MANUAL

for the

Computer-Interfaced Sample Changers

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DRAFT -- DRAFT

Known Problems:

need to add newer devices

CONTENTS

CONTENTS

CHAPTER 1

STEPPING-MOTOR-DRIVEN SAMPLE CHANGERS

1.1 THE **CHANGE** COMMAND

This command is currently (January, 1992) applicable to the sample changer on SAD and to the low-temperature sample changer on GLAD.

To operate the changer or to set any of its software parameters you must run the changer control program SADSAM. To do this enter the command

CHANGE

The following menu should then be displayed:

ENTER NEW POSITION (P), READ CURRENT POSITION (R),
ADJUST STEPWISE (A), SET STEP (S), CALIBRATE (C),
OR EXIT (E) ?

Enter the correct letter for the operation you desire. You will be prompted for any further inputs required. The various operations are outlined below.

1.1.1 Command Options

[Note: positions given in steps represent the sample changer coordinate in units of motor steps from the established zero position (usually the CCW limit).]

[A carriage return after any of the parameter prompts keeps the value displayed for the parameter.]

[To minimize backlash, motors are always driven in the positive direction (increasing step number) to reach the specified position. If the new position is at a lower step number than the old one, the motor is driven BKLASH steps past the new position, and then is driven in a positive direction back to the new position.]

ENTER NEW POSITION - Prompts with the current sample position and accepts a new sample position between 1 and the maximum allowed (5 for GLAD, 7 for SAD) and drives the sample changer to this position.

READ CURRENT POSITION - Responds with where the computer thinks the sample changer is currently positioned.

ADJUST STEPWISE - Prompts with the current position of the changer (in steps), accepts a new position (in steps) between the software low and high limits, and drives the sample changer to this position.

SET STEP - Prompts with the current position of the changer (in steps) and accepts a new value (in steps) for this current position.

CALIBRATE - Prompts with the currently accepted value (in steps) for each of the sample positions and of the software limit switches, and accepts new values for each of these parameters.   Also accepts input for the number of steps to be overdriven for backlash compensation and for the motor number of the motor in use on this changer.

EXIT - Exits from the SADSAM program.

1.2 DEVICE PARAMETERS

     After each of these operations, current values for all of the device parameters are displayed. For SAD the display will look something like this

NEW POSIT	1.000	CUR POSIT	1.000	NEW STEP	375.000	CUR STEP	375.000
POSIT 1	375.000	POSIT 2	2520.000	POSIT 3	4665.000	POSIT 4	6780.000
POSIT 5	8870.000	POSIT 6	11025.000	POSIT 7	13155.000	BKLASH	100.000
LOW LIM	0.000	HIGH LIM	13160.000	MOT NUM	1.000		

while for GLAD it will be similar to this

NEW POSIT	3.000	CUR POSIT	3.000	NEW STEP	4665.000	CUR STEP	4665.000
POSIT 1	375.000	POSIT 2	2520.000	POSIT 3	4665.000	POSIT 4	6780.000
POSIT 5	8870.000	BKLASH	100.000	LOW LIM	0.000	HIGH LIM	13160.000
MOT NUM	1.000						

1.3 INITIAL CALIBRATION PROCEDURE

1.   Put the stepping motor driver in "manual" mode and set the motor power switch to on (toggle switches on the stepping motor driver module).

2.   Manually drive the changer to the CCW limit switch.

3.   Use the **CHANGE** command with the SET STEP option to set the current step number to 0.

4.   Manually drive the changer until one of the sample positions is in roughly the correct place and note how many steps this was from the zero position (CCW limit switch). Repeat for each of the sample positions.

5.   Use the **CHANGE** command with the CALIBRATE option to enter these step values for the various sample positions. Also enter a step value for the software "high limit" position (above the highest sample position, but before hitting the CW limit switch). Enter which motor number (output channel of the BiRa controller) is used to drive this changer.

6.   Using the above numbers, generate a rough distance/step conversion.

7.   Switch sample changer to "auto" mode and make sure the CAMAC BiRa module (at the computer) is set to "on line".

8.   Use the **CHANGE** command with the ENTER NEW POSITION option to drive the changer to one of the sample positions. Optically determine how far the sample position is from the correct position, and using the distance/step conversion calculate the necessary change in the step value for this position. Repeat for all positions.

9.   Use the **CHANGE** command with the CALIBRATE option to enter these new step values for the various sample positions.

10. Iterate steps 8 and 9 until the desired precision is reached.

11. Repeat step 8 under various conditions to check the reproducibility.

If the changer fails to move in step 8:

a.   Check to make sure all cables are connected.

b.   Check to make sure the correct motor number was set up in step 4.

c.   Check to make sure the stepping motor driver is in "auto" mode and the BiRa module is "on line".

d.   If it still doesn't work, try repeating steps 1,2,3,7, and 8 with CCW replaced by CW. If this works, you can either leave it this way or can have the system rewired so that CW rotation corresponds to increasing step number.

e.   If it still doesn't work, check with someone familiar with the system.

1.4 OPERATING PROCEDURE

1.   Make sure the computer knows the correct current changer position, preferably by repeating steps 1,2,3,7, and 8 of the calibration sequence each time the changer is installed or whenever there is a question about the position.

2.   Make sure the stepping motor drive is in "auto" mode and the BiRa module is "on line".

3.   For operation independent of the data acquisition software, use the **CHANGE** command with the ENTER NEW POSITION option.

4.   For operation in conjunction with the data acquisition software, use the "controlled parameters" option when setting up a Run with NEWRUN. Select the changer (on GLAD this is the "DISPLEX CHANGER"; on SAD this is "CHANGER") as your device, and enter the desired position number. The sample changer will be moved to this position when this Run is started.

CHAPTER 2

'JACOB'S LADDER' SAMPLE CHANGERS

2.1 THE **SAMPLE** COMMAND

This command is currently (January, 1992) applicable to the 10-position room-temperature sample controllers used on GLAD, GPPD, and SEPD and to the POSY2 sample changer.

To operate the changer or to set any of its software parameters you must run the changer control program SAMPLE. To do this enter the command

SAMPLE

The following menu should then be displayed:

ENTER NEW POSITION (P), READ CURRENT POSITION (R),
OR EXIT (E) ?

Enter the correct letter for the operation you desire. You will be prompted for any further inputs required. The various operations are outlined below.

2.1.1 Command Options

[A carriage return after any of the parameter prompts keeps the value displayed for the parameter.]

ENTER NEW POSITION - Prompts with the current sample position and accepts a new sample position between 1 and the maximum allowed (10 for GLAD, GPPD, and SEPD; 4 for POSY2) and drives the sample changer to this position.

READ CURRENT POSITION - Responds with where the computer thinks the sample changer is currently positioned.

EXIT - Exits from the SAMPLE program.

2.2 DEVICE PARAMETERS

After each of these operations, current values for all of the device parameters are displayed. In all cases the display will look something like this

   NEW POSIT   1.000 CUR POSIT   1.000

2.3 OPERATING PROCEDURE

1. Make sure the computer knows the correct current changer position, preferably by using the **SAMPLE** command with the READ CURRENT POSITION option. Compare this with the position determined by physical inspection of the sample changer.

2. Make sure the sample changer control modules (a NIM module located at the instrument) is in "auto" mode.

3. For operation independent of the data acquisition software, use the **SAMPLE** command with the ENTER NEW POSITION option.

4. For operation in conjunction with the data acquisition software, use the "controlled parameters" option when setting up a Run with NEWRUN. Select the changer (on GLAD, GPPD, and SEPD this is "CHANGER 2"; on POSY2 this is "SAMPLE") as your device, and enter the desired position number. The sample changer will be moved to this position when this Run is started.