International Aero Engines

SERVICE BULLETIN

STARTING - PNEUMATIC STARTER - INTRODUCTION OF A SYNCHRONOUS ENGAGEMENT CLUTCH - CATEGORY CODE 7 - MOD.ENG-80-0008

1. Planning Information

A. Effectivity

(1) Aircraft: (a) Airbus A320
(b) Airbus A321

(2) Engine: (a) V2500-A1 Engines prior to V0362
(b) V2500-A5 Engines prior to V10127

(3) Starters : All 790425-2 units

B. Concurrent Requirements

None

C. Reason

(1) Condition

Several incidents have occurred where starter output drive shafts have sheared in service due to the excessive torque produced when starter re-engagement is performed at high subidle speeds.

(2) Background

The existing pawl and ratchet type clutch is susceptible to damage when the starter is re-engaged outside of its operating limitations. Re-engagement at high speeds results in damage to the starter clutch mechanism and shearing of the output shaft.

(3) Objective

Incorporation of the changes introduced by this Service Bulletin is designed to allow the starter to withstand running engagement at all speeds up to ground idle.

(4) Substantiation

An extensive programme of testing has been satisfactorily carried out on synchronous engagement clutch starter motors. This testing successfully demonstrated the function, performance and reliability of the new clutch design on engine and aircraft.

(5) Effects of Bulletin on Workshop Procedures:

Removal/Installation	Not Affected
Disassembly/Assembly	Not Affected
Cleaning	Not Affected
Inspection/Check	Not Affected
Repair	Not Affected
Testing	Not Affected

(6) Supplemental Information

None

D. Description

(1) This Service Bulletin covers the installation of a pneumatic starter motor with the introduction of a synchronous engagement clutch. A jaw-faced clutch transmits full starter torque when the starter and output shaft (engine) are at a synchronised speed.

(2) This Service Bulletin introduces a change to the configuration of the starter assembly part number, divorcing the adaptor and quick detach clamp in order to improve the unit maintainability.

(3) Units incorporating this Service Bulletin will be identified by the type number 790425A4.

E. Approval

The part number changes shown in Section 3 of this Service Bulletin have been sanctioned under a product development/control system that has been approved by the D.G.A.C. (Direction Generale de L/Aviation Civile - France).

F. Compliance

Category Code 7

Accomplish when supply of superseded parts have been depleted.

G. Manpower

Estimated manhours to incorporate the full intent of this Bulletin:

Venue	Estimated Manhours
(1) In Service	Not applicable
(2) At Overhaul	Refer to Sumitomo Service Bulletin 80-2509

H. Material - Price and Availability

(1) Modification kit not required.

(2) See 'Material Information' section for prices and availability of future spares.

I. Tooling - Price and Availability

Special tools are not required.

J. Weight and Balance

(1)	Weight change	None
(2)	Moment arm	No effect
(3)	Datum	Engine front mount centerline (Power Plant Station (PPS) 100)

K. Electrical Load Data

This Service Bulletin has no effect on the aircraft electrical load.

L. References

(1) Internal Reference No.

EC93VR070

(2) Other References

Airbus A320 A320 Aircraft Maintenance Manual

Airbus A321 Aircraft Maintenance Manual

Airbus Aircraft Modification 24747

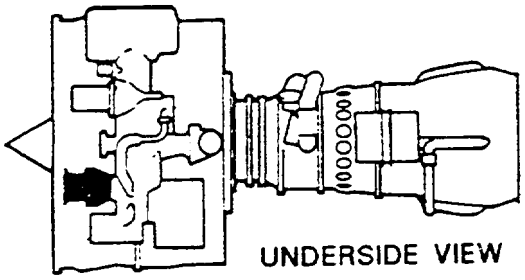
M. Other Publications Affected

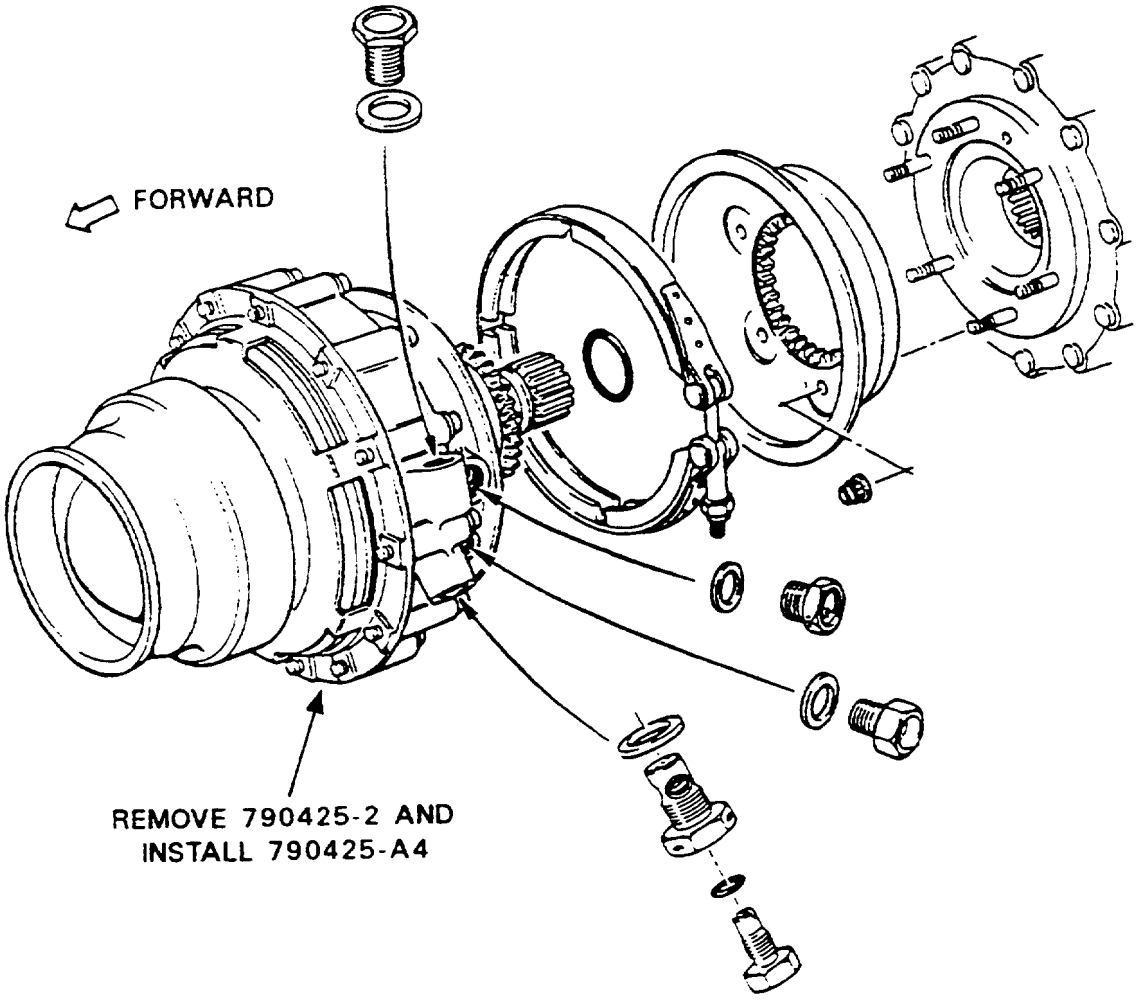
(1) V2500 Illustrated Parts Catalog (S-V2500-1IA), Chapter/Section 80-13-41.

(2) V2500 Illustrated Parts Catalog (S-V2500-2IA), Chapter/Section 80-13-41.

(3) V2500 Engine Manual (E-V2500-1IA), 72-00-60, Removal-13 and Installation-13.

(4) Sumitomo Component Maintenance Manual, Chapter/Section 80-13-41.





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Location of pneumatic starter
Fig.1

2. Accomplishment Instructions

A. Rework Instructions

(1) Incorporate the intent of Sumitomo Service Bulletin 80-2509.

B. Recording Instructions

(1) A record of accomplishment is necessary.

3. Material Information

Applicability: For each V2500 Engine to incorporate this Bulletin.

A. Kits associated with this Bulletin:

None

B. Parts affected by this Bulletin:

New Part No. (ATA No.)	Qty	Est'd Unit Price ($)	Keyword	Old Part No. (IPC No.)	Instructions Disposition
728805-6 (80-13-41)	1	1889.00	Housing, Adaptor	- (01-102)	(A)
790425A4 (80-13-41)	1	33613.00	Starter	790425-2 (01-200)	(A)(B) (S1)
43176AC (80-13-41)	1	129.00	Clamp	- (01-210)	(A)
- (80-13-41)	1		Clamp	43176AC (01-250)	(C)
- (80-13-41)	1		Housing, Adaptor	728805-6 (01-260)	(C)

C. Instructions/Disposition Code Statements:

(A) New part is currently available
(B) Old part will be discontinued
(C) Old part will continue to be made available
(S1) Old and new parts coded (S1) are freely interchangeable, both physically and functionally.

NOTE: The estimated 1995 unit prices shown are provided for planning purposes only and do not constitute a firm quotation. Consult the IAE Price Catalog or contact IAE's Spare Parts Sales Department for information concerning firm prices.

SUMITOMO PRECISION
PRODUCTS CO., LTD.

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STARTING – PNEUMATIC STARTER – INSTALLATION OF THE SYNCHRONOUS ENGAGEMENT CLUTCH

1. Planning Information

A. Effectivity

Pneumatic Starter part number 790425–2.

Pneumatic Starters Not Incorporating Modification Number	Serial Number of First Production Incorporation
790425A4 L11	A10001

NOTE: The Pneumatic Starters are installed in Airbus A320 and A321 aircraft that use IAE/V2500 engines.

B. Reason

There have been removals of the PS400–1 Pneumatic Starter because of crash re–engagements. The new synchronous engagement clutch will prevent crash re–engagement.

C. Description

To change from 790425–2 to 790425A4, the Pneumatic Starter is disassembled. The gear cage and bearing sleeve are changed. The clutch assembly and ring gear carrier are replaced with the synchronous engagement clutch.

D. Compliance

Do when parts can next be accessed because of other maintenance.

E. Approval

This Service Bulletin 80–2509 (IAE SB V2500–ENG–80–008) has been technically approved by IAE. The part number changes shown in paragraph 3 of this Service Bulletin have been sanctioned under a product development/control system that has been approved by the D.G.A.C (Direction Generale de L'Aviation Civile) – Paris.

F. Manpower

Approximately 9.7 man–hours are necessary to do these Service Bulletin procedures when you do component maintenance (or overhaul). The estimate does not include any time for a test. This time is divided as shown here:

(1) Approximately 7.5 man–hours are necessary to change the gear cage and inserts, part number 738138–102 to part number 738138–104.

(2) Approximately 0.9 man–hours are necessary to change the bearing sleeve, part number 797649–1 to part number 797649–2.

(3) Approximately 1.3 man–hours are necessary to assemble the synchronous engagement clutch, part number 803188–1 and install it in the Pneumatic Starter.

G. Material – Cost and Availability

The parts that are necessary to do these Service Bulletin procedures are in Section 3, Material Information. Section 3 tells you all you must know to buy these parts. Send orders for new or spare parts to

Hamilton Standard Product Services, Incorporated
United Technologies Corporation
Attention: Sales Order Administration
PO Box 11804
Rock Hill, SC 29731

H. Tooling

Shimming Ring – 63001001–3
Shimming Fixture – 63001009–1
Locknut Torque Tool – 63001002–3
Shimming Dummy Washer – 63001006–3
Shimming Spacer – 63001007–3
Shimming Dummy Washer – 63001003–3
Shimming Spacer – 63001004–3
Shimming Spacer – 63001005–3

I. Weight and Balance

None

J. Electrical Load Data

Not Affected

K. References

Component Maintenance Manual (CMM) 80–13–41

L. Other Publications Affected

CMM 80–13–41

2. Accomplishment Instructions

A. To change Pneumatic Starter PN 790425–2 to PN 790425A4, use this procedure to replace the pawl and ratchet clutch with the synchronous engagement clutch:

(1) Disassemble the Pneumatic Starter. Use the procedures in DISASSEMBLY of the CMM to do this.

(2) Remove and discard these parts:

- Clutch shaft and spring, part number 753365–21
- Ring gear carrier, part number 797653–1
- Identification plate, part number 797671–2
- External retaining ring, part number 69984–118
- Lock ring, part number 728888–1
- Internal retaining ring, part number 69983–185
- Lock ring, part number 728889–1
- Annular ball bearing, part number 797717–1

(3) Remove these parts and keep them. You will change them and use them to rebuild the Pneumatic Starter:

(a) Gear cage and inserts, part number 738138–102. Check the inner diameter of the gear cage tail shaft for the number of holes. If there are 6 holes, the gear cage can not be changed. You must get a new gear cage.

(b) Bearing sleeve, part number 797649–1.

(4) To change the gear cage and inserts from part number 738138–102 to part number 738138–104, do these steps:

NOTE: The rework of the gear cage can make the wall thinner than 0.200 inch (5.08 mm). (Refer to Figure 1, Note 2.) If so, buy a new gear cage, part number 738138–104, to do this service bulletin.

(a) Remove the cage liner and pins. Refer to Figure 1. You can EDM or machine the pins out of the gear cage.

(b) Machine the cage to the dimensions shown in Figure 1.

(c) Apply protective coating MIL–L–3171 Type VI (chromic acid brush–on treatment) on the surfaces you worked (refer to Figure 1).

(d) Machine the inside diameter of the cage liner, part number S738138–22, for a 0.001 to 0.002 inch (0.0254 to 0.0508 mm) diametral interference fit on the cage liner.

(e) Increase the temperature of the cage liner to 240 °F to 260 °F (115.6 °C to 126.7 °C) for 1 to 2 hours.

(f) Decrease the temperature of the cage to –65 °F (–53.8 °C) maximum.

(g) Apply strontium chromate primer to the tail shaft of the gear cage. Refer to Figure 1.

(h) While the strontium chromate primer is wet, install the cage liner. Remove all unwanted strontium chromate primer.

(i) Let the temperature of the cage and the cage liner go to room temperature.

(j) Drill two holes into the cage and the cage liner. Refer to Figure 1.

(k) Apply strontium chromate primer to two pins, part number 69474A2–5.

(l) While the primer is wet, install the pins in the cage liner and the cage. Refer to Figure 1. Remove all unwanted primer.

(m) Machine the cage liner as shown in Figure 1.

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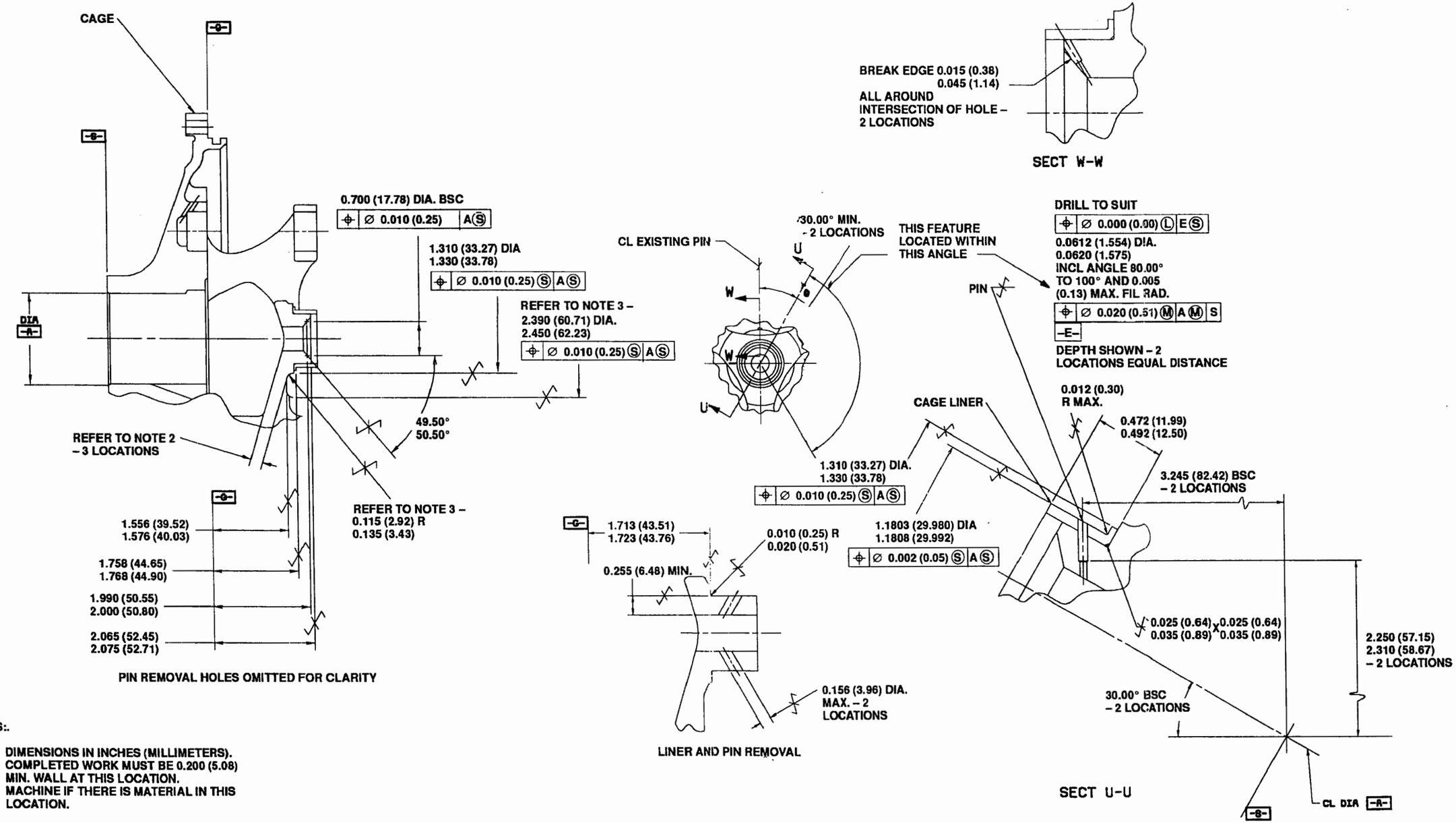

LINER AND PIN REMOVAL

NOTES:.

1. DIMENSIONS IN INCHES (MILLIMETERS).
2. COMPLETED WORK MUST BE 0.200 (5.08) MIN. WALL AT THIS LOCATION.
3. MACHINE IF THERE IS MATERIAL IN THIS LOCATION.

Figure 1. Gear Cage and Inserts

(n) Use the vibration peen method to identify the changed gear cage and inserts. The depth of the characters must be less than 0.003 inch (0.08 mm). Do these steps:

1 Add an "X" over "102".

2 Add "–104" adjacent to the part number.

3 Add "(SK118047)" below the part number.

(5) To change the bearing sleeve from part number 797649–1 to part number 797649–2:

(a) Machine the bearing sleeve to the dimensions shown in Figure 2.

(b) Use the vibration peen method to identify the changed bearing sleeve. The depth of the characters must be less than 0.003 inch (0.08 mm). Do these steps:

1 Add an "X" over "–1".

2 Add "–2" adjacent to the part number.

(6) Install the turbine balance assembly and the cluster gears into the gear cage changed in step (4). Use the procedures in ASSEMBLY of the CMM to do this.

(7) Install the bearing sleeve into the transmission housing, part number 738274–102. Use the procedures in ASSEMBLY of the CMM to do this.

(8) The synchronous engagement clutch, part number 803188–1, can be assembled from spare parts or can be bought as a complete assembly. If spare parts are used, go to step (8)(a). If the clutch is assembled, go to step (8)(b).

(a) To assemble the synchronous engagement clutch, part number 803188–1, do these steps (refer to Figure 3 and Figure 4):

1 Install 3 clutch balls, part number 813425–1, into the pockets in the output shaft, part number 813398–1.

2 Use the shimming ring, part number 63001001–3, to hold the balls in the disengaged position.

3 Install the annular ball bearing, part number 813368–1, into the starter ball guide, part number 813396–1.

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4 Install the tab washer, part number 738612–8, and the retaining ring, part number 69983–112.

CAUTION: DO NOT BEND THE BODY OF THE LOCKING RING WHEN YOU BEND THE TABS. IF THE BODY OF THE RING IS BENT THE LOCKING RING MUST BE REPLACED.

5 Bend the locking tabs of the tab washer. Be careful not to bend the body of the tab washer when you bend the tabs.

6 Install the starter ball guide and the key washer, part number 704349–65, on the output ball guide, part number 813397–1.

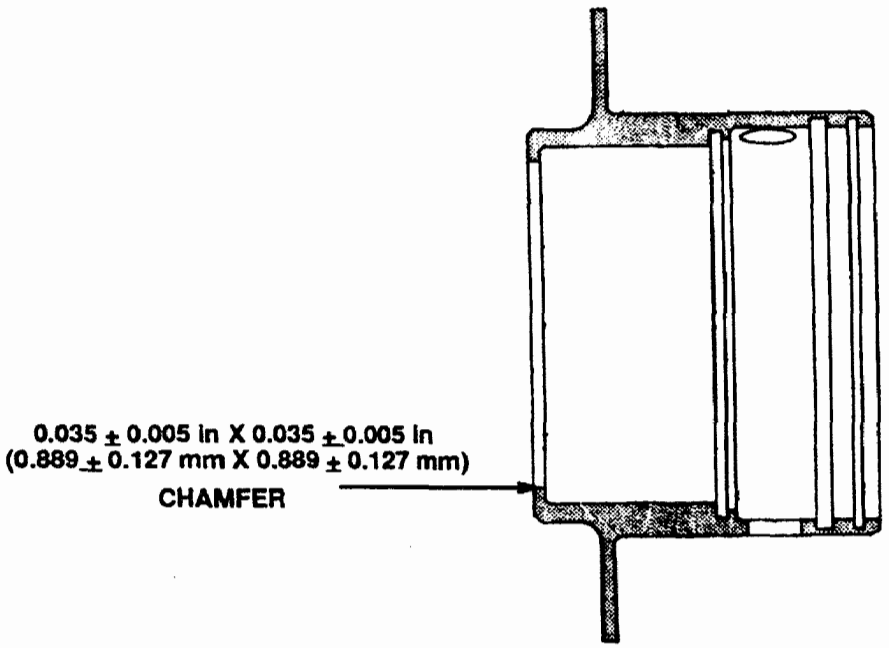

Figure 2. Bearing Sleeve

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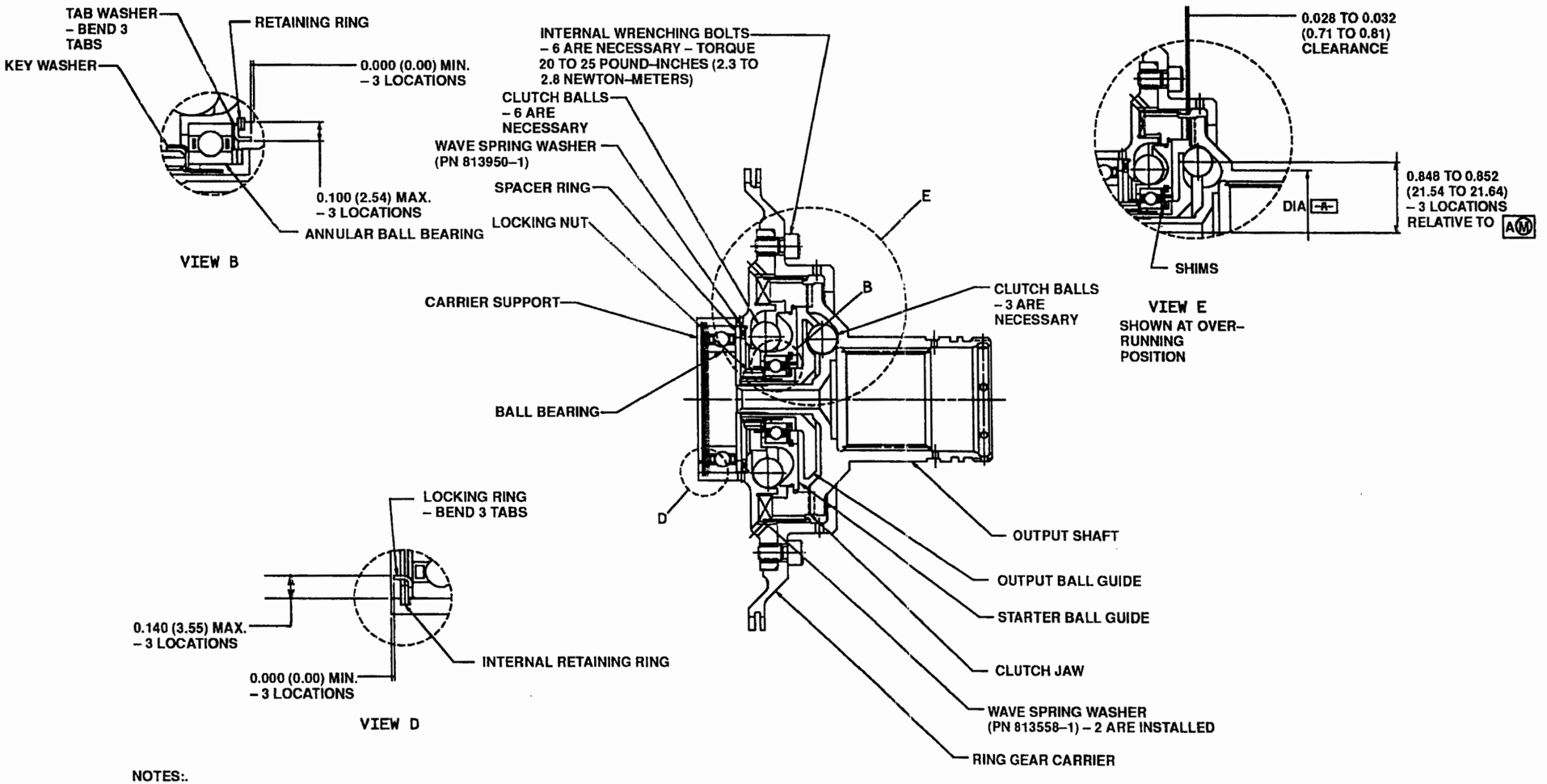

NOTES:.

1 DIMENSIONS IN INCHES (MILLIMETERS).

Figure 3. Synchronous Engagement Clutch

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WARNING: WEAR EYE AND SKIN PROTECTION WHEN YOU USE MIL–L–23699 AND MIL–L–7808 LUBRICATING OIL. MAKE SURE THERE IS GOOD VENTILATION. THE OIL CAN DAMAGE YOUR SKIN, EYES, AND RESPIRATORY TRACT.

7 Apply a thin layer of starter lubricant, MIL–L–23699 or MIL–L–7808, to the threads of the locking nut, part number 813427–1.

8 Install the locking nut on the threads of the output ball guide. Tighten the nut, but do not torque it.

9 Install the ball guides on the output shaft. Make sure that the pin in the output ball guide is aligned with the hole in the output shaft.

10 Install the clutch jaw, part number 813393–1.

11 Measure the clearance between the tops of the teeth of the output shaft jaw face and the tops of the teeth of the clutch jaw face.

12 Remove the clutch jaw and the ball guides.

13 Remove the locking nut and the key washer.

14 Remove the starter ball guide from the output ball guide.

15 Add shims, part numbers, 732243–1 thru 732243–7. Make sure the clearance between the tops of the teeth of the output shaft jaw face and the tops of the teeth of the clutch jaw face is 0.028 to 0.032 inch (0.71 to 0.81 mm). Hold the clutch jaw to make sure that no axial movement occurs when the clearance is measured. Refer to Figure 5.

CAUTION: WHEN THE OUTPUT BALL GUIDE IS HELD IN A CLAMP, MAKE SURE THE CLAMP HAS SOFT JAWS OR IS PADDED, SO THAT THE BALL GUIDE IS NOT DAMAGED.

MAKE SURE THAT THE TANGS ON THE SPECIAL SOCKET ARE IN THE SLOTS IN THE LOCKING NUT, NOT IN THE FLATS ON THE NUT. IF THE TANGS ARE IN THE FLATS, THE SPECIAL TOOL CAN BE DAMAGED.

16 Hold the output ball guide in a clamp.

17 Use the locknut torque tool, part number 63001002–3, to torque the locking nut to 50 to 55 pound–inches (5.65 to 6.22 Nm).

18 Loosen the locking nut and do step 17 again.

19 Bend the keywasher into the slots on the locking nut.

20 Remove the shimming ring, part number 63001001–3. Install the ball guides and clutch jaw on the output shaft.

21 Install six clutch balls in the pockets of the starter ball guide.

22 Install the shimming dummy washer, part number 63001006–3, into the carrier support, part number 813389–1. Refer to Figure 6.

NOTE: Use only this shimming dummy washer to shim the clutch.

23 Install the shimming spacer, part number 63001007–3, into the carrier support. Refer to Figure 6.

24 Attach the ring gear carrier, part number 813390–1, to the carrier support with the six internal wrenching bolts, part number 69274–253. Tighten, but do not torque the six bolts.

25 Make sure there is no clearance between the ring gear carrier and the output shaft. Refer to Figure 6.

26 Install these parts into the carrier support (refer to Figure 7):

- Shimming dummy washer, part number 63001003–3
- Shimming spacer, part number 63001004–3
- Spacer ring, part number 813428–1
- Ball bearing, part number 797717–1
- Shimming spacer, part number 63001005–3
- Internal retaining ring, part number 69983–185.

(b) To install an assembled clutch, part number 803188–1, do these steps (refer to Figures 3 and 4):

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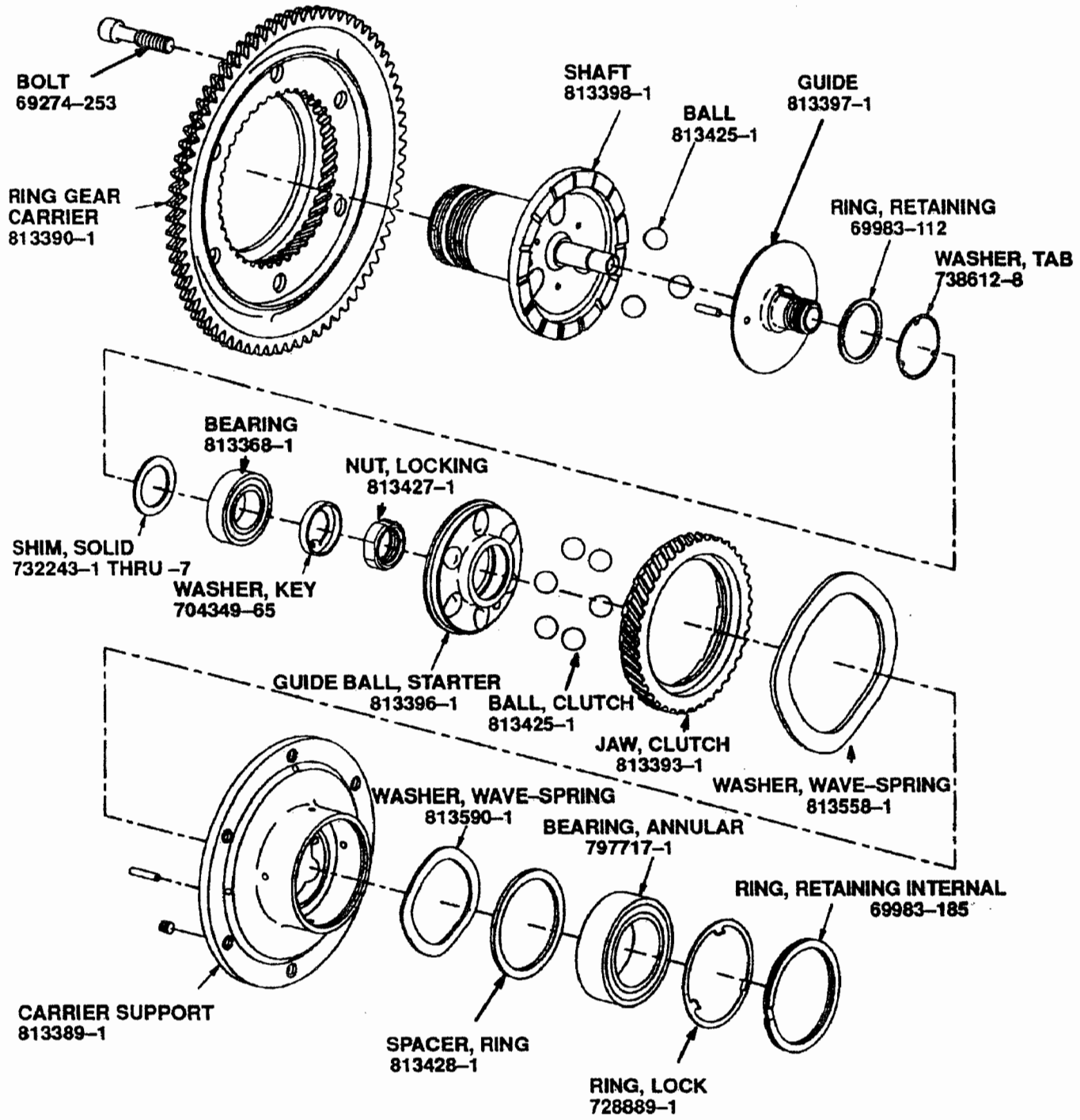

Figure 4. Synchronous Engagement Clutch

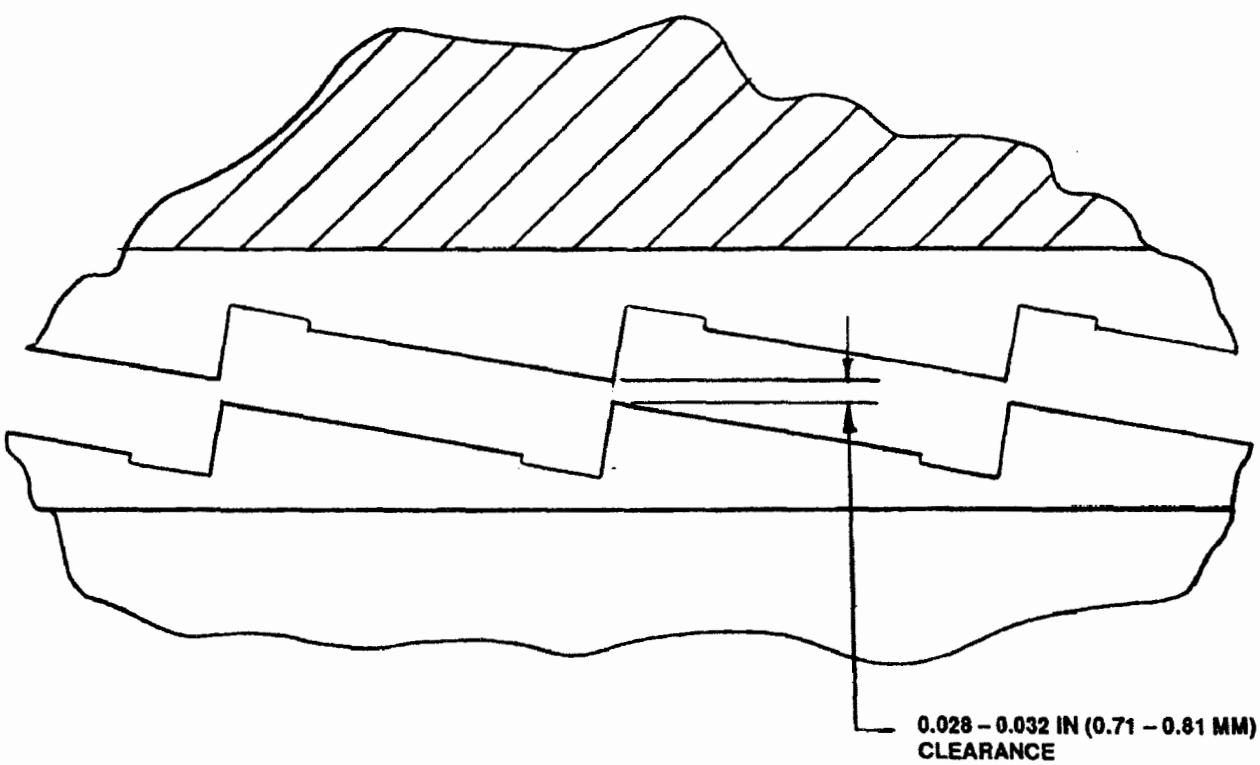

Figure 5. Output Shaft Jaw to Clutch Jaw Tooth Clearance

1 Remove the six internal wrenching bolts, part number 69274–523.

2 Put the synchronous clutch assembly, with the output shaft on the bottom, on a flat surface.

3 Lift the carrier support, part number 813569–1, off the synchronous clutch assembly.

4 Remove the wave spring washer, part number 813558–1.

5 Install a shimming dummy washer, part number 63001006–3, in the carrier support.

NOTE: Use only the test shimming dummy washer to shim the clutch.

6 Install the shimming spacer, part number 63001007–3, in the carrier support.

7 Use the six internal wrenching bolts to attach the ring gear carrier, part number 813390–1, to the carrier support. Tighten, but do not torque the bolts.

8 Make sure there is no clearance between the ring gear carrier and the output shaft. Refer to Figure 6.

9 Remove these parts from the carrier support (refer to Figure 3 and Figure 4):

- Internal retaining ring, part number 69983–185
- Locking ring, part number 728889–1
- Ball bearing, part number 797717–1
- Spacer ring, part number 813428–1
- Wave–spring washer, part number 813590–1.

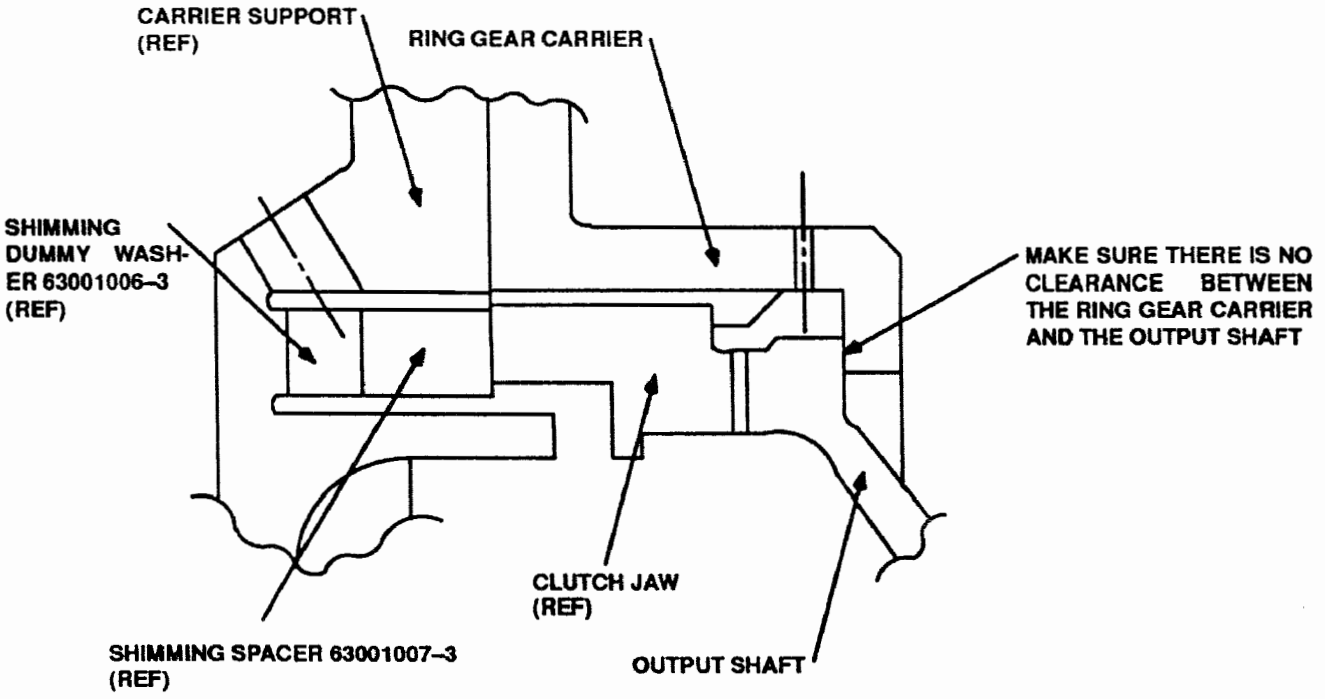

Figure 6. Clearance Between the Ring Gear Carrier and the Output Shaft

10 Install these parts into the carrier support (refer to Figure 7):

- Shimming dummy washer, part number 63001003–3
- Shimming spacer, part number 63001004–3
- Spacer ring, part number 813428–1
- Ball bearing, part number 797717–1
- Shimming spacer, part number 63001005–3
- Internal retaining ring, part number 69983–185

(9) To assemble the starter with the synchronous engagement clutch, part number 803188–1, do these steps (Refer to Figure 8):

(a) Put the synchronous engagement clutch and the ring gear, part number 750501–1, on a flat surface. The cutaway sections in the upper rows of each of the splines must be as shown in Figure 8.

(b) Install the retaining ring, part number 728890–1, between the double rows of splines on the ring gear carrier. The bent ends of the retaining ring must point down. The right end of the retaining ring must be adjacent to the first tooth to the right of the cutaway in the ring gear carrier splines. Refer to 8.

(c) Lift the left end of the retaining ring above the splines. Pull the left end of the retaining ring as far to the right as possible. This will push the retaining ring to the bottom of the groove between the rows of splines.

(d) Install the ring gear carrier. Align the centerline of the cutaway with the center in the cutaway section of the ring gear. Refer to Figure 8.

(e) Push the free end (the left end) of the retaining ring to the left to lock the ring gear and the ring gear carrier together.

(f) Use a screw driver or other equivalent tool to move the left end of the ring. Move the left end of the ring over the top of the spline teeth.

(g) Let the left end of the retaining ring move down between the spline teeth. There must be only two teeth between the ends of the retaining ring.

CAUTION: WHEN THE CLUTCH ASSEMBLY WITH THE RING GEAR IS PUT ONTO THE GEAR CAGE, THE BEARING SURFACE MUST TOUCH THE LINER FLANGE AROUND THE FULL CIRCUMFERENCE OF THE FLANGE. IF NOT, THE BEARING CAN BE DESTROYED WHEN THE STARTER OPERATES, OR THE SHIMMING CAN BE INCORRECT.

(h) Install the synchronous engagement clutch. The ring gear must be in position over the gear cage.

(i) Install the oil slinger, part number 813426–1, on the output shaft. Refer to Figure 9.

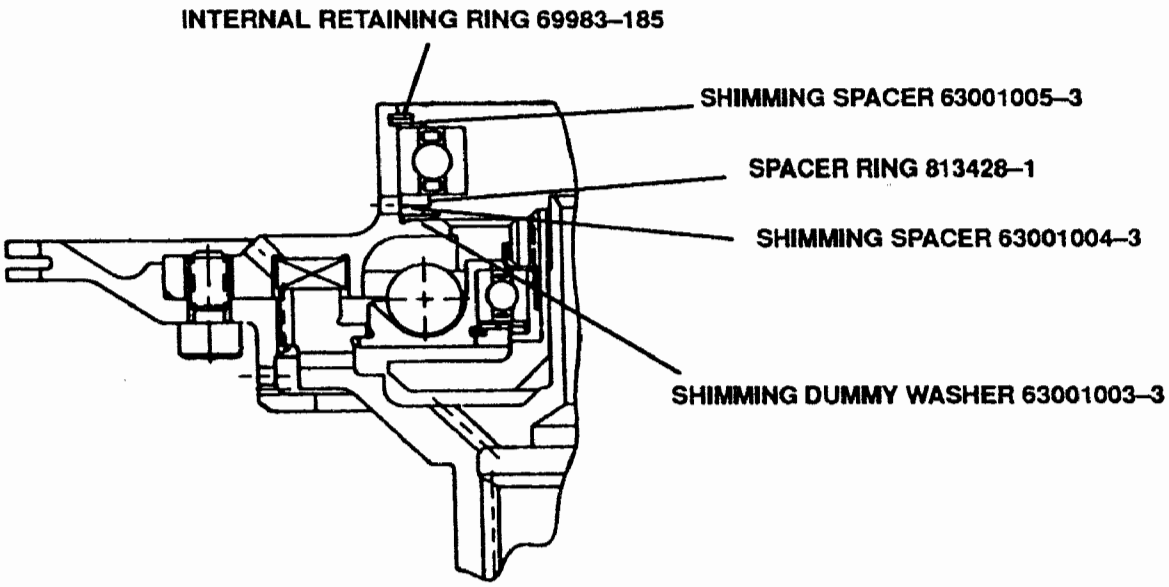

Figure 7. Carrier Support Shimming Tools

(j) Install the shimming fixture, part number 63001009–1, on the gear cage:

1 Align the arrow on the fixture with the flat boss on the gear cage. The bolt holes of the fixture must be in line with the bolt holes in the gear cage.

2 Bolt the shimming fixture to the Pneumatic Starter with the three bolts supplied with the shimming fixture. Make sure that the bolts are an equal distance apart. Refer to Figure 10.

(k) Hold the dial indicator in the dovetail clamp attached to the shimming fixture. The dial indicator stem must touch the oil slinger. Refer to Figure 10.

(l) Install the transmission housing, with the bearing sleeve and bearings, on top of the shimming fixture:

1 Make sure that the transmission housing touches all three spacers on the shimming fixture.

2 Make sure that the tube at the top of the fixture does not touch the bottom bearing in the bearing sleeve. If necessary, turn the top dial of the fixture clockwise to move the tube away from the bearing. Refer to Figure 10.

(m) Use the two bolt holes that are close together to align the transmission housing with the pneumatic starter.

(n) Bolt the transmission housing to the shimming fixture with the three bolts supplied with the fixture.

(o) Turn the top dial of the fixture to touch the bottom of the lower output shaft bearing. Lock the top dial in place with the locking screw.

(p) Turn the lower dial of the fixture to touch the oil slinger (the dial indicator needle moves).

(q) Write the indication shown by the fixture dials.

(r) Write the color of the number (red or green).

(s) Remove the transmission housing, the shimming fixture, the oil slinger, and the synchronous engagement clutch.

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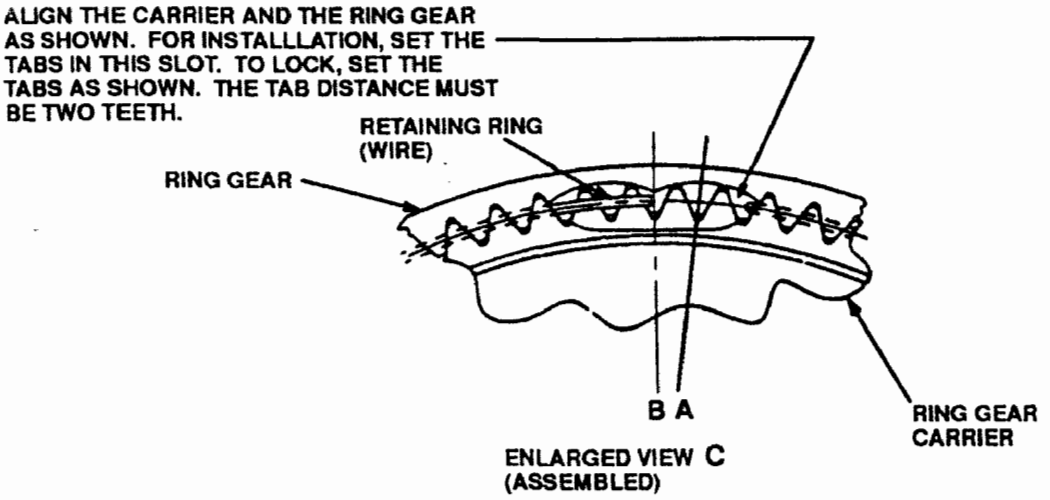

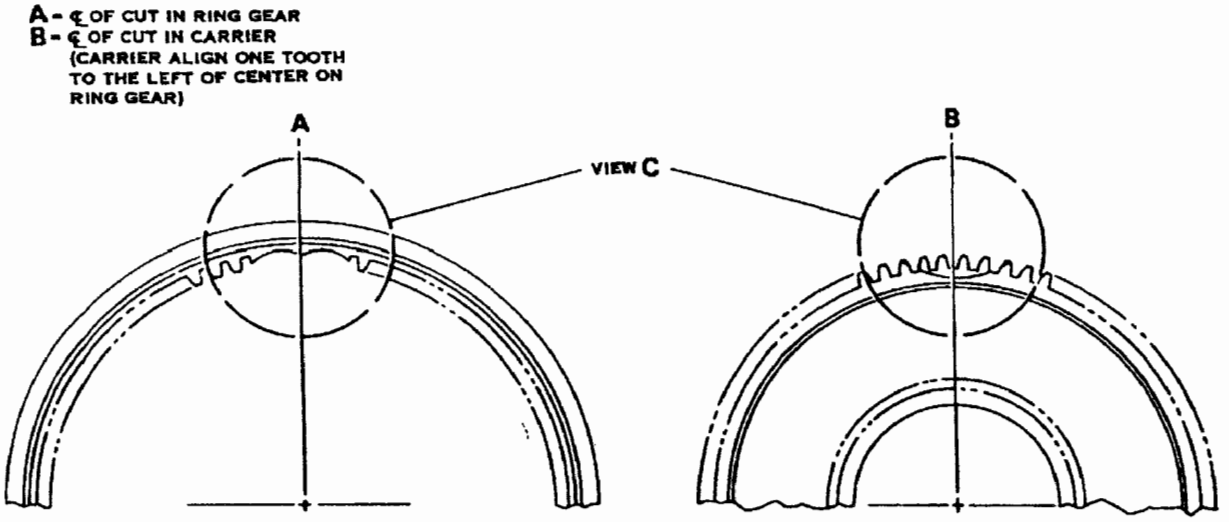

Figure 8. Assembly of the Ring Gear and the Carrier

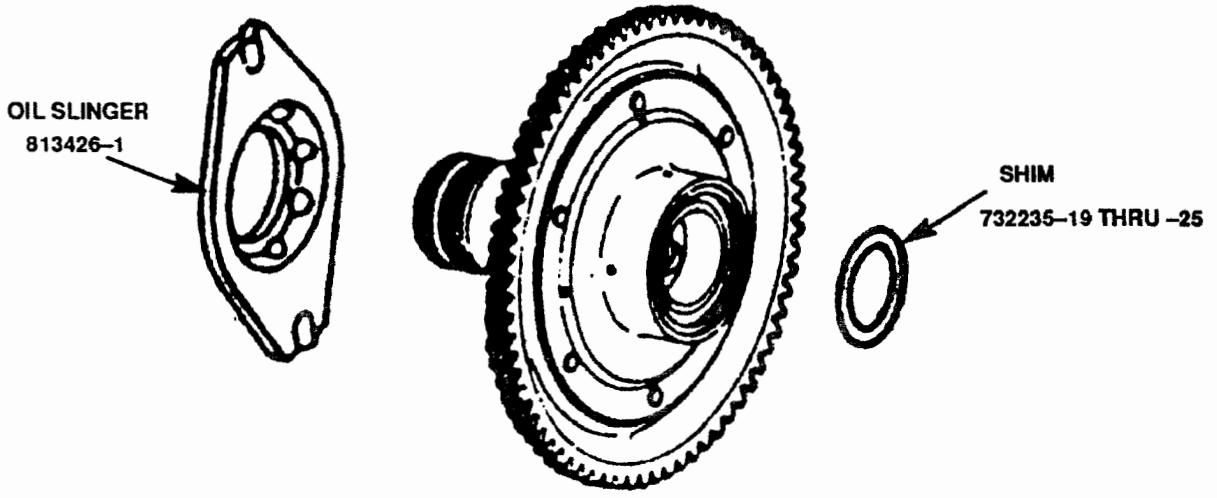

Figure 9. Clutch with Shims and Oil Slinger

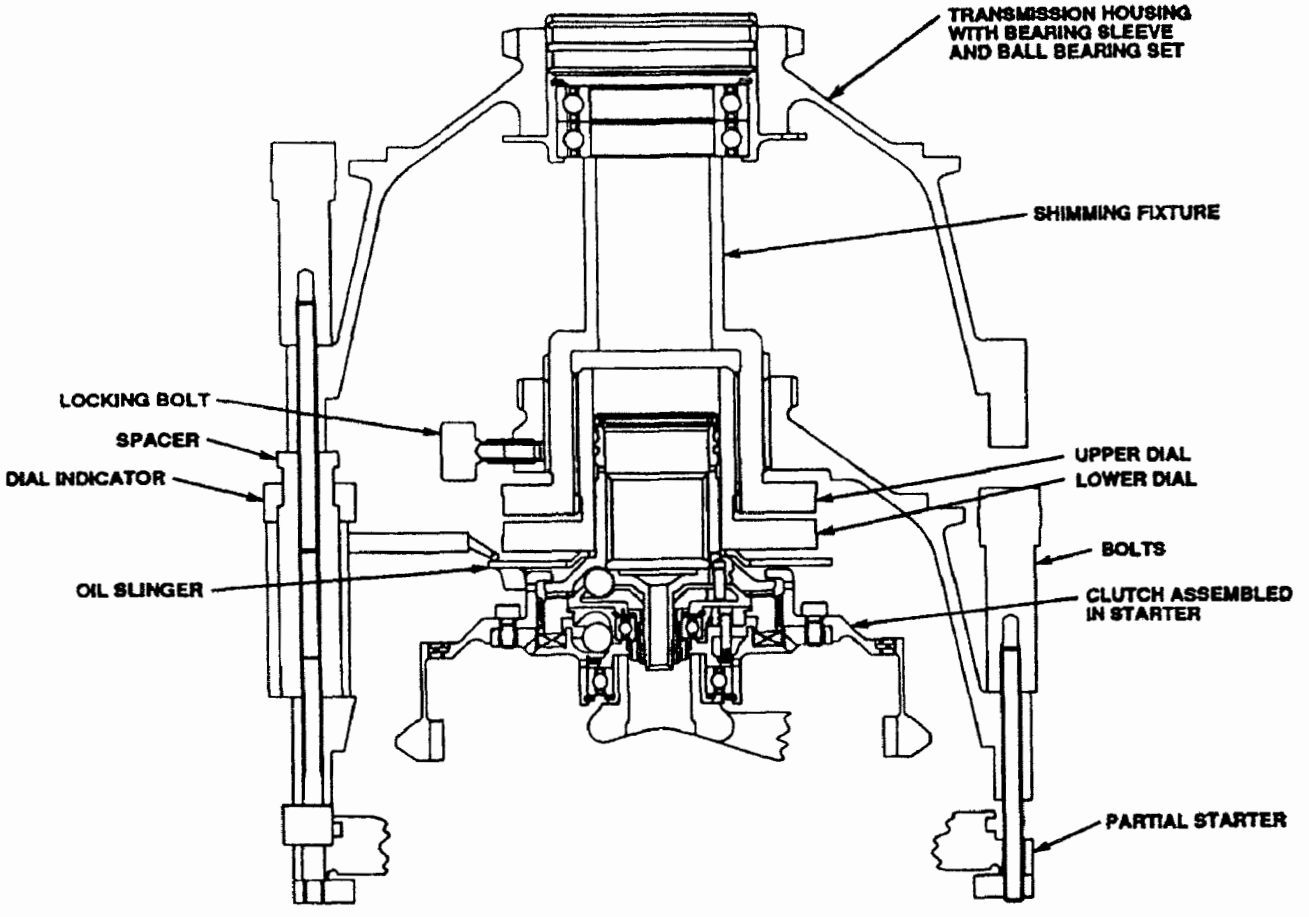

Figure 10. Shimming Fixture

(t) Check the color of the dial numbers written in step (r), then add or remove shims:

1 If the dial numbers in step (r) are green, add shims, part number 732235–19 thru –25, to the gear cage. The thickness of the shims must equal the dimension shown by the fixture ±0.002 inch (0.05 mm).

NOTE: The thickness of shims that are necessary must not be more than 0.074 inch (1.88 mm).

2 If the dial numbers in step (r) are red, remove shims equal to the dimension shown by the fixture ±0.002 inch (0.05 mm).

(u) Install the synchronous engagement clutch, the oil slinger, the shimming fixture with the dial indicator, and the transmission housing. Do steps (6)(h) through (6)(n).

(v) Do steps (6)(o) and (6)(p) again. The fixture dials should show 0.00 ± 0.002. If not, do the shimming procedure again.

(w) Remove the transmission housing, the shimming fixture, the oil slinger, and the synchronous engagement clutch.

(x) Remove the 6 internal wrenching bolts and the carrier support from the clutch. Remove the shimming dummy washer and the shimming spacer. Refer to steps (8)(a)22 and 23 and (8)(b)5 and 6.

(y) Assemble the clutch with a wave spring, part number 813558–1. Refer to Figure 3 and Figure 4.

(z) Install the carrier support and the six internal wrenching bolts. Torque the bolts to 20 to 25 in–lbs (2.26 to 2.83 Nm).

(aa) Remove the internal retaining ring, part number 69983–185, from the carrier support.

(ab) Remove these parts from the carrier support:

- shimming dummy washer, part number 63001003–3
- shimming spacer, part number 63001004–3
- spacer ring, part number 813428–1
- ball bearing, part number 797717–1
- shimming spacer, part number 63001005–3.

(ac) Install one wave–spring washer, part number 813590–1, and the spacer ring, part number 813428–1, into the carrier support. Refer to Figure 2.

(ad) Install the ball bearing, part number 797717–1, into the carrier support.

(ae) Install the locking ring, part number 728889–1, and the internal retaining ring, part number 69983–185, into the carrier support.

CAUTION: DO NOT BEND THE BODY OF THE LOCKING RING WHEN YOU BEND THE TABS. IF THE BODY OF THE RING IS BENT THE LOCKING RING MUST BE REPLACED.

(af) Bend the tabs of the locking ring.

(ag) Install the clutch, the oil slinger, and the transmission housing.

(ah) Complete the assembly of the Pneumatic Starter core. Use the procedures in ASSEMBLY of the CMM to do this.

(ai) To complete the assembly of the Pneumatic Starter, install the output shaft, part number 797640–1. Use the procedures in ASSEMBLY of the CMM to do this.

(10) Use the procedures in TESTING AND TROUBLESHOOTING of the CMM to do a test of the Pneumatic Starter, with this change:

(a) During the overrunning tests, record only the clutch disengagement and re–engagement spreads. There is no specified limit for these speeds.

B. Reidentification

When this service bulletin is done, the unit is marked with the Sumitomo Products Co., LTD. (SPP) part number. Identify changed units by marking 790425A4 on a new identification plate, part number 797671–3. Copy all other data from the old identification plate to the new identification plate.

NOTE: Make sure the unit serial number is marked on the new identification plate.

3. Material Information

A. This Service Bulletin change will use the parts in the list for each Pneumatic Starter that is changed.

B. Any parts that usually are discarded when you disassemble the Pneumatic Starter are not in the list.

C. In the list of parts for this change, MSQ is the "Minimum Sales Quantity". The parts that have an entry in this area of the list are supplied only in this quantity, or a multiplication of this quantity.

D. In the list of parts for this change, the "key word" is a one–word name for the part.

E. In the list of parts for this change, the "instruction codes" tell you what to do with the parts. A short list under the list of parts tells you about the instruction codes that are used in the list.

F. The prices that are shown are estimates for one part. When you buy the parts, the prices may be different. If more data is necessary, ask your account representative.

SUMITOMO PRECISION PRODUCTS CO., LTD.

SERVICE BULLETIN

Mail: Hamilton Standard Production Services, Incorporated
United Technologies Corporation
Attention: Sales Order Administration
PO Box 11804
Rock Hill, SC 29731

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FAX (General Communication):	(203) 654–6905
Main Switchboard	(203) 654–6000
SITA Communications	HFDHT7X
SITA SPEC 2000 Address	RKHHS7X

NOTE: If you purchase an assembled Synchronous Engagement Clutch, part number 803188–1, do not purchase parts with an Instruction Code of E. Do purchase a lock ring, 728889–1. The lock ring is part of the clutch, but is replaced when you do the service bulletin.

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruc–tion Code
803188–1	1		9750.00	Synchronous Engagement Clutch	————	A
S738138–22	1		31.80	Cage Liner	738138–20	A, B, C
738138–104	1		2530.00	Gear Cage and Inserts	738138–102	A, B, C, F
69274–253	6		25.00	Internal Wrenching Bolt	————	E
69474A2–5	2		4.80	Pin	————	D
69983–112	1		2.70	Internal Re-taining Ring	————	E
69983–185	1		3.00	Internal Re-taining Ring	————	E

SERVICE BULLETIN

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruc-tion Code
704349–65	1		60.00	Key Washer	———	E
728889–1	1		3.00	Lock Ring	———	E
732235–19	AR		12.00	Solid Shim	———	A
732235–20	AR		12.00	Solid Shim	———	A
732235–21	AR		12.00	Solid Shim	———	A
732235–22	AR		12.00	Solid Shim	———	A
732235–23	AR		12.00	Solid Shim	———	A
732235–24	AR		12.00	Solid Shim	———	A
732235–25	AR		12.00	Solid Shim	———	A
732243–1	AR		12.00	Solid Shim	———	E
732243–2	AR		12.00	Solid Shim	———	E
732243–3	AR		12.00	Solid Shim	———	E
732243–4	AR		12.00	Solid Shim	———	E
732243–5	AR		12.00	Solid Shim	———	E
732243–6	AR		12.00	Solid Shim	———	E
732243–7	AR		12.00	Solid Shim	———	E
738612–8	1		9.00	Tab Washer	———	E
797717–1	1		200.00	Ball Bearing	———	E
813368–1	1		320.00	Ball Bearing	———	E
813590–1	1		240.00	Wave Spring Washer	———	E
813396–1	1		520.00	Starter Ball Guide	———	E

SERVICE BULLETIN

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruc-tion Code
813397–1	1		920.00	Output Ball Guide	————	E
813425–1	9		3.00	Clutch Ball	————	E
813426–1	1		750.00	Oil Slinger		A
813427–1	1		75.00	Locking Nut	————	E
813428–1	1		65.00	Spacer Ring	————	E
813558–1	1		210.00	Wave Spring Washer	————	E
813389–1	1		1420.00	Carrier Sup-port	————	E
813390–1	1		1790.00	Ring Gear Carrier	————	E
813393–1	1		1520.00	Clutch Jaw	————	E
813398–1	1		1540.00	Output Shaft	————	E
797671–3	1		3.60	Identification Plate	797671–2	B,D
	1			External Retaining Ring	69984–118	B
	1			Internal Retaining Ring	69983–185	B
	1			Annular Ball Bearing	728886–1	B
	1			Lock Ring	728888–1	B
	1			Lock Ring	728889–1	B

SERVICE BULLETIN

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruc–tion Code
	1			Clutch Shaft and Spring	753365–18	B
	1			Ring Gear Carrier	769174–3	B

Instruction Code A. The Service Bulletin change adds the "New PN" to the Pneumatic Starter.

Instruction Code B. The Service Bulletin change removes the "PN before the SB" from the Pneumatic Starter. Discard the part or use it in other equipment.

Instruction Code C. The "PN before the SB" does not have the same fit and function as the "New PN".

Instruction Code D. The "PN before the SB" has the same fit and function as the "New PN".

Instruction Code E. These parts make up the synchronous engagement clutch. They can be purchased as an assembly, part number 803188–1, to decrease the labor necessary to do this service bulletin.

Instruction Code F. If necessary, you can purchase the New PN to do the changes in this Service Bulletin. Refer to step 2.A.(3)(a).

Hamilton Standard Internal Reference Number 230299, 230304, 230351–1, 234296
Hamilton Standard Internal Identification Number 80–2509

SUMITOMO PRECISION PRODUCTS CO., LTD.

SERVICE BULLETIN

STARTING — PNEUMATIC STARTER — INCORPORATE THE PRESSURE FILL FACILITY

1. Planning Information

A. Effectivity

Pneumatic Starter part number 790425A4.

Pneumatic Starters Not Incorporating Modification Number	Serial Number of First Production Incorporation
790425A3 L11	A10001

NOTE: The Pneumatic Starters are installed in Airbus A320 and A321 aircraft that use IAE/V2500 engines and McDonnell Douglas MD–90 aircraft that use IAE/V2500.

B. Reason

To make it easier to add oil during starter maintenance, customers want the starter changed so that oil can be added under pressure.

C. Description

To change from 790425A4 to 790425A3, add two more plugs and one more packing.

D. Compliance

Do when parts can next be accessed because of other maintenance.

E. Approval

This Service Bulletin 80-2510 (IAE SB V2500-ENG-80-0008) was technically approved by IAE on May 24/96. The part number changes shown in paragraph 2 of this Service Bulletin have been sanctioned under a product development/ control system that has been approved by the D.G.A.C (Direction Generale de L'Aviation Civile) — Paris.

F. Manpower

No additional man–hours are necessary to do these Service Bulletin procedures when you do component maintenance (or overhaul). The estimate does not include any time for a test.

G. Material – Cost and Availability

The parts that are necessary to do these Service Bulletin procedures are in Section 3, Material Information. Section 3 tells you all you must know to buy these parts. Send orders for new or spare parts to

Hamilton Standard Product Services, Incorporated
United Technologies Corporation
Attention: Sales Order Administration
PO Box 11804
Rock Hill, SC 29731

H. Tooling

None

I. Weight and Balance

None

J. Electrical Load Data

Not Affected

K. References

Component Maintenance Manual (CMM) 80–13–41

L. Other Publications Affected

CMM 80–13–41

2. Accomplishment Instructions

A. To change Pneumatic Starter part number 790425A4 to part number 790425A3, do these steps (refer to Figure 1):

(1) Remove and discard sight plug, part number 738277–3.

(2) Install new packing, part number 720752–33, onto adapter, part number 797845–1.

(3) Install adapter into transmission housing pressure fill port. Refer to Figure 1.

(4) Torque the adapter to 45 to 60 pound–inches (5.09 to 6.78 Nm).

(5) Use lockwire MS20995C20 to lockwire the adapter to the transmission housing. Refer to AS567.

(6) Install new packing, part number 720752–14, onto the plug, part number MS9954–06.

(7) Install the plug into the adapter, part number 797845–1. Refer to Figure 1.

(8) Torque the plug to 20 to 35 pound–inches (2.26 to 3.96 Nm).

(9) Use lockwire MS20995C20 to lockwire the plug to the transmission housing. Refer to AS567.

(10) Remove and discard the oil fill instruction plate, part number 732229–1.

(11) Install a new oil fill instruction plate, part number 792997–1, as given in the ASSEMBLY procedures of the CMM.

B. Reidentification

When this service bulletin is done, the unit is marked with the Sumitomo Products Co., LTD. (SPP) part number. Identify changed units by marking 790425A3 on the identification plate.

3. Material Information

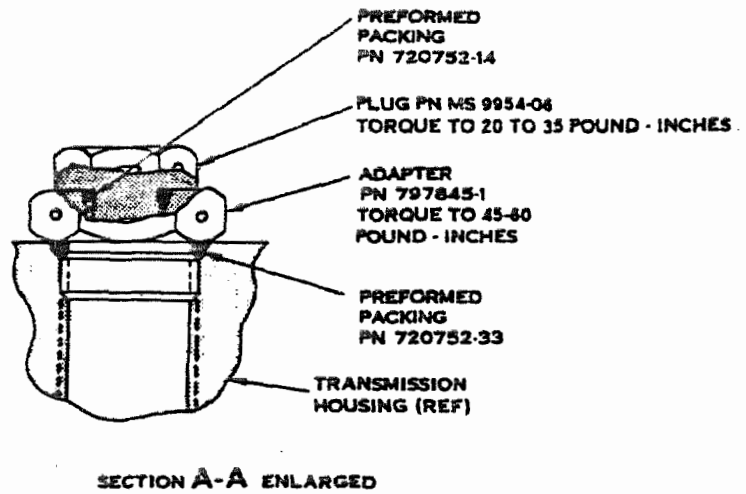
A. This Service Bulletin change will use the parts in the list for each Pneumatic Starter that is changed.

B. Any parts that usually are discarded when you disassemble the Pneumatic Starter are not in the list.

C. In the list of parts for this change, MSQ is the "Minimum Sales Quantity". The parts that have an entry in this area of the list are supplied only in this quantity, or a multiplication of this quantity.

D. In the list of parts for this change, the "key word" is a one–word name for the part.

E. In the list of parts for this change, the "instruction codes" tell you what to do with the parts. A short list under the list of parts tells you about the instruction codes that are used in the list.



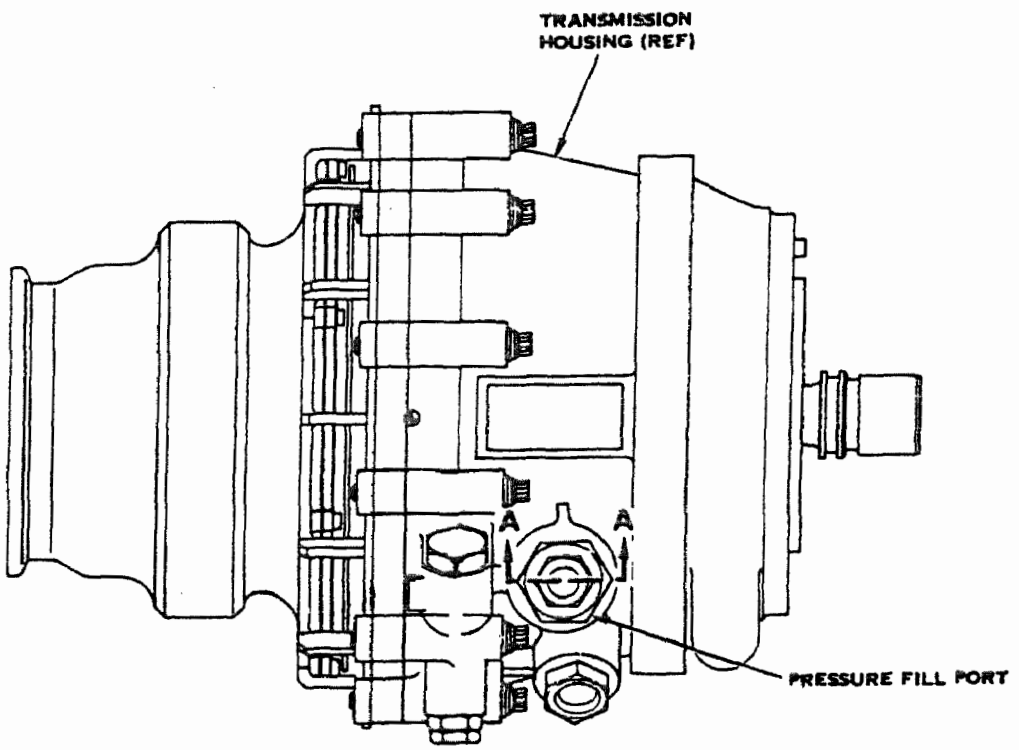


Figure 1. Pressure Fill Adapter Plugs

F. The prices that are shown are estimates for one part. When you buy the parts, the prices may be different. If more data is necessary, ask your account representative.

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Attention: Sales Order Administration
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Main Switchboard	(203) 654–6000
SITA Communications	HFDHT7X
SITA SPEC 2000 Address	RKHHS7X

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruc–tion Code
792997–1	1	1	3.60	Instruction Plate	732229–1	A, B
720752–14	1	1	10.20	Preformed Packing	———	A
MS9954–06	1	1	7.20	Plug	———	A
797845–1	1	1	65.00	Adapter	738277–3	A,B
720752–33	1	1	10.20	Preformed Packing	720752–33	C

Instruction Code A. The Service Bulletin change adds the "New PN" to the Pneumatic Starter.

Instruction Code B. The Service Bulletin change removes the "PN before the SB" from the Pneumatic Starter. Discard the part or use it in other equipment.

Instruction Code C. The "PN before the SB" has the same fit and function as the "New PN".

Hamilton Standard Internal Reference Number 234296
Hamilton Standard Internal Identification Number 80–2510