

LAUNCH VEHICLES

Saturn V NASA-developed three-stage launch vehicle; first stage (S-IC) by Boeing, 138 feet by 33 feet, RP-1 and LOX for 7.76 million pounds of thrust; second stage (S-II) by Rockwell, 81.5 feet by 33 feet, LH₂ and LOX for 1.15 million pounds of thrust; third stage (S-IVB) by McDonnell Douglas, 59.3 feet by 21.7 feet, LH₂ and LOX for 230,000 pounds of thrust; instrument unit by IBM, 3 feet by 21.7 feet; with adapter, Apollo spacecraft and launch escape system, Saturn V stands 363 feet high.

Saturn IB NASA-developed two-stage launch vehicle; first stage (S-IB) by Chrysler Corp., 80.3 feet high and 21.4 feet in diameter, burns RP-1 and LOX to produce 1.6 million pounds of thrust; second stage (S-IVB) by McDonnell Douglas, 58.4 feet high and 21.7 feet in diameter burns liquid hydrogen and LOX for 200,000 pounds of thrust; instrument unit by IBM is 3 feet high, 21.7 feet in diameter; with aft inter-stage, Apollo spacecraft and launch escape system, Saturn IB stands 224 feet high.

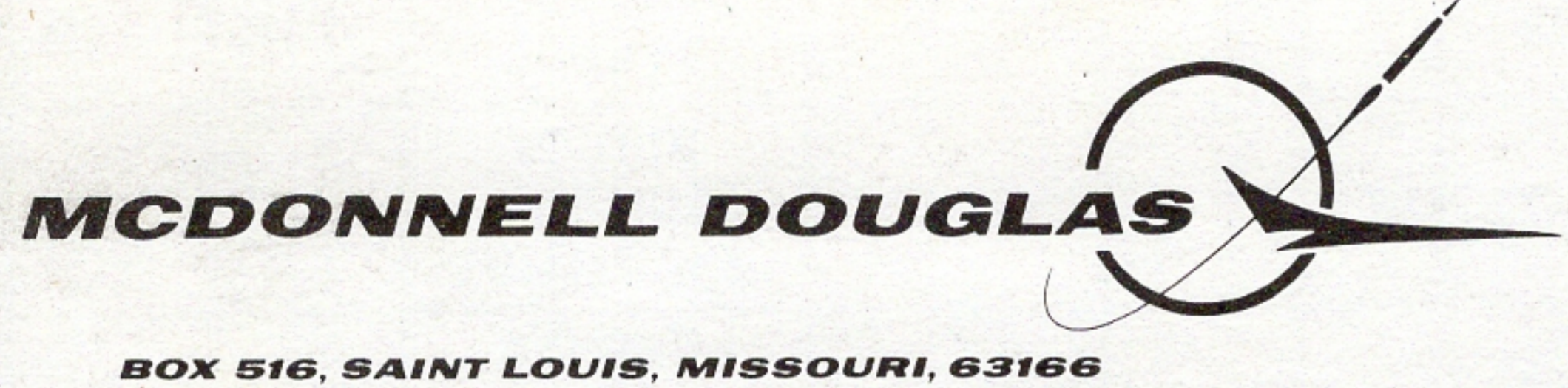
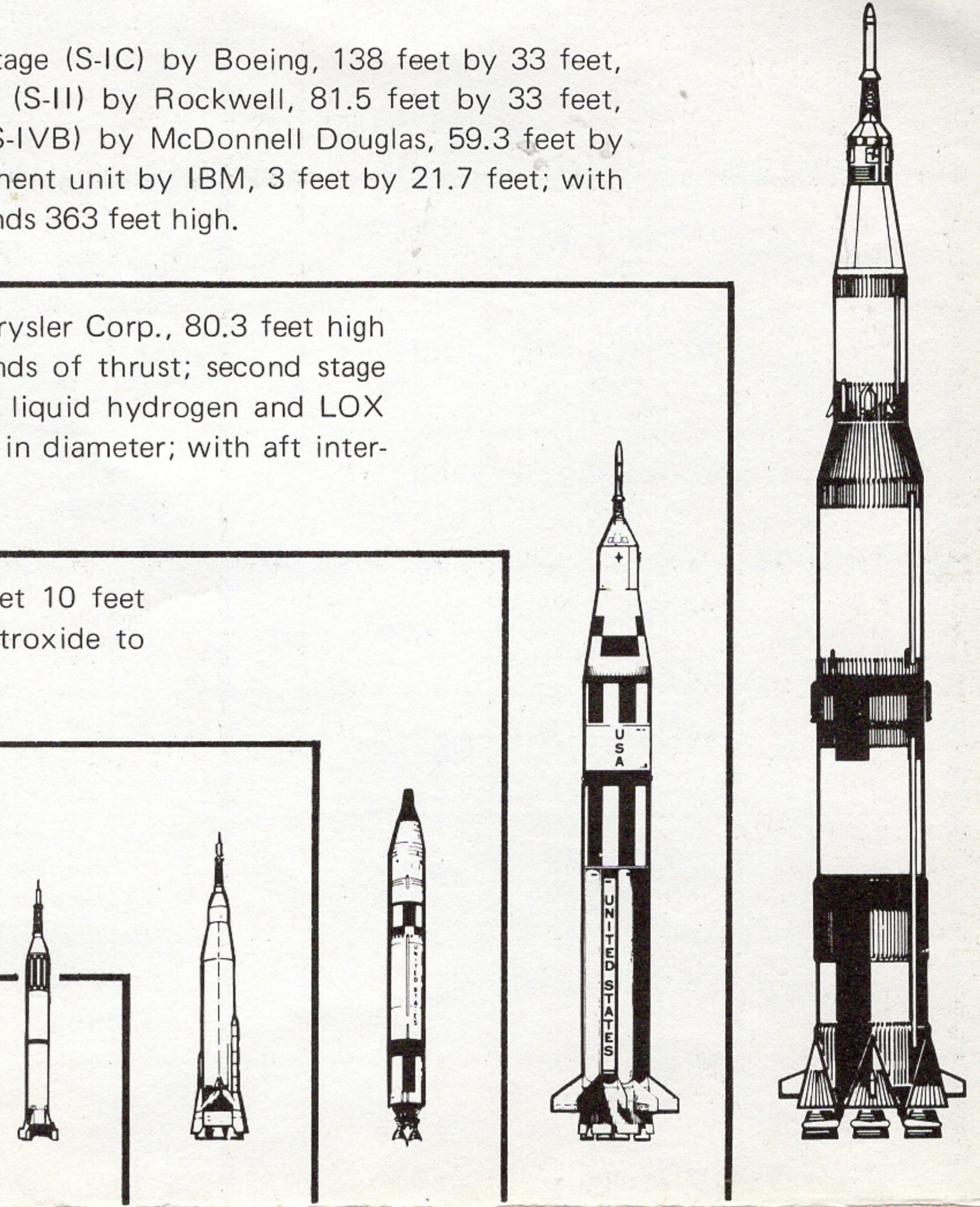
Gemini-Titan modified Air Force missile manufactured by Martin Company; two-stage rocket 10 feet in diameter and 90 feet high (109 feet with spacecraft) burning Aerozine 50 and nitrogen tetroxide to produce 430,000 pounds of thrust in the first stage, 100,000 pounds of thrust in the second.

Mercury-Atlas modified Air Force missile manufactured by General Dynamics; stage-and-a-half rocket 10 feet in diameter (16 feet at base) and 67.3 feet high (95.3 feet with capsule and escape tower), burning RP-1 and LOX to produce 308,000 pounds of thrust from the booster engines (2) and 57,000 pounds of thrust from the sustainer engine.

Mercury-Redstone modified Army ballistic missile manufactured by Chrysler Corp., single-stage rocket 70 inches in diameter and 59 feet high (83 feet with capsule and escape tower) burning alcohol and liquid oxygen to produce 78,000 pounds of thrust.

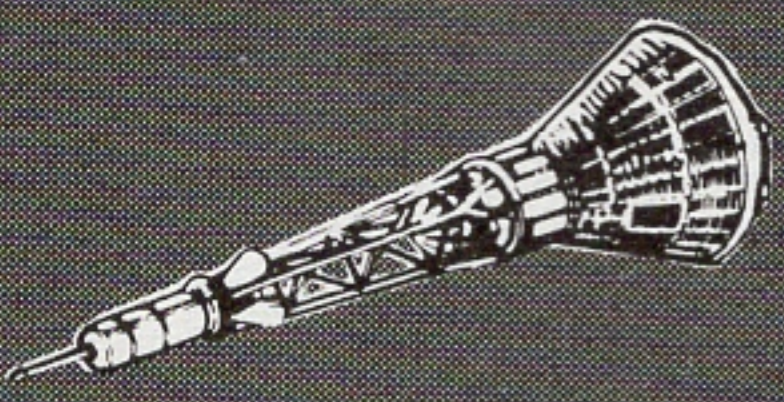
LOX — Liquid Oxygen

Drawings indicate relative sizes of launch vehicles.

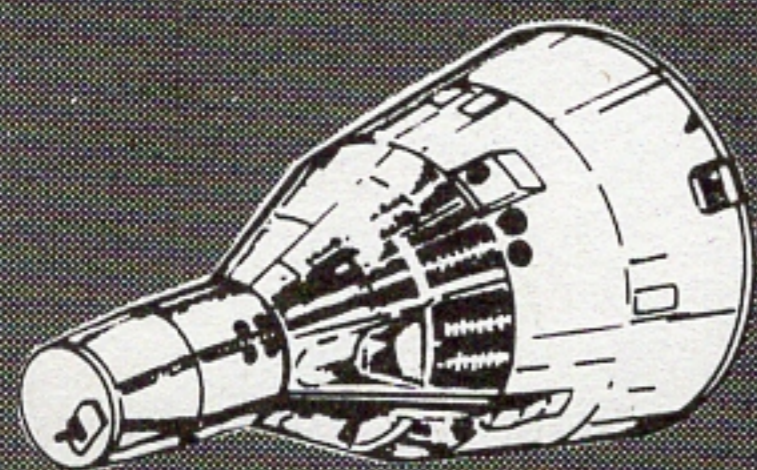


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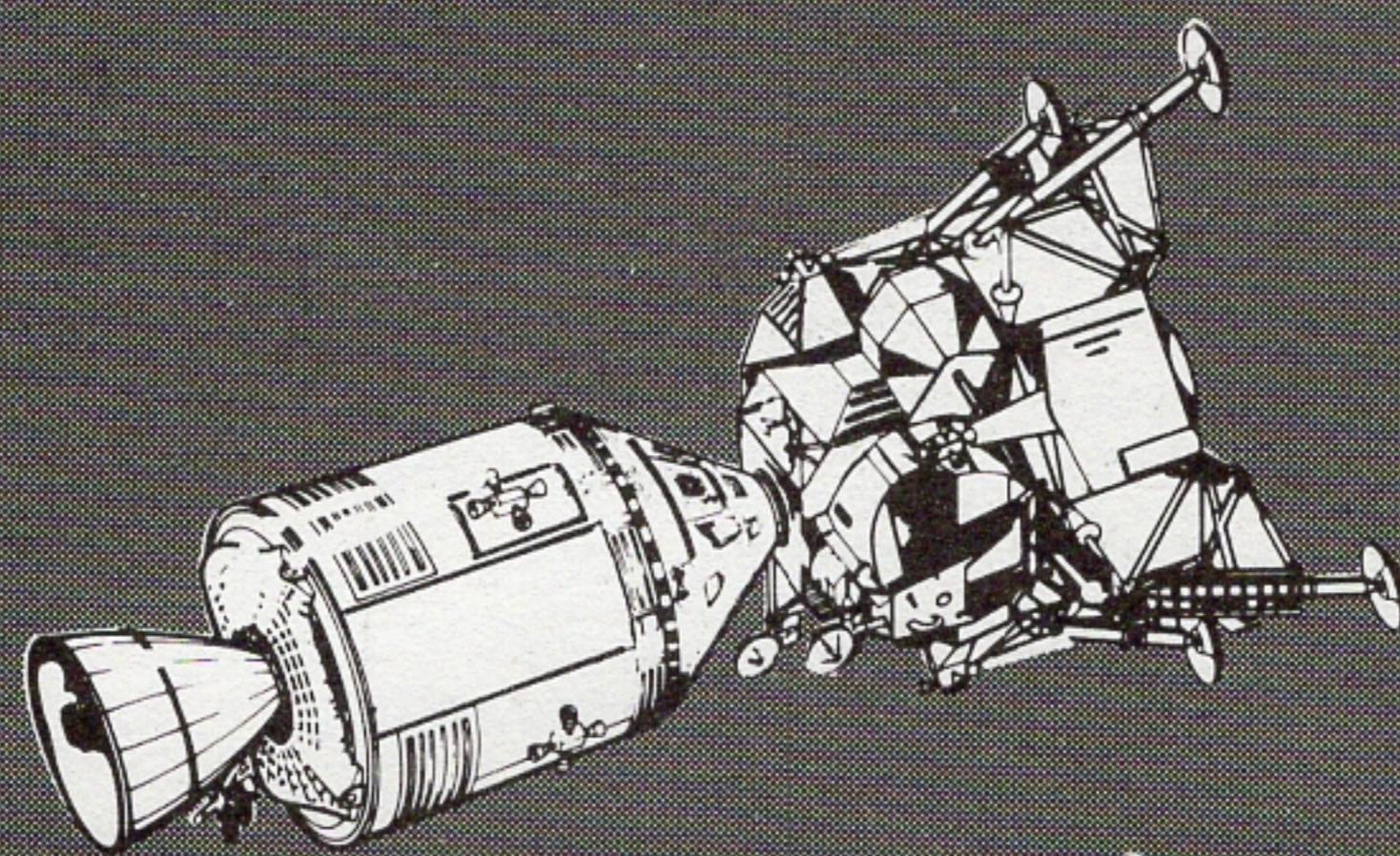
AMERICA'S 20th CENTURY SPACE TRAVELERS



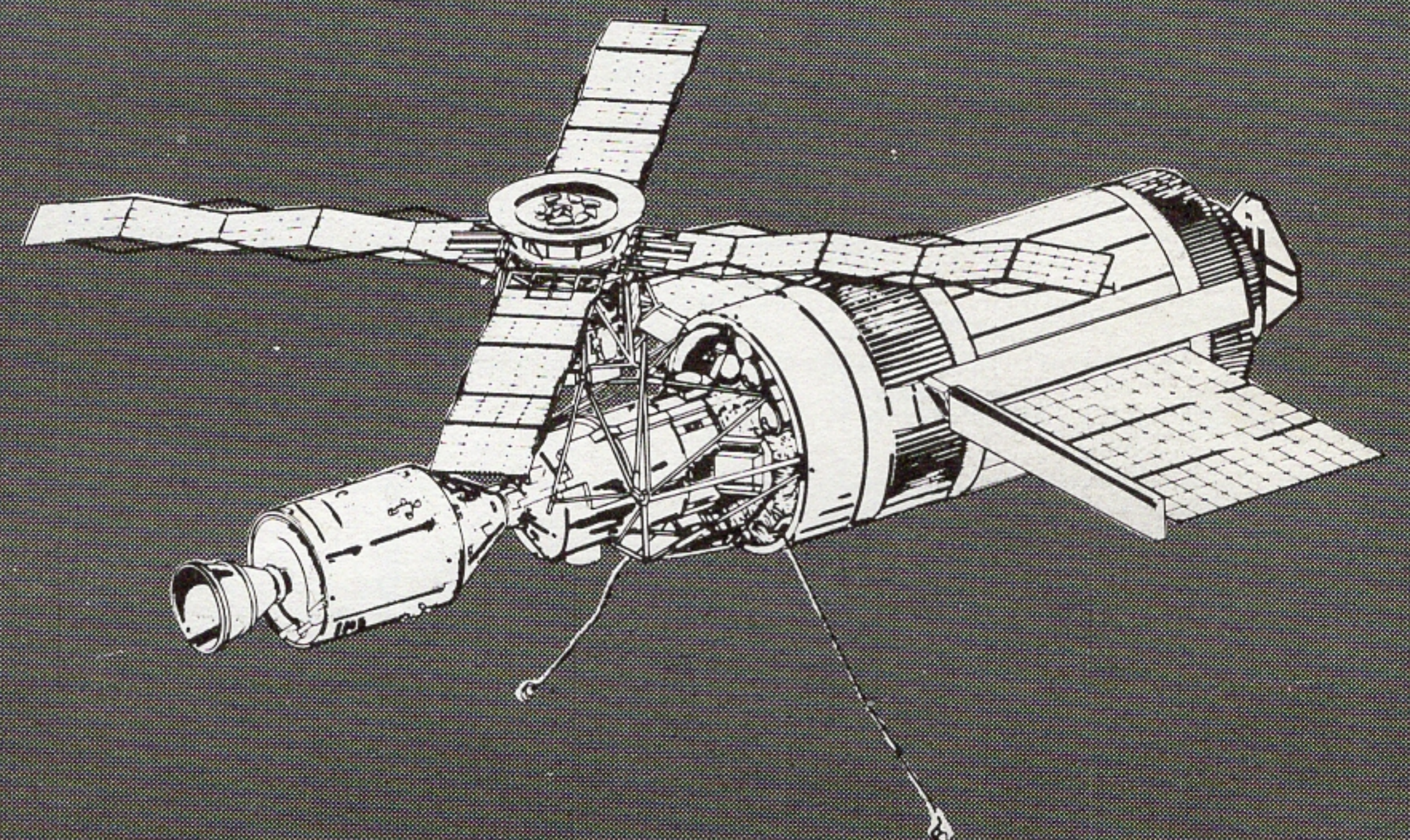
MERCURY



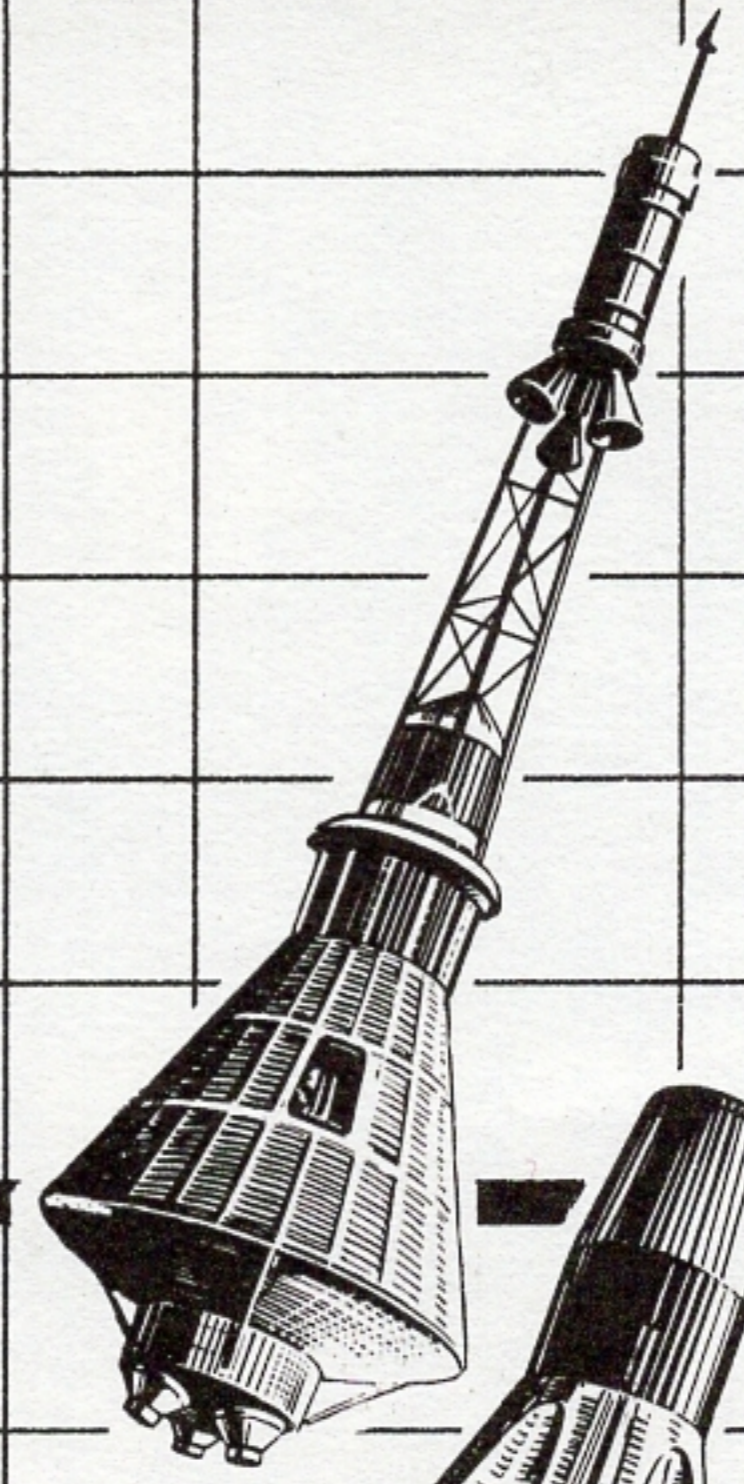
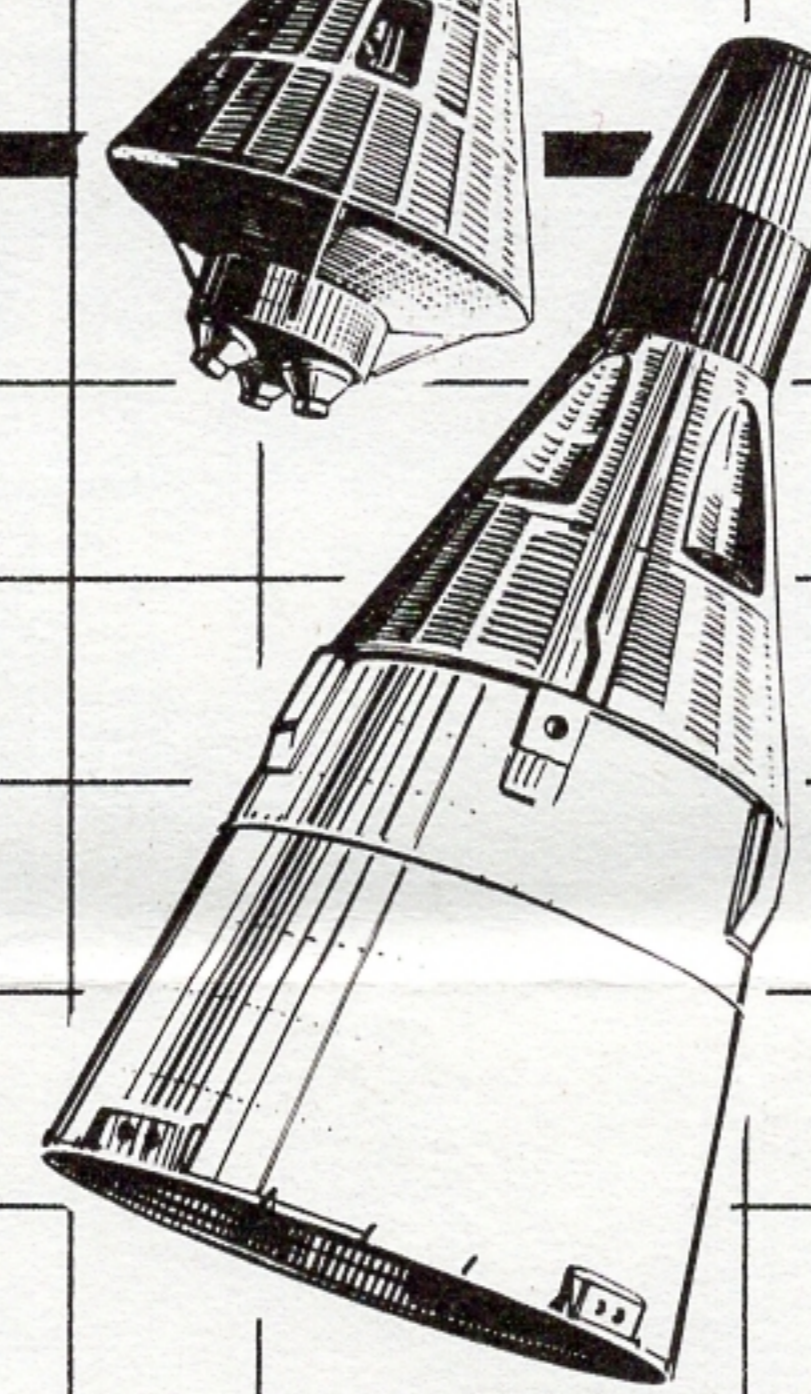
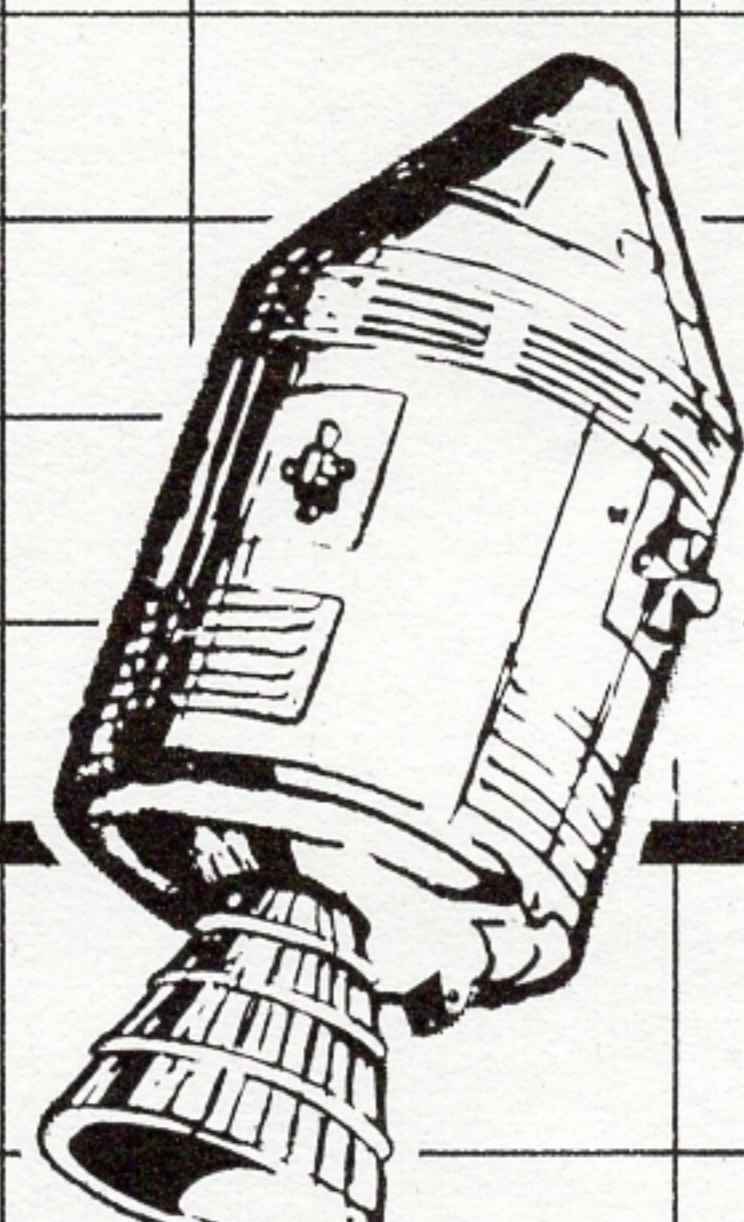
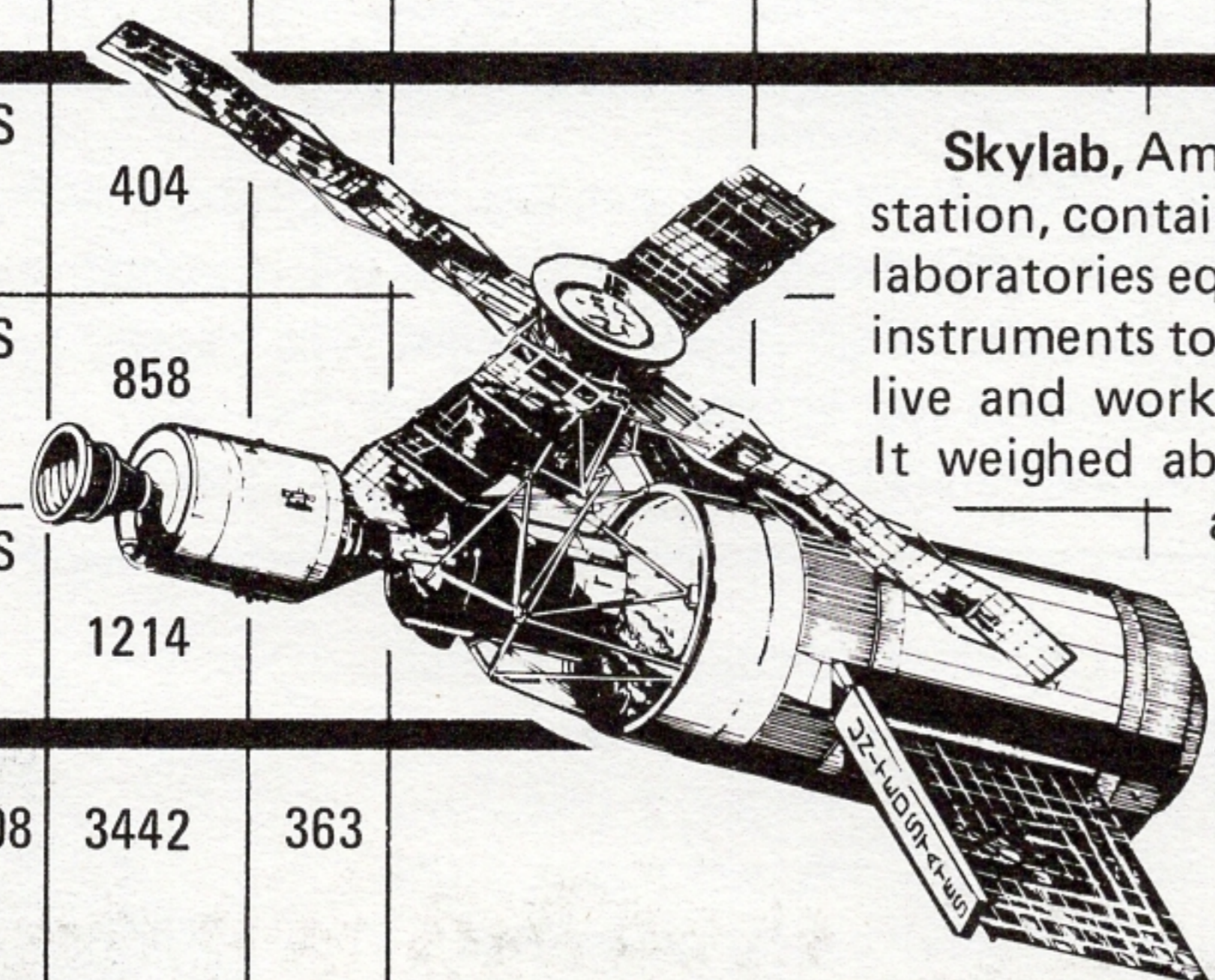
GEMINI



APOLLO



SKYLAB

LAUNCH DATE	ASTRONAUTS	MISSION DURATION (HR:MIN:SEC)	EARTH ORBITS	LUNAR ORBITS	COMMAND MODULE NAME	LUNAR MODULE NAME	LUNAR LANDING SITE	LUNAR STAY TIME	LUNAR TRANSVERSE DISTANCE (KM)	MISSION	LUNAR SAMPLES RETURNED (LB)	MILES TRAVELED	RECOVERY SHIP	LAUNCH VEHICLE	
MAY 5 1961	SHEPARD	00:15:22	SUB-ORBIT		 <p>Mercury set the trend for U.S. spacecraft design in the first decade. The one-man capsule was 6 feet 10 inches long (26 feet with its launch escape tower) and 6 feet 2-1/2 inches in diameter. It weighed about 2990 pounds in orbit. The blunt end was covered with an ablative heat shield to protect against 3000-degree reentry heat. The capsule was built by McDonnell Douglas.</p>				FREEDOM 7	625		USS CHAMPLAIN	MERCURY-REDSTONE 3		
JULY 21 1961	GRISSOM	00:15:37	SUB-ORBIT							LIBERTY BELL 7	630		USS RANDOLPH	REDSTONE 4	
FEB 20 1962	GLENN	04:55:23	3							FRIENDSHIP 7	80,966		USS NOA	ATLAS 6	
MAY 24 1962	CARPENTER	04:56:05	3							AURORA 7	81,325		USS PIERCE	ATLAS 7	
OCT 3 1962	SCHIRRA	09:13:11	6							SIGMA 7	153,904		USS KEARSARGE	ATLAS 8	
MAY 15 AND 16 1963	COOPER	34:19:49	22							FAITH 7	583,469		USS KEARSARGE	ATLAS 9	
MAR 23 1965	GRISSOM YOUNG	04:53:00	3			 <p>Gemini, the two-man craft, was an enlargement of the Mercury vehicle, but experience had shown that much equipment could be placed outside the pressurized cabin and left behind at reentry. Gemini propulsion systems allowed changes in orbit, as well as reentry maneuvers for pinpoint landings. It also was built by McDonnell Douglas. The spacecraft was 19 feet long, 10 feet in diameter, and weighed about 8400 pounds.</p>				GEMINI 3	80,000		USS INTREPID	GEMINI-TITAN III	
JUNE 3 TO 7 1965	McDIVITT WHITE	97:56:11	62								GEMINI 4	1,609,700		USS WASP	TITAN IV
AUG 21 TO 29 1965	COOPER CONRAD	190:55:14	120								GEMINI 5	3,338,000		USS CHAMPLAIN	TITAN V
DEC 4 TO 18 1965	BORMAN LOVELL	330:35:31	206								GEMINI 7	5,716,900		USS WASP	TITAN VII
DEC 15 AND 16 1965	SCHIRRA STAFFORD	25:51:24	16								GEMINI 6-A	449,800		USS WASP	TITAN VI-A
MAR 16 1966	ARMSTRONG SCOTT	10:41:26	7								GEMINI 8	181,450		USS MASON	TITAN VIII
JUNE 3 TO 6 1966	STAFFORD CERNAN	72:21:00	44							GEMINI 9-A	1,255,630		USS WASP	TITAN IX-A	
JULY 18 TO 21 1966	YOUNG COLLINS	70:46:39	43							GEMINI 10	1,223,370		USS GUADALCANAL	TITAN X	
SEPT 12 TO 15 1966	CONRAD GORDON	71:17:08	44							GEMINI 11	1,232,530		USS GUAM	TITAN XI	
NOV 11 TO 15 1966	LOVELL ALDRIN	94:34:31	59							GEMINI 12	1,600,000		USS WASP	TITAN XII	
OCT 11 TO 22 1968	SCHIRRA EISELE CUNNINGHAM	260:09:03	163		 <p>Apollo command and service modules bridge the first decade of American manned space flight with the second; they served both Apollo and Skylab missions. The service module extends the Gemini concept of locating in a separate package the equipment and supplies not needed for reentry, and the three-man command module retains the ablative heat shield of Mercury and Gemini. The command module is 10 feet 7 inches high (to top of apex cover) and 12 feet 10 inches in diameter; its 33-foot launch escape tower is jettisoned before orbital insertion. The service module is 24 feet 9 inches by 12 feet 10 inches. Both modules are built by Rockwell International. Modified versions serve the joint U.S./USSR manned space mission, Apollo-Soyuz Test Project (ASTP).</p>					APOLLO 7	4,550,000		USS ESSEX	APOLLO-SATURN IB	
DEC 21 TO 27 1968	BORMAN LOVELL ANDERS	147:00:42	1.5	10							APOLLO 8	580,000		USS YORKTOWN	SATURN V
MAR 3 TO 13 1969	McDIVITT SCOTT SCHWEICKART	241:00:54	151			GUMDROP	SPIDER			APOLLO 9	4,217,500		USS GUADALCANAL	SATURN IB	
MAY 18 TO 26 1969	STAFFORD YOUNG CERNAN	192:03:23	1.5	31		CHARLIE BROWN	SNOOPY			APOLLO 10	830,000		USS PRINCETON	SATURN V	
JULY 16 TO 24 1969	ARMSTRONG COLLINS ALDRIN	195:18:35	1.5	30		COLUMBIA	EAGLE	SEA OF TRANQUILITY	21 HR 36 MIN	0.25	APOLLO 11	46	952,700	USS HORNET	SATURN V
NOV 14 TO 24 1969	CONRAD GORDON BEAN	244:36:25	1.5	45		YANKEE CLIPPER	INTREPID	OCEAN OF STORMS	31 HR 31 MIN	2	APOLLO 12	75	953,000	USS HORNET	SATURN V
APR 11 TO 17 1970	LOVELL SWIGERT HAISE	142:54:41	1.5	FLY BY		ODYSSEY	AQUARIUS			APOLLO 13	622,690		USS IWO JIMA	SATURN V	
JAN 31 TO FEB 9 1971	SHEPARD ROOSA MITCHELL	216:01:57	1.5	34		KITTY HAWK	ANTARES	FRA MAURO	33 HR 32 MIN	3.3	APOLLO 14	94	1,151,100	USS NEW ORLEANS	SATURN V
JULY 26 TO AUG 7 1971	SCOTT WORDEN IRWIN	295:11:53	1.5	74		ENDEAVOUR	FALCON	HADLEY-APENNINE	66 HR 55 MIN	27.9	APOLLO 15	169	1,275,000	USS OKINAWA	SATURN V
APR 16 TO 27 1972	YOUNG MATTINGLY DUKE	265:51:05	1.5	64		CASPER	ORION	DESCARTES	71 HR 02 MIN	26.7	APOLLO 16	210	1,391,500	USS TICONDEROGA	SATURN V
DEC 7 TO 19 1972	CERNAN EVANS SCHMITT	301:51:59	2	75		AMERICA	CHALLENGER	TAURUS LITTRON	75 HR 00 MIN	35.0	APOLLO 17	257	1,486,000	USS TICONDEROGA	SATURN V
MAY 25 TO JUNE 22 1973	CONRAD WEITZ KERWIN	28 DAYS 00 HR 49 MIN	404			 <p>Skylab, America's first experimental space station, contained spacious living quarters and laboratories equipped with complex scientific instruments to perform its mission for man to live and work in a weightless environment. It weighed about 100 tons. The Workshop, a converted Saturn S-IVB, and Airlock Module were built by McDonnell Douglas.</p>				SKYLAB 2	11.5 MILLION		USS TICONDEROGA	SKYLAB-SATURN IB	
JULY 28 TO SEPT 25 1973	BEAN LOUSMA GARRIOTT	59 DAYS 11 HR 09 MIN	858							SKYLAB 3	24.5 MILLION		USS NEW ORLEANS	SATURN IB	
NOV 16 TO FEB 8 1974	CARR POGUE GIBSON	84 DAYS 01 HR 16 MIN	1214							SKYLAB 4	34.5 MILLION		USS NEW ORLEANS	SATURN IB	
TOTAL		7,629:58:08 (318 DAYS)	3442	363					299 HR 36 MIN	95 KM (59 MILES)		851	106,097,889		