Operators Manual
Condor Digital
Motor Controller

The Condor Power Supply Unit (PSU) is a microprocessor controlled digital regenerative AC power source used for accurate speed control of a turntable motor. The PSU uses Direct Digital Synthesis (DDS) to create an extremely accurate and clean sine wave that improves motor speed stability and allows the user to precisely adjust the turntable platter rotational speed.

The PSU is extremely easy to use and set up. All of the operating parameters are stored in non-volatile memory and the device always power up with the last used speed and frequency offset displayed. The PSU is powerful enough to start up in either speed selection, so there is no need to start in 33 RPM, then switch to 45 RPM as in other units.

Specifications

Physical:

Dimensions:	Controller: 3.565"L x 2.50"W x 1.1875"H.
Weight:	Controller: 4 oz.
Case:	1 piece Extruded Aluminium.

Operating Modes:

Standby, Sleep, Normal, Voltage Calibration, Frequency Calibration, Factory Default Programming Programming Mode

Power Requirements:

DC Supply	24VDC 500 mA nominal Normal mode; 20mA Standby; 5mA Sleep

Output:

Voltage:	3 Phase AC sinewave 3V-24V. Phase and Voltage are frequency dependent.
Frequency:	1Hz to 100.0 Hz in 35µHz steps
Distortion:	Less than 0.5%
Speed Adjust:	±1.0 RPM in 0.1 RPM steps Normal Mode ±1.0 RPM in 0.01 RPM steps Calibration Mode
Min Freq Step:	35µHz
Freq Stability:	Crystal Controlled ±30PPM
Freq Accuracy:	±0.003%

Options:

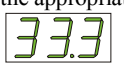
RoadRunner Tachometer input; synchronizes output frequency to digital tachometer reading to within ±0.005 RPM with 2.5PPM (±0.00025%) stability. Serial input on 3.5mm jack, 9600N81.

Operating Modes

☞ ***Note:*** The turntable belt ***MUST*** be on the ***SMALL*** pulley for proper operation.

Standby Mode: The PSU will power up in *Standby Mode* as indicated by 3 dashes: The amplifier's LED will be Red while in *Standby Mode.*

Sleep Mode: While in *Standby Mode*, if no activity is detected for 5 min., the PSU will revert to *Sleep Mode* and blank the display.

Normal Mode: To Exit *Sleep* or *Standby Mode*, press and release the ***Stby*** button. The PSU will revert to the last used speed and output the appropriate AC signal to the motor. The display will show the currently selected speed or offset: 

The amplifier's LED will be Green when the unit exits *Standby Mode.*

Soft Start: Whenever the Condor PSU exits *Standby Mode*, it starts the platter at ~3 RPM and evenly ramps up the speed to prevent "burn out" on the belt. This greatly extends the belt life and improves long term speed stability.

To change between 33.3/45/78 RPM (if enabled), press and release the ***Stby*** button.

To adjust the turntable speed in 0.1 RPM increments, press and release the ***Plus*** or ***Minus*** buttons.

To stop the turntable platter and return to *Standby Mode*, press and hold the ***Stby*** button until the 3 dashes are displayed.

Voltage Output Mode: *Voltage Output Mode* is used to adjust the output voltage the PSU reverts to after the platter has reached operating speed. The motor requires much more torque at start up than it does once the platter is on speed; by reducing the running voltage once the platter is moving, vibration and noise are greatly reduced. The PSU will always assert the maximum output voltage when starting, or changing speeds, then revert to the programmed lower voltage after approximately 3 seconds. *Voltage Output Mode* has separate adjustments for 33.3,45 and 78 RPM; all can be selected, displayed and adjusted while in *Voltage Output Mode*.

Enter *Voltage Output Mode* from *Standby Mode* by holding the ***Minus*** button; press and release the ***Stby*** button. The display will show*:*

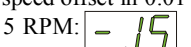
The display will then indicate the current speed selection (33.3/45.0/78.0) and start the turntable motor rotating. The display will then show the current reduced output voltage for the selected speed; range is 0 (no reduction) to -4 (maximum reduction).

Increase or decrease the output voltage for the selected speed by pressing and releasing the ***Plus*** or ***Minus*** buttons until the desired reduction is displayed. To select the other speed output voltage, press and release the ***Stby*** button. The display will show the newly selected speed, then revert to the output voltage for that speed selection. Increase or decrease the output voltage for the selected speed as above.

When output voltage selections are complete, press and hold the ***Stby*** button; the display will show "SAV" and the voltage outputs will be saved in non-volatile memory. The PSU will then return to *Standby Mode*.

Frequency Calibration Mode: *Frequency Calibration Mode* is used to fine tune the output frequency to compensate for belt tension and other variables that may cause the platter to rotate faster or slower than the indicated speed. *Frequency Calibration Mode* will adjust the base frequency in 0.01RPM steps within a range of ±1.0 RPM. *Frequency Calibration Mode* has separate adjustments for 33.3/45/78 RPM; all can be selected, displayed and adjusted while in *Calibration Mode*.

Enter *Frequency Calibration Mode* from *Standby Mode* by holding the ***PLUS*** button; press and release the ***Stby*** button. The display will show*:*

The display will then indicate the current speed selection (33.3/45.0/78) and start the turntable motor rotating. The display will then show the current speed offset in 0.01 RPM steps; range is +0.99 to -0.99. The following indicates an offset of -0.15 RPM: 

Increase or decrease the base frequency offset for the selected speed by pressing and releasing the ***Plus*** or ***Minus*** buttons until the exact turntable speed is indicated by a strobe device or tachometer. Pressing and holding the ***Plus*** or ***Minus*** buttons will automatically increase or decrease the speed at a rate of 8 times per second.

To select the other speed offset, press and release the ***Stby*** button. The display will show the newly selected speed, then revert to the offset for that speed selection. Increase or decrease the base frequency offset for the selected speed as above.

When frequency calibration is complete, press and hold the ***Stby*** button; the display will show "SAV" and the frequency offsets will be saved in non-volatile memory. The PSU will then return to *Standby Mode*.

☞ ***Note: Frequency Calibration Mode is moot if using the RoadRunner tachometer with feedback.***

Program Mode: *Program Mode* is used to specify which pulley you have (300/600 RPM), which direction the motor rotates (CW/CCW), whether 78 RPM mode is enabled/disabled and whether the pulley is 50Hz or 60Hz.

Enter *Program Mode* by removing the cable between the Condor controller and the amplfier. Press and hold the ***Plus*** button while re-inserting the cable. The display will show:

Release the ***Plus*** button and the display will show the currently selected pulley size. Use the ***Plus*** and ***Minus*** buttons to toggle between ***300/600 (250/500 if 50Hz is selected below)***. Press and release the ***Stby*** button to advance to the ***Direction*** menu or press and hold to save the current selections and return to normal operation.

Direction menu allows you to use the motor for belt drive (CW) or rim drive (CCW). Use the ***Plus*** and ***Minus*** buttons to toggle between ***Frd*** (CW) and ***Rev*** (CCW). Press and release the ***Stby*** button to advance to the ***78 RPM*** menu or press and hold to save the current selections and return to normal operation.

78 RPM menu enables or disables 78 RPM in the speed select rotation. Use the ***Plus*** and ***Minus*** buttons to toggle between ***78Y*** (enabled) or ***78n*** (disabled). Press and release the ***Stby*** button to advance to the ***50Hz*** menu or press and hold to save the current selections and return to normal operation.

50Hz menu allows you to select whether you have a 50Hz or 60Hz pulley. Use the ***Plus*** and ***Minus*** buttons to toggle between ***50H/60H***. Press and release the ***Stby*** button to go back to the ***300/600*** (***250/500***) menu or press and hold to save the current selections and return to normal operation.

Factory Default Mode: To return the PSU operating parameters to the factory defaults, remove the cable between the Condor controller and the amplfier. Press and hold the ***Plus*** and ***Minus*** buttons while re-inserting the cable. The display will show:

Release both buttons and the display will show " don" to indicate factory default settings have been restored. Press and hold the ***Stby*** button to return to *Standby Mode*.

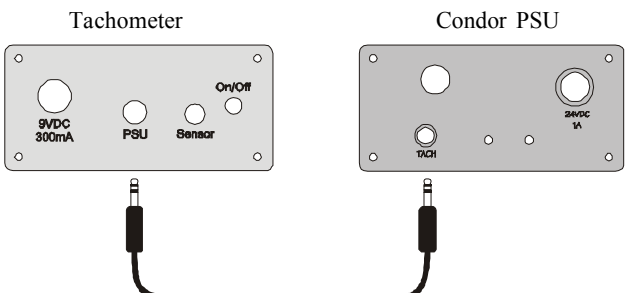
Factory Default Programming restores the following:

Current Speed:	33.3 RPM
Base Speed Offset 33.3:	0.00
Base Speed Offset 45.0:	0.00
Base Speed Offset 78.0:	0.00
Voltage Reduction 33.3:	-2
Voltage Reduction 45.0:	-2
Voltage Reduction 78.0:	-2

☞ ***Note:*** Factory Default Mode does not affect the pulley selection, motor direction or 78 enable/disable.

Tachometer Operation: The PSU can be connected directly to the RoadRunner digital turntable tachometer via a 3 wire serial cable in order to synchronize its output with the direct measurement of the platter speed. Operation is completely automatic with no user intervention needed. The tachometer outputs the speed reading once per revolution. The PSU compares this reading to the speed on the display and can make micro-fine adjustments to the output frequency to lock the turntable speed to within ±0.005 RPM. The adjustment is done slowly and evenly over the entire next revolution and is inaudible to the listener (in most cases, the adjustment is <0.0005 RPM per step). The turntable remains on speed independent of the belt tension, bearing oil viscosity, drag from the needle or any other variables that cause the table to drift over time with speed.

☞ ***Note:*** Whenever the PSU is applying a correction to the speed, the decimal point will blink on the PSU's LED display.



©2019 SOTA Sound Inventions LLC
Rev C 17-Jan-2019