

# Fitting Ah-ha to a machine using Gecko Servo drives

Please note these instructions are for guidance. If you have any doubt on any particular point please check with us. If you have any difficulties in getting your machine running give us a call. We can nearly always get your machine running, hopefully without an engineers visit and any great expense. If you find any part of this documentation unclear or spot any errors PLEASE let us know. We constantly revise and add to our documentation in order to make fitting Ahha control as straight forward as possible. We suggest you read the document right through before following the detailed instructions.

If you have a machine with programmed functions such as spindle on/off, coolant on/off, tool changer, spindle speed etc. that still function it is a very good idea to operate all these individually if possible before disconnecting the old control and identifying the relays and contactors used along with the associated terminal numbers and making a careful note of what does what.

Before removing or disconnecting existing wiring switch off the Machine and Isolate from the mains!

First check the items you need.

We supply the following:-

1 Ah-ha IF card that fits in the PC as per the Ah-ha instruction manual.

1 EMT IF Card that fits in or near the machine electrics.

2 cables that connect the Ah-ha card to the EMT card. We supply 2 so that they can be joined through a slot cut in the cabinet wall saving having to make 37 connections!

You will need the following:-

A normally open push button that switches on the EMT IF card. We recommend adding a normally open contact to the existing machine ON button if there is one.

A normally closed Emergency stop button or additional normally closed contacts on any existing Emergency stops.

A normally open push button to act as the spindle enable.

24 volt DC power supply if there is not one on the machine.

A Power supply for the drives if there is not a suitable one on the machine.

A 5 volt power supply for the step and direction signals

You may need the following:-

A normally open push button to act as remote start if required.

A normally closed push button to act as remote feed hold if required.

Normally closed axis limit switches if they are not already fitted.

### MOST IMPORTANT

All servo machines should have shut down switches fitted on all axes at extreme travel. These should be fitted outside the limit switches that are connected into the EMT IF card sufficiently far away so that they are not operated if the axis hits a limit at rapid speed. If the machine is being retrofitted and already has had servo drives it is highly likely that suitable switches exist and are already wired into the system. We suggest that you wire the shut down switches in series and link directly into the E stop chain that is connected into the EMT IF card Estop terminal. That way you cannot switch on our circuits if you are on a shut down switch. Normally this should never happen and if it did you would have to wind the axis off the switch by hand. Alternatively you can fit a shut down override button but this must only be operated once you have removed whatever caused the axis to hit the shut down in the first place. Failure to do this could result in MAJOR damage. The contactor that will switch on the servo drives is operated through the Terminals Estop1 and Estop2 on the EMT IF card.

The other thing to be aware of is that the motors can run away at speed if you get the encoder connections reversed. Therefore it is essential that the motor encoder assembly is disconnected from the ball screws when you are setting up so that the motors can turn without moving the axis.

We also STRONGLY recommend that you wire up one motor only to start with and get that running correctly. That way if you make wiring errors you will only have one axis to deal with. You will find almost certainly that once you have completed one axis successfully the others will be much easier.

### Suggested Procedure

Mount the EMT IF card in the existing cabinet (if possible) at a location where 1 of the 37 way cables can reach to a wall of the cabinet at a point where the second cable can reach the PC.

If you are fitting an EMT 16OP IF card to control a tool changer and spindle speed it is a good idea to mount this at the same time again siting the board where one of the 25 way cables can reach the cabinet wall close to the 37 way cable.

Locate the existing 24V DC power supply or mount a new one.

A 24V DC connection should be made to our IF terminal T3-1 (The EMT IF terminals are numbered from the bottom in 4 blocks. T3 means the 3rd block up and the 1 means the lowest terminal on that block. It is clearly marked +24VDC. If it is not you have identified the WRONG terminal DO NOT CONNECT and check again until you fully understand our terminology).

A 24V return connection should be made to EMT terminal T1-1.

Fit the Normally Closed contacts to the emergency stop switch(es) and take a 24V connection in series to

EMT terminal T1-12 If you are not using any guards with interlock switches this is a good time to link out the built in guard circuit by fitting a link between EMT terminal T1-11 and 24V.

Fit the new ON push button or the normally open contact to the existing ON push button and make a connection from 24V to one side of the contact . Connect the other side of the contact to the EMT terminal T1-10 (RESET).

Locate the machine limit switches and check they are normally closed. Wire the limit switches normally closed as per the drawing. Taking Z + as an example first remove the existing wire from the common and trace it back to a suitable connection point where it can be disconnected safely. Connect a new wire to the common and connect the other end in the machine cabinet to +24V DC. Connect the other side of the switch to EMT terminal T2-3.

Repeat For the Z - switch but using the terminals as the drawing (The common can be just connected to the common of the Z + limit switch).

Now deal with the X and Y limit switches in the same way.

A N/O push button needs to be fitted to act as the spindle enable button and we normally fit a small button somewhere on the existing machine panel. Connect this new switch as per the circuit diagram supplied using 2 more new wires . Note the purpose of the enable button is to prevent the spindle running just from the PC control. Whenever the control issues a spindle command the programme operation is suspended until the enable button is pressed which also starts the spindle. To be used the Block allow parameter must be mapped to 202. If you use a N/O (normally Open) switch the polarity must be set in parameters to LOW=TRUE. If you are going to use the remote cycle start and feed hold 2 more push buttons need to be fitted at a convenient position and wired back to the EMT board using AUXIN 3 for feed hold and AUXIN 4 for cycle start. These must be mapped in the parameters to 203 and 204 respectively. If you use a N/O (normally Open) switch the polarity must be set in parameters to LOW=TRUE and for a N/C (normally closed) switch HIGH=TRUE. We strongly recommend N/O (normally Open) switches for Enable and Cycle Start and N/C (normally closed) switch for Feed Hold.

Fit the card supplied with the software into the PC as the Ah-ha instructions and connect the PC board and the machine interface using the 2 cables supplied joining the cables at the slot already cut in the cabinet. Check that the machine is connected correctly to the 3 phase mains and most important that the earth connection is properly made and of an adequate size. At this stage it should be safe to switch on the machine but take care in case any mistakes have been made in the new wiring. If all is well you can now press the on button which will switch on both the machine electrics and the new interface card. You should now see red LED's on indicating RLE1 is on and all the green LED's for limits that have been connected are on. If this is not the case switch off and carefully go through all the connections you have made looking for any errors.

Install the drives on a suitable heat sink using a heat sink compound. Note that the terminals lifted off the drives for access to the mounting screws. The heat sink must be cooled by a fan wired to be on whenever the machine is switched on. Fitting a thermal switch on the heat sink as close to each drive as possible. Fit the transformer(s), drive capacitor, the bridge rectifier, a fuse holder for each drive and the drives contactor C1

where ever convenient. Note that if you use toroidal transformers under no circumstances should both ends of the fixing bolt be allowed to come simultaneously into contact with the metal chassis so that an electrical path is formed through the bolt in the centre of the transformer via the chassis. This would result in a direct short and cause considerable damage. A clearance of 4 mm must be allowed over the mounting hardware. Wire the drives and power supply as per the drawings. Ideally run the motor leads through a shielded 3 core cable. Use the third lead to ground the motor back to the drive. The motor armature windings form one plate of a capacitor, the bobbin it's wound on forms the capacitor's dielectric or insulator. The motor case forms the other capacitor plate and it must be shorted back to the drive supply ground to silence interference. Note that the encoder cables MUST be screened cable. You can use CAT 5/6 cable for the encoder. It's twisted-pair, it's shielded and it's cheap. Make sure you get flexible CAT cable. Very important: Run CH\_A and encoder supply ground down one pair, run CH\_B and encoder +5VDC down another pair. Never run CH\_A and CH\_B down the same pair! The cross-talk will 'kill' the system. Ground the CAT 5/6 shield at one end only, usually at the control box end. This keeps external noise safely outside the cable while preventing CH\_A and CH\_B from interfering with each other. The 1000uF capacitors can be mounted into the terminal block on the drive with the power wires. Wire the thermal switches into the E stop chain.

DO NOT insert the fuses. Check the voltage to the fuse holders which must be no more than 70V DC and double check the motor wiring is as per the drawing. Any errors and the drives can be destroyed. When you are sure every thing is OK insert ONE fuse only and power up the system with the On button. This brings in the drive contactor C1. The drive power led should come on and the motor lock in position. If all is well shut down using the E stop button and when the capacitor has discharged insert the fuses for the other drives. The drive led brightness shows the capacitor charge state. It is common practice to put a discharge resistor across the terminals of the capacitor. It would need to be at least a 25 Watt wire wound resistor and we suggest 2K2 ohm as a reasonable value.

Wire the Step and direction signals to drives as per the drawing.

### Loading the software

From DOS (Never Windows)

Insert Floppy Disc in Drive A and log onto A by typing in A: and pressing the enter key.

Type GO and press Enter

When the self-extracting process is complete you can run the software.

Re boot the computer and you will get an option screen enabling you to run Artisan version 4.0, the previous version of artisan or DOS. The option to run the earlier version of Artisan is only applicable if you have the old version and have upgraded.

If we have supplied a PCK file on disk do the following:-

After Running Ah-ha software and for the first time go into setup (ALT S) and then into the CNC timing

menu and make a note of the Linear master timer rate and circular timer rate. These are generated to match the speed of your computer. Exit the software.

Insert the disk with the PCK file and log onto A by typing in A: and pressing the enter key.

Type GOS and press Enter. This will copy the PCK file

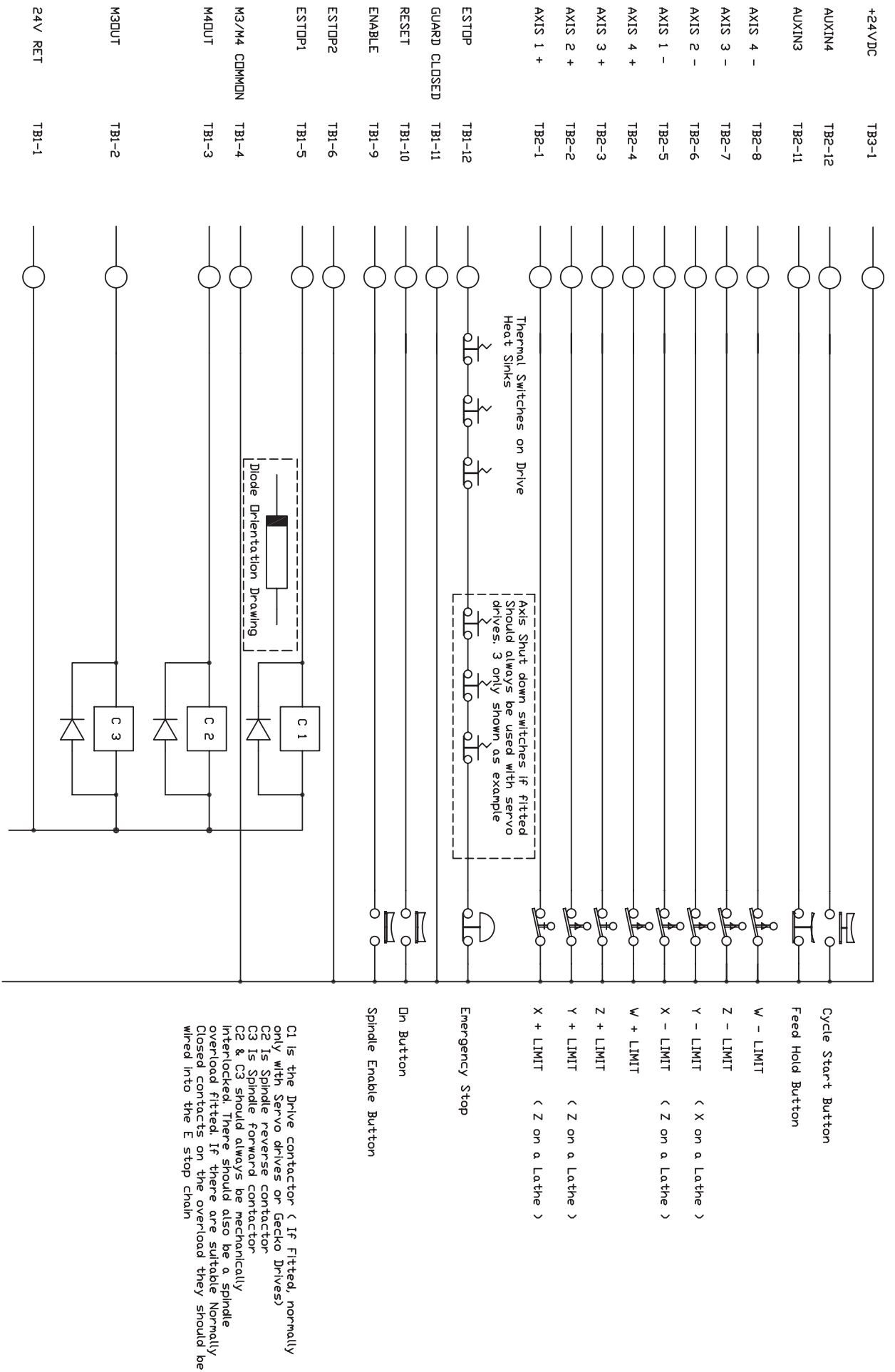
Run the software again by typing CNC40 followed by the enter key and then change the timer rates to the value previously noted (If necessary).

Make sure you have the input and output polarities set correctly for any custom switches and you have fitted.

With Gecko Drives The Step Line polarity parameter must be set to High=True

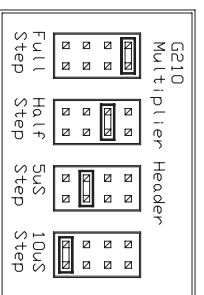
The parameter is in setup ( ALT S) sub menu 8 cnc system configuration menu

If the machine has programmable spindle speeds you will probably need to create an MCDMAP.AGC programme in the CNC40 directory. If we have provide an example this can be installed by typing A: enter and GO enter in the same way as the PCK file was installed. Please note that if you edit the MCDMAP.AGC programme from within the CNC software you must exit to DOS and restart the CNC software as otherwise your changes are not recognised. This is because if an MCDMAP programme is present in the CNC40 directory it is loaded into memory when the software is started.

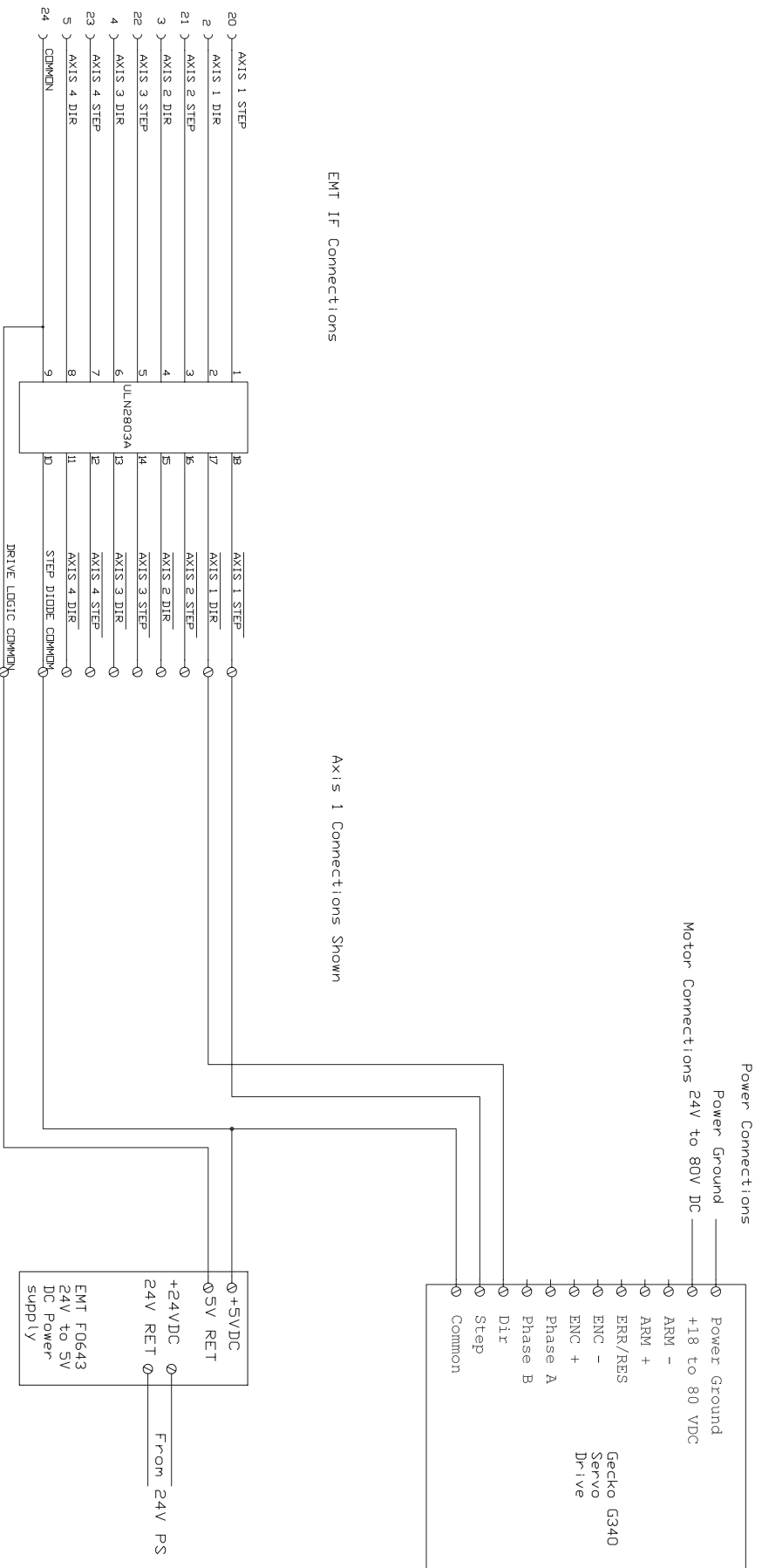


C1 is the Drive contactor ( If Fitted, normally only with Servo drives or Gecko Drives)  
 C2 is Spindle reverse contactor  
 C3 is Spindle forward contactor  
 C2 & C3 should always be mechanically interlocked. There should also be a spindle overload fitted. If there are suitable Normally Closed contacts on the overload they should be wired into the E stop chain

The Alpha Step Line Polarity MUST be set to HIGH = True  
 If Using Gecko G340 the drive must be set for 5 Volt Common Command. This is NOT the Default



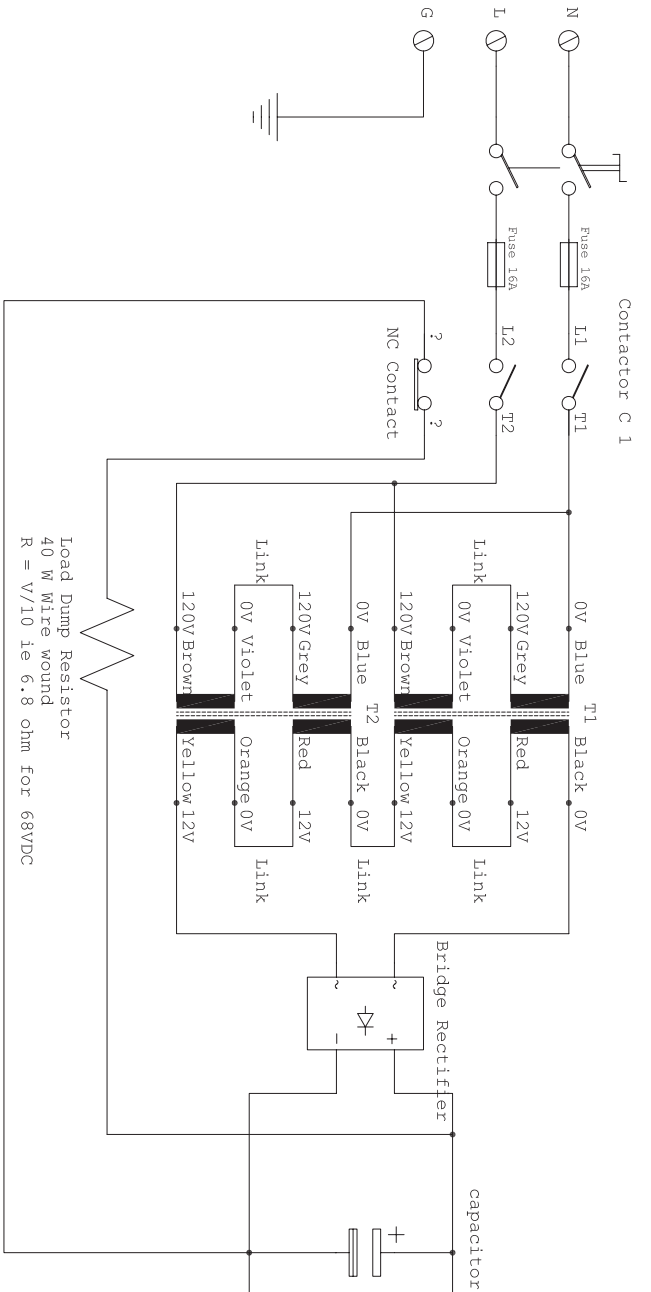
Full Step means 1 Step in 10 micro steps  
 10 uS Step means 1 step in 1 micro step



Gecko G340 IF to drive Connections ( 5 Volt Common )

R. I. E. 25-01-2006

F0640A05



2 Transformers Wired in parallel on the input side and in series on the outputs. Make sure you do not exceed 70 Volts DC after the rectifier.

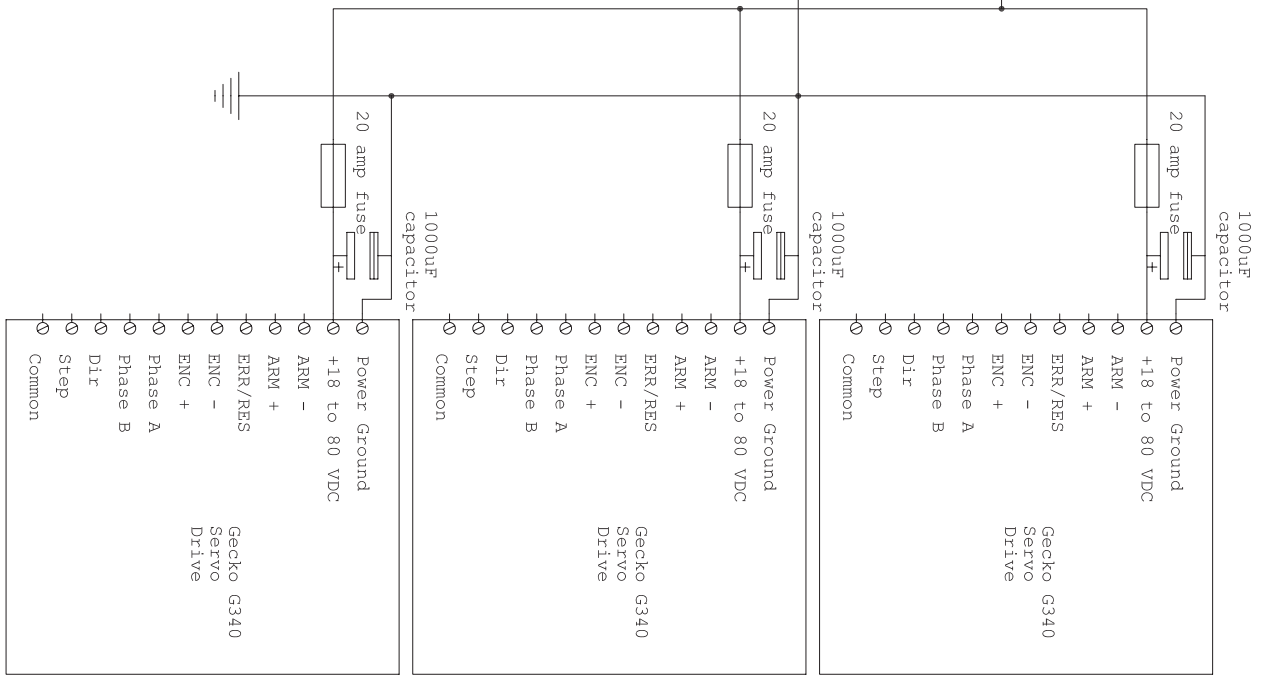
Colours may vary on different makes of transformers.

The transformer rating must equal the maximum current you expect to run the motors at.

Capacitor value

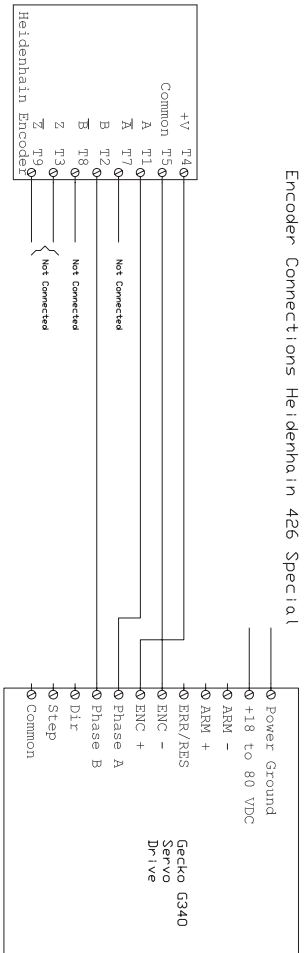
$uF = 80,000 * \text{current (A)} / \text{VDC}$  Typically for a Gecko this cannot exceed 20 amps and 70 Volts  
 Therefore  $uF = 80,000 * 20A / 70VDC = 22,000uF$  per motor  
 However you are unlikely to draw 20 amps on all motors at once.  
 So if you have a capacitor available that is slightly smaller than sum of all the currents it should be safe to use it

Keep AC wiring away from all other circuits. 300mm is recommended.

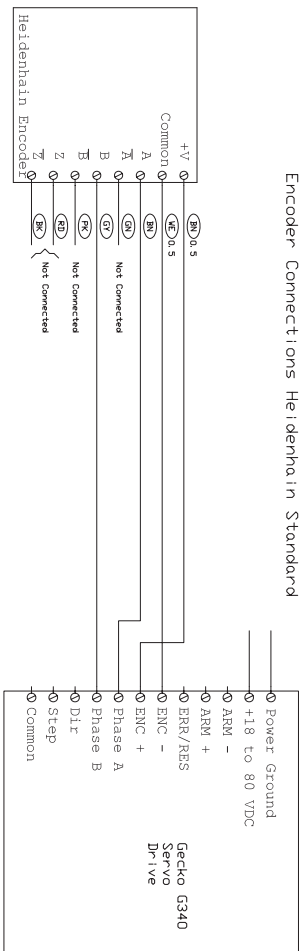


If the encoder supply current is more than 50 mA, use an external +5VDC supply. The encoder may have an INDEX or Zero output which will not be used. If it has differential outputs, use only the + phase outputs. **IMPORTANT:** Connect a 470-ohm resistor from Term. 6 to Term. 7 if an external power supply is used for the encoder.

Encoder Connections Heidenhain 426 Special

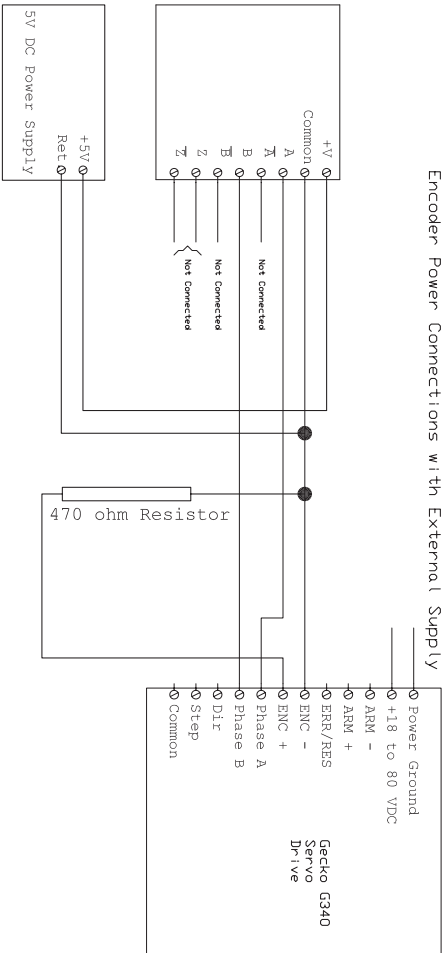


Encoder Connections Heidenhain Standard

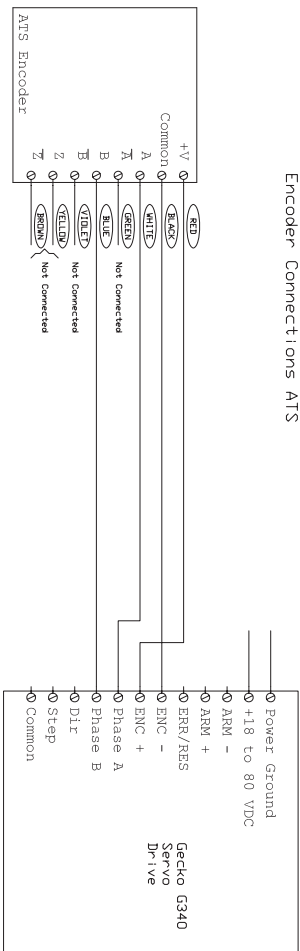


**IMPORTANT!** Check your colours against the Heidenhain Name Plate!!!

Encoder Power Connections with External Supply



Encoder Connections ATS



**IMPORTANT!** Check your colours against the Encoder Name Plate!!!