САМАРСКИЙ УНИВЕРСИТЕТ
SAMARA UNIVERSITY

Samara University
Institute of Aeronautical Engineering
Department of Aircraft Construction and Design

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AIRCRAFT ENGINES

in the museum of the Samara University

Methodical instructions for laboratory work

2017

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Methodical instructions for laboratory work are based on the reference materials on engines located at the Center for the History of Aviation Engines (CHAE) of the Department of Construction and Design of Aircraft of the Samara University. Reference edition is intended for students studying the design of aircraft engines in the framework of the discipline "Aviation power plants" in the direction of 24.03.04. "Aircraft building", bachelors, profile "Aircraft construction". The work presents the actual CHAE plan, photographs and basic parameters of 45 engines of domestic and foreign production are presented, the order of performing laboratory works and the form of students reporting are presented.

CONTENTS

PURPOSE AND OBJECTIVES OF LABORATORY WORKS

The purpose of laboratory works performed in the auditoriums of the Department of Construction and Design of Aircraft of the Samara University, obtaining practical knowledge of the real designs of aircraft engines of various schemes and their nodes.

The tasks of laboratory work on real products are:

- to study the design of domestic and foreign engines;
- to study the design of engine assemblies;
- to study the operation of systems that ensure the functioning of engines.

ORDER laboratory work

1. Prior to the beginning of classes in the CHAE classes, students shall first study the recommended literature [1-7], and on the reference part [8-14] of the guidelines consult the parameters of domestic and foreign Turbojet, Turboprop, Turbofan and helicopter GTE presented at CHAE.
2. In the first part of the classes, students jointly and under the guidance of teachers, divided into subgroups, get acquainted with the design, history of the creation, application and characteristics of all aviation engines presented in the class.
3. Next, each student receives an individual assignment for a particular engine presented in the CHAE classes:
    - compile a description of the engine design,
    - prepare sketches of the schemes of the main engine units (longitudinal section),
    - to propose a scheme for attaching the engine to an aircraft (helicopter),
    - describe the engine start system,
    - describe the operation of the oil system on the engine.

4. The report on laboratory works includes:
    - Description of the engine design
    - Schemes of main GTE nodes
    - Scheme of fastening the engine to the aircraft (helicopter)
    - Scheme of engine start system
    - Engine oil system diagram

Plan classrooms of the Samara Aviation Engine Museum

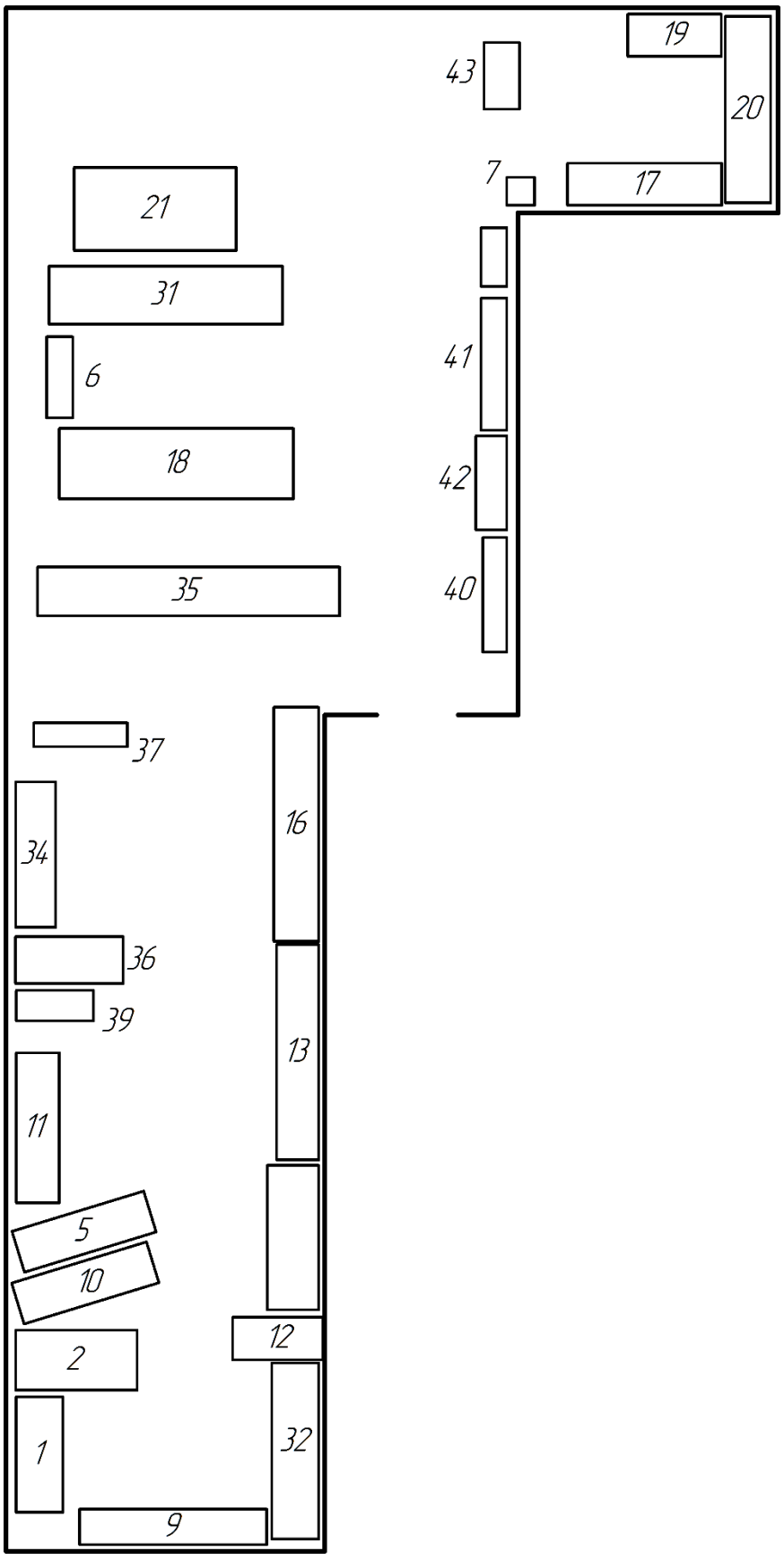


Figure 1 shows the layout of the engines located in class 1.
The numbering of the engines located in the class, as well as the correspondence of the Russian and English names of the engines is given in Table 1.

Figure 2 shows the layout of the engines located in class 2.
The numbering of engines located in class 2, as well as the correspondence of Russian and English names of engines, is given in Table 2.

Fig. 1 - Classrooms 1

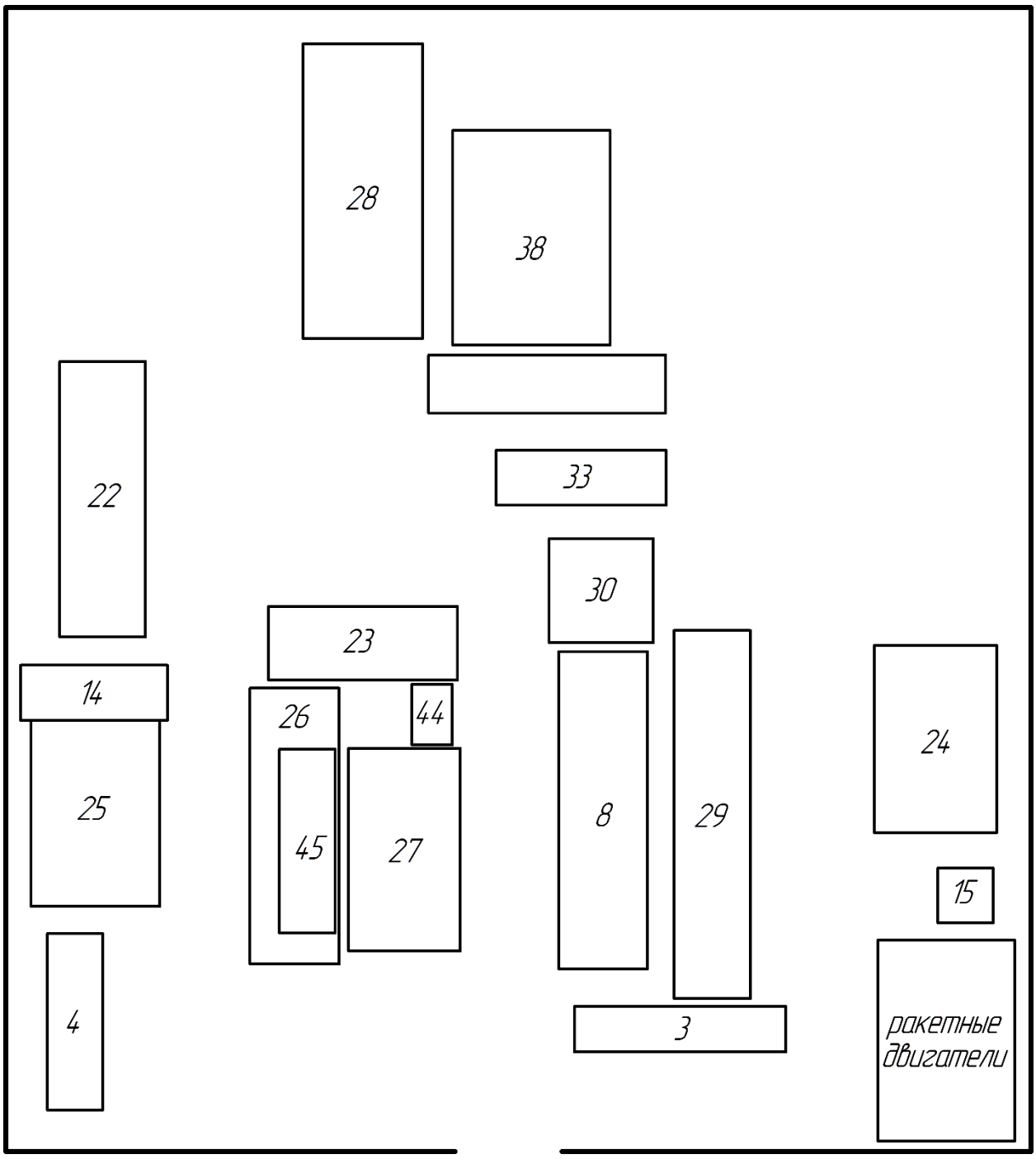


Fig. 2 – Classrooms 2

Table 1. Conditional numbers for the arrangement of engines in class 1 and the correspondence of engine names in Russian and English

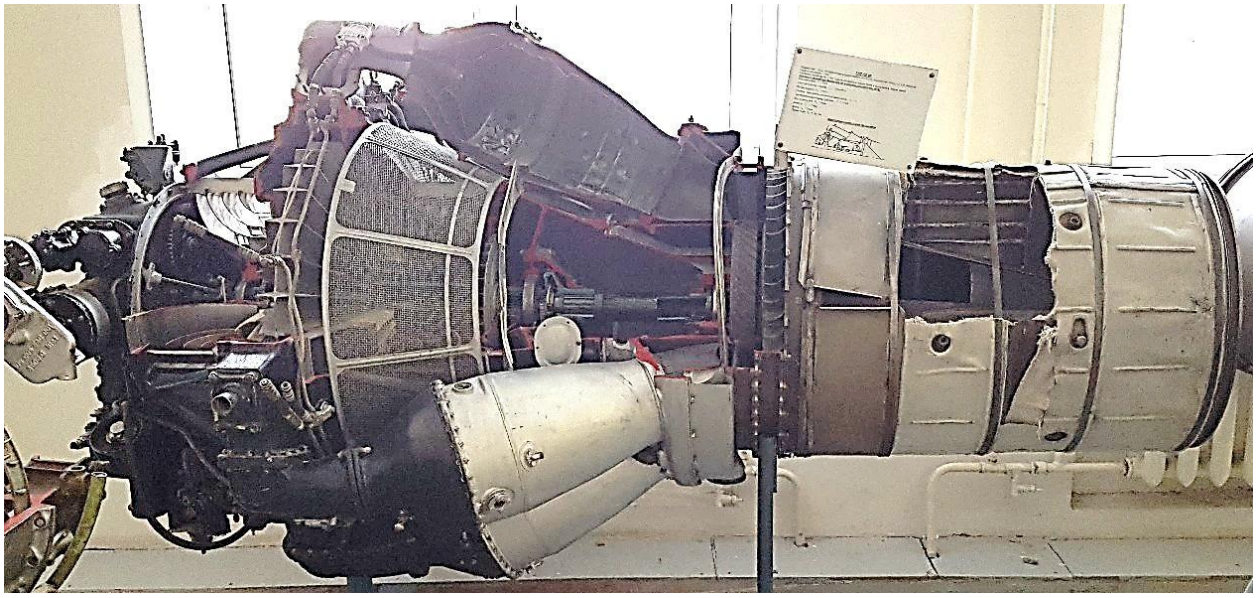
No	Russian	English
1.	РД-45	RD-45
2.	ВК-1	VK-1
5.	АМ-5А	AM-5A
6.	РУ19-300	RU19-300
7.	РД36-35ФВ	RD36-35FV
9.	JUMO-004	JUMO-004
10.	AVON	AVON
11.	AVON-1534R	AVON-1534R
12.	М701с-500	M701c-500
13.	Р11Ф2-300	R11F2-300
16.	Р-29Б-300	R-29B-300
17.	Д-20П	D-20P
18.	НК-8-4	NK-8-4
19.	АИ-25	AI-25
20.	Д-30	D-30
21.	Д-36	D-36
31.	АЛ-31Ф	AL-31F
32.	ТВ-022	TV-022
34.	АИ-20	AI-20
35.	НК-12МВ	NK-12MV
36.	АИ-24	AI-24
37.	ТВД 10	TVD 10
39.	М-601Е	M-601E
40.	ГТД-3Ф	GTE-3F
41.	ТВ2-117	TV2-117
42.	ТВ3-117	TV3-117
43.	ГТД-35	GTE -35

Table 2. Conditional numbers for the arrangement of engines in class 2 and the correspondence of engine names in Russian and English

No	Russian	English
3.	ВК-1Ф	VK-1F
4.	РД-3М	RD-3M
8.	РД 36-51	RD 36-51
14.	АЛ-7Ф-2	AL-7F-2
15.	АЛ-21Ф	AL-21F
22.	НК-86	NK-86
23.	НК-88	NK-88
24.	НК-56	NK-56
25.	Д-18Т	D-18T
26.	Д-30КУ	D-30KU
27.	ПС-90А	PS-90A
28.	НК-6	NK-6
29.	НК-144	NK-144
30.	НК-25	NK-25
33.	НК-4	NK-4
38.	НК-93	NK-93
44.	АИ-26В	AI-26V
45.	РД-900	RD-900

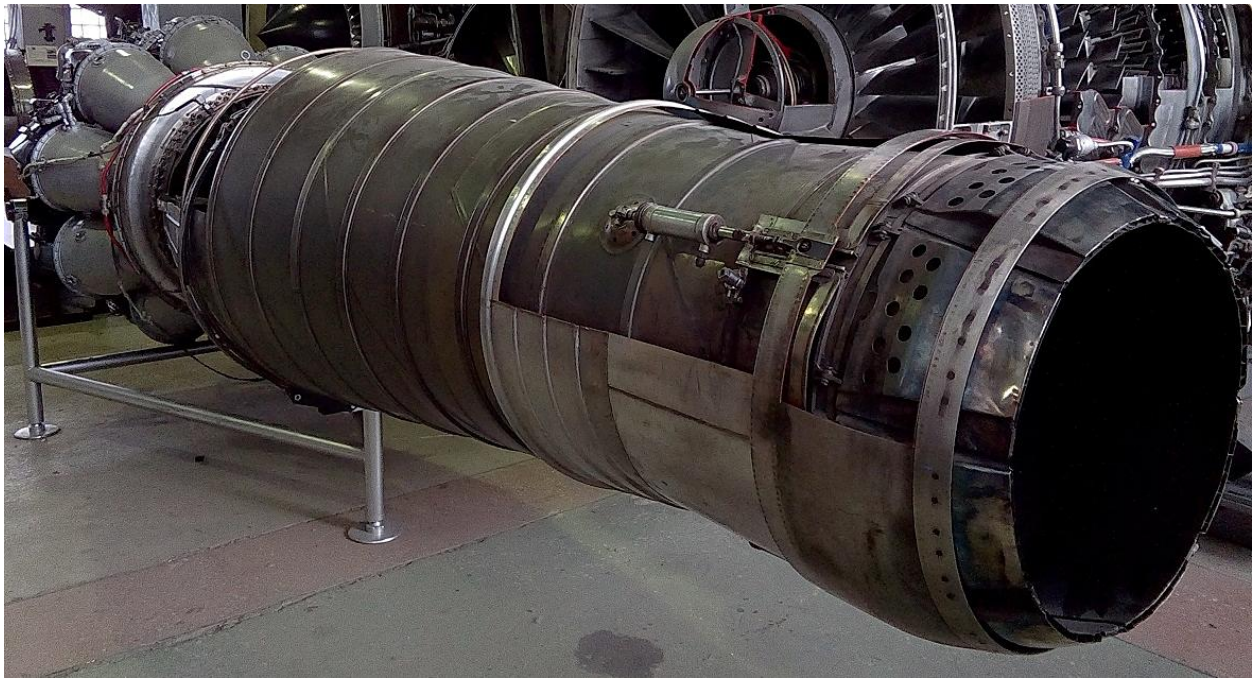
Turbojet engines
Domestic

1. RD-45 (1947)

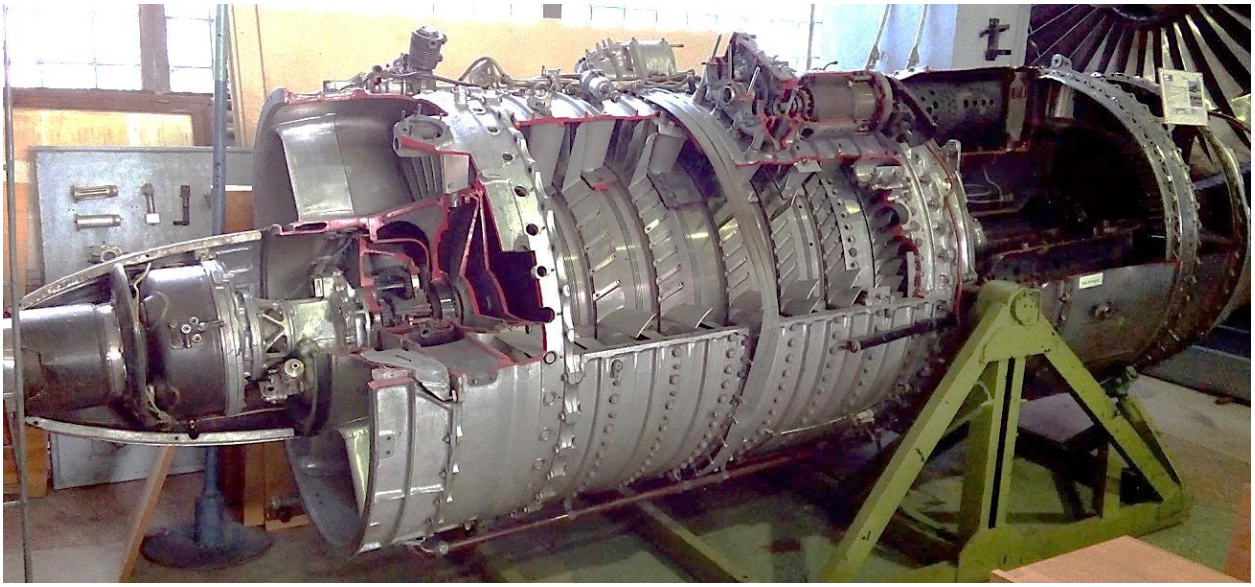


2. VK-1 (1949)

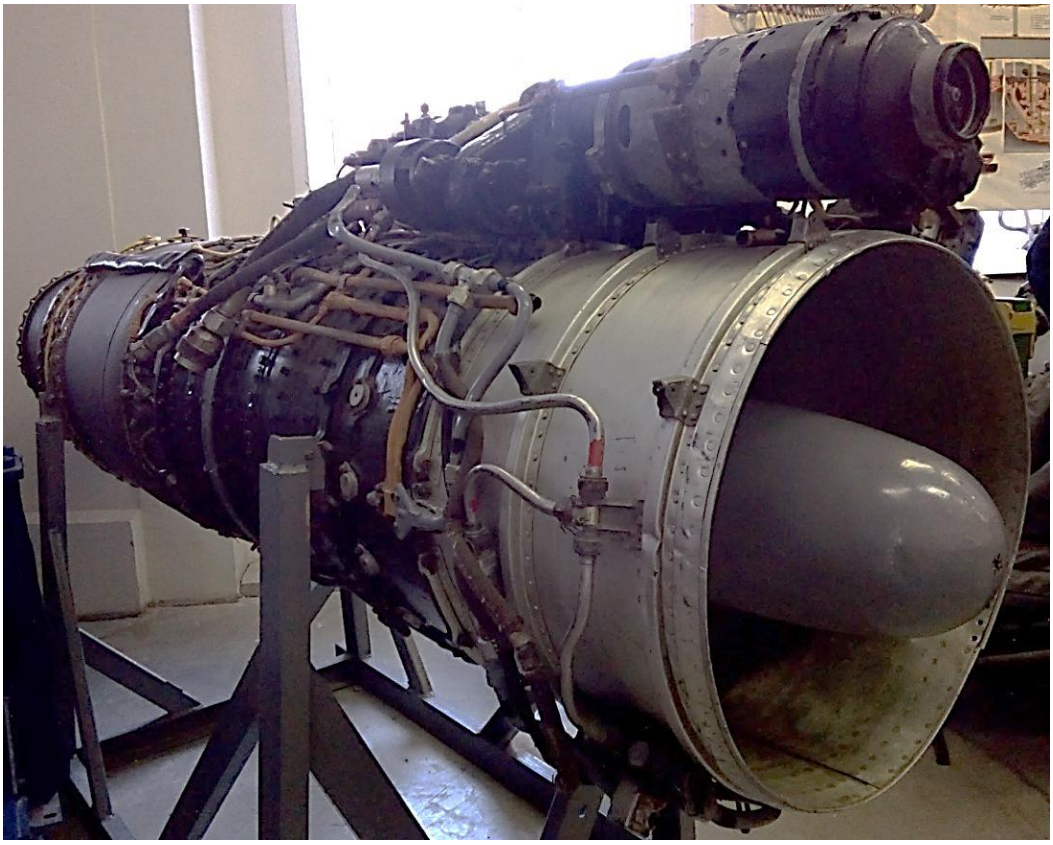
3. VK-1F (1951)



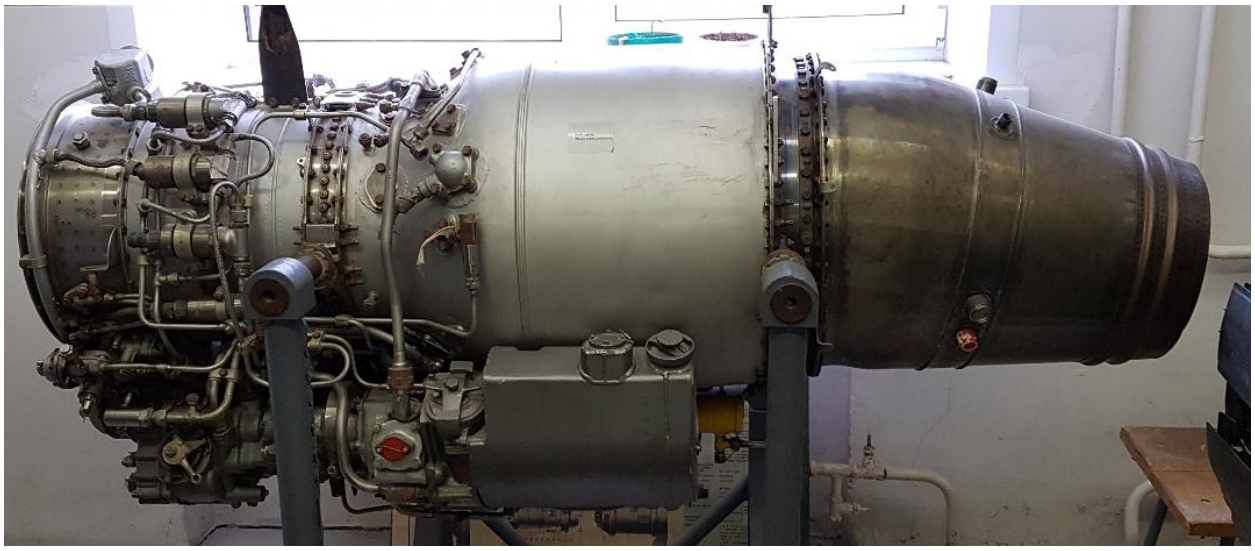
4. RD-3M (1952)



5. AM-5A (1955)

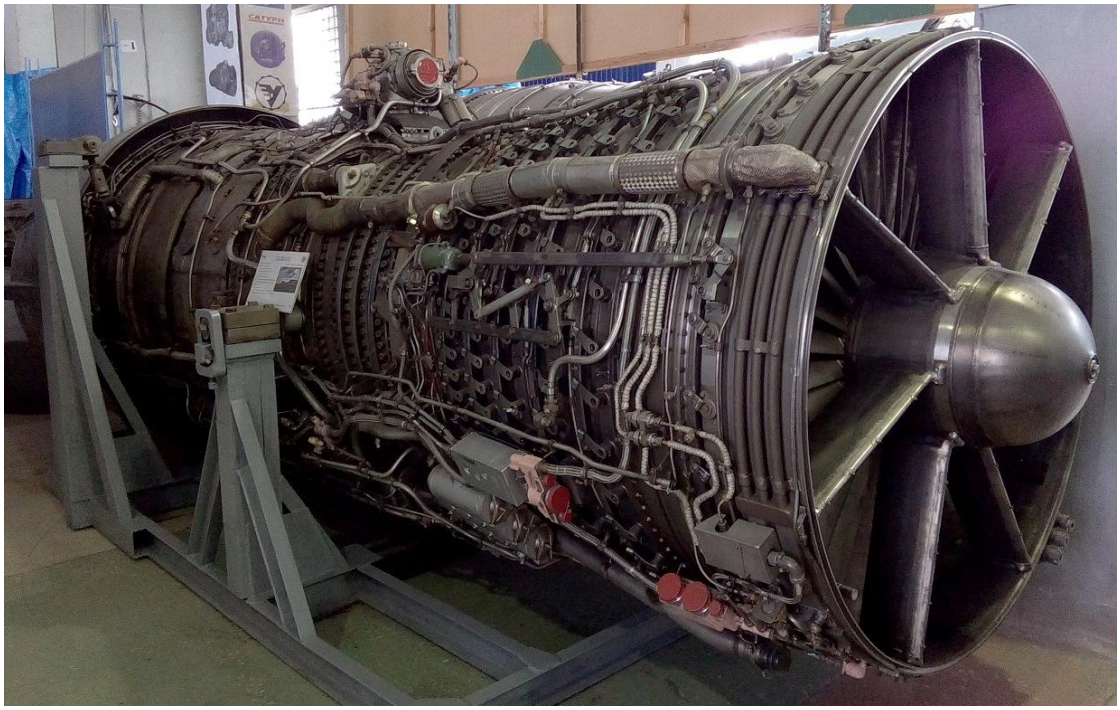


6. RU19-300 (1969)



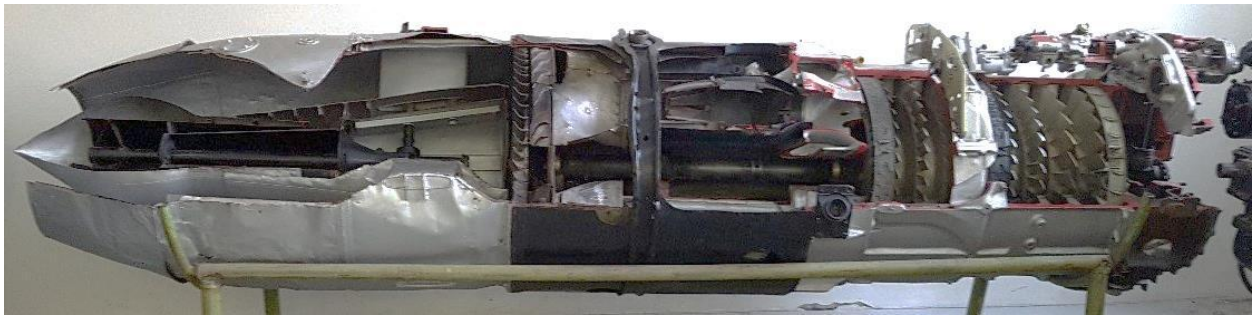
7. RD36-35FV (1972)

8. RD36-51 (1974-1978)

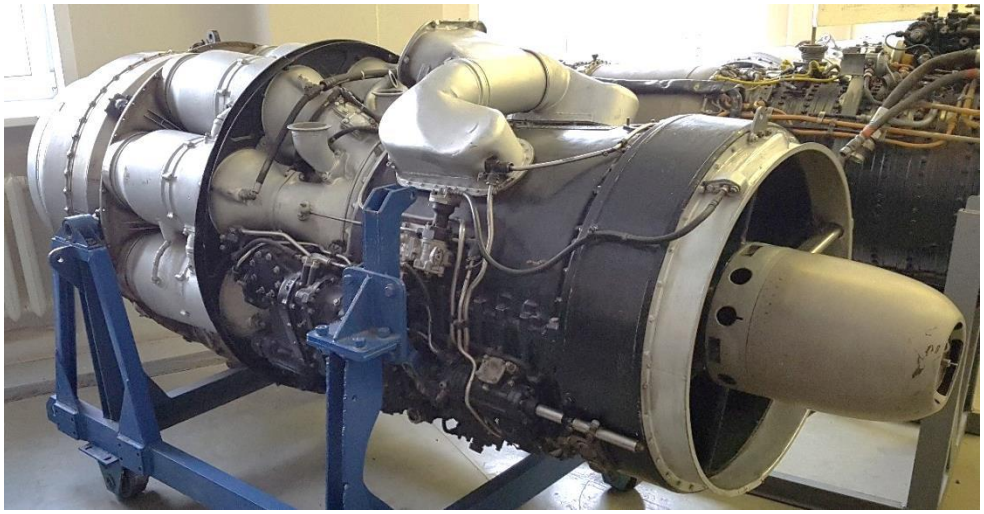


Foreign

9. JUMO-004 (1942)

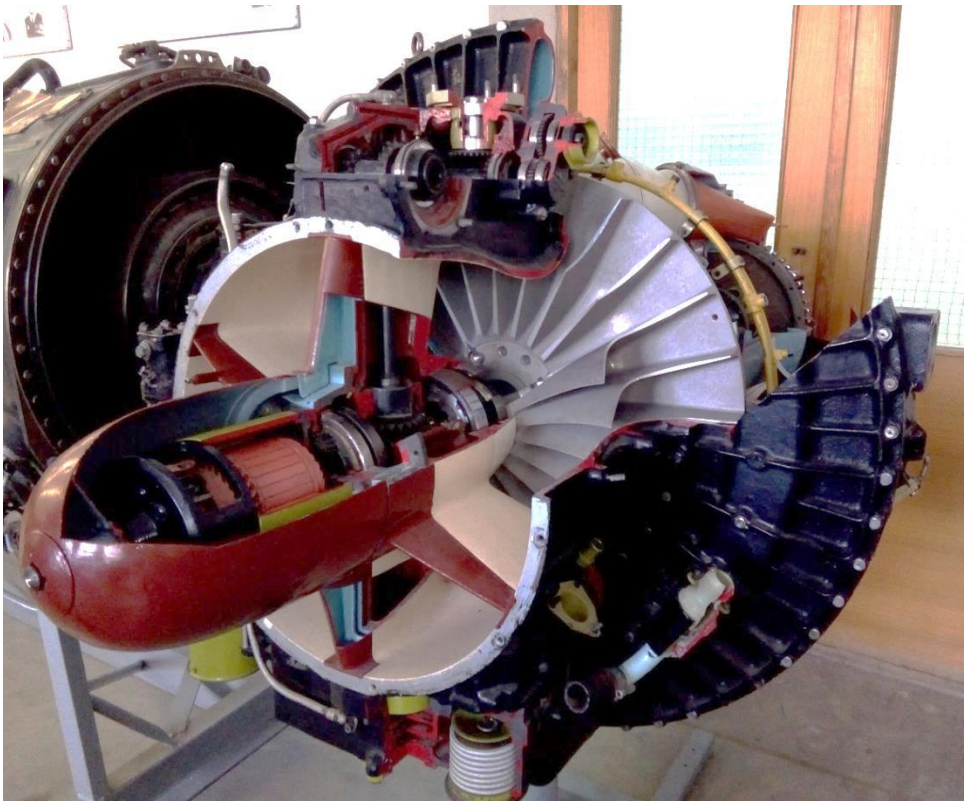


10. AVON (1950)



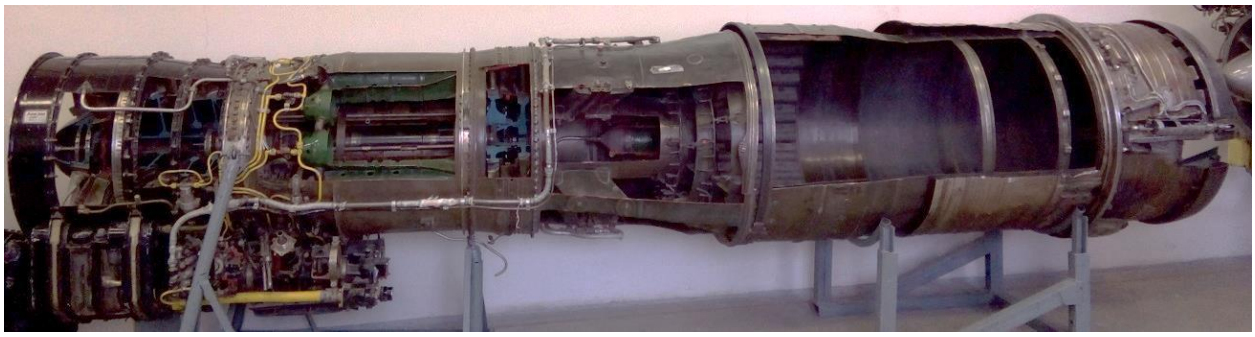
11. AVON-1534R

12. M701c-500 (1961)



Turbojet engine with afterburner

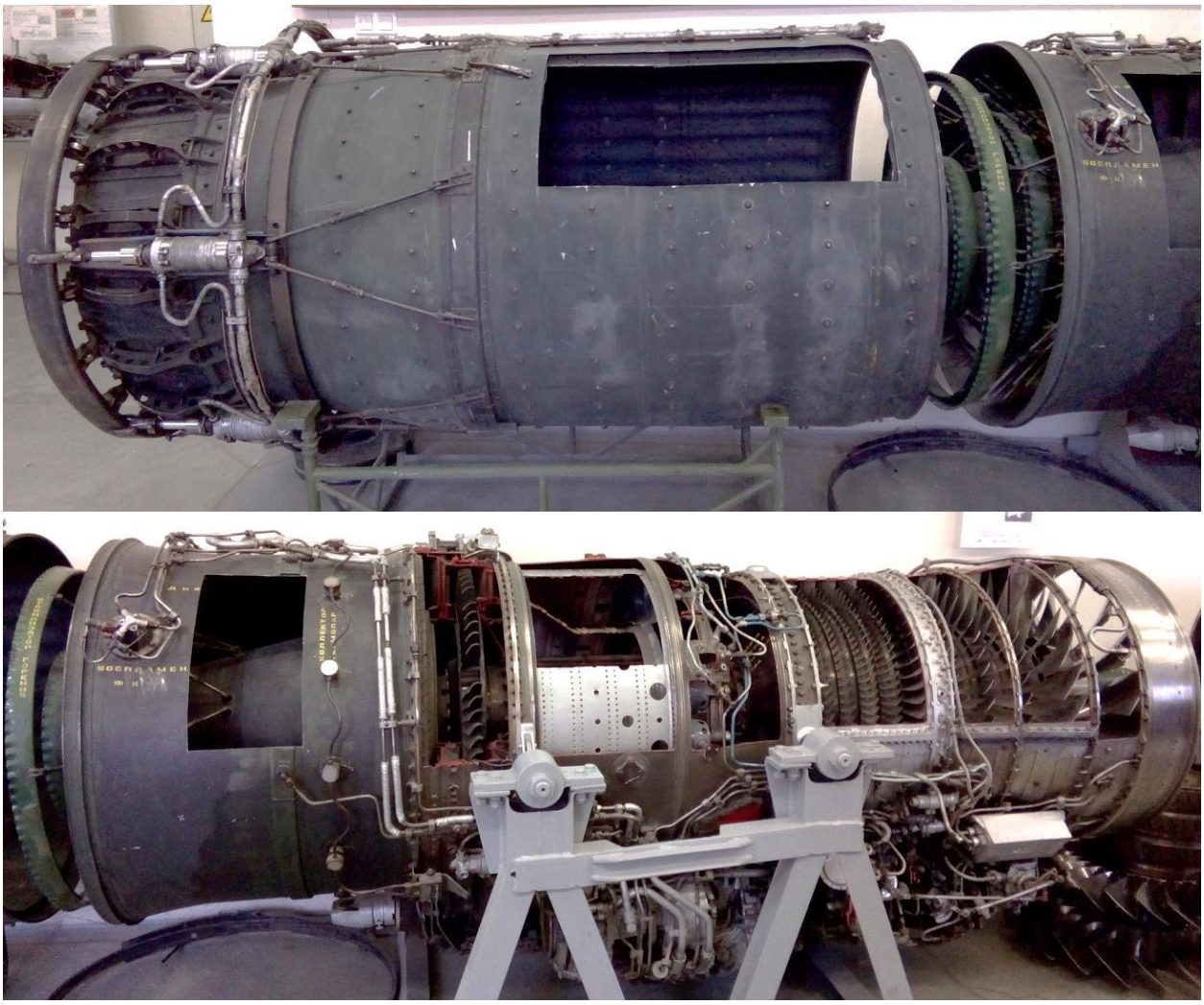
13. R11F2-300 (1958)



14. AL-7F-2 (1960)

15. AL-21F (1967)

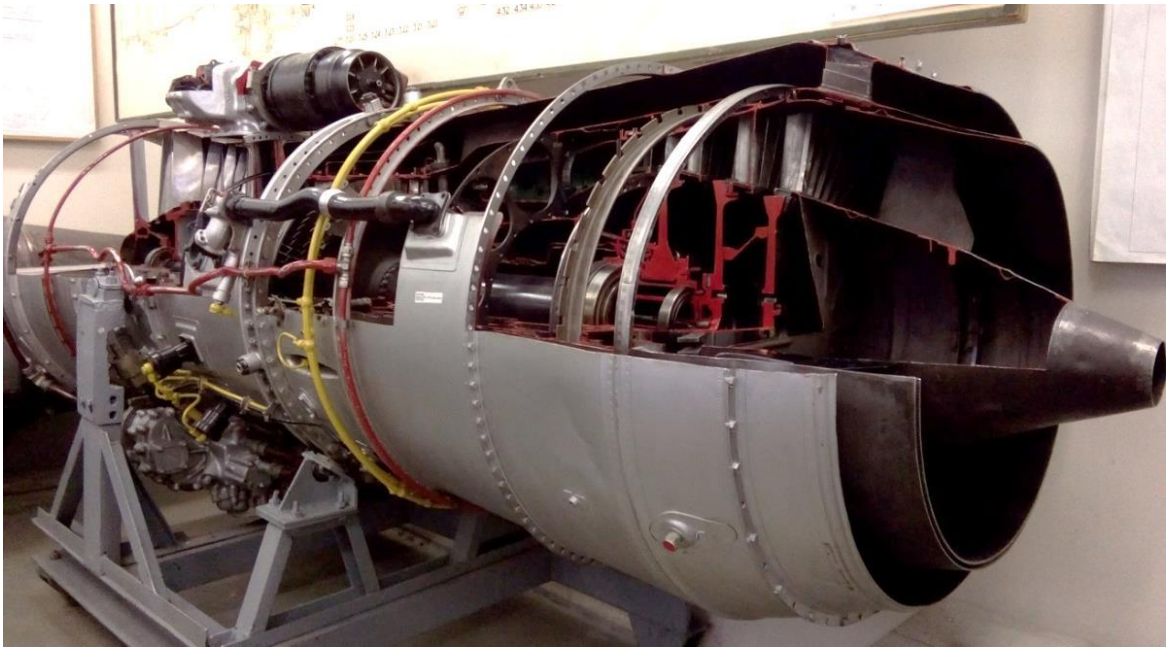
16. R-29B-300 (1972)



Turbofan

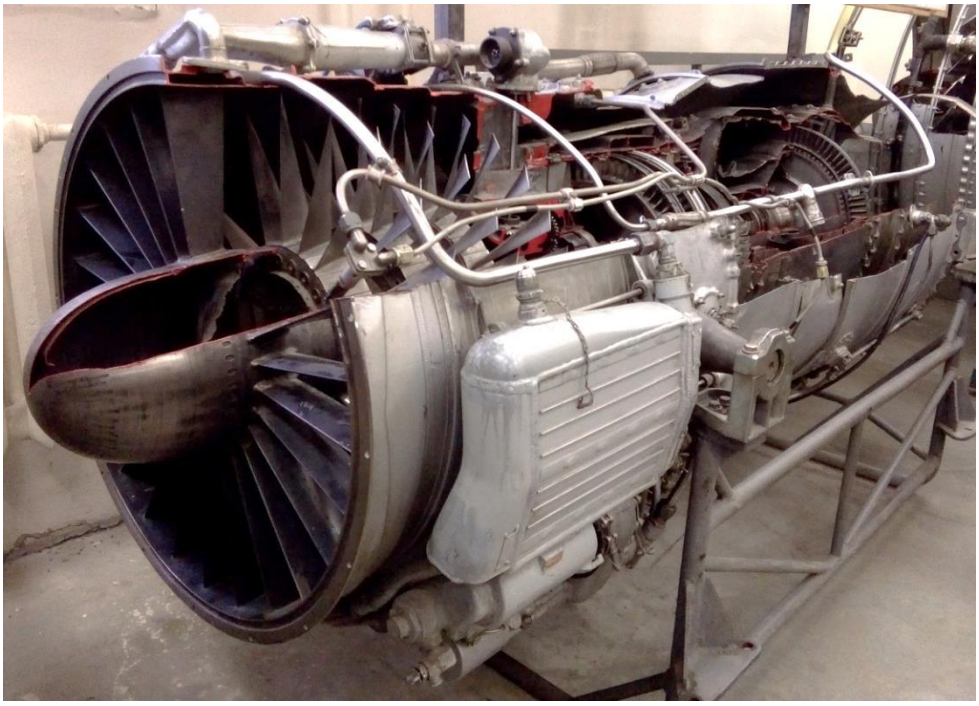
Domestic

17. D-20P (1960)

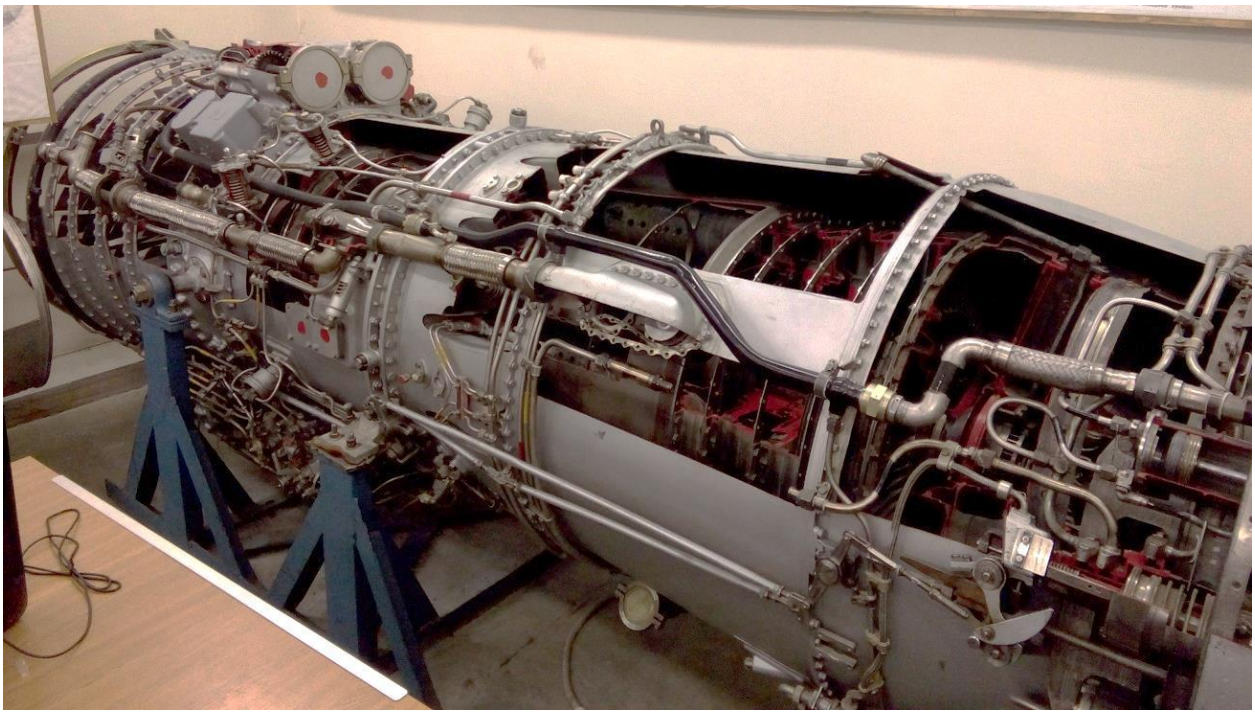


18. NK-8-4 (1962)

19. AI-25 (1967)



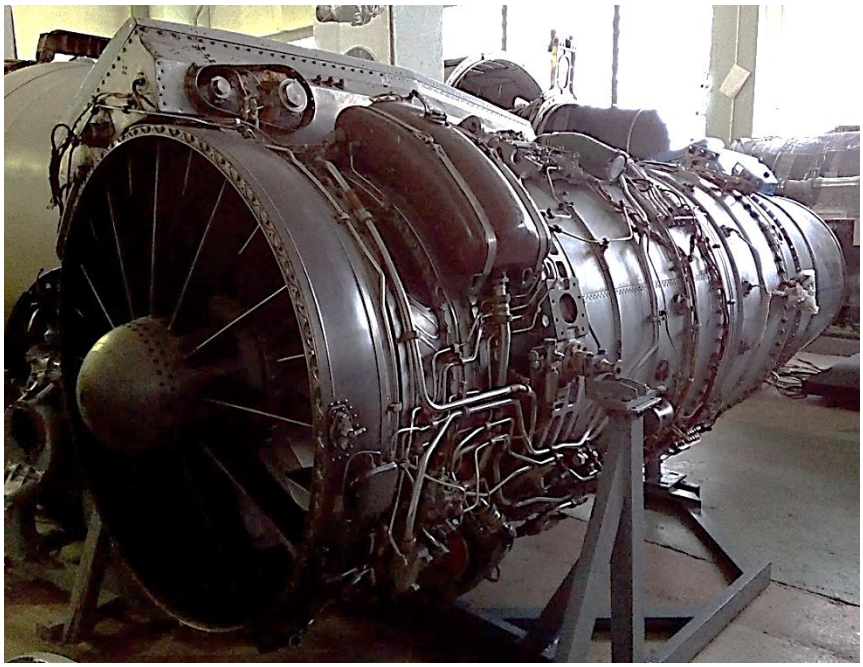
20. D-30 (1969)



21. D-36 (1977)

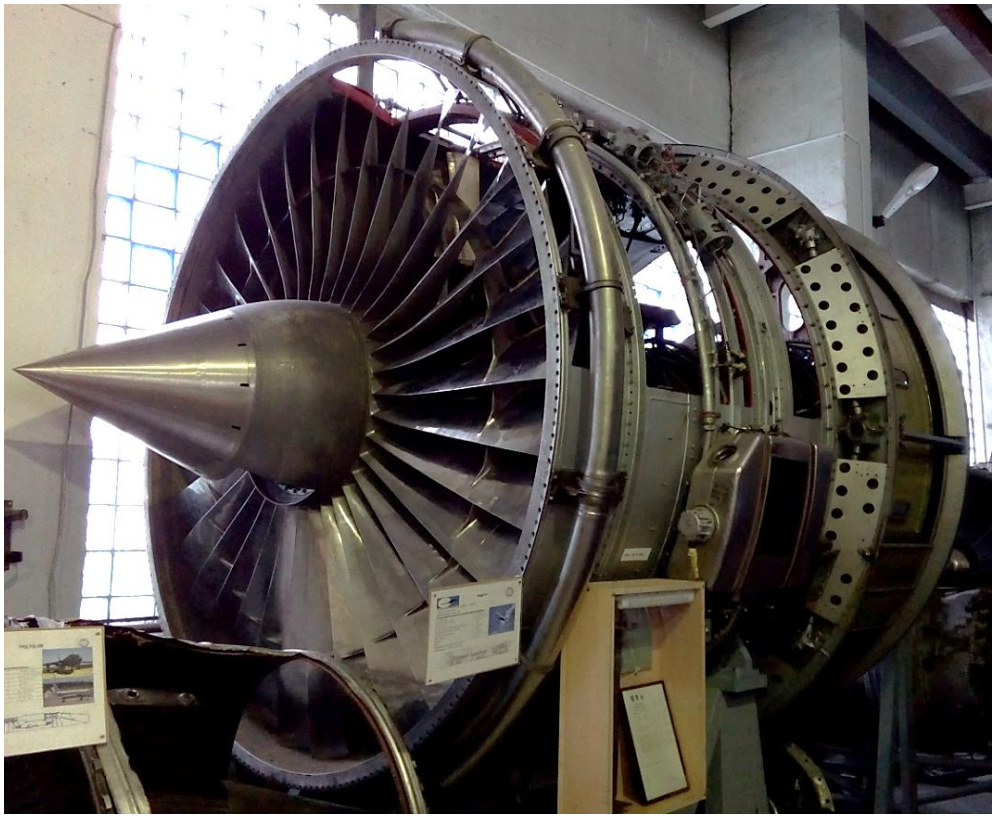
22. NK-86 (1980)

23. NK-88 (1980)



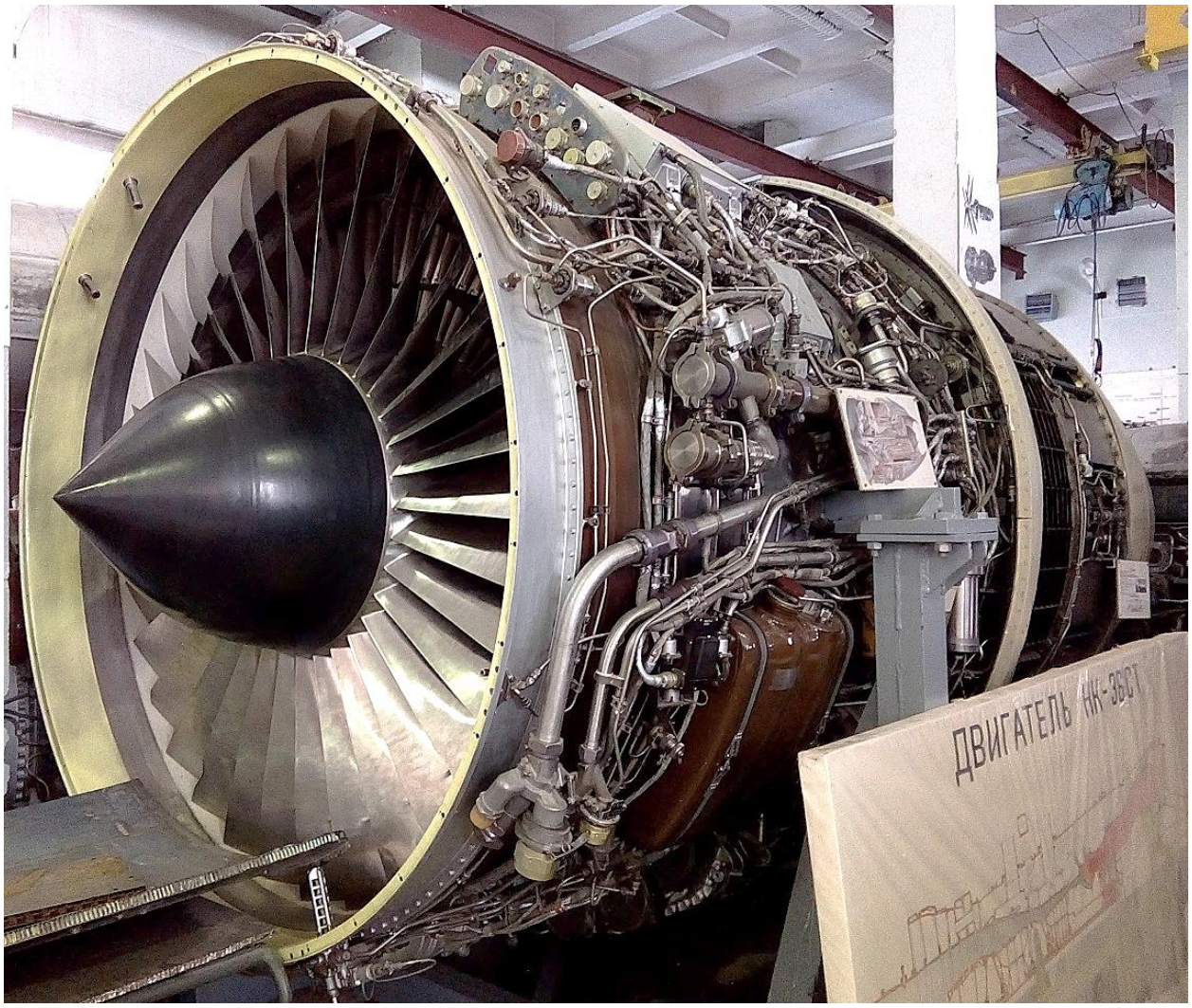
24. NK-56 (1979-1983)

25. D-18T (1984)



26. D-30KU (1988)

27. PS-90A (1988)

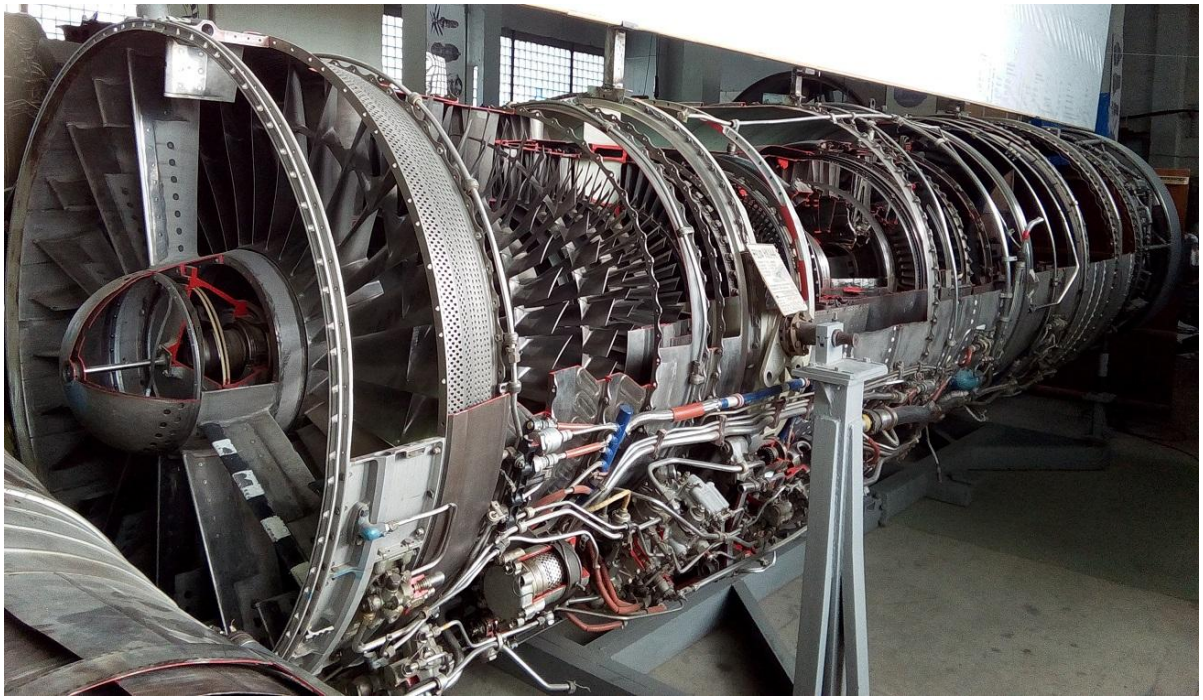


Turbofan with afterburner

Domestic

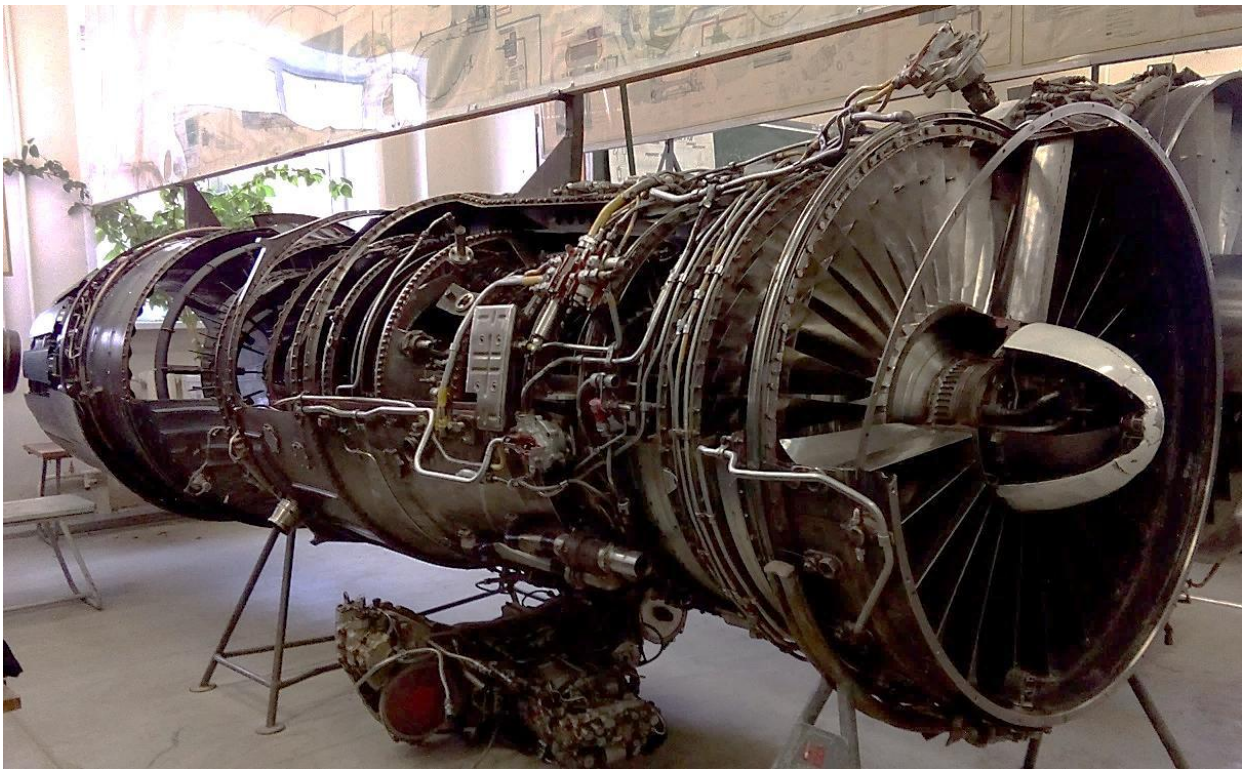
28. NK-6 (1958)

29. NK-144 (1965)



30. Nozzle NK-25 (1978)

31. AL-31F (1981)

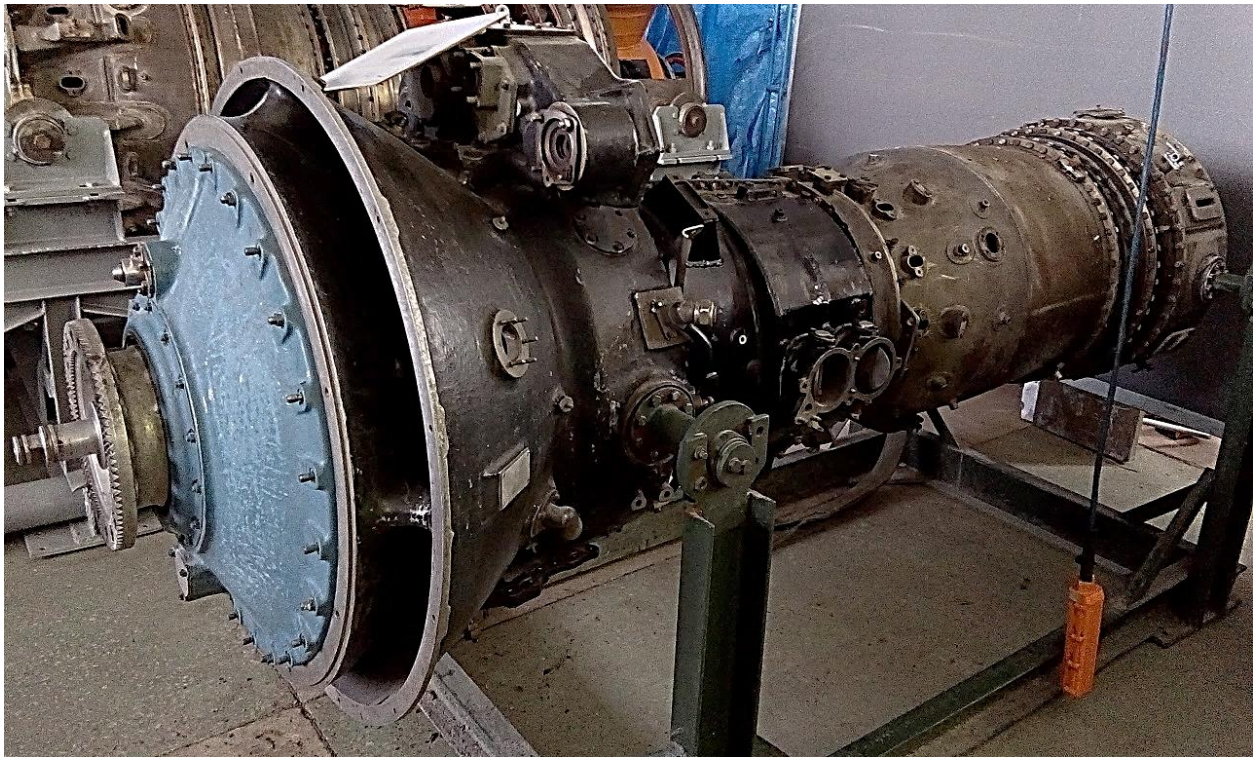


Turboprop

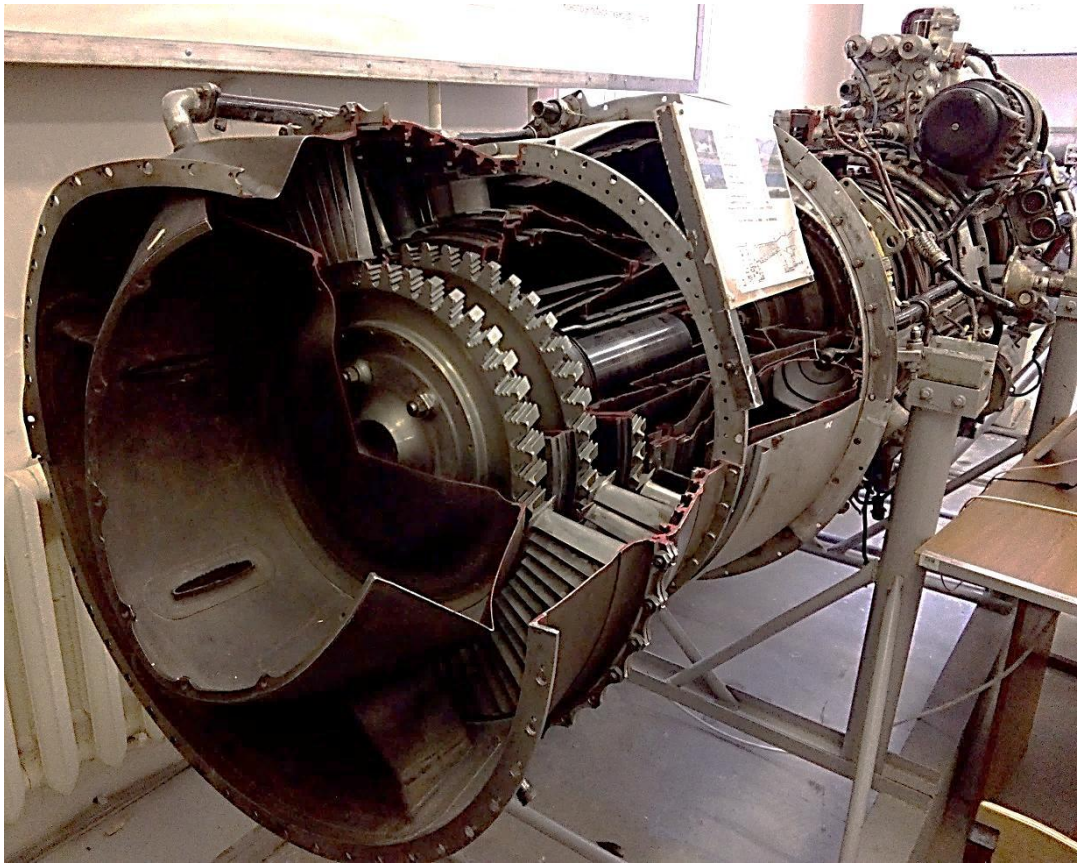
Domestic

32. TV-022 (1949)

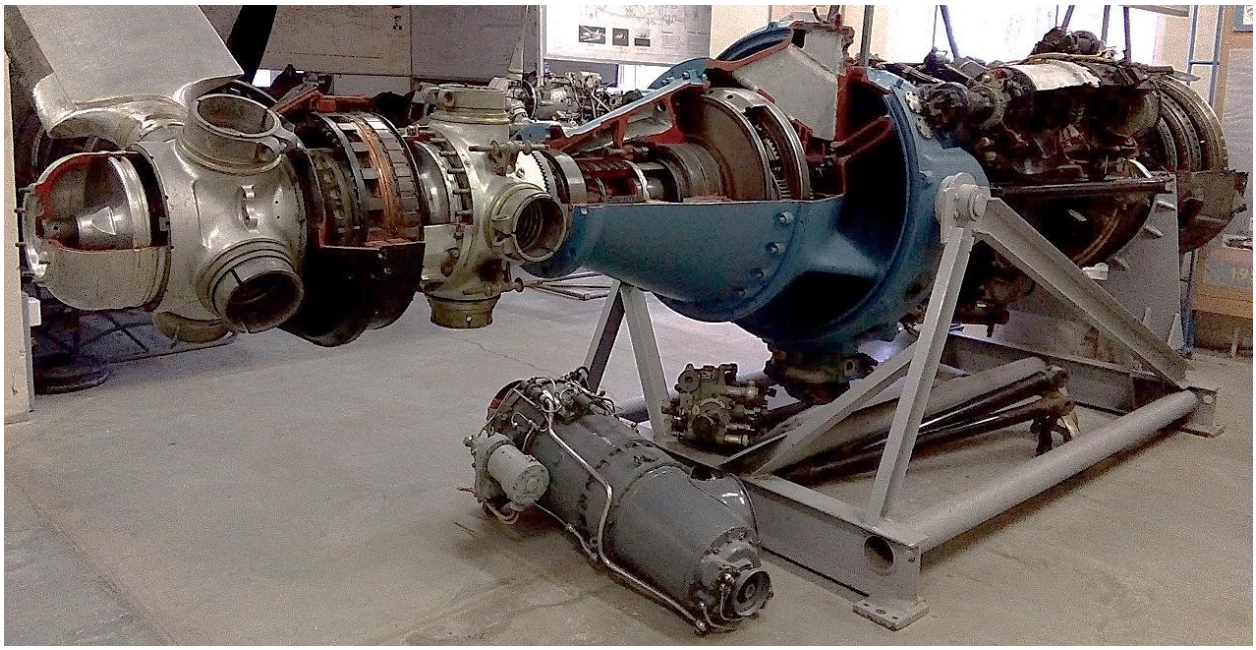
33. NK-4 (1957)



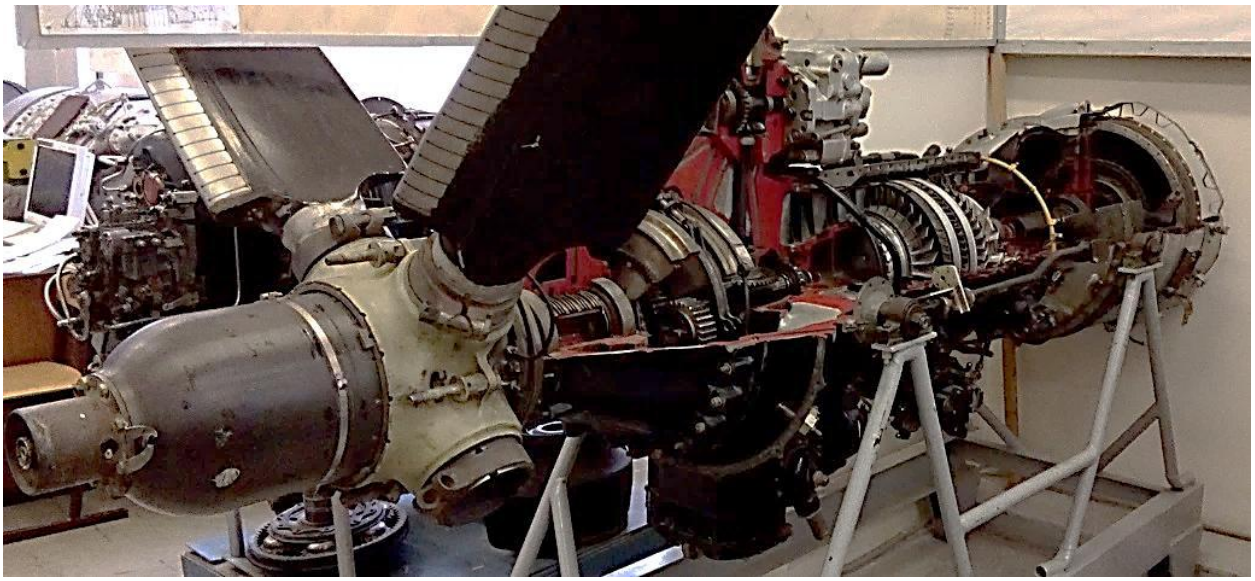
34. AI-20 (1957)



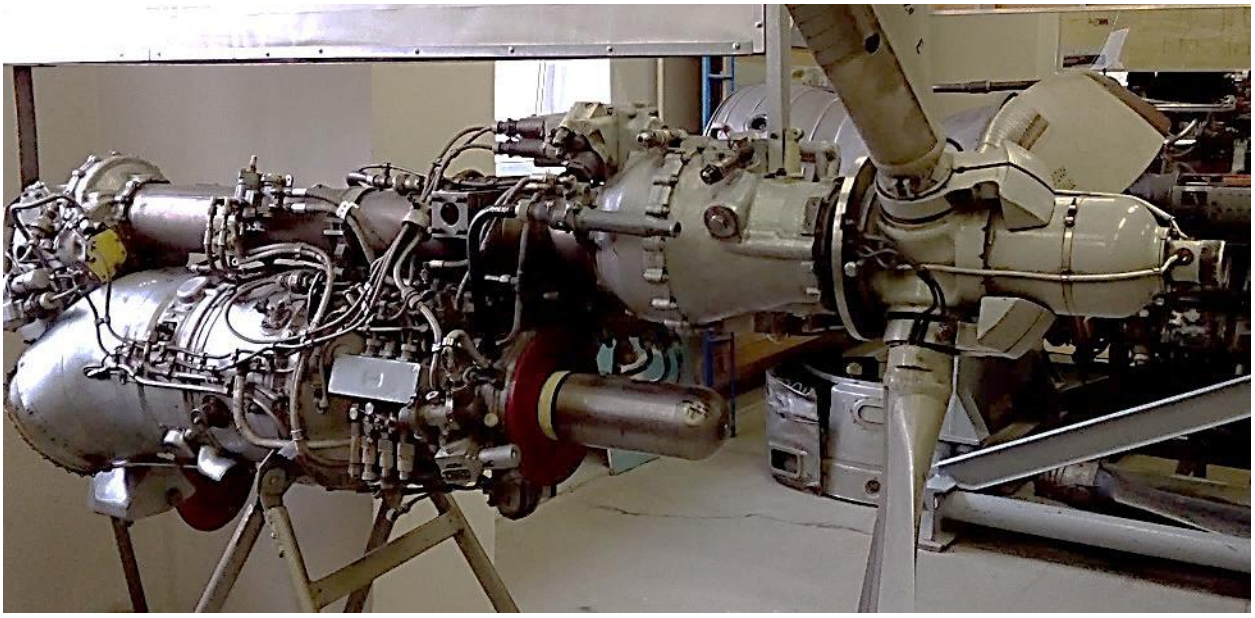
35. NK-12MV (1960)



36. AI-24 (1962)



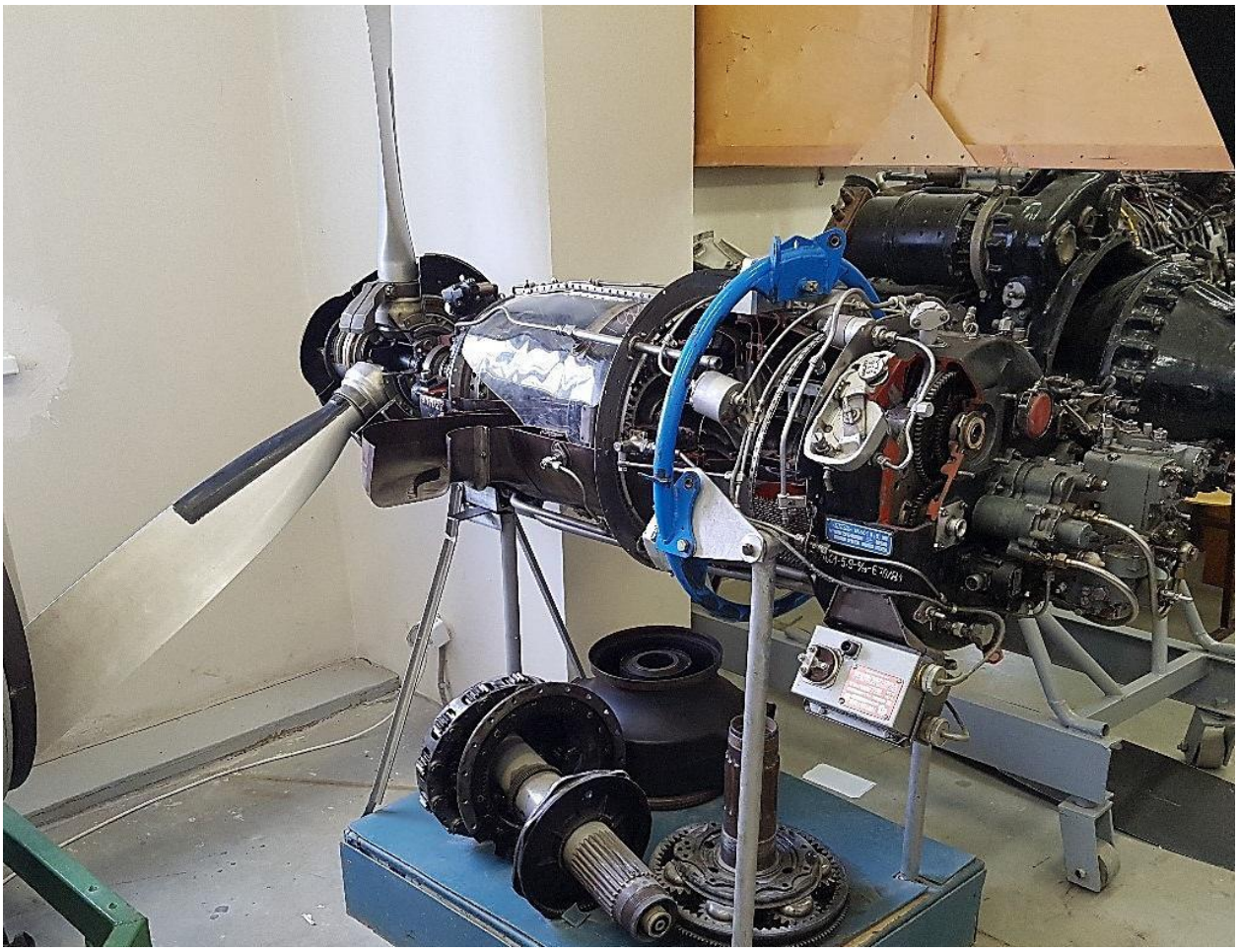
37. TVD 10 (1969)



38. NK-93 (1989)

Foreign

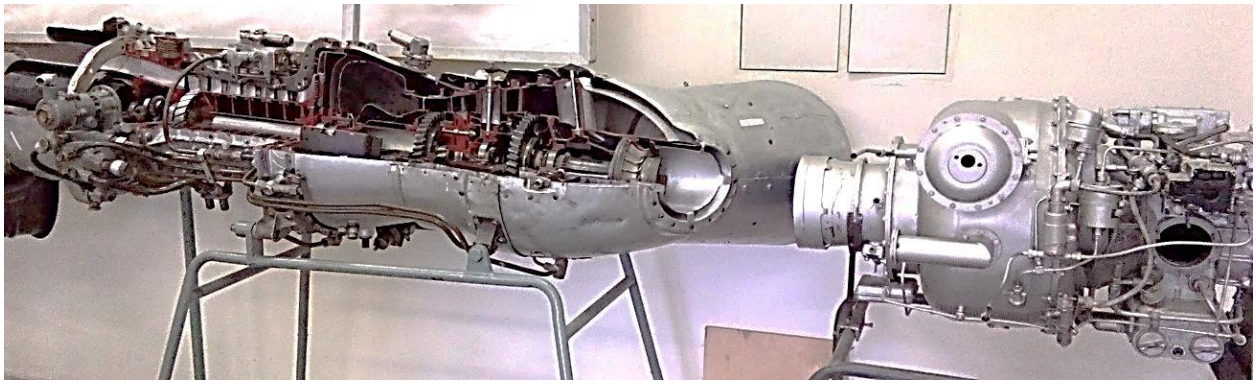
39. M-601E (1967)



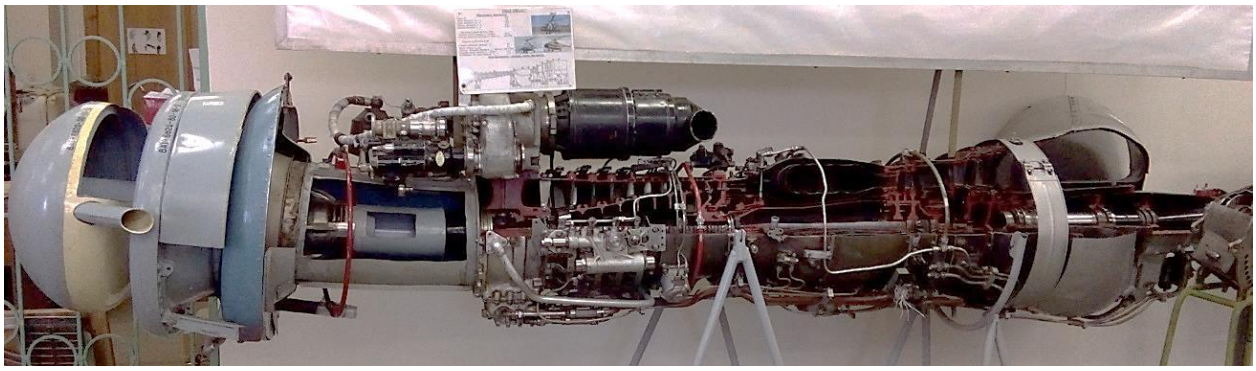
Helicopter GTE

Domestic

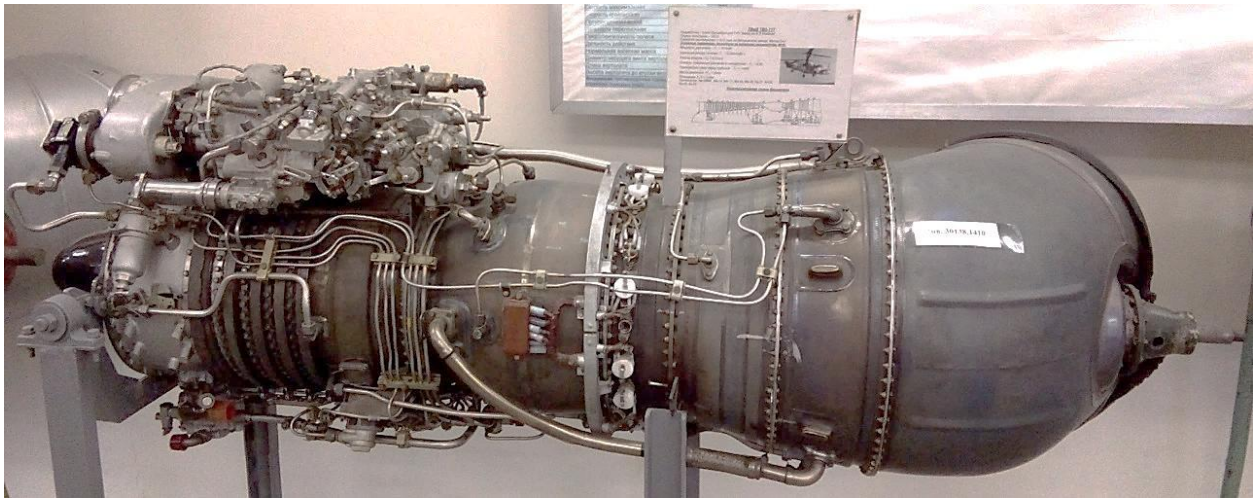
40. GTE-3F (1964)



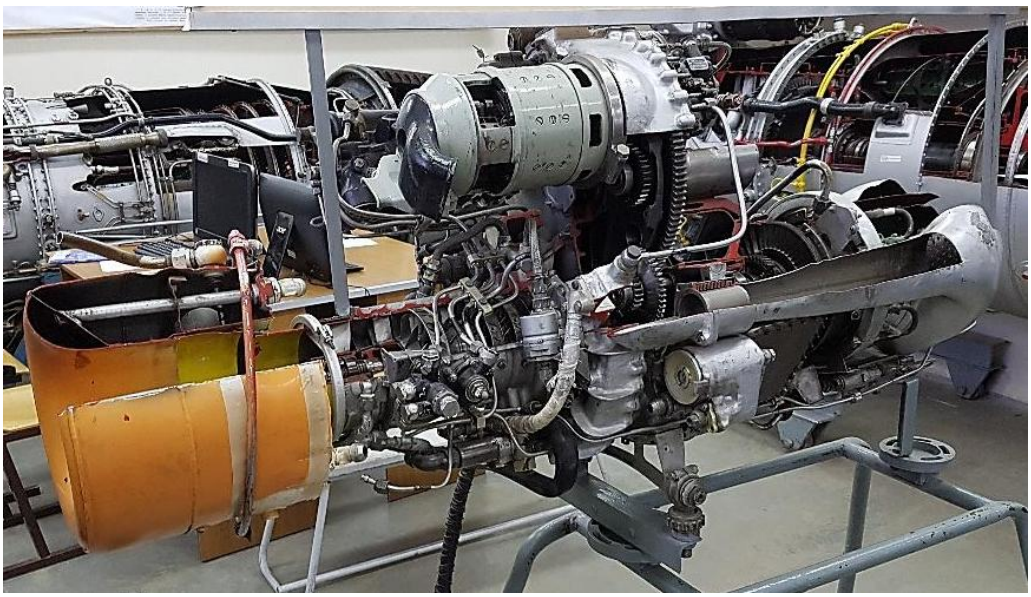
41. TV2-117 (1965)



42. TV3-117 (1972)

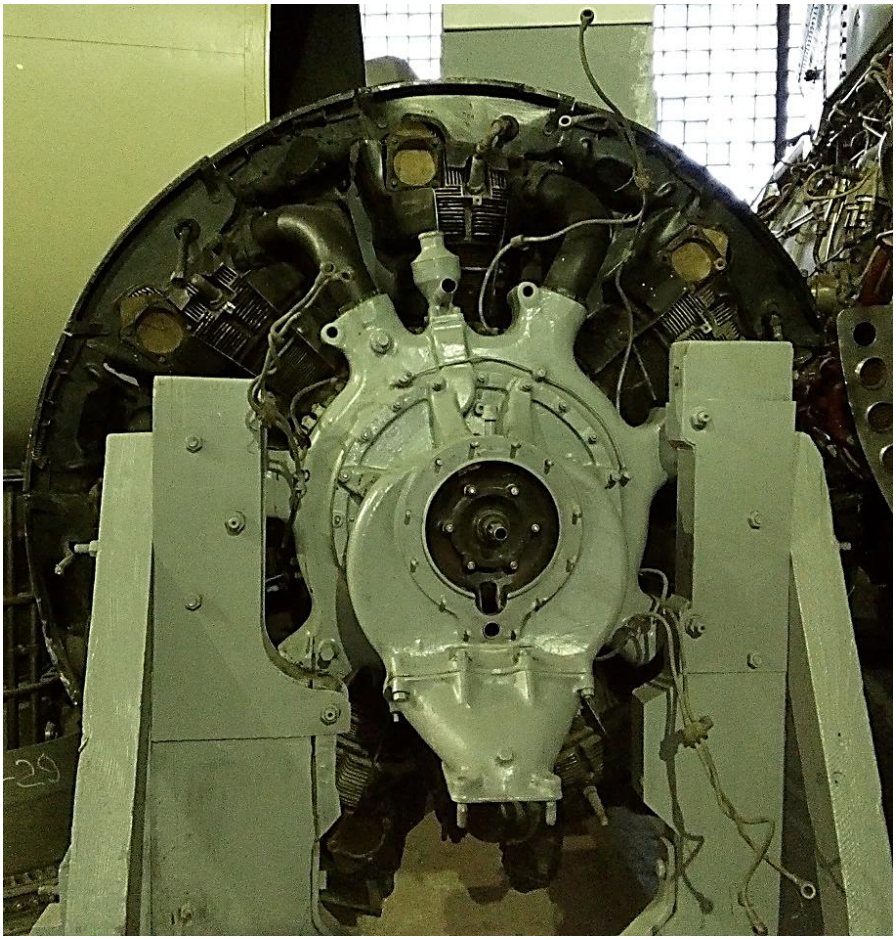


43. GTE-350 (1961)



Piston engines

44. AI-26V (1946)



Ramjet

45. RD-900 (1955)

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