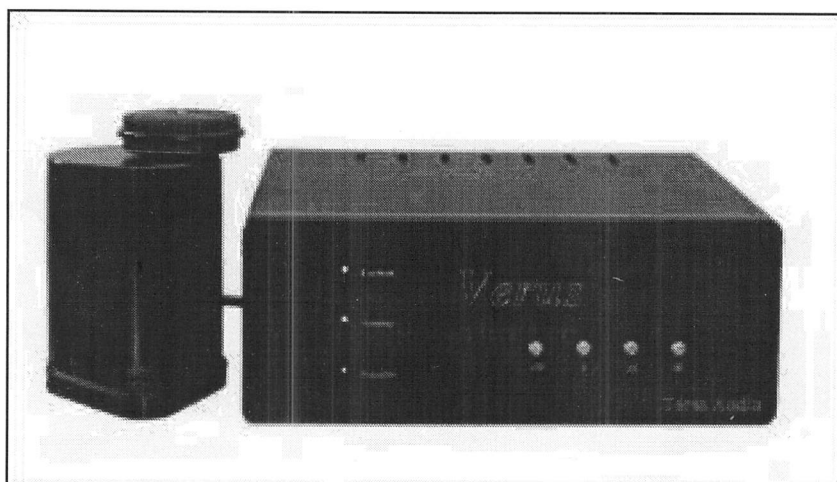


# Verus II Motor Manual

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Teres Audio Inc.



## **Description**

The Verus motor from Teres Audio introduces a simple and effective drive methodology called Direct Coupling. Direct Coupling utilizes a large diameter pulley, an o-ring and gravity to directly couple the motor to the platter. However, the primary advantage of the Verus motor is the Certus inspired multiphase synchronous motor. This unique motor topology provides speed accuracy that only a synchronous motor can deliver coupled with ultra low cogging. The Verus motor controller provides precise drive signals to the multiphase motor accurately establishing rotational speed regardless of load and without servo circuits or speed sensors. This manual applies to Verus serial numbers 93 and greater.

## **I. Setup**

1. The Verus motor unit uses gravity to apply the appropriate amount of pressure for the drive mechanism. Simply place the motor unit so that the pulley rests against the side of the turntable platter. Shift the bottom of the motor unit away from or toward the platter so that the the motor stands straight up.
2. Plug the motor cable into the back of the controller.
3. Connect the AC cord to the controller
4. Remove the controller top cover to provide access to the internal adjustment switches.
5. Adjust the spin-up rate for the fastest spin-up rate that works reliably with your bearing and platter. Eight spin-up rates are available and may be selected via switch S1, switch positions 5, 6 and 7. S1 is the upper switch block on the PCB mounted behind the front panel. See table 1 for details. If too fast of a rate is selected the platter will slow down and stop.
6. Using a strobe disk check the speed accuracy and adjust as required. Switch S2 (the lower switch block) positions 1-8 are used to provide fine adjustment of the speed (0.16% per step). The speed adjustment switches are binary coded and a total of 256 adjustment steps are available. Rather than bothering with binary numbers just follow this simple procedure for adjusting the speed.
  - α) Start with all of the switches open (the upper portion depressed). This should cause the speed to be too fast.
  - β) Close switch #8 and observe the speed with the strobe.
  - χ) If the resulting speed is still fast leave the switch closed. If the speed is slow (even slightly) then open the switch.
  - δ) Repeat steps b & c with switches 7-1

A suitable, down loadable strobe disk is available from Extreme Phono:

[http://www.extremephono.com/free\\_turntable\\_strobe\\_disk.htm](http://www.extremephono.com/free_turntable_strobe_disk.htm).

7. Adjust the motor torque setting to suit individual tastes. Sixteen torque adjustment steps are available and may be selected via switch S1 (upper switch block) switches 1-4. The default setting of 8 is optimized for Teres 200 and 300 series turntables. However, there is no correct setting and experimentation is strongly recommended.

## **II. Operation**

The Verus controller has 4 pushbutton switches for controlling operation, Off and 0, 33 and 45 RPM.

Power on the controller by pressing the 0 RPM button. When the controller is first powered up it goes through a 5 second sequence that aligns the motor magnets. The red and yellow LEDs light during this process and the platter movement will be erratic.

To start the turntable simply press the button for the desired speed. The red LED will light during the spin up process. The green LED lights when the desired speed has been reached but the speed is not fully stabilized until the red LED shuts off. To stop press the 0 RPM button. It's best to not power down the controller until the listening session is over. Do not spin the platter by hand. For 78 RPM press and release the 33 and 45 RPM buttons simultaneously.

The Verus controller has a sleep timer feature which may be used to shut off the controller after 42 minutes of uninterrupted play. The yellow LED flashes to provide a two minute shutoff warning. When the sleep timer expires the motor will shut off and the yellow LED will flash slowly. Reset the sleep timer by pressing the controller Off button. The sleep timer is disabled by default and is enabled via switch S1, Switch 8.

**Note:** It is critical for the the drive wheel o-ring be properly cared for. Do not leave the drive wheel against the turntable platter when not in use. Do not remove or disturb the drive wheel o-ring. The o-ring needs to be cleaned periodically.

### III. Controller Switch Options

The Verus motor controller has a number of options that may be adjusted via internal switches mounted on the front PCB. The top cover needs to be removed for access to the switches. There are 2 red switch blocks. The upper block is S1 and the lower S2. A switch is ON when the lower portion of the switch is depressed. In the picture below S1 switches 1, 2, 5 and 6 are ON and S2 switch 7 is ON.

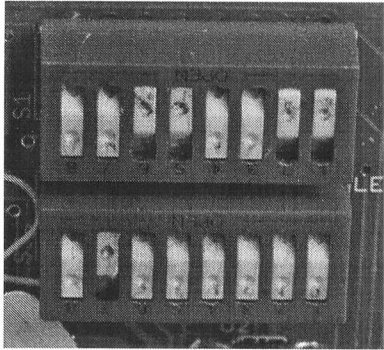


Table 1. Spin-up rates

Platter Weight (lbs)	S1 Sw5	S1 Sw6	S1 Sw7	Spin-up Time (seconds)
1-9	Off	Off	Off	2.8
10-14	On	Off	Off	4
15-19	Off	On	Off	5.6
20-24	On	On	Off	7.6
25-32	Off	Off	On	10.6
33-41	On	Off	On	15.4
42-50	Off	On	On	23.8
Over 50	On	On	On	35.5

Note: platter weights are approximate.

Table 2. Motor torque settings

S1 Sw1	S1 Sw2	S1 Sw3	S1 Sw4	Torque
Off	Off	Off	Off	-8
On	Off	Off	Off	-7
Off	On	Off	Off	-6
On	On	Off	Off	-5
Off	Off	On	Off	-4
On	Off	On	Off	-3
Off	On	On	Off	-2
On	On	On	Off	-1
<b>Off</b>	<b>Off</b>	<b>Off</b>	<b>On</b>	<b>0 Default</b>
On	Off	Off	On	+1
Off	On	Off	On	+2
On	On	Off	On	+3
Off	Off	On	On	+4
On	Off	On	On	+5
Off	On	On	On	+6
On	On	On	On	+7

Table 3. Sleep Timer

S1 Sw8	Sleep Timer
On	Enabled
Off	Disabled

#### **IV. O-Ring Maintenance**

For quiet operation the rubber o-ring must be properly aligned, clean and smooth. O-rings have small ridges left over from the manufacturing process that affect speed stability and noise. The o-rings as delivered are carefully placed and have been sanded to insure that the drive surface is uniform and smooth. If the o-ring is replaced or removed for any reason it should be realigned and resurfaced to insure that the contact surface is uniform.

**Replacement:** If the o-ring is disturbed or removed it must be carefully aligned and resurfaced for proper operation. Here is the procedure:

1. Place the o-ring over the pulley so that it is seated into the groove.
2. Tape a small square of fine sandpaper (400 to 1000 grit) onto the side of your platter where the o-ring makes contact.
3. Wedge the platter so that it does not turn.
4. Set the controller to run the motor at high speed by pressing the 0 and 33 buttons and releasing simultaneously. The motor will spin at high speed and the green light will flash. Carefully slide the motor pod toward the platter until the o-ring makes light contact with the sandpaper. It is tricky to get the pod placed so that there is only light pressure against the sandpaper. Too much pressure stalls the motor. If the motor stalls spin it with a quick flick of the finger to re-start it. Continue this process until the ridge is completely removed and there is a dull surface all the way around the o-ring.

The precision of the o-ring surface has a significant effect on sound quality. Take your time to get the correct pressure against the sandpaper and do not hurry the process. Repeat the process and let motor run for several minutes during each iteration. Patience will produce excellent precision.

**Cleaning:** The o-ring may be cleaned with rubbing (isopropyl) alcohol as required.

Replacement o-rings are available from Teres Audio or McMaster-Carr (<http://www.mcmaster.com/>) part number 9557K234. The o-rings are made from EPDM with an ID of 2-5/8" and an OD of 2-7/8" and are readily available.

#### **V. Technical Specifications**

##### **Dimensions (inches):**

- Motor pod (short): 3.2w x 5.4d x 4.3h
- Controller: 8.45w x 9.75d 3.5h

##### **Drive System:**

- Low cogging multi-phase permanent magnet synchronous (patent pending)
- High resolution digital drive signal synthesis
- Speeds Supported: 33-1/3, 45 and 78
- Speed adjustment available via internal DIP switch, 256 steps at 0.16% per step (33-1/3 RPM) and 0.21% per step (45 RPM).
- Optional sleep timer (shuts off after 42 minutes of uninterrupted operation)

##### **Power Requirements:**

- 115-125vac, 0.4 Amps, 50 watts
- 230-250vac, 0.2 Amps, 50 watts
- Fuse:
  - 120vac - 1.5 amp slow blow
  - 240vac - 1.0 amp slow blow