

## Using tool changers

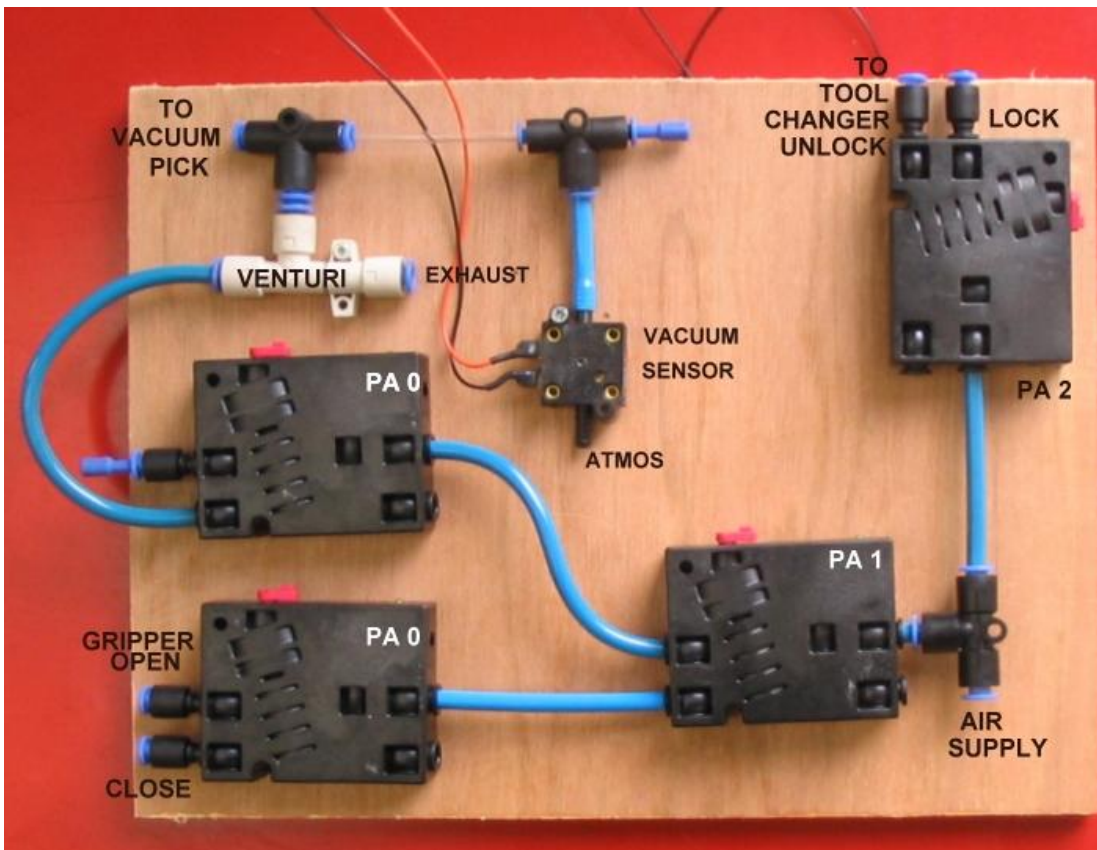
### Overview

The tool changer requires 2 airlines, one to operate (and so drop the tool) and one to open (thus grab the tool). The gripper also requires 2 lines, one to close and one to open but these must both be shut off if the gripper is not being held. The vacuum unit requires only one air line to create the vacuum.

By connecting as follows PA 1 can be used to select gripper or vacuum. With the gripper not being held select vacuum and turn PA 0 off.

**THIS ITEM HAS TEMPORARY CONNECTIONS FOR TESTING ONLY**

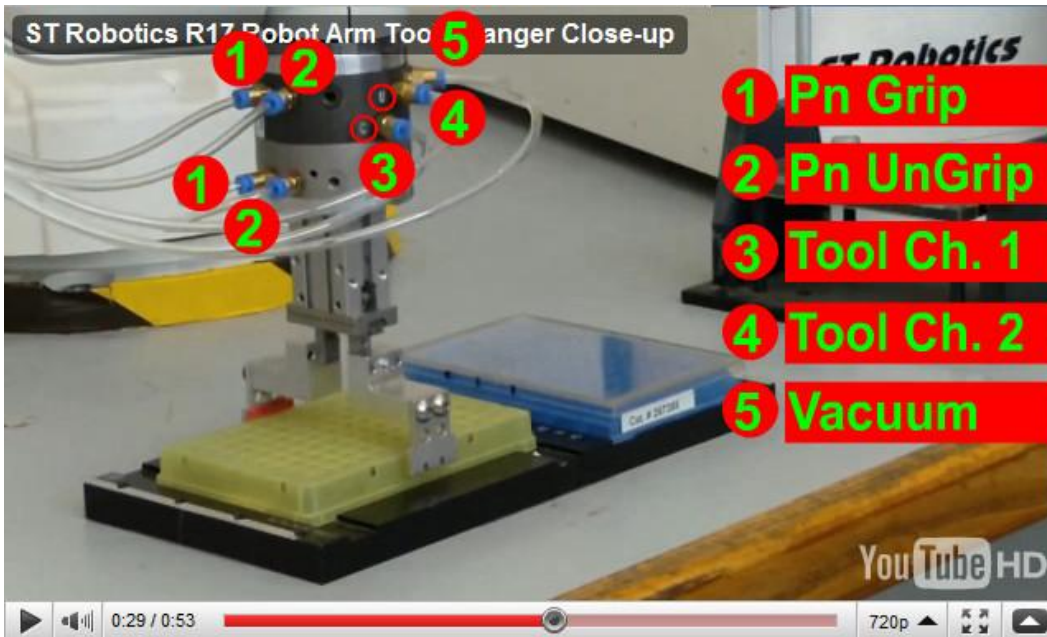
### Pneumatic circuit:



If you have no vacuum pickup then simply remove the upper PA 0 valve and block the PA 1 outlet.

The valves connect to the 15W D connector. The black wires connect to the PA signals (see below) and the red wires to +12v. The vacuum sensor connects to pins 6 and 7 on the 9-way D connector.

# Help sheet 14



## Electrical connections:

	User outputs - 15w D	User inputs - 9w D
1	PA 7	1 PB 6
2	PA 6	2 PB 5
3	PA 5	3 0volts
4	PA 4	4 PB 3
5	PA 3	5 +12V
6	PA 2	6 PB 7
7	PA 1 (elec grip)	7 0 volts
8	PA 0 (gripper)	8 PB 4
9	0 volts	9 +12 volts
10	0 volts	
11	+12v	
12	+12v	
13	+12v	
14	+12v	
15	+12v	

# Help sheet 14



## Controls

PA 0 – controls gripper valve. Use GRIP and UNGRIP in the usual way.

PA 1 – controls gripper stop valve.

PA 1 ON – turns on the gripper and turns off the vacuum.

PA 1 OFF – turns off the gripper and turns on the vacuum.

If the tool changer is holding no tool then PA 1 must be OFF or you will lose air.

PA 2 – controls the tool changer.

PA 2 ON – lets go the tool.

PA 2 OFF – holds the tool.

To pick up a tool open the changer with PA 2 ON, PA 1 and PA 0 should be off.

Once connected with the tool do PA 2 OFF to hold the tool.

If you are holding a vacuum pickup then operate it with PA 0 ON for vacuum and PA 0 OFF to release.

If you are holding a gripper then first enable the gripper with PA 1 ON then you can use GRIP and UNGRIP.

## Programming Tips

Include the following in your project file (this can also be found on the disk as multitool.ed2) or simply load the project multitool.run and build your own project on that. Saving back as a new project.

```
: CHANGER PA 2 ;  
: GVALVE PA 1 ;  
: VAC PA 0 ;  
: VACON GVALVE OFF GRIP ;  
: VACOFF GVALVE OFF UNGRIP ;  
: GRIP GVALVE ON GRIP ; ( this redefines GRIP )  
: UNGRIP UNGRIP GVALVE OFF ; ( this redefines UNGRIP )  
: SELGRIP GVALVE ON ;  
: SELVAC GVALVE OFF ;
```

When holding the gripper the grip +/- on the teach pad will operate it and when holding the vacuum pickup the grip +/- will operate that.

Program a place with an approach position for each of the two nest positions (with the gripper in one nest and the vacuum pickup in the other). Use the teach pad in Cartesian mode (JOG or the J icon) and carefully lower the changer into the tool. Get the changer cones as central in the holes as possible. The changer pulls the tool up about a mm and throws it out a mm so teach a position with about 1-2 mm gap between the changer and the tool. Once you have taught the position operate the changer:

CHANGER ON

Then move vertically to a satisfactory clear position and click “set approach”.

Suggested code:

## Help sheet 14



Suppose the position for the gripper on the cradle is a PLACE you named GHOLDER

Then you could get the gripper as follows:

```
CHANGER ON      ( opens the clamp
GHOLDER         ( goes to the cradle
CHANGER OFF     ( closes the clamp to hold the tool
200 MSECS       ( allows 200mS for the clamp to work
WITHDRAW        ( withdraw from the cradle
SELGRIP         ( enable the gripper valve
```

Now use GRIP and UNGRIP.

Put it back with

```
GHOLDER
GVALVE OFF
CHANGER ON
200 MSECS
WITHDRAW
```

Suppose the position for the vacuum pickup is a PLACE you named VHOLDER

Then you could get the vac pickup as follows:

```
SELVAC          ( disable the gripper, enable vacuum
CHANGER ON      ( opens the clamp
GHOLDER         ( goes to the cradle
CHANGER OFF     ( closes the clamp to hold the tool
200 MSECS       ( allows 200mS for the clamp to work
WITHDRAW        ( withdraw from the cradle
```

Now operate the vacuum pickup with GRIP and UNGRIP