Powermatic 3520A VFD Replacement

This info on a Powermatic VFD replacement is provided by Harvey Meyer, a noted woodturner and retired telecommunications engineer from Atlanta, Georgia. This is an alternative to getting an exact replacement from Powermatic for about $600. This document is only for a replacement on a 3520A. There aree differences for a 3520B.

First of all, this is not a Delta inverter. It does not fit the mounting holes on the back of the headstock. I had to install a small piece of plywood using the mounting holes on the headstock, and then mount the inverter to the plywood. Not a big deal. You will need 4 #10-32, 1.5" long, machine screws to mount the board to the headstock, and 4 #8 sheet metal screws, about 3/4" long, to mount the inverter to the board.

Second, you will need to add a wire from inside the headstock, back of the on/off or forward/reverse switch, common terminal, out the back of the headstock, to connect to the inverter. The original inverter didn't need this wire. Very simple process and it doesn't have to be a heavy gauge wire. More on this later.

Third, the new inverter does have venting slots so you need to protect it from getting dust and chips into the slots. I built a roof over the inverter and installed a thin piece of plastic on one side to keep chips out.

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Fourth, while you're wiring everything, it would be a good time to install a power cutoff switch, also mounted on the piece of plywood, so that the power to the inverter could be shut off without having to pull the plug. My lathe was plugged in for 12 years, except when there were electrical storms in the area. It's a good habit to kill the power to the inverter when not using the lathe since the inverter is always powered up even when the lathe switch is off. I just installed a gem box with a 2 pole switch and wired the power cord to one side of the switch and the inverter power terminals to the other side.

Fifth, wiring is fairly simple. I will tell you exactly which wires get connected to each terminal on the inverter. You probably can figure it out by yourself. The only tricky thing is some of the wires coming off the old inverter are at the maximum gauge that the new inverter will accept and it may be hard to push the wire into the terminals because the wires are tinned. It can be done or you can cut off the tinned ends and re-strip the wires to make them fit easier. And don't forget, you need to add one wire from the fwd/rev switch - it's low voltage so 18 or 20 gauge is fine. You need about 2 feet of wire. Any color will do.

Sixth, the old inverter used a braking resistor, inside the headstock. You won't need this with the new inverter. It has internal braking components. The 2 wires from the braking resistor won't get connected to anything. I left the resistor in the headstock and just left the wires taped together behind the headstock.

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Last is where to get the inverter: http://www.electricmotorwholesale.com/9675-KBDF-27D/
It's $208 right now. Shipping is about $15. I got mine in 2 days. Make sure you get model# KB 9675.

This inverter can run the motor at 240v AC or 120V AC. Of course you'll get 2HP at 240V AC, but you'll only get 1.5HP at 120V AC. I'm sure you'll want to run at 2HP as it's running that way now. There are other inverters available that have sealed enclosures, but they are much more expensive and have less control over the parameters.

You can download the inverter manual here if you want to read it in advance (you'll get a copy with the inverter):
http://www.electricmotorwholesale.com/index.cfm?fuseaction=product.download&fileId=8990

This is the wiring:
Wiring
L1 - Black Power
L2 - White Power

It would be good to wire the power thru a 2 pole switch so you can kill power to the inverter when not using the lathe. You can get a gem box and a 2 pole switch at Home Depot or Lowes.

U - Red to motor
V - Black to motor
W - White to motor
If your motor runs backward when it should run forward, reverse any 2 of these (U,V, or W). If you connect the colors correctly, it should run in the right direction.

2 - yellow
3 - green
4 - red
7 - black
8 - white
9 - blue
11 - common (you add this wire to the bottom terminal of the on/off switch (there's a yellow wire on there now, you have to splice in a wire and send it to #11)

Programming:
Fairly simple process. You'll accept most of the default values that are already programmed into the inverter. You'll change a small number of them. I'll give you the values and the parameter numbers. It's very simple to do this. No advanced

degree required. You'll have to program the params for maximum motor current (6.2a), acceleration time (5secs), decel time (5 secs), min frequency (0), max freq (3200), and a few others that tell the inverter that it will be controlled by an external on/off switch, fwd/rev switch, and speed control. All of this takes 5 minutes.

Programming parameters
Most of these are the default values. You really only change a few. Once you wire things up, you can actually run your motor from the controls on the VFD, but first make sure param 0.05 is set to 60, and 0.01 is set to 6.2 before you try to run the motor. Then you can run your motor.

When you're done with setting params, if the lathe doesn't operate via the lathe controls, make sure you press the local/remote button to tell the inverter that it's being controlled remotely.

Also attached a few photos showing the little enclosure I built to keep dust and chips out (I do blow some compressed air thru the vent slots every now and then.), how I mounted the on/off switch to kill power to the inverter, and where I added the extra wire to the yellow wire on the on/off switch.

Programming parameters		
Group	**Function**	**Setting**
0	.00	0000
	.01	6.2
	.02	
	.03	0000
	.04	0000
	.05	60
	.06	100
1	.00	0001
	.01	0000
	.02	0000
	.03	0000
	.04	0000
	.05	0000
	.06	0.5
	.07	3
	.08	0
	.09	0000
	.10	0
	.11	0.00
	.12	0

	.13	0.0
2	.00	0001
	.01	0000
	.02	0000
	.03	0000
3	.00	5.0
	.01	0.00
	.02	130
	.03	5.0
	.04	5.0
	.05	0.0
	.06	0.0
	.07	0.00
	.08	0.00
	.09	0000
	.10	6.0
	.11	
	.12	
	.13	0000
	.14	7.0
	.15	0000
	.16	5.0
	.17	
	.18	0001
	.19-.24	
4	.00	0000
	.01	100
	.02	0000
	.03	0000
	.04	0000
	.05	0000
	.06	0000
5	.00	0000
	.01	0001
	.02	0005
	.03	0.00
	.04	1.00
	.05	60
	.06-.13	
	.14	0000
	.15	100
6	.00	factory
	.01	factory

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	.02	factory
	.03	factory
	.04	factory
	.05	factory
	.06-.09	
	.10	0000
	.11	0000
	.12	0001
	.13	0000
	.14	0001
	.15	0001
	.16	0000
7	.00	0000
	.01	0001
	.02	0006
	.03	0007
	.04	0010
	.05	0003
	.06	0004
	.07	10.00
	.08	15.00
	.09	20.00
	.10	25.00
	.11	30.00
	.12	35.00
	.13	40.00
	.14	0000
	.15	1.00
	.16	1.5
	.17-.33	
9	.00	100
	.01	0000
	.02	0
	.03	0000
	.04	2
	.05	100
	.06	0000
	.07	0
	.08	2