MISSION DEVELOPMENT SIMULATOR

PHASE 0

SYSTEM TEST PROCEDURE

REV 0

DATE 3/20/69

BYE 5161 39

/10

SECRET/ DORIAN
HANDLE VIA BYEMAN SYSTEM ONLY
INTERNAL SIGN-OFF SHEET

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1/11/69

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1.0 SCOPE

This Document is the Test Procedure for demonstration and verification of the Phase 0 capability of the MDS.

2.0 APPLICABLE DOCUMENTS


SAFSL Exhibit 34003, 15 August 1968

2) Phase 0 Configuration Presentation

Made 6/26/68, BIN-50372-96-3

3) Phase 0 - Simulation Software Requirement Rev 2

October 15, 1968 BIN: BIF-055-1318-20-3-68

4) Mission Development Simulator Phase 0 Demonstration Requirements.

BIF-055-50372-244-268

5) Mission Development Simulator Phase 0 System Test Plan Rev C

1/30/69

BIN: BIF-055-46772-69
3.0 SYSTEM VERIFICATION AND DEMONSTRATION

The overall function characteristics of the Phase 0 will be verified and demonstrated during a series of System Level Tests, Analysis of Subsystem Data and Visual Inspection of the Hardware. The Procedures in this Document are categorized as follows:

1) Verification Tests (Section 4.0. These Tests will be performed during Hardware/Software Integration Tests).
   a) Visual Inspection of Hardware and/or Design Drawings
   b) Individual measurements made at the System Level but not included in the Script of the DOP'S.
   c) Analysis of Subsystem and System Test Data
   d) Pre-Test Checkout Program and Procedure
   e) Demonstration Orbital Passes

2) Demonstration Tests (Section 5.0. These Tests will be performed during the Demonstration Test Period)
   a) Pre-Test Checkout
   b) Demonstration Orbital Passes
   c) Review of Analytical Data
3.1 Validation of Data

All Data taken for verification of Requirements shall be identified, dated and initialed by the Test Conductor, Quality Assurance, AFQA and AFSO to validate that the Test Procedure was followed.

3.1.1 Deviations from Procedure

Any Deviations from the Test Procedure will be noted in the Test Log Book and in the margin of the Procedure and initialed by the Test Conductor, Quality Assurance, AFQA and AFSO. Data taken during Tests where there are deviations from the Procedures will not be submitted for verification until the deviation is approved by the AFSO.

3.1.2 Classification of Deviations from Procedures

3.1.2.1 For the purpose of this Document, Deviations shall be considered only

1) Difference in the location from which Data is recorded. Most Data will be recorded via Patchcords from the System Junction Box.

2) Difference in the type of Signals recorded.

3) Difference in the method of Interpreting recorded Data.
3.1.3 Reverification of Requirements

In the event of a Hardware and/or Software change that could affect Data previously taken, the Test Conductor shall note the change and Test affected in the Test Log Book. These Tests will be re-run to verify the affected Data.

3.1.4 Test Software

Test Software is required for Tests specified in 4.28 and 4.29.

3.1.4.1 Special Program No. 1- This Program is designed to command the HPA and LPA Elevators and transport and Elevators in Sequence to verify the 1.0 second slide change requirement on the Hardware.

3.1.4.2 Special Program No. 2 - This Program is designed to command the HPA and LPA Elevators and transports to skip 5 slides and load the sixth into the viewing station within 3.0 seconds.

4.0 Verification of Requirements

This Section is the Procedures to be used for verification of requirements and the Tests specified will be completed during the Hardware/Software Integration Test Period.
4.0 Continued

Each major paragraph, Ex 4.1, 4.2 etc., is a complete Procedure and is not dependent upon any other major paragraph or Procedure.
4.1 Requirement Title: PERFORMANCE DEMONSTRATIONS

4.1.1 Requirement Paragraph in the Test Requirements Document

3.0 (a)

4.1.2 Requirement

The overall functional characteristics of the Phase 0 MDS, its operability characteristics, and certain of the specific performance and hardware/software design requirements will be demonstrated. General capabilities to be demonstrated are:

a) Pre-test checkout program and procedure.

4.1.3 Related Paragraph in System Test Plan

4.1

4.1.4 Verification Test Procedure

The Test Procedure is defined in Test Plan/Procedure for The Pre-Test Checkout Program. BIN: BIF-055-46753-09. Dated

The Procedure has been separated from this Procedure since it will also be used as a Daily Procedure during Operations to check simulator Hardware by use of appropriate Software.
4.2 Requirement Title: PERFORMANCE DEMONSTRATION

4.2.1 Requirement Paragraph Test Requirements Document

3.0 (b)

4.2.2 Requirement

All controls and displays on Panels 2C, 2D, 3B and 7B of the SLM.

4.2.3 Related Paragraph System Test Plan

4.2

4.2.4 Pre-Test Requirements

None

4.2.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP's.
4.3 Requirement Title: PERFORMANCE DEMONSTRATION

4.3.1 Requirement Paragraph Test Requirements Document

3.0 (c)

4.3.2 Requirement

All controls and displays on Panels 1A, 1B, 2A, 2B, 5A and 5B of the SCC.

4.3.3 Related Paragraph in System Test Plan

4.3

4.3.4 Pre-Test Requirements:

None

4.3.5 Verification Test Procedure

No Test required. Requirement is verified by 4.1. Attach Copy of 4.1 Procedure to these data sheets.

No Test required. All controls and displays are verified during 4.1. Attach a copy of the data sheets from 4.1 to this data sheet.
4.4 Requirement Title: PERFORMANCE DEMONSTRATION

4.4.1 Requirement Paragraph in Test Requirements Document

3.0 (e)

4.4.2 Requirement

The single ATS mode and the single MO Mode (peripheral display at 60°)

4.4.3 Related Paragraph in System Test Plan

4.4

4.4.4 Pre-Test Requirements:

None

4.4.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during ATS/MO DOP's
4.5 Requirement Title: PERFORMANCE DEMONSTRATION

4.5.1 Requirement Paragraph in Test Requirements Document

3.0

4.5.2 Requirement

Test and operations, data collection and reduction capability.

4.5.3 Related Paragraph in System Test Plan

4.5

4.5.4 Pre-Test Requirements

4.5.4.1 Test Team

Test Conductor_________________ Init____

Technicians

____________________________

____________________________

____________________________

Quality Assurance_______________ Init____

AFQA_________________________ Init____

Aerospace Observer_______________ Init____

AFSO_________________________ Init____

4.5.4.2 Test Equipment Required
4.5.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
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4.5.4.4 Subsystems Status

The following are required to be active during this Test.

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<tr>
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<tbody>
<tr>
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4.5.4.5 Power Turn On

Turn Power on to all Subsystems
4.5.5 Verification Test Procedure

4.5.5.1 Load an ATS Only DOP into the SDS 930 Computer.

4.5.5.2 Select ten (10) functions to be recorded on strip chart recorders and the performance data collection tape.

Functions

1) Magnification Control Stick Setting in ATS Range
2) HPA/LPA Select
3) HPA Blanking Command
4) LPA Blanking Command
5) RSS Stick Deflection
6) End Stop Signal
   LPA X Position Value (On Analog Twice. Low Scale and High Scale)
7) LPA Y Position Value (On Analog Twice. Low Scale and High Scale)

9) LPA X Coordinate Rate (Twice on Analog)
10) HPA Y Coordinate Rate (Twice on Analog)
11) MO Measured Pitch Angle

4.5.5.3 Set the recorder chart speed at 20 mm/sec and turn On the recorders.

4.5.5.4 Activate the resume switch to start and complete the DOP run.

4.5.5.5 After completion of the DOP, process the Performance data collection tape to provide a printed stripped and merged data list.
4.5.5.6 Compare the printed list to the strip chart recordings and verify that the same functions have been collected and reduced.

__________ Verified

4.5.5.7 Attach all data to these data sheets for review to verify the consistency and accuracy of the reduced data.
4.6 Requirement Title: PERFORMANCE DEMONSTRATION

4.6.1 Requirement Paragraph in Test Requirements Document

1) 3.0 (i)
2) 3.3.2.1.2

4.6.2 Requirement

1) Turn around capability (10 & 30 minutes)
2) An Automatic Restacking capability is provided

4.6.3 Related Paragraph in System Test Plan

4.6.4 Pre-Test Requirements

4.6.4.1 Test Team

Test Conductor ___________________ Init________

Technicians ____________________

______________________________

______________________________

______________________________

Quality Assurance _________________ Init________
4.6.4.1 Continued

AFQA ____________________ Init________

Aerospace Observer ___________ Init __________

AFSO ____________________ Init________

4.6.4.2 Test Equipment Required

1) Stopwatch

4.6.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration Sticker.

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4.6.4.4 Subsystems Status

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4.6.4.5 Power Turn On

This Test will be performed at the conclusion of the ATS only DOP. Power will already be applied to all Subsystems.

4.6.5 Verification Test Procedure

4.6.5.1 The Script contains a restack Flag at the conclusion of one of the DOP'S. Depress the Special Interrupt switch at the SCC and at the same time start the Stopwatch.

4.6.5.2 The following tasks shall be completed:

1) Automatic restacking by the computer.
4.6.5.2 Continued

1) Continued - The completion of re-stacking will be indicated on the CRT display which will indicate that all slides have been returned to their original order.

2) Manual restacking of the cues. The cue projector shall be returned to position 1 manually or by use of the remote control unit.

3) All switches at the SLM shall be reset to the positions indicated in the DOP procedure.

4.6.5.3 When the CRT display indicates that restacking is completed, stop the stopwatch, stop all activity on items 2 and 3 and remove the supply and takeup elevators from each leg of the SVS. Verify that all slides were returned to the original order according to the script.

Verified

4.6.5.4 Return all magazines and reload the DOP into the computer.
4.6.5.5 Stop the Stopwatch and activate the resume switch. The program shall be allowed to complete the first target group.

4.6.5.6 Record the elapsed time on the Stopwatch.

____________________ Min.  Req is 10 minutes or less

4.6.5.7 At the conclusion of the DOP, start the Stopwatch and verify that the following tasks are completed.

1) Remove all magazines from both legs of the SVS and replace with different magazines.

2) Remove the cue casset and replace with a different casset.

3) Reload the computer program to run a different DOP.

4.6.5.8 When the above items have been completed, activate the resume switch and stop the Stopwatch. The program shall complete the DOP.

4.6.5.9 Record the elapsed time on the Stopwatch.

____________________ Min.  Req is 30 minutes or less.
4.7 Requirement Title: PERFORMANCE DEMONSTRATION

4.7.1 Requirement Paragraph Test Requirements Document

3.0 (j)

4.7.2 Requirement

Operational Scripting capability.

4.7.3 Related Paragraph in System Test Plan

4.7

4.7.4 Pre-Test Requirements

None

4.7.5 Verification Test Procedure

No Test Required. Requirement will be demonstrated by Running DOP's.
4.8 Requirement Title: PRIMARY PERFORMANCE CHARACTERISTICS

4.8.1 Requirement Paragraph in Test Requirements Document

1) 3.1.1.1
2) 3.3.3

4.8.2 Requirement

1) Validate the adherence of the MDS to a mutually agreed AVE baseline established for Phase 0 on May 1, 1968, except the SLM Panels 2C and 2D which were established on June 30, 1968. The software for Phase 0 will be frozen to the Phase 0 Simulation Software Requirements Revision 2.

2) Verify Panels 2C and 2D to insure that these two panels reflect the AVE configuration as presented on:
   Drawing 711-03063 2 July 1968 for Panel 2C
   Drawing 711-03064 2 July 1968 for Panel 2C
Panels 3B and 7B will also be active. Panels 6C and 3C contain simulation peculiar switches. All other panels of the SLM will be blank for Phase 0.

4.8.3 Related Paragraph in System Test Plan

4.8
4.8.4 Pre-Test Requirements

None

4.8.5 Verification Test Procedure

4.8.5.1 Compare AVE Panel Configuration with Simulator

Configuration by comparing AVE drawings with the actual panels.

AVE Dwg.
Panel 2C 711-03063
Panel 2D 711-03064

__________Verified

4.8.5.2 The controls on Panels 3B, 7B 3C and 6C have been verified by 4.1 (Pre-checkout Program)

4.8.5.3 Verify by inspection that all other Panels are Blank.

__________Verified

4.8.5.4 The calibrated test results from the individual CPC Tests for Drive Control Response and Position Simulation shall be available for Review.

4.8.5.5 Demonstration Test Procedure

None
4.9 Requirement Title: TIMING SUBSYSTEM

4.9.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.3.2

4.9.2 Requirement

One event timer shall be driven.

4.9.3 Related Paragraph in System Test Plan

4.9

4.9.4 Pre-Test Requirements:

None

4.9.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP's.
4.10 Requirement Title: IMAGE VELOCITY SENSOR

4.10.1 Requirement paragraph in test requirements document

3.1.1.1.5.3

4.10.2 Requirement

**IVS errors to be simulated are random errors.**
Saturation will be simulated in the event of clouds (when prescribed) in which case the saturate light will be turned on and the IVS output will limit. Normal IVS rate nulling will be simulated in the range of 540u rad/sec and when IVS is enabled the rate will be reduced to approximately [REDACTED].

4.10.3 Related paragraph in system test Plan

4.10

4.10.4 Pre-test Requirements

None

4.10.5 Verification Test Procedure

No test required. The test results from the individual CPC tests verifying this requirement shall be attached to these data sheets.
4.11 Requirement Title: STICK INPUT

4.11.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.5.4

4.11.2 Requirement:

The stick polarity shall be reversible between runs. The stick shall allow low rates to be inserted into the device system. The transfer function shall be provided by the Drive Connection Module of the On-Board Software.

4.11.3 Related Paragraph in System Test Plan

4.11

4.11.4 Pre-test Requirements

None

4.11.5 Verification Test Procedure

No test required. The test results from the individual CPC tests verifying this requirement shall be attached to these data sheets. Requirement will also be demonstrated during DOP.
4.12 Requirement Title: MAGNIFICATION AND REAL FIELD OF VIEW

4.12.1 Requirement Paragraph in Test Requirement Document

3.1.1.1.7.1.1

4.12.2 Requirement

Demonstrate that the MDS shall follow operator commands and reach any commanded value within 0.5 second and that the step from 31.76X ± 5% to 63.5X ± 5% shall occur in 1.0 second or less. (See paragraph 3.1.1.1.7.1.5) for a discussion of presentation rates). Verify that the simulated real field-of-view is 3.78 degrees at 15.88X, and 0.945 degree at 63.5X with the field varying inversely with zoom to the higher powers in each range.

4.12.3 Related Paragraph in System Test Plan

4.12

4.12.4 Pre-Test Requirements

4.12.4.1 Test Team

Test Conductor ___________ Init_________

Technicians ___________ Init

_____________________

___________________
4.12.4.1 Continued

Quality Assurance Init
AFQA Init
Aerospace Observer Init
AFSO Init

4.12.4.2 Test Equipment Required

1) Techniwrite Model TR6460 Event Recorder or equivalent.

2) T-Boxes S/N 4605-and S/N 4605-

3) Eng Test Box SK56179-999

4) HP 3460B Digital Voltmeter or equivalent

5) Brush Mark 200B Analog Recorder or equivalent

6) Graduated Test Slide

4.12.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

Equipment Type Cal Date

SECRET/DORIAN
HANDLE VIA BYEMAN SYSTEM ONLY
4.12.4.3 Continued

<table>
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4.12.4.4 Subsystems Status

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4.12.4.5 Power Turn On

4.12.4.5 Install T-Boxes (S/N 4605- and S/N 4605- at the SVS Interface Connectors J1 and J2.

Turn Power On to all Subsystems.

4.12.5 Verification Test Procedure

4.12.5.1 Install and connect the Engineering Test Box, Per SK56179-999
4.12.5.2 Turn On the HPA Holder Changer, Light Source and Spherical Zoom.

4.12.5.3 Activate the Selector to HPA and Unblank HPA at the Eng. Test Box.

4.12.5.4 Insert the graduated Test Slide into the HPA Viewing Station and verify that the High Power Arm is installed, and that the SVS Reticle is in place.

4.12.5.5 Set the following Drive Voltages at the Engineering Test Box.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Determined by</th>
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<tbody>
<tr>
<td>Spherical Zoom</td>
<td>Eng Analysis</td>
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<tr>
<td>K - Rotator</td>
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</tr>
<tr>
<td>Iris Zoom</td>
<td></td>
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<tr>
<td>Cyl Zoom 1</td>
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<tr>
<td>Cyl Zoom 2</td>
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The X and Y Drives and Filter Modulator will be used to center the Slide and adjust the intensity to a comfortable Level.

4.12.5.6 Center the Test Slide in the FOV using the X and Y Drive and measure the FOV.

_________ Inches
4.12.5.7 Change the Spherical Zoom Drive Voltage to \( \text{V} \) and measure the FOV.

\( \text{Inches} \)

4.12.5.8 Remove the High Power Arm and install the Low Power Arm.

4.12.5.9 Change the Spherical Zoom Drive Voltage to \( \text{V} \) and measure the FOV.

\( \text{Inches} \)

4.12.5.10 Change the Spherical Zoom Drive Voltage to \( \text{V} \) and measure the FOV.

\( \text{Inches} \)

4.12.5.11 Attach the Photometer Mount and Photometer to the Supplemental Eyepiece.

4.12.5.12 Locate the center of the Photometer Spot on the left hand edge of the FOV, and record the angle from Normal.

\( \text{Degrees} \)
4.12.5.13 Locate the Spot on the right hand edge of the FOV and record the angle from Normal. ___________ Degrees
The sum of the two angles should be $60^\circ + 1^\circ$

4.12.5.14 The above Data shall be used to perform the following Analysis:

The objective here is to verify that the system will simulate the correct fields of view at the specified magnifications. In particular, this is a problem of showing that the zoom and anamorphs will be driven correctly together to accomplish this objective. Choosing two cases at opposite extremes (nadir and $= 45.87^\circ$) will exercise the optical system sufficiently and allow calculation of FOV as described below.

This analysis assumes nadir stimulus material for the present time.

The real field of view (in inches) on the test slide can be determined by the following equation:

$$X = \frac{72912}{SF} \times h \times \tan \left(\frac{\angle + 1}{2} 0_R\right) - \tan \left(\frac{\angle - 1}{2} 0_R\right)$$

where:

- $X$ = real FOV (in inches) at slide
- $SF$ = stimulus scale factor
- $h$ = altitude in nm.
- $\angle$ = aspect angle
- $0_R = \frac{OA}{M} = 60^\circ$ = real FOV (in degrees)
4.12.5.14 Continued

\( O_A = \) apparent FOV (in degrees)

\( M = \) system magnification

The worst case aspect angles occur at \( \alpha_{\text{max}} = 45.87^\circ \) and \( \alpha_{\text{min}} = 0^\circ \).

Maximum and minimum X's can be determined for LPA and HPA yielding a total of four test points to be verified.

For LPA, maximum X occurs when: \( h = 85 \text{ nm}, \ SF = 128000:1, M = 15.88X, \ O_R = 3.78^\circ, \alpha = 45.87^\circ. \)

Minimum X occurs when: \( h = 75 \text{ nm}, \ SF = 364000:1, \ M = 31.76X, \ O_R = 1.89^\circ, \alpha = 0^\circ. \)

For HPA, maximum X occurs when: \( h = 85 \text{ nm}, \ SF = 3200:1, M = 63.5X, \ O_R = 0.945^\circ, \alpha = 45.87^\circ. \)

Minimum X occurs when: \( h = 75 \text{ mm}, \ SF = 91000:1, \ M = 127X, \ O_R = 0.472^\circ, \alpha = 0^\circ. \)

The values of X in both cases are 6.78 in. and .56 in.

In order to set up the previous four test conditions, it is necessary to calculate the correct anamorphic lens angles for maximum and minimum aspect angles.
4.12.5.14 Continued

The following equations are used:

\[
\sin \theta = 2 \left( \frac{1}{\sqrt{\cos \alpha}} - \frac{\sqrt{\cos \alpha}}{1} \right)
\]

\[
\tan \psi = \frac{\sin \theta \cos \theta}{1 + \sin^2 \theta - \sqrt{16 + 9 \sin^2 \theta}}
\]

\[
E_{\frac{1}{2}} = -45^\circ - \psi - \frac{\theta}{2} + \xi + \Delta
\]

\[
E_2 = -45^\circ - \psi + \frac{\theta}{2} + \xi + \Delta
\]

Where \(E_{\frac{1}{2}}\) is the angle of the 1/2 power anamorph and \(E_2\) is the angle of the 2 power anamorph. For \(\alpha = 45.87^\circ\), \(E_{\frac{1}{2}} = -116^\circ\) and \(E_2 = -131^\circ\). For \(\alpha = 0^\circ\), \(E_{\frac{1}{2}} = E_2 = 45^\circ\).

For the zoom lens magnification, the following equation is used:

\[
\frac{M_0}{M_N} = \frac{h^2_{\text{stim}}}{h^2_{\text{sim}}} \left( \frac{\cos \alpha \sin \theta}{\cos \theta \sin \theta} \right)^{3/2}
\]

Where \(M_0 = \text{Zoom magnification at } \alpha\)
\(M_N = \text{Zoom magnification at nadir}\)

Assuming \(M_N = .20X\) and nadir stimulus, the worst case zoom magnifications are .09X and .514X. This includes an additional 2:1 range needed after calculating worst case ranges with the above equation.
4.12.5.15 Remove the graduated Test Slide, Eng Test Box and leads that selected and unblanked HPA.

4.12.5.16 Set up two Switches at the Beckman 2200 to Supply Step Commands from $V$ to $V$ for HPA and from $V$ to $V$ for LPA. The HPA Switch shall provide the step on T132 (Signal) and T133 (Return). The LPA shall provide the step on T120 (Signal) and T121 (Return).

4.12.5.17 At the A2 Power Conditioning (SVS interface Connectors J1 and J2) install leads to record the following Signals.

<table>
<thead>
<tr>
<th>Channel</th>
<th>Conn</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPA SPH Zoom DR</td>
<td>J1 - f, g</td>
</tr>
<tr>
<td>HPA SPH Zoom FB</td>
<td>J1 - BB, CC</td>
</tr>
<tr>
<td>LPA SPH Zoom DR</td>
<td>J2 - f, g</td>
</tr>
<tr>
<td>LPA SPH Zoom FB</td>
<td>J2 - BB, CC</td>
</tr>
</tbody>
</table>

4.12.5.18 Set the Analog Recorder chart speed at 20 mm/Sec and turn On the recorders.

4.12.5.19 Apply Step Voltages at the Beckman 2200. Record the elapsed time from initiation of Command to Settling of Feedback Signal to within $\pm 5\%$, as indicated by the change in Polarity of the Feedback Voltage.
4.12.5.19 Continued

HPA | LPA
---|---
Step | Sec | Sec

Time requirement for all Steps is 0.5 sec or less.

Remove recordings and attach to these Data Sheets.

4.12.5.20 Load an ATS Only DOP into the SDS 930 and verify that patchcords are installed at the system junction box to record the following:

<table>
<thead>
<tr>
<th>HPA</th>
<th>LPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Elevator Lower</td>
<td>28</td>
</tr>
<tr>
<td>Supply Elevator Busy</td>
<td>27</td>
</tr>
<tr>
<td>Transport Load</td>
<td>34</td>
</tr>
<tr>
<td>Transport Busy</td>
<td>35</td>
</tr>
<tr>
<td>Blanking Cmd</td>
<td>37</td>
</tr>
<tr>
<td>Blanking FB</td>
<td>38</td>
</tr>
<tr>
<td>HPA/LPA Select</td>
<td>1</td>
</tr>
<tr>
<td>Reject</td>
<td>50</td>
</tr>
</tbody>
</table>

4.12.5.21 Verify that the targets are loaded in the HPA and LPA legs as follows:

<table>
<thead>
<tr>
<th>Supply Elev.</th>
<th>Target #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1</td>
<td>1</td>
</tr>
<tr>
<td>Position 2</td>
<td>2</td>
</tr>
<tr>
<td>Position 3</td>
<td>3</td>
</tr>
<tr>
<td>Position 4</td>
<td>4</td>
</tr>
<tr>
<td>Position 5</td>
<td>Empty</td>
</tr>
<tr>
<td>Position 6</td>
<td>Empty</td>
</tr>
</tbody>
</table>
4.12.5.21 Continued

<table>
<thead>
<tr>
<th>Supply Elev.</th>
<th>Target #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 7</td>
<td>Empty</td>
</tr>
<tr>
<td>8</td>
<td>Empty</td>
</tr>
<tr>
<td>9</td>
<td>Empty</td>
</tr>
<tr>
<td>10</td>
<td>Low Power</td>
</tr>
<tr>
<td>11</td>
<td>Empty</td>
</tr>
<tr>
<td>12</td>
<td>Empty</td>
</tr>
<tr>
<td>13</td>
<td>Empty</td>
</tr>
<tr>
<td>14</td>
<td>Empty</td>
</tr>
<tr>
<td>15</td>
<td>Empty</td>
</tr>
<tr>
<td>16</td>
<td>High Power</td>
</tr>
</tbody>
</table>

4.12.5.22 Set chart speed on the event recorders at 20 MM/Sec and turn On the recorders.

4.12.5.23 Activate the resume switch. When Slide #1 is in view, activate the reject switch. (Switch from target 1 to target 2)

4.12.5.24 When target 2 is in view, activate the reject switch, (Switch from target 2 to target 3)

4.12.5.25 When target 3 is in view, change magnification from 31.76X to 63.5X (Change from LPA to HPA.)

4.12.5.26 When target 4 is in view, change magnification from 63.5X to 31.76X. (Change from HPA to LPA.) The script will lower the elevator one position so that to complete the elevator must raise and transport.
4.12.5.27 When target 3 is in view, activate the reject switch. (Skip 5 positions and view sixth)
4.12.5.28 When target 5 is in view, change magnification from 31.76X to 63.5X (Skip 5 positions and view sixth)
4.12.5.29 When target 6 is in view, change magnification from 63.5X to 31.76X (Skip 5 positions and view sixth)
4.12.5.30 Activate freeze. Identify the slide change times on recorder paper. Remove recordings and attach to these data sheets.

1) Target 1 to target 2 _________ Secs
2) Target 2 to target 3 _________ Secs
3) Target 3 to target 4 _________ Secs
4) Target 4 to target 3 _________ Secs

The requirement for the above changes is 1.0 sec or less. For changes 1 and 2 the elapsed time is from the initiation of the reject command to shutter inblank. For changes 3 and 4 the elapsed time is from initiation of magnification change to shutter unblank.

5) Target 3 to target 5 _________ Sec
6) Target 5 to target 6 _________ Sec
7) Target 6 to target 5 _________ Sec

The requirement for the above changes is 3.0 sec or less. The elapsed time is from initiation of the reject command to shutter unblank.
4.12.5.31 Repeat paragraphs 4.12.5.23 to 4.12.5.30 for the LPA Leg.

1) Target 1 to target 2 __________ Sec
2) Target 2 to target 3 __________ Sec
3) Target 3 to target 4 __________ Sec
4) Target 4 to target 3 __________ Sec
5) Target 3 to target 5 __________ Sec
6) Target 5 to target 6 __________ Sec
7) Target 6 to target 5 __________ Sec

4.12.5.32 Change magnification at various rates from 15.88X to 31.76X, 31.76X to 15.88X. Remove the recordings for Zoom Drive and Feedback and verify that the HPA & LPA Zoom Servos follow Operator Commands. Attach the recordings to these Data Sheets.
4.13 Requirement Title: OTHER CHARACTERISTICS

4.13.1 Requirement Paragraph in Test Requirement Document

3.1.1.1.7.1.2.3

4.13.2 Requirement

Demonstrate that the headrest is of the same configuration as the June 30, 1968 AVE baseline with dimensional changes to adapt it for use with the supplemental eyepiece.

4.13.3 Related Paragraph in System Test Plan

4.13

4.13.4 Pre-Test Requirements

4.13.4.1 Test Team

Test Conductor __________________ Init ______

Technicians __________________

___________________________
4.13.4.1 Continued

Quality Assurance Init

AFQA Init

Aerospace Observer Init

AFSO Init

4.13.5 Verification Test Procedure

4.13.5.1 Verify by Inspection of Quality Assurance Records
that the Headrest conforms to SK56197-453 and
attach the records to these data sheets.

4.13.6 Demonstration Test Procedure
None
4.14 Requirement Title: TARGET LOADING AND COORDINATION

4.14.1 Requirement Paragraph in Test Requirements Document

3.1.1.7.1.5

4.14.2 Requirement

Demonstrate target selection logic.

4.14.3 Related Paragraph in System Test Plan

4.14

4.14.4 Pre-Test Requirements

None

4.14.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP's.
4.15 Requirement Title: SCENE DYNAMICS

4.15.1 Requirement Paragraph in Test Requirements Document
3.1.1.1.7.1.6 and 3.1.1.1.8.1.6

4.15.2 Requirement
Tests will be performed to determine the phase 0 Capability.

4.15.3 Related Paragraph in System Test Plan
4.15

4.15.4 Pre-Test Requirements
4.15.4.1 Test Team

Test Conductor Init
Technicians

Quality Assurance Init
AFQA Init
Aerospace Observer Init
AFSO Init
4.15.4.2 Test Equipment Required

1) Brush Mark 200B Analog Recorder or Equivalent
2) T-Box S/N 4605-

4.15.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.15.4.4 Subsystem Status

The following are required to be active for this Test.

<table>
<thead>
<tr>
<th></th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SLM</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>DIU</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Stimulus S/S</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Computer S/S</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

4.15.4.5 Power Turn On

Turn Power On To all Subsystems
4.15.5 Verification Test Procedure

4.15.5.1 The DOP for this Procedure will be an ATS Only DOP, consisting of 26 Groups, 1 Target per group. The script will contain the following Parameters.

Stimulus Scale - 364,000:1
Altitude - 75 NM
Nadir Stimulus

4.15.5.2 For verification of Requirement (Static Positioning Accuracy) the following errors will be inputed.

<table>
<thead>
<tr>
<th>Group</th>
<th>Target</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>No Errors</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Latitude .1NM</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Longitude .1NM</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Altitude .1NM</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Intrack .3NM</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Crosstrack .1NM</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Altitude .1NM</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Roll 2 Min</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>Pitch 2 Min</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>Yaw 2 Min</td>
</tr>
</tbody>
</table>

4.15.5.3 Install leads at the A2 Power Conditioning to record the following:

<table>
<thead>
<tr>
<th>Channel Conn</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPA X Position Drive J1-V J1-W</td>
</tr>
<tr>
<td>HPA Y Position Drive J1-X J1-Y</td>
</tr>
<tr>
<td>HPA X FB J1-v J1-w</td>
</tr>
<tr>
<td>HPA Y FB J1-x J1-y</td>
</tr>
<tr>
<td>HPA Blank FB J4-E J4-F</td>
</tr>
</tbody>
</table>

4.15.5.4 Set Recorder chart speed at 20 MM/Sec. Turn On Recorders.
4.15.5.5 Activate the Resume Switch at the SCC.

4.15.5.6 When Group 10, Target 10 is in view, activate Freeze and Stop the Recorders.

4.15.5.7 Remove Recordings and attach to these Data Sheets. The Recording of the X and Y Feedback Signals (Output of Servo Positioning Potentiometer) will indicate actual Simulator Position for each error listed in 4.15.5.2. A printout of a computer program which determines actual AVE pointing errors will be compared with the recordings to determine the Static Positioning accuracy.

4.15.5.8 This portion of the Procedure will verify the Dynamic Positioning Accuracy.

4.15.5.9 Install leads at the SVS Pwr Cond. to record the X and Y error signals.

<table>
<thead>
<tr>
<th>Channel</th>
<th>X Error</th>
<th>Y Error</th>
</tr>
</thead>
</table>

4.15.5.10 Activate the resume switch and start the Recorders.

4.15.5.11 Manually point the Positioner during the next 16 targets.

4.15.5.12 When Group 26, Target 26 is in view, stop the recorders and complete the DOP.

4.15.5.13 Remove the recordings and attach to these Data Sheets. The comparison of the Drive Signals, both X and Y, with the error voltage (output of the Servo Summing Amplifier) will indicate the maximum dynamic positioning error.

4.15.5.14 Attach the SVS Acceptance Test Data for minimum Step response to these Data Sheets.
4.16 Requirement Title: LIGHTING

4.16.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.7.2.1

4.16.2 Requirement

Demonstrate that scene illumination can be varied from target to target.

4.16.3 Related Paragraph in System Test Plan

4.16

4.16.4 Pre-Test Requirements

None

4.16.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP's.
4.17 Requirement Title: INITIAL TARGET LOCATION

4.17.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.7.2.3

4.17.2 Requirement

It must be demonstrated that the simulator will accept stimulus material from the specified ranges

<table>
<thead>
<tr>
<th>LPA</th>
<th>HPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale Range A</td>
<td>128,000:1 to 160,000:1</td>
</tr>
<tr>
<td>Scale Range B</td>
<td>286,000:1 to 364,000:1</td>
</tr>
</tbody>
</table>

taken at obliquities of $\pm 15^\circ$ in stereo angle and $\pm 45^\circ$ in roll angle. The simulator shall adjust the scale of the scene along the intrack and crosstrack axes to scales representative of 75 to 85 nm altitude and initial target locations of $+45^\circ$ to $-40^\circ$ intrack with roll angles of $\pm 10^\circ$ of the inherent roll angle in the stimulus slide.

It is a further condition that simulated scene roll angles shall be limited to $\pm 40^\circ$, and also that forward intrack obliquity of up to $+60^\circ$ can be simulated with stimulus material of $+15^\circ$ or less stereo angle when the scale of the stimulus is such that the dimensionally adjusted ground scene is contained in the 9" x 9" stimulus slide.
4.17 Requirement Title: INITIAL TARGET LOCATION  CONTINUED

4.17.3 Related Paragraph in System Test Plan

4.17

4.17.4 Verification Test Procedure

The three components in the optical system of the simulator which have limited ranges of operation are: the anamorphic lenses, zoom lens, and K-rotator. The anamorphs can move through angles of -105° to +105°. The zoom magnifications can range from .09X to .56X. The K-rotator can operate from -180° to +180°. This analysis will determine what combinations of stimulus/simulation conditions constitute worst cases for each component individually. Then the anamorph and K-rotator angles and zoom magnifications will be calculated for these worst cases, and they will be compared to hardware limits.

The anamorphic lenses will be exercised to extremes if the simulated scene is to appear at opposite orientation from the stimulus scene. That is - one of the worst case anamorph angles will occur when stimulus angles are +15° stereo, -35° obliquity, and simulation angles are -40° stereo, -35° obliquity.
4.17.4 Continued

The anamorph angles are determined by the following set of equations:

\[
\begin{align*}
\phi_1 &= (\xi + \Delta - 45^\circ - \psi) - \Theta/2 \\
\phi_2 &= (\xi + \Delta - 45^\circ - \psi) + \Theta/2
\end{align*}
\]

Where \( \sin \Theta = 2/3 \left( \frac{1}{\cos \alpha} - \frac{\sqrt{\cos \alpha}}{1} \right) \)

\[
\tan \psi = \frac{\sin \Theta \cdot \cos \Theta}{4 + \sin^2 \psi + \sqrt{16 + 9 \sin^2 \psi}}
\]

\[
\cos \alpha = \cos \xi \cos \Omega
\]

(\( \alpha \) is aspect angle, \( \xi \) = stereo, \( \Omega \) = obliquity

\( \xi \) and \( \Delta \) are determined using a computer program because of the complexity of calculation)

A ratio of zoom magnifications is calculated by:

\[
\frac{M_0}{M_N} = \frac{h^2 \text{ stim}}{h^2 \text{ sim}} \left( \frac{\cos \xi \text{ sim}}{\cos \xi \text{ stim}} \right)^{3/2}
\]

where \( M_0 \) = zoom mag at \( \xi \text{ sim} \)

\( M_N \) = zoom mag at nadir
4.17.4 Continued

The maximum zoom magnification ratio occurs when 
\( h_{\text{stim}} = 85 \text{ nm}, \ h_{\text{sim}} = 75 \text{ nm}, \ \alpha_{\text{sim}} = 0^\circ, \ \alpha_{\text{stim}} = 17.92^\circ \ (\Sigma = +15^\circ, \ \Omega = +10^\circ) \). This ratio can be converted to a zoom mag. range when \( M_N \) is defined.

The worst case derotation angle will be determined by:

\[ \phi_D = -(\Delta - 2\psi) \]

when the corresponding values of \( \Delta \) and \( \Theta \) are discovered with aid of the computer.
4.18 Requirement Title: DYNAMIC TARGET LOCATION

4.18.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.7.2.4

4.18.2 Requirement

Demonstrate that the stimulus subsystem (Paragraph 3.3.2) can simulate the apparent dynamic perspective, orientation, and slant range of the target, in real time, from the initial intrack position to 40° aft and that the simulator will accomplish the changes in scene appearance for both circular and elliptical orbits within the 75 to 85 nm band.

4.18.3 Related Paragraph in System Test Plan

4.18

4.18.4 Pre-Test Requirements

None

4.18.5 Verification Test Procedure

No Test required, Requirement will be demonstrated during DOP's.
4.19 Requirement Title: SCAN AREA

4.19.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.7.2.5

4.19.2 Requirement

Demonstrate that line of sight excursions are limited only by the stimulus material format size.

4.19.3 Related Paragraph in System Test Plan

4.19

4.19.4 Pre-Test Requirements:

None

4.19.5 Verification Test Procedure

No test required. Test conducted under 4.36 will verify this Requirement. Requirement will be demonstrated during DOP.
4.20 Requirement Title: SCENE STREAMING

4.20.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.7.2.6

4.20.2 Requirement

Demonstrate that the ground scene is blocked from view during periods of ATS slew, and that the field of view is illuminated at an intensity comparable to the scene intensity at these times.

4.20.3 Related Paragraph in System Test Plan

4.20

4.20.4 Pre-Test Requirements

None

4.20.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP's.
4.21 Requirement Title: CONTROL STICK AND MAGNIFICATION CONTROL DURING FREEZE

4.21.1 Requirement Paragraph in Test Requirement Document

3.1.1.1.7.4

4.21.2 Requirement

Demonstrate that, at the option of the SCC operator, the pilot can scan the stimulus and change magnification during the freeze mode.

4.21.3 Related Paragraph in System Test Plan

4.21

4.21.4 Pre-Test Requirements

None

4.21.5 Verification Test Procedure

No Test Required. Test conducted under 4.33 will verify this requirement. Requirement will be demonstrated during DOP.
4.22 Requirement Title: MAGNIFICATION AND REAL FIELD OF VIEW

4.22.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.8.1.1

4.22.2 Requirement

Demonstrate that the simulator will accomplish simulated magnification step changes between the values of 125X, and between the values of

Demonstrate that the real field of view is 0.32 degree ± 5% at 125X and that it varies inversely with magnification.

4.22.3 Related Paragraph in System Test Plan

4.22

4.22.4 Pre-Test Requirements

4.22.4.1 Test Team

Test Conductor_________________ Init____

Technicians_________________
_________________
4.22.4.1 Continued

Quality Assurance ____________ Init____
AFQA ______________ Init____
Aerospace Observer ____________ Init____
AFSO ______________ Init____

4.22.4.2 Test Equipment Required

1) Techniwrite Model TR6460, Event Recorders or equivalent
2) Brush Mark 200B Analog Recorder or equivalent

4.22.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.22.4.4 Subsystem Status

The following are required to be active during this Test.

<table>
<thead>
<tr>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC</td>
<td>X</td>
</tr>
<tr>
<td>SLM</td>
<td>X</td>
</tr>
<tr>
<td>DIU</td>
<td>X</td>
</tr>
<tr>
<td>Stimulus S/S</td>
<td>X</td>
</tr>
</tbody>
</table>

4.22.4.5 Power Turn On

1) Turn Power on to all subsystems

4.22.5 Verification Test Procedure

4.22.5.1 Install Patchcords at the System Junction Box to record the following:

<table>
<thead>
<tr>
<th>Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO MAG (125X)</td>
</tr>
</tbody>
</table>

4.22.5.2 Install Leads at the A2 Power Conditioning to record the following:

<table>
<thead>
<tr>
<th>Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPA Spherical Zoom Drive</td>
</tr>
</tbody>
</table>
4.22.5.3 An analysis (similar to 4.12) has been performed to relate Stimulus Scale Factor to required magnifications and determine the required drive voltage to simulate 125X.

4.22.5.4 Load an ATS/MO or MO only DOP into the SDS 930 Computer.

4.22.5.5 Turn on all devices for LPA and activate resume.

4.22.5.6 Set the Magnification Stick to MO (125X).

4.22.5.7 Set the Magnification Stick to

4.22.5.8 Set the Magnification Stick to

4.22.5.9 Set the Magnification Stick to

4.22.5.10 Activate Freeze

4.22.5.11 Remove recordings and attach to these data sheets for review with the analysis and SVS Zoom Calibration data to verify that the drive voltages specified in the analysis and SVS data are achieved within ± 5%.
4.23 Requirement Title: EYEPiece PROPERTIES

4.23.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.8.1.2

4.23.2 Requirement

The eyepiece properties will be those for the acquisition subsystem with the exception that the image will be masked down to a 40° ± 1° apparent field of view. The apparent field of view will be demonstrated.

4.23.3 Related Paragraph in System Test Plan

4.23

4.23.4 Pre-Test Requirements

4.23.4.1 Test Team

Test Conductor ___________________________ Init______

Technicians ___________________________ Init______

_____________________________ Init______
4.23.4.1 Continued

Quality Assurance _____________ Init____

APQA _____________ Init____

Aerospace Observer _____________ Init____

AFSO _____________ Init____

4.23.4.2 Test Equipment Required

1) Spectra Pritchard Photometer - Model 1970 PR

2) Photometer Mount

4.23.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
4.23.4.4 Subsystems Status

The following are required to be active during this Test

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SLM</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>DIU</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Stimulus S/S</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Computer S/S</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

4.23.4.5 Power Turn On

1) Turn power on to all subsystems except the DIU.
4.23.5 Test Procedure

4.23.5.1 At the SCC Panel 2A, verify that the Servo Test Switch is not activated.

4.23.5.2 Turn on the LPA Light Source and LPA Spherical Zoom. Activate the Selector to LPA and unblank LPA. Insert the 40° mask in the LPA Reticle Plane.

4.23.5.3 Attach the Photometer Mount and Photometer to the supplemental Eyepiece.

4.23.5.4 Locate the center of the Photometer Spot on the Left Hand Edge of the Field of View and record the angle from the Normal.

_________ Degrees

4.23.5.5 Locate the Spot at the Right Hand Edge of the FOV and record the Angle from Normal.

_________ Degrees

The Sum of the Two Angles should be 40° ± 1°.
4.24 Requirement Title: PERIPHERAL DISPLAY

4.24.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.8.1.2.1

4.24.2 Requirement

The VO peripheral display will be incorporated in the ATS pattern. The 32 timer lights will appear on the left hand side of the display.

4.24.3 Related Paragraph in System Test Plan

4.24

4.24.4 Pre-Test Requirements:

None

4.24.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP's.
4.25 Requirement Title: TARGET COORDINATION AND LOADING

4.25.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.8.1.5

4.25.2 Requirement

It will be shown that targets selected by voting logic during the ATS/MO mode demonstration shall be available for viewing through the eyepiece for MO in the appropriate time sequence. The target will appear at a time corresponding to the end of slew and remain in view until the commencement of slew to the next target.

4.25.3 Related Paragraph in System Test Plan

4.25

4.24.4 Pre-Test Requirements:

None

4.25.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP'S.
4.26 Requirement Title: SCENE LIGHTING

4.26.1 Requirement Paragraph in Test Requirement Document

3.1.1.8.2.1.2

4.26.2 Requirement

It will be demonstrated that the scene brightness will be variable over a range of 50:1 ± 10% up to 20 ± 2 foot lamberts as seen by the operator with no stimulus slide in the optical path.

4.26.3 Related Paragraph in System Test Plan

4.26

4.26.4 Pre-Test Requirements

4.26.4.1 Test Team

Test Conductor __________________________ Init____

Technicians _____________________________

___________________________

___________________________

___________________________

___________________________
4.26.4.1 Continued

<table>
<thead>
<tr>
<th>Quality Assurance</th>
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<thead>
<tr>
<th>AFQA</th>
<th>Init</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Aerospace Observer</th>
<th>Init</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>AFSO</th>
<th>Init</th>
</tr>
</thead>
</table>

4.26.4.2 Test Equipment Required

1) Spectra Pritchard Photometer - Model 1970-PR
2) Photometer Mount

4.26.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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</tr>
</tbody>
</table>
4.26.4.4 Subsystems Status

The following are required to be active during this Test.

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>On</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SIM</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>DIU</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Stimulus S/S</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Computer S/S</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

4.26.4.5 Power Turn On

1) Turn power on to all subsystems except the DIU.
4.26.5 Test Procedure

4.26.5.1 Verify that there is no Slide in the LPA Viewing Station and that the SVS Reticle is not in place.

4.26.5.2 At the SCC Panel 2A, verify that the Servo Test Switch is activated and select the LPA Filter Modulator Servo Test.

4.26.5.3 Attach the Photometer Mount and Photometer to the Supplemental Eyepiece.

4.26.5.4 Turn On the LPA Light Source, activate the Selector to HPA and Unblank LPA. Center the Photometer Spot on the approximate center of the field.

4.26.5.5 Set the LPA filter modulator servo test control to maximum (+50 V) and measure and record the system brightness.

_________ Foot Lamberts

4.26.5.6 Set the LPA filter modulator servo test control to minimum (-50 V) and measure and record the system brightness.

_________ Foot Lamberts
4.26.5.7 Calculate the brightness range

\[
\frac{\text{Max}}{\text{Min}} = \text{Ratio}
\]

4.26.5.8 Calculate the quantity and density of Wrotten Neutral Density filters required to reduce the brightness to approximately 0 to 20 foot lamberts.

4.26.5.9 Insert the required filters and adjust the fixed filter at the LPA filter modulator until the brightness is between 18 and 22 foot lamberts.

4.26.5.10 Attach calibration data from SVS Acceptance to show the relationship between Computer Commands and Output Brightness to these data sheets.
4.27 Requirement Title: TARGET LOCATION RELATIVE TO VEHICLE

4.27.1 Requirement Paragraph in Test Requirements Document

3.1.1.1.8.2.3

4.27.2 Requirement

Show that targets within the envelope of:

30 degrees forward to 40 degrees aft in track,
40 degrees left to 40 degrees right crosstrack,
and 75 to 85 nm altitude

can be simulated. Perspective and slant range associated
with the above envelope are considered to be properties
of the stimulus material and will not be altered by the MDS.

Show that altitudes beyond the range stated are possible if
proper stimulus material is provided with scale factor pro-
portional to the required altitude.

Show that the in-track line on the ground scene is properly
oriented for each target and fixed in time. This orient-
tation shall be determined by the script depending on
the status of the derotation prism, orbit inclination and
target latitude.
4.27.3 Related Paragraph in System Test Plan

4.27

4.27.4 Pre-Test Requirements:

None

4.27.5 Verification Test Procedure

No Test required. Requirement will be demonstrated during DOP's.
THIS TEST IS NOT REQUIRED. THE TEST PERFORMED UNDER 4.12.5.23 THRU 4.12.5.27 WILL VERIFY THIS REQUIREMENT

4.28 Requirement Title: SOURCE HOLDING AND SELECTION SYSTEM

4.28.1 Requirement Paragraph in Test Requirement Document

3.3.2.1.2

4.28.2 Requirement

1) The adjacent slide position to the one in viewing position may be selected and viewed within one second.

2) The changer may be commanded to any diapositive, forward or reverse of the present position, and to operate the two elevators independently.

4.28.3 Related Paragraph in System Test Plan

4.28

4.28.4 Pre-Test Requirements

4.28.4.1 Test Team

Test Conductor __________________ Init____

Technicians __________________

________________________

________________________

________________________

________________________
4.28.4.1 Continued

<table>
<thead>
<tr>
<th>Quality Assurance</th>
<th>Init</th>
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<tbody>
<tr>
<td>AFQA</td>
<td>Init</td>
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<tr>
<td>Aerospace Observer</td>
<td>Init</td>
</tr>
<tr>
<td>AFSO</td>
<td>Init</td>
</tr>
</tbody>
</table>

4.28.4.2 Test Equipment Required

1) Techniwrite Model TR6460, Event Recorders or equivalent.

4.28.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
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<tbody>
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</tbody>
</table>
4.28.4.4 Subsystems Status

The following are required to be active during this Test.

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC</td>
<td>ON</td>
</tr>
<tr>
<td>SLM</td>
<td>OFF</td>
</tr>
<tr>
<td>DIU</td>
<td>OFF</td>
</tr>
<tr>
<td>Stimulus S/S</td>
<td>OFF</td>
</tr>
<tr>
<td>Computer S/S</td>
<td>OFF</td>
</tr>
</tbody>
</table>

4.28.4.5 Power Turn On

1) Turn Power On to all Subsystems except the SLM.
4.28.5 Verification Test Procedure

4.28.5.1 Turn on the HPA and LPA Holder Changers.

4.28.5.2 Load special Program No. 1 into the SDS 930 Computer.

4.28.5.3 Install Patchcords at the System Junction Box to record the following signals (if Patchcords are installed, verify recorder channels.

<table>
<thead>
<tr>
<th>Signal</th>
<th>HPA</th>
<th>LPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Elevator Raise</td>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>Supply Elevator Busy</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>Supply Elevator Lower</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>Transport Load</td>
<td>34</td>
<td>12</td>
</tr>
<tr>
<td>Transport Recall</td>
<td>36</td>
<td>14</td>
</tr>
<tr>
<td>Transport Busy</td>
<td>35</td>
<td>13</td>
</tr>
<tr>
<td>Takeup Elevator Raise</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Takeup Elevator Lower</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td>Takeup Elevator Busy</td>
<td>31</td>
<td>9</td>
</tr>
<tr>
<td>Blanking Cmd</td>
<td>37</td>
<td>15</td>
</tr>
<tr>
<td>Blanking Feedback</td>
<td>38</td>
<td>16</td>
</tr>
</tbody>
</table>

4.28.5.4 Set the Recorder Chart Speed at 20MM/Sec and turn On the Recorders.
4.28.5.5 Activate the Computer Start Switch to initiate commands to the HPA Supply Elevator Raise and Transport Load Lines. Record the elapsed time from initiation of Raise Command to the Shutter Unblank. As indicated by the change in Level of the HPA Blanking FB.

Sec Req is 1.0 Sec or Less.

4.28.5.6 Repeat for HPA Supply Elevator Lower and Transport Load Lines.

Sec  Req is 1.0 Sec. or Less.

4.28.5.7 Repeat of HPA Takeup Elevator Raise and Transport Recall Lines.

Sec  Req is 1.0 Sec. or Less.

4.28.5.8 Repeat for HPA Takeup Elevator Lower and Transport Recall Lines.

Sec  Req is 1.0 Sec. or Less.

4.28.5.9 Repeat for LPA Supply Elevator Raise and Transport Load Lines.

Sec  Req is 1.0 Sec. or Less.
4.28.5.10 Repeat for LPA Supply Elevator Lower and Transport Load Lines.

__________ Sec  Req is 1.0 Sec. or less

4.28.5.11 Repeat for LPA Takeup Elevator Raise and Transport Recall Lines.

__________ Sec  Req is 1.0 Sec. or less.

4.28.5.12 Repeat for LPA Takeup Elevator Lower and Transport Recall Lines.

__________ Sec  Req is 1.0 Sec. or less.

4.28.5.13 Remove Recordings and Attach to these Data Sheets.
THIS TEST IN NOT REQUIRED. THE TEST PERFORMED UNDER 4.12.5.28 AND 4.12.5.29 WILL VERIFY THIS REQUIREMENT.

4.29 Requirement Title: SOURCE HOLDING AND SELECTION SYSTEM

4.29.1 Requirement Paragraph in Test Requirement Document

3.3.2.1.2

4.29.2 Requirement

It shall be demonstrated that five slide positions can be skipped and a slide from the sixth position can be viewed in 3 seconds or less.

4.29.3 Related Paragraph in System Test Plan

4.29

4.29.4 Pre-Test Requirements

4.29.4.1 Test Team

Test Condutor ________________ Init

Technicians ________________

____________________

____________________

____________________
4.29.4.1 Continued

Quality Assurance ___________ Init____
AFQA ___________ Init____
Aerospace Observer ___________ Init____
AFSO ___________ Init____

4.29.4.2 Test Equipment Required
1) Techniwrite Model TR6460, Event Recorders or equivalent.

4.29.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
4.29.4.4 Subsystems Status

The following are required to be active during this Test.

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC</td>
<td>X</td>
</tr>
<tr>
<td>SLM</td>
<td>X</td>
</tr>
<tr>
<td>DIU</td>
<td>X</td>
</tr>
<tr>
<td>Stimulus S/S</td>
<td>X</td>
</tr>
<tr>
<td>Computer S/S</td>
<td>X</td>
</tr>
</tbody>
</table>

4.29.4.5 Power Turn On

1) Turn Power On to all Subsystems except the SLM.

4.29.5 Verification Test Procedure

4.29.5.1 Turn on the HPA and LPA Holder Changer.

4.29.5.2 Load Special Program No. 2 into the SDS 930 Computer.
4.29.5.3 Install Patchcords at the System Junction Box to record the following Signals (If Patchcords are installed, verify recorder channels)

<table>
<thead>
<tr>
<th>Channels</th>
<th>HPA</th>
<th>LPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Elevator Lower</td>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>Supply Elevator Busy</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>Transport Load</td>
<td>34</td>
<td>12</td>
</tr>
<tr>
<td>Transport Busy</td>
<td>35</td>
<td>13</td>
</tr>
<tr>
<td>Takeup Elevator Lower</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td>Takeup Elevator Busy</td>
<td>31</td>
<td>9</td>
</tr>
<tr>
<td>Transport Recall</td>
<td>36</td>
<td>14</td>
</tr>
<tr>
<td>Blanking CMD</td>
<td>37</td>
<td>15</td>
</tr>
<tr>
<td>Blanking Feedback</td>
<td>38</td>
<td>16</td>
</tr>
</tbody>
</table>

4.29.5.4 Set the Recorder Chart Speed at 20 MM/Sec and turn On the Recorders.

4.29.5.5 Activate the Computer Start Switch in Initiate Commands to the HPA Supply Elevator Lower and Transport Load Lines to skip 5 Slide Positions and Load the sixth. Record the elapsed time from initiation of Lower Command to Shutter Unblank as indicated by the change in Level of the Blanking Feedback.

Sec Req is 3.0 Sec or Less
4.29.5.6 Repeat for HPA Takeup Elevator Lower and Transport Recall Lines.

Sec Req is 3.0 Sec or Less

4.29.5.7 Repeat for LPA Takeup Elevator Lower and Transport Recall Lines.

Sec Req is 3.0 Sec or less

4.29.5.8 Repeat for LPA Supply Elevator Lower and Transport Load Lines.

Sec Req is 3.0 Sec or Less.

4.29.5.9 Remove Recordings and attach to these Data Sheets.

4.29.6 Demonstration Test Procedure

None
4.30 Requirement Title: IMAGE INTENSITY

4.30.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.3.1

4.30.2 Requirement

It will be demonstrated that the color balance of the light is between 3000° and 6000° Kelvin.

It will be demonstrated that:

1) The image intensity can be varied through a range of 50:1 with the upper level 500 foot lamberts ±10%.

2) The intensity of the image 5 degrees from the edge is no less than 50 percent of the on axis intensity. NOTE: These numbers will be measured at the eyepiece without diapositives in the holder.

3) The color change shall not vary more than ±25 mireds over the intensity range.

4.30.3 Related Paragraph in System Test Plan

4.30
4.30.4 Pre-Test Requirements:

None

4.30.5 Verification Test Procedure

No Test required. The SVS Acceptance Test Data verifying these Requirements shall be attached to these Data Sheets.
4.31 Requirement Title: MANUAL FILTER WHEEL

4.31.1 Requirement Paragraph in Test Requirement Document:

3.3.2.1.3.2

4.31.2 Requirement

It will be demonstrated that the manual filter wheel insertion simulated the optical path transmittances at 100%, 50%, and 25%.

Furthermore, it will be demonstrated that it is readily possible to change these transmittances to other values.

4.31.3 Related Paragraph in System Test Plan:

4.31

4.31.4 Pre-Test Requirements

4.31.4.1 Test Team

Test Conductor

Init.

Technicians

Init.

Init.

Init.

Init.

Init.

Init.

Init.

Init.

Init.

AFQA

Init.

Init.

Init.

Init.

Init.

Init.

Init.

Init.

Init.
4.31.4.2 Test Equipment Required

1) Spectra Pritchard Photometer - Model 1970-PR
2) Photometer Mount

4.31.4.3 Equipment Confidence Status

The Test Conductor will insure that all test equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal. Date</th>
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<tbody>
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</tbody>
</table>

4.31.4.4 Subsystem Status

The following are required to be active during this test:

<table>
<thead>
<tr>
<th></th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SLM</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>DIU</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>STIMULUS S/S</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>COMPUTER S/S</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
4.31.4.5 Power Turn On

1) Turn Power On to all Subsystems.

4.31.5 Test Procedure

4.31.5.1 Attach the Photometer Mount and Photometer to the Supplemental Eyepiece and verify that the SVS Reticle is in Place.

4.31.5.2 Remove all Magazines from Both Legs of the SVS.

4.31.5.3 Turn on all Stimulus Subsystem devices except Reticle Light Source, Haze Light Source, and the Wipeout Display, and verify that the Manual Filter Wheel Setting is 1.0.

4.31.5.4 Load the Program into the SDS 930 Computer.

4.31.5.5 Activate the Resume Switch and after the Reticle is in view, activate Freeze.

4.31.5.6 Center the Photometer on the Reticle Center, lock in place and measure and record the system brightness.

_________ Foot-Lamberts
4.31.5.7 Change the Manual Filter Wheel setting to 0.5, activate the Resume Switch and within approximately 2.0 seconds, activate Freeze.

4.31.5.8 Measure and record the system brightness

_________________________ Foot-Lamberts

The brightness should be 40% to 50% of that measured in 4.31.5.5

4.31.5.9 Change the Manual Filter Wheel setting to 0.25, activate the Resume Switch and within approximately 2.0 seconds, activate Freeze.

4.31.5.10 Measure and record the system brightness.

_________________________ Foot-Lamberts

The brightness should be 22.5% to 27.5% of that measured in 4.31.5.5

4.31.5.11 The Software Part 2 Specification Sections involving transmittance value changes shall be attached to these Data Sheets.
4.32 Requirement Title: IMAGE SIZE

4.32.1 Requirement Paragraph in Test Requirements Document
3.3.2.1.3.4

4.32.2 Requirement

It will be demonstrated that the angular magnification is by continuous zoom techniques.

It will be demonstrated that:

1. The magnification has a range of 7.2:1
2. The field of view subtends an apparent 60 degrees ± 1 degree at the eye.
3. Lowest power the exit pupil is 4 mm ± 0.2 mm
4. Highest power the exit pupil is 2 mm ± 0.1 mm
5. The exit pupil size will vary inversely with magnification within the limits of item 3 and 4 above.
6. Manual focus will have ± 3 diopter adjustment.

4.32.3 Related Paragraph in System Test Plan
4.32

4.32.4 Pre-Test Requirement:

None

4.32.5 Verification Test Procedure

4.32.5.1 No test required. The SVS acceptance test data verifying the requirements shall be attached to these data sheets.
4.33 Requirement Title: RESOLUTION REQUIREMENT

4.33.1 Requirement Paragraph in Test Requirement Document

3.1.2.1.3.5

4.33.2 Requirement

It will be demonstrated that when using a standard white on black bar chart of 2:1 contrast as an input, the device when simulating 127X at nadir from orbit shall provide at least 30 LP/mm for 32K scale stimulus and 67 LP/mm for 72K scale stimulus. This performance shall be provided on axis as viewed through the supplemental eyepiece by the unaided eye, with optical drives operating, the target centered in the FOV and scene drifts nulled by the computer. The resolution variation from the center to the edge of the apparent field shall not vary by more than a factor of 2 from the on axis performance.

The resolution under the above conditions shall not degrade by more than a factor of 2 from the performance at a simulated 127X where the device is configured to simulate a magnification of 63.5X.
4.33.3 Related Paragraph in System Test Plan

4.33

4.33.4 Pre-Test Requirements

4.33.4.1 Test Team

Test Conductor_____________________ Init____

Technicians_____________________

_____________________

_____________________

Quality Assurance___________________ Init____

AFQA_________________________ Init____

Aerospace Observer___________________ Init____

AFSO_________________________ Init

4.33.4.2 Test Equipment Required

1) Resolution Slide #141268G3

2) Eng. Test Box SK56179-999
4.33.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>CAL Date</th>
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4.33.4.4 Subsystems Status

The following are required to be active during this Test.

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<tr>
<td>Computer S/S</td>
<td>X</td>
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</tbody>
</table>
4.33.4.5 Power Turn On

1) Turn Power On to all Subsystems, indicated in 4.33.4.4

4.33.5 Test Procedure

4.33.5.1 Turn On the HPA and LPA positioners and Spherical Zooms.

4.33.5.2 Connect the Eng. Test Box per SK56179-999. Select HPA and Unblank HPA.

4.33.5.3 Insert the Resolution Slide in the HPA Viewing Station.

4.33.5.4 Set the Spherical Zoom Drive Voltage at +33.24 V (127X) and center the Reticle on the ON axis Resolution Chart. Record the Readings from three qualified observers for 127X. For the positions indicated on the attached Data Sheets set the Spherical Zoom Drive Voltage at +0.38 V (63.5X) and center the Reticle on the On Axis Resolution Chart. Record the Readings from three qualified observers for 63.5X for the positions indicated on the attached data sheets.

4.33.5.5 Remove the HPA High Power Arm and insert the Low Power Arm and repeat all Readings from 4.33.5.4

<table>
<thead>
<tr>
<th>SZ Voltage</th>
<th>(127X)</th>
<th>+38.88V</th>
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<tr>
<td></td>
<td>(63.5X)</td>
<td>+8.59V</td>
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</table>
4.33.5.6 Activate the Selector to LPA, Blank HPA
and Unblank LPA. Repeat all Readings from 4.33.5.4

SZ Drive Voltage (127X) +36.56V
(63.5X) + 4.85V

4.33.5.7 Remove the LPA High Power Arm and insert the Low Power Arm and repeat all Readings.

SZ Drive Voltage (127X) +42.32V
(63.5X) +13.43V
<table>
<thead>
<tr>
<th>Resolution Target Position</th>
<th>Arm Magnification</th>
<th>Stick Magnification</th>
<th>Observer 1 Vertical</th>
<th>Observer 2 Vertical</th>
<th>Observer 3 Vertical</th>
<th>Average Vertical</th>
<th>Requirement</th>
<th>Observer #1 Horizontal</th>
<th>Observer #2 Horizontal</th>
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</table>
4.34 Requirement Title: FIELD CURVATURE

4.34.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.3.6

4.34.2 Requirement

It will be demonstrated that the curvature of the apparent field from center to edge under static conditions at 1:1 anamorph setting using the supplemental eyepiece is no greater than 3.5 diopters.

4.34.3 Related Paragraph in System Test Plan

4.34

4.34.4 Pre-Test Requirements:

None

4.34.5 Verification Test Procedure

4.34.5.1 No Test Required. The SVS Acceptance Test Data verifying this Requirement shall be attached to these Data Sheets.
4.35 Requirement Title: IMAGE PERSPECTIVE

4.35.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.3.8

4.35.2 Requirement

The anamorphic optics, which provide image perspective by distorting an input to simulate various slant angles of view, will be demonstrated.

4.35.3 Related Paragraph in System Test Plan

4.35

4.35.4 Pre-Test Requirements

None

4.35.5 Verification Test Procedure

4.35.5.1 No Test required. The SVS Acceptance Test Data verifying this Requirement shall be attached to these Data Sheets.

4.35.6 Demonstration Test Procedure

4.35.6.1 No Test required. Demonstrated as part of 4.17 and 4.18
4.36 Requirement Title: OPTICAL CENTER SELECTION

4.36.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.3.9

4.36.2 Requirement

It will be demonstrated that the center of the optical axis can be continuously varied to at least ±4 inches in the two orthogonal directions with respect to the center of the diapositives.

4.36.3 Related Paragraph in System Test Plan

4.36

4.36.4 Pre-test Requirements

None

4.36.5 Verification Test Procedure

4.36.5.1 No Test required. The SVS Acceptance Test Data verifying this Requirement shall be attached to these Data Sheets.

4.36.6 Demonstration Test Procedure

None
4.37 Requirement Title: BRIGHTNESS CONTROL

4.37.1 Requirement Paragraph in Test Requirements Document
3.3.2.1.4.1

4.37.2 It will be demonstrated for the filter modulator that:
1) Any position within the brightness range can be set within 1 second.
2) Control accuracy is within ± 10 percent of a commanded foot lambert setting.

4.37.3 Related Paragraph in System Test Plan
4.37

4.37.4 Pre-Test Requirements
None

4.37.5 Verification Test Procedure
4.37.5.1 No Test required. The SVS Acceptance Test Data verifying this Requirement shall be attached to these Data Sheets.

4.37.6 Demonstration Test Procedure
None
4.38 Requirement Title: MAGNIFICATION CONTROL

4.38.1 Requirement Paragraph in Test Requirements Document
3.3.2.1.4.2

4.38.2 Requirement
It will be demonstrated that the spherical zoom control will cause any required 2:1 magnification change within 0.5 seconds and will reset to any position within one second. Furthermore, it will be demonstrated that the control is continuous over the operating range as specified in paragraph (3.3.2.1.3.4).

4.38.3 Related Paragraph in System Test Plan
4.38

4.38.4 Pre-Test Requirements
None

4.38.5 Verification Test Procedure
4.38.5.1 No Test required. The measurements taken in 4.12 and the SVS Acceptance Test Data verify this Requirement. Attach the SVS Acceptance Test Data to the Data Sheets.

4.38.6 Demonstration Test Procedure
None
4.39 Requirement Title: ANAMORPHIC CONTROL

4.39.1 Requirement Paragraph in Test Requirement Document

3.3.2.1.4.3

4.39.2 Requirement

It will be demonstrated that:

1) Anamorphic azimuth is continuously variable from 0 to 360 optical degrees.

2) Positional accuracy is ± 15 arc minutes.

3) Any position can be accomplished within 1 second.

4.39.3 Related Paragraph in System Test Plan

4.39

4.39.4 Pre-Test Requirements

4.39.4.1 Test Team

Test Conductor

Init

Technicians


4.39.4.1 Continued

Quality Assurance_________________  Init_____
APQA_________________  Init_____
Aerospace Observer_________________  Init_____
AFSO_________________  Init_____

4.39.4.2 Test Equipment Required

1) Brush Mark 200 B Analog recorder or equivalent.

4.39.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
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<tbody>
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4.39.4.4 Subsystem Status

The following are required to be active during this Test.

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4.39.4.4 Continued

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4.39.4.5 Power Turn On

1) Turn Power On to all Subsystems.

4.39.5 Verification Test Procedure

4.39.5.1 No Test is required for Requirements 1 and 2. The SVS Acceptance Test Data verifying these Requirements shall be attached to these Data Sheets.

4.39.5.2 Set Up two Switches at the Beckman 2200 to supply -50 VDC to +50 VDC Step Commands. One Switch shall provide the Step on T128 (Signal) and T129 (Return). The other shall provide the Step on T130 (Signal) and T131 (Return).
4.39.5.3 Install Leads at the A2 Power Conditioning SVS Interface Connector J1 and J2, to record the following:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Conn.</th>
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<td>J1-h,i J2-h,i</td>
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<tr>
<td>Cyl Zoom 1/2X FB</td>
<td>J1-DD,EE J2-DD,EE</td>
</tr>
<tr>
<td>Cyl Zoom 2X Drive</td>
<td>J1-1,k J2-1,k</td>
</tr>
<tr>
<td>Cyl Zoom 2X FB</td>
<td>J1-FF,GG J2-FF,GG</td>
</tr>
</tbody>
</table>

4.39.5.4 Turn On HPA and LPA Cyl Zoom 1 and 2. Set Recorder Chart Speed at 20 MM/Sec. Turn On Recorders.

4.39.5.5 Activate both Switches at the Beckman 2200. Record the elapsed time from initiation of Step Command to Settling of the Feedback within ± 10%, as indicated by the change in Feedback Polarity, for both HPA Cyl Zoom 1 and 2.

_____________ Sec - HPA Cyl Zoom 1

_____________ Sec - HPA Cyl Zoom 2
4.39.5.6 Change the Outputs at the Beckman 2200

From T128 To T140

T129 T141
T130 T142
T131 T143

4.39.5.7 Repeat 4.39.5.5 for LPA Cyl Zoom 1 and 1

Sec - LPA Cyl Zoom 1
Sec - LPA Cyl Zoom 2

4.39.5.8 Remove recordings and attach to these Data Sheets.

4.39.6 Demonstration Test Procedure

None
4.40 Requirement Title: IMAGE ROTATION

4.40.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.4.4

4.40.2 Requirement

It will be demonstrated that:
1) The image rotation is continuously variable from 0 to 360 degrees.
2) Any position can be accomplished within 1 second.
3) Positional accuracy is ± 30 arc minutes.

4.40.3 Related Paragraph in System Test Plan

4.40

4.40.4 Pre-Test Requirements:

None

4.40.5 Verification Test Procedure

4.40.5.1 No Test required. The SVS Acceptance Test Data verifying this Requirement shall be attached to these Data Sheets.

4.40.6 Demonstration Test Procedure

None
4.41 Requirement Title: POSITION SELECTION

4.41.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.4.5

4.41.2 Requirement

1) The center of the optics chain has a position accuracy of _ 0.0059 inches.

2) Any position, within the operating range, has a repeatable accuracy of 0.0004 inches.

3) The minimum position change is 0.0004 inches.

4) The position change is capable of a change rate between 0 and 4.61 inches per second.

5) During position change, position commands may contain accelerations between 0 and 38 inches per second squared.

4.41.3 Related Paragraph in System Test Plan

4.41

4.41.4 Pre-Test Requirements

None
4.41.5 Verification Test Procedure

4.41.5.1 No Test required. The SVS Acceptance Test Data verifying this Requirement shall be attached to these Data Sheets.
4.42 Requirement Title: ACQUISITION PERIPHERAL DISPLAY

4.42.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.4.6.1

4.42.2 Requirement

It will be demonstrated that:

1) All peripheral lights are displayed against a dark background in the outer three degrees in the periphery of a 60 degree field of view.

2) All lights subtend one-half degree in the field of view.

3) All lights have the capability of being switched on singly, in any combination or sequence.

4) There are 35 lights in the wipe out display and the design has a capacity for 45 lights.

5) There are 25 lights equally spaced within a 120 degree arc in the left hand field of view 60 degrees above and 60 degrees below the horizontal centerline.

6) There are 5 lights equally spaced and centered in a 30 degree arc centered in the upper right quadrant.
4.42.2 Requirement (Continued)

7) There are 5 lights equally spaced and centered in a 30 degree arc centered in the lower right quadrant.

8) There is a means provided to color the peripheral lights individually.

9) There is sufficient flexibility to simulate a wide variety of potential AVE configurations.

4.42.3 Related Paragraph in System Test Plan

4.42

4.42.4 Pre-Test Requirements:

None

4.42.5 Verification Test Procedure

4.42.5.1 Requirements 1 and 3 will be verified by 4.43 Paragraph 4.43.5.3

4.42.5.2 Attach Drawings

To these Data Sheets, for a review to verify Requirements 2, 4, 5, 6, 7, 8, 9

4.42.6 Demonstration Test Procedure

None
4.43 Requirement Title: ACQUISITION PERIPHERAL DISPLAY

4.43.1 Requirement Paragraph in Test Requirement Document

3.3.2.1.4.6.1

4.43.2 Requirement

10) The brightness is variable over a 50:1 ± 10% range.

11) The maximum brightness is 500 foot lamberts ± 10%.

4.43.3 Related Paragraph in System Test Plan

4.43

4.43.4 Pre-Test Requirements

4.43.4.1 Test Team

Test Conductor

Technicians

Quality Assurance

AFQA

Aerospace Observer

AFSO

Init

Init

Init

Init

Init
4.43.4.2 Test Equipment Required

1) Spectra Pritchard Photometer Model 1970-PR

2) Photometer Mount SK

4.43.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

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<td>Computer S/S</td>
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4.43.4.5 Power Turn On

1) Turn Power On to all Subsystems except the DIU.

4.43.5 Test Procedure

4.43.5.1 At the SCC Panel 2A, verify that the Servo Test Switch is not activated.

4.43.5.2 Attach the Photometer Mount and Photometer to the Supplemental Eyepiece.
4.43.5.3  Turn On all Wipeout Lights singly and unblank the Wipeout Display. Verify that all other Light sources are Off.

4.43.5.4  Set the Wipeout Brightness Control to maximum, and center the Photometer spot on one of the Wipeout Lights. Measure and record the Brightness.

4.43.5.5  Set the Wipeout Brightness Control to minimum. Measure and record the Brightness.

4.43.5.6  Repeat 4 and 5 for two more Wipeout Lights

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Maximum shall be 450 to 550 foot Lamberts. Required Ratio is 45:1 to 55:1.
4.44 Requirement Title: HAZE REQUIREMENT

4.44.1 Requirement Paragraph in Test Requirement Document

3.3.2.1.4.6.2

4.44.2 Requirement

The haze brightness (atmospheric luminance) will be demonstrated to show that:

1) The brightness is variable over a 50:1 ± 10% range.

2) The upper level is 500 foot lamberts ± 10%.

4.44.3 Related Paragraph in System Test Plan

4.44

4.44.4 Pre-Test Requirements

4.44.4.1 Test Team

Test Conductor ______________________  Init____________________

Technicians ______________________

____________________

____________________

____________________
4.44.4.1 Continued

Quality Assurance __________ Init____
AFQA __________ Init____
Aerospace Observer __________ Init____
AFSO __________ Init____

4.44.4.2 Test Equipment Required

1) Spectra Pritchard Photometer Model 1970-PR

2) Photometer Mount SK

4.44.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

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4.44.4.4 Subsystems Status

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4.44.4.5 Power Turn On

1) Turn Power On to all Subsystems except the DIU.
4.44.5 Test Procedure

4.44.5.1 At the SCC Panel 2A, verify that the Servo Test Switch is activated.

4.44.5.2 Attach the Photometer Mount and Photometer to the Supplemental Eyepiece.

4.44.5.3 Turn On the HPA Light Source, activate the Selector to HPA, Unblank HPA and select the Haze Filter Modulator Servo Test. Verify that all other Light Sources are Off.

4.44.5.4 Center the Photometer Spot on the Reticle Center.

4.44.5.5 Turn On the Haze Light Source and set the Haze Filter Modulator Servo Test Control at Maximum.

4.44.5.6 Blank HPA and Unblank the Haze Light Source. Measure and record the Haze Brightness.

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<th>Foot Lamberts</th>
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<td>450 to 550</td>
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4.44.5.7 Set the Haze Filter Modulator Servo Test Control to Minimum. Measure and record the Haze Brightness.

| Max | Ratio | Min |

Required Ratio is 45:1 to 55:1
4.45 Requirement Title: HAZE REQUIREMENT

4.45.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.4.6.2

4.45.2 Requirement

The scene brightness and haze brightness will give proper appearance of the overall scene as seen from orbit.

4.45.3 Related Paragraph in System Test Plan

4.45

4.45.4 Pre-Test Requirements

None

4.45.5 Verification Test Procedure

4.45.5.1 No Test required. Requirement will be demonstrated during DOP'S.
4.46 Requirement Title: RETICLE REQUIREMENT

4.46.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.4.6.3

4.46.2 Requirement

The reticle display will be demonstrated to show that:

1) The brightness is variable over a 50:1 range within ±10%.

2) The upper level is 500 foot lamberts, ±10%.

4.46.3 Related Paragraph in System Test Plan

4.46

4.46.4 Pre-Test Requirements

4.46.4.1 Test Team

Test Conductor_________________ Init____

Technicians________________________

________________________

________________________

________________________
4.46.4.1 Continued

Quality Assurance Init
AFQA Init
Aerospace Observer Init
AFSO Init

4.46.4.2 Test Equipment Required

1) Spectra Pritchard Photometer Model 1970-PR
2) Photometer Mount SK

4.46.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker

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4.46.4.4 Subsystems Status

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<td>Computer S/S</td>
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</table>

4.46.4.5 Power Turn On

1) Turn Power On to all Subsystems except the DIU
4.46.5 Verification Test Procedure

4.46.5.1 At the SCC Panel 2A, verify that the Servo Test Switch is not activated.

4.46.5.2 Attach the Photometer Mount and Photometer to the Supplemental Eyepiece.

4.46.5.3 Turn On the HPA Light Source, activate the Selector to HPA and Unblank HPA. Verify that all other Light Sources are Off.

4.46.5.4 Center the Spot in the Photometer on the Reticle Center.

4.46.5.5 Turn On the Reticle Light Source and set the Reticle Brightness Control to Maximum.

4.46.5.6 Blank HPA and Unblank the Reticle. Measure and record the Reticle Brightness.

\[ \text{Foot Lamberts} \]
\[ 450 \text{ to } 550 \text{ Required} \]

4.46.5.7 Set the Reticle Brightness Control to Minimum. Measure and Record the Brightness.

\[ \text{Max} \quad \text{Ratio} \quad \text{Min} \]

Required Ratio is 45:1 to 55:1
4.47 Requirement Title: RETICLE REQUIREMENT

4.47.1 Requirement Paragraph in Test Requirements Document

3.3.2.1.4.6.3

4.47.2 Requirement

It will be demonstrated that:

1) The reticle is illuminated.

2) The reticle will grow and contract with change in magnification.

3) The reticle configuration can be changed.

4.47.3 Related Paragraph in System Test Plan

4.47

4.47.4 Pre-Test Requirements

None

4.47.5 Verification Test Procedure

4.47.5.1 No Test Required. Requirement will be demonstrated during DOP'S.
4.48 Requirement Title: CUE SUBSYSTEM

4.48.1 Requirement Paragraph in Test Requirement Document

3.3.2.1.4.6.4

4.48.2 Requirement

The Cue Subsystem will be presented by rear projection screen display on Panel 2C. Four operating modes shall be simulated in the rear projection display.

1) Manual mode, single step

2) Manual mode, random access

3) Auto-Prepass Mode

4) Auto-During Pass mode

In the manual mode the ability to advance, backup, or random access shall be demonstrated. It shall be demonstrated that consecutive cues can be accessed in one second. Furthermore, it will be demonstrated that any cue in the cue file shall be accessible within 4 seconds.

In the auto-prepass mode it will be demonstrated that the dwell time can be changed manually.
4.48.2 Requirement (Continued)

Demonstrate that the auto-during pass mode will provide a computer controlled dwell time.

It will be demonstrated that the cue system can provide the capability to present one cue per acquisition target in the during pass mode, and one cue of different content per acquisition target in the pre-pass mode. It will be further demonstrated that the cue film storage system uses 35 mm full frame slides with a holding capacity of 80 slides.

4.48.3 Related Paragraph in System Test Plan

4.48

4.48.4 Pre-Test Requirements

4.48.4.1 Test Team

Test Conductor

Technicians

Quality Assurance

AFQA

Init____

Init____

Init____

Init____

Init____
4.48.4.1 Continued

Aerospace Observer ___________ Init__
AFSO ___________ Init__

4.48.4.2 Test Equipment Required

1) Techniwrite Model TR6460 Event Recorders or equivalent.

4.48.4.3 Equipment Confidence Status

The Test Conductor will insure that all Test Equipment has a valid calibration sticker.

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<thead>
<tr>
<th>Equipment Type</th>
<th>Cal Date</th>
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4.48.4.4 Subsystems Status

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4.48.4.4 Subsystems Status (Continued)

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<tr>
<td>Computer S/S</td>
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</tr>
</tbody>
</table>

4.48.4.5 Power Turn On

1) Turn Power On to all Subsystems.

4.48.5 Verification Test Procedure

4.48.5.1 Install Patchcords at the System Junction Box to record the following (If Patchcords are already installed, verify recorder channels).
4.48.5.1 Continued

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<tr>
<td>Cue Busy</td>
<td>42</td>
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<tr>
<td>VDP Insert</td>
<td>49</td>
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</table>

4.48.5.2 Load a DOP Program into the SDS 930 Computer.

4.48.5.3 Verify that the VDP Pwr Switch at Panel 2D is "ON" and that the Frame Select is selecting Frame 1 (00001)

4.48.5.4 Turn On the Cue Light Source and Projector.

4.48.5.5 Activate the Resume Switch and Select Frame 2 (00002). Activate the VDP Insert Switch. Activate the Freeze Switch when the Cue Requested Display indicates #2.

4.48.5.6 Record the elapsed time from initiation of VDP insert to the change in Level of the Cue Busy.

Sec Req is 1.0 Sec.

4.48.5.7 Verify that the Cue Requested and Cue Selected Displays at the SCC Panel 5B are displaying Cue #2 Requested and Selected.

Verified
4.48.5.8 Select Frame ( ), activate the Resume Switch and the activate the VDP Insert Switch.
Activate the Freeze Switch when the Cue Requested display indicates # (Frame 42 is 180° from Frame 2 and will require the longest access time.)

4.48.5.9 Record the elapsed time from initiation of VDP Insert to the change in level of the Cue Busy.

____________________ Sec  Req is 4.0 Sec

4.48.5.10 Verify that the Cue Requested and Cue Selected display at Panel 5B are displaying Cue # requested and selected.

____________________ Verified

4.48.5.11 Remove recordings and attach to these Data Sheets.

4.48.5.12 This Procedure verifies only access times. The remainder of the requirement will be demonstrated during DOP.
5.0 DEMONSTRATION OF REQUIREMENTS

This Section defines the Procedures to be used for conducting the Demonstration Orbital Passes (DOP'S). The script for each DOP will contain stops before each target and/or Group of targets to allow for the Test Conductor to brief the AF Demonstration Team on the events occurring within the target or group, and to obtain agreement on the Requirements demonstrated by the preceding target or group. The following table lists the Requirements to be demonstrated during or prior to DOP'S and lists the paragraph number and type of DOP where the Requirement is demonstrated.

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**SECRET/DORIAN**
HANDLE VIA BYEMAN SYSTEM ONLY
## 5.0 DEMONSTRATION OF REQUIREMENTS (CONTINUED)

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**NOTE:** The Demonstration of Requirements during DOP'S will be visual observations only. No physical measurements (such as Timing) will be made. All required physical measurements have been made under section 4.0 (Verification of Requirements).
5.1 Pre-Test Checkout Program

The Pre-Test Checkout Program Requirement will be demonstrated per Test Procedure BIN: BIF-055-46753-69 on the first day of Demonstration Tests, and at the option of the Test Conductor on the succeeding days.
5.2 ATS Only DOP

5.2.1 General

The test procedure for this DOP contains the tasks required to demonstrate specific requirements of the Phase 0 MDS as defined in Section 4.0 of this Document.

5.2.2 Requirements Demonstrated

5.2.2.1 The following requirements will be demonstrated by the ATS only DOP prior to the Payload Pass.

4.9 Event time operation
4.48 (Partial) Cue Subsystem
   1) Manual callup
   2) Auto-prepass
   3) Alphanumeric Data

The following requirements will be demonstrated during the Payload Pass.

Group 1 4.20 Scene Streaming
   2 4.21 Control Stick and Magnification
   3 Control during Freeze
4.42 Acquisition Peripheral Display
4.48 Cue Subsystem (Auto During-Pass and Cue Hold)

4.46 Reticle Req.
5.2.2.1 Continued

Group 4  4.12 Magnification and Real FOV

5  4.32 Image Size (Continuous Zoom)

6  4.47 Reticle Requirement

Group 7  4.17 Initial Target Location

9  4.18 Dynamic Target Location

Group 11  4.44 Haze Variation

12  4.45 Haze (Haze and Scene Brightness Combined)

13  

14  

Group 15  4.30 Image Intensity

16  4.16 Lighting

17  

18  

Group 19  4.31 Manual Filter

4.33 Resolution

4.36 Optical Center Selection

4.19 Scan Area

Group 20 thru 26

4.11 Stick Input

Group 1-26

4.2 Controls and Displays

4.7 Operations Scripting Capability
5.2.2.1 Continued

Group 1-26 (Continued)

4.15 Scene Dynamics

4.16 10 Min Turn Around

5.2.3 Scripting

This DOP is scripted for both Primary Trackpath and ATS Trackpath #1 containing 26 groups of targets with a total of 58 aiming points. The Primary Trackpath is contained in Trackpath 1 and will be demonstrated. ATS Trackpath 2 will not be scripted or demonstrated.

5.2.4 Stimulus

The stimulus material for this DOP will be slides (LP, HP) numbered sequentially from 1 to 26, which will contain a grid of indexed intersections spaced on one inch centers across the format of each slide.

Where resolution measurements are to be made, a slide with resolution targets (Tribar charts) will be substituted for the numbered gridwork slide. (These are identified in the Procedure).

The cues for this DOP will be numbered 1 to 26 to correspond with group number. If more than one target is in a group, duplicate cue slides will be used. Each cue slide will contain the indexed intersection to be used as that target.

5.2.5 Setup

The MDS will be in an operational configuration as defined in the Pretest Checkout Procedure BIN:BIF-055-46753-69 with all simulation software and AVE programs loaded.
5.2.5 Continued

The simulated command messages, stimulus data, and "SCRIPT" data will be read into the Computer Subsystem. The HP slides will be loaded in the HP arm of the SVS and the LP slides will in the LP arm, in accordance with the script slide load tables.

The SLM setup will consist of a panel checklist for Panels 2C and 2D, contained in the Simulated VDP.

For this DOP, the controls of interest and the positions selected are:

- Trackpath Select
- Magnification Controller
- VDP
- Right Hand Control Stick
- Primary Trackpath No. 1
- LP Range
- Command
- Centered

5.2.6 Pre-Payload Pass Functions

For this DOP, several tasks will be performed prior to actual start of the Payload Pass. These tasks are:

1. Event Timer Setup
2. Auto-Prepass Cue Briefing

This will be an abbreviated briefing since the intent is to show the simulator capability to perform this task and not provide actual briefing for content. If Manual Single Step Mode is desired, place VDP Power Switch to "ON" and activate Single Step Switch.

3. Manual Cue Callup
5.2.6 Continued

This will require the crewman to call up and display the panel checklist for 2C and 2D prior to start of the Payload Pass. The intent here is to demonstrate the manual capability as well as provide the instructions for setting up the panels for the Payload Pass.

5.2.7 ATS Only DOP Procedure

5.2.7.1 General

This DOP will commence when the "RESUME" command is initiated at the SCC. At this point, vehicle time for this DOP will be 112300 seconds. The MDS will be operating continuously through the end of the Payload Pass unless the "FREEZE" interrupt is initiated.

Whenever the FREEZE is initiated the MDS is placed in a "hold" configuration until the "RESUME" is once more initiated. Then the MDS resumes operation from the point in time at which the FREEZE occurred. In order to have Control Stick and Magnification Control during FREEZE, the Stick FREEZE Switch at the SCC must be activated.

One second prior to each Group Decision Time (GDT) a "Scripted Freeze" shall occur to allow time for concurrence of accomplished events. A "Resume" shall be required for continuation of the DOP; however a "Scripted Freeze" shall not occur if it will interrupt operation in the ATS Hold Mode.
5.2.7.2 SCC Initiates DOP

1) SCC operator activates "RESUME" and monitors Vehicle Time on SCC CRT.

5.2.7.3 Crewman Sets Event Timer

1) Timer Power Switch to "Display and Aural"
2) Timer Mode Switch to "IT Set"
3) Insert Time "12680"
4) Timer Mode Switch to "DT Set"
5) Insert Time "00120"
6) Timer Mode Switch to "Operate"
7) Observe Timer Counting Down

5.2.7.4 Crewman Prepares For Prepass Briefing

1) VDP Power Switch to "ON"
2) Press "Lamp Test" and observe "Wrong Module" Light
3) VDP Power Switch to "Command"
4) Await start of Auto-Prepass (112500)

5.2.7.5 Crewman Performs Auto-Prepass Briefing

1) Observe Cue, Alpha-numerics and Target No.
   1    Al P X 5 5    011
2) Adjust Cue "Focus" and "Brightness"
3) Adjust Alphanumeric "Brightness"
5.2.7.5 Continued

4) Press "Reject" on Magnification Controller

5) Observe Cue, Alphanumerics and Target No.
   1 A 3 A X 3 7 012

6) Press "Reject" on Magnification Controller (Repeat Steps 5-6 until Prepass complete or terminated by computer.)

7) Listen for Timer Alarm (10 Sec before (112670) end of Prepass and again at the end of Prepass and verify Timer has reached zero and is now counting up for Duration Time (DT).

5.2.7.5.1 The preceding operations have demonstrated requirements 4.9 (Event Timer) and 4.48 (Cue Subsystem Prepass Mode)

5.2.7.6 Crewman Prepares for Payload Pass

1) VDP Power Switch to "ON"

2) Set "Frame Select" to 07500 (Panel Checklist)

3) Press "Insert and verify panel checklist displayed"

4) Setup Panels 2C and 2D according to Checklist

5) VDP Power Switch to "Command"

6) Await start of Payload Pass. Do not wait more than 10 minutes.

7) Listen for Timer Alarm (112800)

8) Timer Power Switch to "OFF"
5.2.7.7 Crewman Performs Payload Pass

5.2.7.7.1 Group 1

1) Activate "Cue Hold"

2) Observe Cue, Alphanumeric and Target No.

   1 A1PX55 011

3) Observe "ATS Track" Light ON

4) Release "Cue Hold"

5) Observe Slide "1" in Eyepiece and at TV Monitor

6) (SCC Operator) Activate "Freeze" and "Stick Freeze"

7) Adjust Reticle Brightness

8) Adjust Peripheral Brightness

9) Adjust Cue Focus and Brightness

10) Demonstrate control stick and magnification control by scanning the Scene and changing magnification in LP Range only.

11) Adjust Alphanumeric Brightness

12) (SCC Operator) Deactivate Stick Freeze and activate Resume.

13) Observe Peripherals

   a) Primary Target Ind. on Right Side

      (4 Green Lights)

   b) Observe Countdown
5.2.7.7.1 Group 1 Continued

13) Continued
   c) Dwell Light at GDT minus 9 (GDT-9) and
      (GDT-15)
   d) Decision Time Light

14) Observe Eyepiece Blanking at GDT

5.2.7.7.1.1 The preceding Group has demonstrated
the following requirements:

4.21 (Control Stick & Magnification
   Control during Freeze) AFSO

4.46 (Reticle Req) AFSO

5.2.7.7.2 Group 2

1) Activate "Cue Hold"

2) Observe Cue, Alphanumeric and Target No.
   2 B6PX55 022

3) Observe "ATS Track" Light ON

4) Release "Cue Hold"

5) Observe Slide "2" in Eyepiece and at TV
   Monitor.

6) Observe Peripherals
   a) Primary Target Ind. on Right Side
      (4 Green Lights)
   b) Observe Countdown
   c) Dwell Light at GDT-7
   d) Decision Time Light
5.2.7.7.2 Continued

6) Observe Eyepiece Blanking at GDT

5.2.7.7.3 Group 3

1) Observe Cue, Alphanumeric and Target No.
   3    A7PX77    031

2) Observe "ATS Track" Light ON

3) Observe Slide "3" in Eyepiece and
   at TV Monitor

4) Observe Peripherals
   a) Primary Target Ind. on Right Side
      (4 Green Lights)
   b) Observe Countdown
   c) Dwell Time Light
   d) Decision Time Light

5) Set ATS Trackpath Select to Trackpath 1

6) Observe Eyepiece Blanking at GDT

5.2.7.7.3.1 The preceding Groups (1, 2, 3) have demonstrated the following requirements:

4.20 (Scene Streaming)

AFSO

4.42 (Acquisition Peripheral Display)

AFSO
5.2.7.7.3.1 Continued

4.48 (Cue Subsystem-Auto During-Pass and Cue Hold)

AFSO

5.2.7.7.4 Group 4

1) Observe "ATS Track" Light ON
2) Observe Slide "4" in Eyepiece and at TV Monitor
3) Change Magnification between 15.88X and 31.76X and observe Magnification change in both the Scene and the Reticle.
4) Change Magnification Stick from 31.76X to 63.5X and observe Blanking and Slide Change. (Slide No. Changes color)
5) Change Magnification between 63.5X and 127X and observe Magnification change in both the Scene and the Reticle.
6) Return Mag Stick to 15.88X
7) Observe Eyepiece Blanking at GDT and "ATS Track" Light OFF

5.2.7.7.5 Group 5

1) Observe "ATS Track" Light ON
5.2.7.7.5 Continued

2) Observe Slide "5" in Eyepiece and at TV Monitor
3) Change Magnification between 15.88X and 31.76X and observe Magnification change in both the Scene and the Reticle.
4) Change Magnification Stick from 31.76X to 63.5X and observe Blanking and Slide change. (Slide no. changes color)
5) Change Magnification between 63.5X and 127X and observe Magnification change in both the Scene and the Reticle.
6) Return Mag Stick to 15.88X
7) Observe Eyepiece Blanking at GDT and "ATS Track" Light OFF.

5.2.7.7.6 Group 6

1) Observe "ATS Track" Light ON
2) Observe Slide "6" in Eyepiece and at TV Monitor
3) Change Magnification between 15.88X and 31.76X and observe Magnification change in both the Scene and the Reticle.
4) Change Magnification Stick from 31.76X to 63.5X and observe Blanking and Slide change.
5.2.7.7.6  Continued

5) Change Magnification between 63.5X and 127X and observe Magnification change in both the Scene and the Reticle.
6) Return Mag Stick to 15.88X
7) Observe Eyepiece Blanking at GDT and "ATS Track" Light OFF.

5.2.7.7.6.1 The preceding Groups (4, 5, 6) have demonstrated the following requirements:

4.12 (Magnification and Real FOV)  
AFSO

4.32 (Image Size-Continuous Zoom)  
AFSO

4.47 (Reticle Requirement)  
AFSO

5.2.7.7.7 Group 7

1) Activate "ATS Hold"
2) Observe Slide "7" in the Eyepiece
3) Observe Tracking at approximately 0° Roll
4) Observe Effects of Anamorph Drive to Simulate Image Aspect in Pitch
5.2.7.7.7  Continued
5) Observe Tracking Past GDT
6) Remain in the ATS Hold Mode until target is automatically released.

5.2.7.7.8  Group 8
Skipped due to extended tracking of Group 7 Target.

5.2.7.7.9  Group 9
1) Activate "ATS Hold"
2) Observe Slide "9" in the Eyepiece
3) Observe Tracking at approximately 30° Roll
4) Observe Effects of Anamorph Drive
5) Observe Tracking Past GDT
6) "Reject" to Release ATS Hold

5.2.7.7.10  Group 10
Skipped due to extended tracking of Group 9 Target.

5.2.7.7.10.1  The preceding groups (7, 9) have demonstrated the following requirements:
4.17 (Initial Target Location)

AFSO
5.2.7.7.11 Group 11

1) Observe Slide "11" in Eyepiece
2) Observe Addition of Haze approximately (25%)
   for fixed total brightness and effect on Slide Contrast

5.2.7.7.12 Group 12

1) Observe Slide "12" in Eyepiece
2) Observe Change of Haze Level approximately (50%)
   for fixed total brightness and effect on Slide Contrast.

5.2.7.7.13 Group 13

1) Observe Slide "13" in Eyepiece
2) Observe Change of Haze Level approximately (75%)
   for fixed total brightness and effect on Slide Contrast.

5.2.7.7.14 Group 14

1) Observe Slide "14" in Eyepiece
2) Observe Change of Haze Level approximately (100%)
   for fixed total brightness and effect on Slide Contrast.

5.2.7.7.14.1 The preceding Groups (11 thru 14) have demonstrated the following requirements:
5.2.7.7.15 Group 15
1) Observe Slide "15" in Eyepiece
2) Observe Scene Brightness approximately (25%)

5.2.7.7.16 Group 16
1) Observe Slide "16" in Eyepiece
2) Observe Scene Brightness approximately (50%)

5.2.7.7.17 Group 17
1) Observe Slide "17" in Eyepiece
2) Observe Scene Brightness approximately (75%)

5.2.7.7.18 Group 18
1) Observe Slide "18" in Eyepiece
2) Observe Scene Brightness approximately (100%)

5.2.7.7.18.1 The preceding Groups (15 thru 18) have demonstrated the following requirement:

4.16 (Lighting) AFSO
4.30 (Image Intensity) AFSO
5.2.7.7.19 Group 19

1) Observe Resolution Slide in Eyepiece

2) Observe Cue Alphanumeric and Target No.
   19       A7PX55       191

3) Observe "ATS Track" Light ON

4) A Scripted Freeze will occur at (113132).
   The SCC operator will activate Stick Freeze.

5) Using the Control Stick move the Image in
   both axes and observe ± 4 inch motion
   in each axis.

*6) Center the Reticle on the On Axis Resolution Target. Record the Resolution
    readings from three qualified observers
    on the attached Data Sheets, setting the
    Magnification Control Stick as indicated
    on the Data Sheets.

*7) Remove the HPA High Power Arm and insert
    the Low Power Arm. Repeat readings as
    specified on the Data Sheets.

*8) Activate Resume (SCC Operator).

*9) Activate "Crippen Switch".

*10) A Scripted Freeze will occur at (113135).

*11) Repeat Steps 6 and 7 for LPA.

* The number of Resolution Readings shall
    be that required to satisfy the AF
    Demonstration Team that the Verification
    Data taken for 4.33 of this Procedure is
    valid when Scene Drifts are nulled by
    the Computer.
5.2.7.7.19 Continued

12) Activate Resume (SCC Operator).


14) Observe Eyepiece blanking at GDT.

5.2.7.7.19.1 The preceding Group (19) has demonstrated the following requirements:

- 4.31 (Manual Filter)  
  AFSO

- 4.33 (Resolution)  
  AFSO

- 4.36 (Optical Center Selection)  
  AFSO

- 4.19 (Scan Area)  
  AFSO
5.2.7.7.20 Group 20

The remaining Groups will be used to exercise normal ATS operation as follows:

5.2.7.7.21 Group 21

1) Observe Cue, Alphanumeric and Target No.

5.2.7.7.22 Group 22

2) Observe "ATS Track" Light ON

5.2.7.7.23 Group 23

3) Observe Peripherals

5.2.7.7.24 Group 24

4) Center Target and Vote

5.2.7.7.25 Group 25

5.2.7.7.26 Group 26

5.2.7.7.26.1 The preceding Groups (1 thru 26) have demonstrated the ATS Only DOP, and the following requirements:

4.2 (SLM Controls and Displays) _____ AFSO

4.7 (Operational Scripting Capability) _____ AFSO

4.15 (Scene Dynamics) _____ AFSO

5.2.7.7.27 At the conclusion of this DOP, the same Orbital Pass will be setup and rerun in accordance with Paragraph 4.6 of the Procedure.

5.2.7.7.27.1 Completion of 5.2.7.7.27 will have demonstrated the following requirement:

4.6 (10 Min Turnaround and Restacking) _____ AFSO
5.2.8 Display Tables

The proceeding procedure defined a high density ATS only DOP. The following tables define for each group what would be observed if a vote were registered for each Target for both a high and medium density target pass. These tables allow prediction of what would be observed if a script were run without following a step by step procedure of a prescribed DOP.

A table for a low density target pass is not shown since it would be an abbreviated version of either a high or medium density target pass.
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<td>B5PX55</td>
<td>262</td>
<td>GDT</td>
<td>A</td>
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5.3 MO Only DOP

5.3.1 General

The Test Procedure for this DOP contains the tasks required to verify specific requirements of the Phase 0 MDS as defined in Section 4.0 of this Document.

5.3.2 Requirements Demonstrated

The following requirements will be demonstrated during the MO Only DOP.

Target 1
1. 4.10 Image Velocity Sensor
2. 4.24 VO Peripheral Display

Target 3
3. 4.21 Control Stick and Mag Control During Freeze
   4.22 Magnification and Real FOV

Target 4
5. 4.26 Scene Lighting
6. 4.27 Target Location Relative to Vehicle

Target 8
8. 4.11 Stick Input
   thru 4.17 Initial Target Location
9. 4.18 Dynamic Target Location
Target 1 - 4.2 Controls and Displays
26
4.7 Operational Scripting Capability
4.15 Scene Dynamics
4.6 30 Min. Trunaround

5.3.3 Scripting

This DOP contains 26 Targets for tracking in the Primary Optics.

5.3.4 Stimulus

The stimulus material for this DOP consists of 26 sequentially numbered slides. Each slide contains a grid of indexed intersections spaced on one inch centers across the format.

5.3.5 Setup

The MDS will be in an operational configuration as defined in the Pre-test Checkout Program BIN: BIF-055-46753-69 with all simulation software and AVE programs loaded. The simulated command messages, stimulus data and "Script" data will be read into the Computer Subsystem. The slides will be loaded into the LP arm of the SVS.

The panel setup in the SLM will be as follows:

1. Magnification Controller at upper limit of HP range.
2. Control Stick centered
3. "Crippen Switch" On

5.3.6 DOP Procedure

5.3.6.1 General

This DOP will commence when the "Resume command is initiated at the SCC. At this point, vehicle time
5.3.6.1 General (Continued)

will be 112800 seconds.

The MDS will be operating continuously through the end of the Payload Pass unless the "Freeze" is initiated, the MDS is placed in a "Hold" configuration until the "Resume" is once more initiated. Then the MDS resumes operation from the point in time at which the "Freeze" occurred.

5.3.6.2 SCC Initiates DOP

1) SCC Operator presses "Resume" and monitors Vehicle Time on SCC CRT (112800)

5.3.6.3 Crewman Performs Payload Pass

5.3.6.3.1 Target 1

1) Activate "Crippen Switch"
2) Select "125X" on Mag. Controller
3) Observe "MO Track" Light ON
4) Observe Peripherals
   a) 7 Photos scheduled
   b) Wipeout countdown
5) Observe IVS Rate Nulling
6) Observe Eyepiece blanked at end of last Photo
5.3.6.3.2 Target 2

1) Set Mag Controller to "MCSA" detent
2) Observe "MO Track" Light On
3) Observe Peripherals
   a) 6 Photos scheduled
   b) Wipeout countdown
4) Observe Image Rate
5) Set Mag. Controller to "HP Range"
6) Observe IVS Rate nulling
7) Observe Eyepiece blanked at end of last Photo

5.3.6.3.2.1 The preceding targets (1, 2) have demonstrated the following requirements.

4.10 (Image Velocity Sensor)

   AFSO

4.24 (VO Peripheral Display)

   AFSO
5.3.6.3.3 Target 3

1) Observe "MO Track" Light On
2) Observe IVS Rate Nulling
3) Activate Freeze (SCC Operator) & Stick Freeze
4) Activate Mag. Controller to following positions and observe Step Magnification Change.

125X

Deactivate Stick Freeze & Freeze

5) Activate Resume (SCC Operator)

5.3.6.3.3.1 The preceding target has demonstrated the following requirements

4.21 (Control Stick and Mag Control During Freeze)

4.22 (Magnification & Real FOV)
5.3.6.3.4 Target 4
1) Observe Scene Brightness Approximately (25%)

5.3.6.3.5 Target 5
1) Observe Scene Brightness Approximately (50%)

5.3.6.3.6 Target 6
1) Observe Scene Brightness Approximately (75%)

5.3.6.3.7 Target 7
1) Observe Scene Brightness Approximately (100%)

5.3.6.3.6.1 The preceding targets (4, 5, 6, 7) have demonstrated the following requirement:

4.26 (Scene Lighting) AFSO

5.3.6.3.8 Target 8
1) Mag control to "MCSA" detent
2) Control stick to center
3) Observe "MO TRACK" light on
4) View target and null rates manually
5) Exposure adjust to "INCREASE"
6) Press "X" Format INC "INHIBIT"
7) Observe blanking at end of photo sequence

5.3.6.3.9 Target 9
1) Control stick to center
2) Observe "MO TRACK" light on
3) View Target and null rates manually
4) Override photo sequence by placing camera Select to SECONDARY and Shutter Mode to MANUAL
5) Press MANUAL SHUTTER
6) Reset Camera Select to "COMMAND"
7) Reset Shutter Mode to "COMMAND"
8) Observe blanking at end of photo sequence.

5.3.6.3.10 Target 10
1) Control stick to center
2) Observe "MO TRACK" light on
3) View target and null rates manually
4) Override photo sequence by placing Camera Select to SECONDARY and Shutter Mode to MANUAL
5) Press MANUAL SHUTTER
6) Reset Camera Select to "COMMAND"
7) Reset Shutter Mode to "COMMAND"
8) Observe blanking at end of photo sequence.

5.3.6.3.11 Target 11
5.3.6.3.12 Target 12
5.3.6.3.13 Target 13
5.3.6.3.14 Target 14
5.3.6.3.15 Target 15
5.3.6.3.16 Target 16

The remaining targets will be used to perform normal MO Operations such as manual rate nulling as follows:

1) Mag Control in "MCSA" detent
2) Control stick to center
3) Observe "MO Track" Light On
4) View target and null rates manually
The remaining targets will be used to perform normal MO Operations such as manual rate nulling as follows:

1) Mag. Control in "MCSA" detent
2) Control Stick to center
3) Observe "MO Task" Light On
4) View target and null rates manually.

5.3.6.3.26.1 The preceding targets (8 thru 26) have demonstrated the following requirements:

4.11 (Stick Input)  AFSO
4.17 (Initial target Location)  AFSO
4.18 (Dynamic target Location)  AFSO
4.27 (Target location relative to Vehicle)  AFSO
5.3.6.3.26.2 The preceding targets (1 thru 26) have demonstrated the MO Only DOP. And the following Requirements

- MO only DOP

4.2 (SLM Controls)
   (and displays)

4.7 (Operational)
   (Scripting)
   (Capability)

4.15 (Scene Dynamics)

5.3.6.3.27 At the Conclusion of this DOP the ATS/MODOP will be SETUP in accordance with Paragraph 4.6.5.7 thru 4.6.5.9 of the Procedure and Run in accordance with Paragraph 5.4 of this Procedure.

5.3.6.3.27.1 Completion of 5.3.6.3.27 will have demonstrated the following Requirement

- 4.6 (30 Min Turnaround)
5.4 ATS/MO DOP

5.4.1 General

The Test Procedure for this DOP contains the tasks required to verify specific requirements of the Phase 0 MDS as defined in Section 4.0 of this Document.

5.4.2 Requirements Demonstrated

The following requirements will be demonstrated by this DOP:

4.14 Target Loading and Coordination

5.4.3 Scripting

This DOP contains 26 groups of targets scripted for ATS Track-path No. 1 and provides the capability to perform either ATS or MO tasks.

5.4.4 Stimulus

The stimulus material for this DOP will be three sets of slides (LP, HP and MO) numbered sequentially from 1 to 26. Each slide will contain a grid of indexed intersections spaced on one inch centers across the format.

The cues for this DOP will be numbered 1 to 26 to correspond with group number. For more than one target in a group, duplicate cue slides will be used. Each cue slide will contain the indexed intersection to be used as that target.
5.4.5 Setup

The MDS will be in an operational configuration with all simulation software and AVE programs loaded, the simulated command messages, stimulus data and "Script" data will be read into the Computer Subsystem.

The LP and HP slides will be loaded into the HP arm of the SVS and will be restacked to place LP slides in the Supply Elevator and the HP slides in the Takeup Elevator. The MO slides will be loaded into the Supply Elevator of the LP arm of the SVS.

The SIM setup will consist of a panel checklist for Panels 2C and 2D. For this DOP, the controls of interest and the positions selected are:

- Trackpath Select to "Trackpath No. 1"
- Magnification Controller to "LP Range"
- VDP to "Command"
- Right Hand Control Stick Centered
- Camera Select to "Primary"
- Shutter Mode to "Command"
- Crippen Switch to "OFF"

5.4.6 DOP Procedure

5.4.6.1 General

This DOP will commence when the "Resume" command is initiated at the SCC.
5.4.6.1 General (Continued)

At this point, vehicle time will be 112800 seconds. The MDS will be operating continuously through the end of the Payload Pass unless the "Freeze" interrupt is initiated. Then the MDS is placed in a "hold" configuration until the "Resume" is once more initiated and the MDS continues operation from the Point at which the "Freeze" is occurred.

5.4.6.2 Crewman Setup of Panels 2C & 2D

1) Trackpath Select to "Trackpath No. 1"
2) Magnification Controller to "LP Range"
3) VDP to "Command"
4) Right Hand Control Stick "Centered"
5) "Crippen" Switch to "OFF"

5.4.6.3 SCC Initiates DOP

1) (SCC Operator) activates "Resume" and monitors Vehicle Time (112800) at the CRT.

5.4.6.4 Crewman Performs Payload Pass

5.4.6.4.1 Group 1

1) Observe Cue, Alphanumeric & Target No.

1 AIFX55 011
(55)
5.4.6.4.1 Continued

2) Observe "ATS Track" Light On
3) Observe Slide "1" in Eyepiece + Centered on intersection (55)
4) Observe ATS Peripherals
5) Vote Inactive
6) Observe Cue, Alphanumeric & Target No.
   1
   (37)
7) Observe "ATS Track" Light On
8) Slide "1" in Eyepiece + Centered on intersection (37)
9) Observe Peripherals a) No Dominoes b) First dwell Light extinguished
10) Vote Active
11) Observe Eyepiece Blanking at GDT

5.4.6.4.2 Group 2

1) Observe Cue, Alphanumeric & Target No.
   2
   (33)
2) Observe "ATSTrack" Light On
3) Observe Slide "2" in Eyepiece + Centered on intersection (33)
4) Observe Peripherals
5) Vote Inactive
5.4.6.4.3 Group 3

1) Observe Cue, Alphanumeric & Target No.
   3 A7PX74 031
   (74)
   Observe "ATS Track" Light On

3) Observe Slide "3" in Eyepiece + Centered
   on intersection (74)

4) Observe Peripherals

5) Vote Inactive

6) Observe Cue, Alphanumeric & Target No.
   3 B1AX53 032
   (53)

7) Observe "ATS Track" Light On

8) Observe Slide "3" in Eyepiece and Centered
   on intersection (53)

9) Observe Peripherals

10) Vote Override

11) Set Magnification Controller to "MCSA"
    Detent

12) Observe "MO Track" Light On

13) Observe MO Peripherals

14) Observe Slide "3" in Eyepiece (intersection (53) will be centered in FOV)

15) Observe Eyepiece Blanking at end of
    Photo Sequence

16) Set Magnification Controller to "LP Range"
5.4.6.4.4 Group 4

1) Not viewed due to MO Tracking

5.4.6.4.5 Group 5

1) Observe Cue, Alphanumeric & Target No.

   5 A41AX46 051
     (46)

2) Observe "ATS Track" Light On

3) Observe Slide "5" in Eyepiece + Centered on intersection (46)

4) Set Magnification Controller to "HP Range"

5) Observe Eyepiece Blank during Slide Change

6) Observe Slide "5" in Eyepiece + Centered on intersection (46)

7) Observe Peripherals

8) Vote Inactive

9) Set Magnification Controller to "MCSA" Detent

10) Observe "MO Track" Light On

11) Observe MO Peripherals

12) Observe Slide "5" in Eyepiece + Centered on intersection (46)
5.4.6.4.5 Continued

13) Observe Eyepiece Blanking at end of Photo Sequence

14) Set Magnification Controller to "LP Range"

5.4.6.4.6 Group 6

Not viewed due to MO Tracking

5.4.6.4.7 The remainder of this DOP will be conducted in this manner for the odd-numbered Groups. The only variation to be included will be the insertion of target position errors on several targets. The effect of these inputs will be observed in the Eyepiece and will result in the cued intersection being offset from center. The crewman task is to return the target to center prior to voting.

5.4.6.4.8 Completion of this DOP will have demonstrated requirements.

ATS/MO DOP

AFSO

4.2(SLM Controls and) (Displays )

AFSO

4.7(Operational Script-) (ing Capability )

AFSO
### 5.4.6.4.8 Continued

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