SERVICE BULLETIN

Beech

TITLE: **LANDING GEAR - TORQUE KNEE INSPECTION**

SYNOPSIS OF CHANGE

This revision increases aircraft serialization that requires an inspection, changes inspection intervals from hours to cycles, and adds "whichever occurs first" per FAA request, information to plug the bushing holes and document change to perform Fluorescent Penetrant Inspection. Relevant technical changes are marked with change bars in the outside margins.

1. Planning Information

A. Effectivity

(1) Airplanes

(a) Civil

Beech King Air Model 65-90, 65-A90, B90, C90, C90A, Serials LJ-1 through LJ-1559;

Model E90, Serials LW-1 through LW-347.

(b) Military

Model 65-A90-1 and variants, Serials LM-1 through LM-141;

65-A90-4 and variants, Serials LU-1 through LU-16;

Model H-90 (T-44A), Serials LL-1 through LL-61.

If you are no longer in possession of the airplane, please forward this information to the present owner.

(2) Spares

None.

B. Reason

This Service Bulletin is being issued to require a Nondestructive Inspection (NDI) of the main landing gear upper and lower torque knees at reduced intervals and to prevent the loss of the main landing gear lower piston and wheel assembly. Undetected fatigue cracks in the main landing gear torque knees have caused separation of the lower piston and wheel assembly from the upper landing gear cylinder assembly, which may result in damage to the aircraft or personal injury.

NOTE

As a result of the fatigue crack reports, Raytheon Aircraft Company will be issuing future revisions to the Model 90 Maintenance Manual to change the upper and lower torque knee inspection intervals and to modify the inspection procedures called out in the Special Inspection section of Chapter 5. P/N 50-810032-4 upper torque knee and P/N 50-810295-1, P/N 50-810295-3, and P/N 50-810295-17 lower torque knees will have a reduced inspection interval which will be a separate inspection item from the existing landing gear inspection requirements in Chapter 5. Chapter 32 will be revised to add the fluorescent penetrant or magnetic particle inspection procedures for a more thorough inspection of the torque knees.

Product improvements on both torque knees are in process at Raytheon Aircraft Company. Raytheon Aircraft Company is implementing a material change in the upper torque knee from aluminum to a steel alloy. The lower torque knee will be changed to the same stronger steel alloy as the new upper torque knee. A Raytheon Aircraft Company Service Bulletin will be issued to announce the improved torque knees. These improvements will allow the torque knee inspection intervals to return to current 6 years/8000 hours, which ever occurs first, interval to coincide with the main landing gear inspection interval.

C. Description

This Service Bulletin will provide inspection methods to determine if there is any fatigue cracking in the upper and lower torque knees on the main landing gear, and replacement instructions for those torque knees found with cracks.

D. Compliance

(1) Civil Airplanes

Raytheon Aircraft Company considers this to be a mandatory inspection and it should be accomplished within the next 100 cycles (1 cycle = 1 landing) /or next scheduled inspection for main landing gear torque knees with accumulated time in service of 1000 hours. Recurring inspections are required every 1000 cycles or 2 years, which ever occurs first, until Service Bulletin 32-3116 "Main Landing Gear Torque Knee Replacement" has been accomplished.

An Airworthiness Directive has been requested on the matter covered by this Service Bulletin.

(2) Military Airplanes

For compliance information on military airplanes affected by this Service Bulletin, contact the appropriate headquarters.

E. Approval

The engineering data contained in this Service Bulletin is FAA approved.

F. Manpower

The following information is for planning purposes only:

Estimated man-hours: 20 hours.

Suggested number of men: 1 man.

The above is an estimate based on experienced, properly equipped personnel complying with this Service Bulletin. Occasionally, after work has started, conditions may be found which could result in additional man-hours.

G. Weight and Balance

Not changed.

H. Electrical Load Data

Not changed.

I. Software Accomplishment Summary

Not applicable.

J. References

Beech King Air 90 Maintenance Manual, P/N 90-590012-13B3 or subsequent revision, Chapter 32-31, Chapter 32-10, and Chapter 5-20.

Beech King Air Series Component Maintenance Manual, P/N 101-590097-13A15 or subsequent revision, Chapter 32-10.

K. Publications Affected

None.

L. Interchangeability of Parts

Not applicable.

M. Warranty Credit

(1) Civil Airplanes

No warranty credit for the inspection portion of this Service Bulletin.

If fatigue cracks are found, warranty credit to the extent noted under MANPOWER and MATERIAL will be allowed on all affected airplanes which are within standard airframe warranty at the time of the inspection.

Warranty coverage offered in this Service Bulletin will expire 12 months from the last day of the month Revision 1 of this Service Bulletin is issued. After that date, the owner/operator assumes the responsibility for compliance cost. Raytheon Aircraft Company reserves the right to void warranty coverage in the area affected by this Service Bulletin until the date the Service Bulletin is accomplished by a Raytheon Aircraft Company Authorized Service Center.

All warranty work must be accomplished by a Raytheon Aircraft Authorized Service Center rated to perform maintenance on the specific model of Beech Airplane.

All warranty reimbursements are handled through Raytheon Aircraft Company Authorized Service Centers. The owner/operator should arrange for an Authorized Service Center to perform the work and the Authorized Service Center must submit the standard Raytheon Aircraft Company warranty claim form.

(2) Military Airplanes

For warranty information on military airplanes affected by this Service Bulletin, contact the appropriate headquarters.

2. Material Information

A. Materials - Price and Availability

Contact a Raytheon Aircraft Authorized Service Center for information.

B. Industry Support

Not applicable.

C. Airplanes

(1) The following parts may be obtained through a Raytheon Aircraft Authorized Service Center:

Part Number	Description	Quantity Per Airplane
50-810032-12	Main landing gear upper torque knee	As required
50-810295-25	Main landing gear lower torque knee	As required

(2) The following materials may be obtained locally:

Part Number	Description	Quantity Per Airplane
	180 grit aluminum oxide abrasive paper	As required
	Nitric acid	As required
	Sodium hydroxide	As required

Part Number	Description	Quantity Per Airplane
MIL-C-5541	Alodine	As required
MIL-P-23377	Epoxy polyamide primer	As required
	Urethane topcoat paint	As required
PD 680	Solvent	As required
Alconox Inc.	Detergent	As required
	Plug (neoprene or natural rubber)	As required

Raytheon Aircraft Company expressly reserves the right to supersede, cancel and/or declare obsolete, without prior notice, any parts or publications that may be referenced in this Service Bulletin.

D. Spares

Not applicable.

E. Reidentified Parts

None.

F. Tooling - Price and Availability

Not applicable.

3. Accomplishment Instructions

NOTE

Should any difficulty be encountered in accomplishing this Service Bulletin, contact Raytheon Aircraft Company at 1-800-429-5372 or 316-676-3140 for commercial aircraft, and appropriate headquarters for military aircraft.

A. Airplane

WARNING

Observe all Warnings and Cautions contained in the aircraft manuals referred to in this Service Bulletin.

Whenever any part of this system is dismantled, adjusted, repaired or renewed, detailed investigation must be made on completion to make sure that distortion, tools, rags or any other loose articles or foreign matter that

could impede the free movement and safe operation of the system are not present, and that the systems and installations in the work area are clean.

(1) Pull the landing gear control circuit breaker, and place a note on the circuit breaker panel that landing gear maintenance and/or rigging is in progress.

(2) Remove all power from the airplane and disconnect the battery.

WARNING

Place the airplane on jacks prior to performing any inspection or maintenance. After performing maintenance of any type on the landing gear system and before releasing the aircraft to service, the landing gear must be cycled from the fully extended to fully retracted and back to fully extended at least once, checking for proper operation and rigging.

Never service the accumulator or the hydraulic system or do maintenance or rigging of the landing gear without first placing the airplane on jacks. Stay clear of the wheel wells, landing gears, and gear doors while the landing gear is in operation.

When jacking the airplane in an unsheltered area where winds in excess of 35 knots may be encountered, never jack more than one gear clear of the ground at a time.

Anytime the landing gear is only partially retracted during maintenance, always cycle the gear with the power pack through at least one complete cycle before removing the airplane from jacks.

When working on a landing gear or its associated hydraulic retraction system, be aware that movement of a hydraulic actuator cylinder may cause unanticipated movement of other actuator cylinders in the system.

(3) Place the airplane on jacks to support the weight of the airplane. Raise jacks to a height sufficient only to support the weight of the airplane. Do not raise the tires off the floor. Having the tires in contact with the floor will prevent the main landing gear lower pistons from extending after the torque knees are removed.

(4) Release the air pressure entirely before removing the valve core from the shock strut.

(5) Remove the upper torque knee from the airplane. Refer to Chapter 32-10 of the Maintenance Manual for removal procedures. Carefully inspect the complete torque knee for fatigue cracks using the FLUORESCENT PENETRANT INSPECTION methods listed on page 8. Pay particular attention, but not limited to, areas pointed out in Figure 1. Replace any torque knee when fatigue crack indications are found. If no fatigue crack indications are found, repaint the inspected torque knee with epoxy polyamide primer and urethane topcoat paint in accordance with the appropriate Maintenance Manual, Chapter 20-08.

(6) Remove the lower torque knee from the airplane. Refer to Chapter 32-10 of the Maintenance Manual for removal procedures. Carefully inspect the complete torque knee for fatigue cracks using the MAGNETIC PARTICLE INSPECTION methods listed on page 10. Pay particular attention, but not limited to, the areas pointed out in Figure 2. Replace any torque knee when fatigue crack indications are found. If no fatigue crack indications are found, repaint the inspected torque knee with epoxy polyamide primer and urethane topcoat paint in accordance with the appropriate Maintenance Manual.

(7) Install the inspected upper and lower torque knees, or new torque knees, in accordance with the appropriate Maintenance Manual.

(8) Remove the airplane from jacks.

CAUTION

Never tow or taxi with a flat strut. Even brief towing or taxiing with a deflated strut can cause severe damage.

Do not inflate the struts while the airplane is on jacks since sudden extension or over inflating the struts may bend the torque legs.

Before removing the airplane from the jacks, make sure that the manual hand pump handle is in the stowed position, that the red knob on the service valve is pushed down and the plunger retainer and safety pin or safety wire are installed, that the landing gear control handle is in the DOWN position, and that the landing gear is down and locked.

With the airplane empty except for fuel and oil, inflate the main strut with DRY FILTERED AIR or NITROGEN ONLY until the piston is extended 3 inches.

(9) Service the shock strut in accordance with the appropriate maintenance manual.

(10) Place the airplane on jacks.

NOTE

While rigging the landing gear, observe the components and hydraulic lines for any indications of binding, dragging, interference, leakage, or questionable operation. Correct any problems as necessary.

(11) Perform a landing gear system rigging and retraction check, and verify safety switch rigging in accordance with maintenance manual.

(12) Remove the airplane from jacks in accordance with the maintenance manual.

(13) Return the airplane to service.

FLUORESCENT PENETRANT INSPECTION OF THE ALUMINUM UPPER TORQUE KNEE

NOTE

The inspection procedures listed below are provided as general information on the subject and are not intended to substitute for competent training and certification. IT IS RECOMMENDED THAT ONLY QUALIFIED PERSONNEL PERFORM THE INSPECTIONS TO REDUCE THE POSSIBILITY OF MISINTERPRETATION OF INDICATIONS.

(1) Remove the bushings from the three lug locations on each upper torque knee. Refer to the King Air Component Maintenance Manual, Chapter 32-10.

(2) Clean any grease and lubricant residue from the torque knees using Federal Specification PD680, Dry Cleaning Solvent.

(3) Remove all paint and primer from all surfaces of each torque knee using a suitable liquid paint stripper. The stripper manufacturer's recommendations should be followed for use of the product.

(4) After completion of the paint stripping, thoroughly wash each torque knee in a warm water solution containing a cleaner. A recommended product is Alconox detergent mixed at a concentration of 1 ounce cleaner per gallon of warm water. Each torque knee should be scrubbed with a non-metallic stiff bristle brush.

(5) After cleaning, rinse each torque knee under hot running tap water to remove residual cleaner and dry with paper towels.

CAUTION

The bushing holes must be plugged completely with a rubber (neoprene or natural) plug to prevent the sodium hydroxide (NaOH) solution from entering the bushing holes of the torque knee. The sodium hydroxide will etch away minute amounts of metal from the bushing holes which will could make the bushings fit loosely.

(6) Insert the rubber plugs into the bushing holes to prevent sodium hydroxide from entering the holes.

(7) Perform a chemical etch of each torque knee. Chemical etching will increase the capability to detect cracking in locations where surface smearing or abrasion has occurred. Additionally, chemical etching will assist in removing any active corrosion on the surfaces of the part. Etching should be accomplished in accordance with the following procedure:

WARNING

Sodium hydroxide and sodium hydroxide solutions should be handled with care using suitable personal safety protection. Contact with eyes or skin can cause severe chemical burns and possible permanent damage.

(a) In a polyethylene container of suitable size, prepare a 10% (Weight/Volume) solution of sodium hydroxide solution by slowly adding 100 grams sodium hydroxide (NaOH) to 900 milliliters of water. Stir gently until the sodium hydroxide has dissolved. Dilute solution to a final volume of 1 liter and allow to cool before use (70 - 90° F).

WARNING

When preparing acid solutions, always add acid to water, never add water to acid. Acid solutions should be handled with care using suitable safety protection. Contact with eyes or skin can cause severe chemical burns and possible permanent damage. Work areas should be adequately ventilated.

(b) Prepare a 30% nitric acid solution by adding concentrated nitric acid slowly to 700 milliliters of water while stirring until a total volume of 1000 milliliters (1 liter) is obtained.

(c) Immerse the torque knee in the sodium hydroxide solution for 2 to 3 minutes. During etching of torque knees, maintain the sodium hydroxide solution at a temperature between 70 and 90° F. The solution temperature may be controlled by positioning the container in a sink or larger vessel, and flowing hot or cold tap water, as required, around the solution container.

NOTE

The etch rate of the sodium hydroxide solution is influenced by the concentration, the temperature of the solution, and the extent of etchant depletion. Recommended times for immersion in the solution are based on etch rates established for the recommended concentration used within the recommended temperature range. A one liter container of solution is considered acceptable for etching six torque knees before the solution depletion will significantly affect etch rates. After etching six torque knees, the solution should be disposed of in accordance with local regulations.

(d) After completion of the required immersion time, remove the torque knee from the sodium hydroxide solution and rinse in warm flowing tap water.

(e) Immerse the torque knee in the nitric acid solution for one to five minutes or until all black smut is removed. The solution will remove smut created during the etch process and brighten the surface.

(f) Remove the torque knee from the nitric acid solution and thoroughly rinse in warm flowing tap water for complete removal of the solution.

CAUTION

Do not overheat the torque knees during drying. Overheating may cause precipitation aging of the alloy and result in a loss of strength.

(g) The torque knees must be thoroughly dried to drive moisture out of any possible cracks prior to performing the liquid fluorescent penetrant inspection. Drying should be accomplished by

heating the part to a temperature of 150 - 200° F. for a minimum of one hour. Heating can be accomplished in an oven, by the use of heat lamps, or by other suitable means.

(8) Perform a Type I, Method C, Sensitivity Level 3, fluorescent penetrant inspection in accordance with American Society for Testing and Materials ASTM E 1417 95a on all surfaces of the upper torque knee except the inner shear web. The following considerations associated with the inspection process should be observed:

(a) Allow a minimum penetrant dwell time of 30 minutes. Excessive dwell times should be avoided because some penetrants exhibit a tendency to dry during prolonged exposure to air. All surfaces of the part should be maintained wet with penetrant during the dwell cycle.

(b) Indications detected during penetrant inspection should be confirmed or disproved. A questionable indication should first be dry sanded with 180 grit aluminum oxide abrasive paper, sanding in a direction perpendicular to the direction of the indication. The local area then should be recleaned with the penetrant system cleaner and reinspected, starting with application of penetrant.

(c) Indications confirmed to be representative of cracking are cause for rejection of the part unless engineering authorization will allow removal of material to eliminate the cracking location.

(9) Coat torque knee with Alodine 1200, 1200S or 1201. Allow the coating to dwell for approximately five minutes. After the dwell time has elapsed, wash the coated areas with water and blow dry (do not wipe dry).

(10) Prime and paint each torque knee.

(11) Remove the rubber plugs that were installed in Step (6).

(12) Install bushings in all three lugs of each torque knee. Refer to Chapter 32-10 of the Component Maintenance Manual for wear limits and tolerances for the bushings.

MAGNETIC PARTICLE INSPECTION OF LOWER STEEL TORQUE KNEE

NOTE

The following inspection procedures are provided as general information on the subject and are not intended to substitute for competent training and certification. IT IS RECOMMENDED THAT ONLY QUALIFIED PERSONNEL PERFORM THE INSPECTIONS TO REDUCE THE POSSIBILITY OF MISINTERPRETATION OF INDICATIONS.

Inspect the torque knee for any evidence of fatigue cracks after each shot.

The magnetic particle inspection for the P/N 50-810295 Lower Torque Knee consists of a wet continuous, fluorescent particle, three phase, full wave, direct current technique, using a pulse length of 1/2 to 1 second and is accomplished as

follows:

Do not remove bushings from torque knees.

(1) Clean any grease and lubricant residue from the torque knees using Federal Specification PD680, Dry Cleaning Solvent.

CAUTION

Do not remove cadmium plating during paint removal.

(2) Remove all paint and primer from all surfaces of each torque knee using a suitable liquid paint stripper. The stripper manufacturer's recommendations should be followed for use of the product.

(3) After completion of the paint stripping, thoroughly wash each torque knee in a warm water solution containing a cleaner. A recommended product is Alconox detergent mixed at a concentration of 1 ounce cleaner per gallon of warm water. Each torque knee should be scrubbed with a non-metallic stiff bristle brush.

(4) After cleaning, rinse each torque knee under hot running tap water to remove residual cleaner and dry with paper towels.

(5) Shot #1 - Shoot a centrally located central conductor through the small holes at the small end of the torque knee at 500 amps.

(6) Shot #2 - Shoot a centrally located central conductor through the large holes at the larger end of the torque knee at 600 amps.

(7) Demagnetize the torque knee.

(8) Shot #3 - Shoot a direct contact shot between the left-hand large diameter hole ear and the right-hand small diameter ear at 600 amps.

(9) Demagnetize the torque knee.

(10) Shot #4 - Shoot a direct contact shot between the right-hand large diameter hole ear and the left-hand small diameter hole at 600 amps.

(11) Shot #5 - Shoot a coil shot at 800 amps with the torque knee located near the inside diameter of the coil.

(12) Inspect the torque knee for any evidence of fatigue cracks.

(13) Demagnetize and clean the torque knee.

B. Spares

Not applicable.

C. Record of Compliance

Upon completion of this Service Bulletin, make an appropriate maintenance record entry.

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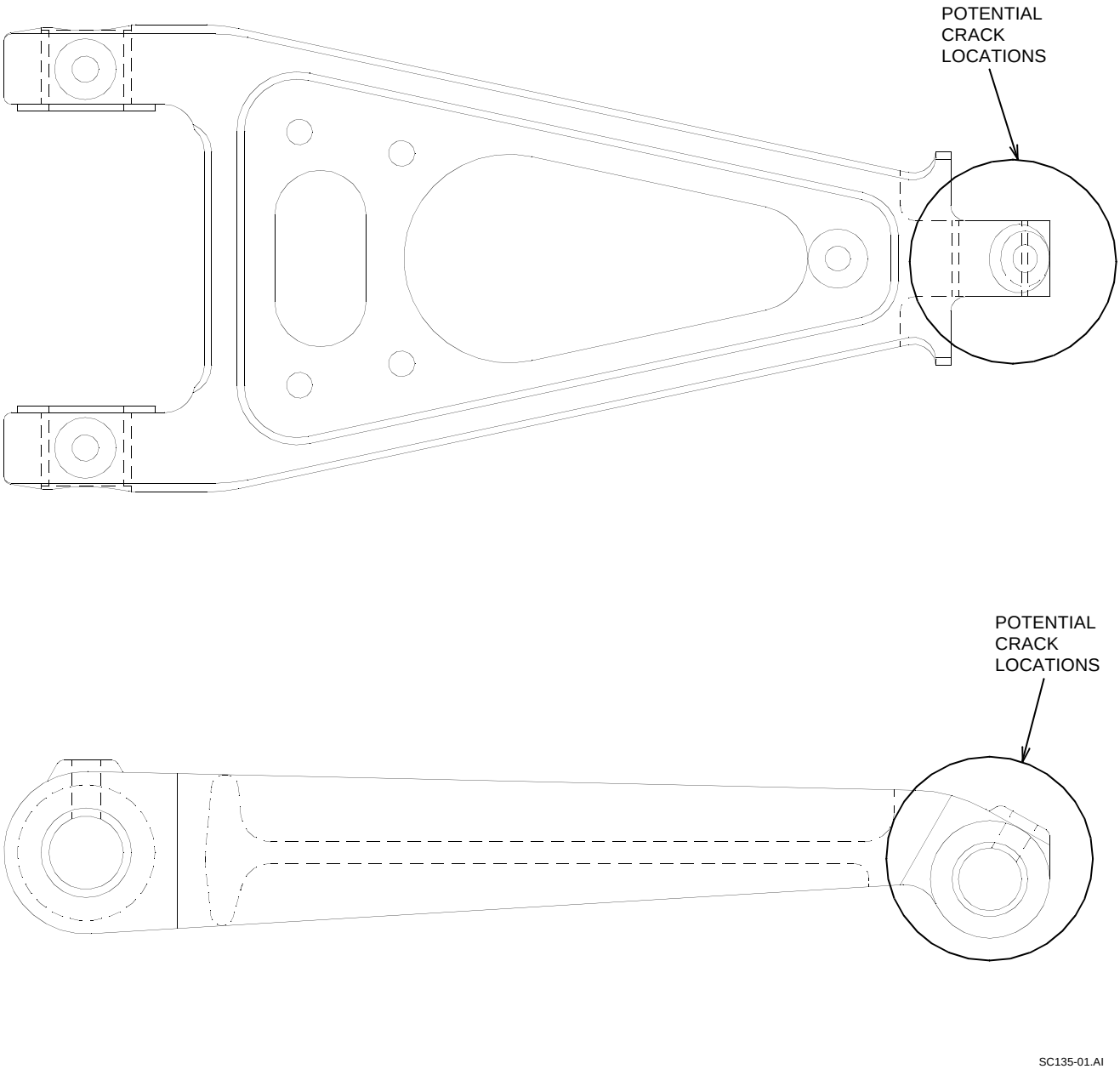
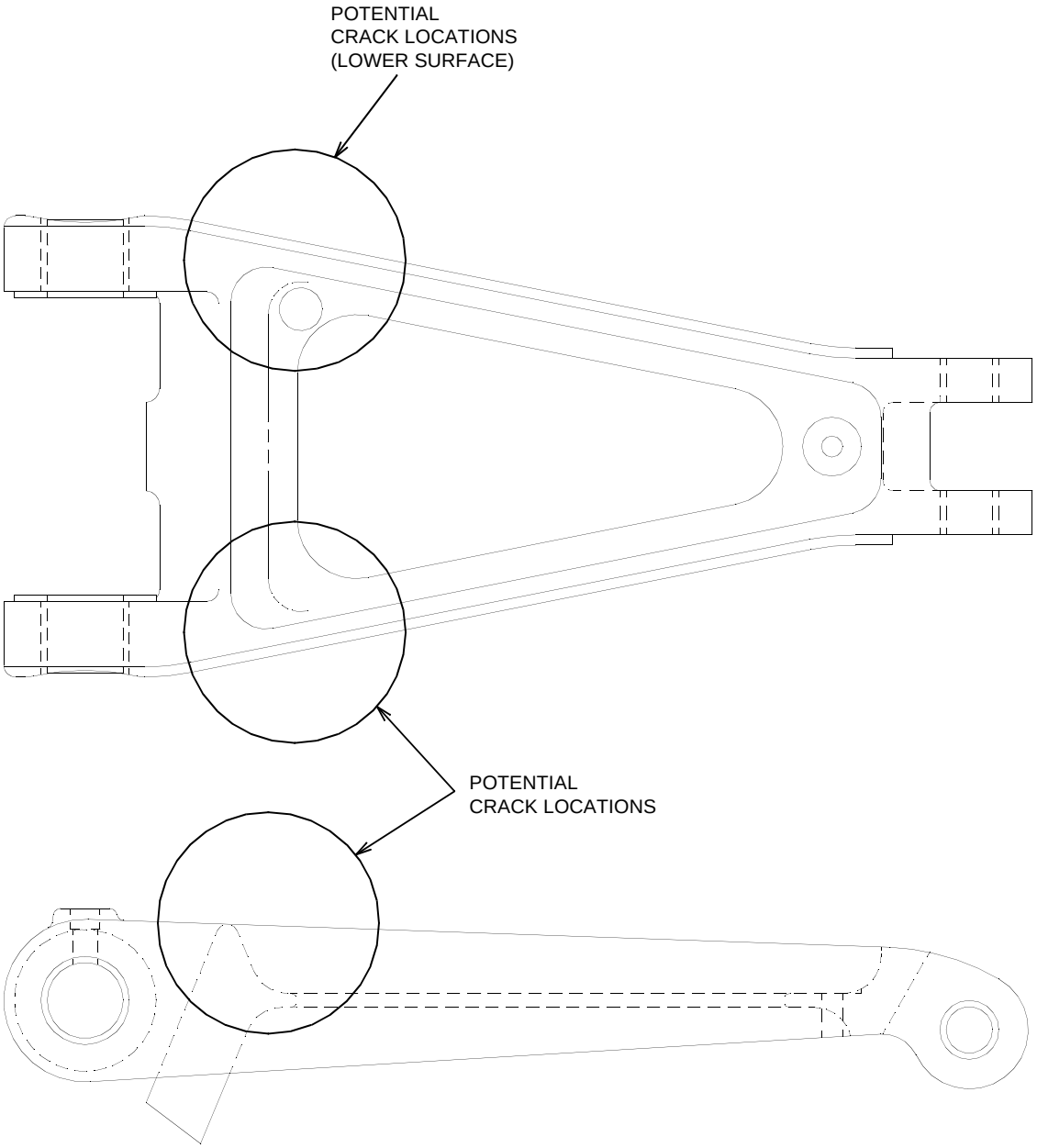


P/N 50-810032-4 Upper Torque Knee
Figure 1

SERVICE BULLETIN



P/N 50-810295-1/-3/-17 Lower Torque Knee
Figure 2