

**THE RUSSIAN FEDERATION
MINISTRY OF TRANSPORT OF THE RUSSIAN FEDERATION
FEDERAL AIR TRANSPORT AGENCY**

AIRWORTHINESS DIRECTIVE (AD)

April 27, 2024

No.2024-FATA-02074(16-Д)-05

Applicability – PS-90A, PS-90A-76, PS-90A1 Type Engines

Design Organization Country – the Russian Federation

The corrective actions described in the present AD are mandatory. No operator may operate an aircraft subject to this AD other than in accordance with the requirements of this AD.

Subsequent to the flight accident that occurred on 12/04/2024 with the IL-76TD-90VD aircraft (RA-76952) associated with the in-flight shutdown of the PS-90A-76 engine No. 3949853102039B1p7 caused by blades and vanes separation and missing low pressure turbine 3rd stage split ring sector retaining pins, to support continued airworthiness of the PS-90A, PS-90A-76, PS-90A1 engines in order to ensure flight safety of the Russian Federation civil aviation aircraft fleet and based on the Technical Decision of UEC-Aviadvigatel No.PШ-0110-2024 dd 22/04/2024 (hereinafter – the Technical Decision)

IT IS HEREBY DEMANDED THAT:

The operators of the PS-90A, PS-90A-76, PS-90A1 engines listed in Annex A to the Technical Decision are to perform an unscheduled inspection of engine core cases to check missing low pressure turbine nozzle vanes assembly split ring retaining pins during the nearest scheduled periodic aircraft B-Check.

2. The unscheduled inspection is to be performed in accordance with the recommendations contained in the Technical Decision. The results of the works completed are to be recorded in the inspection logs to be distributed to the engines design and manufacturing organizations.

3. The Airworthiness Directive (AD) enters into force on 03/05/2024 and terminates upon fulfillment of the provisions of paragraphs 1-2 hereof.

Attachment: Technical Decision No.PШ-0110-2024 dd 22/04/2024, 50 pages.

A.A. Dobryakov
Deputy Director of Federal Air Transport Agency



АКЦИОНЕРНОЕ ОБЩЕСТВО «ОДК-АВИАДВИГАТЕЛЬ»

СОГЛАСОВАНО

Начальник 209 ВП МО РФ

В.Б. Мишенин

«22» 04 2024 г.

УТВЕРЖДАЮ

Заместитель генерального
конструктора - главный
конструктор авиационных
двигателей
АО «ОДК-Авиадвигатель»

А.В. Бусыгин

«19» 04 2024 г.

Главный инженер
АО «ОДК-ПМ»

В.Т. Хайрулин

«19» 04 2024 г.

РЕШЕНИЕ

По поддержанию летной годности двигателей
ПС-90А, ПС-90А-76, ПС-90А1

«22» апреля 2024 г.

№ РИИ-0110-2024

Пермь

На 6 листах

CONCURRED

Head of the Military Representative
Office of the RF Ministry of Defense 209

V.B. Mishenin

22/04/2024

Chief Engineer
JSC “UEC-Perm Engines”

V.T. Khairulin

19/04/2024

APPROVED

Deputy General Designer –
Chief Designer, Aero Engines
JSC “UEC-Aviadvigatel”

A.V. Busygin

19/04/2024

DECISION

on Continued Airworthiness of the PS-90A, PS-90A-76, PS-90A1 Engines

22 April 2024

Perm

No. ПШ-0110-2024

6 pages

The event of in-flight shutdown of the PS-90A-76 engine No. 3949853102039B1p7 was observed on the IL-76TD-90VD aircraft (RA-76952) on 12 April 2024. The aircraft was in a holding zone in Ulyanovsk-Vostochniy airport.

Flowpath inspection (technical report No.191/952 dd 17/04/24) detected multiple separations of low pressure turbine blades and vanes and missing turbine 3rd stage split ring sector retaining pins.

According to the Maintenance Manual, the routine turbine external cases inspection operations are to be performed at the following engines:

- PS-90A (at Tu-204/214 aircraft)– after 900 flight hours (further on every 900 flights hours);
- PS-90A, PS-90A-76, PS-90A1 (at other types of aircraft) – after 500 flights hours (further on every 500 flights hours).

DECIDED:

An unscheduled inspection of engine core cases is to be performed on the PS-90A, PS-90A-76, PS-90A1 engines listed in Annex A to check missing low pressure turbine nozzle vanes assembly split ring retaining pins.

The first time the anomaly was detected on the engine 3949044202043/11B2P5 overhauled on 11/10/2018, therefore the inspection is to cover the engines made and overhauled after 01/01/2018 the operating time of which is from 200 flight hours after manufacturing or overhaul up to the operating time corresponding to the first inspection - 500 or 900 flight hours depending on the type of the aircraft.

The inspection is to be combined with the nearest scheduled B-Check.

The inspection is to be performed in accordance with the Engine Operation Manual:

PS-90A: 94-00-807PЭ Section 072.00.00и Page 621...622л Task Card “Inspection of Engine Core Cases and System Elements Located on Them”;

PS-90A-76: 85-00-800PЭ Section 072.00.00к Page 629...640б Task Card “Inspection of Engine Core Cases and System Elements Located on Them”;

PS-90A1: 194-00-800PЭ Section PSA1-A-72-00-00-02R-300A-A Task Card “Inspection of Engine Core Cases and System Elements Located on Them”.

If it is found out that the pins on the engine are missing, the relevant report is to be issued and forwarded to UEC-Aviadvigatel to take the decision on further operation of the engine.

Annex A

List of engines subject to inspection to find out missing pins in turbine nozzle vane assemblies

Engine No.	A/C No.	TTSN, hrs	TSO, hrs	Operator	Engine type	Aircraft type
3949044832463	96025	270	0	"Rossiya" Government Squadron	PS-90A	IL-96-300
3949043832449	96025	275	0	"Rossiya" Government Squadron	PS-90A	IL-96-300
3949043832455	96025	276	0	"Rossiya" Government Squadron	PS-90A	IL-96-300
3949043832450	96025	278	0	"Rossiya" Government Squadron	PS-90A	IL-96-300
3949044732325	96024	371	0	"Rossiya" Government Squadron	PS-90A	IL-96-300
3949042532228	64524	374	0	"Rossiya" Government Squadron	PS-90A	TU-214
3949042932441	64534	374	0	Special Purpose United Air Detachment (Vnukovo)	PS-90A	TU-214
3940054332067	96104	375	0	Special Purpose United Air Detachment (Vnukovo)	PS-90A1	IL-96-400T
3949044732263	96024	379	0	"Rossiya" Government Squadron	PS-90A	IL-96-300
3949043932477	64534	411	0	Special Purpose United Air Detachment (Vnukovo)	PS-90A	TU-214
3949853533185	78650 (0102)	458	0	Branch company of IL-Aviastar (Ulyanovsk)	PS-90A-76	IL-76MD-90A
3949042532227	64531	617	0	"Rossiya" Government Squadron	PS-90A	TU-214
3949044322019 p2	CU-T1702	12787	206	AK "Cubana de Aviacion S.A."	PS-90A	TU-204-100E
3949043902009 e1p4	64518	16986	367	Red Wings	PS-90A	TU-214
3949041102009 e1n1p4	64518	21648	373	Red Wings	PS-90A	TU-214
3949852622047 p2	4K-AZ100	18044	389	Silk Way Airlines	PS-90A-76	IL-76TD-90
3949042922003 p2	64051	7992	648	Russian Post	PS-90A	TU-204-100C
3949042822147 p1	64010	5547	795	Business Aero	PS-90A	TU-204-300

Approval Sheet

СЭД "DIRECTUM"
ID 15557155

Лист согласования

Решение № РШ-0110-2024 от 18.04.2024 По поддержанию летной годности двигателей ПС-90А, ПС-90А-76, ПС-90А1

Ответственный за согласование - Хряк Кирилл Сергеевич
Руководитель подразделения - Стариков Дмитрий Сергеевич

Занесение в ЕСП – Нет

Кто подписал (За кого поставлена подпись)	Должность	Дата проставления ЭЦП	Версия документа	Примечание к подписи
Кузцов Роман Олегович	Начальник управления безопасности полетов и надежности изделий рук-во убп	18.04.2024 19:41:02	3	С комментариями
Самохвалов Николай Юрьевич	Начальник отделения турбин 204	19.04.2024 08:11:25	3	
Голышков Михаил Сергеевич	Заместитель начальника отдела по обеспечению эксплуатационной надежности КО-2941	19.04.2024 09:37:57	4	
Кузнецов Виктор Павлович	Начальник отделения авиационных двигателей (отд.294)	19.04.2024 10:23:48	5	
Овчинников Павел Владимирович	Начальник отдела КО-401	19.04.2024 13:13:45	6	
Козчанов Дмитрий Павлович	Начальник отдела	19.04.2024 13:15:30	6	
Валетов Илья Игоревич	Начальник отделения летных испытаний и эксплуатации (отд.400)	19.04.2024 13:40:33	6	
Морозов Василий Михайлович	Начальник отдела	19.04.2024 14:02:48	7	
Кедало Михаил Петрович	Начальник управления	19.04.2024 14:16:04	7	С комментариями
Хряк Кирилл Сергеевич	Заместитель начальника отдела по авиационным двигателям и ГТУ на базе двигателя Д-30 КО-2041	19.04.2024 16:17:51	8	
Уткин Павел Александрович	Заместитель генерального конструктора по эксплуатации	19.04.2024 16:43:07	8	

Комментарии к подписям:

Кто подписал (За кого поставлена подпись)	Должность	Дата	Версия док.	Комментарии к подписи	Комментарий инициатора
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Руководитель подразделения: _____ /
Документ соответствует электронной версии, список ЭЦП верен,
Подтверждаю _____ /Овчинников П.В./ 19.04.2024

СЭД "DIRECTUM"

Лист согласования (продолжение)

Решение № РИП-0110-2024 от 18.04.2024 По поддержанию летной годности двигателей ИС-90А, ИС-90А-76, ИС-90А1

ID 15557155

Кто подписал (За кого поставлена подпись)	Должность	Дата	Версия док.	Комментарии к подписи	Комментарий инициатора
Кутузов Роман Олегович	Начальник управления безопасности полетов и надежности изделий рук-во уби	18.04.2024 19:41:02	3	Скорректировать список двигателей (направлен по Outlook).	Скорректирован.
Кедало Михаил Петрович	Начальник управления	19.04.2024 14:16:04	7	Замечания Морозова ВМ у Вас в почте.	Учтены.

209877
19.04.2024
Д.Ю.Цепенников

to Maintenance Manual No	TASK CARD	Pages 629... 640б	
Maintenance Manual Item	Task Title INSPECTION OF ENGINE CORE CASES AND SYSTEM ELEMENTS LOCATED ON THEM (FIGURES 603a... 603л)	Manpower MII	
Description of Operations and Technical Requirements		Works to be performed in case of noncompliance with Technical Requirements	Check
WARNING. 1 LOCK THE THRUST REVERSER IN THE FORWARD THRUST POSITION IN ACCORDANCE WITH TASK CARD 072.80.00, PAGE 209. 2 INSTALL A BANNER PROHIBITING ENGINE STARTING AND CONNECTION OF THE HYDRAULIC PLANT TO THE ENGINE HYDRAULIC SYSTEM IN THE COCKPIT. 3 PERFORM THE WORKS IN THE FAN DUCT WITH TWO PERSONS USING AN INTERCOMMUNICATION SYSTEM. ONE EMPLOYEE MUST ALWAYS STAY NEAR THE THRUST REVERSER CONTROL LEVER AND PREVENT ITS OCCASIONAL ACTUATION. 1 Remove the plug from the nozzle. 2 Mount a fixture for working in the fan duct (072.70.00, Page 401). 3 Remove engine core skin panels according to Task Card 072.70.00, Page 407. 4 Inspect engine core and turbine cases. 5 Inspect the following items located on the cases: - units as per Figure 603a and Table 1 and air-to-air heat exchanger 94-10-8258 as per 075.00.04, Page 421. - pipes, brackets. During inspection of the ice protection system (IPS) control lever and environment control pipeline additionally follow the Task Card 075.00.00, Page 421 - electric harnesses. During inspection of IGV, HPC 1V and 2V control mechanisms use Figure 603л.			

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
In the process of inspection make sure that there are no: - cracking and damage of guide vanes turning levers 1 - cracking and cleaving of levers 2 in tie-rods attachment locations - tie-rods 5 bending and slipping of threaded couplings on the tie-rods - loosening of nuts 6 in tie-rods and levers connections, no backlash - make sure that locking wire 3 and locking pins 4 are in place and intact During inspection of turbine 2-6th stage nozzle vanes assembly cases for no cracking pay special attention to the zones shown in Figure 603r. Also pay attention to the zone for vanes inspection on the 2nd stage nozzle vanes assembly. The locations of potential cracking on the 2nd stage nozzle vanes assembly case are presented in Figure 603д, and those near the vanes inspection hatch – in Figure 603e. CAUTION. 1 MAKE SURE THAT THERE IS NO DAMAGE (PIPELINES CRACKING AND BREAKDOWN, CRACKS ON BRACKETS, VALVES), FUEL AND OIL LEAKS, THAT THE GASKETS AND LOCKERS ARE INTACT, THERE IS NO CONTACT OF PIPELINES AND ELECTRIC HARNESSSES BETWEEN THEMSELVES AND WITH THE ENGINE. 2 WHEN IMPLEMENTING STEP 4, ADDITIONALLY FOLLOW: - FIGURE 603б - DURING INSPECTION OF HPT 2ND STAGE BLADES COOLING VALVE ATTACHMENT BRACKETS - FIGURE 603в - DURING INSPECTION OF ICE PROTECTION SYSTEM CONTROL LEVER SUPPORT BRACKETS, TURBINE 1ST STAGE BLADES COOLING VALVES. 3 BASED ON THE RESULTS OF INSPECTION ADDRESS THE ISSUE OF FURTHER OPERATION OF THE ENGINE WITH THE MANUFACTURER'S REPRESENTATIVE. Notes - 1 Use a mirror for inspection of units, brackets and other systems elements in hard-to-reach locations. 2 Check of valves kinematic links serviceability as per para.7 of Table 1 includes: - evaluate (visually and by hand) no tie-rods and levers disengagement; - evaluate (by hand) no slipping of threaded couplings on the tie-rods; - evaluate (by hand) no backlash beyond 1 mm in tie-rods and levers connections; - check (visually) parallelism of both IPS control levers position (Figure 603в).		



Description of Operations and Technical Requirements		Works to be performed in case of noncompliance with Technical Requirements	Check
6 Install the removed engine core skin panels as per Task Card 072.70.00, Page 411. CAUTION. LOCKS CLOSURE SHALL PRODUCE THE SOUND OF RATCHET. IF THERE IS NO SOUND OF RATCHET, REPLACE THE LOCK AS PER TASK CARD 072.70.00, PAGE 203. 7 Dismantle the fixture for working in the fan duct (072.70.00, Page 401). Take away the mats from the engine fan duct and make sure that there are no foreign items. 8 Plug the engine nozzle. CAUTION. REMOVE THE THRUST REVERSER LOCKS AS PER TASK CARD 072.80.00, PAGE 209. 9 Close engine cowls.			
Instrumentation	Tools and fixtures	Consumables	
	Hand lamp 93-27-844 Special medium-size screwdriver 702260 Mirror for mounting 32-27-827 Intercom device	Lubricant ЦИАТИМ-221 GOST 9433-80 - 0.1 kg Cloth with finished edges 0.4 x 0.4 m made of cotton fabric GOST 29298-2005 - 4 pcs.	

Description of Operations and Technical Requirements

Works to be performed in case of
noncompliance with
Technical Requirements

Check

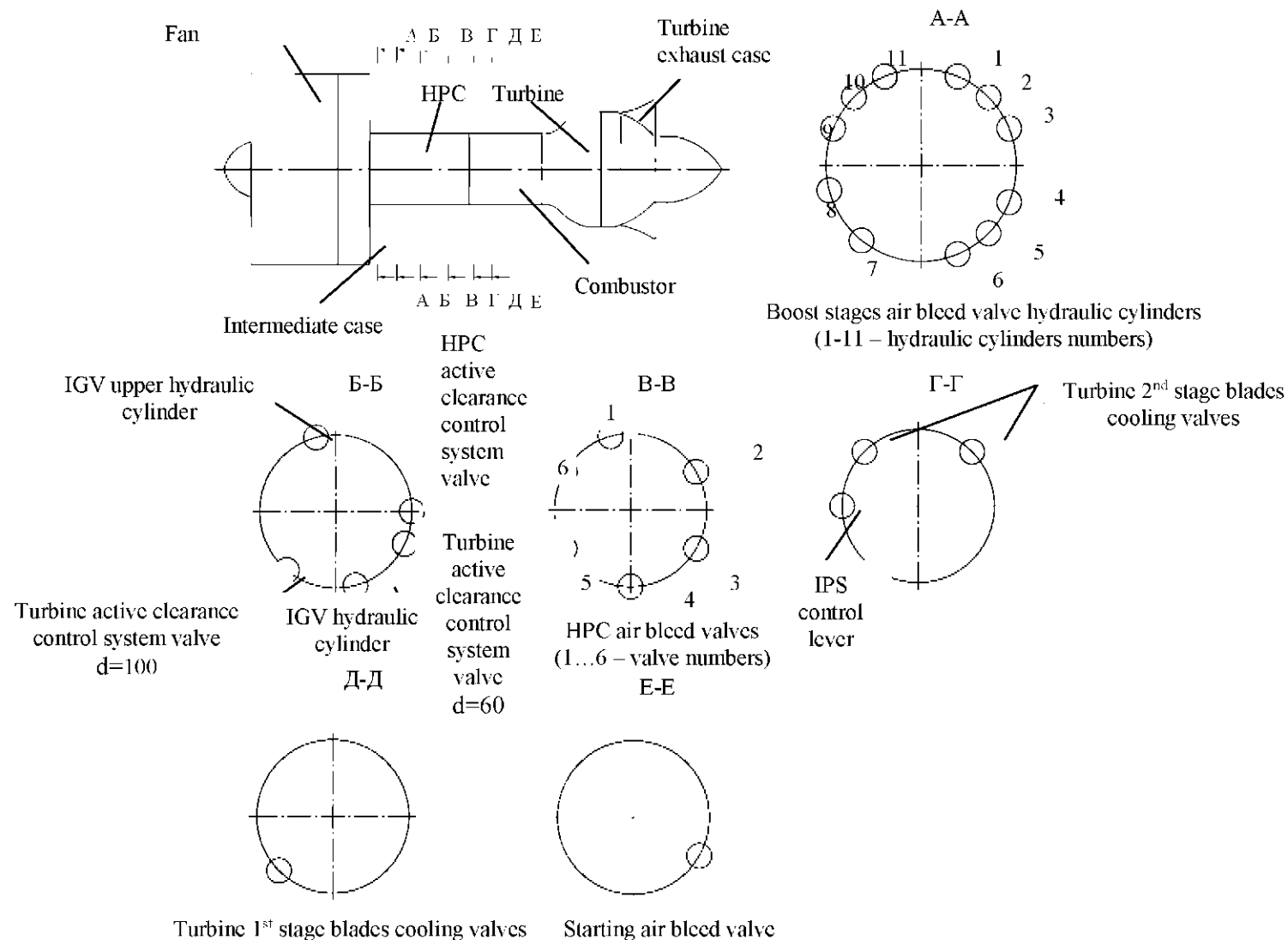
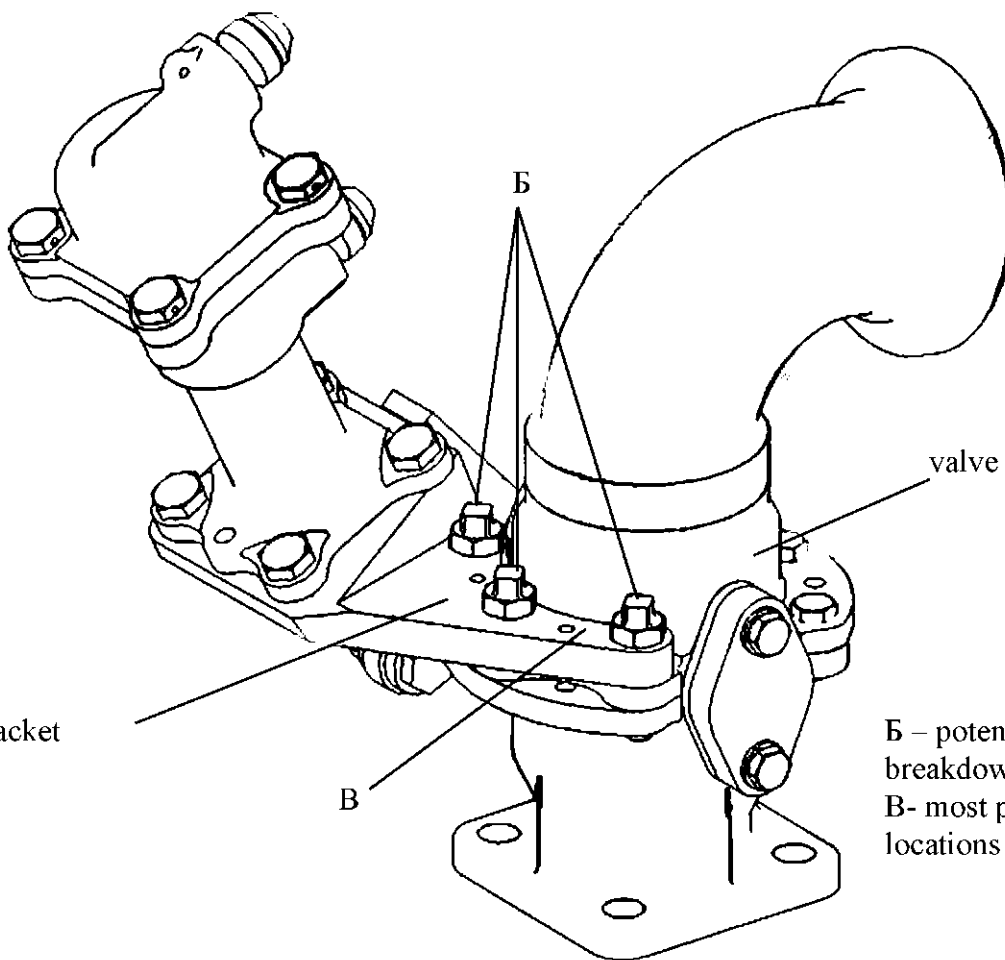


Figure 603a - Position of the engine core units

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
 valve bracket B – potential screw head breakdown locations B- most probable cracking locations Figure 6036 – Inspection of HPT 2B cooling valve brackets		

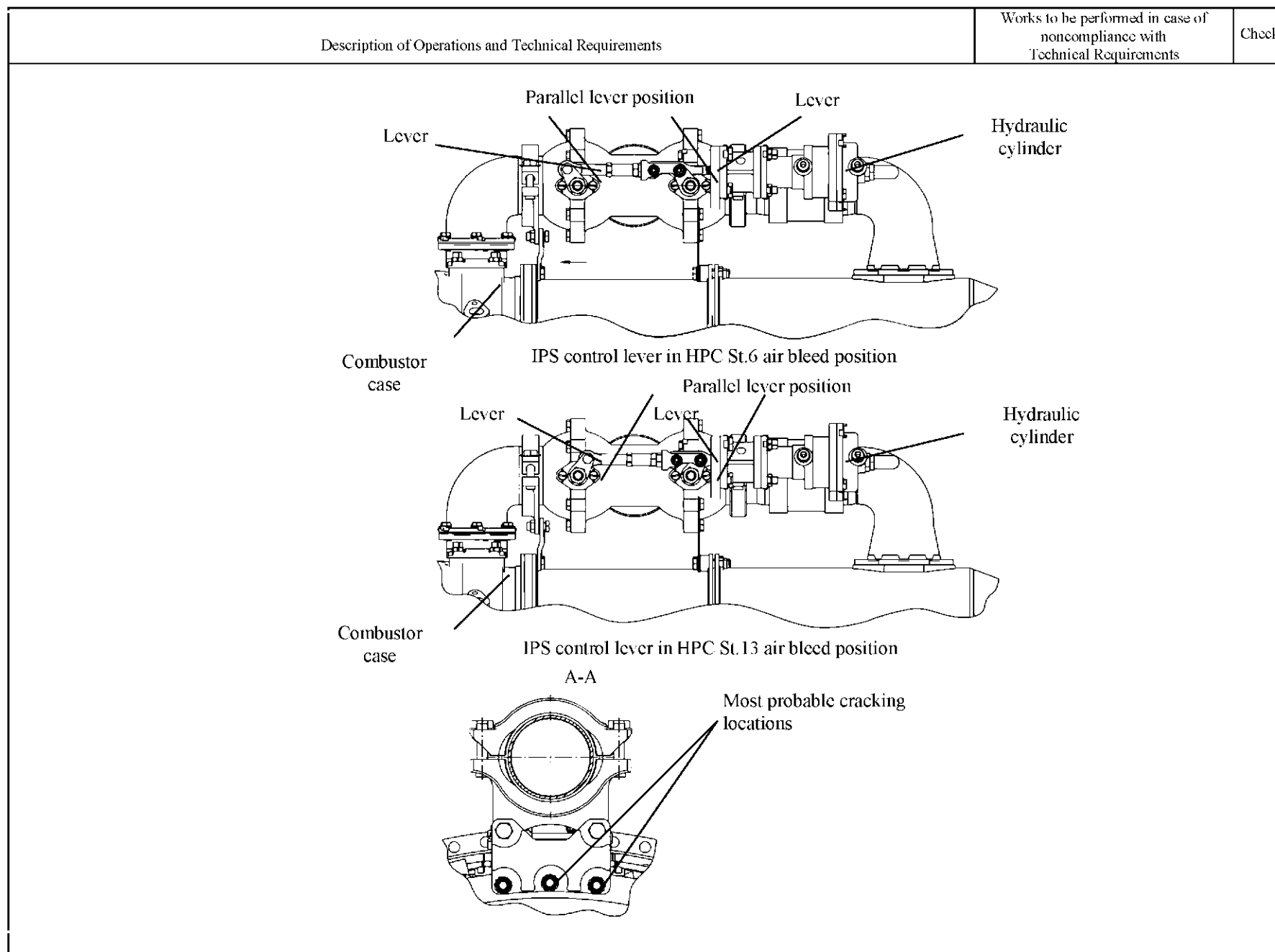
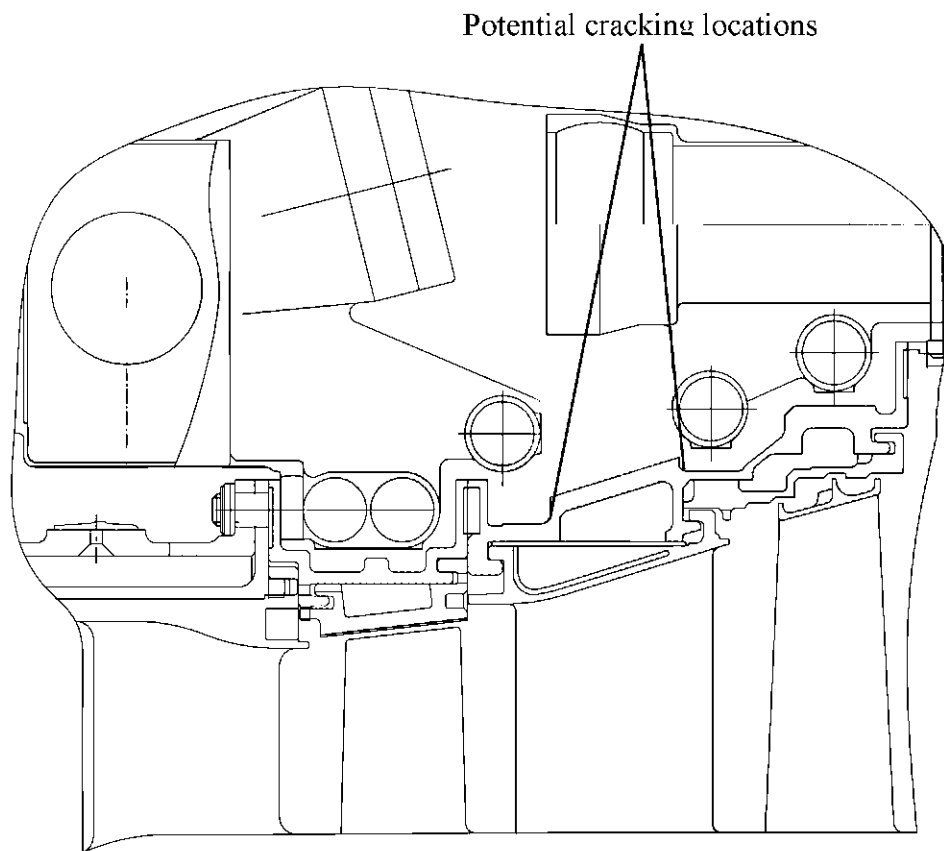


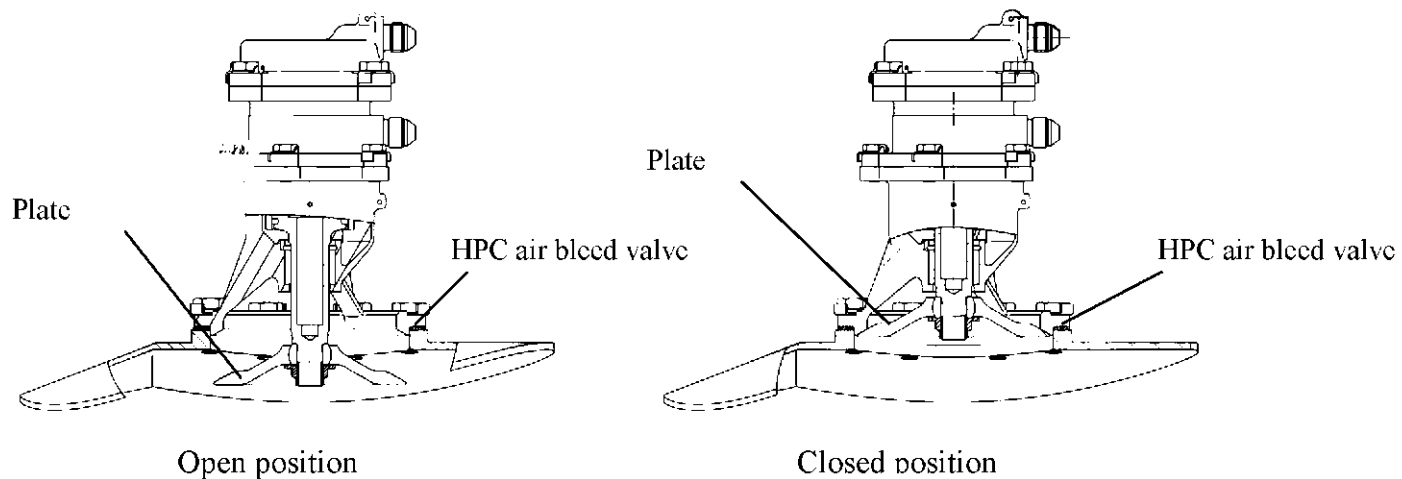
Figure 603B – Inspection of IPS control lever position

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
The diagram illustrates a cross-section of a turbine nozzle vanes assembly. Four specific inspection points are highlighted with leader lines and labels: 3V points to the upper part of the first vane; 4V points to the upper part of the second vane; 5V points to the upper part of the third vane; and 6V points to the upper part of the fourth vane. The assembly consists of multiple vertical vanes mounted on a base, with various seals and fasteners visible at the joints. Figure 603r - Turbine nozzle vanes assembly cases inspection locations		

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
 Figure 603д - Turbine nozzle vanes assembly cases inspection locations. 2nd stage nozzle vanes assembly case.		

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
Potential cracking locations Figure 603e - Turbine nozzle vanes assembly cases inspection locations. Vanes inspection hatch		

Description of Operations and Technical Requirements								Works to be performed in case of noncompliance with Technical Requirements	Check	
Table 1 - Necessary inspections of the units located on the engine core cases										
Inspection focus	Boost stages air bleed valve hydraulic cylinders (11 pcs.)	IGV hydraulic cylinders (2 pcs.)	HPC active clearance control system valve	Turbine active clearance control system valve Ø 60	Turbine active clearance control system e valve Ø 100	HPC air bleed valves (6 pcs.)	IPS control lever	Turbine 1 st stage blades cooling valve	Turbine 2 nd stage blades cooling valves (2 pcs.)	Starting air bleed valve
No fuel leak in the hydraulic cylinder	+	+	+	+	+	+	+	+	+	-
Damage or absence of lockers	+	+	+	+	+	+	+	+	+	+
Absence or unscrewing of screws	+	+	+	+	+	+	+	+	+	+
No cracks on the parts and their damage	+	+	+	+	+	+	+	+	+	+
Intactness of gaskets between unit and combustor case flanges	-	-	-	-	-	-	+	+	+	+
Valve position correspondence to the shut down engine condition	-	-	+	+	+	+	-	+	+	-
Serviceability of kinematic links	-	-	-	-	-	-	+	+	+	-
Note "+" – check required "-" – check not required										

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
 Open position Closed position Figure 603ж – Check of HPC air bleed valves position correspondence to the shut down engine condition by the position of the plate (valves position - open)		

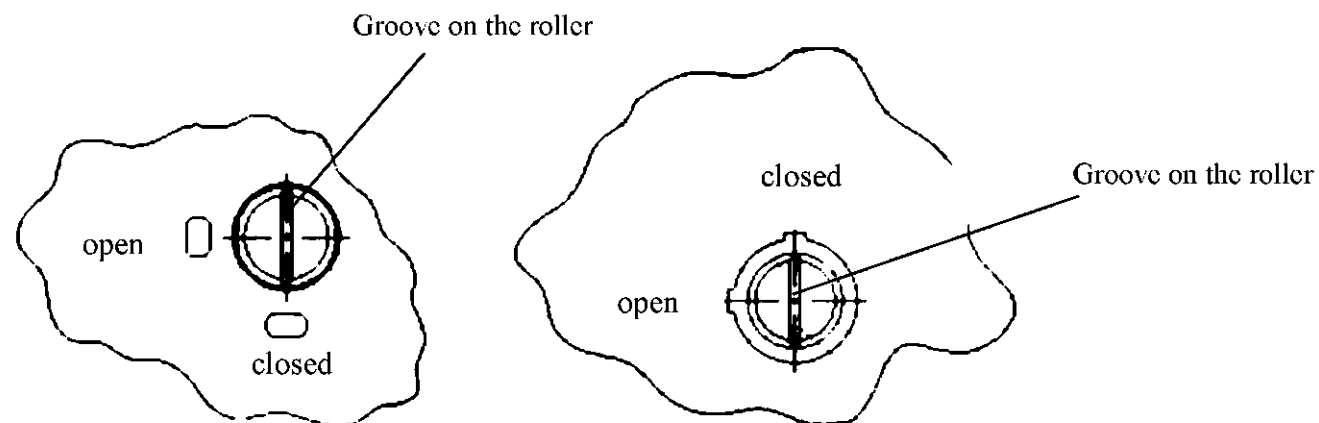
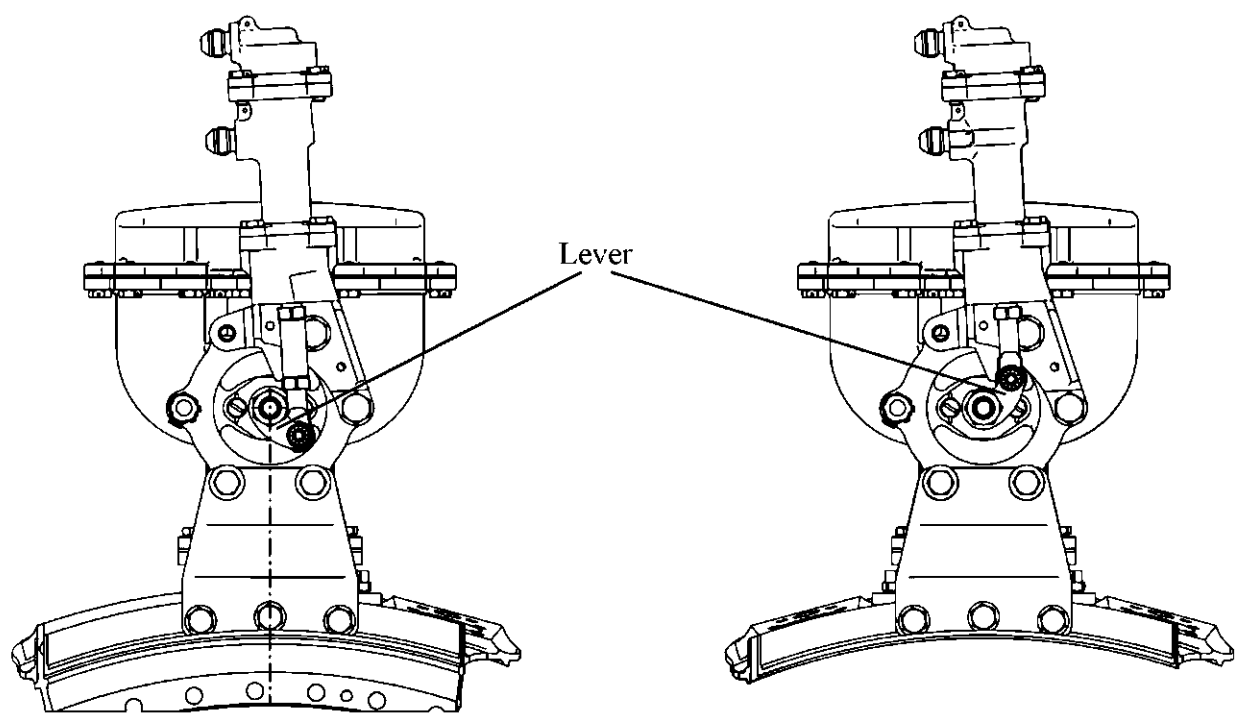
Turbine active clearance control system valve $d=60$ mmTurbine active clearance control system valve $d=100$ mm

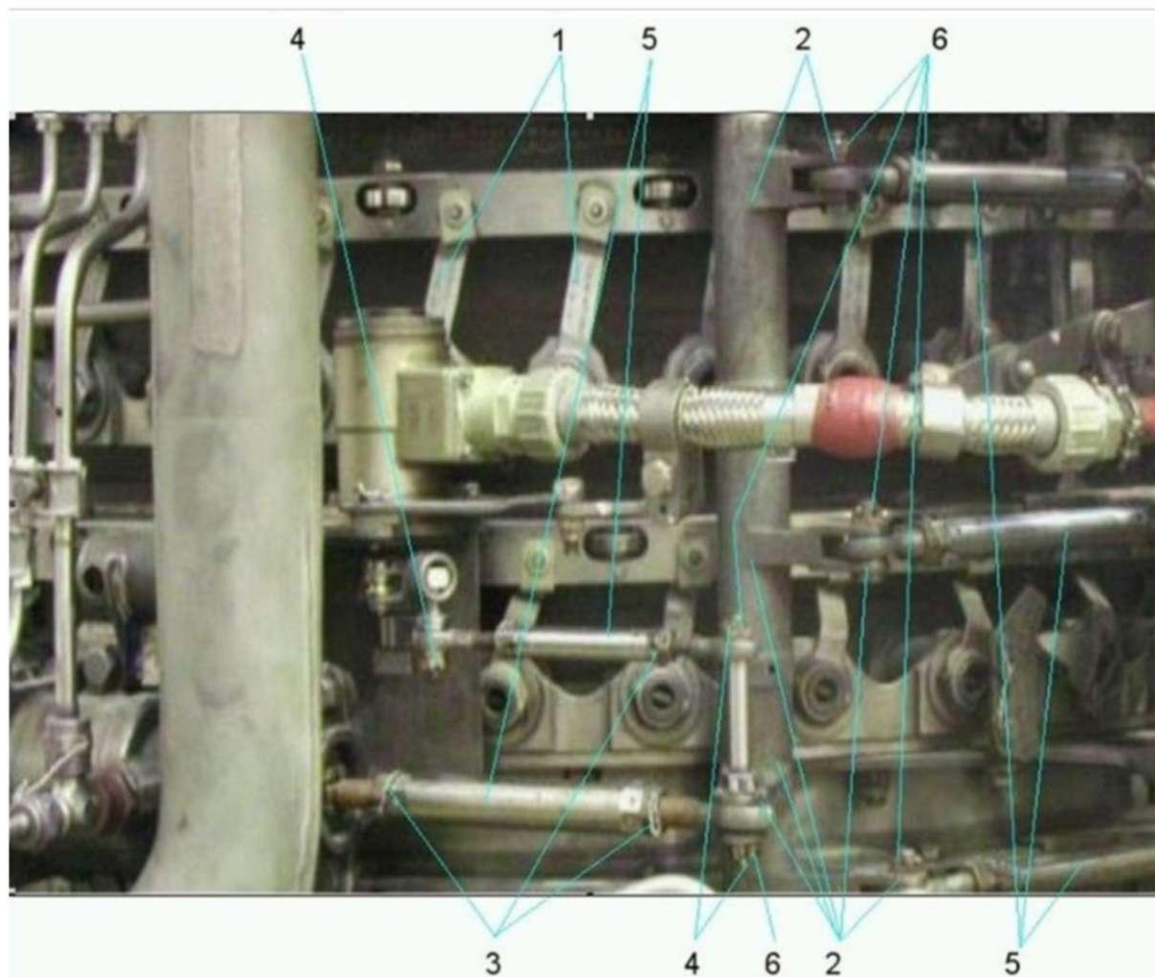
Figure 603и – Check of active clearance control system valve position correspondence to the shut down engine condition by the position of the groove on the roller (valves position - closed)

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
 Open position Closed position Figure 603к - Check of turbine 1B cooling valve position correspondence to the shut down engine condition by the position of the lever (valves position - open)		

Description of Operations and Technical Requirements

Works to be performed in case of
noncompliance with
Technical Requirements

Check



- 1 – guide vanes turning levers
- 2 – tie-rods attachment levers
- 3 – locking wire

- 4 – locking pins
- 5 – tie-rods
- 6 – nuts

Figure 603л – Inspection of IGV, 1V and 2V control mechanism

to Maintenance Manual No _	TASK CARD		Pages 621...622л
Maintenance Manual Item 072.00.00и	Task Title INSPECTION OF ENGINE CORE CASES AND SYSTEM ELEMENTS LOCATED ON THEM (FIGURES 603а, 603б, 603в, 603г, 603д, 603е, 603ж, 603и)	Manpower MH	
Description of Operations and Technical Requirements		Works to be performed in case of noncompliance with Technical Requirements	Check
WARNING 1. LOCK THE THRUST REVERSER IN THE FORWARD THRUST POSITION (072.80.00, PAGE 209 OR 073.21.00, PAGE 203). 2. PERFORM THE WORKS IN THE FAN DUCT WITH TWO PERSONS USING AN INTERCOMMUNICATION SYSTEM. ONE EMPLOYEE MUST ALWAYS STAY NEAR THE THRUST REVERSER CONTROL LEVER AND PREVENT ITS OCCASIONAL ACTUATION 1. Remove the plug from the nozzle. 1а. Install a stepladder. 1б. Mount a fixture for working in the fan duct (072.70.00, Page 209). 2. Remove engine core skin panels by opening panel locks. To open panel locks turn lock screws by 2...2.5 revolutions counterclockwise (072.70.00, Page 401). 3. Inspect the following items located on the cases: - units as per Figure 603а and Tables 1 and 2; - pipes, brackets. During inspection of the ice protection system (IPS) control lever and environment control pipeline (Figure 603г) additionally follow the Task Card 075.00.00, Page 433; - electric harnesses; - VVT-90 air-to-air heat exchanger (075.00.00, Page 601) (for the engines with VVT-90). CAUTION. 1. MAKE SURE THAT THERE IS NO DAMAGE (PIPELINES CRACKING AND BREAKDOWN, CRACKS ON BRACKETS, VALVES), FUEL AND OIL LEAKS, THAT THE GASKETS AND LOCKERS ARE INTACT, THERE IS NO CONTACT OF PIPELINES AND ELECTRIC HARNESSSES BETWEEN THEMSELVES AND WITH THE ENGINE. 2. WHEN IMPLEMENTING STEP 3, ADDITIONALLY FOLLOW: - FIGURE 603б – DURING INSPECTION OF TURBINE 2ND STAGE BLADES COOLING VALVE ATTACHMENT BRACKETS;			



Description of Operations and Technical Requirements								Works to be performed in case of noncompliance with Technical Requirements		Check
- FIGURE 603r – DURING INSPECTION OF ICE PROTECTION SYSTEM CONTROL LEVER SUPPORT BRACKETS, TURBINE 1ST STAGE BLADES COOLING VALVES AND ENVIRONMENT CONTROL PIPELINE WITH HPC 13TH STAGE AIR; - FIGURE 603д – DURING INSPECTION OF ENVIRONMENT CONTROL PIPELINE WITH HPC 13TH STAGE AIR; 3. BASED ON THE RESULTS OF INSPECTION ADDRESS THE ISSUE OF FURTHER OPERATION OF THE ENGINE WITH THE MANUFACTURER’S REPRESENTATIVE. Notes - 1. Use a mirror for inspection of units, brackets and other systems elements in hard-to-reach locations. 2. Perform inspection of the environment control pipeline with HPC 13th stage air and pipeline support bracket only on Tu-204, Tu-214 aircraft. Table 1 – Necessary inspections of the units located on the engine core cases										
Inspection focus	Description of the unit									
	Boost stages air bleed valve hydraulic cylinders (11 pcs.)	IGV hydraulic cylinders (2 pcs.)	HPC active clearance control system valve	Turbine active clearance control system valve Ø 60	Turbine active clearance control system e valve Ø 100	HPC air bleed valves (6 pcs.)	IPS control lever	Turbine 1 st stage blades cooling valves (2 pcs.)	Turbine 2 nd stage blades cooling valves (2 pcs.)	Starting air bleed valve
1. No fuel leak in the hydraulic cylinder	+	+	+	+	+	+	+	+	+	–
2. Damage or absence of lockers	+	+	+	+	+	+	+	+	+	+
3. Absence or unscrewing of screws	+	+	+	+	+	+	+	+	+	+

Description of Operations and Technical Requirements								Works to be performed in case of noncompliance with Technical Requirements		Check
Table 1 continued										
Inspection focus	Boost stages air bleed valve hydraulic cylinders (11 pcs.)	IGV hydraulic cylinders (2 pcs.)	HPC active clearance control system valve	Turbine active clearance control system valve Ø 60	Turbine active clearance control system e valve Ø 100	HPC air bleed valves (6 pcs.)	IPS control lever	Turbine 1 st stage blades cooling valves (2 pcs.)	Turbine 2 nd stage blades cooling valves (2 pcs.)	Starting air bleed valve
4 No cracks on the parts and their damage	+	+	+	+	+	+	+	+	+	+
5 Intactness of gaskets between unit and combustor case flanges	-	-	-	-	-	-	+	+	+	+
6 Valve position correspondence to the shut down engine condition	-	-	+	+	+	+	-	+	+	-
7 Serviceability of kinematic links	-	-	-	-	-	-	+	+	+	-
"+" – check required "-" – check not required Note. Check of valves kinematic links serviceability as per para.7 includes: - evaluate (visually and by hand) no tie-rods and levers disengagement; - evaluate (by hand) no slipping of threaded couplings on the tie-rods; - evaluate (by hand) no backlash beyond 1 mm in tie-rods and levers connections; - check (visually) parallelism of both IPS control levers position (see Figure 603B).										

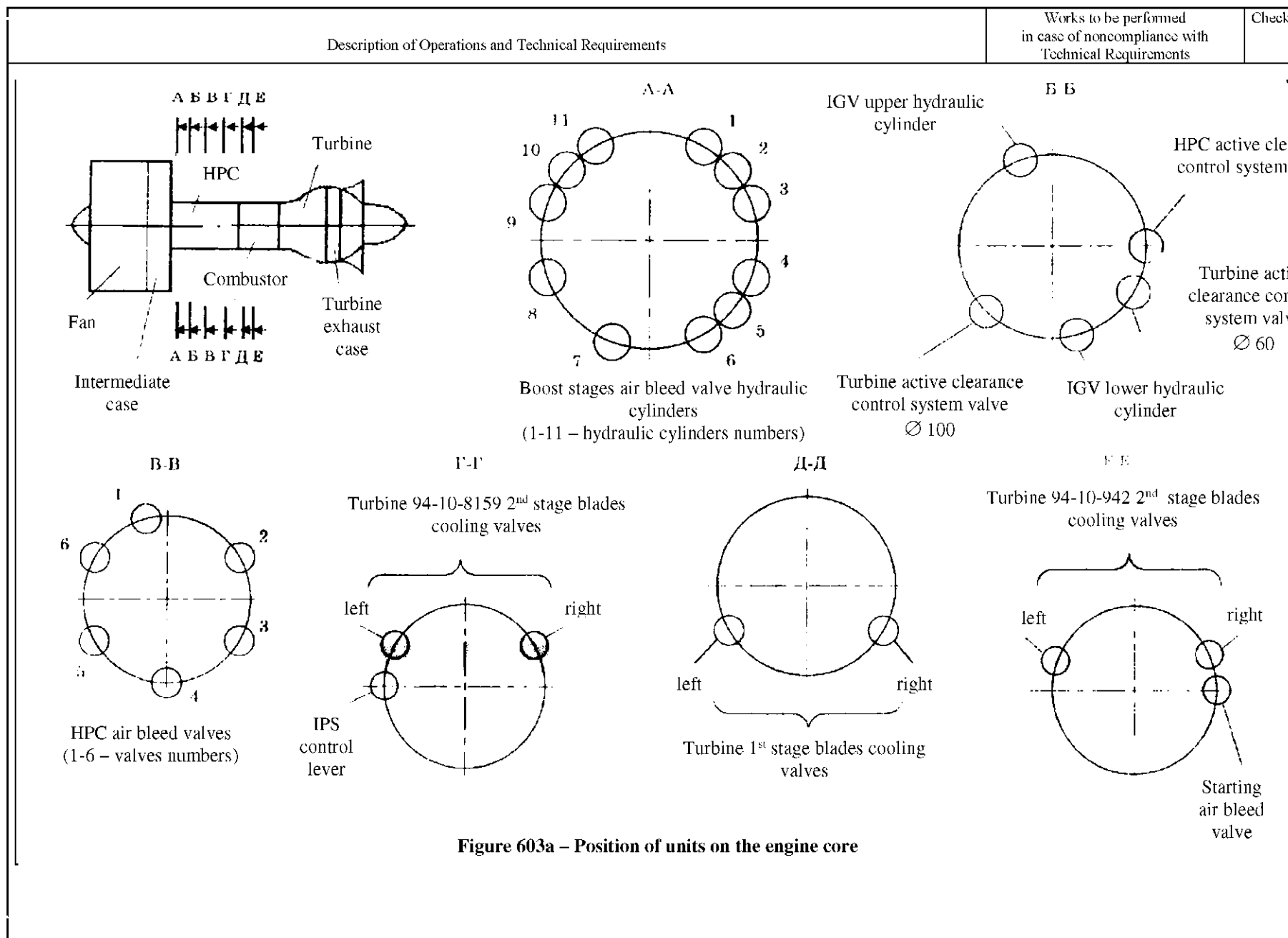
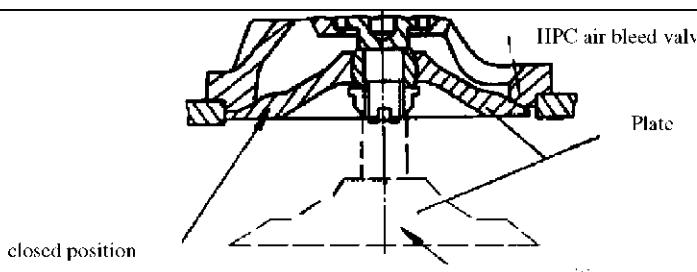
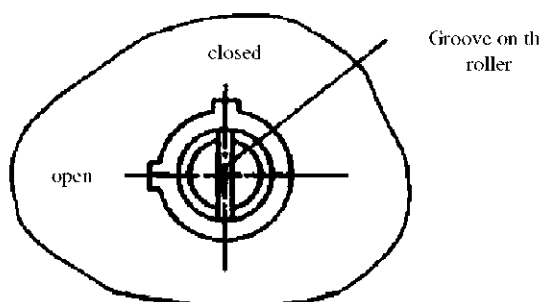
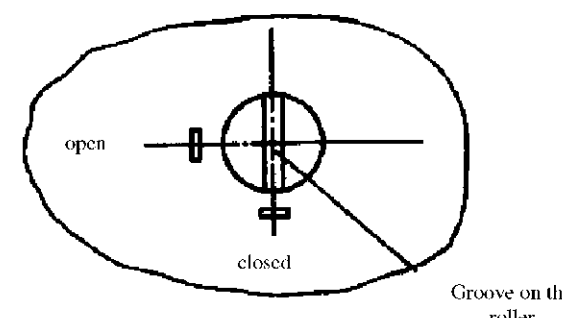
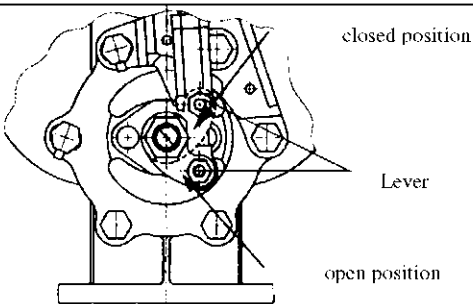
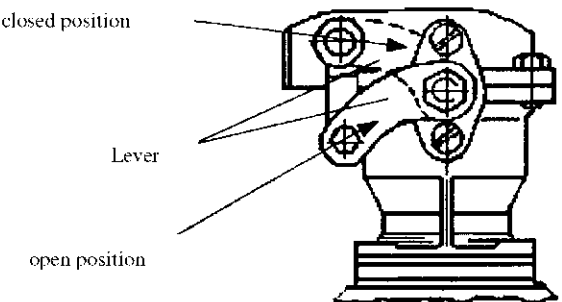
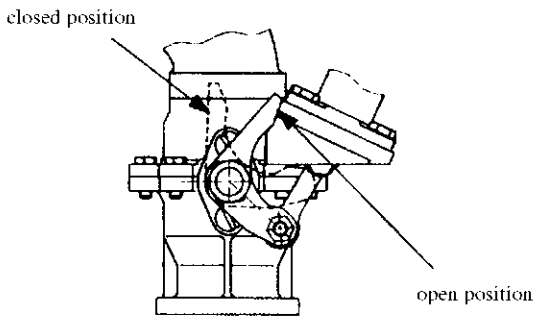


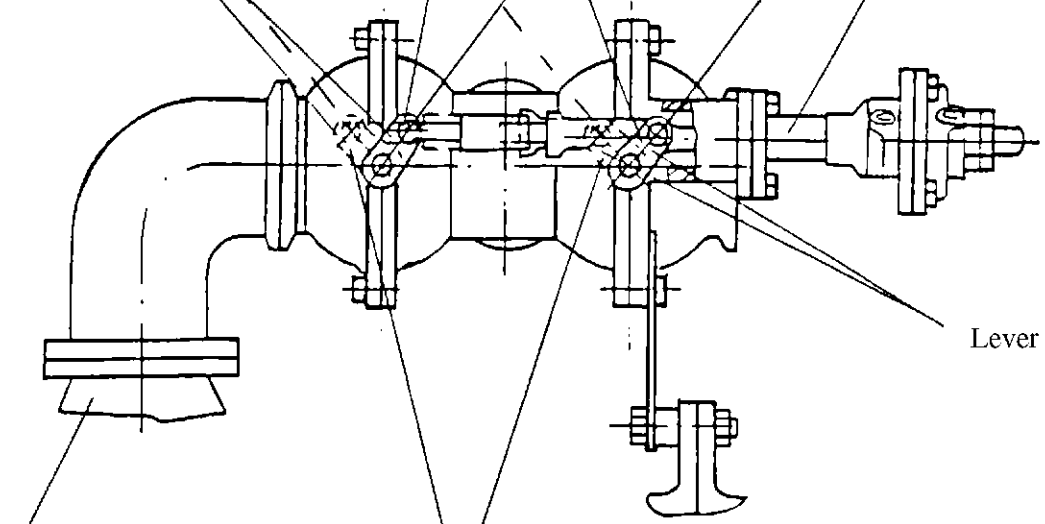
Figure 603a – Position of units on the engine core

Description of Operations and Technical Requirements				Works to be performed in case of noncompliance with Technical Requirements	Check
Table 2					
Check of valve position correspondence to the shut down engine condition					
Unit	Valves position on the shut down engine	Inspection method	Inspected elements arrangement diagram	Works to be performed in case of noncompliance in valves position	
HPC air bleed valves	open	By valve plate position		Valves position noncompliance is acceptable While processing flight data, check timely switchover of the valves.	
HPC active clearance control system valve	closed	By position of the groove on the roller			
Turbine active clearance control system valve Ø 60					
Turbine active clearance control system valve Ø 100					

Description of Operations and Technical Requirements				Works to be performed in case of noncompliance with Technical Requirements	Check
Table 2 continued					
Unit	Valves position on the shut down engine	Inspection method	Inspected elements arrangement diagram	Works to be performed in case of noncompliance in valves position	
Turbine 1 st stage blades cooling valve	open	By valve lever position		Valves position noncompliance is acceptable While processing flight data, check timely switchover of the valves.	
Turbine 94-10-942 2 nd stage blades cooling valve					
Turbine 94-10-8159 2 nd stage blades cooling valve					

Description of Operations and Technical Requirements		Works to be performed in case of noncompliance with Technical Requirements	Check
4 Inspect engine core and low pressure turbine cases. During inspection of turbine 2-6th stage nozzle vanes assembly cases for no cracking pay special attention to the zones shown in Figure 603с. Also pay attention to the zone near the hatch hole for inspection of the 2nd stage nozzle vanes. The type of cracks on the 2nd stage nozzle vanes assembly case is shown in Figure 603ж, and that near the vanes inspection hatch – in Figure 603и. 5 Install the removed engine core skin panels. Lubricate the thread of panel locks with ЦИАТИМ-221 lubricant, close panel locks. In order to close the lock, turn the lock screw by 2...2.5 revolutions clockwise. CAUTION. LOCKS CLOSURE SHALL PRODUCE THE SOUND OF RATCHET. IF THERE IS NO SOUND OF RATCHET, REPLACE THE LOCK (SEE 072.70.00, PAGE 203). 6 Take away the stepladder, dismantle the fixture for working in the fan duct (072.70.00, Page 209). Make sure that there are no foreign items. 7 Plug the engine nozzle. CAUTION. REMOVE THE LOCK FROM THE THRUST REVERSER GUIDES (72.80.00, PAGE 209 OR 073.21.00, PAGE 203). 8 Close engine cowl.		If cracks are detected, take photos or make sketches of them and send them to the manufacturer for decision-making on further operation of the engine.	
Instrumentation	Tools and fixtures	Consumables	
	Hand lamp A6358-8386 Special screwdriver 702260 Intercom device Mirror 32-27-827 Stepladder A63830-9041 or A63830-9041-01	Cloth with finished edges 0.4 x 0.4 m made of cotton fabric GOST 29298-2005– 2 pcs. Lubricant ЦИАТИМ-221 GOST 9433-80 – 0.1 kg	

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
1. HPT 2nd stage blades cooling valve; 2. Bracket B – most probable cracking locations		
Figure 6036 – Inspection of HPT 2nd stage blades cooling valve brackets 94-10-394		

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
 Parallel position of levers 13th stage air bleed Parallel position of levers Hydraulic cylinder Lever Combustor case 6th stage air bleed Figure 603B. IPS control lever position inspection		

Description of Operations and Technical Requirements	Works to be performed in case of noncompliance with Technical Requirements	Check
1, 4, 7 – brackets 2 – IPS control lever distributing gear 3, 6, 9 – most probable cracking locations 5 – turbine 1st stage blades cooling valve 8 – environment control pipeline with HPC 13th stage air		

Figure 603r. Inspection of brackets

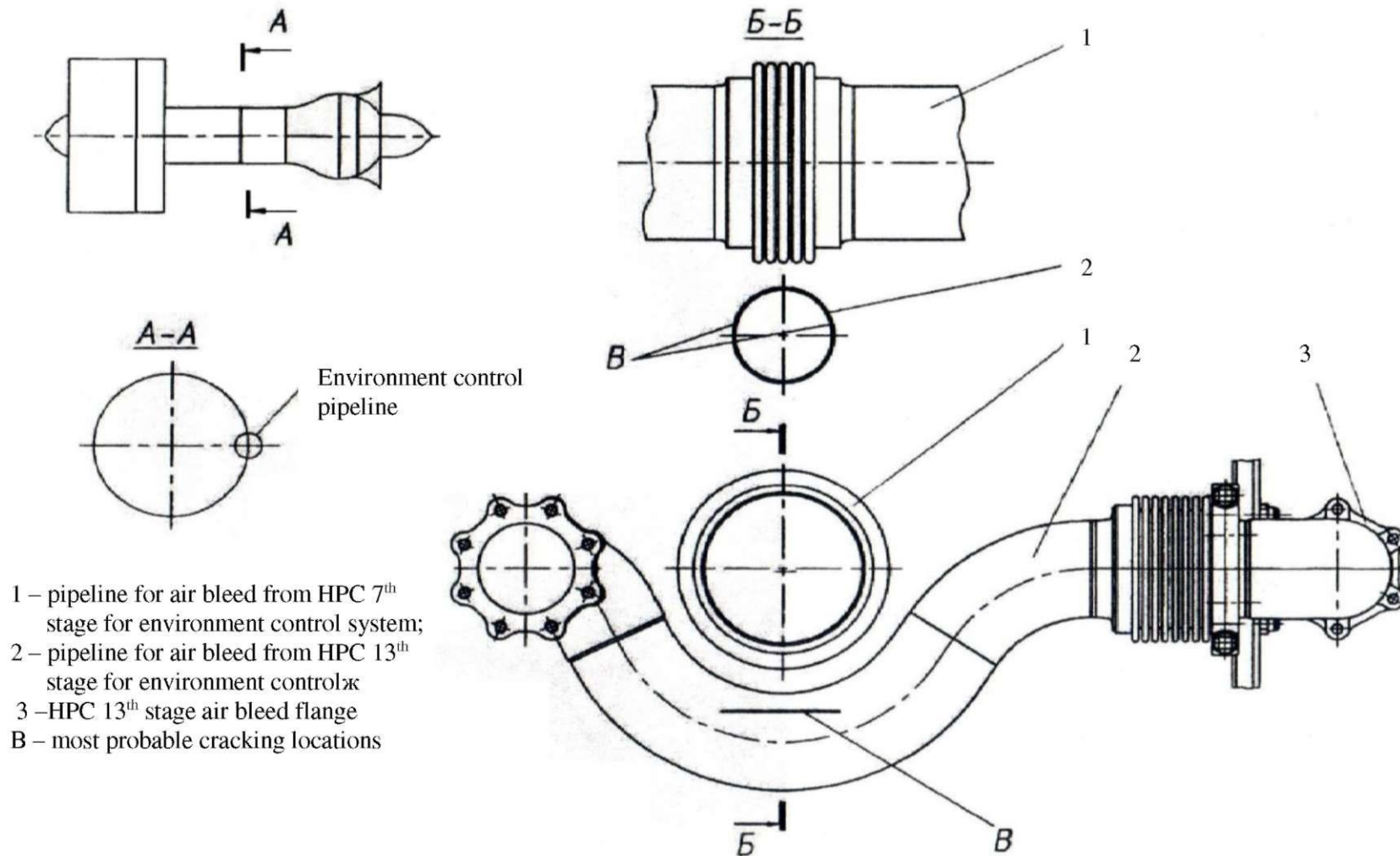


Figure 603д. Inspection of environment control pipeline

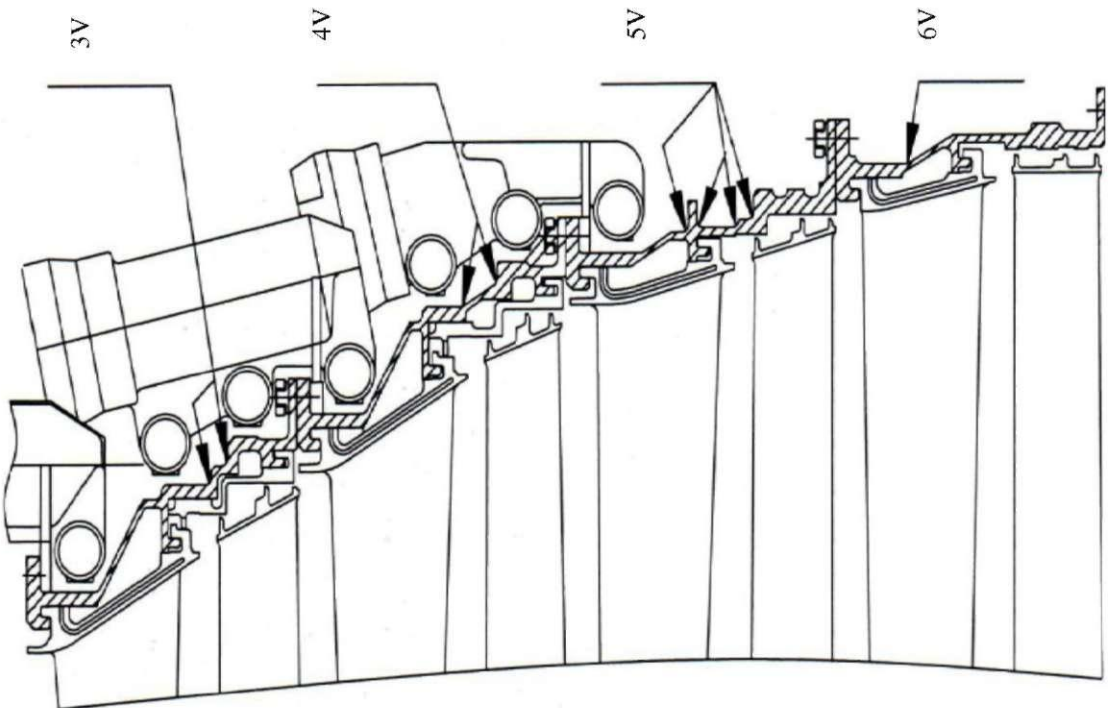
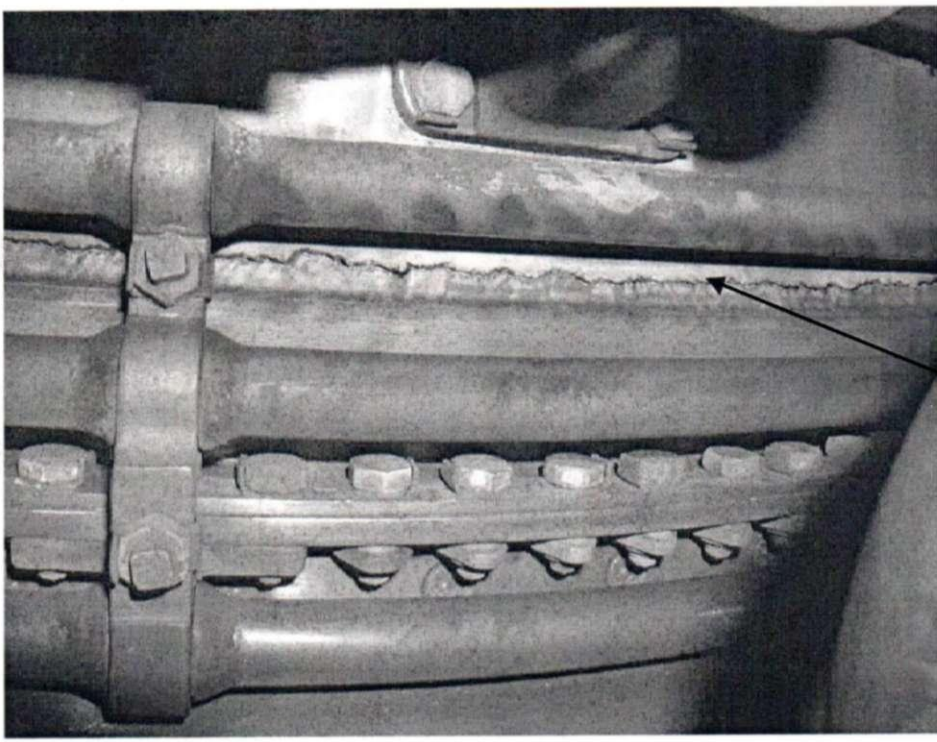
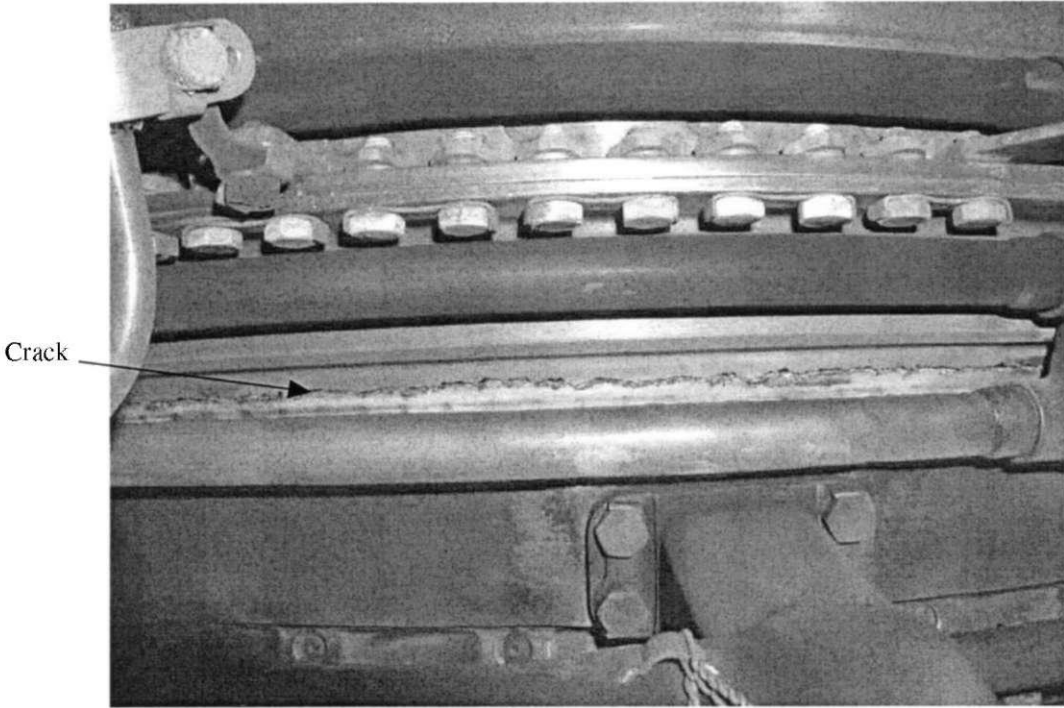
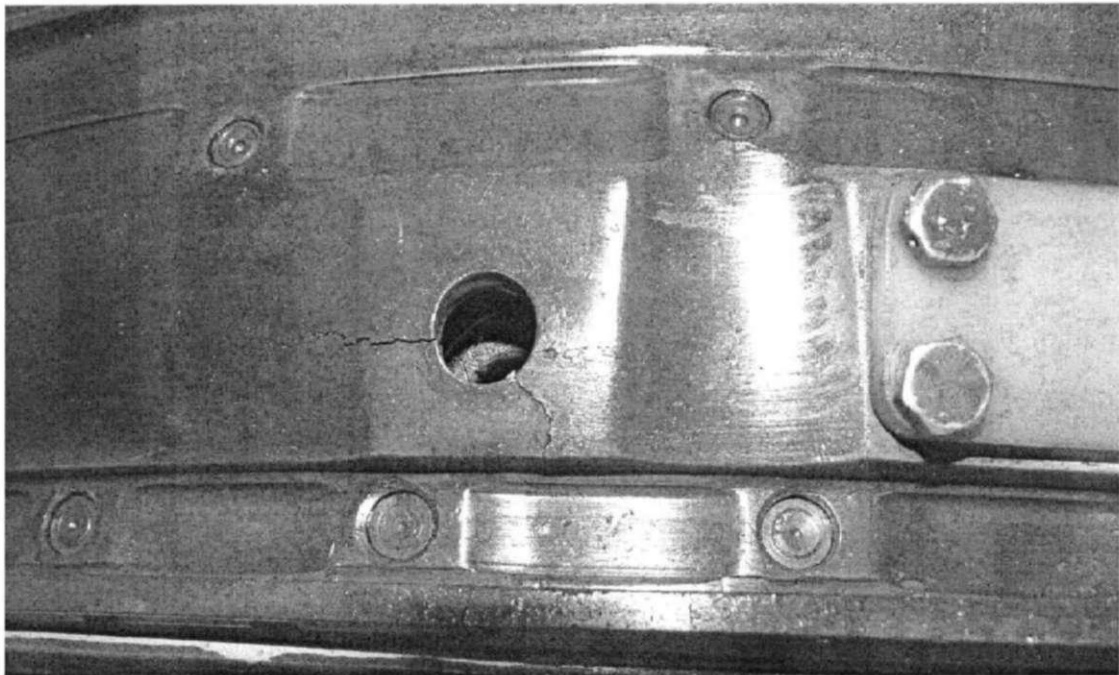
Check	
Works to be performed in case of noncompliance with Technical Requirements	
Description of Operations and Technical Requirements	 Crack

Figure 603e. Turbine nozzle vanes assembly cases inspection location

Figure 603ж. Type of crack on the 2nd St. nozzle vanes assembly (1 of 2)

Check	Works to be performed in case of noncompliance with Technical Requirements	Description of Operations and Technical Requirements
		
	Figure 603ж. Type of crack on the 2nd St. nozzle vanes assembly (2 of 2)	Figure 603и. Type of crack near the vanes inspection hatch



TASK CARD

Inspection of Engine Core Cases and System Elements Located on Them

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References

Table 1 References

Data Module/ Publication	Name
PSA1-A-70-70-00-00R-920A-A	Task Card Removal-Installation of Engine Modules, Components and Parts (General Requirements)
PSA1-A-72-00-00-00R-012A-A	Task Card Safety Measures
PSA1-A-72-33-00-00R-040A-A	Intermediate Case with Internal Drive – Description and Operation
PSA1-A-72-70-00-00R-520A-A	Task Card Removal of Engine Fan Duct Panels
PSA1-A-72-70-00-00R-600A-A	Task Card Repair of Quick-Release Locks
PSA1-A-72-70-00-00R-720A-A	Task Card Installation of Engine Fan Duct Panels
PSA1-A-72-70-00-00R-920A-A	Task Card Removal and Installation of the Fixture for Working in the Engine Fan Duct
PSA1-A-72-80-00-00R-712A-A	Task Card Thrust Reverser Locking in the Forward Thrust Position
PSA1-A-75-00-01-00R-920A-A	Task Card Inspection and Replacement of IPS Control Lever Attachment Brackets
PSA1-A-75-00-04-00R-300A-A	Task Card Inspection of Air-to-Air Heat Exchanger 9410-8258

Preliminary Requirements

Product Data

Maintenance Zones

Engine

Access Panels

Primary Duct

Conditions Required

Table 2 Conditions Required

Action/ Condition	Data Module/ Publication
N/A	

Personnel

Table 3 Personnel

Specialist	Category	Level / Skills	Speciality	Manpower
Specialist A	Engine	Medium		1 hour
Effect:	All			PSA1-A-72-00-00-02R-300A-A



<i>Table 3 Personnel (continued)</i>				
Specialist	Category	Level / Skills	Speciality	Manpower
Specialist B	Engine	Basic		1 hour

Auxiliary Equipment

<i>Table 4 Auxiliary Equipment</i>			
Name	Designation/ Code	Quantity	Notes
Hand lamp	93-27-844	1 pc.	
	702260	1 pc.	
Special medium-size screwdriver			
Mirror	32-27-827	1 pc.	
	94-27-938	1 pc.	
Fixture for working in the fan duct			
Mat for working in the fan duct	94-27-949	1 pc.	
Intercom device		1 pc.	

Consumables

<i>Table 5 Consumables</i>			
Name	Designation/ Code	Quantity	Notes
Lubricant ЦИАТИМ-221 GOST 9433-80		0.1 kg	

Spare Parts

<i>Table 6 Spare Parts</i>			
Name	Designation/ Code	Quantity	Notes
N/A			

Safety Measures

WARNING

Before you start working, be sure to familiarize yourself with the data module [PSA1-A-72-00-00-00R-012A-A](#).



WARNING

- 1 Install a banner prohibiting engine starting and connection of the ground hydraulic plant to the engine hydraulic system in the cockpit.
- 2 Lock the thrust reverser in the Forward Thrust position([PSA1-A-72-80-00-00R-712A-A](#)).
- 3 Perform the works in the fan duct with two persons using a intercom device. One employee must always stay near the thrust reverser control lever and prevent its occasional actuation.

CAUTION

General requirements to installation works - [PSA1-A-70-70-00-00R-920A-A](#).

Procedure

- 1 Remove the plug from the nozzle.
- 2 Mount a fixture for working in the fan duct ([PSA1-A-72-70-00-00R-920A-A](#)).
Inspect intermediate case struts (12 struts, see [PSA1-A-72-33-00-00R-040A-A](#)).
- 3 Remove engine core skin panels according to Task Card [PSA1-A-72-70-00-00R-520A-A](#).
- 4 Inspect Engine Core and Turbine Cases.
- 5 Inspect the following items located on the cases:
 - units in accordance with Figure 1 and Table 7, as well as air-to-air heat exchanger 94-10-8258 in accordance with [PSA1-A-75-00-04-00R-300A-A](#)
 - pipes, brackets. During inspection of the ice protection system (IPS) control lever (Figure 4) additionally follow the Task Card [PSA1-A-75-00-01-00R-920A-A](#).
 - electric harnesses.

During inspection of IGV, HPC 1V and 2V control mechanisms use Figure 13. In the process of inspection make sure that there are no:

 - cracking and damage of guide vanes turning levers 1
 - cracking and cleaving of levers 2 in tie-rods attachment locations
 - tie-rods 5 bending and slipping of threaded couplings on the tie-rods
 - loosening of nuts 6 in tie-rods and levers connections, no backlash
 - make sure that locking wire 3 and locking pins 4 are in place and intact

During inspection of turbine 2-6th stage nozzle vanes assembly cases for no cracking pay special attention to the zones shown in Figure 5. Also pay attention to the zone for vanes inspection on the 2nd stage nozzle vanes assembly. The locations of potential cracking on the 2nd stage nozzle vanes assembly case are presented in Figures 6 and 7, and those near the vanes inspection hatch – in Figure 8.

**CAUTION**

- 1 Make sure that there is no damage (pipelines cracking and breakdown, cracks on brackets, valves), fuel and oil leaks, that the gaskets and lockers are intact, there is no contact of pipelines and electric harnesses between themselves and with the engine.
- 2 When implementing step 4, additionally follow:
 - Figure 2 – during inspection of HPT 2nd stage blades cooling valve attachment brackets;
 - Figure 4 – during inspection of the ice protection system (IPS) control lever support brackets;
 - Figure 14 – during inspection of turbine 1st stage blades cooling valves;
- 3 Based on the results of inspection address the issue of further operation of the engine with the manufacturer's representative.

Note

- 1 Use a mirror for inspection of units, brackets and other systems elements in hard-to-reach locations.
 - 2 Check of valves kinematic links serviceability as per para.7 of Table 7 includes:
 - evaluate (visually and by hand) no tie-rods and levers disengagement;
 - evaluate (by hand) no slipping of threaded couplings on the tie-rods;
 - evaluate (by hand) no backlash beyond 1 mm in tie-rods and levers connections;
 - check (visually) parallelism of both IPS control levers position (Figure 3).
- 6 Install the removed engine core skin panels as per Task Card [PSA1-A-72-70-00-00R-720A-A](#).

CAUTION

Locks closure shall produce the sound of ratchet. If there is no sound of ratchet, replace the lock as per Task Card [PSA1-A-72-70-00-00R-600A-A](#).

- 7 Dismantle the fixture for working in the fan duct ([PSA1-A-72-70-00-00R-920A-A](#)).
Make sure that there are no foreign items in the fan duct.
- 8 Plug the engine nozzle.

CAUTION

Remove the thrust reverser locks as per Task Card [PSA1-A-72-80-00-00R-712A-A](#).

- 9 Close engine cowl.
- 10 Take away the banner prohibiting engine starting.

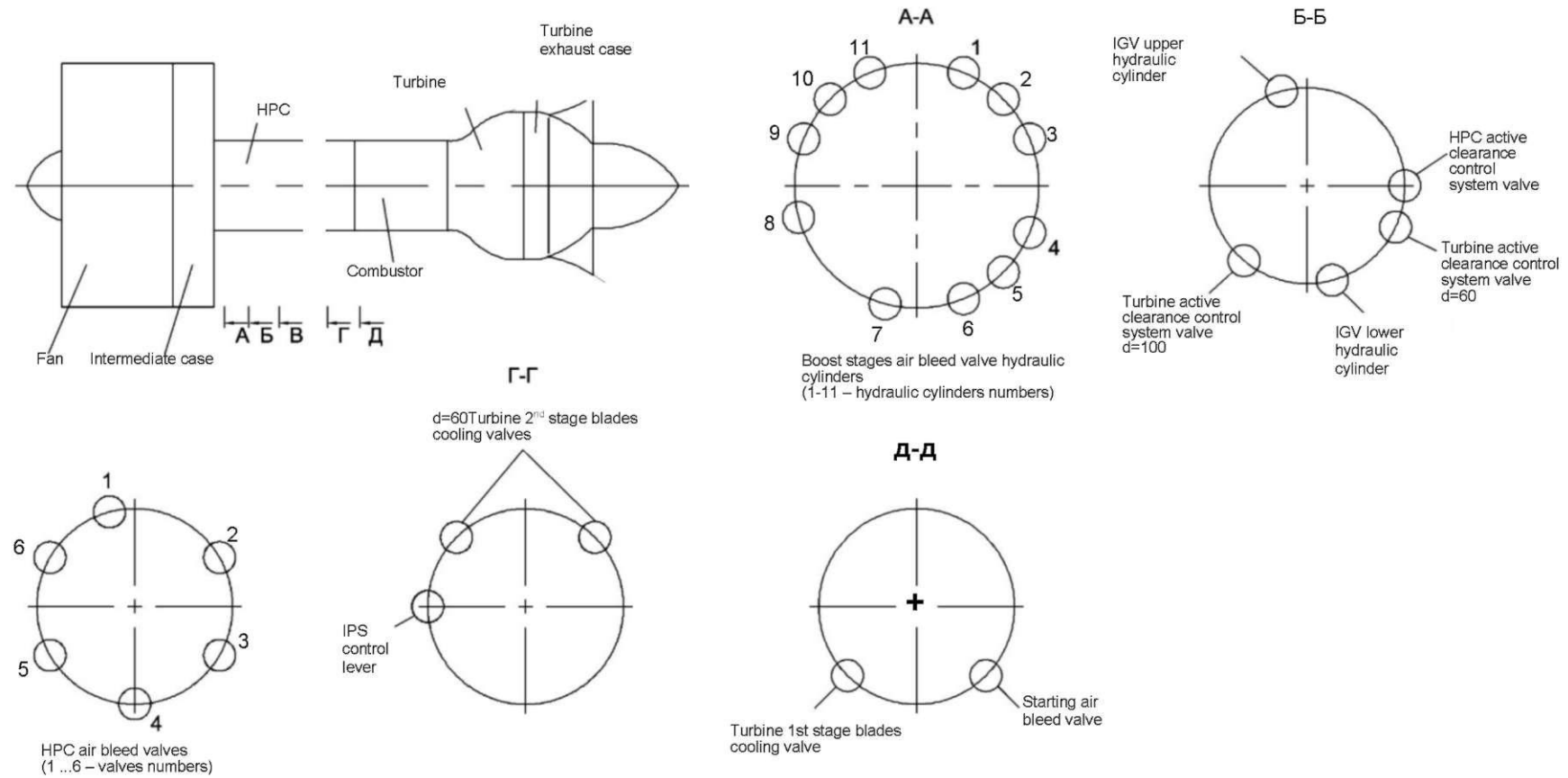
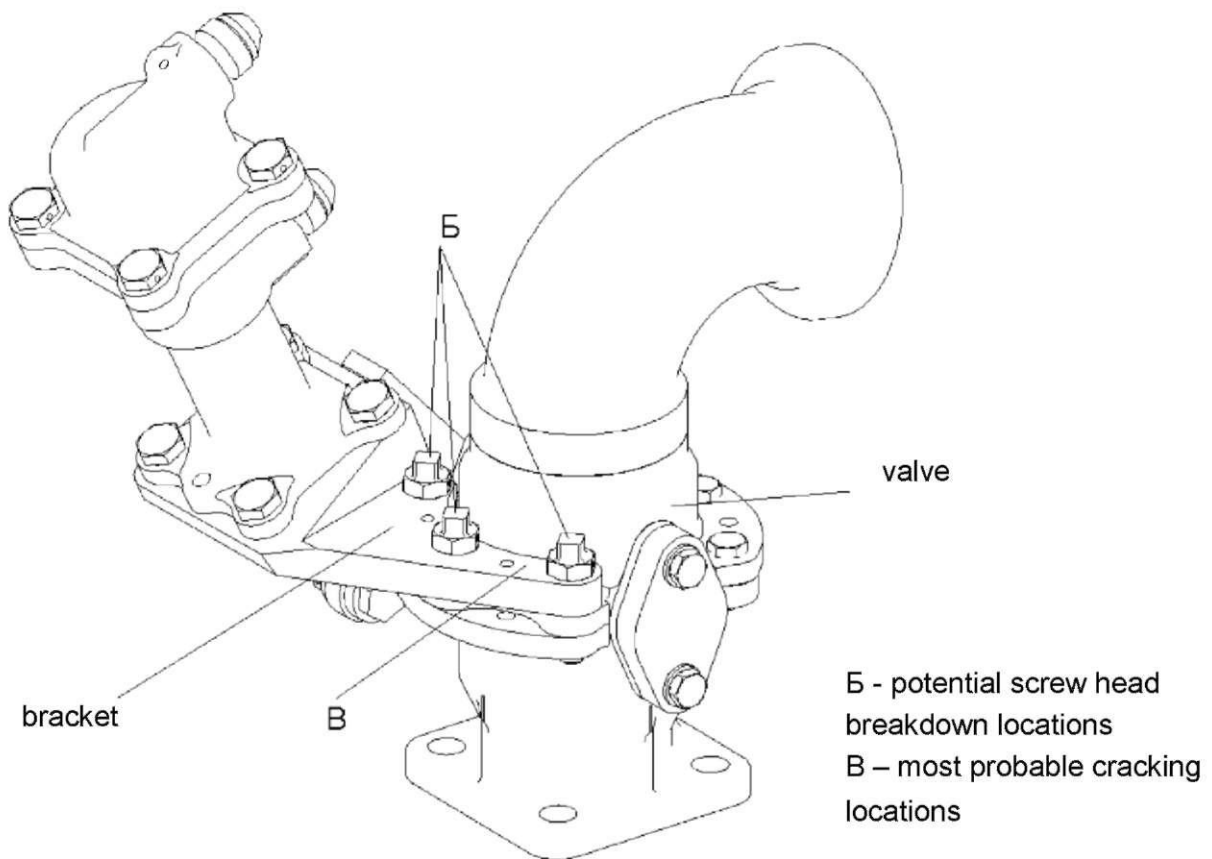


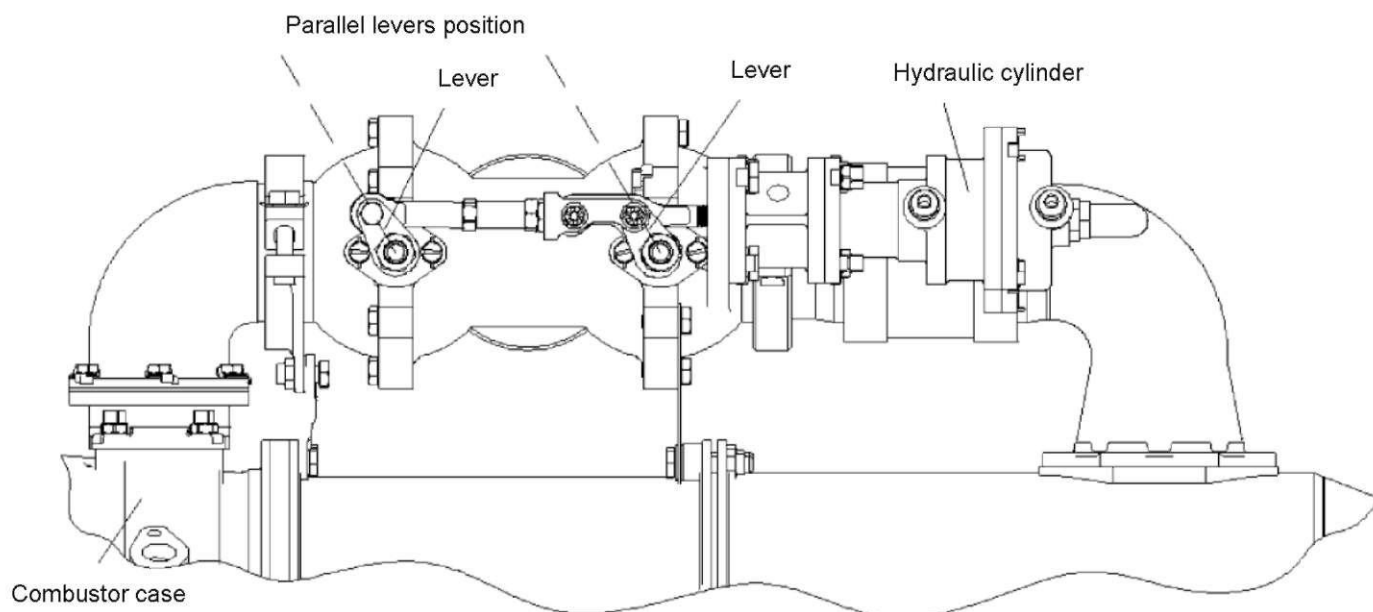
Figure. 1 Position of units on the engine core

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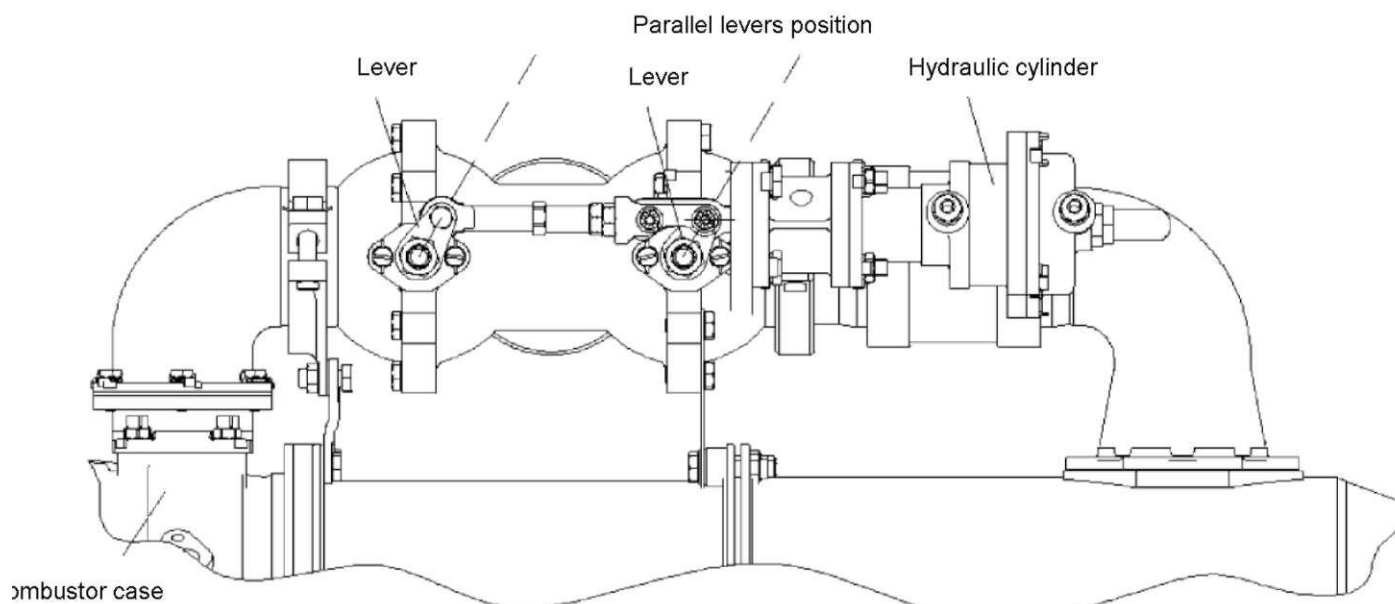


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Figure 2 Inspection of HPT 2B cooling valve brackets



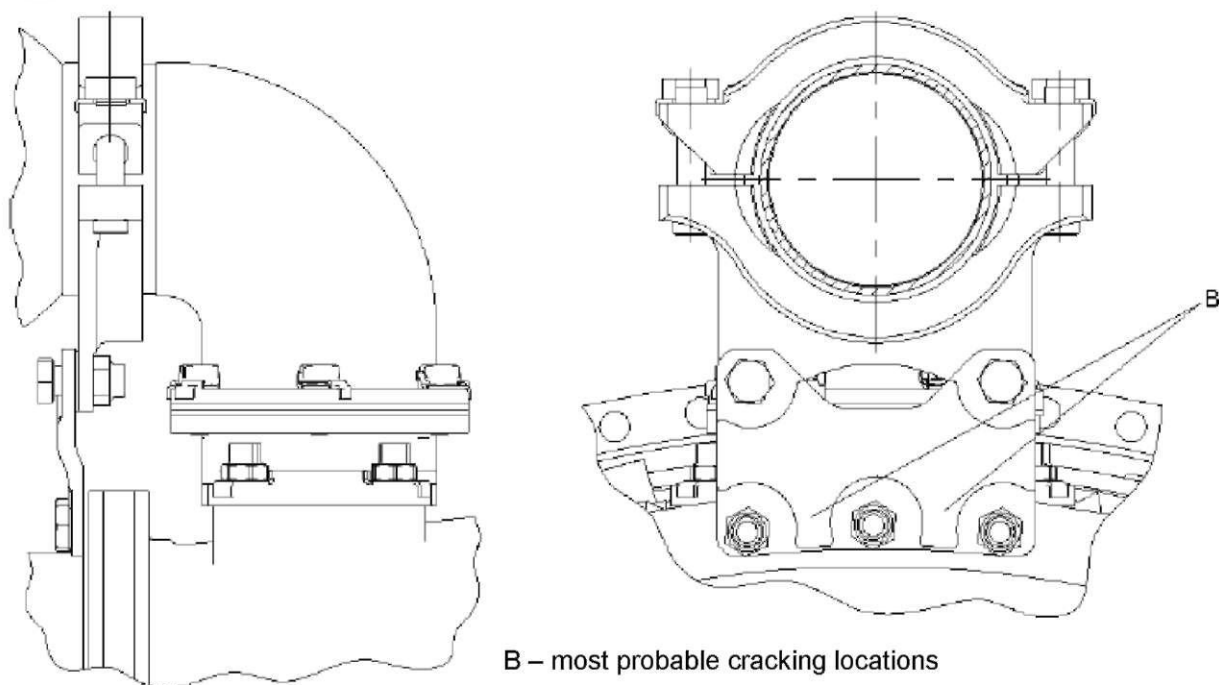
IPS control lever in HPC St.6 air bleed position



IPS control lever in HPC St.13 air bleed position

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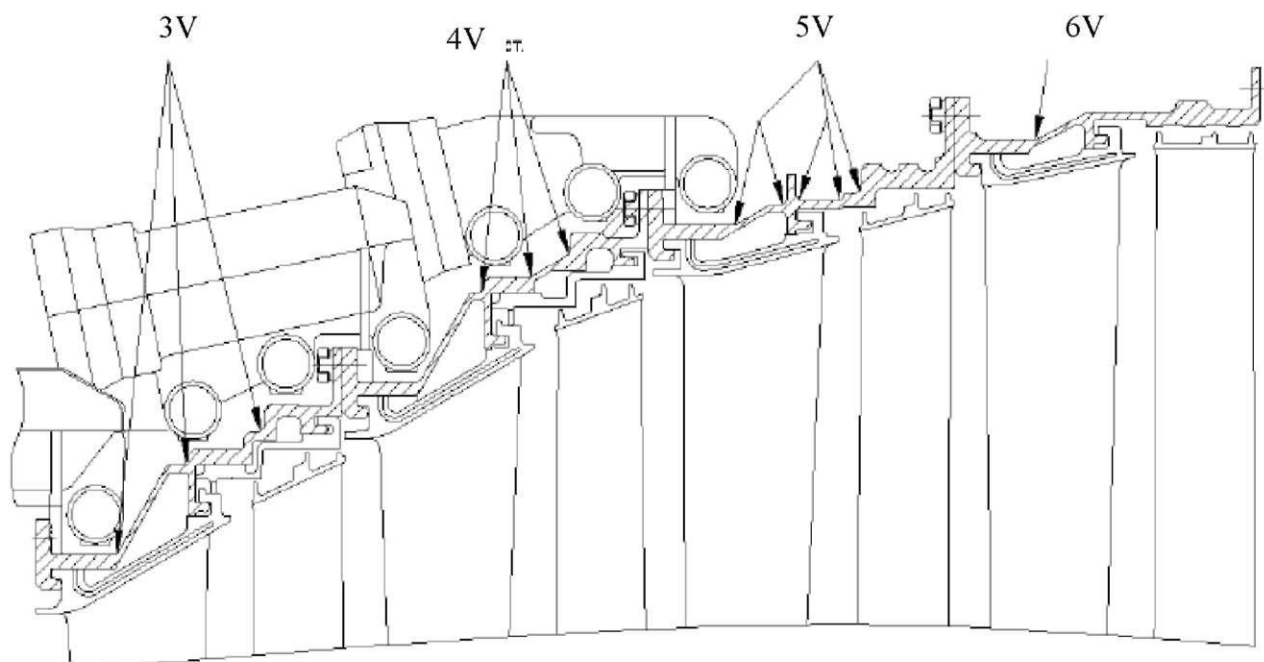
Figure 3 Inspection of IPS Control Levers Position



B – most probable cracking locations

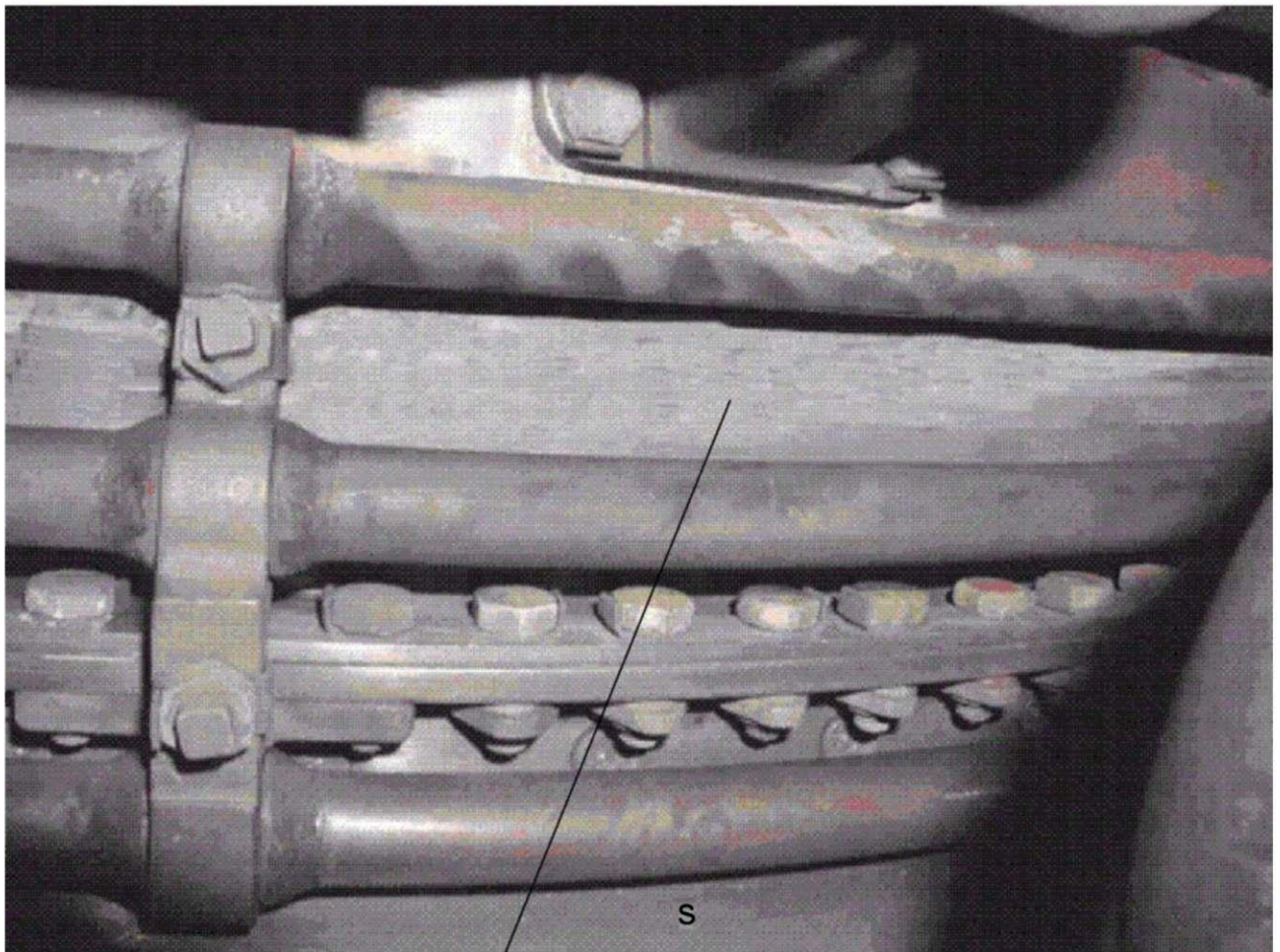
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Figure 4 Inspection of IPS control lever bracket



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Figure 5 Turbine nozzle vanes assembly cases inspection locations

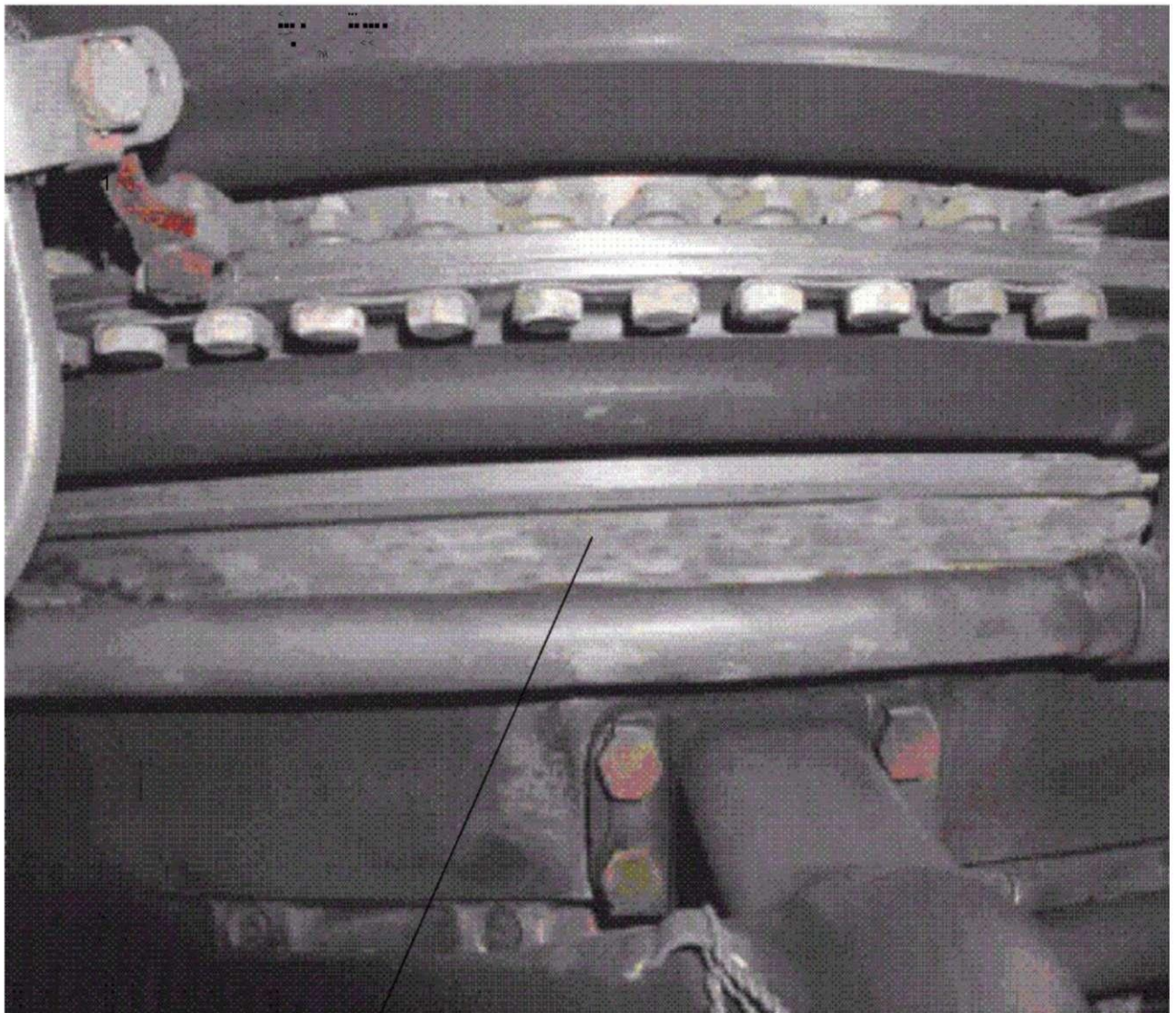


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Figure 6 Turbine nozzle vanes assembly cases inspection locations. 2nd stage nozzle vanes assembly case.

1 Potential cracking locations

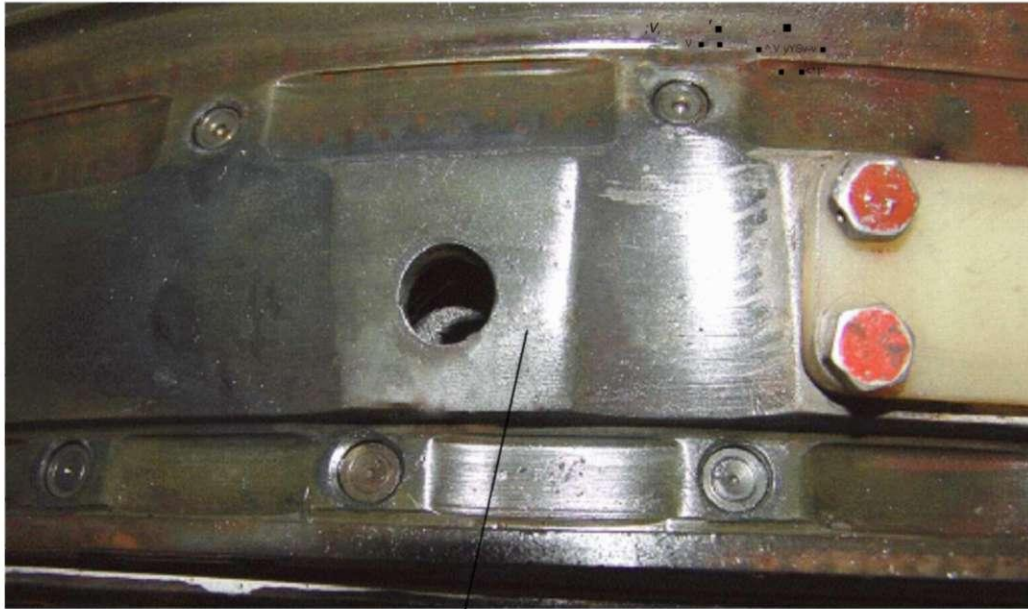


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Figure 7 Turbine nozzle vanes assembly cases inspection locations. 2nd stage nozzle vanes assembly case

1 Potential cracking locations



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Figure 8 Turbine nozzle vanes assembly cases inspection locations. Vanes inspection hatch

1 Potential cracking locations

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Unit	Valves position on the shut down engine	Inspection method	Inspected elements arrangement diagram
HPC air bleed valves	Open	By valve plate position	The diagram shows a cross-section of a valve mechanism. A central vertical shaft is surrounded by a plate. The valve is shown in two positions: 'Closed position' where the valve is seated against the plate, and 'Open position' where the valve is lifted. Labels include 'HPC air bleed valve' and 'Plate'.

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Figure 9 Check of HPC air bleed valves valve position correspondence to the shut down engine condition

Unit	Valves position on the shut down engine	Inspection method	Inspected elements arrangement diagram
HPC active clearance control system valve	Closed	By position of the groove on the roller	The diagram shows a cross-section of a valve mechanism. A central vertical shaft is surrounded by a plate. The valve is shown in a 'Closed' position. Labels include 'Open' and 'Closed'.
Turbine active clearance control system valve d=60			The diagram shows a cross-section of a valve mechanism. A central vertical shaft is surrounded by a plate. The valve is shown in an 'Open' position. Labels include 'Open' and 'Closed'.
Turbine active clearance control system valve d=100			The diagram shows a cross-section of a valve mechanism. A central vertical shaft is surrounded by a plate. The valve is shown in an 'Open' position. Labels include 'Open' and 'Closed'.

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Figure 10 Check of active clearance control system valve position correspondence to the shut down engine condition



Unit	Valves position on the shut down engine	Inspection method	Inspected elements arrangement diagram
Turbine 1 st stage blades cooling valve	Open	By lever position	

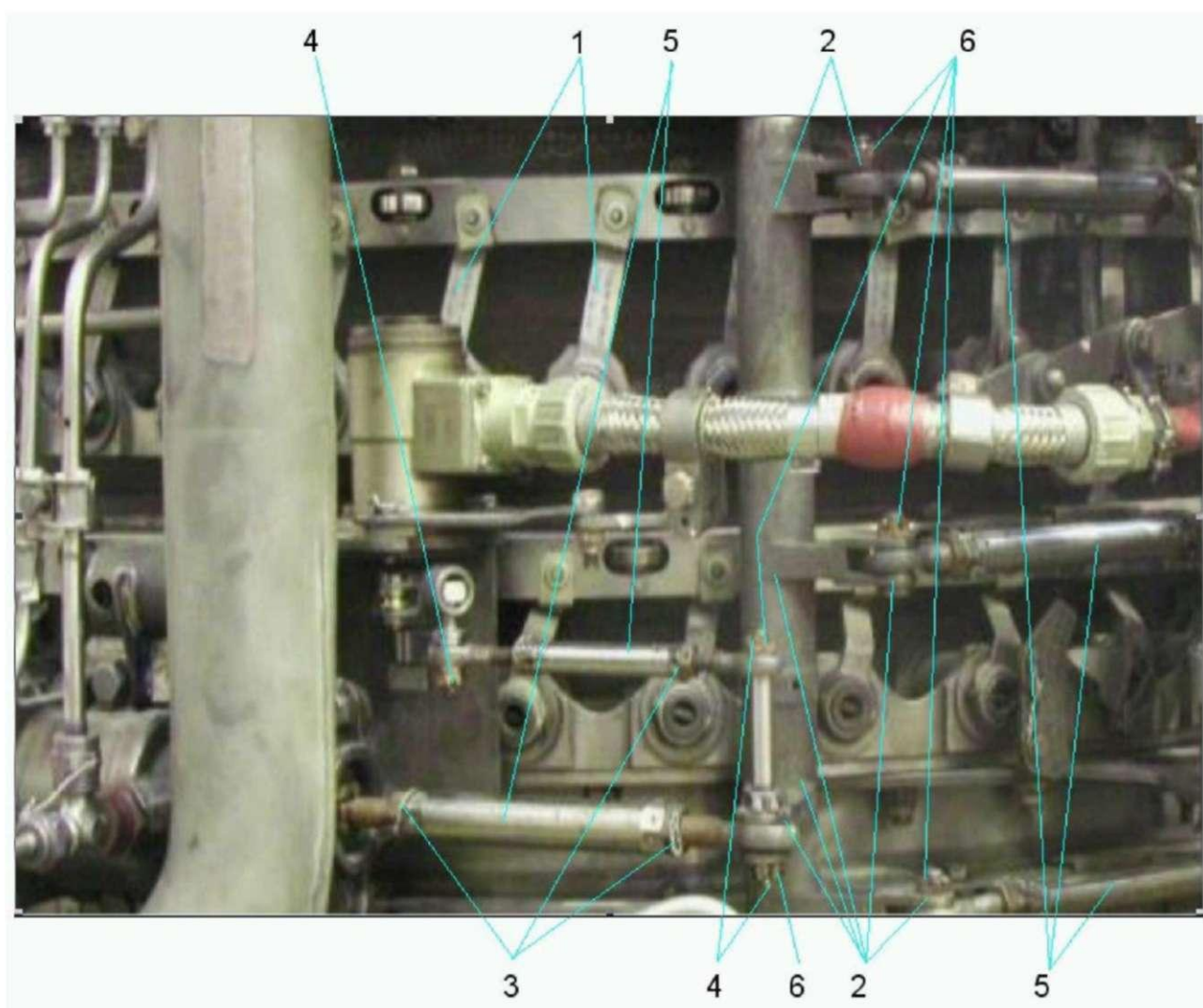
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Figure 11 - Check of turbine 1B cooling valve position correspondence to the shut down engine condition

Unit	Valves position on the shut down engine	Inspection method	Inspected elements arrangement diagram
Turbine 2 nd stage blades cooling valve	Open	By lever position	

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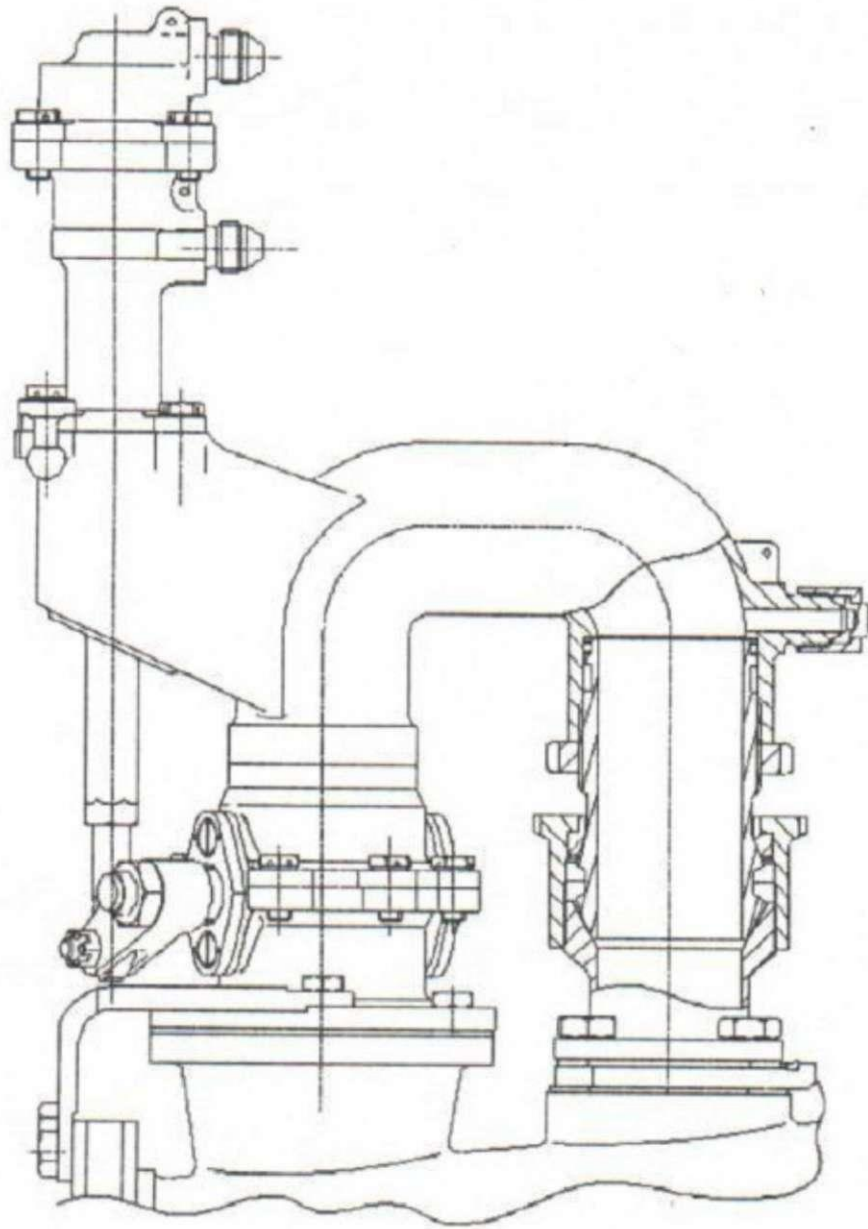
Figure 12 Check of turbine 1B cooling valve position correspondence to the shut down engine condition



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Figure 13 Inspection of IGV, 1V and 2V control mechanism

- 1 – guide vanes turning levers
- 2 – tie-rods attachment levers
- 3 – locking wire
- 4 – locking pins
- 5 – tie-rods
- 6 – nuts



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Figure 14 Inspection of HPT 1B cooling valve

Post Inspection Requirements

Conditions Required

Action/ condition

Table 8 Conditions Required

Data module/ Publication

N/A

Effect: All

PSA1-A-72-00-00-02R-300A-A