Gemini Unified Treadmill
PWM DC Drive Instructions

Models 12M04-00230

INTRODUCTION

Gemini's new unified treadmill power and motor speed controller combines Gemini's state-of-the-art Pulse-Width Modulated (PWM) motor controller with the console computer power supply, elevation motor controls, and interfaces for the computer's speed sensor, elevation sensor, and speed control signals. If you need a control with phone jack connectors you will need a Model 12M04-00182 control

Specifications:

Speed Range: 100:1
Overload Capacity: 150% of rated current for 60 seconds
Maximum Speed Adjustment: 50-110% of rated speed

Model	Input Voltage	Output V. Range	HP	Cont.Output Amps
12M04-00230	115VAC	0-90VDC	1	7.5

GENERAL

These instructions provide basic information for installation and adjustment. Please contact Gemini Corp. if further information is necessary. It is possible to damage the drive through misuse or misapplication. Please read this material thoroughly before proceeding with installation. Unpack the equipment noting any shortages or damaged equipment. Immediately notify the carrier of any damage. Store in clean, dry location if the product is not used immediately. The relative humidity should not exceed 95%, non-condensing.

INSTALLATION

Carefully mount the chassis allowing clearances for access, air flow and conduit entry. The environment should be free of vibration and contaminants. The operating temperature range for the Gemini drive is 32 to 104 degrees Fahrenheit (0-40C). Since the drive produces heat, utilize a source of cooling, such as a fan, when the ambient temperature approaches 104 degrees.

WARNING: This motor control contains a high voltage DC bus with considerable capacitance and a large amount of stored energy. Direct contact with this bus can be very dangerous. Do not touch any conductors or connections to the control while power is on, for at least five minutes after removal of power. Use insulated tools for any adjustments.

WIRING

1. Input Wiring - Connect the AC line to terminals "L1" and "L2" (note wiring diagram). The 115 VAC hot is wired to the terminal "L1". If required, the chassis may be grounded at one of the unused holes. Input wire size must be in compliance with the National Electrical Code and all local codes and restrictions.

WARNING: Do not connect line power to the motor terminal connections.

2. Output Wiring - Connect the negative and positive of the motor to the "A-" and "A+" terminals of the drive. A fuse provides motor protection. Do not operate the drive without connection to the motor.

3. Control Wiring - The unified power and motor speed control combines the functions of the console computer power supply, the elevation motor control and the interconnections between the computer and the speed sensing, the elevation sensing, and the signal to the speed control, with the speed control for the belt drive motor.

Connections to the computer are made through standard modular type connector jacks labeled X1 and X2. Details of the functions of all of these connections are found in Chart #1 for X2 and Chart #2 for X1.

A small 3 terminal header, J6, connects to a potentiometer that is located on the elevation motor, and indicates the degree of elevation. Another small 2 position header connects to a magnetic reed switch located near a magnet on the driven roll for the treadmill track. Periodic closures of this switch indicate the actual speed of the treadmill to the computer. Details of the signal that this switch provides to the computer are shown in figure 2.

Power connections are made in accordance with figure 1. The elevation motor is a three terminal reversing motor that drives the front end of the treadmill up or down to simulate uphill walking or running.

The drive motor for the belt is connected to the motor control portion of the unified power and motor control as shown in Figure 1.

This list describes the connections at 8-pin modular connector X2. The pins are numbered as shown in Figure 1, viewing the connector from the top side. Numbers correspond to the manufacturer's designation of pins.

Pins number 4 and 5 provide 12 volt power to the computer from the power control board with pin 4 of positive polarity, and pin 5 negative. The negative polarity is considered signal ground or 0 volts, and will be referred to as such in the following descriptions of pin functions. This power supply is rated at 300 milliamperes of current.

Pin number 1 supplies 12 volts at 80 milliamperes from the computer to the power control board whenever the computer acts to cause the elevation motor to run in the direction that increases the elevation. At all other times, this signal is absent, either 0 volts (signal common) or open circuited.

Pin number 2 supplies 12 volts at 80 milliamperes from the computer to the power control board in the same manner as the voltage at pin number 1, but for operating the elevation motor in a direction that decreases the elevation. It is important that both pins 1 and 2 are not active at the same time, as damage to the elevation motor may occur.

Pin number 3 supplies 12 volts at 80 milliamperes from the computer whenever it is desired for the motor speed control to be operative. As a general rule, it is good practice to continue to activate the motor control by this signal whenever the treadmill is on, and to use the speed control signal from the computer to stop the motor drive as part of an exercise program. The signal at pin 3 should be used for emergency stopping or for normal deactivation of the treadmill. When used more often than necessary, the high inrush current to the motor speed control may shorten the life of the relay in the power control and the motor control itself.

Pin number 6 supplies + 5 volts from the computer to the power control for powering the elevation sensing potentiometer connected to J6, and the speed sensing magnetic reed switch connected to X7. 10 milliamperes is adequate for this purpose.

Pin number 7 is a signal ground or 0 volts from the computer to the power control board for the speed and elevation sensors.

Pin number 8 receives the signal from the elevation sensing potentiometer connected to X6. This signal varies from near zero voltage when the treadmill has no elevation to near + 5 volts at full elevation.

This list describes the functions of the pins on 6-pin modular connector X1. Again the pins are numbered as shown in Figure 1 viewing the connector from the top side.

Pin number 1 provides 12 volts of positive voltage from the computer to operate an opto-isolator used to signal the speed to the motor control. This voltage is merely passed through the power control board from pin number 4 of J4.

Pin number 2 is a pulse modulated signal whose duty cycle is proportional to the desired belt speed. The amplitude of these pulses is nominally + 5 volts, and the frequency of modulation should be at lease 50 Hz, to keep the speed control from responding to a lower frequency pulse. Upon application of power to the motor control by the signal from pin 3 of J4, the output at pin 2 of J5 should be held low for a minimum of 0.5 seconds, to allow the speed control to establish safe operating conditions. After this short delay, a duty cycle of zero percent represents zero speed of the belt, with increasing speeds resulting from greater duty cycles. The computer normally has a calibration sequence, where the duty cycle is coordinated with the speed sensing magnetic reed switch so that the indication on the console is correct.

Pins number 3 and 4 are not used.

Pin number 5 receives a signal from the power control board derived from the action of the magnetic reed switch located near a magnet on the belt drive, indicating the actual speed of the belt. Electrical characteristics of this signal are shown in Figure 2.

Pin number 6 is a signal ground from the computer to the power control board. The duplication of signal grounds in this system helps in reducing interference from one signal to another.

If additional information is desired, please contact the factory engineering department.

ADJUSTMENTS AND START-UP

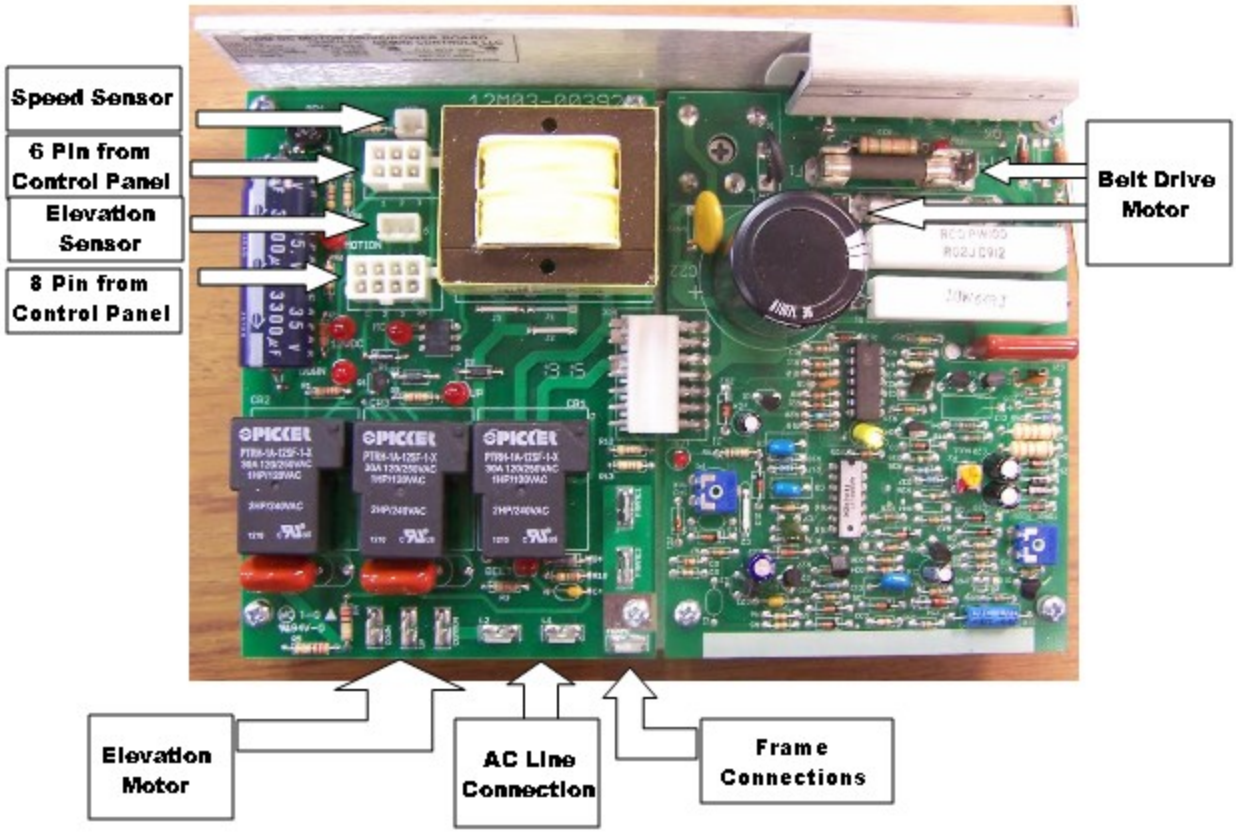
1. Turn the “TORQUE BOOST” P3 and “MAX SPEED” P1 potentiometers, located on the board to their full counterclockwise position. Do not adjust P2 Null Pot.

2. Apply power and increase the speed slightly. Observe the direction of rotation. If incorrect, turn off the power and reverse the motor armature connections.

3. Increase the tredmill speed to full speed, and adjust the “MAX SPEED” potentiometer for the desired maximum speed, or for rated motor voltage as measured with a DC meter at the armature connection.

4. Run the motor at approximately 10% speed and adjust the “TORQUE BOOST” potentiometer clockwise very slowly until the motor surges. Back off on the adjustment until the motor just stops surging.

The system is now ready for operation.



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