

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, UNITED STATES AIR FORCE
WASHINGTON

TECHNICAL ORDER
NO. 01-100LAA-23

30 March 1950

INSTALLATION OF HC12X20-7B PROPELLERS - L-17A (RYAN)

This technical order supersedes kit copies of T. O. No. 01-100LAA-23, dated 25 January 1950.

By whom work will be accomplished:

Organizational maintenance activities, with the aid of field maintenance facilities if necessary.

When work will be accomplished:

As soon as possible, but not later than the next 100-hour inspection period.

AF form entry required:

60A.

1. PURPOSE.

To provide a more reliable propeller installation, the Hartzell HC12X20-1 propeller will be removed from all L-17A aircraft and replaced with the HC12X20-7B propeller in accordance with the instructions contained in paragraph 2. Aircraft already equipped with the HC12X20-7B propeller will require no further modification.

2. MODIFICATION DATA.

a. Removal of the HC12X20-1 propeller assembly.

(1) Remove propeller hub nut safety pin and hub nut.

(2) Remove wire locks and linkscrews.

(3) Remove propeller from hub.

(4) Remove retainer plates, part Nos. 145-44013 and 145-44012, and cover, part No. 145-44018.

(5) Disconnect the linkage and hose connections to servo valve.

(6) Pull actuating piston from cylinder. Catch any oil that may drain from cylinder in a drip pan.

(7) Remove the four stud nuts or attaching brackets and pull the cylinder from the engine. On aircraft which have the cylinder secured to brackets (rather than bolted directly to the engine) it will be necessary to remove the two brackets, part No. 145-44014, from the engine. The bolts which are taken out during the process of removing these brackets should be reinstalled with a 1/16 inch washer under the head of each bolt.

(8) Remove propeller oil pressure and oil return hose from engine. Plug holes in the case to prevent entrance of foreign matter.

(9) Remove forward control guide brackets, part Nos. 145-43023 and 145-44003, reinstalling the bolts removed with a 1/16 inch washer under the head of each bolt.

(10) Remove four propeller element mounting studs from front of engine block. In the case of bracket mounted cylinder, this work will not be required.

b. Rework of cowl.

(1) Rework cut-out in cowl assembly, part No. 145-31501-519, according to dimensions given in figure No. 1.

(2) Lay reinforcing strip, part No. 145-31501-582, on upper nose cowl air entrance flange; using the reinforcing strip as a template, drill five (No. 30 drill) holes and secure reinforcing strip to flange with five rivets, part No. 2R1AD4-5.

(3) Using seal, part No. 145-44061, as a template, drill eight (No. 10 drill) holes in the cowl. Mount one nut plate, part No. AN366F1032, at each hole, using two rivets, part No. 2R1AD3-4. Drill rivet holes with a No. 40 drill.

(4) Replace nose cowl baffle seals with new baffle seals, part Nos. 145-31508-10 and 145-31509-10.

c. Installation of HC12X20-7B propeller.

(1) Use nuts, bolts, and washers removed from forward bracket, part No. 145-43023, to install bracket, part No. 145-44060-2, on right side of engine. (See figure 2.)

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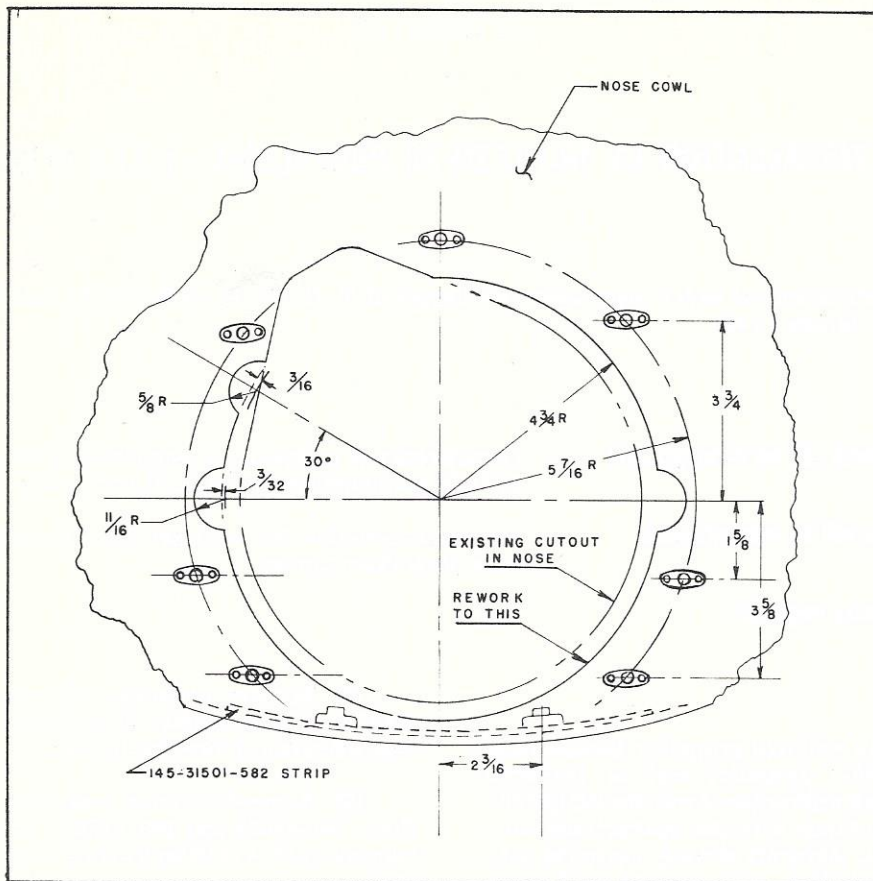


Figure 1 - Nose Cowl Rework

(2) Attach two clips, part No. AN742-4, to top of aft propeller control guide bracket, part No. 145-43023. Attach clamps to bracket in such a manner that propeller control is pointed across engine centerline to right side of engine. Use two each screws, part No. NAS221, and nuts, part No. AN365-1032, to secure clips to bracket.

(3) Attach propeller control to bracket, part No. 145-44060-2, using two each clips, part No. AN742-4, screws, part No. NAS221-8, and nuts, part No. AN365-1032.

(4) Install hose assembly, part No. AN6264-4-17 1/2. Use a gasket, part No. 145-44021, bushing, part No. 145-44052, and nipple, part No. AN816-4, to attach hose to engine.

(5) Attach hose assembly, part No. AN6264-6-11 1/2, to engine, using an elbow, part No. AN822-6-2.

(6) Install propeller on engine in accordance with the following instructions. Exercise utmost care in adjusting propeller control before attaching to A-117 servo valve control lever.

(a) Clean propeller shaft threads and splines thoroughly, removing all nicks, burrs, and galls. Make a careful check to determine that shaft threads are not burred or pulled. Stone out burrs and use crocus cloth to remove scratches.

(b) Remove piston from cylinder by removing A-121 valve link screw and sliding piston forward off piston guide rods.

(c) Remove diaphragm B-119 by removing outer and inner bolting rings B-120 and A-113.

(d) The cylinder is mounted on engine nose with guide pins A-122 in a horizontal plane, and the servo valve on upper right side of the cylinder. In order to eliminate all possibilities of oil leaks it is recommended that a paper gasket be used between cylinder C-111-7 and the face of the engine.

(e) The cylinder C-111-7 is mounted with four Allen head cap screws (5/16-18). Use 1/16 inch thick aluminum washers under the heads of the screws. Be sure the screws do not bottom in the engine tapped hole. Safety screws with wire through drilled holes in screw head.

(f) Install rubber diaphragm with inner and outer bolting rings. **IMPORTANT** - tighten all screws "finger tight" plus 1/4 to 1/2 turn. Breakage of the rings may result if the screws are unevenly tightened. If screws are over tightened, diaphragm failure may result.

(g) Connect hydraulic lines part Nos. AN6264-4-17 1/2 and AN6264-6-11 1/2, to the servo valve. Use an elbow, part No. AN823-4, and a bushing, part

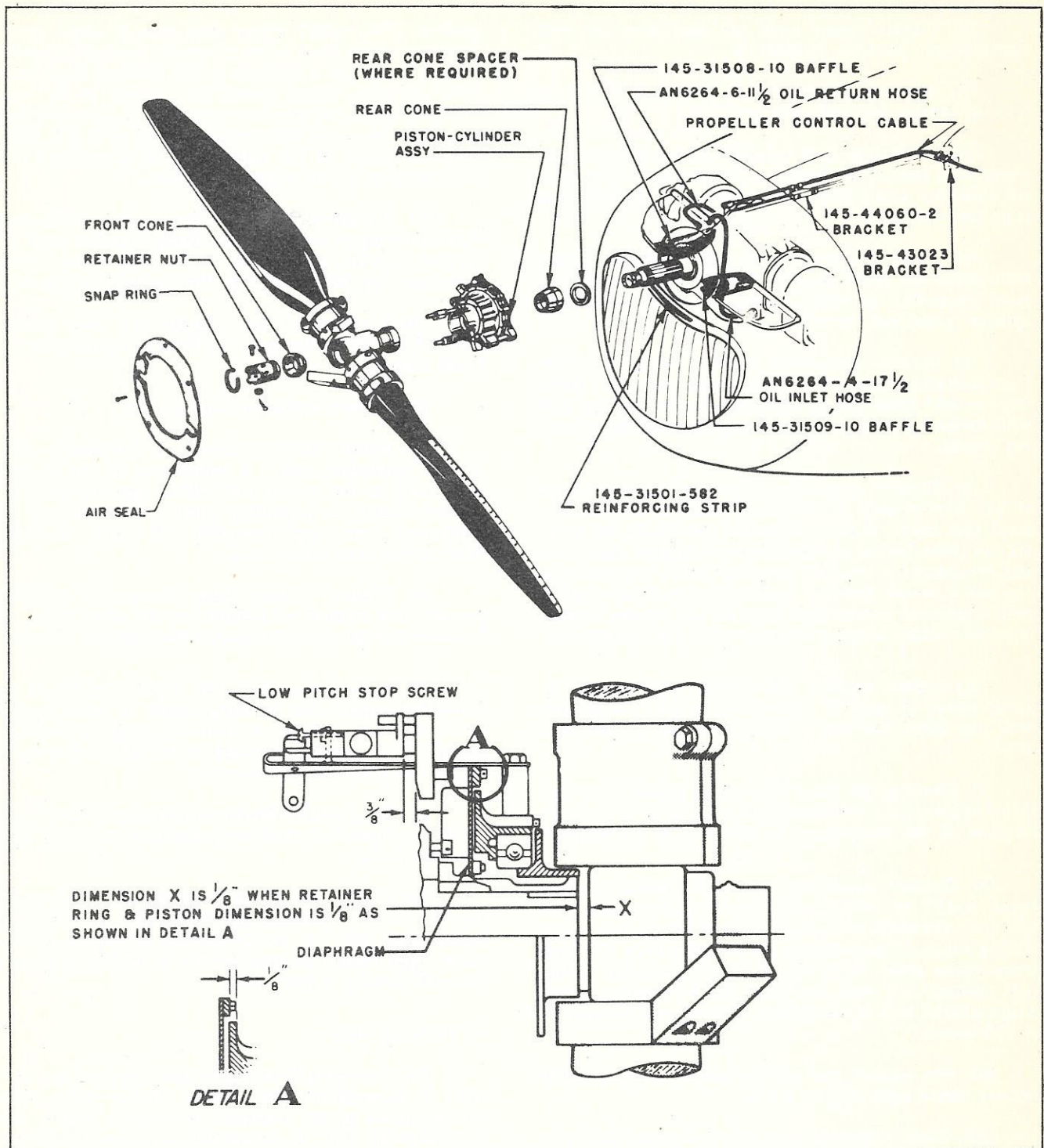


Figure 2 - HC12X20-7B Propeller Installation

No. AN912-3, when connecting the line, part No. AN6264-4-17 1/2, to the valve, and an elbow, part No. AN822-6-6, to connect line, part No. AN6264-6-11 1/2.

(h) Grease front face of rubber diaphragm with Specification No. AN-G-5 grease or equivalent and install piston. Connect A-118 link with piston, using A-121 screw. Safety screw with wire.

(i) Install rear cone using a 1/8 inch 24ST dural spacer washer behind cone, then coat the hub face of cone, and shaft threads with a thin film of antisieze compound (Specification No. AN-C-53, or equivalent). Coat the shaft splines with a thin coating of engine oil.

(j) Slide piston and jack plate assembly into position on cylinder guide rods.

(k) Install engine cowl air seal, securing with nine screws, part No. NAS221-9.

(l) Remove all grease or antirust compound from propeller hub and wipe dry.

(m) Coat hub face of front cone with antisieze compound; install the halves of front cone on retainer nut shoulder and install on propeller. **CAUTION** seat snap ring securely.

(n) Raise propeller and align wide hub spline with propeller shaft master spline. Then carefully slide propeller on shaft, taking care not to damage splines, cone seat, or cone.

(o) Spread propeller counter-weights apart. Turn jack plate counterclockwise until jack plate forks line up with blade shank attaching blocks and tap jack plate forks lightly until they are engaged with the attaching blocks.

(p) Tighten propeller retaining nut with torque of 540 foot-pounds (a 180 pound load at the end of a three foot bar). Install propeller retaining nut locking pin from inside of shaft through aligned shaft hole and retaining nut hole. If propeller shaft and retaining nut holes do not line up, tighten retaining nut slightly until alignment can be obtained. Do not loosen retaining nut to obtain alignment for locking pin installation.

(q) Install washer and safety locking pin. In some cases it may be necessary to use a 3/16 inch lock pin when clearance is not available for 1/4 inch pin.

(7) Check positioning of element piston to ascertain that clearance is available to allow a 3/16 inch deflection of the diaphragm to either side of neutral.

(8) Connect propeller push-pull control to valve lever A-117 by first positioning the piston front face 1/8 inch forward of forward face of diaphragm outer bolting ring. Then position servo valve body 3/8 inch from valve plate (figure 2) and pull propeller push-pull control 1/8 inch out from full forward position. Align clevis end of propeller control and connect to A-117 lever.

(9) Run engine and set low pitch stop to provide proper static rpm (1975 - 2025).

(10) Upon completion of the preceding installation, make an operational check of the jack plate clearance. In the full forward position of the diaphragm, (maximum rpm with engine running), there must be a minimum of 1/8-inch clearance between the jack plate collar and propeller hub. Clearance must be observed from the side of the aircraft while the engine is running. It is important that this jack plate to hub clearance be maintained to preclude any possibility of overloading engine thrust bearing with propeller.

(11) If the foregoing instructions are fully complied with, maximum ground static rpm will be approx-

imately 1975 - 2025 with a 400 rpm control range, down from 1700 rpm, when propeller control is moved from full low pitch position to full high pitch position. Take-off rpm, which should be checked at 95 mph indicated airspeed, must not exceed 2300 rpm. **DO NOT** attempt to increase this control range, if it will cause over-deflection of the diaphragm of more than 3/16 inch forward of the neutral position.

(12) If desired maximum rpm cannot be obtained, blade indexing in hub must be changed rather than removing spacers from back of the rear cone. Blade indexing may be changed by the following procedure:

(a) If propeller and clamp are not already marked, scribe a reference line from propeller blade to blade clamp.

(b) Loosen outboard clamp bolts.

(c) Rotate blade in clamp as necessary to increase maximum rpm. A movement of the blade of 1/32 inch in the clamp will effect approximately a 1 degree change in propeller pitch and will change the maximum rpm approximately 100 rpm. Decrease blade pitch to increase rpm.

(d) Tighten clamp bolts (torque to 20 foot-pounds) and repeat procedure for the other blade. It is essential that pitch change on both blades be identical.

(13) In the event that the engine on which the propeller conversion is being made is rated for 205 hp at 2600 rpm, in order to take advantage of the additional rpm and power available it will be necessary to adjust the propeller as follows:

(a) Re-index the blades to a degree setting 3 degrees less than that used for propellers that turn 2300 rpm maximum.

(b) Install and adjust the propeller in the same manner as recommended previously for the 2300 rpm installation with the exception that maximum ground static rpm should be approximately 2300 to provide a take-off setting of 2600 rpm.

3. SUPPLY DATA.

a. The following listed parts are required per aircraft to accomplish this change. These parts, with the exception of the Hartzell propeller, model No. HC12X20-7B, will be furnished as Class 15 kits for initial installation on L-17A aircraft assigned to the National Guard. The kits will be supplied without requisition in accordance with instructions contained in letter, Hq, USAF, dated 26 April 1949, subject: "Modernization of L-16A and L-17A airplanes," and letter from National Guard Bureau, dated 28 July 1949, same subject. The HC12X20-7B, propellers will be requisitioned direct from Class 03-A, Supply Division, Headquarters, Air Materiel Command. Parts required for maintenance of equipment after initial installation will be requisitioned from the individual property classes.

QTY	STOCK NO.	PART NO.	NOMENCLATURE	CLASS	SOURCE
1	4015-HC12X20-7B		Propeller	03-A	AF Stock
1	1300TO-01-100LAA23	HC12X20-7B	KIT, "Installation Of HC12X20-7B Propellers - L-17A," consisting of the following parts: (UNIT COST - \$20.84)	15	AF Stock
1	6700-613925-318	NAS221-8	Screw - Brazier hd steel Phillips recessed hd 10-32 x 17/32 in.	29	
9	6500-510910	AN366F1032	Nut - Plate self locking two lug type 10-32 fine	04-A	
1	6700-396350	AN380-2-2	Pin - Cotter steel 1/16 x 1/2 in.	29	
1	6700-394970	AN380C2-3	Pin - Cotter corrosion resistant steel 1/16 x 3/4 in.	29	
1	6700-725606-93	AN520-10R14	Screw - RH steel recessed hd 10-32 7/8 in. length	29	
1	6500-326875	AN742-4	Clip - Loop type steel 1/4 in. tube OD	04-A	
1	6500-451884	AN816-4	Nipple - Flared tube and pipe thread steel 1/4 in. tube	04-A	
1	6500-361518	AN822-6-2	Elbow - Flared tube and pipe thread steel 90 deg 3/8 in. tube OD	04-A	
1	6500-361522	AN822-6-6	Elbow - Flared tube and pipe thread steel 90 deg 3/8 in. tube OD	04-A	
1	6500-361410	AN823-4	Elbow - Flared tube and pipe thread steel 45 deg 1/4 in. tube OD	04-A	
1	6500-244710	AN912-3	Bushing - Reducer bronze 3/8 x 1/8 in.	04-A	
1	6600-NSL	AN6264-6-11 1/2	Hose Assembly	04-B	
1	6600-NSL	AN6264-4-17 1/2	Hose Assembly	04-B	
18	0110-2R1AD3-4	2R1AD3-4	Rivet	01-M	
5	0110-2R1AD4-5	2R1AD4-5	Rivet	01-M	
1	0110-2W1-18-18-42	2W1-18-18-42	Washer	01-M	
4	0110-2W1-AL-14-62	2W1-AL-14-62	Washer	01-M	
1	0110-145-31501-582	145-31501-582	Strip - Reinforcing	01-M	
1	0110-145-31508-10	145-31508-10	Seal - Nose cowl baffle	01-M	
1	0110-145-31509-10	145-31509-10	Seal - Nose cowl baffle	01-M	
2	0110-145-43026	145-43026	Sleeve	01-M	
1	0110-145-44021	145-44021	Gasket	01-M	
1	0110-145-44060-2	145-44060-2	Bracket	01-M	
1	0110-145-44061	145-44061	Seal	01-M	
4	0110-145-44062	145-44062	Cap Screw	01-M	
1	0110-44052	145-44052	Bushing	01-M	

b. The complete HC12X20-1 propeller assembly removed in accordance with the preceding instructions will be properly identified, crated, and prepared for storage and forwarded without delay direct to the Hartzell Propeller Company, Division of Hartzell Industries, 1025 Roosevelt Avenue, Piqua, Ohio, for modification. Any other parts removed and not reinstalled will be returned to AF Stock if reparable or serviceable.

4. MAN-HOURS REQUIRED.

Approximately 16 man-hours are required per aircraft to accomplish this change.

5. WEIGHT AND BALANCE INFORMATION.

The basic weight change effected by this modification is negligible.

BY ORDER OF THE SECRETARY OF THE AIR FORCE:

HOYT S. VANDENBERG
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Commanding General
Air Materiel Command

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