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ADVERTISING
Details & Information
Contact: Simpson Communications.
Tel: +44 (0) 1705 499800.
Fax: +44 (0) 1705 499200

DISTRIBUTION DETAILS

Spaceflight may be received worldwide by mail through membership of the British Interplanetary Society. Details from the above address. Library subscription details are also available on request.

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Spaceflight is distributed in the UK and overseas through newsagents by COMAG Specialist Division, Mercury Centre, Central Way, Feltham, Middlesex TW14 ORX Tel 0181-844 1000 Fax 0181-751 266 and in the USA by ADS International, 3400 Dundee Road, Northbrook, IL 60062, USA.

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Back issues of ***Spaceflight*** are supplied at £3.00 (US$6.00) each, inclusive of surface mail delivery. ***Spaceflight*** binders (holding 12 issues) are available at £8.50 (US$17.00), inclusive of surface mail delivery.

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Published monthly by the **British Interplanetary Society**, 27/29 South Lambeth Road, London, SW8 1SZ, England. Registered Company No: 402498. Registered Charity No: 250556. Printed in the UK by Newman Thomson Limited, 13 Albion Street, Brighton BN2 2NE.

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Published By The British Interplanetary Society
Vol. 39 No. 8 August 1997

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Front Cover: **Japan has plans for an extensive series of lunar missions in the first decade of the next century that will feature surface rovers and sample return systems. The first step will be taken by Japan's Institute of Space and Astronautical Science (ISAS) with the launch of the Lunar-A mission now scheduled for February/March 1999. See p.260.** NASDA

Soviet Design Bureaux

BY ASIF A. SIDDIQI
Philadelphia, USA

During the first three decades of the Soviet space programme, little if anything was known about the organisations which actually designed and built hardware. In the last 10 years, however, a plethora of information has flooded the literature on the so-called "Design Bureaux" which participated in the space programme. Unfortunately, much of the information has been confusing and contradictory resulting in the use of incorrect designations and historical details in many articles in the West.

Preliminary Comments

This present article is an early attempt to collate all the information and provide for the first time a listing of the major Experimental Design Bureaux (OKB) and Scientific Research Institutes (NII) which were responsible for early Soviet space achievements. Thus, it is possible to trace the history of an organisation participating in the current Russian space programme back to its original designation, status, and Chief Designer. In the interest of brevity, only those organisations which have been involved in the design of spacecraft, launch vehicles, rocket engines and launch complexes are listed.

The article only purports to present the major institutions involved in the design and development of spacecraft and space launch vehicles. There are, in fact, dozens more enterprises which could have been included, many of whom were involved in both basic research as well as design and production. It should also be noted that many of the listed design bureaux were often branches of others for periods of time. Additionally, many design bureaux themselves have numerous branches and production plants which have been omitted here in the interest of brevity.

- In the listing for Primary Focus, only those activities related to the missile and space programmes are included.
- In the case of Scientific Production Associations (NPO) or Scientific Research Institutes (NII), the enterprise often has the post of Director, which is different from the post of Chief or General Designer. Only the latter have been listed here.
- In some cases, enterprises listed here have been merged although historically they have been considered independent organisations. This is especially true of Machine Building Plants (MZ) and Experimental Design Bureaux (OKB). For example the MZ Khrunichev and KB Salyut joined together in 1993. Additionally, the MZ Progress and the TsSKB merged in 1996.
- All the organisations are titled with their original designation and the name of its first Chief Designer.
- In the date for Establishment of the enterprise, the date refers to the organisation of the Design Bureau, not necessarily the plant at which the Design Bureau is located.

Spacecraft/Launch Vehicles

As is well-known, the very first Design Bureau to participate in the space programme was the OKB-1 headed by Korolev. This enterprise became independent from its parent institute, the NII-88, in August 1956.

Entries into the space industry of independent organisations with lead design roles soon followed: in 1958 came Yangel, Myasischev, and Tsybin; in 1959 came Chelomey; in 1962 came Reshetnev and Iosifyan; in 1965 came Lavochkin and Mikoyan; in 1966 came Savin; in 1969 came Tyurin; in 1974 came Kozlov; and finally in 1976 came Lozino-Lozinskiy.

Many of these organisations also built subsystems for spacecraft. The thirteen "primary contractor" enterprises are listed below. In the case of the Myasischev organisation, it served for many years as a branch of both the Chelomey and Korolev enterprises as the KB Salyut.

OKB-52/Chelomey

Est: 26 August 1955 Loc: Reutov

History: The group was first established on 17 September 1944 at Plant No. 51 in Tushino which had been headed by N. N. Polikarpov. From 1944-53 it worked on air-launched winged cruise missiles. In February 1953, the group was dissolved when the plant was made a division of the OKB-155. In June 1954 a Special Design Group was established once again at Plant No. 500 at Tushino. On 26 August 1955, this group became the OKB-52, later moving to Reutov to focus on naval cruise missiles. In 1959, it began work in the space and missile fields.

Designations:

OKB-52:	(Aug 1955-Mar 1966)
TsKBM:	(Mar 1966-··· 1983)
NPO Mashinostroyenia:	(··· 1983-Present)

Chief Designers:

V.N. Chelomey:	(Aug 1955-Jul 1959)

General Designers:

V.N. Chelomey:	(Jul 1959-Dec 1984)
G.A. Yefremov:	(Dec 1984-Present)

Primary Focus:

- Naval Cruise Missiles
- Long-Range Liquid Propellant Ballistic Missiles
- Piloted Lifting Bodies & Hypersonic Spacecraft
- Piloted Spacecraft
- Space Launch Vehicles
- Fractional Orbital Bombardment System
- Anti-Satellite Systems
- Naval Reconnaissance Satellites
- Automated Scientific Satellites
- Automated Remote Sensing Spacecraft

NII-627/Iosifyan

Est: 1941 Loc: Moscow

History: From 1941 to 1944, the facility was a production plant, where a NII was eventually established in 1944. In 1946 it became involved in the ballistic missile programme and in 1962 it inherited weather satellite projects from the OKB-586. In addition, a space branch was established in 1960 at Istra dedicated to small satellites. This branch became independent in November 1992 as the NII EM.

Designations:

NII-627:	(··· 1944-··· 1953)
VNII ElectroMekhaniki:	(··· 1953-Nov 1992)
NPP VNII ElektroMekhaniki:	(Nov 1992-Present)

Chief Designers:

A.G. Iosifyan	(··· 1941-··· 1974)
N.N. Sheremetyevskiy	(··· 1974-··· 1991)
Yu.V. Trifonov:	(··· 1993-Present)

Primary Focus:

- Automated Remote Sensing Satellites
- Automated Meteorological Satellites
- Automated Satellite Components
- Remote Sensing Equipment
- Motor Generators for Long-Range Ballistic Missiles

OKB-1/Korolev

Est: 26 August 1946
Loc: Podlipki/Kaliningrad/Korolev

History: The group was established as Department 3 of the SKB of the NII-88 on 26 August 1946 to develop long-range ballistic missiles. On 24 April 1950, this department was restructured into the OKB-1 still subordinate to the NII-88. On 14 August 1956, the OKB-1 was made independent of the NII-88. On 22 May 1974 the OKB-1 (then called the TsKBEM) merged with the KB EnergoMash to form the new NPO Energiya.

Designations:

SKB Dept. 3, NII-88:	(Aug 1946-Apr 1950)
OKB-1 of NII-88:	(Apr 1950-Aug 1956)
OKB-1:	(Aug 1956-Mar 1966)
TsKBEM:	(Mar 1966-May 1974)
NPO Energiya:	(May 1974-Apr 1991)
NPO Energiya imeni S.P. Koroleva:	(Apr 1991-Jul 1994)
AOOT RKK Energiya imeni S.P. Koroleva:	(Jul 1994-Present)

Chief Designers:

S.P. Korolev:	(Aug 1946-Jan 1966)
V.P. Mishin:	(Jan 1966-May 1974)

General Designers:

V.P. Glushko:	(May 1974-Jan 1989)
Yu.P. Semenov:	(Jan 1989-Present)

Primary Focus:

- Long-Range Liquid & Solid Propellant

Ballistic Missiles
- Long-Range Liquid Propellant Naval Ballistic Missiles
- Scientific Suborbital Missiles
- Piloted Spacecraft
- Piloted Lifting Bodies & Hypersonic Spacecraft
- Space Launch Vehicles
- Automated Scientific Spacecraft
- Automated Military Photo-Reconnaissance Spacecraft
- Communications Satellites
- Automated Lunar & Interplanetary Spacecraft
- Liquid Propellant Rocket Engines

TsSKB/Kozlov

Est: 23 July 1959 Loc: Kuybyshev/Samara

History: The department was established on 23 July 1959 as a Special Design Department to supervise manufacture of the R-7 and its derivative launch vehicles, becoming the OKB-1 Branch No. 3 in 1960. It inherited all work on reconnaissance satellites in 1964 from the OKB-1 although it remained subordinate to its parent entity until 30 July 1974 when it became independent as the TsSKB. The TsSKB combined with its production plant the Progress MZ in April 1996 to form the GNPRKTs TsSKB-Progress.

Designations:
OKB-1 Special Design Dept No. 25: (Jul 1959-··· 1960)
OKB-1 Branch No. 3: (··· 1960-Mar 1966)
TsSKB Kuybyshev Branch of TsKBEM: (Mar 1966-May 1974)
Tsentralnoye Spetsializirovannoye KB: (May 1974-Apr 1996)
GNPRKTs TsSKB-Progress: (Apr 1996-Present)

Chief Designer:
D.I. Kozlov: (Jul 1959-··· 1983)

General Designer:
D.I. Kozlov: (··· 1983-Present)

- Remote Sensing Satellites
- Military Photo-Reconnaissance Satellites
- Military Piloted Spacecraft
- Microgravity Processing Platforms
- Automated Scientific Satellites
- Space Launch Vehicle Development & Manufacturing
- Long-Range Ballistic Missile Manufacturing

OKB-301/Lavochkin

Est: 1 July 1937 Loc: Khimki

History: Until the early 1950s, the OKB focused exclusively on aviation. In the early 1950s it began efforts in developing surface-to-air missiles as well as long-range cruise missiles. It became a branch of the OKB-52 on 18 December 1962 after which it focused on naval cruise missiles. On 2 March 1965 it officially became an independent entity inheriting all automated lunar and interplanetary programmes from the OKB-1, eventually expanding to classified military projects.

Designations
OKB-301: (Jul 1937-Dec 1962)
OKB-52 Branch No. 2: (Dec 1962-Mar 1965)
GSMZ Lavochkin: (Mar 1965-··· 1974)
NPO Lavochkin: (··· 1974-Present)

Chief Designers:
S.A. Lavochkin: (Jul 1937-Jun 1960)
M.M. Pashinin: (Jun 1960-Dec 1962)
A.I. Eidis: (Dec 1962-Mar 1965)
G.N. Babakin: (Mar 1965-Aug 1971)
S.S. Kryukov: (Aug 1971-Dec 1977)
V.M. Kovtunenko: (Dec 1977-··· 1986)

General Designers:
V.M. Kovtunenko: (··· 1986-Jul 1995)
I.L. Shevalev: (Jul 1995-··· 1995)
V.A. Serebrennikov: (··· 1995-··· 1996?)
S.D. Kulikov: (··· 1996?-Present)

Primary Focus:
- Military Early Warning Spacecraft
- Automated Lunar & Interplanetary Spacecraft
- Automated Scientific Satellites
- Microgravity Research Instrumentation
- Launch Vehicle Upper Stage Production
- Long-Range Cruise Missiles
- Naval Cruise Missiles
- Surface-to-Air Missiles

NPO Molniya/Lozino-Lozinskiy

Est: 26 February 1976
Loc: Moscow (as independent entity)

History: The KB-4 was established as a branch of the OKB-155 to work on two themes: air-to-air missiles (under Bisnovat) and winged cruise missiles/spaceplanes (under Lozino-Lozinskiy). In February 1976 it was separated from the OKB-155, combined with KB Burevestnik, the Tushino MZ, and the Myasischev Experimental Plant at Zhukovskiy and became the NPO Molniya. All air-to-air missile work was transferred to OKB Vympel at that point.

Designations:
KB-4 of OKB-155:
NPO Molniya:
AOOT NPO Molniya:

General Designers:
G.E. Lozino-Lozinskiy: (Feb 1976-Feb 1993)
G.P. Dementyev: (Feb 1993-Present)

Primary Focus:
- Piloted Lifting Bodies & Hypersonic Spacecraft

OKB-155/Mikoyan

Est: 8 December 1939 Loc: Moscow

History: The group was established as an Experimental Design Section (OKO) in December 1939, becoming the OKB-155 on 16 March 1942.

Designations:
OKO: (Dec 1939-Mar 1942)
OKB-155: (Mar 1942-··· 1978)
MMZ Mikoyan: (··· 1978-Present)

Chief Designers:
A.I. Mikoyan: (Dec 1939-Dec 1956)

General Designers:
A.I. Mikoyan: (Dec 1956-May 1969)
R.A. Belyakov: (··· 1971-Present)

Primary Focus:
- Piloted Winged Lifting Bodies & Hypersonic Spacecraft

OKB-23/Myasischev

Est: 24 March 1951 Loc: Fili

History: The OKB focused on the development of long-range bombers and cruise missiles from its establishment on 24 March 1951 to 1960. On 3 October 1960 it became a branch of the OKB-52 and began developing spacecraft, ICBM, and space launch vehicles. It remained in that status until 30 June 1981, when it became a branch of NPO Energiya. On 22 June 1988 it separated from NPO Energiya and formed the NPO Experimental Machine Building. This NPO was eventually dissolved and the KB Salyut became independent for a short while before joining with the Khrunichev MZ in June 1993 to form the GKNPTs Khrunichev.

Designations:
OKB-23: (Mar 1951-Oct 1960)
OKB-52/TsKBM Branch No. 1: (Oct 1960-Jun 1981)
KB Salyut of NPO Energiya: (Jun 1981-Jun 1988)
NPO EM: (Jun 1988-··· 199?)
KB Salyut: (··· 199?-Jun 1993)
KB Salyut of GKNPTs Khrunichev: (Jun 1993-Present)

Chief/General Designers:
V.M. Myasischev: (Mar 1951-Oct 1960)
V.N. Bugayskiy (Oct 1960-··· 1973)
D.A. Polukhin: (··· 1973-Oct 1993)
A.S. Moyseyev: (Oct 1993-··· 199?)
A.K. Nedayvoda: (··· 1994-Present)

Primary Focus:
- Long-Range Aircraft Bombers
- Long-Range Cruise Missiles
- Piloted Lifting Bodies
- Long-Range Liquid Propellant Ballistic Missiles
- Space Launch Vehicles
- Piloted Spacecraft
- Fractional Orbital Bombardment System
- Large-Scale Automated Military & Remote Sensing Platforms

OKB-10/Reshetnev

Est: 4 June 1959 Loc: Krasnoyarsk-26

History: The group was originally formed at the Plant No. 1001 to supervise ICBM production for the OKB-1 but inherited a number of satellite projects from the OKB-586 and the OKB-1 in 1962-66 and began indigenous space projects. In December 1961 it separated from the OKB-1 and became an independent entity.

Designations:
OKB-1 Branch No. 2: (Jun 1959-Dec 1961)
OKB-10: (Dec 1961-··· 1966)
KB Prikladnoy Mekhaniki: (··· 1966-··· 1977)
NPO Prikladnoy Mekhaniki: (··· 1977-Present)

Chief/General Designers:
M.F. Reshetnev: (Jun 1959-Jan 1996)
A.G. Kozlov: (Jan 1996-Present)

Primary Focus:
- Automated Civilian & Military Communications Satellites
- Automated Navigation Satellites
- Automated Geodetic Satellites
- Piloted Spacecraft Complex Elements
- Space Launch Vehicles
- Long-Range Ballistic Missile Production

TsNII Kometa/Savin

Est: 1973 (as an independent entity)
Loc: Moscow

History: The group was established in 1962 as an OKB section of the large KB-1 organisation which was dedicated to anti-missile and anti-space defence projects. From that time it participated in a number of high priority military space programmes, including the IS ASAT project. In 1973 it was detached from the KB-1 and became an independent organisation, the TsNII Kometa.

Designations:
OKB-41? of KB-1: (··· 1962-··· 1973)
TsNII Kometa: (··· 1973-··· 19??)
TsNPO Kometa: (··· 19??-Present)

Chief/General Designers:
A.I. Savin: (··· 1973-Present)

Primary Focus:
- Military Anti-Satellite Spacecraft
- Military Early Warning Spacecraft
- Involvement in Electronic Intelligence Spacecraft
- Involvement in Radar Reconnaissance Spacecraft

OKB-256/Tsybin

Established: May 1955

History: When the OKB was dissolved in October 1959, its database on spaceplane

research was transferred to the OKB-155, while the OKB itself was absorbed by the OKB-23. Chief Designer Tsybin eventually ended up at the OKB-1 in 1960.

Chief Designer:
P.V. Tsybin: (May 1955-Oct 1959)

Primary Focus:
- Piloted Winged Lifting Bodies & Hypersonic Spacecraft

TsKB-7/Tyurin

Est: Plant in 1719, OKB in 1949
Loc: Leningrad/St. Petersburg

History: The OKB was established in 1949 at Plant No. 7 and subordinated to the MATsKB for designing naval anti-ship artillery armaments. In 1959 it began work on solid-propellant ballistic missiles. In 1969 it began work on space themes inheriting RORSAT and EORSAT projects from the OKB-52. It was subordinate to the PO Arsenal imeni M. V. Frunze from the late 1980s to the early 1990s.

Designations:
TsKB-7
GP KB Arsenal imeni M.V. Frunze

Chief Designers:
P.A. Tyurin: (Feb 1953-··· 1981)
S.P. Parnyakov: (··· 19??-··· 1983)
Yu.F. Valov: (··· 1983-Apr 1995)
B.I. Poletayev: (Apr 1995-Present)

Primary Focus:
- Naval Reconnaissance Satellites
- Digital Control Drives
- Surface-to-Air Missile Electronics
- Satellite Thermal Control
- Satellite Transport Containers
- Ground Station Components
- Solid Propellant Long-Range Ballistic Missiles
- Solid Propellant Long-Range Naval Ballistic Missiles
- Solid Propellant Rocket Engines

OKB-586/Yangel

Est: 10 April 1954 Loc: Dnepropetrovsk

History: The group was originally established on 9 May 1951 from transferred personnel from the NII-88 OKB-1 as a Serial Design Bureau to supervise production of OKB-1 missiles at the Dnepropetrovsk Machine Building Plant No. 586. On 10 April 1954, another group of engineers from the NII-88 were transferred to the plant and the OKB-586 was formally established.

Designations:
SKB-586: (May 1951-Apr 1954)
OKB-586: (Apr 1954-Oct 1966)
KB Yuzhnoye: (Oct 1966-Oct 1986)
NPO Yuzhnoye: (Oct 1986-Present)

Chief Designers:
V.S. Budnik: (May 1951-Jul 1954)
M.K. Yangel: (Jul 1954-Oct 1971)
V.F. Utkin: (Oct 1971-Nov 1979)

General Designers:
V.F. Utkin: (Nov 1979-Nov 1990)
S.N. Konyukhov: (Nov 1990-··· 19??)
V.S. Fomenko: (··· 19??-Present)

Primary Focus:
- Long-Range Liquid Propellant Ballistic Missiles
- Long-Range Naval Ballistic Missiles
- Small Automated Scientific Spacecraft
- Small Automated Military Spacecraft
- Automated Meteorological & Remote Sensing Spacecraft
- Space Launch Vehicles
- Fractional Orbital Bombardment System & ASAT Launch Vehicles
- Liquid & Solid Propellant Rocket Engines
- Scientific Suborbital Missiles
- Military Electronic Intelligence Satellites

Rocket Engines

There were/are nine primary rocket engine development organisations in the Soviet space programme. The primary role of many of these, such as Kuznetsov and Lyulka were, in fact, in the field of jet engines for aircraft.

OKB-456/Glushko

Est: 1946 Loc: Khimki

History: The KB EnergoMash was merged with the TsKBEM on 22 May 1974 to create NPO Energiya. On 19 January 1990 they separated and the KB EnergoMash became the NPO EnergoMash.

Designations:
OKB-456: (··· 1946-Mar 1965)
OKB EnergoMash: (Mar 1965-May 1974)
KB EnergoMash of NPO Energiya: (May 1974-Jan 1990)
NPO EnergoMash imeni V. P. Glushko: (Jan 1990-Present)

Chief Designers:
V.P. Glushko: (Jul 1944-May 1974)

General Designers:
V.P. Glushko: (May 1974-Jan 1989)
V.P. Radovskiy: (Jan 1989-··· 1991)
B.I. Katorgin: (··· 1991-Present)

Primary Focus:
- Liquid Propellant Rocket Engines for
  - Long-Range Ballistic Missiles
  - Cruise Missiles
  - Space Launch Vehicles
- Nuclear Rocket Engines

OKB-2/Isayev

Est: 25 May 1943
Loc: Podlipki/Kaliningrad/Korolev

History: The group was originally established as part of a department, the KB-D, in the Plant No. 293 on 4 February 1943. Isayev was the Deputy Technical Leader of the KB-D. On 21 June 1943, Isayev was named the Chief of the Department of Engines at the Plant No. 293. In February 1944, the Plant No. 293 was merged with the NII-3 to form the new NII-1. On 23 June 1944, Isayev was named Chief of a Department at the NII-1. This Department was transferred to the NII-88 on 1 July 1948 as the new SKB Department No. 9, which in 1952 became the OKB-2 of the NII-88. The OKB-2 eventually became an independent organisation on 16 January 1959.

Designations:
Plant No. 293 Dept.: (May 1943-Feb 1944)
NII-1 Dept.: (Feb 1944-Jul 1948)
SKB Dept 9, NII-88: (Jul 1948-··· 1952)
OKB-2 of NII-88: (··· 1952-Jan 1959)
OKB-2: (Jan 1959-··· 1966)
KB KhimMash: (··· 1966-Present)

Chief Designers:
A.M. Isayev: (Aug 1947-Jun 1971)
V.N. Bogomolov: (Jun 1971-··· 1985)
N.I. Leontyev: (··· 1985-Present)

Primary Focus:
- Liquid Propellant Rocket Engines for
  - Long-Range Ballistic Missiles
  - Long-Range Naval Ballistic Missiles
  - Spacecraft
  - Space Launch Vehicles
  - Anti-Ballistic Missiles
  - Cruise Missiles
- Nuclear Rocket Engines

OKB of Iskra Plant/Kartukov

Loc: Moscow

Chief Designers:
I.I. Kartukov:
Yu.K. Kulikov:
B.A. Raysberg:

- Solid-Propellant Rocket Engines for Launch Escape Systems, Soyuz, Soyuz-T

OKB-154/Kosberg

Est: 17 October 1941
Loc: Moscow, then Berdsk, then Voronezh

History: The group was originally established in Moscow, but moved to Voronezh in April 1946.

Designations:
OKB-154: (May 1946-··· 1966)
KB Khimicheskoy Avtomatiki: (··· 1966-Present)

Chief/General Designers:
S.A. Kosberg: (Oct 1941-Jan 1965)
A.D. Konopatov: (Jan 1965-··· 1993)
V.S. Rachuk: (··· 1993-Present)

Primary Focus:
- Liquid Propellant Rocket Engines for
  - Long-Range Ballistic Missiles
  - Space Launch Vehicles
  - Air-to-Air Missiles
  - Surface-to-Air Missiles
- Nuclear Rocket Engines

OKB-276/Kuznetsov

Est: Plant established on 17 April 1946
Loc: Kuybyshev/Samara

Designations:
OKB-276:
NPO Trud:
GNPP Trud:
AO Dvigatel NK:
Samara NTK imeni N.D. Kuznetsov:

Chief Designers:
N.D. Kuznetsov: (··· 1946-··· 1956)

General Designers:
N.D. Kuznetsov: (··· 1956-··· 1994)
Ye.A. Gritsenko: (··· 1994-Present)

Primary Focus:
- Liquid Propellant Rocket Engines for
  - Long-Range Ballistic Missiles
  - Space Launch Vehicles

OKB-165/Lyulka

Est: March 1946 Loc: Moscow

History: The group was originally a department in the NII-1.

Designations:
OKB-165:
KB Saturn:
NPO Saturn:

Chief/General Designers:
A.M. Lyulka (Mar 1946-··· 1984)
V.G. Stepanov: (··· 1984-··· 19??)
Y.P. Marchukov:
V.M. Chepkin: (1993)

Primary Focus:
- Liquid Propellant Rocket Engines for
  - Space Launch Vehicles
- Turbo-Machinery

OKB Fakel/Stechkin

Est: 1955, involved in space industry from 1959

Loc: Kaliningrad/Konigsberg

Designations:
OKB-?? (··· 1955-··· 1972)
OKB Fakel (··· 1972-··· 19??)

Chief Designers:
B.S. Stechkin (··· 1955-··· 1969)
M.I. Shalamov:

A.S. Bober (1989-Present)

Primary Focus:
- Attitude Control Thrusters for Spacecraft
- Hall Effect Ion Engines
- Plasma Generators
- Electrical Propulsion

OKB-300/Tumanskiy

Est: February 1943

Designations:
OKB-300

Chief/General Designers:
A.A. Mikulin: (Feb 1943-··· 1956)
S.K. Tumanskiy: (··· 1956-··· 1973)
O.N. Favorskiy:

Primary Focus:
- Liquid Propellant Rocket Engines for Spacecraft

NII Mashinostroyeniya

Est: 1958
Loc: Nizhnaya Selda

History: The NII was originally established as a branch of the NII-1 in 1958, and eventually became an independent entity in 1981.

Primary Focus:
- Attitude Control Thrusters for Spacecraft

Launch Complexes

Two primary organisations are involved in the design and development of launch complexes for space launch vehicles. In the early years, the OKB of Barmin was the only enterprise in this field, but was joined by the OKB of Petrov in 1963.

GSKB SpetsMash/Barmin

Est: OKB established 30 June 1941
Loc: Moscow

Designations:
Kompressor Plant SKB SpetsMash: (Feb 1941-··· 1946)
GSKB SpetsMash: (··· 1946-Jan 1967)
KB Obshchego Mashinostroyeniya: (Jan 1967-Present)

Chief/General Designers:
V.P. Barmin: (Jun 1941-Jul 1993)
N.M. Korneyev: (Aug 1993-··· 1993)
I.V. Barmin: (··· 1993-Present

Primary Focus:
- Launch Complexes for
  - Long-Range Ballistic Missiles
  - Space Launch Vehicles
  - Anti-Ballistic Missiles
  - Surface-to-Air Missiles
  - Suborbital Scientific Missiles
- Long-term Lunar Bases
- Lunar & Venus Soil Return Units
- Microgravity Furnaces

GSKB/Petrov

Est: August 1948

Designations:
GSKB: (Aug 1948-··· 19??)
KB TransMash: (··· 19??-Present)

Chief/General Designers:
V.P. Petrov: (Aug 1948-··· 1963)
V.N. Solovyev: (··· 1963-··· 1992)
G.P. Biryukov: (··· 1992-Present)

Primary Focus:
- Launch Complexes for
  - Long-Range Ballistic Missiles
  - Space Launch Vehicles
  - Suborbital Scientific Missiles

'Saturn Rocket Years' Competition

The Apollo program depended on the successful development of an immensely powerful rocket within relatively few years to meet President Kennedy's well-known commitment to send men to the Moon. The Saturn rocket was the answer. This month's competition gives readers an opportunity to recall some of the years in the rocket's programme of launches.

Prizes: The first two correct entries to be opened after the closing date of 21 August 1997 will receive a copy of the book:

'Stages of Saturn'
By Roger E. Bilstein

This book of over 500 pages was published in 1996 as a paperback in the NASA History Series and provides a 'nuts-and-bolts' account of the technological history of the Apollo/Saturn launch vehicles. Further details appear on the opposite page.

To Enter: Give the years in which the following launches (of either manned or unmanned vehicles) took place. The six answers are to be found among the following eight dates: 1961, 1963, 1965, 1966, 1967, 1969, 1972, 1975.

Saturn 1: The first and last launches took place in ..... and .....

Saturn 1B: The first and last launches took place in ..... and .....

Saturn 5: The first and last launches took place in ..... and .....

Post to: The British Interplanetary Society
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To arrive by first delivery on 21 August 1997.

Entries may be submitted on a photocopy or otherwise written out in a clear and unambiguous form.

No multiple entries please.

Title/Name .....

Address .....

.....

.....

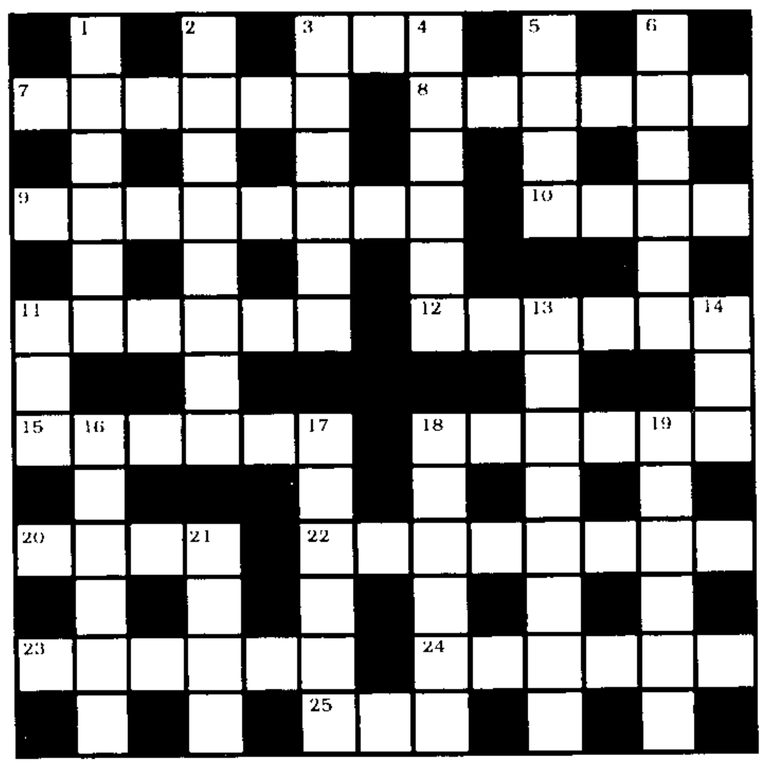
Spaceflight Crossword

No. 48

ACROSS
3. Appeal for help
7. Colour and fruit
8. Part of the Sun visible during a solar eclipse
9. Private US satellite communications company
10. One small one for a man
11. Hard question
12. Coy
15. Band of Earth's surface observed by remote sensing satellite along its ground track
18. Contractile tissue
20. Satellite launch vehicle developed by India (acronym)
22. Gas container of a balloon
23. Influence
24. Followed
25. Shuttle acronym

DOWN
1. European space launcher
2. International mobile communications organisation
3. Detector
4. Protective southern hemisphere constellation (Latin name)
5. Ornithoid southern hemisphere constellation (Latin name)
6. Apollo 8 crew member
11. Toughened polystyrene for manned spacecraft heat shield? (acronym)
13. Reveal
14. Fasten
16. Shuttle crew member on STS-81 the fifth Mir docking mission
17. Appoints
18. Motion pictures
19. Backslides
21. Perception

Solution will appear in the September issue.



Solution to Crossword No. 47.
ACROSS: 7. Apogee; 8. Locate; 10. Seismic; 11. Enter; 12. Lion; 13. Cubed; 17. Tests; 18. Mare; 22. Dwell; 23. Cassini; 24. Expect; 25. Triton.
DOWN: 1. Capsule; 2. Horizon; 3. Terms; 4. Powered; 5. Waste; 6. Metre; 9. Acoustics; 14. Reflect; 15. Satiate; 16. Designs; 19. Added; 20. Seeps; 21. Astra.