
Mech-Mind User's Manual

Mech-Mind

Mar 06, 2023

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This section introduces the master-control program for Kawasaki robots and the procedure of setting up the communication with a robot through the program.

KAWASAKI SETUP INSTRUCTIONS

This section introduces the process of loading the robot master-control program onto a Kawasaki robot. The process consists of the following steps:

- *Check Controller and Software Compatibility*
- *Setup the Network Connection*
- *Load the Program File*
- *Test Robot Connection*

Please have a flash drive ready at hand.

Note: A USB 2.0 flash drive is recommended. Otherwise, the robot controller may not recognize the flash drive.

1.1 Check Controller and Software Compatibility

- Controller: no requirement
- Controller system software version: no requirement
- Additional controller software options: not required
- Mech-Mind Software Suite: latest version recommended

1.2 Setup the Network Connection

1.2.1 Hardware Connection

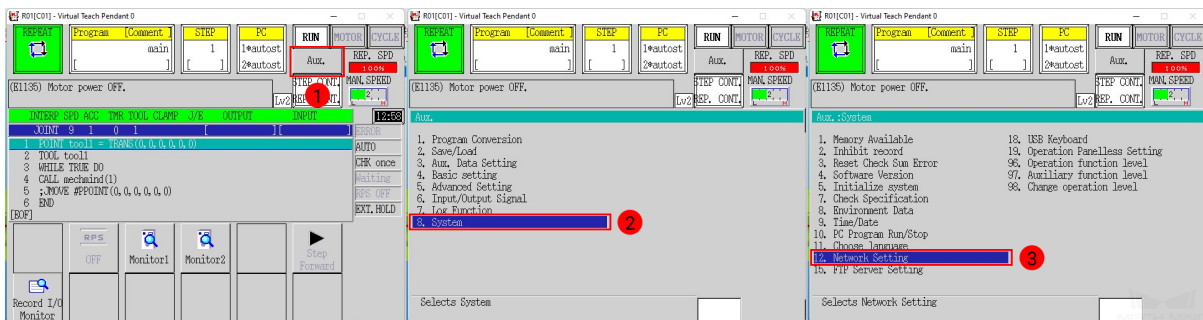
Plug the Ethernet cable into:

- An Ethernet port on the IPC
- The Ethernet port inside the accessory panel on the front of the controller

1.2.2 IP Configuration

To allow communication between the IPC and the robot controller, both must have an IP address in the same subnet. This means that the first three numbers of the IP addresses should be the same. For example, 192.168.100.1 and 192.168.100.2 are in the same subnet.

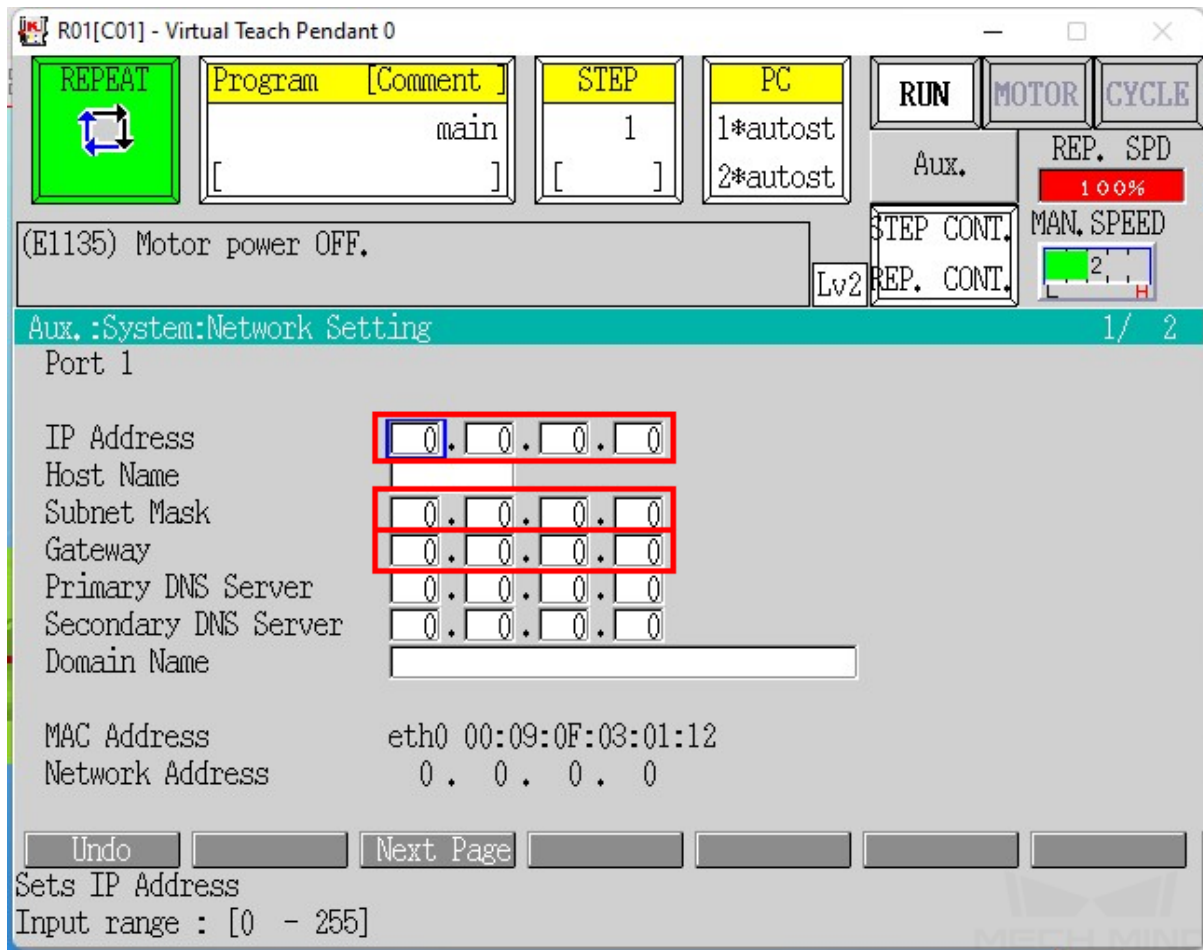
1. Check the IP address of the IPC: please use the `ipconfig` command in Command Prompt or PowerShell to check the IP address.
2. On the teach pendant, press on *Aux.*, and then select **8. System** → **12. Network Setting**.



3. Set **IP Address** to one in the same subnet as that of the IPC.
4. Set **Subnet Mask** to 255.255.255.0.

Note: If the IP address is set to either 192.168.0.1 or 192.168.1.1, please set **Subnet Mask** to 255.255.0.0 instead.

5. If you are using a network gateway, the gateway address should also be set. Please consult your IT support for help.



6. Press the ENTER key to confirm, and then restart the controller.

1.3 Load the Program File

1.3.1 Prepare the File

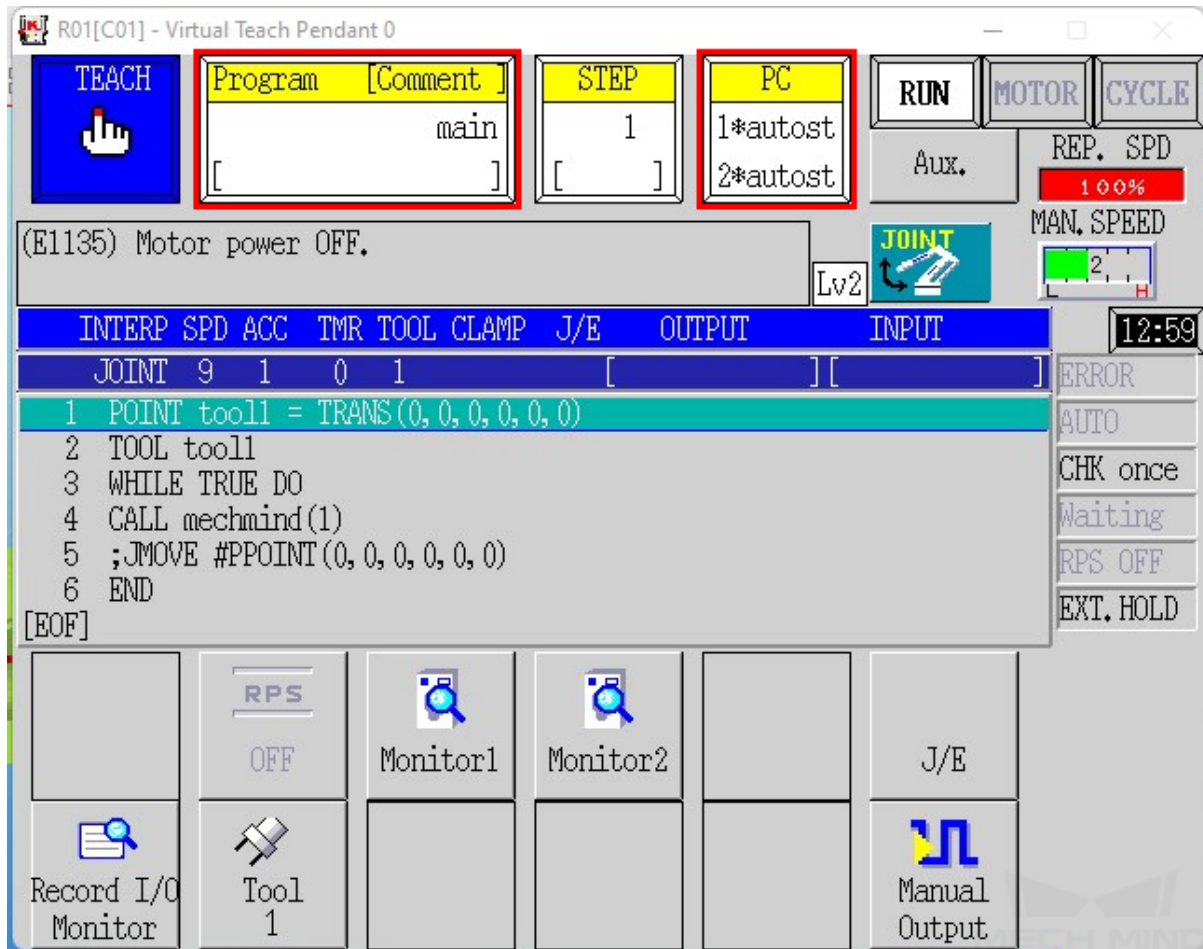
The program file is stored in the installation directory of Mech-Mind Software Suite.

Navigate to `xxx\Mech-Mind Software Suite-x.x.x\Mech-Center\Robot_Server\Robot_FullControl\kawasaki`, and copy `mm_control.as` to your flash drive.

Note: Copy the file to the root directory of the flash drive. Do not put it in another folder or rename it.

1.3.2 Load the File to the Robot

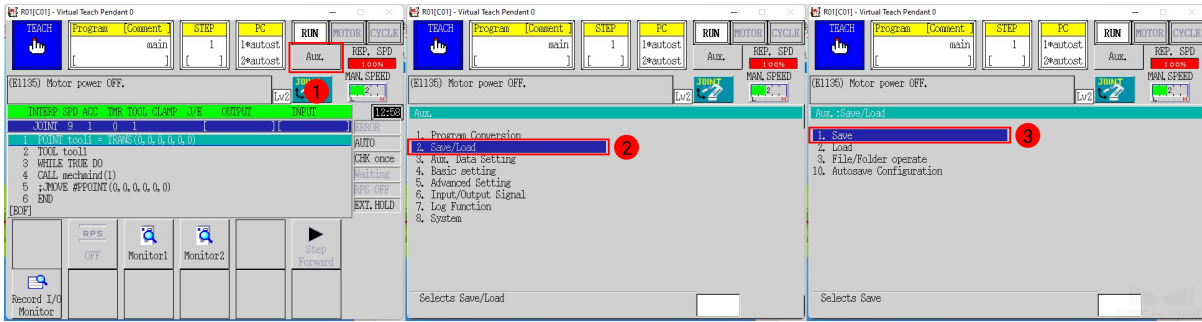
1. Insert the flash drive to the USB port inside the accessory panel on the controller.
2. Check the **Program** and **PC** areas to see if any programs are running. If so, backup and exit the programs according to the following instructions.



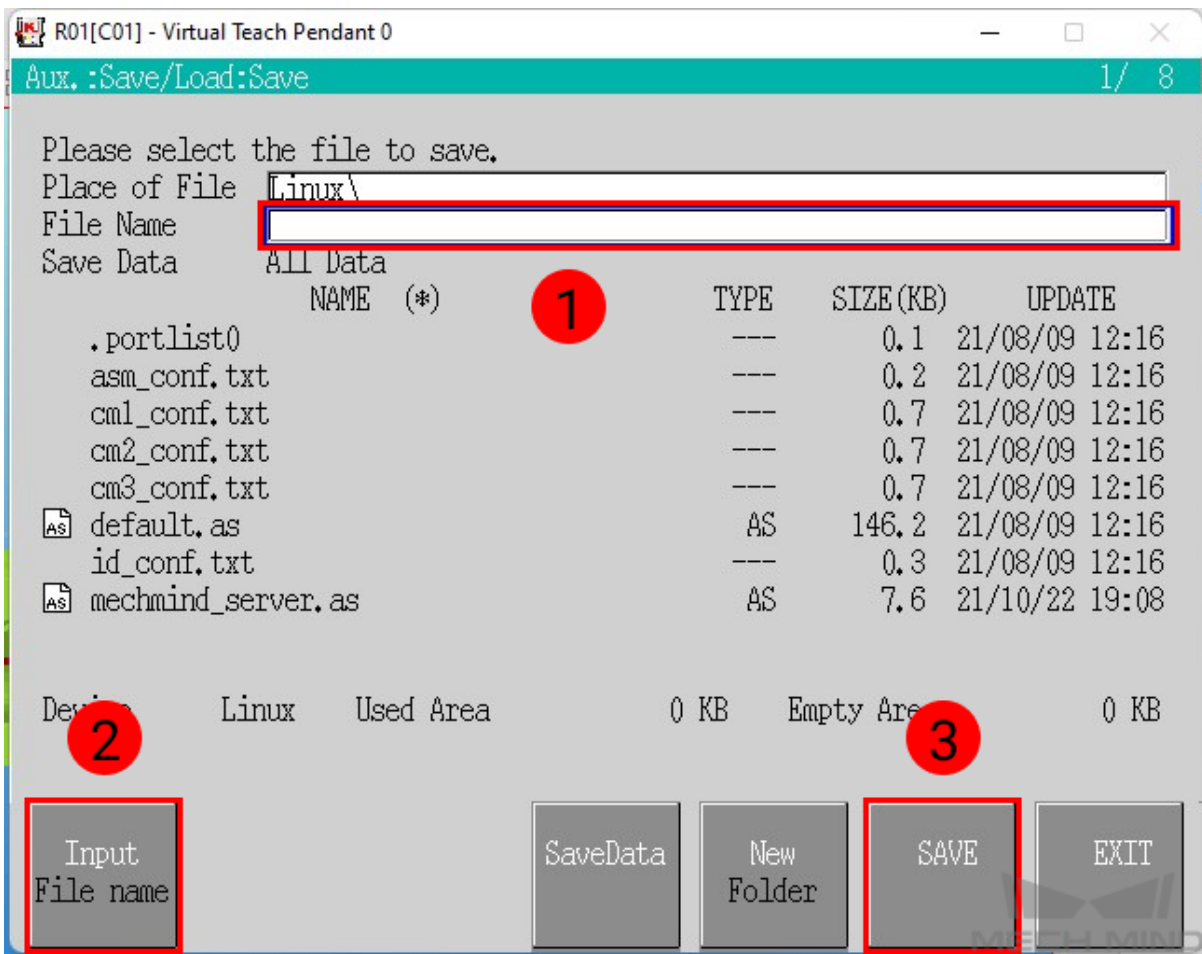
If there is a program in the **Program** area, please create backup first.

Follow the steps below to back up all files except for system logs to the flash drive.

1. Press on **Aux.**, and select **2. Save/Load** → **1. Save**.

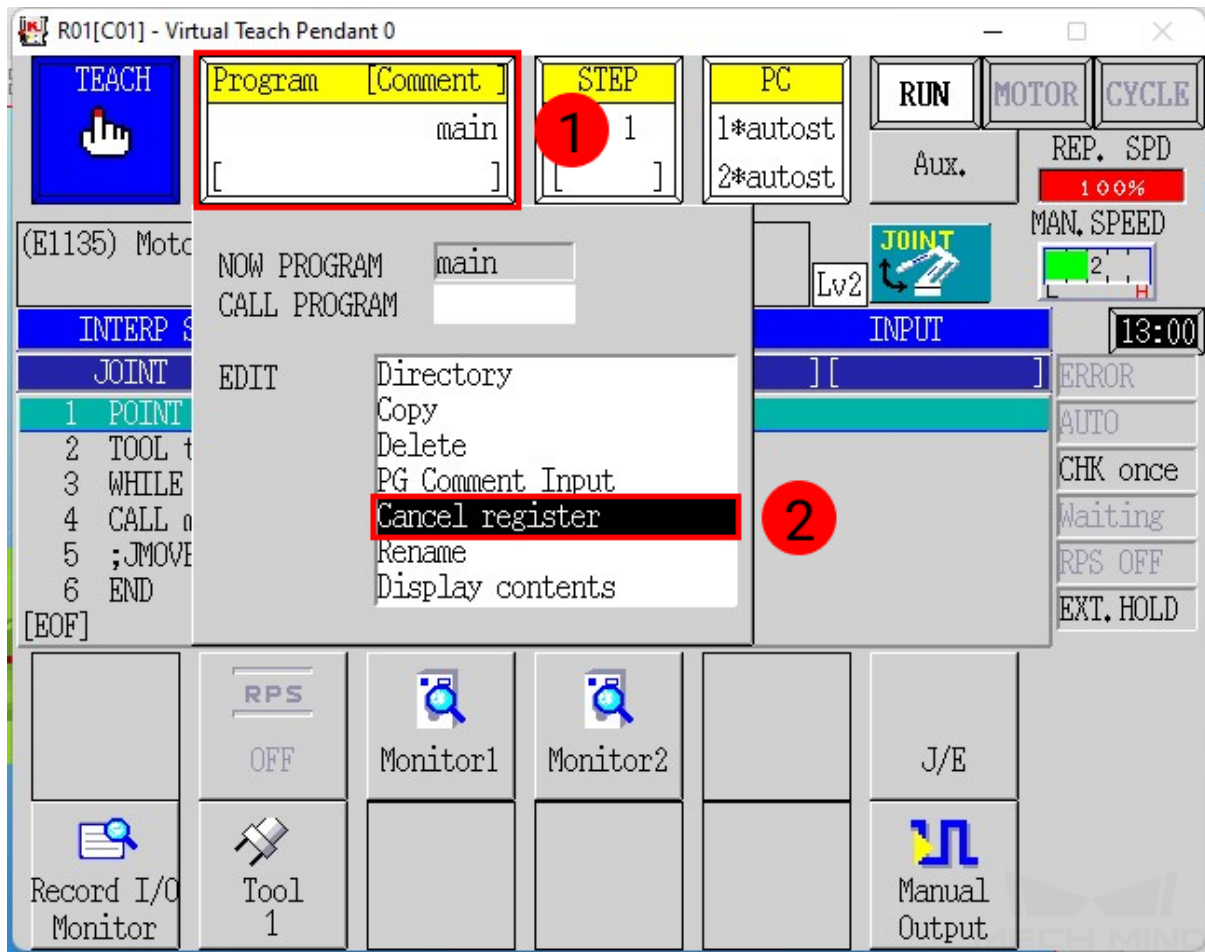


2. Press on *Input File name* to input a **File Name** for the backup file, and then press on **SAVE**.

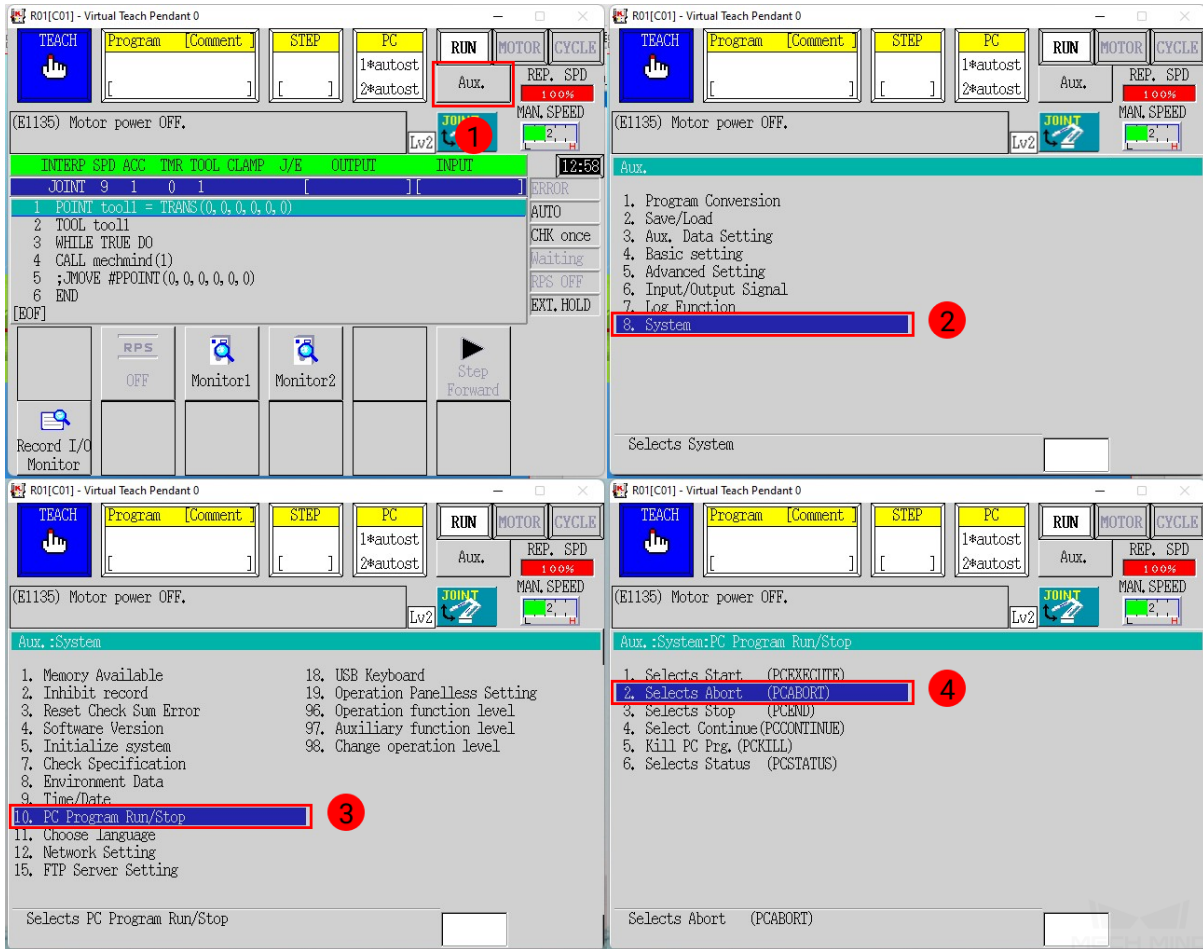


Cancel robot control program and kill PC programs.

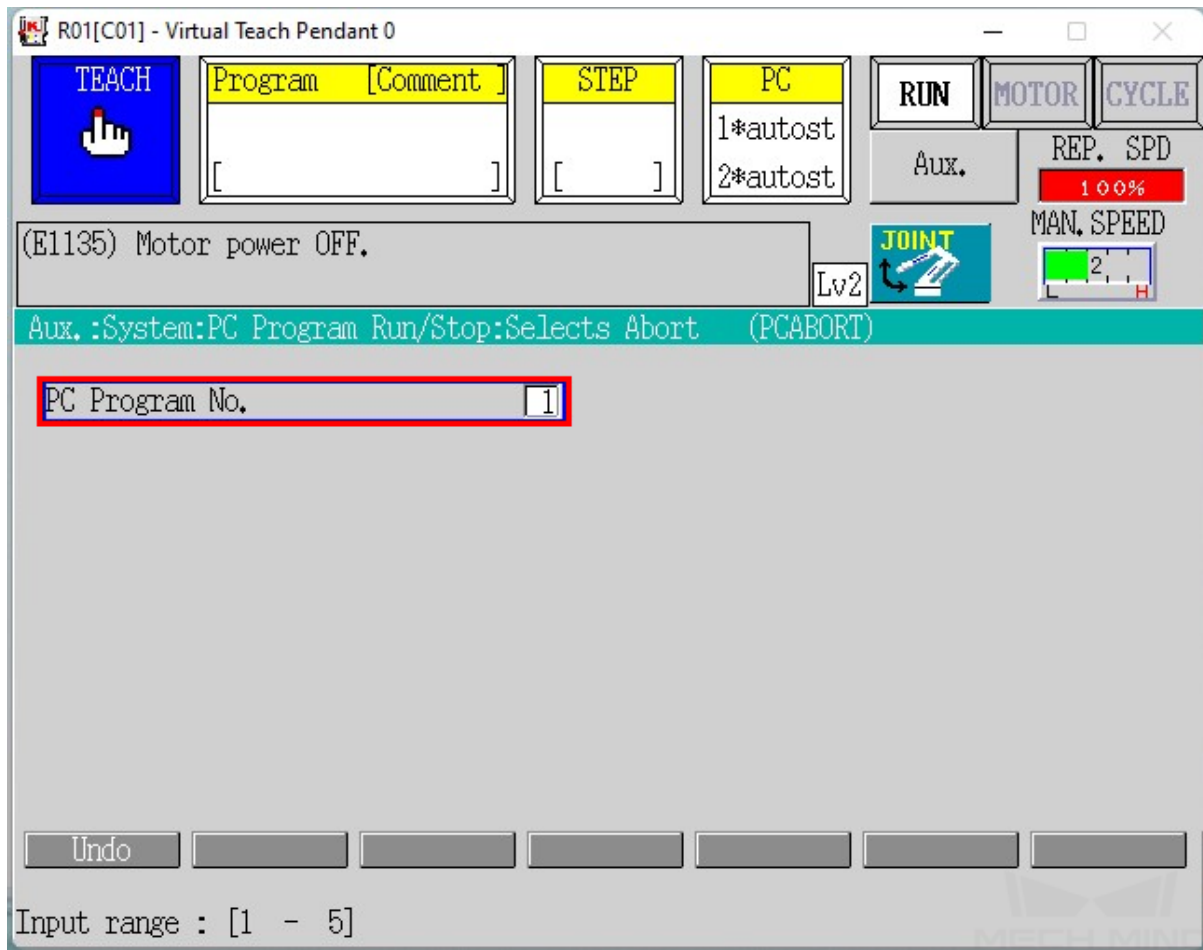
1. Press on the **Program** area, and select **Cancel register** in the drop down menu.



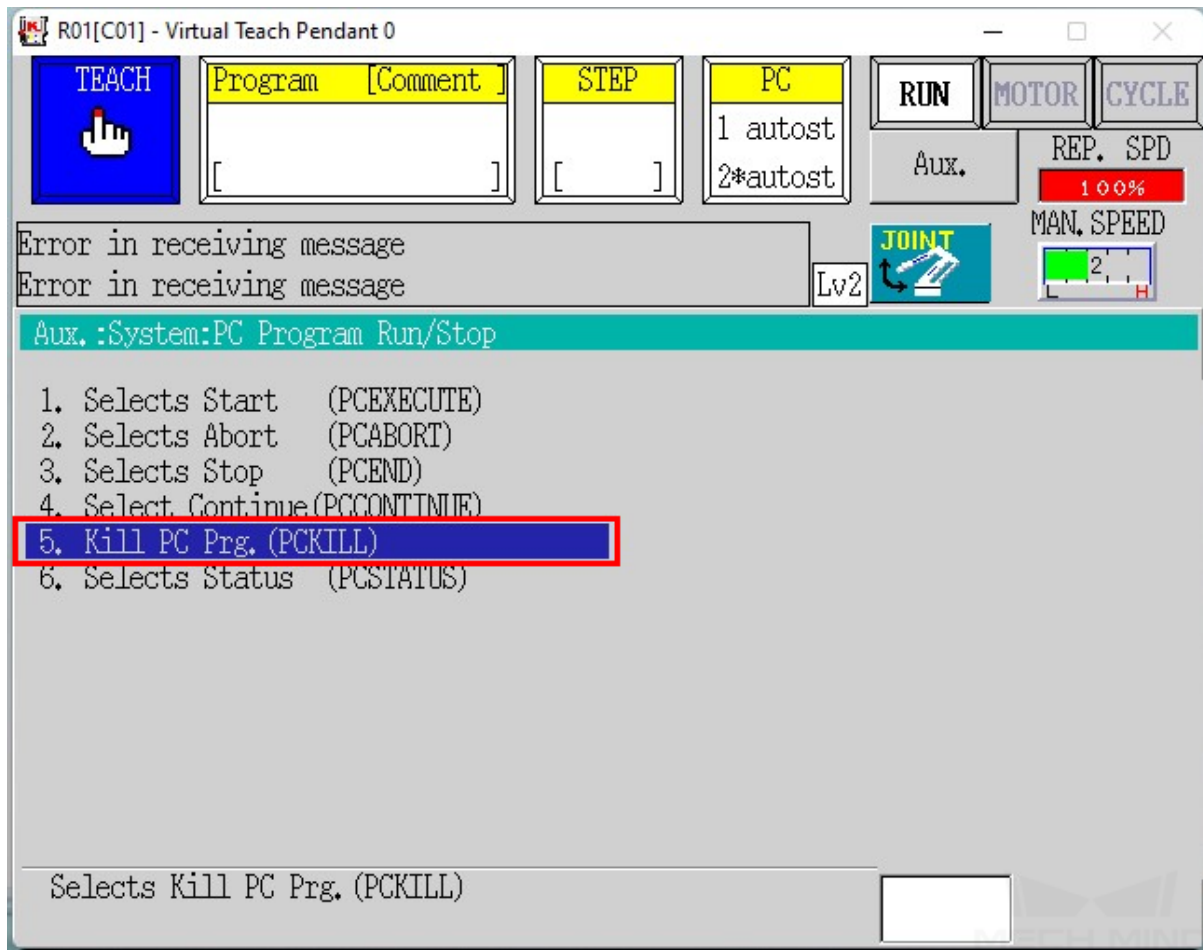
2. Press on Aux., and select 8. System → 10. PC Program Run/Stop → Selects Abort.



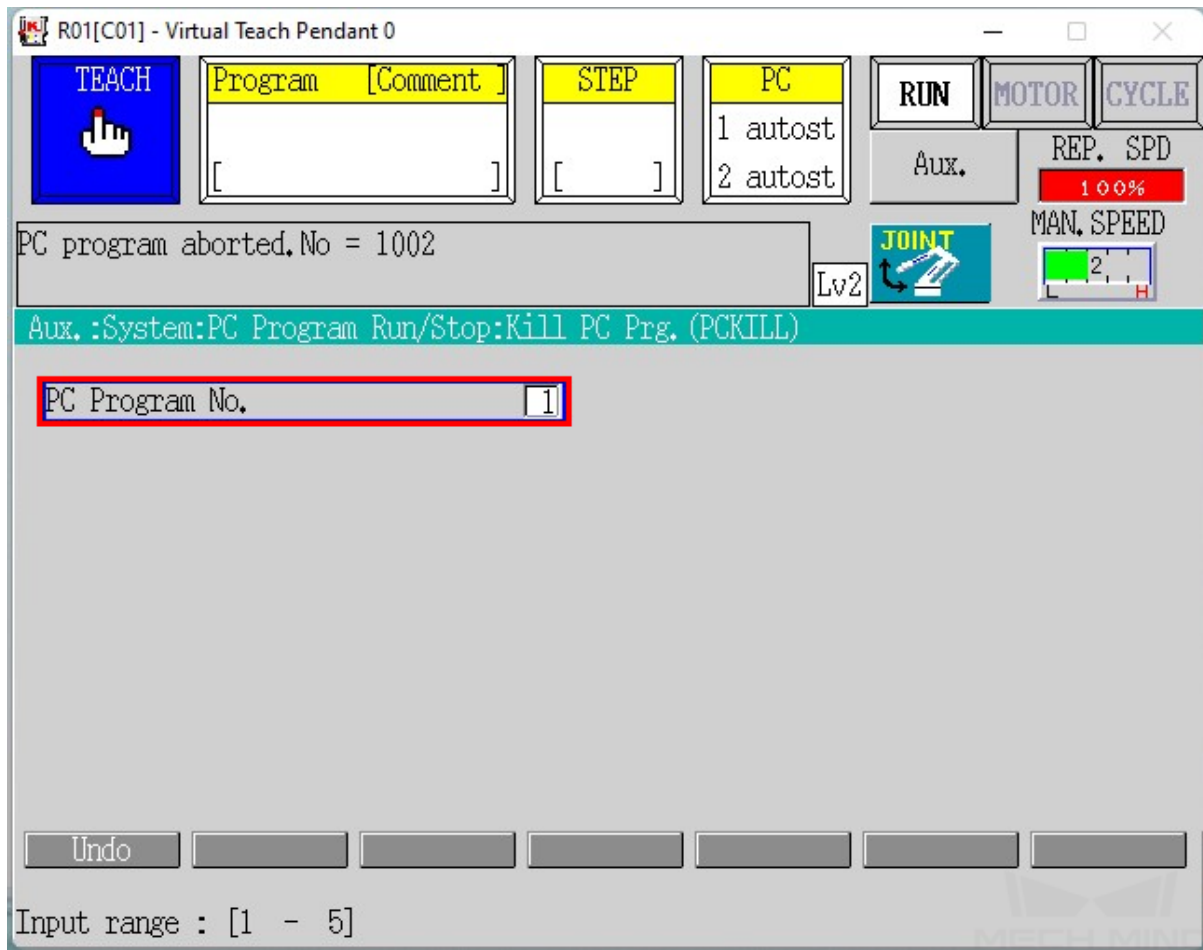
3. Press the ENTER key to abort PC program 1. Then, press 2 to change the program number, and then press ENTER to abort PC program 2.



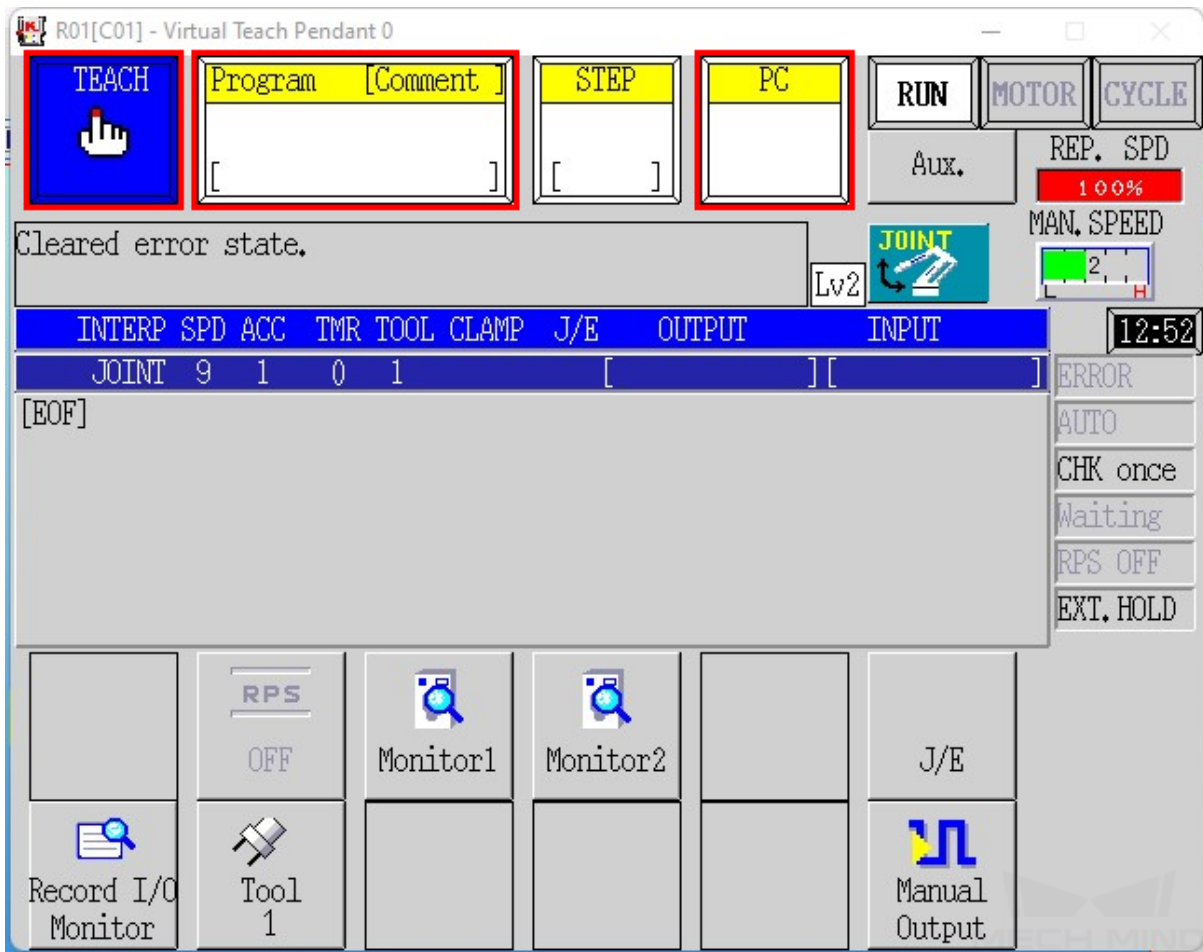
4. Press the R key to return, and select Kill PC Prog..



5. Press the ENTER key to kill PC program 1. Then, press 2 to change the program number, and then press ENTER to kill PC program 2.

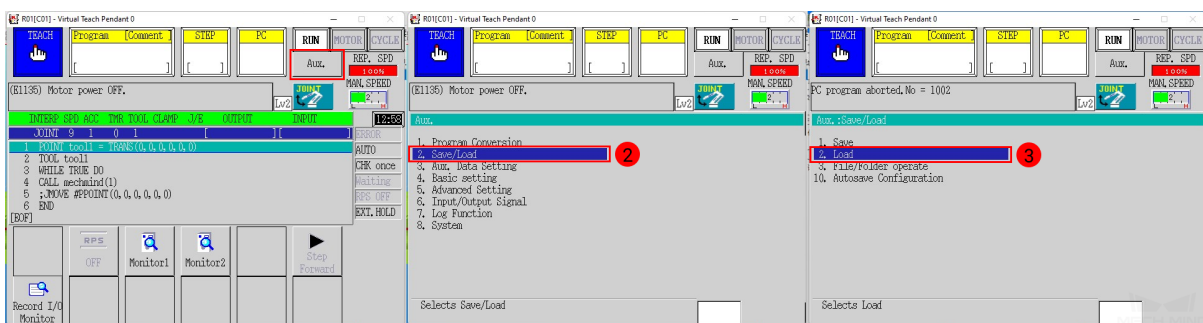


6. Press the **R** key to return. Check the **PC** area to see if any programs are still listed. If so, repeat steps 2 and 4 until there are no programs listed in the **PC** area.
3. Make sure that the robot is in teach mode, and make sure that the **Program** and **PC** areas have nothing listed.



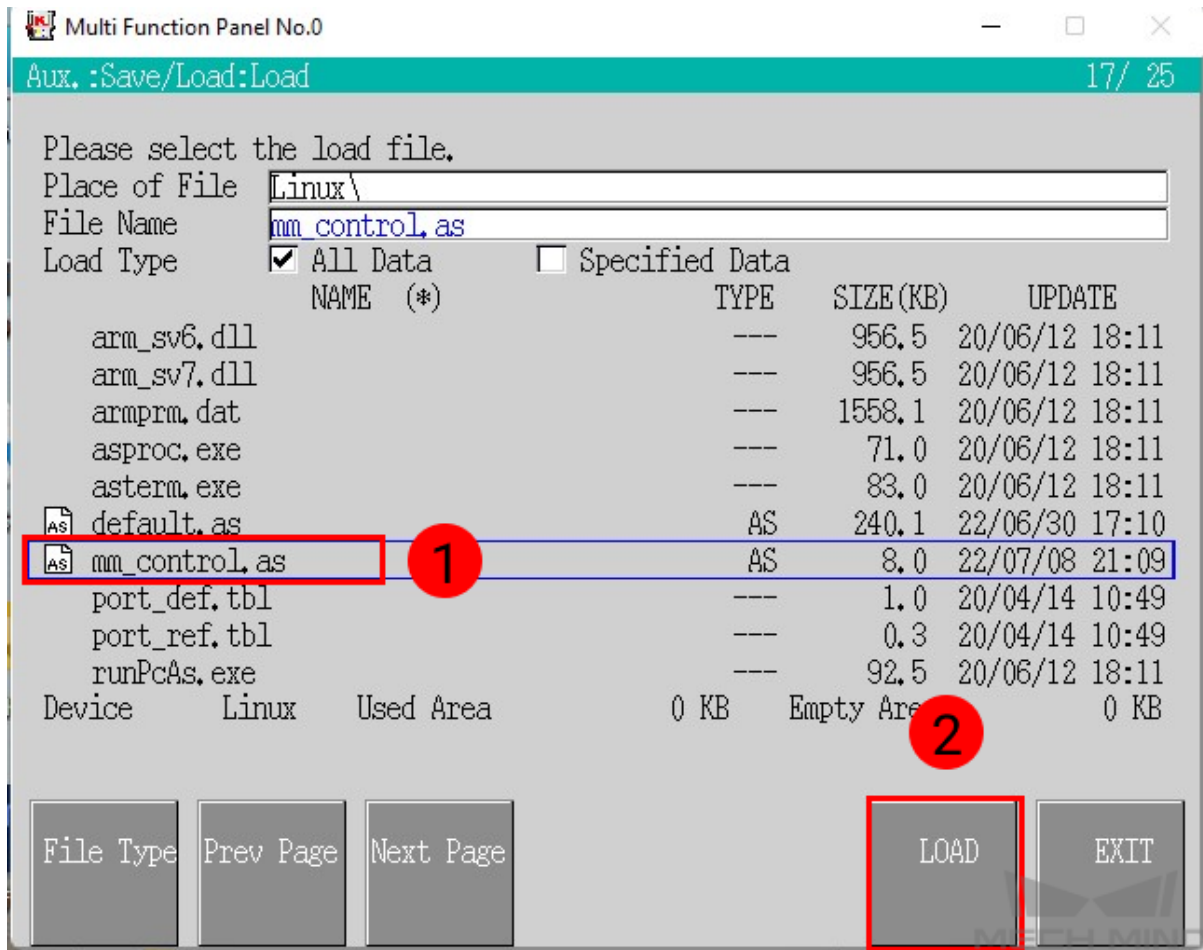
Note: To switch the robot to teach mode, turn the Teach/Repeat switch on the controller to **TEACH**, and the teach lock switch on the teach pendant to **ON**.

4. Press on *Aux.*, and select 2. *Save/Load* → 2. *Load*.

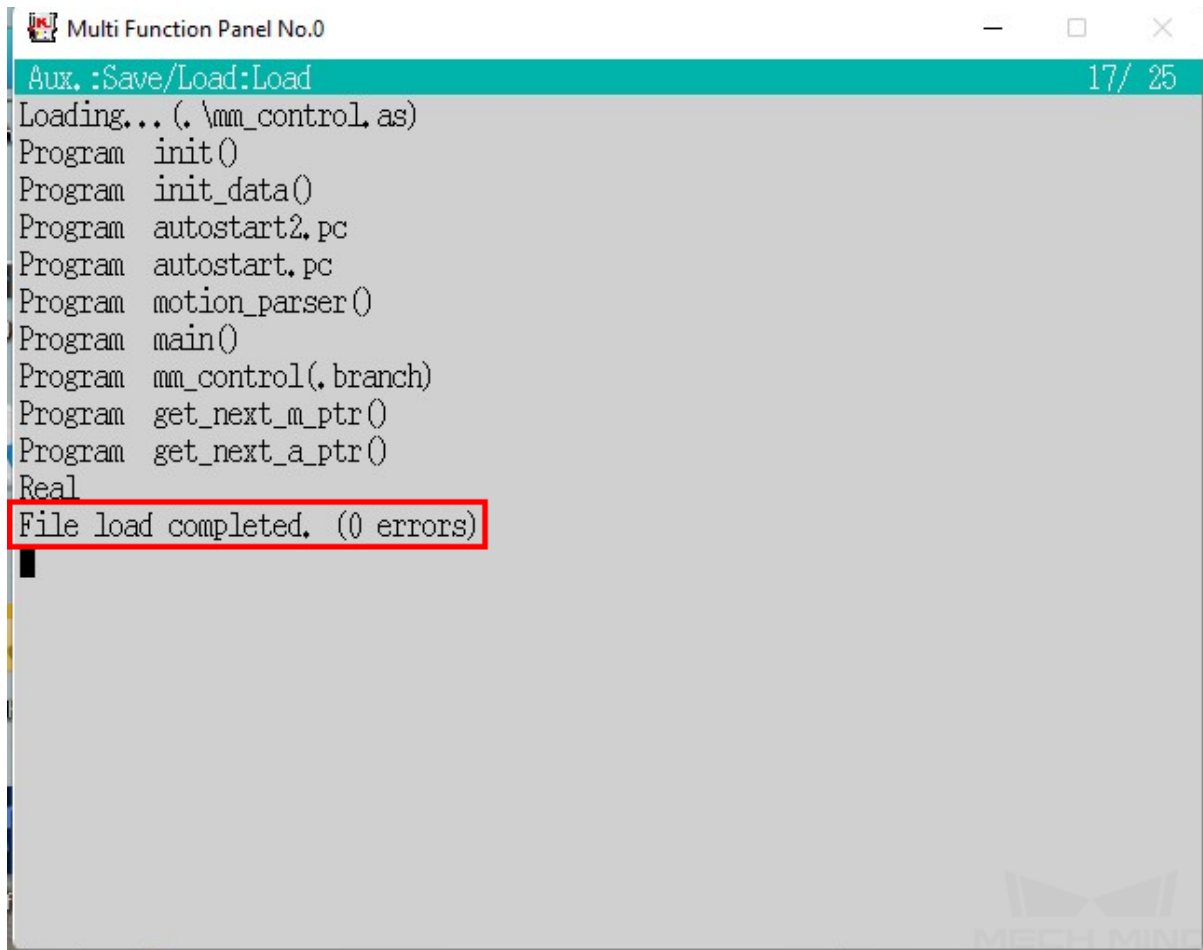


5. Press on `mm_control.as` in the file list twice to select it, and then press on **LOAD**.

1.3. Load the Program File

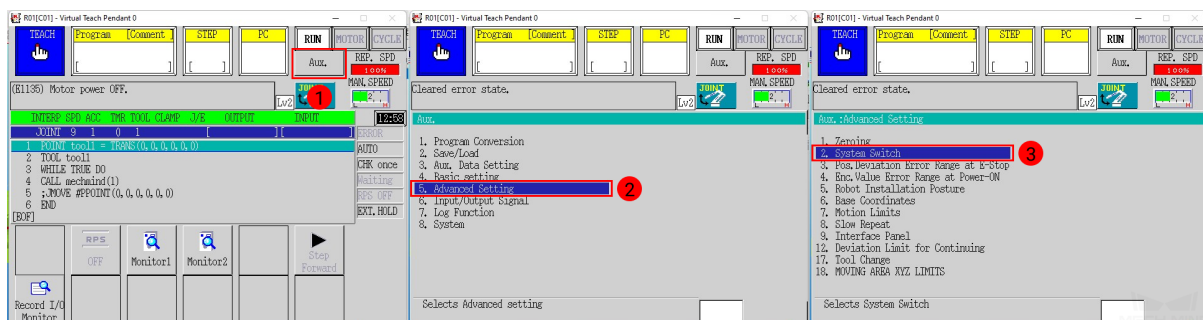


- When loading completes, make sure no errors occurred during loading, and press on the R key to exit.

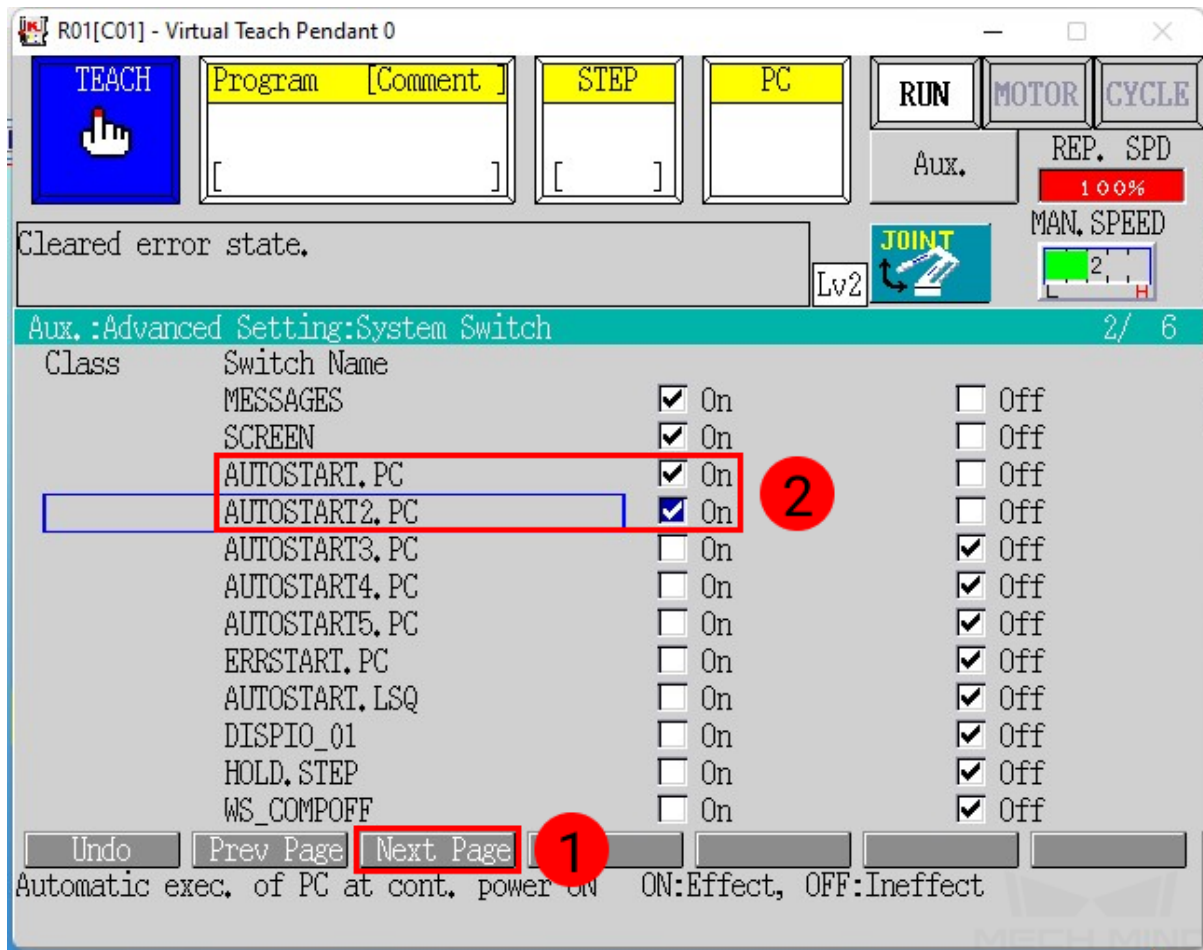


1.3.3 Further Configurations

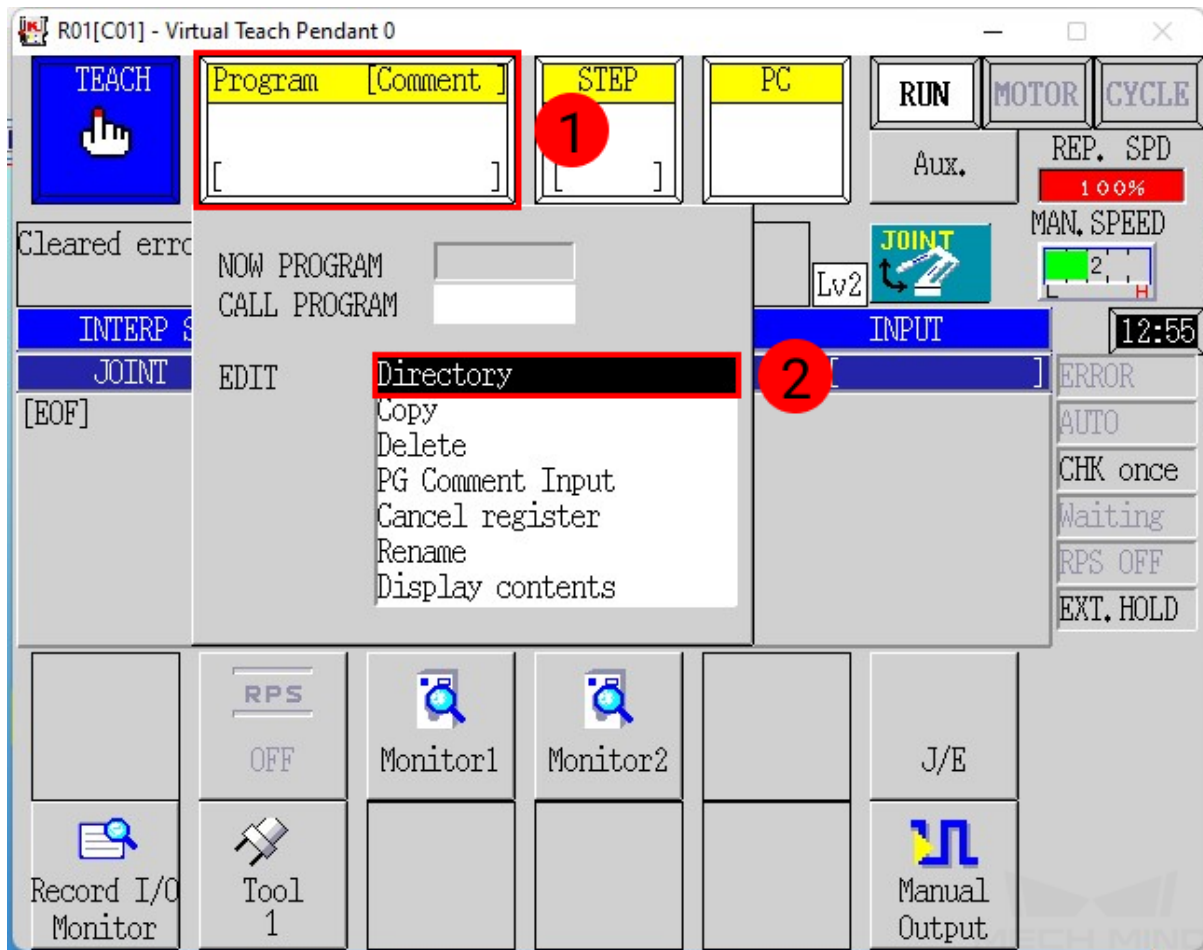
1. Press on *Aux.*, and select 5. *Advanced Settings* → 2. *System Switch*.



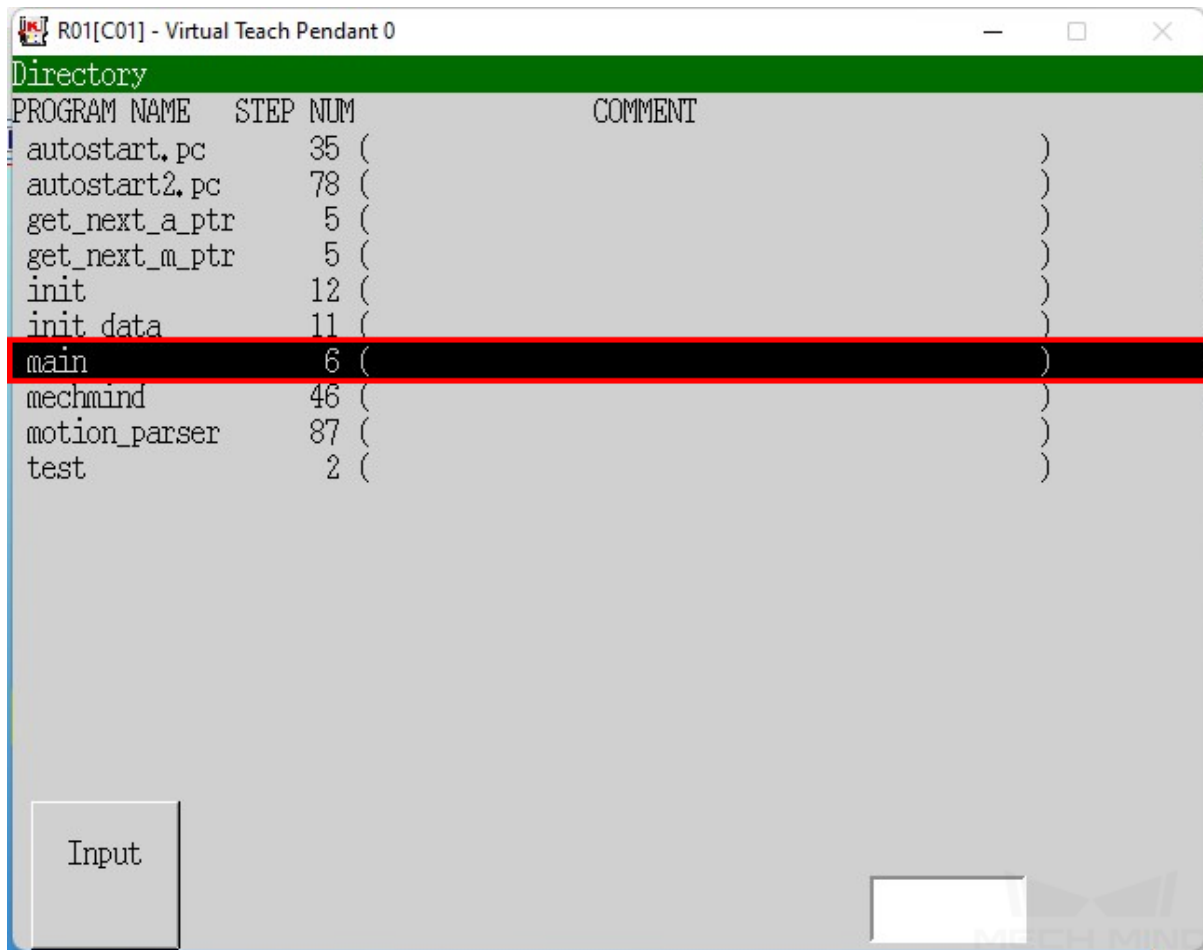
2. Press on *Next Page*, find **AUTOSTART.PC** and **AUTOSTART2.PC**, check the **On** boxes of these two programs, and press the **ENTER** key to save the changes.



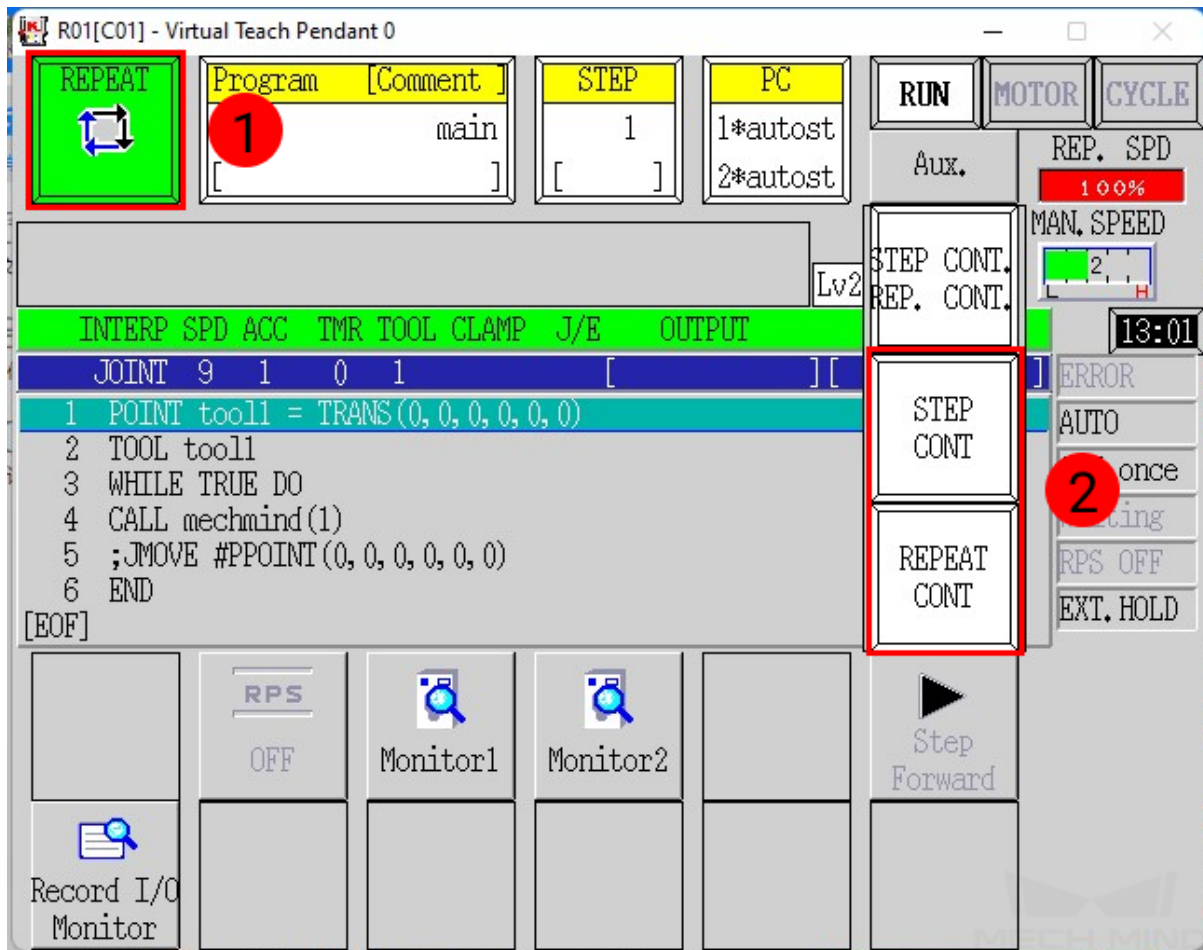
3. Press on the Program area, select Directory.



4. Select **main**, and press the ENTER key to save the change.

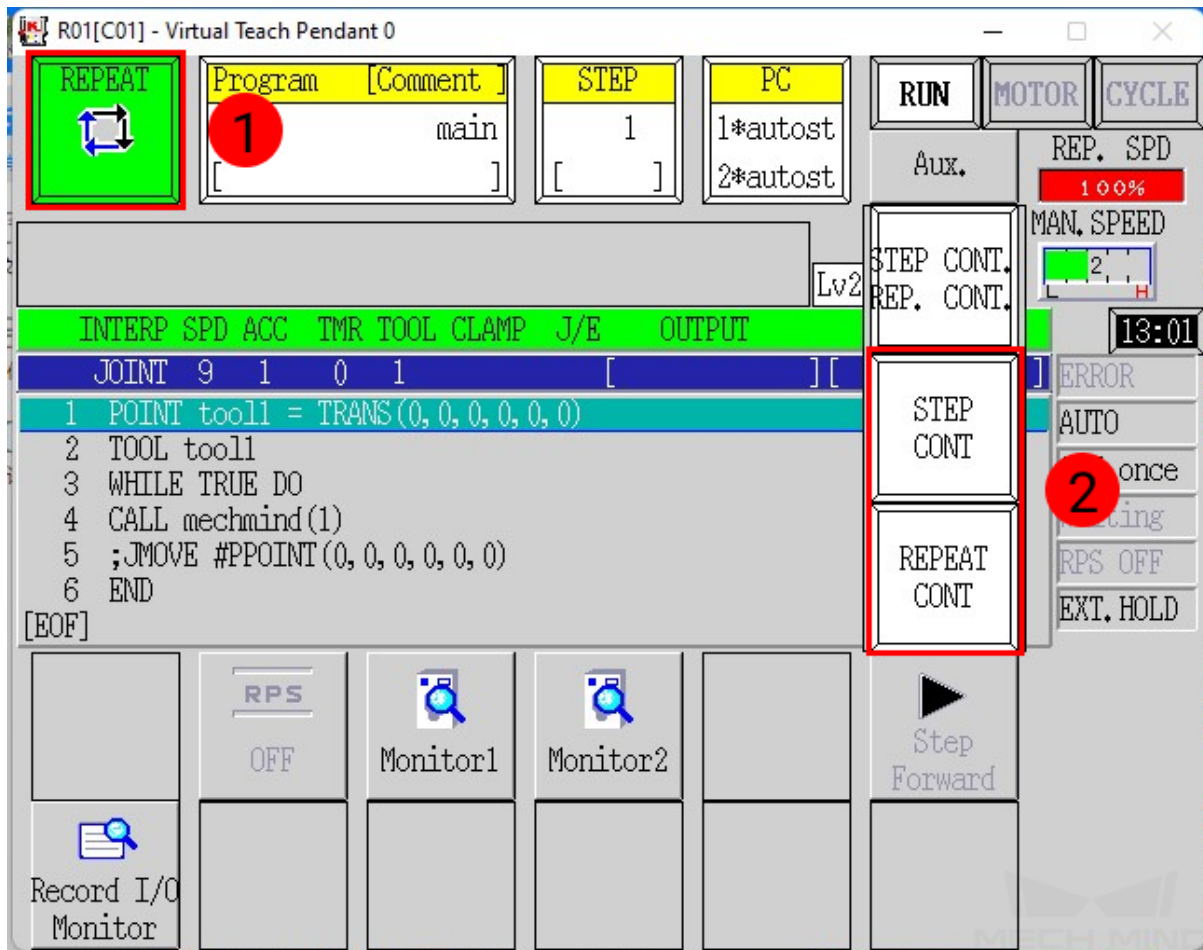


5. Switch the robot to repeat mode, press on the white button below Aux., and change the drop-down options to STEP CONT and REPEAT CONT.



Note: To switch the robot to repeat mode, turn the Teach/Repeat switch on the controller to REPEAT, and the teach lock switch on the teach pendant to OFF.

- Restart the controller. Now the teach pendant should show the following interface, with two PC programs running (indicated by the asterisks after the program numbers) and 1 displayed in the STEP area.



Note: If the STEP isn't 1, please press on the STEP area and change it to 1.

1.4 Test Robot Connection

1.4.1 Configure Robot in Mech-Viz

1. Open Mech-Viz, click *New project* to create a new project.
2. Select the robot model in use in the next page.
3. Save the project by pressing **Ctrl + S**.
4. In the toolbar, change the **Vel.** (velocity) and **Acc.** (acceleration) parameters to 5%.
5. Right-click the project name in **Resources** and select **Autoload Project**.

1.4.2 Configure Settings in Mech-Center

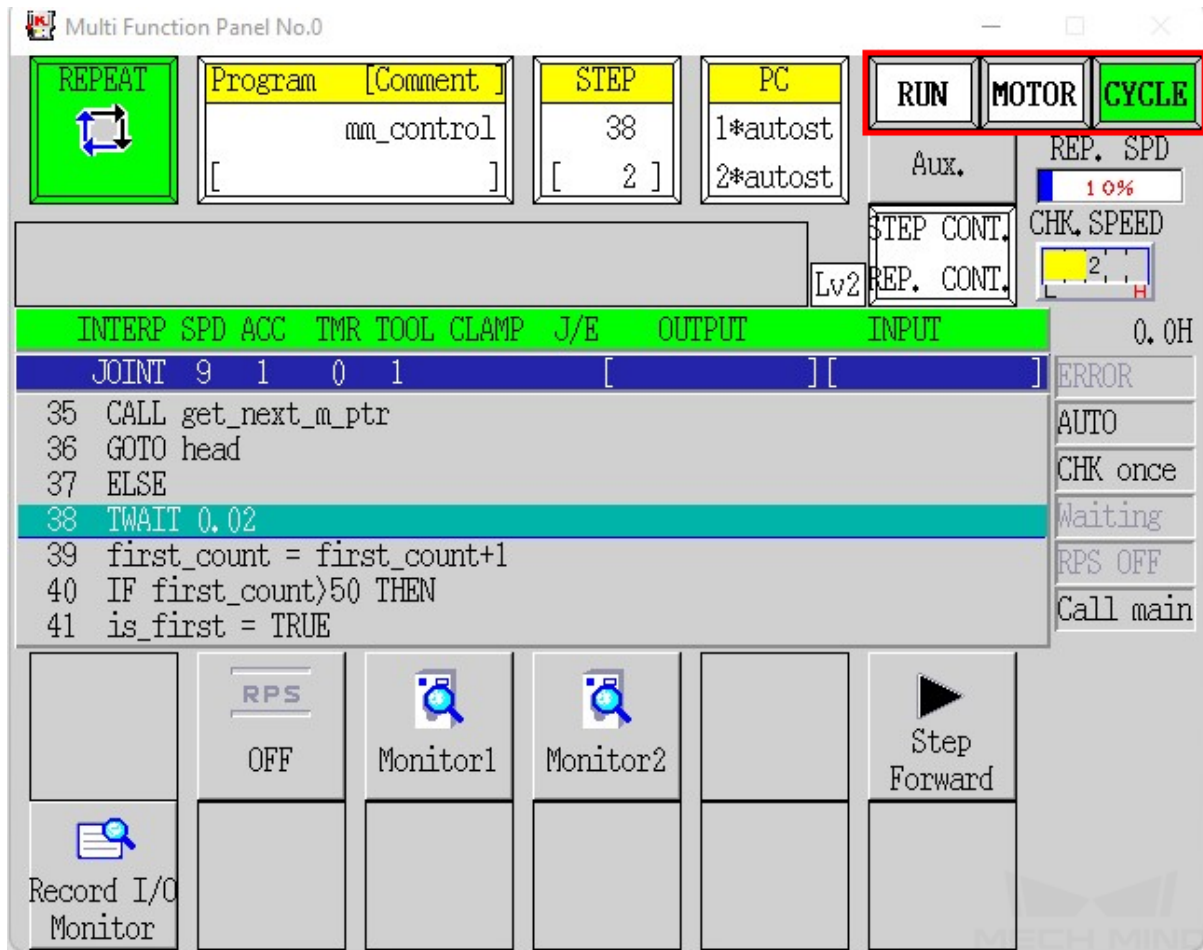
1. Open Mech-Center and click on *Deployment Settings*.
2. Go to **Robot Server**, and make sure **Use robot server** is checked.
3. Check if the robot model displayed next to **Robot type in Mech-Viz project** matches the one in use.
4. Set the Robot IP address, and click **Save**.

1.4.3 Connect to Robot in Mech-Center

1. Click *Connect Robot* in the Toolbar.
2. The robot is successfully connected if:
 - A message saying **Robot: server connected to the robot** shows up in the **Log** panel, and
 - A robot icon with the robot model shows up in the **Service Status** panel.

1.4.4 Operate on the Teach Pendant

1. Press on *MOTOR* while holding down the **A** key to power the motor.
2. Press on *CYCLE* while holding down the **A** key to run the program.
3. If *RUN* does not turn green, press the **RUN/HOLD** key while holding down the **A** key.



The robot is successfully connected if *MOTOR*, *CYCLE*, and *RUN* are lit green, and no error messages appear in Mech-Center or on the teach pendant.

1.4.5 Move the Robot

1. In Mech-Viz, click *Sync Robot* in the toolbar to synchronize the pose of the real robot to the simulated robot. Then, click *Sync Robot* again to disable the synchronization.
2. Click the **Robot** tab in the lower right, and change the joint position of J1 slightly (for example, from 0° to 3°). The simulated robot will move accordingly.
3. Click *Move real robot*, the real robot should move accordingly.

Attention: When moving the robot, please pay attention to safety hazards. In the case of an emergency, press the emergency stop button on the teach pendant!

KAWASAKI PROGRAM DESCRIPTION

2.1 Master-Control Programs

Program	Description
init	Set IP and signals
init_data	Initialize variables
autostart.pc	PC program 1 for receiving commands
autostart2.pc	PC program 2 for sending robot pose and status
motion_parser	Subprogram called by PC program for decoding commands
main	Foreground main program
mechmind	The master-control program
get_next_m_ptr	Index control (motion)
get_next_a_ptr	Index control (storage)

2.2 Internal Signals

Name	Signal	Description
stop_sig	2011	Stop motion
viz_conl_sig	2012	Master-control signal