

I. Instrument Panel

A. Description

Positioned on the instrument panel are all the engine-monitoring, flight monitoring and navigation instruments.

The instrument panel is secured with hex-head screws to the instrument panel frame, which is bolted to the forward part of the windscreen assembly.

On the instrument panel frame are positioned the monitoring equipment for the armament installation and the pressure gauge for the MW installation (see Part 7B).

On the bottom edge of the instrument panel a hinged auxiliary panel is attached, which can be fixed in the upward position, and that latches to the cover of the MK 108 in the lowered position. On this auxiliary panel the ZSK 244A is fitted (see Part 8A).

Especially sensitive instruments: AFN-2 indicator, vertical speed indicator, artificial horizon, airspeed indicator, altimeter, and the repeater compass are mounted separately on an instrument flight panel, which is attached to the main panel by vibration dampening mounts.

B. Installation and Removal

Before removing the instrument panel. Remove the auxiliary panel; do this first release the latch and then attachments to the instrument panel.

Release all cable connections on the rear of the auxiliary panel and remove the auxiliary panel with the ZSK 244A from the cockpit.

In a similar manner, remove the instrument flight panel from the instrument panel.

After that remove all electrical leads, electrical plugs, piping and flexible cables from the rear of the instruments and remove the instrument panel with the attached instruments from the instrument panel frame after removing the four mounting screws.

When disconnecting electrical leads note that all leads are provided with ID tags.

Seal pipe and tubing ends as well as connections on the instruments as protection against contamination.

Installation of the instrument panel follows likewise in reverse sequence. The instruments are installed before the installation of the instrument panel.

Attachment of the instruments to the instrument panel is almost exclusively by slotted head screws, that are screwed into captive nuts (fixed to the rear face of the instrument panel). When tightening the mounting screws watch that the screws are tightened uniformly so that the instrument glass is not cracked.

The limit markings are indicated on the instruments by adjustment marks or by red marks.

III. 1: Equipment Layout in the Cockpit

- 1 Horizontal Stab. Trim
- 2 Flap Handwheel
- 3 Cabin Vents
- 4 Fuel Selector Handle
- 5 Tail Wheel Lock
- 6 Glove Heater Plug
- 7 Stabilizer Trim Indicator
- 8 Engine Primer Hand Pump
- 9 Bomb or Drop Tank jettison
- 10 Prop Pitch Auto/Man. Switch
- 11 Man. Coolant Valve Controls *
- 12 Momentary Limit Switch
- 13 Quick-Stop Handle
- 14 Fuel Selector & Cutoff
- 15 Winter Start Handle
- 16 Throttle with Thumb Switch for Prop Pitch Control
- 17 Motor Generator for Artificial Horizon
- 18 UV Cabin Lights
- 19 Canopy jettison Handle
- 20 Starter Handle
- 21 Landing Gear Push Buttons
- 22 Selector Switch for 21 cm Rockets or MK 108 **
- 23 Landing Gear Indicators

- 24 Magneto Switch
 - 25 Switch for MW Installation
 - 26 Jettison Switch for 21 cm Rocket Tubes **
 - 27 Windscreen Cleaning Valve
 - 28 Main Elect. Circuit Breaker
 - 29 Master Weapon Switch
 - 30 Ammunition Counters & Indicators
 - 31 Armor Glass Windscreen
 - 32 Gun Sight Revi 16B
 - 33 Gun Sight Mount
 - 34 Pressure Gauge for MW Installation
 - 35 Airspeed Indicator
 - 36 Artificial Horizon
 - 37 Vertical Speed Indicator
 - 38 Altimeter
 - 39 Repeater Compass
 - 40 AFN2 Instrument Flight Indicator
 - 41 Instrument Flight Panel
 - 42 Fuel & Oil Pressure Gauge
 - 43 Coolant Temperature Gauge
 - 44 Tachometer
 - 45 Flare Gun Port
 - 46 Oil Temperature Gauge
 - 47 Prop Pitch Indicator
 - 48 Manifold Pressure Gauge
 - 49 Emergency Land. Gear Release
 - 50 Low Fuel Warning Light
 - 51 ZSK 244A Bomb Arming Panel
 - 52 Cover for MK 108
 - 53 Control Column Grip
 - 54 Charging Button For MK 108
 - 55 B2 Button for Bomb Release
 - 56 B1 Button for MK 108 or Rockets
 - 57 A Button for MG 131
 - 58 Radiator Flap Control
 - 59 Fuel jettison Handle
 - 60 Circuit Breaker Panel
 - 61 Compass Deviation Card
 - 62 Oxygen Monitor
 - 63 Oxygen Pressure Gauge
 - 64 Drop Tank Fuel Transfer Sight Glass
 - 65 Oxygen Regulator
 - 66 Main Valve for Oxygen System
 - 67 Control for FuG 16ZY Radio
 - 68 Frequency Selector for FuG 16ZY Radio
 - 69 Headphone Volume Control
 - 70 Control for FuG 25a (IFF) Radio
 - 71 Headphone Jack
 - 72 Oxygen Mask Hose
- * only on initial A/C
** omitted in later A/C

II. Engine Monitoring Instruments

A. Description

The following instruments are installed as engine monitoring instruments (see III. 2):

- 1 Manifold Pressure Gauge (III. 2/1)
- 1 Tachometer (III. 2/2).
- 1 Propeller Pitch Indicator (III. 2/3)
- 1 Dual Pressure Gauge for Oil & Fuel (III. 2/4).
- 1 Thermocouple for Oil (III. 2/5)
- 1 Thermocouple for Coolant (III. 2/6)
- 1 Temperature Gauge for Oil (III. 2/7)
- 1 Temperature Gauge for Coolant (III. 2/8)
- 1 Fuel Level Transmitter for Fuel (III. 2/9)
- 1 Fuel Contents Gauge (III. 2/10)
- 1 Low Fuel Warning Light (III. 2/11)
- 1 Pressure Gauge for MW Installation (III. 2/12)

For the above listed instruments see also Part 6, in which the powerplant equipment is also covered.

For operation, removal and installation, inspection and servicing see the corresponding *D. (Luft) T.*

1. Manifold Pressure Gauge

The manifold pressure gauge with a measuring range of 0.6 to 1.8 atms. is installed in the lower right of the instrument panel. The pressure line is attached to the supercharger exhaust tube and passes through the fuselage forward bulkhead.

2. Tachometer

To measure engine RPMs a mechanical tachometer with a measuring range of 500 to 3500 RPM is mounted on the right of the instrument panel. Operation is through a two piece flexible shaft, which along with the tachometer drive is attached to the rear of the engine.

3. Propeller Pitch Indicator

The propeller pitch indicator is positioned on the right of the instrument panel next to the tachometer. The pitch indicator is connected by a flexible cable and angular drive to a dual-purpose adjusting unit mounted under the front of the engine.

4. Dual Pressure Gauge

For fuel and oil pressure measurement, a dual pressure gauge is installed, which is positioned on the right of the instrument panel and is provided with an indicator for fuel and oil pressure. Pressure is tapped from the fuel transfer pump and from the oil filter respectively. On the pressure line connector at the engine a safety check valve is built into the fuel pressure line.

5. Thermocouple for Oil and Coolant Temperature

The thermocouple for oil temperature is inserted in the elbow of the oil flow line and the thermocouple for coolant temperature is inserted in the vapor separator on the right side of the engine.

6. Temperature Gauge for Oil and Coolant

The electrical oil temperature gauge and the coolant temperature gauge are positioned on the upper right of the instrument panel.

The oil temperature gauge shows the inlet temperature and the coolant temperature gauge the outlet temperature.

7. Fuel Level Transmitter

The fuel level transmitter is fitted to the cover on the top of the main fuel tank. The fuel level transmitter is fitted with a contact for low fuel warning, it operates the electrical fuel contents gauge and switches on the low fuel warning light.

8. Fuel Contents Gauge

The fuel contents gauge is positioned on the lower right of the instrument panel. An accurate indication is given only in flight attitude.

9. Low Fuel Warning Light

The low fuel warning light is positioned on the lower right of the instrument panel. The light indicates when the fuel level in the fuel tank is sufficient for only about 10 minutes of flight.

10. Pressure Gauge for MW Installation

The pressure gauge for the MW (Methanol-Water) installation is positioned on the upper right of the instrument panel frame and is connected to the feed line for MW mixture by a pressure line (see also Part 7B).

III. Flight Monitoring and Navigation Instruments

A. Description

Ill. 2: Overview of the Engine Monitoring instruments (For key to diagram see text)

Flight Monitoring Instruments

The following instruments are installed for flight monitoring purposes (see Ill. 3):

- 1 Airspeed Indicator
- 1 Heatable Pitot Tube
- 1 Pressure Altimeter
- 1 Rate of Climb Indicator
- 1 Differential Pressure Tank

Also in the instrument panel there is a cutout for the installation of an aircraft clock.

1. Airspeed Indicator

The airspeed indicator with a measuring range of 100 to 900 km/h is positioned on the upper left of the instrument flight panel.

2. Pitot Tube

The Heatable pitot tube for airspeed is installed in the wing tip of the left wing. Transmission of the dynamic and static pressures to the airspeed indicator is through tubing.

3. Pressure Altimeter

For altitude measurement, a pressure altimeter is fitted on the instrument flight panel underneath the airspeed indicator. The altimeter is connected to the Static pressure line.

4. Rate of Climb Indicator

To indicate the climb and descent speeds of the aircraft, a rate of climb indicator is installed on the upper right of the instrument flight panel. The indicator is connected on one side to the static pressure line and on the other side to the differential pressure tank.

5. Differential Pressure Tank

The differential pressure tank for the rate of climb indicator is located in the fuselage ahead of the instrument panel and is attached by clamps to two mounting brackets, which are screwed to the Z-section former of the forward fuselage deck.

Ill. 3: Overview of the Flight Monitoring Instruments

- 1. Airspeed Indicator
- 2. Pitot Tube
- 3. Pitot Pressure Tubing
- 4. Electrical-lead for Pitot Heater
- 5. Pressure Altimeter
- 6. Rate of Climb Indicator
- 7. Differential Pressure Tank
- 8. Circuit Breaker Panel

Navigation Instruments

The following navigation instruments are installed (see Ill. 4):

- 1 Master Compass
- 1 Repeater Compass
- 1 Artificial Horizon
- 1 Converter

6. Master Compass

The master compass is in the lower rear fuselage in section 5 in a spring suspension mounting. After serial No. the Master Compass is installed in upper fuselage section 5 and in reconnaissance aircraft in upper fuselage section 6. It is connected electrically to the repeater compass and controls its course card.

7. Repeater Compass

The repeater compass is installed at the bottom of the instrument flight panel. It is a navigation instrument whose course display is controlled electrically by the master compass.

Ill. 4: Overview of the Navigation as well as the Rescue and safety equipment

- 1. Master Compass
- 2. Repeater Compass
- 3. Artificial Horizon
- 4. Motor-Generator
- 5. Safety Belts
- 6. Flare Gun Port
- 7. Circuit Breaker for the Compass Installation

Ill. 5: Master Compass

- 1. Master Compass
- 2. Mounting

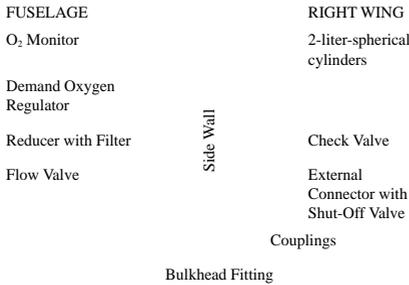
8. Artificial Horizon

The artificial horizon displays the attitude of the aircraft in space and is positioned at the top of the instrument flight panel.

9. Motor-Generator

The Motor-Generator powers the artificial horizon and is mounted in front of the instrument panel on the left fuselage wall.

III. 6: Diagram of the Oxygen System



IV. Oxygen System Installation

A. Description

For the Oxygen Breathing System the following equipment is installed:

- 3 Oxygen Supply Cylinders (Spherical Cylinders)
 - 1 Check Valve
 - 1 External Connector with Shut-off Valve
 - 1 Demand Breathing Regulator
 - 1 Flow Valve
 - 1 O₂ Monitor
 - 1 Pressure Gauge
- will be replaced by an O₂ indicator

The layout of the equipment for the oxygen system is shown in Illustration 7.

The 2-liter oxygen spherical cylinders are fastened to two support beams and are housed in the area between ribs 10 and 12 lit the right wing. Between ribs 10a and 10 a stiffening bracket is fastened on which the support beams are mounted.

The installation is filled through the external connector, which is accessible through a handhole on the wing underside.

To prevent venting of oxygen from the external connector a check valve is installed in the fill line between the external connector and the oxygen cylinders, in addition to the shut-off valve.

The demand regulator, pressure gauge, O₂ monitor and flow valve are grouped in the unit console on the right side of the cockpit.

Oxygen is supplied in the normal mode by the demand regulator of the breathing system by opening the shut-off valve. The pressure gauge indicates the oxygen pressure in the system and the O₂ monitor shows it lie proper operation of the breathing system Above 8000 meters the regulator of the breathing system supplies pure oxygen

The tubing of the system is marked with ID bands, a blue stripe with a white ring around each end.

B. Removal and Installation

CAUTION!

During removal and installation of the oxygen system ensure that the system does not come into contact with oil and grease.

Before removal the oxygen is vented as follows:

After closing the shut-off valve, loosen the pipe fitting after the valve or on the regulator. Then slowly opening the shut-off valve on the unit console and allow the O₂ to flow out. After completely emptying the system, first unscrew the tubing couplings, Next, loosen the support beams from the stiffening brackets and remove the beams and attached cylinders.

III. 7: Plan of the Oxygen System

- | | |
|---|----------------------------|
| 1. Oxygen-Spherical Cylinders | 9. Pressure Gauge |
| 2. Support Beams | 10. O ₂ Monitor |
| 3. Stiffening Brackets | 11. Unit Console |
| 4. External Connector with Shut-off Valve | 12. Tubing Coupling |
| 5. Shut-off Valve | 13. Tubing Coupling |
| 6. Flow Valve | 14. Access Panel |
| 7. Check Valve | 15. Handhole Cover |

8. Demand Regulator

III. 8: Unit Console in the Right Side of the Cockpit

1. Demand Regulator
2. Flow Valve
3. Pressure Gauge
4. O₂ Monitor
5. Unit Console
6. Decking (Right Instrument Console)
7. Push Button O₂ Bypass
6. Breathing Hose

For the removal of the unit console, first remove the instrument console next to the unit console. Nest unscrew the tubing couplings and the mounting screws and remove the unit console.

The installation of the breathing system follows in reverse order from the removal.

CAUTION!

When installing the tubing, check for correct flare and the presence of the thrust ring; also for undamaged inlet and threads.

C. Operation of the Oxygen System

Before flight put on the oxygen mask and check the breathing system for problem free operation. Use the oxygen system at altitudes above 4000 m; to do so open the oxygen flow valve. Watch pressure gauge and O₂ flow monitor (especially if hit!).

To pressure check the oxygen mask, fold the hose and squeeze it together.

In case of breathing difficulties or oxygen emergencies, depress pushbutton momentarily a few times.

When finished with the oxygen system, close flow valve.

D. Filling the Oxygen System

Filling the oxygen system is done from the opening of the handhole cover beneath the external connector in the right wing. Momentarily blow out the external connector and high pressure line.

Attach the high pressure line of the oxygen fill equipment, open the shut-off valve.

After opening the flow valve, fill oxygen system to 165 Atm. (2425 p.s.i.) (Watch pressure gauge!).

Close shut-off valve and unscrew high pressure line of the oxygen fill equipment from the external connector Close handhole cover.

Note: Keep everything oil and grease free.

E. Inspection

Inspect the oxygen system for proper operation, satisfactory condition and mounting, see *D. (Luft) 1205*.

Check hose for cleanliness.

Dirt and moisture retained in the oxygen cylinders are removed by blowing out with oxygen.

To do this, disconnect the tubing connectors close to the cylinders.

Reconnect tubing.

Quick check:

Open flow valve, note oxygen pressure, close flow valve.

Pressure may only drop at most 20 atm. in 20 minutes.

Inspection of the Complete Installation:

Open valve, note pressure; the pressure must be at least 100 atm.

Allow the system to remain under pressure for a few hours. Oxygen pressure drop at most 10 atm.

If pressure drops, locate leaks (soapy water). Eliminate leaks by tightening the fittings. Check for proper flare.

If the seams leak, replace the tubing.

Inspection of the breathing equipment:

Check with Pressure Test Apparatus FI 30453. If not available, then: open shut-off valve until maximum pressure is reached. Close flow valve. In 20 minutes pressure may only drop 20 atm.

With flow valve closed, operate O₂ regulator bypass. Pressure gauge must drop immediately and the O₂ monitor indicate.

F. Servicing

The tubing, where it is in contact with the grounding cables, must be kept bare.

Fuel, oil and especially grease must absolutely be kept away from the installation.

In servicing the Oxygen System, see *D. (Luft) 1205* and *D. (Luft) T. 5210*.

V. Rescue and Safety Equipment

A. Description

1. Safety Belts

For the pilot, a seat belt and shoulder harness are fitted to the seat. Both sets of straps are provided with a quick release buckle for emergency release.

2. Sea Survival Equipment

The pilot's seat is constructed so that the pilot can fly with the Sea Survival Kit (one-man life raft and accessories) (see *D. (Luft) T. 5201*).

3. Emergency Landing Equipment

In the fuselage end (accessible through the manhole) a box is housed, which contains emergency landing rations and equipment

4. Flare Gun

A single shot flare gun, which is inserted into the mount on the right instrument cowling serves for ground communication. The ammunition is carried by the pilot in his flying suit.

The layout of the rescue and safety equipment is shown in Ill. 4.

VI. Fuel Windscreen Cleaning

A. Description

For cleaning the windscreen panels of oil film and dust, a hand operated windscreen cleaner is installed (see Ill. 9).

Operation of the windscreen cleaner is only permitted in flight.

Ill. 9. Layout of the windscreen Cleaner

- | | |
|-----------|---------------------|
| 1. Handle | 3. Spray tube |
| 2. Valve | 4. Cold Start valve |

The valve is opened by means of a handle on the left of the instrument panel; thereby with the motor running, fuel under pressure in the tubing, sprays on the windscreen through the vents of the spray tubes positioned at the base of the windscreen. The fuel line for the windscreen cleaner is connected to the tee at the cold start valve (see Part 7A).

B. Installation and Removal

When changing engines, the required disconnect point is found on the left of the engine. Should the entire system be removed or installed, it is possible to accomplish this without special difficulty. Especially to be noted is that on installation of the spray tubes, they should be fastened to the base of the windscreen so that the windscreen will be properly sprayed with fuel.

C. Inspection and Servicing

The fuel windscreen cleaner system is checked by ensuring that the holes of the spray tubes are not plugged, and so assuring that the windscreen will be sprayed with fuel in flight on operation of the handle and consequently will be cleaned.

VII. Armor Glass Heating

A. Description

To protect against fogging and icing, the armor windscreen can be heated electrically. The system is connected to the aircraft electrical circuit, but is safetied by a switch operated by the retracted landing gear, so that the system can not be switched on while on the ground (see also Part 9B, Section 1).