

**COS DCE BOOT FSW v1.09 Component Test Results  
Requirement 5.2.4.1 Command to Jump Anywhere in Code**

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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 5.2.4.1 — Command to Jump Anywhere in Code

### 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

Testing the **LFDGOTO** capability of the FSW is treated in two ways: to test jumps to the ROM the script issues **LFDGOTO** commands referencing three unused ISRs (corresponding to storage addresses 0x0023, 0x002B, and 0x0033). The invocation of any ISR corresponding to an unused (or unexpected) interrupt should produce the diagnostic 0x0031. The script issues **LFDGOTOS** to each of these three ISRs, checking to ensure that **DIAG0031** is present in the **LFDDIAGS** array and also in the **LFDERR** array, and that the corresponding storage address in each case, i.e., 0023, 002B, and 0033, is in the corresponding position of the **LFDERRP** array.

To test jumps to external RAM the script constructs three binary routines, each of which simply generates an unused diagnostic code and returns. The three codes used are 0x0023, 0x0024, and 0x0025. The binary routines are uploaded to a scratch area in external RAM, and the script issues **LFDGOTOS** to each of the routines in turn. After each **LFDGOTO**, the script verifies that the generated diagnostic code is present in the **LFDDIAGS** array.

### 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\_2\_4\_1.tst**

Parameter	Meaning	Correct Argument for Version 1.09
#0	Absolute hex storage address of "scratch" buffer for special 8051 code	C000
#1	Absolute hex offset of <b>SLOT</b> byte from origin of scratch area	0013

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

#### 1.6.2 Test Script Techniques

The binary 8051 code generated by the script has the following form. Note that the total length of the code segment is 18 bytes.

```
C000 74FF  SUB1: MOV  A,#23h
C002 900A80  LCALL REPORT_DIAGNOSTIC
C005 22      RET
C006 74FF  SUB2: MOV  A,#24h
C008 900A80  LCALL REPORT_DIAGNOSTIC
C00B 22      RET
C00C 74FF  SUB3: MOV  A,#25h
C00E 900A80  LCALL REPORT_DIAGNOSTIC
C011 22      RET
```

## 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:

EGSE			DCE		
<b>taiyo</b>	<b>shorty</b>	<b>ginger</b>	<b>ETU</b>	<b>DCE #1</b>	<b>DCE #2</b>
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\	<b>UniScript.pl</b>	<b>UniScript</b> interpreter
\disks\galex\users\galex\tcs\uniscript\stp5_2_4_1\	<b>u</b>	Shell script for this procedure
Ditto	<b>stp5_2_4_1.tst</b>	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-03-0028	<i>DCE FSW Test Procedure 5.2.4.1</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

#### 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.

Step	Operator Entry/System Response	Description
1	C:\tcs\us> <b>telnet taiyo.ssl.berkeley.edu</b>	Establish connection to <b>taiyo</b> via Telnet client program
2	Login: <b>tcs</b> Password:	Using telnet window, login as user <b>tcs</b>

## 4.1.4 Set Current Directory

Step	Operator Entry/System Response	Description
3	tcs@taiyo% <b>cd ~galex/tcs</b> tcs@taiyo% <b>pwd</b> /disks/galex/users/galex/tcs	Change current directory as shown

4.1.5 **slogin** as eagcos

Step	Operator Entry/System Response	Description
4	tcs@taiyo% <b>slogin -l eagcos taiyo.ssl.berkeley.edu</b> eagcos@taiyo.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	<b>slogin</b> as <b>eagcos</b> ; get password from SSL personnel

## 4.1.6 Set Current Directory

Step	Operator Entry/System Response	Description
5	eagcos:taiyo% <b>cd</b> <b>/disks/galex/users/galex/tcs/uniscript/stp5_2_4_1</b> eagcos:taiyo% <b>pwd</b> <b>/disks/galex/users/galex/tcs/uniscript/stp5_2_4_1</b>	Change current directory as shown

4.1.7 Ensure that Proper Files are Present

Step	Operator Entry/System Response	Description
6	<pre>eagcos@taiyo% ls -l Total 12 -rw-r--r-- 1 tcs   eag   1398 Oct  8 18:03 stp5_2_4_1.tst -rw-r--r-- 1 tcs   eag    62 Oct  9 17:44 u</pre>	List files; the <b>.tst</b> file and the shell script <b>u</b> should be present

4.2 OPERATION EXECUTION

4.2.1 Establish Initial Test Conditions

Step	Operator Entry/System Response	Description
7	<pre>eagcos:taiyo% set path=(\$path ~dbb/scripts/bin)</pre>	Set path as shown to enable access to <b>hks</b> tools

4.2.2 Execute the Script

Step	Operator Entry/System Response	Description
8	<pre>eagcos:taiyo% sh u \$estring=0A40,C000,0,0,0,0,0,0 Parameters are: Script File: stp5_2_4_1                 #0: 0A40                 #1: C000                 #2: 0                 #3: 0                 #4: 0                 #5: 0                 #6: 0                 #7: 0  Report file  &gt;/disks/galex/users/galex/tcs/uniscript/stp5_2_4_1/stp5_ 2_4_1.rp1 successfully opened. Report file  &gt;/disks/galex/users/galex/tcs/uniscript/stp5_2_4_1/stp5_ 2_4_1.rp2</pre>	Shell to <b>u</b> . You should see the accompanying output as <b>UniScript</b> executes

Step	Operator Entry/System Response	Description
	<p>successfully opened. Script file</p> <p>/disks/galex/users/galex/tcs/uniscript/stp5_2_4_1/stp5_2_4_1.tst successfully opened at level 0.</p> <p>"Sending two PORs, WAITs" "Sending LFDGOTO 0023"</p> <p>LFDGOTO ISR23</p> <p>WAIT 0: HKV0=1; HKV1=0; wc=5 WAIT 1: HKV1=1; wc=4</p> <p>LFDDIAGC</p> <p>"Sending LFDGOTO 002B"</p> <p>LFDGOTO ISR2B</p> <p>WAIT 0: HKV0=4; HKV1=3; wc=5 WAIT 1: HKV1=4; wc=4</p> <p>LFDDIAGC</p> <p>"Sending LFDGOTO 0033"</p> <p>LFDGOTO ISR33</p> <p>WAIT 0: HKV0=7; HKV1=6; wc=5 WAIT 1: HKV1=7; wc=4 "Uploading test code to scratch area"</p> <p>LFDUPLD SUB1,18,CRC1</p> <p>LFDDNLOD SUB1,18</p>	

Step	Operator Entry/System Response	Description
	<pre> "LFDGOTO SUB1(0023)"  LFDGOTO SUB1  LFDNOOP  WAIT 0: HKV0=12; HKV1=11; wc=5 WAIT 1: HKV1=11; wc=4 WAIT 1: HKV1=13; wc=3 "LFDGOTO SUB2(0024)"  LFDGOTO SUB2  LFDNOOP  WAIT 0: HKV0=16; HKV1=14; wc=5 WAIT 1: HKV1=15; wc=4 WAIT 1: HKV1=16; wc=3 "LFDGOTO SUB3(0025)"  LFDGOTO SUB3  LFDNOOP  WAIT 0: HKV0=20; HKV1=18; wc=5 WAIT 1: HKV1=19; wc=4 WAIT 1: HKV1=20; wc=3 "Test 5.2.4.1 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\_2\_4\_1.tst**, **stp5\_2\_4\_1 rp1**, and **stp5\_2\_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:	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_2_4_1 "0A40,C000,0,0,0,0,0,0"  
cosnoopy&
```

## Appendix B. Test Script stp5\_2\_4\_1.tst

```
; *****  
; * STP 5.2.4.1 -- Command to Jump Anywhere in Code *  
; * ----- *  
; * Verify proper jumps to more than 2 locations in PROM *  
; * VErify proper jumps to more than 2 locations in external code area *  
; *****  
;  
; *****  
; * PROM jumps are to unusaed ISRs. They produce diagnostics (DIAG00310 plus *  
; * HST error parameters (the PROM addresses of the ISRs. We use the ISRs *  
; * at 0023, 002B, 0033 *  
; * ----- *  
; * Parameters: #0 = address of REPORT_DIAGNOSTIC = 0A40 *  
; * #1 = address of scratch area = C000 *  
; *****  
;  
SYM      ISR23    =0x0023  
SYM      ISR2B    =0x002B  
SYM      ISR33    =0x0033  
SYM      DIAG0031=0x0031  
SYM      SUB1     =0x#1  
SYM      SUB2     =SUB1+6  
SYM      SUB3     =SUB2+6  
SYM      DELTA    =5  
;  
DTG      3,"(0) Sending two PORs, WAITs"  
WTO      "Sending two PORs, WAITs"  
;  
POR  
WAIT     1  
POR  
WAIT     1  
;  
; *****  
; * "Three Places in ROM" *  
; *****  
;  
ECHO     2  
;  
DTG      3,"(1) Sending LFDGOTO 0023"  
WTO      "Sending LFDGOTO 0023"  
;  
LFDGOTO  ISR23  
WAIT     DELTA,HK  
LOG      1,LFDDIAGS,LFDERR,LFDERRP  
DIAG     1,ANY,DIAG0031  
CHECK    1,($LFDERR[0]==$SYM{"DIAG0031"})  
CHECK    1,($LFDERRP[0]==$SYM{"ISR23"})  
LFDDIAGC  
WAIT     1  
;  
DTG      3,"(2) Sending LFDGOTO 002B"  
WTO      "Sending LFDGOTO 002B"  
;  
LFDGOTO  ISR2B  
WAIT     DELTA,HK  
LOG      1,LFDDIAGS,LFDERR,LFDERRP  
DIAG     1,ANY,DIAG0031  
CHECK    1,($LFDERR[0]==$SYM{"DIAG0031"})  
CHECK    1,($LFDERRP[0]==$SYM{"ISR2B"})  
LFDDIAGC  
WAIT     1  
;  
DTG      3,"(3) Sending LFDGOTO 0033"  
WTO      "Sending LFDGOTO 0033"  
;  
LFDGOTO  ISR33
```



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```

WAIT      DELTA,HK
LOG       1,LFDDIAGS, LFDERR, LFDERRP
DIAG     1,ANY,DIAG0031
CHECK    1,($LFDERR[0]==$SYM{"DIAG0031"})
CHECK    1,($LFDERRP[0]==$SYM{"ISR33"})
;LFDDIAGC
WAIT     1
;
; *****
; * "Three Places in RAM" *
; *****
; *****
; * The script constructs 3 tiny subroutines in scratch storage as follows: *
; *
; * C000 74FF      SUB1:  MOV   A,#23h
; * C002 900A80    LCALL  REPORT_DIAGNOSTIC
; * C005 22        RET
; * C006 74FF      SUB2:  MOV   A,#24h
; * C008 900A80    LCALL  REPORT_DIAGNOSTIC
; * C00B 22        RET
; * C00C 74FF      SUB3:  MOV   A,#25h
; * C00E 900A80    LCALL  REPORT_DIAGNOSTIC
; * C011 22        RET
; *
; * A GOTO (LFDGOTO command) to, e.g., SUB1 should cause the bogus diagnostic *
; * code 0023 (e.g.) to be reported. Since no other FSW component uses this *
; * code (which is undefined), its occurrence in LFDDIAGS is proof-positive *
; * that a GOTO C000 was executed. Similarly for the other two subroutines. *
; *****
;
DATA     1, 0,6,CONST=0x7423_12#022
DATA     1, 6,6,CONST=0x7424_12#022
DATA     1,12,6,CONST=0x7425_12#022
;
DTG      3,"(4) Uploading test code to scratch area"
WTO      "Uploading test code to scratch area"
;
XMIT     1,18
WAIT     1
LFDUPLD  SUB1,18,CRC1
WAIT     1
;
LFDDNLOD SUB1,18
RECV     2,0,18
LOG      1,1,2
WAIT     1
;
DTG      3,"(5) LFDGOTO SUB1(0023) "
WTO      "LFDGOTO SUB1(0023) "
;
LFDGOTO  SUB1
WAIT     1
LFDNOOP
WAIT     DELTA,HK
LOG      1,LFDDIAGS
DIAG     1,ANY,0x0023
;
DTG      3,"(6) LFDGOTO SUB2(0024) "
WTO      "LFDGOTO SUB2(0024) "
;
LFDGOTO  SUB2
WAIT     1
LFDNOOP
WAIT     DELTA,HK
LOG      1,LFDDIAGS
DIAG     1,ANY,0x0024
;
DTG      3,"(7) LFDGOTO SUB3(0025) "
WTO      "LFDGOTO SUB3(0025) "
;

```

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---

```
LFDGOTO  SUB3
WAIT     1
LFDNOOP
WAIT     DELTA,HK
LOG      1,LFDDIAGS
DIAG     1,ANY,0x0025
;
DTG      3,"(8) Test 5.2.4.1 completed successfully"
WTO      "Test 5.2.4.1 completed successfully"
```

Appendix C. Test Report stp5\_2\_4\_1.rp1

```

1                               55555          222          4  4
11                              5             2  2          4  4
1          ssss  ttttt  pppp  555             2          4  4
1          s      t    p  p    5             2          44444
1          sssss  t    pppp   5             2          4
1          s      t    p    5  5             2          4
1          ssss   t    p    555  _____ 22222  _____ 4  _____
111

```

Ver 01.09 Fri Dec 1 01:02:30 2000 "(0) Sending two PORs, WAITs"

Ver 01.09 Fri Dec 1 01:02:32 2000 "(1) Sending LFDGOTO 0023"

LFDGOTO ISR23

```

Addr Addr HK-Name      Value
-----
1780-179F LFDIAGS      0231 011B 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

```

1640-1647 LFDERR 31 00 00 00 00 00 00 00

1648-1657 LFDERRP 0023 0000 0000 0000 0000 0000 0000 0000 0000

DIAG 1,ANY,DIAG0031
Found: DIAG0031 == 49.

S U C C E S S

CHECK: (\$LFDERR[0]==\$SYM{"DIAG0031"})
eval: (0000[0]==0000{"DIAG0031"})

S U C C E S S

CHECK: (\$LFDERRP[0]==\$SYM{"ISR23"})
eval: (0000[0]==0000{"ISR23"})

S U C C E S S

LFDIAGC

Ver 01.09 Fri Dec 1 01:02:35 2000 "(2) Sending LFDGOTO 002B"

LFDGOTO ISR2B

```

Addr Addr HK-Name      Value
-----
1780-179F LFDIAGS      0331 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

```

1640-1647 LFDERR 31 00 00 00 00 00 00 00

1648-1657 LFDERRP 002B 0000 0000 0000 0000 0000 0000 0000 0000

DIAG 1,ANY,DIAG0031
Found: DIAG0031 == 49.

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S U C C E S S

CHECK: (\$LFDERR[0]==\$SYM{"DIAG0031"})  
eval: (0000[0]==0000{"DIAG0031"})

S U C C E S S

CHECK: (\$LFDERRP[0]==\$SYM{"ISR2B"})  
eval: (0000[0]==0000{"ISR2B"})

S U C C E S S

LFDDIAGC

Ver 01.09 Fri Dec 1 01:02:38 2000 "(3) Sending LFDGOTO 0033"

LFDGOTO ISR33

Addr	Addr	HK-Name	Value												
1780-179F	LFDDIAGS		0431	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											

1640-1647 LFDERR 31 00 00 00 00 00 00 00

1648-1657 LFDERRP 0033 0000 0000 0000 0000 0000 0000 0000

DIAG 1,ANY,DIAG0031  
Found: DIAG0031 == 49.

S U C C E S S

CHECK: (\$LFDERR[0]==\$SYM{"DIAG0031"})  
eval: (0000[0]==0000{"DIAG0031"})

S U C C E S S

CHECK: (\$LFDERRP[0]==\$SYM{"ISR33"})  
eval: (0000[0]==0000{"ISR33"})

S U C C E S S

Ver 01.09 Fri Dec 1 01:02:40 2000 "(4) Uploading test code to scratch area"

LFDUPLD SUB1,18,CRC1

LFDDNLOD SUB1,18

Len	CRC	Buffer	Data
0012	BE5D	1	74 23 12 0A 40 22 74 24 12 0A 40 22 74 25 12 0A 40 22
0012	BE5D	2	74 23 12 0A 40 22 74 24 12 0A 40 22 74 25 12 0A 40 22

Ver 01.09 Fri Dec 1 01:02:44 2000 "(5) LFDGOTO SUB1(0023)"

LFDGOTO SUB1

LFDNOOP

Addr	Addr	HK-Name	Value												
1780-179F	LFDDIAGS		0523	0431	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											

DIAG 1,ANY,0x0023

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Found: 0x0023 == 35.

S U C C E S S

Ver 01.09 Fri Dec 1 01:02:48 2000 "(6) LFDGOTO SUB2(0024)"

LFDGOTO SUB2

LFDNOOP

Addr	Addr	HK-Name	Value											
1780-179F	LFDDIAGS	0624	0523	0431	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										

DIAG 1,ANY,0x0024

Found: 0x0024 == 36.

S U C C E S S

Ver 01.09 Fri Dec 1 01:02:51 2000 "(7) LFDGOTO SUB3(0025)"

LFDGOTO SUB3

LFDNOOP

Addr	Addr	HK-Name	Value											
1780-179F	LFDDIAGS	0725	0624	0523	0431	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										

DIAG 1,ANY,0x0025

Found: 0x0025 == 37.

S U C C E S S

Ver 01.09 Fri Dec 1 01:02:55 2000 "(8) Test 5.2.4.1 completed successfully"

Appendix D. Test Report stp5\_2\_4\_1.rp2

```

1                    55555          222          4 4
11                   5            2 2          4 4
1                    ssss ttttt  pppp  555          2          4 4
1                    s          t  p  p    5            2          44444
1                    sssss  t    pppp    5            2          4
1                    s          t  p    5 5          2          4
1                    ssss  t    p    555  _____ 22222  _____ 4  _____
111

```

Ver 01.09 Fri Dec 1 01:02:30 2000 "(0) Sending two PORs, WAITs"

Ver 01.09 Fri Dec 1 01:02:32 2000 "(1) Sending LFDGOTO 0023"

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 044AFFDC 04480023
-----
          SN          OPCODE
0446FFFE 04440001 04421515 0440EAEA
-----

```

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 04420B0B 0440F4F4
-----

```

Ver 01.09 Fri Dec 1 01:02:35 2000 "(2) Sending LFDGOTO 002B"

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 044AFFD4 0448002B
-----
          SN          OPCODE
0446FFFB 04440004 04421515 0440EAEA
-----

```

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-----  
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				

-----

-----  
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			
0446FFF9 04440006 04420B0B 0440F4F4				

-----

Ver 01.09 Fri Dec 1 01:02:38 2000 "(3) Sending LFDGOTO 0033"

-----  
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 044AFFCC 04480033				
SN	OPCODE			
0446FFF8 04440007 04421515 0440EAEA				

-----

-----  
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			
0446FFF7 04440008 04427F7F 04408080				

-----

Ver 01.09 Fri Dec 1 01:02:40 2000 "(4) Uploading test code to scratch area"

-----  
U P L O A D P A C K E T  
-----

00402374 00420A12 00442240 00462474 00480A12 004A2240 004C2574 004E0A12  
00502240

-----

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

PARM4	PARM3	PARM2	PARM1	PARM0
045AFFFF 04580000 0456FFFF 04540000 045241A2 0450BE5D 044EFFED 044C0012 044A3FFF 0448C000				
SN	OPCODE			
0446FFF6 04440009 04425252 0440ADAD				

-----

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

Center for Astrophysics & Space Astronomy

```

      PARM4      PARM3      PARM2      PARM1      PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFED 044C0012 044A3FFF 0448C000
-----
      SN      OPCODE
0446FFF5 0444000A 04425151 0440AEAE
-----

```

Ver 01.09 Fri Dec 1 01:02:44 2000 "(5) LFDGOTO SUB1(0023)"

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 044A3FFF 0448C000
-----
      SN      OPCODE
0446FFF4 0444000B 04421515 0440EAEA
-----

```

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
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 044EFFFF 044C0000 044AFFFF 04480000
-----
      SN      OPCODE
0446FFF2 0444000D 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
0446FFF1 0444000E 04427F7F 04408080
-----

```

Ver 01.09 Fri Dec 1 01:02:48 2000 "(6) LFDGOTO SUB2(0024)"

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 044A3FF9 0448C006
-----
      SN      OPCODE
0446FFF0 0444000F 04421515 0440EAEA
-----

```

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



Center for Astrophysics & Space Astronomy

```

          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFFF 044C0000 044AFFFF 04480000
-----
          SN          OPCODE
0446FFEF 04440010 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
0446FFEE 04440011 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
0446FFED 04440012 04427F7F 04408080
-----

```

Ver 01.09 Fri Dec 1 01:02:51 2000 "(7) LFDGOTO SUB3(0025)"

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 044A3FF3 0448C00C
-----
          SN          OPCODE
0446FFEC 04440013 04421515 0440EAEA
-----

```

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
0446FFEB 04440014 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
0446FFEA 04440015 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  
0446FFE9 04440016 04427F7F 04408080  
-----
```

Ver 01.09 Fri Dec 1 01:02:55 2000 "(8) Test 5.2.4.1 completed successfully"