**COS DCE BOOT FSW v1.09 Component Test Results**
**Requirement 5.1.2.1a Watchdog**

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**THE UNIVERSITY OF COLORADO**
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**The Center for Astrophysics and Space Astronomy**

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# Table of Contents

# 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 5.1.2.1 — Watchdog.

## 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 script issues two **POR**s, each followed by a one-second **WAIT**, to ensure that FSW is in the Boot State. It then issues **LFDWDOG 1** to enable WDRs, and **WAIT**s 11 seconds. During this interval a WDR should occur. The script checks the HK variable **LFCTIME**, whose value should be < 10. It also determines that the code 001C is present in the diagnostic code stack.

### 1.6 TEST SCRIPT IMPLEMENTATION

#### 1.6.1 Test Script Arguments

The script makes no use of parameters.

#### 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

- 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\uniscript** | **UniScript.pl** | **UniScript** interpreter |
| **\disks\galex\users\galex\tcs\uniscript\stp5_1_2_1a** | **u** | Shell script for this procedure |
| Ditto | **stp5_1_2_1a.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) | *NASA Basic Safety Manual* |
| 2 | COS-03-0017 | *DCE FSW Test Procedure 5.1.2.1a* (this document) |
| 3 | UCB-COS-008 | *COS FUV Detector Software Test Plan* |
| 4 | UCB-COS-DOC-1118 | *COS EGSE Startup Procedure* |

## 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> **telnet shorty.ssl.berkely.edu** | Establish connection to shorty via Telnet client program |
| 2 | | Login: **tcs**<br>Password: | Using telnet window, login as user **tcs** |

4.1.4 Set Current Directory

| Step | QA | Operator Entry/System Response | Description |
|---|---|---|---|
| 3 | | tcs@shorty% **cd ~galex/tcs**<br>tcs@shorty% **pwd**<br>/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**<br>eagcos@shorty.ssl.berkeley.edu's password: ***(get from SSL personnel)***<br>Last login: Sat Oct 7 10:41:05 2000 from auntem.ssl.berke<br>Sun Microsystems Inc. SunOS 5.8 Generic February 2000<br>You have mail.<br>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_2_1a**<br>eagcos:shorty% **pwd**<br>/disks/galex/users/galex/tcs/uniscript/stp5_1_2_1a | 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**<br>Total 12<br>-rw-r--r-- 1 tcs eag 1398 Oct 8 18:03 stp5_1_2_1aa.tst<br>-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 | | eagcos:shorty% **sh u**<br>$pstring=0,0,0,0,0,0,0,0<br>Parameters are: Script File: stp5_1_2_1a<br>#0: 0<br>#1: 0<br>#2: 0<br>#3: 0<br>#4: 0<br>#5: 0<br>#6: 0<br>#7: 0<br>Report file<br><br>>/disks/galex/users/galex/tcs/uniscript/stp5_1_2_1a/stp5_1_2_1a.rp1<br>successfully opened.<br>Report file<br><br>>/disks/galex/users/galex/tcs/uniscript/stp5_1_2_1a/stp5_1_2_1a.rp2 | Shell to **u**. You should see the accompanying output as **UniScript** executes |

| Step | QA | Operator Entry/System Response | Description |
|---|---|---|---|
| | | successfully opened.<br>Script file<br><br>/disks/galex/users/galex/tcs/uniscript/stp5_1_2_1a/stp5_1_2_1a.tst<br>successfully opened at level 0.<br><br>"Sending two PORs"<br>"Sending LFDWDOG 1"<br><br>LFDWDOG ENABLE<br><br>gnxtser 0: NEXTSEQ=1<br>"Waiting 11 seconds, followed by LFDNOOP"<br><br>LFDNOOP<br><br>gnxtser 0: NEXTSEQ=2<br>WAIT 0: HKV0=2; HKV1=1; wc=5<br>gnxtser 0: NEXTSEQ=3<br>WAIT 1: HKV1=0; wc=4<br>gnxtser 0: NEXTSEQ=4<br>WAIT 1: HKV1=2; wc=3<br>"Test 5.1.2.1a 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_2_1a.tst**, **stp5_1_2_1a.rp1**, and **stp5_1_2_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_2_1a "0,0,0,0,0,0,0,0"
cosnoopy&
```

# Appendix B. Test Script stp5_1_2_1a.tst

```
; ******************************************************
; * DCE FSW Requirement 5.1.2.1a -- Watchdog           *
; * -------------------------------------------------- *
; * Verify DIAG001C is produced by WDR after 10 seconds *
; ******************************************************
;
SYM       ENABLE  =1
SYM       DIAG001C=0x001C
SYM       NSEC    =5
;
ECHO      2
;
DTG       1,"(0) Sending two PORs"
WTO       "Sending two PORs"
;
POR
WAIT      1
;
POR
WAIT      1
;
DTG       1,"(1) Sending LFDWDOG 1"
WTO       "Sending LFDWDOG 1"
;
LFDWDOG   ENABLE
;
DTG       1,"(2) Waiting 11 seconds, followed by LFDNOOP"
WTO       "Waiting 11 seconds, followed by LFDNOOP"
;
WAIT      11
LFDNOOP
WAIT      NSEC,HK
LOG       1,LFDOPERT,LFCTIME,LFDDIAGS
CHECK     1,($LFCTIME < 10)
DIAG      1,ANY,DIAG001C
;
DTG       1,"(3) Test 5.1.2.1a completed successfully"
WTO       "Test 5.1.2.1a completed successfully"
```

# Appendix C. Test Report stp5_1_2_1a.rp1

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

Ver 01.09  Thu Nov 16 21:06:32 2000    "(0) Sending two PORs"

Ver 01.09  Thu Nov 16 21:06:34 2000    "(1) Sending LFDWDOG 1"

LFDWDOG   ENABLE

Ver 01.09  Thu Nov 16 21:06:34 2000    "(2) Waiting 11 seconds, followed by LFDNOOP"

LFDNOOP

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

Addr Addr HK-Name        Value
---- ---- -------------- -----
1680-1683 LFCTIME        00000001

1780-179F LFDDIAGS       011C  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

CHECK:   ($LFCTIME < 10)
eval:    (0001 < 10)

S U C C E S S

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

S U C C E S S

Ver 01.09  Thu Nov 16 21:06:47 2000    "(3) Test 5.1.2.1a completed successfully"
```

# Appendix D. Test Report stp5_1_2_1a.rp2

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

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

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

------------------------------------------------------------------------------------------
                            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
0446FFFE 04440001 04420E0E 0440F1F1
------------------------------------------------------------------------------------------


------------------------------------------------------------------------------------------
                            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
------------------------------------------------------------------------------------------
             SN            OPCODE
0446FFFC 04440003 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
0446FFFB 04440004 04427F7F 04408080
-------------------------------------------------------------------------------------------
```