PILOT RESPONSE WITH CONVENTIONAL DISPLAYS

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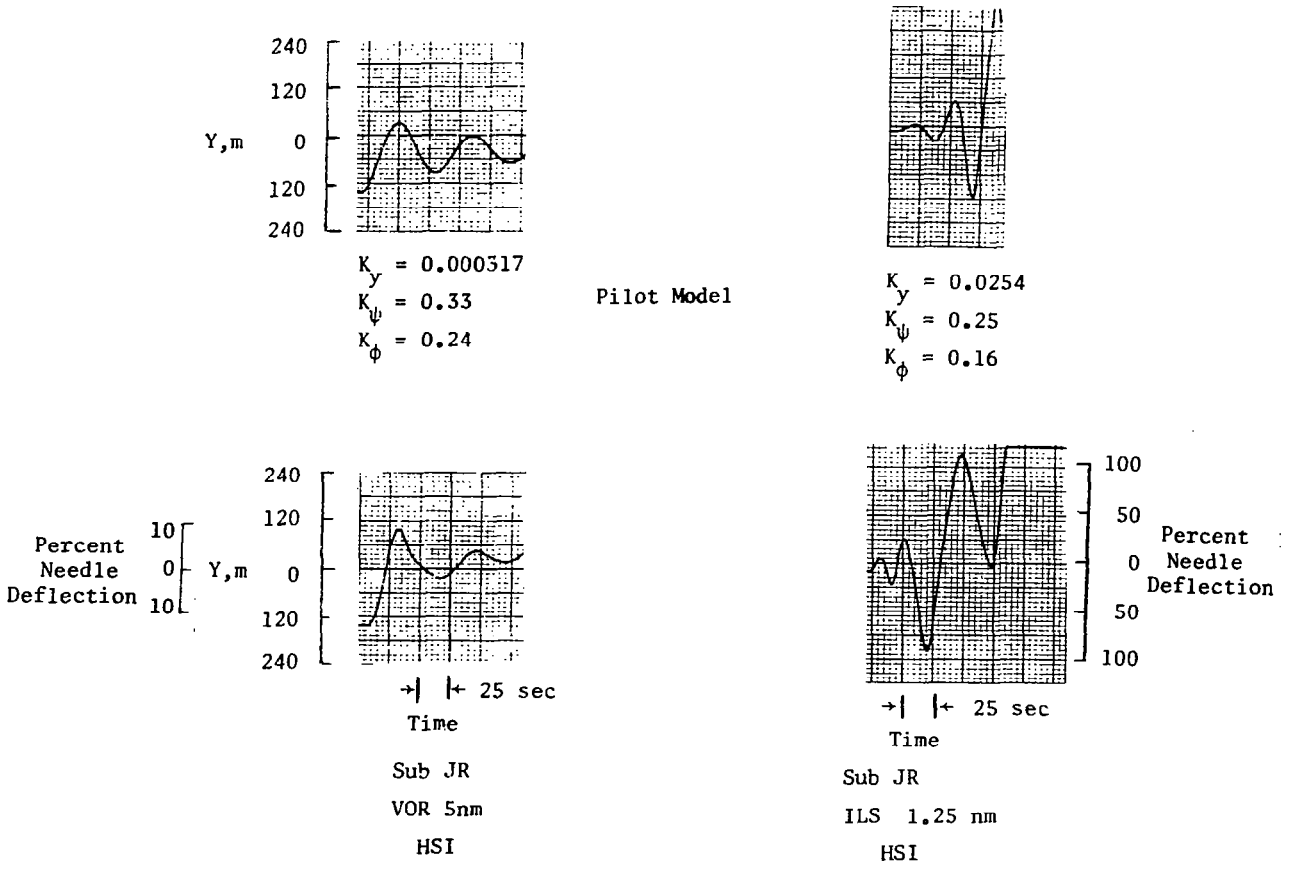
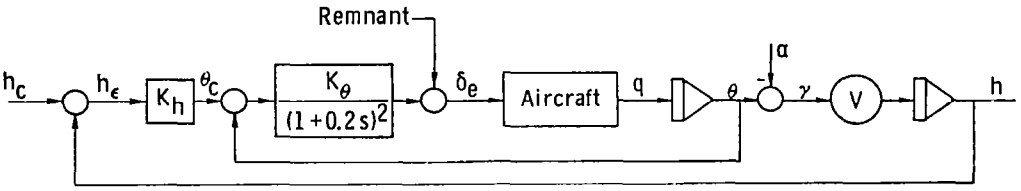
A critical examination of pilot-aircraft-display system response has been conducted for conventional displays. The study concentrated on determining the system frequency and damping both by visual examination of system responses to initial errors and by pilot model analysis. Examples of system response at two points in a flight are shown on the first figure. The long periods and the occasional loss of system damping in these responses are a matter of concern. These system characteristics can be duplicated with the pilot model shown on the pilot-model-aircraft system block diagram of the second figure. The responses obtained with the pilot model are also shown on the first figure, together with the pilot model gains used in obtaining these responses. The factors that determine what these gains will be are the requirements for system stability, the sensitivity of the displays, and the scanning required in looking at the displays. The effects of scanning on system response can be determined with the test set-up shown in the third figure. Using this test equipment, it was found that separating bank angle information from heading information caused a noticeable degradation in system response.

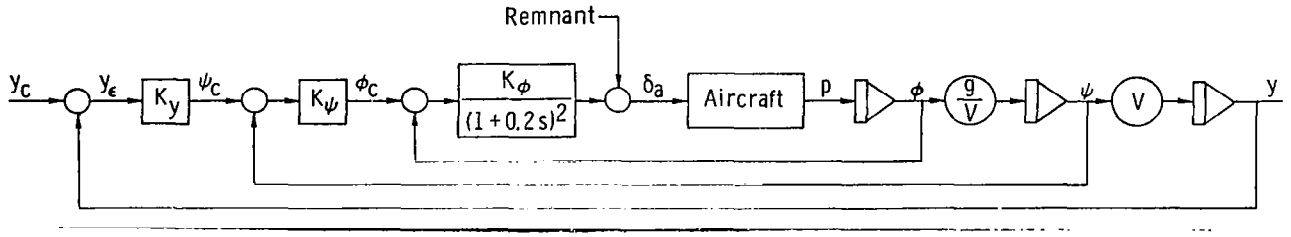
PILOT AIRCRAFT SYSTEM RESPONSE



Aircraft lateral position response obtained with subject JR and with a pilot model with the sensitivity of the HSI set at two different values corresponding to the condition noted.

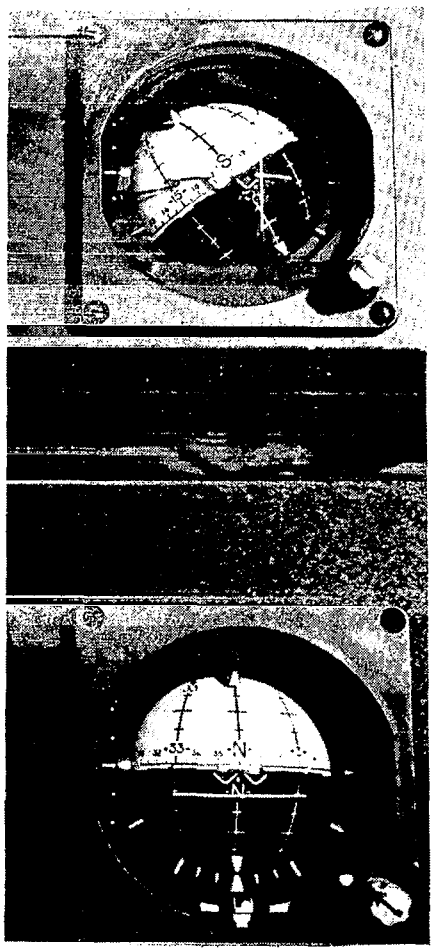


(a) longitudinal system



(b) lateral system

Pilot-model—aircraft system.



Test set-up for measuring effect of pilot scan.