ANSWER KEY - LABORATORY EXERCISE 10
PID TUNING FROM CLOSED LOOP TESTS

2. TUNING BY CLOSED LOOP PROCESS TESTS

NOTE: Some persons may use the GENERIC2 model for Laboratory Exercises 9 and 10, rather than the suggested GENERIC model. Hence, data is given for both models.

2.2 Process Testing

	PROCESS MODEL					
	GENERIC			GENERIC2		
Ultimate Process Gain	9.0			2.3		
Ultimate Period	7.0 mins			18.3 mins		
	P	PI	PID	P	PI	PID
Gain (Kc)	4.5	4.05	5.4	1.15	1.03	1.6
Prop Band (PB)	22%	25%	18%	87%	97%	63%
Integ Time (Ti) Mins/Rpt	___	5.8	3.5	___	15.0	9.0
Reset Rate Rpts/Min	___	0.17	0.29	___	0.07	0.11
Deriv Time (TD)	___	___	0.87	___	___	2.25
Decay Ratio	0.29	0.612	0.136	0.236	0.18	0.186
Period, mins	10.0	10.4	9.3	21.4	24.5	17.0
Period/Integ Time	___	2.1	___	___	1.63	___

For the P-only controller, the eventual settling value was 313.9, compared with a Set Point of 325. Therefore the decay ratio was figured from overshoots above 313.9.

For the P-only controller, the eventual settling value was 306.6, compared with a Set Point of 325. Therefore the decay ratio was figured from overshoots above 306.6.

Using the GENERIC process model, the closed loop testing method produced a controller is too aggressive, particularly using PI modes. We could have deduced that this would be true as soon as we calculated the parameters (without entering them and actually testing the loop) by comparison with the tuning parameters produced by the open loop method, Laboratory Exercise 9.

Using the GENERIC2 process model, the controller tuning resulting from closed loop testing is fairly similar to that produced by open loop testing. Hence the loop performance resulting from the two methods is comparable. THIS WILL NOT ALWAYS BE TRUE, as the results using the GENERIC model demonstrate.