

**COS DCE BOOT FSW v1.13 Component Test Results
Requirement 5.5.4.1 HST Memory Monitors in Housekeeping**

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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 5.5.4.1 — HST Memory Monitors in Housekeeping.

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 test was originally designed to show that “an LFDMADDR command with an index parameter in the range 0..7 does not generate an invalid-command diagnostic, but that LFDMADDR with an index of eight or higher produces a diagnostic.” However, the design of the FSW has been changed since the software and test requirements were originally written. In the present FSW design, the monitor index is obtained by re-computing LFDMADDR’s first argument “modulo-8”, effectively obviating the concept of “invalid index argument”. The test therefore demonstrates that the argument 8 is interpreted as 0, and that no diagnostic code is generated as a result. Hence, the command sequence

```
LFDMADDR 0,0xC000,0
```

```
...
```

```
LFDMADDR 8,0xC008,0
```

results merely in monitor address 0 (i.e., 0xC000) being overwritten with the value 0xC0008 (see the `stp5_5_4_1.rp1` listing in Appendix C).

1.6 TEST SCRIPT IMPLEMENTATION

1.6.1 Test Script Arguments

The script is not parameterized. The 8051 storage addresses 0xC000..0xC008 are “hard-coded” into the script.

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_4_1\	u	Shell script for this procedure
Ditto	stp5_5_4_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-03-0068	<i>DCE FSW Test Procedure 5.5.4.1</i> (this document)
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

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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.berkeley.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: (<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

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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_4_1 eagcos:shorty% pwd /disks/galex/users/galex/tcs/uniscript/stp5_5_4_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_4_1.tst -rw-r--r-- 1 tcs eag 62 Oct 9 17:44 u eagcos@shorty% more < u #!/bin/sh perl ../UniScript.pl stp5_5_4_1 "0,0,0,0,0,0,0"	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=0,0,0,0,0,0,0 Parameters are: Script File: stp5_5_4_1 #0: 0 #1: 0 #2: 0 #3: 0 #4: 0	Shell to u . You should see the accompanying output as UniScript executes

Step	QA	Operator Entry/System Response	Description
		<pre> #5: 0 #6: 0 #7: 0 Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_5_4_1/ stp5_5_4_1.rp1 successfully opened. Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_5_4_1/ stp5_5_4_1.rp2 successfully opened. Script file /disks/galex/users/galex/tcs/ver_1_13/stp5_5_4_1/s tp5_5_4_1.tst successfully opened at level 0. "Sending two PORs with WAITs" "Clearing diagnostic stack" LFDDIAGC WAIT 0: HKV0=1; HKV1=0; wc=5 WAIT 1: HKV1=0; wc=4 WAIT 1: HKV1=1; wc=3 "Sending LFDMAADDR 0,0xC000,0" LFDMAADDR 0,0xC000,0 "Sending LFDMAADDR 1,0xC001,0" LFDMAADDR 1,0xC001,0 "Sending LFDMAADDR 2,0xC002,0" LFDMAADDR 2,0xC002,0 </pre>	

Step	QA	Operator Entry/System Response	Description
		"Sending LFDMAADDR 3,0xC003,0" LFDMAADDR 3,0xC003,0 "Sending LFDMAADDR 4,0xC004,0" LFDMAADDR 4,0xC004,0 "Sending LFDMAADDR 5,0xC005,0" LFDMAADDR 5,0xC005,0 "Sending LFDMAADDR 6,0xC006,0" LFDMAADDR 6,0xC006,0 "Sending LFDMAADDR 7,0xC007,0" LFDMAADDR 7,0xC007,0 WAIT 0: HKV0=11; HKV1=9; wc=5 WAIT 1: HKV1=10; wc=4 WAIT 1: HKV1=11; wc=3 "Sending LFDMAADDR 8,0xC008,0" LFDMAADDR 8,0xC008,0 WAIT 0: HKV0=14; HKV1=12; wc=5 WAIT 1: HKV1=13; wc=4 WAIT 1: HKV1=14; wc=3 "Test 5.5.4.1 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_4_1.tst**, **stp5_5_4_1.rp1**, and **stp5_5_4_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:

TIME: _____ Hr/Min

DATE: _____

TEST TERMINATED

TIME: _____ Hr/Min

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_4_1 "0,0,0,0,0,0,0,0"  
cosnoopy&
```

Appendix B. Test Script stp5_5_4_1.tst

```

; *****
; * STP 5.5.4.1 -- HST Memory Monitors in Housekeeping *
; * ----- *
; * Verify that an LFMADDR command with an index parameter in the range 0..7 *
; * does not generate and invalid-command diagnostic, but that LFMADDR with *
; * an index of 8 or higher produces a diagnostic. *
; *****
;
SYM      DIAG0011=0x0011
;
ECHO     2
;
DTG      3,"(0) Sending two PORs with WAITs"
WTO      "Sending two PORs with WAITs"
;
POR
WAIT     1
POR
WAIT     1
;
DTG      3,"(1) Clearing diagnostic stack"
WTO      "Clearing diagnostic stack"
;
LFDDIAGC
WAIT     5,HK
LOG      1,LFDDIAGS,LFDMONS,LFDMADD
;
DTG      3,"(2) Sending LFMADDR 0,0xC000,0"
WTO      "Sending LFMADDR 0,0xC000,0"
LFMADDR 0,0xC000,0
WAIT     1
;
DTG      3,"(3) Sending LFMADDR 1,0xC001,0"
WTO      "Sending LFMADDR 1,0xC001,0"
LFMADDR 1,0xC001,0
WAIT     1
;
DTG      3,"(4) Sending LFMADDR 2,0xC002,0"
WTO      "Sending LFMADDR 2,0xC002,0"
LFMADDR 2,0xC002,0
WAIT     1
;
DTG      3,"(5) Sending LFMADDR 3,0xC003,0"
WTO      "Sending LFMADDR 3,0xC003,0"
LFMADDR 3,0xC003,0
WAIT     1
;
DTG      3,"(6) Sending LFMADDR 4,0xC004,0"
WTO      "Sending LFMADDR 4,0xC004,0"
LFMADDR 4,0xC004,0
WAIT     1
;
DTG      3,"(7) Sending LFMADDR 5,0xC005,0"
WTO      "Sending LFMADDR 5,0xC005,0"
LFMADDR 5,0xC005,0
WAIT     1
;
DTG      3,"(8) Sending LFMADDR 6,0xC006,0"
WTO      "Sending LFMADDR 6,0xC006,0"
LFMADDR 6,0xC006,0
WAIT     1
;
DTG      3,"(9) Sending LFMADDR 7,0xC007,0"
WTO      "Sending LFMADDR 7,0xC007,0"
LFMADDR 7,0xC007,0
WAIT     5,HK
LOG      1,LFDDIAGS,LFDMONS,LFDMADD

```

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```
;
CHECK    1,NOTANY,DIAG0011
;
DTG      3,"(10) Sending LFDMAADR 8,0xC008,0"
WTO      "Sending LFDMAADR 8,0xC008,0"
LFDMAADR 8,0xC008,0
WAIT     5,HK
LOG      1,LFDDIAGS,LFDMONS,LFDMAADR
;
DTG      3,"(10) Test 5.5.4.1 completed successfully"
WTO      "Test 5.5.4.1 completed successfully"
```


Appendix C. Test Report stp5_5_4_1.rp1

```

1                               55555          55555          4  4
11                              5              5              4  4
1          ssss ttttt  pppp  555          555          4  4
1          s          t  p  p    5              5          44444
1          sssss  t  pppp    5              5              4
1          s          t  p    5  5          5  5          4
1          ssss  t  p    555  _____  555  _____  4  _____
111

```

Ver 01.13 Wed Jan 17 18:49:09 2001 "(0) Sending two PORs with WAITs"

Ver 01.13 Wed Jan 17 18:49:11 2001 "(1) Clearing diagnostic stack"

LFDDIAGC

Addr	Addr	HK-Name	Value
1780-179F	LFDDIAGS	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	

1738-173F LFDMONS FF FF FF FF FF FF FF FF

1740-174F LFDMA DD 0000 0000 0000 0000 0000 0000 0000 0000

Ver 01.13 Wed Jan 17 18:49:13 2001 "(2) Sending LFDMA DD 0,0xC000,0"

LFDMA DD 0,0xC000,0

Ver 01.13 Wed Jan 17 18:49:14 2001 "(3) Sending LFDMA DD 1,0xC001,0"

LFDMA DD 1,0xC001,0

Ver 01.13 Wed Jan 17 18:49:15 2001 "(4) Sending LFDMA DD 2,0xC002,0"

LFDMA DD 2,0xC002,0

Ver 01.13 Wed Jan 17 18:49:16 2001 "(5) Sending LFDMA DD 3,0xC003,0"

LFDMA DD 3,0xC003,0

Ver 01.13 Wed Jan 17 18:49:17 2001 "(6) Sending LFDMA DD 4,0xC004,0"

LFDMA DD 4,0xC004,0

Ver 01.13 Wed Jan 17 18:49:19 2001 "(7) Sending LFDMA DD 5,0xC005,0"

LFDMA DD 5,0xC005,0

Ver 01.13 Wed Jan 17 18:49:20 2001 "(8) Sending LFDMA DD 6,0xC006,0"

LFDMA DD 6,0xC006,0

Ver 01.13 Wed Jan 17 18:49:21 2001 "(9) Sending LFDMA DD 7,0xC007,0"

LFDMA DD 7,0xC007,0

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

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```

1780-179F LFDDIAGS      0000 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 0000

```

1738-173F LFDMONS 00 00 00 00 00 00 00 00

1740-174F LFDMAADD C000 C001 C002 C003 C004 C005 C006 C007

```

CHECK:  NOTANY,DIAG0011
eval:   NOTANY,DIAG0011

```

S U C C E S S

Ver 01.13 Wed Jan 17 18:49:23 2001 "(10) Sending LFDMAADDR 8,0xC008,0"

LFDMAADDR 8,0xC008,0

Addr	Addr	HK-Name	Value
1780-179F	LFDDIAGS	0000 0000 0000 0000 0000 0000 0000 0000 0000 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 0000 0000 0000 0000 0000 0000 0000 0000 0000

1738-173F LFDMONS 00 00 00 00 00 00 00 00

1740-174F LFDMAADD C008 C001 C002 C003 C004 C005 C006 C007

Ver 01.13 Wed Jan 17 18:49:25 2001 "(10) Test 5.5.4.1 completed successfully"

Appendix D. Test Report stp5_5_4_1.rp2

```

1                55555      55555      4 4
11              5          5          4 4
1                ssss ttttt pppp 555      555      4 4
1                s      t  p  p    5          5      44444
1                sssss  t  pppp    5          5          4
1                s      t  p    5 5      5 5      4
1                ssss  t  p    555  _____ 555  _____ 4 _____
111

```

Ver 01.13 Wed Jan 17 18:49:09 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 18:49:11 2001 "(1) Clearing diagnostic stack"

```

-----
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              OP CODE
0446FFFE 04440001 04420B0B 0440F4F4
-----

```

```

-----
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              OP CODE
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              OP CODE
0446FFFC 04440003 04427F7F 04408080
-----

```

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Ver 01.13 Wed Jan 17 18:49:13 2001 "(2) Sending LFDMAADR 0,0xC000,0"

```
-----
                          C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FFF 044CC000 044AFFFF 04480000
-----
          SN              OPCODE
0446FFFF 04440004 04427E7E 04408181
-----
```

Ver 01.13 Wed Jan 17 18:49:14 2001 "(3) Sending LFDMAADR 1,0xC001,0"

```
-----
                          C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FFE 044CC001 044AFFFE 04480001
-----
          SN              OPCODE
0446FFFA 04440005 04427E7E 04408181
-----
```

Ver 01.13 Wed Jan 17 18:49:15 2001 "(4) Sending LFDMAADR 2,0xC002,0"

```
-----
                          C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FFD 044CC002 044AFFFD 04480002
-----
          SN              OPCODE
0446FFF9 04440006 04427E7E 04408181
-----
```

Ver 01.13 Wed Jan 17 18:49:16 2001 "(5) Sending LFDMAADR 3,0xC003,0"

```
-----
                          C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FFC 044CC003 044AFFFC 04480003
-----
          SN              OPCODE
0446FFF8 04440007 04427E7E 04408181
-----
```

Ver 01.13 Wed Jan 17 18:49:17 2001 "(6) Sending LFDMAADR 4,0xC004,0"

```
-----
                          C O M M A N D   P A C K E T
-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FFB 044CC004 044AFFFB 04480004
-----
          SN              OPCODE
0446FFF7 04440008 04427E7E 04408181
-----
```

Ver 01.13 Wed Jan 17 18:49:19 2001 "(7) Sending LFDMAADR 5,0xC005,0"

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

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```

      PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FFA 044CC005 044AFFFA 04480005
-----
      SN              OP CODE
0446FFF6 04440009 04427E7E 04408181
-----

```

Ver 01.13 Wed Jan 17 18:49:20 2001 "(8) Sending LFDMAADR 6,0xC006,0"

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

```

      PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FF9 044CC006 044AFFF9 04480006
-----
      SN              OP CODE
0446FFF5 0444000A 04427E7E 04408181
-----

```

Ver 01.13 Wed Jan 17 18:49:21 2001 "(9) Sending LFDMAADR 7,0xC007,0"

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

```

      PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FF8 044CC007 044AFFF8 04480007
-----
      SN              OP CODE
0446FFF4 0444000B 04427E7E 04408181
-----

```

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

```

      PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFF8 044C0000 044AFFFF 04480000
-----
      SN              OP CODE
0446FFF3 0444000C 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 044EFFF7 044C0000 044AFFFF 04480000
-----
      SN              OP CODE
0446FFF2 0444000D 04427F7F 04408080
-----

```

Ver 01.13 Wed Jan 17 18:49:23 2001 "(10) Sending LFDMAADR 8,0xC008,0"

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

```

      PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044E3FF7 044CC008 044AFFF7 04480008
-----
      SN              OP CODE
0446FFF1 0444000E 04427E7E 04408181
-----

```

Center for Astrophysics & Space Astronomy

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
0446FFF0 0444000F 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
0446FFEF 04440010 04427F7F 04408080
-----

```

Ver 01.13 Wed Jan 17 18:49:25 2001 "(10) Test 5.5.4.1 completed successfully"