

Chapter 1 Introduction

- ∅ The standard feedback control structure (water temperature system)
- ∅ Basic requirements on control systems
- ∅ The typical test signals for control systems

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Standard Feedback Control Structure

Example: Water temperature control system

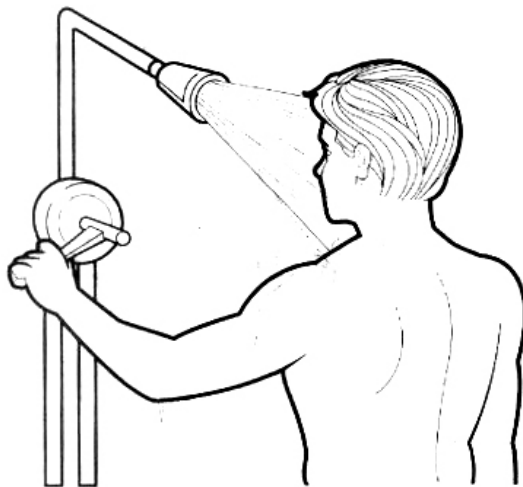
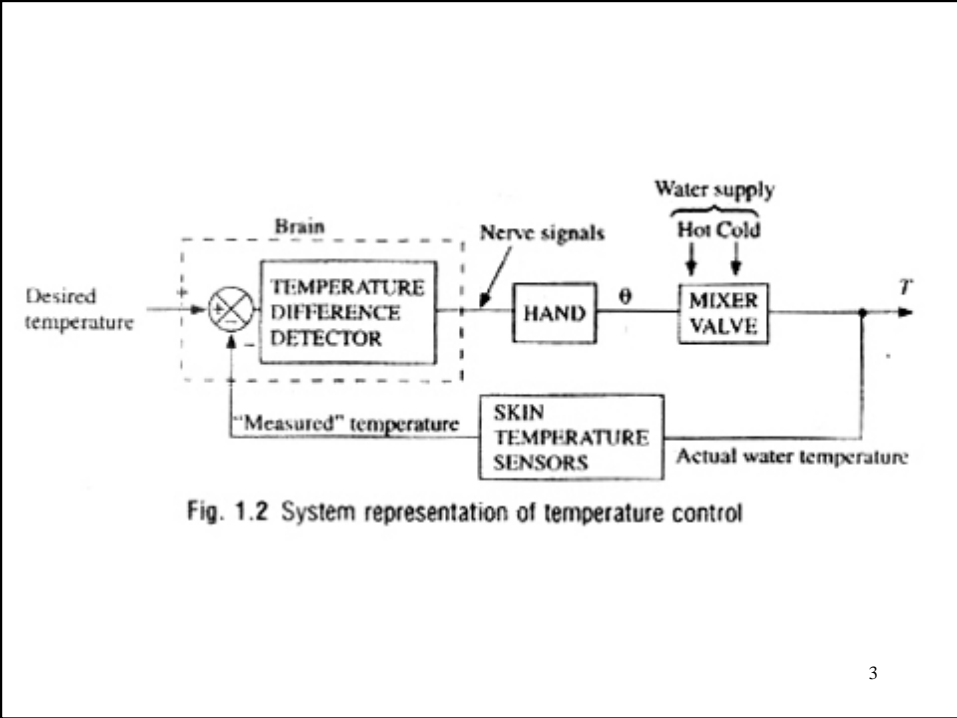
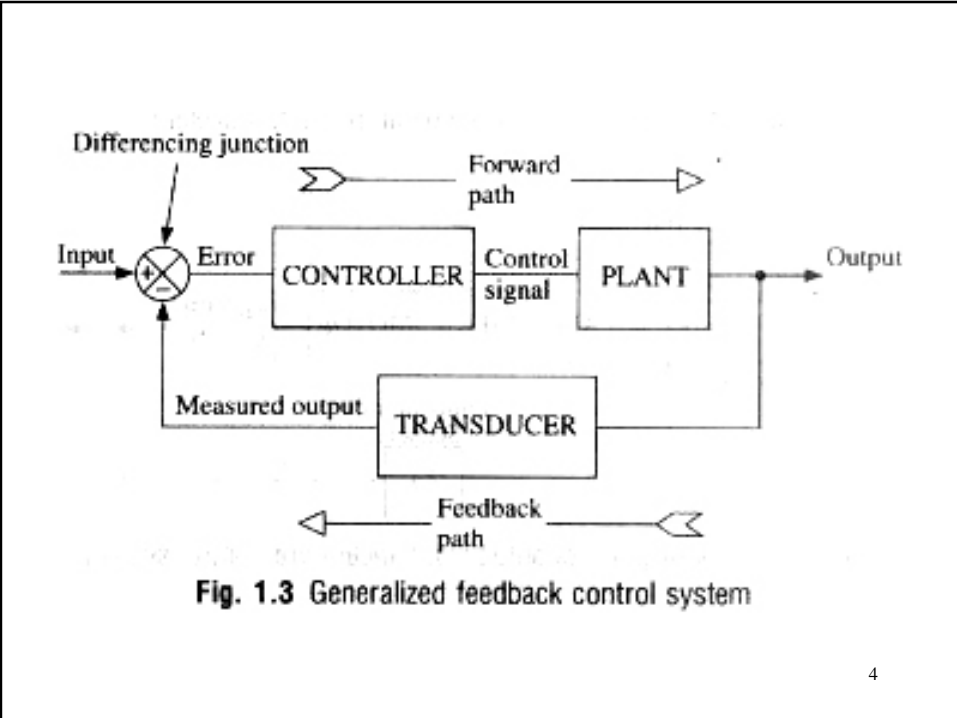


Fig. 1.1 Water temperature control system

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water temperature control system without human:

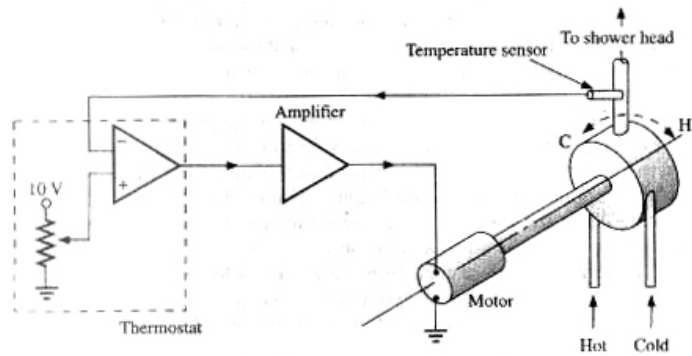


Fig. 1.4 Automatic water temperature control system

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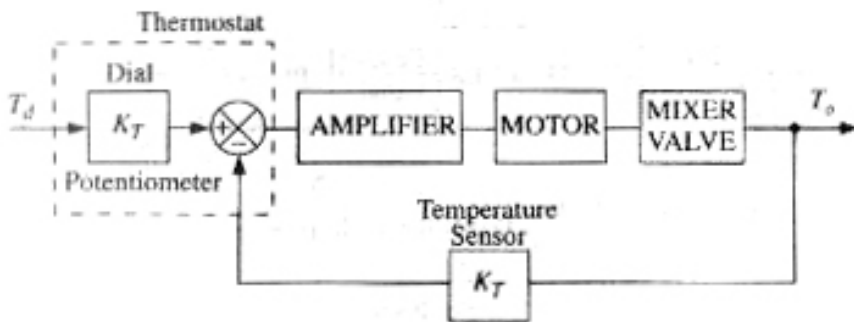
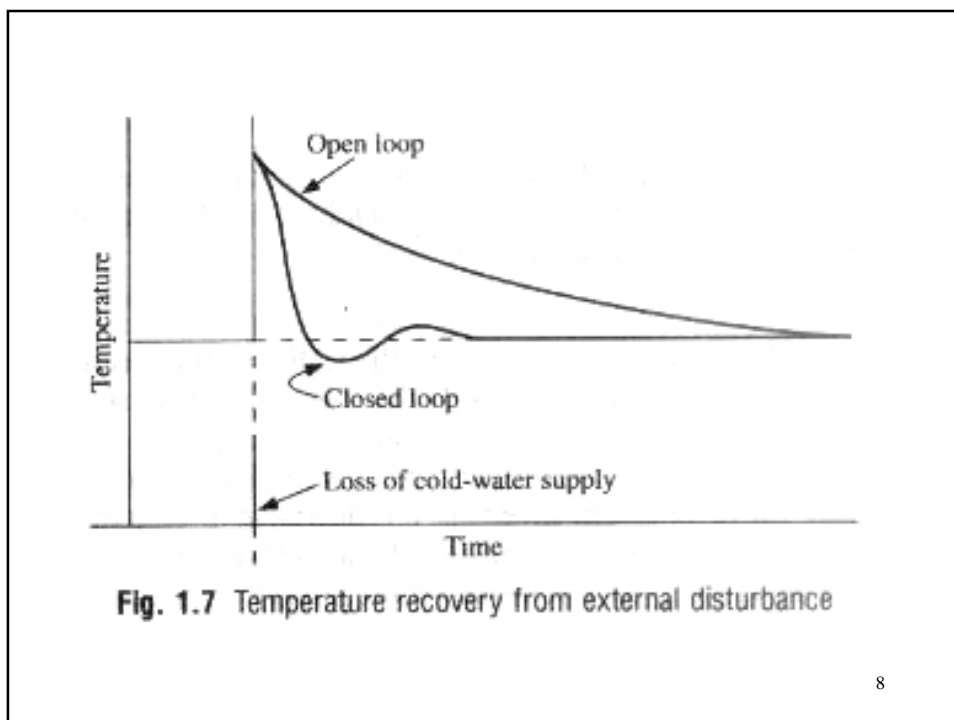
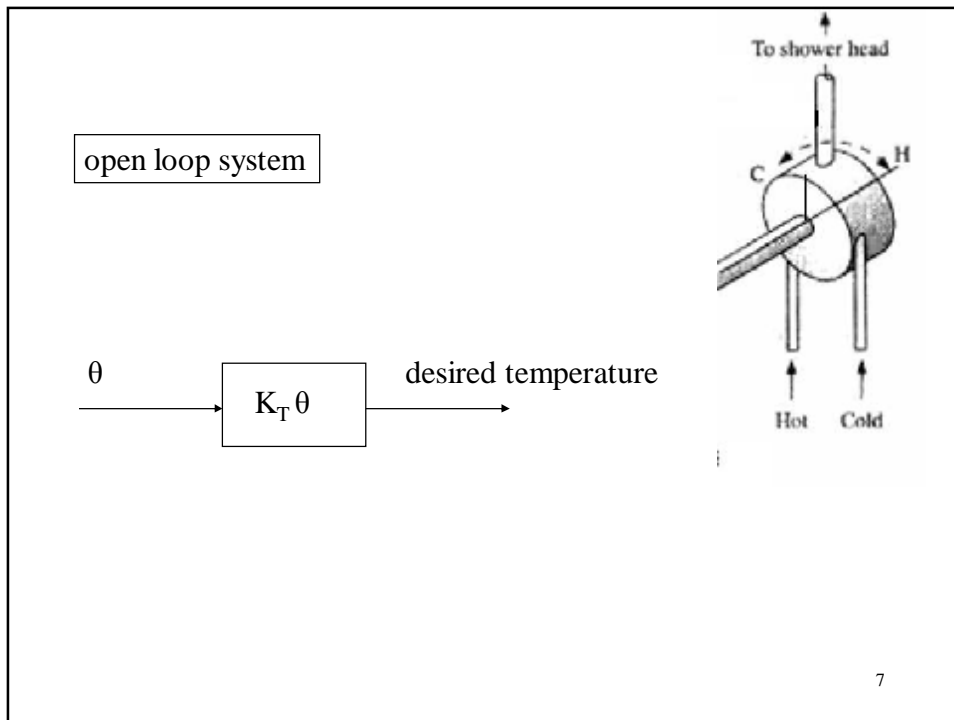


Fig. 1.5 Block diagram of automatic temperature control system

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Basic requirements for a control system:

- ∅ Stability:
- ∅ dynamic performance
- ∅ steady state performance

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The typical test signals for control systems

Step input function

$$r(t) = R \cdot u(t) = \begin{cases} R & t \geq 0 \\ 0 & t < 0 \end{cases}$$

Ramp input function

$$r(t) = \begin{cases} Rt & t \geq 0 \\ 0 & t < 0 \end{cases}$$

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Impulse input function

$$r(t) = d(t) = \begin{cases} \infty & t = 0 \\ 0 & t \neq 0 \end{cases}$$

$$\int_{-\infty}^0 d(t) dt = 1$$

Sine function

$$r(t) = A \sin(\omega t + f)$$

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