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UNITED STATES GOVERNMENT

# Memorandum

TO : MG/Acting Deputy Director, Gemini Program

DATE: January 3, 1966

FROM : MGS/Director, Gemini Systems Engineering

SUBJECT: Orbits of high inclination

Attached chart summarizes some possibilities for orbits of high inclination. Top of chart shows current weight status of SC 8 through 12, (short duration, rendezvous configuration). These weights include 120 to 335 pounds for the currently assigned experiments.

A spacecraft designed for short duration (2-3 days) but no rendezvous could be reduced in weight by up to 600 pounds (500 pounds of rendezvous propellant, 100 pounds for radar and docking).

The right column assumes a SC without the 500 pounds propellant and current experiments, and with new experiments of 100 pounds weight which replaces the radar and docking equipment.

GLV -3 $\sigma$  capability also shown for 8 through 12.

Lower part of chart shows GLV performance for GLV 10 at various orbit inclinations. GLV 10 is lowest of 8 through 12.

A launch azimuth of 45 $^{\circ}$  gives an inclination of 55 $^{\circ}$  with small second stage yaw steering. Northerly launch azimuths greater than 35 to 40 $^{\circ}$  present no booster impact problem.

Bermuda tracking would cover nearly the same range as for the easterly launches.

An inclination of 55 $^{\circ}$  appears feasible from a performance and launch standpoint. Additional performance (up to 500 pounds of hardware weight) could be attained by optimizing the booster/SC performance to use the SC propulsion by filling the OAMS tanks. This would also provide a known booster second stage impact in the Indian Ocean.

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Gemini Performance at Various Inclinations

<u>Mission No.</u>	<u>GLV -3<math>\sigma</math> Capability</u>	<u>SC Wt (Incl experiments)</u>	<u>SC Wt (w/o experiments)</u>	<u>SC Wt Less experiments and 500 lb. prop. (167 # remaining)</u>
8	8170	8174	7842	7342
9	8262	8006	7733	7233
10	8122	8016	7896	7396
11	8153	8072	7881	7381
12	8222	8098	7763	7263

<u>Launch Azimuth (deg)</u>	<u>Orbit Inclination</u>	<u>GLV #10* -3<math>\sigma</math> Capability (87 x 146 n.mi.)</u>
90	28.3	8122
72/108.	33	8010
65	40	7820
58	45	7670
51	50	7530
45	55	7380
39	60	7200

\*Lowest of remaining GLV's.

An additional 300 to 500 pounds margin available by using spacecraft propulsion for attaining orbit. (Booster deposited in Indian Ocean.)

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