 15,000 feet, where the air is so thin that the propeller is inefficient and cannot propel you forward enough to produce any more lift.

Variable Pitch in a Propeller:

What if we could change the pitch of the propeller blades while we were in flight? Then as the air gets thin, we could change the pitch for thinner air.

In other words, take a bigger bite out of the air as we cruise higher.

As we return back to the ground, change the pitch back to “normal” for landing. Now we can save fuel, engine wear and even climb higher.

Variable Pitch in a Propeller:

Looking at the propeller blades while you move the propeller lever (the blue knob), you can see the low pitch, high pitch changes.

Take off

Cruise

Landing

Variable Pitch in a Propeller: The Governor controls the RPM accordingly

Low pitch:

- biting less air
- Less torque needed
- High rpm

Take off

High pitch:

- biting more air
- more torque needed
- lower rpm

Cruise

Low pitch:

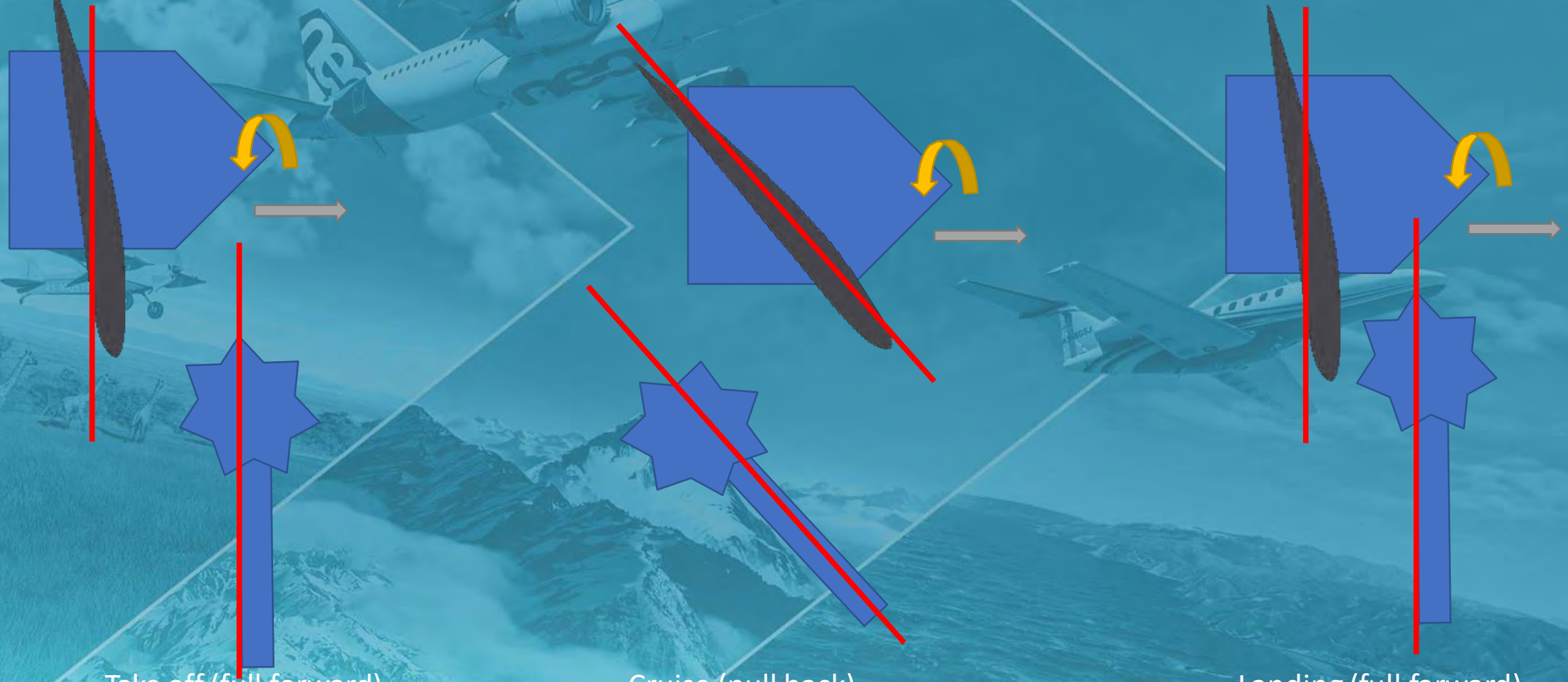
- biting less air
- Less torque needed
- High rpm

Landing

All available power if needed for a go-around

Variable Pitch in a Propeller:

As a memory aid, examine how the blue lever is the same angle as the propeller blade. This is a good way to remember how it works.



Take off (full forward)

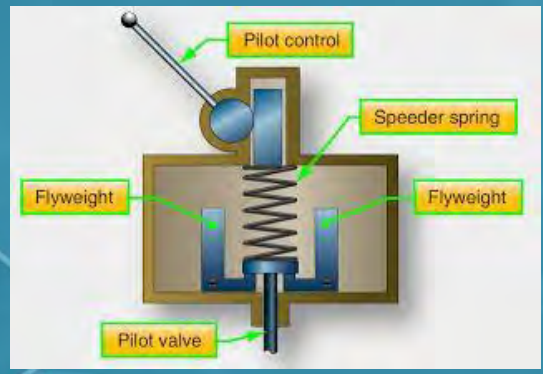
Cruise (pull back)

Landing (full forward)

The Governor:

The Governor is a complex design of springs, flyweights and oil valves that you would learn about in ground school studies.

What we care about in our simulator is that the Governor automatically adjusts the RPM every time you change the propeller pitch (blue lever).



So the end result is that the blue lever seems to control rpm.

Keep in mind while taxiing we use the black lever to control power and rpm at these low rpm settings, like conventional throttle control. **The blue lever and red lever are fully forward for taxiing, takeoff and landing. (easy to remember)**

The Black Lever:

We all know the black lever from fixed-pitch propeller airplanes such as the Cessna 172 as our throttle control. We change the rpm of the engine with this lever in the 172.

With more rpm, the propeller produces more thrust and moves our plane faster, giving us more lift on our wings.

The Black Lever:

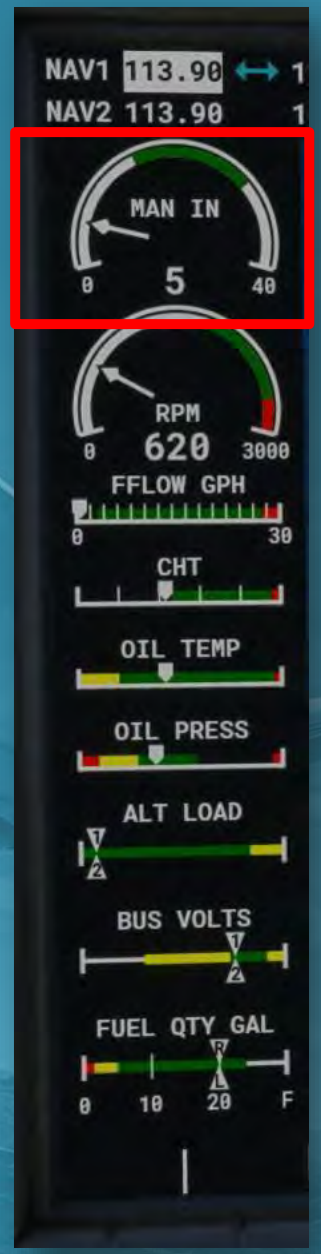
Here in a variable-pitch propeller airplane, it now controls power, but more specifically controls **Manifold Pressure or MP.**

MP suction at the engine intake manifold is the same units as your atmospheric pressure that you set for your Altimeter. ~30 **inches of mercury** at sea level.

You are managing the amount of fuel/air mixture that enters the engine using the black lever.

Normal operation for taxiing and specific settings at cruise outlined in your POH.

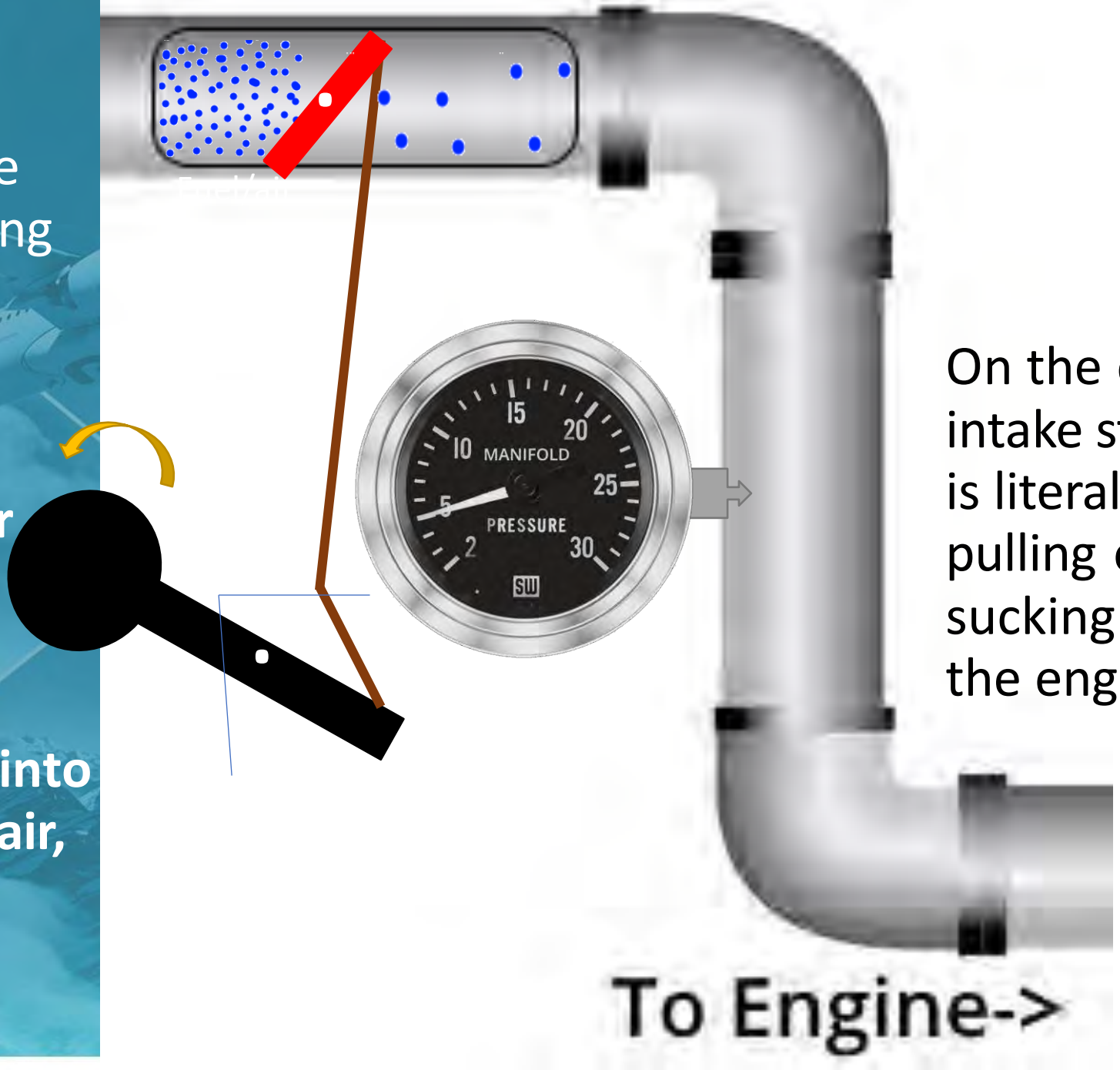
Use the black lever **while taxiing and it will control MP and RPM** as we are accustomed.



The Black Lever:

Your Manifold Pressure gauge is actually reading **suction**, not ram air pressure.

The black power lever controls the butterfly valve that blocks or allows the fuel/air mixture to be sucked into the engine. Less fuel/air, less power.

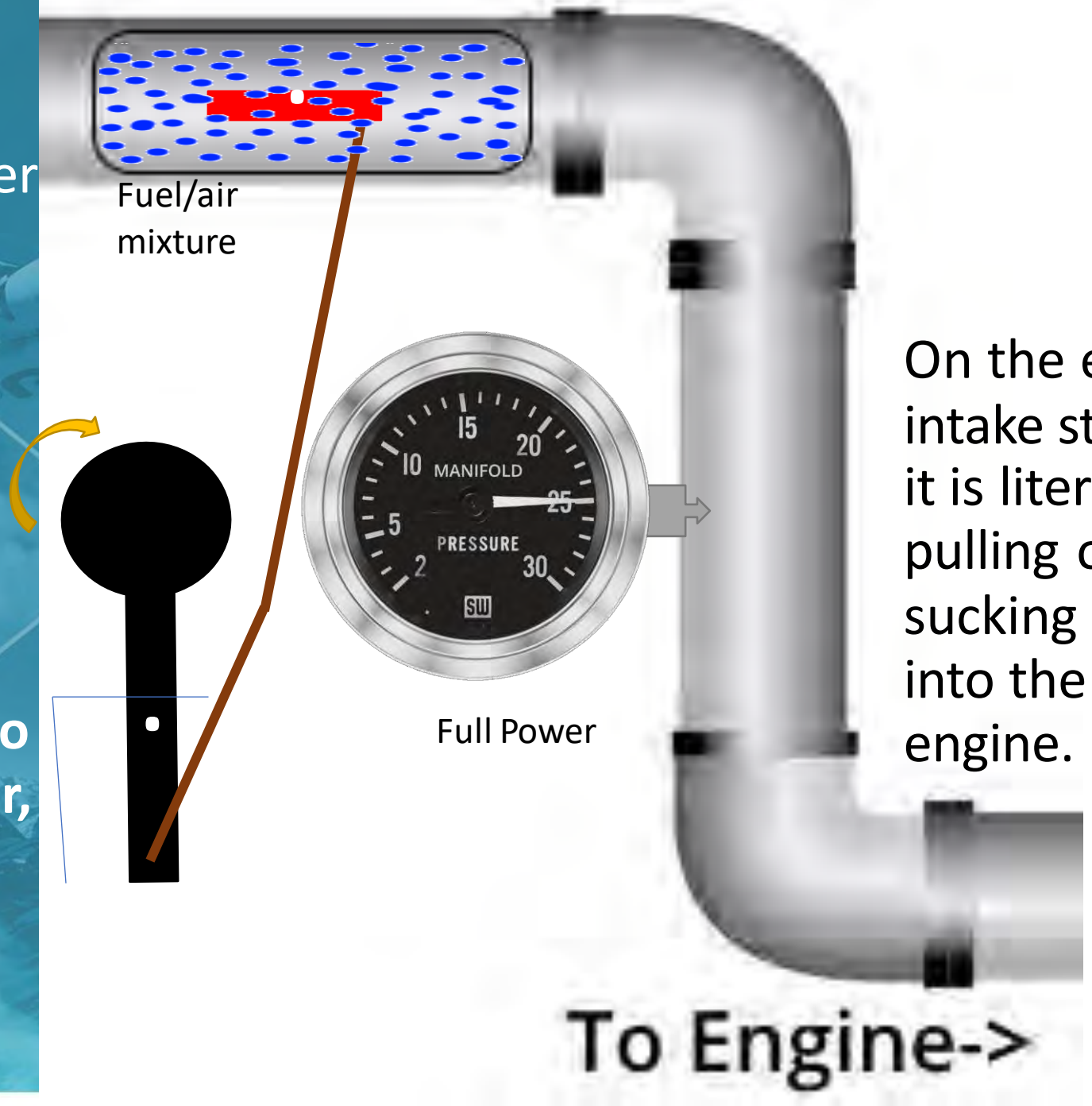


On the engine intake stroke, it is literally pulling or sucking air into the engine.

The Black Lever:

Now we advance the lever to full and it opens the butterfly valve.

The black power lever controls the butterfly valve that blocks or allows the fuel/air mixture to be sucked into the engine. More fuel/air, more power.



On the engine intake stroke, it is literally pulling or sucking air into the engine.

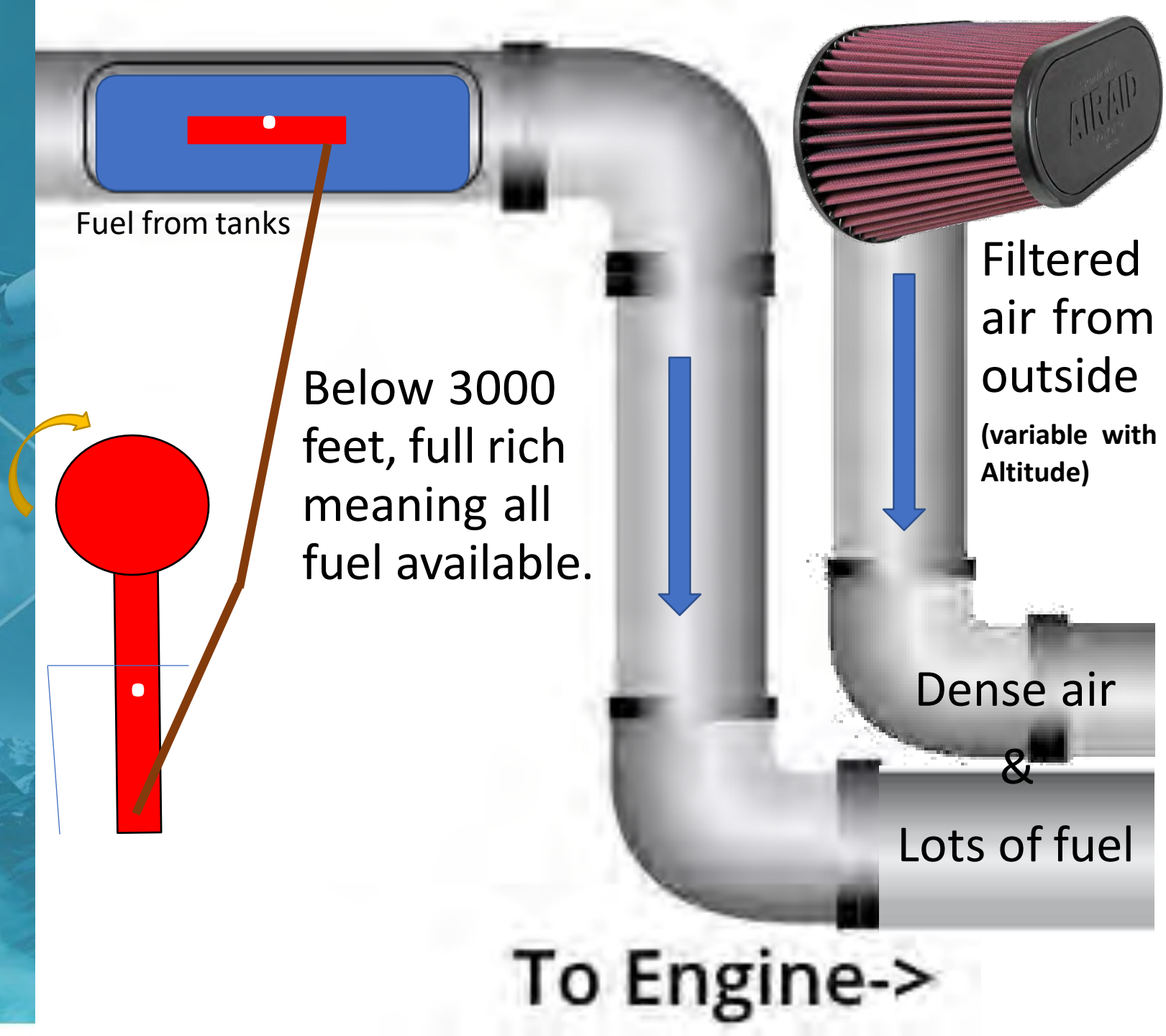
The Red Lever:

Controls pure fuel.

During take off and landing we keep it full rich unless at a high-altitude airport.

Here it is in the full rich position or pushed full into the panel.

Full-rich means all possible fuel available to the engine.



The Red Lever:

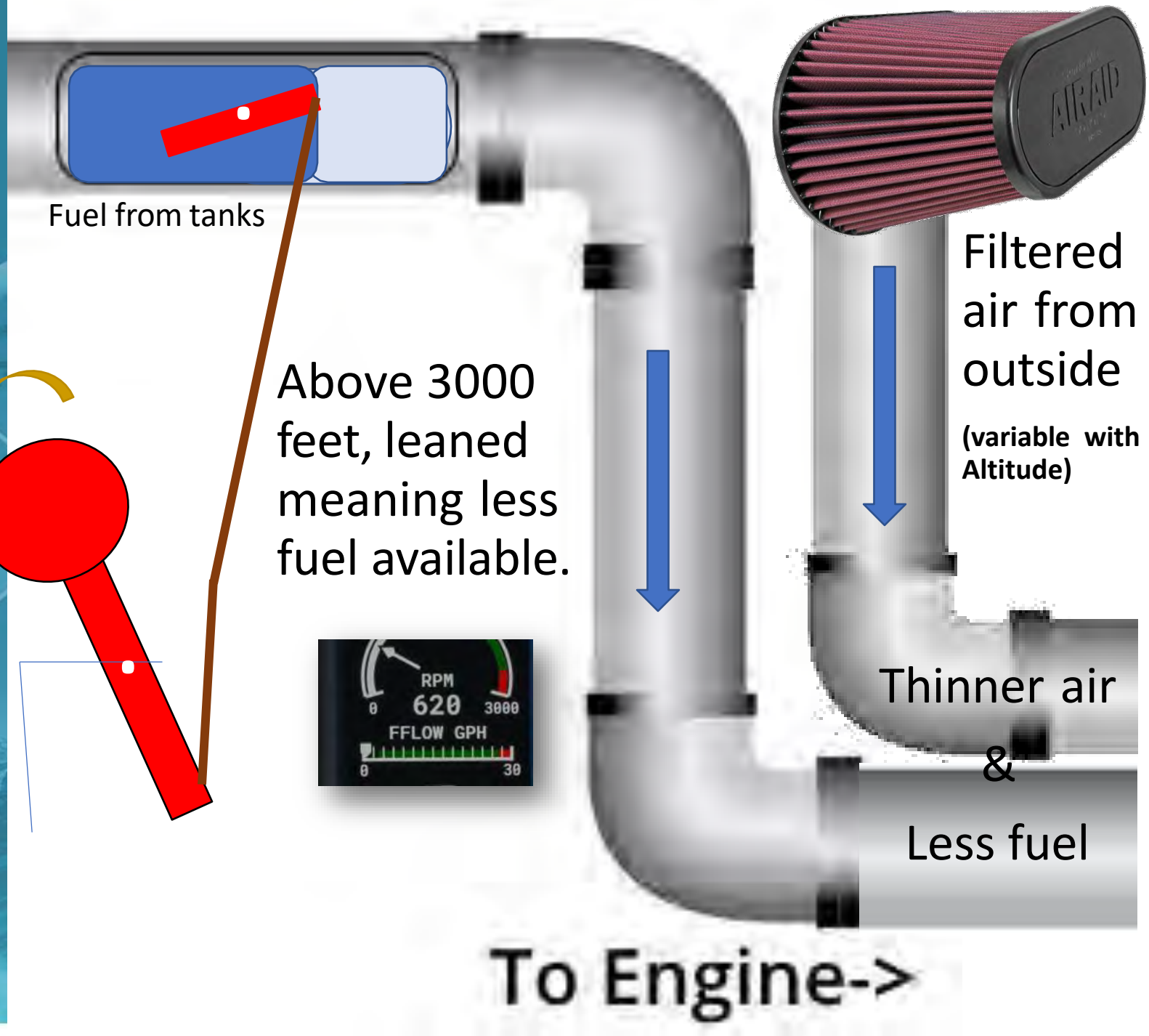
Controls pure fuel.

As we climb above 3000 feet, we need to pull back this lever to reduce fuel used and save money.

Here it is pulled back less than full rich. You watch your EGT gauge and your GPH gauge during adjustments.

EGT=Exhaust Gas Temperature

GPH=Gallons Per Hour



Correct Leaning Procedure G36

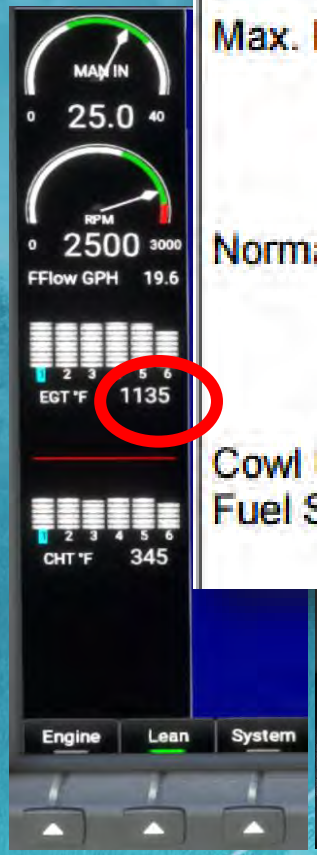
You can reference charts in the POH or see the summary on your checklist.

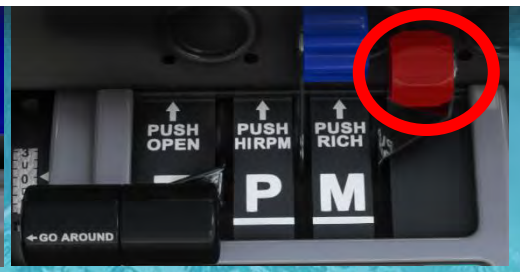
CRUISE

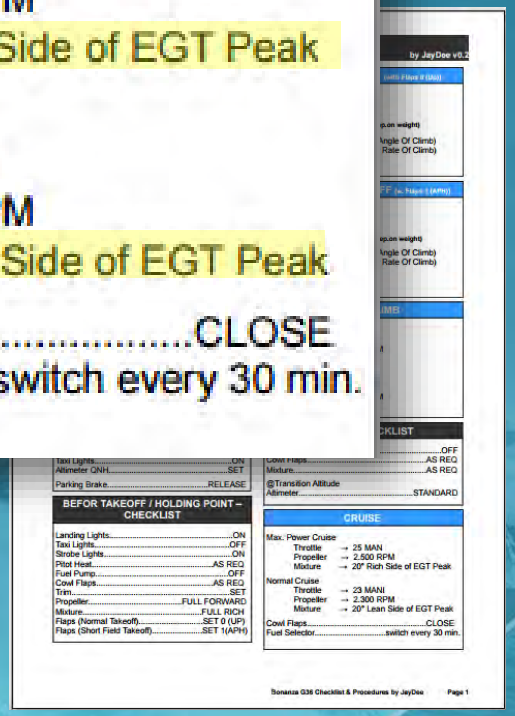
Max. Power Cruise
- Throttle → 25 MAN
- Propeller → 2.500 RPM
- Mixture → 20° Rich Side of EGT Peak

Normal Cruise
- Throttle → 23 MANI
- Propeller → 2.300 RPM
- Mixture → 20° Lean Side of EGT Peak

Cowl Flaps.....CLOSE
Fuel Selector.....switch every 30 min.







LEANING USING THE EXHAUST GAS TEMPERATURE (EGT) INDICATION

A thermocouple-type exhaust gas temperature (EGT) probe is mounted in each cylinder exhaust. All probes interface with the Engine/Airframe Unit (GEA 71). The indicators are calibrated in degrees Celsius. Use the EGT system to lean the fuel/air mixture when cruising at 2500 rpm and 25 in. Hg manifold pressure power setting or less in the following manner:

See the following information in Section 5, PERFORMANCE:

- MANIFOLD PRESSURE vs RPM graph for leaning limitations
- CRUISE POWER SETTING tables

The EIS Lean page is found on the MFD.

1. ENGINE Softkey . . . . . PRESS
2. LEAN Softkey . . . . . PRESS
   a. Rich of Peak: Slowly lean the mixture and note the first cylinder EGT to peak. Then enrich the mixture to the desired cruise mixture. Enriching the mixture is referred to as operation on the rich side of peak EGT.
   b. Lean of Peak: Slowly lean the mixture and note the last cylinder EGT to peak. Further lean the mixture to the desired cruise mixture. Further leaning is referred to as operation on the lean side of peak EGT.

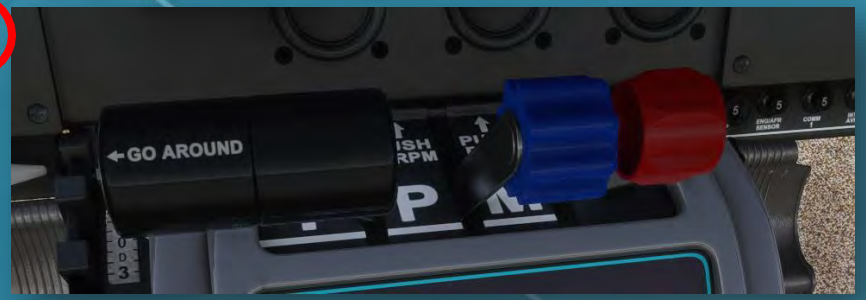
Combining All Three Levers

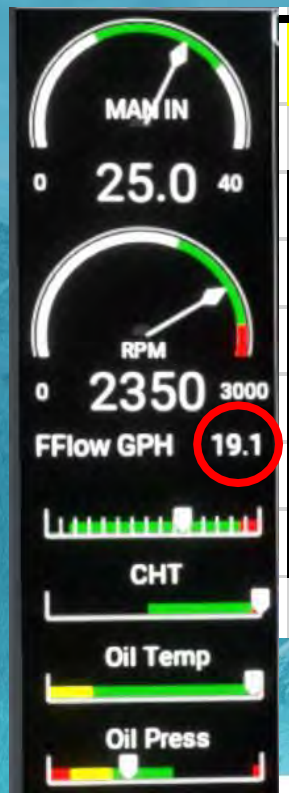
-**Blue** is RPM

-**Black** is MP or Manifold Pressure

-**Red** is GPH at altitude (over 3000)

You still use the black knob as you normally would. Here are recommended settings at various altitudes using both knobs.

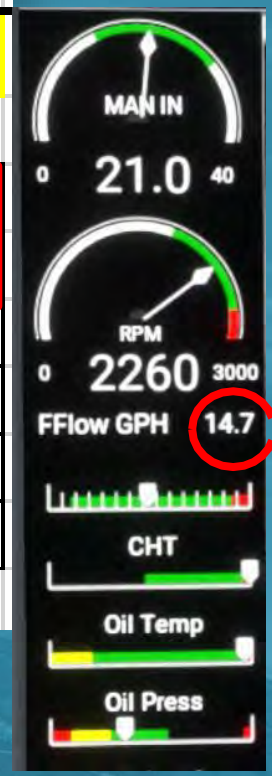




POWER SETTINGS

	75% POWER		65% POWER		55% POWER	
Altitude	RPM/MP	KTAS	RPM/MP	KTAS	RPM/MP	KTAS
4,000 Ft.	25/23.5	166	23/22.9	154	21/22.6	141
6,000 Ft.	25/23.0	168	23/22.4	157	21/22.1	143
8,000 Ft.	25/21.7	165	23/21.7	158	21/21.6	144
10,000 Ft.	25/20.0	163	23/20.0	154	21/20.2	141
12,000 Ft.	25/18.3	161	23/18.4	150	21/18.5	134
Standard Conditions						Zero Wind

Note RPM at 25 for all settings at 75% power.



Engine Cowling Flaps: -Adjustable openings on the engine cowling.

One on each side of the front landing gear.

These are used to manage the temperature of the engine compartment.

Open for more cooling of the engine.

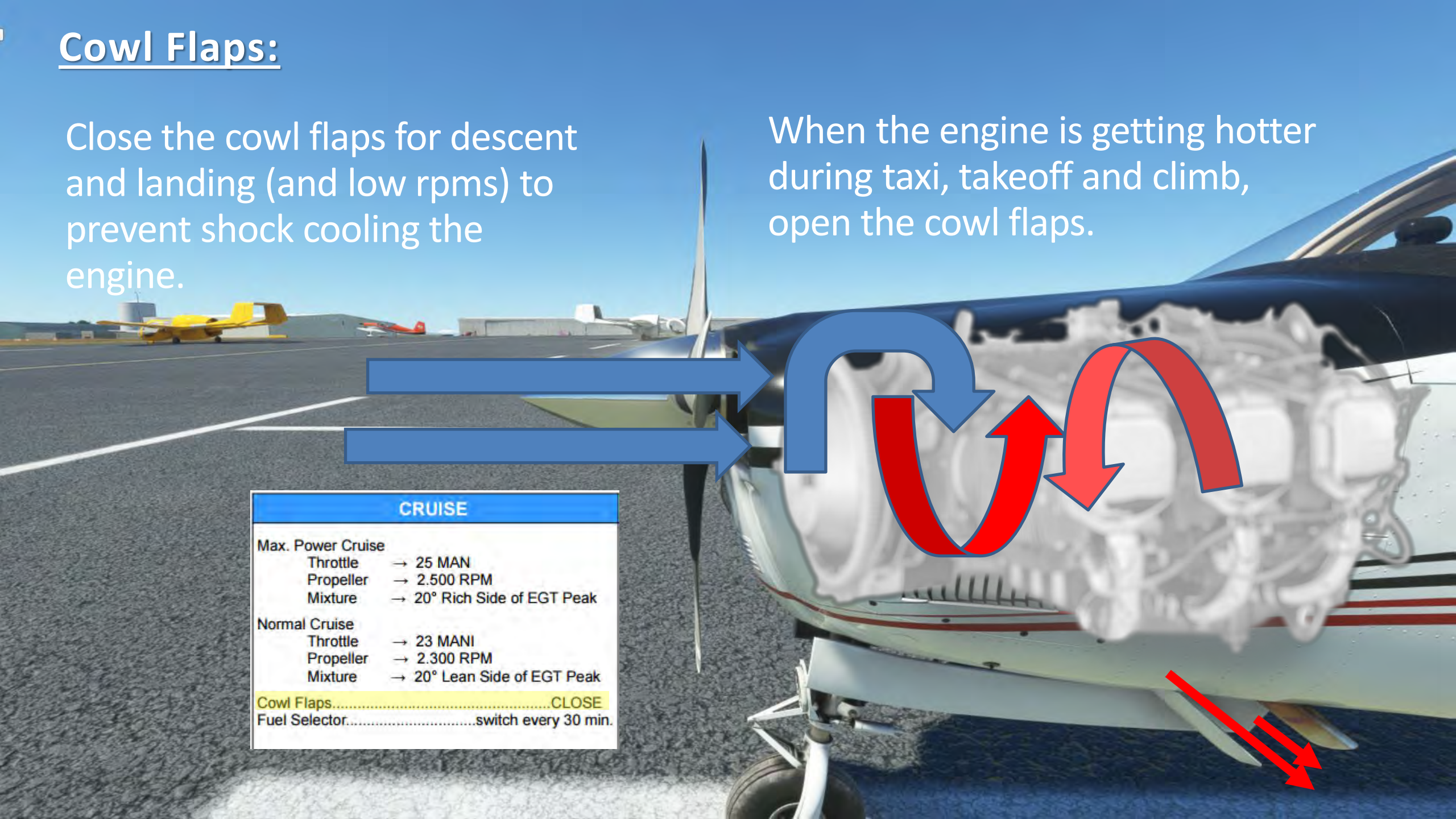
Engine Cowling Flaps: -Adjustable openings on the engine cowling.

Shown here in the closed position, to retain more heat during descent and landings.

Cowl Flaps:

Close the cowl flaps for descent and landing (and low rpms) to prevent shock cooling the engine.

When the engine is getting hotter during taxi, takeoff and climb, open the cowl flaps.



CRUISE	
Max. Power Cruise	
Throttle	→ 25 MAN
Propeller	→ 2.500 RPM
Mixture	→ 20° Rich Side of EGT Peak
Normal Cruise	
Throttle	→ 23 MANI
Propeller	→ 2.300 RPM
Mixture	→ 20° Lean Side of EGT Peak
Cowl Flaps	CLOSE
Fuel Selector	switch every 30 min.

What About Planes With Just a Throttle?

FADEC: Full Authority Digital Engine Control

While common on turbine-powered systems for some time, FADEC systems are making their way into piston-powered general aviation airplanes as well.

The Icon A5 is equipped with a single throttle lever. No red or blue levers. The FADEC computer will balance throttle, propeller, fuel/air mixture and even monitor temperature and pressure.

5. Cockpit orientation.

Get to know where everything is so you know where to look or touch when you need to.

Examples:

-Where is the fuel tank selector switch?

-Where are the gear/flaps/landing light switches?

-Where is the fuel pump switch?

5. Cockpit orientation.

Get to know where everything is.

Questions Before Departure?

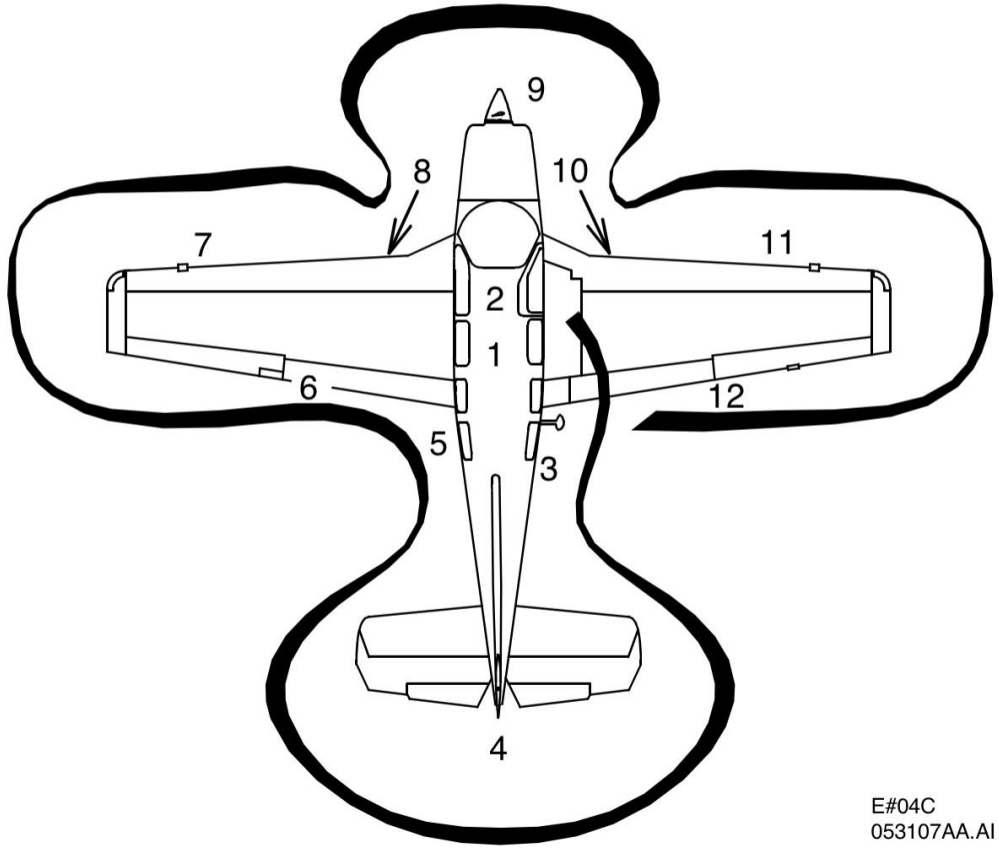
We have a low-wing plane with cowl flaps, retractable gear, manifold pressure, rpms and mixture and gas tank selector to always mind.

Notice that the walkaround starts at the exit door.

This low-wing plane has three fuel tester points; one under each wing and one below the engine.

The POH outlines the procedure on pages: 4-6 to 4-11

PREFLIGHT INSPECTION



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1. CABIN
   a. Emergency Exits. . . . . .CHECK
      1) Safety Wire (Beneath Cover). . . . . INTACT
      2) Windows . . . . . CLOSED & LOCKED

Microsoft Flight Simulator

Gone Flying!

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YOUR CONTROL

A 3rd party free download to pass control of the airplane back and forth.

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Advanced Lesson 1

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The G36 Beechcraft Bonanza

POST FLIGHT

(1) Review Lesson, re-brief as necessary.
(2) Assign reading for next lesson

Review Lesson

The G36 Bonanza

!Manual (FAA online docs)

Post-flight Advanced Lesson 1

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1.What is the VLE, VFE Approach and VFE Full?

Answer:

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2. Explain “rich-of-peak” and “lean-of-peak” and when you would use them?

Answer:

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3. What is Manifold Pressure and why does it matter?

Answer:

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4. What is “The Blue Lever” on this plane and how do you use it?

Answer:

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5. When an ATC controller says, “check 3 in the green”, what does that mean?

Answer:

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6. What are cowl flaps and when do you use them?

Answer:

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7. How many exits are there on the Bonanza G36?

Answer:

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Practice

1. As with all new airplanes, take it out to the practice area and practice various phases of flight.

2. Do plenty of touch and goes until your approach speed and takeoff speeds are right on.

3. Add-in ATC

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Homework

1. As with all new airplanes, read the POH cover to cover.
2. Start off with Section 2, specifically 2-9 to 2-12
3. Next, read section 4-5: Airspeeds
4. Then, read the whole POH.

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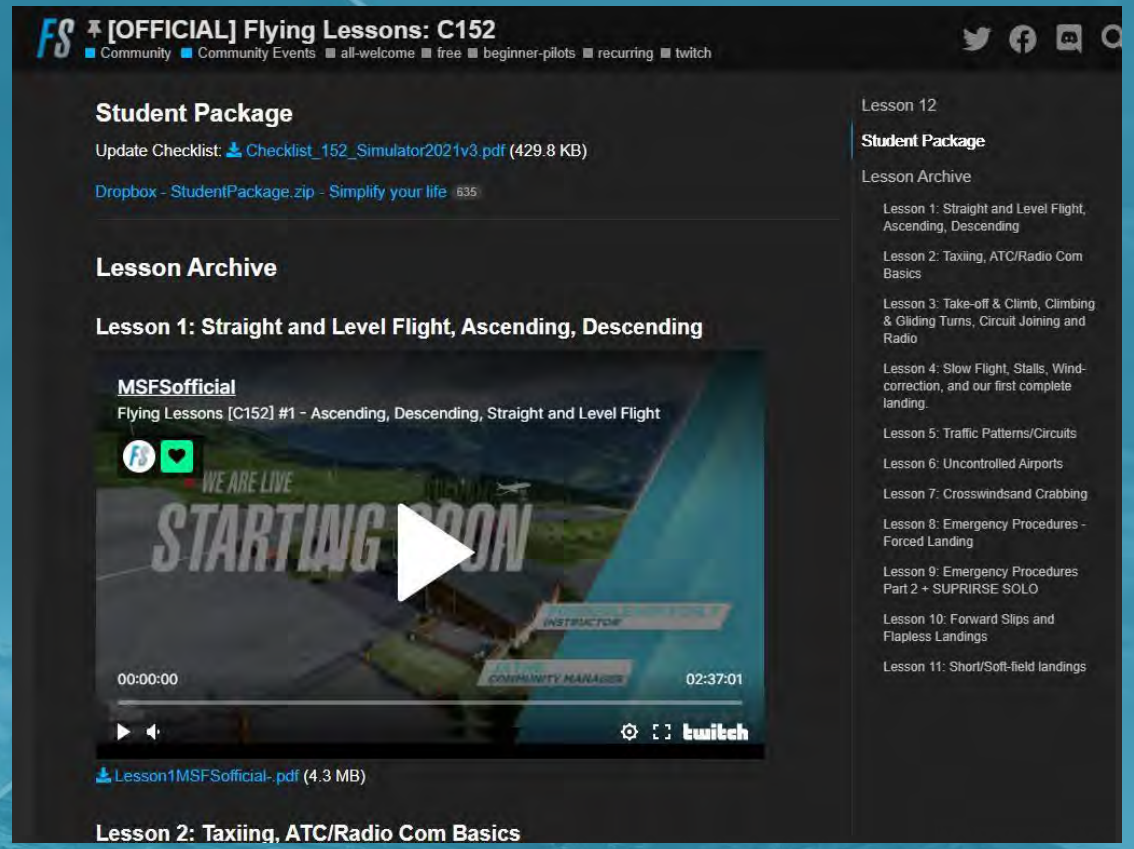
The Student HUB

Come join the discussions and continue the conversation on the student hub for this lesson series with Jayne and Forder.

Add your thoughts, your knowledge and your enthusiasm for learning a deeper understanding of flight using Microsoft Flight Simulator.

New Xbox Flyers welcome.



We welcome CFIs, real-life student pilots, flight enthusiasts and those new to flight simulation.

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Pilot IRL and Course Designer

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