

Projekt SPOLEČNÉ VZDĚLÁVÁNÍ PRO SPOLEČNOU BUDOUCNOST

Současná kosmonautika a kosmické technologie 2014



A přece se točí...



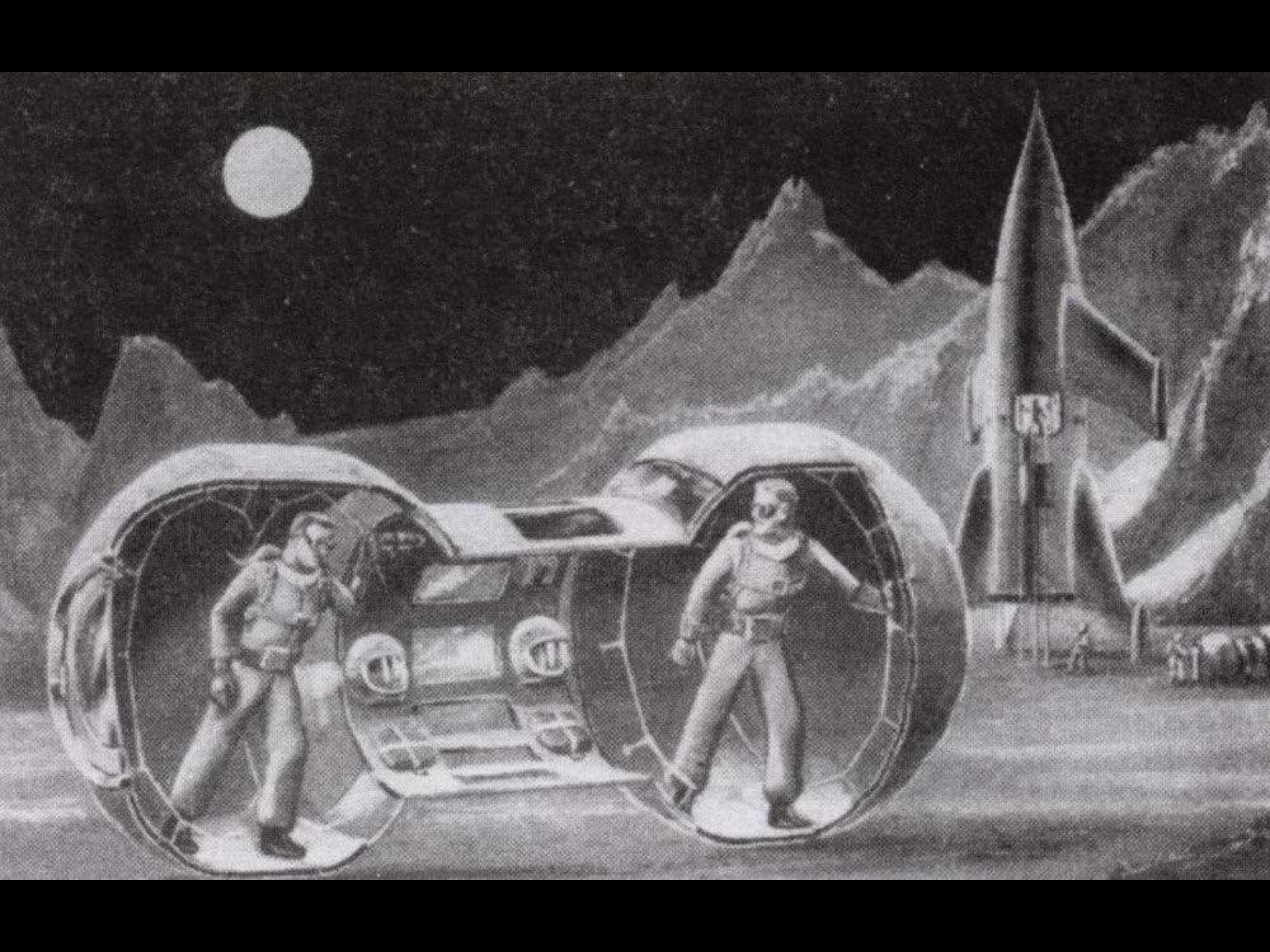
Ing. Tomáš PŘIBYL
www.kosmonaut.cz
tomas.pribyl@seznam.cz

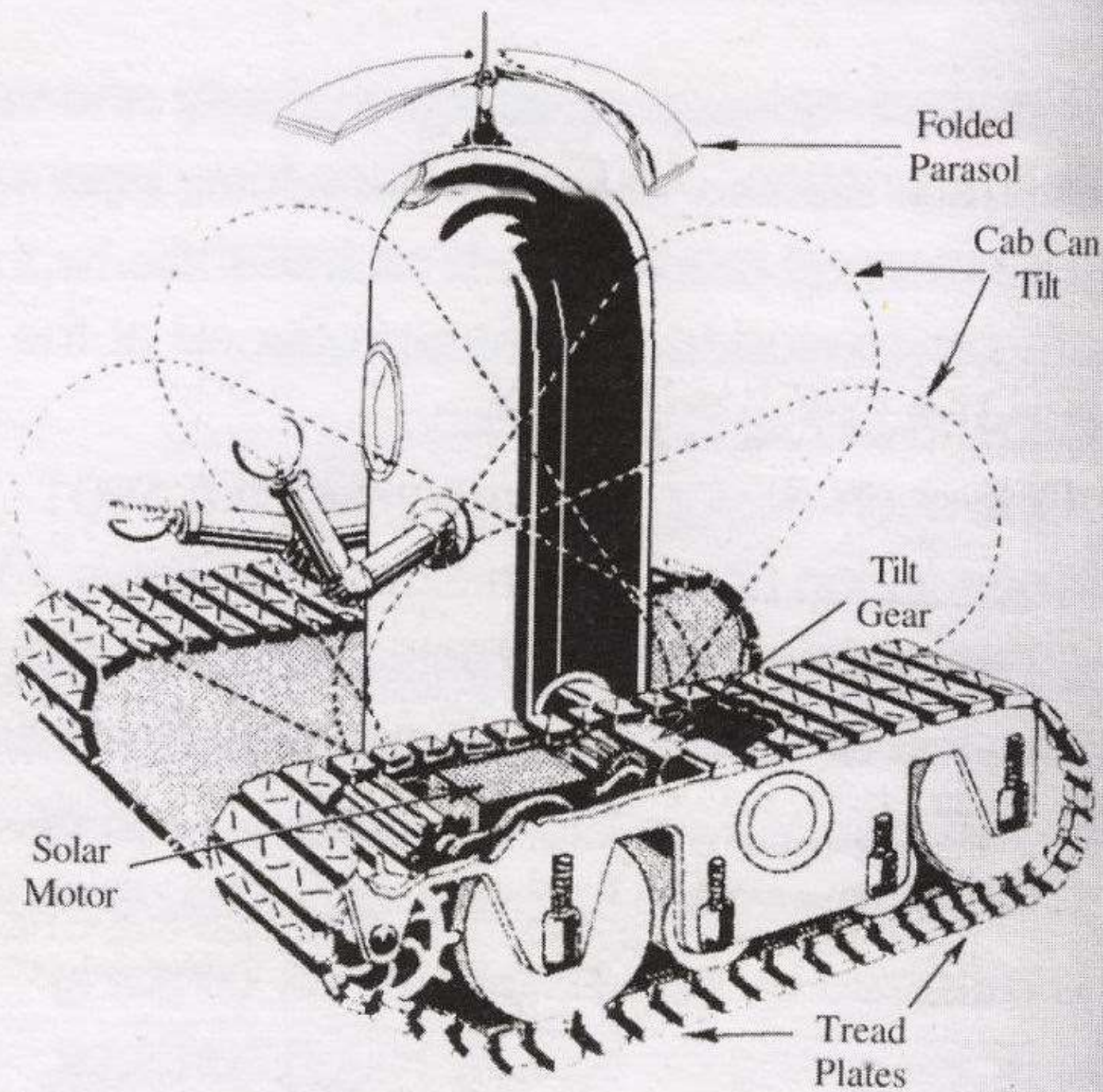


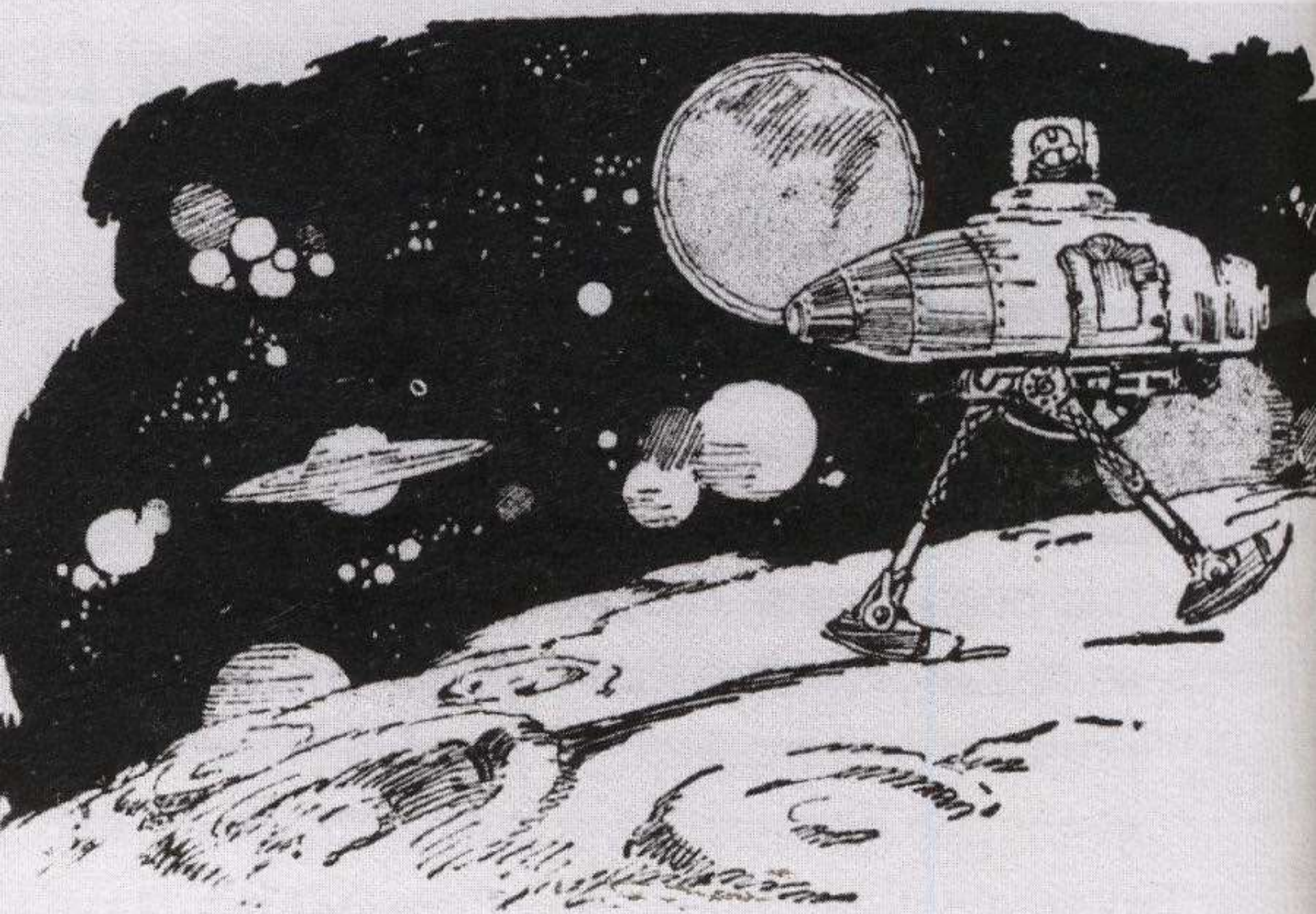
Jerszy Zulawski, 1901

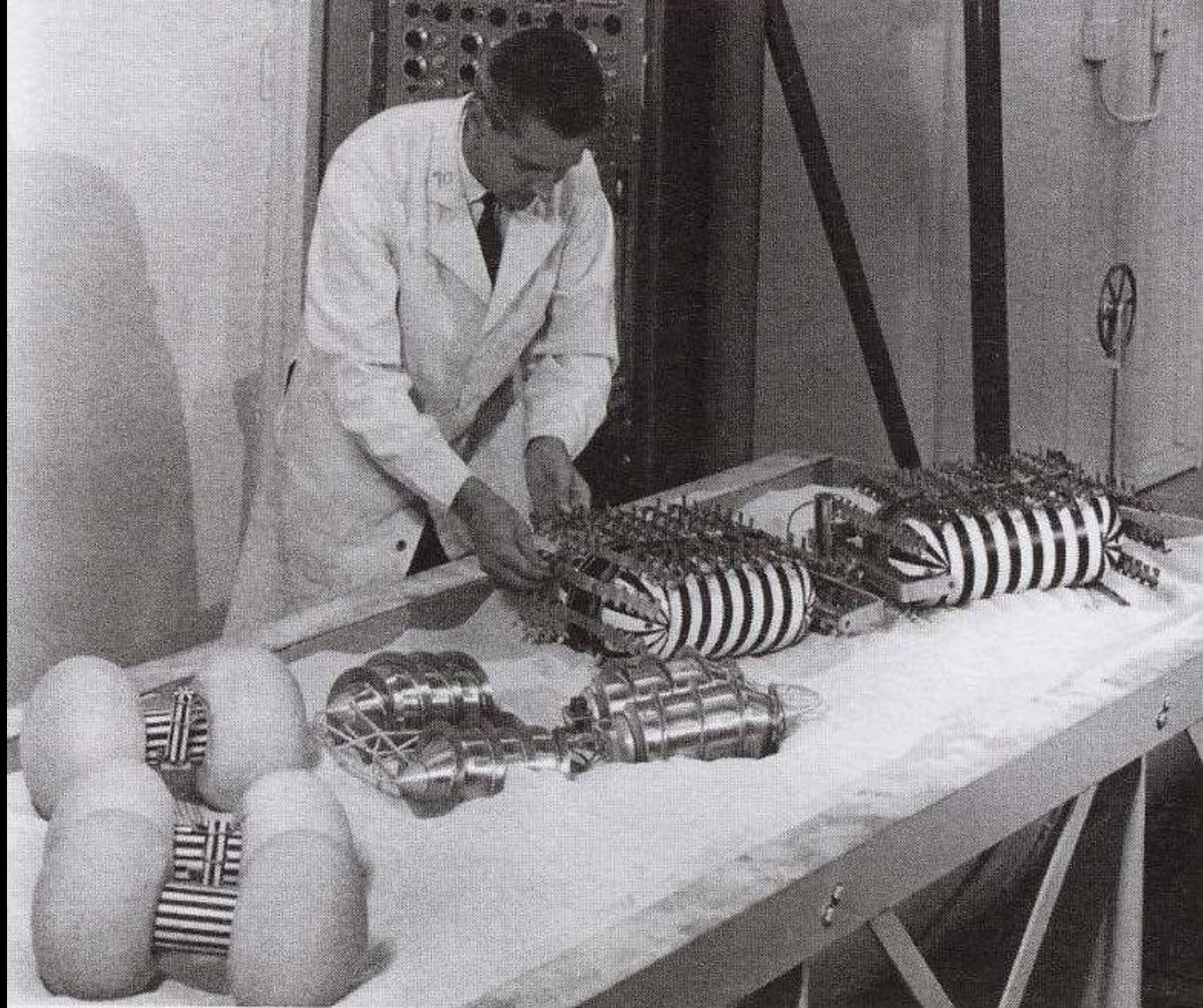
Na stříbrném globusu





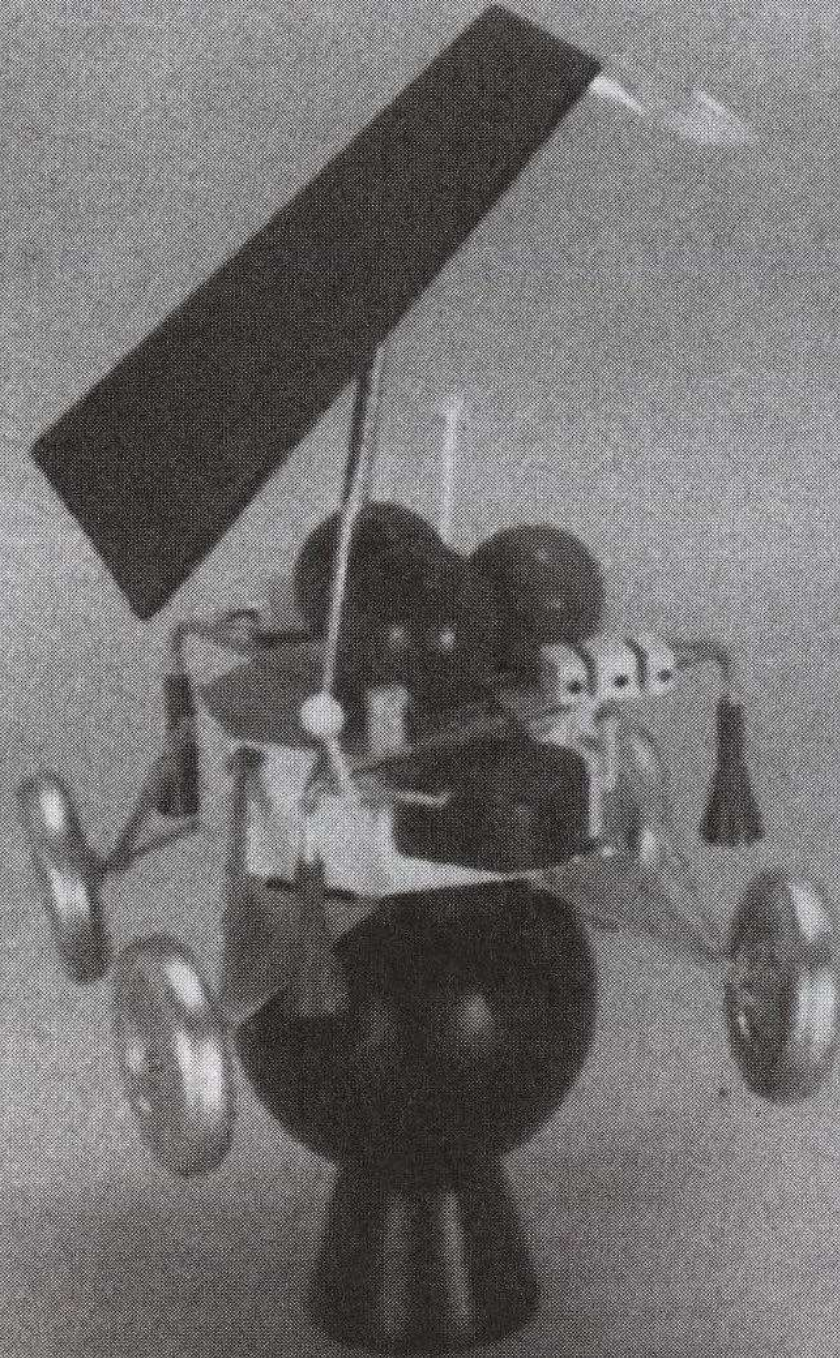


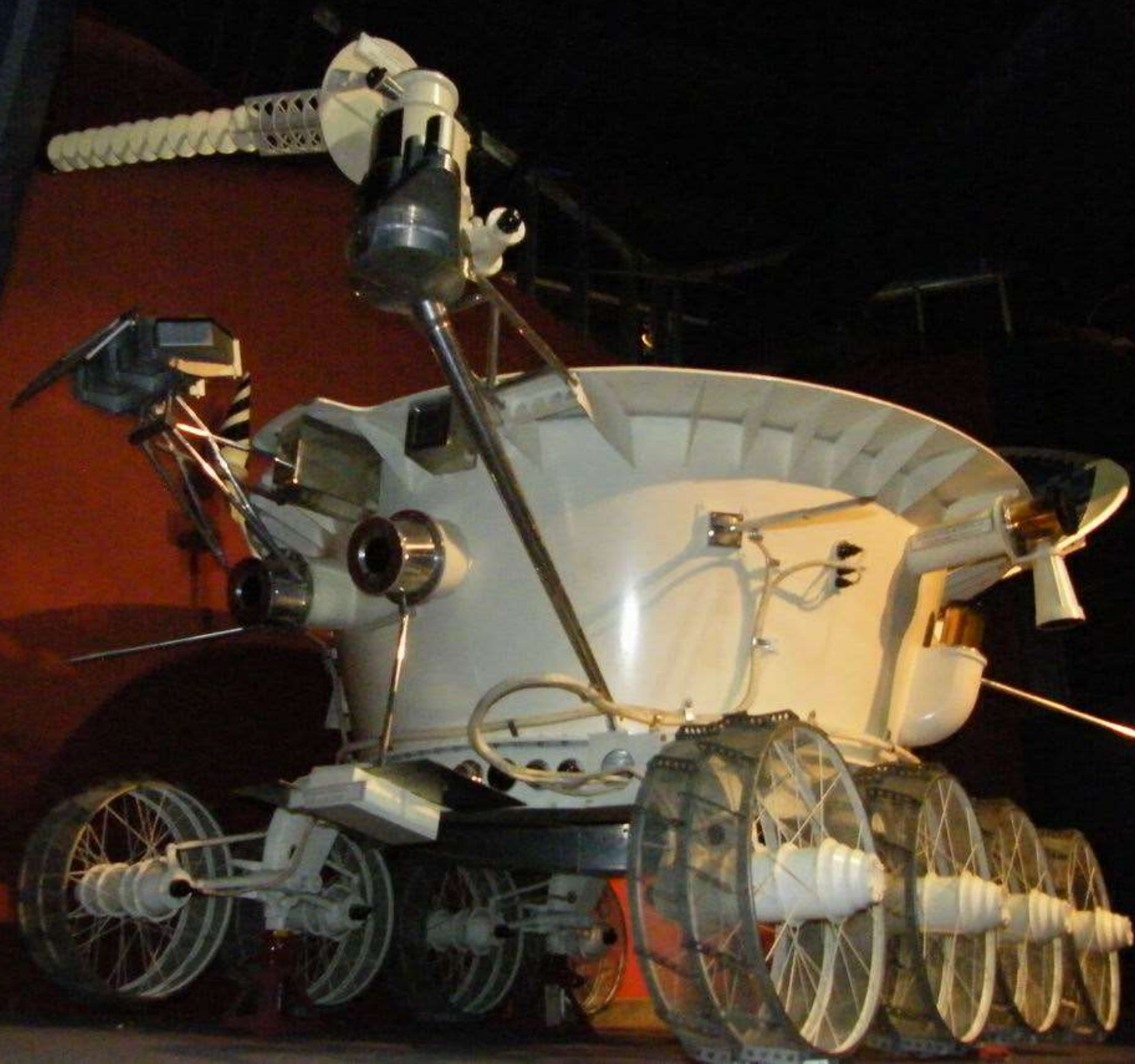




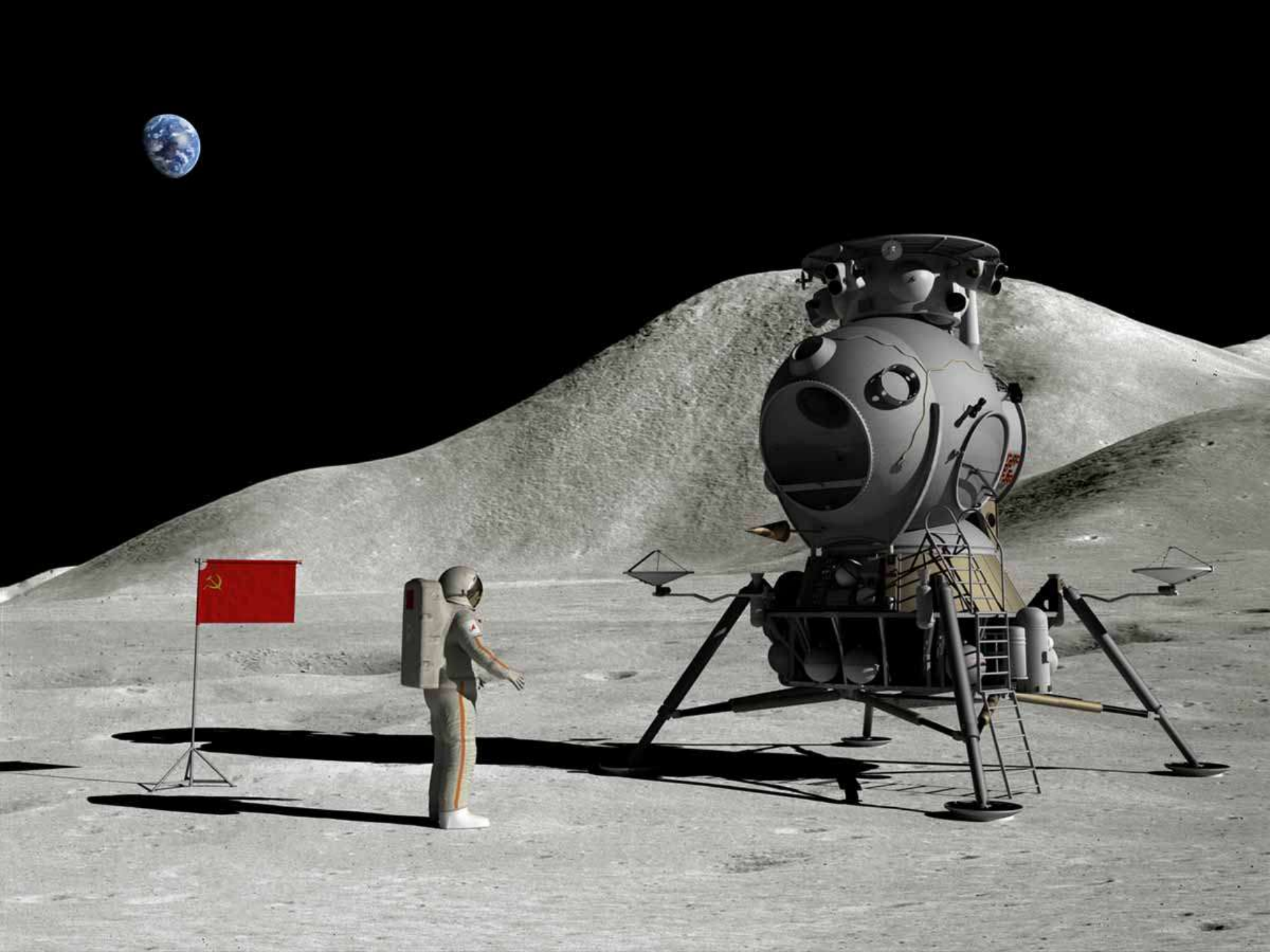






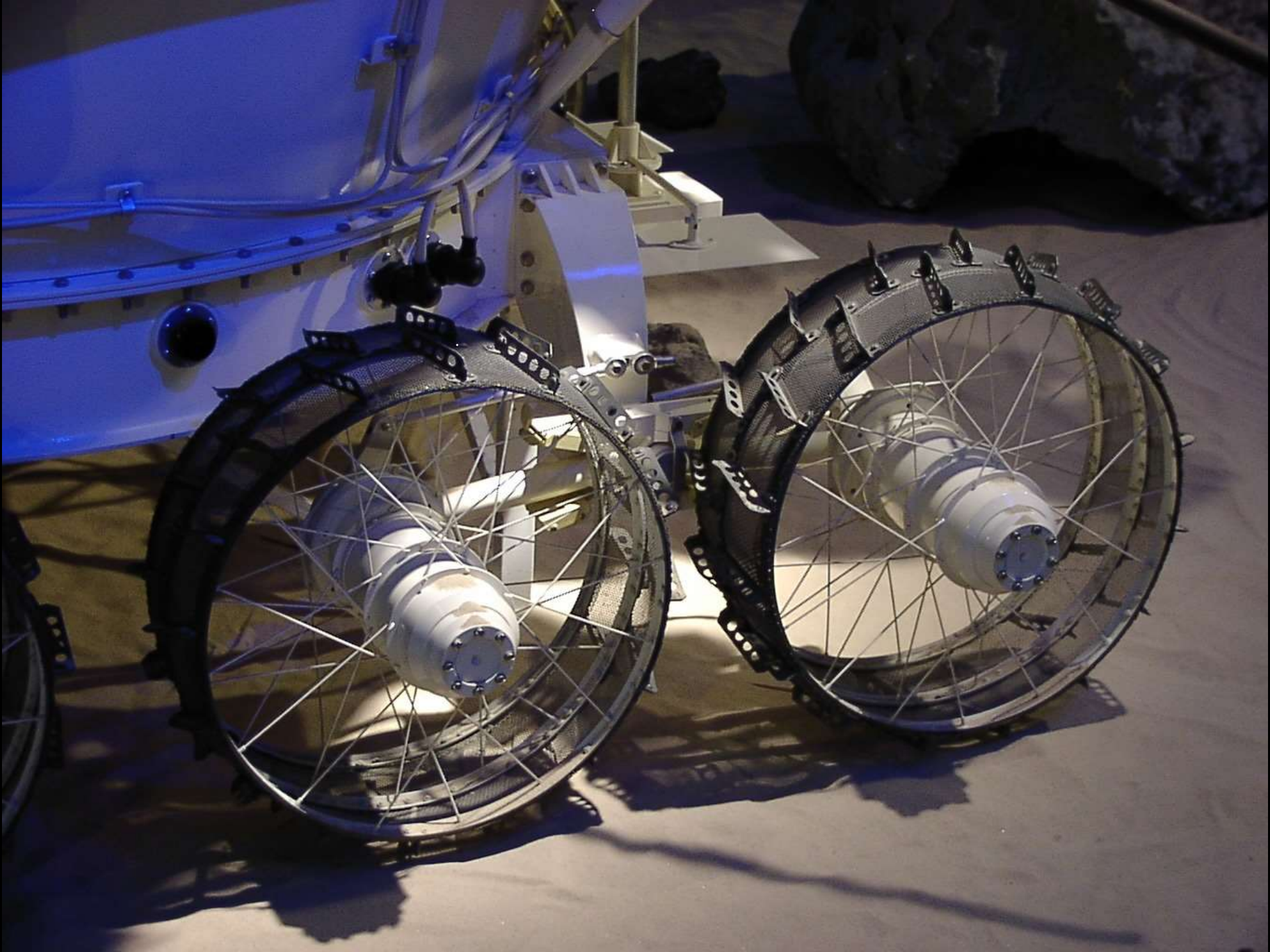




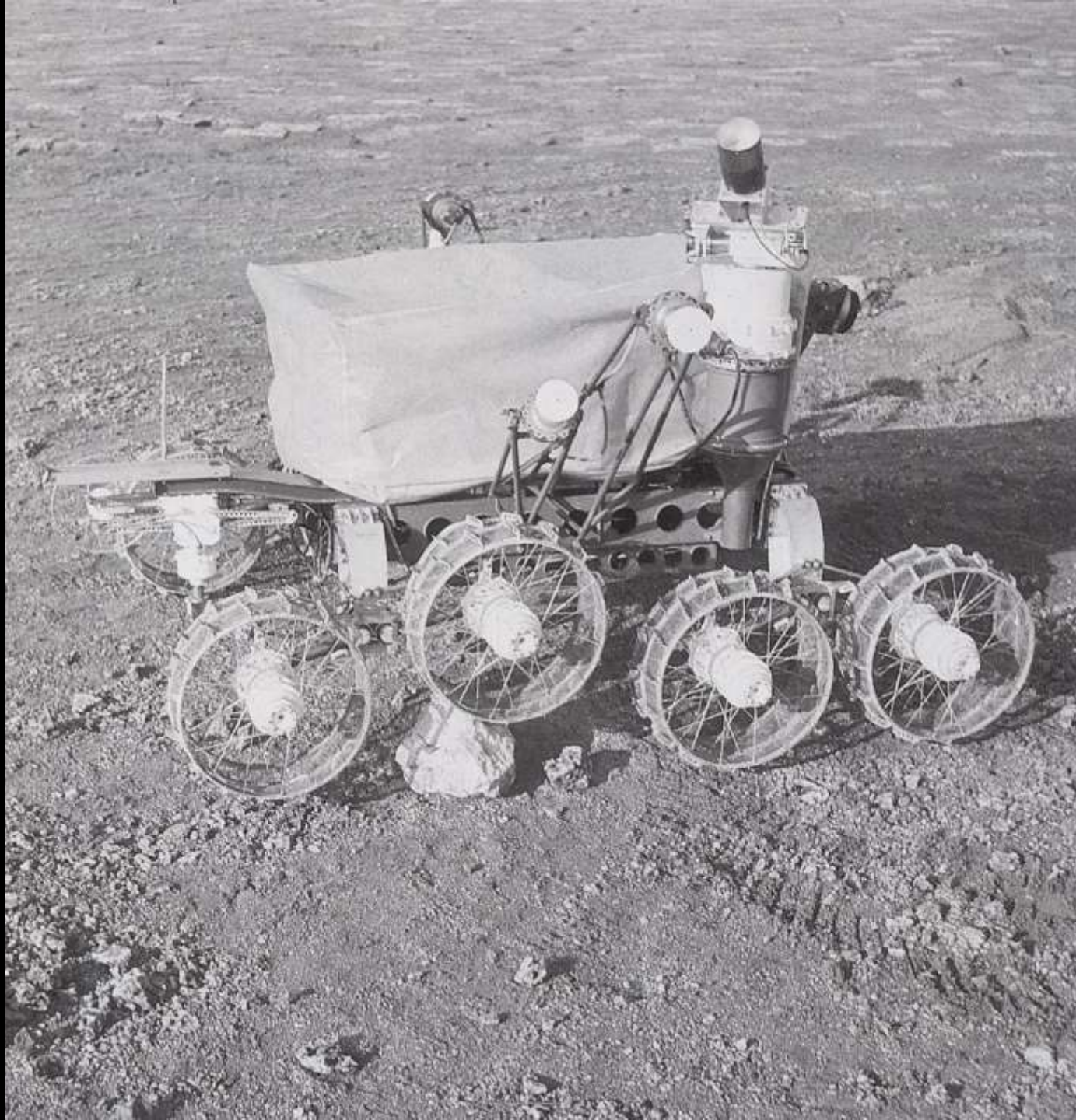


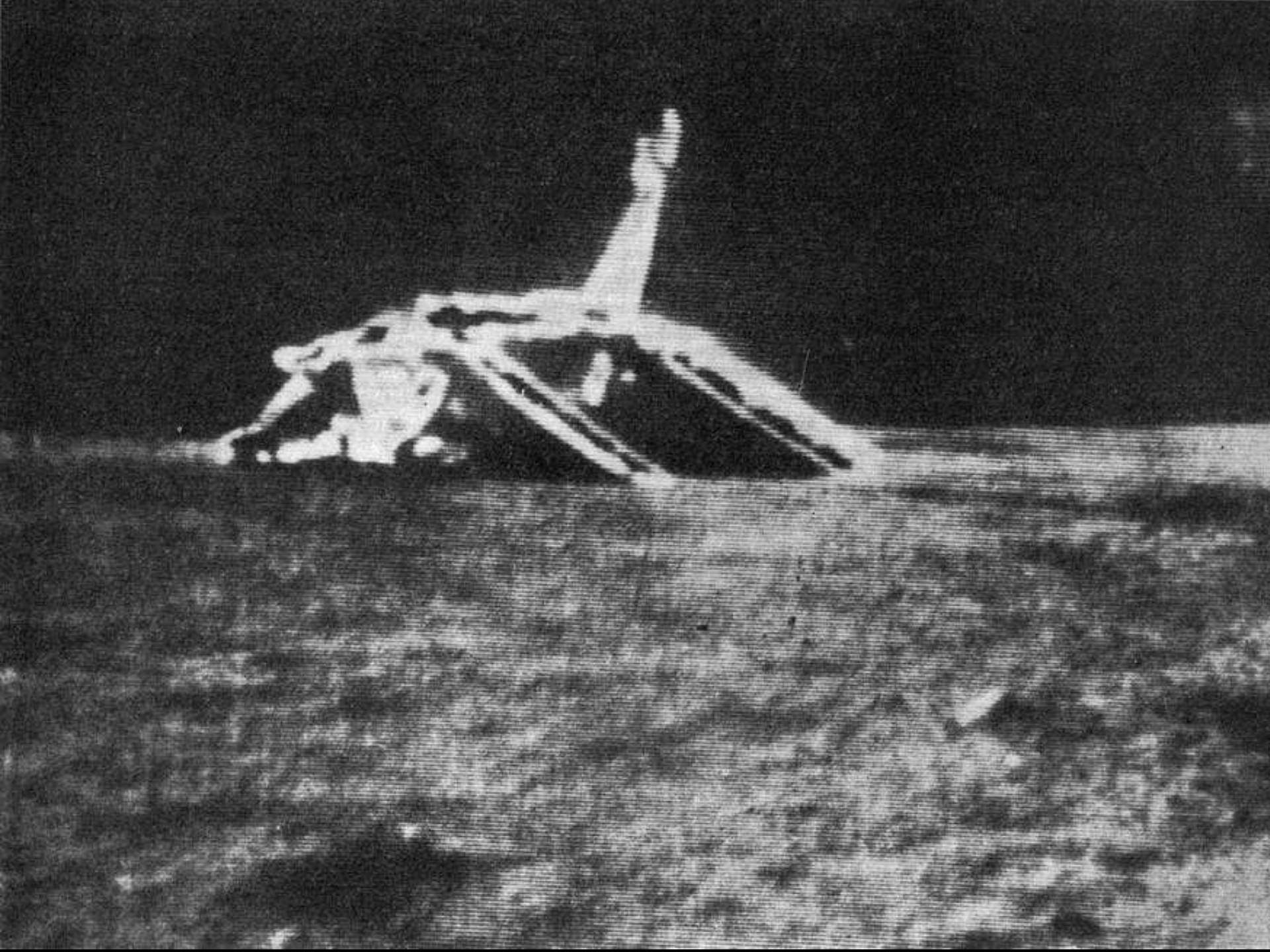


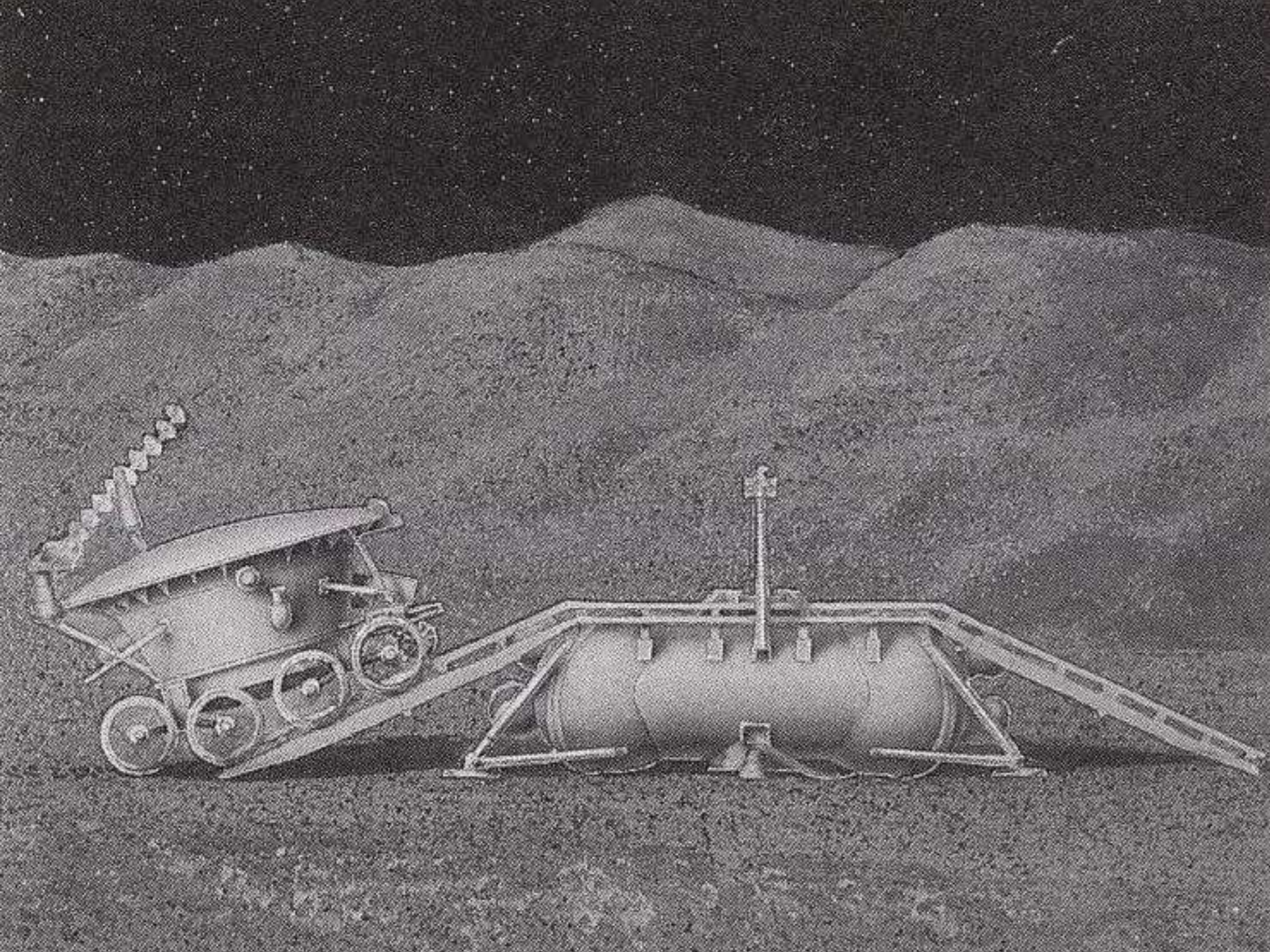










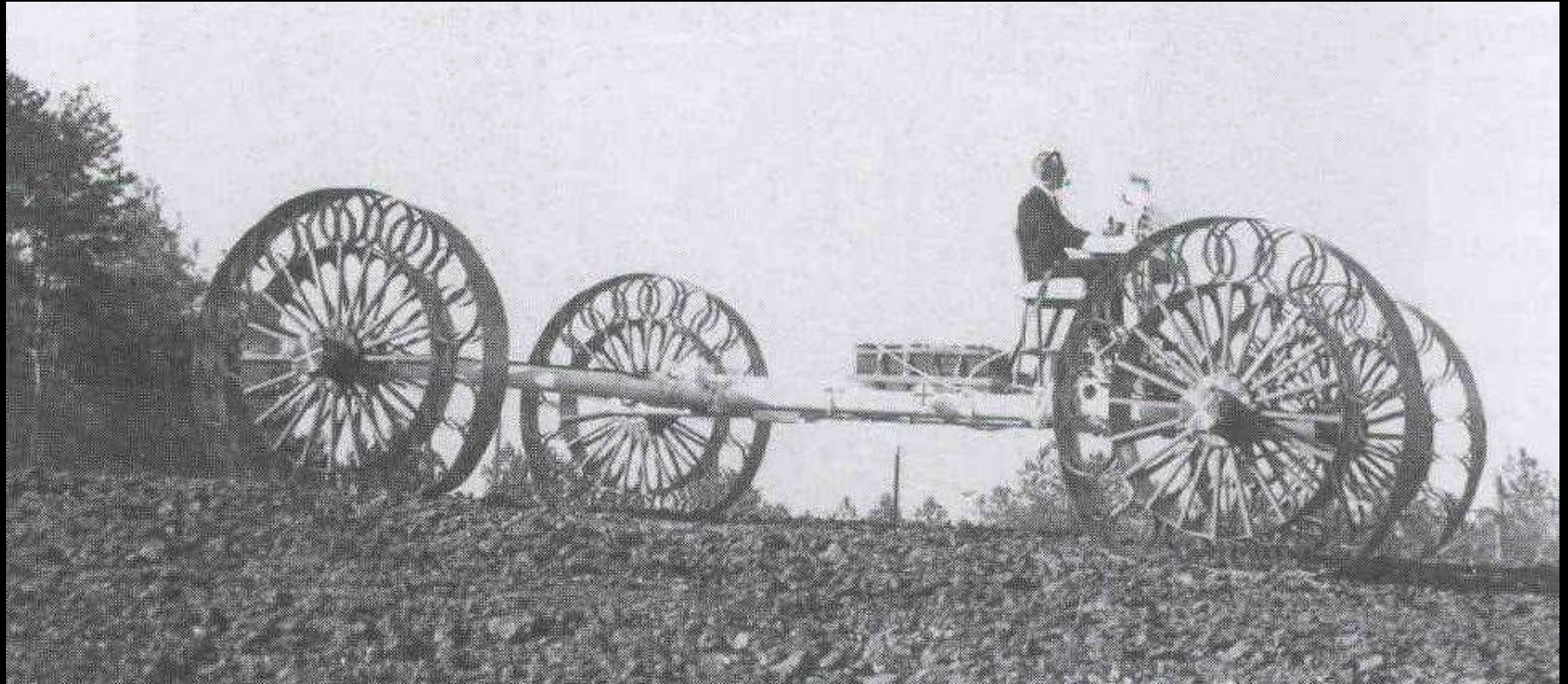


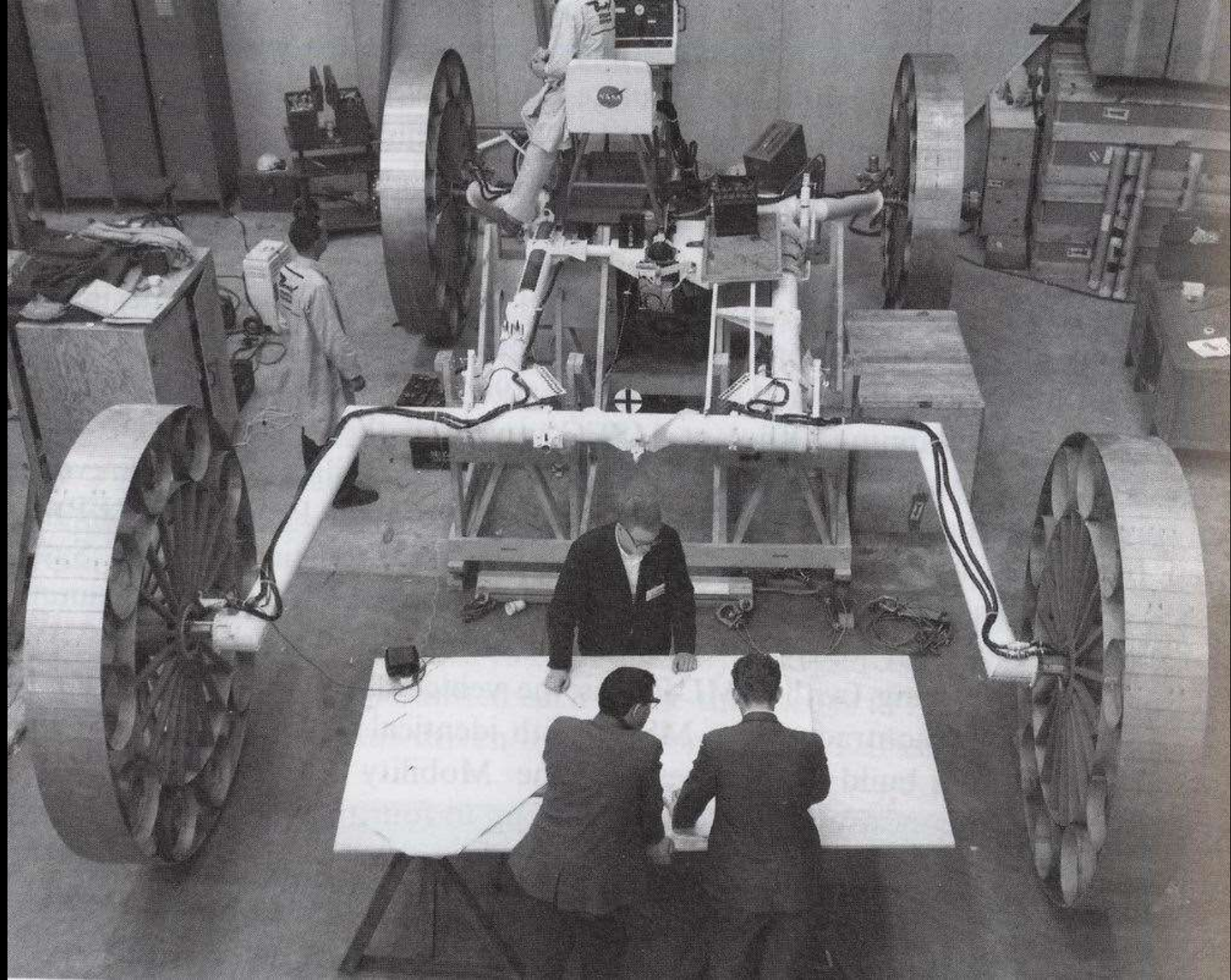


„Nejdůležitějším doporučením,
na kterém se účastníci
konference shodli, je zajištění
mobility na lunárním povrchu.
... Při prvních misích Apollo
se předpokládá, že operační
rádius astronautů bude zhruba
500 metrů. Je důležité, aby se
tento rádius co nejrychleji
rozšířil na více než 10
kilometrů.“

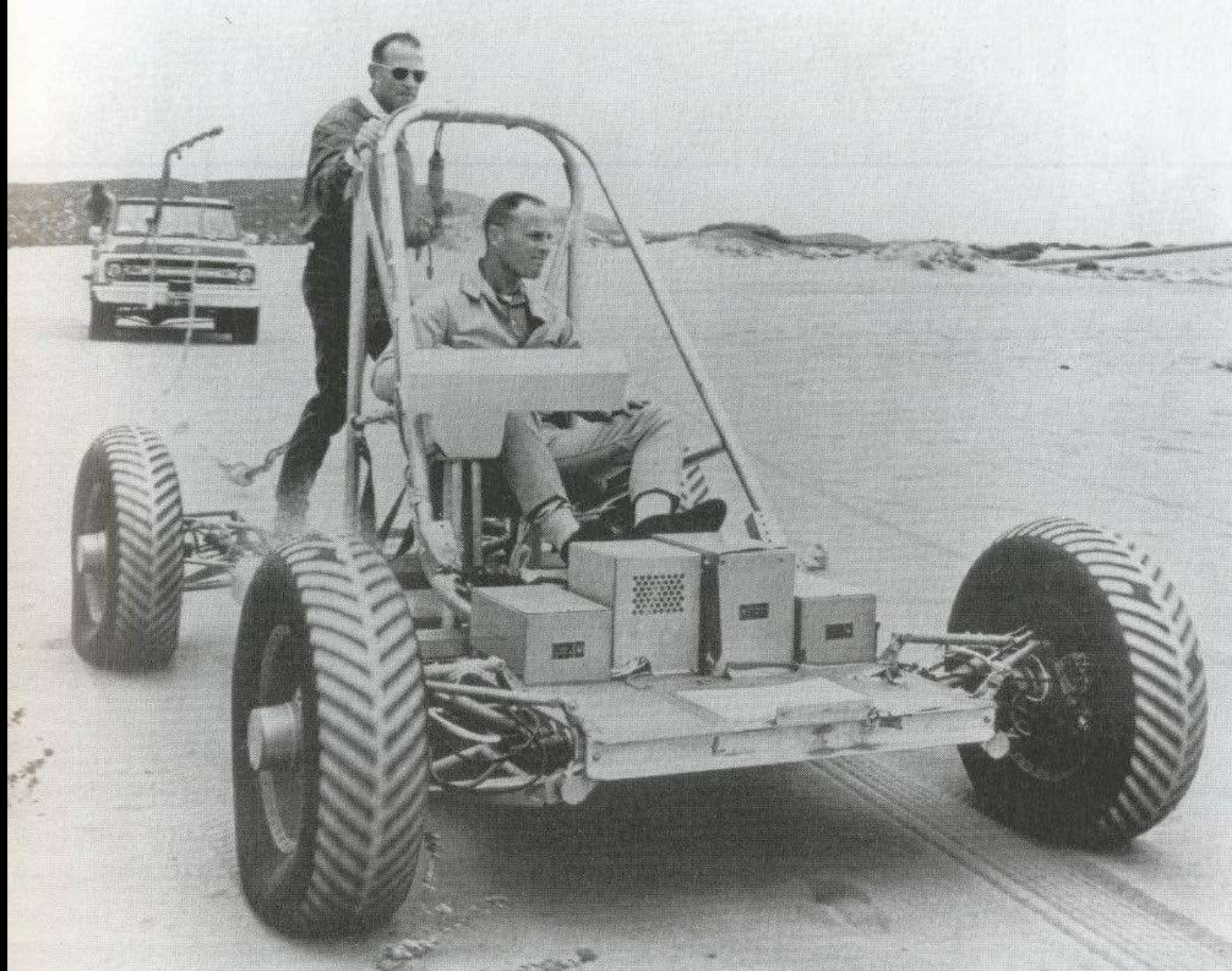
Mobility Test Article

Bendix Corporation





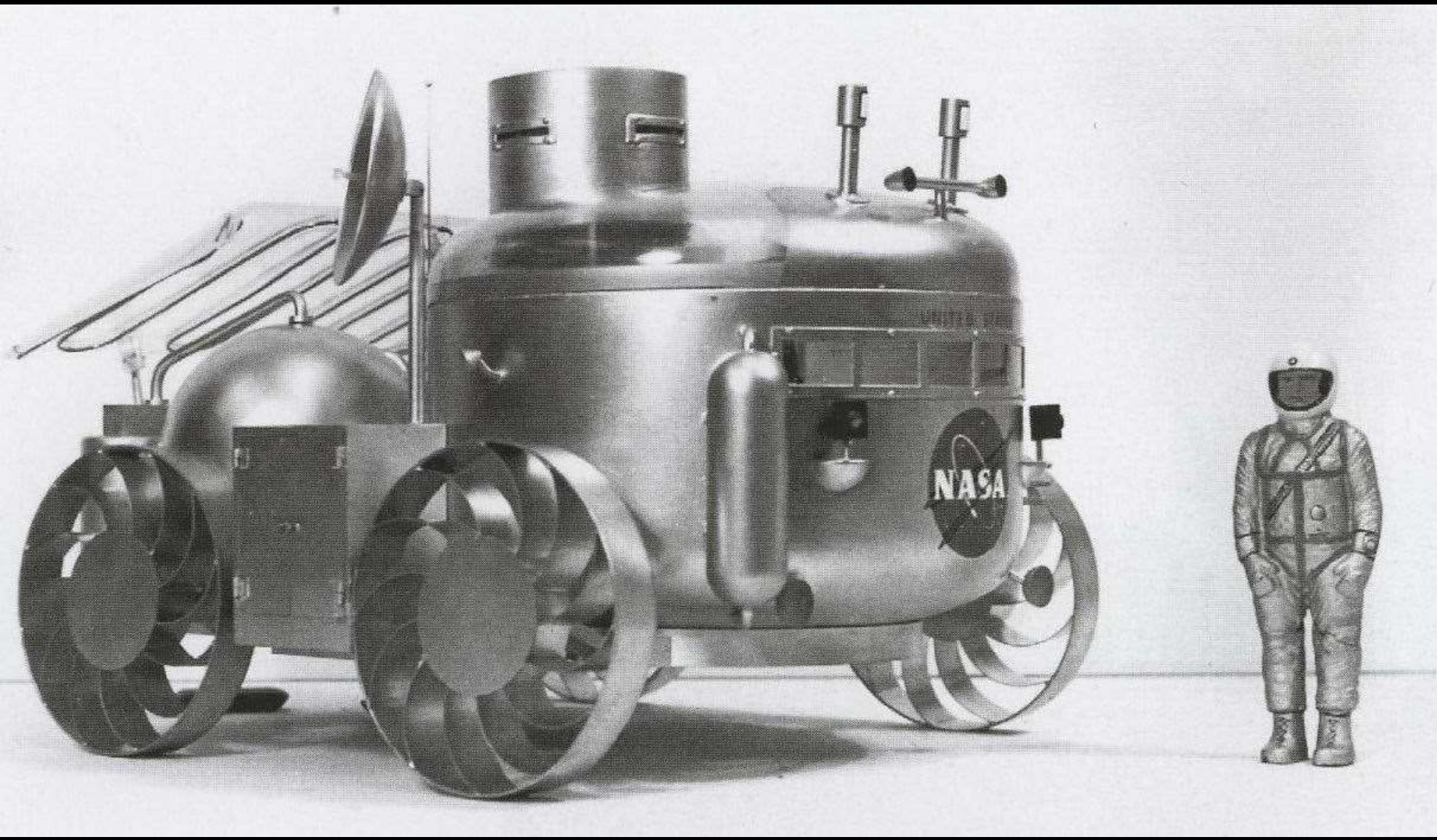


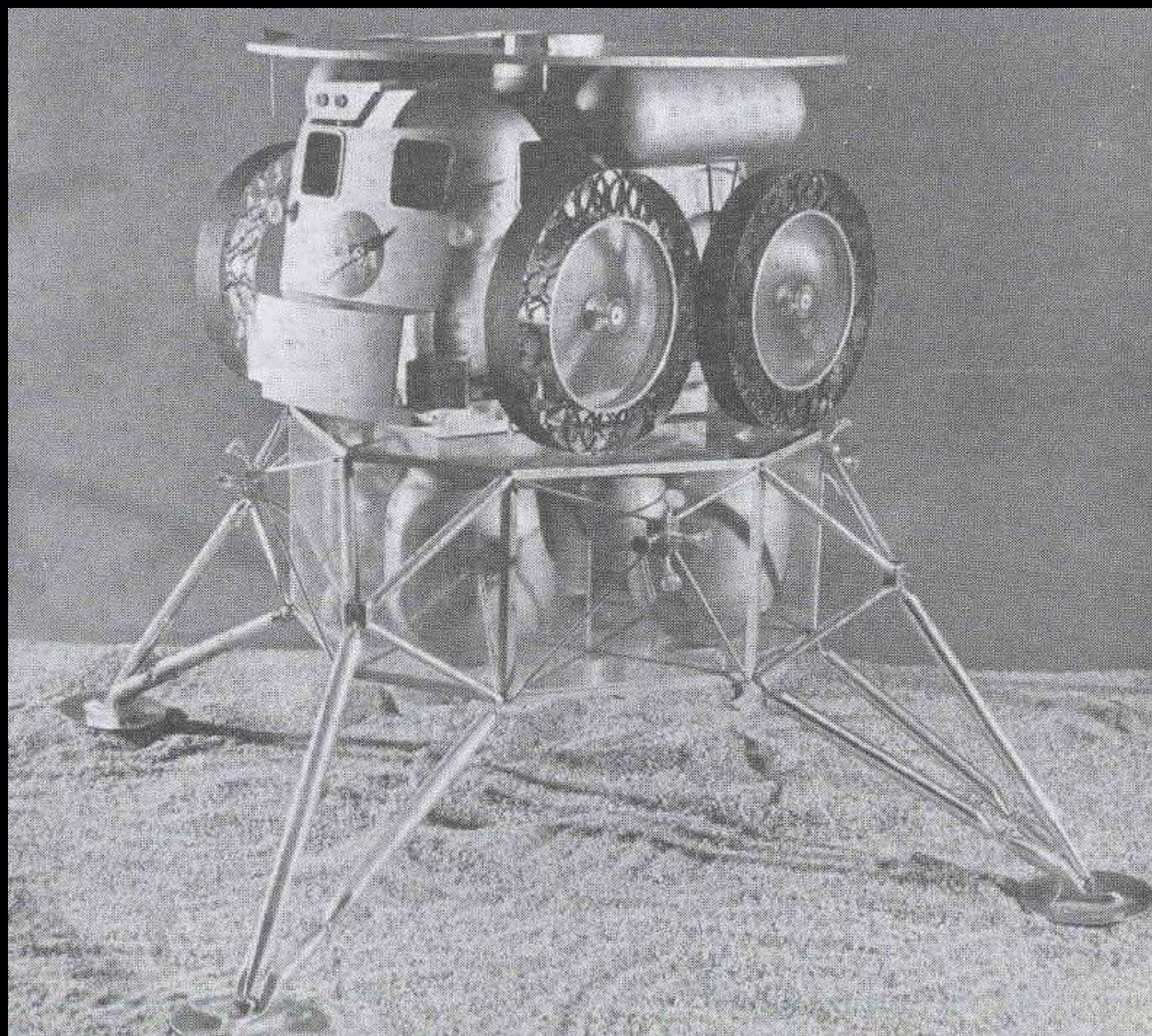






Apollo Logistic Support System







DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

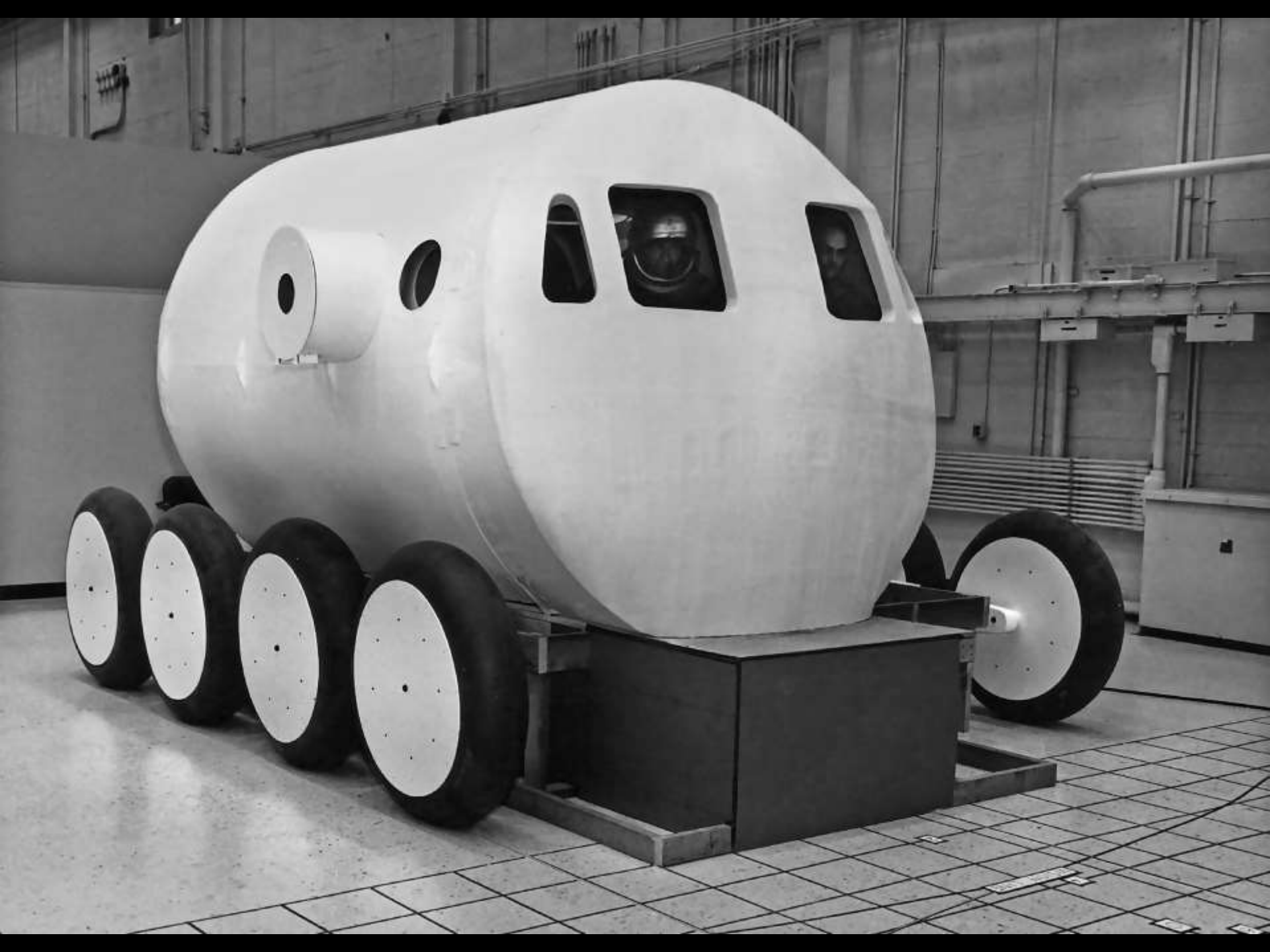
MOBILE GEOLOGICAL LABORATORY

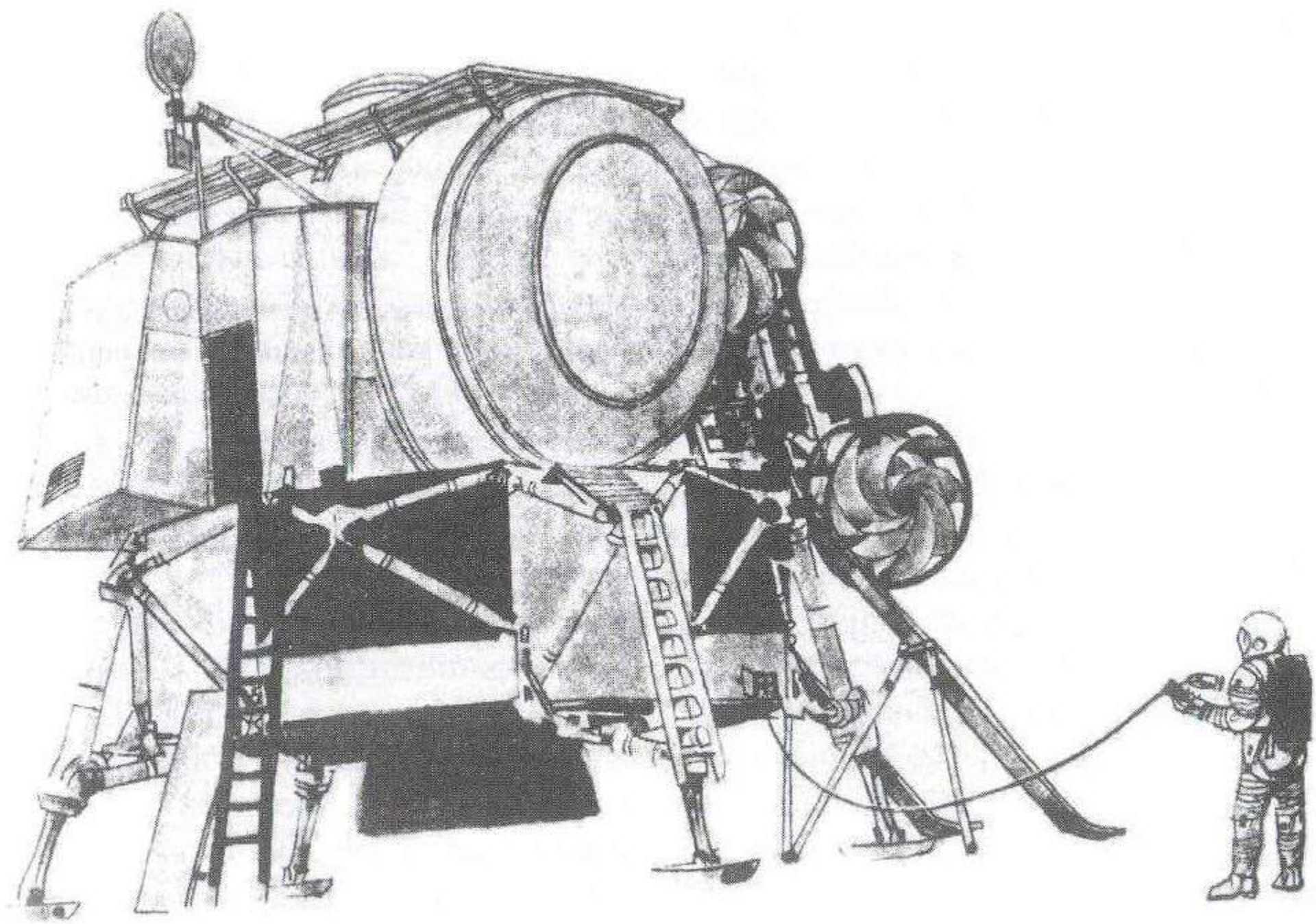
GM

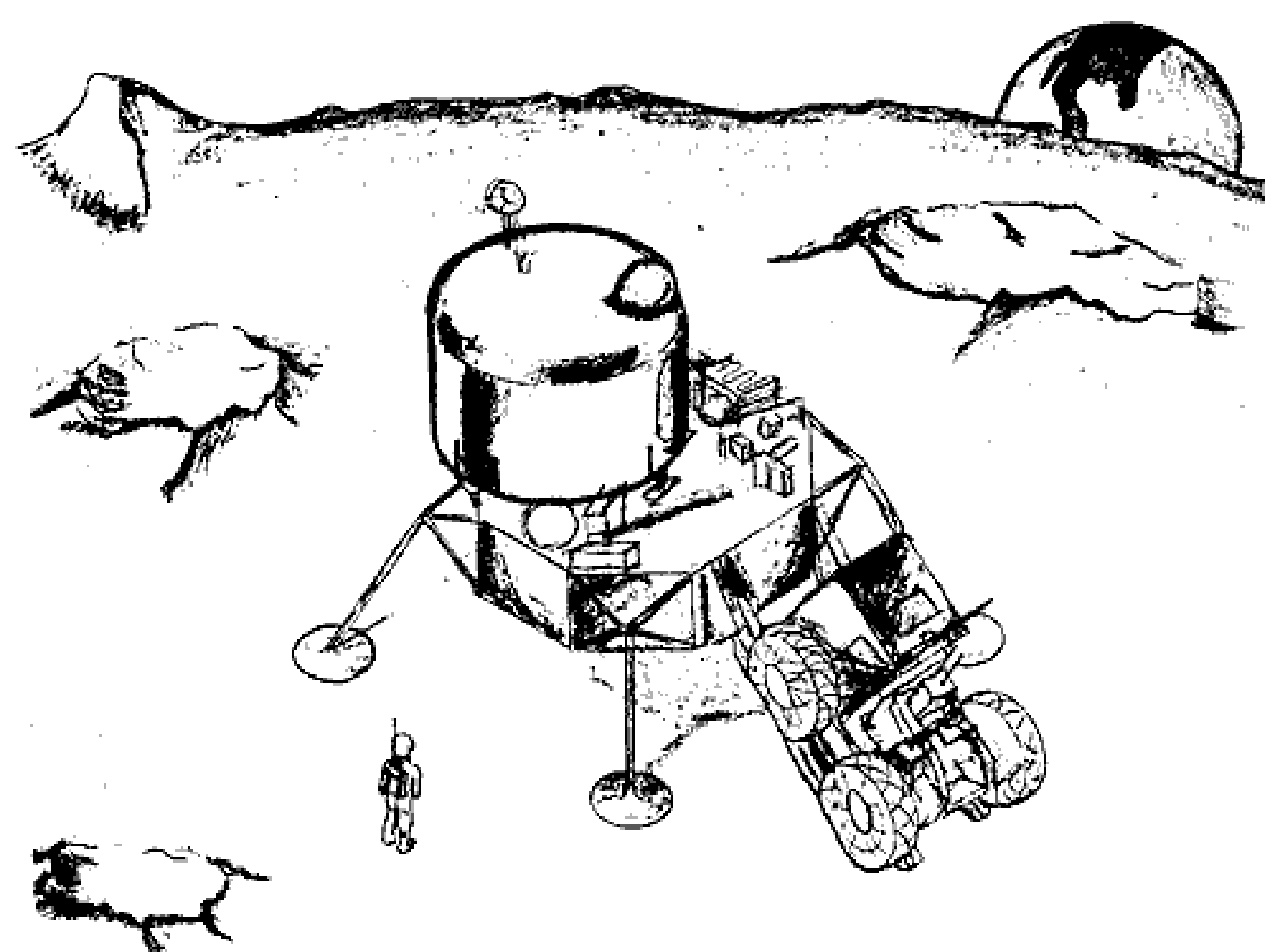


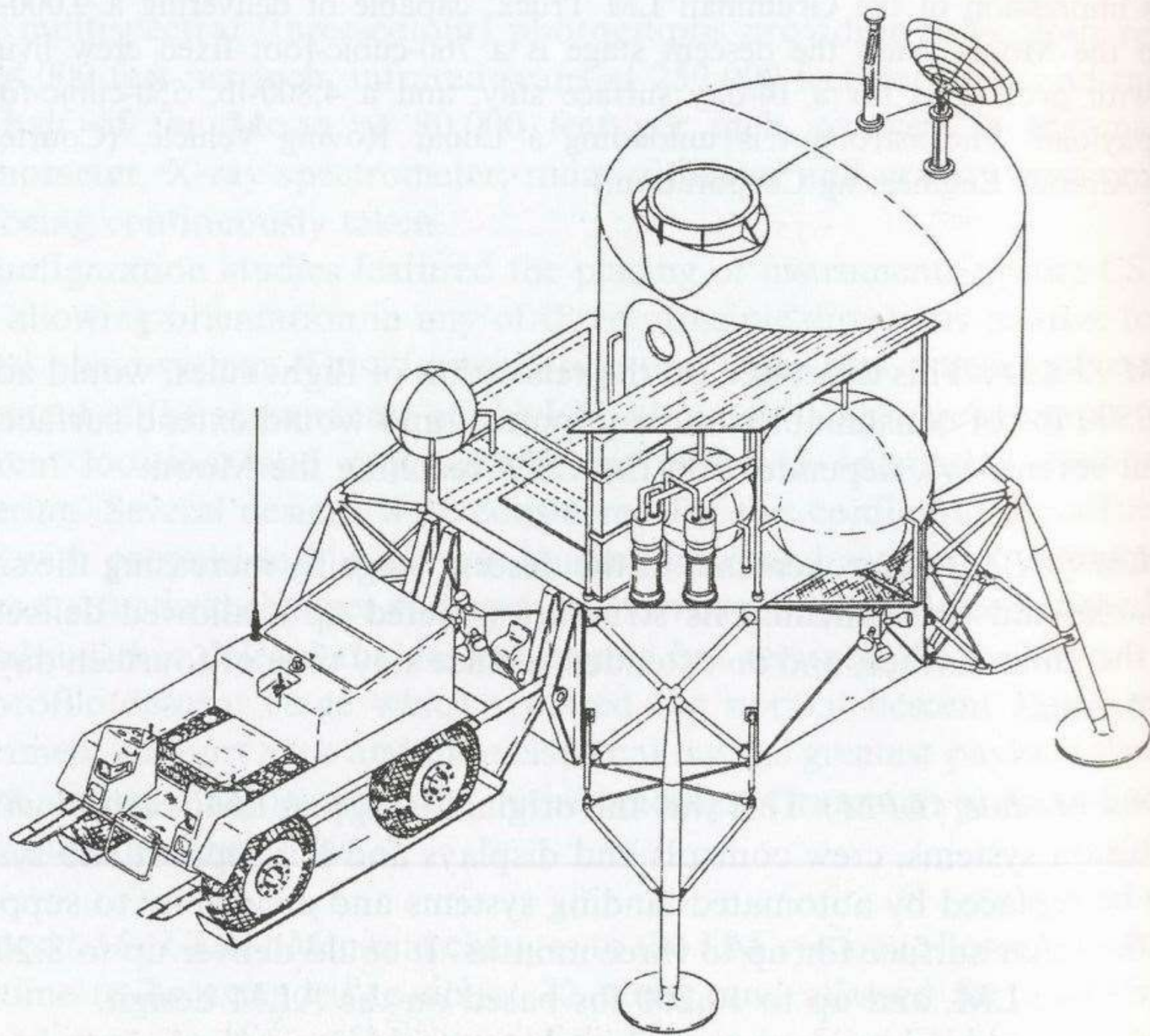


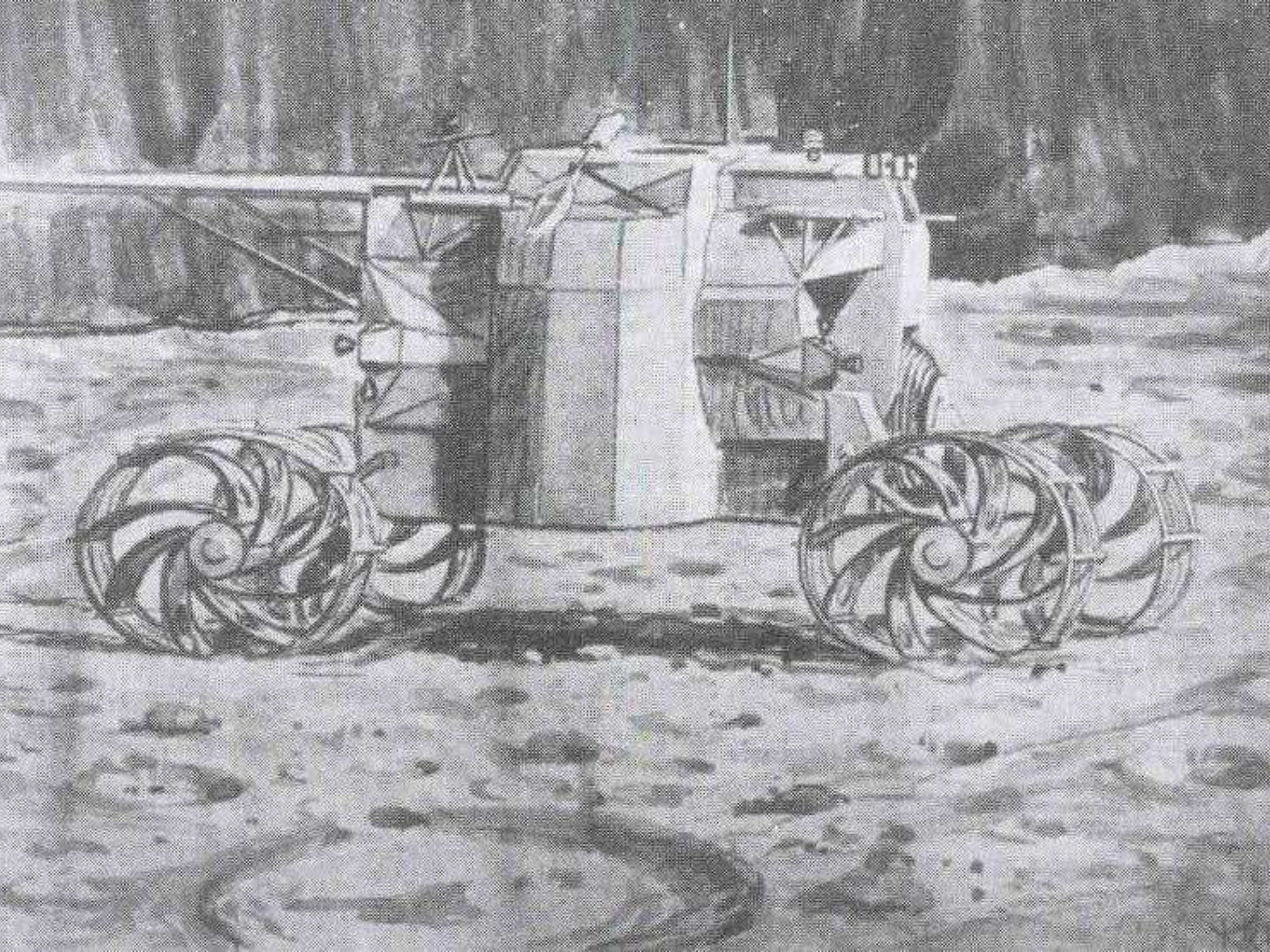












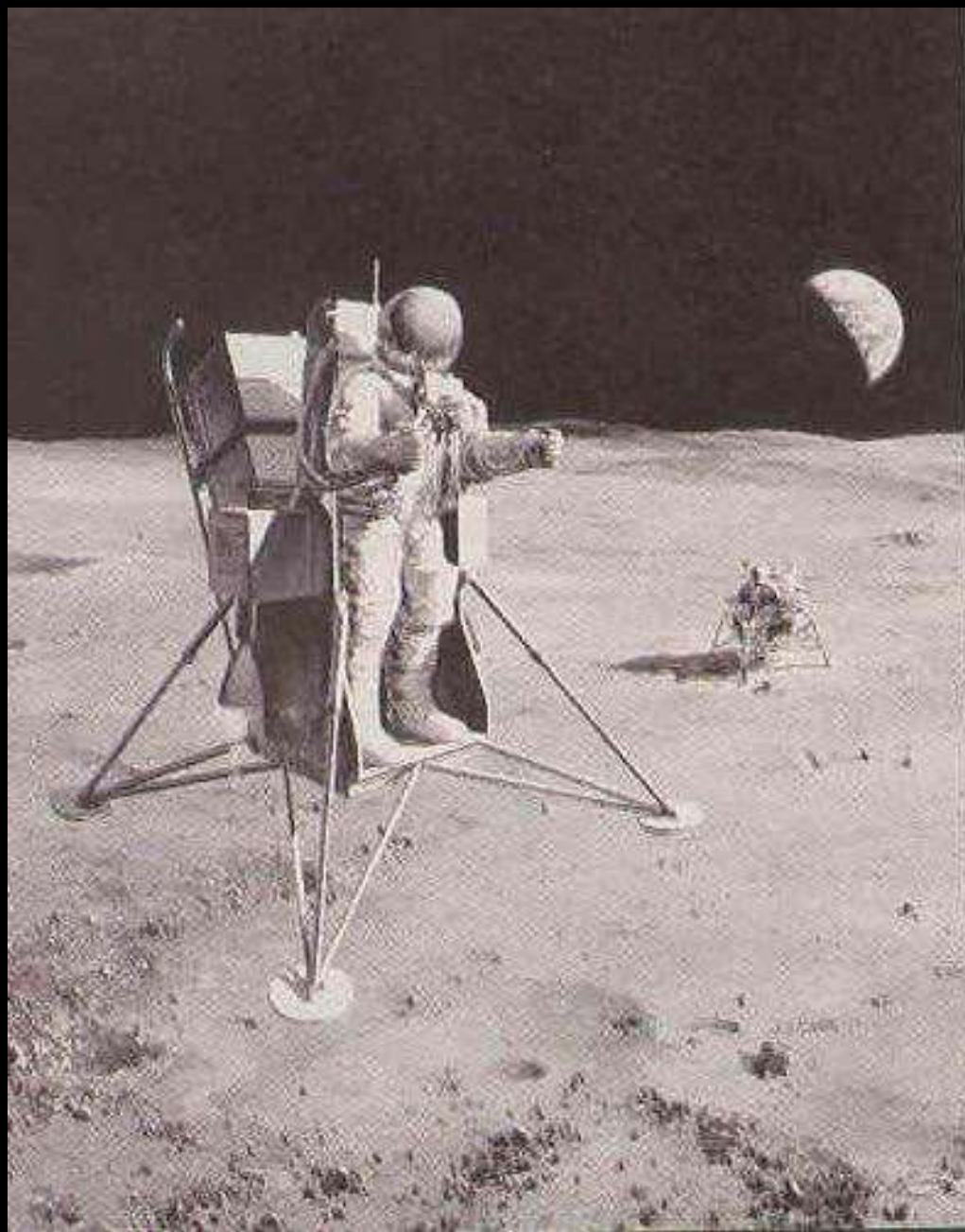
1965 - NASA

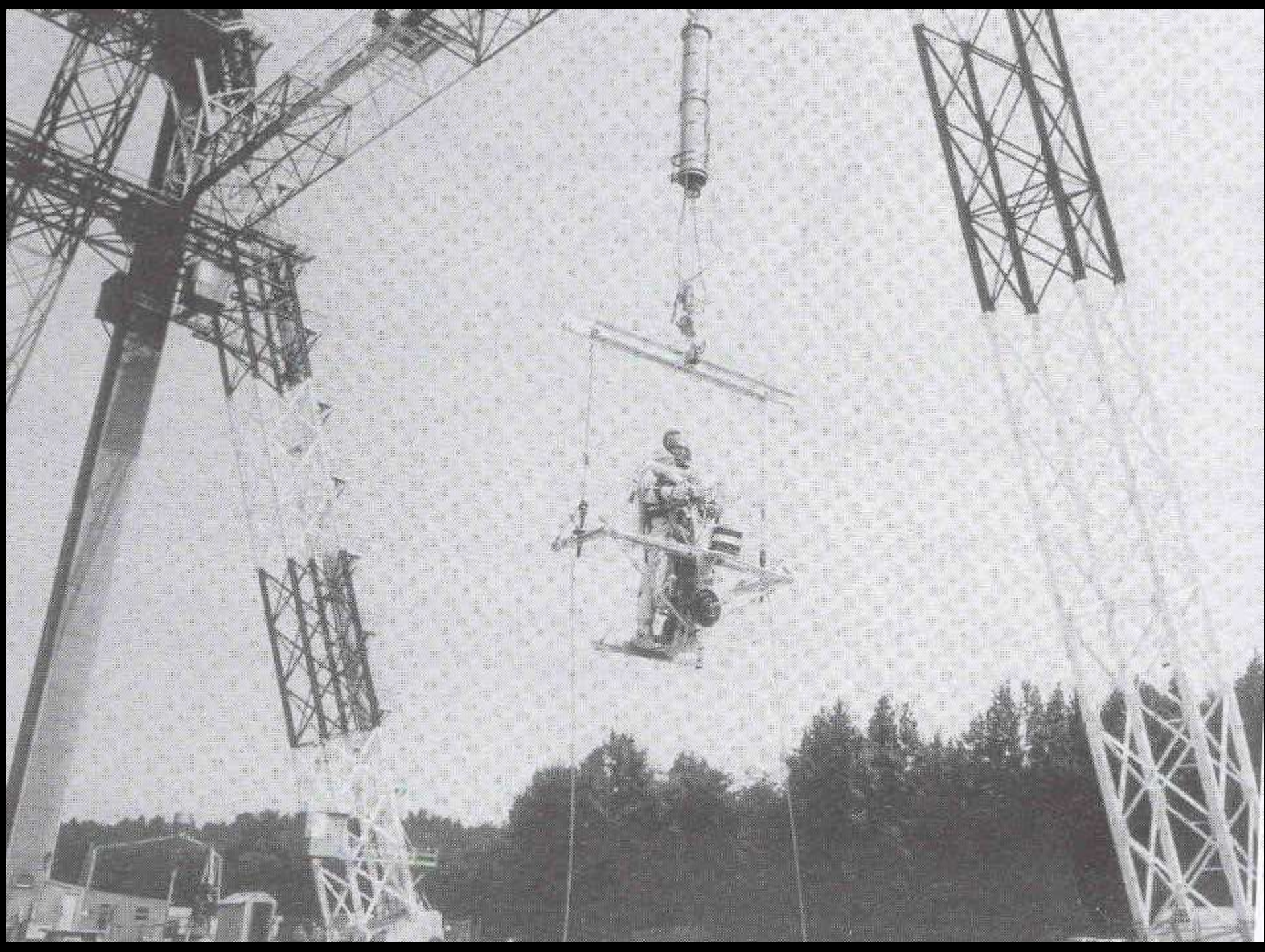


Lunar Flying Unit



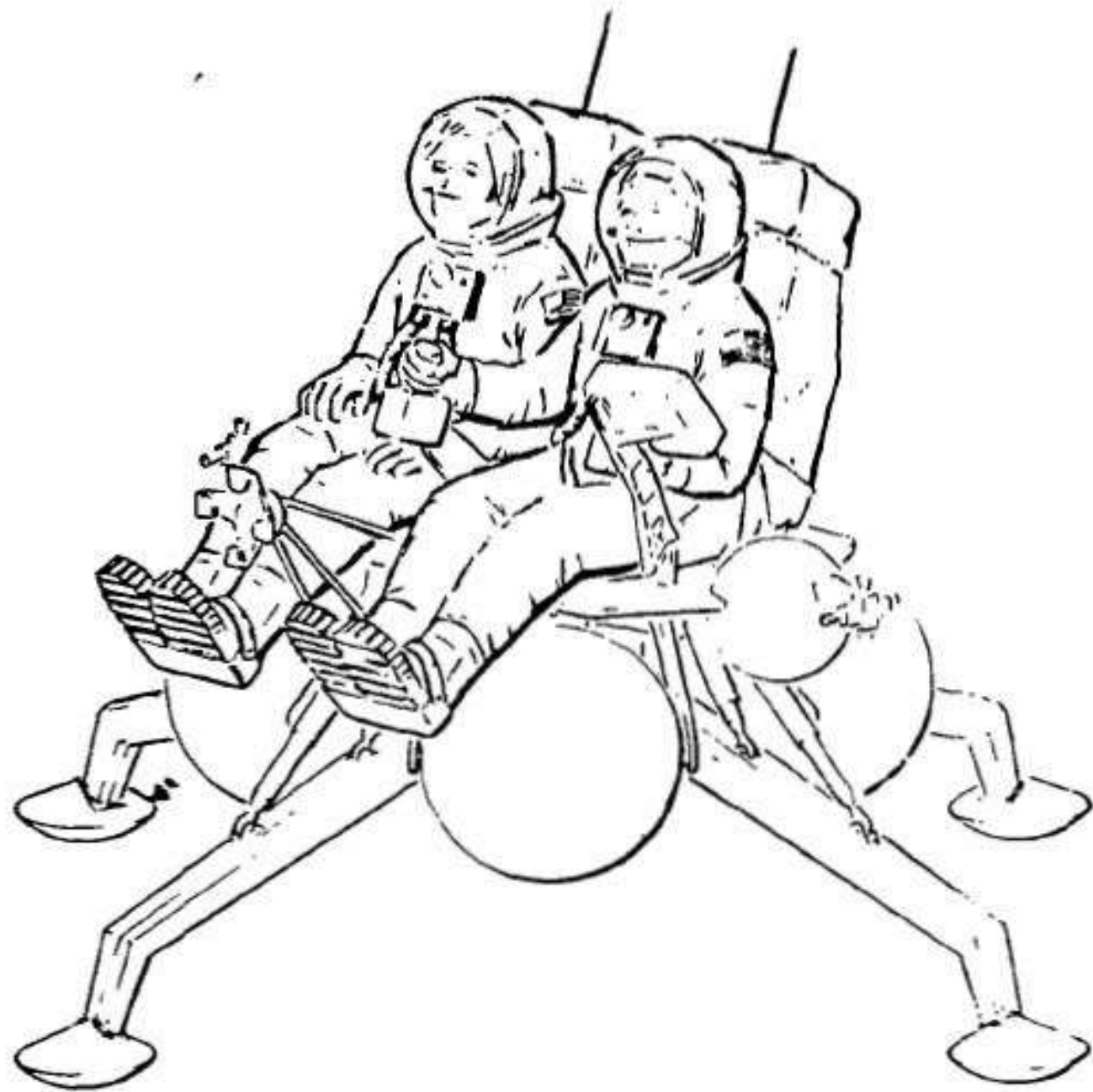


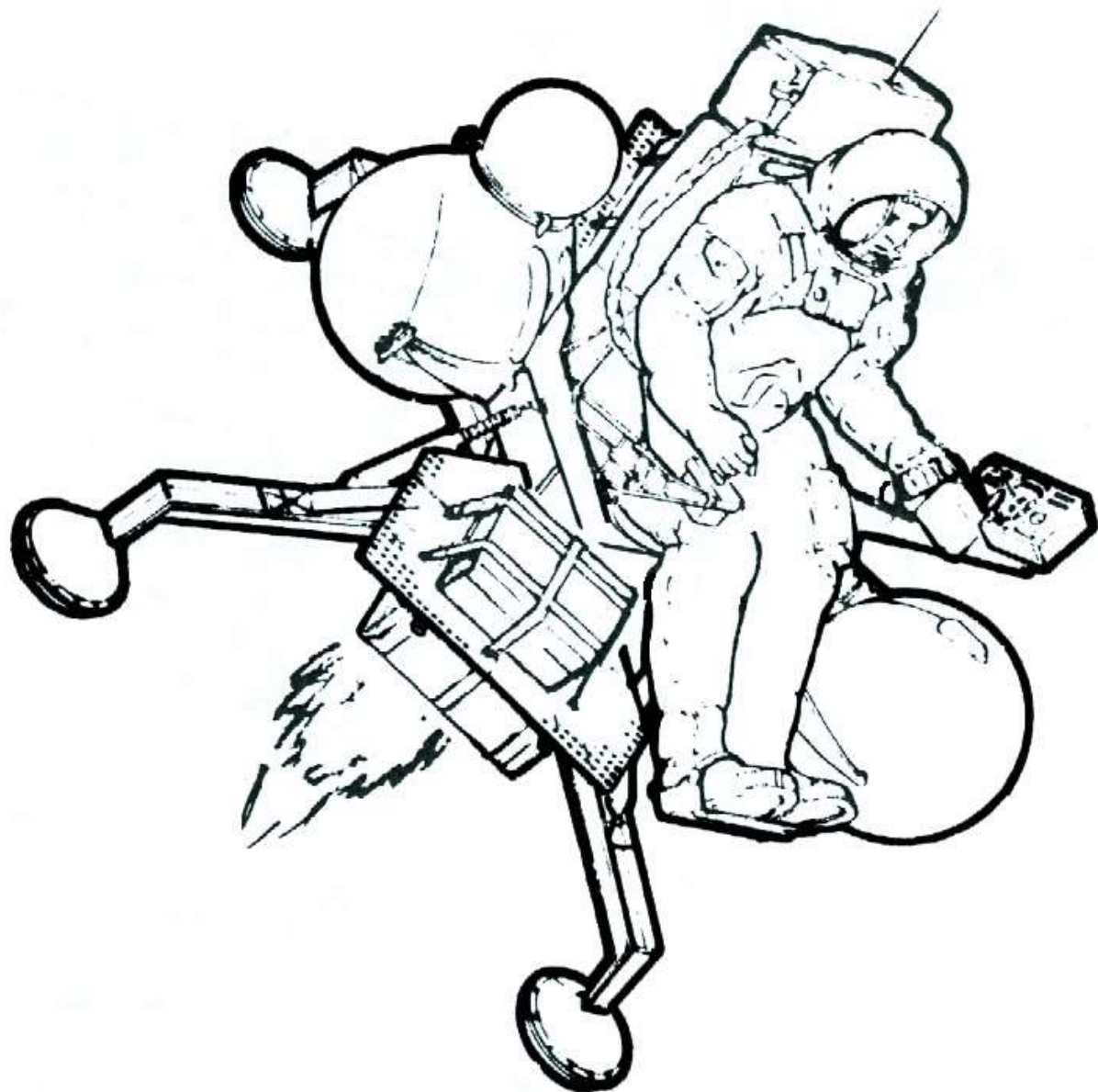


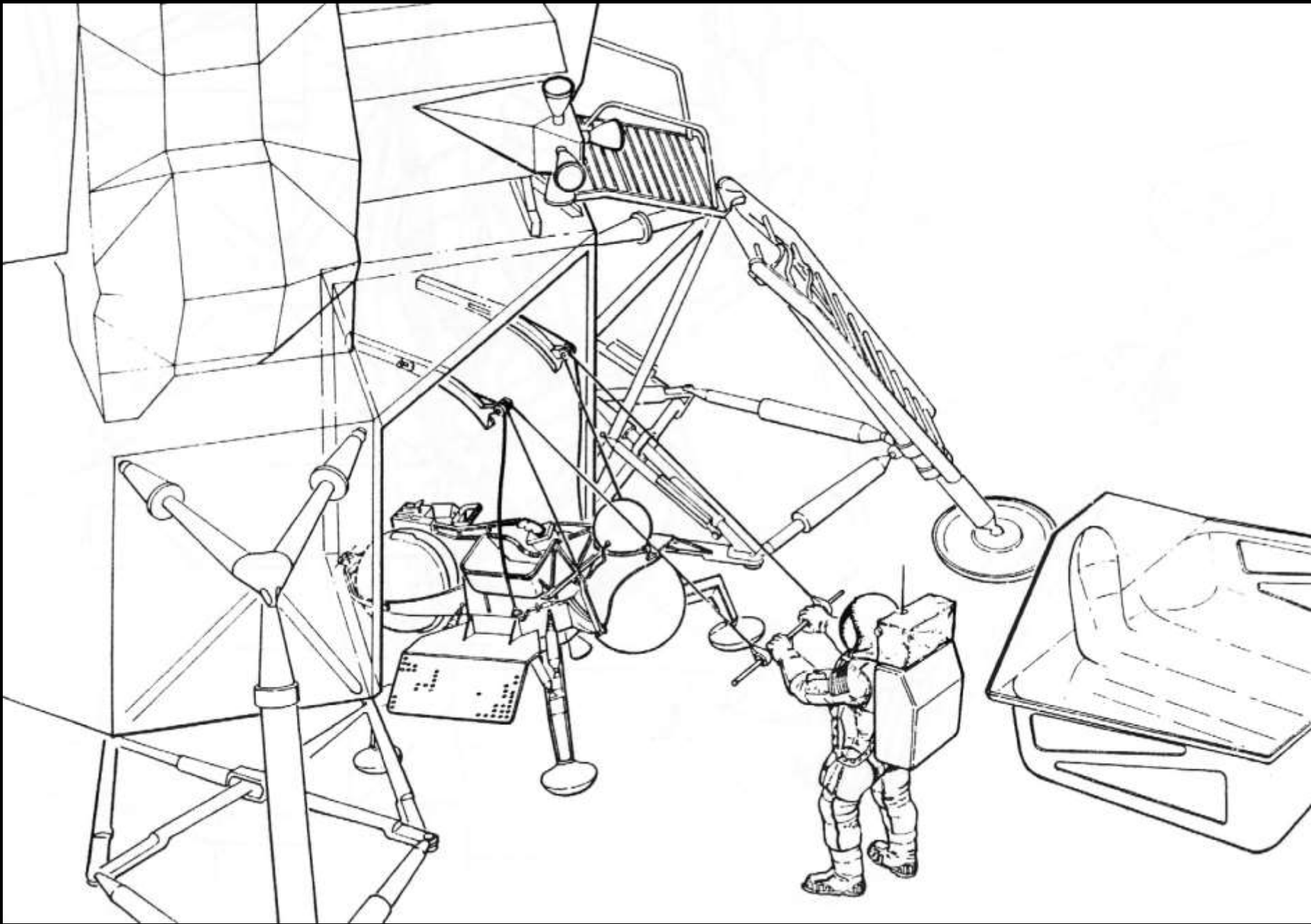


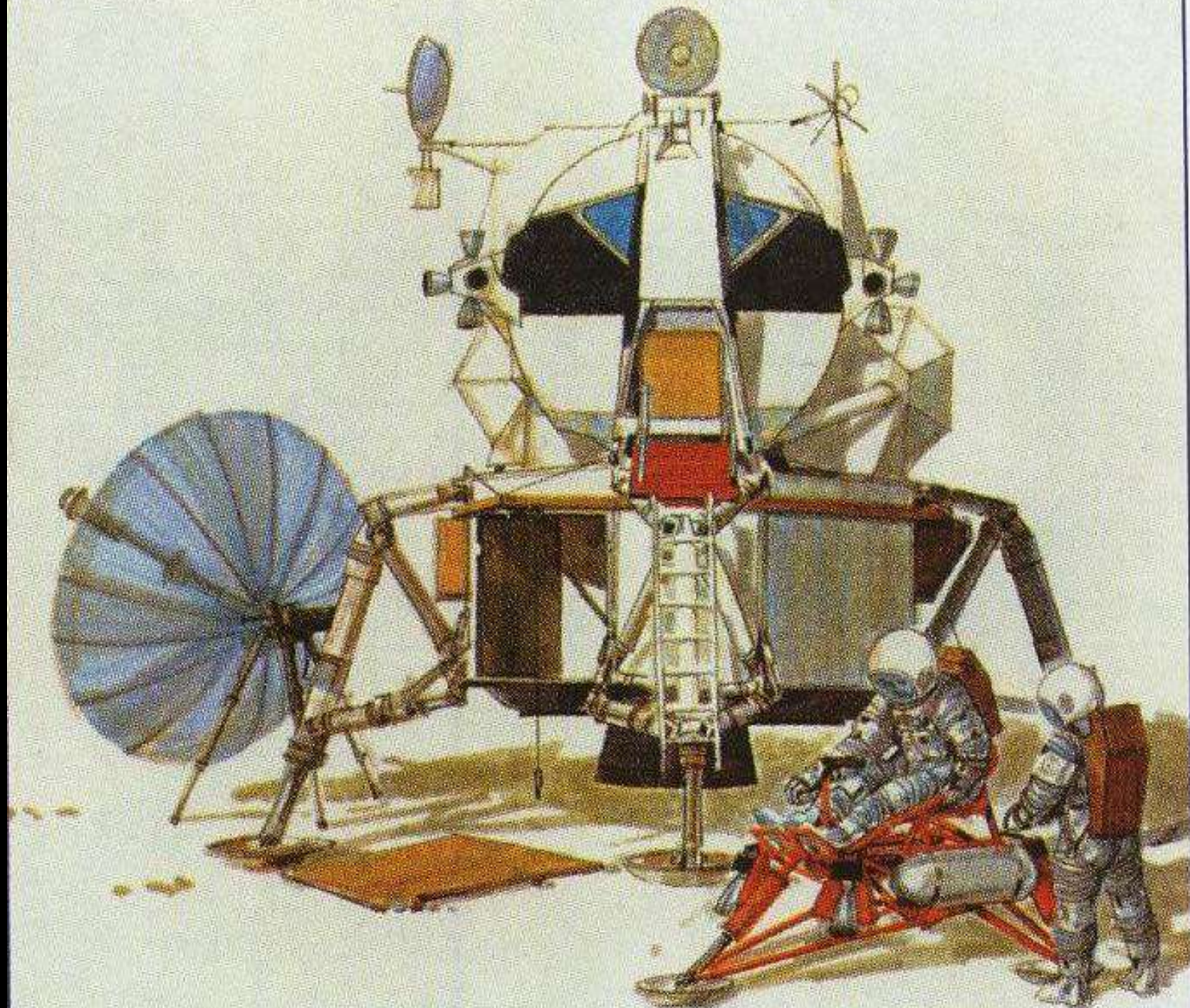




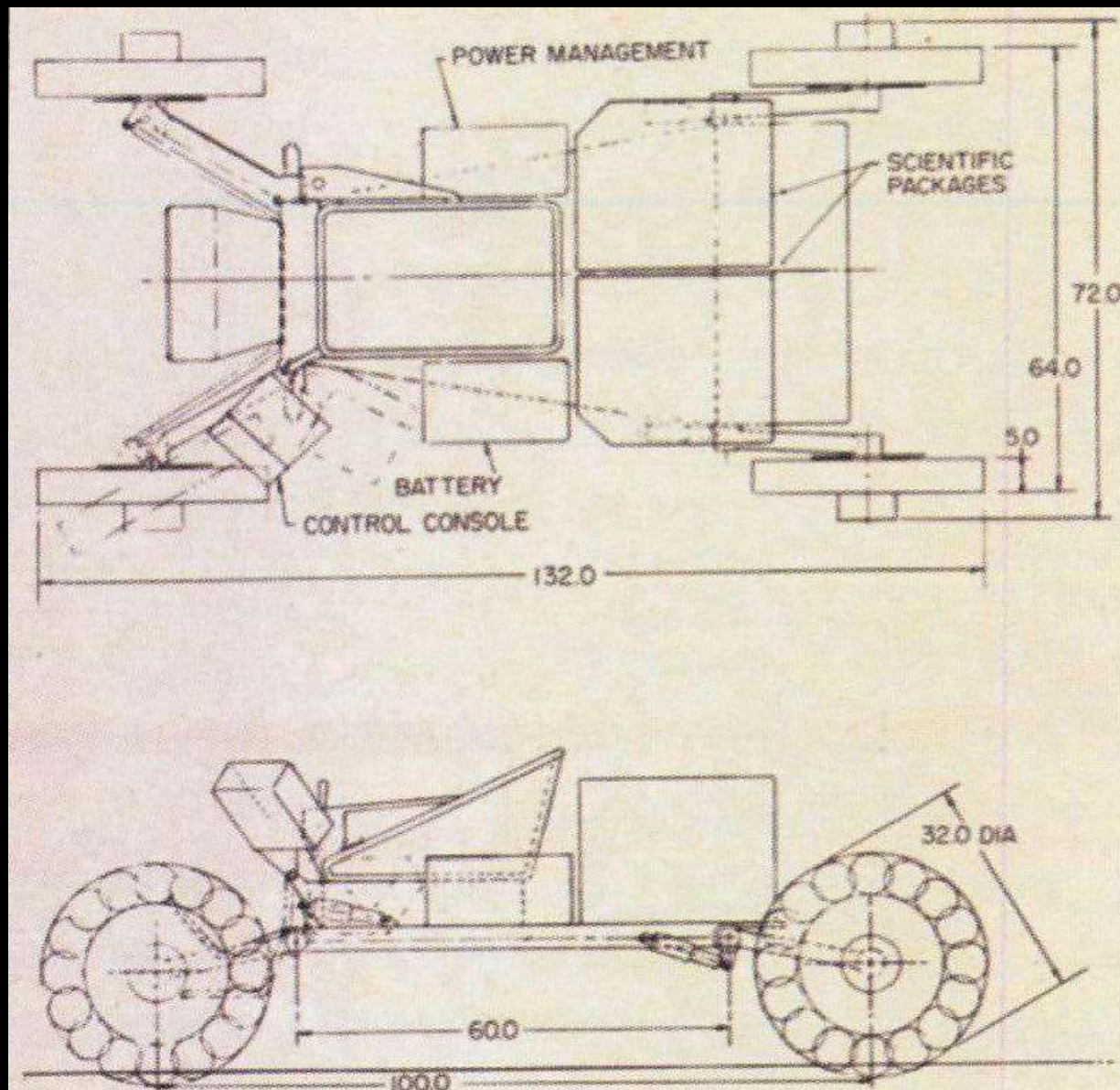


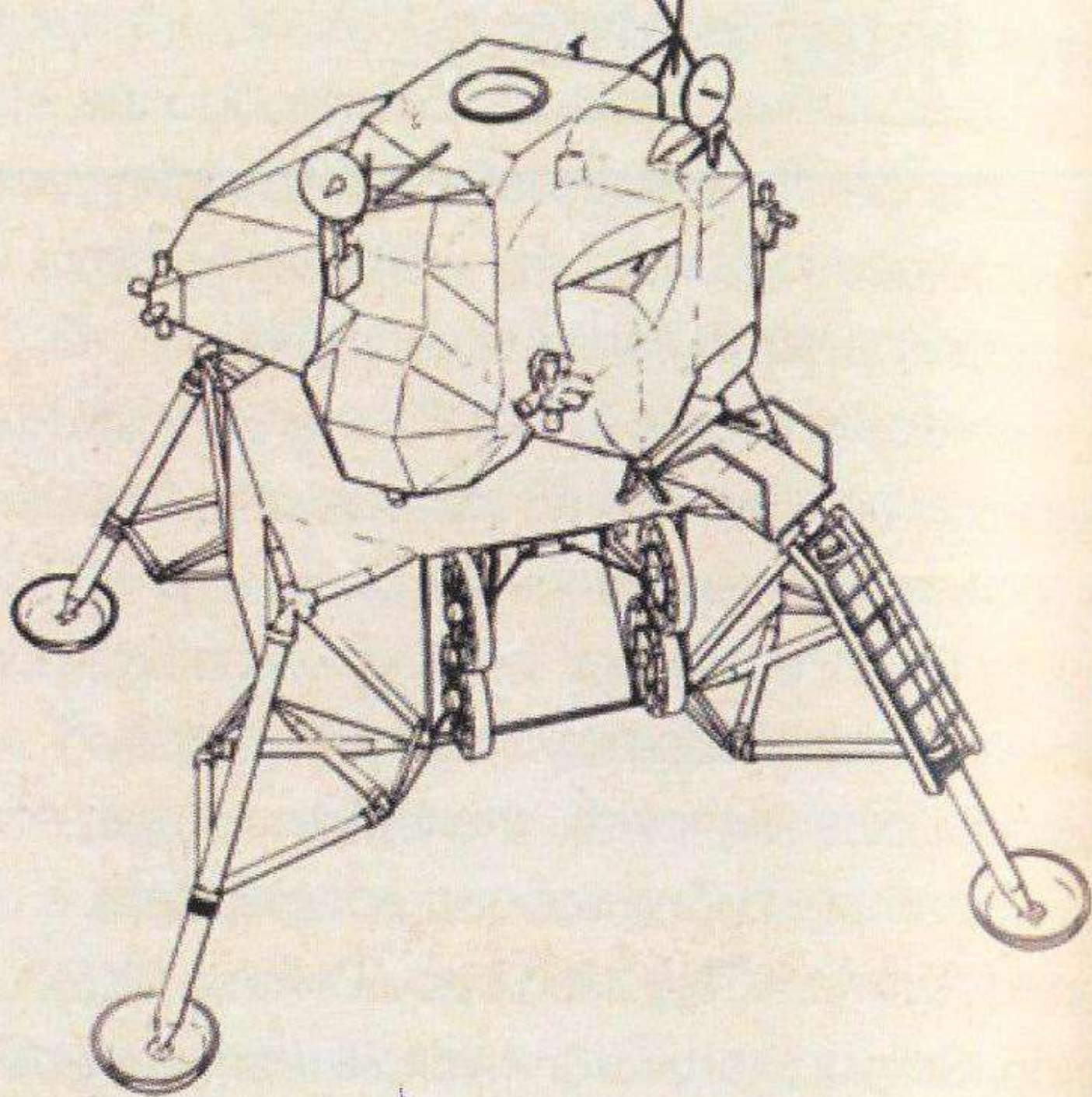


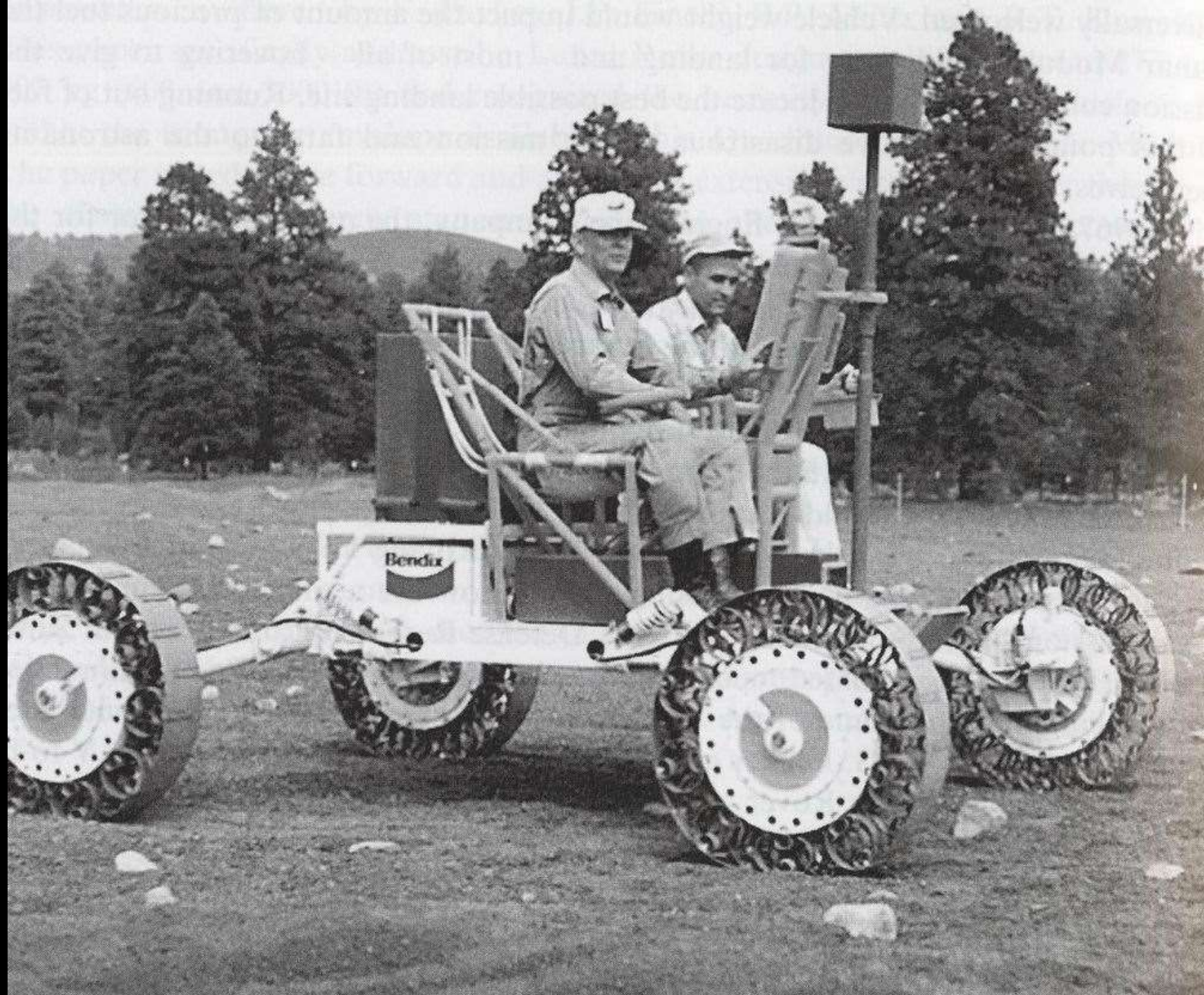


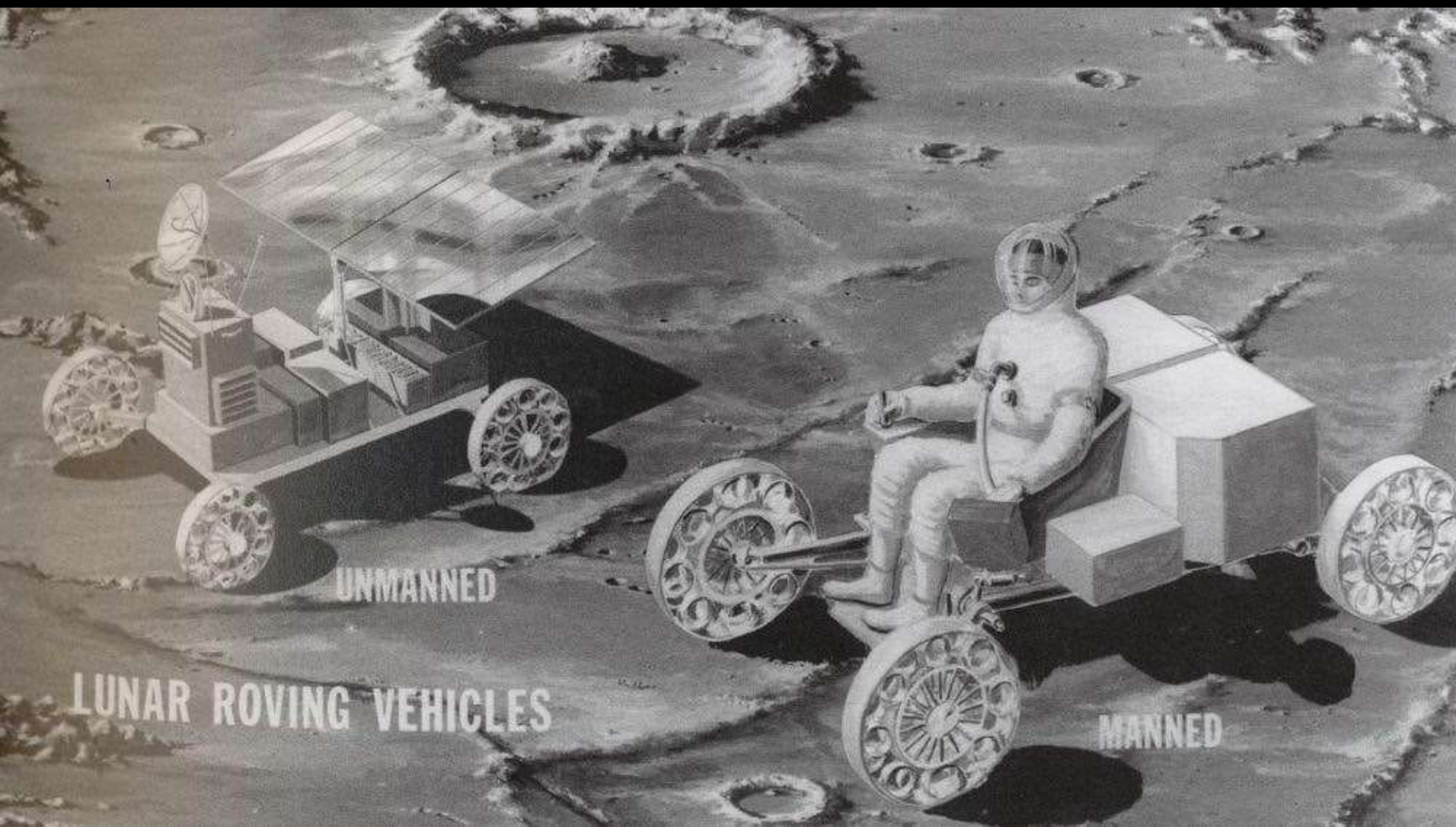


Bendix









UNMANNED

LUNAR ROVING VEHICLES

MANNED

Grumman

Mass Properties

Gross Weight, l bm 1269

Center of Gravity, in.

X 149.2

Y 1.2

Z 114.5

Moment of Inertia
(Suspended), slug-ft²

I_{xx} 109.9

I_{yy} 280.7

I_{zz} 310.8

Wheel Loading, l bm

Front axle 619

Rear axle 650

SURVEY STAFF
(HORIZONTAL
POSITION)

VHF ANTENNA
(OPTIONAL)

ROLL-OVER
BAR

POWER TOOL
(OPTIONAL: MAGNETOMETER,
GRAVIMETER, IO-METER DRILL)

RADIATOR

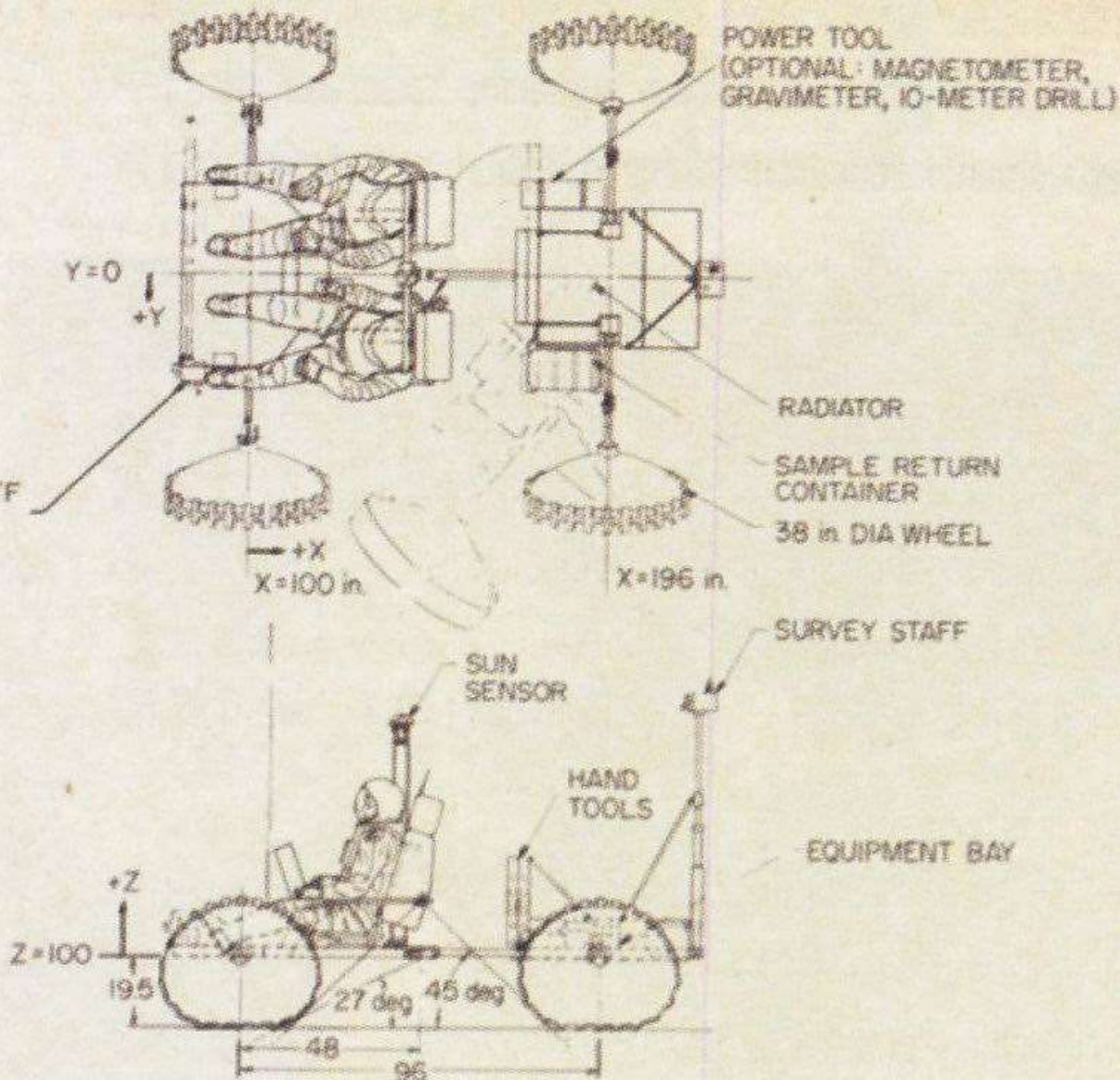
SAMPLE RETURN
CONTAINER

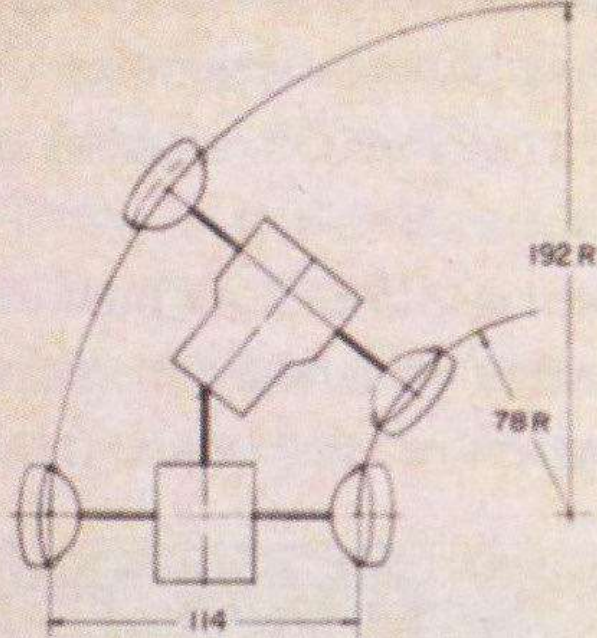
38 in DIA WHEEL

SUN
SENSOR

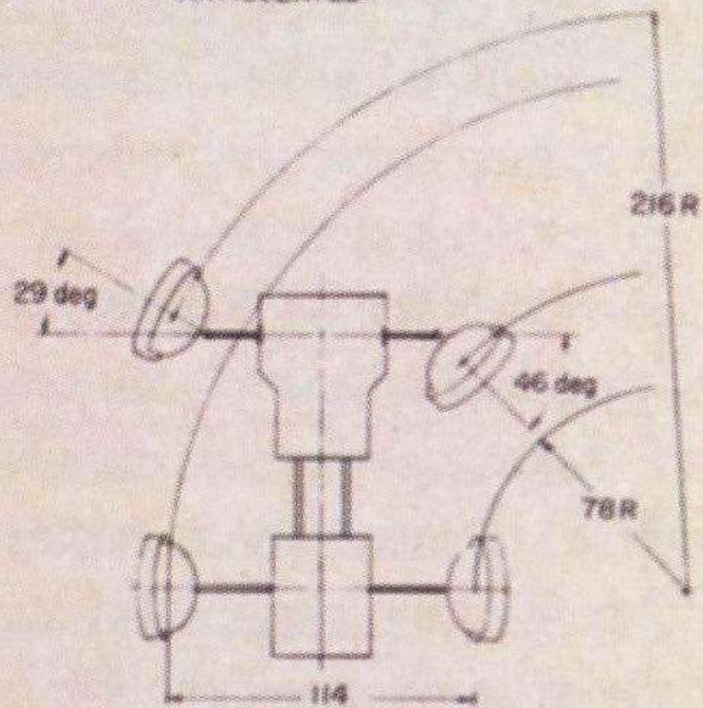
HAND
TOOLS

EQUIPMENT BAY



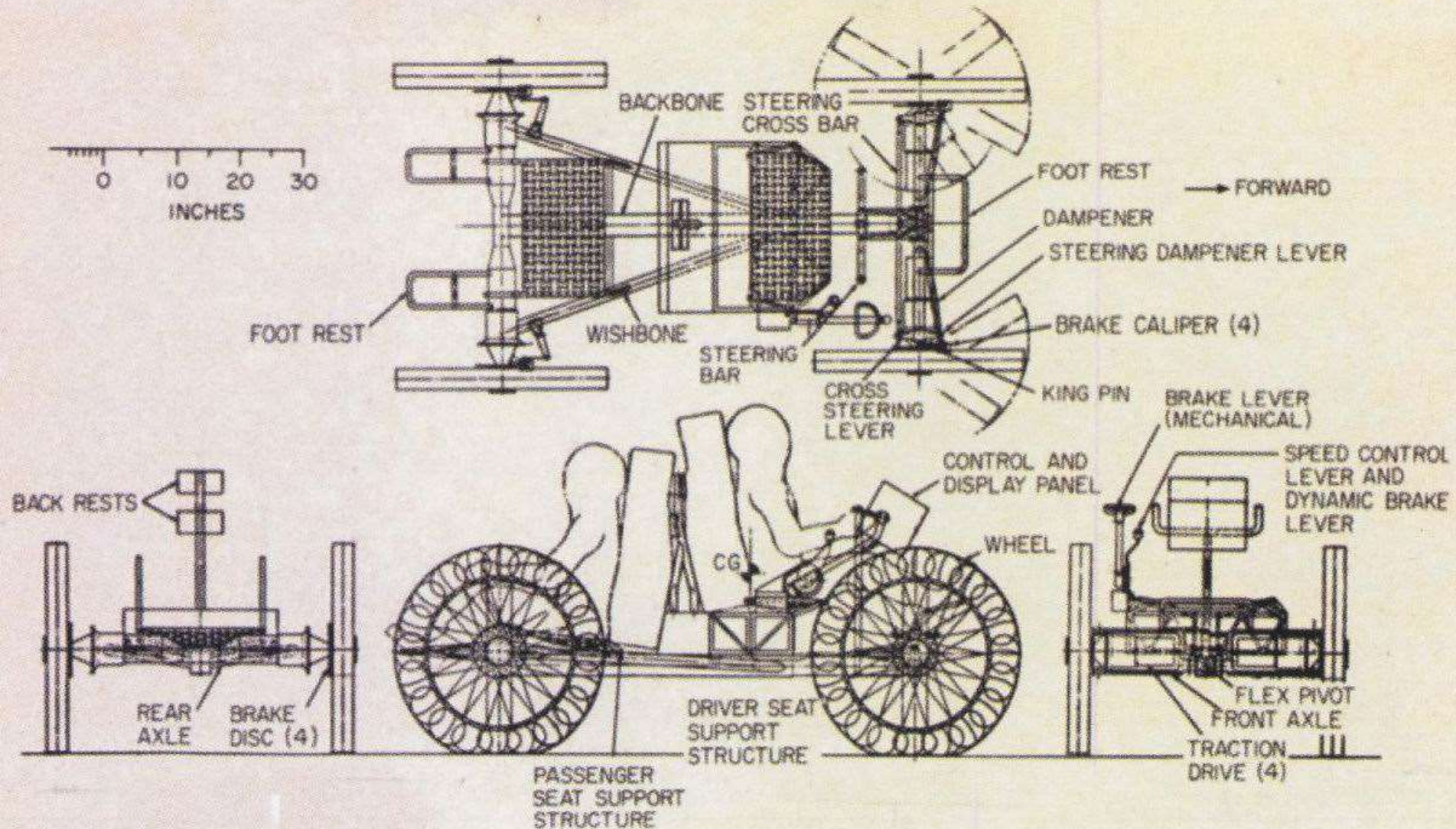


ARTICULATED

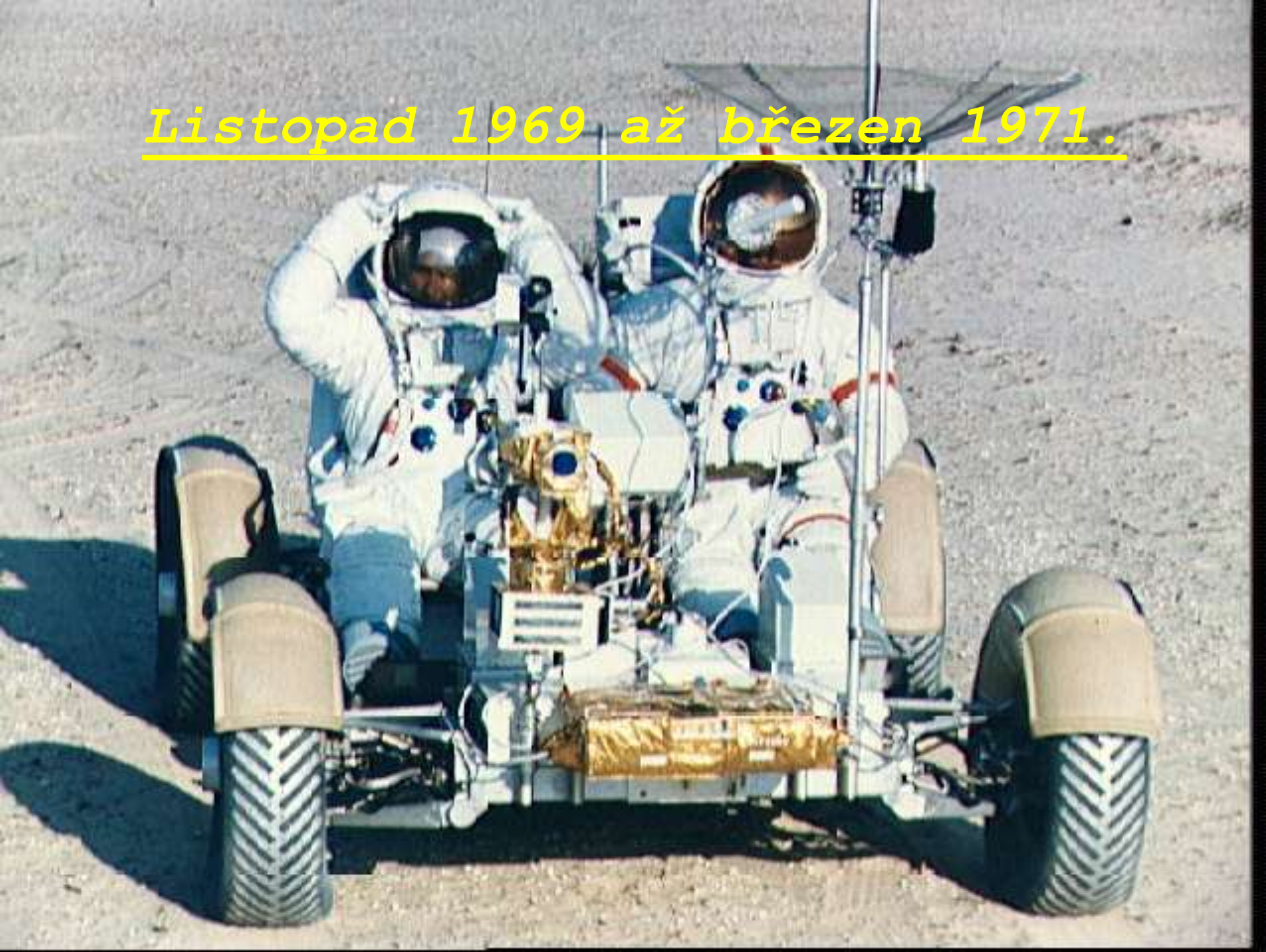


ACKERMAN

Chrysler



Listopad 1969 až březen 1971.





(DEPLOYED, EMPTY)

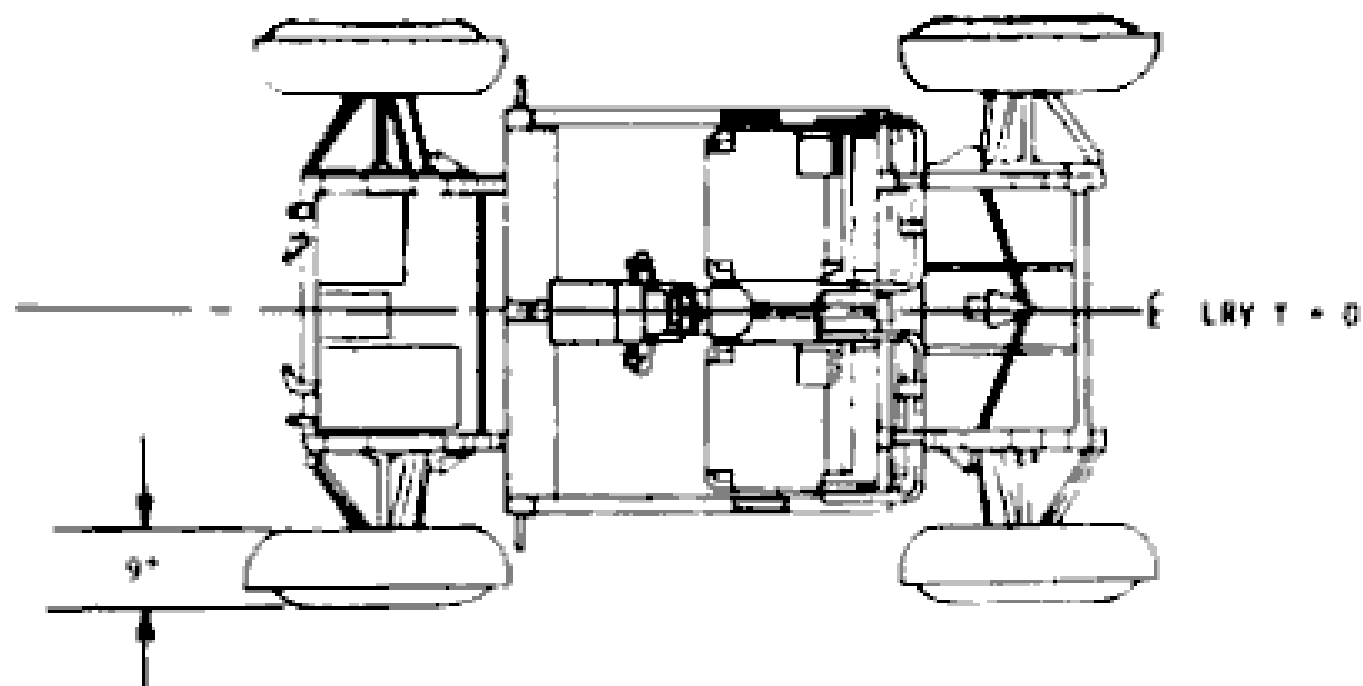
WEIGHT = 462 LB*

C.G. LOCATION:

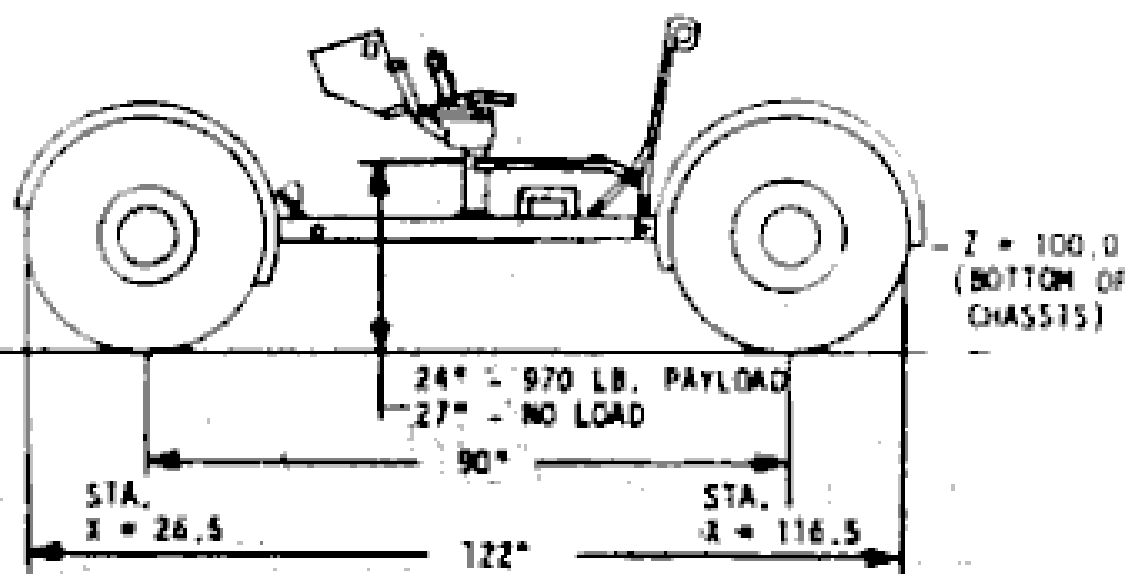
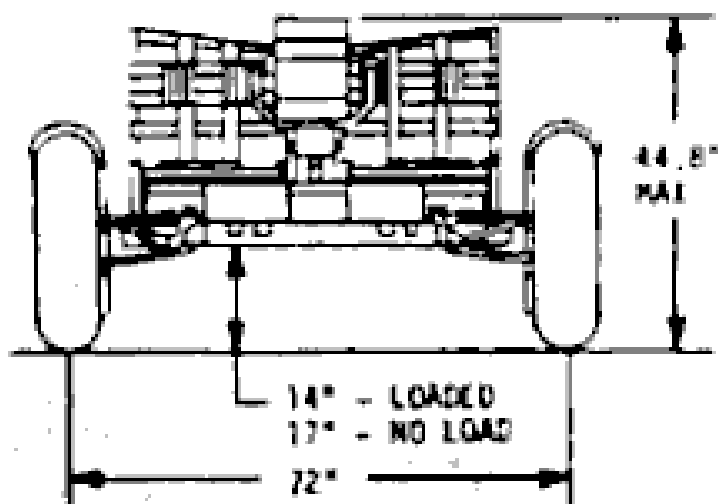
$X = 52.8$

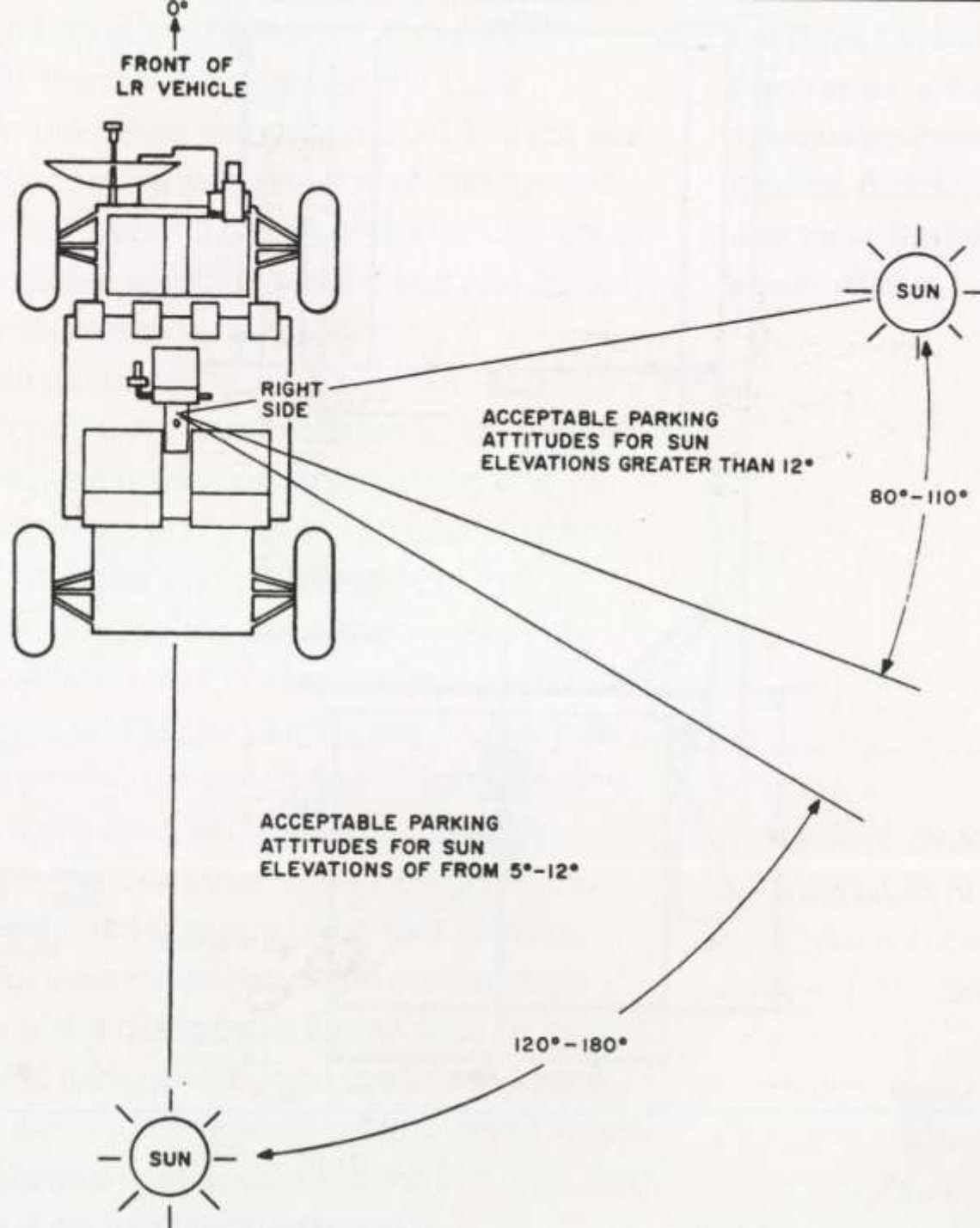
$Y = -0.3$

$Z = 103.3$

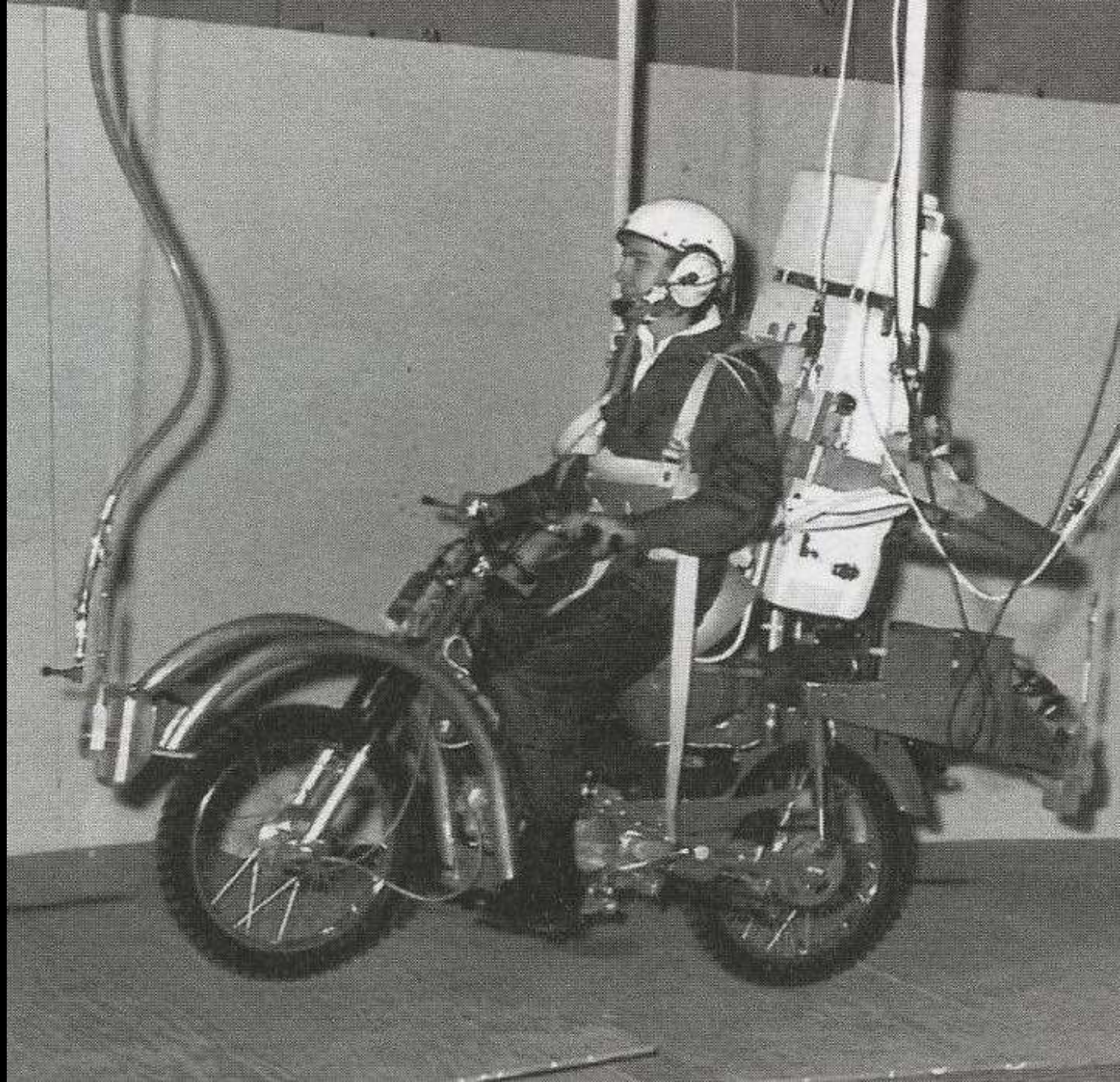


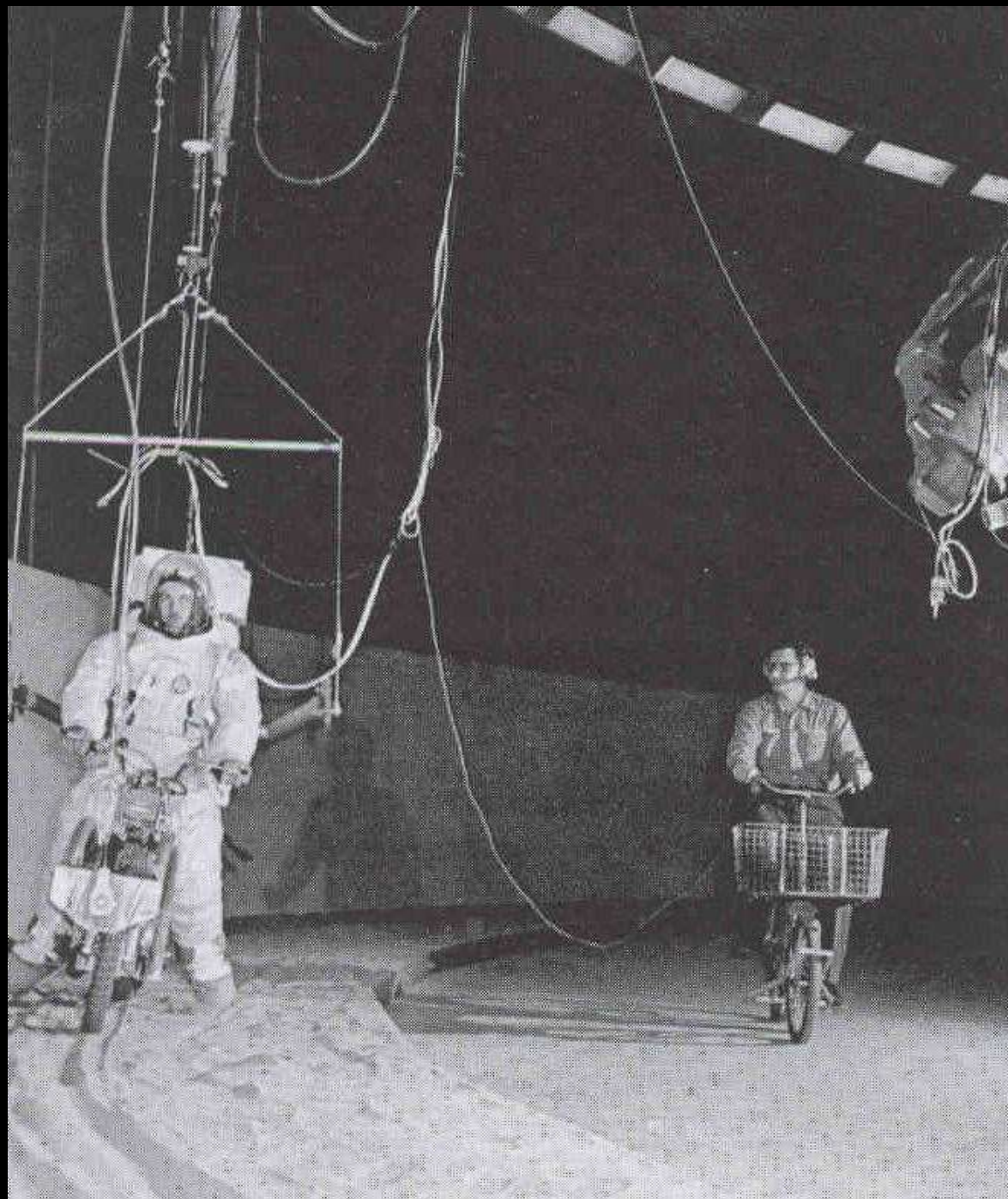
*INCLUDES BATTERIES
& PAYLOAD SUPPORTS,
EXCLUDES SSE.



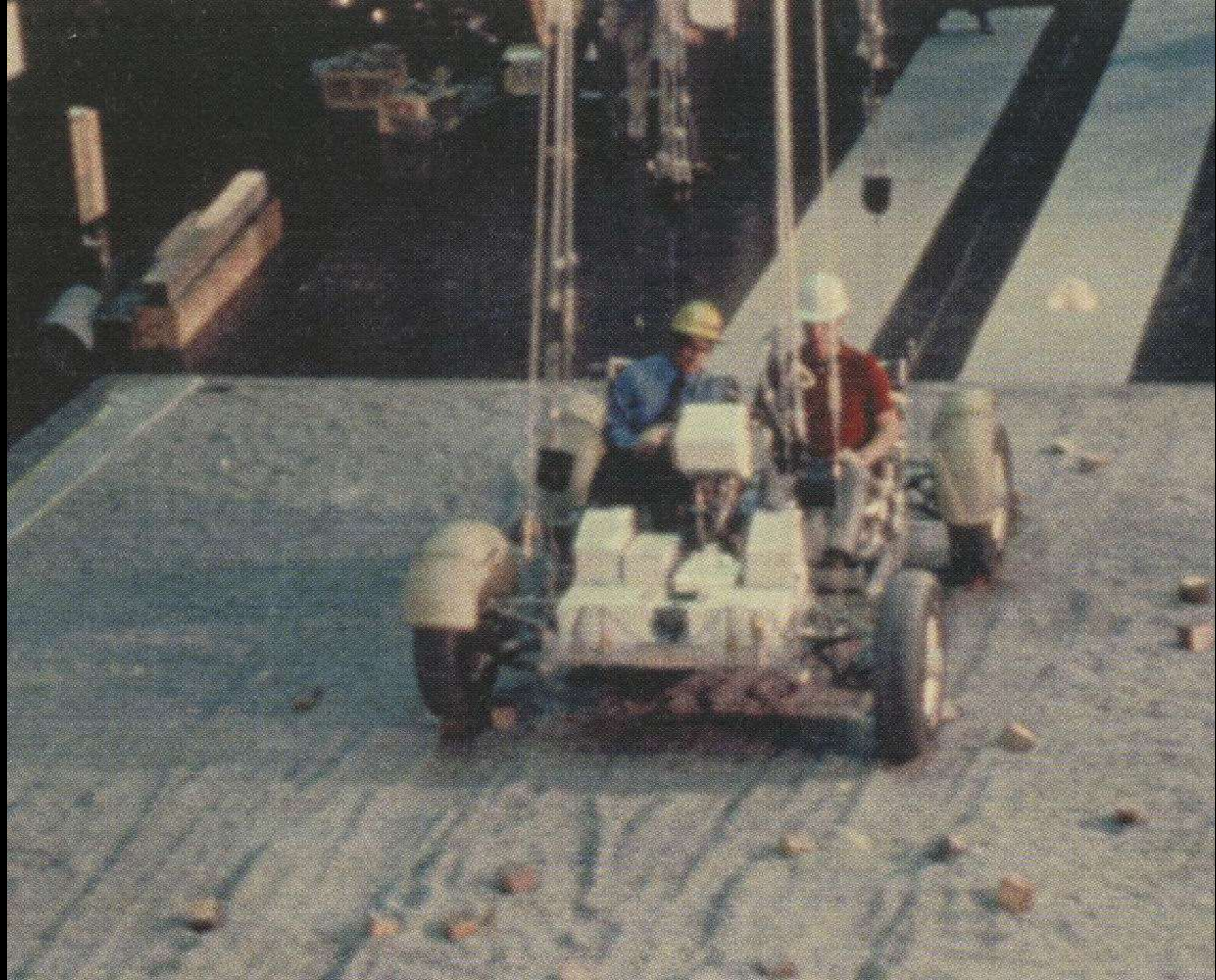




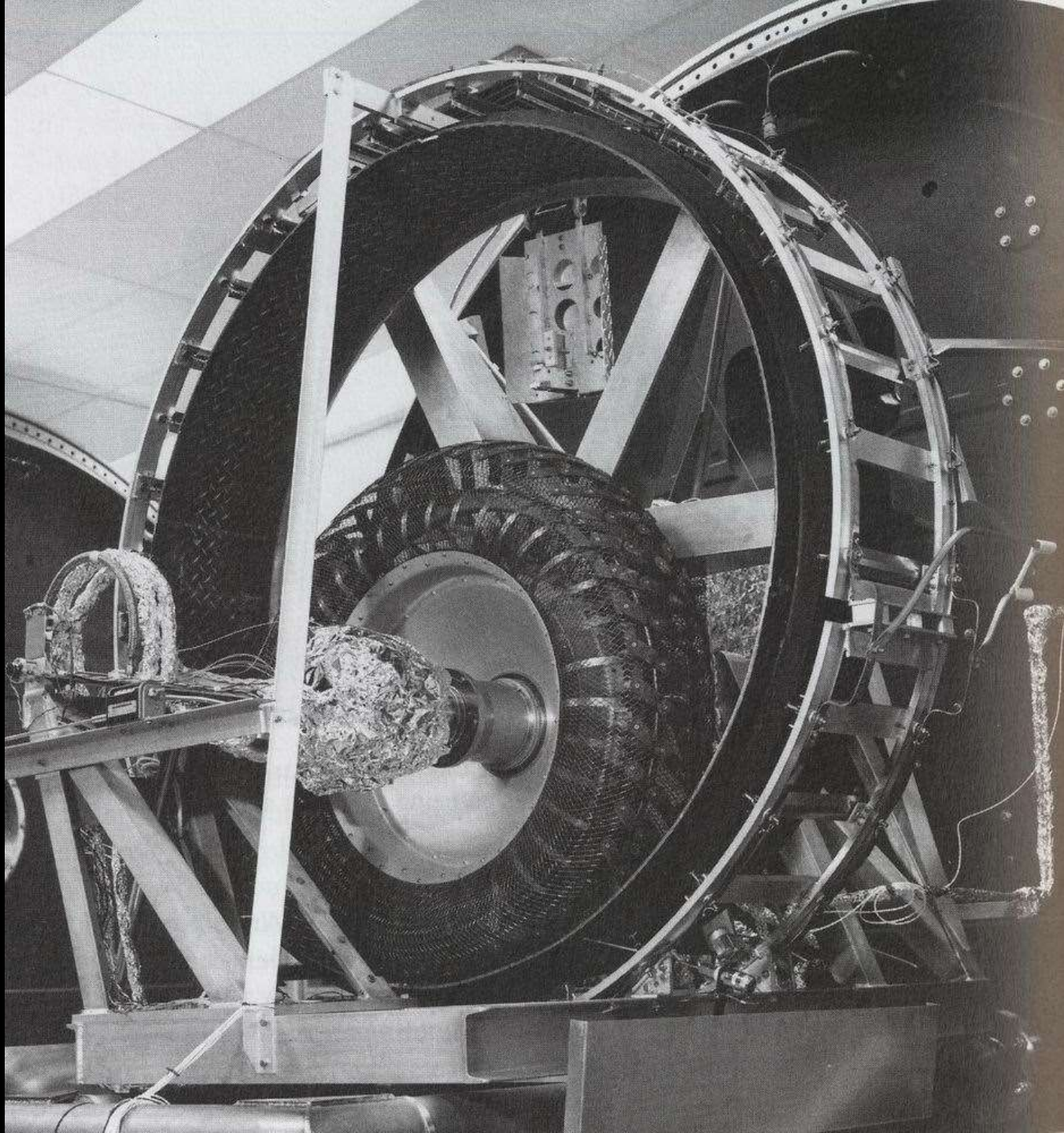


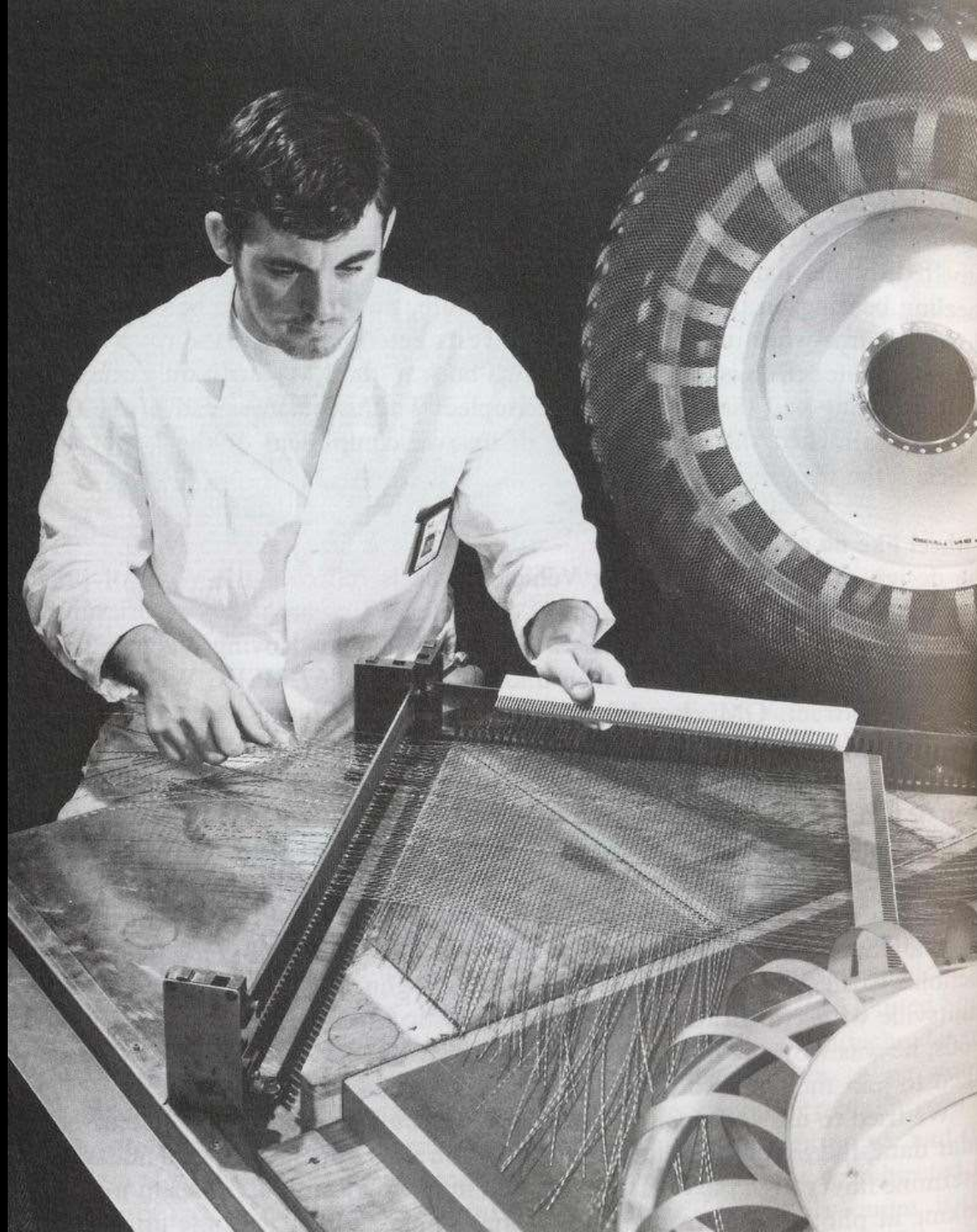


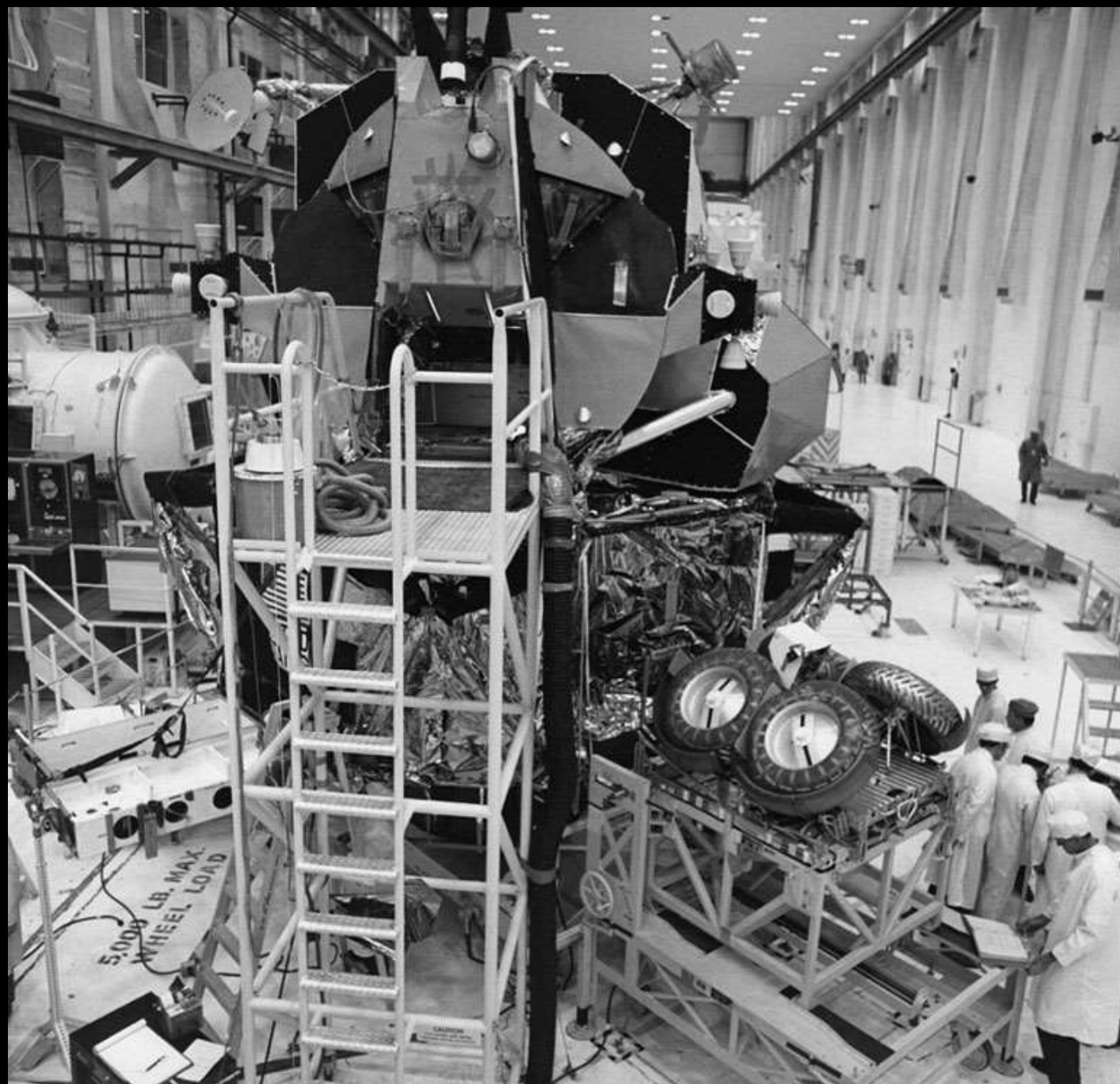






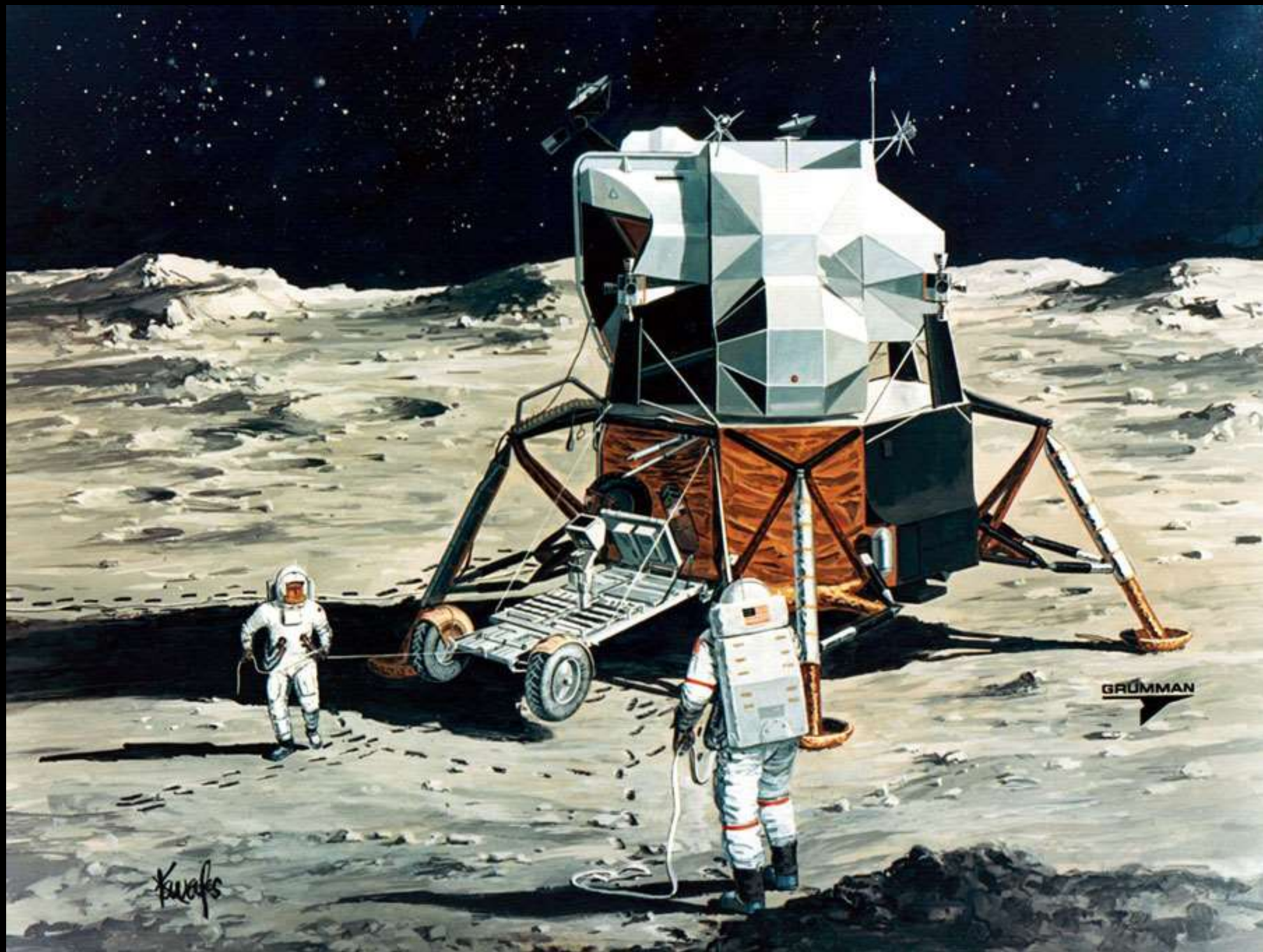


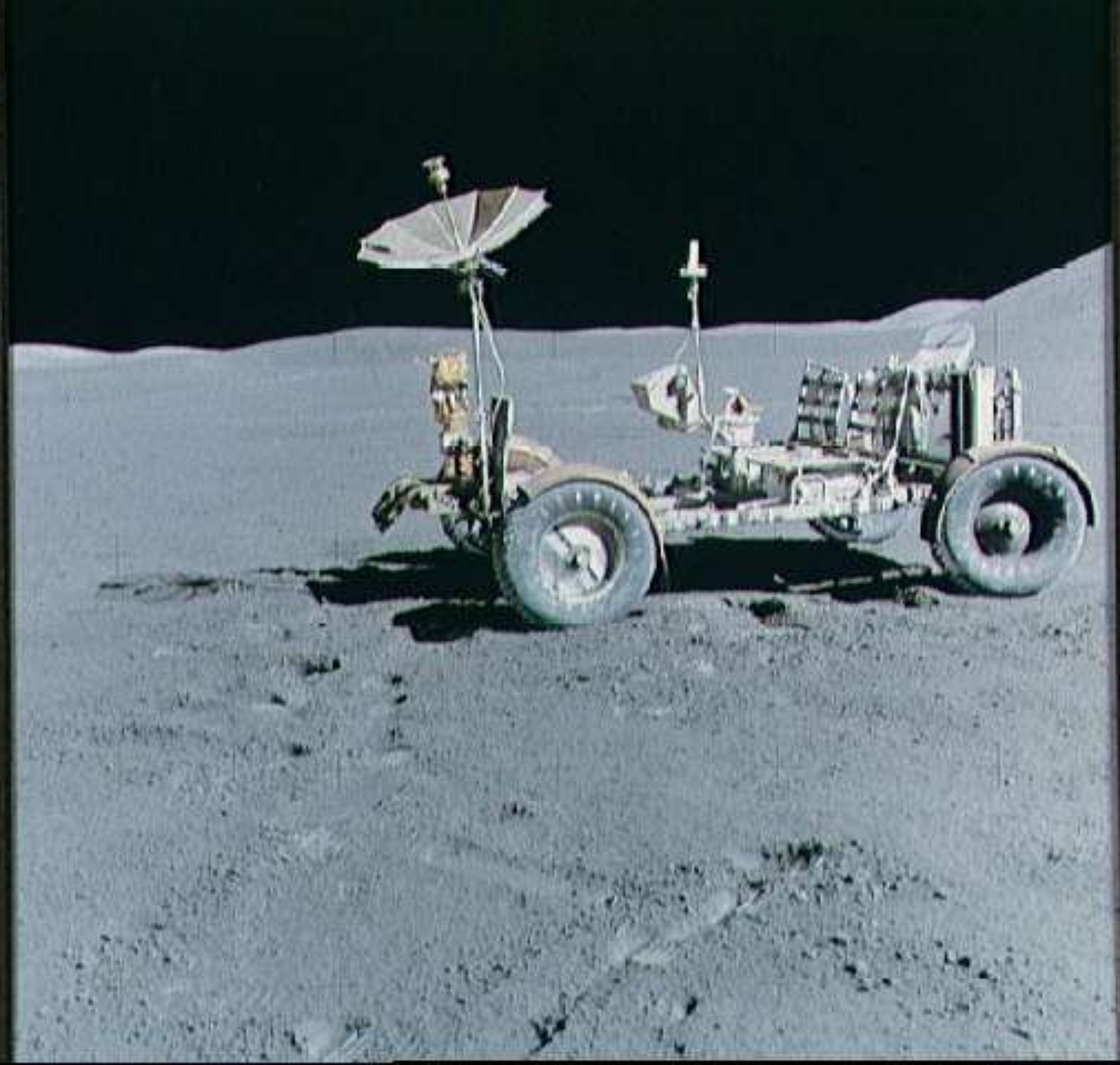


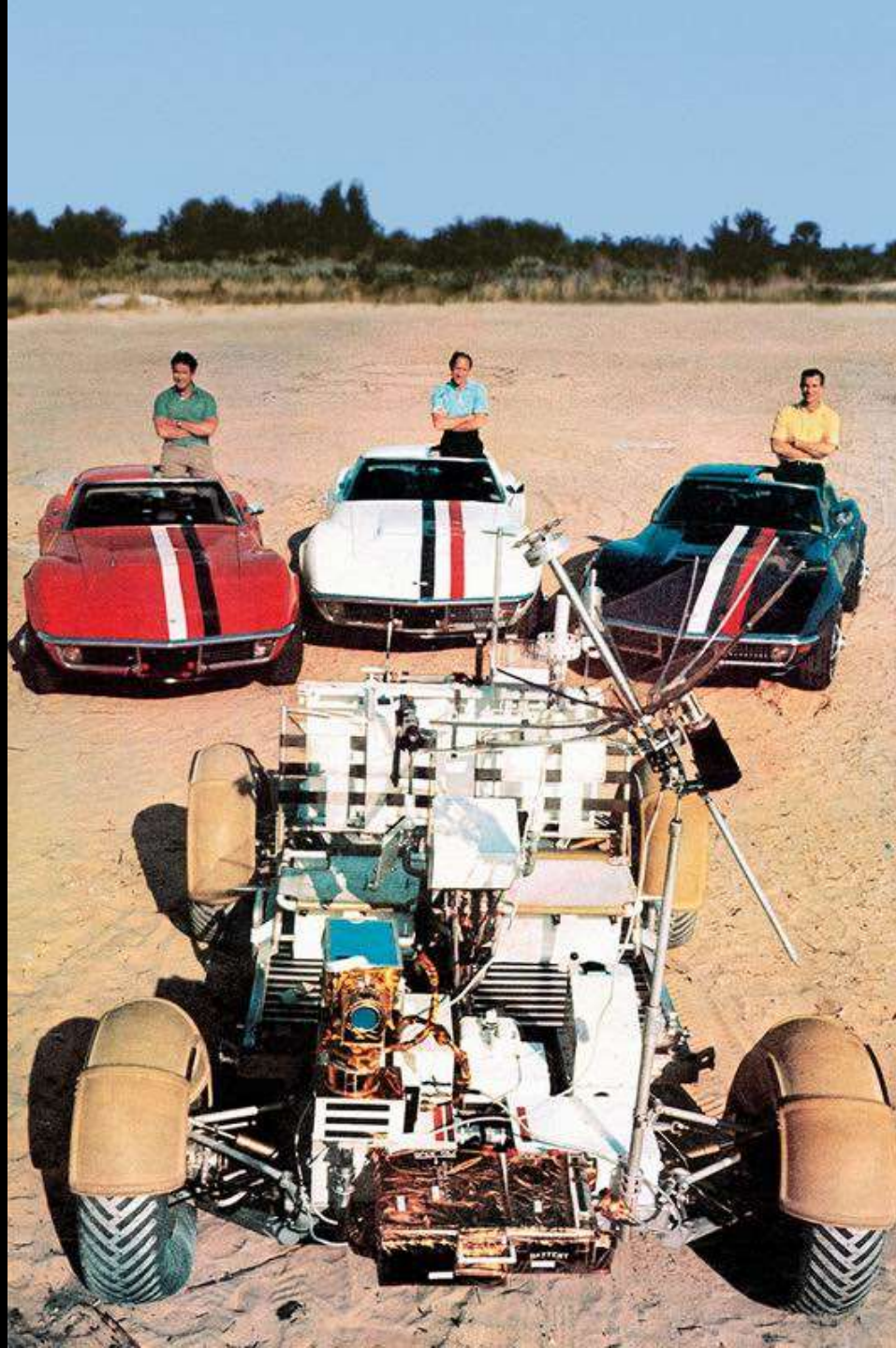






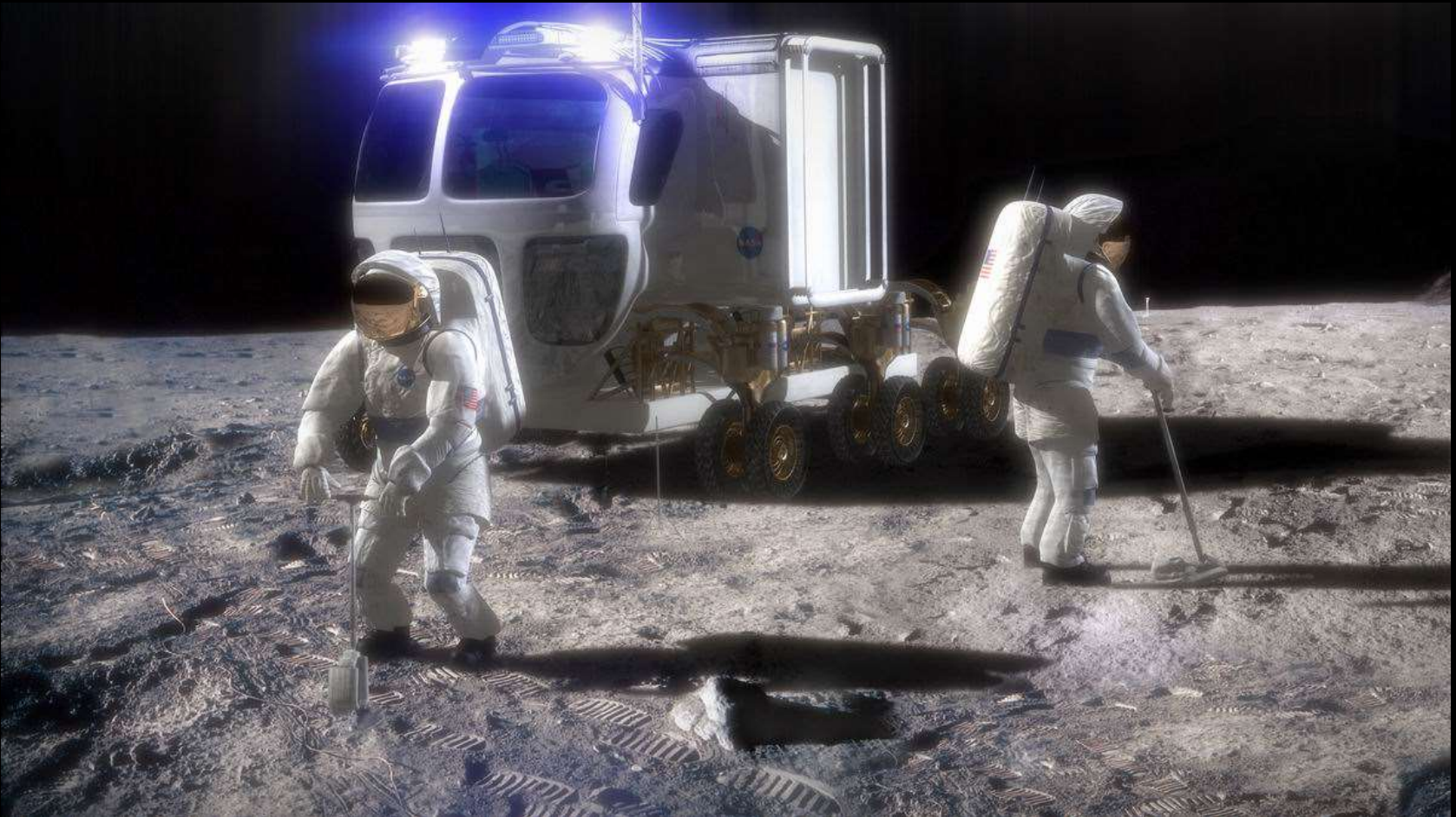






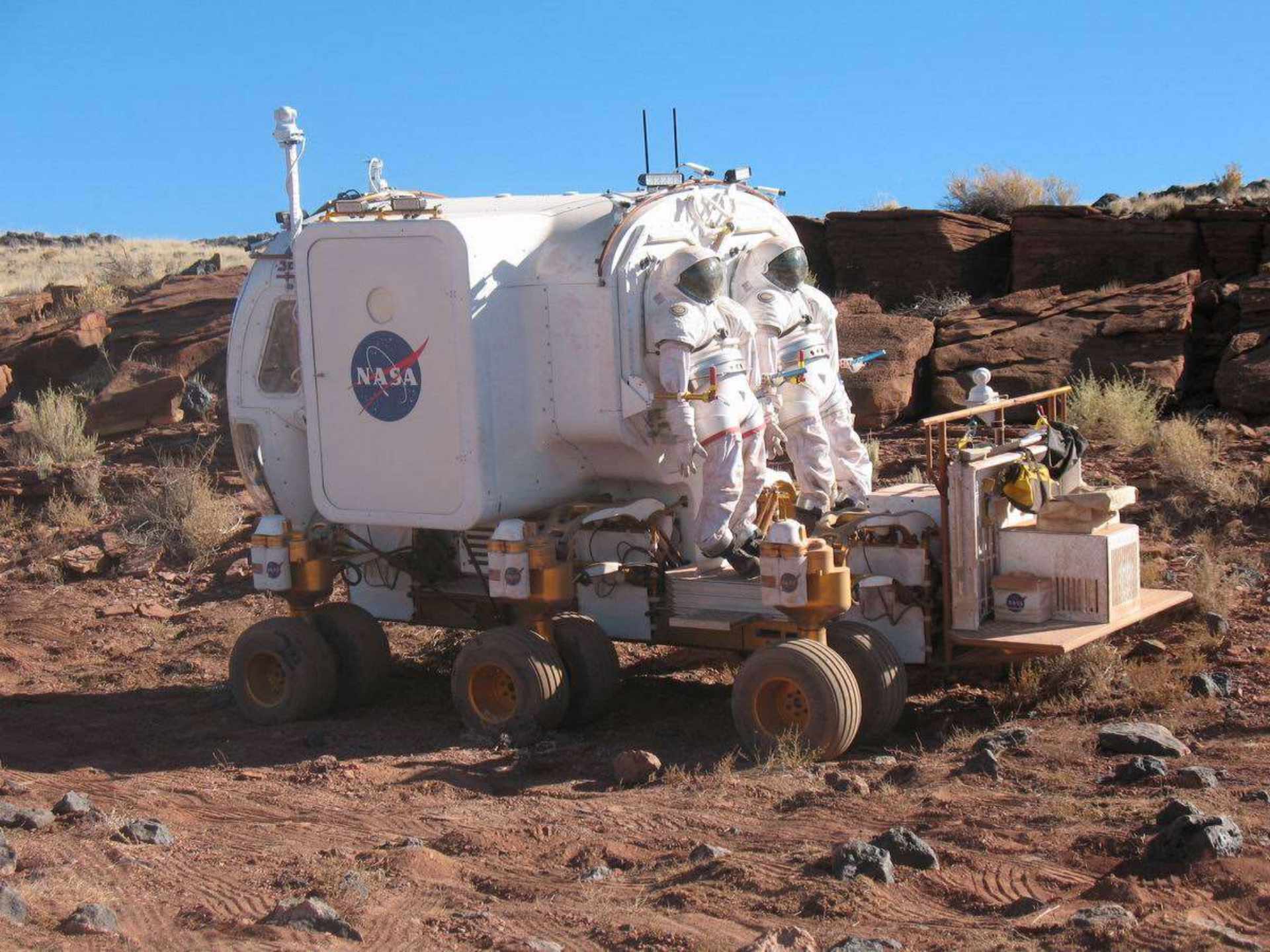
SPACE EXPLORATION VEHICLE

Lunar Electric Rover









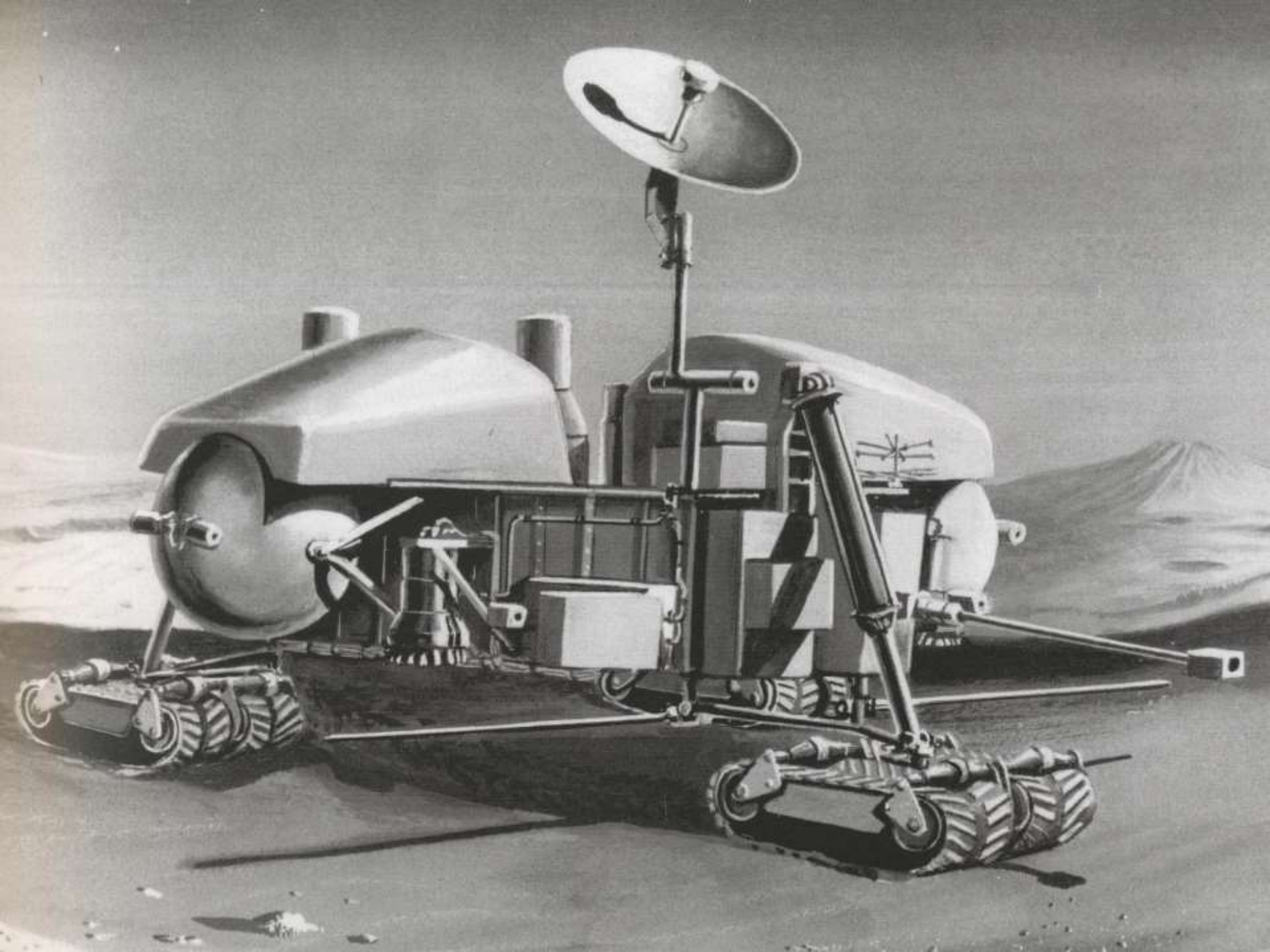


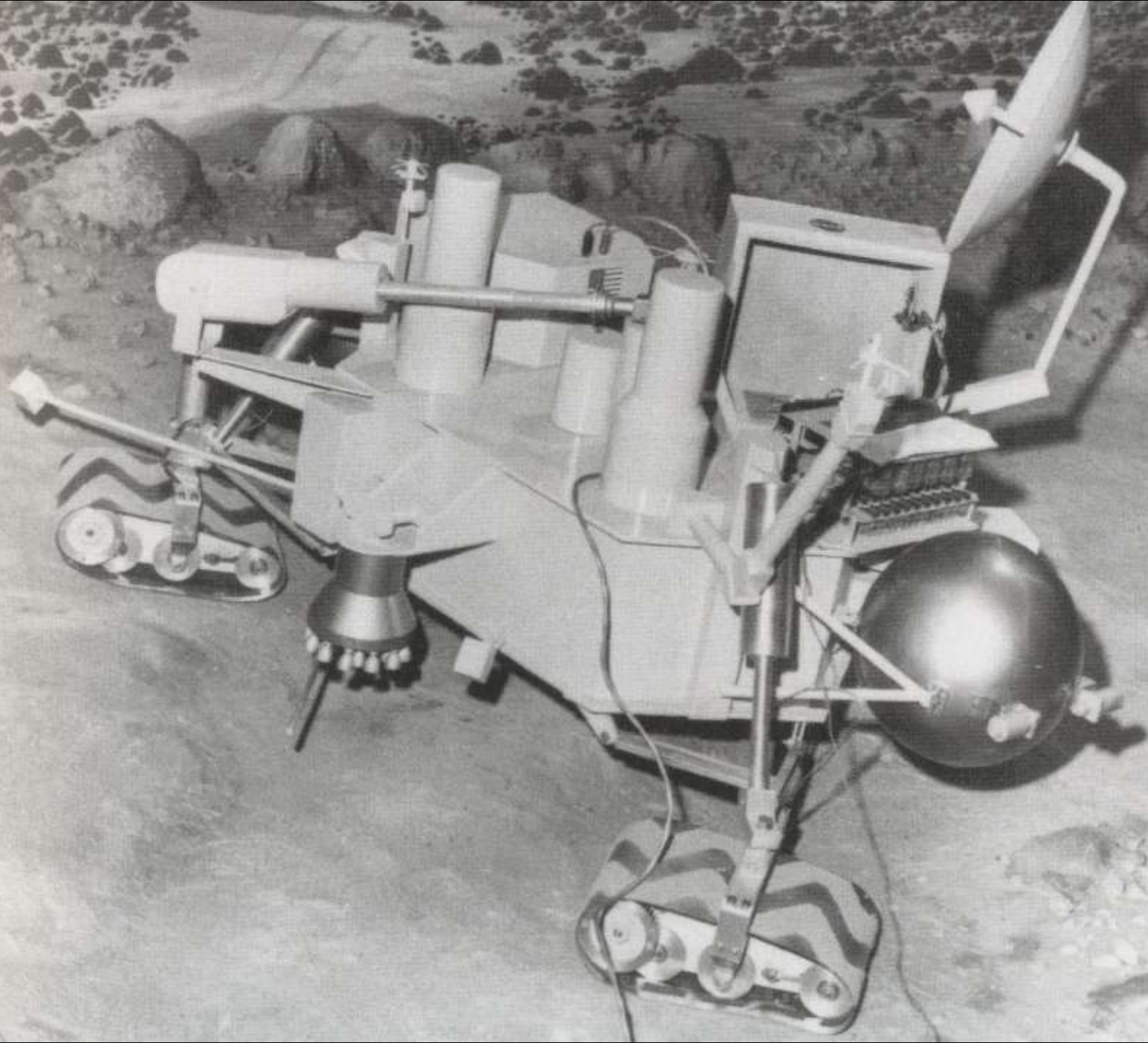


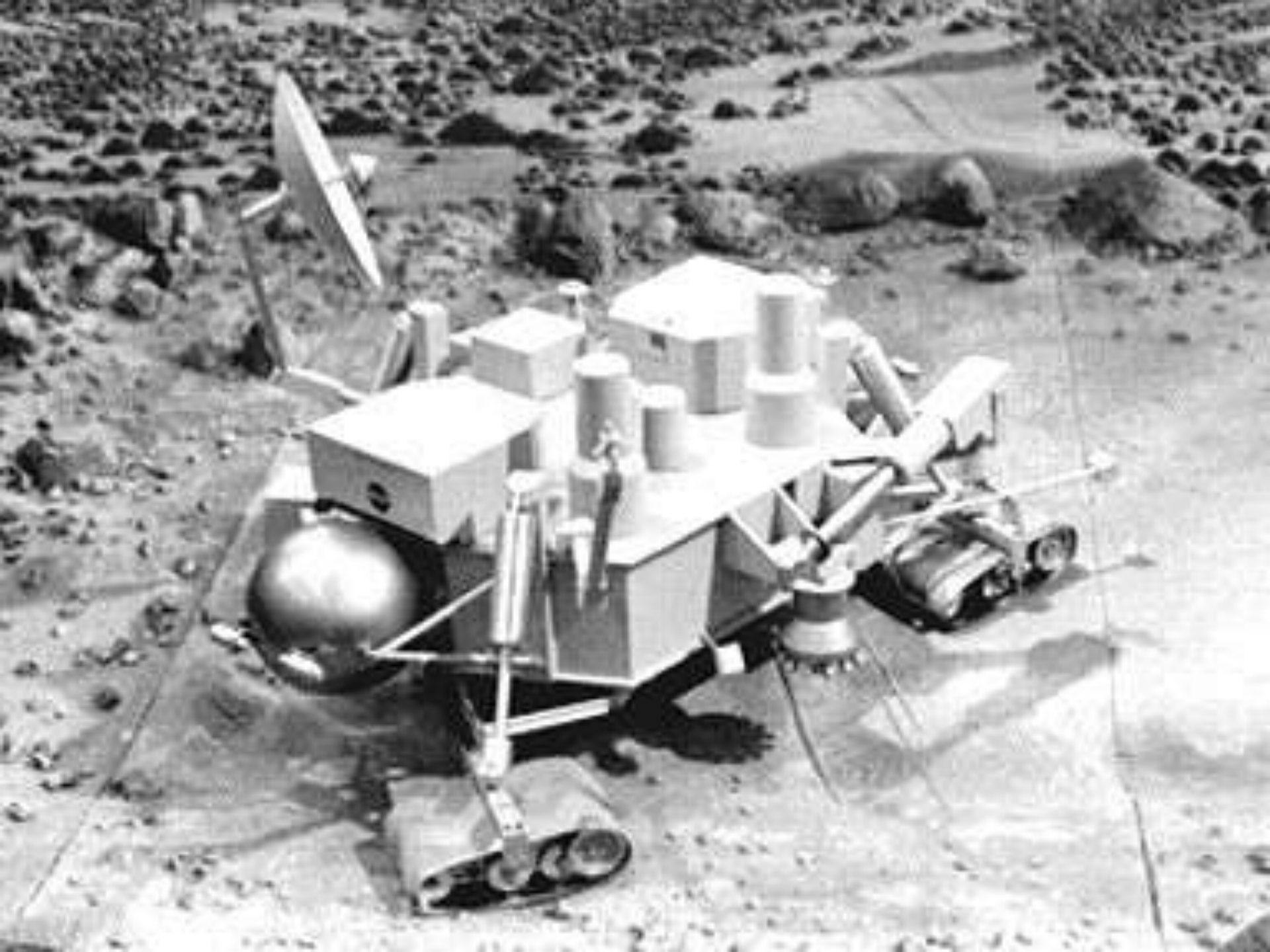


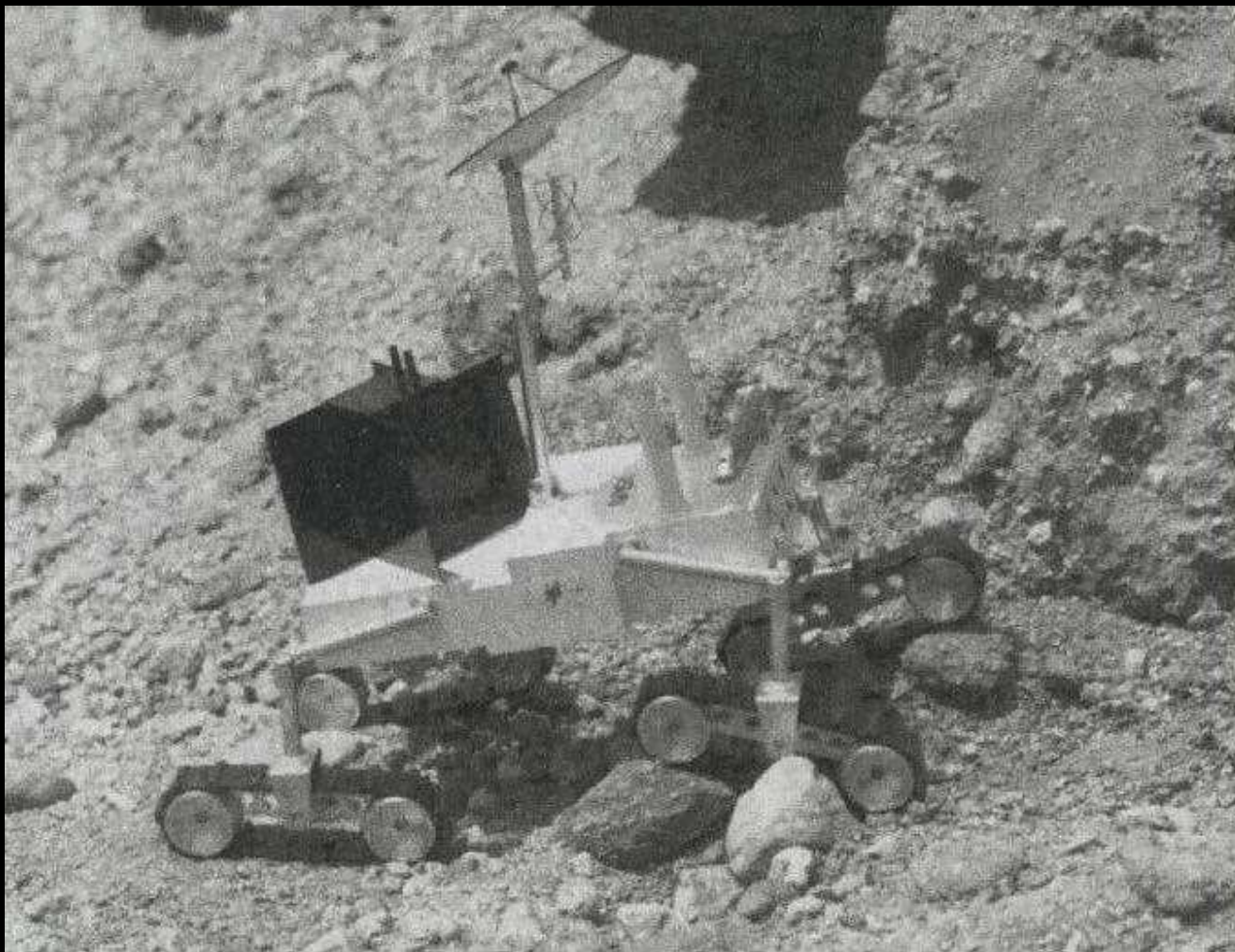






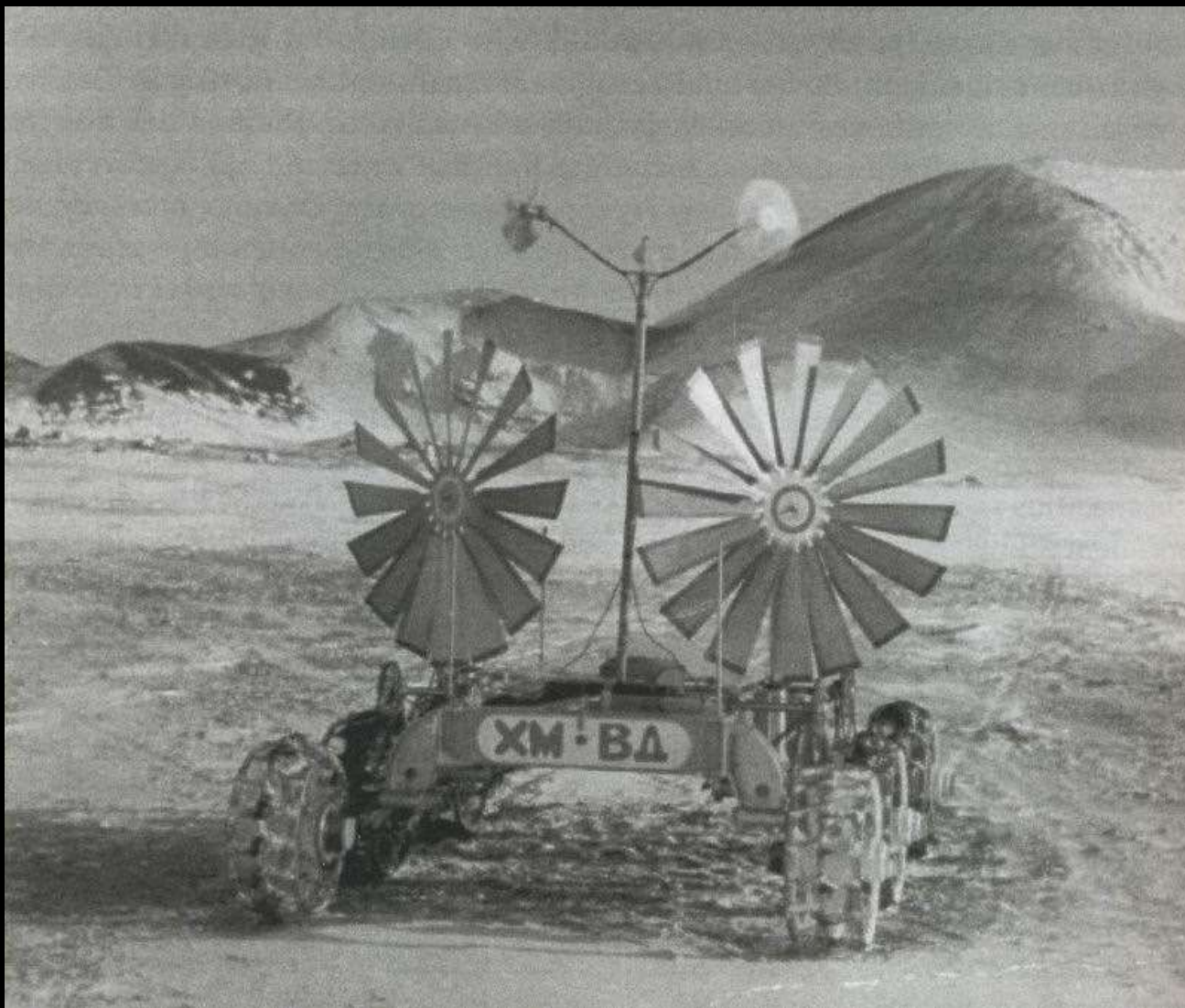






- 1) Malý mobilní robot na 100 m kabelu.
- 2) Nezávislý 100 kg robot, který pojede kilometry.

VENĚROCHOD

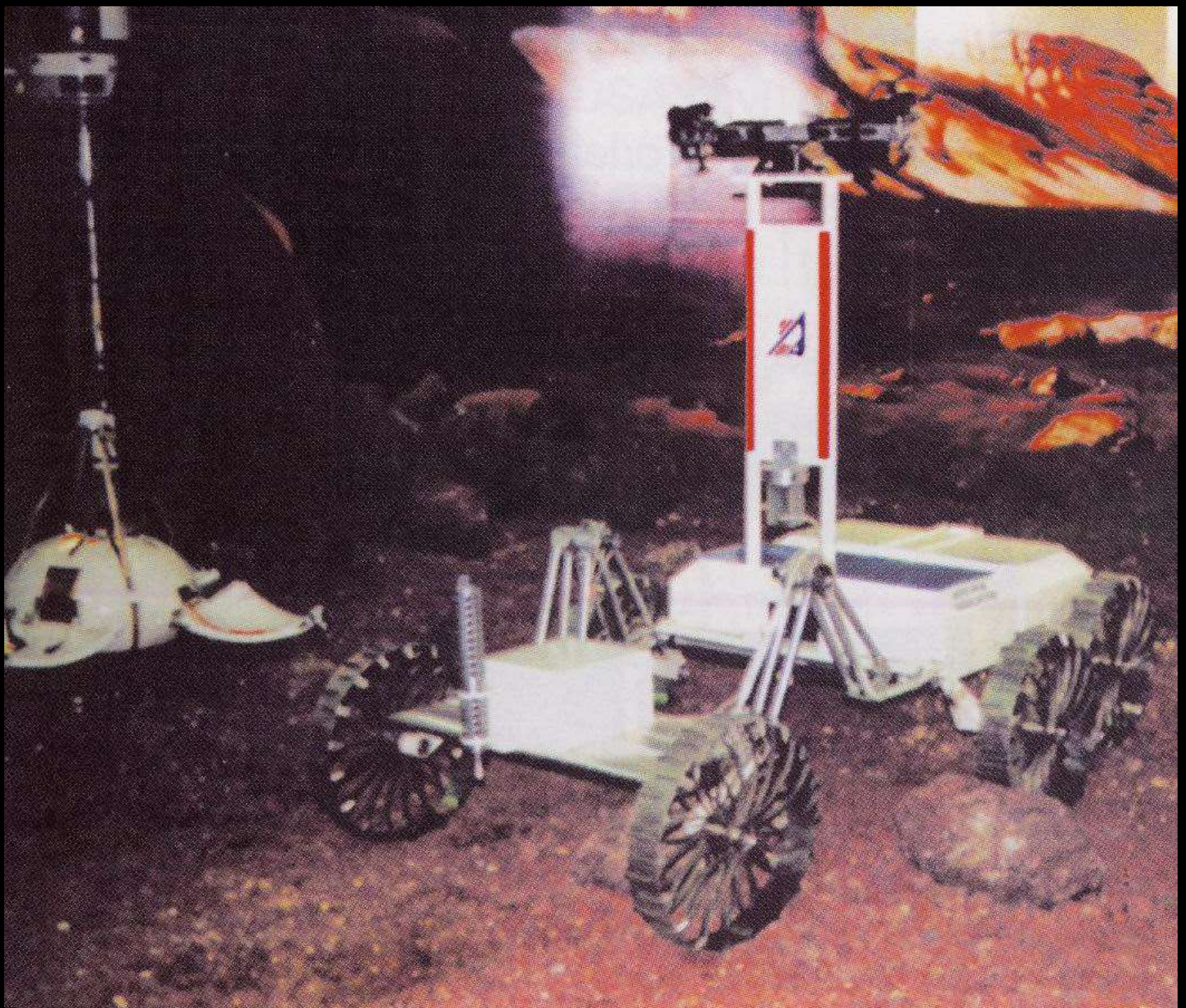


1984 až 87



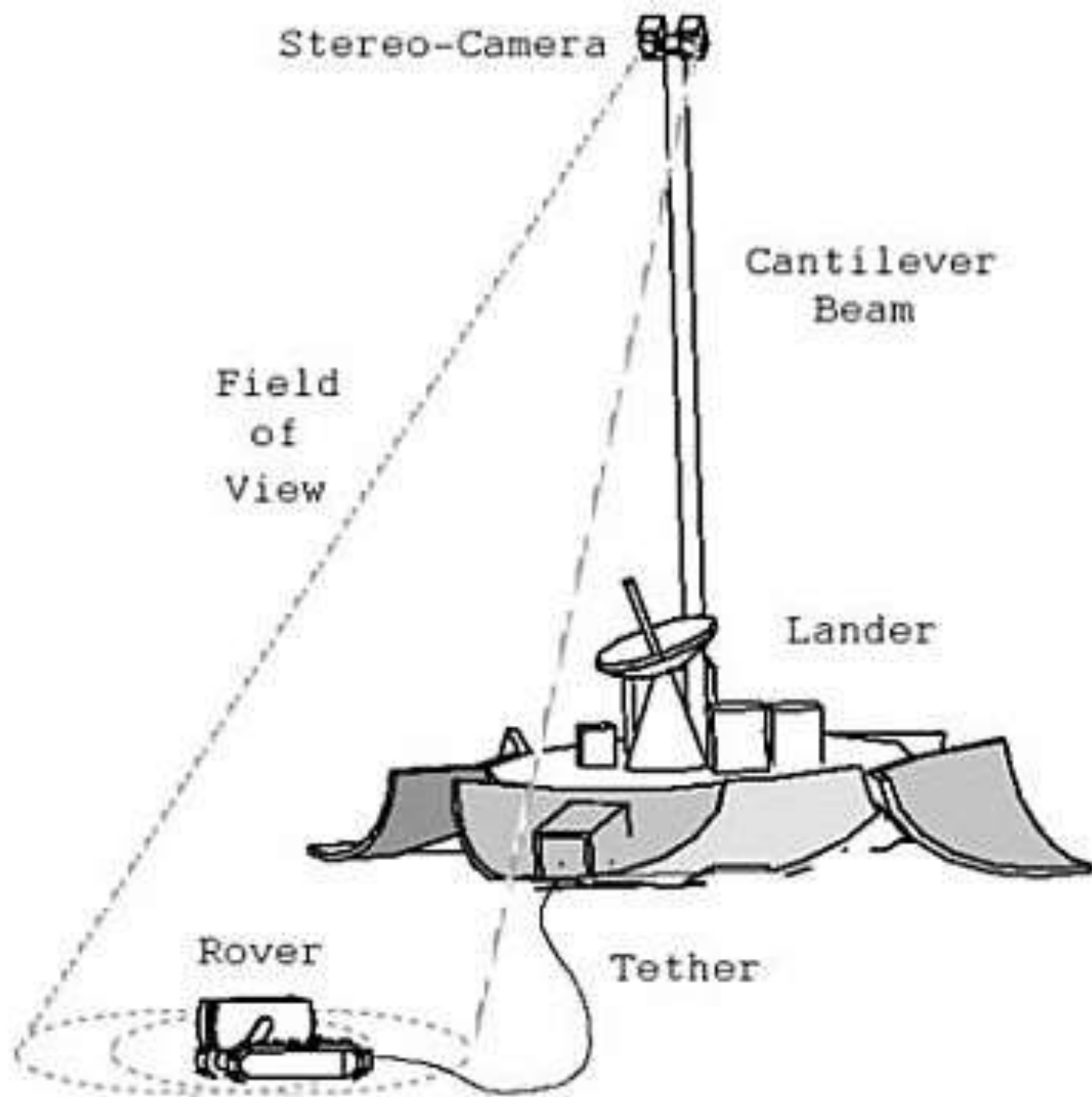

LAVOCHKIN
Association





Sem a tam na Marsu





eesa

© 2002 HANSON ELECTRONICS

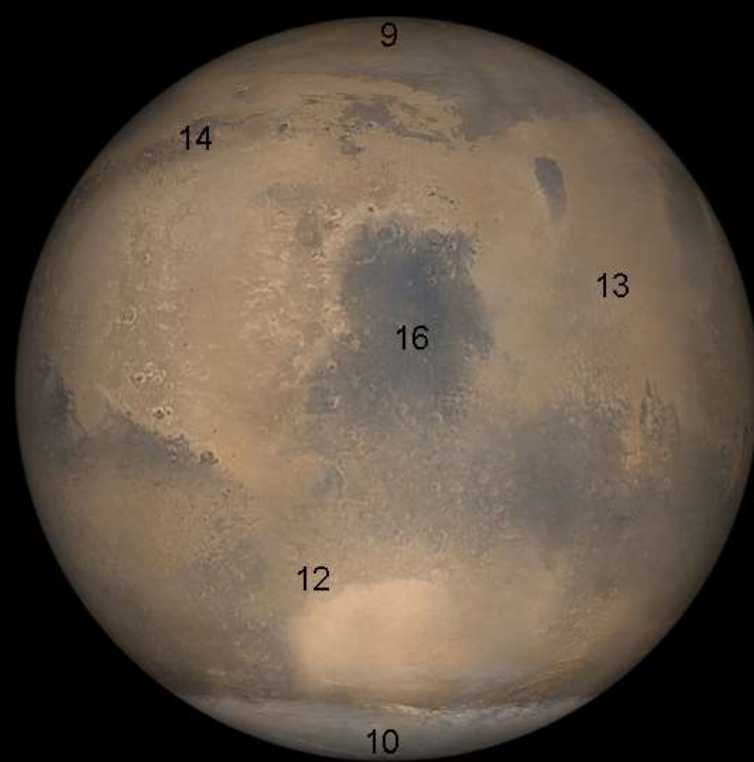
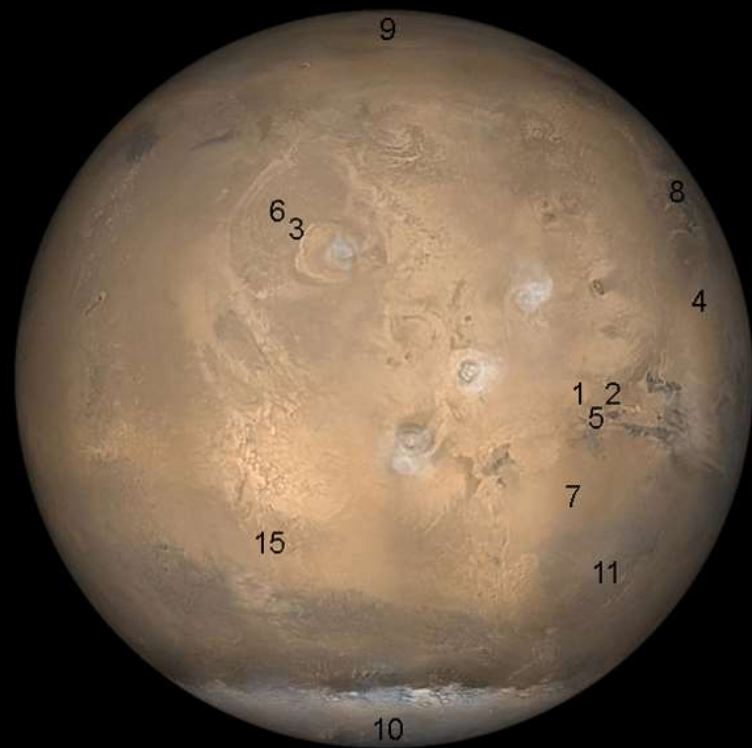
RoSA/M Model A

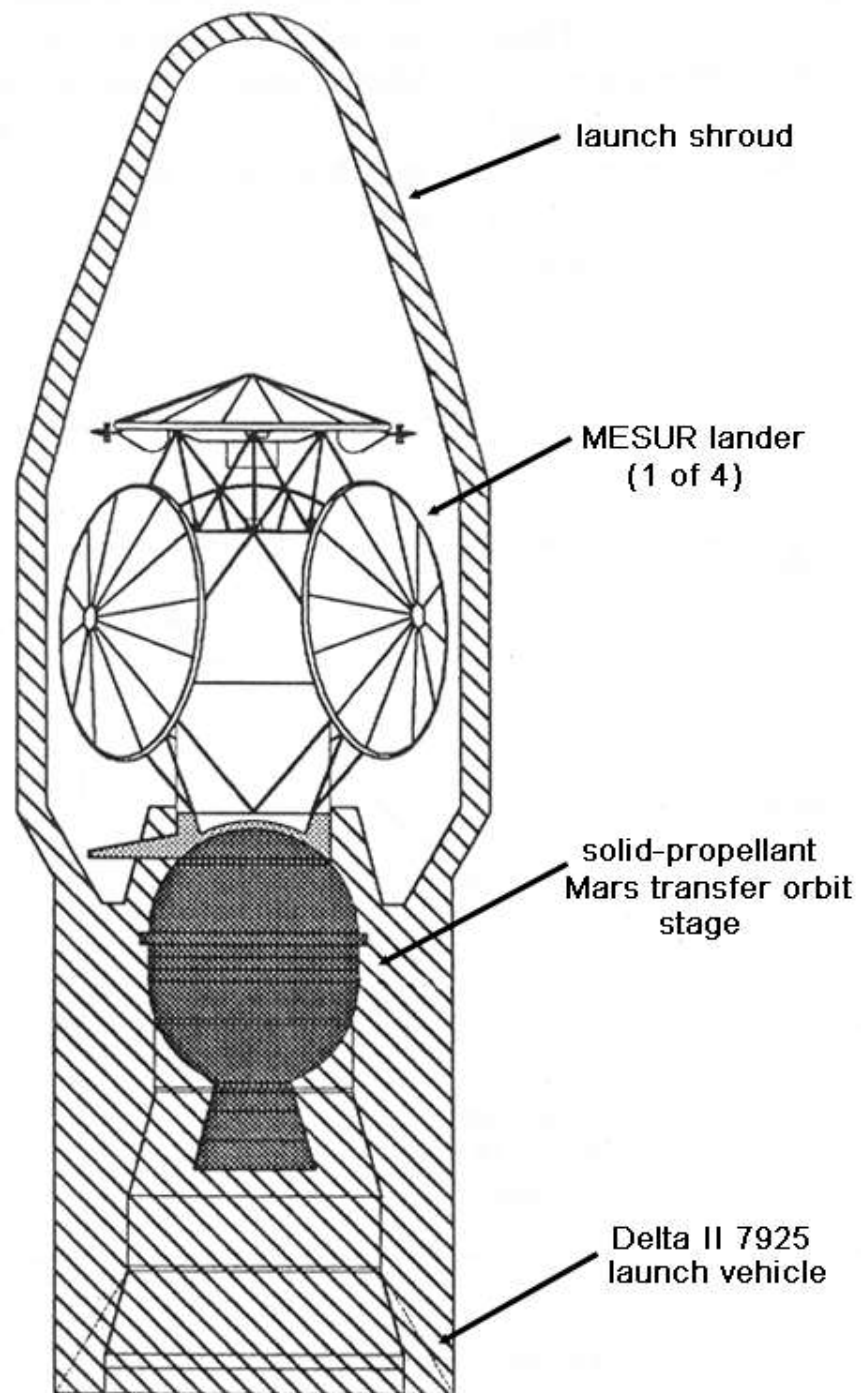
VHS

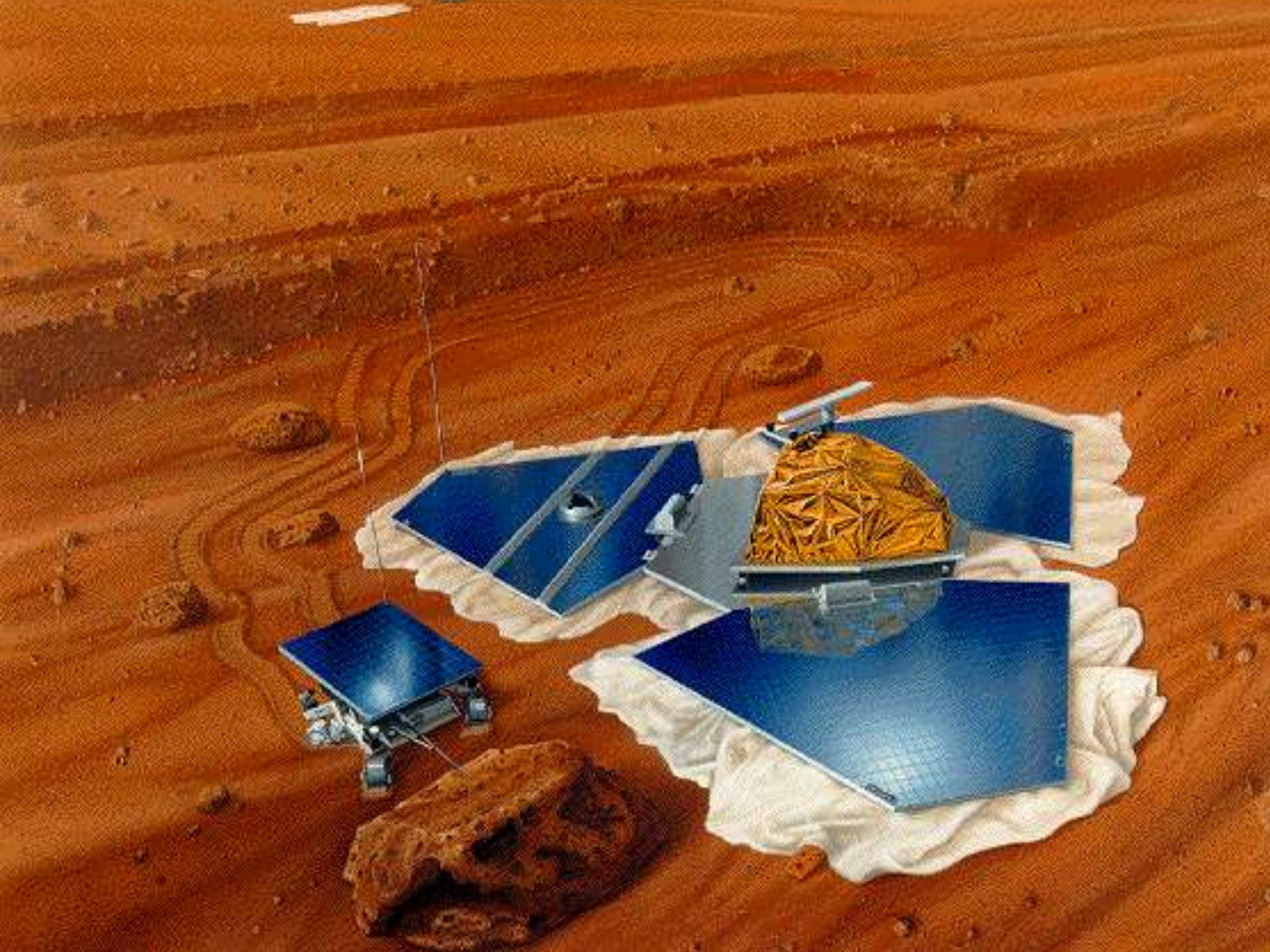




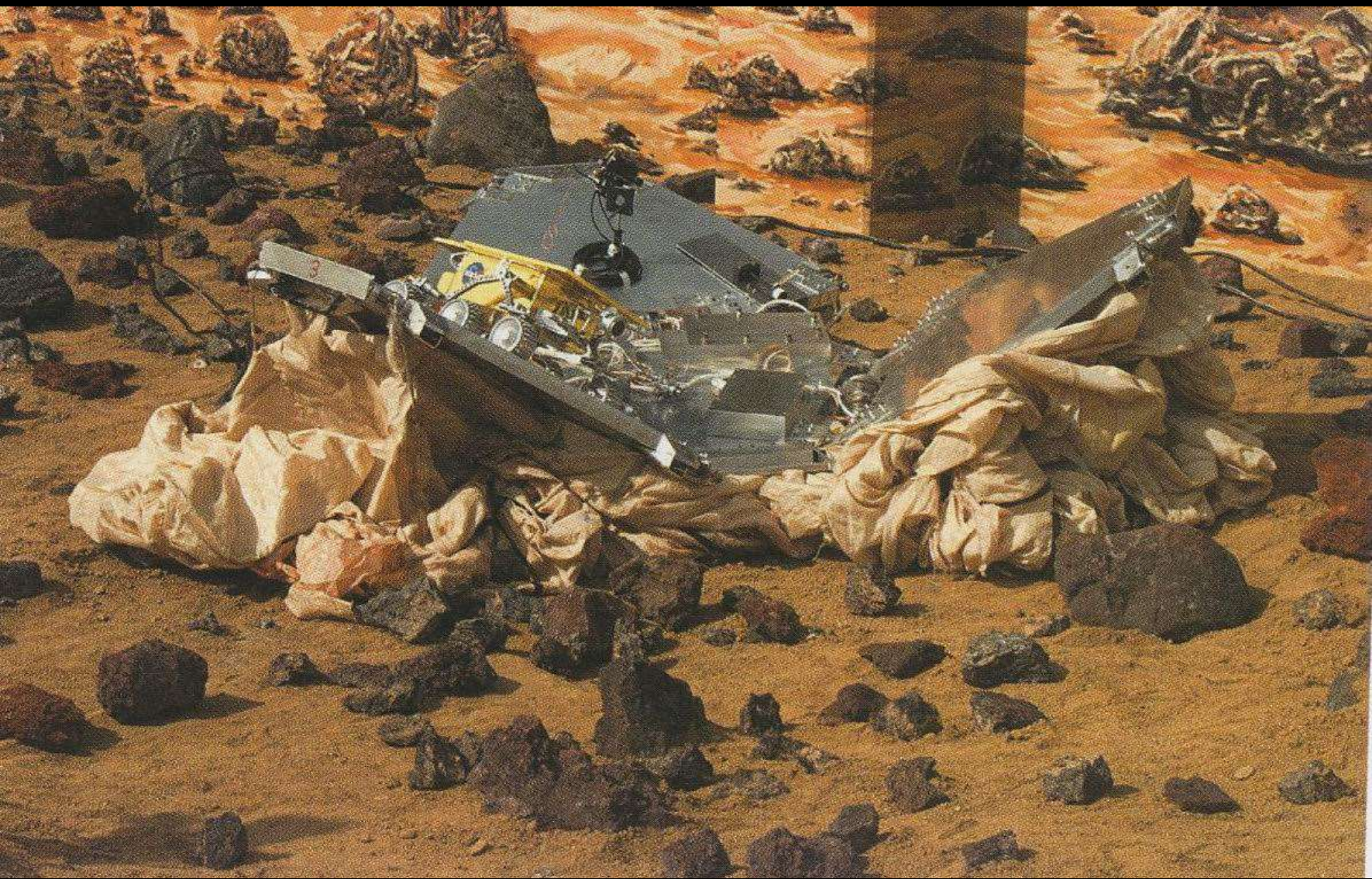


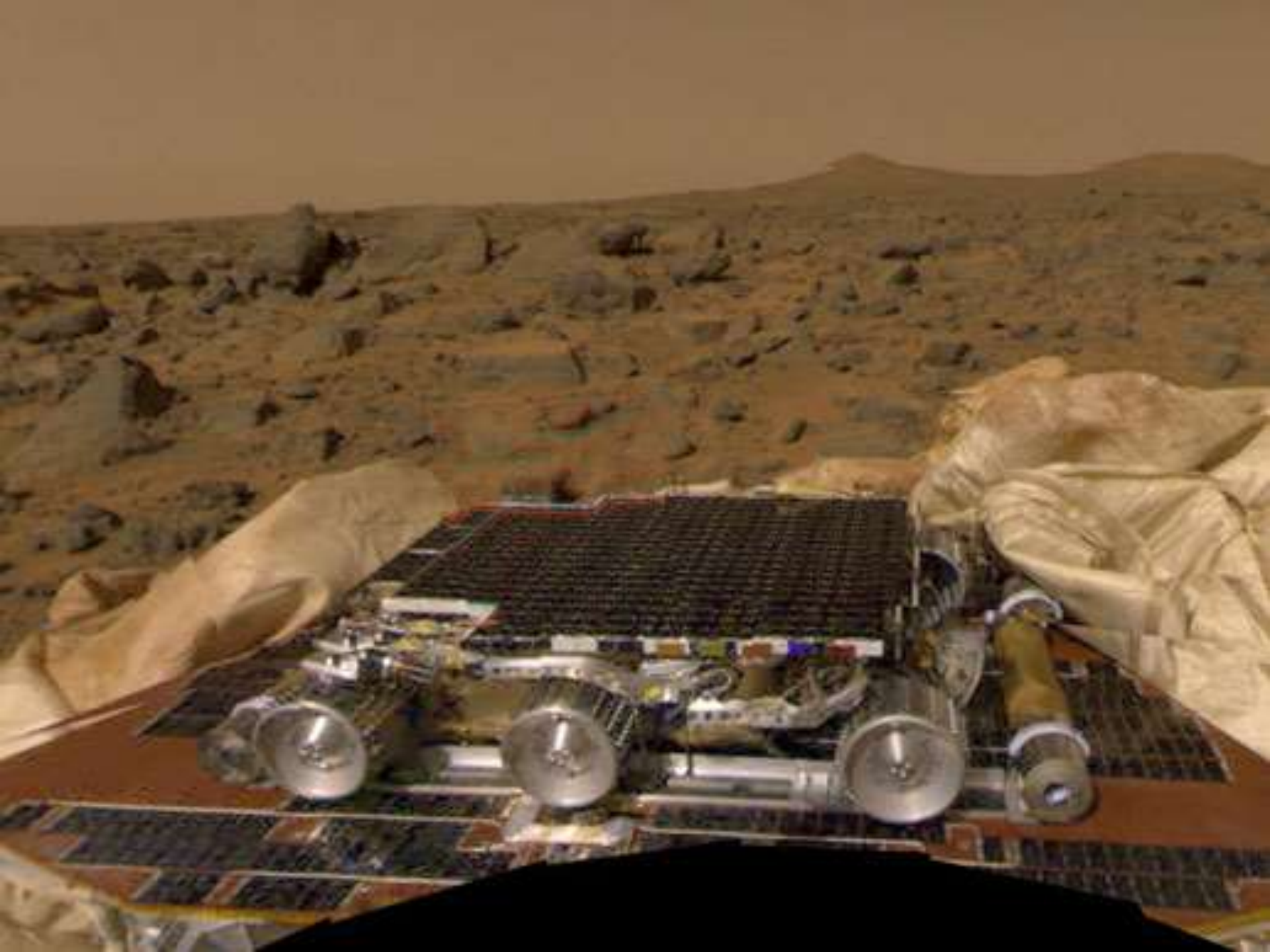


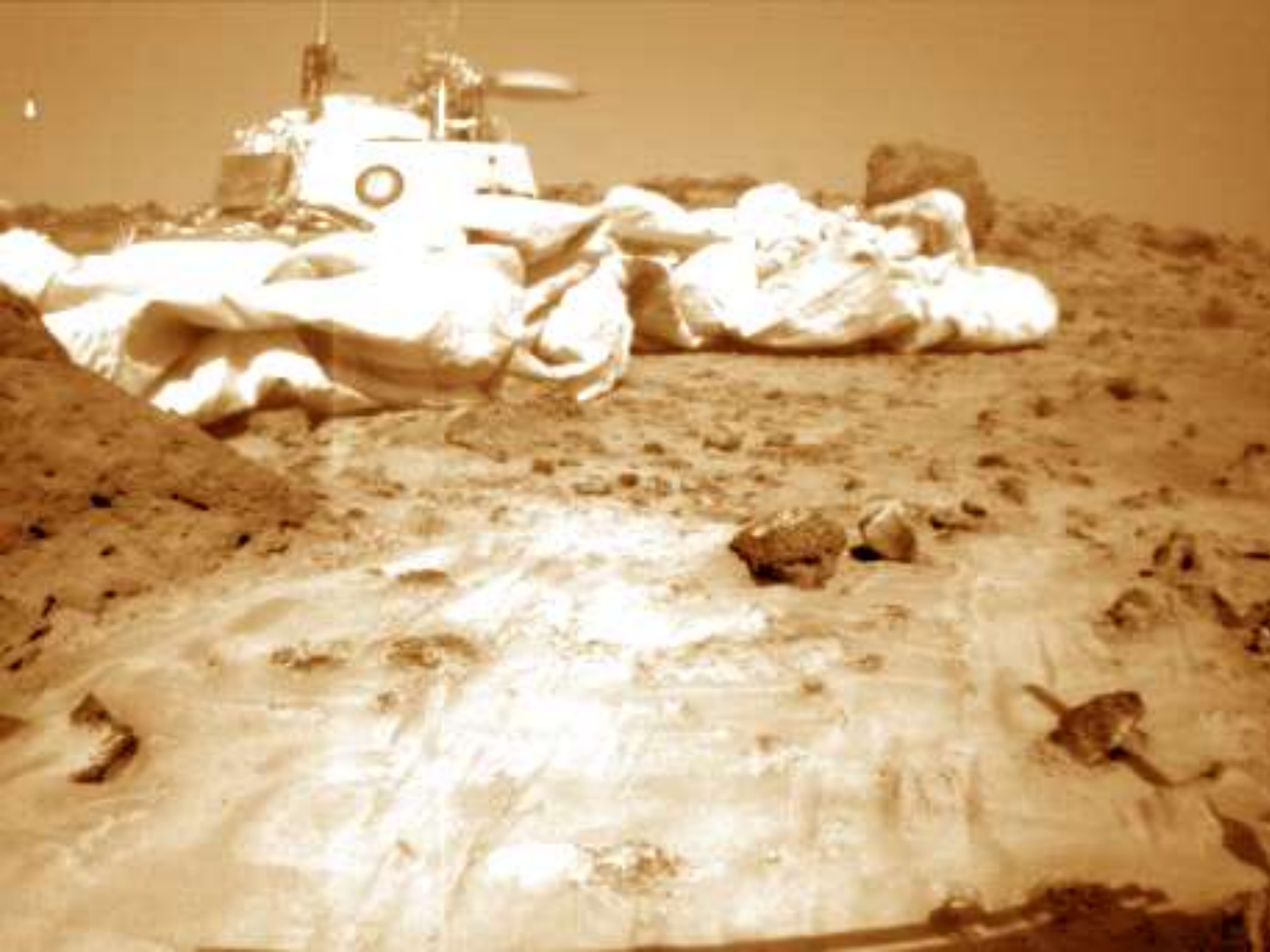










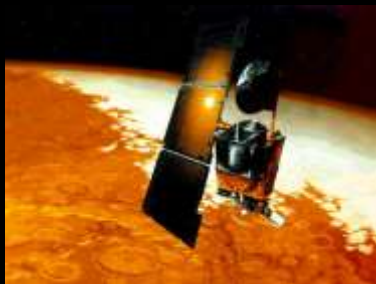




1997



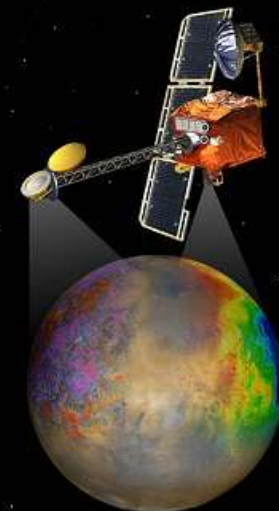
1999



2001



2003

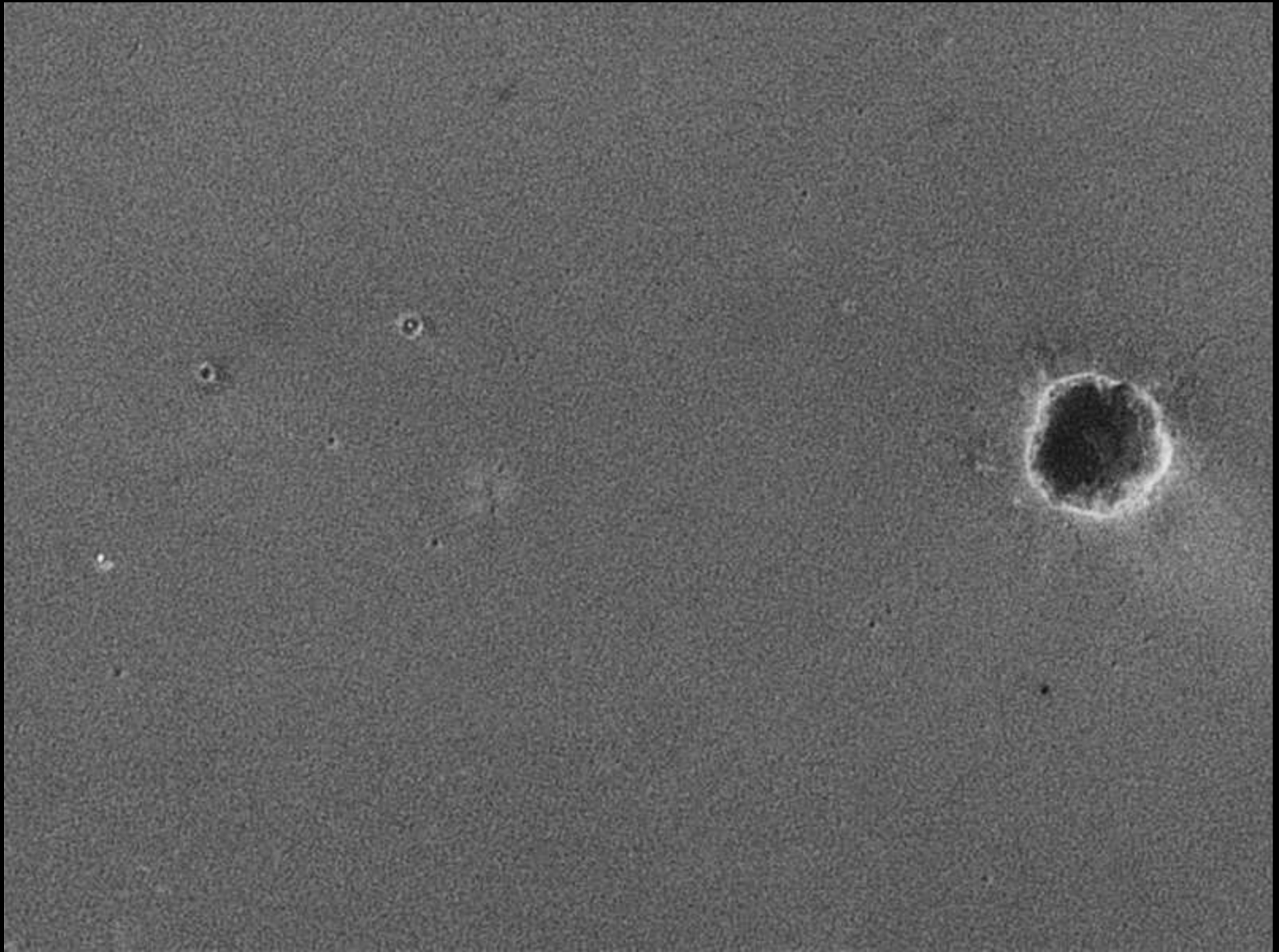


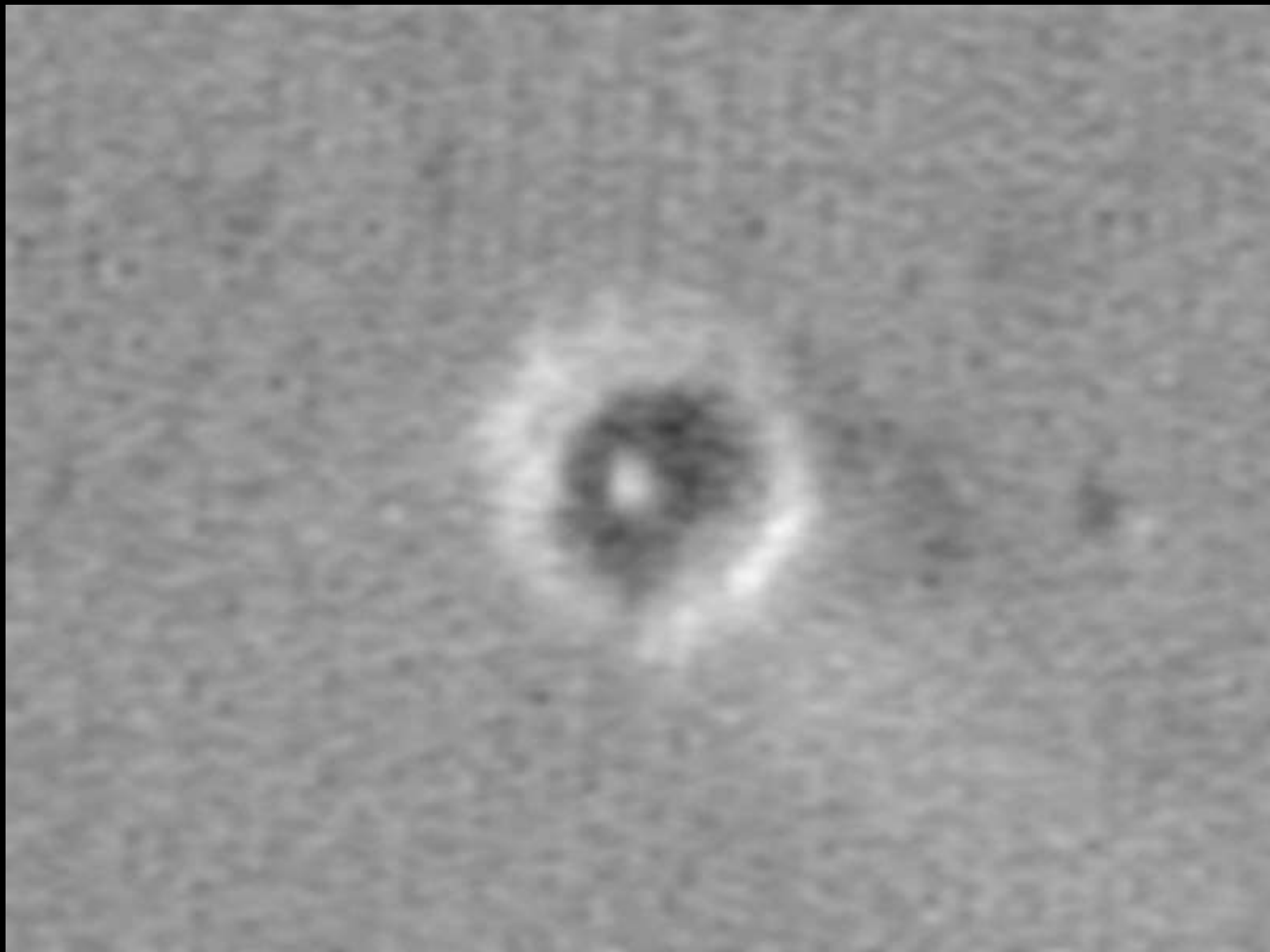
2005



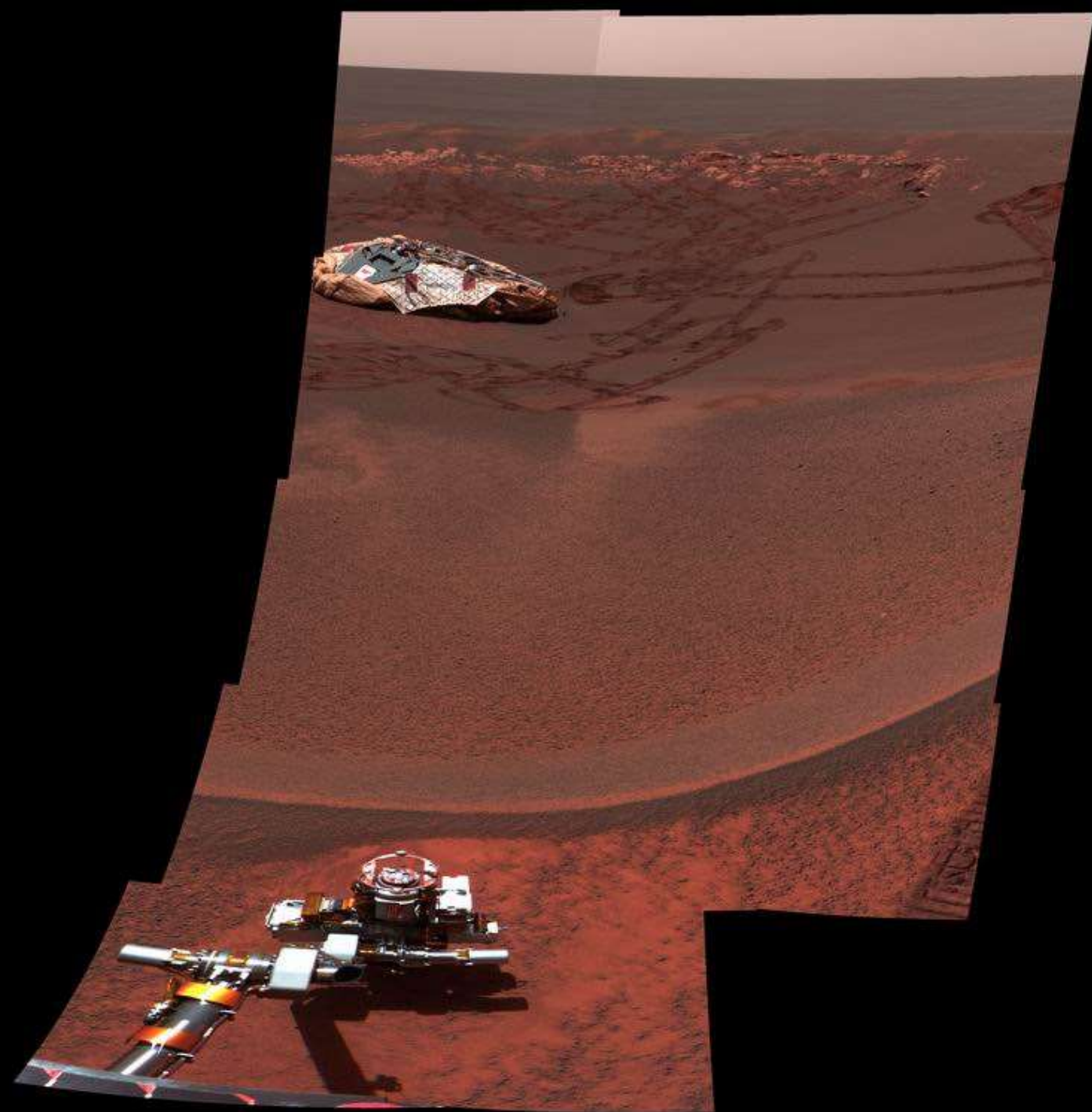
Spirit a Opportunity





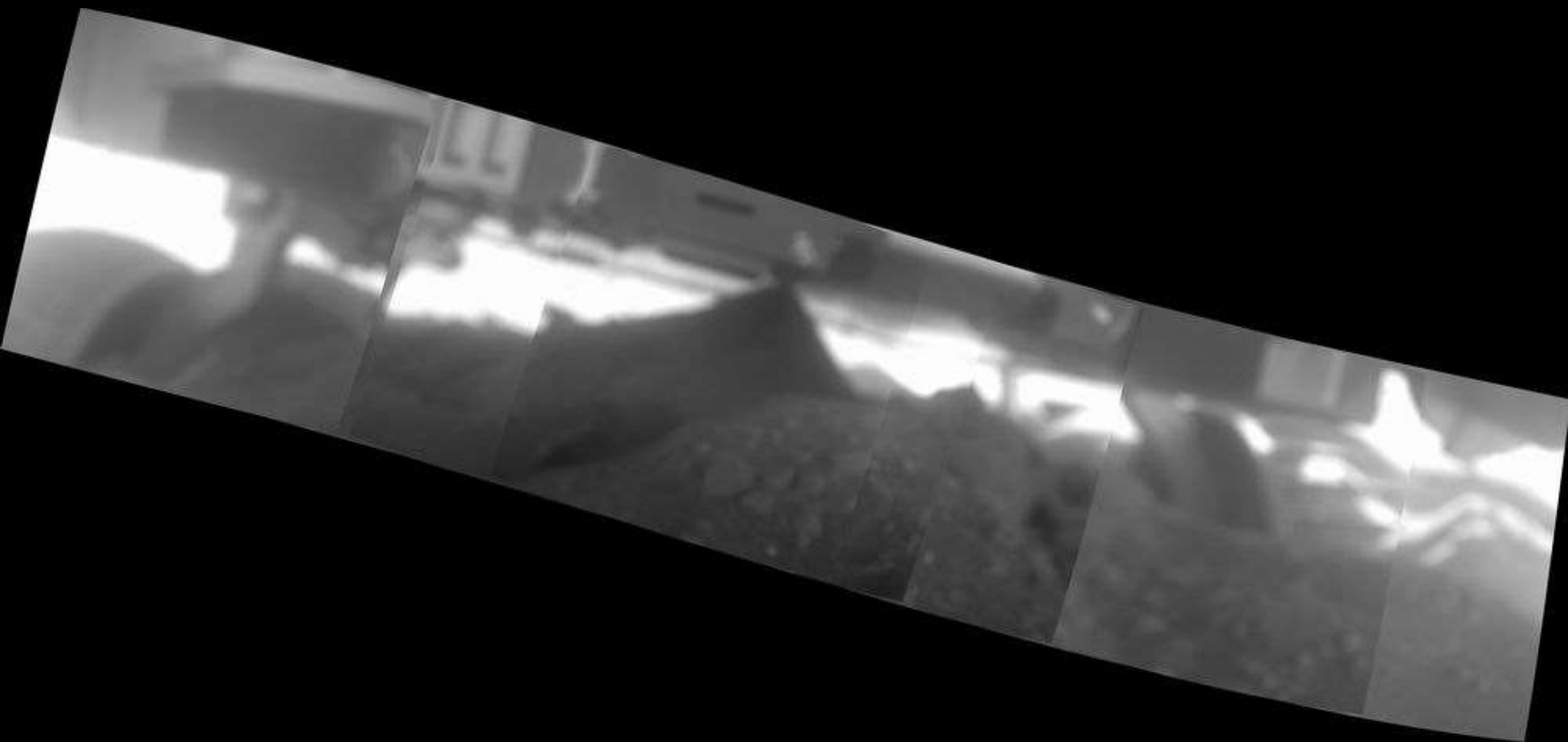












MARS — MOON —



41,13 km



[1970-1971]

Curiosity
[2012-present]

Spirit
[2004-2010]

Sojourner
[1997]

Yutu
(China)
(2013)

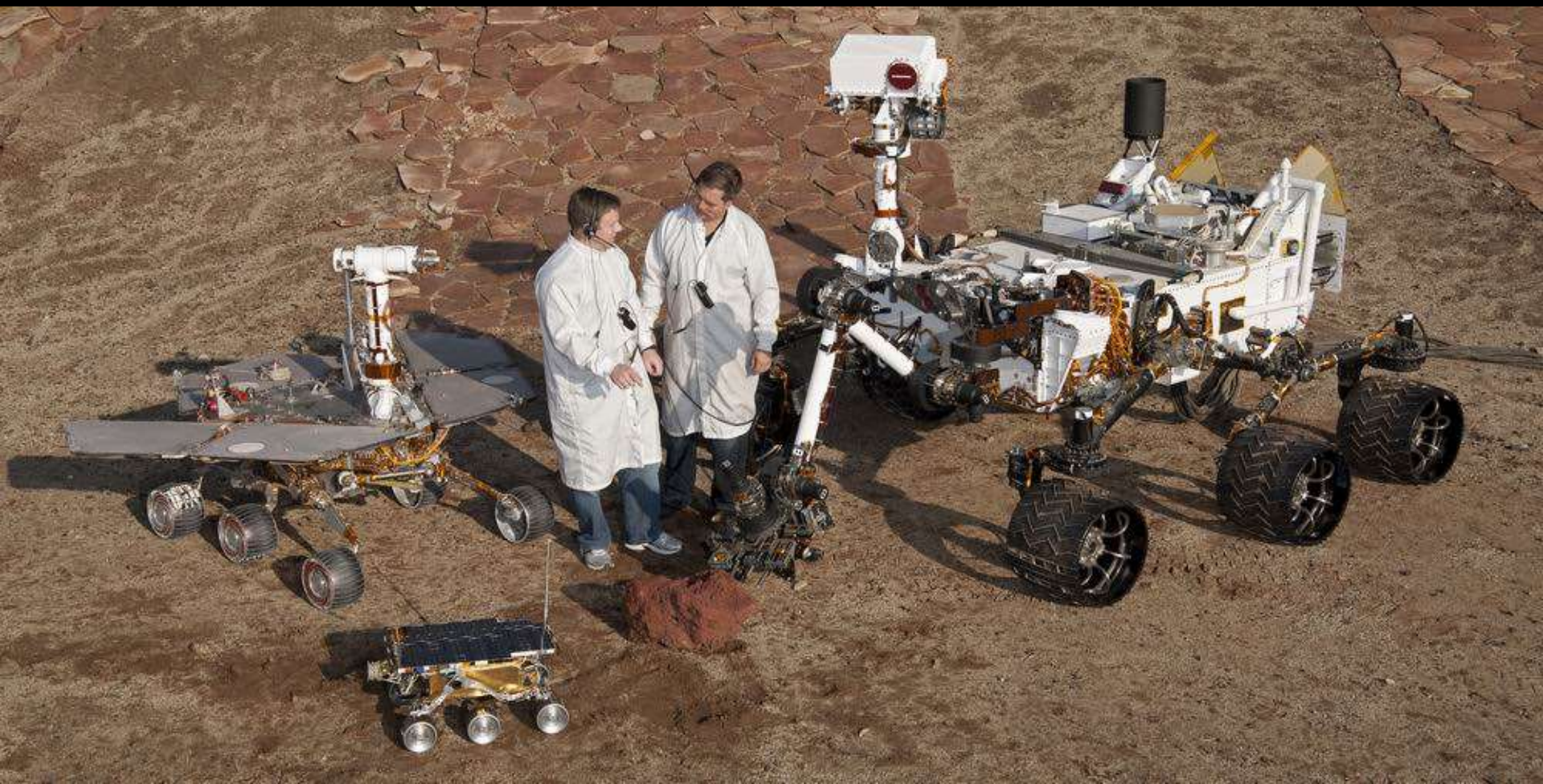


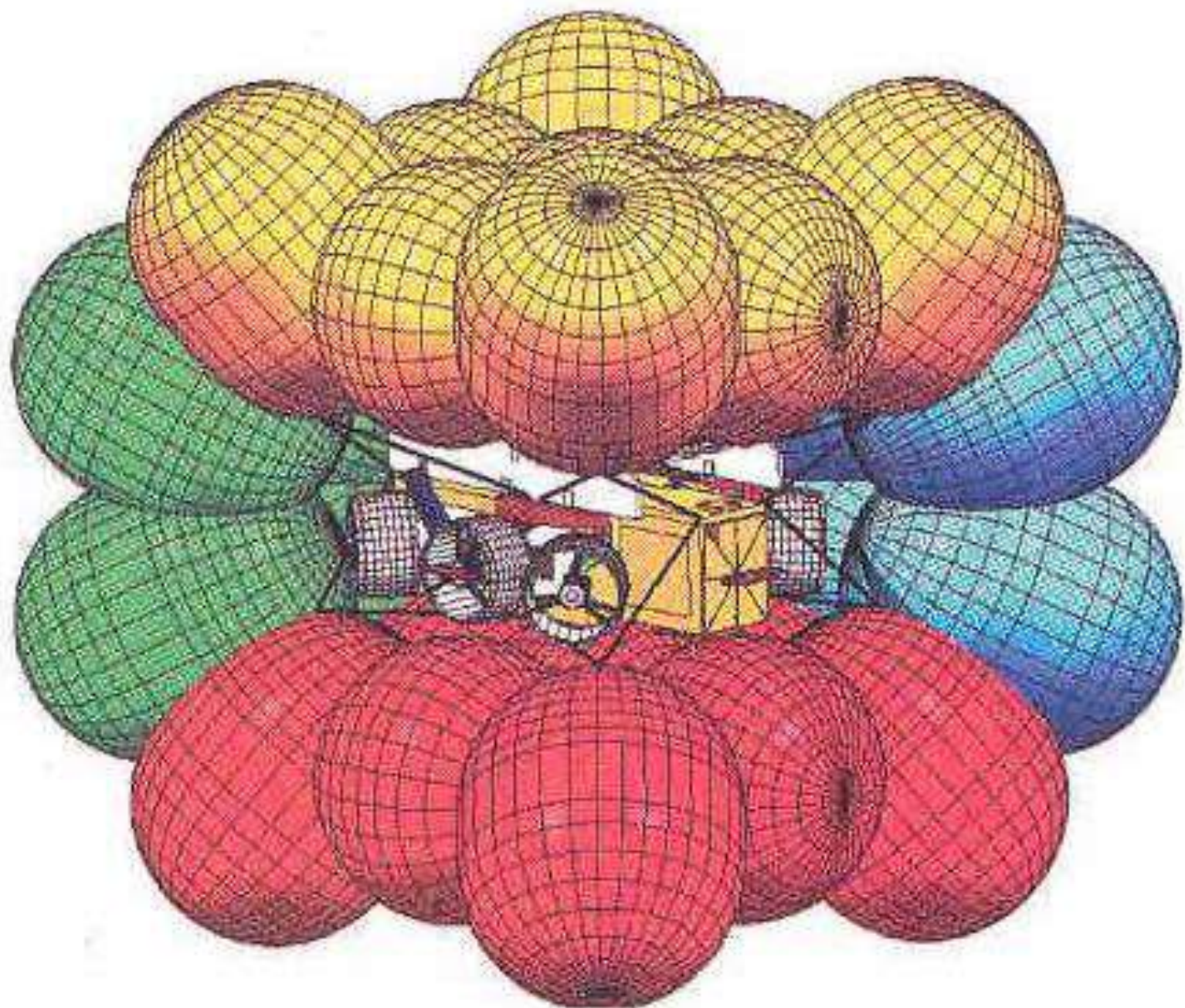


JPL
Jet Propulsion
Laboratory



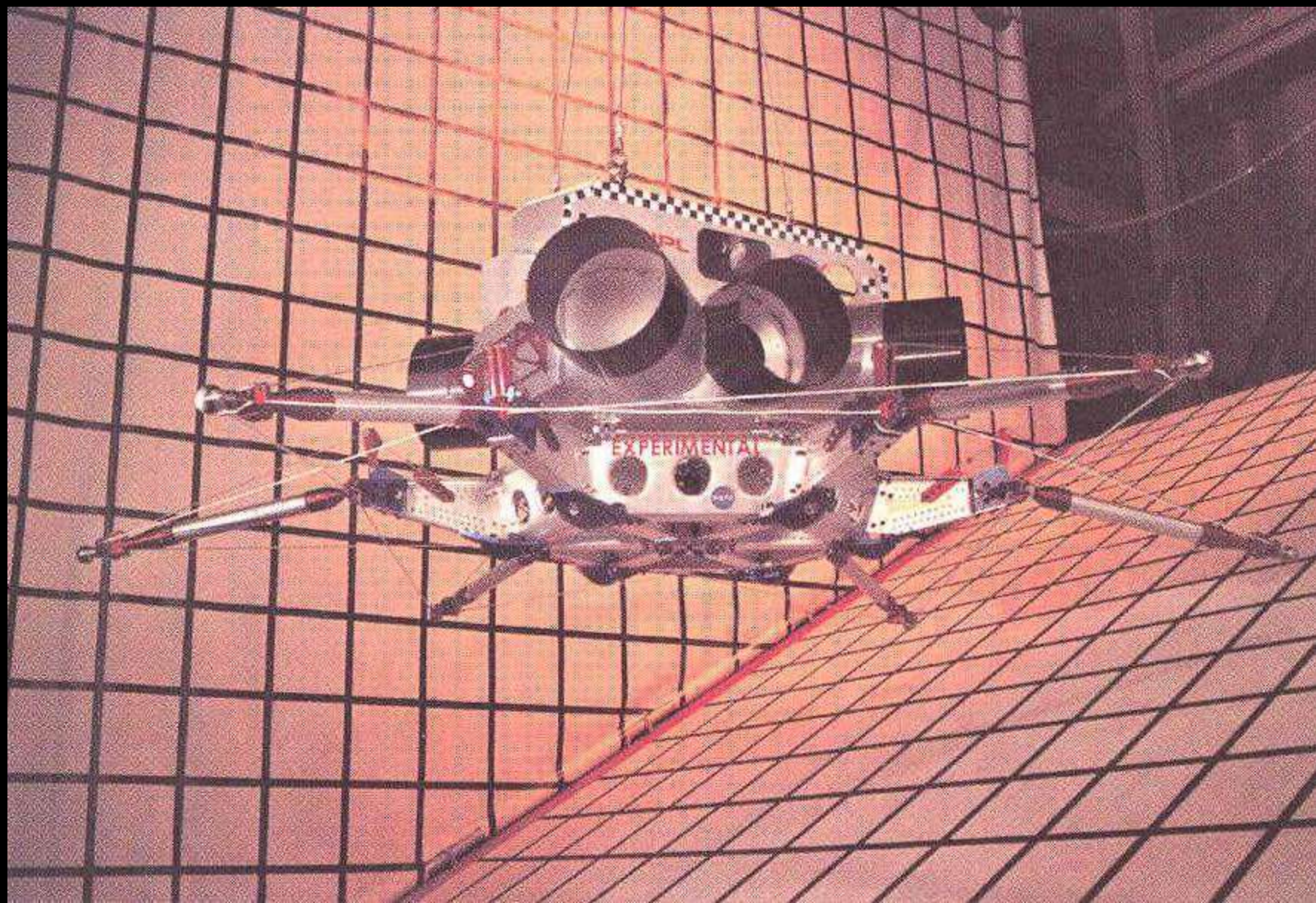
MARS SCIENCE LABORATORY

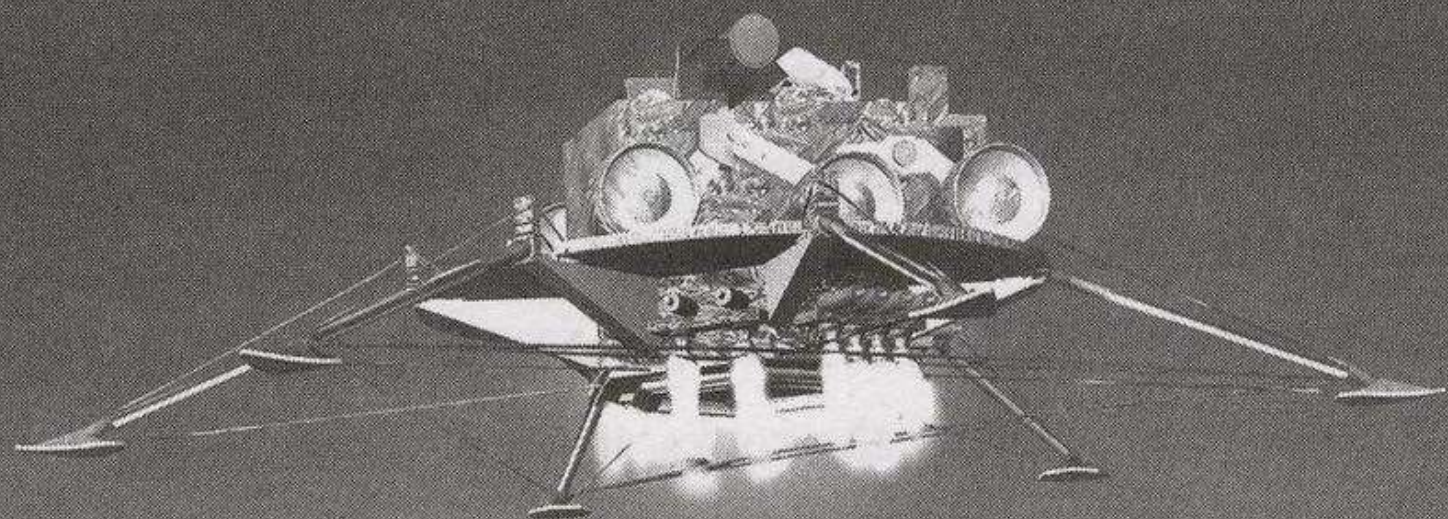




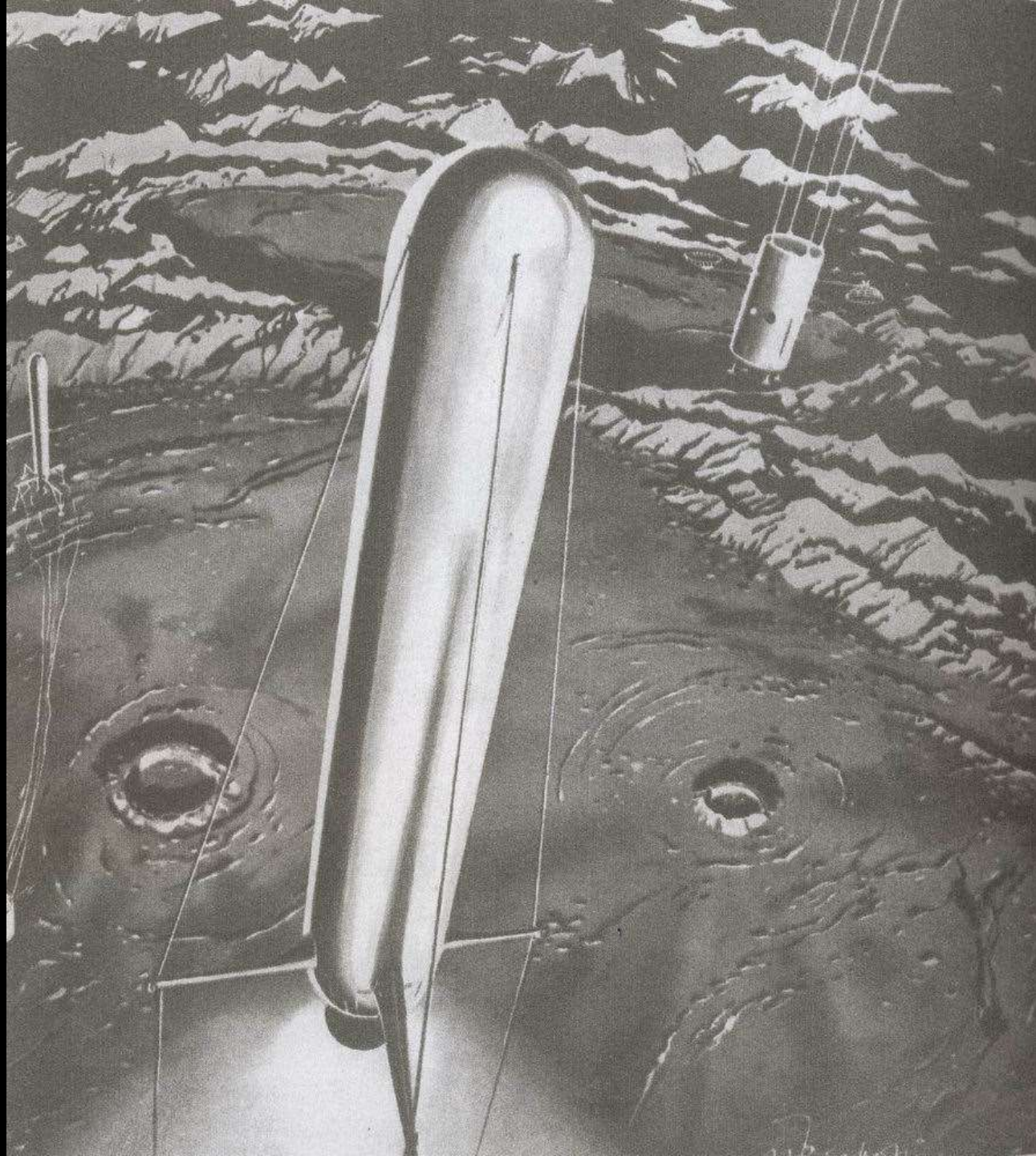
„Intelligentní“ přistávací platforma





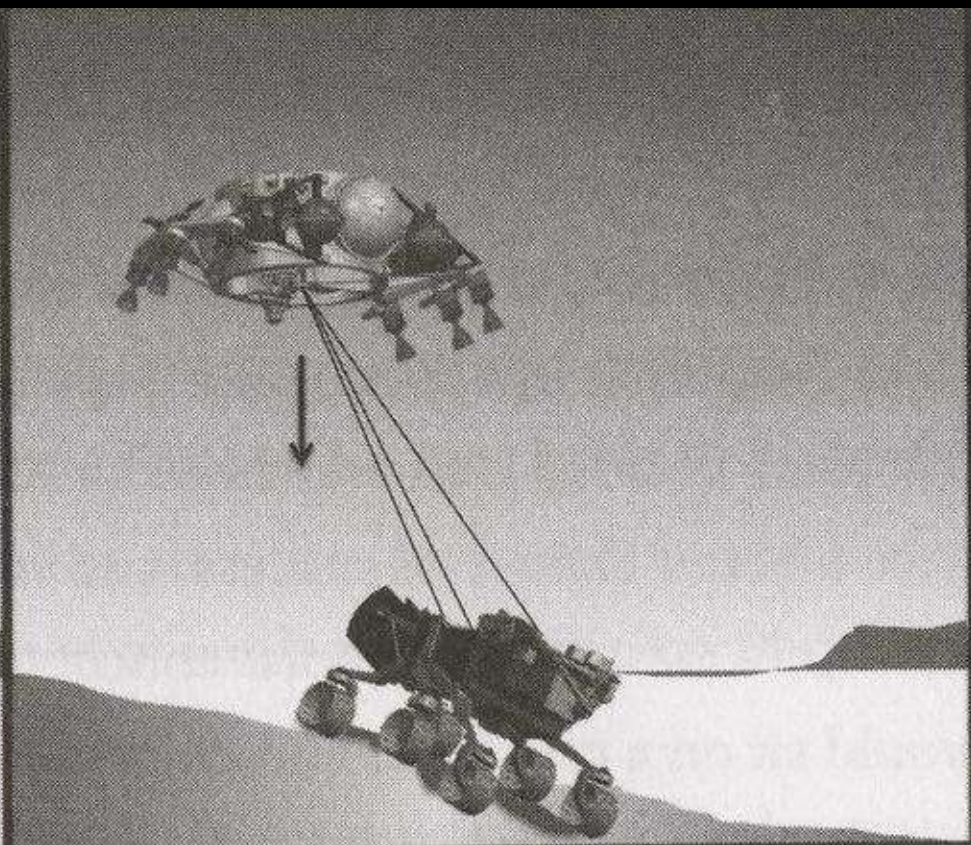
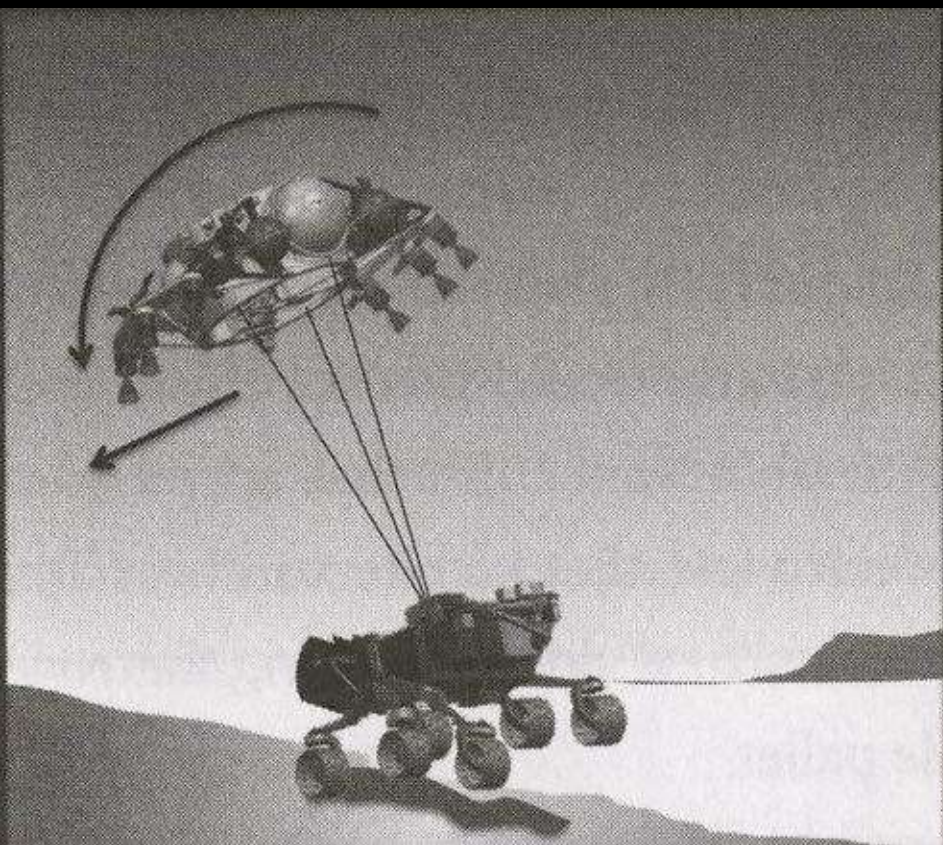








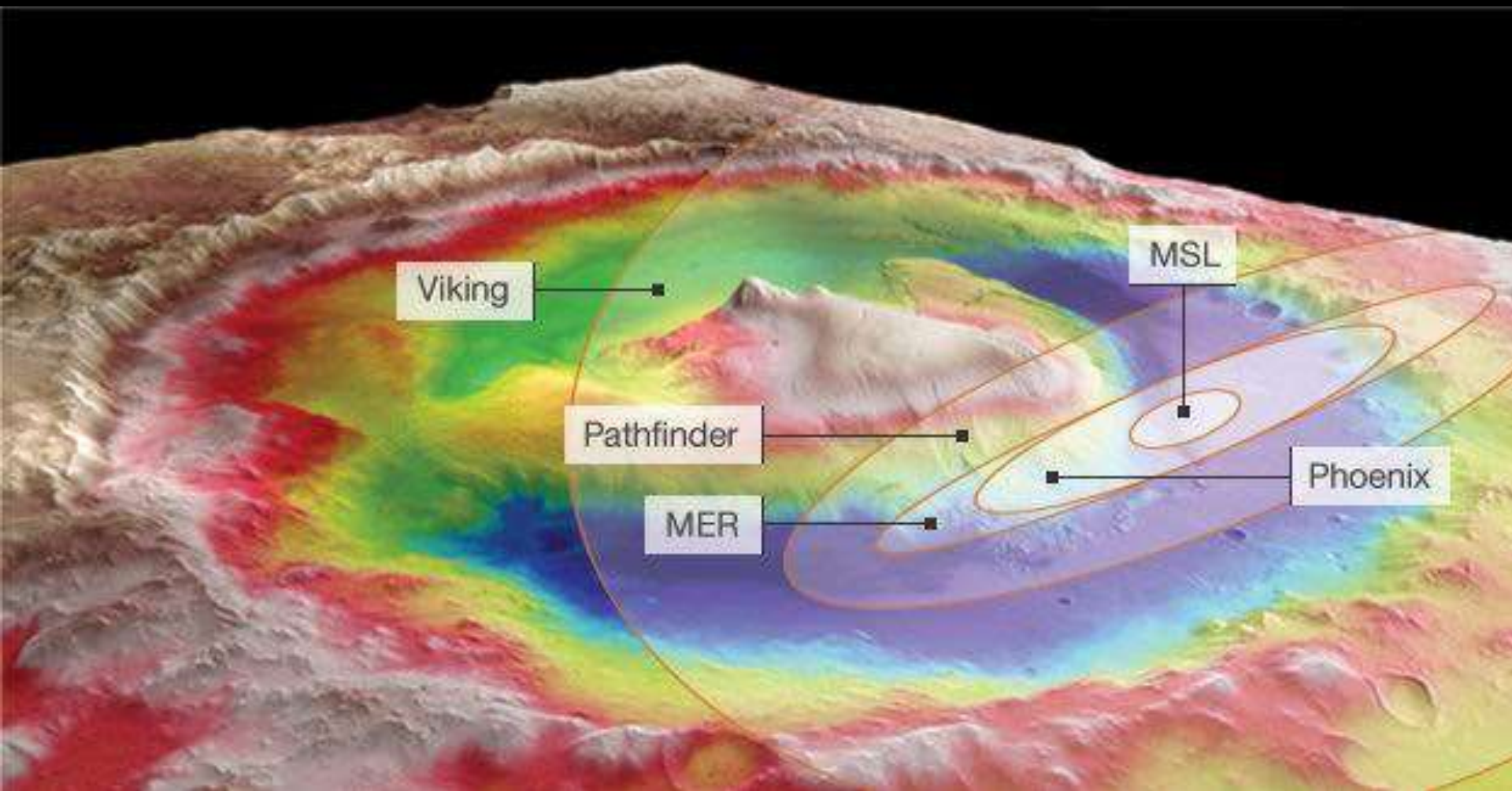




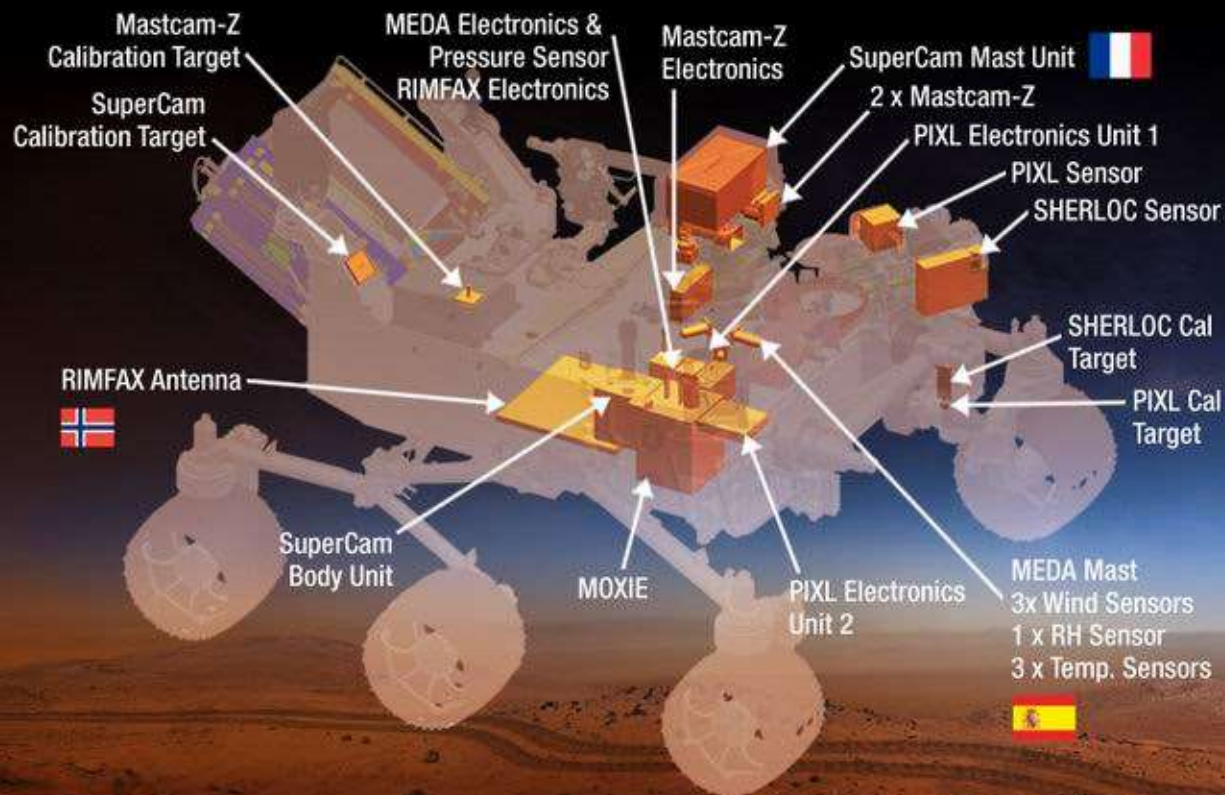
Tango Delta Nominal







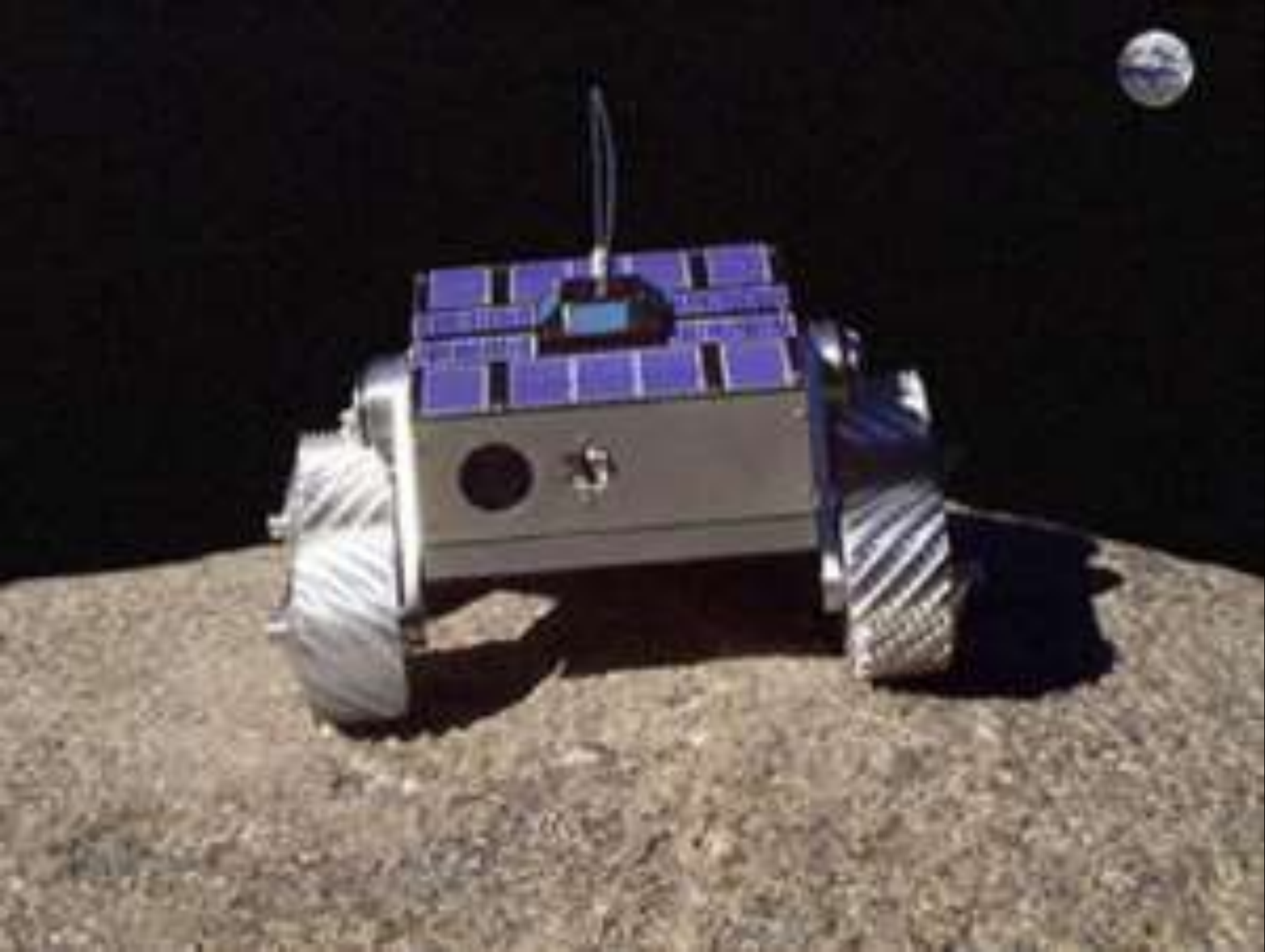
Mars 2020 Rover



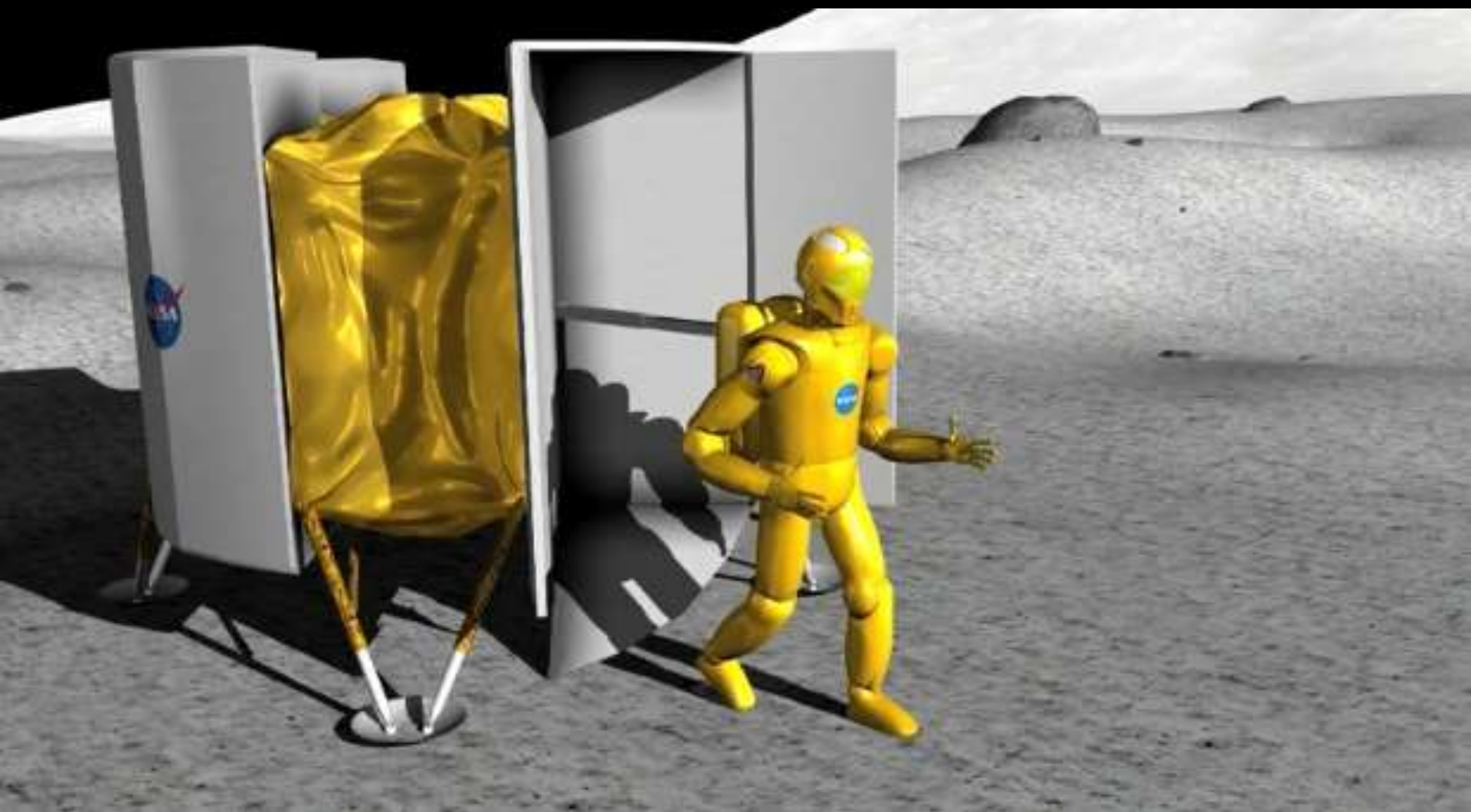
Mars Ball

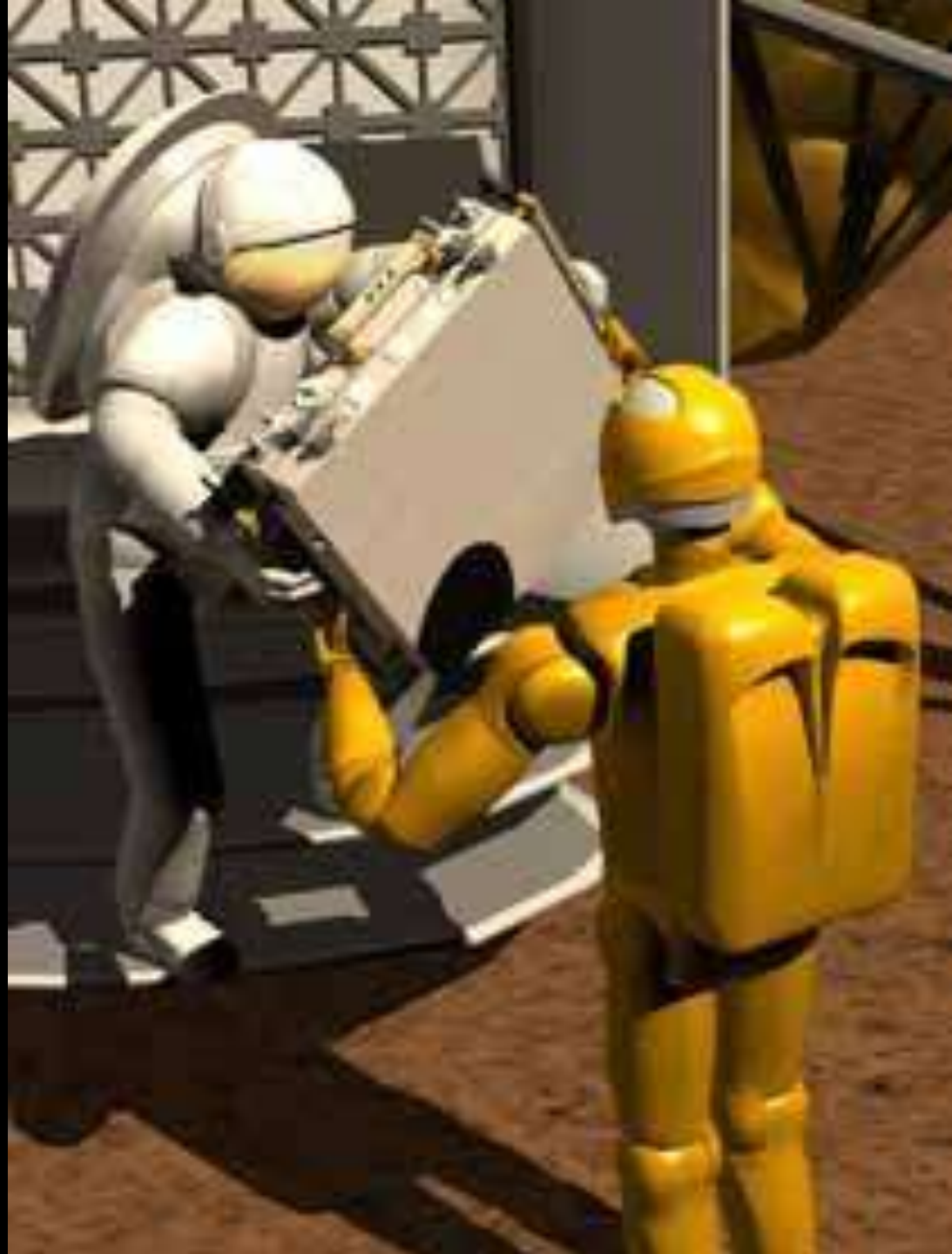












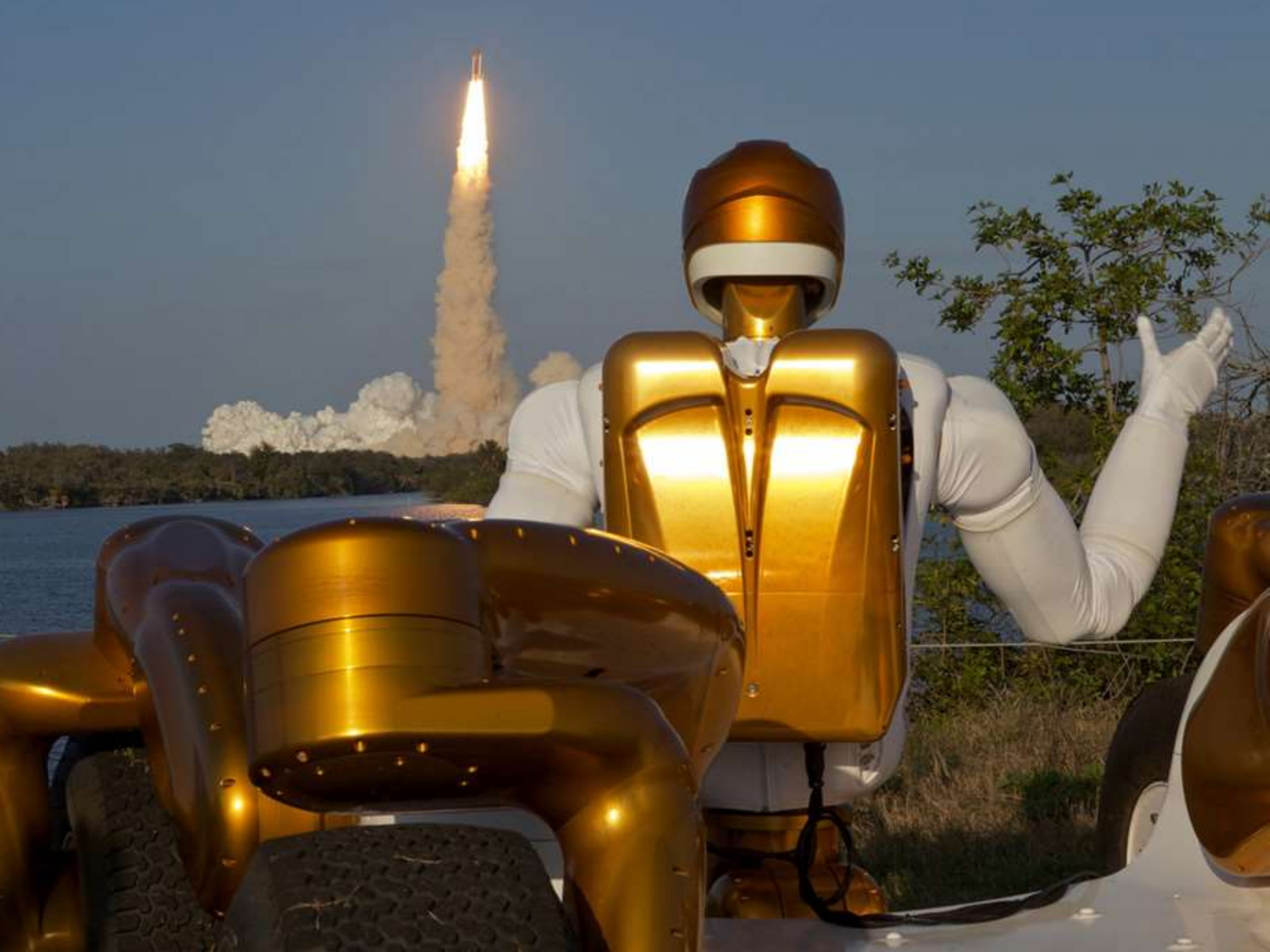


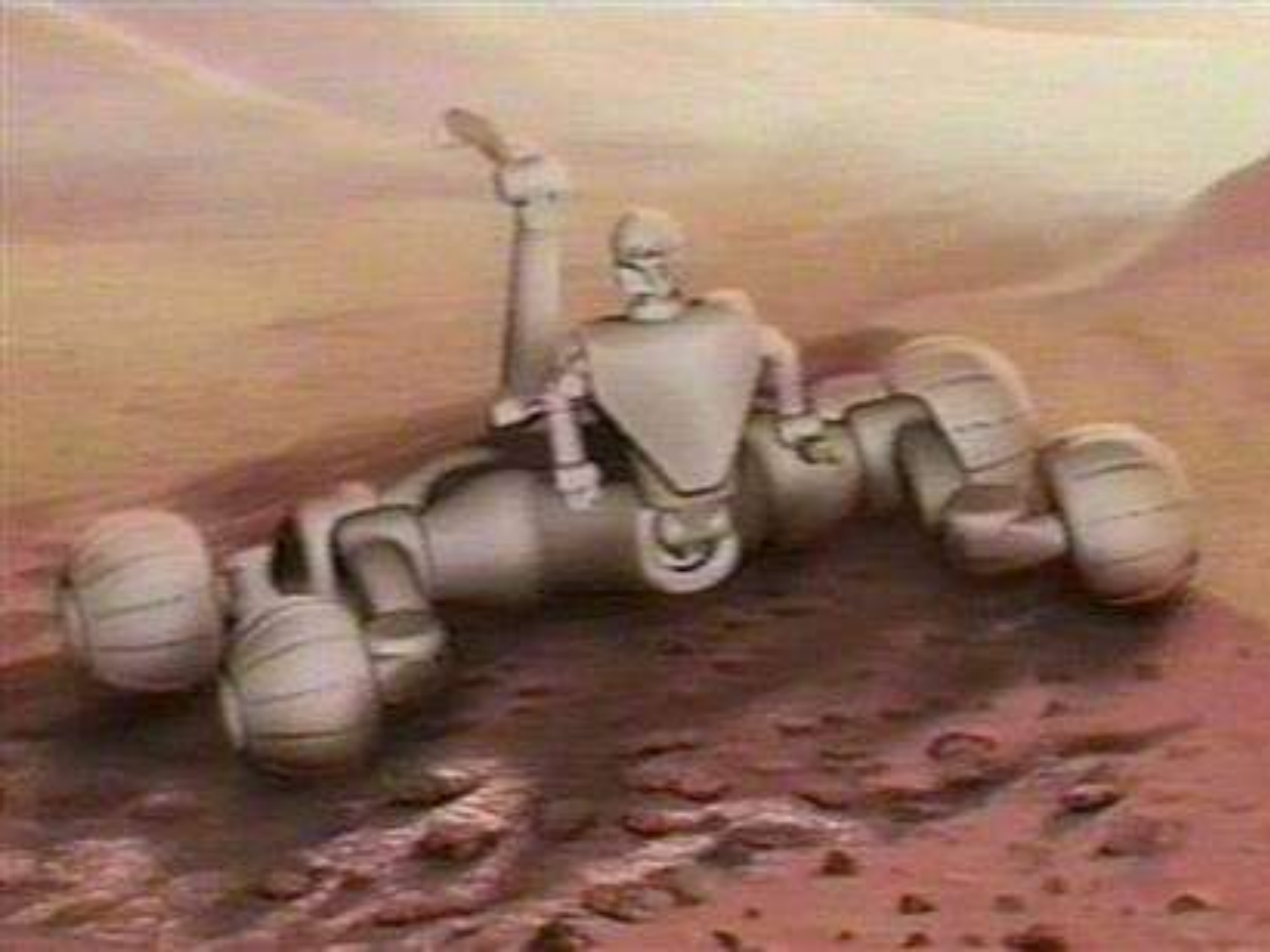


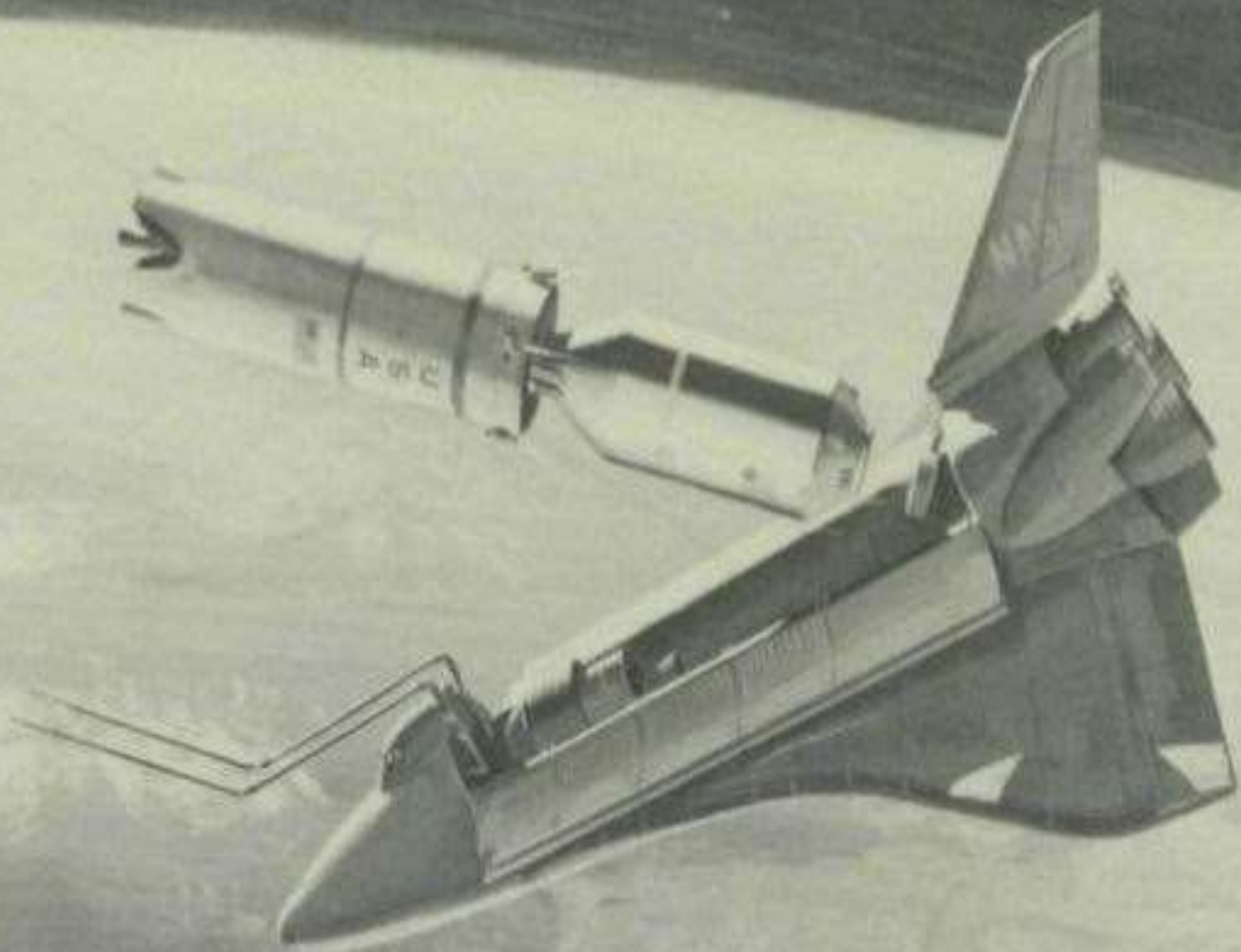


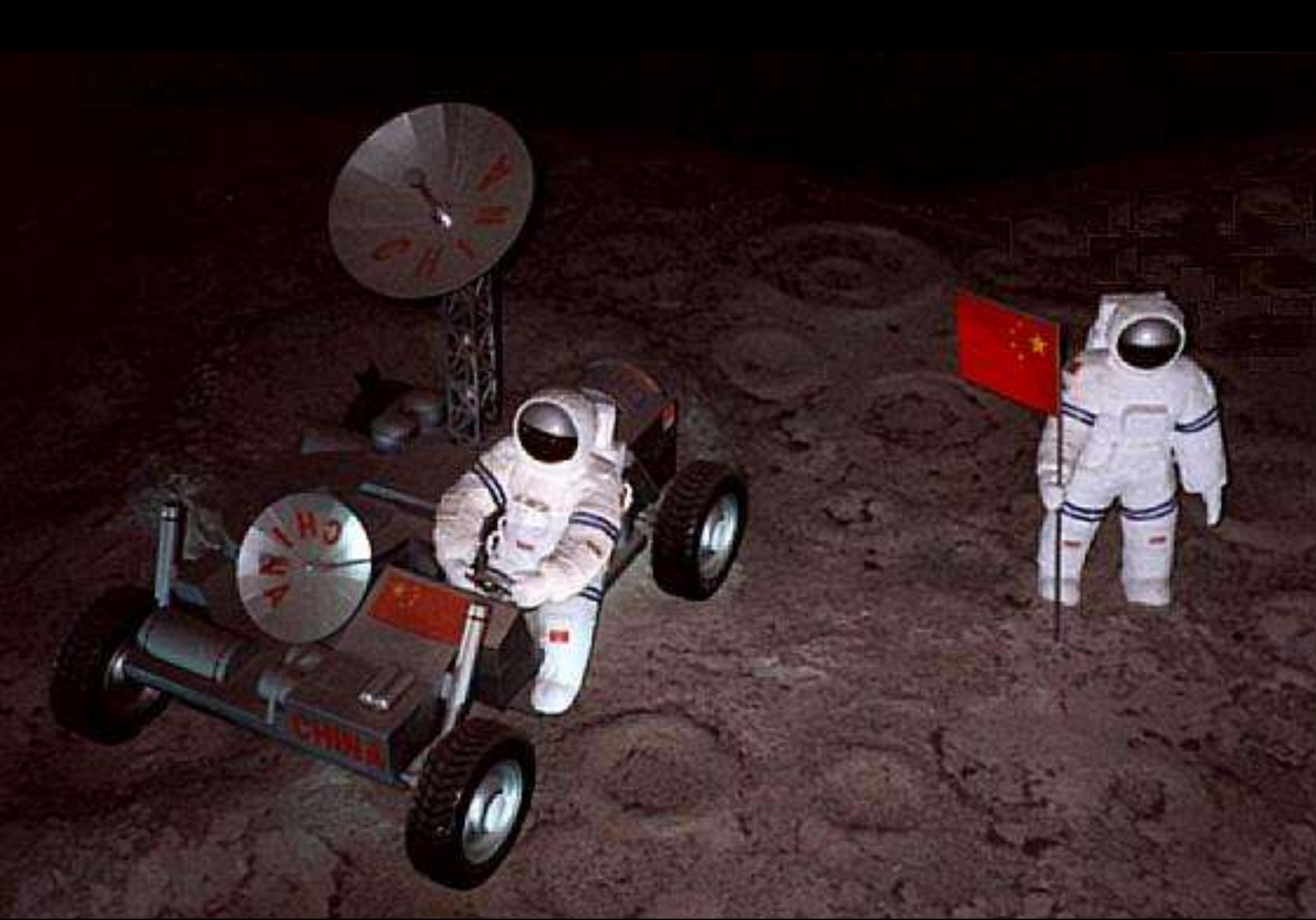






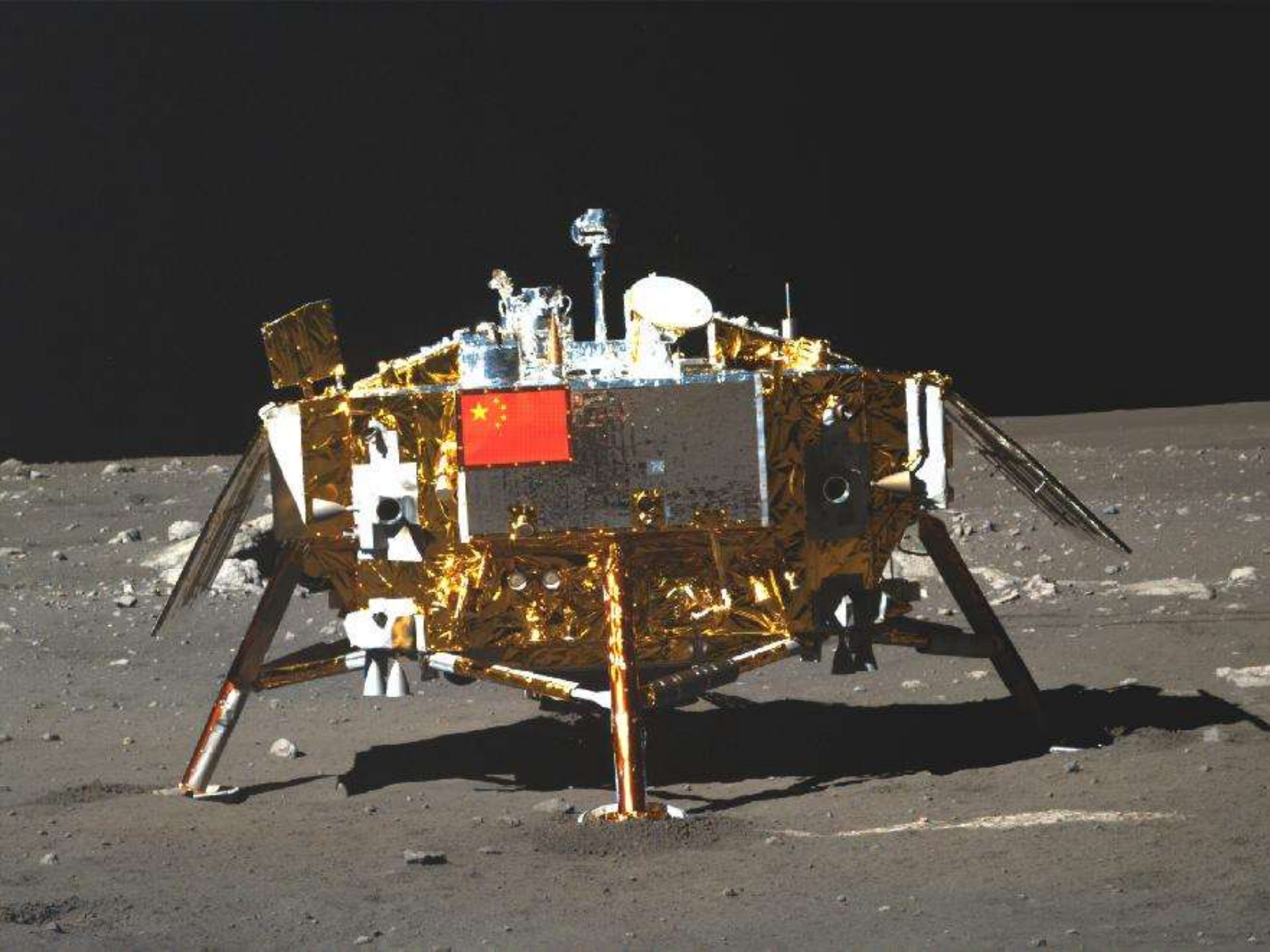


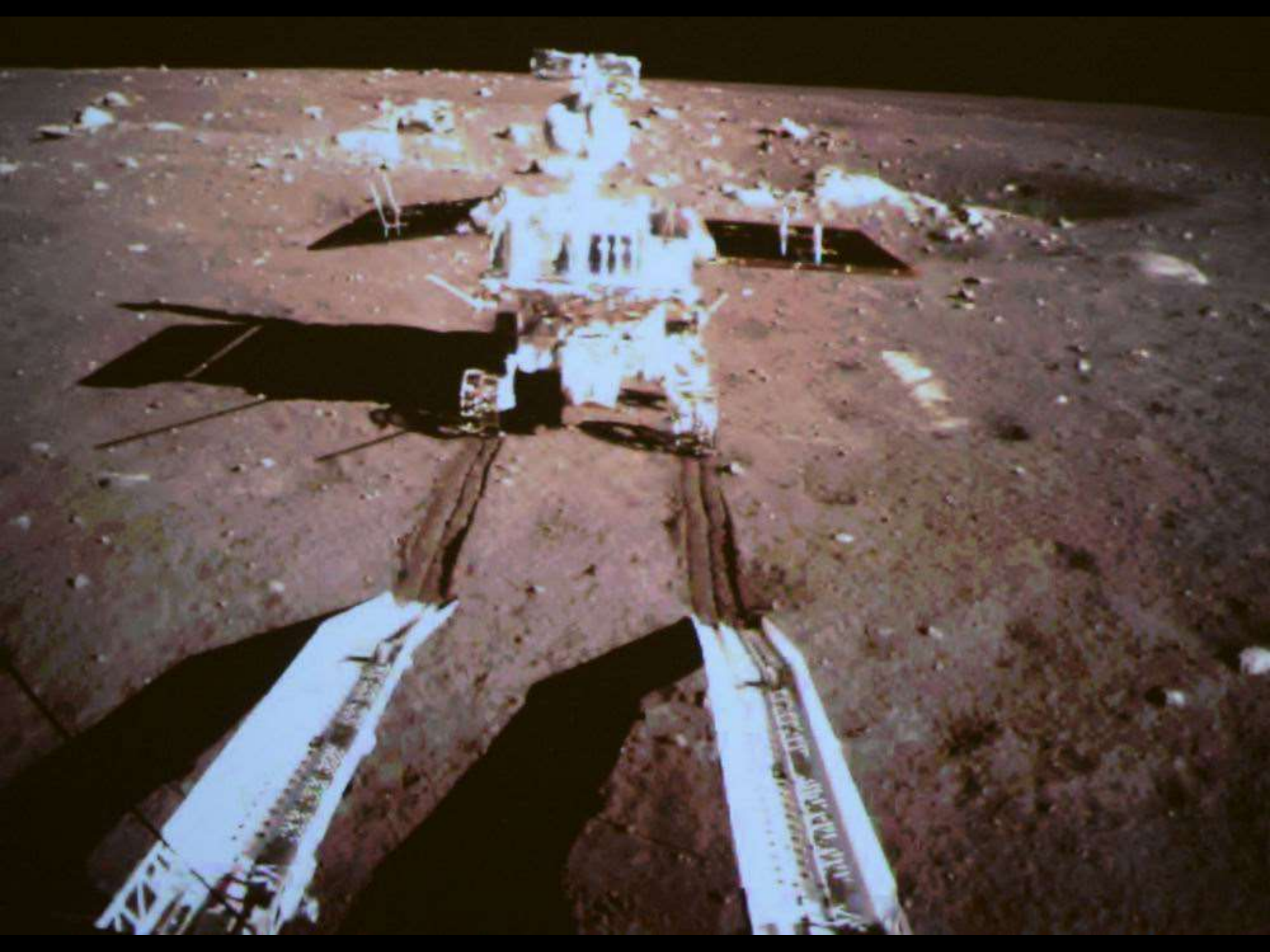


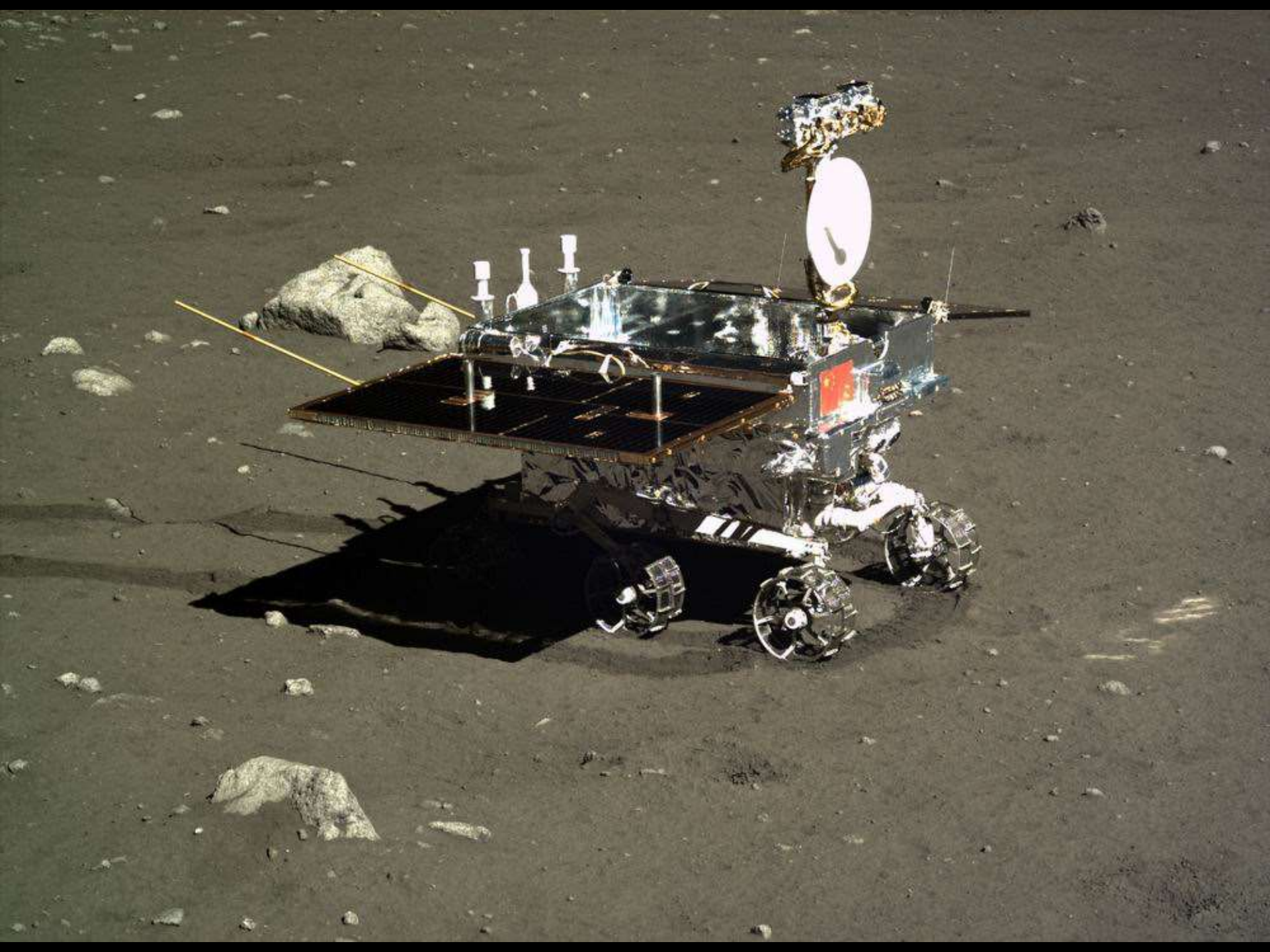




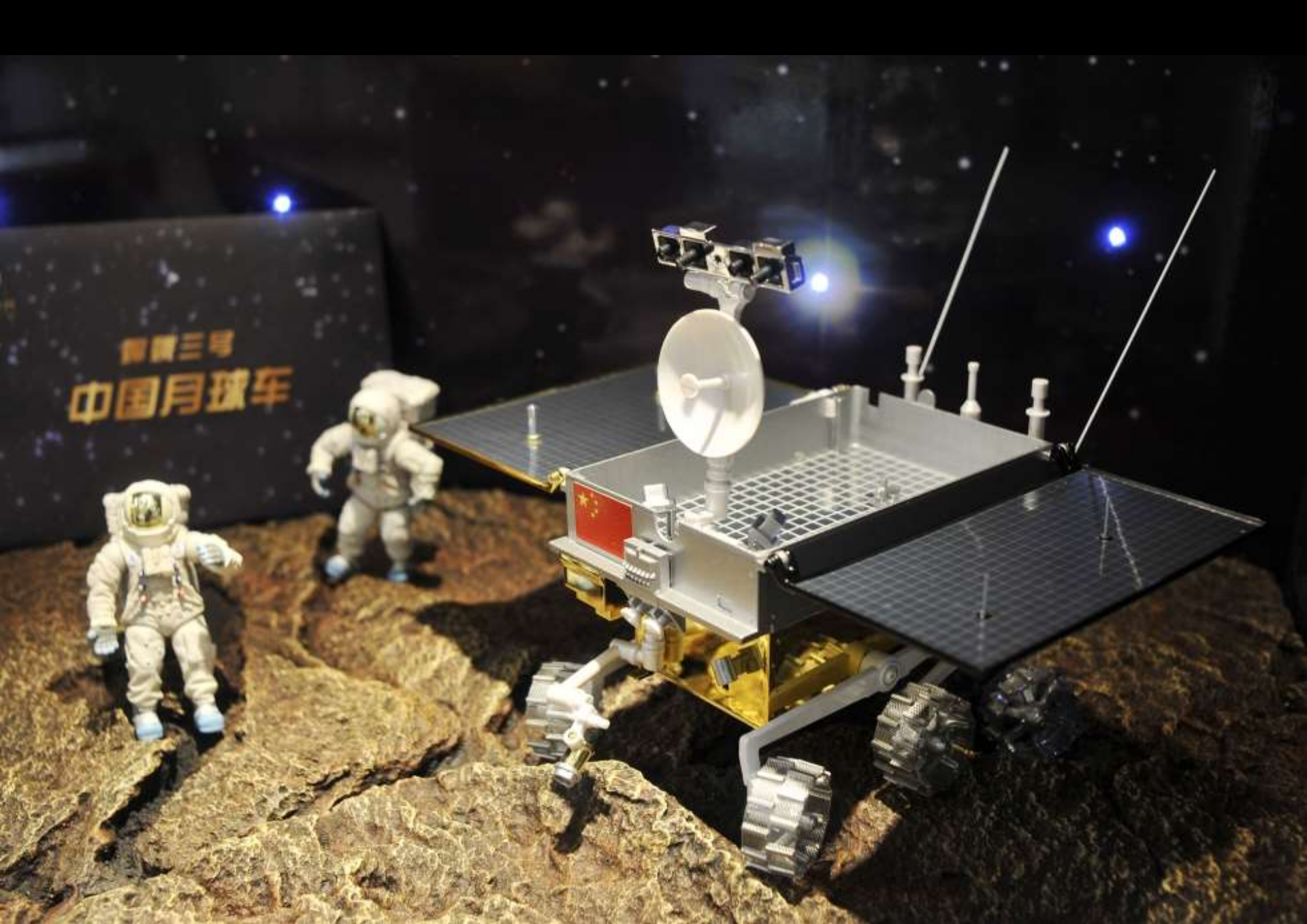




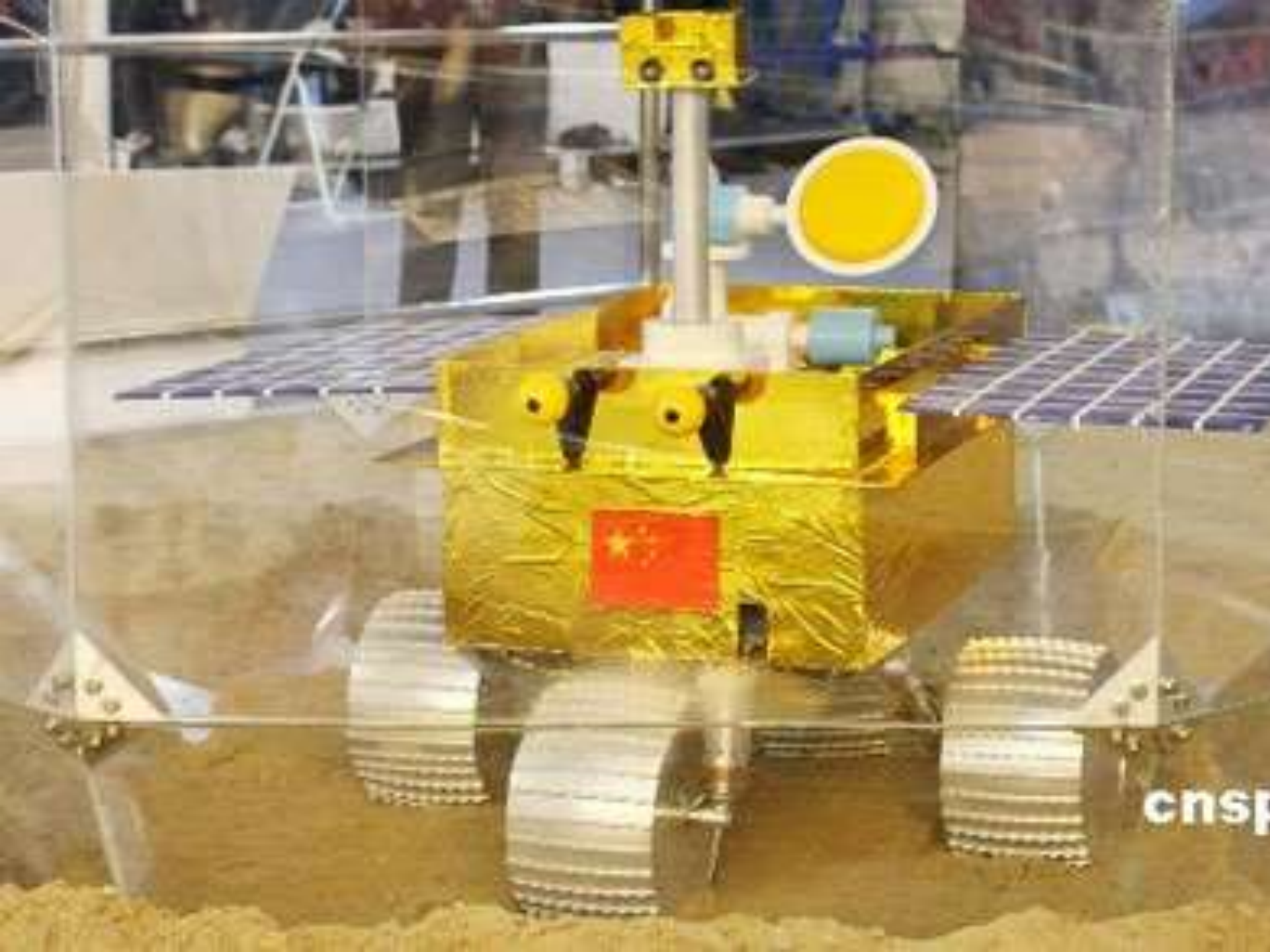




嫦娥三号
中国月球车







cns











原理样机

火星车模型样机

航天元远制造
五轴机床专业制造商·服务商

火星车原理样机

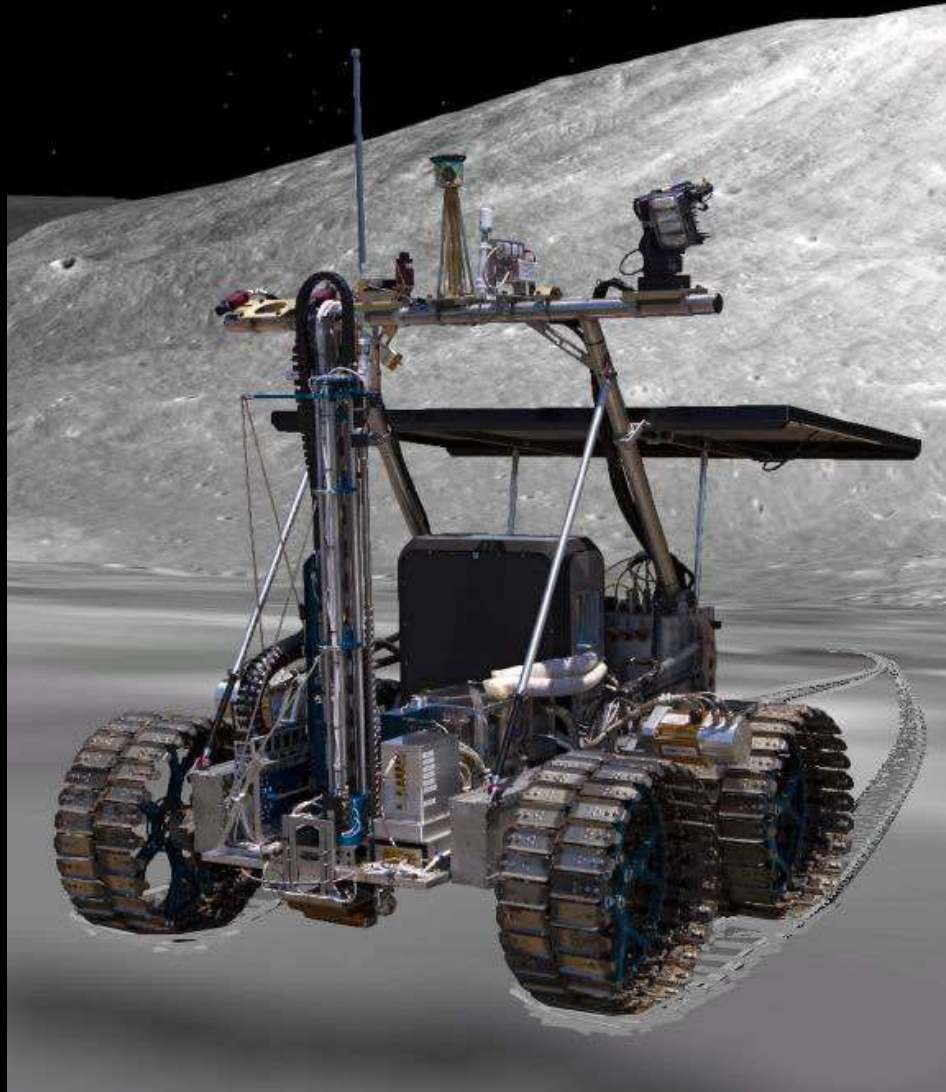


GOOGLE LUNAR X-PRIZE



Barcelona Moon Team

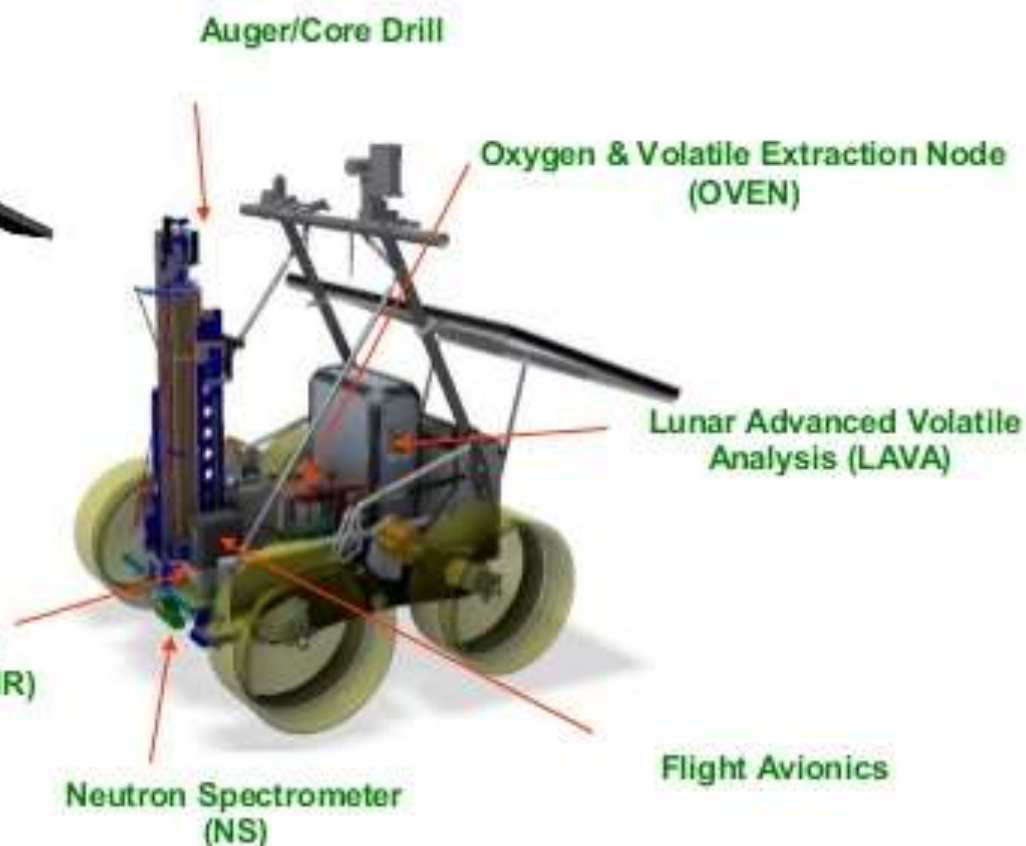
Resource Prospector Mission



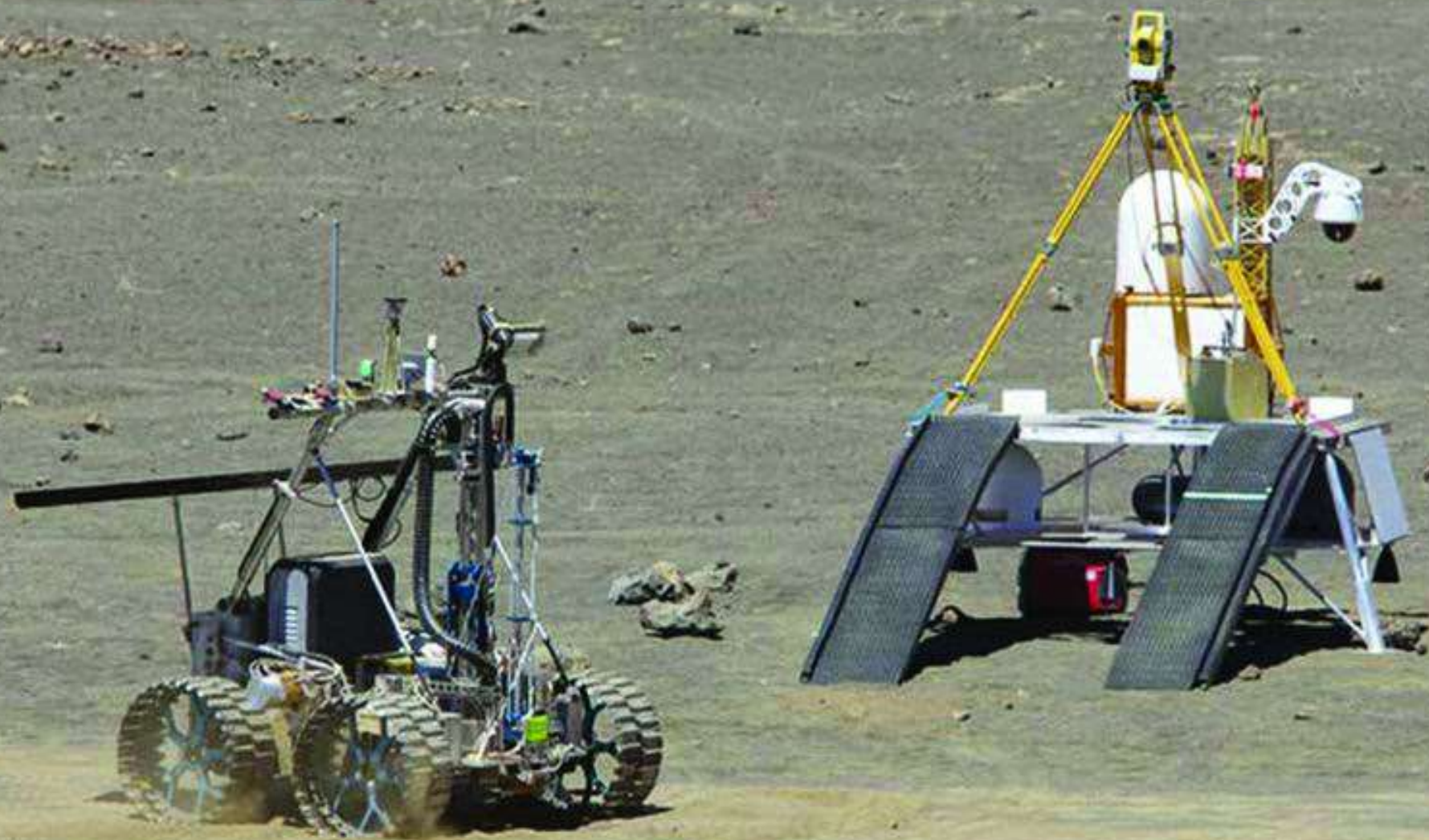
Joint study with NASA Resource Prospector Mission



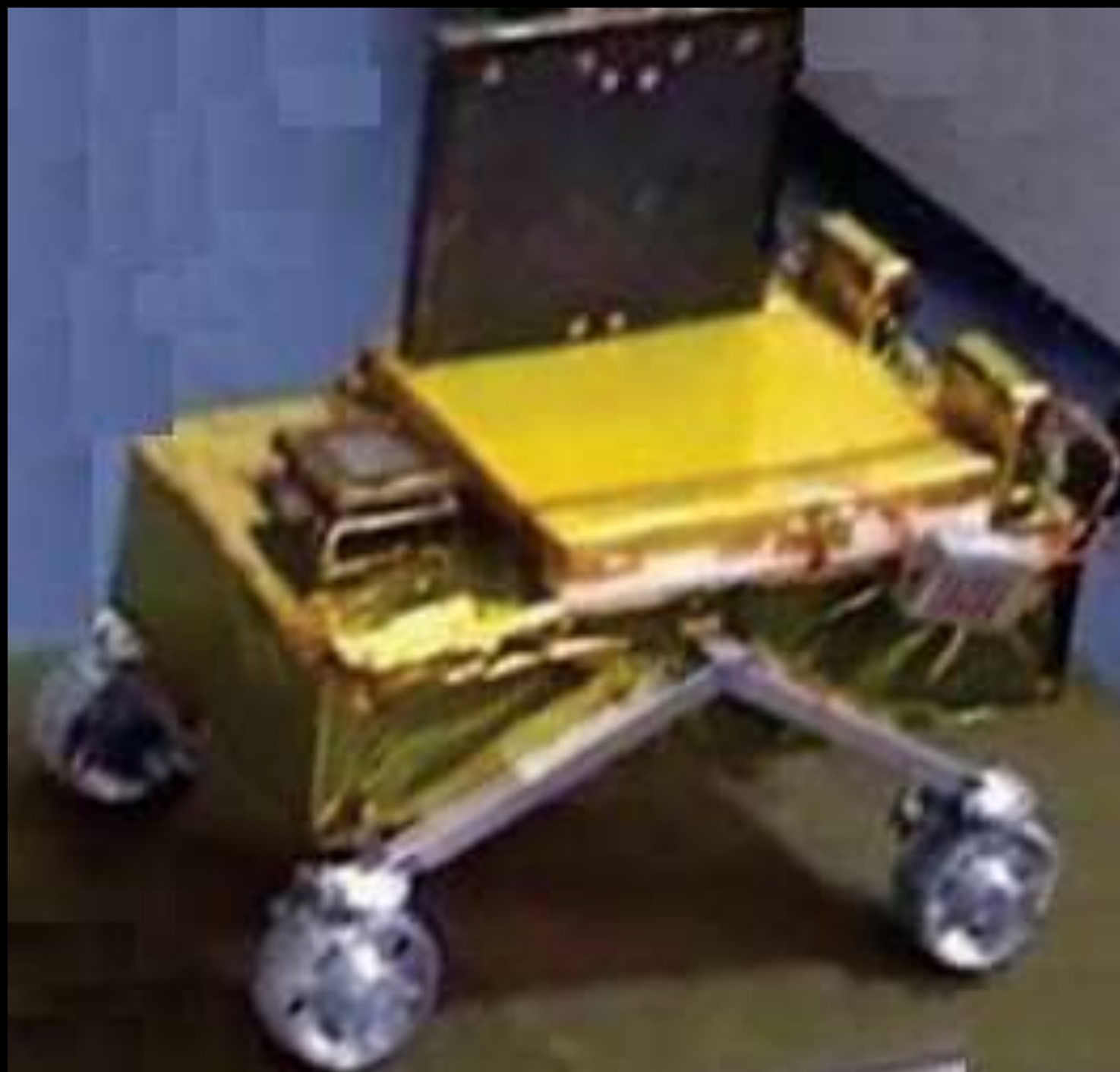
JAXA lander

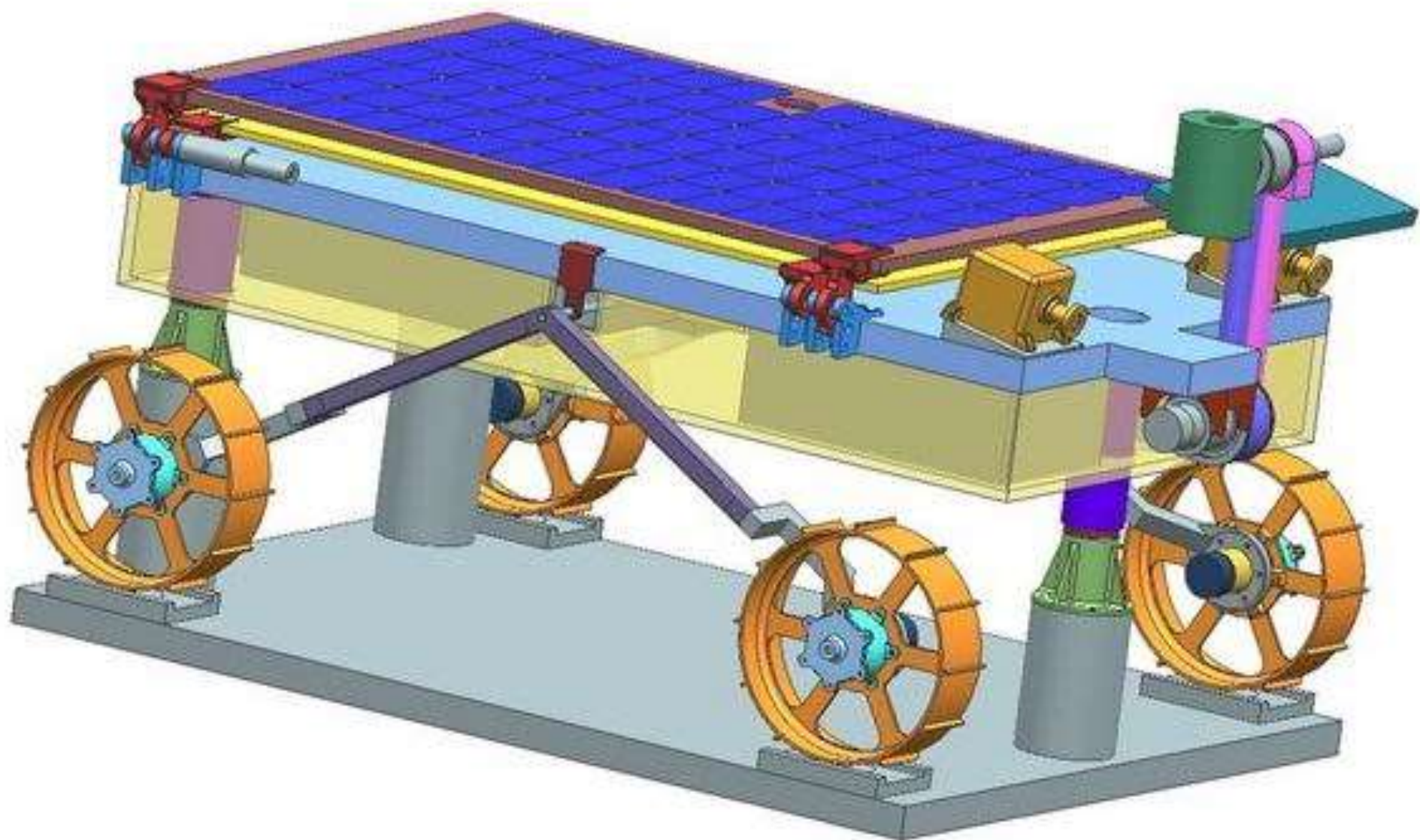


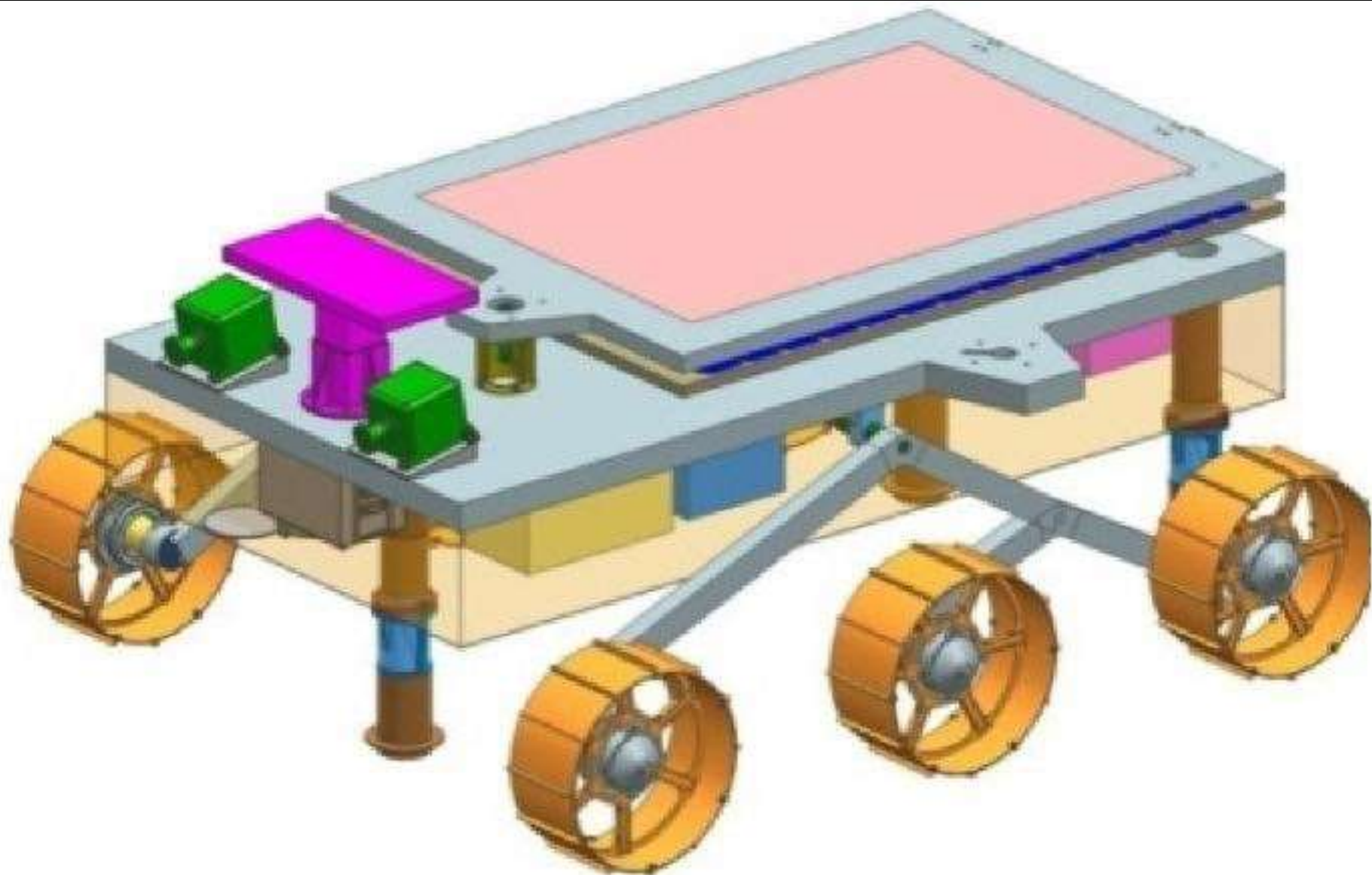
Video



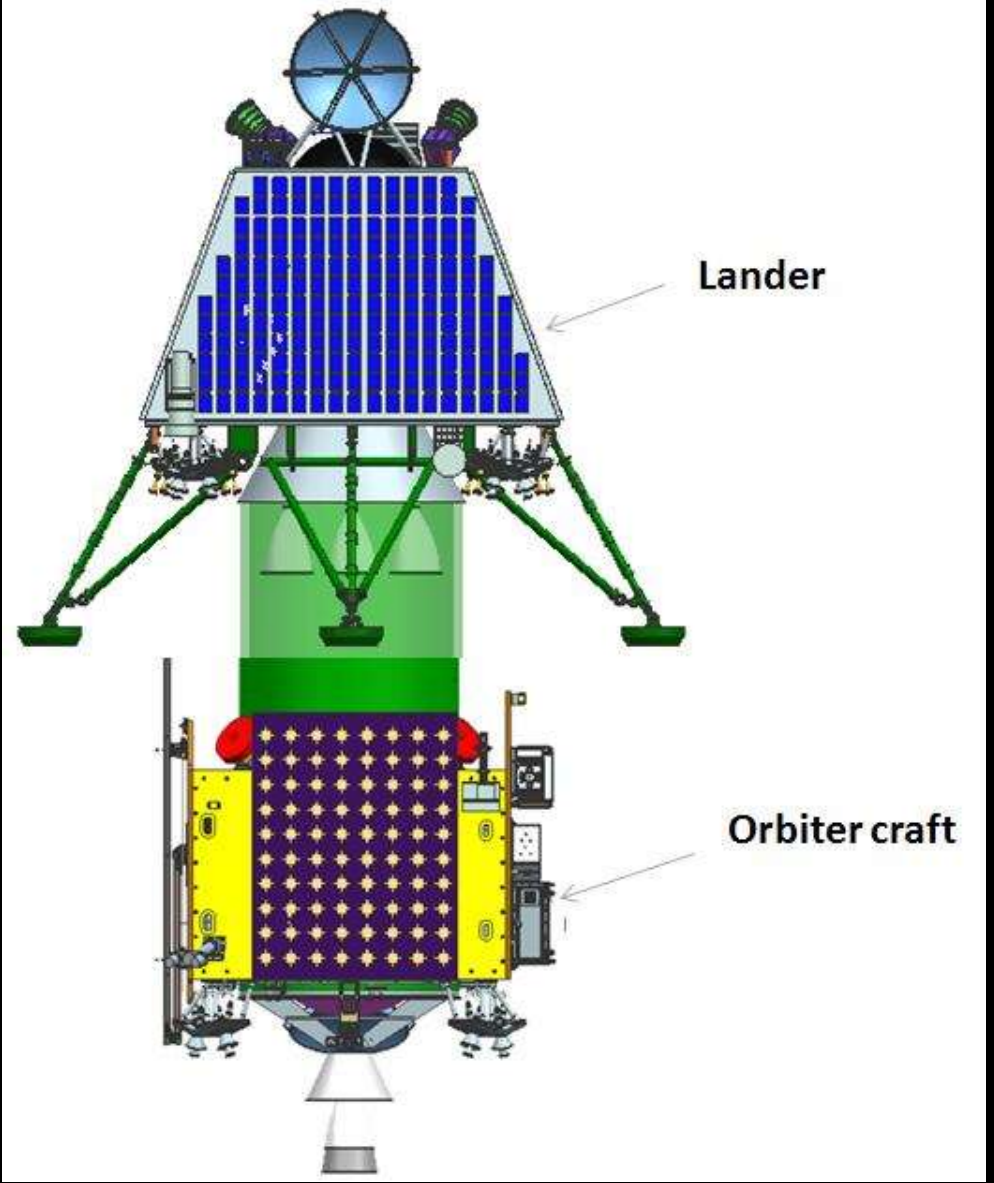








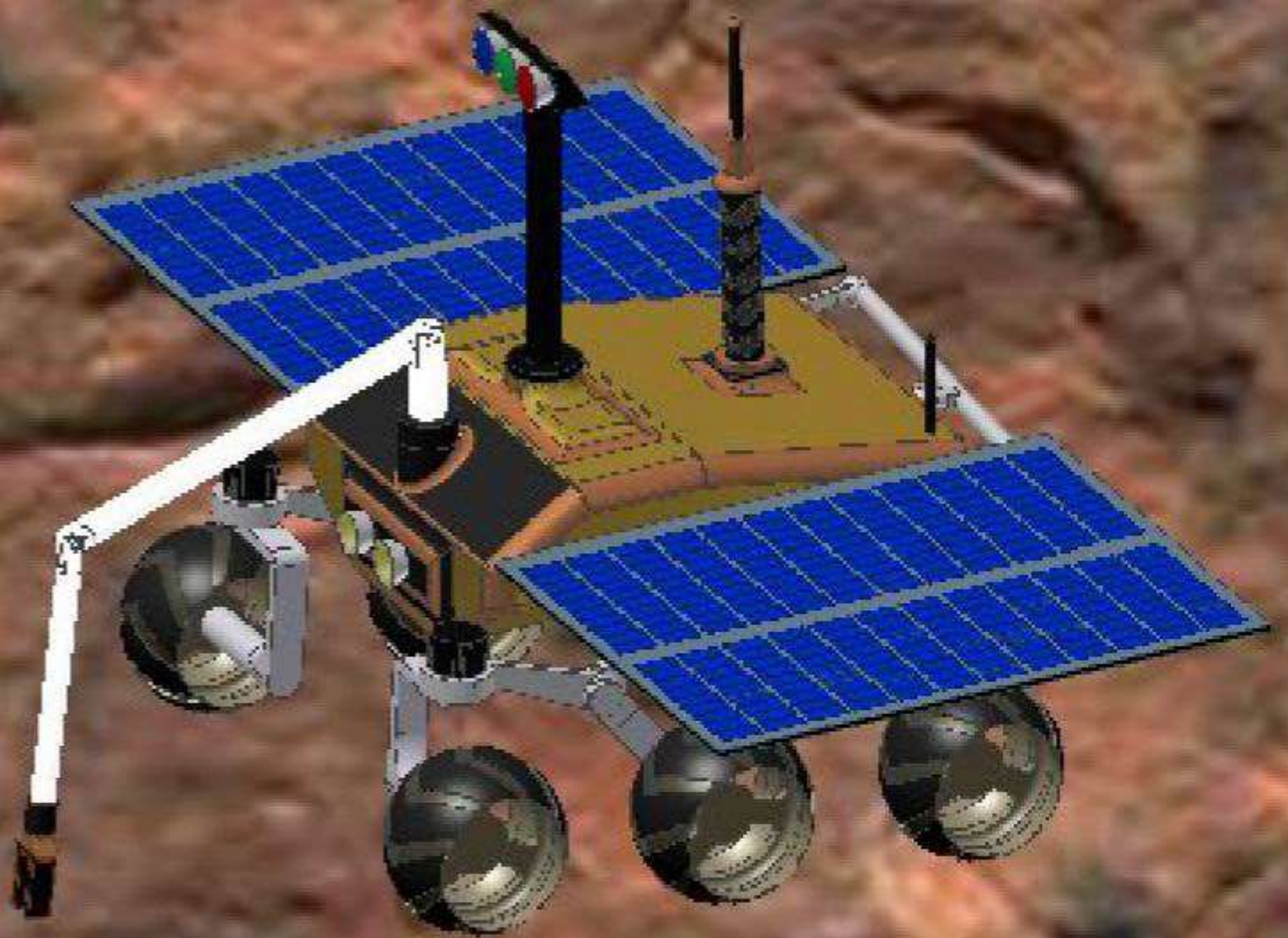












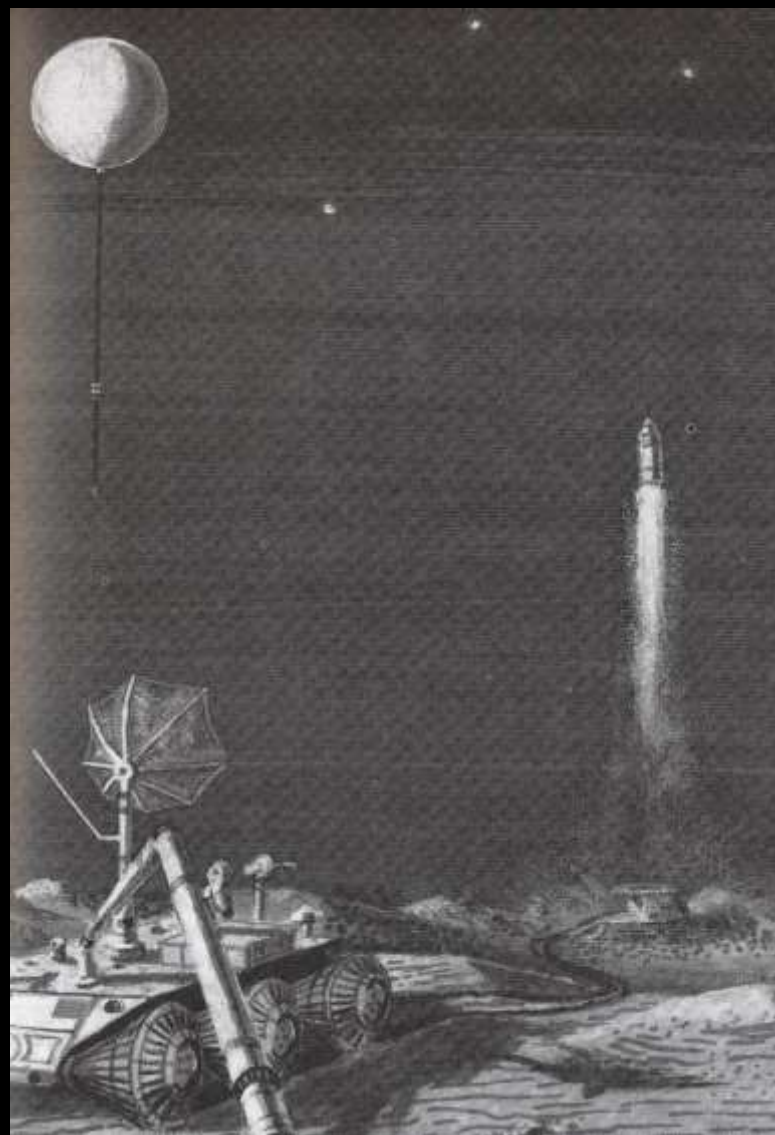
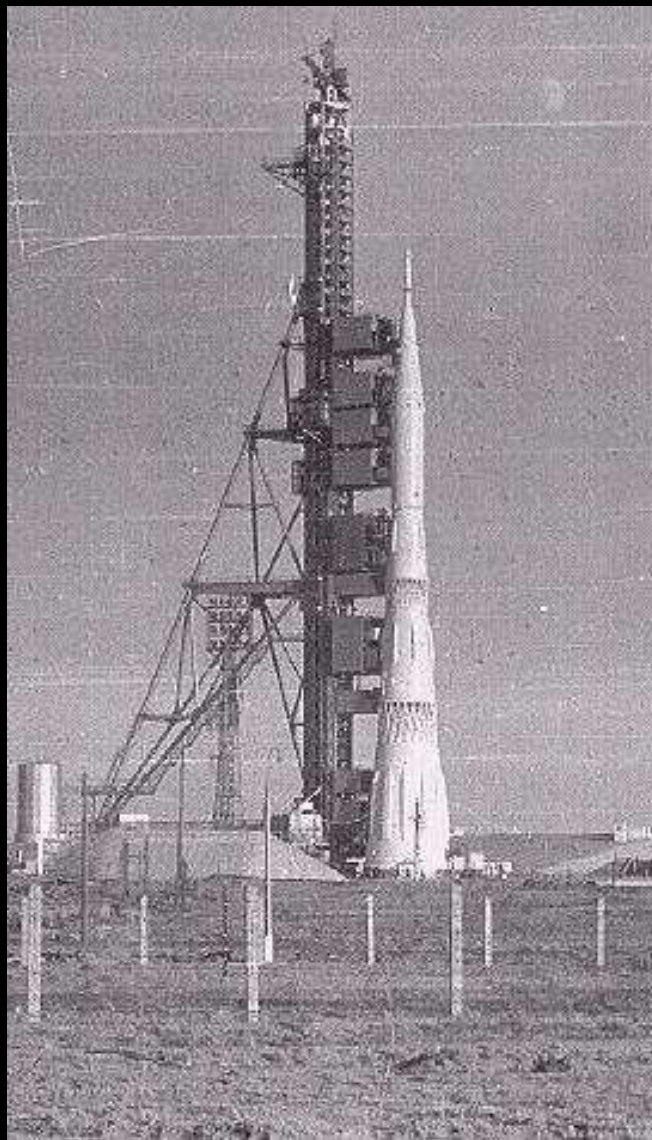
SELENE 2 (JAXA)





Artistic

17. září 1975



5 Н М

8 орбитальный отсек
земля-марс

7 приборный
отсек

6 аэродинамический
экран

5 посадочная
ступень

4 I ступень взлета

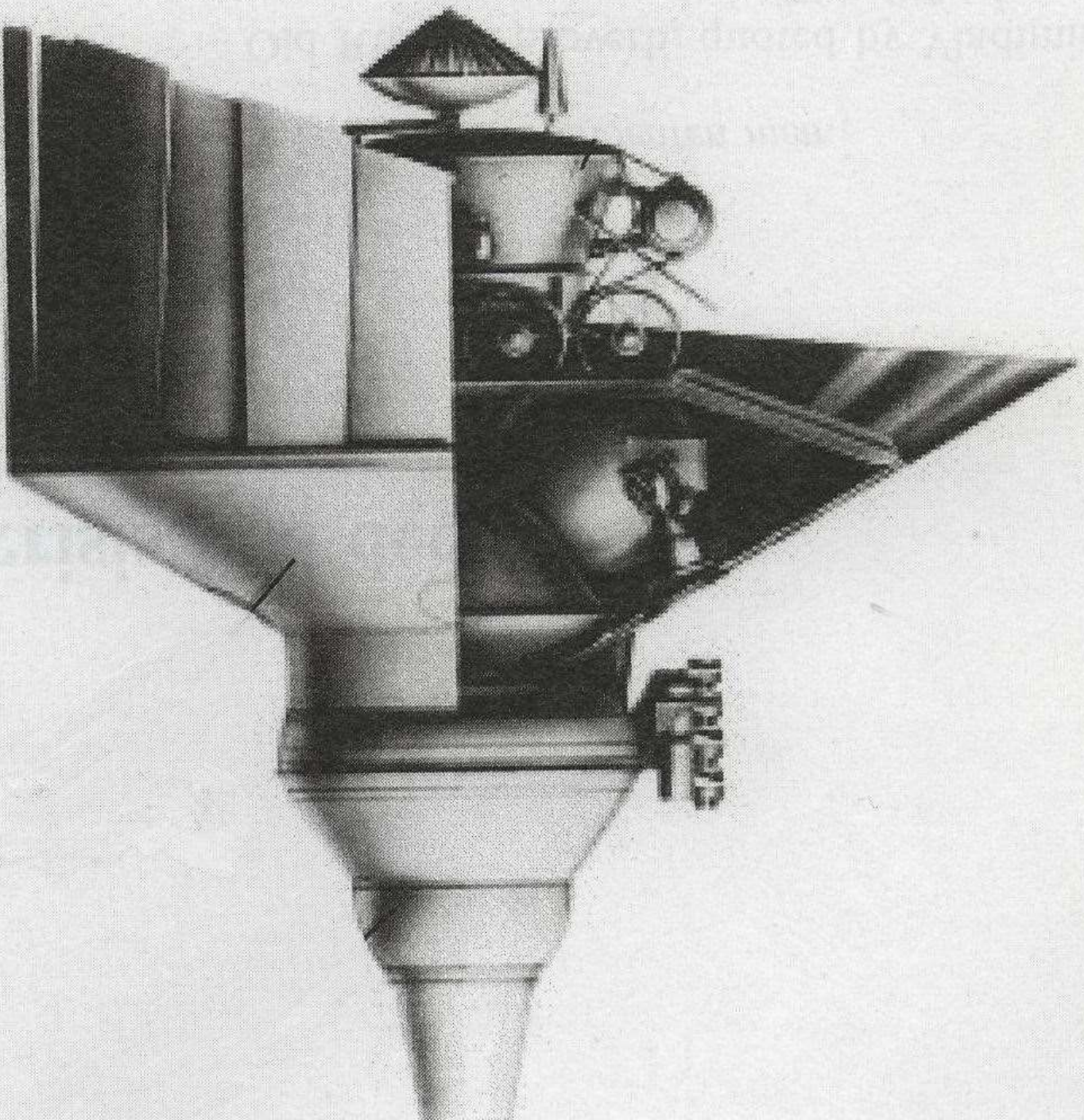
3 II ступень взлета

2 орбитальный отсек
марс-земля

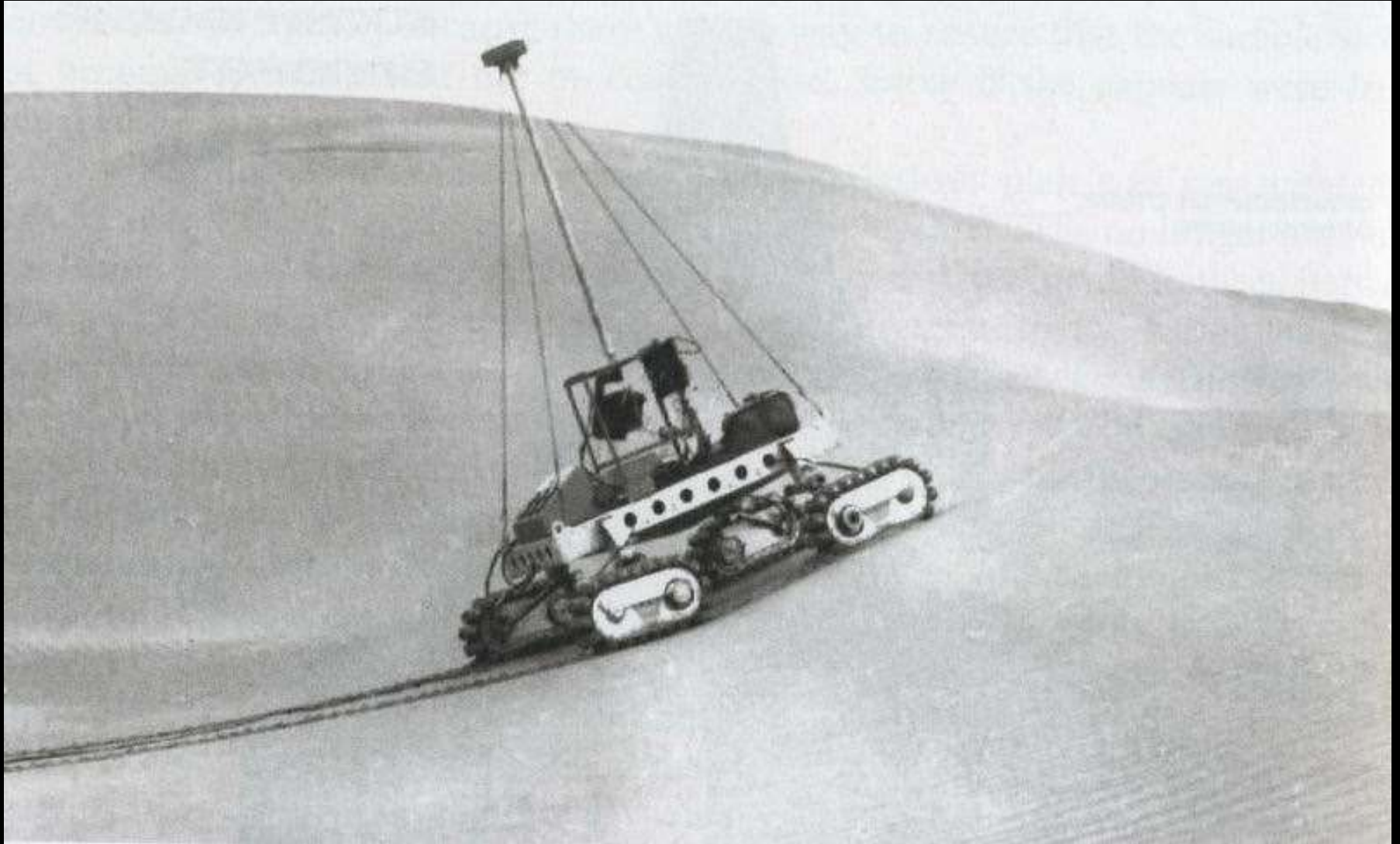
1 возвращаемый
аппарат

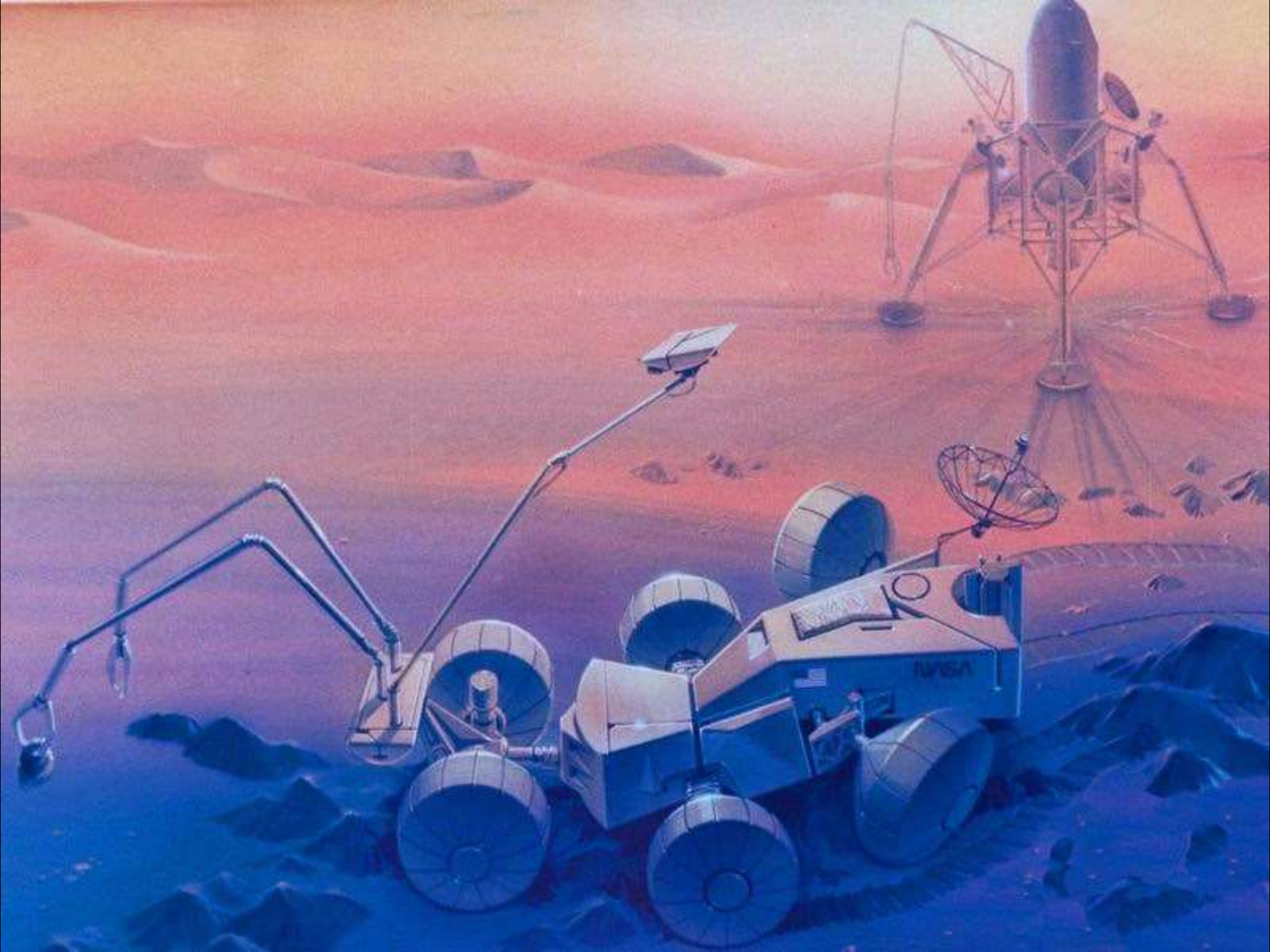
9 посадочный
аппарат



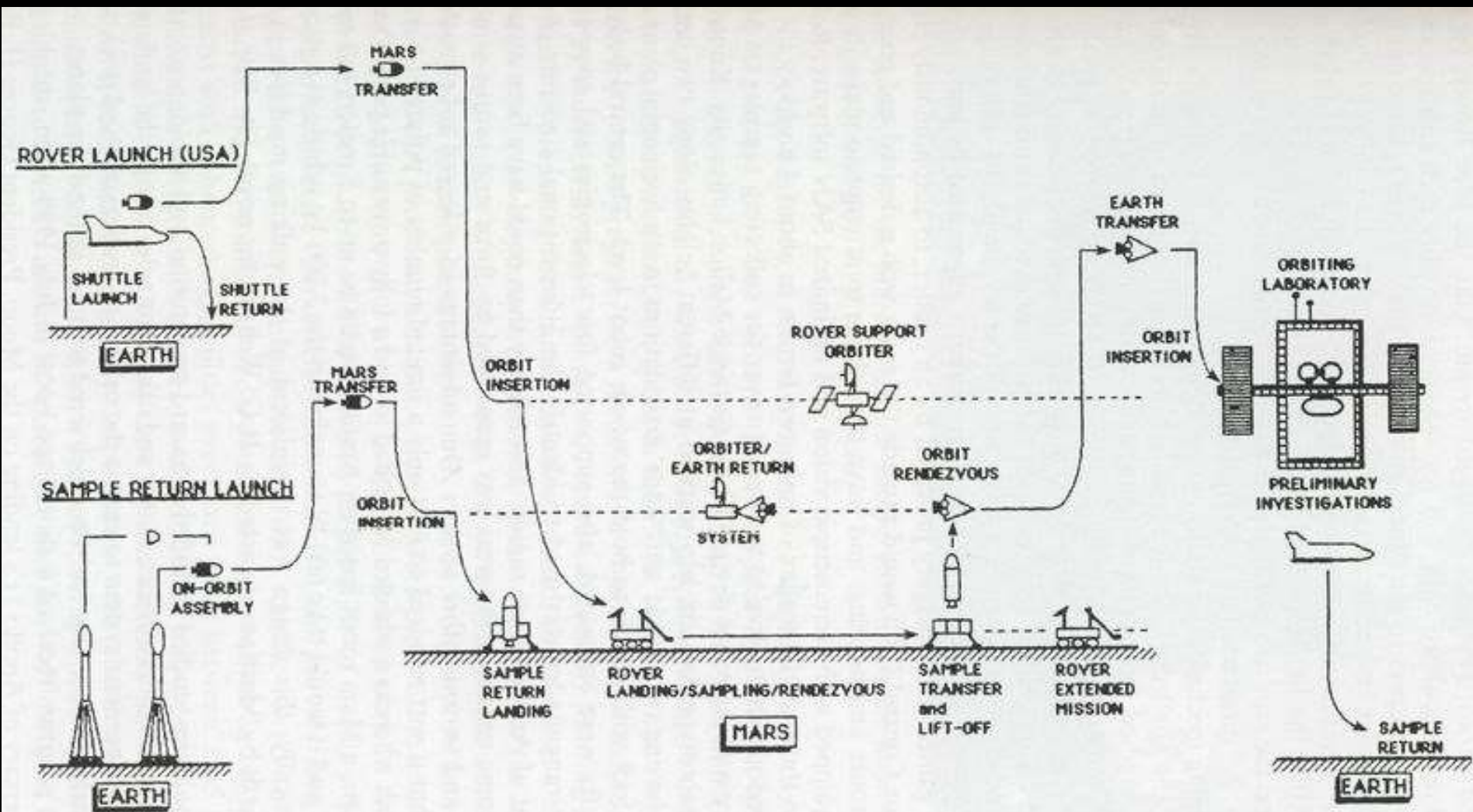


5M (vozidlo z referenční mise)

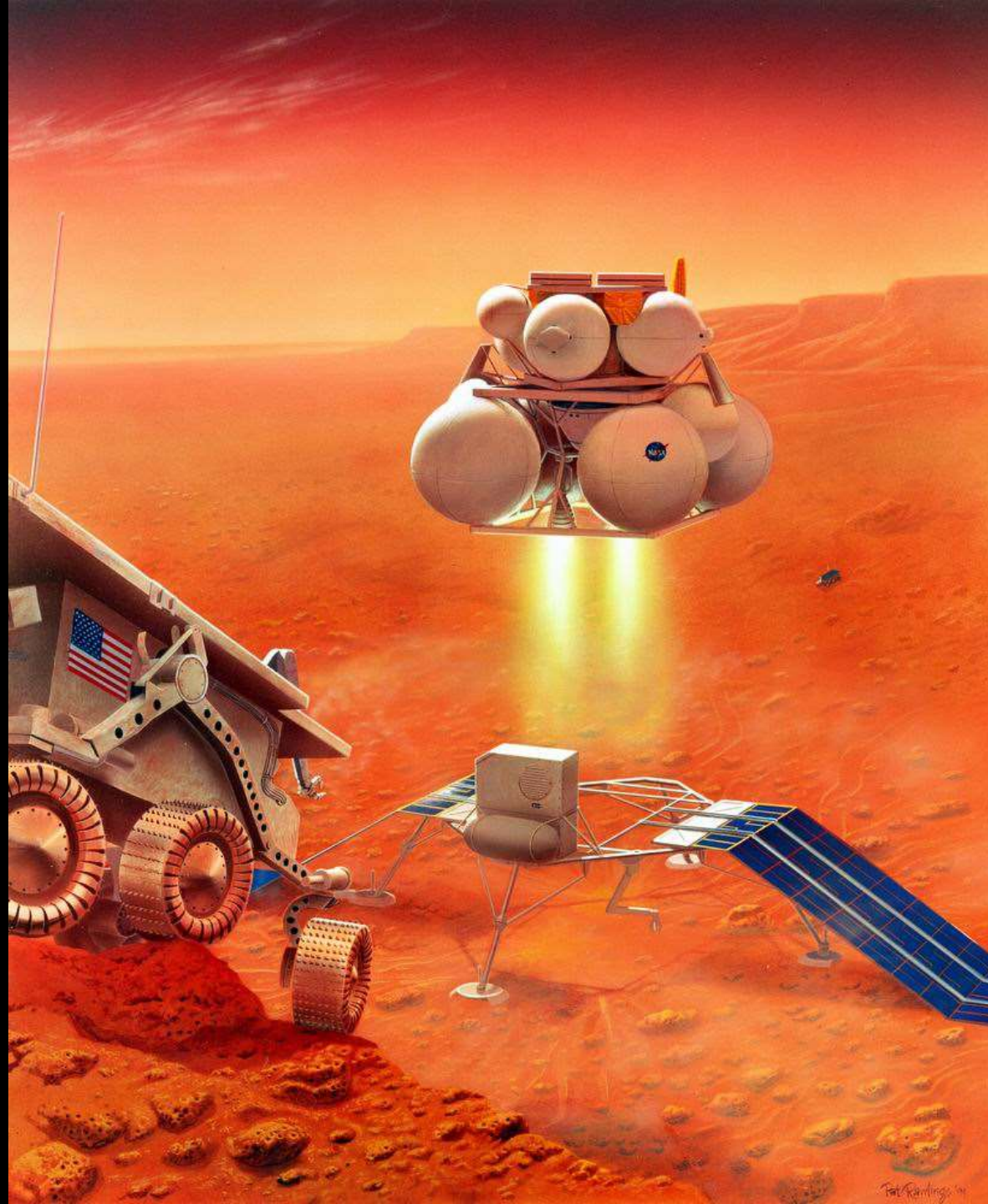


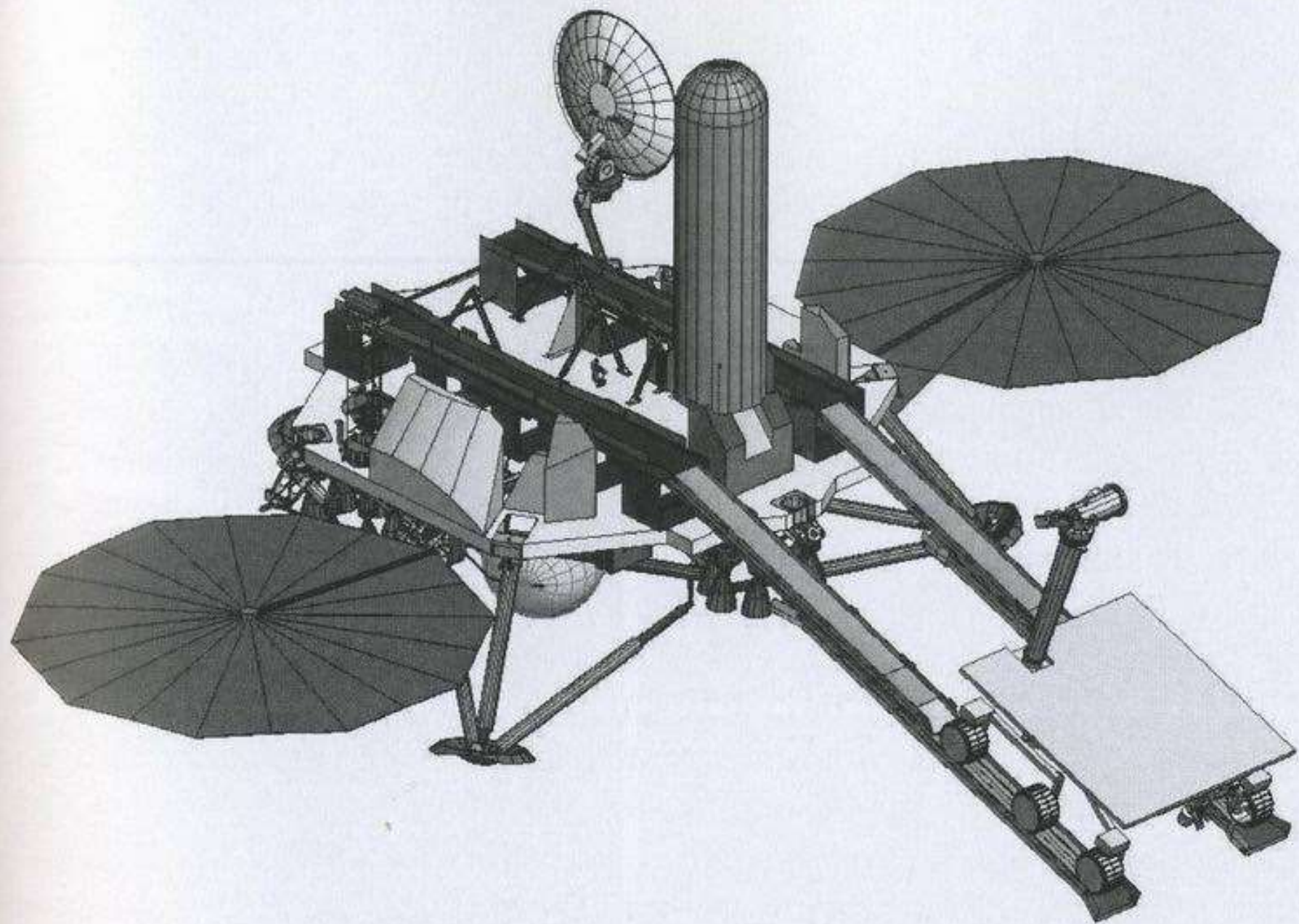


Mars Rover and Sample Return

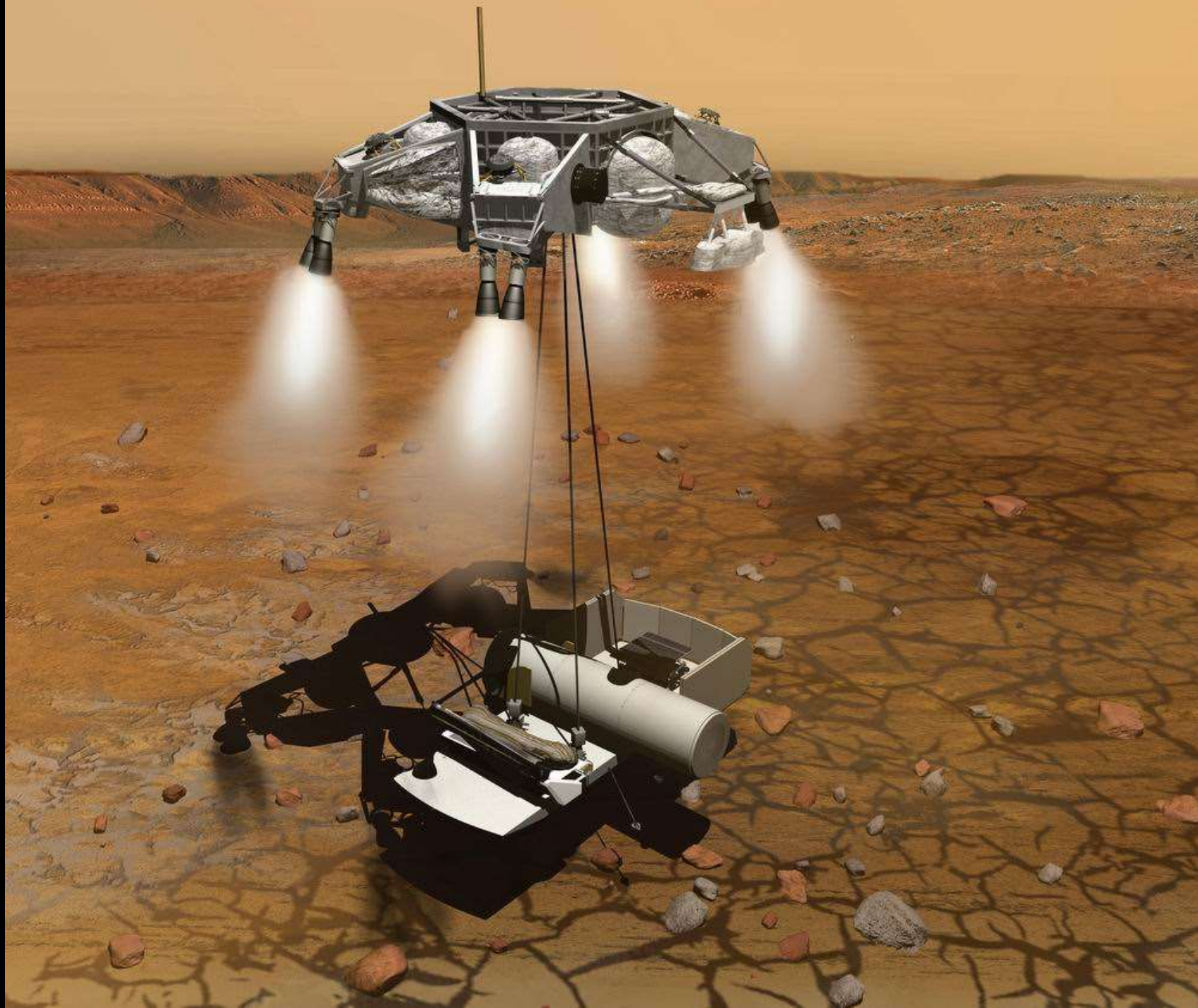












ESA-NASA ExoMars programme 2016-2018

2016

ESA-Led Mission

2016

ESA Entry Descent &
Landing Demonstrator
(EDL Demonstrator)

2018

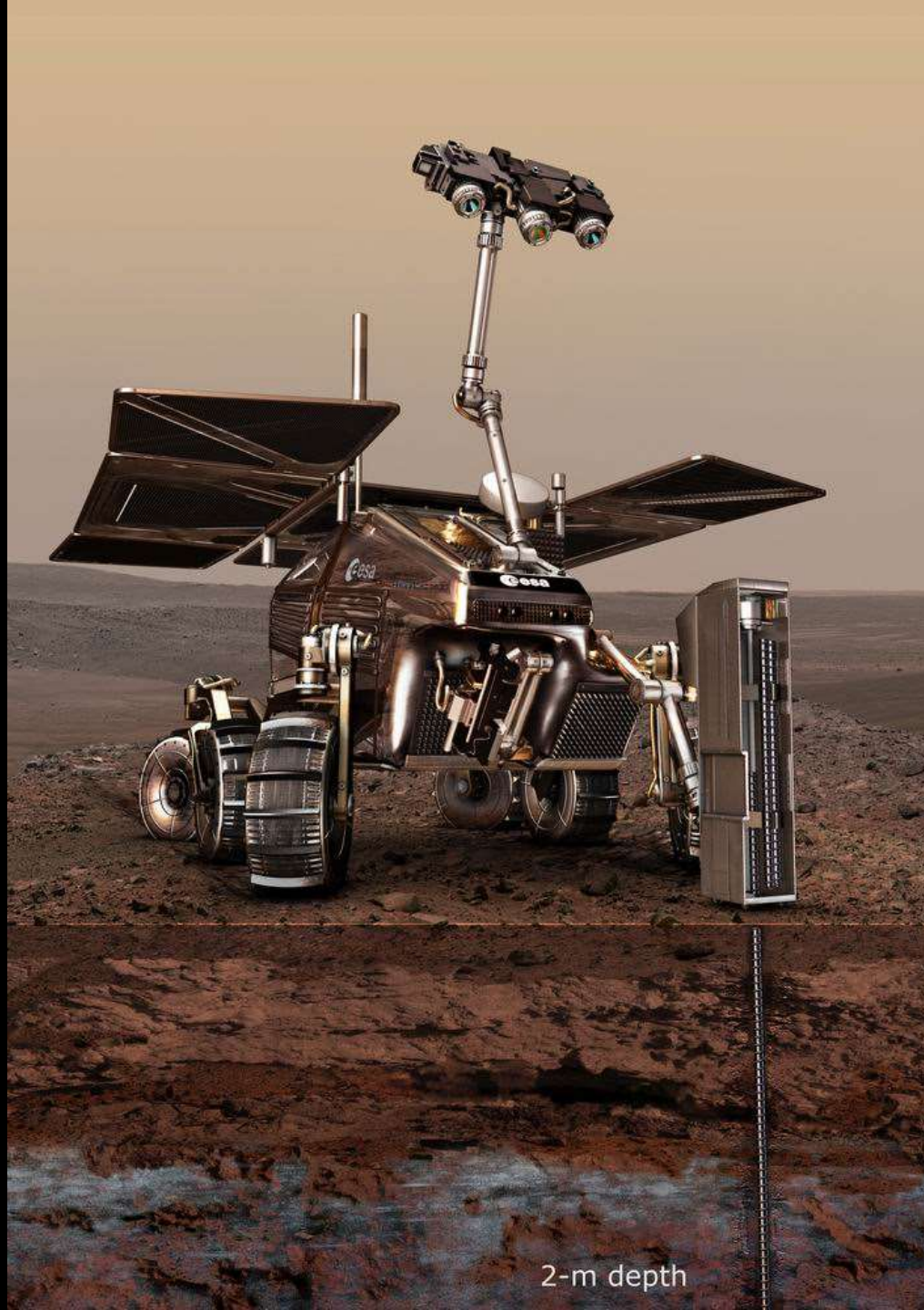
Sample-returning rover
Development led by NASA

2018

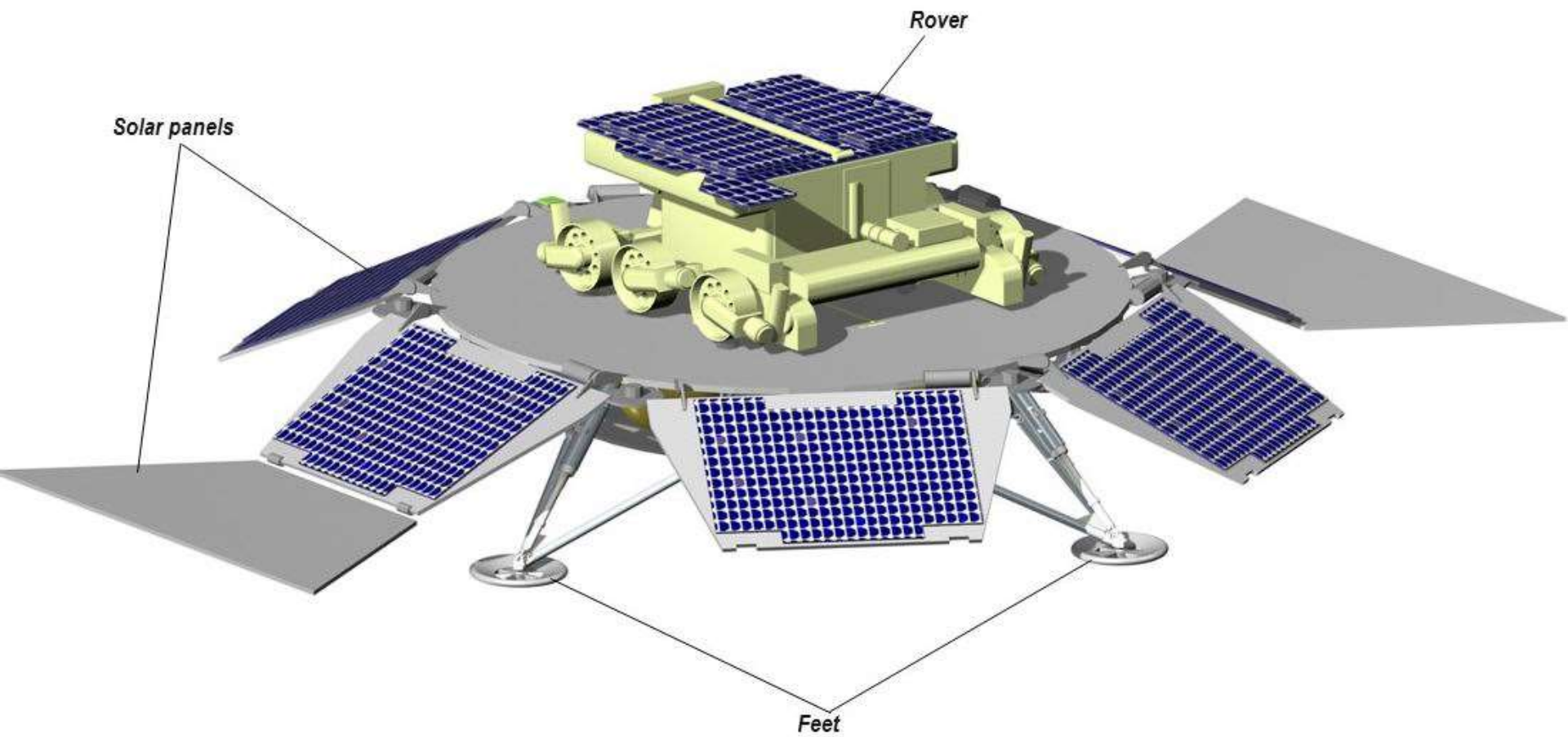
ESA ExoMars Rover







2-m depth





Děkuji za pozornost!

Ing. Tomáš PŘIBYL
tomas.pribyl@seznam.cz
www.kosmonaut.cz



Použitá a doporučená literatura



"This is a firsthand behind-the-scenes account of veteran engineers and scientists who banded together to explore faraway Mars. Faced by their own ingenuity and, more often, they overcame all odds—technical problems, bureaucratic barriers, even touches of self-doubt—to successfully land the one-ton NASA Curiosity rover on the Red Planet. It's a superb, fast, and fun-filled account of humankind on the leading edge of opening up a frontier, our home home away from home: Mars."

—Buzz Aldrin, Apollo 11 astronaut

MARS ROVER CURIOSITY

An Inside Account
from Curiosity's Chief Engineer

ROB MANNING and WILLIAM L. SIMON
Mars Science Lab Chief Engineer at NASA/JPL New York Times Best-Selling Author

