



# **FS 0CPP 0002 - DSP Mico 5.0.5**

## **Release note**

**Version 1.2**

*March 11, 2014*

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## Revisions & Approval

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1.1	S. Latour	Added bug information	2014-03-06
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### Requirements Specification Approval History

Approving Party	Version Approved	Signature	Date

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# 1 Introduction

## 1.1 Purpose

This document is used as a release note on MICO's DSP Version 5.0.5

**NOTE: The last release is 5.03.0012. The last release note is 5.03.**

## 2 New Features

### **REHABILITATION**

#### **2.1 Spasm filter**

The spasm filter reduces or eliminates involuntary commands sent to the robot. This allows being more precise, especially if the control is not proportional. When the user sends a command to move, the velocity will gradually increase. When the user wants to stop (by releasing the stick) the robot will stop immediately. The spasm filter can be activated with Jacosoft. There are five levels:

- 0 – The spasm filter is not activated
- 1 – Very low filter
- 2 – Low filter
- 3 – Medium filter
- 4 – High filter

It is also possible to configure the functionalities “Decrease spasm level” and “Increase spasm level” on a button or a stick.

#### **2.2 Advance goto (Multipoint)**

In the Advance Go To (predefined trajectory), the user needs to record a minimum of 1 position (or point) in space. An additional point may be added at all time and there is a limit of 20 points that may be included into a trajectory. This sequence of points defines the predefined trajectory that will be followed by the robotic arm when needed. The points will be followed in the order they have been added. When the user first activates the functionality, the recorded position nearest to the actual location will be reached first. Each time the user reactivates the functionality afterwards, the trajectory will toggle between normal trajectory and reverse trajectory (similarly to the ready-retract). Up to 5 trajectories may be recorded.

The opening/closing position of the fingers when a position is recorded is not important as the fingers will stay in the opening/closing position in which they are when the GOTO function is activated, and will stay there through all the predefined trajectory.

- AdvanceGOTO\_X : Move the robotic arm in the sequence recorded with the AdvanceGOTO\_Add\_X function.
- AdvanceGOTO\_Clear\_X : Delete all the points of the AdvanceGOTO\_X
- AdvanceGOTO\_Add\_X : Used to add a position to an AdvanceGOTO\_X.

## 2.3 Automatic orientation (Goto orientation)

The Automatic Orientation places the robotic arm's end effector in a position defined by the axis.

- `AutomaticOrientationXPlus` : Directs the opening of the end effectors towards the left and aligns the axis that comes out of the end effector on the X axis.
- `AutomaticOrientationXMinus` : Directs the opening of the end effectors towards the right and aligns the axis that comes out of the end effector on the X axis.
- `AutomaticOrientationYPlus` : Directs the opening of the end effectors towards the back and aligns the axis that comes out of the end effector on the Y axis.
- `AutomaticOrientationYMinus` : Directs the opening of the end effectors towards the front and aligns the axis that comes out of the end effector on the Z axis.
- `AutomaticOrientationZPlus` : Directs the opening of the end effectors towards the ceiling and aligns the axis that comes out of the end effector on the Z axis.
- `AutomaticOrientationZMinus` : Directs the opening of the end effectors towards the floor and aligns the axis that comes out of the end effector on the Z axis.

## 2.4 It is possible to perform “click” functionalities with the stick.

It is now possible to perform any functionality with the stick. This includes “click” functionalities like “Switch Mode A” or “Record Position 1” for example. The functionalities “*Record Position*”, “*AdvanceGOTO\_Add*” and “*AdvanceGOTO\_Clear*” must be held for one second with the stick. It is strongly suggested to activate “Diagonal disabled” with these modes.

## 2.5 Return at actual mode

When switching from a mode list to another one (A and B list), you always get back to the last selected mode from the new selected list. Example: User is in mode B1, then switch to list A, when he'll get back to list B, he will still be in mode B1.



## 2.6 Goto are now slow when they are near of their targets

When a goto (standard and advanced goto) is approaching its target, the robot motion will be slower. The robot starts decelerating when it is within *8cm* of its target. This allows the user to hold the Goto without being afraid to hit an object or himself.

## RESEARCH

### 2.7 Set Admittance control values

It is now possible to change the admittance parameters values. The parameters are the minimum and maximum force, the virtual damping and the virtual mass. This can be done in angular mode and in Cartesian mode. This is done using the API with the functions:

SetCartesianForceMinMax

SetCartesianInertiaDamping

SetAngularTorqueMinMax

SetAngularInertiaDamping

### 2.8 Simulator / Emulator

The simulator existed in previous DSP version below 4.2.9. It was not functional since version 5.0.2 and it is now functional. When no joints are connected, the device will be in a simulator mode. You will be able to send commands to the robot and the motion will be simulated. This is useful to test programs with a base before to actually do it with a robot.

### 2.9 New USB commands

#### 2.9.1 GetPeripheralInventory

This new usb command allows to get all the peripheral connected, the port on which it is connected, its address and its code version

Supported Peripherals

- Actuators
- Fingers
- Joysticks ( including universal interface, Oled Display, easy rider and api joysticks)
- Can Interfaces

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### **2.9.2 GetAngularForceGravityFree**

The function “GetAngularForce” returns the torque reading from the torque sensors of each joints. The function “GetAngularForceGravityFree” returns the same information but the gravity terms of the robot are removed by using a model.

### **2.9.3 GetActuatorAcceleration**

Each actuator has a 3-axis accelerometer. This functions returns the acceleration information of each sensor.

### **2.9.4 InitFingers**

This function initializes the fingers of the robot. After the initialization, the robot is in angular control mode.

### **2.9.5 MoveHome**

This moves the robot to the HOME position also known as READY position.

## **GENERAL**

### **2.10 When reprogramming a DSP version, a restore factory default is now done automatically**

This prevents some mistakes. It is thus important to save the user profile before to reprogram the DSP.

## 3 Improvements / modifications

### REHABILITATION

#### **3.1 Ready has now priority over everything else**

The ready functionality has priority over everything else (motions, goto, etc.).

#### **3.2 Increase/decrease speed**

Previously, the increase and decrease speed was done by multiplying or dividing respectively the actual speed by a factor 2. The increase and decrease speed is now adding or subtracting 5 cm/s.

#### **3.3 It is possible to have a “click” and a “hold down” on the same button. The time delay to detect one or the other has been increased**

When only a hold down is mapped on a button, it takes a 0.15 seconds before the hold down is detected. When a click and a hold down are mapped on a same button, the threshold is 0.4s. Below 0.4s, a click is detected and above 0.4s, a hold down is detected. That means that if a user holds a button, it will take 0.4s before the functionality is activated.

#### **3.4 Drinking mode change does not require reboot**

A reboot was required to change the drinking mode settings. A reboot is no longer required.

### RESEARCH

#### **3.5 In a trajectory, the fingers now only close once if the fingers command stays the same**

When a finger command is sent, the fingers will try to go to this position. Sometimes it can't reach this position because something is in their way (an object for example). After a few seconds, the fingers stop trying to reach the position and stays in place (to avoid heating the motors). Previously, if a trajectory with many points was performed, the fingers command was sent at each point even if the finger command was

the same. Thus, at each point, the fingers were trying to reach the position again and again. From now on, if the finger command is the same, the fingers will only close once.

### **3.6 Virtual joystick now performs a Clear Trajectory List**

When performing motions with the virtual joystick, the trajectory list will be cleared. This is the same behaviour used with the physical joystick. This allows moving the robot even if the trajectory list is not empty.

### **3.7 Trajectory maximum size increased 2000**

Previously, the trajectory maximum list was 20 points. This has been increased to 2000 points. Also, when more than 20 points were sent, the trajectory was not valid. From now on, when sending more than 2000 points, the exceeding points will be ignored.

## **GENERAL**

### **3.8 New algorithm for the angular ready**

Previously, when performing an angular ready (which happens at each reboot), it was possible in some configurations that joint 2 and 3 were not going in a good direction and the arm was colliding with itself. This has been corrected. It is still possible for the arm to collide with itself in some very particular situations (related to joints 4 and 5).

### **3.9 Robot not responding problem with protection zones**

The robot had some problem in some particular situations with the protection zones. This has been corrected.

### **3.10 10 000 degrees**

Joint 1, 4, 5 and 6 angular limitation is 10 000 degrees. The Cartesian control was not responding as it should near this limit. This has been corrected.

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### **3.11 Robot not responding**

In some particular configurations, the robot may stop responding (it is possible to perform a faulty ready if this happens). The algorithm was improved in order to avoid the robot not to respond.

### **3.12 Joint 3 intermediary ready point was increased**

When performing a basic ready for the first time after a boot or anytime in angular mode, joint 3 has an intermediary point (to avoid the robot colliding with itself). This intermediary position has been increased.

## 4 Bug Fix

### **REHABILITATION**

None (See general)

### **RESEARCH**

#### **4.1 Virtual joystick management**

The management of the virtual joystick was improved. For example, when a virtual ready was performed, it was sometimes not possible to launch a trajectory.

#### **4.2 “Get Gripper status” was lacking information**

These informations were completed.

#### **4.3 Disable fingers was not always working**

In a trajectory, disable fingers was not always working. This has been resolved.

#### **4.4 Angular velocity control not working on incomplete arm with less than 6 actuators.**

Fixed

#### **4.5 Protection zones management**

We now support a list of 10 protection zones instead of 2.

### **GENERAL**

#### **4.6 Angular motion with the joystick**

The order of joint 4 and 5 were inversed when performing motions with the stick.

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#### **4.7 It was possible to do a Cartesian Goto while in angular mode**

This is not possible anymore.

#### **4.8 When the robot was performing a trajectory where the joint 3 was going downwards and was interrupted by a retract the arm was going to a random position**

This has been resolved.

#### **4.9 If the voltage is too low, it is not possible to write in flash memory**

This is to prevent a corruption of the flash memory.

#### **4.10 Angular motion error when reaching the minimum or maximum zone**

Because of the low acceleration allowed for Mico joints, it was possible for the command to go above the accepted joint limitations. The result was a minor error. This has been corrected.

#### **4.11 Healthcenter: Force overcharge alert was not set**

It is now set.

#### **4.12 Advanced Status Corrections**

Some of the information was not displayed correctly in previous DSP version. This has been fixed.

#### **4.13 Ghost joystick in Jacosoft**

Sometime the joystick was shown as connected in Jacosoft event after it was disconnected. This has been solved.

#### **4.14 Actuator 5 not always detected / actuators code version not present in jacosoft**

Boot sequence has been improved and fixed those problems.

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## **4.15 In Angular velocity control actuators 4 and 5 were inverted.**

Fixed



## 5 Known issues and workaround

### **REHABILITATION**

#### **5.1 Goto orientation with drinking mode**

The Goto Orientation (automatic orientation) has some problem when the drinking mode is active. When the orientation can't be reached, the arm may drift in position.

#### **5.2 If the advance ready boots at the ready position, it will go to the first point instead of the second point.**

To be corrected.

### **RESEARCH**

None (See General).

### **GENERAL**

#### **5.3 The DSP programming does not go from 4.2.9 to 5.05**

When a DSP version equal or prior to 4.2.9 is programmed, we can't program a 5.05 version. Doing so will fail and the DSP will be in boot loader. To program the robot, we must first program version 5.03.0012 and then 5.05.0033.

#### **5.4 DSP Hex file for Mico is large**

The DSP Hex file for Mico is very large. It takes a long time to program the DSP.

#### **5.5 Mico ready algorithm should be improved**

Mico ready algorithm does not always reach the ready position especially when the starting point is low. The user can still perform a "Faulty ready" is there is a problem.

#### **5.6 It is not possible to perform a retract if a motion is active**

If a motion is active (XPlus on the stick for example), a ready can be performed but the stick must be released in order to perform the retract.

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## **5.7 Mico Communication problems**

The communication between the DSP and the joints should be improved.  
This results in communication errors.