HEADQUARTERS, ARMY AIR FORCES
WASHINGTON 25, D. C.

TECHNICAL ORDER
NO. 01-60JE-8

14 August 1944

AIRPLANES AND MAINTENANCE PARTS

NORTH AMERICAN—INSTALLATION OF DORSAL FIN AND REVERSE RUDDER BOOST TAB—P-51D

NOTE As prescribed in T. O. No 00-20A, appropriate reference to this Technical Order will be entered on AAF Forms 60-A for the airplanes affected. The work directed herein will be accomplished as soon as practicable by service activities with the aid of base maintenance facilities, if necessary.

1. To correct the tendency, existing when certain maneuvers are performed, for P-51D airplanes to assume a high angle of yaw which may result in overloading the horizontal stabilizer, a dorsal fin will be installed. In conjunction with this, the rudder trim tab will be converted to a reverse rudder boost tab in order that the forces required to operate the rudder will increase in proportion to the rudder throw and thus decrease the tendency for the pilot to inadvertently overcontrol. Model P-51D airplanes, AF Nos. 44-13253 to 44-13902 inclusive, will be reworked in accordance with the instructions contained in paragraph 2. Model P-51D airplane, AF No. 44-13903 and subsequent, will be modified by the contractor prior to delivery.

2. The instructions for accomplishing this change as contained in North American Service Bulletin 51-134, dated 6 June 1944, are as follows:

a. INSTALLATION OF DORSAL FIN.

(1) Remove the vertical stabilizer nose fillet, the horizontal stabilizer nose fillets, and the rear fillets.

(2) Using a 1/4 (.250-inch) drill, remove the second row of three rivets, part No. AN442AD8, at the lower end of the front spar of the vertical stabilizer. (See detail B-B, figure 1.)

NOTE The rear section upper bulkhead is the flat portion of the rear fuselage section upon which the horizontal stabilizer rests.

(3) Locate the attaching angle, part No. 73-23003-5, on the vertical stabilizer front spar, as shown in detail B-B, so that the beam assembly, part No. 109-25101, of the dorsal fin, when attached will be 8-27/32 inches above the rear section upper bulkhead. (See figure 1.)

(4) Using a C clamp secure the angle to the spar and drill three 1/4 (.250-inch) holes in the angle from the aft side of the spar through the holes from which the three rivets were removed.

(5) Remove the angle, part No. 73-23003-5, from the vertical stabilizer front spar.

(6) Bur the holes just drilled in the angle.

(7) Attach the angle to the vertical stabilizer front spar with three rivets, part No. AN442AD8-14.

(8) Place the dorsal fin assembly on the airplane.

(9) Mark the aft end of the beam, part No. 109-25101, of the dorsal fin through the three holes in the angle, part No. 73-23005-5.

(10) Remove the dorsal fin from the airplane and drill three No. 10 (.1935-inch) holes in the beam where marked.

(11) Reinstall the dorsal fin on the airplane and insert the three bolts, part No. AN3-4A, through the holes just drilled in the beam and the holes in the angle.

(12) At the forward end of the dorsal fin draw a line 3/8 of an inch to the left and parallel to the center line of the airplane. (See detail A-A, figure 1.)

(13) Using a 3/8-inch duplicating punch, mark a point on the line as described in preceding paragraph through the 3/8-inch attaching hole in the forward end of the dorsal fin.

(14) Drill a pilot hole at the point marked, with a No. 30 (.1285-inch) drill, through the skin and frame.

(15) Remove the dorsal fin from the airplane.

(16) Enlarge the No. 30 (.1285-inch) hole just drilled with a 1/4 (.250-inch) drill.

(17) Attach basket nut, part No. 22A21-2-82, on the outside of the fuselage skin over the 1/4 (.250-inch) hole just drilled with a screw, part No. 7S5-8-10, to center the basket nut over the hole.

(18) Using the attaching holes in the basket nut as a template, drill two No. 30 (.1285-inch) holes through the fuselage skin and frame.

(19) Remove the basket nut.

(20) Countersink the two No. 30 (.1285-inch) holes just drilled 100 degrees x 7/32-inch diameter.

(21) Attach the basket nut to the inside of the fuselage using two rivets, part No. AN426AD4-7.

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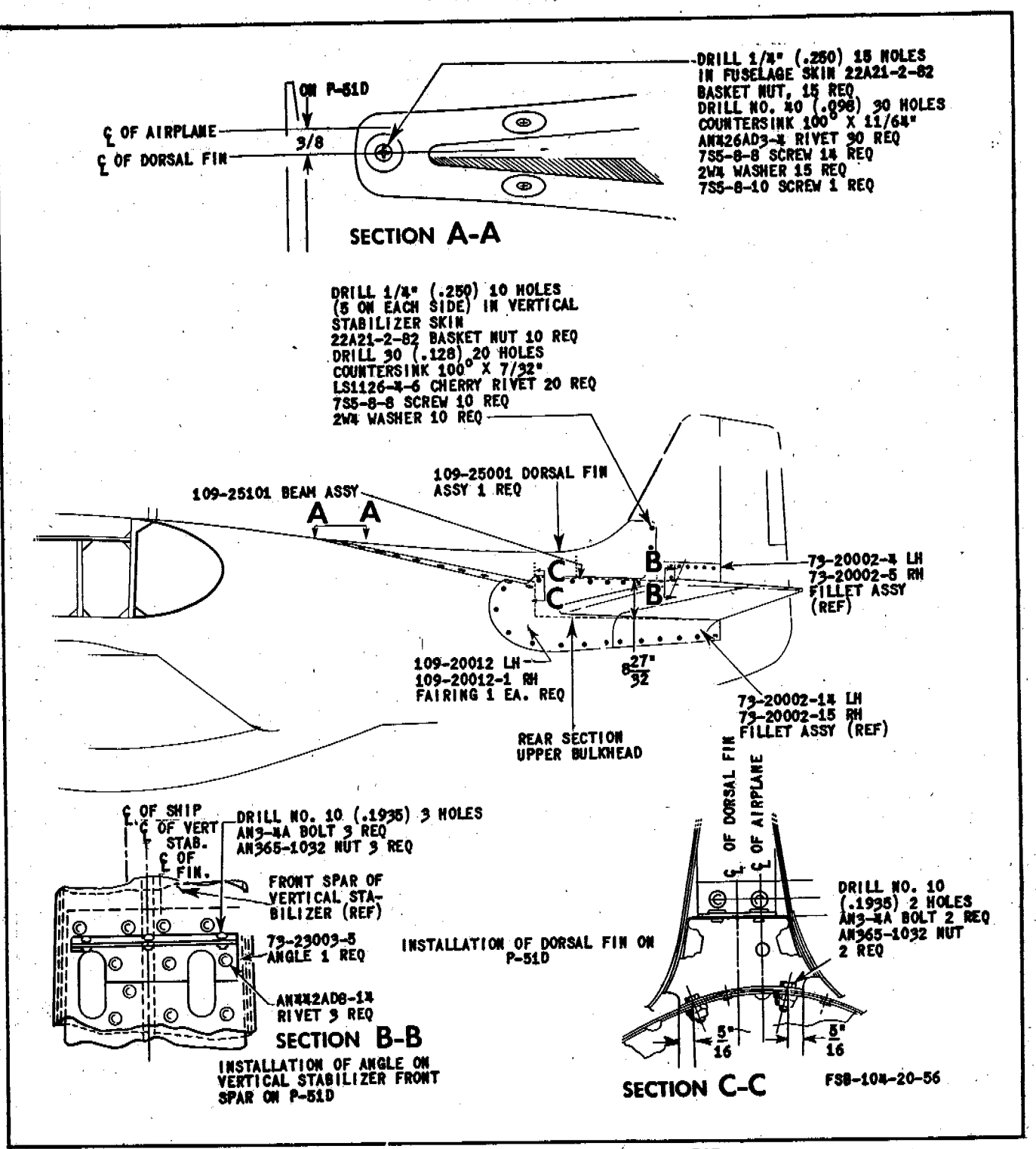

Figure 1 - Installation of Dorsal Fin on P-51D

(22) Reinstall the dorsal fin on the airplane and insert the three bolts, part No. AN3-4A, through the beam and angle. Fasten the forward end to the fuselage with one washer, part No. 2W4, and one screw, part No. 7S5-8-10.

(23) Using a 3/8-inch duplicating punch, mark the fuselage skin through the seven holes on each side and aft of the forward attaching hole of the dorsal fin.

(24) Mark the skin of the vertical stabilizer through the ten 3/8-inch holes (five on each side) in aft end of the dorsal fin with a 3/8-inch duplicating punch.

(25) At each of the 14 points marked on the fuselage skin, drill a pilot hole with a No. 30 (.1285-inch) drill.

(26) At the 10 points marked on the vertical sta-

bilizer drill No. 30 (.1285-inch) pilot holes through the skin.

(27) Remove the dorsal fin from the airplane.

(28) Enlarge the pilot holes in the fuselage skin with a 1/4 (.250-inch) drill.

(29) Attach a basket nut, part No. 22A21-2-82, on the outside of the fuselage over each of the 1/4 (.250-inch) holes just drilled with a washer, part No. 2W4, and a screw, part No. 7S5-8-8, to center the basket nuts over the holes.

(30) Using the basket nuts as a template, drill the necessary No. 40 (.908-inch) holes through the fuselage skin.

(31) Remove the basket nuts.

(32) Countersink the No. 40 (.098-inch) holes just drilled 100 degrees x 11/64-inch diameter on the outside of the fuselage.

(33) Attach the basket nuts to the inside of the fuselage skin using 20 rivets, part No. AN426AD3-4.

(34) Enlarge the rivet attaching holes in 10 new basket nuts, part No. 22A21-2-82, with a No. 30 (.1285-inch) drill.

(35) Enlarge the 10 pilot holes drilled in the vertical stabilizer skin with a 1/4 (.250-inch) drill.

(36) Center the basket nuts just reworked over the ten 1/4 (.250-inch) holes drilled in the vertical stabilizer skin and drill No. 30 (.1285-inch) holes in the skin through the enlarged holes in the basket nuts.

(37) Countersink the 20 No. 30 (.1285-inch) holes just drilled 100 degrees x 7/32-inch diameter.

(38) Install the 10 basket nuts, part No. 22A21-2-82, on the inside of the vertical stabilizer skin, using 20 cherry rivets, part No. LS1126-4-6.

(39) Reinstall the dorsal fin on the airplane and secure at the lower aft end with three bolts, part No. AN3-4A, and three nuts, part No. AN365-1032 to the angle previously installed on the front spar of the vertical stabilizer.

(40) Fasten the upper aft end of the dorsal fin to the vertical stabilizer with 10 screws, part No. 7S5-8-8, and 10 washers, part No. 2W4.

(41) Fasten the forward end of the dorsal fin to the fuselage with one screw, part No. 7S5-8-10, and one washer, part No. 2W4.

(42) Install 14 screws, part No. 7S5-8-8, and 14 washers, part No. 2W4 (seven on each side), in the attaching holes aft of the forward attaching hole of the dorsal fin.

(43) As shown in detail C-C, figure 1, drill two No. 10 (.1935-inch) holes through the flange of the front rib of the dorsal fin and the fuselage frame.

(44) Install two bolts, part No. AN3-4A, in the two holes and secure with nuts, part No. AN365-1032.

(45) Install the new fillets, part Nos. 109-20012 left-hand and 109-20012-1 right-hand, as shown in figure 1 and all of the necessary fillets previously removed.

b. INSTALLATION OF REVERSE RUDDER BOOST TAB.

(1) Set rudder trim tab control in the pilot's cockpit in the neutral position.

(2) Disconnect the rudder trim tab actuating rod at the trim tab.

(3) Remove the trim tab actuating rod fairing from the rudder.

(4) Remove the metal cap at the bottom of the rudder.

(5) Disconnect the rudder actuating rod at the lower hinge casting.

(6) Remove the bolt from the lower hinge casting.

(7) Remove the bolt from the center hinge casting.

(8) Support the rudder and then remove the bolt from the upper hinge casting.

(9) Disconnect the navigation light wire.

(10) Guide the rudder straight aft, off the vertical stabilizer, until it is clear of the trim tab rod.

(11) Remove the trim tab rod.

NOTE Retain the clevis bolt, part No. AN23-15, the bushing, part No. 73-52535, and the nut, part No. AN320-3, removed when disconnecting the above push rod.

(12) Using a No. 30 (.1285-inch) drill, remove the two rivets, part No. AN425AD4, that secure the fitting, part No. 73-52528, in the end of the rod assembly, part No. 73-525124. (See detail A-A, figure 2.)

(13) Remove the fitting, part No. 73-52528, from the rod assembly.

(14) Insert the new fitting, part No. 104-52528 or 109-52528, in the rod assembly so that the bearing center line is to the left of the center line of the vertical stabilizer and parallel to the vertical center line of the rudder hinge, holding 1-7/32 inch dimension from end of rod, part No. 73-525124, to center line of bearing on fitting, part No. 104-52528 or 109-52528, as shown in detail A-A, figure 2.

NOTE The 104-52528 and the 109-52528 fittings are identical. Whichever part is furnished with the kit is satisfactory to use.

(15) Drill two No. 30 (.1285-inch) holes in the new fitting to match the holes in the rod assembly where the rivets were removed.

(16) Enlarge the two holes just drilled with a No. 21 (.159-inch) drill.

(17) Countersink the above holes on both sides 100 degrees x 7/32-inch diameter.

(18) Secure the new fitting in the rod assembly with two rivets, part No. AN426AD5-13.

(19) As shown in detail B-B, figure 2, elongate the 1-inch diameter hole in the rudder beam, part

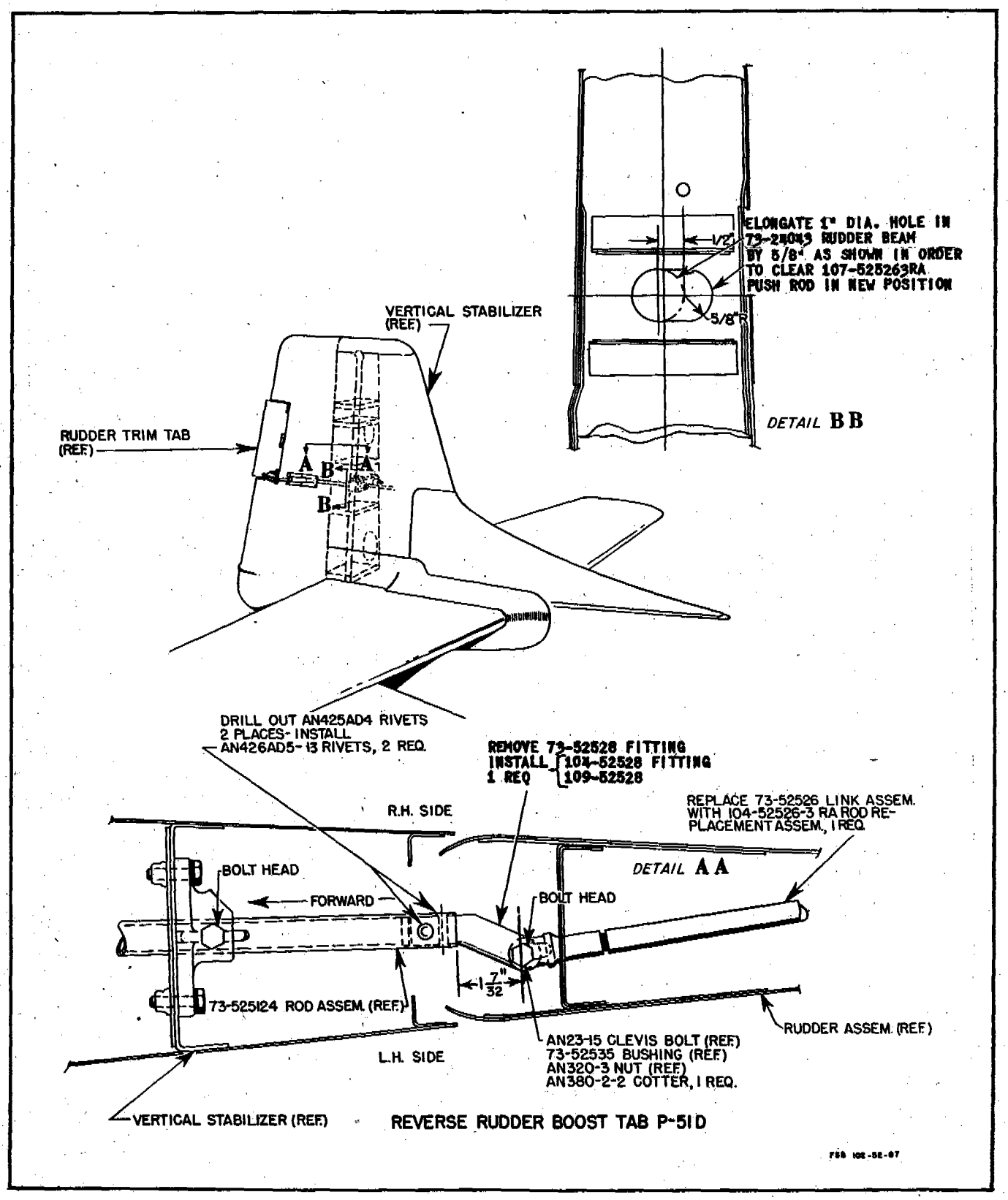

Figure 2 - Reverse Rudder Boost Tab - P-51D

No. 72-24043, by 5/8 inch on the left side in order to clear the new link assembly, part No. 104-52526, in the new position.

(20) Remove the rod end, part No. REB3N-2, and the lock nut, part No. AN316-5R, from the old link assembly, part No. 73-52526, and install them on the new rod replacement assembly, part No. 104-52526-3RA.

(21) Connect the new link assembly, part No. 104-52526-3RA, to the new fitting installed in the end of the rod assembly, part No. 73-525124, with the bushing, part No. 73-52535, the clevis bolt, part No. AN23-15, and the nut, part No. AN320-3, previously removed. (The adjustable end of the rod, part No. 104-52526, connects directly to the rudder trim tab.)

(22) Install one new cotter pin, part No. AN380-2-2, in the clevis bolt, part No. AN23-15.

(23) Insert the link assembly just connected, into the elongated hole in the rudder beam and guide the rudder forward onto the upper hinge bearing.

NOTE Ascertain that the link assembly (or trim tab push rod) goes through the rudder to the trim tab cut-out.

(24) Connect the navigation light wire.

(25) Insert the bolt removed from the upper hinge through the loose end of the bonding strip then through the upper hinge casting.

(26) Replace the bolt in the center hinge that was taken out when removing the rudder.

(27) Connect the rudder to the vertical stabilizer at the lower hinge with the bolt and nut previously removed.

(28) Secure the bolts through the top and center hinge bearings with the nuts that were removed and two cotter pins, part No. AN380-2-2.

(29) Insert the bolt for connecting the rudder actuating rod through the loose end of the bonding then connect the rod to the rudder.

(30) Secure the bolt with the nut and a new cotter pin, part No. AN380-2-2.

(31) Reinstall the metal cap on the bottom of the rudder.

(32) Ascertain that the rudder trim tab control in the pilot's cockpit is in the neutral position.

(33) Put the rudder in the neutral position, then adjust the length of the trim tab push rod so that the trim tab will be in the neutral position.

(34) Connect the trim tab push rod to the trim tab with the bolt and nut that were removed and a new cotter pin, part No. AN380-2-2.

(35) The reverse rudder boost tab will now move 18 degrees $\pm$ 1 degree to the right of the rudder when it is moved to the full right position (30 degrees) and 12 degrees $\pm$ 1 degree to the left of the rudder in the full left position (30 degrees).

(36) Reinstall the trim tab push rod fairing.

3. a. The following parts are required per airplane to accomplish this change. These parts are furnished as complete kits and will be requisitioned in accordance with T. O. No. 00-35A-15. Parts required for replacement after initial installation will be requisitioned as individual parts and not as complete kits from Class 15 Stock.

QTY	STOCK NO.	PART NO.	NOMENCLATURE	CLASS	SOURCE
1	1300TO-01-60JE8		KIT, "Installation of Dorsal Fin and Reverse Rudder Boost Tab, P-51D," consisting of the following parts:	15	AF Stock
1		109-25001	Dorsal Fin Assy	01-M	
1		73-23003-5	Angle	01-M	
3		AN442AD8-14	Rivet	29	
5		AN3-4A	Bolt	04-A	
5		AN365-1032	Nut	04-A	
25		22A21-2-82	Basket Nut	04-A	
1		7S5-8-10	Screw	01-M	
24		7S5-8-8	Screw	01-M	
25		2W4	Washer	01-M	
28		AN426AD3-4	Rivet	29	
20		LS1126-4-6	Cherry Rivet	29	
1		109-20012	Fillet Assy LH	01-M	
1		109-20012-1	Fillet Assy RH	01-M	
1		109-52528	Fitting	01-M	
2		AN426AD5-13	Rivet	29	
1		104-52526-3RA	Rod Assy	01-M	
5		AN380-2-2	Pin - Cotter	29	
2		AN426AD4-7	Rivet	29	

b. One complete kit of parts packed for overseas shipment measures approximately 4-1/2 x 1-1/2 x 1 feet and weighs approximately 7 pounds.

c. Approximately 12 man-hours are required to complete this installation.

d. The weight change is equivalent to an increase of 5 pounds at 320 inches aft of reference datum.

e. Parts removed and not reinstalled will be disposed of in accordance with AAF Regulation 65-43.

By Command of General ARNOLD:

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Major General, U.S.A.,
Commanding General, Air Service Command.

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