

COS DCE BOOT FSW v1.13 Component Test Results
Requirement 5.1.1.2 Distinguish Between Power-up and Watchdog Resets

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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 5.1.1.2 — Distinguish Between Power-Up and Watchdog Interrupts.

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

1.5.1 Correct Diagnostic for POR

The script **WAITS** for second (to allow any reset in progress to complete), then uplinks the 32-bit constant 0x80000000 (in this case, the **XMIT** local directive is not followed by **LFDUPLOD**), which should cause a POR; **WAITS** again for one second and reads the HK data; then checks for the presence of **DIAG001B**. If the code is present in the diagnostic stack, the test continues; otherwise it *fails*.

1.5.2 Correct Diagnostic for WDR

The script then **WAITS** for 11 seconds (which, in the absence of any concurrent commanding activity, ought to precipitate a Watchdog reset) and reads the HK data; and finally checks for the presence of **DIAG001C**. If the code is present in the diagnostic stack, the test *succeeds*; otherwise it *fails*.

Note: The automatic transmission of **LFDNOOP** commands should be re-initiated at the conclusion of the test.

1.6 TEST SCRIPT IMPLEMENTATION

1.6.1 Test Script Arguments

The script is not parameterized.

1.6.2 Test Script Coding

The script uses standard **UniScript** commands and directives.

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

To ensure the safety and well-being of the COS operations bench, SITS, and related test equipment, the following primary safety requirements will be in effect during the execution of this test procedure:

- 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		
taiyo	shorty	ginger	ETU	DCE #1	DCE #2
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\	UniScript.pl	UniScript interpreter
\disks\galex\users\galex\tcs\uniscrpt\stp5_1_1_2\	u	Shell script for this procedure
Ditto	stp5_1_1_2.tst	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-03-0042	<i>DCE FSW Test Procedure 5.1.1.2 (this document)</i>
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

In the following steps, the EGSE system (“taiyo”) may be any of the systems listed in Paragraph 1.4. *Output*, from either the Unix system or from UniScript, to the Telnet terminal is represented in typeface. *Input* from the Test Conductor is represented in **Bold** typeface.

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

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4.1.4 Set Current Directory

Step	QA	Operator Entry/System Response	Description
3		tcs@shorty% cd ~galex/tcs tcs@shorty% pwd /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% slogin -l eagcos shorty.ssl.berkeley.edu 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 eagcos ; get password from SSL personnel

4.1.6 Set Current Directory

Step	QA	Operator Entry/System Response	Description
5		eagcos:shorty% cd /disks/galex/users/galex/tcs/uniscript/stp5_1_1_2 eagcos:shorty% pwd /disks/galex/users/galex/tcs/uniscript/stp5_1_1_2	Change current directory as shown

4.1.7 Ensure that Proper Files are Present

Step	QA	Operator Entry/System Response	Description
6		eagcos@shorty% ls -l Total 12 -rw-r--r-- 1 tcs eag 1398 Oct 8 18:03 stp5_1_1_2.tst -rw-r--r-- 1 tcs eag 62 Oct 9 17:44 u	List files; the .tst file and the shell script u should be present

4.2 OPERATION EXECUTION

4.2.1 Establish Initial Test Conditions

Step	QA	Operator Entry/System Response	Description
7		eagcos:shorty% set path=(\$path -dbb/scripts/bin)	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:taiyo% sh u \$psstring=0,0,0,0,0,0,0,0 Parameters are: Script File: stp5_1_1_2 #0: 0 #1: 0 #2: 0 #3: 0 #4: 0 #5: 0 #6: 0 #7: 0 Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_1_1_2/ stp5_1_1_2.rp1 successfully opened. Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_1_1_2/ stp5_1_1_2.rp2 successfully opened. Script file /disks/galex/users/galex/tcs/ver_1_13/stp5_1_1_2/s tp5_1_1_2.tst successfully opened at level 0. "First, 1-second, WAIT..." "Sending LFDRSTP" "Sending two PORs. WAITING 1sec twice" "Second, 1-second, WAIT..." LFDNOOP WAIT 0: HKV0=1; HKV1=0; wc=5 WAIT 1: HKV1=0; wc=4</pre>	<p>Shell to u. You should see the accompanying output as UniScript executes</p>

	<pre> WAIT 1: HKV1=1; wc=3 "Sending LFDDIAGC, LFDWDOG" LFDWDOG ENABLE "Waiting for Watchdog Reset (11 seconds)" LFDNOOP WAIT 0: HKV0=5; HKV1=4; wc=5 WAIT 1: HKV1=0; wc=4 WAIT 1: HKV1=5; wc=3 "Test 5_1_1_2 completed successfully" eagcos:taiyo%</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_2.tst**, **stp5_1_1_2.rp1**, and **stp5_1_1_2.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  
kill cosnoopy  
perl ../UniScript.pl stp5_1_1_2 "0,0,0,0,0,0,0,0"  
cosnoopy&
```

Appendix B. Test Script stp5_1_1_2.tst

```

; *****
; * DCE FSW Requirement 5.1.1.2 -- Distinguish between Power-Up and Watchdog Resets *
; *****
; * Verify that appropriate diagnostic (DIAG001B) is produced after POR *
; * ----- *
; * Verify that appropriate diagnostic (DIAG001C) is produced after WDR *
; *****
;
SYM      DIAG001B=0x001B
SYM      DIAG001C=0x001C
SYM      ENABLE =1
;
ECHO     2
DTG      3,"(0) First, 1-second, WAIT..."
WTO      "First, 1-second, WAIT..."
WAIT     1
;
DTG      3,"(1) Sending LFDRSTP"
WTO      "Sending LFDRSTP"
;
; *****
; * Try to clear out the EGSE's pipes *
; *****
;
DTG      3,"(1a) Sending two PORs. WAITING 1sec twice"
WTO      "Sending two PORs. WAITING 1sec twice"
POR
WAIT     1
POR
WAIT     1
;
DTG      3,"(2) Second, 1-second, WAIT..."
WTO      "Second, 1-second, WAIT..."
LFDNOOP
WAIT     5,HK
LOG      1,LFDDIAGS,LFSBITS1,LFDOPERT,LFSBITS2,LFDWDDIS,LFDCBUF
DIAG     1,ANY,DIAG001B
;
DTG      3,"(3) Sending LFDDIAGC, LFDWDOG"
WTO      "Sending LFDDIAGC, LFDWDOG"
;LFDDIAGC
WAIT     1
LFDWDOG  ENABLE
;
WTO      "Waiting for Watchdog Reset (11 seconds)"
DTG      3,"(4) Waiting for Watchdog Reset (11 seconds)"
WAIT     11
LFDNOOP
WAIT     5,HK
LOG      1,LFDDIAGS,LFSBITS1,LFDOPERT,LFSBITS2,LFDWDDIS
DIAG     1,ANY,DIAG001C
;
DTG      3,"(5) Test 5_1_1_2 completed successfully"
WTO      "Test 5_1_1_2 completed successfully"

```

Appendix C. Test Report stp5_1_1_2.rp1

```

222                55555                1                1
2                5                11                11                2
2                ssss ttttt pppp 555                1                1
2                s      t  p  p      5                1                1
2                sssss t  pppp      5                1                1
2                s      t  p      5  5                1                1                2
22222             ssss t  p      555 _____ 111 _____ 111 _____

```

```

Ver 01.13 Tue Jan 16 12:51:57 2001 "(0) First, 1-second, WAIT..."
Ver 01.13 Tue Jan 16 12:51:58 2001 "(1) Sending LFDRSTP"
Ver 01.13 Tue Jan 16 12:51:58 2001 "(1a) Sending two PORs. WAITING 1sec twice"
Ver 01.13 Tue Jan 16 12:52:00 2001 "(2) Second, 1-second, WAIT..."

```

LFDNOOP

Addr	Addr	HK-Name	Value
1780-179F	0000	LFDDIAGS	011B 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
17A0-17BF	0000		0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

16F4-16F5		LFSBITS1	0000
-----------	--	----------	------

Addr	Mask	HK-Bit-Name	Value
16F4	0008	LFDOPERT	0

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

Addr	Mask	HK-Bit-Name	Value
16E4	4000	LPDWDDIS	0

Addr	Addr	HK-Name	Value
1664-167F	0000	LPDCBUF	8080 7F7F 0001 FFFE 0000 FFFF 0000 FFFF 0000 FFFF 0000 FFFF 0000

```

DIAG      1,ANY,DIAG001B
Found: DIAG001B == 27.

```

S U C C E S S

```

Ver 01.13 Tue Jan 16 12:52:02 2001 "(3) Sending LFDDIAGC, LPDWDOG"
LPDWDOG      ENABLE
Ver 01.13 Tue Jan 16 12:52:03 2001 "(4) Waiting for Watchdog Reset (11 seconds)"

```

LFDNOOP

Addr	Addr	HK-Name	Value
----	----	-----	-----

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```

1780-179F LFDIAGS      011C 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000
17A0-17BF             0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000

```

16F4-16F5 LFSBITS1 0000

```

Addr Mask HK-Bit-Name  Value
-----
16F4 0008 LFDOPERT      0

```

```

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

```

```

Addr Mask HK-Bit-Name  Value
-----
16E4 4000 LFDWDDIS      0

```

```

DIAG      1,ANY,DIAG001C
Found: DIAG001C == 28.

```

S U C C E S S

Ver 01.13 Tue Jan 16 12:52:16 2001 "(5) Test 5_1_1_2 completed successfully"

Appendix D. Test Report stp5_1_1_2.rp2

```

222                55555                1                1
2                5                11                11                2
2                ssss ttttt pppp 555                1                1
2                s      t  p  p    5                1                1
2                sssss  t  pppp    5                1                1
2                s      t  p    5  5                1                1                2
                ssss  t  p    555                111                111
22222

```

```

Ver 01.13 Tue Jan 16 12:51:57 2001 "(0) First, 1-second, WAIT..."
Ver 01.13 Tue Jan 16 12:51:58 2001 "(1) Sending LFDRSTP"
Ver 01.13 Tue Jan 16 12:51:58 2001 "(1a) Sending two PORs. WAITING 1sec twice"

```

```

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

```

```

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

```

```

Ver 01.13 Tue Jan 16 12:52:00 2001 "(2) Second, 1-second, WAIT..."

```

```

-----
C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000
-----
          SN          OPCODE
0446FFFE 04440001 04427F7F 04408080
-----

```

```

-----
C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000
-----
          SN          OPCODE
0446FFFD 04440002 04427F7F 04408080
-----

```

```

-----
C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000
-----

```

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SN OPCODE
0446FFFC 04440003 04427F7F 04408080

Ver 01.13 Tue Jan 16 12:52:02 2001 "(3) Sending LFDDIAGC, LFDWDOG"

C O M M A N D P A C K E T

PARM4 PARM3 PARM2 PARM1 PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFE 04480001

SN OPCODE
0446FFFB 04440004 04420E0E 0440F1F1

Ver 01.13 Tue Jan 16 12:52:03 2001 "(4) Waiting for Watchdog Reset (11 seconds)"

C O M M A N D P A C K E T

PARM4 PARM3 PARM2 PARM1 PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000

SN OPCODE
0446FFFA 04440005 04427F7F 04408080

C O M M A N D P A C K E T

PARM4 PARM3 PARM2 PARM1 PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000

SN OPCODE
0446FFF9 04440006 04427F7F 04408080

C O M M A N D P A C K E T

PARM4 PARM3 PARM2 PARM1 PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000

SN OPCODE
0446FFF8 04440007 04427F7F 04408080

Ver 01.13 Tue Jan 16 12:52:16 2001 "(5) Test 5_1_1_2 completed successfully"