9040-63-564
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COPY 2 OF 2

JIM

19 March 1963

STATINTL TO: [redacted]

In accordance with Item A.9, paragraph (d), enclosed are three (3) copies of the reports listed below:

1. "Report of Low Temperature Test on Pan Subsystem Unit No. 1," dated 14 February 1963.

2. "Report of Thermal Altitude Test on Pan Subsystem Unit No. 2," dated 28 January 1963.

Very truly yours,

STATINTL [redacted]

DJ:cm
Enclosures (6)

cc: [redacted] 1)
) 1)
) (3)

STATINTL

BT-1443
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25X1

[redacted]

NRO review(s) completed.

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Approved For Release 2007/03/28 : CIA-RDP66B00728R000100170001-0

Next 9 Page(s) In Document Exempt

Approved For Release 2007/03/28 : CIA-RDP66B00728R000100170001-0

ABSTRACT

The Pan Subsystem was subjected to vacuum as specified in QTP #49993. In addition to the direct requirements of the thermal altitude test procedure, tests were conducted to gather data on the subsystem's temperature rise, heat radiation, corona and long term vacuum effects on components.

The subsystem successfully endured 96 hours of vacuum and transported a full spool of film (approximately 7000 feet).

ADMINISTRATIVE DATA

Purpose of Test:

The purpose of this test was to establish the endurance capabilities of the subsystem under vacuum conditions.

Serial No.:	9040-2
Quantitiy of Items Tested:	1
Date Test Completed;	28 January 1963
Test Conducted by:	Project 9040 test personnel
Disposition of Specimen:	Use for additional tests. Refurbish as required prior to delivery to customer

Reference Documents:

43961	Specification for Pan and S/I Subsystems
49977	Qualification Test Specification, Pan Subsystem
49993	Qualification Test Procedure, Pan Subsystem
6117B	Environmental Test Specification
J43877	Electrical Schematic, Overall Equipment
J43800	Assembly Drawing, Main Assembly

FACTUAL DATA

Test Procedure:

The thermal altitude test was conducted in accordance with QTP #49993. A copy of this procedure, with completed data sheets, is included in this report.

The subsystem was installed in the thermal jacket as shown in Figures 1 and 2 and placed in the vacuum chamber. A reflector stow and cell pinning test was performed prior to evacuation.

The subsystem was operated at $70^{\circ} \pm 10^{\circ}$F ambient at pressures of 10^{-3} to 10^{-4} mm hg. The unit was placed in the OPERATE mode every ninety minutes and operated for a time duration or number of frames specified in the test procedure. The time duration for each turn-on varied from a single 16 frame burst to twenty minutes of continuous operation. At least half of the operation was at maximum V/h. Periods of both stereo and monoscopic operation were included and operation at all values of roll steering was performed. Photographic data was taken only during monoscopic, zero roll steer angle operation.

The following tests were conducted in addition to the test requirements of QTP #49993.

Subsystem Temperature Monitoring:

Temperature sensors installed in the subsystem (shown in Figure 3) were monitored once every minute during each operate period and approximately once every 15 minutes throughout the entire 96 hours test period.

Corona Test:

A photo-multiplier type corona was positioned in the film transport area and its' output was recorded during subsystem operation.

Thermal Blanket Temperature Test:

Thermal blanket temperatures were monitored to indicate radiation from the subsystem while under vacuum conditions.

Additional Functional TM Tests:

The following TM points were monitored in addition to those specified in QTP #49993:

a. Cycle start
b. DRT error signal
c. Light detector (corona)
d. Pan footage
e. Roll steering

Included in this report are curves and data relating to the additional engineering tests as well as the direct requirements of the thermal altitude test procedure.

Test Results:

No degradation of performance occured as a direct result of prolonged operation in vacuum.

There were some instances of DRT equipment and operator malfunctions but these were temporary and did not disturb the test environment.

A section of damaged film passed through the transport causing a temporary non-standard film metering condition but this was self corrected when the section of defective film passed.

After prolonged operation at maximum V/h, the scan servo exhibited a tendency of insufficient latch time, however, operation on subsequent subsystem operate periods was normal.

One of the data block bits signifying roll steering angle appeared to be intermittent.

Engineering Evaluation:

Operation of the Pan Subsystem for 96 hours under hard vacuum conditions has demonstrated the subsystem's ability to operate and transport a full spool of film as specified in QTP #49993.

Operations in the Stereo mode were conducted without malfunctions. However, during one run, a lead became disconnected from the console patch panel causing the TM to indicate no Stereo operation.

The roll steering control and drive operated correctly as indicated by TM output signals. However, an intermittent operating microswitch in the roll steering mechanism caused errors in the data block roll steering angle indications. A microswitch design change has been initiated.

Film tracking problems, causing film spoilage, were believed caused by incorrect alignment between the platen and the film transport assembly. It is anticipated that investigation, now in progress, in this area will correct these conditions. The recovery of the transport system indicates that the subsystem can withstand considerable abuse and still function normally.

Fogging occured repeatedly throughout the test. Investigations of the data block, film handling during processing, and corona during operation are being conducted to determine the cause. Additional vacuum tests, with the data block relocated outside the platen area as a self contained package, have indicated some improvement. The degree of improvement will be determined from the results of further testing, using data block readout equipment, to establish data block compatability.

Corona indications occured during operate periods 21 through 27 and 31 through 35. Film analysis revealed that corona and data block fogging appeared in the same general area. During a previous test, a glow was observed between the edge of the film and the spool. This glow is believed to have caused the edge fogging (approximately .030 in width) observed at the edge of the film.

To determine the cause of fogging, additional engineering tests are being planned in conjunction with 24 operate periods in a hard vacuum during the cold window test. Corrective action to be taken, if necessary, is as follows:

a. The film transport system rollers will be coated with "Anti-stat" (an anti corona substance) which has been effective in similar conditions.

b. Film will be transported, utilizing the new data block design.

c. Film will be transported during various vacuum levels to determine critical corona areas.

Pages 32 and 33 show plots of 14 temperature sensors representing subsystem temperature variations throughout the entire endurance run. Analysis of the data revealed the maximum temperature rise occured during the continuous operate periods. The platen center area, sensor #15 (A18-A2) indicated the largest temperature rise of 6.5°F at operate period 18. This rise was a result of radiation from the film transport amplifiers, mechanical friction of the shutter assembly and motor device mounted at the end of the platen. Temperature rise of sensor #14 (A21-A5), which is located in the film transport area, was 5°F. This rise occured during the minimum rather than the maximum V/h run due to the fact that the three amplifiers, mounted on this structure, dissapate more power across the output transistors at low V/h than at high V/h operation. The remaining amplifiers, located near sensor #2 (A19) will see the effects of power dissipated from the amplifiers, friction of IMC cam and follower, and the trunnion bearings.

In general, the temperature rise at maximum V/h was higher than at minimum V/h. This occurs because the total power input to the subsystem increases with V/h. However, as noted previously, in localized areas near the amplifiers, the temperature rise may be higher at minimum V/h due to the power distribution difference between amplifiers and load. The temperature rise of sensor #12 was caused by mechanical friction and power in the lens torque motor.

All remaining sensors appeared to follow the same trend as to time of temperature rise. Sensors #4 and #5, mounted at the top and bottom of the cell assembly, varied within the $\pm$ 1° sensor accuracy range preventing a positive statement of temperature variation.

Page 34 shows the chamber pressure variations throughout the 96 hour test run. Chamber pressure increased each time that film was transported indicating outgassing of the film during each operate period. Pressure difference occured between the inside of the subsystem and the film transport area during sustained operating periods. If corona is enhanced by outgassing, these pressure differences would tend to support the existance of corona.

TM information during this test was invaluable. The pan footage indicator on the take-up spool indicated a reduction of film expended would be necessary to avoid running out of film before the test run was completed. Functional TM on roll steering indicated that the system had performed the operation when a switch adjustment had failed to produce an indication on the data block.

Due to the film rationing problem we fell 58 frames short of transporting 1610 frames at maximum V/h. It was decided at that time, that the 96 hour operation was more important than 58 frames out of the 3220 total.

SECRET

QA Evaluation:

The Pan Subsystem was subjected to vacuum as specified in QTP #49993. A total of 3,220 frames of film were transported during 64 operating periods in a 10^{-4} mm. hg. vacuum. Analysis of the film produced the following results:

Torn Film:

Definition: Any break in the film is considered a tear.

Total Count:

11 frames

Wrinkled Film:

Definition: Any irregularity on the surface of the film.

Total Count:

186 frames

Short Frames:

Definition: Any frame grossly undersized

Total Count:

3 frames

Clear Frames:

Definition: Frames where no fogging was discernible to the naked eye.

Total Count:

34 frames

Static "Trees":

Definition: Static discharge impressions on the film resembling a tree.

Total Count:

243 frames

Fogging:

Definition: Patches of struck film ranging in density from barely discernible to high density and ranging in size from ½" to greater than 6 inches.

Total Count:

3186 frames

Roll 66-02-15

Operate Period 1 - Frame 1
to
Operate Period 4 - Frame 18

Operate Period	Test Performed	Results	Remarks
#1	Thru focus nom V/h, shift platen ± .004 out of focus	400 - 500 ok, 550 - 600 operate error	
#2	Thru focus max V/h, shift platen ± .004 out of focus	No apparent focal shift with operation	Target drive sync incompatible with camera
#3	Thru focus min. V/h, shift platen ± .004 out of focus	No apparent focal shift with time	
#4	Thru focus max V/h, shift platen ± .004 out of focus.	No apparent focal shift with time	

Roll Summary:

This roll represents the first 6 hours of the endurance run and indicates low resolution, due partly to the fact that exposure was not optimum. The target drive test equipment did not come to the proper speed at the maximum V/h condition. There was evidence of fogging at the edge of the film near the index light. This is believed to be caused by electrical discharge between the edge of the film and the spool. Visual indications have been observed during previous tests which were conducted under similar conditions. Repetitive fogging also occured in the area adjacent to the data block which could be the result of data block light-up. Testing with the relocated data block should produce more evidence as to whether this is the actual cause of fogging in this area. There were no tracking problems during this period of operation.

Roll 66-02-14

Operate Period 4 - Frame 9
to
Operate Period 9 - Frame 86

Operate Period	Test Performed	Results	Remarks
#4	Thru focus max V/h, Shift Platen ± .004 out of focus	Satisfactory	
#5			
#6			
#7			
#8			
#9	15 minute operate at nom V/h photography at platen positions 8 & 2	Unsatisfactory	Data Block Light Up D2 - ON D14 - OFF No targets exposed

25X1
NRO

Roll Summary:

In the non-photo portion of the operate period, data block light up for Stereo operation and roll steering was correct for the commands given. Film tracking appeared to be malfunctioning, but not to the extent where it would effect the photographic format. During the first 15 minute operate period, in which targets were to be exposed for 7½ minutes at position #8, there was an operator error. The DRT aperture was not opened to the light source, resulting in no exposures until the error was discovered. A factory splice in the film passed through the platen without difficulty. The same edge fog which was present in the last film roll was observed.

Roll 66-02-13

Operate Period 9-Frame 87
to
Operate Period 9-Frame 308

Operate Period	Test Performed	Results	Remarks
#9	15 min. operate nom V/h, photo at platen positions 8 and 2	Unsatisfactory	No visible targets Ref. Roll Summary 66-02-11

Roll Summary:

This roll is a continuation of the film transported in the 15 minute operate period described in 66-02-14. Fogging was observed around the data block and edge of film out of format.

Roll 66-02-12

Operate Period 8 - Frame 309
to
Operate Period 10 - Frame 17

Operate Period	Test Performed	Results	Remarks
#9	15 min operate at nom. V/h with photo at platen positions 8 and 2	Unsatisfactory	No targets Ref. Roll Summary 66-02-11
#10	Max. V/h photo run	Unsatisfactory	No targets Ref. Roll Summary 66-02-11

Roll Summary:

Film tracking remained satisfactory. There was a temporary malfunction in the data block. This was attributed to the fact that the TM ground was disconnected at the console patch panel.

Roll 66-02-11

Operate Period 10 - Frame 18
to
Operate Period 17 - Frame 22

Operate Period	Test Performed	Results	Remarks
#10	Max. V/h, 16 frames pos. 8, N.D.6Y frames pos. 2	Unsatisfactory	No visible targets
#11	Min. V/h, 16 frames pos 8, N.D.64, 16 frames pos. 2	Unsatisfactory	No targets, slight fogging
#12	Thru focus, max. V/h 450 - 600 pos 8 N.D. 4, shift platen ± .004 out of focus	Unsatisfactory	No targets, slight fogging
#13	[redacted]		
#14			
#15			
#16			
#17	Thru focus nom. V/h, 16 frames at pos. 8 16 frames at pos. 14	Satisfactory	Targets visible No focus change

25X1
NRO
NRO

66-02-11 (Continued)

25X1
NRO

Roll Summary:

A Data block light-up malfunction occured [redacted] which actuates the light up pulse for this lamp. Adjusting the 4 ganged micro switches has proved impractical. A redesign has been initiated to correct this deficiency. All other TM and tracking operations appeared to be normal. Corona and static discharge occured under questionable circumstances. Additional tests are being formulated for verification.

It was in the 17th operate period that the DRT aperature was discovered closed and corrected. Targets are now being photographed.

Roll 66-02-10

Operate Period 17 - Frame 23
to
Operate Period 18 - Frame 226

Operate Period	Test Performed	Results	Remarks
#17 (con't)	Thru focus nom. V/h, 16 frames at pos. 8 16 frames at pos 14	Satisfactory	
#18	Max. V/h photo run, twenty min. operation 896 frames pos. 8 & 14	Satisfactory, DRT occasionally out of sync resulting in loss of target	Passed 1 E.K. splice targets visible

Roll Summary:

Targets were exposed and photographed during the 20 minute operate mode at maximum V/h. During this period the second factory splice was passed through the system. There was difficulty with target drive sync time resulting in an occasional loss of targets. At the conclusion of this operate period, 2,500 feet of film had been transported satisfactorily.

Roll 66-02-09

Operate Period 18 - Frame 227
to
Operate Period 18 - Frame 468

Operate Period	Test Performed	Results	Remarks
#18	Continued from 66-02-10	Satisfactory	No targets after frame 333. Electrical discharge patterns appeared more frequently.

Roll Summary:

The loss of targets was the result of malfunctioning test equipment caused by continuous operation in a hard vacuum. Because of the motor temperature rise the test equipment had to be turned off to allow the motor to return to operating temperature before taking more target photographs. There was evidence of electrical discharge patterns and fogging in the data block area. The fogging was caused by vertical film motion in the data block area, which was not part of the normal photographic format during the time of the light up pulse. This problem has been corrected by relocating the data block outside the platen area. Tests have been run on the new design and have satisfactorily corrected this problem.

Roll 66-02-08

Operate Period 18 - Frame 469
to
Operate Period 18 - Frame 720

Operate Period	Test Performed	Results	Remarks
#18	Continued from 66-02-09	Unsatisfactory	Section of film torn at frame 494 Edge wrinkled between 498-508, 513-520 and 641-642 Extreme wrinkles at frames 673-672

Roll Summary:

A tracking problem occured at maximum V/h and resulted in severe tearing of the film. The system continued transporting film at the max. V/h condition adjusting and correcting for the torn film and wrinkled edges. It's apparent that the ability to recover from this condition was an achievement in itself. It was noted that TM indicated a tracking problem and returned to normal after completion of the max. V/h run. At this point we had transported 3,784 feet of the 7000 foot film supply.

Roll 66-02-07

Operate Period 18 - Frame 721
to
Operate Period 19 - Frame 896

Operate Period	Test Performed	Results	Remarks
#18	Continued from 66-02-08	Unsatisfactory	Edge wrinkled to 804 also 820-896
#19	Min. V/h, photo Pos. 8 & 14		Targets available, Rather bad fogging around data block area.

Roll Summary:

The previous three rolls (approximately 1500 feet) were in operation under maximum V/h conditions. Film transport recovered and returned to normal with a loss of about 60 feet of film. Target photography was resumed with all test systems operating satisfactorily.

Roll 66-02-06

Operate Period 20 - Frame 1
to
Operate Period 25 - Frame 6

Operate Period	Test Performed	Results	Remarks
#20	Max. V/h functional operation.	Satisfactory	Film free of wrinkle
[redacted]			
#22	Thru focus pos. 8 max. V/h, shift platen ± .004 out of focus	Unsatisfactory	DRT not operating during most of run.
[redacted]			
#25	Thru focus nom. V/h, shift platen ± .004 out of focus	Satisfactory	Some fogging noted

25X1 NRO

25X1 NRO

Roll 66-02-06 (continued)

Roll Summary:

During this roll, it became necessary to deviate from the normal operating period sequence. The test equipment was repaired and operation resumed following operate period #30. Roll steering, stereo, and data block TM indications were satisfactory. There were no indications of tracking problems during this roll. Test equipment repairs were temporary and as the equipment failure would effect only a small portion of the remaining test, the results were considered insignificant compared to the endurance capabilities of the subsystem.

Roll 66-02-05

Operate Period 25 - Frame 7
to
Operate Period 27 - Frame 32

Operate Period	Test Performed	Results	Remarks
#25	Thru focus nom. V/h, shift platen ± .004 out of focus	Satisfactory	Some fogging noted
#26	Functional operation, max. V/h	Satisfactory	Some fogging in data block area
#27	15 min operate, min. V/h, 7½ min. pos 8 7½ min. pos 2		Some fogging in data block area. Target not operating properly

Roll Summary:

Recovery from the tracking problem which occured previously, was verified in this roll. Data block fogging was present and test equipment limitations continued to exist throughout this roll. Continuous operation for 15 minutes at minimum V/h was initiated during this time. 486 feet of film had been transported without difficulty. Normal test sequence was resumed for the remaining operations.

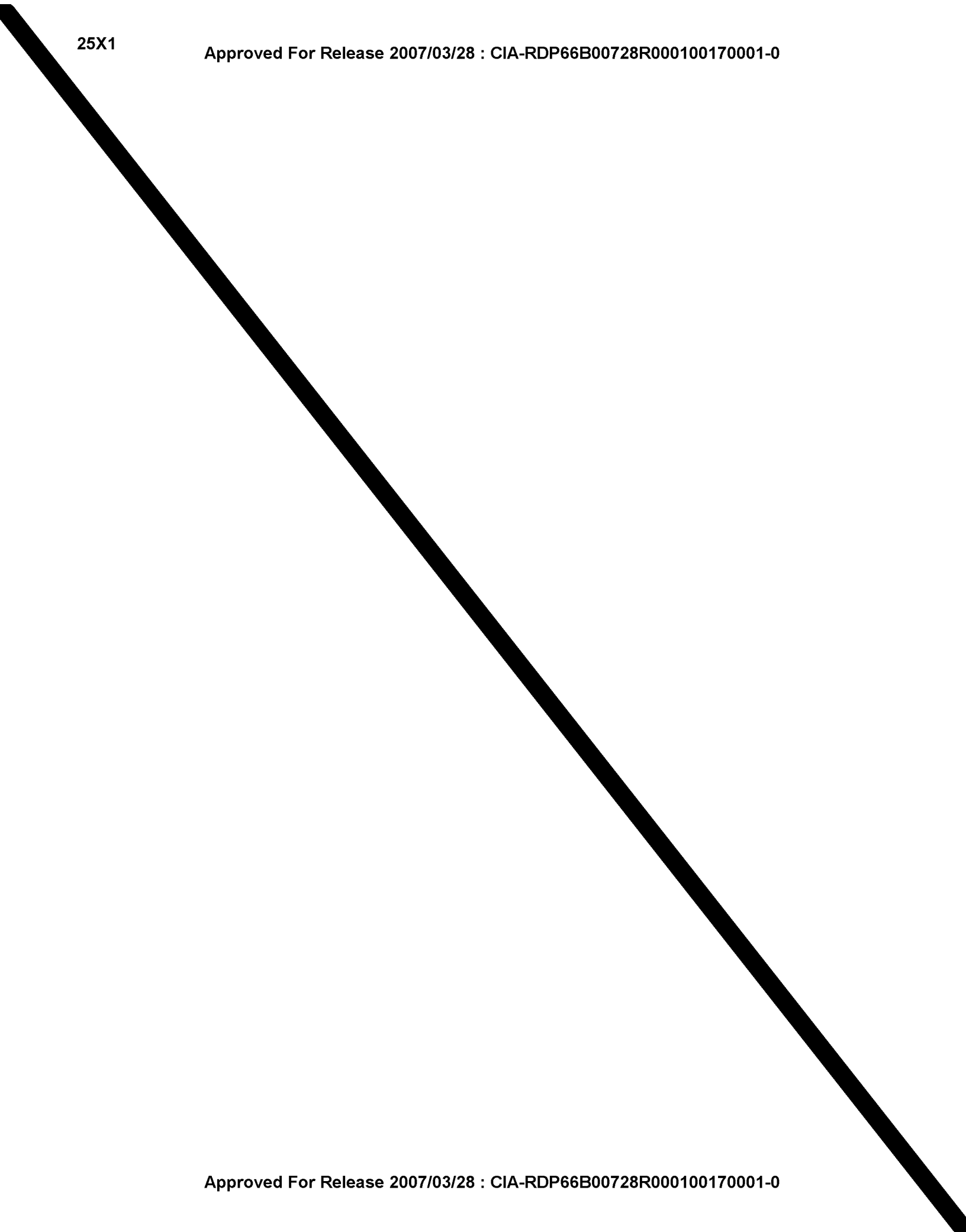
Roll 66-02-04

Operate Period 27 - Frame 185
to
Operate Period 28 - Frame 368

Operate Period	Test Performed	Results	Remarks
#27	15 min. operate, min. V/h, 7½ min pos. 8 7½ min pos. 2	Satisfactory	Some fogging in data block area. Target drive not operating properly, subsystem OK
#28	32 frames functional operation, max V/h,		

Roll Summary:

15 minute continuous operation was completed satisfactorily. Operate periods, which required photographic operation at max. V/h, were changed to nominal photographic operation under the same operate conditions.



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Roll 66-02-03 (continued)

25X1
NRO

Operate Period	Test Performed	Results	Remarks
#40			
#41	16 frames photography, nom. V/h, reflector vertical, pos. 8	Satisfactory	

Roll Summary:

After 46 hours of operation, TM indications showed approximately 5,900 feet of film had been transported to the take up spool.

Examination of the amount of film remaining on the supply spool revealed that film would be completely transported before the end of the 96 hour endurance run. Therefore, a change in the number of frames transported during each operate period was required to insure that a sufficient quantitiy of film would be available for the remainder of the test.

All functional systems have been operating satisfactorily with the exceptions noted previously.

Roll 66-02-02

Operate Period 41 - Frame 14
to
Operate Period 52 - Frame 10

Operate Period	Test Performed	Results	Remarks
#41	Thru focus pos. 8, nom V/h, shift platen ± .004 out of focus	Unsatisfactory	Target drive smear
#42	Functional operate, max. V/h	Satisfactory	Data block light up OK
#43	Thru focus pos. 8, min. V/h, shift platen ± .004 out of focus	Satisfactory	Out of focus below 550
#44	Functional operate, max. V/h	Satisfactory	Data block light up OK
#45	[redacted]		
#46			
#47			
#49	Thru focus pos. 8, nom V/h, shift platen - .004 out of focus	Satisfactory	Out of focus below 550
#50	Thru focus pos. 8, nom V/h, shift platen + .004 out of focus	Satisfactory	Out of focus below 550
#51	Thru focus pos. 8, min V/h, shift platen - .004 out of focus	Satisfactory	Out of focus below 550
#52	Thru focus pos. 8, nom V/h, shift platen + .004 out of focus	Satisfactory	Out of focus below 550

25X1
NRO

Roll 66-02-02 (Continued)

Roll Summary:

Target drive smear and data block light up problems were covered in previous summaries. Tracking was satisfactory, however fogging still persisted in the data block areas.

Roll 66-02-01

Operate Period 52 - Frame 11
to
Operate Period 61 - Frame 16

Operate Period	Test Performed	Results	Remarks
#52	Thru focus pos. 8, nom V/h, shift platen -.004 out of focus	Satisfactory	Out of focus below 550
#53			
#54			
#55			
#56			
#57	Thru focus pos. 8, nom V/h, shift platen -.004 out of focus	Satisfactory	Out of focus below 550
#58	Functional operate, max V/h, nom photo	Satisfactory	Data block lamps OK
#59	Thru focus pos. 8, min V/h, shift platen -.004 out of focus	Satisfactory	Data block below 550
#60	Functional operate, max V/h, nom photo	Satisfactory	Data block lamps OK
#61	Thru focus pos. 8, shift platen +.004 out of focus	Satisfactory	Out of focus below 550

25X1
NRO

Roll 66-02-01 (Continued)

Operate Period	Test Performed	Results	Remarks
#62	Thru focus pos. 8, nom V/h, shift platen +.008 out of focus	Satisfactory	Out of focus above 650
#63			
#64			
#65	Thru focus pos. 8, shift platen -.008 out of focus	Unsatisfactory	Film supply empty, 96 hour test completed

25X1 NRO

Roll Summary:

25X1 NRO

Film tracking during this roll was satisfactory. Except [redacted] all data block lamps were normal. Operate periods #63 and #64 were changed to non-photo runs to conserve film for a final thru focus run after the 96 hour test period was concluded. During this run, the film supply ran out ending the test.

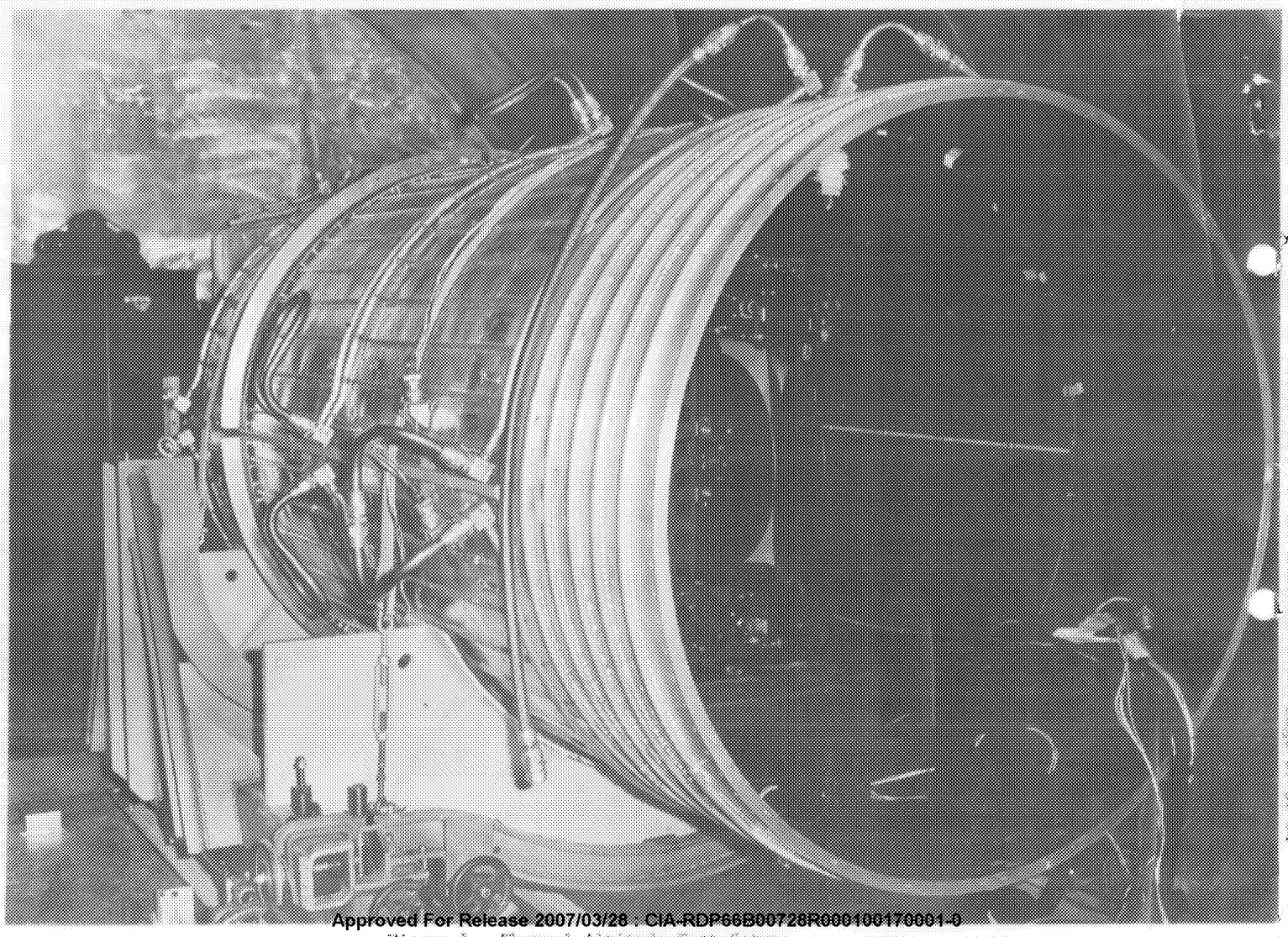


Figure 1. Thermal Altitude Test Setup

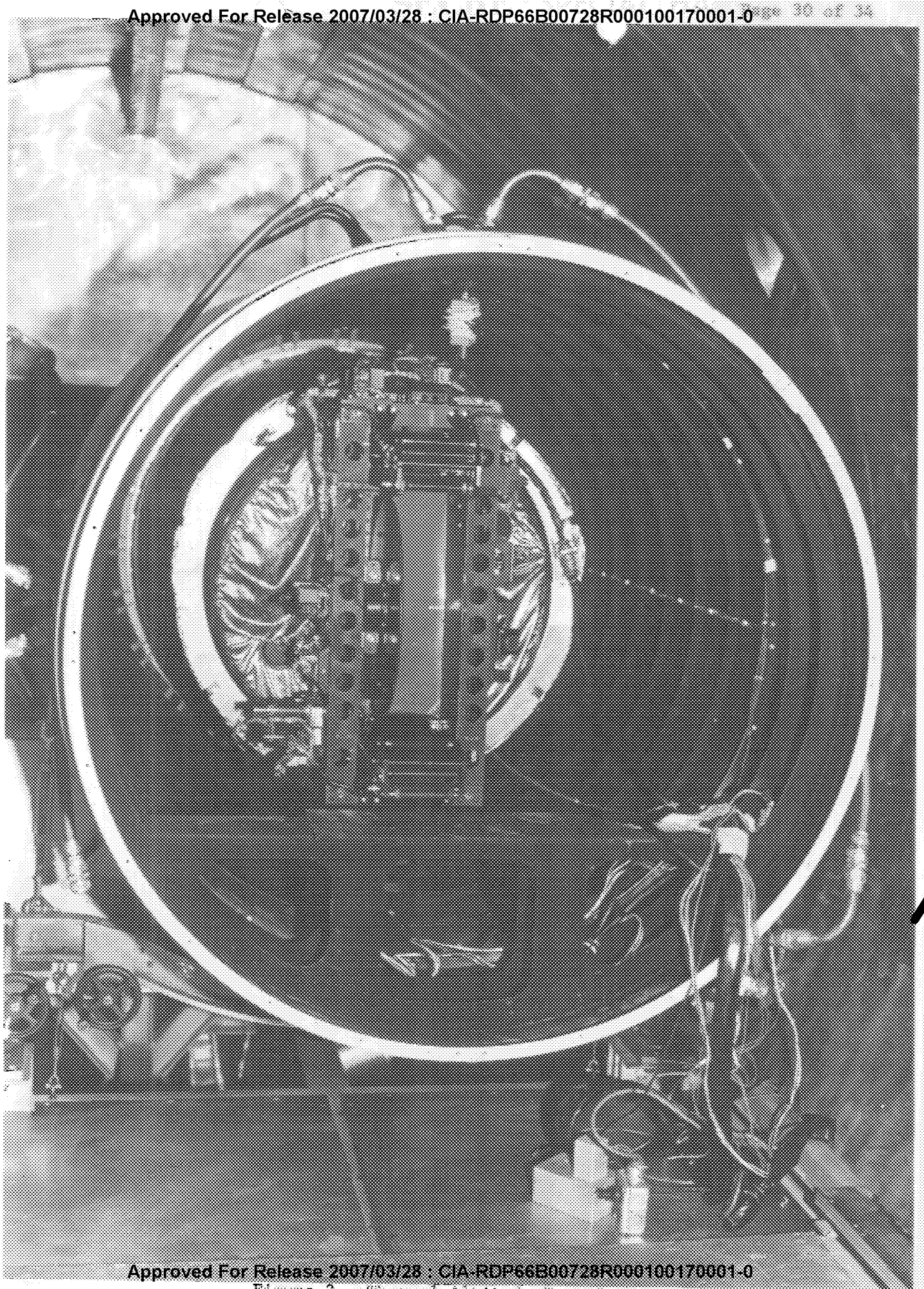
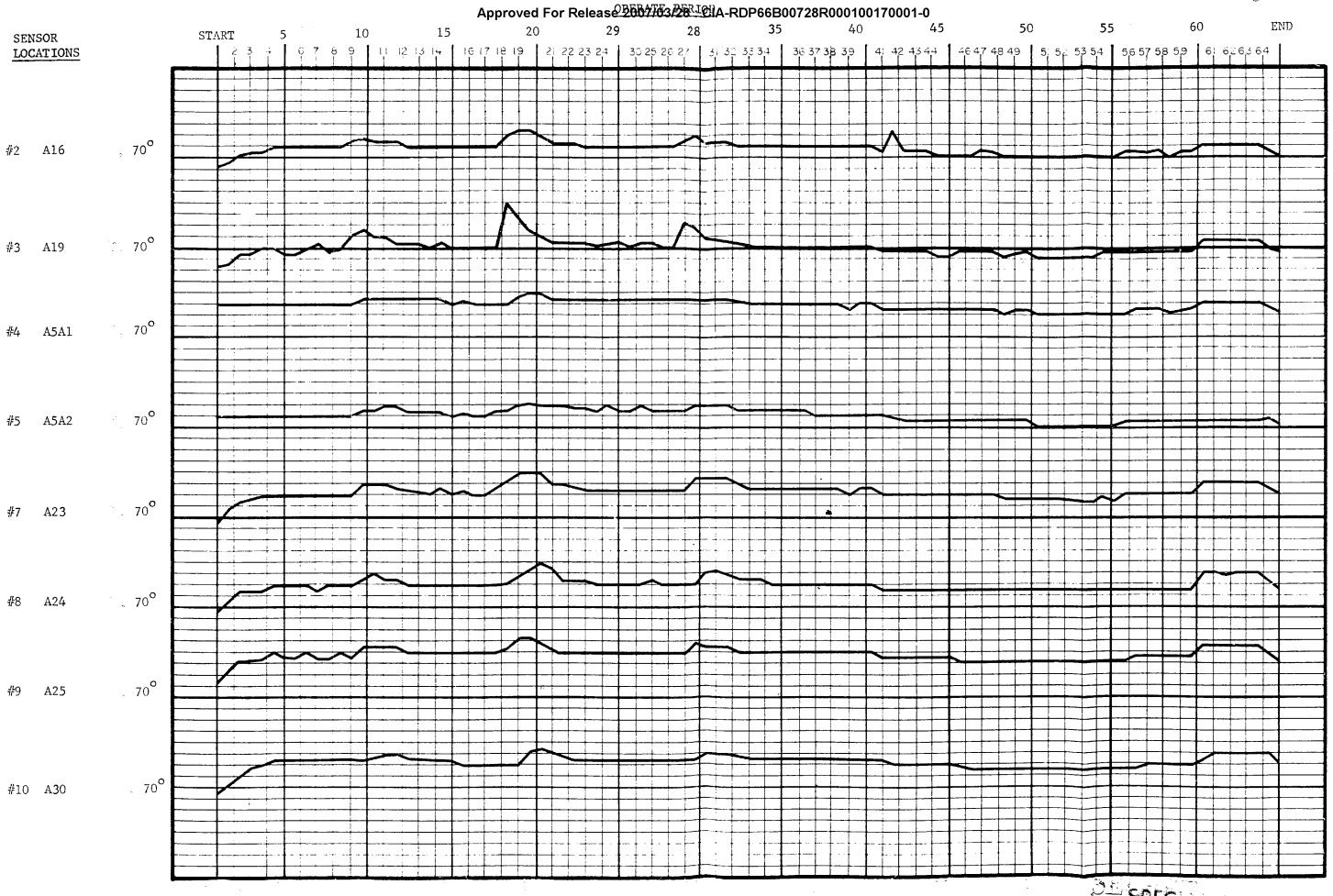


Figure 2. Thermal Altitude Test Setup



PEAK HOURLY AVERAGE TEMPERATURE OF PAN SYSTEM TEMPERATURE SENSORS

OPERATE PERIODS

PEAK HOURLY AVERAGE TEMPERATURE OF PAN SYSTEM TEMPERATURE SENSORS

NOTE: Each Operate Period = 90 Min.

SPECIAL HANDLING

SECRET

TEMP NO.	LOCATION	UNIT NO.	SERIAL NOS.	TEMP RANGE	CONN. NOS. & PIN INFO.	SENSOR TYPE
1	TAKE-UP	A22 RT1		-40°→+120°F	J104 - A	BN2400
2	P.S.T STA 125 TOP	A16		50°→+120°F	J102 - d	TMTR
3	P.S.T. STA 125 BOT	A19		50°→+120°F	c	TMTR
4	SCAN BOT FWD	A5A1		50°→+120°F	b	TMTR
5	SCAN TOP FWD	A5A2		50°→+120°F	a	TMTR
6	REFLECTOR	A9RT1		-40°→+120°F	Z	BN2400
7	P.S.T. STA 100 TOP	A23		50°→+120°F	Y	TMTR
8	P.S.T. STA 75 TOP	A24			X	
9	P.S.T. STA 100 BOT	A25			W	
11	P.S.T STA 75 BOT	A26			U	
12	P.S.T. STA 90 SIDE (Y-)	A27			T	
13	P.S.T. STA 90 SIDE (Y+)	A28			S	
14	SUPPLY STR	A21A5			J102 - R	
15	PLATEN CNT	A18A2			J103 - X	
16	OUTER CYLINDER STA 90 BOT	A29			J103 - W	
10	OUTER CYLINDER STA 90 TOP	A30		50°→+120°F	J103 - V	TMTR

STA 0

A22 RT1

TAKE-UP

SECRET

SUPPLY TRANS

A21 A5

All REF

SECRET

SPECIAL HANDLING

SECRET

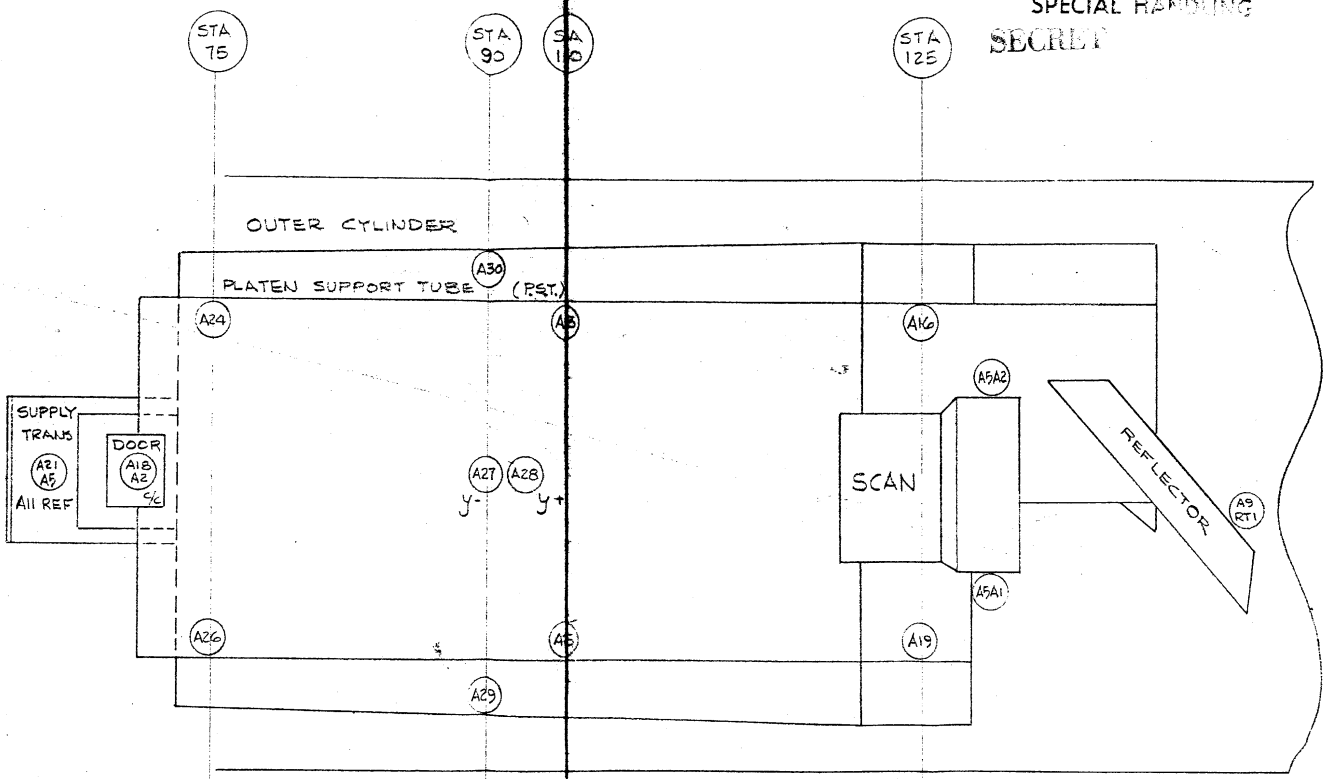


FIG 3

SENSOR LOCATIONS

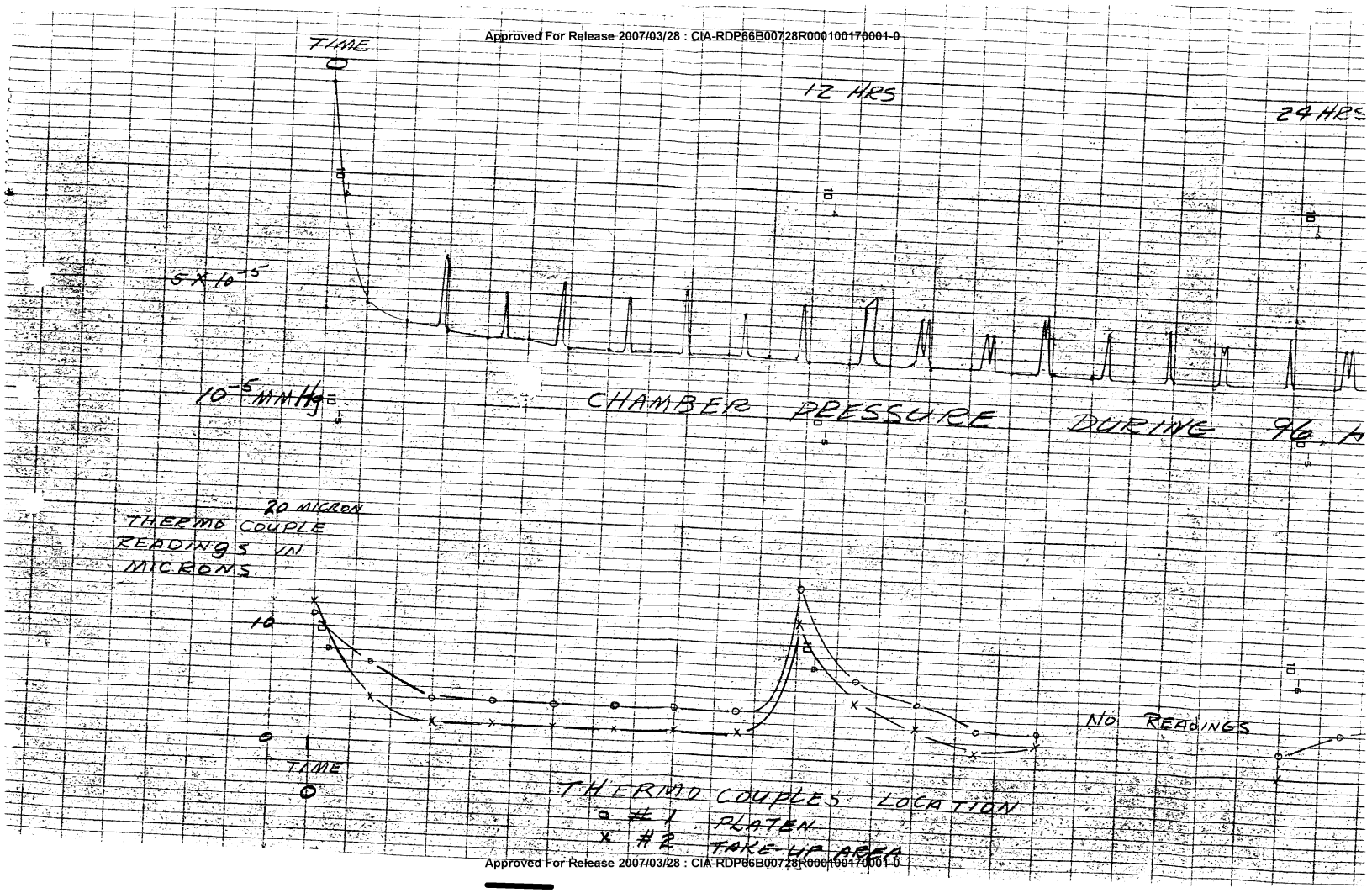
SECRET

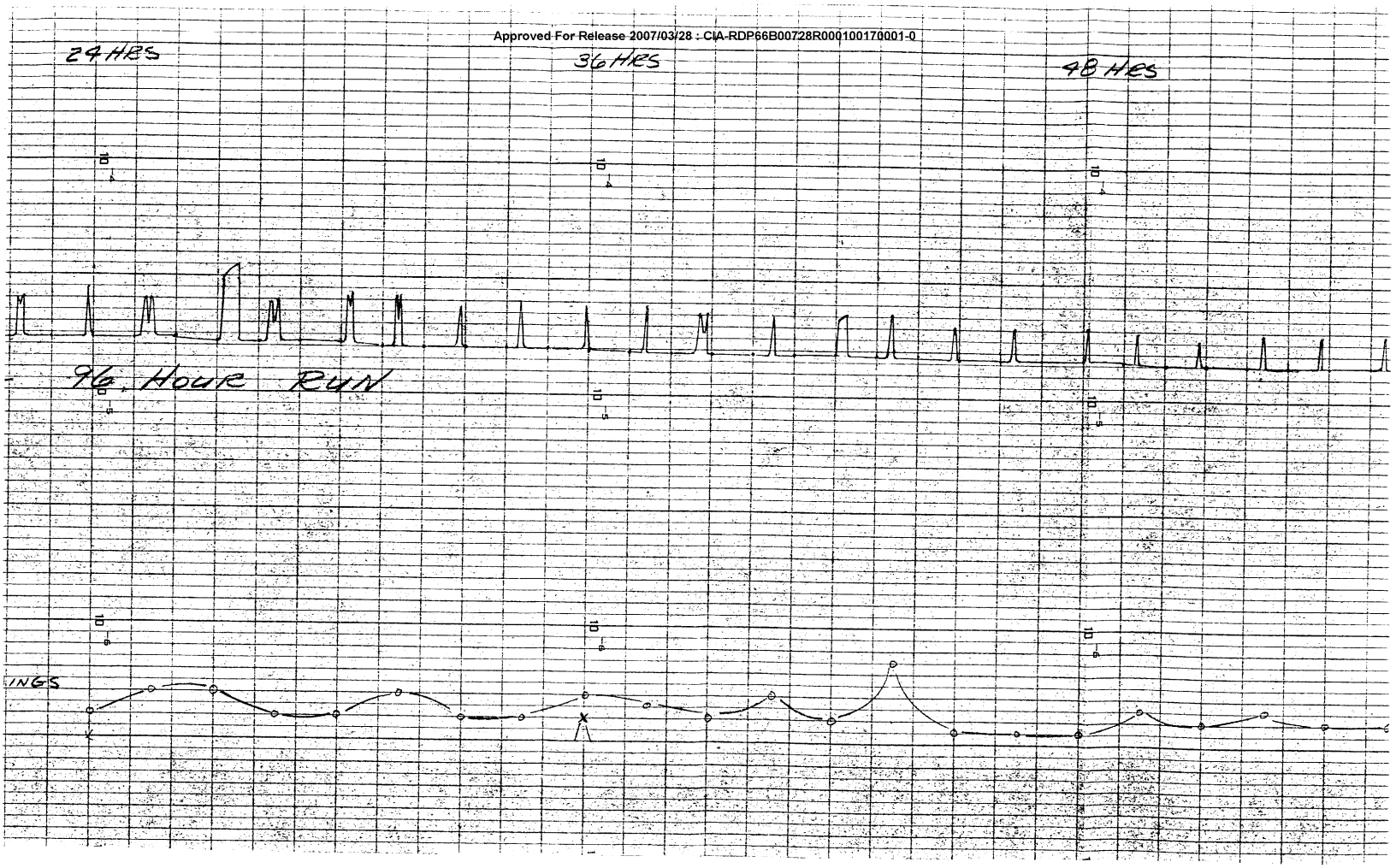
SECRET

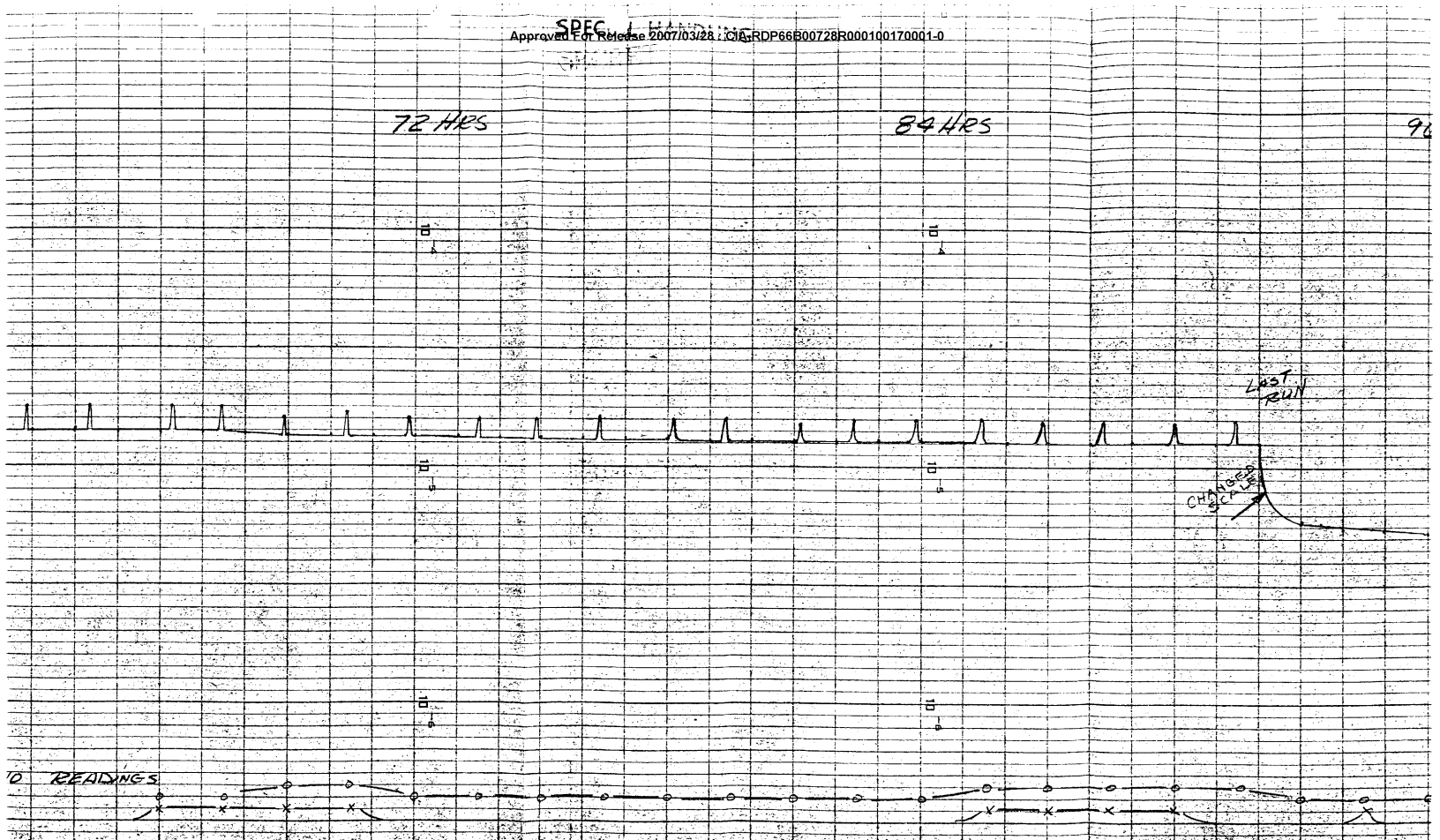
25X1A

SPECIAL HANDLING

ISSUED 12/27/62







TEST PROCEDURE

SECRET

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	Revised Per PCN30	1/23/63	

25X1

[redacted]

Specifications Procedures

Engrg	
Engrg	
Engrg	STATINTL
Engrg	
Project	
QA App'd	
SE App'd	
Issued	11 December 1962

[redacted]

SECRET

TITLE

THERMAL ALTITUDE

9040

49893

Code 92208 Sheet 1 of 13

1.0 SCOPE

1.1 This document describes the procedure to be used for thermal altitude tests of the Pan Subsystem in accordance with paragraph 6.1.6, Qualification Test Procedure 49979.

2.0 APPLICABLE DOCUMENTS

2.1 The following documents or applicable revisions form a part of this procedure to the extent specified herein:

Specifications	
43961	Specification for Pan and S/I Subsystems
49977	Acceptance Test Specification, Pan Subsystems
6117B	Environmental Test Specification
MIL-STD-150A	Photographic Lenses
Procedures	
49979	Qualification Test Procedure, Pan Subsystems
Drawings	
J43877	Electrical Schematic, Overall Equipment
J43800	Assembly Drawing, Main Assembly
E43704	Format Specification

3.0 REQUIREMENTS

3.1 **Test Conditions:**

Temperature: $70^{\circ} \pm 10^{\circ}F$

Pressure: 10^{-4} mm Hg.

Test invalidated if pressure exceeds 10^{-3} Hg.

3.2 Test Equipment:

Eight channel Sanborn Recorder with 8 DC Preamplifiers

Three-Bay Checkout Console

Dynamic Resolution Tester

Thermal Jacket and associated controls.

3.3 Photographic Requirements:

3.3.1 Before conducting this test, the platen must have been shimmed for optimum focus, and target drive/scan rate compatibility established. For focus setting, exposure level, etc., see results of "In-House Photo" tests.

3.4 Scan Rate Scaling:

3.4.1 Before conducting this test, the V/h Adjust and V/h Programmer subassemblies shall have been adjusted for the following V/h vs. stepping switch conditions. Check data sheet.

V/h Selection	Precent V/h
6	Nominal
10	67
1	133

3.5 Preparation for Test:

3.5.1 Install thermal jacket on Pan Subsystem.

3.5.2 Install Subsystem in DRT chamber.

3.5.3 Mate all interface connectors between Pan Subsystem and Checkout and DRT consoles.

3.5.4 Verify proper orientation of Subsystem with respect to DRT.

3.5.5 Connect the Checkout Console patch panel as follows:

Interface	Function	Scaling	Patch Panel	Plug Box Number
--	+28V Reg. Current	0.3V/5A	A2 -	1
			A3 -	1
--	-28V Reg. Current	0.3V/3A	A5 -	2
			A6 -	2
--	+24V Unreg. Current	0.3V/50A	A8 -	3
			A9 -	3
103HH	Frame Count 2^0, 2^{11}	0-5V	E1 -	4
103GG	Frame Count 2^1, 2^{10}	0-5V	E2 -	5
103FF	Frame Count 2^2, 2^9	0-5V	E3 -	6

Interface	Function	Scaling	Patch Panel	Plug Box Number
102N	Scan Energized	0-5V	G1 -	7
102P	Cell Pin Released	0-5V	G2 -	8
106C	Scan Angle Monitor	0-5V	P14 -	9
102i	Reflector Pos. Monitor	0-5V	G4 -	10
102EE	Reflector Stowed Monitor	0-5V	G5 -	11
102j	Roll Steering Monitor	0-5V	G6 -	12
102p	V/h Code Monitor	2nd bit 0-5V	G9 -	13
102q	V/h Code Monitor	1st bit 0-5V	G10 -	14
102r	V/h Signal Volts Monitor	0-5V	G11 -	15
102u	24V Unreg. Volts Monitor	0-5V	G14 -	16
103m,n	Metering Commutator	0-5V	P1 -	17
103y,z	Supply Idler Commutator	0-5V	P2 -	18
103s,t	Cycle Start Relay Monitor	0-5V	P3 -	19
103q,r	Door Pos. Comm.	0-5V	P4 -	20
104C	Takeup Input Idler Comm.	0-5V	P7 -	21
105Z	I Comm.	0-5V	P10 -	22
105a	S Comm.	0-5V	P11 -	23
105b	Door Monitor No. 3(SI)	0-5V	P12 -	24

4.0 PRE-VACUUM OPERATIONAL TEST

4.1 Checkout Console Switch Settings: Set the Checkout Console switches as follows:

Power On	ON
Index/Stellar	OFF
Operate	OFF
Reflector Mode	CYCLING
Heater	OFF
Brake Release	OFF
TM Power	ON
Gen. Start	OFF
Ramp Select	6 (nominal V/h)
Roll	0°

4.2 DRT Console Settings: Set the DRT Console switches as follows:

a.) AC power ON

b.) Lamp ON (prior to photo run)

c.) Focus Setting - 500 (or see "In House Photo")

d.) Exposure Level ... see "In House Photo".

e.) IMC Power Supply ON (15 min. prior to photo run)

f.) IMC Chassis ON (prior to photo run)

g.) Target Drive Code ... See Table 1.

h.) Target position ... See Table 1.

i.) Shutter open (manually operated) for 10 frames per pan burst (16 frames) for photo requirements.

4.3 Recorder Connections: Connect the following inputs to the recorder:

Channel	Function	Interface	Plug Box
1	+24V Unreg. Current	-	1
2	Frame Count 2^0, 2^{11}	J103H	4
3	Scan Angle Monitor	J106C	9
4	Door Comm.	J103g,r	20
5	Metering Comm.	J103m,n	17
6	Supply Idler Comm.	J103y,z	18
7	Takeup Input Idler Comm.	J104C	21
8	Reflector Position Mon.	J102i	10

4.4 Test Procedure:

4.4.1 Start Recorder.

4.4.2 Momentarily press Operate button. After 10 frames return Reflector Mode switch to OFF. Observe TM recording and check data sheet for following indications:

4.4.2.1 Cell Scans.

4.4.2.2 Film transports

4.4.2.3 Frame Count advances.

4.4.2.4 Reflector cycles and finishes in vertical position.

4.4.2.5 Target drive operates properly with each scan.

4.4.2.6 Operate mode ends after 16 frames.

4.4.2.7 Interval mode continues and automatically shuts off to standby.

5.0 REFLECTOR STOW AND CELL PINNING

5.1 Test Requirement: To simulate operational usage, the reflector must be stowed and the cell pinned as the last operation before Chamber pump-down for the endurance test.

NOTE

It is essential that the last operation of the scan is at nominal V/h, and that roll steering is at 0°. Check Data Sheet.

5.2 Checkout Console Switch Settings: As in 4.1 and as mated in the test.

5.3 DRT Console Switch Settings: As in 4.2.

5.4 Recorder Connections: As in 4.3, but substitute "Cell Pin Released Monitor", J102P, Plug Box 8 for Door Comm. on Channel 4.

5.5 Test Procedure:

5.5.1 Start the recorder and observe approximately 4 volts.

5.5.2 In Standby Mode, place Reflector Mode switch in STOW position. Observe Reflector Position TM showing transfer from vertical to stow position. Check data sheet.

5.5.3 Observe transition to Cell Pin Released Monitor from 4 to 0 volts. Check data sheet.

5.5.4 Observe that Stowed indicator on Checkout Console lights. Check data sheet.

5.5.5 Return Reflector Mode switch to OFF. Observe that Stowed indicator goes out. Check data sheet.

5.5.6 Check TM recordings to see that reflector stops in stow position and that cell pin is engaged.

6.0 THERMAL ENDURANCE TEST

6.1 Check Console Switch Settings: As in 4.1 and as noted in the test for each Operate period.

6.2 DRT Console Switch Settings: As in 4.2 and as noted in the test for each Operate period.

6.3 Recorder Connection 2. As in 4.3. Reconnect Channel 4 to Door Commutator Monitor, Plug Box 20, after test of 5.0.

6.4 Test Procedure:

6.4.1 Seal and evacuate chamber to 10^{-4} Hg.

6.4.2 Start the 96-hour endurance run after chamber pump-down. During the ninety six-hours, perform the series of 64 Operate periods at 90-minute intervals under the operating times, V/h conditions, reflector modes, photo requirements, etc., outlined in Table 1.

6.4.3 The thermal jacket shall be controlled to maintain $70^{\circ} \pm 10^{\circ}$F environment.

6.4.4 Continuous recording of all operations is not required, but occasional checks should be made to verify proper system operation.

6.5 Evaluation of Results:

6.5.1 Upon completion of the test return chamber to atmosphric pressure, remove film under light-safe conditions and process.

6.5.2 Evaluate photographic data from a photographic period near the start and end of the test. Inspect data block for correlation with test conditions.

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OPERATE PERIOD	FRAMES	V/h RAMP	REFL MODE	PHOTO OPERATION	TARGET DRIVE CODE	TARGET POSITION	CLOCK TIME START	CLOCK TIME FINISH	CYCLE COUNT START	CYCLE COUNT FINISH
1	32	6(100%)	off	thru focus 450 to 600	0100001010	8 50 div. inc	2000 1/24/63	2005	33227	33259
2	32	1(133%)	off	thru focus 450 to 600	00110010000	8 50 div. inc	2130	2133	33259	33307
3	32	10(67%)	off	thru focus 450 to 600	0110001100	8 50 div. inc	2300	2304	33307	33339
4	32	1	off	thru focus 450 to 600		8 50 div. inc	1/25 0030	0034	33339	33371
5	32	6	cyc				0200	0204	33371	33403
6	32	1	cyc				0330	0333	33403	33435
7	32	10	cyc				0500	0504	33435	33467
8	32	1	cyc				0630	0634	33467	33499
9	15 minutes 670	6	off	7.5 min 7.5 min	0100001010 0100001110	8 2	0800	0815	33511	33643
10	32	1	off	16 frames 16 frames	0011001000 0011100000	8 11	0130	0134	33643	33675
11	32	10	off	16 frames 16 frames	0110001100 0110010001	8 2	1100	1104	33675	33707
12	32	1	off	thru focus 450 to 600	0110001100	8 50 div. inc	1230	1232	33707	33739
13	32	6	cyc				1400	1404	33739	33771
14	32	1	cyc				1530	1532	33771	33803

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OPERATE PERIOD	FRAMES	V/h RAMP	REFL MODE	PHOTO OPERATION	TARGET DRIVE CODE	TARGET POSITION	CLOCK TIME START	CLOCK TIME FINISH	CYCLE COUNT START	CYCLE COUNT FINISH
15	32	10	cyc				1700	1710	34203	34235
16	32	1	cyc	Thru focus 450 to 600	0110001100	8 50 div. inc	1230	1232	34235	34267
17	32	6	off	16 frames 16 frames	0100001010 0100001110	8 14	2000	2005	34267	34299
18	20 minutes 673	1	off	10 min 10 min	0011001000 0011001011	8 14	2140	2200	34299	35145
19	32	10	off	16 frames 16 frames	0110001100 0110010001	8 14	2300	2303	35145	35227
20	32	1	off				1/26 0049	0053	35145	35259
21	32	6	cyc				0200	0204	35259	35211
22	32	1	off	Thru focus 450 to 600	0011001000	8 50 div. inc	0330	0334	35211	35323
23	32	10	cyc				0500	0504	35323	35355
24	32	1	cyc				0630	0634	35355	35387
25	32	6	off	16 frames 16 frames	0100001010 0100001110	8 2	1100	1103	35451	35483
26	32	1	off				1230	1232	35483	35515
27	15 minutes (approx. 347 frames)	10	off	7.5 min 7.5 min	0110001100 0110010001	8 2	1400	1415	35515	35483

* OPERATE PERIODS #29 & 30 WERE RUN BEFORE DUE TO ORT PROBLEMS.

OPERATE PERIOD	FRAMES	V/h RAMP	REFL MODE	PHOTO OPERATION	TARGET DRIVE CODE	TARGET POSITION	CLOCK TIME START	CLOCK TIME FINISH	CYCLE COUNT START	CYCLE COUNT FINISH
28	32	1	off				1530	1532	35283	35915
29	32	6	cyc			*	0800	0804	35387	35419
30	32	1	cyc			*	0930	0934	35419	35451
31	16	10	cyc				1700	1701	35915	35931
32	16	1	cyc				1230	1231	35931	35947
33	16	6	off	thru focus 450 to 600	0100001010	8 50 div. inc	2000	2001	35947	35963
34	16	6	off	thru focus 450 to6600	0011001000	8 50 div. inc	2130	2131	35963	35979
35	16	10	off	thru focus 450 to 600	0110001100	8 50 div. inc	2300	2301	35979	35995
36	16	6	off	thru focus 450 to 600	0011001000	8 50 div. inc	1127 0000	0033	35995	36011
37	16	6	cyc				0200	0203	36011	36027
38	16	1	cyc				0330	0333	36027	36043
39	16	10	cyc				0500	0503	36043	36059
40	16	1	cyc				0630	0633	36059	36075
41	16	6	off	thru focus 450 to 600	0100001010	8 50 div. inc	0800	0803	36075	36091

* OPERATE PERIODS #29 & 30 WERE RUN BEFORE #28 DUE TO DRT PROBLEMS

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OPERATE PERIOD	FRAMES	V/h RAMP	REFL MODE	PHOTO OPERATION	TARGET DRIVE CODE	TARGET POSITION	CLOCK TIME START	CLOCK TIME FINISH	CYCLE COUNT START	CYCLE COUNT FINISH
42	16	1	off				0930	0933	36091	36107
43	16	10	off	thru focus 450 to 600	0110001100	8 50 div. inc	1100	1103	36107	36123
44	16	1	off				1230	1231	36123	36139
45	16	6	cyc				1400	1402	36139	36155
46	16	1	cyc				1530	1531	36155	36171
47	16	10	cyc				1700	1703	36171	36187
48	16	1	cyc				1830	1831	36187	36203
49	16	6	off	thru focus 450 to 600	0100001010	8 50 div. inc	2000	2002	36203	36219
50	16	6	off	"	0011001000	8	2130	2132	36219	36235
51	16	10	off	"	0110001100	8	2300	2303	36235	36251
52	16	6	off	"	0011001000	8	1/28 0030	0033	36251	36267
53	16	6	cyc				0200	0203	36267	36283
54	16	1	cyc				0330	0333	36283	36299
55	16	10	cyc				0500	0503	36299	36315

SECRET

SPECIAL HANDLING

SECRET

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OPERATE PERIOD	FRAMES	V/h RATE	REFL MODE	PHOTO OPERATION	TARGET DRIVE CODE	TARGET POSITION	CLOCK TIME START	CLOCK TIME FINISH	CYCLE COUNT START	CYCLE COUNT FINISH
56	16	1	cyc				0630	0633	36315	36331
57	16	6	off	Thru Focus 16 frames 450 - 500	0100001010	8	0800	0803	36331	36347
58	16	1	off	0	Non Photo		0930	0433	36347	36363
59	16	10	off	Thru Focus 16 Frames 450 - 500	0100001010	8	1100	1103	36363	36379
60	16	1	off	0	Non Photo		1230	1231	36379	36395
61	16	6	off	Thru Focus 16 Frames 550 - 600	0100001010	8	1400	1402	36395	36411
62	16	6	off	Thru Focus 16 Frames 650 - 700	0100001010	8	1530	1532	36411	36427
63	0		off			25X1 NRO	1700	1703	—	—
64	0		off				1830	1833	—	—
65	16	6	off	0 [illegible] 16	Thru Focus 0100001010 450 - 500	8	2000	2002	36427	36447

SECRET

SPECIAL HANDLING

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QUAL. ✓
VAR.

TEST DATA SHEET

THERMAL ALTITUDE TEST

Serial No. 2

3.2	Test Equipment:		Calibration Due
	Eight Channel Recorder		4-12-63
	Checkout Console		4-19-63
	Dynamic Resolution Tester		3-1-63
3.4.1	V/h Adjusted	Check	✓
4.4.2.1	Cell scans	Check	✓
4.4.2.2	Film transports	Check	✓
4.4.2.3	Frame Count advances	Check	✓
4.4.2.4	Reflector cycles, stops in vertical	Check	✓
4.4.2.5	Target drive operates	Check	✓
4.4.2.6	Operate mode stops at 16 frames	Check	✓
4.4.2.7	Interval mode shuts off to Standby	Check	✓
5.1	V/h at 6, [redacted] Refl Stowed, Cell Pinned	Check	✓
5.5.1	Cell Pin Released TM 4 volts	Check	✓
5.5.2	Reflector Position TM shows Stow	Check	✓
5.5.3	Cell Pin Released TM to 0 volts	Check	✓
5.5.4	Stowed indicator on	Check	✓
5.5.5	Stowed indicator out	Check	✓
5.5.6	Reflector stops in Stow Cell pin engaged	Check	✓
6.4	Endurance test completed	Check	✓
6.5.2	Film evaluated,	Check	✓
	Data Block correlates	Check	✓

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Test Started 1/24/63

Test Ended 1/28/63

Test Engineer

Q. A.

STATINTL

Witness

Witness