PROGRAM CEZHRANIČNEJ SPOLUPRÁCE
2007 2013
SLOVENSKÁ REPUBLIKA
ČESKÁ REPUBLIKA

EURÓPSKA ÚNIA
EURÓPSKY FOND REGIONÁLNEHO ROZVOJA
SPOLOČNE BEZ HRANÍC

Projekt podpořený Operačním programem
Přeshraniční spolupráce Slovenská republika – Česká republika 2007-2013

OBLOHA NA DLANI
Hvezdáreň v Partizánskom
Hvězdárna Valašské Meziříčí

TRENČIANSKY
SAMOSPRÁVNY
K • R • A • J

Zlínský kraj
Tato akce je realizována s finanční výpomocí Zlínského kraje

Než poprvé odstartoval raketoplán

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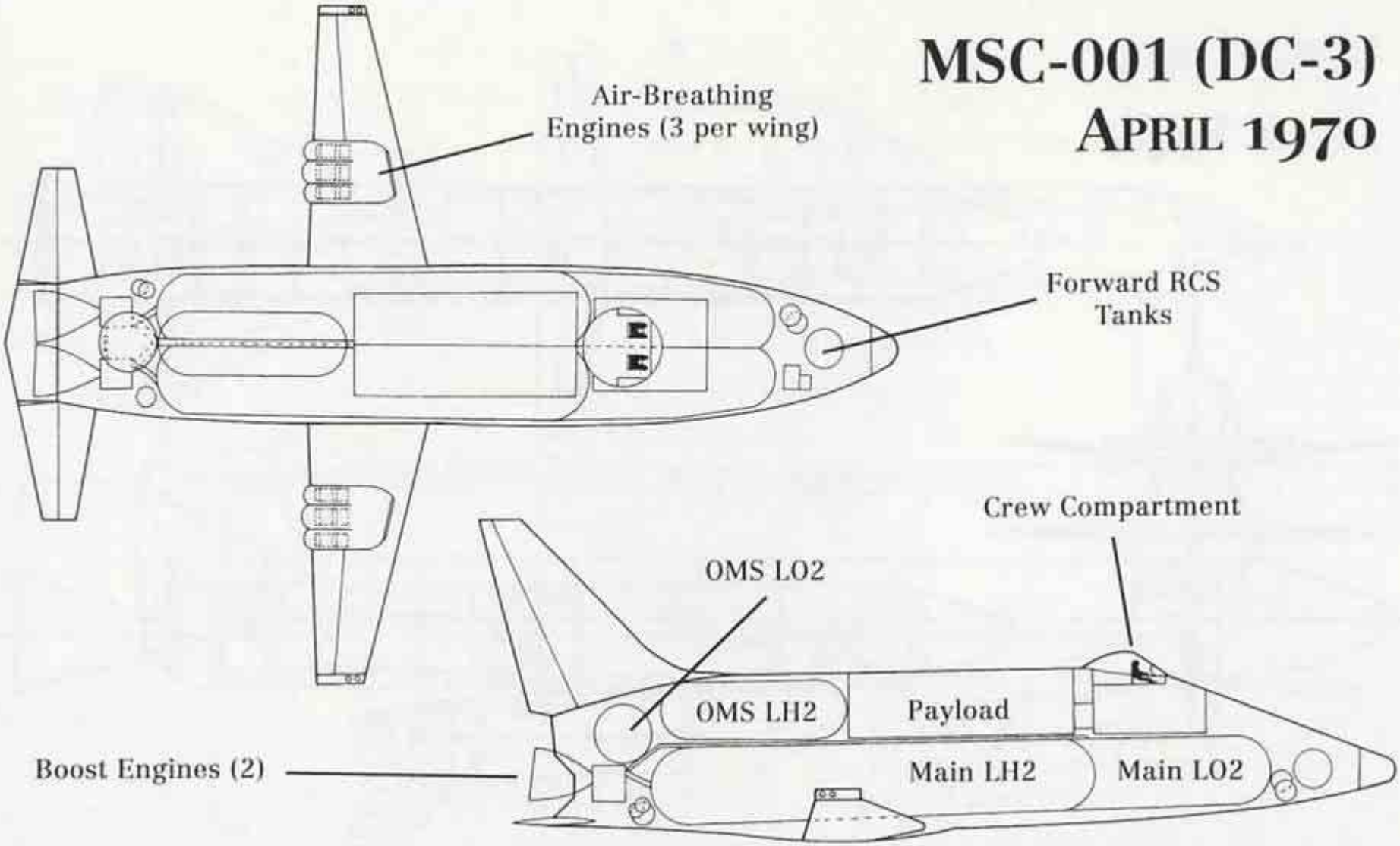
MSC-001 (DC-3)
APRIL 1970



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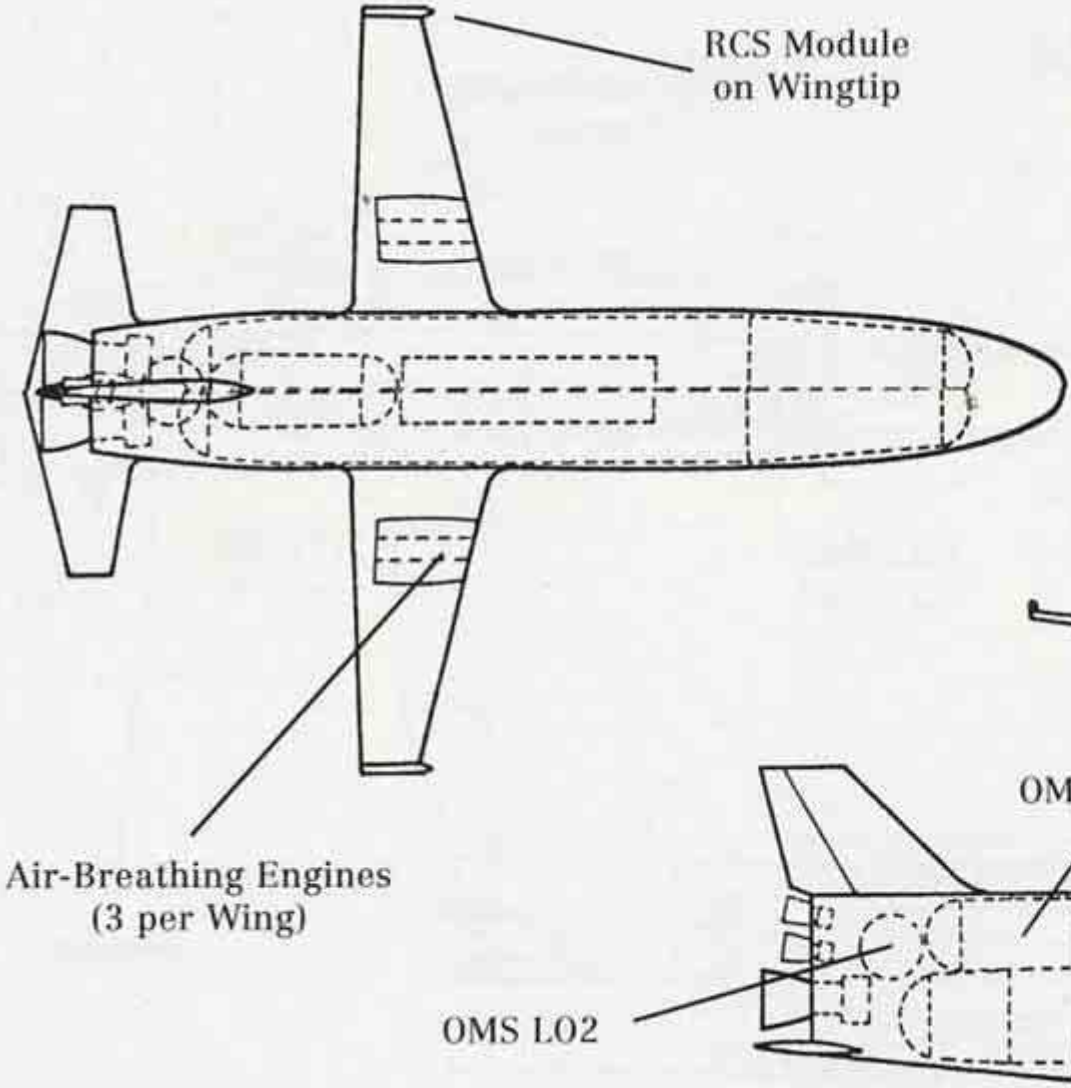
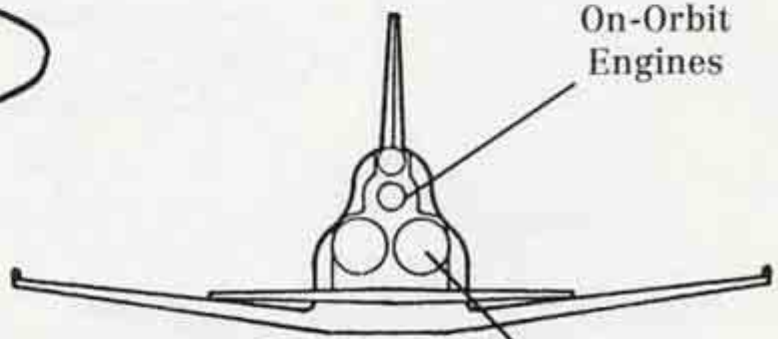
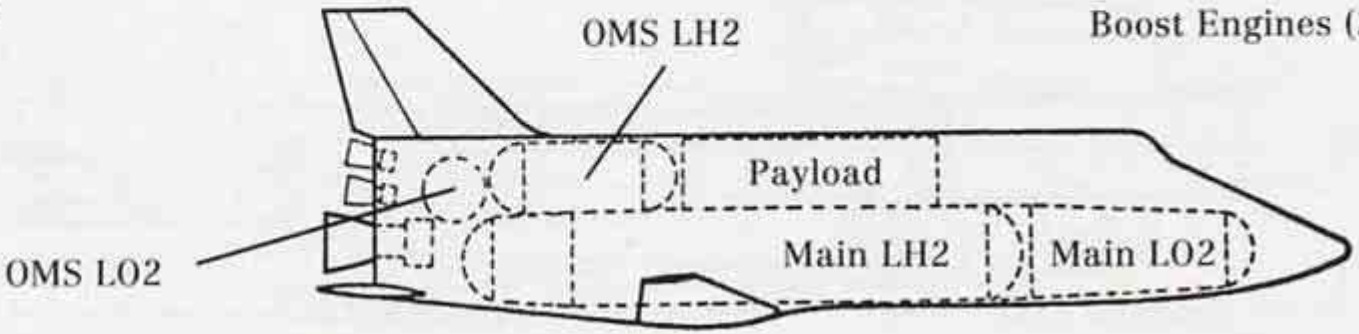
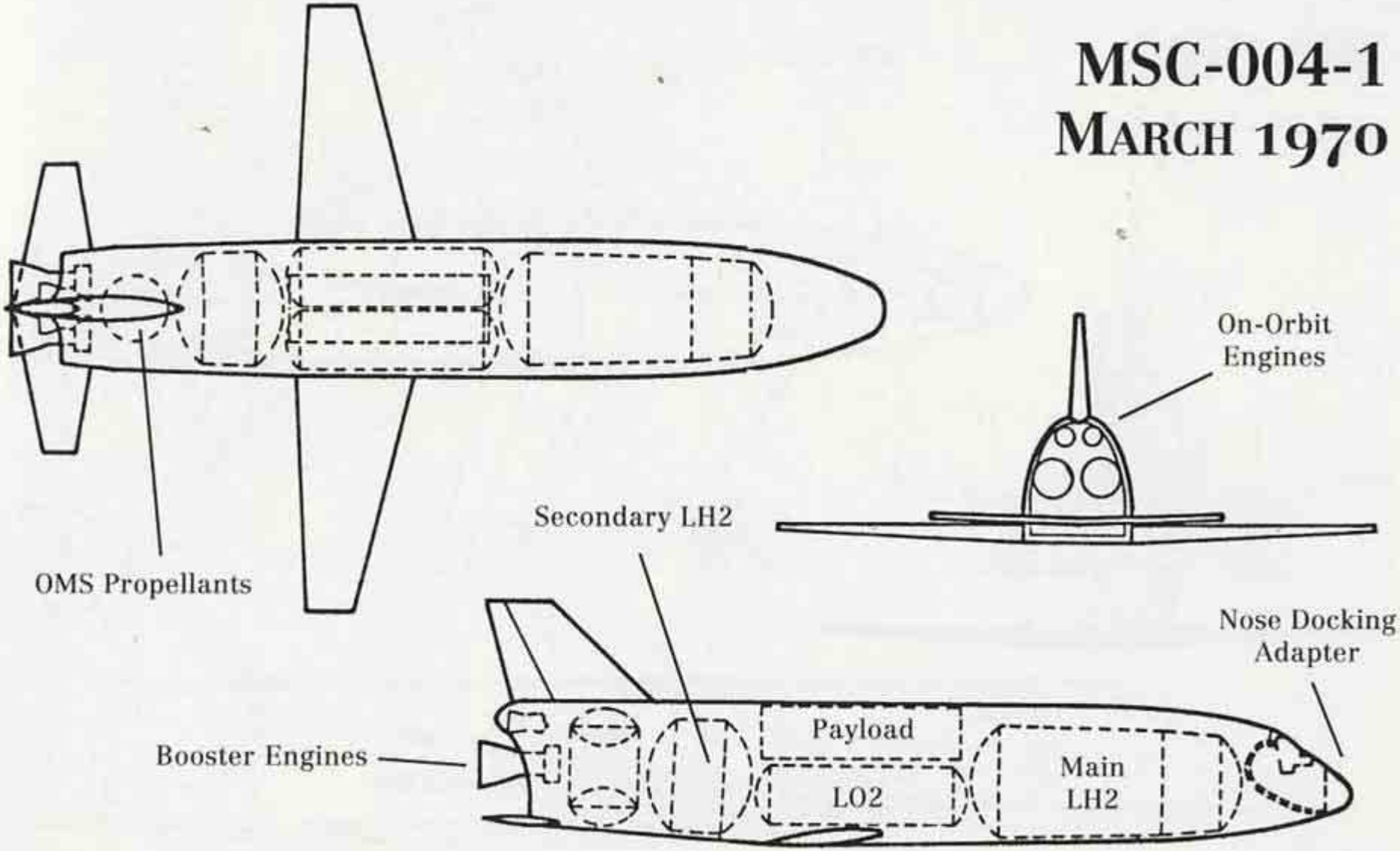
APRIL 1970







MSC-004-1
MARCH 1970



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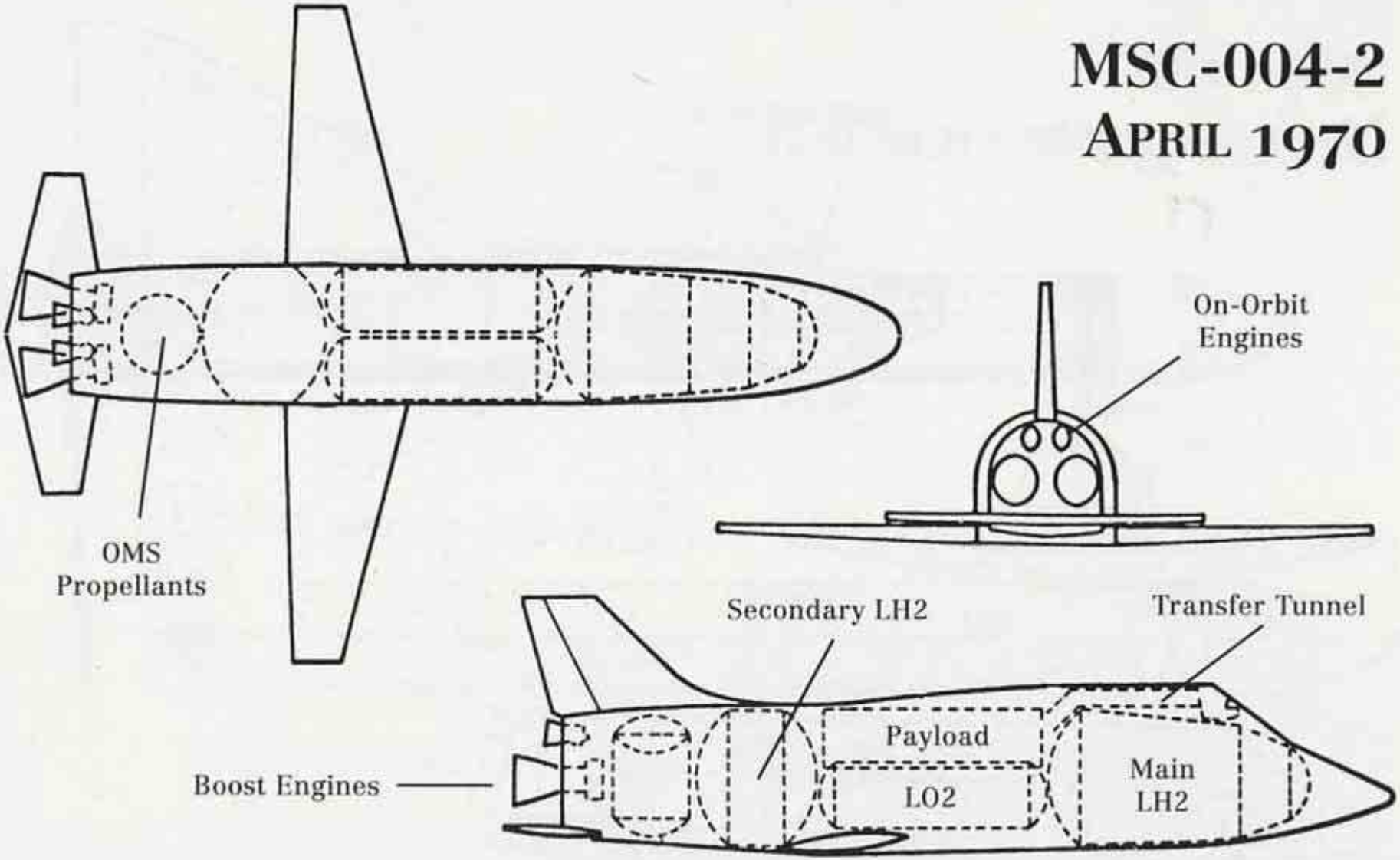

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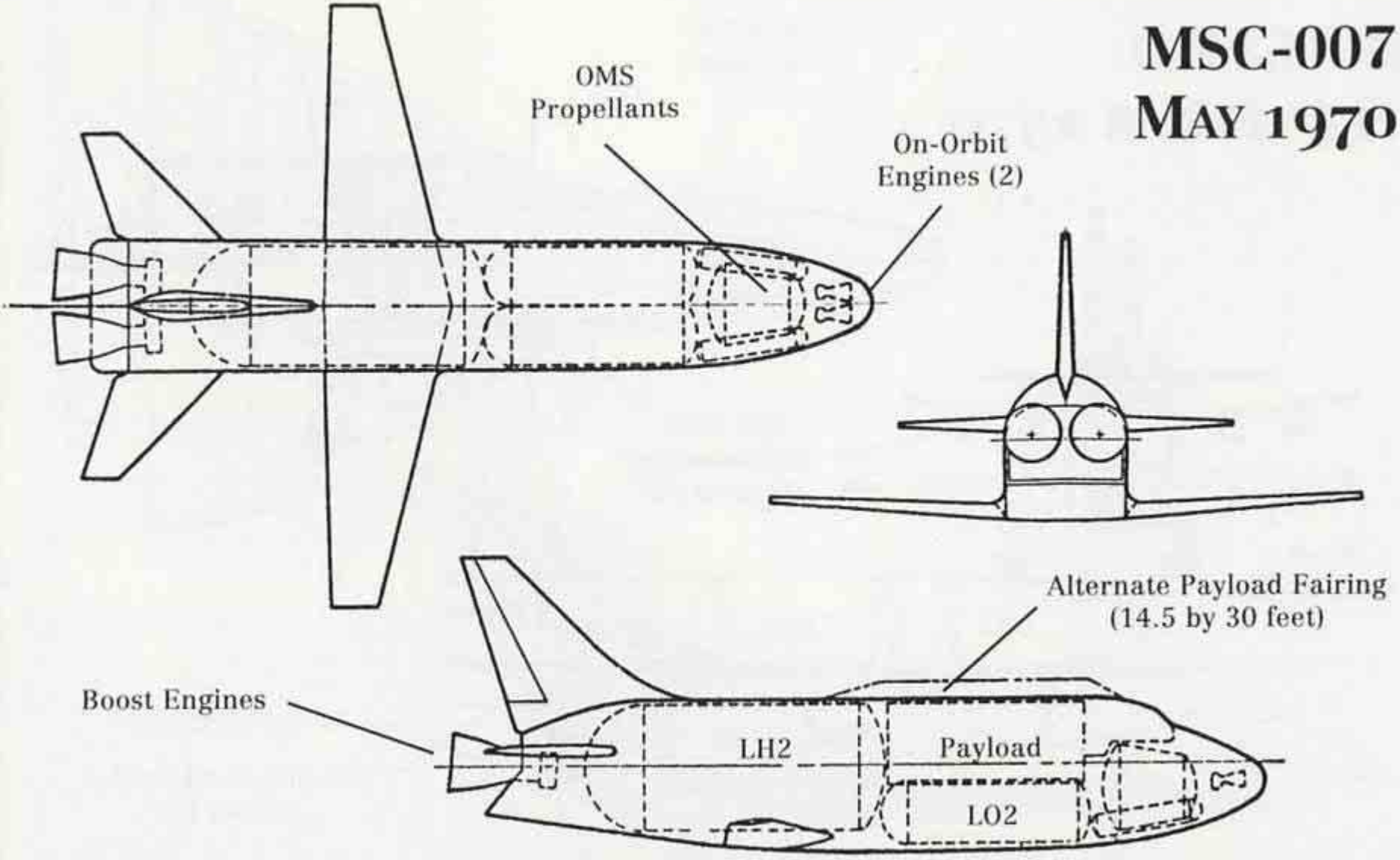
MAY 1970



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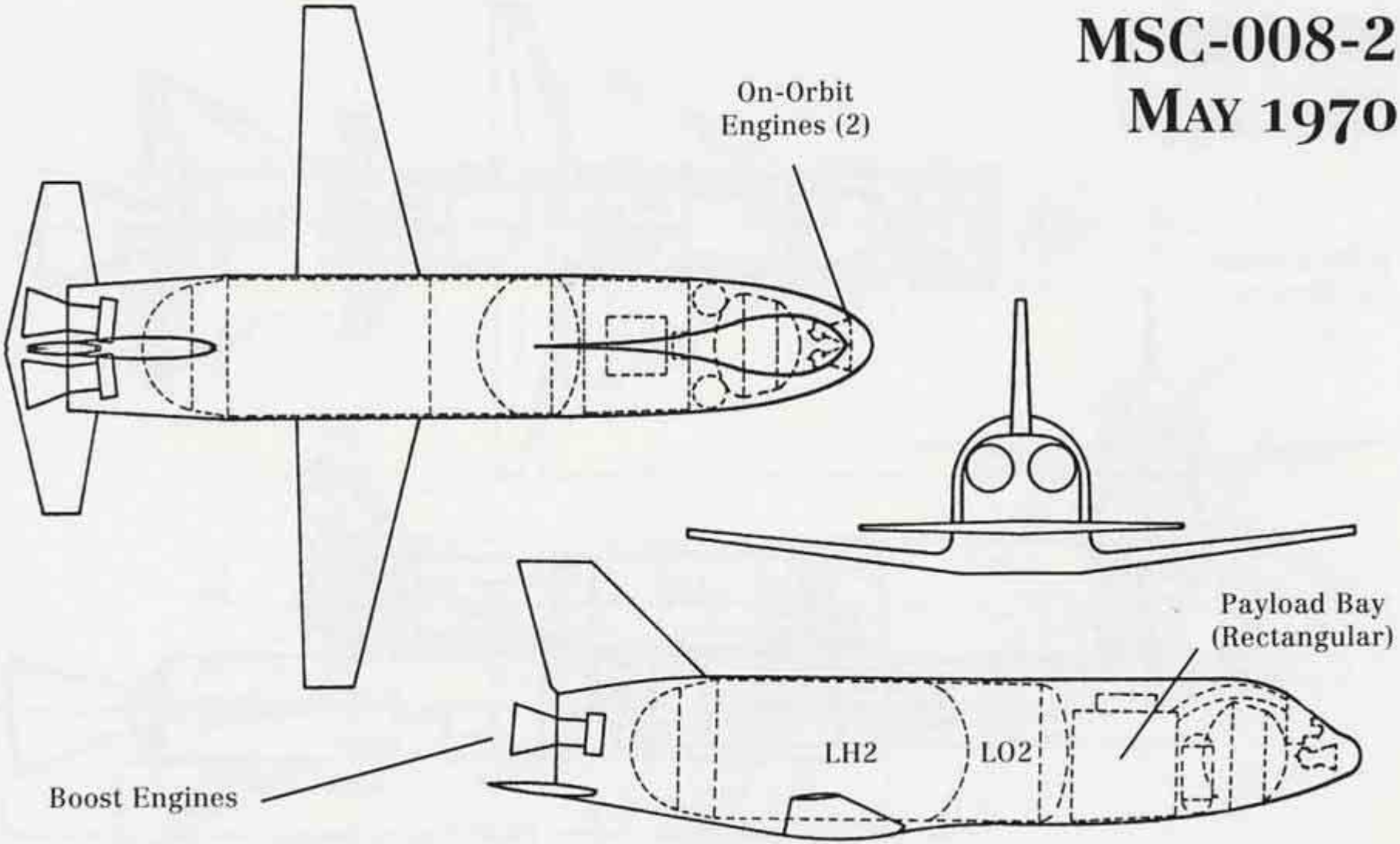
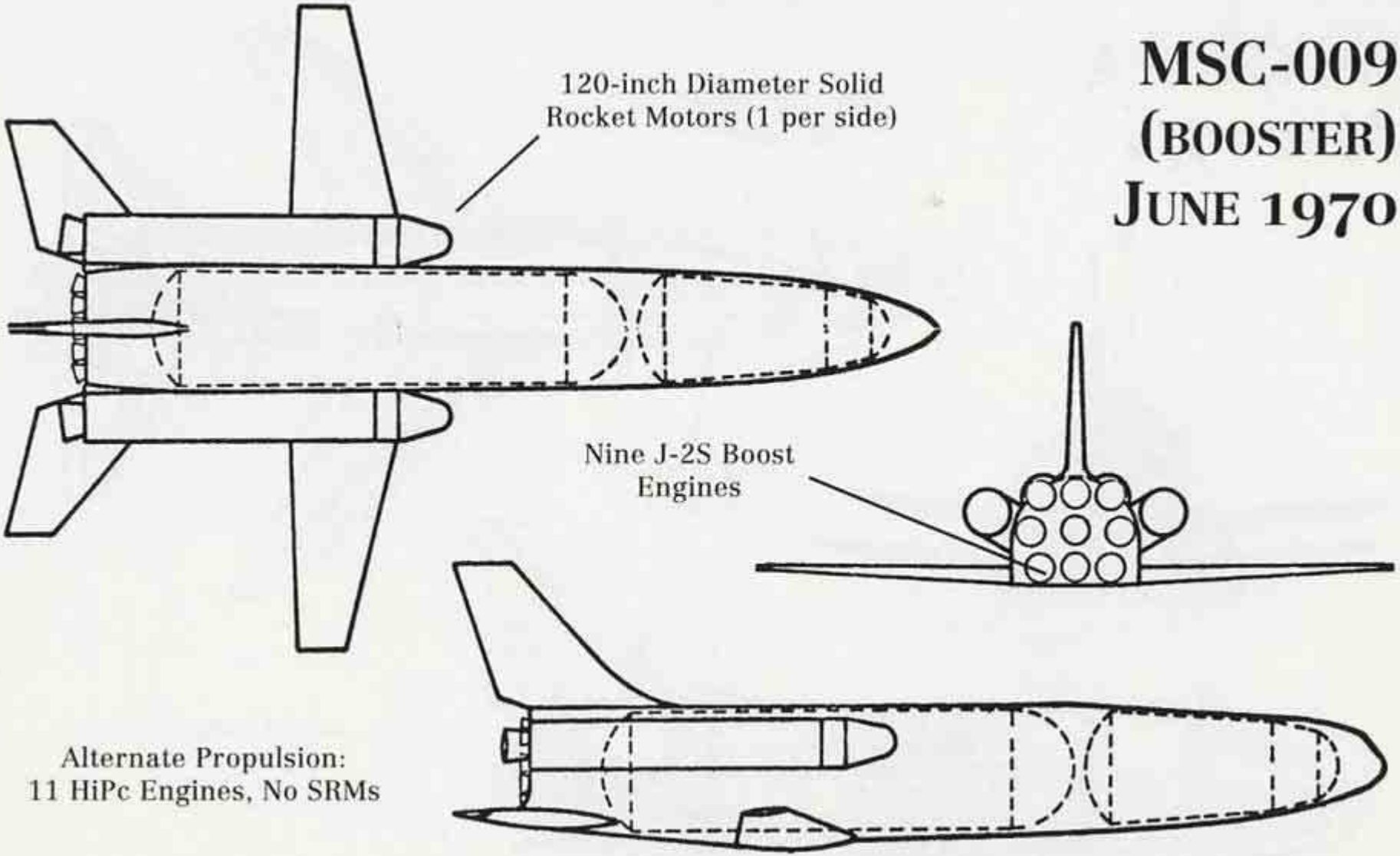
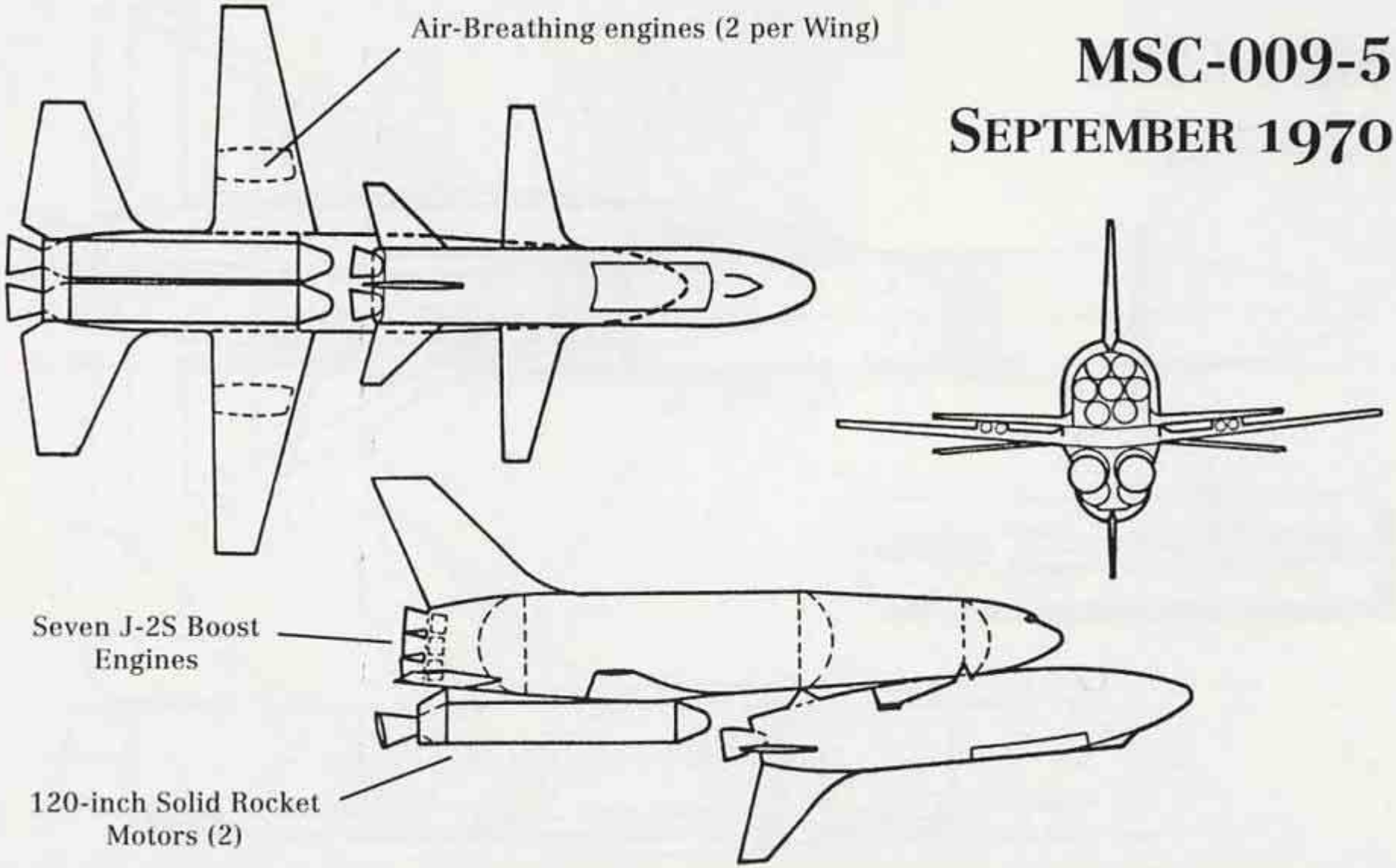


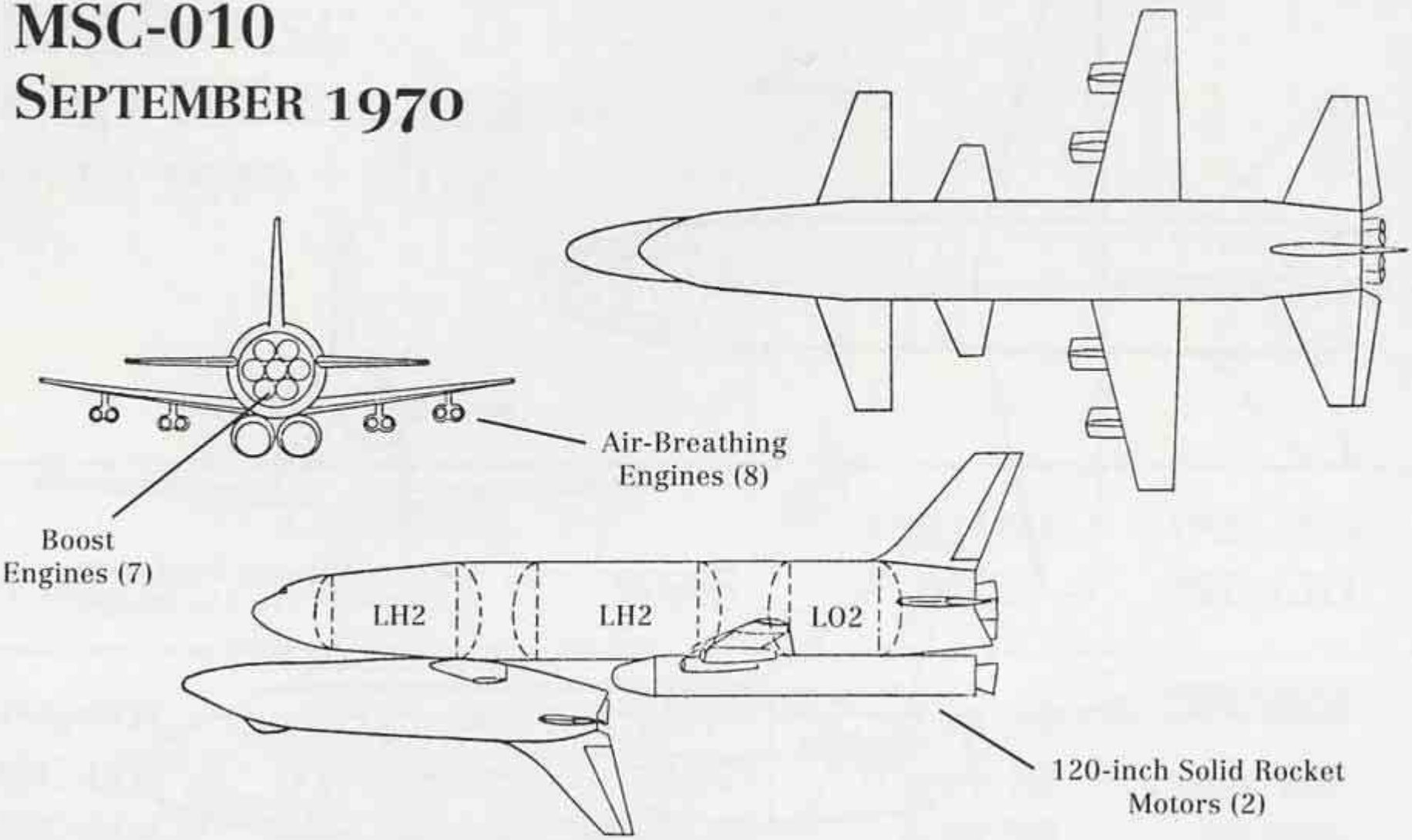
MSC-009 (BOOSTER) JUNE 1970





MSC-009-5
SEPTEMBER 1970

MSC-010
SEPTEMBER 1970



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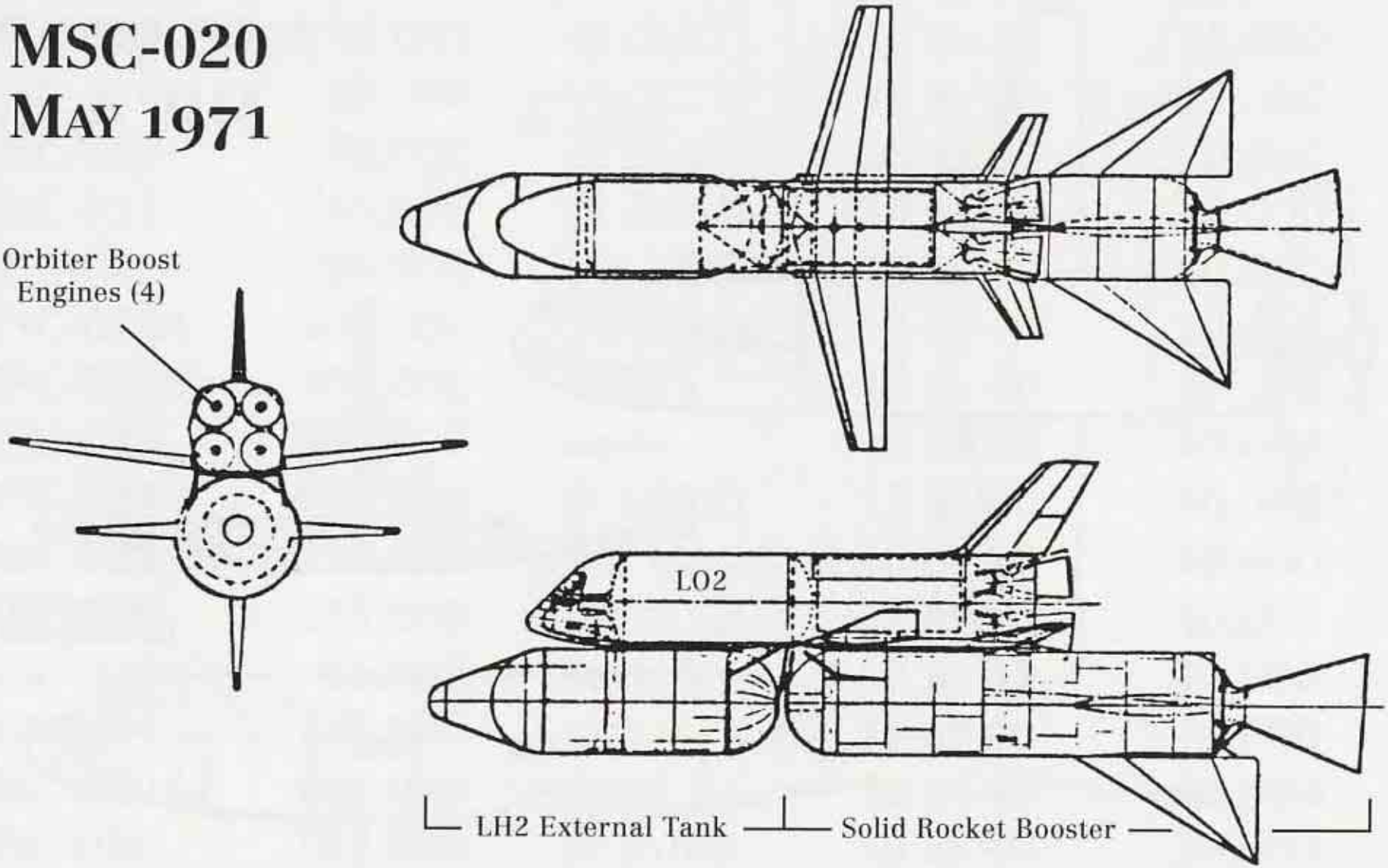
May 1971



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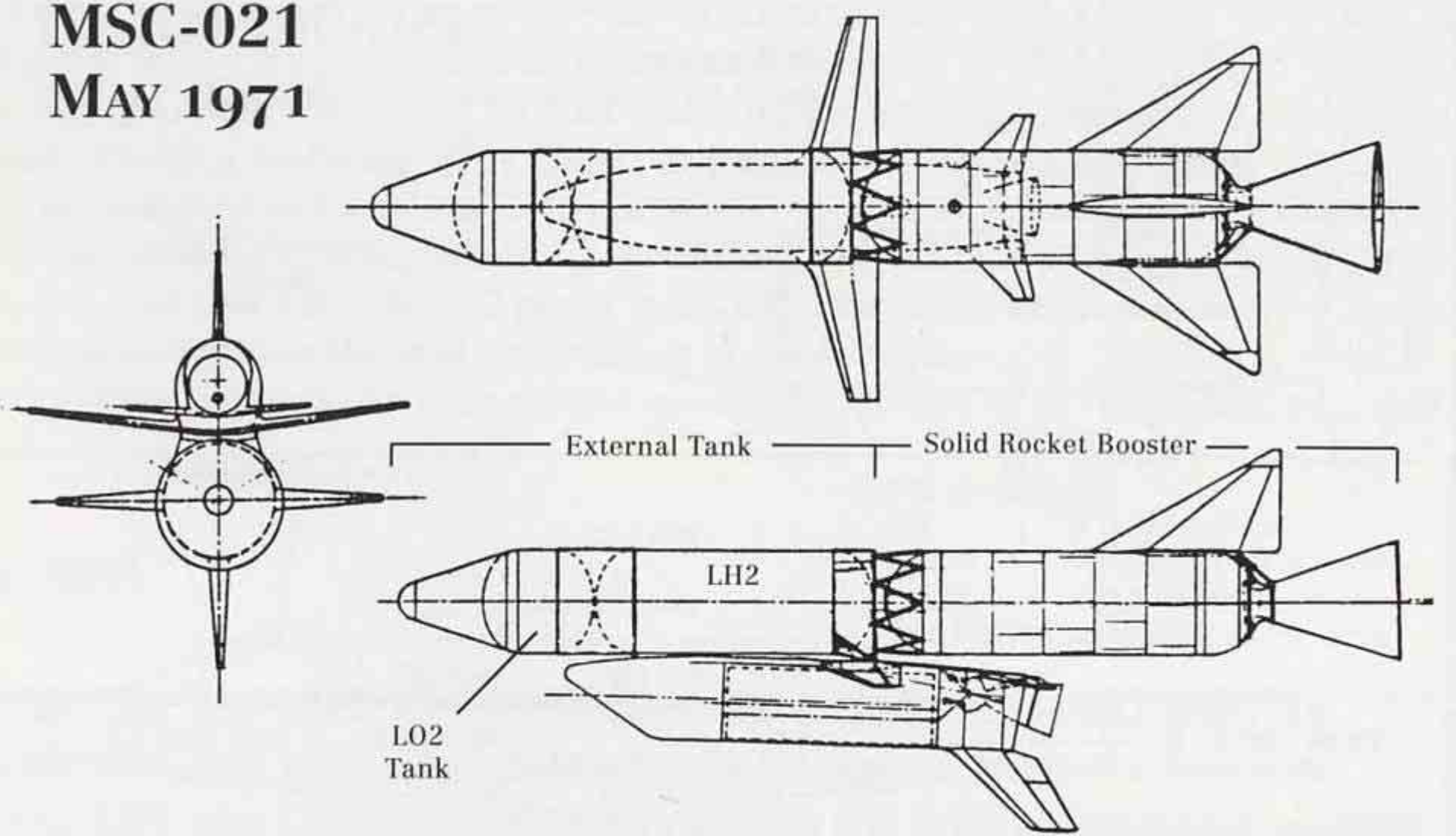
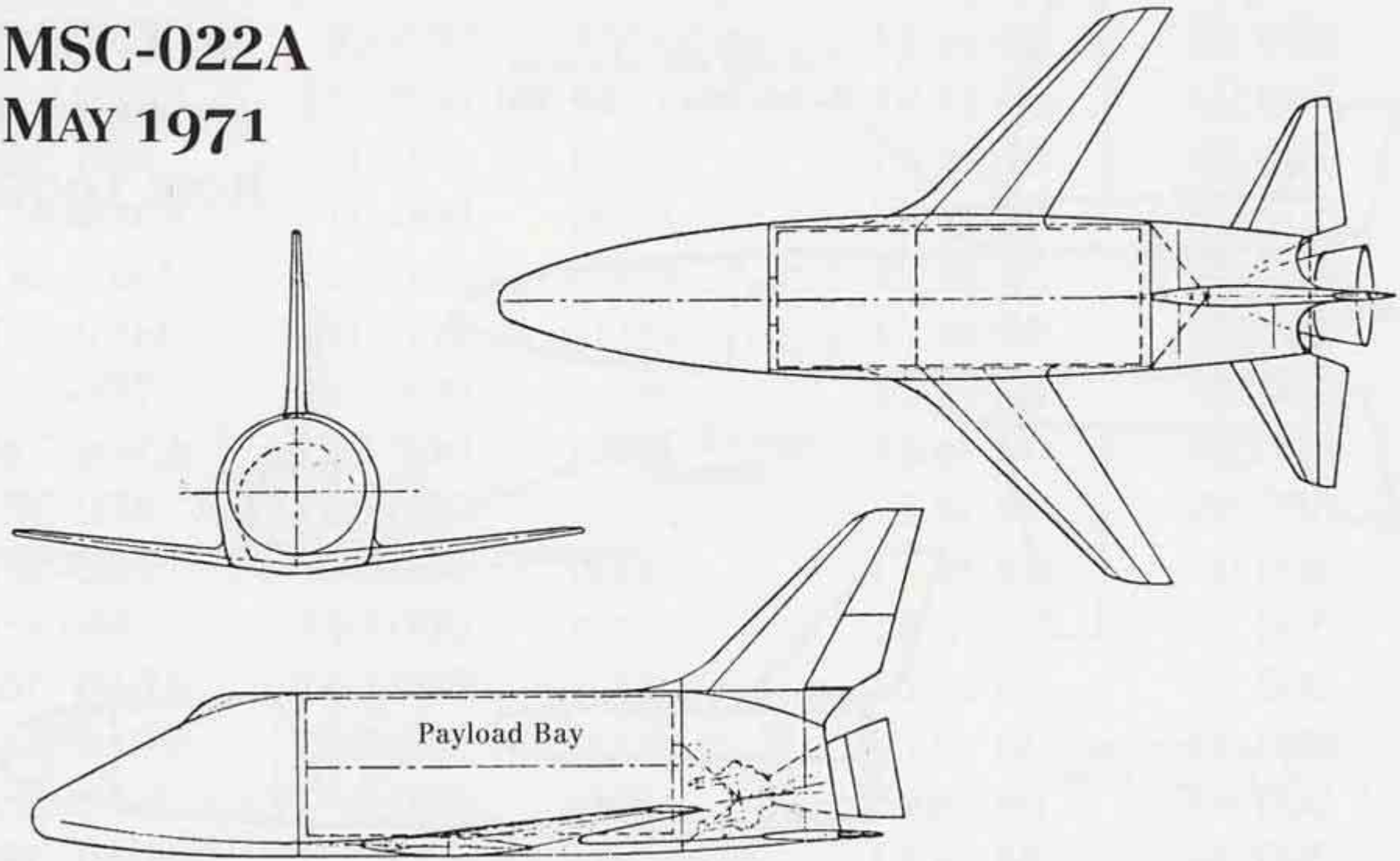
May 1971



MSC-022A
May 1971



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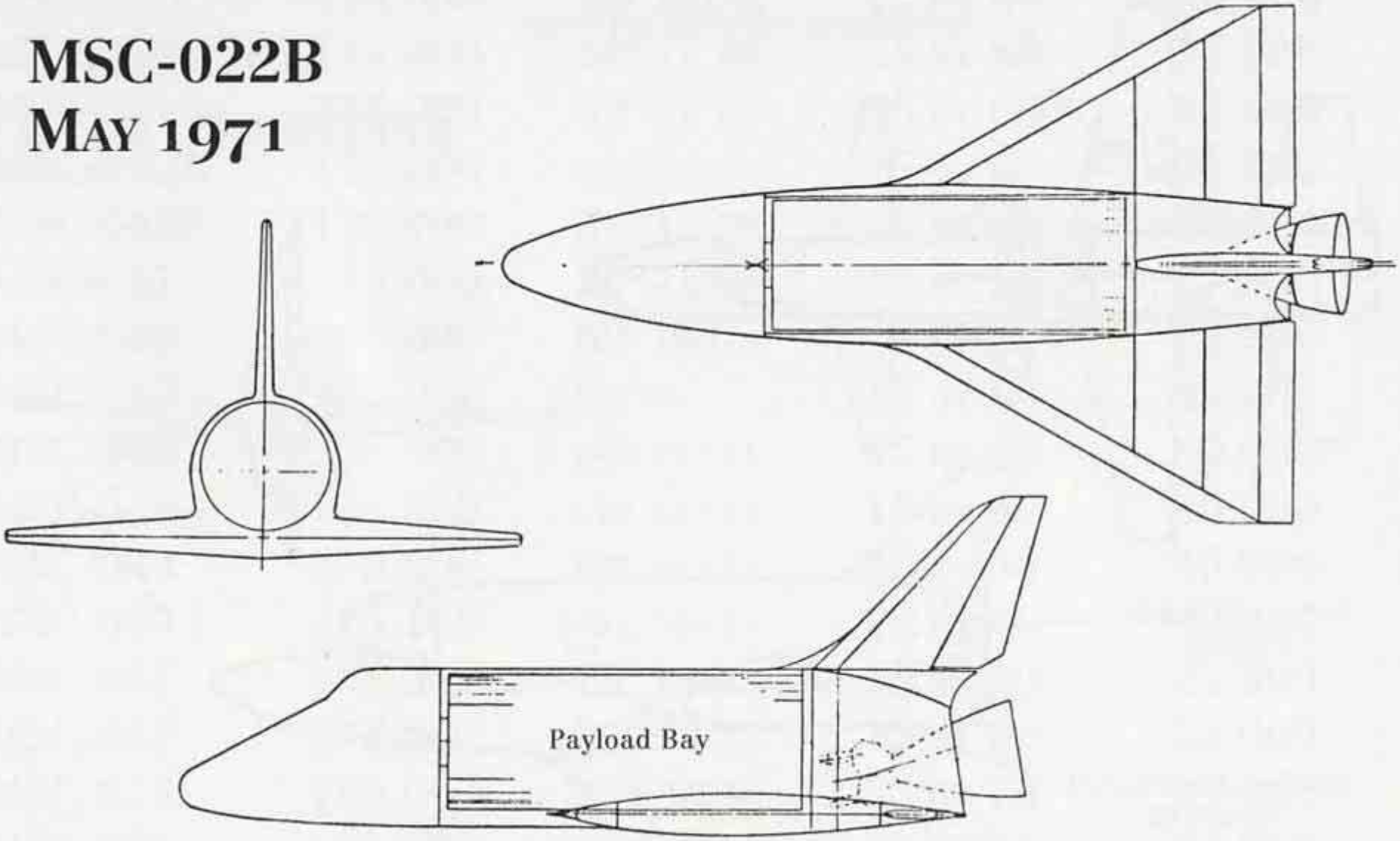
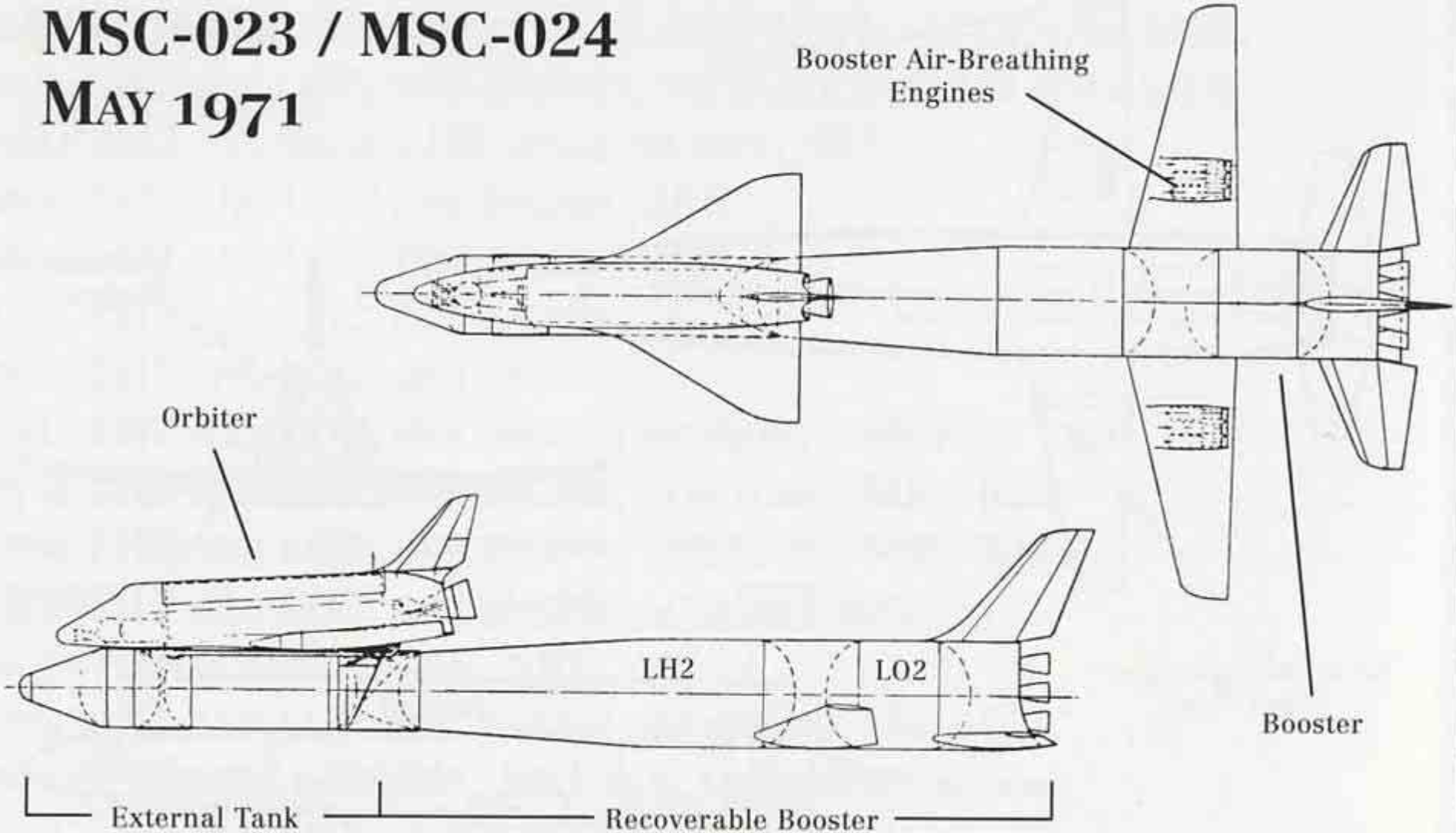
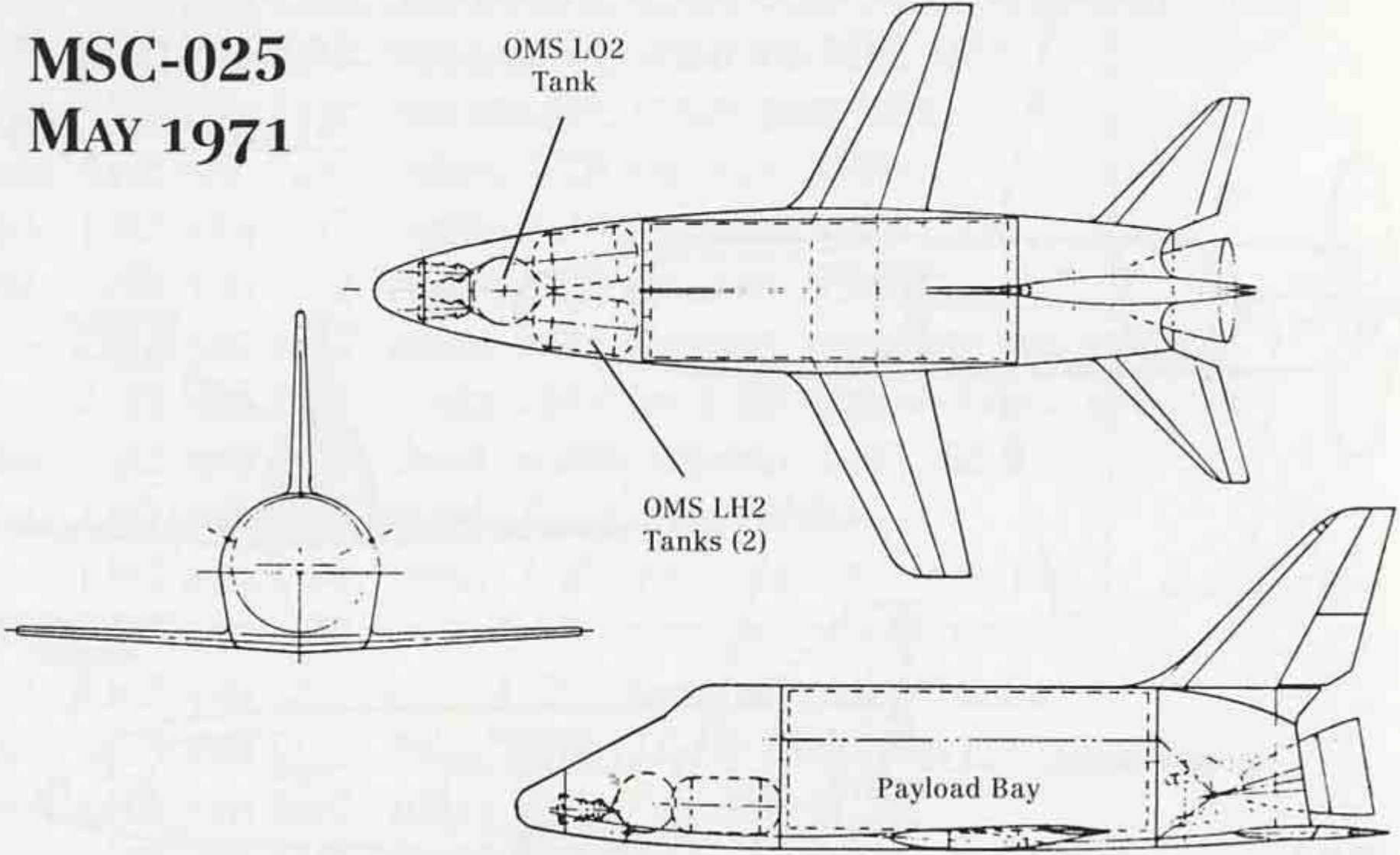


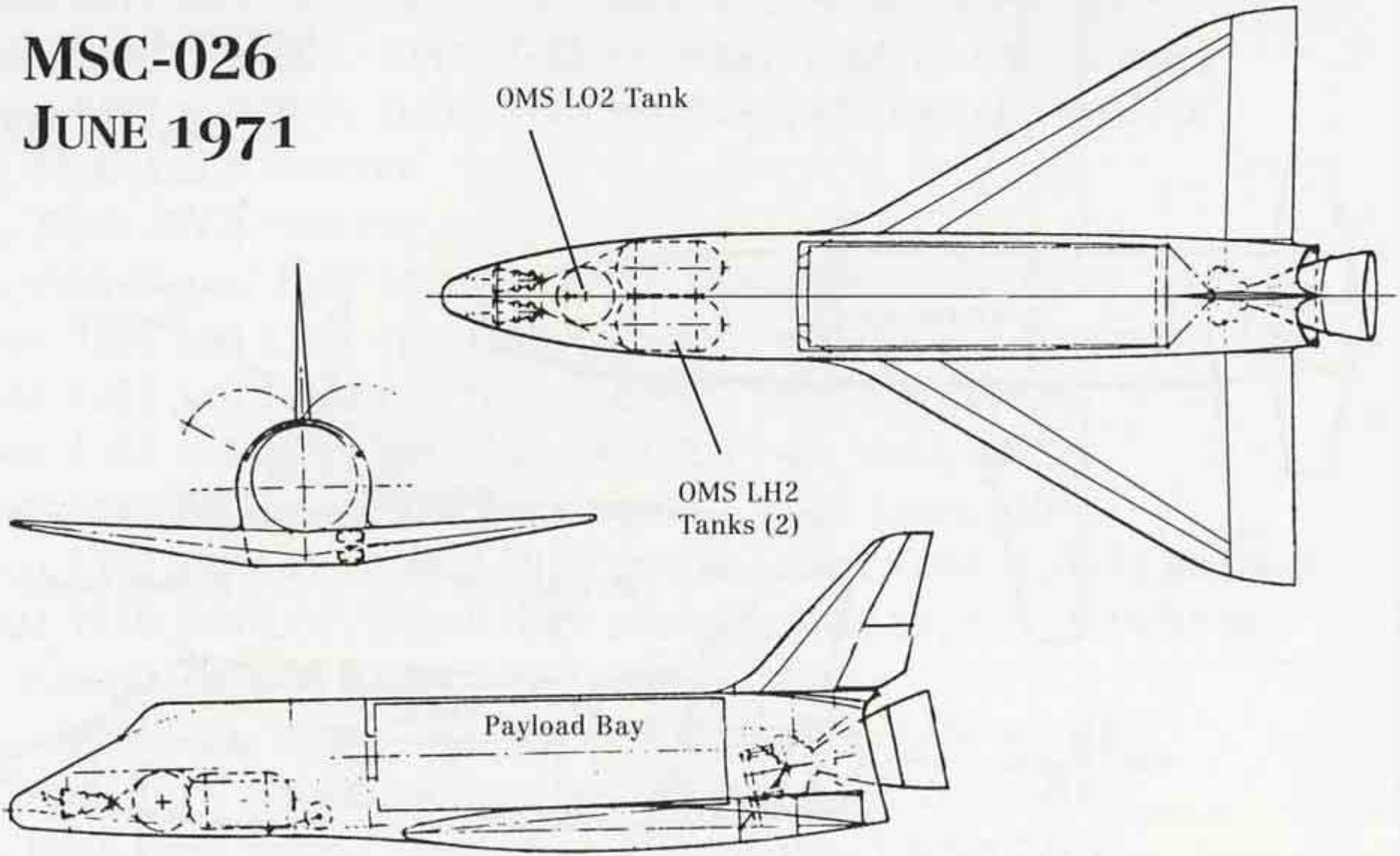
MSC-023 / MSC-024
MAY 1971



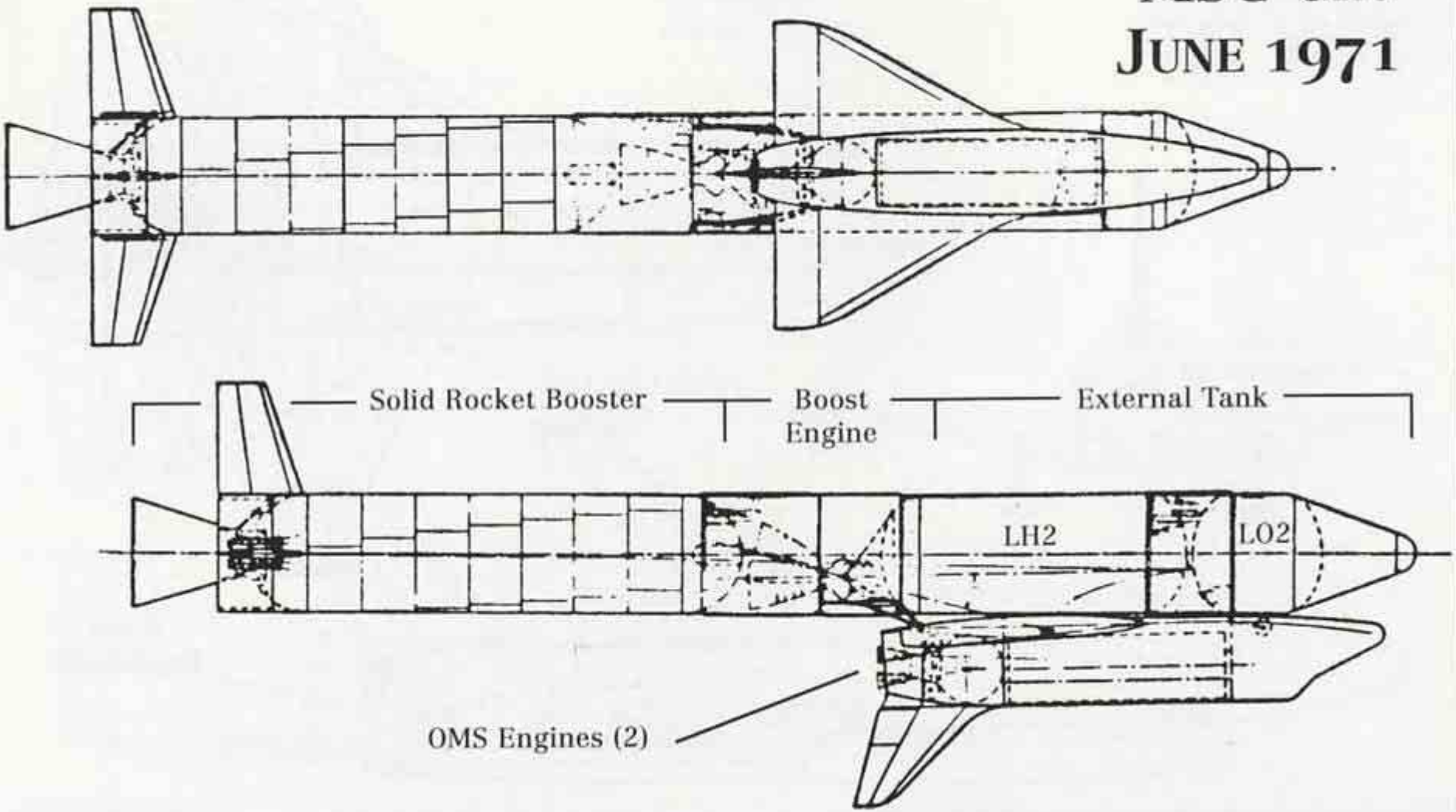
MSC-025
MAY 1971



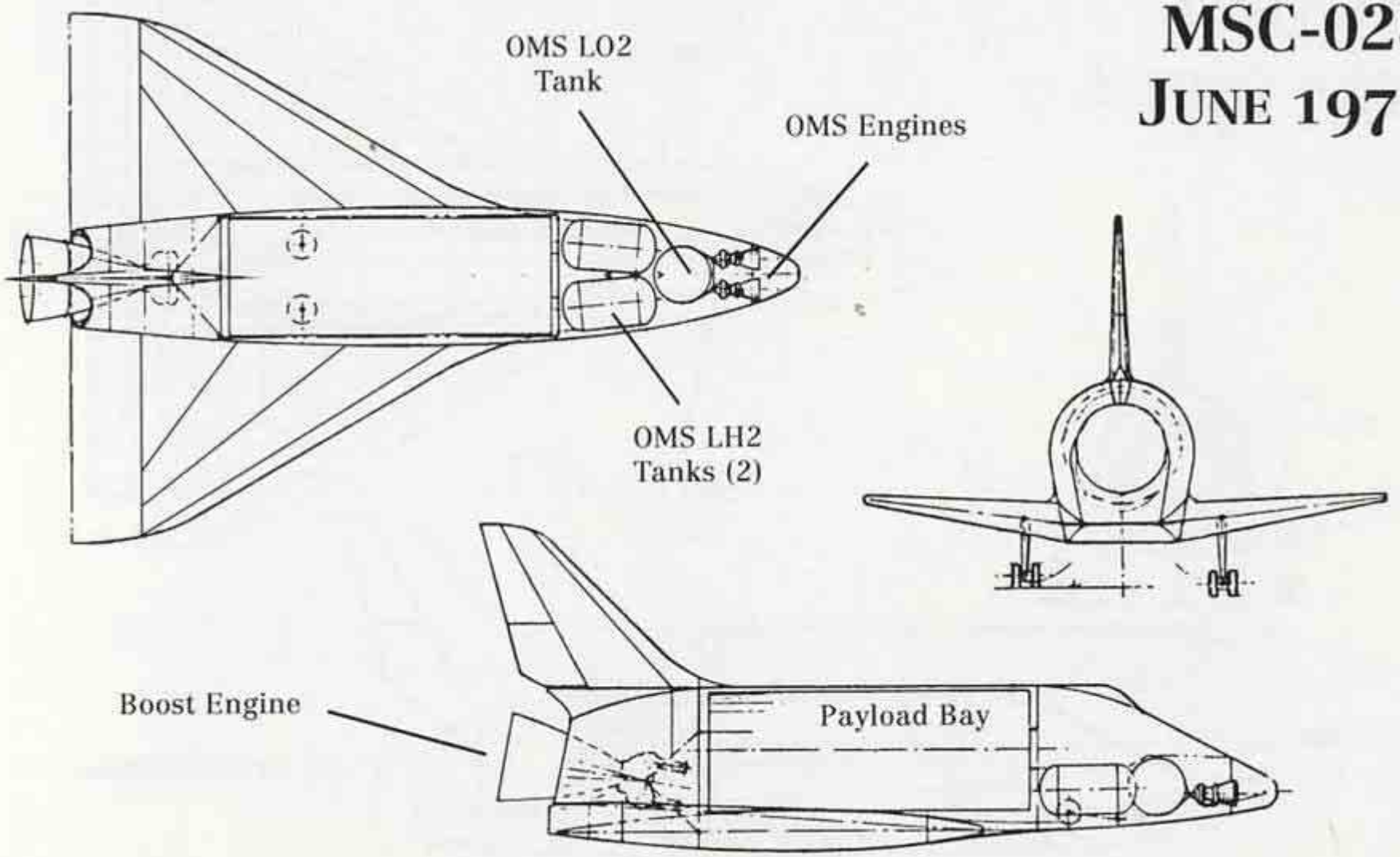
MSC-026
JUNE 1971



MSC-027
JUNE 1971



MSC-028
JUNE 1971



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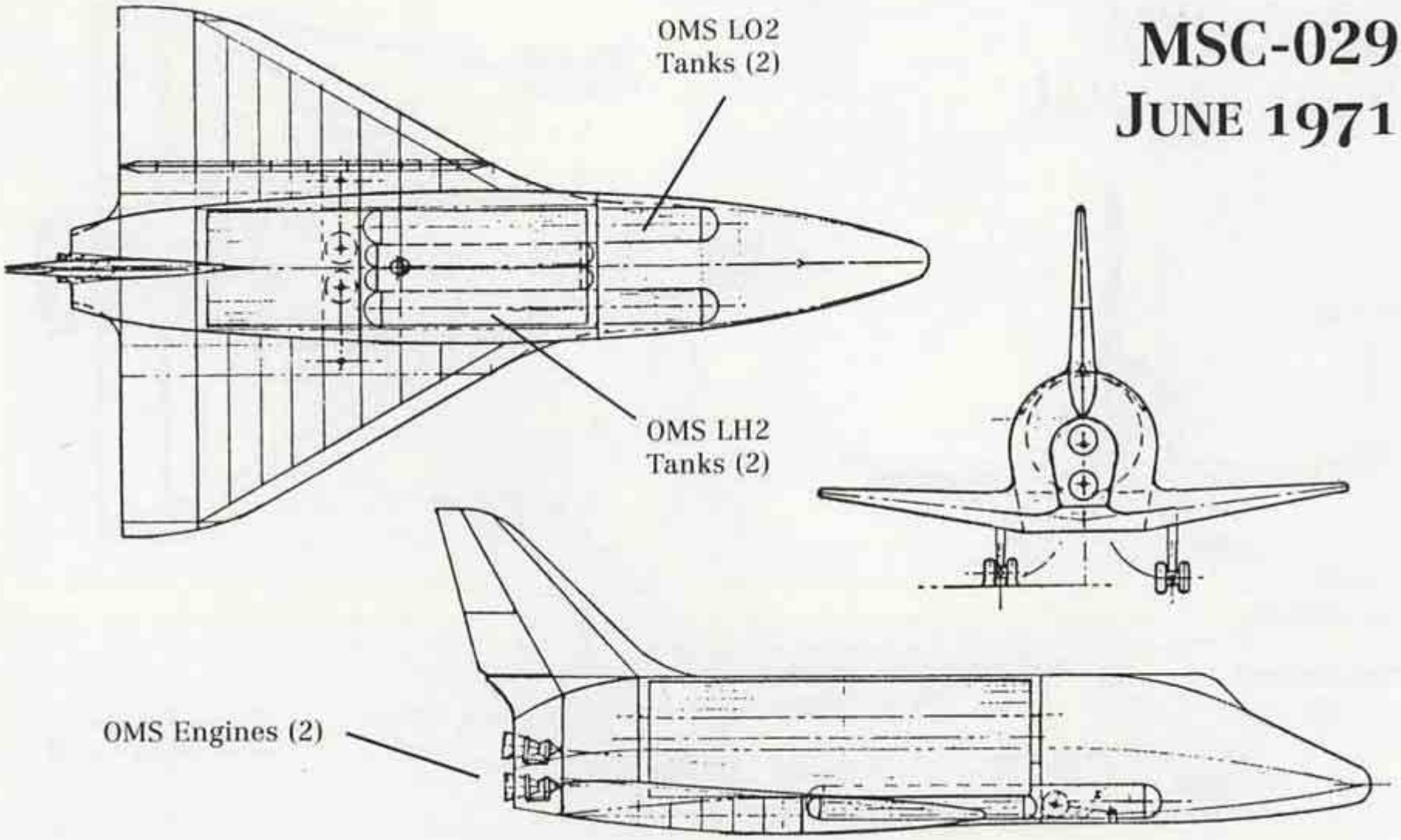
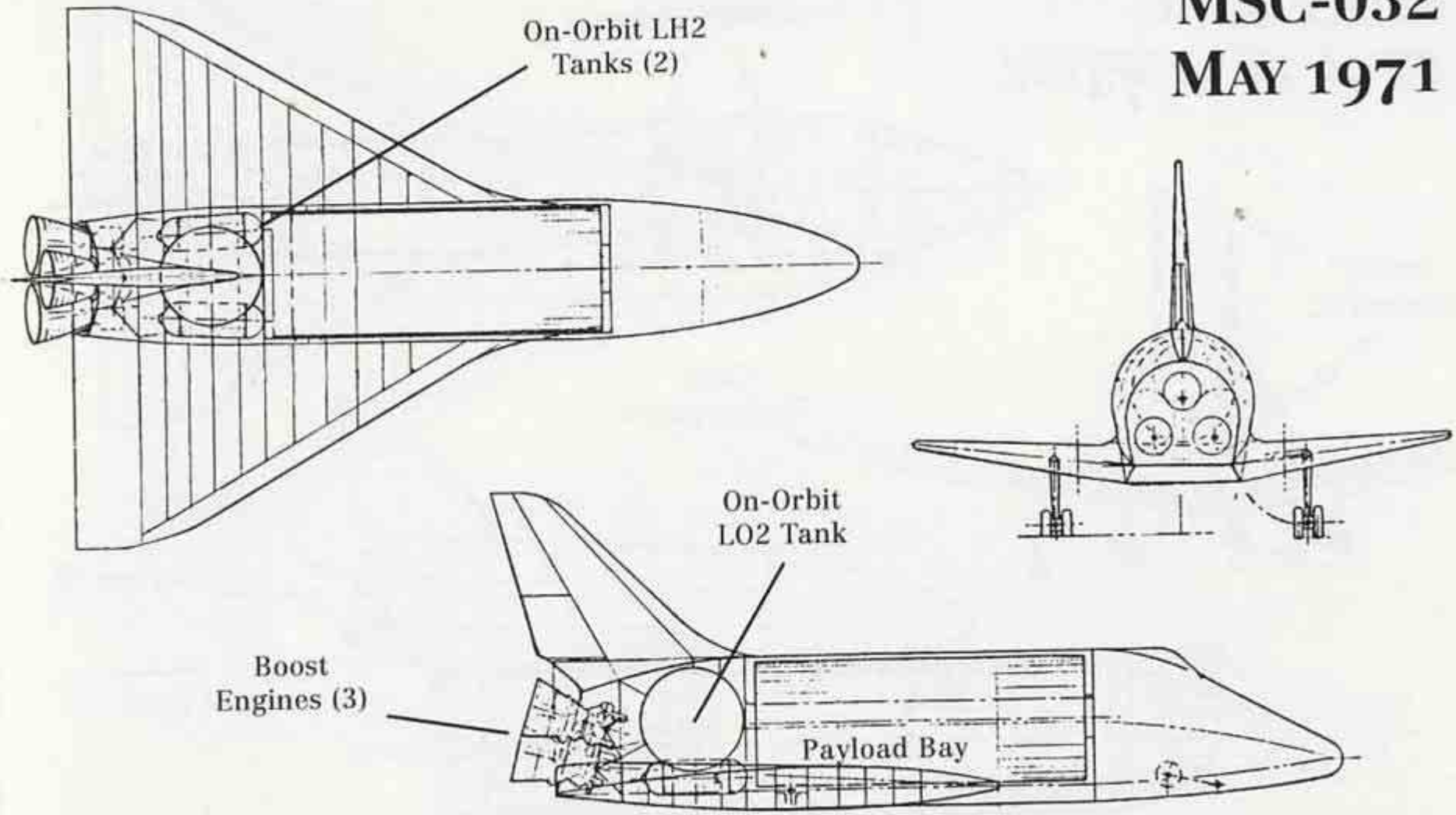
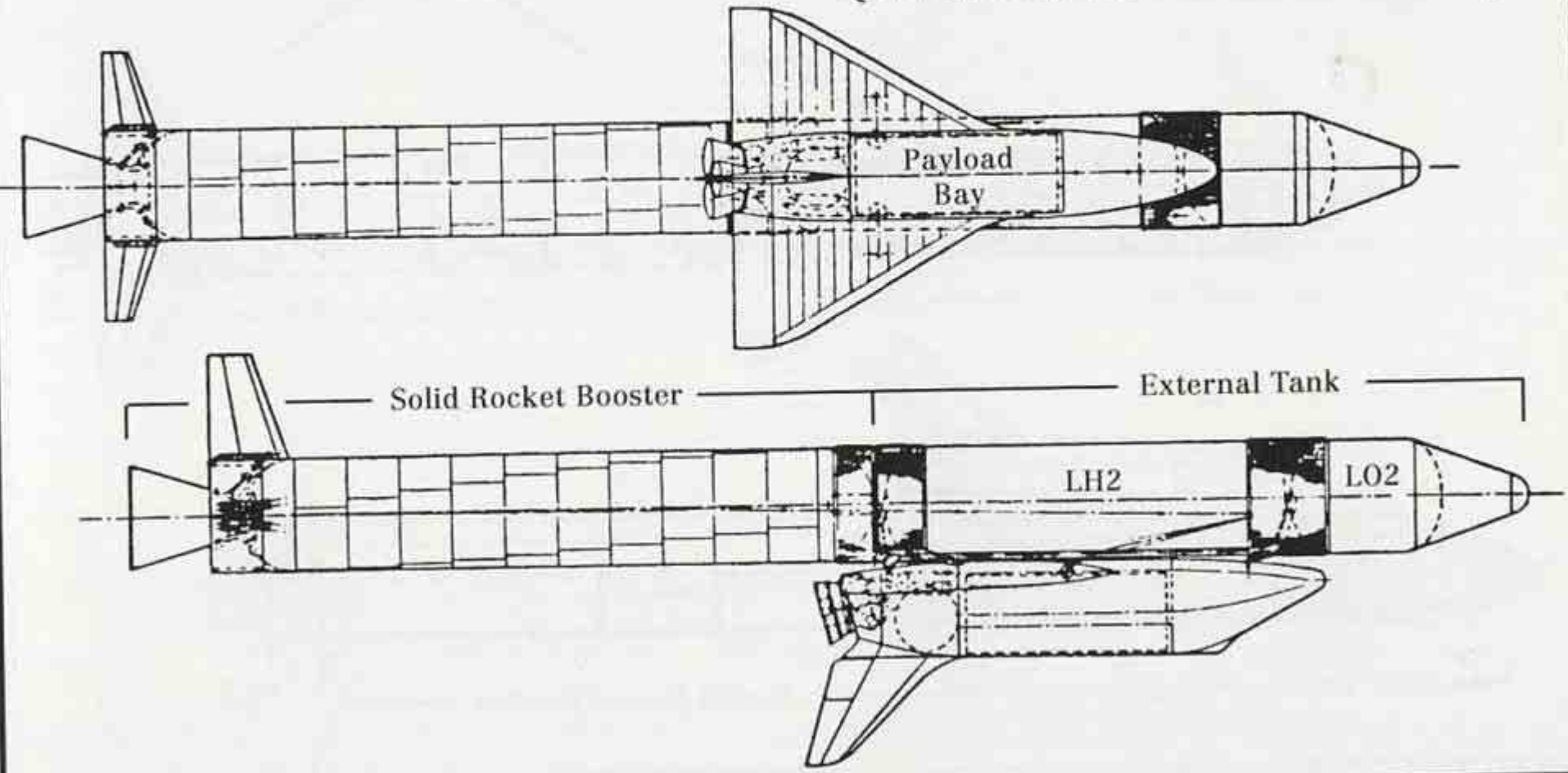
JUNE 1971



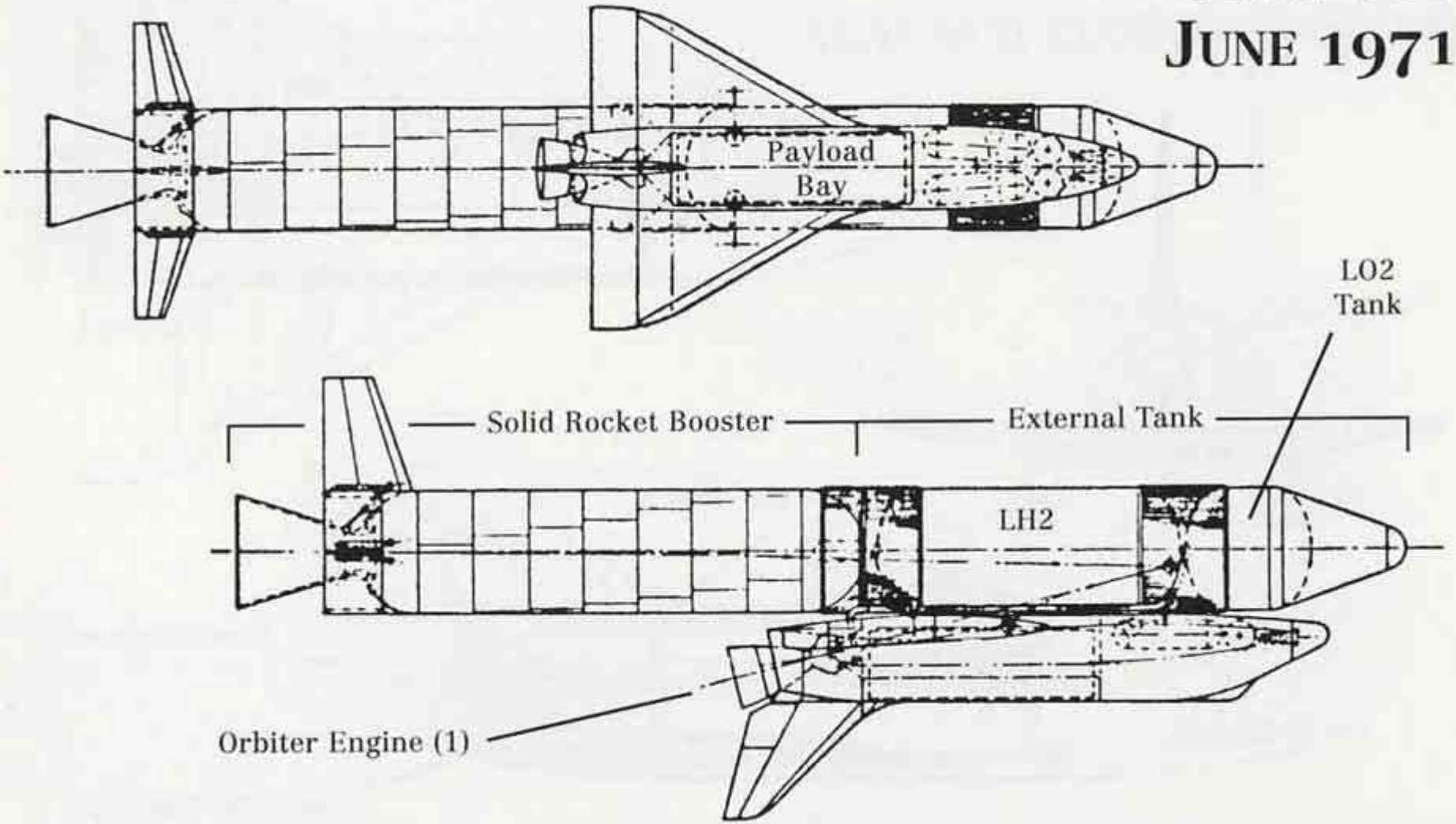
MSC-032
MAY 1971



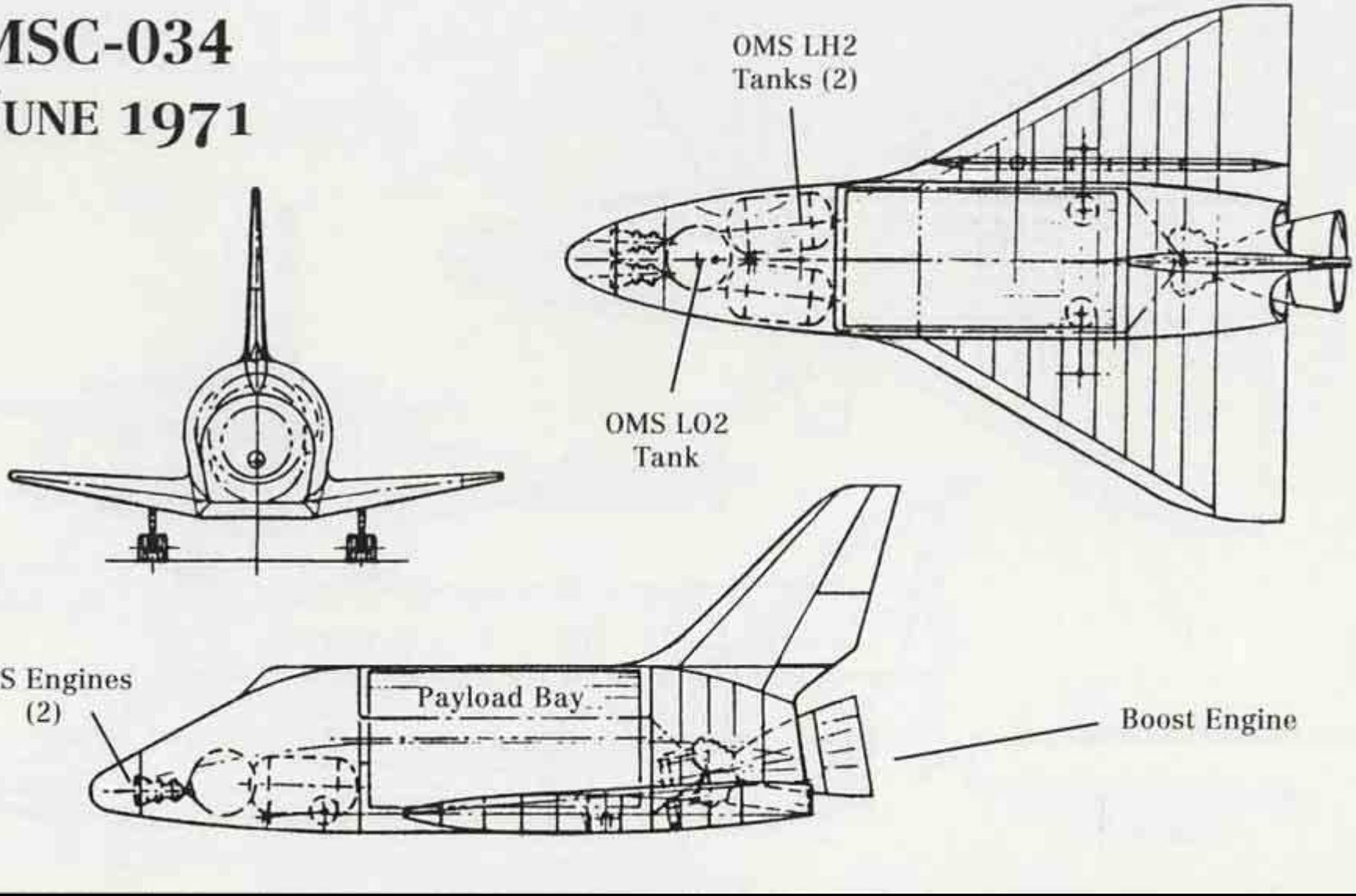
MSC-032
(LAUNCH CONFIGURATION)



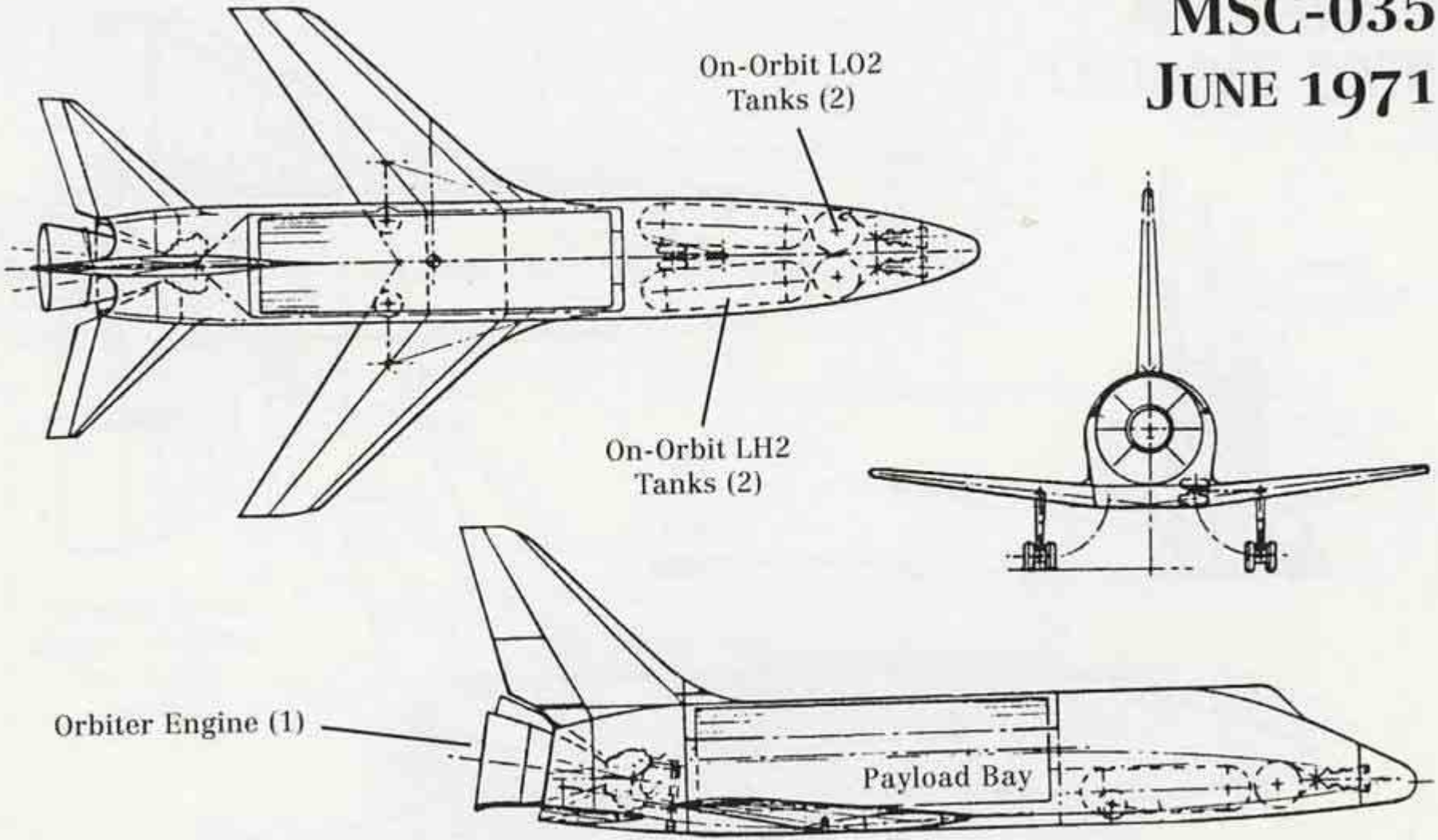
MSC-033
JUNE 1971



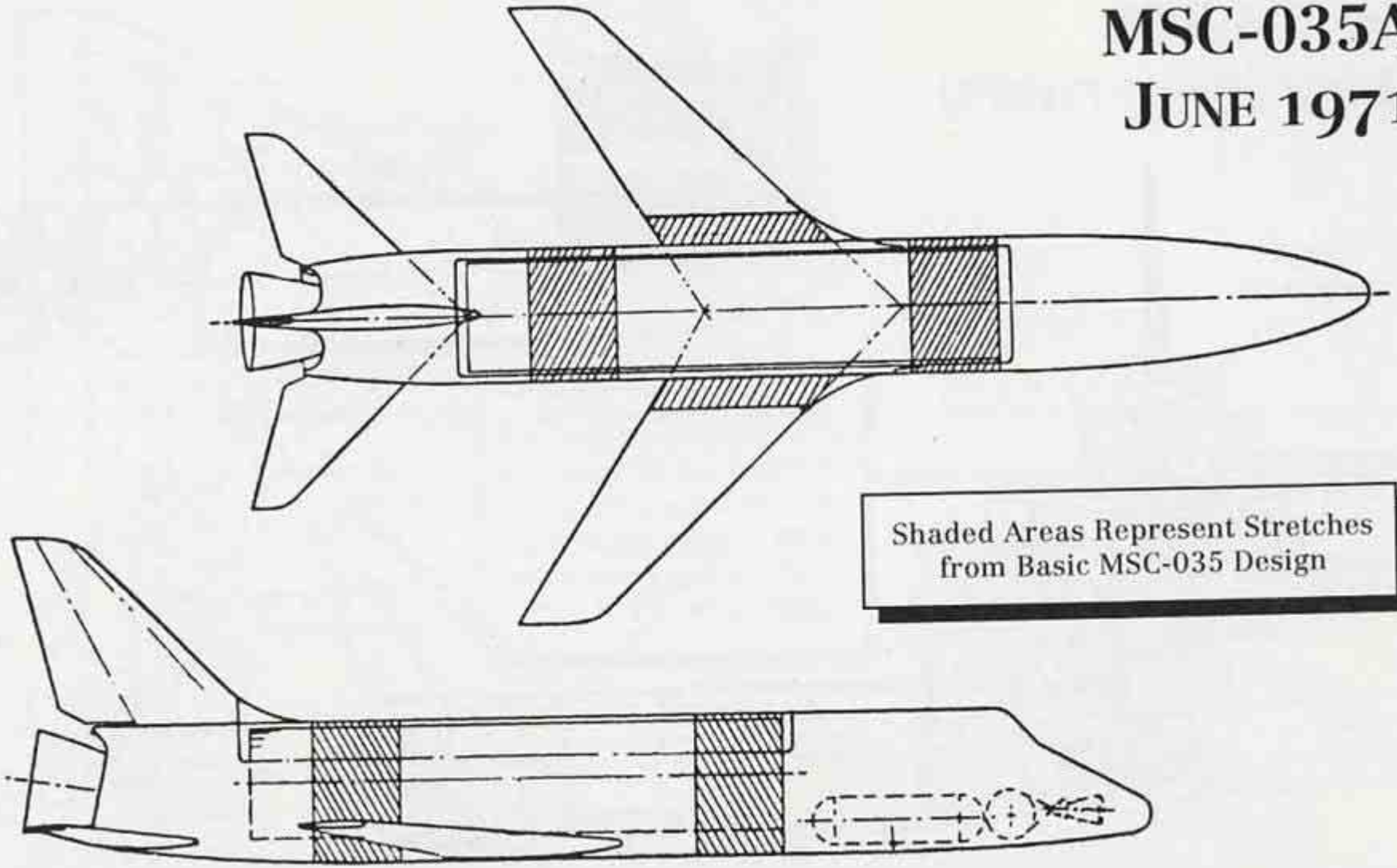
MSC-034
JUNE 1971



MSC-035
JUNE 1971

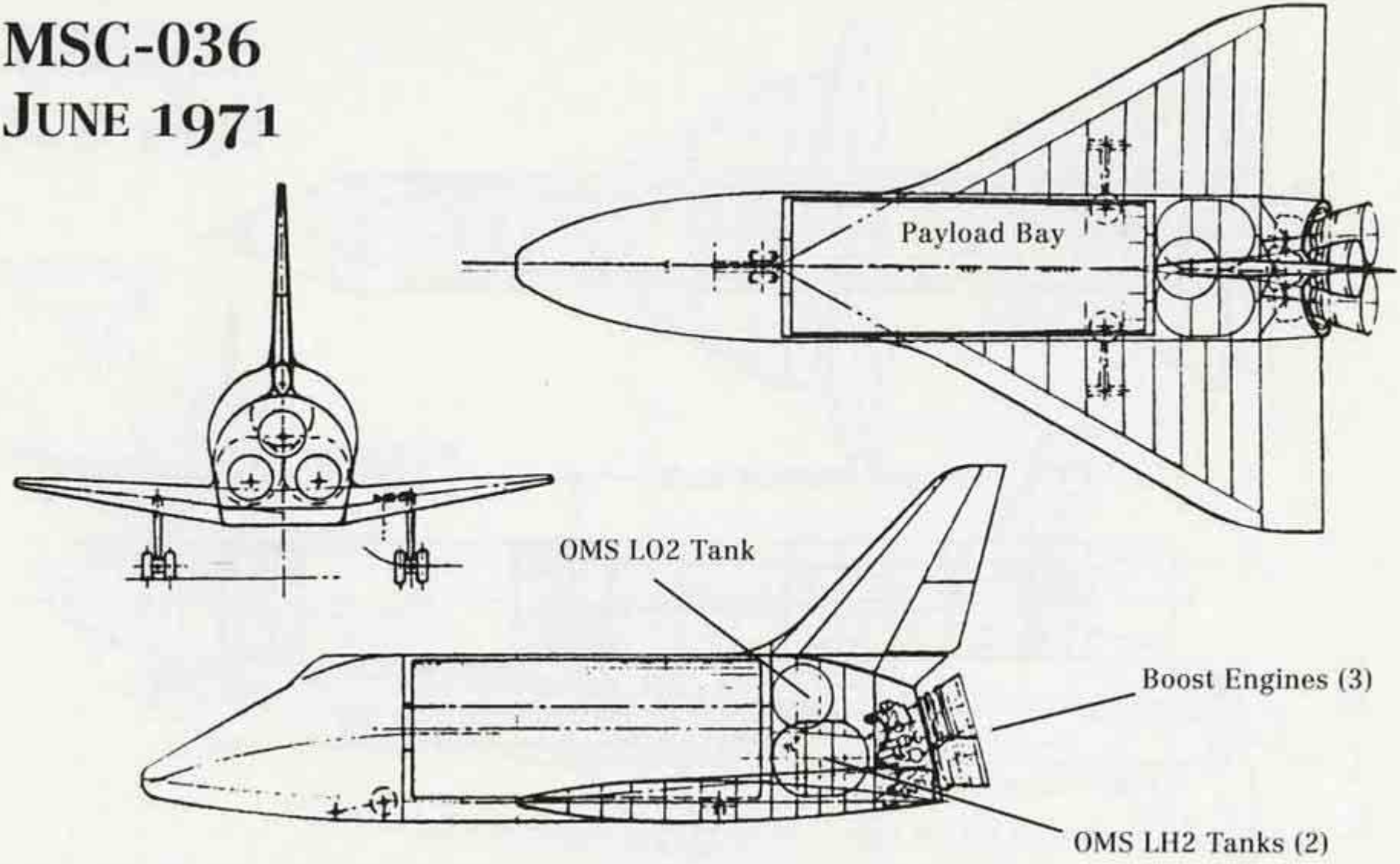


MSC-035A
JUNE 1971

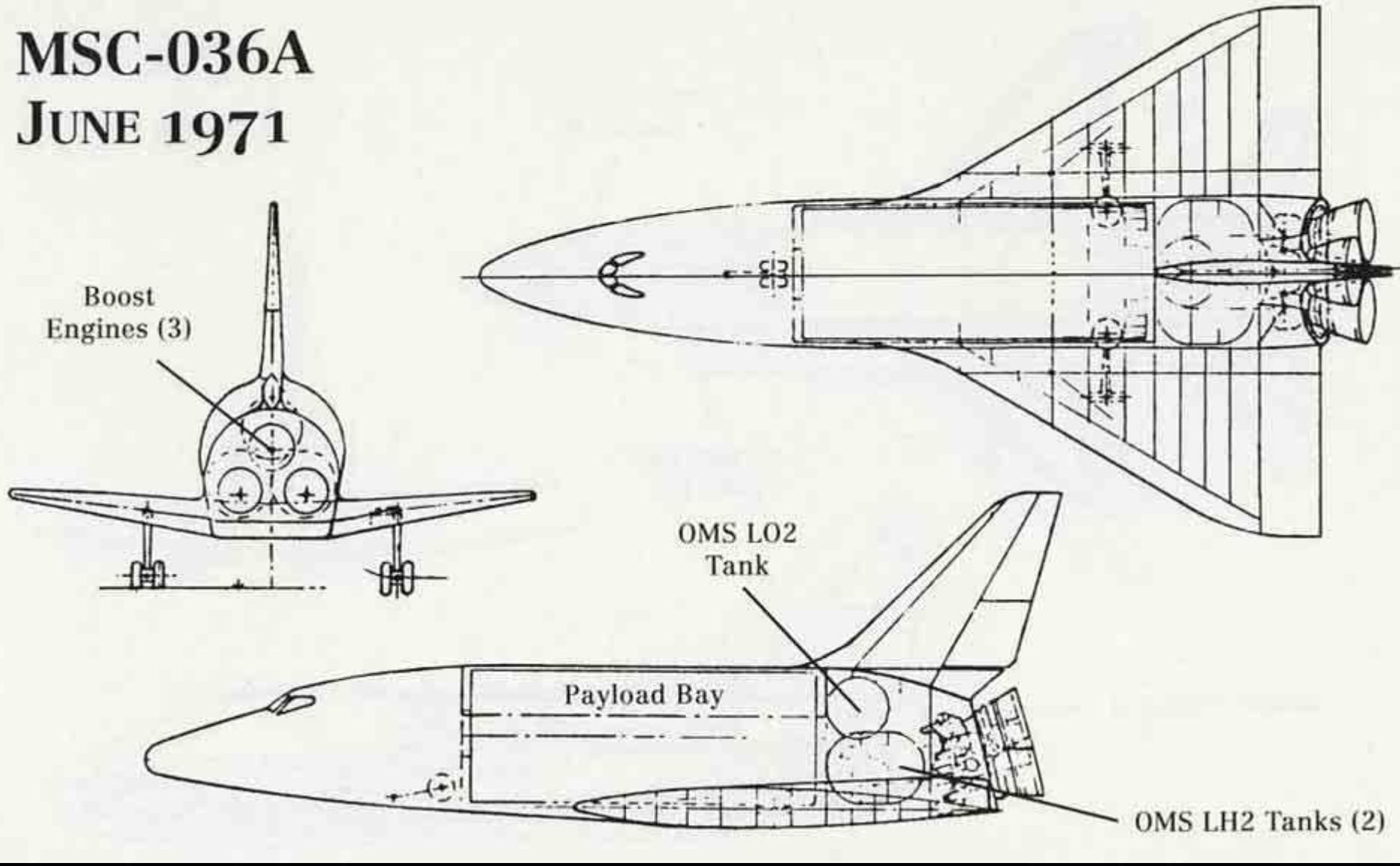


Shaded Areas Represent Stretches
from Basic MSC-035 Design

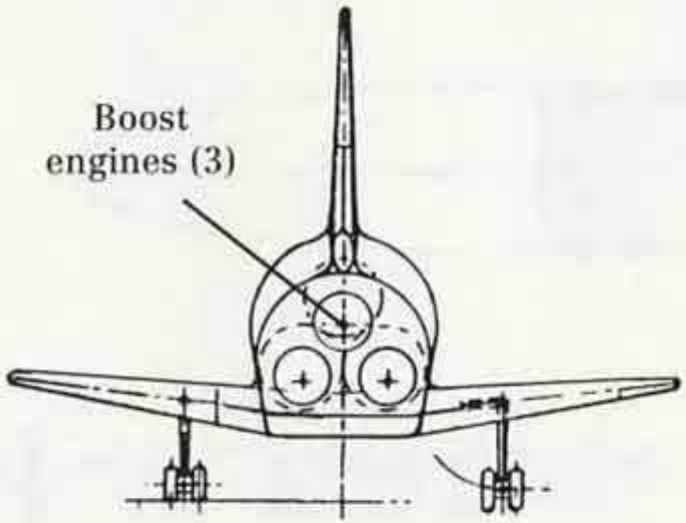
MSC-036
JUNE 1971

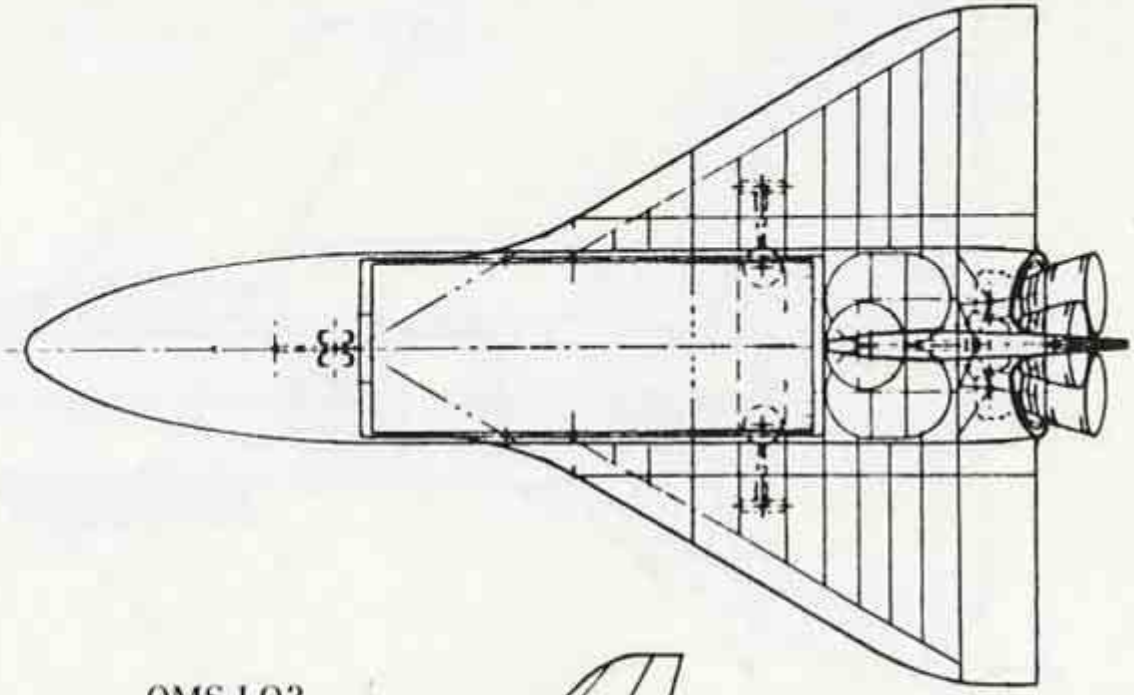


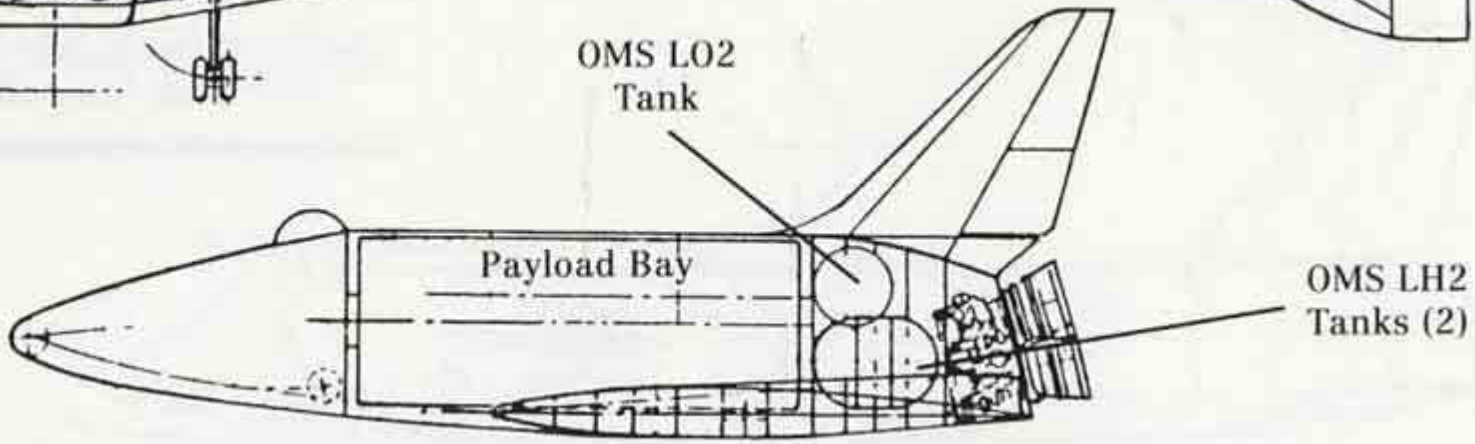
MSC-036A
JUNE 1971



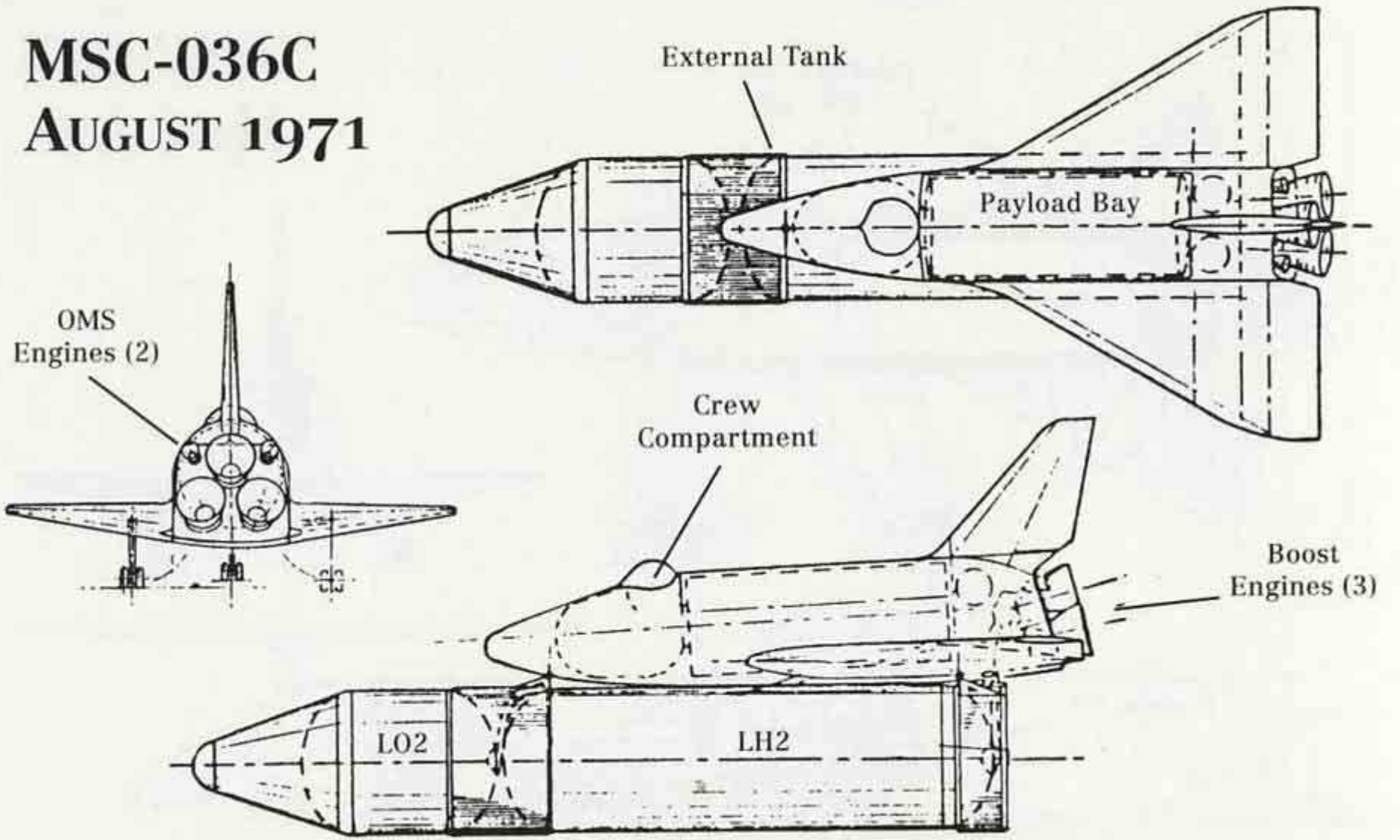
MSC-036B
JULY 1971



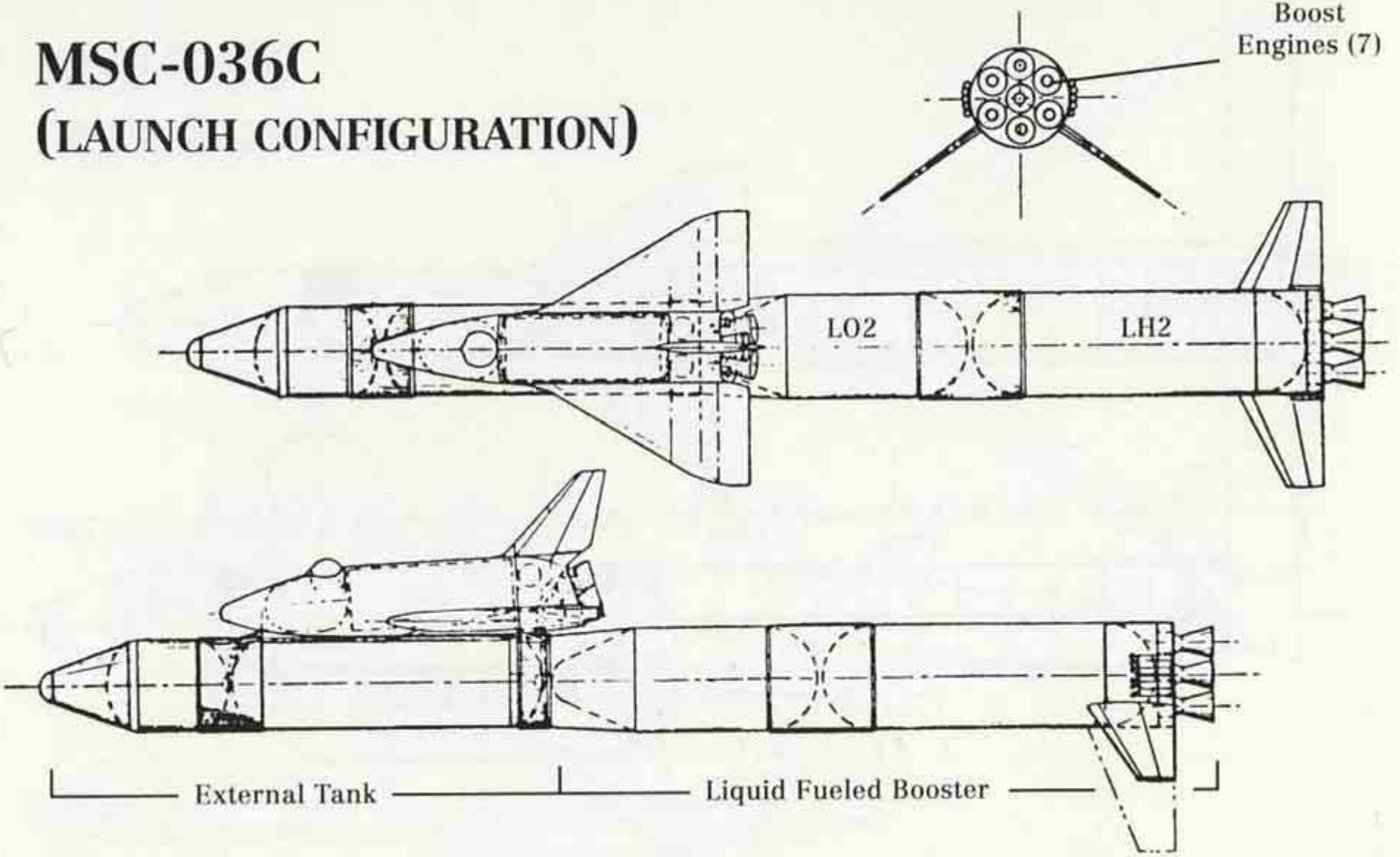




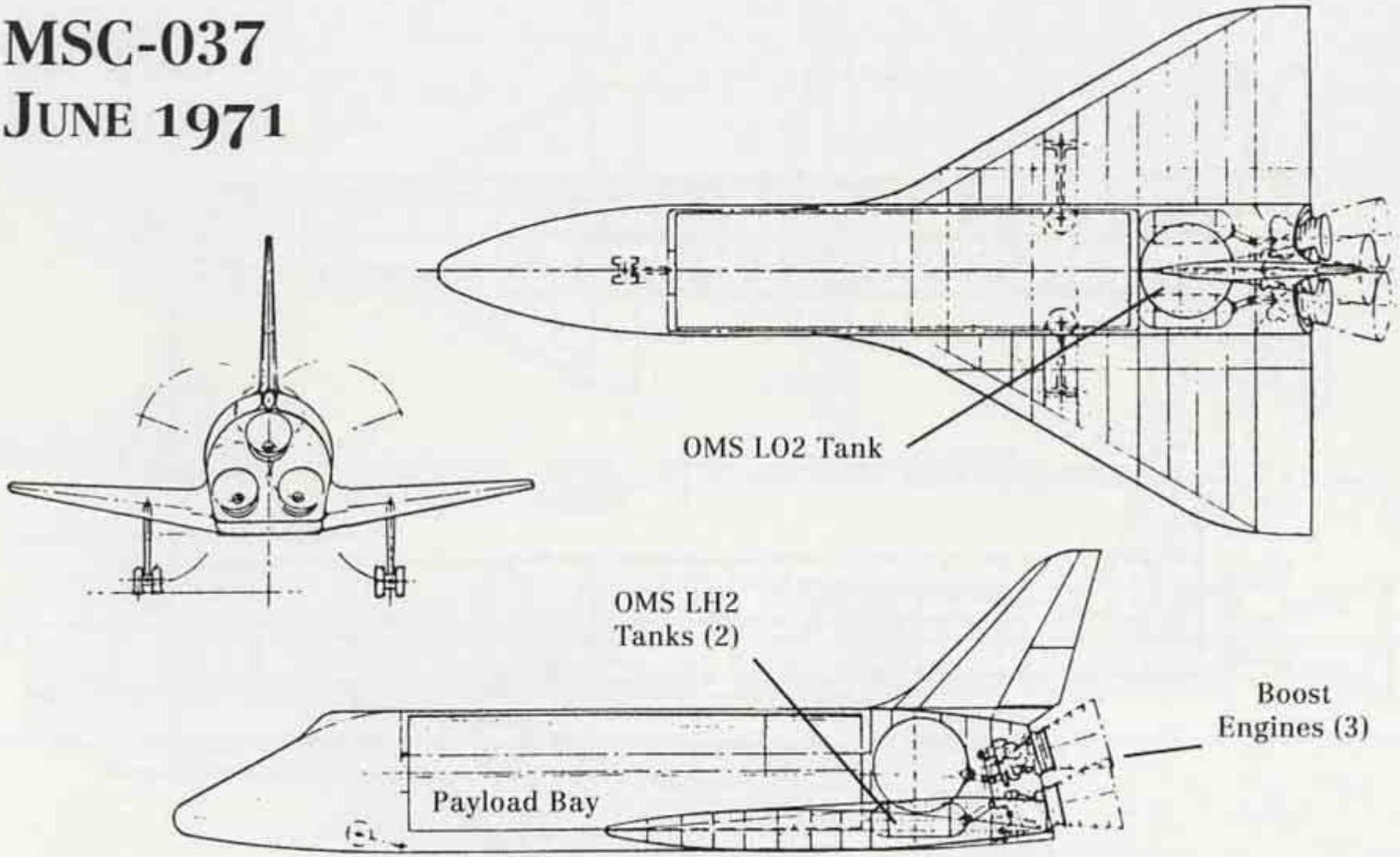
MSC-036C
AUGUST 1971



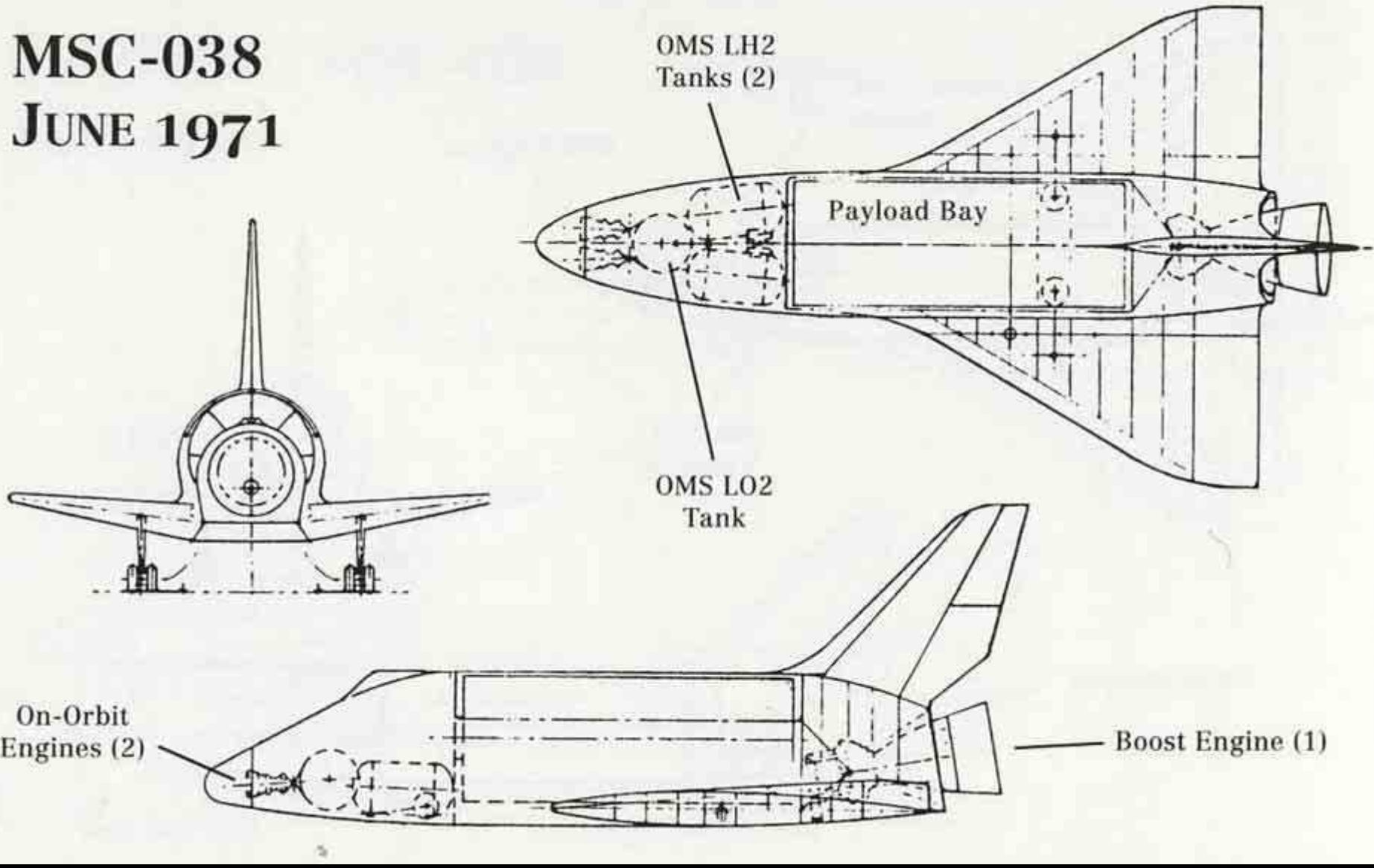
MSC-036C
(LAUNCH CONFIGURATION)



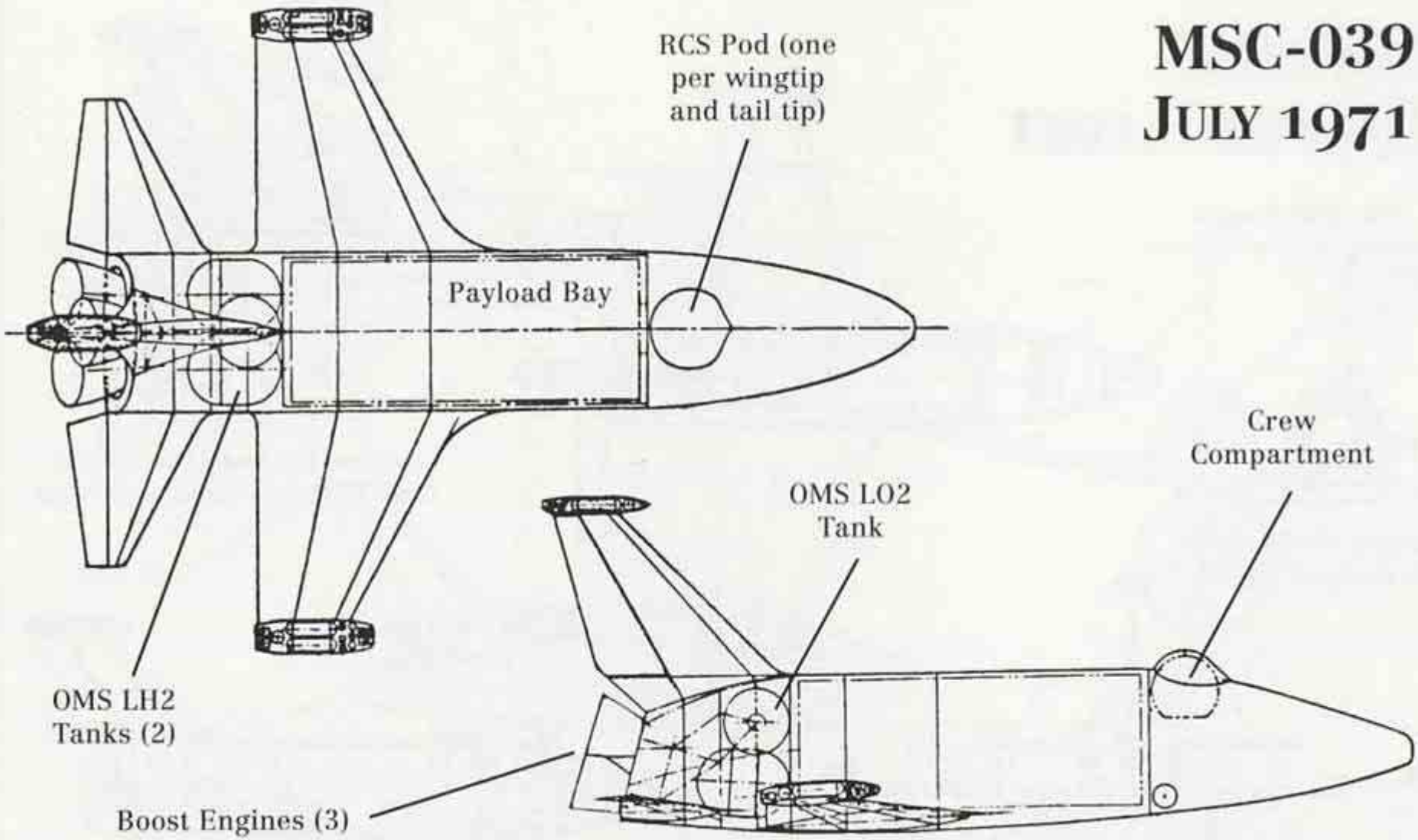
MSC-037
JUNE 1971



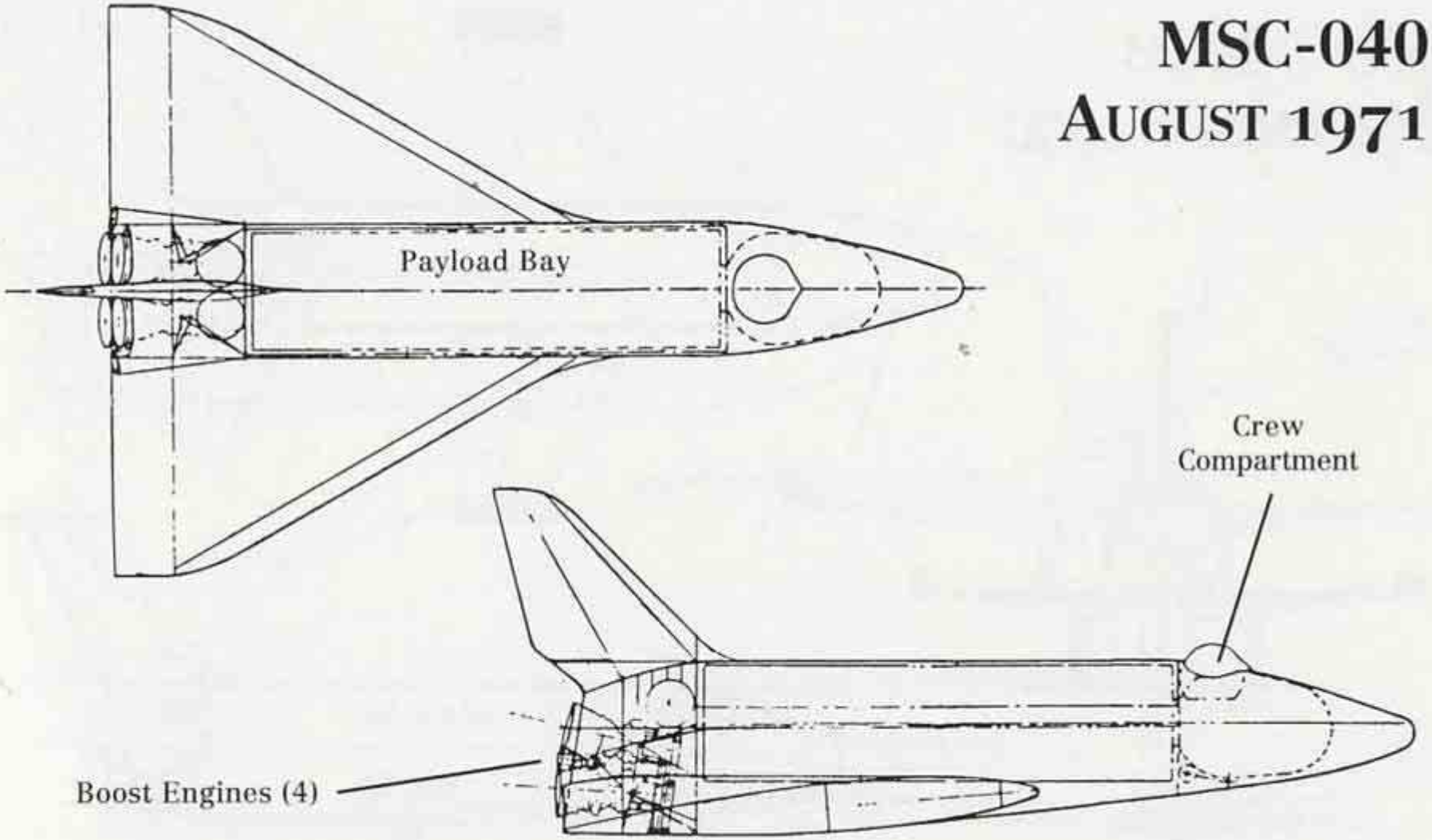
MSC-038
JUNE 1971



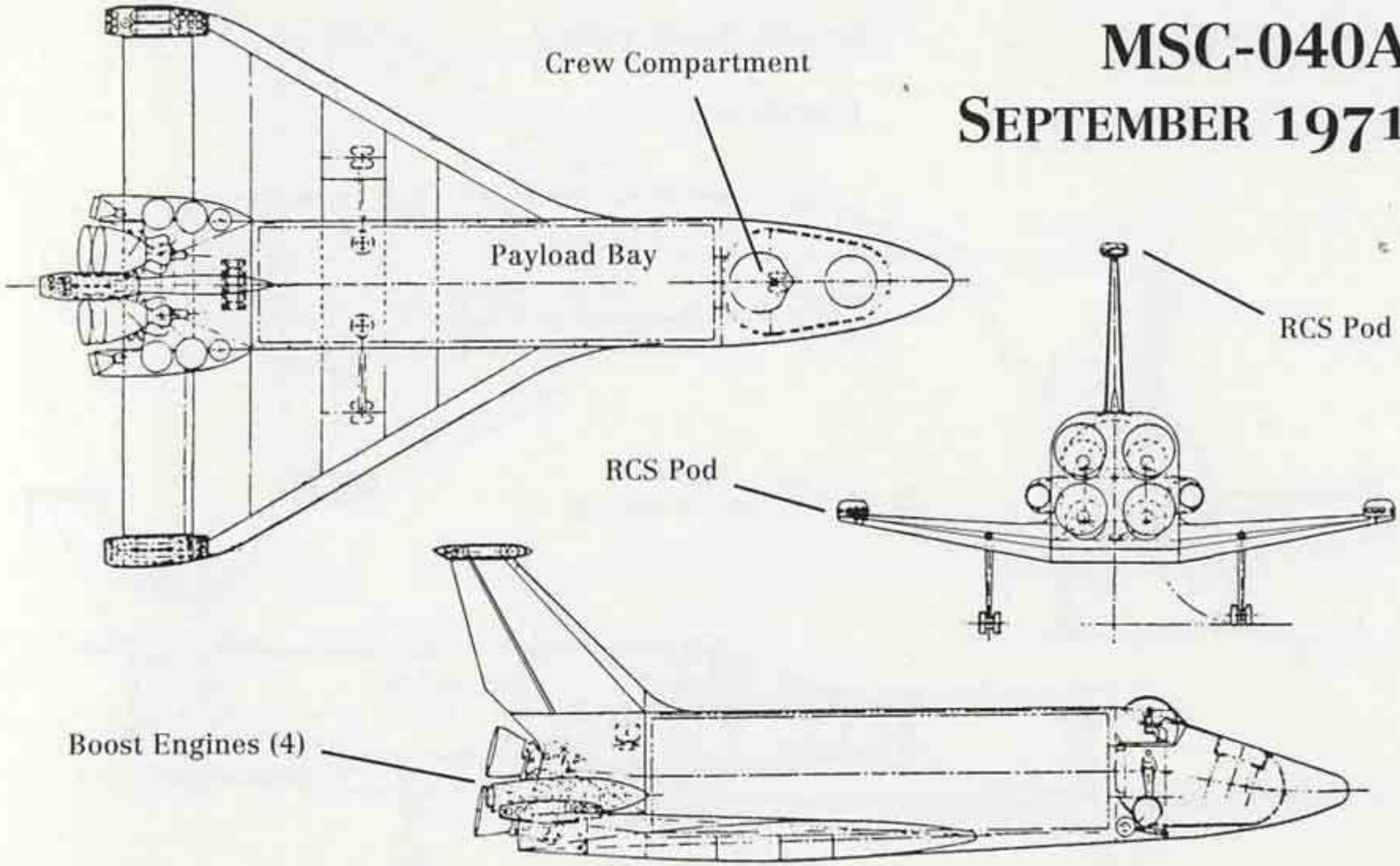
MSC-039
JULY 1971



MSC-040
AUGUST 1971



MSC-040A
SEPTEMBER 1971



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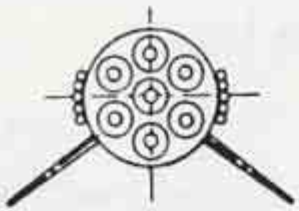
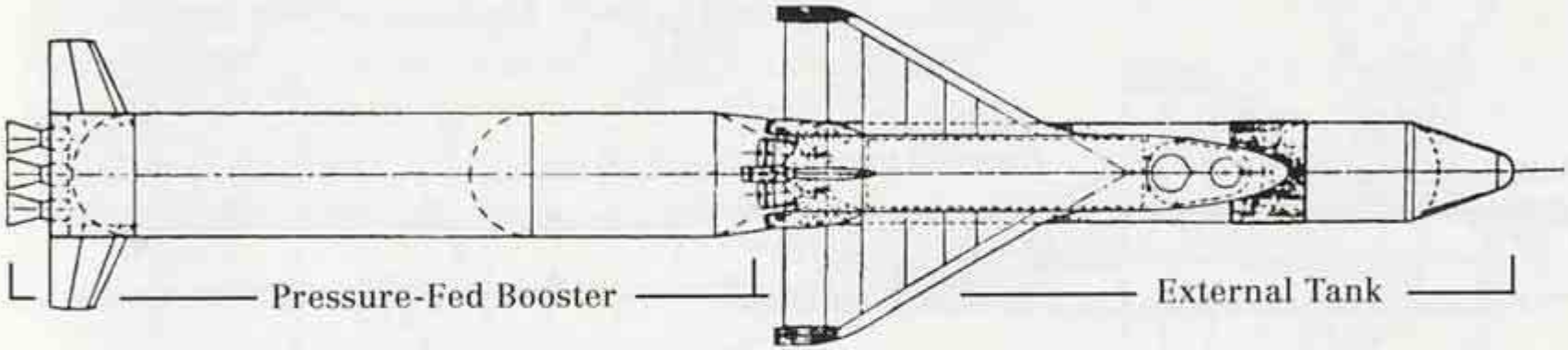
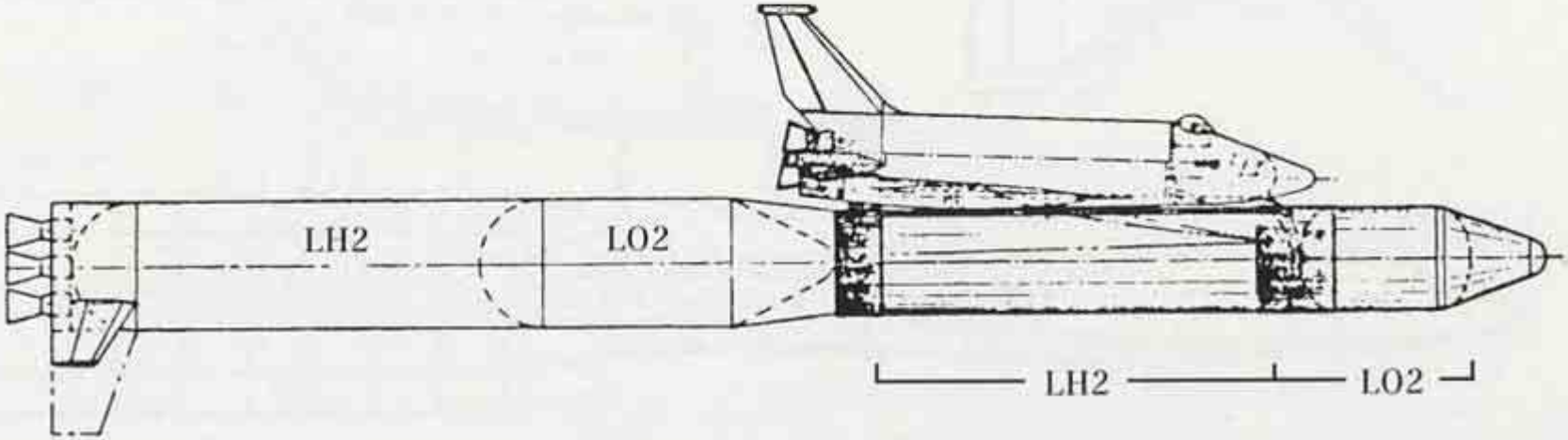
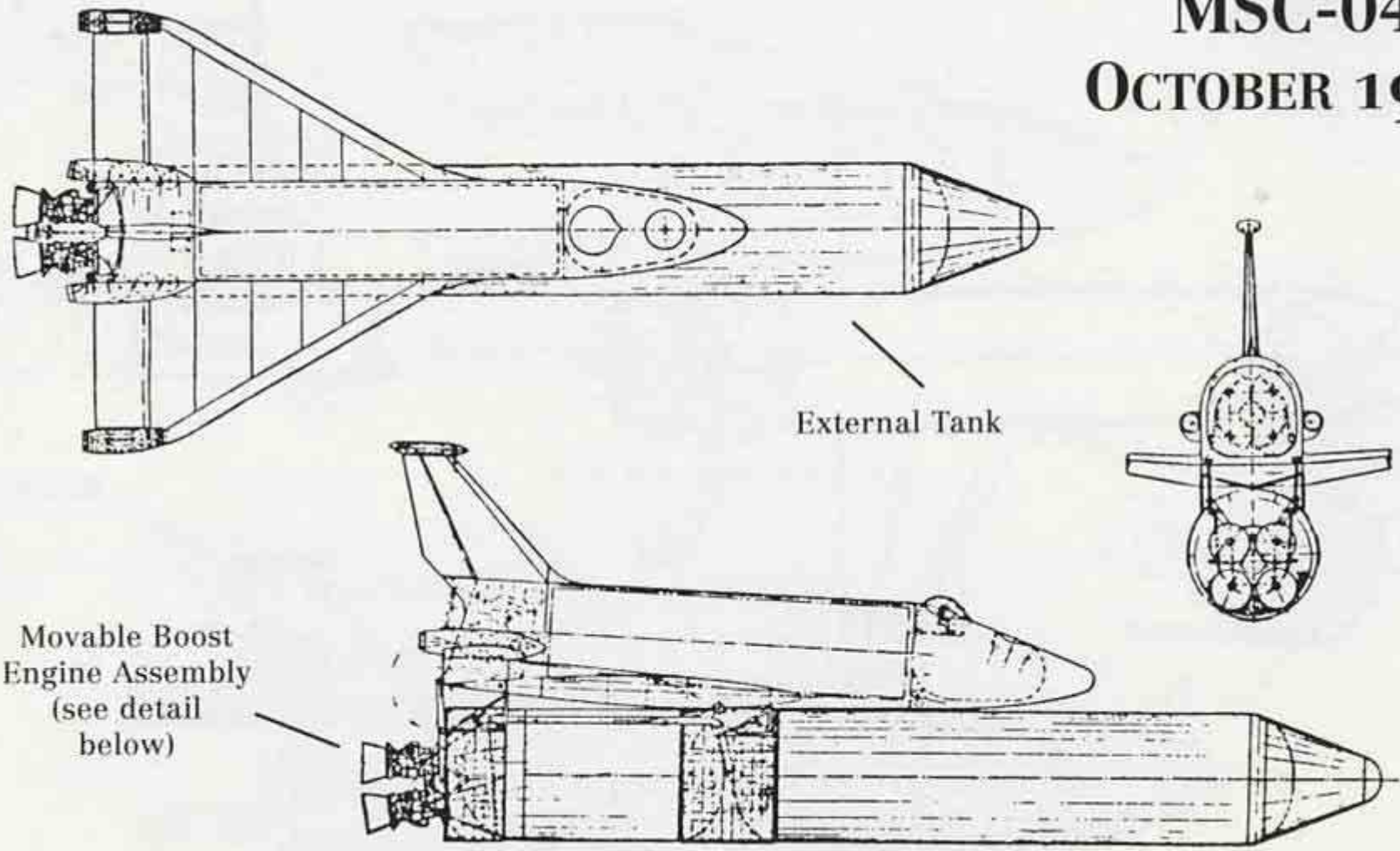
(LAUNCH CONFIGURATION)



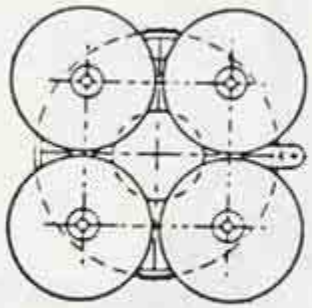




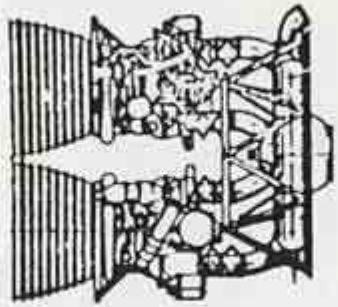
MSC-040B
October 1971

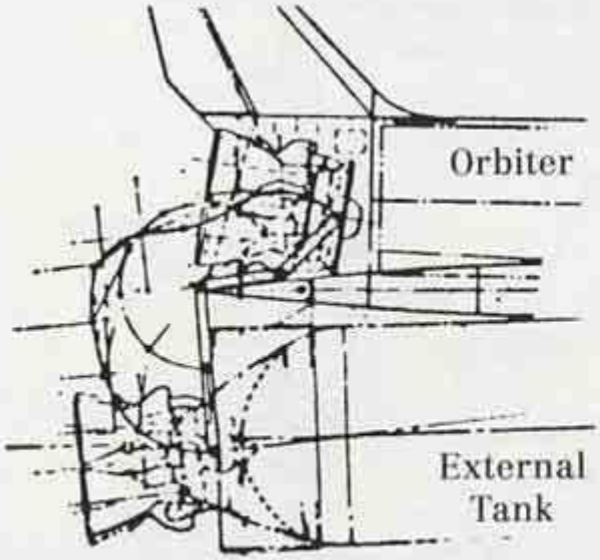


MSC-040B
(PROPULSION UNIT)

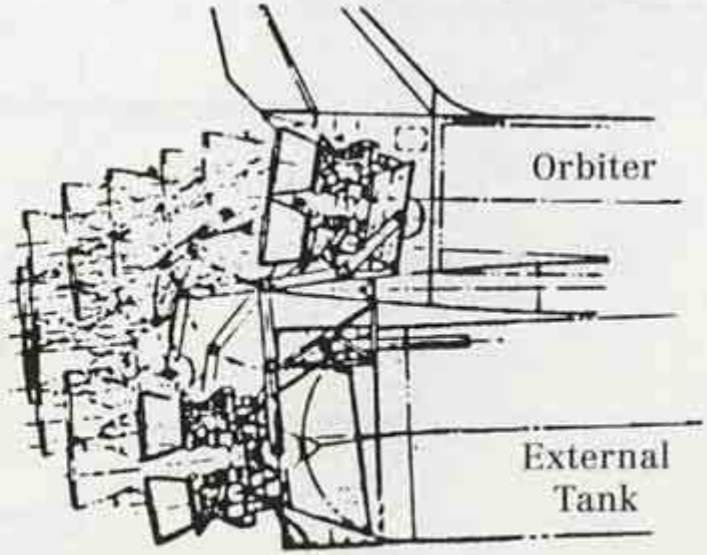


Main Engine
Assembly
(4 Engines)

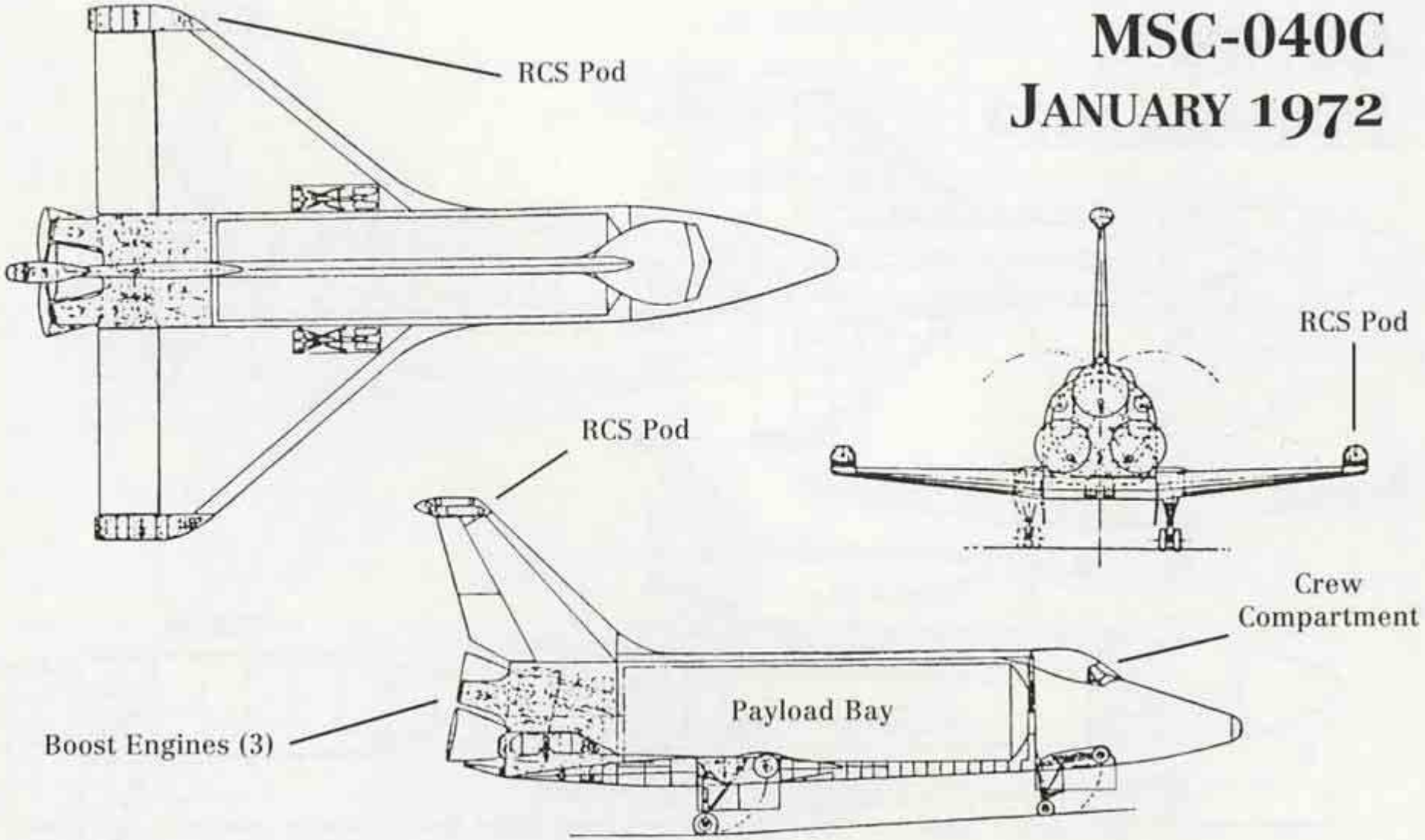




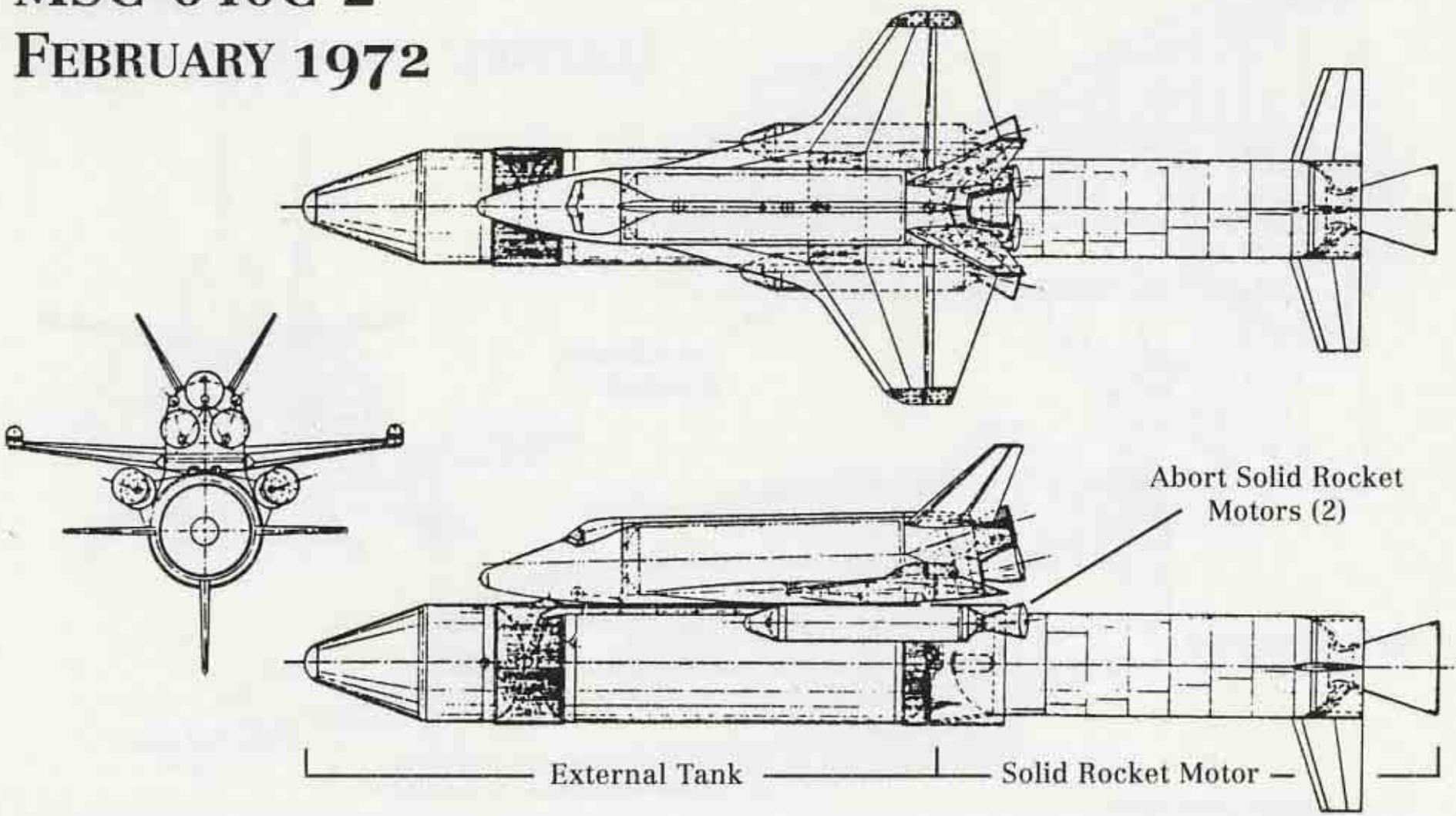
The engine assembly was mounted on the External Tank during the launch and boost phases, then transferred to the Orbiter prior to ET separation.



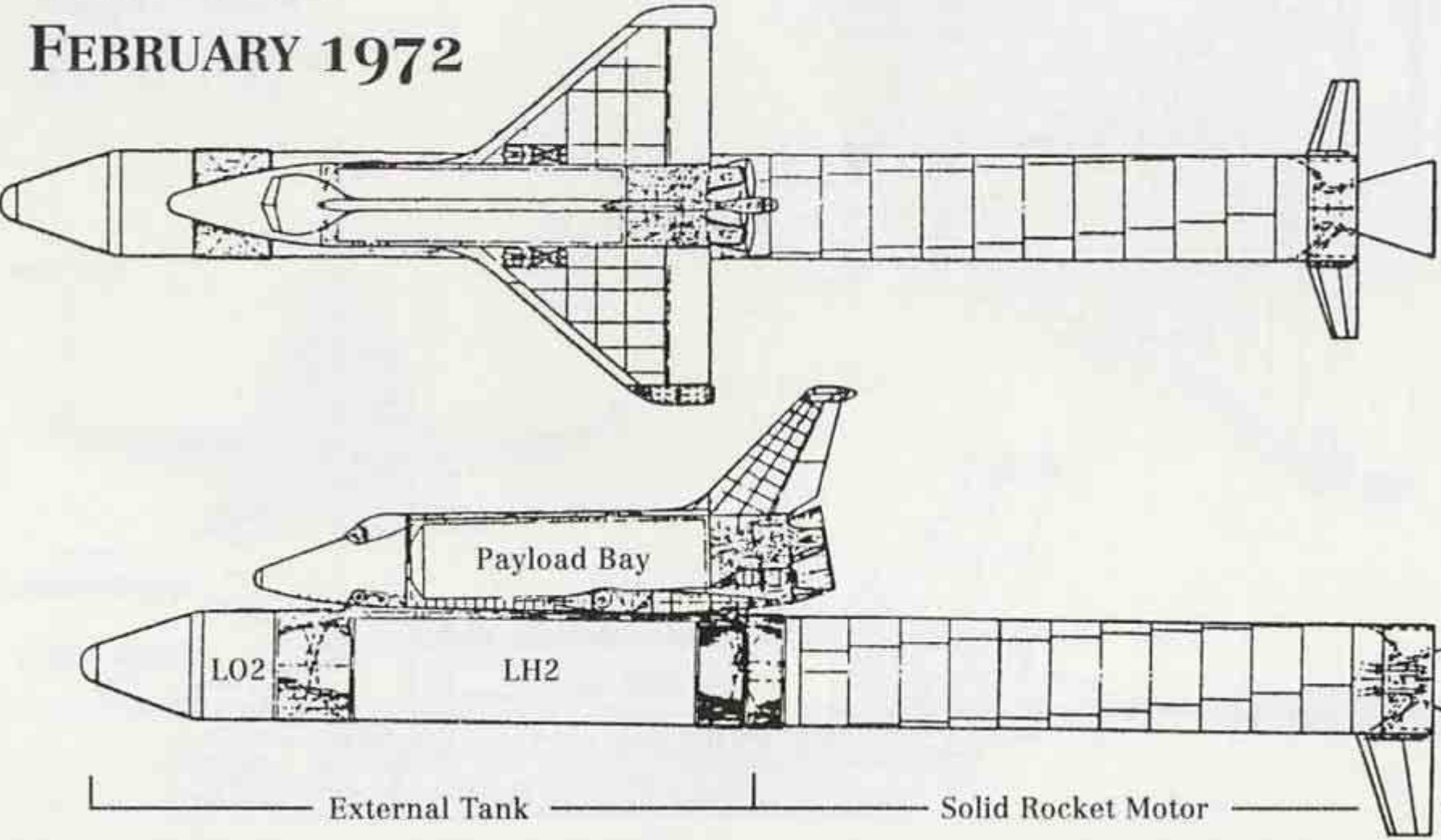
MSC-040C
JANUARY 1972



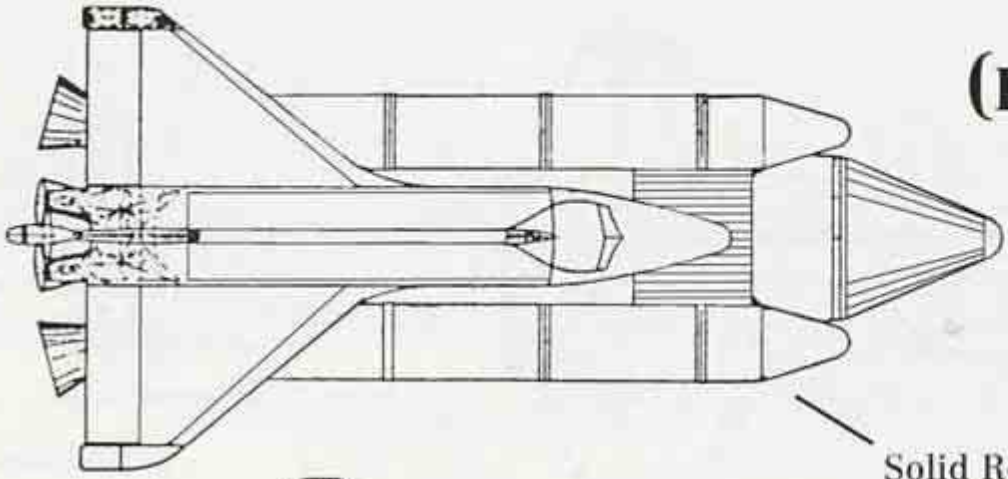
MSC-040C-2
FEBRUARY 1972



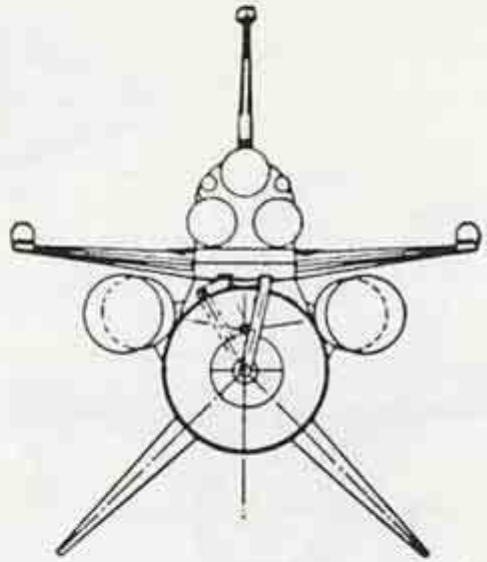
MSC-040C
FEBRUARY 1972

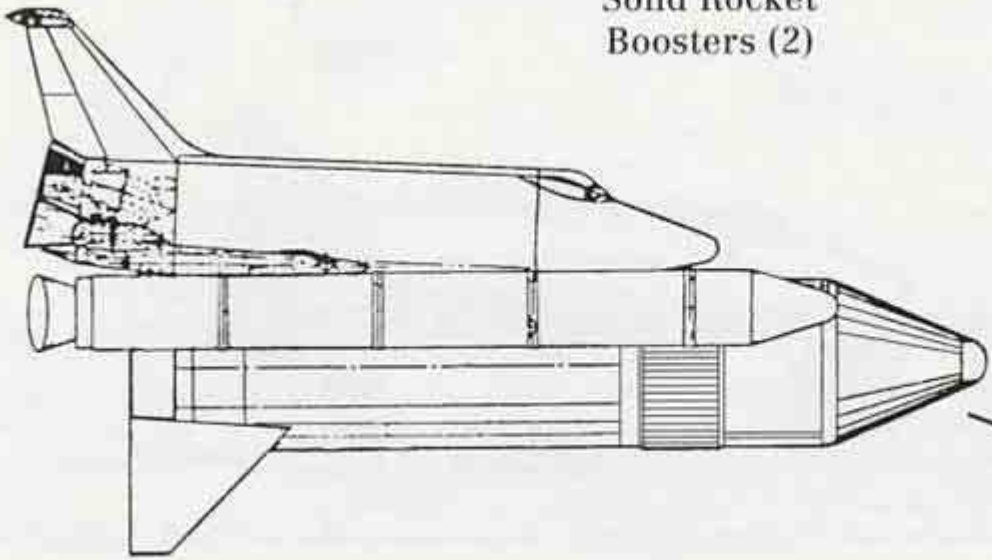


MSC-040C
(LAUNCH CONFIGURATION)



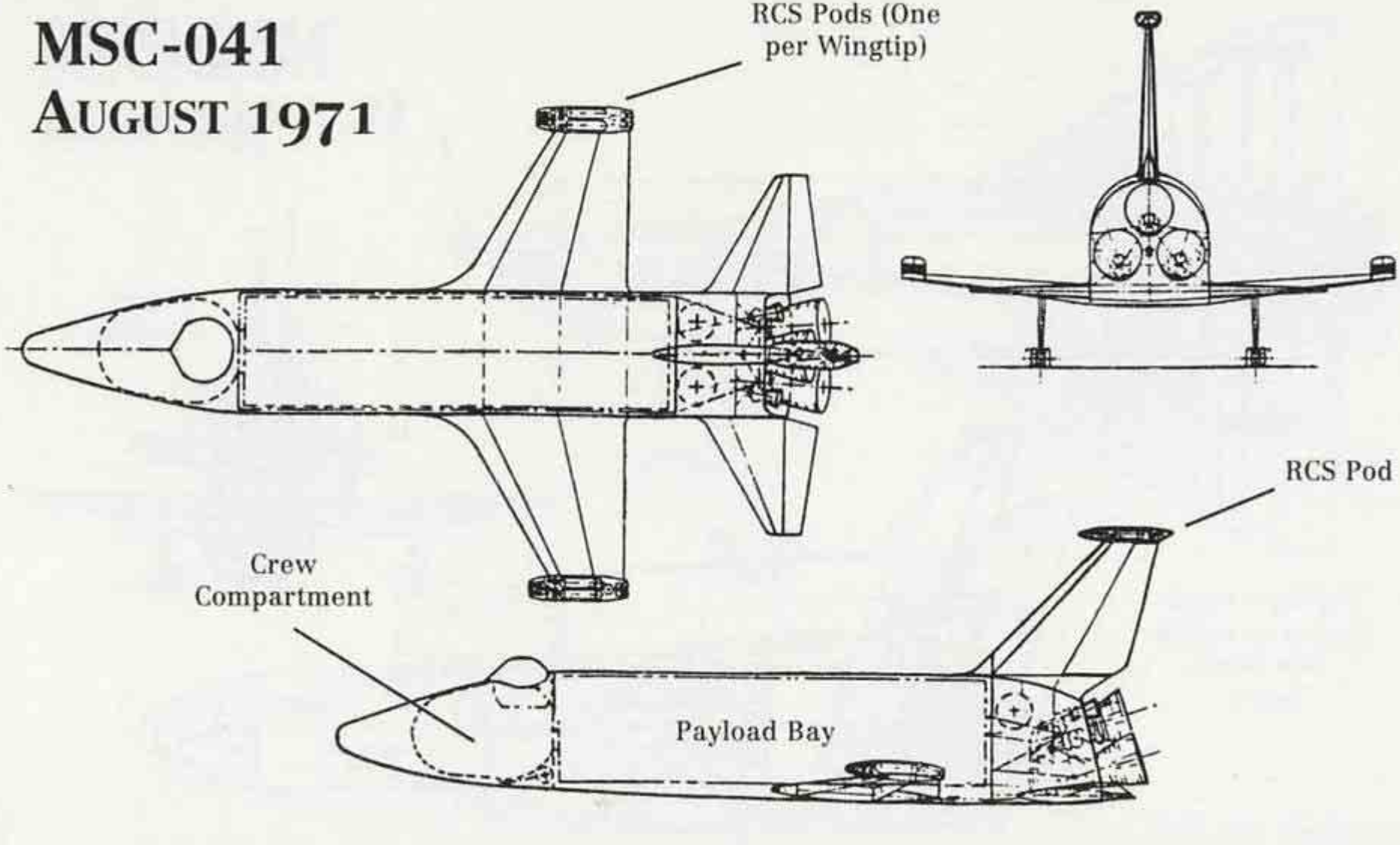
Solid Rocket
Boosters (2)



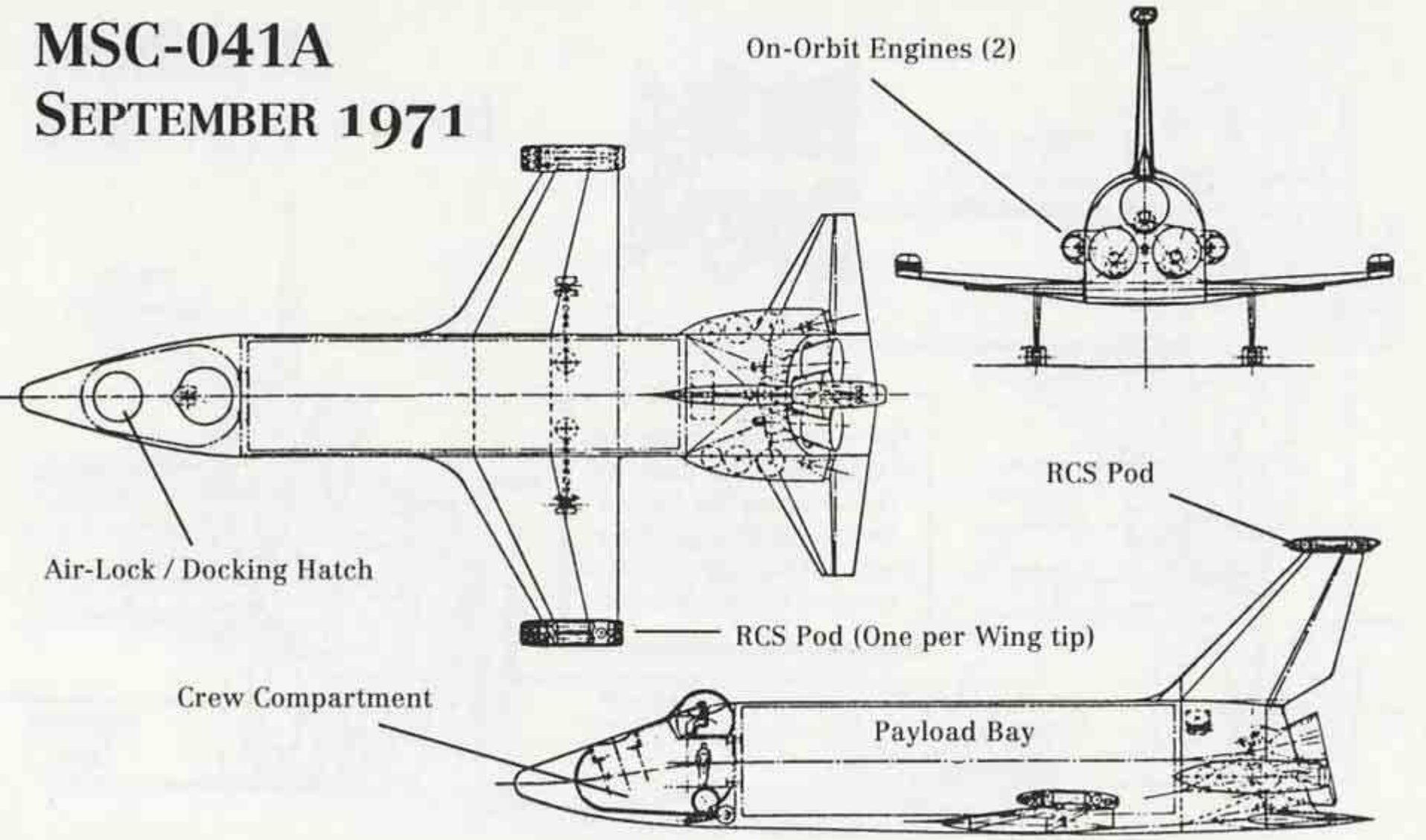


External Tank

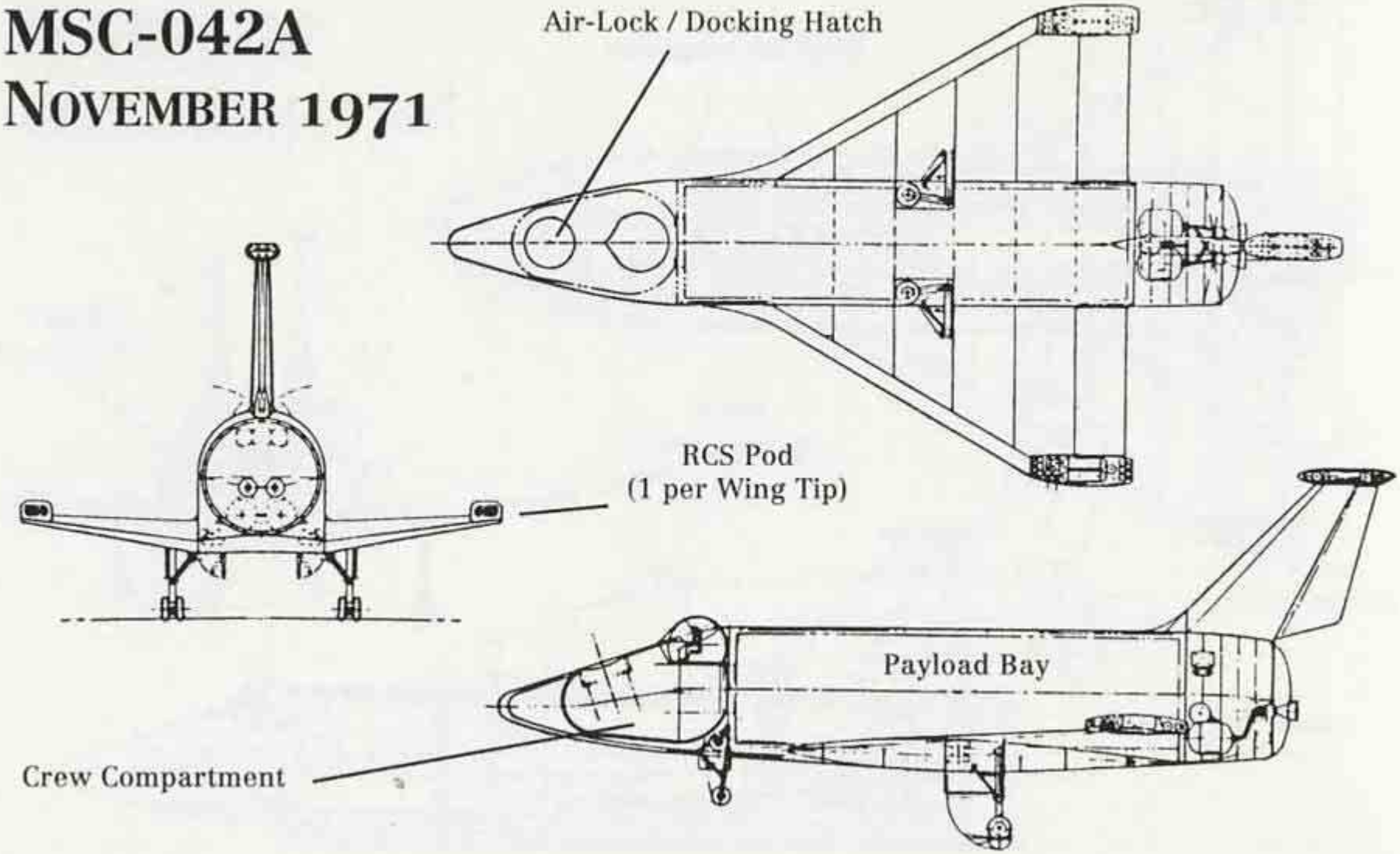
MSC-041
AUGUST 1971



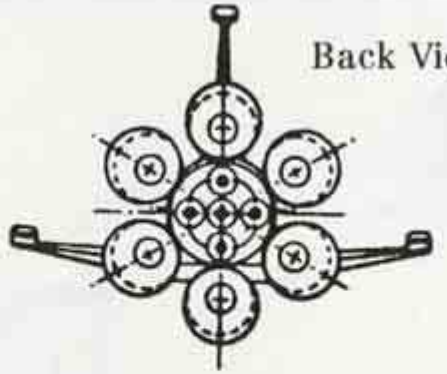
MSC-041A
SEPTEMBER 1971



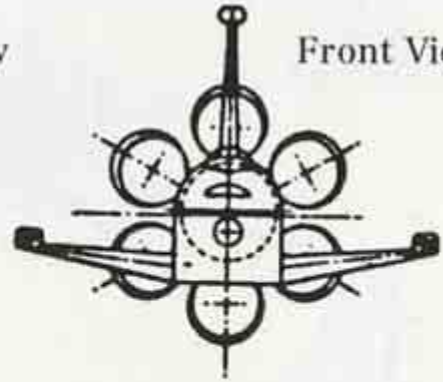
MSC-042A
NOVEMBER 1971



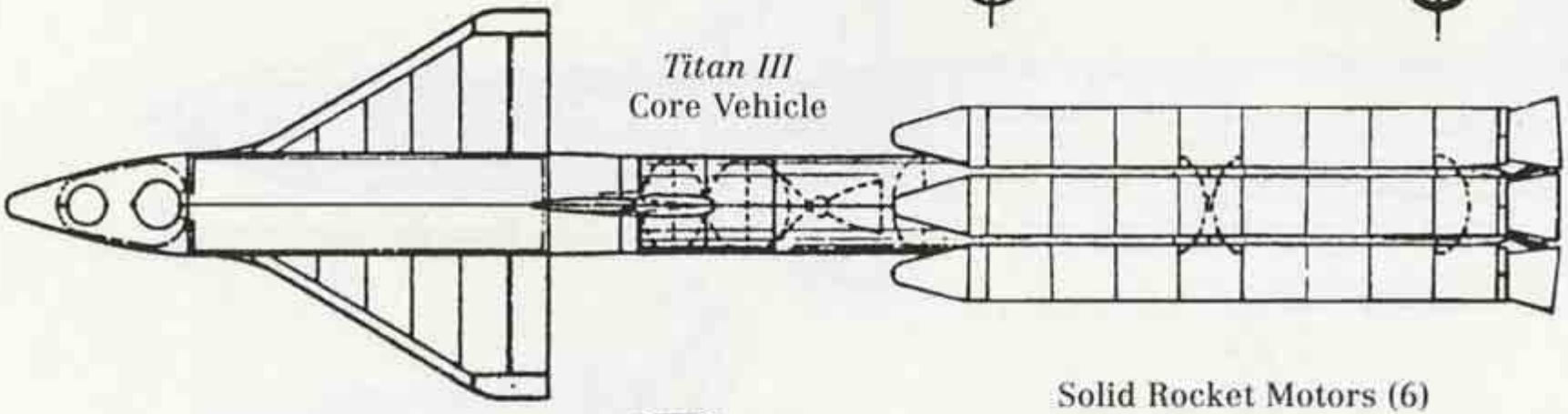
MSC-042A
(LAUNCH CONFIGURATION)



Back View

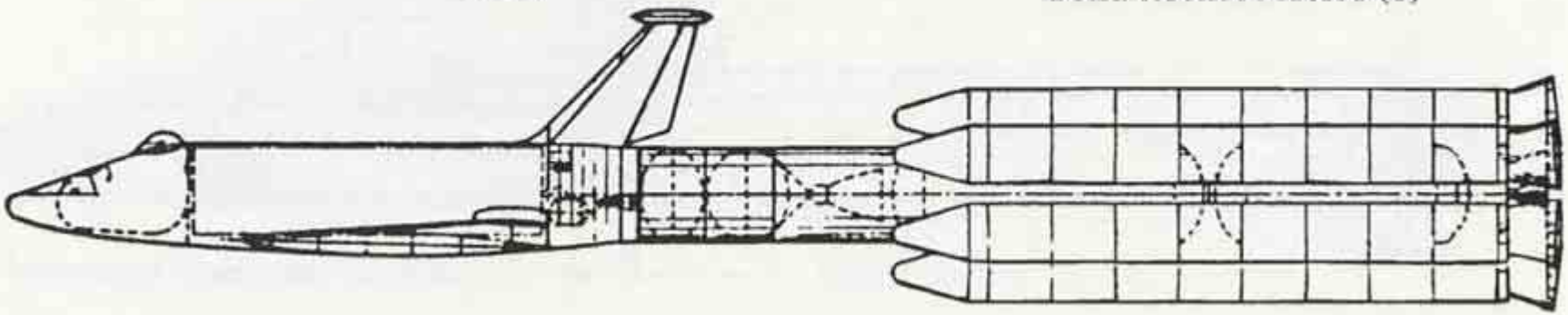


Front View

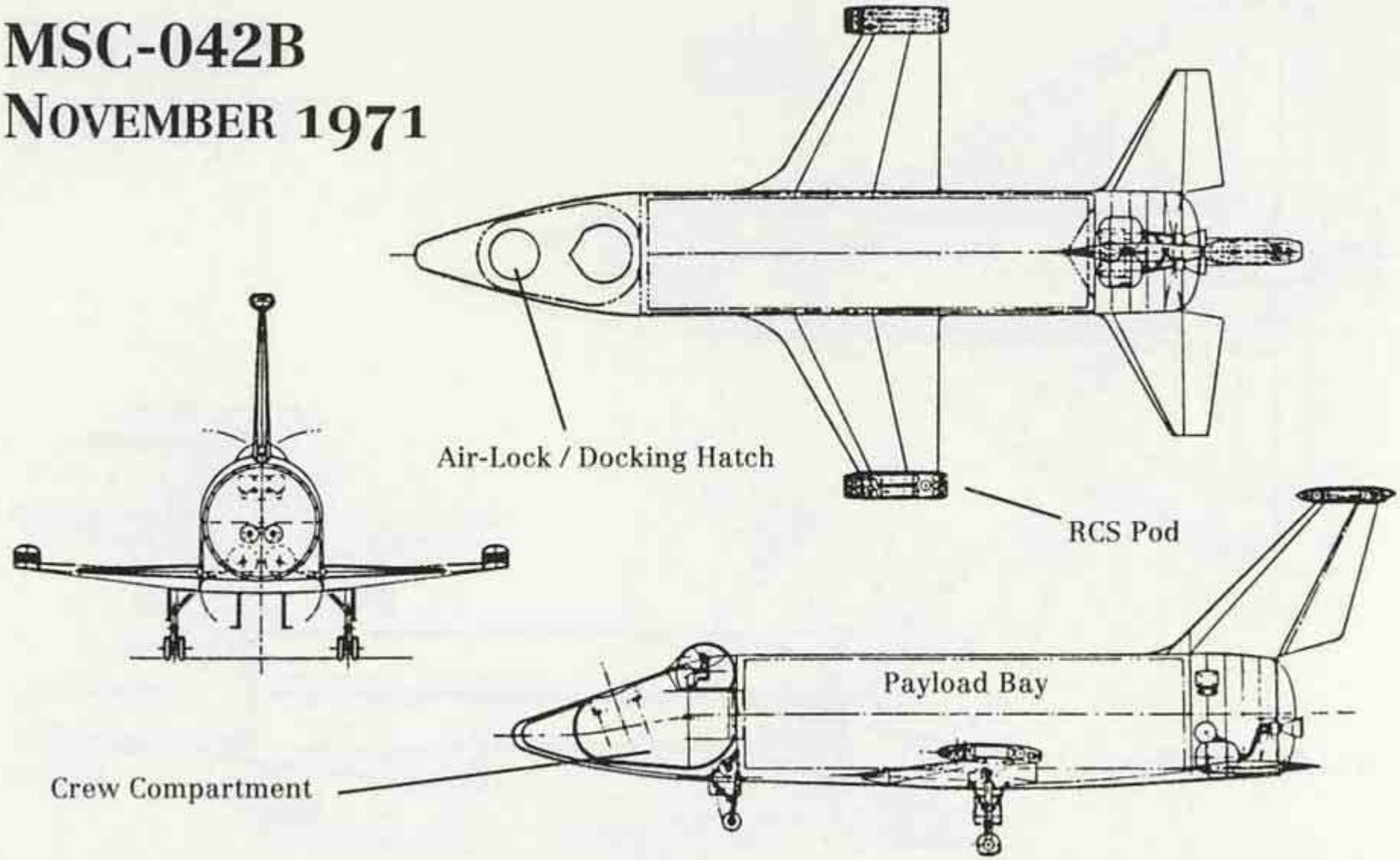


Titan III
Core Vehicle

Solid Rocket Motors (6)

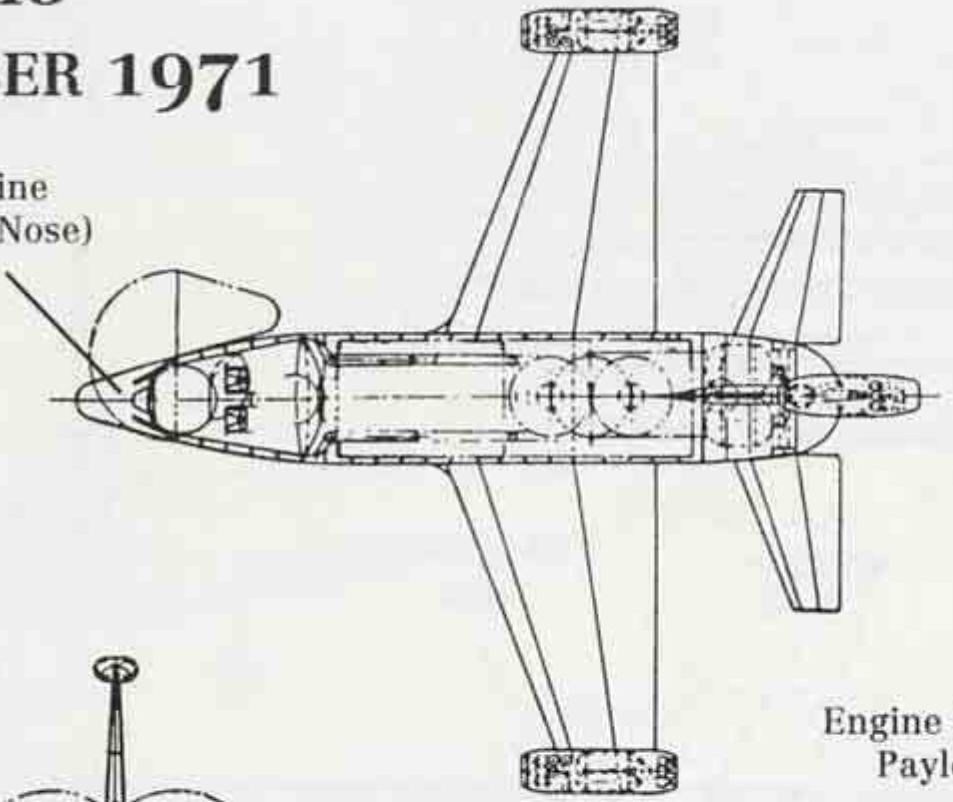


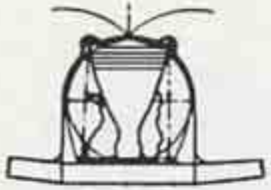
MSC-042B
NOVEMBER 1971



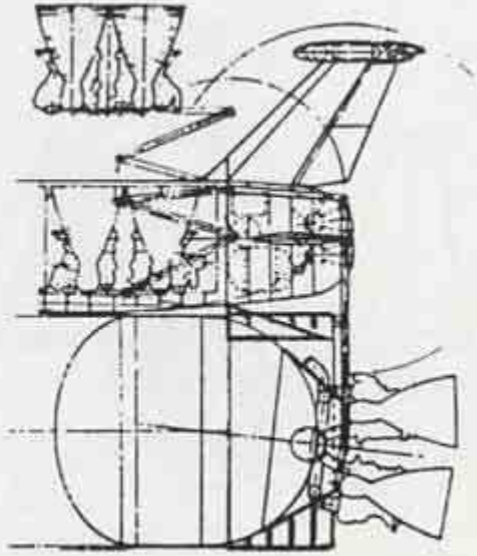
MSC-043
DECEMBER 1971

De-Orbit Engine
(Swing-Around Nose)

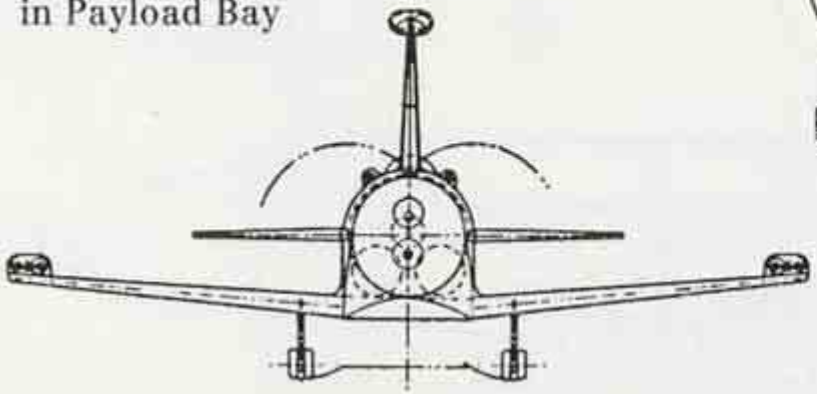




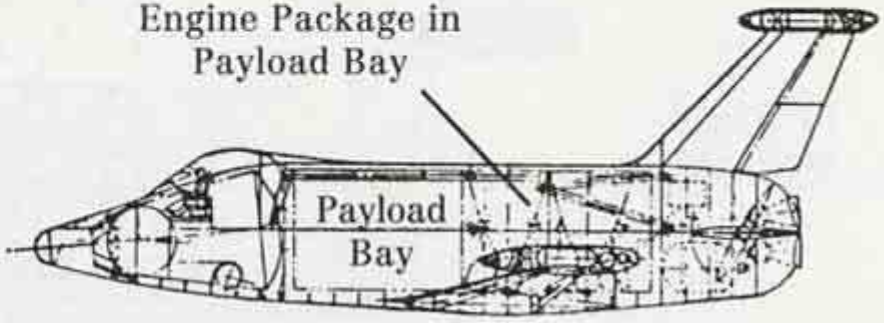
Engine Package
in Payload Bay



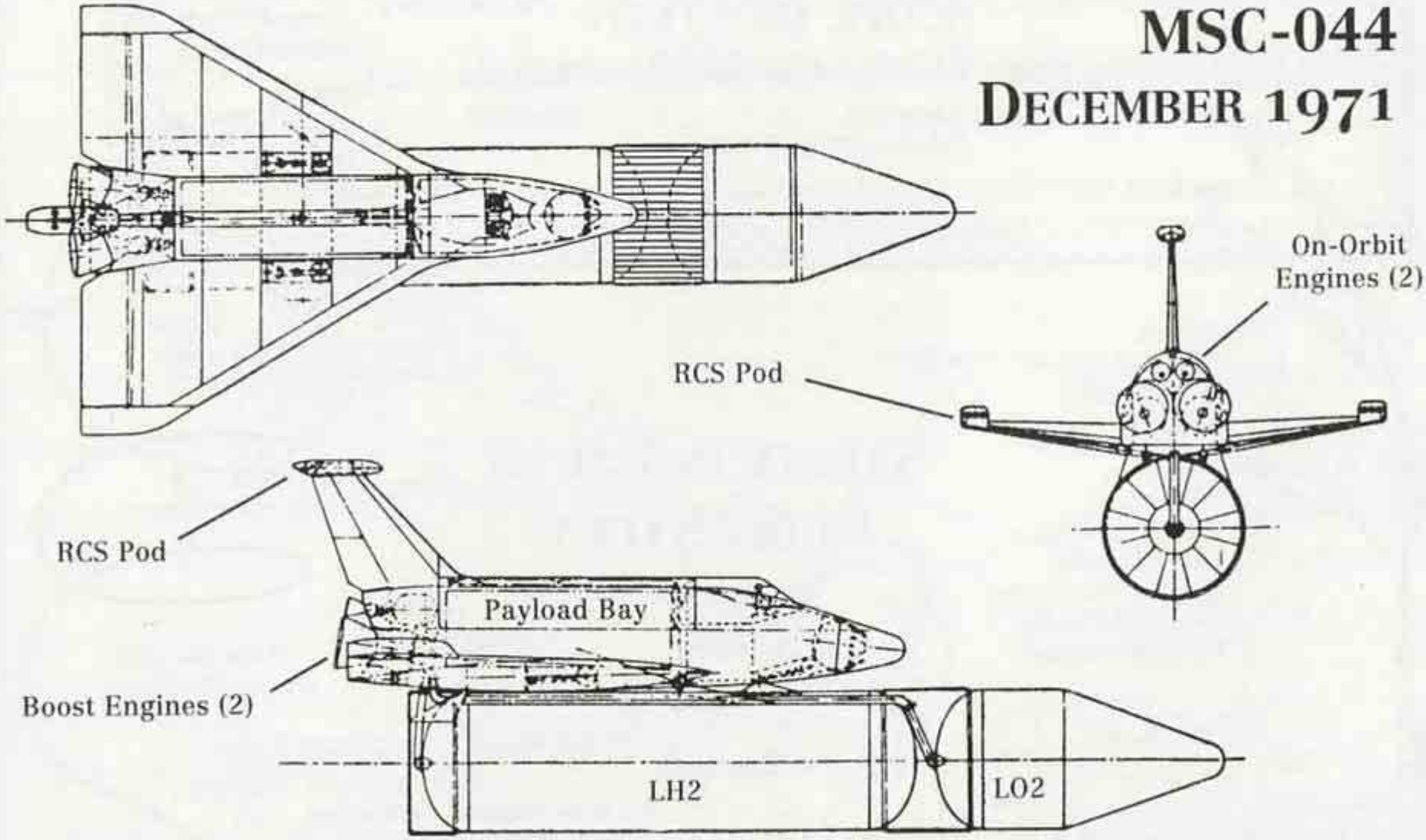
Engine Package translating
from External Tank to Orbiter



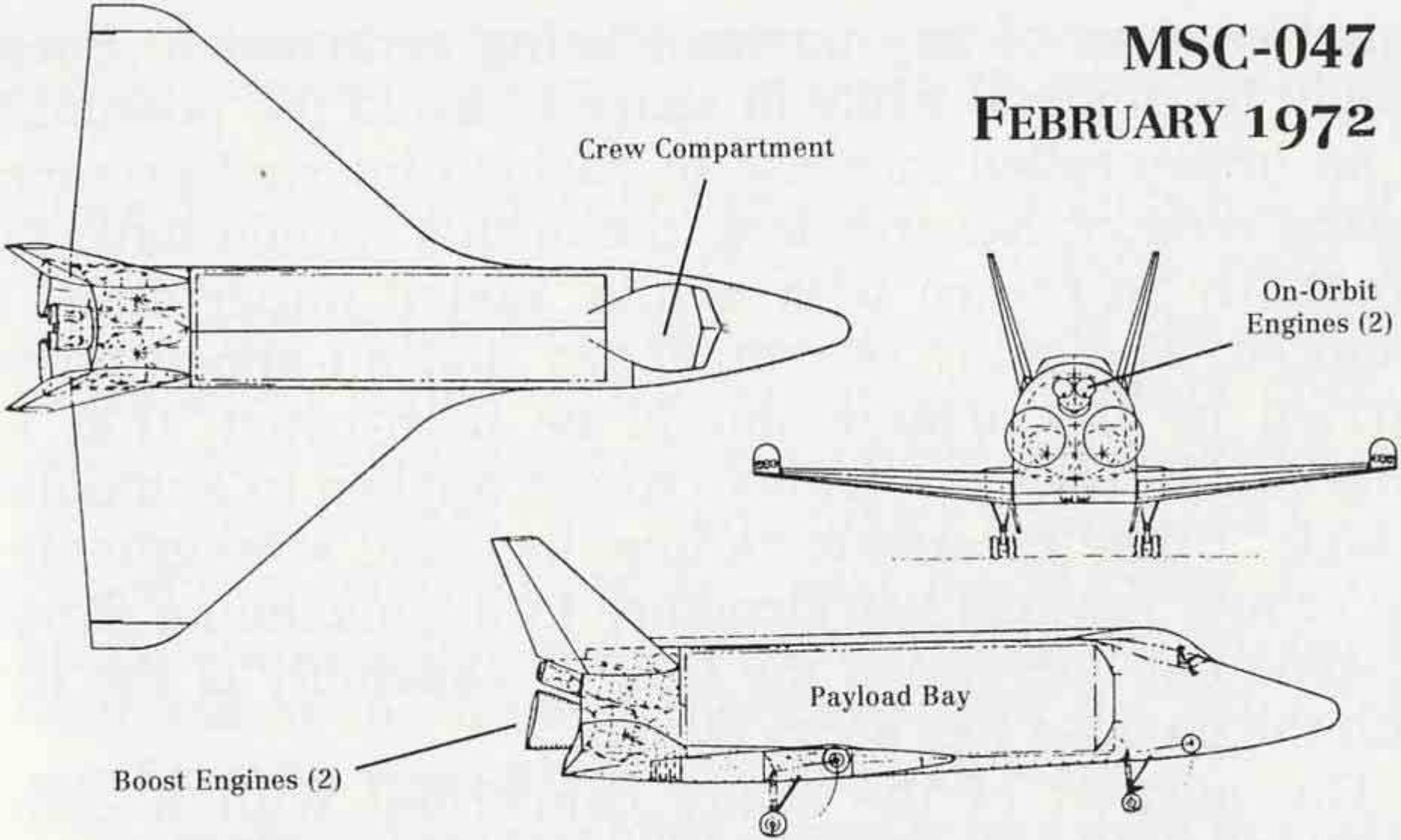
Engine Package in
Payload Bay



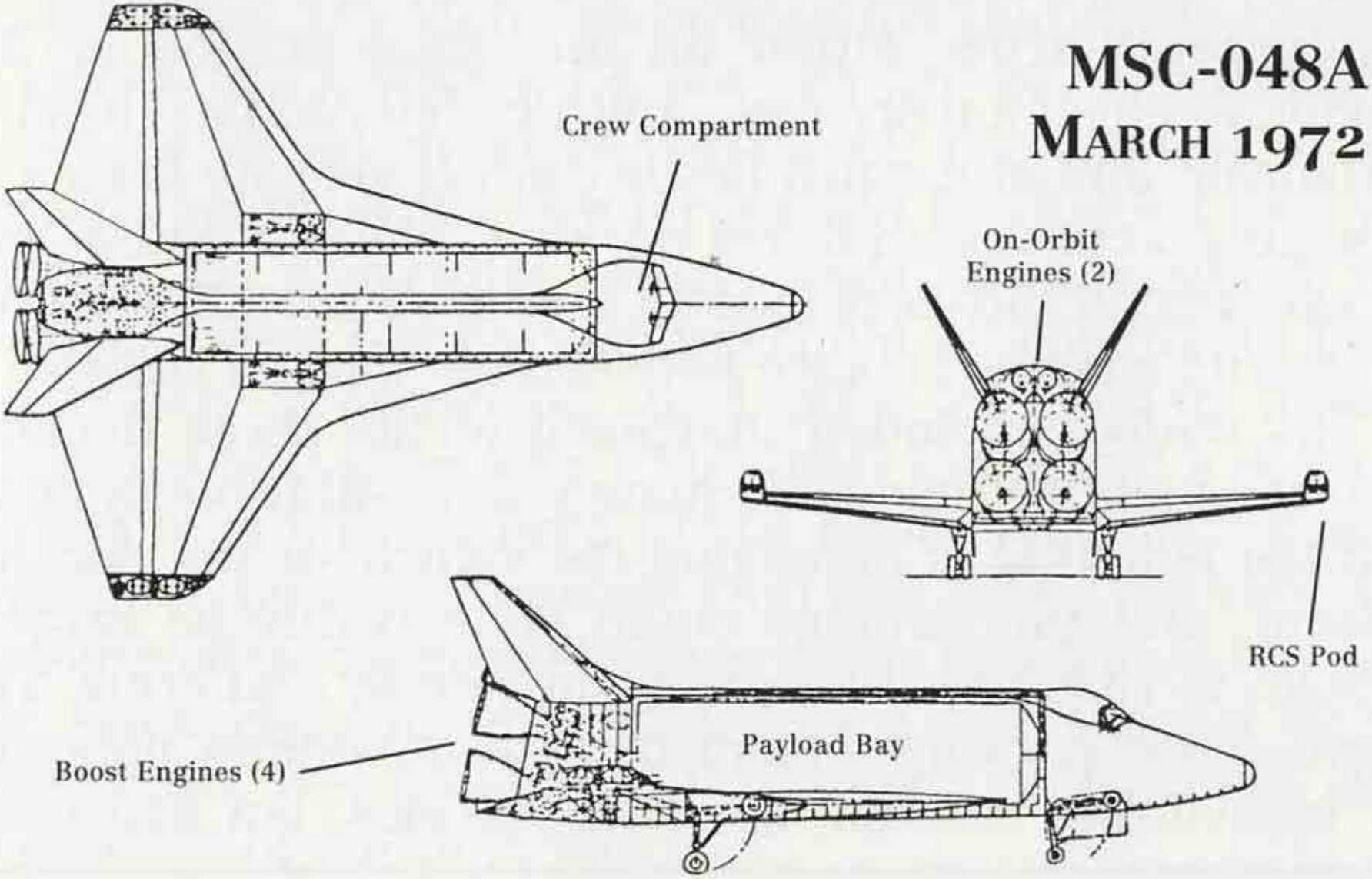
MSC-044
DECEMBER 1971



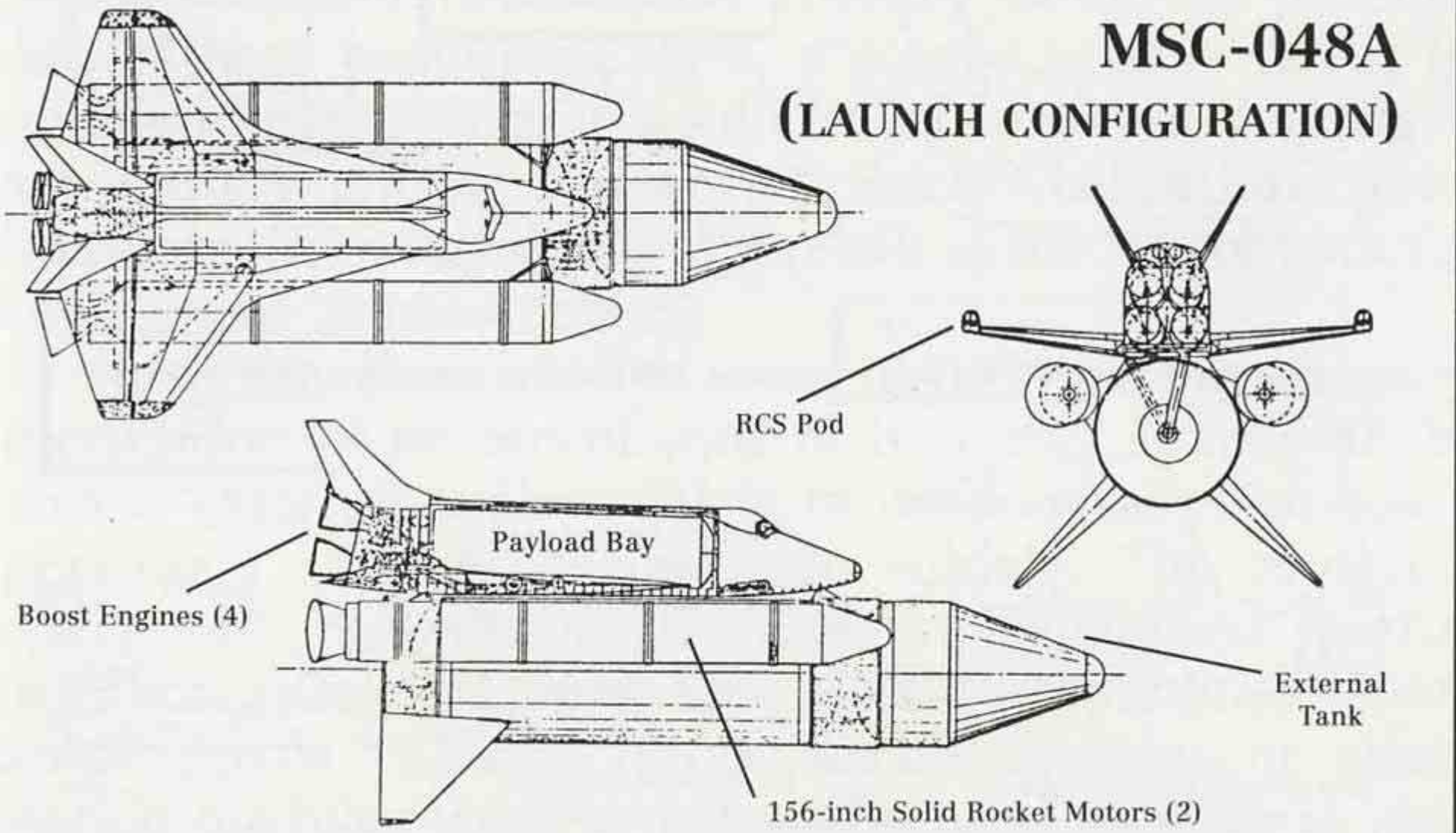
MSC-047
FEBRUARY 1972



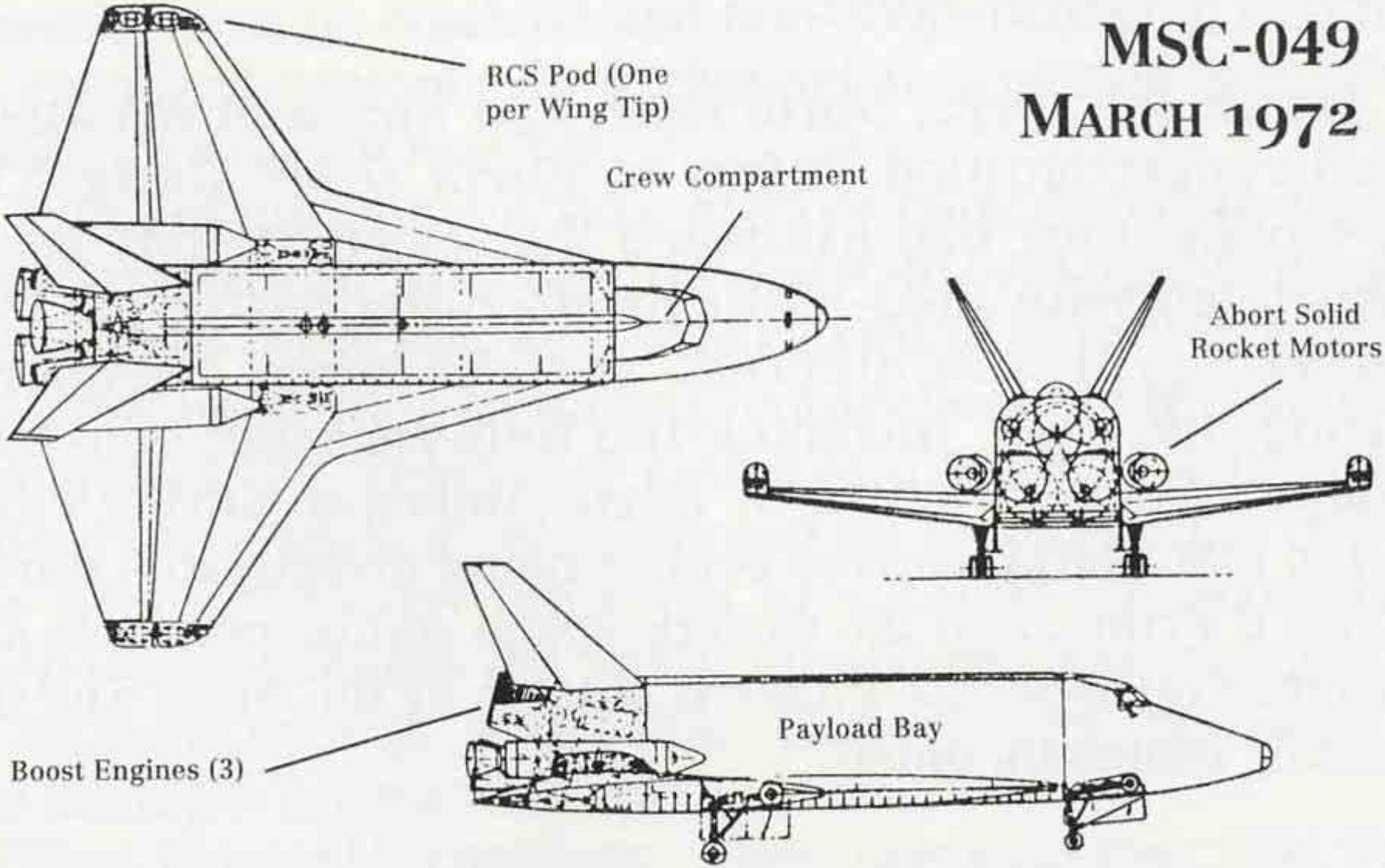
MSC-048A
MARCH 1972



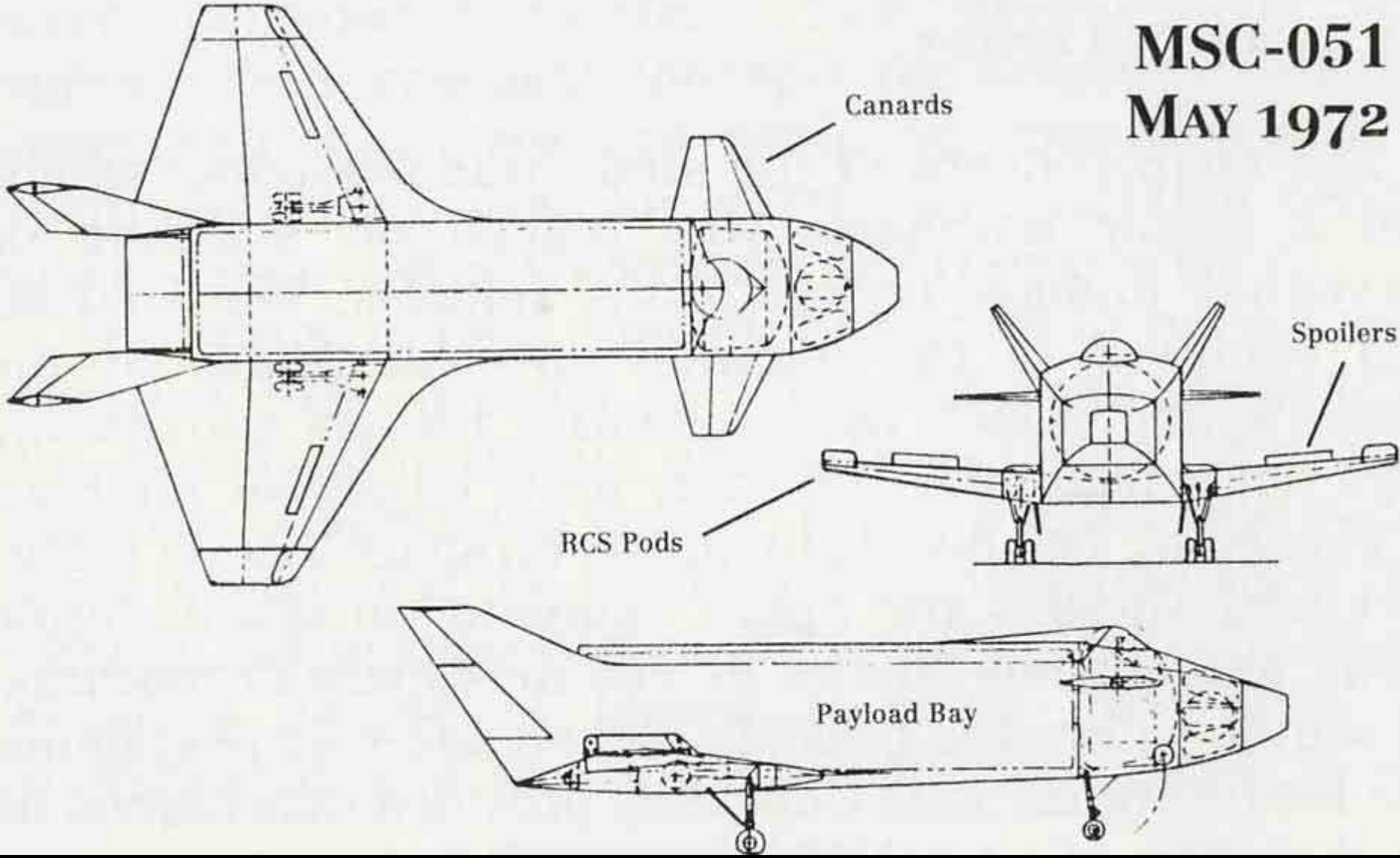
MSC-048A
(LAUNCH CONFIGURATION)



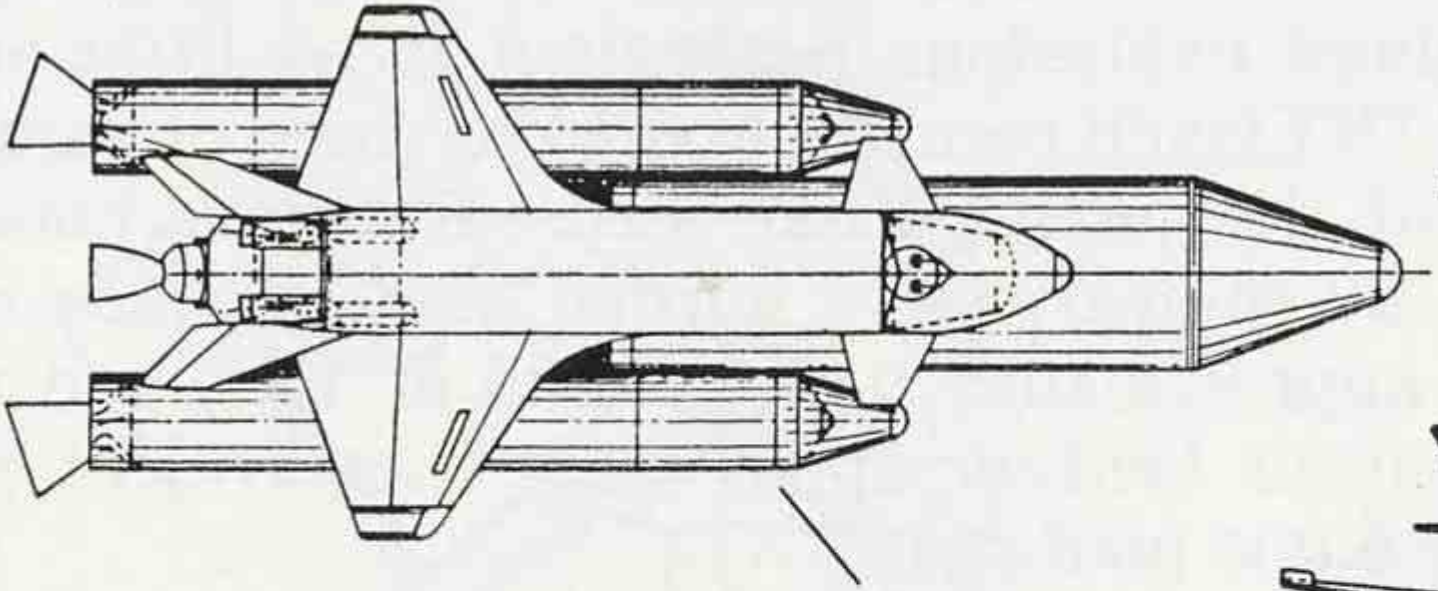
MSC-049
MARCH 1972



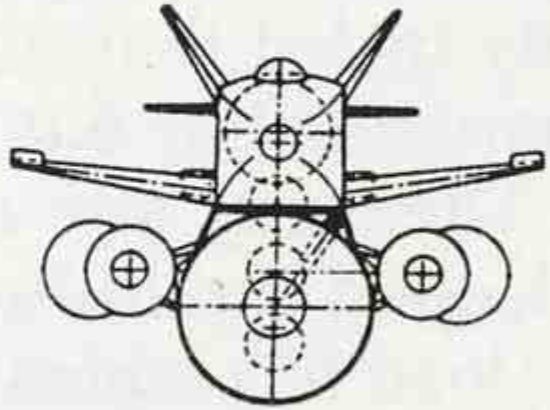
MSC-051
MAY 1972

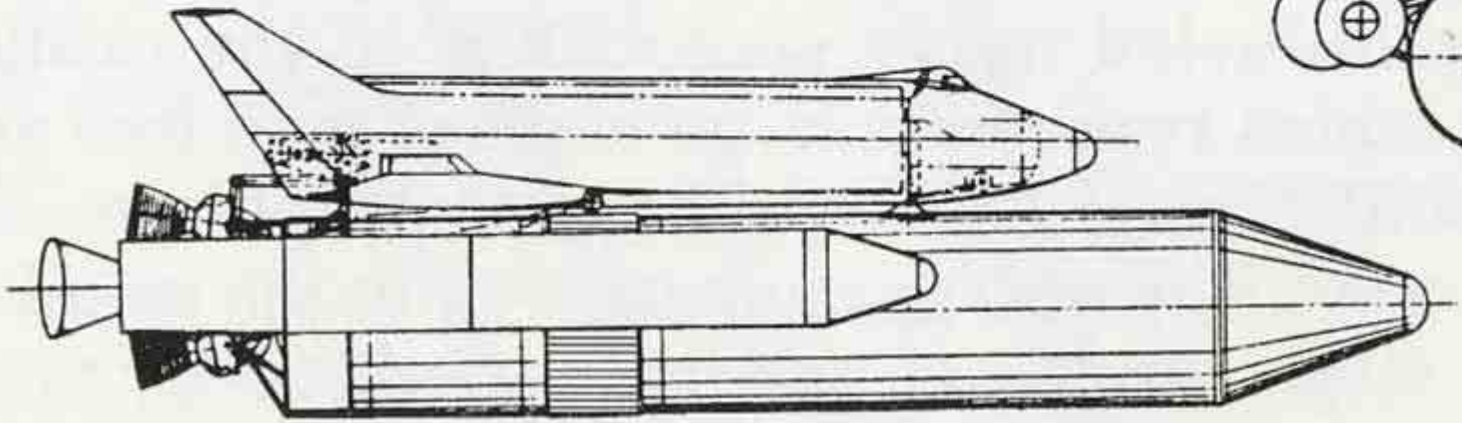


MSC-052
JUNE 1972

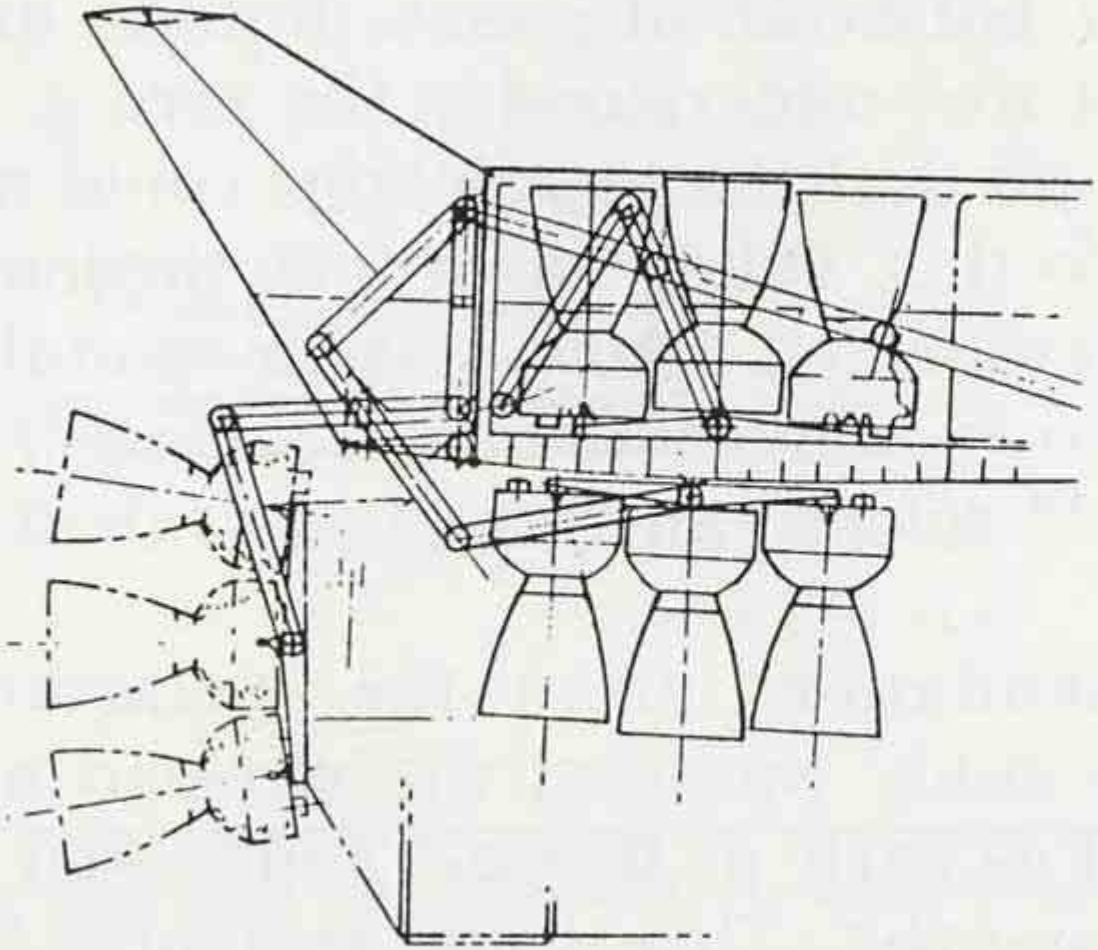


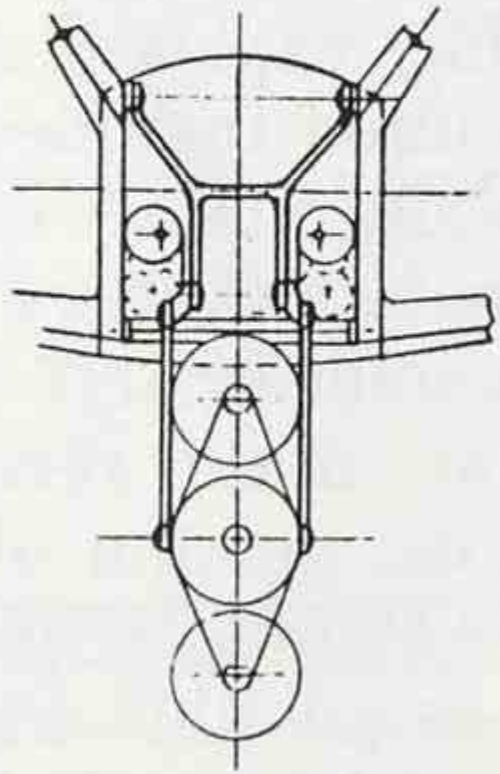
Solid Rocket Booster (2)





MSC-052
(PROPULSION UNIT)

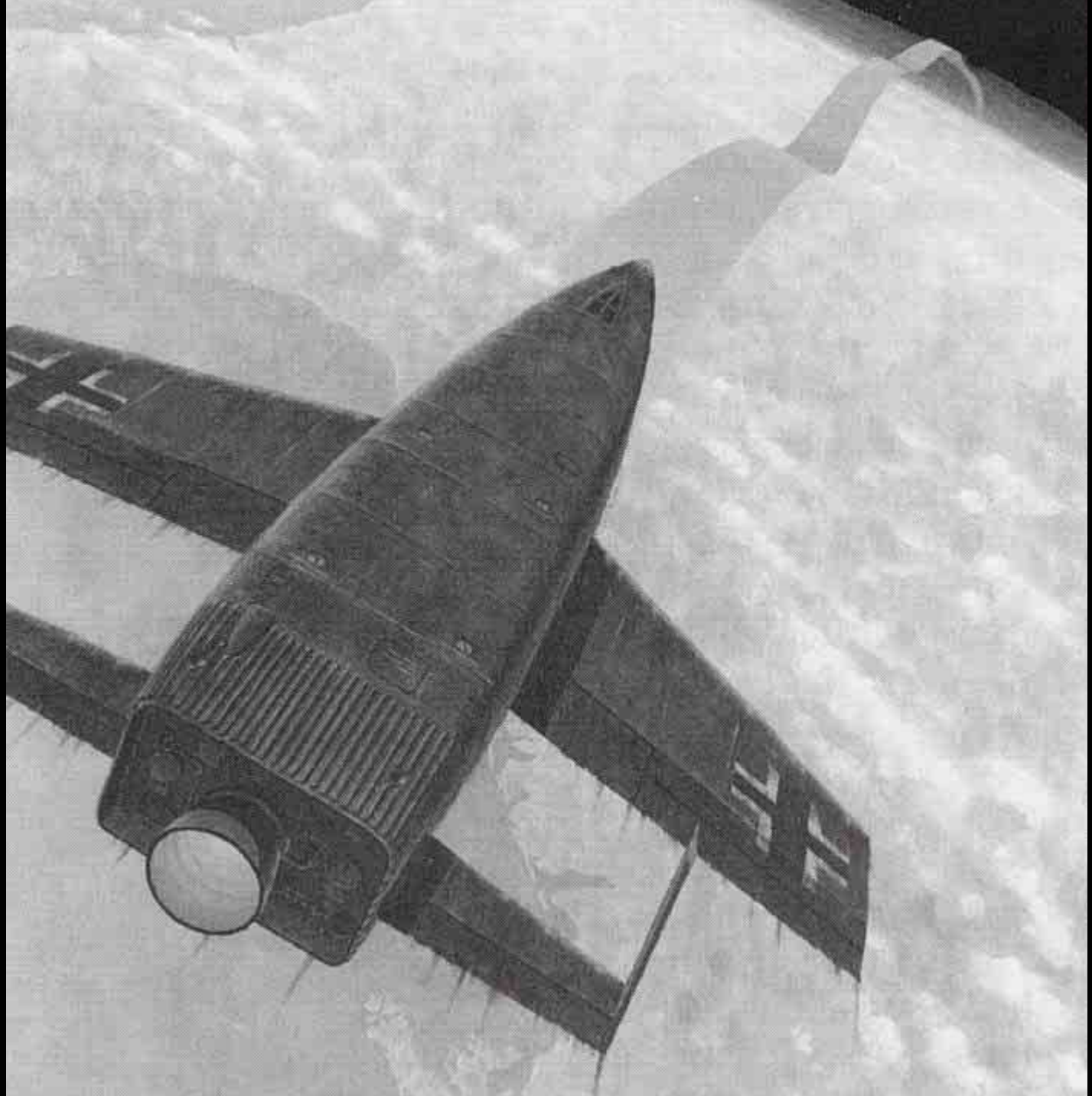


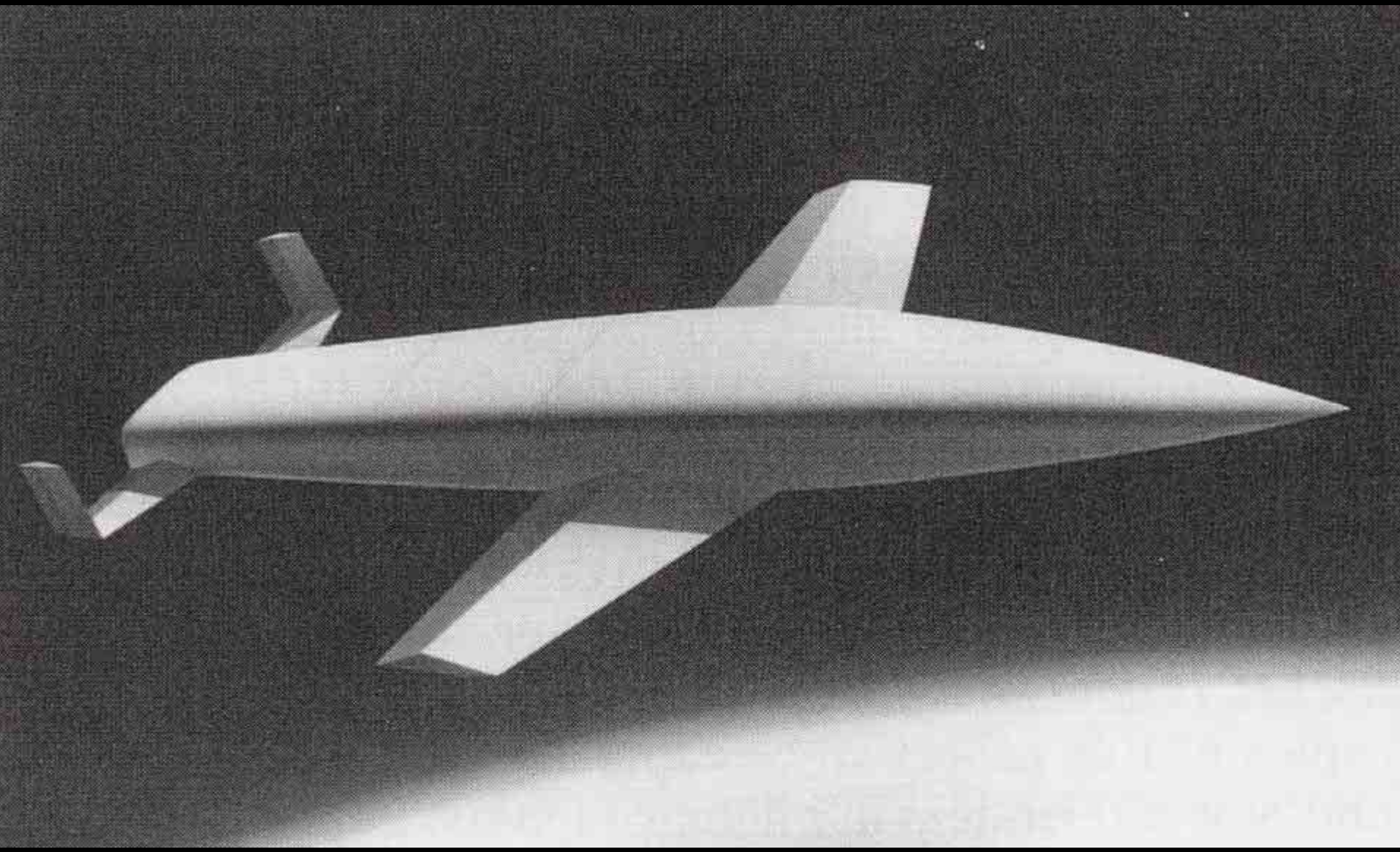


Než poprvé odstartoval raketoplán

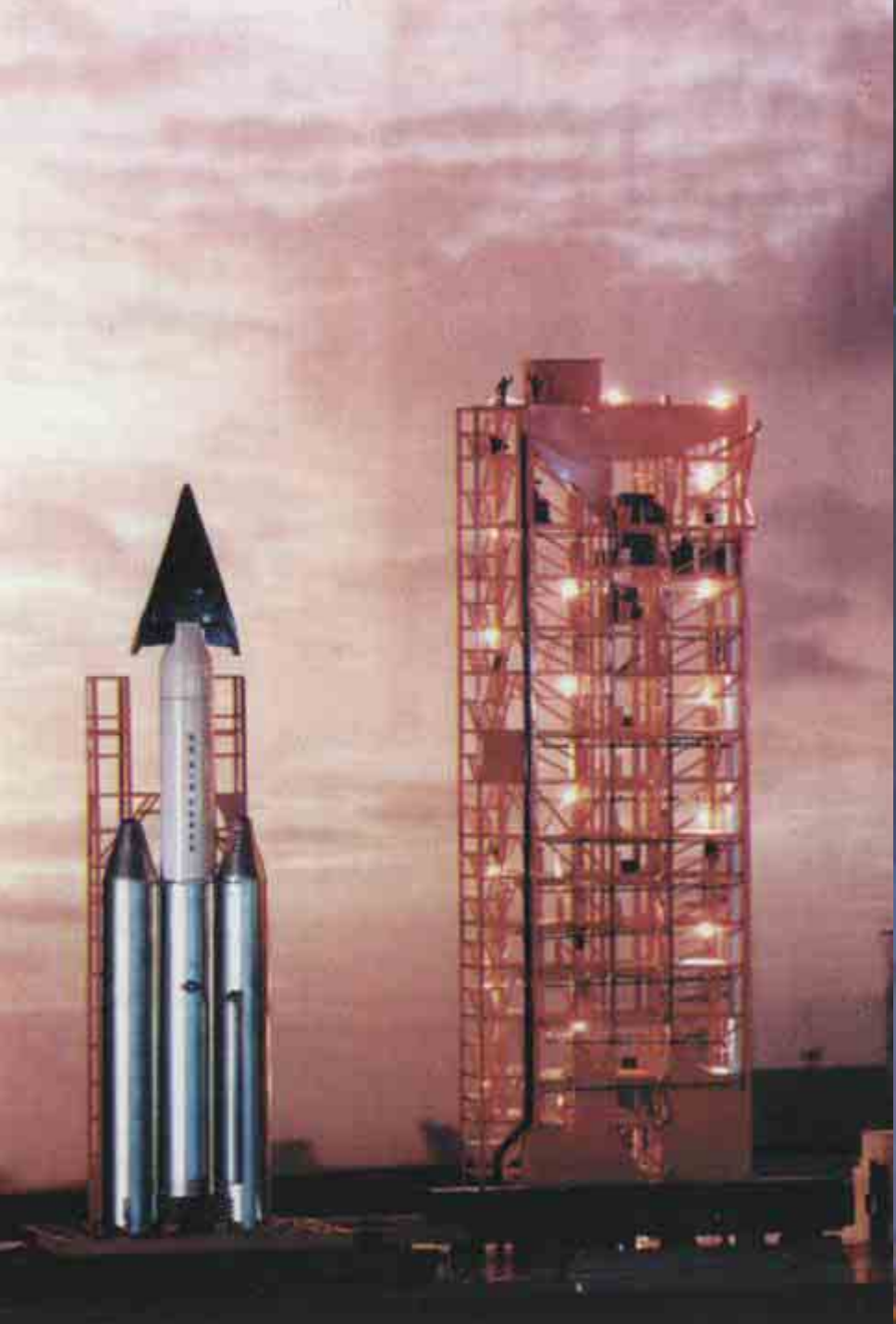
Ing. Tomáš PŘIBYL
tomas.pribyl@seznam.cz
www.kosmonaut.cz


Silbervogel





Dyna Soar




U.S. AIR FORCE


U.S. AIR FORCE

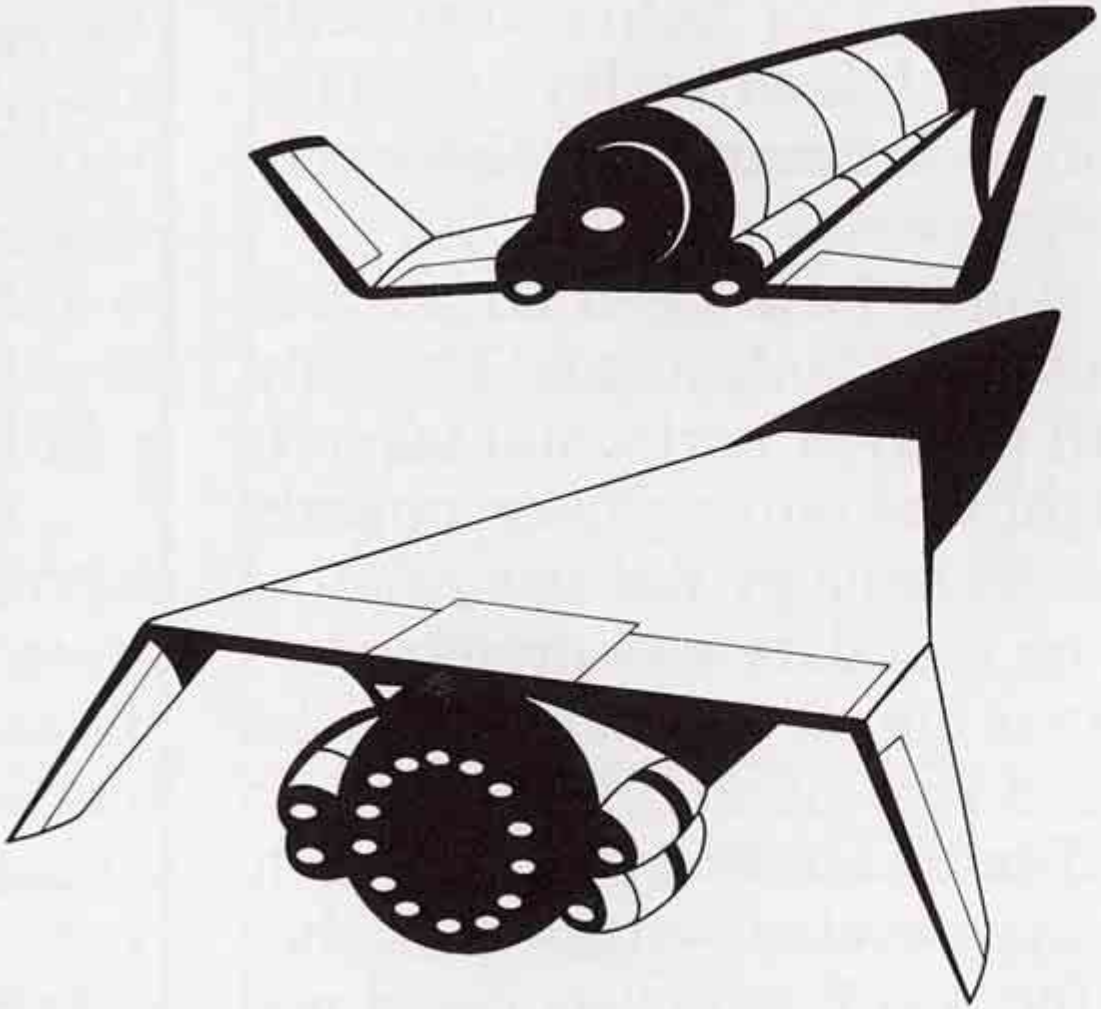
Vztlaková tělesa

X-15

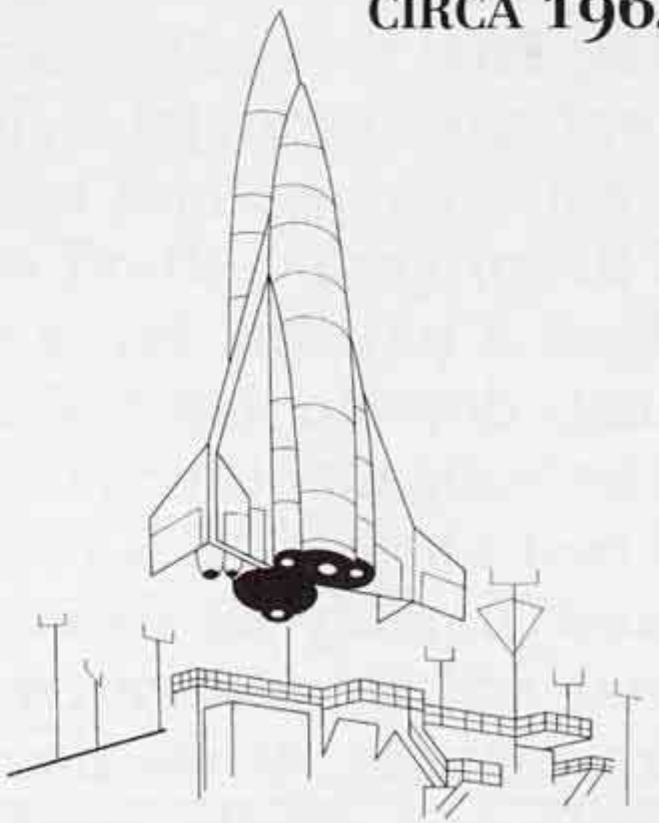

U S AIR FORCE


NASA
66670
U.S. AIR FORCE

Martin Marietta: Astrorocket



PROPOSED
MARTIN MARIETTA
ASTROROCKET
CIRCA 1964

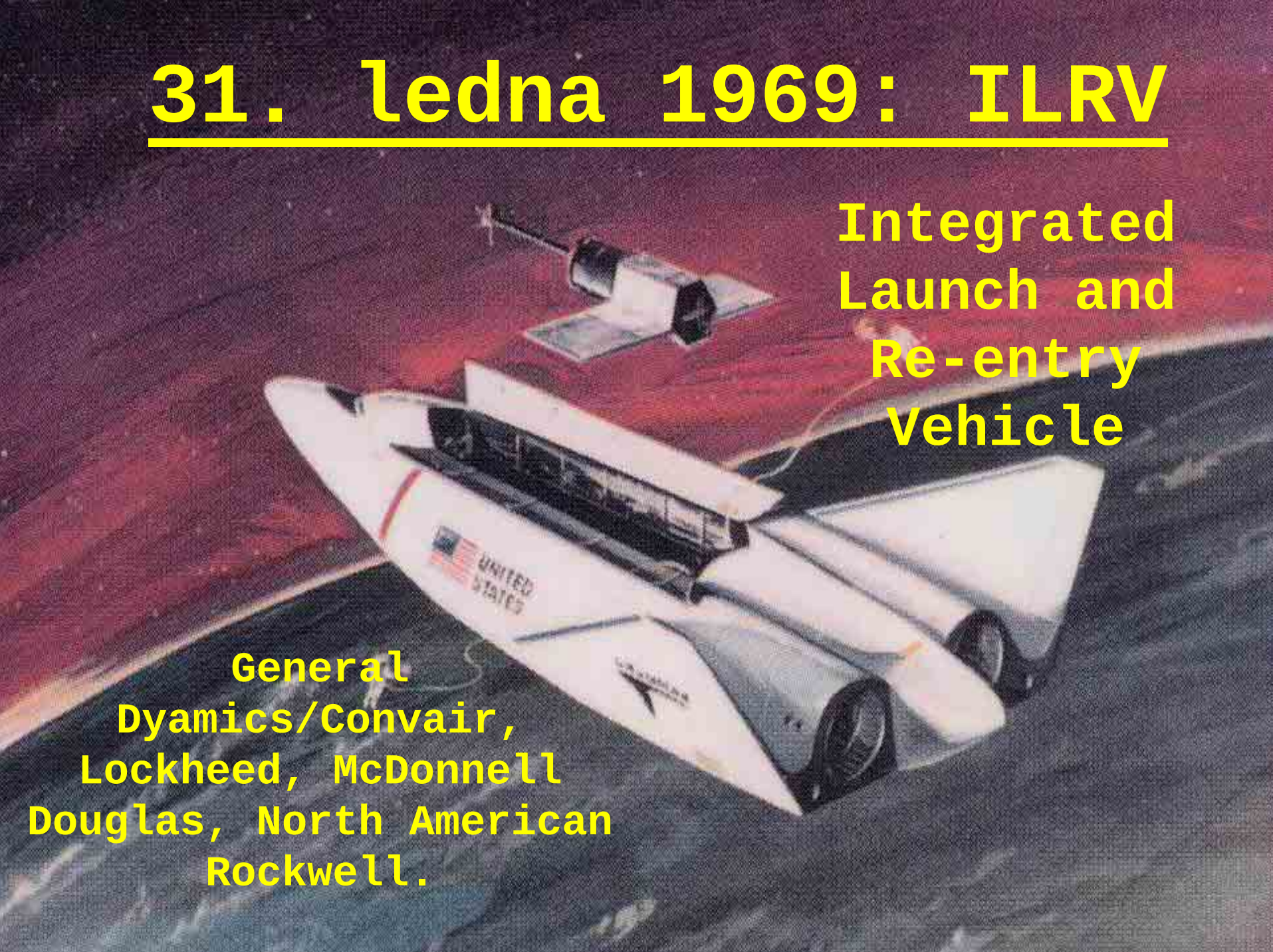


28. února 1968

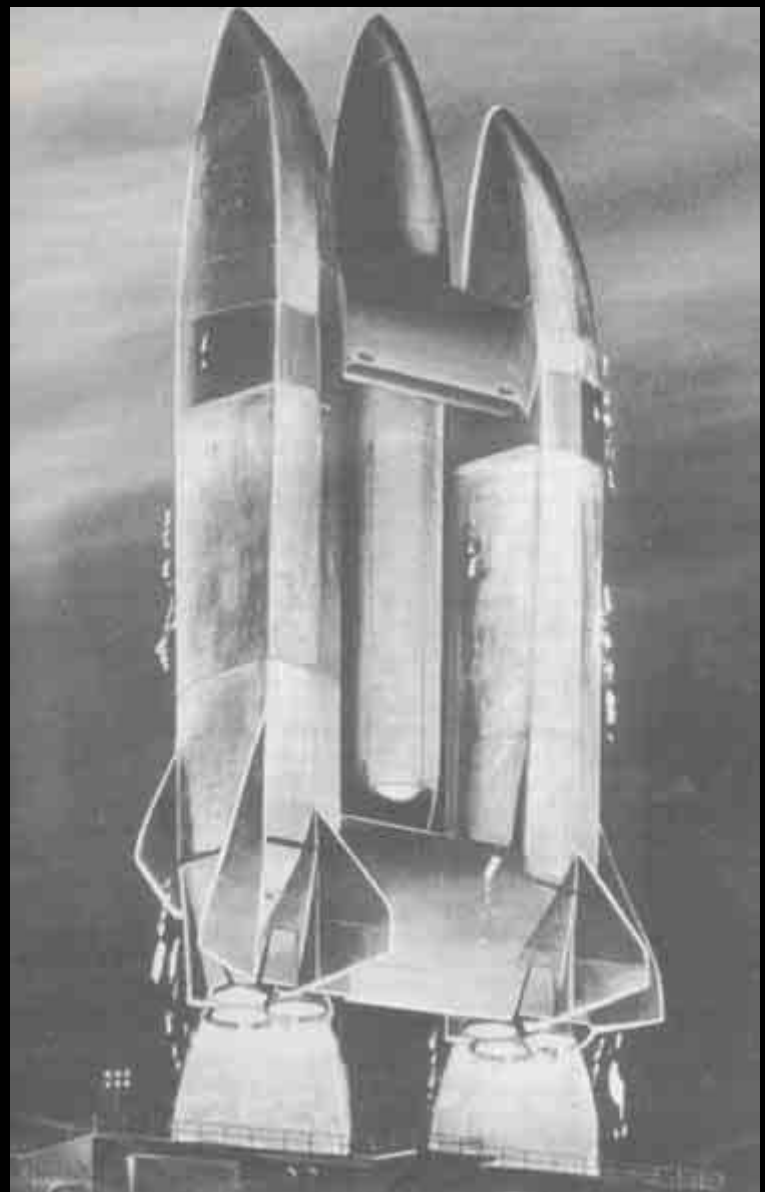
George Mueller (přidružený administrátor pro kosmické lety), kosmický výbor Senátu.

1. dubna 1968

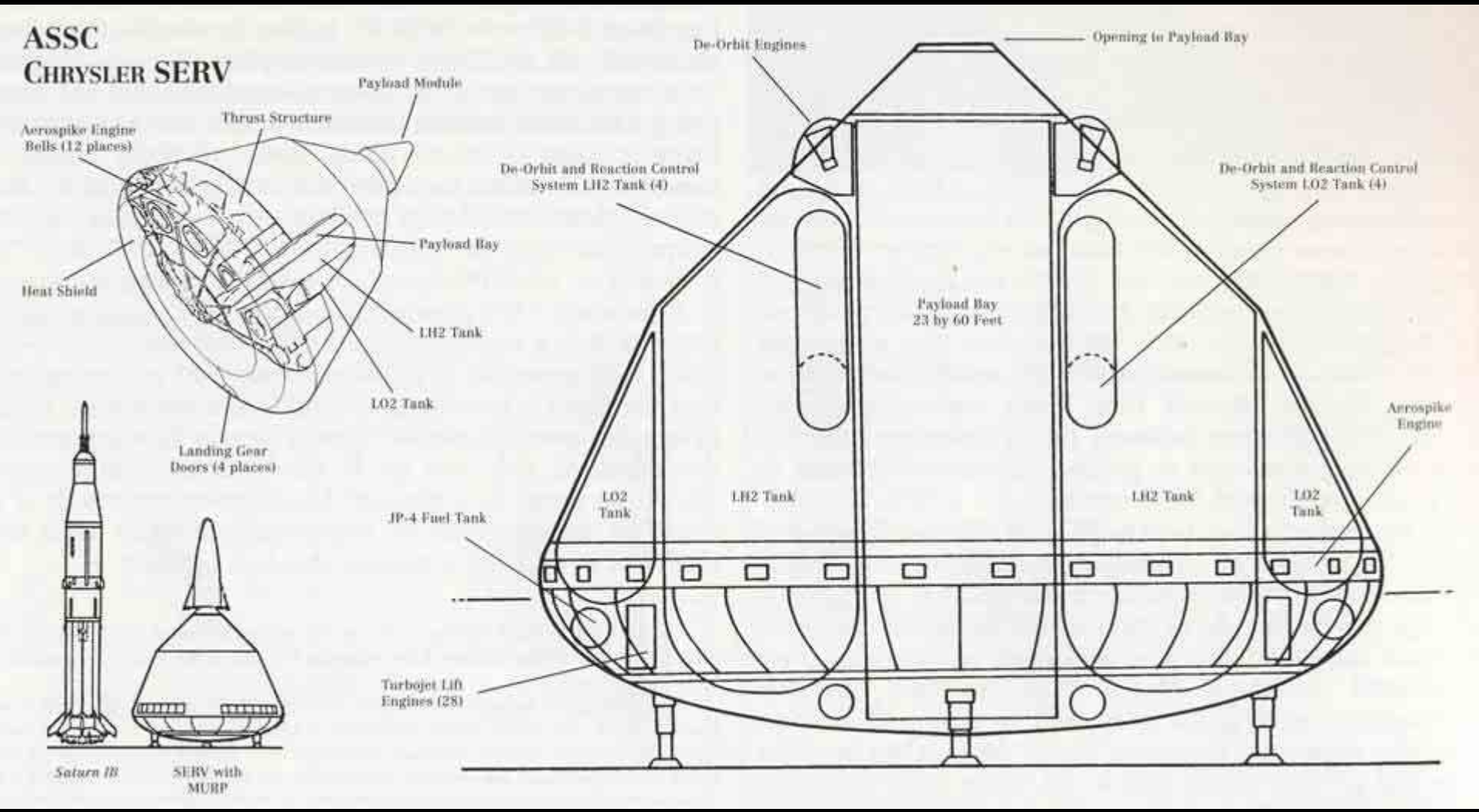
31. ledna 1969: ILRV



Martin Marietta Spacemaster



Chrysler: SERV (Single stage Earth orbital Reusable Vehicle)



Space Task Group

1) Pilotované přistání na Marsu 1983. (9 mld. USD ročně)
2) Mars 1986. (8 mld. USD ročně.)
3) Mars mezi 1990 až 2000. (5,5 mld. USD, od 1980 na 8 mld. ročně.)

Každopádně vždy stanice a dopravní systém (raketoplán).

13. ledna 1970

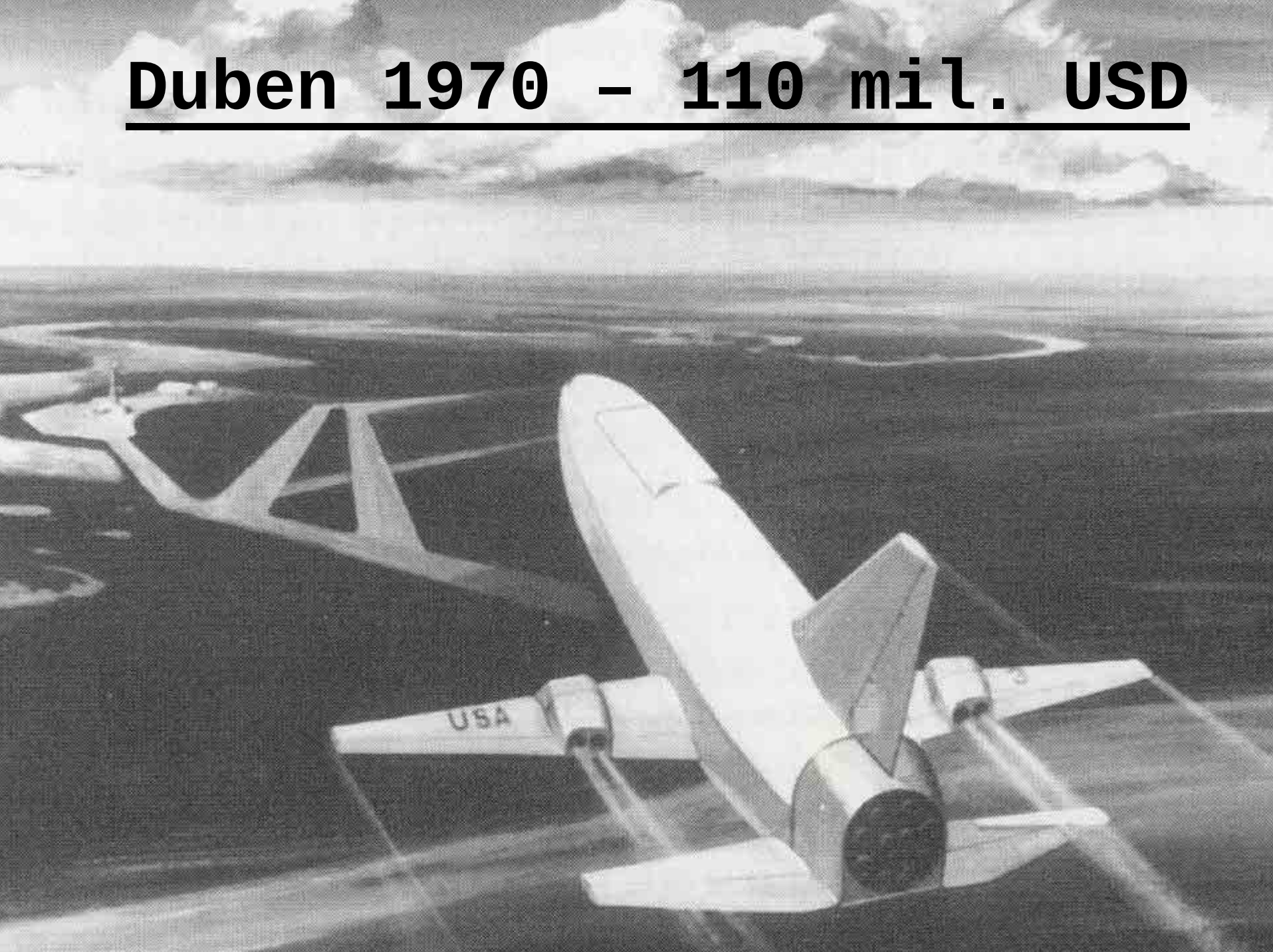
Na neurčitou dobu nebudeme objednávat další rakety Saturn-5.

Prodloužíme dobu mezi misemi Apollo na šest měsíců.

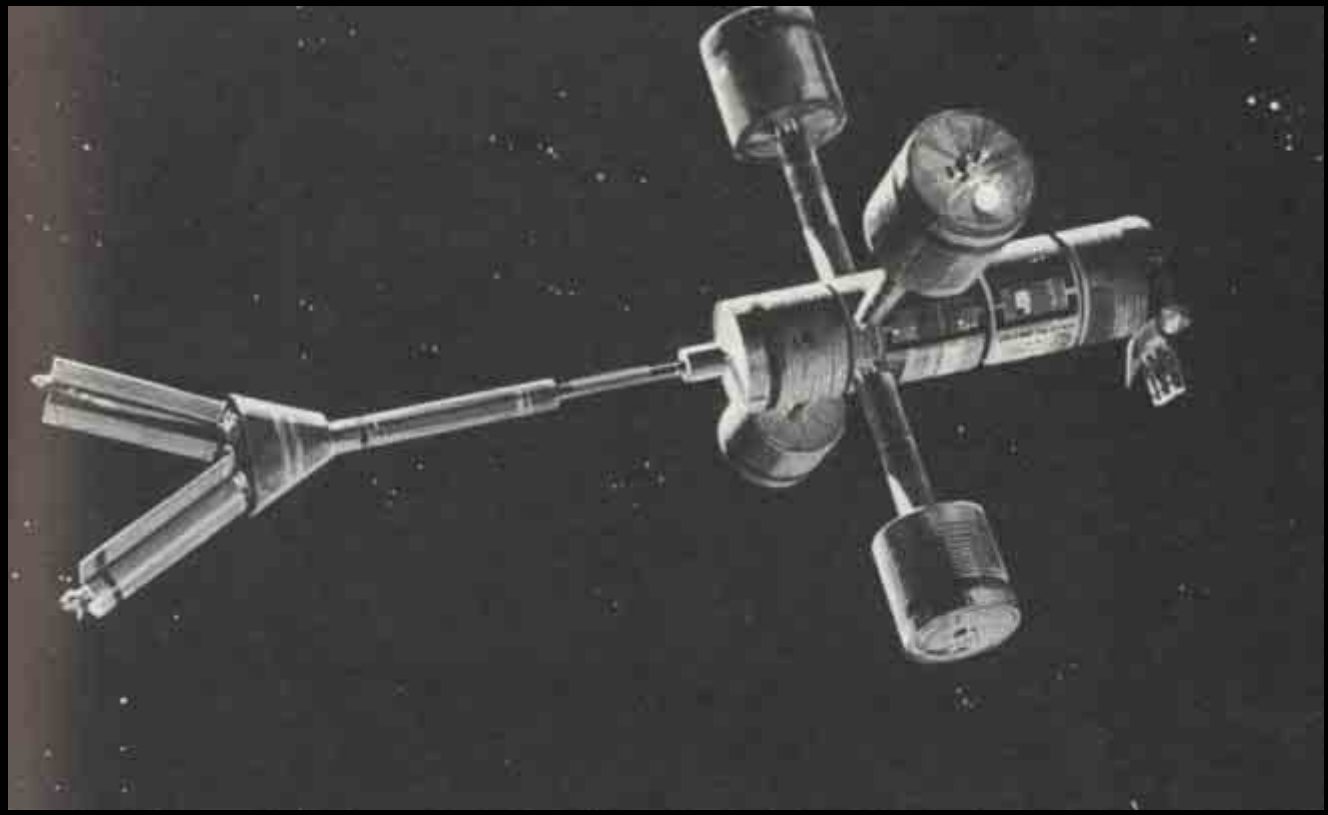
Přerušíme lunární výpravy v době fungování stanice Skylab.

Odložíme start sond Viking na 1975.

Duben 1970 – 110 mil. USD



North American Rockwell a McDonnell Douglas

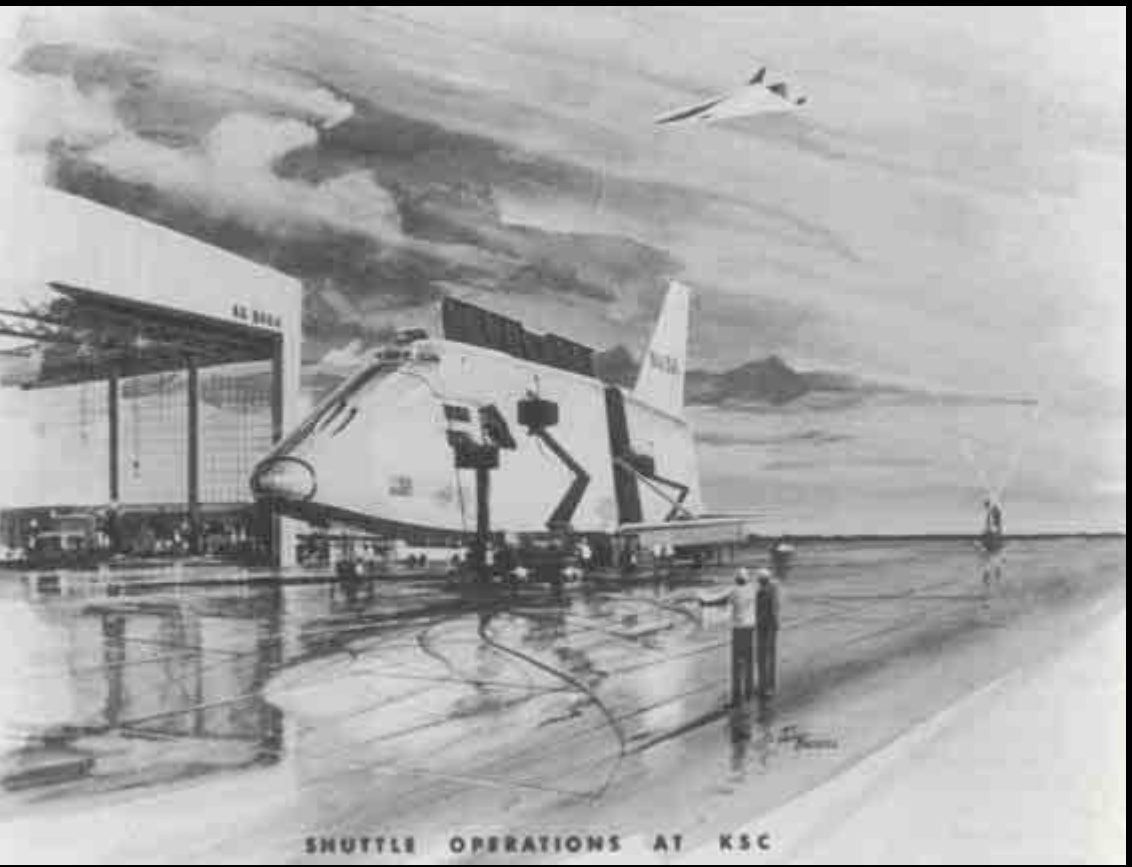


„Už nechci nic slyšet o kosmické stanici – rozhodně ne, dokud budu tady.“ James Fletcher, duben 1970

1970: koalice s Pentagonem

Ne titanu.

1. června 1970: požadavky



Dvoustupňový, plně vícenásobně použitelný.

Oba stupně možnost řiditelného přistání.

Start do 43 hodin.

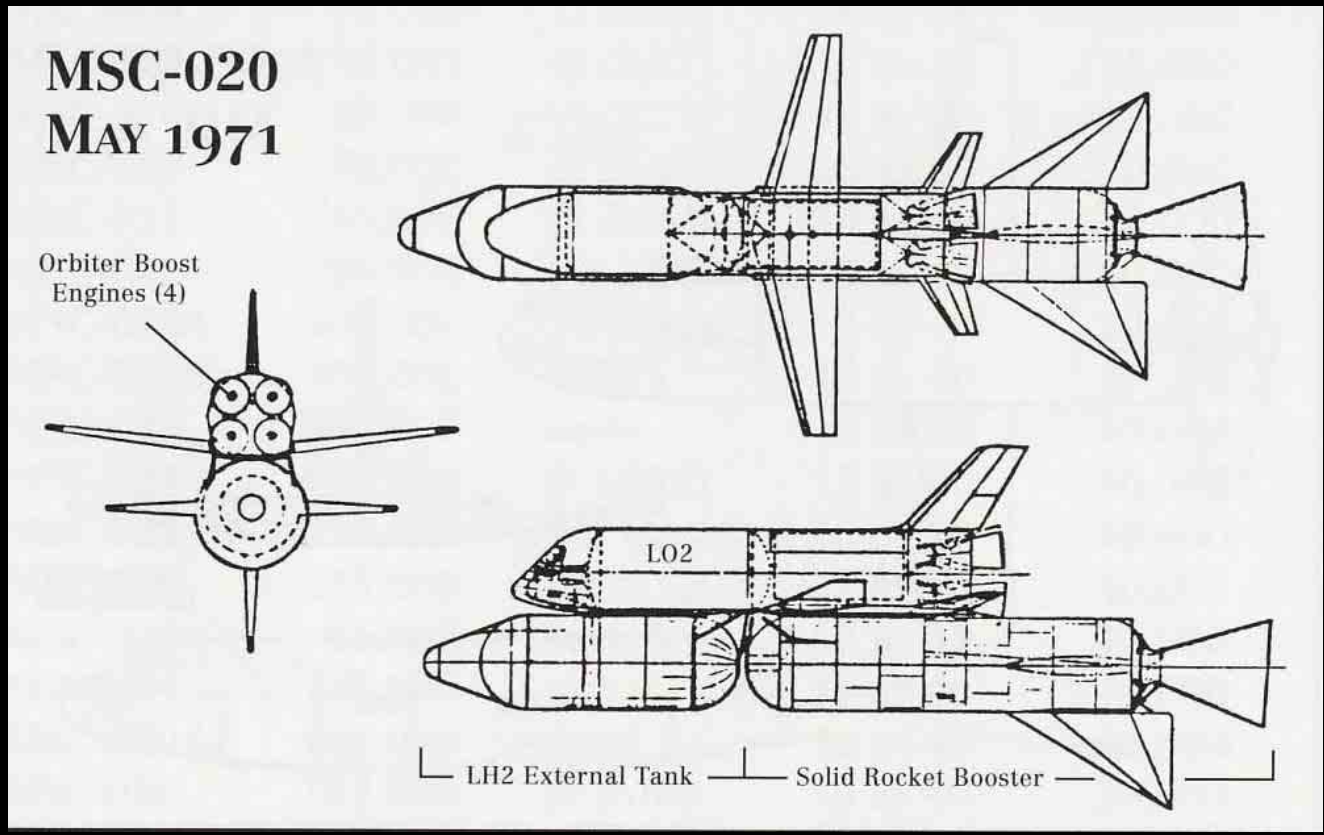
Vertikální start, horizontální přistání.

První start před koncem 1977.

Sedm dní výdrž.

Ne vztlakové těleso.

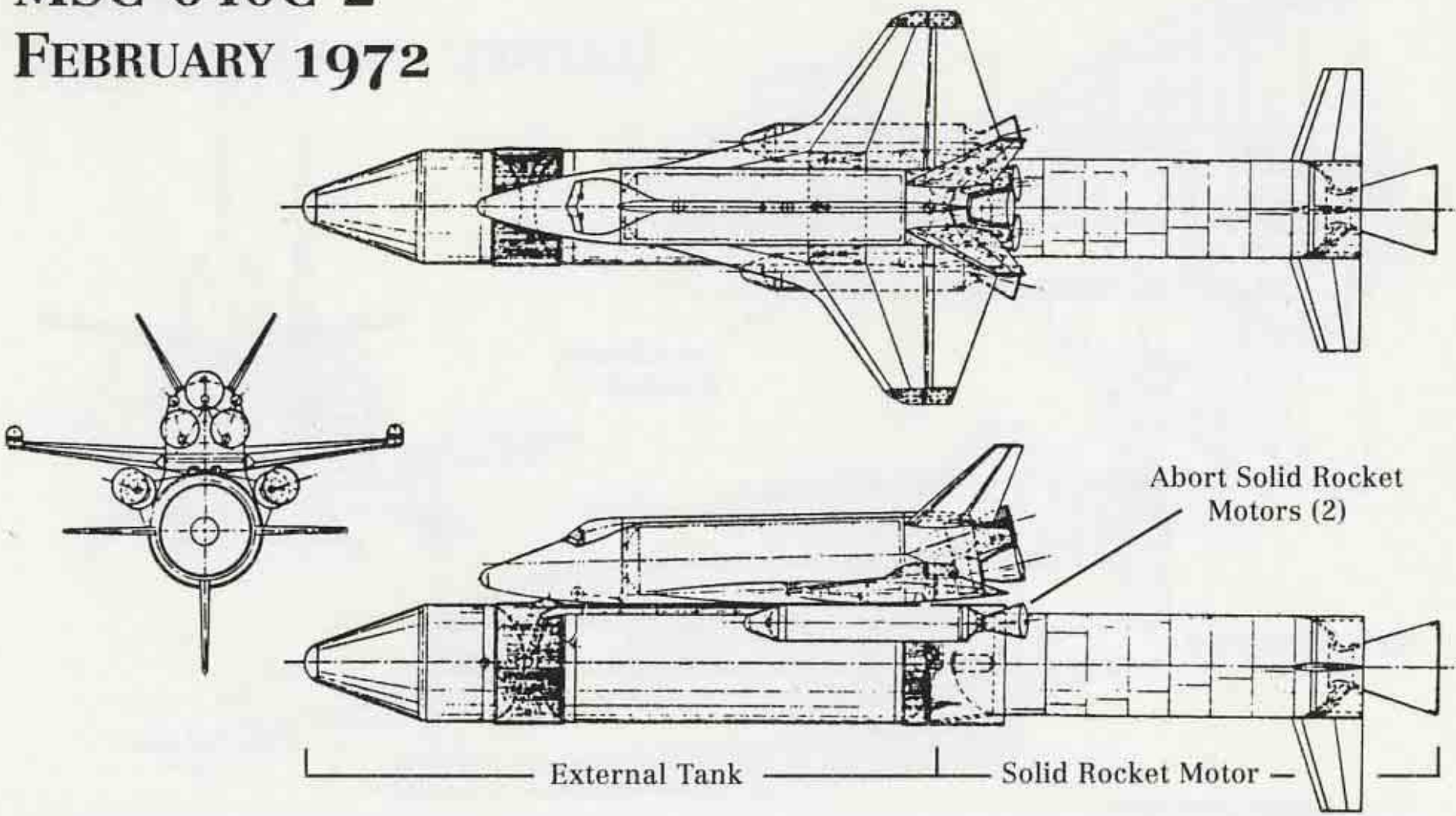
10,5 mld. USD je moc…

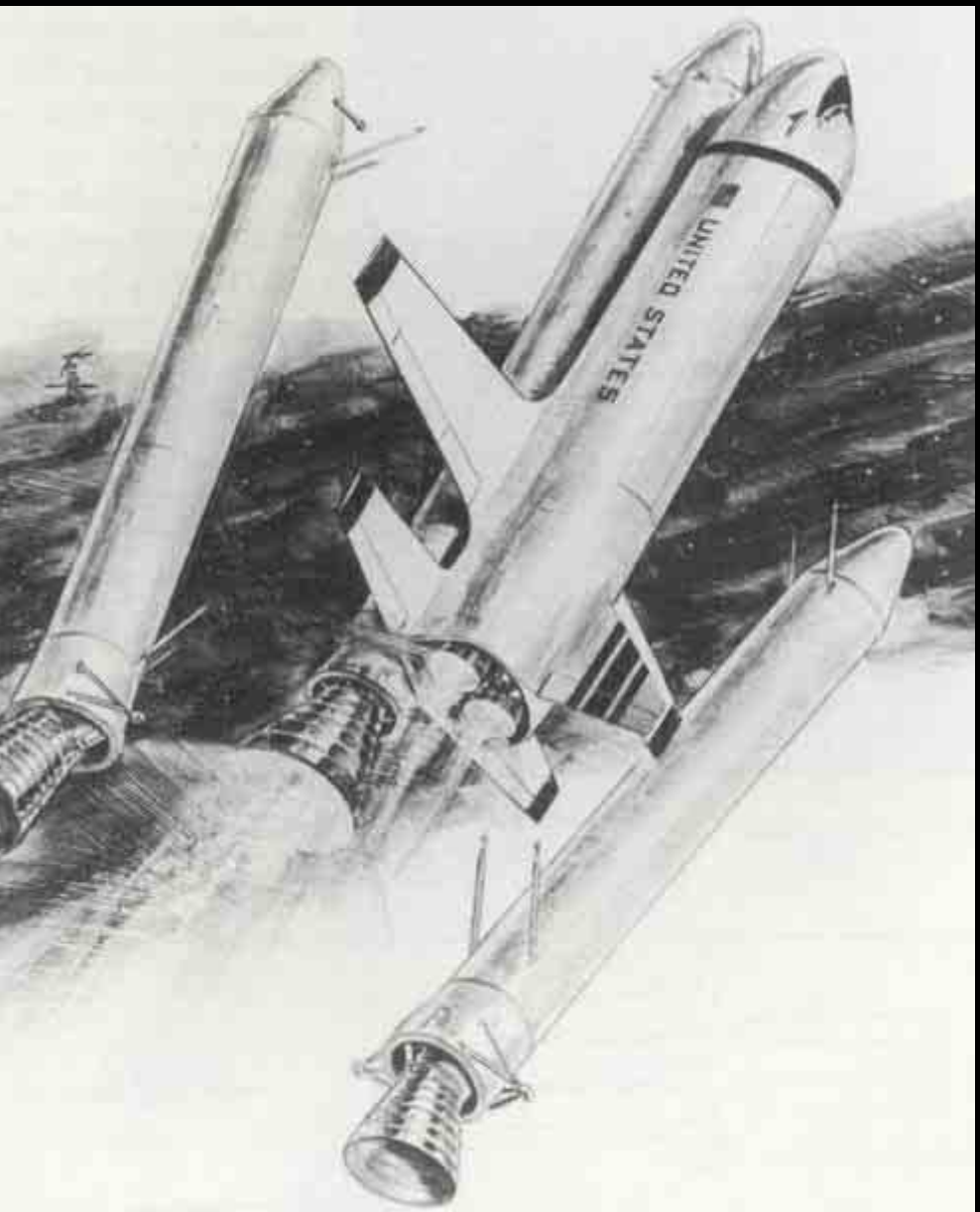


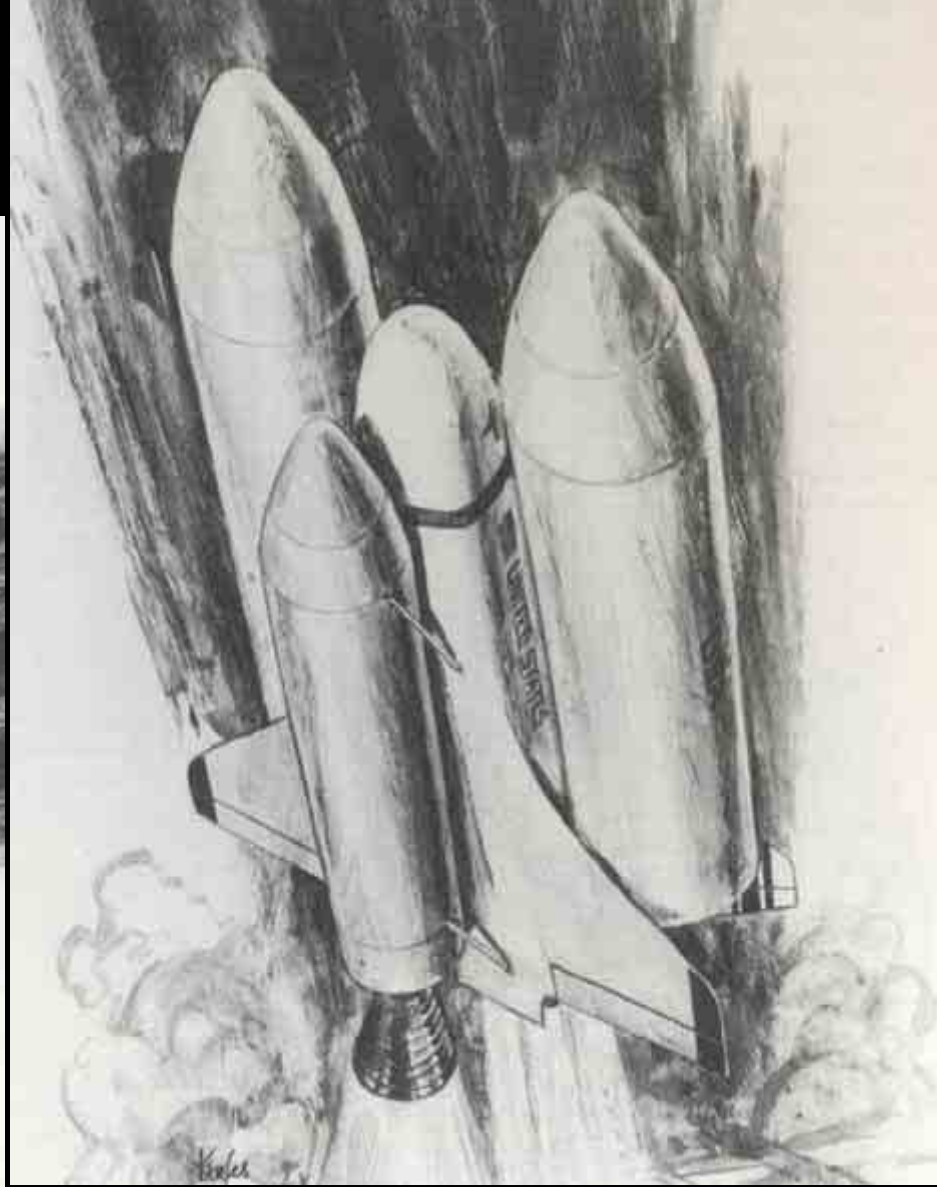
Květen 1971: finanční stop-stav.

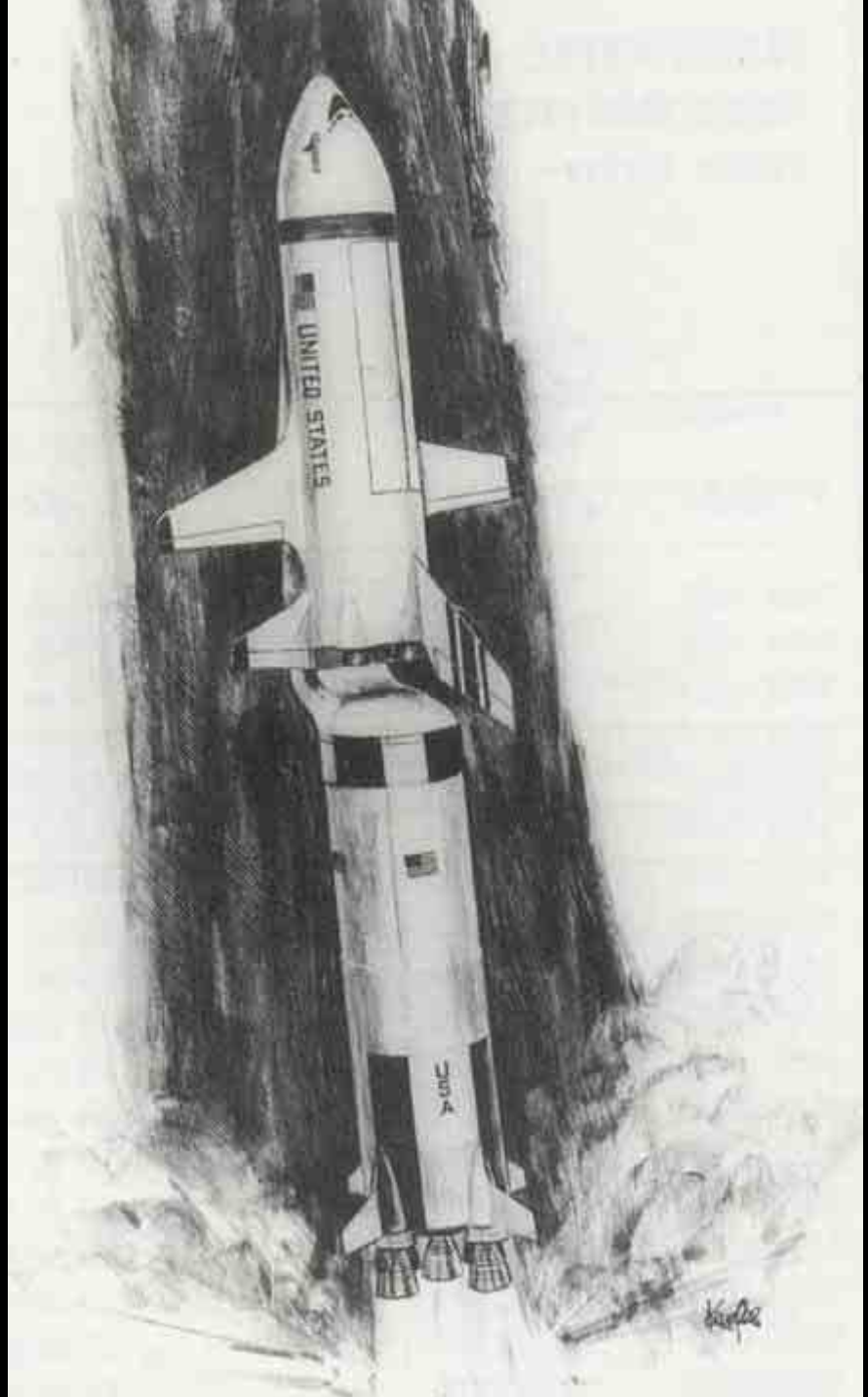
Náklad 10 t, 5 krát 10 m.

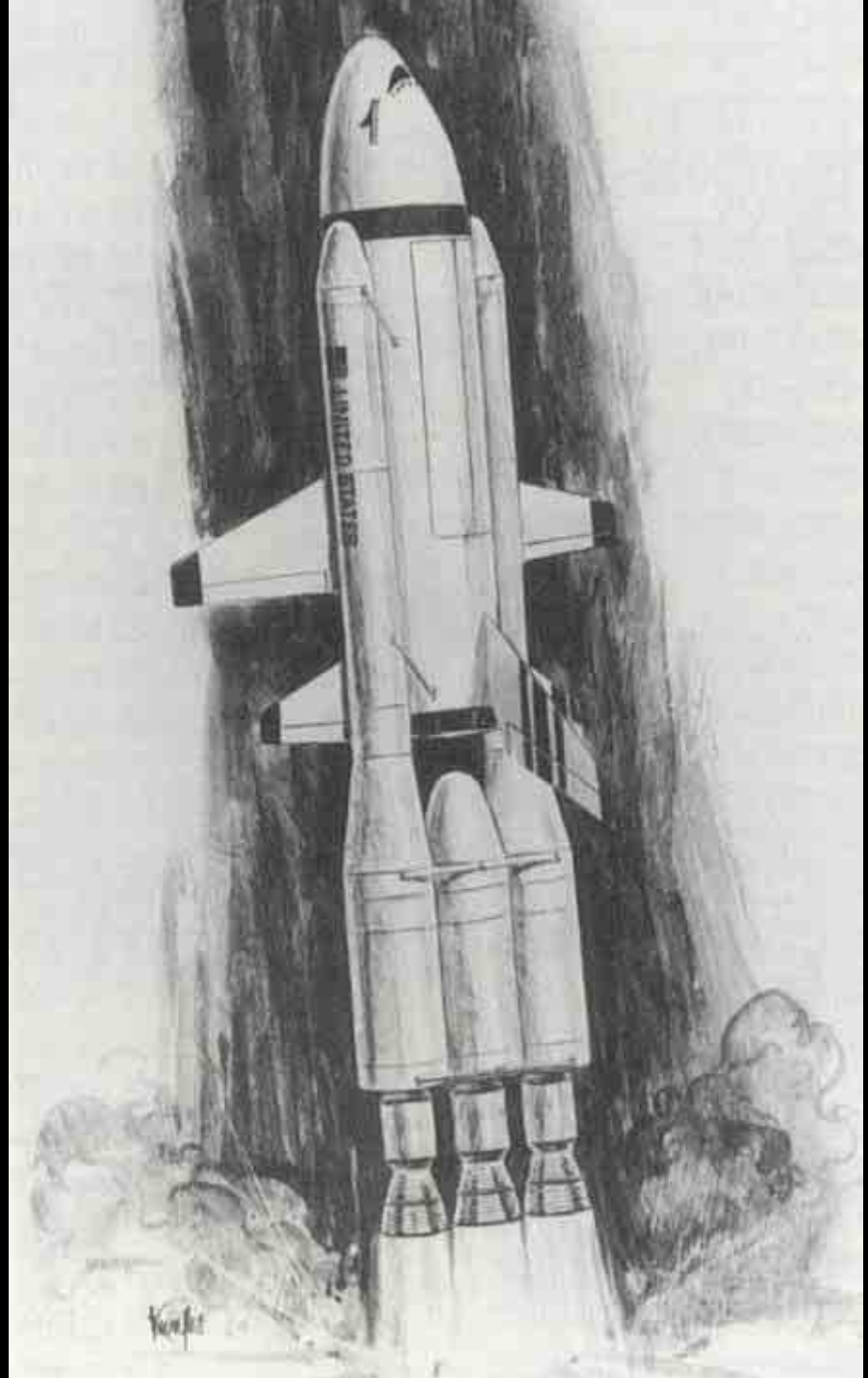
MSC-040C-2
FEBRUARY 1972




UNITED STATES

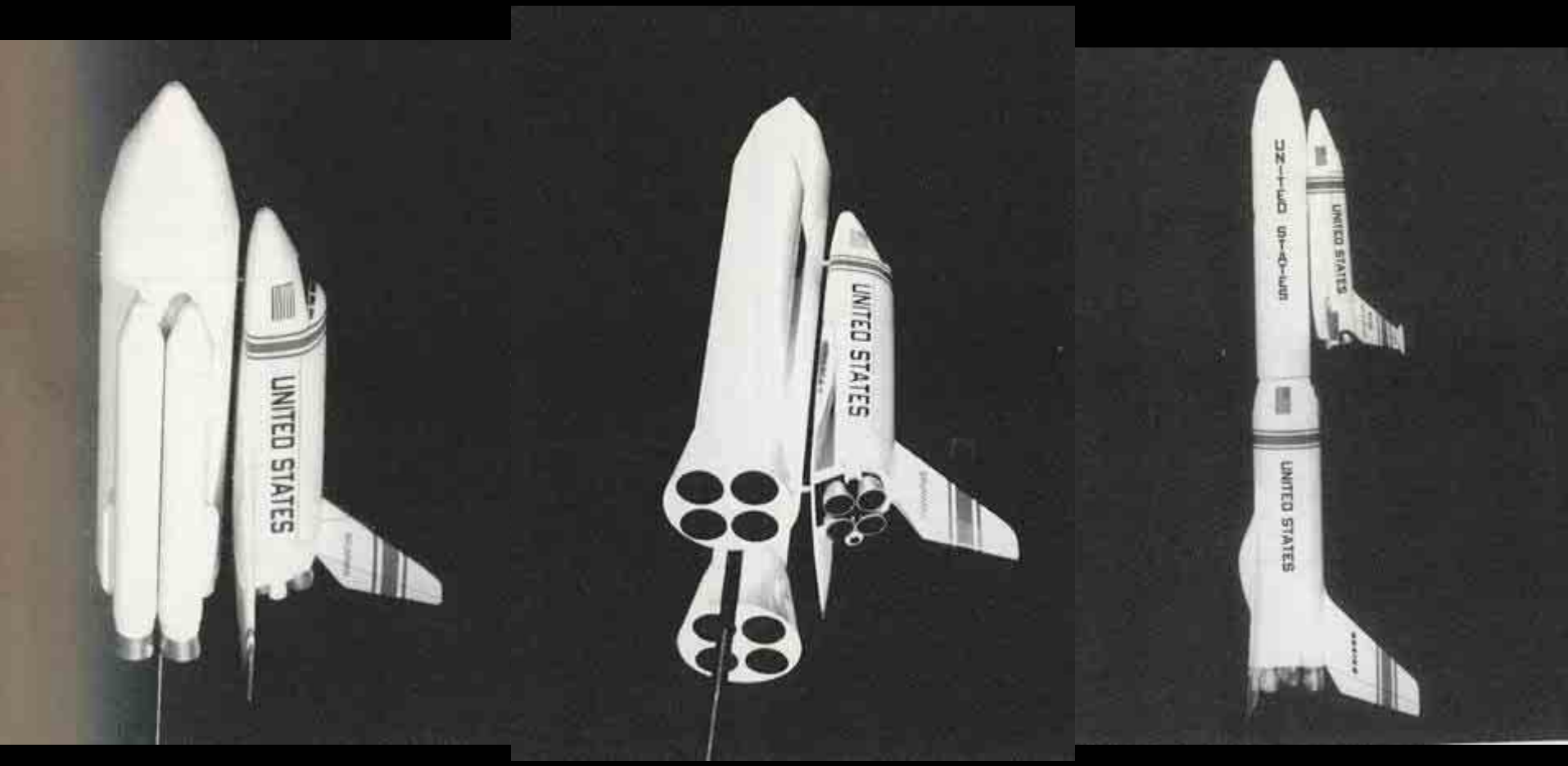

UNITED STATES


UNITED STATES
USA


UNITED STATES

5. ledna 1972

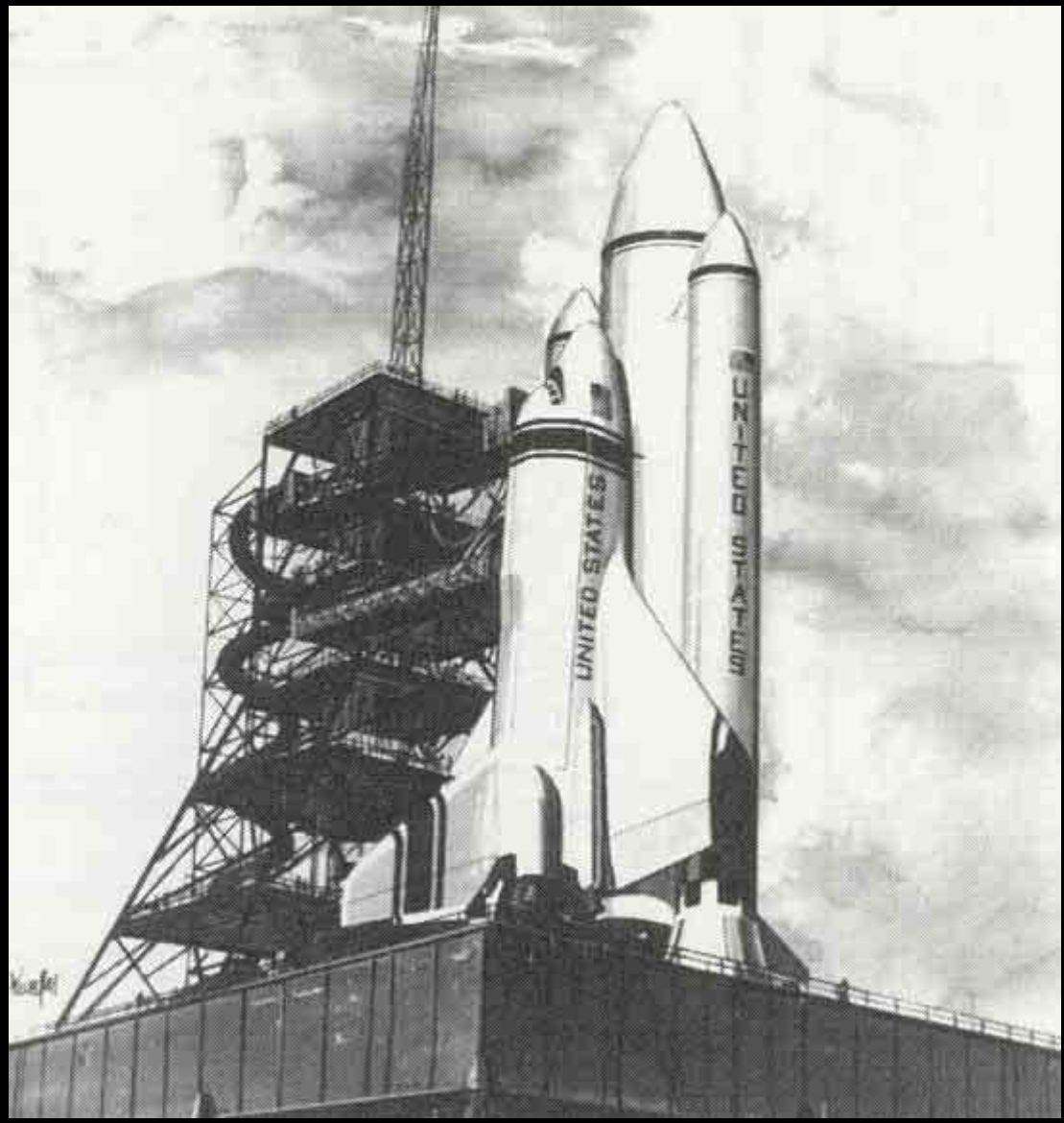
Paralelní vs. sériové, najednou vs. postupně




UNITED
STATES
UNITED
STATES
UNITED
STATES
UNITED
STATES
UNITED
STATES

Záchrana posádky

Abort Solid Rocket Motors



„Porcování“ raketoplánu

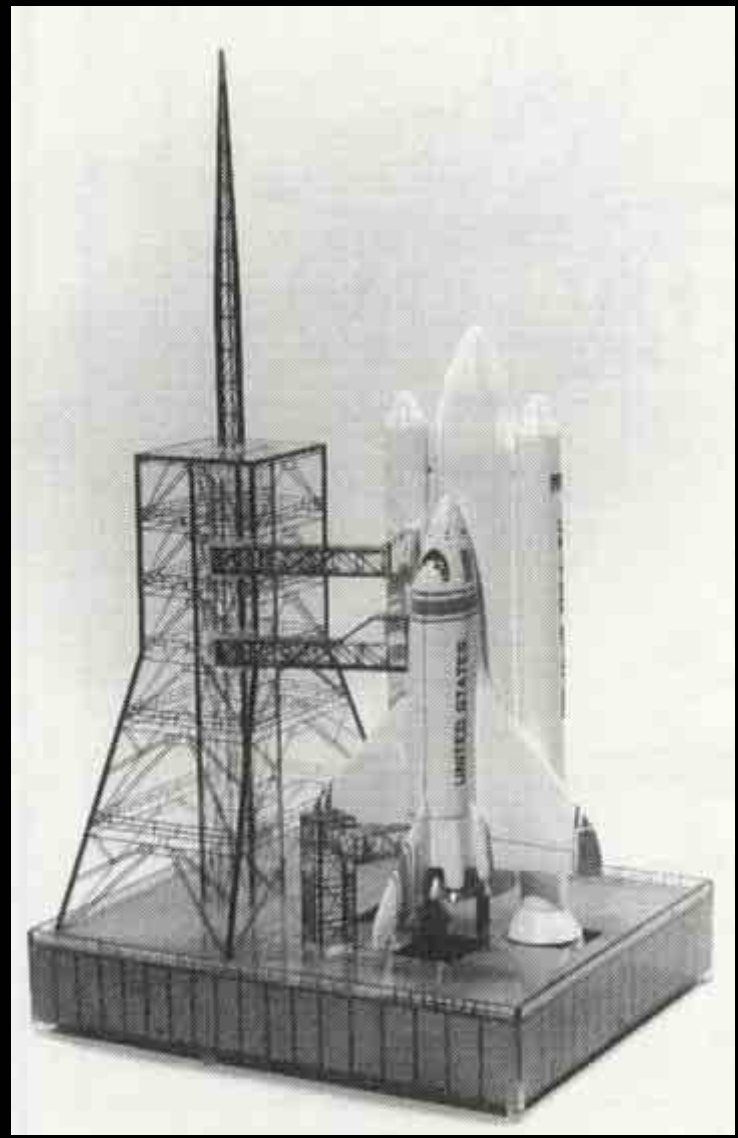
Orbiter – North American Rockwell.

Rocketdyne – SSME.

International Business Machine – počítače a software.

Martin Marietta – hlavní nádrž.

Thiokol – pomocné motory.



Plány (a realita)

1979 až 1990: 580 letů.

Až 50 startů ročně.

38 procent Spacelab, 31 procent armáda, 38 procent komerční a stanice.

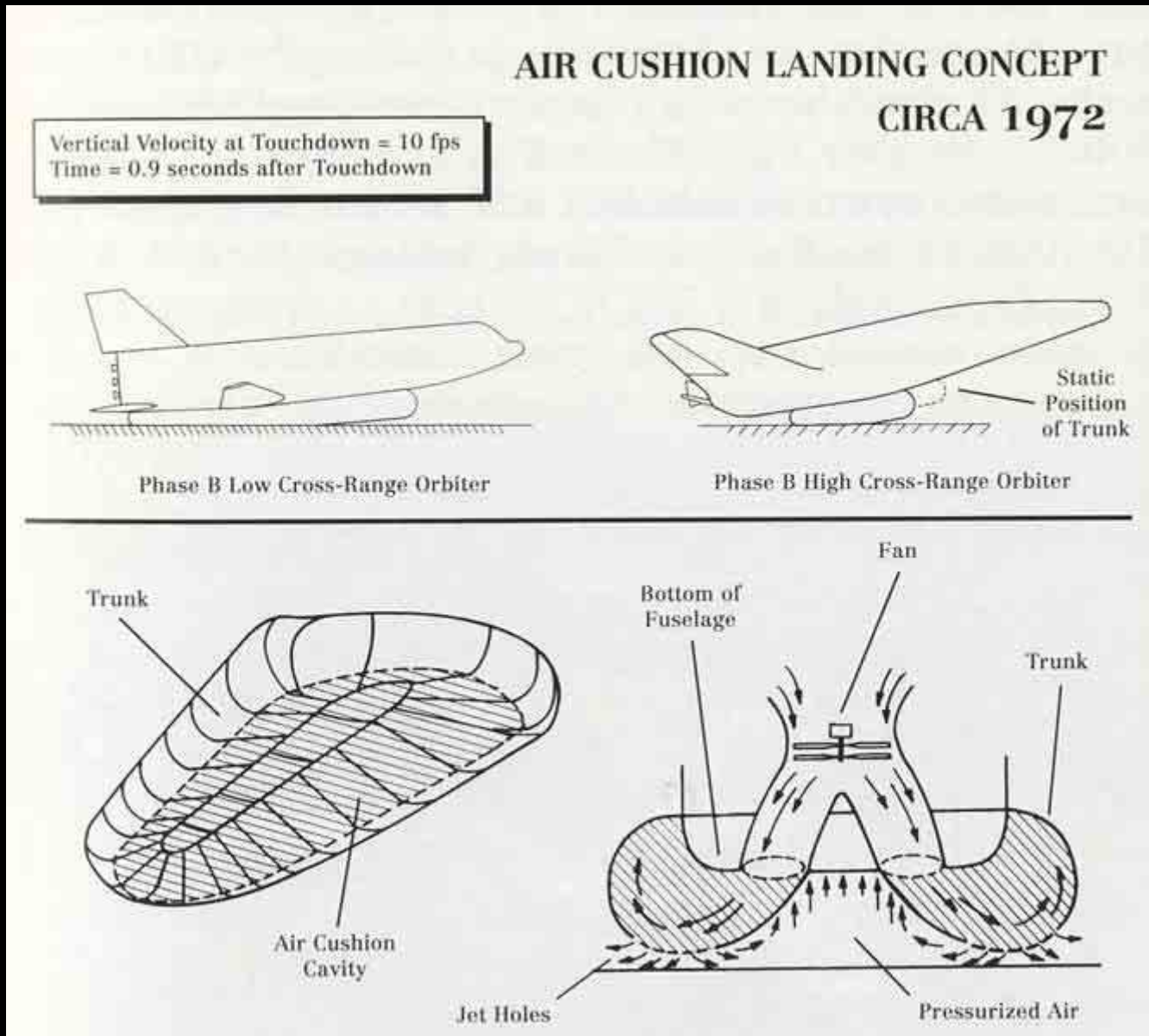
Zajištění raketami 13,2 mld. USD, raketoplány 8,1 mld. USD (bez nákladů na vývoj).

Na rampu do 24 hodin, start do 2 hodin.

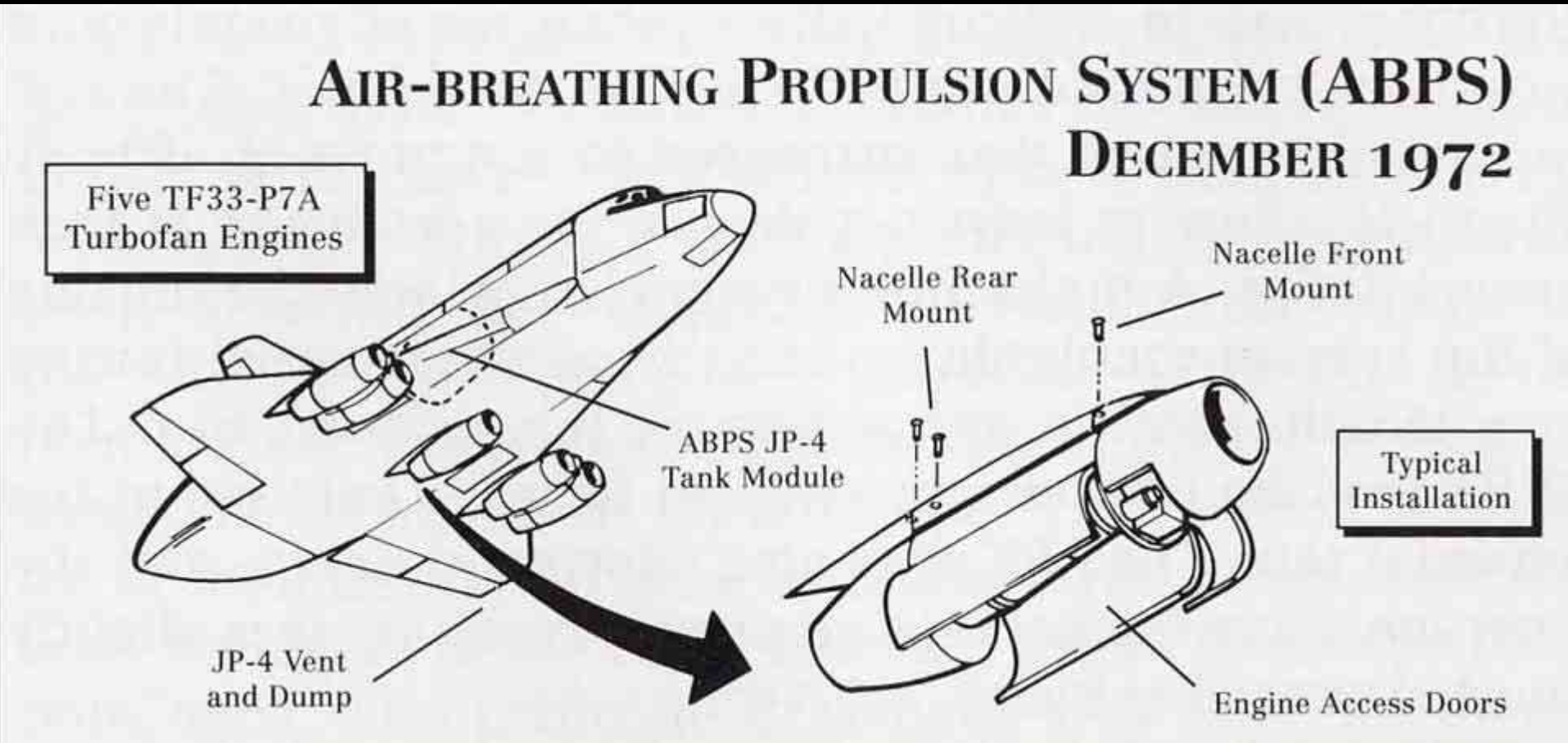
1974: odstranění atmosférických motorů

Ablativní tepelný štít?

Přistání?

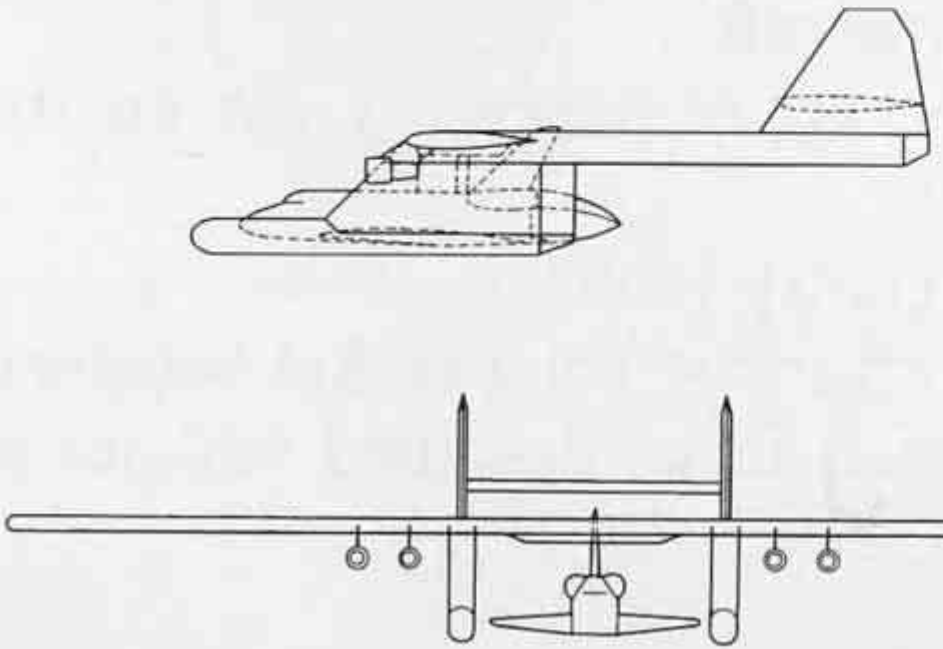

AIR CUSHION LANDING CONCEPT
CIRCA 1972
Vertical Velocity at Touchdown = 10 fps
Time = 0.9 seconds after Touchdown
Static
Position
of Trunk
Phase B Low Cross-Range Orbiter
Phase B High Cross-Range Orbiter
Trunk
Air Cushion
Cavity
Fan
Bottom of
Fuselage
Trunk
Jet Holes
Pressurized Air

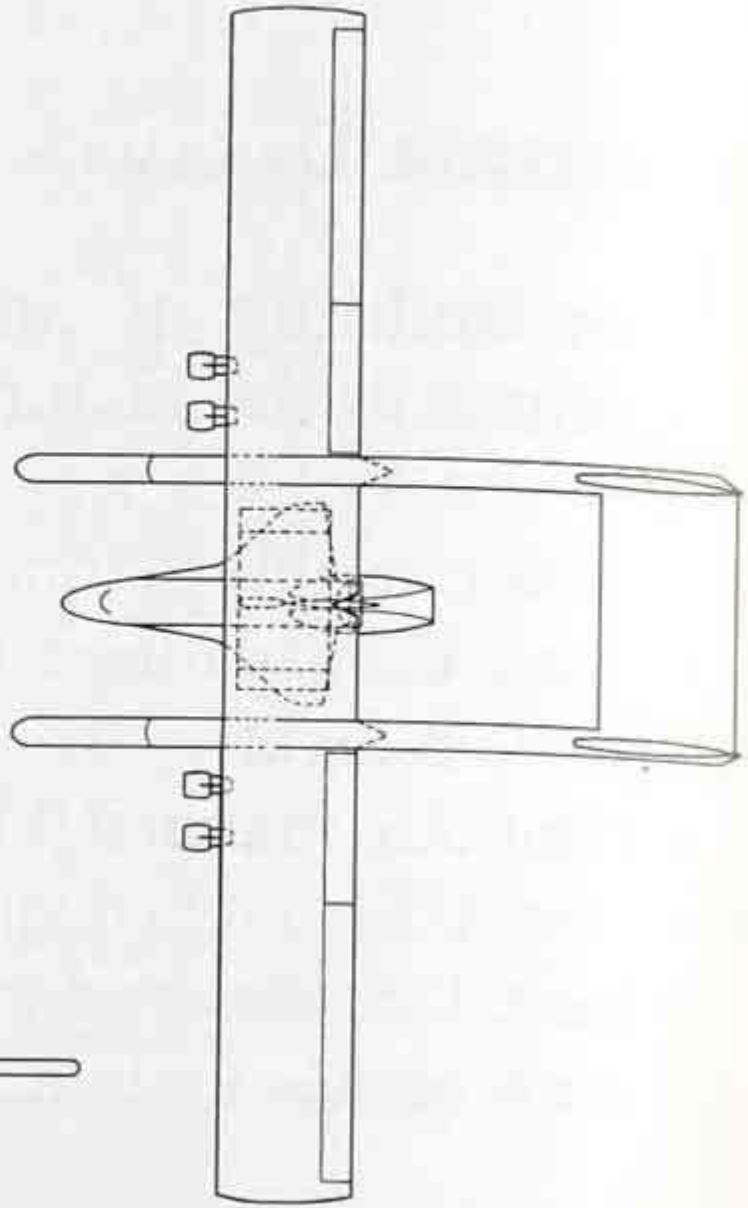
Vzduchoplod? Lod? Letadlo?

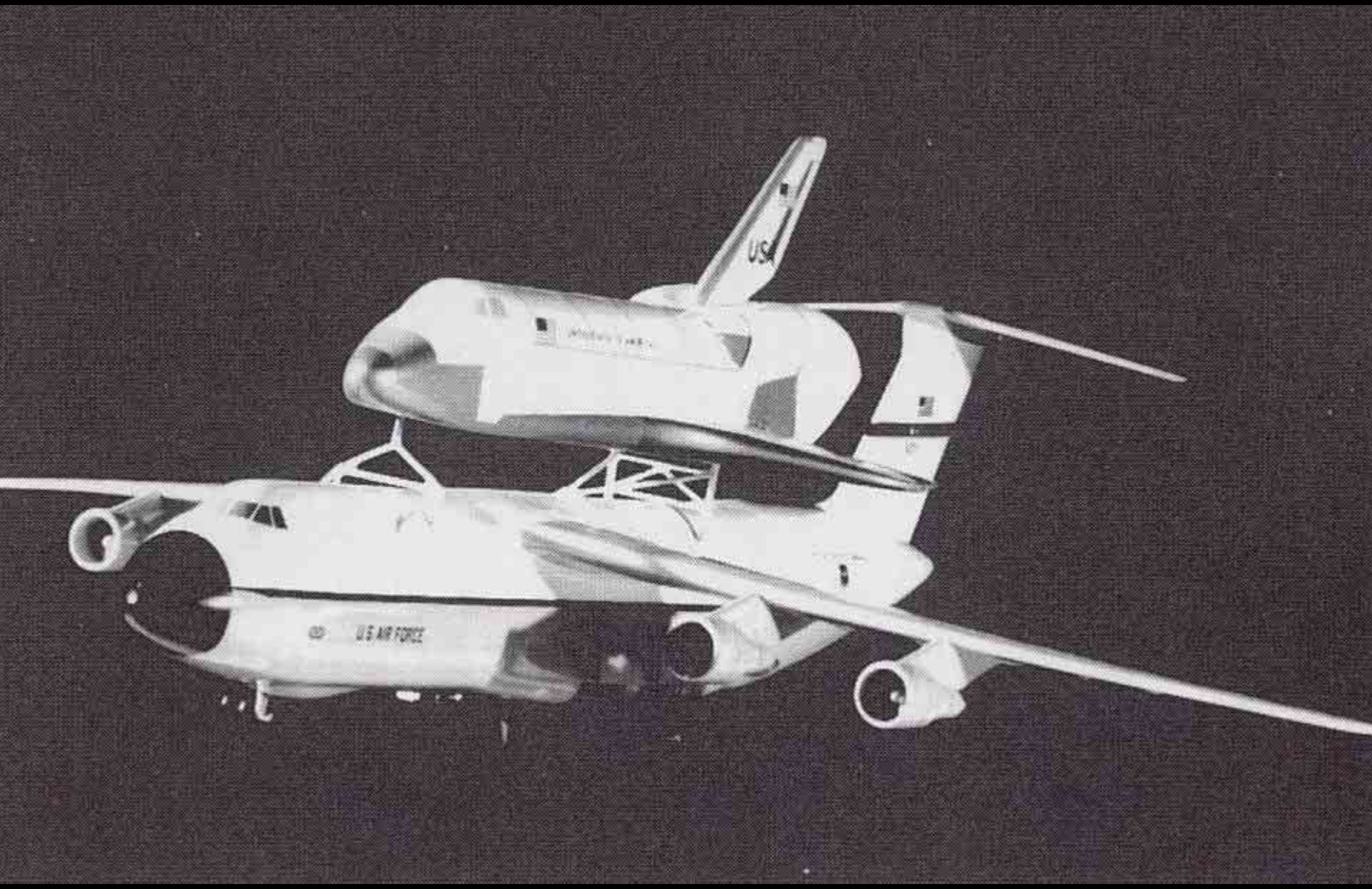


PROPOSED
LaRC TRANSPORT AIRCRAFT
CIRCA 1975

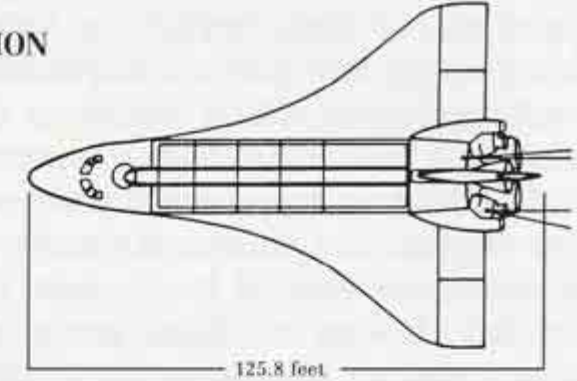
Length:	293 feet
Wing Span:	472 feet
Height:	98 feet

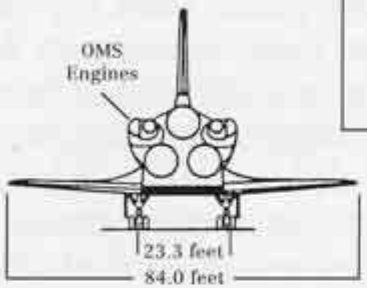




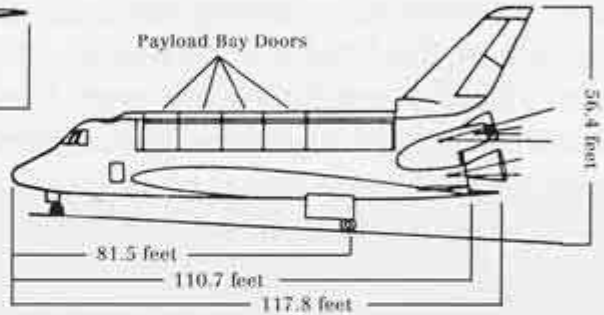

US
US AIR FORCE

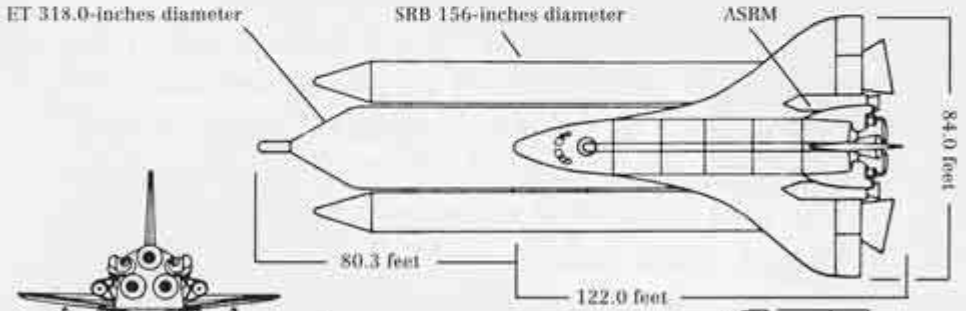
ATP CONFIGURATION
(VEHICLE 1)
MARCH 1972



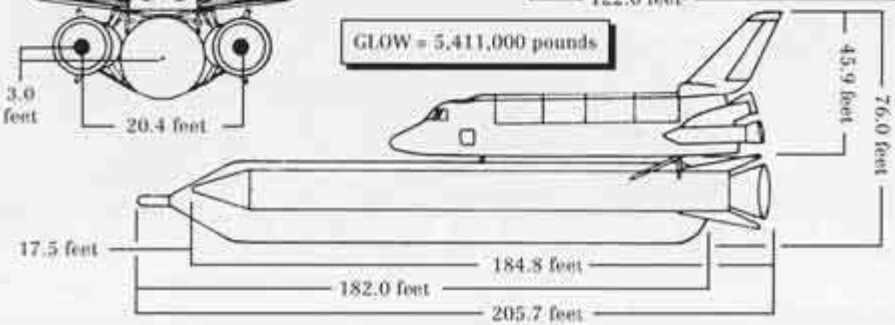


	WING	VERT.
Area (sqft)	3,220	435
Aspect Ratio	2.19	1.675
Sweep (LE)	50°	45°
M.A.C. (in)	525.5	205
Dihedral (TE)	3°30'	N/A

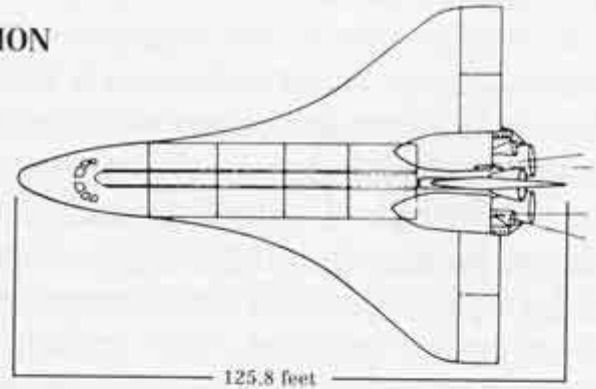


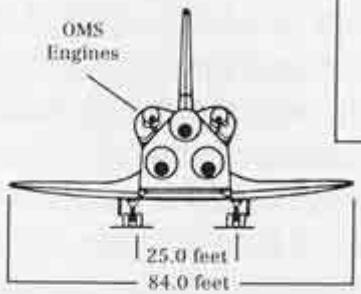


GLOW = 5,411,000 pounds

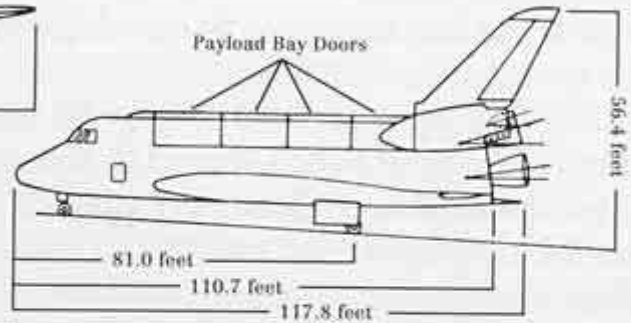


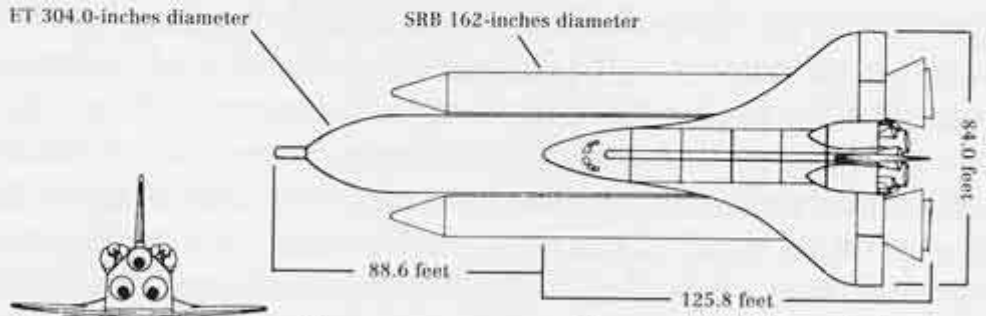
PRR CONFIGURATION
(VEHICLE 2)
OCTOBER 1972

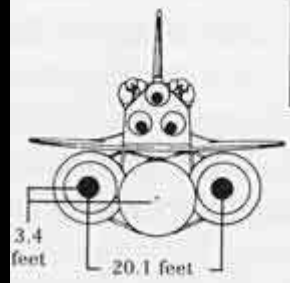




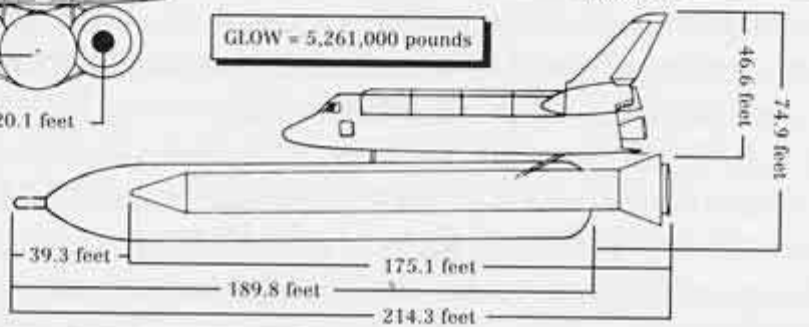
	WING	VERT.
Area (sqft)	3,220	435
Aspect Ratio	2.19	1.68
Sweep (LE)	50°	45°
M.A.C. (in)	525.5	205
Dihedral (TE)	3°30'	N/A



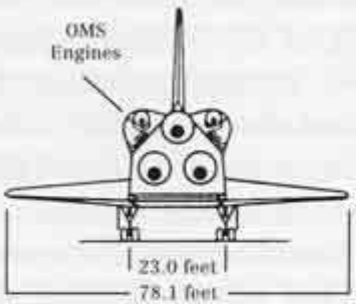


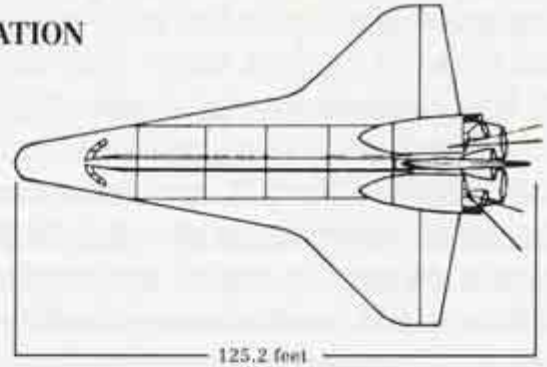


GLOW = 5,261,000 pounds

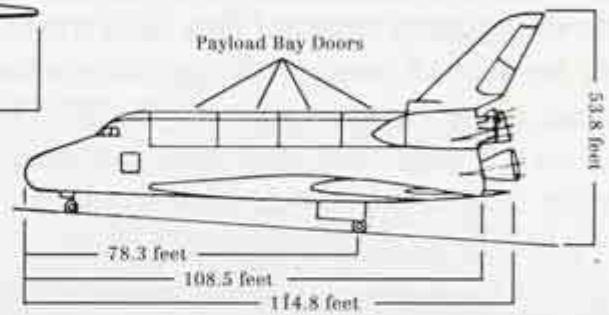


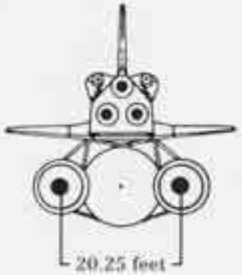
VEHICLE 2A CONFIGURATION
(150K ORBITER)
DECEMBER 1972

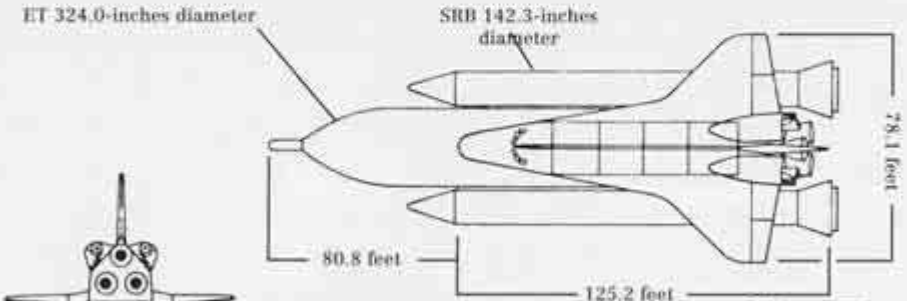




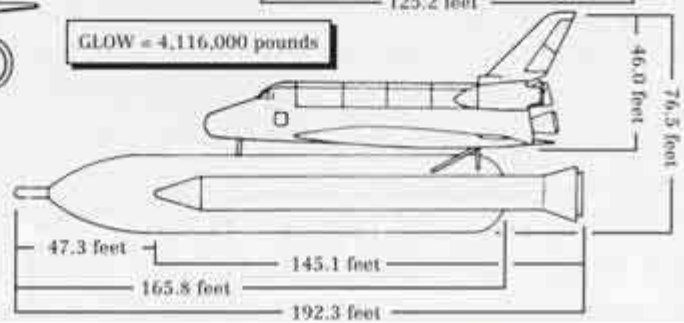
	WING	VERT.
Area (sqft)	2,690	413.25
Aspect Ratio	2.265	1.675
Sweep (LE)	45°	45°
M.A.C. (in)	474.8	199.81
Dihedral (TE)	3°30'	N/A



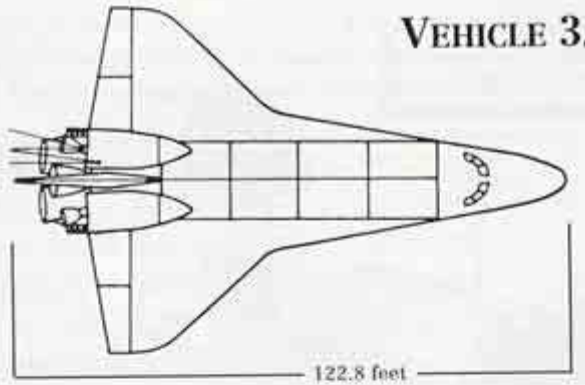


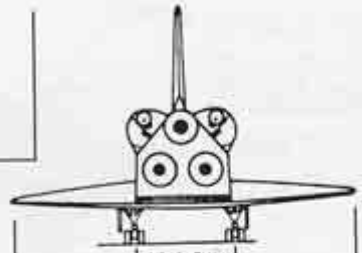


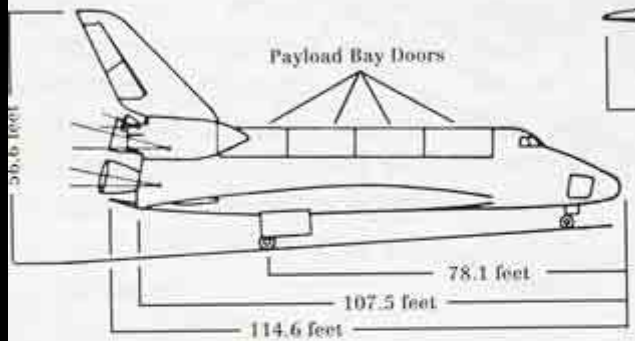
GLOW = 4,116,000 pounds



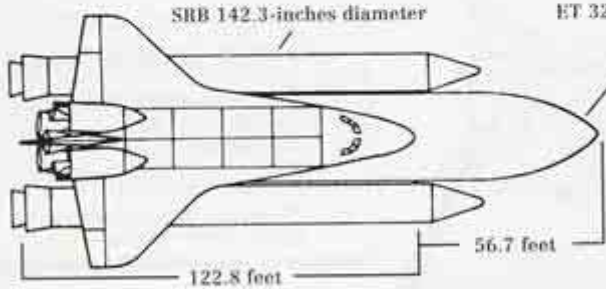
VEHICLE 3/4 CONFIGURATION
MAY 1973



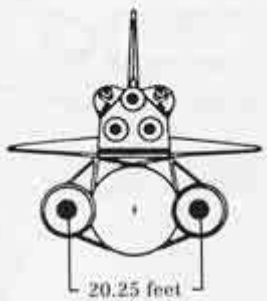


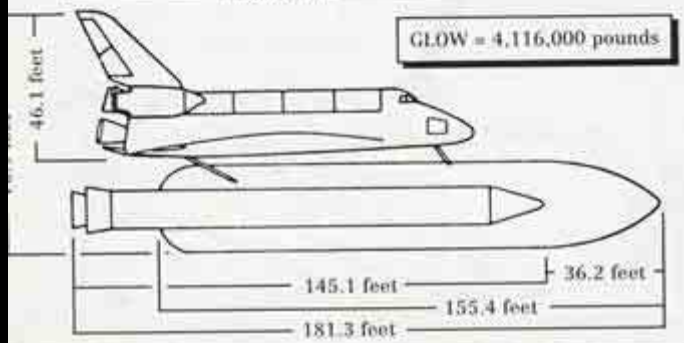


	WING	VERT
Area (sqft)	2,690	413.25
Aspect Ratio	2.265	1.675
Sweep (LE)	45°	45°
M.A.C. (in)	474.8	199.81
Dihedral (TE)	3°30'	N/A

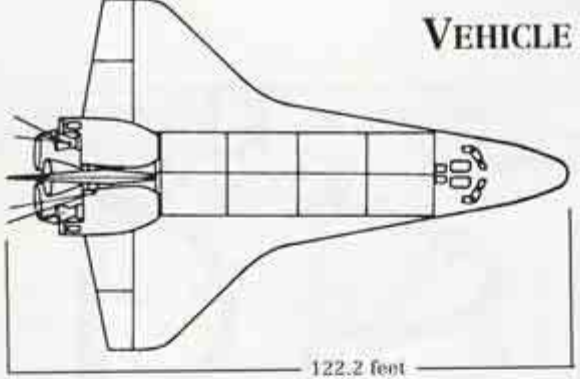


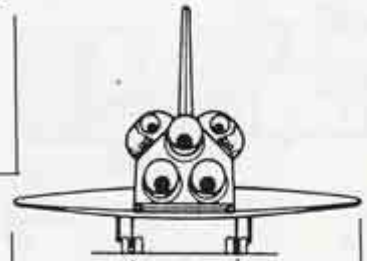
GLOW = 4,116,000 pounds

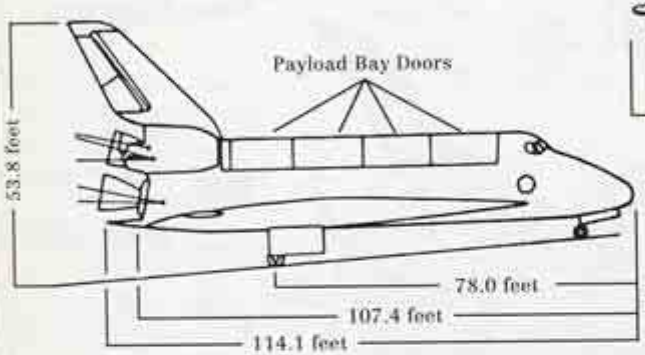




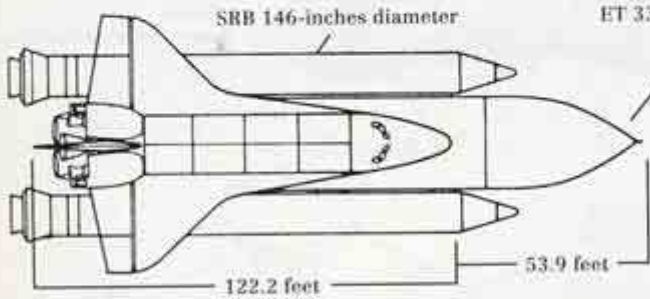
VEHICLE 5/6 CONFIGURATION
JUNE 1974

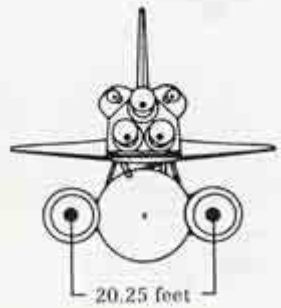




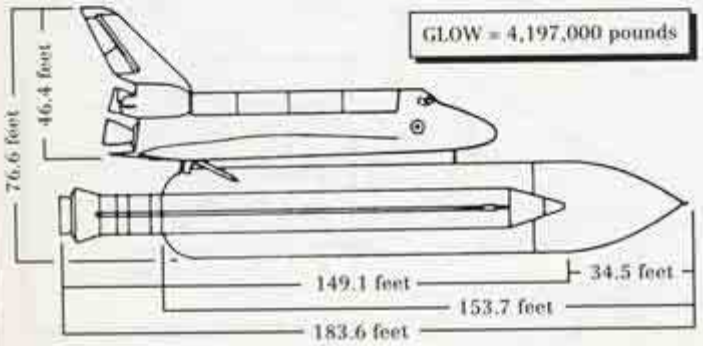


	WING	VERT.
Area (sqft)	2,690	413.25
Aspect Ratio	2.265	1.675
Sweep (LE)	45°	45°
M.A.C. (in)	474.81	199.81
Dihedral (TE)	3°30'	N/A

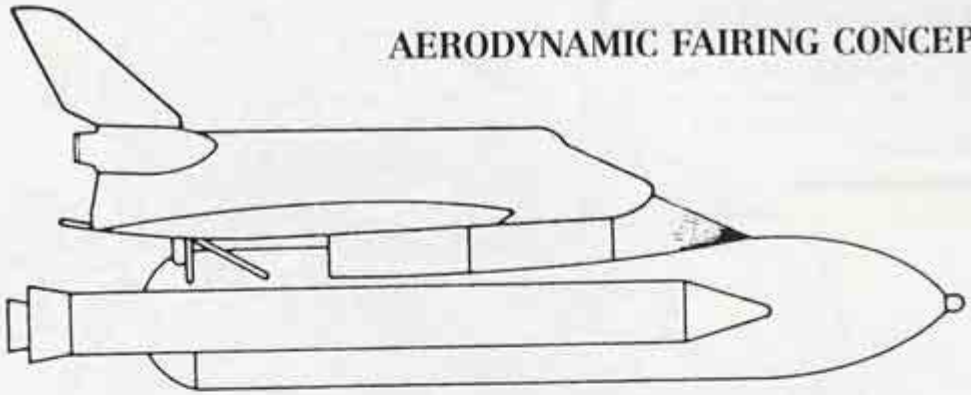




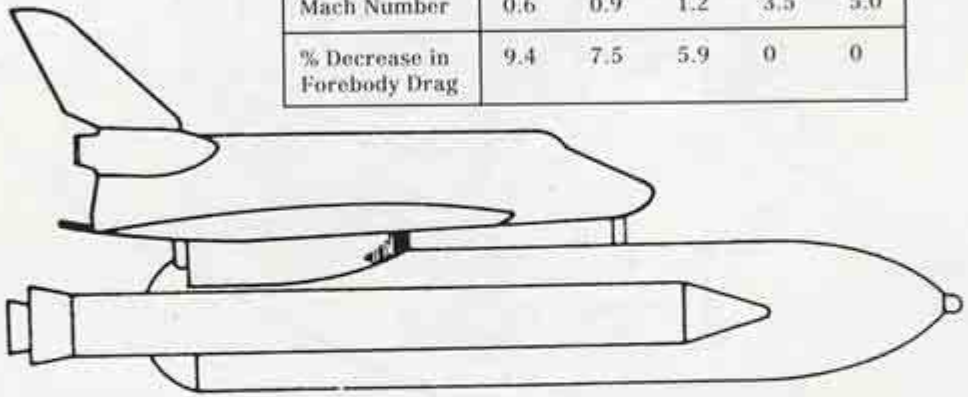
GLOW = 4,197,000 pounds



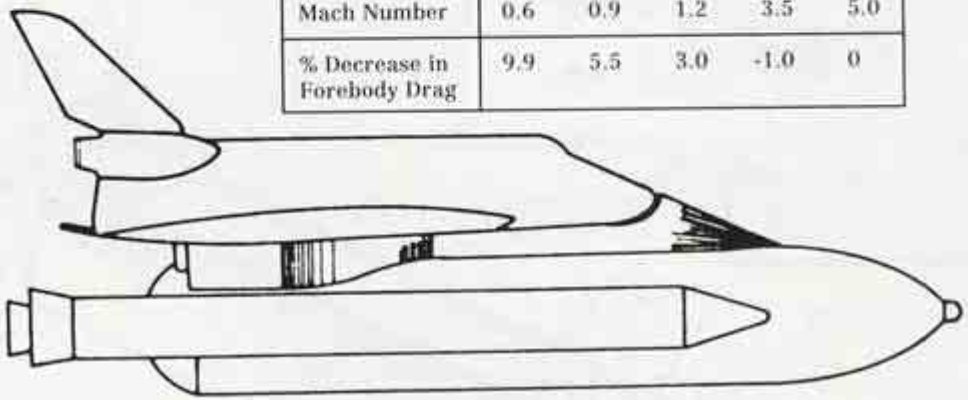
AERODYNAMIC FAIRING CONCEPTS



Mach Number	0.6	0.9	1.2	3.5	5.0
% Decrease in Forebody Drag	9.4	7.5	5.9	0	0

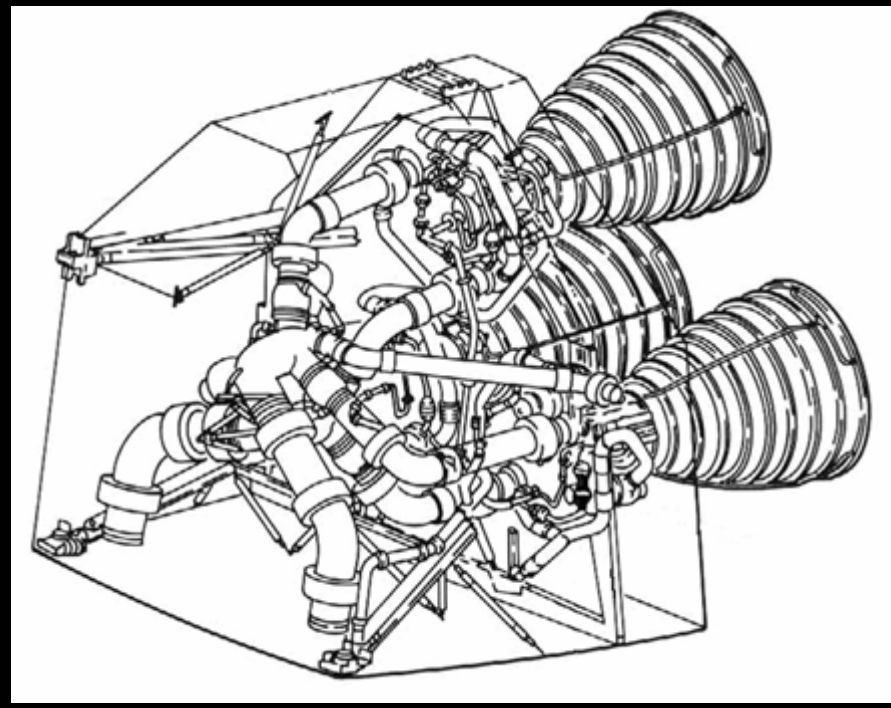


Mach Number	0.6	0.9	1.2	3.5	5.0
% Decrease in Forebody Drag	9.9	5.5	3.0	-1.0	0



Mach Number	0.6	0.9	1.2	3.5	5.0
% Decrease in Forebody Drag	14.0	7.6	5.8	3.8	2.1

17. září 1976: Constitution



OMS.

Absence potrubí.

Zjednodušená kabina.

Bez tepelné ochrany.

Bez palivových článků.

Nefunkční nákladový prostor.

Bez MPS (Main Propulsion System).

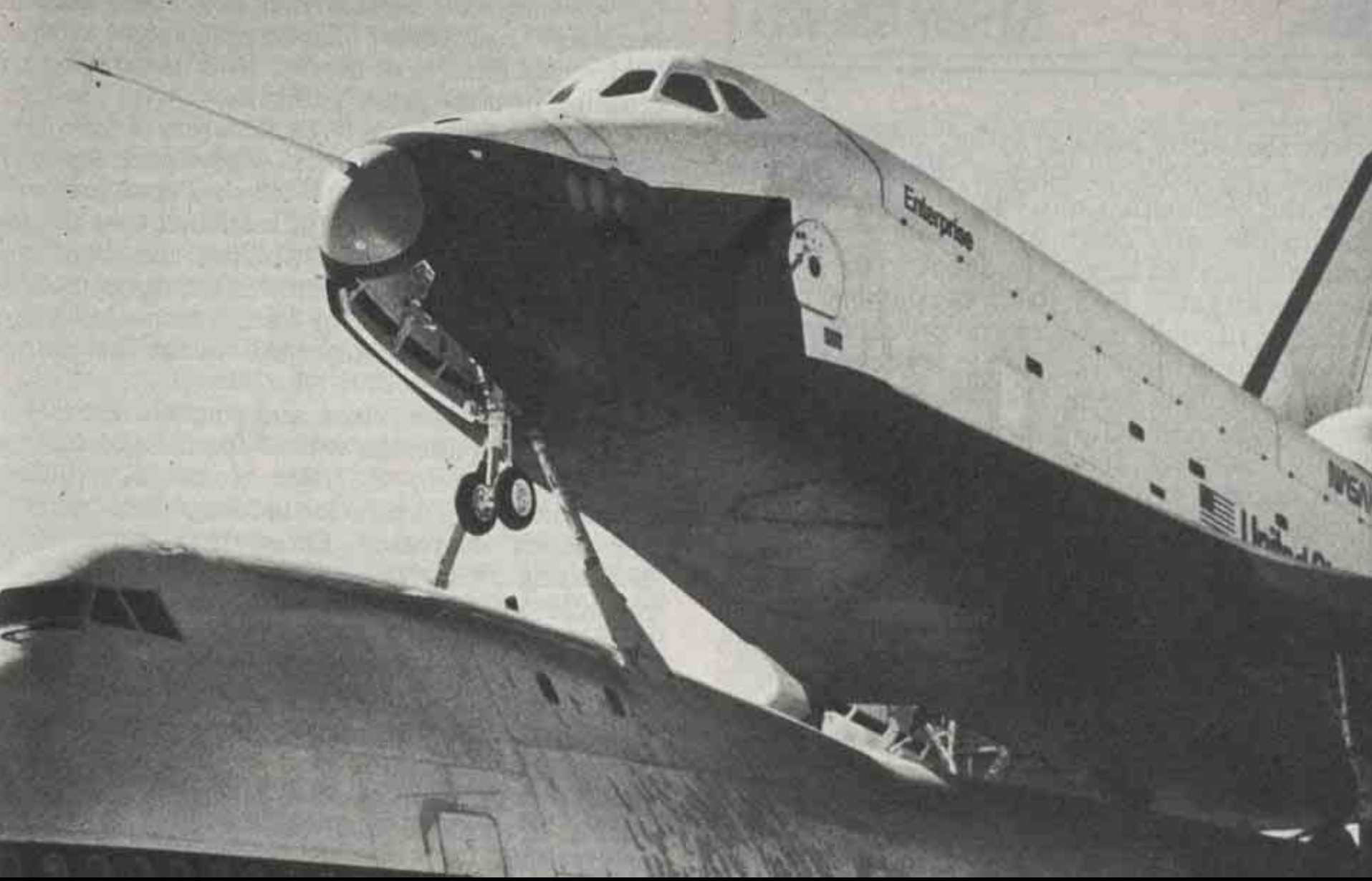
+ Balast.

Approach and Landing Tests

8. února 1977 – spojení 747 a OV-101.

15. února – pojezdové zkoušky.

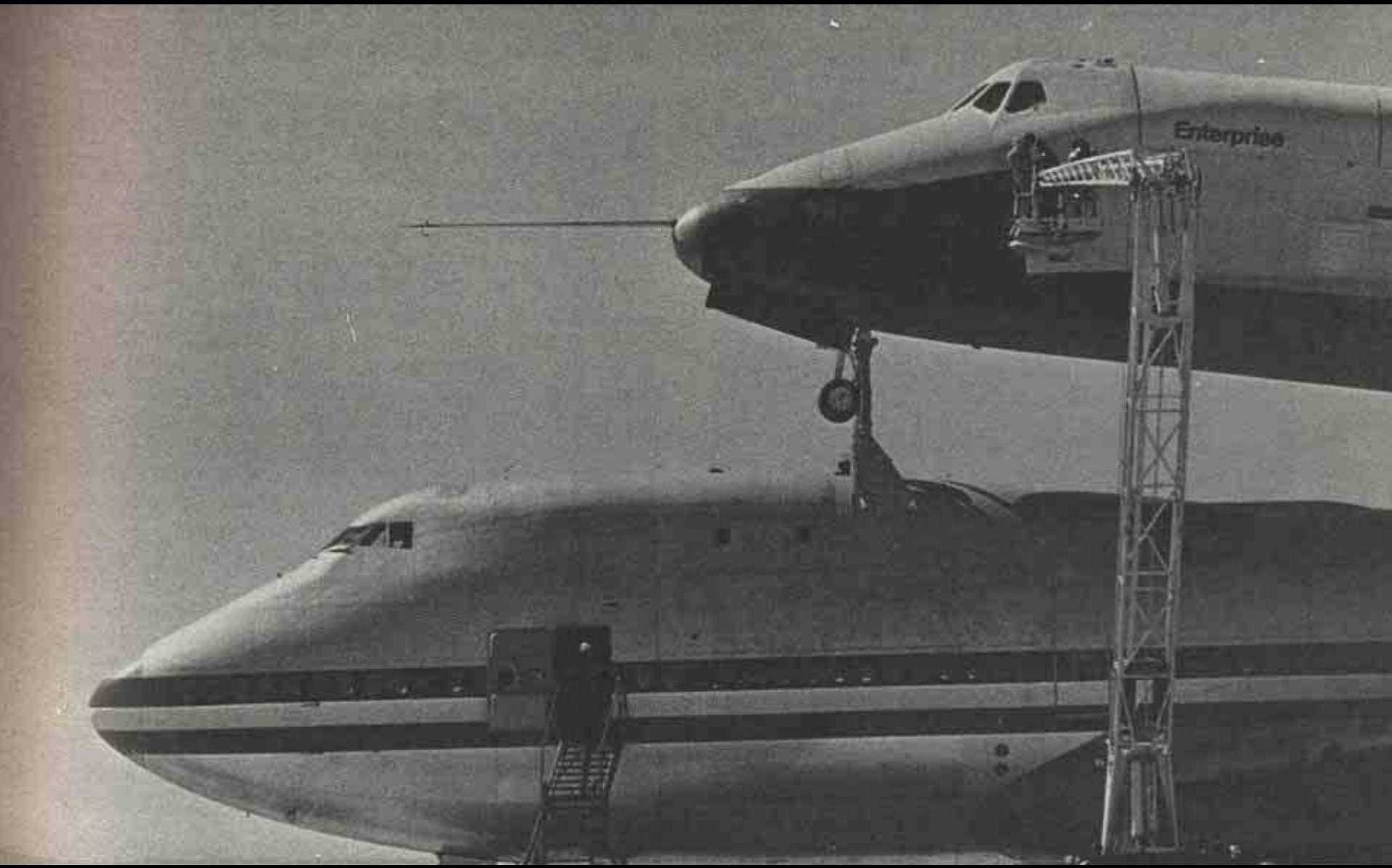
18. února – první let (pasivní). +4



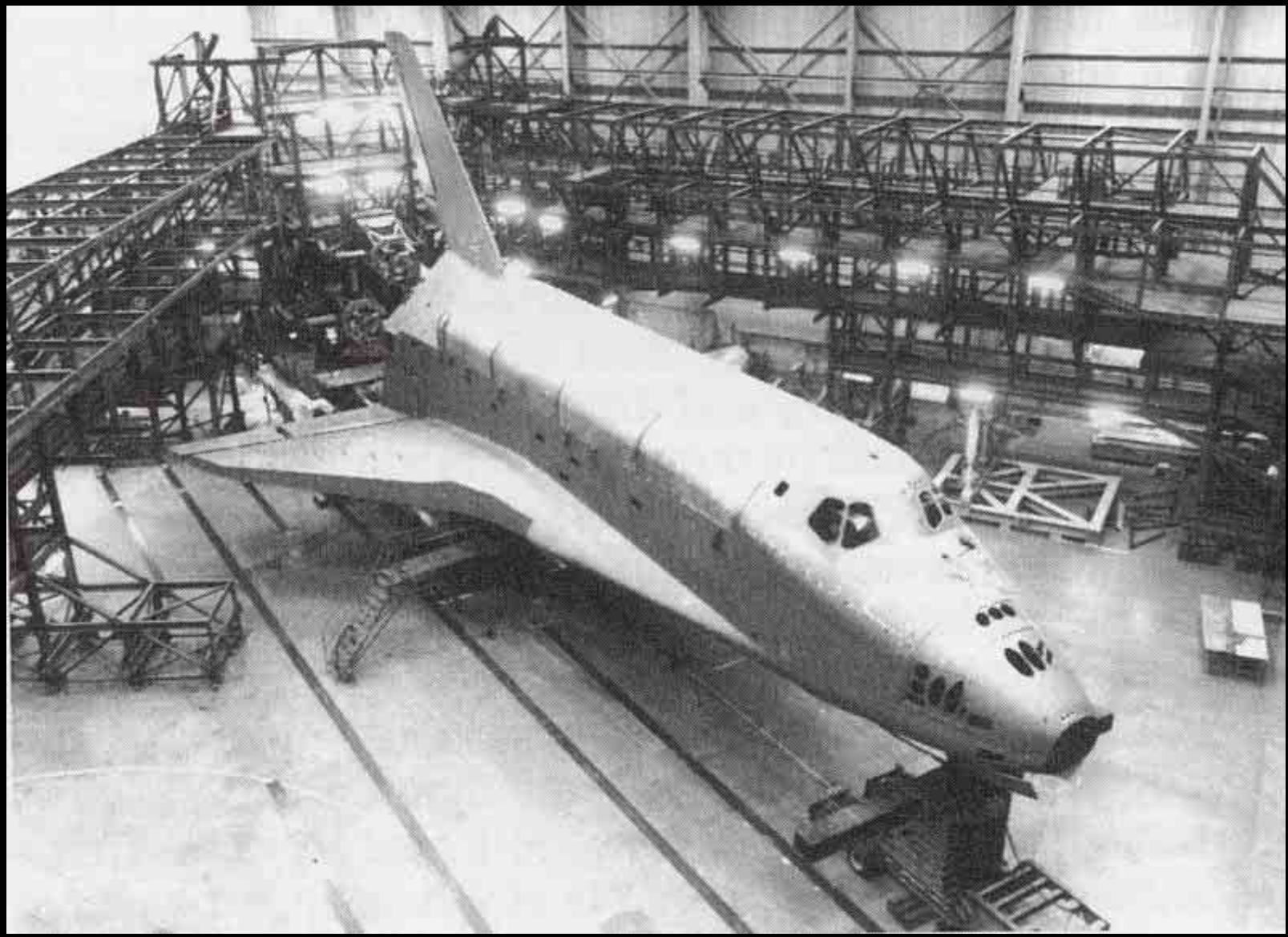
18. června – první aktivní let. +3

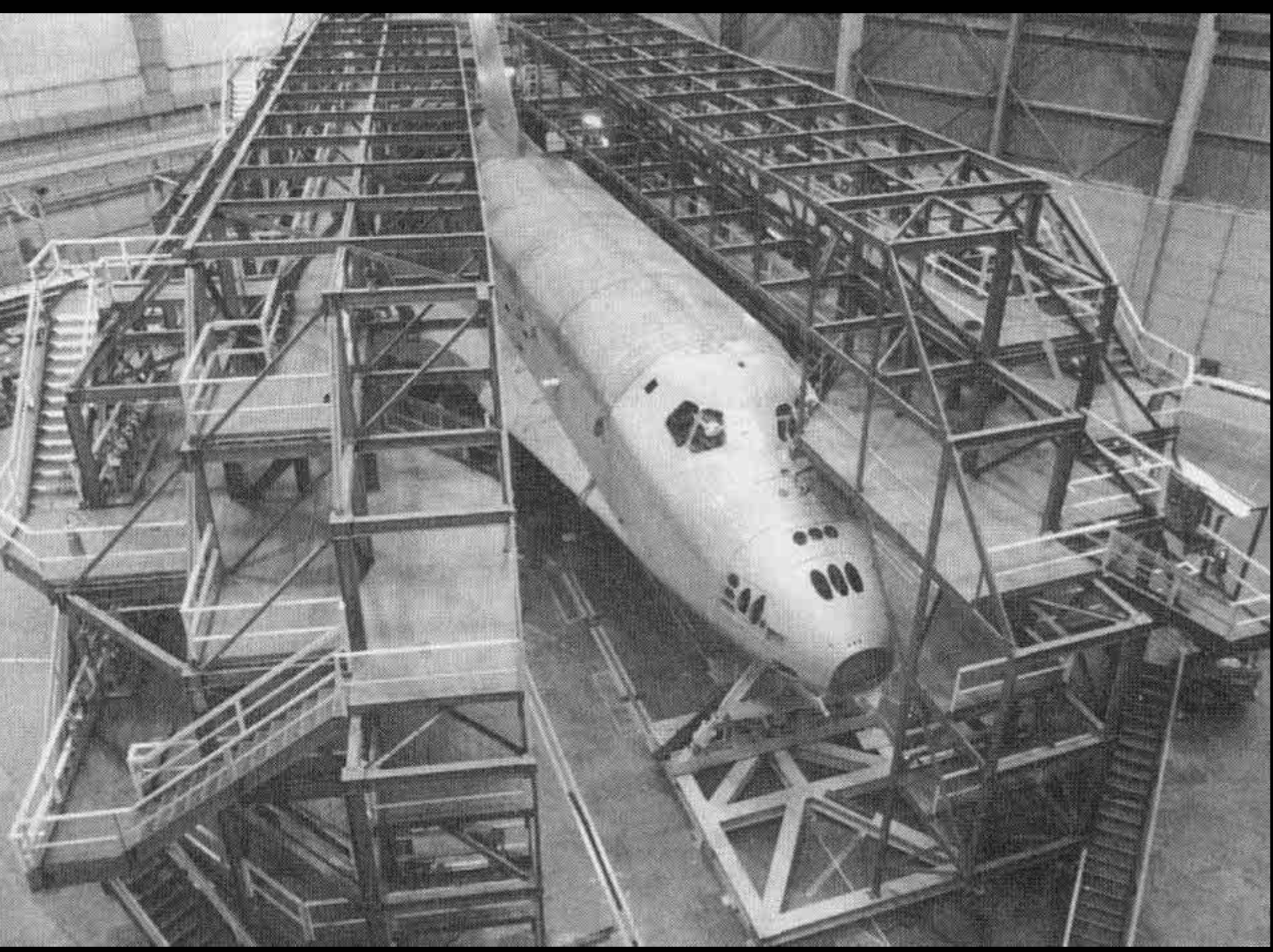
12. srpna – první samostatný let. +2

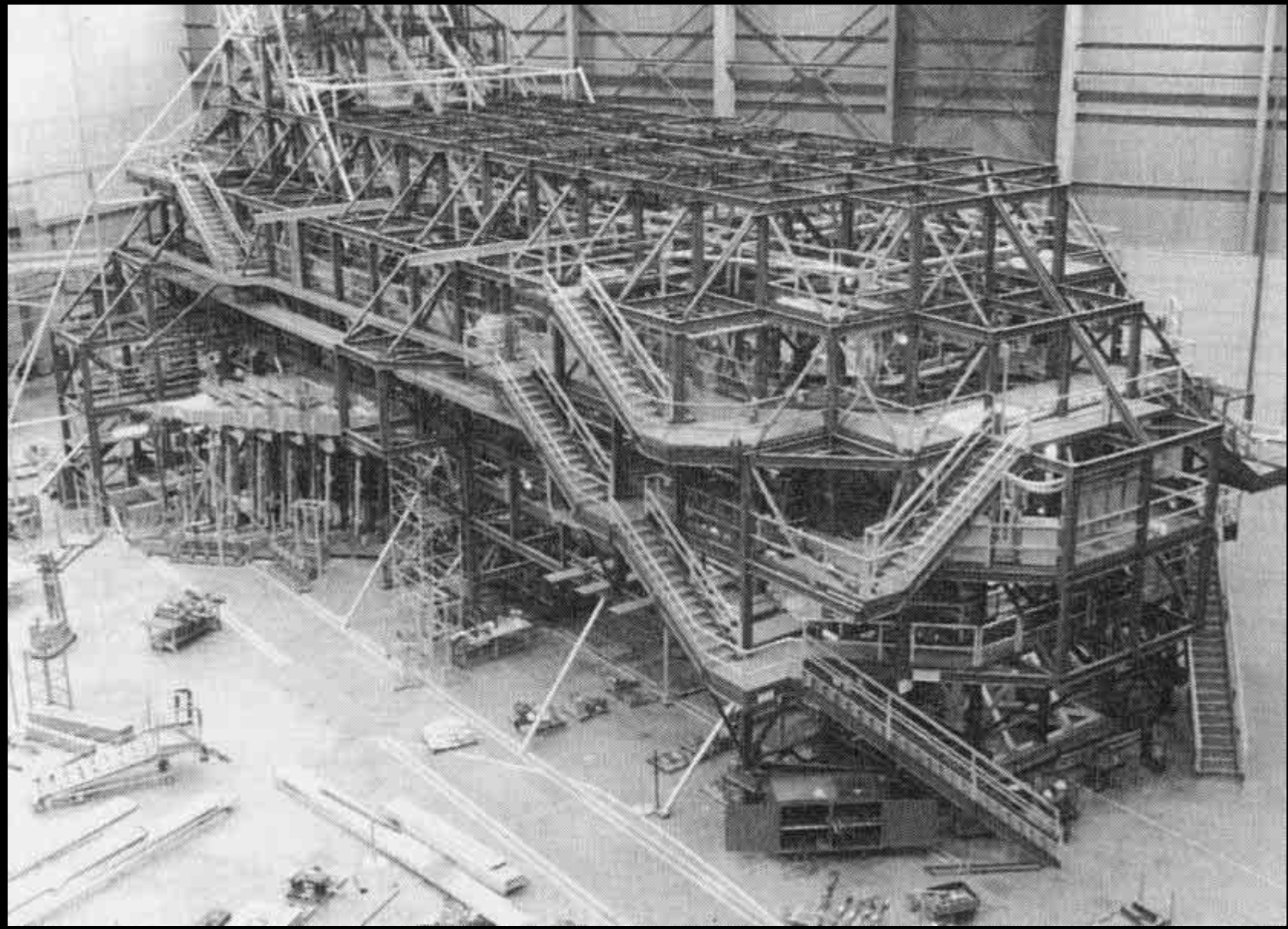
12. října – první samostatný bez krytu motorů. +1


Enterprise

OV-101 vs. STA-099/OV-099







256 uchycení, 836 parametrů, 25 teplotních zón.

MPTA-098

STA-099 (Challenger)

OV-101 (Enterprise)

OV-102 (Columbia)

(OV-098) Pathfinder

2,6 mld. dolarů – čtyři stroje (dva letové, dva testovací).

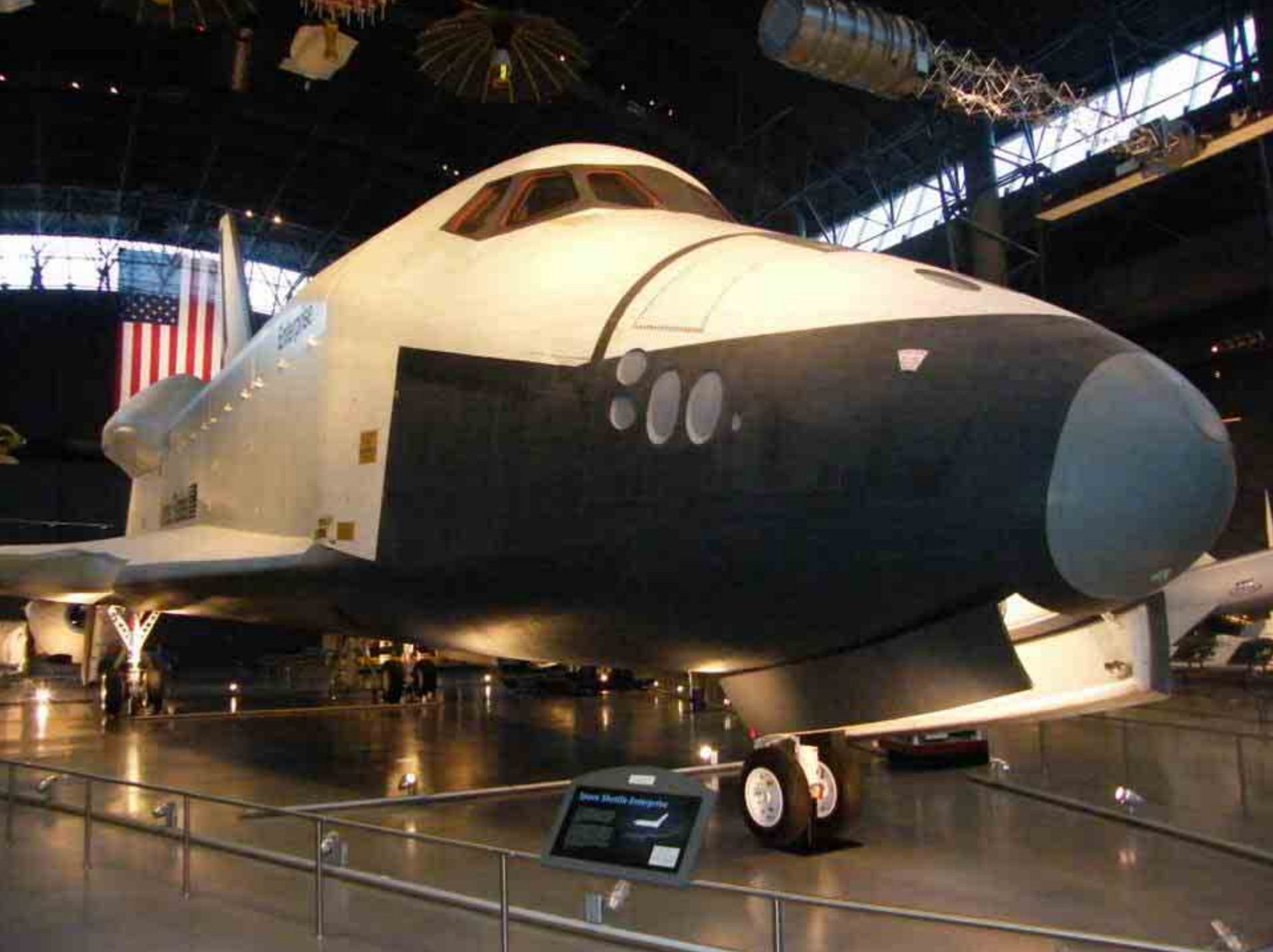
1,9 mld. OV-103 a OV-104 (a modifikace OV-102).

1,3 mld. OV-105 (náhradní díly).

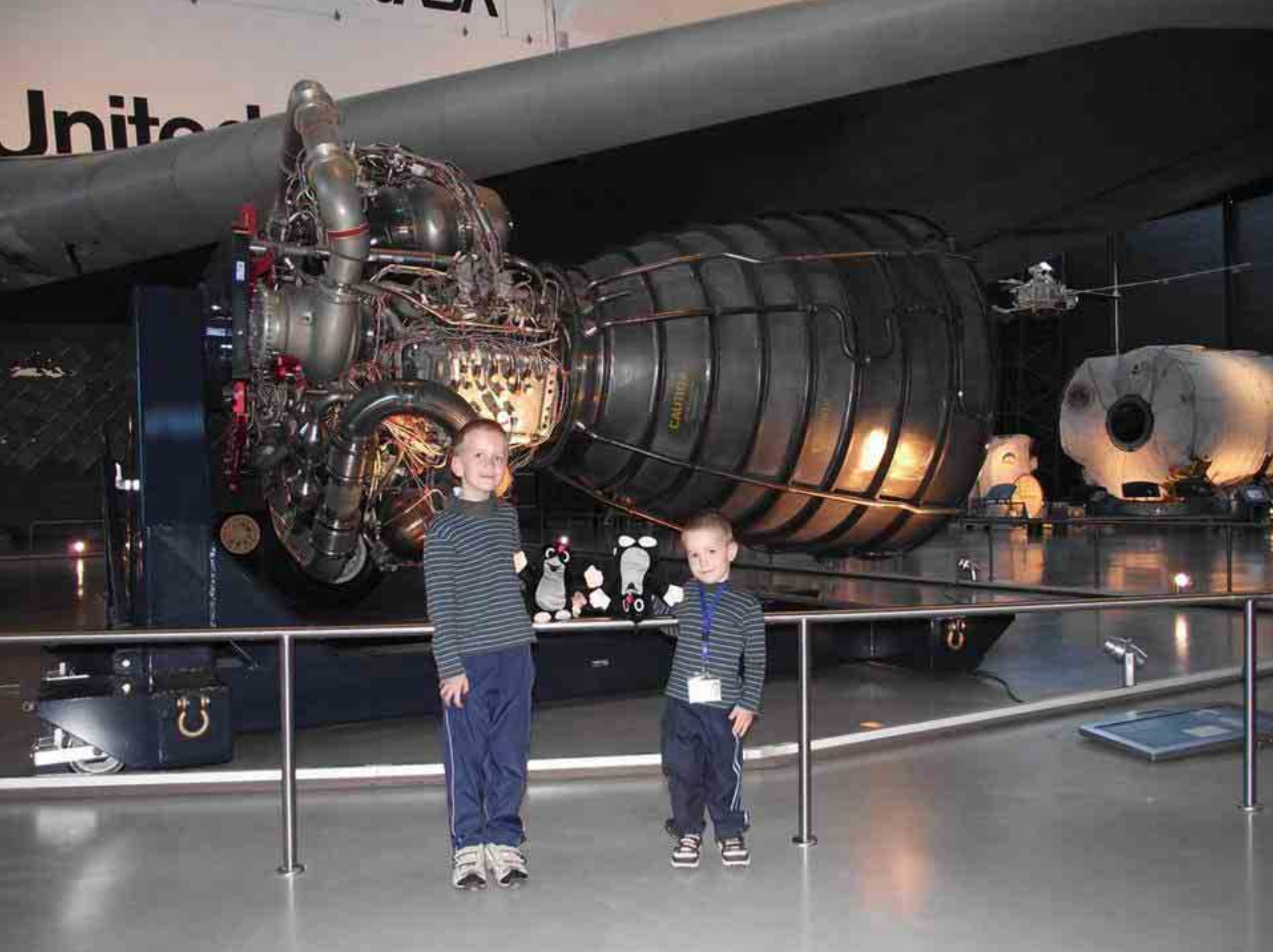
Zvažovaný OV-106.

1983: Francie, Německo, Itálie, Velká Británie, Kanada

Vandenberg Launch Complex (alias SLC-6)



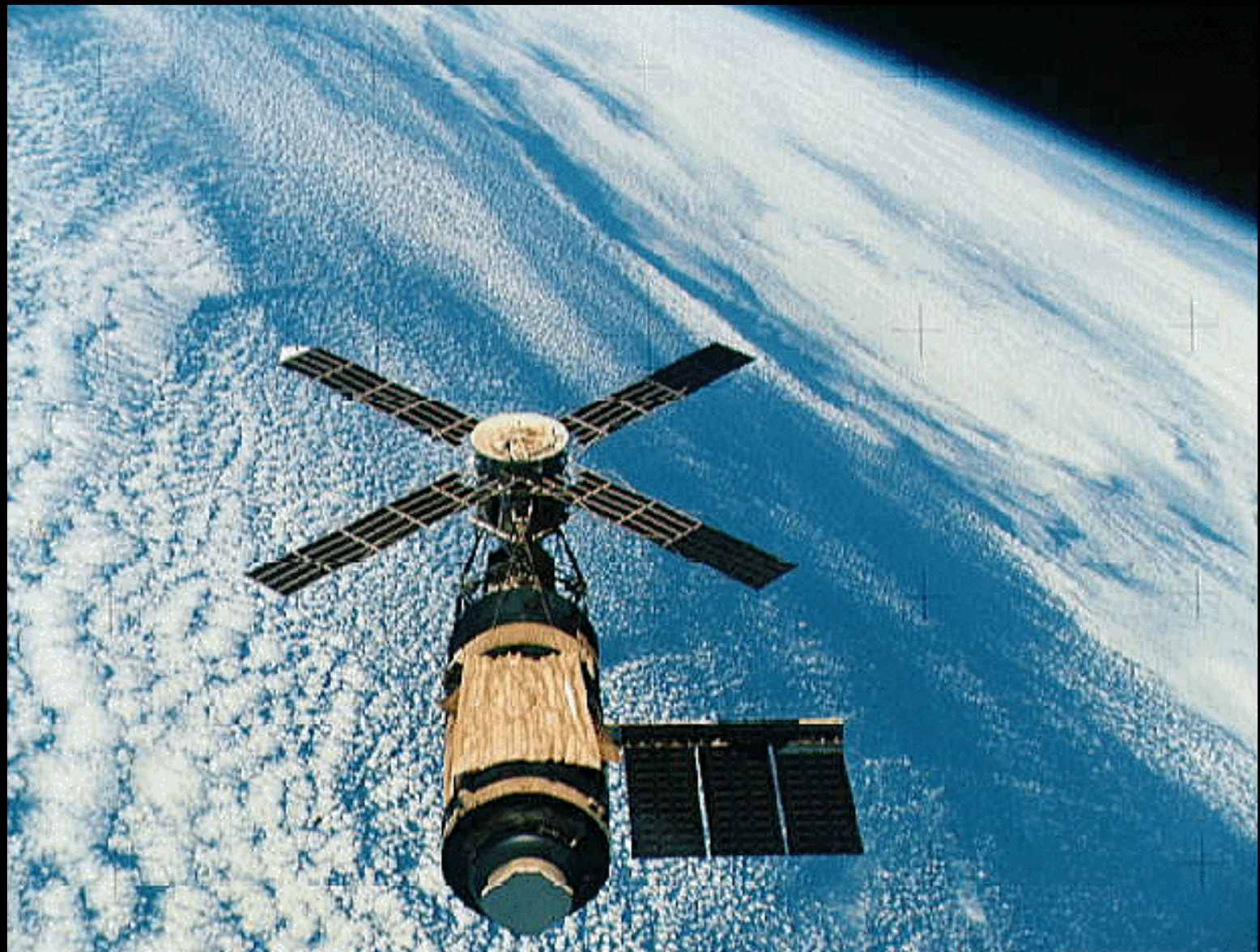

NASA



Posádky 2+1(+1)

„Jsme připraveni na 230 procent!“

„Save the Skylab“




SKYLAB TRAINER


SKYLAB BOOST
MISSION

23. července 1975

Duben 1977 – plný test

MPTA(-098)

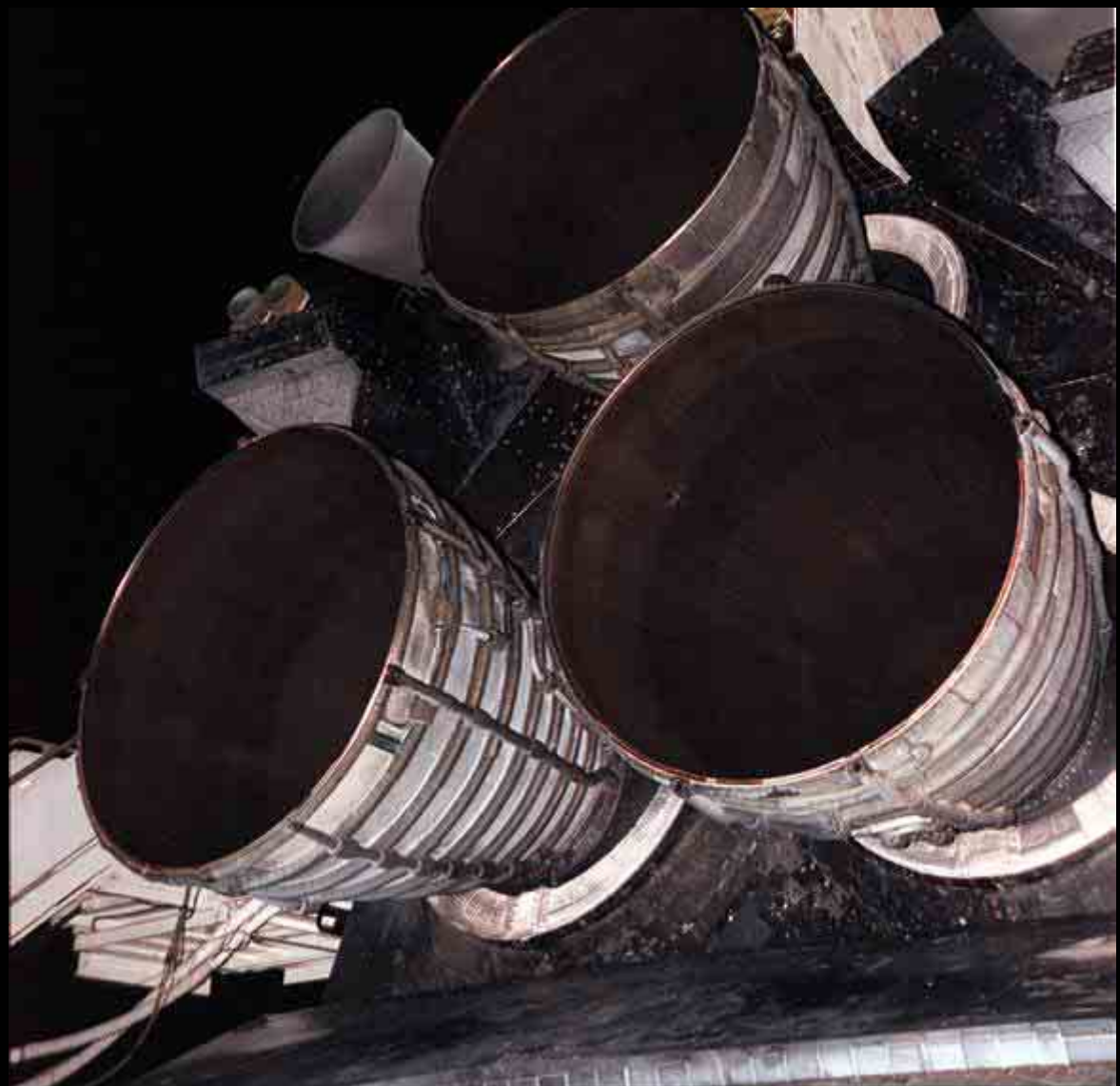
Červen 1977: příjezd.

Duben 1978: test.

Červenec 1979: poškození.

Prosinec 1979: tři SSME.

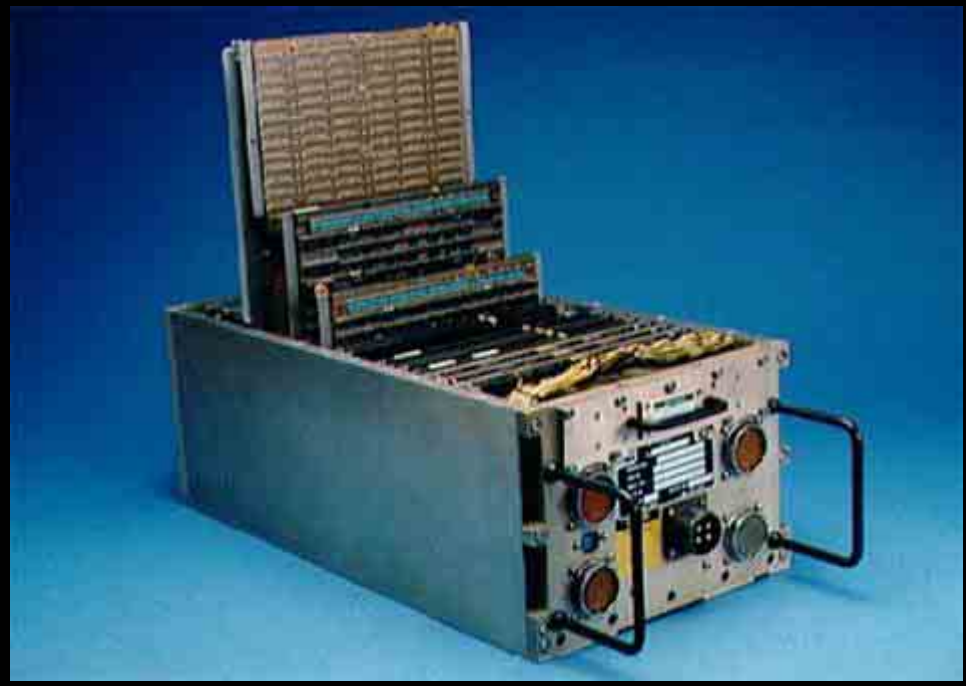
2005, 2006, 2007: počátek 1979



Čtyři vývojové (1977 až 79)

Tři kvalifikační (1979 a 80)

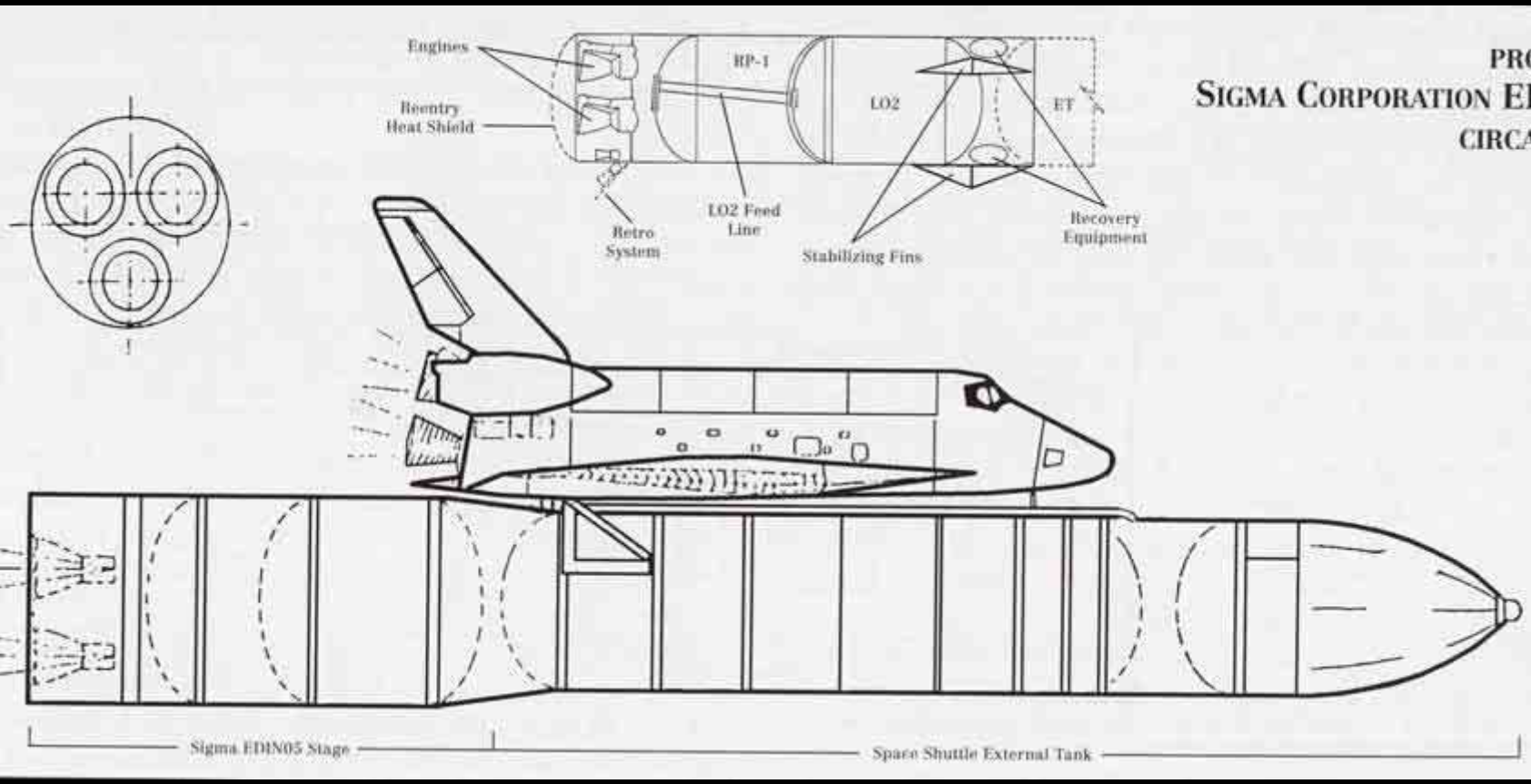
Primary Avionics System Software



Běžný software 50 až 60.

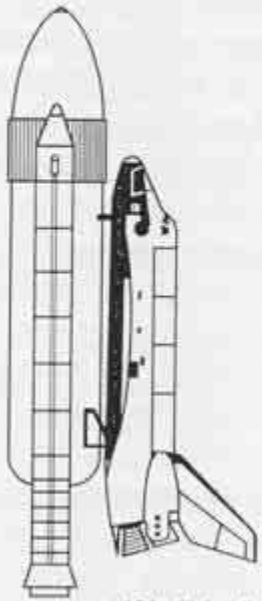
Kritický 10 až 12.

Raketoplány 0,11.



PROPOSED
SIGMA CORPORATION EDIN05
CIRCA 1976

Baseline STS

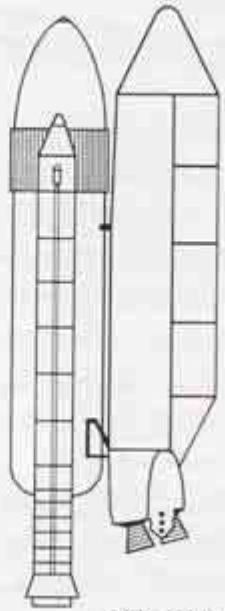


- 15 by 60 foot Payload
- 65,000 pounds

Shuttle-C

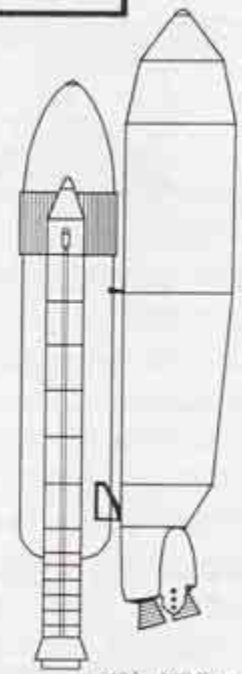
- 15 by 82 foot Payload
- 80 – 150,000 pounds

Shuttle-C Block II



- 33 by 100 Foot Payload
- 128 – 136,000 pounds

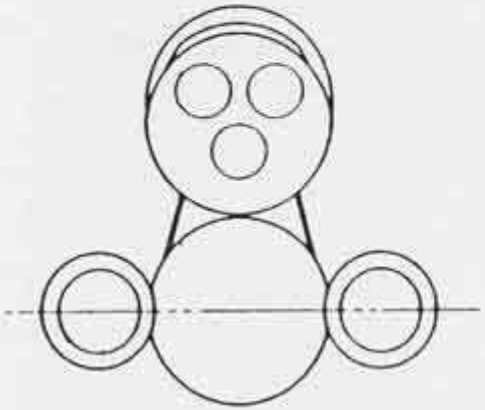
Shuttle-Z

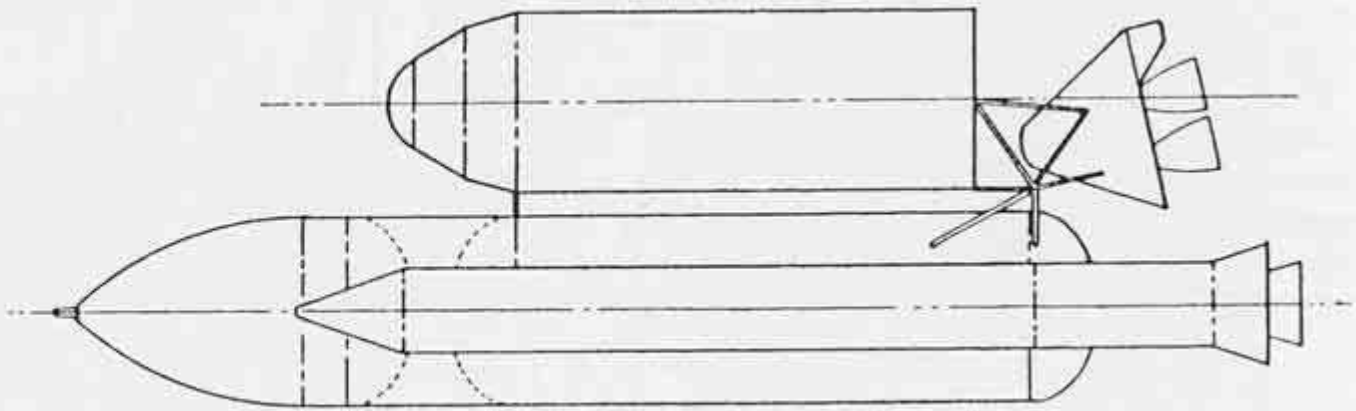


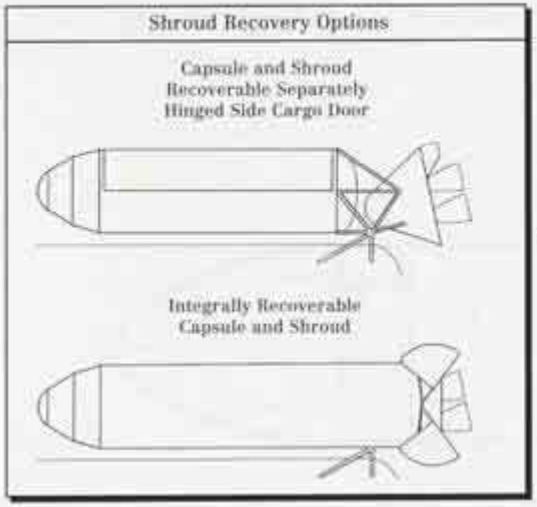
- 40 by 120 Foot Payload
- 300,000 pounds

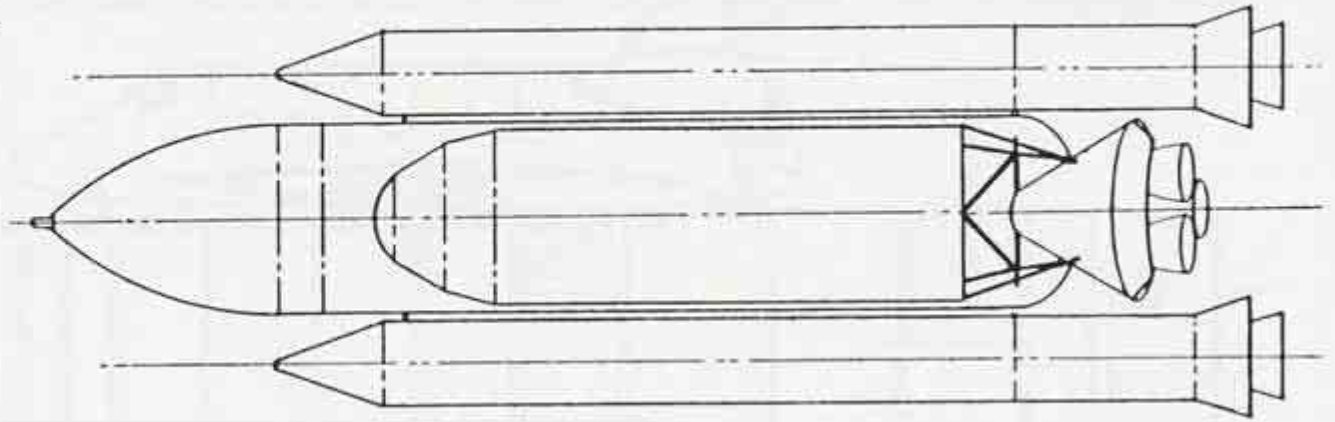
PROPOSED

BOEING CLASS 1
SHUTTLE DERIVED VEHICLE
CIRCA 1977

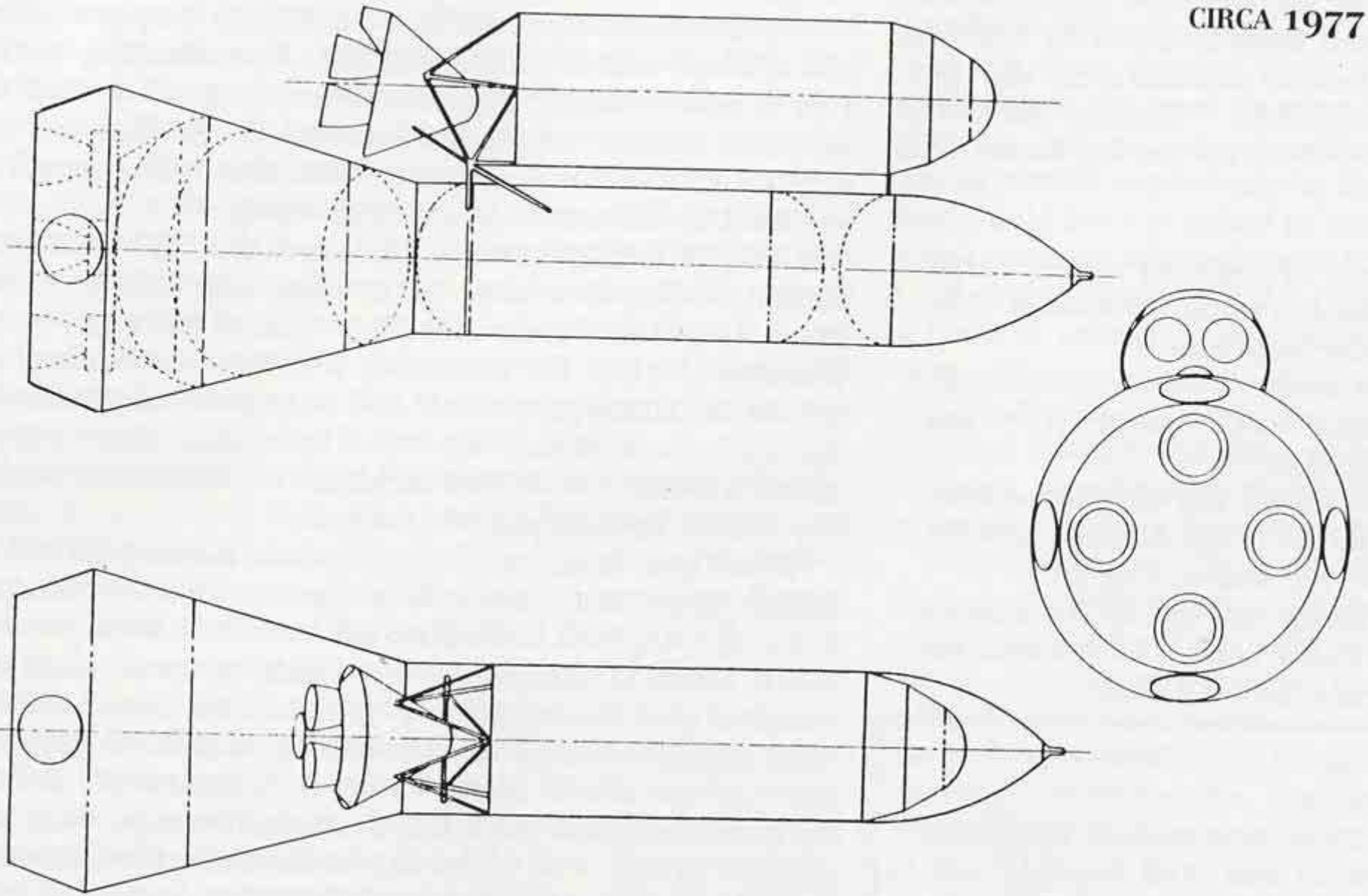




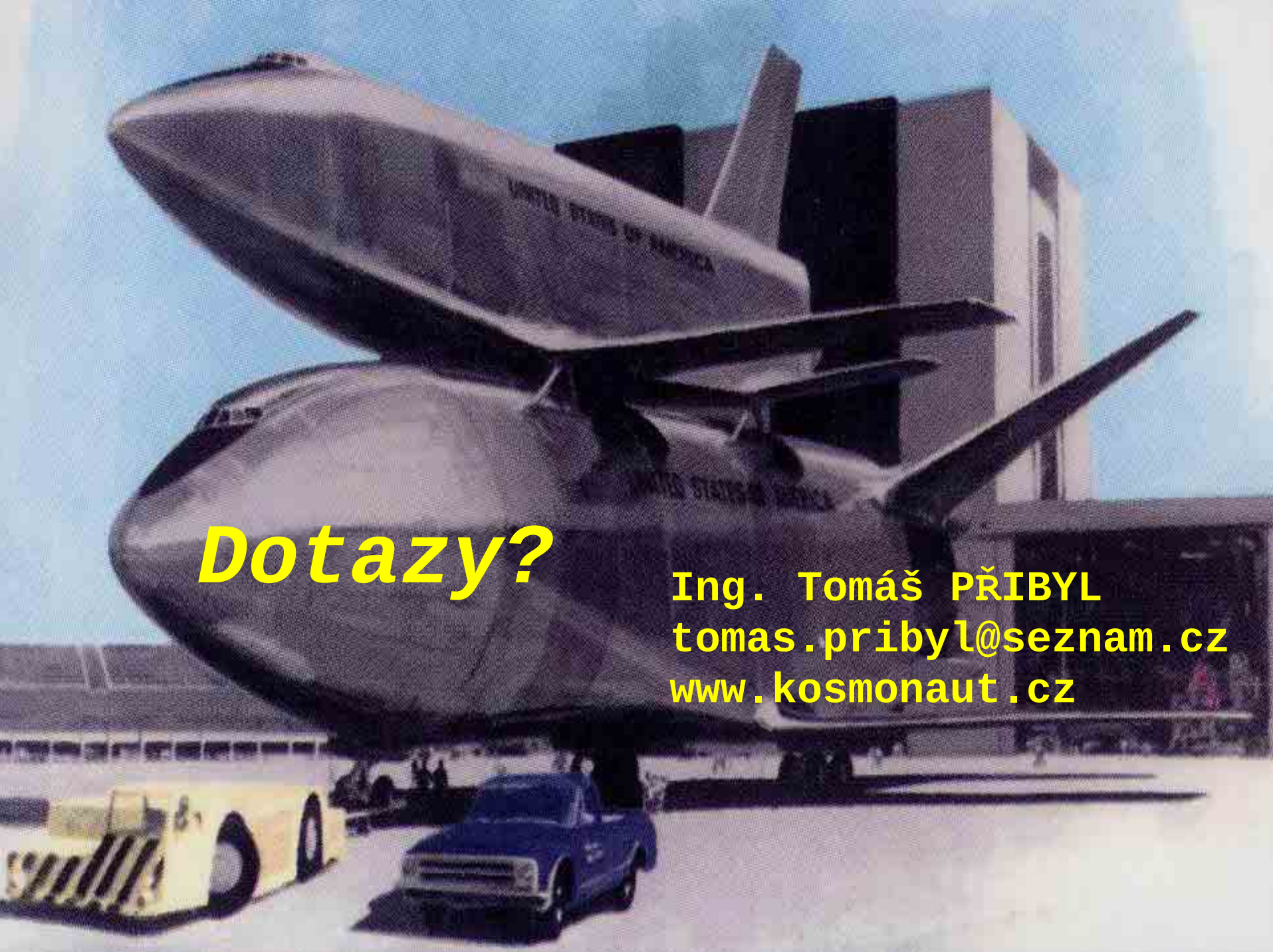




PROPOSED
BOEING CLASS 2
SHUTTLE DERIVED VEHICLE
CIRCA 1977




12. dubna 1981
USA



Dotazy?

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