

Buy Now



1963 FORD

Thunderbird

**SHOP MANUAL
SUPPLEMENT**

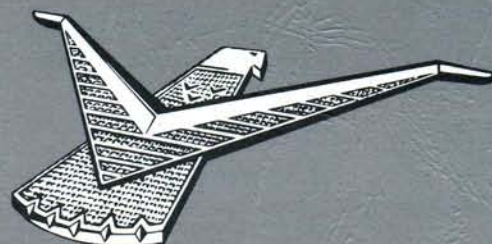
DEMO

This DEMO contains only a few pages of the entire manual/product.

Not all Bookmarks work on the Demo, but they do on the full version.

Features:

- Searchable text
- Printable pages
- Bookmarked for easy navigation
- High Resolution images
- Zoom to see exact details
- Money back Guarantee
- Transfer to USB flash drive support



Discover more ebooks! Visit our website: fordshopmanual.com

Copyright © 2009, Forel Publishing Company, LLC, Woodbridge, Virginia

All Rights Reserved. No part of this book may be used or reproduced in any manner whatsoever without written permission of Forel Publishing Company, LLC. For information write to Forel Publishing Company, LLC, 3999 Peregrine Ridge Ct., Woodbridge, VA 22192

1963 Ford Thunderbird Shop Manual

EAN: 978-1-60371-013-8

ISBN: 1-60371-013-2

Forel Publishing Company, LLC
3999 Peregrine Ridge Ct.
Woodbridge, VA 22192



This publication contains material that is reproduced and distributed under a license from Ford Motor Company. No further reproduction or distribution of the Ford Motor Company material is allowed without the express written permission of Ford Motor Company.

Note from the Editor

This product was created from the original Ford Motor Company's publication. Every effort has been made to use the original scanned images, however, due to the condition of the material; some pages have been modified to remove imperfections.

Disclaimer

Although every effort was made to ensure the accuracy of this book, no representations or warranties of any kind are made concerning the accuracy, completeness or suitability of the information, either expressed or implied. As a result, the information contained within this book should be used as general information only. The author and Forel Publishing Company, LLC shall have neither liability nor responsibility to any person or entity with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the information contained in this book. Further, the publisher and author are not engaged in rendering legal or other professional services. If legal, mechanical, electrical, or other expert assistance is required, the services of a competent professional should be sought.

1963 FORD THUNDERBIRD

SHOP MANUAL SUPPLEMENT

SERVICE DEPARTMENT
FORD DIVISION



MOTOR COMPANY

FIRST PRINTING—SEPTEMBER, 1962

© 1962 FORD MOTOR COMPANY, DEARBORN, MICHIGAN

Reprinted with Ford Motor Company's Permission

GROUP INDEX

THUNDERBIRD IDENTIFICATION

ENGINE AND EXHAUST SYSTEM

1

IGNITION SYSTEM

2

FUEL SYSTEM

3

COOLING SYSTEM

4

CRUISE-O-MATIC TRANSMISSION

5

REAR AXLE AND DRIVE LINE

6

STEERING

7

BRAKES AND SUSPENSION

8

GENERATING AND STARTING
SYSTEMS

9

LIGHTS, INSTRUMENTS AND
ACCESSORIES

10

BODY

11

MAINTENANCE, LUBRICATION
AND SPECIAL TOOLS

12

SPECIFICATIONS

13

FOREWORD

The information in this supplement, when used with the 1962 Ford Thunderbird Shop Manual, provides the necessary information for servicing the 1963 Thunderbird. Complete 1963 maintenance information and specifications are included.

The descriptions and specifications contained in this supplement were in effect at the time the manual was approved for printing. The Ford Division of Ford Motor Company reserves the right to discontinue models at any time, or change specifications or design, without notice and without incurring obligation.

**SERVICE DEPARTMENT
FORD DIVISION
FORD MOTOR COMPANY**

THUNDERBIRD IDENTIFICATION



FIG. 1—Thunderbird Warranty Plate

Figure 1 illustrates a Thunderbird Warranty plate and its elements. The Warranty plate is attached to the left door front pillar.

The official Vehicle Identification number for title and registration purposes is stamped on the body just forward of the right-hand hood lock plate (Fig. 2). Do not use the Vehicle Warranty number which appears on the Warranty plate for title or registration purposes.

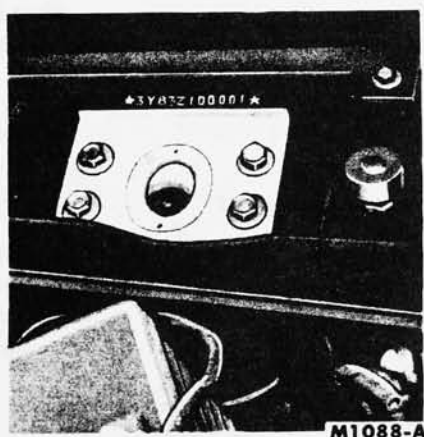


FIG. 2—Vehicle Identification Number Location

VEHICLE DATA

Example (Fig. 1):

63A	J	85	9H	11	1	4
63A	Tudor Hardtop					
J	Red					
85	Red Leather					
9H	Ninth day of August					
11	District Code					
1	3.00:1 Axle Ratio					
4	Cruise-O-Matic					

BODY

63A	Tudor Hardtop
76A	Tudor Convertible

COLOR

If a special paint is used, the paint color space will not be stamped.

M30J/M32J

Code	Number	Color	Sales Name
A	1724	Black	Raven Black
D	1070	Med. Turquoise Metallic	Patrician Green
E	1269	Med. Blue Metallic	Acapulco Blue
G	1446	Silver Blue Metallic	Silver Mink
H	1544	Dark Blue Metallic	Caspian Blue
J	1515	Red	Rangoon Red
K	1452	Lt. Turquoise	Chalfonte Blue
L	1458	Pink	Sahara Rose
M	1238	White	Corinthian White
N	921	Diamond Blue	Diamond Blue
O	1554	Med. Green Metallic	Green Mist
R	1456	Yellow	Tucson Yellow
S	1453	Dk. Green Metallic	Cascade Green
T	1543	Lt. Beige	Sandshell Beige
U	1450	Dark Turquoise Metallic	Deep Sea Blue
V	1470	Chestnut Metallic	Chestnut
W	1555	Lt. Pink Metallic	Rose Beige
X	1444	Maroon Metallic	Heritage Burgundy
Z	1427	Beige Metallic	Fieldstone Tan

TRIM

Deviation trim sets will use existing trim codes plus a suffix. A trim code with a numerical suffix is not serviced, while a trim code with an alphabetical suffix is serviced.

Code	Crinkle Vinyl	Pin Stripe B/C
72	Lt. Blue D/L	Dk. Blue
77	Lt. Turquoise D/L	Dk. Turquoise
74	Pearl Beige	Med. Beige
76	Black	Black

Code	Crinkle Vinyl	Vachette Vinyl
52.....	Med. Blue D/L.....	Lt. Blue D/L.....
57.....	Med. Turquoise D/L.....	Lt. Turquoise D/L.....
59.....	Med. Chestnut D/L.....	Med. Chestnut D/L.....
54.....	Pearl Beige.....	Pearl Beige.....
56.....	Black.....	Black.....
55.....	Red.....	Red.....
50.....	Med. Silver Blue Met.....	Lt. Silver Blue D/L.....
58.....	Lt. Gold D/L.....	Lt. Gold D/L.....
51.....	Lt. Rose Beige D/L.....	Lt. Rose Beige D/L.....

Code	Crinkle Leather	Vachette Leather
82.....	Lt. Blue D/L.....	Lt. Blue D/L.....
84.....	Pearl Beige.....	Pearl Beige.....
86.....	Black.....	Black.....
85.....	Red.....	Red.....

DATE

The code letters for the month are preceded by a numeral to show the day of the month when the Thunderbird was completed. The second year code letters are to be used if model production exceeds 12 months.

Month	First Model Year	Second Model Year
January.....	A.....	N.....
February.....	B.....	P.....
March.....	C.....	Q.....
April.....	D.....	R.....
May.....	E.....	S.....
June.....	F.....	T.....
July.....	G.....	U.....
August.....	H.....	V.....
September.....	J.....	W.....
October.....	K.....	X.....
November.....	L.....	Y.....
December.....	M.....	Z.....

DSO

Thunderbirds built to a Domestic Special Order, Foreign Special Order, or Pre-Approved Order have the complete order number recorded in this space. Also appearing in this space is the two digit code number of the District which ordered the unit. If the unit is regular production, only the District code number will appear.

DISTRICT CODE

Code	District	Code	District
11.....	Boston	45.....	Davenport
12.....	Buffalo	51.....	Denver
13.....	New York	52.....	Des Moines
14.....	Pittsburgh	53.....	Kansas City
15.....	Newark	54.....	Omaha
21.....	Atlanta	55.....	St. Louis
22.....	Charlotte	61.....	Dallas
23.....	Philadelphia	62.....	Houston
24.....	Jacksonville	63.....	Memphis
25.....	Richmond	64.....	New Orleans
26.....	Washington	65.....	Oklahoma City
31.....	Cincinnati	71.....	Los Angeles
32.....	Cleveland	72.....	San Jose
33.....	Detroit	73.....	Salt Lake City
34.....	Indianapolis	74.....	Seattle
35.....	Lansing	81.....	Ford of Canada
36.....	Louisville	83.....	Government
41.....	Chicago	84.....	Home Office Reserve
42.....	Fargo	85.....	American Red Cross
43.....	Rockford	89.....	Transportation Services
44.....	Twin Cities	90-99.....	Export

AXLE

Code	Ratio
1.....	3.00:1
A*.....	3.00:1

*Equa-Lock Type.

TRANSMISSION

Code	Type
4.....	Cruise-O-Matic

VEHICLE WARRANTY NUMBER

Example (Fig. 1): 3Y83Z100001

3.....	1963 Model
Y.....	Wixom Assembly Plant
83.....	Tudor Hardtop
Z.....	8-Cylinder 390 Cubic Inch Engine
100001.....	First Unit Built

MODEL YEAR

The number "3" designates 1963.

ASSEMBLY PLANT

Code	Location
Y.....	Wixom Assembly Plant
S.....	Pilot Plant

MODEL

Code	Type
83.....	Tudor Hardtop
85.....	Tudor Convertible
87.....	Tudor Landau
89.....	Tudor Roadster

ENGINE

Code	Type
M.....	8-Cylinder 390 Cubic Inch (6-barrel High Performance)
9.....	8-Cylinder 390 Cubic Inch (4-barrel Low Compression Export, 84 Octane)
Z.....	8-Cylinder 390 Cubic Inch (4-barrel)

CONSECUTIVE UNIT NUMBER

The assembly plant, with each model year, begins with consecutive unit number 100001 and continues on for each unit built.

GROUP 1—ENGINE AND EXHAUST SYSTEM

The 1963 maintenance recommendations are in Group 12 and the 1963 specifications are in Group 13 of this manual.

All the service procedures outlined in Group 1 of the 1962 Shop Manual apply for both the 1963 390 4-V engine and the 390 6-V High Performance engine with the following exceptions.

390 4-V ENGINE (Part 1-1)

CAMSHAFT

The camshaft and related parts are shown in Fig. 3.

Removal

1. Refer to "Valve Rocker Arm Shaft Assembly Removal" (page 1-15, 1962 Shop Manual) and remove the valve rocker arm shaft assemblies.

2. Remove the cylinder front cover following steps 1 thru 16 under "Cylinder Front Cover and Timing Chain Removal" (page 1-23, 1962 Shop Manual).

3. Remove the valve push rods in sequence and place them in a rack so that they can be installed in their original positions.

4. Position an inspection light through a push rod opening and into the valve push rod valley (Fig. 55, page 1-26, 1962 Shop Manual). Remove the valve lifters with a magnet through the push rod openings. In some cases, it will be necessary to

transfer the lifter over to an adjoining push rod opening in order to remove it. Place the lifters in a rack so that they can be installed in their original positions.

5. Install a dial indicator so the indicator point is on the camshaft sprocket retaining screw. Push the camshaft toward the rear of the engine and set the dial indicator on zero. Pull the camshaft forward and release it. Compare the indicator reading with the specifications. If the end play is excessive, check the spacer for correct installation before it is removed. **The side of the spacer having a chamfer on the ID must be against the camshaft front journal.** If the spacer is installed correctly, replace the thrust plate.

6. Remove the dial indicator. Remove the camshaft sprocket cap screw, lock washer, flat washer, and fuel pump eccentric.

7. Slide both sprockets and the timing chain forward, and remove the sprockets and timing chain as an assembly (Fig. 49, 1962 Shop Manual).

8. Remove the oil pan and oil pump by following the procedure under "Oil Pan and Oil Pump Removal" (page 1-32, 1962 Shop Manual).

9. Remove the camshaft thrust plate and spacer. Carefully remove the camshaft by pulling it toward the front of the engine. **Use caution to avoid damaging the camshaft bear-**

ings.

Installation

1. Oil the camshaft and apply Lubriplate to the lobes. Carefully slide the camshaft through the bearings. Install the thrust plate. Install the thrust plate with the side having a chamfered ID against the camshaft front journal. **The oil groove in the thrust plate must be above the camshaft, and it must face towards the front (against the camshaft sprocket).**

2. Follow step 5 under "Camshaft Removal" and check the camshaft end play.

3. Position the sprockets and timing chain on the camshaft and crankshaft with the timing marks on the sprockets aligned as shown in Fig. 48, page 1-24, 1962 Shop Manual.

4. Install the fuel pump eccentric, flat washer, lock washer, and sprocket cap screw. Torque the sprocket cap screw to specifications. Install the front oil slinger.

5. Replace the crankshaft front oil seal. Install the cylinder front cover, the crankshaft damper, and related parts following steps 3 thru 16 under "Cylinder Front Cover and Timing Chain Installation" (page 1-24, 1962 Shop Manual).

6. With No. 1 piston on TDC at the end of the compression stroke, position the distributor in the block with the rotor at the No. 1 firing position and the points open. Install the hold down clamp.

7. Connect the distributor vacuum line. Install the distributor cap. Connect the coil high tension lead.

8. Install the valve lifters in the bores from which they were removed. Install the push rods.

9. Refer to "Valve Rocker Arm Shaft Assembly Installation" and install the valve rocker arm shaft assembly following steps 1 thru 9, page 1-16, 1962 Shop Manual.

10. Fill and bleed the cooling system. Fill the crankcase with the proper grade and quantity of engine oil.

11. Start the engine and check and adjust the ignition timing. Operate the engine at fast idle and check all hose connections and gaskets for leaks.

Cleaning and Inspection. Refer to the 1962 Shop Manual for cleaning and inspection procedures.

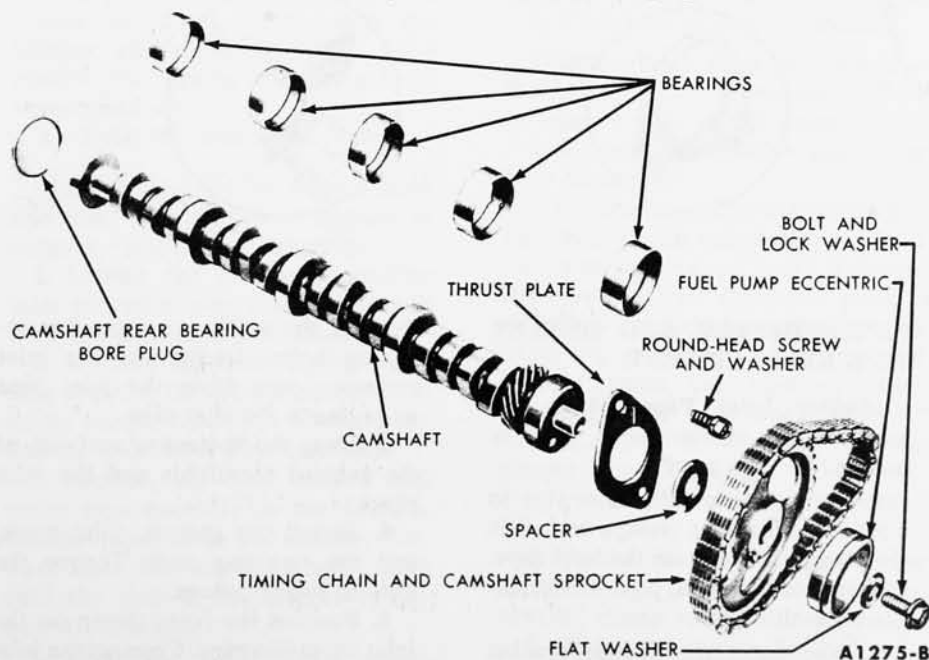


FIG. 3—Camshaft and Related Parts

390 6-V HIGH PERFORMANCE ENGINE (Part 1-1)

The warranty plate identification symbol for the engine is "M". This engine is the same as the 390 4-V engine except for specifications (Group 13) and the following differences:

1. A cast aluminum intake manifold replaces the cast iron intake manifold used on the 390 4-V engine.
2. The coolant-heated carburetor

spacer is eliminated.

3. The exhaust gas control valve is mounted with the counterweight on the outboard side of the engine.

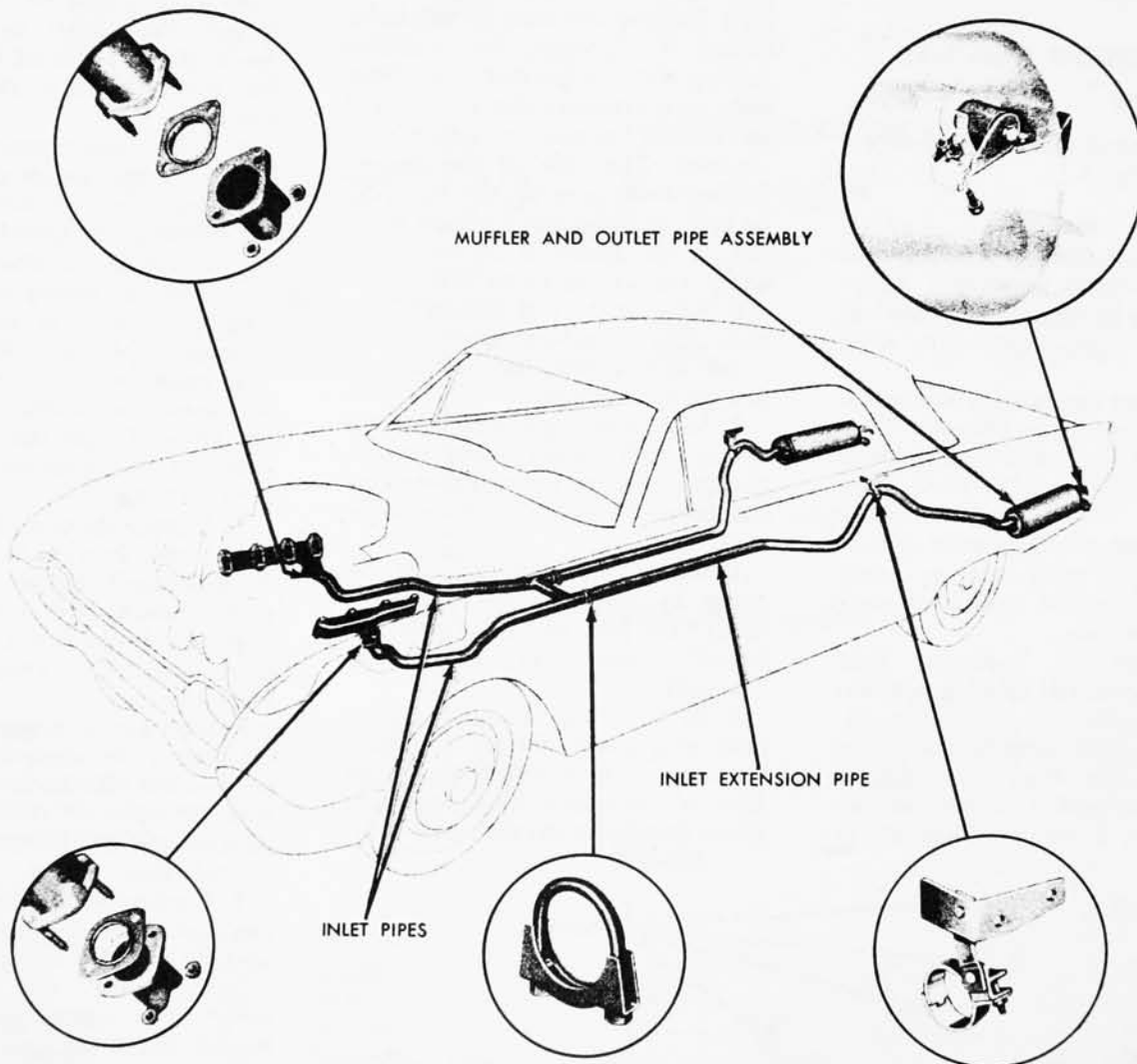
EXHAUST SYSTEM (Part 1-2)

DESCRIPTION

A single exhaust system is standard equipment on all 1963 Thunderbirds. A dual exhaust system is available as optional equipment on

all models.

The dual exhaust system (Fig. 3A) consists of: a one-piece muffler inlet pipe with separate front section inlet pipes that are joined together by a welded cross-over pipe; separate right and left inlet extension pipes; right and left mufflers that contain integral muffler outlet pipes; retaining clamps, brackets, nuts and bolts; two exhaust manifolds to inlet pipe gaskets.



A1730-A

FIG. 3A—Dual Exhaust System

The single exhaust system (Fig. 3B) consists of: a one-piece muffler inlet pipe with "Y" type inlet pipes that are joined and welded together; a muffler with an integral outlet pipe; a muffler inlet extension pipe; retaining clamps, brackets, bolts and nuts; two exhaust manifolds to inlet pipe gaskets; a sealing gasket, located at the flange of the inlet pipe and the inlet extension pipe rear flange.

INLET PIPE, INLET EXTENSION

PIPE, MUFFLER AND OUTLET PIPE REPLACEMENT

Muffler Inlet Pipe—Dual Exhaust. The muffler inlet pipe is serviced in one piece.

1. Loosen the muffler inlet pipe to inlet extension pipe clamps and slide the clamps forward on the inlet pipe. Disconnect the inlet pipe at the exhaust manifolds.

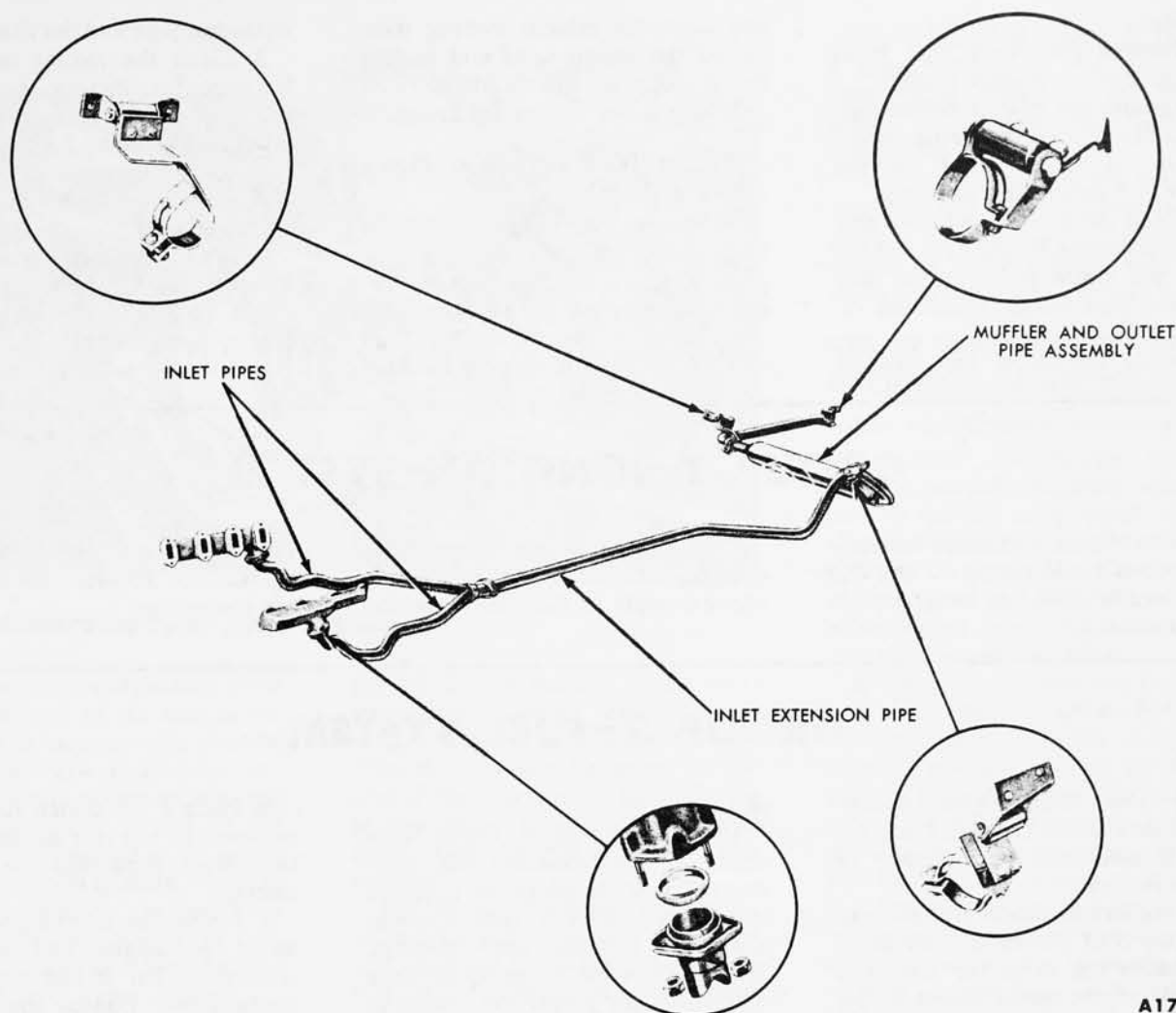
2. Disconnect the hanger bracket clamp from the inlet extension pipe.

Remove the muffler rear bracket retaining bolts. Disconnect the inlet extension pipe from the inlet pipe and remove the inlet pipe.

3. Clean the mounting surfaces of the exhaust manifolds and the inlet pipes.

4. Install the gaskets, inlet pipes, and the retaining nuts. Torque the nuts to specifications.

5. Position the front clamp on the inlet extension pipe. Connect the inlet pipe and the inlet extension pipe;



A1731-A

FIG. 3B—Single Exhaust System

then install the muffler, muffler rear bracket retaining bolts, and the inlet extension bracket clamp.

6. Align the exhaust system; then, torque the front clamp, inlet extension pipe bracket clamp, and muffler rear bracket retaining bolts to specifications.

7. Check the system for leaks.

Muffler and Outlet Pipe – Dual Exhaust. The procedure applies to either a right or left assembly.

1. Loosen the muffler to muffler inlet extension pipe clamp and slide it forward on the extension pipe.

2. Remove the retaining bolts and nuts securing the muffler rear bracket to the hanger assembly. Remove the muffler and outlet pipe assembly.

3. Position the new muffler and outlet pipe assembly on the inlet extension pipe. Slide the muffler forward into the inlet extension pipe until the slots in the muffler extension are blocked.

4. Align the muffler and outlet pipe assembly. Install the muffler in-

let extension pipe clamp and the muffler rear bracket retaining bolts and nuts. Torque the clamp and bolts to specifications.

5. Check the system for leaks.

Muffler Inlet Pipe Extension – Dual Exhaust. The procedure applies to either a right or left assembly.

1. Remove the muffler and outlet pipe assembly.

2. Loosen the muffler inlet extension pipe front clamp and remove the inlet extension pipe hanger bracket clamp. Remove the inlet extension pipe.

3. Position the inlet extension pipe front clamp on the end of the inlet pipe. Connect the inlet extension pipe to the inlet pipe. Install the inlet extension pipe front clamp and the hanger bracket clamp.

4. Install the muffler and outlet pipe assembly.

5. Torque the inlet extension pipe front and rear clamps and the hanger bracket clamp to specifications.

6. Check the system for leaks.

Muffler Inlet Pipe – Single

Exhaust. The muffler inlet pipe is serviced as one piece.

1. Remove the retaining bolts and nuts from the inlet pipe to inlet extension pipe flange. Remove the clamp from the inlet extension pipe hanger bracket.

2. Disconnect the inlet pipes at the exhaust manifold. Remove the inlet pipe and gaskets from the exhaust manifolds.

3. Clean the mounting surfaces of the exhaust manifolds and the inlet pipes. Install the gaskets, inlet pipes, and retaining nuts. Torque the nuts to specifications.

4. Install a new gasket between the inlet pipe and the inlet pipe extension flange. Install the flange retaining bolts and nuts; then, torque them to specifications.

5. Install the inlet extension pipe hanger bracket clamp and torque the retaining nuts to specifications.

6. Check the system for leaks.

Muffler – Single Exhaust. The muffler and outlet pipe is serviced as

one piece.

1. Remove the outlet pipe front and rear hanger bracket clamps.

2. Remove the inlet extension pipe to muffler flange retaining bolts. Remove the flange gasket and the muffler and outlet pipe assembly.

3. Clean the muffler and inlet pipe extension flanges. Position the muffler flange and a new gasket on the inlet extension pipe flange. Install the retaining bolts and nuts.

4. Install the outlet pipe clamps

and align the exhaust system; then, torque the clamp bolts and muffler flange bolts to specifications.

5. Check the system for leaks.

Muffler Inlet Extension Pipe — Single Exhaust

1. Remove the flange bolts from both flanges of the inlet extension pipe. Remove the clamp from the extension pipe hanger bracket.

2. Pry the muffler toward the right side of the car and remove the inlet

extension pipe and the flange gaskets.

3. Clean the mating surfaces of the mounting flanges; then, position the inlet extension pipe on the inlet pipe and muffler flanges. Insert a new gasket between the front and the rear flanges. Install the mounting bolts and nuts.

4. Install the inlet extension pipe hanger bracket clamp. Torque the flange bolts and the hanger clamp bolt to specifications.

5. Check the system for leaks.

GROUP 2—IGNITION SYSTEM

The 1963 maintenance recommendations are in Group 12 and the 1963 specifications are in Group 13 of this manual.

The ignition system service procedures outlined in the 1962 Shop Manual apply to the 1963 Thunder-

bird. Refer to Group 2 of the 1962 manual for the recommended service procedures.

GROUP 3—FUEL SYSTEM

The 1963 maintenance recommendations are in Group 12 and the 1963 specifications are in Group 13 of this manual.

All the service procedures outlined in Group 3 of the 1962 Shop Manual remain the same for the 1963 390 4-V engine series except as described herein (Ford 4-V carburetor). Service procedures for the 1963 High Performance 390 6-V engine series (three Holley dual carburetors) are included in this supplement.

FORD 4-BARREL CARBURETOR

OPERATION

The carburetor incorporates the following changes:

1. A magnet and bracket assembly was added to the front wall of the carburetor air horn to entrap the choke plate in the closed position and increase the force holding the choke plate closed during cold engine starting.

2. A lower torque rate choke housing spring has been incorporated to reduce the forces tending to close the choke plate after the engine has started, thereby minimizing the tendency of the carburetor to overchoke the engine and cause "loading".

3. An external vent opening has been added to the secondary fuel bowl cover to provide an escape for the highly volatile fuel vapors, thereby reducing the possibility of flooding the intake system during a hot soak

period.

4. Standpipe pitot tubes were added to the secondary fuel bowl internal vent openings to raise the level of the internal vent openings above the external vent openings. This provides the necessary pressure differential for proper evacuation of the gaseous vapors through the external vent during a hot soak period.

5. Two baffles have been added in the internal fuel equalizer passage between the primary and secondary fuel bowls to permit proper control of the metering forces within each fuel bowl, since these forces were thrown out of balance by the addition of the secondary fuel bowl external vent.

6. The calibration of the secondary section of the carburetor was revised to compensate for the reduction in the metering forces. Refer to the specifications for the proper metering jets.

IN-CHASSIS ADJUSTMENT

Automatic Choke. Use the following procedure to adjust the magnet and bracket assembly:

1. Rotate the choke thermostat coil housing 90° in the "rich" direction (counterclockwise).

2. Adjust the bellcrank lever, if necessary, to obtain 0.050 inch between the top edge of the fast idle cam and the cast stop boss on the rear of the choke housing.

3. Place a 0.010-inch feeler gauge between the top rear straight edge of the choke plate and the air horn casting.

4. Loosen the attaching screws and adjust the magnet and bracket assembly so that it just contacts the choke plate. Tighten the attaching screws and remove the feeler gauge. Set the choke thermostat coil housing to the proper index mark. All other procedures for adjusting the automatic choke are the same as outlined in Part 3-1 of the 1962 Thunderbird Shop Manual.

Fuel Level Float Adjustment. On carburetors equipped with Viton-tipped fuel inlet needles, the dry float fuel level settings should be used as a guide only, and a final check and adjustment of the wet fuel level should be made as follows:

1. Operate the engine for 30 minutes at 1200 rpm to normalize engine temperatures, and place vehicle on a flat surface as near level as possible. Stop the engine.

2. Remove the air cleaner assembly, carburetor air horn assembly, and gasket.

3. Temporarily place the air horn gasket in position on the carburetor main body and start the engine. Let the engine idle for several minutes; then remove the air horn gasket.

4. While the engine is idling, use a standard depth scale to measure the vertical distance from the top ma-

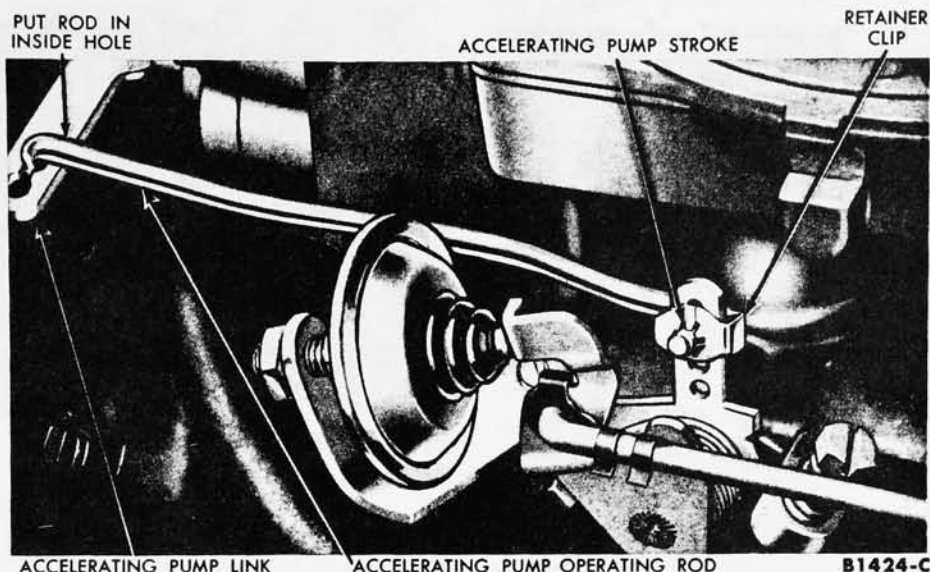


FIG. 4—Accelerating Pump Stroke Adjustment

chined surface of the carburetor main body to the level of the fuel in the fuel bowl. The measurement must be made at least 1/4 inch from any vertical surface to assure an accurate reading because the surface of the fuel is concave (higher at the edges than in the center). Care must be exercised to measure the fuel level at the point of contact with the fuel. Refer to the specifications for the correct fuel level (wet) setting.

5. If any adjustment is required, stop the engine to minimize the hazard of fire due to fuel spray when the float setting is disturbed. To adjust the fuel level, bend the float tab contacting the fuel inlet valve upward, in relation to the original position, to raise the fuel level and downward to lower it. Each time an adjustment is made to the float tab to alter the fuel level the engine must be started and permitted to idle for at least three (3) minutes to stabilize the fuel level. Check the fuel level after each adjustment until the specified level is achieved.

6. Install a new air horn gasket and the carburetor air horn assembly.

7. Check the engine idle speed and idle fuel mixture and adjust as required.

8. Install the air cleaner assembly.

Accelerating Pump Stroke. The over-travel lever has 4 holes and the accelerating pump link has 2 holes to control the accelerating pump stroke for different engine applications (Fig. 4).

For average ambient temperature operation (40° to 80°F), place the accelerator pump operating rod in

the No. 2 hole position of the over-travel lever (second hole from the throttle shaft). **To release the rod from the retainer clip, press the tab end of the clip toward the rod, and at the same time press the rod away from the clip until it is disengaged.**

For low ambient temperature operation (below 40°F), place the pump operating rod in the No. 3 hole position of the over-travel lever (third hole from the throttle shaft).

For extremely low ambient temperature operation (−15°F and below), the pump operating rod may be placed in the No. 4 hole position to suit individual operating conditions.

For high ambient temperature operation (above 80°F and/or above 5000 feet altitude), the pump oper-

ating rod may be placed in the No. 1 hole position of the over-travel lever (hole closest to the throttle shaft) to suit individual operating conditions.

The correct position for the pump operating rod at the accelerator pump plunger lever, for all operating conditions, is in the inboard hole (hole closest to the pump plunger).

HOLLEY DUAL CARBURETORS IN-CHASSIS ADJUSTMENTS

Idle Fuel Mixture Adjustment

1. Operate the engine until it reaches normal operating temperature. If the car is equipped with an air conditioner, the engine must be operated at least 20 minutes. **All engine speed and idle fuel mixture adjustments must be made with the air cleaner installed.**

2. Establish an initial idle fuel mixture adjustment by turning both idle mixture screws on each carburetor (Fig. 5) inward until they are lightly seated. Then turn the idle mixture screws on each secondary carburetor (Fig. 6) outward 3/4 turns, and turn the primary carburetor idle mixture screws outward one full turn.

3. Install an engine speed tachometer. Start the engine; move the transmission selector lever to the DRIVE (D1) position, and set the parking brake. Adjust the engine idle rpm to 575-600 rpm by turning the idle speed adjusting screw (Fig. 5) on the primary carburetor only.

4. Turn the primary carburetor idle mixture screws inward until the engine begins to run rough from the lean mixture. Turn the mixture screws outward until the engine be-

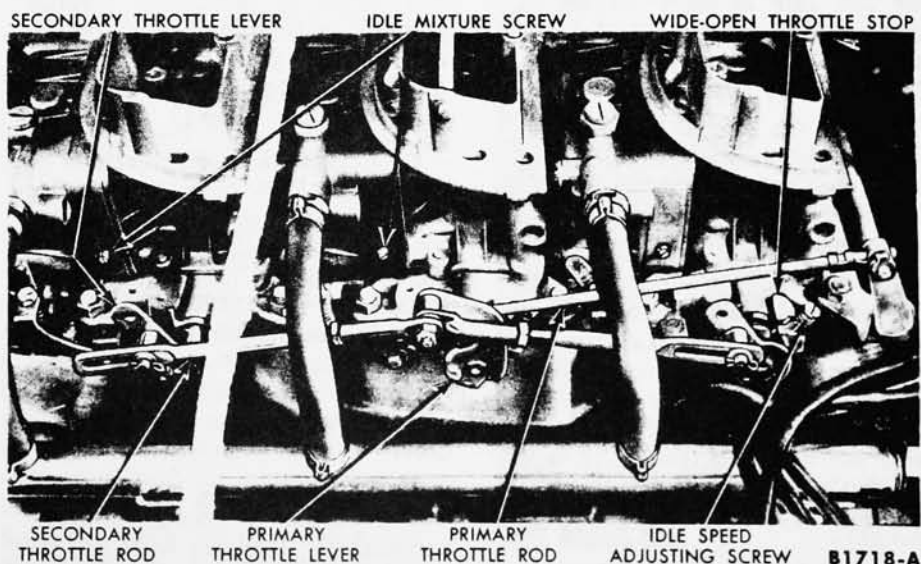


FIG. 5—390 6-V Carburetor Throttle Linkage Installation

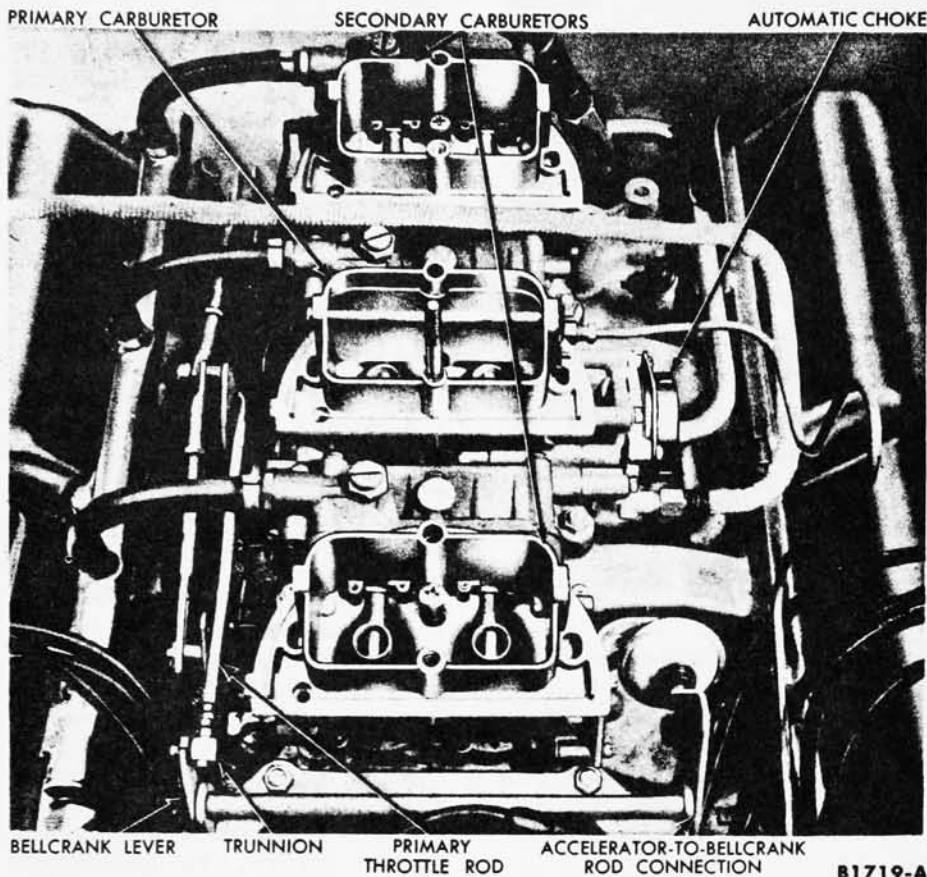


FIG. 6—390 6-V Carburetor Installation

gins to roll from the rich mixture. Turn the screws inward until the engine runs smoothly and evenly. Always favor a slightly "rich" idle fuel mixture.

5. Repeat this procedure (step 4) to adjust the idle mixture screws on the front secondary carburetor.

6. Following the same procedure, adjust the idle mixture screws on the rear secondary carburetor. **The right and left idle mixture screws on any one carburetor should be open an equal amount, within 1/8 turn, after the final adjustment.**

7. With the engine operating at idle and the transmission in Drive range, check the engine speed. The tachometer should indicate 575-600 engine rpm.

8. If the engine still does not idle properly, due to a too rich mixture, i.e., idle mixture screws are seated, it may be caused by improper initial idle speed setting of the secondary carburetors. Also, if the throttle levers are not synchronized, it will be difficult to obtain a satisfactory idle adjustment.

Idle Speed Adjustment. All engine speed and idle fuel mixture adjust-

ments must be made with the air cleaner installed and the engine at normal operating temperature.

1. Back off the idle speed adjusting screw (Fig. 5) on each secondary carburetor sufficiently to allow the throttle plates to seat in the throttle bores. Turn the idle speed screws inward until the screw end just touches the stop on the throttle lever; then turn it inward an additional 1/2 to 3/4 turns. **A minimum throttle opening is desired on the secondary throttle plates. The only requirement necessary is that the plates do not stick in the bores.**

2. Operate the engine for 30 minutes at 1200 rpm to normalize engine temperatures. Install an engine speed tachometer. Start the engine. Move the transmission selector lever to the DRIVE (D1) position, and set the parking brake. Adjust the engine idle rpm to 575-600 rpm by turning the idle speed adjusting screw on the primary carburetor only.

3. Set the fast idle speed (cold) with the engine at normal operating temperature. Align the high step on the fast idle cam with the adjusting screw (Fig. 7). Turn the screw in-

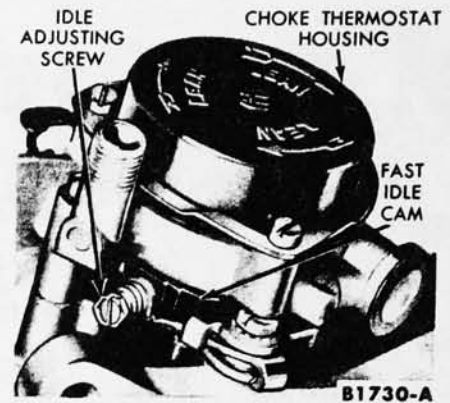


FIG. 7—Fast Idle Speed Adjustment

ward to increase or outward to decrease the idle speed to obtain the specified rpm.

Throttle Lever Synchronization. If the throttle linkage is disassembled or it is improperly synchronized, the following procedure is recommended for synchronizing the throttle levers on the three carburetors.

1. Insert a 1/8-inch diameter rod through the gauging holes (Fig. 8) provided in the bellcrank lever and mounting bracket on the left side of the bellcrank assembly. This locks the lever in the gauging (closed throttle) position.

2. Disconnect the secondary throttle rods at each secondary carburetor throttle lever (Fig. 5). Disconnect the primary throttle rod at the bellcrank lever.

3. Loosen the lock nut and adjust the length of the front secondary carburetor throttle rod so that, when installed, the throttle lever of the front secondary carburetor will be completely closed when the primary throttle lever is closed against the idle speed adjusting screw stop (normal idle position).

4. Adjust the length of the rear secondary carburetor throttle rod in the same manner.

5. Install the secondary throttle rods on the secondary throttle levers with the spacer washers and retainers. Tighten the lock nuts to secure the adjustment.

6. With the primary throttle lever against the idle stop, adjust the length of the primary throttle rod (Fig. 6), so that the trunnion will just engage in the hole in the bellcrank lever. Install the rod retainer clip.

7. Adjust the anti-stall dashpot clearance.



FIG. 8—Anti-Stall Dashpot Adjustment

Anti-Stall Dashpot Adjustment

1. Adjust the engine idle speed and idle fuel mixture, and synchronize the carburetor linkage. Operate the engine until it reaches normal operating temperature.

2. Lock the throttle linkage in the gauging position by inserting a 1/8-inch diameter rod through the gauging holes provided in the bellcrank lever and mounting bracket on the left side of the bellcrank assembly (Fig. 8).

3. Loosen the lock nut and turn the anti-stall dashpot screw in, or away from the bellcrank lever. Fully depress the dashpot plunger with a screwdriver blade, and adjust the clearance between the plunger and bellcrank lever to 1/8-3/16 inch. Tighten the locknut and remove the 1/8-inch rod from the gauge holes.

Automatic Choke Adjustment. The automatic choke has an adjustment to control its reaction to engine temperature. By loosening the three screws that retain the choke thermostat housing (Fig. 7), it can be turned to alter the thermostatic spring adjustment. Turning the housing in a counterclockwise direction provides a richer mixture, and conversely, a leaner mixture is obtained by turning the housing in a clockwise direction as indicated by the arrows on the housing. Refer to the specifications for the proper setting.

Accelerating Pump Adjustment. With the throttle lever (Fig. 9) held in the wide-open-throttle position and the accelerating pump arm fully depressed (manually), there should be 0.015-inch clearance between the screw head and the pump arm. Turn

the adjusting screw into the screw head to increase the clearance and outward to decrease the clearance. One-half turn of the screw equals approximately 0.015 inch.

To satisfy acceleration requirements in various climates, the accelerating pump cam can be placed in either of two positions. Aligning the top hole of the cam with the top hole of the throttle lever gives the shortest stroke which is recommended for warm weather or average conditions. Aligning the cam bottom hole with the lever bottom hole gives the longest stroke which is recommended for cold weather operation.

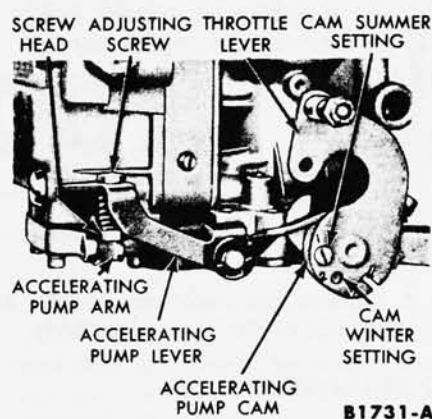


FIG. 9—Accelerating Pump Adjustment

Fuel Level Check. Position the car on a level floor. Be sure the fuel pump pressure is within specifications. Operate the engine for 30 minutes at 1200 rpm until normal operating temperature has been reached. Place a suitable container below the fuel level sight plug to collect any spill-over of fuel.

With the engine stopped, remove the fuel level sight plug and gasket and check the fuel level (Fig. 10). The fuel level within the bowl should be at the lower edge of the sight plug opening $\pm 1/16$ inch.

If the fuel level is satisfactory, install the sight plug. Do not install the air cleaner at this time.

If the fuel level is too high, drain the fuel bowl and refill it and check it again before altering the float setting. This will eliminate the possibility of foreign material causing a temporary flooding condition. To drain the fuel bowl, remove one lower retaining bolt from the fuel bowl and drain the fuel into a suitable container. Install the bolt and start the engine to fill the fuel bowl.

After the fuel level has stabilized, stop the engine and check the fuel level.

Float Adjustment

1. If the fuel level is too high, it should first be lowered below specifications and then raised until it is just at the lower edge of the sight plug opening. If the fuel level is too low, it is only necessary to raise it to the specified level; thus omit steps 3 and 4 of this procedure.

2. With the engine stopped, loosen the lock screw on top of the fuel bowl just enough to allow rotation of the adjusting nut underneath (Fig. 10). **Do not loosen the lock screw or attempt to adjust the fuel level with the engine running because the pressure in the line will spray fuel out and present a fire hazard.**

3. Turn the adjusting nut approximately $1/2$ turn in to lower the fuel level below specifications ($1/6$ turn of the adjusting nut, depending on the direction of rotation, will raise or lower the float assembly at the fuel level sight plug opening $3/64$ inch).

4. Tighten the lock screw. Start the engine. After the fuel level has stabilized, stop the engine and check the level at the sight plug opening. The fuel level should be below specified limits. If it is not, repeat step 3, turning the adjusting nut an additional amount sufficient to lower the fuel below the specified level.

5. Loosen the lock screw and turn the adjusting nut out in increments of $1/6$ turn or less until the correct fuel level is achieved. After each adjustment, tighten the lock screw, and then start the engine and stabilize the fuel level. Check the fuel level

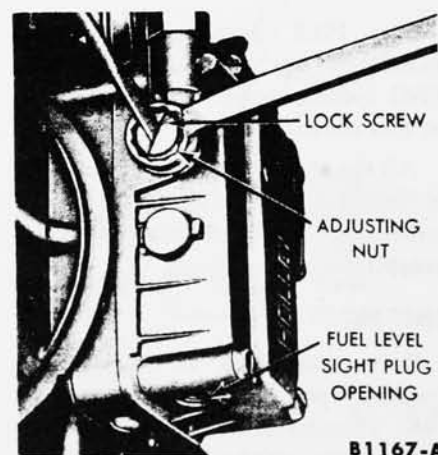


FIG. 10—Fuel Level Adjustment

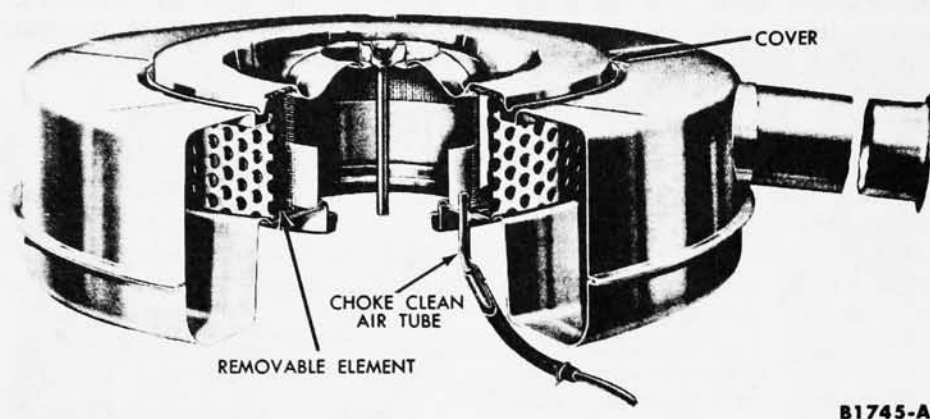


FIG. 11—Air Cleaner Assembly

at the sight plug opening. Install the sight plug and gasket.

6. Install the air cleaner. Check and adjust the idle fuel mixture and idle speed as necessary.

AIR CLEANER (Part 3-1)

The engine is equipped with a dry-type air cleaner that has a replaceable cellulose fiber filtering element (Fig. 11). The air from the engine compartment enters the air cleaner through the opening on the side and passes through the filter element. The filtered air is deflected down into the carburetor. Dust particles are trapped in the filter element as the air rushes through it. A tube attached to the filtered air chamber is connected to the automatic choke heat chamber in the right exhaust manifold to supply clean air to the automatic choke.

MAINTENANCE

Refer to Group 12 for the recom-

mended maintenance mileage interval for cleaning and replacement of air cleaner elements.

REMOVAL

1. Remove the air cleaner wing nut. Disconnect the choke clean air tube, and lift the air cleaner off the carburetor.

2. Remove the cover and lift the element out of the air cleaner body.

INSTALLATION

1. Place the air cleaner body on the carburetor so that the word "FRONT" faces the front of the car. Connect the choke clean air tube to the air cleaner.

2. Place the element in the air cleaner body. Install the cover.

FUEL PUMP (Part 3-3)

The 1963 Carter design fuel pump is basically the same as the 1962

pump except for incorporation of a horizontal cross vent system in place of the vertical passage, increased diameter internal fuel passages, and pressure leak-down bleeds in the pump valves. In addition, the pump will incorporate the long-life, disposable fuel filter element (Fig. 12).

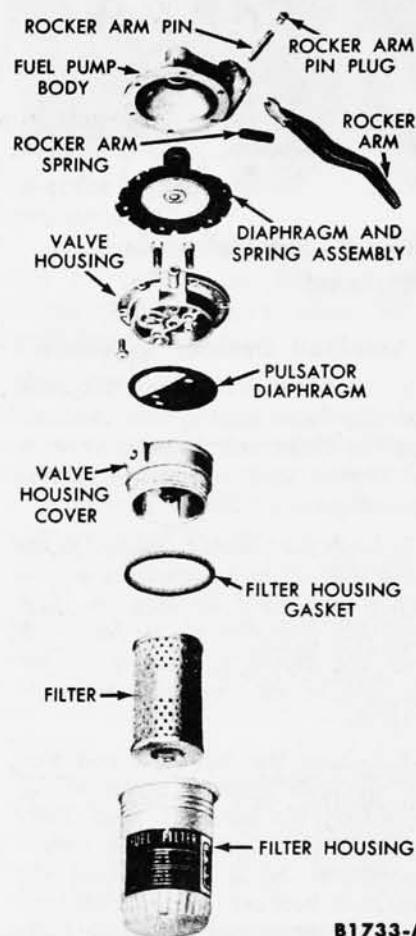


FIG. 12—Fuel Pump Assembly

GROUP 4—COOLING SYSTEM

The 1963 maintenance recommendations are in Group 12 and the 1963 specifications are in Group 13 of this manual.

All the service procedures outlined in Group 4 of the 1962 Shop Manual remain the same with the following exceptions.

THERMOSTAT

Only one type of thermostat (poppet-type) is being used in the 1963 Thunderbirds. For replacement instructions, refer to "Thermostat," page 4-4, 1962 Shop Manual.

THERMOSTAT TEST

Remove the thermostat and immerse it in boiling water. Replace the thermostat if it does not open more than 1/4 inch. If the problem being investigated is insufficient heat, the thermostat should be checked for leakage. This may be done by holding the thermostat up to a lighted background. Light leakage around the thermostat valve (thermostat at room temperature) is unacceptable and the thermostat should be replaced. It is possible, on some thermostats, that a slight leakage of light at one or two

locations on the perimeter of the valve may be detected. This should be considered normal.

FAN BELTS

REMOVAL

1. Loosen the power steering pump bracket at the water pump and remove the drive belt.

On a car with an air conditioner, remove the compressor drive belt.

2. Loosen the alternator mounting bolts and the alternator adjusting arm

bolt. Move the alternator toward the engine. Remove the belts from the alternator and crankshaft pulleys, and lift them over the fan.

INSTALLATION

1. Place the belts over the fan. In-

sert the belts in the water pump pulley, crankshaft pulley, and alternator pulley grooves. Adjust the belt tension to specifications.

2. On a car with an air conditioner, install and adjust the com-

pressor drive belt to specifications.

3. Install the power steering pump drive belt and tighten the pump bracket to the water pump. Adjust the drive belt tension to specifications.

GROUP 5—CRUISE-O-MATIC TRANSMISSION

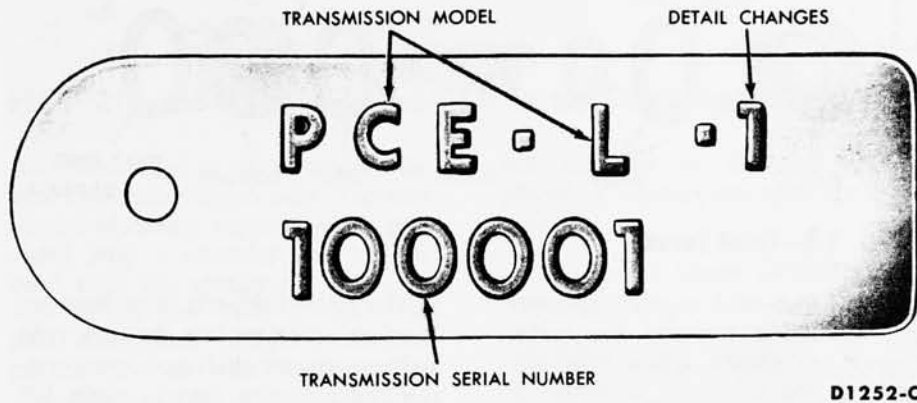


FIG. 13—Cruise-O-Matic Identification Tag

The 1963 maintenance recommendations are in Group 12 and the 1963 specifications are in Group 13 of this manual.

All of the procedures outlined in Group 5 of the 1962 Shop Manual remain the same with the following exceptions.

IDENTIFICATION TAG (Part 5-1)

The transmission identification tag (Fig. 13) is attached to the left side of the case. The first line on the tag indicates the model. The second line indicates the Serial No. and starts with 100001.

FRONT OIL PUMP SEAL (Part 5-5)

A new improved pump seal is being used in the 1963 models. The

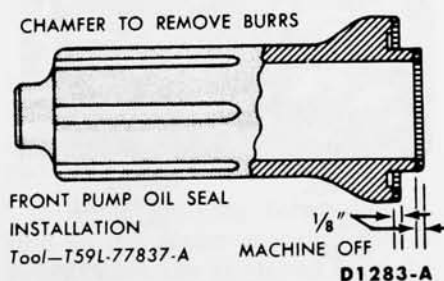


FIG. 14—Tool T59L-77837-A Rework Dimensions

new seal is 1/8-inch narrower than the seal previously used. The seal is removed and installed in the same manner as the old type except for the tool. The existing tool (T59L-77837-A) can be reworked as shown in Fig. 14 to install the narrower seal or a new tool (T63L-77837-A) is available.

NYLON-TYPE SPEEDOMETER DRIVE GEAR (Part 5-5)

A nylon speedometer drive gear replaces the steel drive gear previously used. If gear replacement is necessary, the old type steel gear may be used.

The nylon drive gear is a 0.004-0.010-inch shrink fit on the output shaft and can be removed or installed in the following manner.

1. Remove the output shaft from the transmission in the usual manner.
2. Remove the oil distributor tubes from the sleeve.
3. Remove the speedometer drive gear snap ring from the shaft.
4. Pry the oil delivery sleeve toward the rear of shaft with a hammer handle. Make certain to apply pressure on the governor counterweight, and not against the governor valve body (Fig. 15).

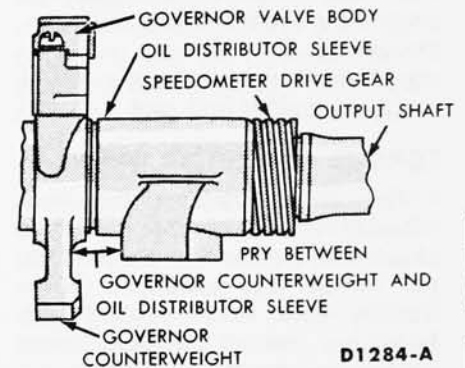


FIG. 15—Pressure Apply Point for Drive Gear Removal

5. Slide the oil delivery sleeve toward the front of the transmission.

6. Using a hammer and a small brass drift, tap the gear evenly and alternately (Fig. 16) to prevent cocking it on the shaft. Tap the gear gently to prevent damaging it.

7. To install the gear, dip it in transmission fluid and place it on an illuminated 100-watt light bulb.

8. Allow the gear to remain on the bulb for five minutes, then, turn it over and heat the other side for five minutes. This will heat the gear to approximately 180°F.

9. Make sure the lock ball is in

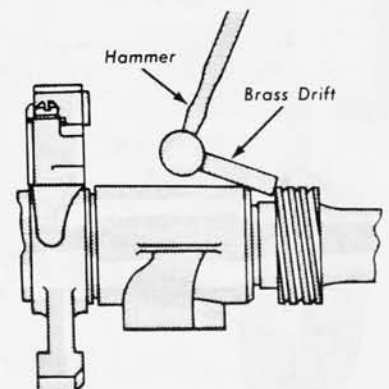


FIG. 16—Speedometer Drive Gear Removal

place on the shaft, then quickly slide the gear into place.

10. Install the speedometer drive gear snap ring on the output shaft.

11. Install the output shaft in the usual manner.

OUTPUT SHAFT THRUST WASHER (Part 5-5)

A new type needle bearing thrust washer is used in the 1963 Thunderbird transmission. A counterbore is provided in the rear pump to accommodate the thrust bearing race. Figure 17 shows the relative position of the thrust washer and race.

TORQUE CONVERTER (Part 5-6)

The 1963 converter has been modified to replace the sprag-type clutch with a roller-type clutch. Also, the bronze and aluminum thrust washers have been replaced with aluminum coated stamped thrust washers and flat steel retainers.

The design of the new thrust washers is such that a new longer locking rod (Tool T63P-7902-A) will be required for use with the existing converter clutch checking tool.

The checking procedure is the same as for previous model converters.

FRONT SERVO (Part 5-5)

The accumulator piston and related parts have been eliminated on the 1963 models. Servicing of the servo remains the same as in the 1962 manual with the exception of the eliminated parts shown in Figure 18.

CONVERTER HOUSING (Part 5-4)

To accommodate the addition of

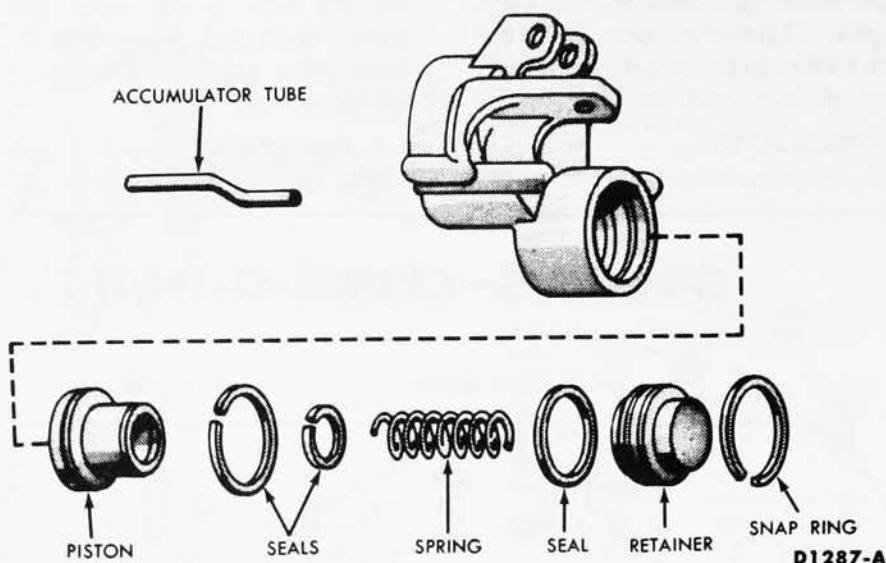


FIG. 18—Front Servo

an 0.075-inch thick engine rear cover plate mounted between the transmission and engine, a new converter housing and converter assembly is used. The new converter housing will have the starter pilot eliminated. Piloting of the starter will be accomplished by the engine rear cover plate.

The new converter assembly will have longer flywheel mounting stud pads and a longer crankshaft pilot, in order to provide adequate piloting in the crankshaft and maintain the same converter to front pump relationship.

PARKING LINKAGE (Part 5-5)

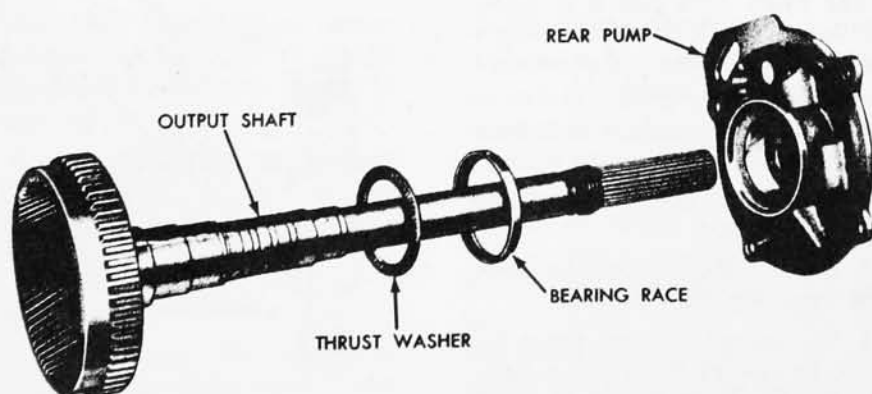
Figure 19 illustrates the new type parking pawl linkage in the transmission. The control rod incorporates a compression spring to drive the toggle lift lever into the apply position.

The following parts have been revised to accommodate the new type linkage; manual shaft and lever, control valve detent lever, toggle lift lever, torsion rod and the lift lever shaft.

PLANETARY CLUTCH (Part 5-5)

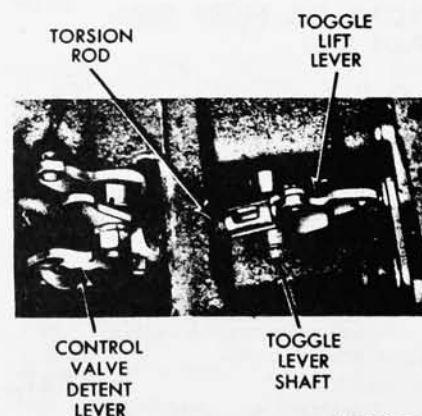
A new roller-type planetary clutch has replaced the sprag-type clutch previously used. The new roller-type clutch requires a new planet carrier with a cam-type clutch race (Fig. 20). In conjunction with the clutch and the planet carrier, a new type center support is used.

The roller clutch is installed in the same location, and functions in the same manner as the sprag-type clutch previously used. The original center support is chamfered at the rear of



D1289-A

FIG. 17—Output Shaft Thrust Washer and Race



D1290-A

FIG. 19—Parking Linkage Installed

1962 FORD

Thunderbird



SHOP MANUAL



Copyright © 2009, Forel Publishing Company, LLC, Woodbridge, Virginia

All Rights Reserved. No part of this book may be used or reproduced in any manner whatsoever without written permission of Forel Publishing Company, LLC. For information write to Forel Publishing Company, LLC, 3999 Peregrine Ridge Ct., Woodbridge, VA 22192

1962 Ford Thunderbird Shop Manual

EAN: 978-1-60371-012-1

ISBN: 1-60371-012-4

Forel Publishing Company, LLC

3999 Peregrine Ridge Ct.

Woodbridge, VA 22192

Email address: webmaster@ForelPublishing.com

Website: <http://www.ForelPublishing.com>



This publication contains material that is reproduced and distributed under a license from Ford Motor Company. No further reproduction or distribution of the Ford Motor Company material is allowed without the express written permission of Ford Motor Company.

Note from the Editor

This product was created from the original Ford Motor Company's publication. Every effort has been made to use the original scanned images, however, due to the condition of the material; some pages have been modified to remove imperfections.

Disclaimer

Although every effort was made to ensure the accuracy of this book, no representations or warranties of any kind are made concerning the accuracy, completeness or suitability of the information, either expressed or implied. As a result, the information contained within this book should be used as general information only. The author and Forel Publishing Company, LLC shall have neither liability nor responsibility to any person or entity with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the information contained in this book. Further, the publisher and author are not engaged in rendering legal or other professional services. If legal, mechanical, electrical, or other expert assistance is required, the services of a competent professional should be sought.

1962

FORD THUNDERBIRD

SHOP MANUAL

SERVICE DEPARTMENT
FORD DIVISION
 MOTOR COMPANY

FIRST PRINTING—SEPTEMBER, 1961

© 1961 FORD MOTOR COMPANY, DEARBORN, MICHIGAN

Reproduced under License #5008 from Ford Motor Company January 2006

INDEX

GROUP

THUNDERBIRD IDENTIFICATION

ENGINE AND EXHAUST SYSTEM

1

IGNITION SYSTEM

2

FUEL SYSTEM

3

COOLING SYSTEM

4

CRUISE-O-MATIC TRANSMISSION

5

REAR AXLE AND DRIVE LINE

6

STEERING

7

BRAKES AND SUSPENSION

8

GENERATING AND STARTING
SYSTEMS

9

LIGHTS, INSTRUMENTS, AND
ACCESSORIES

10

BODY

11

MAINTENANCE, LUBRICATION,
AND SPECIAL TOOLS

12

INDEX

SPECIFICATIONS AT THE END OF EACH GROUP

FOREWORD

This manual provides information for the proper servicing of the 1962 Thunderbird. The descriptions and specifications contained in this manual were in effect at the time the manual was approved for printing. The Ford Division of Ford Motor Company reserves the right to discontinue models at any time, or change specifications or design, without notice and without incurring obligation.

**SERVICE DEPARTMENT
FORD DIVISION
FORD MOTOR COMPANY**

THUNDERBIRD IDENTIFICATION

BODY COLOR		TRIM		DATE		D.S.O.		AXLE		TRANS.	
83A		J		85 9H				1		4	
SERIAL NUMBER						MADE IN U.S.A. BY		REG. U.S. PAT. OFF.			
2Y71Z100001						Ford					
THIS VEHICLE IS CONSTRUCTED UNDER UNITED STATES LETTER PATENTS											
2590719		2617681		2631694		2677572		2677574		2683578	
2698012		2726894		2782722		2784363		2789621		2810447	
OTHER PATENTS PENDING											

M1072-A

FIG. 1—Thunderbird Patent Plate

Fig. 1 illustrates a Thunderbird patent plate and its elements. The patent plate is attached to the left door front pillar.

VEHICLE DATA

Example (Fig. 1):

63A	J	85	9H	1	4
63A	Tudor Hardtop				
J	Red				
85	Red Leather				
9H	Ninth day of August				
1	3.00:1 Axle Ratio				
4	Cruise-O-Matic				

BODY

63A	Tudor Hardtop
76A	Tudor Convertible

COLOR

If a special paint is used, the paint color space will not be stamped.

Code	Number	Color	Sales Name
A	1724	Black	Raven Black
D	1070	Med. Turquoise Metallic	Patrician Green
E	1269	Med. Blue Metallic	Acapulco Blue
F	1226	Lt. Blue	Skymist Blue
G	1446	Silver Blue Metallic	Silver Mink
H	1544	Dark Blue Metallic	Caspian Blue
J	1515	Red	Rangoon Red
K	1452	Lt. Turquoise	Chalfonte Blue
L	1458	Pink	Sahara Rose
M	1238	White	Corinthian White
N	921	Diamond Blue	Diamond Blue
R	1456	Yellow	Tucson Yellow
T	1543	Lt. Beige	Sandshell Beige
U	1450	Dark Turquoise Metallic	Deep Sea Blue
V	1470	Chestnut Metallic	Chestnut
X	1444	Maroon Metallic	Heritage Burgundy
Z	1427	Beige Metallic	Fieldstone Tan

TRIM

Deviation trim sets will use existing trim codes plus a suffix. A trim code with a numerical suffix is not serviced, while a trim code with an alphabetical suffix is serviced.

Code	Color and Material
50	Lt. Silver Blue Met. Vinyl
52	Light Blue Metallic Vinyl
54	Lt. Pearl Beige Vinyl
55	Red Vinyl
56	Black Vinyl
57	Light Turquoise Metallic Vinyl
59	Med. Chestnut Vinyl
70	Lt. Silver Blue Met. Vinyl & Med. Silver Blue Bedford Cloth
72	Lt. Blue Met. Vinyl & Med. Blue Bedford Cloth
74	Lt. Pearl Beige Vinyl & Med. Beige Bedford Cloth
76	Black Vinyl & Med. Gray Bedford Cloth
77	Lt. Turquoise Met. Vinyl & Med. Turquoise Bedford Cloth
80	Lt. Silver Blue Met. Leather
82	Med. Blue Leather
84	Lt. Pearlescent Beige Leather
85	Red Leather
86	Black Leather
87	Lt. Turquoise Metallic Leather
89	Med. Chestnut Metallic Leather

DATE

The code letters for the month are preceded by a numeral to show the day of the month when the Thunderbird was completed. The second year code letters are to be used if 1962 model production exceeds 12 months.

Month	First Model Year	Second Model Year
January	A	N
February	B	P
March	C	Q
April	D	R
May	E	S
June	F	T
July	G	U
August	H	V
September	J	W
October	K	X
November	L	Y
December	M	Z

DSO

Thunderbirds built to a Domestic Special Order, Foreign Special Order, or Pre-Approved Order have the complete order number recorded in this space. If the unit is regular production, this space will remain blank.

AXLE

Code	Ratio
1	3.00:1
A*	3.00:1

*Equa-Lock type.

TRANSMISSION

Code	Type
4	Cruise-O-Matic

SERIAL NUMBER

Example (Fig. 1): 2Y83Z100001

2	1962 Model
Y	Wixom Assembly Plant
83	Tudor Hardtop
Z	8-Cylinder 390 Cubic Inch Engine
100001	First Unit Built

MODEL YEAR

The number "2" designates 1962.

ASSEMBLY PLANT

Code	Location
Y	Wixom Assembly Plant
S	Pilot Plant

MODEL

Code	Type
83	Tudor Hardtop
85	Tudor Convertible

ENGINE

Code	Type
R	8-Cylinder 390 Cubic Inch (4-barrel Low Compression Export, 84 Octane)
Z	8-Cylinder 390 Cubic Inch (4-barrel)

CONSECUTIVE UNIT NUMBER

The assembly plant, with each model year, begins with consecutive unit number 100001 and continues on for each unit built.

1962 FORD THUNDERBIRD SHOP MANUAL

GROUP I

ENGINE AND EXHAUST SYSTEM

	PAGE
PART 1-1 ENGINE	1- 2
PART 1-2 EXHAUST SYSTEM	1-41
PART 1-3 SPECIFICATIONS	1-43

PART

1-1

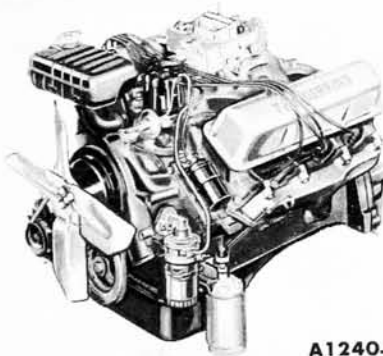
ENGINE

Section	Page
1 Description.....	1-2
2 Engine Trouble Diagnosis..	1-6
3 Engine Tests and Adjustments.....	1-12
4 Engine Removal and Installation.....	1-13
5 In-Chassis Repair Operations.....	1-15
Engine Supports.....	1-15
Valve Rocker Arm Shaft Assembly.....	1-15

Section	Page
5 In-Chassis Repair Operations (Continued)	
Intake Manifold.....	1-17
Exhaust Manifold.....	1-18
Positive Crankcase Ventilation System.....	1-19
Cylinder Heads and Valves.....	1-19
Valve Stem Seal Replacement.....	1-22
Cylinder Front Cover and Timing Chain.....	1-23
Camshaft.....	1-25

Section	Page
5 In-Chassis Repair Operations (Continued)	
Camshaft Rear Bearing Bore Plug Replacement..	1-26
Hydraulic Valve Lifter Replacement.....	1-26
Crankshaft Lower Rear Oil Seal Replacement....	1-27
Main and Connecting Rod Bearing Replacement	1-28
Piston and Connecting Rod Assembly.....	1-28
Flywheel.....	1-32
Oil Filter Replacement...	1-32
Oil Pan and Oil Pump...	1-32
6 Work Stand Repair Operations.....	1-34
Crankshaft.....	1-34
Camshaft Bearing Replacement.....	1-36
Engine Disassembly....	1-36
Cylinder Block.....	1-38
Engine Assembly.....	1-38
7 Crankcase Ventilation System Maintenance.....	1-40

1 DESCRIPTION



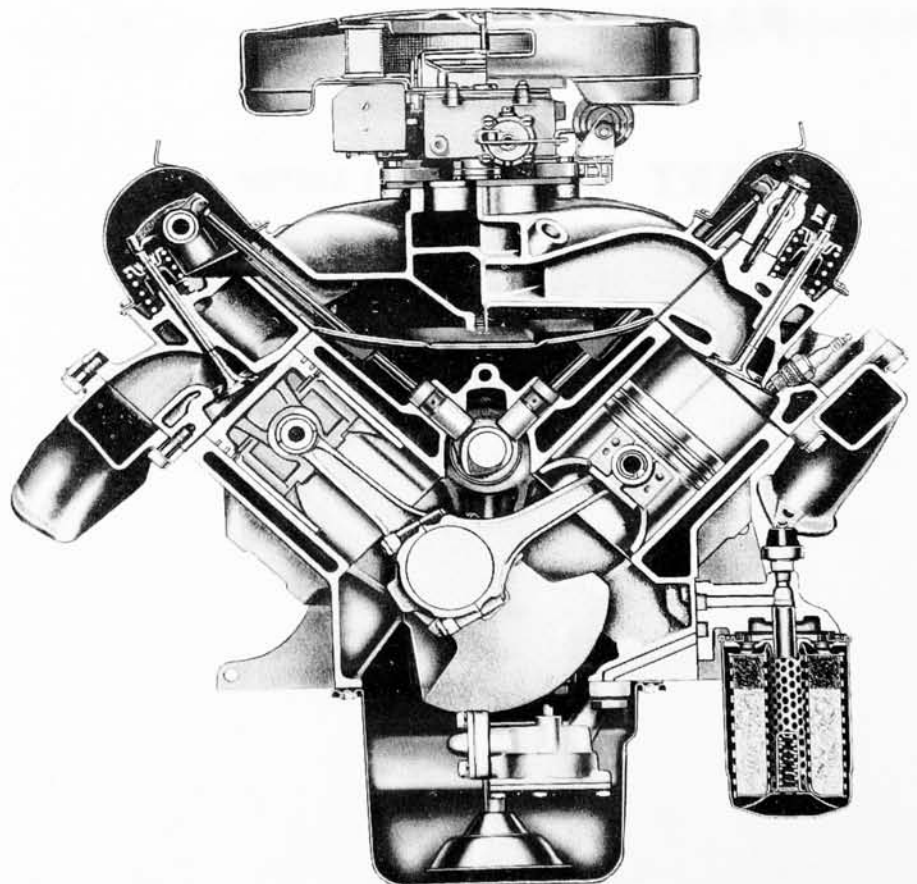
A1240-C

FIG. 1—Thunderbird 390 Special V-8 Engine

The Thunderbird 390 Special V-8 engine (Figs. 1 and 2) has a 4.05-inch bore and a 3.78-inch stroke and a total piston displacement of 390 cubic inches. It has a compression ratio of 9.6:1. The patent plate symbol for the engine is "Z."

MANIFOLDS

An engine coolant heated spacer is located between the carburetor and the intake manifold (Fig. 3). The coolant flows from the front of the engine through the spacer inlet hose and into the carburetor coolant spacer. The coolant circulates through the spacer and flows into the heater inlet hose and into the heater. Ex-



A1241-C

FIG. 2—Sectional View 390 Special V-8 Engine

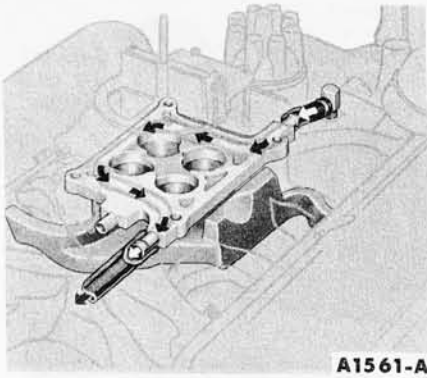


FIG. 3—Intake Manifold Coolant Passages

haust gases provide the initial heat necessary to assist in vaporizing the incoming fuel mixture.

The intake manifold has two sets of fuel passages, each with its own separate inlet connection to the carburetor (Fig. 4). The right barrels of the carburetor feed Nos. 1, 4, 6, and 7 cylinders and the left barrels feed Nos. 2, 3, 5, and 8 cylinders.

The distributor is mounted at the left front of the intake manifold.

Warm air for the automatic choke is drawn from the heat chamber of the right exhaust manifold (Fig. 5).

CYLINDER HEADS

The cylinder head assemblies contain the valves and the valve rocker arm shaft assembly. The combustion chambers are machined in the head. Valve guides are an integral part of the head. The valves are arranged from front to rear on both banks E-I-E-I-E-I-E (Fig. 6).

CYLINDER BLOCK

The cylinders are numbered from front to rear, on the right bank 1, 2,

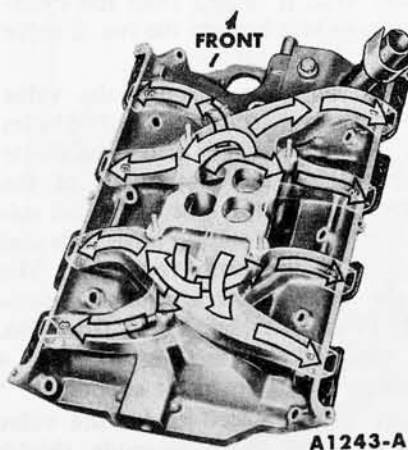


FIG. 4—Intake Manifold Fuel Passages

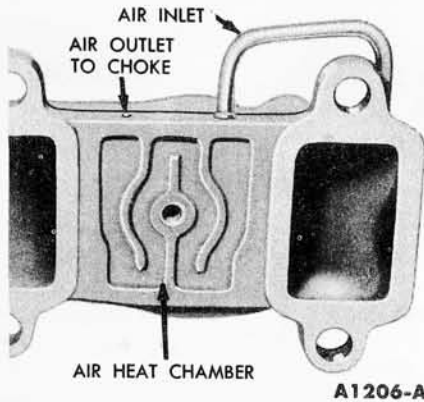


FIG. 5—Automatic Choke Heat Chamber

3 and 4 and on the left bank 5, 6, 7 and 8. The firing order is 1-5-4-2-6-3-7-8.

The oil pump, mounted inside the oil pan at the front, is driven by the distributor through an intermediate drive shaft.

The crankshaft is supported by five main bearings. Crankshaft end thrust is controlled by the flanges of the No. 3 main bearing.

The pistons have two compression rings and one oil control ring. The top compression ring is chrome-plated and the lower compression ring is phosphate-coated. The oil control ring assembly consists of a serrated spring and two chrome-plated steel rails.

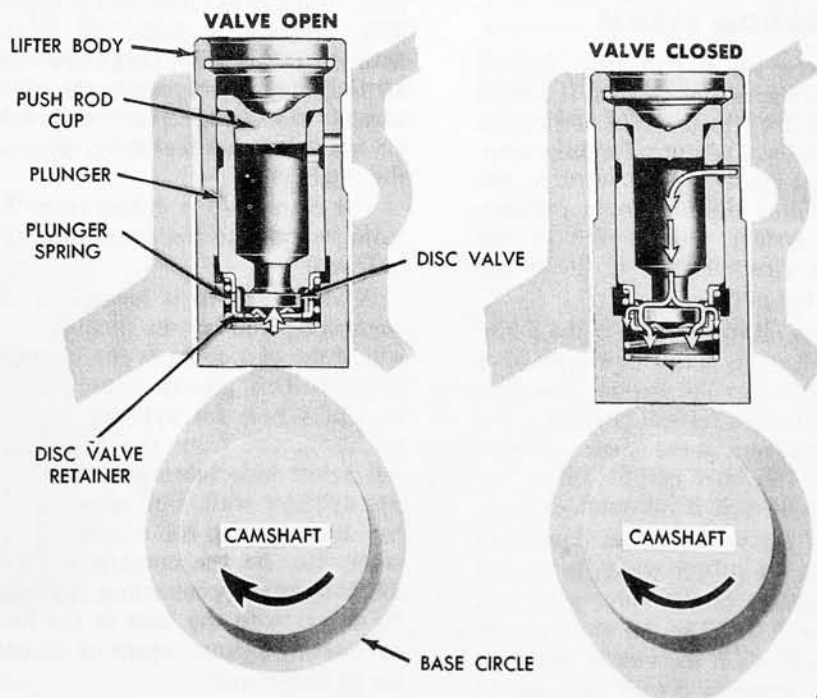


FIG. 7—Typical Hydraulic Valve Lifter Operation



FIG. 6—Valve Port Arrangement

VALVE TRAIN

The intake and exhaust valve assemblies are the rotating-type which rotate each time the valve opens and closes.

The push rods are solid steel with oil cushioned sockets.

The camshaft is supported by five bearings pressed into the block. It is driven by a sprocket and timing chain in mesh with a sprocket on the crankshaft. Camshaft end play is controlled by a thrust button and spring located between the camshaft sprocket bolt and the cylinder front cover. An eccentric, bolted to the front end of the camshaft, operates the fuel pump.

Hydraulic valve lifters are used which provide zero valve lash. The operation and parts identification of the hydraulic valve lifters are shown in Fig. 7.

When the valve is closed, the lifter assembly is on the base circle of the camshaft lobe and the valve push rod is in its lowest position. With the lifter assembly in this position, the plunger spring expands forcing the plunger upward. This action is trans-

A1245-A

mitted to the valve rocker arm via the valve push rod until there is solid contact between the valve and the valve end of the valve rocker arm (zero valve lash). In this position, the oil hole in the lifter and plunger is indexed with the lifter oil gallery and oil is forced under pressure into the plunger. This creates a pressure differential above and below the valve disc. The high pressure above the valve disc forces the valve disc open and the oil fills the area below the plunger, equalizing the pressure on each side of the valve disc.

Whenever clearance between the valve and the valve rocker arm tends to be present, the plunger spring expands pushing the plunger until there is solid contact between all parts of the valve train mechanism.

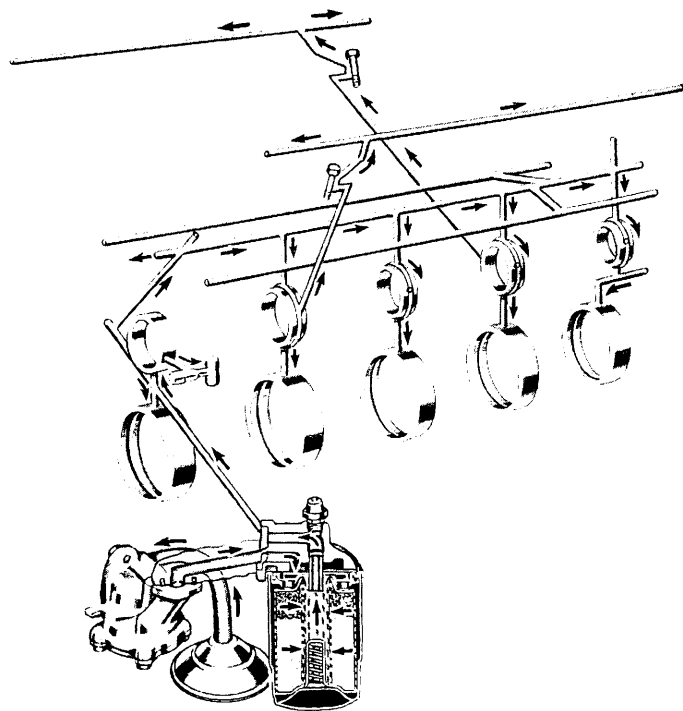
As the camshaft rotates (valve opening), the valve lifter is raised and the sudden increase in oil pressure below the plunger forces the valve disc closed and the lifter becomes a hydraulic ram. During this period, a slight leakage of oil from below the plunger occurs. As the high point on the camshaft lobe rotates past the lifter, the push rod forces the valve lifter down and re-seats the valve. The pressure on the oil below the plunger is relieved and the valve disc opens so that the chamber can again be filled. This cycle is repeated for each revolution of the camshaft.

LUBRICATION SYSTEM

Oil from the oil pan sump, located in the front of the oil pan, is forced through the pressure-type lubrication system (Fig. 8) by a rotor oil pump. A spring-loaded relief valve in the pump limits the maximum pressure of the system. Oil relieved by the valve is directed back to the intake side of the pump.

All the oil discharged by the pump passes through a full flow-type filter before it enters the engine. The filter is mounted in a vertical position at the lower left front of the engine. A relief valve in the filter permits oil to bypass the filter if it becomes clogged.

From the filter, the oil flows into the main oil gallery which is located in the center of the valve push rod chamber floor. The oil gallery supplies oil to each individual camshaft bearing, through drilled passages in the block. Passages are drilled from each camshaft bearing to each main



A1246-A

FIG. 8—Lubrication System

bearing. No. 1 camshaft bearing feeds No. 1 main bearing, and No. 2 camshaft bearing feeds No. 2 main bearing, etc. The oil then flows through notches or grooves in the main bearings to lubricate the crankshaft journals. A jiggle pin in the main oil gallery front plug allows any air that may be trapped in the oil to escape. The timing chain and sprockets are splash lubricated by oil from the jiggle pin.

The crankshaft is drilled from the main bearings to the connecting rod bearings.

A small groove is located in the connecting rod at the mating face where the cap contacts the connecting rod. This groove is used as an oil squirt hole for cylinder wall lubrication. Oil from the connecting rod squirt hole lubricates the opposite cylinder wall. For example, the No. 1 connecting rod oils No. 5 cylinder, etc. As the crankshaft turns, the hole in the connecting rod bearing aligns with the hole in the journal causing a direct squirt of oil onto the cylinder wall.

Oil passages are drilled from the main oil gallery to each valve lifter

oil gallery. Oil from here feeds the valve lifter assemblies. A reservoir at each valve lifter bore boss traps oil so that oil is available for valve lifter lubrication as soon as the engine starts.

An oil passage is drilled from No. 2 camshaft bearing web to the left cylinder head between Nos. 5 and 6 cylinders to lubricate the valve rocker arm shaft assembly (Fig. 9). The oil passage in the cylinder head is drilled from the cylinder head bolt bore to the No. 2 valve rocker arm shaft support.

The oil flows through the valve rocker arm shaft through drilled holes in each valve rocker arm to lubricate the bushing and both ends of the valve rocker arm. The excess oil spirals down the rotating push rods and lubricates the push rod seats. The right valve rocker arm shaft assembly is similarly lubricated from No. 4 camshaft bearing via the No. 4 valve rocker arm shaft support.

A baffle located under the valve rocker arm shaft assembly shields the valve stems from oil splash. Excess oil is returned to the oil pan through drain-back holes located at each end

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

ENGINE CRANKS NORMALLY, BUT WILL NOT START (Continued)	To determine if the cause of the trouble is in the primary or the secondary circuit, remove the coil high tension lead from the top of the distributor and hold it approximately $\frac{3}{16}$ inch from the cylinder head. With the ignition on, crank the engine and check for a spark. If the spark at the coil high tension lead is good, the cause of the trouble is probably in the distributor cap or rotor. If there is no spark or a weak spark at the coil high tension lead, the cause of the trouble is probably in the primary circuit, coil to distributor high tension lead, or the coil. IF THERE IS A GOOD SPARK AT THE SPARK PLUGS Check the spark plugs. If the spark plugs are not at fault, check the following items: AUTOMATIC CHOKE Check the position of the choke plate. If the engine is hot, the plate should be open. If the plate is not open, the engine will load up due to the excessively rich mixture and will not start. If the engine is cold, the plate should be closed. If the plate is not operating properly, check the following items: The choke linkage for binding.	The fast idle cam for binding. Thermostatic spring housing adjustment. FUEL SUPPLY AT THE CARBURETOR Work the throttle by hand several times. Each time the throttle is actuated, fuel should spurt from the accelerating pump discharge nozzles. If fuel is discharged by the accelerating pump, the engine is probably flooded, or there is water in the fuel system, or an engine mechanical item is at fault. If fuel is not discharged by the accelerating pump, disconnect the carburetor fuel inlet line at the carburetor. Use a suitable container to catch the fuel. Crank the engine to see if fuel is reaching the carburetor. If fuel is not reaching the carburetor, check: - The fuel filter. - The fuel pump. - The carburetor fuel inlet line for obstructions. - The fuel pump flexible inlet line for a collapsed condition. - The fuel tank line for obstructions. - The fuel tank vent. If fuel is reaching the carburetor, check: - The fuel inlet system including the fuel inlet needle and seat assembly, and the float assembly.
ENGINE STARTS, BUT FAILS TO KEEP RUNNING	FUEL SYSTEM - Idle fuel mixture needles not properly adjusted. - Engine idle speed set too low. - The choke not operating properly. - Float setting incorrect. - Fuel inlet system not operating properly. - Dirt or water in fuel lines or in the fuel filter.	- Carburetor icing. - Fuel pump defective. - Dirt in the carburetor, not allowing fuel to enter or be discharged from the idle system. IGNITION SYSTEM - Leakage in the high tension wiring.
ENGINE RUNS, BUT MISSES	Determine if the miss is steady or erratic and at what speed the miss occurs by operating the engine at various speeds under load. MISSES STEADILY AT ALL SPEEDS Isolate the miss by operating the engine with one cylinder not firing. This is done by operating the engine with the ignition wire removed from one spark plug at a time, until all	cylinders have been checked. Ground the spark plug wire removed. If the engine speed changes when a particular cylinder is shorted out, that cylinder was delivering power before being shorted out. If no change in the engine operation is evident, the miss was caused by that cylinder not delivering power before being shorted out. In this case, check the: IGNITION SYSTEM If the miss is isolated in a particu-

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

ENGINE RUNS, BUT MISSES (Continued)	lar cylinder, perform a spark test on the ignition lead of that cylinder. If a good spark does not occur, the trouble is in the secondary circuit of the system. Check the spark plug wire and the distributor cap. If a good spark occurs, check the spark plug. If the spark plug is not at fault, a mechanical component of the engine is probably at fault. ENGINE Perform a compression test to determine which mechanical component of the engine is at fault. MISSES ERRATICALLY AT ALL SPEEDS EXHAUST SYSTEM Exhaust system restricted. IGNITION SYSTEM Defective breaker points, condenser, secondary wiring, coil, or spark plugs. High tension leakage across the coil, rotor, or distributor cap. FUEL SYSTEM Float setting incorrect. Fuel inlet system not operating properly. Dirt or water in fuel lines or carburetor. Restricted fuel filter. COOLING SYSTEM Check the cooling system for in-	ternal leakage and/or for a condition that prevents the engine from reaching normal operating temperature. ENGINE Perform a compression test to determine which mechanical component of the engine is at fault. MISSES AT IDLE ONLY FUEL SYSTEM Idle fuel mixture needles not properly adjusted. IGNITION SYSTEM Excessive play in the distributor shaft. Worn distributor cam. ENGINE Perform a compression test to determine which mechanical component of the engine is at fault. MISSES AT HIGH SPEED ONLY FUEL SYSTEM Power valve clogged or damaged. Low or erratic fuel pump pressure. Fuel inlet system not operating properly. Restricted fuel filter. COOLING SYSTEM Engine overheating.
ROUGH ENGINE IDLE	FUEL SYSTEM Engine idle speed set too low. Idle fuel mixture needles not properly adjusted. Idle compensator malfunction. Float setting incorrect. Air leaks between the carburetor, spacer, and the manifold and/or fittings. Power valve leaking fuel. Idle fuel system air bleeds or fuel passages restricted. Fuel bleeding from the accelerating pump discharge nozzles. Secondary throttle plates not closing. Improper secondary throttle plate stop adjustment. Leaking fuel pump, lines, or fittings.	IGNITION SYSTEM Improperly adjusted or defective breaker points. Fouled or improperly adjusted spark plugs. Incorrect ignition timing. Spark plug misfiring. ENGINE Loose engine mounting bolts or worn insulator. Cylinder head bolts not properly torqued. Crankcase ventilation regulator valve defective or a restricted exhaust tube.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

POOR ACCELERATION	IGNITION SYSTEM Incorrect ignition timing. Fouled or improperly adjusted spark plugs. Improperly adjusted or defective breaker points. Distributor not advancing properly. FUEL SYSTEM Inoperative accelerating pump inlet ball check. Inoperative accelerating pump discharge ball check. Accelerating pump diaphragm defective. Float setting incorrect. Throttle linkage not properly adjusted. Accelerating pump stroke not properly adjusted. Leaky power valve, gaskets, or accelerating pump diaphragm. Dirt or corrosion in accelerating system. Distributor vacuum passages in the carburetor blocked. Restricted fuel filter. BRAKES Improper adjustment. TRANSMISSION Improper band adjustment. Converter One-Way Clutch.
ENGINE DOES NOT DEVELOP FULL POWER, OR HAS POOR HIGH SPEED PERFORMANCE	FUEL SYSTEM Restricted air cleaner. Restricted fuel filter. Clogged or undersize main jets and/or low float setting. Clogged or undersize secondary jets. Power valve clogged or damaged. Secondary throttle plates not opening. Fuel pump pressure incorrect. Distributor vacuum passage in the carburetor blocked. IGNITION SYSTEM Ignition timing not properly adjusted. Defective coil, condenser, or rotor. Distributor not advancing properly. Excessive play in the distributor shaft. Distributor cam worn. Fouled or improperly adjusted spark plugs. Improperly adjusted or defective breaker points. COOLING SYSTEM Thermostat inoperative or incorrect heat range. Check the cooling system for internal leakage and/or for a condition that prevents the engine from reaching normal operating temperature. EXHAUST SYSTEM Restriction in system. ENGINE Perform an engine compression test to determine which mechanical component is at fault. One or more camshaft lobes worn beyond wear limit. TRANSMISSION Improper band adjustment.

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

EXCESSIVE FUEL CONSUMPTION	Determine the actual fuel consumption with test equipment installed in the car. If the test indicates that the fuel consumption is not excessive, demonstrate to the owner how improper driving habits will affect fuel consumption. If the test indicates that the fuel consumption is excessive, make a preliminary check of the following items before proceeding to the fuel and ignition systems. PRELIMINARY CHECKS CHASSIS ITEMS Check: Tires for proper pressure. Front wheel alignment. Brake adjustment. EXHAUST SYSTEM System restricted. ODOMETER Check calibration. IGNITION SYSTEM Check: Distributor breaker points. Ignition timing. ENGINE Crankcase ventilation regulator valve defective or restricted exhaust tube.	FINAL CHECKS FUEL SYSTEM Check: Fuel pump pressure. Engine idle speed. Idle fuel mixture needles for proper adjustment. Automatic choke for proper operation. Fast idle speed screw for proper adjustment. Accelerating pump stroke adjustment. Anti-stall dashpot for proper adjustment. Air cleaner for restrictions. Float setting. Jets for wear and/or damage. Power valve operation. Air bleeds for obstructions. Accelerating pump discharge nozzles for siphoning. Accelerator linkage for binds. Choke adjustment. IGNITION SYSTEM Check: Spark plug condition and adjustment. Distributor spark advance operation. ENGINE Perform an engine compression test to determine which mechanical component of the engine is at fault. COOLING SYSTEM Check thermostat operation and heat range. TRANSMISSION Check band adjustment.
ENGINE OVERHEATS	TEMPERATURE SENDING UNIT AND GAUGE Unit or gauge defective (not indicating correct temperature), or constant voltage regulator defective. ENGINE Cylinder head bolts not properly torqued.	Low oil level or incorrect viscosity oil used. COOLING SYSTEM Insufficient coolant. Cooling system leaks. Drive belt tension incorrect. Radiator fins obstructed.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

ENGINE OVERHEATS (Continued)	Thermostat defective. Thermostat improperly installed. Cooling system passages blocked. Water pump inoperative.	Faulty fan drive. IGNITION SYSTEM Incorrect ignition timing.
LOSS OF COOLANT	COOLING SYSTEM Leaking radiator. Loose or damaged hose connections. Water pump leaking. Radiator cap defective. Overheating. ENGINE Cylinder head gasket defective.	Intake manifold to cylinder head gasket defective. Cylinder head or intake manifold bolts not properly torqued. Cylinder block core plugs leaking. Temperature sending unit leaking. Cracked cylinder head or block, or warped cylinder head or block gasket surface.
ENGINE FAILS TO REACH NORMAL OPERATING TEMPERATURE	TEMPERATURE SENDING UNIT AND GAUGE Unit or gauge defective (not indicating correct temperature) or constant voltage regulator defective.	COOLING SYSTEM Thermostat inoperative or of incorrect heat range.
NOISY HYDRAULIC VALVE LIFTER	A noisy valve lifter can be located by operating the engine at idle speed and placing a finger on the face of the valve spring retainer. If the lifter is not functioning properly, a shock will be felt when the valve seats. Another method of identifying a noisy lifter is by the use of a piece of hose. With the engine operating at idle speed, place one end of the hose near the end of the valve stem and the other end to the ear and listen for a metallic noise. Repeat this procedure on each intake and exhaust valve until the noisy lifter(s) has been located. The most common causes of hydraulic valve lifter troubles are dirt, gum, varnish, carbon deposits, and air bubbles. Dirt in the lifter assembly can prevent the disc valve from seating, or it may become lodged between the plunger and body surfaces. In either case, the lifter becomes inoperative due to failure to "pump-up," or because the internal parts are no	longer free to function properly. When dirt is found to be responsible for lifter malfunction, remove the lifter assembly and thoroughly clean it. Recommended engine oil and filter change intervals should be followed to minimize lifter problems caused by dirt. Deposits of gum and varnish cause similar conditions to exist which may result in lifter malfunction. If these conditions are found to be present, the lifter should be disassembled and cleaned in solvent to remove all traces of deposits. Air bubbles in the lubricating oil, caused by an excessively high or low oil level, may likewise cause lifter malfunction. A damaged oil pick-up tube may allow air to be drawn into the lubricating system. To check for the presence of air, remove a valve rocker arm cover and note the condition of the oil as it flows from the valve rocker arm shaft assembly. Perform corrective action as required to remove air from the lubricating oil.

3 ENGINE TESTS AND ADJUSTMENTS

CAMSHAFT LOBE LIFT

1. Remove the air cleaner and the valve rocker arm cover. Remove the valve rocker arm shaft assembly and install a solid tappet-type push rod in the push rod bore of the camshaft lobe to be checked.

2. Make sure the push rod is in the lifter push rod cup. Install a dial indicator in such a manner as to have the actuating point of the indicator in the push rod socket and in the same plane as the push rod movement (Fig. 13).

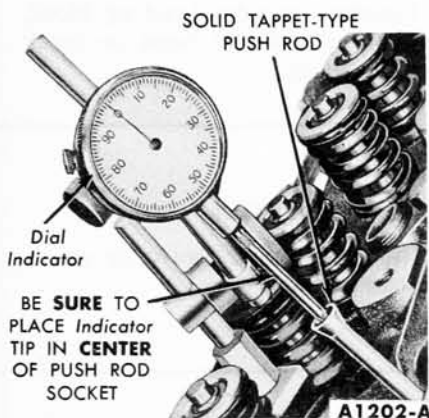


FIG. 13—Camshaft Lobe Lift

3. Turn the crankshaft damper slowly in the direction of rotation until the lifter is on the base circle of the camshaft lobe. At this point, the push rod will be in its lowest position.

4. Zero the dial indicator.

5. Continue to rotate the damper slowly until the push rod is in the fully raised position.

6. Compare the total lift recorded on the indicator with specifications.

7. To check on the accuracy of the original indicator reading, continue to rotate the crankshaft until the indicator reads zero.

8. Remove the dial indicator.

9. Install the valve rocker arm shaft. Install the rocker arm cover and the air cleaner.

VALVE CLEARANCE

A 0.060-inch shorter push rod (color coded white) or a 0.060-inch longer push rod (color coded yellow) are available for service to provide a means of compensating for dimensional changes in the valve

mechanism. Valve stem to valve rocker arm clearance should be 0.078-0.218 inch with the hydraulic lifter completely collapsed. Repeated valve reconditioning operations (valve and/or valve seat refacing) will decrease this clearance to the point that if not compensated for, the hydraulic valve lifter will cease to function.

To determine whether a shorter or a longer push rod is necessary, make the following check:

1. Position the crankshaft as outlined in steps 5 and 6.

2. Position the hydraulic lifter compressor tool on the rocker arm and slowly apply pressure to bleed down the hydraulic lifter until the plunger is completely bottomed (Fig. 14). Hold the lifter in the fully collapsed position.

3. Insert the correct end of the clearance gauge between the valve stem and the rocker arm of the valve being checked.

4. If the first step of the gauge enters, a standard length push rod may be used.

If the first step of the gauge does not enter, replace the standard push rod with a 0.060-inch shorter service push rod.

If the second step of the gauge enters, the operating range of the lifter is excessive. This indicates that the incorrect push rod has been installed or severe wear has occurred at the push rod ends, rocker arm, or valve stem. In this case, it will be necessary to determine the area of discrepancy and the incorrect or defective part(s) should be replaced.

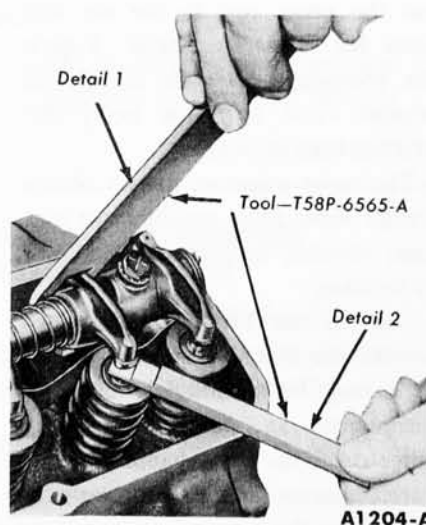


FIG. 14—Valve Clearance

If all the valve train components except the push rod are within limits, install a 0.060-inch longer push rod.

5. Rotate the crankshaft until No. 1 piston is on TDC at the end of the compression stroke. With No. 1 piston on TDC, check the following valves:

No. 1 Intake	No. 1 Exhaust
No. 3 Intake	No. 4 Exhaust
No. 7 Intake	No. 5 Exhaust
No. 8 Intake	No. 8 Exhaust

6. Position No. 6 piston on TDC and check the following valves:

No. 2 Intake	No. 2 Exhaust
No. 4 Intake	No. 3 Exhaust
No. 5 Intake	No. 6 Exhaust
No. 6 Intake	No. 7 Exhaust

When compressing the valve spring to remove push rods, be sure the piston in the individual cylinder is below TDC to avoid contact between the valve and the piston.

To replace a push rod, it will be necessary to remove the valve rocker arm shaft assembly.

Upon replacement of a valve push rod and/or valve rocker arm shaft assembly, the engine should not be cranked or rotated until the hydraulic lifters have had an opportunity to leak down to their normal operating position. The leak-down rate can be accelerated by using the tool shown in Fig. 14 on the valve rocker arm and applying pressure in a direction to collapse the lifter.

MANIFOLD VACUUM TEST

A manifold vacuum test aids in determining the condition of an engine and also in helping to locate the cause of poor engine performance. To test manifold vacuum:

1. Operate the engine for a minimum of 30 minutes at 1200 rpm.

2. Install an accurate, sensitive vacuum gauge in the fitting in the intake manifold.

3. Operate the engine at recommended idle rpm, with the transmission selector lever in neutral.

4. Check the vacuum reading on the gauge.

TEST CONCLUSIONS

Manifold vacuum is affected by carburetor adjustment, valve timing, the condition of the valves, cylinder

compression, and leakage of the manifold, carburetor, carburetor spacer, or cylinder head gaskets.

Because abnormal gauge readings may indicate that more than one of the above factors is at fault, exercise caution in analyzing an abnormal reading. For example, if the vacuum is low, the correction of one item may increase the vacuum enough to indicate that the trouble has been corrected. It is important, therefore, that each cause of an abnormal reading be investigated and further tests conducted where necessary in order to arrive at the correct diagnosis of the trouble.

Table 2 lists various types of readings and their possible causes.

Allowance should be made for the effect of altitude on the gauge reading. The engine vacuum will decrease with an increase in altitude.

COMPRESSION TEST

1. Be sure the battery is properly charged. Operate the engine for a minimum of 30 minutes at 1200 rpm. Turn the ignition switch off, then remove all the spark plugs. Remove the coil high tension lead at the distributor cap.

2. Set the primary throttle plates and choke plate in the wide open position.

3. Install a compression gauge in No. 1 cylinder.

4. Using a remote starter switch, crank the engine several times and record the highest reading recorded. Note the number of compression strokes required to obtain the highest reading.

5. Repeat the test on each cylinder, cranking the engine the same number of times for each cylinder as was required to obtain the highest reading on the No. 1 cylinder.

TABLE 2—Manifold Vacuum Gauge Readings

Gauge Reading	Engine Condition
18 inches	Normal.
Low and steady.	Loss of power in all cylinders caused possibly by late ignition or valve timing, or loss of compression due to leakage around the piston rings.
Very low.	Manifold, carburetor, spacer, or cylinder head gasket leak.
Needle fluctuates steadily as speed increases.	A partial or complete loss of power in one or more cylinders caused by a leaking valve, cylinder head or intake manifold gasket leak, a defect in the ignition system, or a weak valve spring.
Gradual drop in reading at engine idle.	Excessive back pressure in the exhaust system.
Intermittent fluctuation.	An occasional loss of power possibly caused by a defect in the ignition system or a sticking valve.
Slow fluctuation or drifting of the needle.	Improper idle mixture adjustment, carburetor, spacer, or intake manifold gasket leak, or possibly late valve timing.

TEST CONCLUSIONS

A variation of ± 20 pounds from specified pressure is satisfactory. However, the compression of all cylinders should be uniform within 10 pounds.

A reading of more than the allowable tolerance above normal indicates excessive deposits in the cylinder.

A reading of more than the allowable tolerance below normal indicates leakage at the cylinder head gasket, piston rings, or valves.

A low even compression in two adjacent cylinders indicates a cylinder head gasket leak. This should be checked before condemning the rings or valves.

To determine whether the rings or

the valves are at fault, squirt the equivalent of a tablespoon of heavy oil into the combustion chamber. Crank the engine to distribute the oil and repeat the compression test. The oil will temporarily seal leakage past the rings. If approximately the same reading is obtained, the rings are satisfactory, but the valves are leaking. If the compression has increased 10 pounds or more over the original reading, there is leakage past the rings.

During a compression test, if the pressure fails to climb steadily and remains the same during the first two successive strokes, but climbs higher on the succeeding strokes, or fails to climb during the entire test, it indicates a sticking valve.

4 ENGINE REMOVAL AND INSTALLATION

The procedures given are for the engine without the transmission attached. If the engine and transmission are removed as an assembly, install standard eye bolts with $\frac{1}{2}$ -14 threads in the bosses at the top rear of the exhaust manifolds. Then attach the engine lifting bracket and sling to the eye bolts. The engine installation is shown in Fig. 15.

REMOVAL

1. Drain the cooling system and the crankcase. Remove the hood and the air cleaner.

2. Disconnect the radiator upper hose at the radiator supply tank and the radiator lower hose at the water pump.

3. Disconnect the transmission oil

cooler lines at the radiator. Remove the radiator and support as an assembly.

4. Disconnect the battery ground cable at the generator mounting bracket. Remove the oil level dipstick and the ignition coil.

5. Disconnect the oil pressure sending unit wire at the sending unit

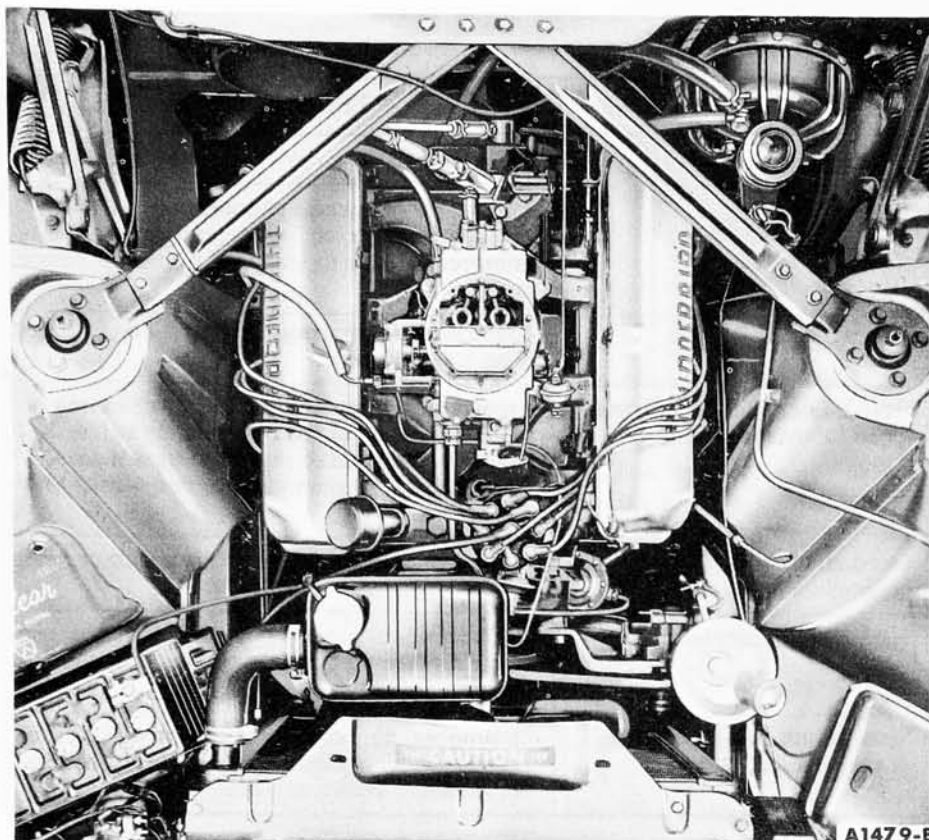


FIG. 15—Engine Installation

and the flexible fuel line at the fuel tank line.

6. Remove the wire loom from the clips on the left valve rocker arm cover and position the wires out of the way.

7. Disconnect the three windshield washer lines at the washer pump and position them out of the way.

8. Disconnect the accelerator rod at the carburetor. Remove the accelerator retracting spring. Remove the accelerator cross shaft bracket from the intake manifold and position it out of the way.

9. Disconnect the power steering pump bracket from the water pump, then wire the power steering pump to the hood left hinge in a position that will prevent the oil from draining out.

10. Disconnect the power brake line at the intake manifold and at the flexible line. Release the line from the brackets on the left valve rocker arm cover and remove the line.

On a car with an air conditioner, disconnect the magnetic clutch wire. Isolate the compressor.

11. Disconnect the heater hose at the water pump and at the intake manifold.

12. Disconnect the generator wires at the generator.

13. Disconnect the water temperature sending unit wire at the sending unit.

14. Remove the engine ground strap. Remove the starter cable retaining bracket from the generator mounting bracket.

15. Raise the front of the car.

16. Remove the starter and dust seal and the transmission fluid filler tube bracket.

17. Disconnect the muffler inlet pipes from the exhaust manifolds, and the engine right and left support insulators at the engine.

18. Remove the converter housing lower access cover and the cover assembly. Remove the flywheel to converter nuts. Secure the converter assembly in the housing. Remove the converter housing to engine lower bolts, and remove the oil cooler lines retaining clamp from the engine block.

19. Lower the car, then support the transmission. Remove the converter housing upper retaining bolts.

20. Install the engine left lifting bracket on the front of the left cylinder head where the coil mounts.

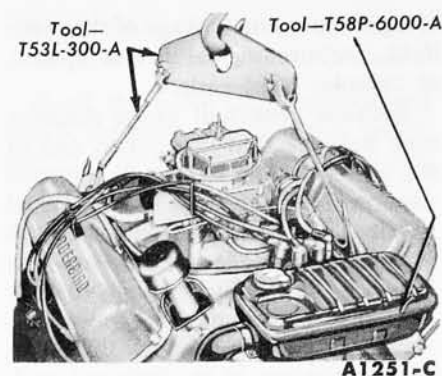


FIG. 16—Engine Lifting Brackets and Sling

Install the engine right lifting bracket at the rear of the right cylinder head. Attach the engine lifting sling (Fig. 16).

21. Raise the engine slightly and carefully pull it from the transmission.

22. Lift the engine out of the engine compartment and install it on a work stand (Fig. 17).

INSTALLATION

1. Place a new gasket over the studs of the exhaust manifolds.

2. Attach the engine lifting brackets and sling (Fig. 16). Remove the engine from the work stand.

3. Lower the engine carefully into the engine compartment. Make sure the exhaust manifolds are properly aligned with the muffler inlet pipes and the dowels in the block engage the holes in the converter housing. Start the converter pilot into the crankshaft.

4. Install the converter housing upper bolts. Torque the bolts to specifications.

5. Start the engine right and left support insulator to engine bolts.

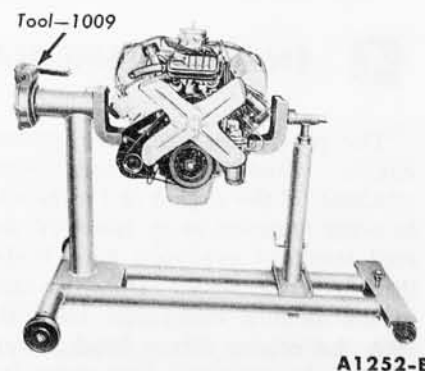


FIG. 17—Engine Work Stand

in Fig. 20. Be sure the oil holes in the shaft are facing downward. Complete the assembly by installing the remaining flat washer and the spring washer and install the cotter pin.

CLEANING AND INSPECTION

Clean all the parts thoroughly. Make sure that all oil passages are open.

Check the clearance between each rocker arm and the shaft by checking the ID of the rocker arm bore and the OD of the shaft. If the clearance between any rocker arm and the shaft exceeds the wear limit, replace the shaft and/or the rocker arm. Inspect the shaft and the rocker arm bore for nicks, scratches, scores, or scuffs. Dress up minor surface defects with a hone.

Inspect the pad at the valve end of the rocker arms for a grooved radius. If the pad is grooved, replace the rocker arm. Do not attempt to true this surface by grinding.

Check for broken locating springs.

INTAKE MANIFOLD REMOVAL

1. Drain the cooling system. Remove the air cleaner.

2. Disconnect the accelerator rod at the carburetor. Remove the accelerator cross shaft bracket from the intake manifold and position it out of the way.

3. Remove the carburetor fuel inlet line and the automatic choke heat tube. Disconnect the brake vacuum booster line at the intake manifold and at the flexible hose. Remove the vacuum line.

4. Disconnect the coil high tension lead, and the coil wires at the coil. Disconnect the oil pressure sending unit wire at the sending unit. Remove the wire loom from the retaining clips on the left valve rocker arm cover and position it out of the way.

5. Disconnect the spark plug wires at the spark plugs and remove the wires from the ignition harness brackets on the valve rocker arm covers.

6. Remove the distributor cap and spark plug wire assembly. Disconnect the distributor vacuum line at the distributor.

7. Remove the distributor hold-down bolt and clamp. Remove the distributor.

8. Disconnect the radiator upper hose at the radiator supply tank, then remove the supply tank. Remove the heater hose at the intake manifold, and the water temperature sending unit wire at the sending unit.

9. Slide the clamp on the water pump by-pass hose toward the water pump.

10. Clean the outside of the valve rocker arm covers and remove the covers.

11. Refer to "Valve Rocker Arm Shaft Assembly Removal" and remove the valve rocker arm shaft

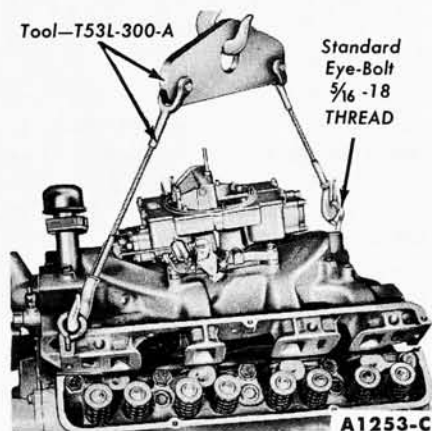


FIG. 21—Intake Manifold
Removal or Installation

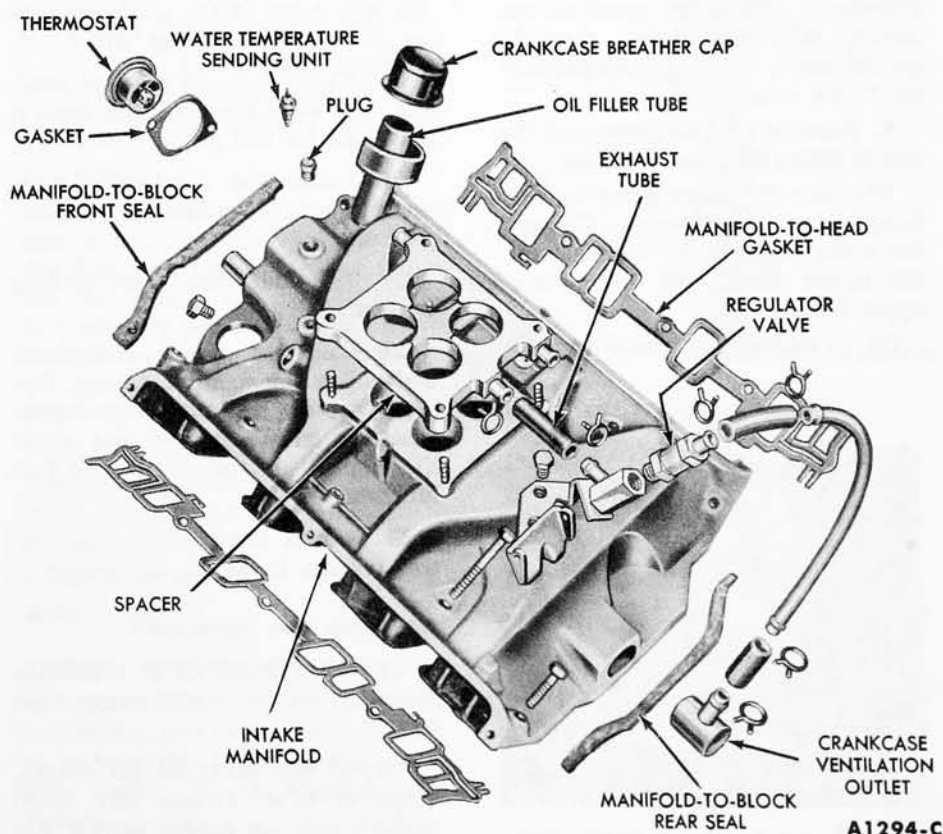


FIG. 22—Typical Intake Manifold Assembly

assembly by following steps 4 and 5.

12. Remove the valve push rods in sequence.

13. Remove the intake manifold retaining bolts.

14. Install standard eye bolts with 5/16-18 threads in the left front and right rear rocker arm cover screw holes. Attach the engine lifting sling (Fig. 21).

15. Raise the manifold and carefully remove the intake manifold and radiator supply tank as an assembly. Remove the intake manifold gaskets and seals.

16. If the manifold is to be disassembled, remove the radiator supply tank, thermostat, and gasket. Remove the carburetor, spacer, and gasket.

On an engine with positive crankcase ventilation, remove the crankcase ventilation regulator valve and exhaust tube.

INSTALLATION

The intake manifold assembly is shown in Fig. 22.

1. If the intake manifold was disassembled, install the carburetor, spacer, and gasket. Coat the thermostat gasket with water resistant sealer and place it in position on the intake

manifold. Install the thermostat and radiator supply tank.

2. Clean the mating surfaces of the intake manifold, cylinder heads, and cylinder block.

3. Coat the intake manifold and cylinder block seal surfaces with oil resistant sealer.

4. Position new seals on the cylinder block and new gaskets on the cylinder heads. Position the gasket slots in the end tabs over the ribs on the seals. Be sure the holes in the gaskets are aligned with the holes in the cylinder heads. The correct installation of the gaskets and seals is shown in Fig. 23.

5. Install the eye bolts in the intake manifold and attach the engine lifting sling and carefully lower the intake manifold on the engine (Fig. 21).

6. Position the intake manifold by inserting the distributor in place. **After the intake manifold is in place, run a finger around the seal area to make sure the seals are in place. If the seals are not in place, remove the intake manifold and reposition the seals.**

7. Start the water pump by-pass hose on the intake manifold.

8. Be sure the holes in the manifold gaskets and manifold are in alignment. Install the manifold retaining bolts and torque them to specifications, working from the center to the ends.

9. Remove the distributor and the engine lifting sling and eye bolts.

10. Slide the water pump by-pass hose clamp into position. Connect the water temperature sending unit, the heater hose, and the radiator upper hose.

On an engine with positive crank-



FIG. 23—Intake Manifold Gaskets and Seals Installation

case ventilation, install the crankcase ventilation regulator valve and exhaust tube.

11. Apply Lubriplate to both ends of the push rods. Install the push rods in their original bores, positioning the lower ends of the rods in the lifter cups. Refer to "Valve Rocker Arm Shaft Assembly Installation" and install the valve rocker arm shaft assembly by following steps 1 thru 6.

12. Rotate the crankshaft damper until the No. 1 piston is on TDC at the end of the compression stroke. Position the distributor in the block with the rotor at the No. 1 firing position and the points open. Install the hold down clamp.

13. Clean the valve rocker arm covers. Apply oil resistant sealer to one side of new cover gaskets. Lay the cemented side of the gaskets in place in the covers. Install the valve rocker arm covers.

14. Connect the brake vacuum booster line and connect the flexible hose.

15. Install the carburetor fuel inlet line and connect the distributor vacuum line. Install the automatic choke heat tube.

16. Install the distributor cap. Connect the spark plug wires. Install the wire loom in the retaining clips on the left valve rocker arm cover.

17. Connect the oil pressure sending unit wire, the coil high tension lead, and the coil primary wire.

18. Install the accelerator cross shaft bracket. Connect the accelerator rod.

19. Fill and bleed the cooling system.

20. Start the engine and check and adjust the ignition timing. Operate the engine until engine temperatures have stabilized and adjust the engine idle speed and idle fuel mixture.

21. Adjust the transmission control linkage. Install the air cleaner.

CLEANING AND INSPECTION

Clean the manifold in a suitable solvent, then dry it with compressed air.

Inspect the manifold for cracks, leaks, or other defects that would make it unfit for further service. Replace all studs that are stripped or otherwise damaged. **Remove all fil-**

ings and foreign matter that may have entered the manifold as a result of repairs.

Check the baffle plate on the underside of the manifold for looseness and be sure the maze screen is in place. Clean off any varnish accumulation.

EXHAUST MANIFOLD

REMOVAL

1. Remove the air cleaner. Disconnect the exhaust manifold at the muffler inlet pipe.

2. Remove the automatic choke heat tube from the right exhaust manifold.

3. Disconnect the power steering pump bracket from the cylinder block and move it out of the way. Position the pump so that the oil will not drain out. Disconnect the power steering hose bracket and position the hoses out of the way.

4. Remove the dipstick and tube assembly.

5. Remove the retaining bolts and tab washers and remove the exhaust manifolds.

INSTALLATION

1. Clean the mating surfaces of the exhaust manifold and cylinder head. Scrape the gasket material from the mounting flange of the exhaust manifold and muffler inlet pipe.

2. Apply graphite grease to the mating surface of the exhaust manifold.

3. Install a new gasket on the studs of the exhaust manifold.

4. Position the exhaust manifold on the cylinder head and install the retaining bolts and tab washers. Working from the center to the ends torque the retaining bolts to specifications. Lock the bolts by bending one tab of the washer over a flat on the bolt.

5. Install the dipstick and tube assembly.

6. Position the power steering pump bracket on the cylinder block and install the retaining bolts. Adjust the belt tension. Position the hoses and install the power steering hose bracket.

7. Install the automatic choke heat tube on the right exhaust manifold.

8. Connect the exhaust manifold at the muffler inlet pipe. Install the air cleaner.

CRANKCASE VENTILATION OUTLET

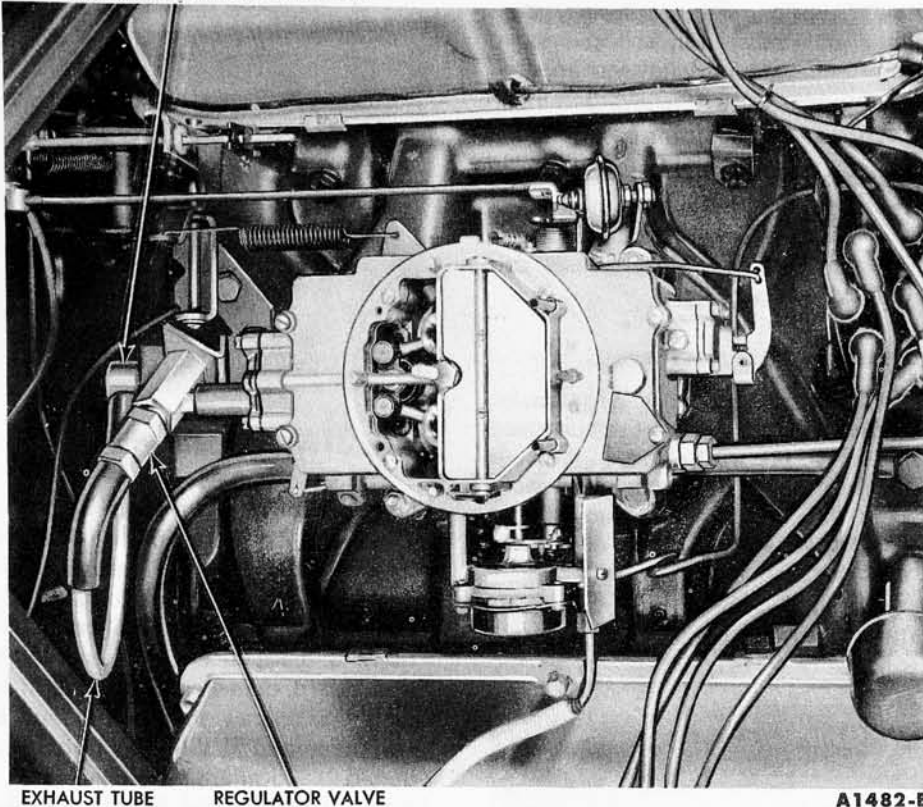


FIG. 24—Regulator Valve and Exhaust Tube

CLEANING AND INSPECTION

Inspect the manifolds for cracks, leaks, or other defects that would make them unfit for further service.

On the right exhaust manifold, clean out the automatic choke air heat chamber (Fig. 5). Make sure the air inlet and outlet holes are completely open and the cover does not leak. Blow out the automatic choke air heat tube with compressed air.

POSITIVE CRANKCASE VENTILATION SYSTEM

REMOVAL

1. Disconnect the exhaust tube at the crankcase ventilation outlet and regulator valve and remove the tube. Remove the exhaust tube that connects to the spacer (Fig. 24).

2. Remove the regulator valve assembly from the Tee-fitting.

3. Remove the outlet adapter from the intake manifold.

INSTALLATION

1. Install the outlet adapter. If the adapter enters the intake manifold more than $\frac{1}{2}$ inch, replace the adapter.

2. Install the regulator valve in the Tee-fitting.

3. Install the exhaust tubes.

REGULATOR VALVE DISASSEMBLY

Place the hex on the regulator valve body in a vise. Remove the connector, valve, and spring (Fig. 25).

CLEANING

Clean the valve parts and exhaust tube in clean carburetor solvent and dry them with compressed air. Clean the rubber hose connections with a low volatility petroleum base solvent and dry with compressed air.

REGULATOR VALVE ASSEMBLY

Position the spring and valve inside the regulator valve body. Install the regulator valve connector.

CYLINDER HEADS AND VALVES

CYLINDER HEAD REMOVAL

1. Remove the intake manifold, carburetor, and radiator supply tank as an assembly following the procedure under "Intake Manifold Removal."

2. Disconnect the exhaust manifolds at the muffler inlet pipes.

If the left cylinder head is to be removed, remove the ignition coil.

3. Remove the cylinder head bolts. Install the cylinder head holding fixtures (Fig. 26).

4. Lift the cylinder heads off the block. **Do not pry between the head and the block.** Remove and discard the cylinder head gasket.

CYLINDER HEAD INSTALLATION

1. Clean the cylinder head and cylinder block gasket surfaces.

2. If the cylinder head was removed for a cylinder head gasket replacement, check the flatness of the cylinder head and block gasket surfaces (Fig. 29).

3. Apply cylinder head gasket sealer to both sides of a new gasket. Guided by the word "FRONT" on the gasket, install the gasket over the cylinder head dowels.

4. Place the cylinder head on the engine, then remove the holding fixtures.

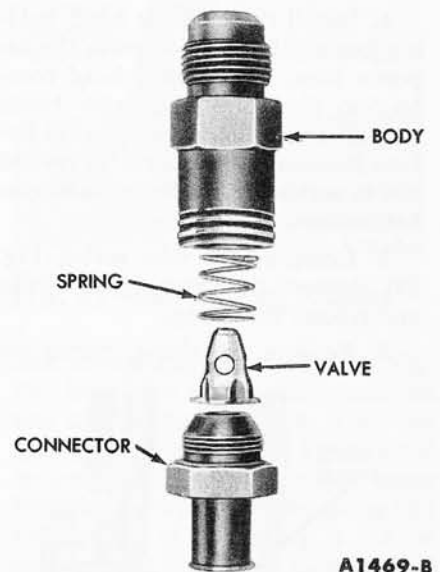


FIG. 25—Regulator Valve Assembly

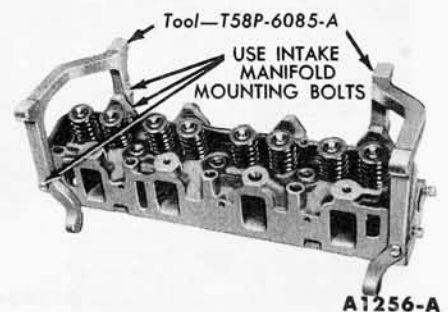


FIG. 26—Cylinder Head Holding Fixtures

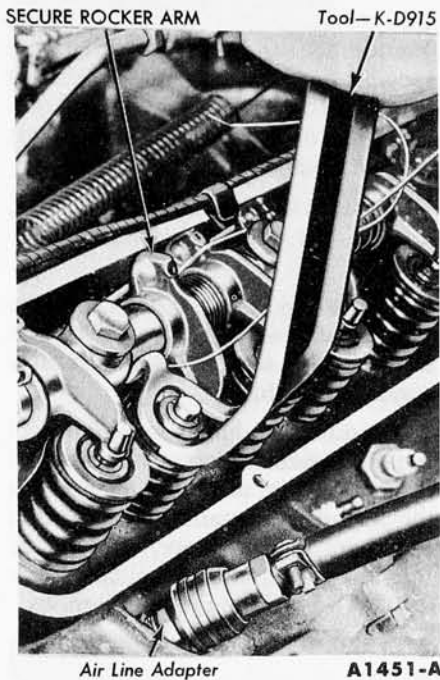


FIG. 43—Compressing Valve Spring

(Fig. 43). Using the valve spring compression tool shown in Fig. 43, compress the valve spring. Remove the valve spring retainer locks, the sleeve, spring retainer, and the valve spring. If an end rocker arm is to be worked on, it will be necessary to remove the rocker arm from the shaft.

6. Remove the valve stem seal (Fig. 44).

7. Install a new valve stem seal. Place the spring in position over the valve. Install the spring retainer and sleeve. Compress the valve spring and install the valve spring retainer locks.

Be sure the damper spring is in-

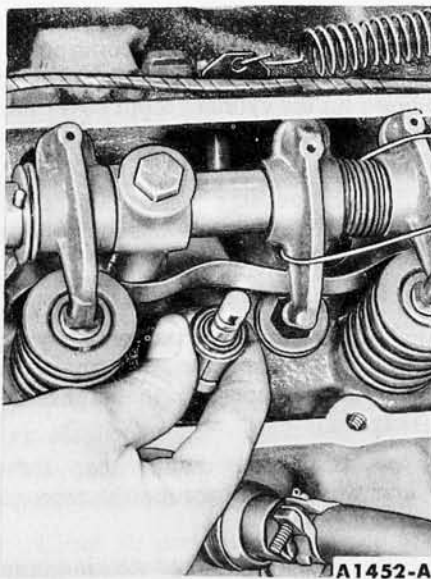


FIG. 44—Valve Stem Seal Removal

stalled in the valve spring so that the coil end of the damper spring is 135° counterclockwise from the coil end of the valve spring.

8. Apply Lubriplate to both ends of the push rod. Install the push rod making sure the lower end of the rod is positioned in the lifter push rod cup.

9. Remove the wire securing the valve rocker arm and slide the rocker arm into position. Turn off the air and remove the air line and adapter. Install the spark plug.

10. Install the valve rocker arm cover and connect the spark plug wires. Install the air cleaner.

CYLINDER FRONT COVER AND TIMING CHAIN

REMOVAL

1. Drain the cooling system and the crankcase. Remove the air cleaner. Disconnect the battery ground cable.

2. Disconnect the radiator upper hose at the radiator supply tank. Disconnect the radiator lower hose at the water pump.

3. Disconnect the transmission oil cooler lines at the radiator. Remove the radiator and support as an assembly.

4. Disconnect the heater hose at the water pump. Slide the water pump by-pass hose clamp toward the engine.

5. Disconnect the power steering pump bracket from the water pump and remove the drive belt. Wire the power steering pump assembly to the left side of the car in a position that will prevent the oil from draining out.

On a car with an air conditioner, remove the compressor drive belt.

6. Loosen the generator mounting bolts at the generator. Remove the drive belt. Remove the generator support bolt at the water pump. Remove the water pump, drive belt adjusting arm, pulley, and fan as an assembly. Remove the power steering pulley from the crankshaft damper.

7. Remove the cap screw and washer from the end of the crankshaft. Install the puller on the crankshaft damper (Fig. 45) and remove the damper.

8. Disconnect the carburetor fuel inlet line at the fuel pump.

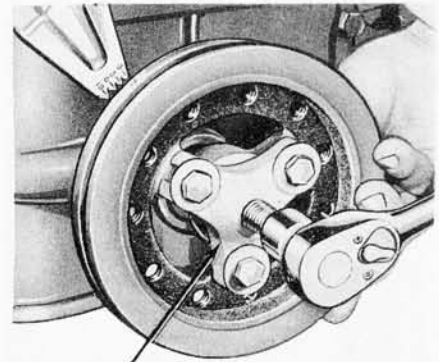


FIG. 45—Crankshaft Damper Removal

9. Remove the fuel pump retaining bolts and lay the pump to one side with the flexible fuel line still attached.

10. If the crankshaft sleeve is not stepped down (the same OD on both ends), remove it as shown in Fig. 46. If the sleeve is stepped down, remove it with a three jawed puller (tool 7675-N).

11. Remove the screws fastening the cylinder front cover to the block. Remove the cylinder front cover. On a car with an air conditioner, the compressor brackets are retained by cylinder front cover screws.

12. Discard the cylinder front cover gasket. Remove the oil slinger.

13. Rotate the crankshaft in a clockwise direction (as viewed from the front) to take up the slack on the left side of the chain.

14. Establish a reference point on the block and measure from this point to the chain (Fig. 47).

15. Rotate the crankshaft in the opposite direction to take up the slack on the right side of the chain. Force the left side of the chain

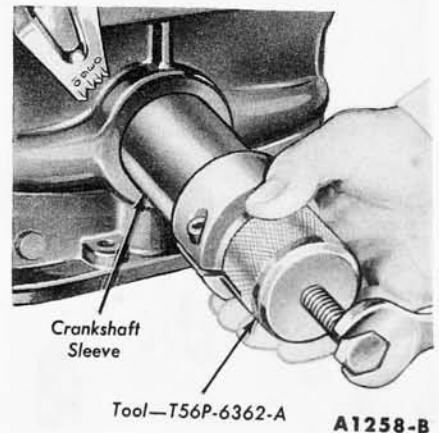
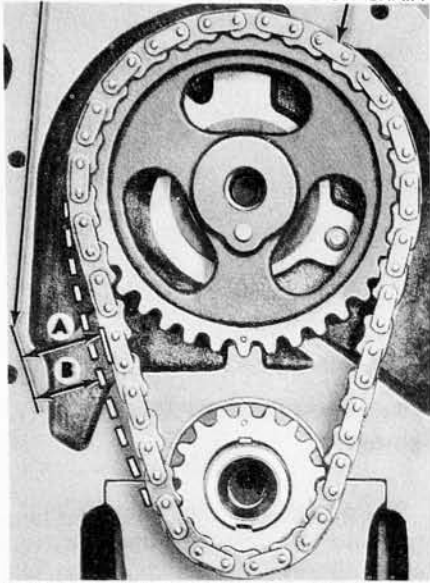


FIG. 46—Crankshaft Sleeve Removal

REFERENCE POINT RIGHT SIDE OF CHAIN



TAKE UP SLACK ON LEFT SIDE, ESTABLISH REFERENCE POINT. MEASURE DISTANCE A. TAKE UP SLACK ON RIGHT SIDE. FORCE LEFT SIDE OUT. MEASURE DISTANCE B. DEFLECTION IS A MINUS B. A1284-A

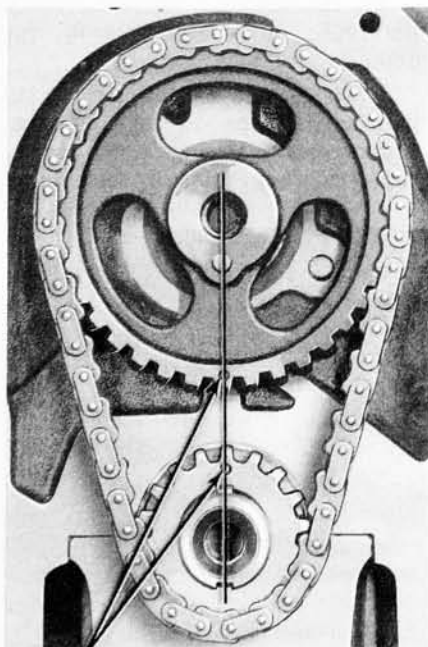
FIG. 47—Timing Chain Deflection

out with the fingers and measure the distance between the reference point and the chain. The deflection is the difference between the two measurements.

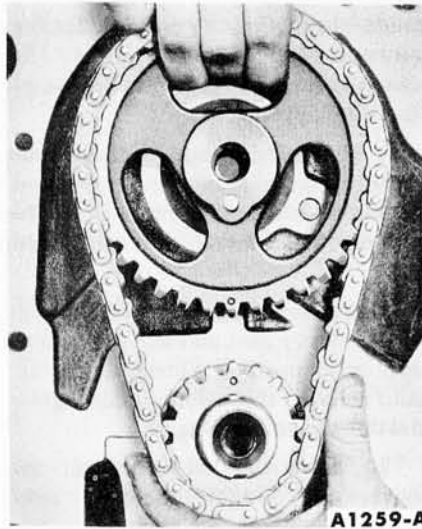
If the deflection exceeds $\frac{1}{2}$ inch, replace the timing chain and/or sprockets.

16. Crank the engine until the timing marks on the sprockets are positioned as shown in Fig. 48.

17. Remove the camshaft thrust



TIMING MARKS A1283-A

FIG. 48—Aligning Timing Marks

A1259-A

FIG. 49—Timing Chain Removal or Installation

button and spring, the sprocket cap screw, the thrust button spring retainer, and the fuel pump eccentric.

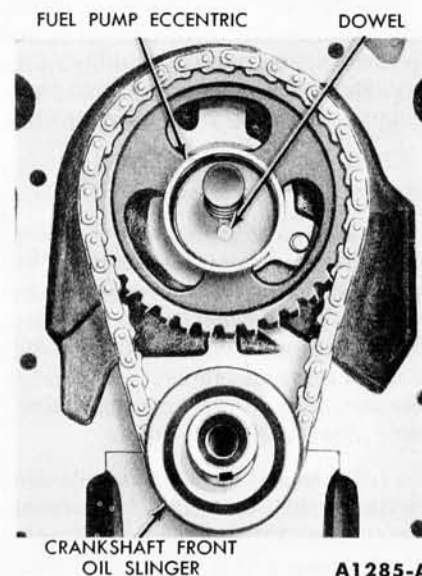
18. Slide both sprockets and the timing chain forward, and remove the sprockets and timing chain as an assembly (Fig. 49).

19. Remove the oil pan and oil pump screen, following the procedure under "Oil Pan Removal."

INSTALLATION

1. Position the sprockets and timing chain on the camshaft and crankshaft (Fig. 49). Be sure the timing marks on the sprockets are positioned as shown in Fig. 48.

2. Install the fuel pump eccentric, the camshaft sprocket cap screw, and



A1285-A

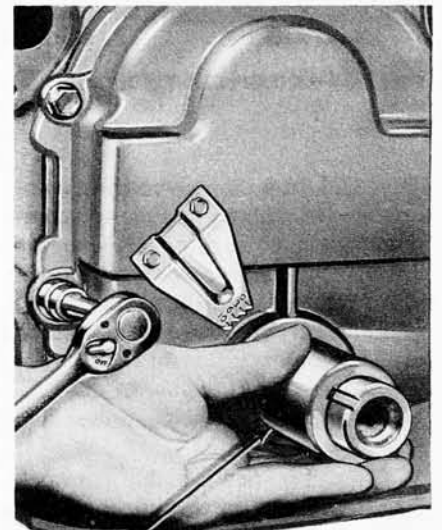
FIG. 50—Fuel Pump Eccentric and Front Oil Slinger Installed

the thrust button spring retainer. Torque the sprocket cap screw to specifications. Install the camshaft thrust button spring and thrust button (Fig. 50). Install the crankshaft front oil slinger.

3. Clean the cylinder front cover, oil pan, and the block gasket surfaces.

4. Coat the gasket surface of the block and cover and the cover bolt threads with sealer. Position a new gasket on the block.

5. Install the alignment pilot tool on the cylinder front cover so that the keyway in the pilot aligns with the key in the crankshaft. Position the cover and pilot over the end of the crankshaft and against the block (Fig. 51). Install the retaining screws.



Tool—T61P-6019-B

A1287-B

FIG. 51—Cylinder Front Cover Alignment

On a car with an air conditioner, position the compressor bracket in place on the cylinder front cover and install the retaining screws finger-tight.

While pushing in on the pilot, torque the screws to specifications. Remove the pilot.

6. Install the crankshaft sleeve.

7. Line up the damper keyway with the key on the crankshaft. Install the damper on the crankshaft (Fig. 52).

8. Install the damper cap screw and washer, and torque the screw to specifications.

9. Install the power steering pump pulley on the damper. Torque the screws to specifications.

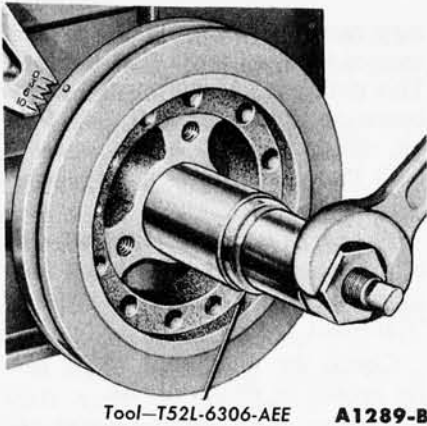


FIG. 52—Crankshaft Damper Installation

10. Clean the oil pan and the oil pump screen. Install the oil pump screen and oil pan.

11. Clean the water pump gasket surfaces. Coat new gaskets with sealer and position the gaskets on the block. Install the water pump, pulley, fan, and generator adjusting arm as an assembly.

12. Install and adjust the generator drive belt(s).

On a car with an air conditioner, install and adjust the drive belt.

13. Install the power steering pump drive belt and attach the pump bracket to the water pump. Adjust the drive belt tension.

14. Install the fuel pump using a new gasket.

15. Connect the carburetor fuel inlet line. Connect the heater hoses. Slide the water pump by-pass tube clamp forward on the tube.

16. Install the radiator and support as an assembly. Connect the radiator lower hose at the water pump and the radiator upper hose at the radiator supply tank. Connect the battery ground cable. Connect the transmission oil cooler lines.

17. Fill and bleed the cooling system. Fill the crankcase with the proper grade and quantity of engine oil. Connect the heater hose to the intake manifold.

18. Operate the engine at fast idle and check for coolant and oil leaks. Adjust the ignition timing. Install the air cleaner.

CLEANING AND INSPECTION

Clean all parts in solvent and dry them with compressed air. Inspect the chain for broken links and the sprockets for cracks, and worn or

damaged teeth. Replace all the components of the timing chain and sprocket assembly if any one item needs replacement.

FRONT OIL SEAL REPLACEMENT

It is good practice to replace the oil seal each time the cylinder front cover is removed.

1. Drive out the old seal with a pin punch. Clean out the recess in the cover.

2. Coat a new seal with grease, then install the seal (Fig. 53). Drive the seal in until it is fully seated in the recess. Check the seal after installation to be sure the spring is properly positioned in the seal.

CAMSHAFT

The camshaft and related parts are shown in Fig. 54.

REMOVAL

1. Remove the cylinder front cov-

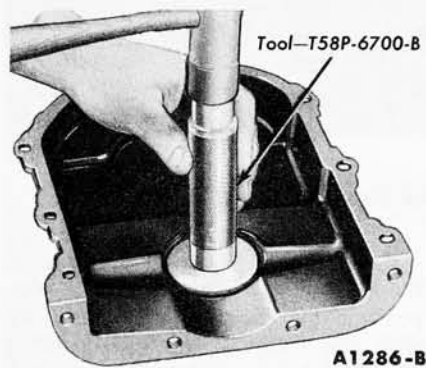


FIG. 53—Oil Seal Installation

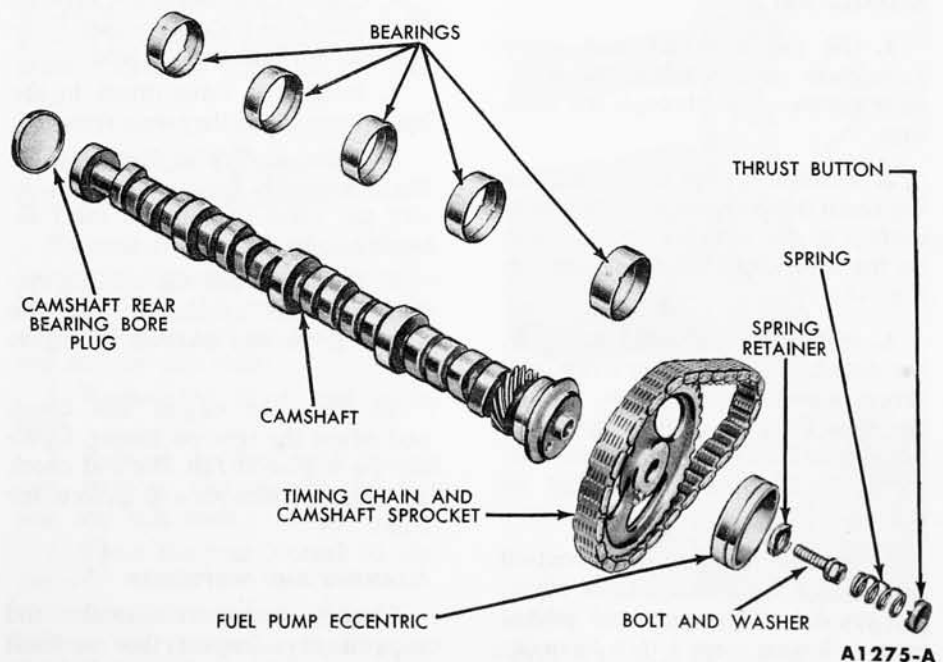


FIG. 54—Camshaft and Related Parts

er and the timing chain and sprockets following steps 1 thru 18 under "Cylinder Front Cover and Timing Chain Removal."

2. Disconnect the spark plug wires at the spark plugs and remove the wires from the ignition harness brackets on the valve rocker arm covers. Disconnect the coil high tension lead at the coil. Remove the distributor cap and spark plug wire assembly. Disconnect the distributor vacuum line at the distributor. Remove the distributor hold down bolt and clamp and remove the distributor.

3. Remove the valve rocker arm covers. Refer to "Valve Rocker Arm Shaft Assembly Removal" and remove the valve rocker arm shaft assemblies by following steps 4 and 5.

4. Remove the valve push rods in sequence and place them in a rack so that they can be installed in their original positions.

5. Position an inspection light through a push rod opening and into the valve push rod valley (Fig. 55). Remove the valve lifters with a magnet through the push rod openings. In some cases, it will be necessary to transfer the lifter over to an adjoining push rod opening in order to remove it. Place the lifters in a rack so that they can be installed in their original positions.

6. Remove the oil pan and oil pump screen by following the pro-

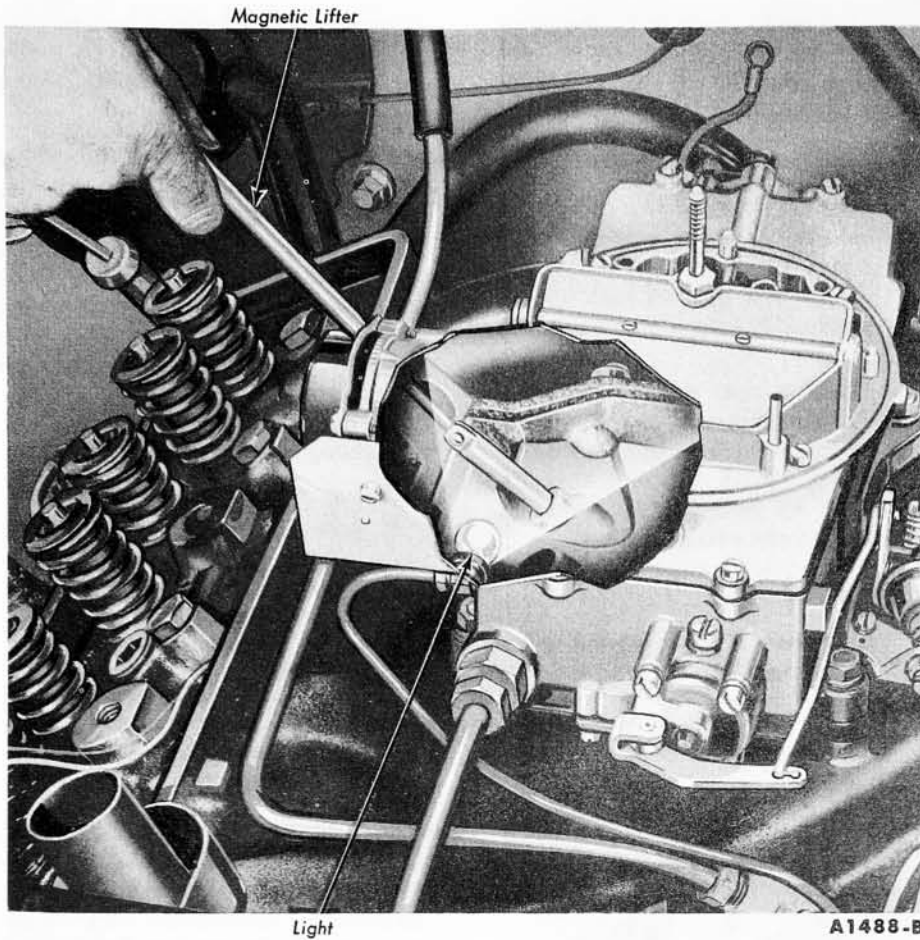


FIG. 55—Valve Lifter Replacement—Intake Manifold Installed

cedure under "Oil Pan Removal."

7. Carefully remove the camshaft by pulling it toward the front of the engine. Use caution to avoid damaging the camshaft bearings.

INSTALLATION

1. Oil the camshaft and apply Lubriplate to the lobes. Carefully slide the camshaft through the bearings.

2. Position the sprockets and timing chain on the camshaft and crankshaft (Fig. 49) with the timing marks on the sprockets aligned as shown in Fig. 48.

3. Install the fuel pump eccentric, the camshaft sprocket cap screw, and thrust button spring retainer. Torque the sprocket cap screw to specifications. Install the camshaft thrust button (Fig. 50). Install the front oil slinger.

4. Replace the crankshaft front oil seal. Install the cylinder front cover, the crankshaft damper, and related parts following steps 3 thru 16 under "Cylinder Front Cover and Timing Chain Installation."

5. With No. 1 piston on TDC at the end of the compression stroke, position the distributor in the block with the rotor at the No. 1 firing position and the points open. Install the hold down clamp.

6. Connect the distributor vacuum line. Install the distributor cap. Connect the coil high tension lead.

7. Install the valve lifters in the bores from which they were removed.

8. Refer to "Valve Rocker Arm Shaft Assembly Installation" and install the valve rocker arm shaft assembly following steps 1 thru 9.

9. Fill and bleed the cooling system. Fill the crankcase with the proper grade and quantity of engine oil.

10. Start the engine and check and adjust the ignition timing. Operate the engine at fast idle and check all hose connections and gaskets for leaks.

CLEANING AND INSPECTION

Clean the camshaft in solvent and wipe it dry. Inspect the camshaft lobes for scoring, and signs of abnormal wear. Lobe wear characteristics

may result in pitting in the general area of the nose portion of the lobe. This pitting is not detrimental to the operation of the camshaft, therefore, the camshaft should not be replaced until the lobe lift loss has exceeded 0.005 inch.

The lift of camshaft lobes can only be accurately checked with the camshaft installed in the engine. Refer to "Camshaft Lobe Lift."

Check the distributor drive gear for broken or chipped teeth.

Remove light scuffs, scores, or nicks from the camshaft machined surfaces with a smooth oilstone.

CAMSHAFT REAR BEARING BORE PLUG REPLACEMENT

1. Remove the transmission and converter housing by following the procedure in Part 5-4.

2. Remove the flywheel retaining bolts and remove the flywheel.

3. Drill a 1/2-inch hole in the camshaft rear bearing bore plug and use tool T-7600-E to remove the plug.

4. Clean out the plug bore recess thoroughly.

5. Coat the flange of a new plug with water resistant sealer and install it with the flange facing out (Fig. 83).

6. Install the flywheel.

7. Install the transmission and converter housing by following the procedure in Part 5-4.

HYDRAULIC VALVE LIFTER REPLACEMENT

The following procedure is applicable for removing one or all of the valve lifters. This procedure can not be used if the valve lifters are stuck in their bores by excessive varnish, etc. In this case it will be necessary to remove the intake manifold. After the intake manifold has been removed, remove the valve lifters.

1. Refer to "Valve Rocker Arm Shaft Assembly Removal" and remove the valve rocker arm covers and the valve rocker arm shaft assemblies by following steps 1 thru 5.

2. Position an inspection light through a push rod opening and into the valve push rod valley (Fig. 55). Remove the valve lifters with a magnet through the push rod openings. In some cases, it will be necessary to transfer the lifter over to an adjoining push rod opening in order to re-

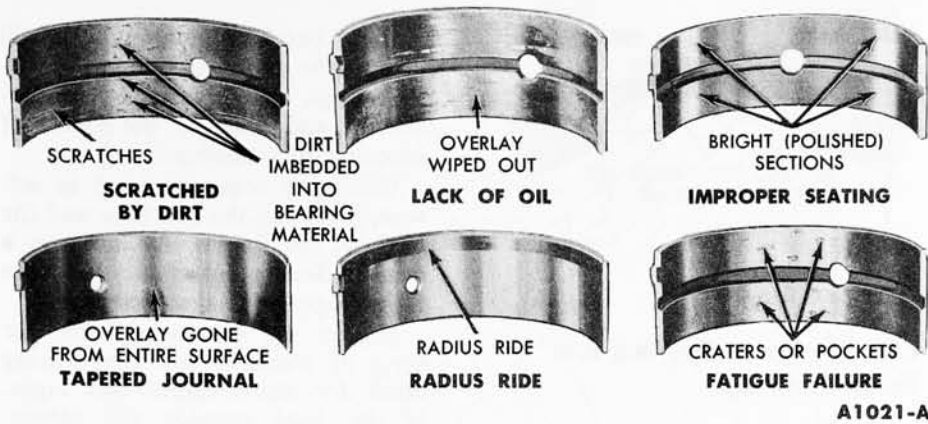


FIG. 59—Typical Bearing Failures

manifold, cylinder heads, oil pan and oil pump following the procedures in this section.

2. Remove any ridge and/or deposits from the upper end of the cylinder bores as follows:

Turn the crankshaft until the piston to be removed is at the bottom of its travel and place a cloth on the piston head to collect the cuttings. Remove any ridge and/or deposits from the upper end of the cylinder bores. Remove the cylinder ridge with a ridge cutter. Follow the instructions furnished by the tool manufacturer. **Never cut into the ring travel area in excess of 1/32 inch when removing ridges.**

3. Make sure all connecting rod caps are marked so that they can be installed in their original locations.

4. Turn the crankshaft until the connecting rod being removed is down.

5. Remove the connecting rod cap.

6. Push the connecting rod and piston assembly out the top of the cylinder with the handle end of a hammer. **Avoid damage to the crankshaft journal or the cylinder wall when removing the piston and rod.**

7. Remove the bearing inserts from the connecting rod and cap.

8. Install the cap on the connecting rod from which it was removed.

INSTALLATION

1. If new piston rings are to be installed, remove the cylinder wall glaze. Follow the instructions of the tool manufacturer.

2. Oil the piston rings, pistons, and cylinder walls with light engine oil. **Be sure to install the pistons in the same cylinders from which they were removed, or to which they were**

fitted. The connecting rods and bearing caps are numbered from 1 to 4 in the right bank and from 5 to 8 in the left bank beginning at the front of the engine. The numbers on the connecting rod and bearing cap must be on the same side when installed in the cylinder bore. If a connecting rod is ever transposed from one block or cylinder to another, new bearings should be fitted and the connecting rod should be numbered to correspond with the new cylinder number.

3. Make sure the ring gaps are properly spaced around the circumference of the piston.

4. Install a piston ring compressor on the piston and push the piston in with a hammer handle until it is slightly below the top of the cylinder (Fig. 60). Be sure to guide the connecting rods to avoid damaging the crankshaft journals. **Install the piston with the indentation in the piston head toward the front of the engine.**

5. Check the clearance of each bearing by following the procedure

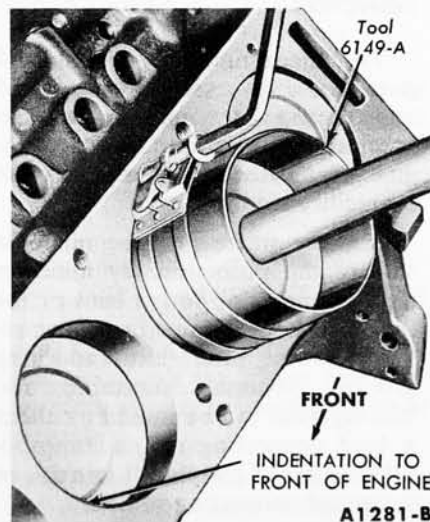


FIG. 60—Piston Installation

under "Connecting Rod Bearing Replacement."

6. After the bearings have been fitted, apply a light coat of engine oil to the journals and bearings.

7. Turn the crankshaft throw to the bottom of its stroke. Push the piston all the way down until the connecting rod bearing seats on the crankshaft journal.

8. Install the connecting rod cap. Torque the nuts to specifications.

9. After the piston and connecting rod assemblies have been installed, check the side clearance between the connecting rods on each crankshaft journal (Fig. 61).

10. Disassemble, clean, and assemble the oil pump. Clean the oil pump inlet tube screen, and the oil pan and block gasket surfaces.

11. Install the oil pump and the oil pan.

12. Install the cylinder heads by following steps 1 thru 5 under "Cylinder Head Installation."

13. Refer to "Intake Manifold Installation" and install the intake manifold by following steps 2 through 19.

14. Fill and bleed the cooling system. Fill the crankcase with the proper grade and quantity of engine oil.

15. Operate the engine and check for oil and coolant leaks. Check and

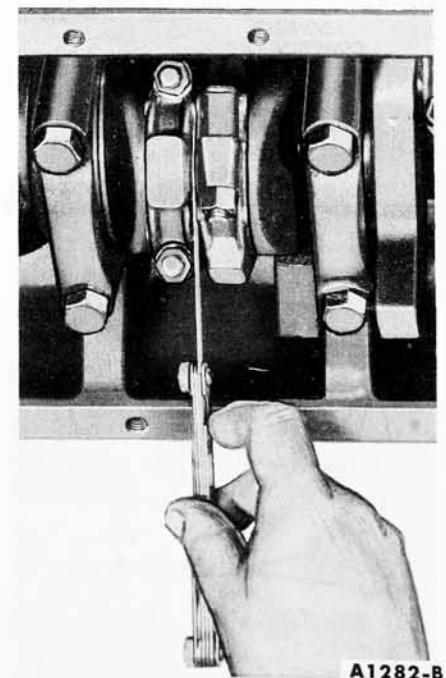


FIG. 61—Connecting Rod Side Clearance

adjust the ignition timing. Adjust the engine idle speed and fuel mixture.

16. Install the air cleaner.

DISASSEMBLY

1. Mark the pistons and pins to assure assembly with the same rod and installation in the same cylinder from which they were removed.

2. Remove the piston rings. Remove the piston pin retainers. Drive the pin out of the piston and connecting rod (Fig. 62). Discard the retainers.

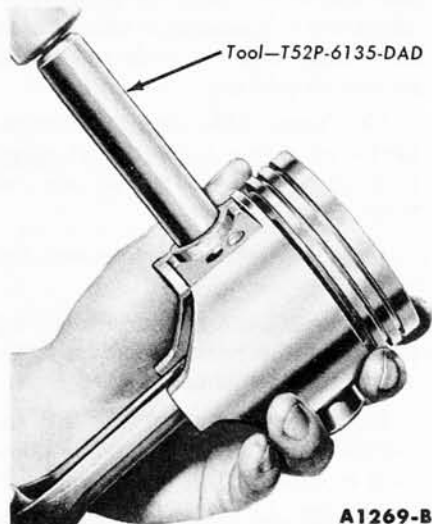


FIG. 62—Piston Pin Removal

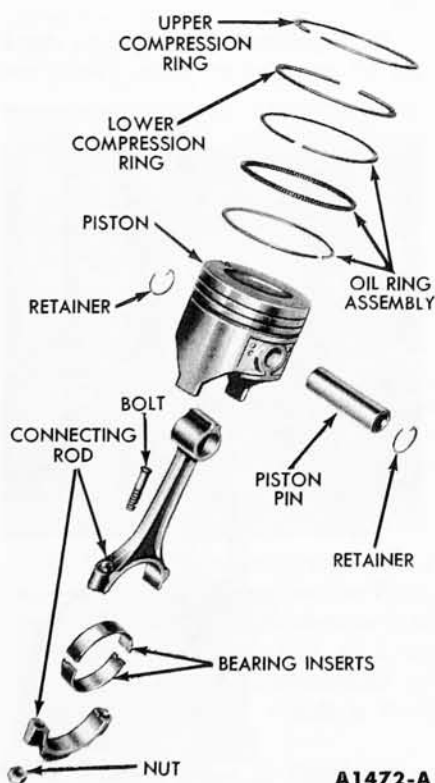


FIG. 63—Piston, Connecting Rod, and Related Parts

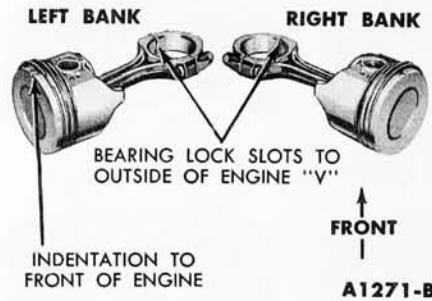


FIG. 64—Connecting Rod and Piston Assembly

ASSEMBLY

The piston, connecting rod, and related parts are shown in Fig. 63.

1. Lubricate all parts with light engine oil. Position the connecting rod in the piston and push the pin into place. Assemble the piston and connecting rod as shown in Fig. 64.

2. Insert new piston pin retainers by spiraling them into the piston with the fingers. Do not use pliers. Follow the instructions contained on the piston ring package and install the piston rings.

3. Check the ring side clearance of the compression rings with a feeler gauge inserted between the ring and its lower land (step 6 under "Fitting Piston Rings").

4. Be sure the bearing inserts and the bearing bore in the connecting rod and cap are clean. Foreign material under the inserts may distort the bearing and cause a failure. Install the bearing inserts in the connecting rod and cap with the tangs fitting in the slots provided.

CONNECTING ROD CLEANING AND INSPECTION

The connecting rods and related parts should be carefully inspected and checked for conformance to specifications. Various forms of engine wear caused by these parts can be readily identified.

A shiny surface on the pin boss side of the piston usually indicates that a connecting rod is bent or the piston pin hole is not in proper relation to the piston skirt and ring grooves. Abnormal connecting rod bearing wear can be caused by either a bent connecting rod, an improperly machined crankshaft journal, or a tapered connecting rod bore.

Twisted connecting rods will not create an easily identifiable wear

pattern, but badly twisted rods will disturb the action of the entire piston, rings, and connecting rod assembly and may be the cause of excessive oil consumption.

Clean the connecting rod in solvent, including the rod bore and the back of the inserts. **Do not use a caustic cleaning solution.** Blow out all passages with compressed air.

Inspect the connecting rods for signs of fractures and the bearing bores for out-of-round and taper. If the bore exceeds the recommended limits and/or if the connecting rod is fractured, it should be replaced.

Check the piston pin to connecting rod bushing clearance. Replace the connecting rod if the bushing is so worn that it cannot be reamed or honed for an oversize pin.

Replace defective connecting rod nuts and bolts.

After the connecting rods are assembled to the piston, check the connecting rods for bend or twist on a suitable alignment fixture. Follow the instructions of the fixture manufacturer. If the bend and/or twist is excessive, the connecting rod should be straightened or replaced.

PISTONS, PINS, AND RINGS CLEANING AND INSPECTION

Remove deposits from the piston surfaces. Clean gum or varnish from the piston skirt, piston pins, and rings with solvent. **Do not use a caustic cleaning solution or a wire brush to clean pistons.** Clean the ring grooves with a ring groove cleaner (Fig. 65). Make sure the oil ring slots (or holes) are clean.

Carefully inspect the pistons for fractures at the ring lands, skirts, and pin bosses, and for scuffed, rough, or scored skirts. If the lower inner portion of the ring grooves have high steps, replace the piston. The step will interfere with ring operation and cause excessive ring side clearance.

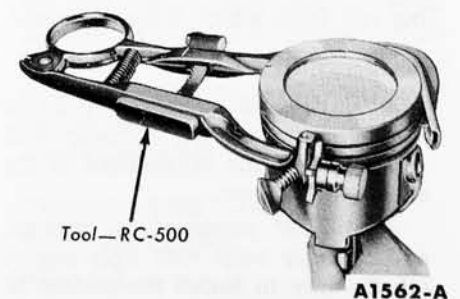


FIG. 65—Cleaning Ring Grooves

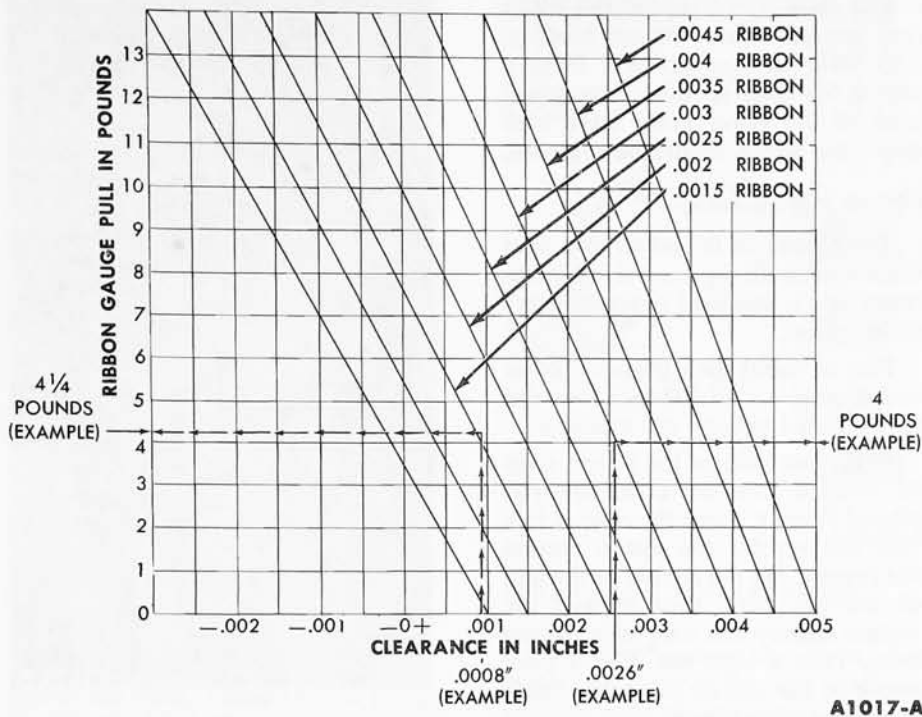


FIG. 66—Piston Clearance Chart

Spongy, eroded areas near the edge of the top of the piston are usually caused by detonation, or pre-ignition. A shiny surface on the thrust surface of the piston, offset from the centerline between the piston pin holes, can be caused by a bent connecting rod. Replace pistons that show signs of excessive wear, wavy ring lands, fractures, and/or damage from detonation or pre-ignition.

Check the piston to cylinder bore clearance with a tension scale and ribbon by following the procedure under "Fitting Pistons." Check the ring side clearance by following the procedure under "Fitting Piston Rings."

Replace piston pins showing signs of fracture or etching and/or wear. Check the piston pin fit in the piston and rod.

Replace all rings that are scored, chipped, or cracked. It is good practice to always install new rings when overhauling the engine. **Rings should not be transferred from one piston to another regardless of mileage.**

FITTING PISTONS

Pistons are available for service in standard sizes and 0.020, 0.030, 0.040, and 0.060-inch oversize.

If the clearance is greater than the maximum specified limit, recheck calculations to be sure that the prop-

er size piston has been selected, check for a damaged piston, then try a new piston.

If the clearance is less than the minimum limit, recheck calculations before trying another piston. If none can be fitted, refinish the cylinder for the next size piston. **When a piston has been fitted, mark it for assembly in the cylinder to which it was fitted.**

If the taper and out-of-round conditions of the cylinder bore are within limits, new piston rings will give satisfactory service provided the piston clearance in the cylinder bore is within limits. If the new rings are to be installed in a used cylinder that has not been refinished, remove the cylinder wall "glaze."

To fit a piston:

1. Calculate the size piston to be used by taking a cylinder bore check (Fig. 86).
2. Select the proper size piston to provide the desired clearance.
3. Make sure the piston and cylinder bore are at room temperature (70°F). After any refinishing operation, allow the cylinder bore to cool and make sure the piston and bore are clean and dry before the piston fit is checked.

4. Attach a tension scale to the end of a feeler gauge ribbon that is free of dents or burrs. The feeler ribbon should be 1/2-inch wide and

of one of the thicknesses shown in Fig. 66.

5. Position the ribbon in the cylinder bore so that it extends the entire length of the piston at 90° from the piston pin location. Invert the piston and install it in the bore so that the end of the piston is about 1 1/2 inches below the top of the cylinder block and the piston pin is parallel to the crankshaft axis. Hold the piston and slowly pull the scale in a straight line with the ribbon, noting the pull required to remove the feeler ribbon (Fig. 67).

In Fig. 66 the diagonal lines represent feeler ribbons of various thicknesses, the horizontal lines represent the pounds pull, and the vertical lines represent the clearances. To determine the clearance, locate the line representing the pounds pull required to remove the feeler ribbon from the cylinder bore. Follow the horizontal line to the right until it intersects the diagonal line representing the feeler ribbon. Read down the vertical line for the clearance.

Example 1. If a 0.0015-inch feeler ribbon is used and it takes approximately 4 1/4-pounds pull to remove the feeler ribbon, the clearance is approximately 0.0008 inch. This is determined by locating the pounds pull (4 1/4) in Fig. 66 and following the line to the right until it intersects with the diagonal line representing the 0.0015-inch feeler ribbon. Read down the vertical line for the clear-

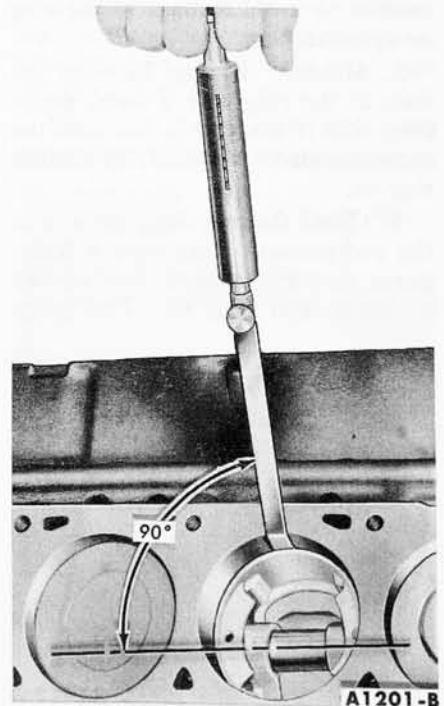


FIG. 67—Checking Piston Fit

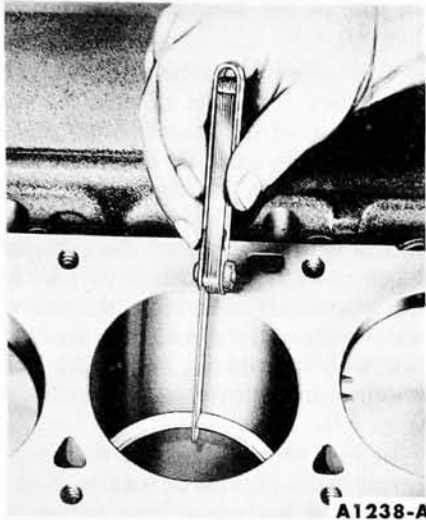


FIG. 68—Piston Ring Gap

ance (approximately 0.0008 inch).

Example 2. If a 0.003-inch feeler ribbon is used and it takes approximately 9-pounds pull to remove the ribbon, the resultant clearance is approximately 0.0015 inch.

FITTING PISTON RINGS

1. Select the proper ring set for the size piston to be used.
2. Position the ring in the cylinder bore in which it is going to be used.
3. Push the ring down into the cylinder bore area where normal ring wear is not encountered.
4. Use the head of a piston to position the ring so that the ring is square with the cylinder wall. Use **caution to avoid damage to the ring or cylinder bore.**
5. Measure the gap between the ends of the ring with a feeler gauge (Fig. 68). If the gap is less than the recommended lower limit, try another ring set.
6. Check the ring side clearance of the compression rings with a feeler gauge inserted between the ring and its lower land (Fig. 69). The gauge



FIG. 69—Ring Side Clearance

should slide freely around the entire ring circumference without binding. Any wear that occurs will form a step at the inner portion of the lower land. **If the lower lands have high steps, the piston should be replaced.**

FITTING PISTON PINS

The piston pin fit should be a light thumb press fit at normal temperature (70°F). Standard piston pins are coded green.

Pins of 0.001-inch oversize (color coded blue) and 0.002-inch oversize (color coded yellow) are available.

If the pin hole in the piston must be reamed, use an expansion-type piloted reamer. Place the reamer in a vise and revolve the piston around the reamer. Set the reamer to the size of the pin bore, then expand the reamer slightly and trial ream the pin bore. Take a light cut. Use a pilot sleeve of the nearest size to maintain alignment of the bores.

Check the hole size, using the new piston pin. If the bore is small, expand the reamer slightly and make another cut. Repeat the procedure until the proper fit is obtained. Check the piston pin for fit in the respective rod bushing. If necessary, ream or hone the bushing to fit the pin.

FLYWHEEL

REMOVAL

1. Disconnect the transmission from the engine and slide it to the rear as outlined in Part 5-4.
2. Remove the flywheel retaining bolts and remove the flywheel.

INSTALLATION

1. Install the flywheel on the crankshaft flange and install the retaining bolts. Torque the bolts in sequence across from each other to specifications.
2. Connect the transmission to the engine as outlined in Part 5-4.

OIL FILTER REPLACEMENT

1. Place a drip pan under the filter. Unscrew the filter from the adapter fitting. Clean the filter adapter recess.
2. Coat the gasket on the new filter with oil, and place the filter in position on the adapter (Fig. 70). Hand tighten the filter until the gasket contacts the adapter face, then advance it ½ turn.

COAT GASKET WITH ENGINE OIL

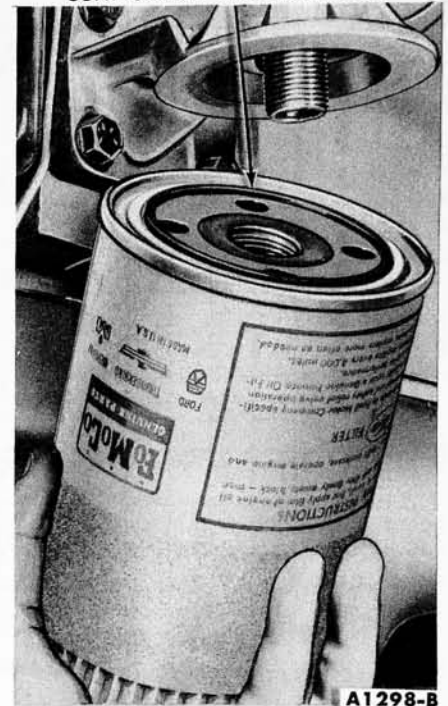


FIG. 70—Oil Filter Replacement

3. Operate the engine at fast idle and check for leaks. If oil leaks are evident, perform the necessary repairs to correct the leakage. Check the oil level and fill the crankcase if necessary.

OIL PAN AND OIL PUMP

REMOVAL

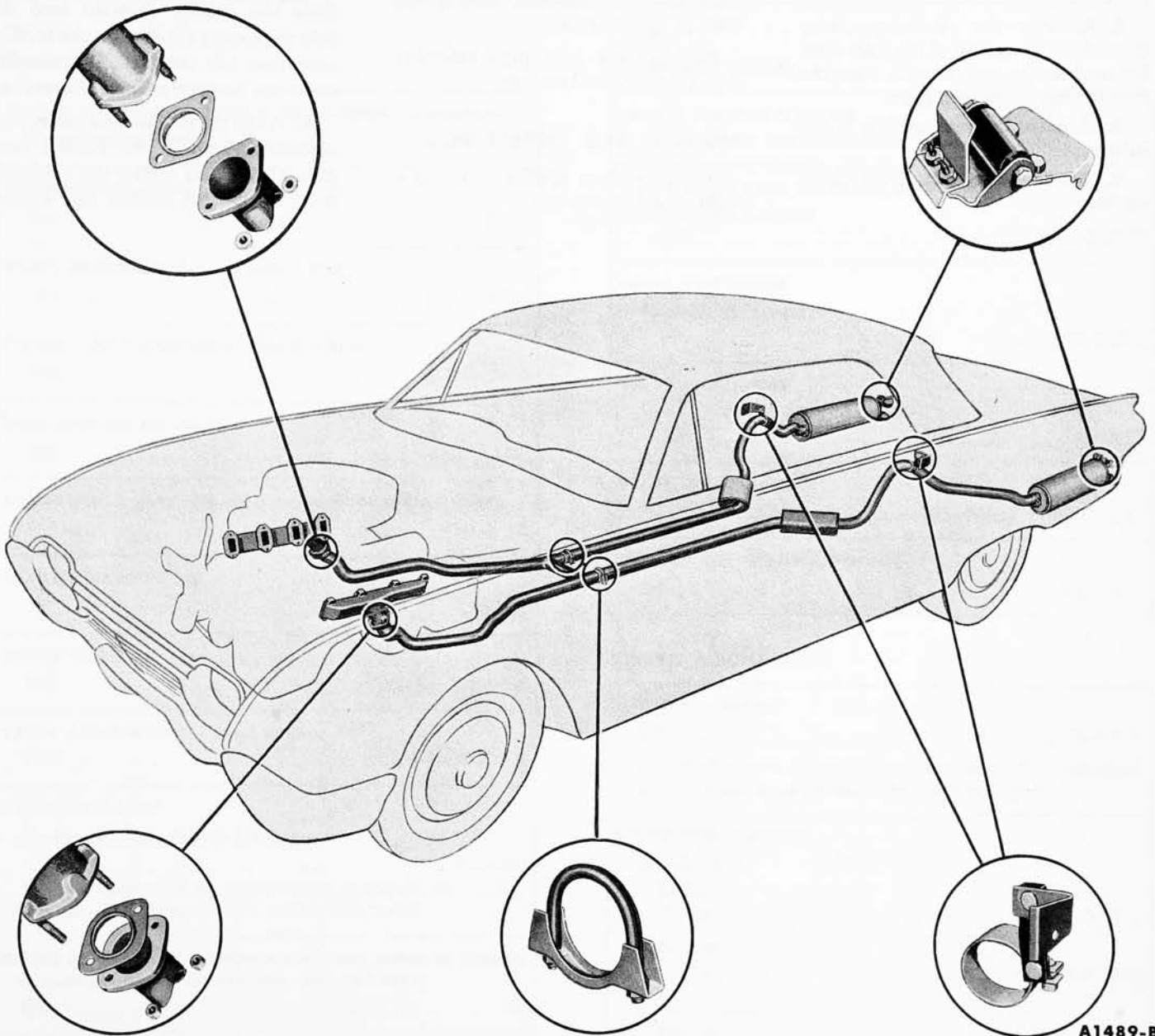
1. Drain the cooling system and the crankcase. Disconnect the radiator upper hose at the radiator supply tank.
2. Remove the oil pan retaining screws and lower the oil pan to the underbody cross member. Position the crankshaft so that the counterweight will clear the oil pan and move the pan forward.
3. Install the engine lifting brackets and sling. Raise the engine high enough to place tension on the engine mounts.
4. Remove the engine front insulator to engine retaining bolts. Raise the engine high enough to permit removal of the oil pump retaining bolts, then remove the bolts. Remove the oil pan and the oil pump.

INSTALLATION

1. Clean the oil pan and block gasket surfaces. Position a new gasket on the oil pan.
2. Clean the oil pump and inlet

PART**1-2****EXHAUST SYSTEM****Section****Page**

- | | | |
|---|---|------|
| 1 | Description..... | 1-41 |
| 2 | Inlet Pipe, Muffler, and
Outlet Pipe Replacement.. | 1-42 |

**FIG. 1—Exhaust System****1****DESCRIPTION**

A dual exhaust system (Fig. 1) is used on all Thunderbirds. The system consists of a separate muffler,

muffler inlet pipe rear section, and muffler outlet pipe for each exhaust manifold. The right and left muffler

inlet pipe front sections are a one-piece assembly and are serviced as such.

2 INLET PIPE, MUFFLER, AND OUTLET PIPE REPLACEMENT

MUFFLER INLET PIPE

The right and left muffler inlet pipe front sections are serviced as one piece.

1. Loosen the muffler inlet pipe front bracket clamp bolt and slide the clamp from the bracket. Disconnect the inlet pipes at the exhaust manifolds.

2. Remove the retaining clamp from the rear section of the inlet pipe. Disconnect the rear bracket from the rear section of the inlet pipe.

3. Remove the rear section of the inlet pipe.

4. Remove the inlet pipe front section.

5. Position the clamp on the rear section of the new inlet pipe. Connect the front and rear sections. Place a new gasket on the exhaust manifolds.

6. Position the inlet pipe assembly on the exhaust manifold studs and on the extension of the mufflers.

7. Connect the inlet pipe to the exhaust manifolds and torque the nuts to specifications.

8. Align the inlet pipe assembly and connect the brackets.

MUFFLER AND OUTLET PIPE

The procedure applies to either a right or left assembly.

1. Loosen the muffler inlet pipe rear clamp, then spread the clamp and slide it off the muffler.

2. Remove the lower half of the muffler rear clamp. Remove the muffler from the inlet pipe.

3. Position the new muffler and outlet pipe assembly on the inlet pipe. Slide the muffler forward into the inlet pipe until the slots in the muffler extension are blocked. The overlap must not be greater than 1¾ inches.

4. Align the muffler and outlet pipe assembly. Position the muffler inlet pipe clamp and install the retaining bolts. Install the muffler rear clamp.

1962 FORD THUNDERBIRD SHOP MANUAL

GROUP 2

IGNITION SYSTEM

	PAGE
PART 2-1 IGNITION SYSTEM MAINTENANCE.....	2-2
PART 2-2 DISTRIBUTOR.....	2-11
PART 2-3 SPECIFICATIONS.....	2-16

Buy Now

