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1 May 1961

MEMORANDUM FOR: [redacted] DPD-DD/P

SUBJECT: Project GEMINI

As the time for a decision on the configuration of the convergent camera system becomes critical, we feel that we should reaffirm our desire for the incorporation of specific components which will materially assist us and other users of the film in our analyses.

(1) We strongly suggest that the camera package for this Program be equipped with the same type of clock as is being used for the ARGON Program. Our justification for this position is quite similar to the one which we advanced in January for the C''' Program. Our understanding is that this justification would have been sufficient for incorporation of the ARGON clock into the C''' Program except for the fact that time did not permit. This position is doubly enhanced by virtue of the fact that the current digitote failed miserably during the last CORONA operation and that, from all telemetering records, the "A" clock worked perfectly over a four-day period with a total error of 1/100 of a second during the last "A" shot. We regard the incorporation of a reliable, accurate clock as absolutely necessary for the complete exploitation of satellite photography. Such a clock should be considered as an integral part of the photographic collection system rather than just a desirable component. This is particularly necessary when we are concerning ourselves with a non-synchronized convergent stereo photographic system. We feel also that the addition of [redacted] binary reading equipment at the processing site will be a valuable addition to the Program so that [redacted] can be provided on-the-spot readings shortly after processing with the proper control tape in order that their flexowriter titling equipment can incorporate numeric timing information with the standard titling data.

(2) From the information we have been able to gather, it is NPIC's position that the addition of a separate vertical reference framing camera would provide valuable additional information for photogrammetric analysis of the main camera's photography if such an additional camera can be installed without jeopardizing theprime function of the C'''[2] package. Some of the most immediately apparent benefits are:

(a) A geometric comparison between oblique panoramic images and the orthographic geometry of the vertical firing camera. We feel that this is particularly beneficial because the main

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cameras are being designed to use SO 132 film which, because of its extremely slow ASA rating, will require exposures with an equivalent time of about 1/200 of a second. It is our understanding that the vertical cameras will use SO 1188 film or its equivalent which will permit exposures on the order of 1/500 of a second under similar lighting conditions.

(b) With a 1½" focal length using 70mm film, we should get coverage of about equal to the width of a panoramic sweep at a scale on the order of 1:6,500,000. This, by a happy coincidence, is about the same scale which we will be realizing from the "A" Program and should provide very useful correlation material with the "A" photography.

(c) The wide angle, short focal length photography should provide excellent information for the Air Weather Service whereas we will have no photographic rectification capability for the oblique panoramic pictures.

(d) We feel that we can obtain equally good or better attitude information for the standard horizon exposures, even if oblique, as we could from the vertical framing terrain camera pictures. Therefore, we do not regard incorporation of this additional camera as being mandatory but rather as a device which will provide quite valuable additional information.

(e) It is suggested that consideration possibly be given to mounting this same auxiliary camera to provide stellar exposures rather than terrain exposures. The stars provide an excellent control system for the accurate determination of camera orientation (pitch, roll and yaw). The present technique of horizon reduction could be continued, with the stellar camera providing an exposure every tenth frame of the panoramic cameras, which would allow the graphs of the horizon determined pitch and roll to be adjusted. [redacted] stated recently that 1/10 mile position accuracy from radar alone will soon be possible and that accurate time will soon be available, which means that we must provide better orientation data or this will be the weak link in the system. For these purposes, time would have to be provided for each stellar exposure. However, readout could be made compatible for the techniques developed for ARCON, the Franchanstein and computer programs are already available.

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Chief, TISD
National Photographic Interpretation Center