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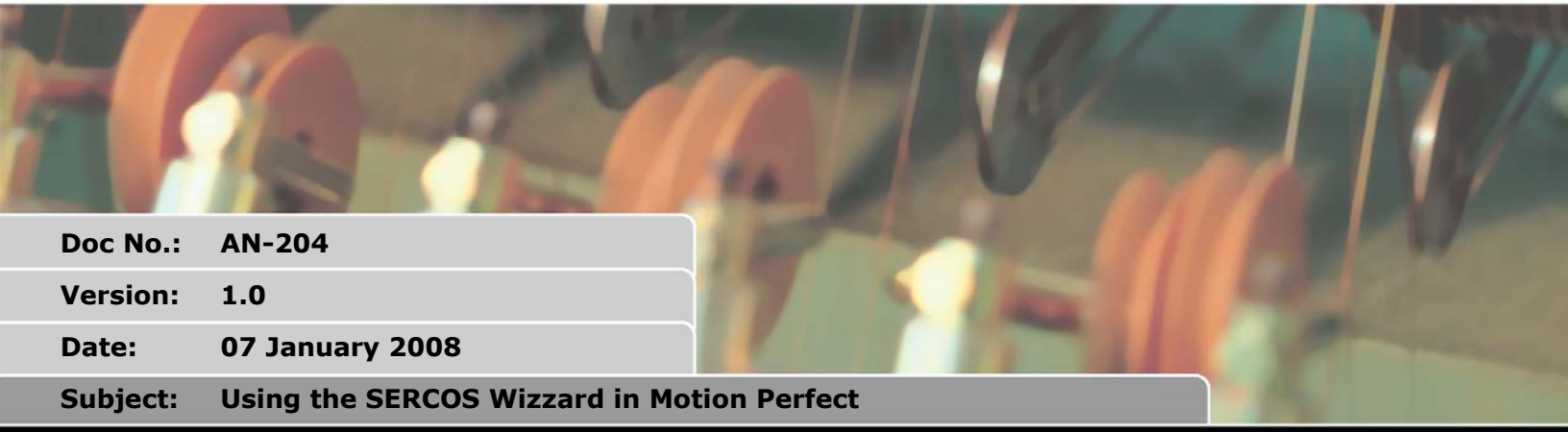

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Subject: Using the SERCOS Wizzard in Motion Perfect

APPLICATION NOTE

www.triomotion.com

1. Introduction

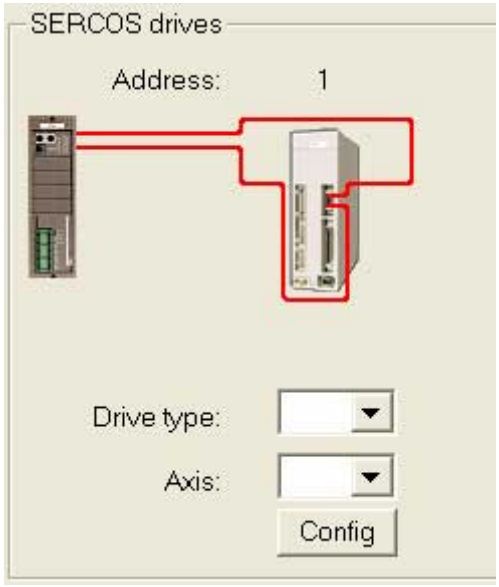
Motion Perfect contains a set of set-up pages that provide the user with a straight-forward method for initialising a SERCOS system. This application note is a step-by-step guide to using the wizard. It also includes some additional technical information to help with debugging the SERCOS ring.

To use the SERCOS setup pages, you must have a compatible Motion Coordinator fitted with at least one P291 SERCOS Daughter Board. One or more SERCOS drives must be connected to the fibre optic SERCOS ring.

2. Starting the SERCOS set-up wizzard

Open Motion Perfect and "connect" to the Motion Coordinator in the usual way. Using the PC mouse, select the *Tools* menu, then click on *Intelligent Drives*. Select *SERCOS* from the list. If SERCOS is "greyed out" it means that there is no P291 SERCOS Daughter Board fitted to the controller.

Motion Perfect will scan the SERCOS ring and the SERCOS setup window will now open. It will initially show a graphic representation of the discovered drives along with two selectable boxes below each drive. The selection of the drive type and the axis number will be done using these boxes.

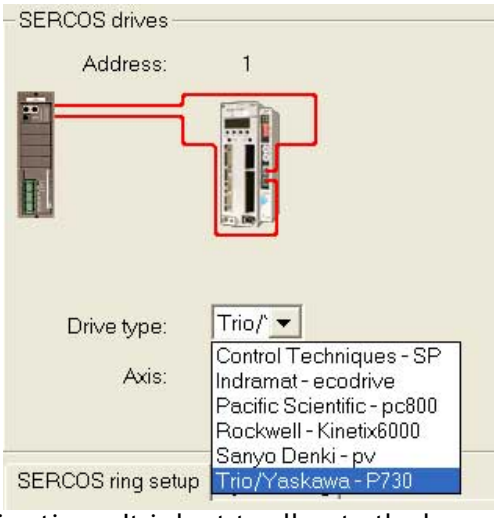


Hint: If no drives are discovered, make sure that the baud rate is correctly shown on the lower half of the setup window. If the baud rate must be changed, select the correct baud rate then click the *Scan SEROCS Ring* button to scan for the drives again.

3. Setting drive type and axis number

Click the pull-down arrow next to Drive type and select the drive from the list.

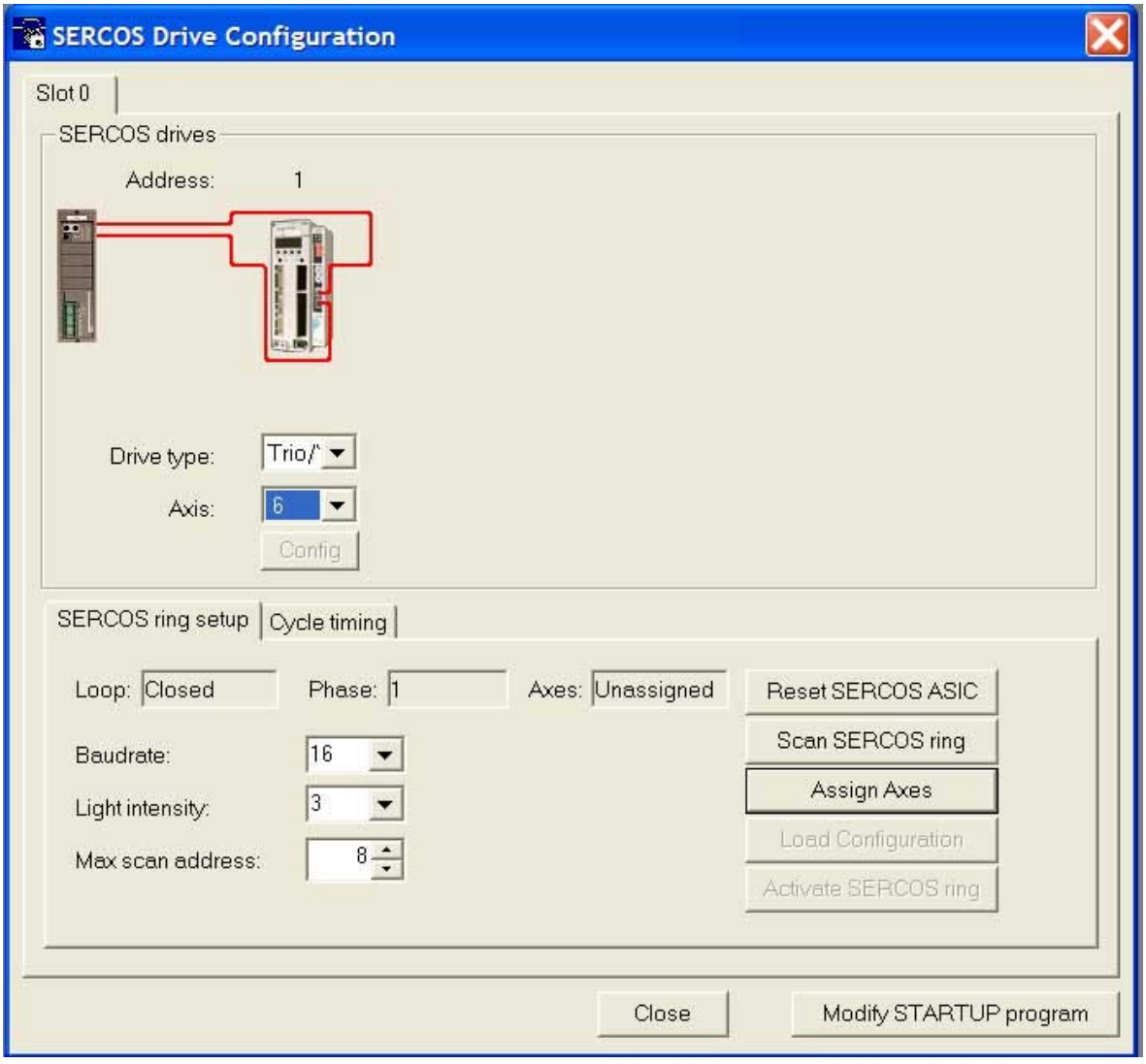
If the desired drive is not in this list, then select the Indramat drive as this gives a “generic” SERCOS setup.



Next, select the required axis number to be allocated to this drive. All available axes will be shown when you pull down the list. You can use any axis, but the following guidelines should be followed:

1. Do not use axis numbers that you may want to allocate to other daughter boards in the future. Daughter board based analogue axes must use the slot number of the daughter board as their axis number.
2. Try to avoid using high axis numbers first. For example allocating axis 23 on a MC224 will be wasteful of processing time. It is best to allocate the lower numbers first.

After the axes are allocated, the window will look like this:



4. Assign Axes

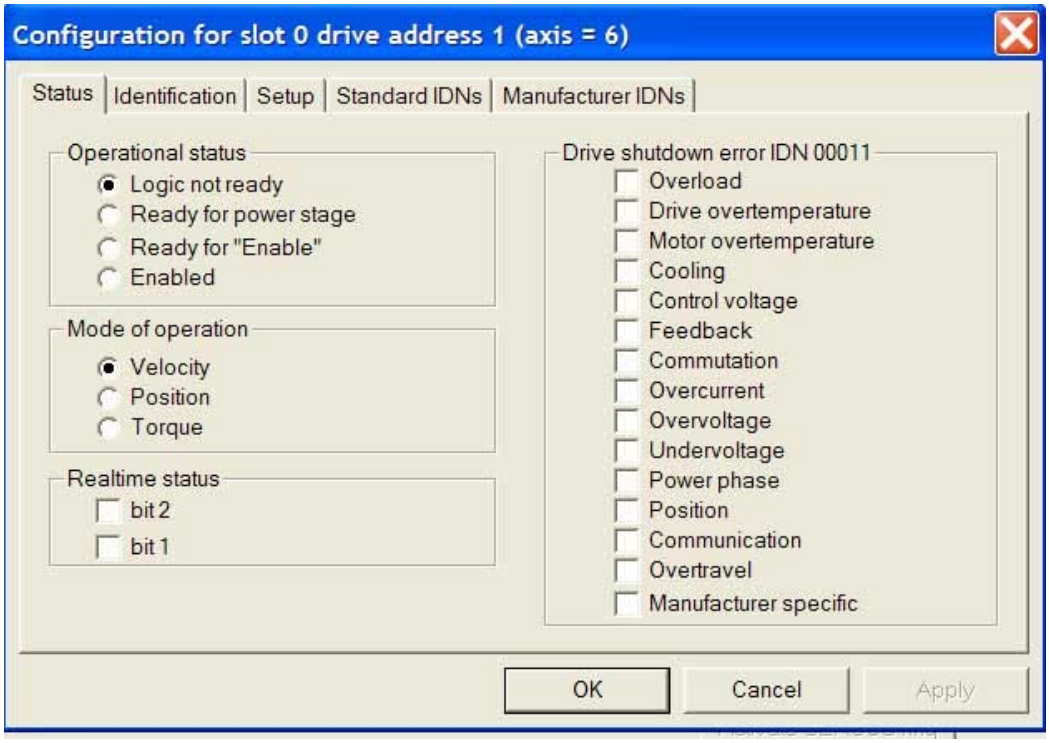
Notice that in the previous picture, there is a box with the SERCOS Phase Number in. It shows Phase 1. In order to take the SERCOS ring to Phase 2, the Assign Axes button must be clicked.

After the SERCOS goes to Phase 2, the P291 master and all the slave drives are in agreement about the ring configuration and the drive setup and initialisation can be done.

5. Drive Configuration

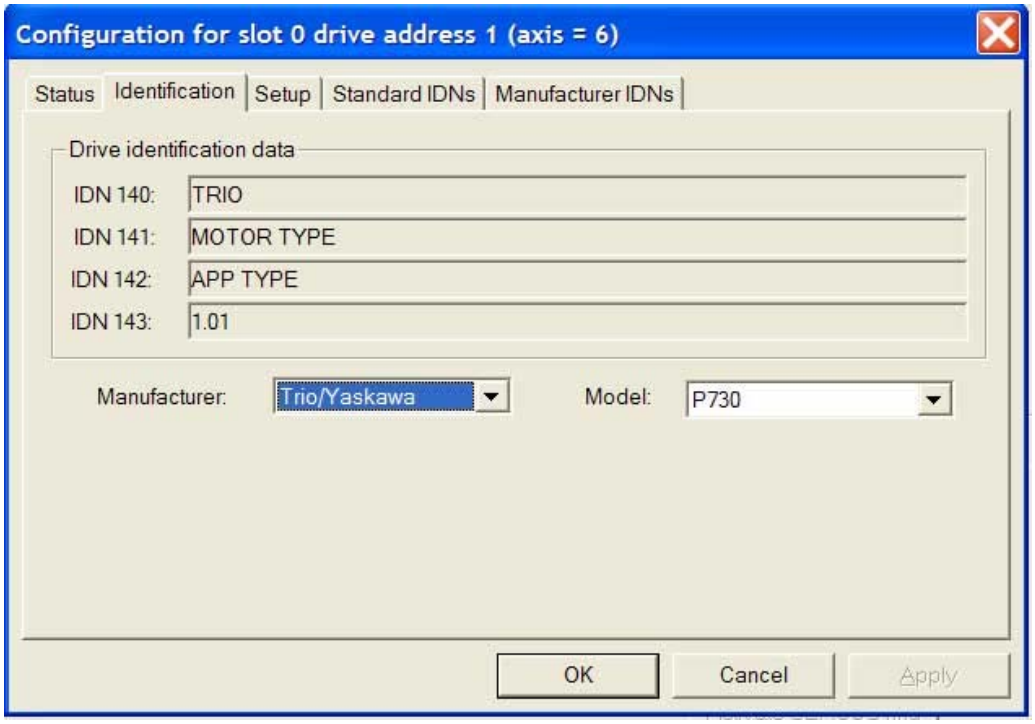
If it is required to configure the drives, click the Config button that appears below the drive axis number. This opens the drive configuration window. There are 5 TABs.

STATUS:



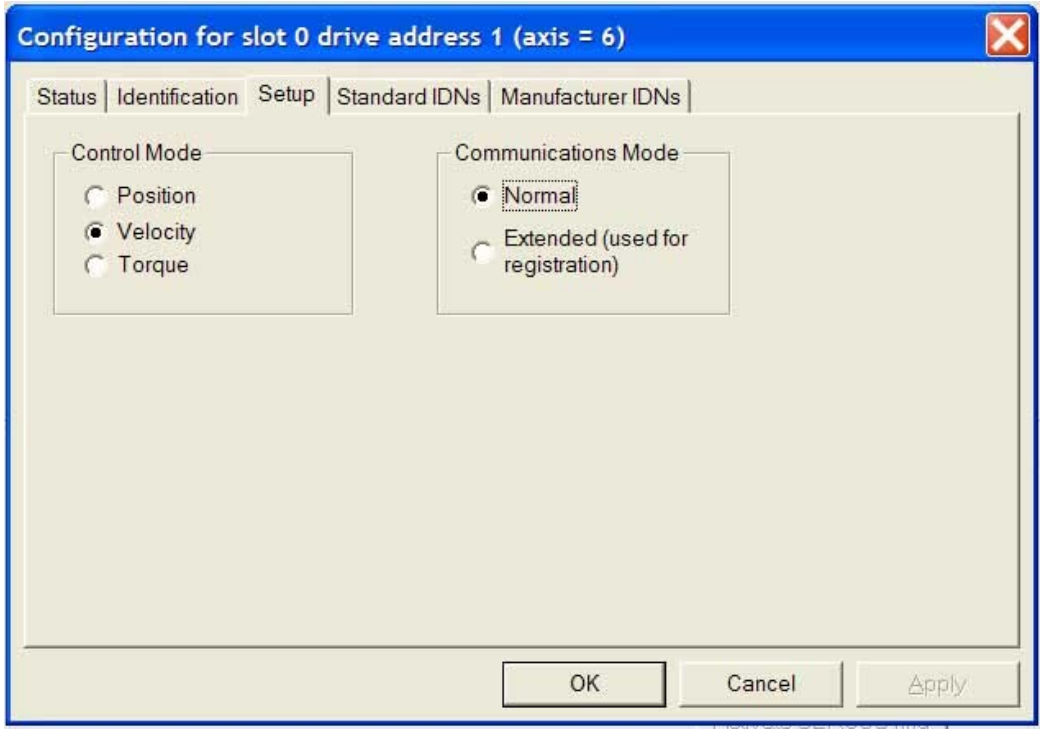
This shows the state of the drive status, its mode, the 2 RTS bits and the flags returned by IDN 00011, Class 1 Diagnostic.

Identification:



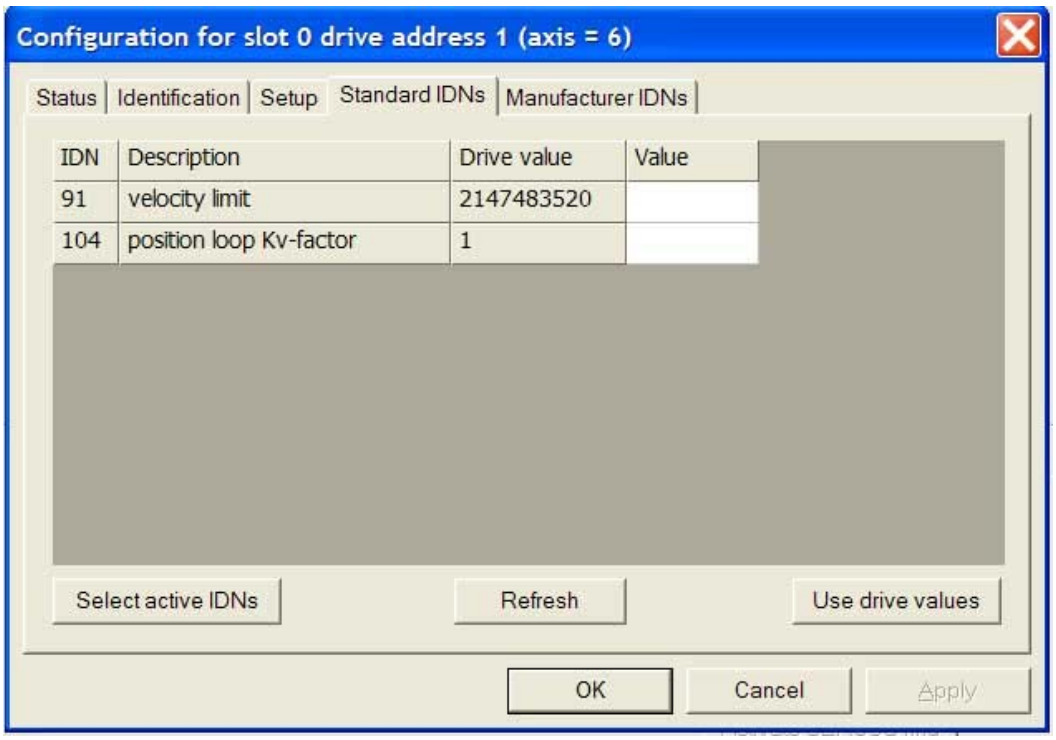
Returns the drive identification information supplied in IDNs 140, 141, 142 and 143.

Setup:



Allows the programmer to select the drive mode required and whether normal or extended communications mode is to be used. Registration requires the use of the extended mode.

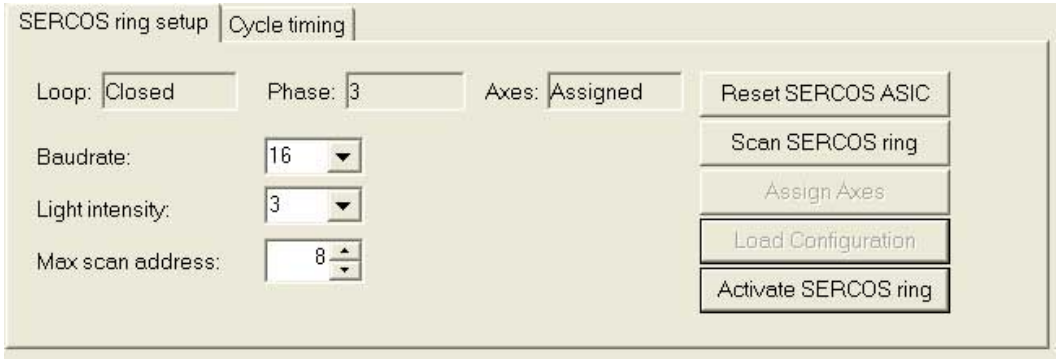
Standard IDNs and Manufacturer IDNs:



These 2 tabs have identical formats and they allow access to a sub-set of the drive registers that can be used during the set up process. The set of IDNs is defined by Trio for each drive. If other IDNs must be set, then this can be done manually using the SERCOS command in a BASIC program or from the terminal.

6. Loading the configuration

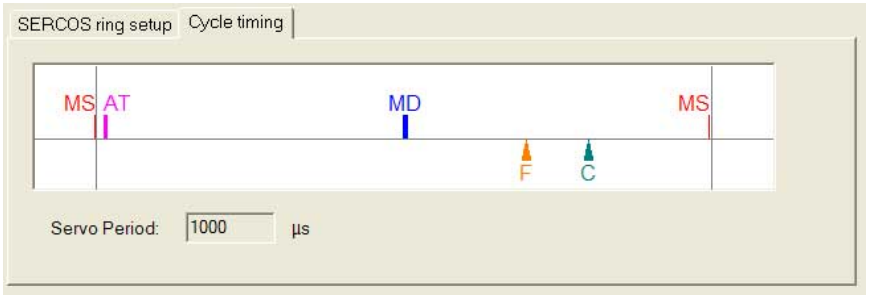
After all the drive configuration has been completed, the SERCOS ring can be advanced to Phase 3 by clicking the *Load Configuration* button.



When the ring is in Phase 3, the cyclic transfer of data is started. In this Phase, it is possible that errors may be seen, either on the drive or in the master. If this happens, please check the following:

1. Is the light intensity being too high or too low?
2. Are the Fibre Optic cables in good condition? No sharp bends, ends made correctly, clean and polished.
3. Are the AT and MDT timings correct? See the drive manual for details.

A pictorial view of the AT and MDT timing diagram can be seen by selecting the *Cycle Timing* tab at lower part of the window.

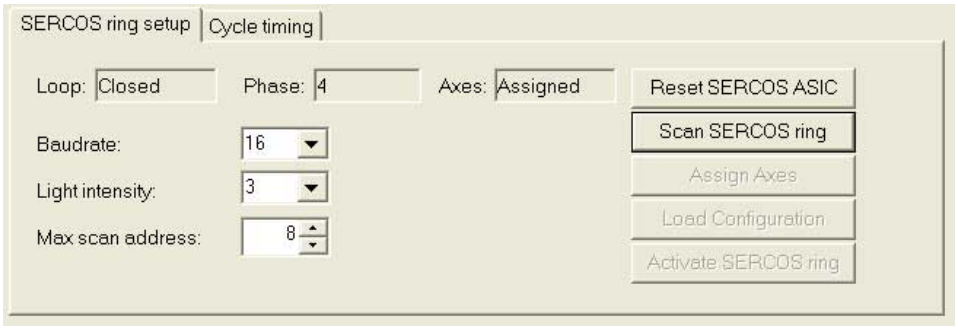


The Actual Position Data Telegrams (AT) should be located at the beginning of the cycle and be evenly spaced. The Mater Data Telegram (MD) should appear later, as shown above.

If all is well, then proceed to the final phase.

7. SERCOS ring activation

Click the *Activate SERCOS Ring* button to take the drives to Phase 4.

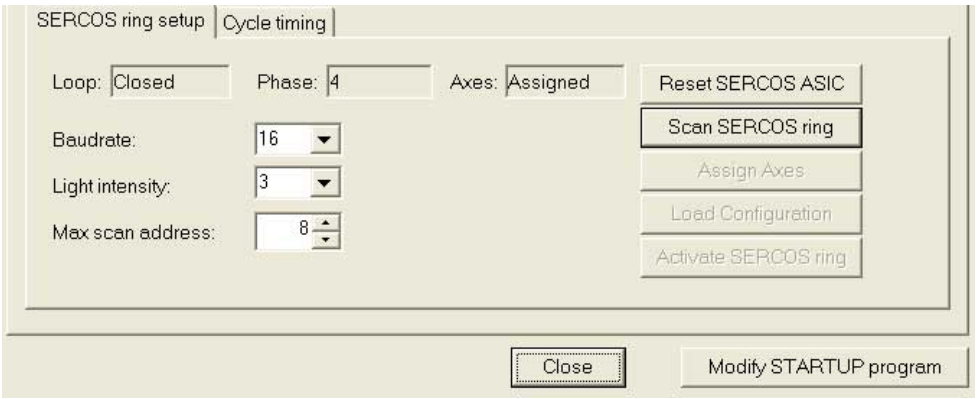


The drives should also indicate that they are in Phase 4 and are ready to be enabled. Enabling the drives is quite simple. If a hardware enable input is required, then this must be set to the enable state. The drives are then enabled via the SERCOS ring by setting WDOG=ON in a Trio BASIC program, or setting the Enable flag on the Motion Perfect control panel.

8. Saving the configuration

The drive and Motion Coordinator configuration are not saved automatically, so that after the power is removed, this whole process needs doing again.

To save time, and make configuration more automatic, the SERCOS wizard can be used to make a STARTUP.BAS program. Click the *Modify Startup Program* button at the bottom of the SERCOS window.



The complete setup configuration will be captured and saved to STARTUP.BAS in a partition called the Sercos Section. No tuning data in the Standard Section will be affected.

9. Running the Axis

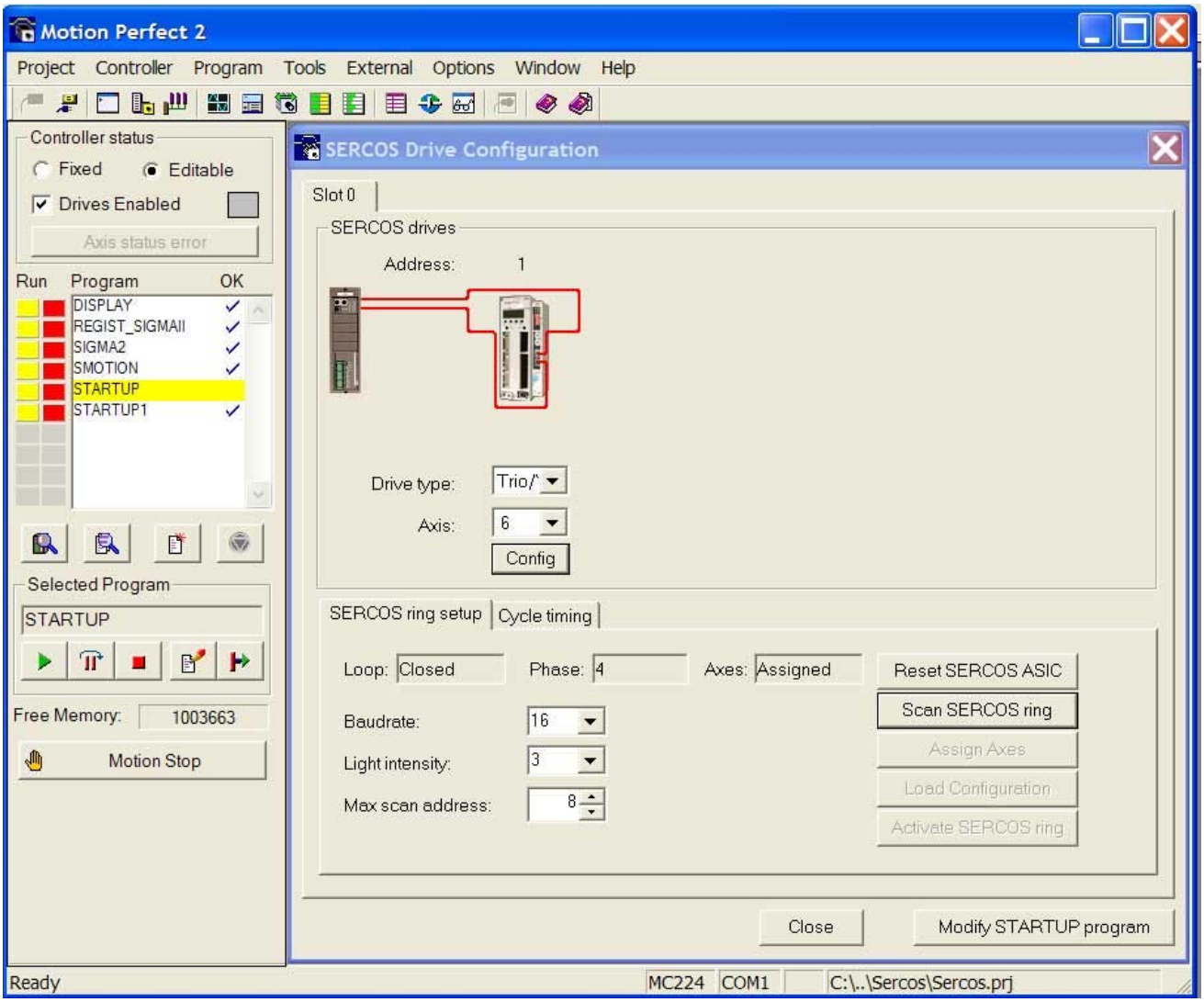
After the SERCOS ring is in Phase 4 and the drives are Enabled, the drive position feedback is continuously transmitted back to the Motion Coordinator and is seen in the MPOS value in the usual way. Likewise, the Motion Coordinator calculates and sends to the drive a velocity or position command every SERCOS cycle. The command depends on which mode was chosen during the configuration.

In all cases, once the SERCOS system is running, the operation of the Motion Coordinator is quite normal. All move types can be run and the SERVO ON/OFF enables and disables the position servo loop and/or the FE_LIMIT error checking. The axis "Actual Position" is given by MPOS and the required position determined by the Trio is given by DPOS.

The main differences between a SERCOS axis and an analogue axis are:

1. Position resolution – Most SERCOS drives have a much higher count per revolution that is usually seen from a "normal" encoder. This can affect the gain setting in the position loop.
2. Velocity command resolution – Most SERCOS drives have a much higher velocity command value for maximum RPM compared to a drive controlled by a +/-10V analogue signal. This can affect the gain setting in the position loop.
3. Processing delays – Drives with the SERCOS designed as an optional add-on module may have a bigger processing delay when compared to the analogue version. In high accuracy systems, it is advisable to run the SERCOS loop at the highest available rate so as to minimise any processing delays.

Appendix 1 – Motion Perfect after setup is completed



Appendix 2 -