

**COS DCE BOOT FSW v1.09 Component Test Results
Requirement 5.5.2.1 Process Memory Download Commands**

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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 5.5.2.1 — Process Memory Download Commands.

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 downloads 256 bytes from the “scratch” region beginning at 0xC000 of DCE external RAM to UniScript Buffer 1. Two CRCs are automatically computed by this operation: the variable LFMXFER in the HK data, which gives the CRC for the most recently transferred block of data; and CRC1, the automatically computed CRC of Buffer 1. These two variables are compared for equality.

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_2_1c.tst

Parameter	Meaning	Correct Argument for Version 1.09
#0	Absolute hex storage address of “scratch” area in DCE 8051 external RAM	C000

This parameter 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\uniscrpt\	UniScript.pl	UniScript interpreter
\disks\galex\users\galex\tcs\uniscrpt\stp5_5_2_1\	u	Shell script for this procedure
Ditto	stp5_5_2_1.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-03-0033	<i>DCE FSW Test Procedure 5.5.2.1 (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].

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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 Password: qqsv0001	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: (<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_5_2_1 eagcos:shorty% pwd /disks/galex/users/galex/tcs/uniscript/stp5_5_2_1	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_2_1.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_2_1 #0: C000 #1: 0 #2: 0 #3: 0 #4: 0 #5: 0 #6: 0 #7: 0 Report file	Shell to u . You should see the accompanying output as UniScript executes

Step	QA	Operator Entry/System Response	Description
		<pre> >/disks/galex/users/galex/tcs/uniscript/stp5_5_2_1/ stp5_5_2_1.rp1 successfully opened. Report file >/disks/galex/users/galex/tcs/uniscript/stp5_5_2_1/ stp5_5_2_1.rp2 successfully opened. Script file /disks/galex/users/galex/tcs/uniscript/stp5_5_2_1/st p5_5_2_1.tst successfully opened at level 0. "Sending two PORs with WAITs" "Downloading block to Buffer 1" LFDDNLOD SCRATCH,NBYTES "Comparing CRCs" WAIT 0: HKV0=1; HKV1=0; wc=5 WAIT 1: HKV1=0; wc=4 WAIT 1: HKV1=1; wc=3 "Test 5.5.2.1 completed successfully" </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_5_2_1.tst**, **stp5_5_2_1.rp1**, and **stp5_5_2_1.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_5_2_1 "C000,0,0,0,0,0,0,0"  
cosnoopy&
```

Appendix B. Test Script stp5_5_2_1.tst

```

; *****
; * STP 5.5.2.1 -- Process Memory Download Commands *
; * ----- *
; * Download a block of DCE memory; compute the CRC of the block with the EGSE; *
; * verify correct operation by comparing the EGSE-computed CRC with the HK data. *
; *****
;
; *****
; * Parameters: #0 = scratch area = C000 *
; *****
;
ECHO      2
;
SYM      SCRATCH=0x#0
SYM      NBYTES =256
;
DTG      3,"(0) Sending two PORs with WAITs"
WTO      "Sending two PORs with WAITs"
;
POR
WAIT     1
POR
WAIT     1
;
DTG      3,"(1) Downloading block to Buffer 1"
WTO      "Downloading block to Buffer 1"
LFDDNLOD SCRATCH,NBYTES
WAIT     1
RECV     1,0,NBYTES
WAIT     1
;
DTG      3,"(2) Comparing CRCs"
WTO      "Comparing CRCs"
;
WAIT     5,HK
LOG      1,LFMXFER
CHECK    1,($LFMXFER == $CRC1)
;
DTG      3,"(3) Test 5.5.2.1 completed successfully"
WTO      "Test 5.5.2.1 completed successfully"

```

Appendix C. Test Report stp5_5_2_1.rp1

```
1          55555      55555      222
11         5          5          2  2
1          ssss  ttttt  pppp  555      555      2
1          s      t  p  p      5          5          2
1          sssss  t  pppp      5          5          2
1          s      t  p      5  5          5  5          2
1          ssss      t  p      555  _____  555  _____  22222  _____
111
Ver 01.09  Wed Nov 22 02:57:15 2000  "(0) Sending two PORs with WAITs"
Ver 01.09  Wed Nov 22 02:57:17 2000  "(1) Downloading block to Buffer 1"
LFDDNLOD SCRATCH,NBYTES
Ver 01.09  Wed Nov 22 02:57:19 2000  "(2) Comparing CRCs"
Addr Addr HK-Name      Value
-----
17F5-17F6 LFMXFER      1E57
CHECK:    ($LFMXFER == $CRC1)
eval:    (1E57 == 1E57)
S U C C E S S
Ver 01.09  Wed Nov 22 02:57:22 2000  "(3) Test 5.5.2.1 completed successfully"
```

Appendix D. Test Report stp5_5_2_1.rp2

```

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

```

Ver 01.09 Wed Nov 22 02:57:15 2000 "(0) Sending two PORs with WAITs"

POR PACKET

80000000

POR PACKET

80000000

Ver 01.09 Wed Nov 22 02:57:17 2000 "(1) Downloading block to Buffer 1"

COMMAND PACKET

```

      PARM4      PARM3      PARM2      PARM1      PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0100 044A3FFF 0448C000

```

```

      SN      OPCODE
0446FFFE 04440001 04425151 0440AEAE

```

Ver 01.09 Wed Nov 22 02:57:19 2000 "(2) Comparing CRCs"

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

```

Ver 01.09 Wed Nov 22 02:57:22 2000 "(3) Test 5.5.2.1 completed successfully"