

14 CFR 43

Appendix A Paragraph C

Preventive Maintenance

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14 CFR 43 Appendix A Paragraph C: Preventive Maintenance

- Steve Snyder
 - Got my A&P from SLCC
 - Duncan Aviation, Airframe, Sheet metal and Composite, Training
 - Utah Division of Aeronautics, A&P/IA
 - Flying High Aviation, Owner, A&P/IA
 - Worked on a variety of aircraft from gliders and experimental to Global Express and GV's.
 - King Air 200/300, Lycoming and Continental Engines Factory Service Training, Abaris Composite Training

STOP!

• THIS PRESENTATION IS INTENDED AS REFERENCE AND EDUCATIONAL MATERIAL ONLY AND IS **NOT** TO BE USED AS A SOURCE FOR MAINTENANCE, SERVICE OR OVERHAUL OF ANY AIRCRAFT, AIRCRAFT COMPONENTS OR PRODUCTS.

• **WARNING:**

• YOU MUST CONSULT ALL APPLICABLE SERVICE MANUALS, MAINTENANCE MANUALS, OVERHAUL MANUALS, ACTIVE SERVICE BULLETINS, SERVICE LETTERS, SERVICE ADVISORIES, SERVICE INSTRUCTIONS, AND FAA AIRWORTHINESS DIRECTIVES WHEN PERFORMING MAINTENANCE. FAILURE TO DO SO MAY RESULT IN A DANGEROUS CONDITION OR FAILURE OF A COMPONENT THAT COULD RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

Preventive Maintenance

- Goals for these sessions:
 - Better understand what is considered preventive maintenance
 - Learn how to properly perform common maintenance items
 - Get hands on experience with these maintenance items

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- ***Preventive maintenance:***

- Preventive maintenance is limited to the following work, provided it does not involve complex assembly operations
 - Removal, installation, and repair of landing gear tires.
 - Replacing elastic shock absorber cords on landing gear.
 - Servicing landing gear shock struts by adding oil, air, or both.
 - Servicing landing gear wheel bearings, such as cleaning and greasing.
 - Lubrication not requiring disassembly other than removal of nonstructural items such as cover plates, cowlings, and fairings.
 - Replacing defective safety wiring or cotter keys.

Preventive Maintenance Cont.:

- Making simple fabric patches **not requiring** rib stitching or the removal of structural parts or control surfaces.
- Replenishing hydraulic fluid in the hydraulic reservoir.
- Refinishing decorative coating of fuselage...wings, tail group surfaces (**excluding balanced control surfaces**), fairings, cowlings, landing gear, cabin, or cockpit interior when removal or disassembly of any primary structure or operating system is **not required**.

Preventive Maintenance Cont.:

- Repairing upholstery and decorative furnishings of the cabin, cockpit...when the repairing **does not require** disassembly of any primary structure or operating system.
- Trouble shooting and repairing broken circuits in landing light wiring circuits.
- Replacing bulbs, reflectors, and lenses of position and landing lights.
- Replacing or cleaning spark plugs and setting of spark plug gap clearance.

Preventive Maintenance Cont.:

- Replacing any hose connection except hydraulic connections.
 - Replacing prefabricated fuel lines.
 - Cleaning or replacing fuel and oil strainers or filter elements.
 - Removing, checking, and replacing magnetic chip detectors.
 - Replacing and servicing batteries.
-
- All considered preventive maintenance under 14 CRF 43 Appendix A

Preventive Maintenance Cont.:

- The **inspection and maintenance tasks prescribed and specifically identified as preventive maintenance** in a primary category aircraft type certificate or supplemental type certificate holder's approved special inspection and preventive maintenance program when accomplished on a primary category aircraft **provided:**

Preventive Maintenance Cont.:

- (i) They are performed by the holder of at least a private pilot certificate issued under **part 61 of this chapter** who is the registered owner (including co-owners) of the affected aircraft and who holds a certificate of competency for the affected aircraft (1) issued by the holder of the production certificate for that primary category aircraft that has a special training program approved under § **21.24 of this subchapter**; or (2) issued by another entity that has a course approved by the Administrator; **and**

Preventive Maintenance Cont.:

- (ii) The inspections and maintenance tasks are performed in accordance with instructions contained by the special inspection and preventive maintenance program approved as part of the aircraft's type design or supplemental type design.

Preventive Maintenance Cont.:

- Main Areas of Focus:
 - **Oil Changes**
 - Proper use of technical data, proper tooling and best practices
 - **Tires**
 - Proper use of technical data, proper tooling and best practices
 - **Batteries**
 - Proper use of technical data, proper tooling and best practices
 - **Light bulbs**
 - Proper parts, troubleshooting and best practices

Preventive Maintenance- Tools

- Make sure you have the correct tools for the work you are doing.
- Basic hand tools: Sockets, wrenches, screwdriver and picks, pliers and safety wire pliers, multimeter.
- Get good quality tools.
 - Don't have to buy the most expensive, but don't go with the cheapest.
- Quality calibrated torque wrench.

Preventive Maintenance- Hardware

Aircraft Grade Hardware verses Commercial Grade Hardware

Do Not use commercial grade hardware found in hardware or automotive stores on aircraft!

Why?

Common steel bolts purchased from a hardware store are made of low carbon steel that has a low tensile strength usually in the neighborhood of 50,000 to 60,000 psi. They also bend easily and have little corrosion protection.

Preventive Maintenance- Hardware

Aircraft Grade Hardware vs Commercial Grade Hardware

In contrast, aircraft bolts are made from corrosion resistant steel and are heat treated to a strength in excess of 125,000 psi. The same comparison applies to most hardware items.

The importance of aircraft hardware is often overlooked because of its small size; however, the safe and efficient operation of any aircraft is greatly dependent upon the correct selection and use of aircraft hardware.

Preventive Maintenance- Hardware

Aircraft Grade Hardware verses Commercial Grade Hardware

Always use or replace hardware specified by the manufacturer of the aircraft or component.

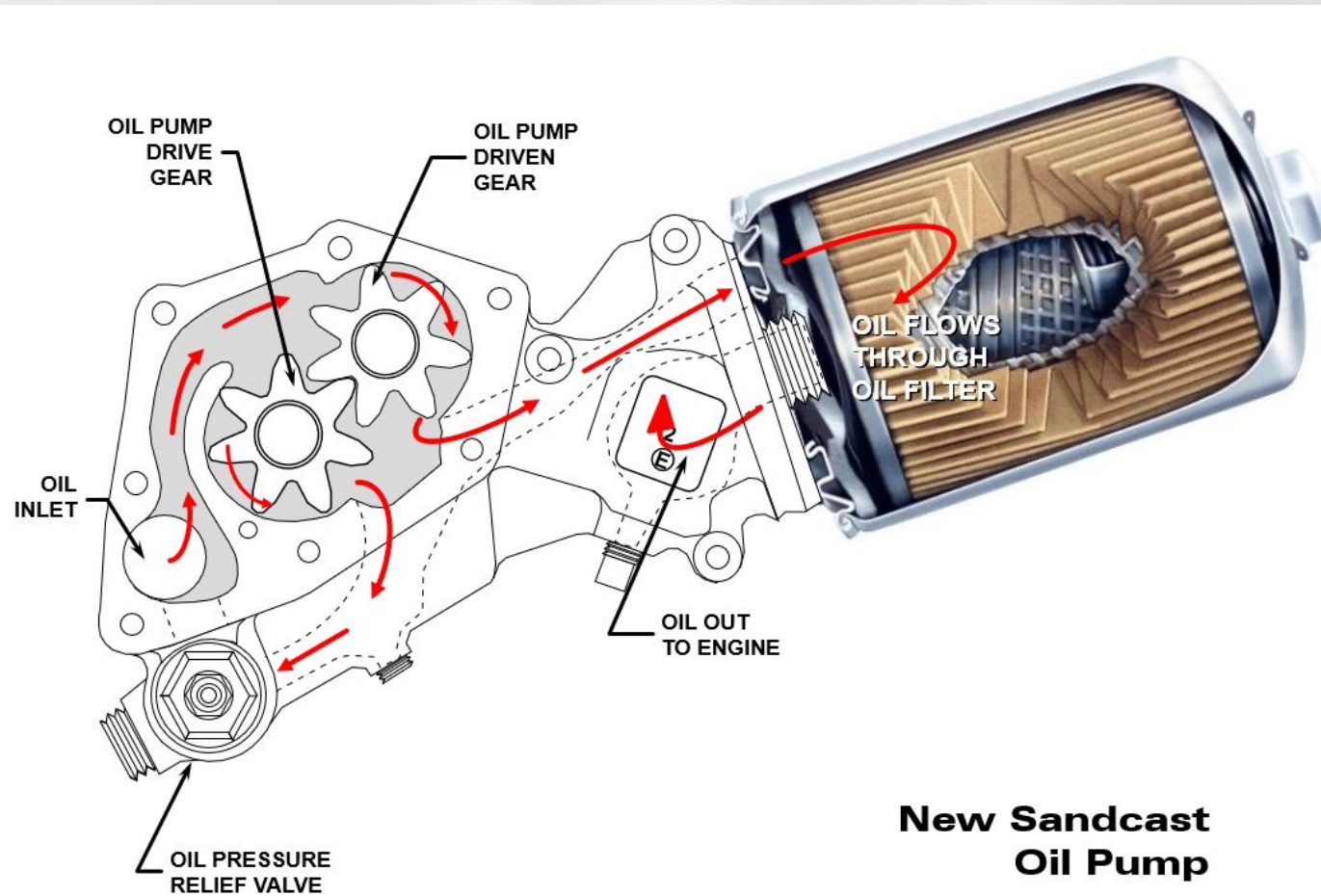
Part numbers can be obtained from OEM Parts Manuals, Component Manuals or Engineering Drawings.

Preventive Maintenance- Oil Changes

- Approved Data
 - Where are we going to get the information for an oil change?
 - Are we using the latest version of the data?
 - SIL17-03



Preventive Maintenance- Oil Changes



Preventive Maintenance- Oil Changes



Preventive Maintenance- Oil Changes

- 1) Remove and discard the safety wire securing the oil filter to the adapter.
- 2) Remove the oil filter (Figure 6-7 through Figure 6-22) from the oil filter adapter with a six-point box end wrench or socket, oil filter wrench, or strap wrench.

Preventive Maintenance- Oil Changes

- 3) Cut the oil filter in two parts using an Oil Filter Can Cutter ((Tempest P/N AA470, or equivalent)(Table 2-1, “Special Tools List”).
- 4) Allow the pleated filter element to drain into the catch basin strainer to
- remove residual oil.

Preventive Maintenance- Oil Changes

- 5) Closely inspect each pleat of the oil filter element for metal debris trapped
- within the element and to assess the engine condition. Cutting and removing
- the pleated filter media from the center tube canister will allow the element
- pleats to be spread completely apart and allow for optimum inspection,

Preventive Maintenance- Oil Changes

- cleaning, and flushing of particulate material. If debris is found, wash the
- filter media debris into a clean container using the procedure outlined in
- Section 6-4.8.5, “Oil Trend Monitoring and Spectrographic Oil Analysis”)
- and troubleshoot the engine according to instructions in Chapter 8

Preventive Maintenance- Tire Changes

- Removal, installation, and repair of landing gear tires.
- Where are we getting the approved data from?
 - Maintenance Manuals
 - Airframe and component
 - SB's and AD's
 - AC-43.13

Preventive Maintenance- Tire Changes

5-18. **DISASSEMBLY.** (Cleveland Wheel.) (See figure 5-3, Sheet 2 of 3.)

- a. Remove valve core and deflate tire and tube. Break tire beads loose from wheel rims.

WARNING

Injury can result from attempting to separate wheel halves with tire inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick in the wheel may cause wheel failure.

- b. Remove thru-bolts and separate wheel halves, removing tire, tube and brake disc.
- c. Remove grease seal rings, felts and bearing cones from wheel halves.

NOTE

Bearing cups (races) are press-fit in the wheel halves and should not be removed unless a new part is to be installed. To remove bearing cups, heat wheel halves in boiling water for 30 minutes or in an oven not to exceed 149°C (300°F). Using an arbor press, if available, press out bearing cup and press in new bearing cup while wheel half is still hot.



Preventive Maintenance- Tire Changes

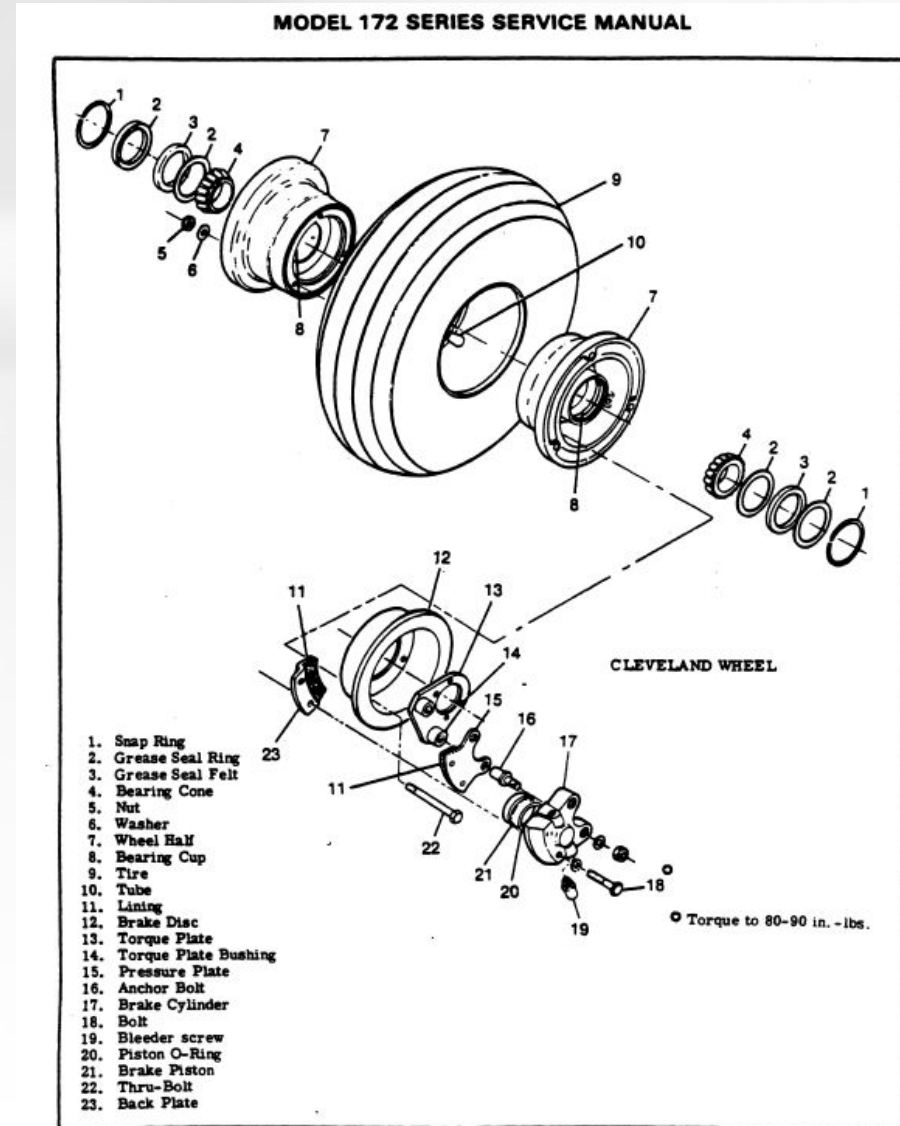


Figure 5-3. Main Wheel and Brake (Sheet 2 of 3)

Preventive Maintenance- Tire Changes

- 5-19. MAIN WHEEL INSPECTION AND REPAIR. (Cleveland Wheel.) (See figure 5-3, Sheet 2 of 3.)**
- a. Clean all metal parts and grease seal felts in solvent and dry thoroughly.**
 - b. Inspect wheel halves for cracks. Cracked wheel halves should be discarded and new parts used. Sand out nicks, gouges and corroded areas. When protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.**
 - c. Inspect brakes per paragraph 5-81.**
 - d. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack bearing cones with clean aircraft wheel bearing grease, as outlined in Section 2, before installing in wheel half.**



Preventive Maintenance- Tire Changes

- 5-20. MAIN WHEEL REASSEMBLY. (Cleveland Wheel.) (See figure 5-3, Sheet 2 of 3.)
- a. Insert thru-bolts through brake disc and position disc in the inner wheel half, using thru-bolts to guide the disc. Ascertain that the disc is bottomed in the wheel half.
 - b. Position tire and tube on outboard wheel half with tube inflation valve through hole in wheel half.
 - c. Place inner wheel half in position on outboard wheel half. Apply a light force to bring wheel halves together. While maintaining the light force, assemble a washer and nut on thru-bolt and tighten to maintain force. Assemble remaining washers and nuts to thru-bolts. Tighten nuts evenly to the torque value of 90 lb. in.

CAUTION

Uneven or improper torque of thru-bolt nuts can cause failure of bolts, with resultant wheel failure.

- d. Clean and pack bearing cones with clean aircraft wheel bearing grease, as outlined in Section 2.
- e. Assemble bearing cones, grease seal felts and rings into wheel halves.
- f. Inflate tire to seat tire beads, then adjust to correct tire pressure. Refer to chart in Section 1 for correct tire pressure.



Preventive Maintenance- Tire Changes

5-24. MAIN WHEEL INSTALLATION. (See figure 5-1.)

- a. Place wheel assembly on axle.
- b. Install axle nut and tighten axle nut until a slight bearing drag is obvious when the wheel is rotated. Back off nut to nearest castellation and install cotter pin.
- c. Place brake back plate in position and secure with bolts and washers.
- d. Install hub cap. Install speed fairing (if used) as outlined in paragraph 5-13.

CAUTION

Always check scraper-to-tire clearance after installing speed fairings, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. If the aircraft is flown from surfaces with mud, snow, or ice, the fairing should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Refer to paragraph 5-13 for correct scraper-to-tire clearance.



Preventive Maintenance- Batteries



Preventive Maintenance- Batteries

16-15. REMOVAL AND INSTALLATION. (See figure 16-2.)

CAUTION

When installing or removing battery always observe the proper polarity with the aircraft electrical system (negative to ground), reverse the polarity, even momentarily, may result in failure of semiconductor devices (alternator diodes, radio protection diodes and radio transistors).

Always remove the battery ground cable first and replace it last to prevent accidental short circuits.

- a. THRU 1979 MODELS.
 1. Remove upper half of cowl.
 2. Remove battery box cover and beginning with 1978 models also remove side panel.
 3. Disconnect the ground cable from the negative battery terminal.
 4. Disconnect the cable from the positive terminal of the battery.
 5. Lift the battery out of the battery box.
 6. To replace the battery, reverse this procedure.
- b. BEGINNING WITH 1980 MODELS.
 1. Remove upper half of engine cowl.
 2. Disconnect ground strap from negative battery terminal.
 3. Cut sta-strap and remove cover from positive battery terminal.
 4. Disconnect the cable from the positive battery terminal.
 5. Remove clamp and battery drain tube.
 6. Remove bolts and washers securing battery and cover, then remove cover and lift battery out of pan.



Preventive Maintenance- Batteries

- 16-16. **CLEANING THE BATTERY.** For maximum efficiency, the battery and connections should be kept clean at all times.
- a. Remove the battery in accordance with the preceding paragraph.
 - b. Tighten battery cell filler caps to prevent the cleaning solution from entering the cells.
 - c. Wipe the battery cable ends, battery terminals and entire surface of the battery with a clean cloth moistened with a solution of bicarbonate of soda (baking soda) and water.
 - d. Rinse with clear water, wipe off excess water and allow battery to dry.
 - e. Brighten up cable ends and battery terminals with emery cloth or a wire brush.
 - f. Install the battery according with the preceding paragraph.
 - g. Coat the battery terminals with petroleum jelly or an ignition spray product to reduce corrosion.

Preventive Maintenance- Batteries

16-17. **ADDING ELECTROLYTE OR WATER TO THE BATTERY.** A battery being charged and discharged with use will decompose the water from the electrolyte by electrolysis. When the water is decomposed, hydrogen and oxygen gases are formed which escape into the atmosphere through the battery vent system. The acid in the solution chemically combines with the plates of the battery during discharge or is suspended in the electrolyte solution during charge. Unless the electrolyte has been spilled from a battery, acid should not be added to the solution. The water, however, will decompose into gases and should be replaced regularly. Add distilled water as necessary to maintain the electrolyte level with the horizontal baffle plate or the split ring on the filler neck inside the battery. When "dry charged" batteries are put into service, fill as directed with electrolyte. When the electrolyte level falls below normal with use, add only distilled water to maintain the proper level. On Aircraft Serials 17269310 thru 17269605 and F1721640 thru F1721729 refer to Cessna Single-Engine Service Letter, SE78-6 Dated February 13, 1978 when filling the battery. The battery electrolyte contains approximately 25% sulphuric acid by volume. Any change in this volume will hamper the proper operation of the battery.

CAUTION

Do not add any type of "battery rejuvenator" to the electrolyte. When acid has been spilled from a battery, the acid balance may be adjusted by following instructions published by the Association of American Battery Manufacturers.



Preventive Maintenance-Lights

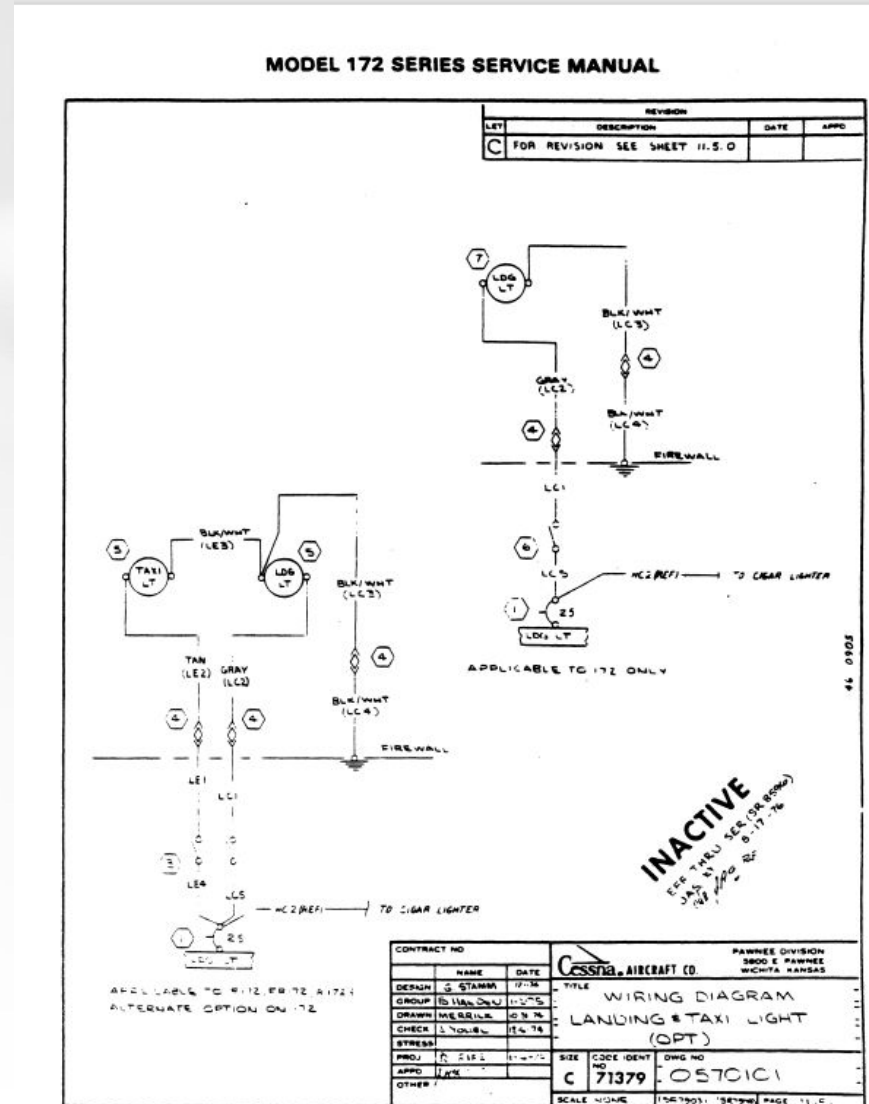
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(16) Trouble shooting and repairing broken circuits in landing light wiring circuits.

(17) Replacing bulbs, reflectors, and lenses of position and landing lights.



Preventive Maintenance-Lights



Preventive Maintenance-Lights

FLASHING BEACON CONSTANTLY LIT.	Defective flasher.	1. Install new flasher.
ALL NAV LIGHTS OUT.	Short circuit in wiring.	1. Inspect circuit breaker. If open, proceed to Step 2. If ok, proceed to Step 3.
	Defective wiring.	2. Isolate and test each nav light circuit until short is located. Repair or replace wiring.
	Defective switch.	3. Check voltage at nav light with master and nav light switches on. Should read bat- tery voltage. Replace switch.
ONE NAV LIGHT OUT.	Lamp burned out.	1. Inspect lamp. Replace lamp.
	Open circuit in wiring.	2. Test wiring for continuity. Repair or replace wiring.

