International Aero Engines

SERVICE BULLETIN

ENGINE - MAIN GEARBOX ASSEMBLY - PROVIDE A NEW HYDRAULIC PUMP GEAR DRIVE WITH GREASE LUBRICATED SPLINE - CATEGORY CODE 4 - MOD.ENG-72-0205

1. Planning Information

A. Effectivity

(1) Aircraft: McDonnel Douglas MD-90

(2) Engine: V2525-D5 engines prior to serial number V20016

(3) Engine: V2528-D5 engines prior serial number V20016

B. Reason

(1) Condition

(a) Current gearbox design allows fitment of an hydraulic pump with an oil lubricated drive spline.

(2) Background

(a) There is a customer requirement to allow fitment of an hydraulic pump with grease lubricated spline

(3) Objective

To allow fitment of a hydraulic pump with a driven spline lubricated by grease.

(4) Substantiation

A 150 hours endurance test has successfully been carried out

(5) Effects of Bulletin on Workshop Procedures:

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

C. Description

(1) The changes introduced by this Service Bulletin are as follows:

- A modified hydraulic pump drive gear.

- A modified oil jet.

D. Approval

The part number changes and/or part modifications described in Section 2 and 3 of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA-APPROVED for the Engine Model listed.

E. Compliance

Category Code 4

Accomplish at the first visit of an engine or module to a maintenance base capable of compliance with the accomplishment instructions regardless of the planned maintenance action or the reason for engine removal.

F. Manpower

Estimated man-hours to incorporate the full intent of this Bulletin:

Venue	Estimated Manhours
(1) In Service:	
(a) To gain access	12 minutes
(b) To remove hydraulic pump	19 minutes
(c) To rework hydraulic pump	18 minutes
(d) To install hydraulic pump	37 minutes
(e) To return flyable status	...14 minutes
TOTAL	1 hour 40 minutes
(2) At overhaul.....	Not applicable (Parts are accessible at overhaul)

G. Material - Price and Availability

(1) Modification Kit is not provided

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

H. Tooling - Price and Availability

Tool No.	Qty	Description	Function	Avail.
IAE1F10007	1	Puller, removal	mating ring	1
IAE1F10031	1	Pusher, installation	mating ring	1
IAE1F10171	1	Base, assembly	inner race	1
IAE1F10173	1	Base, assembly	inner race	1
IAE1F10174	1	Drift, installation	inner race	1
IAE1F10232	1	Drift, remove	inner race	1
IAE1F10233	1	drift, remove	inner race	1
IAE1F11111	1	Drift, installation	inner race	1
IAE1F11193	1	Pusher, installation	seal	1
IAE1F11501	1	Puller, removal	seal	1
IAE1F11513	1	Base, removal	inner race	1
IAE1F11514	1	Ring, removal	inner race	1
IAE2F11181	1	Clamping fixture	backlash check	1
IAE2F11187	1	Backlash check lever	backlash check	1

(1) Shows that the Tool Design Aperture Cards is available from IAE.

I. Weight and Balance

(1) Weight change	No effect
(2) Moment arm	No effect
(3) Datum	Engine front mount centerline (Powerplant Station P.P.S) 100)

J. Electrical Load Data

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

K. References

(1) Internal Reference No.

EC93VF005

(2) Other references

The MD-90 Aircraft Maintenance Manual

The V2500-D5 Engine Manual

L. Other Publications Affected

NOTE: All units will be retrofitted prior to entry-into-service. The old configuration will not be supported in IAE documents. The new configuration will be the baseline standard shown

(1) V2500-D5 Engine Illustrated Parts Catalog, Chapter/Section 72-60-00, 72-60-03, 72-60-10 and 72-60-23 to remove and add parts as applicable.

(2) V2500-D5 Power Plant Illustrated Parts Catalog, Chapter/Section 72-60-00, to add the new part number.

(3) The V2500-D5 Engine Manual Chjapter/Section 72-60-10, and 72-60-23 Disassembly and Assembly will be revised

(4) The V2500-D5 Engine Manual Chapter/Section 72-60-23, Cleaning to change part number

(5) The V2500-D5 Engine Manual Chapter/Section 72-60-23, Inspection to change part number

(6) The V2500-D5 Engine Manual Chapter/Section 72-60-23, Repair to change part number

(7) The V2500 Illustrated Tool and Equipment Manual will be revised

2. Accomplishment Instructions

A. Disassembly Instruction

(1) Open the fan cowls by the approved procedure in Reference (1), Chapter/Section 71-13-00

(2) Remove the hydraulic pump, if installed. See Reference 1 Chapter/ section 29-11-01

(3) Remove the (72-60-10,01-350) oil nozzle. See Figure 1

(a) Remove the nut and the washer which attach the oil nozzle to the gearbox casing.

(b) Remove the oil nozzle

(c) Remove and discard the two packings.

(4) Remove the hydraulic pump drive gear assembly. See Figure 1

NOTE: If the hydraulic pump was installed proceed at point (c)

(a) Remove the six nuts and washers which attach the cover to the hydraulic pump housing. Remove the cover.

(b) Loosen the nuts and remove the plug assy from the end of the hydraulic pump housing.

(c) Remove the retaining ring

(d) Install the IAE 1F11501 puller 1 off, on the seal. Remove the seal and discard the packing

(e) Remove the IAE 1F11501 puller 1 off.

(f) Install the IAE 1F10007 puller 1 off, on the mating ring.

(g) Remove the mating ring and discard the packing. Remove the IAE 1F10007 puller 1 off.

(h) Remove the eight bolts and the six washers that attach the hydraulic drive housing to the gearbox casing.

(i) Remove the bracket.

(j) Install three of the eight bolts, just removed, on the inserts of the hydraulic drive housing flange. Operate to disconnect the hydraulic drive housing.

(k) Remove the hydraulic drive housing from the gearbox casing and from the hydraulic pump drive gear.

(l) Remove the hydraulic pump drive gear from the gearbox casing.

B. Rework Instructions

(1) Rework the hydraulic pump drive gear. see Figure 2 and 3

CAUTION: THE OUTER AND INNER BEARING RACES MUST BE MATCHED WITH SAME S/N.

(a) Remove the two inner races of the roller bearings from the old hydraulic pump drive gear

(i) Put IAE 1F1514 ring 1 off around and below the inner race of the roller bearing on the ID splined end of the gearshaft.

(ii) Install the ring and the hydraulic pump drive gear on IAE 1F11513 base 1 off with the ID splined end to the top.

(iii) Install IAE 1F10232 drift 1 off in to the ID of the gearshaft. Push the drift until the hydraulic pump drive gear is fully removed from the inner race of the roller bearing. Use an arbor press or equivalent.

(iv) Remove the drift. Remove the ring and the hydraulic pump drive gear from the base.

(v) Turn the hydraulic pump drive gear. Put the IAE 1F11514 ring 1 off around and below the inner race of the remaining roller bearing.

(vi) Install the ring and the hydraulic pump drive gear IAE 1F11513 1 off base with the ID splined end to the bottom.

(vii) Install IAE 1F10233 drift 1 off in to the ID of the hydraulic pump drive gear. Push the drift until the gearshaft is fully removed from the inner race of the roller bearing. Use an arbor press or equivalent.

(viii) Remove the drift. Remove the ring and the hydrulic pump drive gear from the base.

(b) Install the inner race of the roller bearing in the new hydraulic pump drive gear

NOTE: Do not change the bearing inner race position on the hydraulic gear shaft.

(i) Install the hydraulic pump drive gear on IAE 1F10171 base 1 off with the internal splined end to the bottom.

(ii) Put the inner race of the roller bearing in to oven and increase the temperature to 250 deg F (120 deg C) maximum.

WARNING: DO NOT TOUCH THE HOT PARTS WITHOUT PROTECTIVE GLOVES. hOT PARTS CAN CAUSE REDDENING AND BLISTERING OF THE SKIN IF THE HANDS ARE NOT PROTECTED. IMMERSE THE CONTACTED AREA IN COLD WATER FOR 10 MINUTES IF THE SKIN BURNED. IMMEDIATELY GET THE MEDICAL ATTENTION IF PAIN OR BLISTERING PERSISTS.

(iii) Install the inner race of the roller bearing on the guide bush of IAE 1F11111 drift 1 off.

(iv) Put the guide bush of the drift in to the ID of the hydraulic pump drive gear.

(v) Push the drift until the inner race of the roller bearing touch the shoulder of the hydraulic pump drive gear. Use arbor press or equivalent. apply a load of 3372 lbf (15000 N).

(vi) Remove the drift from the hydraulic pump drive gear.

(vii) Let the inner race of the roller bearing get to the room temperature. Make sure that the inner race of the roller bearing is correctly installed to the gearshaft.

(viii) Examine the gap between the inner race and the shoulder. The maximum gap permitted is 0.001in. (0,03 mm).

(ix) Remove the hydraulic pump drive gear from the base.

(c) Install the inner race of the roller bearing in the new hydraulic pump drive gear

NOTE: Do not change the bearing inner race position on the hydraulic pump drive gear.

(i) Install the hydraulic pump drive gear on IAE 1F10173 base assembly 1 off with the internal splined end to the top.

(ii) Put the inner race of the roller bearing in to oven and increase the temperature to 250 deg F (120) deg C) maximum.

WARNING: DO NOT TOUCH THE HOT PARTS WITHOUT PROTECTIVE GLOVES. HOT PARTS CAN CAUSE REDDENING AND BLISTERING OF THE SKIN IF THE HANDS ARE NOT PROTECTED. IMMERSE THE CONTACTED AREA IN COLD WATER FOR 10 MINUTES IF THE SKIN BURNED. IMMEDIATELY GET THE MEDICAL ATTENTION IF PAIN OR BLISTERING PERSISTS.

(iii) Put the inner race of the roller bearing on the gearshaft.

(iv) Put IAE 1F10174 drift 1 off on the inner race of the roller bearing with the guide of the drift in to the ID of the gearshaft.

(v) Push the drift until the inner race of the roller bearing touch the shoulder of the gearshaft. Use arbor press or equivalent. Apply a load of 3372 lbf (15000 N).

(vi) Remove the drift from the hydraulic pump drive gear.

(vii) Let the inner race of the roller bearing get to the room temperature. Make sure the inner race of the roller bearing is correctly installed to the gearshaft.

(viii) Examine the gap between the inner race and the shoulder. The maximum gap permitted is 0.001in. (0,03 mm).

(ix) Remove the hydraulic pump drive gear from the base.

C. Assembly instructions. See Figure 1

(1) Install the new hydraulic pump drive gear in the external gearbox module

(a) Put the hydraulic pump drive gear, with the ID splined end pointed to the front of the gearbox, in the gearbox.

(b) Put the roller bearing in to the outer race installed in the gearbox casing

(c) Install (72-60-10,01-740) packing 1 off in to the groove of the hydraulic pump housing.

(d) Align the holes of the hydraulic pump housing with the holes on the gearbox casing and the outer race with the front roller bearing. Carefully put the hydraulic pump housing over the hydraulic pump drive gear and install in the pad on the gearbox casing.

(e) Install the bracket, the six washer and the eight bolts which attach the housing to the gearbox casing.

(f) Torque the bolts to 85 to 95 lbfin (9,604 to 10,734 Nm).

(g) Measure the axial travel of the hydraulic pump drive gear. Use a standard dial gage. The axial travel must be to 0.0040 to 0.0315in. (0,10 to 0,80 mm)

(2) Set the tools to check the existence of a circumferential backlash between the hydraulic pump drive gear and the starter idler gear.

(a) Install IAE 2F11187 backlash check lever 1 off in the hydraulic pump drive gear

(i) Put the expander of the backlash check lever into the ID of the hydraulic pump drive gearshaft. Turn the handle until the backlash check lever is locked on the gearshaft. Look the handle

(b) Install IAE 2F11181 clamping fixture 1 off on the starter idler gear

(i) Remove the two bolts and washers that attach the crank cover to the gearbox casing.

(ii) remove the crank cover and discard the packing

(iii) Put the clamping fixture on the crank cover bore. Install the adapter on th idler gear shaft. Align the two holes in the clamping fixture and the two holes in the gearbox casing. Install the two special screws to attach the the clamping fixture to the gearbox. Tighten the screws

(iv) Turn the handle of the clmping fixture until the starter idler gear is locked

(v) Turn the handle of the backlash check lever by hand and check the existence of the backlash.

(3) Remove the backlash tools

(4) Install a new (72-60-21.01-280) packing 1 off in to the crank cover

(5) Install the crank cover in the gearbox casing. Install the two washers and bolts. torque the bolts 85 to 95 lbfin (9,604 to 10,734)

(6) Install the mating ring on the hydraulic pump drive gear.

(a) Install a new (72-60-23,01-340) packing 1 off in the internal groove of mating ring.

(b) Install the mating ring on the drive gear. Make sure that the large contact face points the front of the gearbox

(c) Align the lugs on the smaller diameter of the mating ring with the slots on the inner race of the front roller bearing

(d) Push the rotating ring against the inner race of the front roller bearing. Use IAE 1F10031 pusher, installation 1 off.

(e) Install the seal on the hydraulic pump drive gear

(f) Put the seal fully in to CoMat 10-077 approved engine oils before the installation. Make sure the free movement of the carbon seal.

NOTE: The carbon sel must have the free axial movement during its full travel in the seal

(g) Install a new (72-60-23,01-300) packing 1 off in to the groove of the new seal

(h) Install the seal in to the hydraulic pump housing. Use IAE1F11193 pusher installation, 1 off to fully install the seal

(i) Install the retaining ring in to the hydraulic pump housing.

(7) Install the cover on the hydraulic pump housing only if the installation of the hydraulic pump is not required

(a) Install the cover on the hydraulic pump housing. Install the six washers and the six nuts.

(b) Torque the nuts to 290 to 325 lbfin (32,7 to 36,6 Nm)

(8) Install the new(72-60-10,01-350) oil nozzle

(a) Install (72-60-10,01-361) and (72-60-10,01-364) packing 1 off each in to the grooves of the oil nozzle.

(b) Install the oil nozzle in to the seat. Align the hole in the nozzle flange in the adjacent stud.

(c) Install the washer and the nut

(d) Torque the nut to 85 to 95 lbfin (9,604 to 10,734 Nm).

D. If required, install the hydraulic pump. See Reference 1, Chapter/ section 29-11-01

E. Renumber the gearbox assembly

(1) Identify the main gearbox assembly (written on the rear side of the gearbox casting)

(2) Cross by vibro-peen P/N 4A2100 and write P/N 4A2101 (if accessible)

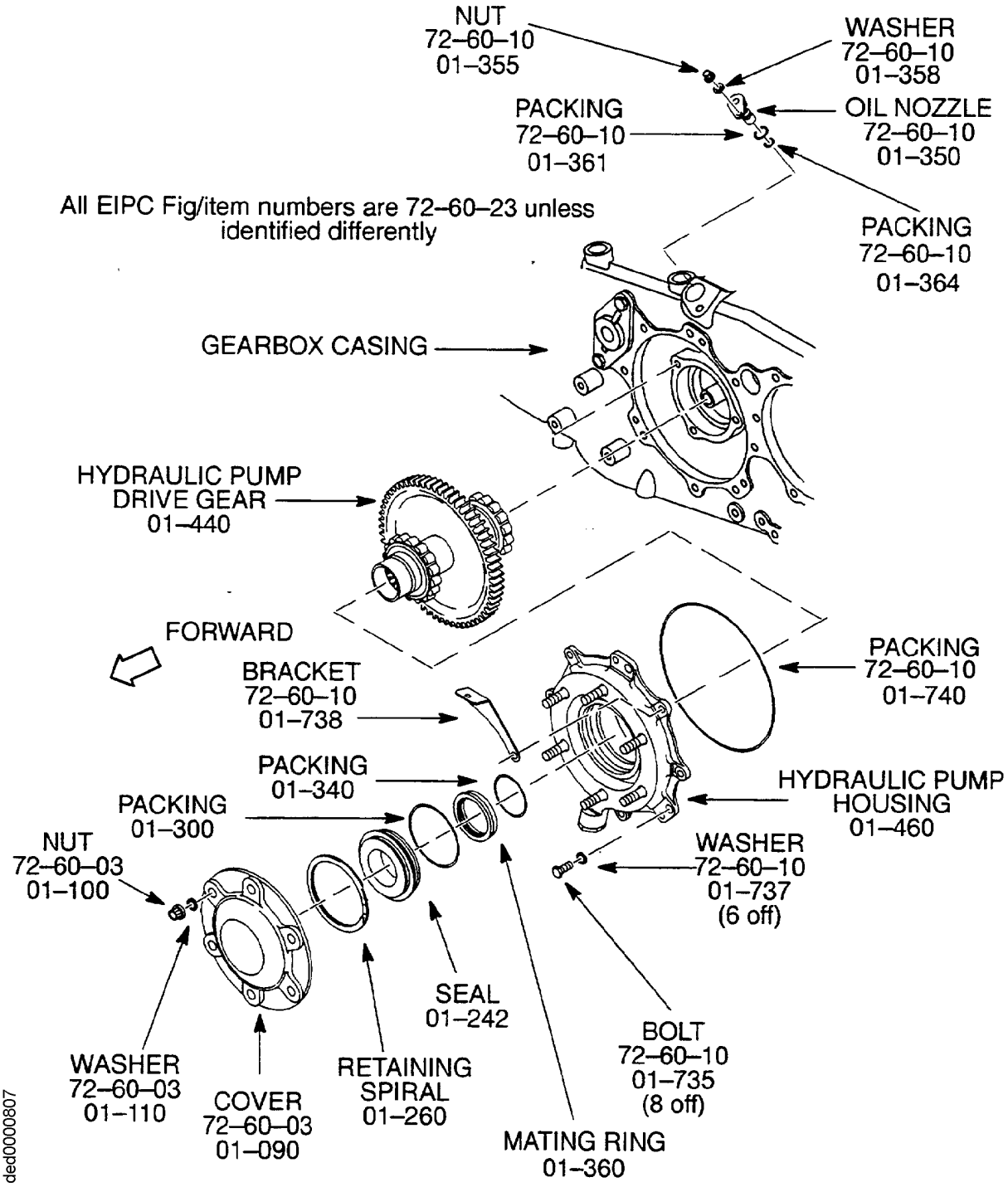
(3) Identify the module accessory gearbox part numbers (written on two plates installed on the button of the gearbox casting and on the angle gearbox.)

(4) Cross by vibro-peen P/N 4A2050 and write P/N 4A2051

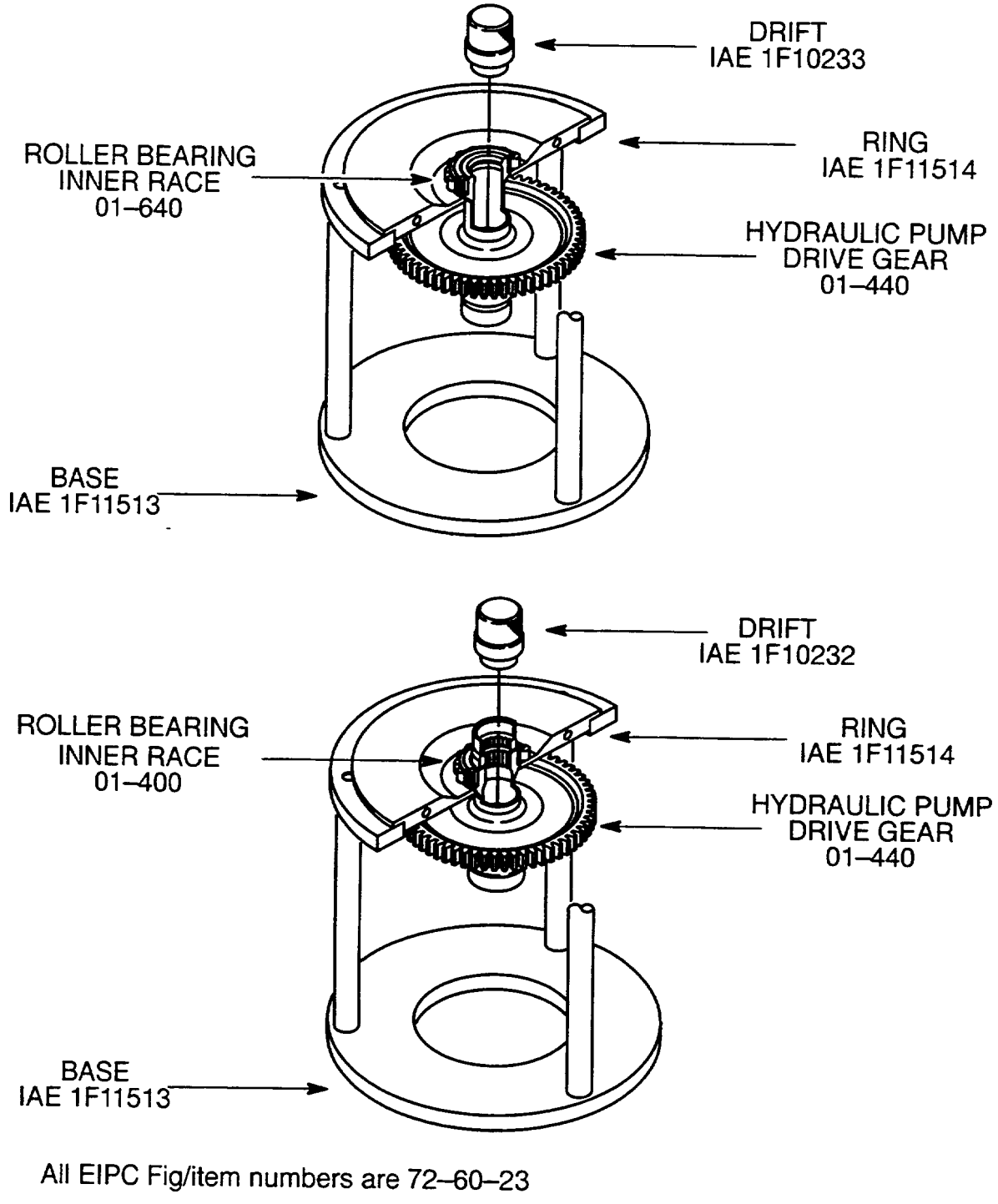
F. Do an oil leak check. (See 71-00-00)

G. Close the fan cowls

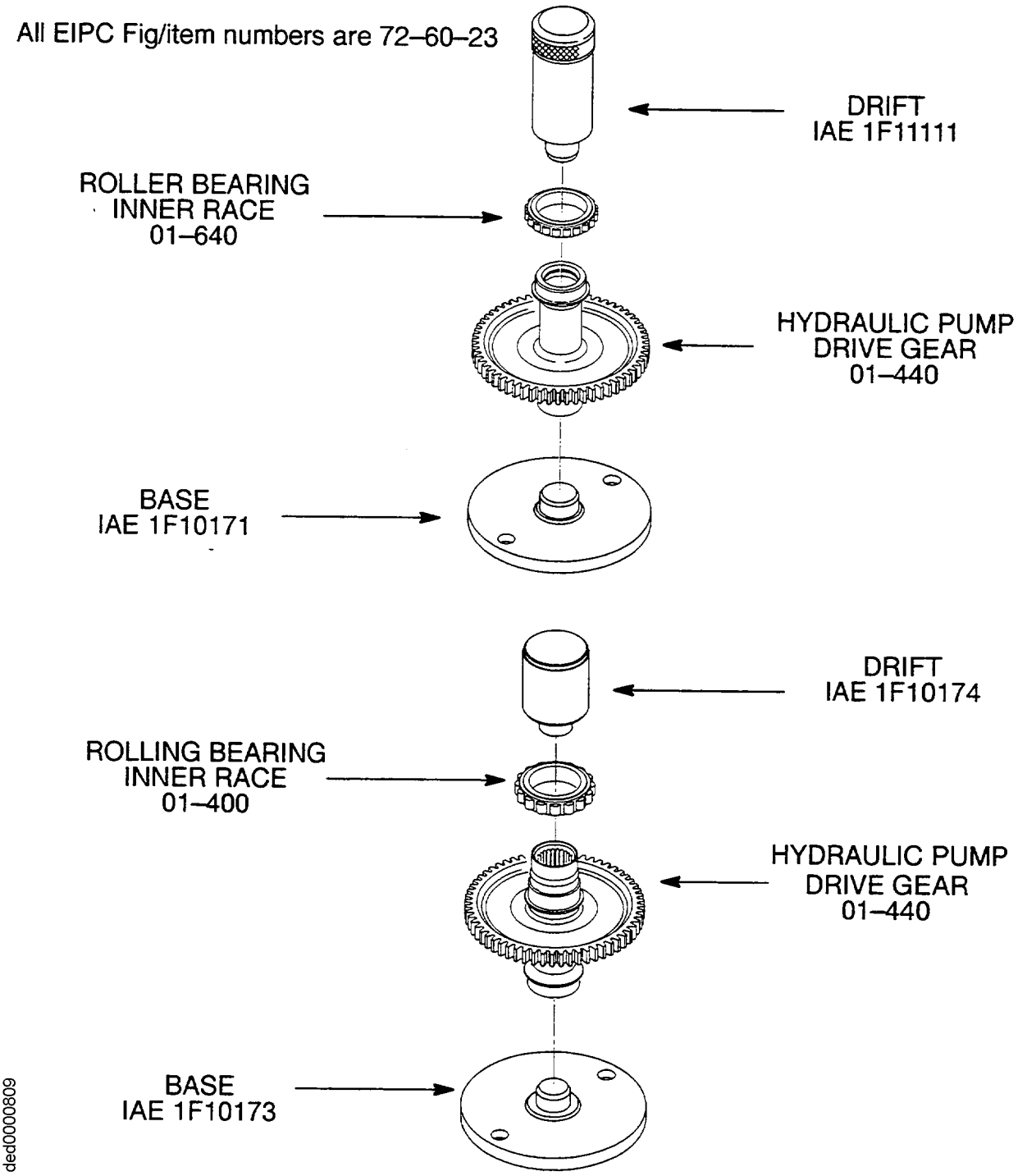
H. A Record of accomplishment is necessary.



Remove/install the hydraulic pump drive gear
Fig.1



Disassemble the old hydraulic pump drive gear
Fig.2



ded0000809

Assemble the new hydraulic pump drive gear
Fig.3

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
4A2051 (72-60-00)	1	-	GBX Module	4A2050 (01-001)	(A) (B) (S1) (1D)
- (72-60-03)	-	-	.Plug,Assy shaft	4A0138 (01-290)	(C)
- (72-60-03)	-	-	..Packing	AS3209-123 (01-295)	(C)
- (72-60-03)	-	-	..Nut Self Locking Dbl. Hex.	4W004 (01-300)	(C)
- (72-60-03)	-	-	Plug, Shaft	4P0135 (01-310)	(C)
- (72-60-03)	-	-	..Packing	4P0137 (01-320)	(C)
- (72-60-03)	-	-	..Ring,Retaining	4P0136 (01-330)	(C)
- (72-60-03)	-	-	..Housing, Retaining ring	4P0134 (01-340)	(C)
4A2101 (72-60-10)	1	-	Gearbox,Assy Main	4A2100 (01-001)	(A) (B) (S1) (1D)
4B2286 (72-60-10)	1	-	.Nozzle,A/O Oil	4B2253 (01-350)	(A) (S2) (B)
4P2284 (72-60-23)	1	-	.Gear, Hydraulic Pump Drive	4P2227 (01-420)	(A) (S2) (B)

C. Expendables

Part Number	Nomenclature	Qty	Chapter/Fig-Item
8023812	Packing	1	29-11-51-05-040
S700G1047	Gasket	1	29-11-51-05-080
AS3209-162	Packing	1	72-60-10-01-740
AS3209-143	Packing	1	72-60-23-01-300

AS3209-130	Packing	1	72-60-23-01-340
AS3209-113	Packing	1	72-60-10-01-361
AS3209-110	Packing	1	72-60-10-01-364
AS3209-122	Packing	1	72-60-21-01-280

D. Instructions/Disposition Code Statements:

(A) New Parts are currently available for sale.

(B) Old part will no longer be available for sale.

(C) Old part coded (C) will be deleted.

(S1) Old parts and new parts coded (S1) are directly interchangeable.

(S2) New parts coded (S2 must replace old parts coded (S2) as a complete set per engine.

(1D) New part number may be obtained by rework and reidentification of the old part number.

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.