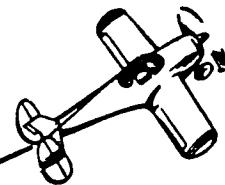


Ercoupe MEMORANDUM

ERCOUPE
SERVICE
MEMORANDUM

No. **19**

**SUBJECT: Discussion of Longitudinal
Trim Device**



Revised 1-6-06

1. The method now used for longitudinal trimming, in the present Ercoupe airplane, was adopted only after very careful consideration and with the thought that the safety quality of the plane would be definitely improved. With the first method of trimming, used on airplanes having serial numbers from 1 to 212 inclusive, there is no reserve method of longitudinal control in case part of the elevator system becomes disconnected, and with the control disconnected the airplane trims at a speed of approximately 130 MPH, which is obviously too high for a safe landing. With the new trim device, used on airplanes from serial number 213 up, two safety provisions are added. In the first place the trimming device actuates the elevator directly instead of the control column, and will therefore provide an additional means of control in case of failure of the elevator linkage. In the second place the natural trim speed in a glide with the controls and trim device disconnected is now approximately 70 MPH, a speed at which the airplane can be maneuvered to a satisfactory landing by throttle alone.

2. The present method provides that the glide speed be established by using the trailing edge of the elevator as a fixed trim tab. The result is that the tension required to trim the airplane, at cruising speed is relatively high since the force exerted on the fixed trim tab is greater at cruising speed than when gliding. Trim spring tension, then, becomes greater when the elevator is in "full up" position. This preload on the elevator controls tends to resist elevator up motion. Thus, the elevator is restricted in assuming its normal attitude of thirteen degrees (twelve to fourteen degrees allowable range) when the controls are in "full up" position.

3. Certain criticisms have been received by the company regarding the adoption of this method. The principle complaints seem to be:

1. Objection to excessive turning, required to adjust trim control crank.
2. Preload on elevator controls, if pilot fails to reset trim control crank for landing approach; caused by reduction of force acting on fixed trim tab, as speed decreases, resulting in increased trim spring tension.
 - a. Restriction of elevator motion, due to increase in spring tension.

4. We are now studying a change which will remedy the above conditions. We feel that it can be accomplished by using a crank turning within a 65 degree radius and incorporating a movable trim tab. The use of a movable trim tab will not affect the feel of the controls, nor introduce restriction of elevator travel. Such a change will, however, require some time to develop and may or may not be available as a replacement for the present trim device.

5. The existing conditions cannot be entirely overcome, in the present trim device, as it is not possible to rig the control cables to prevent them. The trouble can be minimized, however, if careful consideration is exercised when rigging the control cables and the trim unit is properly reset to the "full-up" position for landing approach.

6. The method of rigging the elevator trim controls must be completely understood before any changes and/or adjustments are undertaken. The correct procedure for rigging and adjusting trim control cables, is as follows:

1. Disconnect trim unit spring from elevator.
2. Anchor control wheel "full back."
3. Lay out template line on outboard side of fin and rudder.
 - a. Draw vertical center line through centers of fin attaching bolts.
 - b. Locate point, on this line, halfway between bolt centers and mark.
 - c. Locate center of stabilizer leading edge and draw center line.
 - d. Project this center line to outside surface of fin leading edge.
 - e. Draw line from this point through mark between fin attaching bolt centers (a and b above) and project to trailing edge of rudder.
 - f. Lay out line on rudder at 13° using point between bolt centers (a and b above) as axes and horizontal line (c, d, and e above) as base line.

4. The elevator should then be parallel to this 13° template line.
 5. Re-set and secure control wheel 4 and 5/8 inches back from the "full down" position.
 6. With trim control crank on instrument panel turned to "nose full up" position, connect spring to stabilizer. There should be no tension on trim unit cable when spring is attached.
 7. Flight check should show a glide speed of 68-70 MPH with trim unit set at "nose up."
7. After checking, the following changes and/or adjustments are correct:
1. Adjust elevator cable rigging to obtain proper "up" motions of elevator. Cables must be tightened with care so as not to introduce such loads as to deflect the airplane structures.
 - a. Replace safety wire, wherever removed, after adjustments on cables are made. Use new safety wire and discard the old wire.
 2. Change trim cable clamp to obtain zero load with controls in proper position (5 and 6 in preceding paragraph).
 3. Change elevator trailing edge to function as a fixed trim tab, to obtain proper glide speed.