~~SECRET/D~~

BIF-4-B10064-69
Copy $\underline{2}$ of $\underline{10}$
Total Pages $\underline{87}$

Specificaton No. $\underline{CG\ 101}$

COMPUTER PROGRAM

CONTRACT END ITEM DETAIL SPECIFICATION

PERFORMANCE/DESIGN REQUIREMENTS

CG-MPS-101

Mission Planning Software

for

MOL/DORIAN Program 632A

In addition to the security requirements which
apply to this document and must be met, it may
be further distributed by the holder only with
the specific prior approval of SAFSL-5B.

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

(Reverse of this page is intentionally left blank)   APR 2 2 1969

~~SECRET/D~~

END ITEM CONFIGURATION CHART

SPECIFICATION ISSUE AND DATE	ECP'S	PRODUCTION EFFECTIVITY (SERIAL NUMBER)

(Reverse of this page is intentionally left blank)

SPECIFICATION CHANGE LOG				
SCN NO.	ECP NO.	SCN DATE	PAGES AFFECTED	EFFECTIVITY

(Reverse of this page is intentionally left blank)

Specification No. <u>CG101</u>
Volume <u>1</u> of <u>1</u> Volume
Part I of Two Parts

COMPUTER PROGRAM
CONTRACT END ITEM DETAIL SPECIFICATION
PART I
Revision A
PERFORMANCE/DESIGN REQUIREMENTS
CG-MPS-101
Mission Planning Software

Approved by _____   Approved by _____
           T. A. Magness   MOL Systems Office

Date _____   Date _____

Prepared for: <u>MOL Systems Office</u>
Under Contract: ████████████████
DOD Form 1423
Line Item _____<u>UC01</u>_____
By: <u>TRW Systems Group</u>

(Reverse of this page is intentionally left blank)

CONTENTS

Page

SECRET/D

CONTENTS (Continued)

1. SCOPE

This document contains the requirements for performance, design, test, and qualification of a computer program identified as the Mission Planning Software, CPCEI No. CG-MPS-101, for the MOL/DORIAN Program 632A. This CPCEI is utilized to plan the payload operations for the manned/automatic and automatic modes of the MOL/DORIAN photographic reconnaissance mission.

Selected targeting events for MOL/DORIAN payload operations are the primary outputs of the Mission Planning Software (MPS). This information is corporated into the command message by the Command and Control Software (C&C).

The flow charts in Section 3 of this specification are included for information purposes only and are not to be considered as constraining on the design of this CPCEI.

Revisions to the Part I Specification are denoted in the margins by the symbols A

! Change
A Addition
D Deletion

2. APPLICABLE DOCUMENTS

The following documents, of exact issue shown, form a part of this specification to the extent specified herein. In the event of conflict between documents referenced here and in the detail content of Sections 3 and 4, the detailed requirements in Sections 3 and 4 shall be considered superceding requirements.

<u>Control Data Corporation</u> 6400/6500/6600 Computer Systems Documentation

CDC Pub. No. 60190900A 9 October 1968	COMPASS Reference Manual 1.1
CDC Pub. No. 60176600B December 1967	FORTRAN Extended Reference Manual 1.0

SECRET/D

Control Data Corporation (Continued)

CDC Pub. No. 60100000F 16 May 1967	64/65/6600 Computer Systems Reference Manual
CDC Pub. No. 60189400G (TBD)	SCOPE 3.1.4 Reference Manual
(TBD) (TBD)	SCOPE 3.M Reference Manual

General Electric Company

CEI MOK 802A (TBD)	Contract End Item Detail Specification, Part I, Performance/Design Requirements and Detailed Technical Description (CEI MOK 802A) On-Board Computer Program
CEI MOK 804A (TBD)	Contract End Item Detail Specification, Part I, Performance/Design Requirements and Product Configuration Requirements (CEI MOK 804A) Command and Control Program
BIF-50366-86-1 BIF-50366-86-2 25 September 1968	MOL Command Definition Specification
BIF-055-12816-69 3 March 1969	Hardware-Software Limitations Specification
(TBD) (TBD)	MOL Interface Specification Ground Software to Orbiting Vehicle (IFS 823002)

SECRET/D

General Electric Company (Continued)

(TBD)
(TBD)

System Module Specification Performance and Design Requirements for the (MOL) Orbital Flight Support System Module

TRW Systems

DM 36-0066
1 December 1967

Users Manual for TWONDER

CG-MCD-102A
(TBD)

Contract End Item Detail Specification, Part I, Performance/Design Requirements (CEI CG-MCD-102 Revision A) Mission Correlation Data Program

Lockheed Missiles and Space Company

(TBD)
(TBD)

Performance and Design Requirements for the Air Force Satellite Control Facility Advanced Data System

MOL Systems Office

SMOND-1 69-5
21 March 1969

MOL Flight Support Plan

MOES Contractor (TBD)

(TBD)
(TBD)

Contract End Item Detail Specification, Part I, Performance/Design Requirements (MOES) MOL Orbit Ephemeris Subsystem

(Reverse of this page is intentionally left blank)

SECRET/D

SECRET/D

3. REQUIREMENTS

This section contains the functional requirements for the Mission Planning Software (MPS) and establishes those requirements which shall be used for verification during test.

3.1 PERFORMANCE

The Mission Planning Software shall be designed to perform the following functions:

a. The MPS shall have the capability to determine an optimum or near optimum sequence of events for payload operations of the MOL/DORIAN system. This shall be based on an input target deck containing information associated with target identification, location, priority, intelligence characteristics, and photographic requirements. The selection process shall consider as applicable the operational constraints imposed by:

1. Vehicle ephemeris

2. Weather

3. Hardware operating modes and limitations

4. Consumables

5. Flight crew operations

6. Command and Control Software (C&C) and Airborne Digital Computer (ADC) Software

7. Computer running time

b. Process up to 4000 targets on a single rev.

c. The MPS shall plan payload operations during the manned/automatic and automatic modes of the MOL/DORIAN mission. The software shall plan payload operations to permit evaluation of the automatic mode during manned/automatic flights.

d. The MPS shall operate in two modes: The Flight Plan Generation Mode and the Command Message Generation Mode.

1. The Flight Plan Generation Mode shall generate payload operation planning events for planning and for the generation of the Flight Plan.

SECRET/D

SECRET/D

2. The Command Message Generation Mode shall generate conflict-free payload operation events as inputs to the C&C for message generation.

e. The MPS shall model the orbiting vehicle and its physical environment to the extent necessary to determine payload operations.

f. The MPS shall provide listable outputs and displays that present a detailed specification of program results. These outputs shall be of sufficient detail to permit program verification and operational usage. In addition, data summaries shall be provided.

g. The selected sequence of events shall meet the following constraints:

1. Limiting Stereo and Obliquity Angles. All primary optics operation and acquisition telescope viewing shall be scheduled to occur within specified stereo and obliquity limits for these systems.

2. Stereo Rate, Obliquity Rate, Settling Time and IVS Lock-on Time. Successive events shall allow time for slewing, settling and IVS lock-on time. Maneuver and settling time requirements shall be specified as input functions of maneuver angles.

3. Camera Operation. Each event shall allow sufficient time for the selected photographic sequence.

4. Acquisition Telescope (ATS) Operation. Each event shall allow sufficient time for flight crew viewing.

5. ACTS Enable. Payload operations shall be scheduled to allow proper enable/inhibit of the Attitude Control and Translation Subsystem (ACTS).

6. Consumables. The program shall have the capability of selecting payload operations subject to constraints on the following consumables: power, film, and message size.

7. Single Photographic Sequence. The MPS shall select one and only one photographic sequence to be associated with each target in the selection.

8. Interleaving Inhibition. No different target shall be scheduled for photography between any two frames of photography on a given selected target.

SECRET/D

9. <u>Door Open Time</u>. Payload operations shall be selected to allow appropriate ATS and primary optics door-open and door-close considerations.

h. The MPS shall select a sequence of events to accomplish the intelligence requirements of the MOL/DORIAN Mission. The selection shall consider:

1. <u>Priorities</u>. The active and inactive worths of each target shall be based upon priorities associated with each target.

2. <u>Photographic Sequence</u>. The worth of ..ch specified sequence of photography shall be assigned for each target.

3. <u>Target/Vehicle Orientation</u>. The weighting of each target shall reflect preferences and limits on the azimuth and elevation of the vehicle with respect to the target at the time of photography. An alternate method shall weight each target with independent, continuous functions of the stereo angle and obliquity angle of the line of sight at the time of photography. The particular target/vehicle orientation weighting functions to be used will be specified by target card input.

4. <u>Weather</u>. The basic worth of each target shall be weighted as a function of predicted cloud free probability/climatology/priority.

5. <u>Resolution</u>. The basic worth of each target shall be weighted with a function of an estimate of the obtainable relative photographic resolution.

6. <u>Sun Angle</u>. The weighting of each target shall allow the inclusion of preferences and limits on the sun orientation relative to the line of sight at the time of photography.

i. The MPS shall have the capability to generate payload operation events to satisfy Special Flight Requirements (SFR) to include:

1. Boresight exercise

2. Focus exercise

3. Near-station events

4. Door opening and closing

SECRET/D

3.1.1 <u>System Requirements</u>

a. The MPS shall be compatible with:

1. Air Force Satellite Control Facility (AFSCF) Operating
Environment

2. Command and Control Software (C&C)

The following document applies:

<u>General Electric Company</u>

1. CEI MOK 804A   Contract End Item Detail Spec-
ification, Part I, Performance/
Design Requirements and
Product Configuration Require-
ments (CEI MOK 804A) Command
and Control Program

3. Airborne Digital Computer (ADC)

The following documents apply:

<u>General Electric Company</u>

1. CEI MOK 802A   Contract End Item Detail Spec-
ification, Part I, Performance/
Design Requirements and Detail-
ed Technical Description
(CEI MOK 802A) On-Board
Computer Program

2. BIF-50366-86-1   MOL Command Definition Spec-
    BIF-50366-88-2   ification

4. MOL Orbit Ephemeris Subsystem (MOES)

The following documents apply: (TBD)

<u>MOES Contractor (TBD)</u>

1. (TBD)   Contract End Item Detail Spec-
ification, Part I, Performance/
Design Requirements (MOES)
MOL Orbit Ephemeris Subsystem

SECRET/D

5. Mission Correlation Data Program

   The following document applies:

   TRW Systems

   1. CG-MCD-102A   Contract End Item Detail
                         Specification, Part I, Per-
                         formance/Design Requirements
                         (CEI CG-MCD-102 Revision A)
                         Mission Correlation Data
                         Program

6. CDC 6600 Computer System

   The following documents apply:

   1. Pub. No. 60100000F   6600 Computer Systems
                            Reference Manual

7. SCOPE 3.M

   The following documents apply:

   Control Data Corporation 6400/6500/6600 Computer
   Systems documentation

   1. CDC Pub. No.   SCOPE 3.1.4 Reference
      60189400G   Manual

   2. (TBD)   SCOPE 3.M Reference Manual

8. Advanced Data System (ADS)

   The following document applies:

   Lockheed Missiles and Space Company

   1. (TBD)   Performance and Design
                            Requirements for the Air
                            Force Satellite Control
                            Facility Advanced Data
                            System

SECRET/D

9. FORTRAN EXTENDED 1.0 and COMPASS 1.1 Assembler

The following document apply:

Control Data Corporation 6400/6500/6600 Computer Systems
documentation

1. CDC Pub. No. 60190900A   COMPASS Reference Manual
                             1.1

2. CDC Pub. No. 60176600B   FORTRAN Extended Reference
                             Manual 1.0

10. MOL/DORIAN Hardware

The following documents apply:

General Electric Company

1. BIF-055-12816-69   Hardware Software Limita-
                       tions Specification

2. (TBD)   MOL Interface Specification A
                       Ground Software to Orbit-
                       ing Vehicle (IFS 823002)

11. MOL/DORIAN System Module   A

The following document applies:

General Electric Company

1. (TBD)   System Module Specifica-
                       tion Performance and Design
                       Requirements for the MOL
                       Orbital Flight Support
                       System Module

b. The MPS shall have the capability of being operated from the
   Mission Control Center (MCC) consoles, by card inputs
   or through the use of the Command and Control Software.

c. The MPS shall provide, on option:

   1. Listable output

   2. Summaries

   3. Operating comments

   4. Conflict messages

   5. Error messages

   6. Outputs for display devices

d. The MPS shall be structured to allow for the updating of pre-
   viously generated payload operations events where minor
   changes are required. These options shall include:

   1. Ephemeris update of target selection

   2. Modification of a target selection by adding, changing,
      or deleting specific targets

SECRET/D

3.1.2 Operational Requirements

The MOL/DORIAN Mission Planning Software (MPS) as shown in Figure 3-1 (see Section 1.) shall be composed of four basic functions: Pre-Processor, Primary Optics Target Selection Algorithm, Acquisition Telescope Target Selection Algorithm, and Post-Processor.

An important feature in the overall design of the target selection procedures shall be the progressive reduction in size and improvement in organization of the initial target list. This reformatting, compression, and reordering of the original target list shall be the function of the Pre-Processor. Subsequent to the Pre-Processor, the precise selection logic of the Primary Optics Target Selection Algorithm and the Acquisition Telescope Target Selection Algorithm shall be exercised. The Post-Processor shall then be employed to consolidate the information required for event generation, and to provide listable program output and displays. The MPS shall further provide a set of options which permit selective updating of previous MPS output to reflect changes in the operational environment.

The principal subfunctions of the four basic functions are:

a. Pre-Processor

   1. Organization and reduction of master target list into a set of targets visible over a specified rev span

   2. Generation of precise pointing information and formation of Candidate Operations Table (COT)

   3. Initialization of Special Flight Requirements data generation

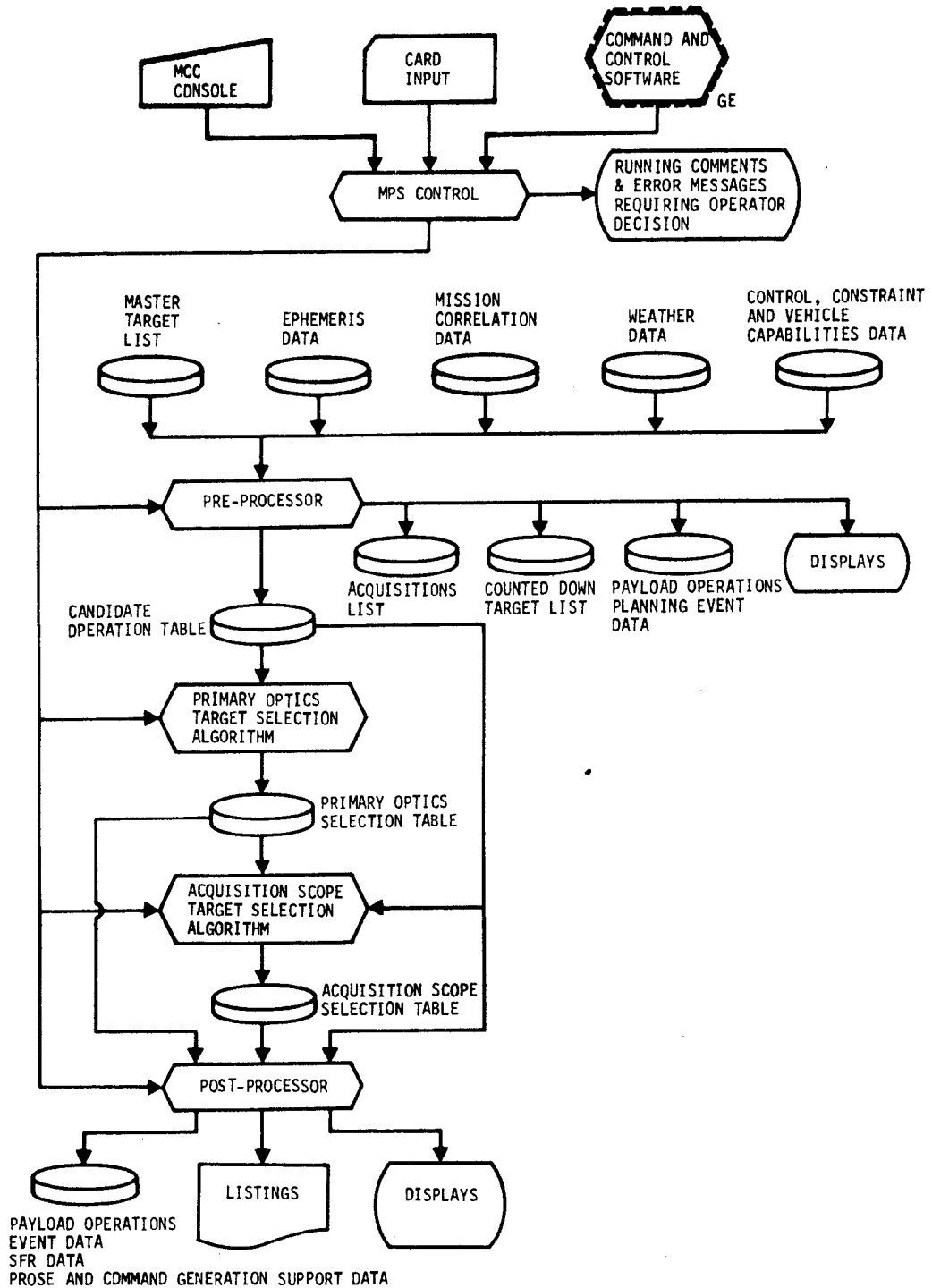   4. Generation of payload operation planning events for the generation of the Flight Plan.

SECRET/D

Figure 3.1 Mission Planning Software
Functional Block Diagram

SECRET/D

    b. Primary Optics Target Selection Algorithm

        1. Reduction of target data to the subset required for
            primary optics target selection

        2. Determination of primary optics target selection and forma-
            tion of the Primary Optics Selection Table (MOST).

    c. Acquisition Telescope Target Selection Algorithm

        1. Reduction of target data to the subset required for
            ATS target selection

        2. Determination of ATS target selection and formation of
            the Acquisition Scope Selection Table (ASST)

    d. Post-Processor

        1. Consolidation of target selection information

        2. Generation of conflict-free payload operations events
            data

        3. Consolidation/generation of special flight requirements
            schedules and data

        4. Generation of conflict-free payload operations events
            to support C&C generation of prose and commands

        5. Generation of payload operations summary data

        6. Preparation of output listings and displays

Sequencing of the computations shall be performed by the MPS Control Program.
It is the function of the MPS Control Program to accept inputs and initiate
the processing to be performed by the program. The MPS Control Program shall
have the capability of initiating computation at several points in the
overall processing cycle according to the particular run requirements. The
operations associated with these optional entry points include:

    a. Pre-Processor

        1. Prepare a target list

        2. Countdown an existing target list

        3. Prepare an acquisitions list from an existing target list

        4. Generate a Candidate Operations Table from an existing
            acquisitions list

SECRET/D

b. Primary Optics Target Selection Algorithm

1. Generate Primary Optics Selection Table (MOST) from exist-
    ing Candidate Operations Table

c. Acquisition Telescope Target Selection Algorithm

1. Generate Acquisition Scope Selection Table (ASST) from
    existing Primary Optics Selection Table and Candidate
    Operations Table

d. Post-Processor

1. Generate display information and/or payload operations
    event data based upon primary optics and acquisition
    scope selection tables (MOST and ASST)

2. Generate display information and/or payload operations
    event data based upon MPS history data.

The MPS shall also have the capability of modifying the input at
several stages of this procedure by means of operator inputs.

As is indicated in Figure 3-1 (see Section 1.), the MPS shall be
initiated as part of a 6600 job, generated by the Command and Control Soft-
ware, card inputs, or MCC console inputs. Error messages and/or conflict
information shall be displayed for operator action.

3.1.2.1 Pre-Processor

The Pre-Processor shall acquire, validate, edit, countdown, organize
and reduce the master target list to produce within the data base a time-
ordered set of targets which are visible over a specified span of revolu-
tions and which satisfy constraints of hardware operating modes on payload
operation parameters. This list of targets and corresponding Pre-Processor
computed values of payload operation parameters, including SFR data, is
called the Candidate Operations Table. The Candidate Operations Table shall
be the source of all targets and target specific data considered by the
target selection optimization functions of the MPS. In addition, the Pre-
Processor shall initialize generation of SFR data and provide for appropriate
output listings and plots.

SECRET/D

The information flow through the Pre-Processor is illustrated in the block diagram, Figure 3-2 (see Section 1.).

3.1.2.1.1 Source and Type of Inputs

Master Target List

The master target list will be input as a set of target cards, as a BCD target tape, or will be available within the data base. The target data input for each target in the list will include data in the following categories:

        a.   Target identification information

        b.   Physical/geographical information

        c.   Target intelligence characteristics

        d.   Photographic conditions

        e.   Weighting functions

        f.   Secondary camera operations

The minimal required data for each target will be identification, location, priority and requirement status. In the event only minimal data is received, nominal data base values for unspecified parameters shall be assumed.

SECRET/D

MOL I.D. Correspondence Data

Correspondence data between standard target identification numbers
and MOL internal target numbers will be input for generation of the target
list.

A

Cue Correspondence Data

Correspondence data between standard target indentification numbers
and on-board cueing information will be input for generation of the target
list.

A

Target Alteration Requests

a. Target Additions

   Target addition data shall consist of at least minimal
   data for each target to be added to the target list.

b. Target Deletions by I.D.

   This data shall consist of the I.D.'s of the targets to
   be deleted.

c. Target Alterations by I.D.

   The inputs required for target alterations shall be the
   I.D.'s of the targets to be altered and the new values
   of the parameters to be altered.

~~SECRET/D~~

DATA BASE
PARAMETERS

MASTER
TARGET
DECK

MASTER
TARGET
TAPE

VALIDATE TARGET
DATA, PREPARE
TARGET LIST

DATA CARD
EDIT REQUESTS

TARGET
LIST

TARGET ADD,
DELETE OR
ALTER CARDS

TARGET
LIST
EDIT

EDITED
TARGET
LIST

PERFORM
EXTERNAL
COUNTDOWN?

NO → B

ASSESSED
WEATHER
DATA

MCD
DATA

YES

EXTERNAL
COUNTDOWN

A
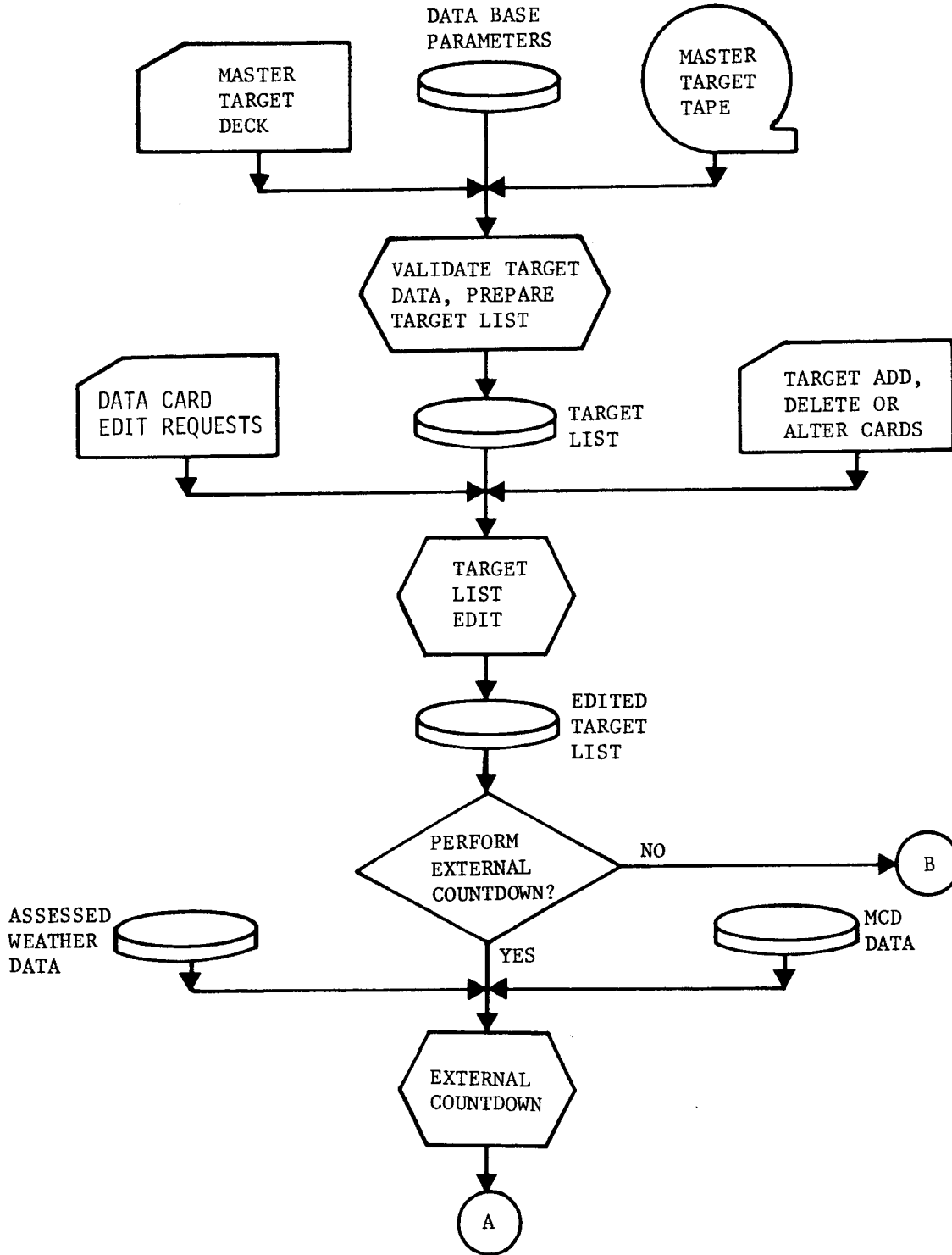
Figure 3-2.   Pre-Processor Information Flow Block Diagram

~~SECRET/D~~

SECRET/D

A

COUNTED DOWN
TARGET LIST

B

GENERATE
EPHEMERIS
REQUEST

SFR
DATA

EPHEMERIS
DATA

SWATH SORT,
TIME
ORDERING

ACQUISITIONS
LIST

CLIMATOLOGY
DATA

PREDICTED
WEATHER
DATA

GENERATE
SWATH
PLOT?

YES

PLOT
GENERATION

SWATH
PLOT

NO

WEATHER
ANALYSIS

EPHEMERIS
DATA

WEATHER ANALYSED
ACQUISITION
LIST

PAYLOAD
OPERATION
PARAMETER
GENERATION

CANDIDATE
OPERATIONS
TABLE

EXIT

Figure 3-2. Pre-Processor Information Flow
Diagram (Continued)

SECRET/D

SECRET/D

  d. Target Deletion by Priority or Category or Type

    The inputs required shall be the specific active or in-
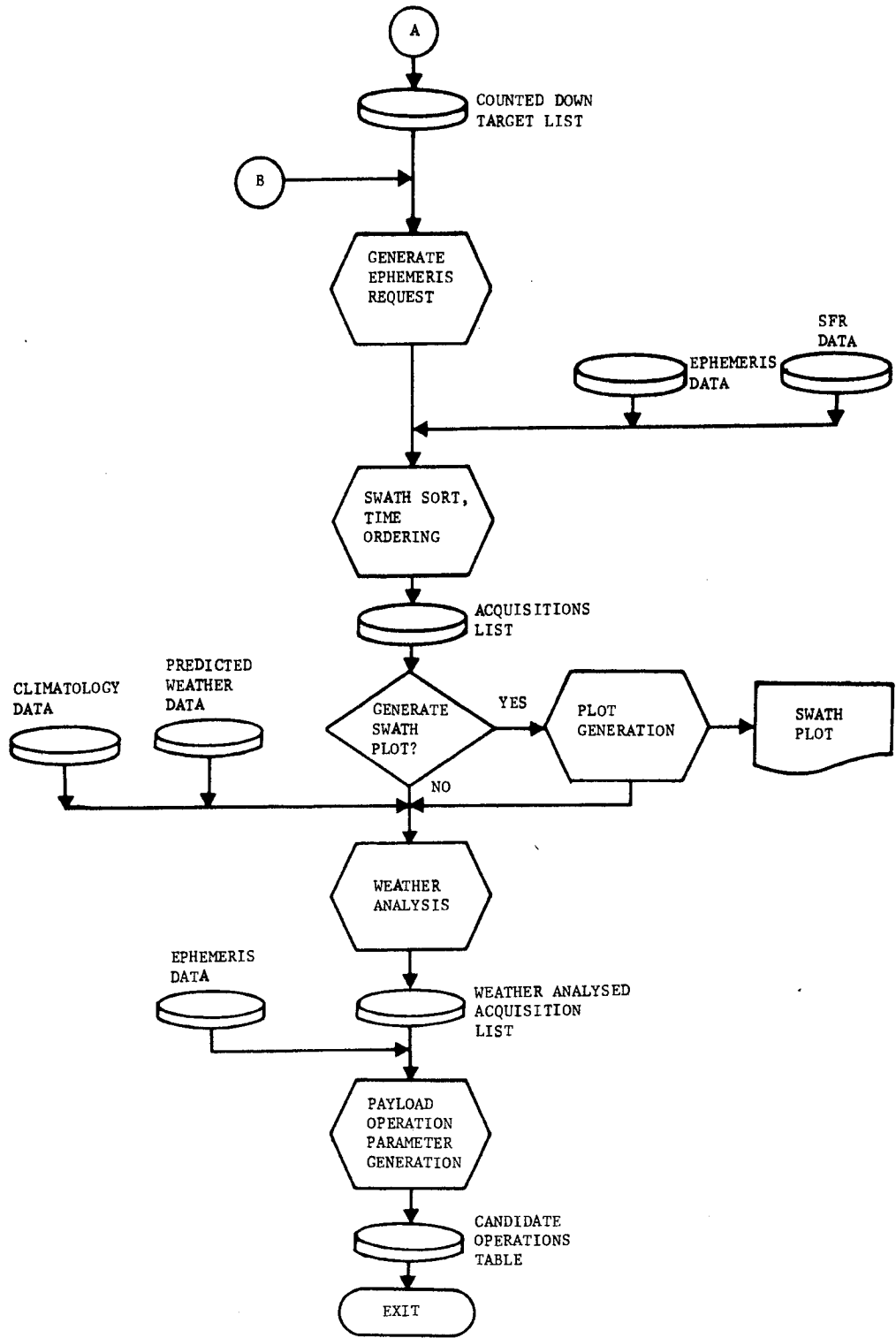active priorities, categories or types which are to be
deleted.

  e. Target Alterations by Priority or Category

    This data shall consist of new values of parameters to
be altered and the active or inactive priorities or
categories affected.

  f. Rev Specific Target Deletions/Alterations

    The inputs required shall be the time bands and/or latitude
bands from which targets below a designated active or
inactive priority are to be deleted or altered for each rev.

Control, Constraint and Vehicle Capabilities Data

  The data base shall contain parameters which control the operation
of the Pre-Processor and which constrain and/or determine the values of
target acquisition and payload operation parameters. These include:

  a. Print option flags

  b. Plot option flags

  c. Target type delete flags

  d. Nominal values of unspecified target data parameters

  e. Maximum vehicle altitude

  f. Minimum sun angle

  g. Maximum slant range

  h. Maximum mirror obliquity

  i. Maximum ATS obliquity

  j. Maximum forward and aft mirror l.o.s. stereo angles

  k. Maximum forward and aft ATS l.o.s. stereo angles

  l. Target worth as a function of target priority

  m. Target/vehicle orientation weighting functions

SECRET/D

n.   Relative resolution weighting functions

o.   Weather data weighting functions

p.   Sun orientation weighting functions

q.   Relative resolution sensitivity coefficients

r.   Countdown parameters

s.   SFR event parameters

t.   Reference constants

    1.   Earth constants

    2.   Mathematical constants

    3.   Conversion factors

Weather Data

a.   Assessed weather data from Global Weather Central will be sufficient to allow the determination of cloud free probabilities over each target photographed during previous operations.

b.   Predicted and climatological weather data input to the Pre-Processor will be sufficient to determine for each target on the acquisitions list the cloud free probabilities as predicted from forecasts and as expected from climatology. The predicted weather data will also be sufficient to determine the reflectance for each target on the acquisitions list.

MCD Data

If the MCD program has completed its countdown procedures, the Pre-Processor shall accept from MCD a countdown list which will include the following data for each target to be counted-down:

a.   Target I.D.

b.   Old requirement status

c.   New requirement status

SECRET/D

Alternately, if the MCD program has not completed countdown procedures, the MCD data required by the MPS shall be the countdown candidates list, a list of the targets photographed and/or viewed during previous operations containing the following information.

  a. Target I.D.

  b. Photographic sequence

  c. Photographic time

  d. Target state (active or inactive)

Ephemeris Data

The Pre-Processor requires ephemeris data obtained from the MOL Orbit Ephemeris Subsystem (MOES). The ephemeris data stored will include position, velocity and acceleration vectors at referenced times within the rev span, and time and longitude at ascending nodes. The ephemeris data will have incorporated within it all planned orbit adjust data.

3.1.2.1.2 Destination and Type of Outputs

  a. Target List

    The target list is the master target deck converted to data base format. The target list includes the MOL internal target numbers, cue numbers, and standard target identification numbers. All target card data shall be stored in the data base. The target list which shall be output by the Pre-Processor may also be an edited target list, or an edited and counted-down target list if these functions of the Pre-Processor are exercised.

  b. Acquisitions List

    The acquisitions list shall be the rev sorted, time ordered listing of the targets visible over a specified rev span. The data contained in the acquisitions list for each visible target shall be as follows:

    1. All target card data

    2. Time of closest approach (TCA)

SECRET/D

3. Target obliquity at TCA

4. Vehicle altitude at TCA

5. Sun angle

6. Slant range at TCA

7. Weather data

    a. Predicted and climatological cloud-free proba-
bilities

    b. Predicted reflectance

c. Acquisitions List Summary

The acquisitions list summary data shall include the following:

1. Number of targets contained within each rev of the
acquisitions list

2. Boundaries of payload regions within each rev

3. Number of targets within specified priority spans
within each payload region

d. Candidate Operations Table

The data stored in the Candidate Operations Table shall
include:

1. All target card data

2. Payload operation parameters

    a. Time at first forward, closest approach and last
aft acquisition for primary optics

    b. Required obliquity angle at first forward, closest
approach and last aft acquisitions for primary optics

    c. Vehicle altitude at TCA

    d. Sun angle and sun orientation

    e. Slant range at TCA

SECRET/D

      f. Relative resolution estimate

      g. Target active and inactive worths weighted by weather factors, relative resolution, target/ vehicle orientation factors and sun orientation

      h. Weather data including predicted and climatological cloud-free probabilities and predicted reflectance

D

e. Weather Request Message

The Weather Request Message shall contain Acquisitions List information.

f. Payload Operations Planning Events Table

The Payload Operations Planning Events Table shall include:

1. Start times and durations of payload regions

2. Target density information

3. Payload region identification

4. Crew requirements

5. ADC buffer storage data statistics

g. Listings

On user option, the Pre-Processor shall provide headed and labeled listings of the following:

1. Target list

2. Acquisitions list

3. Acquisitions list summary

4. I.D. - sorted acquisitions list

5. Candidate Operations Table

6. Payload Operations Planning Events Table

h. Editorial Comments

The Pre-Processor shall print out the I.D. of the target
edited and a summary of the editing action performed for
each target added, deleted or altered in all stages of
Pre-Processor operation.

i. Plots

On option, the Pre-Processor shall generate a plot of the
visibility swath, a labeled and scaled orthogonal plot of
obliquity versus system time which displays all targets in
the acquisitions list. The data presented on the plot for
each target shall include target identification, obliquity,
interval of visibility in system time (optional), and an
identifier which reflects the active and inactive priorities
of the target.

3.1.2.1.3 Information Processing Requirements and Capabilities

The Pre-Processor shall have the capabilities to:

a. Check all target data in the master target deck or BCD tape
to ensure that the data format is correct, that all data
values are within reasonable ranges and that there are no
duplicate I.D.'s.

b. Convert the master target deck into data base format, and
store within the data base as the target list.

c. Update an existing target list to add, delete or alter
target data by I.D.

d. Update an existing target list to delete or alter target
data based on priority or category.

e. On option, perform external countdown of the target list
to alter as appropriate target data (requirement status).
Generate a counted-down target list.

f. Perform a swath sort and time-order the visible targets
over a specified rev span. A target is visible if it meets
input constraints on obliquity angle, slant range, vehicle
altitude, and sun angle.

Delete/alter on specified revs those targets which lie
within input defined latitude bands or which are visible
within input defined time bands.

Generate the acquisitions list. Additionally, on option,
generate an I.D.-sorted acquisitions list.

SECRET/D

g. Update an existing acquisitions list to provide new time tables and acquisition parameters as a function of new ephemeris data.

h. Update an existing acquisitions list to delete targets or alter target data parameters.

i. Prepare from the acquisitions list the data necessary for the generation of the plot of the visibility swath.

j. Generate the weather request message. Operate upon the weather data retrieved from Global Weather Central to obtain the predicted cloud free probability and reflectance for each target in the acquisitions list.

   Operate upon the climatological data in the data base to obtain the expected cloud free probability for each target in the acquisitions list.

   Combine the predicted and expected cloud free probabilities and determine appropriate weather weighting factors. Generate the weather analyzed acquisitions list.

k. Compute precise pointing data and payload operations parameters which define the opportunities for photography and viewing of each target in the acquisitions list.

l. Calculate timing and payload parameters to support scheduling of SFR events.

m. In the Flight Plan Generation Mode, generate the Payload Operations Planning Events Table.

n. The sequence of Pre-Processor operations shall be enterable at any of several different points. These optional starting points include:

   1. Generation of a target tape from the master target deck

   2. Update of an existing target list to add, delete or alter targets

   3. Countdown of an existing target list

   4. Generation of an acquisitions list from an existing target list

   5. Update of an existing acquisitions list to reflect new ephemeris data or to delete or alter target data

SECRET/D

6.   Generation of a weather analyzed acquisitions list
     from an existing acquisitions list

7.   Generation of a Candidate Operations Table from an
     existing acquisitions list

o.   Provide error messages and intermediate output for the
     purposes of program checkout and validation.

3.1.2.2   Primary Optics Target Selection Algorithm

The Primary Optics Target Selection Algorithm shall select, based upon
intelligence requirements, the best score set of non-conflicting targets
for photography by the primary optics. An optimal selection shall be deter-
mined with respect to the weighting criteria and hardware operating modes
and limitations established through data base inputs. The required inputs
for the algorithm shall include this data base information plus the target
specific data generated by the Pre-Processor. The output of the Primary
Optics Target Selection Algorithm shall consist of the key parameters
required to adequately define the selection.

The basic information flow within the Primary Optics Target Selection
Algorithm is indicated in Figure 3-3 (see Section 1.). The algorithm
shall perform three basic functions:

a.   Reduction of the input COT to the subset of targets and
     target data required for primary main optics selection

b.   Selection of a best predecessor chain for each of the
     targets considered in the selection

c.   Selection of the best score chain from the set of
     predecessor chains determined in b above.

3.1.2.2.1   Source and Type of Inputs

The inputs to the Primary Optics Target Selection Algorithm shall
consist of:

~~SECRET/D~~

DATA BASE
PARAMETERS

CANDIDATE
OPERATIONS
TABLE

CONDENSE TARGET INFORMATION
TO SUBSET REQUIRED FOR
PRIMARY OPTICS SELECTION

PRIMARY OPTICS CANDIDATE
OPERATIONS TABLE

CONSTRUCT SET OF OPTIMAL
PREDECESSOR CHAINS SUCH
THAT ALL TARGETS ARE
CONTAINED ON AT LEAST
ONE CHAIN

INTERMEDIATE STORAGE
OF OPTIMAL PREDECESSOR
CHAINS

SELECT BEST CHAIN FROM
THE AVAILABLE SET OF
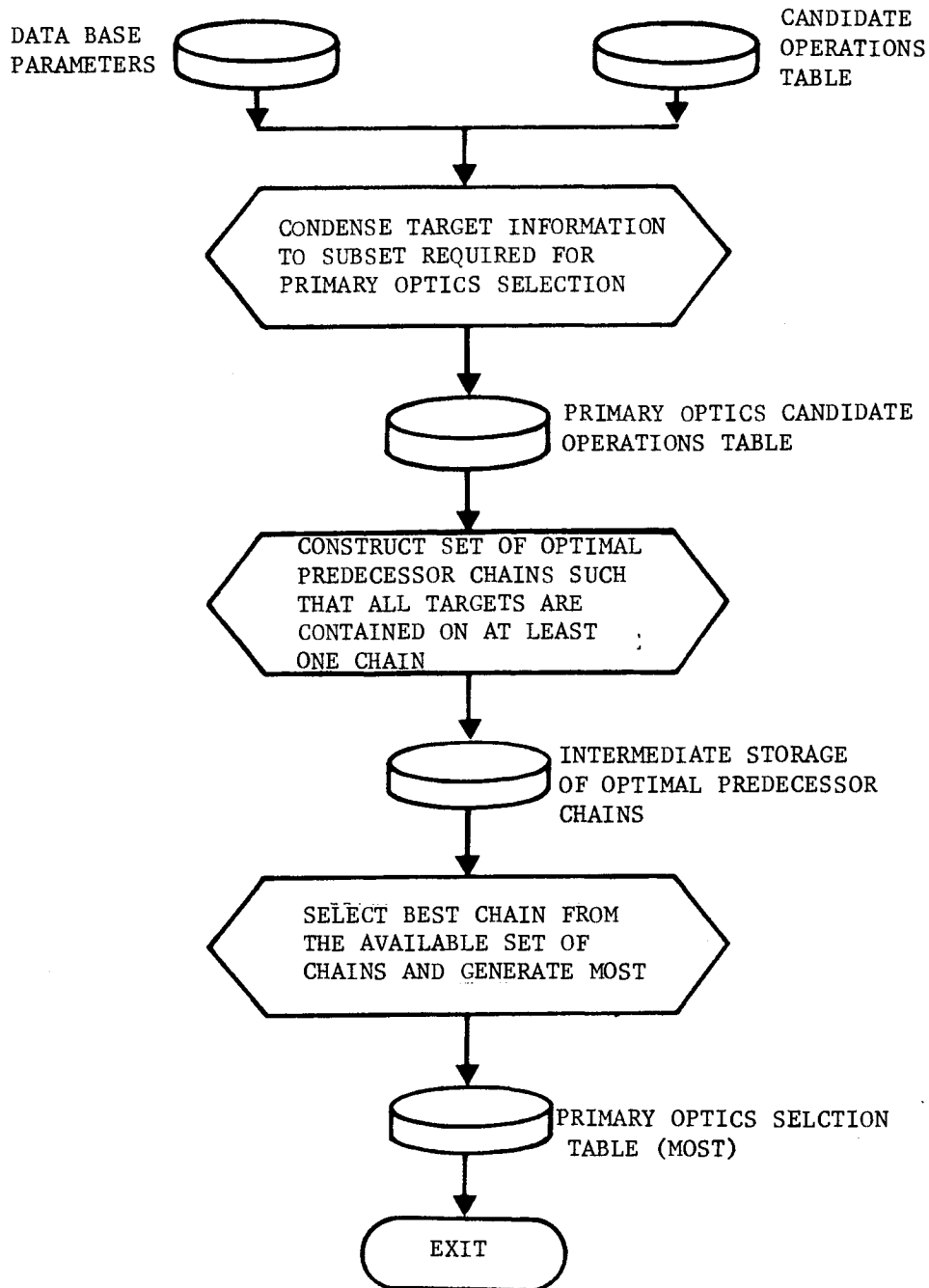CHAINS AND GENERATE MOST

PRIMARY OPTICS SELCTION
TABLE (MOST)

EXIT

Figure 3-3. Primary Optics Target Selection Algorithm
Information Flow Block Diagram

~~SECRET/D~~

Candidate Operations Table

The data stored in the Candidate Operations Table shall include:

    a. All target data

    b. Payload operation parameters

These items have been previously defined in Section 3.1.2.1.2.

Control, Constraint and Vehicle Capabilities Data

Data base parameters are required to define the hardware operating modes and limitations and to establish the weighting criteria. These items will include:

    a. Maximum forward and aft stereo angle for primary optics photography

    b. Maximum obliquity for primary optics photography

    c. Primary optics stereo slewing rate and settling time as function of maneuver angle

    d. Primary optics obliquity slewing rate and settling time as a function of maneuver angle

    e. Image velocity sensor (IVS) lock on time

    f. Target/vehicle orientation weighting functions

    g. Definitions of primary optics photographic sequences

    h. Photographic sequence weighting vectors

    i. Priority constraints on primary optics target selection

    j. Maximum allowable target density for primary optics selection

    k. Hardware operating mode parameters

    l. Flight crew capabilities parameters

    m. Print option flags

SECRET/D

3.1.2.2.2 Destination and Type of Outputs

MOST. The principal output of the Primary Optics Target Selection
Algorithm shall consist of the key parameters that define the optimal photo-
graphic selection. This information shall be contained in the Primary
Optics Selection Table (MOST). The following data shall be provided in this
table for each of the selected targets:

   a. Target Identifier

   b. Photography Start Time

   c. Selected Photographic Sequence

Printed and/or Displayed Output. On option, the Primary Optics
Target Selection Algorithm shall provide printed output of deletion
comments for those targets deleted within the algorithm prior to the
selection process.

3.1.2.2.3 Information Processing Requirements and Capabilities

The Primary Optics Target Selection Algorithm shall have the
following capabilities:

   a. Determine an optimal non-conflicting chain of targets/
       sequences subject to hardware operating modes, hardware
       limitations (item c, below) and weighting criteria
       (item d, below).

   b. The selection shall be optimized within the following
       constraints:

      1. Limiting Stereo and Obliquity Angles

          All camera operations shall be scheduled to occur
          within the stereo and obliquity limits of the primary
          optics system.

      2. Stereo Rate, Obliquity Rate, Settling Time and
          IVS Lock-on Time

          Successive events shall allow time for maneuvering,
          settling and IVS lock-on. The maneuvering and
          settling time requirements shall be specified as
          functions of maneuver angles.

SECRET/D

3. Camera Operation

Each event shall allow sufficient time for the
selected photographic sequence.

4. Single Photographic Sequence

The Primary Optics Target Selection Algorithm shall
select one and only one photographic sequence to be
associated with each target in the selection.

5. Interleaving Inhibition

No different target shall be scheduled for photography
between any two frames of photography on a given
selected target.

c. The following criteria shall be employed in the determination
of the optimal selection:

1. Basic Target Worth

The active and inactive worths of each target as
computed by the Pre-Processor, together with probability
of activity, shall be used to determine the basic worth
of each target. On option, the basic target worth shall
be set equal to the inactive worth.

2. Photographic Sequence

The worth of specified sequences of photography shall
be assigned for each target

3. Target/Vehicle Orientation

The weighting of each target shall reflect preferences
and limits on the azimuth and elevation of the vehicle
with respect to the target at the time of photography.
An alternate method shall weight each target with
independent, continuous functions of the stereo angle
and obliquity angle of the line of sight at the time of
photography. The particular target/vehicle orientation
weighting functions to be used will be specified by
target card input.

d. Controls shall be available to limit the number of selection
    candidates. These controls shall allow for the elimination
    of targets on the basis of priority or worth.

e. Intermediate outputs and error messages shall be provided
    for the purposes of program checkout and validation.

f. Deletion comments shall be provided, on option, for those
    targets deleted prior to the selection process.

3.1.2.3 Acquisition Telescope Target Selection Algorithm

The Acquisition Telescope (ATS) Target Selection Algorithm shall
select, based on intelligence requirements and flight crew operations
considerations, the best score set of non-conflicting targets for ATS
viewing. An optimal selection shall be determined with respect to the
weighting criteria and hardware operating modes and limitations established
through data base inputs. The required inputs for the algorithm shall
include this data base information, the target-specific information
generated by the Pre-Processor, and the primary optics selection determined
by the Primary Optics Target Selection Algorithm. The output of the ATS
Target Selection Algorithm shall consist of the key information required
to adequately define the selection.

The basic information flow within the ATS Target Selection Algorithm
is indicated in Figure 3-4 (see Section 1.). The algorithm shall
consist of three basic subfunctions:

a. Reduction of the input COT to the subset of targets and
    target information required for ATS selection.

b. Selection of a best predecessor chain for each of the
    targets considered in the selection.

c. Selection of the best score chain from the set of pre-
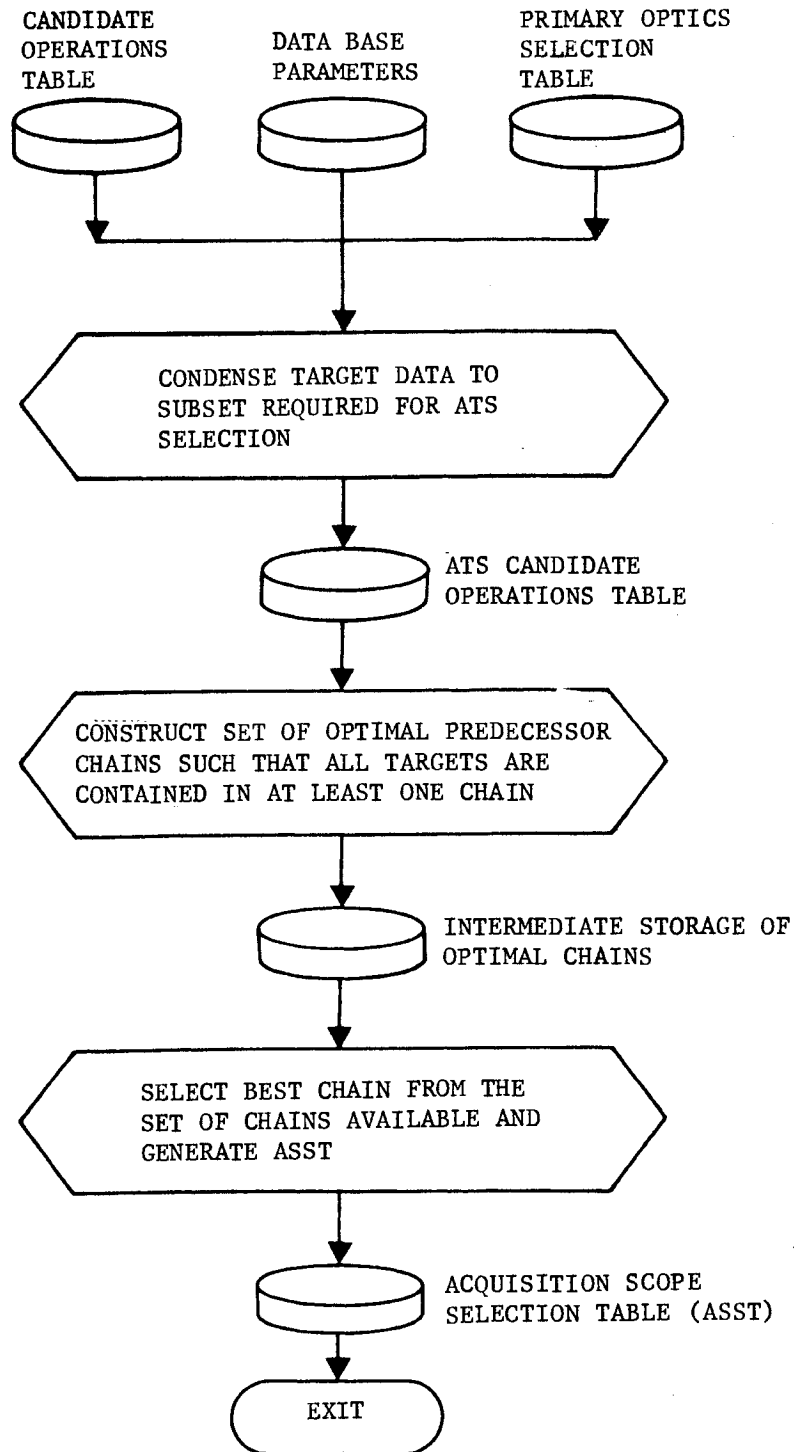   decessor chains determined in b above.

CANDIDATE
OPERATIONS
TABLE

DATA BASE
PARAMETERS

PRIMARY OPTICS
SELECTION
TABLE

CONDENSE TARGET DATA TO
SUBSET REQUIRED FOR ATS
SELECTION

ATS CANDIDATE
OPERATIONS TABLE

CONSTRUCT SET OF OPTIMAL PREDECESSOR
CHAINS SUCH THAT ALL TARGETS ARE
CONTAINED IN AT LEAST ONE CHAIN

INTERMEDIATE STORAGE OF
OPTIMAL CHAINS

SELECT BEST CHAIN FROM THE
SET OF CHAINS AVAILABLE AND
GENERATE ASST

ACQUISITION SCOPE
SELECTION TABLE (ASST)

EXIT

Figure 3-4.   Acquisition Telescope (ATS) Target Selection
Algorithm Information Flow Diagram

3.1.2.3.1 Source and Type of Inputs

The inputs required by the ATS Target Selection Algorithm shall consist of:

Candidate Operations Table (COT). The data stored in the Candidate Operations Table shall include:

    a. All target data

    b. Payload operation parameters

These items have been previously defined in Section 3.1.2.1.

Primary Optics Selection Table (MOST). The Primary Optics Selection Table shall include the key parameters required to define the selected set of primary optics targets. This table is defined in Section 3.1.2.2.2.

Control, Constraint and Vehicle Capabilities Data. Data base parameters shall be required to define the hardware operating modes and limitations and establish the weighting criteria. These items shall include:

    a. Maximum forward and aft stereo angles for ATS viewing

    b. Maximum target obliquity for ATS viewing

    c. Stereo and obliquity slewing rates and settling times for the alternate target selection

    d. Definition of the weighting criteria to be used in the alternate target selection

    e. Number of acquisition scopes to be considered in optimization

    f. Control parameters defining the type of targets that shall be considered for alternate target selection as a target group

    g. Control parameters defining maximum number of targets to be selected per group

    h. Maximum number of succeeding primary targets which may be affected by photographing an alternate target in a group

    i. Hardware operating mode parameters

    j. Flight crew capabilities parameters

    k. Print option flags

3.1.2.3.2 Destination and Type of Outputs

Acquisition Scope Selection Table (ASST). The output of the ATS Target Selection Algorithm shall consist of the key parameters that define the selection. These are:

    a. Target identifier

    b. Path number

    c. Group number

    d. Target type flag

    e. Viewing duration

    f. Recommended view start time

    g. Decision time for target group

    h. Target worth

This information shall be provided for each of the selected targets ordered by target group and by recommended view start time within a target group.

The acquisition and tracking scope selection shall constitute the Acquisition Scope Selection Table (ASST) and this table shall be input to the Post Processor.

Printed and/or Displayed Outputs. On option, the ATS Target Selection Algorithm shall provide printed output of deletion comments for those targets deleted within the algorithm prior to the selection process.

SECRET/D

3.1.2.3.3 Information Processing Requirements and Capabilities

The ATS Target Selection Algorithm shall have the following capabilities:

a. Determine an optimal non-conflicting chain of targets/ operations subject to hardware operating modes, hardware limitations, (item c below), and the potential value of subsequent photography.

b. The selection shall be optimized within the following constraints:

1. Limiting Stereo and Obliquity Angles

   All ATS viewing shall be scheduled to occur within the stereo and obliquity limits of the ATS's.

2. Stereo Rate, Obliquity Rate and Settling Time

   Successive ATS events shall allow time for maneuvering and settling.

3. Primary Optics Maneuver History

   The ATS selection shall include only those targets that can be subsequently photographed by the primary optics except in the case of targets that are designated for visual intelligence only.

4. Recommended Dwell Time

   The ATS selection shall include only those alternate targets which can be viewed for their recommended dwell times.

5. Maximum Flight Crew Recognition Angle

   The ATS algorithm shall not schedule for viewing any target such that viewing is completed at an angle greater than the maximum flight crew recognition angle.

SECRET/D

6. Requested Photographic Sequence

A target shall be included in the ATS selection by
the ATS Target Selection Algorithm only if that target,
if chosen at decision time, can subsequently be photo-
graphed in the photographic sequence requested for
that target as an alternate in the target list.

c. Provide a decision time for each target group such that
the primary optics can be maneuvered to photograph any target
in the group if the maneuver is initiated at decision time.

d. Provide, on option, a one scope or two scope optimization.

e. On option, all primary targets shall be scheduled on a
single path.

f. Ensure the selection of all primary targets for ATS viewing
to the extent that this is possible within the hardware
operating modes and limitations.

g. Establish a group of alternates to each primary target.

h. Controls shall be available to limit the number of selection
candidates. These controls shall allow for the elimination
of targets on the basis of target type or target worth.

i. The requirements of special targets, such as mandatory
targets, scan targets and visual intelligence targets shall
be satisfied.

j. Intermediate output and error messages shall be provided
for the purposes of program checkout and validation.

k. On option, the ATS Target Selection Algorithm shall ensure
that the primary target in each group is scheduled for
viewing before any other target in that group is scheduled
on the same path.

l. Deletion comments shall be provided for those targets
eliminated within the algorithm prior to the selection
process.

SECRET/D

3.1.2.4 Post-Processor

The chief function of the Post-Processor is to validate, edit and combine the outputs of the primary optics and acquisition scope target selection algorithms so as to produce conflict-free payload operations event data compatible with the requirements of the Command and Control Software and the ADC. In addition, the Post-Processor shall provide print-outs and plots of the computed selections, and shall generate pertinent displays. A block diagram illustrating the information flow through the Post-Processor is presented as Figure 3-5 (see Section 1.).

3.1.2.4.1 Source and Types of Inputs

Primary Optics Selection Table (MOST). The Post-Processor requires the MOST as specified in section 3.1.2.2.2.

Acquisition Scope Selection Table (ASST). The Post-Processor requires the ASST as specified in Section 3.1.2.3.2.

Candidate Operations Table (COT). The Post-Processor requires the Candidate Operations Table as described in paragraph 3.1.2.1.2.

Control, Constraint and Vehicle Capabilities Data. The data base shall contain parameters which control the operation of the Post-Processor and which enable determination of the values of payload operations parameters pertinent to the development of payload operation events and the resolution of payload operation event conflicts. These include:

  a. Print option flags

  b. Plot option flags

  c. Maximum and minimum mirror and ATS line of sight (l.o.s.) stereo angles

  d. Maximum mirror and ATS obliquity angles.

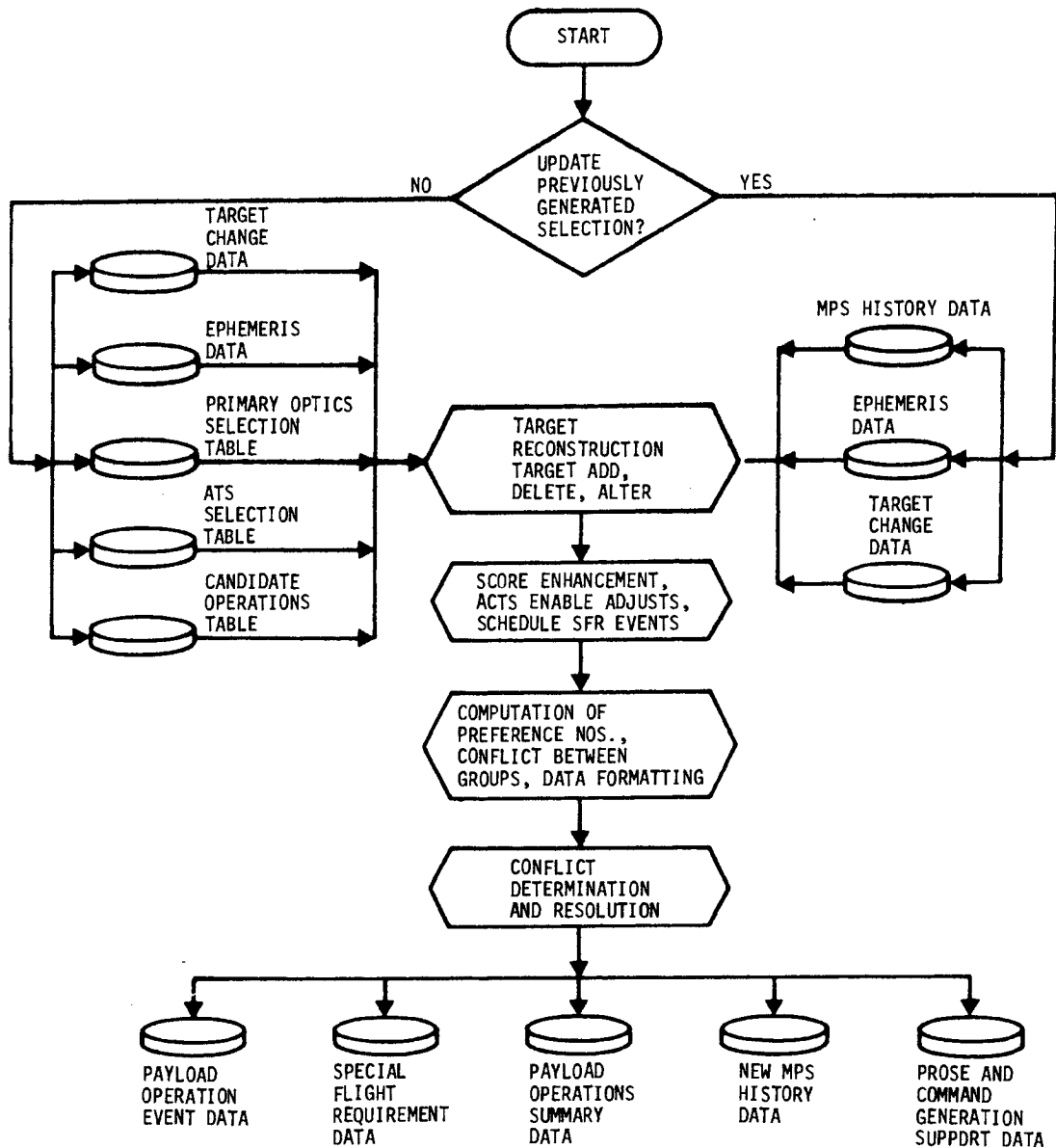 e. Stereo slewing rates and settling times for mirror and ATS as functions of maneuver angles.

Figure 3-5. Post-Processor Information Flow Block Diagram

SECRET/D

f.   Obliquity slewing rates and settling times for mirror and ATS as functions of maneuver angles.

g.   Target/vehicle orientation weighting factors.

h.   Photographic sequence weighting vectors.

i.   Definition of primary optics photographic sequences.

j.   IVS lock-on time.

k.   Consumable constraints parameters on power, film, and message size.

l.   Door open constraint parameters.

m.   ACTS enable/inhibit parameters.

n.   SFR event parameters.

o.   Flight crew capability parameters.

p.   Reference constants.

   1.   Earth constants

   2.   Mathematical constants

   3.   Conversion factors

Target Change Data. Targets to be deleted by the Post-Processor shall be available within the data base.

Ephemeris Data. The Post-Processor requires ephemeris data obtained from the MOES. The ephemeris data stored shall include position, velocity, and acceleration vectors at referenced times within the rev span and time and longitude at ascending nodes. The ephemeris data will have incorporated within it all planned orbit adjust data.

MPS History Data. A complete description of the payload operations events previously transmitted by MPS to C&C, and edited by MPS on the basis of C&C data to indicate which events have been sent to the orbiting vehicle, shall be available within the data base for use by the Post-Processor if the decision is made to update a previously generated selection rather than generate a new selection.

3.1.2.4.2 Destination and Type of Outputs

Payload Operations Event Data. The Post-Processor shall prepare the primary optics and acquisition telescope selections into the format required for interface with the Command and Control Software and the ADC. Either one of two payload operations event data formats shall be output dependent upon on-board data availability and resultant up-link data requirements. The payload operations event data shall be organized into target groups. The sequence of photography for each primary and alternate target shall be specified in either of two ways: as a referenced slit number and a sequence number corresponding to a photographic sequence stored on-board or as a series of camera types, on times and slit numbers. The payload operations event data shall include the following:

a. Format 1

   Group specific data

   1. Group number

   2. Number of targets in group

   3. Group acquisition time

   4. ACTS enable flag

Target Specific Data

1. Target I.D.

2. Primary/Alternate Flag

3. AMU Search Flag

4. Implied vote flag

5. Photographic sequence number

6. ATS view time

7. Conflict with targets in next group

8. Benchmark target flag

9. Reference slit width

10. Path assignment

11. Preference numbers

12. Start photography time

13. Sequence of photography times, camera types and
    slit widths as required

14. Cue location data

b. Format 2

Format 2 is the same as Format 1 with additional target
specific data. These are:

1. Target latitude

2. Target longitude

3. Target altitude

4. Alphanumeric Cue Data

Special Flight Requirements Data. The Post-Processor shall generate for the Command and Control Software schedules for the performance of Special Flight Requirements events. SFR events include focusing, boresighting, door opening and closing, and near station payload operations.

Prose and Command Generation Support Data. The Post-Processor shall generate for the Command and Control Software data to support the generation of payload and SFR related prose and commands.

Payload Operations Summary Data. The Post-Processor shall generate for the Command and Control Software payload operations summary data which shall contain the start and finish times of each payload region, the number of primary optics and ATS targets in each region, and other significant summary information.

MPS History Data. A complete description of the payload operations events transmitted to C&C shall be prepared by the Post-Processor. The Post-Processor shall generate these data for subsequent use by the Post-Processor if a decision is made to update a previously generated selection rather than generate a new selection. In addition, the Post-Processor shall generate a table which contains data indicating for which revs MPS History Data are available. The MPS shall edit the MPS History Data on the basis of data made available by C&C to indicate which events have been transmitted to and accepted by the orbiting vehicle.

Displays. The Post-Processor shall generate displays which include:

    a. Payload operations summary data

    b. Error messages requiring operator action.

Printed Outputs.

    a. Primary Optics Selection

        The Post-Processor shall output a headed and labeled listing of all targets in the primary optics selection per rev. The data contained in the listing of the primary optics selection shall include:

        1. All target data

2. Acquisition data

3. Photography start and finish times

4. Photographic sequence

5. Selection worth

6. Target/vehicle orientation

7. Primary optics selection summary data

b. Acquisition Telescope Selection

The Post-Processor shall provide a headed and labeled listing of all targets in the acquisition telescope selection per rev. The data printed shall include:

1. All target data

2. Acquisition data

3. Selected view start and finish times

4. Path assignment

5. Group number

6. Photographic sequence

7. Group decision time

8. Selection worth

9. Target type

10. Acquisition telescope selection summary data

c. Plots

On option, the Post-Processor shall output a swath plot indicating the targets selected as primary targets and alternates. The target selection shall be superimposed upon a labeled and scaled orthogonal plot of obliquity versus system time which displays all targets in the acquisitions list. The targets selected shall be super-imposed so as to distinguish between the time intervals that have been chosen for primary target photography and for ATS viewing. The target data presented on the plot

shall include target identification, obliquity, interval
of visibility (optional), and an identifier which reflects
the active and inactive priorities of the target. In
addition, group decision times shall be indicated.

3.1.2.4.3 Information Processing Requirements and Capabilities

The Post-Processor shall provide the capabilities to:

a. Process the Primary Optics Selection Table and the Acquisi-
tion Scope Selection Table to produce conflict-free payload
operations event generation data, scheduled in vehicle time,
compatible with the requirements of the Command and Control
Software and the ADC.

b. Update a previously generated set of payload operations to
incorporate new ephemeris data.

c. Delete targets in the primary optics and
ATS selections.

d. Adjust the ATS and primary optic selections to satisfy
consumables constraints.

e. Determine the possibilities for, and execute any minor
score enhancing adjustments to the computed strategies.

f. Examine the scheduled maneuvers of the primary optics be-
tween target groups. Flag those target groups between
which the scheduled maneuvers will allow for the enabling
of the ACTS. In those regions where the scheduled maneuvers
will not allow ACTS enabling, and in which the ACTS must be
enabled to insure proper attitude control, make appropriate
(i.e., minimum score loss) adjustments to the group con-
figurations so that the ACTS may be enabled.

g. Compute payload summaries to contain the boundaries of
payload regions, the number of targets in each region, and
other significant summary information.

h. Generate schedules for the performance of Special Flight
Requirements events.

i. Compute the conflict relationship between each target and
the targets in the next group.

j. Compute target preference numbers for all targets within
each target group.

SECRET/D

k. Have the capability to reallocate the recommended dwell times to better utilize the total available viewing time.

l. Develop the data necessary to support the generation of payload and SFR related prose and commands.

m. Identify those targets not on the AMU and generate appropriate data.

n. Compute reference slit width numbers for all selected targets.

o. Provide intermediate output and error comments for the purposes of program checkout and validation.

p. On option, display or print deletion comments for targets deleted from the primary optics or ATS selection.

q. Have the capability to compare the target selection to MPS History Data and generate supplemental target data.

r. On option, prepare the data necessary for the generation of the plot of the visibility swath indicating those targets selected as primary targets and alternates.

s. Determine and automatically resolve any conflicts in the primary optics and ATS selections. The process of resolving conflicts shall involve consideration of shifts in photography and/or view time, modification of photographic sequence or length of ATS view time and deletion of targets. The conflict resolution procedure selected shall be such that any unavoidable loss in score is minimized.

3.1.3 Data Base Requirements

The paragraphs which follow specify the parameters for which the MPS requires storage within the data base. The data base is that set of data available to the SCOPE 3.M MOL environment. A data base set/use table is presented as Table 3.1.

SECRET/D

Table 3.1   Data Base Set/Use Table

	Pre-Processor	P.O. Target Selection Algorithm	ATS Target Selection Algorithm	Post-Processor	MCD	MOES	C&C	Global Weather Central	Operator
Target List	B								S
Acquisitions List	B								
Ephemeris Data	U			U	U	S	U		
MCD Data	U				S				
Weather Data	U							S	
Payload Operations Planning Event Data	S								
MOST		S	U	U			U		
ASST			S	U					
Payload Operations Events Data				S			U		
Special Flight Requirements Data				S			U		
Payload Operations Summary Data				S			U		
MPS History Data				B	U				
Weather Request Message	S							U	
Control, Constraint, & Vehicle Capabilities Data	U	U	U	U					S
Target Change Data				U					S

SECRET/D

3.1.3.1 Target List

The data base shall provide for the storage of a target list to contain up to 40,000 targets. The data stored for each target shall be as specified in 3.1.2.1.2.

3.1.3.2 Acquisitions List

An acquisitions list, to contain, in time order, the targets visible during the current days operations (16 revs), shall be maintained within the data base. The data to be stored by the MPS for each entry in the acquisitions list are as presented in 3.1.2.1.2.

3.1.3.3 Candidate Operations Table

The Candidate Operations Table stored within the data base shall contain, in time order, entries for all targets visible and satisfying constraints on acquisition and payload operation parameters during the revs for which the MOL/DORIAN vehicle shall next receive commands. The particular parameters to be stored for each entry in the Candidate Operations Table shall be as in 3.1.2.1.2.

3.1.3.4 Ephemeris Data

The data base will provide storage for the ephemeris data required by the Pre-Processor and Post-Processor functions of the MPS. The Ephemeris Data required are as specified in 3.1.2.1.1.

3.1.3.5 MCD Data

The MCD Data required by the MPS is as specified in 3.1.2.1.1.

3.1.3.6 Weather Data

The Weather Data required by the MPS is as specified in 3.1.2.1.1.

SECRET/D

3.1.3.7 Payload Operations Planning Events Data

The Payload Operations Planning Events Data to be generated by the MPS in the Flight Plan Generation Mode are as specified in 3.1.2.1.2.

3.1.3.8 Primary Optics Selection Table (MOST)

The data to be contained in the MOST generated by the Primary Optics Target Selection Algorithm of the MPS are as specified in 3.1.2.2.2.

3.1.3.9 Acquisition Scope Selection Table (ASST)

The ASST generated by the ATS Target Selection Algorithm of the MPS is as specified in 3.1.2.3.2.

3.1.3.10 Payload Operations Events Data

The Payload Operations Events Data generated by MPS are as specified in 3.1.2.4.2.

3.1.3.11 Special Flight Requirements Data

The Special Flight Requirements Data generated by MPS are as specified in 3.1.2.4.2.

3.1.3.12 Payload Operations Summary Data

The Payload Operations Summary Data generated by the MPS are as specified in 3.1.2.4.2.

3.1.3.13 Prose and Command Generation Support Data

The Prose and Command Generation Support Data generated by MPS are as specified in 3.1.2.4.2.

3.1.3.14 MPS History Data

The MPS History Data generated by the MPS are as specified in 3.1.2.4.2.

D

SECRET/D

3.1.3.15 Weather Request Message

The Weather Request Message generated by MPS is as specific in
3.1.2.1.2.

3.1.3.16 Control, Constraint and Vehicle Capabilities Data

The Control, Constraint and Vehicle Capabilities Data required by
MPS are as specified in 3.1.2.1.1, 3.1.2.2.1, 3.1.2.3.1, and 3.1.2.4.1.

3.1.3.17 Target Change Data

Targets to be added, deleted or altered are as specified in 3.1.2.4.1.

3.1.4 Human Performance

In order to ensure that the Mission Planning Software is being
properly exercised it will be required that the operator monitor program
operation. The program shall provide for this capability through the use
of CRT displays and hard copy outputs.

During the normal operation of the program, the current status of the
computation shall be provided through the use of CRT displays. If a problem
the program shall to the extent possible display a set of recovery options
and await a decision from the operator. Once the operator has decided on
which option to pursue, the program shall immediately respond and continue.

Output listings shall be provided so that the selected payload opera-
tions events and payload operations planning events can be inspected by the
MCC analysts. Summary outputs, plots, and detailed listings shall be
available.

D

In order to support the loading cycle, 24 hour a day monitoring of
program operation/output will be required. The sequence of operations will
consist of:

1. Job Definition Phase

At job definition time, operator inputs to the MPS portion
of the job should be available. The operator will be
required to update the data base and include run specific
MPS parameters in the job definition.

2. MPS Operation

During MPS execution an operator will be required to
monitor program operation via displays, and respond to
MPS decision requests. Response time for decision by
operator will be of the order of one minute. Operator
response time will directly add to MPS running time.

3. Post-MPS Analysis

Within minimum time after job completion, hard copy MPS
summary information will be in the hands of the analysts
for an acceptance check.

SECRET/D

4. Message Update

    At message update deadline the operator will set-up and
    execute update. Performance required is an described in
    job definition and MPS Operation.

5. Message Update Analysis

    MPS update summary information should be supplied to the
    operators within minimum time after completion of update
    either as display or hard copy. An immediate acceptance
    check will be made and the decision transmitted by the
    operator for action prior to message generation.

6. General Output Analysis

    After execution of MPS, hard copy of complete MPS output
    should be distributed to appropriate analysts. Detailed
    evaluation of performance will be made at this time.
    Results of this analysis will be used, as applicable, in
    modifications and changes to subsequent operations, deter-
    mination of MPS problem areas, and verification of perfor-
    mance.

3.2 CPCEI DEFINITION

The following paragraphs specify the functional relationships of this
CPCEI to the government furnished operating system (AFSCF) and the relation-
ships with other applicable programs which comprise the MOL/DORIAN system.

3.2.1 Interface Requirements

The following paragraphs define the specific requirements that this
CPCEI places on the operating system and on the programs to be developed
by the associate contractors.

3.2.1.1 Interface Block Diagram

The Interface Block Diagram is presented as Figure 3-6 (see Section 1.).
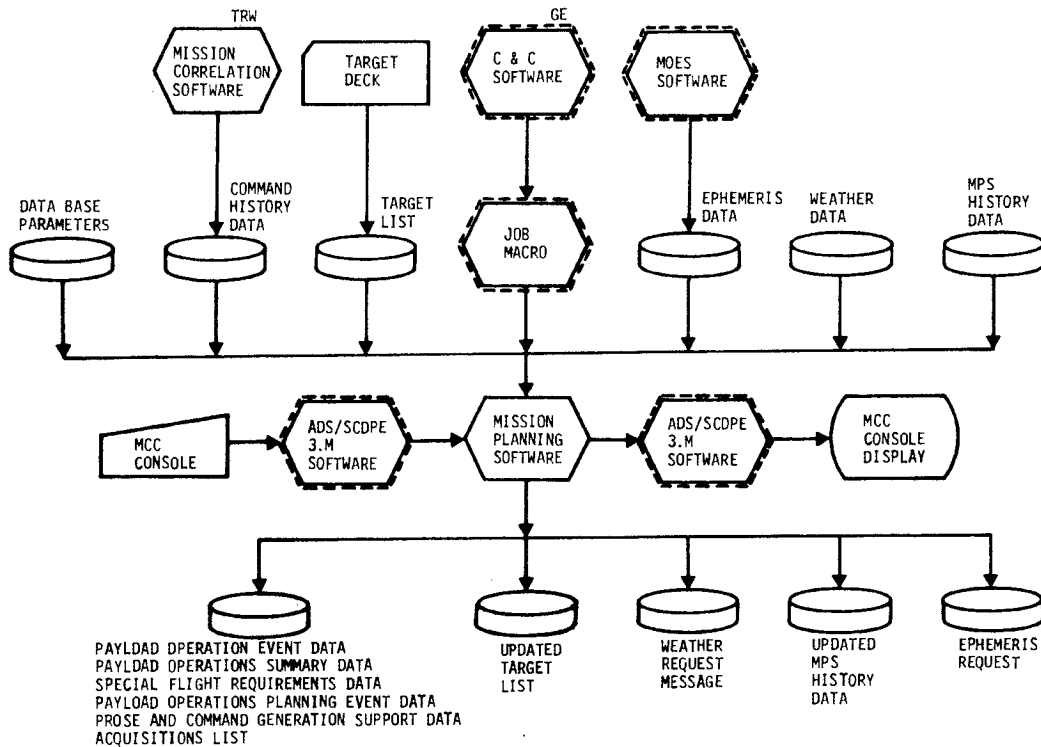

Figure 3-6.   Mission Planning Software, Executive and
Control Interface Diagram

3.2.1.2 Detailed Interface Definition

    a. The Command and Control Subsystem will provide:

        1. Control data necessary to select and initiate operation of the MPS in the Flight Plan Mode or the Command Message Generation Mode.

SECRET/D

2. Data sufficient to enable editing of the MPS History Data to indicate which payload operation events have been sent to and accepted by the orbiting vehicle.

3. Exchange software to perform interface between CPCEI's and the Command and Control Payload Event and Flight Plan data.

b. MOES will provide the following capabilities:

1. A MOL vehicle ephemeris will be provided for the required span of MPS operation and will include planned orbit adjusts.

2. A basic routine to verify labeling and span of ephemeris.

3. A basic routine to rapidly acquire MOL vehicle position, velocity, and acceleration vectors in standard ECI and ADBARV elements for any given time.

4. A basic routine to acquire time and longitude of ascending node for any given rev.

5. Utility routines, ephemeris prediction capability, data management and accuracy requirements as set forth in MOL/DORIAN System Module Specification.

c. 6600 SCOPE 3.M software system will provide:

1. Capabilities as outlined in the MOL Flight Support Plan.

   The following document applies:ocumentation includes:
   SMOND-1 69-5   MOL Flight Support Plan

2. Capability of selectively listing data base files with defined mnemonics and units.

3. Minimum time communication with mass storage.

4. On-line program correction capability.

5. Provision for job processing in a secure mode.

6. Provision for printed program execution times (CPU, PPU, and elapsed time at control point).

7. A fast and efficient checkpoint/restart capability that includes saving of required temporary and permanent data base files.

SECRET/D

8. Control of the MCC/6600 and MCC/ADS/6600 interactive
interface in all operating modes and configurations.

9. Program control over abort and error conditions.

10. Processing of program output files in a timely manner.

11. A minimum field length of (TBD) decimal words of 6600
Central Memory storage for use of MPS software and
data parameters.

d. ADS will provide the following:

1. Transmission of job interaction and control messages
between MCC and CDC 6600.

e. Global Weather Central will provide: D

1. Assessed weather data sufficient to allow the deter-
mination of the cloud-free probability over each
target photographed during previous operations.

2. Predicted and climatological weather data sufficient
to determine for each target on the acquisitions list
the cloud-free probabilities as predicted from fore-
casts and as expected from climatology. The predicted
weather data will also be sufficient to determine the
reflectance for each target in the acquisitions list.

f. The MCD will provide:

1. A countdown list to include the following data for
each target to be counted-down:

a. Target I.D.

b. Old requirement status

c. New requirement status

g. The operators of the MPS will provide:

1. Target list

2. Control, Constraint and Vehicle Capabilities Data

3. Mol I.D. Correspondence Data

4. Cue Correspondence Data

SECRET/D

h. The MPS shall provide the following:

1. To the Command and Control Subsystem the following data
as described in Sections 3.1.2.1.2 and 3.1.2.4.2:

a. Payload Operations Event Data

b. Special Flight Requirements Data

c. Payload Operations Summary Data

d. Prose and Command Generation Support Data

e. Payload Operations Planning Events Data

f. Acquisitions List

2. To Global Weather Central: A weather request message
as described in Section 3.1.2.1.

3. To MCD:

a. Acquisitions list described in Section 3.1.2.1.2

b. MPS History Data described in Section 3.1.2.4.2

3.2.2 User Furnished Programs

None.

3.3 DESIGN REQUIREMENTS

This section describes the design requirements the CPCEI shall satisfy
from general considerations of CPCEI usability. These requirements are
distinct from the performance requirements of Paragraph 3.1.

3.3.1 Program Running Time Requirements

The program operating time shall satisfy the following requirements:

a. The Flight Plan Generation Mode of the MPS shall have the
capability of generating payload operations planning events
over a 60-day mission length in 3 hours of CPU time. The
design goal is 2.3 hours of CPU time.

SECRET/D

b. The Command Message Generation Mode shall satisfy the following requirements:

1. The portion of the MPS that established revolution number for visibility of each target shall have the capability of running as a daily update program. The design requirement is 2000 targets per minute of CPU time. An updating mode in which 100 targets can be merged with and/or edited from an existing daily output, or in which intrack ephemeris corrections can be made to existing daily output shall operate in 5 minutes of CPU time with a design goal of 2.5 minutes of CPU time.

2. Exclusive of rev assignment the path selection program shall be able to process up to 4000 time-ordered targets on 1 revolution in less than 7.5 minutes of CPU time, with a design goal of 5 minutes of CPU time.

3. The portion of the MPS responsible for conversion of the selected payload operations events into events for the uplink message generation process shall operate in 30 seconds of CPU time or less per rev.

4. The Command Message Generation Mode shall have a fast mode of operation. The reduction in required run time shall be accomplished through the incorporation of appropriate filters at several points within the MPS information processing to reduce the number of selection candidates with minimal excursion from optimality.

3.3.2 Program Standards

a. All coding of the CPCEI shall follow the rules and definitions of FORTRAN EXTENDED 1.0 and COMPASS 1.1.

Applicable Control Data Corporation documentation includes:

CDPN 60176600, Revision B FORTRAN EXTENDED 1.0
              Reference Manual

CDPN 60190900   COMPASS 1.1
              Reference Manual

b. The design of the CPCEI shall utilize the programming standards and conventions recommended for all programs coded to run in SCOPE 3.M.

SECRET/D

Applicable documentation includes (TBD).

c. Interface tables and common data shall be referenced by
the same or related program symbols in all portions of
the CPCEI.

3.3.3 Program Organization

a. The CPCEI shall be segmented by major tasks and sub-tasks.
A segment shall satisfy the following:

1. Perform a well-defined major task to completion.

2. Produce well-defined internal or external interface
data sufficient for execution of following tasks or
sub-tasks.

b. Sub-tasks common to several segments shall be broken out
as independent subroutines whenever possible to reduce
duplication and the associated check-out problems.

c. The number of sequential executable segments shall be
controlled to:

1. Reduce program load times

2. Reduce the number of internal interfaces.

d. Within each segment sub-tasks shall be written as closed
subroutines to the extent possible. The major program
sections and major sub-tasks of a program segment shall
be primarily control sections that define the sub-tasks
to be performed, the order of their execution, and the
interface requirements.

3.3.4 Program Modification Considerations

The CPCEI shall be designed to allow reliable modifications during
CPCEI operation within the CPCEI operational environment. To the extent
possible, the following capabilities shall be included in the CPCEI:

a. Facility for easily adding new program capability at
a later date.

b. Flexibility with regard to possible variation in MOL/
DORIAN hardware, onboard software, and operating para-
meter inputs.

SECRET/D

SECRET/D

3.3.5 Program Testing

a. To facilitate testing of the CPCEI, the CPCEI segments shall be written to allow maximum possible independent check-out.

b. CPCEI segments shall be designed to be compatible with the requirements of the SCOPE 3.M System debugging aids so as to take full advantage of the selected dumps, traces, and other check-out capabilities.

Applicable documentation includes (TBD).

3.3.6 Program Growth Potential

The CPCEI segments shall be sized to allow growth potential. The requirements to be used include:

a. The design goal of each independent program or overlay shall be to occupy no more than 85% of the maximum field length.

b. Any independent program or overlay that exceeds a tolerance limit of 95% of the maximum field length will be re-evaluated.

c. Internal and external interface data handling methods shall be designed to be open-ended insofar as possible so as to make internal data core storage requirements relatively independent of the data volume.

SECRET/D

SECRET/D

4. QUALITY ASSURANCE PROVISIONS

This section specifies the requirements for verification of the performance of the CPCEI in accordance with the requirements provided in Section 3 of this document. The Category I and Category II tests to be performed are outlined in paragraphs 4.1 and 4.2 below. Table 4-1 identifies the Category I and Category II tests and the general test methods that shall be used for verification of each of the requirements.

4.1 ITEM TEST

Three basic tests comprise the Item Test. These are:

    a. Computer Programming Test and Evaluation

    b. Preliminary Qualification Test

    c. Formal Qualification Test

4.1.1 Computer Programming Test and Evaluation

This test shall be performed to verify the validity and operation of subroutines and computer program components. The testing begins with individual components that are self contained, i.e., those that do not require other components for their execution. The next level of testing involves functions that utilize multiple components during execution, each level containing more complicated functions. In this manner, errors are detected before they can propagate into higher level functions.

The requirement to be tested are shown in Table 4-1.

The following paragraphs specify the Government Furnished Equipment (GFE), and government furnished software, data and facilities required to perform CPT&E tests on the CPCEI and the Test Requirements which define the testing methods to be employed.

SECRET/D

a. Government Furnished Equipment, Software, Data and Facilities

1. CDC 6600 and associated hardware:

    a. 1 - CDC 6600 Computer System containing 131K words of central memory

    b. 2 - 6612 control consoles

    c. 2 - 6638 disks

    d. 2 - 856 drums

    e. 1 set 4-854 disk packs, each with a controller

    f. 4 - 512 line printers

    g. 3 - 405 card readers

    h. 1 - 415 card punch

    i. 1 - 3691 paper tape reader/punch

    j. 12 - 607 tapes - 3 controllers

    k. 1 - 3290 TREND Controllers and 4 TREND Consoles

2. Remote data terminal system from the ASTC to the CPDC, A
    Santa Monica:

    a. 1 - 40,800 bit/second line fully encrypted

    b. 1 - CDC 160A stand-alone computer at each end of the data line with standard peripherals compatible with 6600 peripherals

3. FORTRAN EXTENDED 1.0 Compiler and COMPASS 1.1 Assembler for CDC 6600

4. SCOPE 3.M Software System

    a. SCOPE 3.M operating system

    b. Associated library routines

    c. Associated loader

    d. Associated data base

5. Sufficient secure times scheduled at the GFE test
    facilities and terminal to carry out the test program

    a. Turn-around time sufficient to allow two runs of
        any given test per standard working day at either
        the GFE test or Santa Monica facilities

    b. Secure working area at either the GFE test or Santa
        Monica facilities to allow evaluation, preparation
        and storage of test runs and their output

    c. Competent and sufficient personnel at both the GFE
        test and Santa Monica facilities to support the
        testing program

6. Documentation support of all hardware and software
    furnished

7. MOES or equivalent ephemeris generation program

    a. Milestone 5 or equivalent (for Category I Testing)

    b. Milestone 8 or equivalent (for Category II Testing)

8. Support personnel representing CPCEI user organizations

9. Sample Target Deck

    a. Definition

    b. Model (for Category I Testing)

    c. Actual (for Category II Testing)

10. Advanced Data System (ADS) containing as a minimum

    a. Control and Display System (CADS) software

    b. Supporting display and control hardware

    c. Operational 360/6600 data link for job control,
        displays, and interaction

11. Command and Control (C&C) Software (for Category II
    Testing)

12. Airborne Digital Computer (ADC) or equivalent simulation
    program (for Category II Testing)

b. Test Requirements

Four basic testing methods shall be used to validate this CPCEI. These are: inspection, review of analytic data, demonstration tests and review of test data. A series of tests of these four general types shall be employed for verification of the CPCEI. These methods are defined below:

1. Inspection

   a. Logical Validity

      Verification of the operation logical flow by inspection of program operation.

   b. Programming Validity

      Verification of programmed equations and logic.

   c. Structural Validity

      Verification of basic design requirements such as programming language and modularity by examination of documentation and listings.

2. Review of Analytic Data

   a. TWONDER References

      Comparison, where applicable, of CPCEI output with results produced by the TWONDER Mission Planning Study Program.

      The following TRW document applies:

      DM 36-0066   Users Manual for TWONDER

   b. Hand Calculations

      Comparison of the Mission Planning Software output with hand calculated results using equations specified in the program.

   c. Alternate Hand Calculations

      Comparison of Mission Planning Software output with hand calculated results using alternate equations or methods equivalent to those specified in the program.

3. Demonstration Tests

   a. CPC Interface Validity

      Verification that the Computer Program Components are compatible and that information is properly passed between components.

SECRET/D

b. CPCEI Interface Validity

Verification that the Mission Planning Software is compatible with the software and equipment with which it will interface.

c. Program Operation Demonstration

Verification that program options are properly executed within required timing constraints.

4. Review of Test Data

a. Output Validity

Verification that the output quantities are produced by inspection of program output.

4.1.2 Preliminary Qualification Tests

The preliminary qualification tests shall demonstrate the operation of the CPCEI on a function-by-function basis including the compatibility of the functions to the MPS job. The GFE items are the same as those listed in Section 4.1.1. The requirements to be satisfied are shown in Table 4-1.

4.1.3 Formal Qualification Tests

The formal qualification tests shall emphasize overall CPCEI performance. This shall include the operation of the integrated CPCEI and shall stress those aspects of CPCEI performance that were not verified by preliminary tests.

The GFE items are the same as those listed in Section 4.1.1 with the additional requirement that these tests be conducted at the ASTC. The requirements to be satisfied are shown in Table 4-1.

4.2 SYSTEM TESTS

The system tests shall demonstrate and verify the CPCEI using operationally configured ASTC equipment and software. Interface requirements that could not be verified in the earlier testing, operating procedures, and operating requirements shall be emphasized in this testing. The GFE requirements are the same as those listed in Section 4.1.1. The requirements to be satisfied are **SECRET/D**

TEST METHOD / TEST

REQUIREMENT (PART I CEI PARAGRAPH NUMBER)	INSPECTION	DEMONSTRATION	REVIEW OF ANALYTICAL DATA	REVIEW OF TEST DATA	COMPUTER PROGRAM TEST AND EVALUATION	PRELIMINARY QUALIFICATION TEST	FORMAL QUALIFICATION TEST	SYSTEM TEST
PERFORMANCE								
3.1 a		X	X			X	X	
b		X	X	X			X	
c		X	X	X			X	
d			X					
e	X							
f		X	X			X		
g			X			X		
h						X		
i		X				X		
SYSTEM								
3.1.1 a	X	X		X	X	X	X	X
b	X	X			X			X
c	X	X			X			X
d	X	X						
PRE-PROCESSOR								
3.1.2.1.3 a	X	X				X		
b	X	X				X		
c	X	X	X			X		
d	X	X	X			X		
e	X	X				X		
f	X	X						
g	X	X						
h	X	X			X			
i	X	X			X			
j	X	X						
k	X	X	X					
l	X	X	X		X	X		
m	X	X	X		X			

Table 4-1. Item Test Plan Matrix

~~SECRET/D~~

REQUIREMENT (PART I CEI PARAGRAPH NUMBER)	TEST METHOD				TEST			
	INSPECTION	DEMONSTRATION	REVIEW OF ANALYTICAL DATA	REVIEW OF TEST DATA	COMPUTER PROGRAM TEST AND EVALUATION	PRELIMINARY QUALIFICATION TEST	FORMAL QUALIFICATION TEST	SYSTEM TEST
PRE-PROCESSOR (CONTINUED)								
n	X	X				X		
o	X	X		X		X		
PRIMARY OPTICS TARGET SELECTION ALGORITHM								
3.1.2.2.3 a	X		X			X		
b	X		X			X		
c	X		X			X		
d	X	X		X		X		
e	X	X		X		X		
f	X	X		X		X		
ATS TARGET SELECTION ALGORITHM								
3.1.2.3.3 a	X	X	X			X		
b	X	X	X			X		
c	X	X	X			X		
d	X		X			X		
e	X	X	X			X		
f	X	X	X			X		
g	X		X			X		
h	X					X		
i	X			X		X		
j	X	X				X		
k	X	X				X		
l	X	X		X		X		

Table 4-1. Item Test Plan Matrix (Continued)

~~SECRET/D~~

REQUIREMENT (PART I CEI PARAGRAPH NUMBER)	TEST METHOD				TEST			
	INSPECTION	DEMONSTRATION	REVIEW OF ANALYTICAL DATA	REVIEW OF TEST DATA	COMPUTER PROGRAM TEST AND EVALUATION	PRELIMINARY QUALIFICATION TEST	FORMAL QUALIFICATION TEST	SYSTEM TEST
POST-PROCESSOR								
3.1.2.4.3 a	X	X	X			X		
b	X	X	X			X		
c	X	X				X		
d	X		X			X		
e	X		X			X		
f	X		X			X		
g	X		X			X		
h	X		X			X		
i	X		X			X		
j	X					X		
k	X					X		
l	X					X		
m	X	X	X			X		
n	X	X		X		X		
o	X					X		
p	X			X		X		
q	X					X		
r	X		X			X		
s	X							
t	X							
DATA BASE								
3.1.3.1		X				X		
.2		X				X		
.3		X				X		
.4		X				X		
.5		X				X		
.6		X				X		
.7								
.8								

Table 4-1. Item Test Plan Matrix (Continued)

REQUIREMENT (PART I CEI PARAGRAPH NUMBER)	TEST METHOD				TEST			
	INSPECTION	DEMONSTRATION	REVIEW OF ANALYTICAL DATA	REVIEW OF TEST DATA	COMPUTER PROGRAM TEST AND EVALUATION	PRELIMINARY QUALIFICATION TEST	FORMAL QUALIFICATION TEST	SYSTEM TEST
DATA BASE CONTINUED								
.9		X				X		
.10		X				X		
.11		X				X		
.12		X				X		
.13		X				X		
.14		X				X		
.15		X				X		
.16		X				X		
.17		X				X		
HUMAN PERFORMANCE 3.1.4		X						X
INTERFACE DEFINITION 3.2.1.2 a		X						X
b		X						X
c		X						X
d		X						X
e		X						X
f		X						X
g		X						X
h		X						X
DESIGN REQUIREMENTS 3.3	X	X						X

Table 4-1. Item Test Plan Matrix (Continued)

.6. NOTES

6.1 GLOSSARY

1. Acquisition telescope path — The targets selected to be acquired and viewed by an acquisition scope

2. ACTS — Attitude Control and Translation Subsystem

3. Active worth — The worth of a target based exclusively upon the active priority of that target

4. ADC — Airborne Digital Computer

5. ADS — Advanced Data System

6. AFSCF — Air Force Satellite Control Facility

7. AMU — Auxiliary Memory Unit

8. Assessed Weather Data — Surface and satellite observations of total cloud cover which existed at or near the time and location of a payload operation are analyzed by AFGWC. Their assessment of these data is used to delineate areas of equal cloud-free probability for any target photographed within each area. These probabilities are transmitted by target to the DORIAN data base. AFGWC also uses these data to verify their predicted cloud-free probabilities for the same specified payload swath.

9. ASST — Acquisition Scope Selection Table

10. ASTC — Advanced Satellite Test Center

11. ATS — Acquisition Telescope

12. Basic worth — The worth of a target based exclusively upon the active and inactive worths and the probability of activity of that target. The basic worth may also be equal to the

SECRET/D

		inactive worth of the target if that option of the MPS has been exercised.
13.	Benchmark Target	A target of precisely known location to be used to update the ephemeris employed by the orbiting vehicle
14.	C&C	Command and Control Software, GE CEI MOK804A
15.	CDC	Control Data Corporation
16.	Command Message Generation Mode	The MPS operating mode in which the payload Operations Events Data, Payload Operations Summary Data, Special Flight Requirements Data, and the Prose and Command Generation Support Data are generated.
17.	Conflict-free	Pertains to events generated which are consistent and compatible, without conflicts, to the extent that conflicts are defined in the data base and as reflected by the vehicle status and image.
18.	Consumables	Consumable resources, e.g., film, power, message length
19.	COT	Candidate Operations Table
20.	CPAC	Computer Program Associate Contractor
21.	CPC	Computer Program Component
22.	CPCEI	Computer Program Contract End Item
23.	CPIC	Computer Program Integration Contractor
24.	Data base	The set of data available to the scope 3. M/MOL environment
25.	ECI	Earth Centered Inertial
26.	Flight Plan Generation Mode	The MPS operating mode in which payload Operations Planning Events are generated in support of the generation of the Flight Plan by the C&C.
27.	Function	A main logical sub-division of the Mission Planning Software

SECRET/D

28. GFE — Government Furnished Equipment

29. Group decision time — The target group specific time at which all astronaut observations of the targets in that group are to be completed.

30. I.D. — Identification number

31. Inactive worth — The worth of a target based exclusively upon the inactive priority of that target.

32. Interleaving — The execution of photography of any other target between any two frames of photography on a given target.

33. IVS — Image Velocity Sensor

34. l.o.s. — Line-of-sight

35. Maximum flight crew recognition angle — The line of sight angle between the vehicle and the target beyond which the flight crew ability to observe targets is unacceptable. The MPS shall not schedule for viewing any target such that viewing is completed at an angle greater than the maximum flight crew recognition angle.

36. MCD — Mission Correlation Data

37. MOES — MOL Oribit Ephemeris System

38. MOL — Manned Orbiting Laboratory

39. MOST — Primary Optics Selection Table

40. MP&E — Mission Planning and Evaluation

41. MPS — Mission Planning Software

42. Payload Operations Event — An employment of the primary optics or ATS scheduled by the MPS operating in the Command Message Generation Mode

SECRET/D

43. Payload Operations Planning Event — A region in which payload operations events are predicted by the MPS operating in the Flight Plan Generation Mode.

44. Photographic sequence — A defined sequence of primary and secondary camera operations.

45. Predecessor Chain — The sequence of non-conflicting targets which precede a given target and produces the maximum score.

46. Predicted Weather Data — AFGWC generates forecasts of total cloud cover based upon previously observed atmospheric parameters. Forecasts generated for specified payload Operations are used. These probabilities are transmitted to the DORIAN Data Base.

47. Relative Resolution — An estimate of the photographic resolution obtainable.

48. Score — The sum of the selection worths of all targets selected by MPS.

49. Selection — The set of targets and corresponding photographic sequences, times at initiation of photography, ATS dwell time, times at initiation of ATS dwell time and group decision times selected by the MPS.

50. Selection Worth — The worth of a given target as selected by the MPS. This worth includes the effects of all weighting functions.

51. Settling time — The time required to dampen the oscillations induced by optics or spacecraft maneuvers.

52. Slewing — A mode of maneuvering of the primary optics or ATS.

53. t.c.a. — Time at closest approach

54. Tracking — A mode of maneuvering the primary optics or ATS to maintain acquisition of a target.
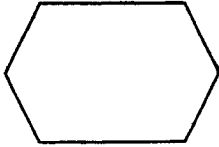
55. Visual Intelligence Target   A target to be viewed by the ATS but not photographed.

56. Weighting   The processing of altering the worth of a target to reflect certain specified acquisition and/or payload operation parameters.
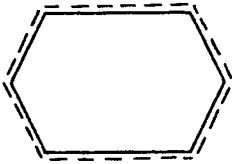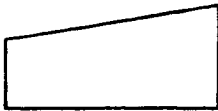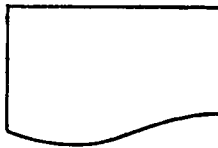
SECRET/D

6.2 FLOW CHART SYMBOLS

Self-contained set of CPC's which are
part of this CEI

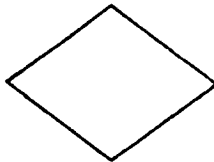Programs or functions which are external
to this CEI

MCC console

Printed output

Cards

Display

Decision

SECRET/D

~~SECRET/D~~

Tapes

Disc storage

Terminal

Connector

(Reverse of this page is intentionally left blank)