

**COS DCE BOOT FSW v1.13 Component Test Results
Requirement 5.2.4.1 Command to Jump Anywhere in Code**

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Prepared By: _____ Date _____
Tim Swanson, Software Test Engineer, Design_Net Eng.

Reviewed By: _____ Date _____
K. Brownsberger, COS Sr. Software Scientist, CU/CASA

Reviewed By: _____ Date _____
Grant Blue, COS Software & Operations Manager, BATC

Approved By: _____ Date _____
Barry Welsh, FUV Detector Program Manager. UCB

Approved By: _____ Date _____
John Andrews, COS Experiment Manager, CU/CASA



Center for Astrophysics & Space Astronomy
University of Colorado
Campus Box 593
Boulder, Colorado 80309

REVISIONS

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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 1.13
#0	Absolute hex storage address of "scratch" buffer for special 8051 code	C000
#1	Absolute hex offset of SLOT 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		
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_2_4_1\	u	Shell script for this procedure
Ditto	stp5_2_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-03-0060	<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> telnet taiyo.ssl.berkely.edu	Establish connection to taiyo via Telnet client program
2	Login: xxx Password: -----	Using telnet window, login as user tcs

4.1.4 Set Current Directory

Step	Operator Entry/System Response	Description
3	tcs@taiyo% cd ~galex/tcs tcs@taiyo% pwd /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% slogin -l eagcos taiyo.ssl.berkeley.edu 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	slogin as eagcos ; get password from SSL personnel

4.1.6 Set Current Directory

Step	Operator Entry/System Response	Description
5	eagcos:taiyo% cd /disks/galex/users/galex/tcs/uniscript/stp5_2_4_1 eagcos:taiyo% pwd /disks/galex/users/galex/tcs/uniscript/stp5_2_4_1	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 .tst file and the shell script u 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 hks tools

4.2.2 Execute the Script

Step	Operator Entry/System Response	Description
8	<pre>sh u \$estring=0B30,C000,0,0,0,0,0 Parameters are: Script File: stp5_2_4_1 #0: 0B30 #1: C000 #2: 0 #3: 0 #4: 0 #5: 0 #6: 0 #7: 0 Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_2_4_1/stp5_ 2_4_1.rp1 successfully opened. Report file >/disks/galex/users/galex/tcs/ver_1_13/stp5_2_4_1/stp5_</pre>	Shell to u . You should see the accompanying output as UniScript executes

Step	Operator Entry/System Response	Description
	<p>2_4_1.rp2 successfully opened. Script file</p> <p>/disks/galex/users/galex/tcs/ver_1_13/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=0; wc=4 WAIT 1: HKV1=1; wc=3</p> <p>LFDDIAGC</p> <p>"Sending LFDGOTO 002B"</p> <p>LFDGOTO ISR2B</p> <p>WAIT 0: HKV0=5; HKV1=3; wc=5 WAIT 1: HKV1=4; wc=4 WAIT 1: HKV1=5; wc=3</p> <p>LFDDIAGC</p> <p>"Sending LFDGOTO 0033"</p> <p>LFDGOTO ISR33</p> <p>WAIT 0: HKV0=9; HKV1=7; wc=5 WAIT 1: HKV1=8; wc=4 WAIT 1: HKV1=9; wc=3 "Uploading test code to scratch area"</p> <p>LFDUPLOD SUB1,18,CRC1</p>	

Step	Operator Entry/System Response	Description
	<p>LFDDNLOD SUB1,18</p> <p>"LFDGOTO SUB1(0023)"</p> <p>LFDGOTO SUB1</p> <p>LFDNOOP</p> <p>WAIT 0: HKV0=15; HKV1=14; wc=5</p> <p>WAIT 1: HKV1=14; wc=4</p> <p>WAIT 1: HKV1=16; wc=3</p> <p>"LFDGOTO SUB2(0024)"</p> <p>LFDGOTO SUB2</p> <p>LFDNOOP</p> <p>WAIT 0: HKV0=19; HKV1=17; wc=5</p> <p>WAIT 1: HKV1=18; wc=4</p> <p>WAIT 1: HKV1=20; wc=3</p> <p>"LFDGOTO SUB3(0025)"</p> <p>LFDGOTO SUB3</p> <p>LFDNOOP</p> <p>WAIT 0: HKV0=23; HKV1=22; wc=5</p> <p>WAIT 1: HKV1=23; wc=4</p> <p>"Test 5.2.4.1 completed successfully"</p> <p>eagcos:shorty%</p>	

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 "0B30,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,LFDEERR,LFDEERRP
DIAG     1,ANY,DIAG0031
CHECK    1,($LFDEERR[0]==$SYM{"DIAG0031"})
CHECK    1,($LFDEERRP[0]==$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 01.13 Wed Jan 17 17:23:36 2001 "(0) Sending two PORs, WAITs"

Ver 01.13 Wed Jan 17 17:23:38 2001 "(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 01.13 Wed Jan 17 17:23:42 2001 "(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 01.13 Wed Jan 17 17:23:45 2001 "(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 01.13 Wed Jan 17 17:23:49 2001 "(4) Uploading test code to scratch area"

LFDUPLD SUB1,18,CRC1

LFDDNLOD SUB1,18

Len	CRC	Buffer	Data
0012	0460	1	74 23 12 0B 30 22 74 24 12 0B 30 22 74 25 12 0B 30 22
0012	0460	2	74 23 12 0B 30 22 74 24 12 0B 30 22 74 25 12 0B 30 22

Ver 01.13 Wed Jan 17 17:23:52 2001 "(5) LFDGOTO SUB1(0023)"

LFDGOTO SUB1

LFDDNOOP

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 01.13 Wed Jan 17 17:23:56 2001 "(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 01.13 Wed Jan 17 17:24:01 2001 "(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 01.13 Wed Jan 17 17:24:05 2001 "(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 01.13 Wed Jan 17 17:23:36 2001 "(0) Sending two PORs, WAITs"

Ver 01.13 Wed Jan 17 17:23:38 2001 "(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 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 04420B0B 0440F4F4
-----

```

Ver 01.13 Wed Jan 17 17:23:42 2001 "(2) Sending LFDGOTO 002B"

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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 044AFD4 0448002B

SN OPCODE
0446FFFA 04440005 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
0446FFF9 04440006 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
0446FFF8 04440007 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
0446FFF7 04440008 04420B0B 0440F4F4

Ver 01.13 Wed Jan 17 17:23:45 2001 "(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 044AFCC 04480033

SN OPCODE
0446FFF6 04440009 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
0446FFF5 0444000A 04427F7F 04408080

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              OP CODE
0446FFF4 0444000B 04427F7F 04408080
-----

```

Ver 01.13 Wed Jan 17 17:23:49 2001 "(4) Uploading test code to scratch area"

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

```

-----
00402374 00420B12 00442230 00462474 00480B12 004A2230 004C2574 004E0B12
00502230
-----

```

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

```

-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FB9F 04500460 044EFFED 044C0012 044A3FFF 0448C000
-----
          SN              OP CODE
0446FFF3 0444000C 04425252 0440ADAD
-----

```

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

```

-----
          PARM4          PARM3          PARM2          PARM1          PARM0
045AFFFF 04580000 0456FFFF 04540000 0452FFFF 04500000 044EFFED 044C0012 044A3FFF 0448C000
-----
          SN              OP CODE
0446FFF2 0444000D 04425151 0440AEAE
-----

```

Ver 01.13 Wed Jan 17 17:23:52 2001 "(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              OP CODE
0446FFF1 0444000E 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              OP CODE
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
-----

```


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```
-----
                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
-----
```

Ver 01.13 Wed Jan 17 17:23:56 2001 "(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
0446FFED 04440012 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
0446FFEC 04440013 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
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
-----
```

Ver 01.13 Wed Jan 17 17:24:01 2001 "(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
-----
```

Center for Astrophysics & Space Astronomy

 SN OPCODE
0446FFE9 04440016 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
0446FFE8 04440017 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
0446FFE7 04440018 04427F7F 04408080

Ver 01.13 Wed Jan 17 17:24:05 2001 "(8) Test 5.2.4.1 completed successfully"