CONTENTS

FIGURES

TABLES

1. Tools, Consumables, and Expendables

The following tools, consumables, and expendables will be required for propeller removal or installation:

NOTE: Compact propellers are manufactured with five basic hub mounting flange designs. The flange types are F, K, L, N, or R. The flange type used on a particular propeller installation is indicated in the propeller model number stamped on the hub. For example, HC-C2Y**F**-4A indicates an "F" flange. Refer to Aluminum Hub Propeller Model Identification in the Description and Operation chapter of this manual for a description of each flange.

A. Tooling

F Flange
- Safety wire pliers
- Torque wrench (1/2 inch drive)
- Torque wrench adapter (Hartzell P/N BST-2860)
- 3/4 inch open end wrench

L Flange
- Safety wire pliers
- Torque wrench (1/2 inch drive)
- Torque wrench adapter (Hartzell P/N BST-2860)
- 5/8 inch open end wrench

N Flange
- Safety wire pliers
- Torque wrench (1/2 inch drive)
- 7/8 inch open end wrench
- 7/8 inch crowfoot wrench

K and R Flange
- Safety wire pliers
- Torque wrench (1/2 inch drive)
- Torque wrench adapter (Hartzell P/N BST-2860)
- 3/4 inch open end wrench

B. Consumables
- Quick Dry Stoddard Solvent or Methyl-Ethyl-Ketone (MEK)

C. Expendables
- 0.032 Stainless Steel Aircraft Safety wire
- O-ring - propeller to engine seal (see Table 302)

2. Pre-Installation

A. Inspection of Shipping Package

(1) Examine the exterior of the shipping container for signs of shipping damage, especially at the box ends around each blade. A hole, tear or crushed appearance at the end of the box (at the propeller tips) may indicate the propeller was dropped during shipment, possibly damaging the blades.

B. Uncrating

(1) Place the propeller on a firm support.

(2) Remove the banding and any external wood bracing from the cardboard shipping container.

(3) Remove the cardboard from the hub and blades. Place the propeller on a padded support that supports the propeller over large area. Never stand the propeller on a blade tip.

(4) Remove the plastic dust cover cup from the propeller mounting flange (if installed).

C. Inspection after Shipment

(1) After removing the propeller from the shipping container, examine the propeller components for shipping damage.

3. Spinner Pre-Installation

The spinner support must be mounted before the propeller can be installed. The spinner will mount either to a bulkhead installed on the propeller hub, or, on some Lycoming engine installations, to an adapter attached to the starter ring gear. Follow the appropriate directions below.

A. Spinner Bulkhead to Propeller Hub Installation

(1) See Figure 301. Remove the nuts from the hub clamping bolts that are located on either side of the blade shank. The remaining nuts/bolts should not be disturbed. Do not remove the bolts.

(2) See Figure 301. The spinner may be supplied with long hub clamping bolts. If the bolts were supplied with the spinner, remove the bolts on either side of the blade shank and replace them with the bolts supplied with the spinner. The supplied hub clamping bolts will be longer than those removed from the hub.

NOTE: Depending upon the installation, the propeller hub may have been shipped from the factory with the longer hub clamping bolts installed. In this case, the hub clamping bolts will not be supplied with the spinner.

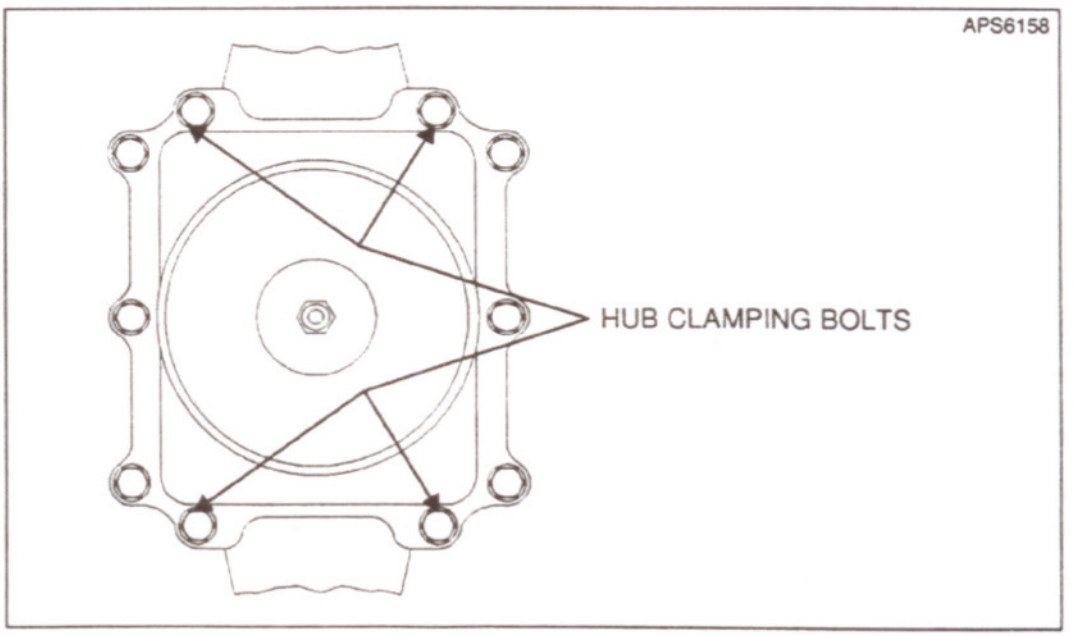

Figure 301 - Hub Clamping Bolt Location

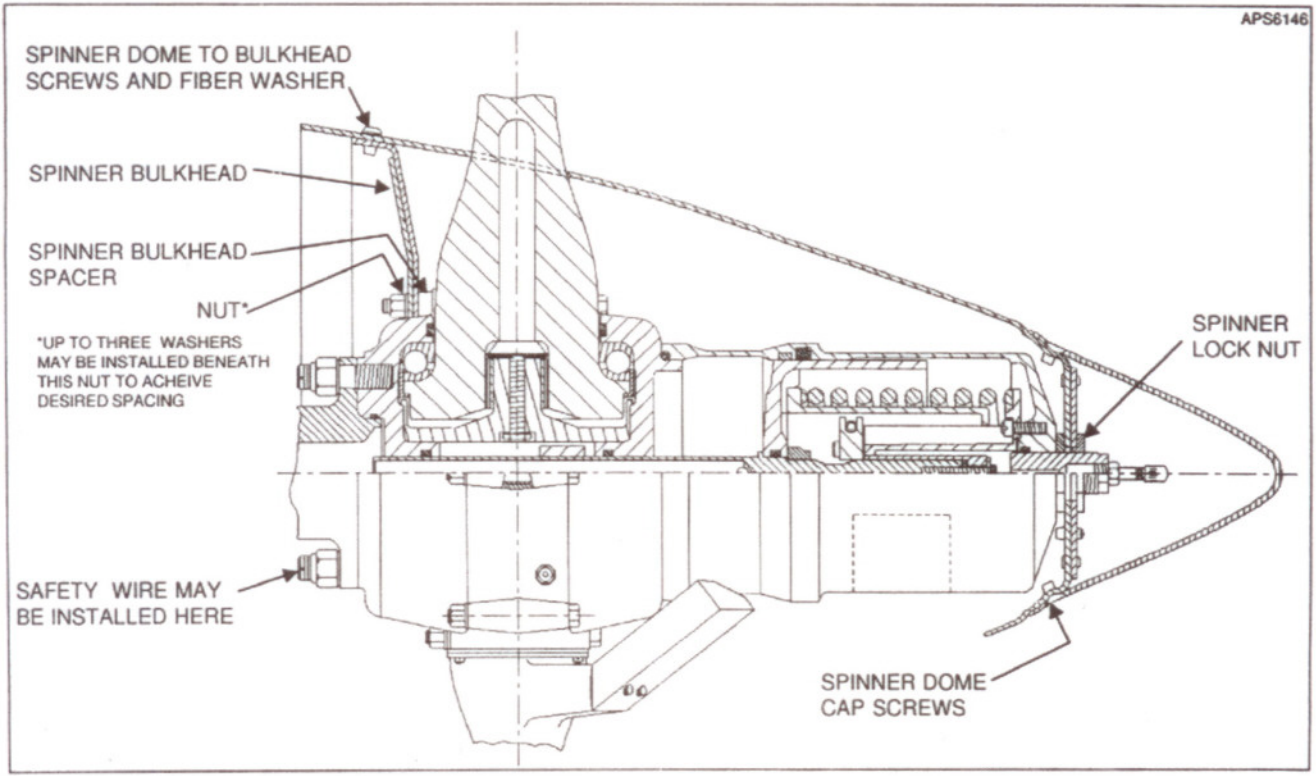

Figure 302 -Spinner Bulkhead and Spinner Mounting (Hub Mounted Spinner)

(3) See Figure 302. Place the spinner bulkhead spacers on the hub clamping bolts. Install the spinner bulkhead over the installed spacers on the hub clamping bolts.

NOTE: When the spinner bulkhead is installed, there should be no less than one or no more than three threads of the hub clamping bolt exposed beyond the nut. Up to three washers may be installed beneath the nut to achieve this result. On some installations, it may be necessary to install spacers and one or more washers beneath the head of the hub clamping bolt in order to avoid interference with aircraft cowling.

(4) Install at least one flat washer and a new self-locking nut on each of the hub clamping bolts used to mount the spinner bulkhead. Torque the nuts per Table 301.

Installation Torques	
Hub clamping bolts/spinner mtg. nuts	22 ft-lbs (29.8 N•m)*
F flange propeller mtg. nuts	70-80 ft-lbs (95-108 N•m)*
Except ( )HC-C3YF-5	80-90 ft-lbs (108-122 N•m)*
N flange propeller mtg. nuts	90-100 ft-lbs (122-136 N•m)*
L flange propeller mtg. studs	50 ft-lbs (36.9 N•m).*
K and R flange propeller mtg. studs	60-70 ft-lbs (81.4-95 N•m)*
Except Lycoming IO 720	90-100 ft-lbs (122-136 N•m)*
Spinner lock nut (see Figure 306, 307)	15-20 ft-lbs (20.3-27.1 N•m)*
*NOTE: All torques listed are dry torque. Clean hardware before installing.	

$$\frac{\text{(actual torque required) X (torque wrench length)}}{\text{(torque wrench length) + (length of adapter)}} = \text{Torque wrench reading to achieve required actual torque}$$

Table 301 - Torque Table

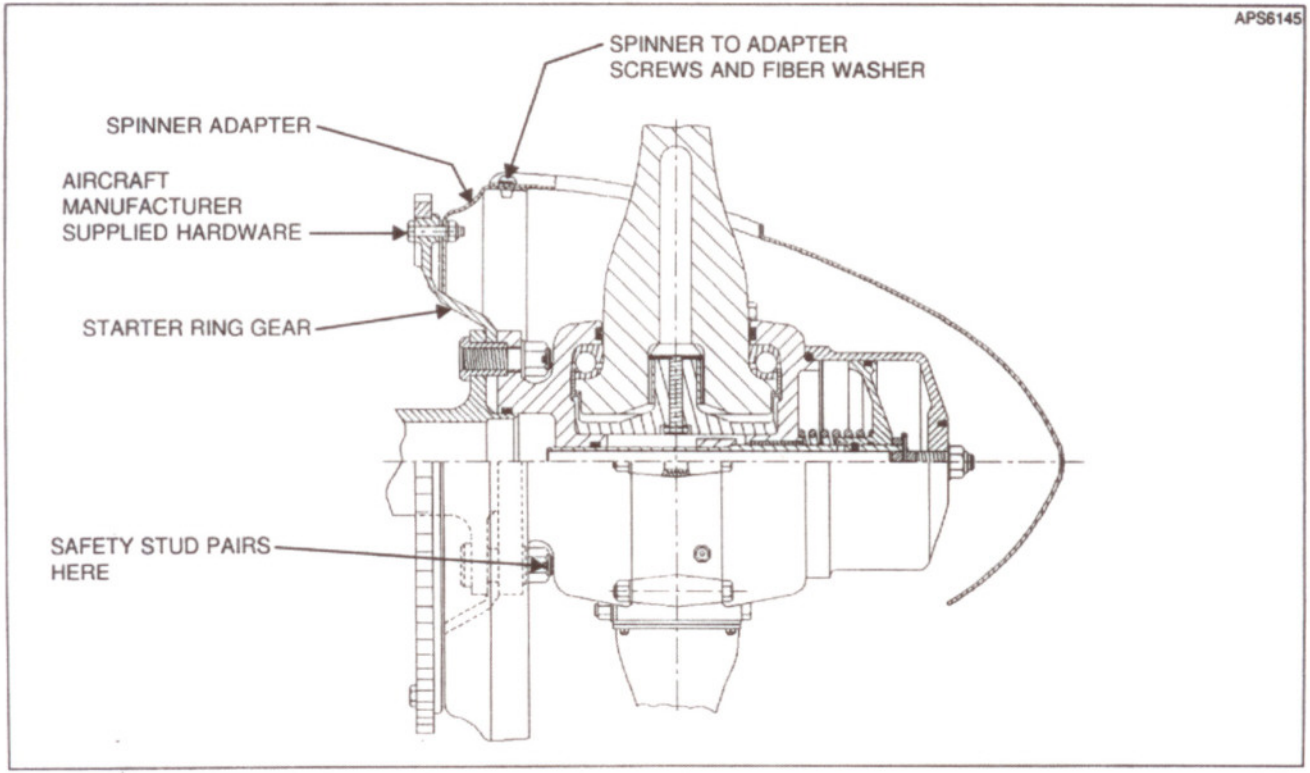

Figure 303 -Spinner Adapter and Spinner Mounting (Starter Ring Gear Mount)

B. Spinner Adapter to Starter Ring Gear Installation

CAUTION: INSTALL SPINNER ADAPTER BOLTS SO THAT THE BOLT HEADS ARE AT THE REAR OF THE STARTER RING GEAR AS INDICATED IN FIGURE 303. BOLTS INSTALLED INCORRECTLY MAY DAMAGE ENGINE COMPONENTS.

(1) See Figure 303. Install the spinner adapter ring to the starter ring gear using the hardware supplied by the airframe manufacturer. Torque the bolts as specified by the airframe manufacturer.

4. Propeller Installation

A. Flange Description

Compact propellers are manufactured with five basic hub mounting flange designs. The flange type designators are F, K, L, N, or R. The flange type used on a particular propeller installation is indicated in the propeller model stamped on the hub. For example, HC-C2Y**F**-4A indicates an "F" flange. Refer to Aluminum Hub Propeller Model Identification in the Description and Operation Chapter of this manual for description of each flange type. Sample flanges are also shown in Figures 304 and 305.

Propeller/Engine Flange O-rings	
"F" flange O-ring	C-3317-228
"K" flange O-ring	C-3317-228
"L" flange O-ring	C-3317-228
"N" flange O-ring (turbine)	C-3317-230
"N" flange O-ring (recip)	C-3317-145
"R" flange O-ring	C-3317-228

Table 302 - Propeller/Engine Flange O-rings

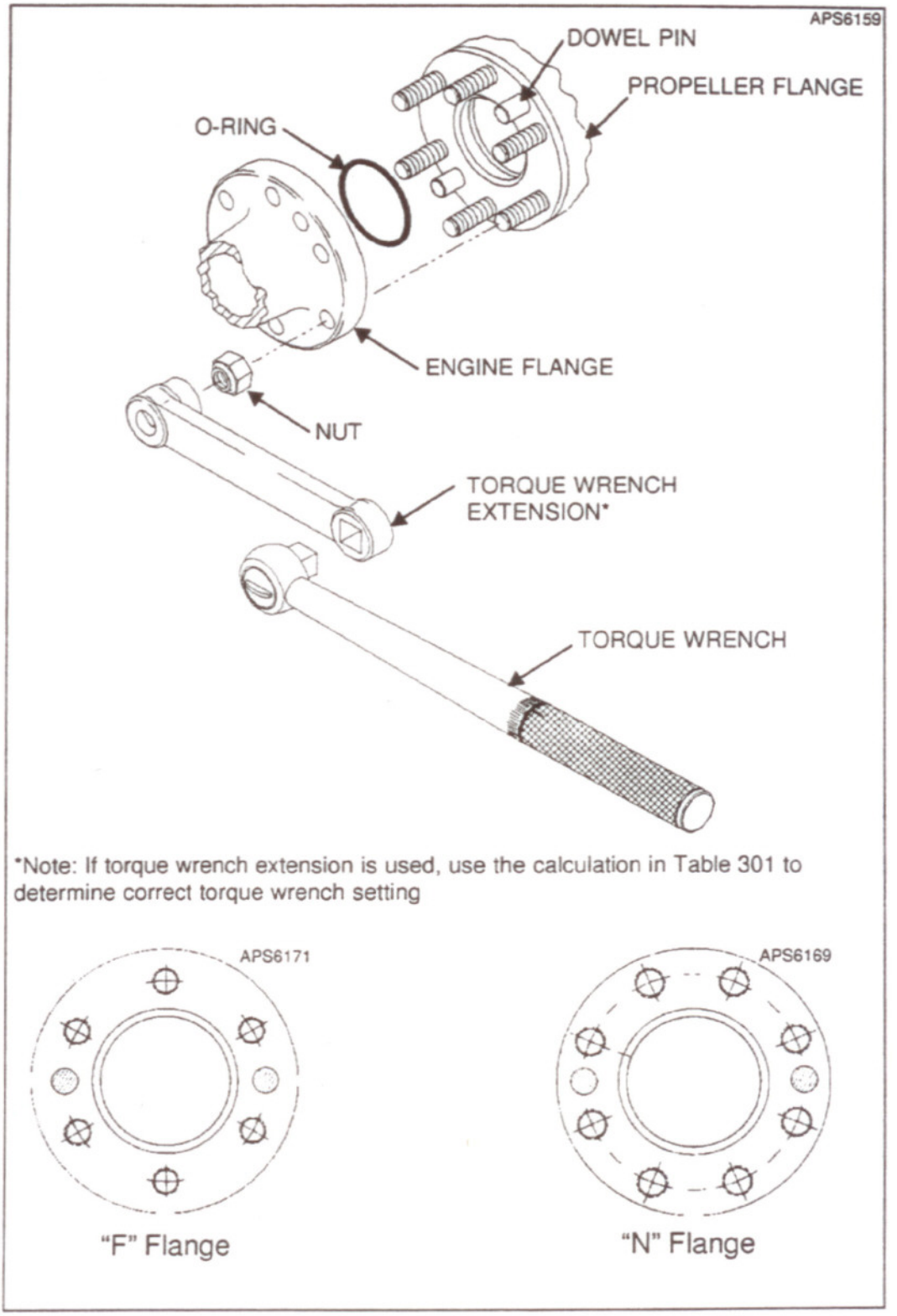

Figure 304 - "F" and "N" Flange Propeller Mounting

B. Installation of "F" Flange Propellers

An "F" flange propeller has six 1/2 inch studs configured in a four inch circle. Two dowel pins are also provided to transfer torque and index the propeller with respect to the engine crankshaft. See Figure 304. The dowel pin locations used on a particular propeller installation are indicated in the propeller model stamped on the hub. Refer to Aluminum Hub Propeller Model Identification in the Description and Operation Chapter of this manual.

(1) Perform the appropriate steps under Spinner Pre-Installation within this chapter.

(2) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent or MEK.

(3) See Figure 304. Install the O-ring in the O-ring groove in the hub bore. See Table 302 for the proper O-ring.

(4) Install the propeller on the engine flange. Make certain to align the dowel pins in the propeller flange with the corresponding holes in the engine mounting flange.

NOTE: The propeller may be installed on the engine flange in a given position, or 180 degrees from that position. Check the engine and airframe manuals to determine if either manual specifies a propeller mounting position.

CAUTION: TIGHTEN NUTS EVENLY TO AVOID HUB DAMAGE.

(5) Torque the 1/2 inch propeller mounting nuts (dry) as indicated in Table 301. Safety wire the studs in pairs (if required by aircraft maintenance manual) at the rear of the propeller mounting flange. See Figure 302.

(6) Install the propeller spinner dome in accordance with Spinner Installation within this chapter.

C. Installation of "N" Flange Propellers

An "N" flange propeller has eight 9/16 inch studs configured in a 4.25 inch circle. Two dowel pins are also provided to transfer torque and index the propeller with respect to the engine crankshaft. See Figure 304. The dowel pin locations used on a particular propeller installation are indicated in the propeller model stamped on the hub. Refer to Aluminum Hub Propeller Model Identification in the Description and Operation Chapter of this manual.

(1) Perform the appropriate steps under Spinner Pre-Installation within this chapter.

(2) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent or MEK.

(3) See Figure 304. Install the O-ring on the engine flange. See Table 302 for the proper O-ring to be installed.

(4) Install the propeller on the engine flange. Make certain to align the dowel pins in the propeller flange with the corresponding holes in the engine mounting flange.

NOTE: The propeller may be installed on the engine flange in a given position, or 180 degrees from that position. Check the engine and airframe manuals to determine if either manual specifies a propeller mounting position.

CAUTION: TIGHTEN NUTS EVENLY TO AVOID HUB DAMAGE.

(5) Torque the 9/16 inch propeller mounting nuts (dry) as indicated in Table 301. Safety wire the studs in pairs (if required by aircraft maintenance manual) at the rear of the propeller mounting flange. See Figure 302.

(6) Install the propeller spinner dome in accordance with Spinner Installation within this chapter.

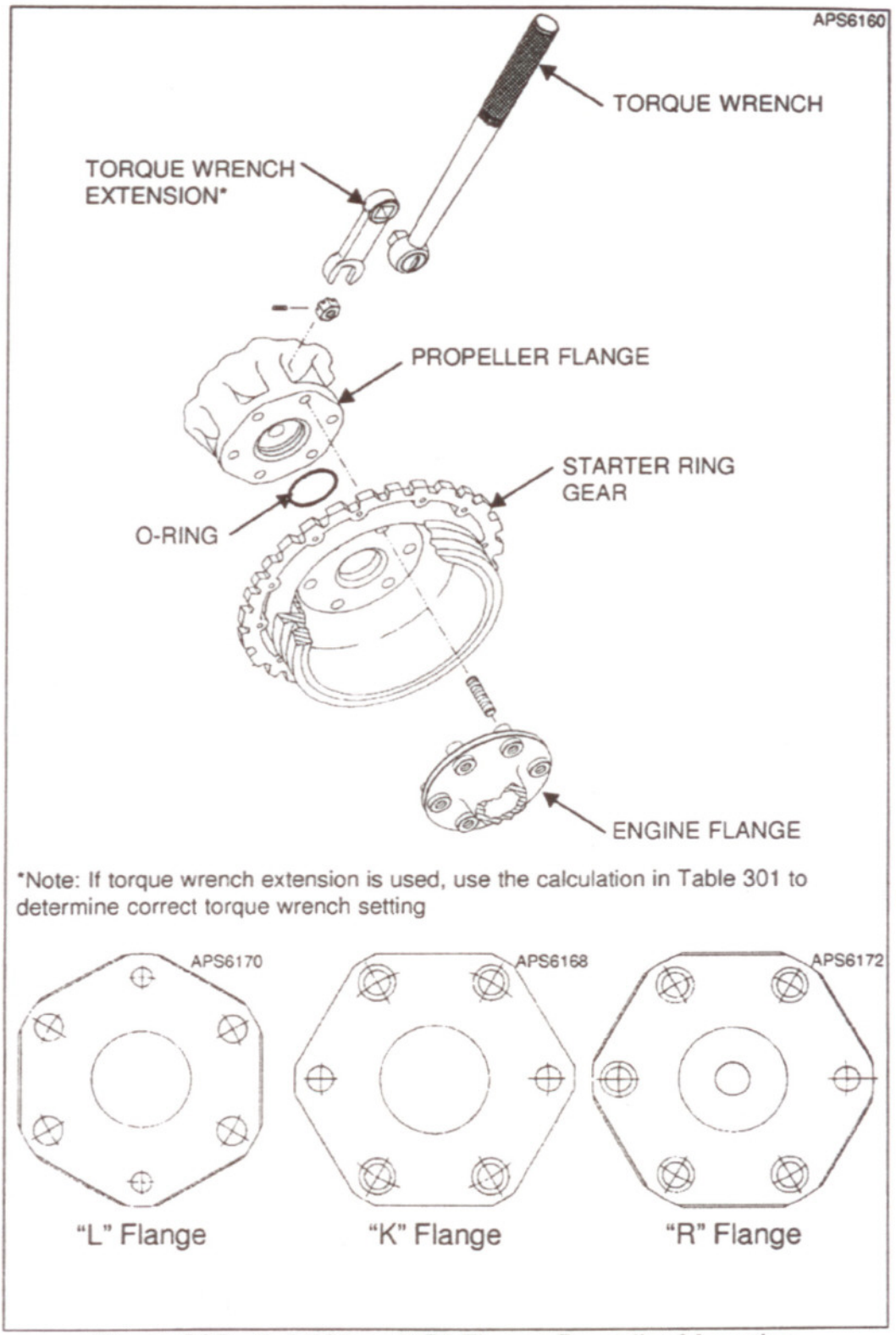

Figure 305 - "L," "K," and "R" Flange Propeller Mounting

D. Installation of "L" Flange Propellers

An "L" flange is an SAE No. 2 flange with six 7/16 inch studs configured in a 4.75 inch circle. Four drive bushings transfer torque and index the propeller with respect to the engine crankshaft. The bushings are located on the engine flange and fit into openings on the propeller flange. See Figure 305. The bushing locations used on a particular propeller installation are indicated in the propeller model stamped on the hub. Refer to Aluminum Hub Propeller Model Identification in the Description and Operation Chapter of this manual.

(1) Perform the appropriate steps under Spinner Pre-Installation within this chapter.

(2) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent or MEK.

(3) See Figure 305. Install the O-ring in the O-ring groove in the rear of the hub. See Table 302 for the proper O-ring to be installed.

(4) Install the propeller on the engine flange. Align the engine flange bushings with the corresponding holes in the propeller flange.

NOTE: The propeller may be installed on the engine flange in a given position, or 180 degrees from that position. Check the engine and airframe manuals to determine if either manual specifies a propeller mounting position.

CAUTION: TIGHTEN STUDS EVENLY TO AVOID HUB DAMAGE.

(5) Torque the 7/16 inch mounting studs (dry) as indicated in Table 301. Safety wire mounting stud nut pairs. See Figure 303.

(6) Install the propeller spinner dome in accordance with Spinner Installation within this chapter.

E. Installation of "K" and "R" Flange Propellers

A "K" or "R" flange is an SAE No. 2 flange that has six 1/2 inch studs configured in a 4.75 inch circle. Four ("K" flange) or five ("R" flange) drive bushings transfer torque and index the propeller with respect to the engine crankshaft. The bushings are located on the engine flange and fit into counterbored holes on the propeller flange. See Figure 305. The bushing locations used on a particular propeller installation are indicated in the propeller model stamped on the hub. Refer to Aluminum Hub Propeller Model Identification in the Description and Operation chapter of this manual.

NOTE: An "R" flange propeller may be installed on an "K" engine flange. A "K" flange propeller cannot be installed on a "R" flange engine.

(1) Perform the appropriate steps under Spinner Pre-Installation within this chapter.

(2) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent or MEK.

(3) See Figure 305. Install the O-ring in the O-ring groove in the rear of the hub. See Table 302 for the proper O-ring to be installed.

(4) Install the propeller on the engine flange. Align the engine flange bushings with the corresponding holes in the propeller flange.

NOTE: A "R" flange propeller may be installed on a "K" engine flange in a given position, or 180° from that position. An "R" flange propeller may be installed on an "R" engine flange in one position only. A "K" flange propeller may be installed only on a "K" engine flange, but may be installed in a given position, or 180 degrees from that position. Check the engine and airframe manuals to determine if either manual specifies a propeller mounting position.

CAUTION: TIGHTEN STUDS EVENLY TO AVOID HUB DAMAGE

(5) Torque the 1/2 inch propeller mounting studs (dry) as indicated in Table 301. Safety wire mounting stud nut pairs. See Figure 303.

(6) Install the propeller spinner dome in accordance with Spinner Installation within this chapter.

5. Spinner Installation

CAUTION: TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

A. Single Piece Spinner Dome

NOTE: The following instructions relate to Hartzell spinners only. In some cases, the airframe manufacturer produced the spinner assembly. If so, refer to the airframe manufacturer's manual for spinner installation instructions.

(1) Examine the interior of the spinner dome. If the spinner dome has an internal support (see Figure 203) that encircles the propeller cylinder, the cylinder may need to be wrapped with one or more layers of UHMW tape (Hartzell P/N B-6654-100).

NOTE: Spinner dome internal support must fit snugly on cylinder, or cylinder will become damaged by chafing.

(2) Install the spinner and check for a snug fit where the internal support contacts the cylinder. If the support does not fit snugly on the cylinder, apply a layer of tape and recheck. Repeat until the spinner support fits snugly on the cylinder.

(3) Secure the spinner to the spinner bulkhead or adapter ring with the supplied screws and washers. To avoid damaging the aircraft cowling, screws must not extend more than three threads past the bulkhead nutplates.

NOTE: When the spinner dome has been removed to facilitate maintenance, check the spinner internal support to cylinder fit. If the spinner loosens in service, add one or more layers of UHMW tape to the cylinder until the spinner fits snugly.

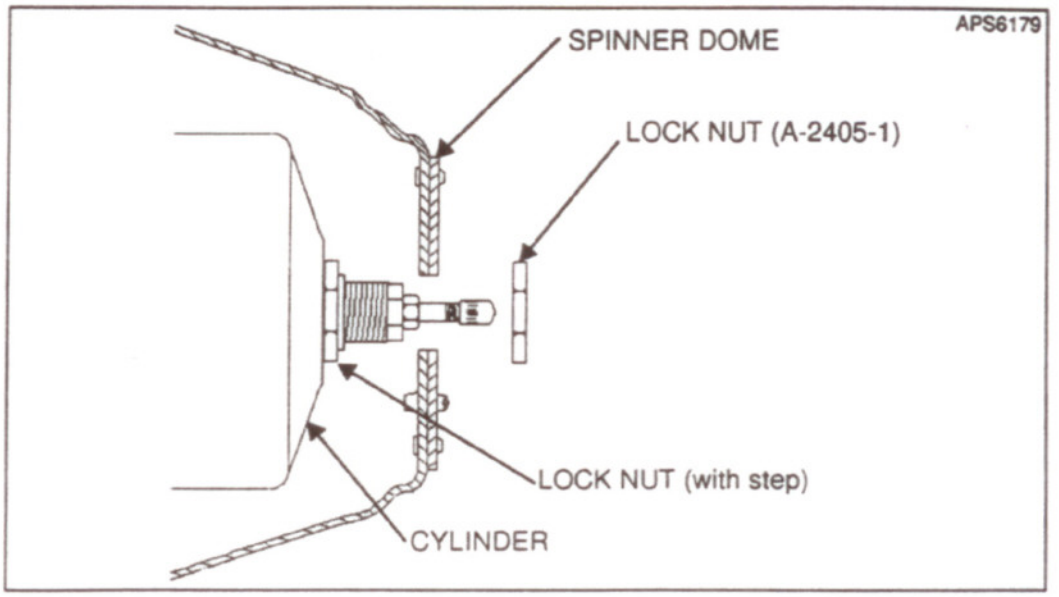

Figure 306 - Two-Piece Spinner Mounting (Procedure 1)

B. Two-Piece Spinner Dome (Procedure 1)

NOTE 1: A spinner dome which is to be installed using Procedure 1 may identified by the lock nut at the top of the cylinder. The lock nut will have a "step" facing away from the cylinder as illustrated in Figure 306.

NOTE 2: The following instructions relate to Hartzell spinners only. In some cases, the airframe manufacturer produced the spinner assembly. If so, refer to the airframe manufacturer's manual for spinner installation instructions.

(1) Refer to Figure 306. Install spinner dome. Push spinner dome toward the bulkhead to align the spinner mounting holes with those of the bulkhead. Secure the spinner to the bulkhead or adapter ring with screws and washers.

(2) Install the lock nut on the low pitch stop. Refer to Table 301 for lock nut torque.

(3) Safety wire the lock nut to each of the two screws on the flat face of the spinner dome surrounding the lock nut.

(4) Secure the spinner dome cap to the spinner dome with flat head screws. To avoid damaging the aircraft cowling, screws must not extend more than three threads past the bulkhead nutplates.

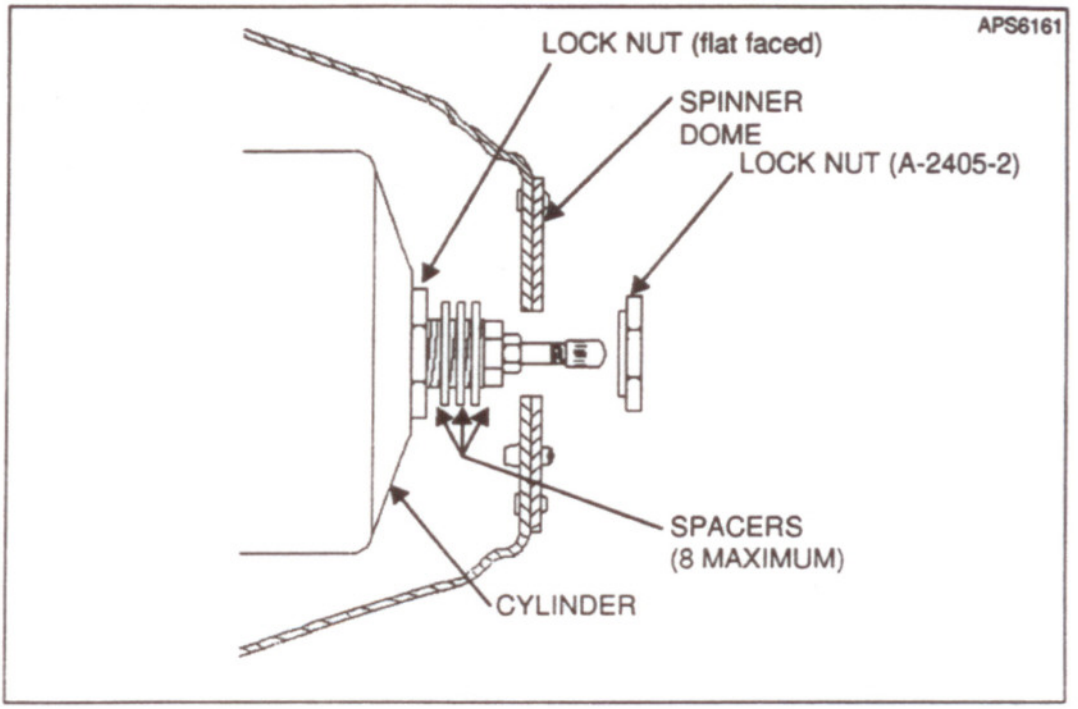

Figure 307 - Two-Piece Spinner Mounting (Procedure 2)

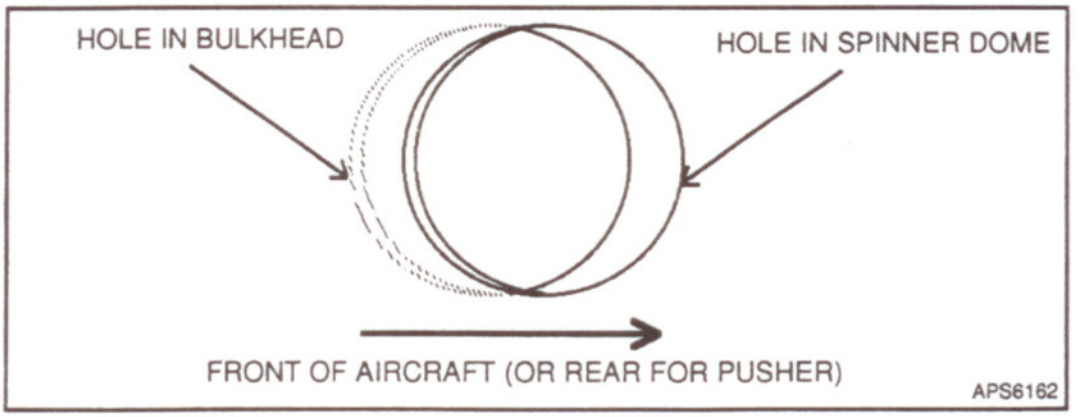

Figure 308 - Spinner Dome to Bulkhead Mounting Hole Alignment

C. Two-Piece Spinner Dome (Procedure 2)

NOTE 1: A spinner dome which is to be installed using Procedure 2 may identified by the lock nut at the top of the cylinder. The lock nut will be flat-faced as illustrated in Figure 307.

NOTE: The following instructions relate to Hartzell spinners only. In some cases, the airframe manufacturer produced the spinner assembly. If so, refer to the airframe manufacturer's manual for spinner installation instructions.

(1) Refer to Figure 307. Place spacers on the low pitch stop lock nut. Up to eight spacers may be used. Install spacers, then check spinner fit. Spinner is correctly spaced when the holes in the spinner dome are misaligned 1/4 -1/3 of their diameter toward the front of the aircraft, or rear in a pusher installation (See Figure 308). Add or remove spacers to achieve this alignment.

(2) Install spinner dome. Push spinner dome aft to align the spinner mounting holes with those of the bulkhead or adapter ring. Secure the spinner to the bulkhead or adapter ring with screws and washers. To avoid damaging the aircraft cowling, screws must not extend more than three threads past the bulkhead nutplates.

(3) Install the lock nut (that has a shoulder and safety wire holes) on the low pitch stop. Refer to Table 301 for lock nut torque.

(4) Safety wire the lock nut to each of the two screws on the flat face of the spinner dome surrounding the lock nut.

(5) Secure the spinner dome cap to the spinner dome with flat head screws.

6. Post-Installation Checks

Perform Static RPM Check as outlined in the Maintenance Practices chapter in this manual.

7. Spinner Removal

CAUTION: WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE REMOVING THE SPINNER DOME TO PREVENT DAMAGING THE BLADE AND BLADE PAINT.

A. Removal of Single Piece Spinner

(1) Remove the screws and washers that secure the spinner to the spinner bulkhead or adapter ring.

(2) Remove the spinner dome.

B. Removal of Two-Piece Spinner

(1) Remove the flat head screws that secure the spinner dome cap to the spinner dome.

(2) Cut and remove the lock nut safety wire.

(3) Remove the lock nut.

(4) Remove the screws and washers that secure the spinner dome to the spinner bulkhead.

(5) Remove the spinner dome.

C. Hub Mounted Spinner Bulkhead Removal

(1) Remove propeller. Refer to Propeller Removal in this chapter.

(2) Remove the flat washers and self-locking nuts that secure the spinner bulkhead to the propeller hub. Remove the spinner bulkhead.

(3) Reinstall the flat washers and self-locking nuts that were removed during the spinner bulkhead removal.

D. Starter Ring Gear Spinner Adapter Removal

(1) Remove propeller. Refer to Propeller Removal in this chapter.

(2) Remove the spinner adapter by removing the hardware that secures the spinner adapter to the starter ring gear.

8. Propeller Removal

A. Removal of "F" Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) Support the propeller assembly with a sling.

(3) Cut and remove the safety wire (if installed) on the propeller mounting studs.

(4) Remove the six 1/2 inch mounting nuts.

CAUTION: REMOVE THE PROPELLER FROM THE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(5) Using the support sling, remove the propeller from the mounting flange.

(6) Place the propeller on a cart for transport.

B. Removal of "N" Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) Support the propeller assembly with a sling.

(3) Cut and remove the safety wire (if installed) on the propeller mounting studs.

(4) Remove the eight 9/16 inch mounting nuts.

CAUTION: REMOVE THE PROPELLER FROM THE ENGINE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(5) Using the support sling, remove the propeller from the mounting flange.

(6) Place the propeller on a cart for transport.

C. Removal of "L" Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) Support the propeller assembly with a sling.

(3) Cut and remove the safety wire (if installed) on the propeller mounting stud nuts.

(4) Unscrew the six 7/16 inch mounting studs from the engine bushings.

CAUTION: REMOVE THE PROPELLER FROM THE ENGINE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(5) Using the support sling, remove the propeller from the mounting flange.

(6) Place the propeller on a cart for transport.

D. Removal of "K" and "R" Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) Support the propeller assembly with a sling.

(3) Cut and remove the safety wire (if installed) on the propeller mounting stud nuts.

(4) Unscrew the six 1/2 inch mounting studs from the engine bushings.

CAUTION: REMOVE THE PROPELLER FROM THE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(5) Using the support sling, remove the propeller from the mounting flange.

(6) Place the propeller on a cart for transport.