



SERVICE BULLETIN

SUBJECT: UNIVERSAL JOINT REPLACEMENT - RUDDER CONTROL (MOD N448)

1. Planning Information:

A. Effectivity:

(1) Aircraft Affected

All Nomad N22-Series and N24-Series aircraft whose log books do not already record the embodiment of Mod N448 or compliance with Service Bulletin NMD-27-21 or Service Bulletin NMD-27-21 Revision

Pre-certification implementation of the intent of this Service Bulletin is recorded in the Airframe Log Book as Mod N448.

(2) Spares Affected

Nil.

B. Reason

To eliminate backlash in and improve durability of universal joints in Rudder Control circuit.

C. Description

Existing torque shaft universal joints in the rudder control system are replaced by universal joints of superior material quality. In addition the existing taper bolts attaching the universal joints to the lower torque shafts are replaced by close tolerance bolts.

D. Compliance

Incorporation of the modification described in this Service Bulletin is strongly recommended as soon as possible following availability of Mod Kit.

E. Approval

The modification detailed herein has been approved pursuant to Air Navigation Regulation 40 and conforms with the type certification requirements.

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F. Manpower

20 Manhours.

G. Material - Price and Availability

The parts required to incorporate the modification detailed in this Service Bulletin are available as Kit No. NMD-27-21-1 from the operator's local distributor. Distributors are to place a purchase order on G.A.F. through the normal procurement procedure. Purchase orders are to quote the Aircraft Serial No. and Service Bulletin No. NMD-27-21 Revision 1. This Kit is available ex-factory, price on application.

H. Tooling - Price and Availability

Nil.

J. Weight and Balance

Negligible effect.

K. References

MM - Maintenance Manual.
IPC - Illustrated Parts Catalogue.

L. Publications Affected

MM
IPC

2. Accomplishment Instructions

A. Remove Torque Shaft Assemblies (Ref. Figure 1)

WARNING: DO NOT OPERATE FLIGHT CONTROLS WITH CONTROL COMPONENTS DISCONNECTED OR WHEN PERSONNEL ARE WORKING IN THE AREA CONCERNED. SERIOUS INJURY TO PERSONNEL OR DAMAGE TO FLIGHT CONTROL COMPONENTS AND STRUCTURES COULD OCCUR.

- (1) Remove the cover plates (Ref. IPC 53-30-01, Figure 1, Items 2) in the forward baggage compartment rear bulkhead.
- (2) Remove the rudder pedal and control column guards in the flight compartment to gain access to the torque shafts. (Ref. IPC 53-20-02, Figure 1).
- (3) Release the tension and disconnect the forward and aft rudder cables from the RH upper lever shaft (Ref. IPC 27-20-02, Figure 4, Item 11). Retain the nuts, washers and clevis bolts but discard the split pins.

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- (4) Disconnect the connecting rod between the LH and RH upper lever shafts (Ref. IPC 27-20-02 Figure 5), and from the connecting rod to the nose wheel steering assembly (Ref. IPC 32-50-00 Figure 1). Retain the bolts and washers but discard the self-locking nuts.
- (5) Remove the self-locking nuts, washers and bolts from the upper collars, retain the bolts and washers but discard the self-locking nuts. Slide the upper collars up the upper lever shafts as far as possible.
- (6) Remove and discard the self-locking nuts, special washers and taper bolts securing the universal joints to the lower lever shafts.
- (7) Remove the four self-locking nuts, washers and bolts securing the lower bearing housings to the structure for the LH and RH upper lever shafts, discard the self-locking nuts.
- (8) Adjust the rudder pedals to the fully aft position.
- (9) Disconnect the control rods from the LH and RH lower lever shafts. Retain the bolts and washers but discard the self-locking nuts.
- (10) Separate the upper lever shafts from the lower lever shafts by easing the upper lever shafts upwards and the lower lever shafts downwards as far as possible until each universal joint is clear of its associated lower lever shaft.
- (11) Lift the lower lever shafts from the bearings in the pedal slide assemblies and remove the shafts from the aircraft.
- (12) Lower the upper lever shafts from the upper bearing housings and remove the shafts, complete with universal joints from the aircraft.
- (13) Carry out crack detection test on upper and lower levers (Ref Alert Service Bulletin ANMD-27-23 (MOD N567) Para 5.C).

B. Replacement of Universal Joints.

- (1) Remove and discard the taper pins and universal joint attached to each upper lever shaft.
- (2) Using pigmented jointing compound, wet assemble the new universal joints to the upper lever shafts ensuring that the shoulder of the universal joint butts against the bottom of the lever shaft.

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NOTE: When fitting the universal joint to the upper lever shaft ensure that if an inspection hole or inspection paint mark is provided in the universal joint, the hole or the paint mark is at 90 degrees to the nearest taper pin hole in the upper lever shaft.

- (3) Ensure that the upper collars and lower bearing housings on the upper lever shafts are pushed well clear of the lower collars. Drill and ream for 0.250 inch per foot tapered pins through the lower collars, upper lever shafts and universal joints at the existing taper pin holes.
- (4) Fit taper pins P/N MS24692-311P through the lower collars, shaft and universal joints.

NOTE: The large end of the taper pin should protrude a minimum of half its diameter, (0.145 inches approximately), while the small end, before peening, should protrude about half its diameter (0.125 inches approximately).

- (5) Peen the small end of the taper pins.

NOTE: The large end of the taper pin should be supported whilst peening the small end to prevent the pin from moving.

- (6) Re-identify the LH torque shaft assembly as P/N 1/N-03-697 and the RH torque shaft assembly as P/N 1/N-03-698.
- (7) Locate the lower lever shafts on the universal joint journals ensuring that the shoulder of the universal joint butts against the top of the lower lever shaft, and align upper and lower lever shafts as shown in Figure 2. Do not wet assemble the joint to the lower lever shaft at this step.
- (8) Using the existing holes in the lower lever shaft, drill and ream the lower lever shafts and universal joints to $.3128 \pm .0003$ inches diameter. Spot face each hole 0.562 inches diameter to a maximum depth of 0.050 inches.
- (9) Separate the lower lever shafts from the universal joints, marking the shafts and universal joints to ensure correct re-alignment of the reamed holes on assembly in the aircraft.
- (10) Re-identify the lower lever shafts as P/N 2/N-45-1102.

C. Install Torque Shafts in the Aircraft

- (1) Install the LH and RH upper lever shafts into their respective locations. At this stage do not install the bolts, washers and self-locking nuts securing the lower bearing housing to the aircraft structure.

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- (2) Engage the lower lever shafts in the rudder pedal slide assembly bearings. Manipulate the lower lever shafts until the lower journals of the universal joints engage in the shafts. Use a pigmented jointing compound to wet assemble the lower lever shafts to the universal joints.
- (3) Align the reamed holes in the lower lever shafts and universal joints and install the bolts, washers and new self-locking nuts (with one washer under the bolt head and one under the nut). The bolt heads are to face outboard and aft respectively. Torque tighten the nuts to between 60 and 85 pounds inches.
- (4) Install the bolts, washers and new self-locking nuts securing the lower bearing housing to the aircraft structure. Torque tighten the nuts to between 90 and 110 pounds inches.
- (5) Move the upper collars into position and align the holes. Install the bolts, washers and new self-locking nuts and torque tighten the nuts to between 12 and 15 pounds inches.
- (6) Connect the rudder pedal control rods to the lower lever shaft arms with the bolts, washers and new self-locking nuts. Torque tighten the nuts to between 30 and 40 pounds inches.

NOTE: Ref Alert Service Bulletin ANMD-27-23 (Mod N567) Para 5.B for rework and shimming of levers.

- (7) Connect the connecting rod to the LH and RH upper lever shafts (Ref IPC 27-20-02 Figure 5) and to the nosewheel steering assembly rod (Ref IPC 32-50-00 Figure 1). Install the bolts (bolt heads uppermost), washers and new self-locking nuts, ensuring that there are spacing washers between the bearings and forks. Torque tighten the nuts to between 30 and 40 pounds inches.
- (8) Connect the forward and aft rudder control cables to the RH upper lever shaft arms with the clevis bolts, washers, nuts and split pins. (Ref IPC 27-20-02 Figure 5 items 19, 18, 17 and 16).

NOTE: Ensure the clevis bolts are free to turn with a maximum end float of 0.020 inches.

CAUTION: ENSURE THAT THE RUDDER CONTROL SYSTEM IS FREE FROM OBSTRUCTION.

- (9) Check the rigging of the rudder control system (Ref. MM 27-20-00).
- (10) Refit cover plates, rudder pedal and control column guards and any other panels removed for access to the torque shaft assemblies.

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3. Materials Information

A. Parts Required per Aircraft

(1) Kit P/N NMD 27-21-1 is required for each Aircraft.

(2) Each kit P/N NMD 27-21-1 comprises the following items:

<u>Item P/N</u>	<u>Title</u>	<u>Qty</u>
20-PF-1042	Universal joint	2
MS 24692-311P	Tapered pin, plain	4
NAS 1305-21	Bolt	4
MS 21083-N5	Nut	4
1/N-03-699	Washer, special	8

(3) The operator is required to provide the following items from stock or local sources:

<u>Item P/N</u>	<u>Title</u>	<u>Qty</u>
MS21044N3	Nut	2
MS21083N4	Nut	13
MS24665-153	Cotter pin-split	4

B. Parts Modified and Re-identified by Operator

<u>Item P/N</u>	<u>Title</u>	<u>Old P/N</u>
1/N-03-697	Torque shaft LH	1/N-45-1100
1/N-03-698	Torque shaft RH	1/N-45-1101
2/N-45-1102	Lever shaft, lower	1/N-45-1102

C. Parts Required to Modify Spares

None.

D. Removed Parts

<u>Item P/N</u>	<u>Title</u>	<u>Qty</u>	<u>Recommended Disposition</u>
MS 20271-B16	Universal joint	2	Scrap
AN 386-2-11A	Tapered pin, threaded	4	Scrap
MS 21083-N3	Nut	4	Scrap
AN 975-3	Washer, tapered pin	4	Scrap
MS 24692-284P	Tapered pin, plain	4	Scrap

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E. Special Tools and Equipment

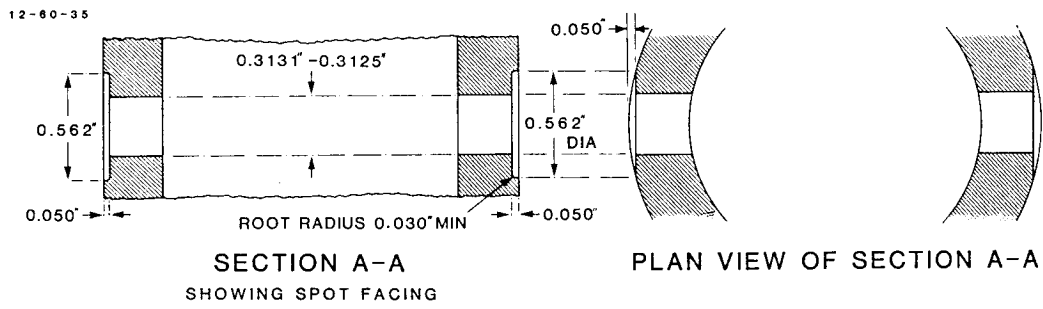
None.

4. Recording Action

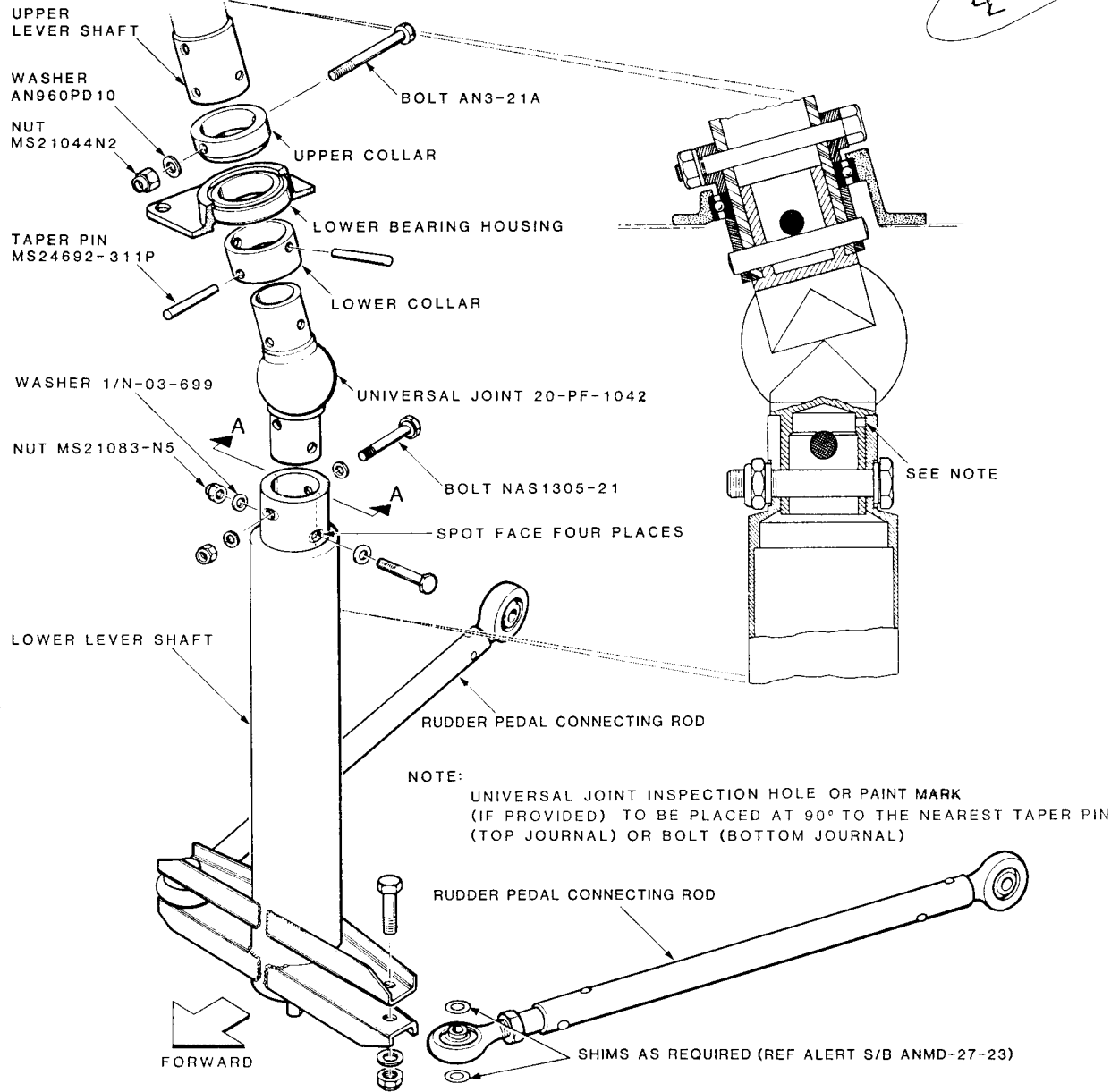
Record compliance with Service Bulletin NMD-27-21 Revision 1 in the airframe log book.

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NOT TO SCALE

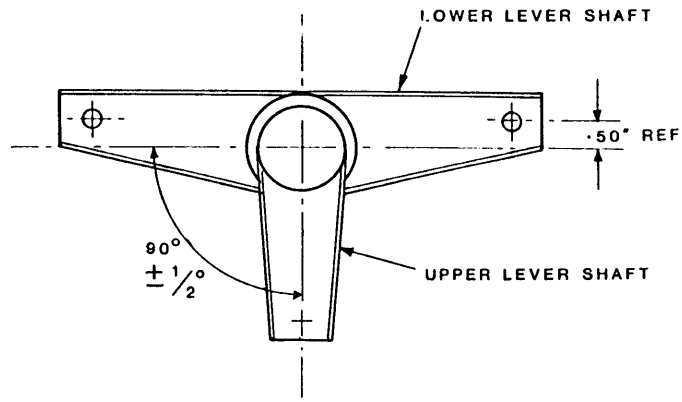


Reworked Torque Shaft Assembly LH
(Assembly RH Similar)
Figure 1

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Alignment of Upper and Lower Lever Shafts
Figure 2

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