

WRIGHT AERONAUTICAL CORPORATION

*presents*

INSPECTION and SERVICE

*of the*

WRIGHT CYCLONE

9  
GC



## FOREWORD

These pages tell a picture story of the "Inspection and Service of the Wright Cyclone 9GC."

It is common knowledge among those in the field of Aviation that systematic inspection and service is your assurance of perfection in performance—your guarantee of maximum efficiency—your keynote on how to "Keep 'em Flying."

In a constant effort to reduce engine problems to a bare minimum, the Wright Aeronautical Corporation has set forth recommended procedures to be followed by you, the service mechanic. This manual is devoted to the Inspection and Service of the Cyclone 9GC.

Here is an adaptation from a slide film on the same subject—the entire story told by word picture and actual demonstration. It was originally intended to be used as an accompaniment for handy reference and a systematic guide in the servicing and inspection of the Cyclone 9GC. The operations are outlined step-by-step—planned so the mechanic may do his job as he reads this through.

Copies of this edition are available for distribution upon request.

*Service Department*

WRIGHT AERONAUTICAL CORPORATION

(A Division of Curtiss-Wright Corporation)

PATERSON, NEW JERSEY, U.S.A.





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WRIGHT AERONAUTICAL CORPORATION  
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PATERSON, NEW JERSEY, U.S.A.

(FIRST EDITION)

PART NO. 854795



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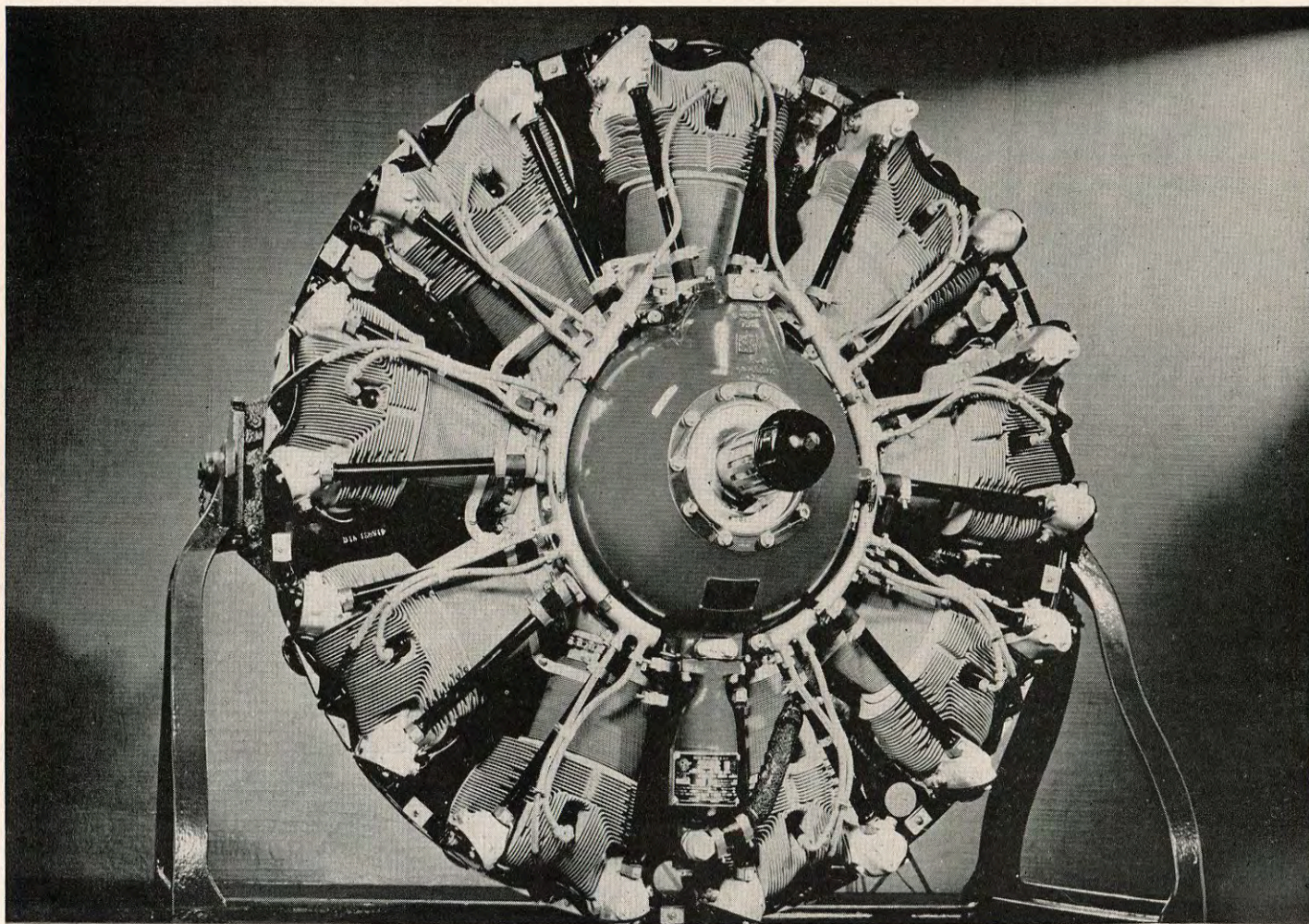
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CYCLONE 9 GC



WRIGHT AERONAUTICAL CORPORATION  
A DIVISION OF CURTISS-WRIGHT CORPORATION  
PATERSON, NEW JERSEY, U. S. A.

*presents*  
INSPECTION *and* SERVICE  
*of the*  
WRIGHT CYCLONE  
9 GC  
PART I

In the following pages the Wright Aeronautical Corporation presents the recommended engine inspection procedure included in any inspection of the Cyclone 9GC.

The information given here is concerned with inspection and service of the Cyclone itself, not with the many different mobile units powered by the engine. For the convenience of the reader, we have shown the engine on an engine stand where each operation can be clearly shown and thoroughly explained.

# CHECK-OFF SHEET

**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

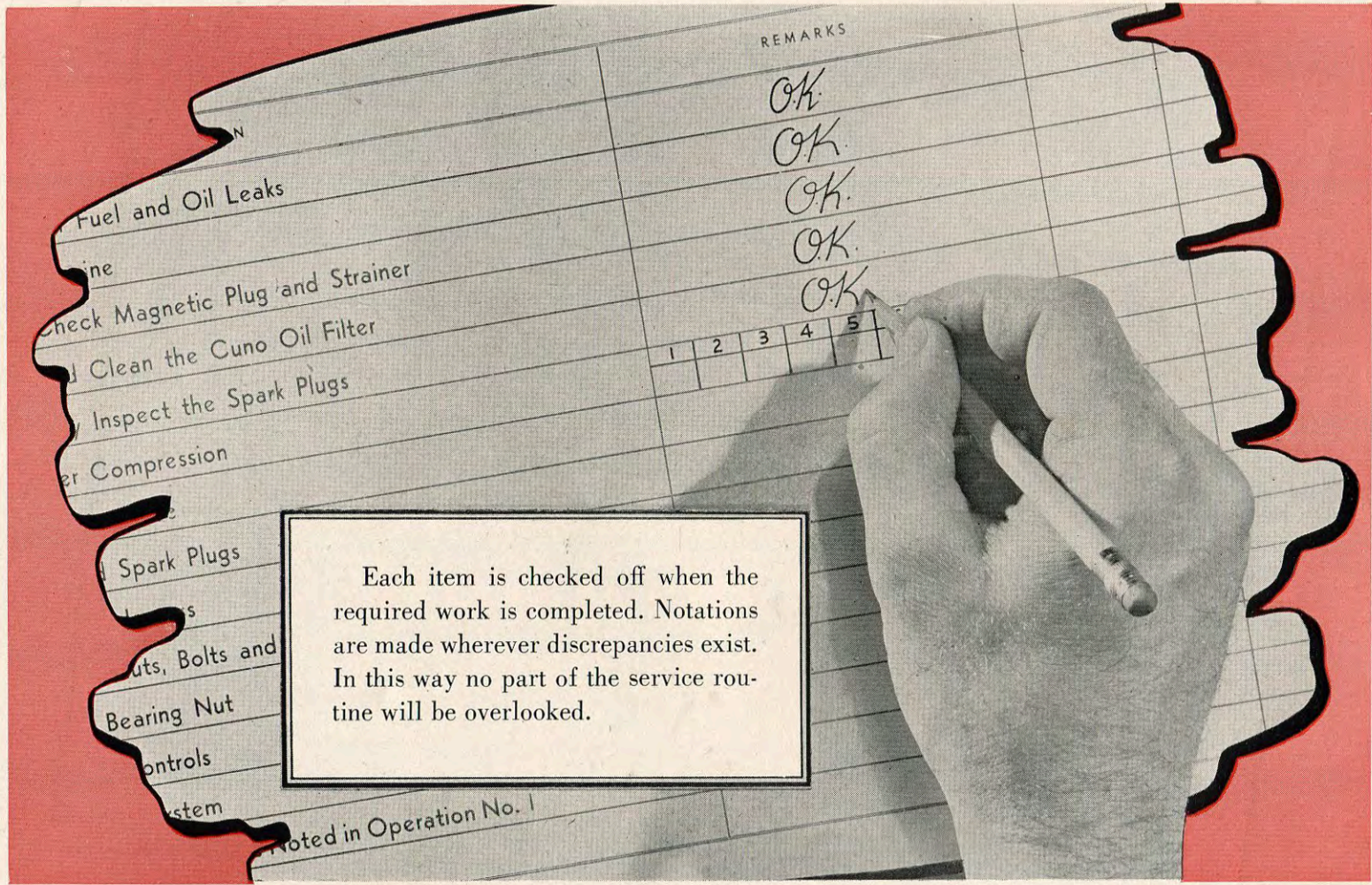
ITEM NO.	OPERATION	REMARKS										MECHANIC	FOREMAN
			1	2	3	4	5	6	7	8	9		
1.	Inspect the Engine for Fuel and Oil Leaks												
2.	Wash and Dry the Engine												
3.	Drain Oil Sump. Check Magnetic Plug and Strainer												
4.	Remove, Inspect, and Clean the Cuno Oil Filter												
5.	Remove and Visually Inspect the Spark Plugs												
6.	Check the Cylinder Compression												
7.	Check the Valve Clearance												
8.	Check Magnetos and Install Reconditioned Spark Plugs												
9.	Inspect the Ignition Harness												
10.	Check All External Nuts, Bolts, and Cap Screws												
11.	Check the Thrust Bearing Nut												
12.	Check the Engine Controls												
13.	Inspect the Exhaust System												
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1												
15.	Inspect the Carburetor Strainer												

A check-off sheet is provided to guide the service man in making a thorough, systematic inspection of the engine. If no check-off sheet is available, use this illustration as a sample.

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_



# CHECK OFF EACH ITEM



Each item is checked off when the required work is completed. Notations are made wherever discrepancies exist. In this way no part of the service routine will be overlooked.





# INSPECTION ITEM NO. 1

CHECK-OFF SHEET  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetic Plug and Strainer			
4.	Remove, Inspect and Clean the Cuno Oil Filter			
5.	Remove a			
6.	Check the			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install Reconditioned Spark Plugs			
9.	Inspect the Ignition System			
10.	Check All External			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

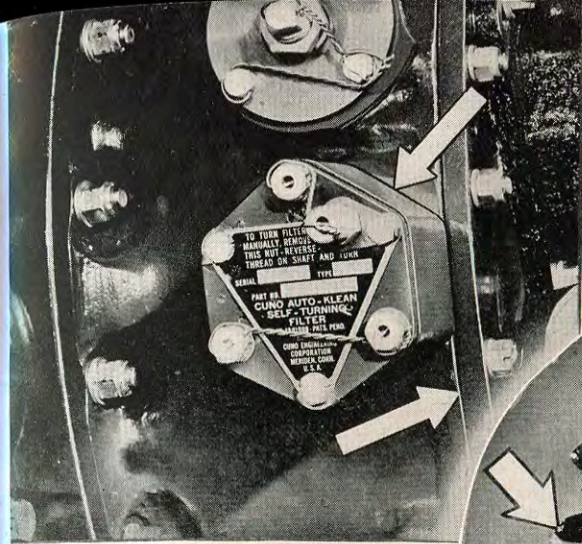
ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

# INSPECT THE ENGINE FOR FUEL AND OIL LEAKS

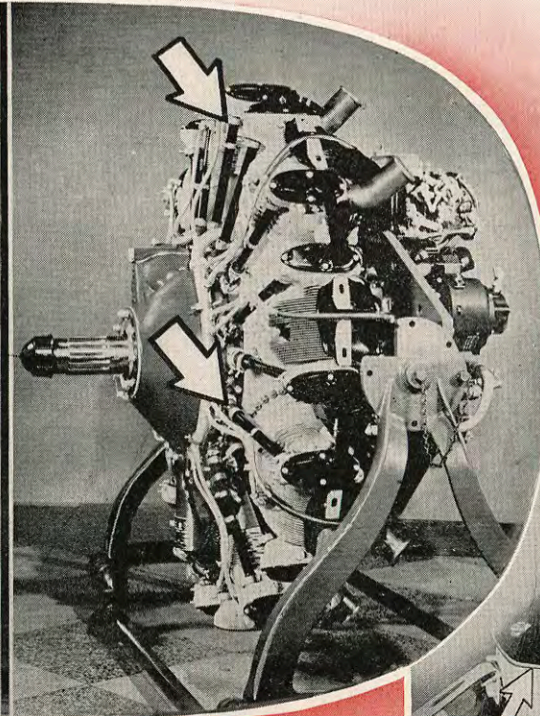
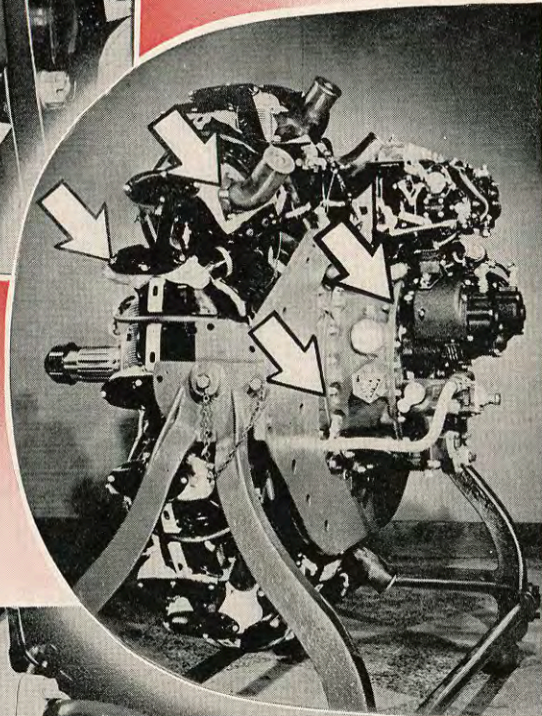


# EXAMINE FOR OIL AND FUEL LEAKS

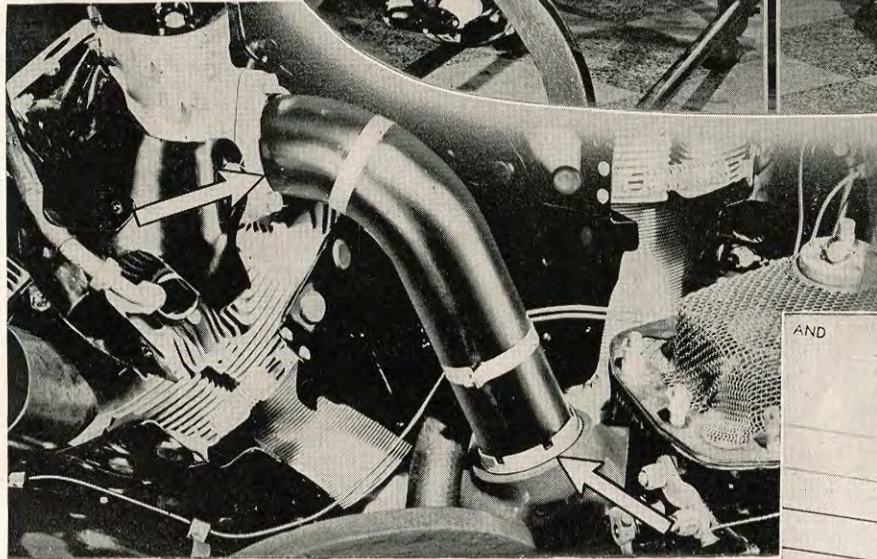
Inspect the engine for fuel and oil leaks. This means examine all external joints—such as parting surfaces, gaskets, intake pipes, and hose connections for evidence of leakage. If any leaks are found, make a note of them on the check-off sheet. Then proceed to the next operation.



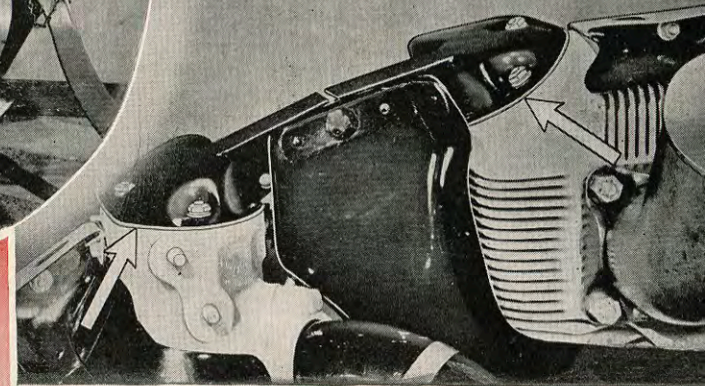
**EXAMINE FOR OIL AND FUEL LEAKS**



**EXAMINE ALL PARTING SURFACES**



**INTAKE PIPE CONNECTIONS**



**ROCKER BOX COVERS**

AND

REMARKS	MECHANIC	FOREMAN
Fuel leak at base of No. 7 Intake Pipe Oil leak at No. 1 Exhaust Rocker Box Cover		

**NOTE LEAKS ON CHECK-OFF SHEET**

# INSPECTION ITEM NO. 2

**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

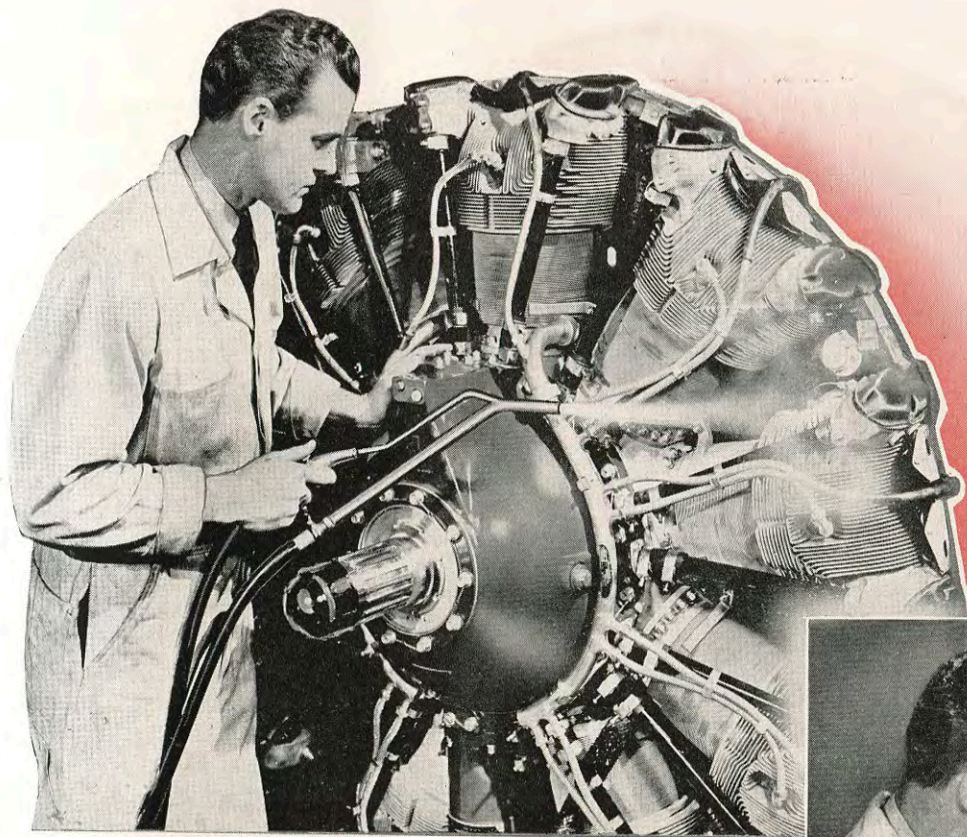
ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Carburetor			
3.	Drain Oil Sump. Check Magnetos and Spark Strainer			
4.	Remove, Inspect, and Clean the Cuno Oil Filter			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install and Adjust Spark Plugs			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts, Bolts, and Cap Screws			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

WASH AND DRY  
THE ENGINE

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

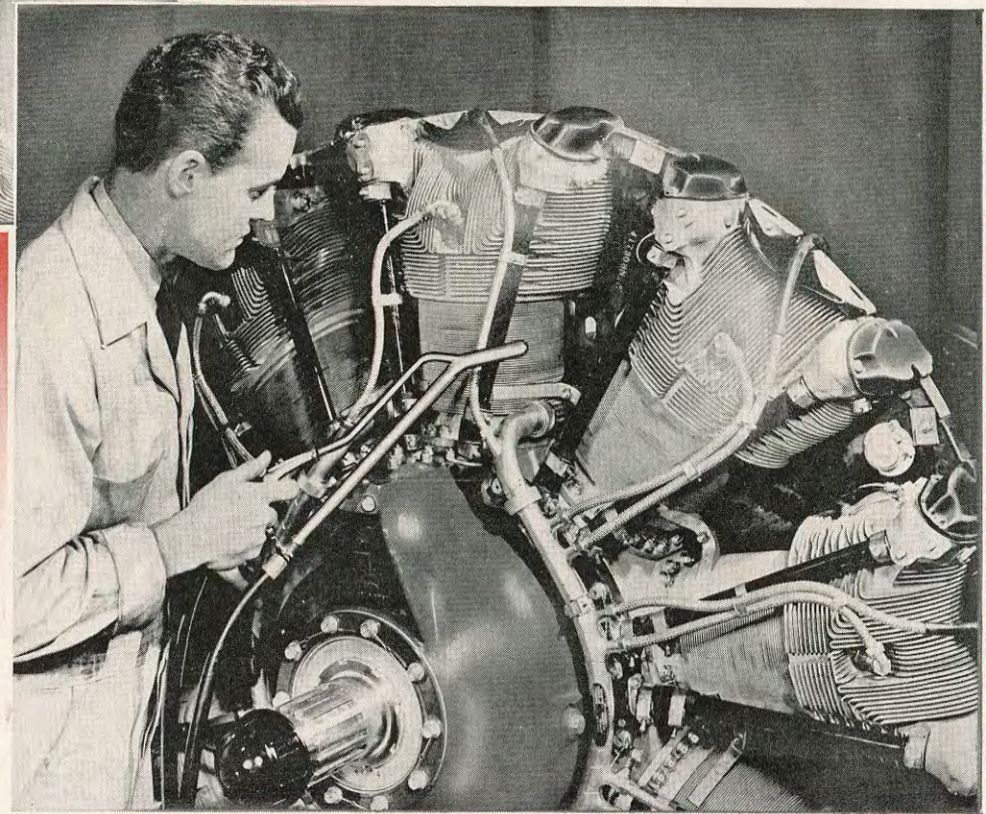
ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_





### **SPRAY ENGINE WITH SOLVENT**

← Spray the engine with a non-corrosive solvent, such as Varsol, to clean it thoroughly. Immediately following this operation, carefully wipe off the ignition system with a dry cloth.



### **DRY WITH COMPRESSED AIR**

→ Dry the engine with compressed air. Use care when drying the engine, so that moisture is not driven into the ignition harness. Thoroughly clean and dry the engine.

# INSPECTION ITEM NO. 3

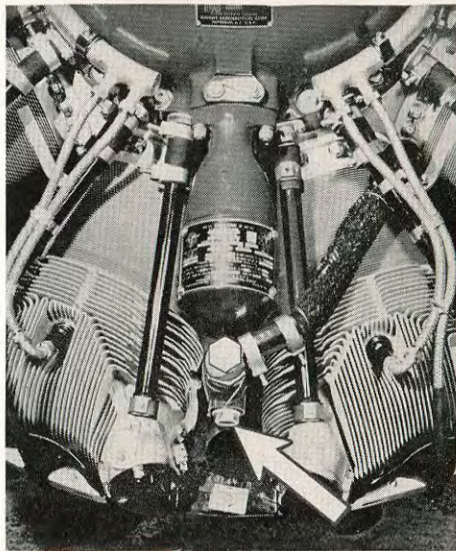
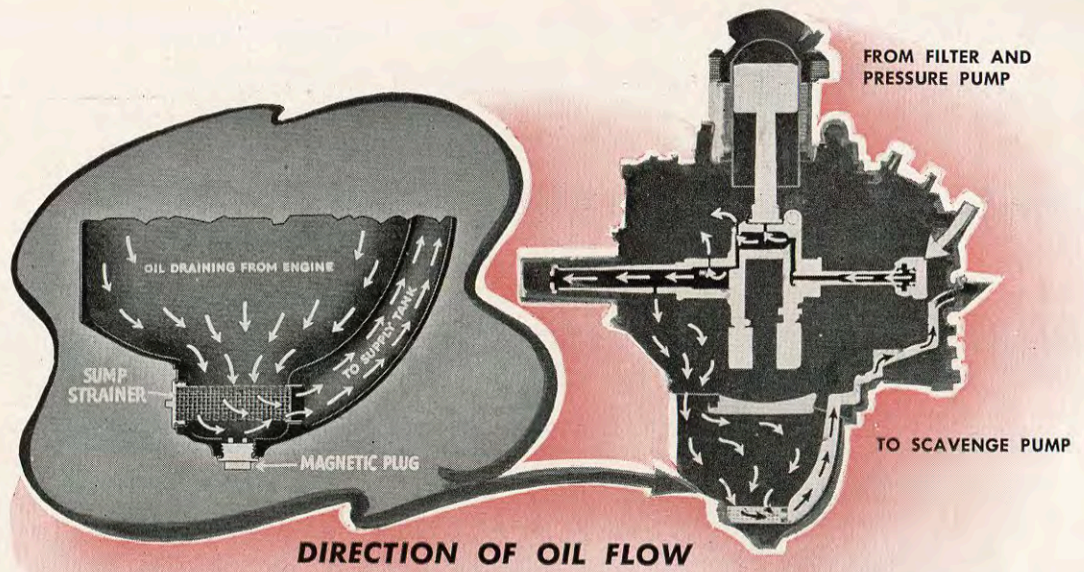
CHECK-OFF SHEET  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect for Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetic Plug and Strainer			
4.	Inspect and Clean the Cuno Oil Filter			
5.	Check the Cylinder Compression			
6.	Check the Valve Clearance			
7.	Check Magnetos and Install Reconditioned Spark Plugs			
8.	Check the Thrust Bearing Nut			
9.	Check the Engine Controls			
10.	Inspect the Exhaust System			
11.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
12.	Inspect the Carburetor Strainer			
13.				
14.				
15.				

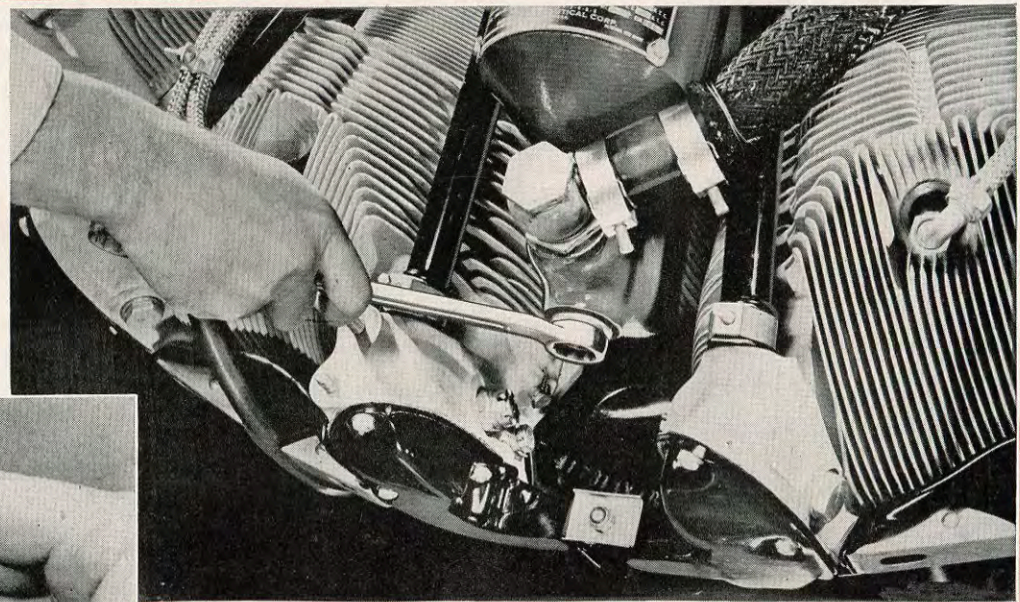
ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_



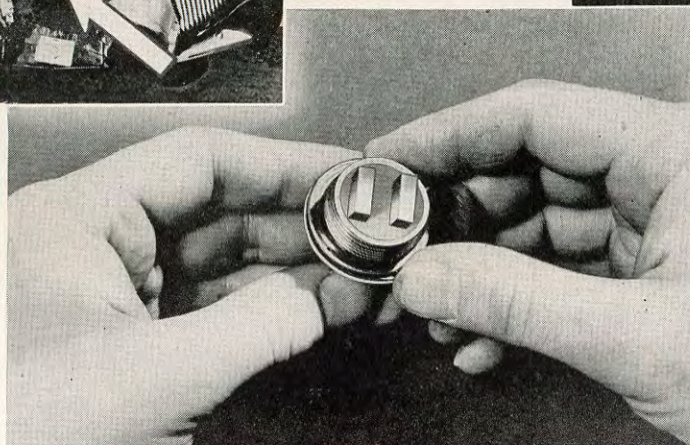
This diagram shows the flow of oil in the Cyclone 9GC. Oil, which drains from the crankcase, passes through the sump before returning to the supply tank. Foreign material is trapped at the sump by the magnetic plug or the strainer.



**MAGNETIC  
PLUG  
IN SUMP**



**REMOVE MAGNETIC PLUG**

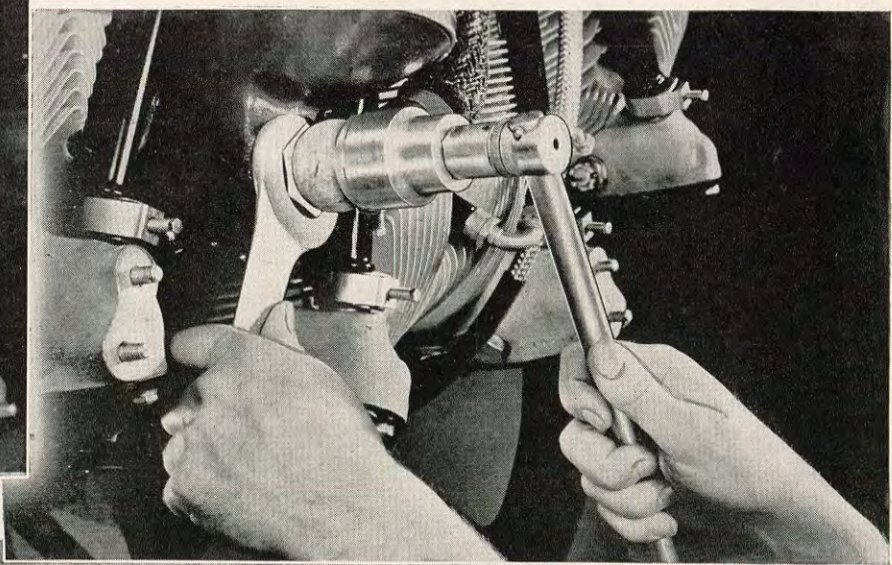


**INSPECT FOR METAL PARTICLES**

The magnetic plug attracts iron and steel particles from the oil. It does not, however, detect particles of stainless steel as this metal is non-magnetic. Remove the magnetic plug. Examine the magnet for iron or steel particles which might indicate abnormal wear, thereby evidencing engine failure.

**EXTERNAL TUBE CONNECTION**

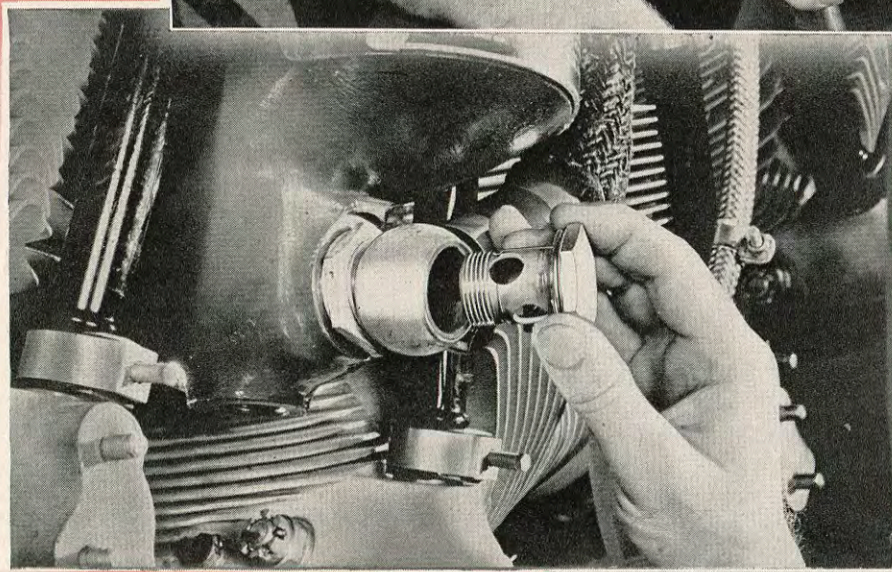
**STRAINER**



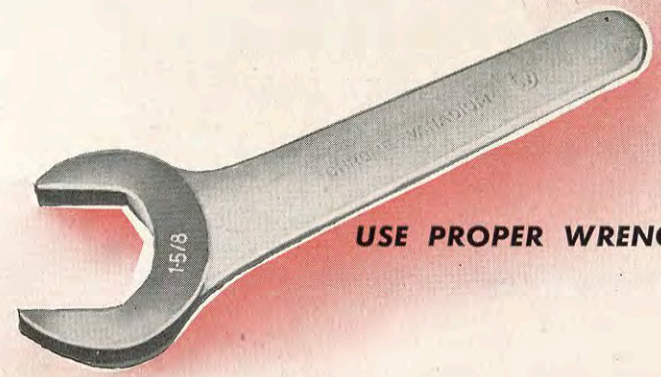
**LOOSEN THE ADAPTER PLUG**

**SUMP STRAINER**

Remove the oil strainer from the sump. Inspect the strainer for dirt or metal particles. Foreign material in this or any of the strainers may indicate that the lubrication system needs cleaning or, in the case of metal particles, that internal part replacement may be necessary.



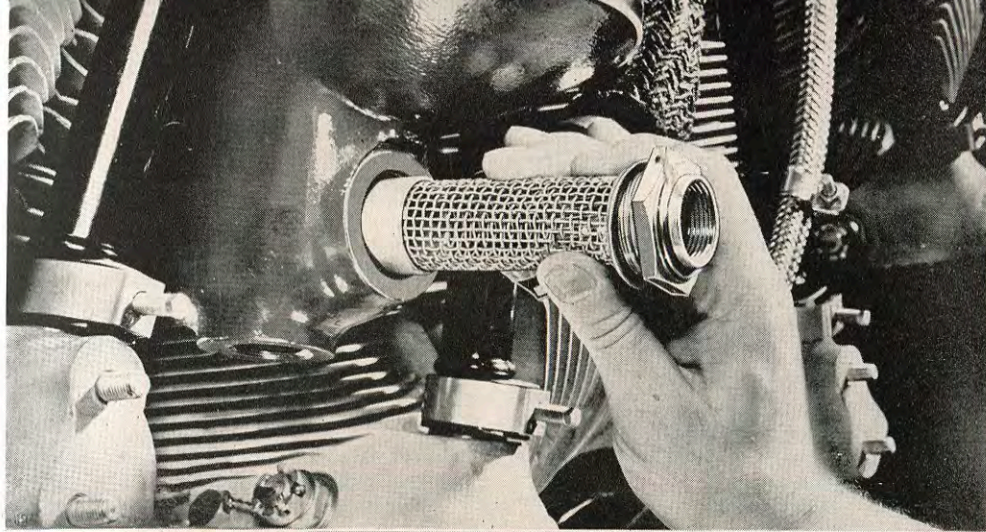
**REMOVE THE ADAPTER PLUG**



**USE PROPER WRENCH**

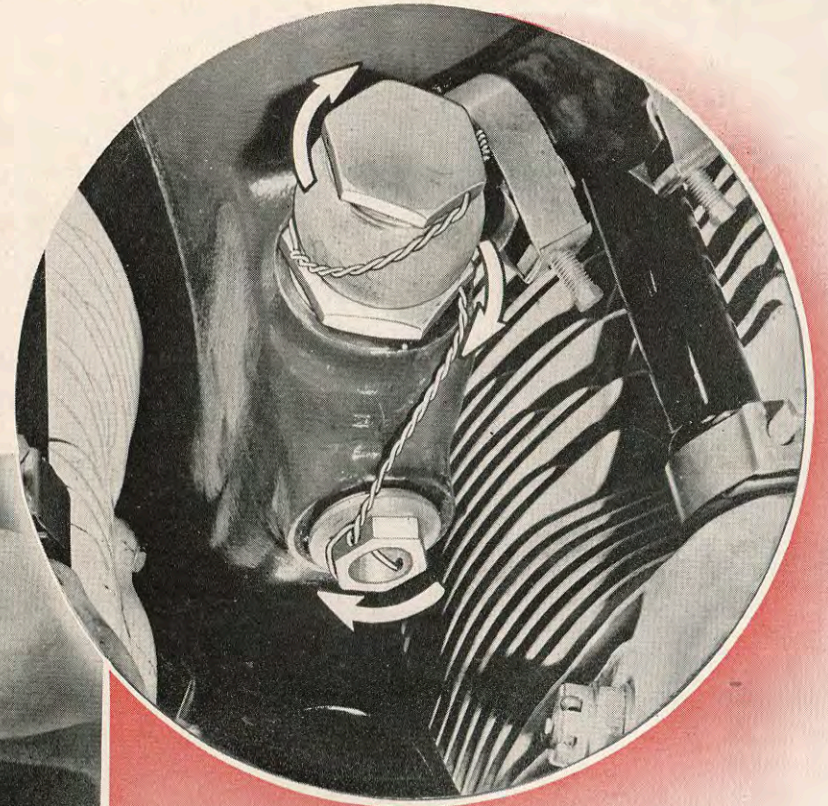
**REMOVE ADAPTER**





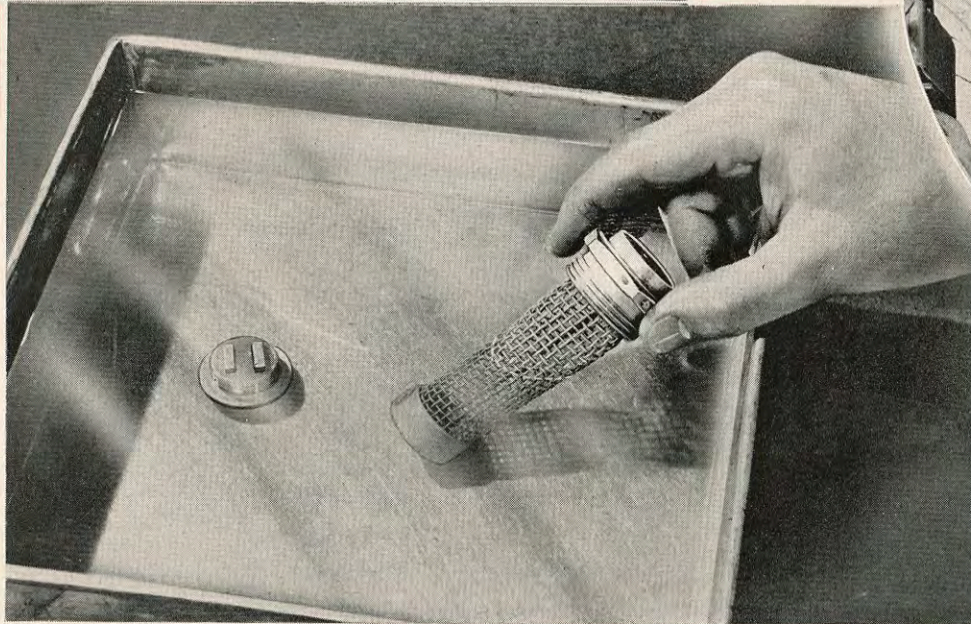
**REMOVE  
OIL  
STRAINER**

**PULL IN TIGHTENING DIRECTION**



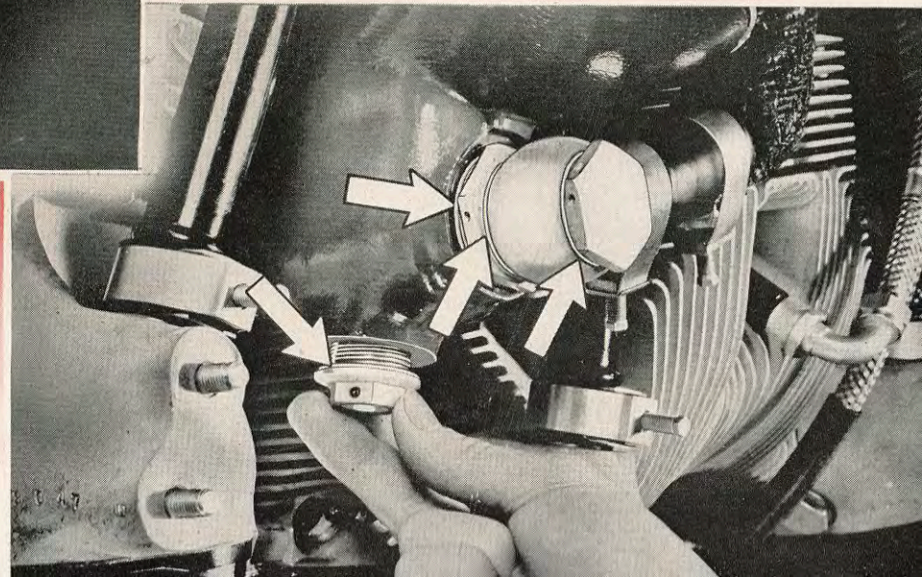
**USE NEW GASKETS**

**WASH PLUG  
AND STRAINER**



After removing the magnetic plug and strainer from the sump, wash them thoroughly in a suitable cleaning solvent.

Reinstall magnetic plug and strainer with new copper-asbestos gaskets. Lockwire the strainer and plug together, arranging the lock wire so that it pulls all parts in the direction of tightening.





# INSPECTION ITEM NO. 4

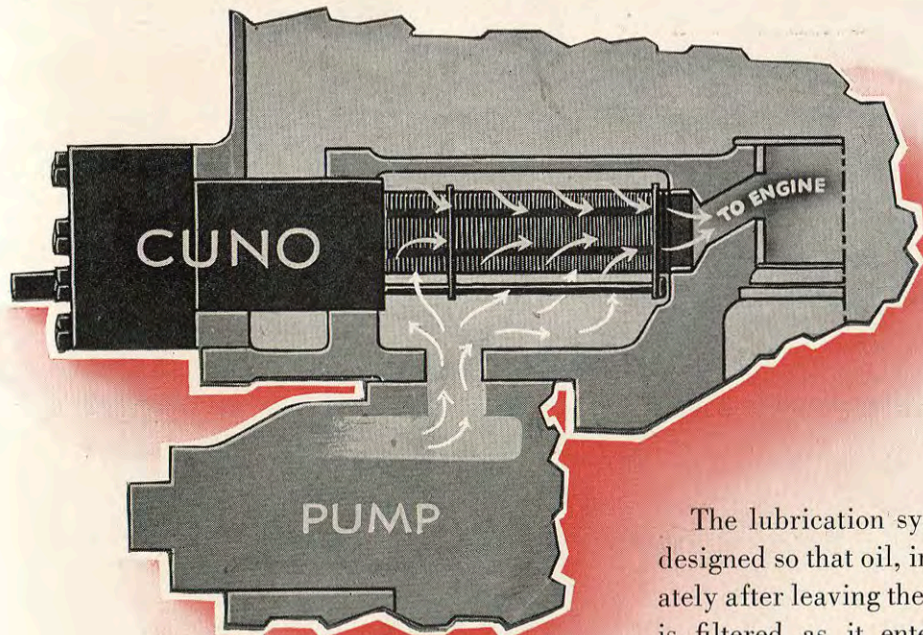
**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetic Plug and Strainer			
4.	Remove, Inspect, and Clean the Cuno Oil Filter			
5.	Remove and Visually Inspect Spark Plugs			
6.	Check the Cylinder			
7.	Check the Valve Clearance			
8.	Check Magneto and Install Reconditioned Spark Plugs			
9.	Inspect the			
10.	Check All Lubrication			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

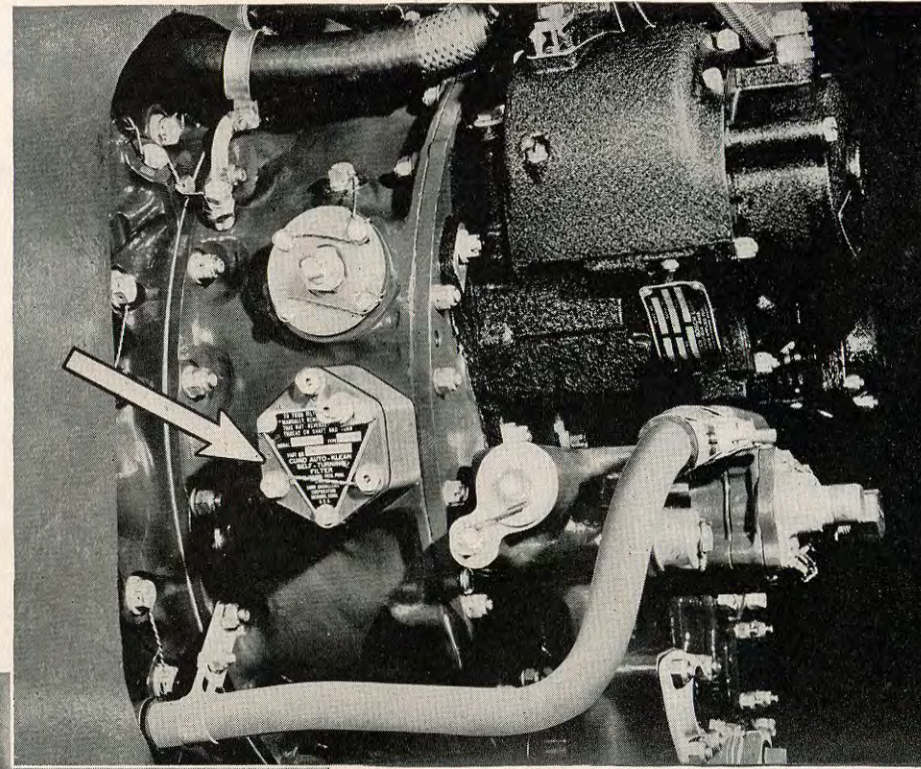
REMOVE, INSPECT,  
 AND CLEAN THE  
 CUNO OIL FILTER





**LOCATION OF CUNO FILTER**

The lubrication system is designed so that oil, immediately after leaving the pump, is filtered as it enters the engine.

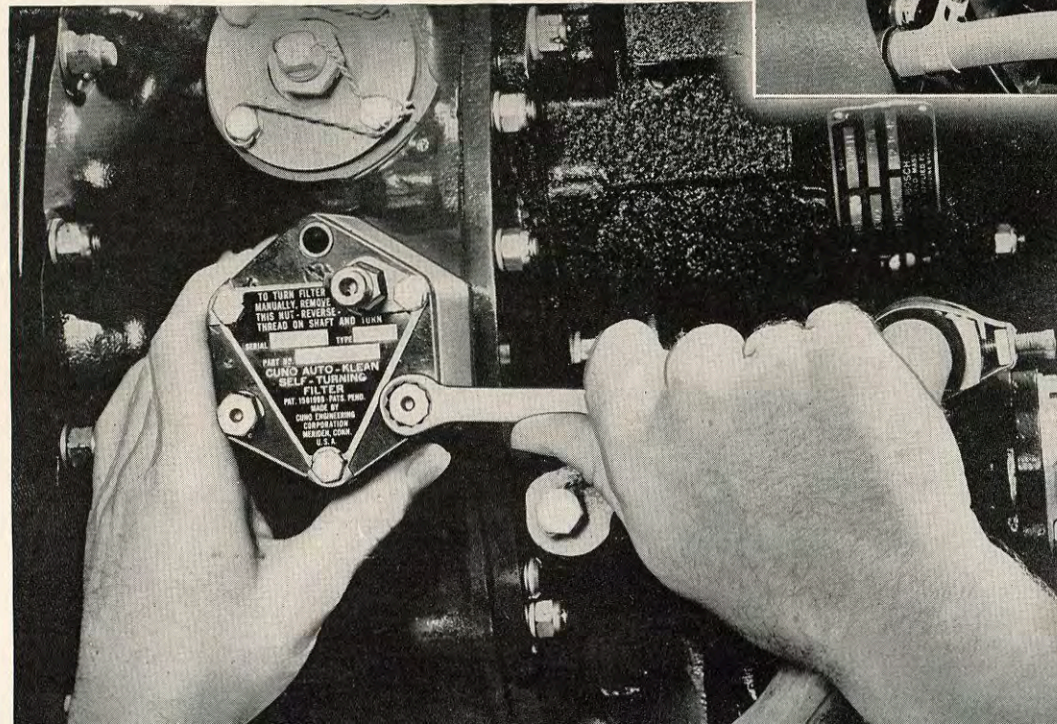


**CUNO FILTER IN REAR SECTION**

The Cuno filter can be either of two types—automatic, or manually operated. The one shown here first is automatic.

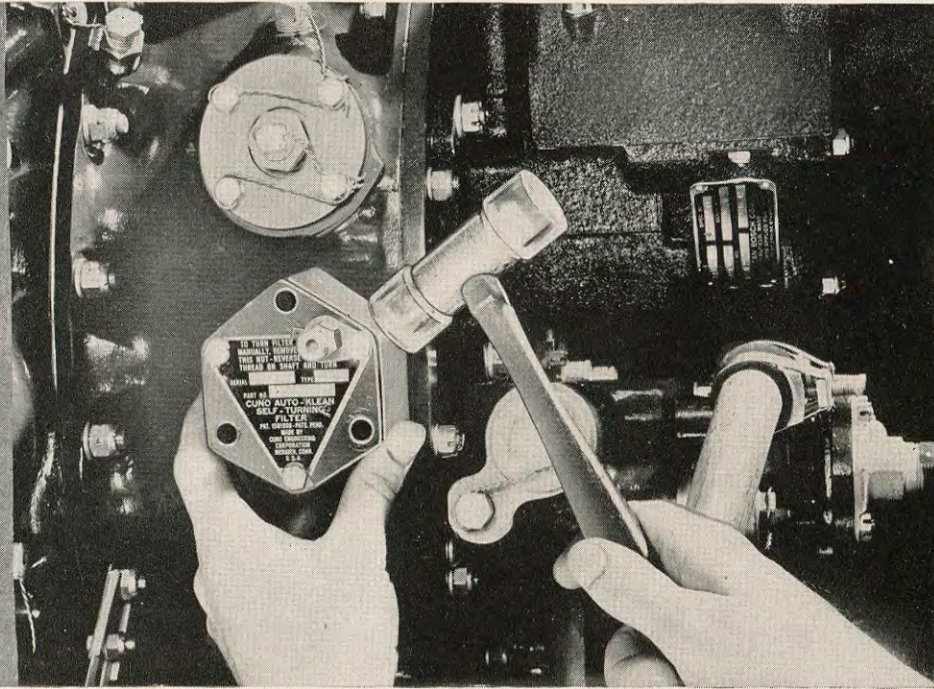
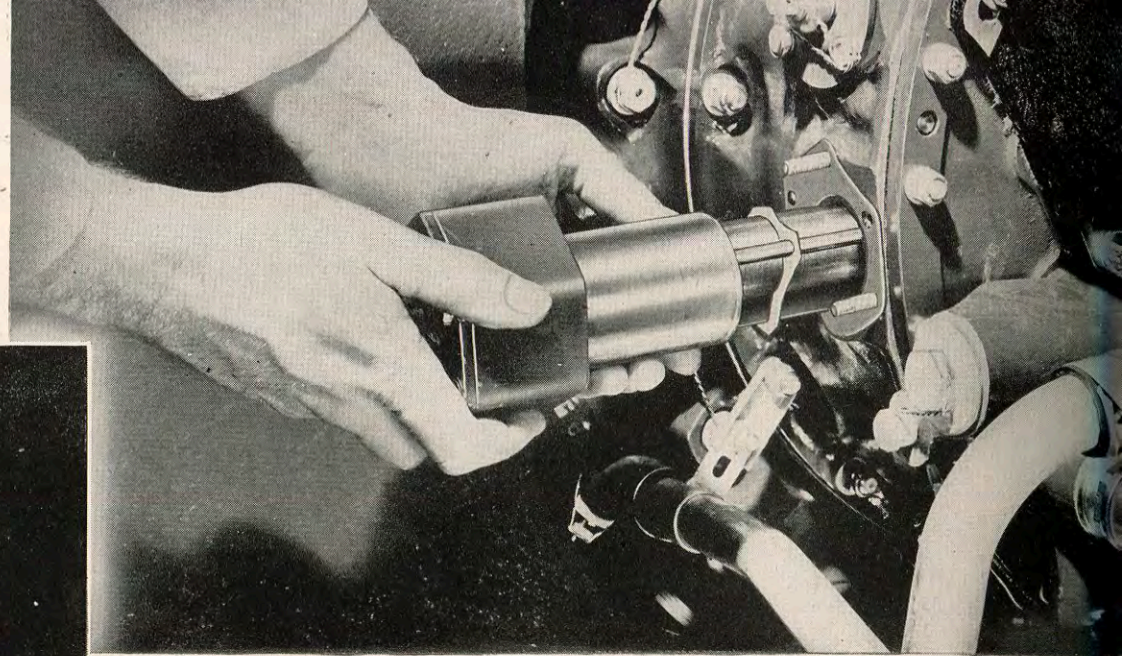
To inspect the filter, take out the attaching drop nuts so the filter can be removed from the engine.

**REMOVE THE FILTER**



### REMOVE FILTER STRAIGHT

Remove the filter carefully. It is important to pull it out *straight* to insure the paper-thin leaves against damage caused by striking the side of the hole. ➔



### TAP WITH PLASTIC HAMMER

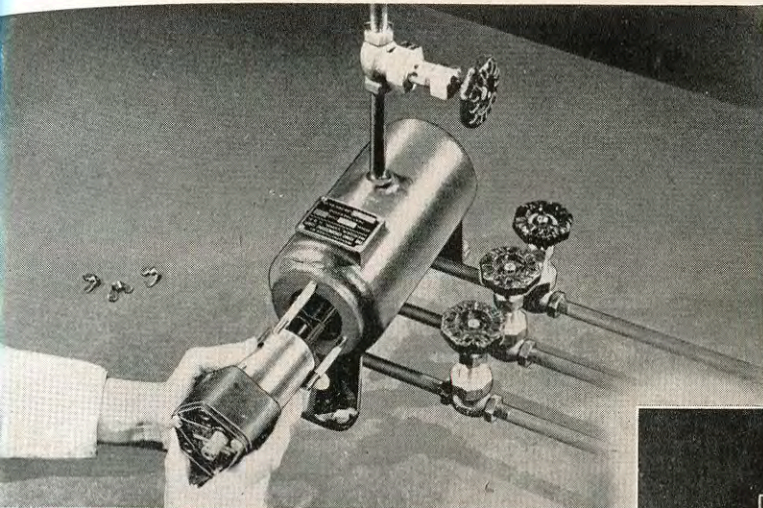
↑  
If the filter sticks, tap the edges lightly with a rawhide or plastic hammer. Never pry under the flange with sharp tools.



### EXAMINE FOR METAL PARTICLES

Carefully examine the cartridge and cleaner blades for metal flakes or foreign matter indicative of possible engine trouble.

# TEST IN CUNO FIXTURE

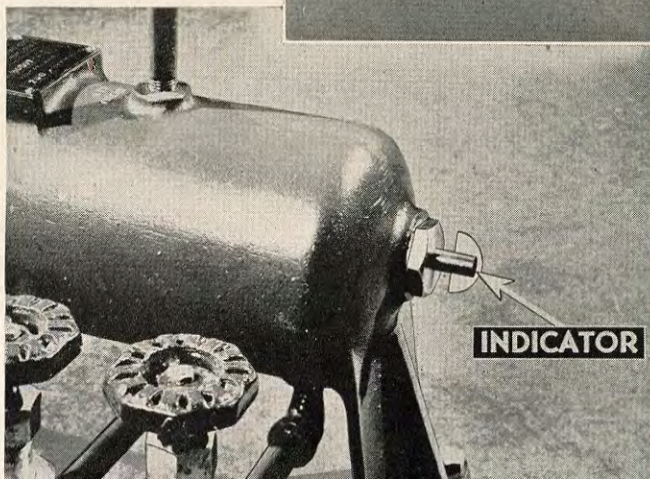


## PLACE IN CUNO FIXTURE

This fixture cleans the filter with slushing oil and also checks the automatic turning mechanism.

## CHECK TURNING MECHANISM

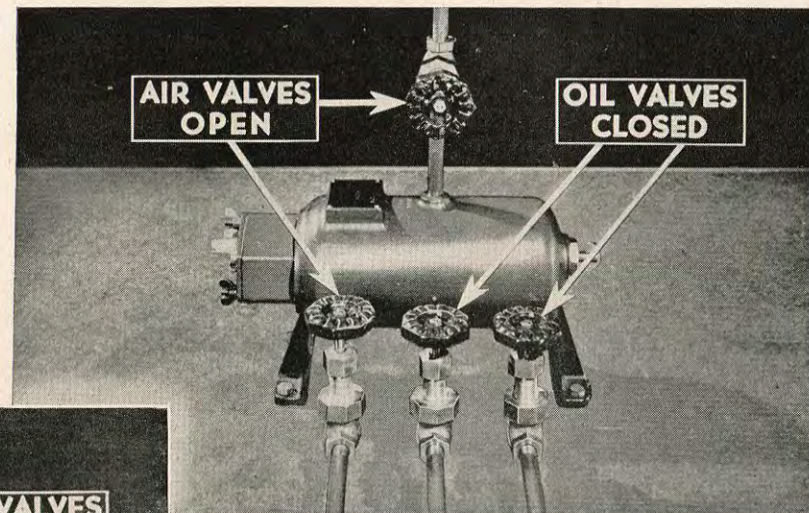
When the air valves are open, the indicator should rotate if the Cuno filter is operating properly.



INDICATOR

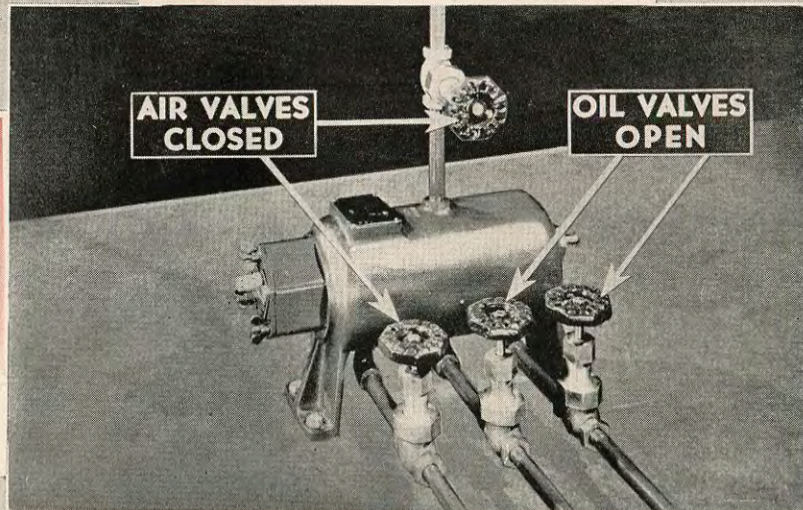
## SLUSH WITH OIL

With the Cuno in the fixture, open the valves which control the flow of oil through the unit.



AIR VALVES  
OPEN

OIL VALVES  
CLOSED

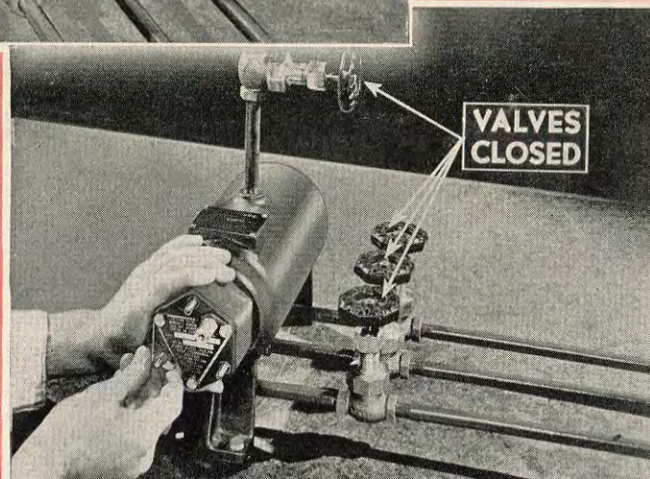


AIR VALVES  
CLOSED

OIL VALVES  
OPEN

## APPLY AIR UNDER PRESSURE

After slushing, close the oil valves and open the air valves to remove the slushing oil from the motor head. Do not leave open for more than a minute as scoring will result.



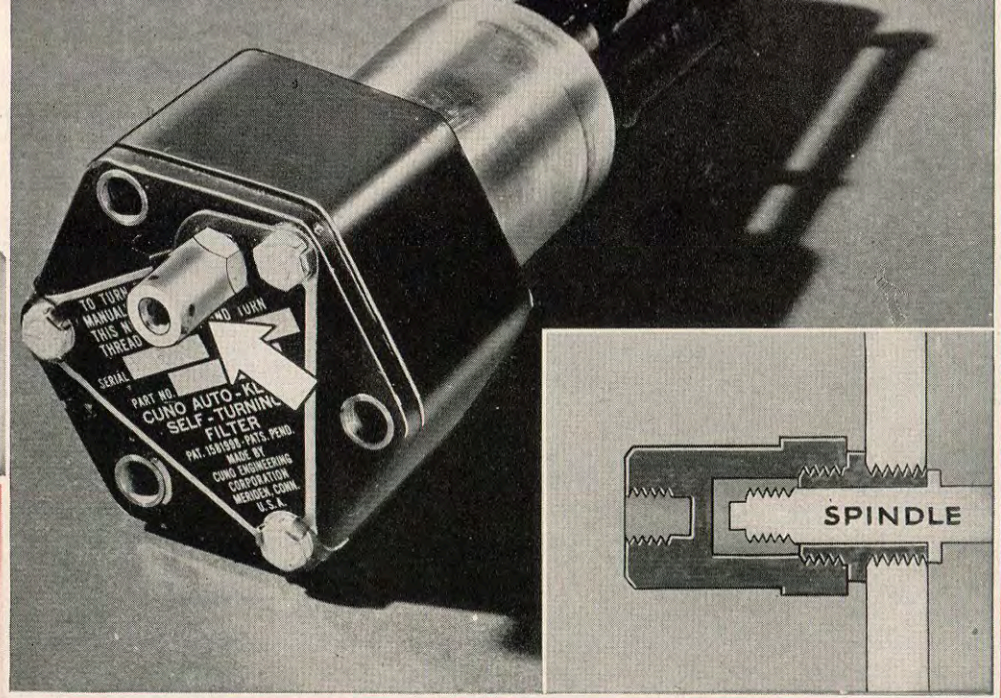
VALVES  
CLOSED

## REMOVE FILTER

Close all valves before removing filter. Be sure to remove the filter straight.

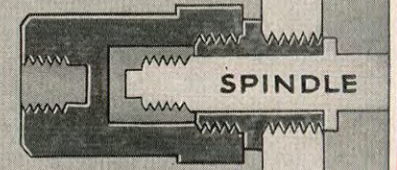
## CHECK FILTER BY-PASS VALVE

Check the filter by-pass valve with a pencil or fiber rod. The valve must be free to move, and must remain closed in the free position.

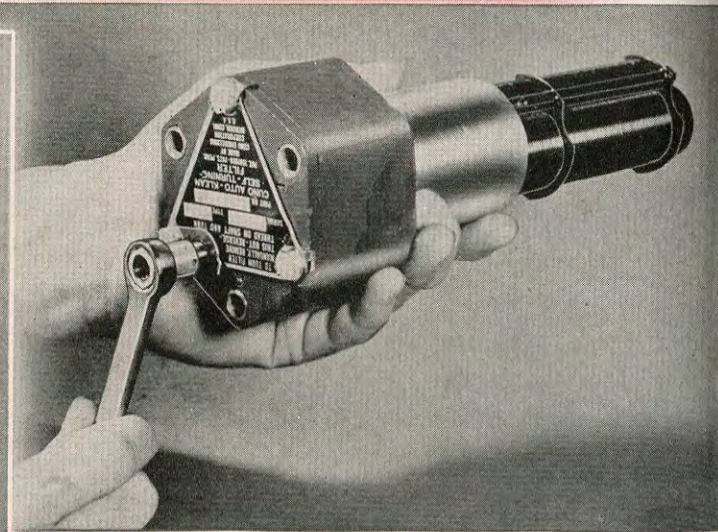
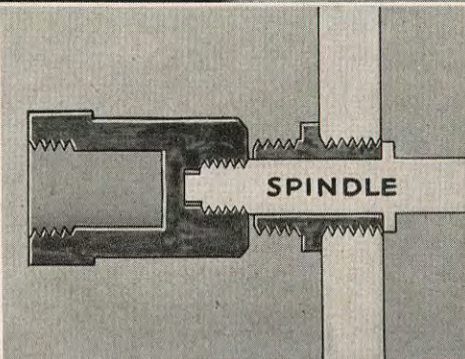
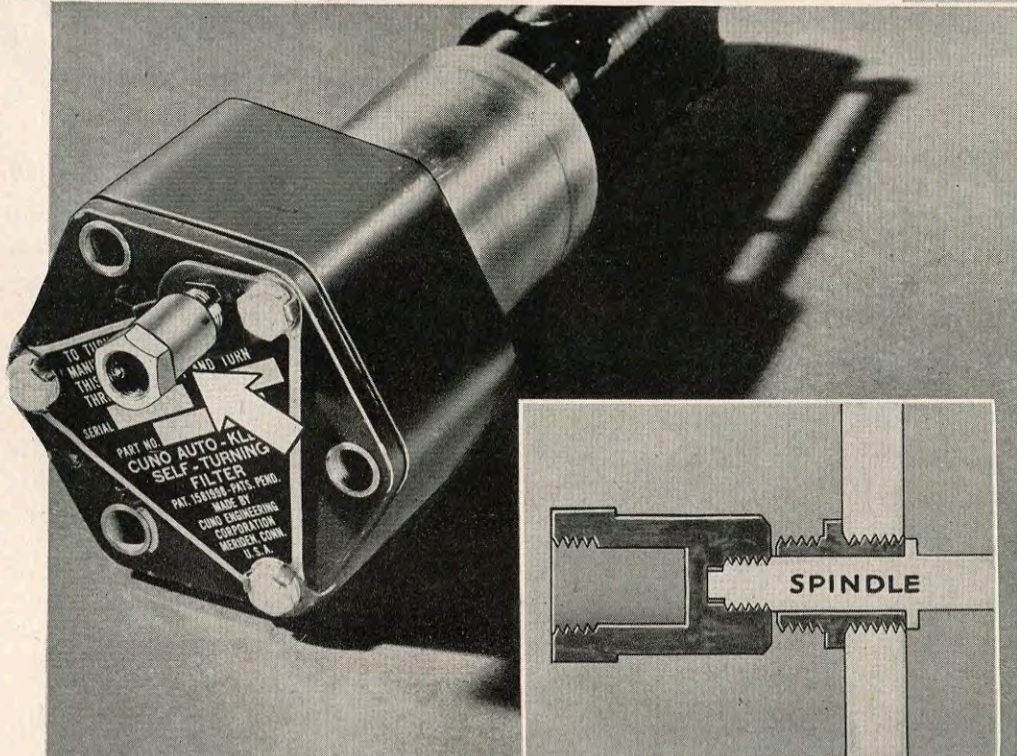


REVERSE CAP NUT

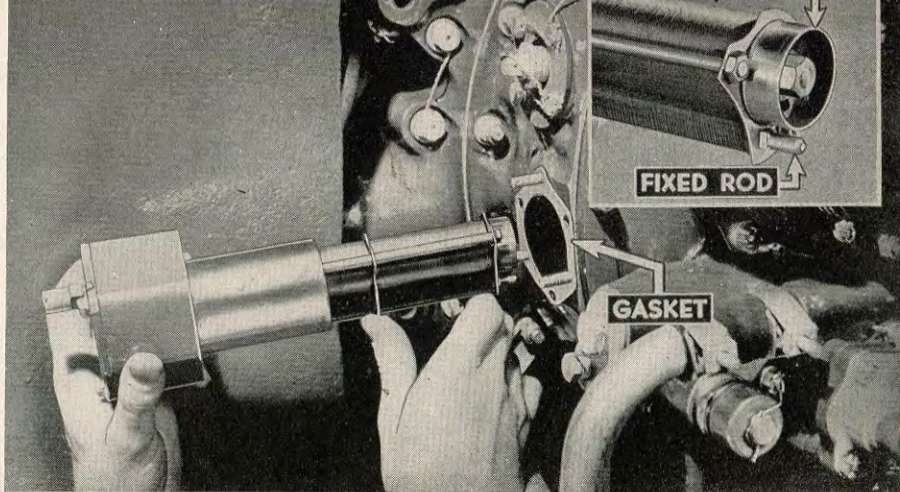
REMOVE CAP NUT



To check the filter for smooth rotation, remove the cap nut from its normal position *over* the spindle. Reverse the cap nut **ON** the spindle so that the cartridge can be rotated. Turn the cap nut to see if the cartridge rotates smoothly. Remove the cap nut and place it over the spindle in its normal position.



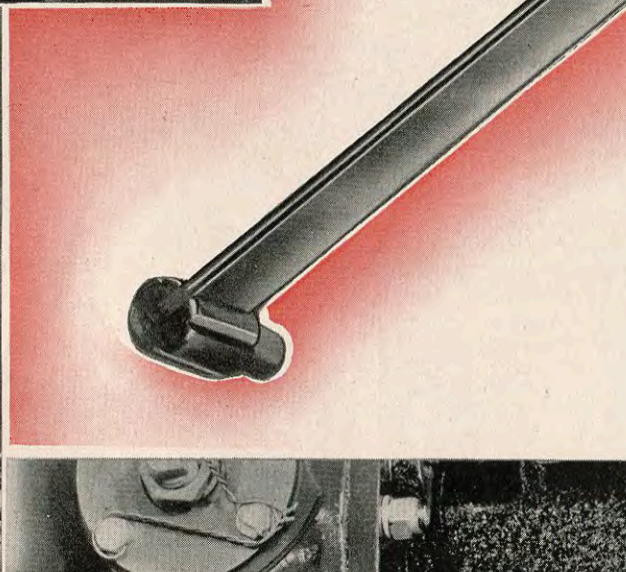
CHECK FOR SMOOTH ROTATION



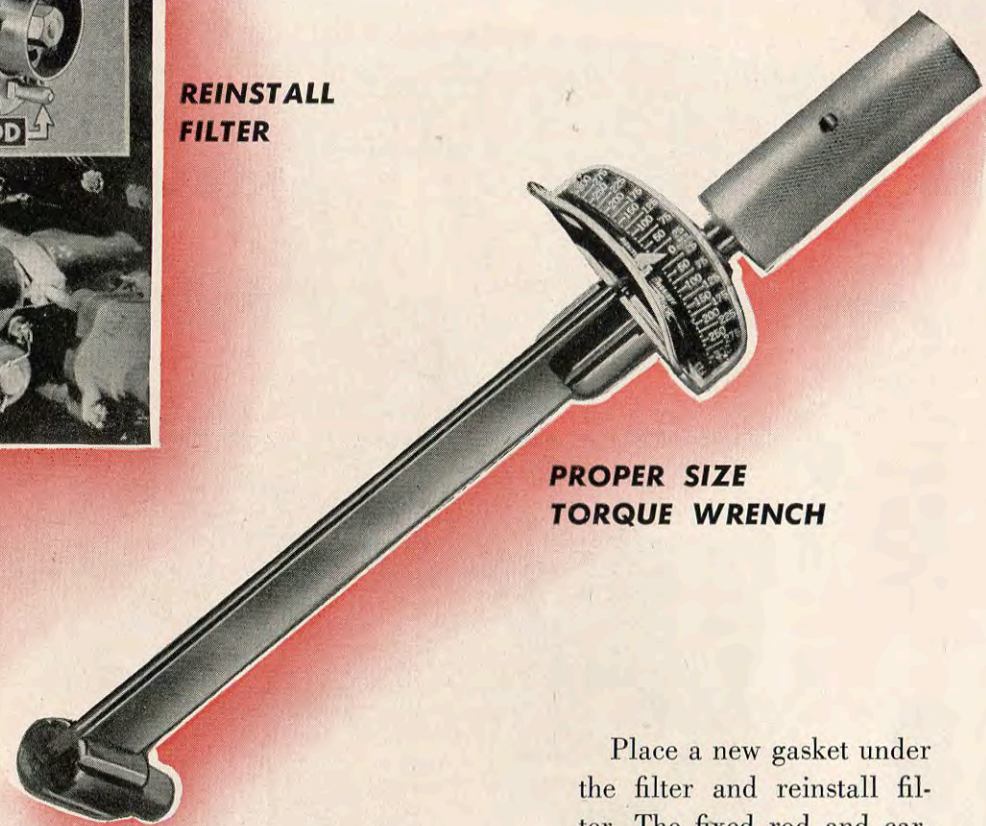
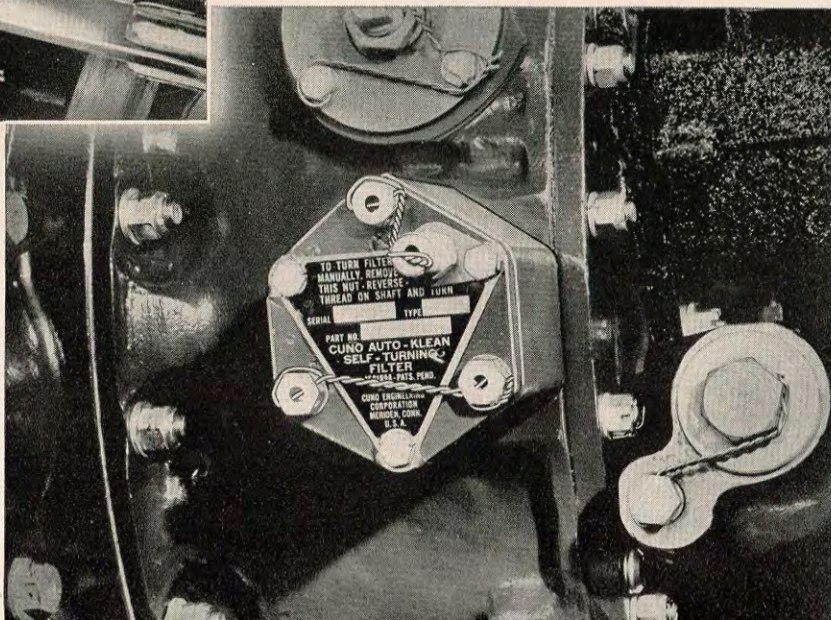
**REINSTALL  
FILTER**



**TIGHTEN TO PROPER TORQUE**



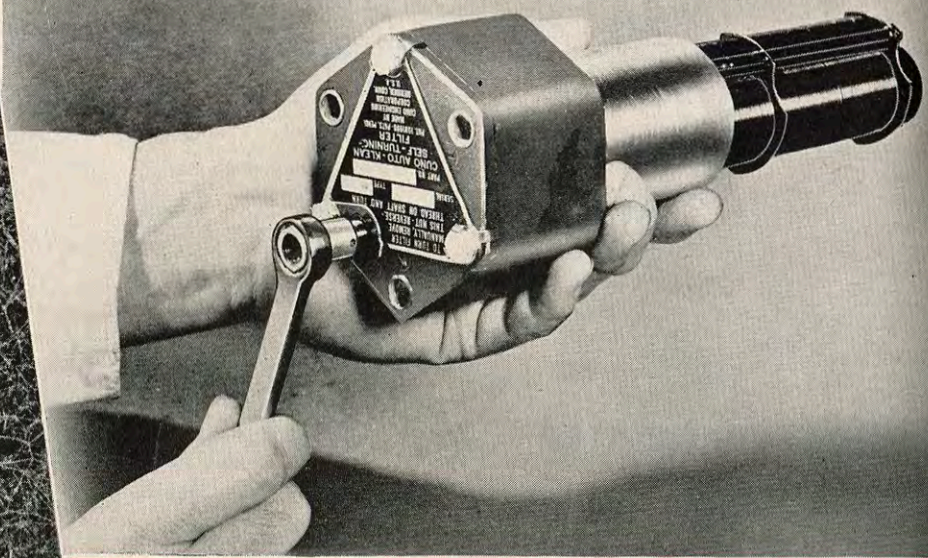
**LOCKWIRE**



**PROPER SIZE  
TORQUE WRENCH**

Place a new gasket under the filter and reinstall filter. The fixed rod and cartridge fit into special recesses in the filter pocket; install accordingly. Put in the attaching nuts and new copper washers. Use the proper size torque wrench, W.A.C. Tool No. 802178. Refer to the Table of Limits and tighten to the torque value listed. Finally, lockwire the attaching nuts and the cap nut.

The foregoing procedure for cleaning and reinstalling the filter is varied slightly if no Cuno cleaning and testing fixture is available



**CHECK FOR SMOOTH ROTATION**

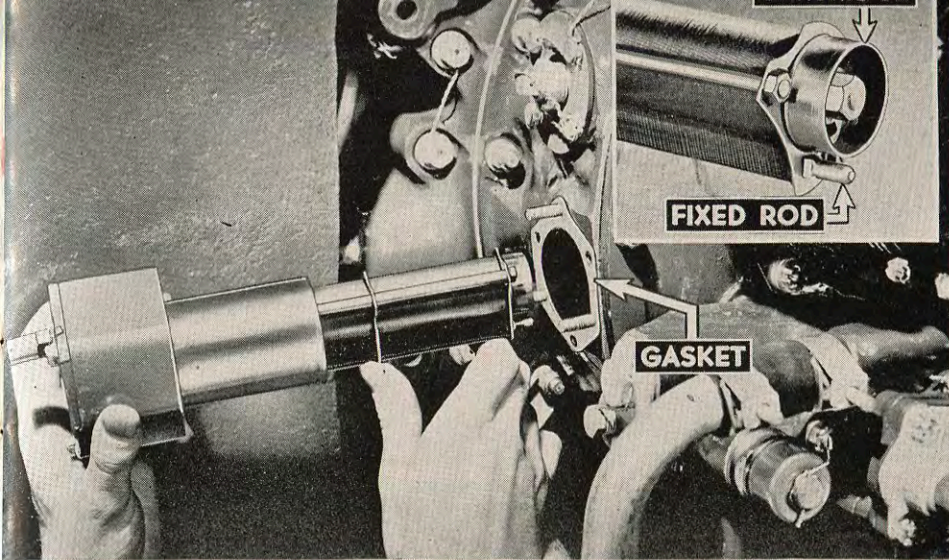


**WASH FILTER IN SOLVENT**

After examining the filter for metallic particles or other signs of possible engine trouble, clean it with a non-corrosive solvent. Never use a hard, edged, or pointed tool to clean the filter. Rotate the cartridge to aid in cleaning. Take every precaution not to damage the filter's delicate fins. Check the filter by-pass for free movement, and test the filter for smooth rotation.



**CHECK FILTER BY-PASS VALVE**



**REINSTALL FILTER**

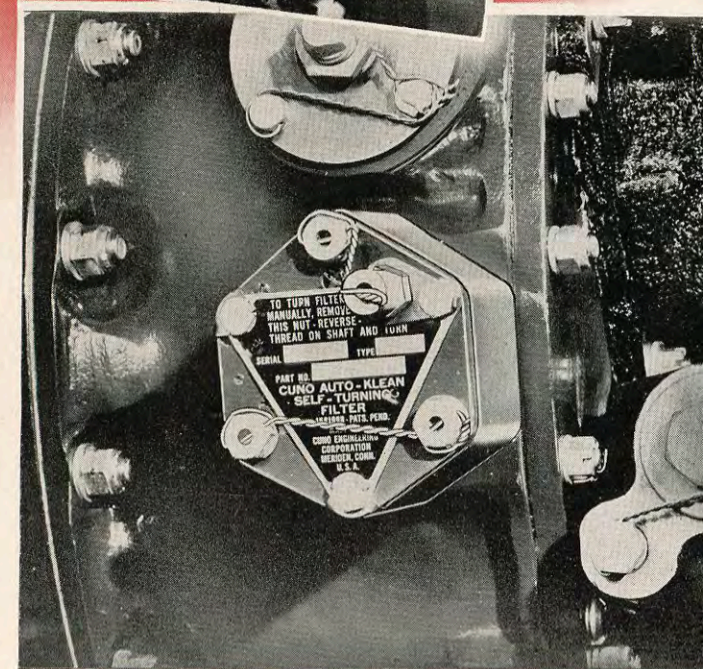


**CHECK TURNING MECHANISM**



**MARK TOP SURFACE**

Reinstall the filter in the engine, and check the turning mechanism. With the cap nut in reversed position, mark the top surface. Then start the engine and allow it to idle for several minutes. If the cap nut has apparently remained stationary, recheck by running the engine another minute and a half. The cap nut may have made a complete revolution and returned to its original position. After completing this check, install the cap nut in its normal position. Tighten and lockwire the filter as previously demonstrated.



**LOCKWIRE FILTER**



# INSPECTION ITEM NO. 5

CHECK-OFF SHEET  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetic Plug and Strainer			
4.	Remove, Inspect and Clean the Cuno Oil Filter			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install Reconditioned Spark Plugs			
9.	Inspect the Ignition Timing			
10.	Check All External Fittings, etc.			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

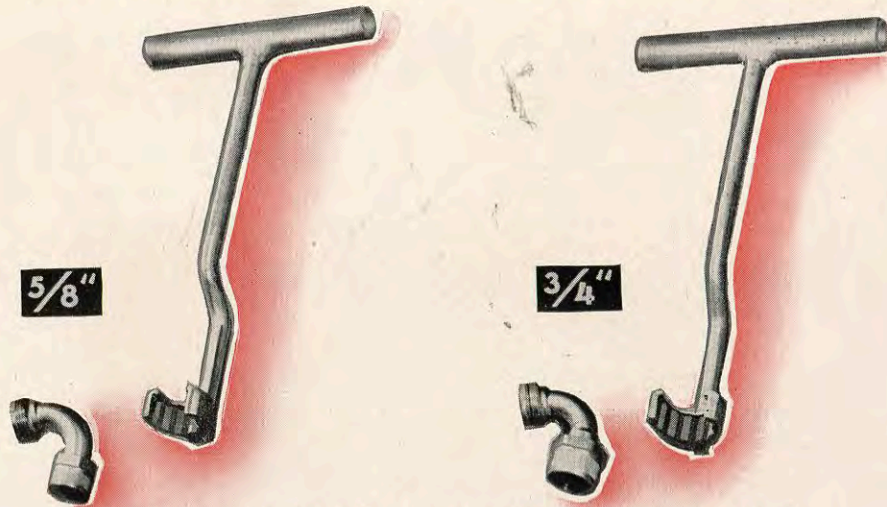
ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

**REMOVE AND  
VISUALLY INSPECT  
SPARK PLUGS**

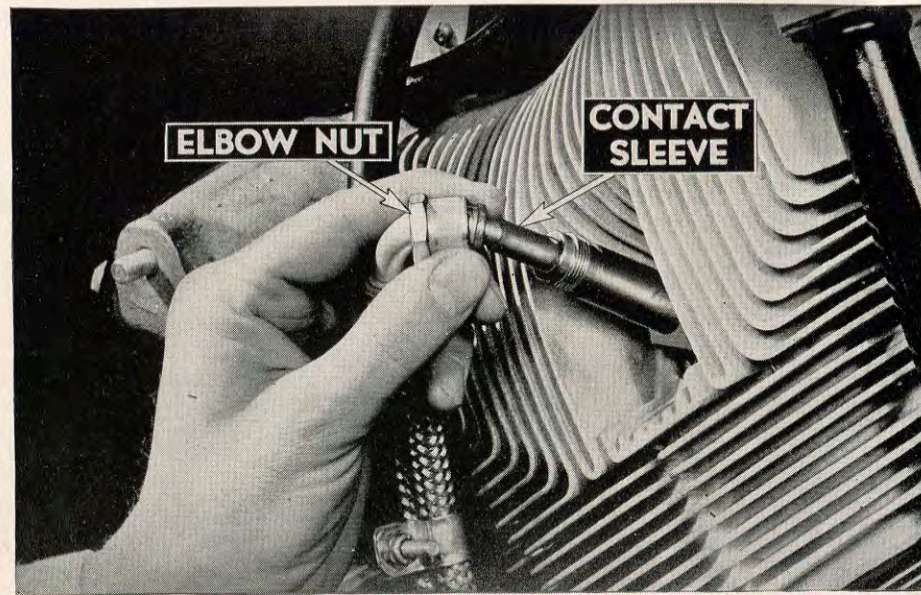


W.A.C. TOOL NO. 800629

W.A.C. TOOL NO. 800630

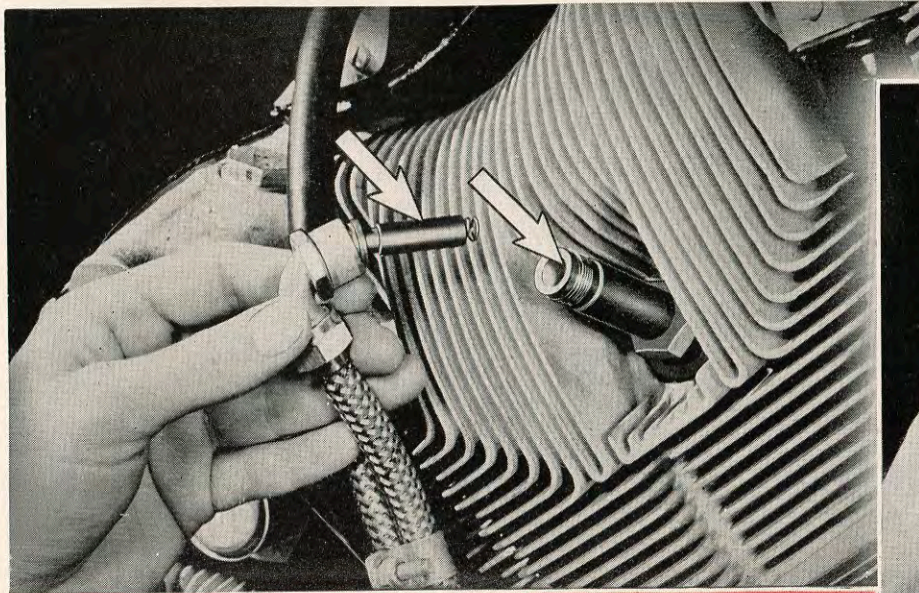


USE SPECIAL WRENCH TO REMOVE ELBOW NUTS



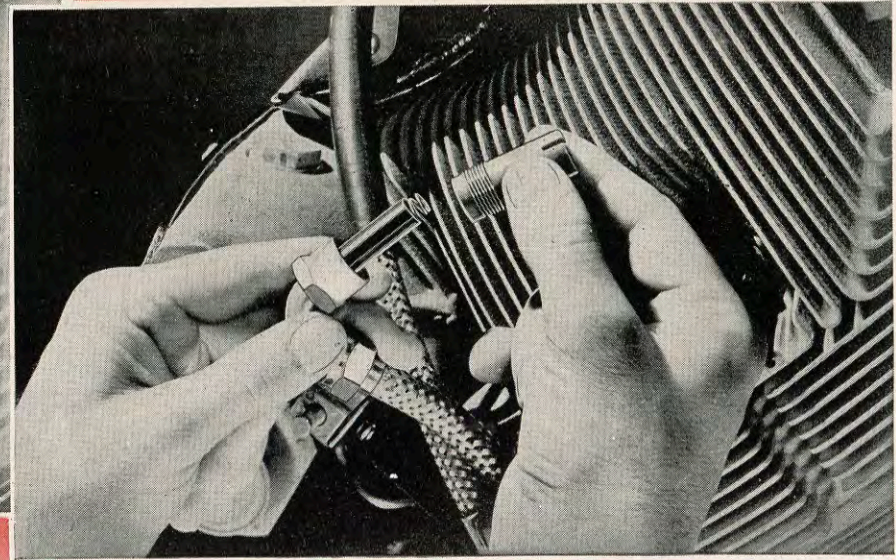
REMOVE CONTACT SLEEVE CAREFULLY

With the elbow nut unscrewed and slipped back, withdraw the ignition wire contact sleeve *straight out*, so that neither the sleeve nor the spark plug will be scratched.



SCRATCHES CAUSE FAILURE

Even the slightest scratch on the spark plug insulation or on the terminal contact sleeve may collect moisture and dirt which consequently might cause ignition failure.



USE PROTECTIVE CAPS

Protective caps are used to cover the terminal contacts. For 5/8 inch elbow nuts: W.A.C. Part No. 116539N1. For 3/8 inch elbow nuts: W.A.C. Part No. 116539N2.

**Navy and Commercial Engines**

84450  
for  $\frac{7}{8}$ " hex



84414  
for 1" hex



**Army Engines**

84458  
for  $\frac{7}{8}$ " hex



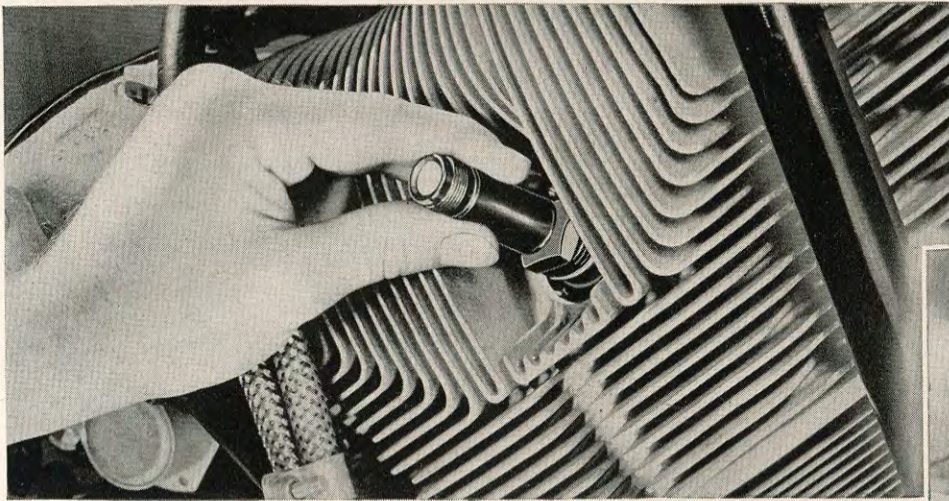
84457  
for 1" hex



**SPARK PLUG WRENCHES**

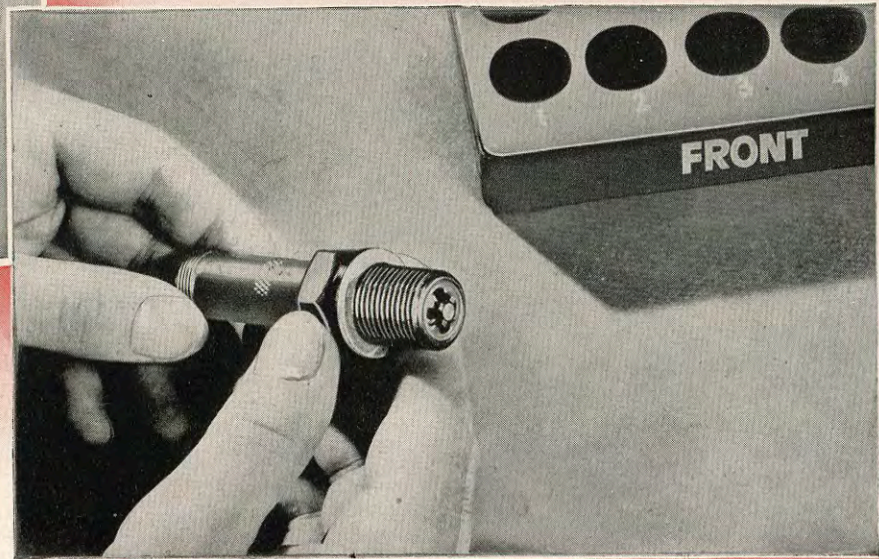


**LOOSEN PLUG WITH SPECIAL WRENCH**

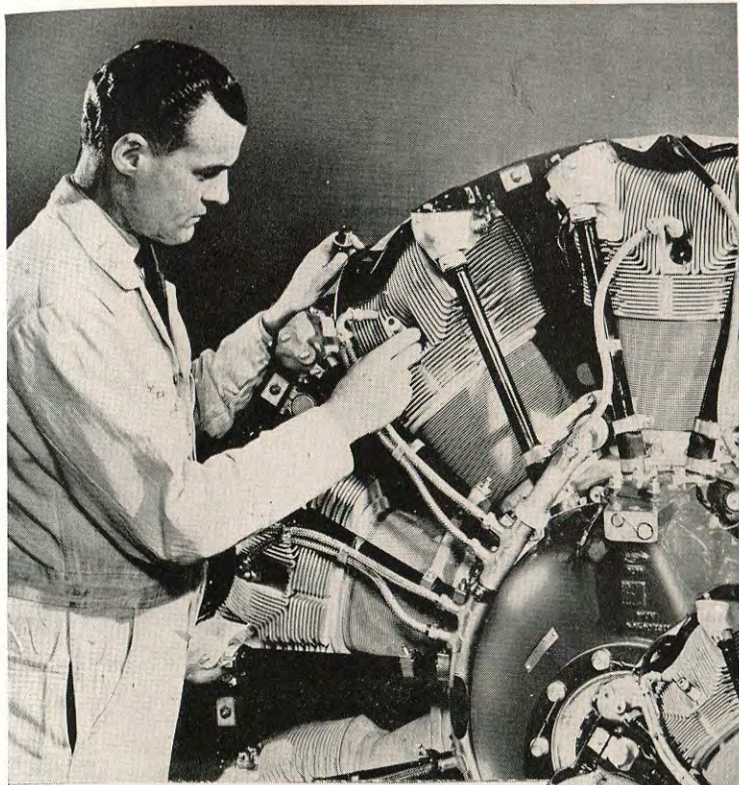


**REMOVE PLUG BY HAND**

Use these special wrenches to remove the spark plugs. Use the special socket wrench to loosen the front and rear plugs in cylinder number one. Remove the plugs by hand, to prevent their falling from the wrench and breaking. Carefully examine each plug for evidence of faulty ignition or oil leakage, and place it in a numbered rack to facilitate later identification.

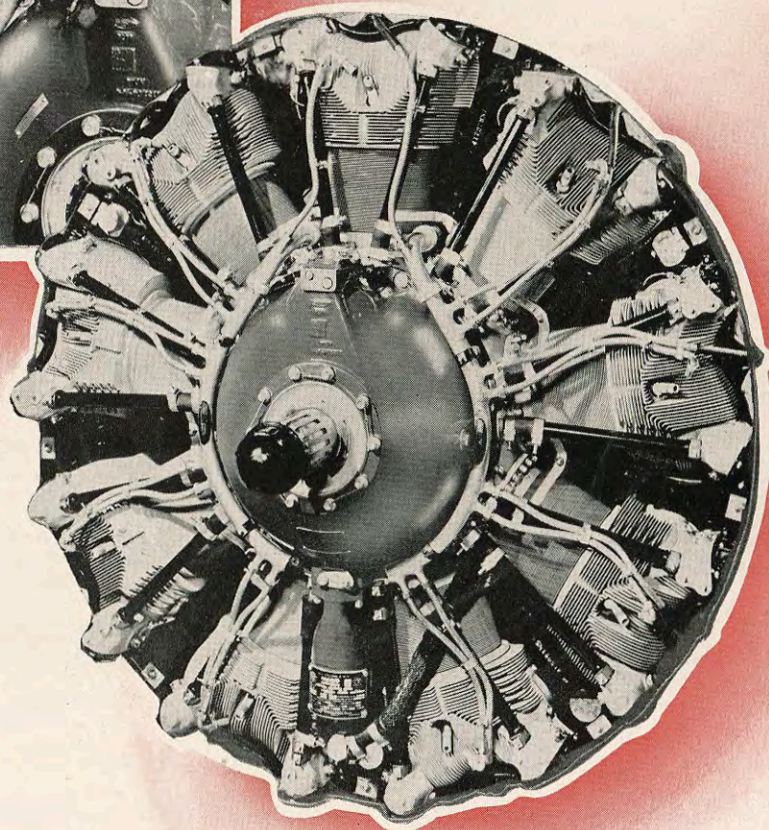


**EXAMINE EACH PLUG**



### **INSTALL DUMMY SPARK PLUGS**

Install dummy spark plugs in the front and rear spark plug holes of cylinder number one.



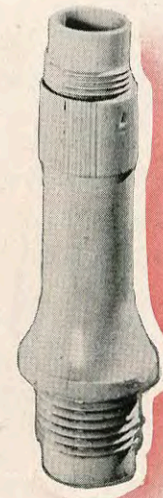
### **VENTED PLUGS IN FRONT**

Unvented plugs are installed in the rear and vented plugs in front. This permits rotation of the engine without compression loads.

### **VENTED PLUG**



### **UNVENTED PLUG**



### **DUMMY PLUGS IN ALL CYLINDERS**

Remove spark plugs and spark plug washers from remaining cylinders and install dummy plugs in all cylinders. Be sure to install one dummy plug and one vented plug in each cylinder.

# INSPECTION ITEM NO. 6

CHECK-OFF SHEET  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetic Plug and Strainer			
4.	Remove, Inspect, and Clean the Cuno Oil Filter			
5.	Remove and Visually Inspect Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install Reconditioned Spark Plugs			
9.	Inspect the Ignition System			
10.	Check All External Fasteners			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

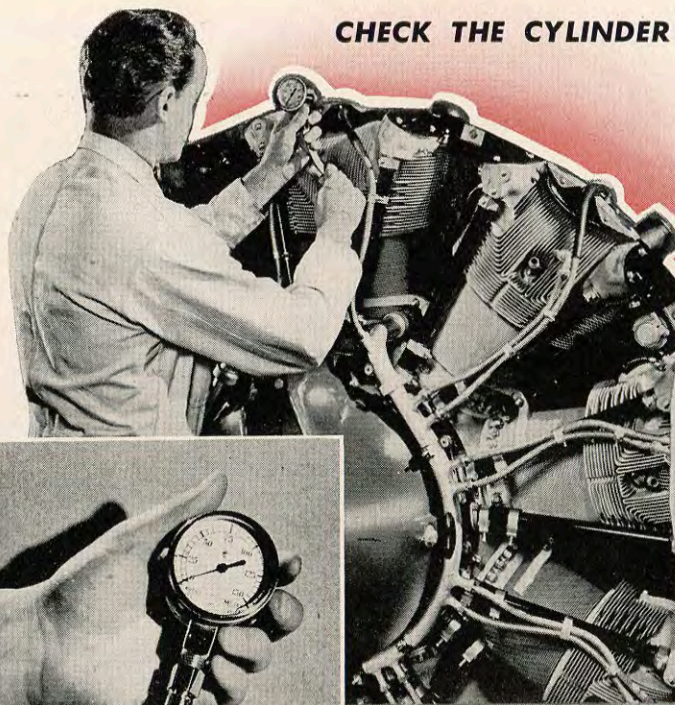
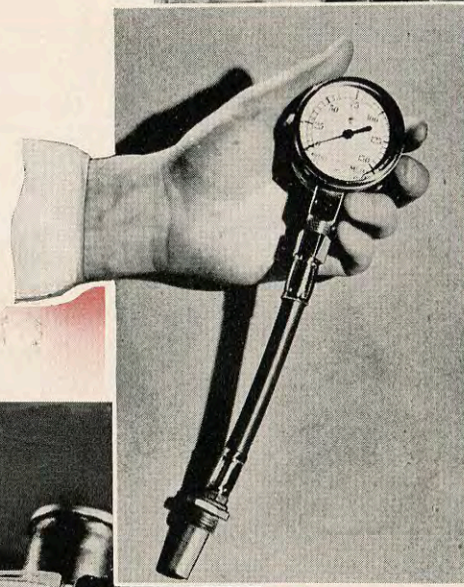
**CHECK  
THE CYLINDER  
COMPRESSION**



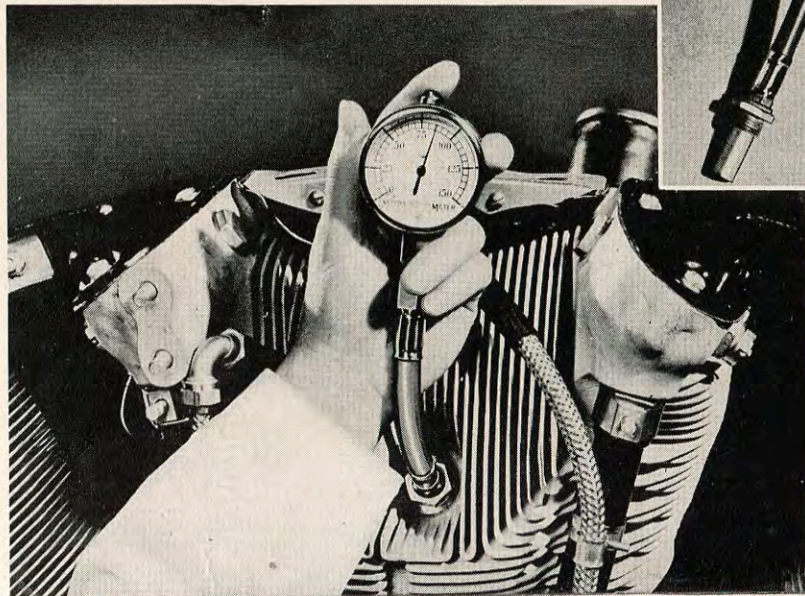
## CHECK THE CYLINDER COMPRESSION

The gage illustrated here provides an accurate means of measuring the cylinder compression. Remove the dummy spark plug from the front hole of cylinder number one, and insert the compression gage. Turn the crankshaft until the compression stroke is completed. The needle in the gage registers the cylinder compression.

Make three tests, recording the compression of each test, and take the average reading. Check the compression of all cylinders in this manner, and remember to turn the crankshaft as quickly as possible. As each cylinder is completed, reinstall the *dummy* spark plug, as previously, in preparation for the *next* operation.

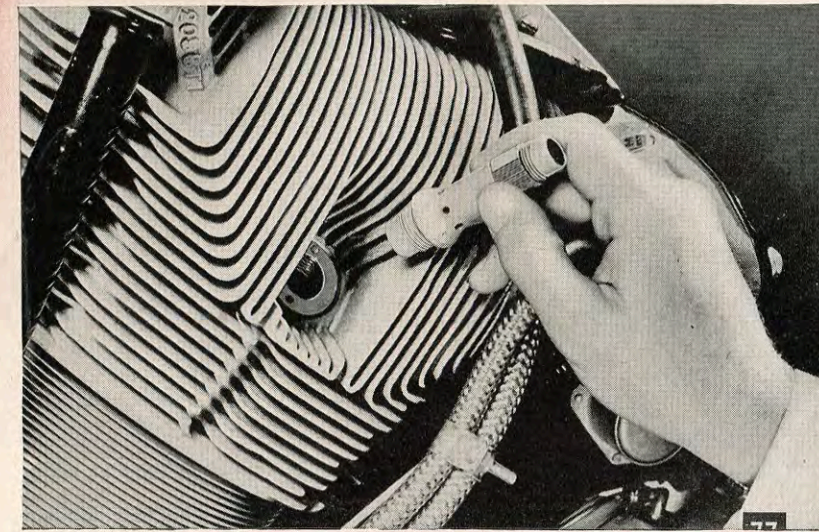


GAGE REGISTERS COMPRESSION



THREE TESTS ON EACH CYLINDER

↑  
COMPRESSION  
GAGE

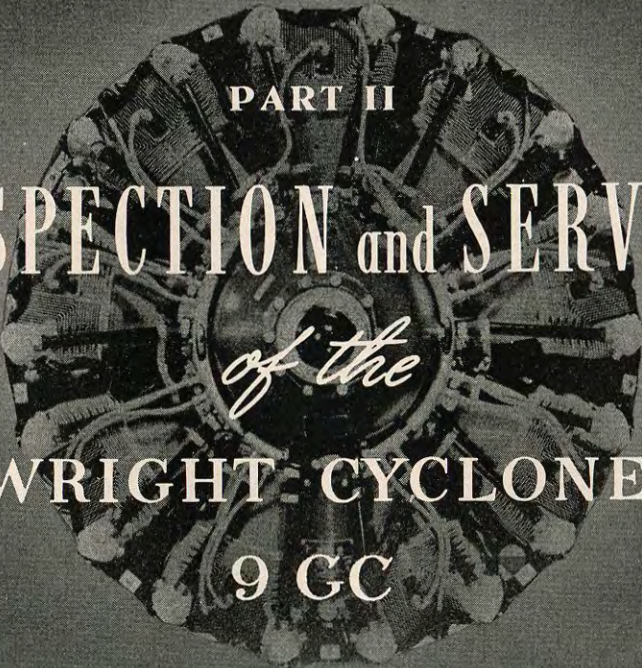


REINSTALL DUMMY SPARK PLUGS



## REVIEW

1. Inspect the engine for fuel and oil leaks
2. Wash and dry the engine
3. Drain the oil sump and check magnetic plug and strainer
4. Remove, inspect, and clean the Cuno oil filter
5. Remove and visually inspect the spark plugs
6. Check the cylinder compression



PART II

INSPECTION and SERVICE

*of the*

WRIGHT CYCLONE

9 CC



# INSPECTION ITEM NO. 7

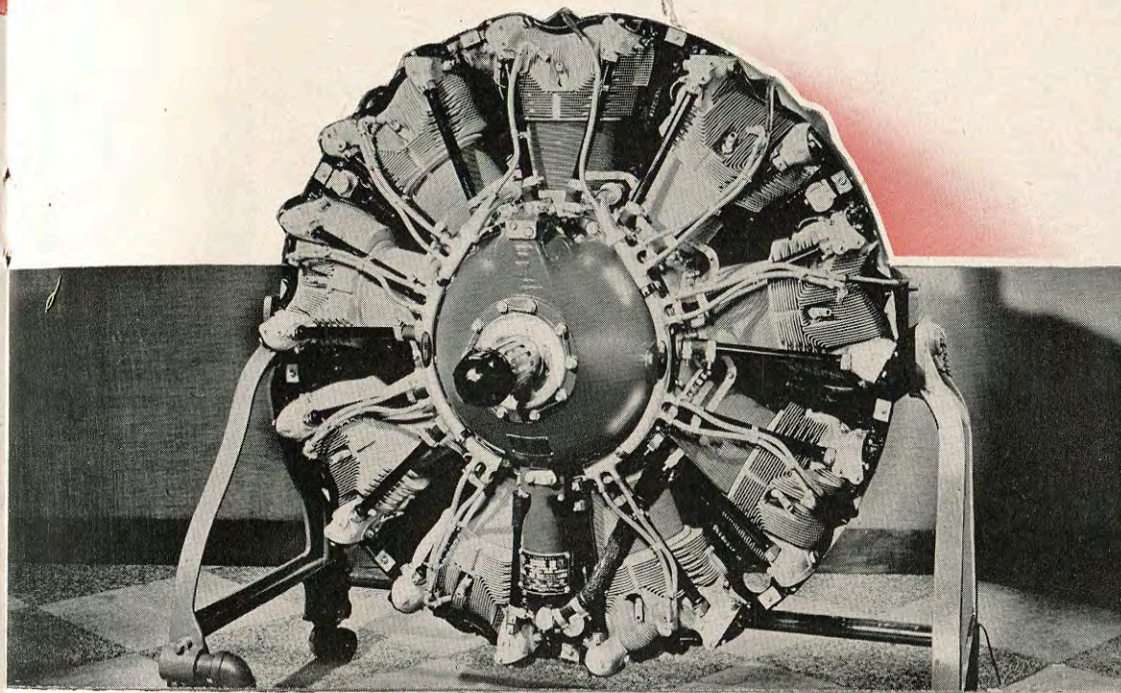
**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Clean the Engine			
3.	Drain Oil			
4.	Remove, Inspect, and Clean the Oil Filter			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Inspect Ignition			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts, Bolts, and Cap Screws			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

CHECK THE VALVE CLEARANCE

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_





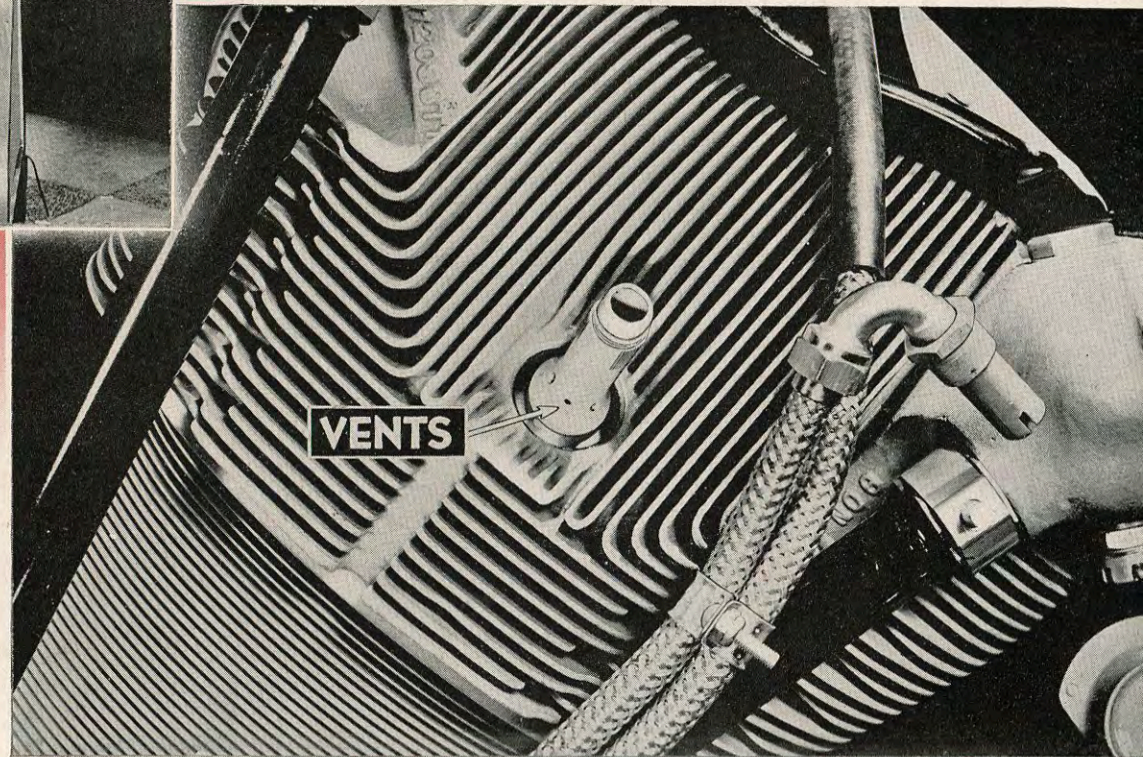
### DUMMY PLUGS IN ALL CYLINDERS

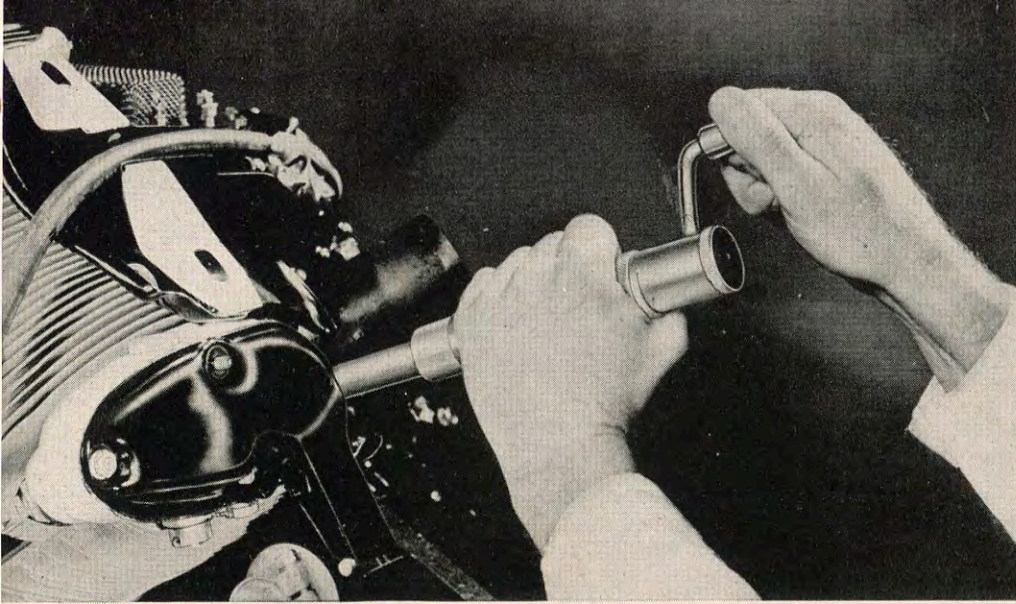
At the completion of the cylinder check, in Part I of this book, you were asked to reinstall the dummy spark plugs in all cylinders as before. It is important that these plugs are installed in the following manner—*vented* plugs placed in the front; *unvented* plugs in the rear.



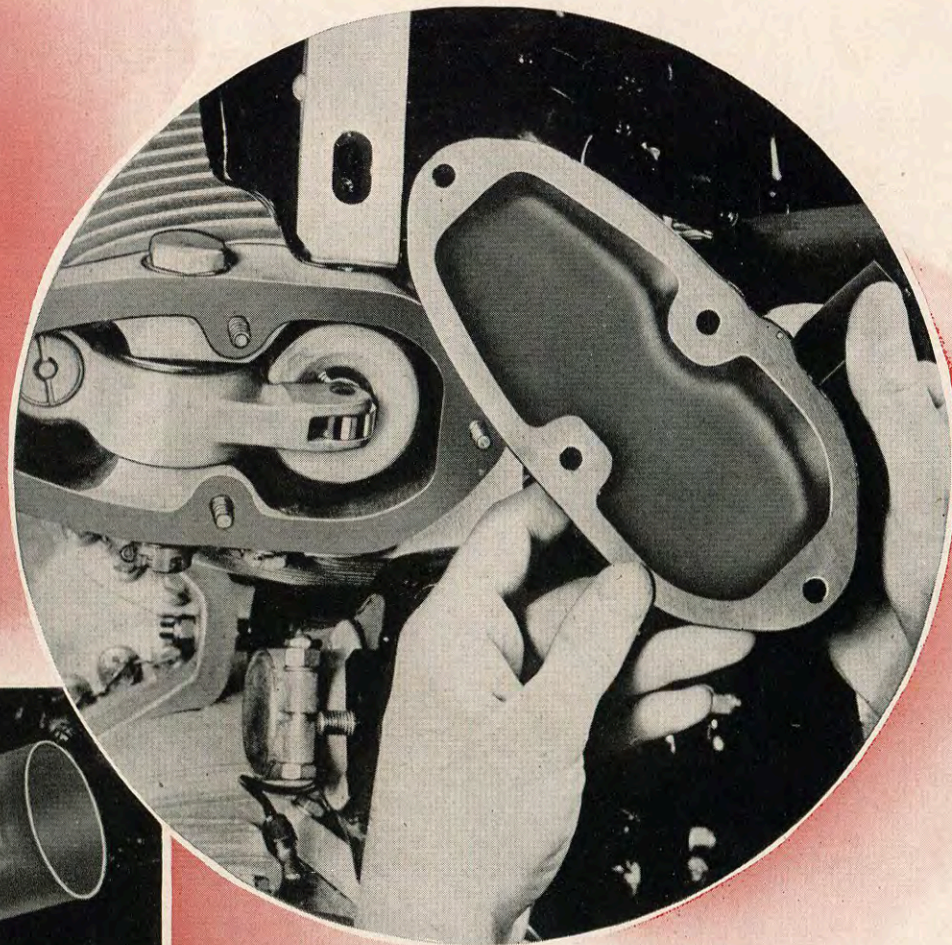
### EASY CRANKSHAFT TURNING

During inspection or servicing of the engine, the dummy plugs act as a protective cover, preventing loose material from falling into the engine. *Vents*, in the *front* plugs, permit easy turning of the crankshaft which is necessary in checking the valve clearance.

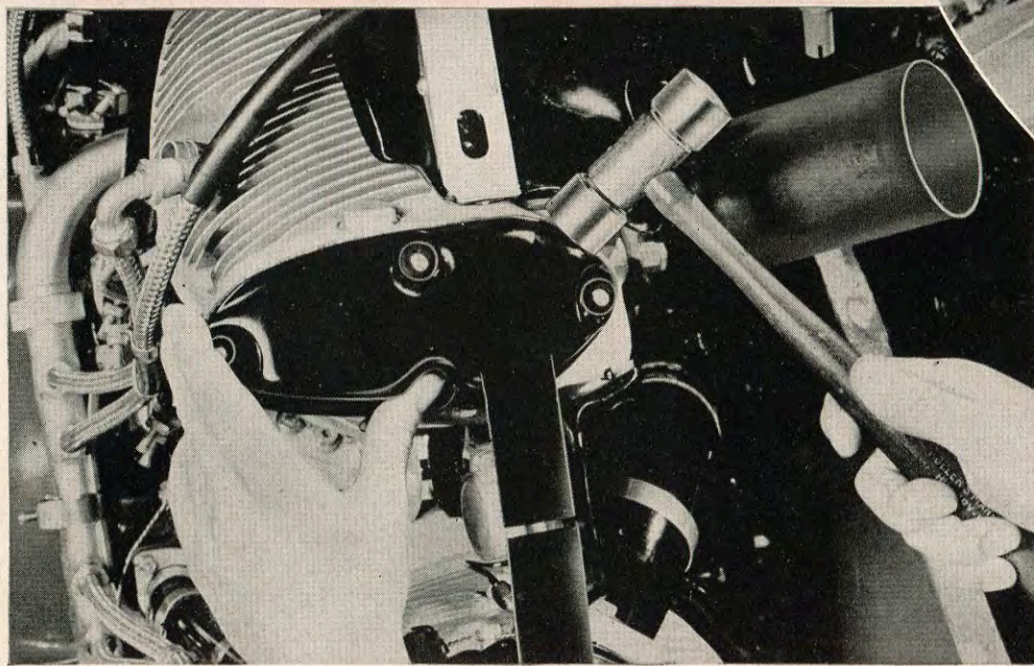




**REMOVE ROCKER-BOX COVERS**

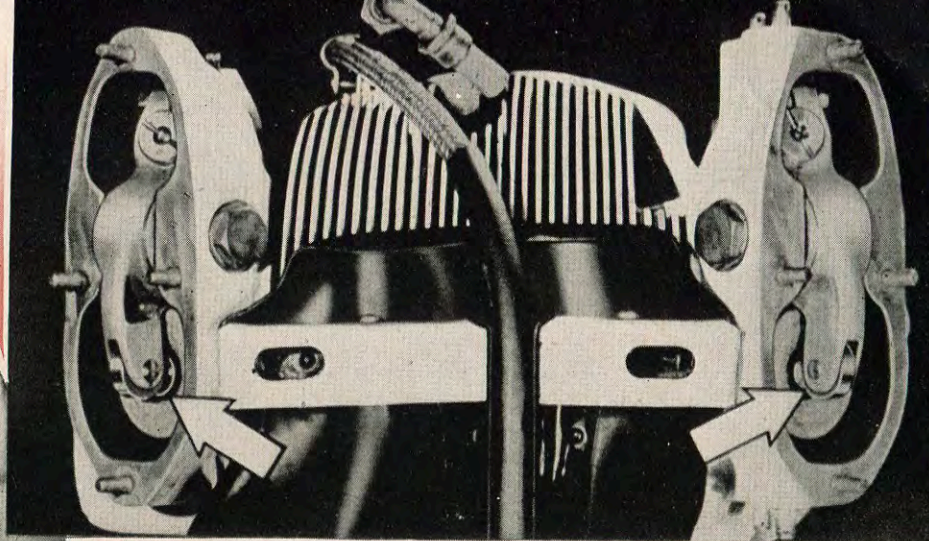
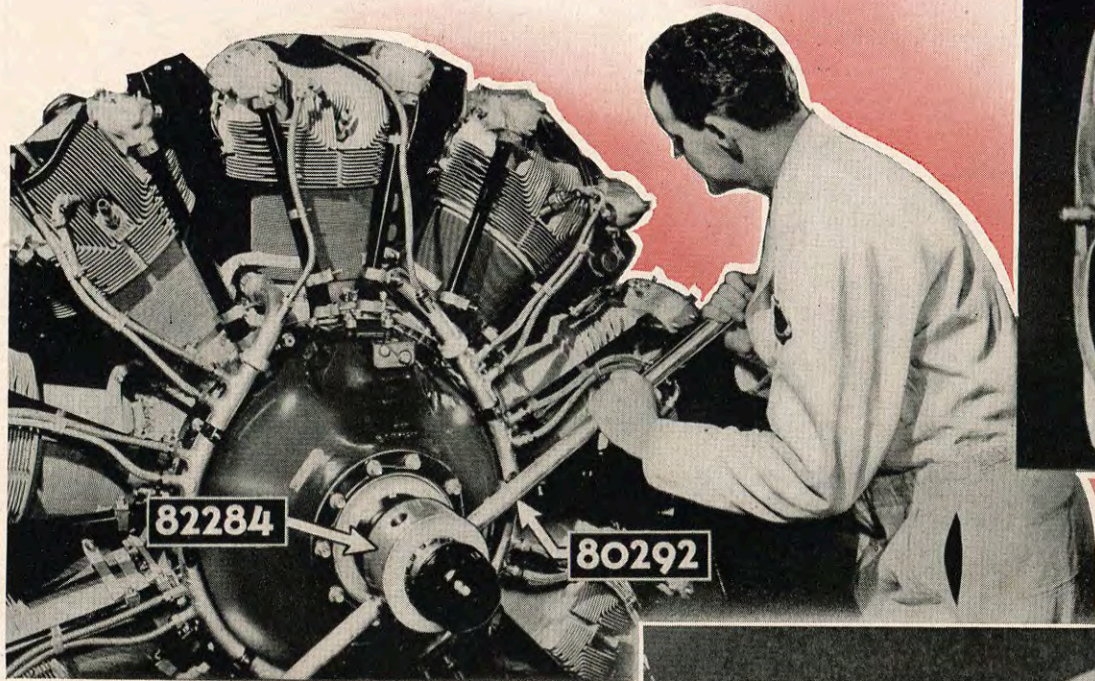


**INSPECT FOR METAL PARTICLES**



**TAP WITH PLASTIC HAMMER**

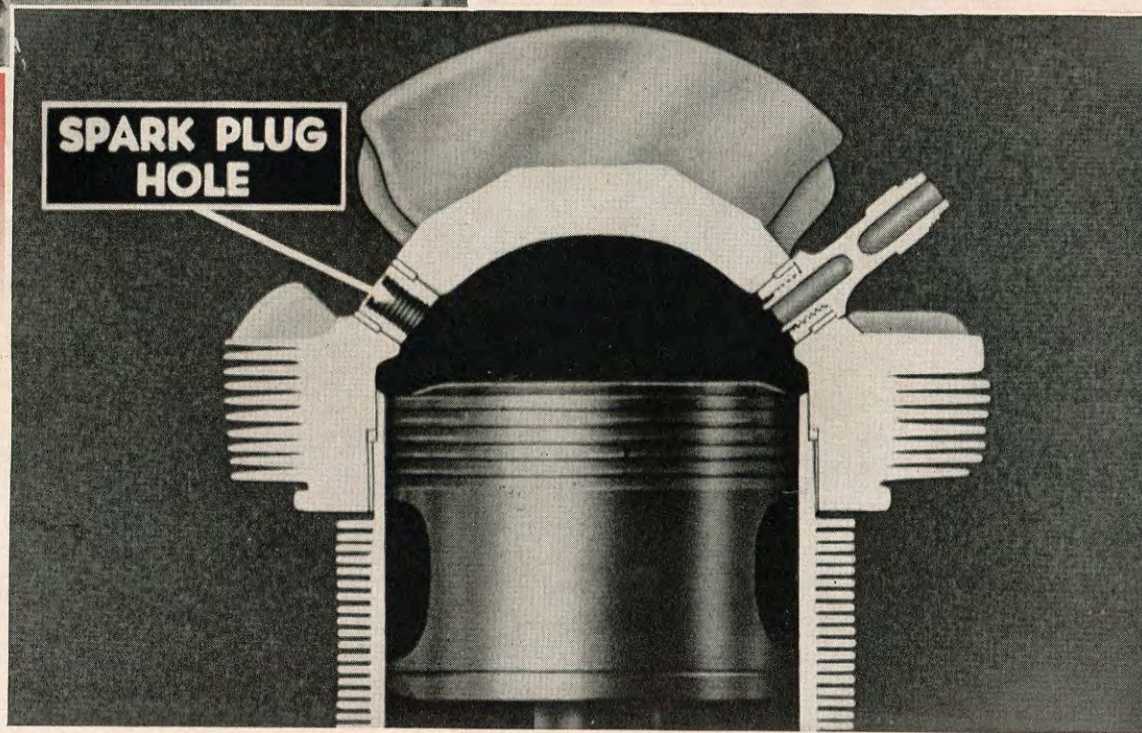
To check valve clearance first remove the rocker-box covers, and remove the attaching nuts. Lift the cover from the rocker-box. If the cover sticks, tap it lightly with a rawhide or plastic hammer. Never use a metal hammer or a prying tool. When the covers have been removed, inspect the rocker boxes and rocker arms for fine metallic particles that might denote failure of some part of the valve mechanism.



**ROLLERS FREE TO TURN**

**TOP CENTER COMPRESSION STROKE**

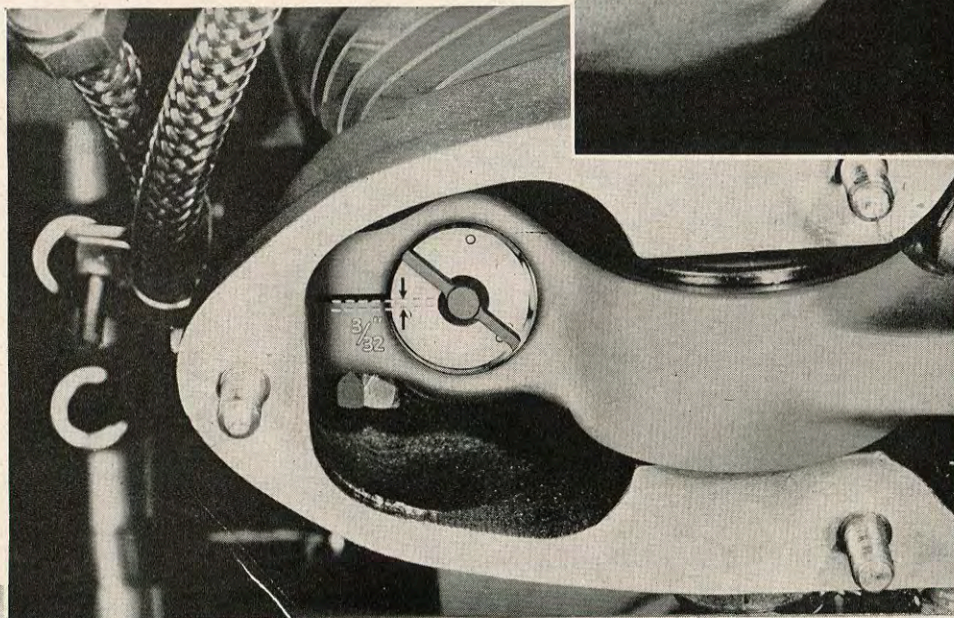
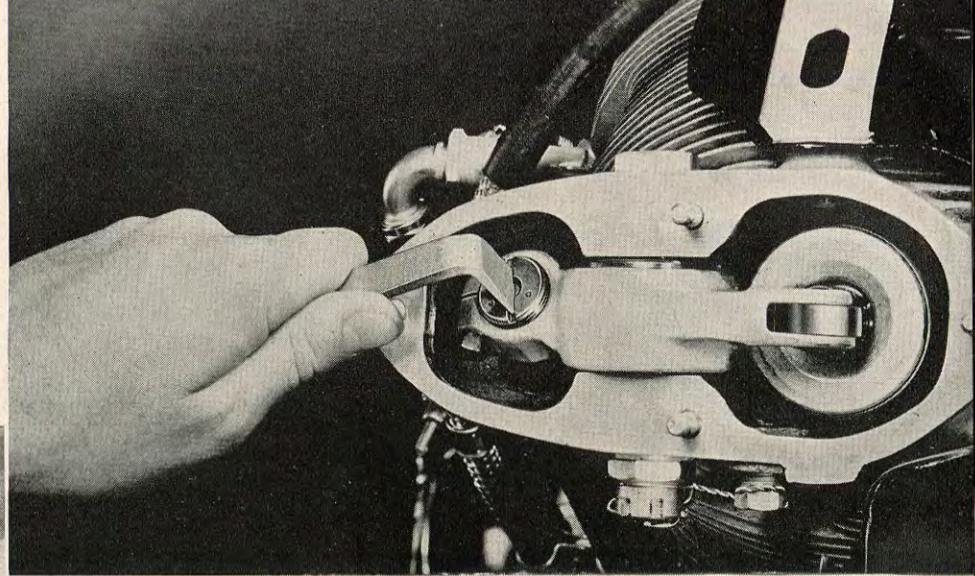
Before checking the valve clearance, move the piston to the top center position on the compression stroke, with both valves closed and rocker rollers free. The engine is turned in direction of rotation until the piston reaches top dead center as viewed through the spark plug hole.



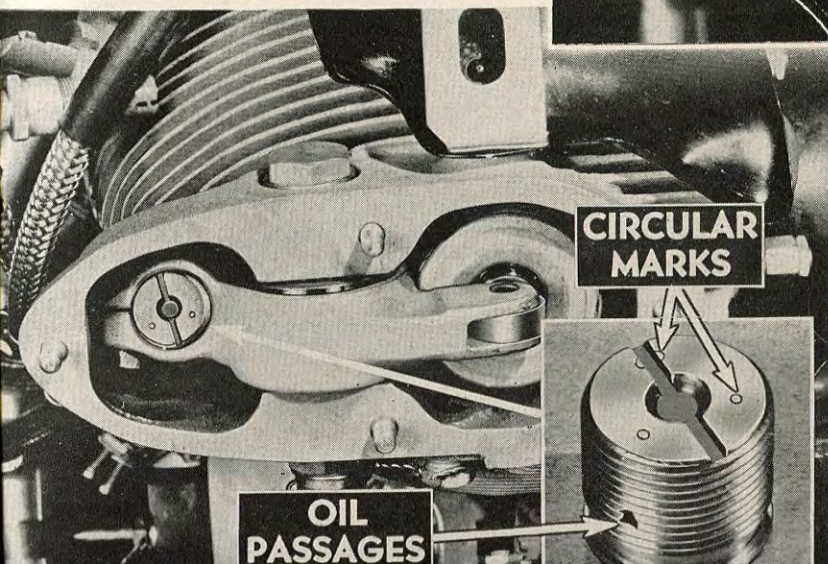
**TOP DEAD CENTER**



The three circular marks point out the location of oil passages in the valve-clearance adjusting screw. To prevent loss of oil, these marks must be *at least* three thirty-seconds of an inch from the split in the rocker arm. If correct valve clearance *lessens* this distance, turn the adjusting screw in the direction requiring least movement until the marks are brought to three thirty-seconds. When the circular marks are properly positioned, tighten the lock screw and make certain the adjusting screw is securely clamped in the rocker arm before checking the next valve.



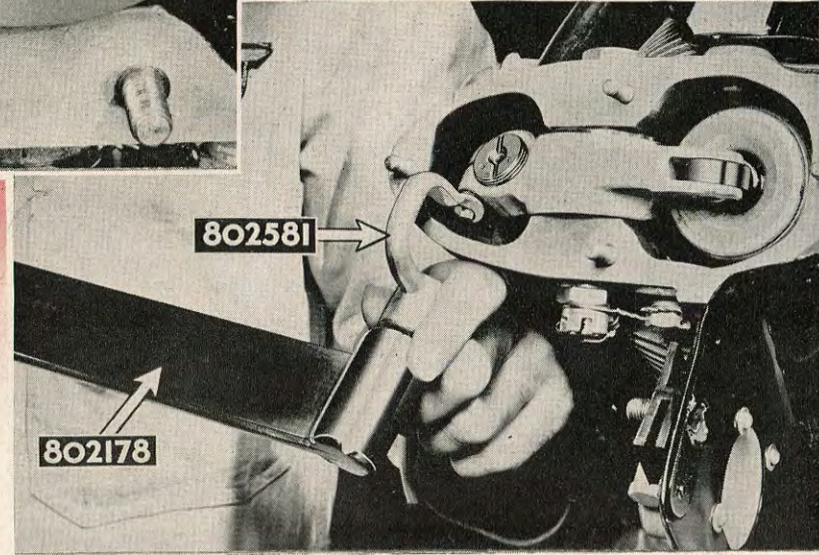
**MINIMUM DISTANCE 3/32"**



**CIRCULAR MARKS**

**OIL PASSAGES**

**OIL PASSAGES**



**802581**

**802178**

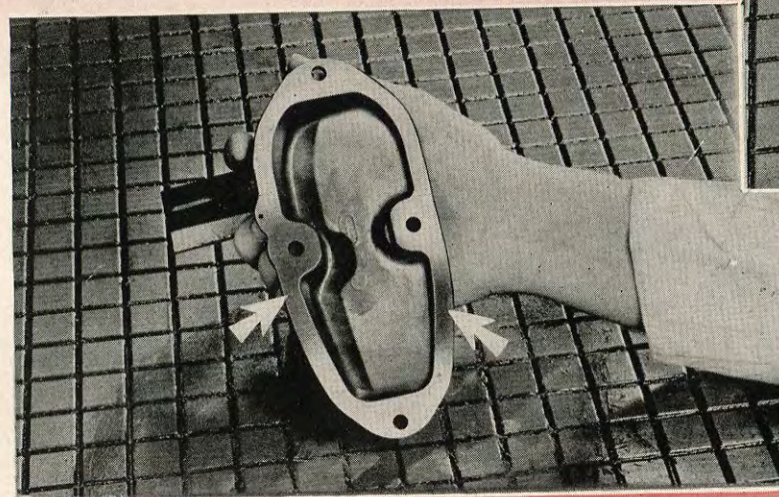
**TIGHTEN LOCK SCREW**



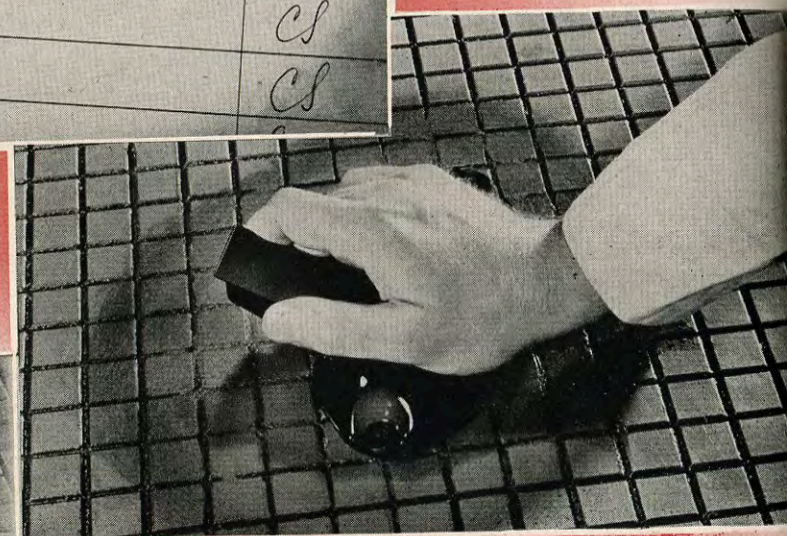
REMARKS	MECHANIC
Fuel leak at base of No. 9 Intake Pipe	CS
Oil leak at No. 2 Exhaust Rocker Box Cover	CS
OK.	CS
OK.	CS
OK.	CS
OK.	CS

**REFER TO CHECK-OFF SHEET  
CLEAN ROCKER-BOX COVERS**

When *all* valve clearances have been checked, clean the rocker-box covers by washing in a cleaning solution and drying with compressed air. Reinstall with a new gasket under each cover. In this case, it should be noted that one of the rocker boxes showed signs of oil leakage. This information was recorded on the check-off sheet during operation number one.

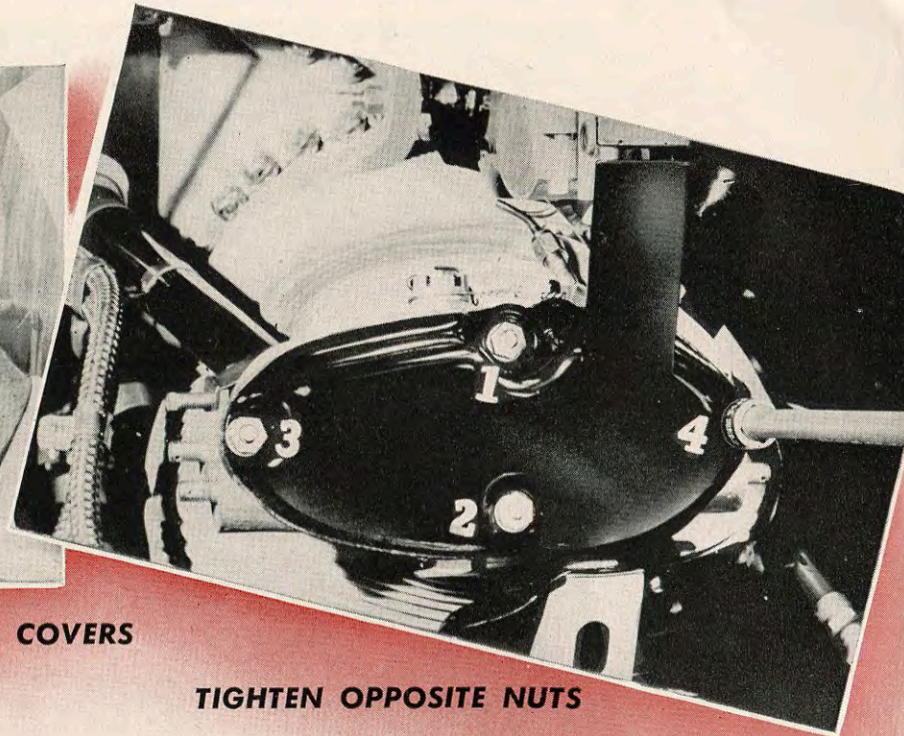


**LOW SPOTS**



**USE LAPPING COMPOUNDS**

To determine where the oil leakage is, rub the parting surface of the rocker-box cover over a lapping plate covered with compound. Dark marks signify low spots and must be removed by continued rubbing. When the parting surface is perfectly smooth, wash the cover thoroughly in a cleaning solution and dry with compressed air.



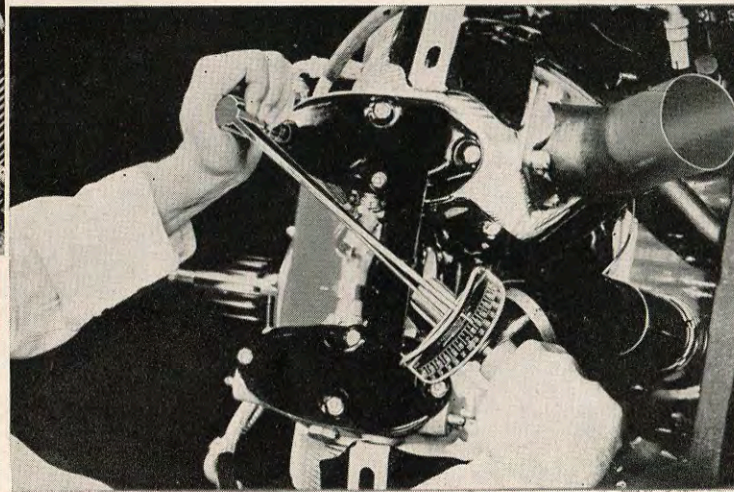
**REINSTALL ROCKER-BOX COVERS**

**TIGHTEN OPPOSITE NUTS**



**OIL IN UPPER ROCKER-BOX COVERS**

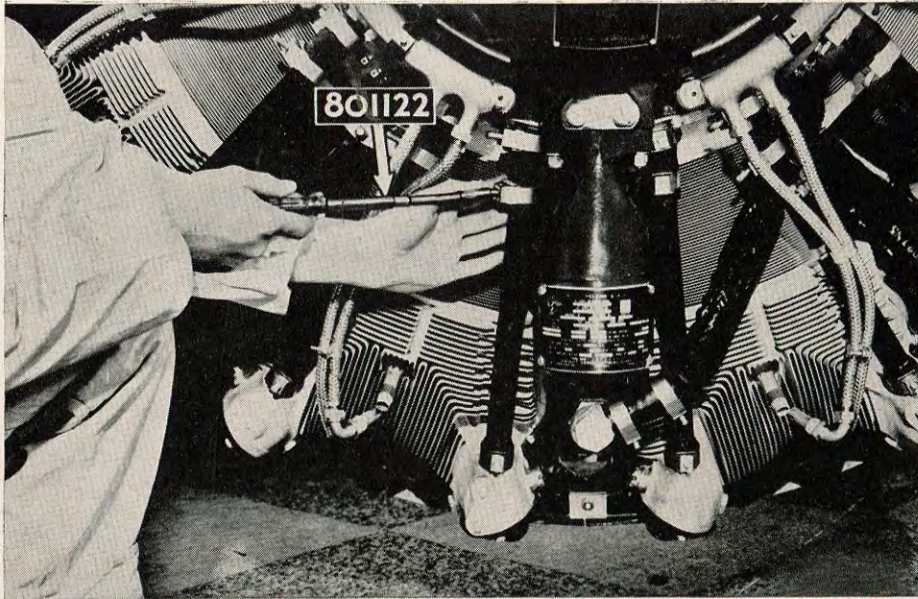
After all rocker-boxes have been cleaned, pour approximately a half pint of engine oil in the boxes *above* the horizontal line of the engine. Reinstall all rocker-box covers over new gaskets.



**TIGHTEN TO PROPER TORQUE**

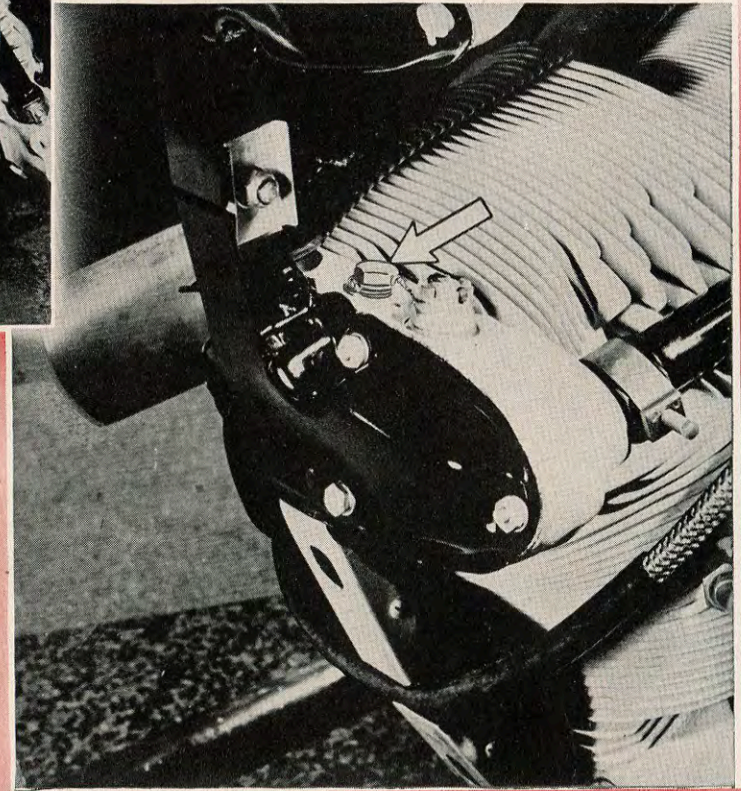
Tighten all nuts snugly and evenly, thus preventing distortion which causes leaks. Employ the original procedure and tighten opposite nuts alternately. First tighten the nuts at the middle of the cover; then the nuts at the ends. Finally, tighten all nuts with a torque wrench to the value specified in the Table of Limits. Follow the same sequence as in the initial tightening.





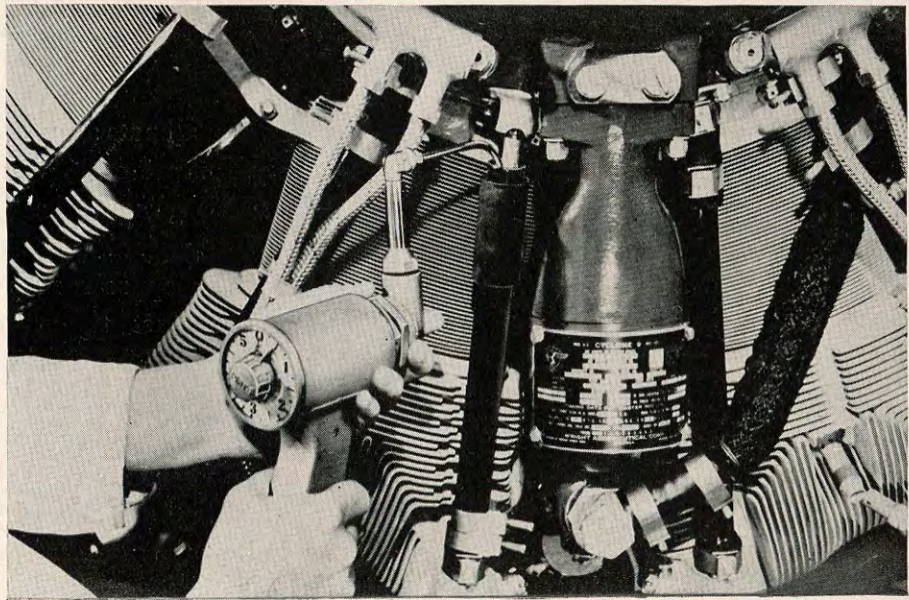
### LOOSEN HOSE CONNECTIONS

Fill the *lower* rocker-boxes with oil. Disconnect the hose connection at the crankcase.



### PIPE PLUG

An alternate method of getting oil into the rocker-boxes is to remove the plug and inject the oil through the pipe plug hole.



### OIL LOWER ROCKER-BOXES

Pour approximately half a pint of oil into the housing. Be sure to use the same grade and brand of oil used in the engine lubricating system.

# INSPECTION ITEM NO. 8

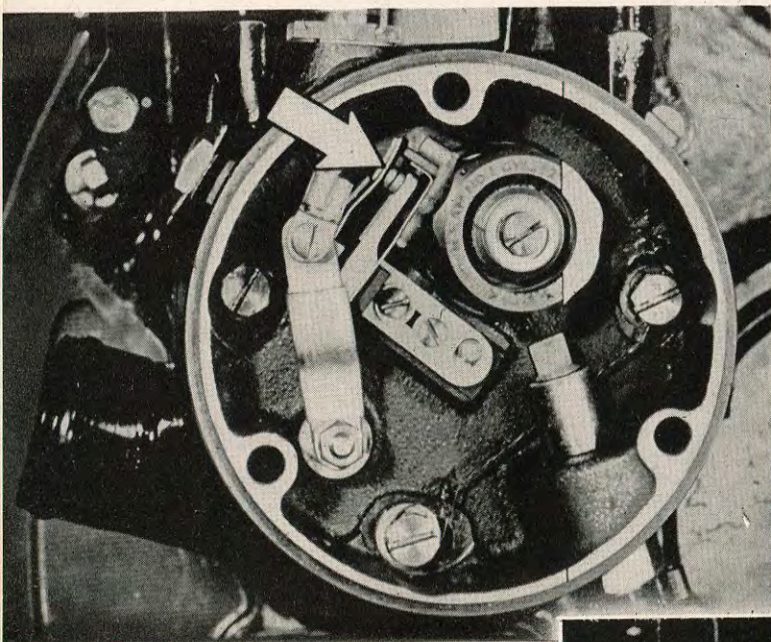
CHECK-OFF SHEET  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	DESCRIPTION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetos, Plug and Strainer			
4.	Remove, Inspect, and Clean Spark Plugs			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and install			
9.	Inspect the Ignition Harness			
10.	Check All External Bolts and Cap Screws			
11.	Check the Thrust Rod			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

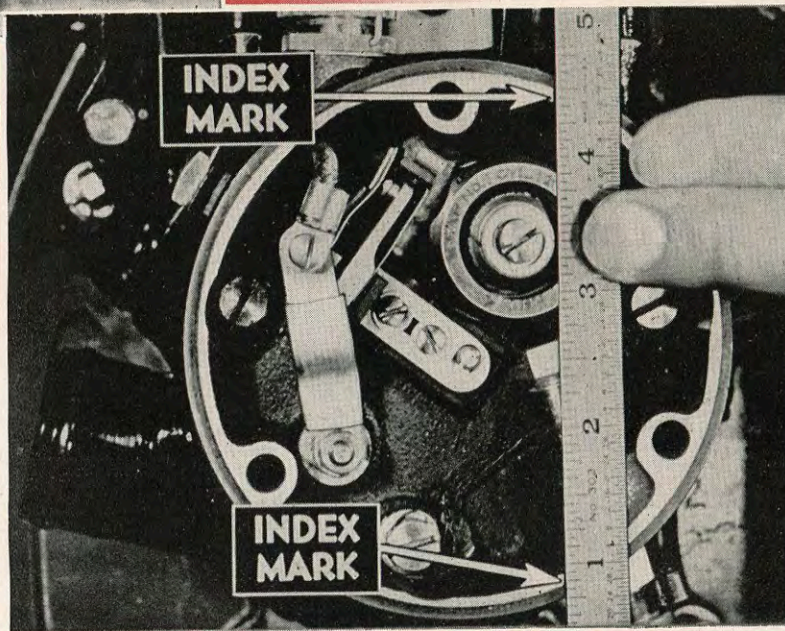
**CHECK MAGNETOS  
AND INSTALL  
RECONDITIONED  
SPARK PLUGS**





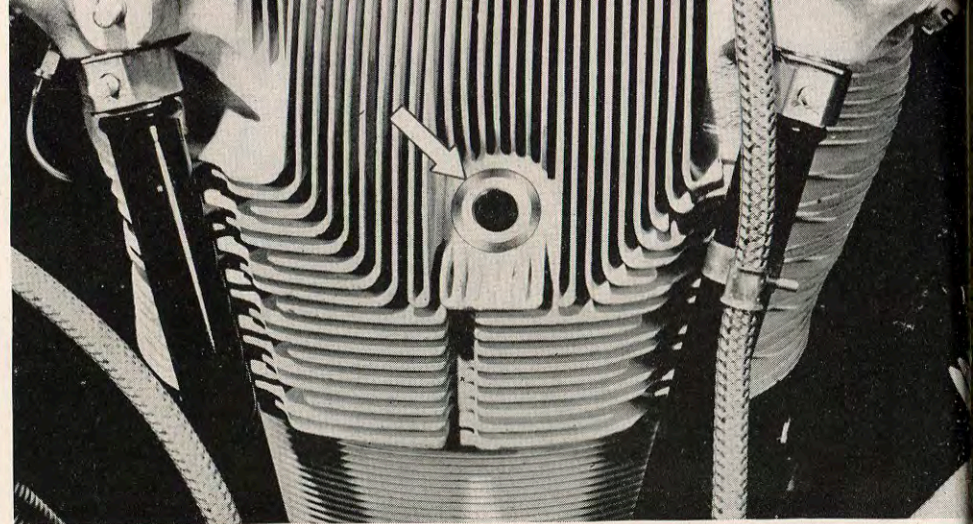
**(MAGNETO) — INSPECT  
BREAKER POINTS**

Inspect the magneto breaker points to see that they are free from oil and dirt and not pitted. Also check for proper adjustment by using a straight edge across the flat on the cam to the index marks.

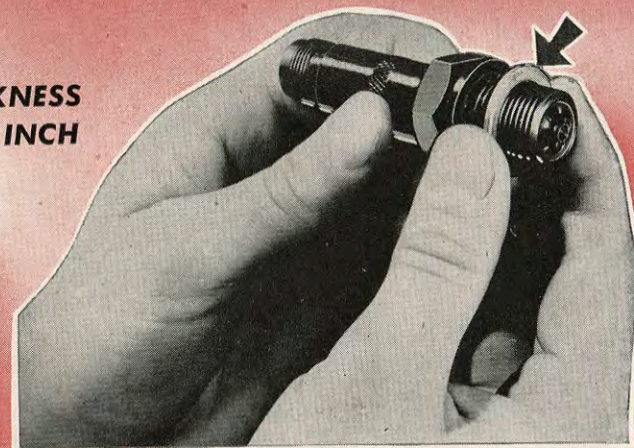


**(MAGNETO) — CHECK FOR PROPER ADJUSTMENT**

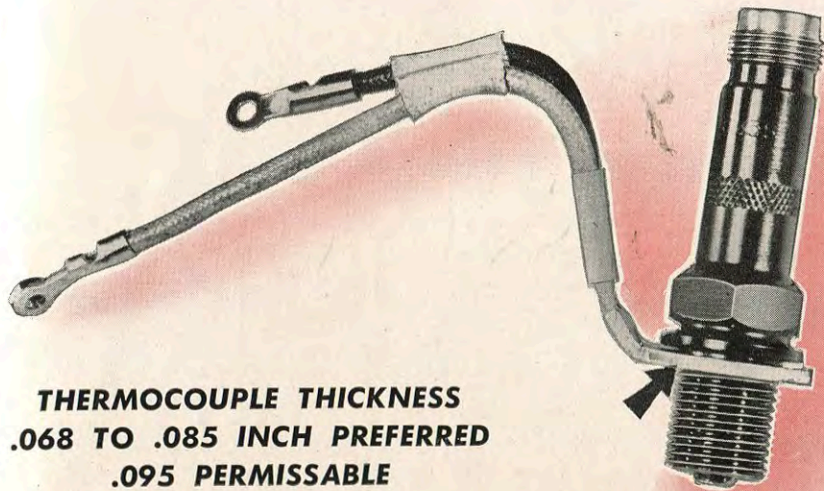
**INSPECT  
SPARK PLUG  
INSERTS**



**THICKNESS  
.068 TO .085 INCH**

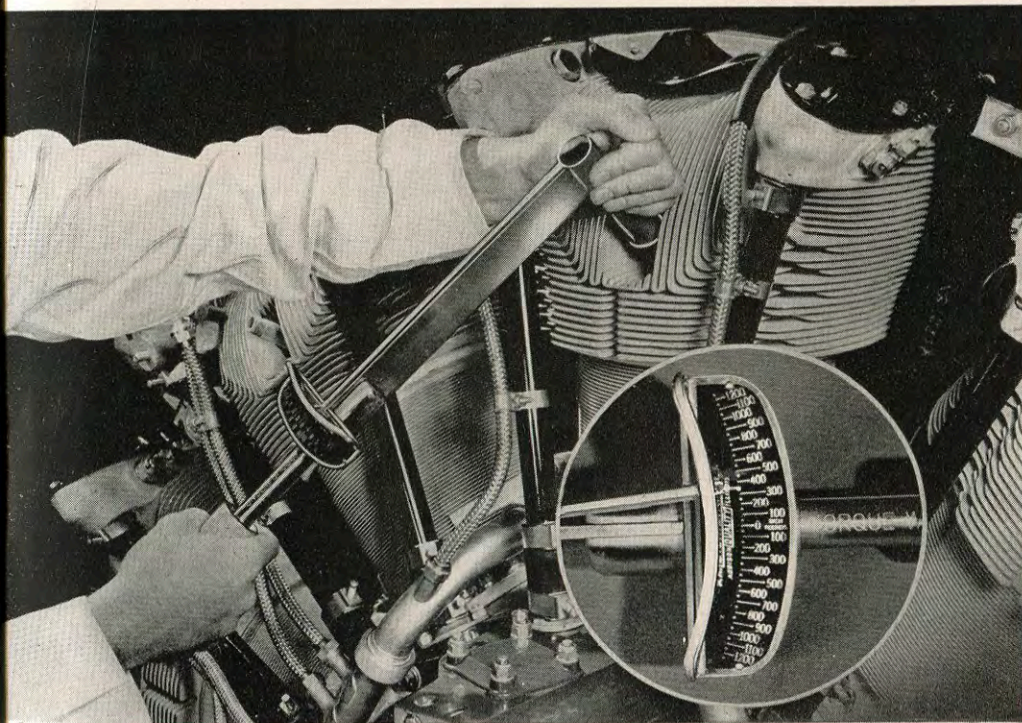
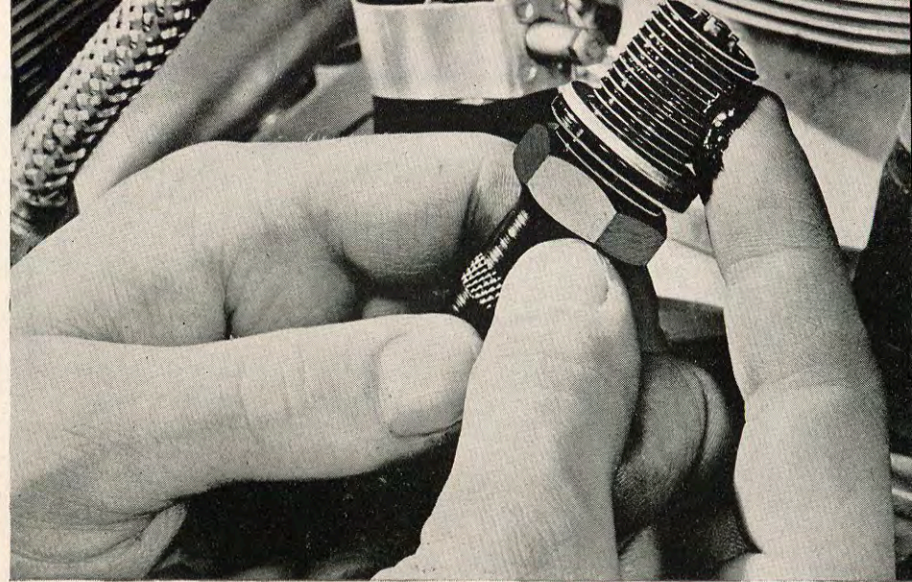


Make sure that the spark plug inserts are clean, that the threads are not burred, and that all gaskets have been removed. Place a new solid-copper gasket on the spark plug. Where cylinder head thermocouples are used, regular gaskets are unnecessary, for the thermocouple serves also as a gasket.

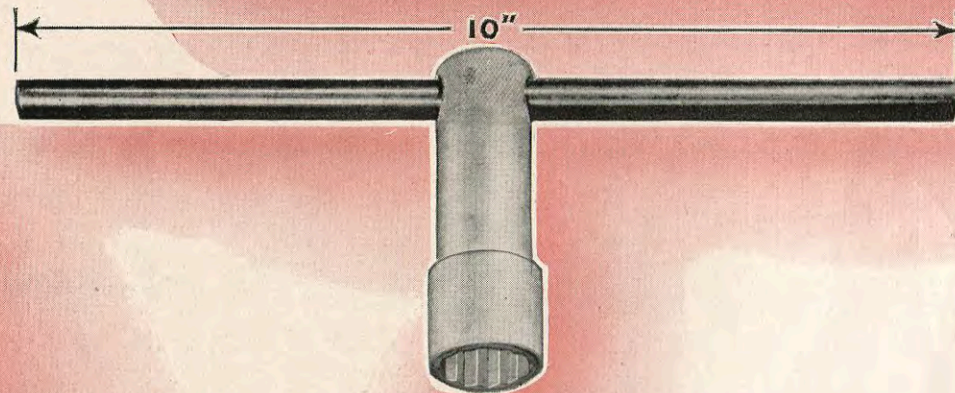


**THERMOCOUPLE THICKNESS  
.068 TO .085 INCH PREFERRED  
.095 PERMISSABLE**

**APPLY  
SPARK PLUG  
LUBRICANT**



**330 TO 360 INCH POUNDS**



**GUARD AGAINST OVER-TIGHTENING**

Prior to installing the spark plugs, apply a light coat of mica spark plug lubricant to the threads. Be particularly careful to keep the electrodes dry. Tighten the spark plugs to a torque of 330 to 360 inch pounds. If no torque wrench is available, guard against over-tightening by using a wrench having a handle not more than ten inches long.

# INSPECTION ITEM NO. 9

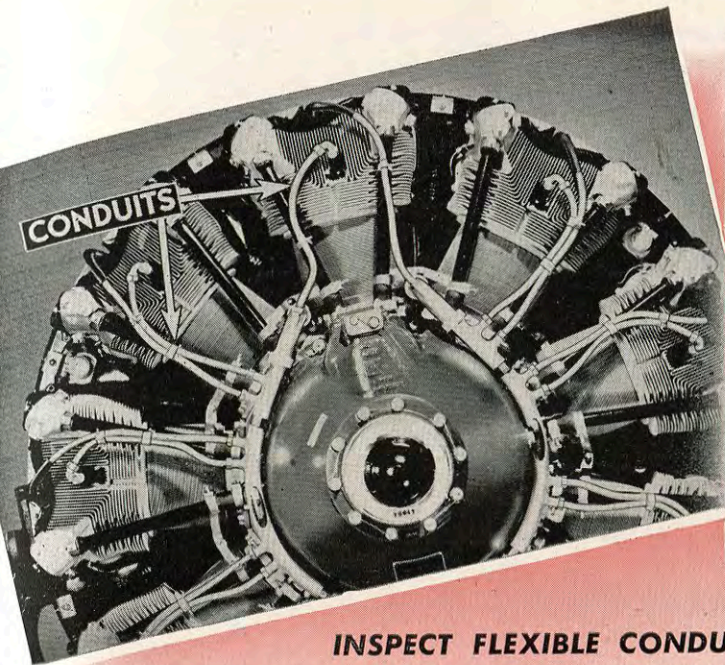
**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and			
3.	Drain Oil			
4.	Remove, Inspect, and Clean the Cur			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install Reco			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts, Bolts, and Cap Screws			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

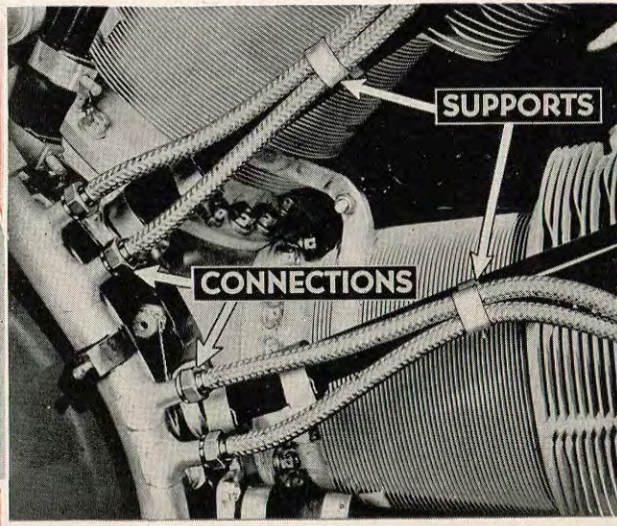
**INSPECT IGNITION HARNESS**

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_





**INSPECT FLEXIBLE CONDUITS**

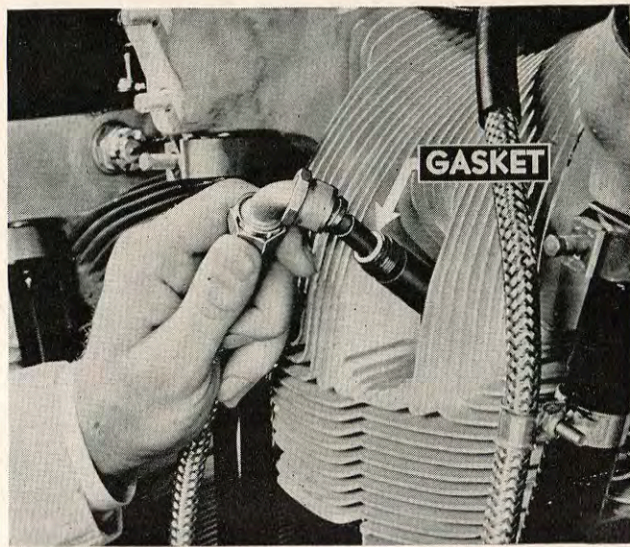


**CHECK SUPPORTS AND CONNECTIONS**



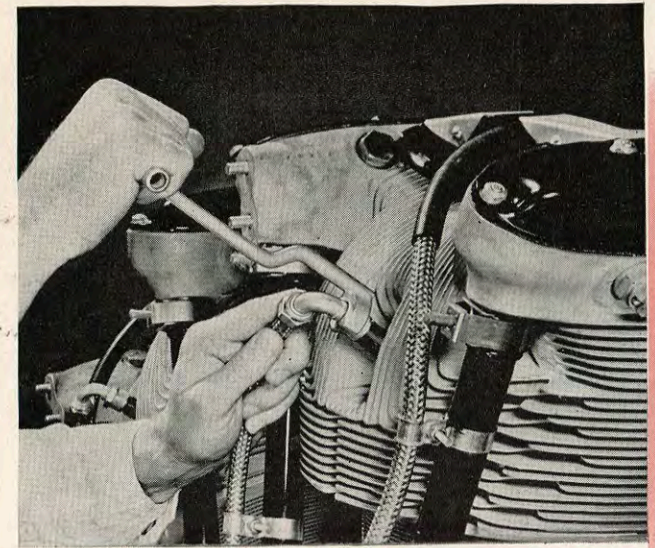
**CLEAN TERMINAL CONTACTS**

Inspect the flexible conduits for dents, crushing, or frayed metallic braiding. Check all conduit supports for security and all connections at the manifold for tightness.



**INSERT CONTACT CAREFULLY**

Clean the terminal contacts before installing them. Remove all grease, dirt, or moisture with a cloth dipped in carbon tetrachloride. Replace contacts that are cracked or broken. Make certain a copper gasket is placed between the spark plug barrel and the terminal elbow. Insert the contact straight in the spark plug well. Tighten the elbow nuts snugly, but not enough to disturb the position of the spark plug core.



**TIGHTEN TERMINAL ELBOW NUTS**

# INSPECTION ITEM NO. 10

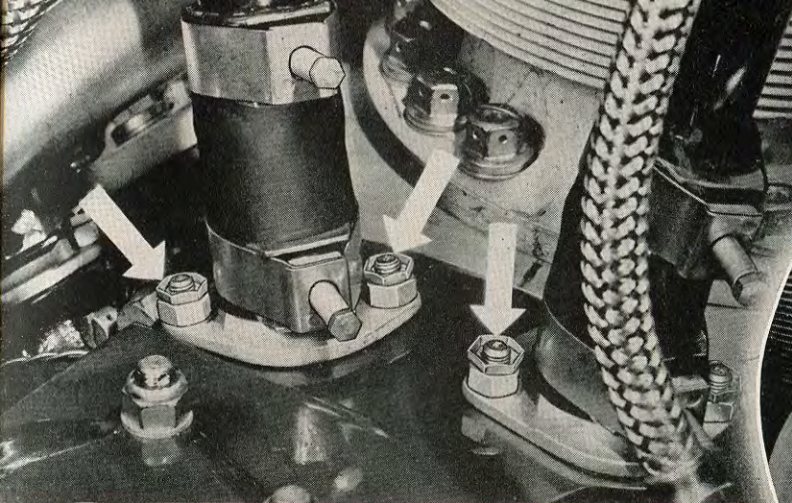
CHECK-OFF SHEET  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetic Plug and Strainer			
4.	Remove, Inspect and Clean the Cuno Oil Filter			
5.	Remove and Inspect the Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install Reconditioned Spark Plugs			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts and Bolts			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

**CHECK ALL EXTERNAL  
NUTS, BOLTS, AND  
CAPSCREWS**



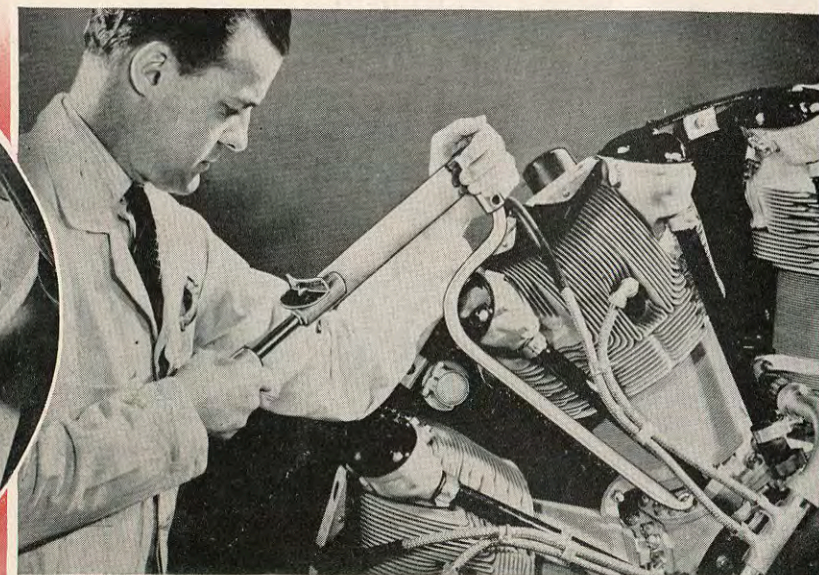


**CHECK ALL PALNUTS FOR TIGHTNESS**



**CHECK ALL LOCK WIRE**

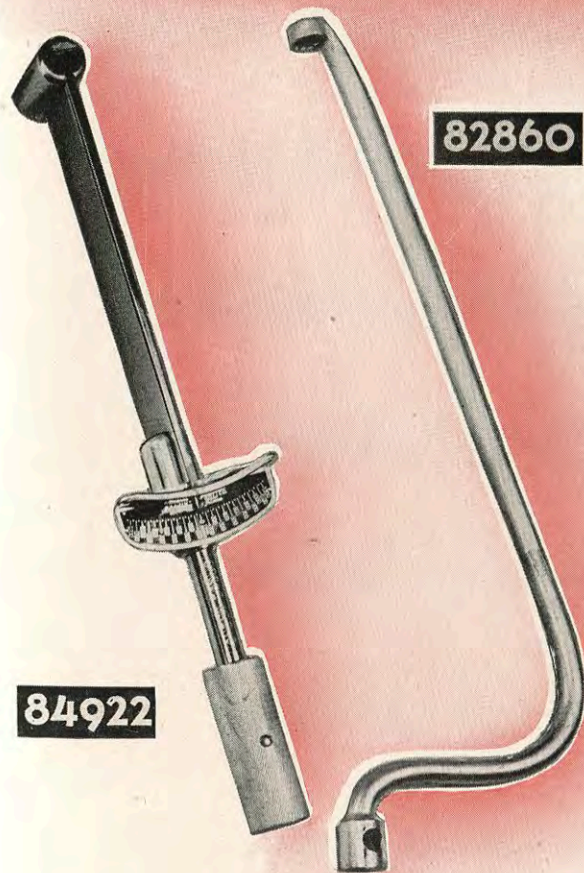
If lock wire is loose or broken, or a cotter pin is missing, the nut or cap screw should be checked for tightness with a torque wrench. Check all palnuts for tightness. If a palnut is loose, remove it. Tighten the retaining nut, and install a new palnut. If any of the cylinder hold-down cap screws move when the Table of Limits torque is applied, remove *all* hold-down cap screws in that cylinder flange. These two special screws are used to properly re-position, or re-locate the cylinder. This must be done before the hold-down cap screws are re-installed.



**CHECK FOR PROPER TORQUE**

**INSPECT AIR DEFLECTORS**

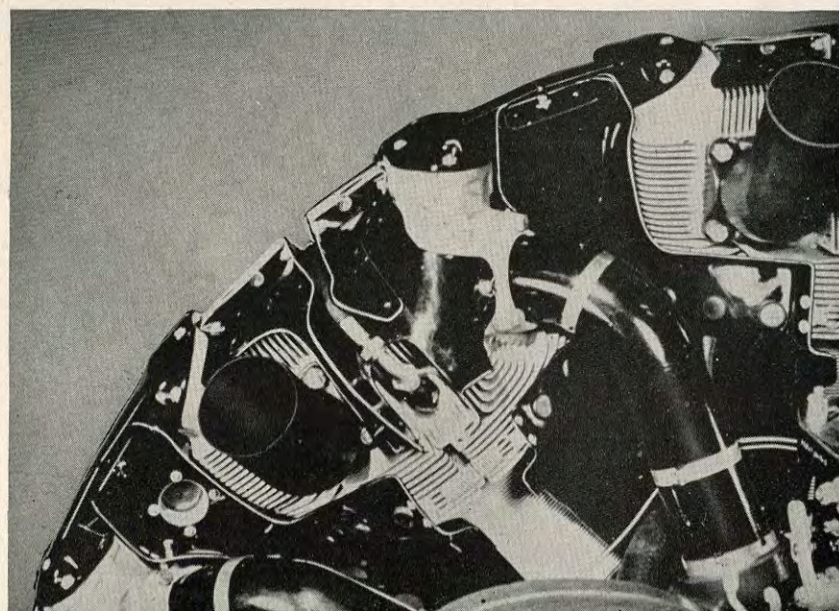
Inspect all air deflectors for cracks, chafing, and looseness.



**84922**

**82860**

**USE PROPER TOOLS**








## REVIEW

7. Check the valve clearance
8. Check the magneto and install reconditioned spark plugs
9. Inspect the ignition harness
10. Check all external nuts, bolts, and cap screws



PART III

INSPECTION and SERVICE

*of the*

WRIGHT CYCLONE

9 CC

# INSPECTION ITEM NO. 11

**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain the Carburetor and Clean the Air Filter			
4.	Remove, Inspect, and Clean the Spark Plugs			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Ignition			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts, Bolts, and Cap Screws			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

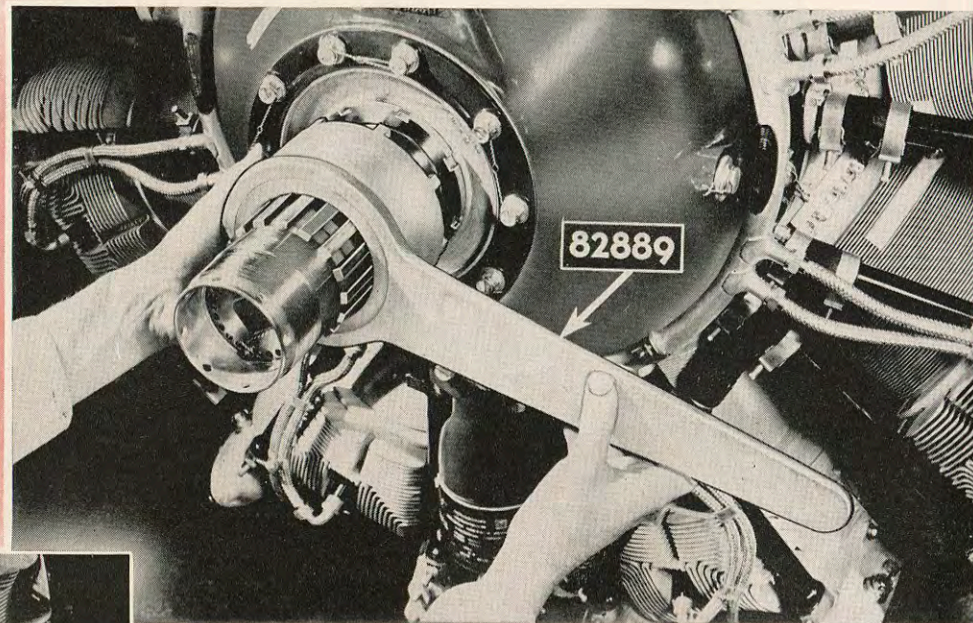
ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

CHECK THE THRUST BEARING NUT

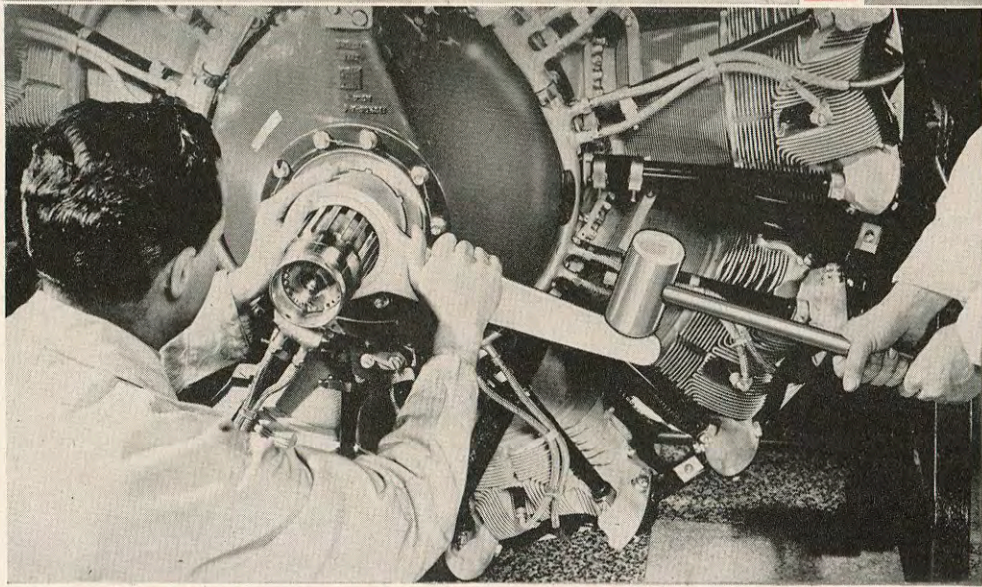




**ALIGNMENT MARKS**

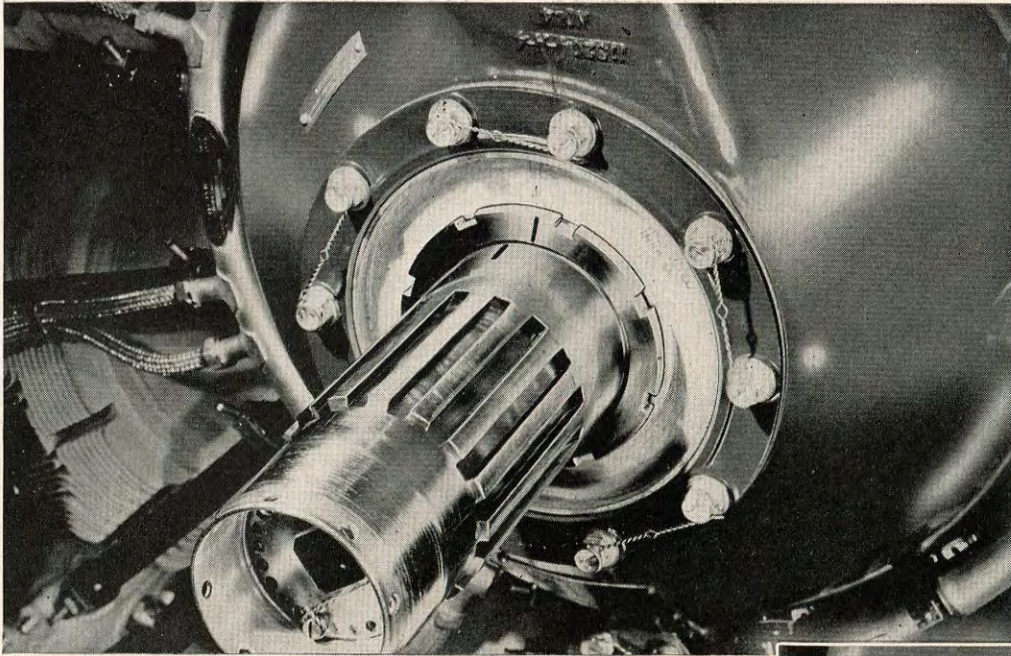


**USE SPECIAL LUG WRENCH**



**HOLD WRENCH FIRMLY**

Make alignment marks on the thrust bearing nut and propeller shaft. Use a soft pencil or crayon to prevent scratching the metal surfaces. Place the special lug wrench over the nut so the lugs fit the slots in the nut. Hold the wrench firmly and strike it a few blows with a lead hammer. The stroke should be in the direction of tightening.

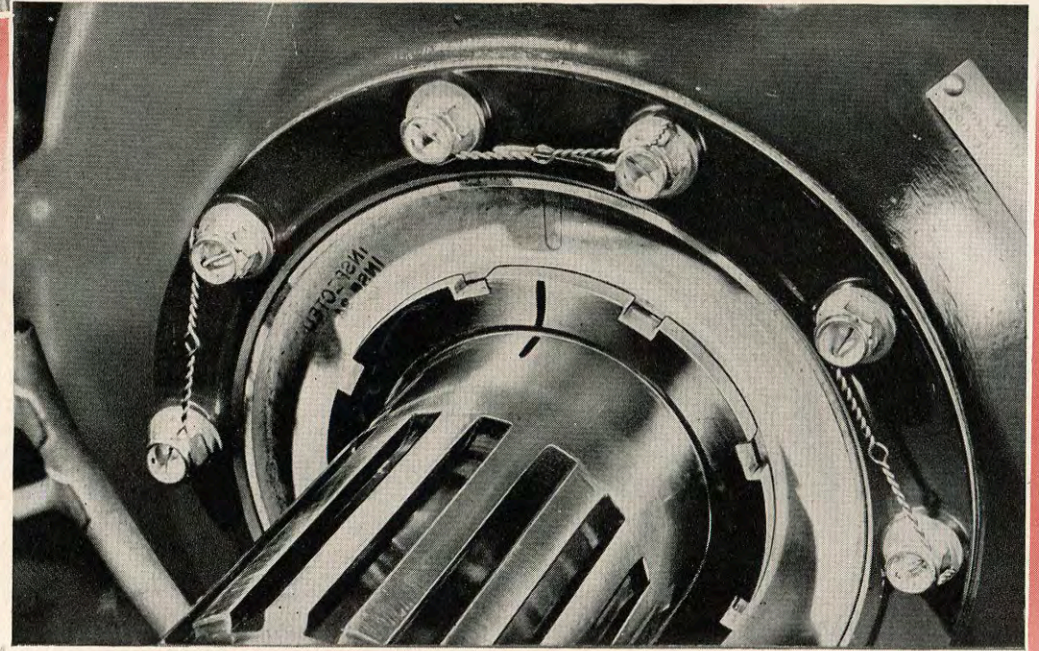


### **CHECK ALIGNMENT MARKS**

Check the alignment marks on the thrust nut and propeller shaft. If they are separated thus indicating excessive looseness of the nut, inspect the crankcase front section for possible trouble.

### **ALIGNMENT MARKS LINED UP**

If the alignment marks are still lined up after the thrust nut has been tested, you may proceed with the next operation.



# INSPECTION ITEM NO. 12

**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

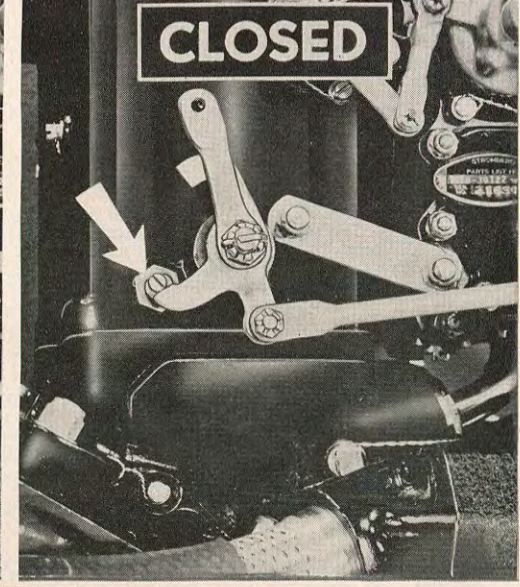
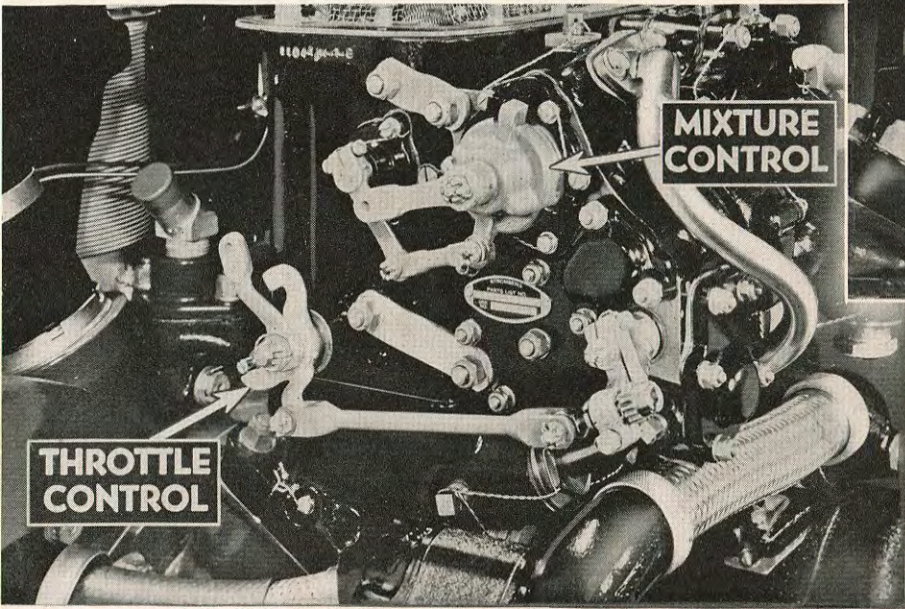
ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnets and Strainer			
4.	Remove, Inspect, and Clean the Cylinders			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Cylinder Compression			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install Retainers			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts, Bolts, and Cap Screws			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

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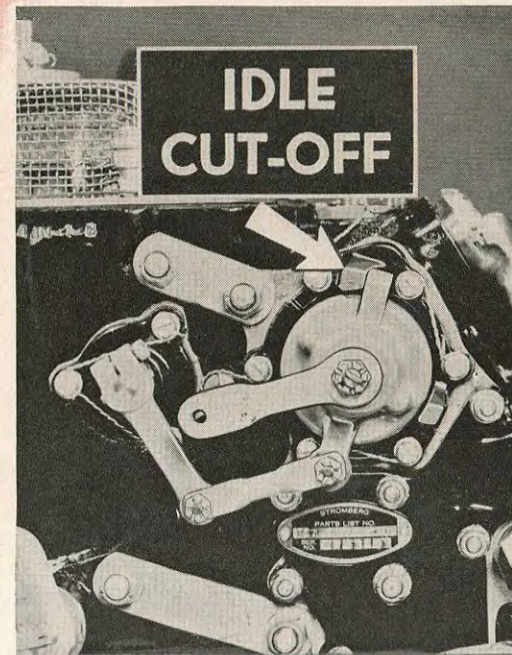
CHECK ENGINE CONTROLS



## CHECK CARBURETOR CONTROLS



## CHECK FOR FULL TRAVEL



## CHECK FOR FULL TRAVEL

We are concerned here with only the *engine end* of the control system. Therefore, move the throttle control on the carburetor, to see that it hits the *open* stop and the *closed* stop. Move the mixture control from idle cut-off to automatic rich. The movement must be free and complete.

# INSPECTION ITEM NO. 13

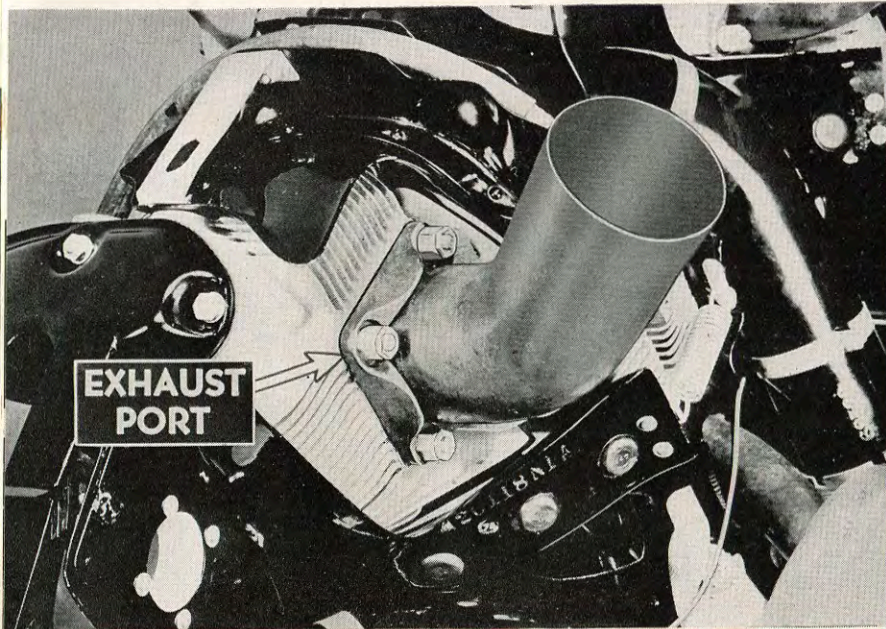
**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetos and Spark Plugs			
4.	Remove, Inspect, and Clean the Cylinders			
5.	Remove and Visually Inspect the Spark Plugs			
6.	Check the Cylinders for Compression			
7.	Check the Piston and Rings			
8.	Check Magnetos and all Ignition Components			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts, Bolts, and Cap Screws			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

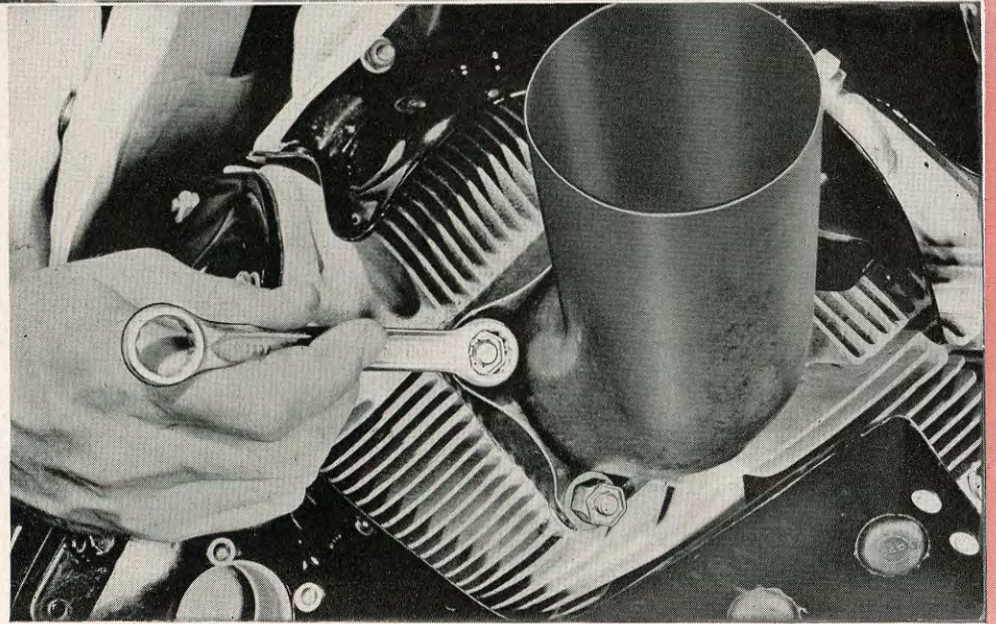
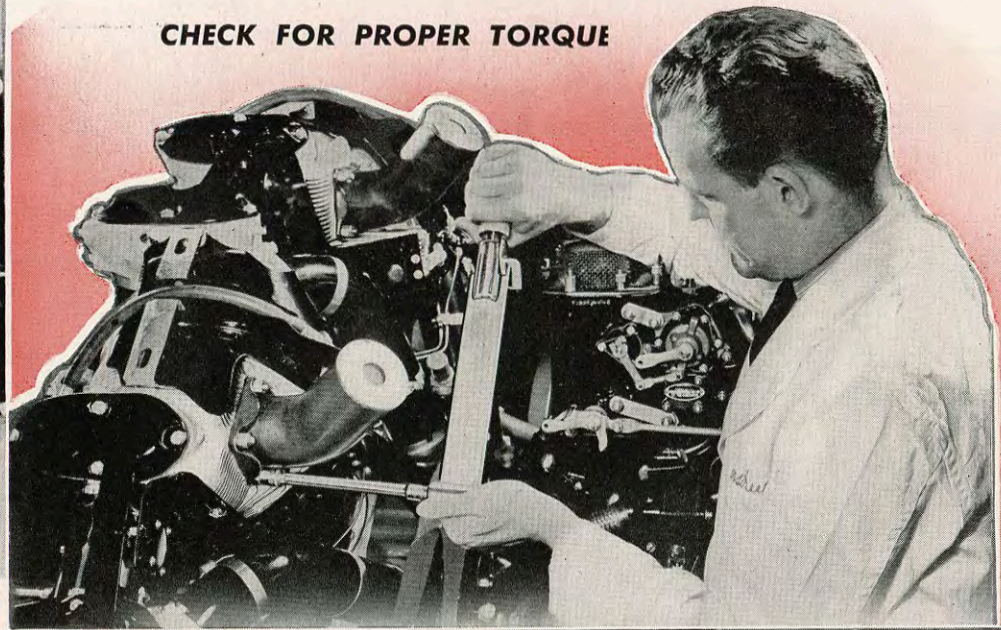






**EXAMINE FOR LEAKS AND CRACKS**

Examine exhaust stacks for cracks and for leakage at the exhaust port of each cylinder. Remove the palnuts and check the flange attaching nuts for tightness; install new palnuts. *Note: Always replace locking devices such as palnuts and lock wire with new parts whenever locks are removed.*



**USE NEW PALNUTS**

# INSPECTION ITEM NO. 14

**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

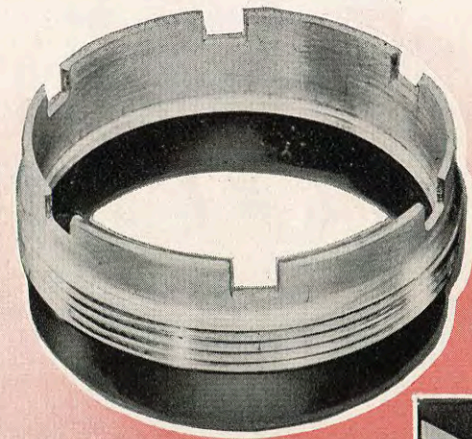
ITEM NO.	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks		
2.	Wash and Dry the Engine		
3.	Drain Oil Sump. Clean Oil Filter and Strainer		
4.	Remove, Inspect and Clean Spark Plugs		
5.	Remove and Visually Inspect the Spark Plugs		
6.	Check the Cylinder Compression		
7.	Check the Valve Clearance		
8.	Check Magnetos and Install Recommended Spark Plugs		
9.	Inspect the Ignition Harness		
10.	Check All External Cap Screws		
11.	Check the Engine Controls		
12.	Check the Engine Controls		
13.	Inspect the Exhaust System		
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1		
15.	Inspect the Carburetor Strainer		

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

CORRECT ANY FUEL  
 AND OIL LEAKS  
 NOTED IN  
 OPERATION NO. 1



REMARKS	MECHANIC
Fuel leak at base of No. 9 Intake Pipe	CS
Oil leak at No. 2 Exhaust Rocker Box Cover	CS
O.K.	CS
O.K.	CS
O.K.	
O.K.	

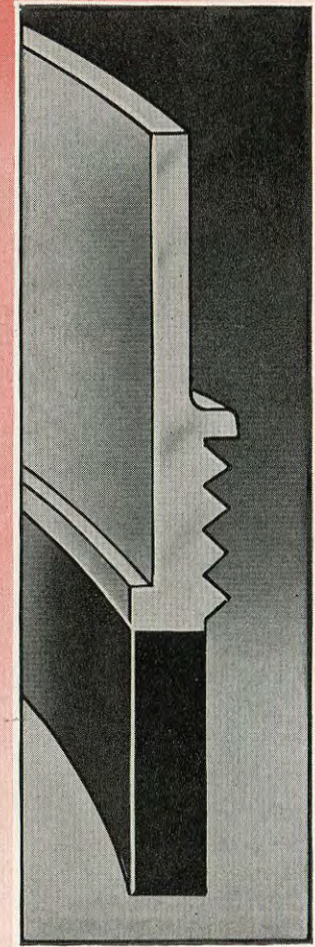


**FUEL LEAK**

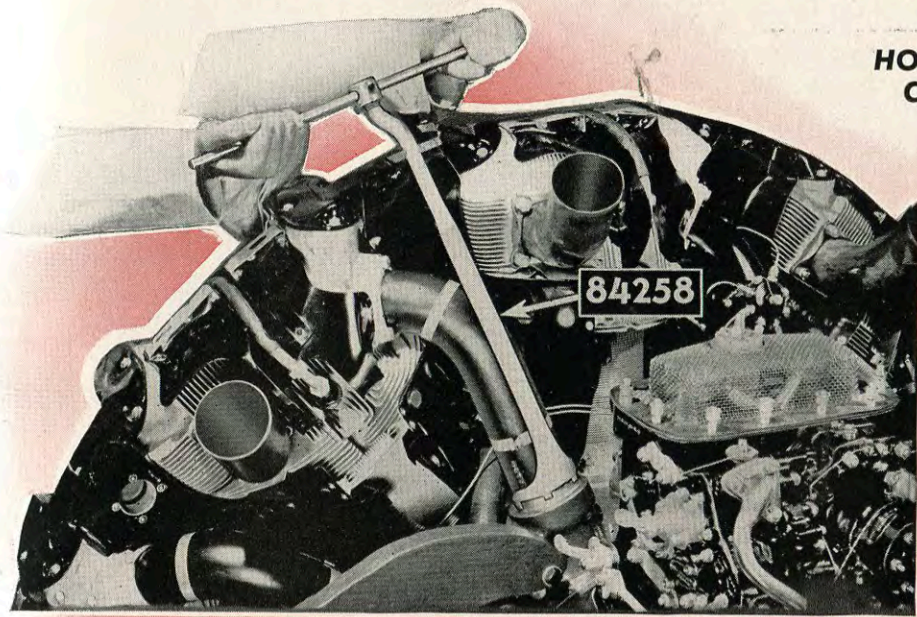


**FUEL LEAK AT PACKING NUT**

Our check-off sheet shows a fuel leak discovered at the base of the number nine intake pipe. If an engine has run more than 10 hours, this type of leak cannot be fixed by merely tightening the packing nut. This is due to the synthetic rubber packing becoming vulcanized to the packing nut. Removal of the packing nut would break the seal which would not form again. Before installing new packing, remove the intake pipe.

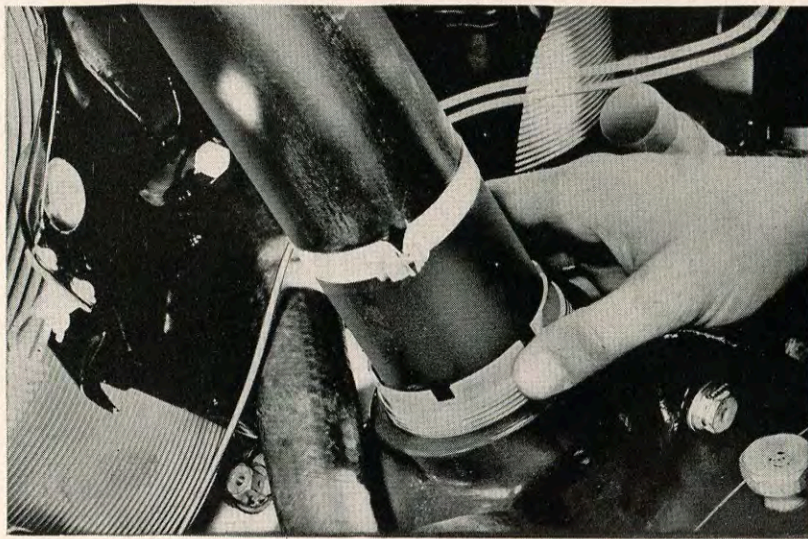


**PACKING VULCANIZES TO NUT**

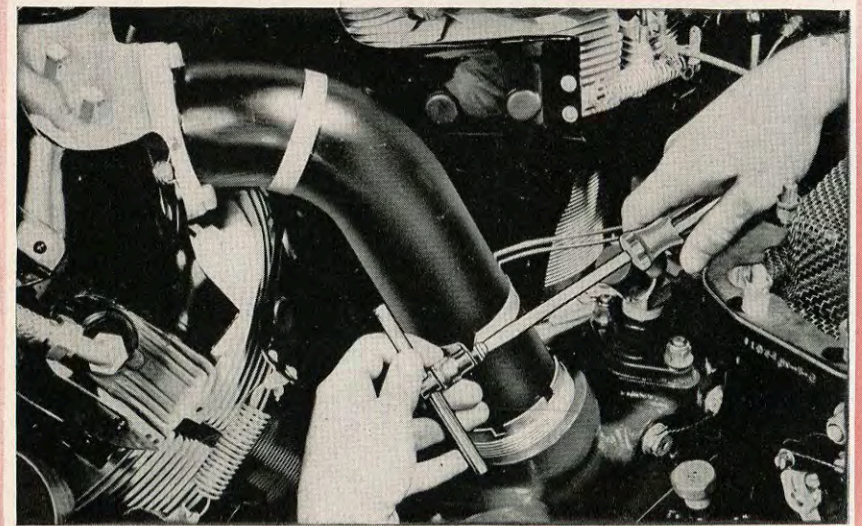


**HOLD FIRMLY IN  
CASTELLATIONS**

**LOOSEN PACKING NUT**

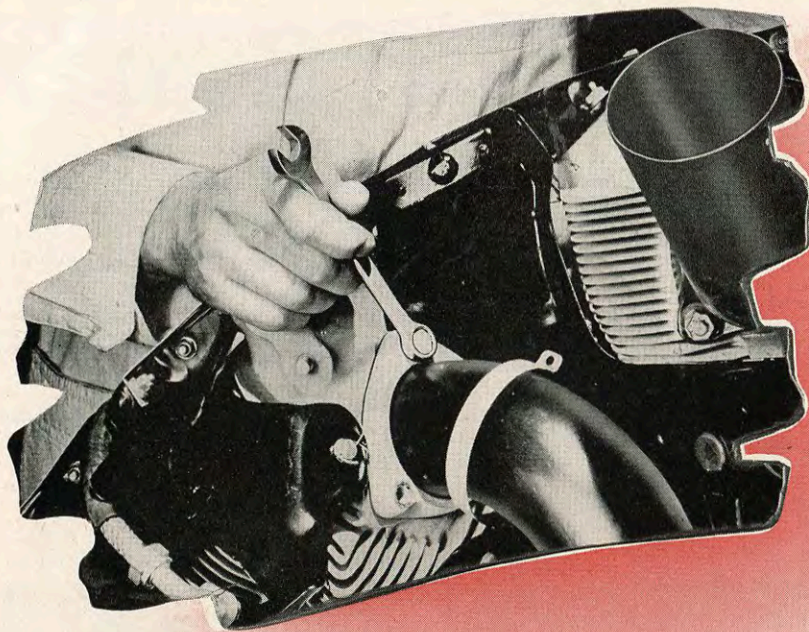


**UNSCREW PACKING NUT**

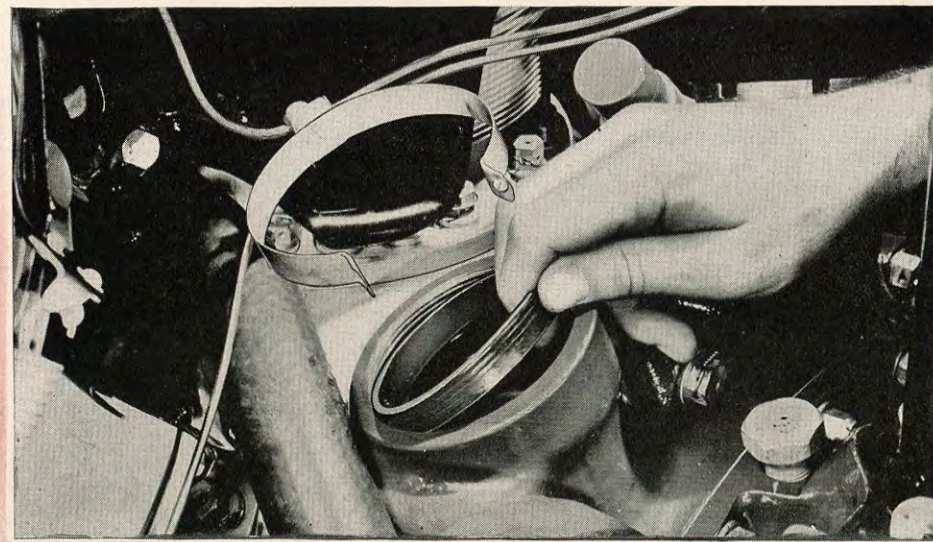


**REMOVE PRIMER SUPPORT BOLTS**

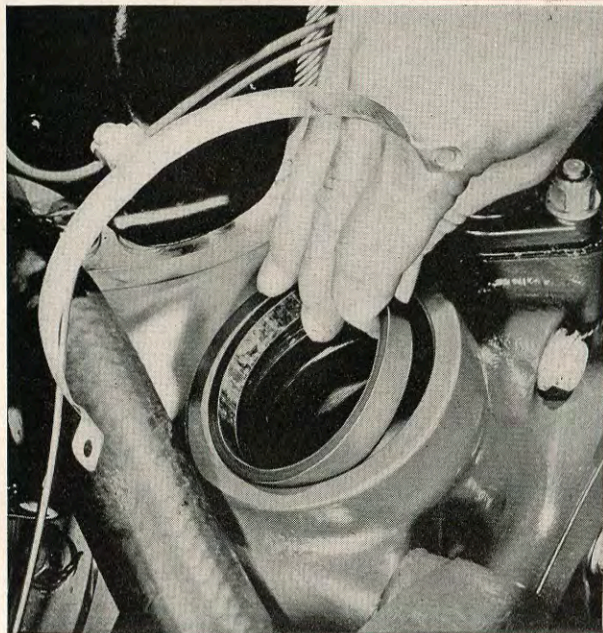
A special wrench is provided to loosen the packing nut. Handle it carefully. Do not damage the intake pipe by letting the wrench slip from the castellations of the packing nut. Hold it firmly in place. Loosen the packing nut, first with the special wrench—and then with your hand. Remove primer support bolts.



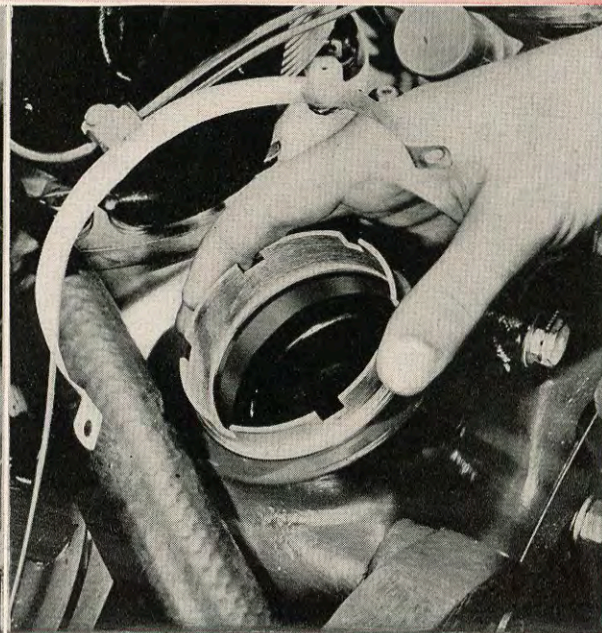
**REMOVE CAP SCREWS AT FLANGE**



**REMOVE OLD PACKING**

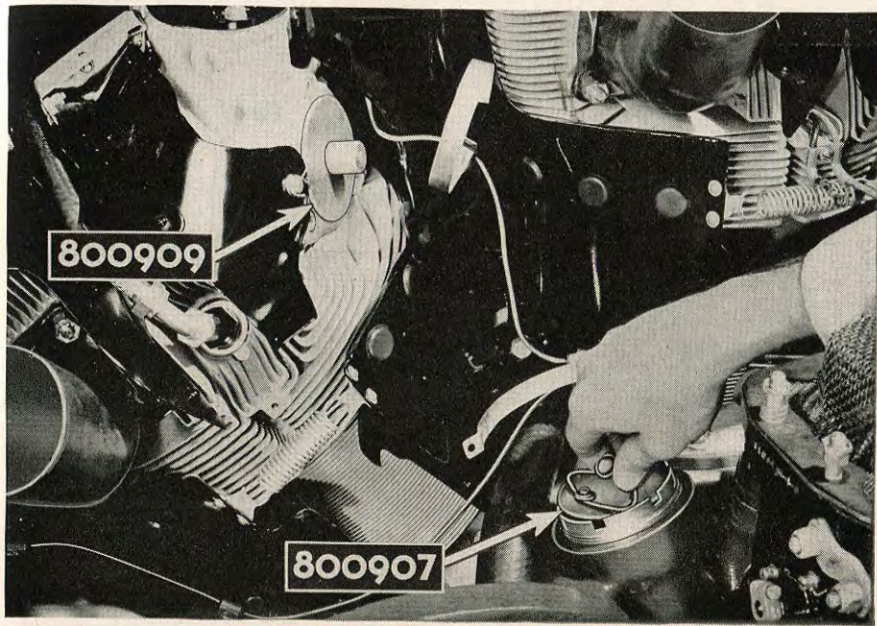


**INSERT NEW PACKING**



**INSTALL NUT LOOSELY**

After removing the small bolts which secure the primer line support, take out the cap screws at the cylinder end and remove the pipe. Remove the packing nut; then withdraw and discard the old packing. Insert new packing in the counterbore of the intake pipe support in the crankcase. Lubricate and install the packing nut loosely, just tight enough to hold the packing in place.

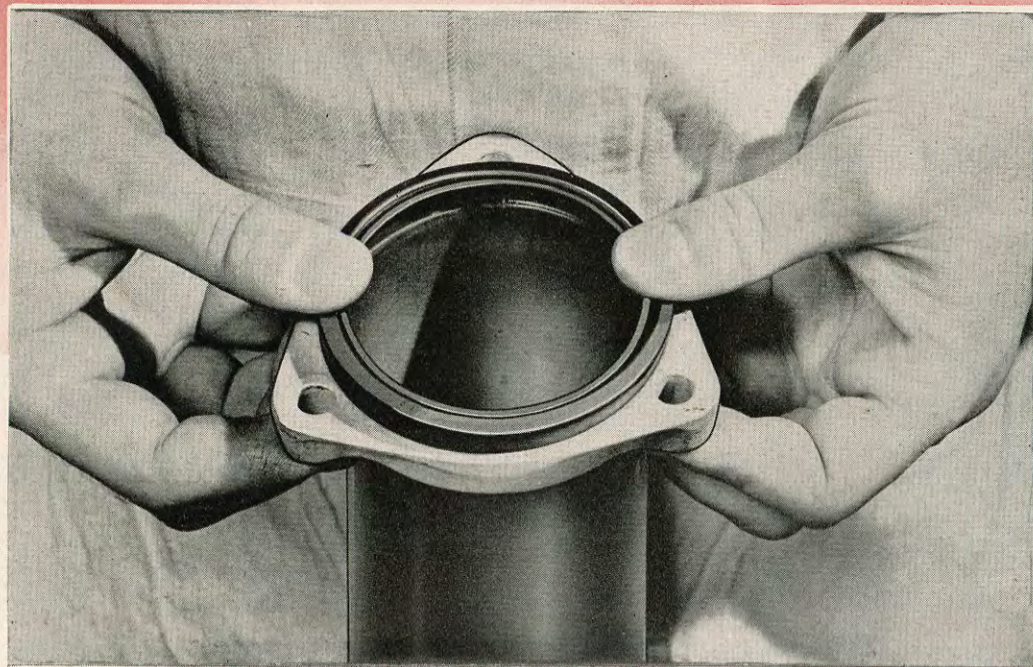


**USE PROTECTIVE COVERS**

After installing the intake pipe packing nut cover, both the intake port in the cylinder head and the intake pipe connection in the supercharger front housing should be recovered with Tools No. 800907 and 800909. Discard the oil seal ring at the intake port end of the intake pipe. Place a new oil seal ring under the intake pipe flange on the intake pipe.



**DISCARD RING SEALS**



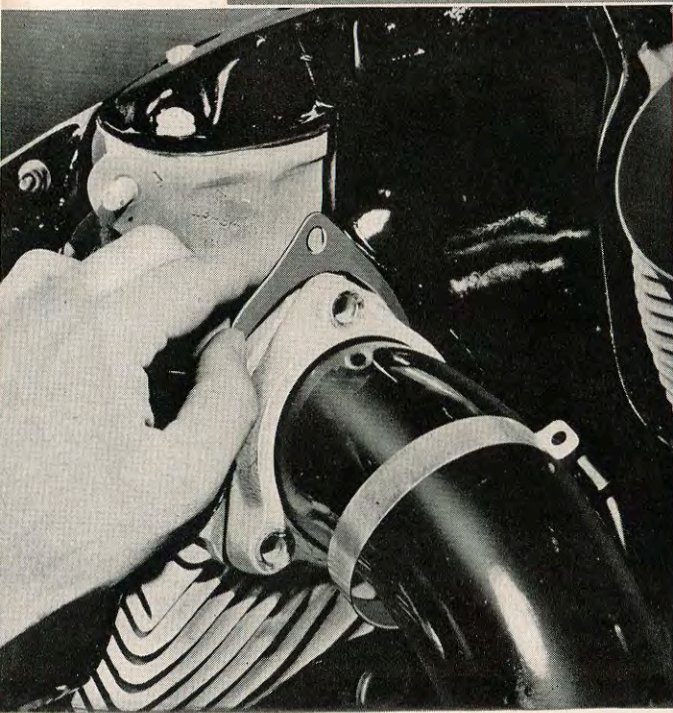
**INSTALL NEW RING SEAL**



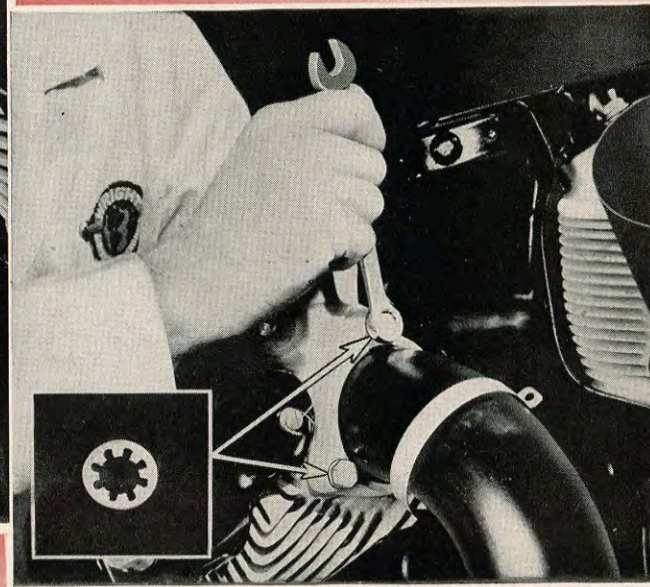
**APPLY LIGHT FILM  
OF OIL**



**INSTALL INTAKE PIPE**



**USE NEW GASKET**



**SECURE CYLINDER END FIRST**

Apply a light coating of engine oil to the lower end of the intake pipe so that it will slip through the packing easily. Install the intake pipe on the engine. Place a new gasket under the cylinder attaching flange. Install the cap screws and new shakeproof washers. When the cap screws have been tightened evenly, lockwire them securely. Secure the clamps which support the primer line. Tighten the packing nut with the lug wrench.

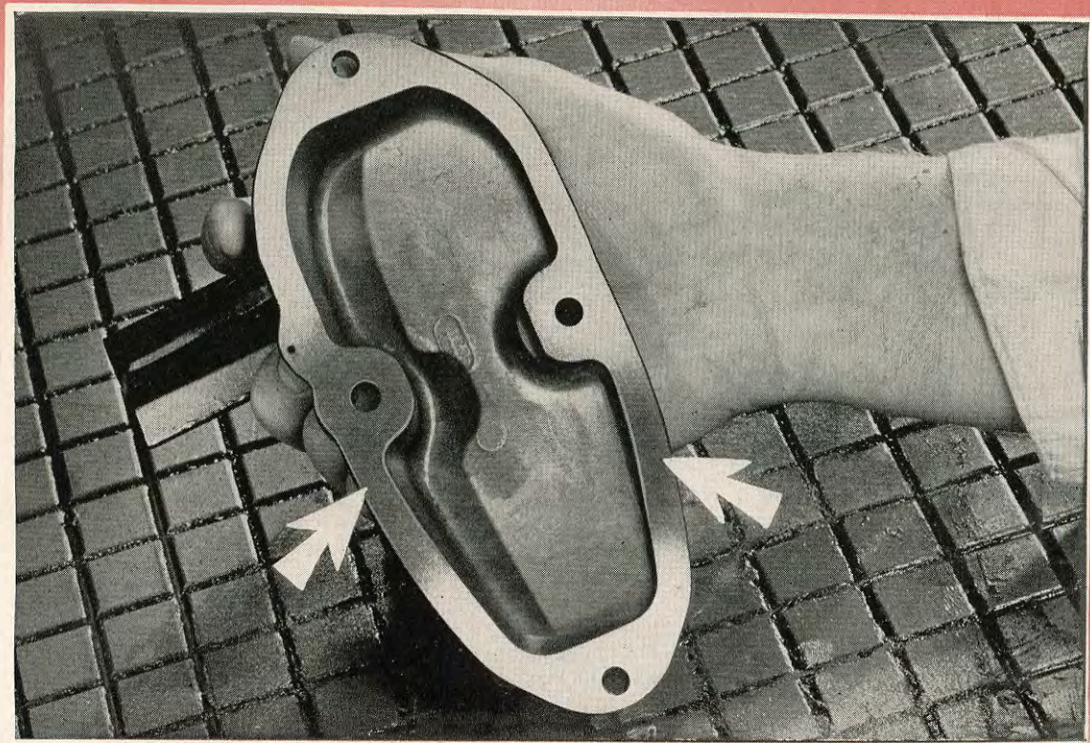
REMARKS	MECHANIC
Fuel leak at base of No. 9 Intake Pipe	CS
Oil leak at No. 2 Exhaust Rocker Box Cover	CS
O.K.	CS
O.K.	CS
O.K.	CS
OK	CS



**USE LAPPING COMPOUND**

**REFER TO CHECK-OFF SHEET ITEM NO. 1**

Item No. 1 on the check-off sheet indicates an oil leak at the No. 2 rocker box cover. However, the cause of the oil leak was corrected when the rocker box was removed to check the valves, as shown previously in Part II.



**LOW SPOTS**



# INSPECTION ITEM NO. 15

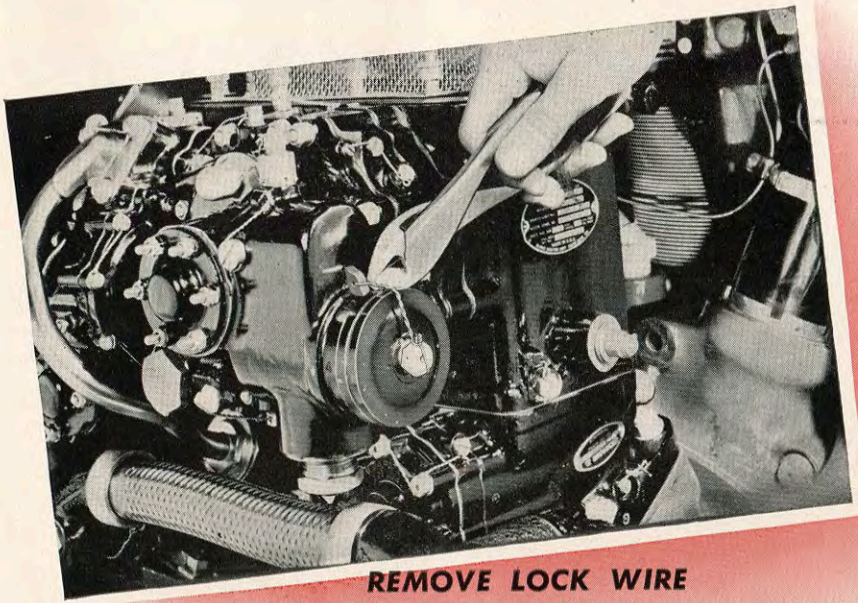
**CHECK-OFF SHEET**  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks			
2.	Wash and Dry the Engine			
3.	Drain Oil Sump. Check Magnetic Plug and Strainer			
4.	Remove, Inspect, and Clean the Cuno Oil Filter			
5.	Remove and Visually Inspect			
6.	Check the Cylinder Comp			
7.	Check the Valve Clearance			
8.	Check Magnetos and Install Reconditioned Spark Plugs			
9.	Inspect the Ignition Harness			
10.	Check All External Nuts, Bolts, and			
11.	Check the Thrust Bearing Nut			
12.	Check the Engine Controls			
13.	Inspect the Exhaust System			
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1			
15.	Inspect the Carburetor Strainer			

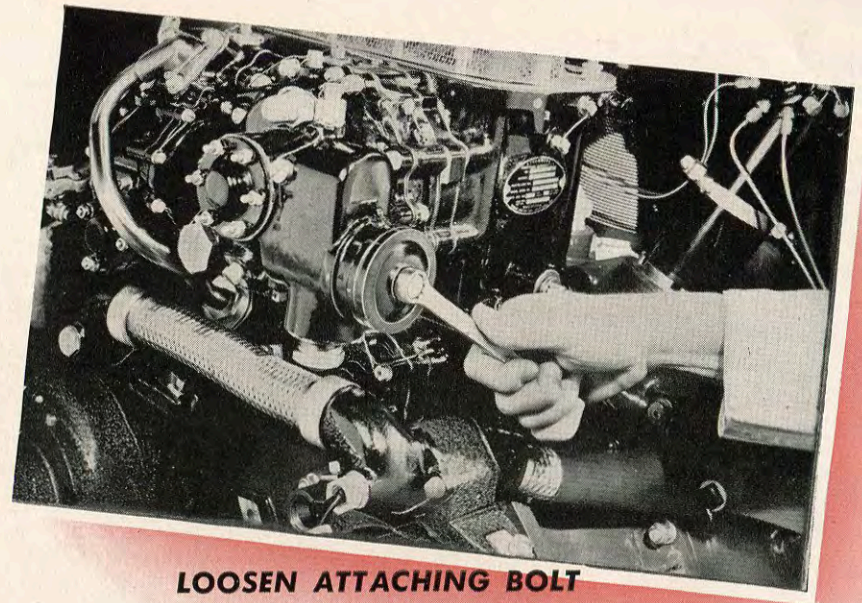
ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

INSPECT  
CARBURETOR  
STRAINER





**REMOVE LOCK WIRE**



**LOOSEN ATTACHING BOLT**

Cut the lock wire on the strainer attaching bolt. Place a drainage pan under the carburetor. Loosen, but do not remove, the strainer attaching bolt until the strainer cap has been loosened. If the cap sticks, tap it lightly with a rawhide or plastic mallet. *Never* use a prying tool. When the cap is loosened, the bolt, cap, spring, and strainer can be withdrawn as a unit and inspected.



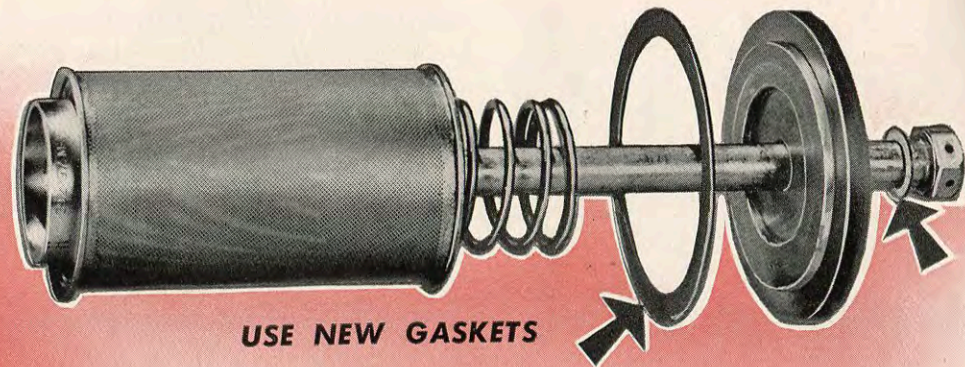
**TAP THE CARBURETOR LIGHTLY**



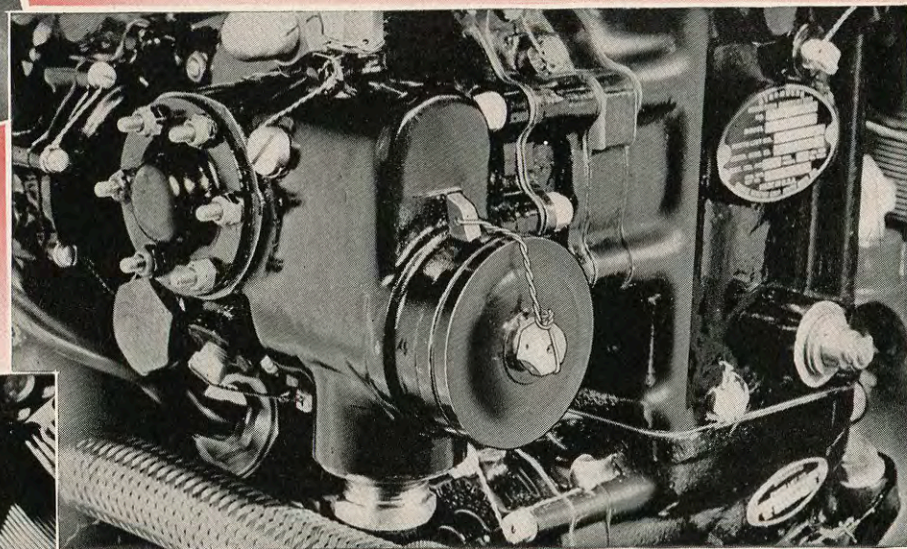
**REMOVE STRAINER ASSEMBLY**



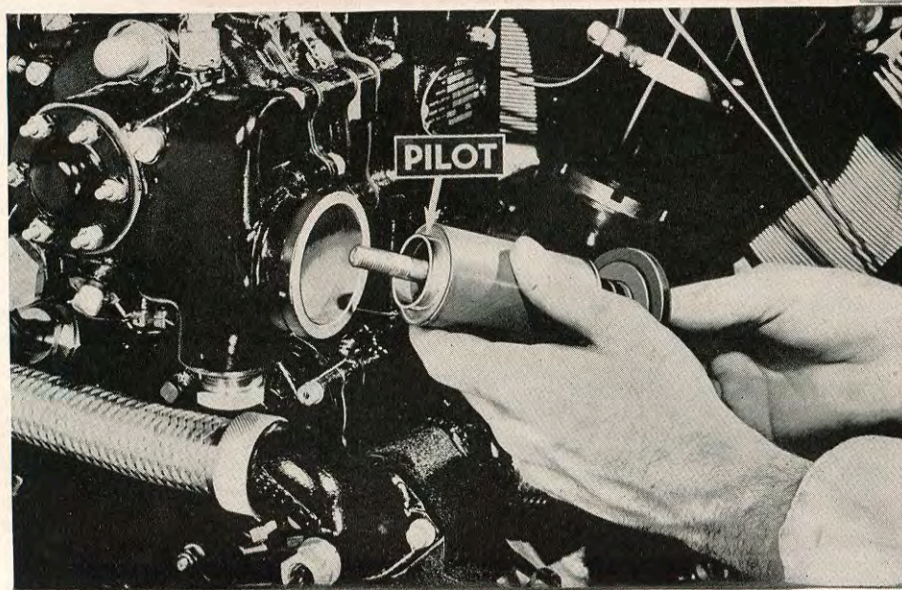
**CLEAN IN UNLEADED GASOLINE**



**USE NEW GASKETS**



**LOCKWIRE THE BOLTS**



**INSTALL STRAINER ASSEMBLY**

Clean the strainer assembly in unleaded gasoline. Install new fiber gaskets under the strainer cap and attaching bolt head. Replace the strainer assembly in the carburetor. Make certain the pilot on the strainer properly enters the counterbore of the carburetor. Finally, securely lockwire the strainer attaching bolt.



## REVIEW

11. Check the thrust bearing nut
12. Check the engine controls
13. Inspect the exhaust system
14. Correct any fuel and oil leaks noted in operation number one
15. Inspect the carburetor strainer

# ALL ITEMS CHECKED OFF

CHECK OFF SHEET  
INSPECTION AND SERVICE CYCLONE 9GC

ITEM NO.	OPERATION	REMARKS	MECHANIC	FOREMAN
1.	Inspect the Engine for Fuel and Oil Leaks	Fuel leak at base of No 9 Intake Pipe Oil leak at No 2 Exhaust Valve Cover	CS	
2.	Wash and Dry the Engine	OK	CS	
3.	Drain Oil Sump. Check Magnetic Plug and Strainer	OK	CS	
4.	Remove, Inspect, and Clean the Cuno Oil Filter	OK	CS	
5.	Remove and Visually Inspect the Spark Plugs	OK	CS	
6.	Check the Cylinder Compression	84 13 95 88 95 87 89 96 90	CS	
7.	Check the Valve Clearance	OK	CS	
8.	Check Magnetos and Install Reconditioned Spark Plugs	OK	CS	
9.	Inspect the Ignition Harness	OK	CS	
10.	Check All External Nuts, Bolts, and Cap Screws	OK	CS	
11.	Check the Thrust Bearing Nut	OK	CS	
12.	Check the Engine Controls	OK	CS	
13.	Inspect the Exhaust System	OK	CS	
14.	Correct Any Fuel and Oil Leaks Noted in Operation No. 1	OK	CS	
15.	Inspect the Carburetor Strainer	OK	CS	

ACCEPTED BY \_\_\_\_\_ INSPECTOR \_\_\_\_\_

The Cyclone 9GC and its infinite intricate parts, does a full-time job every moment it is in operation. In military service, its perfection and performance means life to our fighting men and ultimately the day of victory drawn near-

er. In peacetime its reliability must be assured for every purpose of its employment. But in war or peace, its success depends on *accurate inspection* and *careful service*—thus its success depends on *you*—the service mechanic.



