

Chapter Five

Conclusion and Recommendation

5.1 Conclusion

- Programmable logic controller (PLC) is specialized computer used to control machine and process. It uses a programmable memory to store instructions and specific functions that include on/off control, timing, counting, sequencing, arithmetic, and data handling.
- Proportional Integral Derivation (P-I-D) controller has the optimum control dynamics including zero steady state error, fast response (short rise time), no oscillations and higher stability.
- Programmable controllers are generally programmed in ladder diagram (or "relay diagram). Their purpose is to perform these control operations in a more reliable manner at a lower cost.
- The design of hydraulic system using PLC system is better because easy programming, Reprogramming required, less expensive and Easy to identify fault and repair.
- Design using continues close loop PID to safe the status of system after more time because in this project the SP is unfixed to allow to changing under any external disturbance.

5.2 Recommendations

1. Selecting the appropriate PLC for an application is important because the right PLC can make a process more efficient, more effective, and less expensive.
2. Using the MATLAB to design this project because the fixable language, software is available and easier.
3. Create the complex hydraulic system use the PLC have PID controller use ladder diagram because the system to be have easy program ,reprogram, less cost, zero steady state error, fast response and higher stability.

Reference

- [1] L.A. Bryan and E.A. Bryan," Programmable Controllers Theory and Implementation", Second Edition, An Industrial Text and Video Company 1950 Spectrum Circle Tower A-First Floor Marietta, Georgia 30067.
- [2] Nise, Norman C.," Control Systems Engineering", 2nd ed. Benjamin/Cummings, Redwood City, CA, 1995.
- [3] "Introduction programmable logic controllers (PLC)", industrial control systems, fall 2006.
- [4] Dr.D.J.Jackson, "Electrical and computer engineering", Department of Electronics Engineering, Mandalay Technological University (MTU), Myanmar.
- [5] Dr. Alfred R. Boysen, "PROGRAMMABLE LOGIC CONTROLLERS AND LADDER LOGIC", Department of Humanities South Dakota School of Mines and Technology Technical Communications I, April 2008.
- [6] Group Members: Sena Teme, Semih Yagli, Semih Goren, "P, PD, PI, PID CONTROLLERS", Middle East Technical University, Electrical and Electronics Engineering Department.
- [7] Sandar Htay, Su Su Yi Mon, "Implementation of PLC Based Elevator Control System", Department of Electronics Engineering, Mandalay Technological University (MTU), Myanmar, 1956.
- [8] Joint initiative of IITs and IISc – Funded by MHRD- NPTEL – Mechanical – Mechatronics and Manufacturing Automation.
- [9] Joey K. Parker, Dale Schinstock, "Introduction to Hydraulic and Logic Systems in a Controls Course", Department of Mechanical Engineering, the University of Alabama, Tuscaloosa, AL.
- [10] J. Paulusová, L. Körösi," Institute of Control and Industrial Informatics", Slovak University of Technology, Faculty of Electrical Engineering and Information Technology.

- [11] A. Pulen," Implementation of automatic design of PID controller in the PLC". Master Thesis, FEI STU, Slovak Republic, May 2009.
- [12] Dr.Majid A. Oleiwi, Abdul Muhsin M. Al-Timimi and Ammas Abdulhussein, " Design & Simulation of PLC Control and Electro-Hydraulic System for a Punching Machine", Received on: 21/5/2008, Accepted on: 7/5/2009, Eng. & Tech. Journal, Vol. 27, No.8, 2009.
- [13] Raymond T. Stefani, Clement J. Savant, Jr., Bahram Shahian and Gene H. Hostetter, "Design of Feedback Control Systems", copyright 1994, 1989, 1982 by Saunders College Publishing.

Appendix

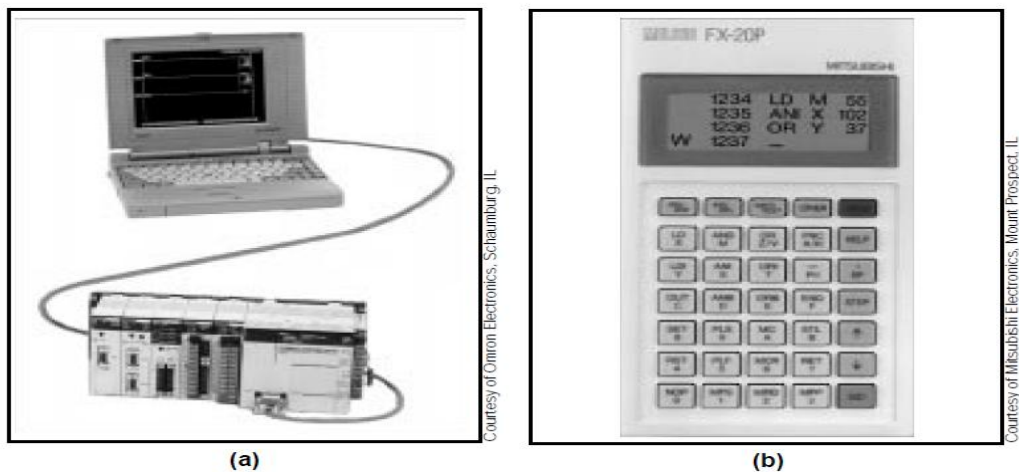


Figure A.1: (a) Personal computer used as a programming device and (b) a mini programmer unit.

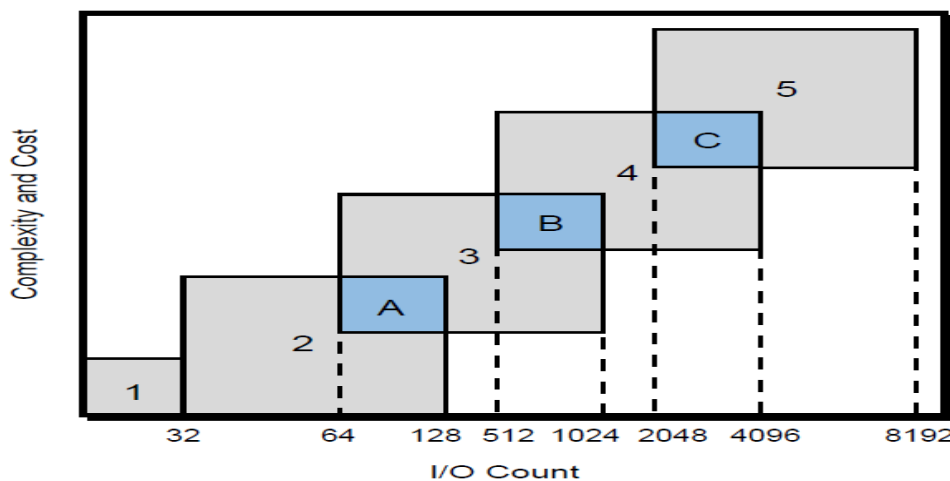


Figure A.2: The uncluttered control panel of an installed PLC system.

PLC PRODUCT APPLICATION RANGES

Figure A.3 graphically illustrates programmable controller product ranges. This chart is not definitive, but for practical purposes, it is valid. The PLC market can be segmented into five groups:

1. Micro PLCs
2. Small PLCs
3. Medium PLCs
4. Large PLCs
5. Very large PLCs



FigureA.3: PLC product ranges.

Micro PLCs are used in applications controlling up to 32 input and output devices, 20 or less I/O being the norm. The micros are followed by the small PLC category, which controls 32 to 128 I/O. The medium (64 to 1024 I/O), large (512 to 4096 I/O), and very large (2048 to 8192 I/O) PLCs complete the segmentation. Figure A5 shows several PLCs that fall into this category classification.

The A, B, and C overlapping areas in Figure A4 reflect enhancements, by adding options, of the standard features of the PLCs within a particular

segment. These options allow a product to be closely matched to the application without having to purchase the next larger unit.

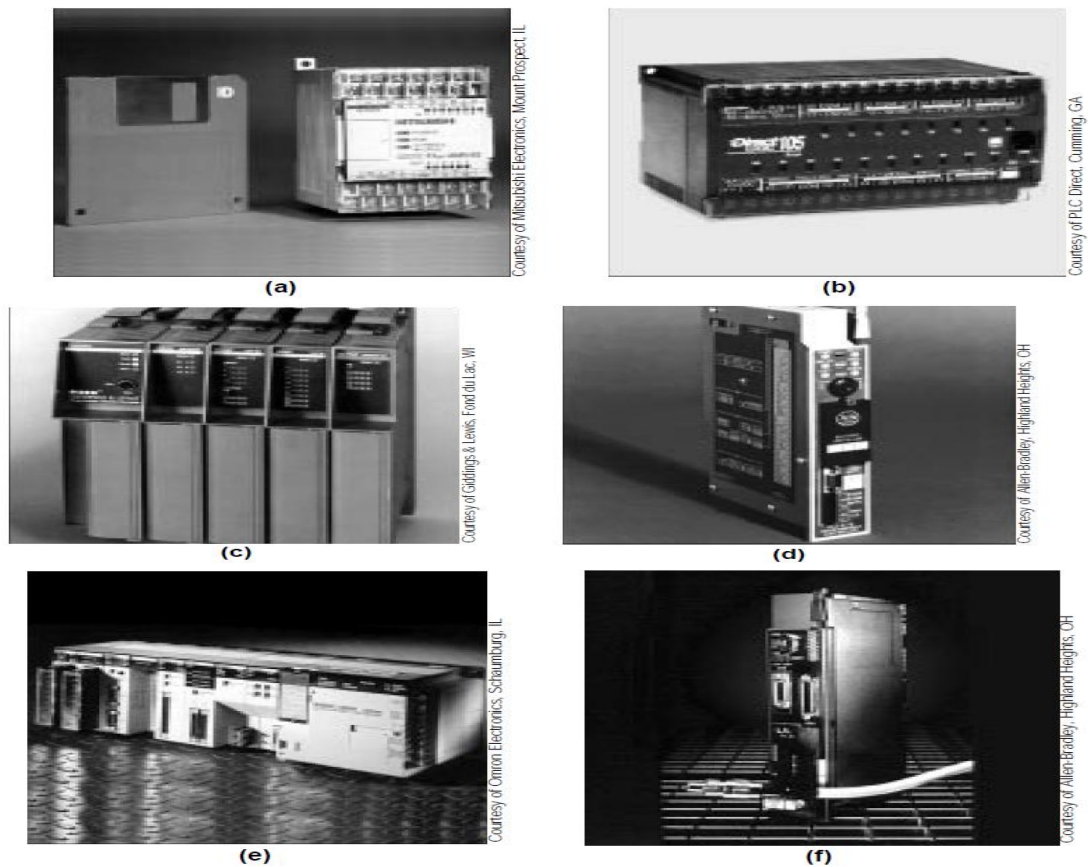


Figure A5: **(a)** Mitsubishi's smallest print size PLC (14 I/O), **(b)** PLC Direct DL105 with 18 I/O and a capacity of 6 amps per output channel, **(c)** Giddings & Lewis PIC90 capable of handling 128 I/O with motion control capabilities, **(d)** Allen-Bradley's PLC 5/15 (512 I/O), **(e)** Omron's C200H PLC (1392 I/O), and **(f)** Allen-Bradley's PLC 5/80 (3072 I/O).

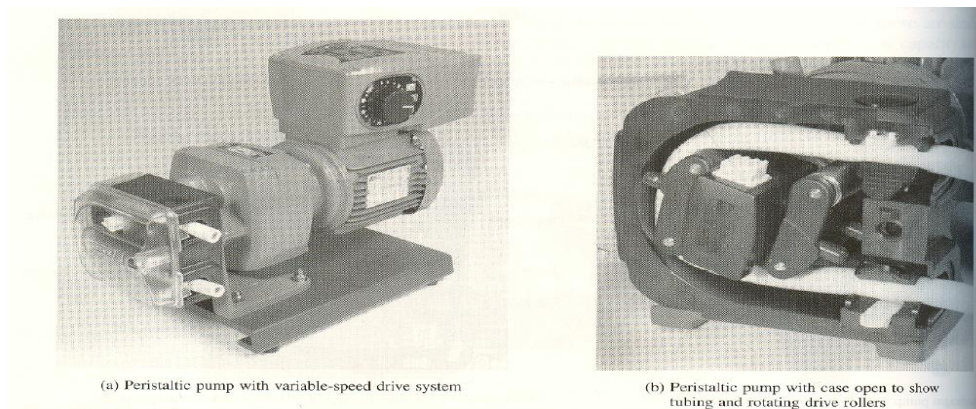


Figure A6: Peristaltic pump