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DAMP 639, ANGLO 623
DAMP PASS LAGOON
ANGLO PASS ETHER

TOP SECRET 231700Z JUN 50 CITE BISON 6365
INFO ETHER, LAGOON.
HANDLE VIA BYEMAN CHANNELS ONLY
DAMON/HEXAGON
TO: J. HILL, INFO: ETHER, LAGOON/L. CRESS
FROM: BISON D. HUTCHISON
SUBJ: DAMON METRIC EXPERIMENT
REF: A. BISON 5665, 3 JUN 80
B. 6771, 4 JUN 80
THE FOLLOWING DESCRIPTION OF THE DAMON METRIC EXPERIMENT ARE
PROVIDED AS PER YOUR REQUEST IN REFERENCE A.
A. OBJECTIVE (AND DESCRIPTION OF THE EXPERIMENT):
1) BACKGROUND. HARDWARE STUDIES IN SUPPORT OF THE NOW
DEFUNCT "Z" PROGRAM SHOWED THAT THE CAPITAL INVESTMENT FOR A MEDIUM
RESOLUTION WIDE AREA IMAGING SYSTEM AS MUCH (SEVERAL HUNDRED MILLION
DOLLARS) LESS FOR A SHUTTLE PALLATE THAN FOR A FREE FLYER. BECAUSE THE
PALLATE HAD NO NEED FOR PROPULSION SYSTEMS, REACTION CONTROL SYSTEMS,
ETC., AND BOTH HAD TO BE INTEGRATED INTO THE SPACE SHUTTLE.
OPERATIONS COSTS WERE ANOTHER MATTER, DEPENDING ON RIDE-SHARING
OPPORTUNITIES FOR THE PALLATE, METHOD AND FREQUENCY OF FILM RETRIEVAL,
REFUELING/REFURBISHMENT SCHEDULES, NUMBER OF MISSIONS/DAYS ON ORBIT
PER YEAR REQUIRED TO MEET ANY SET OF REQUIREMENTS, ETC.) PUTTING
OPERATIONS COSTS ASIDE (THEY ARE BEING ADDRESSED IN ANOTHER KUBISON
STUDY) ONE SHOULD DETERMINE THE TECHNICAL SUITABILITY OF THE SHUTTLE
AS AN NSG PLATFORM. WHETHER AND OTHERS HAVE THE FOLLOWING CONCERNS:
LA1 POINTING ACCURACY AND STABILITY. THE SHUTTLE HAS NO ATTITUDE
SENSOR ACCURATE ENOUGH TO RECOVER NSG ACCURACIES (A FEW ARC-SECONDS).
THE SHUTTLE WILL NOT DOG. THE SHUTTLE'S IMU DEAD BANDS ARE NOT LIKE
AX, NEITHER ARE ITS AERODYNAMICS. HOW DOES ALL OF THIS AFFECT THE
ABILITY TO RECOVER POINTING?
1B) THERMAL EFFECTS. THE HX METRIC PAN CAPABILITY IS HIGHLY DEPENDENT
ON A DETAILED HX THERMAL DISTORTION MODEL FOR POINTING FOR THE TWO-
CAMERA ASSEMBLY (TCA). WILL THE TCA THERMAL MODEL WORK IN THE SHUTTLE
BAY? WILL THE S-CUBED (SOLID-STATE STELLAR SENSOR) PACKAGE WORK IN THE
BAY?
1C) ORBIT DETERMINATION ACCURACY. WILL THE SHUTTLE ORBIT BE STABLE
ENOUGH TO MODEL BETWEEN FIXES? WHAT ABOUT THE NON-COUPLED REACTION
CONTROL SYSTEM WHICH MAY CAUSE UNPREDICTABLE DISPLACEMENTS? WHAT
ABOUT GRAVITY GRADIENT AND AERODYNAMICS EFFECTS? HOW WELL MODELED
ARE ORBIT ADJUSTS? WILL THE HX EXPERIENCE (TRANSLATE TO THE SHUTTLE?)
ARE OPS RECEIVERS NEEDED?
1D) CONTAMINATION. ACOUSTIC AND ACCELERATION ENVIRONMENTS. WILL
TCA TO S-CUBED CALIBRATION BE STABLE? WILL S-CUBED SURVIVE? BE DE-
GRADAD, OR WHAT?
(2) ALTITUDE. HOW IMPORTANT WILL SHUTTLE ALTITUTDE BE TO METRIC
ACCURACY AND IMAGE QUALITY?
(2) OBJECTIVE: THE DAMON METRIC EXPERIMENT IS DESIGNED TO ANSWER
THE ABOVE CONCERNS BY EVALUATING THE SHUTTLE AS A METRIC COLLEc-
TION PLATFORM. THE DATA WILL ENABLE ANY REQUIRED MODIFICATIONS TO
THE SHUTTLE TO BE DETERMINED WITH HIGH CONFIDENCE. THE RESULTS
WILL BE MUCH MORE CREDIBLE AND LESS EXPENSIVE TO OBTAIN THAN ANY
COMPARABLE ANALYSIS. THE EXPERIMENT IS A JOINT EFFORT BETWEEN
KWETHER AND KWISON. KNOWN SPACE QUALIFIED HARDWARE WILL BE
ADDED TO THE DAMON SYSTEM TO ALLOW EVALUATION OF METRICITY:
- STELLAR REFERENCE (S-CUBED) FOR POINTING
- DOFFLER BEACON (DBS) FOR ORBIT DETERMINATION
- MESA (MINIATURED ELECTROSTATIC ACCELEROMETER) FOR ORBIT
MODELING.
- DBS AND ECS (EXTENDED COMMAND SYSTEM) MODS FOR PRECISION TIMING.
- HEXAGON METRIC PAN HARDWARE, SOFTWARE, ANALYSES AND EXPERIENCE
ARE ESSENTIAL.
B. EQUIPMENT TO BE USED. THE DAMON METRIC EXPERIMENT WILL USE
HESEASON RESOURCES TO THE MAXIMUM EXTENT POSSIBLE. HEXAGON
QUALIFICATION MODEL AND SPARE SOLID-STATE STELLAR Camera AND
THEIR ASSOCIATED ELECTRONICS WILL BE USED, ON A NON-INTERFERENCE
BASIS, FOR ALTITUDE REFERENCE. NAVIGATIONAL AIDS (DOFFLER BEACON
SYSTEM AND ACCELEROMETERS) WILL BE PROVIDED BY KWETHER AND USED
TO PROVIDE ORBITAL POSITION.
C. COST. ESTIMATES FOR THE METRIC EXPERIMENT INCLUDE $2M
FOR THE KWISON TASKS OF EXPERIMENT INTEGRATION, FLIGHT PLANNING,
S-CUBED HARDWARE INTEGRATION, AND TEST, AND $2M FOR THE KUETHER
TASKS FOR EXPERIMENTAL PLANNING, ANY GROUND DATA HANDLING SYSTEM
SOFTWARE MODIFICATIONS, DOFFLER BEACON AND MESA HARDWARE, AND
EXPERIMENT DATA REDUCTION. KWISON COSTS CAN BE BORNE IN THE
CURRENT PROGRAM BY ACCEPTING RISK APPROPRIATE TO AN EXPERIMENT.
THE DAMON PROGRAM WILL BE RESTRUCTURED LATER IF REQUIRED TO STAY
WITHIN BUDGETARY CONSTRAINTS SHOULD UNEXPECTED COSTS PROBLEMS
DEVELOP. A GROUND RULE FOR DAMON IS TO MAINTAIN THE BUDGET BASE
LINE SET WITH CONGRESS IN FY 80.
D. SCHEDULE. THE METRIC EXPERIMENT IS TO FLY ON THE FIRST DAMON
FLIGHT IN MAY 1982.
E. SUPPORT BY KWETHER. ACTIVITIES OF KWETHER WERE DELINATE
BY REF 1. BASICALLY, KWETHER WILL PROVIDE: THE NAVIGATIONAL
AID IN DEFINING AND PLANNING THE EXPERIMENT; IMAGERY
EXPLOITATION; REDUCTION AND ANALYSIS OF THE DATA; AND DOCUMENT-
ATION OF THE RESULTS OF THE EXPERIMENT.

REV 20 JUN 80

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