

Engine Alliance **PRELIMINARY**
GP7000 SERIES ENGINE MANUAL (PN 5700147)

ENGINE GENERAL - (CDN - TCF UNIT) - INSTALLATION-01

Special Wales review - Torque Tool / CDP seal Nut Installation Procedure Only

Task 72-00-50-420-001:

1. Install The Combustor Diffuser Nozzle - Turbine Center Frame Unit (CDN - TCF Unit)

A. Prerequisites

- (1) Refer to the Engine Assembly/Sectionalization Selection Index, 71-00-00, Installation-00 (Task 71-00-00-420-000) for a list of all prerequisite tasks.
- (2) Refer to Specific Fits And Clearances, 72-00-52, Inspection/Check-01 (Task 72-00-52-220-001) for interface fits and clearances. Special torques and special assembly procedures appear where necessary in the text and are identified with a reference number.

B. Equipment And Materials Necessary

Standard Tools:

No Specific	Fibrescope
No Specific	Sling, Two Chain
AMD-300	Torque System (CDP Rotating Seal)

Special Tools:

7C2015G01	Fixture, Aft Lift And Turn (Propulsor)
7C2016G01	Strongback, Lift And Turn (Core Unit)
7C2018G01	Lock, Rotor - Aft (HPT Rotor Assembly)
7C2021G01	Fixture, Runout (CDP Rotating Seal)
7C2033P01	Cover (No. 4 Bearing Sump)
7C2036G01	Protector, HPC Rotor Assembly (HPC Rotor Stage 7-9 Spool)
7C2114G01	Fixture, Lock (HPC Rotor)
7C2125G01	Retainer, Bolt (CDP Rotating Seal)
7C2130G01	Fixture, Chill - Install (HPT Rotor Stage 1 Disk)
7C2145G01	Guide Tube - Borescope (HPT/HPC Rotor Assemblies)
7C2512G01	Tool Set, Seating Bolt (CDP Seal)
7C2514P01	Protector (CDP Rotating Seal)
7C2564G01	Protector (HPC Stator Stage 9 Shroud)
7C2810P01	Nut, Assembly (Aft Bulkhead Seal)
7C2821G01	Nut Tool, Assembly - Bolt Protection (Aft Bulkhead Seal)

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Consumable Materials:

Item No.	Designation
EAC-0001	Cloth, Lint Free Cotton
EAC-0008	Oil, Engine
EAC-0023	Marker, (TEC)
EAC-0034	Ice, Dry

Expendable Parts:

Item	Part Name	Quantity	Parts Catalog Reference Section/Figure/Item
[1]	Bolt, CDP	A/R	72-51-60/01/270
[1]	Bolt, Balance	A/R	72-51-60/01/272
[2]	Nut, CDP Rotating Seal	40	

WARNING: REFER TO THE MSDS FOR ALL MATERIAL USED AND THE MANUFACTURER'S SAFETY INSTRUCTIONS FOR ALL EQUIPMENT USED. IF YOU DO NOT OBEY THIS WARNING, INJURY CAN OCCUR.

C. Procedure

CAUTION: INSTALL PROTECTION COVERS ON ALL OPENINGS IMMEDIATELY TO PREVENT DAMAGE TO THE ENGINE.

- (1) Make sure that you remove and install protection covers as necessary to prevent damage to the engine. If necessary, refer to EAP-1020 - Use Of Protection Covers.
- (2) Install the 7C2125 Bolt Retainer in the HPT rotor stage 1 disk as follows. See Figure 401.
 - (a) Put the nylon webbing around the outer face of the retainer ring, around the forward end, and up through the center of the retainer ring.
 - (b) Put the Retainer into the HPT rotor stage 1 disk shaft. Make sure that the Retainer aft end is against the tab around the inner diameter of the shaft and the forward, chamfered end of the retainer is against the forward flange.

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(17) Prepare to install the 40 CDP seal nuts [2] as follows. See Figure 409.

- (a) Remove the Fibrescope from the Guide Tube.
- (b) Remove the Guide Tube from the Rotor Lock.
- (c) Remove the Rotor Lock from the CDN - TCF unit.
- (d) Prepare the 40 CDP seal nuts [2] for installation as follows.

CAUTION: IF TOO MUCH ENGINE OIL EAC-0008 IS USED IT CAN CAUSE OIL LEAKAGE THROUGH THE BOLTHOLES AND INTO THE JOINT. REMOVE UNWANTED ENGINE OIL EAC-0008 FROM THE CDP SEAL NUTS [2] OR DAMAGE TO THE ENGINE CAN OCCUR.

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- 1 Apply a thin layer of Engine Oil EAC-0008 to the 40 CDP seal nuts [2]. Make sure that the threads and washer faces of the CDP seal nuts [2] are lubricated 360 degrees.

NOTE: The washer faces of the CDP seal nuts [2] must have a smooth layer of Engine Oil EAC-0008.

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(18) Prepare the AMD-300 Torque Tool as follows. See Figure 411.

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- (a) Remove the protection from the Torque Tool.

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- (b) Attach a hoist and Two Chain Sling to the two detail hoist rings.

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- (c) Install the standard/buildup gearbox on the Torque Tool.

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- (d) Make sure that the nut wrench is in the down position. If it is not, move the nut wrench lift handle to the fully down position.

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- (e) Make sure that the nut wrench lock handle is in the fully down position to lock the nut wrench.

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- R (f) Make sure that the bolthead wrench is in the
R retracted position. If it is not, turn the top
R segment of the bolthead wrench handle CCW until it
R stops.
- R (g) Make sure that the bolthead wrench is in the fully
R down position. If it is not, lower the detail
R t-handle allen wrench to the detail retracting
R bolt and turn it CCW until it stops. Remove the
R detail t-handle allen wrench.
- R (h) Make sure that the two nut wrench engagement
R levers are in the fully down position.
- R (19) Install the Torque Tool in the HPT rotor stage 1 disk
R shaft as follows. See Figure 412 (Sheet 1), Figure 412
R (Sheet 2), and Figure 412 (Sheet 3).
- R (a) Put the Torque Tool above the HPT rotor shaft.
- R CAUTION: BEFORE YOU INSTALL THE TORQUE TOOL, MAKE
R SURE THAT THE BOLTHEAD AND NUT WRENCHES
R ARE FULLY INSIDE THE WORKING DIAMETER
R OF THE TOOL CYLINDER OR DAMAGE TO THE
R ENGINE AND TOOLING CAN OCCUR.
- R (b) Lower the Torque Tool while you align the SLOT 1-1
R arrow mark on the Torque Tool with the 1 1 slot of
R the HPT rotor shaft. Make sure that the Torque
R Tool fully engages the castellations at the aft
R end of the shaft.
- R (c) Remove the hoist and Two Chain Sling from the
R Torque Tool.
- R (d) Lower the detail t-handle allen wrench to the
R detail retracting bolt and turn it clockwise until
R it stops to move the bolthead wrench to the fully
R up position. Remove the detail t-handle allen
R wrench.
- R (e) Turn the top segment of the bolthead wrench handle
R clockwise until it stops to deploy the bolthead
R wrench.
- R (f) Make sure that the two nut wrench engagement
R levers are in the down position and turn the
R Torque Tool to align the arrow mark with the 1
R mark on the alignment ring.

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- R (g) Turn the bottom segment of the bolthead wrench
R handle to align the white dots and lower the
R bolthead wrench handle to engage the bolthead.
- R (h) Lift and turn the nut wrench lock handle to unlock
R the nut wrench.
- R (i) Move the nut wrench lift handle up until it stops
R to lift the nut wrench.
- R (j) Remove the nut wrench lift handle from the Torque
R Tool as follows.
- R 1 Loosen the detail knurled nut from the Torque
R Tool.
- R 2 Turn the nut wrench lift handle CCW until it
R stops.
- R 3 Lift the handle and remove it from the Torque
R Tool.
- R (k) Pull the detail knurled plunger out and away from
R the torque drive ring.
- R (l) Push down and turn the torque drive ring clockwise
R until it stops to engage the torque drive shaft in
R the standard/buildup gearbox.
- R (m) Install the detail torque plate on the Torque
R Tool.
- R (n) Install the detail drive pin in the torque drive
R ring.
- R (o) Install the AMD-139 Torque Multiplier on the
R detail torque plate.
- R (20) Install the 40 CDP seal nuts [2] on the CDP
R bolts/balance bolts [1] as follows. See Figure 412
R (Sheet 1), Figure 412 (Sheet 2), and Figure 412 (Sheet
R 3).
- R (a) If necessary, lower a borescope into the HPT
R rotor stage 1 disk as an aid in CDP seal nut [2]
R installation.

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- R (b) Make sure that the nut wrench is fully retracted.
R If it is not, lift the torque drive ring a small
R distance and turn CCW until it stops.
- R (c) Engage two or three threads of the CDP seal nut
R [2] on the detail rod (with the threaded end).
R Lower the CDP seal nut [2] and install it in the
R nut wrench. Remove the detail rod.
- R (d) Lift the torque drive ring a small distance and
R turn it 180 degrees clockwise to deploy the nut
R wrench.
- R (e) Make sure that the two nut wrench engagement
R levers are in the down position and turn the
R Torque Tool to align the arrow mark on the Torque
R Tool with the CDP bolt/balance bolt [1] position
R mark on the alignment ring.
- R (f) Turn the bottom segment of the bolthead wrench
R handle to align the white dots and lower the
R handle to engage the bolthead.
- R (g) Move the two nut wrench engagement levers up to
R raise the CDP seal nut [2] to the CDP bolt/balance
R bolt [1].
- R CAUTION: DO NOT ALLOW THE CDP SEAL NUT [2] TO
R CROSS-THREAD ON THE CDP BOLT/BALANCE
R BOLT [1] OR DAMAGE TO THE ENGINE CAN
R OCCUR.
- R CAUTION: DO NOT TORQUE THE CDP SEAL NUT [2] TOO
R MUCH OR DAMAGE TO THE ENGINE CAN OCCUR.
- R (h) Apply minimal torque with the square drive to
R start the CDP seal nut [2] on the CDP bolt/balance
R bolt [1].
- R (i) Lift the bolthead wrench handle a small distance
R and turn the bottom segment to raise the bolthead
R wrench away from the CDP bolt/balance bolt [1].
- R (j) Move the two nut wrench engagement levers to the
R fully down position (nut wrench in the down
R position and the CDP seal nut [2] away from the
R CDP bolt/balance bolt [1]).

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- R (k) Repeat steps (b) through (j) until all 40 CDP seal
R nuts [2] are installed.
- R (21) Torque the 40 CDP seal nuts [2] as follows.
- R (a) Connect the Torque Tool to the Torque Tool console
R and apply power.
- R (b) Install the detail torque transducer in the Torque
R Tool.
- R (c) Install the AMD-139 Torque Multiplier on the
R detail torque transducer.
- R (d) Turn the Torque Tool to align the arrow mark with
R the X mark on the alignment ring.
- R (e) Start the torque program on the Torque Tool
R console.
- R (f) Follow the console instructions to apply an
R initial torque of TBF in. lbs. (metric) on the
R 40 CDP seal nuts [2].
- R (g) Follow the console instructions to loosen each of
R the 40 CDP seal nuts [2] 360 degrees.
- R (h) Follow the console instructions to apply an
R initial torque of TBF in. lbs. (metric) to the
R CDP seal nut [2] at the 1 mark again.
- R NOTE: This step calculates individual run-on
R torque.
- R (i) Follow the console instructions to apply final
R torque of TBF in. lbs. (metric) on the CDP seal
R nut [2] at the 1 mark.
- R (j) Follow the console instructions to apply initial
R and final torque on the 39 remaining CDP seal nuts
R [2].
- R NOTE: A used CDP seal nut [2] can be used again
R only if it keeps the full running torque,
R but discard all CDP seal nuts [2] after an
R engine run.

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- R (k) If a CDP seal nut [2] falls into the core module,
R record this immediately in the engine record. If
R possible, remove the CDP seal nut [2] with the
R detail rod. Make sure that all CDP seal nuts [2]
R that fall into the core module are removed when
R the Protector is removed.
- R (22) Remove the Torque Tool as follows. See Figure 412
R (Sheet 1), Figure 412 (Sheet 2), and Figure 412 (Sheet
R 3).
- R (a) Remove the detail torque transducer from the
R Torque Tool.
- R (b) Remove the AMD-139 Torque Multiplier, detail drive
R pin, and detail torque plate from the Torque Tool.
- R (c) Make sure that the two nut wrench engagement
R levers are in the fully down position.
- R (d) Make sure that the nut wrench is in the retracted
R position. If it is not, lift the torque drive
R ring a small distance and turn it 180 degrees CCW.
- R (e) Install the nut wrench lift handle as follows.
- R 1 Align the end of the handle with the Torque
R Tool keyway and lower it until it stops.
- R 2 Turn the nut wrench lift handle CCW 1/4 turn to
R engage the nut wrench.
- R (f) Turn the torque drive ring CCW to disengage the
R drive shaft from the nut wrench.
- R (g) Move the nut wrench lift handle down to lower the
R nut wrench.
- R (h) Turn the nut wrench lock handle a small distance
R and lower it to lock the nut wrench in the down
R position.
- R (i) Make sure that the bolthead wrench is in the
R retracted position as follows.
- R 1 Lift the bolthead wrench handle a small
R distance and turn the bottom segment to lift
R and hold the bolthead wrench away from the CDP
R bolt/balance bolt [1].

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- R 2_ Turn the top segment of the bolthead wrench
R handle 180 degrees CCW to retract the bolthead
R wrench.
- R (j) Lower the detail t-handle allen wrench to the
R detail retracting screw and turn CCW until it
R stops to move the bolthead wrench to the fully
R down position. Remove the detail t-handle allen
R wrench.
- R (k) Attach a hoist and Two Chain Sling to the two
R detail hoist rings and remove the Torque Tool from
R the HPT rotor assembly.
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