

Savoia-Marchetti S.55 / S.55X

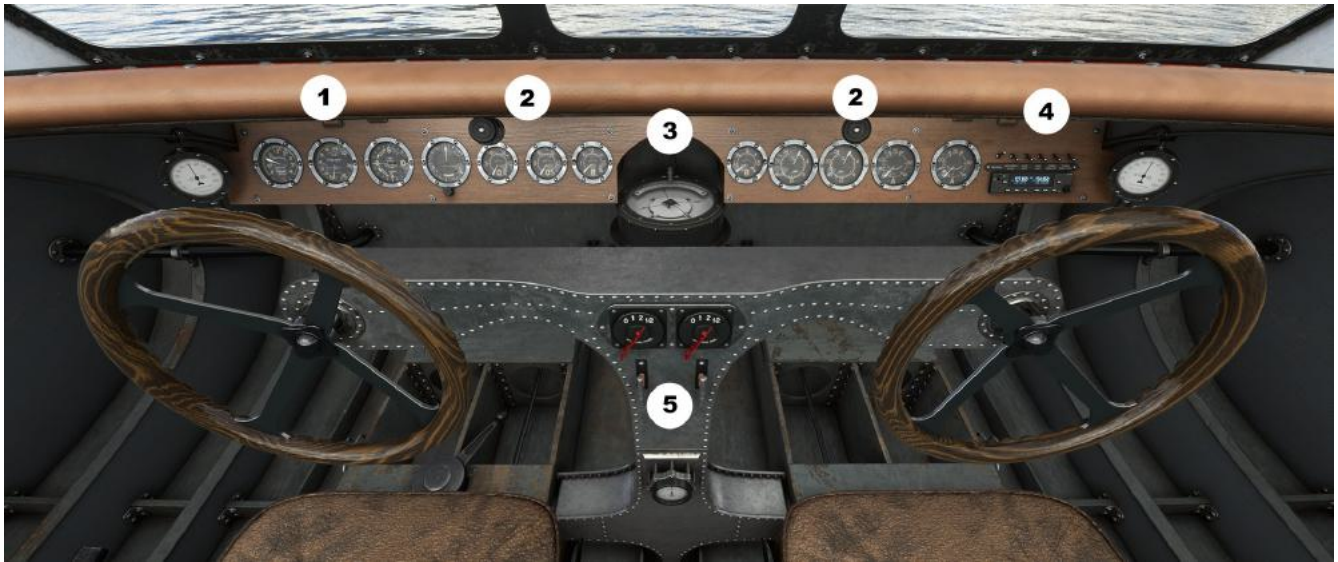


Pilot's Guide

for Microsoft Flight Simulator 2020

DO NOT USE IN REAL AIRCRAFT

COCKPIT OVERVIEW (S.55 Prototype 'Jahu')



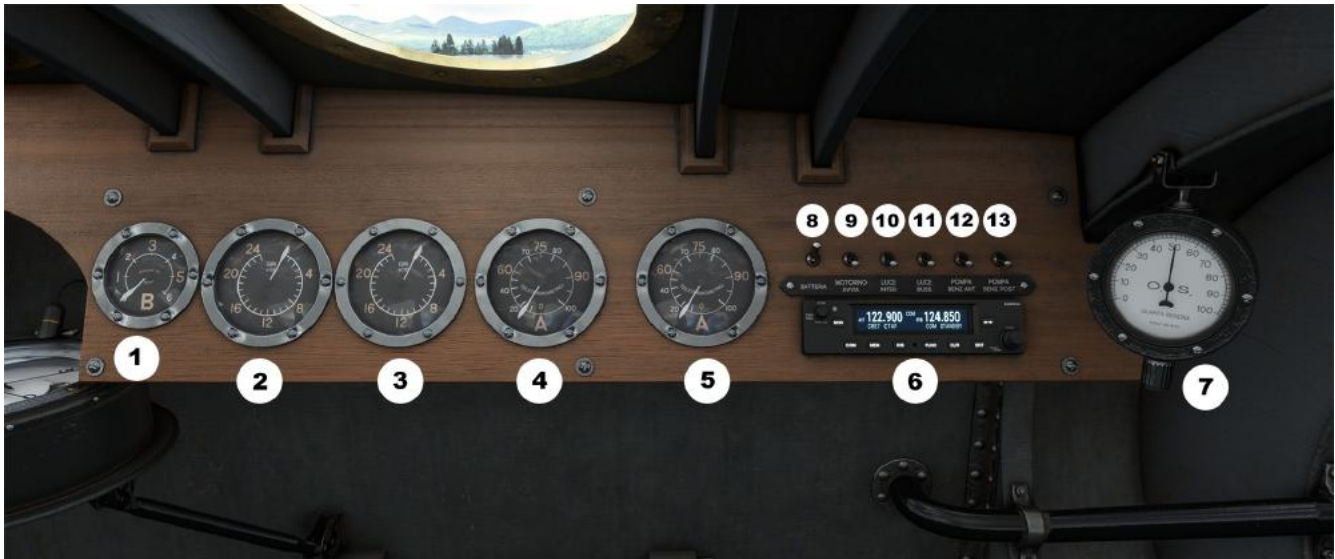
1. Flight Instruments
2. Engine Instruments
3. 'Husun' Aperiodic Compass
4. Electrical switches and Comm Radio
5. Control Column with Engine Ignition controls

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1. Port hull fuel tank capacity (% remaining of 450 gal maximum)
2. Auxiliary power unit compressed air capacity (in Atmospheres) (used for engine start)
3. Airspeed Indicator (in Kilometres per hour x10)
4. Vertical Speed Indicator (in metres per second)
5. Altimeter (in metres x1000)
6. Oil Pressure, Rear Engine (in Kilograms per centimetre squared)
7. Oil Pressure, Front Engine (in Kg/cm²)
8. Fuel Pressure, Rear Engine (in Kg/cm²)

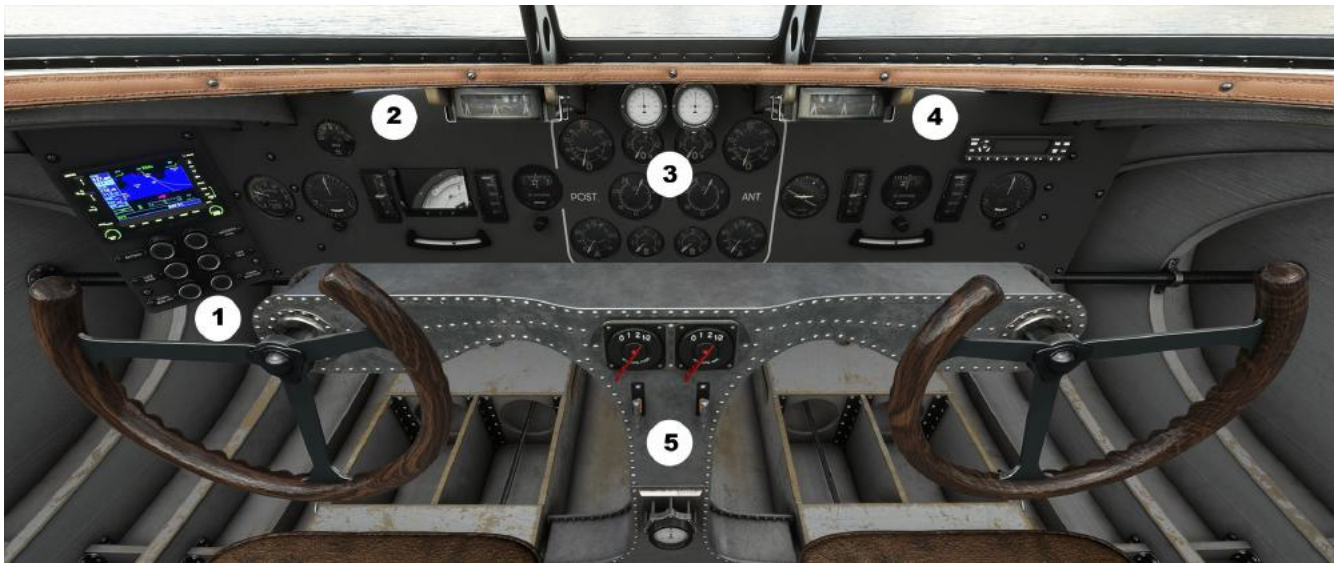
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1. Fuel Pressure, Front Engine (in Kg/cm²)
2. Tachometer, Rear Engine (rpm)
3. Tachometer, Front Engine (rpm)
4. Water (Coolant) Temperature, Rear Engine (in degrees Celsius)
5. Water (Coolant) Temperature, Front Engine (in degrees Celsius)
6. Comm Radio
7. Starboard hull fuel tank capacity (% remaining of 450 gal maximum)
8. Battery Master switch ("Batteria")
9. Auxiliary Power Unit start/stop switch ("Motorino Avviamento")
10. Interior (panel) light switch ("Luce Interna")
11. Compass light switch ("Luce Bussola")
12. Fuel Pump switch, Front Engine ("Pompa Benzina Anteriore")
13. Fuel Pump switch, Rear Engine ("Pompa Benzina Posteriore")

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COCKPIT OVERVIEW (S.55X)



1. Electrical switches and GPS/NavComm
2. Pilot's Flight Instruments and 'Husun' Aperiodic Compass
3. Engine Instruments
4. Co-pilot's Flight Instruments and Transponder
5. Control Column with Engine Ignition controls

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1. GNS 530 GPS/NavComm
2. Battery Master switch (“Batteria”)
3. Auxiliary Power Unit start/stop switch (“Motorino Avviamento”)
4. Interior (panel) light switch (“Luce Interna”)
5. Navigation lights switch (“Luce di Navigazione”)
6. Fuel Pump switch, Front Engine (“Pompa Benzina Anteriore”)
7. Fuel Pump switch, Rear Engine (“Pompa Benzina Posteriore”)
8. Auxiliary power unit compressed air capacity (in Atmospheres) (used for engine start)
9. Altimeter (in metres x1000)
10. Askania Compass Heading Selector (See Askania Compass operation section)
11. Vertical Speed Indicator (in metres per second)
12. ‘Husun’ Aperiodic Compass
13. Slip indicator
14. Airspeed Indicator (in Kilometres per hour)
15. Directional Gyro / Heading Indicator

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1. Port hull fuel tank capacity (% remaining of 670 gal maximum)
2. Starboard hull fuel tank capacity (% remaining of 670 gal maximum)
3. Oil Temperature, Rear Engine (degrees Celsius)
4. Oil Pressure, Rear Engine (in Kg/cm²)
5. Tachometer, Rear Engine (rpm)
6. Water (Coolant) Temperature, Rear Engine (in degrees Celsius)
7. Fuel Pressure, Rear Engine (in Kg/cm²)
8. Oil Pressure, Front Engine (in Kg/cm²)
9. Oil Temperature, Front Engine (degrees Celsius)
10. Tachometer, Front Engine (rpm)
11. Fuel Pressure, Front Engine (in Kg/cm²)
12. Water (Coolant) Temperature, Front Engine (in degrees Celsius)
13. Askania compass deviation indicator (Pilot's)
14. Askania compass deviation indicator (Co-pilot's)

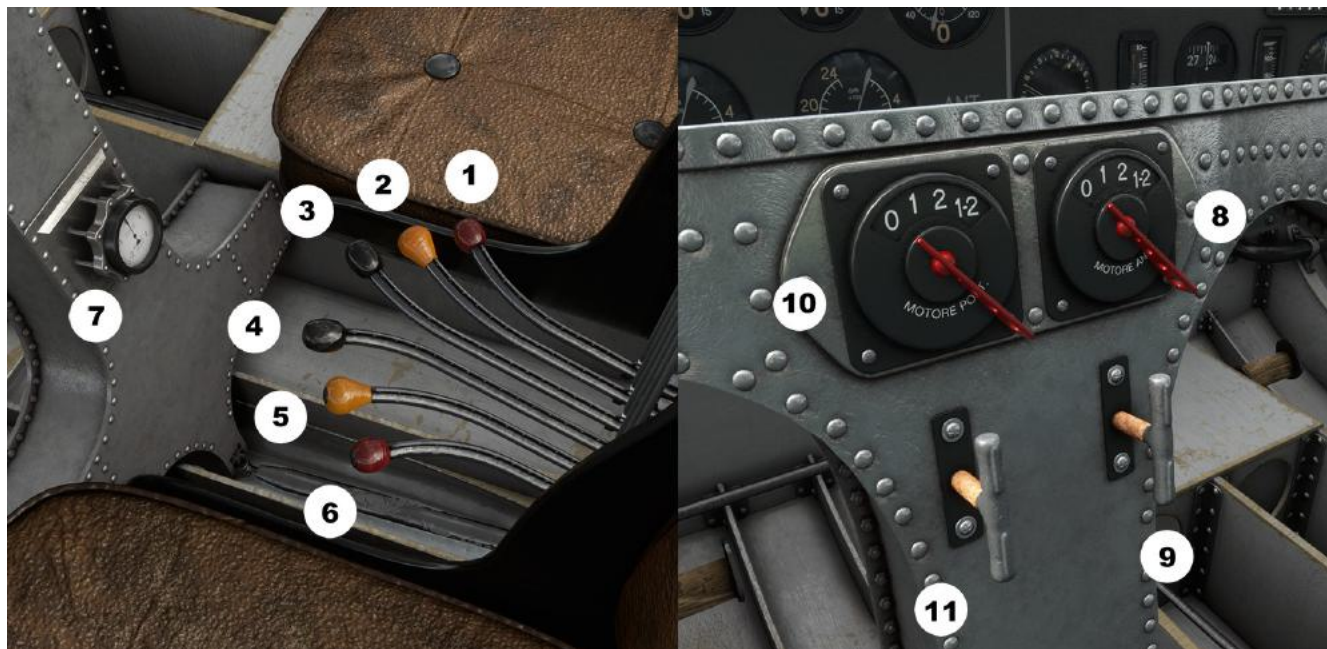
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1. Artificial Horizon
2. Vertical Speed Indicator (in metres per second)
3. Directional Gyro / Heading Indicator
4. Slip Indicator
5. Airspeed Indicator (in Kilometres per hour)
6. Altimeter (in metres x1000)
7. Transponder

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COMMON CONTROLS (S.55 Prototype & S.55X)



1. Carburettor Heat lever, Front Engine
2. Mixture control lever, Front Engine
3. Throttle, Front Engine
4. Throttle, Rear Engine
5. Mixture control lever, Rear Engine
6. Carburettor Heat lever, Rear Engine
7. Pitch Trim indicator (Needle vertical = Neutral trim)
8. Magnetto Control, Front Engine (Off – Left – Right – Both)
9. Engine Start switch, Front Engine (Pull to crank)
10. Magnetto Control, Rear Engine (Off – Left – Right – Both)
11. Engine Start switch, Rear Engine (Pull to crank)

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COMMON CONTROLS CONTINUED... (S.55 Prototype & S.55X)



1. Radiator Cowl Flap control location (S.55 Prototype 'Jahu')
2. Radiator Cowl Flap control location (S.55X)

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COMMON CONTROLS CONTINUED... (S.55 Prototype & S.55X)



The Hughes & Sons 'HUSUN' Compass was a peculiar aviation and marine compass system that was in fashion for a brief period in the 1920s and early 1930s. Nearly every S.55 had one installed, so it is dutifully represented in this simulation. The compass' layout is unique, but there is really nothing special about it other than the marking system, which at first glance can be confusing.

How to use the compass:

1. Note there are 4 needles on the compass spindle, marked 1, 2, 3, and 0. These needles indicate "hundreds" of degrees. The 1, 2, and 3 needles are spaced 100 degrees clockwise apart from each other, with the 0 needle spaced a further 60 degrees from the 3 needle.
2. The arc at the top of the compass indicates individual degrees between 0 and 100.
3. In the picture above you will see that the '2' needle is pointed at 60 on the arc. This indicates a heading of 260 degrees (nearly West).

Example headings:

- To fly North (360 or 0 degrees) you would turn until the '3' needle is pointed at 60 degrees on the arc. When this happens the '0' needle will also point at 0 degrees on the arc, indicating 3 hundreds + 60 degrees.
- To fly South (180 degrees) turn until the '1' needle points to 80 degrees on the arc, indicating 1 hundreds + 80 degrees.
- To fly at headings less than 100 degrees, say 80 degrees, you would turn until the '0' needle points to 80 on the arc. Essentially this is read as 0 hundreds + 80 degrees.

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ASKANIA MECHANICAL COMPASS (S.55X only)



The Askania mechanical compass is a navigation aid that was fitted to many European aircraft in the 1930s. It is spring based, not magnetic, and designed to show deviation from intended track over time. It is surprisingly accurate over long distances when used correctly.

Components of the compass system:

1. Selected heading wheel
2. Heading selector knob
3. Track deviation indicators (one for Pilot and Co-pilot each, both show same deviation)
4. Track deviation markings (right of track, on track, left of track)

How to use the Askania compass:

1. Establish the aircraft on your intended heading using the normal Husun compass and heading indicators.
2. Rotate the Askania compass heading selector knob (2) until your current and intended heading appears and aligns with the chevron marker at the top of the heading wheel (1). When you have finished selecting your heading the deviation marker (3) will move to the centre position, showing you are on course. Note: The selected heading is for visual reference only, it is not magnetically aligned.
3. As you fly, if you drift left of your intended course over time the deviation indicator (3) will slowly slide to the right, and vice versa.
4. To correct your course, change aircraft heading 30 degrees towards the deviation needle until the needle centres again, and then resume your intended heading, adjusting for wind.
5. If you change your heading selection on the Askania compass mid-flight, then the springs in the compass will reset and the track deviation needle will return to centre, and then resume calculating deviation from your new selected track.

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ELECTRICAL SYSTEMS and APU NOTES (S.55 Prototype and S.55X)

Neither the S.55 prototype nor the S.55X had alternators/generators fitted to their engines, nor did they have electric starter motors for the engines. Electrical power for the prototype came purely from very substantial batteries located in the forward sections of the hulls. These batteries were able to provide electrical power for at least 20 hours of continuous flight.

The S.55X had much smaller batteries but was fitted with a ram air turbine generator on the upper surface of the port hull for charging the batteries in flight. This turbine becomes effective above 50 knots (90 km/h) airspeed.

Engine start on S.55s was achieved through a compressed air charge into the intake manifold, forcing the engine to turn.

APU:

All S.55s were fitted with an early form of APU (Auxiliary Power Unit) which provided both electricity for the aircraft's systems and charged a compressed air tank to be used during engine start. This came in the form of a Garelli two cylinder motorcycle engine. In the prototype this motor was mounted inside the wing, aft of the co-pilot's seat. In the S.55X it was mounted in the engine pod between the two engines. Upon ignition the APU will immediately provide electricity and begin charging the air tank.

Due to the S.55X's smaller batteries it is common practice to leave the APU running whilst taxiing on the water, until just before takeoff, and to start it again immediately after landing.

Use of the APU on the prototype is generally not needed after engine start unless the batteries run unexpectedly low.

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ENGINE START PROCEDURE (S.55 Prototype and S.55X)

NOTE: The front engine is always started first, to help ensure adequate airflow through the radiator for both engines.

1. Ensure aircraft is ready for engine start: Set magnetos off, all electrical switches off, both mixture levers at idle-cutoff setting.
2. Battery master switch on
3. Fuel pump switches on (both engines)
4. APU (“Motorino Avvia.”) switch on. The APU will begin providing electrical power to recharge the batteries and begin compressing air for engine start.
5. Set radiator cowl flaps lever to “full open”.
6. Set front engine Magnetos to “1-2” (both)
7. Set front engine Mixture lever to full rich.
8. Observe APU pressure gauge (far left on both panels) for at least 3.5 atmospheres of pressure. Waiting for the tank to completely fill is advised.
9. Pull and HOLD front engine start switch.
10. Observe RPM rise for front engine, and at ignition point (~450 rpm) release starter switch.
11. Lean mixture lever as required.
12. Repeat steps 6 – 11 for Rear Engine.
13. Once both engines are running, set APU switch to off (or as needed) and turn the electric fuel pumps off after takeoff in order to conserve battery power..

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NOTES ON WEIGHT AND BALANCE:

You may notice that the S.55 can be configured to carry fuel loads far in excess of its published maximum takeoff weight. This was common practice during the long range flights the type achieved during its service, and is required for some of the longest journeys. Provided the seas are calm and sufficient water area is available for takeoff there is no danger in this. Note though that climb performance suffers greatly in an overloaded state and takeoffs in this condition from short lakes or towards rising terrain are not advised. If such a takeoff must be attempted then it is advised to perform a high-speed run-up first to determine the optimal mixture settings for best power. Also note that landings in an overloaded state are somewhat more dangerous. Extra care must be taken in ensuring a very smooth flare at as low an airspeed as possible. Note that the aircraft will also have a very long landing 'roll' with such weight.

NOTES ON OPTIMAL WATER HANDLING:

Most S.55s were not fitted with water rudders as they were generally not needed. The three air rudders were very effective at turning the aircraft on the water. To achieve the tightest turn radius on water first set the rudders fully in the direction of intended turn, and then use the rear engine throttle **only** (the left throttle lever) to apply moderate short 'blips' of power, returning to idle after each one. As the turn rate begins to slow down apply another moderate blip from the rear engine to accelerate it.

The effectiveness of the rudders though has a downside: the S.55 is very prone to weather-vaning. In any significant wind you may struggle to get the aircraft onto an intended heading on the water, and to maintain it. Taxiing in high winds is not advised in restricted spaces.

FLIGHT CHARACTERISTICS CONSIDERATIONS:

The S.55 has generally very benign and docile handling qualities. Control authority on all axes is very smooth and progressive, and drops off in effectiveness as speed approaches Vne (~150 knots / 280 km/h). The type does have one serious quirk though that pilots need to be aware of: significant pitch moment changes during engine power adjustments.

Due to the design's high mounted engines being so far above the aircraft's centre of gravity, any abrupt power change will result in a corresponding and immediate change in pitch. Reducing power quickly will result in a noticeable pitch up moment, and a pitch down moment will occur with every increase in power. Generally re-trimming is not required though, just a momentary adjustment of elevator deflection until the airspeed changes to match the new settings. The engines are canted at 9 degrees positive pitch to help alleviate this effect, but it is still very present and must be accounted for at all times, especially on approaches.

As an example, the pitch moment can be violent enough to cause the aircraft to lift off the water if a takeoff using full power is aborted with a quick pull to idle! This handling quirk thankfully does not take long to get used to.

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