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Subject: Frame 4 – 2 Axis Pick and Place

Application Note

Frame 4 Geometry

Frame 4 is one of a set of Transforms that can be used with any series 2 Motion Coordinator. It is not included as standard in the system firmware and must be requested as a special version from Trio. The frame is designed for 2 physical axes that are positioned at 90 degrees to one another, X and Z. The arrangement is such that there is interaction between the 2 axes when seen at the tool tip. Frame 4 mathematically transforms this geometery to standard x / z coordinates.

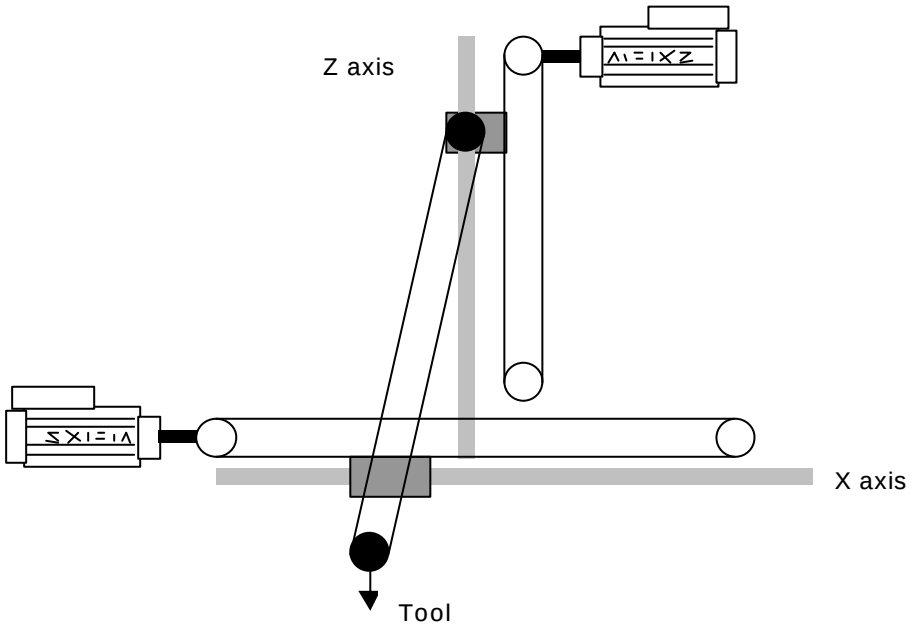

Figure 1 – Axis Geometry

Set-up calibration

There are 2 measurements that must be taken and entered into the set-up program. These are the length from the Z joint to the tool tip, and the distance from the Z joint to the X joint with the arm vertical. (See Fig. 2) Both axes must have the same UNITS value. i.e. the same number of encoder edges per mm.

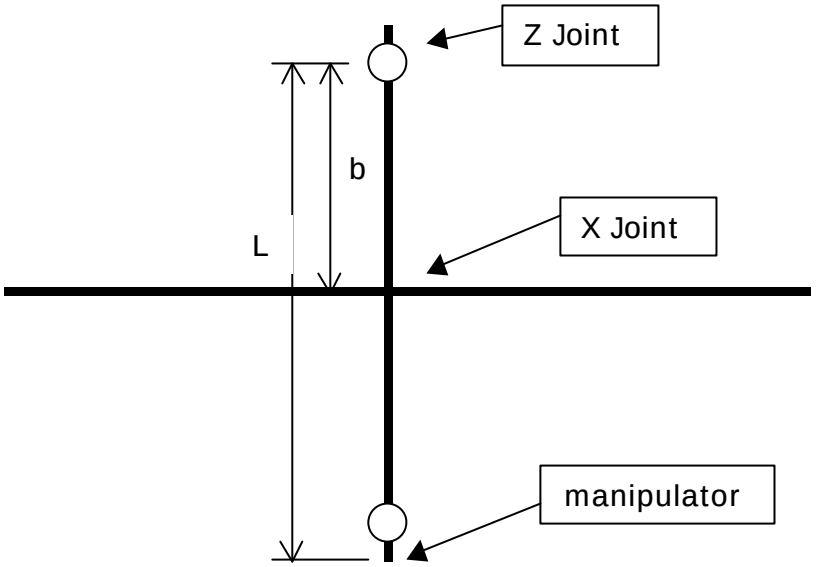

Figure 2 – Calibration points

Startup program sequence

The entry of calibration constants and the home sequence must be carried out in the following way.

```
FRAME = 0
BASE(z)
DATUM(4) ‘ move z axis to top of travel
WAIT IDLE
BASE(x)
DATUM(4)
WAIT IDLE
MOVEABS(centre) ‘ move x axis to centre
WAIT IDLE

BASE(x, z)
TABLE(0,length) ‘ set the length of L
DEFPOS(0, b) ‘ set the distance b
WA(5)
FRAME = 4
```

The system is now ready. All moves can be defined using standard Cartesian Co-ordinates in the x / z plane. Transformation is done by the system software into the physical co-ordinates X and Z. It is not possible to re-define the absolute positions after the FRAME is set to 4. Calculate the required positions in BASIC, using (0, b) as the home position.

Notes

When the FRAME has been set to 4, the following conditions will apply:-

MPOS will show the actual positions of the physical axes X and Z.

DPOS shows the Cartesian positions x and z.

FE shows the following error of the physical axes. (i.e. the difference between the internal demand position after the transform and the MPOS)

If end-limit switches are used these will stop the motion when X or Z reach the switches as usual.

The software end-limits FS_LIMIT and RS_LIMIT will stop the motion when x or z reach the limit value. (Cartesian co-ordinate values)