PRO-A6C

~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL SYSTEM

~~1ST~~ NATIONAL RECONNAISSANCE OFFICE
WASHINGTON, D.C.

31 Mar Rec'd numbers from Patterson
Ltr Gave Schow numbers JRN

THE NRO STAFF

30 March 1970

MEMORANDUM FOR DR. NAKA JRN

SUBJECT: Proposed HEXAGON Changes

BACKGROUND

Subsequent to [redacted] briefing (TAB A) some three weeks ago, two messages have been received from Mr. Crowley's office stating that they are proceeding with the proposed sensor subsystem improvement studies. The first of these (PILOT 8624, TAB C) was in response to your Color Task Force Report message (TAB B) and stated that the inflight changeable filter and material change detector had already progressed through the preliminary design stage. The second message (PILOT 8653, TAB D) was a follow-up to the briefing to confirm that all of the studies were proceeding. In a telecon with [redacted] subsequent to our discussion on 20 March, he stated that the effort was still under way but that he had worked up some rough FY 71 impact which could result if the changes were implemented. He indicated that these would be presented to you at your earliest convenience. I advised him that Mr. [redacted] was still expecting a formal request for approval of the new effort (including FY 71 impact) and suggested that Mr. McDonald call [redacted] on the matter.

DISCUSSION

I have had several conversations with [redacted] in which he has emphasized the fact that the current situation is contrary to established procedure. Specifically, new effort is under way without the submittal of a formal request; the accomplishment of policy, technical, and fiscal staffing; and the granting of appropriate approval. The point of procedure might appear on the surface to be a small one. It is, however, necessary if the NRO is to exercise effective management of its programs.

Apart from procedural considerations, however, there are some other general and specific aspects which should be noted. In the general area, I would offer the following comments.

~~HEXAGON~~

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With the exception of the changeable filter/material change detector item, the effort consists of studies only. This is fairly innocuous since presumably the studies themselves will cause no significant cost of hardware impact but rather create a basis for possible future system change decisions. Because of the current "tight money" situation, however, the fiscal impact of ultimately implementing changes must be estimated to the best degree possible from the beginning. Irrespective of the ultimate advantages of a system change, the cost of its development must be borne in addition to maintaining the system in its current configuration. There is no point in even studying changes which we simply can't afford.

The reason advanced for initiating the work now is to take advantage of design and engineering personnel on the Perkin-Elmer payroll who might otherwise be laid off or reassigned. One counterargument is to question whether any such loss of personnel is really imminent during this period of tight schedule and system debugging. A related consideration is whether the dilution of available management and technical talent in order to support system improvement studies is really prudent when the primary problem is to get the system working in its current configuration. The failure of one of the development model cameras during thermal-vacuum tests on 20 March is an indication that this problem is still very much with us. Virtually all of the proposed improvements will affect several system interfaces such as weight, power, command and control, telemetry, software, etc. This implies thorough coordination and perhaps collateral or subsequent investigations by SAFSP/Lockheed/Aerospace before any improvement studies could be completely validated. In short, the total effort must necessarily involve more than some Perkin-Elmer studies.

Some specific comments can be made about each of the proposed improvements:

a. In-Flight Changeable Filter and Material Change Detector. This is a very logical improvement in view of the recent availability of high resolution color film and the excitement this material has caused in the community. It is a cold, hard fact, however, that no requirements for recurring color acquisition or on call color capability have yet been stated. This item is already under way and is the only one on the list for which hardware cost estimates have been provided.

b. Brush Motors. This improvement is almost completely within the scope of producing an effective sensor subsystem and as such can be regarded as more of a desirable option than a major change. It is unlikely that there will be any trend back to a vacuum environment due to the long film paths and the need to maintain UTB within acceptable relative

humidity limits. The lower efficiency of the brush motors may affect the power interface, however.

c. Large Capacity Buffer ("Super Looper"). A very substantial sensor subsystem change with considerable impact on operation. This can be anticipated to involve substantial development and hardware costs.

d. Improved Sequencer. This would fall into the same category as brushless motors, i.e., adopting a more desirable design option.

e. Supply Caging Simplification. See d. above.

CONCLUSIONS

The proposed sensor subsystem improvement effort has been initiated without following procedures with regard to request, staffing and approval.

There are a number of aspects of the effort which should be noted prior to endorsing it.

RECOMMENDATION

I would recommend, and believe it is your intent, to rectify the procedural breach. I will work with [redacted] to prepare a suitable written communication if you feel this course of action is appropriate.

ROBERT A. SCHOW, JR.
Major, CE, USA

Atchs
TAB A, [redacted] Brief, 10 Mar 70
TAB B, WHIG 0037 (FPP F-1)
TAB C, PILOT 8624 (FPP F-1)
TAB D, PILOT 8653 (Pro A6c)

Copy to: [redacted]

[redacted]

SENSOR SUBSYSTEM IMPROVEMENTS

I. IN-FLIGHT CHANGEABLE FILTER AND MATERIAL CHANGE DETECTOR

- o PURPOSE : COLOR FILM UTILIZATION
- o BENEFITS : INCREASE SYSTEM CAPABILITIES
- o SCOPE : CCR 96 ALREADY APPROVED NEW FIELD GROUP HOUSING
  FILTERS WILL BE WRATTEN 12 AND CLEAR GLASS
- o COSTS : $203K (INCLUDING F.G.H. MODS) (FY'70)
  $742K -- REMAINING COSTS (INCLUDING HDWR FOR UNITS 7-12)
- o EFFECTIVITY : FLIGHT UNIT #7

Briefing by [redacted]
to Nate 10 March 1970

II. BRUSH MOTORS

- o PURPOSE : REPLACE BRUSHLESS DC MOTORS AND/OR DIGITAL TACHOMETERS (USING OPTICAL ENCODERS) WITH BRUSH-TYPE MACHINES
- o BENEFITS :
  - o INCREASE RELIABILITY BY 3.56%
  - o LOWER RECURRING COSTS ($20K PER SYSTEM)
    (4000 FEWER ELECTRONIC PARTS)
- o SCOPE : STUDIES REASSESSING ORIGINAL BRUSHLESS DECISION BASED ON:
  - o ALL BUT THE O.B. MOTOR NOW OPERATE UNDER 0.5 PSI, INSTEAD OF HARD VACUUM
  - o ADVANCES IN COMMUTATOR AND BRUSH MATERIALS
  - o LESS EFFICIENT (60% vs 85%), LESS COMPLEX CIRCUITS NOW WITH SOLAR PANELS AND RECHARGEABLE BATTERIES
- o COSTS : $89,493
- o EFFECTIVITY : FLIGHT UNIT #13

III. LARGE CAPACITY BUFFER ("SUPER LOOPER")

- PURPOSE : REPLACE THE PRESENT LOOPER WITH A STORAGE DEVICE OF LARGE CAPACITY TO OMIT THE REWIND PHASE.
- BENEFITS :
  - ZERO STOP/START TIME
  - ELIMINATING REWIND AND NON-VOLATILE MEMORY REQUIRMENT INCREASES RELIABILITY BY 1.84%
  - VERY THE SCAN MODE DURING AN OPERATION
  - REDUCES FILM WASTAGE BY 4,300 FT.
  - REDUCES SUPPLY AND TAKE-UP TORQUE, POWER AND WEIGHT
  - ELIMINATES VEHICLE DISTURBANCES FROM THE FINE FILM TRANSPORT
- SCOPE : STUDY WHICH OF 2 OR 3 VIABLE APPROACHES IS OPTIMUM
- COSTS : $34,404
- EFFECTIVITY : FLIGHT UNIT #17

IV. IMPROVED SEQUENCER

- PURPOSE : ELIMINATE THE MODES IN THE CURRENT SEQUENCER WHICH COULD RESULT IN NON-RECOVERABLE SYSTEM FAILURES.
- BENEFITS :
  - SINGLE FAILURE DESTRUCTIVE MODES WOULD BE ELIMINATED
  - COMBINE AND SIMPLIFY MANY OF THE EXISTING FUNCTIONAL OUTPUTS (I.E. RECYCLE PROFILE, FILM VELOCITY PROFILE, OB PHASING, MODE SWITCHING, EVENT SEQUENCERS, ETC.)
  - SEPARATE "EMERGENCY SHUTDOWN" FROM THE NORMAL FUNCTIONAL CIRCUITRY.
- SCOPE : A STUDY TO INVESTIGATE THE IMPACT OF ALL SEQUENCER OUTPUT FUNCTIONS ON SYSTEM PERFORMANCE, SPECIFICALLY THOSE MALFUNCTIONS WHICH COULD CAUSE CATASTROPHIC FAILURES.
- COSTS : $85K (PAUSELESS RECYCLE PROFILE GENERATOR AND INDEPENDENT EMERGENCY SHUTDOWN ONLY)
- EFFECTIVITY : FLIGHT UNIT #17

V. SUPPLY CAGING SIMPLIFICATION

- o PURPOSE : REDUCE OR EILIMINATE SUPPLY CAGING ARMS
- o BENEFITS :
  - o HIGHER RELIABILITY
  - o MORE FAILSAFE
  - o DECREASE WEIGHT (155# PER SYSTEM)
  - o LOWER RECURRING COSTS ($150K PER SYSTEM)
- o SCOPE : STUDIES AND TESTS TO EVALUATE FILM STACK INTEGRITY DURING LAUNCH
- o COSTS : $81,729
- o EFFECTIVITY : FLIGHT UNIT #7