Help sheet 2   Using a nest

Calibration from a known position (a nest)

This is useful if the workspace has insufficient headroom for the regular calibrate and home positions. Make a fixture (or NEST) in which the robot can be parked before it is switched off. The nest needs to hold the gripper or other end effector in a reliable way. Guide the robot into this fixture using Cartesian positioning e.g. JOG. When in position press WH? Or type WHERE to see the Cartesian position of the fixture. Note all 5 values.

Also make an approach position so that the robot can get in and out of the nest position easily.
Switch off power.
Move the robot by hand to this nest position.

When you power up again with the robot in this position do the following:
1. Type START ENCOFF
2. Enter your 5 values as follows:
(x-value) X ! (y-value) Y ! (z-value) Z ! (pitch-value) PITCH ! (w-value) W !
3. TRANSFORM ASSUME (calculates what the motor values would be for this Cartesian position and over-writes the counters.
4. ENCSET (calculates what the encoder values would be and over-writes them.)
5. Use JOG to get the robot out of the fixture. A PLACE might also work.
6. Once free of the fixture the robot is calibrated and can go to any other position in the workspace directly without going HOME

You can also use a known position in a route or matrix as follows (example for a route called TRAY with line 1 as the reference)
1. Type START then DE-ENERGIZE and ENCOFF then move the robot by hand to the first position of TRAY. Type ENERGIZE
2. **Alternatively** use 1 GOTO or 1 INTO then Jog or Teach to get the robot in exactly the right position.
3. Enter TRAY then
1 LINE AXES
type WHERE and you will see the robot thinks it's at line 1
4. TRANSFORM ASSUME (calculates what the motor values would be for this Cartesian position and over-writes the counters.
5. ENCSET (calculates what the encoder values would be and over-writes them.)
6. Use JOG to get the robot out of the fixture.
7. Once free of the fixture the robot is calibrated and can go to any other position in the workspace directly without going HOME

After such an absolute calibration you can (if you wish) obtain new CALIBRATE values as follows:
1. Go to HOME
2. CHECK - robot seeks out the sensors
3. SETLIMITS – overwrites the old calibration values.
4. USAVE to save to flash
5. Click file, save binary and save to a file of extension .SIG.RAM. Memory area to save:
Bank 0, start A200, length 200

Help sheet 2   Using a nest

ST Robotics

Using a nest with a known joint position.

A nest is a known location in the work space to which all the other locations are related. In theory all the locations are related to the calibrate position i.e. the counts in the array LIMITS. However if the robot is serviced (or even replaced with another robot having a different "signature") or in case of severe "trauma" (serious collision) the calibrate position may alter.

Suppose, for example, the waist sensor were moved. All the learned positions would move also. Therefore it is necessary to drive the robot to a known location, count back to the calibrate position and over-write the values in LIMITS to these new counts.

The nest should, ideally, be a separate location to any of the positions which have been learned. For example make and mount a dummy fixture that the robot's end effector can fit onto/into with some accuracy. Teach the robot there. Type WHERE and note the (motor count) positions. Suppose this resulted in (using R17 as example):

WAIST	SHOULDER	ELBOW	L-HAND	WRIST	OBJECT
1000	2000	3000	4000	5000	
1280	2560	3480	5120	6402	
1001	2002	2999	4000	5001	

Then enter:
CREATE NEST 1000 , 2000 , 3000 , 4000 , 5000 , 0 , 0 , 0 ,
The values are entered value space comma space value etc. There should be 8 values in all so make the last three (or more) values zero.
Make sure this line goes into your text file for reloading.

Later you can correct errors with this procedure:
1. Move to the NEST
2. Adjust the position of the robot to fit exactly using TEACH
3. enter NEST ASSUME
4. sync the encoders with ENCSET
5. TEACH robot clear of NEST

Use of CALIBRATE would restore previous positioning so you can change future calibration as follows:
6. enter CHECK - this seeks out the sensors in the same way as CALIBRATE but does not correct errors.
8. enter SETLIMITS
You have now changed LIMITS to new values to which all your learned positions are related.
The next use of CALIBRATE will be as adjusted for the changes in NEST.
10. Save the new calibration figures with file, save binary, save as name.SIG.RAM
11. In Mk5 controllers enter USAVE