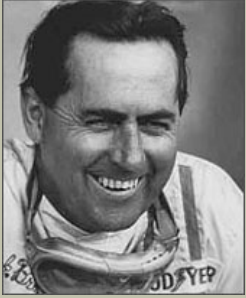




April 2007

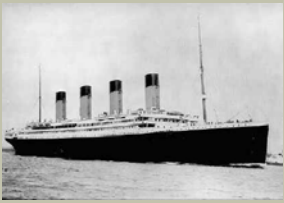
Basic Principles: Control Loops

Historical April



2nd April 1926

Sir John Arthur "Jack" Brabham OBE, Triple Formula One World Champion driver, born in Hurstville, Sydney, NSW.



15th April 1912

At 2.20am the ill fated Olympic-class passenger liner 'RMS Titanic' sinks 450 miles off Newfoundland.



30th April 1945

Der Führer, Adolf Hitler, dictator of Germany & his wife of 2 days, Eva Braun, commit suicide in Berlin.

Many cars today are available with cruise control - a function designed to maintain constant speed (output variable) by altering the engine throttle (input variable).

Open & Closed Loops

An easy way to implement cruise control is to fix the engine throttle when cruise control is engaged. The problem however is that whenever the terrain changes from flat, the vehicle will either speed up or slow down. This is known as *open loop* control because there is no direct intelligent link (feedback) between the input (throttle) and output (constant speed). It won't work.



The Fat Controller: Not a stocked item

Cruise control will only work if the car throttle is automatically adjusted to compensate for changes that affect the car speed such as the road gradient or wind speed. To do this a feedback controller continually monitors the vehicle speed and adjusts the engine throttle to maintain a constant speed. This is known as a *closed loop* control system.

PID Control Loops

The most common feedback control used worldwide is 'Proportional-Integral-Derivative' (PID) Control. A controller compares a measured process value to a known set point value. Any difference between the values is used to adjust a process input in order to bring the process and set point values closer.



Cruise control : Closed loop

The *Proportional Band* alters the controller output proportionally depending on the error between the measured value and the desired set point value.

The *Integral* action operates to vary the controller output dependant on the amount of time an error is present between the measured process & set point values.

The *Derivative* action looks at the rate of change of the measured difference. It is often used to avoid unwanted overshoot in closed loop control systems.

A thermocouple (T/C) is formed when two different metallic conductors are in contact and where there is a temperature difference along each of the conductors. The voltage that occurs depends on the type of metals in contact.

Eight standard T/C exist: Type-J & Type-K are commonplace though other varieties; T,E,N,S,R,B are also used within the industrial sector.

Which Thermocouple?

Type	Min Temp (Deg C)	Max Temp (Deg C)
J	-40	+750
T	-200	+350
K	-200	+1200
E	-200	+900
N	-200	+1200
S	-40	+1600
R	-40	+1600
B	+600	+1700



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For almost 25 years Intech Instruments have been operating throughout New Zealand, servicing a variety of industries. Our product range is made up of both our own high quality manufactured products plus a range of first class imported items.

Our core business is concerned with supervisory, monitoring and control – utilising hardware and software facilities to provide a host of solutions.

Based in Christchurch, where we have both a sales and service operation, Intech Instruments also have offices in Auckland and Hawkes Bay.

With a combination of industrial experiences and technical skills, Intech provide customers with the best solutions possible.

Shimaden SR90 Series

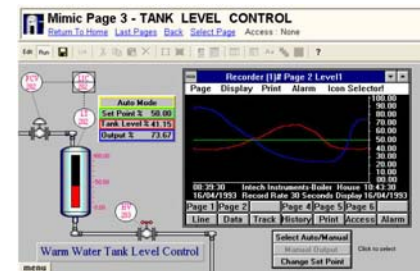
Shimaden controllers are used extensively throughout New Zealand. The SR90 series has provided end users with excellent service and are used for a vast range of applications due to the flexible input signal options available. Microprocessor controlled, easy to use and exceptionally reliable, these are stocked items. Intech offer a complete sales, service & repair facility for Shimaden products.



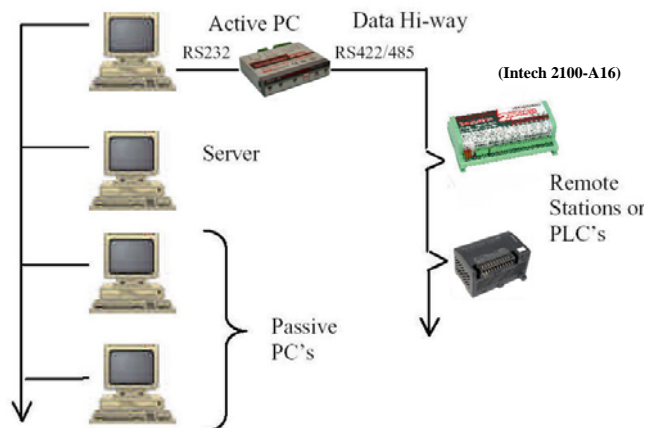
Shimaden's FP93 (left) is a highly capable programmable ramp controller unit whilst the SR90 series (right) is by far the most popular of the Shimaden digital units.

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