# PRIMARY EXPERIMENTS DATA

# FOR THE

# MANNED ORBITING LABORATORY SYSTEM (MOL)

# PROGRAM

MARCH 1965



HEADQUARTERS
SPACE SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
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[redacted]



SSMM-67

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 [redacted]

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.

<u>Key Acronyms</u>

PTS (Pointing & Tracking Scope)

IVSS (Image Velocity Subsystem)

MOC

2 Kinds of experiments: primary / secondary

1. Acq + Tracking of Ground Targets: <u>80 tests</u>
   mil land observation missions
   want very high resolution photos for tech. intelligence

tech. pri: Take a good picture while moving.

How does man perform in acquiring + tracking (prescribed) targets?
given varying conditions of target type + lighting?

Uses a Pointing + Tracking Scope (PTS), including scanners
Frame camera
Film processor

Uses dual field telescope system
1. a wide field optical system
2. A narrow field optical system

Uses 2 70mm frame camera's

5 Kinds of Target types
- Test patterns
- Collimated targets
- Mil. complex (large)
- " " (small)
- Geographic targets.

# 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.

# 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

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

| 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 | 826 | 49.0 |

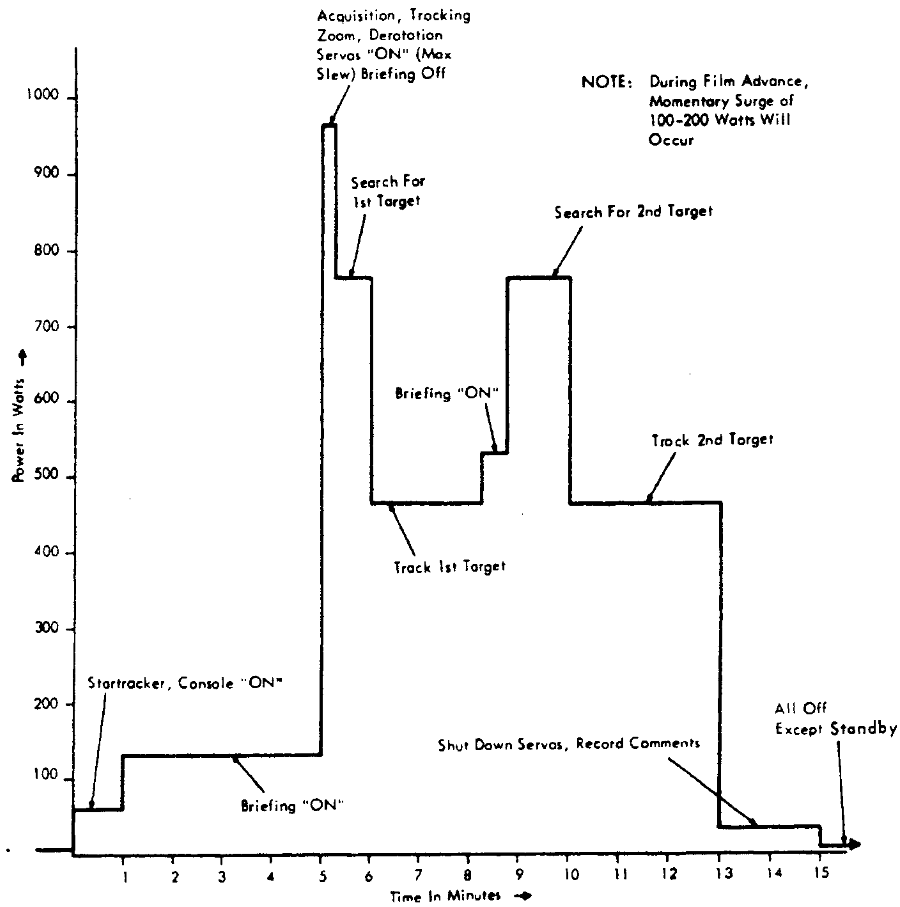


Figure 3-2. Experiment P-1 Power Profile
Typical Sighting on Targets of Opportunity, Two Targets

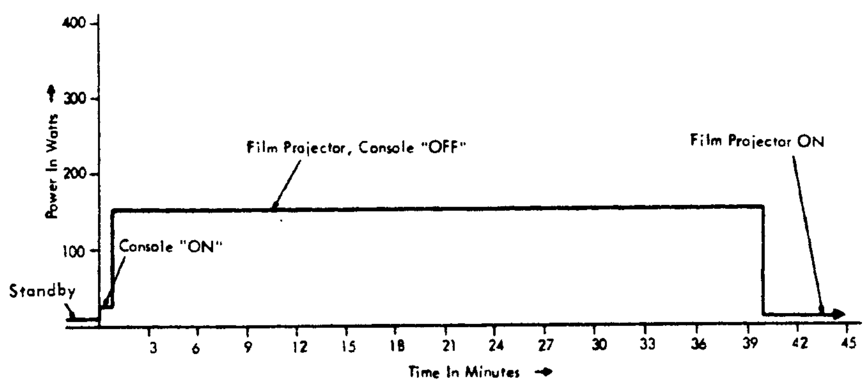


Figure 3-3. Experiment P-1 Power Profile
Typical Photo-Data Measurement and Analysis Period

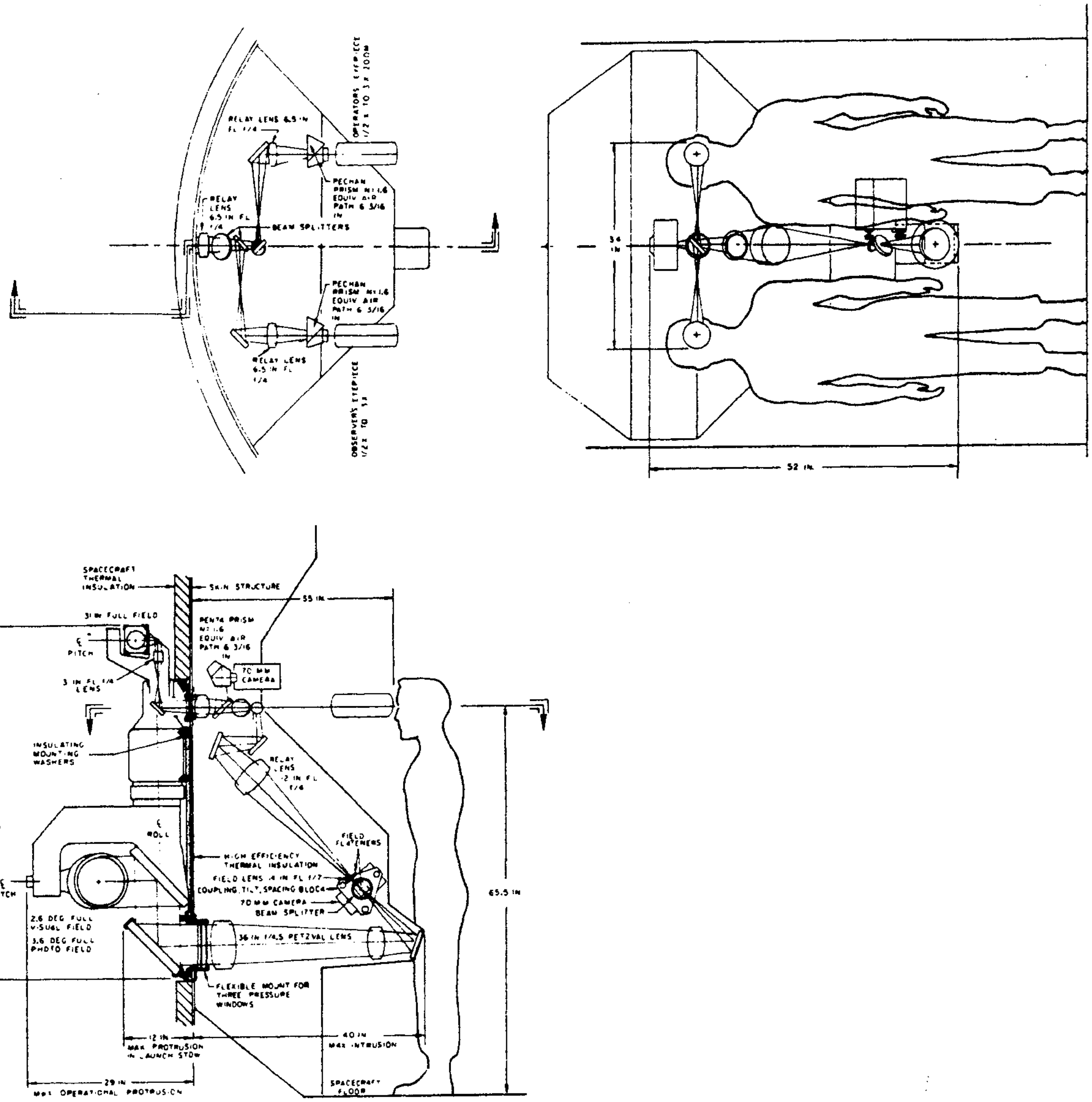


Figure 3-4. Pointing and Tracking Scope Configuration

**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 x to 108 x. The objective focal 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 wide- and 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.

| | |
|---|---|
| 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. |

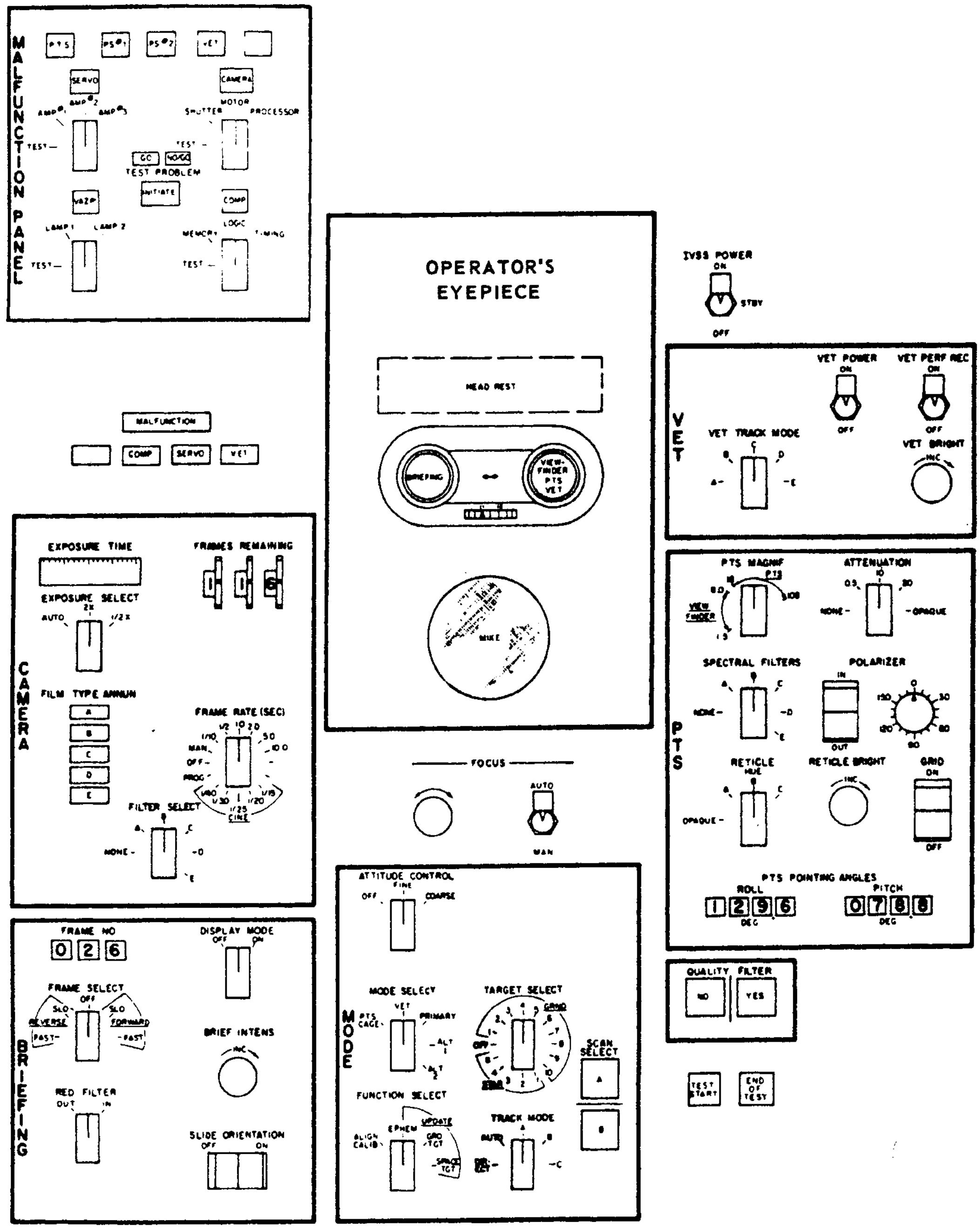


Figure 3-6. IVSS Control Panel

| | |
|---|---|
| Vehicle Stability | 0.05 deg/$sec^2$ angular acceleration, 0.01 deg/sec angular velocity, 0.5 deg angular position, all three axes.<br><br>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.<br><br>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. |
| Vibration Limits | To be specified during laboratory Phase I study. |
| Launch Vibration and Shock Limits | The equipment will withstand the Titan IIIC launch environment. |
| Hazards Peculiar to Equipment | None |
| Temperature Limits | The equipment will be designed to withstand a minimum skin temperature of $-150^{\circ}$F. Temperatures inside the MOL are not expected to exceed 60 to $130^{\circ}$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. |

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.

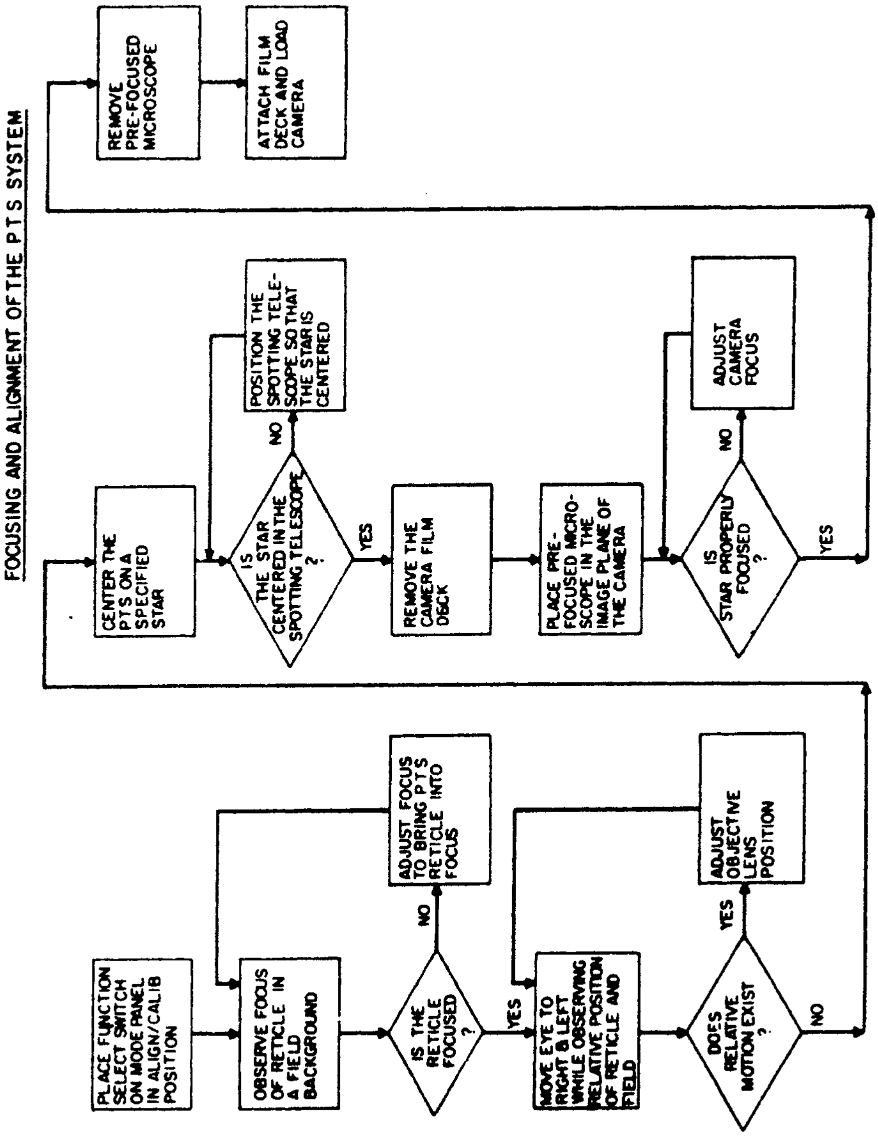


Figure 3-9. Focusing and Alignment of the PTS

Experiment Parameters to be Varied

| | |
|---|---|
| Environmental parameters | These parameters are assessed by utilizing an adequate number of samples and by scheduling sub-experiment 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 or reference point characteristics | 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 | 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. |

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.

Target locations

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.

Test Procedure

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

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°58' | Shipyard |
| Blytheville AFB | 35°57'30" | 89°56'30" | B-52 A/C |
| Tinker AFB | 35°25' | 97°23'30" | AF Depot<br>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<br>a- Sighting from Space<br>b- Sighting from Ground (Tracking Capabilities) |
| Vandenberg AFB | 34°42' | 120°33' | Atlas D. E. F.<br>Various Facilities for Missile & Space Vehicle Launches<br>Tracking Capabilities |
| Altus AFB | 34°39' | 99°16'30" | B-52 A/C<br>Atlas F |
| Sheppard AFB | 33°59' | 98°30'30" | B-52 A/C |
| March AFB | 33°53' | 117°16" | B-52 A/C<br>15th AF Hq. |
| Columbus AFB | 33°37'38" | 88°26' | B-52 A/C |
| Walker AFB | 33°18' | 104°31' | B-52 A/C<br>Atlas F |
| Holloman AFB | 32°52' | 106°6' | WSMR<br>a- Sight frcm Space<br>b- Tracking Capabilities |
| Carswell AFB | 32°46'30" | 97°26' | B-58 A/C<br>B-52 A/C<br>Dallas, Ft. Worth |
| Warner Robbins AFB | 32°38' | 82°35' | B-52 A/C<br>Depot, Electronics |
| Yuma Test Range | 32°38' | 114°35' | Test Range<br>a- Sight from Space |

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.

## Evaluation Procedure

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.

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

| 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<br>Existence of "target" on photographic data.<br>LOS Angular Rate | Examine photographic-telemetered data for:<br>• accuracy of crosshair placement on<br>• acquisition, during tracking with respect to target | <br><br>> 250 feet<br><br>> 0.2 percent LOS Angular Rate | 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 qualitative statement of human contribution should be made. |
| Does crew/experimenter system management, selection of modes, and operation of systems differed significantly from base-line data? | Discrete mode controls | Sample selected discrete IVSS mode controls and discrete system response to 0.01 second. | | Digital recording of discrete operator response buffered and telemetered to ground at appropriate time. |
| Did human have adequate time to perform tasks expected of him? | Operator performance by measuring mode controls, etc.<br>Operator log and commentary. | (Same as above) | | |
| Can the effects of environment, particularly weather be characterized 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 predictive purposes. | Sampling of atmosphere by aircraft a requirement. Test pattern desirable. |

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

Data To Be Recorded

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 real-time 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.

On-Board Data Processing

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.

Table 3-5. Console Data Recording Requirements (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 Discrete(s) | 1/sec | 1 bits/sec | |
| slide orientation | Select mode for auto orientation of briefing slide | 2-position switch | 2 Discretes | 1/sec | 2 bits/sec | |
| Frame No. | Identify proper briefing material slide | 3 digital wheels | Digital | 1/10 sec | 12 bits/10 sec | 3 digital wheels, 4 binary bits per wheel |
| Red filter | Self-evident | 2-position discrete rotary dial | Discrete | 1/sec | 2 bits/sec | |
| MODE PANEL Mode select | | 5-position discrete rotary switch | 5 Discretes | 1/sec | 5 bits/sec | |
| Function select | | 4-position discrete rotary switch | 4 Discretes | 1/sec | 4 bits/sec | |
| Target select | Self-evident | 16-position discrete rotary switches | 16 Discretes | 1/sec | 16 bits/sec | |

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

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

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

| Parameter | Purpose | Source | Type | Sample Rate | Data Bits | Remarks |
|---|---|---|---|---|---|---|
| MDIU | | | | | | |
| Numeric insert | Enter or address message in MDDU | Keyboard | Digital | 5/sec, BCD data inserted when "Data line is up | 20 bits/sec | Keyboard inserted into 4-bit buffer serially, Computer verifies and displays on MDDU |
| TARGET PARAMETERS PANEL | | | | | | |
| Time to target | Indicate time before target is in view | 4 decimal wheels | Digital | 1/sec | 16 bits/sec | -- |
| Target track time | Computed time space targets is in view | 3 decimal wheels | Digital | [redacted] | 12 bits/fix | -- |
| Lattitude | Indicate position of target | 5 decimal wheels plus 4-position wheel | Digital | 1/sec, at time of fix sampled during program interrupt | 20 bits/sec | -- |

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

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

Table 3-6. Sensor Data Requirements

| Parameter | Purpose | Source | Type | Sample Rate | Data Bits | Remarks |
|---|---|---|---|---|---|---|
| PTS gimbal angles, pitch and roll | Enables computation of LOS | Gimbal angle encoders | Digital | 2/sec at time of fix sampled during program interrupt routine | 16 bits/sec | |
| PTS servo loop error signal | Find lag in loop, permit comput. of commanded rate | Error signal to servo | Digital | 20/sec | 760 bits/sec | |
| Vehicle attitude pitch and roll angles | Reference PTS angles to inertial reference | Phasolver | Digital | 1/sec and also during program interrupt | 72 bits/sec | 2 trackers |
| "Star Present" signal | Malfunction detection or loss of star | Photo-multiplier | Dis-cretes (2) | 1/sec | 2 bits/sec | |
| Angle Commands for star tracker | To drive tracker to acquire navigational star | Computer | | 1/sec during slew | 48 bits/sec for 10 sec 6 times/orbit | 12 bits/channel - 2 trackers 4 channels |

Table 3-7. DCS - Computer Interface Data Requirements

| Parameter | Purpose | Source | Type | Sample Rate | Data Bits | Remarks |
|---|---|---|---|---|---|---|
| Vehicle location | Update computed vehicle location | Computer storage | Digital | 10/sec on discrete from DCS | 20 bits/10 sec latitude 21 bits/10 sec longitude | |
| [redacted] | | | | | | |
| Time | Update time reference unit in computer | Computer storage | Digital | 10/sec on discrete from DCS | 27 bits/10 sec | |

Table 3-9. Normal Data Recording

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

Table 3-11. Photographic Interpretation Data

| Parameter | | Data Rate (bits/frame) |
|---|---|---|
| X Position of Crosshair | | 17 |
| Y Position of Crosshair | | 17 |
| X Position of Target | | 17 |
| Y Position of Target | | 17 |
| | Subtotal | 68 |
| | Identification | 2 |
| | Frame Number | 10 |
| | Total | 80 |

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

[redacted]

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.

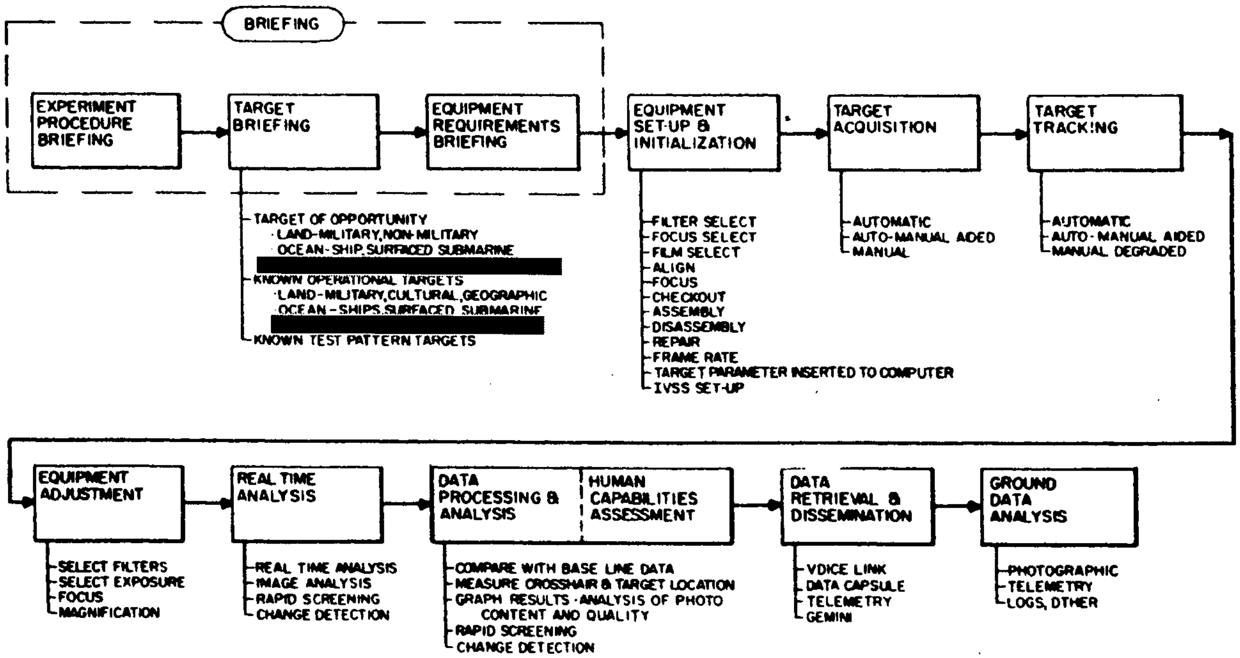


Figure 3-10. Flow of Functions Required for IVSS Experimentation and Operation

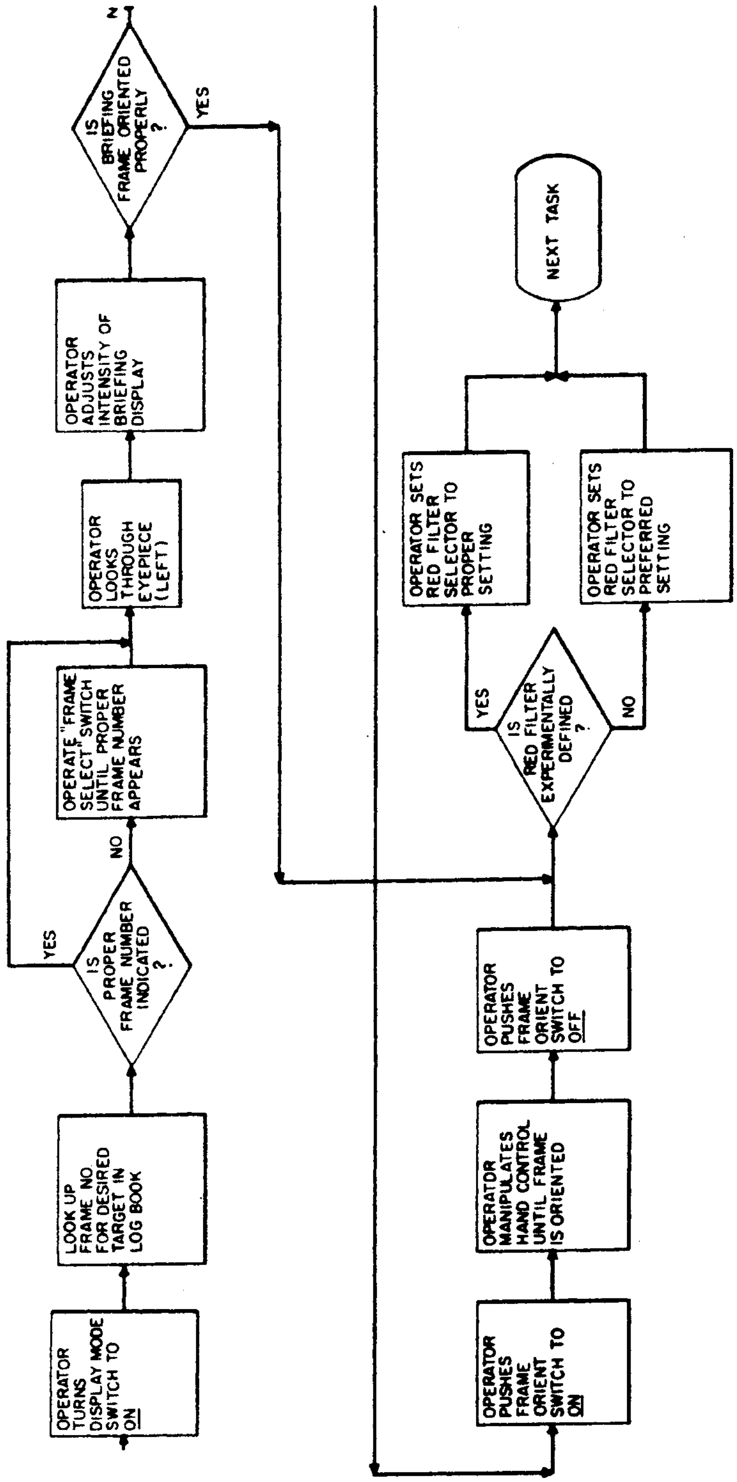


Figure 3-12. Task Flow for Briefing Function - Station I

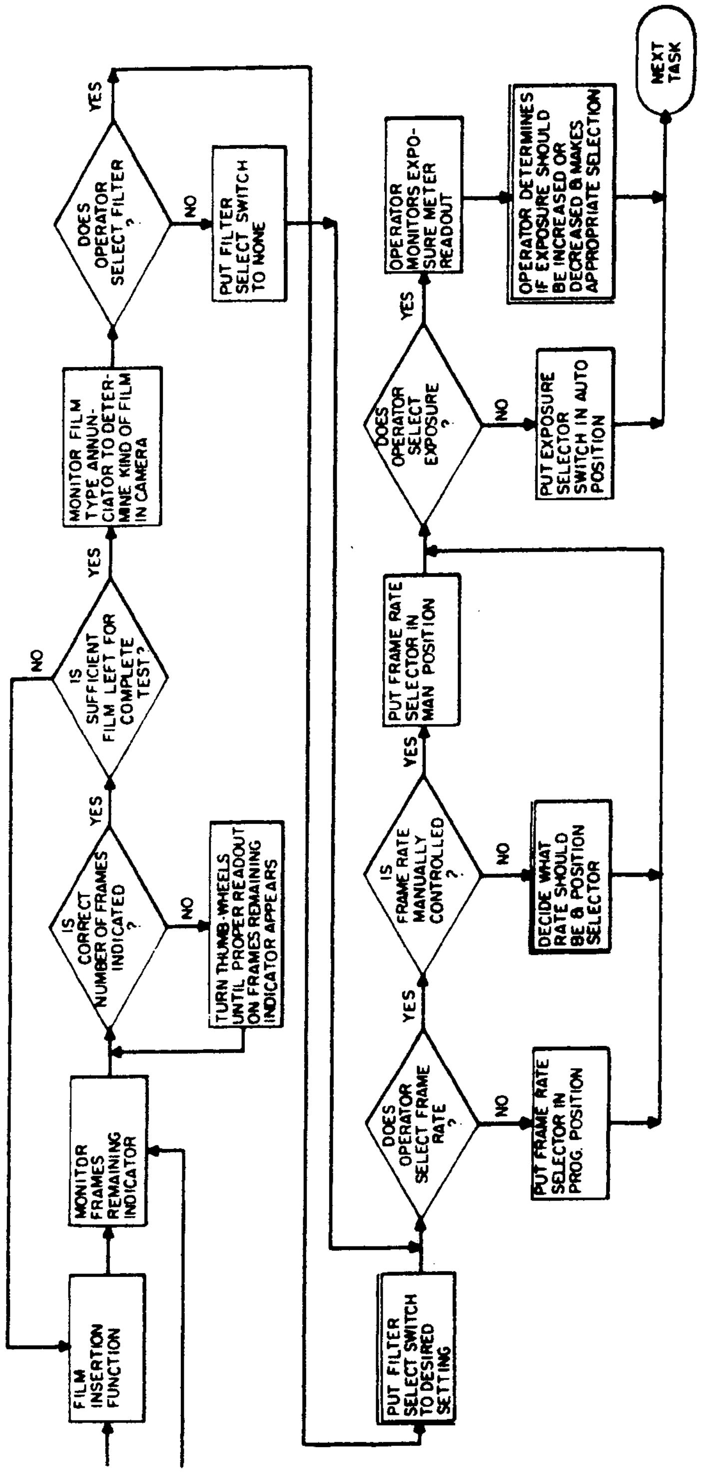


Figure 3-14. Task Flow for Camera Control Function - Station I

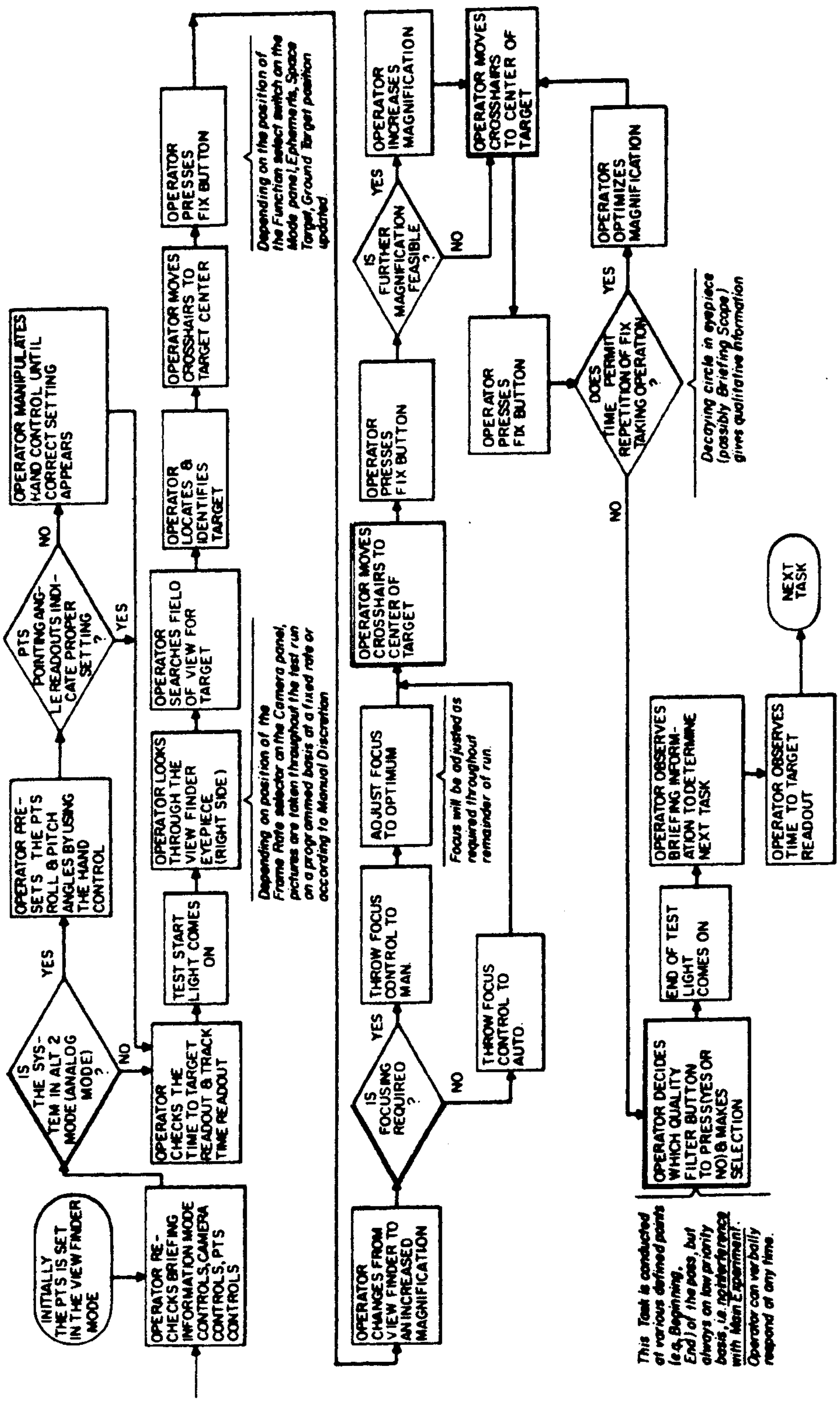


Figure 3-16. Task Flow for Tracking Function - Station I

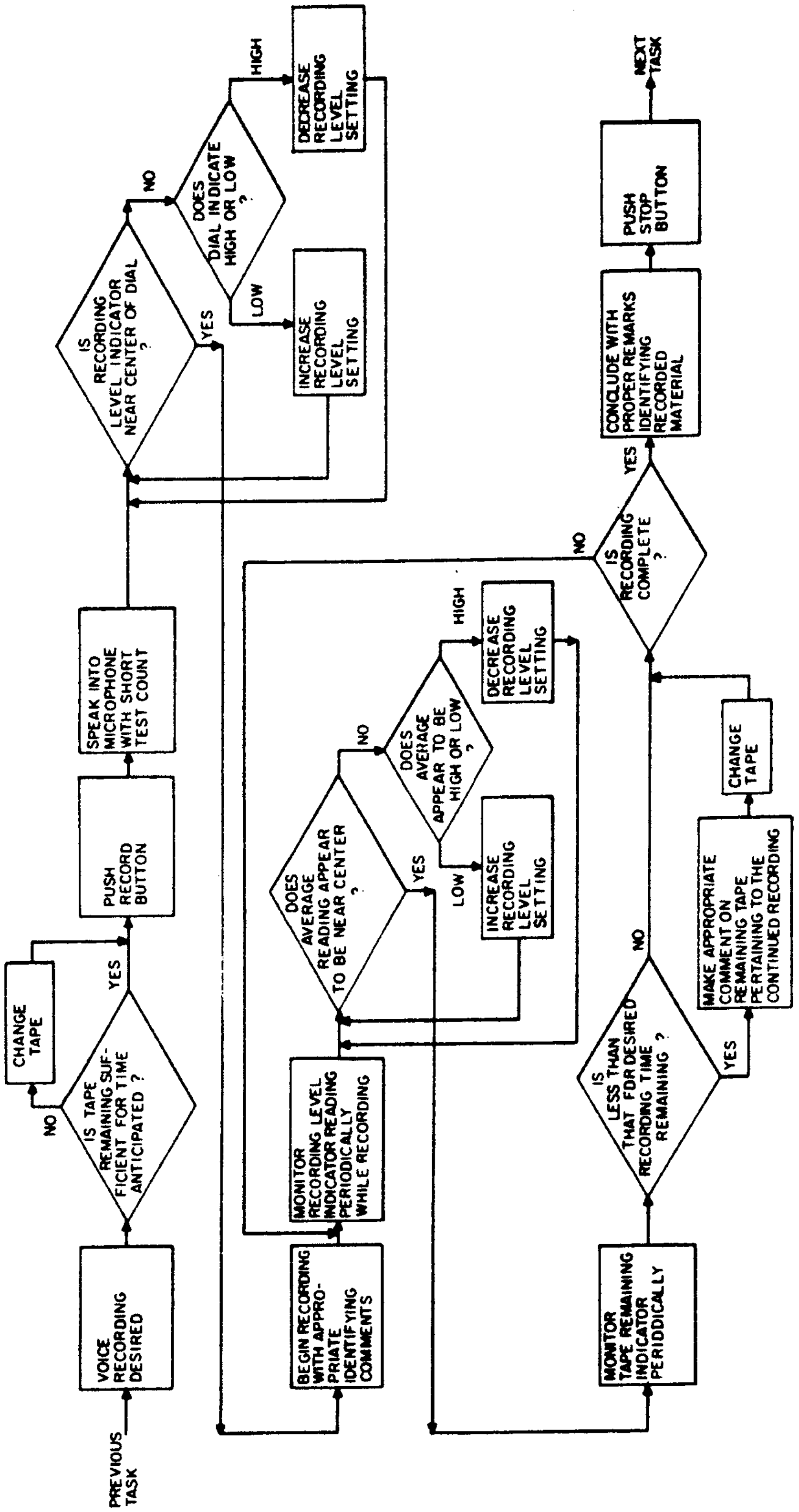


Figure 3-18. Task Flow, Voice Commentary During Experiment

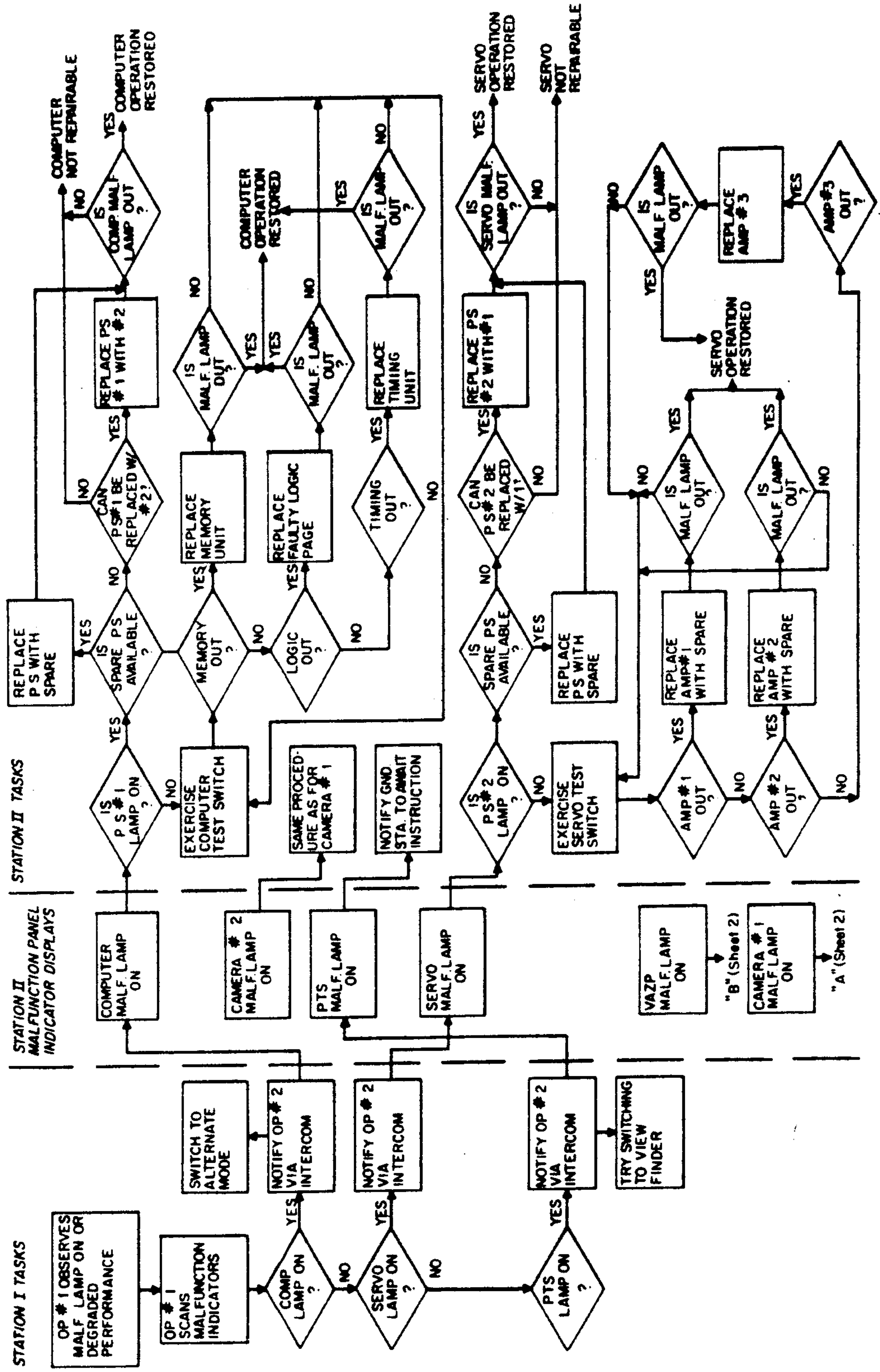


Figure 3-20. Task Flow for Malfunction (Sheet 1 of 2)

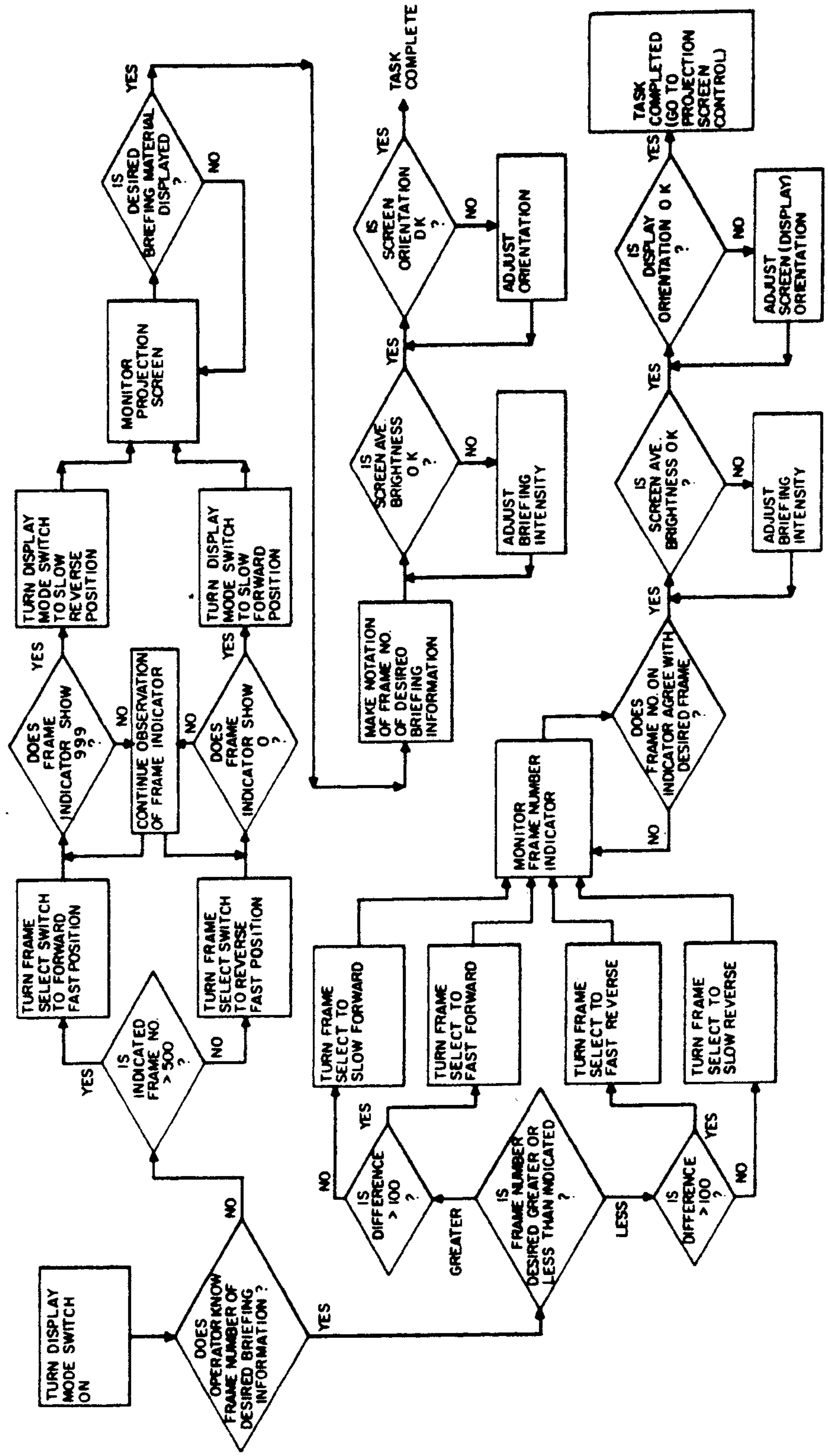


Figure 3-21. Task Flow for Photo-Data Function - Station II