Beech Aircraft Corporation

OVERHAUL SPECIFICATION

PRESERVATION AND STORAGE OF RECIPROCATING AIRCRAFT ENGINES

Overhaul Specification 7004

ISSUED June 4, 1953

REVISED December 8, 1953

T. R. Taylor
Writer

R. B. Bosworth
Chief Liaison Engineer

M. DeLapp
Model Project Engineer

A. S. Odevseff
Chief Project Engineer - Military

USAF Quality Control

H. Rawdon
Chief Project Engineer, Com'l

E-371

Beech Aircraft Corporation

OVERHAUL SPECIFICATION 7004

TITLE PRESERVATION AND STORAGE OF RECIPROCATING AIRCRAFT ENGINES

ISSUED 6-4-53

WRITTEN BY T. R. Taylor REVISED 12-8-53

1. SCOPE

1.1 Purpose.- This overhaul specification has been prepared to provide the latest information and instructions for the preservation of air-cooled reciprocating aircraft engines, installed and not installed; for procedures for maintaining them in the preserved state; and for depreservation.

1.2 Application.- This overhaul specification is applicable to all air-cooled reciprocating type aircraft engines installed or to be installed in aircraft being built, reconditioned or serviced by Beech Aircraft Corporation.

1.3 List of Pages and Revisions.- This specification consists of the pages listed below. An asterisk (*) denotes pages revised at the current revision.

Page	Date	Description of Revision	Serial Effectivity
* 1	12-8-53	Record Revision	Record Change
2			
3			
* 4	12-8-53	Change MIL-C-5629 to MIL-C-6529	Record Change
5			
6			
7			
8			
* 9	12-8-53	Deleted requirement to spray interior of rocker boxes	Record Change
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

E-8800

1.4 Compliance.- Compliance with this overhaul specification is mandatory on all government owned aircraft engines in the possession of Beech Aircraft Corporation and the department having physical custody of the aircraft engine is responsible for compliance. The Inspection Department will be responsible for the procuring and completion of the Preservation Procedure Check-off Form and Form E-241B and any other form deemed necessary by Inspection.

2. APPLICABLE PUBLICATIONS

2.1 Beech.-

OS 7005 Pre-oiling and Ground Operations of Reciprocating Aircraft Engines

OS 7009 Preservation and Shipping of Propellers

2.2 Technical Orders.- Compliance with this specification constitutes compliance with the technical order listed below.

02A-1-1 Corrosion Control of Reciprocating Aircraft Engines, dated November 25, 1952

3. REQUIREMENTS

3.1 General:

3.1.1 Theory of Preservation of Aircraft Engines.- Combating corrosion in aircraft metals and alloys is primarily a fight against moisture. The procedures outlined in this overhaul specification are based on the principle that corrosion will not occur in a clean atmosphere when water is not permitted to reach the metal surface. For the dehydration techniques outlined herein, the atmosphere must be maintained at or below 30 percent relative humidity to attain this end.

3.1.2 Preservation Procedure - General.- Preservation to prevent corrosion, as herein applied, consists primarily of placing a barrier between critical metal surfaces and any moisture. This is accomplished by one or both of the following procedures.

3.1.2.1 Protective Surface Films.- As a direct barrier, all metal parts of the engine are protected from moisture by being coated with a protective surface film. Critical bearing surfaces are protected by a film of oil to which has been added a corrosion-preventive compound. Heavy grease films are applied to exterior surfaces. All of these films are for the purpose of preventing or controlling the presence of moisture in contact with metal surfaces, and thus to prevent corrosion. Temporary surface films are effective for only relatively short periods due to a tendency to run off or dry out, but are particularly effective during periods of heavy condensation immediately after operation of the engine before dehydration can be accomplished. Corrosion begins as soon as the engine begins to cool. Preservation to be effective must start prior to this. Therefore, corrosion prevention as herein applied begins prior to final shut-down by thoroughly treating the engine with corrosion-preventive compound used as a lubricant during final operation, and by introducing corrosion-preventive compound into the engine through the intake system during shut-down, thereby thoroughly coating the intake systems, valves and guides, the piston rings and cylinder walls, and the exhaust valves, guides and stacks prior to the time when corrosion can begin.

3.1.2.2 Dehydration.- The engine is protected from corrosion by dehydrating the enclosed and surrounding air to minimize chemical and electrolytic action. Since certain materials are present in aircraft engines which tend to absorb moisture at relative humidities substantially below a dew point, and thus provide an electrolyte for corrosive action, it is necessary to establish and maintain a relative humidity below that at which any significant amount of moisture may be absorbed by materials other than the dehydrating agent. This is accomplished by placing a dehydrating agent in the available openings in the engine, and sealing the engine to prevent moisture penetration. In addition, the engine is placed in a moisture impervious envelope or metal container and the air therein dehydrated. This provides two moisture barriers to protect the critical interior parts of the engine.

Engines which have been stored for extended periods are extremely subject to corrosion upon removal from dehumidified storage due to the deterioration of the basic protective coating of oil film. This is equally true during the replacement of expended dehydrating agents required in maintenance. Care should be exercised to keep to a minimum the exposure time of the engine during these two periods prior to renewal of the oil films or dehydration.

NOTE: The dehydrator bags will not be removed from their moisture-resistant container until immediately before attachment to the engine.

TITLE PRESERVATION AND STORAGE OF RECIPROCATING AIRCRAFT ENGINES

ISSUED 6-4-53

WRITTEN BY E. R. Taylor REVISED 11-8-53

3.1.2.3 Corrosion-Preventive Mixture.

(a) Hereinafter, when the use of corrosion-preventive mixture is specified for treatment or retreatment, the mixture will consist of one part Specification MIL-C-7853 compound in three parts of Specification MIL-L-6082 new lubricating oil except for use in Pratt & Whitney R-2800 engines. The mixture for these engines will consist of one part Specification MIL-C-6529 corrosion-preventive compound in three parts of Specification MIL-L-6082 new lubricating oil. These mixtures must be maintained thoroughly mixed at a temperature of 105 to 121° C (221 to 250° F). When existing supplies of Specification MIL-C-7853 corrosion-preventive compound are expended, use Specification MIL-C-6529 corrosion-preventive compound, blending all corrosion-preventive mixtures.

(b) A given batch of the corrosion-preventive mixture will be reused in only 10 engines. This practice is necessary to avoid excessive dilution of the mixture with engine lubricating oil. Following each application to an engine, two to three quarts of straight corrosion-preventive compound, Specification MIL-C-7853 or MIL-C-6529, and a quantity of mixture sufficient to restore the mixture to the original quantity will be added.

(c) The corrosion-preventive compound applied under Specification MIL-C-7853 or MIL-C-6529 will not provide adequate storage protection under high humidity conditions for periods in excess of 30 days. It is therefore necessary to use dehydration to maintain the relative humidity within the moisture barrier below 30 percent. It has been determined by test that corrosion will not occur on metal surfaces if this relative humidity is not exceeded.

3.2 Engines on Incoming Aircraft for Reconditioning or Service. - Reciprocating aircraft engines, military or commercial, flown in for reconditioning or service will be preserved in accordance with the instructions applicable to the length of time the engine will be in storage or in a preserved state. If any reciprocating aircraft engine is stored beyond the time limits of the short term storage period called out in Paragraph 3.2.1, the engine will be preserved for extended storage, Paragraph 3.2.2 Navy and Air Force Model 18 reconditioned aircraft will be preserved in accordance with Paragraph 3.2.2 extended storage.

E-3308

3.2.1 Short Term Storage.- For aircraft flown in for routine service or repair that will not require over 7 days, use Procedure (a). For aircraft flown in for service or repair that will be inoperative for a period up to 30 days, use Procedure (b). When the engines cannot be run up on the applicable third or seventh day as called out in Paragraph 3.2.1.(a) and (b), use Procedure (c).

(a) When the engine or engines are serviced with a regular grade of lubricating oil, they will be ground run-up each third day. Storage of engines in this manner will not exceed 7 days as this procedure does not provide sufficient protection against corrosion over a longer period of time.

(b) When it is known the aircraft will be in repair more than 7 days, service the engine lubrication system with the corrosion-preventive mixture called out in Paragraph 3.1.(c). The engine or engines will be ground run-up every seventh day. The ground run-up will consist of operation at a speed and power necessary to produce oil inlet temperatures of 95 to 102° C (203 to 216° F). Excessive ground operation should be avoided. Maximum ground operating cylinder head temperatures will not be exceeded. Tie placard 694-180044 to the control wheel stating that the engine is in a preserved condition. Storage of aircraft in this manner will not exceed 90 days.

(c) The following procedure will be used when it is impossible to ground run-up the engine on the seventh day. Storage of engines in this manner will not exceed 15 days.

(1) Drain the engine oil system if it is serviced with a regular grade of engine lubricating oil.

(2) After draining the oil system, reservice with corrosion-preventive mixture.

NOTE: Fasten to pilots control wheel placard 694-180044 denoting corrosion-preventive mixture in engine lubrication system.

(3) Ground run up the engine to produce an inlet oil temperature of 95 to 102° C (203 to 216° F). Maximum ground operating cylinder head temperatures will not be exceeded. After shutdown, remove one spark plug from each cylinder and treat as directed in the following paragraphs.

(4) Using dehydrated compressed air, spray the exhaust valves with corrosion-preventive mixture. Maintain temperature of mixture as called out in Paragraph 3.1.2.3(a). This spraying will be accomplished through the exhaust port with the

3.2.1 Short Term Storage.- (Continued)

valves fully open except in engines having exhaust collectors that are difficult to remove. In that case, the spraying may be done through the spark plug holes with the exhaust valves fully opened. Use spray equipment called out in the following paragraphs.

(5) The interior of each cylinder will be sprayed through the spark plug holes with corrosion-preventive mixture. Use only dehydrated compressed air for spraying the corrosion-preventive mixture. A spray nozzle with perforations in the sides as well as the tip will be used. These perforations should extend at least 2 inches up from the tip. This nozzle must be able to spray horizontally from all sides in order to cover all areas of the cylinder walls, valves and top of the combustion chamber. Start the spraying operation with No. 1 cylinder on bottom dead center, turning the crankshaft in the direction of normal rotation. By spraying the cylinders in the order they are called out in the following chart, all cylinders may be sprayed in one revolution of the crankshaft.

ENGINE MAKE	MODEL	CYLINDER NUMBER ORDER OF SPRAYING
Continental 6 cyl.	O-470 Series E-185, E-225	1 and 2, 6 and 5, 3 and 4
Lycoming, 6 cyl.	O-435 Series	1 and 2, 4 and 3, 5 and 6
Pratt & Whitney	R-985 Series	1, 2, 3, 4, 5, 6, 7, 8, 9
Pratt & Whitney	R-2800 Series	1 and 10, 3 and 12, 5 and 14, 7 and 16, 9 and 18, 11 and 2, 13 and 4, 15 and 6, 17 and 8

Following the initial spraying, each cylinder will be sprayed through the spark plug hole without rotation of the crankshaft. Spray approximately 1/2 pint of corrosion-preventive mixture into each cylinder to thoroughly coat all surfaces. Move the nozzle of the spray gun from the top to the bottom of the cylinder. Place placard 694-180044 on the propeller after completing the internal spray. In the event the propeller is to be removed, the placard will not be installed.

3.2.1 Short Term Storage.- (Continued)

(6) Reinstall spark plugs to prevent the corrosion-preventive mixture from running out of the cylinders.

(7) Install three 1/2-pound bags of dehydrating agent conforming to AND-6, Type V, Grade A, in the carburetor air intake. Place a humidity indicator, AN7511-1 or AN7513-2, in such a position that it may be viewed through a transparent covering which is installed next. Seal covering and all other openings with tape conforming to JAN-P-127. A red cloth streamer or red tape will be attached to the sealed-area to indicate the presence of the dehydrating agent and sealing of an opening.

NOTE: Install placard 764-180046 on sealed area to show the number of bags of dehydrating agent placed within.

(8) Where there are individual exhaust stacks, seal each one individually with moisture-resistant tape conforming to JAN-P-127. When the exhaust system employs an exhaust collector ring and tail pipe, place four 1/2-pound bags of dehydrating agent conforming to AND-6, Type V, Grade A, in the tail pipe. Also place a humidity indicator, AN7511-1 or AN7513-2, in the tail pipe and cover with a transparent material. Seal the tail pipe, slip joints, and all holes with tape conforming to JAN-P-127.

NOTE: Install placard 764-180046 on sealed area to show the number of bags of dehydrating agent placed within.

3.2.2 Extended Storage.- Air Force and Navy Model 18 reconditioned aircraft and any other aircraft for reconditioning that will not fall within the time limits of Paragraph 3.2.1 will have their engines preserved in accordance with the instructions contained in this paragraph. The aircraft will be in a non-flyable condition while the engine is preserved according to these instructions. The engines will be preserved as soon as possible after being received. Preserve according to the following instructions.

3.2.2 Extended Storage.- (Continued)

(a) Drain the oil from the engine system and refill the system till approximately 50 percent full with corrosion-preventive mixture specified in Paragraph 3.1.2.3.

NOTE: Fasten to pilots control wheel placard 694-180044 denoting corrosion-preventive mixture in the engine lubrication system.

(b) Operate the engine for 15 minutes or more if necessary on service fuel at a power and speed that will produce an oil inlet temperature of 95 to 102° C (203 to 216° F). The oil cooler will be blanked off, or by-passed if necessary, to produce the specified oil temperature. Maximum ground operating cylinder head temperatures will not be exceeded. Oil dilution will not be used. Propellers that operate from the engine oil system will be operated throughout their entire pitch range at least three times during the run-up of the engine.

CAUTION: Measures which restrict the flowing of cooling air over the engine such as closing the cowl flaps shall not be used to obtain the desired oil inlet temperatures as serious damage to the ignition harness may result.

(c) With the engine operating at 1500 rpm, corrosion-preventive mixture will be released through a nozzle installed in the induction passage following the carburetor. The aspiration nozzle will be thoroughly cleaned prior to each use. As soon as white smoke appears at the exhaust stacks for radial engines and all stacks for opposed engines, the mixture control will be moved to "IDLE CUT-OFF" position ("FULL LEAN" for float type carburetor), and the engine allowed to come to a stop. The aspiration of the mixture will continued until the engine ceases to rotate. The mixture source will be a tank connected to an air pressure line providing 60 to 80 psi pressure of dehydrated, compressed air. The mixture capacity of the aspiration tank will be one pint for Continental and Lycoming opposed engines of 470 cubic inches piston displacement or less, one quart for the Pratt and Whitney R-985 Series, and three quarts for the Pratt and Whitney R-2800 Series.

(d) Following the run up and aspiration, remove the cowling and spark plugs. Preserve the spark plugs in the following manner.

(1) Clean thoroughly with PS 661 dry cleaning solvent or equivalent.

TITLE PRESERVATION AND STORAGE OF RECIPROCATING AIRCRAFT ENGINES

ISSUED 6-4-53

WRITTEN BY T. R. Taylor REVISED 12-8-53

3.2.2 Extended Storage.- (Continued)

(2) Treat the shell and shielding barrel threads with Specification AN-C-124 Type I or II rust-preventive compound applied with a brush. Care must be exercised to prevent any compound being placed on the electrodes or inside the firing bore and shielding barrel, and to handle the spark plug after this treatment without touching the threads.

(3) The inside of the plug shall be sprayed with Specification MIL-L-6082 engine oil or equivalent.

(4) Pack in a moisture proof container or wrap in barrier conforming to JAN-B-121. Spark plugs will be stored and shipped with the engine.

(e) Drain the corrosion-preventive mixture from the crankcase, filter or scroon chambers, and sumps while the engine is still warm. Screens or filters will be removed, cleaned, oiled with corrosion-preventive mixture and reinstalled.

(f) DELETED.

(g) Spray the exhaust valves with corrosion-preventive mixture. This spraying will be accomplished through the exhaust port with the exhaust valves fully open. In case the engines have exhaust collectors that are difficult to remove, the spraying may be done through the spark plug holes with the exhaust valves fully open. On Air Force and Navy Model 18 aircraft the exhaust system will be removed. Removed parts may be stored in the aircraft cabin until time of teardown.

(h) Perform the cylinder bore inspection as called out under Paragraph 4.1.(b). When inspection has been completed, the cylinder bores will be sprayed as called out under Paragraph 3.2.1.(c)(5).

(i) Install AN4062-11 (18mm thread) cylinder dehydrator plugs in all spark plug holes and torque them to 25-inch pounds. Support the spark plug leads with AN4060-1 cable protectors. Due to the short length of cable on the front row of cylinders between deflector plate and dehydrator plug, cable protectors need not be connected to the dehydrator plugs for the R-2800 Series engines.

E.3389

3.2.2 Extended Storage.- (Continued)

(j) On Pratt and Whitney engines remove the crankcase breather plug and install an AN4061-12 dehydrating plug. Torque the AN4061-12 dehydrating plug to 45-inch pounds. On opposed engines seal off the crankcase breather with moisture-resistant tape conforming to Specification JAN-P-127.

(k) Remove the propeller and preserve according to OS 7009. Coat the propeller shaft with compound conforming to Specification MIL-C-6708 and wrap the shaft in barrier conforming to Specification JAN-B-121. Spray the interior of the propeller shaft with the corrosion-preventive mixture and place the applicable thread protector cap over the end of the propeller shaft.

AN5012-20	Cap, propeller shaft	No. 20	Opposed engines
AN5012-30	Cap, propeller shaft	No. 30	R-985 engines
AN5012-50	Cap, propeller shaft	No. 50	R-2800 engines
AN5012-60	Cap, propeller shaft	No. 60	R-2800 engines

(l) Remove the drain plugs in the carburetor and drain all fuel. On carburetors having a throttle-operated accelerating pump, a few strokes of the pump lever will empty the pump of fuel. Disconnect the main fuel inlet line at the fuel pump, allowing the residual fuel to drain from the pump and fuel line. Introduce corrosion-preventive mixture into the inlet of the fuel pump by forced pressure feed. The pressure can be provided by either a wobble or motorized pump. The pressure of the corrosion-preventive mixture admitted to the carburetor must not exceed the carburetor operating limits set up by the manufacturer. After flushing the pump and carburetor thoroughly, remove the improvised line to the pump and seal the pump with a standard shipping plug or pad as required. The drain plugs will be installed in the carburetor to seal the openings.

(m) Two 1/2-pound bags of dehydrating agent conforming to Specification AND-6, Type V, Grade A, will be placed and anchored in the carburetor air intake scoop or carburetor adapter. On Model 18 reconditioned aircraft, remove the 18S9132-1 and -2 cold air intake elbow, and with 18S9150 carburetor air scoop in the "COLD AIR" position, place dehydrating agent inside the carburetor air scoop. Seal one cold air inlet with tape conforming to Specification JAN-P-127. Place AN7511-1 or AN7513-2 activated humidity indicator in remaining open inlet in a position so it may be viewed during inspection.

3.2.2 Extended Storage.- (Continued)

Cover the opening with a transparent, moisture-proof barrier and seal with moisture-resistant tape conforming to JAN-P-127. Remove the entire hot air intake system down to the hot air inlet on 185S9150 carburetor air scoop. The two hot air inlets will be sealed with moisture-resistant tape conforming to JAN-P-147. Install 764-180046 placard on sealed area to show the number of bags of dehydrating agent placed within.

NOTE: The dehydrator bags will not be removed from their moisture-resistant container until immediately before attachment to the engine.

(n) All openings such as distributor vents, magneto vents, generator vents and breather vents will be sealed with tape conforming to Specification JAN-P-127, red.

(o) All aircraft equipped with engine covers will have the covers installed as the last step in the preservation procedure.

(p) Inspect according to instructions contained in Paragraph 4.1.

3.3 Preservation and Packaging of Engines for Storage or Shipment:-

3.3.1 Preservation.- This preservation procedure is written for engines that may be run-up during the preservation period. When the mechanical condition of the engine does not permit ground run-up, the interior of the engine will be sprayed with dehydrated air and corrosion-preventive mixture. The oiling system will be flushed with corrosion-preventive mixture under pressure when equipment is available.

(a) Engines preserved according to Paragraph 3.2.2 which are installed on aircraft and meet the requirements of Paragraph 4.1 are ready to be prepared for storage. Begin the procedure with Step (c) below.

(b) Engines installed on aircraft or test blocks that are not preserved will be preserved in accordance with Paragraph 3.2.2 with the exception of Steps (m) and (n) which need not be complied with, providing the engine will be removed and the following procedure begun.

(c) Remove the propeller and preserve it in accordance with OS 7009.

3.3.1 Preservation.- (Continued)

(d) Remove the engine and wash it down with Specification PS 661 solvent or its equivalent. Complete the removal of all accessories that are not included with the basic engine.

(e) Remove the carburetor and flush all fuel chambers and passages with corrosion-preventive mixture. Remove drain plugs, drain the surplus oil and reinstall the drain plugs. Install carburetor on a shipping board if one is available. Otherwise, attach a one pound bag of dehydrating agent to the carburetor and pack in an appropriate sized carton which has a moisture-proof protective lining and seal. Attach the sealed carton securely to the engine case with steel straps.

(f) Accessory drive cover plates will be removed and all accessory drives will be thoroughly sprayed with the corrosion-preventive mixture. Use dehydrated air for spraying. Reinstall cover plates on all accessory drive openings.

(g) The oil intake and outlet will be sealed with locally manufactured moisture- and oil-resistant blank caps or cover plates.

(h) All breather openings in the engine and magneto shall be adequately sealed against moisture by means of oil- and moisture-resistant covers, dehydrator plugs, or tape conforming to Specification JAN-P-127.

(i) Preparatory to installation of the engine into shipping container, all surfaces of the engine will be sprayed with hot ANC-124 corrosion-preventive compound.

3.3.2 Packaging:

3.3.2.1 Wooden Container:

3.3.2.1.1 Radial Engines.- The engine mounting plate will be removed from the engine shipping container and the applicable engine envelope for the engine being preserved will be fitted to the mounting plate and punched with holes for the anchor bolts. The gaskets on both sides of the engine will be fitted to each anchor bolt hole, and the anchor bolts inserted to hold the envelope in position. The engine mounting plate and the envelope will then be fitted to the engine, taking care not to tear the envelope. The engine mounting plate will be secured to the engine using the full number of bolts. Lock washers on self-locking

3.3.2.1.1 Radial Engines.- (Continued)
nuts will be used at all times. The engine will then be placed in the shipping container and the mounting plate bolted to the container.

3.3.2.1.2 Opposed Engines.- The gaskets on both sides of the applicable engine envelope for the engine being preserved will be fitted to each anchor bolt hole and the anchor bolts inserted to hold the envelope in position on the stand, spreading the envelope over the stand so that the envelope will not be damaged when the engine is placed on the shipping stand. The engine shall then be bolted to the stand, using the full number of bolts intended. Lock washers or self-locking nuts will be used at all times.

3.3.2.1.3 Envelope Protector.- Creped barrier will be placed around the periphery of radial engines to prevent the engine envelope from tearing on any sharp protrusions. In the case of opposed engines, the covering will be placed over the entire engine. Creped grease-proof barrier, 20 inches in width conforming to Specification JAN-B-121, will be used on all two-row, radial engines. The barrier will be held in place by tape or by stapling. Make a cutout at a spot where the humidity indicator will be installed.

3.3.2.1.4 Humidity Indicator.- Fasten an AN7511-1 humidity indicator to the engine in such a manner that it will easily be visible from the inspection port of the engine box after the box has been closed.

3.3.2.1.5 Distribution of Dehydrating Agent.- Dehydrating agent conforming to Specification AND-6, Type V, Grade A, will be hung about the engine at the rate of 2 pounds dehydrating agent per cylinder.

NOTE: The dehydrator bags will not be removed from their moisture-resistant container until immediately before attachment to the engine.

3.3.2.1.6 Sealing the Envelope.- Raise the envelope over the engine and bring the ends together and seal in accordance with the instructions appearing on the envelope. Close non-heat-sealable envelopes by gathering the top, wrapping tightly with JAN-P-127 cloth tape, and clamping with an AN734 hose clamp. Before final sealing, remove excess air from the envelope. Fold excess envelope material carefully around the propeller shaft, and secure with tape. After sealing, check the envelope for leakage from holes and tears. Extreme care will be exercised in lowering the engine container cover

3.3.2.1.6 Sealing the Envelope.- (Continued)

over the engine to avoid tearing the envelope. All engines installed in wood containers will be inspected in accordance with Paragraph 4.2.1.

3.3.2.2 Metal Container.-

(a) Lower the engine into container and secure. An engine envelope is not used when storing the engine in a metal container.

(b) Bagged dehydrating agent conforming to AND-6, non-indicating Type V, Grade A, will be placed in metal baskets provided in the lower section of the container. The amount of dehydrating agent required will be 2 pounds per cylinder. When Grade B dehydrating agent is used, 3 poimds per cylinder will be required.

(c) Secure AN7511-1 humidity indicator to the engine in a position to be viewed through the window in the container.

(d) The upper section of the container will be installed exercising care so as not to strike and damage the engine. The full number of flange bolts will be installed and torqued to 600 - 800 inch pounds.

(e) Metal containers will be pressurized to 5 psi (gage) using only dehydrated air. After 1 hour elapsed time, the container will be checked to determine any leakage. If leakage is found, the air will be evacuated slowly from the container and the upper section removed. The sealing surfaces and gasket will be examined for damage and necessary repairs accomplished. The upper section of the container will be replaced, the flange bolts installed and torqued, and the container will be repressurized and inspected to determine any leakage. Soapy water may be used if desired to locate any leakage.

(f) All engines installed in metal containers will be inspected in accordance with Paragraph 4.2.2.

3.4 Preservation of Engines on Aircraft Awaiting Delivery.- Completed aircraft that cannot be delivered within two weeks due to a shortage or some other reason will be preserved according to the instructions below:

(a) Run-up the engine in accordance with Paragraph 3.2.2.3(b).

(b) Remove the spark plugs and store in a moisture-resistant container. On radial type aircraft engines, only one plug per cylinder need be removed.

3.4 Preservation of Engines on Aircraft Awaiting Delivery.- (Continued)

(c) Treat exhaust valves in accordance with Paragraph 3.2.1.(c)(4).

(d) Spray the cylinder bores according to Paragraph 3.2.1.(c)(5).

(e) Install AN4062-11 cylinder dehydrator plugs in spark plug holes. On R-985 engines install dehydrator plugs in front row only.

(f) On radial engines install AN4061-12 dehydrator plug in place of crankcase breather with moisture-resistant tape conforming to Specification JAN-P-127, red.

(g) Flush the fuel pump and carburetor in accordance with Paragraph 3.2.2.(1).

(h) Place two 1/2-pound bags of AND-6 dehydrator agent in the induction system. Place AN7511-1 or AN7513-2 humidity indicator with the dehydrator agent and seal with a transparent moisture-resistant barrier.

NOTE: Install 764-180046 placard on the sealed area to show the number of bags of dehydrating agent placed within.

(i) Seal all exhaust stacks with moisture-resistant tape conforming to Specification JAN-P-127. On exhaust systems employing a collector ring and tail pipe, place three 1/2-pound bags of dehydrating agent AND-6, Type V, Grade A, with a transparent barrier and seal with moisture-resistant tape. All slip joints and drain holes in the exhaust and induction system will be sealed with moisture-resistant tape.

NOTE: Install 764-180046 placard on the sealed area to show the number of bags of dehydrating agent placed within.

(j) When the propeller is removed, coat the propeller shaft with corrosion-preventive compound conforming to Specification MIL-C-6708. Wrap the shaft with barrier conforming to Specification JAN-B-121. Spray interior of propeller shaft with corrosion-preventive mixture and install AN5012 thread protector cap.

(k) Depreserve according to Paragraph 3.5.2.

3.5 Depreservation of Engines:

3.5.1 Engines in Short Term Storage.- Before starting the engine, remove the dehydrating agent from the carburetor air intake and exhaust system. Remove all tape and sealing agents. One spark plug from each cylinder will be removed and the crankshaft turned by hand in the normal direction of rotation at least 4 or 5 revolutions for a final check to determine that there is no excessive corrosion-preventive mixture in any cylinder. Engines installed in aircraft which have been prepared for short term storage require no preparation for service except as noted in this Paragraph.

3.5.2 Engines in Extended Storage Installed on Aircraft.- Engines installed on aircraft which have been prepared for extended storage and are to be depreserved and operated again will be prepared for service as follows not more than one week prior to the time the engine is to be placed in operation.

(a) Remove cylinder and crankcase dehydrator plugs, dehydrating agent, cover plates, nipples, tape, plugs, etc., which have been installed to close lines and openings.

(b) Reassemble all induction and exhaust systems and check all joints for tightness.

(c) Before installing spark plugs, remove any excess corrosion-preventive mixture from the cylinders by means of a pump or by draining.

(d) The corrosion-preventive mixture may remain in the lubricating system if not previously drained, or be drained and replaced with straight engine lubricating oil.

(e) The oil filter and/or oil screens will be removed, cleaned in solvent dried, re-oiled, and re-installed.

(f) Pre-oil the engine in accordance with OS 7005.

(g) Flush fuel pump and carburetor with gasoline to remove corrosion-preventive mixture. Wash all oil and dirt from the main or boost venturi tubes, the impact tubes, or the automatic mixture control unit.

NOTE Check all fuel line connections for hook-up and leakage.

(h) Before starting the engine, one spark plug from each cylinder, if installed, will be removed and crankshaft turned by hand in the normal direction of rotation at least four to five revolutions for final check, to determine that there is no corrosion-preventive mixture in any cylinder

(i) After run-up, the cylinder bore will be inspected for rust in accordance with Paragraph 4.1.(a).

3.5.3 Depreservation of Packaged Engines.-

(a) Remove cover from shipping container. Before removing cover from metal container, depressurize slowly to prevent damage to diaphragms, seals and gaskets.

(b) Remove engine envelope and dehydrating agents.

(c) On R-985 engines remove the carburetor adapter and drain corrosion-preventive mixture from supercharger and rear section with engine propeller shaft in a vertical position.

(d) Clean engine with PS 661 or its equivalent.

(e) Complete the engine build-up, keeping all openings sealed until the time of installation of the accessories. When the induction and exhaust systems are installed, place two 1/2-pound bags of dehydrating agent conforming to Specification AND-6 in each system. The induction and exhaust systems will then be sealed with moisture-resistant tape conforming to JAN-P-127. Sealed systems will be marked with a red streamer or tape. Attach placard 764-180046 to indicate the number of bags of dehydrating agent placed within.

(f) Flush the carburetor with gasoline and adjust as necessary for installation on the engine.

(g) The oil filter and/or oil screens will be removed, cleaned in PS 661 or equivalent, dried, re-oiled, And reinstalled.

(h) The engine will be pre-oiled prior to the initial run-up in accordance with OS 7005.

4. INSPECTION

4.1 Engines Installed on Aircraft.-

(a) Subsequent to initial engine run-up and prior to initial cylinder bore spraying, the cylinder bore will be inspected through the spark plug for signs of corrosion or rust. Superficial rust is not detrimental to engine operation and shall not be cause for cylinder or engine rejection. Superficial rust will appear as a film of powdery brown coating. Upon removal of this rust through depreservation and engine run-up, a slight discoloration will develop but is acceptable. Surface rust which appears as a reddish-yellow flaking on cylinder walls will be accepted, providing a roughened surface does not develop following depreservation and engine run-up.

4.1 Engines Installed on Aircraft.- (Continued)

Rust pitting of cylinder walls will be cause for rejection. Rust pitting can be detected by the presence of small pits in the cylinder walls. Rejected cylinders will be replaced with serviceable cylinders. Engines being returned to the government will not be repaired.

(b) Engine cylinder dehydrator plugs will be inspected bi-weekly or more often during humid or rainy weather, and changed as soon as their color indicates an unsafe condition of storage. If the dehydrator plugs have changed color in one-half or more of the cylinders, the dehydration agent in the air intake and exhaust system will also be replaced. Replacement of the dehydrator plugs or bags should not be made on highly humid or rainy days. If a cylinder or any other section of the engine becomes saturated with moisture and the changing of dehydration plugs and agent does not cure the situation, represerve that section with corrosion-preventive mixture and dehydrated compressed air.

(c) The cylinder bores of all engines prepared for extended storage will be resprayed with corrosion-preventive mixture in accordance with Paragraph [illegible](c)(5) every 6 months. At the time of respraying, the cylinder bore will be inspected through the spark plug hole.

(d) Inspect all vents and openings for proper preservation and seals.

4.2 Inspection of Packaged Engines.

4.2.1 Inspection of Engines Stored in Wooden Containers.- Serviceable or repairable engines stored in wooden containers will be inspected in the following manner

(a) When an opaque envelope having no inspection window is used, the AN7511-1 humidity indicator will be inspected at 2-month intervals. The inspection will be accomplished by cutting the seal at the corner marked "OPEN HERE FOR INSPECTION OF HUMIDITY INDICATOR" and noting the color of the humidity indicator.

(b) When an inspection window is provided in an opaque envelope, the humidity indicator will be inspected at monthly intervals and prior to shipment to ascertain the color of the silica gel contained therein.

WRITTEN BY Leo E Holmes	DATE ISSUED 6-4-53	OVERHAUL SPECIFICATION PRESERVATION AND STORAGE OF RECIPROCATING AIRCRAFT ENGINES		
PROJECT ENGINEER E Free				
APPROVAL [illegible]	DATE REVISED	Beech Aircraft CORPORATION Wichita 1 Kansas	OVERHAUL SPECIFICATION NO 7004	PAGE 18
APPROVAL [illegible]				

E-350A

4.2.1 Inspection of Engines Stored in Wooden Containers.- (Continued)

NOTE: Engines may occasionally be found on which the humidity indicator card will indicate the engine to be in an unsafe condition (pink) but the dehydrator plugs will indicate a safe condition (blue). When this condition is noted, it may be indicative of the existence of an unsafe condition within the engine. This is brought about by color fixation of the desiccant crystals in the dehydrator plugs, due to contamination through exposure to various materials. The following materials may fix the blue color (cobalt chloride) of the desiccant: certain types of corrosion-preventive compounds, vapor phase inhibitors, all types of cleaning compounds, ammonium hydroxide, and free ammonia vapors. Every precaution should be taken when storing equipment containing dehydrator plugs to isolate it from possible contamination. A simple test to determine contamination is as follows: Remove a blue dehydrator plug and add several drops of water to the silica gel. If, after 1 hour, the crystals are not all pink, the dehydrator plug is contaminated and the following steps will be taken.

(1) All of the other plugs in the engine will be tested. If they show pink after the test then it can be safely assumed that only the original plug was contaminated. However, if any of these plugs show a permanent blue after test, the following instructions will be complied with.

(2) Check all cylinders for corrosion.

(3) If no corrosion exists all desiccant bags will be replaced with fresh desiccant.

(4) Replace dehydrator plugs and reseal envelope.

(5) Thirty days later all plugs will be tested. If any of the plugs show a permanent blue a complete inspection of the cylinder bores will be required. If any corrosion then exists, the engine shall be tagged as unserviceable and necessary repairs made.

4.2.2 Inspection of Engines Stored in Metal Containers.- Serviceable or repairable engines, stored in metal containers will be inspected each 90 days in the following manner

4.2.2 Inspection of Engines Stored in Metal Containers.- (Continued)

(a) The cover will be removed from the receptacle containing the indicating type dehydrator plug and filler valve, and the air pressure within the container will be checked. Minimum air pressure will be 1 psi (gage). Maximum air pressure will be 5 psi (gage) plus or minus 1 psi (gage). This maximum 5 psi is considered for pressurizing or repressurizing the container.

(b) If the pressure within the container is less than 1 psi and the indicator plug shows safe (blue), the container will be repressurized to 5 psi (gage) with dehydrated air only. No further action is required and the engine will be considered satisfactory for continued storage.

(c) If the pressure within the container is satisfactory and the indicator plug shows safe (blue), no further action is required and the engine will be considered safe for continued storage.

(d) If the pressure within the container is less than 1 psi and the indicator plug shows unsafe (pink) the engine will be preserved in the following manner.

(1) Remove container cover.

(2) Remove all dehydrator plugs.

(3) Inspect cylinders for corrosion.

(4) Respray exhaust valves in accordance with Paragraph 3.2.1.(c)(4).

(5) Respray cylinder bore in accordance with Paragraph 3.2.1.(c)(5).

(6) Install activated dehydrator plugs in cylinders and crankcase.

(7) Remove rocker boxes and respray in accordance with Paragraph 3.2.2.(f).

(8) Accessory drive cover plates will be removed and the drives resprayed with corrosion-preventive mixture and dehydrated air.

(9) Complete the represervation according to Paragraph 3.3.2.2.