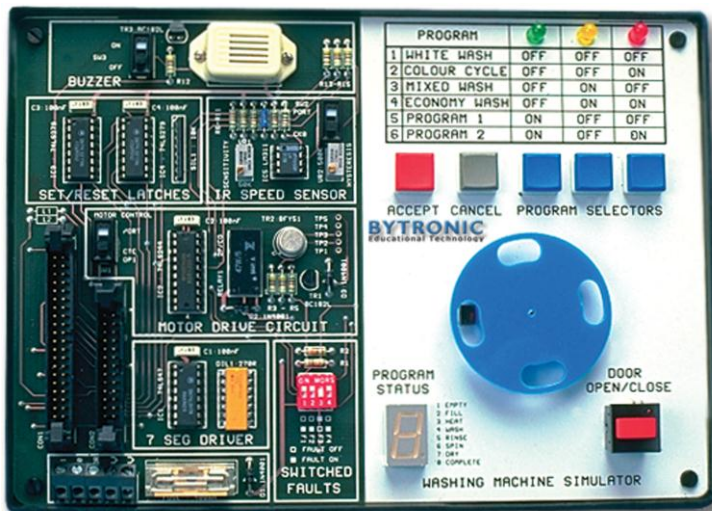# Washing Machine Simulator WMS

Key Features:

- Simulates actual domestic washing machine processes

- Control of DC motor, speed and direction

- Closed loop and PWM control of DC motor

- Target application for PC or Microcontroller

- Test Points and Switched Faults for diagnostics fault finding techniques

- Visual indication of activities using LEDs and display

The Washing Machine Simulator (WMS) is an application for electronic control engineering. The unit incorporates a series of input and output devices, which together simulate the actions of a typical domestic washing machine. The WMS has two main areas. The first area comprises the electronic circuits and connector sockets, the second area is the indicators, a motorised disc (which represents the washing machine drum) and the user controls. The circuit board incorporates test points, a fuse and four switches for fault insertion.

Three blue push buttons are used to select a 'wash program' from the software program and inputs from these buttons turn on green, yellow and red LED's. The binary pattern displayed may be compared to a 'program selector table' to indicate the current choice of program. A grey push button is used to cancel the current choice and a red push button to 'accept' input for the controller. A mechanically latched push button with a built in LED provides an input, which simulates the open/closed status of the washing machine door. An infra-red reflective sensor mounted beneath the disc supplies feedback on the speed of the motor. A seven-segment display is used to highlight the 'wash program status'. The status options are: Empty, Fill, Heat, Wash, Rinse, Spin, Dry and Complete.

Motor speed can be controlled using PWM and a buzzer activated to indicate the end of the 'wash program' (can be enabled or disabled using on-board switch). The buzzer can also be used to indicate that the 'door' has been opened or that a fault has occurred. Variations for programming the WMS are possible using two switches that change the input/output characteristics of the motor drive and speed sensor feedback. The WMS can be connected to a PC, using a suitable interface, or to a microcontroller.

Curriculum Coverage

- Getting Started
- Connecting to a PC through an interface card
- Connecting to an 8051 Micro
- Connecting to a Programmable Logic Controller
- The features of the washing machine simulator
- Washing machine electronics

- 7 segment display driver
- Motor drive and direction control
- Buzzer
- Switch input set/reset latch circuitry
- Infra red speed sensor
- Switched faults

Labworks

- Control of digital outputs
- Control of the seven segment display
- Reading the program selector switches
- On/Off control of the DC motor
- Controlling the DC motor/speed open loop
- Reading the motor speed feedback
- Colour wash program cycle
- Closed loop control of the DC motor

Specification

Controlled outputs	Motor on/off and direction control
	Buzzer
	Seven-segment display
	4 - switch data reset
Inputs	1 x 8-bit input port
Outputs	1 x 8-bit output port
Sensor inputs	Door
	3 x program selectors:

- cancel
- accept
- speed feedback

Switched faults	Four dual in-line switches
Connections	1 x 40-way IDC
	1 x 26-way IDC
	1 x 2 screw terminal for power input
Power supply requirements	5V d.c. @ 400mA fused

Required

A suitable PC with minimum; Pentium processor, 1GB RAM, 20GB HDD, CDROM Drive, and Windows XP or above

Ordering Information

Model Number:	**WMS**
Consists of:	1 x Washing machine simulator
	1 x 5V d.c. power supply unit
	1 x 2.5mm adaptor lead
	1 x User manual
	1 x Software CD

Weights and Dimensions

Un-Packed		Packed	
Approximate Dimensions (mm)	220W x 160D x 60H	Approximate Dimensions (mm)	300L x 300W x 200H
Approximate Weights	0.5Kg	Approximate Weights	2Kg