~~SECRET~~/D

SFT
(Atch an

DEPARTMENT OF THE AIR FORCE
OFFICE OF SPECIAL PROJECTS (OSAF)
PO BOX 92960, WORLDWAY POSTAL CENTER
LOS ANGELES, CALIFORNIA 90009

MEMO FOR DR. HERMANN

25 April 1980

I have attached the DAMON Road Map for a Minimal Evolutionary Program which would continue past the currently approved experiment. A feature of this program is the inclusion of program funds at $15M/year in 1980 dollars to support the evolutionary growth from FY 82 thorugh FY 87. I have included this program as an alternative in the FY 82 budget submission.

JOHN E. KULPA, JR.
Major General, USAF
Director

1 Atch
DAMON Roadmap

~~SECRET~~/D

Handle Via
BYEMAN
Control System Only

ROADMAP

FOR

DAMON

MINIMAL EVOLUTIONARY PROGRAM

1. Introduction

DAMON is a program to establish the precedent for conducting overhead reconnaissance from the Space Transportation System (STS), to gain operational experience for the NRO and DOD in integrating with and conducting mission operations from the STS, and to return useful intelligence to augment other overhead collection systems. DAMON is not an operational reconnaissance system, but an experimental program. A photoreconnaissance mission was selected for the focus of the DAMON effort because a photo mission places stringent demands upon the host spacecraft and on the integration process. Any STS-induced mission degradation or operational difficulties will be readily identified.

The DAMON system is implemented as a photoreconnaissance pallet designed to fly in a sortie mode aboard the STS orbiter. It will remain coupled to the orbiter at all times and will be returned with the orbiter after a nominal seven day reconnaissance sortie. Two sortie flights are planned; the first in 1982 and the second in 1983. The first flight will establish the reconnaissance precedent and the second flight will establish the concept of refurbishment/reflight of a sortie pallet system. The experimental objectives of the DAMON program will therefore be accomplished in the two sortie flights.

2. DAMON Extension

DAMON was conceived and implemented as an experimental STS sortie system with prime emphasis on minimizing cost and schedule risk. Minimum photographic performance goals were established to assure that the experiment would be sensitive to a wide range of potential reconnaissance mission limiting or degrading factors.

After DAMON has completed the first two experimental flights, it will represent an integrated, flight proven hardware set with a demonstrated capability to return useful intelligence. The obvious questions then arise: Can the DAMON program be extended beyond the two flights to become an operational system? At what cost? What capabilities could could it provide as a supplementary or back-up system? What collection requirements could it satisfy as currently configured? Can it be modified or improved to satisfy other more stringent collection requirements?

The answer to these questions is that DAMON could be extended to continue to serve as a supplementary or back-up collector against medium resolution [redacted] and surveillance requiremen (b)(1) (b)(3) but with two important caveats. First, the DAMON pallet will fly in an STS optimum orbit of 57 degrees inclination and 150 NM altitude. In this orbit [redacted] (b)(1) (b)(3) [redacted] Second, DAMON was not designed to be an operational system which must possess extensive attributes of reliability, availability, maintainability, and extended reuse capability. There are no

fundamental attributes of the DAMON pallet which would preclude reuse and reflight past the two experimental flights; but neither has there been the required development effort to ensure that continuing reflights are feasible with the required reliability and within reasonable refurbishment costs.

3. DAMON Evolution

The DAMON experiment could be extended and simultaneously upgraded to be capable of satisfying the full range of medium resolution [redacted] and surveillance requirements as well as some other missions as a supplementary or backup collection system. This could be accomplished with an evolutionary program for a limited number of years followed by a continuing program for sustained operations. The evolutionary program would include sustaining operational manpower and hardware needs plus a wedge of funds to be used for the gradual improvement of the DAMON pallet to an upgrade operational photoreconnaissance system. (b)(1) (b)(3)

4. DAMON Minimum Evolution Program

A Minimal Evolutionary Program is provided which would permit improvements in the following attributes of the DAMON experimental pallet and gradually evolve DAMON to an operational sortie photoreconnaissance system:

a. Quality

Image quality (interpretability) would be improved by the following methods:

(1) Fly lower - improve image scale factor

(2) Use improved films - faster and/or lower granularity films

(3) Improve optics - improve transmission factors and/or reduce wavefront errors

(4) Improve camera controls - reduce image motion compensation errors and focus errors

(5) Improve metric accuracy - increase photogrammetric geolocation accuracy through improved position, pointing and timing recovery and imagery correlation.

(6) Improved mission planning - including improved orbits

b. Quantity

The quantity of imagery (the number of cloud-free unique images which satisfy requirements) would be improved by the following methods:

(1) Fly longer - increase mission durations to 14, 21 or 28 days to increase percentage of cloud free return

(2) Fly sun-synchronous orbits - improve access to target areas for additional unique coverage, to synchronize accesses with DMSP weather satellites for improved weather prediction for targeting, and to improve the sun angle profile during the mission.

(3) Increase film load - return a greater number of images

(4) Fly additional missions - multiply the collection quantity directly.

(5) Improve mission planning - including collection strategy.

c. Availability

Availability and responsiveness would be improved by the following methods:

(1) Improve reliability - reduce the incidence of failures on orbit or on the ground

(2) Incorporate self test and diagnostic capability - reduce the delay in isolating failed components

(3) Improve maintainability - upgrade electronics to improve repairability and modularity for improved equipment access and reduced remove/replace downtime

(4) Improve turn around time - reduce the refurbishment/checkout cycle to permit earlier availability for reflight

(5) Improve responsiveness - improve tasking, targeting and operational commanding responsiveness by incorporating compatibility with AFSCF/Data System Modernization and NASA [redacted] (b)(1) (b)(3)

d. Economy of Operation

Continuing operational costs can be reduced by the following methods:

(1) Reduce sustaining manpower - restructure the program support base for increased efficiency in manpower utilization

(2) Incorporate field maintenance concepts - reduce the need to maintain factory teams to support routine refurbishment and checkout cycles.

e. Support Corollary Missions

Utilize the investment in the DAMON pallet to reduce the support costs for other overhead missions by the following methods:

(1) Add secondary payload support capability - create power, thermal, command, data, telemetry, and physical mounting interfaces for secondary payloads

(2) Add subsat deployment capability - create physical and electrical interfaces to permit the on-orbit checkout and then deployment of sub-satellites from the DAMON pallet

(3) Add alternate mission capability - create quick turn-around mate/demate interfaces to permit removal of the DAMON camera assembly and replacement with an alternate payload for ELINT or another specialized sortie mission.

5. Fiscal Year Effort

The attached roadmap depicts the relative time frames in which the evolutionary improvements could be accomplished. A program which provides $15M per year in FY80 dollars above the sustaining operations & flight costs for FY82 through FY87 to accomplish the minimal evolution is also attached.

a. FY82

Conduct analysis to determine the performance, cost and schedule for desired evolutionary improvements in DAMON. Evaluate first flight lessons learned to refine the priority for accomplishment of the individual improvement elements. Initiate design work for first priority improvements.

b. FY83

Continue analyses to incorporate lessons learned from refurbishment and reflight (flight #2) and refine improvement element priorities. Continue the design of improvements and begin hardware modifications. Test and evaluate some hardware improvements on flight 3.

c. FY84-87

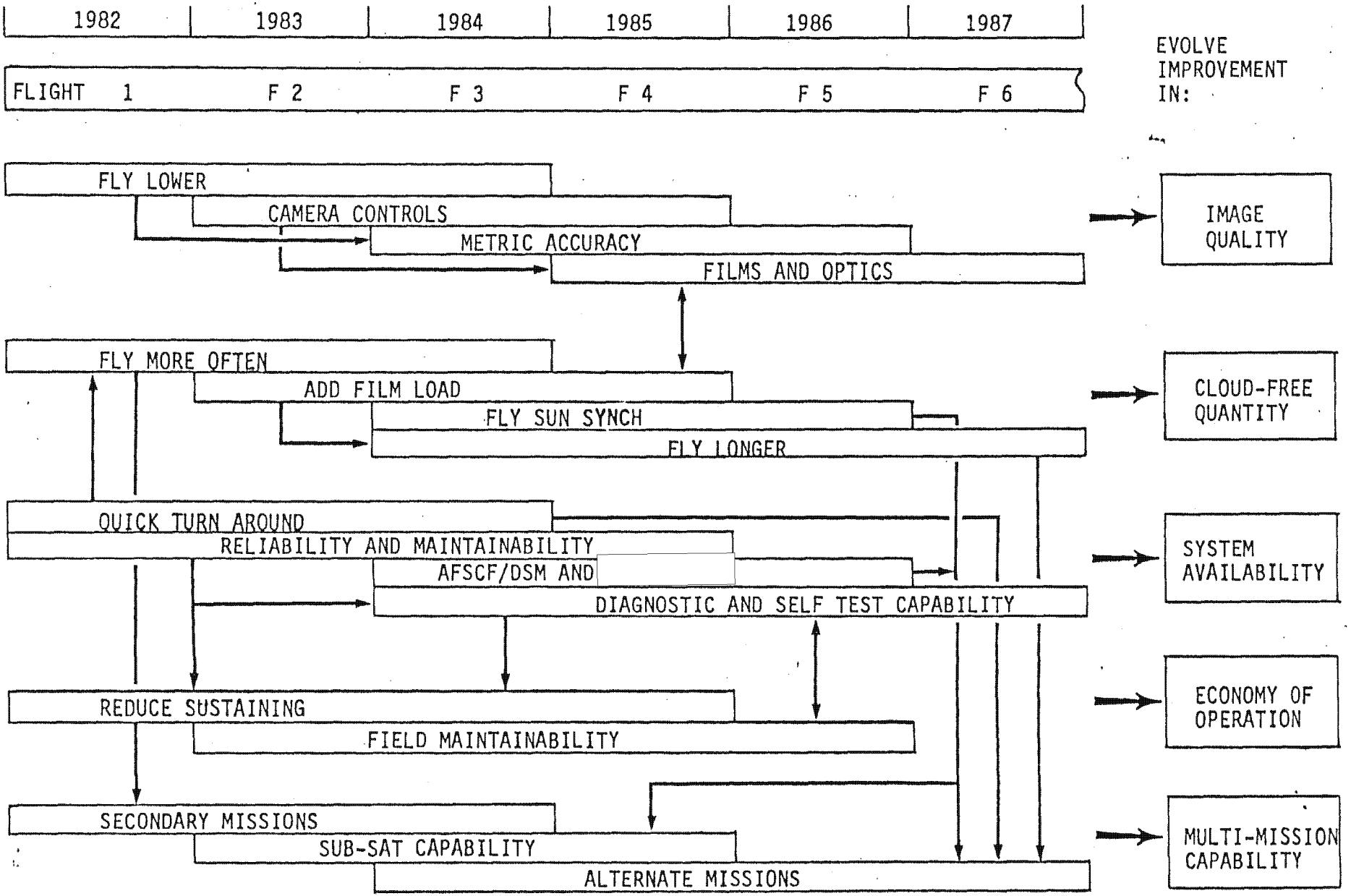
Continue evolutionary improvements as identified and prioritized in earlier studies. Continue operations with at least one flight per year.

DAMON MINIMAL EVOLUTIONARY PROGRAM

FY	81	82	83	84	85	86	TOTAL
DAMON EXTENDED	21.7	44.0	46.7	75.9	75.8	81.2	345.3
EVOLUTIONARY IMPROVEMENTS		18.2	20.0	22.0	24.2	26.6	111.0
MINIMAL EVOLUTIONARY	21.7	62.2	66.7	97.9	100.0	107.8	456.3

(b)(1)
(b)(3)

DAMON MINIMAL EVOLUTIONARY PROGRAM



~~SECRET~~/D

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

Approved for Release: 2019/06/18 C05124087