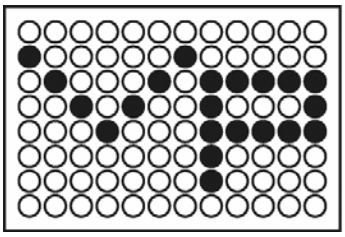

V&P SCIENTIFIC, INC.

Innovators in Liquid Handling, Arraying and Mixing

OPERATION AND CARE MANUAL FOR THE V&P SCIENTIFIC LINEAR SHUTTLE MAGNETIC LEVITATION STIRRER*

07/01/2004

*US Patent 6,357,907

TABLE OF CONTENTS

INITIAL SETUP

CAUTION!!!!!

Be advised that the Linear Shuttle Levitation Stirrer has a very strong magnetic field. People with pacemakers should not get closer than 12 inches to the magnetic dipole. Remove all magnetic influenced tools and objects from the immediate area to prevent them from being pulled onto the magnets or from striking people as they are pulled onto the magnets. Keep credit cards, watches and other magnetic sensitive items at least 1 foot from the Linear Shuttles magnetic field.

1. Have 2 people grasp the stainless steel handles on the magnetic dipole and lift it from the shipping container to where you want to place it. The Shuttle weighs ~ 60 lbs.

2. Connect the power supply to a 220 V outlet, connect round plug of the cable harness to the power supply, connect the 5 pin plug to the motor and tighten attachment screws. Connect the RS232 plug on the cable harness to your computer's serial port and tighten attachment screws.

OPERATION

SOFTWARE INSTALLATION:

Exit all programs on the computer. Insert the V&P Scientific/Animatics CD into the drive. Installation of the Animatics control program should start automatically. If the program fails to automatically launch, then browse to your CD-ROM drive and double click on Setup.exe. Once installation is completed, restart your computer.

The HELP FILE in the Animatics Folder is a great resource for assistance in customizing the control program. Sample programs are also available in this folder.

USING THE ANIMATICS PROGRAM TO CHANGE SHUTTLE SPEED:

Connect the motor to a computer loaded with the Smart Motor Interface software via the RS 232 cable. Turn the motor on. Under the File Menu, select "Retrieve Program from Motor". See **Table 1** for a list of the factory installed command lines. PLEASE NOTE: Lines 1-24 and 26-39 are machine command codes which include acceleration, deceleration and starting velocity commands that should NOT be changed. The velocity setting for the factory installed program is

200,000 (Line #25: V= 200000) and will produce 6 complete cycles/minute of the Shuttle through the magnetic dipole or 12 lifts and drops of the levitation balls/minute. Save this file as "Default Program – 12 Lifts per Minute".

To double the default velocity, change V= 200000 to V= 400000 in Line #25.

This will increase speed ~2 fold

Once the new speed is established, save the file under a new name. After saving the modified file, send it to the motor by clicking on the shortcut key labeled: "T". The program will be scanned for errors. If no errors are found it will be compiled and sent to the motor. If there are any problems, the software will tell you what to do.

To test the downloaded program remove power from the motor, wait for the LED's to go out and restore the power. The program will always be executed upon power up. In this case, the motor will move back and forth in accordance with the program you have sent it. It is fully stand-alone now and will operate without the host computer.

As an alternative to powering down the motor you can issue the "Z" command which completely resets the SmartMotor as if it were newly powered up.

TABLE 1 Default Command Lines from Motor Control Program

Line #	Command
1	KP=42
2	KI=28
3	KD=550
4	KL=20
5	F
6	LIMH
7	LIMD
8	AMPS=300
9	E=500
10	MV
11	A=500
12	V=100000
13	G
14	PRINT("MOVING CLOCKWISE - PRESS LIMIT SWITCH",#13)
15	TWAIT
16	PRINT("LIMIT SWITCH WAS PRESSED",#13)
17	WAIT=4000
18	AMPS=1000
19	MP
20	D=-20
21	G
22	TWAIT
23	O=0
24	PRINT("HOMING COMPLETE!",#13)
25	**V=200000**
26	A=100
27	WHILE 1
28	TWAIT
29	P=0
30	G
31	TWAIT
32	P=-54200
33	G
34	TWAIT
35	P=0
36	G
37	LOOP
38	END
39	END

Table 2 lists the approximate cycles or lifts per minute at different velocity settings. Use this table to record your custom settings for different experiments.

TABLE 2 Conversion from Velocity to Cycles or Lifts per Minute

Velocity Setting (V)	Cycles/Minute	Lifts/Minute
200,000	6	12
400,000	12	24
600,000	18	36
800,000	24	48

Top speed: V= 3,200,000

LOADING AND UNLOADING MICROPLATES

To load and unload microplates, turn the power switch off when the Shuttle is at the end of a cycle. Load a microplate into the hold-down shoe by simply holding the plate at a 10 degree angle and sliding the leading edge into the toe of the hold-down shoe. The trailing edge of the microplate should then snap down into the heel of the shoe and will be held in place. Check each plate to make sure it is properly seated. To unload a microplate, just lift up on the trailing edge of the microplate until it clears the heel and pull it towards you until it disengages.

All Levitation Stirrers are equipped with microplate "hold down shoes" designed to fit the Polyfiltronic/Whatman 384 deep well blocks (Uni Plate 400 - 400 ul volume) and ABgene's 96 deep well blocks (2.2 ml volume) #AB-0661. Both these deep well blocks have a broad flat flange on the bottom and no skirt. This feature allows us to easily capture the plate and hold it securely in the strong magnetic field.

CARE

The hold-down shoes are polycarbonate. They can be cleaned with mild detergents. Avoid exposure to UV light. When not in use, turn the power switch off. Do not place the power supply in a humid chamber with elevated temperature. Do not place stirrer in chamber with temperatures above 50^{o}C. Periodically check the Levitation magnets for a build up of magnetic debris on the surface. Remove any magnetic debris with a dry cloth. The Linear Shuttle motor is a “Brushless” Servo Motor and requires no maintenance.

WARRANTY

There is a one year warranty against defective parts. We will replace or repair the defective part and not charge a labor fee. Damage to the machine caused by user is not covered.