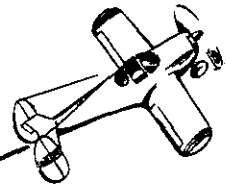


# Ercoupe MEMORANDUM

ERCOUPE  
SERVICE  
MEMORANDUM

No. **15**

**SUBJECT: Vibration—Nose Landing Gear  
Strut and wheel**



1. This company has found that certain undesirable vibration occasionally occurs in the Ercoupe airplane and the cause has been traced to the Nose Landing Gear. Following the established policy of forwarding all information, as soon as it is available, we are supplying you with the following analysis and correction of the condition.

2. The basic trouble seems to be the lack of static balance and probably dynamic balance, also looseness in the nose landing gear assembly. This lack of balance and looseness can cause or contribute to wheel shimmy, wheel tramp or vibration in the nose landing gear. The strut vibration is fore and aft bending of the strut. The frequency of this vibration is the natural frequency of the nose landing gear strut and wheel assembly. When the R.P.M. of the wheel is close to the frequency the strut vibrates with amplitude depending upon the amount of unbalance. It is in no way resonant with the vibration frequency of any other component on the airplane. It does forcibly vibrate parts of the airplane structure by transmission through the engine mount and fuselage. This vibration continues only so long as the excitation exists. To determine if this condition exists, the tail of the airplane should be lowered and anchored so that the nose landing gear wheel is suspended clear of the ground. A strong steady stream of compressed air should be played over the surface of the tire or directed to the vanes in the wheel, turbine fashion, so that the wheel rotates. The wheel should rotate smoothly, at all speeds, and perpendicular to the axle without any irregular side motion. If unbalanced, the wheel will show a wobble, vibrate or shimmy. When the latter result is observed, immediate correction of the condition is necessary.

3. In order that the customer may not be burdened with undue delay, it is recommended that the work be done locally. Any reputable automotive machine shop will have facilities to dynamically balance a wheel and the cost is negligible. If a counterbalance is required, we recommend that the wheel bearing housing rim be drilled and tapped at the point where installation is necessary so that the counterbalance may be screwed down permanently.

4. When it is found that a wheel is unbalanced, further inspection of all component parts of the nose landing gear and wheel assembly must be made to determine if there has been any resulting damage or loosening due to vibration. The following is a check list governing the correct procedure in regard to inspecting parts in the nose landing gear and wheel assemblies:

1. The wheel assembly should be removed and disassembled.
  - a. Check wheel bearing housing casting for cracks, breaks and deformation with emphasis on bearing surfaces.
  - b. There should be a snug fit between the axle and bearing. Excessive play or looseness will prove axle or bearing to be defective. Bearing surfaces should be checked for abrasions, irregularities and cracks. Axle should resist removal by hand and any looseness, whatsoever, will indicate that the piece should be replaced.
  - c. Contact facings, where wheel rim join should be smooth and must seat flush.
  - d. Check bolts, nuts and threads for damage.
2. Check tire and tube for uncommon abrasions and irregularities.
3. When wheel is assembled, nuts must be placed on side where rim is drilled to take inner tube valve. Draw nuts tight to assure flush seating of rim facings. Old cotter pins should be discarded and new ones used.
4. Nutcracker and fairing assembly should be removed and inspected.
  - a. Check generally for breaks and distortion.
  - b. At points where nutcracker assembly is anchored to strut assembly collar and wheel support casting, check bolts, nuts and bushings. Steel bushings should be smooth and show no surface irregularities. Bakelite bushings should fit tight in strut assembly collar and wheel support casting anchor points. Insert steel bushings in bakelite bushings and check clearance. Clearance should not exceed an allowable wear factor of .008". Greater clearance indicates bushings should be replaced.

5. Remove engine cowl bottom and cabin floor board to inspect ball joint, connecting rod and control column anchor point for excessive looseness and breaks.
  6. Grasp oleo strut assembly at collar and shake to determine whether there is any play in anchor point on engine. If any excessive looseness is apparent, the oleo strut should be removed and through bolt examined. Check Phillips screws in top of strut for tightness. When oleo strut is re-installed draw nut tight and use new cotter pin to lock nut. Inspect collar on oleo strut for breaks and check bolts for tightness.
  7. Reassemble nose landing gear assembly.
    - a. Bolts on nutcracker assembly anchor points, on strut collar and wheel support, should be tight so that steel bushing will turn in bakelite bushing.
    - b. Edge of the break on the leading edge of nutcracker should be checked to see that it fits close to strut cylinder when nose landing gear assembly is extended.
5. The company does not contemplate assuming wheel balancing charges of any outside shop. We will, however, balance wheels in our own plant if local facilities are not available and/or customer is willing to concur with the delay involved. There shall be no charge for wheels balanced in this plant provided wheel is shipped prepaid. Replacements will be made for damaged and defective parts, that are a direct result of this condition. A charge will not be made on replacements, only on the condition that damaged and defective parts are shipped to us; as such. This offer does not include wheel and tire assemblies.