

Q3 October 2000 Examination

The sequence of operations in a printing machine is to be automated using three pneumatic cylinders, **A**, **B** and **C**. A **START** pushbutton is to initiate each sequence of operations but the sequence will only begin if an incoming part is present, as indicated by the actuation of a limit valve **LV**. Once initiated, the cylinders move according to the following

A+ **B+** (DELAY) **B-** **C+** **B+** (DELAY) **B-** **A-**
C-

Each of the time delays before the two **B-** motions in the sequence needs to be individually adjustable.

- (a) Design a purely pneumatic control circuit to achieve the sequence of operations as described above. (You may provide your answer on the template of three cylinders provided.) (20 marks)
- (b) Show how you would modify your pneumatic circuit to provide the following additional features:

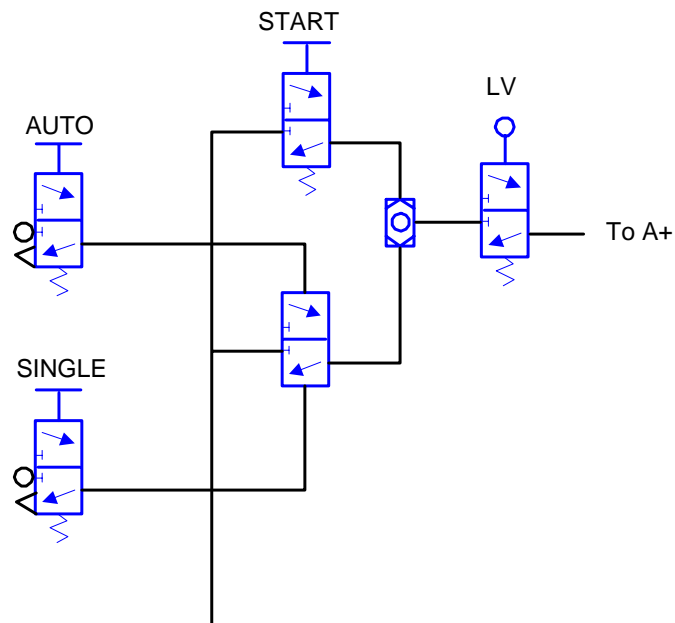
Two additional pushbuttons, **SINGLE** and **AUTO**, are to be provided such that

- i) Actuation of **AUTO** at any time will place the system in the automatic mode of operation. In this mode of operation, after a sequence of operation has been completed, a new sequence will be automatically initiated as long as an incoming part is present, as detected by **LV**.
- ii) Actuation of **SINGLE** at any time will place the system in the single-cycle mode of operation. In this mode, any on-going sequence will continue until it is completed. The system will then rest in that position until **START** is again pressed to initiate a new sequence.

(5 marks)

Solution to Q3(b)

Change the **START** PB and the **LV** limit valve to the following circuit_



From Group I

A+ B+ | (DELAY) B- C+ | B+ | (DELAY) B- A- C- |

