CHAPTER

31

INDICATING / RECORDING SYSTEMS

CONTENT

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EFFECTIVITY: All

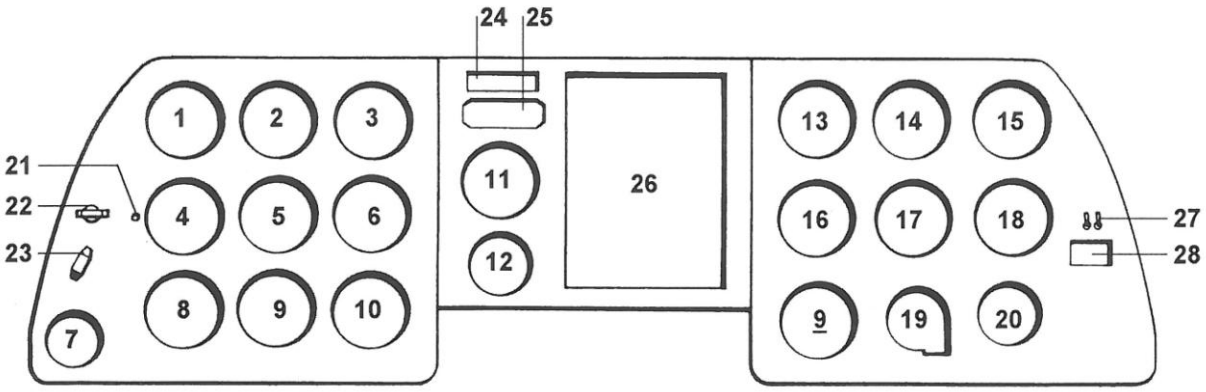
GENERAL

The flight and engine instruments are installed in instrument panels. The panel under the instrument panel contains pressure gauge of check of main spar lower flange plate being filled with nitrogen. The light annunciation panel is above the middle instrument panel.

INSTRUMENT PANEL

DESCRIPTION AND OPERATION

The instrument panel set (Fig. 31-1) consists of left, middle and right panels. The individual panels contain flight and engine instruments, communication and navigation equipment.



1 ... airspeed indicator I
2 ... attitude gyro
3 ... altimeter I
4 ... turn - and - bank indicator I
5 ... directional gyro
6 ... vertical speed indicator I
7 ... clock
8 ... *ADF indicator*
9 ... CHT/EGT indicator
10 ... *VOR/ILS indicator*
11 ... R.P.M. indicator
12 ... manifold pressure gauge
13 ... *airspeed indicator II*
14 ... *turn - and - bank indicator II*
15 ... *altimeter II*
16 ... *vertical speed indicator II*
17 ... quadruple engine indicator
18 ... quadruple fuel indicator
19 ... V-A meter
20 ... accelerometer
21 ... annunciator of emergency feeding of turn-and bank indicator I
22 ... adjusting screw of ASPS
23 ... selector valve of ASPS
24 ... *marker*
25 ... *intercom*
26 ... *avionics unit*
27 ... *emergency switches (if installed)*
28 ... *engine run counter*

NOTE

The instruments written in italics are optional.
The instrumentation may be optionally varied.

Fig. 31-1 Typical instrument panel

EFFECTIVITY: All

REPAIRS

Fault	Possible reason	Remedy
Warning flag of Turn-and-Bank Indicator after the **FLIGHT INSTR.** switch is turned on indicates fault.	Short circuited circuit (Fig. 91-12, item L2).	Remove short circuit by repair or replacement of faulty part.
	Faulty **TURN C. 1A** fuse . (up to S/N 0045 incl.).	Detect reason and replace fuse.
	TURN C. circuit breaker is OFF (from S/N 0046 incl.).	Detect reason and circuit breaker ON.
	Cut electric circuit.	Check circuit with ohmmeter and repair or replace faulty parts; replace faulty conductors.
	Faulty Turn-and-Bank Indicator.	Measure voltage at the instrument terminals and if is the same as the feeding source and flag annunciates defect replace Turn-and-Bank Inductor.
Green LED annunciator indicating run of Turn-and-Bank Indicator with emergency electric source is not lit white only Master Switch is on and Turn-an-Bank Indicator operates correctly.	Faulty LED (Fig. 91-12, item L15).	Measure drop of voltage upon LED. It should be 1.6 V. Replace LED if it is less than 1.2 V or higher than 1.8 V.
	Faulty series resistor (Fig. 91-12, item L16).	Measure resistor with ohmmeter. Its resistance should be 1500 Ω ± 10 %. Replace faulty resistor.
Warning flag of Attitude Gyro indicates fault after the **FLIGHT INSTR.** switch turning on.	Short circuited circuit (Fig. 91-12, item L3).	Remove short circuit by repair or replacement of faulty part.
	Faulty **ATT. GYR. 1A** fuse (Up to S/N 0045 incl.).	Detect reason and replace fuse.
	ATT. GYR. circuit breaker is OFF (From S/N 0046 incl.).	Detect reason and circuit breaker ON.
	Cut electric circuit.	Check circuit by means of ohmmeter, repair or replace faulty parts, and defective conductors.
	Faulty Attitude Gyro.	Measure voltage at the terminals of Attitude Gyro and replace the instrument if the voltage is the same as the of board electric network and warning flag is extended.
The Directional Gyro warning flag indicates defect after the **FLIGHT INSTR.** switch is turned on.	Short circuited circuit (Fig. 91-12, item L4)	Remove short circuit by repair or replacement of faulty part.
	Faulty **DIR. GYR. 1A** fuse (up to S/N 0045 incl.).	Detect reason and replace fuse.
	DIR. GYR. circuit breaker is OFF (from S/N 0046 incl.).	Detect reason and circuit breaker ON.
	Cut electric circuit.	Check circuit by means of ohmmeter, repair or replace faulty parts, and defective conductors.
	Faulty Directional Gyro	Measure voltage at the terminals of Directional Gyro and replace the instrument if the voltage is the same as that of board electric network and warning flag is extended.

Fault	Possible reason	Remedy
Pitot-static pressure instruments (airspeed indicator, altimeter, VSI) are not operation.	Frozen pitot head (Fig. 34-1, item 1) or other sensor (2; 4).	Turn **PITOT HEATING and STATIC HEATING** switches on (1 minute on ground).
	Clogged pitot head (1), sensor (2; 4) or coupling plumbing (5; 6, 7) of pitot-static system.	Uncouple the hoses from airspeed indicator, altimeter and VSI ports and blow pitot head and its plumbing (5; 6; 7) with compressed air. Couple the hoses to pertinent ports of airspeed indicator, altimeter and VSI.
	Faulty airspeed indicator, altimeter, Vertical speed indicator.	Replace instrument and send the faulty one to authorized repair shop.

MAINTENANCE

REMOVAL / INSTALLATION

REMOVAL OF INSTRUMENTS FROM INSTRUMENT PANEL

Simple standard removals are not issued this manual.

INSTALLATION OF INSTRUMENTS TO INSTRUMENT PANEL

Installation requirements

CAUTION

RIVETING, DRILLING AND OTHER WORKS IN INSTRUMENT PANEL WITH INSTALLED INSTRUMENTS ARE STRICTLY PROHIBITED.

THE MINIMUM DISTANCE BETWEEN FIXED PARTS OF COCKPIT AND INSTRUMENT PANEL WITH THE INSTRUMETS SHOULD BE AT LEAST 6 mm (0,24 in).

a) The distance between instruments in installation sleeves and instrument panel should be at least 0,5 to 1 mm (0,02 to 0,04 in). The instrument should protrude from instrument panel for at least 0,5 to 1 mm (0,02 to 0,04 in).

b) The electric cables of electric instruments and hoses of pitot static instruments should be of sufficient length and suitably fixed to enable sliding out and tilting the instrument panel.

c) The nuts of electric connectors should be screwed by hand and use of tools is prohibited. Lock the nuts with safety wire.

d) The twin airspeed indicators should be paired to exhibit the same allowance (both + or both -), or the sum of their inaccuracy should be equal to half of permissible allowance.

e) The Attitude Gyro and Turn-and-bank indicator are installed to be parallel with longitudinal axis of airplane.

- Fix the Attitude Gyro in operating position of instrument, i. e. after the airplane is leveled in horizontal position.
- Set the turn - and - bank indicator by its turning round axial to have the ball of slip indicator in the middle position with the allowance ± 0,5 mm (± 0,02 in), when the wings are set to horizontal position using the leveling points upon wings (To achieve this it is possible to file a bit the holes in instrument panel).

REMOVAL OF INSTRUMENT PANEL

Preparatory works

a) Turn master switch off.

Removal of instrument panels

a) Unscrew eight screws (Fig. 31-2, item 4) and four screws (5).

b) Tilt left and right panels (1; 2) of instrument panels with its upper part into the cockpit as the polyamide ropes (6) allow.

c) Slide middle instrument panel (3) in the direction to cockpit.

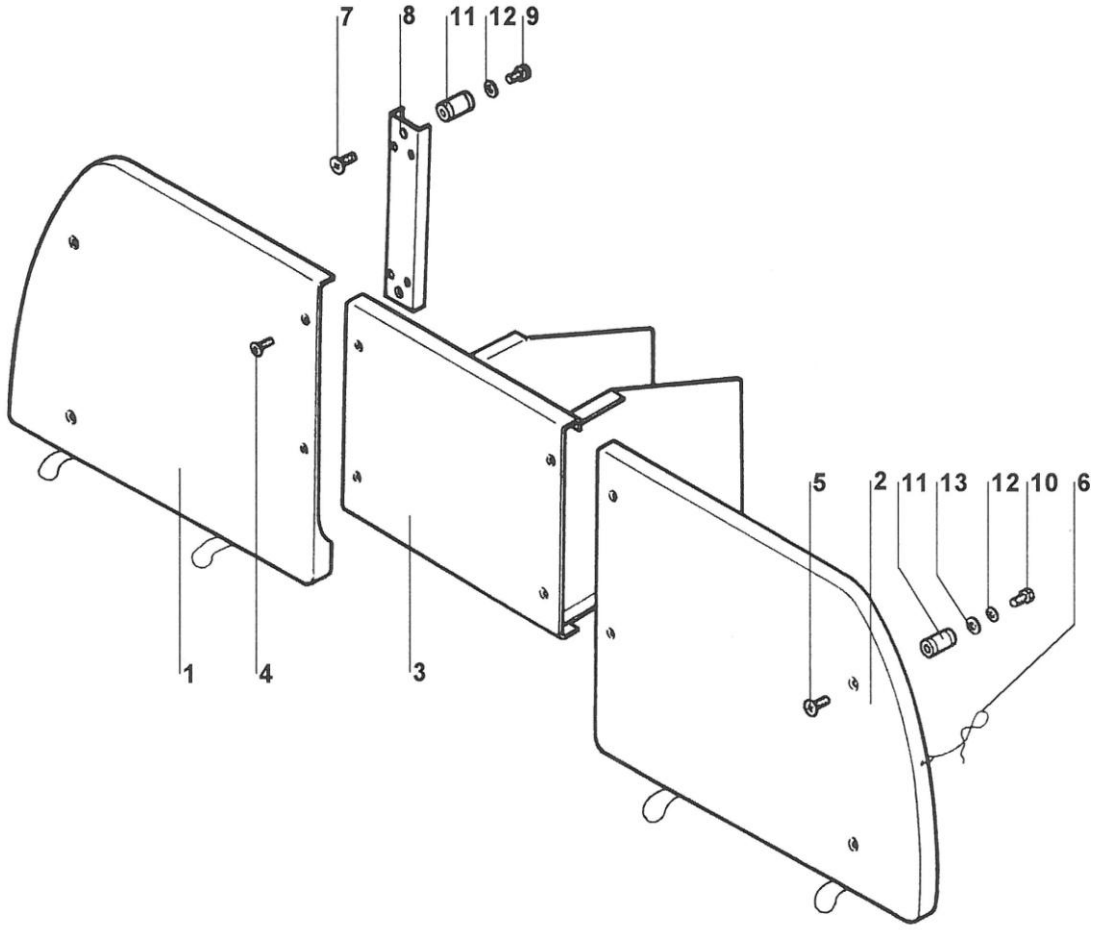
Removal of vibration dampers

a) Unscrew flour screws (7) from holders (8) of instrument panel.

b) Unlock and unscrew four screws (9) and four screws (10). Remove vibration damper (11) with washers (13).

NOTE

The improved access to screws (9; 10) and to vibration dampers (11) may be achieved by removal of cable fixing straps and increase thus (sliding) of instrument panels.



1 ... left panel
2 ... right panel
3 ... middle panel
4 ... screw
5 ... screw
6 ... polyamide rope
7 ... screw
8 ... holder of instrument panel
9 ... screw
10 ... screw
11 ... vibration damper
12 ... washer
13 ... washer

Fig. 31-2 Fixing of instrument panel

EFFECTIVITY: All

INSTALLATION OF INSTRUMENT PANELS

Installation of vibration damper

a) Screw the vibration dampers (Fig. 31-2, item 11) with washers (12; 13) by screws (9; 10) to the vertical consoles of instrument panel. Lock the screws with safety wire.

NOTE

Install washers (13) under the vibration damper (11) only in the outboard sides of left and right instrument panels.

b) Install two holders (8) to fixed vibration dampers (11) of instrument panels by means of countersunk bolts (7).

Installation of instrument panel

CAUTION

THE MINIMUM DISTANCE FROM THE FIXED PARTS OF COCKPIT ALONG THE PERIPHERY OF INSTALLED INSTRUMENT PANELS SHOULD BE 6 mm (0.24 in).

NOTE

Fix the electric cables again if they were released (fixing straps removed) to improve access to instrument panels.

A) Tilt back the left (2) and right (1) instrument panels and slide in the middle panel (3).

B) Fix instrument panels (1; 2; 3) by means of screws (4) to holders (8) and by screw (5) to vibration dampers (11).

INSPECTION / CHECK

NOTE

Send faulty instruments or those not meeting the operational requirements to be repaired.

CHECK OF SERVICEABILITY OF ENGINE INSTRUMENTS

a) Turn Master, **BATTERY** and **ENGINE INSTR.** switches on.

b) Make sure the engine instrument pointers show initial positions.

c) Turn **ENGINE INSTR., BATTERY** and Master switches off.

CHECK OF SERVICEABILITY OF AIRSPEED INDICATORS AND ALTIMETERS

Check serviceability of airspeed indicator and altimeter during tightness test of pitot-static system (34-10-00). The other checks are not required.

APPROVED REPAIRS

REPAIRS OF INSTRUMENT PANELS

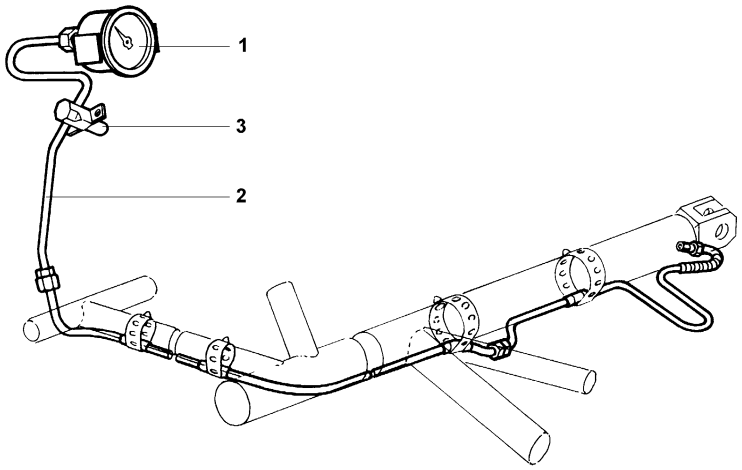
Fault	Remedy
1) Fixing of instrument panels: - Broken or damaged rubber vibration dampers.	Replace faulty vibration dampers.
2) Corrosion of metal parts of instrument panels and faulty paints.	Remove corrosion with emery and repair painting (subsection 51-72-00).

PRESSURE CHECK OF MAIN WING SPAR

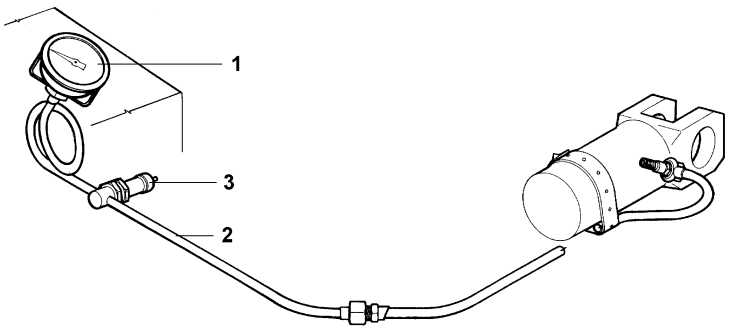
DESCRIPTION AND OPERATION

The pressure gauge (Fig.31-3, item1) serves for continuous check of welds main spar lower flange plate of wing center section. It is located in panel under the instrument panel (up to S/N 0045 incl.), or panel between seats (from S/N 0046 incl.) and joined by pipe (2) with lower spar flange plate. The lower spar flange plate is filled with nitrogen at 200 kPa (29 p.s.i.) that may vary due to temperature change for ± 50 kPa (7 p.s.i.). The nitrogen filling at pressure below 150 kPa (22 p.s.i.) is enabled by the valve (3) that is located in right side of panel under the instrument panel (up to S/N 0045 incl.), or in starboard side panel between seats (from S/N 0046 incl.).

up to S/N 0045 incl.



from S/N 0046 incl.



1 ... pressure gauge
2 ... pipe
3 ... valve

Fig. 31-3 Pressure check of lower flange plate of center section of main wing spar

EFFECTIVITY: All

REPAIRS

Fault	Possible reason	Remedy
The pressure gauge indicates constant drop of nitrogen pressure below 150 kPa (22 p.s.i.) in lower flange plate of main spar.	Untaught valve of pipe couplings	Fill the pressure to 200 kPa (29 p.s.i.) and check tightness of valves and pipe couplings by soap solution. Replace faulty valve and tighten untaught pipe couplings.
	Faulty pressure gauge.	Check pressure gauge (see INSPECTION/CHECK); replace faulty pressure gauge.
	Crack in lower flange plate of main spar.	Enable the flaw detection of lower flange plate of main wing spar and repair of cracks either in manufacture facilities or in authorized repair shop. The main spar may be either repaired or replaced according to character of defect.

MAINTENANCE

INSPECTION / CHECK

CHECK OF PRESSURE GAUGE ACCURACY

a) Couple to the pressure source:
- Checked pressure gauge.
– Checking pressure gauge.

b) Increase pressure gradually at 100 kPa (14.5 p.s.i.) increments to pressure gauge maximum value and then in 100 kPa (14.5 p.s.i.) decrements to zero.

NOTE

The gauge pointer during gradual pressure increase and decrease should move continuously and without seizing.

Compare indicated data of both gauges during pressure increase and increase. The permissible difference may be 2.5 %.

c) Replace faulty pressure gauge.

LIGHT ANNUNCIATION PANEL

DESCRIPTION AND OPERATION

The light annunciation panel is in middle instrument panel. Above the light annunciation panel there is tiltable glare shield that permits, if needed, to dim the intensity of annunciation lights. The light annunciation test push button is at the light annunciation panel.

The wiring diagram of light annunciation panel is issued in subsection 91-42-00.

Outer appearance of the light annunciation panel:

L FUEL LOW LEVEL	**R FUEL LOW LEVEL**	**GENERATOR**	**EXT. POW. SOURCE**
OIL PRESSURE LOSS	**STALL. WARN. INACTIVE**	**PITOT HEATING**	**STATIC HEATING**

The aircraft registered in GFR use instead of **STALL: WARN. INACTIVE** the annunciator:

P/Ü/S - HEIZ. STÖRUNG

Meaning of light annunciators:

L FUEL LOW LEVEL (yellow)	- Remainder of usable fuel in left tank.
R FUEL LOW LEVEL (yellow)	- Remainder of usable fuel in right tank.
GENERATOR (yellow)	- Drop of alternator voltage below 26.2 V.
EXT. POW. SOURCE (yellow)	- Ground power unit connected and switched on.
OIL PRESSURE LOSS (red)	- Oil pressure less than 170 kPa (25 p.s.i.)
P/Ü/S - HEIZ. STÖRUNG (yellow)	- Pitot head, and/or stall warning sensor, and/or static vent heating unserviceable;
STALL. WARN. INACTIVE (white)	- Weight-on-wheel micro-switch disconnected stall warning system.
PITOT HEATING (green)	- Pitot heat, and/or stall warning sensor heating unserviceable.
STATIC HEATING (green)	- Static vent heating unserviceable

MAINTENANCE

INSPECTION / CHECK

CHECK OF SERVICEABILITY OF LIGHT ANNUNCIATION

a) Turn Master, **BATTERY, ENGINE INSTR.** and **FLIGHT INSTR.** switches on. The **STALL WARN. INACTIVE, GENERATOR** and **OIL PRESS. LOSS** annunciators should be lit in the light annunciation panel.

NOTE

The airplane registered in GFR are without independent **STALL WARN. INACTIVE** annunciator.

b) Turn **PITOT HEATING** switch on and the **PITOT HEATING** annunciator in the light annunciation panel should be lit.

NOTE

In case the **PITOT HEATING** (GFR airplane **P/Ü/S - HEIZ. STÖRUNG** is lit) annunciator is not lit either the pitot or stall warning heating circuits are faulty. The actual state of these sensors should checked by finger touch.

The **PITOT HEATING** switch should be turned off immediately after heating check (max. 1 minute).

c) Turn **STATIC HEATING** switch on and the **STATIC HEATING** annunciator in the light annunciation panel should be lit.

NOTE

In case the **STATIC HEATING** (GFR airplane **P/Ü/S - HEIZ. STÖRUNG** is lit) annunciator is not lit any of two static vent heating is faulty. The actual state of these sensors should be checked by finger touch.

The **STATIC HEATING** switch should be turned off immediately after heating check (max. 1 minute).

d) Press **SIGNALLING CHECK** push button and audio warning signal should be heard and all the annunciation lights in the annunciation light panel should be lit.