

Hall

UNITED STATES GOVERNMENT

Memorandum

TO : MO-2/Gemini Mission Director

DATE: MAY 9 1966

FROM : MGS/Director, Gemini Systems Engineering

SUBJECT: Gemini Spacecraft Times to Roll 90°,
One Thruster Operating

The results of the computations you requested are summarized below. We have not attempted a highly refined analysis, but these numbers should be representative of what can be anticipated under the conditions noted. In particular, these numbers assume that resultant motion is pure roll whereas elements of pitch and yaw are also present. A summary of the basic data used is attached.

<u>Configuration</u>	<u>Condition</u>	<u>Thrust (lbs)</u>	<u>*Time to 90° (sec)</u>	<u>Acceleration (radians/sec²)</u>
Spacecraft	Prerendezvous	25	7.63	.0540
	Post docking	25	7.37	.0579
Docked	Pre-PPS	25	8.25	.0462
		10(ACS)	17.	.0108
		½(ACS)	58.	.000542
Docked	Agena Empty	25	7.98	.0493
		10(ACS)	16.5	.0116
		½(ACS)	73.8	.000577

* $t^2 = 2\theta/\ddot{\theta}$, assuming spacecraft is not rolling and no thrusters are on at $t=0$; only one thruster operates to produce roll, it operates continuously for time indicated at 100% effectiveness.



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Comparison with C. Mathews' Gemini VIII charts, NASA-S-66-4039 thru 4042

Docked, pre-PPS, 25 lb. thrust,	
Gemini VIII, ACS on, time to reach 20°/sec	10 sec
Above data, ACS off, time to reach 20°/sec	7.5 sec
Spacecraft, postdocking, 25 lb. thrust	
Gemini VIII, time to reach 300°/sec	1.71 min
Above data, time to reach 300°/sec	1.51 min

E. W. Hall

Eldon W. Hall

cc: MG/Mr. Day
MGO/Mr. Edwards

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FA/S. Sjoberg, Flight Operations Division
CF/W. J. North, Flight Crew Support

July 9, 1965

MGS/E. W. Hall

Gemini Missions

As a result of our discussions today, a suggested list of missions (enclosed) is being considered. I would appreciate your review of these missions and comments on your ability to support them. If you are unable to support any of the missions, please identify those aspects which cause the difficulty.

I am also interested in any suggestions you may have for improving the overall missions for the Gemini Program. A response is needed by July 15.

Eldon W. Hall

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(UNCLASSIFIED WHEN ENCLOSURES ARE DETACHED)

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- Gemini V
1. Long duration (7 days primary, 1 additional day secondary)
 2. REP exercise
 3. Full pressure suits; no hatch opening
 4. Experiments

- Gemini VI
1. Agena rendezvous (radar, computer guidance)
 2. Simultaneous countdown
 3. Docked vehicle attitude maneuvers and SPS exercises
 4. After final separation - SC and ground commanded Agena PPS maneuvers. Insert Agena into n. mi. circular orbit.
 5. Experiments
 - a. Rerendezvous with Agena (radar monitored optical)
 - b. Cabin movies of crew and instrument console during rendezvous

- Gemini VII
1. Long duration (14 days)
 2. Ground controlled optical rendezvous with inactive Agena VI
 3. Shirtsleeve environment
 4. Experiments

- Gemini VIII
1. Agena rendezvous (by fourth darkness/apogee)
 2. Docked vehicle maneuvers with Agena PPS
 3. EVA. Externally mounted camera for docking. Improved hand held maneuvering unit
 4. Agena VIII long life experiments. Post-docked Agena VIII in 180 n. mi. circular orbit.
 5. SC experiments
 - a. Rerendezvous with Agena (LEM abort simulation)
 - b. ATMU systems test
 - c. Agena tether

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- Gemini IX
1. Agena rendezvous (by second darkness/apogee)
 2. 3-day duration
 3. Dual rendezvous with Agena VIII in docked configuration
 4. EVA. Retrieve Agena VIII experiments.
 5. MMU checkout
 6. Experiments
 - a. Onboard computing for dual rendezvous if possible.

- Gemini X
1. Agena rendezvous
 2. 3-day duration
 3. Dual rendezvous with Pegasus C
 4. Onboard computing for dual rendezvous
 5. EVA
 6. Experiments

- Gemini XI
1. Agena rendezvous
 2. 3-day life
 3. Dual rendezvous with Pegasus C or other satellite
 4. Onboard computing for dual rendezvous
 5. EVA
 6. Experiments

- Gemini XII
1. Agena rendezvous
 2. 2 days
 3. EVA
 4. MMU
 5. Apollo simulations
 6. Experiments