

DOE FILE COPY

DOE/SF/10539-07  
(STMPO-294)

MCR-80-1376

DOCUMENT IDENTIFICATION 8912

HELIOSTAT STIMULATOR

OPERATOR'S MANUAL

NOVEMBER 1980

Martin Marietta Corporation

Denver Division

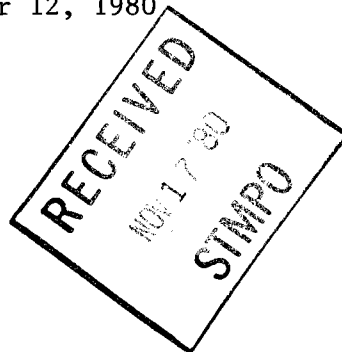
Denver, Colorado 80201

1 DNS, cc. to Morehouse  
2. File 7.2.2.17

MARTIN MARIETTA AEROSPACE

DENVER DIVISION  
POST OFFICE BOX 179  
DENVER, COLORADO 80201  
TELEPHONE (303) 977-3000

November 12, 1980



Refer to: 80-Y-64655

To: United States Department of Energy  
San Francisco Operations Office  
Solar Ten Megawatt Project Office  
9550 Flair Drive, Suite 210  
El Monte, CA 91731

Attn: Mr. Richard N. Schweinberg

Subj: Contract DE-AC03-80SF10539, Heliostat Stimulator Operator's Manual

Ref: (a) Contract DE-AC03-80SF10539, Task E-1 of Exhibit I, SOW

Encl: (1) MCR-80-1376, Heliostat Stimulator Operator's Manual

1. The Enclosure (1) documentation is transmitted in accordance with the Reference (a) contract requirement.
2. Questions concerning this documentation should be directed to Mr. Walt Hart, (303) 977-0692.

Very truly yours,

MARTIN MARIETTA CORPORATION

James L. Meeks  
Contract Requirements  
and Documentation  
Solar Energy Systems  
Martin Marietta Aerospace  
Denver Division

JLM:EJF:mc

cc: SNLL, Mr. Duncan Tanner (1 cy, encl 1)  
STMPO, Mr. W. Morehouse (1 cy, encl 1)

## FOREWORD

This document is prepared to meet contractual requirement Task E 1, Exhibit I, SOW, Collector Subsystem for the 10 MWe Solar Thermal Central Receiver Pilot Plant. Prepared for the U. S. Department of Energy under contract number DE-AC03-80SF10539.

This document is also prepared as part of contractual requirement Annex C-3, 3.3.5, in accordance with Annex A-1, Exhibit I, SOW, para. 3.1.1.6 for the Small Solar Power Systems/Central Receiver System. Prepared for Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, e.v., IEA Operating Agent under contract number 387/4011/79.

## TABLE OF CONTENTS

SECTION		PAGE NO.
1	OVERVIEW OF SYSTEM	1-001
	1.0 INTRODUCTION	1-001
	2.0 STIMULATOR CONTROLS AND DISPLAYS	1-002
2	SUMMARY OF OPERATOR COMMANDS	2-001
	1.0 COMMAND ENTRY AND OPTION PREFIXES	2-001
	2.0 BRIEF DESCRIPTIONS OF COMMANDS	2-002
3	FUNCTIONAL OPERATION OF COMMANDS	3-001
	1.0 OVERVIEW OF COMMAND USAGE	3-001
	2.0 DETAILED DESCRIPTIONS OF COMMANDS	3-003
	2.1 <u>ALIGN</u> az,e1	3-003
	2.2 <u>AZEL</u> az,e1[,hn]	3-003
	2.3 <u>BEAM</u> x,y,z[,hn]	3-003
	2.4 <u>BIAS</u> az,e1	3-003
	2.5 <u>CORRIDOR</u> { <u>A</u> , <u>B</u> , <u>C</u> , <u>D</u> },x,y,z	3-003
	2.6 <u>COMTEST</u>	3-004
	2.7 <u>CUL</u> { <u>A</u> , <u>B</u> , <u>C</u> , <u>D</u> },x,y,z	3-004
	2.8 <u>CLL</u> { <u>A</u> , <u>B</u> , <u>C</u> , <u>D</u> },x,y,z	3-004
	2.9 <u>CDE</u> { <u>A</u> , <u>B</u> , <u>C</u> , <u>D</u> },x,y,z	3-004
	2.10 <u>CAM</u> { <u>A</u> , <u>B</u> , <u>C</u> , <u>D</u> },n,n,n,...	3-005
	2.11 <u>CYCLE</u> [az,e1]	3-005
	2.12 <u>DOWN</u> { <u>A</u> , <u>B</u> , <u>C</u> , <u>D</u> }	3-005
	2.13 <u>HC</u> n	3-005
	2.14 <u>HCAUTO</u>	3-006
	2.15 <u>HCBUS</u>	3-006

## TABLE OF CONTENTS

<u>SECTION</u>		<u>PAGE NO.</u>
2.16	<u>HCMODE</u> { <u>P,A,S</u> }	3-006
2.17	<u>HELP</u>	3-006
2.18	<u>HFC</u> n	3-006
2.19	<u>HFC</u> AUTO [n]	3-007
2.20	<u>HFC</u> MODE { <u>P,A,S</u> }	3-007
2.21	<u>HFC</u> INIT	3-007
2.22	<u>INIT</u> az,e1	3-008
2.23	<u>LOCATION</u> x,y,z	3-008
2.24	<u>MARK</u>	3-008
2.25	<u>MODE</u> { <u>HC,HFC</u> }	3-009
2.26	<u>MANUAL</u>	3-009
2.27	<u>MOTOR</u>	3-010
2.28	<u>PRINT</u> [n]	3-011
2.29	<u>SECOND</u>	3-012
2.30	<u>STATUS</u>	3-012
2.31	<u>STOW</u>	3-013
2.32	<u>SUN</u> x,y,z	3-013
2.33	<u>UP</u> { <u>A,B,C,D</u> }	3-013
4	APPENDIX	4-001
1.0	MESSAGES	4-001
1.1	Error Messages	4-001
1.2	Informational Messages	4-006
1.3	Internal Stimulator Errors	4-008
2.0	OPERATION OF HC AUTOMATIC TEST	4-009

TABLE OF CONTENTS

SECTION

PAGE NO.

3.0 OPERATION OF HFC AUTOMATIC TEST

4-011

## LIST OF ILLUSTRATIONS

	<u>PAGE NO.</u>
Heliostat Stimulator	1-005
Stimulator Front Panel Controls and Displays	1-006

---

**SECTION 1 - OVERVIEW OF SYSTEM****1.0 INTRODUCTION**

The Heliostat Stimulator is a portable test tool, housed in a suitcase, which can be used to perform the following functions:

1. Acceptance testing of newly manufactured Heliostat Controllers (HC) and Heliostat Field Controllers (HFC).
2. Aid in the installation and alignment of Heliostats.
3. Provide diagnostic troubleshooting capability in the event of Heliostat failure in the field.

The Heliostat Stimulator is pictured in Figure 1.1.



---

## 2.0 STIMULATOR CONTROLS AND DISPLAYS

The Stimulator front panel is pictured in FIGURE 1.2. The major controls, connectors, and display devices are identified.

### 2.1 Keyboard

The keyboard is used to enter commands to cause some action to be performed, or to start a test program. The arrangement of the alphabetical and numerical keys is similar to a typewriter, and additional special function keys are included.

As characters are typed on the keyboard, the right (elevation) LCD display will indicate the number of characters that have been typed. When the LINE FEED key is pressed, all the characters that have been entered at that point are printed on the printer. If corrections have to be made, the RUBOUT key will function as a backspace key, erasing the last character typed. By simultaneously pressing the CTRL and L keys, the entire line may be erased.

When the line has been typed correctly, the function desired may be started by pressing the RETURN key. This will cause the line entered to be printed, and the command to be executed.

The ALT MODE key functions as an abort function key. It will cancel a running test, stop the motors, and disable the manual motor controls.

The PAGE key causes a four line test pattern to be printed on the printer.

### 2.2 Printer

The electrostatic printer is used to display commands entered, flag error conditions, and print position and status information.

---

### 2.3 Liquid Crystal Displays

The LCD displays normally indicate the Heliostat azimuth and elevation positions, in units of encoder counts. 2048 encoder counts is equivalent to 90 degrees, or approximately 22.756 counts per degree.

The encoder counts displayed correspond to actual Heliostat position only after the azimuth and elevation encoder marks have been encountered. Anytime the Heliostat Controller (HC) loses power, the marks must be found before the displays will be accurate. (See MARK test).

### 2.4 Cable Connectors

Connector J1 is used for communication between the Stimulator and a Heliostat Controller (HC) and Heliostat Field Controller (HFC). It also is used for manual control of the motors with the Stimulator front panel switches. The appropriate cable must be connected between J1 and an HC/HFC box before any tests can be run. This cable has an additional connector which may be used to connect multiple HC's to the Stimulator.

Connector J2 is used to monitor the motor voltages with the voltmeter built into the Stimulator. Connecting the motor power lines to J2 is only necessary when the motor voltages are to be measured.

Connector J3 is used to simulate the encoder inputs to the HC during the HC Automatic Test. Connecting the encoder cable to J3 is only necessary during HCAUTO test.

Connector J4 is used to supply 120 volt, 60 Hertz power to the Stimulator.

### 2.5 Voltmeter and Motor Select Switch

The built in voltmeter is used to monitor the motor power voltage. When the motor 'T' cable is connected to J2, the HC, and the motors, the voltmeter reads the voltage being applied to the motors. The motor switch is used to select which motor is being monitored, the azimuth or the elevation.

---

## 2.6 Manual Motor Controls

These controls, when enabled, may be used to manually drive the Heliostat motors, in either direction, high or low speed. The manual controls are enabled by entering the MANUAL or ALIGN commands. The controls are disabled by pressing the ALT MODE key.

## 2.7 Power Switch

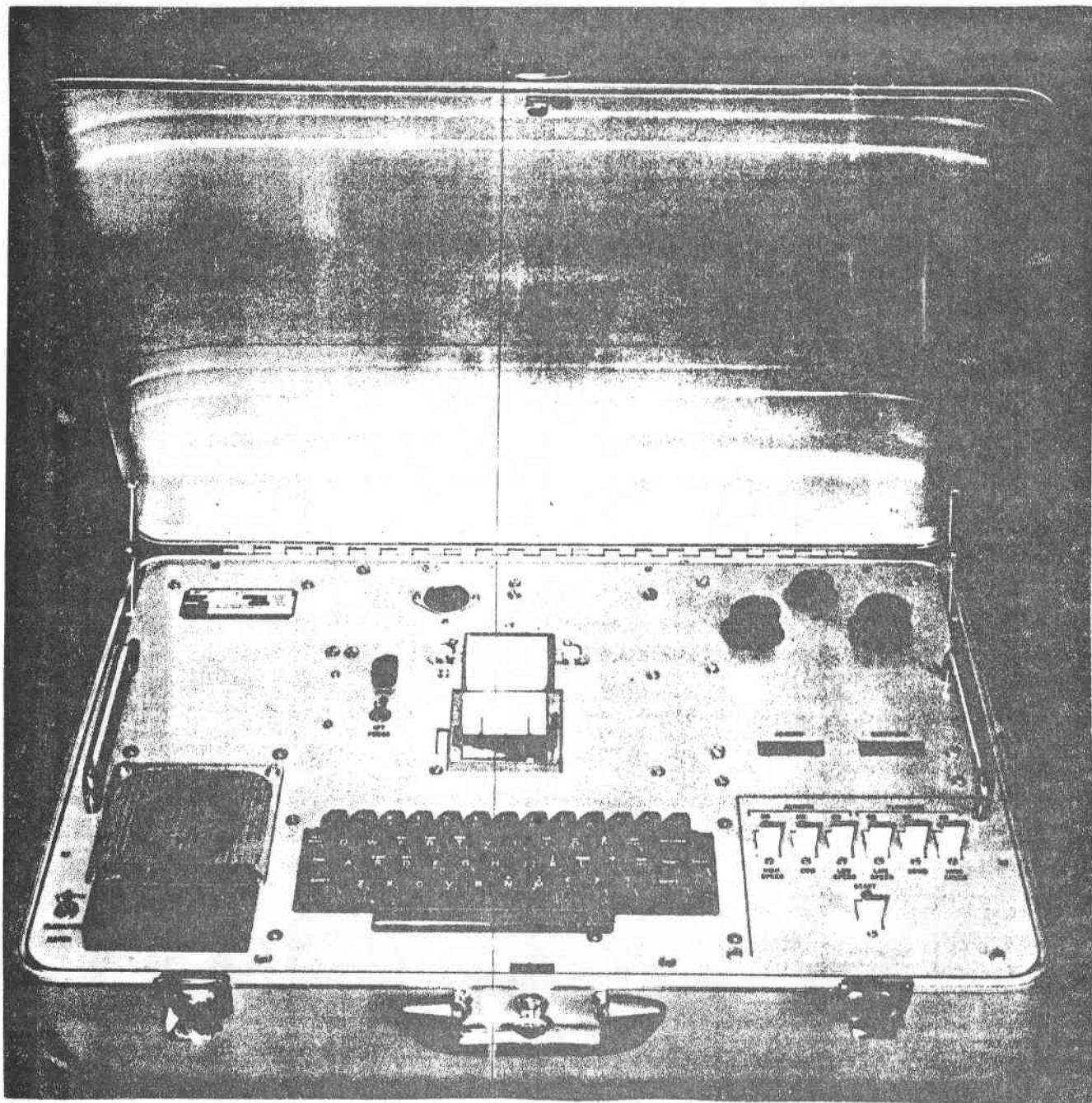
When the power switch is turned on, the printer displays the following message:

```
HELIOSTAT  
STIMULATOR
```

```
TYPE 'HELP' FOR INFO
```

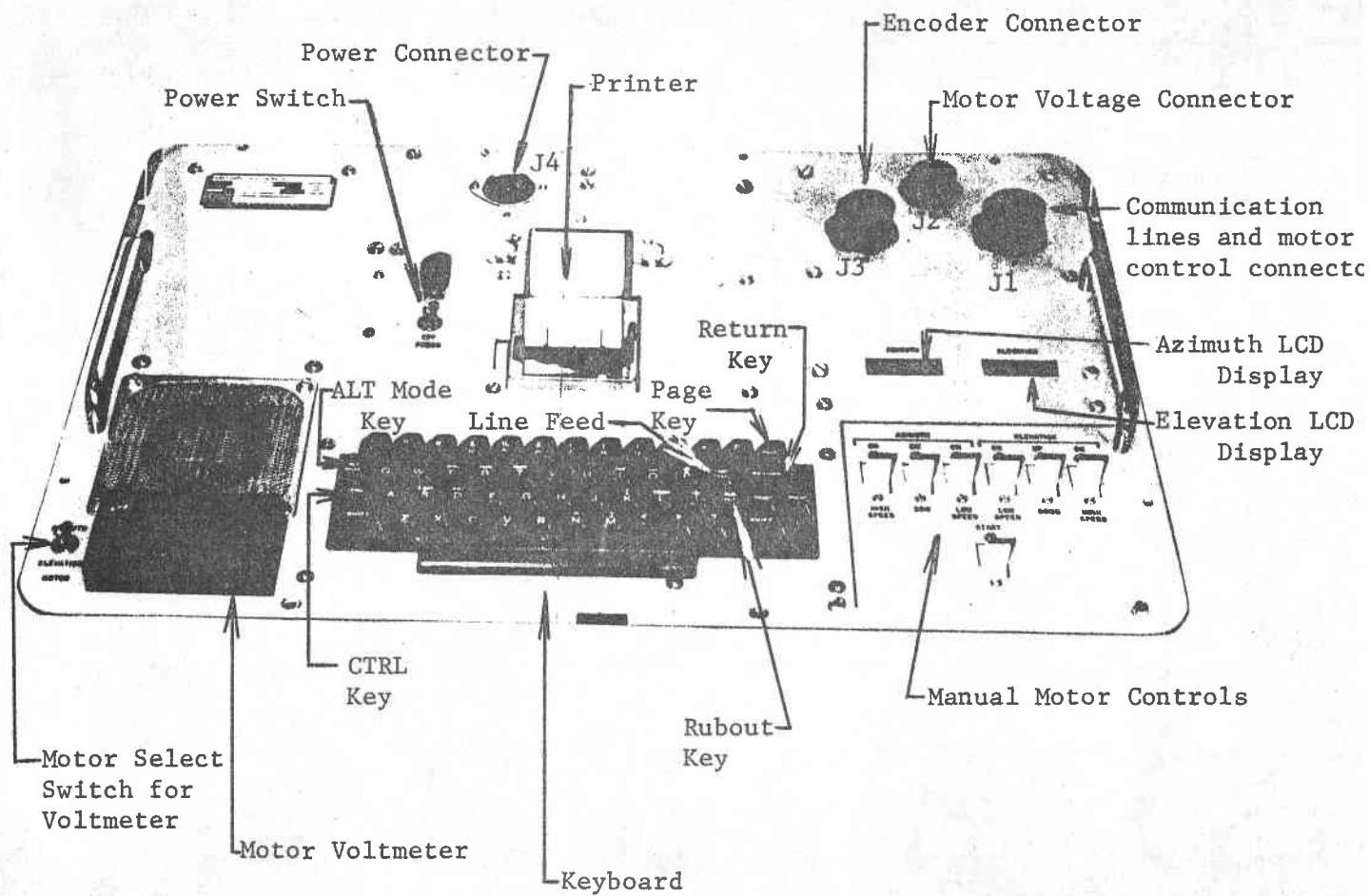
```
READY
```

FIGURE 1.1 PAGE 1 OF 1



HELIOSTAT STIMULATOR

FIGURE 1.2 PAGE 1 OF 1



---

SECTION 2 - SUMMARY OF OPERATOR COMMANDS

## 1.0 COMMAND ENTRY AND OPTION PREFIXES

The Stimulator is ready to accept a command when it prints READY. The desired command is typed in, and the RETURN key is pressed to start execution of the command. A command word consists of a string of letters with no embedded blanks. The command word may be abbreviated. The minimum abbreviation is underlined in the descriptions of each command. The command word may be followed by parameters, whose format depends on the particular command.

The command word may optionally be preceded by a word which invokes several alternate modes of execution. Execution of a command is normally aborted when an error occurs, and the error message is printed. When execution of the command is completed, the printer prints READY, and the next command may be entered. The option prefix words alter this pattern as follows:

<u>C</u> ONTINUE	Causes the Stimulator to print an error message when an error occurs, but continue execution of the command.
<u>R</u> EPEAT	Same as the CONTINUE option, plus the command executes repeatedly until aborted.
<u>L</u> OOP	Same as the REPEAT option, plus error messages are not printed.

A blank (space) must be entered between the option prefix word and the command word

The ALT MODE key may be used to abort execution of the command.

---

 2.0 BRIEF DESCRIPTIONS OF COMMANDS

The available commands are listed below. The minimum possible abbreviation is indicated by underlining. Optional parameters are surrounded by brackets ( [.....] ). When parameters are listed within braces ( { p1,p2,p3,... } ), one and only one of the parameters listed is to be used. Parameters in capital letters are to be entered exactly as shown. Parameters in lower case letters are to be replaced by data, as follows:

Parameter	Meaning
n	Decimal integer, ranging from -9999 to +9999.
az,el	Two decimal integers, separated by commas, indicating azimuth and elevation position in encoder counts. The numbers may range from -8192 to +8191.
hn	Hexidecimal number, ranging from 00 to FF.
x,y,z	List of three floating point numbers, indicating a coordinate point in the Cartesian coordinate system in the field. Each number may range from -999.999 to +999.999.
<u>ALIGN</u> az,el	- Call alignment test.
<u>AZEL</u> az,el[,hn]	- Send az-el command to HC or HFC. hn is an optional mode bit designator for the command.
<u>BEAM</u> x,y,z[,hn]	- Send beam pointing command to HC or HFC. hn is an optional mode bit designator for the command.
<u>BIAS</u> az,el	- Change bias counts for HC initialization.
<u>CORRIDOR</u> { <u>A,B,C,D</u> },x,y,z	- Send corridor pointing command to the HC (only usable in HC mode).
<u>COMTEST</u>	- Call communication line monitor test.
<u>CUL</u> { <u>A,B,C,D</u> },x,y,z	- Change corridor upper limit point for HFC initialization. The {A,B,C,D} parameter selects the corridor.
<u>CLL</u> { <u>A,B,C,D</u> },x,y,z	- Change corridor lower limit point for HFC initialization.

- 
- CDE {A,B,C,D},x,y,z - Change corridor deltas for HFC initialization
- CAM {A,B,C,D},n,n,n,... - Change corridor assignment mask for HFC initialization. The n,n,n,... parameter is a list of HC numbers.
- CYCLE [az,el] - Call life-cycle test.
- DOWN {A,B,C,D} - Send HFC a down corridor command. Only usable in HFC mode.
- HC n - Change primary HC number (1-32).
- HCAUTO - Call automatic HC verification test.
- HCBUS - Open relay to allow communication with more than one HC.
- HCMODE {P,A,S} - Change HC select mode:  
P = Send commands to primary HC only.  
A = Send commands to all HC'S.  
S = Require entry of HC list before each command is sent.
- HELP - Print list of available commands.
- HFC n - Change primary HFC number (1-8).
- HFCAUTO [n] - Call HFC automatic test.
- HFCMODE {P,A,S} - Change HFC select mode:  
P = Send commands to primary HFC only.  
A = Send commands to all 8 HFC'S.  
S = Require entry of HFC list before each command is sent.
- HFCINIT - Initialize HFC with corridor parameters.
- INIT az,el - Initialize HC with specified current az,el, using the biases and Heliostat location coordinates.
- LOCATION x,y,z - Change Heliostat location coordinates for HC initialization.
- MARK - Call test which seeks the encoder marks.



- 
- MODE {HC,HFC}
- Set the operational mode of the Stimulator to communicate with the HC or the HFC, and establish communication with the HC or HFC.
- MANUAL
- Enable the manual motor controls.  
(WARNING: Do not shut off the Stimulator when manual controls are enabled).
- MOTOR
- Call motor voltage test.
- PRINT [n]
- Print out selected communication line message. n is the number of the desired message. If n is left out, a list of available messages is printed.
- SECOND
- Switch over to secondary HFC communication bus.
- STATUS
- Print out HC or HFC status, depending on the current mode.
- STOW
- Send az-el command of 0,-2048 to HC or HFC
- SUN x,y,z
- Modify sun vector. x,y,z must be a unit vector.
- UP {A,B,C,D}
- Send HFC an up corridor command.  
Only works in HFC mode.

---

**SECTION 3 - FUNCTIONAL OPERATION OF COMMANDS****1.0 OVERVIEW OF COMMAND USAGE****1.1 Selection of Stimulator Communication Mode**

The Stimulator operates in one of two communication modes. It may simulate an HFC by sending sun/sync/commands and status polls to the HC, and receiving command and status responses from the HC, or, it may simulate a HAC by sending sun/syncs, commands, and status polls to the HFC, and receiving status responses from the HFC. The mode of operation desired is selected with the MODE command. By entering MODE HC, the Stimulator will communicate directly with the HC. By entering MODE HFC, the Stimulator will communicate with the HFC, and monitor the transmissions from the HFC to the HC.

The MODE command selects the operating mode, and then attempts to establish communication with the HC(HFC). It does this by polling all 32(8) HC's(HFC's), and determining which one(s) respond. If no HC(HFC) responds, the error message 'HC DIDN'T RESPOND' or 'HFC DIDN'T RESPOND' is printed. If one or more HC's(HFC's) respond, the message 'RESPONDING HC(S)' or 'RESPONDING HFC(S)' is printed, followed by a list of numbers indicating which HC's(HFC's) responded. The first HC(HFC) responding is designated as the primary HC(HFC).

Once communication is established, automatic status polling of the HC(HFC) is commenced, with polls being sent once each second. The LCD displays will reflect the azimuth and elevation positions returned in the status response. The position displayed is that of the primary HC. If HFC mode was entered with no prior entry into HC mode, the primary HC number defaults to 1. If at any time the HC(HFC) does not successfully status respond to the poll, an error message will be printed, and the LCD displays will display 8888, to indicate that they are no longer valid. When the HC(HFC) successfully responds again, the LCD's will resume display of valid position.

Most of the tests will force the mode needed by that test. This forcing of mode selection will be indicated by the 'RESPONDING HC(S)' or 'RESPONDING HFC(S)' messages being printed during the execution of the test.

After the MODE command establishes communication with the HC(HFC), it checks its status response to determine if it has been initialized. If not, the operator is asked if the HC(HFC) should be initialized with the default parameters. The operator may answer with a yes or no response.

---

## 1.2 Selection of HC's or HFC's to be Commanded

The Stimulator normally sends commands to the primary HC or HFC. The primary HC or HFC number is set by the MODE command, as described above. The primary number may be altered with the HC n or the HFC n commands, where n ranges from 1 to 32 for HC's, and from 1 to 8 for HFC's.

The Stimulator can be set to send commands to more than one HC or HFC by using the HCMODE and HFCMODE commands. Entering HCMODE A or HFCMODE A will cause all subsequent commands to be sent to all HC's or HFC's. Entering HCMODE S or HFCMODE S will cause the Stimulator to ask for a list of HC or HFC numbers before each subsequent command is sent. The commands will be sent only to the listed HC's or HFC's. Note that it is possible to send commands to multiple HFC's, and to multiple HC's under each HFC. Entering HCMODE P or HFCMODE P will cause the Stimulator to return to the default select mode of commanding only the primary HC or HFC.

Commanding multiple HFC's will always take one second per HFC being commanded, except when initializing the HFC's, which takes seven seconds per HFC. Commanding multiple HC's will not take any additional time, except when initializing the HC's, which will take one second per HC.

---

## 2.0 DETAILED DESCRIPTIONS OF COMMANDS

### 2.1 ALIGN az,el

Calls Heliostat installation alignment test. This test sends an az-el command to the HC to the selected position. When the Heliostat reaches the commanded position, the test enables the manual motor controls. The operator may then fine position the Heliostat until the exact target is reached. Whenever the operator presses the RETURN key, the current az-el position will be printed. The difference between the original commanded az-el and the az-el printed when fine position is completed will be the bias difference needed for initialization of the HC.

This test is terminated by pressing the ALT MODE key.

### 2.2 AZEL az,el[,hn]

Sends an az-el positioning command to the HC or HFC. If the hn parameter is left out, the mode bits in the command sent will indicate stow mode. The operator may change the mode and submode bits sent by entering the desired bits as a hexadecimal number after the desired az-el position.

### 2.3 BEAM x,y,z[,hn]

Sends an beam pointing command to the HC or HFC. If the hn parameter is left out, the mode bits in the command sent will indicate track receiver mode. The operator may change the mode and submode bits sent by entering the desired bits as a hexadecimal number after the desired x,y,z target point.

### 2.4 BIAS az,el

Changes the biases used for HC initialization. The default biases are -114,-1934 (-5 degrees azimuth, -85 degrees elevation). The HC biases will not be changed until the INIT command is entered.

### 2.5 CORRIDOR {A,B,C,D},x,y,z

Sends a corridor positioning command to the HC. The corridor mask being used is selected by which letter is used as the first parameter. For example, to send a corridor B command, the command CORRIDOR B,1.,2.,3. could be used.

This command only works when in HC mode.

2.6 COMTEST

Calls the communication line monitor test.

2.7 CUL {A,B,C,D},x,y,z

Changes a corridor upper limit point used in HFC initialization. This new corridor coordinate will be sent to the HFC when the HFCINIT command is entered. The default upper limit points for each corridor are as follows:

Corridor	Default Upper Limit Point
A	25.0, 0.0, 37.59
B	0.0, 25.0, 37.59
C	-25.0, 0.0, 37.59
D	0.0, -25.0, 37.59

2.8 CLL {A,B,C,D},x,y,z

Changes a corridor lower limit point used in HFC initialization. This new corridor coordinate will be sent to the HFC when the HFCINIT command is entered. The default lower limit points for each corridor are as follows:

Corridor	Default Lower Limit Point
A	60.0, 0.0, -2.0
B	0.0, 60.0, -2.0
C	-60.0, 0.0, -2.0
D	0.0, -60.0, -2.0

2.9 CDE {A,B,C,D},x,y,z

Changes a corridor delta increment used in HFC initialization. This new corridor increment will be sent to the HFC when the HFCINIT command is entered. The default delta increments for each corridor are as follows:

Corridor	Default Deltas
A	-0.875, 0.0, 0.99
B	0.0, -0.875, 0.99
C	0.875, 0.0, 0.99
D	0.0, 0.875, 0.99

2.10 CAM {A,B,C,D},n,n,n,...

Changes a corridor assignment mask used in HFC initialization. The n,n,n,... parameter is a list of HC numbers to be assigned to this corridor during emergency corridor walk. The HC's listed to be assigned to this corridor are automatically removed from the corridor assignment masks of the other three corridors. This insures that no HC is assigned to more than one corridor.

This new corridor assignment will be sent to the HFC when the HFCINIT command is entered. The default corridor assignments for each corridor are as follows:

Corridor	Default Corridor Assignment
A	1,5,9,13,17,21,25,29
B	2,6,10,14,18,22,26,30
C	3,7,11,15,19,23,27,31
D	4,8,12,16,20,24,28,32

2.11 CYCLE [az,e1]

Calls the automatic cycle test of the HFC and HC. This test establishes communication with the HC, and then the HFC. It then sends az-el commands to the HFC to move the Heliostat at the rate of one encoder count every two seconds. The starting az-el position for this may be specified in the optional parameter. If no explicit start point is entered, the test defaults to -1024,-2048 (-45 degrees azimuth, -90 degrees elevation). The test commands the Heliostat to move +90 degrees from the start point, in both azimuth and elevation. When the full 90 degrees swing is reached, the Heliostat is commanded back to the start point. This process is continued until the test is aborted, taking 8192 seconds per each full cycle. The test will print out the number of hours that it has run, once per hour.

2.12 DOWN {A,B,C,D}

Sends the HFC a start down corridor command, on the selected corridor. The HFC will send the selected HC's a beam command to the upper limit point, and will then walk the HC(s) down the corridor.

2.13 HC n

Changes the primary HC number, which is used for automatic status polling, and for command output when the HC select mode is primary.

---

**2.14** HCAUTO

Calls the automatic HC verification test. This test forces HC mode, and performs a complete functional test of the primary HC. The test simulates encoder movements to the HC, and the LCD's will reflect this high-speed simulated movement.

The test will print error messages when an error is detected, and, if one of the option prefixes was used with this command, the test will normally print a table of expected and actual data at the point of error. This will facilitate isolation of an error condition.

See Appendix, Paragraph 2.0, for details.

**2.15** HCBUS

Closes the relay which allows communication through the HC bus 'T' connector, thereby allowing commanding of more than one HC. This relay stays closed until the Stimulator is powered off, or a test is called which opens it, such as HCAUTO or HFCAUTO.

**2.16** HCMODE {P,A,S}

Changes the HC select mode for commands:

HCMODE P - Send all subsequent commands to the primary HC only.  
(Default mode)

HCMODE A - Send all subsequent commands to all 32 HC's.

HCMODE S - On all subsequent commands, prompt the operator to enter a list of HC's to receive that command. 1 to 32 HC numbers may be entered, separated by commas. The prompting message is 'ENTER HC LIST TO CMD'.

**2.17** HELP

Prints out a list of valid commands and their syntax. The printout may be terminated at any time by pressing RETURN.

**2.18** HFC n

Changes the primary HFC number, which is used for automatic status polling and for command output when the HFC select mode is primary.

---

**2.19** HFCAUTO [n]

Calls automatic HFC verification test. This test forces HFC mode, and then proceeds through functional testing of the primary HFC. Functions are tested in the following order: watchdog timer, status responses, HC initialization, sun vector, az-el commands, beam pointing commands, corridor walking, and the emergency corridor walk sequence.

The test may be run in two different versions, with different execution times. If the optional n parameter is left out or is zero, the test will terminate after the corridor walk portion of the emergency sequence is completed. This version takes about seven minutes to execute. If the n parameter is 1, the test will wait for eleven more minutes after the corridor walk, and then re-establish communication with the HFC on the primary bus. This version takes about 18 minutes to execute. Note that if the short version is selected, the HFC will not respond again until its eleven minute delay has expired, or the HFC has been powered off and back on. Therefore, if REPEATING or LOOPING of this test is desired, the long version must be used.

See Appendix, Paragraph 3.0, for details.

**2.20** HFCMODE {P,A,S}

Changes the HFC select mode for commands:

- HFCMODE P - Send all subsequent commands to the primary HFC only. (Default mode)
- HFCMODE A - Send all subsequent commands to all 32 HFC's.
- HFCMODE S - On all subsequent commands, prompt the operator to enter a list of HFC's to receive that command. 1 to 8 HFC numbers may be entered, separated by commas. The prompting message is 'ENTER HFC LIST'.

**2.21** HFCINIT

Initializes the HFC with the corridor parameters entered with the CUL, CLL, CDE, and CAM commands. Initialization takes seven seconds per HFC to execute.

This command only works in HFC mode.



---

**2.22** INIT az,el

Initializes the HC(s) with the specified current az-el, and the biases and Heliostat location coordinates entered with BIAS and LOCATION commands. When in HC mode, initialization will take one second per HC to execute. When in HFC mode, commanding multiple HFC's, initialization will take one second for each HC times the number of HFC's getting the command. Thus, if all HFC's and HC's are being sent this command, its execution will take 256 seconds.

**2.23** LOCATION x,y,z

Changes the Heliostat location coordinates used in HC initialization. The default coordinates are 0.0,511.0,0.0 .

**2.24** MARK

Calls the test which seeks the encoder marks. This test forces HC mode, and then commands the HC to move the Heliostat until both encoder marks are found. The test runs most efficiently when the Heliostat is at stow (0,-2048 = 0 degrees azimuth, -90 degrees elevation), but it will eventually find the marks from any start position.

The test starts out by moving the Heliostat -20 degrees in azimuth and +20 degrees in elevation. Whenever a mark is encountered on either axis, that axis is commanded back to the mark position. If a mark is not found before the Heliostat reaches the commanded position, the Heliostat is moved in the opposite direction. If a limit switch is encountered, the Heliostat is commanded in the opposite direction. The test terminates when both marks are encountered, leaving the Heliostat positioned at the marks.

When a mark is encountered, at any time, the Stimulator prints a message of the following format:

AZ MARK: nnnn ss

or

EL MARK: nnnn ss

Where nnnn is the HC's position count when the mark was encountered. If the position printed was different than the bias value for that axis, the count is set equal to the bias value. ss is the first byte of the HC status, in hexadecimal.

---

**2.25** MODE {HC,HFC}

Sets the communication mode of the Stimulator.

MODE HC set up the Stimulator to communicate with the HC. It then status polls all 32 HC's, and reports which one's responded. If no HC responded, an error message is printed. If at least one HC responded, automatic status polling of the primary HC each second is commenced. The current position of the primary HC will be displayed on the LCD's. If the primary HC has not been initialized, the operator will be asked 'INITIALIZE HC (Y/N)?'. A response of 'Y' will cause the HC to be initialized to the stow position (0,-2048), with the biases and Heliostat location coordinates entered with the BIAS and LOCATION commands.

MODE HFC sets up the Stimulator to communicate with the HFC, and allows the HFC to communicate to the HC, with the Stimulator monitoring. Then, the test status polls all 8 HFC's, and reports which one's responded. If no HFC responds, an error message is printed. If at least one HFC responded, automatic status polling of the primary HFC each second will commence. The primary HC will be the first HC polled by the HFC, and its position will be displayed on the LCD's. If the HFC has not been initialized, the operator will be asked 'INITIALIZE HFC (Y/N)?'. A response of 'Y' will cause the HFC to be initialized with the corridor parameters entered with the CUL, CLL, CDE, and CAM commands.

**2.26** MANUAL

Enables the manual motor controls to be used for positioning the Heliostat, which disables the HC from controlling the motors. Pressing the ALT MODE key will disable the manual motor controls, returning control of the motors to the HC.

This command takes three seconds to execute.

**WARNING:**

Do not shut off the Stimulator when the manual motor controls are enabled. This could result in damaged high-voltage components in the HC.

2.27 MOTOR

Calls the motor voltage measuring test. This test forces HC mode, and then prompts the operator to set the motor select switch and read voltages for each motor, both directions, in high and low speed. The test first prints 'SWITCH VOLTMETER TO AZIMUTH', and waits for a RETURN key. The operator then sets the switch, and presses RETURN. The test then prints '+AZ HI', and commands the HC to move to azimuth motor in the positive direction at high speed. The voltmeter reading for that condition may then be read. The operator then presses RETURN again, and the test prints '+AZ LO', and commands the HC to move the azimuth motor in the positive direction at low speed. This process continues until all combinations have been read on both azimuth and elevation. The full test printout is listed below:

```
MOTOR
RESPONDING HC(S)
 32
SWITCH VOLTMETER
  TO AZIMUTH
+AZ HI
+AZ LO
AZ OFF
-AZ LO
-AZ HI
SWITCH VOLTMETER
  TO ELEVATION
+EL HI
+EL LO
EL OFF
-EL LO
-EL HI
TEST COMPLETE
READY
```

2.28 PRINT [n]

Prints out a communication line message selected from the menu listed below. The printout is a hexadecimal dump of the selected message.

n	Message
1	The last HFC command sent from the Stimulator to the HFC.
2	The sun/sync being sent to the HFC each second.
3	The last status response received from the HFC.
4	The seven initialization commands to be sent to the HFC with the HFCINIT command. This buffer reflects the last initialization parameters sent to the HFC, unless the CUL, CLL, CDE, or CAM commands have been entered since that time. These commands update this buffer directly. Each initialization command is 20 bytes long, so this message is 140 bytes long.
5	The sun/sync/command transmitted by the HFC to the HC in response to an HFC command being sent by the Stimulator. This message remains the same until another command is sent to the HFC by an operator command.
6	The last sun/sync/command sent to the HC by the Stimulator in response to a command entered by the operator. This message remains the same until another command is sent to the HC.
7	The dummy sun/sync/command being sent to the HC each second. This message will contain a 7F header byte, the current sun vector, and the rest of the buffer will be zero.
8	The last status response received from the HC.

Messages 1,3, and 5 are only meaningful in HFC mode, and messages 6,7, and 8 are only meaningful in HC mode. Messages 1,2,4,6, and 7 are messages transmitted by the Stimulator, and will not have a valid checksum byte. Messages 3,5, and 8 are received by the Stimulator, and will have a valid checksum byte.

If the n parameter is left off, or is out of the range 1-8, an abbreviated version of this menu will be printed.

---

**2.29** SECOND

Switches over from the primary to the secondary HAC-HFC bus.

As long as the Stimulator is powered up, regardless of the mode (HC or HFC), sun/syncs are transmitted on the HAC-HFC bus. The only exceptions to this are during the HFC AUTO test, and when the SECOND command is entered. This command terminates transmission of the HFC sun/syncs, waits 12 seconds, and resumes transmission of sun/syncs on the secondary HAC-HFC bus. If the Stimulator was in HFC mode, this command then attempts to re-establish communication with the HFC on the secondary bus, and reports which HFC's responded. (See the MODE command).

**2.30** STATUS

Takes a snapshot recording of the next status response, and prints out all information contained in that response.

In HC mode, the printout will look like this:

```
STATUS
HC STAT  AZ   EL
32 2060 0001 -2047
READY
```

The first number is the number of the responding HC (1-32). The second number is the two-byte status of the HC, in hexadecimal. The azimuth and elevation position of the HC is reported in decimal encoder counts.

When in HFC mode, the printout looks like:

```
STATUS
HC STAT  AZ    EL
32 2018  0000 -2048
01 0400  0010  1000
02 0400  0011  1100
03 0400  7615  3893
```

```
HFC STATUS: 8000
HFC COMMAND: 06
CMD RECEIVED MASK:
0000 0001
READY
```

The status reported by all four HC's that the HFC polled are printed. The first one is the first HC being polled, which is the primary HC. The HFC status is a two-byte hexadecimal number. The command response received mask and the last HFC command are not printed from the current status response, but rather are saved from the first status response received after the last HFC command was sent. This is done because these two parameters are only meaningful at that time. The command response received mask consists of four hexadecimal bytes. The last HFC command number is the header byte from the last command sent to the HFC, in hexadecimal.

### 2.31 STOW

Sends an az-el command of 0,-2048 (0 degrees azimuth, -90 degrees elevation) to the HC or HFC.

### 2.32 SUN x,y,z

Changes the sun vector being sent the HC and the HFC each second. The vector entered must be a unit vector, not a cartesian coordinate point. The sun vector is set to 0.0,0.0,1.0 (straight up) on power up of the Stimulator.

### 2.33 UP {A,B,C,D}

Sends a start up corridor command to the HFC. The HFC then sends the HC(s) a beam pointing command to the lower limit point, and then walks the HC(s) up the corridor.

This command is only valid in HFC mode.

## SECTION 4 - APPENDIX

## 1.0 MESSAGES

All possible messages are listed below, with each category listed in alphabetical order. The commands or tests which may print the message are listed in parenthesis.

## 1.1 Error Messages

- AZ MARK ERROR - (HC Automatic Test) Azimuth zero mark was not detected by HC.
- BAD MOTOR CONTROLS - (HCAUTO) HC's motor control outputs are incorrect.
- BEAM POINTING ERROR - (HCAUTO) HC error occurred during a beam pointing command.
- CORRIDOR STATUS ERROR - (HFC Automatic Test) HFC status did not properly reflect status of active corridors.
- CORRIDOR WALK ERROR - (HCAUTO) HC error occurred during a corridor pointing command.  
(HFCAUTO) HFC to HC sun/sync/command was incorrect during corridor walks.
- EL MARK ERROR - (HCAUTO) Elevation zero mark was not detected by HC.
- EMERGENCY WALK ERROR - (HFCAUTO) HFC to HC sun/sunc/command was incorrect during emergency corridor walks.
- \*\*ERROR,  
999.999 IS MAX-RETRY - (BEAM,CORRIDOR,CUL,CLL,CDE,LOCATION,SUN)  
Indicates that a coordinate in an x,y,z parameter was out of the allowable range of the Stimulator.
- HC CMD RSP TIME-OUT - (MODE HC,INIT,AZEL,BEAM CORRIDOR) No command response was received from the HC.
- HC CMD RSP INCORRECT - (MODE HC,INIT,AZEL,BEAM,CORRIDOR) HC command response header byte was wrong.
- HC DIDN'T RESPOND - (MODE HC) No HC's responded to status poll.

- 
- HC NOT RESTARTED - (HCAUTO) The death command was given to the HC, and it didn't get restarted by the watchdog timer. Probably indicates watchdog timer error.
- HC STAT RSP CHKSM ERR - (MODE HC, or from automatic polls) A checksum error was detected in the HC status response.
- HC STAT RSP INCORRECT - (MODE HC, or from automatic polls) Header byte in HC status response was wrong.
- HC STAT RSP TIME-OUT - (From automatic polls) The HC did not respond to a status poll.
- HFC DIDN'T RESPOND - (MODE HFC) No HFC's responded to status poll.
- HFC-HC CMD CHKSM ERR - (MODE HFC,HFCINIT,AZEL BEAM,INIT,DOWN,UP) A checksum error was detected in the sun/sync/command transmitted from the HFC to the HC.
- HFC-HC CMD INCORRECT - (MODE HFC,HFCINIT,AZEL,BEAM,INIT,DOWN,UP) The sun/sync/command transmitted from the HFC to the HC had an invalid header byte.
- HFC-HC CMD TIME-OUT - (MODE HFC,HFCINIT,AZEL,BEAM,INIT,DOWN,UP) No sun/sync/command was transmitted from the HFC to the HC.
- HFC-HC POLL CHKSM ERR - (HFCAUTO) A checksum error was detected in a status poll transmitted from the HFC to the HC.
- HFC-HC POLL INCORRECT - (HFCAUTO) The status poll transmitted from the HFC to the HC had an invalid header byte.
- HFC-HC POLL TIME-OUT - (HFCAUTO) No status poll was transmitted from the HFC to the HC.
- HFC NOT RESTARTED - (HFCAUTO) A death command was sent to the HFC, and the watchdog timer did not reset the HFC. Usually indicates a watchdog timer error.
- HFC POLLED WRONG HC - (MODE HFC, or from automatic polls) The HFC status response indicates that the HFC did not poll the correct HC.



- 
- HFC STAT CHECKSUM ERR - (MODE HFC, or from automatic polls) A checksum error was detected in the HFC status response.
- HFC STAT INCORRECT - (MODE HFC, or from automatic polls) The header byte in the HFC status response was invalid.
- HFC STAT TIME-OUT - (From automatic polls) HFC did not respond to status poll.
- INITIALIZATION ERROR - (HCAUTO) HC did not initialize properly.
- LAST HFC CMD WRONG - (HFCAUTO) The last HFC command field in the HFC status response does not properly reflect the last command sent to the HFC.
- MODE BITS INCORRECT - (HCAUTO) The mode bits in the HC status response do not properly reflect the last command sent to the HC.
- MOTORS STUCK ON - (HCAUTO) The motor controls are stuck in the on condition. This is always a fatal error.
- MUST BE IN HC MODE - (CORRIDOR) This command must be executed in HC mode.
- MUST BE IN HFC MODE - (HFCINIT,DOWN,UP) These commands must be executed in HFC mode.
- MUST SET MODE FIRST - (AZEL,BEAM,INIT,STATUS) The Stimulator communication mode must be determined before these commands will execute.
- NO COMM LOSS STATUS - (HCAUTO) The Stimulator ceased to send sun/sync/command's to the HC, and the HC failed to report loss of communication.
- NO WATCHDOG RESET - (HFCAUTO) The HFC was sent a death command, and it never ceased sending sun/sync/commands to the HC.
- NOT MOVING BIT ON - (HCAUTO) The HC erroneously reported a motor not moving status.
- NOT MOVING TIMEOUT - (HCAUTO) The HC failed to report motor not moving status.

- 
- PARAMETER ERROR - (ALIGN,AZEL,BIAS,INIT) Comma missing between az and el parameters.  
(BEAM,LOCATION,SUN) Comma(s) missing between x,y or z parameters.  
(CORRIDOR,CUL,CLL,CDE) Comma(s) missing between corridor designator,x,y, or z parameters, or corridor designator invalid (not A, B, C, or D).  
(CAM) Comma(s) missing or trailing in parameter list, or corridor designator invalid.  
(HC) Number not in range 1-32.  
(HFC) Number not in range 1-8.  
(HCMODE,HFCMODE) Parameter not P, A, or S  
(MODE) Parameter not HC or HFC.  
(DOWN,UP) Invalid corridor designator.
- POSITION INCORRECT - (HCAUTO) Encoder position reported in HC status response is not correct.
- SSC ERR: AZEL - (HCAUTO) The commanded az-el position in the sun/sync/command sent from the HFC to the HC is not the same as that sent to the HFC from the Stimulator.
- SSC ERR: BEAM - (HCAUTO) The beam pointing target in the sun/sync/command sent from the HFC to the HC is not the same as that sent to the HFC by the Stimulator.
- SSC ERR: HEADER BYTE - (HCAUTO) The header byte in the sun/sync/command sent from the HFC to the HC is incorrect.
- SSC MASK NOT ZERO - (HCAUTO) All five HC select masks in the sun/sync/command sent from the HFC to the HC should be zero, but one of them is not.
- STAT ERR: CMD MASK - (HCAUTO) The command response received field in the HFC status response does not properly reflect the HC's which command responded.
- STAT ERR: HC STATUS - (HCAUTO) The HC status reported in the HFC status response is not correct.
- STAT ERR: MODE BITS - (HCAUTO) The HC status mode bits reported in the HFC status response is not correct.

- 
- STAT ERR: POSITION - (HFCAUTO) The HC position reported in the HFC status response is not correct.
- STATUS INCORRECT - (HCAUTO) The status field in the HC status response is incorrect.
- SUN VECTOR ERROR - (HFCAUTO) The sun vector in the sun/sync/command sent from the HFC to the HC was not the same as that in the sun/sync sent to the HFC.
- UNKNOWN COMMAND - The command entered was not recognized. Re-check the spelling of the command, and try again.
- WRONG HC INITIALIZED - (HFCAUTO) The HFC did not initialize the right HC when it received an HC initialize command.
- WRONG HC RESPONDED - (MODE HC,INIT,AZEL,BEAM,CORRIDOR) The command response received was from the wrong HC.  
(MODE HC or from automatic polls) The status response received was from the wrong HC.
- WRONG HFC RESPONDED - (MODE HFC or from automatic polls) The status response received was from the wrong HFC.
- WRONG INIT PARAMS - (HFCAUTO) The HC initialization position, biases, or Heliostat location coordinates in the sun/sync/command sent from the HFC to the HC were not the same as those sent to the HFC.

---

## 1.2 Informational Messages

- \*\*ABORT\*\*** - Indicates that the ALT MODE abort key was pressed, and that the abort function is being executed.
- AZ MARK: nnnn ss - Indicates azimuth mark encountered.
- CURRENT AZ-EL - (ALIGN) Printed out following a press of the RETURN key. The next line will contain the current azimuth and elevation position, in encoder counts.
- EL MARK: nnnn ss - Indicates elevation mark encountered.
- ENTER HC LIST TO CMD - Printed in response to a command when the HC select mode of 'S' has been chosen. The operator should enter a list of HC numbers (1-32), separated by commas, and then press RETURN.
- ENTER HFC LIST - Printed in response to a command when the HFC select mode of 'S' has been chosen. The operator should enter a list of HFC numbers (1-8), separated by commas, and then press RETURN.
- GOING ALT HAC/HFC BUS - (SECOND, HFC AUTO) Indicates that the primary HAC to HFC communication bus is being deactivated, and the secondary bus is being activated.
- HC AUTO TEST - (HCAUTO) Indicates the beginning of the automatic HC verification test.
- HFC AUTO TEST - (HFCAUTO) Indicates the beginning of the automatic HFC verification test.
- INITIALIZE HC(Y/N)? - (MODE HC, CYCLE, ALIGN, MARK, MOTOR) Indicates that the HC has not yet been initialized. If the operator responds with a 'Y', the HC will be initialized to be at the stow position (0, -2048), with the biases and location coordinates entered with the BIAS and LOCATION commands.

- 
- INITIALIZING HFC - (MODE HFC,CYCLE,HFCINIT,HFCAUTO) Indicates that the HFC is being initialized. This process takes seven seconds to execute.
- READY - Indicates that the Stimulator is ready to accept another command from the operator.
- RESPONDING HC(S) - (MODE HC,ALIGN,CYCLE,HCAUTO,MARK,MOTOR) Indicates that at least one HC responded to a status poll. This message will be followed with a list of up to 32 HC numbers, indicating which HC's responded. The first HC in the list will thereafter be the primary HC, and its position will be indicated in the LCD displays.
- RESPONDING HFC(S) - (MODE HFC,CYCLE,HFCAUTO) Indicates that at least one HFC responded to a status poll. This message will be followed with a list of up to 8 HFC numbers, indicating which HFC's responded. The first HFC in the list will thereafter be the primary HFC.
- TEST COMPLETE - Indicates that execution of a test has completed.

---

1.3 Internal Stimulator Errors

The following messages should never occur. If one appears, save the listing surrounding it, and give it to the engineer in charge.

EXC OVR  
STACK OVERFLOW  
SYSTEM ERROR

---

## 2.0 OPERATION OF HC AUTOMATIC TEST

### 2.1 Phase 1 - Verify Watchdog Timer

The test sends a death command to the HC. A death command is an initialization command with the azimuth bias equal to FFFF hex. The HC responds to this command by simulating a software error, and the watchdog timer should reset the HC within five seconds. After seven seconds, the test polls the HC, and verifies that it indicates a restarted status mode.

### 2.2 Phase 2 - Check for Motor Stuck On

The test reads the HC motor control outputs, and verifies that all the high and low speed controls are off.

### 2.3 Phase 3 - Initialize HC

The test initializes the HC twice, to insure exact position compare. The LCD displays should indicate 0,-2048. The test then verifies that HC indicates initialized mode, position compare, the correct az-el position, and all motors are still off.

### 2.4 Phase 4 - Verify Motor Controls

Az-el position commands are sent to the HC to cause it to turn various motor controls on. The motor controls are tested one at a time, and any discrepancies are reported. All combinations of mode bits for az-el commands are used and verified. The LCD displays will not change during this phase.

### 2.5 Phase 5 - Verify Mark Detection and Position Compare Status

The simulated encoders are moved through the marks both separately and simultaneously, and the HC status response is checked for proper reporting of the marks. The encoders are moved to within 8 bits of the commanded position, and the position compare status is verified. The LCD displays will make small changes around -114,-1934 during this phase.

### 2.6 Phase 6 - Beam Pointing Commands

The HC is sent several beam pointing commands, the simulated encoders are moved to the corresponding target positions, and the HC is checked for position compare and motors off. All combinations of mode bits for beam commands are used and verified. The LCD displays will make one long change, and then several small ones around -2048,+1024 during this phase.

---

### 2.7 Phase 7 - Corridor Walk Commands

The HC is sent several corridor walk pointing commands, the simulated encoders are moved to the corresponding target position, and the HC is checked for position compare and motors off. Beam pointing commands are inserted between the corridor commands to set the mode bits to all possible corridor walk modes. The LCD displays will make small changes around -2048,+1024 during this phase.

### 2.8 Phase 8 - Return to Marks

The HC is sent an az-el pointing command to go back to the marks, the simulated encoders are sent back through the marks, and the HC status response is checked for proper reporting of these marks. The LCD displays will make one long change to -113,-1935, and then move to -177,-1997.

### 2.9 Phase 9 - Not Moving Status

The HC is given an az-el command in one direction, and the simulated encoders are held constant. The HC should report motor not moving status within fifteen seconds. Next, the HC is given an az-el command in the other direction, and the simulated encoders are moved one count per second. The HC should not report motor not moving in the next fifteen seconds. The LCD's will end up at -193,-2013 when this phase ends.

### 2.10 Phase 10 - Loss of Communication Status

Transmission of sun/sync/commands to the HC will be terminated. The HC should report loss of comm. within five seconds.



---

### 3.0 OPERATION OF HFC AUTOMATIC TEST

#### 3.1 Phase 1 - Test Watchdog Timer

The HFC is sent a death command. A death command is a command with a header of F8. This command causes the HFC to simulate a software error. The watchdog timer should reset the HFC within five seconds. The Stimulator verifies that sun/sync/command output from the HFC terminates after the death command. After seven seconds, the test polls the HFC, and verifies that it reports restarted status.

#### 3.2 Phase 2 - Initialize HFC

The HFC is initialized with known corridor parameters.

#### 3.3 Phase 3 - Check HFC status response, and Initialize HC's

The Stimulator simulates all 32 HC's to the HFC by command and status responding to the HFC. All 32 simulated HC's start out in restarted mode. The test cycles through all 32 HC's, verifying mode bits, status, and position for each, initializing each, and verifying successful initialization for each. The command response received mask and loss of comm status fields of the HFC status response are also checked. The LCD displays will display the number of the first HC being polled by the HFC in the az display, and 100 times that number in the el display. During this phase, they will cycle through 1,5,9,13,17,21,25,29 and 1.

#### 3.4 Phase 4 - HFC to HC Sun/sync/command

Two different sun vectors are sent the HFC in the sun/sync, and the HFC-HC sun/sync/command (SSC) is checked to verify that the same sun vector is sent to the HC's. The header byte and HC select masks are checked to verify a no-op condition. The LCD displays will remain at 1,100 during this phase.

#### 3.5 Phase 5 - Az-el Positioning Commands

The HFC is sent two different az-el position commands. The SSC is checked for the proper header byte, HC select mask, and az-el target position. The HFC status response is checked for command response received mask and HC mode bits. The LCD displays will display 5,500 during this phase.

---

### 3.6 Phase 6 - Beam Pointing Commands

The HFC is sent two different beam pointing commands. The SSC is checked for the proper header byte, HC select mask, and beam target point. The HFC status response is checked for command response received mask and HC mode bits. The LCD displays will display 9,900 during this phase.

### 3.7 Phase 7 - Secondary HAC-HFC Bus Switchover

The Stimulator terminates transmissions on the primary HAC-HFC bus, and 12 seconds later begins transmission on the secondary bus, verifying that the HFC responds. The messages 'GOING ALT HAC/HFC BUS' and 'RESPONDING HFC(S)' will be printed during this phase.

### 3.8 Phase 8 - Corridor Walks

The HFC is sent start up corridor commands on all four corridors. The corridors are all five seconds long. One corridor is sent a down command before it finishes going up. The other three are sent down commands after they finish going up. The SSC's and corridor status field of the status response are checked each second of the corridor walks. If an error occurs in the SSC, the message 'CORRIDOR WALK ERROR' is printed. If an option prefix was specified for this test, the test will wait 15 seconds to gather additional data, and then print 'ENTER SSC OFFSET'. Entry of a number from -15 to +15 will cause SSC's around the error point to be dumped to the printer. An offset of 0 corresponds to the SSC in error, -1 is the SSC immediately before the one in error, +1 is the SSC immediately after the one in error, etc.

### 3.9 Phase 9 - Emergency Corridor Walk

The HFC is re-initialized with slightly different corridor parameters, making corridors A and D thirty seconds long. The HFC is then given commands to set up the HC mode bits as follows: four HC's tracking receiver, four tracking ALT-1, four tracking ALT-2, four tracking BCS, four tracking corridor upper limit points, four tracking corridor lower limit points, and four at stow. Then, the HFC is sent commands to send two HC's up corridor A, and two down corridor D.

Next, all transmissions on the HAC-HFC bus are terminated, and the test begins monitoring the SSC's being transmitted by the HFC to the HC's. The Stimulator verifies all phases of the emergency sequence, down to sending the last HC's to stow position. If an error occurs, the message 'EMERGENCY WALK ERROR' is printed. If an option prefix was specified, the test waits 15 seconds to gather more data, and then prints 'ENTER SSC OFFSET'. SSC's around the error point may then be dumped as in phase 8.

The azimuth LCD will display seconds of run time of the emergency corridor walk sequence, and the elevation LCD will display the number of the first HC being polled by the HFC each second.

### 3.10 Phase 10 - Restoration of HAC-HFC Communication

If the short version of this test was selected (see description of HFC AUTO command), the test exits now. If the long version was selected, the test waits for the eleven minutes required before the HFC will respond to communication on the primary HAC-HFC bus, and then re-establishes communication with the HFC. During this phase, the azimuth LCD will continue to display seconds of run time, but the elevation LCD will not change.

### 3.11 Printout From HFC Automatic Test

The following printout is expected from the HFC Automatic Test (long version):

```
HFC AUTO TEST
RESPONDING HFC(S)
01
INITIALIZING HFC
GOING ALT HAC/HFC BUS

RESPONDING HFC(S)
01
INITIALIZING HFC
RESPONDING HFC(S)
01
```

STMAPO-294

MARTIN MARIETTA AEROSPACE

DENVER AEROSPACE  
POST OFFICE BOX 179  
DENVER, COLORADO 80201  
TELEPHONE (303) 977-3000

May 3, 1982

Refer to: DAC-82-389

To: U. S. Department of Energy  
P. O. Box 808  
Livermore, California 94550

Attn: Roger S. Gaither, Esq.  
Assistant Chief for Prosecution  
Office of Patent Counsel, L-376

Subj: Contract DE-ACO3-80SF10539

1. Attached is the Patent Certification on the subject contract.
2. If you have any questions, please contact me at (303) 977-6109.

Very truly yours,

MARTIN MARIETTA CORPORATION

*Phillip L. DeArment*  
Phillip L. DeArment  
Assistant Patent Counsel

PLD:jes

PATENT CERTIFICATION

DOE CONTRACT NO. DE-ACO3-80SF10539

1. The following is a complete list of technical reports prepared during the course of the work under this contract and the DOE office to which the reports were sent:

See Attachment I

2. Technical data of this contract other than reports (i.e., notebooks, drawings, etc.) are completely listed, as follows:

See Attachment II

3. Each of the above-listed documents under paragraphs 1 and 2 has been examined for invention subject matter by me and/or technical personnel under my direction; to the best of my knowledge and belief, no inventions or discoveries were made or conceived in the course of or under this contract other than the following:

<u>CONTRACTOR NO.</u>	<u>TITLE</u>	<u>DATE REPORTED</u>	<u>DOE NO.</u>
Docket # 80YD41	FASTON TERMINAL INSTALLATION TOOLS	03/09/81	S-55,956, RL-8354
Docket # 81YD19	FASTON TERMINAL EXTRACTION TOOLS	05/03/82	S-59,046, RL-8843

4. There were no subcontracts or purchase orders involving research and development, except as follows:

NONE

5. The completion date of this contract is as follows: February 13, 1982

6. The following period is covered by this certification:

December	3,	1979	to	February	13,	1982
<u>Month</u>	<u>Day</u>	<u>Year</u>		<u>Month</u>	<u>Day</u>	<u>Year</u>

Martin Marietta Corporation  
Contractor Denver Aerospace  
P. O. Box 179  
Denver, Colorado 80201  
Address

Phillip L. DeArment  
Signature Phillip L. DeArment  
Assistant Patent Counsel

Title

Submit in duplicate to:

Roger S. Gaither  
Assistant Chief for Prosecution  
California Patent Group, L-376  
U. S. Department of Energy  
P. O. Box 808  
Livermore, California 94550

Form completed by: M. Frohardt  
Date: Feb 23, 1982

Date of Certification

February 22, 1982  
Attachment I  
Patent Certification  
DOE Contract No. DE-AC03-80SF10539

1. The following is a complete list of technical reports prepared during the course of the work under this contract and the DOE office to which the reports were sent:

<u>Report Type</u>	<u>Office Mailed</u>
Monthly Submittals	Huntington Beach
Technical Status Report Issue 1 through Issue 25	Huntington Beach
Design and Manufacturing Drawings	Huntington Beach and Canoga Park
Technical Correspondence	Huntington Beach and Canoga Park
Contract Correspondence	Oakland, CA.
Deliverables	Huntington Beach and Canoga Park
Periodic Reports	Huntington Beach and Canoga Park

2. Technical data of this contract other than reports (i.e., notebooks, drawings, etc.) are completely listed, as follows:

All correspondence, reports, etc., mailed to Huntington Beach office.

Monthly submittals, Issue 1 through 25 as follows:

- a. Milestone Schedule and Status Report
- b. Cost Management Report
- c. Project Status Report
- d. Documentation Tab Run
- e. List of active changes/modifications
- f. List of drawing revisions/levels
- g. Indentured Parts List

Minority Business Reports

Updated OPDD Documentation

Controls Hardware Drawings

Software Design Specification

Safety Plan

Hazard Analysis

Preliminary Design Review Package

Preliminary Design Review Package Final

Manufacturing Plan

Quality Assurance Plan

Functional Test Plan

Functional Test Report

C/S Integrated Acceptance Test Plan

February 22, 1982  
Attachment II  
Patent Certification  
DOE Contract No. DE-AC03-80SF10539

Page Two

C/S Integrated Test Report

Supplemental Spares Plan

Two Copies of Drawings with Latest Revisions

Operational and Maintenance Manuals

Collector Subsystem Instrumentation

Maintenance Instructions

Control System Theory of Operations

Software/Firmware Design Specifications



ST1440-284

MARTIN MARIETTA AEROSPACE

DENVER DIVISION  
POST OFFICE BOX 179  
DENVER, COLORADO 80201  
TELEPHONE (303) 977-3000

10 November 1982

Ms. Mary Jane Holliday  
Contract Examiner  
Department of Energy  
California Patent Group  
San Francisco Operations Office  
Oakland, California 94612

Re: Final Patent Certification for DOE  
Contract DE-AC03-80SF10539

Dear Ms. Holliday:


Pursuant to your letter of September 7, 1982, addressed to Mr. Cecil W. Duclon, I have made the corrections you requested thereon.

With respect to Invention Disclosures 81YD16, 81YD24 and 81YD25, please see our attached letters dated March 11, 1982 wherein you were notified that these inventions are not reportable. I am also attaching Mr. Carnahan's letter dated March 22, 1982.

If we can be of further assistance, please contact our office. Mr. DeArment may be reached at (303) 977-6109 and I may be reached at (303) 977-6501/6110.

Very truly yours,

MARTIN MARIETTA CORPORATION

  
(Miss) Josephine E. Salazar  
Assistant to Phillip L. DeArment  
Assistant Patent Counsel

cc: C. W. Duclon  
W. A. Brevier  
J. T. Weber



STMPD-294

Department of Energy  
San Francisco Operations Office  
1333 Broadway  
Oakland, California 94612

Reply to:  
DOE Site Office  
P.O. Box 366  
Daggett, CA 92327  
ATTN: S. D. Elliott, Jr.

Melvin W. Frohardt  
Martin Marietta Aerospace  
P.O. Box 179  
Denver, CO 80201

JUN 25 1983

Subj.: Request for patent clearance and TIC Distribution of Documents from  
DOE Contracts ET21007 and SF10539 (Solar One Heliostats, Phases I & II)

Dear Mel:

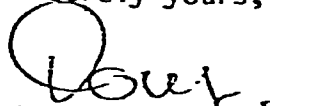
We are about to come out, with the help of EPRI, with a bibliography of key Project documents. To cope with anticipated requests for copies, I would like to arrange for properly cleared documents to be filed with and distributed through the DOE Technical Information Center at Oak Ridge. A check with TIC shows that only MCR-80-1377 has been cleared by them to date. Can you provide me with signed-off Patent Clearance Requests for:

- o The five indicated documents from the Phase I study (ET21007);
- o The twelve indicated documents from Phase II (SF10539);
- o The as-built drawing set provided via Sandia at the end of Phase II;
- o Any other Project documents generated by MMC you think the utility/industry community should have.

I'd also appreciate a check on the Phase I CDR handout; was it MCR-78-1325?

Your help is greatly appreciated; it will save me (and you) a lot of running about once the bibliography comes out. I will insure that you get a copy; it lists about 500 documents, not including drawings (these we will provide to TIC in aperture card form at a later date, with a full index). Please call me ((619) 254-2672/-2142) if you have any questions or concerns.

Sincerely yours,

  
S. D. Elliott, Jr.  
DOE Project Director



STMPU-294

Department of Energy  
San Francisco Operations Office  
1333 Broadway  
Oakland, California 94612

Reply to:  
DOE Site Office  
Post Office Box 366  
Daggett, CA 92327

Mr. Melvin T. Frohardt  
Martin Marietta Aerospace  
Post Office Box 179  
Denver, CO 80201

DEC 06 1983

Subj.: Closeout Actions on Martin Marietta Contracts with DOE San Francisco Operations Office

Dear Mel:

Nearly six months ago, I requested your assistance in finalizing patent clearance on a number of the documents from the Collector Phase I and Phase II contracts which we wish to enter into the DOE Technical Information Center system. Thus far, I have not had any response to this request. We are about to issue the bibliography developed by Burns & McDonnell under the EPRI-funded "Lessons Learned and Project Documentation" study (I assume you have received a copy of Vol. 1, "Lessons Learned" - if not, let me know and I will send you one), and we and TIC anticipate a substantial number of requests for key documents, including yours.

In addition, SAN Contracts Closeout (Sonia Jackson) advises me that several of the final documents needed to complete closeout (and release final payment of withheld funds), ~~is~~ as yet lacking, not only on the above two contracts, but also on the old Preliminary Design contract. I would greatly appreciate your assistance (or your guidance as to who can assist us) in getting this wrapped up and off both of our desks. To recapitulate (adding the items needed by SAN) for the three contracts:

DE-AC03-76ET20422 (Old Contract -1110), Central Receiver System Prel. Design:

- o A "Final Invoice", to be submitted to Sonia Jackson, with copy to me;
- o "Contractors Assignment of Refunds and Rebates", to Sonia;
- o "Contractors Release", to Sonia;
- o "Contractor Request for Patent Clearance" (send to me, only), for:
  - MCR-77-161, "System Safety Design Criteria for Central Receiver...System",
  - MCR-77-162, "System Safety Program Requirements for Solar Thermal Systems".(These were done under an extension to the Preliminary Design contract, and are valuable background documents.)

DE-AC03-78ET21007 Collector System, Phase I:

- o "Final Invoice", to Sonia, copy to me;
- o "Assignment of Funds and Rebates", to Sonia;

- o "Contractors Release", to Sonia;
- o "Contractor Request for Patent Clearance", to me, for:
  - MCR-78-1323, "10-MWe Solar Thermal Pilot Plant Conceptual Design Review";
  - MTR-78-1330, "10-MWe Solar Thermal Pilot Plant Preliminary Design Review";
  - MCR-79-1302, "10-MWe Solar Thermal Pilot Plant Final Design Review (2 Vols.)";
  - 40-0-500-4P, "10-MWe Solar Thermal Pilot Plant Phase II O&M Equipment";
  - 40-0-500-6P, "10-MWe Solar Thermal Pilot Plant Phase II Planning."

DE-AC03-80SF10539, Collector System Phase II

- o "Final Invoice", to Sonia, copy to me;
- o "Assignment of Funds and Rebates", to Sonia;
- o "Contractors Release", to Sonia;
- o "Contractor Request for Patent Clearance", to me, for:
  - MCR-79-1352B\*, "Quality Assurance Plan for 10-MWe Phase II Collector..";
  - MCR-80-1304, "10-MWe Solar Pilot Plant Collector Subsystem Safety Plan";
  - MCR-81-1331B, "Hazard Analysis for 10-MWe ...Pilot Plant";
  - 40-0-500-2P, "10-MWe ...Pilot Plant Phase II Mfg. Plan, Rev. 2";
  - MCR-80-1341A, "10-MWe Collector Sybsystem Software/Firmware Functional Req'ts.";
  - MCR-80-1362, "System Description Document, Collector Subsystem...";
  - MCR-80-1376\*, "Heliostat Stimulator Operators' Manual";
  - MCR-81-1708, "Operation Instructions, Heliostat Field Subsystem...";
  - MCR-81-1709A, "Maintenance Instructions, Heliostat Field Subsystem...";
  - MCR-81-1769, "...Collector Subsystem Functional Test Report";
  - MCR-81-1770, "Supplemental Spares Plan, Heliostat Field...";
  - MCR-80-1377A, "Software/Firmware Design Specifications...";
  - MCR-82-1701, "Control System Theory of Operation";
  - Drawing Set, as Identified in "Drawing Tree 400500 5132701";
  - Source Listing of Code for Heliostat Controller ROM or EPROM\*
  - Source Listing of Code for Heliostat Field Controller ROM/EPROM\*

Our files do not have current copies of the following other items identified in the Drawing Tree (400500 5132701):

Documents: 40M500-2S, "Foundation Req'ts.", 40M500-1T, "Installation Instructions", 40M500-2M, "Canting Procedures", 40M500-5P, "Acceptance Plan", MCR-80-1361, "Collector System Functional Test Plan", and MCR-81-1715, "Collector System Integrated Acceptance Test Plan."

\* Current copies of these four items are lacking from the Project files; your assistance in obtaining at least one copy of each will be most appreciated.

Drawings: 40M500 5132788, "Adapter Plate/Control Arm Heat Tool", 40M500 5132771, "Field Canting Tool", and 40E500 5132776, "Drive Unit Checkout Console".

While these items are not carried in the current version of the Bibliography (none of the Plant as-built drawings have been entered as yet), many, if not all, of them may be expected to be of interest to the solar community. I would appreciate at least one copy of each, again with your release. To save you considerable effort in preparing the Patent Clearance Request forms (I am enclosing several copies of the form), you may combine many of the above by simply clearing the "Drawing Tree", with its contents.

If you need the other closeout forms cited above (your Contract Administration staff should have them in stock), please call Sonia Jackson at FTS 536-4179, or write her at:

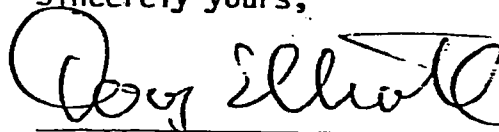
Ms. Sonia Jackson (CM)  
Department of Energy  
1333 Broadway  
Oakland, CA 94612

Finally, since we are required to forward two clean, reproducible copies of each document to DOE/TIC, as well as needing one clean copy for our on-site archives, any "extras" you can turn up around your offices would be greatly appreciated; certainly, rather than throw anything of possible interest out, send it to me.

Mel, I know (believe me!) that this is all a significant amount of work, and I wish I didn't have to ask you (or your staff) to go through it, but it will be to our mutual benefit in the end to get these three contracts all cleaned up, and a comprehensive package of Project documentation (currently, over 550 documents, plus drawings) into the archives. If there is anything further I can do to assist you in this effort, please call on me.

Encl.: DOE Proj. Ofc. ltr. 6/25/83  
Patent Clearance Req. Forms

Sincerely yours,



S. D. Elliott, Jr., Director,  
DOE Project Office, Barstow

cc: H. C. Wroton, MMC  
Sonia Jackson, DOE/SAN (CM)

PS: I keep running across references to a document I can't identify: MCR-78-1325; what was it?

STMPD-294

MARTIN MARIETTA AEROSPACE

DENVER DIVISION  
POST OFFICE BOX 179  
DENVER, COLORADO 80201  
TELEPHONE (303) 977-3000

January 30, 1984

Mr. Doug Elliott  
DOE Site Office  
Post Office Box 366  
Daggett, CA 92327

Subject: Closeout Actions on Martin Marietta Contracts with DOE San Francisco Operations Office

Reference: Letter of December 06, 1983, S.D. Elliott, Jr. to M. Frohardt, Closeout of Contracts

In regard to the referenced letter, following is the status and actions in process to close out these items:

1. Contract Closeout Status

In regard to the closeout of cost type contracts DE-AC03-76ET20422, Central Receiver Test Facility, and DE-AC03-78ET21007, Collector System Phase I, we include the "Contractors Assignment of Refunds and Rebates" and "Contractors Release" with our final invoice package. The final invoices for these two contracts will be submitted upon completion of final settlement negotiations for our 1979 overhead and G&A rates which is currently in progress. In reference to the closeout of contract DE-AC03-80SF10539, Collector System Phase II, please see Attachment 1, the letter to Ms. Joann Littlehales dated January 23, 1984, for the current status.

2. Patent Clearance

The following documents are in the process of being cleared by our Patent office. When this transmittal is available, I will send a copy to you.

- MCR-78-1323, "10-MWe Solar Thermal Pilot Plant Conceptual Design Review"
- MCR-78-1330, "10-MWe Solar Thermal Pilot Plant Preliminary Design Review"
- MCR-79-1302, "10-MWe Solar Thermal Pilot Plant Final Design Review (2 Vols)"
- 40-0-500-4P, "10-MWe Solar Thermal Pilot Plant Phase II O&M Equipment"
- 40-0-500-6P, "10-MWe Solar Thermal Pilot Plant Phase II Planning"

Mr. Doug. Elliott  
January 27, 1984  
Page 2

The remainder of the documents have been previously cleared by the following letters, copies of which are included in Attachment 2.

Letters from Phillip DeArment to Roger Gaither:

DAC-83-417, dated May 24, 1983  
80-Y-15555, dated July 28, 1980  
DAC-82-389, dated May 3, 1982  
Letter dated March 11, 1982  
Letter dated November 10, 1982

3. Documents

You requested copies of some documents and drawings in the referenced letter. Copies of the following drawings and documents are being submitted under Attachment 3.

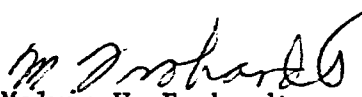
MCR-78-1330, "Preliminary Design Review Package"  
MCR-79-1352B, "Quality Assurance Plan for 10-MWe Phase II  
Collector"  
MCR-80-1376, "HelioStat Stimulator Operators' Manual"  
40M500-2S, "Foundation Requirements"  
40M500-2M, "Canting Procedures"  
40M500-1T, "Installation Instructions"  
40M500-5P, "Acceptance Plan"  
MCR-81-1715, "Collector System Integrated Acceptance Test Plan"  
MCR-80-1361, "Collector System Functional Test Plan"  
40M500 5132788, "Adapter Plate/Control Arm Heat Tool"  
40M500 5132771, "Field Canting Tool"  
Source Listing of Code for HelioStat Controller ROM or EPROM\*  
Source Listing of Code for HelioStat Field Controller ROM/EPROM

No drawing exists for 40E500 5132776, "Drive Unit Checkout Console" as this checkout console consisted of a stimulator to operate a production Drive Mechanism Assembly. Also MCR-78-1330 is the correct document number for the Preliminary Design Review Package rather than MCR-78-1325. MCR-78-1325 is the document number assigned to all the Monthly Progress Reports written during the Phase I contract.

Doug, I hope this will help in getting the documentation finalized. I will follow-up with the additional information identified. If you have any questions please call on me.

Sincerely yours,

MARTIN MARIETTA CORPORATION

  
Melvin W. Frohardt  
Solar Programs

Enclosures

cc: H. Wroton  
Sonia Jackson

## U.S. DEPARTMENT OF ENERGY

**memorandum**DATE **MAY 14 1984**REPLY TO  
ATTN OF

S. D. Elliott, Jr., Director, DOE Solar One Project Office

SUBJECT

Submission of Thirteen Reports Prepared for 10-MWe Pilot Plant ("Solar One") Project by Martin Marietta Corporation under Contract DE-AC03-80SF10539

TO:

Roger S. Gaither, DOE/SAN Office of Patent Counsel  
William D. Matheny, DOE/TIC Document Control

Enclosed are thirteen documents prepared by the Martin Marietta Corporation, Denver Aerospace Division, for the Solar Ten-Megawatt Project Office in conjunction with design and fabrication of the Pilot Plant Collector (Heliostat) System, under Contract DE-AC03-80SF10539:

<u>Primary Document No.</u>	<u>Secondary No.</u>	<u>Brief Title</u>
DOE/SF/10539-01	(STMPO-288)	"Quality Assurance Plan..."
DOE/SF/10539-02	(STMPO-289)	"...System Safety Plan"
DOE/SF/10539-03	(STMPO-290)	"Hazard Analysis..."
* DOE/SF/10539-04	(STMPO-291)	"Phase II Manufacturing Plan (Revision 2)"
DOE/SF/10539-05	(STMPO-292)	"Software/Firmware Functional Requirements..."
* DOE/SF/10539-06	(STMPO-293)	"System Description Document..."
DOE/SF/10539-07	(STMPO-294)	"Heliostat Stimulator Operator's Manual"
DOE/SF/10539-08	(STMPO-295)	"Operations Instructions, Heliostat Field..."
* DOE/SF/10539-09	(STMPO-296)	"Maintenance Instructions, Heliostat Field..."
DOE/SF/10539-10	(STMPO-297)	"...Functional Test Report"
DOE/SF/10539-11	(STMPO-298)	"Supplemental Spares Plan..."
* DOE/SF/10539-12	(STMPO-299)	"Software/Firmware Design Specification..."
DOE/SF/10539-13	(STMPO-300)	"Control System Theory of Operation"


One copy of each document, accompanied by a SAN Form 70 prepared by the Project Office (on the basis of Attachment 1, the Contractor's Patent Certification as submitted May 3, 1982), is provided for SAN/OPC review and clearance. The fabrication and maintenance materials indicated in the above list by an asterisk should be reviewed in the light of the two disclosures filed with Attch. 1, as well as the Martin Marietta Dockets 81YD16, -24, and -25, claimed as developed outside the scope of the contract in Attch. 2, MMC letter of November 10, 1982. Please return the "feedback" copies of the Form 70's to this office; the clearance copies of the documents themselves may be returned to Mr. Mike Lopez, SAN/FGS.

Two copies of each document, accompanied by a completed DOE Form RA-426, are submitted for archiving and announcement by the DOE Technical Information Center and for forwarding to the National Technical Information Service.

Attchs.: 1. Martin Marietta Ltr. 5/3/82  
2. Martin Marietta ltr. 11/10/82

Encls.: 13 Documents w/transmittal forms

cc: Mike Lopez, DOE/SAN (FGS)  
Don Holz, DOE/SAN (ISEA)  
Mary Soderstrum, Burns & McDonnell

  
S. D. Elliott, Jr., Director,  
DOE Solar One Project Office





DEPARTMENT OF ENERGY  
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE  
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No. DE-AC03-80SF10539
Subcontract No. (N/A)
Report No. DOE/SF/10539-07 (STMP0-294)
Date of Report November 1980
Name & Phone No. of DOE Technical Representative S. D. Elliott, Jr. (619) 254-2672

TO: Roger S. Gaither, Asst. Chief for Prosecution  
Office of Patent Counsel/Livermore Office  
P.O. Box 808, L-376  
Livermore, California 94550

FROM: DOE Solar One Project Office  
Post Office Box 366  
Daggett, CA 92327

- Document Title:  
"Heliostat Stimulator Operator's Manual"
- Type of Document:  Technical Report,  Conference Paper,  Journal Article,  Abstract or Summary,  
 Copy of Oral Presentation,  Other (please specify): \_\_\_\_\_
- In order to meet a publication schedule or submission deadline, patent clearance by \_\_\_\_\_ (routine) would be desired.

SENDER IS TO CHECK BOX #4 OR #5 BELOW.

- I have reviewed (or have had reviewed by technically knowledgeable personnel) this document for possible inventive subject matter (Subject Inventions) and that no inventions or discoveries (Subject Inventions) are deemed to be disclosed in this document except as stated below:
  - Attention should be directed to pages \_\_\_\_\_ of this document.
  - This document describes matter relating to an invention:
    - Contractor Invention Docket No. \_\_\_\_\_
    - A disclosure of the invention was submitted to DOE on \_\_\_\_\_ (date)
    - A disclosure of the invention will be submitted shortly \_\_\_\_\_ (approximate date)
    - A waiver of DOE's patent rights to the contractor:
  has been granted,  has been applied for; or  will be applied for \_\_\_\_\_ (date) by me
- This document is being submitted, but no review has been made of this document for possible inventive subject matter.

6. Remarks: See Martin Marietta letter 5/3/82 for Patent Certification

Reviewing/Submitting Official: Name (Print/Type) S. D. Elliott, Jr., Director  
Title DOE Solar One Project Office  
Signature *S. D. Elliott* Date 11 May, 1984

TO: INITIATOR OF REQUEST

FROM: ASSISTANT CHIEF FOR PROSECUTION  
Office of Patent Counsel/Livermore Office

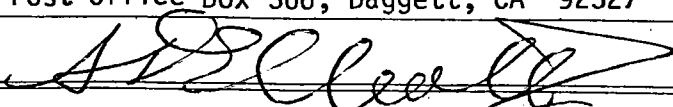
- No patent objection to above-identified release.
- Please defer release until advised by this office.

Signed \_\_\_\_\_ Date Mailed \_\_\_\_\_

DOE AND MAJOR CONTRACTOR RECOMMENDATIONS FOR  
ANNOUNCEMENT AND DISTRIBUTION OF DOCUMENTS

See Instructions on Reverse Side

1. DOE Report No. DOE/SF/10539-07 (STMP0-294)	2. Contract No. DE-AC03-80SF10539	3. Subject Category No. UC-62
4. Title "HELIOSTAT STIMULATOR OPERATOR'S MANUAL"		
5. Type of Document ("x" one) <input checked="" type="checkbox"/> a. Scientific and technical report <input type="checkbox"/> b. Conference paper: Title of conference _____  <div style="text-align: right;">Date of conference _____</div> Exact location of conference _____ Sponsoring organization _____ <input type="checkbox"/> c. Other (specify planning, educational, impact, market, social, economic, thesis, translations, journal article manuscript, etc.) _____		
6. Copies Transmitted ("x" one or more) <input type="checkbox"/> a. Copies being transmitted for standard distribution by DOE-TIC. <input type="checkbox"/> b. Copies being transmitted for special distribution per attached complete address list. <input checked="" type="checkbox"/> c. Two completely legible, reproducible copies being transmitted to DOE-TIC. (Classified documents, see instructions) <input type="checkbox"/> d. Twenty-seven copies being transmitted to DOE-TIC for TIC processing and NTIS sales.		
7. Recommended Distribution ("x" one) <input type="checkbox"/> a. Normal handling (after patent clearance): no restraints on distribution except as may be required by the security classification. <input type="checkbox"/> b. To U.S. Government agencies and their contractors. <input type="checkbox"/> c. within DOE and to DOE contractors. <input type="checkbox"/> d. within DOE. <input type="checkbox"/> e. to those listed in item 13 below. <input checked="" type="checkbox"/> f. Other (Specify) Archive/issue on request		
8. Recommended Announcement ("x" one) <input checked="" type="checkbox"/> a. Normal procedure may be followed. <input type="checkbox"/> b. Recommend the following announcement limitations:		
9. Reason for Restrictions Recommended in 7 or 8 above. <input type="checkbox"/> a. Preliminary information. <input type="checkbox"/> b. Prepared primarily for internal use. <input type="checkbox"/> c. Other (Explain) _____		
10. Patent, Copyright and Proprietary Information Does this information product disclose any new equipment, process or material? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If so, identify page nos. _____ Has an invention disclosure been submitted to DOE covering any aspect of this information product? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If so, identify the DOE (or other) disclosure number and to whom the disclosure was submitted. Are there any patent-related objections to the release of this information product? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If so, state these objections. Does this information product contain copyrighted material? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If so, identify the page number _____ and attach the license or other authority for the government to reproduce. Does this information product contain proprietary information? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If so, identify the page numbers _____ ("x" one <input type="checkbox"/> a. DOE patent clearance has been granted by responsible DOE patent group. <input checked="" type="checkbox"/> b. Document has been sent to responsible DOE patent group for clearance.		
11. National Security Information (For classified document only; "x" one) Document <input type="checkbox"/> a. does <input type="checkbox"/> b. does not contain national security information		
12. Copy Reproduction and Distribution Total number of copies reproduced <u>25</u> Number of copies distributed outside originating organization <u>10</u>		
13. Additional Information or Remarks (Continue on separate sheet, if necessary)		

14. Submitted by (Name and Position) (Please print or type)  
S. D. Elliott, Jr., Director, DOE Solar One Project Office  
Organization \_\_\_\_\_  
Post Office Box 366, Daggett, CA 92327 (619) 254-2672  
Signature  Date MAY 11 1984



DEPARTMENT OF ENERGY  
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE  
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No. <b>DE-AC03-80SF10539</b>
Subcontract No. <b>(N/A)</b>
Report No. <b>DOE/SF/10539-07 (STMP0-294)</b>
Date of Report <b>November 1980</b>
Name & Phone No. of DOE Technical Representative <b>S. D. Elliott, Jr. (619) 254-2672</b>

TO: Roger S. Gaither, Asst. Chief for Prosecution  
Office of Patent Counsel/Livermore Office  
P.O. Box 808, L-376  
Livermore, California 94550

FROM: DOE Solar One Project Office  
Post Office Box 366  
Daggett, CA 92327

1. Document Title:

"Heliostat Stimulator Operator's Manual"

2. Type of Document:  Technical Report,  Conference Paper,  Journal Article,  Abstract or Summary,  
 Copy of Oral Presentation,  Other (please specify): \_\_\_\_\_

3. In order to meet a publication schedule or submission deadline, patent clearance by \_\_\_\_\_ (routine) would be desired.

**SENDER IS TO CHECK BOX #4 OR #5 BELOW.**

4. I have reviewed (or have had reviewed by technically knowledgeable personnel) this document for possible inventive subject matter (Subject Inventions) and that no inventions or discoveries (Subject Inventions) are deemed to be disclosed in this document except as stated below:

a. Attention should be directed to pages \_\_\_\_\_ of this document.

b. This document describes matter relating to an invention:

- i. Contractor Invention Docket No. \_\_\_\_\_
- ii. A disclosure of the invention was submitted to DOE on \_\_\_\_\_ (date)
- iii. A disclosure of the invention will be submitted shortly \_\_\_\_\_ (approximate date)
- iv. A waiver of DOE's patent rights to the contractor:  
 has been granted,  has been applied for; or  will be applied for \_\_\_\_\_ (date) by me

5. This document is being submitted, but no review has been made of this document for possible inventive subject matter.

6. Remarks: See Martin Marietta letter 5/3/82 for Patent Certification

Reviewing/Submitting Official: Name (Print/Type) S. D. Elliott, Jr., Director  
Title DOE Solar One Project Office  
Signature [Signature] Date 11 May, 1984

TO: INITIATOR OF REQUEST

FROM: ASSISTANT CHIEF FOR PROSECUTION  
Office of Patent Counsel/Livermore Office

No patent objection to above-identified release.

Please defer release until advised by this office.

Signed L. E. Carnahan

Date Mailed 5/21/84

*M. Lopez, SAN*