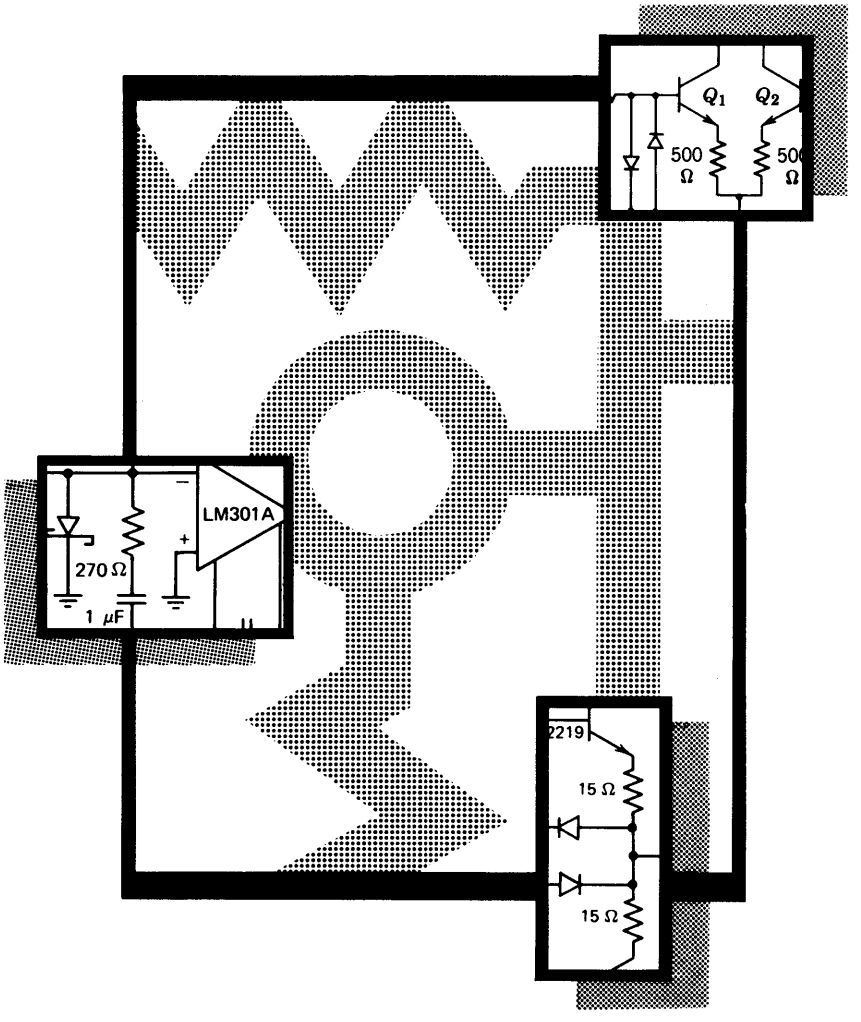
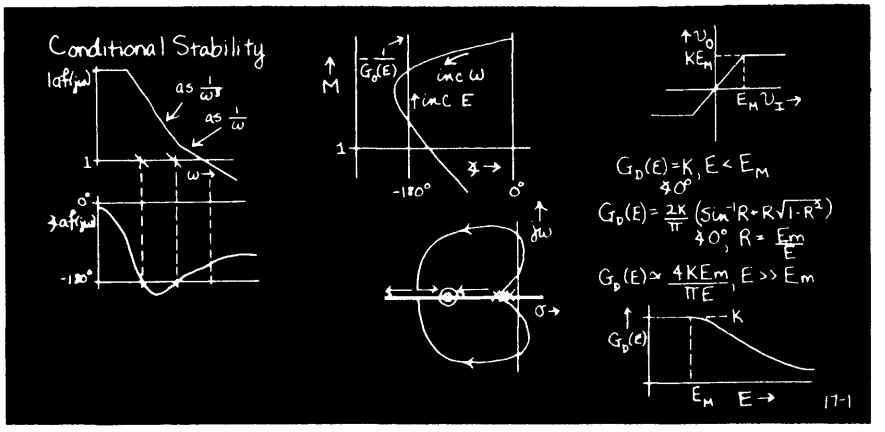
VIDEO COURSE MANUAL

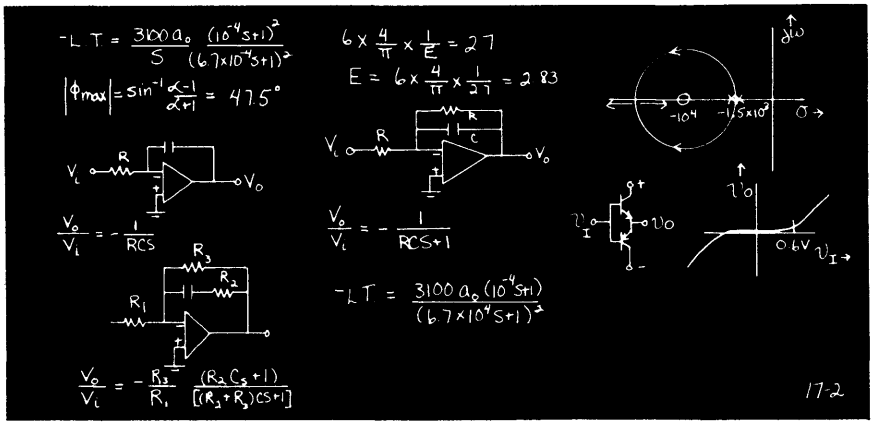
Conditional Stability 17



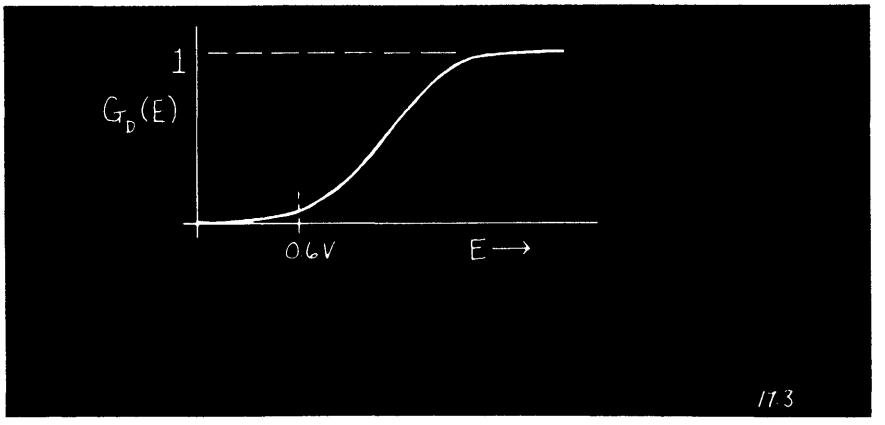
Blackboard 17.1



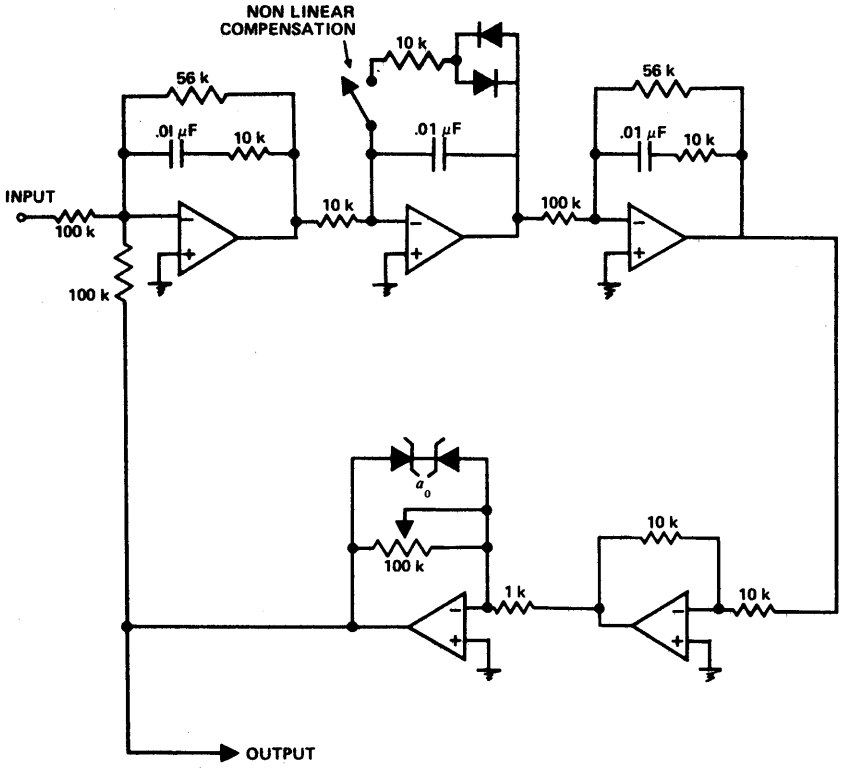
Blackboard 17.2



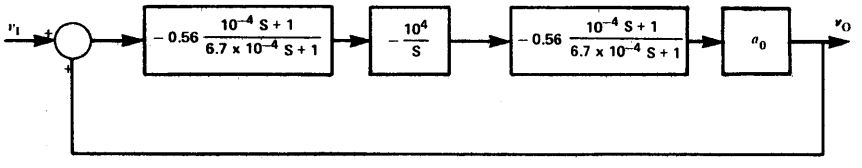
Blackboard 17.3



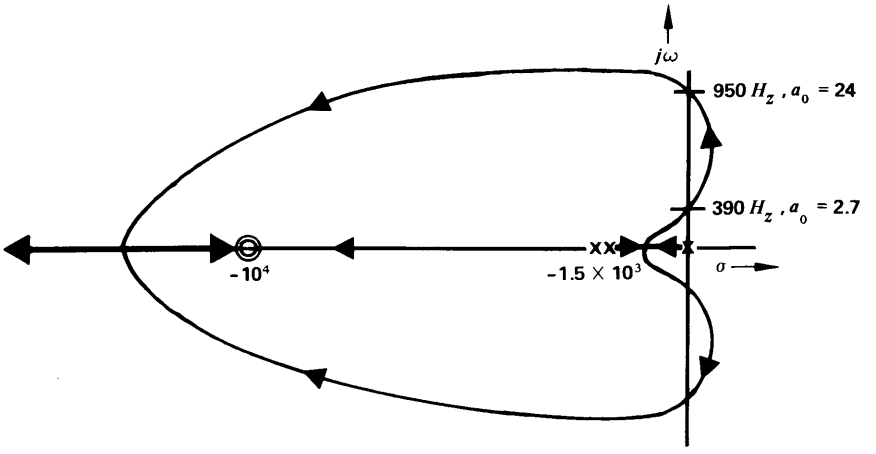
Viewgraph 17.1



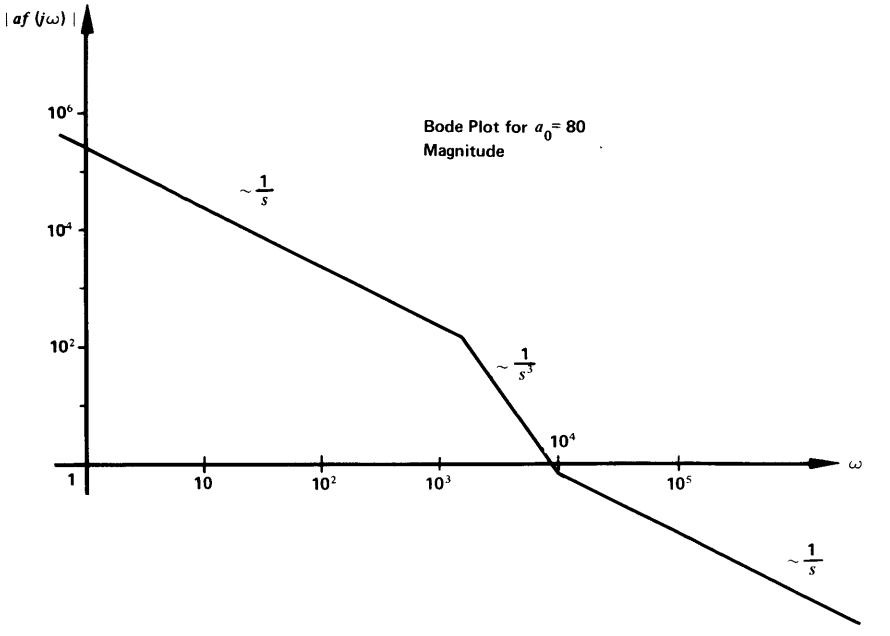
Viewgraph 17.2



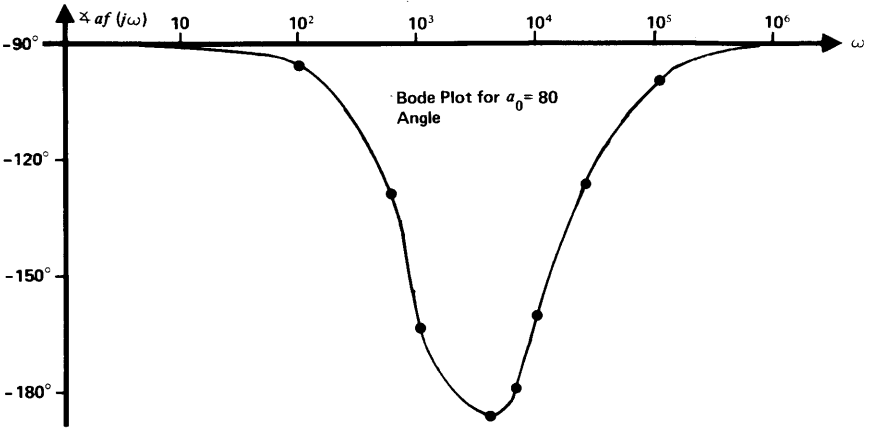
Viewgraph 17.3



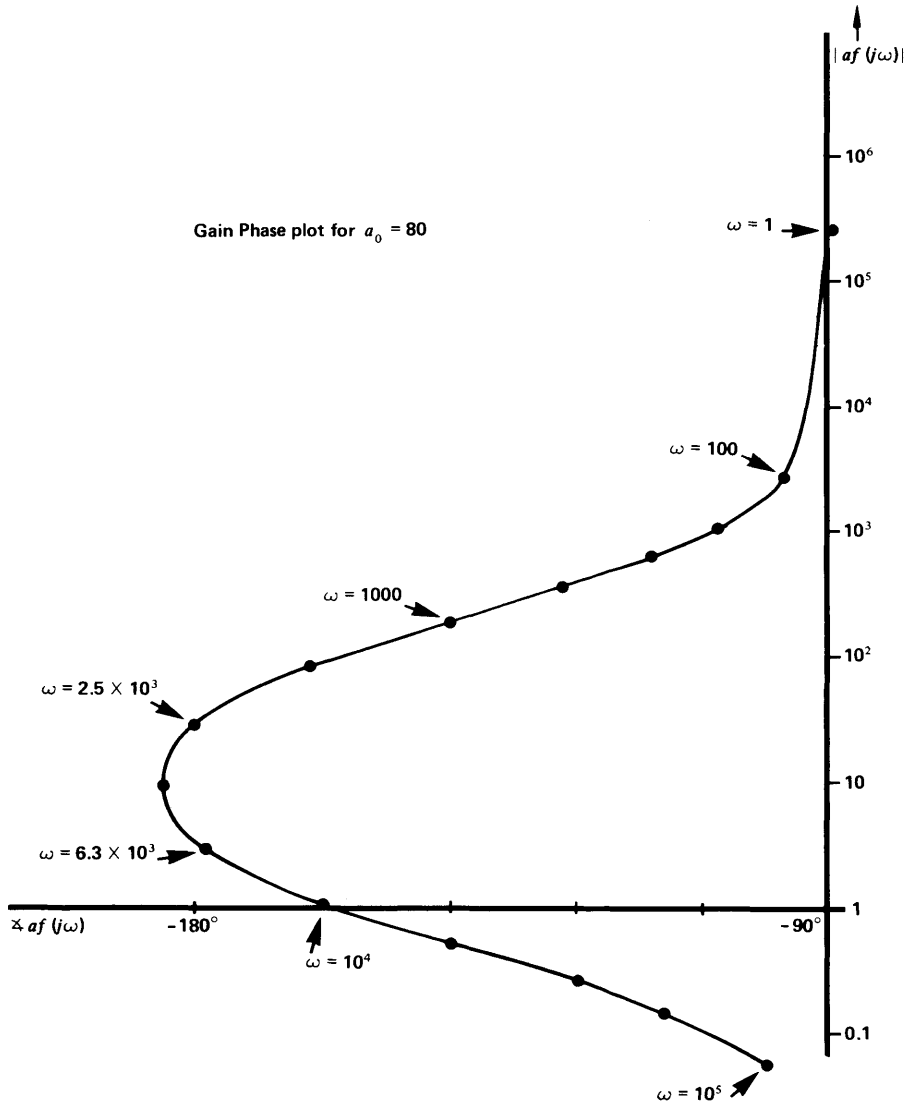
Viewgraph 17.4



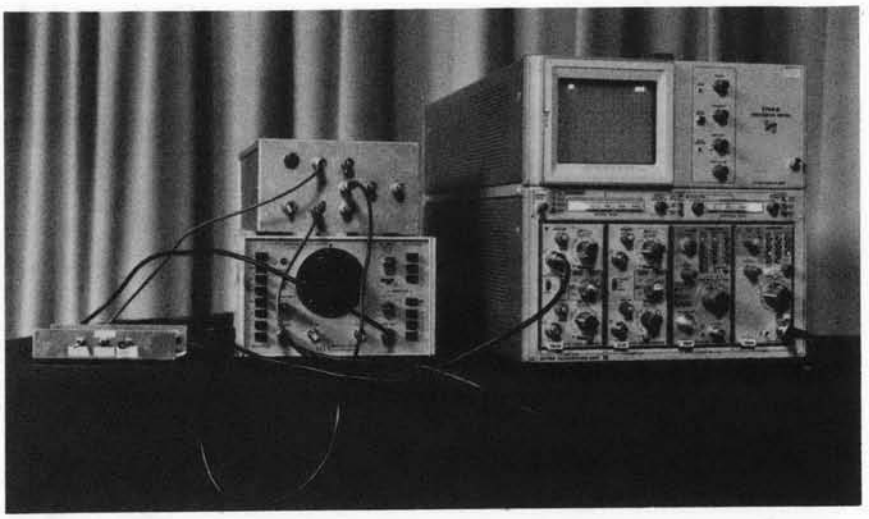
Viewgraph 17.5



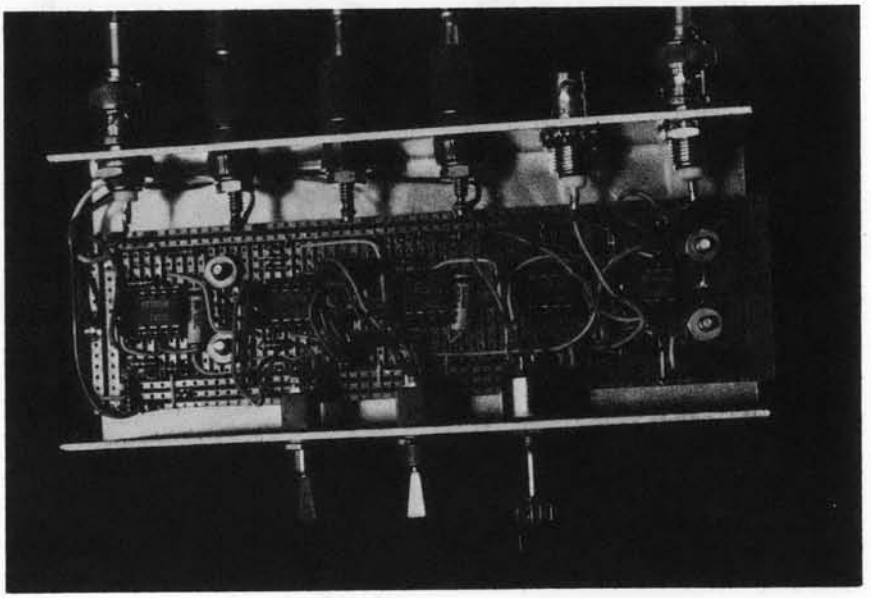
Viewgraph 17.6



Demonstration Photograph
17.1 Conditional-stability demonstration



Demonstration Photograph
17.2 Close-up of conditionally-stable system



Comments

This lecture introduces the idea of conditional stability and uses a demonstration system to illustrate important concepts. In certain systems, a loop transmission that rolls off faster than $1/s^2$ over a range of frequencies is used to achieve high desensitivity while retaining a relatively low crossover frequency. If the frequency range of fast roll-off is broad enough, the phase angle may become more negative than $-180°$ over a range of frequencies below crossover. Such systems can be well behaved when they are operating in their linear region, yet become unstable when saturation lowers crossover frequency to a region of negative phase margin.

Describing-function analysis indicates the potential for this type of behavior, predicts oscillation parameters in systems where instability is possible, and can also be used to determine appropriate nonlinear compensation methods.

Reading

Textbook: Sections 6.3.4 and 6.3.5.

Problem

Problem 17.1 (P6.9)

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RES.6-010 Electronic Feedback Systems

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