

BEAR STUDIOS MIG-15BIS



MSFS 2020 FLIGHT MANUAL

IN MEMORIAL OF MIG PILOTS FLOWN UNDER DIFFERENT COLORS

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Difference on MSFS, P3D and FSX Versions (Steam Edition)

New Features on MSFS:

- 1, Native GLTF format models and animations under current SDK 0.20.5.0.
- 2, Mixed xml and html templates, gauges, which have elements inactive with native new simulate variables from MSFS 2020.
- 3, New texture system with dynamic Icing and Fogging visual effects. Dynamic engine heating blur, vapor and vortex and ground effects driven by new simulate variables formulas.
- 4, Add direction finder function to ARK-5(ADF) navigation system to support indicating relative bearing to active com radio stations.
- 5, Modern flight model only, not support classic/legacy flight model.
- 6, New control methods for cockpit lights, radio and audio volumes from MSFS SDK.
- 7, No living weapons include gun firing, bomb/drop tanks release, canopy jettison, eject seat and signal flares under current SDK.

Basic Features from P3D and FSX:

- 1, Similar 3d models and animations behaviors support PBR textures (P3D versions) and Normal Bump textures (FSX Versions)
- 2, Sound system modified slightly from P3D versions, most of same xml gauge code from P3D versions, the aircraft keep almost same functional elements except MSFS current limitation
- 3, Knee Board panel have same control logic and similar display screens from P3D
- 4, Duo the elements above, I want to set same or similar function or behavior between different flight simulator platforms except their stock functional limitation. You may choose the proper versions for your own flight simulating experience with my MiG-15Bis Mod.

P3D and FSX Version setup package release on Just Flight and SimMarket

<https://www.justflight.com/product/bear-studios-mig-15-p3d-fsx>

<https://secure.simmarket.com/bear-studios-mig-15bis-p3d4-5-fsx-fsxse.phtml>

MSFS 2020 SETTING



Fig. 0-1 MSFS GRAPHICS SETTING

To avoid inactive elements on Integrated Kneeboard rendering offset problem, set LENS CORRECTION OFF

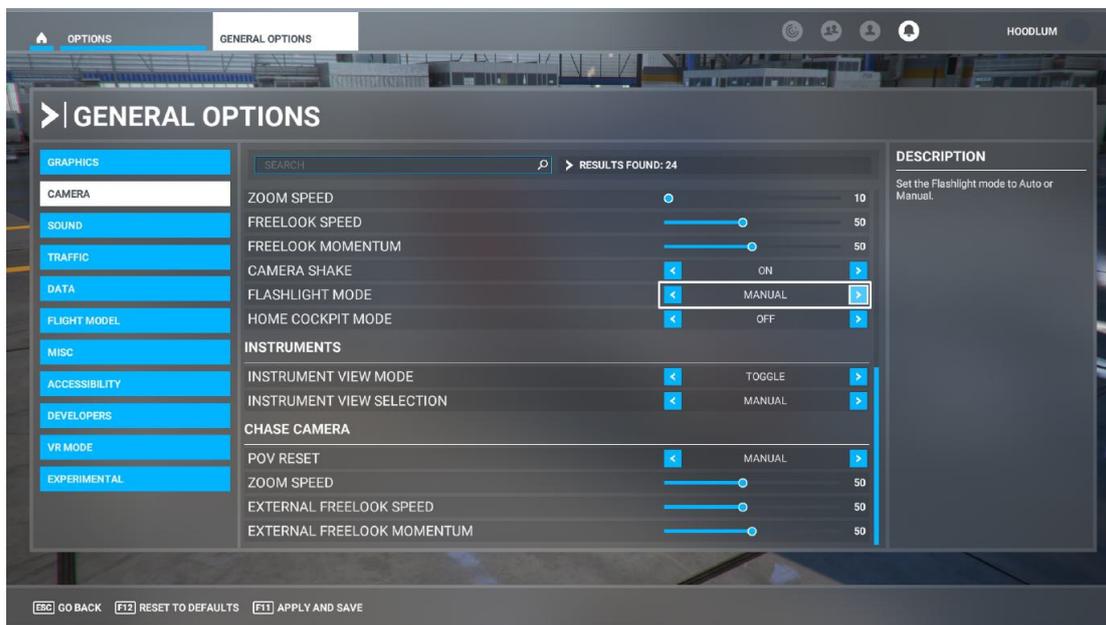


Fig. 0-2 MSFS CAMERA SETTING

Set FLASHLIGHT to MANUAL for simulating MiG Pilots true life experience when preparing night flight in early 1950s



Fig. 0-3 MSFS FLIGHT MODEL SETTING



Fig. 0-4 MSFS ASSISTANCE SETTING

For experience true life of early 1950s MiG Pilot Flight Operating, turn off G-suit for no such equipment, and turn off HUD display in both VC and Exterior View



Fig. 0-5 MSFS ACCESSIBILITY SETTING

To avoid inactive elements on Integrated Kneeboard rendering offset problem, set **COCKPIT INTERACTION SYSTEM** to **LEGACY** Mode.

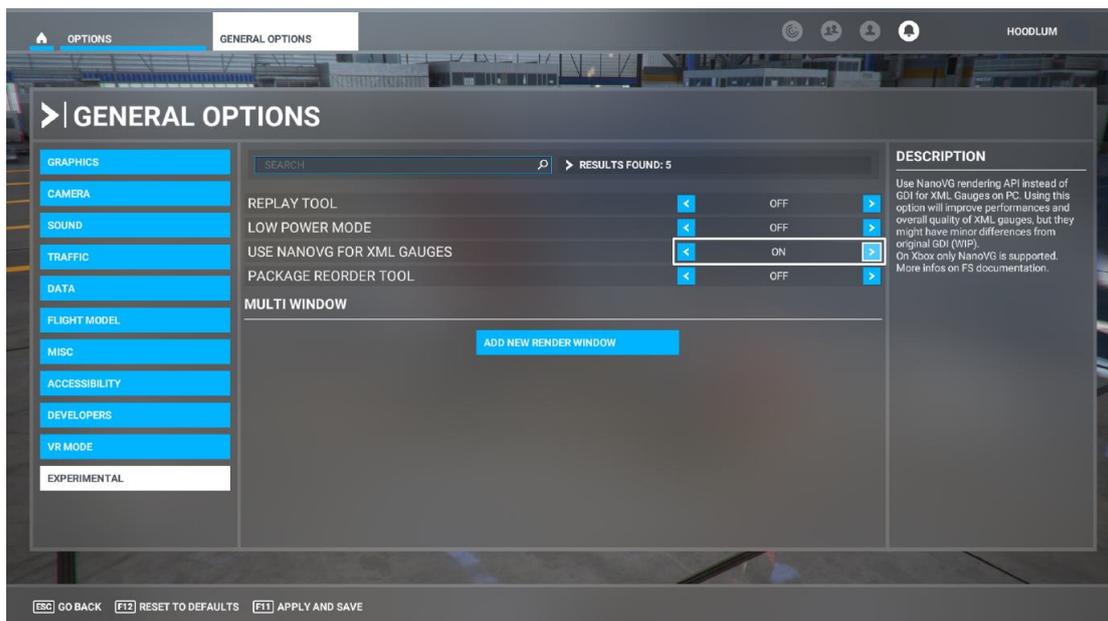


Fig. 0-6 MSFS EXPERIMENTAL SETTING

Make **XML GAUGES** Display have more effective on MSFS Versions higher than 1.29.30

MSFS 2020 AI CONTROL LIMITATION



Fig. 0-7 AI FLIGHT ASSISTANT TAKE OFF

Notice: MiG-15Bis has no autopilot flight control system. MSFS 2020 AI Flight Assistant can control aircraft like autopilot, but it can not lead aircraft to coupled destination GPS or Radio Navigation Station, just keep aircraft level fly under proper airspeed at altitude and heading. Pilot control aircraft and keep it navigates to planned or coupled destination manually when turn off AI PILOTING Off.

Notice: MSFS 2020 now has SDK and Main Version Functions Limitation for living weapons , No gun firing and payload jettison and firing effects. When in future living weapons supported, I will make it working for aircraft updates

MSFS 2020 VISUAL EFFECTS



Fig. 0-8 MSFS WIND SHIELD ICE FROZEN EFFECT



Fig. 0-9 MSFS AIRCRAFT ICEING EFFECT

To Active Wind Shield and Glass De-Ice system, set Cockpit Air Supply Valve (135) to Open positions, and turn on Air Ventilation Outlet Control Lever (80)



Fig. 0-10 MSFS AIRCRAFT ENGINE HEAT EFFECT

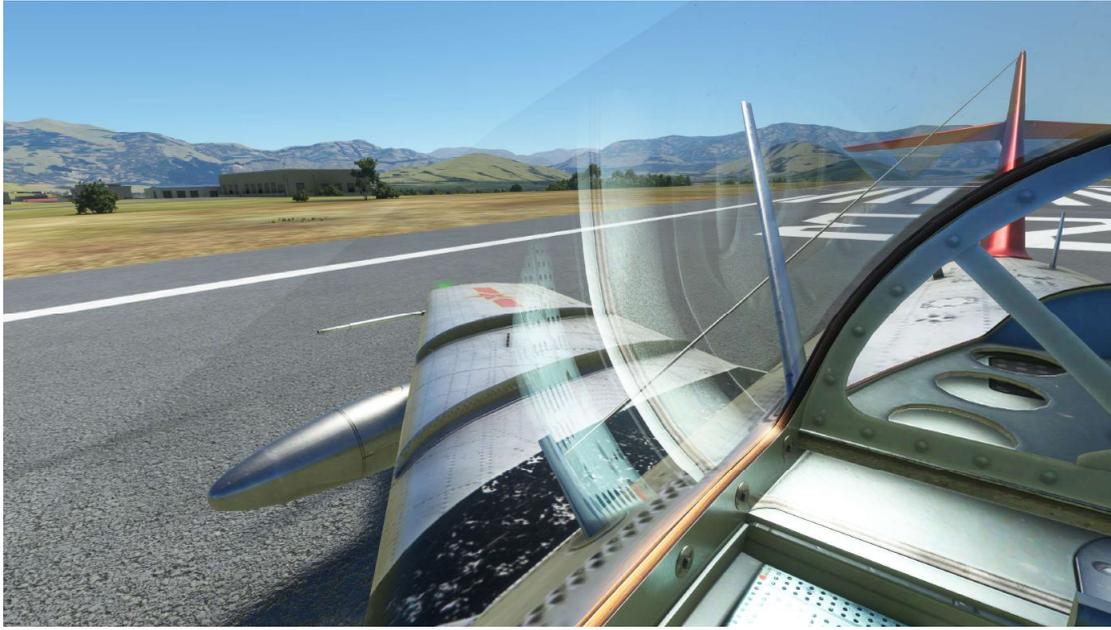


Fig. 0-11 MSFS Glass Reflect Effect

MSFS 2020 LIGHT EFFECTS



Fig. 0-12 UV Gauge Back Light with Potentiometer Dimmer Control

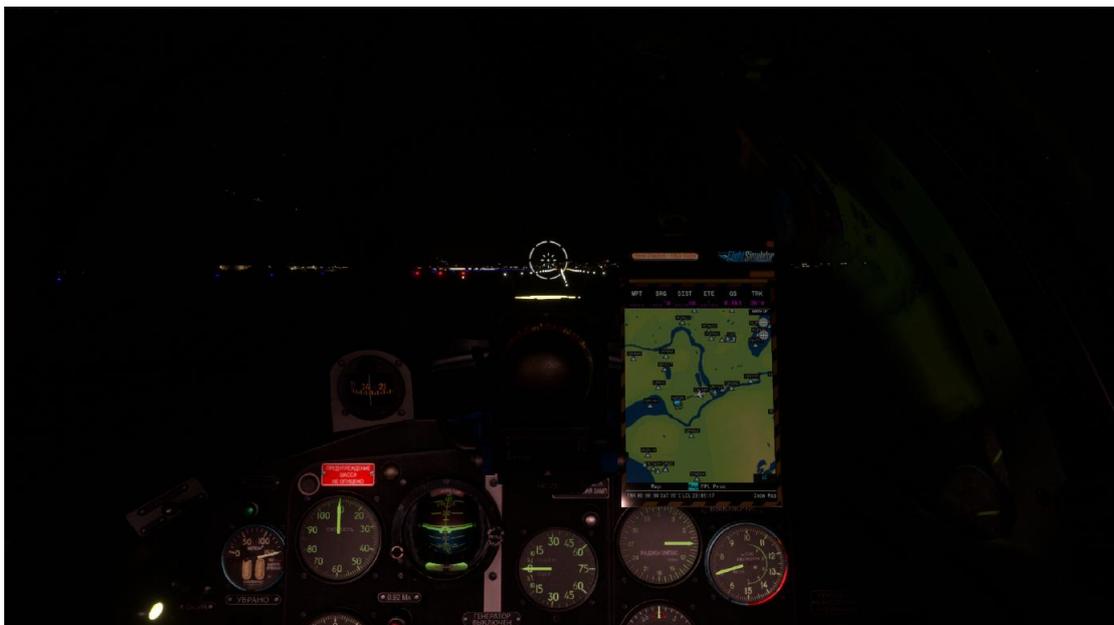


Fig. 0-13 Center Flood Light, Gun Sight Reticule with Potentiometer Dimmer Control



Fig. 0-14 Right Flood Light, AKR-7 Gauge Light, with Potentiometer Dimmer Controls



Fig. 0-15 Left Flood Light, Radio Display, with Potentiometer Dimmer Control

PREFACE

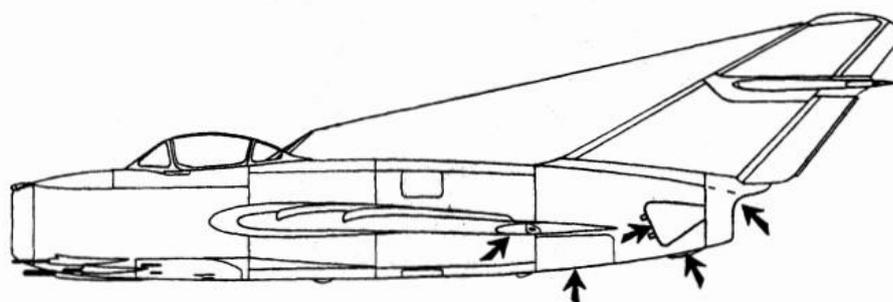
This manual has been prepared specifically for the purpose of providing USAF personnel with operating information on the MiG-15Bis (VK-1) to an extent that, if necessary, this airplane may be used as a means of escape from hostile territory.

The operating instructions are not complete, only the information which the pilot must know is presented.

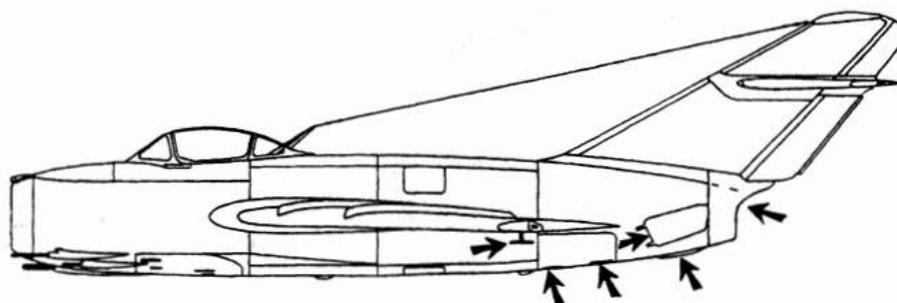
Some procedures which might be considered unorthodox for operational flying of this airplane are recommended because they represent the simplest means for assuring safe flight.

The material presents in this manual is for the operation of the MiG-15Bis with the 6,000-lb thrust engine (VK-1) shown in Figure 1.

It is not valid for the earlier model MiG-15 (RD-45) with the 5,000-lb thrust engine. However, it is believed the operating instructions are, to a large degree, valid for the MiG-17.



RD-45



VK-1

Fig. 1 Recognition Points Between MiG-15 (RD-45) and MiG-15Bis (VK-1)

SECTION I GENERAL DESCRIPTION

1. Aircraft

The MiG-15Bis aircraft is a single-seat, swept-wing interceptor powered by a 6,000-lb thrust VK-1 centrifugal flow type jet engine. The wing has a leading edge sweep of 35°, an anhedral of about 2°, and has two full chord wing fences attached to the upper surface.

The ailerons are aerodynamically balanced by a sealed "beak" type of balance and have a hydraulic booster unit incorporated into their control system.

Both elevator and rudder are manually controlled. Electrically operated trimming tabs are fitted to the aileron and elevator. The rudder has a ground set tab.

The vertical fin leading edge is swept back at 60°. The horizontal Stabilizer is mounted about half way up on the vertical fin.

The fuselage is circular in cross section and has the engine air intake in the nose. The engine is mounted about midway along the fuselage with a straight jet pipe extending to the end of the fuselage.

The cockpit is well forward with the main fuel tank which between the cockpit and engine.

Petal type air brakes are fitted on each side of the rear fuselage.

Two small fuel tanks are located aft of the engine compartment and forward of the air brakes.

The armament consists of a 37-mm. gun. And two 23-mm. guns: mounted between the air intake in the front fuselage.

Two drop tanks can be carried from a shackle under each wing.

2. Cockpit

The cockpit is not roomy but adequate. When the pilot is strapped in his seat, He can reach all the controls, instruments, indicators, and emergency equipment with ease.

Vision over the nose is 11° to 12° and the side view from the canopy is good. Rearward vision is poor.

A console type control panel arrangement is on the left and right of the instrument panel. The master switches are located on the right and all of the engine switches are on the left. The gun sight and a magnetic compass are mounted above the main instrument panel.

Heating and defrosting of the cockpit is accomplished through the cabin pressurization system.

The aircraft oxygen system may be a pressure demand or diluter demand type.

SECTION II

FUNCTION AND OPERATION

1. Ground Check

a. Before selecting an aircraft for flight, determine that it has been completely refueled and serviced with air and oxygen as shown in Figures 2 and 3.

b. Make certain that no external control surface locks are in place.

c. See that the airplane is not tied down that wheels chocks are removed, and that covers are removed from the nose inlet, tail pipe and the pitot-static head.

d. If in available, attach an external power supply (Ground Power Unit, or Battery Cart) to the airplane (Figure 2), in such a manner that it can be pulled free easily after starting. It has been reported that only one start can be made with the aircraft's battery.

2. Entering the Aircraft

From the outside, the canopy can be opened from the ground the wing, or from a ladder, and entrance to the cockpit can be gained from the wing or by using a ladder. The canopy is opened by first pushing the aft end of a flush mounted lever (Figure 4) which is located on the lower left forward side of the canopy.

Pushing on the lever causes it to protrude such a manner that it can be grasped by the hand. The outside portion of the lever pivots clockwise about its end, unfolding and doubling its length.

The entire lever is then rotated in a clockwise direction, unlocking the canopy so that it can be moved back. The canopy locks in the rear position.

3. Canopy

Inside the aircraft, the pilot can close the canopy by grasping the closing handle (Figure 5) located on the forward edge of the canopy. Pulling forward on this handle releases the rear latch and allows the canopy to slide forward and lock in the closed position.

To open the canopy from inside the cockpit, the pilot reaches forward with both handles, grasps the knobbed handles on the left and right sides on the forward lower corners of the canopy and pulls the canopy aft. The left-hand knob will release both canopy latches (Figure 6).

Emergency release of the canopy can be accomplished in two different ways.

One is used for maintenance and ground emergency, the other prior to ejection.

On the ground, the canopy can be released by pushing forward on two levers (Figure 7) located on the underside of the right and left forward canopy rails. The canopy is then moved by hand, aft and up.

To remove the canopy prior to ejection, the safety pin in the canopy release lever (Figure 10) is pulled and the lever is lifted rotated forward.

This action allows the canopy to rise and arms the ejection seat. The air stream will remove the canopy.



- A. Main Fuel Tank Filler
- B. Ground Power Unit Connector (For connect External Power on Ground)
- C. Rear Fuel Tank Filler
- D. Board Ladder
- E. Wheel Chocks

Fig 2 MiG-15Bis Left Side



- A. Signal Flare Launcher (4 different shots, functional in simulation)
- B. Pneumatic System Service Point
- C. Oxygen System Service Point

Fig 3 MiG-15Bis Right Side

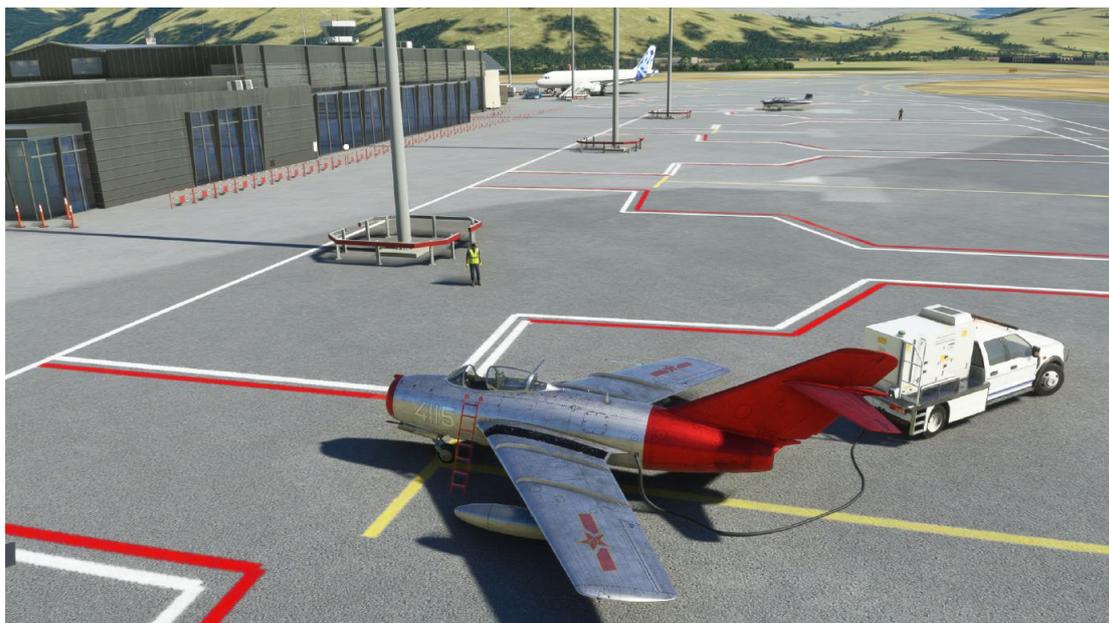


Fig 4 MSFS Stock Ground Service Operating

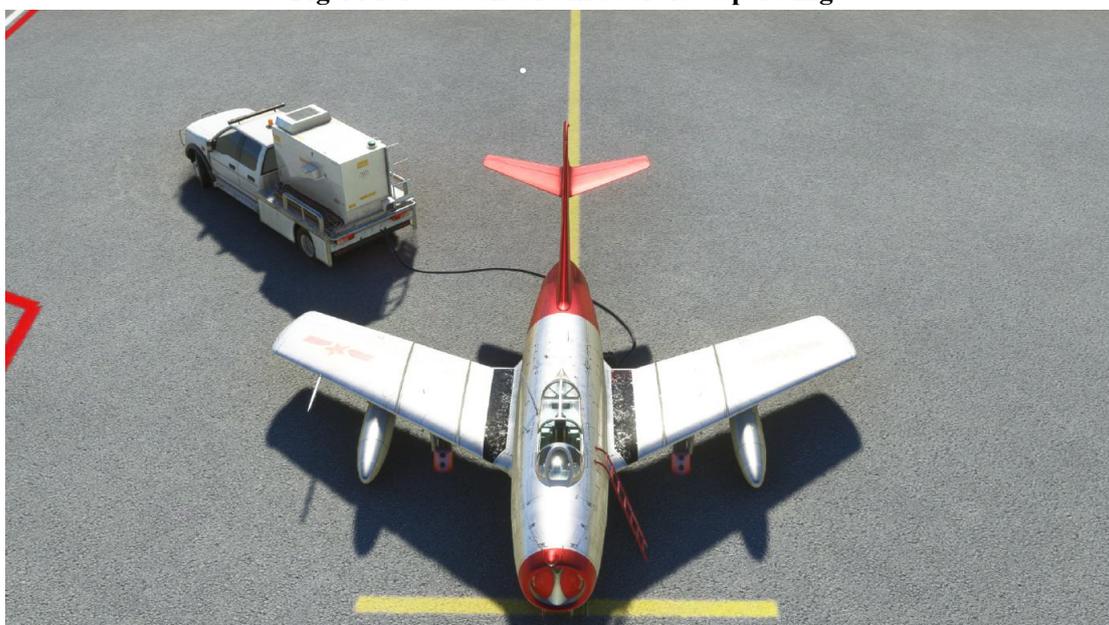


Fig 4-1 Ladder, Wheel Chocks and GPU connected on Ground

MSFS 2020 Stock GPU Vehicle replace the Battery Cart. To call the GPU Vehicle, Pilot can use ATC dialogue Ground Service Windows, or Follow Steps Below:

- 1, Aircraft Parking on Ramp or Position has GPU Vehicle near by. Parking Brake Engaged (Wheel Chocks Placed).**
- 2, Master Battery and Generator Switches Off, now electrical power on main bus.**
- 3, Radio Avionics Power Switch On, or Starter Button Pressed, or Master Ignition Switch On**
- 4, Wait the GPU Vehicle Approach aircraft position and connect cable with aircraft.**



Fig 4-2 Fuel Truck and GPU connected on Ground

MSFS 2020 Refueling. To call the Fuel Truck, Pilot can use ATC dialogue Ground Service Windows, or Follow Steps Below:

- 1, Aircraft Parking on Ramp or Position has Fuel Truck near by. Parking Brake Engaged (Wheel Chocks Placed).**
- 2, Engine Off, now fuel feed into and flame out**
- 3, Main or Rear fuel tank quantity less than 10%, Radio Avionics Power Switch On**
- 4, Wait the Fuel Truck Approach aircraft position and connect fuel hose with aircraft.**



Fig 4-3 Pushback Tug connected on Ground

MSFS 2020 Stock Pushback Tug, to call the Pushback Tug, Pilot can use ATC dialogue Ground Service Windows, or Follow Steps Below:

- 1, Aircraft Parking on Ramp or Position which Pushback Tug near by. Parking Brake Discharged (Wheel Chocks Removed).**

- 2, Engine Off, no thrust generates from the aircraft's own turbine engine
- 3, Master Battery Switch On, Radio Avionics Power Switch On, Navigation Lights On
- 4, Wait the Pushback Tug approach to aircraft position center, then connect to nose wheel for moving aircraft backwards.



Fig 4-4 Pushback Tug Direction Control during Moving Aircraft

To Control Pushback Direction and Distance during it move aircraft:

- 1, Steer aircraft rudder right or left to change pushback moving direction, when rudder in center position, pushback tug will moving in strait line.
- 2, Press aircraft wheel brake keys to hold pushback tug and aircraft temporary. Release wheel brake keys, pushback will moving aircraft again.
- 3, when aircraft is moved on prop position, Press aircraft parking brake keys to stop aircraft and release the Pushback Tug disconnect from aircraft. Then, Pushback Tug will return to its waiting position near the ramp.
- 4, Or Pilot can use pushback command from ATC dialogue window.

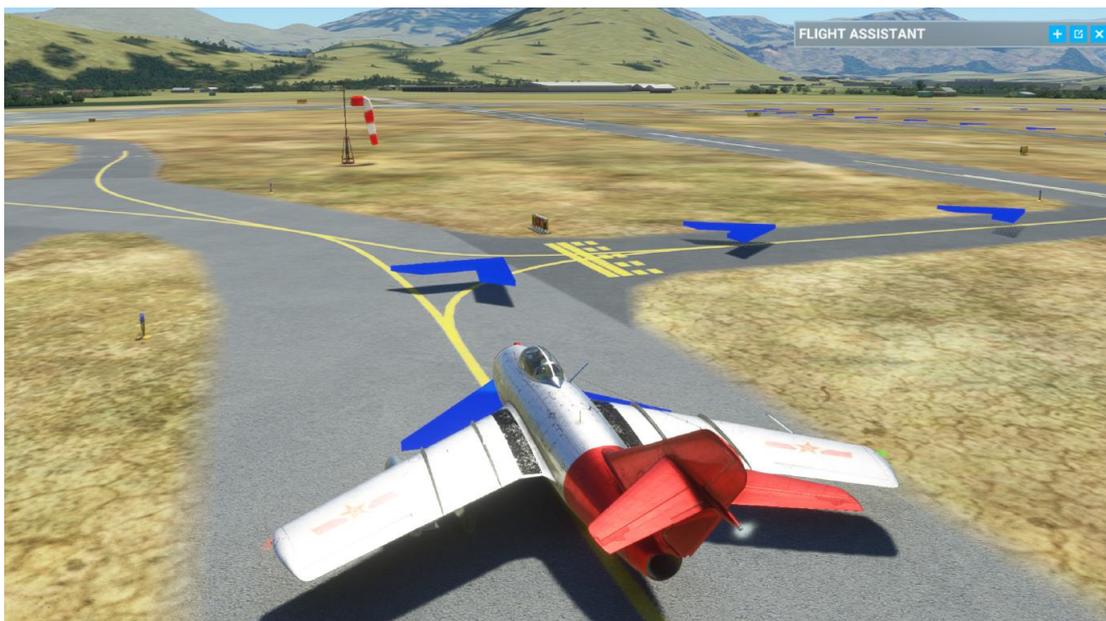


Fig 4-5 AI Flight Assistant Control Aircraft Taxi with Ribbon Displays

To let AI Control aircraft taxi ground follow planned path from positions to runway, Switch **AI PILOTING ON** in the Flight Assistant Window



Fig 4-6 AI Flight Assistant Control Aircraft Take Off

To let AI make aircraft rolling and take from runway, when aircraft ready to take off on the runway position, Switch **AI PILOTING ON**, wait AI take off, retract gear up and level flight, it may keep 500 feet AGL from ground, in this case, pilot can press **TELEPORT TO INCREASE ALTITUDE** line to get aircraft raise altitude.

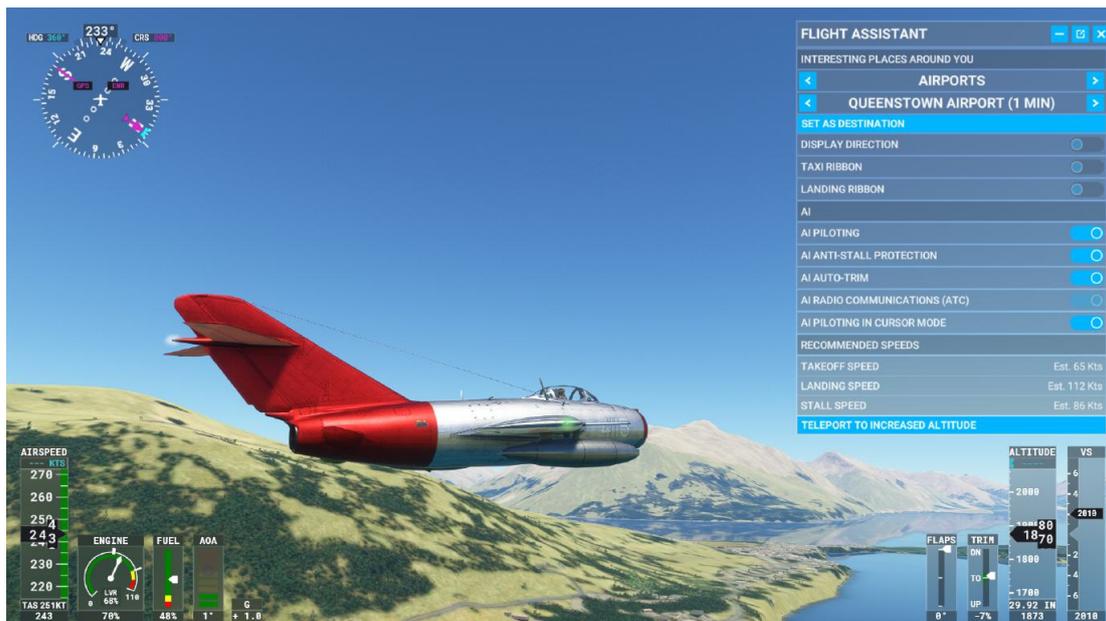


Fig 4-7 AI Flight Assistant Control Aircraft Wing Level Flight

Notice: MiG-15Bis has no autopilot flight control system. MSFS 2020 AI Flight Assistant can control aircraft like autopilot, but it can not lead aircraft to coupled destination GPS or Radio Navigation Station, just keep aircraft level fly under proper airspeed at altitude and heading. Pilot control aircraft and keep it navigates to planned or coupled destination manually when turn off AI PILOTING Off.

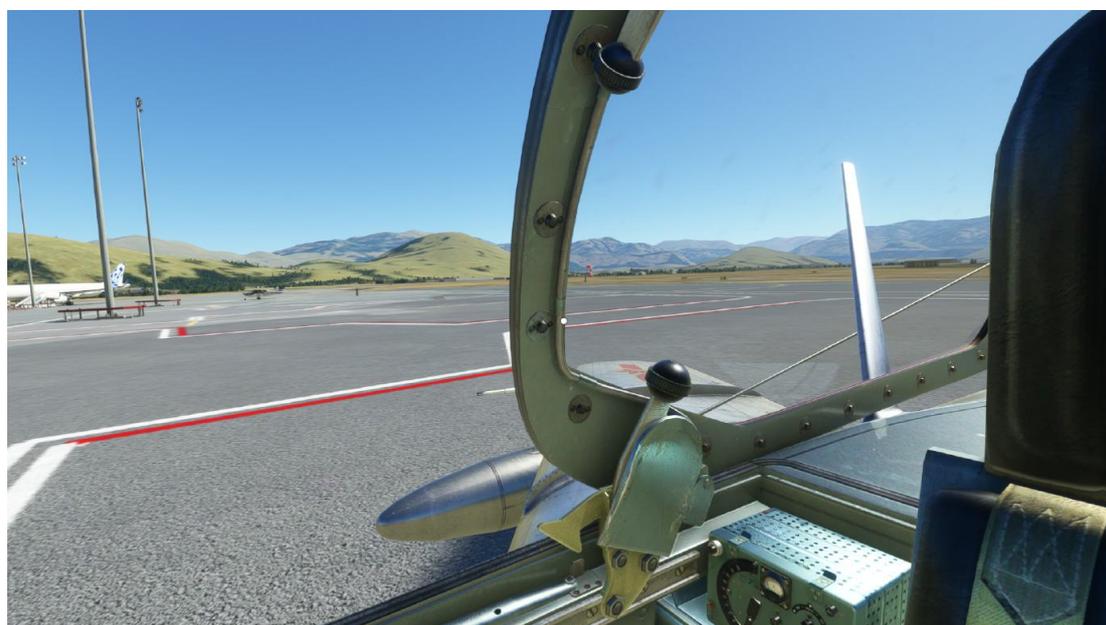


Fig 5 Canopy Closing Knob

To Close Canopy, press the Canopy Closing Knob Attach on Canopy frame above, and wait canopy closing. Or press Shift+E/E in Virtual Cockpit or Exterior Camera Views.

4. Ejection Seat

The pilot's ejection able bucket seat is built to accommodate a seat type parachute pack and the seat is not readily adjustable.

The lever (Figure 10) on the left arm of the seat is for shoulder harness tension adjustment.

The lever on the right arm is for canopy jettison and the large 'D' ring under the right arm is raised for seat ejection.

There is a safety pin through the ejection tube at the top rear of the seat.

This pin should be removed prior to flight.

5. Fuel System

The MiG-15Bis has an internal capacity of 372 US gals. This fuel is contained in two tanks:

The main tank, located just behind the pilot, has a capacity of 330 US gals.

And a rear tank which has a capacity of 42 US gals.

The filler points for these tanks are shown in Figure 2.

Fuel from the rear tank is transferred to the main tank by an electrically driven transfer pump, controlled by a switch (Figure 12 No.32).

A light (71) indicates when the rear tank is empty.

The fuel quantity gauge (72) reads up to 277 gallons (1050 liters) and does not indicate other than full, until all but 277 gallons of fuel have been exhausted.

When the fuel level in the main tank goes below 79 gallons (300 liters), light (55) comes on.

In addition to the internal fuel, the MiG-15Bis can carry 66-106 gallons of fuel in each of two droppable wing tanks.

(In this simulation mod, just apply 106 gallons PTB-400 drop tank model for 400 liters, when they was dropped, simulation can not restore their quantity even reset back models during flight.)

This fuel automatically used first. When the tanks are empty, light (2) indicates that the tanks may be dropped. The button (7), located at the bottom of the instrument panel with safety cover, is depressed to drop the tanks.

6. Engine Starting

Normally the MiG-15Bis (VK-1) is started with the aid of a Ground Power Unit (battery cart), which is plugged in on the left side of the fuselage at the trailing edge of the wing (Figure 2).

The switches for engine operation are located on the left console (Figures 8 and 12), the aircraft system switches and the right console (Figures 9 and 12).

Before starting is attempted, all switches should be turned off (aft), the throttle (16) closed, (the engine cannot be started unless the throttle is in the full aft position), and the high-pressure fuel valve (fuel cock level, 11) closed (up).

To start the engine, the following procedure is used:

a. Turn the following switches "on" (forward):

(1) Engine instruments (29)

- (2) Ignition isolator (28)
- (3) Rear (Aft) tank transfer pump (32)
- (4) Booster pumps for start and engine running (30)

b. When the low-pressure fuel warning light (70) goes out, press starting button (15) for five seconds and release it. After approximately 10 seconds (the engine speed will be 800 – 1,000 rpm), start to open the high-pressure fuel valve (fuel cock lever 11) slowly (down). As the engine accelerates, open the valve to the full open position. The engine will automatically accelerate to an idling speed of 2500 rpm.

c. The re-light warning light (59) will be on during the automatic starting cycle. When it goes out, turn on the generator switch (85) and the battery switch (84). Then disconnect the GPU or battery cart.

NOTE: It should be remembered that reports indicate only one engine start can be made with the aircraft's battery instead of an external power source. If it is necessary to use the aircraft's battery, the battery and generator switches (84 and 85) should be turned on in addition to the engine switches as indicated in steps one.



Fig 6 Canopy Opening Knobs – Right Hand

To Open Canopy Open, press the Canopy Open Knob, or Press Shift+E/E to open canopy.



Fig 7 MiG-15Bis Cabin



Fig 8 Left Consoles

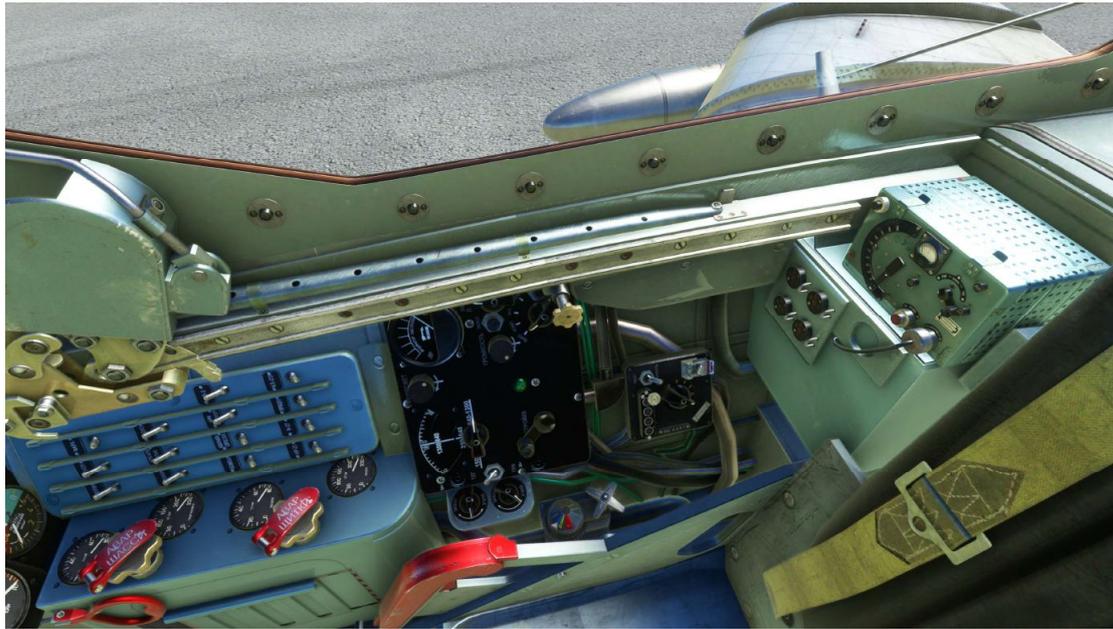
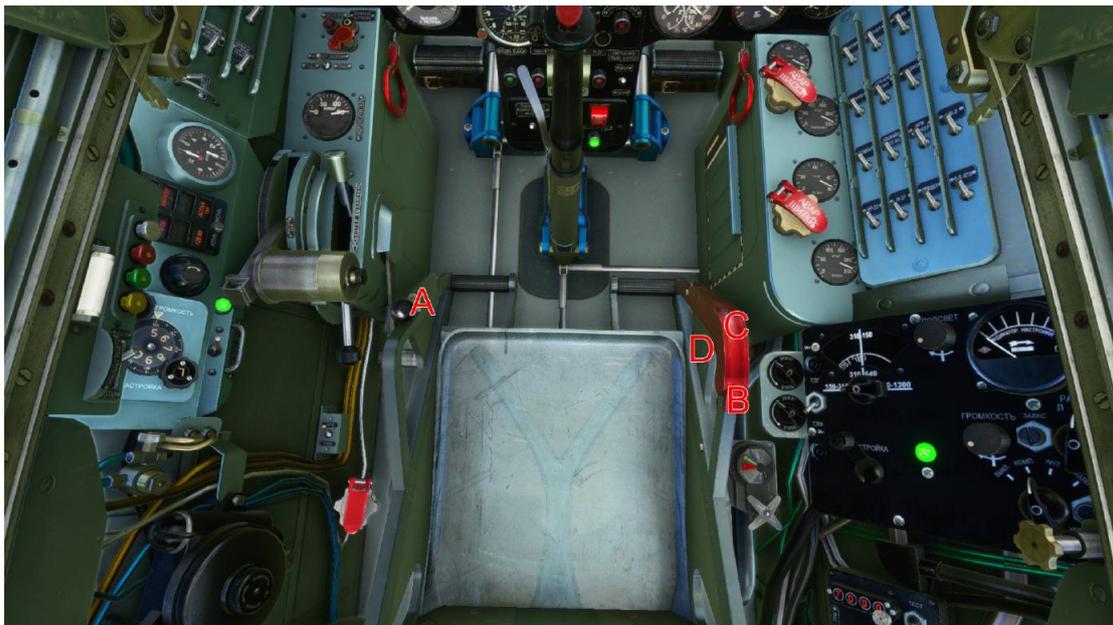


Fig 9 Right Console



- A. Harness Adjustment Knob (In simulation, adjust eye point up and down)
- B. Canopy Jettison Lever Safety Pin
- C. Canopy Jettison Lever
- D. Ejection Seat Firing Ring

Fig 10 Pilot Seat

Notice: MSFS 2020 now has SDK and Main Version Functions Limitation for living weapons , Eject Seat and canopy have no Jettison and Firing Effects.

7. Wheel Brake

Operating the air operated (pneumatic) wheel brakes are actuated by squeezing the brake lever, which located on the control stick (Figure 11). When the lever is squeezed, air is supplied to the brake system.

Gauge (26) indicates the pressure in each brake. For normal brake application the gauge reading should not exceed 6 kg/ cm².

Direction of braking corresponds to rudder movement, with both brakes being applied when the rudder is in neutral. The brakes are released when the lever is released.

The pneumatic system is serviced at a point on the lower right side of the fuselage, under the cabin, as shown in figure 3.

8. Landing Gear

The aircraft is equipped with a tricycle, lever suspension landing gear. The main gear retracts inward, the nose gear retracts forward.

For normal operation the gear is retracted or extended by moving the landing gear handle lever (82) to the "up" or "down" position.

A sliding guard (83) prevents it from being raised accidentally to the "up" position. The gear handle should be returned to neutral after the cycle is completed.

The gear is actuated by the aircraft's hydraulic system. The system pressure is indicated on the main system pressure gauge (100). A green band along the edge of the instrument dial indicates normal pressure (90- 120 atm).

The aircraft is provided with an emergency pneumatic system, which for lowering the landing gear.

A gauge (98) indicates the pressure (47- 55 kg/cm²) in this system. To use the system, take these steps:

- a. Place the landing gear selector handle in the "down" position.
- b. Pull on each of the red "D" rings clipped to the forward lower sides of the right and left consoles.
- c. Open emergency gear extend valve (99).

This will extend and lock the landing gear in the "down" position.

There are two systems for indicating the landing gear position. First, the position lights (80), located on the instrument panel, and second, "Pop-Up" rods protruding from three points (two from the wings, above the pivot point of each main gear, and one from a point just forward of the Windshield, above the nose gear) when the gear is extended.

9. Flaps

The airplane is equipped with hydraulically operated 3-position flaps. The flaps are operated by a four position lever (13) on the aft side of the left console. The four positions, from top to bottom, are:

(1) Flaps up, (2) Neutral, (3) An approach position of about 20°, and (4) A landing position of 55°.

The handle should be returned to the neutral position after cycle is completed.

A green "down" flap position indicator light (42) is located at the top left-hand side on the main instrument panel. There is also a mechanical "pop-up" flap position indicator in the top of

the left wing, between the two wing fences.

The hydraulic pressure gauge for the flaps is the main hydraulic pressure gauge (100) located on the right console.

An emergency flap pneumatic system for extending the flaps is provided. By opening valve (102), located on the right console, the flaps are fully extended. The air pressure gauge (101) for this system is located on the right console. The normal working pressure is between 47 and 55 kg/cm².

10. Primary Flight Controls

The aircraft is equipped with a control stick (Figure 11) and rudder pedals for operating the elevator ailerons and rudder.

The rudder and elevator are manually controlled, and the ailerons are operated manually or with the aid of a hydraulic boost system.

The boost system is engaged when lever (14) is in the forward position and disengaged (manual) when in the aft position. The system pressure is indicated by a gauge (19) located on the left console.

The elevator and ailerons are equipped with electrically operated trim tabs. And switch (20) operates the aileron trim tab, switch (130) operates the elevator trim tab. Light (131) indicates the neutral position of the elevator tab.

The circuits to both switches are controlled by a master switch (97) located on the right console.

11. Speed Brakes

The petal type speed brakes are controlled by either one of two switches, one on the pilot's left and one on the control column.

The Switch (35) on the pilot's left is for continuous open position. The light (34), adjacent to the switch, indicates the open position.

The button on the control column (Figure 11) is used for "blipping" the brakes.

12. Control Stick

The control column (Figure 11) has provisions for the following:

a. Brake Lever: this lever is on a position which requires the fingers to be fully extended for operation. There is no parking position for the lever.

b. Speed Brake Control: This spring loaded "blipping" button is well placed under the thumb. Push to open, Release to close.

C. 37-mm gun firing button: this button is on top of the stick and is protected by the tongue.

D. 23-mm trigger: the hinged tongue, which protects the 37-mm firing button, pivots forward and down and serves as a trigger, when squeezed it is pressed against the firing button.

e. Bomb Release Button: This button, protected by safety latch, is located on the front and at the bottom of the control grip.

f. At the bottom of the control column there is a gust lock, a pivoted arm which is disengaged when it is swing up and forward.

(In this simulation mod, just 37-mm gun firing button, safety cover tongue inactive from pilot's view, other triggers and buttons occluded by control stick shape, can not clickable, so

recommends using keys defined on kneeboard checklist pages for operate these weapon firing/release systems.)

13. Cabin Conditioning and Pressurization

The cabin of the airplane is pressurized and ventilated by air bleed from the engine compressor.

This air is controlled by a manually operated temperature control valve (135) located on the pilot's right. The cabin pressure is controlled by a valve (80) on the main instrument panel's right forward up position.

The manually operated temperature control valve also controls the inflation of the canopy seal. The valve functions thus: Turning the handle counter-clockwise moves the valve pointer clockwise, shutting off the cabin air supply and causing the canopy seal to deflate. In turning the valve (counter-clockwise) to full on from the off position, the following sequence occurs:

- a. Canopy seal inflates.
- b. Cold air flow starts.
- c. All cold air supplied.
- d. Cold and hot air mixed.
- e. All hot air supplied.

The cabin pressure regulator (80), located on the main instrument panel's right forward up position, is designed to maintain the pressure schedule shown in Figure 11. It is necessary that the lever be turned in (clockwise) before the regulator will function. The handle is turned counter-clockwise to dump the cabin air.

The cabin altitude and pressure differential are indicated by gauge (65). If the cabin pressure differential exceeds its red line value, the pressure can be controlled by manual operation of the control valve (80).

14. Oxygen

The airplane contains a high pressure oxygen system having duration of approximately 2 hours. The system is serviced at a fitting located under the nose access cover, as shown in Figure 3.

The oxygen regulator is an automatic diluter-demand, pressure-demand type (124) which is made operational by opening (counter-clockwise) the two valves (121 and 125).

Gauge (41) indicates oxygen pressure and oxygen flow.

The oxygen tube goes from the aircraft's oxygen outlet to the front of the seat type parachute pack, which contains a bailout oxygen bottle, then to the oxygen mask.

Upon ejection, the oxygen hose to the airplane is automatically disconnected and the bailout bottle is automatically put into operation.

If the parachute is in the airplane but no oxygen mask is available, the short length of hose from the parachute (to which the mask would be attached) can be used for breathing oxygen.

If no oxygen is available, the aircraft should not be flown above a cabin altitude (65) of 5,100 meters (16, 000 feet) which is approximately 32,000 feet aircraft altitude.

15. Electrical

The airplane has a 24-volt electric power system.

The switches are circuit breaker toggle type.

The battery switch (84) when on connects the battery to the aircraft electrical system, include the engine starting circuit.

The generator switch (85) connects the generator to the aircraft's electric system.

The generator warning light (52) indicates red when the generator output is below rated voltage (when the generator is inoperative or the engine rpm is low).

16. Radio Compass

The airplane is equipped with a completely automatic radio compass (ARK-5) similar to the USAF SCR-26. The tuning controls box (K-7 control box, Fig 12 Detail H) is located at the pilot's right and a master on-off switch (89) is located at the right console. A beacon signal in the 150-1300 KC band can be used for homing, when switch (36) is in the aft position.

17. Transmitter and Receiver

The airplane utilizes a high frequency (3.75 - 5.0 HC) transmitter and receiver unit (RSI-6M).

Both the transmitter and receiver are turned on by switch (88) located on the right console.

The receiver is tuned at box (24) located on the pilot's left.

The transmitter is tuned while on the ground and cannot be tuned readily in flight.

The "push-to-talk" transmitter button (17) is located on the throttle (16). ADF (ARK) / HF Radio Receiver Switch (122) change the head phones between radio beacon and command receiver.

Notice: In Simulation, this RSI-6 radio only supply civil aviation UHF radio frequency ranges between 108 to 118 MHz, and Switch (122) reprogrammed to change radio navigation frequencies between NDB and VOR Stations.

18. Armament

The aircraft has two 23-mm guns and one 37-mm gun located in the lower forward fuselage.

The guns can be electro-pneumatically charged by push buttons (37, 38 and 39 located at the forward left-side of the cabin) after master power switches (93, 94) have been turned on.

The lights (3, 4 and 5 located below the main instrument panel) indicate when the guns are charged.

The gun triggers are located on the control stick (Figure 11).

The gun sight is operated and functions in the same manner as the K-14 gyro lead computing gun sight. The sight is turned on by a switch (91) located on the right console.

19. Remote Indicating Compass (DGMK)

The aircraft is equipped with a remote indicating compass (60) which is turned on by switch (87) located on the right console.

When the knob (69) is turned to the desired heading at the top of the instrument, it is only necessary to turn the aircraft so the indicator aligns itself with the desired heading.

This system is gyro synchronized and may be used as a directional gyro. It may be necessary, when starting the system, to push the synchronizing push button (67).

SECTION III
OPERATING PROCEDURE

1. Select an aircraft that has been observed to have been completely serviced with fuel, oxygen, and air. In addition a parachute or equivalent size cushion will be necessary for the bucket seat in the airplane. An oxygen mask may be stored in the aircraft. However, its presence may not be assured.
2. If possible, obtain and connect an external power source (GPU).
3. Before entering the cockpit make certain that the external locks, chocks, nose and dust covers have been removed. Note position of elevator and aileron trim tabs.
4. Enter the aircraft from the left side by use of a ladder or from the wing. Pull the seat ejection safety pin, located in the top of the ejection gun, at rear of the headrest.
5. Turn all switches to the off position (aft). Place the throttle (16) in the closed (full aft) position. Place the high pressure fuel valve (11) in the off position (up). Unlock the control column. (The lock is located at the base of the column).
6. Turn master trim tab switch (97) at (forward) and place elevator tab in neutral, using rocker lever (130) until light (131) comes on. Set aileron trim tab to neutral, using switch (20). Visual check tab position.
7. To start the engine:
 - a. Turn the following switches:
 - (1) Engine instruments (29)
 - (2) Ignition isolator (28)
 - (3) Rear (Aft) tank transfer pump (32)
 - (4) Boost pump for Start and Engine Running (30)
 - (5) If a starting cart is not used, one attempt at starting can be made with use of the aircraft's battery, by placing the battery switch (84) and the generator switch (85) in the on position.
 - b. After the fuel pressure warning light. (70) Goes out, press the starting button (17) and hold for about 10 seconds.

After a period of approximately 10 seconds, when the engine rpm is between 800 and 1000, start opening the high-pressure fuel valve (11) by slowly pressing it down. As the engine accelerates, open the high-pressure fuel valve to the full down position.

The engine will automatically accelerate to an idling speed approximately 2500 rpm (the re-light warning light (59) will be on during the automatic starting cycle; however, it will automatically go out in the completion of the cycle, if it always on when engine running, turn off ignition isolate switch.)
8. Turn on the battery switch (84) and the generator switch (85) and disconnect the battery cart, if used.

9. Take off

- a. The highest rpm and tail pipe temperature for take-off should be 11,500 rpm and 660 degrees centigrade.
- b. Raise the nose at 160 km/hr.
- c. Aircraft leaves the ground at 227 km/hr without flaps or wing tanks.
- d. Retract landing gear.

10. Re-light in the Air

The best altitude for re-starting the engine in the air is between 1800 meters and 5400 meters. The standard procedure is as follows:

- a. Throttle lever closed.
- b. High-pressure fuel valve closed.
- c. Dive to 4000 meters altitude.
- d. Decrease air speed to between 300 and 320 km/hr. Engine rpm will be approximately 800 - 1000.
- e. Switch for radio off.
- f. Re-light switch (27) on.
- g. Re-light switch warning light (59) will be on.
- h. After 10 to 15 seconds smoothly opens the high-pressure fuel valve. Jet pipe temperature and increasing rpm should be watched to see whether the start is successfully.
- i. After the engine starts the re-light switch (27) is placed in the off position.

11. Cruise

CROUSE (CONSTANT ALTITUDE)

<u>Altitude (feet)</u>	<u>Indicated Air Speed (km/hr)</u>	<u>Approximate PPH</u>	<u>Range (nmiles)</u>
SL	565-620	8,500-9,000	220
15,000	505-535	9,000	340
25,000	435-460	9,200	440
35,000	460-485	9,800	530
40,000	415-430	10,000	580
45,000	370-380	10,500	630

12. Landing

Approach - FULL flaps (55°) and gear down.

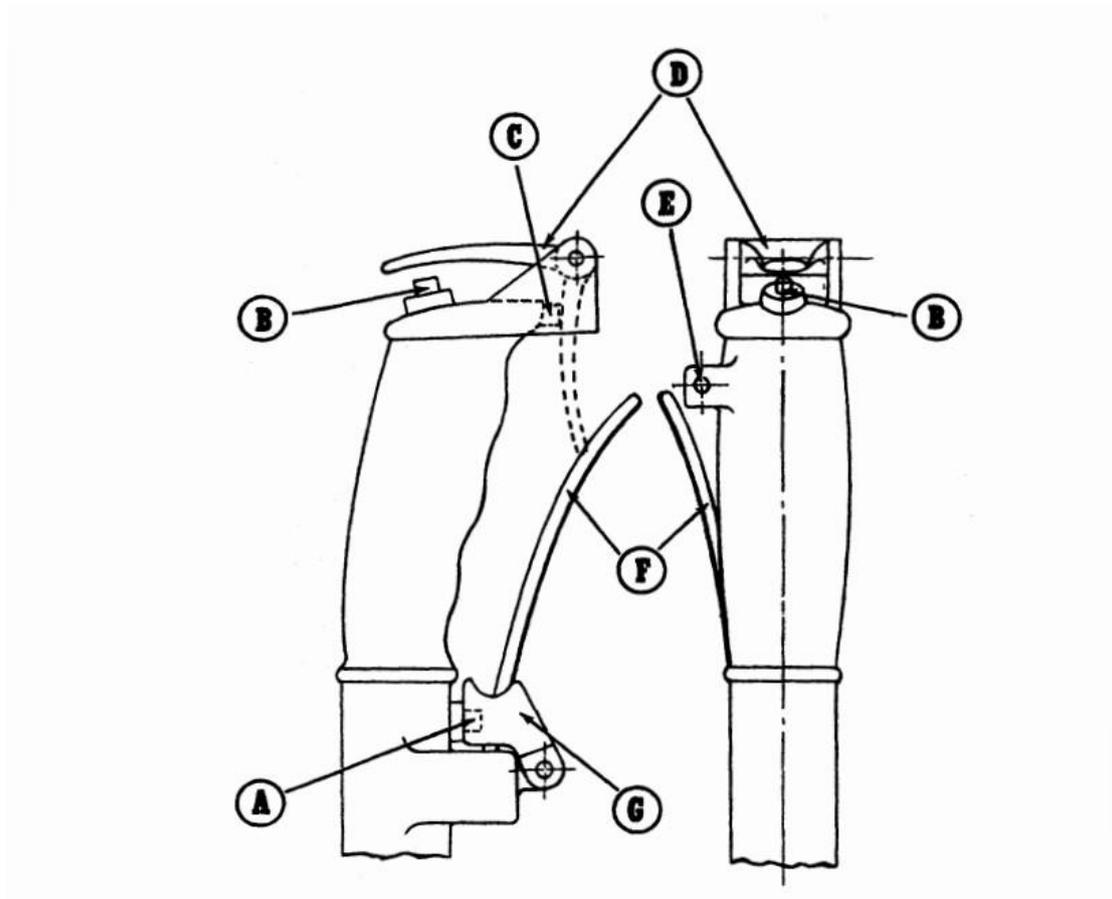
Last turn is made at 300 km/hr.

Final at 250 km/hr.

Engine speed 6-7000 rpm, fuel pressure 5 atmospheres.

Touch down at 172 km/h

(In Simulation, when aircraft carry drop tanks with fuel quantity loaded, may use elevator trim to keep aircraft nose level or slight up for cruise flight. When drop tank jettisoned or empty, it may need adjust elevator trim for level flight.)



- A. Bomb Release Button
- B. Firing Button for 37-mm Gun
- C. Release Button for Firing 23-mm Guns
And it operated by D
- D. Combined "Trigger" for Firing 37-mm Gun
And Safety Lever.
- E. Speed Brake "Blipping" Button
- F. Wheel Brake Operating Lever
- G. Safety Guard for bomb release button

Fig 11 Control Stick

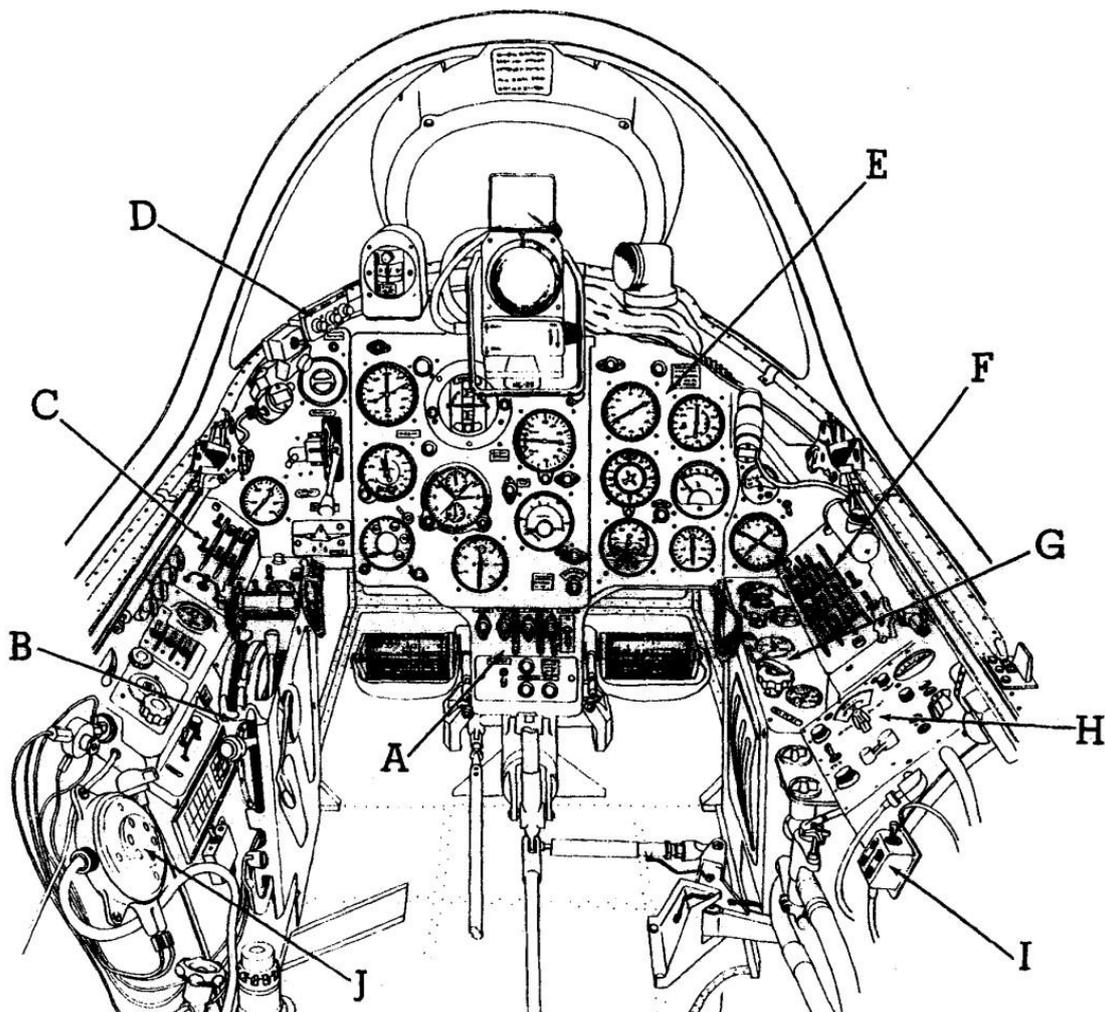


Fig 12 MiG-15Bis (VK-I) Cabin Layout



1. Bomb Fuse Switch
2. Wing tank (Drop Tank) Empty Light (Green for Drop tanks empty or released)
3. 23-mm Gun Reload Indicator Light (Red for Gun Ammo Charged and Gun Cocked)
4. 23-mm Gun Reload Indicator Light (Red for Gun Ammo Charged and Gun Cocked)
5. 37-mm Gun Reload Indicator Light (Red for Gun Ammo Charged and Gun Cocked)
6. Drop Tank Signal Light On/Off Switch.
7. Drop Tank/Bomb Emergency Release (Jettison) Button with Safety Cover.
8. Bomb Pylon Cocked and Selected Indicate Light (Green, Right Wing)
9. Bomb Fuse Light (Red)
10. Bomb Pylon Cocked and Selected Indicate Light (Green, Left Wing)

Fig 12 Cabin Layout - Detail A (Weapon Panel)



11. Fuel Cock lever (Fuel High Pressure Valve, Up: Close, Down: Open)
12. Throttle Friction Lever (Not functional in simulation)
13. Flaps Lever
14. Hydro Booster Switch
15. Engine Ground Start Button with Safety Cover
16. Throttle Lever with Gun sight Range Selector Knob
17. Push to Talk Button for RSI-6M Radio Transmit
18. Gear Emergency Extend Handle (Left)
19. Booster Hydraulic Gauge
20. Aileron Trim Rocker Switch
21. Fire Warning Light
22. Fire Extinguisher Button with Safety Cover
23. Fire Warn Light Test Button

Fig 12 Cabin Layout - Detail B (Left Side Console)



- 24. RSI-6M Radio Remote Control Panel DU-6
"H" Knob for Switch Mode Between Band Setting and Band Change.
"L" Knob for Change Band Using by RSI-6M Radio.(Band Setting Via Integrated Knee Board)
- 25. Radio Frequencies Display Panel
- 26. Brake Pressure Gauge
- 27. Engine Re-Light (Air Restart) Switch
- 28. Ignition Isolator (Master Ignition) Switch
- 29. Engine Instruments Switch (Also Control Left Console Light On/Off)
- 30. Booster Pump Switch (For Engine Start, Turn On and Leave this Switch On)
- 31. Isolating Valve Lamp (Green)
- 32. Aft Tank Booster Pump Switch (For Transfer Fuel from Rear Fuel Tank to Main Fuel Tank)
- 33. Isolating Valve Switch
- 34. Air Brake indicator Light (Green, When Air Brake "Open", Light "On")
- 35. Air Brake Operation Toggle Switch
- 129. Cabin Flood Light Knob (Left Side)

Fig 12 Cabin Layout - Detail C (Left Side Panel)



- 36. Radio Beacon FAR-NEAR Switch
- 37. Gun Charge (Cocking) Button 23-mm (Outer)
- 38. Gun Charge (Cocking) Button 23-mm (Inner)
- 39. Gun Charge (Cocking) Button 37-mm
- 130. Elevator Trim Rocker Lever
(Pull After for Nose Trim Up, Push Forward for Nose Trim Down)
- 131. Elevator Trim Neutral Position Indicating Light
(White, when Elevator Trim Neutral or Trim Power Switch Reset, turns "On")
- 132. Navigation Light Switch

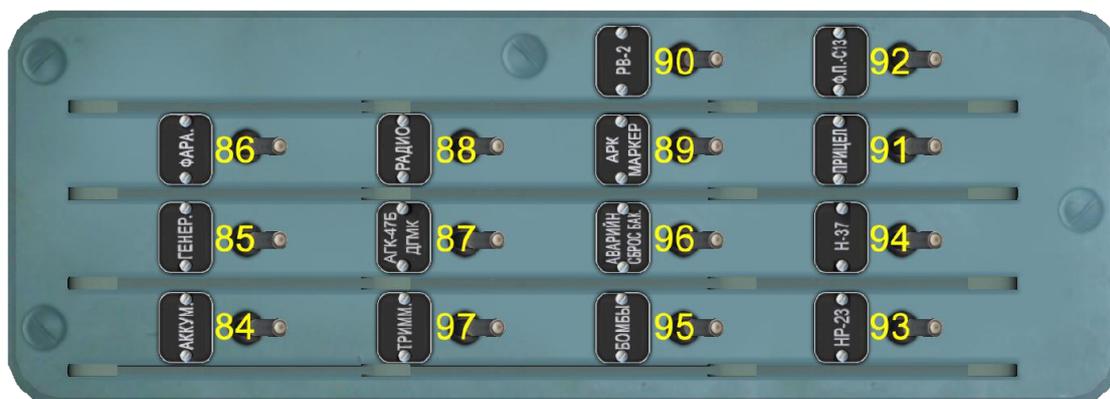
Fig 12 Cabin Layout - Detail D (Left Forward Panels)



40. Landing Lamp (Head Light) Switch
41. Oxygen Cylinder Pressure and Flow Indicator
42. Flap Indicator Light (Green, "On" When Flaps Extended to 55°)
43. Altimeter Barometric Setting Knob
44. Altimeter
45. Air Speed Indicator (Thin Needle for True Airspeed, Wide Needle for Indicate Airspeed)
46. Backup Magnetic Compass
47. M0.92 Red Warning Light (Turn "On" when Aircraft Mach Exceed Mach 0.92)
48. Configuration Warning Light Gear Not Down (Red, when Flaps Extended and Gear Up)
49. Adjustment Knob for ADI Bar Position
50. AGI-1 ADI Combined Attitude and Turn Indicator
51. Caging Knob for ADI Gyro
52. Generator Warning Light (Red, when Engine Off or Generator Off Line)
53. Turn Bank Indicator
54. Rate of Climb (Vertical Speed) Indicator
55. Fuel Warning Light (Red, Turn "On", when Main Fuel Tank Less than 300 Liter)
56. Gun Camera Indicator Light (White, when Gun Camera Power Up or then Press Gun Trigger)
57. Marker Beacon Indicator Light (Red)
58. Indicator for the Radio Compass Receiver (ADF Indicator, ARK-5 Radio Navigation System)
59. Warning Light for Engine Re-light Switch
(Turn "On" when Engine Running and Master Ignition Switch still On exceed 10 sec)
60. Gyro Magnetic Compass (DGMK) Indicator
(Aircraft Symbol for Aircraft Heading, Scale Ring for Desired Heading Adjust via 69)
61. Engine RPM Indicator
62. Jet Pipe (Engine Exhaust) Temperature
63. Volt Ammeter (Press Button on Gauge to display Volt or Ampere on Main Bus)
64. Pitot Tube and Clock Heater Switch (Using to heat in Cold Weather Flight)
65. Cockpit Differential Pressure and Cabin Altimeter Indicator
66. Fuel Pressure Gauge
67. Gyro Magnetic Compass Synchronizing Push Button (Push to Reset DGMK Gyro Drift Error)
68. Engine Gauge Unit (EMI-3K, Indicate Oil Temperature, Oil Pressure and Fuel Pressure)
69. Gyro Magnetic Compass (DGMK) Scale Adjust Knob
(Select Desired Heading, usually Runway Heading to Take Off or Landing)
70. Low Fuel Pressure Warning Light (Red)
71. Signal Light (Green) for Rear (Aft) Fuel Tank Booster Pump Out or Fuel Tank Empty
72. Fuel Quantity Gauge (Indicator Fuel Quantity Less than 1050 Liter in Main Fuel Tank)
73. AChS-1 Clock Right Crown Button (Press to Start /Stop /Reset Flight Time Record)
74. AChS-1 Clock Light Crown Button (Press to Start /Stop /Reset Stop Watch)
75. Range Switch (Radio Altimeter, Switch Between 0-120 Meters and 0-1200 Meters Scale)
76. Indicating Meter for Radio Altimeter RV-2
77. On/Off Switch (Radio Altimeter)
78. AChS-1 Cockpit Chronograph
(Clock, Main panel for Current Time, Up Panel for Flight Time, Down panel for Stop Watch)
79. Landing Gear Indicator (Red, Gear Retracted Up, Green Gear Extended Down and Locked)

- 80. Air Ventilation Outlet Control Lever (Open to Emergency Cabin Depressurization)
- 81. Blank Gauge Position (Oxygen Cylinder Pressure Gauge replaced by Combined Gauge on 41)
- 82. Gear Handle Lever (Middle Position for Neutral)
- 83. Gear Handle Safety Lock Lever (Lock Gear Handle when Aircraft Rest on Ground)

Fig 12 Cabin Layout - Detail E (Main Instruments Panel)



- 84. Master Battery Switch
- 85. Generator Master Switch
- 86. Landing Lamp Bus Switch (Head Light Power Bus, Also Control Right Console Light On/Off)
- 87. AGI-1 and DGMK Gyro Power Switch
- 88. Radio Transmitter Receiver (RSI-6M) Power Switch
- 89. ARK-5 Marker Power Switch (Radio Compass, ADF)
- 90. RV-2 Radio Altimeter Power Switch
- 91. Gun Sight Power Switch (To Start ASP-3N Gyro Gun Sight, Switch On and wait 30 Sec)
- 92. Gun Camera Power Switch (To Start and Heat S-13 Gun Camera, Switch On and wait 30 Sec)
- 93. Master Power Switch for 23-mm Guns (On for Allow Pilot Charging and Firing Guns)
- 94. Master Power Switch for 37-mm Gun (On for Allow Pilot Charging and Firing Guns)
- 95. Bomb Release Arm Switch (On for Allow Pilot Arming, Jettison or Release Bombs)
- 96. Drop Tank Release Arm Switch (On for Allow Pilot Arming and Jettison Drop Tanks)
- 97. Trim Master Power Switch (On for Elevator and Aileron Trims Operational, Off for Reset)

Fig 12 Cabin Layout - Detail F (Right Side Panel)



- 98. Emergency Gear Extend Pneumatic Air Pressure Gauge
- 99. Gear Emergency Extend Valve with Safety Cover
- 100. Main Hydraulic Pressure Gauge
- 101. Emergency Flaps Extend Pneumatic Air Pressure Gauge
- 102. Flaps Emergency Extend Valve with Safety Cover
- 103. Main Pneumatic Air Pressure Gauge
- 18. Gear Emergency Extend Handle (Right)

Fig 12 Cabin Layout - Detail G (Right Side Console)



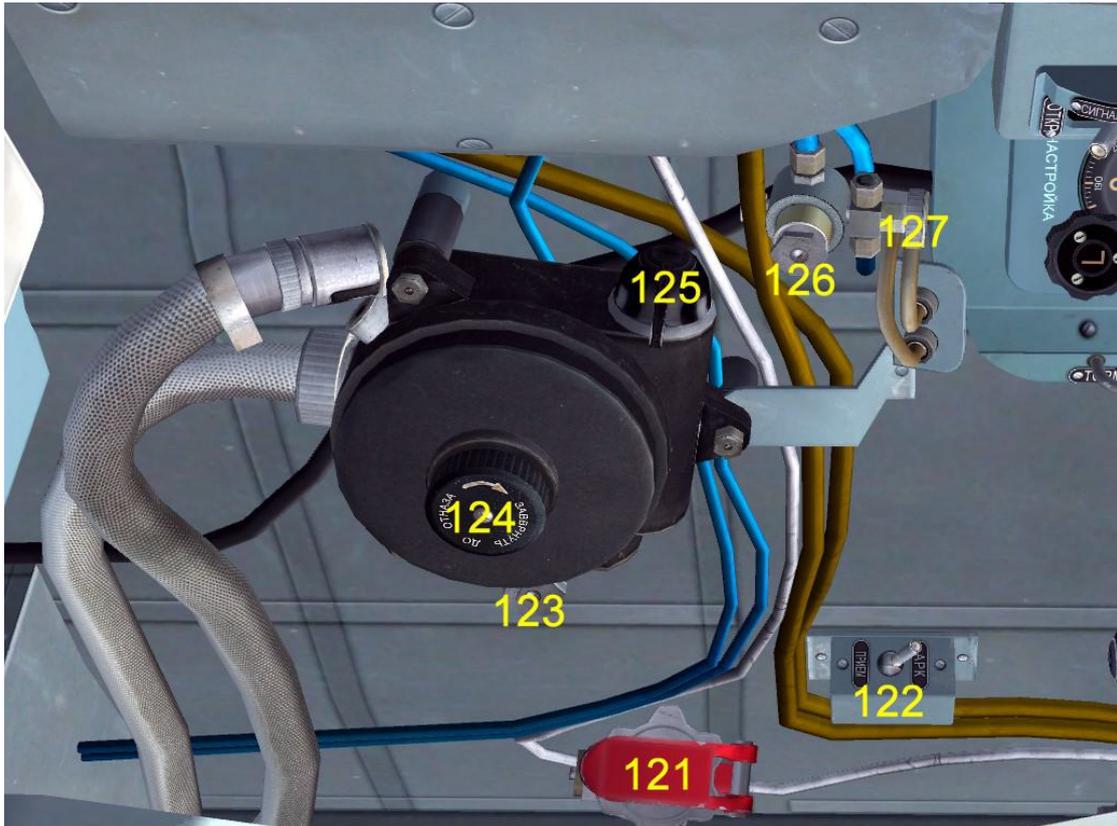
- 106. BFO Relay (On/Off) Switch, Up position for Turn on ADF Signal Audio
MSFS 2020 Function Changes: Switch On to receive Com1 frequency and find direction from coupled active radio com station
- 108. ADF Frequency Turning Crank, Rotate to turn ADF frequency after select proper band
- 109. ARK-5 Remote Control Box "On" Indicator Lamp
- 110. ARK-5 Function Knob , Left to Right: 1st=Off, 2nd=On, 3rd=Receive Signal only, 4th= receive from Ring Antenna Manually for Test.
- 111. Control Button (Press to Change ADF Channel in Simulation)
- 112. ADF Signal Indicator Needle Adjust Knob
- 113. ADF Antenna Test Spring Rocker , Left or Right to rotate ring antenna manually
- 114. Indicator Meter for Beacon Station Signal Strength
- 115. Volume Control Knob (For Beacon Marker Audio Sound On/Off in Simulation)
MSFS 2020 Function Changes: Potentiometer Volume Control by press hold and drag knob
- 116. Light Intensity Control Knob (For ARK-5 Frequency and Signal Meter Back Light On/Off)
MSFS 2020 Function Changes: Potentiometer Dimmer Control
- 117. Band Change Selector Knob
- 118. Frequency Dial Window

Fig 12 Cabin Layout - Detail H (Radio Compass ARK-5 Remote Control Box K-7)



- 104. Transponder Code Input Knob
- 105. Transponder Code Input Position Selector Button
- 107. SOV-2 IFF Transponder Test Code Switch (Switch on for set Code 7700 into Transponder)
- 119. Transponder Code Indicator
- 120. SOV-2 Reset Switch with Safety Cover (Open Cover, Switch On for set VFR Code 1200)

Fig 12 Cabin Layout - Detail I (SOV-2 IFF Transponder Control Box)



121. Oxygen Supply Valve with Safety Cover

122. ADF (ARK) / HF Radio Receiver Switch

(In Simulation, Select Current Navigation Radio Beacon Marker between NDB and VOR)

123. Oxygen Pure or Mixture Valve

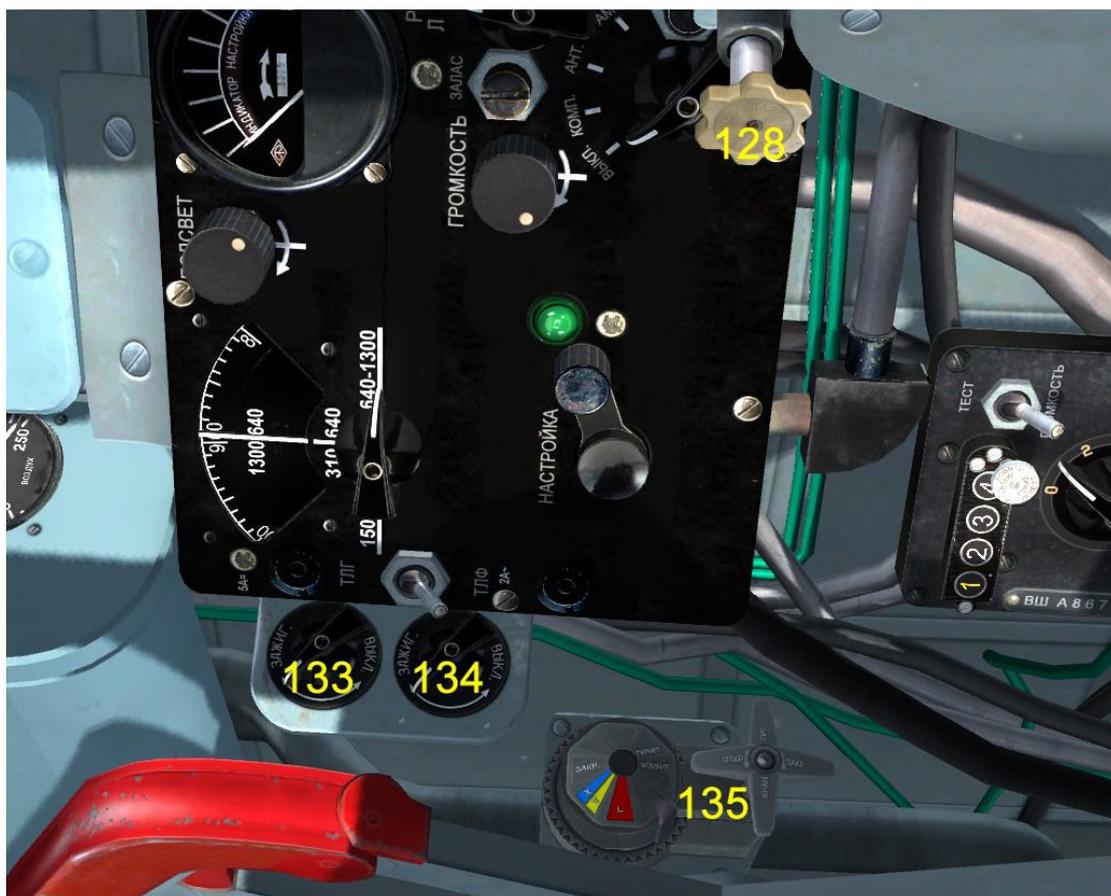
124. Mask Connector Hose Cover

125. Oxygen Diluter Valve Lever

126. Oxygen Relief Valve

127. Emergency Oxygen Supply Valve

Fig 12 Cabin Layout - Detail J (Oxygen Regular and Diluter)



128. Emergency Pneumatic Air Charging Valve

133. Gauge Light Knob (UV Back Light)

MSFS 2020 Function Changes: Potentiometer Dimmer Control

134. Cabin Flood Light Knob (Right Side)

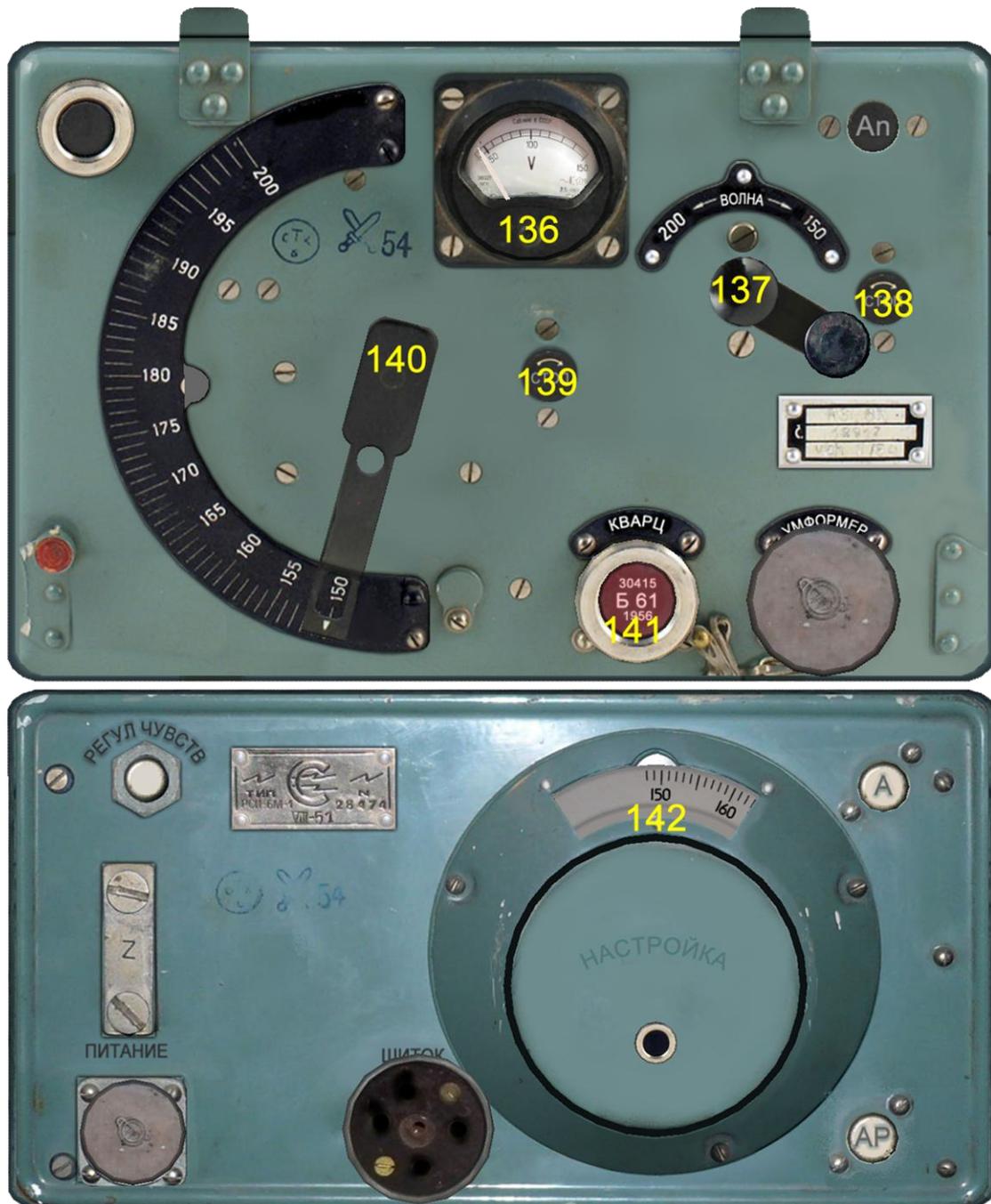
MSFS 2020 Function Changes: Potentiometer Dimmer Control

135. Cockpit Air Supply Valve with Indicator

(Bleed Air from Engine, Only 4 Positions in Simulation)

MSFS has Only 2 position under current main and SDK versions

Fig 12 Cabin Layout - Detail K (Air Supply and Emergency Pneumatic System)



- 136. RSI-6K Transmitter Signal Strength Meter
- 137. RSI-6K Antenna Tuning Knob
- 138. Antenna Tuning Lock
- 139. Transmitter Wave Band Lock
- 140. Transmitter Wave Band Knob
- 141. Socket for Crystal Plug Tube
- 142. RSI-6M Receiver Wave Band Indicator Window

Fig 12 Cabin Layout - Detail L (RSI-6K Radio Transmitter and RSI-6M Receiver)

SECTION IV COMBAT FLIGHT PROCEDURE

Notice: MSFS 2020 now has SDK and Main Version Functions Limitation for living weapons , No gun firing and payload jettison and firing effects.

1. Lockheed Martin Prepar3D Professional and VR Simulation TacPack

According to difference between Flight Simulation Platforms (Microsoft Flight Simulator X, Lockheed Martin Prepar3D), Bear Studios MiG-15Bis supports:

a. Perpar3D Professional Version's Native Weapon System. On this platform, MiG-15bis has actual weapons model and setting.

b. VR Simulation TacPack installed on Lockheed Martin Prepar3D Academic Version, or Microsoft Flight Simulator X.

Notice:

Please Read VR Simulation TacPack's Documents for how to install and setup on FSX and P3D, In normal conditions, keep default setup from VRS official manuals.

VRS TacPack has support weapon defines and models from its native list, in current version, has no Russian weapons supported yet.

So MiG-15Bis use GAU-8 and M61-A2 guns which set to actual fire rate and bullet ballistic as N-37 and NS-23 guns.

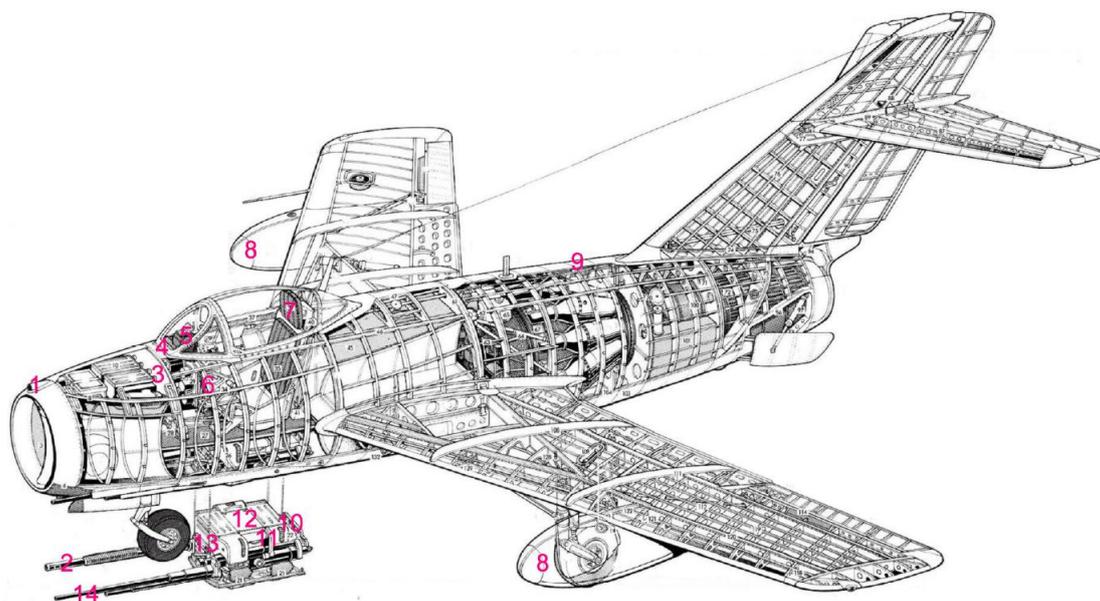
Presents AN-M64-A1 bomb as OFAB-100 bomb, F86_Tank as PTB-400 drop tank.

c. Bear Studios MiG-15Bis internal program judgments flight simulation platforms automatically, when it detected no any weapon system available, this mod works on **Basic Combat Simulating** condition.

It means no living fire and actual damage affect on target, but target acquire, aiming, weapons arming, charging, firing or release/jettison have same operation sequences.

Pilots can chase target, trigger gun camera to take screenshots on it, as combat training in real world military flight.

2. Weapon System on MiG-15Bis



1. S-13 Gun Camera
2. N-37D Gun
3. Armored Plate on Frame No. 4
4. Armored Canopy Wind Screen
5. ASP-3N Gun Sight
6. Fire Control Buttons on Stick
7. Armored Headrest
8. Bomb /Drop Tank Racks
9. Signal Flare Launcher (4 Signal Flare Shot for Different Colors)
10. Gun Carriage
11. NS-23 Gun Ammunition Box
12. N-37D Gun Ammunition Box
13. Armored Plate on Frame No. 5
14. NS-23 Guns

Fig 13 Weapon System - Detail M (Weapon System)

3. Gun Cocking, Reloading and Firing

a. Make sure the gun sight power switch (91) and gun master power switches (93, 94) are turned ON. The gun camera power switch (92) is optional.

b. Make sure guns are loaded by checking the reload lights (3, 4 and 5). The lights should be illuminated in red. The guns are armed by pressing the gun reload buttons (37, 38 and 39) for 3 - 4 seconds

c. Open 37-mm gun safety cover forward to make both 37-mm and 23-mm guns trigger operational.

d. Set target wingspan as required (11 m for F-86 Saber, as a typical) on gun sight, using the twist grip on the throttle input target range.

e. for the target range and the target wingspan setting control

f. for the target's wingspan.

g. Set gun sight to gyro mode (gun sight cage lever Up) when you have the target in sight. Otherwise, keep gun sight mode set to fixed mode (Down).

h. Fire when ready by pressing the trigger (Please see integrated kneeboard's checklist pages for default keyboard and stick button defines)

i. To reset guns rounds quantity when all rounds fired, turn off gun master power switches (93, 94), then press gun fire triggers defined on keyboard or buttons on flight stick one time. Check the integrated kneeboard's aircraft payload configuration page.

4. Payload Arming, Jettison and Release:

a. Normal dive bombing (from 2000 m @ 40 ° dive)

b. Set gun sight mode to fixed position, or raise mechanical corsair (gyro caged, gun sight cage lever Down, or iron corsair lever Up)

c. Set bomb release arming switch (95) to On (Forward position).

d. Active bomb fuse using the bomb fuse switch On (1, Up position). So the tactical release indicate light (bomb fuse active light, 9) and two green lights (bomb pylon cocking and selecting lights 8, 10) illuminated, confirming that the bombs are loaded and armed.

- e. Deploy airbrakes and set engine RPM to 6000 or less.
- f. Start a 40°-50° dive.
- g. Release bomb using the weapons release button at 800-1200 m. Use the lower line of the gun sight as an aiming reference.
- h. Drop tanks release or bomb emergency jettison.
- j. for release drop tanks, turn on the drop tank release arm (96) to On (Forward position).

for jettison bombs, set bomb release arming switch (95) to On (Forward position) and set bomb fuse switch Off (1, down position), check tactical release indicate light turns Off (bomb fuse active light, 9)

k. Flip the bomb /drop tank emergency release button (7) safety cover up, then press the emergency release button under safety cover to jettison payloads.

l. To reset payloads quantity when released, turn off drop tank release arm (96) and bomb release arming switch (95), then press bomb/ drop tank release button defined on keyboard or on flight stick one time. Check the integrated kneeboard's aircraft payload configuration page.

Notice: Under simulation limited, when drop tanks jettisoned, reset drop tank payload can not restore fuel quantity in drop tanks. It just reloads drop tanks models back to aircraft model.



Fig 13 Weapon System - Detail N (Guns and Weapons Preparing Related Equipments)

5. Signal Flare Shot Fire:

Notice: MSFS 2020 now has SDK and Main Version Functions Limitation for living weapons , Signal Flares has no firing animation and visual effects.

The Signal Flare Dispenser Unit consists of the signal flare shot cartridges, which installed on the right side of the after part of the fuselage, the signal flare remote control on the cockpit left vertical console.

The cartridge is designed to be loaded with 4 signal flares shots using electrical pyrotechnical charges. Flares can be launched with the signal flare remote control:

To launch a flare, it is necessary to set the Signal Rockets Switch (A) in the On (Forward position) position, and then press the flare launch buttons (B to E) with the desired flare color.

When in external view, firing signal flares as steps below:

- a. Using Shift+Q for Signal Rockets Switch turns to On position
- b. Press Ctrl+A to launch signal flare sequence from Yellow (B) to White (E), or Press Ctrl+1 for firing Yellow shot, press Ctrl+2 for Green, Ctrl+3 for Red, and to press Ctrl+4 for White one.
- c. If it has necessary to reload/reset signal flare shots, turn off Signal Rocket Switch, then, press Ctrl+A one time to reset flare quantity.



- A. Signal Rockets (Flare Power) Switch (Shift+Q)
 - B. Yellow Flare Shot Firing Button (Ctrl+1)
 - C. Green Flare Shot Firing Button (Ctrl+2)
 - D. Red Flare Shot Firing Button (Ctrl+3)
 - E. White Flare Shot Firing Button (Ctrl+4)
- Launch Signal Flares sequence in external view (Ctrl+A)

Fig 13 Weapon System - Detail O (Signal Flares Launcher and Control Box)

6. Gyro Gun Sight



1. Reticule Reflector Glass
 2. Sun Glare Glass and Raise Lever
 3. Mechanical Backup Corsair
 4. Target Wing Span Selector Knob (**Adjust by press hold and drag knob**)
 5. Gun Sight Reticule Brightness Knob
- MSFS 2020 Function Changes: Potentiometer Dimmer Control by press hold and drag knob**
6. Gun Sight Gyro Cage Lever
 7. Target Range Scale
 8. Target Range Adjust Knob (**Adjust by press hold and drag knob**)

Fig 13 Weapon System - Detail P (ASP-3N Gyro Gun Sight)

7. Gun Camera

The S-13 gun camera, installed in the upper nose part of the fuselage, is used to control the results and the effectiveness of shooting.

The gun camera system consists of the S-13 gun camera itself and the Gun sight power switch (92) on the right electrical panel.

The gun camera is enabled while pressing any of the two gun triggers.

Camera operation is indicated by the gun camera indicate light (56), on the main instrument panel, which illuminates when gun camera power up, then if any of the two gun triggers is pressed.

Notice: In simulation, gun camera take screen shot pictures every 0.5 second, when press triggers, and stores into flight simulator (Flight Simulator X Files, or Prepar3D vX folder) which located in user document's picture folder.



Fig 14 MSFS Gyro Gun Sight View Setting

MSFS 2020 Function Changes: In case of MSFS 2020 changed the eye point control method in view/camera, and can not support texture define for create collimation gun sight now, so it only display gun sight reticule in HUD sub mode.

8. Air to Air Combat



Gyro Off, Fixed Corsair,
Adjust Target Wing Span

Gyro On, Chase for Leading
Angle

D=Max, Computing Leading
Angle in Turning



Adjust Range Scale to Keep
Target Frame in Reticule

D=Min, Shoot or Break Off

Mechanical Corsair Up when
Gyro Failure for Last Chance

Fig 14-1 Combat Pattern Detail Q (Air to Air Shooting Via Gyro Gun Sight)

9. Air to Surface Strike

Notice: MSFS 2020 now has SDK and Main Version Functions Limitation for living weapons , Bomb and Drop Tanks has Drop animation.

MiG-15 can attack ground target using OFAB Bombs and Guns. When rolling in ground strike course, make sure the air to ground weapons working on proper mode:

- a. Bomb release arming switch (95) On, Bomb fuse switch On (1, Up position).
- b. Set gun sight mode to fixed position, or using mechanical corsair. (For VRS TacPack, this mode switch to acquire surface target on ground or sea from acquire targets in air)
- c. Dive bombing @ 40 °, aiming target using gun sight's reticule reflector glass bottom.
- d. Shoot ground target, aiming using mechanical corsair or fixed Reticule (no lead angle and range computing to ground target)

SECTION V

RADIO, BEACON MARKER and TRANSPONDER

1, RSI-6M Radio Transmitter and Receiver.

RSI-6M Radio Receiver and RSI-6K Radio Transmitter on MiG-15Bis have no direct frequency input method, they are using 50 band in a certain wave range depend on crystal plug into radio as early military radios during WW2 and 1950s. So, in simulation, this MiG-15Bis mod keep RSI-6 system's operating functions, add radio frequency setting and display methods for it.

To set frequency to a selected band, there are 2 ways:

- a. Receive ATC command and change current active com1 frequency automatically.
- b. Using Radio Frequency Setting Page in Integrated Kneeboard (Fig 15 Integrated Kneeboard Detail T).

When using this method, "H" knob on RSI-6's remote control box (24) must on Band Setting position (Disable Com1 Receive Function), this is default position before using RSI-6 system.

Then, Open Integrated Kneeboard Page, Press the Radio Setting button enters the certain page. Now, all the radio stations frequencies within 50 nmiles from your current position listed on the page by select different airport ICAO code.

Moving Frequency Selector Up or Down, bring selected frequency into Active Frequency window.

Then, moving Band Selector Up or Down to set a band number (max number up to 50) for setting the selected frequency, the certain band selected now write that selected frequency.

Select other frequency and another band number, until all bands has frequency write into.

If it necessary to reset frequency in certain band number, select this band number, and press CLR button to clean it's frequency, then select the proper frequency for re-writing into it.

c. When Frequency-Band Setting finished, whether before flight or in flight, Rotate "H" knob to RSI-6M Receiver's Band Change Position, this radio is ready to working on different Bands with Frequencies. (Also Enable Com1 Receive Function).

Rotate "L" knob on RSI-6's remote control box (24) to change different band for RSI-6M, current band number indicated on both Band Dial (24) , RSI-6M Receiver Wave Band Indicator Window (142), Wave Band Scale on RSI-6K transmitter panel and Radio Frequencies Display Panel (25)

If it has necessary to lock current band, press Transmitter Wave Band Lock (139) on RSI-6K Transmitter Panel at pilot's right back corner.

2. ARK-5 Radio Compass and Beacon Marker

MiG-15Bis has radio navigation system ARK-5 radio compass (ADF), this system include:

- * SUP-7 Indicator for Radio Compass (58)
- * K-7 Control Box (Fig 12, Detail H)
- * MRP-48P Marker Beacon Indicator Light (57) with audio buzzer
- * Radio Beacon FAR-NEAR Switch (36)
- * ADF (ARK) / HF Radio Receiver Switch (122)

In simulation, NDB stations only have 2 types include beacon stations for directional, terminal marker for airfield's ILS system. It can not support difference ranges.

So this MiG-15 mod regards directional beacon station as normal beacon marker, ADF1 for

Far station, ADF2 for Near station. Pilot can change current ADF channels to simulate FAR-NEAR dual station radio navigation, whether the turned beacon station coupled to airfield or not.

According to terminal marker (Outer, Middle, Inner marker) stations installed with ILS system, can not using for dual station mode with their own frequency, so MiG-15Bis mod regard VOR stations as 2 or 3 ranges beacon stations for directional navigation.

When set proper frequency via Integrated Kneeboard's Navigation Frequency Setting page, or through Radio Frequency Display Panel (25), turn the ADF-NAV Signal Switch (122) to Rear position, the MRP-48 marker beacon indicator light and SUP-7 radio compass indicator working with VOR signal.

On this mode, the radio compass still can support dual station navigation via switch FAR-NEAR Switch; the Turning Meter (114) indicates signal strength

To input or set proper frequency to ADF or NAV channels:

a. Dial ADF frequency on K-7 control box:

When ADF (ARK) / HF Radio Receiver Switch (122) to Forward position,
Radio Beacon FAR-NEAR Switch (36) on Right position,
ARK-5 Marker Power Switch (89) on Forward position,
ARK-5 Function Knob rotates to 2nd position.

Rotate Band Change Selector Knob (117) to set proper frequency band range (150-310 KHz, 610-640 KHz or 640-1300 KHz),

Then rotate ADF Frequency Turning Crank (108) for input proper frequency to ADF1 channel as FAR station.

If it necessary to set Near station frequency, turn Radio Beacon FAR-NEAR Switch (36) on Left position, then follow other same steps above.

b. Set ADF frequency using Navigation Frequency Setting page in a Integrated Kneeboard (Fig 15 Integrated Kneeboard Detail S)

Then Press the Navigation Station Frequency button enters the certain page. Now, all the NDB and VOR stations frequencies within 50 nmiles from your current position listed in ADF list section and TCN list section, with type, distance, related bearing and type.

Moving ADF Frequency Selector Up or Down, bring selected frequency into ADF1 or ADF2 channels, and display in Active Frequency window.

c. When ADF (ARK) / HF Radio Receiver Switch (122) on Rear position, navigation working on NAV mode. To input NAV frequency, Moving NAV Frequency Selector Up or Down, bring selected frequency into NAV1 or NAV2 channels, and display in Active Frequency window.

d. Or, click to change NAV frequency on Radio Frequency Display Panel (25)

3. Set Transponder Code on IFF Control Box

MiG-15Bis has variants with IFF which interrogating and responding, in simulation, the SOV-2 IFF control box reprogramming for transponder code receive, display and setting.

This control box mounted on right of pilot, just behind ARK-5 radio compass's K-7 control box. (Fig 12 Cabin Layout - Detail K)

To using IFF control box as Transponder, Turn On Radio Transmitter Power Switch (88) first. Then, if working on automatic receive mode, just follow change transponder code commands

from ATC dialogue window.

When working on manual code input mode, press Transponder Code Input Position Button (105) to select current code number position to change, and then rotate Transponder Code Input Knob (104) for input code number at this position.

If it necessary, pilot can operate Test Code Switch (107) On for set Code 7700 into Transponder temporary. When pilot using Reset Switch (120) under safety cover to reset code to 1200, ATC command may leave your aircraft within your own flight course under VFR rule.

4. Radio Altimeter RV-2

MiG-15Bis has Radio Altimeter RV-2 to detect and indicate actual aircraft flight height from ground surface. This system helps pilot monitor safe altitude during take off and landing approach stage. The RV-2 radio altimeter has 2 antennas under both wings.

To operate Radio Altimeter, the RV-2 Radio Altimeter Power Switch (90) must be turn On position.

Then, RV-2 indicator gauge's On/Off switch (77) must turn to On, position, pilot may see needle of this gauge begin to move from 0 position, even aircraft rest on ground.

According to different flight mission profiles, operate Range Scale Switch (75) between 0-120 Meters and 0-1200 Meters.

SECTION VI INTERGRATED KNEEBOARD

Integrated Kneeboard is a 2D instrument for help pilot preparing aircraft radio communication, navigation frequency, and refer proper steps follow checklist before and during flight, Press Shift+1 can bring or hide this instrument in interior or exterior views.

Integrated Kneeboard also display a simple navigation chart as GPS map, and aircraft payload status display, which pilot can reset weapon payload quantity and gun ammo during flight.

This instrument also contains ADI reference map from aircraft's official manual to help pilot recognize Russian AGI-1 attitude indicator usage. It is important for pilot have no familiar on early cold war era's Russian aircraft, because Russian ADI has just reverse color pattern from western ADI instruments.

A suggested keyboard define set pages include in Integrated Kneeboard, so if it necessary, pilot can use shortcut keys to operate the instruments and interactive elements in interior (virtual cockpit) or some actions in exterior views.

(Notice: Display Unit Changes automatically when system unit changes, MSFS 2020 has different Keyboard Mapping Method, Most of Keys Mapping on P3D and FSX unusable)

MSFS 2020 Version Changes: The Integrated Kneeboard changed to 3D shape with inactive elements and 2D xml/html display screens merged. It has 2 docking position in Virtual Cockpit

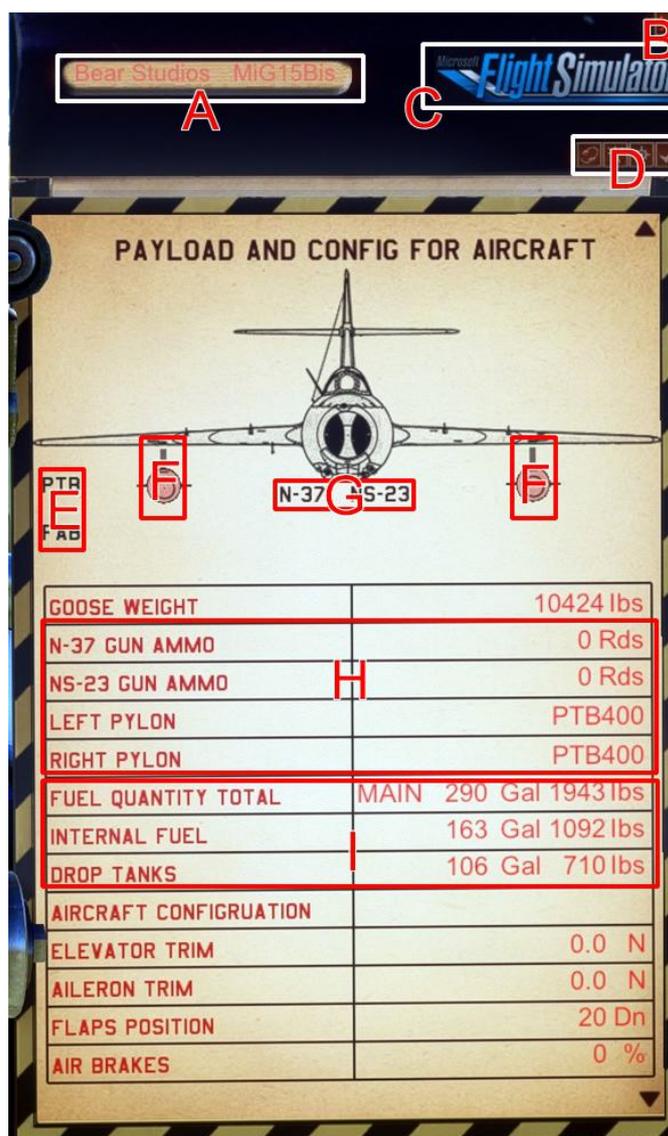


1st Dock Position for MSFS 2020 3D- Integrated Kneeboard, Call Kneeboard Panel on this position, just press the Map Holder at right console side, or press the ADF/NAV Marker Lamp on main panel.

This position usually for Radio or GPS navigation during flight.



**2nd Dock Position for MSFS 2020 3D- Integrated Kneboard, Call Kneboard Panel on this position, just press the Map Holder twice at right console side.
This position usually for RMI-6 Radio Com ADF frequency coupled to band storage or ARK-5 navigation frequency setting to active channel in the pre-flight preparing stage.**



Interactive Elements:

Up and Down Triangle Arrow to switch pages in current section page.

- A. Aircraft Title
- B. Instrument Display/Hide Button
- C. VRS TacPack Powered Logo
- D. Kneeboard Section Pages Buttons

E. Payload Mount Buttons

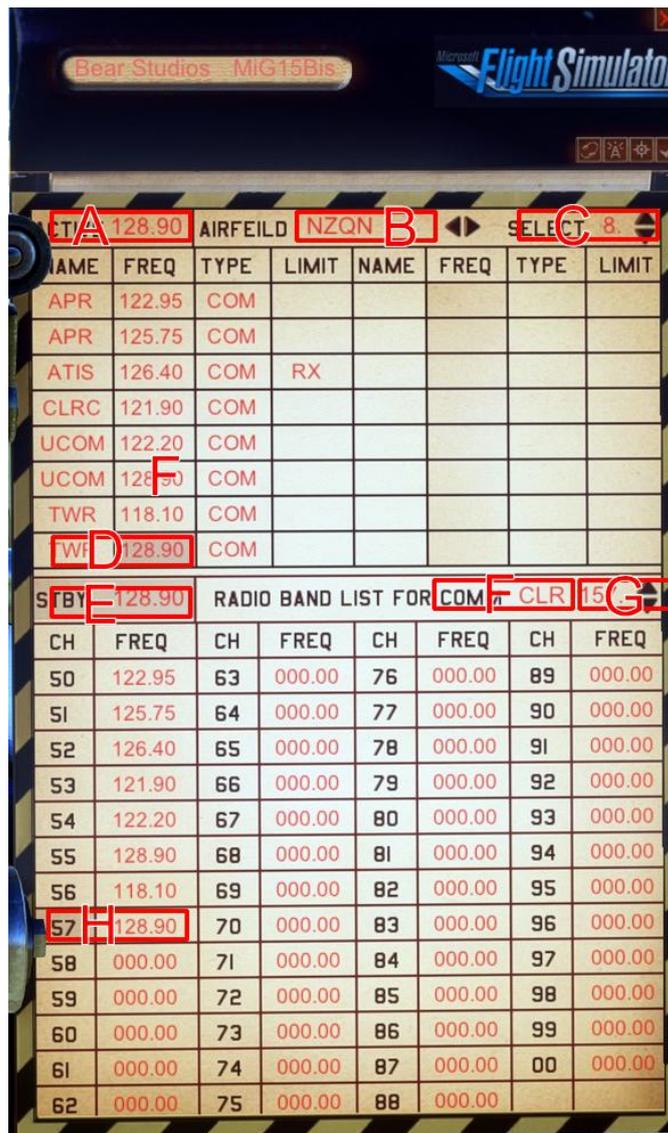
F. Payload Type Symbols

Function:

Display Current Aircraft Title
 Display or Hide Kneeboard when Panel On
 When VRS TacPack installed and operational
 From Left to Right:
 Radio Communication Frequency Page
 Navigation Station Frequency Page
 Navigation Chart Page
 Check List and Reference Page
 PTB: press to mount PTB-400 drop tanks
 FAB: press to mount OFAB-100 bombs
 (Only Living Setting when VRS TacPack installed)
 When Proper payload mounted on aircraft,

	display related symbol.
	In current version, just support 400 liter drop tank (PTB-400) and 100 kg bomb (OFAB-100).
G. Guns reload button	Press to reload gun ammo when all ammo fired and gun power switches turned off
H. Weapon Status Display Lines	Display current weapon mount status.
I. Fuel Quantity Status Display lines	Display Fuel Status: Total Volume and Weight: Fuel on aircraft, include internal fuel tanks, and drop tanks under wings. Internal Fuel: Display Fuel quantity in aircraft's main and rear fuel tanks. Drop Tanks: Display Fuel quantity contains in drop tanks under aircraft wings. (Notice: Limited by simulation, when drop tanks released from aircraft, the fuel quantity in drop tanks also set to zero, when reload drop tanks model back on aircraft, the fuel do not restored as quantity before release.)

Fig 15 Integrated Kneeboard Detail S (Payload and Configuration Page)



Interactive Elements:

- A. Active Frequency for current selected
- B. Airport Selector
- C. Frequency Selector
- D. Frequency Value for Selected Band
- E. Standby Frequency for current Band
- F. CLR Button
- G. Band Selector

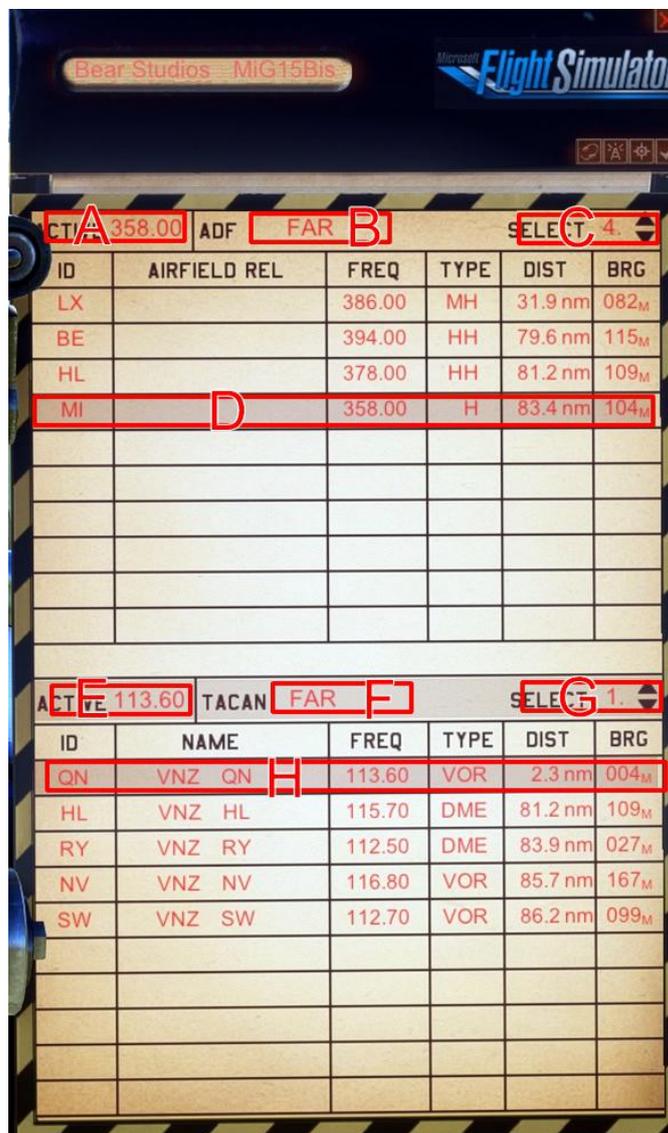
Function:

- Display selected radio frequency from airport's radio stations list with 50 nmiles from current aircraft position.
- Press Left or Right Triangle Arrow button for change current selected airport. Then, the radio station list related to this airport show up.
- Press Up or Down Triangle Arrow button to pick proper frequency from radio station list.
- Display current selected frequency ready to write into band slot which RSI-6 radio can rotate to use.
- Display Frequency from selected Band.
- Press to clean frequency in current selected Band Slot.
- Press Up or Down Triangle Arrow button to

H. Band Slot Number Selected

select Band slot which want to set frequency.
Display current selected Band Slot for set frequency.

Fig 15 Integrated Kneebord Detail T (Radio Communication Frequency Page)



Interactive Elements:

A. ADF Frequency for current selected

B. ADF Far-Near Channel Button

C. ADF Frequency Selector

D. Frequency Value Selected for current ADF Channel

E. NAV Frequency for current selected

Function:

Press to change ADF/HF Mode for Radio Compass using ADF Channels, Display Frequency from selected NDB Station.

Press to switch navigation station between Far (ADF1) or Near (ADF2)

Press Up or Down Triangle Arrow button to select NDB station for navigation.

Display current selected NDB station write into Active ADF Channel

Press to change ADF/HF Mode for Radio

F. NAV Far-Near Channel Button

Compass using NAV Channels, Display Frequency from selected VOR/TCN Station.

G. NAV Frequency Selector

Press to switch navigation station between Far (NAV1) or Near (NAV2)

H. Frequency Value Selected for current NAV Channel

Press Up or Down Triangle Arrow button to select VOR/TCN station for navigation.

Display current selected VOR/TCN station write into Active Navigation Channel

Fig 15 Integrated Kneboard Detail U (Navigation Station Frequency Page)



Fig 15 Integrated Kneboard Detail V (Navigation Chart and Setup Pages)

Map Elements in AS3X touch GPS Screen

- 1, Top Line Readout Line display current coupled destination or waypoint set via GPS code input pages.
- 2, Map Always North Up, the aircraft symbol indicates current aircraft bearing from north. So aircraft heading may plus or minus from bearing degrees.
- 3, Zoom + and Zoom – buttons to change Map range scales, Minimum 0.5NM, Maximum 200NM
- 4, Press and hold Map screen, drag to pan map, Press aircraft center symbol under Zoom buttons to reset map center to aircraft current position.

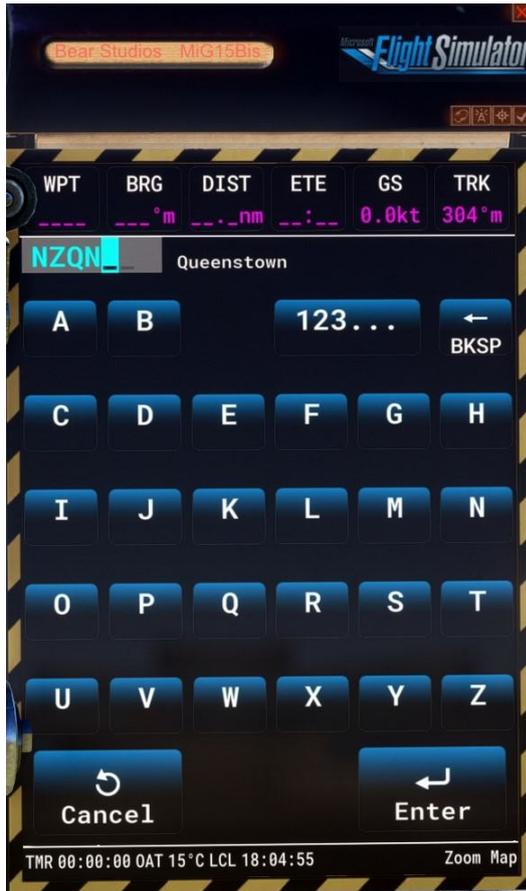
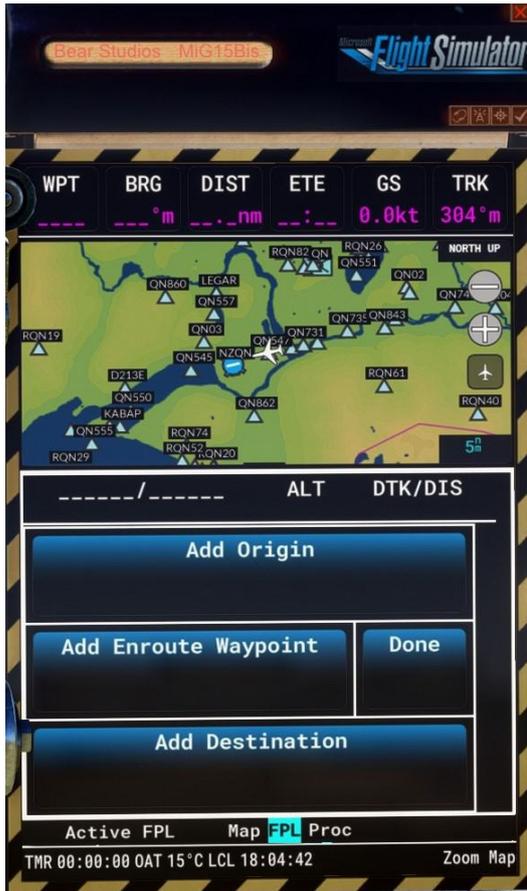




Fig 15-1 AS3X Touch GPS Direct To Input Pages

- 1, Active FPL Setting page, Press Add Origin Button, then Enter Take Off Position ICAO code
- 2, in code input pages, press keyboard button on page to enter ICAO code sequence, press Enter button to confirm input, or press BKSP button to clean current input position and reselect code.
- 3, Press Cancel button to exit origin code input page
- 4, Press Add Destination button to enter destination code input page, and using same method to set destination
- 5, Press coupled destination button, then in pop-up mode window, press Direct To button and active Direct-To flight plan. The current active flight plan display on the map page.

Bear Studios MiG15Bis Flight Simulator

WPT	BRG	DIST	ETE	GS	TRK
USER	171°m	64.3nm	1:17	0.0kt	304°m

Waypoint Identifier Lookup

A B 123... BKSP

C D E F G H

I J K L M N

O P Q R S T

U V W X Y Z

Cancel Enter

TMR 00:00:00 OAT 15°C LCL 18:06:58 Zoom Map

Bear Studios MiG15Bis Flight Simulator

WPT	BRG	DIST	ETE	GS	TRK
USER	38°m	186.5n	3:43	0.0kt	304°m

USER/NZCB	ALT	DTK/DIS
Enroute		
NZCH Christchurch Intl	106FT	38° 186NM

Add Enroute Waypoint Done

Active FPL Map FPL Proc

TMR 00:00:00 OAT 15°C LCL 18:07:19 Zoom Map

Bear Studios MiG15Bis Flight Simulator

WPT	BRG	DIST	ETE	GS	TRK
NZCH	38°m	186.5n	3:43	0.0kt	304°m

NZQN/NZCB	ALT	DTK/DIS
NZQN Queenstown		
Enroute		
NZCH Christchurch Intl	106FT	38° 187NM

Active FPL Map FPL Proc

TMR 00:00:00 OAT 15°C LCL 18:07:45 Zoom Map

Bear Studios MiG15Bis Flight Simulator

WPT	BRG	DIST	ETE	GS	TRK
NZCH	38°m	186.5n	3:43	0.0kt	304°m

Map Map FPL Proc

TMR 00:00:00 OAT 15°C LCL 18:08:37 Zoom Map

Fig 15-2 AS3X Touch GPS Waypoint Edit Pages

- 1, Add waypoints in a flight plan, when origin and destination code inputted, press adds Enroute Waypoint button to get code input page.
- 2, in code input pages, press keyboard button on page to enter ICAO code sequence, press Enter button to confirm input, or press BKSP button to clean current input position and reselect code.
- 3, Press Active Leg to Waypoint button to change current active flight plan sections.
- 4, Flight Plan with active leg and legs displays as different colors on Map

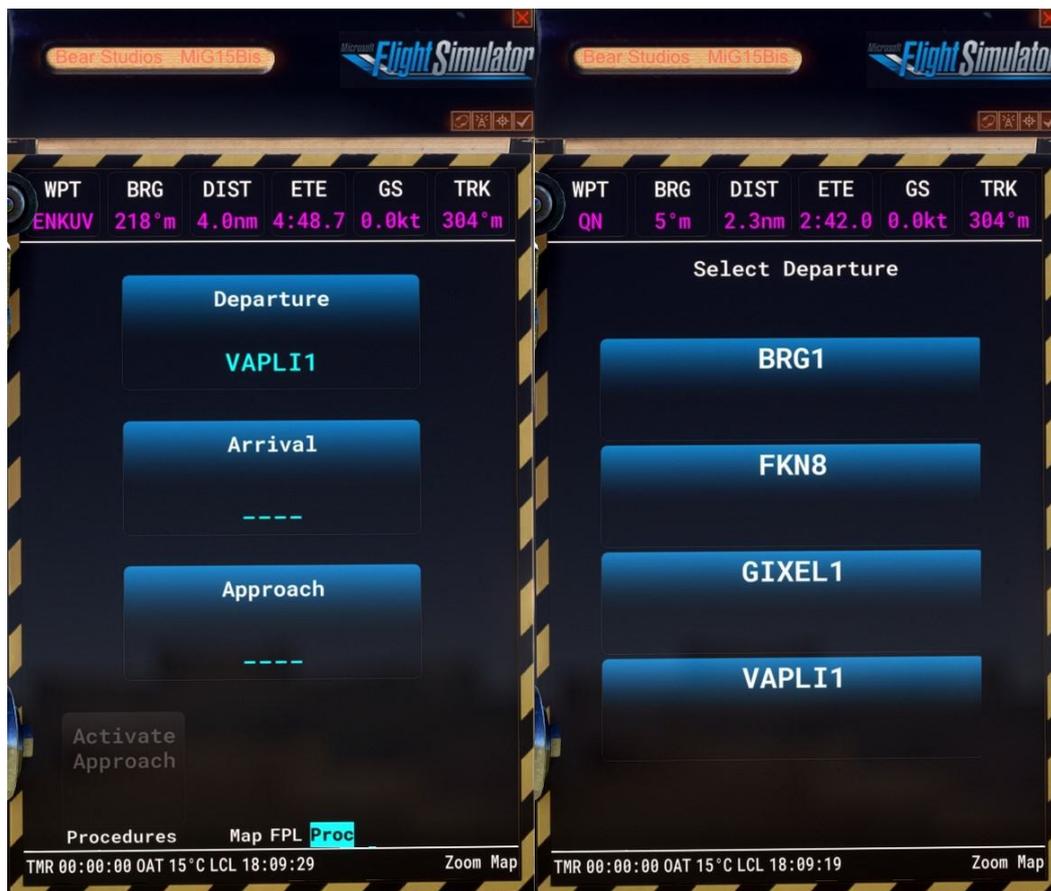




Fig 15-3 AS3X Touch GPS Departure, Arrival and Approach Pages

- 1, Select Departure, Arriver or Approach enroute path, Input and set origin take off position, and waypoint or destination positions ICAO code in Active FPL pages.
- 2, Press Produce button on select page to enter Proc pages. Then press departure button to get pre defined departure route plan selection page, press route name to enter selected plan
- 3, Flight plan with produce route display on Map



Fig 15-4 AS3X Touch GPS Setup Pages

Display Setup:

- 1, Press Map-FPL-Proc line on the GPS Map main page to enter Select Page
- 2, Press Setup Button on Select Page, then press Display button enter the Map Display Setting Page
- 3, Select mast mode by press Photo Cell / Manual Button
- 4, Press + or – to adjust the volume for display



Com and VOR/TACAN Frequency Setup

- 1, the adjustable frequency are standby frequency, when it changed by input on these pages, press XFER button to Active Frequency for Using.
- 2, Press Number Pad Buttons to input frequency value, and then press Enter button for confirm the value input.
- 3, Press BKSP button to Del current input value, then, input new value for current input.
- 4, Press Cancel Button to Leave Frequency input pages, back to Main Map Page.



Left: AGI-1 Attitude Indicator Reference

Right: Check List

Press Up and Down Triangle Arrows to change pages in Reference Pages Section

Fig 15 Integrated Kneboard Detail W (AGI-1 Reference) and Detail X (Checklist Pages)

SECTION VII
CHECKLIST and REFERENCE

CHECKLIST

BEFORE ENGINE START:

<input type="checkbox"/> BATTERY MASTER SWITCH	OFF
<input type="checkbox"/> GENERATOR SWITCH	OFF
<input type="checkbox"/> FUEL COCK	CLOSED (UP)
<input type="checkbox"/> WHEEL CHOCKS	PLACED

ENGINE START:

RIGHT CIRCUIT BREAKER PANEL:

<input type="checkbox"/> GROUND POWER UNIT	CONNECTED
<input type="checkbox"/> BATTERY MASTER SWITCH	FWD
<input type="checkbox"/> GENERATOR SWITCH	OFF
<input type="checkbox"/> TRIM MASTER SWITCH	ON
<input type="checkbox"/> RSI-6M RADIO SWITCH	AS REQUIRED
<input type="checkbox"/> RV-2 RADIO ALTIMETER SWITCH	OFF
<input type="checkbox"/> AGI-1 and DGMK GYRO SWITCH	ON
<input type="checkbox"/> S-13 GUN CAMERA SWITCH	ON
<input type="checkbox"/> ASP-3N GUNSIGHT SWITCH	ON

LEFT CIRCUIT BREAKER PANEL:

<input type="checkbox"/> ENGINE AIR START SWITCH	OFF
<input type="checkbox"/> MASTER IGNITION SWITCH	ON
<input type="checkbox"/> BOOSTER PUMP SWITCH	ON
<input type="checkbox"/> ENGINE INSTRUMENTS SWITCH	ON
<input type="checkbox"/> AFT FUEL TANK PUMP SWITCH	ON
<input type="checkbox"/> ISOLATION VALVE SWITCH	OFF
<input type="checkbox"/> ISOLATION VALVE LAMP	EXTINGUISHES

THROTTLE IDLE:

<input type="checkbox"/> EXTERNAL TRANSFER LAMP	ON
<input type="checkbox"/> ENGINE FIRE WARN LAMP	TEST
<input type="checkbox"/> FUEL QUANTITY	CHECK
<input type="checkbox"/> ENGINE START COVER	OPEN
<input type="checkbox"/> ENGINE START BUTTON	PRESS
<input type="checkbox"/> LOW FUEL PRESSURE LAMP	EXTINGUISHES
<input type="checkbox"/> RPM 600 REACHED	FUEL COCK 1/2
<input type="checkbox"/> RPM 900-1200	FUEL COCK GRADUAL

<input type="checkbox"/> RPM 1200 REACHED	FUEL COCK FULL OPEN(DOWN)
<input type="checkbox"/> RPM 2500 REACHED	THROTTLE UP to RPM 4500
<input type="checkbox"/> GENERATOR OFF LAMP	EXTINGUISHES
<input type="checkbox"/> GROUND POWER UNIT	DISCONNECTED
<input type="checkbox"/> BATTERY MASTER SWITCH	ON
<input type="checkbox"/> RPM 6000-7000 for COLD START	SET

ENGINE OPERATION CHECK:

<input type="checkbox"/> RPM 6500-7500	SET
<input type="checkbox"/> ISOLATING VALVE	ON
<input type="checkbox"/> RPM DROP Less Than 250	CHECK
<input type="checkbox"/> RPM 5000	CHECK
<input type="checkbox"/> THROTTLE	CHECK
<input type="checkbox"/> RPM 11500	CHECK
<input type="checkbox"/> EGT Less Than 690 Deg C	CHECK
<input type="checkbox"/> FUEL PRESSURE 45 Kg/Cm2	CHECK
<input type="checkbox"/> OIL PRESSURE 1.4-3.5 Kg/Cm2	CHECK

THROTTLE SET IDLE:

<input type="checkbox"/> OIL TEMPERATURE -40 to +90 Deg C	CHECK
<input type="checkbox"/> ISOLATING LAMP, RPM +50 or -200	ON,CHECK
<input type="checkbox"/> ISOLATING VALVE	OFF
<input type="checkbox"/> RPM 2500	CHECK
<input type="checkbox"/> EGT Less Than 510 Deg C	CHECK
<input type="checkbox"/> FUEL PRESSURE 7-12 Kg/Cm2	CHECK
<input type="checkbox"/> OIL PRESSURE More Than 0.2 Kg/Cm2	CHECK

HYDRAULIC SYSTEMS CHECK:

<input type="checkbox"/> RPM 8000	SET
<input type="checkbox"/> HYDRAULIC PRESSURE 80-140 Kg/Cm2	CHECK
<input type="checkbox"/> BOOSTER HYDRAULIC 40-60 Kg/Cm2	CHECK
<input type="checkbox"/> FLAPS	CHECK
<input type="checkbox"/> AIR BRAKES	CHECK

BEFORE TAXI:

<input type="checkbox"/> CANOPY	CLOSE
<input type="checkbox"/> OXYGEN VALVE	OPEN
<input type="checkbox"/> COCKPIT AIR SUPPLY VALVE	SET
<input type="checkbox"/> WHEEL CHOCKS	REMOVE

<input type="checkbox"/> GEAR LEVER LOCK	UNLOCK
<input type="checkbox"/> FLAPS	20 Deg
<input type="checkbox"/> PITOT HEAT SWITCH	ON
<input type="checkbox"/> CLOCK AND FLIGHT TIME	SET
<input type="checkbox"/> COM RADIO BAND and FREQ	SET
<input type="checkbox"/> IFF TRANSPONDER	CHECK

TAXI OUT and ROLLING:

<input type="checkbox"/> PENUMATIC PRESSURE 60-80 Kg/Cm2	CHECK
<input type="checkbox"/> PENUMATIC BRAKES	CHECK
<input type="checkbox"/> BRAKES	SET
<input type="checkbox"/> RPM 8000-9000	SET
<input type="checkbox"/> BRAKES	RELEASE
<input type="checkbox"/> TAXI Less Than 40 Km/H(20 Knots)	SET
<input type="checkbox"/> TURNING Use DIFFERENTIAL BRAKES	SET
<input type="checkbox"/> FLIGHT CONTROLS	FREE,CHECKED
<input type="checkbox"/> ELEVATOR TRIM	NEUTRAL
<input type="checkbox"/> AILERONS TRIM	NEUTRAL
<input type="checkbox"/> DGMK HDG	SET to RUNWAY HEADING
<input type="checkbox"/> ARK-5 CONTROL and AUDIO	ON
<input type="checkbox"/> FAR/ NEAR MARKER SWITCH	FAR,CHECKED
<input type="checkbox"/> RSI/ADF MARKER SWITCH	ADF,CHECKED

TAKE OFF:

<input type="checkbox"/> FLIGHT STICK	NEUTRAL
<input type="checkbox"/> RUDDER PEDALS	NEUTRAL
<input type="checkbox"/> THROTTLE	FULL
<input type="checkbox"/> RPM 11500	SET
<input type="checkbox"/> EGT 690 Deg C	CHECK
<input type="checkbox"/> NOSE UP	ROTATE on 150-160Km/H
<input type="checkbox"/> NOSE UP Less Than +5 Deg	MAINTAIN
<input type="checkbox"/> TAKE OFF	220-240Km/H
<input type="checkbox"/> GEAR LAVER	UP, Than NEUTRAL

CLIMB:

<input type="checkbox"/> VERTICAL SPEED POSITIVE	CHECK
<input type="checkbox"/> FLAPS	UP, Than NEUTRAL
<input type="checkbox"/> START TURNING PATTERN	380-400Km/H
<input type="checkbox"/> RPM 10500	SET

- | | |
|---|----------------------|
| <input type="checkbox"/> CLIMB to CRUISE ALTITUDE | 430-450Km/H |
| <input type="checkbox"/> ELEVATOR TRIM | SET for LEVEL FLIGHT |

BEFORE LANDING:

- | | |
|--|-------------|
| <input type="checkbox"/> AIRSPEED | 400-450Km/H |
| <input type="checkbox"/> ELEVATOR TRIM | NEUTRAL |
| <input type="checkbox"/> AILERONS TRIM | NEUTRAL |
| <input type="checkbox"/> GEAR LEVER | DOWN |
| <input type="checkbox"/> DECENT TO LANDING PATTERN | 350Km/H |
| <input type="checkbox"/> RV-2 SCALE SWITCH | 100 SCALE |
| <hr/> | |
| <input type="checkbox"/> AIRSPEED | 320-350Km/H |
| <input type="checkbox"/> FLAPS | FULL |

LANDING:

- | | |
|---|-------------|
| <input type="checkbox"/> GLIDE SPEED | 260-270Km/H |
| <input type="checkbox"/> VERTICAL SPEED NEGATIVE | 7-8m/s |
| <input type="checkbox"/> RPM Above 6000 | MAINTAIN |
| <input type="checkbox"/> RV-2 SCALE SWITCH | 10 SCALE |
| <input type="checkbox"/> RUDDER | AS REQUIRED |
| <hr/> | |
| <input type="checkbox"/> AIR BRAKE | AS REQUIRED |
| <input type="checkbox"/> TOUCH DOWN IDLE THROTTLE | 200Km/H |
| <input type="checkbox"/> FLARE ATTITUDE at AGL 5m | MAINTAIN |

GO AROUND:

- | | |
|--|------------------------|
| <input type="checkbox"/> THROTTLE | FULL |
| <input type="checkbox"/> FLIGHT CONTROL | LEVEL FLIGHT |
| <input type="checkbox"/> AIRSPEED | Above 260Km/H |
| <input type="checkbox"/> GLIMB and GEAR UP | 280-300Km/H |
| <input type="checkbox"/> RETRACT FLAPS | Above 100m AGL,300Km/H |

ENGINE SHUT DOWN:

- | | |
|---|----------------------|
| <input type="checkbox"/> THROTTLE | IDLE and WAIT 30 Sec |
| <input type="checkbox"/> FUEL COCK | CLOSE(UP) |
| <input type="checkbox"/> BATTARY and BOOSTER PUMP | ON |
| <input type="checkbox"/> OTHER SWITCHS ON CB PANELS | OFF |
| <input type="checkbox"/> COMPRESSOR STOPPED | CHECK |
| <input type="checkbox"/> BATTARY and BOOSTER PUMP | OFF |

PARKING and EXIT:

- WHEEL CHOCKS ON
- COCKPIT AIR SUPPLY VALVE ON
- OXYGEN VALVE ON
- CANOPY ON

NIGHT FLIGHT:

- UV PANEL LIGHT KNOB ON
- ENGINE INSTRUMENTS SWITCH ON
- HEAD LIGHT SWITCH ON
- COCKPIT FLOOD LIGHT KNOB ON
- ARK-5 FLOOD LIGHT KNOB ON
- NAV and NOSE LIGHT SWITCHES ON

ENGINE FAILURE IN FLIGHT:

- FUEL COCK CLOSE
- THROTTLE SET IDLE
- BATTERY MASTER SWITCH ON
- GENERATOR SWITCH ON
- TRIM MASTER SWITCH ON
- RSI-6M RADIO SWITCH ON
- OTHER SWITCHES ON RIGHT CB PANEL OFF
- ALTITUDE QUICKLY DESCENT to 11000m
- RESTART ENGINE Above 2000m
- LAND OR EJECT Below 2000m

ENGINE RESTART:

- ALTITUDE Below 6000m
- AIRSPEED 300-320Km/H
- MASTER IGNITION SWITCH ON
- ENGINE AIR START SWITCH ON
- FUEL COCK OPEN in 10-15 Sec

IF ENGINE NOT START DURING 10-15 Sec

- THROTTLE BACKWARDS to MIN
- RPM INCREASE THROTTLE SET IDLE
- EGT Less Than 510 Deg C CHECK
- ENGINE AIR START SWITCH OFF
- MASTER IGNITION SWITCH OFF
- RPM Above 6000 SET

SWITCHS ON RIGHT CB PANEL ON

IF ENGINE NOT START DURING 40-45 Sec

FUEL COCK CLOSE
 ENGINE AIR START SWITCH ON
 FUEL COCK OPEN
 ENGINE RESTART REATTEMPT 20-30 Sec
 LAND OR EJECT Below 2000m

ENGINE STALL:

THROTTLE IDLE
 RPM NORMAL CHECK
 EGT NORMAL CHECK
 ENGINE AIR START SWITCH ON
 THROTTLE SMOOTH FORWARD

ENGINE ON FIRE:

THROTTLE IDLE
 FUEL COCK CLOSE
 BOOSTER PUMP SWITCH OFF
 FIRE EXTINGUISHER COVER OPEN
 FIRE EXTINGUISHER BUTTON PRESS
 AIRSPEED CLIMB and SLOW to 300-350Km/H
 FIRE EXTINGUISHED RESTART ENGINE

IF ENGINE NOT START

LAND OR EJECT Below 2000m

COCKPIT DEPRESSURIZATION:

ALTITUDE and AIRSPEED REDUCE
 EMERGENCY OXYGEN SUPPLY ON

GENERATOR FAILURE:

RSI-6M RADIO SWITCH ON
 PITOT HEAT SWITCH ON
 ARK-5 ADF SWITCH ON
 AGI-1 and DGMK GYRO SWITCH ON
 ENGINE INSTRUMENTS SWITCH ON

<input type="checkbox"/> OTHER SWITCHS ON CB PANELS	OFF
<input type="checkbox"/> BOOSTER PUMP ON	Above 9000m
<input type="checkbox"/> BATTERY LIVING TIME	24-26 Min for Day
<input type="checkbox"/> BATTERY LIVING TIME	20-23 Min for Night

EMERGENCY GEAR and FLAPS EXTEND:

<input type="checkbox"/> GEAR LEVER	NEUTRAL
<input type="checkbox"/> GEAR EMRGENCY EXTEND HANDLE	PULL
<input type="checkbox"/> GEAR LEVER	DOWN
<input type="checkbox"/> EMERGENCY GEAR EXTEND VALVE	OPEN
<input type="checkbox"/> FLAPS LEVER	55 Deg
<input type="checkbox"/> EMERGENCY FLAPS EXTEND VALVE	OPEN

FORCE LANDING:

<input type="checkbox"/> LANDING GEAR	DO NOT EXTEND
<input type="checkbox"/> FLAPS	55 Deg
<input type="checkbox"/> GLIDE SPEED	260-270Km/H
<input type="checkbox"/> ENGINE	SWITCH OFF

Living Weapons Based On Prepar3D Professional , Or Prepar3D Academic and FSX With VRS TacPack Installed

ARMING GUNS:

<input type="checkbox"/> N37 GUN POWER SWITCH	ON
<input type="checkbox"/> NS23 GUN POWER SWITCH	ON
<input type="checkbox"/> GUNS RELOAD BUTTONS	PRESS
<input type="checkbox"/> N37 and NS23 GUN RELOAD LAMP	ON
<input type="checkbox"/> ASP-3N GUNSIGHT POWER SWITCH	ON

ARMING BOMBS:

<input type="checkbox"/> BOMB ARM SWITCH	CHECK ON
<input type="checkbox"/> TACTICAL RELEASE	ARM
<input type="checkbox"/> PAYLOAD ARM LAMP	CHECK ON

DROPTANKS:

<input type="checkbox"/> DROPTANK ARM SWITCH	CHECK ON
<input type="checkbox"/> TANK SIGNAL SWITCH	ON
<input type="checkbox"/> FLAPS	20 Deg
<input type="checkbox"/> PAYLOAD ARM LAMP	CHECK ON

RELEASE or EMERGENCY RELEASE:

[] NORMAL	BOMB RELEASE BUTTON PRESS
[] EMERGENCY	EMERGENCY COVER OPEN
[] EMERGENCY RELEASE BUTTON	PRESS
[] PAYLOAD ARM LAMP	EXTINGUISHES
[] TANK SIGNAL SWITCH	OFF
[] DROPTANK ARM SWITCH	OFF
[] BOMB ARM SWITCH	OFF

REFERENCE

<i>VMO - Maximum Operating Speed</i>	581Kts/1076Km/h
<i>MMO - Maximum Operating Speed Mach</i>	.919 Mach
<i>Turbulent Air Penetration Speed</i>	206Kts/382Km/h
<i>VLE - Maximum Gear Operating Speed</i>	270Kts/500Km/h
<i>VLO - Maximum Gear Retraction Speed</i>	260Kts/482Km/h
<i>VA - Maneuvering Speed</i>	216Kts/400Km/h
<i>VMC - Minimum Control Speed</i>	103Kts/190Km/h
<i>VX - Best Angle-of-Climb</i>	232Kts/430Km/h
<i>VY - Best Rate of Climb</i>	243Kts/450Km/h
<i>Best Glide Speed</i>	162Kts/300Km/h

Maximum Flap Placard Speeds

Flaps	IAS
Approach	216Kts/400Km/h
Full Flaps and Gear Extension	216Kts/400Km/h

V1 - Takeoff Decision Speed dry runway; flaps takeoff

Standard temperature, 5,000' pressure altitude

11120Ibs/5044Kg	97Kts/180Km/h
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VR - Rotation Speed dry runway, flaps takeoff

Standard temperature, 5,000' pressure altitude

11120Ibs/5044Kg	119Kts/220Km/h
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V2 - Takeoff Safety Speed dry runway, flaps up

Standard temperature, 5,000' pressure altitude

11120Ibs/5044Kg	124Kts/230Km/h
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SECTION VIII **REFERENCE and CREDIT**

Aircraft Model Shape Modifying and Correction up to Version 1.2

YoYo from www.yoyosims.pl

SDK from Microsoft Flight Simulator

[Software Development Kit \(SDK\) – FS2020](#)

This Aircraft Mode running on FS2020 Version 1.29.30 (40-years anniversary-edition).

And has limitation to one default skin under this version.

Weapon System Powered by VR Simulations VRS TacPack

[VRS | TacPack \(vrsimulations.com\)](#)

SDK from Lockheed Martin Prepare3D

[Software Development Kit \(SDK\) – Prepar3D](#)

This Aircraft Mode running on Prepare3D V4 and V5.

Discuss and Topic on FS Developer Forum, Thanks for all Members of FS Developer

[New MiG-15Bis for P3D and MSFS&FSX from BearStudios. | FSDeveloper](#)

Ground Power Unit and Support Equipments

YoYo from www.yoyosims.pl

Historical Reference and Resource

MiG-15 Aircraft Overhaul and Modifying in China PLAAF

[上海市地方志办公室 \(shtong.gov.cn\)](http://shtong.gov.cn)

MiG-15 History PDF about Czech Air Force

[Mig-15: 'fifteen' Mig-15 in Czechoslovak Air Force-1983 \(jakab 5\) \[PDF\] \[1oc2fh1tm0m0\] \(vdoc.pub\)](#)

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MiG-15 Museum Pictures

[MiG-15 \(valka.cz\)](#)

[Mikoyan MiG-15 Photo Walk Around \(cybermodeler.com\)](#)

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http://walkarounds.scalemodels.ru/v/walkarounds/avia/after_1950/mig-15_vinnitsia/

ARK-5(WL-5) Radio Compass System

[WL 5 无线电自动罗盘.pdf \(book118.com\)](#)

RSI-6 Radio System

[Flugfunkempfänger Airborne HF Receiver Commercial Re MILITARY USSR \(radiomuseum.org\)](#)
[SOV - RSI-6 \(aircraft radio station\): Aircraft radios \(valka.cz\)](#)

Russian IFF System in Cold War Era

<https://www.mil-airfields.de/equipment/soviet-iff-kremniy.htm>
[Soviet/Russian IFF | Secret Projects Forum](#)

MiG-15 Gauges

[Course Indicator / Directional Gyro, USSR, MiG-15 Jet Fighter – AeroAntique](#)

Main Reference for Simulation Programming and Manual

MiG-15Bis Tech Report from USAF, The Main Template for this manual

https://www.governmentattic.org/14docs/MIG-15pilotOpManual_1955.pdf

Mig-15UTI manual from WW2Aircraft forum

[MiG-15 UTI manuals | Aircraft of World War II - WW2Aircraft.net Forums](#)

Inspired by DCS MiG-15Bis and War Thunder MiG-15Bis, My Favorite Aircraft Mod in DCS world and War Thunder.

[DCS: MiG-15bis \(digitalcombatsimulator.com\)](#)

[MiG-15bis - War Thunder Wiki](#)

Thanks to WenJing0718, for his long time support on this project and my process in flight simulator during years.

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3d modeling, Texture and animation: WeiGang Wu (Bill Wolfgen)

Effects, Sound, Simulation Programming: WeiGang Wu (Bill Wolfgen)

Flight Dynamic: WeiGang Wu (Bill Wolfgen)

Manual and Documents: WeiGang Wu (Bill Wolfgen)