COS DCE BOOT FSW v1.09 Component Test Results
Requirement 5.1.1.2 Distinguish between Power-Up and Watchdog Resets

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<table>
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Original Release

**THE UNIVERSITY OF COLORADO**
At Boulder

**The Center for Astrophysics and Space Astronomy**

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Requirement 5.1.1.2 Distinguish between Power-Up and Watchdog Resets

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<th>Document No.</th>
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Scale: N/A

Drawn: K. Brownsberger 2-13-01
Reviewed: 
Approved: 
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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 lfduload), 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:

<table>
<thead>
<tr>
<th>EGSE</th>
<th>DCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>taiyo</td>
<td>ETU</td>
</tr>
<tr>
<td>shorty</td>
<td>DCE #1</td>
</tr>
<tr>
<td>ginger</td>
<td>DCE #2</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

3.3 DATA/SOFTWARE

The following files must be present:

Table 3-1: Required Program and Data Files

<table>
<thead>
<tr>
<th>EGSE (shorty) Directory</th>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\disks\galex\users\galex\tcs\uniscript\</td>
<td>UniScript.pl</td>
<td>UniScript interpreter</td>
</tr>
<tr>
<td>\disks\galex\users\galex\tcs\uniscript\stp5_1_1_2\</td>
<td>u</td>
<td>Shell script for this procedure</td>
</tr>
<tr>
<td>Ditto</td>
<td>stp5_1_1_2.tst</td>
<td>Test script for this procedure (Appendix B)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Document Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NHB 1700.1(V1-A)</td>
<td>NASA Basic Safety Manual</td>
</tr>
<tr>
<td>2</td>
<td>COS-03-0010</td>
<td>DCE FSW Test Procedure 5.1.1.2 (this document)</td>
</tr>
<tr>
<td>3</td>
<td>UCB-COS-008</td>
<td>COS FUV Detector Software Test Plan</td>
</tr>
<tr>
<td>4</td>
<td>UCB-COS-DOC-1118</td>
<td>COS EGSE Startup Procedure</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Step</th>
<th>QA</th>
<th>Operator Entry/System Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>QA</td>
<td>C:\tcs\us&gt; <strong>telnet shorty.ssl.berkely.edu</strong></td>
<td>Establish connection to shorty via Telnet client program</td>
</tr>
</tbody>
</table>
| 2    | QA | Login: **tcs**
|      |    | Password:                        | Using telnet window, login as user **tcs**        |
### 4.1.4 Set Current Directory

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

### 4.1.5 Slog in as eagcos

<table>
<thead>
<tr>
<th>Step</th>
<th>QA</th>
<th>Operator Entry/System Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>tcs@shorty% slogin –l eagcos shorty.ssl.berkeley.edu <a href="mailto:eagcos@shorty.ssl.berkeley.edu">eagcos@shorty.ssl.berkeley.edu</a>’s password: (get from SSL personnel) 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</td>
<td>slogin as eagcos; get password from SSL personnel</td>
<td></td>
</tr>
</tbody>
</table>

### 4.1.6 Set Current Directory

<table>
<thead>
<tr>
<th>Step</th>
<th>QA</th>
<th>Operator Entry/System Response</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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

<table>
<thead>
<tr>
<th>Step</th>
<th>QA</th>
<th>Operator Entry/System Response</th>
<th>Description</th>
</tr>
</thead>
</table>
| 6    | eagcos@shorty% ls –l  
Total 12  
-rw-r-- 1 tcs eag 1398 Oct 8 18:03  
stp5_1_1_2.tst  
-rw-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

<table>
<thead>
<tr>
<th>Step</th>
<th>QA</th>
<th>Operator Entry/System Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td></td>
<td><code>eagcos:shorty% set path=($path ~dbb/scripts/bin)</code></td>
<td>Set path as shown to enable access to hks tools</td>
</tr>
</tbody>
</table>

4.2.2 Execute the Script

<table>
<thead>
<tr>
<th>Step</th>
<th>QA</th>
<th>Operator Entry/System Response</th>
<th>Description</th>
</tr>
</thead>
</table>
| 8    |    | `eagcos:taiy0% sh u` $pstring=0,0,0,0,0,0,0,0,0,0` 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/uniscript/stp5_1_1_2/stp5_1_1_2.rp1` successfully opened. |
|      |    | `/disks/galex/users/galex/tcs/uniscript/stp5_1_1_2/stp5_1_1_2.rp2` successfully opened. |
|      |    | `/disks/galex/users/galex/tcs/uniscript/stp5_1_1_2/stp5_1_1_2.tst` successfully opened at level 0. | Shell to `u`. You should see the accompanying output as **UniScript** executes |
"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   |
| 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"

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: \hspace{1cm} \hspace{1cm} TEST TERMINATED
\hspace{1cm} \hspace{1cm}
\hspace{1cm} \hspace{1cm}
TIME: _______ Hr/Min \hspace{1cm} TIME: _______ Hr/Min
DATE: _______ \hspace{1cm} \hspace{1cm} DATE: _______

LOGS USED: ________________________________________________________

ANOMALY REPORTS GENERATED: ___________________________________

____________________________________________________________________

COMMENTS: ________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

TEST CONDUCTOR: _________________________________________________
\hspace{1cm} Signature/Date

QA REPRESENTATIVE: _______________________________________________
\hspace{1cm} Signature/Date
Appendix A. Shell Script u

#!/bin/sh
pkill cosnoop
perl ../UniScript.pl stp5_1_1_2 "0,0,0,0,0,0,0,0"
cosnoop&
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 *
; ***********************************************************************
;                                                             *
;                                                             *
SYM     DIAG001B=0x001B
SYM     DIAG001C=0x001C
;
ECHO  2
DTG   3,"(0) First 1-second WAIT..."
WTO    "First 1-second WAIT..."
WAIT   1
;
WTO    "Sending POR"
DATA   1,0,4,CONST=0x80000000
LOG    1,1
XMIT    1
LF DuploD
DTG   3,"(1) Second 1-second WAIT..."
WTO    "Second 1-second WAIT..."
WAIT   1,HK
LOG    1,LFDDiags
DIAG    1,ANY,DIAG001B
;
WTO    "Waiting for Watchdog Reset (11 seconds)"
DTG   3,"(2) Waiting for Watchdog Reset (11 seconds)"
WAIT   11,HK
LOG    1,LFDDiags
DIAG    1,ANY,DIAG001C
;
DTG   3,"(3) Test 5_1_1_2 completed successfully"
WTO    "Test 5_1_1_2 completed successfully"
Appendix C. Test Report stp5_1_1_2.rp1

<table>
<thead>
<tr>
<th>55555</th>
<th>1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ssss</td>
<td>tttt</td>
<td>pppp</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ssss</td>
<td>t</td>
<td>pppp</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ssss</td>
<td>t</td>
<td>p</td>
</tr>
<tr>
<td>555</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Ver 01.09 Thu Nov 16 02:48:38 2000 "(0) First, 1-second, WAIT..."
Ver 01.09 Thu Nov 16 02:48:39 2000 "(1) Sending LFDRSTP"
Ver 01.09 Thu Nov 16 02:48:39 2000 "(1a) Sending two PORs. WAITING 1sec twice"
Ver 01.09 Thu Nov 16 02:48:41 2000 "(2) Second, 1-second, WAIT..."

LFDNOOP

<table>
<thead>
<tr>
<th>Addr</th>
<th>Mask</th>
<th>HK-Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1780-179F</td>
<td>0000</td>
<td>LFDDIAGS</td>
<td>011B</td>
</tr>
<tr>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
</tr>
<tr>
<td>0000</td>
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<td>0000</td>
<td>0000</td>
</tr>
<tr>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
</tr>
<tr>
<td>16F4-16F5</td>
<td>0000</td>
<td>LFSBITS1</td>
<td>0000</td>
</tr>
<tr>
<td>16E4-16E5</td>
<td>0000</td>
<td>LFSBITS2</td>
<td>0000</td>
</tr>
<tr>
<td>16E4</td>
<td>0000</td>
<td>LFDWDDIS</td>
<td>0</td>
</tr>
<tr>
<td>1664-167F</td>
<td>0000</td>
<td>LFDBUF</td>
<td>8080</td>
</tr>
<tr>
<td>7f7f</td>
<td>0001</td>
<td>FFfE</td>
<td>0000</td>
</tr>
<tr>
<td>FFFF</td>
<td>0000</td>
<td>FFFF</td>
<td>0000</td>
</tr>
<tr>
<td>FFFF</td>
<td>0000</td>
<td>FFFF</td>
<td>0000</td>
</tr>
</tbody>
</table>

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

SUCCESS

Ver 01.09 Thu Nov 16 02:48:44 2000 "(3) Sending LFDDIAGC, LFDDWDOG"

LFDWDOG Enables

Ver 01.09 Thu Nov 16 02:48:45 2000 "(4) Waiting for Watchdog Reset (11 seconds)"

LFDNOOP

<table>
<thead>
<tr>
<th>Addr</th>
<th>Mask</th>
<th>HK-Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1780-179F</td>
<td>0000</td>
<td>LFDDIAGS</td>
<td>011C</td>
</tr>
<tr>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
</tr>
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</tbody>
</table>

Ver 01.09 Thu Nov 16 02:48:44 2000 "(3) Sending LFDDIAGC, LFDDWDOG"

LFDWDOG Enables

Ver 01.09 Thu Nov 16 02:48:45 2000 "(4) Waiting for Watchdog Reset (11 seconds)"
<table>
<thead>
<tr>
<th>Addr Mask HK-Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>17A0-17BF</td>
<td>0000</td>
</tr>
<tr>
<td></td>
<td>0000</td>
</tr>
<tr>
<td>0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000</td>
<td>0000</td>
</tr>
<tr>
<td>16F4-16F5 LFSBITS1</td>
<td>0000</td>
</tr>
<tr>
<td>Addr Mask HK-Name</td>
<td>Value</td>
</tr>
<tr>
<td>16F4 0008 LFDOPERT</td>
<td>0</td>
</tr>
<tr>
<td>Addr Addr HK-Name</td>
<td>Value</td>
</tr>
<tr>
<td>16E4-16E5 LFSBITS2</td>
<td>0000</td>
</tr>
<tr>
<td>Addr Mask HK-Name</td>
<td>Value</td>
</tr>
<tr>
<td>16E4 4000 LFDOWDDIS</td>
<td>0</td>
</tr>
</tbody>
</table>

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

```
Ver 01.09 Thu Nov 16 02:48:59 2000
"(5) Test 5_1_1_2 completed successfully"
```

SUCCESS
Appendix D. Test Report stp5_1_1_2 rp2

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

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

Ver 01.09 Thu Nov 16 02:48:38 2000 "(0) First, 1-second, WAIT..."
Ver 01.09 Thu Nov 16 02:48:39 2000 "(1) Sending LFDRSTP"
Ver 01.09 Thu Nov 16 02:48:39 2000 "(1a) Sending two PORs. WAITING laec twice"

-----------------------------------------------------------------------------------------
COMMAND PACKET
-----------------------------------------------------------------------------------------
PARM4 PARM3 PARM2 PARM1 PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000
-----------------------------------------------------------------------------------------
SN OPCODE
0446FFFE 04440001 04427F7F 04408080
-----------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
COMMAND PACKET
-----------------------------------------------------------------------------------------
PARM4 PARM3 PARM2 PARM1 PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000
-----------------------------------------------------------------------------------------
SN OPCODE
0446FFFD 04440002 04427F7F 04408080
-----------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
COMMAND PACKET
-----------------------------------------------------------------------------------------
PARM4 PARM3 PARM2 PARM1 PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000
-----------------------------------------------------------------------------------------
SN OPCODE
0446FFFC 04440003 04427F7F 04408080
COS DCE BOOT FSW v1.09 Component Test Results
Requirement 5.1.1.2 Distinguish Between Power-Up and Watchdog Resets

Ver 01.09 Thu Nov 16 02:48:44 2000  "(3) Sending LFDDIAGC, LFDDWDOG"

Ver 01.09 Thu Nov 16 02:48:45 2000  "(4) Waiting for Watchdog Reset (11 seconds)"

Ver 01.09 Thu Nov 16 02:48:59 2000  "(5) Test 5_1_1_2 completed successfully"