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### PRIMARY EXPERIMENTS DATA

### FOR THE

### MANNED ORBITING LABORATORY SYSTEM (MOL)

PROGRAM

MARCH 1965

SPECIAL ACCESS REQUIRED Program 632 A Area Arb

HEADQUARTERS SPACE SYSTEMS DIVISION AIR FORCE SYSTEMS COMMAND UNITED STATES AIR FORCE

> Group 1 Excluded from automatic downgrading and declassification

SSMM-67



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ABSTRACT

The 13 Primary Experiments and the On-Orbit Experiments Information System for the MOL mission constitute an experiments package that exercises all critical manned functions relating to key military missions. The discussions of each experiment which follow as individual sections to this Data Book are complete within the scope of present development. The format which has been utilized makes possible a tabular consideration of the experiments. With the exception (On-Orbit Experiments Information System), the six areas considered for each experiment are:

> Objective Description Experiment Equipment Design Characteristics and Requirements Alignment and Calibration Test and Evaluation Procedures Manning Data

A brief description of each of the 13 experiments and of the On-Orbit Experiments Information System follows:

 P-1 Acquisition and Tracking of Ground Targets Measures man's ability to acquire and track pre-assigned ground targets under varying conditions.
 P-2
 P-3 Direct Viewing for Ground Targets Measures man's ability to detect surface targets of opportunity and to make cursory intelligence assessments.
 P-4 Electromagnetic Signal Detection Measures man's ability to make semi-analytical decisions and adjustments based on information from electromagnetic emitters.



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### 1. INTRODUCTION

### 1.1 PURPOSE

The purpose of the Primary Experiments Data Book is to insure that all organizations concerned with the MOL Program have access to a common technical baseline description of the primary experiments identified by completed pre-phase I studies.



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### 2. EXPERIMENTS PROGRAM DEFINITION

### 2.1 PRIMARY AND SECONDARY EXPERIMENTS

The experiments have been divided into two categories: (1) Primary Experiments which have the objective of measuring man's utility in space, and (2) Secondary Experiments which have the objective of advancing technology or providing scientific data of unusual importance. This document provides technical characteristics and discussions of the Primary Experiments as identified at the completion of pre-phase I studies.



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### 3. EXPERIMENT P-1 - ACQUISITION AND TRACKING OF GROUND TARGETS

### 3.1 OBJECTIVE

Future military land observation missions will require the capability to obtain very high resolution photographs for technical intelligence. The high resolution photographs can be obtained if a sufficiently large optical system is provided and if precise image motion compensation (IMC) can be accomplished.

The objective of this experiment is to evaluate man's performance in acquiring preassigned targets and tracking them to an accuracy compatible with the requirements for precise IMC determination under various conditions of target type and lighting. The crew member will be provided with reference photos of the target area to aid in acquisition, thus permitting evaluation of his proficiency in accomplishing acquisition (under various conditions of target-type and lighting) as a function of the resolution of the reference photographs. The results of the evaluations will provide a quantitative basis for design of future manned orbital reconnaissance systems.

### 3.2 DESCRIPTION

### 3. 2. 1 Experiment Equipment

The equipment complement for Experiment P-1 will consist of:

Pointing and Tracking Scope (PTS), including scanners Frame Camera (2) Film Processor PTS Electronic Interface Unit Briefing Material and Film File Briefing Presentation Unit Film Viewer Film Comparator



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Table 3-1. Equipment Weight and Volume, Experiments P-1, P-2, P-3, and P-8

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Item	Weight (lb)	Volume (cu ft)
PTS, 8 inch Aperture	262	31.0
Cameras (2) 70 mm	12	0.5
Electronic Interface Unit	25	0.5
Briefing Material	10	0.5
Briefing Presentation Unit	16	1.0
Film and BiMat - 5000 Frames	25	1.0
Film Viewer	15	0.5
Film Comparator	15	1. 0
Displays and Console	75	3.0
Mounting and Cold Plates	55	1,0
Wiring and Circuitry	35	2.0
Spares and Calibration	50	3.0
Film Processer	10	0.5
Star Trackers (3)	70	2.5
Star Tracker Electronics	57	1.0
Accelerometer	3	
Fairings (10 percent of 160 lb)	16	
Contingency	75	

• Total

49.0

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Figure 3-2. Experiment P-1 Power Profile Typical Sighting on Targets of Opportunity, Two Targets



Figure 3-3. Experiment P-l Power Profile Typical Photo-Data Measurement and Analysis Period



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Dual field telescope system

The wide-field optical system will be capable of simultaneously focusing images at the operator's eyepiece, the observer's eyepiece, and the wide-field camera. Both eyepieces will have a 45 deg apparent field angle; magnification will vary from 1.5 x to 9 x. The objective focal length will be 1.5 inches, the objective diameter 0.75 inch.

The narrow-field optical system will be capable of simultaneously focusing images at the operator's eyepiece and the narrow-field camera. The operator's eyepiece will have a 45 deg apparent field angle; magnification will vary from  $18 \times to 108 \times to 10$ length will be 36 inches, the objective diameter 8 inches. The operator's and observer's eyepieces will have a 6:1 zoom system. The operator will be able to select either the wide or the narrow field. A manually controlled focusing system will be provided for the narrow field.

# Acquisition and tracking scanners

The acquisition and tracking scanners will each contain two servo-positioned reflecting elements that will direct the LOS of the wideand narrow-field optical systems from nadir to 80 deg above nadir in all directions. The two scanning systems will be slaved to the acquisition system. Table 3-2 presents a summary of tracking servo requirements.



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Frame Camera	Two 70 mm frame cameras will provide photographs for evaluating results of the experiments, one each for the narrow- and the wide- field optical systems. Each camera will have a data-recording block. Up to 100 ft of film will be provided and exposure rates up to 4 frames/sec will be adjustable from the operator's console. Special high-definition serial film will be used; exposure time can be varied from 1 sec max to 0.001 sec min.
Film processor	The film processor will develop the exposed film by a web mono- bath technique.
PTS electronic interface unit	The PTS electronic interface unit will contain all the PTS system electronics and will provide for the interconnection of the PTS system to the Experiment Information System (EIS) and the displays and controls console.
Briefing material and film file	This unit will store briefing material, exposed and unexposed film, and processing material.
Briefing presentation unit	This unit will be capable of presenting a briefed target in the same perspective as the actual target will be viewed. The unit will have magnification capability.
Film viewer	This unit will contain a film holder and an arrangement to project the film onto a translucent screen. Means will be provided for magnification for measurement of relative distances between points on the film.



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Figure 3-6. IVSS Control Panel

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### Vehicle Stability

0.05 deg/sec<sup>2</sup> angular acceleration, 0.01 deg/sec angular velocity, 0.5 deg angular position, all three axes.

The MOL vehicle attitude control system will first null vehicle rates, then be shut down after acquisition. Rate gyros will supply body axis rates to the computer with a threshold performance of 0.001 deg/sec.

A star tracker will be required for consecutive tracking of several targets (optional mode) to provide long-term celestial reference for PTS pointing from target to target. Alignment errors between PTS servos and the star trackers should be minimal.

To be specified during laboratory Phase I study.

The equipment will withstand the Titan IIIC launch environment.

None

The equipment will be designed to withstand a minimum skin temperature of -150°F. Temperatures inside the MOL are not expected to exceed 60 to 130°F. Because of the wide variation between internal and external temperatures, each optical unit should be packaged either completely inside or completely outside the vehicle skin.



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Launch Vibration and Shock Limits

Vibration Limits

Hazards Peculiar to Equipment

Temperature Limits



The PTS may be mounted 45 deg up from the lower centerline of the vehicle to allow the operator to manually aid the star trackers during acquisition and lock-on, and to facilitate on-orbit checks of star tracker alignment with the PTS.

Other Units

All other P-1 hardware will be mounted adjacent to the PTS inside the laboratory. Figures 3-4 and 3-5 show the relative locations of most of these units.

### 3.4 ALIGNMENT AND CALIBRATION

On-orbit alignment and calibration procedural flow charts are presented in Figures 3-8 and 3-9.

### 3. 4. 1 Alignment and Calibration Equipment

Alignment and focusing of the PTS and cameras will be required. The items required to perform this task will include:

- (a) A ground-glass viewing plate for camera check.
- (b) A PTS camera preset-microscope attachment for examination of the sharpness of the star diffraction pattern for proper focusing.

### 3. 4. 2 On-Orbit Alignment and Calibration Procedures

PTS Camera Focus and Misalignment

Alignment and focus

Spatial alignment will be achieved by sighting on a stationary target (a star) and centering the PTS crosshairs on the target. Micrometer screws on the camera will be used to bring the target image into similar alignment.

Focus adjustment will be performed by removing the film deck and attaching a prefocused microscope in the camera image plane. The focus will be varied by micrometer screws to bring the diffraction pattern of the target image into maximum sharpness.



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Figure 3-9. Focusing and Alignment of the PTS

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Experiment Parameters to be Varied

Environmental parameters

Target or reference point characteristics

System parameters

These parameters are assessed by utilizing an adequate number of samples and by scheduling subexperiment testing at appropriate times during the mission. Specific environmental parameters of interest are:

Weather: Clear, 10 to 60 percent, clouds, 60 to 90 percent clouds, 90 to 100 percent clouds.

Lighting: Incident angle of sun or moonlight

Time of Day: Day, night, dawn, dusk

Atmospheric Characteristics (nominal): Temperature, pressure, humidity

Atmospheric Characteristics (special): Aerosol content, etc.

Target parameters and reference points of at least five general categories will be used. Each category will consist of targets or reference points of considerable variability within target class. Target types are:

Test Patterns

Cultural Targets (nonmilitary)

Military Complex (large)

Military Complex (small)

Geographic (significant or unique)

System parameters will be varied in a systematic manner to insure that human contribution can be assessed at several meaningful levels of man-machine interaction, from minimal or no-aiding to more complex types of aiding.



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United States (preferably an arid region), and in the eastern United States or Puerto Rico.

Military Complexes - 55 military complexes (see Table 3-3), ranging from airfields to army installations, have been assessed with regard to availability, time of exposure to optical sighting, etc. These analyses have permitted estimates to be made of elapsed orbits to completion of Experiment P-1.

Cultural Targets - Significant cultural features such as intersections of long straight lines (interstate highways), cities, and bridges will be used as known reference points, particularly in areas where military complexes are scarce or nonextent.

Targets will be located within the ZI, Hawaii, Puerto Rico, and Australia. Exact locations are to be determined. Table 3-3 is a list of possible Experiment P-1 targets.

In a typical test procedure, the crew member or the general purpose computer will select an appropriate preassigned target, display the target area map, and enter the target coordinates into the display. Preselected test targets both in and out of the orbital plane will be used. These may include airfields, missile sites, and specially prepared target areas. The crew member will then activate the equipment and align the vehicle so one body axis is parallel to the ground track. The PTS scanning element will be rotated to the correct azimuth and elevation for acquisition. Scan and acquisition will then be accomplished



### Target locations

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### Test Procedure

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### Table 3-3. IVSS Target Characteristics (continued)

Name	Latitude	Longitude	Possible_Targets
Castle AFB	37°23'	120°32'30''	B-52 A/C
Norfolk	36°54'	76°581	Shipyard
Blytheville AFB	35°57'30''	89°56'30''	B-52 A/C
Tinker AFB	35°25'	97°23'30''	AF Depot Oklahoma City
Clinton Sherman AFB	35°2' 30"	99°12'	B-52 A/C
Seymour Johnson AFB	35°20'30''	77°58'	B-52 A/C
Amarillo AFB	35°13'30''	101°42'	B-52 A/C
Little Rock AFB	34°55'30''	92°9'	Titan II
Edwards AFB	34°54†	117°53'	AF Test Range a- Sighting from Space b- Sighting from Ground (Tracking Capabilities)
Vandenberg AFB	34° <b>42</b> †	120°33'	Atlas D. E. F. Various Facilities for Missile & Space Vehiele Launches Tracking Capabilities
Altus AFB	34°39'	99°16'30''	B-52 A/C Atlas F
Sheppard AFB	3 <b>3°</b> 59'	98°30'30''	B-52 A/C
March AFB	33°531	117°16''	B-52 A/C 15th AF Ilq.
Columbus AFB	33°37 <b>'3</b> 8''	88°26'	B-52 A/C
Walker AFB	33°18'	104°31'	B-52 A/C Atlas F
Holloman AFB	32°52'	106°6'	WSMR a- Sight from Space b- Tracking Capabilities
Carswell AFB	32°46'30''	97°26'	B-58 A/C B-52 A/C Dallas, Ft. Worth
Warner Robbins AFB	32°38'	82°351	B-52 A/C Depot, Electronics
Yuma Test Range	32°38'	114°35'	Test Range a- Sight from Space



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with a low magnification and large FOV. The target will be centered and automatic tracking engaged. The magnification will then be increased and the crew member will manually correct tracking errors through the nadir point. During the run, periodic frame photographs with a superimposed crosshair will be taken by the coupled camera.

The information flow will proceed in the following manner. Knowledge of the MOL ephemeris, from ground tracking or autonomous navigation, and of the target's geographic coordinates, will allow precomputation of the motion of the LOS to the target. This in turn will allow the computation of: (1) the orientation of the PTS scanning plane, (2) the orientation of the target locus relative to the MOL, and (3) the initial pointing angles of the PTS and its associated angular rate profile.

The operator, upon acquisition of the target with the viewfinder slaved to the digital computer, will generate error signals to the PTS pitch and roll gimbal servos. These error signals will be used to stabilize the image presentation and to update the MOL orbital parameters using linear perturbation theory.

The evaluation criteria established for Experiment P-1 range from measurement of photo data on records returned to earth to analysis of system state variables telemetered to ground. The evaluation procedures and criteria are shown in Table 3-4.



Evaluation Procedure

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Experimental Question	Evaluation Parameter	Evaluation Technique	Criteria (if established)	Remarks
What percentage of pre-assigned targets has operator acquired and tracked for criteria?	X-hair location over time Existence of "target" on photographic data. LOS Angular Rate	<ul> <li>Examine photographic-telemetered data for:</li> <li>a accuracy of crosshair placement on</li> <li>a acquisition, during tracking with respect to target</li> </ul>	<ul> <li>&gt; 250 fect</li> <li>&gt; 0.2 percent LOS Angular Rate</li> </ul>	Ground analysis by photo interpreters.
For all conditions of P-1 over time	All established parameters	Compare base-line automatic photos with human aided photographs,	None	Both quantitative and qual- itative statement of human contribution should be
Does crew/experimenter system management, selection of modes, and operation of systems differed and invertionally from hose-line data 2	Discrete mode controls	Sample selected discrete IVSS mode controls and discrete system re- sponse to 0.01 second.		Digital recording of dis- crete operator response buffered and telemetered to ground at aupropriate
big human have adequate time to perform tasks expected of him?	Operator performance by measuring mode controls, etc. Operator log and commen- tary.	(Same as above)		time.
Can the effects of environment, particularly weather be charac- terized with respect to impact upon human performance?	Performance criteria as a function of atmospheric and lighting constraints.	Ground correlation of atmospheric conditions, other factors, with performance.	Boundaries of human performance for pre- dictive purposes.	Sampling of atmosphere by aircraft a requiremont. Test pattern desirable.

# Experiment P-1 Evaluation Techniques and Criteria (continued) Table 3-4.



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Data To Be Recorded

**On-Board Data Processing** 

the correct value. The difference between this value and that computed onboard with imperfect tracking will be the IMC error.

During an experiment, data will be sampled from the following:

Console

Sensor

Computer Interface

Unique Calibration Equipment

Some sample data from the console which will be employed for realtime experiment control will not be recorded. This will also be true of some computer interface data. Tables 3-5 through 3-8 list the data to be sampled and recorded. Where no sampling or recording is necessary, it is so noted. The approximate storage rates are shown in Tables 3-9 through 3-12.

The experiment information system (EIS) will allow the crew to control and monitor the IVSS experiments. The EIS must receive, convert, store, and distribute data concerning targets, vehicle state parameters, operational subsystems, and experiments. It must interpret the data where appropriate, and transfer the data to the communications subsystem for transmittal to the ground.

The EIS will route IVSS data to various MOL equipment. This task will comprise four major subtasks: collecting, converting, formatting, and storing all IVSS data which must be subsequently analyzed.



Ţ	able 3-5. Cons	sole Data Recor-	ding Req	uirements	(continued)	
Parameter	Purpose	Source	Type	Sample Rate	Data Bits Remarks	
BRIEFING PANEL Display mode	Selects "On- Off" of briefing slide-data	2-position rotary switch	2 Dis- crete(s)	1/sec	l bits/sec	
slide orienta- tion	Select mode for auto orientation of briefing slide	2-position switch	2 Dis- cretes	1/sec	2 bits/sec	
Frame No.	ldentify prop- er briefing material slide	3 digital wheels	Digital	1/10 sec	12 bits/ 3 digital whe 10 sec 4 binary bits per wheel	eels, s
Red filter	Self-evident	2-position discrete rota- ry dial	Dis- crete	l/sec	2 bits/sec	
MODE PANEL Mode select		5-position discrete rota- ry switch	5 Dis- cretes	l/sec	5 bits/sec	
Function select		4-position discrete rota- ry switch	4 Dis- cretes	1/sec	4 bits/sec	
Target select	Self-evident	l6-position discrete rota- ry switches	l6 Dis- cretes	l/sec	l6 bits/sec	



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Parameter	Purpose	Source	Type	Sample Rate	Data Bits	Remarks
Polarizer "In-Out"		toggle	2 Discretes	1/sec	1 bits/sec	8 5
PTS pointing angle	Indicates PTS pitch and roll angles to operator	Decimal wheels	Digital	l/sec	l6 bits/sec (pitch) l6 bits/sec (roll)	1
Polarizer adjust	Sets angle between polarizer lens	Rotary "pot"	18 Discretes	1/sec	5 bits/sec	1
OTHER IVSS power "On"		toggle	2 Discretes	1/10 sec	1 bits/sec	I U
Start-end test		2 push- button lights	2 Discretes	1/sec	2 bits/sec	1
Quality filter		2 push- button lights	2 Discretes	l/sec	2 bits/sec	1
<b>Malfunction</b> lights	Lights for malfunction detection	Lights (16)	4 Discretes	l/sec	16 bits/sec	1



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Table 3-5. Console Data Recording Requirements (continued)

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ParameterPurposeSourceTypeSampleData BitsMDIUNumericEnter orKeyboardDigital5/sec, BCD20 bits/secNumericEnter orKeyboardDigital5/sec, BCD20 bits/secNumericEnter orKeyboardDigital5/sec, BCD20 bits/secNumericEnter orMDDUNumericIne stainser-20 bits/secNumericEnter orKeyboardDigital1/sec16 bits/secTARGETPARAMETERSIndicate4 decimal1/sec16 bits/secPARAMETERSIndicate4 decimalDigital1/sec16 bits/secPARAMETERSIndicate3 decimalDigital1/sec, at20 bits/secParget trackComputed3 decimalDigital1/sec, at20 bits/secTarget trackComputed3 decimalDigital1/sec, at20 bits/secInneInter of fixSectionSectionSec, at20 bits/secIntideIndicate5 decimalDigital1/sec, at20 bits/secIntideIndicate5 decimalDigitalDigital1/sec, at20 bits/secIntideMdicate5 decimalDigitalDigitalIntervet20 bits/secIntideMdicate5 decimalDigitalDigitalIntervet20 bits/secIntideMdicate5 decimalDigitalDigitalIntervet20 bits/sec	Tabl	e 3-5. Consol	e Data Record	ing Requir	ements (cont	inued)	
MDIU Numeric Enter or Keyboard Digital 5/sec, BCD 20 bits/se insert address address message TARGET PARAMETERS PARAMETERS PARAMETERS PARAMETC Indicate 4 decimal Digital 1/sec 16 bits/se target track time before wheels target track Computed 3 decimal Digital 1/sec, at 20 bits/se time position wheels plus sampled of target wheel 5 decimal Digital 1/sec, at 20 bits/se target time of fix sampled for the position wheel 5 decimal Digital 1/sec, at 20 bits/se	Parameter	Purpose	Source	Type	Sample Rate	Data Bits	Remarks
TARGET PARAMETERS PANEL Time to target target trackIndicate terme time before target is in view4 decimal bigitalDigital l //sec1/sec16 bits/seTarget track target trackComputed time space time time time time3 decimal bigitalDigital1/sec16 bits/seTarget track time time time time time time time time3 decimal bigitalDigital tal12 bits/fisTarget track time time time time time time time time time time time time time time time time target target target target 	MDIU Numeric insert	Enter or address message in MDDU	Keyboard	Digital	5/sec, BCD data inser- ted when "Data line is up	20 bits/sec	Keyboard in- serted into 4-bit buffer serially, Computer verifies and displays on MDDU
Target trackComputed3 decimalDigital12 bits/fistimetimespacewheelstime12 bits/fistimetargets is in viewtargets is in view1/sec, at20 bits/seLattitudeIndicate5 decimalDigital1/sec, at20 bits/setimeof target4-positionwheelstime of fix brogram20 bits/se	TARGET PARAMETERS PANEL Time to target	Indicate time before target is in view	4 decimal wheels	Digital	l/sec	16 bits/sec	1 8
Lattitude Indicate 5 decimal Digital 1/sec, at 20 bits/se position wheels plus time of fix of target 4-position aduring wheel program interrupt	Target track time	Computed time space targets is in view	3 decimal wheels	Digital		12 bits/fix	1 2
	Lattitude	Indicate position of target	5 decimal wheels plus 4-position wheel	Digital	l/sec, at time of fix sampled during program interrupt	20 bits/sec	1

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Remark	;	1 1	t t	1
Data Bits	3 bits/sec	3 bits/sec	1 bit/sec	3 bits/sec
Sample Rate	l/sec ea	1/sec ea	1/sec	l/sec
Type	3 Dis- cretes	3 Dis- cretes	2 Dis- cretes	3 Dis- cretes
Source	3-position rotary switch	3-position rotary switch	2-position rotary switch	<b>3-position</b> rotary switch
Purpose	Isolate malfunction	Isolate malfunction	Selects "On- Off" of film projector	Self-evident
Parameter	Lamp switch	Computer switch	FILM VIEWER CONTROL PANEL Display mode	Magnification

Table 3-5. Console Data Recording Requirements (continued)

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Tab	le 3-6.	Sensor Data	Requirements		
	Source	Type	Sample Rate	Data Bits	Re
ion	Gimbal angle	Digital	2/sec at time of fix	16 bits/sec	

s Remarks	с		sec	sec sec 2 trackers	sec sec 2 trackers
Data Bits	16 bits/s	760 bits/	72 bits/s g	2 bits/se	48 bits/s for 10 se 6 times/ orbit
Sample Rate	2/sec at time of fix sampled during program interrupt routine	20/sec	l/sec and also durin program interrupt	l/sec	l/sec during slew
Type	Digital	Digital	Digital	Dis- cretes (2)	
Source	Gimbal angle encoders	Error signal to servo	Phasolver	Photo- multiplier	Computer
Purpose	Enables computation of LOS	Find lag in loop, permit comput. of commanded rate	Reference PTS angles to inertial reference	Malfunction detection or loss of star	To drive tracker to acquire navigational star
Parameter	PTS gimbal angles, pitch and roll	PTS servo loop error signal	Vehicle attitude pitch and roll angles	"Star Present" signal	Angle Com- mands for star tracker

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eter Pu n coi loc	rpose fate ation	Source Computer storage	Type Digital	Sample Rate 10/sec on dis- crete from DCS	Data Bits 20 bits/10 sec 1atitude 21 bits/10 sec longitude	Remarks
UP ref uni con	late time erence t in nputer	Computer storage	Digital	10/sec on discrete from DCS	27 bits/10 sec	

DCS - Computer Interface Data Requirements Table 3-7.



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### Table 3-9. Normal Data Recording

Parameter		Data Rate (bits/sec)
PTS Gimbal Angles Vehicle Attitude Star Present PTS Servo Loop Error Signa Roll and Oblique Perspectiv GMT Horizon Sensor Inhibit Vehicle Rates Mode Select (Mode Panel) Function Select (Mode Panel) Target Select (Mode Panel) Track Mode (Mode Panel) Scan Select (Mode Panel) Display Mode (Briefing) Slide Orientation (Briefing) Frame Number (Briefing) Red Filter (Briefing) PTS Magnification Spectral Filters Reticle Hue Attenuation Polarizer "In-Out" Polarizer Adjust Quality Filter Malfunction Indication Time to Target Target Latitude Target Longitude Attitude Control System Mod	l e of Briefing Slide le	$\begin{array}{c} 76\\ 72\\ 2\\ 760\\ 12\\ 27\\ 22\\ 1\\ 36\\ 5\\ 4\\ 16\\ 5\\ 2\\ 1\\ 2\\ 12\\ 2\\ 6\\ 6\\ 4\\ 4\\ 1\\ 5\\ 2\\ 20\\ 16\\ 20\\ 21\\ 3\\ 380 \end{array}$
	Subtotal	1545
	Identification	5
	Total	1550



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Table 3-11. Photographic Interpretation Data

Parameter		Data Rate (bits/frame)
X Position of Crossha	ir	17
Y Position of Crossha	ir	17
X Position of Target		17
Y Position of Target		17
	Subtotal	68
	Identification	2
	Frame Numbe	r <u>10</u>
	Total	80



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The functional requirements of the MOL computer which must be included are:



Vehicle alignment for acquisition and tracking.

Generation of initial PTS pointing angles. The relative vehicle state vector will be transformed into vehicle coordinates whereby position and velocity vector projections on the vehicle axes will be used to provide gimbal angle and gimbal angle rate commands for PTS control.

Estimation of relative trajectory parameters for accurate image motion sensing and focus adjustment.

PTS control and image velocity sensing.

Communication Data Requirements to Ground

The telemetry/communications/ground support interfacing required by the experiment results from the data continuously recorded during the experiments, photo tag data, photo interpretation data, and alignment and calibration data.



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Flow of Functions Required for IVSS Experimentation and Operation

Figure 3-10.

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NEXT TASK OPERATOR DETERMINES IF EXPOSURE SHOULD BE INCREASED OR DECREASED & MAKES APPROPRIATE SELECTION ÆS OPERATOR MONITORS EXPO-SURE METER READOUT DOES OPERATOR SELECT FILTER PUT FILTER SELECT SWITCH TO NONE ş Æ PUT EXPOSURE SELECTOR SWITCH IN AUTO POSITION MONITOR FILM TYPE ANNUN-CIATOR TO DETER-MANE KIND OF FILM IN CAMERA OPERATOR SELECT SELECT ¥ YES PUT FRAME RATE SELECTOR IN MAN POSITION IS SUFFICIENT FILM LEFT FOR COMPLETE TEST? ş YES YES IS FRAME RATE MANUALLY CONTROLLED TURN THUMB WHEELS UNTIL PROPER READOUT ON FRAMES REMAINING INDICATOR APPEARS DECIDE WHAT RATE SHOULD BE & POSITION SELECTOR CORRECT NUMBER OF FRAMES ş Ŷ YES PUT FRAME RATE SELECTOR IN PROG. POSITION DOES OPERATOR SELECT FRAME RATE ¥ MONITOR FRAMES REMAINING INDICATOR PUT FILTER SELECT SWITCH TO DESIRED SETTING FILM INSERTION FUNCTION Т

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Figure 3-14. Task Flow for Camera Control Function - Station I

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Figure 3-16. Task Flow for Tracking Function - Station I

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Figure 3-21. Task Flow for Photo-Data Function - Station II



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