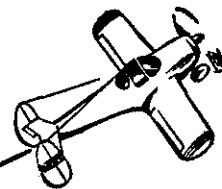


Ercoupe MEMORANDUM

ERCOUPE
SERVICE
MEMORANDUM

No. **41**

**SUBJECT: Rebuilding of Nose Landing
Gear Assembly**



The purpose of this memorandum is to provide information and instructions for maintaining and rebuilding the Ercoupe nose landing gear assembly. All changes and modifications which have been incorporated in production to this date will be included.

It is recommended that nose landing gear assemblies be rebuilt when any major component part is replaced, in order that current improvements may be incorporated.

1. Preliminary Operations

(a) Remove nose landing gear assembly from ship.

- (1) Weight down the tail using sand bags, protecting the surface of the stabilizer assembly to prevent damages to the skin.
- (2) Disconnect the pushrod assembly at the ball steering joint fitting.
- (3) Remove bolt attaching lower end of outer cylinder, to engine mount "V" supports.
- (4) Remove upper attaching bolt at top of outer cylinder.
- (5) Slip out complete nose landing gear assembly by pulling out of engine mount sleeve.

(b) Prepare for disassembly.

- (1) Remove external dirt, grease, and oil with cleaning fluid.
- (2) Remove gauge assembly from the strut and drain hydraulic oil, by inverting and supporting in extended position for about an hour. This may be speeded up by pumping it up and down after several minutes draining.

2. Disassembly: (Reference Figure 1).

(a) Remove wheel assembly from support.

- (1) Straighten the tab of the lockwasher that holds lock nut.
- (2) Remove lock nut with spanner wrench or tap off with a soft nosed punch and hammer.
- (3) Remove lockwasher.
- (4) Remove wheel assembly from axle. It is a press fit and can be either tapped or pressed off. (See Service Bulletin No. 16).

(b) Remove nutcracker assembly.

- (1) Remove lower attaching bolt at junction of nutcracker lower link with wheel support assembly.
- (2) Remove upper attaching bolt at junction of nutcracker upper link with steering sleeve.
- (3) Remove nutcracker assembly.

(c) Disassemble oleo strut assembly.

- (1) Remove the four countersunk screws which fasten the cylinder head assembly to the outer cylinder.
- (2) Push down cylinder head assembly into outer cylinder until oil retainer support is exposed below bottom of outer cylinder.
- (3) Remove the four countersunk screws which fasten oil retainer support to top of inner cylinder.
- (4) Pull inner cylinder off of piston assembly.
- (5) Dump spring out of bottom of inner cylinder.
- (6) Push up piston assembly and remove through top of outer cylinder.
- (7) Remove bolts that hold steering sleeve and steering collar together and slide both off of outer cylinder.

3. Inspection, Reworking, and Assembly of Collar, Sleeve and Outer Cylinder Assemblies:

(a) Inspect collar and sleeve assemblies:

Item	Satisfactory	Reject	Rework
1. Collar and sleeve inside diameter.	2.200" or less 415-34029F } To be used 415-34057J } with early cylinder 415-34080E.	Over 2.200	Rebore to 2.212 becomes 415-34029G } Then use 415-34057K } with a revised cylinder, 415-34080F.
	2.220" to 2.210" 415-34029G } For use with 415-34057K } revised cylinder, 415-34080F.	Over 2.220	None
2. Collar Steering Ball joint; (a) Hole.	.378" I.D. or less	Above .378" I.D.	Use threaded bushing. See sub-para. (b-1) which follows.
(b) Threaded Mount 415-34029K.	Threads meet Class 3 fit.	Threads fail to meet Class 3 fit.	
3. Collar and sleeve assy. bolt holes, inside diameter.	.255" or less	.256" or more	None
4. Sleeve, nutcracker attachment boss.	Boss must be chamfered 1/8" x 1/8" parallel to major bore axis for nutcracker clearance.		Chamfer. See sub-para. (b-2) which follows.

(b) Rework collar and sleeve assemblies where applicable as follows:

(1) Rework ball steering joint fitting holes as follows; (ref. Fig. 2).

- a. Drill and ream hole to 7/16" (.437) diameter.
- b. Counterbore top of hole 9/16" diameter, leaving 25/64" (.390) from bottom of counter bore to bottom of boss.
- c. Insert special bushing (415-34212-1) by pressing.
- d. Screw ball fitting into bushing until tight and lock with elastic stop nut (AN364-624).

(2) File 1/8" x 1/8" chamfer on each end of boss, parallel to major bore and at 45° to bushing hole. (See Fig. 3D).

(c) Inspect outer cylinder assembly.

Item	Satisfactory	Reject	Rework
1. Lower attaching fitting.	Sound weld, holes not elongated. No apparent deformation.	Crack in weld. Damaged by bending and twisting.	None.
2. Upper inner bushing inside dia.	Less than 1.895" bore.	More than 1.895" at any point.	None.
3. Upper end, counter-sunk screw holes.	Inner diameter of four holes not elongated.	Any holes elongated, except by staking.	Install four added screws at 45° to old holes (cyl. head must be reworked to match).

Item	Satisfactory	Reject	Rework
4. Dia. of outside bearing surfaces (415-34080F).	2.187" O.D. or larger. Smooth surface.	Less than 2.187" O.D. or scored surface.	None.
4a. Diameter of outside bearing surfaces (415-34080E).	2.200" O.D. or larger Smooth surface.	Less than 2.200" O.D. or scored surface.	Rework to become 415-34080E. See sub-para. (d-1) which follows.
5. Lubrication. Fitting opening	Threads satisfactory. Passage open and clean.	Threads damaged.	Clean passage and retap thread.
6. Collar and sleeve lubrication opening.	Passage exists and open.		Incorporate change. See sub-para. (d-2) which follows.
7. Air Vent.	Passage exists and open.		Incorporate change. See sub-para. (d-3) which follows.
8. Lower inner bushing.		All old type.	Replace with 415-34133. See sub-para. (d-4) which follows.

(d) Rework outer cylinder where applicable as follows:

- (1) Machine outer cylinder bearing areas to 1.192" O.D., smooth machine finish. Use collar 415-34029F and sleeve 415-34057J with cylinder, which is now 415-34080E.
- (2) Modify outer cylinder to incorporate sleeve and collar lubrication openings (ref. Fig. 3C), if not previously drilled.
 - a. Mark holes in external bearing area of outer cylinder as shown in illustration 3c.
 - b. Drill a 1/4" hole at each of the four locations.
 - c. Burr holes carefully and chamfer outside edges slightly.
- (3) Modify outer cylinder to incorporate air vent holes, (ref. Fig. 3B) if not previously drilled.
 - a. Mark two holes in outer cylinder, opposite each other, as shown in illustration 3A.
 - b. Drill two No. 30 holes through outer cylinder at the marked locations and burr holes.
 - c. Before the strut is installed, similar air vent holes must be drilled in engine mount sleeve as shown in illustration 3B, and they must be aligned on assembly.
- (4) Machine bore of outer cylinder to take new type bushing. (ref. Figure 3D)
 - a. Bore cylinder from lower end, concentric with cylinder outside surface, 1-1/4" deep to a diameter of 2.019 making a light press fit with the new lower bushing (415-34133) to be used. Do not press bushing in place until sleeve has been installed on cylinder.

(e) Assemble outer cylinder as follows:

- (1) Coat lubrication grease on bore of collar and sleeve assemblies and slide in respective places on outer cylinder. Be sure to insert sleeve spacer washer (415-34051) on top of steering sleeve at assembly.
- (2) Fasten collar and sleeve assemblies with two bolts (AN4-13A), two washers (AN960-416L) and two elastic stop nuts (AN965-428).
- (3) Check up and down play of collar and sleeve assemblies. If in excess of .002", replace sleeve spacer washer (415-34051) with a thicker one as required. Replacement spacers are laminated shim stock that can be peeled to desired thickness.
- (4) Install lower bushing (415-34133) as follows: (ref. Figure 3D).
 - a. Press bushing (415-34133) into lower end of outer cylinder.
 - b. Mark two holes on each side of outer cylinder as shown in Illustration 3D.
 - c. Drill these four holes with a No. 36 drill through outer cylinder and bushing. Burr holes very carefully, chamfering slightly.
 - d. Tap these holes with a 6-32-NC-3 tap.
 - e. Secure bushing with four fillister head screws (415-34214) and four washers (AN960-6). Safety the screws on each side to each other with .041" dia. brass safety wire.

NOTE: It is recommended that the new type bushing be installed on all outer cylinders, since its life is several times that of the straight bushing.

4. Inspection, Reworking, and Assembly of Inner Cylinder, Wheel Support, Piston Assembly and Spring:

(a) Inspect inner cylinder and associated parts after disassembly.

Item	Satisfactory	Reject	Rework
1. Inner cylinder wall thickness.	More than .107".	.070" or less, this is "thin wall" cyl.	None. To remove inner cylinder from wheel support, see sub-para. (b-1) which follows.
2. Inner cylinder outside dia.	1.8725" O.D. or more.	Less than 1.8725" O.D.	
3. Countersunk screw holes.	Inner dia. of four holes not elongated.	Any holes elongated except by staking.	Drill and countersink four screw holes 45° to old holes.
4. Wheel support	No distortion or cracks. Axle at 90° to bore.	Any distortion or cracks. Support bent.	None. Straighten if sprung.
5. (a) Piston Assy. 415-34082 used with "thin wall" inner cylinder.	See Item 1, this part cannot be used with "heavy wall" inner cylinder.		None.
(b) Cyl. head assy. and piston guide tube.	Four attachment hole threads meet Class 3 fit. Upper strut attach. hole not elongated. Guide tube not distorted or loose in cylinder head assy.	Any attachment hole thread failing to meet Class 3 fit. Strut attachment hole damaged. Guide tube distorted or loose in cylinder head assy.	None. None. None. Tube is induction brazed to cyl. head.
(c) Shock Absorber.	No swelling, cuts or pinches.	Any swelling, cuts or pinches.	None.
(d) Oil retainer Support.	Four attachment hole threads meet Class 3 fit.	Any attachment hole threads failing to meet Class 3 fit.	Redrill and tap four 6-40 screws at 45° to old holes.
(e) Oil retainer.		Oil retainer must be replaced.	None.
(f) Support flange.	Tight on tube.	Any bolt hole wear.	None.
(g) Orifice fitting.	9/32" dia. orifice hole. Tight on tube.	Worn bolt hole.	Incorp. 9/32" orifice hole, see sub-para. (B-2) which follows.
6. Spring.	Solid height 4". Free length 6½" or more.	Solid height more than 4". Less than 6½".	None. None.

(b) Rework inner cylinder, wheel support, piston assembly where applicable.

(1) Remove inner cylinder from wheel support, when necessary, as follows:

a. Remove nut from stud which extends through wheel support.

b. Heat wheel support by immersing it in boiling water or hot oil (220°-300°F). Leave in liquid until support reaches 200° or more.

c. Tap top of wheel support with a soft-nose hammer to remove it from the cylinder.

(2) Incorporate 9/32" diameter orifice hole by enlarging to that size with 9/32" drill, drill at 25° to axis. Burr hole, but do not chamfer.

(c) Assemble wheel support to inner cylinder.

(1) Coat bore of wheel support (415-34096) with Litharge of Lead Oxide and Glycerine.

(2) Press inner cylinder (415-34130) into bore, aligning stud with hole in wheel support.

(3) Secure inner cylinder to wheel support with washer (AN960-416L) and self-locking nut (AN364-428).

(d) Reassemble piston parts to fabricate piston assembly (415-34126).

- (1) Remove old oil retainer from its support (if old support is to be used) by driving out with a punch and press new one (415-34126-1) in place with solid face in bottom of bore.
- (2) Slide shock absorber (415-34087), oil retainer support (415-34129), support flange (415-34128), and orifice fitting (415-34127) on piston guide tube.
- (3) Fasten support flange and orifice fitting with bolts (AN3-11A), washers (AN960-10L), and elastic stop nuts (AN365-1032). Avoid excessive tightening because it will deform piston guide tube.

5. Inspection, Reworking, and Assembly of Nutcracker Assembly:

(a) Inspect nutcracker assembly (415-34059).

Item	Satisfactory	Reject	Rework
1. Upper and lower link assemblies.	No cracks at welding. No distortion or twist. No elongation at attachment holes.	Any cracks, distortion, twist, or elongated attachment holes.	None.
2. Rubber bumper.	Snug attachment. No cuts or bruises.	Any cuts or signs of bruises or deterioration.	None.
3. Fairing.	No cracks at rivets or radius. No dents or bends.	Excessive cracks. Dented too much.	None.
4. Middle joint.	Less than 1/32" play between parts.	More than 1/32" play between parts.	Add washers to eliminate play. See sub-para. (b-1) following.

(b) Rework nutcracker assembly.

- (1) Add washers (AN960-416L), as required to eliminate end play between upper link spacer and lower link collar.

(c) Reassemble nutcracker.

- (1) Assemble upper link (415-34043) and lower link (415-34019) with bolt (AN24-40) two washers (AN960-416L) and castle nut (AN320-4) with the necessary spacer washers. Tighten bolt, then back off 1/2 turn to cotter pin hole.

6. Inspection, Reworking and Assembly of Wheel and Axle:

(a) Inspect wheel assembly and axle. NOTE: Before attempting to disassemble wheel, tire must be fully deflated to avoid personal injury or damage to tire.

Item	Satisfactory	Reject	Rework
1. Rims.	Aluminum Alloy. No cracks, distortion or wear.	Magnesium Die Cast. Any cracks, distortion or wear.	As per Bulletin No. 16. None.
2. Wheel Bolts.	Knurl on bolt 1 3/8" long (415-34212).	Knurl on bolt less than 1 3/8" long.	Old bolt may be used if sheer nut and cotter pin are still used.
3. Bearing.	No excess wear or play.	Any excess wear or play.	None.
4. Tire.	No thin spots, cuts or breaks.	Any thin spots, cuts or breaks.	Vulcanize.
5. Tube.	No leaks, weak spots or cuts.	Any leaks, weak spots or cuts.	Hot patch.
6. Axle.	No damage to threads.	Any damage to threads.	None.
7. Snap Ring.	Tight in recess.	Loose in recess.	None.

(b) Reassemble wheel.

- (1) Place tube in tire.
- (2) Press bearing (SKF No. 6207-2RS) into left rim.
- (3) Place three bolts (415-34212) through left rim (415-34205) and press into place.
- (4) Slide tire and tube on left rim, then assemble right rim (415-34207) to left. Be sure valve stem comes through hole provided in right rim.
- (5) Secure rim together with three elastic stop nuts (AN365-428), and tighten evenly.
- (6) Turn tire to align valve stem so that it protrudes straight through hole in right rim. Inflate tube to 20 P.S.I.
- (7) Balance wheel statically and dynamically. Automotive shop will do this if equipment is not available. One ounce weights (415-34114-7) and half ounce weights (415-34114-6) are available for this purpose.

7. Assembly of Landing Gears:

(a) Assemble oleo strut.

- (1) Install "O" ring (AN6227-31) in lower bushing wiper groove. Lubricate with light coat of AN-G-15 grease.
- (2) Insert piston assembly into top of outer cylinder and push down until oil retainer support is exposed below bottom of outer cylinder.
- (3) Insert spring into inner cylinder.
- (4) Push inner cylinder onto piston assembly as far as oil retainer support.
- (5) Coat outside edge of retainer support with 3M cement and tap it into inner cylinder, being sure that the four holes align. Wipe off any excess 3M cement. (Use 3M cement, type EC 570).
- (6) Screw four new recessed head screws (AN510-6R4) into above holes. Stake screw heads into "V" slots in inner cylinder with a dull chisel or punch, driving part of screw head into "V" slot on each side. After all screw heads are staked, remove burrs with file, leaving a smooth flush surface.
- (7) Push inner cylinder up into outer cylinder until piston assembly is even with top of outer cylinder.
- (8) Align screw holes at top of cylinder and insert four new recessed head screws (AN510-10R4). Stake these screws in "V" slots and file screw heads as on inner cylinder.

(b) Install nutcracker assembly.

- (1) Install new Bakelite bushing (415-34042) and serrated end steel bushing (415-34134) in steering sleeve and in wheel support. The steel bushings should be a finger press fit in Bakelite bushings which are reamed, on assembly to $.375 \pm .001$.
- (2) Fasten nutcracker to wheel support and collar with two new bolts (AN4-24A), two washers (AN960-416L), and two elastic stop nuts (AN363-428). Tighten nuts so that serrated end of new bushing clamps securely to nutcracker. (Approximately 175 inch pounds).

(c) Install wheel assembly.

- (1) Tap or press wheel assembly on axle with valve stem away from wheel support.
- (2) Place new lockwasher (415-34110-3) on axle being certain that inner tab of lockwasher fits in keyway under bearing.
- (3) Install lock nut and tighten with spanner wrench or tap using soft-nose punch. Tighten to align one of the locknut slots with a tab of lockwasher.
- (4) Bend lockwasher tab into locknut slot.
- (5) Spin wheel to be sure of free rotation.
- (6) Be sure that valve stem does not ride on lockwasher tab.

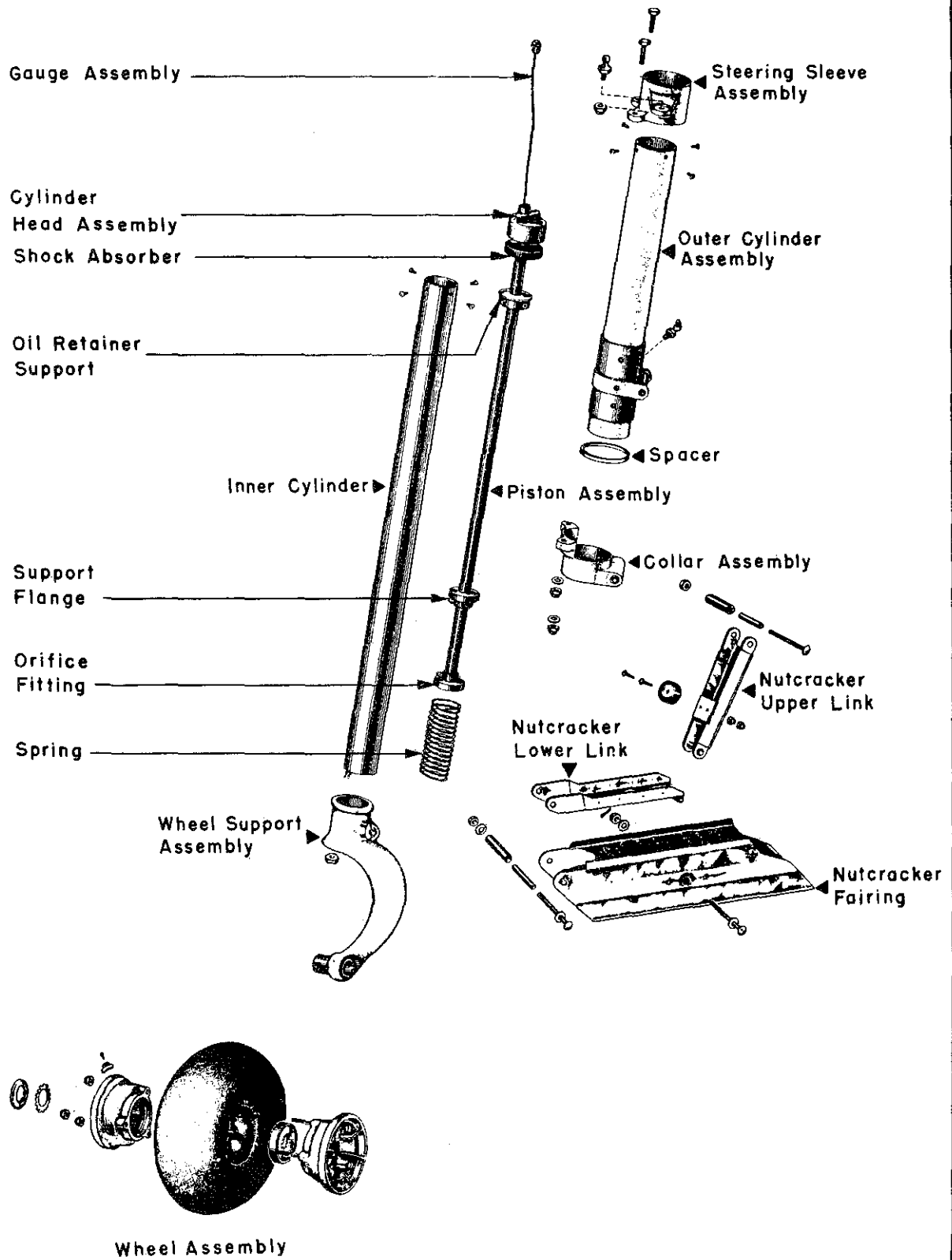
(d) With the oleo strut in the compressed position, fill with AN-VV-O-366B hydraulic oil to red mark on gauge assembly. (Approximately 1½ pints.)

(e) Check operation of strut for full extension and free up and down movement. The nutcracker fairing must be a close fit around inner cylinder, but should not make contact because with the aid of dirt and grease, it will wear a groove in the inner cylinder.

8. Installation of Nose Landing Gear Assembly to Airplane:

(a) Install gear assembly to airplane.

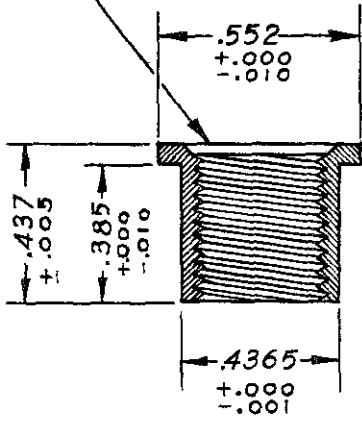
- (1) Push gear assembly up into engine mount sleeve.
- (2) Install lower attaching bolt (AN4-31) at lower end of outer cylinder and engine mount "V" support.
- (3) Install upper attaching bolt (AN5-26) at upper end of outer cylinder.
- (4) Connect Control-column-to-nose-gear-pushrod to ball on collar of strut.
- (5) Remove weight from tail and check hydraulic oil level with airplane weight on gear. Level must be at red mark on gauge assembly. Fluid level should not be lower than green mark at any time. Tighten gauge assembly and safety to engine mount sleeve with .041" brass safety wire.
- (6) Taxi ship and check track of nose wheel. See Service Memo. No. 35 for checking track.



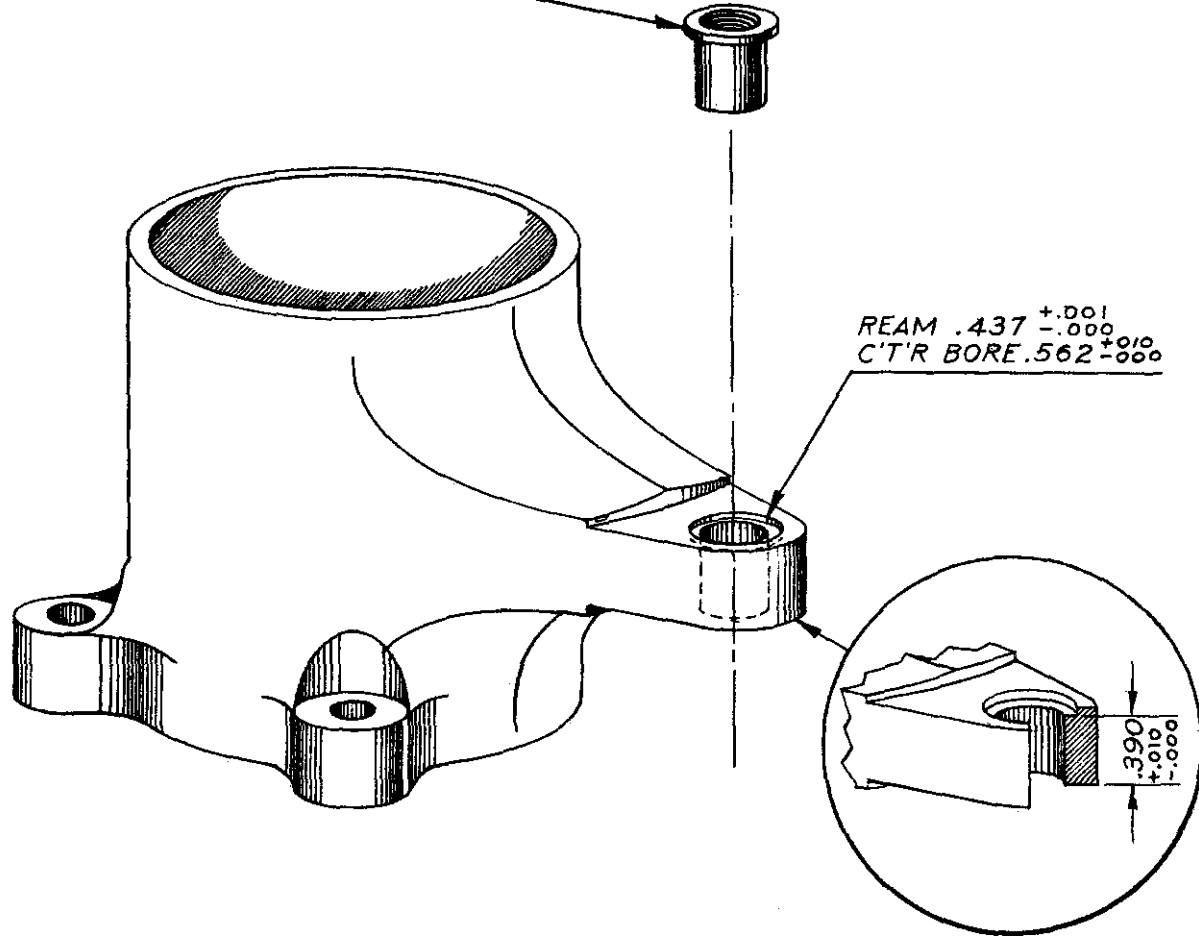
(FIG. 1)

STEERING BUSHING
415-
SEE SECTIONAL VIEW

DRILL #Q(.332)
TAP $\frac{3}{8}$ -24NF-3
C5K 90° X.455-D $\pm .010$



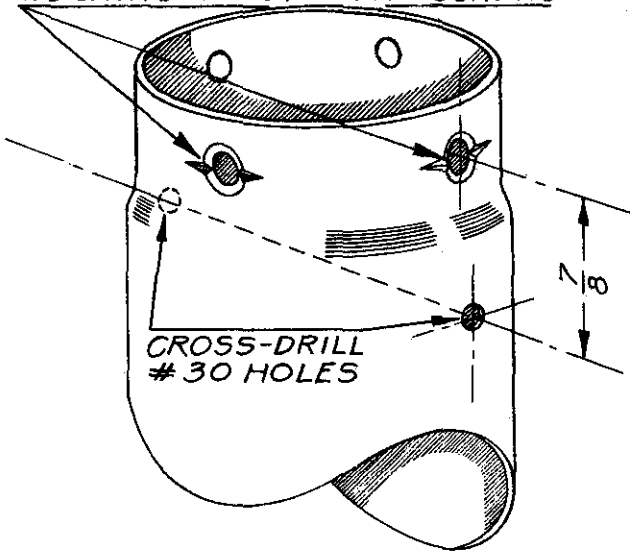
STEERING BUSHING
SECTION



(FIG. 2)

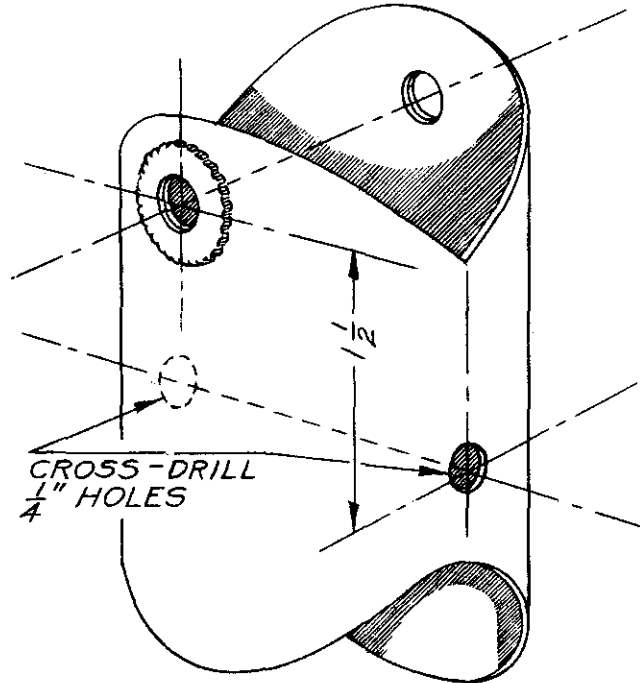
DRILLING AIR VENT HOLES
IN TOP OF OLEO STRUT, OUTER
CYLINDER ASSEMBLY

FILE SLOTS, AS SHOWN, IF NOT
ALREADY DONE. TO OBTAIN PROPER
LOCKING OF CT'S'K HD SCREWS

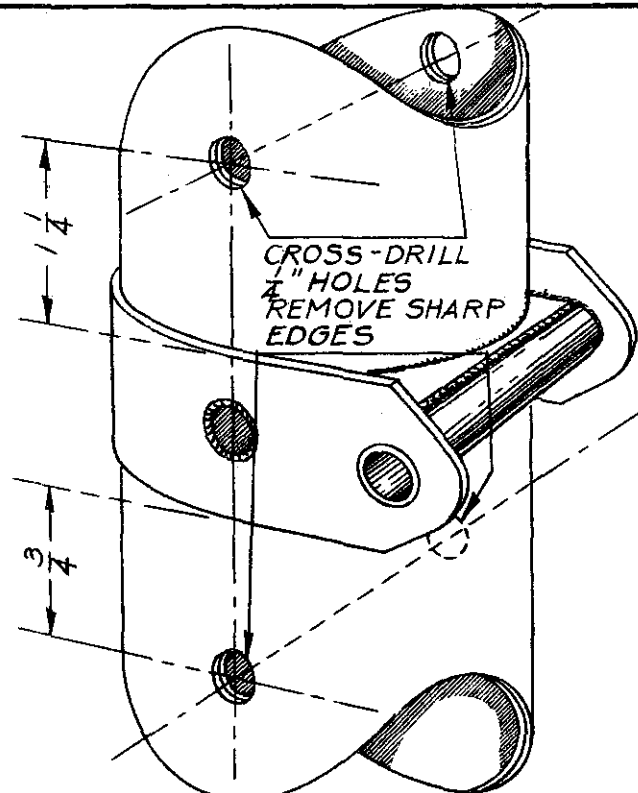


SKETCH A

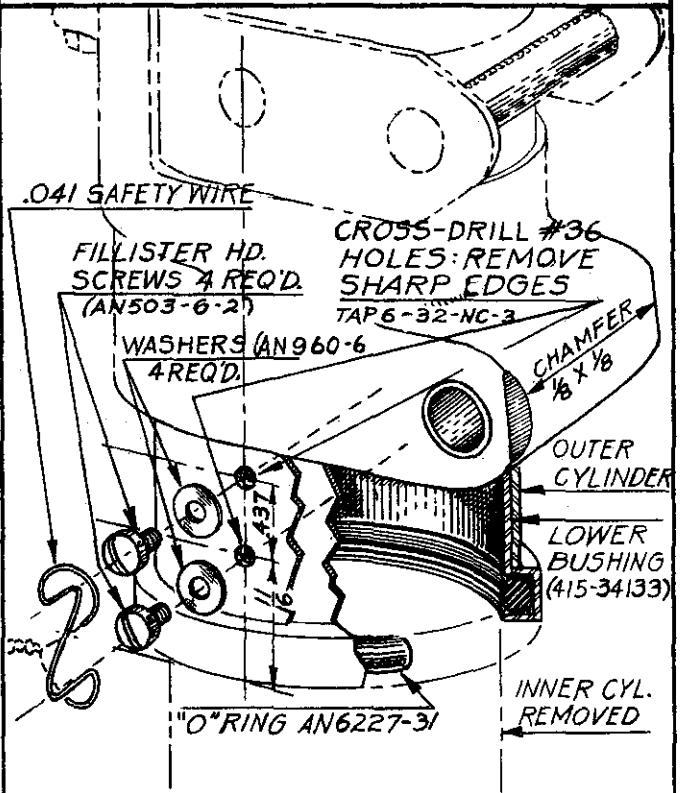
DRILLING AIR VENT HOLES
IN NOSE LANDING GEAR ENGINE
MOUNT SLEEVE



SKETCH B



DRILLING OIL TRANSFER HOLES
IN INNER CYLINDER ASSEM. AT MOUNTING COLLAR
SKETCH C



INSTALLATION OF LOWER BUSHING
& O-RING IN END OF OUTER CYLINDER ASSEM.
SKETCH D

(FIG. 3)

No. 41

Installation of Upper Bushing in Outer Cylinder Assem.

