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Memorandum

Houston

TO : Memorandum for Record

DATE: December 1, 1969

FROM : CB/D. L. Holmquest

SUBJECT: AAP Experiments S071/72, Circadian Rhythms

On November 6, 1969, I met with the engineers at Ames Research Center, Moffett Field, California to discuss the AAP experiments S071/72. From these discussions I have obtained the following information.

Mission Impact: The circadian rhythm experiments will be carried in the service module on AAP-3 mission. The flight crew plays essentially no role in the experiment, and there are only four switches in the command module with which the crew must be familiar. These are:

1) Two (2) ON/OFF switches. There is one of these switches for each portion of the experiment. These will be turned ON by the ground crew at the time of installation of the experiment. The flight crew will turn them OFF in flight when the experiment is over.

2) A backup Initiate switch for S072. This experiment is started in motion by a brief flash of light which is accomplished in orbit by a ground up-link command. In the event that the up-link command fails, this switch which will be used by the crew to initiate the experiment.

3) A backup data-dump switch. The stored-up data is dumped by ground up-link command every 8 hours. In the event that the up-link command fails, the data dump will be initiated by this switch.

General Information: The S071 experiment consists of six pocket mice which characteristically show about 4 hours per day of decreased body temperature very near that of the ambient air. These animals show a marked daily cycle in body temperature and activity. The present plan is to measure body temperature and activity as well as heart rate. However, because of increasing cost there is some talk of dropping the heart rate measurement. The implanted transmitter weighs about nine to ten grams, and will be implanted in either male or female mice which are chosen individually for their stable rhythms. The animals will be placed in the experimental hardware about three weeks prior to launch; the total experiment lasts approximately six weeks. Thus the experiment will continue only into about the first three weeks of the flight. Measurements of heart rate and body temperature are taken every ten minutes and

are stored in a memory unit that stores information from both parts of the experiment. Data is dumped on ground command every 8 hours. The data is dumped on low-bit-rate telemetry and takes about 2½ to 3 minutes to dump. Should the data dump be delayed more than about 8 hours, experimental data will be lost.

In the S072 portion of the experiment, the eclosion rhythm of the vinegar gnat, Drosophila is studied. The experimental apparatus contains four capsules of 180 gnats each. These are maintained at 5 degrees centigrade prior to launch, and at the time of launch two capsules are increased to 10 degrees and two to 20 degrees. Once in orbit the eclosion cycle is started by a light flash. The light flash is given either by ground command or the backup initiate switch. The experiment lasts a total duration of ten days, after which the power switch is turned OFF by the crew. The time of turning this switch off is not critical.

Delivery of flight hardware is expected to be made between February and June in 1971 to North American Rockwell for integration into the service module.

Don Holmquest

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