MOL SUPPORT BY SCF

August 1968

BACKGROUND

1964 - 1965   -   STUDIES OF NASA AND AF SUPPORT OF MOL

SPRING '65   -   MARRIAGE OF MOL REQUIREMENTS WITH SCF

                DEVELOPMENT PLANS - BROCKWAY MCMILLAN, PASTOR

        o   POWERED FLIGHT CONTROL - FLORIDA

        o   MCC - STC AUGMENTED

        o   NETWORK - SCF AUGMENTED

        o   DATA SYSTEM - SCF - ADS

        o   NAVIGATION - SCF - AOES

SUMMER '65   -   POLAR ORBIT DECISION

        o   CHANGED NETWORK AUGMENTATION TO WAKE ISLAND

        o   INCORPORATED POWERED FLIGHT CONTROL IN STC

POWERED FLIGHT CONTROL

o   REAL TIME EVALUATION OF SLOW MALFUNCTIONS

o   ABORT OR SWITCHOVER DECISIONS ONLY

o   MAJOR CONTRIBUTORS TO DECISION RELATIVELY STABLE

   -GEMINI B

   -TIIIM

o   TRW SELECTED AS ASCENT-RE-ENTRY SOFTWARE CONTRACTOR
     BASED ON UNIQUE EXPERIENCE SUPPORTING NASA

o   DOCUMENTED REQUIREMENTS AVAILABLE

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MAJOR ELEMENTS OF ORBIT OPERATIONS SYSTEM

o   HARDWARE

-   -REMOTE STATIONS
-   -COMMUNICATIONS LINES AND TERMINALS
-   -STC COMPUTERS, CONTROLS AND DISPLAYS, WORKING SPACE

o   SOFTWARE

-   -SCF SOFTWARE   STATIONS, BUFFER & DISPLAY (ADS),
    ORBIT (AOES), EXECUTIVE (SYSTEM II)

-   -MOL SOFTWARE   MISSION PLANNING AND MCD
    FLIGHT PLANNING
    UPLINK MESSAGE GENERATION
    TELEMETRY PREDICTION AND ANALYSIS

o   PERSONNEL AND PROCEDURES

-   -SCF
-   -MOL AF
-   -MOL AEROSPACE
-   -MOL ASSOCIATES

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WHAT'S SPECIAL ABOUT CONTROL OF MOL ON ORBIT?

o   EARLY ORBIT - TIME IS OF THE ESSENCE UNTIL CREW TRANSFER

o   VEHICLE COMPLEXITY - LAB AND PAYLOAD SUBSYSTEMS

o   ORBIT NAVIGATION REQUIREMENT NECESSITATES:

     -RADAR UPDATE

     -LO-G ACCELEROMETER

o   ON-BOARD COMPUTATION OF LOCATION, ATTITUDE, POINTING

    ANGLES

o   MAN'S INTERACTION WITH HARDWARE AND SOFTWARE IN NORMAL

    OPERATIONS:

     -PAYLOAD ACTIVITIES - ACTIVITY, WEATHER, CONFIRMATION

     -SUPPORT ACTIVITIES - SPECIAL TESTS, CREW SUSTENANCE

o   MAN'S ACTIVITIES RESULTING FROM FAILURES:

     -DIAGNOSIS

     -WORK AROUND

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SIGNIFICANT ACTIONS TO DATE

o   CLOSE COORDINATION WITH SCF AT EACH STAGE OF SYSTEM

    DEVELOPMENT

o   DEVELOPED AND DOCUMENTED OPERATING CONCEPTS

    - FLIGHT TEST AND OPS PLAN

    - GROUND/CREW TIMELINE

o   ALLOCATED FUNCTIONS TO SOFTWARE, MOL AND SCF,

    USING SCF DOCUMENTATION AS REFERENCE

o   MOL SOFTWARE, PART I CEI SPECS. REVIEWED AND APPROVED;

    PDR'S IN PROCESS

o   PUBLISHED ORD'S INCLUDING MOL SPECIFIC REQUIREMENTS

    ON SCF HARDWARE AND SOFTWARE

    (DETAILS NEXT CHART)

STATUS OF MOL REQUIREMENTS FOR SCF

ORBIT SUPPORT

o RTS CHANGES FOR SGLS (VOICE, GEMINI)	DEFINED
o CONTROL CENTER LAYOUT IN STC	DEFINED
o INTERFACES WITH MULTI-OPS, COMPLEX L, WEATHER	PARTLY DEFINED
o VERSUS SCF OPERATING POSITIONS	DEFINED
o ORBIT DETERMINATION SPECIAL REQUIREMENTS:	GROSSLY DEFINED- UNDER STUDY
-3800 COMPUTER CORE AND EXECUTIVE RQMT'S.	GROSSLY DEFINED
-VOICE AND COMMAND DATA HANDLING AT RTS AND STC	DEFINED
* -CONTROL AND DISPLAY REQUIREMENTS	CONSOLE # ONLY; ADS COMPATIBLE
* -TELEMETRY DATA HANDLING AT RTS AND STC	ADS COMPATIBLE

* PRESENT PROBLEM AREA

PROBLEM AREA

DETAILED CONTROL & DISPLAY REQUIREMENTS

o TWO MAJOR SOURCES OF REQUIREMENTS:

1. PREPASS, PASS AND POST-PASS OPERATIONS
(TLM AND COMMAND)

2. 3800 SOFTWARE FOR MISSION, UPLINK, DOWNLINK

o ALL BUT THE TELEMETRY DATA PORTION OF (1) CAN BE

ACCOMPLISHED WITH SCF HELP (TELEMETRY PROBLEM

COVERED NEXT CHART).

o 3800 SOFTWARE DISPLAY AND CONTROL CAN BE SIZED, BUT

REQUIRES SEQUENCE DEVELOPMENT AND CONTINGENCY

ANALYSIS TO SPECIFY IN DETAIL.

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PROBLEM AREA

TELEMETRY DATA HANDLING

o   ADS SPECS. BASED ON PAST EXPERIENCE PLUS REASONABLE
    DATA SYSTEM DESIGN

o   PRESENT MOL PLANS MAKE USE OF ADS ALGORITHMS, DISPLAYS,
    RECALL CAPABILITIES

o   TO DEVELOP DETAILED TELEMETRY PROCESSING AND DISPLAY
    REQUIREMENTS, WE NEED:

    1.   SCRUBBED TELEMETRY LIST

    2.   DEFINITION OF ALL NORMAL AND FAILURE MODES
         AND THEIR TELEMETRY AND COMMAND REQUIREMENTS

    3.   OPERATIONS TEAM TO INTEGRATE 1 AND 2 INTO DATA
         AND DISPLAY MODES.

FLIGHT OPERATIONS PLANNING GROUP

MEMBERS: SCF, MOL AF, AEROSPACE, MOL ASSOCIATES

REPRESENTATION FROM SEGMENTS

FUNCTION: INSURE SYSTEM APPROACH TO OPERATIONS PLANNING ---

STARTING WITH FTOP

- POSITION DEFINITIONS
- TELEMETRY MODES
- CONTROL & DISPLAY
- COMMUN. NETWORK
- SOFTWARE VS PEOPLE

IMMEDIATE PLAN - REVIEW EACH SUBSYSTEM:

- TELEMETRY - INFORMATION, USAGE & PROCESSING
  BY PHASE
- RELATE FAILURES TO TELEMETRY, GROUND AND
  CREW RESPONSE
- RESULTS IN SCRUBBED TLM LIST
- INITIAL TELEMETRY MODES AND DISPLAYS
  CAN THEN BE DESIGNED

PLAN OF ACTION FOR MOL STAND-ALONE

o   ASSUME BASIC ALLOCATION OF FUNCTIONS TO MOL AND SCF

SOFTWARE DOES NOT CHANGE

o   REVIEW WITH SCF OPEN ITEMS, SUCH AS:

-DATA BASE MANIPULATION

-RTS SIMPLEX

-EXECUTIVE SYSTEM REQUIREMENTS

-TRACKING UPDATE AND LO G ACCELEROMETER DATA HANDLING

-CONTROL AND DISPLAY REQUIREMENTS OF SCF SOFTWARE

 AND MOL COMMAND DATA

-AREA L, WEATHER, MULTI-OPS INTERFACES

o   DEVELOP CONTROL AND DISPLAY REQUIREMENTS OF MOL SOFTWARE

(OCTOBER 1)

o   DEVELOP TELEMETRY DATA PROCESSING REQUIREMENTS:

-HIGH CONFIDENCE SOLUTION REQUIRING ENGINEERING AND

 OPERATIONS ANALYSIS - SIX MONTH MINIMUM

o   INTERIM SOLUTION BASED ON EXTRAPOLATION FROM OTHER

VEHICLES, PLUS ESTIMATES.   ~~SECRET~~/DORIAN