

**COS DCE BOOT FSW v1.09 Component Test Results  
Requirement 5.1.1.5a Performs Requisite Initializations**

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**Table of Contents**

- 1. Introduction ..... 2
  - 1.1 Purpose ..... 2
  - 1.2 Scope ..... 2
  - 1.3 Limitations and Constraints ..... 2
  - 1.4 Procedure Overview ..... 2
  - 1.5 Theory of Test ..... 3
  - 1.6 Test Script Implementation ..... 3
- 2. Special Instructions ..... 3
  - 2.1 Quality Assurance ..... 3
  - 2.2 Safety ..... 3
    - 2.2.1 Personal Safety ..... 3
    - 2.2.2 Test Article and Equipment Safety ..... 4
  - 2.3 Contamination ..... 4
- 3. Support Requirements ..... 4
  - 3.1 Personnel ..... 4
  - 3.2 Tools, Equipment, and Materials ..... 4
  - 3.3 Data/Software ..... 5
  - 3.4 Required Documentation ..... 5
- 4. Procedure/Task Steps ..... 5
  - 4.1 Pre-Operation Activities ..... 5
    - 4.1.1 Make Sure that **hks** Tools Are Active ..... 5
    - 4.1.2 Make Sure that the Proper ROM Is Installed ..... 5
    - 4.1.3 Log In to the EGSE ..... 6
    - 4.1.4 Set Current Directory ..... 6
    - 4.1.5 Slogin as eagcos ..... 6
    - 4.1.6 Set Current Directory ..... 6
    - 4.1.7 Ensure that Proper Files are Present ..... 7
  - 4.2 Operation Execution ..... 7
    - 4.2.1 Establish Initial Test Conditions ..... 7
    - 4.2.2 Execute the Script ..... 7
  - 4.3 Post-Operation Activities ..... 8
    - 4.3.1 Copy Reports to PC Files and Print Them ..... 8
    - 4.3.2 Complete The Test Procedure Form ..... 8

## 1. INTRODUCTION

### 1.1 PURPOSE

This document presents the Cosmic Origins Spectrograph (COS) Device Control Electronics (DCE) Flight Software (FSW) certification procedure. The purpose of this procedure is to verify that the FSW satisfies Software Requirements according to the method specified in the DCE FSW Test Plan (STP).

### 1.2 SCOPE

This test procedure comprises the steps necessary to verify that the FSW satisfies Software Requirements Document (SRD) paragraph 5.1.1.5 — Initialize to Boot State after Reset: Verify that it performs requisite initializations.

### 1.3 LIMITATIONS AND CONSTRAINTS

This test cannot be run in parallel with any other commanding activity directed at the DCE FSW (such as, for example, the periodic transmission of NOOP commands). Test hardware shall be visually inspected, and its configuration noted, prior to conducting this test.

### 1.4 PROCEDURE OVERVIEW

The procedure requires the `hks` tools running on the Sun SparcStation Electronic Ground Support Equipment (EGSE) whose network IP address is one of

**shorty.ssl.berkeley.edu**  
**taiyo.ssl.berkeley.edu**  
**ginger.ssl.berkeley.edu.**

Test time shall be scheduled in advance. The Test Conductor must be logged into the Unix system as user `eagcos`, and be commanding from the appropriate directory. This directory contains both the test script file and the shell script file; these two files control test execution. The test is conducted by invoking the shell script. This shell script in turn invokes the Perl 5 program `UniScript.pl`, which resides in its own distinct directory. The test procedure steps have been pre-recorded in the test script file, and are executed interpretively by the `UniScript` program. The shell script and test script are attached to this document as appendices. As `UniScript` executes the test script it sends results to the operator console and to two report files, which are also placed in the current directory. After completion of the test script, the Test Conductor can certify successful test

execution by examining the contents of the report files and determining that required outputs are present in them. Printed copies of the report files are attached to the manually completed checklist (Paragraph 4 below) as documentation of the test.

## 1.5 THEORY OF TEST

The following HK variables are identified as being initialized (to 0) by DCE FSW Boot State code:

LFGPHA, LFGPHB, LFCDECA, LFCDECB, RFXSVD2, LFCSDC1, LFCSDC2  
LFCFECA, LFCFECB, RFVP21D, RFRESER0, RFRLATCH, RFD1HZ, RFDPROJT  
LFMRAM, LFHSTATE, LFRILIM, LFHVILIM, LFPCNTA, LFPINTA, LFPCNTB  
LFHVLOA, LFHVLOB, LFHVNOMA, LFHVNOMB, LFPINTB, LFGSTIMA, LFGSTIMB  
RFDPEEK, LFRPOS, LFRTIMER, RFXSVD1, LFHRAMPT, LFHVTGTA, LFHVTGTB

The script transmits the POR packet (0x80000000) to the DCE in order to force a power-on reset. The resulting HK data are then examined to ensure that the variables named above have value 0.

## 1.6 TEST SCRIPT IMPLEMENTATION

The script employs the CHECK directive to inspect the HK values. In the three cases of bit-valued variables (RFRLATCH, RFD1HZ, RFDPROJT) the bit mask for these variables is logically ANDed with the value for the containing variable (LFSBITS2 and LFSBITS1, respectively); the result should be 0 (eight or 16 bits).

## 2. SPECIAL INSTRUCTIONS

### 2.1 QUALITY ASSURANCE

QA support is required to verify the configuration and setup environment as well as monitoring test steps and verifying results.

### 2.2 SAFETY

#### 2.2.1 Personal Safety

To ensure the safety of the test personnel during test execution the guidelines contained in Paragraph 3.4, Reference [1] will be adhered to.

2.2.2 Test Article and Equipment Safety

- If access within one (1) meter of COS bench electronics is necessary, wrist straps attached to technical ground shall be used by all personnel involved in handling of any COS test article. Overcurrent and overvoltage shall be set to remove power if nominal limits are exceeded.
- Emergency Power Shutdown — If, during the COS DCE FSW test, power is ON and a severe test equipment failure results in the power system exceeding specified limits, the Test Conductor shall direct or perform shutdown of power.

2.3 CONTAMINATION

All flight hardware shall be handled with clean latex gloves; it shall be covered with clean ESD material and/or stored in a clean flow-bench.

3. SUPPORT REQUIREMENTS

3.1 PERSONNEL

Execution of the COS DCE FSW certification procedure requires the following personnel (to be completed at the Test Readiness Review (TRR):

Test Director: \_\_\_\_\_  
 Test Conductor: \_\_\_\_\_  
 Test Technician: \_\_\_\_\_  
 QA: \_\_\_\_\_

3.2 TOOLS, EQUIPMENT, AND MATERIALS

The following is a list of tools, equipment, or materials required in this test. Record manufacturer and model, metrology, or property numbers of equipment used, where appropriate. Record calibration due dates where appropriate.

Boot Mode ROM: schematic **27C256**

Engineering Ground Support Equipment (see paragraph 1.4). Indicate specific configuration:

EGSE			DCE		
<b>taiyo</b>	<b>shorty</b>	<b>ginger</b>	<b>ETU</b>	<b>DCE #1</b>	<b>DCE #2</b>
	X			X	

3.3 DATA/SOFTWARE

The following files must be present:

**Table 3-1: Required Program and Data Files**

EGSE (shorty) Directory	File	Description
\disks\galex\users\galex\tcs\uniscrpt\	<b>UniScript.pl</b>	<b>UniScript</b> interpreter
\disks\galex\users\galex\tcs\uniscrpt\stp5_1_1_5a\	<b>u</b>	Shell script for this procedure
Ditto	<b>stp5_1_1_5a.tst</b>	Test script for this procedure (Appendix B)

In addition, the **hks** tools must be active. Directions for activating **hks** are given in UCB-COS-DOC-1118 (Paragraph 3.4, Reference [4]).

3.4 REQUIRED DOCUMENTATION

Reference	Document Number	Title
1	NHB 1700.1(V1-A)	<i>NASA Basic Safety Manual</i>
2	COS-03-0013	<i>DCE FSW Test Procedure 5.1.1.1a</i> (this document)
3	UCB-COS-008	<i>COS FUV Detector Software Test Plan</i>
4	UCB-COS-DOC-1118	<i>COS EGSE Startup Procedure</i>

**4. PROCEDURE/TASK STEPS**

4.1 PRE-OPERATION ACTIVITIES

4.1.1 Make Sure that **hks** Tools Are Active

Follow the procedure given in Paragraph 3.4, Reference [4].

4.1.2 Make Sure that the Proper ROM Is Installed

Visually verify that the ROM under test is installed: if EEPROM, in U18: if PROM, in U2 and U7.

#### 4.1.3 Log In to the EGSE

Step	QA	Operator Entry/System Response	Description
1		C:\tcs\us> <b>telnet shorty.ssl.berkeley.edu</b>	Establish connection to shorty via Telnet client program
2		Login: <b>tcs</b> Password:	Using telnet window, login as user <b>tcs</b>

#### 4.1.4 Set Current Directory

Step	QA	Operator Entry/System Response	Description
3		tcs@shorty% <b>cd ~galex/tcs</b> tcs@shorty% <b>pwd</b> /disks/galex/users/galex/tcs	Change current directory as shown

#### 4.1.5 Slogin as eagcos

Step	QA	Operator Entry/System Response	Description
4		tcs@shorty% <b>slogin -l eagcos</b> <b>shorty.ssl.berkeley.edu</b> eagcos@shorty.ssl.berkeley.edu's password: ( <i>get from SSL personnel</i> ) Last login: Sat Oct 7 10:41:05 2000 from auntem.ssl.berke Sun Microsystems Inc. SunOS 5.8 Generic February 2000 You have mail. COS EGSE software version: devel	slogin as <b>eagcos</b> ; get password from SSL personnel

#### 4.1.6 Set Current Directory

Step	QA	Operator Entry/System Response	Description
5		eagcos:shorty% <b>cd</b> <b>/disks/galex/users/galex/tcs/uniscript/stp5_1_1_1</b> eagcos:shorty% <b>pwd</b> /disks/galex/users/galex/tcs/uniscript/stp5_1_1_1	Change current directory as shown



4.1.7 Ensure that Proper Files are Present

Step	QA	Operator Entry/System Response	Description
6		<pre>eagcos@shorty% ls -l Total 12 -rw-r--r--  1 tcs   eag   1398 Oct  8 18:03 stp5_1_1_1a.tst -rw-r--r--  1 tcs   eag    62 Oct  9 17:44 u eagcos@shorty% more &lt; u #!/bin/sh perl ../UniScript.pl stp5_1_1_1a "0,0,0,0,0,0,0"</pre>	List files; the <b>.tst</b> file and the shell script <b>u</b> should be present

4.2 OPERATION EXECUTION

4.2.1 Establish Initial Test Conditions

Step	QA	Operator Entry/System Response	Description
7		<pre>eagcos:shorty% set path=(\$path ~dbb/scripts/bin)</pre>	Set path as shown to enable access to hks tools

4.2.2 Execute the Script

Step	QA	Operator Entry/System Response	Description
8		<pre>eagcos:shorty% sh u \$Pstring=0,0,0,0,0,0,0 Parameters are: Script File: stp5_1_1_1a #0: 0 #1: 0 #2: 0 #3: 0 #4: 0 #5: 0 #6: 0 #7: 0  Report file  &gt;/disks/galex/users/galex/tcs/uniscript/stp5_1_1_1a /stp5_1_1_1a.rp1 successfully opened.</pre>	Shell to <b>u</b> . You should see the accompanying output as <b>UniScript</b> executes

---

	<pre>Report file  &gt;/disks/galex/users/galex/tcs/uniscript/stp5_1_1_1a /stp5_1_1_1a.rp2 successfully opened. Script file  /disks/galex/users/galex/tcs/uniscript/stp5_1_1_1a/s tp5_1_1_1a.tst successfully opened at level 0.  "First 10-second wait ..."  LFDRSTP  "Second 10-second wait ..." "Test 5.1.1.1a Succeeded"</pre>	
--	---	--

4.3 POST-OPERATION ACTIVITIES

4.3.1 Copy Reports to PC Files and Print Them

Using an FTP client, copy the **u**, **stp5\_1\_1\_1a.tst**, **stp5\_1\_1\_1a.rp1**, and **stp5\_1\_1\_1a.rp2** files to appropriate PC files. Include these files as Appendices A, B, C, and D with this completed form.

4.3.2 Complete The Test Procedure Form

Ensure that all blank fields in this report are completed correctly and submit the completed report to QA.

SUMMARY SHEET

OPERATION TITLE: \_\_\_\_\_ WOA# \_\_\_\_\_

TEST ARTICLES IDENTIFICATION (including serial and/or part numbers):  
\_\_\_\_\_

TASKS/STEPS COMPLETED: \_\_\_\_\_  
\_\_\_\_\_

LOCATION: \_\_\_\_\_

TEST STARTED:

TEST TERMINATED

TIME: \_\_\_\_\_ Hr/Min

TIME: \_\_\_\_\_ Hr/Min

DATE: \_\_\_\_\_

DATE: \_\_\_\_\_

LOGS USED: \_\_\_\_\_

ANOMALY REPORTS GENERATED: \_\_\_\_\_  
\_\_\_\_\_

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TEST CONDUCTOR: \_\_\_\_\_

Signature/Date

QA REPRESENTATIVE: \_\_\_\_\_

Signature/Date

## Appendix A. Shell Script u

```
#!/bin/sh  
pkill cosnoopy  
perl ../UniScript.pl stp5_1_1_5a "0,0,0,0,0,0,0,0"  
cosnoopy&
```

## Appendix B. Test Script stp5\_1\_1\_5a.tst

```
; *****  
; * DCE FSW Requirement 5.1.1.5a -- Performs requisite initializations *  
; *****  
;  
SYM      DELTA=5  
;  
ECHO     2  
DTG      3," (0) Sending POR"  
WTO      "Sending POR"  
WAIT     1  
POR  
;  
WAIT     DELTA,HK  
LOG      1,LFGPHA,LFGPHB,LFCDECA,LFCDECB,RFXSVD2,LFCSDC1,LFCSDC2  
LOG      1,LFCFECA,LFCFECB,RFVP21D,RFRESERO,RFRLATCH,RFD1HZ,RFDPROJT  
LOG      1,LFMRAM,LFHSTATE,LFRILIM,LFHVILIM,LFPCNTA,LFPINTA,LFPCNTB  
LOG      1,LFHVLOA,LFHVLOB,LFHVNOMA,LFHVNOMB,LFPINTB,LFGSTIMA,LFGSTIMB  
LOG      1,RFDPEEK,LFRPOS,LFRTIMER,RFXSVD1,LFHRAMPT,LFHVTGTA,LFHVTGTB  
;  
DTG      3," (1) Testing HK variables"  
WTO      "Testing HK variables"  
;  
; *****  
; * list of variables tested *  
; * ----- *  
; * LFGPHA      array word      *  
; * LFGPHB      array word      *  
; * LFCDECA     dword           *  
; * LFCDECB     dword           *  
; * RFXSVD2     word            *  
; * LFCSDC1     dword           *  
; * LFCSDC2     dword           *  
; * LFCFECA     dword           *  
; * LFCFECB     dword           *  
; * RFVP21D     byte            *  
; * RFRESERO    byte            *  
; * RFRLATCH    bit             *  
; * RFD1HZ      bit             *  
; * RFDPROJT    bit             *  
; * LFMRAM      word            *  
; * LFHSTATE    byte            *  
; * LFRILIM     byte            *  
; * LFHVILIM    byte            *  
; * LFPCNTA     word            *  
; * LFPINTA     word            *  
; * LFPCNTB     word            *  
; * LFHVLOA     byte            *  
; * LFHVLOB     byte            *  
; * LFHVNOMA    byte            *  
; * LFHVNOMB    byte            *  
; * LFPINTB     word            *  
; * LFGSTIMA    byte            *  
; * LFGSTIMB    byte            *  
; * RFDPEEK     byte            *  
; * LFRPOS      byte            *  
; * LFRTIMER    byte            *  
; * RFXSVD1     word            *  
; * LFHRAMPT    byte            *  
; * LFHVTGTA    byte            *  
; * LFHVTGTB    byte            *  
; *****  
;  
; *****  
; * Test PH counter arrays *  
; *****  
;
```



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```

CHECK      1, ($LFGPHB[100]==0 && $LFGPHB[101]==0 && $LFGPHB[102]==0 && $LFGPHB[103]==0 &&
$LFGPHB[104]==0 && $LFGPHB[105]==0 && $LFGPHB[106]==0 && $LFGPHB[107]==0 &&
$LFGPHB[108]==0 && $LFGPHB[109]==0)
CHECK      1, ($LFGPHB[110]==0 && $LFGPHB[111]==0 && $LFGPHB[112]==0 && $LFGPHB[113]==0 &&
$LFGPHB[114]==0 && $LFGPHB[115]==0 && $LFGPHB[116]==0 && $LFGPHB[117]==0 &&
$LFGPHB[118]==0 && $LFGPHB[119]==0)
CHECK      1, ($LFGPHB[120]==0 && $LFGPHB[121]==0 && $LFGPHB[122]==0 && $LFGPHB[123]==0 &&
$LFGPHB[124]==0 && $LFGPHB[125]==0 && $LFGPHB[126]==0 && $LFGPHB[127]==0)
;
; *****
; * Check scalars *
; *****
;
CHECK      1, ($LFCDECA == 0)
CHECK      1, ($LFCDECB == 0)
CHECK      1, ($RFXSVD2 == 0)
CHECK      1, ($LFCSDC1 == 0)
CHECK      1, ($LFCSDC2 == 0)
CHECK      1, ($LFCFECA == 0)
CHECK      1, ($LFCFECB == 0)
CHECK      1, ($RFVP21D == 0)
CHECK      1, ($RFRESERO == 0)
CHECK      1, ($LFMRAM == 0)
CHECK      1, ($LFHSTATE == 0)
CHECK      1, ($LFRILIM == 0)
CHECK      1, ($LFHVILIM == 0)
CHECK      1, ($LFCNTA == 0)
CHECK      1, ($LFPINTA == 0)
CHECK      1, ($LFCNTB == 0)
CHECK      1, ($LFHVLOA == 0)
CHECK      1, ($LFHVLOB == 0)
CHECK      1, ($LFHVNOMA == 0)
CHECK      1, ($LFHVNOMB == 0)
CHECK      1, ($LFPINTB == 0)
CHECK      1, ($LFGSTIMA == 0)
CHECK      1, ($LFGSTIMB == 0)
CHECK      1, ($RFDPEEK == 0)
CHECK      1, ($LFRPOS == 0)
CHECK      1, ($LFRTIMER == 0)
CHECK      1, ($RFXSVD1 == 0)
CHECK      1, ($LFHRAMPT == 0)
CHECK      1, ($LFHVTGTA == 0)
CHECK      1, ($LFHVTGTB == 0)
;
; *****
; * Check bits *
; *****
;
CHECK      1, ($LFSBITS2 & $RFRATCH == 0)
CHECK      1, ($LFSBITS1 & $RFD1HZ == 0)
CHECK      1, ($LFSBITS1 & $RFDPROJT == 0)
;
DTG        3, "(2) Test 5.1.1.5a completed successfully"
WTO        "Test 5.1.1.5a completed successfully"

```

Appendix C. Test Report stp5\_1\_1\_5a.rp1

```

55555      1      1      55555
              ssss ttttt pppp 5 11 11 5
aaa              555      1      1      555
a a              s      t      p      p      5      1      1      5
aaaaa           sssss      t      pppp      5      1      1      5
a a              s      t      p      5      5      1      1      5      5
a a              ssss      t      p      555      111      111      555

```

Ver 01.09 Thu Nov 16 17:36:21 2000 "(0) Sending POR"

Addr	Addr	HK-Name	Value
1440-145F	LFGPHA	0000	0000
0000	0000	0000	0000
1460-147F		0000	0000
0000	0000	0000	0000
1480-149F		0000	0000
0000	0000	0000	0000
14A0-14BF		0000	0000
0000	0000	0000	0000
14C0-14DF		0000	0000
0000	0000	0000	0000
14E0-14FF		0000	0000
0000	0000	0000	0000
1500-151F		0000	0000
0000	0000	0000	0000
1520-153F		0000	0000
0000	0000	0000	0000
1540-155F	LFGPHB	0000	0000
0000	0000	0000	0000
1560-157F		0000	0000
0000	0000	0000	0000
1580-159F		0000	0000
0000	0000	0000	0000
15A0-15BF		0000	0000
0000	0000	0000	0000
15C0-15DF		0000	0000
0000	0000	0000	0000
15E0-15FF		0000	0000
0000	0000	0000	0000
1600-161F		0000	0000
0000	0000	0000	0000
1620-163F		0000	0000
0000	0000	0000	0000
1694-1697	LFCDECA	00000000	
1698-169B	LFCDECB	00000000	
169C-169D	RFXSVD2	0000	
16A4-16A7	LFCSDC1	00000000	
16A8-16AB	LFCSDC2	00000000	
16AC-16AF	LFCFECA	00000000	
16B0-16B1	LFCFECB	0000	
16D0-16D0	RFVP21D	00	
16D1-16D1	RFRESER0	00	
16E4	8000	RFRLATCH	0



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16F4 0001 RFD1HZ 0  
16F4 0010 RFDPROJT 0

Addr	Addr	HK-Name	Value
16FA-16FB		LFMRAM	0000
1705-1705		LFHSTATE	00
170A-170A		LFRILIM	00
170B-170B		LFHVILIM	00
170E-170F		LFPCNTA	0000
171C-171D		LFPINTA	0000
171E-171F		LFPCNTB	0000

Addr	Addr	HK-Name	Value
1720-1720		LFHVLOA	00
1721-1721		LFHVLOB	00
1724-1724		LFHVNOMA	00
1725-1725		LFHVNOB	00
1728-1729		LFPINTB	0000
172E-172E		LFGSTIMA	00
172F-172F		LFGSTIMB	00

Addr	Addr	HK-Name	Value
1734-1734		RFDPEEK	00
1735-1735		LFRPOS	00
1754-1755		LFRTIMER	0000
1764-1765		RFXSVD1	0000
1774-1775		LFHRAMPT	0000
17D2-17D2		LFHVTGTA	00
17D3-17D3		LFHVTGTB	00

Addr	Addr	HK-Name	Value
16E4-16E5		LFSBITS2	0000

Ver 01.09 Thu Nov 16 17:36:22 2000 "(1) Testing HK variables"

CHECK: (\$LFGPHA[ 0]==0 && \$LFGPHA[ 1]==0 && \$LFGPHA[ 2]==0 && \$LFGPHA[ 3]==0 &&  
\$LFGPHA[ 4]==0 && \$LFGPHA[ 5]==0 && \$LFGPHA[ 6]==0 && \$LFGPHA[ 7]==0 && \$LFGPHA[  
8]==0 && \$LFGPHA[ 9]==0)  
eval: (0000[ 0]==0 && 0000[ 1]==0 && 0000[ 2]==0 && 0000[ 3]==0 && 0000[ 4]==0 &&  
0000[ 5]==0 && 0000[ 6]==0 && 0000[ 7]==0 && 0000[ 8]==0 && 0000[ 9]==0)

S U C C E S S

CHECK: (\$LFGPHA[ 10]==0 && \$LFGPHA[ 11]==0 && \$LFGPHA[ 12]==0 && \$LFGPHA[ 13]==0 &&  
\$LFGPHA[ 14]==0 && \$LFGPHA[ 15]==0 && \$LFGPHA[ 16]==0 && \$LFGPHA[ 17]==0 && \$LFGPHA[  
18]==0 && \$LFGPHA[ 19]==0)  
eval: (0000[ 10]==0 && 0000[ 11]==0 && 0000[ 12]==0 && 0000[ 13]==0 && 0000[ 14]==0 &&  
0000[ 15]==0 && 0000[ 16]==0 && 0000[ 17]==0 && 0000[ 18]==0 && 0000[ 19]==0)

S U C C E S S

CHECK: (\$LFGPHA[ 20]==0 && \$LFGPHA[ 21]==0 && \$LFGPHA[ 22]==0 && \$LFGPHA[ 23]==0 &&  
\$LFGPHA[ 24]==0 && \$LFGPHA[ 25]==0 && \$LFGPHA[ 26]==0 && \$LFGPHA[ 27]==0 && \$LFGPHA[  
28]==0 && \$LFGPHA[ 29]==0)  
eval: (0000[ 20]==0 && 0000[ 21]==0 && 0000[ 22]==0 && 0000[ 23]==0 && 0000[ 24]==0 &&  
0000[ 25]==0 && 0000[ 26]==0 && 0000[ 27]==0 && 0000[ 28]==0 && 0000[ 29]==0)

S U C C E S S

CHECK: (\$LFGPHA[ 30]==0 && \$LFGPHA[ 31]==0 && \$LFGPHA[ 32]==0 && \$LFGPHA[ 33]==0 &&  
\$LFGPHA[ 34]==0 && \$LFGPHA[ 35]==0 && \$LFGPHA[ 36]==0 && \$LFGPHA[ 37]==0 && \$LFGPHA[  
38]==0 && \$LFGPHA[ 39]==0)  
eval: (0000[ 30]==0 && 0000[ 31]==0 && 0000[ 32]==0 && 0000[ 33]==0 && 0000[ 34]==0 &&  
0000[ 35]==0 && 0000[ 36]==0 && 0000[ 37]==0 && 0000[ 38]==0 && 0000[ 39]==0)

S U C C E S S

Center for Astrophysics & Space Astronomy

---

```
CHECK:  ($LFGPHA[ 40]==0 && $LFGPHA[ 41]==0 && $LFGPHA[ 42]==0 && $LFGPHA[ 43]==0 &&
$LFGPHA[ 44]==0 && $LFGPHA[ 45]==0 && $LFGPHA[ 46]==0 && $LFGPHA[ 47]==0 && $LFGPHA[
48]==0 && $LFGPHA[ 49]==0)
eval:    (0000[ 40]==0 && 0000[ 41]==0 && 0000[ 42]==0 && 0000[ 43]==0 && 0000[ 44]==0 &&
0000[ 45]==0 && 0000[ 46]==0 && 0000[ 47]==0 && 0000[ 48]==0 && 0000[ 49]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[ 50]==0 && $LFGPHA[ 51]==0 && $LFGPHA[ 52]==0 && $LFGPHA[ 53]==0 &&
$LFGPHA[ 54]==0 && $LFGPHA[ 55]==0 && $LFGPHA[ 56]==0 && $LFGPHA[ 57]==0 && $LFGPHA[
58]==0 && $LFGPHA[ 59]==0)
eval:    (0000[ 50]==0 && 0000[ 51]==0 && 0000[ 52]==0 && 0000[ 53]==0 && 0000[ 54]==0 &&
0000[ 55]==0 && 0000[ 56]==0 && 0000[ 57]==0 && 0000[ 58]==0 && 0000[ 59]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[ 60]==0 && $LFGPHA[ 61]==0 && $LFGPHA[ 62]==0 && $LFGPHA[ 63]==0 &&
$LFGPHA[ 64]==0 && $LFGPHA[ 65]==0 && $LFGPHA[ 66]==0 && $LFGPHA[ 67]==0 && $LFGPHA[
68]==0 && $LFGPHA[ 69]==0)
eval:    (0000[ 60]==0 && 0000[ 61]==0 && 0000[ 62]==0 && 0000[ 63]==0 && 0000[ 64]==0 &&
0000[ 65]==0 && 0000[ 66]==0 && 0000[ 67]==0 && 0000[ 68]==0 && 0000[ 69]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[ 70]==0 && $LFGPHA[ 71]==0 && $LFGPHA[ 72]==0 && $LFGPHA[ 73]==0 &&
$LFGPHA[ 74]==0 && $LFGPHA[ 75]==0 && $LFGPHA[ 76]==0 && $LFGPHA[ 77]==0 && $LFGPHA[
78]==0 && $LFGPHA[ 79]==0)
eval:    (0000[ 70]==0 && 0000[ 71]==0 && 0000[ 72]==0 && 0000[ 73]==0 && 0000[ 74]==0 &&
0000[ 75]==0 && 0000[ 76]==0 && 0000[ 77]==0 && 0000[ 78]==0 && 0000[ 79]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[ 80]==0 && $LFGPHA[ 81]==0 && $LFGPHA[ 82]==0 && $LFGPHA[ 83]==0 &&
$LFGPHA[ 84]==0 && $LFGPHA[ 85]==0 && $LFGPHA[ 86]==0 && $LFGPHA[ 87]==0 && $LFGPHA[
88]==0 && $LFGPHA[ 89]==0)
eval:    (0000[ 80]==0 && 0000[ 81]==0 && 0000[ 82]==0 && 0000[ 83]==0 && 0000[ 84]==0 &&
0000[ 85]==0 && 0000[ 86]==0 && 0000[ 87]==0 && 0000[ 88]==0 && 0000[ 89]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[ 90]==0 && $LFGPHA[ 91]==0 && $LFGPHA[ 92]==0 && $LFGPHA[ 93]==0 &&
$LFGPHA[ 94]==0 && $LFGPHA[ 95]==0 && $LFGPHA[ 96]==0 && $LFGPHA[ 97]==0 && $LFGPHA[
98]==0 && $LFGPHA[ 99]==0)
eval:    (0000[ 90]==0 && 0000[ 91]==0 && 0000[ 92]==0 && 0000[ 93]==0 && 0000[ 94]==0 &&
0000[ 95]==0 && 0000[ 96]==0 && 0000[ 97]==0 && 0000[ 98]==0 && 0000[ 99]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[100]==0 && $LFGPHA[101]==0 && $LFGPHA[102]==0 && $LFGPHA[103]==0 &&
$LFGPHA[104]==0 && $LFGPHA[105]==0 && $LFGPHA[106]==0 && $LFGPHA[107]==0 &&
$LFGPHA[108]==0 && $LFGPHA[109]==0)
eval:    (0000[100]==0 && 0000[101]==0 && 0000[102]==0 && 0000[103]==0 && 0000[104]==0 &&
0000[105]==0 && 0000[106]==0 && 0000[107]==0 && 0000[108]==0 && 0000[109]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[110]==0 && $LFGPHA[111]==0 && $LFGPHA[112]==0 && $LFGPHA[113]==0 &&
$LFGPHA[114]==0 && $LFGPHA[115]==0 && $LFGPHA[116]==0 && $LFGPHA[117]==0 &&
$LFGPHA[118]==0 && $LFGPHA[119]==0)
eval:    (0000[110]==0 && 0000[111]==0 && 0000[112]==0 && 0000[113]==0 && 0000[114]==0 &&
0000[115]==0 && 0000[116]==0 && 0000[117]==0 && 0000[118]==0 && 0000[119]==0)
```

S U C C E S S

```
CHECK:  ($LFGPHA[120]==0 && $LFGPHA[121]==0 && $LFGPHA[122]==0 && $LFGPHA[123]==0 &&
$LFGPHA[124]==0 && $LFGPHA[125]==0 && $LFGPHA[126]==0 && $LFGPHA[127]==0)
eval:    (0000[120]==0 && 0000[121]==0 && 0000[122]==0 && 0000[123]==0 && 0000[124]==0 &&
0000[125]==0 && 0000[126]==0 && 0000[127]==0)
```

## Center for Astrophysics &amp; Space Astronomy

## S U C C E S S

```
CHECK:  ($LFGPHB[ 0]==0 && $LFGPHB[ 1]==0 && $LFGPHB[ 2]==0 && $LFGPHB[ 3]==0 &&
$LFGPHB[ 4]==0 && $LFGPHB[ 5]==0 && $LFGPHB[ 6]==0 && $LFGPHB[ 7]==0 && $LFGPHB[
8]==0 && $LFGPHB[ 9]==0)
eval:    (0000[ 0]==0 && 0000[ 1]==0 && 0000[ 2]==0 && 0000[ 3]==0 && 0000[ 4]==0 &&
0000[ 5]==0 && 0000[ 6]==0 && 0000[ 7]==0 && 0000[ 8]==0 && 0000[ 9]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 10]==0 && $LFGPHB[ 11]==0 && $LFGPHB[ 12]==0 && $LFGPHB[ 13]==0 &&
$LFGPHB[ 14]==0 && $LFGPHB[ 15]==0 && $LFGPHB[ 16]==0 && $LFGPHB[ 17]==0 && $LFGPHB[
18]==0 && $LFGPHB[ 19]==0)
eval:    (0000[ 10]==0 && 0000[ 11]==0 && 0000[ 12]==0 && 0000[ 13]==0 && 0000[ 14]==0 &&
0000[ 15]==0 && 0000[ 16]==0 && 0000[ 17]==0 && 0000[ 18]==0 && 0000[ 19]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 20]==0 && $LFGPHB[ 21]==0 && $LFGPHB[ 22]==0 && $LFGPHB[ 23]==0 &&
$LFGPHB[ 24]==0 && $LFGPHB[ 25]==0 && $LFGPHB[ 26]==0 && $LFGPHB[ 27]==0 && $LFGPHB[
28]==0 && $LFGPHB[ 29]==0)
eval:    (0000[ 20]==0 && 0000[ 21]==0 && 0000[ 22]==0 && 0000[ 23]==0 && 0000[ 24]==0 &&
0000[ 25]==0 && 0000[ 26]==0 && 0000[ 27]==0 && 0000[ 28]==0 && 0000[ 29]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 30]==0 && $LFGPHB[ 31]==0 && $LFGPHB[ 32]==0 && $LFGPHB[ 33]==0 &&
$LFGPHB[ 34]==0 && $LFGPHB[ 35]==0 && $LFGPHB[ 36]==0 && $LFGPHB[ 37]==0 && $LFGPHB[
38]==0 && $LFGPHB[ 39]==0)
eval:    (0000[ 30]==0 && 0000[ 31]==0 && 0000[ 32]==0 && 0000[ 33]==0 && 0000[ 34]==0 &&
0000[ 35]==0 && 0000[ 36]==0 && 0000[ 37]==0 && 0000[ 38]==0 && 0000[ 39]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 40]==0 && $LFGPHB[ 41]==0 && $LFGPHB[ 42]==0 && $LFGPHB[ 43]==0 &&
$LFGPHB[ 44]==0 && $LFGPHB[ 45]==0 && $LFGPHB[ 46]==0 && $LFGPHB[ 47]==0 && $LFGPHB[
48]==0 && $LFGPHB[ 49]==0)
eval:    (0000[ 40]==0 && 0000[ 41]==0 && 0000[ 42]==0 && 0000[ 43]==0 && 0000[ 44]==0 &&
0000[ 45]==0 && 0000[ 46]==0 && 0000[ 47]==0 && 0000[ 48]==0 && 0000[ 49]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 50]==0 && $LFGPHB[ 51]==0 && $LFGPHB[ 52]==0 && $LFGPHB[ 53]==0 &&
$LFGPHB[ 54]==0 && $LFGPHB[ 55]==0 && $LFGPHB[ 56]==0 && $LFGPHB[ 57]==0 && $LFGPHB[
58]==0 && $LFGPHB[ 59]==0)
eval:    (0000[ 50]==0 && 0000[ 51]==0 && 0000[ 52]==0 && 0000[ 53]==0 && 0000[ 54]==0 &&
0000[ 55]==0 && 0000[ 56]==0 && 0000[ 57]==0 && 0000[ 58]==0 && 0000[ 59]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 60]==0 && $LFGPHB[ 61]==0 && $LFGPHB[ 62]==0 && $LFGPHB[ 63]==0 &&
$LFGPHB[ 64]==0 && $LFGPHB[ 65]==0 && $LFGPHB[ 66]==0 && $LFGPHB[ 67]==0 && $LFGPHB[
68]==0 && $LFGPHB[ 69]==0)
eval:    (0000[ 60]==0 && 0000[ 61]==0 && 0000[ 62]==0 && 0000[ 63]==0 && 0000[ 64]==0 &&
0000[ 65]==0 && 0000[ 66]==0 && 0000[ 67]==0 && 0000[ 68]==0 && 0000[ 69]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 70]==0 && $LFGPHB[ 71]==0 && $LFGPHB[ 72]==0 && $LFGPHB[ 73]==0 &&
$LFGPHB[ 74]==0 && $LFGPHB[ 75]==0 && $LFGPHB[ 76]==0 && $LFGPHB[ 77]==0 && $LFGPHB[
78]==0 && $LFGPHB[ 79]==0)
eval:    (0000[ 70]==0 && 0000[ 71]==0 && 0000[ 72]==0 && 0000[ 73]==0 && 0000[ 74]==0 &&
0000[ 75]==0 && 0000[ 76]==0 && 0000[ 77]==0 && 0000[ 78]==0 && 0000[ 79]==0)
```

## S U C C E S S

```
CHECK:  ($LFGPHB[ 80]==0 && $LFGPHB[ 81]==0 && $LFGPHB[ 82]==0 && $LFGPHB[ 83]==0 &&
$LFGPHB[ 84]==0 && $LFGPHB[ 85]==0 && $LFGPHB[ 86]==0 && $LFGPHB[ 87]==0 && $LFGPHB[
88]==0 && $LFGPHB[ 89]==0)
```

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---

```
eval: (0000[ 80]==0 && 0000[ 81]==0 && 0000[ 82]==0 && 0000[ 83]==0 && 0000[ 84]==0 &&
0000[ 85]==0 && 0000[ 86]==0 && 0000[ 87]==0 && 0000[ 88]==0 && 0000[ 89]==0)
```

S U C C E S S

```
CHECK: ($LFGPHB[ 90]==0 && $LFGPHB[ 91]==0 && $LFGPHB[ 92]==0 && $LFGPHB[ 93]==0 &&
$LFGPHB[ 94]==0 && $LFGPHB[ 95]==0 && $LFGPHB[ 96]==0 && $LFGPHB[ 97]==0 && $LFGPHB[
98]==0 && $LFGPHB[ 99]==0)
```

```
eval: (0000[ 90]==0 && 0000[ 91]==0 && 0000[ 92]==0 && 0000[ 93]==0 && 0000[ 94]==0 &&
0000[ 95]==0 && 0000[ 96]==0 && 0000[ 97]==0 && 0000[ 98]==0 && 0000[ 99]==0)
```

S U C C E S S

```
CHECK: ($LFGPHB[100]==0 && $LFGPHB[101]==0 && $LFGPHB[102]==0 && $LFGPHB[103]==0 &&
$LFGPHB[104]==0 && $LFGPHB[105]==0 && $LFGPHB[106]==0 && $LFGPHB[107]==0 &&
$LFGPHB[108]==0 && $LFGPHB[109]==0)
```

```
eval: (0000[100]==0 && 0000[101]==0 && 0000[102]==0 && 0000[103]==0 && 0000[104]==0 &&
0000[105]==0 && 0000[106]==0 && 0000[107]==0 && 0000[108]==0 && 0000[109]==0)
```

S U C C E S S

```
CHECK: ($LFGPHB[110]==0 && $LFGPHB[111]==0 && $LFGPHB[112]==0 && $LFGPHB[113]==0 &&
$LFGPHB[114]==0 && $LFGPHB[115]==0 && $LFGPHB[116]==0 && $LFGPHB[117]==0 &&
$LFGPHB[118]==0 && $LFGPHB[119]==0)
```

```
eval: (0000[110]==0 && 0000[111]==0 && 0000[112]==0 && 0000[113]==0 && 0000[114]==0 &&
0000[115]==0 && 0000[116]==0 && 0000[117]==0 && 0000[118]==0 && 0000[119]==0)
```

S U C C E S S

```
CHECK: ($LFGPHB[120]==0 && $LFGPHB[121]==0 && $LFGPHB[122]==0 && $LFGPHB[123]==0 &&
$LFGPHB[124]==0 && $LFGPHB[125]==0 && $LFGPHB[126]==0 && $LFGPHB[127]==0)
```

```
eval: (0000[120]==0 && 0000[121]==0 && 0000[122]==0 && 0000[123]==0 && 0000[124]==0 &&
0000[125]==0 && 0000[126]==0 && 0000[127]==0)
```

S U C C E S S

```
CHECK: ($LFCDECA == 0)
eval: (0000 == 0)
```

S U C C E S S

```
CHECK: ($LFCDECB == 0)
eval: (0000 == 0)
```

S U C C E S S

```
CHECK: ($RFXSVD2 == 0)
eval: (0000 == 0)
```

S U C C E S S

```
CHECK: ($LFCSDC1 == 0)
eval: (0000 == 0)
```

S U C C E S S

```
CHECK: ($LFCSDC2 == 0)
eval: (0000 == 0)
```

S U C C E S S

```
CHECK: ($LFCFECA == 0)
eval: (0000 == 0)
```

S U C C E S S

```
CHECK: ($LFCFECB == 0)
eval: (0000 == 0)
```

S U C C E S S

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---

CHECK: (\$RFVP21D == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$RFRESER0 == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFMRAM == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHSTATE == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFRILIM == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHVILIM == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFPCNTA == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFPINTA == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFPCNTB == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHVLOA == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHVLOB == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHVNOMA == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHVNOMB == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFPINTB == 0)  
eval: (0000 == 0)

S U C C E S S

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---

CHECK: (\$LFGSTIMA == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFGSTIMB == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$RFDPEEK == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFRPOS == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFRTIMER == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$RFXSVD1 == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHRAMPT == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHVTGTA == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: (\$LFHVTGTB == 0)  
eval: (0000 == 0)

S U C C E S S

CHECK: ((\$LFSBITS2 & \$RFRLATCH) == 0)  
eval: ((0000 & 8000) == 0)

S U C C E S S

CHECK: ((\$LFSBITS1 & \$RFD1HZ) == 0)  
eval: ((0000 & 0001) == 0)

S U C C E S S

CHECK: ((\$LFSBITS1 & \$RFDPROJT) == 0)  
eval: ((0000 & 0010) == 0)

S U C C E S S

Ver 01.09 Thu Nov 16 17:36:23 2000 "(2) Test 5.1.1.5a completed successfully"

**Appendix D. Test Report stp5\_1\_1\_5a.rp2**

```

55555      1          1          55555      11          11          5
          ssss ttttt pppp  555      1          1          555
aaa
a  a      s      t  p  p    5          1          1          5
          sssss  t  pppp    5          1          1          5
aaaaa
a  a      s      t  p    5  5          1          1          5  5
a  a      ssss  t  p    555  _____ 111  _____ 111  _____ 555

```

Ver 01.09 Thu Nov 16 17:36:21 2000 "(0) Sending POR"

```

-----
P O R   P A C K E T
-----
80000000
-----

```

Ver 01.09 Thu Nov 16 17:36:22 2000 "(1) Testing HK variables"

Ver 01.09 Thu Nov 16 17:36:23 2000 "(2) Test 5.1.1.5a completed successfully"