

## Exercise 6

1. The following are examples of automatic controllers. Fill in the type of controller, the measured parameter and the controlled quantity. The first is done as an example.

Type of system	Type of controller	Loop	Type of control	Measured variable	Controlled variable
Semiconductor process oven	PID controller	Closed	Regulation Fixed setpoint	Temperature	Electric power
Domestic oven	Threshold controller	Closed			
Automatic door opener					
Servo steering on car	P-controller		Servo tracking		
Automatic vacuum control system	Threshold controller				
Spacecraft steering motors (manual)		open			Burn time
Aircraft undercarriage					Up / down
LN <sub>2</sub> level control (e.g RITU type)					
Aqualung for Diving	P-controller			Water pressure	

2. You have the task of making a controller for tension in the paper passing through a paper machine. The tension must rise quickly from zero when the machine starts but must not oscillate or overshoot by more than a few % or the paper will tear and production will stop. What type of controller could you use and why?

3. Anti-skid braking systems (ABS brakes) on modern cars work by detecting if any wheel is not rotating and releasing the hydraulic pressure applied fed to the brake on that wheel till the wheel starts to turn. Investigate what type of controller is used.