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CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

Instructions for preparing Fleet Models 1, 2, and 7 for use in the War Training Service Secondary Course.

(Note: These instructions do not constitute approval of any airplane for the subject course. Final approval is contingent upon satisfactory reports on ground inspection and flight characteristics by CAA Inspectors as specified below and issuance of a letter of approval and operation instructions for the individual airplanes by the Director of CAA War Training Service, Washington, D. C.)

1. Fleet Models 1 and 2 airplanes of these models must first be converted to Model 7 by the following alterations:

(a) Fleet 1 - Change engine from Warner Scarab (125 H.P.) to Kinner B5 (125 H.P.) Engine mount and powerplant installation are not the same. Drawings for the installation of the Kinner engine may be obtained from the Aircraft Engineering Division, Washington, D. C..

Fleet 2 - Change engine from Kinner K5 to Kinner B5 (125 H.P.). Engine mount and powerplant installations are not affected for the original design B5 engine.

(b) Change cabane wire to #16 (4000 lb. rating) with AN665-46 terminals.

2. Large size oval surfaces, with approximate dimensions of which are shown on the attached sketch, are required on all Fleet Model 1, 2, or 7 airplanes. If these surfaces are not available, instructions for converting smaller surfaces to the required dimensions may be obtained from the Aircraft Engineering Division, Washington, D. C..

3. General Ground Inspection

Because of the age of these airplanes, it is essential that the structure, including wires, fittings, spars, fabric and plywood coverings be thoroughly inspected to determine that it is in first class condition before beginning the course, and, at any time there is reason to believe the airplane has been subjected to more than normal accelerations in maneuvers. A competent certificated mechanic who is familiar with this model should be assigned to these inspections. The first inspection must be witnessed by a C.A.A. inspector who will endorse the log book when the inspection is satisfactorily completed. Any special items of equipment should be located so as not to shift.

the center of gravity of the airplane appreciably aft of its normal position. Special attention should be given to the following:

- (a) Ascertain that the front and rear spar root fittings of the lower wing panels have been inspected for play in the joint and spar cracks in accordance with Airworthiness Maintenance Bulletin No. 13 and also that proper corrective measures have been taken in cases where defects have been found.
 - (b) Inspect stabilizer guide and stop (small channel section) in vicinity of attachment weld for defects. Also make sure that the sides of guide channel are not deformed as to make adjusting of stabilizer difficult. In case of defects replace guides.
4. Conduct the Ground and Flight checks outlined in the attached paper on "Spin Precautions."
 5. The above ground inspections must be witnessed or checked by a C.A.I. Inspector who will endorse the log book accordingly when the inspections are satisfactory.
 6. The airplane should then be submitted for flight test of maneuvering and spin characteristics by C.A.A. Flight Engineering and Factory Inspection Division personnel. Arrangements for these tests may be made by contacting your C.A.A. Regional Manager.

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Attachment

CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

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Spin Precautions - Fleet Models 2 and 7

It has been found that spin characteristics of these models vary greatly and can become dangerous under certain circumstances. These variations are mainly due to differences in rigging of the wings, elevator and rudder travel, and center of gravity location. In view of the above, it is important that these items be carefully controlled by observance of the following instructions:

A. Ground Checks.

1. Rigging.

Wings should be rigged in accordance with the attached diagram. It is important that wings have constant incidence over the whole span; for example, no "wash-in" at the tips.

2. Large size tail surfaces should be installed if this has not already been done. The approximate required dimensions are shown on the attached sketch. Instructions for constructing smaller surfaces to these dimensions may be obtained from the Aircraft Engineering Division, Washington, D. C..

3. Rudder and Elevator Travel.

The stops on the control stick assembly should be adjusted so that the elevator travel is not more than 250 up and 300 down from the stabilizer chord line in middle position. Rudder stops on cables should be adjusted for 300 rudder travel either way. Aileron travel is not so critical and approximately 170 up and down is satisfactory.

4. Large windshields which might disturb the airflow over the tail should be removed.

5. Location of Gravity Location.

If the center of gravity (c.g.) location is aft of a certain point, which varies with individual airplanes, bad spin characteristics may develop. The following procedure is recommended for checking the airplanes in this respect. First, the airplane should be inspected to determine whether any weights, alterations or additional items of weight have

in which items to shift the center of gravity aft of its normal location. If such items are found, they should be removed, re-located forward, or their effect on the balance counteracted by adding ballast near the nose, depending on the circumstances. For example, if the large size tail is installed, the increase in weight of the new surfaces above the old should be determined. An increase in tail weight of 1 lb. requires approximately 6 lbs. at the firewall or $2\frac{1}{2}$ lbs. at the propeller to keep the same center of gravity location.

In the course of the flight check outlined below it may be found advisable to try a center of gravity location still farther forward, and this may require the use of ballast or a heavier propeller. If ballast is used, it should be securely fastened and tagged to show the amount of weight and the purpose for which installed, and an appropriate entry made in the log book. No baggage should be carried during aerobatics.

B. Flight Checks.

After the above ground inspection has been satisfactorily completed, the spin characteristics should be checked by starting with one turn or less, with the pilot in the front cockpit, carefully noting the behavior of the controls and attitude of the nose, and progressively increasing to the required number of turns, and repeating the procedure from the rear cockpit, provided the spin characteristics are found satisfactory at each step. During these and any subsequent spins care should be taken to note the appearance of any "back pressure" (tendency of the stick to stay back) on the elevator controls, and if this condition develops, the spin should be stopped as quickly as possible by full application of the controls in the recovery sense. The airplane will not be considered satisfactory unless it will meet all the spin requirements specified in AEC-34. (In all other operations except these checks, spins should then be limited to three turns prior to attempting recovery.)

If the airplane is found unsatisfactory, the ground inspection (A) should be rechecked. If the characteristics with the pilot in the front cockpit were better than in the rear cockpit, it may be advisable to move the center of gravity further forward by the use of ballast and/or a heavier propeller, and the check repeated. If the spins are still unsatisfactory, the cause should be determined and the case reported to the Chief Engineering and Factory Inspection Division, Washington.

U.S.A. Method of Spin Recovery.

Students should familiarize themselves with the emergency spin recovery methods described in N.A.S.A. Technical Note No. 325. This recommends, when normal spins recovery techniques is inadequate, that the rudder and elevator first be held full with the spin, ailerons neutral throughout, and recovery effected as follows:

1. Briskly move the rudder full against the spin.
2. After an appreciable time, say one-half turn, briskly move the elevator to approximately full down position.
3. Hold these positions of the controls until recovery is effected.

D. Spin Instruction and Practice.

The principles discussed above should be carried over to regular operations, for example:

1. Instruction and practice spins should be limited to three turns before attempting recovery.
2. When instructor and student differ appreciably in weight, the heavier person should occupy the front cockpit. A heavy person should practice solo in the front cockpit.
3. The rigging should be ground checked and spins re-checked in flight whenever the airplane is subjected to an abnormal load in acrobatics.

Fleet Models 1, 2, and 7

Instructions for converting small tail surfaces to large tail surfaces.
(The approximate overall dimensions for large surfaces are shown on the attached sketch).

Stabilizer. Either of two alternate methods may be used to increase the stabilizer span to the required dimensions.

- (1) The stabilizer may be rebuilt in accordance with drawing No. 57064 enclosed. The ribs, fittings and other detail parts shown on this drawing are the same as those in the small stabilizer, but are located differently on the longer spars. The old parts may, of course, be used again if they are in good condition after disassembly.
- (2) The stabilizer may be left unchanged outboard of the first main rib from the center, the leading edge and the front and rear spar tubes cut about 2 inches inboard of the first main rib, and pieces of tubing spliced in to make the dimension from the center line of the inboard elevator hinge to the center of the outboard elevator hinge equal to 39-3/8 inches. The splices should, of course, be standard fish mouth splices in accordance with Civil Aeronautics Manual 18 (CAK 18). An additional rib, similar to the adjacent ribs, should be added near the center line of the stabilizer.

Elevator. Either of two alternate methods may also be used for the elevator.

- (1) The elevator may be rebuilt in accordance with drawing No. 57085 enclosed, using the old parts in any case in good condition after disassembly.
- (2) The elevator may be cut between the inboard and outboard hinges and pieces of tubing spliced into the torque tube and trailing edge to raise the elevator hinge to the same pitch with those of the enlarged stabilizer. In fabricating the ribs of sheet metal (similar to present ribs) or small tubing it will be noted in the bay where the enlargement is made.

Fin. A new fin should be constructed in accordance with drawings 57111, 57098, 57121, 57117 and 57038 enclosed. The old fin post with attached fittings may be used again. The fin attaching clip 57121 should be clamped on the fuselage cross tube just to the left of the stabilizer guide channel. The dimension from the fin post to the leading edge tube on drawing 57111 may have to be approximately 4 inches less on some airplanes in order to meet the fuselage cross tube. The lengths of the ribs shown on drawing 57117 should be adjusted accordingly.

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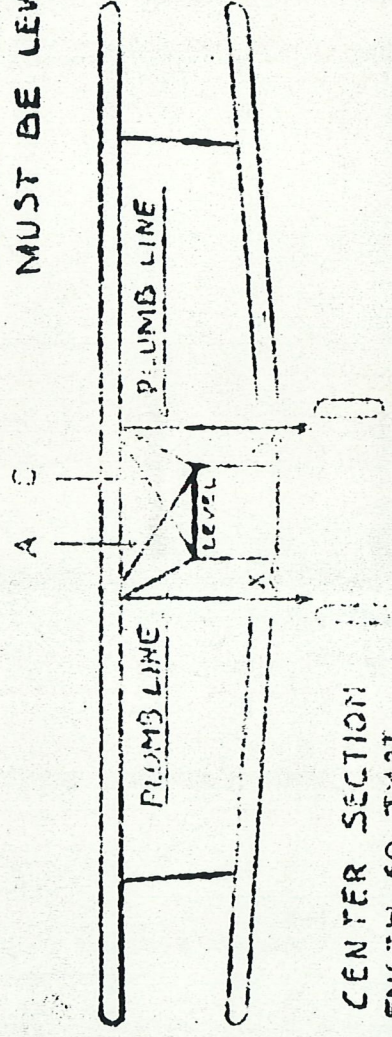
Rudder. The rudder may be enlarged by splicing sheet metal sections on to the three lower ribs and balance mass rib as shown on the enclosed sketch and fairing a new trailing edge around the rib ends. The rib splices should be made well forward of the old trailing edge, lapping the original ribs for several inches, and the extensions made of channel sections similar to the original ribs.

Brace wires. The longer wires required by the increased stabilizer span should be of the same size as the original; that is, 10-32.

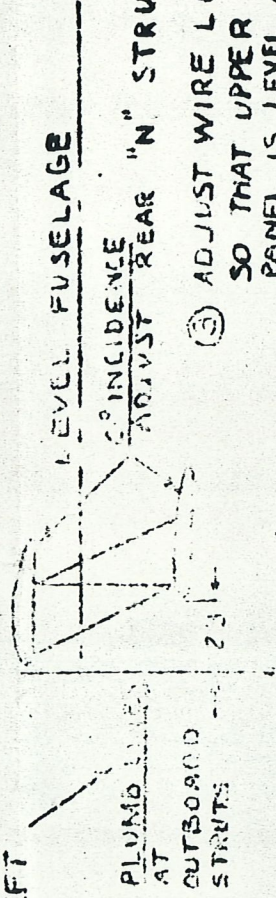
Inspection. The revised structure should be inspected by your local Civil Aeronautics Administration Inspector, before covering, for workmanship and compliance with these instructions. The usual Forms 337 should be submitted upon completion of the alteration.

THIS IS TO CERTIFY THAT THE ABOVE DESCRIBED WORK HAS BEEN DONE IN ACCORDANCE WITH THE INSTRUCTIONS OF THE CIVIL AERONAUTICS ADMINISTRATION AND THAT THE AIRCRAFT IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE FEDERAL AVIATION ACT OF 1958.

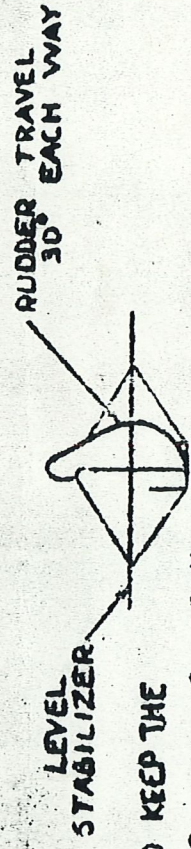
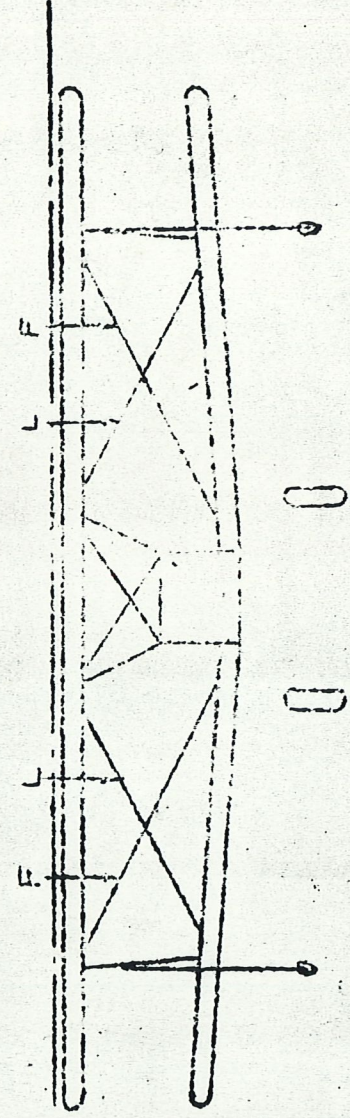
(1) ADJUST WIRES A & B
 SO THAT X & Y ARE
 EQUAL -- AIRPLANE
 MUST BE LEVEL



(2) ADJUST CENTER SECTION
 STRUT LENGTH SO THAT
 STAGGER IS SAME AT
 BOTH RIGHT & LEFT



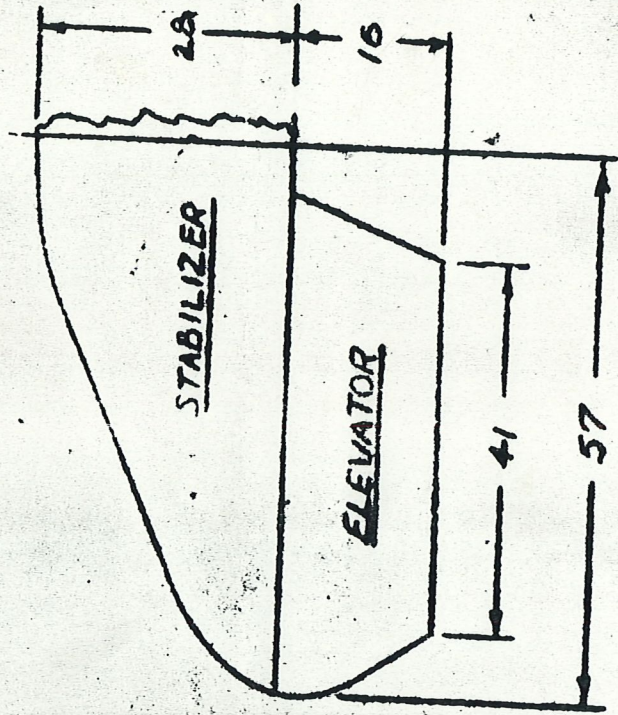
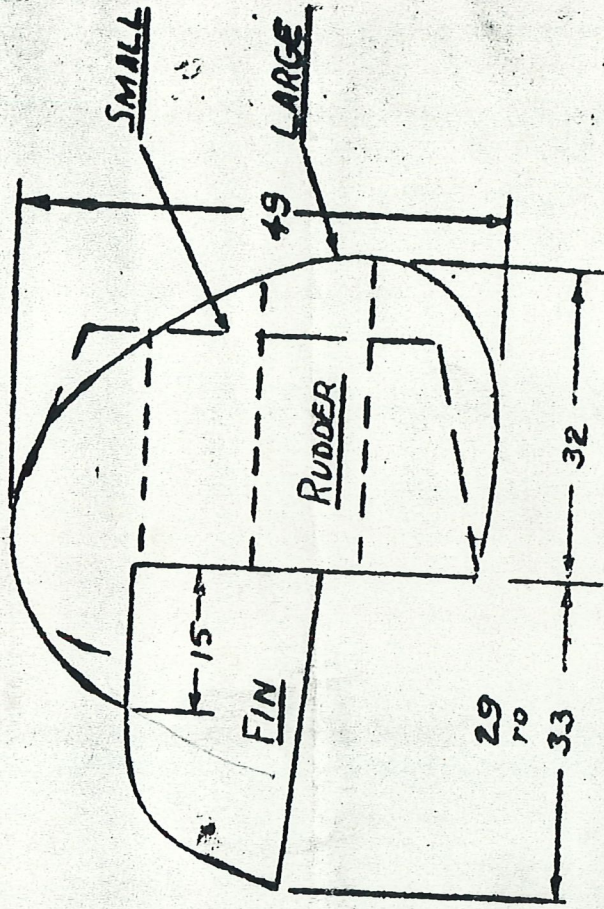
(3) ADJUST WIRE L & F
 SO THAT UPPER
 PANEL IS LEVEL & FLAT



IT IS IMPORTANT TO KEEP THE
 SAME INCIDENCE OVER WHOLE SPAN
 CORRECT WING HEAVINESS BY USE
 A METAL TAB ON TRAILING EDGE
 ALONG INSTEAD OF BY
 WING

FLEET RIGGING DIAGRAM

1548
"LARGE" TAIL SURFACES FLEET MODELS 1, 2, 7



NOTE: DIMENSIONS ARE APPROXIMATE