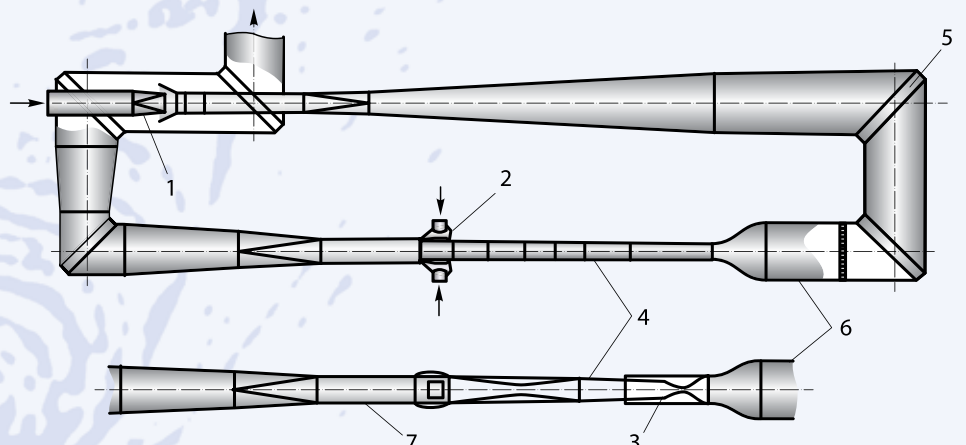




## Main Technical Parameters

Flow M number .....	0.4...4.0	Run duration .....	up to 15 min
Re number per 1 m .....	up to $60 \cdot 10^6$	Test section dimensions:	
Total pressure .....	80...560 kPa	Cross section area .....	$2.25 \times 2.25$ m
Dynamic pressure .....	up to 140 kPa	Test section length .....	5.5 m
Stagnation temperature .....	environmental	Model dimensions:	
Angle of attack ( $\alpha$ ) .....	$-5^\circ \dots 15^\circ$	Length .....	up to 2.0 m
Side slip angle ( $\beta$ ) .....	$-9^\circ \dots 3^\circ$	Wing span .....	up to 1.5 m



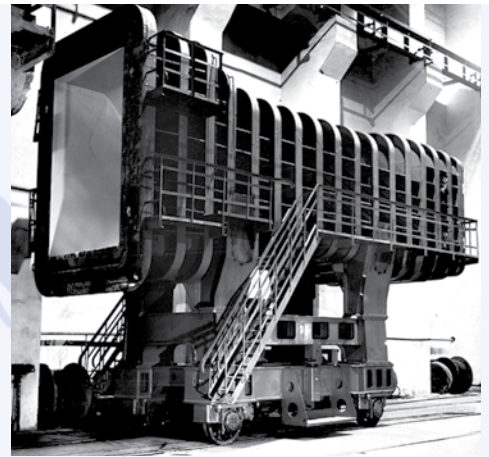
1. Forcing ejector
2. Suction ejector
3. Variable nozzle
4. Test section
5. Turning blades
6. Stilling chamber
7. Supersonic diffuser

## General Description

Aerodynamic wind tunnel T-109 is a variable density, blowdown, half-closed layout test facility with a reverse channel, two ejectors and adjusted supersonic diffuser. The flow is generated by compressed air accumulated in bottles with the help of compressors.

The test section is closed and perforated at model location area with square cross section intended for investigations under  $M \leq 1.7$ . Horizontal walls porosity can vary from 0 to 18%, while vertical walls porosity is from 0 to 65%.

The wind tunnel is equipped with suspension devices of three types intended for standard tests performance: tail string, strip suspension and side string. Flow operational regimes are enabled by a set of fixed area nozzles and a variable area nozzle ( $M = 0.4 \dots 0.4$ ).



## Capabilities

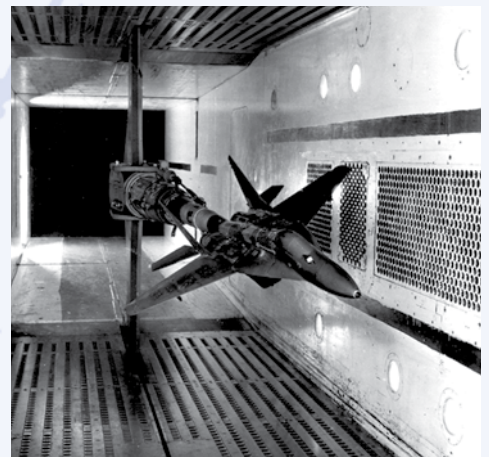
The following investigations can be carried out in T-109:

- Joint investigation of total and distributed aerodynamic characteristics of a model and its components;
- Tests with engine jets simulation ( $q_{\text{cons}} \sim 250 \text{ kg/s}$ , cold jet  $P_0 = 300 \text{ atm}$ , hot jet  $P_0 = 70 \text{ atm}$ ,  $T = 2000^\circ\text{C}$ ) for jet engines characteristics determination;
- Determination of static and dynamic aero elasticity characteristics of the aircraft models, namely flutter, buffeting, divergence, reverse;
- Research of aerodynamic characteristics of cargo-carriage separation, investigation of separation process;
- Simulation of a flow in aircraft armory compartment;
- Measurement of pressure pulsations along aircraft model surface ( $f = 0 \dots 20 \text{ kHz}$ );
- Investigation of Re numbers influence on aircraft aerodynamic characteristics;
- Physical research.



## Technological advantages

- Multiple modular measurement system with standard inference; digital systems of automated control of  $M$ ,  $Re$ ,  $\alpha$ ,  $\beta$  parameters; system of experimental data output in real time mode;
- Compressed air supply systems simulating different types of jet flows;
- Automated suspension units with remote control enabling research of load-aircraft separation process.



## Application

All the above-mentioned capabilities of T-109 wind tunnel are widely used for experimental research of various models of aviation, rocket and space engineering products and their structural components.

