COS DCE BOOT FSW v1.13 Component Test Results
Requirement 5.5.1.3 Check Upload Integrity

Date:	February 13, 2001
Document Number:	COS-03-0063
Revision:	Initial Release
Contract No.:	NAS5-98043
CDRL No.:	N/A

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Letter	ECO No.	Description	Check	Approved	Date
-		Initial Release			

Original Release Name	Date
Drawn: K. Brownsberger	2-13-01
Reviewed:	
Approved:	

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At Boulder
The Center for Astrophysics and Space Astronomy

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Size	Code Indent No.	Document No.	Rev
A		COS-03-0063	-
Scale: N/A			

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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 5.5.1.3 — Check Upload Integrity.

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 generates 256 bytes of pseudo-random data into **UniScript** Buffer 1 and uploads this data to a "scratch" region in the DCE 8051 external RAM. The script then issues an **LFDCRC SCRATCH,256,0** command to force the FSW to compute the CRC of the scratch region and return it as the HK variable **LFMCRC**.This value is then compared with the value, **CRC1**, automatically computed for Buffer 1.

1.6 TEST SCRIPT IMPLEMENTATION

1.6.1 Test Script Arguments

The script is parameterized as shown in the following Table:

Table 1-1: Parameters/Arguments for stp5_5_1_3.tst

Parameter	Meaning	Correct Argument for Version 1.13
#0	Absolute hex storage address of 8051 "scratch" area	C000

These parameters must be encoded into the shell script **u** (see Appendix A).

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_5_1_3	**u**	Shell script for this procedure
Ditto	**stp5_5_1_3.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-03-0063	*DCE FSW Test Procedure 5.5.1.3* (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: **xxx** 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** 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: ***(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	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_5_1_3** eagcos:shorty% **pwd** /disks/galex/users/galex/tcs/uniscript/stp5_5_1_3	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_5_1_3.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		eagcos:shorty% **sh u** $pstring=C000,0,0,0,0,0,0,0 Parameters are: Script File: stp5_5_1_3 #0: C000 #1: 0 #2: 0 #3: 0 #4: 0 #5: 0 #6: 0 #7: 0	Shell to **u**. You should see the accompanying output as **UniScript** executes

Step	QA	Operator Entry/System Response	Description
		Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_5_1_3/stp5_5_1_3.rp1 successfully opened. Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_5_1_3/stp5_5_1_3.rp2 successfully opened. Script file /disks/galex/users/galex/tcs/ver_1_13/stp5_5_1_3/stp5_5_1_3.tst successfully opened at level 0. "Sending two PORs with WAITs" "Generating and uploading 256 bytes of random data" LFDUPLOD SCRATCH,NBYTES,0 "Sending LFDCRC" LFDCRC SCRATCH,NBYTES,EXTERN LFDNOOP WAIT 0: HKV0=3; HKV1=1; wc=5 WAIT 1: HKV1=2; wc=4 WAIT 1: HKV1=3; wc=3 "Checking generated CRC" "Test 5.5.1.3 completed successfully" eagcos:shorty%	

4.3 POST-OPERATION ACTIVITIES

4.3.1 Copy Reports to PC Files and Print Them

Using an FTP client, copy the **u**, **stp5_5_1_3.tst**, **stp5_5_1_3.rp1**, and **stp5_5_1_3.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_5_1_3 "C000,0,0,0,0,0,0,0"
cosnoopy&
```

Appendix B. Test Script stp5_5_1_3.tst

```
; ********************************************************************************
; * STP 5.5.1.3 -- Check Upload Integrity                                        *
; * ---------------------------------------------------------------------------- *
; * Prepare a block of data in the EGSE; compute the CRC of this block in the    *
; * EGSE; using LFDUPLOD, upload the data, suppressing the CRC checking by setting *
; * the CRC parameter to 0; compute the CRC of the uploaded block by using LFDCRC; *
; * verify the integrity of the upload by means of the HK data.                  *
; ********************************************************************************
;
; ***************************************
; * Parameters: #0 = scratch area = C000 *
; ***************************************
;
ECHO     2
;
SYM      SCRATCH=0x#0
SYM      NBYTES =256
SYM      EXTERN =0
;
DTG      3,"(0) Sending two PORs with WAITs"
WTO      "Sending two PORs with WAITs"
;
POR
WAIT     1
POR
WAIT     1
;
DTG      3,"(1) Generating and uploading 256 bytes of random data"
WTO      "Generating and uploading 256 bytes of random data"
;
DATA     1,0,NBYTES,RAND=56
LOG      1,1
XMIT     1,NBYTES
LFDUPLOD SCRATCH,NBYTES,0
WAIT     1
;
DTG      3,"(2) Sending LFDCRC"
WTO      "Sending LFDCRC"
LFDCRC   SCRATCH,NBYTES,EXTERN
WAIT     1
LFDNOOP
WAIT     5,HK
;
DTG      3,"(3) Checking generated CRC"
WTO      "Checking generated CRC"
;
LOG      1,LFMCRC
CHECK    1,($LFMCRC==$CRC1)
;
DTG      3,"(4) Test 5.5.1.3 completed successfully"
WTO      "Test 5.5.1.3 completed successfully"
```

Appendix C. Test Report stp5_5_1_3.rp1

```
                                        55555         55555           1
333
                                        5             5              11           3
3
                          ssss  ttttt  pppp   555           555            1
3
                         s        t    p   p     5             5            1
3
                         sssss    t    pppp       5             5          1
3
                             s    t    p      5   5         5   5          1           3
3
                         ssss     t    p       555   _____   555   _____   111   _____
333

Ver 01.13  Wed Jan 17 18:16:16 2001    "(0) Sending two PORs with WAITs"

Ver 01.13  Wed Jan 17 18:16:18 2001    "(1) Generating and uploading 256 bytes of random
data"

Len  CRC  Buffer         Data
---- ---- ------         ----
0100 1E57 1              C6 C1 CE D9 85 09 CF 9F 31 E3 34 A3 64 AD 8B 4B 5C 19 DE 1D 1E
47 69 BD 06 67 3B 77 AD A3 8D 1D
                         8C 6D 2B CB 6C F5 0C 5F AE E1 C2 35 50 15 3A 0B 8D 8F 44 69 9B
3B 80 A5 48 C3 7A CD 4D 2D AC 7D
                         42 4F EA 11 F4 FD FB 0B 75 F7 0E 45 2B 47 C7 BD E1 71 2F 75 66
DB 2E 5F 73 DB E7 BB 64 FF 7A E5
                         7C B3 F2 E1 DD 23 BE CB 12 4D 5F 69 B8 21 63 E9 67 CD B9 35 82
E5 14 CF 8A 9D 45 99 54 B7 D2 97
                         7F 69 E8 EF E0 E3 90 45 36 95 CD B5 EC 01 2B 95 50 31 65 21 DC
9B 1B 5B 27 77 D9 3B 9F 75 AB 5D
                         1D BF 88 75 97 3D 1D 9D 9C FD A2 C3 CF C3 89 45 C9 AD 80 2F 2C
B5 CE EB 5C 57 C8 F9 CB D5 7A 79
                         9A 83 07 27 52 AB EA 7D E7 31 B9 A5 5F C7 95 01 E2 CB 80 D3 D7
77 C1 E5 92 AB 7C A5 43 F5 92 B5
                         88 03 74 3B 01 2D B0 09 7E 5F DE F3 6B ED 74 4F 69 9D 67 05 CC
9B EC 2B 6B 61 FD 99 35 75 84 57

LFDUPLOD SCRATCH,NBYTES,0

Ver 01.13  Wed Jan 17 18:16:20 2001    "(2) Sending LFDCRC"

LFDCRC   SCRATCH,NBYTES,EXTERN

LFDNOOP

Ver 01.13  Wed Jan 17 18:16:24 2001    "(3) Checking generated CRC"

Addr Addr HK-Name        Value
---- ---- ------------- -----
171A-171B LFMCRC         1E57

CHECK:   ($LFMCRC==$CRC1)
eval:    (1E57==1E57)

S U C C E S S

Ver 01.13  Wed Jan 17 18:16:24 2001    "(4) Test 5.5.1.3 completed successfully"
```

Appendix D. Test Report stp5_5_1_3.rp2

```
                                        55555         55555           1
333
                                        5             5              11           3
3
                          ssss  ttttt  pppp   555           555            1
3
                         s        t    p   p     5             5           1
3
                         sssss    t    pppp       5             5          1
3
                             s    t    p      5   5         5   5          1           3
3
                         ssss     t    p       555   _____   555   _____   111   _____
333

Ver 01.13  Wed Jan 17 18:16:16 2001    "(0) Sending two PORs with WAITs"

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

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

Ver 01.13  Wed Jan 17 18:16:18 2001    "(1) Generating and uploading 256 bytes of random
data"

------------------------------------------------------------------------
                       U P L O A D   P A C K E T
------------------------------------------------------------------------
0040C1C6 0042D9CE 00440985 00469FCF 0048E331 004AA334 004CAD64 004E4B8B
0050195C 00521DDE 0054471E 0056BD69 00586706 005A773B 005CA3AD 005E1D8D
00606D8C 0062CB2B 0064F56C 00665F0C 0068E1AE 006A35C2 006C1550 006E0B3A
00708F8D 00726944 00743B9B 0076A580 0078C348 007ACD7A 007C2D4D 007E7DAC
00804F42 008211EA 0084FDF4 00860BFB 0088F775 008A450E 008C472B 008EBDC7
009071E1 0092752F 0094DB66 00965F2E 0098DB73 009ABBE7 009CFF64 009EE57A
00A0B37C 00A2E1F2 00A423DD 00A6CBBE 00A84D12 00AA695F 00AC21B8 00AEE963
00B0CD67 00B235B9 00B4E582 00B6CF14 00B89D8A 00BA9945 00BCB754 00BE97D2
00C0697F 00C2EFE8 00C4E3E0 00C64590 00C89536 00CAB5CD 00CC01EC 00CE952B
00D03150 00D22165 00D49BDC 00D65B1B 00D87727 00DA3BD9 00DC759F 00DE5DAB
00E0BF1D 00E27588 00E43D97 00E69D1D 00E8FD9C 00EAC3A2 00ECC3CF 00EE4589
00F0ADC9 00F22F80 00F4B52C 00F6EBCE 00F8575C 00FAF9C8 00FCD5CB 00FE797A
0100839A 01022707 0104AB52 01067DEA 010831E7 010AA5B9 010CC75F 010E0195
0110CBE2 0112D380 011477D7 0116E5C1 0118AB92 011AA57C 011CF543 011EB592
01200388 01223B74 01242D01 012609B0 01285F7E 012AF3DE 012CED6B 012E4F74
01309D69 01320567 01349BCC 01362BEC 0138616B 013A99FD 013C7535 013E5784
------------------------------------------------------------------------

------------------------------------------------------------------------------------------
                            C O M M A N D   P A C K E T
------------------------------------------------------------------------------------------
            PARM4             PARM3             PARM2             PARM1             PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFEFF 044C0100 044A3FFF 0448C000
------------------------------------------------------------------------------------------
               SN            OPCODE
0446FFFE 04440001 04425252 0440ADAD
------------------------------------------------------------------------------------------
```

```
Ver 01.13  Wed Jan 17 18:16:20 2001    "(2) Sending LFDCRC"

-------------------------------------------------------------------------------------------
                              C O M M A N D   P A C K E T
-------------------------------------------------------------------------------------------
            PARM4             PARM3             PARM2             PARM1             PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFEFF 044C0100 044A3FFF 0448C000
-------------------------------------------------------------------------------------------
               SN            OPCODE
0446FFFD 04440002 04427D7D 04408282
-------------------------------------------------------------------------------------------


-------------------------------------------------------------------------------------------
                              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
-------------------------------------------------------------------------------------------


-------------------------------------------------------------------------------------------
                              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
-------------------------------------------------------------------------------------------

Ver 01.13  Wed Jan 17 18:16:24 2001    "(3) Checking generated CRC"

Ver 01.13  Wed Jan 17 18:16:24 2001    "(4) Test 5.5.1.3 completed successfully"
```