1962-63 FORD

Econoline

and

FALCON CLUB WAGON

SHOP MANUAL SUPPLEMENT

1962-63

FORD ECONOLINE and FALCON CLUB WAGON

SHOP MANUAL SUPPLEMENT

GROUP INDEX

SERVICE DEPARTMENT
FORD DIVISION
Ford MOTOR COMPANY

FIRST PRINTING—SEPTEMBER, 1962

FOREWORD

The information in this supplement, when used with the 1961 Ford Econoline Shop Manual, provides the necessary information for servicing the 1962 and 1963 Ford Econoline and Ford Falcon Club Wagons. Complete 1962 and 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

1962 ECONOLINE IDENTIFICATION

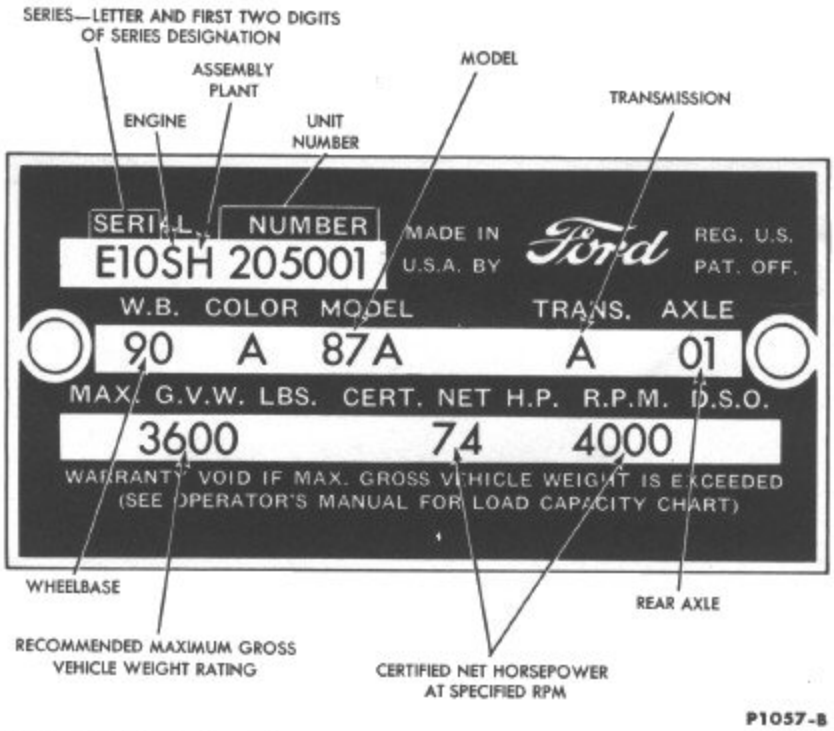

FIG. 1—1962 Rating Plate

RATING PLATE

The Econoline rating plate (Fig. 1) on 1962 models is located on the rear face of the left front door inner panel.

SERIAL NUMBER

The serial number identifies the vehicle series, engine type, assembly plant and consecutive unit number. The complete serial number, preceded and followed by asterisks is also stamped on various frame members.

SERIES AND MODEL CODES

Series	Models
E10	E103—Regular Pick-up
	E104—Heavy Pick-up
E11	E110—Falcon Station Bus
E12	E120—Falcon Club Wagon
E13	E130—Falcon Deluxe Club Wagon
E14	E143—Regular Van
	E144—Heavy Van

ENGINE TYPE

Code	Type
S	6-Cylinder 144 Cubic Inch
T	6-Cylinder 170 Cubic Inch
K	6-Cylinder 144 Cubic Inch (Low Compression Export)
M	6-Cylinder 170 Cubic Inch (Low Compression Export)

ASSEMBLY PLANT

H.....Lorain

UNIT NUMBER

A uniform serial number system has been developed to provide a means of identifying annual model year programs and extended production cycles of five or more years without the use of the current model year designation. Basically the system requires the monthly assignment of serial numbers into blocks.

August	205,000 thru 209,999
September	210,000 thru 219,999
October	220,000 thru 229,999
November	230,000 thru 239,999
December	240,000 thru 249,999
January	250,000 thru 259,999
February	260,000 thru 269,999
March	270,000 thru 279,999
April	280,000 thru 289,999
May	290,000 thru 299,999
June	300,000 thru 309,999
July	310,000 thru 319,999
August	320,000 thru 329,999
September	330,000 thru 339,999

VEHICLE DATA

W. B.

The wheelbase dimension in inches is entered in this space. The Falcon Bus wheelbase will not be recorded.

COLOR

Two-Tone paint codes use the same symbols as the single colors except that two symbols are used. A blank space indicates a special paint color.

Code	M-30-J Number	Color
A	1724	Black
B	556	Turquoise
C	1525	White
E	1448	Medium Blue Metallic
F	1449	Light Blue
G	1526	Chrome Yellow
J	1515	Red
L	1237	Dark Green
M	1238	Corinthian White
T	1543	Honey Beige
V	1024	Dark Blue
X	358	Yellow

MODEL

87A	Pick-up
89A	Van
89B	Falcon Bus

TRANSMISSION

A	Manual-Shift

AXLE

Code	Ratio
01	3.50
02	4.00

G.V.W.—H.P.—R.P.M.—D.S.O.

The Max. G.V.W. Lbs., Cert. Net H.P., and R.P.M. will not be shown for the Falcon Bus.

MAX. G.V.W. LBS.

The maximum gross vehicle weight in pounds is recorded in this space.

CERT. NET H.P. R.P.M.

The certified net horsepower at specified rpm is marked at this location.

D.S.O.

Trucks built to a Domestic Special Order have the order number stamped in this space. If the truck is a regular production unit, this space will be blank.

1963 ECONOLINE IDENTIFICATION

FIG. 2—1963 Rating Plate

RATING PLATE

Econoline rating plates for 1963 (Fig. 2) differ from the 1962 plates in two respects. A warranty number block replaces the serial number block, and a body type block is used to indicate the body used on the vehicle.
The complete official "serial number" is stamped on various frame members and body locations. Asterisks precede and follow the number.

WARRANTY NUMBER

The warranty number identifies the vehicle series, engine type, assembly plant location and unit number.

SERIES AND MODEL CODES

Series	Models
E10	E-100 Regular Pick-up
	E-104 Heavy Pick-up
E11	E-110 Std. Sta. Bus
E12	E-120 Cust. Sta. Bus
E13	E-130 Club Wagon
E14	E-143 Regular Van
	E-144 Heavy Van
E15	E-150 Heavy Pick-up
E16	E-160 Heavy Van

ENGINE TYPE

Code	Series
S	6-Cylinder 144 Cubic Inch
T	6-Cylinder 170 Cubic Inch
K	6-Cylinder 144 Cubic Inch (Low Compression Export)

ASSEMBLY PLANT

H	Lorain

UNIT NUMBER

A uniform serial number system has been developed to provide a means of identifying annual model year programs and extended production cycles of five or more years without the use of the current model year designation. Basically, the system requires the monthly assignment of serial numbers into blocks.

August	325,000 thru 329,999
September	330,000 thru 339,999
October	340,000 thru 349,999
November	350,000 thru 359,999
December	360,000 thru 369,999
January	370,000 thru 379,999
February	380,000 thru 389,999
March	390,000 thru 399,999
April	400,000 thru 409,999
May	410,000 thru 419,999
June	420,000 thru 429,999
July	430,000 thru 439,999
August	440,000 thru 449,999
September	450,000 thru 459,999

VEHICLE DATA

W.B.

The wheelbase dimension in inches is entered in this space. The Falcon Bus and Club Wagon wheelbase will not be recorded.

COLOR

Two-tone paint codes use the same symbols as the single colors except that two symbols are used. A blank space indicates a special paint color.

EXTERIOR PAINT COLOR CODES

M-30-J/M-32-J

Code	Specification Number	Color
A	1724	Raven Black
B	556	Carribean Turquoise
E	1448	Viking Blue
Y	1553	Glacier Blue
J	1515	Rangoon Red
L	1237	Holly Green
M	1238	Corinthian White
T	1543	Sandshell Beige
V	1024	Academy Blue
K	1618	Driftwood
S	1373	Mint Green

BODY CODES

ECONOLINE

87A	Standard Pick-up
87B	Custom Pick-up
89A	Standard Van
89E	Std. Van R.H. Fixed Window
89F	Std. Van R & L Fixed Windows
89G	Std. Van R & L Doors

FALCON STATION BUS AND CLUB WAGONS

89B	Standard Station Bus
89C	Custom Station Bus
89D	Club Wagon

TRANSMISSION

Code	
A	Manual-Shift

AXLE

Code	Ratio
01	3.50
02	4.00
03	3.80
04	4.50

NOTE: The following information does not apply to the Falcon Station Bus or Club Wagon warranty plates.

MAX. G.V.W. LBS.

The maximum gross vehicle weight in pounds is recorded in this space.

CERT. NET H.P. R.P.M.

The certified net horsepower at specified rpm is marked at this location.

D.S.O.

Trucks built to a Domestic Special Order have the order number and the District code number of the district which ordered the unit stamped in this space. If the truck is a regular production unit, only the District code 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	Buffalo	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

GROUP 1—ENGINES AND EXHAUST SYSTEM

The 1962 - 1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures in Group 1 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

ENGINE (PART 1-1)

CRANKCASE VENTILATION

All 1963 Econoline 144 and 170 engines are equipped with a positive crankcase ventilation system.

TUNE-UP

Clean Fuel Pump Sediment Bowl. The 1962 or 1963 fuel pump does not have a sediment bowl. Therefore, cleaning the sediment bowl and filter screen has been eliminated from the tune-up procedure.

Replace Fuel Filter. Remove and discard the filter clamps. Remove the filter, rubber sleeves, and fuel pump outlet fitting. Remove the screen from the outlet fitting. Clean and install the screen in the fitting. Install the fitting in the pump and position the rubber sleeves. Slide new clamps on the rubber sleeves. Position the new filter in the rubber sleeves so that the fuel flow arrow on the filter points away from the fuel pump. Slide the clamps into position and lock the clamps.

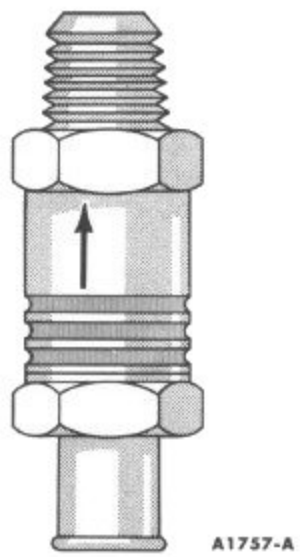

FIG. 3—Engine Ventilation Regulator Valve

Positive Crankcase Ventilation System. The regulator valve assembly is shown in Fig. 3.

CLEANING. Remove the crankcase ventilation regulator valve, tubing, connections and outlet adapter. Disassemble the regulator valve. Clean the valve, tubing, and outlet adapter in clean carburetor solvent and dry them with compressed air. Clean the rubber hose connections with a low volatile petroleum base solvent and dry them with compressed air.

Be sure the crankcase outlet adapter is not loose. To avoid restricting the ventilation system, do not install the adapter into the cylinder block more than ½-inch.

IN-CHASSIS REPAIR OPERATIONS

Camshaft Rear Bearing Bore Plug Replacement. Apply non-drying oil resistant sealer to the flywheel to crankshaft bolts before installing them.

Main and Connecting Rod Bearing Replacement.

MAIN BEARINGS. Numbers 1, 2, 3 and 4 main bearing lower inserts have no oil groove or hole in them. Numbers 1, 2 and 4 have two tangs on the inserts that match two slots in the caps.

A wider tang and slot is used in the number 3 lower bearing insert and cap than is used in the upper half.

Pistons and Connecting Rods. New pistons are used (Fig. 4). Refer to Group 15 for the revised service specifications.

WORK STAND REPAIR OPERATIONS

Crankshaft Installation. Numbers 1, 2, 3 and 4 main bearing lower inserts have no oil groove or hole in them. Numbers 1, 2 and 4 have two tangs on the inserts that match two slots in the caps.

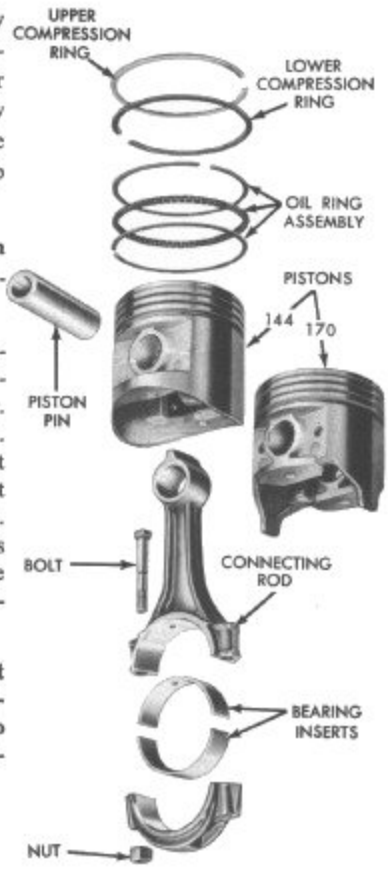

FIG. 4—Piston, Connecting Rod and Related Parts

A wider tang and slot is used in the number 3 lower bearing insert and cap than is used in the upper half.

Apply non - drying oil resistant sealer to the flywheel to crankshaft bolts before installing them.

EXHAUST SYSTEM (PART 1-2)

New muffler and muffler inlet pipe heat shields are used on the Econoline Van and Bus, and on the Falcon Club Wagon. The 1961 service procedures are not affected.

GROUP 2—IGNITION SYSTEM

The 1962 - 1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The ignition system service procedures outlined in Group 2 of the 1961 Shop Manual remain the same for 1962 and 1963.

GROUP 3—FUEL SYSTEM

The 1962 - 1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures in Group 3 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

FUEL SYSTEM AND AIR CLEANER MAINTENANCE (Part 3-1)

FUEL FILTER REPLACEMENT

The fuel filter is located in the fuel pump outlet line. There is no provision for cleaning the filter. Replace it if it becomes clogged and at the recommended interval.

1. Remove and discard the filter clamps. Remove the filter, rubber sleeves, and fuel pump outlet fitting.

2. Remove the screen from the outlet fitting. Clean and install the screen in the fitting. Install the fitting in the pump and position the rubber sleeves.

3. Slide new clamps on the rubber sleeves. Position the new filter in the rubber sleeves so that the fuel flow arrow on the filter points away from the fuel pump. Slide the clamps into position and lock the clamps.

4. Start the engine and check the fuel line for leaks.

OIL BATH AIR CLEANER—1963

The engine is equipped with an oil bath carburetor air cleaner (Fig. 5) that has a removable filter element.

REMOVAL

Remove the wing nut retaining the air cleaner to the carburetor and remove the air cleaner.

INSTALLATION

Position the air cleaner on the carburetor with the word "FRONT" toward the front of the engine. **Make certain the air cleaner is properly seated on the gasket.** Install the cover and wing nut.

MAINTENANCE

Refer to Group 14 for the recommended maintenance mileage interval.

1. Remove the cover and drain the oil from the reservoir. Wash all the air cleaner parts in a suitable cleaning solvent. Dry them with compressed air.

2. Inspect the gasket between the oil reservoir chamber and cleaner body and replace it if necessary.

3. Saturate the filter element with engine oil.

4. Fill the oil reservoir to the full mark with the recommended engine oil.

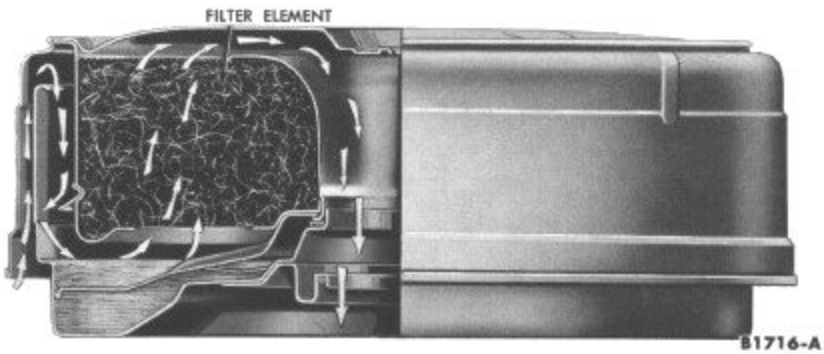

FIG. 5—Oil Bath Air Cleaner

CARBURETOR IN-CHASSIS ADJUSTMENTS

THROTTLE LINKAGE

With the accelerator pedal fully depressed to the wide open throttle position, make the following adjustments:

1. Adjust the accelerator pedal connecting rod at the equalizer to obtain a distance of 1⅝ inches between the engine rear cover panel and the equalizer (Fig. 6).

2. Adjust the carburetor connecting rod at the equalizer to obtain full throttle plate opening.

FORD SINGLE-BARREL—1963

All carburetor in-chassis adjustments, with the exception of the "Final (Hot) Engine Idle and Fuel Mixture" adjustments, can also be performed as bench adjustments, with the carburetor removed from the engine.

Idle Adjustments. A stop screw at the throttle lever flange of the carburetor (Fig. 7) controls the engine idle speed. Turn the screw outward to increase the engine idle speed and inward to decrease the engine idle speed. Make the idle adjustments in the sequence listed.

INITIAL CURB IDLE. The initial curb idle adjustment will automatically set the fast idle rpm required.

Position the choke control lever so that the choke plate is fully open. Seat the throttle plate in the throttle bore. Set the idle adjusting screw to just make contact with the cam contour; then, turn the screw outward an additional turn.

The "Final (Hot) Engine Idle and Fuel Mixture" adjustments provide the specified rpm required for the vehicle.

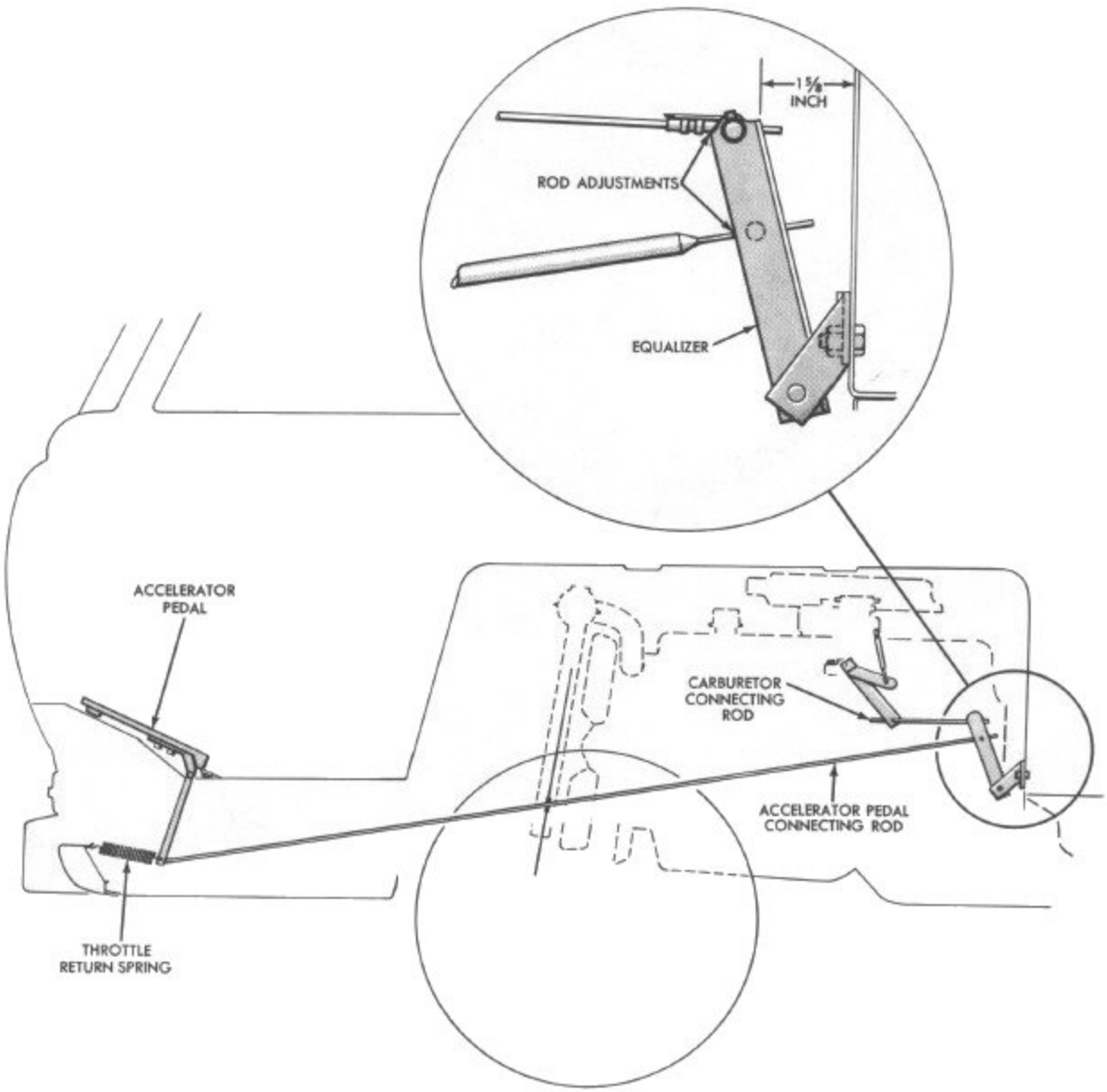

FIG. 6—Throttle Linkage

FINAL (HOT) ENGINE IDLE AND FUEL MIXTURE

1. Place the transmission selector lever in neutral position and set the parking brake.

2. Operate the engine at fast idle until the temperature has stabilized (approximately 1200 rpm for 30 minutes).

3. Attach a tachometer to the engine.

Turn the idle speed "stop" screw in a direction to obtain the specified rpm. Open the throttle by hand and allow it to close normally. Recheck the engine idle speed.

Final engine idle speed may be varied to suit the conditions under which the vehicle is to be operated.

4. Remove the tachometer if the idle fuel mixture is not going to be adjusted. If the idle fuel mixture is to be adjusted, leave the tachometer installed so that the idle speed can be checked after the mixture has been adjusted.

IDLE MIXTURE. The idle fuel mixture is controlled by the idle mixture adjusting screw (Fig. 8). Turn the screw inward to lean the mixture, and outward to enrich the mixture.

1. Adjust the engine idle speed.

2. Make the initial mixture adjustment by turning the screw inward until it lightly touches its shoulder seat; then, back it off the specified number of turns.

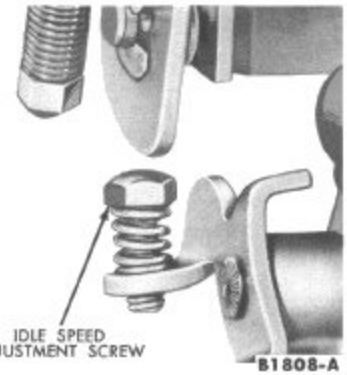

FIG. 7—Ford Single-Barrel Idle Speed Adjustment

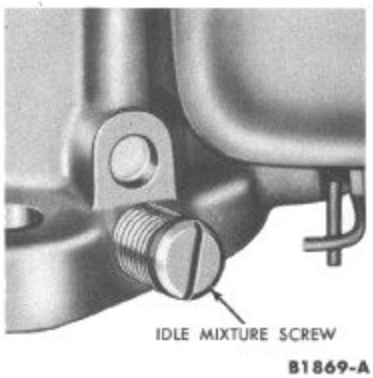

FIG. 8—Ford Single-Barrel Idle Fuel Mixture Adjustment

3. Be sure the engine is at normal operating temperature.

4. Turn the mixture screw inward until the engine begins to run rough. Turn the screw outward until the engine begins to run rough; then, turn the screw inward until the engine runs smoothly. **Always favor a rich mixture rather than a lean mixture.**

5. Re-check the engine idle speed and adjust it, if necessary.

Accelerating Pump Adjustments

1. Insert the roll pin in the lower hole ("HI") position in the lever stop hole.

2. Position the throttle and choke linkage so that the throttle plate will seat in the throttle bore. Hold the throttle plates in the closed position. Position a gauge or drill of the specified thickness between the roll pin and the cover surface. Bend the accelerating pump actuating rod at the existing bends to obtain the specified gauge or drill clearance between the pump cover and the roll pin in the pump lever (Fig. 9).

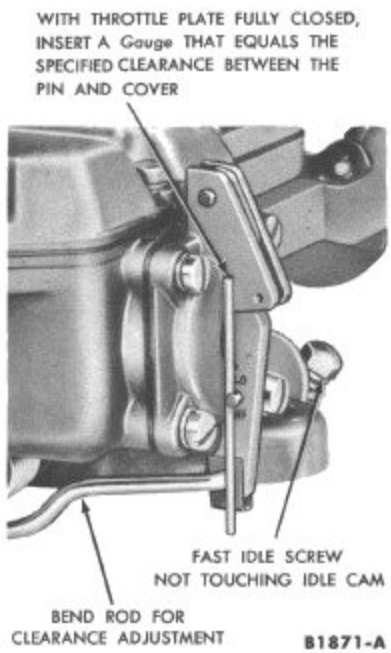

FIG. 9—Ford Single-Barrel Accelerating Pump Adjustment

Acceleration requirements in various climates are satisfied by controlling the amount of fuel discharged by the accelerating pump. The pump stroke is controlled by changing the location of the roll pin in the lever stop hole (Fig. 10).

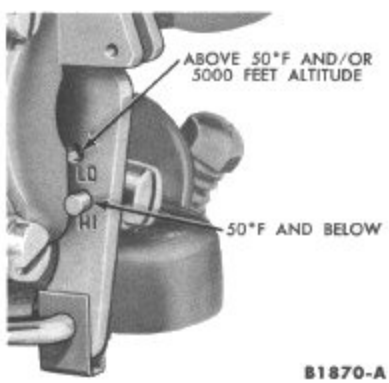

FIG. 10—Ford Single-Barrel Accelerating Pump Lever Adjustment

For operation in ambient temperatures 50°F and below, place the roll pin in the hole of the pump operating lever marked "HI" (lower-hole). For best performance and economy at normal ambient temperatures and high altitude (above 50°F and/or above 5,000 feet altitude), place the roll pin in the "LO" (upper) hole of the lever.

Manual Choke Adjustment. Place the choke linkage in the full-choke position. Insert a drill or gauge of the specified size between the choke plate and the inside of the air horn; then, while maintaining the full-choke position, adjust the choke pull-down nut to just contact the swivel on the cam lever (Fig. 11).

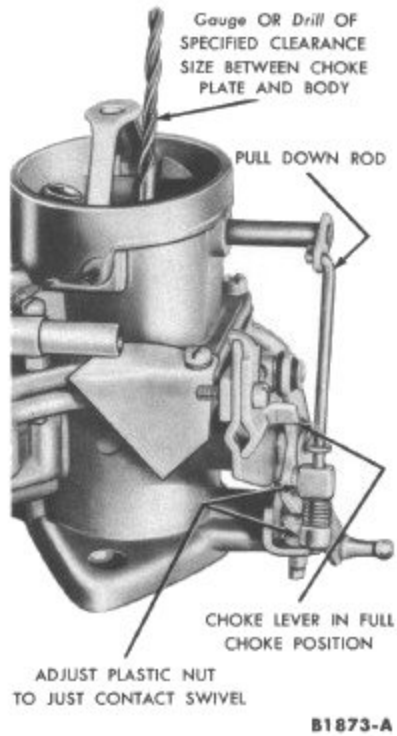

FIG. 11—Ford Single-Barrel Manual Choke Pull-Down Adjustment

Float Adjustment

1. With the carburetor upper body and mounting gasket removed from the carburetor assembly, turn the upper body upside down.

2. Measure the distance from the gasket surface of the upper body to the crown (extreme top) of the float (Fig. 12). If the float adjustment is not within the specified dimension, bend the float arm tab, as necessary, to obtain the specified dimension. **Do not apply pressure on the fuel inlet needle. The viton tip of the fuel**

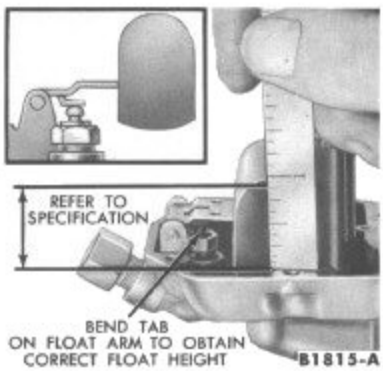

FIG. 12—Float Adjustment

inlet needle may be damaged through undue pressure exerted on it and thus cause an improper fuel level within the bowl.

CARBURETOR (Part 3-2)

CARBURETOR OPERATION—FORD SINGLE-BARREL

The 1963 Ford Single-Barrel Carburetor is used on the Econoline 144 and 170 engines (Fig. 13).

The carburetor consists of two main assemblies, the main (upper) body and the throttle (lower) body.

The upper body assembly contains the major metering components of the carburetor; the main and idle fuel, power valve, float chamber vent and fuel inlet systems.

The lower body assembly contains the fuel bowl, accelerating pump assembly, idle mixture adjusting screw and spark valve.

A manual choke system is standard equipment on all models.

The engine speed is regulated by controlling the proportion of fuel and air mixture delivered to the cylinders for all engine operating conditions. Operation is based on the principle of pressure differences or "vacuum".

Air is drawn into the carburetor air horn by manifold vacuum. As the air passes through the carburetor on its way to enter the cylinders, lower pressure is created at the fuel discharge outlets of the carburetor. The fuel bowl is vented to atmospheric pressure through a vent hole in the upper body assembly. The higher air pressure exerted on the fuel in the bowl forces the fuel to travel up through the fuel discharge channels and out into the air stream passing through the carburetor. The fuel and air is mixed at this point and distributed into the engine cylinders for burning.

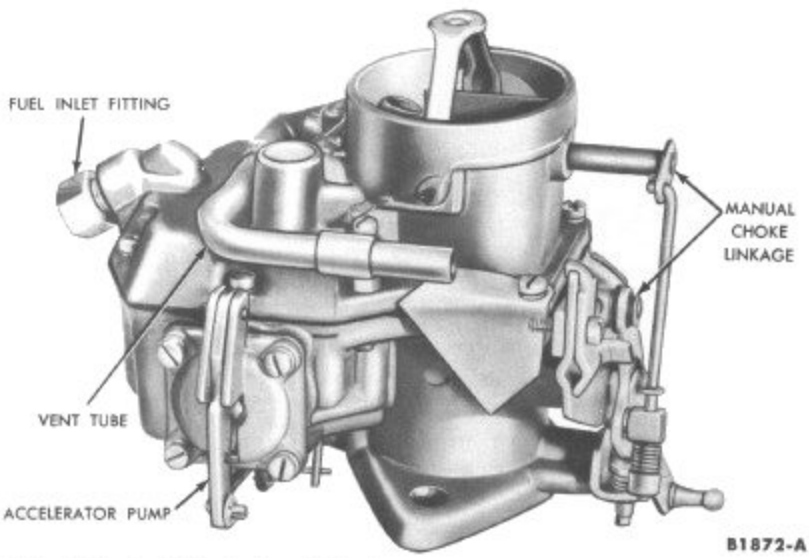

FIG. 13—Ford Single-Barrel Carburetor

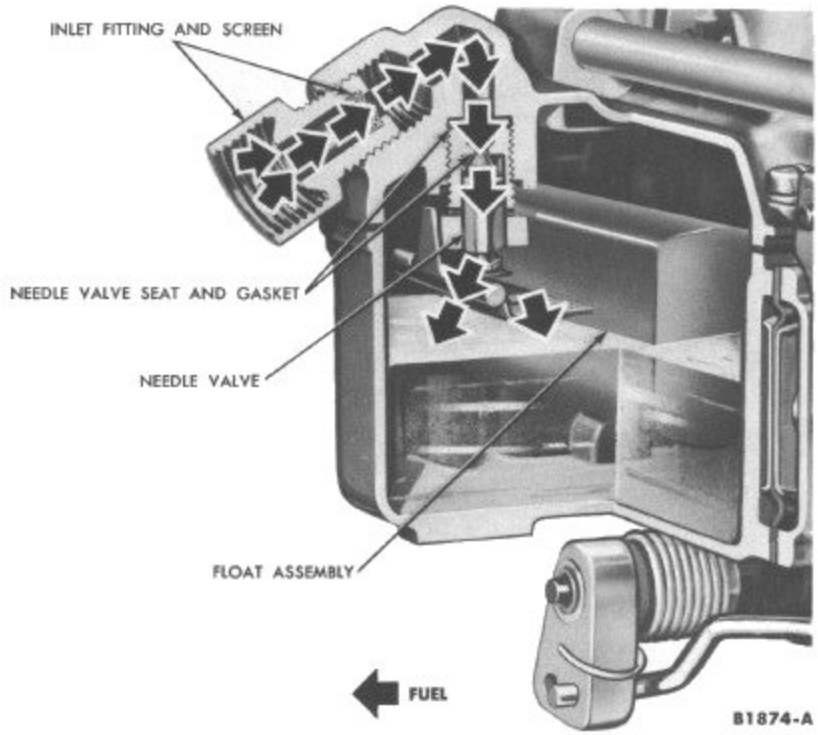

FIG. 14—Fuel Inlet System

FUEL INLET SYSTEM

The fuel inlet system (Fig. 14) of the carburetor maintains a predetermined fuel level within the fuel bowl. **The fuel level within the bowl is extremely important to carburetor calibration.** If the level of the fuel within the bowl is below the specified setting, a lean fuel-air mixture will result. A richer fuel-air mixture will occur from a high fuel level. The entire calibration of the

carburetor is disturbed if the fuel level is not set as specified.

Fuel enters the fuel bowl through the fuel inlet needle valve and seat assembly. The amount of fuel entering is regulated by the distance the needle valve is moved off the seat and by fuel pump pressure. **Correct fuel pump pressure is important if the carburetor wet fuel level is to be maintained within the specified limits.**

The fuel level is maintained at a predetermined level by the float and lever assembly which controls the movement of the needle valve. The needle valve, riding on the tab of the float and lever assembly, reacts to any change in height of the float and the fuel level.

IDLE FUEL SYSTEM

The idle system (Fig. 15) functions when the engine is operating at low rpm. It supplies the fuel-air mixture when the air flow through the carburetor venturi is insufficient to operate the main metering system.

The range of the idle system will extend into the operation of the main metering system. Fuel will flow from the main well up the idle well and through the calibrated idle jet. Filtered air from the carburetor air horn enters the idle air bleed restriction and mixes with the fuel. The air bleed restriction also serves as a vent to prevent syphoning of fuel at high speeds or when the engine is shut off. The fuel-air mixture then passes down through an idle channel restriction and is transferred to the idle channel in the lower body assembly. The fuel-air mixture passes down the idle channel, past 2 idle transfer holes, to the idle mixture adjusting screw. The idle transfer holes act as additional air bleeds at normal idle. At idle, fuel-air mixture passes through drilled holes in the adjusting screw and is discharged below the throttle plate. The amount of mixture to be discharged is determined by the position of the idle screw in the lower body passage.

During off-idle operation, when the throttle plate is moved past the idle transfer holes, each hole begins discharging fuel as it is exposed to the lower air pressure (manifold vacuum). Continued opening of the throttle plate increases engine rpm and air flow through the carburetor. The greater air flow through the booster venturi causes a pressure drop in the venturi great enough to

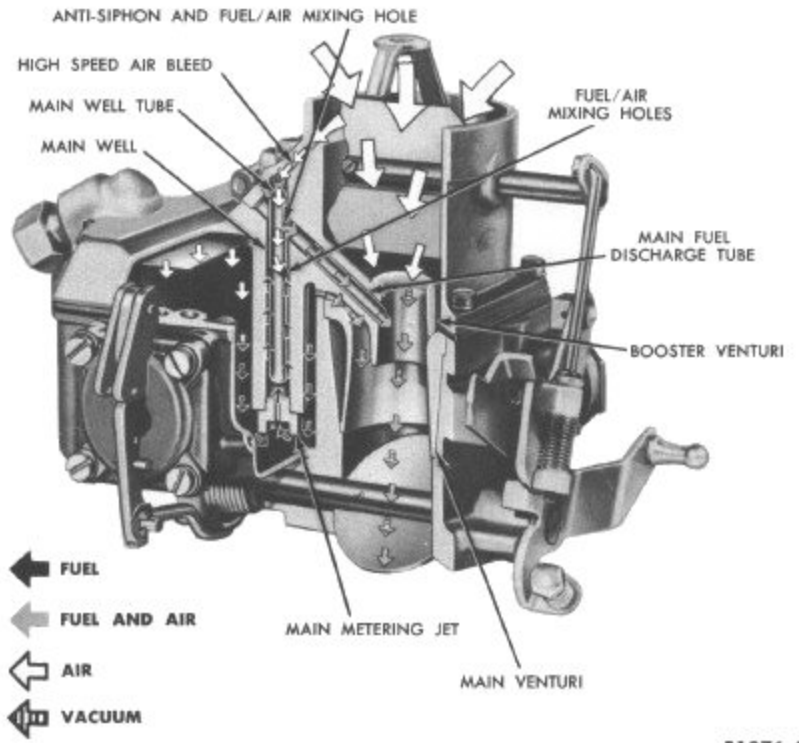

FIG. 16–Main Metering System

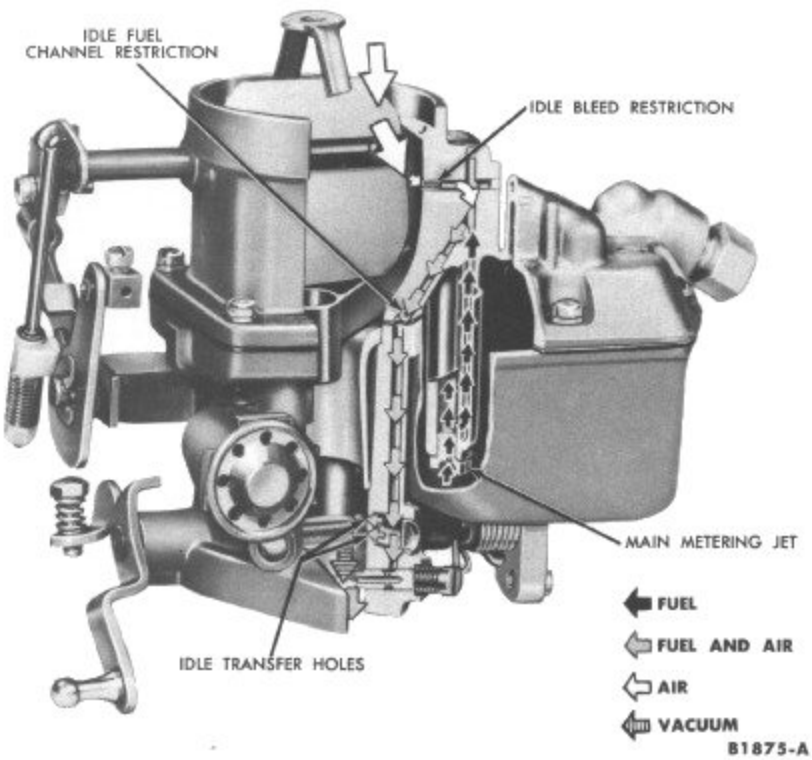

FIG. 15–Idle Fuel System

bring the main fuel metering system into operation as the idle fuel metering system tapers off.

MAIN FUEL METERING SYSTEM

The main fuel metering system (Fig. 16) supplies the fuel required for engine operation during the cruise, part or full throttle range. The system begins to function when the air flow through the carburetor venturi creates a sufficient vacuum to start fuel flowing in the main system. The vacuum at the discharge nozzle will increase as the air flow increases. The faster the engine operates, the more fuel will flow through the main fuel system.

Fuel entering the main jet, located at the bottom of the main well, flows up toward the main nozzle. The main well tube is inserted within the main well. Air from the high speed bleed channel enters the main well tube through a calibrated restriction at the top of the tube. The air passes through holes spaced along the tube, mixing with the fuel flowing up the main well. The fuel and air mixture being lighter than solid fuel, responds faster to changes in venturi pressures. The mixture continues flowing up the main well to the anti-syphon bleed. More air is introduced at the anti-syphon bleed to the fuel and air mixture which is then discharged from the main nozzle. The fuel is mixed with the filtered air moving past and through the booster venturi.

The anti-syphon bleed also acts as a vent to prevent syphoning of fuel at low engine speeds.

ACCELERATING PUMP SYSTEM

Smooth acceleration requires a momentary increase in the supply of fuel. The air flow through the carburetor responds almost immediately to any increase in carburetor throttle valve opening. The fuel within the metering passages will lag momentarily in its response to the pressure difference created by this increased air flow. This lag in fuel response will cause a temporary leanness in the fuel-air mixture that results in a hesitation in engine acceleration. A mechanically operated accelerating pump system (Fig. 17) supplies added fuel to provide a proper fuel-air mixture for this brief period of time.

The accelerating pump, located on the side of the lower body assembly, is actuated by linkage connected to the throttle shaft. When the throttle is opened on acceleration, the diaphragm forces fuel from the accelerating pump chamber into the discharge channel. The inlet ball check closes to prevent a reverse flow of fuel. Fuel under pressure forces the discharge ball check and the weight off its seat allowing fuel to pass up to the discharge nozzle. The fuel is sprayed from the nozzle into the air stream above the main venturi.

When the throttle plate is closed on deceleration, a return spring forces the diaphragm back drawing fuel through the inlet channel. The inlet ball check opens allowing fuel to pass into the chamber while the discharge ball check closes preventing entry of air. A bleed hole is located in the body casting to allow vapor and excess pressure to escape from the diaphragm chamber.

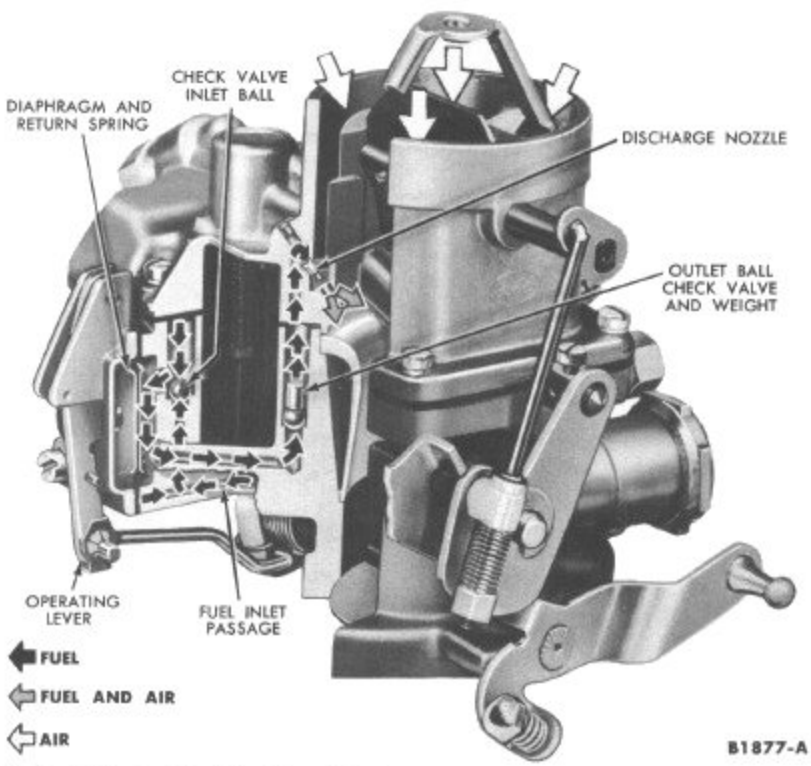

FIG. 17—Accelerating Pump System

POWER FUEL SYSTEM

When the engine is required to deliver more power to meet an increased road load demand or wide-open throttle operation, the carburetor must deliver a richer fuel-air mixture than supplied during the operation of the main fuel system. When the engine is running under a high power demand, intake manifold vacuum is low. The vacuum below the carburetor throttle plate approximates intake manifold vacuum. The carburetor power valve (Fig. 18) will open when the manifold vacuum drops below a predetermined value. The fuel-air mixture is thus automatically enriched to meet the increased engine power demands.

Manifold vacuum is transmitted from an opening below the throttle plate through a channel to the upper body assembly and to the top of the power valve piston. At idle and normal engine speeds the manifold vacuum is great enough to hold the power valve piston up.

The power valve rod is connected to the piston. The foot of the rod controls the spring-loaded power valve ball check. With the piston held up by manifold vacuum, the ball check closes the power jet inlet channel.

A power valve spring is located on the rod. The spring is shim calibrated to overcome the vacuum above the piston when manifold vacuum drops below a predetermined level. Upon demand for more power, the mani-

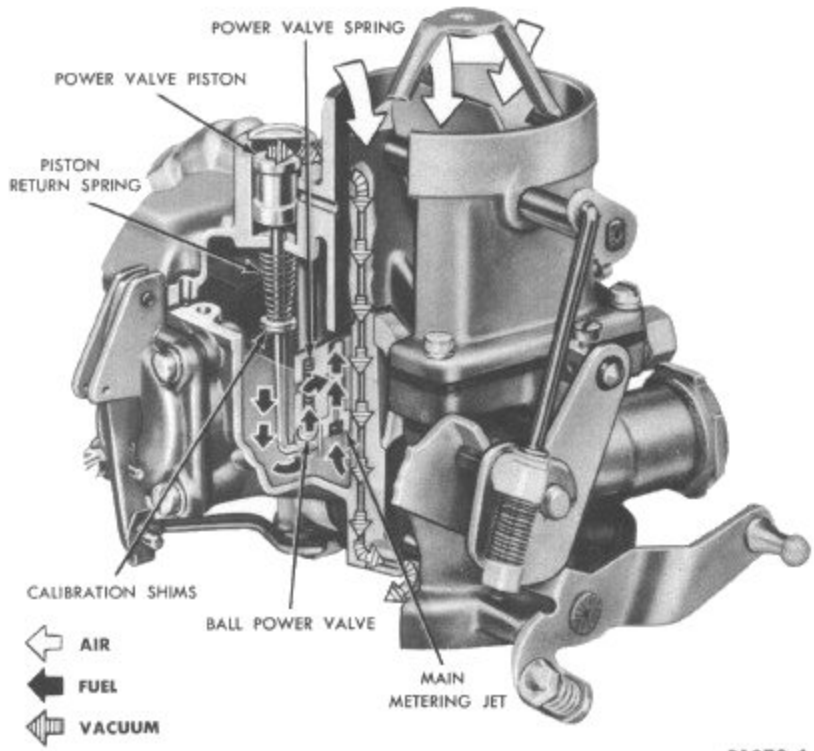

FIG. 18—Power Valve and Fuel Enrichment System

fold vacuum drops below this level. The spring tension moves the rod down and allows the power valve ball check to drop and open the power jet inlet passage. Air pressure above the fuel bowl forces fuel to flow through the power jet, adding to fuel in the main fuel system, enriching the fuel-air mixture.

As the demand for power decreases and manifold vacuum increases, the vacuum above the piston overcomes the spring tension. The piston and rod move up and the ball check closes the power jet channel.

FUEL BOWL VENT SYSTEM

The fuel bowl requires venting to provide proper operation for the various systems. Fuel vapors may form in the fuel bowl when a hot engine is stopped, idling, or operating at very low speeds. By venting the fuel bowl to the atmosphere by means of a tube, engine performance is improved. At higher engine speeds, venting to the carburetor air horn prevents undue calibration changes due to normal air cleaner contamination.

SPARK CONTROL VALVE SYSTEM

The degree of spark advance in the distributor is determined by the strength of the vacuum acting on the distributor diaphragm. Vacuum to the distributor diaphragm is the result of a combination of venturi vacuum and manifold vacuum.

Venturi vacuum is available to the distributor through the pick-up tube in the carburetor main venturi. Manifold vacuum enters a hole above the throttle plate (Fig. 19) and is channeled to the spark valve. In normal operation, the combination of manifold vacuum, a calibrated spring in the spark valve, and atmospheric pressure holds the spark valve open. With the valve open, manifold vacuum aids the venturi vacuum for distributor advance.

When accelerating, manifold vacuum momentarily drops below a predetermined point and the calibrated spring closes the spark valve, shutting off manifold vacuum to the distributor to retard the spark timing. Venturi vacuum prevents full-spark retard. The spark valve opens as manifold vacuum increases; therefore, the distributor advance is increased for more efficient operation.

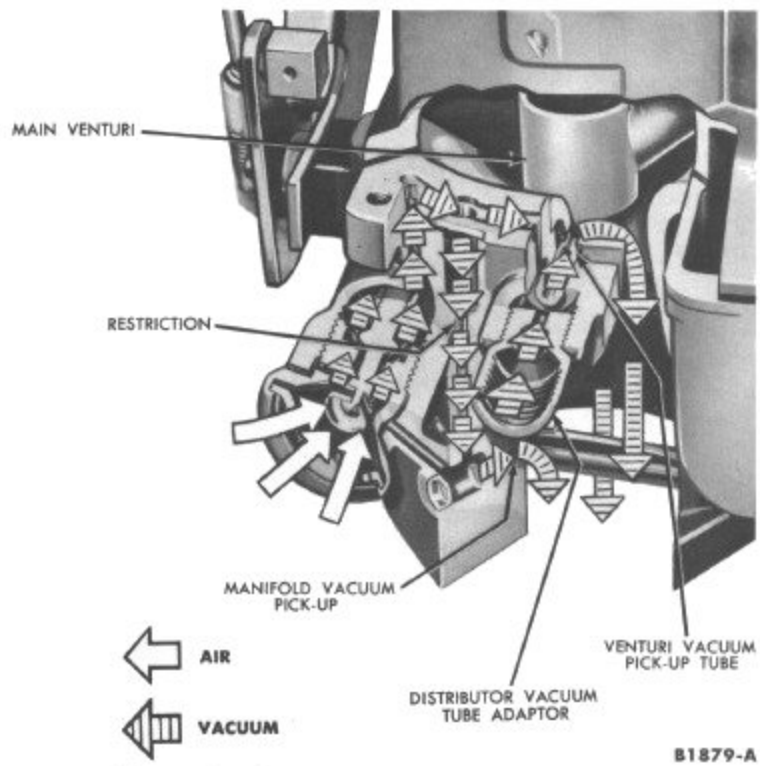

FIG. 19—Spark Control Valve System

CARBURETOR REMOVAL AND INSTALLATION—FORD SINGLE-BARREL

CARBURETOR REMOVAL

1. Remove the air cleaner.
2. Disconnect the accelerator rod, choke control cable, fuel line, and the distributor vacuum line.
3. Remove the carburetor and gasket from the intake manifold spacer. Discard the gasket.

INSTALLATION

1. Clean the gasket surface of the carburetor and spacer. Position a new gasket on the spacer.
2. Install the carburetor and tighten the retaining nuts.
3. Connect the choke and throttle linkage to the carburetor. Adjust the cable and linkage, if necessary.
4. Connect the fuel inlet line and the distributor vacuum line. Install the air cleaner.
5. Adjust the idle fuel mixture and engine idle speed.

IN-CHASSIS ADJUSTMENTS

The carburetor "In-Chassis Adjustments" are covered in this group.

CARBURETOR DISASSEMBLY, CLEANING AND INSPECTION AND ASSEMBLY

FORD SINGLE-BARREL—1963

Carburetor Disassembly. A disassembled view of the carburetor is shown in Fig. 20.

Use a separate container for the component parts of the various assemblies to facilitate cleaning, inspection, and assembly.

MANUAL CHOKE LINKAGE

1. Depress the tangs on the fast idle cam lever retainer and remove the retainer from the stud.
2. Remove the fast idle cam lever and the rod assembly from the stud. Move the lever and the rod assembly clockwise and remove it from the choke shaft lever.
3. Remove the rod adjusting nut and the spring from the rod. Slide the rod out of the swivel.
4. Remove the fast idle cam stud and the choke cable bracket assembly from the body.

FUEL VENT TUBE

Remove the screw from the tube retaining clip. Remove the tube from the upper body by pulling it outward with a twisting motion.

UPPER AND LOWER BODY

1. Remove the upper to lower body retaining screws. Separate the upper body assembly, gasket, and lower body assembly.
2. Invert the lower body assembly and allow the accelerating pump discharge weight and ball check, the accelerating pump inlet ball check to fall into the hand.

UPPER BODY

1. Remove the float retaining pin and the float assembly.
2. Remove the fuel inlet needle valve. Remove the needle valve seat and gasket.
3. Remove the main jet.
4. Remove the fuel inlet fitting and the screen assembly.
5. If it is necessary to remove the air cleaner bracket retaining roll pins, use pliers. Turn them in a direction that will coil the pins to a smaller diameter. If they offer resistance to turning, turn them in the opposite direction. Pull the bracket out of the retaining channels.
6. If it is necessary to remove the choke plate and shaft, lightly scribe the choke plate along the choke shaft so that the choke plate can be installed in the same position during installation.

Remove the choke plate screws. The retaining screws are staked in the choke shaft. Use care to prevent damage to the choke shaft, plate and venturi while filing the screws. Remove the choke plate from the top of the air horn by sliding the plate out of the shaft. Slide the shaft out of the body.

LOWER BODY

1. Remove the accelerating pump lever to throttle shaft retaining ring and washer. Remove the lever and the overtravel spring from the throttle shaft.
2. Remove the accelerating pump cover retaining screws. Remove the cover assembly from the body. Separate, if necessary, the pump diaphragm and spring from the cover or body.
3. Depress the tab on the accelerating pump lever and rod retaining clip and slide the rod out of the lever. Remove the clip from the lever.
4. Remove the distributor vacuum outlet adaptor.
5. If the carburetor is equipped with a spark valve, remove the spark valve and the gasket.
6. Remove the idle mixture adjusting screw and spring.
7. If it is necessary to remove the throttle plate and shaft, lightly scribe the throttle plate along the throttle shaft so that the throttle plates can be installed in the same position during installation.
8. Remove the throttle plate retaining screws and slide the plate out of the shaft. **The retaining screws are staked to the throttle shaft.** If the tips of the screws are flared excessively, file off the flared portion to avoid damage to the threads in the throttle shaft. Be careful not to damage the throttle shaft or venturi while filing the screws.
9. Remove the overtravel spring tension pin from the throttle shaft and slide the shaft out of the body.

Carburetor Cleaning and Inspection. The cleaning and inspection of only those parts not included in the carburetor overhaul repair kit are covered. All gaskets and parts included in the repair kit should be installed when the carburetor is assembled and the old gaskets and parts should be discarded.

The power valve is factory calibrated to each casting and care must be exercised not to bend or distort the rod. **Do not remove the shims for cleaning or overhaul operations.**

Wash all the carburetor parts (except the accelerating pump diaphragm) in clean commercial carburetor cleaning solvent. If a commercial solvent is not available, lacquer thinner or denatured alcohol may be used. Rinse the parts in kerosene to remove all traces of the cleaning solvent. Be sure all dirt, gum, carbon, and other foreign matter are removed from all parts. Dry them with compressed air. Wipe all parts that can not be immersed in solvent with a clean, soft, dry cloth.

Force compressed air through all passages of the upper and lower carburetor bodies. Do not use a wire brush to clean any parts, or a drill or wire to clean out any openings or passages in the carburetor. A drill

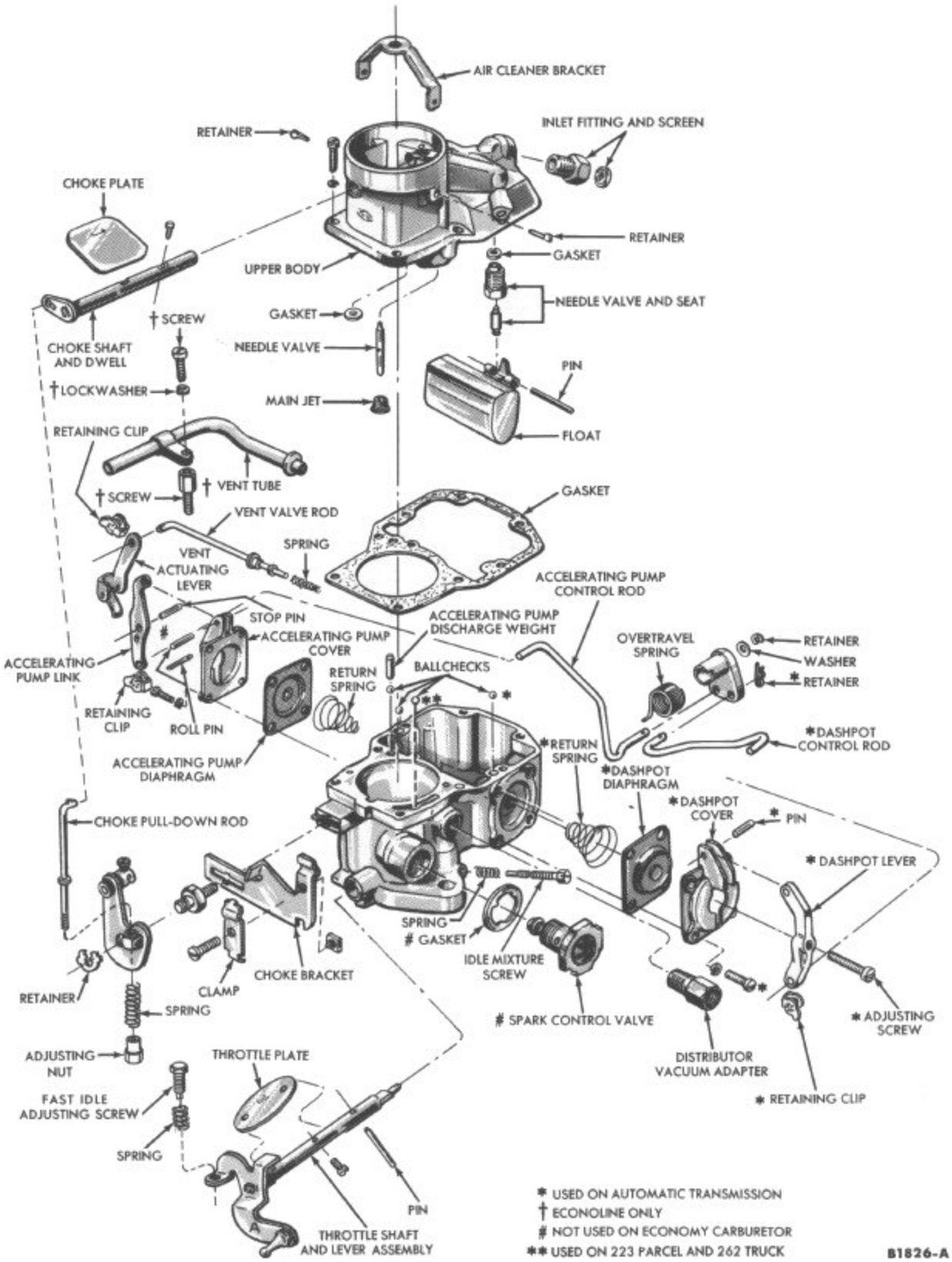

FIG. 20—Ford Single-Barrel Carburetor—Disassembled

or wire may enlarge the hole or passage, changing the calibration of the carburetor.

Check the choke shaft for grooves, wear, and excessive looseness or binding. Inspect the choke plate for nicked edges and ease of operation and free it if necessary.

Check the throttle shaft in its bore for excessive looseness or binding and check the throttle plate for burrs which prevent proper closure. If the throttle shaft and plate are not serviceable, it will be necessary to replace the carburetor.

Inspect the upper and lower carburetor body for cracks and stripped threads. Repair or replace the castings if damage is found.

Check the power valve for free movement of the piston and rod assembly. Also, check the power valve ball check for proper seating by immersing the upper body assembly in mineral spirits or hydraulic valve lifter checking fluid, and holding a finger over the main jet hole (jet removed). Hold the power valve rod upward. Turn the upper body assembly right side up and remove it from the liquid container. Check for a leak from the bottom of the power valve and seat.

Check the needle tip for damage or looseness. Replace the float if the arm needle contact surface is grooved or damaged. If the float is serviceable, polish the needle contact surface of the arm. Replace the float shaft if it is worn or damaged.

Replace all screws and nuts that have stripped threads.

Replace all distorted or broken springs.

Inspect all gasket mating surfaces for nicks and burrs. Repair or replace any parts that have a damaged gasket surface.

Carburetor Assembly. A disassembled view of the carburetor is shown in Fig. 20.

UPPER BODY

1. If the choke plate and the shaft were removed, insert the choke shaft assembly into the air horn, with the lever pointing toward the accelerating pump side of the carburetor.

Refer to the line previously scribed on the choke plate and insert the choke plate into its original position with the plate indentation facing upward and toward the accelerating pump side of the carburetor. Install the choke plate retaining screws snug, but not tight.

Check for proper plate fit, binding in the air horn and free rotation of the shaft by moving the plate from the closed position to the open position. If it moves freely, tighten the 2 choke plate screws while holding the plate in the fully closed position. Stake the screws. **When staking the screws, support the shaft and plate on a block of wood or a metal bar to prevent bending of the shaft.**

2. Install the fuel inlet screen and adapter in the fuel inlet of the body.

3. Install the main jet in the main fuel well.

4. Install the needle valve seat gasket and the seat within the tapped seat hole. Tighten the needle valve seat firmly. Insert the needle valve into the needle valve seat, with the viton tip toward the seat. **Use care to prevent damage to the tip.**

5. Position the float assembly in the body, with the tab on the arm located over the needle valve and the hinge of the arm lined up between the hinge bracket holes in the upper body casting. Insert the float hinge pin through the holes in the upper body and the float assembly.

6. Check the float setting. Refer to "Carburetor In-Chassis Adjustments" in this group of the manual.

7. Insert the air cleaner bracket in the channels of the air horn and install the bracket retaining pins.

LOWER BODY

1. If the throttle plate and shaft were removed, slide the throttle shaft into the lower body, with the lever on the throttle shaft located opposite the fuel bowl.

Refer to the line previously scribed on the throttle plate and insert the plate through the slot in the throttle shaft. The plate indentation must face the bottom of the body and point toward the accelerator pump side. Install the throttle plate screws snug, but not tight.

Rotate the throttle shaft while lightly slapping the throttle plate within the throttle bore. Check for free rotation of the throttle shaft. Hold the lower body up to the light. **Little, or no light should show between the throttle plate and throttle bore.** When the plate is properly located, hold the throttle plate closed; then, tighten and stake the retaining screws. **When staking the screws, support the shaft and plate on a block of wood or a metal bar to prevent bending of the shaft.**

2. Install the distributor vacuum outlet fitting.

3. If the lever and rod were removed from the accelerating pump cover, position the top hole of the lever between the top bracket holes in the cover; then, install the retaining roll pin.

Install the roll pin in the "HI" (lower) lever stop hole.

Position the small diameter end of the diaphragm return spring into the boss in the accelerating pump chamber. Position the diaphragm assembly into the accelerating pump cover and line up the holes. Position the cover and diaphragm over the return spring and onto the body. Install the cover retaining screws finger-tight. Push the diaphragm assembly inward and tighten the screws.

4. Position the accelerating pump actuating rod retaining clip over the hole in the accelerating lever, with the tab side of the clip toward the carburetor barrel. Depress the tab and insert the shorter end of the rod through the lever and clip. Release the tab when the rod is inserted. Perform the "Accelerating Pump Adjustments" after the carburetor is assembled. Refer to the "Carburetor In-Chassis Adjustments" in this group of the manual for the proper procedure.

5. Position the overtravel spring on the accelerating pump lever and hook the tang of the spring on the lever. Position the overtravel lever and spring onto the throttle shaft and insert the accelerating pump actuating rod into the closest hole in the lever. Install the washer and retaining ring.

Install the overtravel tension retaining pin in the throttle shaft. Pull the arm of the overtravel spring over the retaining pin to apply spring tension to the overtravel lever.

6. Position the spark valve gasket over the spark valve and install them into the lower body. Tighten the valve securely. A loose valve will cause poor engine operation.

7. Install the idle mixture adjusting screw in the lower body. Turn the screw inward until it bottoms on the lower body; then, back it off the specified amount of turns.

UPPER TO LOWER BODY ASSEMBLY

1. Place the ball check and the accelerating pump weight into the

lower body accelerating pump outlet passage. Insert a ball check into the accelerating pump inlet passage.

2. Install the upper to lower body gasket onto the lower body. **Make certain the word "TOP"** (inscribed on the gasket) is facing upward. Position the upper body onto the lower body and gasket. Install the body retaining screws.

3. Insert the fuel vent tube into the fuel vent passage in the upper body and tighten the retaining clip screw.

MANUAL CHOKE

1. Position the choke cable bracket assembly onto the lower body assembly and install the stud.

2. Insert the threaded end of the choke shaft to cam lever rod through the cam lever swivel. Install the spring and adjusting nut onto the rod.

3. Position the rod end into the keyhole in the choke shaft lever; then, insert the rod and turn it counterclockwise.

4. Position the cam lever assembly over the stud and install the retainer. Perform a "Manual Choke Adjustment" prior to installation of the carburetor. Refer to "Carburetor In-Chassis Adjustments" in this group of the manual for the proper procedure.

Carburetor Bench Adjustments. All carburetor adjustments, with the exception of the Final (Hot) Engine Idle and Idle Fuel Mixture adjustments can be performed prior to installing the carburetor.

HOLLEY SINGLE-BARREL – 1962

Carburetor Disassembly. Use a separate container for the component parts of the various assemblies to facilitate cleaning, inspection, and assembly. The carburetor is shown in Fig. 21.

MAIN BODY

1. Remove the cotter pin from the accelerating pump connecting link and remove the link.

2. Remove the two throttle body screws and lock washers. Separate the throttle body and main body, and remove the gasket. Discard the gasket.

3. Remove the fuel bowl (and identification tag) and gasket.

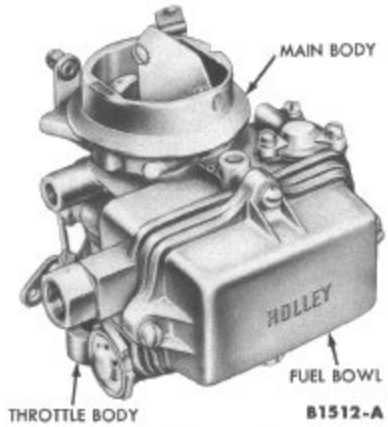

FIG. 21—Holley Single-Barrel Carburetor

4. Remove the fuel inlet fitting with a box wrench, and remove the gasket. Remove the fuel inlet seat screw and gasket located in the fuel inlet opening.

5. Remove the fuel inlet needle seat and bracket assembly, and the gasket from inside the main body.

6. Remove the float shaft, releasing the float. Slide the fuel inlet needle assembly off the float lever tab.

7. Remove the power valve cover and gasket. Lift the power valve diaphragm and stem assembly out of the main body.

8. Using a jet wrench, remove the main jet (Fig. 22). Remove the main well.

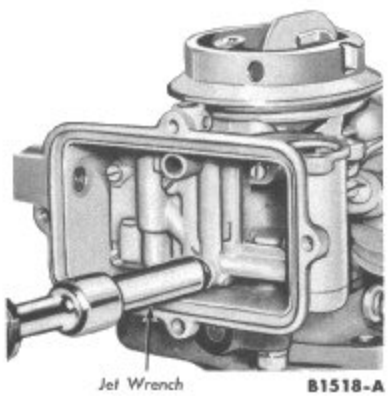

FIG. 22—Jet Removal or Installation

9. Remove the accelerating pump diaphragm return spring from the metal disc on the accelerating pump piston.

10. Pull the accelerating pump diaphragm out of the main body. Remove the accelerating pump operating lever retainer, then slide the lever off the stud.

11. Remove the choke pick-up lever retainer and lever spring. Slide the choke lever off the shaft. Remove the choke bracket.

12. Remove the two choke plate screws, and slide the choke shaft out of the main body. Remove the choke plate assembly. Remove the choke shaft and lever assembly retainer and remove the assembly from the choke plate.

13. Press the accelerating pump rod sleeve toward the diaphragm until the sleeve retainer ball drops out. Remove the sleeve and spring.

THROTTLE BODY

1. Remove the idle adjusting needle and spring.

2. Remove the spark control valve and gasket, using a socket wrench.

3. At times, it may be necessary to remove the throttle plate and shaft to accomplish a thorough cleaning job. If this is done, lightly scribe the plate along the throttle shaft before removal so it can be installed in exactly the same position. **The throttle plate and shaft cannot be interchanged between carburetors, nor are they serviced as separate parts.**

Assembly. A disassembled view of the carburetor is shown in Fig. 23.

THROTTLE BODY

1. If the throttle plate was removed, slide the throttle shaft into the throttle body. Referring to the line scribed on the throttle plate, install the plate in its original position with the screws snug, but not tight. Hold the throttle body up to the light. Little or no light should show between the throttle plate and the throttle bore. Tap the plate lightly with a screw driver handle to seat it. Tighten and stake the screws.

2. Install the accelerating pump link in the throttle lever. Secure it with a cotter pin. Install the link in the hole closest to the throttle shaft for warm weather and the hole farthest from the throttle shaft for cold weather.

3. Install the idle adjusting needle and spring. Turn the needle in gently with the fingers until it seats, then back it off 1-1½ turns for a prelimi-

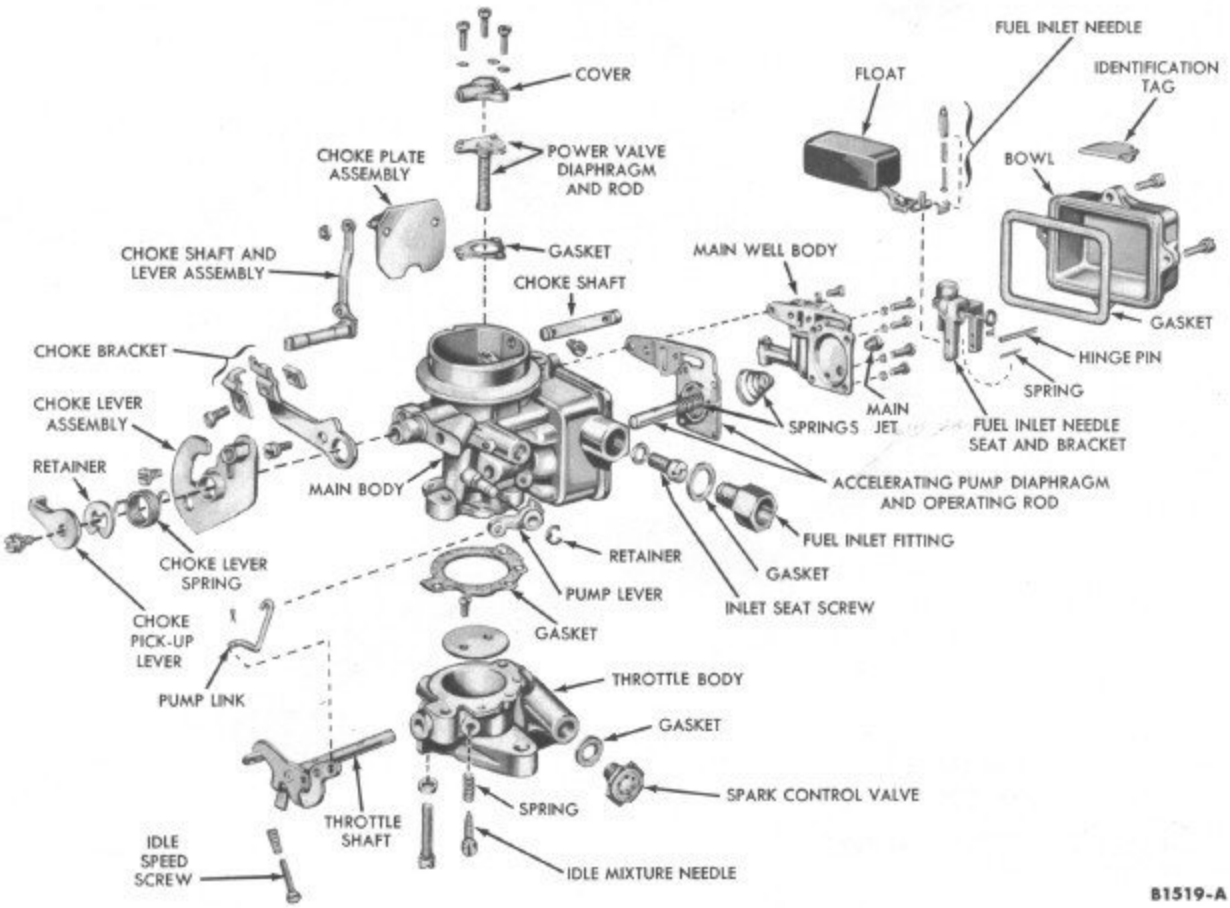

FIG. 23—Carburetor Assembly

nary idle adjustment. **Do not force the needle against the seat. If the needle is damaged, it must be replaced before a proper idle mixture adjustment can be made.**

4. Install the spark control valve and gasket, using a socket wrench.

MAIN BODY

1. Position the choke shaft and lever assembly on the choke plate and install the retainer. Position the choke plate assembly in the main body. Slide the choke shaft in the main body. Install the choke plate screws.

2. Install the choke bracket. Position the choke lever on the main body with the number on the lever facing out. Position the spring on the lever (Fig. 24). Install the retainer and the choke pick-up lever (Fig. 25).

3. Place the spring on the accelerating pump diaphragm rod, and press the rod sleeve onto the rod to compress the spring.

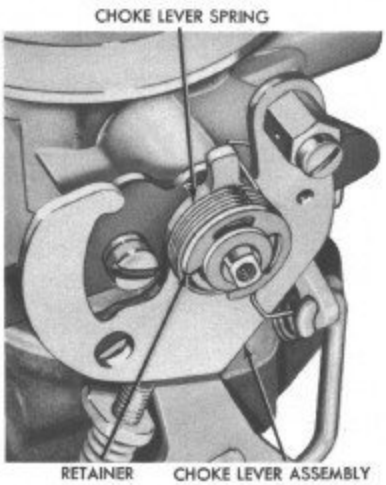

FIG. 24—Choke Lever Spring Installation

4. Drop the rod sleeve retainer ball into the hole in the sleeve.

5. Position the accelerating pump assembly in the main body.

6. Position the large end of the

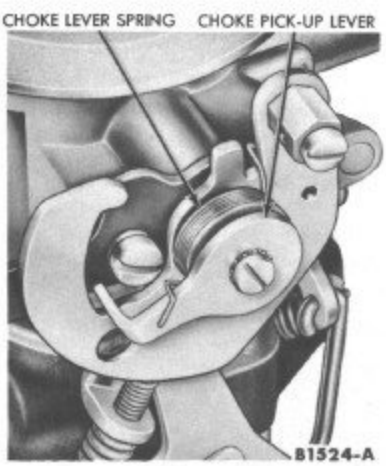

FIG. 25—Choke Pick-Up Lever Installation

accelerating pump return spring in the metal disc on the diaphragm.

7. Position the screws and lock washers in the main well. The two long screws are placed in the center top and center bottom holes. The short screws are used in the three remaining holes.

8. Insert the power valve end of the main well body into position against the spacer gasket as follows:

Apply pressure with the index finger against the protruding end of the accelerating pump rod sleeve to fully compress the accelerating pump return spring as the thumb presses the main well body into position (Fig. 26). This will prevent the return spring pressure from disturbing the alignment of the holes in the diaphragm and main body. Before releasing the accelerating pump rod sleeve, tighten the screws. Install the main jet.

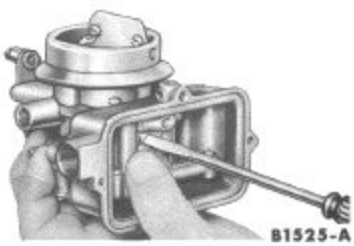

FIG. 26—Main Well Body Installation

9. Position the power valve gasket and power valve diaphragm stem assembly on the cover. Position the screws in the cover and install the assembly on the main body. Do not over-tighten the retaining screws.

10. Clip the fuel inlet needle on the float lever tab.

11. Guide the fuel inlet needle into the seat, and position the float lever between the two float hinge bracket arms with the float tang spring to the right of the float tang. Install the float lever shaft. **Do not attempt to interchange the fuel inlet needle or seat. They are matched assemblies.**

12. Place the fuel inlet needle seat screw bracket on the screw and insert the screw through the fuel inlet fitting boss.

13. Place the seat gasket on the threaded end of the inlet seat screw which protrudes into the fuel bowl.

14. Place the fuel inlet needle seat and bracket, float, and fuel inlet needle assembly into position. Place the fuel level gauge under the float hinge bracket to prevent the assembly from tilting when the seat screw is tightened (Fig. 27).

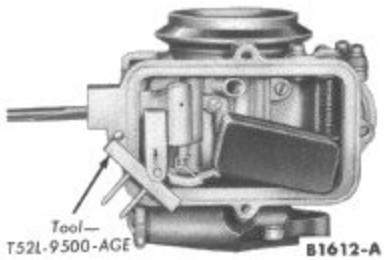

FIG. 27—Fuel Inlet Needle and Seat Installation

15. Tighten the screw securely, then remove the gauge. Install the fuel inlet fitting and gasket.

16. Invert the main body assembly, and check the setting of the float (Fig. 28). With the main body in the upright position, check the float drop (Fig. 29). Make sure the clearance between the bottom of the float chamber to the lowest point of the float is to specifications. Bend the upright tang on the float lever to achieve the correct clearance.

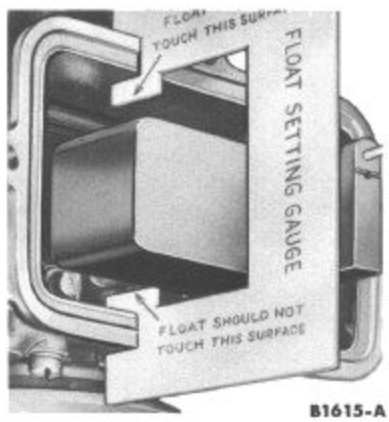

FIG. 28—Bench Float Setting

17. If necessary, bend the tab on the float arm to bring the float setting within limits. This should provide the proper fuel level.

18. Install a new fuel bowl gasket in the recess in the main body.

19. Place the fuel bowl into position. Install the retaining screws and lock washers and identification tag. Tighten the two center screws, then the two end screws, alternately, to evenly compress the gasket.

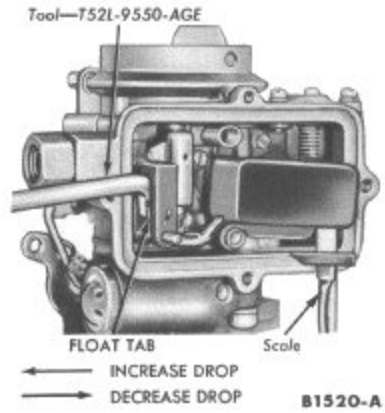

FIG. 29—Float Drop

20. Place a new throttle body to main body gasket on the throttle body, and check the alignment of all holes in the gasket with the corresponding holes in the throttle body.

21. Insert the two throttle body screws and lock washers through the throttle body and gasket to maintain gasket alignment, then position the main body on the throttle body.

22. Invert the carburetor, and evenly tighten the two throttle body screws.

23. Insert the accelerating pump link through the hole in the pump operating lever.

24. Slide the accelerating pump operating lever on the lever stud and install the retainer.

FUEL PUMP, FUEL TANK AND FUEL LINES (Part 3-2)

FUEL PUMP—1962

The fuel pump is shown disassembled in Fig. 30.

DISASSEMBLY

1. Scribe a line on the fuel pump body, valve housing, and pulsator cover, so that on assembly, the inlet and outlet openings will be in the correct position.

2. Remove the pulsator cover retaining screw with a clutch-type screw driver, then remove the cover and pulsator.

3. Hold the valve housing against the pump body and remove the housing retaining screws, then remove the valve housing.

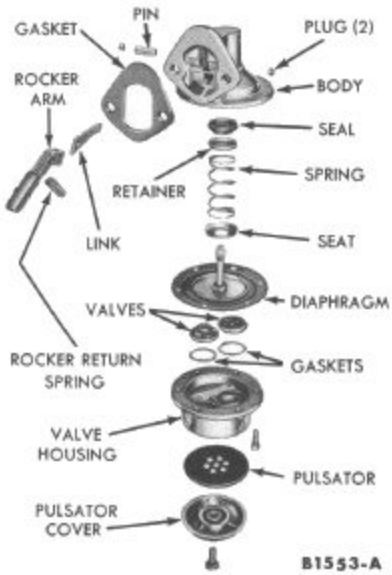

FIG. 30—Fuel Pump Assembly

4. Scrape away the staking marks at the rocker arm plugs and remove one plug. Drive out the other plug and pin with tool T56L-9350-A, Detail 3 (Fig. 31). Remove the rocker arm and spring.

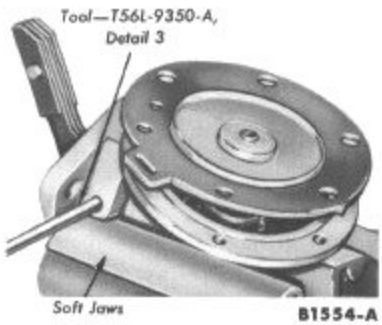

FIG. 31—Rocker Arm Pin Removal

5. Press the diaphragm into the fuel pump body and unhook the rocker arm link from the slot in the diaphragm rod (Fig. 32). Remove the rocker arm link, diaphragm, and spring.

6. Scrape away the staking marks and flip the valves out of the valve housing with a screw driver. **Note the position of the inlet and outlet valves so that the new valves can be installed in the same manner.**

CLEANING AND INSPECTION

Clean the fuel pump body, valve housing, pulsator cover, and outlet

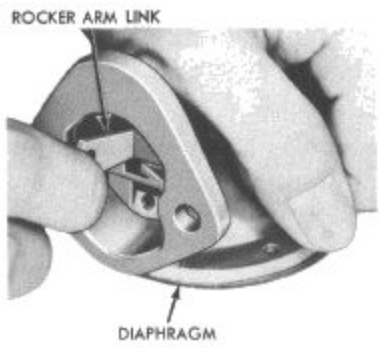

FIG. 32—Diaphragm and Link Removal or Installation

fitting screen in solvent. Blow out all passages with compressed air.

Inspect the body, valve housing, and cover for cracks or damage and replace them if necessary. Inspect the staked areas around the valve and seal counterbores for high spots which may cause distortion of the new parts upon installation. Remove all high spots. Inspect the mounting flange for distortion. Replace the pump body or lap the distorted flange, if necessary.

ASSEMBLY

Install all the parts included in the overhaul kit.

1. Install a new diaphragm rod oil seal and retainer using Tool T56L-9350-A, Detail 1 (Fig. 33). Stake the retainer at four points.

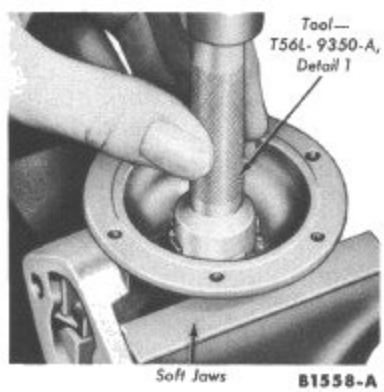

FIG. 33—Diaphragm Rod Oil Seal and Retainer Installation

2. Lubricate the fuel pump diaphragm rod with grease. Assemble the spring seat (cup side toward the spring) and spring on the diaphragm rod. Insert the diaphragm rod through the pump oil seal.

3. Lubricate the rocker arm and link with engine oil. Apply pressure on the diaphragm spring and insert the link in the diaphragm rod slot (Fig. 32). Position the rocker arm over the link.

4. Install the rocker arm pin. Coat the plugs with sealer. Install the plugs (Fig. 30) and stake them in place. Install the rocker arm return spring in the rocker arm.

5. Install the valve gaskets, then press the valves in place using Tool T56L-9350-A, Detail 1 (Fig. 34). Stake each valve at four points.

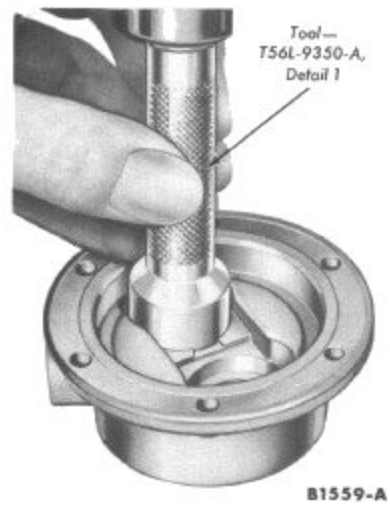

FIG. 34—Pump Valve and Gasket Installation

6. Position the valve housing on the pump body, aligning the scribed marks. Hold the housing tight against the diaphragm and pump body, and install the housing retaining screws. Make sure the diaphragm extends evenly around the edge of the housing. Tighten the screws evenly.

7. Using the scribed lines as guides, install the pulsator and the pulsator cover.

FUEL PUMP — 1963

The fuel pump for the 1963 EEV-144 and EEW-170 engine installations is a new design, single action type, manufactured by Carter. The pump incorporates pressure leak-down bleed holes in the valve assemblies to prevent excessive pressure build-up in the fuel line during hot soak periods. Specifications are identical to those for the 1962 pump. The fuel pump is shown in Fig. 35.

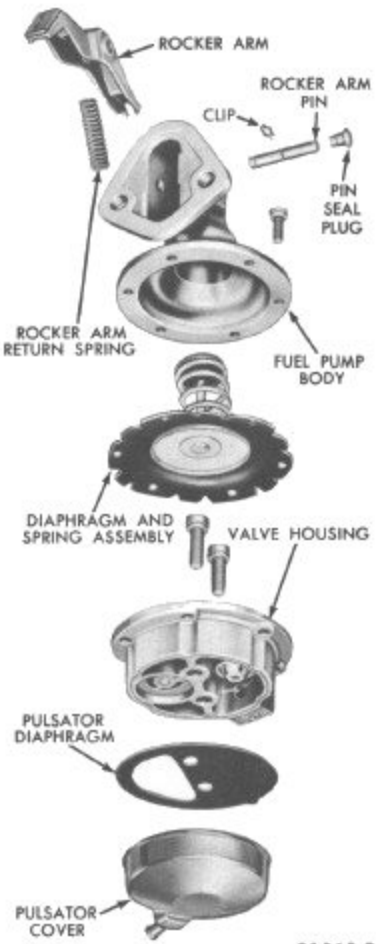

FIG. 35—Fuel Pump Assembly

TROUBLE DIAGNOSIS AND TESTS

Trouble diagnosis and tests are covered in Part 3-1 of the 1961 Shop Manual.

REMOVAL

1. Disconnect the fuel lines at the pump.

2. Remove the pump retaining screws, then remove the pump and gasket. Discard the gasket.

INSTALLATION

1. Remove all the gasket material from the mounting pad and pump flange. Apply oil resistant sealer to both sides of a new gasket.

2. Position the new gasket on the pump flange, and hold the pump in position against the mounting pad. Make sure the rocker arm is riding on the camshaft eccentric.

3. Press the pump tight against the pad, install the retaining screws, and alternately torque them to specifications. Connect the fuel lines.

4. Operate the engine and check for leaks.

DISASSEMBLY

1. Scribe marks on the fuel pump body, valve housing, and pulsator cover so that these parts can be assembled in their original position.

2. Remove the valve housing assembly. Separate the valve housing from the pulsator cover and note the position of the pulsator diaphragm so that it can be assembled in its proper position. **Do not remove the fuel valves from the housing. The valve housing is replaced as an assembly.**

3. Remove the rocker arm return spring, then remove the clip from the rocker arm pin (Fig. 35).

4. Remove the rocker arm pin seal plug (Fig. 36).

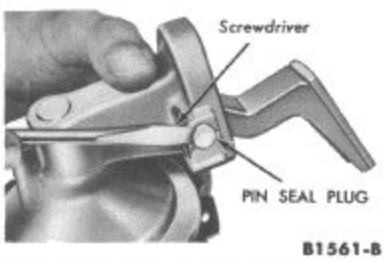

FIG. 36—Rocker Arm Pin Seal Plug Removal or Installation

5. Press the fuel pump diaphragm into the fuel pump body to release the tension on the rocker arm and allow the rocker arm pin to fall out. If the pin does not come out freely, use needle nose pliers (Fig. 37). Pull the rocker arm out to unhook it from the diaphragm stem.

6. Remove the fuel pump diaphragm. **Do not disassemble.** The diaphragm and spring are serviced as an assembly.

CLEANING AND INSPECTION

Clean the fuel pump body, valve housing, and pulsator cover in solvent. Blow out all body, housing and cover passages. Inspect the pump body, valve housing and pulsator cover for cracks or damage and replace them if necessary. **The fuel valves are not serviceable, so if replacement is necessary, replace the valve housing and valves as an assembly.** Inspect the mounting flange for distortion. Replace pump body or lap distorted flange if necessary.

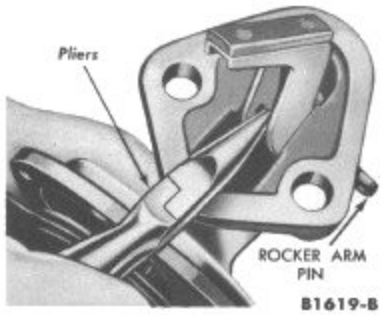

FIG. 37—Rocker Arm Pin Removal or Installation

ASSEMBLY

1. Position the fuel pump diaphragm assembly into the pump body. Apply pressure on the diaphragm spring so that the rocker arm can be installed on the stem as shown in Fig. 38.

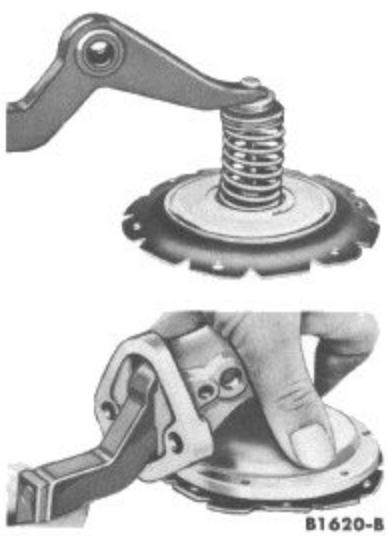

FIG. 38—Rocker Arm Installation

2. Align the rocker arm pin holes by applying slight pressure on the diaphragm spring, then install the rocker arm pin (Fig. 36).

3. Install a new rocker arm pin seal plug, then install the clip over

the groove in the center of the rocker arm pin (Fig. 35).

4. Position the rocker arm return spring on the boss in the pump body. Compress the spring and slip it over the tang in the rocker arm.

5. Place a new pulsator diaphragm on the valve housing in the position previously noted on disassembly (opening in the diaphragm over the fuel inlet valve(s) as shown in Fig. 39). Position the cover on the valve housing, aligning the scribed lines on the cover with the line on the valve housing. Be sure the pulsator diaphragm extends evenly around the edge of the cover. Install and tighten to specifications the two retaining screws and lockwashers inside the valve housing.

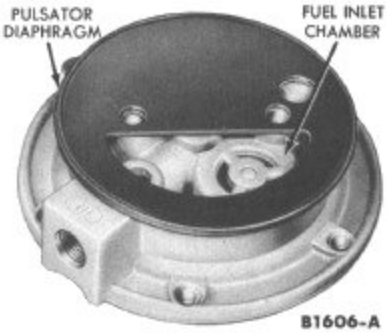

FIG. 39—Pulsator Diaphragm Installation

6. Align the scribe lines. Hold the valve housing assembly tight against the fuel pump body and install the six screws and lockwashers. Be sure the fuel pump diaphragm extends evenly around the edge of the valve housing before tightening the retaining screws to specifications.

GROUP 4—COOLING SYSTEM

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures outlined in Group 4 of the 1961 Shop Manual remain the same for 1962 and 1963.

GROUP 5—CLUTCH AND TRANSMISSION

SYNCHRO-SMOOTH DRIVE TRANSMISSION

The 1962-1963 maintenance recommendations are in Group 14 and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures outlined in Group 5 of the 1961 Shop Manual are the same for 1962 and 1963, with the following exceptions:

TROUBLE SHOOTING

TROUBLE SYMPTOMS AND POSSIBLE CAUSES

JUMPING OUT OF HIGH GEAR	Shift linkage out of adjustment, worn or loose. Insufficient spring tension of rail detent springs. Misalignment or loose transmission case and/or clutch housing. Worn input shaft pilot bearing. Bent output shaft. Worn or broken high gear synchronizer. Worn clutch teeth on input shaft and/or worn clutch teeth on synchronizer sleeve. Bent or worn shift fork, lever and/or shaft. End play in input shaft (bearing retainer loose or broken, loose or worn bearings on input and output shafts). Clutch teeth not engaging completely. Not enough over-shift travel in column.
STICKING IN HIGH GEAR	Clutch not releasing fully. Burred or battered teeth on synchronizer sleeve and/or input shaft. Frozen synchronizing blocking ring on input shaft gear cone. Stuck shifter plunger. Lack of lubrication. Improper lubrication. Corroded transmission levers (shaft). Defective (tight) input shaft pilot bearing.

CONTINUED ON NEXT PAGE

TROUBLE SYMPTOMS AND POSSIBLE CAUSES (Continued)

JUMPING OUT OF SECOND GEAR	Shift linkage out of adjustment, worn or loose. Insufficient spring tension of rail detent springs. Worn input shaft pilot bearing. Bent output shaft. Worn clutch teeth on second gear and/or worn clutch teeth on synchronizer sleeve. Bent or worn shifter fork, lever and/or shaft.	End play in output shaft (extension loose or broken, and loose or worn bearings on input and output shafts). Clutch teeth not engaging completely. Excessive end play in cluster gear (worn thrust washers). Not enough over-shift travel in column.
STICKING IN SECOND GEAR	Clutch not releasing fully. Burred or battered teeth on synchronizer sleeve and/or intermediate gear. Frozen synchronizing blocking ring on intermediate gear cone. Stuck shifter plunger.	Lack of lubrication. Improper lubrication. Corroded transmission levers (shaft). Second speed gear seizure on shaft will give same effect as gears stuck in second gear.
JUMPING OUT OF LOW GEAR	Shift linkage out of adjustment, worn or loose. Insufficient spring tension of rail detent spring. Misalignment or loose transmission case and/or clutch housing. Bent output shaft. Worn or broken clutch teeth on low gear. Worn or broken clutch teeth on reverse sliding gear.	Bent or worn shift fork, lever and/or shaft. End play in output shaft (extension loose or broken, loose or worn output shaft bearing). End play of low gear. Clutch teeth not engaging completely. Not enough over-shift travel in column.
STICKING IN LOW GEAR	Clutch not releasing fully. Burred or battered teeth on synchronizer sleeve and/or low gear. Frozen synchronizing blocking ring on low gear cone. Stuck shifter plunger. Lack of lubrication.	Improper lubrication. Corroded transmission levers (shaft). Low gear seizure on shaft will give same effect as gears stuck in first gear.
GEARS SPINNING WHEN SHIFTING INTO GEAR FROM NEUTRAL	Clutch not releasing fully. Binding input shaft pilot bearing. Synchronizers not functioning.	
LOW, SECOND AND HIGH GEAR CLASH	Worn blocking rings and/or cone surfaces. Broken blocking rings. Excessive output shaft end play.	Weak or broken detent springs in the synchronizer assembly. Dragging clutch plate. Excessive rock of synchronizer assembly on output shaft.
REVERSE GEAR CLASH	Transmission gears can be made to clash by shifting into reverse gear too quickly after the clutch pedal is depressed, even though the clutch is in perfect working order. Sufficient time MUST be allowed before shifting into reverse gear. If gear clash continues after allowing proper time	for the clutch driven plate parts to stop, check the clutch adjustments to specified limits. Also, make sure that the engine idle speed is to specification. Gear clash also may be caused by a dragging clutch plate (plate distorted, or input shaft pilot bearing tight).

CONTINUED ON NEXT PAGE

TROUBLE SYMPTOMS AND POSSIBLE CAUSES (Continued)

GEAR NOISE	Some gear noise is to be expected in all except high speed gears. Comparison with another vehicle is the only means of determining whether or not gear noise is excessive. Before	removing the transmission for correction of gear noise, determine by test which gears are noisy under load, so that these parts can be thoroughly inspected when removed.
GEAR RATTLE DURING ACCELERATION	An improperly calibrated clutch driven plate and a faulty crankshaft balancer may cause rattle in the transmission in third speed gear on	acceleration. Rattles occurring on wide open throttle between 40 and 60 mph are usually caused by improper clutch driven plate dampening.
NOISE WHEN SHIFTING OUT OF REVERSE GEAR	Shifting out of reverse very slowly will usually result in some noise just as the gears disengage. This is normal because of the gear pointing necessary for easy engagement. Noise when disengaging reverse	indicates that the reverse idler gear is at fault. All tests must be made by disengaging reverse gear while the vehicle is still in motion.
SCORED OR BROKEN GEAR TEETH	Gears and gear clutch teeth will be seriously damaged and possibly broken by failure of the vehicle's op-	erator to fully engage the gears on every shift before engaging the clutch and applying engine power.
NOISY IN ALL GEARS	Low lubricant level. Incorrect lubricant. Cluster gear bearings worn or damaged. Input shaft bearing or gear worn or damaged.	Output shaft bearing worn or damaged. Transmission misalignment or loose.
NOISY IN FIRST THROUGH THIRD GEARS	Working gears worn or damaged. Cluster gear worn or damaged. Synchronizers worn or broken.	
NOISY IN REVERSE	Reverse idler shaft worn or damaged. Reverse gear and sleeve worn or broken.	Shift linkage improperly adjusted. Bent, damaged or loose shift linkage.
HARD SHIFTING	Clutch improperly adjusted. Clutch parts worn or damaged. Shift linkage out of adjustment, damaged or loose parts.	Synchronizers worn or damaged. Shift levers or forks worn. Shift rail components not functioning properly.

OPERATION

The three-speed transmission (Fig. 40) is of the fully synchronized type, with all gears except the reverse gear and sleeve in constant mesh. All forward-speed changes are accomplished with synchronizer sleeves (Fig. 41) instead of sliding gears. The synchronizers will enable quicker shifts, eliminate gear clash and permit down-shifting, high to intermediate between 40-20 mph and from intermediate to low below 20 mph.

The forward-speed gears are helical-cut and are in constant mesh (Fig. 41). Gears used in the reverse train are spur-cut and are not synchronized.

Ball bearings support the input gear and the center of the output shaft (Figs. 50 and 51). Needle bearings, in the input gear bore, support the front of the output shaft. The countershaft gear (cluster gear) also runs on 2 rows of needle bearings. A bronze bushing is used in the reverse idler gear (Fig. 47). The output shaft in this transmission is short enough to enable the rear bearing to support the front of the driveshaft.

Synchronizers and blocking rings are the conventional tapered ring and straight-clutch gear type (Fig. 50).

The shift forks, shift rails, detent mechanism and related parts are provided in the transmission case (Fig. 46).

When first gear is selected, the shift lever moves the reverse gear and sleeve forward and forces the synchronizer blocking ring conical surface against the matching cone on the constant mesh first gear located on the output shaft. If the vehicle is moving, the internal teeth of the reverse gear and sleeve and blocking ring will not index until the constant mesh first gear is brought up or down

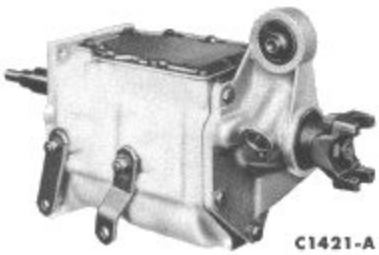

FIG. 40—Three-Speed Transmission

to the speed of the reverse gear and sleeve which is rotating at output shaft speed.

The reverse gear and sleeve has internal splines that, with further movement, will slide over the blocking ring and engage external clutch teeth on the constant mesh first gear. Since first gear is now locked to the output shaft and is always meshed with the countershaft (cluster) gear, the power flow is from the input gear, through the countershaft gear, to the constant mesh first gear, through the reverse gear and sleeve to the output shaft and out the rear of the transmission.

Engagement of second and third gears is the same as first except for ratio. In third gear, the input gear and shaft is locked directly to the output shaft by the second and third speed synchronizer to provide a ratio of 1:1.

Spur teeth are cut on the outside of the reverse gear and sleeve. The reverse gear and sleeve like the hub are always locked to the output shaft. Reverse gear is engaged by sliding the reverse gear and sleeve into mesh with the spur gear at the rear of the idler gear. The drive is then from the input gear, through the countershaft gear, to and through the reverse idler gear to the output shaft reverse gear and sleeve. The gears in this position, will rotate the output shaft in a reverse direction.

A system of interlocks and detents in the transmission case makes it possible for the selection of one gear speed at a time and helps to hold any gear in the selected position.

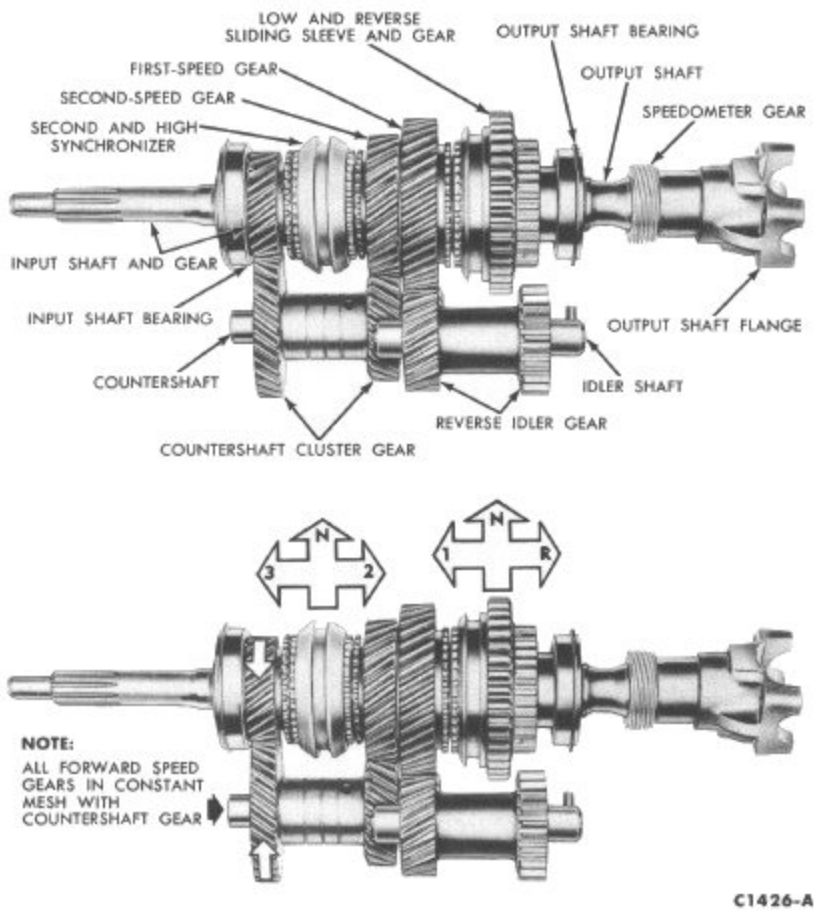

FIG. 41—Power Flow—Three-Speed Transmission

TRANSMISSION OVERHAUL

Disassembly

1. Remove the drain plug from the bottom of the transmission case and drain the lubricant.
2. Remove the 9 cap screws that attach the cover to the case. Remove the cover and the gasket (Fig. 42) from the case.
3. Remove the nut and flat washer that secures the companion flange to the output shaft. Remove the flange from the output shaft.
4. Remove the 5 cap screws and lock washers that attach the extension housing to the case. Remove the extension housing and gasket from the case.
5. Remove the 4 cap screws and lock washers that attach the front bearing retainer to the case. Remove the retainer and gasket from the case and input shaft.
6. Remove the lubricant filler plug from the right side of the case. Working through the plug opening, drive the roll pin out of the case and countershaft with a small punch (Fig. 43).
7. Hold the countershaft gear with a hook and with Tool T63P-7111-B (Fig. 44), push the countershaft out the rear of the case until the countershaft gear (cluster) can be lowered to the bottom of the case. Remove the countershaft from the rear of the case.
8. Lift the input gear and shaft from the front of the case. Be careful not to drop the needle bearings from the bore of the input shaft.
9. Slide the speedometer drive gear off the output shaft. Remove the speedometer drive gear lock ball from the shaft.
10. Remove the snap ring that retains the output shaft bearing on the shaft. Remove the bearing from the case and shaft as shown in Fig. 45 with tool T63P-7025-A.
11. Place both shift levers in the neutral (center) position.
12. Remove the set screw (Fig. 46) that retains the detent springs and plugs in the case. Remove a detent spring and plug from the case.
13. Remove the set screw that secures the first and reverse shift fork to the shift rail. Slide the first and reverse shift rail out through the rear of the case.

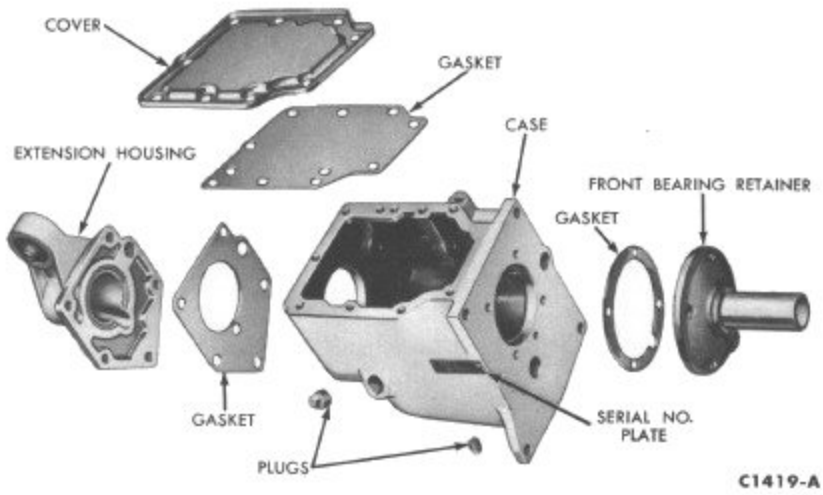

FIG. 42—Transmission Case and Related Parts

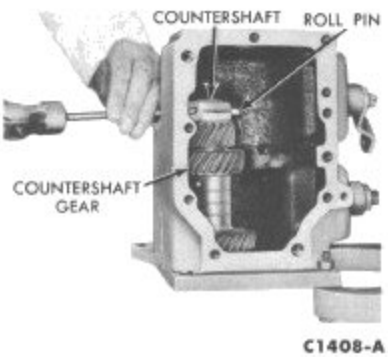

FIG. 43—Removing Countershaft Roll Pin

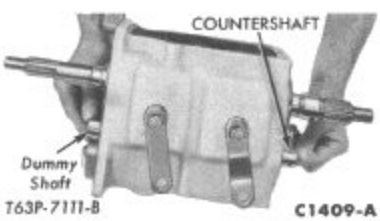

FIG. 44—Removing Countershaft

14. Rotate the first and reverse shift fork upward, then lift it from the case.

15. Remove the set screw that secures the second and third shift fork to the shift rail. Rotate the shift rail 90° with a pair of pliers. Be careful not to damage the rail surface with the pliers.

16. Lift the interlock plug (Fig. 46) from the case with a magnet.

17. Tap on the inner end of the second and third shift rail to remove the expansion plug (Fig. 46) from the front of the case.

18. Remove the second and third detent plug and spring from the detent bore.

19. Rotate the second and third shift fork upward, then lift it from the case.

20. Carefully lift the output shaft assembly out through the top of the case.

21. Working through the front bearing opening, drive the reverse idler gear shaft (Fig. 47) out through the rear of the case with a drift.

22. Lift the reverse idler gear and two thrust washers from the case.

23. Lift the countershaft and thrust washers from the case. Be careful not to allow the dummy shaft and needle bearings (Fig. 48) to fall out of the gear.

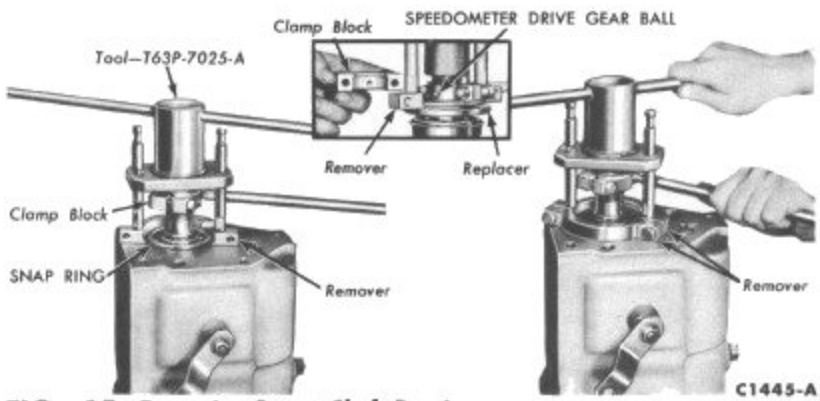

FIG. 45—Removing Output Shaft Bearing

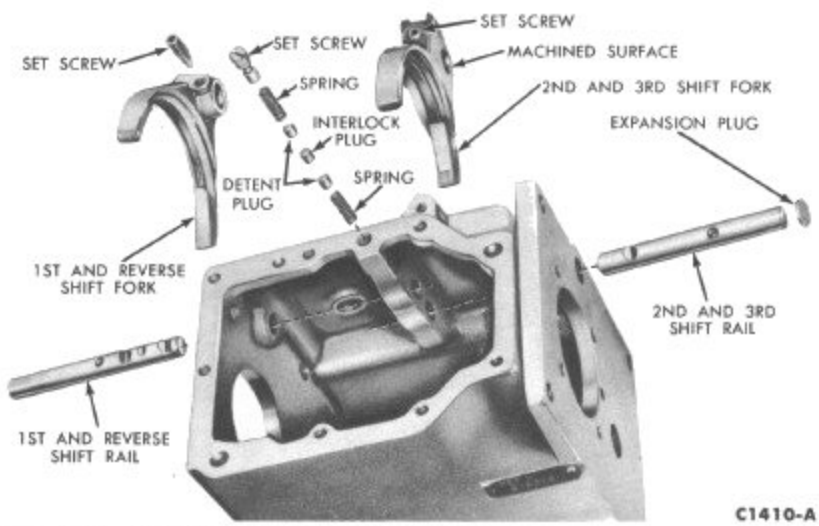

FIG. 46—Shift Rails and Forks Disassembled

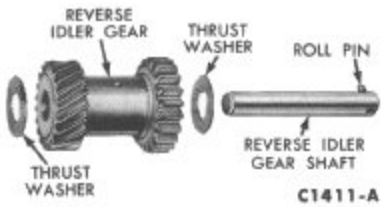

FIG. 47—Reverse Idler Shaft Disassembled

24. Remove the countershaft to case retaining pin and any needle bearings which may have fallen into the case.

25. Remove the nut, lock washer and the flat washer that secures each shift lever (Fig. 49) to the lever and shaft. Lift the shift levers off the shafts. Slide each lever and shaft out of the case. Discard the O-ring from each shaft.

26. Remove the snap ring from the front of the output shaft, then slide the synchronizer and the second speed gear (Fig. 50) off the shaft.

27. Remove the next snap ring and thrust washer from the output shaft, then slide the first gear and blocking ring off the shaft.

28. Remove the next snap ring from the output shaft, then slide the reverse gear and sleeve off the shaft.

29. Remove the dummy shaft, 50 roller bearings and the 2 retainer washers (Fig. 48) from the countershaft gear.

30. If the input shaft and gear bearing (Fig. 51) is to be replaced, remove and install it with the tools shown in Fig. 52.

31. Disassemble the synchronizers as shown in Figs. 53 and 54.

Cleaning and Inspection

CLEANING

1. Clean all parts except the ball bearings in cleaning solvent and dry them with compressed air.

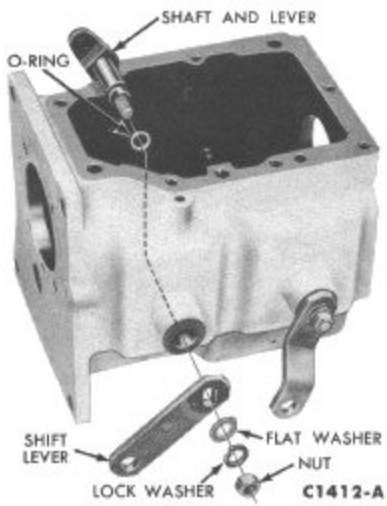

FIG. 49—Shift Levers and Lever and Shaft Disassembled

2. To clean the bearings, rotate them in clean solvent until all traces of lubricant and dirt have been removed.

3. Dry the bearings with compressed air, but do not allow them to spin.

4. After the bearings are dry, dip them in transmission lubricant, then wrap them in a clean lint-free cloth until ready for use.

INSPECTION

1. Inspect the transmission case for being cracked, worn or damaged bearing bores, damaged threads, thrust washer wear or any other damage which could affect the operation of the transmission.

2. Inspect the front face of the case for small nicks or burrs that could cause misalignment of the transmission with the flywheel housing. Remove all small nicks or burrs.

3. Replace a cover that is bent or distorted. Make sure that the vent hole in the cover is open.

4. Check the condition of the shift levers, forks, shift rails and the lever and shafts.

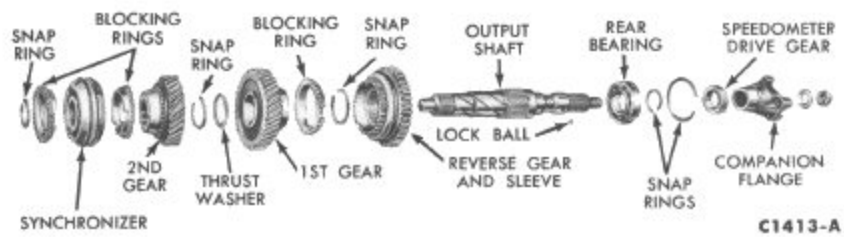

FIG. 50—Output Shaft Disassembled

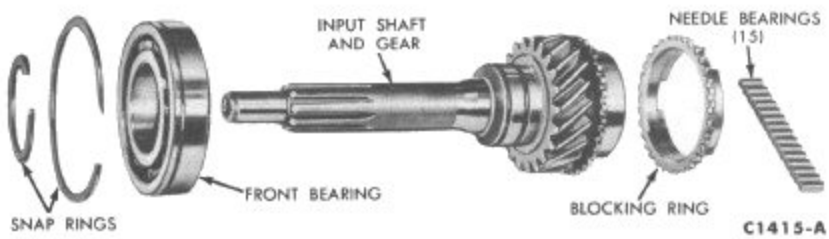

FIG. 51—Input Shaft Gear Disassembled

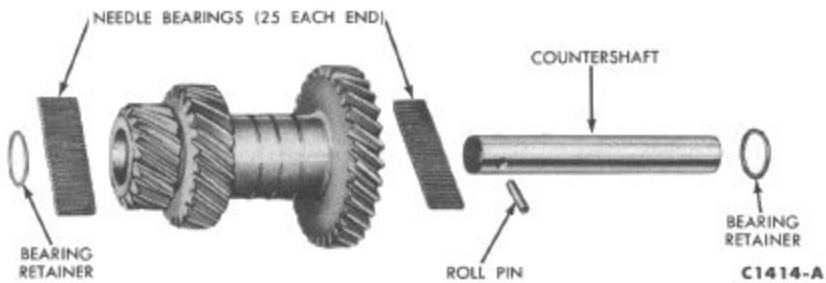

FIG. 48—Countershaft Gear Disassembled

5. Examine the ball bearing races for being cracked, worn or rough. Inspect the balls for looseness, wear, end play or other damage. Check the bearing assemblies for looseness in the bores. If any of these conditions exist, replace the bearings.

6. Replace needle bearings that are broken, worn or rough.

7. Replace the countershaft gear (cluster) if the teeth are chipped, broken or worn. Replace the counter-

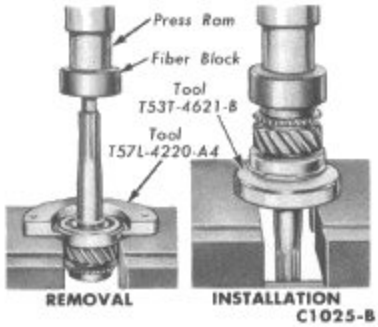

FIG. 52—Replacing Input Shaft Gear Bearing

shaft (Fig. 48) if it is bent, scored or worn.

8. Coat the bore in each end of the countershaft gear with grease. Hold the tool T63P-7111-B in the gear and install 25 needle bearings and a retainer washer in each end of the gear. Install the countershaft gear, thrust washers and the countershaft in the case. Place the transmission case in a vertical position. Check the end play with a feeler gauge as shown in Fig. 55. If the end play exceeds 0.018 inch, replace the thrust washers as required to obtain an

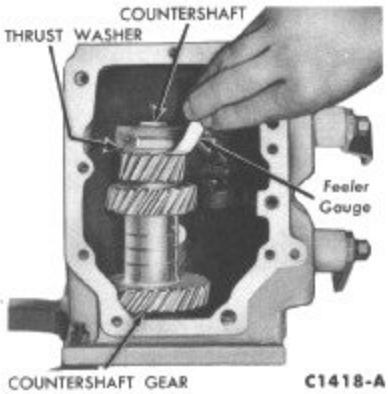

FIG. 55—Checking Countershaft Gear End Play

end play of 0.004-0.018 inch. Once the end play has been established, remove the countershaft with the dummy shaft. Allow the countershaft gear to remain in the case.

9. Replace the reverse idler gear if the teeth are chipped, worn or broken. If the bushings are worn or damaged, replace the gear assembly. Replace the idler gear shaft if worn or scored. Install the idler gear, thrust washers and shaft in the case. Make sure that the thrust washer with the flat side is at the web end, and that the spur gear is toward the rear of the case. Check the reverse idler gear end play as detailed in step 8. If the end play is within specifications (0.004-0.018 inch), leave the gear installed in the case.

10. Replace the input shaft and gear (Fig. 51) if the splines are damaged or if the teeth are chipped, worn or broken. If the needle bearing surface in the bore of the gear is worn or rough, or if the cone surface is damaged, replace the gear and rollers.

11. Replace all other gears that are chipped, broken or worn.

12. Check the synchronizer sleeves for free movement on their hubs. Make sure that the alignment marks (etched marks) are properly indexed as shown in Figs. 53 and 54.

13. Check the blocking rings for the grooves being worn smooth or for the teeth being damaged.

14. Replace the speedometer drive gear if the teeth are stripped or damaged. Make certain to install the correct size replacement gear.

15. Replace the output shaft if there is any evidence of wear or if any of the splines are damaged.

16. Inspect the seal in the extension housing and replace it if worn or damaged. **A bushing is not used in the extension of the Econoline transmission.**

17. Replace the seal in the input shaft bearing retainer if it is damaged.

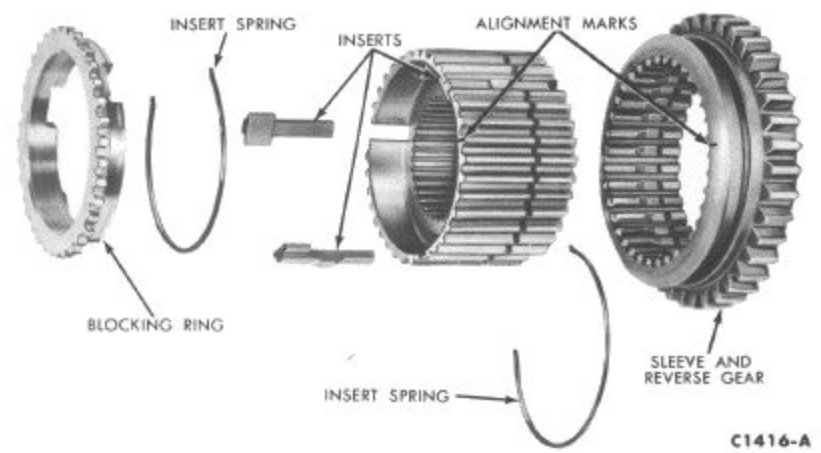

FIG. 53—First and Reverse Gear Synchronizer Disassembled

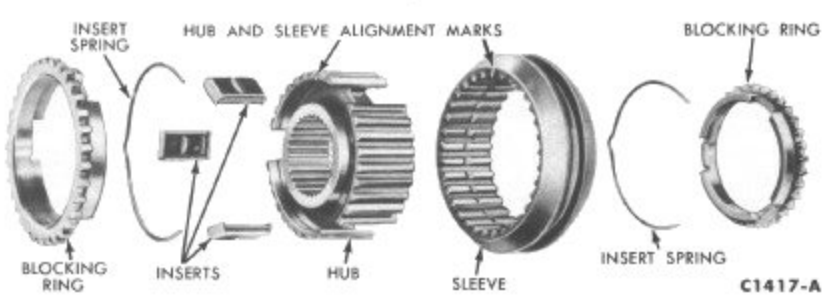

FIG. 54—Second and Third Gear Synchronizer Disassembled

Assembly

1. The countershaft gear and the reverse idler gear should be in the transmission case as detailed in steps 8 and 9 under "Inspection."

2. Install an insert spring (Fig. 53) in the groove of the 1st and reverse synchronizer hub. Make sure that the spring covers all insert grooves. Start the hub in the sleeve making sure that the alignment marks are properly indexed. Position the three inserts in the hub making sure that the small end is over the spring and that the shoulder is on the inside of the hub. Slide the sleeve and reverse gear onto the hub until the detent is engaged. Install the other insert spring in the front of the hub to hold the inserts against the hub.

3. Install one insert spring (Fig. 54) in to a groove of the synchronizer

hub, making sure that all three insert slots are fully covered. With the alignment marks on the hub and sleeve aligned, start the hub into the sleeve. Place the three inserts on top of the retaining spring and push the assembly together. Install the remaining insert spring, so that the spring ends cover the same slots as do the other spring. **Do not stagger the springs.** Place a synchronizer blocking ring in each end of the synchronizer sleeve.

4. Lubricate the output shaft splines and machined surfaces with transmission lubricant.

5. Slide the first and reverse synchronizer (Fig. 50) onto the output shaft with the teeth end of gear facing toward the rear of shaft. Secure it in place with the snap ring.

6. Coat the tapered machined surface on the first gear with grease. Place the blocking ring on the greased surface.

7. Slide the first gear onto the output shaft with the blocking ring toward the rear of the shaft. Rotate the gear as necessary to engage the three notches in the blocking ring with the synchronizer inserts. Secure the first gear with the thrust washer and snap ring.

8. Coat the tapered machined surface of the second gear with grease and slide the blocking ring onto it. Slide the second gear with blocking ring and the third and fourth gear synchronizer onto the mainshaft. The tapered machined surface of the second gear must be toward the front of shaft. Make sure that the notches in the blocking ring engage the synchronizer inserts. Secure the synchronizer with a snap ring.

9. Install a new O-ring on each of the two shift lever shafts (Fig. 49). Lubricate the shafts with transmission lubricant and install them in the case. Secure each shift lever to its respective shaft with a flat washer, lock washer and nut.

10. Coat the bore of the input shaft and gear with a thick coat of grease. Install the 15 needle bearings (Fig. 51) in the bore.

11. Position the output shaft assembly in the case.

12. Place a detent plug spring and a plug in the case (Fig. 46). Place the second and third speed shift fork in the synchronizer groove. Rotate the fork into position and install the second and third speed shift rail. It will be necessary to depress the detent plug to enter the rail in the bore. Move the rail inward until the detent plug engages the center notch (neutral). Secure the fork to the shaft with the set screw.

13. Install the interlock plug in the case. If the second and third shift rail is in the neutral position, the top of the interlock will be slightly lower than the surface of the first and reverse shift rail bore.

14. Place the first and reverse shift fork in the groove of the first and reverse synchronizer. Rotate the fork into position and install the first and reverse shift rail. Move the rail inward until the center notch (neutral) is aligned with the detent bore. Secure the fork to the shaft with the set screw. Install the remaining detent plug and spring. Secure the detent spring with the slotted head set screw. Turn the set screw in until the head is flush with the case.

15. Install a new expansion plug in the case.

16. Carefully install the input shaft and gear in the front of the case. Make sure that the needle bearings do not fall out of place.

17. Position a new front bearing retainer gasket on the case.

18. Place the bearing retainer on the case making sure that the oil return groove is at the bottom. Install and tighten the four attaching screws to 19-25 ft-lbs.

19. Install the large snap ring on the rear bearing. Place the bearing on the output shaft with the snap ring end toward the rear of the shaft. Press the bearing into place with tool T63P-7025-A (Fig. 56). Secure the bearing to the shaft with a snap ring.

20. Hold the speedometer drive gear lock ball in the detent and slide the spedometer drive gear into place.

21. Place the transmission in the vertical position. Working through the drain hole in the bottom of the case, align the bore of the countershaft gear and the thrust washers with the bore of the case using a screwdriver.

22. Working from the rear of the case, push the dummy shaft out of the countershaft gear with the countershaft. Before the countershaft is completely inserted in the bore, make sure that the hole that accommodates the roll pin is in alignment with the hole in the case.

23. Working through the lubricant filler hole, install a roll pin (Fig. 43) in the case and countershaft.

24. Install the filler and drain plugs in the case. Make sure that the magnetic plug is installed in the bottom of the case.

25. Coat a new extension housing gasket with sealer and position it on the case.

26. Install external thread lock washers on the five attaching screws. Dip the threads of the cap screws in sealer. Secure the housing to the case and tighten the cap screws to 42-50 ft -lbs.

27. Secure the companion flange to the output shaft with a flat washer and nut. Tighten the nut to 60-80 ft-lbs.

28. Place the transmission in gear. Pour lubricant over the entire gear train while rotating the input or output shaft.

29. Coat a new cover gasket with

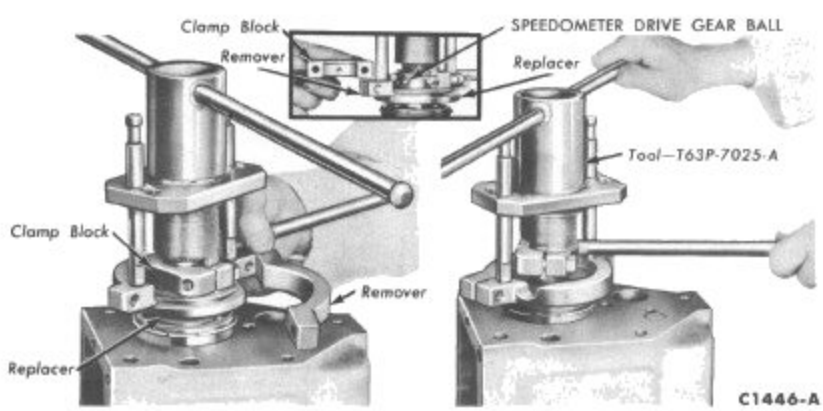

FIG. 56—Installing Output Shaft Rear Bearing

sealer. Secure the cover with 9 cap screws. Tighten the screws to 14-19 ft-lbs.

30. If the extension housing seal is to be replaced, remove it with the tools T50T-100-A and T50T-101-A or 1175-AE.

31. Install the new extension housing seal with tool T57L-7657-A.

32. Check the operation of the transmission in all of the gear positions.

GROUP 6—REAR AXLE AND DRIVE LINE

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

All the basic service procedures in Group 6 of the 1961 Shop Manual remain the same for 1962 and 1963 with the following exceptions:

REAR AXLE TROUBLE SHOOTING AND MINOR REPAIRS

REAR AXLE SHAFT, WHEEL BEARING AND OIL SEAL REPLACEMENT

Soak the new rear axle seal in SAE 10 engine oil for ½ hour before it is installed.

REAR AXLE OVERHAUL

DIFFERENTIAL CASE AND DRIVE PINION OVERHAUL – HOUSING IN TRUCK

Assembly and Installation. Soak the new drive pinion seal in SAE 10 engine oil for ½ hour before it is installed.

Differential Case Assembly and Installation. Set the preload of the right differential bearing nut 2 or 3 notches tight after it contacts the bearing cup.

GROUP 7—WHEELS, TIRES, CHASSIS SUSPENSION AND UNDERBODY

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

All basic service procedures in Group 7 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

WHEELS AND TIRES (Part 7-2)

HUBS, BEARINGS, AND OIL SEALS OR GREASE RETAINERS

Front Wheel Bearing Adjustment. The front wheel bearings should be adjusted if the wheel is loose on the spindle or if the wheel does not rotate freely. The following procedure will bring the end play to specification.

1. Raise the vehicle until the wheel and tire clear the floor.

2. Pry off the wheel cover and remove the grease cap from the hub (Fig. 57).

3. Wipe the excess grease from the end of the spindle, and remove the adjusting nut cotter pin and nut lock.

4. While rotating the wheel, hub, and drum assembly, tighten the adjusting nut snug (12-15 ft-lbs) to seat the bearings (Fig. 58).

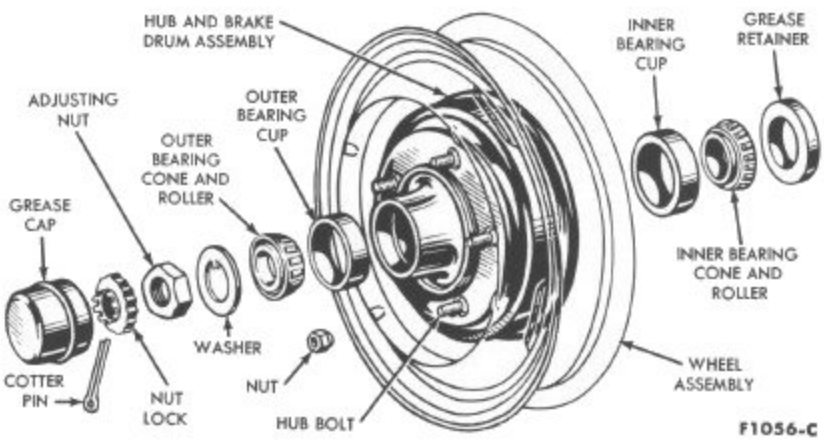

FIG. 57—Front Hub, Bearings and Grease Retainer

FIG. 58—Front Wheel Bearing Adjustment

5. Locate the nut lock on the adjusting nut so that the castellations on the lock are aligned with the cotter pin hole in the spindle.

6. Using a 1⅛-inch box wrench, back off both the adjusting nut and nut lock 2 castellations.

7. Install a new cotter pin, and bend the ends of the cotter pin around the castellated flange of the nut lock.

8. Check the front wheel rotation. If the wheel rotates properly, install the grease cap and the hub cap or wheel cover. If the wheel still rotates roughly or noisily, clean or replace the bearings and cups.

9. Lower the vehicle.

GROUP 8—STEERING

The 1962-1963 maintenance recommendations are in Group 14 and the 1962-1963 specifications are in Group 15 of this manual.

All the basic service procedures in Group 8 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

STEERING GEAR (Part 8-1)

STEERING GEAR REPAIR—1963

For 1963, the worm shaft upper bearing cup is no longer a press fit in the bearing adjuster. The lower bearing cup is no longer a press fit in the housing. During disassembly or assembly, the cup will slide in or out of the adjuster and housing without use of special tools.

The worm shaft bearing adjuster lock nut is marked on its outer side with the letter "S". Install the lock nut with the flat side against the bearing adjuster and the identifying letter "S" outward.

When removing or installing the sector shaft bushing, use Tool T60K-3576-A.

STEERING GEAR INSTALLATION

1. Slide the steering column and shift tube assembly over the worm shaft so that the boss in the column and shift tube bracket pilots into the hole in the steering column (Fig. 3 of the 1961 Shop Manual).

2. Position the clamp to the steering column and bracket and install the two clamp retaining bolts. Do not tighten the clamp bolts at this time.

3. Install the steering column and steering gear assembly through the passenger compartment, and pilot the sector shaft into the sector shaft (Pitman) arm.

4. Position the column-to-instrument panel clamp, and start the retaining bolts and nuts.

5. Install the gear housing mounting bolts and torque to specifications.

6. Move the Pitman arm firmly onto the sector shaft and install the bolt and nut that clamp the arm to the shaft.

7. The steering shaft must center in the steering column upper bearing. For **right or left adjustment,** move the column as required. With the shaft centered in the bearing, torque the screws at the instrument panel to specifications.

8. For **fore-and-aft adjustment,** loosen the housing bolts, center the shaft, and torque the housing bolts to specifications.

9. Position the upper bearing sleeve and spring.

10. Position the steering wheel and horn contact, install the retaining nut, and torque to specifications. Stake the nut.

11. Adjust the clearance between the steering wheel and the column, and finally tighten the upper and lower clamp bolts.

12. Tighten the steering column and shift tube bracket clamp bolts.

13. Connect the transmission shift rods to the shift tube levers, install the steering column floor pan (six retaining screws), and install the rubber seal.

14. Connect the horn and turn signal wires, and secure them in the retaining clip.

GROUP 9—BRAKES

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures in Group 9 of the 1961 Shop Manual are the same for 1962 and 1963.

GROUP 10—GENERATING AND STARTING SYSTEMS

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures in Group 10 of the 1961 Shop Manual are the same for 1962 and 1963.

GROUP 11—LIGHTS, INSTRUMENTS AND ACCESSORIES

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

All basic service procedures in Group 11 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

WINDSHIELD WIPER

TWO-SPEED ELECTRIC MOTOR DISASSEMBLY

The two-speed electric motor may be disassembled for service of the drive mechanism parts.

1. Remove the gear housing cover plate and gasket (Fig. 59).

2. Remove the output shaft retainer and spacer washer.

3. Remove the crankpin bearing retainer and remove the spacer washer and cam return spring assembly.

4. Remove the arm and link assembly.

5. Remove the crankpin bearing cam.

6. Remove the input gear retainer and outer spacer shim, and remove the input gear and inner spacer shim.

7. Remove the wiper arm lever nut and lock washer.

8. Remove the wiper arm lever and spacer, and remove the output shaft and gear assembly from the housing.

9. The output gear may be removed from its shaft by tapping with a fiber hammer. Be careful not to damage the end of the shaft.

The worm drive gear and armature assembly is not serviced.

TWO-SPEED ELECTRIC MOTOR ASSEMBLY AND ADJUSTMENT

1. Tighten the motor cover. Adjust the motor shaft end play to 0.005-0.007 inch by turning the shaft stop screw. Measure with a feeler gauge between the stop screw and the motor shaft.

2. Install the input gear shim or the input gear shaft and install the gear in the housing. Adjust the end play to 0.005 to 0.010 inch by adding or removing shims under the input gear retainer. Install the retainer.

3. Install the output gear on the output shaft. Make sure that the gear is bottomed on the shaft.

4. Install the output shaft and gear assembly into the housing with the gear teeth facing the motor. Install one spacer washer to the outside end of the output shaft and assemble the wiper arm lever to the output shaft, with the linkage studs facing away from and above the shaft. Secure the lever with a lock washer and nut.

5. Place the bearing cam on the crankpin with the small diameter portion of the cam facing outward.

6. Install the arm and link assembly to the bearing cam. As the arm is placed on the shaft, the gears must be meshed and the link which is riveted to the arm must be installed to the output shaft at the same time. Proper gear indexing is obtained when the bottom tooth of the arm and gear segment will be in mesh with the bottom valley of the output shaft gear.

7. Install the output shaft spacer washer and retainer. Check the end play of the output shaft (0.005-0.010 inch). Remove or install spacer washers under the shaft retainer to adjust the end play.

8. Install the cam return spring assembly.

9. Install the bearing spacer and retainer. If the retainer cannot be installed, one or more coils of the spring clutch are probably out of place. If the bearing has excessive end play on the crankpin, the projection of the bearing may ride out of the semi-circle slot in the end plate. Add spacer washers under the retainer if necessary.

10. Apply generous amounts of Sun Prestige No. 41 grease to all moving parts. Install the gear housing cover plate.

When operating the unit on the bench, do not place hands or fingers between the wiper lever and the case, or inside the gear housing, as considerable power is developed by the gear reduction.

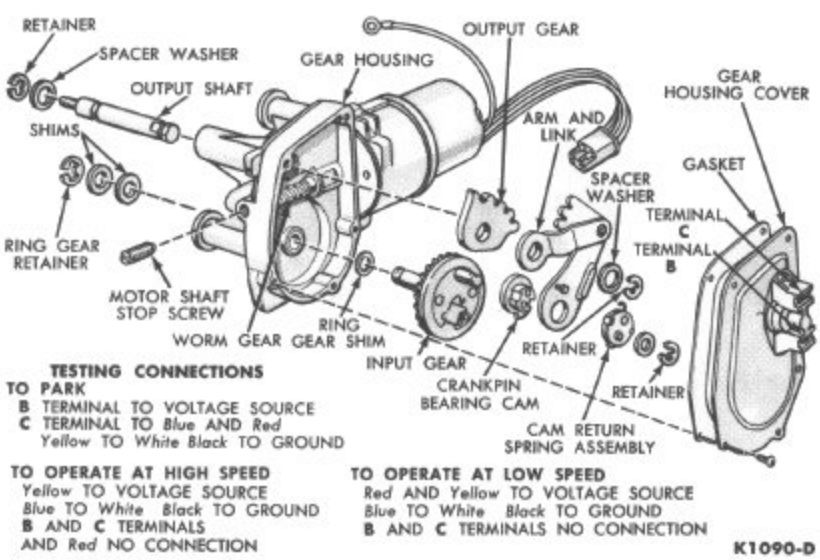

FIG. 59—Two-Speed Electric Wiper Motor—1963

GROUP 12—DOORS, SHEET METAL AND GENERAL MAINTENANCE

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures outlined in Group 12 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions.

SIDE DOOR AUXILIARY STEP REPLACEMENT

1. From under the body, remove the step front mud deflector to underbody rail screw. Remove the screws and nuts to the front and rear mud deflectors at the lower portion of the rocker panel (Fig. 60).

2. From inside, disconnect the actuating lever rod retaining pin at the door.

3. Remove the linkage cover inside the body to allow removal of the rod retaining hairpin clip, washer, spring, and rod assembly. Remove the door hold-open link pin roller from the linkage arm.

4. Remove the screws inside the body at the floor pan to allow the step assembly to be removed.

5. To install, reverse the above procedure and seal the necessary screw holes. **All moving parts should be lubricated before installation.**

SIDE DOOR AUXILIARY STEP

The side door step is actuated through linkage from the door and extends as the door is opened and retracts as the door is closed.

SIDE DOOR STEP ADJUSTMENT

The door-to-step mechanism connecting linkage is adjustable to permit proper closing of the door.To adjust the linkage, remove the rod retaining pin at the door. With the door closed and step fully retracted, turn the actuating lever rod so that the hole in the rod aligns with the holes in the actuating lever rod door bracket, then install the pin.

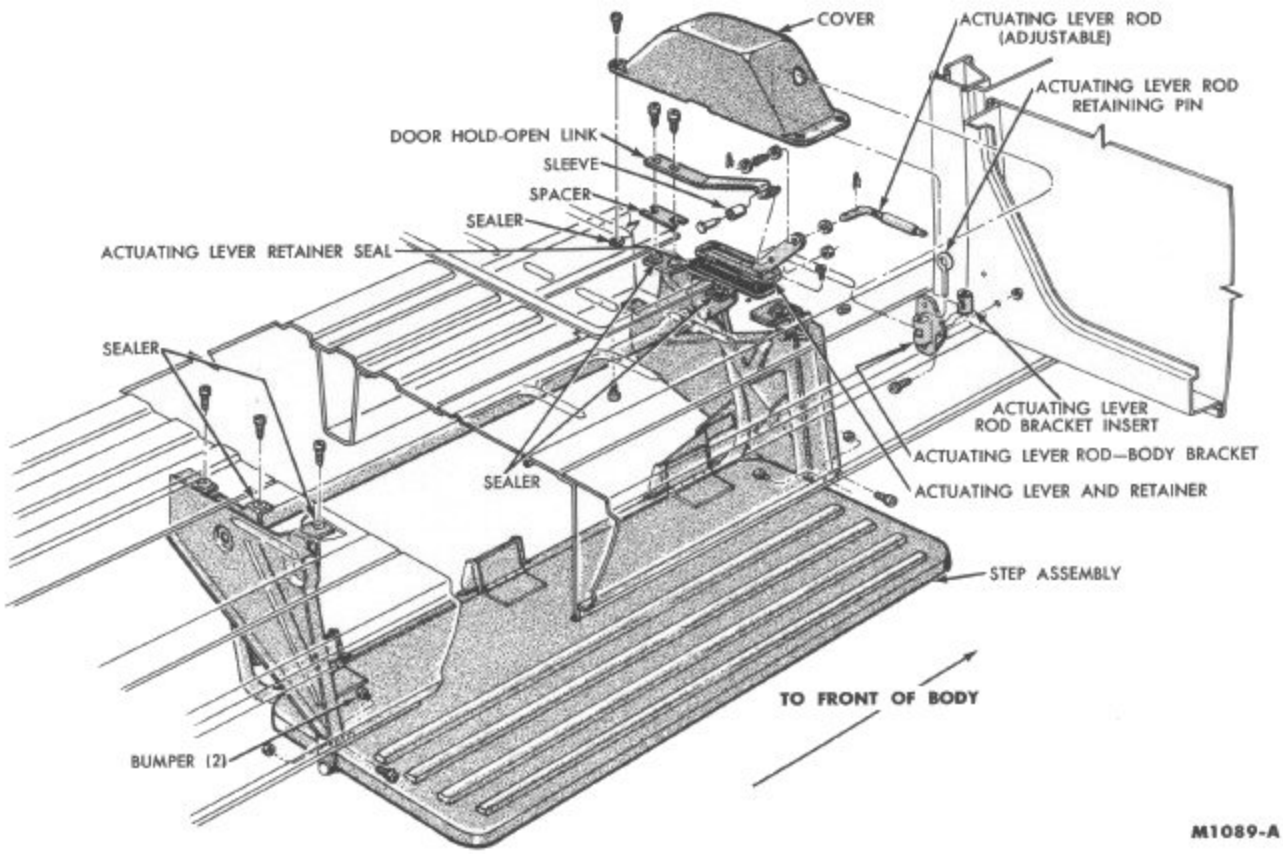

FIG. 60—Side Door Auxiliary Step Installation

GROUP 13—INTERIOR TRIM, SEATS AND WINDOWS

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures outlined in Group 13 of the 1961 Shop Manual are the same for 1962 and 1963.

GROUP 14—MAINTENANCE AND LUBRICATION

MAINTENANCE SCHEDULE (Part 14-1)

INTERVAL	OPERATION
AS REQUIRED	Check Door Drain Holes (Semi-Annually)
	Check Battery Water Level
	Check Tire Condition and Pressure
	Check Engine and Transmission Mountings
	Check Steering Stop Adjustments
	Check and Adjust Transmission Controls
	Check Front Wheel Alignment
	Check Brake Adjustment
	Inspect Exhaust System

INTERVAL	OPERATION
AS REQUIRED	Inspect Front and Rear Springs
	Inspect Engine Cooling System, Hoses and Lines
	Drain and Flush Cooling System (Every 36,000 Miles or 2 Years)
	Lubricate Door and Tailgate Hinges, Engine Cover Hinges, Door Striker Plates, Latch Rotors and Door Lock Cylinders
	Lubricate Heater and Air Control Pivots and Defroster Detent
	Adjust Clutch Pedal Travel

1962 AND 1963 MAINTENANCE AND LUBRICATION SCHEDULE

INTERVAL	OPERATION	LUBRICANT
AT EACH FUEL STOP	Check Radiator Coolant Level	
	Check Engine Oil Level	
EACH 1000 MILES	Lubricate Front Axle Spindle Bolts	Chassis Lubricant
	Lubricate Steering Linkage	Chassis Lubricant
	Lubricate Drive Shaft Universal Joint and Slip Yoke	Chassis Lubricant
	Check Rear Axle Lubricant Level	FoMoCo or Rotunda Hypoid Gear Lubricant C2AZ-19580-A (SAE 90) above —25°F, C2AZ-19580-B, (SAE 80) below —25° F. Equivalent substitute rear axle lubricants must conform to Ford Specifications M-2C28-B (SAE 90) or M-2C28-A (SAE 80).
	Check Transmission Lubricant Level and Clean Breather	Engine Oil (MIL-L-2104-A) SAE 50 or Straight Mineral Oil Gear Lubricant (with no EP additives) SAE 90 for prevailing temperatures above 10° F. Engine Oil (MIL-L-2104-A) SAE 30 or Straight Mineral Oil Gear Lubricant (with no EP additives) SAE 80 for prevailing temperatures below 10° F. Equivalent substitute lubricants must conform to Ford Specification M-2C27-E (above 10° F) or M-2C27-C (below 10° F).
	Lubricate Transmission, Accelerator, Clutch, Brake and Parking Brake Linkage Pivots and Clevises	Engine Oil SAE 10W
	Lubricate Clutch and Brake Pedals	Chassis Lubricant
EACH 4000 MILES	Check Brake Master Cylinder Fluid Level	FoMoCo or Rotunda Heavy Duty Brake Fluid B7A-19542
	Clean Engine Crankcase (non-positive Ventilation) Vent System	
	Clean Engine Positive Crankcase Ventilation System**	
EACH 6000 MILES	Change Engine Oil and Replace Oil Filter (or each 6 months)	SAE 40 or 20W-40 for prevailing temperatures above 100° F SAE 30 or 10W-30 between 32° F and 100° F SAE 20 or 10W-30 between 10° F and 32° F SAE 10W between 10° F and —10° F SAE 5W* or 5W-20 for prevailing temperatures below —10° F Use only engine oils which have been tested and certified by their marketers as satisfying the engine operating sequence* for service MS. When an MS oil is used which is not certified by the maker as having passed the engine operating sequence test, addition of Rotunda Oil Conditioner to the engine oil will satisfy the requirements
	Clean Carburetor Oil Bath Air Cleaner and Fill Reservoir	SAE 30 above 32° F. SAE 20 below 32° F.
EACH 8000 MILES	Perform Minor Engine Tune-Up	
	Cross-Switch Tires	

*Defined by the ASTM Committee D2 for Section I (formerly G IV) to Technical committee B published in the SAE handbook, 1962 edition.
**Maintain at 2000-mile intervals or every two months when truck is used in stop-and-go service.

CONTINUED ON NEXT PAGE

1962 AND 1963 MAINTENANCE AND LUBRICATION SCHEDULE (Continued)

INTERVAL	OPERATION	LUBRICANT
EACH 12,000 MILES	Lubricate Speedometer Cable	Ford Speedometer Cable Grease B5A-19581-A
EACH 24,000 MILES	Check Steering Gear Lubricant Level	FoMoCo Special Steering Gear Lubricant 8BA-19578-A. Equivalent substitute steering gear lubricants must conform to Ford Specification M-4738.
	Change Transmission Lubricant	Engine Oil (MIL-L-2104-A) SAE 50 or Straight Mineral Oil Gear Lubricant (with no EP additives) SAE 90 for prevailing temperatures above 10° F. Engine Oil (MIL-L-2104-A) SAE 30 or Straight Mineral Oil Lubricant (with no EP additives) SAE 80 for prevailing temperatures below 10° F. Equivalent substitute lubricants must conform to Ford Specification M-2C27-E (above 10° F) or M-2C27-C (below 10° F)
	Inspect and Adjust Brakes	
	Repack and Adjust Front Wheel Bearings	FoMoCo Wheel Bearing Grease C2AZ-19585-A
	Perform Major Engine Tune-up	

MAINTENANCE OPERATIONS (Part 14-2)

OPERATION AND LUBRICANT

CHECK BATTERY WATER LEVEL	The level should be maintained at the ring in the bottom of each filler	well. Do not overfill the battery.
CHECK RADIATOR COOLANT LEVEL	The level should be maintained just below the bottom of the radiator	filler neck.
CHECK BRAKE MASTER CYLINDER FLUID LEVEL	The level should be maintained ⅜ inch below the top of the filler opening.	
CHECK STEERING GEAR LUBRICANT LEVEL	Remove the lowest bolt in the steering gear housing cover and check the lubricant level. To add lubricant, turn the steering wheel to the left to move the ball nut below	the filler hole, remove the filler plug, and fill until lubricant comes out of the bolt hole. Use FoMoCo Special Steering Gear Grease. Part No. B8A-19578-A.
CHECK TRANSMISSION LUBRICANT LEVEL	The level should be maintained at the bottom of the filler hole.	
CHECK REAR AXLE LUBRICANT LEVEL	The level should be maintained at the bottom of the filler hole.	
CHECK EXHAUST SYSTEM FOR LEAKS	Torque the exhaust manifold bolts to 13-18 ft-lbs, beginning at the center of the manifold and working toward either end. Inspect the entire system for signs of leaking or burn-	ing through. Eliminate all points of interference between the pipes and chassis or body that would cause rattles or vibration. Check for broken or improperly aligned clamps.
CHECK ENGINE AND TRANSMISSION MOUNTINGS	Check engine mounts for tightness and tighten to specifications.	
CHECK STEERING STOP ADJUSTMENT	Steering Stops should be adjusted so right or left front wheel turns out	no more than 33° from the straight ahead position.
CHECK FRONT WHEEL ALIGNMENT	Check Front Wheel Alignment as covered in Part 7-1 of the 1961 Econoline Shop Manual. See Group	15 of this Shop Manual Supplement for specifications.

CONTINUED ON NEXT PAGE

OPERATION AND LUBRICANT (Continued)

CHECK DOOR DRAIN HOLES	The Drain Holes are located at the underside of the body side and rocker panels and outboard of the weatherstrip at the bottom of the	doors. Check the drain holes for obstructions. Use a screwdriver to clear the openings.
CHECK STEERING GEAR ADJUSTMENTS	See Part 8-1 of the 1961 Econoline Shop Manual for adjustment	procedure.
CHECK AND ADJUST TRANSMISSION CONTROLS	Check the transmission controls for wear and ease of operation. See Group 5 of the 1961 Econoline Shop	Manual for Adjustment of the Transmission Control Linkage.
CLEAN ENGINE CRANKCASE BREATHER CAP	Wash the oil filler tube breather cap in solvent, and oil it.	
CLEAN CARBURETOR OIL-BATH AIR CLEANER AND FILL RESERVOIR	Remove the air cleaner and drain the oil from the reservoir. Wash all parts in solvent and dry them with compressed air. Install a new gasket	if necessary. Saturate the element with engine oil, and fill the reservoir to the full mark.
CLEAN ENGINE POSITIVE CRANKCASE VENTILATION SYSTEM	Clean the positive crankcase ventilation valve as outlined in Part 1-1 of the 1961 Econoline Shop Manual.	
LUBRICATE TRANSMISSION, ACCELERATOR, CLUTCH, BRAKE, AND PARKING BRAKE LINKAGE PIVOTS AND CLEVISES	Spray pivots with engine oil – SAE 10W.	
LUBRICATE HEATER AND AIR CONTROL PIVOTS AND DEFROSTER DETENT	Lubricate heater and air control pivots with SAE 10W oil. Lubricate defroster detent with Lubriplate.	
LUBRICATE CLUTCH AND BRAKE PEDALS	Lubricate clutch and brake pedals at grease fittings with chassis lubri-	cant.
LUBRICATE DOOR HINGES AND LOCK ROTORS	Spray with engine oil – SAE 10W.	
LUBRICATE DOOR LOCK CYLINDERS	Spray with lock lubricant.	
LUBRICATE DOOR LATCH STRIKER PLATES	Apply stick wax.	
LUBRICATE SPEEDOMETER CABLE	Lubricate Speedometer Cable as Outlined in Part 11-1 of the 1961	Econoline Shop Manual.
LUBRICATE FRONT AXLE SPINDLE BOLTS	Apply lubricant with pressure gun.	
LUBRICATE STEERING LINKAGE	Apply lubricant with pressure gun.	
REPACK AND ADJUST FRONT WHEEL BEARINGS	Front wheel bearing lubrication procedure is given in Part 7-2 of	the 1961 Econoline Shop Manual.
LUBRICATE UNIVERSAL JOINTS AND SLIP YOKE	Apply lubricant with pressure gun.	

CONTINUED ON NEXT PAGE

OPERATION AND LUBRICANT (Continued)

CHANGE ENGINE OIL AND REPLACE ROTUNDA OIL FILTER	Discard the used filter element and wash the housing and other filter parts in solvent. Install a new Rotunda filter element, and fill the crankcase to the full mark on the	oil level dipstick. Run the engine at idle speed and check for oil leaks at the filter and drain hole. Recheck level and add oil if necessary.
CHANGE TRANSMISSION LUBRICANT	Drain and refill with the recommended lubricant.	
DRAIN AND FLUSH COOLING SYSTEM	Drain and flush cooling system. Install required amount of coolant.	
INSPECT TIRES AND CHECK TIRE AIR PRESSURE	Check for bruises, cuts, holes and other damage. Remove objects wedged in the treads. Make sure that	the air pressures in all tires agree with those specified for the tires and vehicle being checked.
INSPECT FRONT AND REAR SPRING LEAVES	Inspect the front and rear spring leaves and tighten spring clips or U-bolts to specifications.	
INSPECT ENGINE COOLING SYSTEM, HOSES AND LINES	Inspect engine cooling system for signs of leakage. Inspect engine cooling system hoses and lines for	signs of leakage, cracks and/or deterioration. Make corrections as necessary.
INSPECT AND ADJUST BRAKES	Remove one front wheel and drum, and inspect the drum and linings for wear or damage. Scored drums should be repaired. Reline or replace the brake shoes if the linings are worn to within 1/32 inch of any rivet.	Adjust the brakes until the pedal travel is not more than half the distance between the released position and the floor. See Part 9-1 of 1961 Econoline Shop Manual for adjustment procedures.
ADJUST CLUTCH PEDAL TRAVEL	The clutch pedal must be properly adjusted to provide correct pedal total travel and pedal free travel. See	Part 5-1 of 1961 Econoline Shop Manual for the complete checking and adjusting procedure.
PERFORM MAJOR ENGINE TUNE-UP	Clean, adjust and test spark plugs. Take a compression reading of each cylinder. Replace spark plugs. Check and adjust the deflection of the drive belts. Replace fuel filter. Check and adjust carburetor fuel level. Clean the distributor cap and rotor. Lubricate the distributor cam and bushing. Clean battery cables and terminals. Check battery state of charge. Check and adjust breaker point dwell.	Check and adjust spark advance Perform a spark intensity test of each spark plug wire. Check fuel pump pressure and capacity. Inspect the radiator, hoses and engine for coolant leaks. Check and adjust ignition timing. Adjust accelerator pump link to seasonal position. Check and adjust engine idle speed. Check and adjust idle fuel mixture. Check and adjust valve lash.
PERFORM MINOR ENGINE TUNE-UP	Clean, adjust and test spark plugs. Check and adjust drive belt deflection. Replace fuel filter. Clean distributor cap and rotor. Check condition of distributor breaker points. Lubricate distributor cam and distributor bushing. Check battery state	of charge. Check and adjust breaker point dwell. Check and adjust ignition timing. Adjust accelerator pump link to seasonal position. Check and adjust engine idle speed. Check and adjust idle fuel mixture. Check and adjust valve lash.
CHECK BRAKE ADJUSTMENTS	Adjust the brakes whenever pedal travel is more than half the distance between the released position and the	floor. See Part 9-1 of the 1961 Econoline Shop Manual for adjustment procedures.
CROSS-SWITCH TIRES AND TIGHTEN WHEEL STUD NUTS	All tires, including the spare tire, should be cross-switched as shown in	the diagram in Part 7-2 of the 1961 Econoline Shop Manual.

GROUP 15—SPECIFICATIONS AND SPECIAL TOOLS

NOTE: All specifications are given in inches unless otherwise noted.

ENGINE

GENERAL SPECIFICATIONS

Piston Displacement (Cubic Inches)	144 or 170
Bore and Stroke	144 Six—3.50 x 2.50 170 Six—3.50 x 2.94
Compression Ratio	8.7:1
Engine Fuel Requirements	Regular
Comp. Pressure—Sea Level @ Cranking Speed	150-190
Brake Horsepower @ Specified Engine rpm	144 Six— 85 @ 4200 170 Six—101 @ 4400
Torque (ft-lbs) @ Specified Engine rpm	144 Six—134 @ 2000 170 Six—156 @ 2400
Firing Order	1-5-3-6-2-4
Valve Arrangement (Front to Rear)	E-I-I-E-I-E-E- I-E-I-I-E
Taxable Horsepower (SAE)	29.4
Engine Idle rpm	550-575
Engine Idle Manifold Vacuum—Minimum Inches Hg. @ Specified Engine Idle rpm (Sea Level) For 1962 both Engines	144 Six—16 170 Six—17 18
Initial Ignition Timing—B.T.D.C.*	(1962) 6° (1963) 4°
Crankcase Oil Capacity—Quarts Without Filter Replacement—U.S. Measure —Imperial Measure With Filter Replacement—U.S. Measure —Imperial Measure	 3.5 3 4.5 3.75
Oil Pressure (psi) Hot @ 2000 rpm	35-55

CAMSHAFT AND TIMING CHAIN

Journal Standard Diameter		1.8095-1.8105
Journal Maximum Out of Round		0.0005
Journal to Bearing Clearance —Wear Limit		0.001-0.003 0.006
Timing Chain Deflection		0.5
Camshaft Lobe Lift	Intake	0.2405
	Exhaust	0.2395
Max. Allowable Lobe Lift Loss—Intake & Exhaust		0.005
Camshaft End Play —Wear Limit		0.001-0.007 0.012

CAMSHAFT BEARINGS

Inside Diameter—Assembled	1.8115-1.8125
Location in Relation to Front Face of Block Cam Bearing Bore—No. 1 Bearing Only—Below	0.115-0.125

CYLINDER HEAD

Gasket Surface Flatness**	0.003 in any 6 inches or 0.006-inch overall
Valve Guide Bore Diameter—Intake and Exhaust	0.3115-0.3125
Valve Seat Width—Intake and Exhaust	0.070-0.080
Valve Seat Angle—Intake and Exhaust	45°
Valve Seat—Maximum Runout (1962 and 1963) —Wear Limit (1962 only)	0.002 0.0025

*The initial ignition timing may be advanced 5° over the recommended setting. To do this, advance the timing progressively until engine detonation (spark knock) is evident under actual road test acceleration. Retard the timing until the detonation is eliminated. If the individual requirements of the vehicle and/or if sub-standard fuels are used, the initial timing may be retarded from the recommended setting not to exceed 2° BTC.

**1963—0.007 inch overall

VALVE MECHANISM

Valve Lash—Intake & Exhaust		0.018
Valve Stem Diameter—Standard	Intake	0.3100-0.3107
	Exhaust	0.3090-0.3097
Valve Stem Diameter 0.003 O.S.	Intake	0.3130-0.3137
	Exhaust	0.3120-0.3127
Valve Stem Diameter 0.015 O.S.	Intake	0.3250-0.3257
	Exhaust	0.3240-0.3247
Valve Stem Diameter 0.030 O.S.	Intake	0.3400-0.3407
	Exhaust	0.3390-0.3397
Valve Stem to Valve Guide Clearance	Intake	0.0008-0.0025
	Exhaust	0.0018-0.0035
—Wear Limit	Intake	0.0045
	Exhaust	0.0055
Valve Head Diameter	Intake (144) Intake (170)	1.462-1.472 1.522-1.532*
	Exhaust	1.261-1.276
Valve Face Angle—Intake & Exhaust		44°
Valve Face Maximum Runout (Intake & Exhaust) —Wear Limit (1962 only)		0.0015 0.002
Valve Spring Free Length (Approximate)		2.00
Valve Spring Maximum Out of Square		(1962) 1/16—(1963) 0.072)
Valve Spring Pressure (lbs)—Specified Length —Wear Limit		47.75—56.25 @ 1.585 43 @ 1.585
Valve Spring Pressure (lbs)—Specified Length —Wear Limit		112-122 @ 1.222 101 @ 1.222
Valve Spring Assembled Height		1 5/16-1 39/64
Valve Push Rod Maximum Runout		0.025
Valve Tappet Diameter		0.8740-0.8745
Valve Tappet to Tappet Bore Clearance		0.0005-0.0020
Rocker Arm to Rocker Shaft Clearance —Wear Limit		0.002-0.0045 0.006
Rocker Arm Shaft Outside Diameter		0.780-0.781
Rocker Shaft Bore Diameter		0.783-0.784

*1963—1.522-1.537

CRANKSHAFT

Main Bearing Journal Standard Diameter	Coded Red	2.2486-2.2490
	Coded Blue	2.2482-2.2486
Main Bearing Journal Maximum Runout —Wear Limit		0.0025 0.0035
Main Bearing Journal Thrust Face Maximum Runout		0.001
Connecting Rod Journal Diameter	Coded Red	2.1236-2.1240
	Coded Blue	2.1232-2.1236
Connecting Rod and Main Bearing Journal Maximum Out-of-Round —Wear Limit (1962 only)		0.0004 0.0006
Connecting Rod and Main Bearing Journal Maximum Taper —Wear Limit (1962 only)		0.0003 0.001
Thrust Bearing Journal Length		1.275-1.277
Crankshaft Free End Play —Wear Limit		0.004-0.008 0.012
Assembled Flywheel Clutch Face Maximum Runout		0.010
Assembled Flywheel Outside Diameter Runout		0.007

MAIN BEARINGS

Journal Clearance—Copper Lead		0.0007-0.0025
Bearing Wall Thickness—Copper Lead	Red	0.0754-0.0759
	Blue	0.0758-0.0763
	0.002 U.S.	0.0768-0.0773

CONNECTING ROD

Piston Pin Standard Inside Diameter		0.9107-0.9112
Bearing Bore Diameter	Coded Red	2.2390-2.2394
	Coded Blue	2.2394-2.2398
Bearing Bore Maximum Out-of-Round		0.0002
Bearing Bore Maximum Taper		0.0002
Connecting Rod Length (Center to Center)	144 Six	4.854-4.856
	170 Six	4.714-4.716
Connecting Rod—Maximum Twist Total Difference		0.012
Connecting Rod—Maximum Bend Total Difference		0.004
Connecting Rod Assembly (Assembled to Crankshaft) Side Clearance —Wear Limit		0.004-0.008 0.014

CONNECTING ROD BEARINGS

Bearing to Crankshaft Clearance		0.0008-0.0023
Bearing Wall Thickness	Red	0.0569-0.0574
	Blue	0.0573-0.0578
	0.002 U.S.	0.0583-0.0588

PISTON

Standard Piston Diameter at Right Angle to Piston Pin Centerline	Red	3.4976-3.4982
	Blue	3.4988-3.4994
	0.003 O.S.	3.5000-3.5006
Piston to Bore Clearance at Right Angle to Piston Pin Centerline		0.0018-0.0036

PISTON PIN

Piston Pin Dia. Standard (Coded Green)	0.9120-0.9123
Piston Pin Length	3.010-3.030
Piston Pin to Piston Clearance	0.0001-0.0003

PISTON RINGS

Ring width—Compression—Upper Lower	0.0774-0.0781 0.0770-0.0780
Side Clearance—Compression—Upper Lower	0.0019-0.0036 0.0020-0.004
Piston Ring Gap Width—Compression (Upper and Lower)—Standard Bore	0.010-0.020
Side Clearance—Oil	Snug
Gap Width—Oil—Standard Bore	0.015-0.055 Rail

CYLINDER BLOCK

Cylinder Bore Std. Diameter Spread for 8 Grades		3.5000-3.5024
Cylinder Bore Maximum Out-of-Round —Wear Limit		0.001 0.003
Cylinder Bore Maximum Taper —Wear Limit		0.001 0.005
Main Bearing Bore Diameter	Coded Red	2.4012-2.4016
	Coded Blue	2.4016-2.4020
Head Gasket Surface Flatness*		0.003 in any 6 inches or 0.006 inch overall

*1963—0.007 inch overall.

OIL PUMP

Relief Valve Spring Tension (lbs)	8.6-9.5 @ 1.078
Relief Valve Clearance	0.0015-0.0029
Drive Shaft to Housing Bearing Clearance	0.0015-0.0029
Rotor Assembly End Clearance (Pump Assembled)	0.0011-0.0041
Outer Race to Housing—Radial Clearance	0.006-0.012

TORQUE LIMITS

	Foot-Pounds
Main Bearing Cap Bolts (Oiled)	60-70
Cylinder Head Bolts (Oiled)	65-75
Oil Pan to Cylinder Block	7-9
Flywheel to Crankshaft	75-85
Exhaust Manifold to Cylinder Head	13-18
Oil Pump to Cylinder Block	12-15
Oil Pump Cover Plate	6-9
Camshaft Thrust Plate to Cylinder Block	12-15
Cylinder Front Cover	7-9
Water Outlet Housing	12-15
Oil Pan Drain Plug	15-20
Crankcase Ventilation Tube to Engine	6-9
Rocker Arm Cover	3-5
Camshaft Sprocket to Camshaft	35-45
Damper or Pulley to Crankshaft	45-55
Connecting Rod Nuts	19-24
Rocker Shaft Support to Cylinder Head	30-35
Water Pump to Cylinder Block	12-15
Oil Tube to Oil Pump Nut	12-15
Valve Rocker Arm Adjusting Screw (Self-Locking)—Minimum Torque to Rotate	3
Fuel Pump to Cylinder Block	12-15
Engine Front Support— Rear Support Assembly to Engine	24-32
Insulator Assembly to Attaching Bracket Lock Nut	11-15
Insulator Assembly to Engine	18-24
Engine Rear Support— Support Retainer to Engine	24-30
Support Assembly to Body Lock Nut	10-15
Insulator to Transmission Extension Bolts	23-29
Insulator Assembly Nuts	23-29
Support to Transmission Extension Bolts	37-42
Oil Filter Adapter to Cylinder Block	50-60
Muffler Inlet Pipe to Exhaust Manifold	23-27

IGNITION SYSTEM

SPARK PLUGS

Part Number	Size	Gap (Inches)	Torque (Ft-Lbs)
Autolite BF-82	18 mm	0.035	15-20

CONDENSER

Capacity Microfarads	Min. Leakage Megohms	Max. Series Resistance Ohms
0.21-0.25	5	1

DISTRIBUTOR—GENERAL SPECIFICATIONS

Breaker Arm Spring Tension (Ounces)	17-20
Contact Spacing (Inches)	0.024-0.026
Dwell Contact at Idle Speed	35°-38°

VACUUM ADVANCE CHARACTERISTICS

Note: The vacuum advance characteristics given apply to the distributor with the indicated number only. The distributor number is stamped on the distributor housing or on a plate attached to the distributor housing.

DISTRIBUTOR NO. C3UF-12127-E (144 Six) (1963)
Set test stand to 0° @ 250 rpm and 0 inches of vacuum.

Distributor rpm	Advance (Degrees)	Vacuum Inches of Mercury
500	1 - 2	0.30
800	4¾ - 5¾	0.80
1200	8 - 9	1.80
1600	10 -11	3.00
2000	11 -12¼	3.90
Maximum Advance Limit	13½	10

Note: The vacuum advance characteristics given apply to the distributor with the indicated number only. The distributor number is stamped on the distributor housing or on a plate attached to the distributor housing.

DISTRIBUTOR NO. C3UF-12127-D (170 Six) (1963)
Set test stand to 0° @ 250 rpm and 0 inches of vacuum.

Distributor rpm	Advance (Degrees)	Vacuum Inches of Mercury
600	¼ - 1¼	0.45
800	3½ - 4½	0.75
1200	7 - 8	1.75
1600	9¼ -10¼	2.90
2000	11 -12¼	3.70
Maximum Advance Limit	15	10

DISTRIBUTOR DIMENSIONS

Distributor Shaft	Inches
Diameter (at bushing)	0.4675-0.4680
End clearance (to gear)	0.028
Gear Location (from bottom of gear to bottom of mounting rib)	2.510-2.515

COIL

Primary Resistance (Ohms)	1.40-1.54 (75°F.)
Secondary Resistance (Ohms)	8000-8800 (75°F.)
Amperage Draw Engine Stopped Engine Idling	 4.5 2.5
Primary Circuit Resistor (Ohms)	1.30-1.40 (75°F.)

VACUUM ADVANCE CHARACTERISTICS

Note: The vacuum advance characteristics given apply to the distributor with the indicated number only. The distributor number is stamped on the distributor housing or on a plate attached to the distributor housing.

DISTRIBUTOR NO. C0DF-12127-A (144 Six) (1962)
Set test stand to 0° @ 300 rpm and 0 inches of vacuum.

Distributor rpm	Advance (Degrees)	Vacuum Inches of Mercury
400	0	0.33
600	½ - 1½	0.78
800	3½ - 4½	1.30
1400	10 -12	3.45
1800	12½ -15	5.00
2000	12¾ -15½	5.35
Maximum Advance Limit	16½	10

Note: The vacuum advance characteristics given apply to the distributor with the indicated number only. The distributor number is stamped on the distributor housing or on a plate attached to the distributor housing.

DISTRIBUTOR NO. C1DF-12127-B (170 Six) (1962)
Set test stand to 0° @ 450 rpm and 0 inches of vacuum.

Distributor rpm	Advance (Degrees)	Vacuum Inches of Mercury
700	1½ - 2½	0.43
1000	5¼ - 6¼	0.92
1300	7½ - 8¾	1.50
1700	10 -11¾	2.40
2000	11 -12¾	3.00
Maximum Advance Limit	16½	10

FUEL SYSTEM

FUEL PUMP

Minimum Intake Vacuum (Hg.) @ 500 Engine rpm	6
Eccentric Total Lift	0.290-0.310
Fuel Pump Static Pressure psi @ 500 Engine rpm	3.5-5.5
Min. Fuel Pump Volume (Flow) @ 500 Engine rpm	1 pint within 30 seconds

FUEL TANK

	(U.S. Gallons)	(Imperial Gallons)
Capacity	14	11.6

CARBURETOR

144 SIX (1963)	
C3UF-9510-A	Manual-Shift transmission
Main Metering Jet Identification No.	
0-5,000 Feet	52
5,000-10,000 Feet	50
10,000-15,000 Feet	48
Float Setting	1 ± 1/64 inch from bottom of float to air horn, with air horn inverted
Venturi Size	1 1/64 inches
Spark Control Valve Identification No. or Color	Red
Initial Idle Mixture Adjustment	3-4 turns open
Power Valve Opens at	6-8 inches of mercury
144 SIX (1962)	
C2UE-9510-A	Manual-Shift transmission
Main Metering Jet Identification No.	
0-5,000 Feet	53
5,000-10,000 Feet	52
10,000-15,000 Feet	51
Float Setting	11/64 ± 1/64 inch from the roof of the float chamber to the lowest point of the float, carburetor inverted
Fuel Level Setting	23/32 ± 1/32 inch below the economizer piston mounting surface.
Float drop	3/16 inch between the bottom of the float at the lowest point and the floor of the float chamber with the main body in an upright position.
Venturi Size	1 1/8 inches
Spark Control Valve Identification No.	728
Initial Idle Mixture Adjustment	1-1½ turns open
Power Valve Opens at	4-7 inches of mercury

170 SIX (1963)	
C3UF-9510-B	Manual-Shift transmission
Main Metering Jet Identification No.	
0-5,000 Feet	57
5,000-10,000 Feet	55
10,000-15,000 Feet	53
Float Setting	1 ± 1/64 inch from bottom of float to air horn, with air horn inverted.
Venturi Size	1 7/64 inches
Spark Control Valve Identification No. or Color	Red
Initial Idle Mixture Adjustment	3-4 turns open
Power Valve Opens at	6-8 inches of mercury
170 SIX (1962)	
C1UE-9510-D	Manual-Shift transmission
Main Metering Jet Identification No.	
0-5,000 Feet	60
5,000-10,000 Feet	59
10,000-15,000 Feet	58
Float Setting	11/64 ± 1/64 inch from the roof of the float chamber to the lowest point of the float, carburetor inverted
Fuel Level Setting	23/32 ± 1/32 inch below the economizer piston mounting surface.
Float drop	3/16 inch between the bottom of the float at the lowest point and the floor of the float chamber with the main body in an upright position.
Venturi Size	1¼ inches
Spark Control Valve Identification No.	35
Initial Idle Mixture Adjustment	1-1½ turns open
Power Valve Opens at	7-10 inches of mercury

COOLING SYSTEM

Cooling System Pressure	13-15 psi
Water Pump Impeller to Housing Clearance	0.005-0.025
Pump Pulley or Pulley Hub to Pump Housing Mounting Face Alignment	3.94 inches from front face of pulley hub
Drive Belt Tension New Belt Used Belt*	 90-120 lbs. 60-90 lbs.

*Belt operated for a minimum of 10 minutes is considered a used belt.

Cooling System Capacity*	U.S. Measures	9 Quarts
	Imperial Measures	7.5 Quarts
Thermostats		
Low Temp.	Opens °F	155°-162°
	Fully Open at °F	182°
High Temp.	Opens °F	185°-192°
	Fully Open at °F	210°-212°

*Add 1.5 qts. for heater.

CLUTCH AND MANUAL-SHIFT TRANSMISSION

CLUTCH IDENTIFICATION

Pressure Plate			Disc	
Diameter (Inches)	Number of Springs	Spring Color	Number of Springs	Spring Color
8½	6	Unpainted	6	(3) Green (3) Unpainted

PILOT BUSHING

Maximum ID	0.634 inch

TORQUE LIMITS

	Ft-Lbs
Flywheel Housing to Engine Bolts	40-50
Clutch Release Equalizer Frame Bracket Bolts	25-32
Pressure Plate Cover to Flywheel	23-28

TORQUE LIMITS (Continued)

TRANSMISSION (1963)	Ft - Lbs
Input Shaft Gear Bearing Retainer to Transmission Case	19-25
Transmission to Flywheel Housing	32-36
Transmission Cover to Transmission Case	14-19
Speedometer Cable Retainer to Transmission Extension	3-4.5
Transmission Extension to Transmission Case	42-50
Flywheel Housing to Engine	40-50
Gear Shift Lever to Cam & Shaft Assembly Lock Nuts	14-19

TRANSMISSION (1962)	
Main Drive Gear Bearing Retainer to Transmission Case	12-15
Transmission to Flywheel Housing	32-36
Transmission Cover to Transmission Case—Side	10-13
Speedometer Cable Retainer to Transmission Extension	3-4.5
Transmission Extension to Transmission Case	37-42
Flywheel Housing to Engine	40-50
Gear Shift Lever to Cam & Shaft Assembly Lock Nuts	12-15

ADJUSTMENTS

CLUTCH	Inches
Clutch Pedal Free Travel	⅜-1⅛
Clutch Pedal Total Travel	6-6½
Maximum Variation of Finger Height	0.031
TRANSMISSION (1963)	
Detent Set Screw Head	Flush to 0.020 below case surface
End Play—Reverse Idler	0.004-0.018
End Play—Cluster Gear	0.004-0.018
TRANSMISSION (1962)	
Cam Ramp to Interlock Shift Sleeve—Clearance	0.001-0.013
(5) Interlock Shift Sleeves Available—Length	1.286-1.288
End Play—Cluster Gear	0.0045-0.0185

TRANSMISSION GEAR RATIO

Gear	Low	2nd	High	Reverse
Gear Ratio (1963)	3.41	1.86	1.00	3.51
Rear Ratio (1962)	3.39	1.97	1.00	4.12

APPROXIMATE LUBRICANT REFILL CAPACITIES

Application	Pints
Transmission (1963)	3
Transmission (1962)	2½

REAR AXLE

REAR AXLE RATIOS AND GEAR IDENTIFICATION

Axle Ratio	Number of Teeth	
	Drive Gear	Pinion
3.50 to 1	35	10
4.00 to 1	36	9

APPROXIMATE LUBRICANT REFILL CAPACITIES

Application	Pints
Rear Axle	2

ADJUSTMENTS

REAR AXLE	Inches
Backlash Between Drive Gear and Pinion	0.008-0.012
Backlash Variation between Teeth	Max. 0.002
Runout of Backface of Ring Gear as Assembled	Max. 0.002
Thickness: Differential Side Gear Thrust Washers	0.030-0.032
Differential Pinion Gear Thrust Washers	0.030-0.032
Rear Bearing Cone to Pinion Gear Nominal Shim Shims Available: 0.008 through 0.024 inch	0.018

TORQUE LIMIT

REAR AXLE	Foot-Pounds
Rear Cover Bolts	10-17
Differential Bearing Cap Screws	40-50
Differential Bearing Adjusting Nut Lock Bolts	12-20
Universal Joint Flange Axle End to Universal Joint Bearing Assembly Nuts	10-14
Drive Gear Attaching Cap Screws	40-50
Rear Axle Shaft Bearing Retaining Nuts	30-35
Minimum Torque Required to Tighten Pinion Flange Lock Nut to Obtain Correct Pinion Bearing Preload	140
Pinion Bearing Preload (Inch-Pounds) New Bearings Used Bearings	17-27 6-10
Differential Bearing Preload	2-3 notches tight

DRIVE PINION ADJUSTING SHIM THICKNESS CHANGES—INCHES

Old Pinion Marking	New Pinion Marking								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

FRONT AND REAR SUSPENSION

CASTER*

Degrees	5° ± ¾°

*Maximum difference between both front wheel caster angles is ¾°.

CAMBER*

Degrees	⅓° ± ¼°

*Maximum difference between both front wheel camber angles—½° (¼° preferred).

TREAD AND TOE-IN

Tread (Inches)	Front Rear	60 60¼
Toe-In (Inches)		3/32 ± 1/32
Toe-Out on Turns (Degrees)†		21½°

†Angle of inside wheel when outside wheel is turned 20°.

King Pin Inclination ..... 7½°

FRONT SUSPENSION TORQUE LIMITS

Description	Foot-Pounds
Spring to Front Hanger	30-50
Spring Shackle at Rear to Body and Spring	20-32
Spring to Front Axle—Spring Clip Nuts	50-60
Shock Absorber Mounting Bolt and Nut—Upper and Lower	40-55
Stabilizer to Body	25-35
Stabilizer to Link	12-17
Stabilizer Link to Front Axle	40-55
Stabilizer to Link Nut	12-17
Spindle Connecting Rod to Spindle Arm	45-55
Spindle Arm to Spindle Nut	100-250
Drag Link to Left Spindle Arm	45-55

SEMI-ELLIPTIC LEAF SPRINGS—FRONT

No. of Leaves	Capacity at Normal Loaded Height (Pounds)	Deflection Rate (Pounds per Inch)	Length (Inches)	Width (Inches)
4	768-812	119-131	48.0	2.25
5 optional	836-884	129-143	48.0	2.25

REAR SUSPENSION TORQUE LIMITS

Description	Foot-Pounds
Spring to Front Hanger	30-50
Spring Shackle at Rear to Body and Spring	20-32
Spring to Rear Axle—Spring Clip Nuts	30-40
Shock Absorber Mounting Bolt and Nut—Upper and Lower	30-40

SEMI-ELLIPTIC LEAF SPRINGS—REAR

No. of Leaves	Capacity at Normal Loaded Height (Pounds)	Deflection Rate (Pounds per Inch)	Length (Inches)	Width (Inches)
5	622-668	74-85	48.0	2.25
6	874-946	128-142	48.0	2.25
optional		190-210		

STEERING

STEERING GEAR AND LINKAGE ADJUSTMENTS

Sector Shaft End Play—Steering Linkage Disconnected	No Perceptible
*Worm Bearing Pre-Load (Pull to keep steering wheel moving)	3-6 in-lbs.
†Total Pre-Load@ Mesh Load plus Worm Bearing Pre-Load (Pull to rotate worm past center high spot)	8-13 in-lbs.
Backlash permissible at 30° on either side of straight-ahead steering position	No Perceptible

*With seal installed in adjuster assembly and not in mesh with sector tooth.
†Must be minimum of 2 in-lbs greater than worm bearing preload.

DIMENSION

Sector Adjusting Screw Head to End of Sector Shaft Maximum Clearance	0.002 inch

TORQUE LIMITS

Description	Foot-Pounds
Steering Arm to Spindle	100-250
Pitman to Drag Link Ball Stud	45-55
Sector Shaft Arm to Drag Link Ball Stud	45-55
Spindle Arm Connecting Rod and End Assembly to Spindle Arm	45-55
Spindle Connecting Rod Clamp to Adjusting Sleeve	25-35
Steering Wheel to Shaft	25-35*
Steering Gear Housing Cover to Housing	12-20
Pitman Arm to Sector Shaft Assembly	55-65
Steering Gear Housing to Body	30-40
Steering Column to Instrument Panel Bracket	10-15

*1963—35-55

BRAKES

BRAKE CHECKS AND ADJUSTMENTS

Type of Check or Adjustment	Specification
Brake Pedal	Pedal Free Play ¼-⅜ inch
Brake Shoe Repair	Brake Lining Clearance (Midway between Rivets)
	Maximum 0.005 inch Lining Wear Limit
	(From Top of Rivets) Maximum 1/32 inch
Master Cylinder	Hydraulic Master Cylinder Bore, Honed
	Diameter, Maximum 1.003 inch

DIMENSIONS

		Front	Rear
Drum Inside Diameter		10.000	
Drum Maximum Boring Limit		10.060	
Lining Width	Primary	2.50	1.75
	Secondary	2.50	1.75
Wheel Cylinder Bore Diameter		1.125	0.8125
Master Cylinder Bore Diameter		1.000	

TORQUE LIMITS

	Foot-Pounds
Master Cylinder Eccentric Bolt to Brake Pedal Assembly	12-24
Brake Tube Fitting	10-12½
Rear Brake Assy. & Bearing Retainer to Rear Axle Housing	30-35
Brake Cylinder to Brake Carrier Plate	11-19
Parking Brake Control to Front Floor	7-15
Master Cylinder to Mounting Bracket	23-29
Parking Brake Control to Mounting Bracket	23-29
Brake Hose	12-18
Brake Line Connection or Rear Axle Housing Bolt	12-18
Front Brake Carrier Plate to Spindle	45-60
Wheel Nuts	55-85

GENERATING AND STARTING SYSTEM

REGULATOR

Current Rating (Amperes)	25
Current Regulation (Amperes)	23-27
Cut-In Voltage	12.4—13.2
Maximum Reverse Current to Open (Amperes)	8
Voltage Regulation @ 75°F.	14.6—15.4

STARTER MOTOR

Normal Engine Cranking rpm	Min. Torque @ 5 Volts		Maximum Commutator Runout (Inches)	No Load Amperage @ 12 v
	Ft-Pounds (Min.)	Amp. Load (Max.)		
250-290	8*	450*	0.002	70
	9.6†	500†		

*144 Six †170 Six

ALLOWANCE FAST CHARGE TIME—DOMESTIC ONLY

Specific Gravity	Maximum Fast Charge Time
1.150 or less	1 hour
1.150 to 1.175	¾ hour
1.175 to 1.200	½ hour
1.200 to 1.225	¼ hour
Above 1.225	Slow Charge Only

STARTER MOTOR BRUSHES

Mfg. Length (Min.) (Inches)	Wear Limit (Inches)	Brush Spring Tension (Min.) (Ounces)	No. Used
0.46	5/16	45	4

BATTERIES

Plates	Amp. Hours	Specific Gravity
54	40	1.270-1.290

BATTERY FREEZING TEMPERATURES

Specific Gravity	Freezing Temp.
1.250	—62°F.
1.200	—16°F.
1.150	+ 5°F.
1.100	+19°F.

VOLTAGE REGULATION SETTING VERSUS AMBIENT AIR TEMPERATURE

Ambient Temperature °F.	Voltage Regulation Setting (Volts)
35	15.0-15.8
55	14.8-15.6
75	14.6-15.4
95	14.3-15.1
115	14.1-14.9
135	13.8-14.6

GENERATOR

Part Number	Field Current Draw Amperes @ 12 v 75° F.	Watts	Gen. rpm Charge Starts*	Maximum Rate		Pulley		Brushes		
				Amps.	Gen. rpm*	Belt Width (In.)	Pitch Diameter (Inches)	No.	Original Length (Inches)	Spring Tension (Oz.)
C2DF-10,000-B	1.2-1.8	375	1420	25	2610	3/8	2.7	2	29/32	20-26

External Circuit Resistance (generator armature terminal to battery positive terminal: 0.6 Volt Maximum @ 25 Amperes).
Maximum Commutator Runout: 0.002 inch.
*To find equivalent engine rpm, divide generator pulley diameter by crankshaft pulley diameter, and multiply by generator rpm.

LIGHTS, INSTRUMENTS AND ACCESSORIES

BULB CHART

	Candle Power or Wattage	Trade
Headlights	50/40w	6012
Front Turn Signal and Parking	32/4 c.p.	1157
Rear Turn Signal, Stop and Tail	32/4 c.p.	1157
License Plate	4 c.p.	1155
Dome Light	15 c.p.	1003
Cargo Light	15 c.p.	1003
Front Turn Signal Light (Accessory)	32 c.p.	1156
Spotlight	30w	4405

	Candle Power or Wattage	Trade No.
Instrument Panel Indicators:		
Hi Beam	1.5 c.p.	1445
Oil Pressure	2 c.p.	1895
Generator	2 c.p.	1895
Turn Signal	2 c.p.	1895
Cluster	2 c.p.	1895
Radio Dial	2 c.p.	1895

FUSE AND CIRCUIT BREAKER CHART

Circuit	Protective Device	Location
Headlights	Circuit Breaker	Integral with Headlight Switch
Dome Light & Rear Parking	AGC 15 or 3AG-15 Fuse	Fuse Panel on Lighting Switch
Turn Signals	SFE-14 Fuse	
Radio	SFE-7.5 Fuse	
Heater Blower	SFE-14 Fuse	
Instrument Panel Light Rheostat	1AG-1 or AGA-1	Cartridge in feed wire
Emergency Warning Flasher	SFE-14	
Windshield Wiper Motor Single-Speed Two-Speed	 5 Amp Circuit Breaker 12 Amp Circuit Breaker	Integral with Switch
Cigar Lighter	Reset Circuit Breaker	On back of lighter socket
Spotlight	SFE-7.5	Cartridge in feed wire

HORN

Horn Current at 12 v	9.5 Amperes

STOP LIGHT SWITCH

Operating Pressure	60-110 psi

TURN INDICATOR

Current Draw at 12 v	0-4 Amperes

INSTRUMENTS

Fuel and Temperature Gauges—Average Voltage at Gauge Terminals	5 v

HEATER MOTOR CURRENT DRAW

At Low Speed	4-5 Amperes at 12 volts
At High Speed	5-6 Amperes at 12 volts

WINDSHIELD WIPER MOTOR CURRENT DRAW

FORD Single Speed		0.7 ± 0.3 amperes at 12 volts no load
FORD 2 Speed	Low	3.0 ± 0.3 amperes at 12 volts no load
	High	2.0 ± 0.3 amperes at 12 volts no load
Bosch Single Speed		2.6 ± 0.3 amperes at 12 volts no load
Bosch 2 Speed	Low	3.0 ± 0.3 amperes at 12 volts no load
	High	1.5 ± 0.3 amperes at 12 volts no load

BODY

GENERAL DIMENSIONS

	87A	89A	89B
Overall Length (Inches) Including Rear Bumper	168.33	168.33	168.33
Overall Width (Inches) Including Rear Bumper	75.00	75.00	75.00
Overall Height (Inches) 6.50 x 13 Tire 7.00 x 13 Tire	 75.94 76.23	 77.32 77.21	 77.70 77.43
Wheelbase (Inches)	90.00	90.00	90.00
Tread (Inches) Front Rear	 60.00 60.24	 60.00 60.24	 60.00 60.24
Estimated Curb Weight (Pounds)	2414	2464	2700

SPECIAL TOOLS

ENGINE

Tool Number	Source	Tool Purpose
835*	KRW	Engine Stand (Existing)
1002*	KRW	Engine Stand (New)
1009*	KRW	Engine Stand (New)—Requires 6005-CF Conversion Flange for Adapters
3600-E	M	Piston Pull Scale
6001-ES	M	Engine Stand
6001-FAB	M	Engine to Repair Stand Mount
6110-E	M	Ring Groove Cleaner
6149-3	M	Piston Ring Expander
6149	M	Piston Ring Compressor
6331	M	Main Bearing Upper Insert Remover

*No longer available; those still in use will handle 1963 engines. Manzel tools 6001-ES and 6001-FAB will replace.

Tool Number	Source	Tool Purpose
6505-G	M	Valve Stem Clearance Gauge
6513-CG	M	Exhaust Valve Micrometer
6513-EE	M	Valve Spring Compressor
1011	O	3-Jaw Puller
12132	M	Distributor Shaft Bushing Burnisher
12132-A	M	Distributor Shaft Bushing Replacer
12132-H	M	Distributor Shaft Bushing Remover
KD-385	KD	Valve Spring Compressor
LM-106	M	Valve Spring Tester
RC-500	S	Ring Groove Cleaner

TRANSMISSION

Tool Number	Source	Tool Purpose
82	S	Socket Type Short Screwdriver
1175-AB	M	Puller Head Adapter—Extension Housing Seal Grease and Oil Seal Remover
3200-32	St	Transmission—High Jack (2-Stage)
7000-DD	M	Rubber Tip Assy.—Replacement Part for 7000-DE Air Nozzle
7064	M	Snap Ring Pliers
7688	M	Shift Fork Cam Oil Seal Replacer

FRONT SUSPENSION

Tool Number	Source	Tool Purpose
OW483	OTC	Adjustable Face Spanner—Upper Bearing Retainer Lock Nut Removal and Replacement
2086-L	M	Brake Shoe Return Spring Remover and Replacer
3590-FC	M	Steering Arm Remover
3600-AA	M	Steering Wheel Remover
3600-E	M	Steering Wheel Pull Scale

REAR AXLE

Tool Number	Source	Tool Purpose
951	O	Pinion Gear Bearing Cone Remover
4201-C	M	Ring Gear Backlash Indicator
4209-C	M	Pinion Tension Scale Socket
4209-C12	M	Pinion Tension Scale

GENERATOR

Tool Number	Source	Tool Purpose
10044-A	M	Generator Pole Screw Wrench

BRAKES

Tool Number	Source	Tool Purpose
1112-144	MB	Torque Brake Cylinder Hydraulic Lines

Key: KD—K. D. Mfg. Co. KRW—K. R. Wilson, Inc. M—Manzel, Inc. O—Owatonna S—Snap-on Tool Corp. St—Stephenson W—Williams MB—Milbar

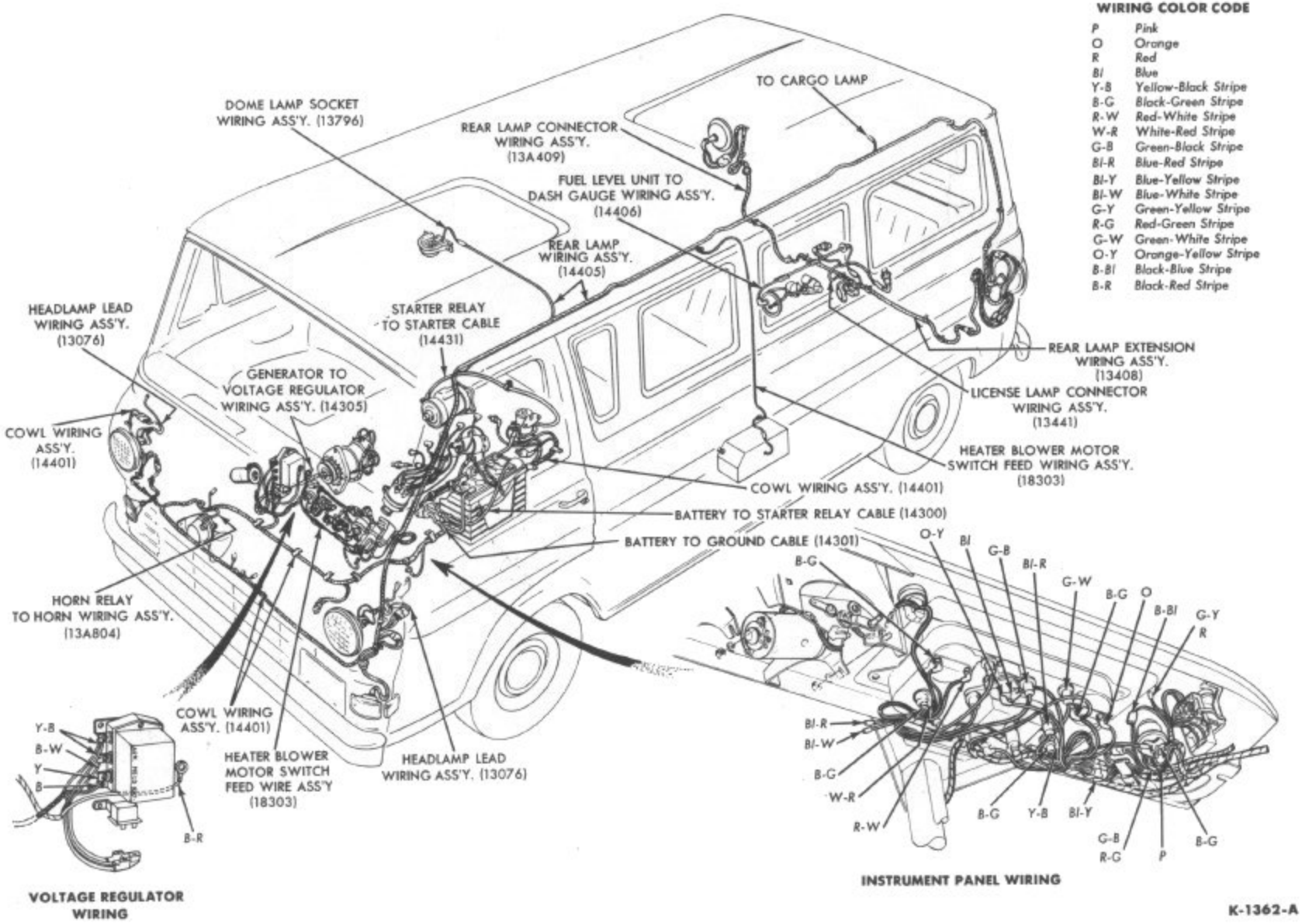

FIG. 61—Wiring Diagram

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