~~SECRET~~
~~Handle via BYEMAN~~
~~Control System~~

ZCZCFTC738/2 62055Z
BT
XXXXX
GUA D 106

S E C R E T 261828Z CITE CHARGE 7452.
WHIG
EARPOP
FOR OR FLAX FROM GENERAL MARTIN
REFERENCE WHIG 6324
SUBJECT: P-11 BOOSTERS

PART I. INTRODUCTION:

1. THIS IS RESPONSE TO YOUR WHIG 6324 WHICH (1) DIRECTED THAT WE PREPARE TO IMPLEMENT A P-11 SATELLITE TO COVER 4-12 GHZ GENERAL SEARCH, (2) ASKED FOR AN EVALUATION OF ALTERNATIVES FOR PROVIDING P-11 RIDES, AND (3) SUGGESTED THAT WE CONSIDER PROCUREMENT OF OTHER SMALL SPACECRAFT FOR MISSIONS TYPICALLY ASSIGNED TO P-11'S.

PART II. 4-12 GHZ GENERAL SEARCH VEHICLE.

1. WITH RESPECT TO THE 4-12 GHZ GENERAL SEARCH VEHICLE (TRIPOS/SOUSEA) WE HAVE SOLICITED AND RECEIVED TWO COMPETITIVE PAYLOAD PROPOSALS. THE WINNER WILL BE A SUBCONTRACTOR TO LMSC. WE ARE READY TO MOVE OUT ON THIS PAYLOAD, WHICH PRESENTS FEW UNKNOWNS. EARLIEST POSSIBLE LAUNCH IS FEBRUARY OR MARCH 1968, ASSUMING IMMEDIATE APPROVAL. NO SPECIFIC FUNDING ACTION IS REQUIRED, SINCE THIS REPRESENTS DEFINITION OF THE PAYLOAD FOR A VEHICLE (4420) ALREADY PROGRAMMED. CONSIDERING THAT THE 4-12 GHZ GENERAL SEARCH REQUIREMENT IS ONE OF LONG STANDING, I URGE THAT WE GO AHEAD NOW WITHOUT INVOKING A FURTHER USIB REQUIREMENT APPROVAL PROCEDURE, OR ATTEMPTING TO RE-EXAMINE ABM SEARCH CRITERIA, WITH ALL THAT MIGHT INVOLVE.

PART III. P-11 BOOSTER REQUIREMENTS

1. THE ALTERNATIVES YOU ASKED ABOUT ARE (1) BIG SOLIDS FOR THE 846 BOOSTER AND (2) THOR/BURNER II BOOSTERS WITH TWO P-11'S EACH LAUNCHED BY THE 10TH ADG. WE HAVE ADDED SOME VARIATIONS TO THE THOR/BURNER II CASE. IN COMPARING THESE ALTERNATIVES WE FIRST TOOK NOTE THAT THE P-11 RIDE SITUATION IS GOOD UNTIL CALENDAR 1969. TO RECAPITULATE THE 1967/1968 SCHEDULE: THERE ARE 13 P-11'S TO BE DELIVERED BETWEEN NOW AND THE END OF CALENDAR 1968, OF WHICH THREE P-11'S ARE BACK-UP (DUPLICATE) ABM BIRDS WHICH MAY NOT HAVE TO BE LAUNCHED IN THAT PERIOD. WE NEED, THEREFORE, BETWEEN 10 AND 13 RIDES BETWEEN NOW AND DECEMBER 1968. TO MEET THAT

~~SECRET~~
~~Handle via BYEMAN~~
~~Control System~~

REQUIREMENT WE HAVE 12 RIDES PLANNED, 10 ON UNMODIFIED 846 BOOSTERS AND TWO ON UP-RATED POPPY BOOSTERS USING CASTOR II SOLIDS. BY 1969, THERE WILL BE ESSENTIALLY NO MORE 846 RIDES ON THE PRESENT BOOSTERS. BASED ON EXPERIENCE FACTORS, WE ARE FORECASTING LAUNCH OF EIGHT P-11'S IN 1969 AND A POSSIBLE SEVEN IN 1970. THE PROBLEM IS TO FIND RIDES FOR THESE 1969 AND 1970 VEHICLES, FOR WHICH MISSIONS HAVE NOT YET BEEN DETERMINED.

2. TWO P-11 CONFIGURATIONS ARE DEFINED. THE LIGHT CONFIGURATION EMPLOYS ANTENNAS NO LARGER THAN A 6 FOOT DISH AND WEIGHS BETWEEN 215 AND 250 LBS WITHOUT KICK MOTORS DEPENDING ON PAYLOAD CONFIGURATION. THE HEAVY CONFIGURATION PLANNED FOR FUTURE LAUNCHES CAN EMPLOY UP TO A 10 FOOT ANTENNA DISH AND WEIGHS APPROXIMATELY 330 LBS. TWO 20 LB KICK MOTORS EACH PROVIDING 300-650 FPS INPULSE ARE REQUIRED FOR 846 RIDES. ONE 85 LB KICK MOTOR PROVIDING 2000 FPS IMPULSE IS REQUIRED FOR "SLICK" TAT BURNER II LAUNCHES. TOTAL VEHICLE WEIGHTS FOR THE TWO RIDE OPTIONS ARE:

A. 846 PIGGY BACK

	LIGHT	HEAVY
P-11	215-250	330
KICK MOTORS	40	40
INTERFACE PANEL	50	50
TOTAL	305-340	420 LBS

B. DUAL LAUNCH

	2 LIGHT	2 HEAVY	1 LIGHT/1 HEAVY
P-11-S	430-500	660	545-580
TE345 MOTORS	170	170	170
INTERFACE STRUCT	50-100	50-100	50-100
TOTALS	650-770	880-930	765-850

3. ALTERNATIVES.

A. ALTERNATIVE I: MODIFY THE 846 J-3 BOOSTER TO THE THORAD/SENIOR/AGENA CONFIGURATION TO PROVIDE CAPABILITY OF ONE P-11 RIDE FOR EACH 846 LAUNCH. DEVELOPMENT LEAD TIME IS FIFTEEN MONTHS. THIRTEEN J-3 VEHICLES NOW ON CONTRACT COULD BE UPGRADED TO PROVIDE ONE ADDITIONAL RIDE IN 1968, 10 RIDES IN 1969 AND TWO RIDES IN 1970. THE COSTS ARE:

NON-RUCURRING: $14.0 MILLIONS

RECURRING EK

IØALC .25 MILLIONS

B. ALTERNATIVE II. CONVERTED SM 75 PLUS BURNER II, WITH ALL BLUE-SUIT LAUNCH. UTILIZING SUBORBITAL TRANSFER, THIS BOOSTER COMBINATION CAN PLACE 720 LBS (APPROX) IN A 300 NM ORBIT PROVIDED THE PAYLOAD PROVIDES 2000 FPS IMPULSE NECESSARY TO CIRCULARIZE. INCORPORATION OF THE LARGE TE345 MOTORS WILL REQUIRE MAJOR REDESIGN OF P-11 EQUIPMENT BAY. ONLY ONE HEAVY P-11 CAN BE LAUNCHED. TWO LIGHT P-11'S ARE POSSIBLE IN MOST CASES. THERE ARE FIVE SM 75 VEHICLES REMAINING TO BE CONVERTED. I UNDERSTAND THAT A PLAN EXISTS TO ALLOCATE THESE BOOSTERS TO PROGRAM 417, SO AS TO PUSH A BOOSTER CONVERSION DATE FOR THAT PROGRAM AS FAR INTO THE FUTURE AS POSSIBLE. BURNER II LEAD TIME IS 16-18 MONTHS, WHICH INCLUDES PECULIARIZATION FOR THIS MISSION.

COSTS FOR THIS OPTION ARE:

NON-RECURRING: $1.0 MILLION
BII CONVERSION ENGRG 350K
P-11 LVI 650K
RECURRING $1.2 MILLIONS
SM 75 650K
BII 550K

C. ALTERNATIVE III. THOR SLV-2A (WITHOUT SOLIDS) PLUS BURNER II WITH ALL BLUE-SUIT LAUNCH. LAUNCH IS AT PAD LE6, WTR BY THE 10TH ADG. UPGRADING SM 75 TO SLV-2A (WITHOUT SOLIDS) INCREASES TOTAL PAYLOAD LIFT-OFF WEIGHT TO 780 LBS (APPROX). ONLY ONE HEAVY P-11 CAN BE LAUNCHED. ONE HEAVY AND ONE LIGHT POSSIBLE FOR COMBINATIONS WHICH INCLUDE AN AVERAGE WEIGHT LIGHT P-11. TWO LIGHT ARE POSSIBLE IN ANY CASE. THE SLV-2A IS NOW CONFIGURED FOR THE AGENA UPPER STAGE AND WILL REQUIRE MODIFICATION OF ALL SYSTEMS CHECKOUT STANDS AND CONVERSION ENGINEERING. RETRAINING COST FOR AIR FORCE LAUNCH CREW FROM SM 75 TO SLV-2A IS UNKNOWN. COSTS FOR THIS OPTION ARE:

NON-RECURRING $2.15 MILLIONS
PAD MODS 600K
ALL SYSTEM CHECKOUT STAND MODS 250K
BII/P-11 CONVERSION ENGRG 350K
SLV-2A CONVERSION ENGRG 100K
BII/SLV-2A CONVERSION ENGRG 200K
P-11 LVI 650K
RECURRING $1.35 MILLIONS
SLV-2A 800K
BURNER II 550K

D. ALTERNATIVE IV: THOR SLV-2A (WITHOUT SOLIDS) PLUS BURNER II WITH CONTRACTOR LAUNCH OF THE SLV-2A, AIR FORCE LAUNCH CREW FOR BURNER II. P-11 RIDE CAPABILITY SAME AS ALTERNATIVE III. COSTS ARE BASED ON SLV-2A LAUNCH FROM SLC-2W, WITH ALL CONTRACTOR LAUNCH SUPPORT COSTS CHARGED TO P-11. COSTS FOR THIS OPTION ARE:

NON-RECURRING $1.8 MILLIONS
SYSTEM TEST AGE MODS 250K
CONVERSION ENGRG 650K
.SAME AS III ABOVE)
P-11 LVI 650K
BII AGE 250K
RECURRING $2.25 MILLIONS
SLV-2A 800K
BURNER II 550K
SLV-2A LAUNCH SERVICES 900K

2. WHEN VIEWED IN THE CONTEXT OF P-11 ALONE, THE THORAD SENIOR IS THE MOST COSTLY OPTION. THE DUAL LAUNCH OPTIONS SHOW LOWER COSTS. THE COST FIGURES DO NOT, HOWEVER, TAKE INTO CONSIDERATION THE ENGINEERING AND OPERATIONAL FLEXIBILITY OF THE PIGGY BACK SCHEME TO WHICH I ATTACH GREAT IMPORTANCE. I, THEREFORE, DRAW YOUR ATTENTION TO SOME PERTINENT ARGUMENTS NOT REFLECTED IN THE COST DATA.

A. FIRST, P-11'S WHEN PUT INTO THE SAME INCLINATION ORBIT AT ONE TIME PRESENT A MULTI-OPS PROBLEM FOR GROUND READOUT FACILITIES.

ATTEMPTS TO SPACE DUAL LAUNCH VEHICLES WILL INTRODUCE ADDITIONAL SYSTEM COMPLEXITY.

B. SECOND, P-11 DESIGN IS BASED ON AFT RACK AGENA INSTALLATION. ANTENNA CONFIGURATIONS, STRUCTURAL MOUNTS FOR ANTENNAS, AND PREFERENTIAL ORIENTATION OF "G" LOADS IS PECULIARIZED FOR 846 LAUNCH. INSTALLATION OF THE LARGER ROCKET MOTOR FOR DUAL LAUNCH WILL REQUIRE MAJOR STRUCTURE CHANGES AND REQUALIFICATION.

C. THIRD, CURRENT P-11 VEHICLE, LAUNCH ASSEMBLY, AND SPIN MECHANISM CONFIGURATIONS ARE PROVEN DESIGNS WHICH HAVE PERFORMED RELIABLY. THE DUAL SYSTEM WILL BE OF UNDEMONSTRATED RELIABILITY AND SUBJECTS TWO P-11'S TO LOSS IN THE EVENT OF A LAUNCH FAILURE.

D. FOURTH, THE P-11 CONCEPT INVOLVES A SERIES OF VEHICLES, EACH UNIQUE IN SOME RESPECTS. THESE VEHICLES ARE SERIALLY PREPARED FOR LAUNCH. BY CONTRAST, THE FRONT END OPTIONS AS DESCRIBED CALL FOR P-11'S TO BE LAUNCHED IN SETS OF TWO. THIS MEANS THAT VEHICLES WILL BE PAIRED OFF IN THE DESIGN PHASE SO AS TO BE PHYSICALLY COMPATIBLE WITH EACH OTHER AND THAT BOTH MUST BE READY FOR LAUNCH AT THE SAME TIME. THESE CONSTRAINTS MAKE THE PROGRAM MORE DIFFICULT TO EXECUTE, ADD UNCERTAINTY AND DISCONTINUITY TO THE SCHEDULE, AND TEND TO NEGATE THE QRC ORIENTATION THAT MAKES THE P-11 SERIES SUCH A USEFUL PART OF THE OVERALL SIGINT PROGRAM.

E. FIFTH. AS A COMPLICATING FACTOR, THERE IS SOME UNCERTAINTY AS TO EXACTLY WHAT TYPES OF SPACECRAFT WILL BE NEEDED AT LOW ALTITUDES IN 1969 AND 1970. THERE VERY PROBABLY WILL BE SOME SPINNING P-11'S IN THE MIX, AS WE HAVE FORECAST. THAT BEING ASSUMED, I WOULD NOT WANT TO RISK THE EARLY TERMINATION OF THE PRESENT EMPLOYMENT OF P-11'S UNTIL THE REPLACEMENT HAS BEEN IDENTIFIED.

3. THE SAFSP FY 68 FINANCIAL PLAN SUBMISSION, BYE 66561-67, DATED 8 MAY 1967, PROVIDED ARGUMENTS FOR THE 846 THORAD SENIOR DEVELOPMENT. ARGUMENTS FOR APPROVAL OF THIS DEVELOPMENT ARE BASED ON THE FOLLOWING:

A. FIRST, THE THORAD SENIOR WILL PROVIDE APPROXIMATELY 1000 LBS MORE ON-ORBIT PAYLOAD CAPABILITY. THIS ADDITIONAL CAPABILITY WILL PERMIT ACHIEVING ORBITAL INCLINATION ANGLES UP TO 110 AND MISSION LIFE OF 18-20 DAYS WITH THE J-3 PAYLOAD. THIS COMPARES TO THE PRESENT BOOSTER WHICH LIMITS ORBITAL INCLINATION TO A MAXIMUM OF 80 DEGREES FOR LOW ALTITUDE DMU SUPPORTED MISSIONS OF 14 DAYS DURATION; HOWEVER, IF A P-11 IS CARRIED WITH THE J-3 PAYLOAD, MISSION LIFE IS REDUCED TO SEVEN DAYS (PRESENT BOOSTER).

B. SECOND, I CONSIDER THE CAPABILITY OF CARRYING SURVIVABILITY AIDS TO PROTECT THE J-3 SYSTEM IN THE EVENT OF HOSTILE ATTACK AS A DESIRABLE OPTION WHICH CAN BE EVOKED WHEN REQUIRED. WHILE THE 846 PROGRAM HAS THE BOOST CAPABILITY TO CARRY SURVIVABILITY AIDS CONSISTENT WITH THE THREAT MODEL FOR THE NEXT 12 MONTHS, THE PRESENT BOOST CAPABILITY WILL NOT SUPPORT A MISSION AGAINST THE THREAT MODEL IN CY 69. THE THORAD SENIOR, COMBINED WITH REDUCED MISSION LIFE, WILL PROVIDE WEIGHT CAPABILITY FOR SURVIVAL AIDS DURING THIS LATTER PERIOD.

C. THIRD, DEVELOPMENT OF THE THORAD SENIOR WILL PROVIDE A NEW STANDARD BOOSTER OF INCREASED PERFORMANCE TO OTHER AIR FORCE AND NASA PROGRAMS, BOTH IN BEING AND CONTEMPLATED. IT COULD LEAD TO A SECOND GENERATION 846 J-3 PAYLOAD (J-4) WITH INCREASED PERFORMANCE.

4. IN SUMMARY, I REITERATE MY RECOMMENDATION IN THE FY 68 SAFSP

~~SECRET~~
~~Handle via BYEMAN~~
~~Control System~~

FINANCIAL PLAN IN FAVOR OF THE THORAD SENIOR DEVELOPMENT. ALTHOUGH NO SINGLE UTILIZATION WILL SUPPORT THIS DEVELOPMENT FROM A COST EFFECTIVE STANDPOINT, THE POTENTIAL APPLICATIONS WHEN CONSIDERED IN TOTAL MAKE THIS AN ATTRACTIVE ALTERNATIVE.

PART IV. CONSIDERATION OF ADDITIONAL SMALL SPACECRAFT.

WE ARE EVALUATING THE RESULTS OF OUR SIGINT ADVANCED SYSTEM STUDY CONTRACT. IT APPEARS THAT BY 1969 WE MAY BE ENTERING AN ERA CHARACTERIZED BY "HIGH" SYSTEMS (ABM TYPE) AND "LOW" SYSTEMS (STRAWMAN AND/OR A FAMILY OF SMALL VEHICLES). THE POSSIBILITY EXISTS THAT ALL LOW-ALTITUDE MISSIONS CAN BE ASSIGNED TO SMALL VEHICLES, SOME OF WHICH MIGHT BE SPINNING P-11'S, AND OTHERS OF WHICH MIGHT BE EARTH-ORIENTED THREE-AXIS STABILIZED VEHICLES. WE ARE WITHHOLDING THE DEFINITION OF SPECIFIC P-11 CONFIGURATIONS FOR CALENDAR 1969 AND BEYOND, WHILE WE EXAMINE THE POSSIBILITIES FOR NEW SPACECRAFT. IF THE THORAD SENIOR IS NOT AVAILABLE FOR CONTINUATION OF THE PIGGY BACK OPTION FOR THE 1969-1970 PERIOD, IT WOULD BE PRUDENT TO FORECAST COSTS ON THE BASIS OF THOR/BURNER II BOOSTERS.

S E C R E T

BT

N

N

N

~~SECRET~~
~~Handle via BYEMAN~~
~~Control System~~