

Service Bulletin

Service Bulletin: SB412-304 BG; Bell 412 Air Conditioner System

Subject: Installation of Belt Guard & Improved Idler Bearing – M412 Cabin Air Conditioning System.

Date: August 22, 2003

Applicability: Bell Helicopter Models 412, 412EP, 412HP, 412SP equipped with the Air Comm Corporation Air Conditioner System.

The modifications defined by this document have been incorporated in air conditioning systems with kit serial numbers, AC412-115 and on. The kit serial number is located on the compressor mount below the compressor.

Reference:

1. F.A.A./S.T.C. #SR00066DE, Bell Helicopter 412 Air Conditioning System.
2. 412-302, Rev D Compressor Installation Drawing (No Speed Reducer)
3. 412AC-304, Rev F Compressor Installation Drawing (With Speed Reducer).

I. Discussion:

It has come to our attention that slippage between the aluminum idler pulley and idler pulley bearing, or failure of the compressor idler pulley bearing, or a compressor drive belt, can result in the belt becoming lodged between the Main Rotor Transmission Housing, and the Main Transmission Input Quill.

This Service Bulletin provides for the installation of “Flanged Ring Segments” to the forward surface of the Compressor Drive Pulley, to prevent the Compressor Drive Belt(s) from becoming lodged in this area.

In addition, a stainless steel idler pulley and a new bearing is to be installed.

II. Approval:

The Technical aspects of this Service Bulletin have been FAA approved.

III. Background

A recent change to the speed reducer design replaced the aluminum Idler Pulley by a stainless steel pulley. The bearing in the stainless steel pulley is removable and can be replaced if required. The bearing in the aluminum Idler Pulley is not removable, thus the pulley-bearing assembly must be replaced in case of bearing failure. Also, the possibility of slippage between the idler pulley and bearing is eliminated by the change in idler pulley material.

This bulletin recommends replacement of all aluminum idler pulleys in accordance with the schedule provided in this document.

Contamination (dirt, sand, etc.) of the bearing and belt over-tension are important factors affecting bearing life.

This document provides for the installation of a new bearing which incorporates an improved seal.

Also, new idler pulley inspection procedures and a bearing service life are provided.

IV. Modification Requirement – Bell Models 412EP & 412HP Which Have Been Previously Upgraded With The Stainless Steel Idler Pulley.

To be removed:

Item	Part Number	Description	Qty.
1	412AC-3500-20	Retainer Ring	2
2	35BD219VV	Speed Reducer Bearing	1
3	412AC-3500-21	Bolt	8

To be installed:

Item	Part Number	Description	Qty.
4	412AC-3500-22	Belt Guard Assy	1
5	NAS1802-3D4	Bolt	8
6	35BD219DUM	Bearing	1

Items 4, 5 & 6 can be ordered from the ACC Customer Service Department at no charge. Ph 303-440-4075, Fax 303-440-6355.

Recommended Time of Compliance

Modification Requirement	
Item No	Hours Following Receipt of Bulletin
4	25
5	25
6	300

JUL 07 2004

Ans'd.....

V. Modification Requirement – Bell Models 412EP & 412HP Which Have Not Been Upgraded With The Stainless Steel Idler Pulley.

To be removed:

Item	Part Number	Description	Qty.
1	412AC-3500-20	Retainer Ring	2
2	412AC-3016-3	Speed Reducer Pulley/Bearing (Al)	1
3	412AC-3500-21	Bolt	8

To be installed:

Item	Part Number	Description	Qty.
4	412AC-3500-22	Belt Guard Assy	1
5	NAS1802-3D4	Bolt	8
6	412AC-3016-5	Speed Reducer Pulley/Bearing (SS)	1

Items 4 & 5 can be ordered from the ACC Customer Service Department at no charge. Item 6 can be ordered from the ACC Customer Service Department at a cost of \$794.55 USD.

Recommended Time of Compliance

Modification Requirement	
Item No	Hours Following Receipt of Bulletin
4	25
5	25
6	300

VI. Modification Requirement – Bell Models 412 & 412SP Which Have Been Previously Upgraded With The Stainless Steel Idler Pulley

To be removed:

Item	Part Number	Description	Qty.
1	412AC-3504-20	Retainer Ring	2
2	412AC-3500-21	Bolts	8
3	35BD219VV	Speed Reducer Bearing	1

To be installed:

Item	Part Number	Description	Qty.
4	412AC-3504-21	Belt Guard Assy	1
5	NAS1802-3D4	Bolt	8
6	35BD219DUM	Speed Reducer Bearing	1

Items 4, 5, & 6 can be ordered from the ACC Customer Service Department at no charge.

Recommended Time of Compliance

Modification Requirement	
Item No	Hours Following Receipt of Bulletin
4	25
5	25
6	300

JUL 07 2004

Ans'd.....

VII. Modification Requirement – Bell Models 412 & 412SP Which Have Not Been Upgraded With The Stainless Steel Idler Pulley

To be removed:

Item	Part Number	Description	Qty.
1	412AC-3504-20	Retainer Ring	2
2	412AC-3500-21	Bolts	8
3	412AC-3016-3	Speed Reducer Pulley/Bearing (Al)	1

To be installed:

Item	Part Number	Description	Qty.
4	412AC-3504-21	Belt Guard Assy	1
5	NAS1802-3D4	Bolt	8
6	412AC-3016-5	Speed Reducer Pulley/Bearing (SS)	1

Items 4, and 5, can be ordered from the ACC Customer Service Department at no charge. Item 6 can be ordered at a cost of 794.55 USD.

Recommended Time of Compliance

Modification Requirement	
Item No	Hours Following Receipt of Bulletin
4	25
5	25
6	300

VIII Modification Requirement – Bell Models 412EP & 412HP Which Are Not Equipped with The Speed Reducer Compressor Mount.

To be removed:

Item	Part Number	Description	Qty.
1	412AC-3500-20	Retainer Ring	2
2	412AC-3500-21	Bolt	8

To be installed:

Item	Part Number	Description	Qty.
3	412AC-3500-22	Belt Guard Assy	1
4	NAS1802-3D4	Bolt	8

Items 3 and 4 can be ordered from the ACC Customer Service Department at no charge.

Recommended Time of Compliance

Modification Requirement	
Item No	Hours Following Receipt of Bulletin
3	25
4	25

JUL 07 2004

Ans'd.....

IX Modification Requirement – Bell Models 412 & 412SP Which Are Not Equipped with The Speed Reducer Compressor Mount.

To be removed:

Item	Part Number	Description	Qty.
1	412AC-3504-20	Retainer Ring	2
2	412AC-3500-21	Bolts	8

To be installed:

Item	Part Number	Description	Qty.
3	412AC-3504-21	Belt Guard Assy	1
4	NAS1802-3D4	Bolt	8

Items 3, and 4, can be ordered from the ACC Customer Service Department at no charge.

Recommended Time of Compliance

Modification Requirement	
Item No	Hours Following Receipt of Bulletin
3	25
4	25

JUL 07 2004

Ans'd.....

X Removal of Speed Reducer Assembly (see figure 4).

1. Remove upper transmission cowling to gain access to the air conditioner Compressor, Mount and Speed Reducer Assembly
2. Remove the top Compressor Drive Belts by loosening the Compressor Belt Tensioning link located on the top of the Compressor Mount Assy.

NOTE

It will be necessary to loosen the Compressor Mounting bolts to allow the compressor to pivot during this process.

3. Remove the bottom Compressor Drive Belt by loosening the four AN6C-10A speed reducer clamping bolts, and the Speed Reducer Belt Tensioning bolt 412AC-3016-16 on the top of the Compressor Mount Assy (see figure 4).

NOTE

It is not necessary to disconnect the Driveshaft, or remove the lower belt from the aircraft.

4. Remove the cotter pin and the AN320-6 Nut at the bottom of the 412AC-3016-16 Bolt. Remove the AN960-616 Washers located between the Speed Reducer Assy and the bottom of the Compressor Mount (see figure 1 or 2).

CAUTION

Support the Speed Reducer Pulley / Shaft Assembly prior to removal of attaching hardware, as this part is heavy and may cause damage to the aircraft, or driveshaft if dropped.

5. Remove the four AN6C-10 Bolts from the face of the Speed Reducer Pulley / Shaft Assembly, and remove the assembly from the aircraft (figure 4).
6. Remove MS21043-6 Nut from AN6C-10A Bolt in center of the Speed Reducer assembly (figure 5).
7. Remove AN6C-10A, 412AC-3036-13 Bevel Washer, 412AC-3036-14 Retainer Plate (figure 5).
8. Remove N5000-218PP Snap Ring from Speed Reducer Shaft.
9. Remove 412AC-3016-4 Pulley Assembly from the Speed Reducer Shaft.

NOTE

A pulley removal tool will be required to remove the pulley from the shaft.

10. Remove 35BD219VV Bearing, by pressing the bearing from the opposite side of the pulley from which the N5000-218PP Snap Ring was removed.

JUL 07 2004

Ans'd.....

XI Replacement Of The Speed Reducer Pulley/Bearing Assy (New SS Pulley & New Bearing; Part Number 412AC-3016-5).

1. Accomplish the requirement of Section X.
2. Visually inspect the bearing surface of the Speed Reducer Shaft , and the interior portion of the pulley and bearing mating surfaces for signs of corrosion, galling, pitting, or evidence that the bearing has spun on the Shaft portion of this assembly.

NOTE

Minor corrosion can be removed with the use of fine steel wool, crocus cloth, or equivalent. Evidence of galling, pitting, or the bearing having spun on the shaft may require the replacement of this part.

3. Install new 412AC-3016-5 Pulley / Bearing on to the Speed Reducer Shaft (see figure 6).

NOTE

To aid in the installation of the Speed Reducer Pulley to the Speed Reducer Shaft, It is recommended that you place the Speed Reducer Shaft in dry ice for approximately 20 minutes, while warming the Speed Reducer Pulley to no more than 120° F. This should allow the new pulley to be installed with the least amount of effort.

Re-install the N5000-218PP Snap Ring on the Speed Reducer Shaft.

4. Reinstall the AN6C-10A Bolt, 412AC-3036-14 Retainer Plate, 412AC-3036-13 Bevel Washer, and MS21043-6 Nut on the Speed Reducer Shaft, and torque the MS21043-6 Nut to 95 – 110 In-lbs (see figure 5).
5. Rotate Pulley to check for smooth and noise-free operation.

XII Replacement Of Existing Bearing By New Bearing (Applicable only if stainless steel pulley has been previously installed).

1. Accomplish the requirements of Section X.
2. Remove and discard previously installed Bearing (see Items X-10 and X-11).
3. Install new Bearing on to the Pulley (see figure 6), and re-install Snap Rings.
4. Install Pulley Bearing Assembly on to the Speed Reducer Shaft (figure 6).

NOTE

To aid in the installation of the Speed Reducer Pulley to the Speed Reducer Shaft, It is recommended that you place the Speed Reducer Shaft in dry ice for approximately 20 minutes, while warming the Speed Reducer Pulley to no more than 120° F. This should allow the new pulley to be installed with the least amount of effort.

Re-install the N5000-218PP Snap Ring on the Speed Reducer Shaft.

Rotate pulley to check for smooth and noise-free operation

5. Reinstall the AN6C-10A Bolt, 412AC-3036-14 Retainer Plate, 412AC-3036-13 Bevel Washer, and MS21043-6 Nut on the Speed Reducer Shaft, and torque the MS21043-6 Nut to 95 – 110 In-lbs (figure 5).

XIII Installation Of Belt Guard Ring (Figures 1 & 2)

1. Removal of the existing Ring Segments from the Compressor Pulley.
 - A. Cut the safety wire and remove the eight (8) Bolts from the forward surface of the Compressor Drive Pulley, and remove Ring Segments.
2. Installation of the new Belt Guard Ring.
 - A. Install the new Belt Guard Ring, using eight (8) NAS1802-3D4 (provided) Bolts to the forward surface of the Compressor Drive Pulley. Tighten the bolts and safety with .032 Safety Wire.

JUL 07 2004

Ans'd.....

XIV Installation Of Speed Reducer Assembly And Adjustment Of Belt Tension

1. Reinstall the four AN6C-10A Bolts through the slots in the Speed Reducer Shaft assembly, into the Nutplates located in the Compressor Mount (figure 4).

NOTE

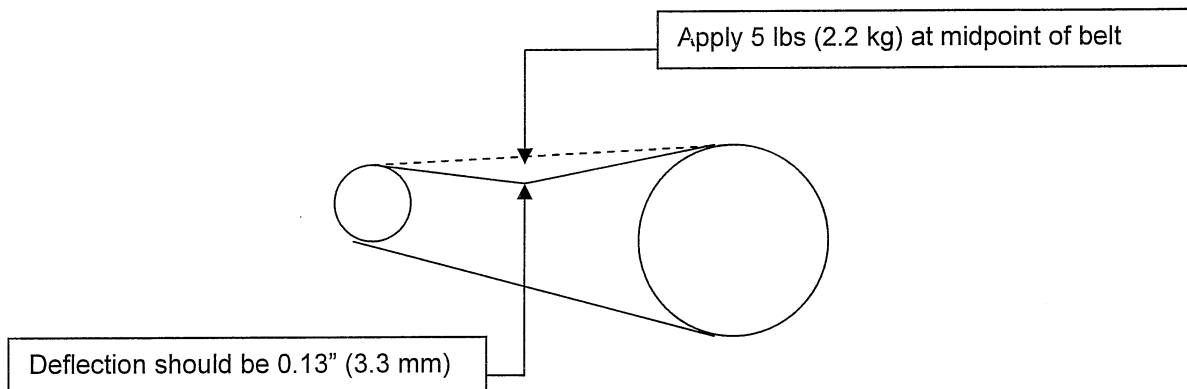
Tighten these four bolts only finger tight at this point of the installation, as this will allow for movement of the Speed Reducer Assembly during the belt tensioning process.

2. Reinstall the two AN960-616 Washers between the top of the Speed Reducer Assy. and the bottom of the Compressor Mount, reinstall the AN320-6 Nut, and AN380-3-3 Cotter Pin in the bottom of the 412AC-3016-16 Bolt (figure 2).
3. Reinstall the lower drive belt on the Drive Pulley and to the inner race of the Speed Reducer Pulley.

Using the 412AC-3016-16 Bolt tension lower drive belt to 61 lbs. by turning the Belt Tensioning Bolt Counter-clockwise.

NOTE

This same tensioning procedure as shown below applies for both the upper and lower drive belts.



4. Torque the four AN6C-10A Bolts in the face of the Speed Reducer Assy. to 95 – 110 in-lbs.
5. Tighten the MS509-8 Jam Nut on the 412AC-3016-16 bolt, and safety using .032 safety wire (figure 4).
6. Reinstall the upper drive belt on the outer race of the Speed Reducer pulley, and the outer race of the Compressor Pulley. Using the Belt Tension Link located on the top of the compressor, tension the belt to 61 lbs. of tension. Safety the Belt Tension Link using .032 safety wire.

The belt tensioning procedures presented by step 3 (above) is applicable to the upper belt.

7. Re-torque the nuts (2 Pls) on the Compressor & Compressor Mounting attachment hardware to 95 – 110 inch lbs.
8. Perform a maintenance operational check (MOC) of the system, and re-install the upper transmission cowlings.

JUL 07 2004

Ans'd.....

XIV Speed Reducer Inspection And Replacement Cycle

Effective on receipt of this document the speed reducer pulley/bearing assembly should be inspected every 25 flight hours to confirm bearing integrity.

Inspection is to be accomplished by application of a 2 to 3 lb. (.9 to 1.4 Kg) force to the edge of the pulley as shown by figure 1. Any free-play of the pulley/bearing assembly in the direction X-X is cause for immediate replacement of the bearing.

The replacement bearing part number is 35BD219DUM.

It is recommended that the bearing be replaced after 900 hours of service.

These instructions have been incorporated into ACC document 412AC-208M, revision 5; Instructions For Continued Airworthiness.

JUL 07 2004

Ans'd.....

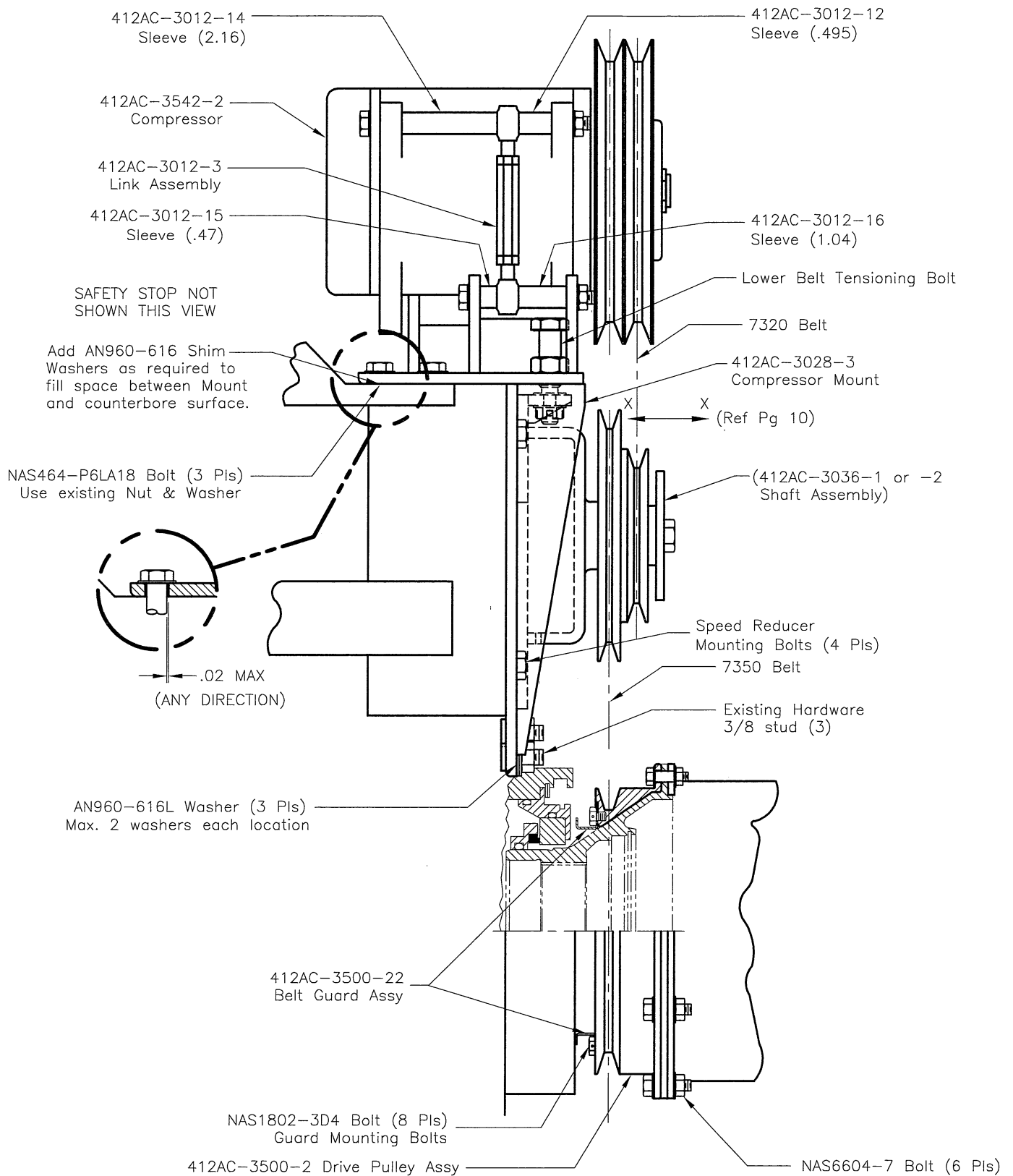


Figure 1, 412EP & 412HP Compressor Installations

JUL 07 2004

Ans'd.....

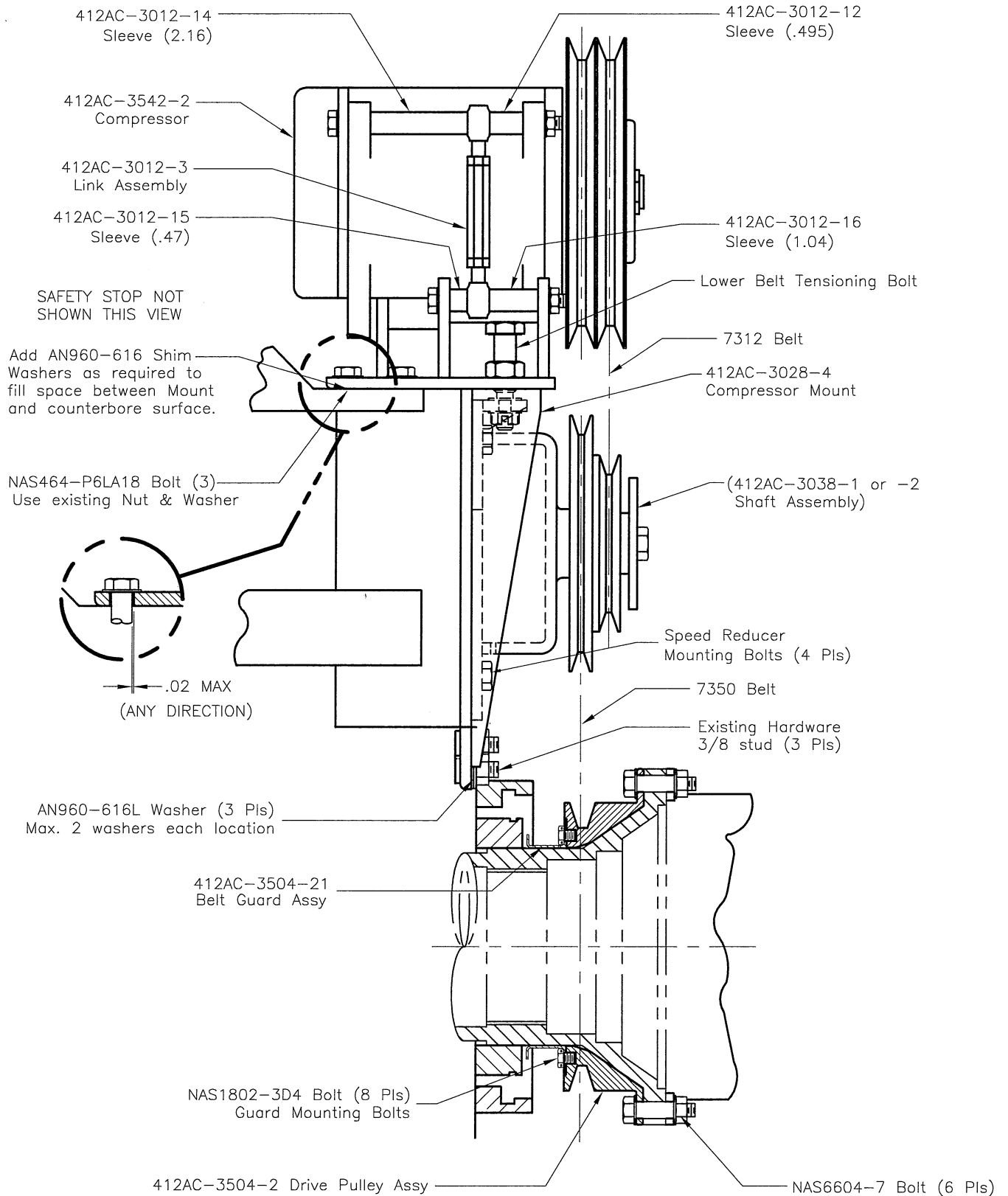
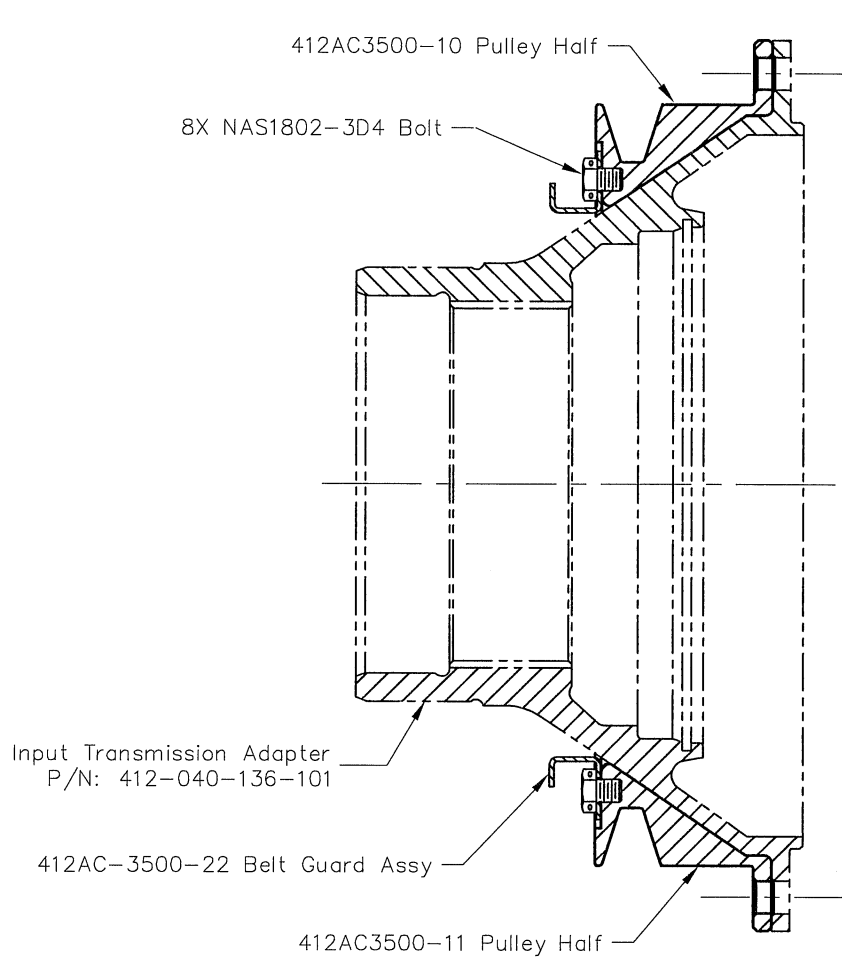
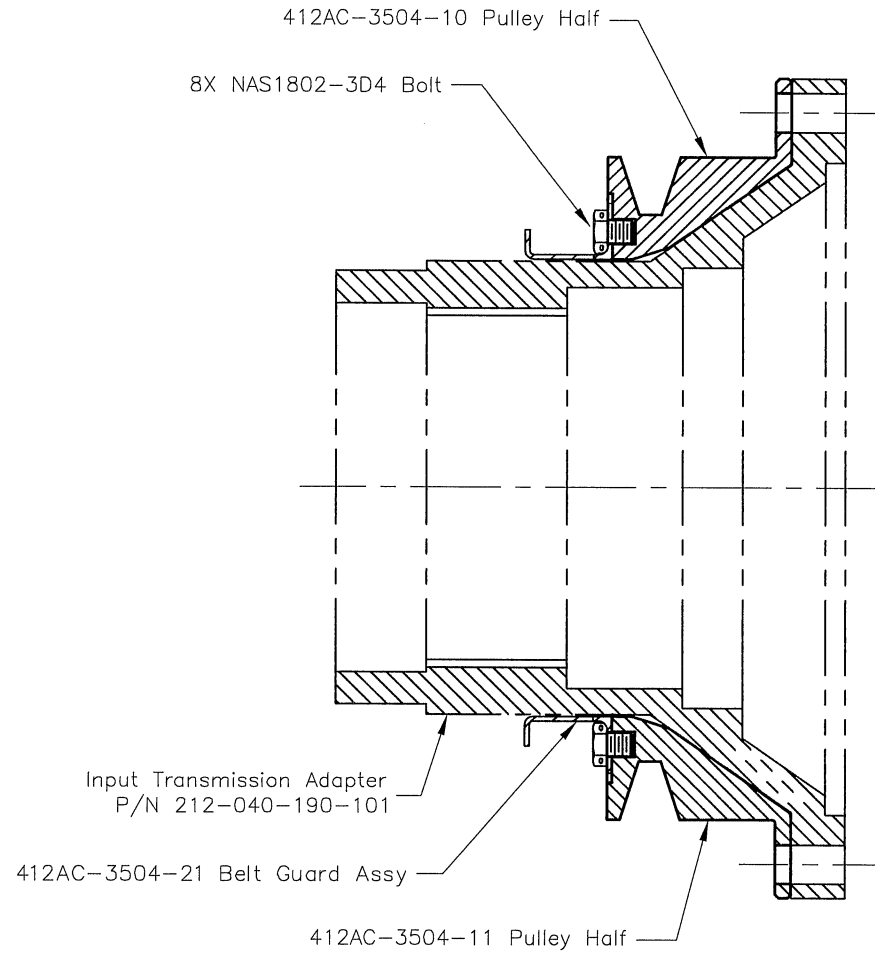


Figure 2, 412 & 412SP Compressor Installations



412EP & 412HP Drive Pulley



412 & 412SP Drive Pulley

Figure 3, 412AC-3500 & 412AC-3504 Drive Pulley Belt Guard Installation

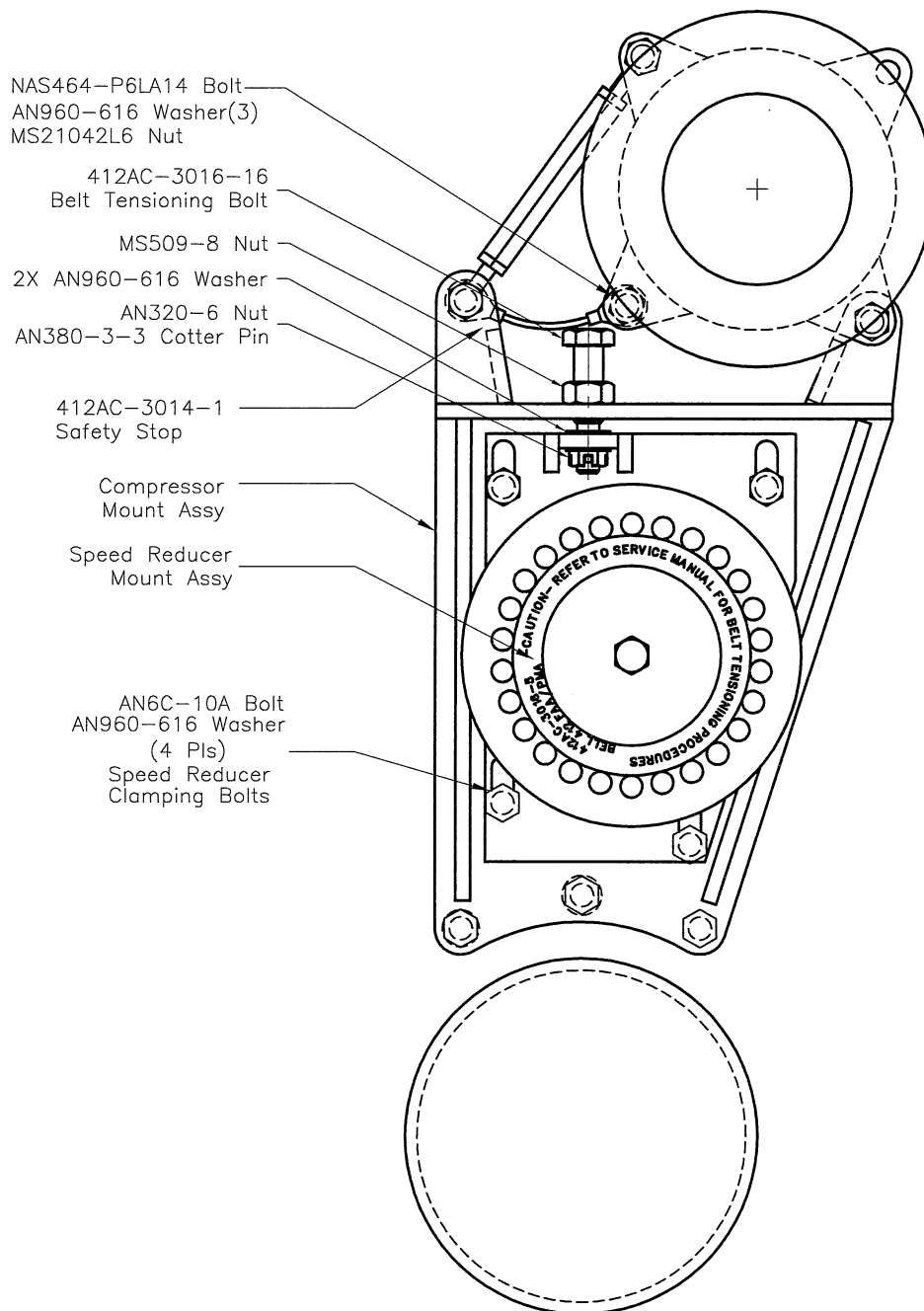


Figure 4, 412 Air Conditioner Compressor Mount and Speed Reducer Assembly

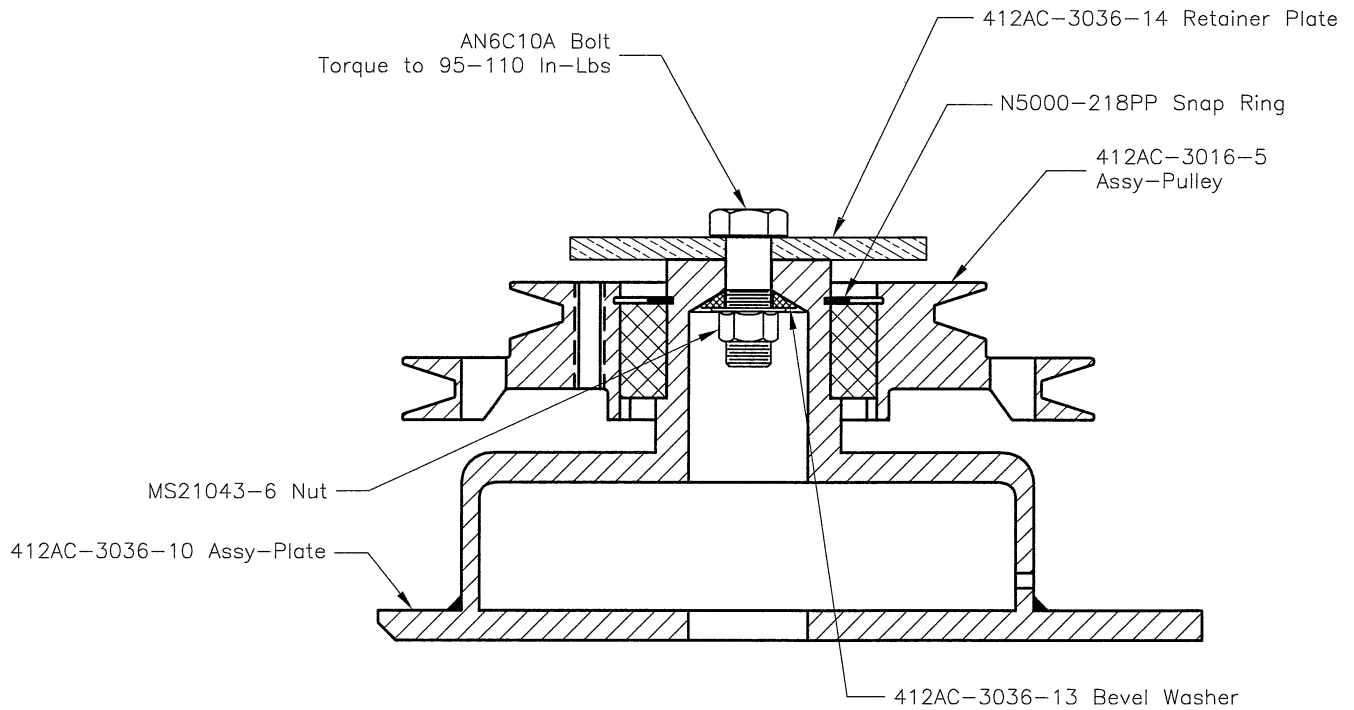


Figure 5, 412 Air Conditioner Speed Reducer Assembly

JUL 07 2004

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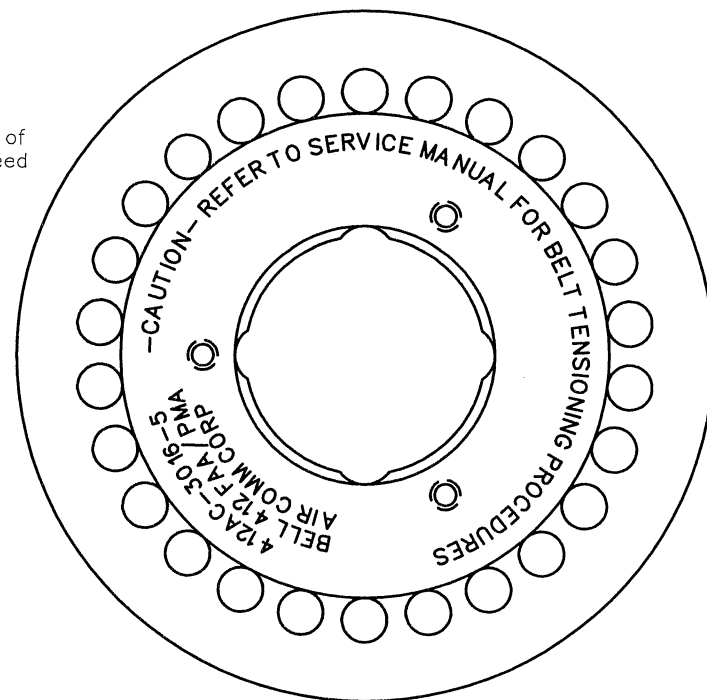
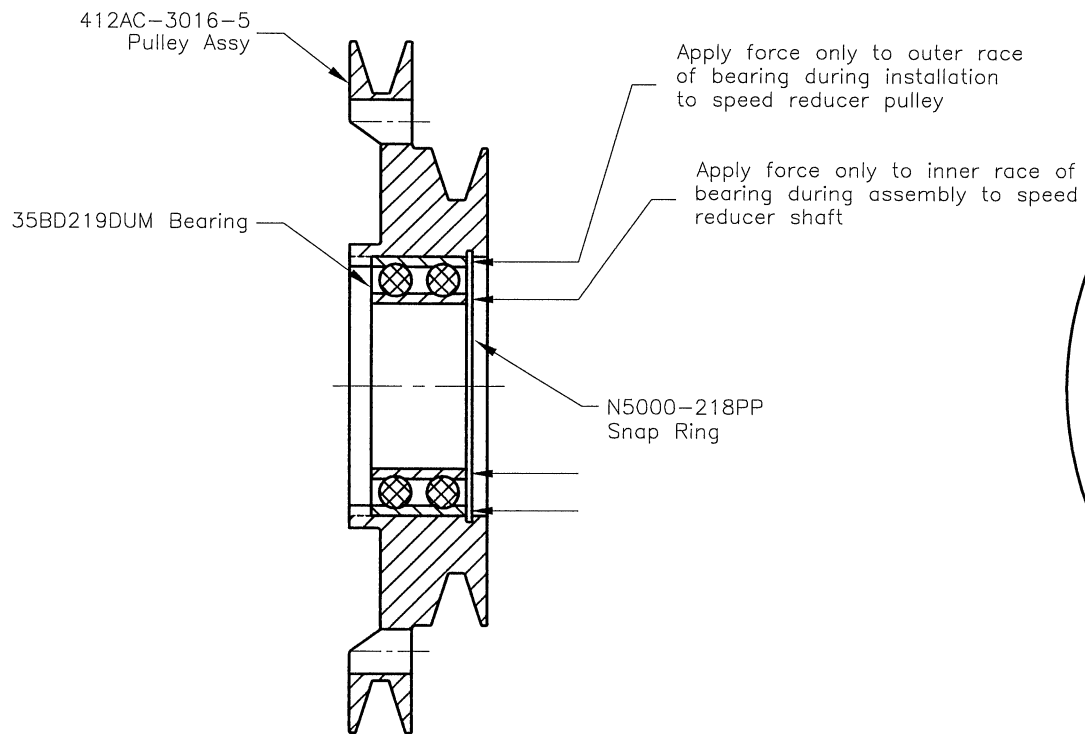


Figure 6, Speed Reducer Pulley and Bearing Assembly