Technical Comments

Comments on "Navy Variable-Stability Studies of Longitudinal Handling Qualities"

LAWRENCE G. MALCOM*
The Boeing Company, Renton, Wash.

REFERENCE 1 by J. A. Eney contains a misapplication of criteria which leads to erroneous conclusions. Mr. Eney incorrectly states that his Refs. 5 and 6 both have envelopes that are normalized about a steady-state value that is not defined. We found that it was not feasible to specify a single criterion encompassing both the transient and steady-state responses of the longitudinal control system. We therefore specify a criterion for the transient response and a separate criterion for the steady-state response. The envelopes to which Mr. Eney refers are envelopes for transient responses normalized to their own steady-state value. All responses therefore reach a steady-state value of 1.0. By rescaling his curves in Fig. 10, Mr. Eney will find that most of the 2.5 rated responses fall within the envelope. The conclusions reached by Mr. Eney about the inadequacy of the criteria of Refs. 5 and 6 are therefore highly distorted.

The steady-state response is governed by stick force per g in the current military specification. As Mr. Eney pointed out, stick force per g is of little consequence in visual landing approach. This is because vertical acceleration is not predominant due to the pilot during landing approach. We found that stick force per C^* provides a steady-state criterion that includes landing approach.

The steady state F_s/C^* criterion described below has somewhat arbitrary limits, but it does show how steady-state criterion can be applied separate from the transient criterion. A forward velocity of 1500 fps was selected to set the F_s/n_z limits between 3.32 lb/g and 8.85 lb/g. The corresponding F_s/C^* limits were then found to be 2.62 lb/g and 7.0 lb/g and were assumed independent of forward velocity. The variation in F_s/n_z limits was then computed as a function of forward velocity corresponding to the constant F_s/C^* limits. A plot of these limits is shown in Fig. 1. Also included on this plot are values of F_s/n_z and F_s/C^* for a typical supersonic fighter.

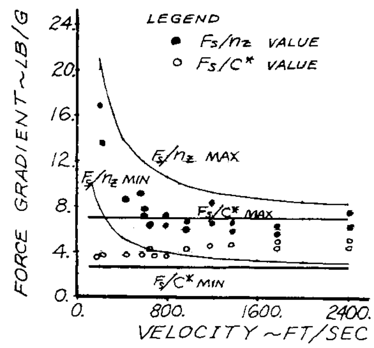

Fig. 1 Plot of F_s/n_z and F_s/C^*.

Received September 5, 1968; revision received December 6, 1968.
* Research Engineer, Electrodynamics Staff.

Reference

[1] Eney, J. A., "Navy Variable-Stability Studies of Longitudinal Handling Qualities," *Journal of Aircraft*, Vol. 5, No. 3, May–June 1968, pp. 271–276.

Reply by Author to L. G. Malcom

JOHN A. ENEY*
Naval Air Development Center, Johnsville, Warminster, Pa.

HAVING restudied Mr. Malcom's original report[1] in light of his comment in this issue, I must concede that my discussion of the C^* boundaries in the subject article[2] was indeed a misapplication of criteria. When the article was prepared, I was unaware that the steady-state C^* values were to be based on other as then undefined criteria.

Rescaling the responses in the original Fig. 10 will not bring configurations 11 and 13 into compliance. I cannot disregard these two configurations as being bad data points. They were well rated, given proper control sensitivity, by several pilots. My concluding statement in Ref. 2 therefore remains the same: "The only point that can be made regarding these time history comparisons is to say that configurations satisfying the boundaries were indeed well rated. However, some which exceeded the boundaries were equally well rated."

References

[1] Malcom, L. G. and Tobie, H. N., "New Short Period Handling Quality Criterion for Fighter Aircraft," Document D6-17841, T/N, Oct. 19, 1965, The Boeing Co.

[2] Eney, J. A., "Navy Variable-Stability Studies of Longitudinal Handling Qualities," *Journal of Aircraft*, Vol. 5, No. 3, May–June 1968, pp. 271–276.

Received October 24, 1968; revision received December 2, 1968.
* Aerospace Engineer, Flight Analysis Division, Aero Mechanics Department.

Comment on "Investigation of Heat Transfer and of Suction for Tripping Boundary Layers"

W. J. MCCROSKEY*
U. S. Army Aeronautical Research Laboratory, NASA Ames Research Center, Moffett Field, Calif.

CEBECI and Smith[1] have reported unsuccessful attempts to trip a laminar boundary layer on an airfoil by means of heat transfer at the leading edge. The authors state quite

Received November 25, 1968.
* Research Scientist. Member AIAA.