QuickPhase Hardware Reference Manual

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MICROKINETICS   CORPORATION

Table of Contents

QuickPhase-PC™

Installation

1   QuickPhase-PC

1.1 Features

The QuickPhase-PC is a single card IBM compatible stepper motor controller that controls up to three stepper motors. It is designed for cost sensitive applications that do not require very high stepping speeds and where the convenience of having the indexers and drivers on one card are important.

The features of QuickPhase-PC include:

- Operates interactively, i.e. no uploading or downloading of programs is required, as well as providing for keyboard control of such functions as JOG, PAUSE and ABORT, etc.

- Drives motors requiring up to 0.9 amps at 12 Volts DC (higher voltages are not recommended for use inside your PC).

- Built-in timer assures motor speed consistency regardless of the speed of the computer used.

- Programmable acceleration/deceleration.

- Programmable address selection allows coexistence with other cards that may otherwise cause address conflicts.

- Requires only one slot.

- All motor power and limit switch connections are routed to a single high density DB25 connector for low cabling cost.

1.2 Specifications & Requirements

Electrical Specifications

Drive circuit .... Bipolar constant current chopper
Chopping rate .... 20 KHz nominal
Operating Voltage range .... 5 ~ 15 VDC
Output current .... 0.9 Amp per phase(factory setting)
Limit Switch Input signals... 6 TTL compatible active low
Auxiliary Output control signals .... 2 TTL compatible active low
Motor control outputs .... 4 current mode chopper lines per axis
Current capability .... 0.9 Amp per phase continuous
Working Temperature range .... (32°F ~ 122° F (0° C ~ 50° C)
Warranty .... 5 years parts and labor

Hardware Specifications
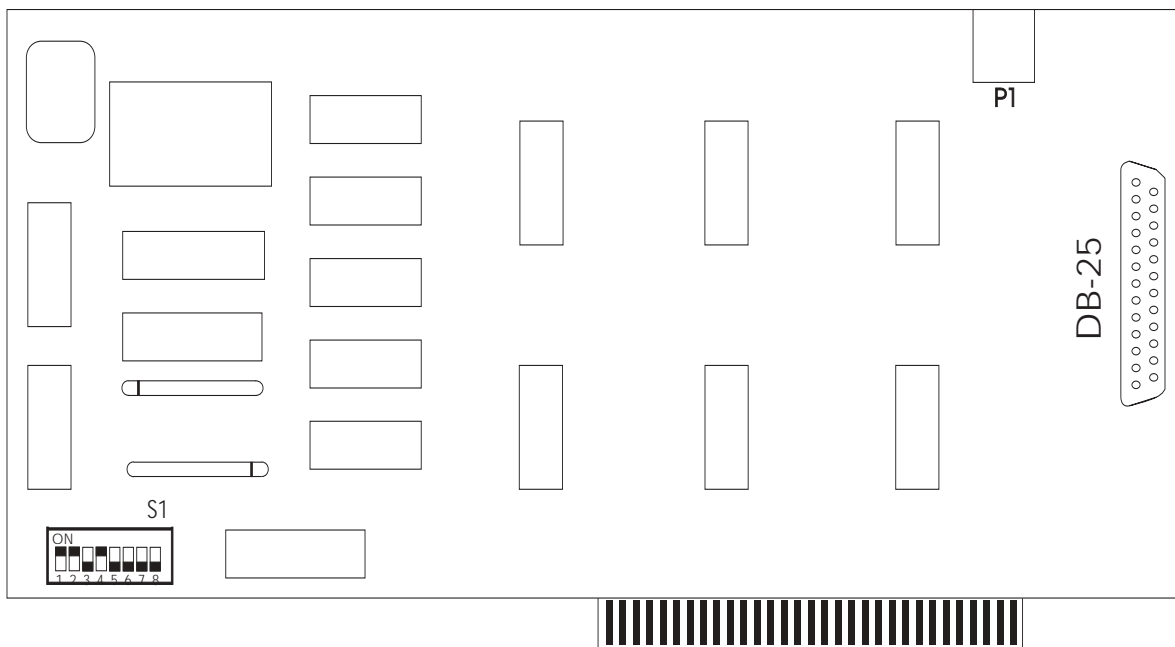
Figure 1 - QuickPhase-PC Mechanical Layout Diagram

Connector P1 is used to power the board from the computers power supply. The header is compatible with the 3.5" disk drive connector.

Requirements

8 or 16 bit IBM PC / AT expansion slot
12 volts D.C. from power supply to power stepper motors

1.3 Changing the Current Level

The QuickPhase comes standard with 0.39 Ohm resistors that set the peak current to the motor to 0.9A per phase. To change the current level you must replace resistors R2 and R5 for M1, R8 and R17 for M2, and R11 and R14 for M3. These resistors may only be replaced with 1W, 1% resistors. The resistors are inserted in miniature spring sockets for easy removal and replacement. To calculate the value of the new resistor use the equation below.

$R_s = 0.35 / I_p$

I_p = peak value of desired current

R_s = new resistor value

Once you have determined the new resistor value remove the old resistors from their sockets. Bend the legs of the resistors so they are 0.5" apart and trim the legs to approximately 0.25". Insert the new resistors in the sockets. **Note: You must change both resistors per axis.**

Caution: If the desired current level exceeds 1.0A you must install a heatsink on each motor driver to prevent the chips from overheating (U7 & U8 - M1, U9 & U10 - M2, U11 & U12 - M3). The current level should not exceed 1.2 Amps.
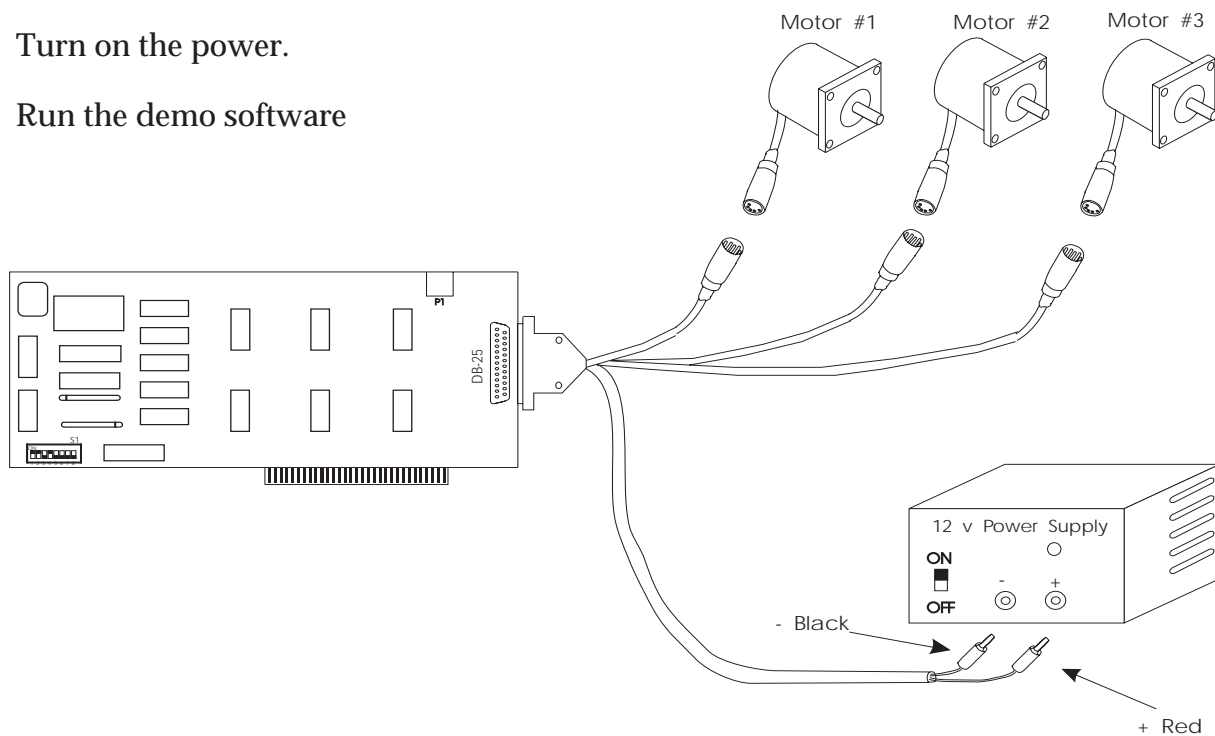
2   Installation

2.1   Installation

Follow these instructions and refer to ***Figure 2*** for proper installation:

QuickPhase-PC

1)   Turn off the computer.

2)   Set the dip switches on the card so that the selected I/O address does not conflict with other cards in the system. (The default (592) setting is usually acceptable). Refer to Appendixes A & B for more information.

3)   Insert the QuickPhase-PC card into a standard 8 bit or 16 bit slot (preferably the second or third slot from the power supply).

4)   Tighten the retaining screw.

5)   Attach the cable assembly to the connector at the back and to the motors.

6)   Connect 3.5" disk drive power cable to P1 or banana plugs to external power supply.

7)   Turn on the power.

8)   Run the demo software

Figure 2 - QuickPhase-PC Installation Diagram

2.2   QuickPhase Cable Wiring Diagram

Phase A+
Phase A-
Phase B+
Phase B-
Motor# 1

Phase A+
Phase A-
Phase B+
Phase B-
Motor# 2

Phase A+
Phase A-
Phase B+
Phase B-
Motor# 3

Shown from back of connectors.
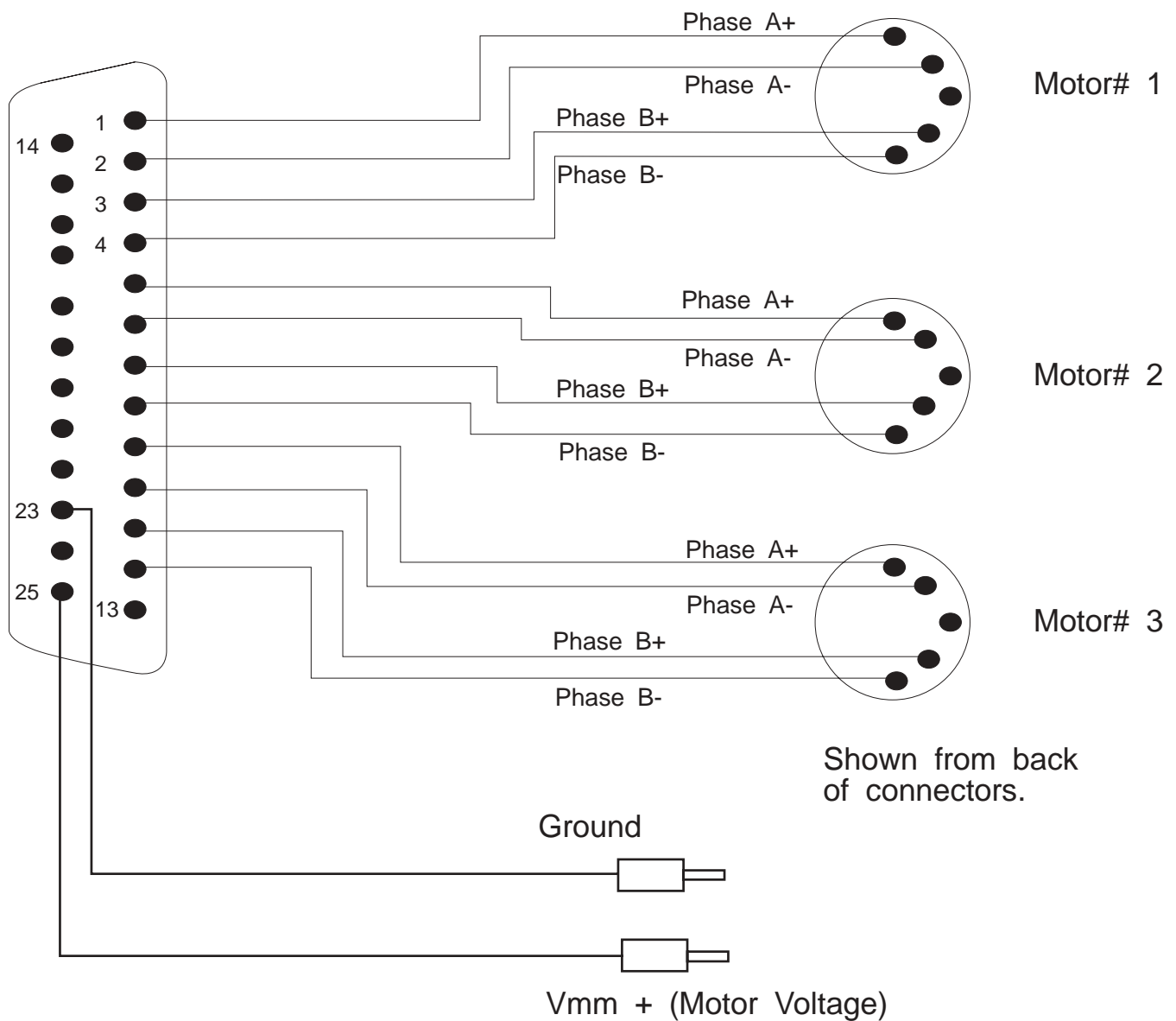
Ground

Vmm + (Motor Voltage)

Figure 3 - **QuickPhase Cable Wiring Diagram**

2.3 Stepper Motor Wiring Diagrams

2.3.1 4 Lead motor connection

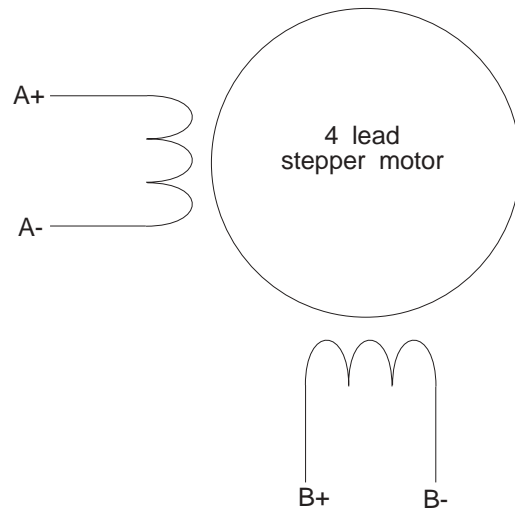Four lead motors must be connected as shown in figure 4.

Figure 4 - **4 Lead Motor Connection**

2.3.2 6 Lead motor connection

Six lead motors can be connected in two configurations, center tap and series. In center tap mode (Figure 5), the motors will run at their normal current and torque ratings. In series mode (Figure 6), the motors will have greater low end torque ratings but will not run as fast as center tapped motors. In series mode, the motors should also be run at only 70% of their rated current to prevent over heating.
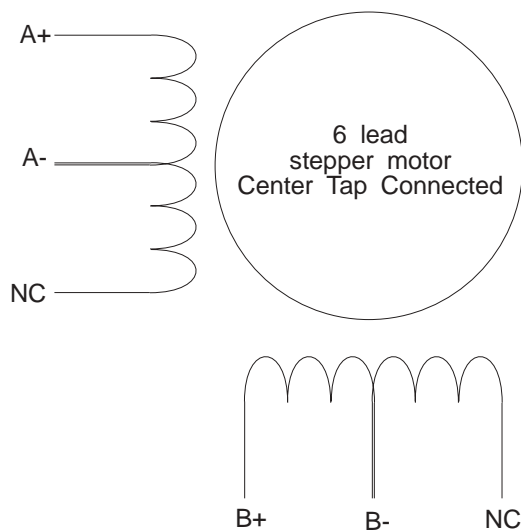
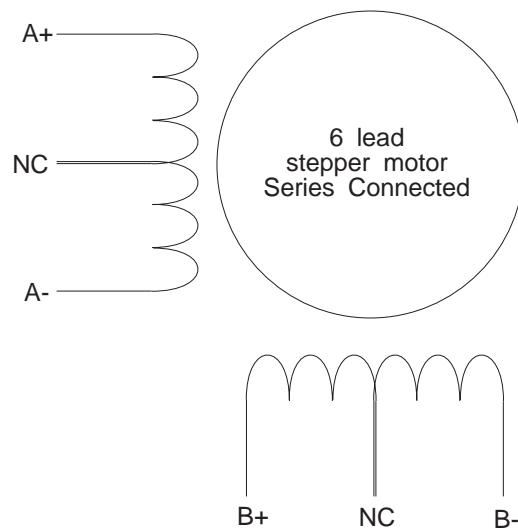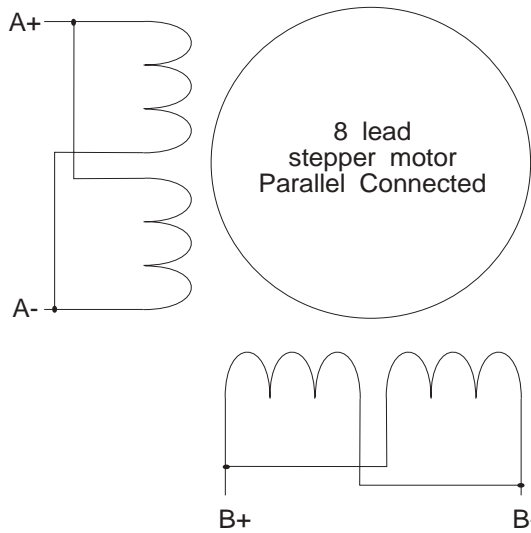**Figure 5** - **6 Lead Series Connected**   **Figure 6** - **6 Lead Center Tapped**

2.3.3 8 Lead motor connection

Eight lead motors can be connected in three configurations, parallel, series, and two of four windings. In parallel mode (Figure 7), the motor will run at 140% of its normal current rating, and will provide higher torque at higher speeds.

Figure 7 - **8 Lead Parallel Connected**
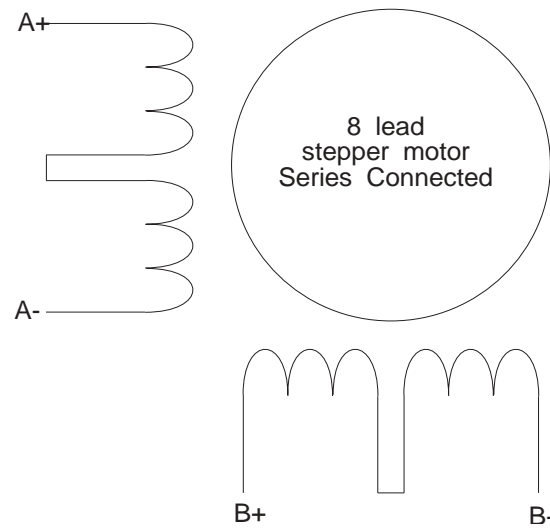
Figure 8 - **8 Lead Series Connected**

 In series mode (Figure 8.), the motor will have greater torque capability at low speeds but the torque will drop off sharply as speed increases. In series mode, the motors should be run at only 70% of their rated current to prevent over heating. The two of four method (Figure 9) uses only half of the windings available on the motor. The current requirements are those stated for the motor.
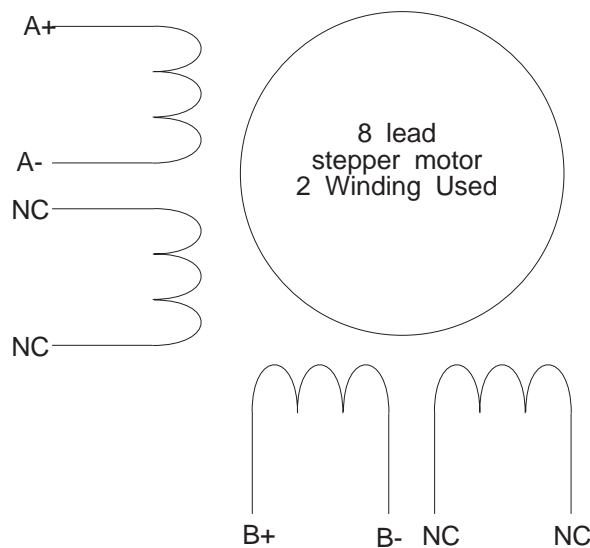
Figure 9 - **8 Lead Two Windings Used**

APPENDIX A

Dip Switch Settings

SW1	SW2	SW3	SW4	SW5	Hex	Dec
ON	ON	ON	ON	ON	200	512
ON	ON	ON	ON	OFF	210	528
ON	ON	ON	OFF	ON	220	544
ON	ON	ON	OFF	OFF	230	560
ON	ON	OFF	ON	ON	240	576
ON	*ON*	*OFF*	*ON*	*OFF*	*250*	*592 **
ON	ON	OFF	OFF	ON	260	608
ON	ON	OFF	OFF	OFF	270	624
ON	OFF	ON	ON	ON	280	640
ON	OFF	ON	ON	OFF	290	656
ON	OFF	ON	OFF	ON	2A0	672
ON	OFF	ON	OFF	OFF	2B0	688
ON	OFF	OFF	ON	ON	2C0	704
ON	OFF	OFF	ON	OFF	2D0	720
ON	OFF	OFF	OFF	ON	200	736
ON	OFF	OFF	OFF	OFF	2F0	752
OFF	ON	ON	ON	ON	300	768
OFF	ON	ON	ON	OFF	310	784
OFF	ON	ON	OFF	ON	320	800
OFF	ON	ON	OFF	OFF	330	816
OFF	ON	OFF	ON	ON	340	832
OFF	ON	OFF	ON	OFF	350	848
OFF	ON	OFF	OFF	ON	360	864
OFF	ON	OFF	OFF	OFF	370	880
OFF	OFF	ON	ON	ON	380	896
OFF	OFF	ON	ON	OFF	390	912
OFF	OFF	ON	OFF	ON	3A0	928
OFF	OFF	ON	OFF	OFF	3B0	944
OFF	OFF	OFF	ON	ON	3C0	960
OFF	OFF	OFF	ON	OFF	3D0	976
OFF	OFF	OFF	OFF	ON	300	992
OFF	OFF	OFF	OFF	OFF	3F0	1008

* Default Setting

Interrupt Selection (currently unused)

SW6	SW7	SW8	INTERRUPT SELECTION
OFF	*OFF*	*OFF*	*NO INTERRUPTS (DEFAULT)*
ON	OFF	OFF	INTERRUPT #3 SELECTED
OFF	ON	OFF	INTERRUPT #4 SELECTED
OFF	OFF	ON	INTERRUPT #7 SELECTED

APPENDIX B

Avoiding I/O address conflicts

In setting the address dip switches on the controller card you must choose an address that is not in conflict with another card in your system. The following table lists I/O port addresses used by standard devices in the IBM PC. Select an address that avoids the ones used in the table below as well as avoiding any addresses used by any special hardware that might be in your system such as tape backup hardware, video digitizers, scanners, networking cards etc..

I/O Address	I/O Channel
1F0-1F8	AT fixed disk
200-20F	Game I/O adapter
210-217	Expansion unit
220-24F	Reserved
250-277	Not used
278-27F	Second parallel printer interface (LPT2)
280-2EF	Not used
2F0-2F7	Reserved
2F8-2FF	Second 8250 serial UART interface (COM2)
300-31F	Prototype card
320-32F	XT hard disk
330-377	Not used
378-37F	First parallel printer interface (LPT1)
380-38C	SDLC or secondary binary synchronous interface
390-39F	Not used
3A0-3AF	Primary binary synchronous
3B0-3BF	Monochrome display and first parallel printer
3C0-3CF	Reserved
3D0-3DF	Color/graphics display adaptor
3E0-3EF	Reserved
3F0-3F7	5-1/4 floppy disk drive controller
3F8-3FF	First 8250 serial UART interface (COM1)

APPENDIX C

QuickPhase-PC

DB-25 CONNECTOR PIN DESCRIPTIONS

PIN#	DB-25 DESCRIPTION
1	MOTOR#1 PHASE A+
2	MOTOR#1 PHASE A-
3	MOTOR#1 PHASE B+
4	MOTOR#1 PHASE B-
5	MOTOR#2 PHASE A+
6	MOTOR#2 PHASE A-
7	MOTOR#2 PHASE B+
8	MOTOR#2 PHASE B-
9	MOTOR#3 PHASE A+
10	MOTOR#3 PHASE A-
11	MOTOR#3 PHASE B+
12	MOTOR#3 PHASE B-
13	+5 VOLTS (500mA max)
14	MOTOR#1 NEG LIMIT INPUT
15	MOTOR#1 POS LIMIT INPUT
16	MOTOR#2 NEG LIMIT INPUT
17	MOTOR#2 POS LIMIT INPUT
18	MOTOR#3 NEG LIMIT INPUT
19	MOTOR#3 POS LIMIT INPUT
20	SAFETY SHIELD INTERRUPT INPUT
21	GROUND.
22	TTL OUTPUT #1
23	GROUND
24	TTL OUTPUT# 2
25	Vmm (Motor Voltage)