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AAP 711.23, Vol 2, Pt 1

NENE INSTRUCTION NO 12
(ISSUE 2)

Application: ALL NENE
2-VH ENGINES

PRESERVATION FOR STORAGE AND TRANSIT OF NENE ENGINES

Introduction

1. This instruction details the preservation treatment applicable to Nene engines to ensure an adequate standard of protection against corrosion during storage and transit.

Short Term Storage

2. This term applies to engines in storage or inoperative for periods of less than one month.

Engines which can be run

3. (a) Run the engine at least once in every seven days at idling speeds for about four minutes with a further one minute at maximum continuous RPM to clear the engine.
- (b) Examine the external surfaces of the engine for traces of corrosion and damage to the protective finish. Remove any corrosion found and re-enamel exposed metal; treat affected parts with rust preventative PX-1, K2/229. Clean all control joints and lubricate with clean engine oil.

Engines which cannot be run

4. Where it is not possible to run installed engines or in the case of uninstalled engines which are expected to be out of use for periods of over 7 days, but not exceeding one month, the engine must be inhibited and protected as described in the following paragraphs.

Long Term Storage

5. This term applies to engines which are expected to be in storage or inoperative for one month or more; engines are to be internally and externally treated and the fuel system fully inhibited within 48 hours of the last ground run.

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Fuel System - Inhibition

6. The "Nene" engine fuel system is to be inhibited by filling with oil to Specification OM-11 D ENG RD 2490, Stores Reference K2/248, whenever it is likely that the engine will be inoperative for a period of seven days or longer. The equipment and procedure recommended are as follows:-

Equipment

7. (a) The use of a compressed air operated oil primer is recommended, when inhibiting the fuel system of these engines. The equipment is to be adjusted for use on jet engines, so that the priming pressure does not exceed the safe maximum. The normal priming pressure should be 10 to 12 psi. On no account is the pressure to be allowed to exceed 20 psi, or damage to the system will result.

(b) When the primer mentioned in the preceding paragraph is not available, a suitable rig may be made up in the following manner:-

Set up an oil tank with a capacity of at least four (4) gallons, to give a head of three (3) feet on the fuel pump. Then, using 7/8 inch or 1 inch bore pipe line, make a pipe run free from sharp bends to the fuel filter inlet.

(c) If the aircraft fuel tanks are to be drained and the equipment mentioned in sub-paragraphs (a) and (b) is not available, oil may be poured into the main fuselage tank and the engine motored over. After making sure all fuel is drained from the main fuselage tank, pour 5-6 gallons of oil to Specification OM-11 D ENG RD 2490, Stores Reference K2/248 oil into the main fuel tank and use the tank booster pump to supply the oil to the low pressure fuel filter.

8. Proceed as set out in paragraph 9 below. Ensure that the LP cock is turned off and that all tanks, pipe lines and oil to be used for inhibiting purposes are clean and uncontaminated. See that the engine sump contains an adequate quantity of oil to Specification OM-11 D ENG RD 2490 to ensure that the various engine bearings are lubricated during motoring.

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Procedure

9. The sequence of operations is then as follows:-
- (a) Check that the HP and LP cocks are in the "OFF" position.
 - (b) Close the throttle.
 - (c) Disconnect the booster coils or high energy igniter units from the aircraft supply.
 - (d) Remove the blanking plug from the highest bleed point on each fuel pump and attach the bleed tools BL 3384.
 - (e) Loosen the LP filter drain plug and drain the fuel system, depressing both bleed tool plungers in turn, to permit gravity draining. The top plunger should be depressed first. After all the fuel has drained off, retighten the filter drain plug.
 - (f) If inhibiting oil is being supplied from a rig, disconnect the fuel inlet pipe to the filter and blank off the pipe. Connect the inhibiting rig pipe to the filter. If the oil is being supplied from the aircraft main tank, leave the inlet pipe to the fuel filter intact.
 - (g) Check that the inhibiting rig tank contains at least four (4) gallons of oil. Turn on the oil supply. When the inhibiting oil is to be drawn from the main fuel tank, turn "ON" tank booster pump and open the LP cock.
 - (h) Depress the bleed tool plungers on both pumps, until oil is emitted in a steady stream, free from air bubbles. Remove the bleed tools from both pumps and refit the blanks.
 - (j) Check that the fuel pump isolating switch is "OFF" (ie, pumps in "normal" condition) and on engines with torch igniters, that the main and T.I. feed pump switches are "ON". Carry out a motoring cycle with the engine starter, and after ten seconds of this cycle, open the HP cock and the throttle valve in order to flush the pilot burners and manifold. Check that the inhibiting oil flows freely from the drain valve between Nos 5 and 6 combustion chambers.
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- (k) When the engine has stopped turning, close the HP cock and the throttle valve and disconnect the inhibiting rig pipe. To minimise loss of oil from the fuel system, immediately close off the fuel inlet to the LP filter. If the oil has been supplied from the fuel tank, close the LP cock, switch "OFF" tank booster pump and drain unused oil from the fuel tank.
- (l) Replace the booster coil connections or high energy igniter units, first checking that the current supply is switched "OFF".

WARNING: Operation of the starter motor, while the engine is turning, will result in damage to the starter motor engaging mechanism.

- Notes:- (a) When no means exist for rotating the engine, as, for example when the engine is removed from the aircraft or the aircraft facilities are not available for use, the engine turning handle (HW4855) may be used, but it is essential that the maximum speed possible be attained (400 rpm approximately), two minutes' turning in a clockwise direction being the equivalent of one motoring cycle. If hand turning is employed, a 24-volt electrical supply is to be connected to the Plessey priming pump and the torch igniter solenoid valves when fitted, to ensure a flow of inhibiting oil through these components during the turning cycle.
- (b) Where turning handle is not available, the engine may be turned over by hand at the turbine, making sure that the direction or rotation is correct (anti-clockwise from the rear). Prior to starting the engine after an inoperative period, where inhibiting the fuel system has been carried out, it will be necessary to bleed the fuel system as described in RAAF "Nene" Instruction No 7.

General Internal Preservation, Installed Engines

10. Interior of the engine is to be inhibited in the following manner:-

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After the Fuel System has been inhibited, 10 grams (approximately one table spoon) of Vapour Phase Inhibitor powder K4/10993 is to be introduced to each of the following positions:-

- (a) Inside the jet pipe as near the turbine blades as is possible without uncoupling the jet pipe.
- (b) Through the front and rear intake screens taking care that the powder does not fall through the lower screens and out of the engine. This can be done with canvas covers fitted.
- (c) Into the cooling air intake through the rear end of the rear main screen.
- (d) Into the bottom of the engine bay. The engine should now be sealed from atmosphere as far as possible by blanking off engine and nacelle apertures including the cabin pressure pipe, and doping fabric covers and the jet pipe orifice and the aircraft air-intakes.

General Internal Preservation for engines which are not installed.

11. These engines are to be treated in the same manner as installed engines, but in addition 10 grams of VPI powder should be introduced through the turbine blades and nozzle guide vanes into the nozzle bore using a rubber bulb and nozzle.

- 12. (a) Engine is to be thoroughly cleaned with kerosene or white spirit taking care that the cleaning agent does not enter the compressor inlets.
- (b) Inspection of engine is to be carried out and where paint has been removed by abrasion or impact, corrosion if any is to be removed by scraping and/or scrubbing with fine emery cloth.
- (c) With the exception of the oil sump and external wheelcase all main castings are of aluminium. These after removal of corrosion if any are to have a coat of zinc chromate (K3/176) applied and allowed to dry for 15 minutes. A coat of air drying enamel is then to be applied.
- (d) Magnesium castings (oil sump and external wheelcase) which shows signs of corrosion are to have a 10%

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solution of selenious acid in water applied to the affected part until a dark brown film is formed. The solution is then wiped off with a wet rag and the area dried immediately. This item is identified as K4/11055 Acid Selenious Crystals and is to be used in accordance with AP 2656A, Vol, 1 Sect 5, Chap 2, para 11. The casting is then to be given a coat of zinc chromate K2/176 and finished off with a coat of air drying enamel.

- (e) All engine openings are to be fitted with appropriate covers, if necessary seal with adhesive tape.
- (f) Corrodible exterior parts ie controls, studs, nuts, clips etc are to be treated locally with K2/229 (Protective PX 1).
- (g) Ball ends, and control joints are to be liberally coated with grease XG-275, K2/210.

Note: Care is to be taken to prevent corrosion preventative mixtures used in external inhibition from entry to air intakes. Under no circumstances is the exhaust unit to be treated.

13. Uninstalled engines are to be packed in metal lined, or water vapour proofed containers and stored in a dry, cool place, or stored covered by a plastic reusable moisture proof envelope on a transit stand.

14. The following are types of approved casings, and plastic moisture proof envelopes.

- (a) Case Steel Nene Engine approx 5 ft diam x 7' long
(Ident No B23/800001)
- (b) Container Steel, Blast Tube. (Ident No B23/800002)
- (c) Cases C/W Stand 7'10 $\frac{1}{4}$ " x 5'4 $\frac{1}{4}$ " x 5'7 $\frac{1}{2}$ " high
(Ident No B23/800000)
- (d) Stands Nene Engine Tubular Steel Mobile (for
Airfreights) (Ident No B23/800003)
- (e) Cover Moisture Vapour Proof (Ident No B23/800004)
- (f) Case Transit Exhaust Unit (Ident No B23/800005)

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15. Engines must be enveloped in the Covers Moisture Proof before being installed in Case Steel Ident No B23/800001. Immediately before sealing engines in air tight cases, a liberal number of bags containing Silica gel(K4/546) is to be distributed around the engine. Care must be taken to ensure that the silica gel bags do not touch the metal surfaces of the engine. Grease proofed paper may be inserted between engine and desiccant and taped to the engine to prevent contact. Sprinkle between $\frac{1}{4}$ to $\frac{1}{2}$ lb of VPI on the bottom of the case or blow same into envelope. Insert a humidity indicator if provision is made for one. Seal envelope and case.

Note: It is imperative that the Silica gel and indicators are not exposed to the atmosphere for more than 10 minutes before sealing in container. The certificate RAAF Form E/E 203 is to be completed and attached to the engine in a conspicuous position.

Represervation During Storage

16. (a) The requirements for represervation will depend upon the conditions under which the engine is stored and the results of the periodic inspections. An engine which is to be represerved is to have the complete internal treatment applied as described in the foregoing paragraphs; damage or deterioration to the original external treatment is to be rectified before the engine is repacked.
- (b) Unless inspection indicates the necessity for more frequent attention, the represervation of engines held in store is to take place at the following intervals:-
- (i) Installed engines: every six months.
 - (ii) Engines packed in unlined wooden cases: every six months.
 - (iii) Engines packed in hermetically sealed containers or cocooned engines. The humidity indicator is to be checked every three months and provided it shows no discolouration, the engine may remain in storage without further treatment.

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Preparation for use after Storage

17. Prior to starting the engine after an inoperative period, where inhibiting of the fuel system has been carried out, the fuel system is to be bled.

18. This instruction cancels and supersedes Nene Instruction No 12, dated 3rd June, 1954.

Reference : File, Department of Air, 150/4/8776.

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