INTRODUCTION to the 1968 FORD PRODUCT LINE

Ford

REGISTERED TECHNICIAN

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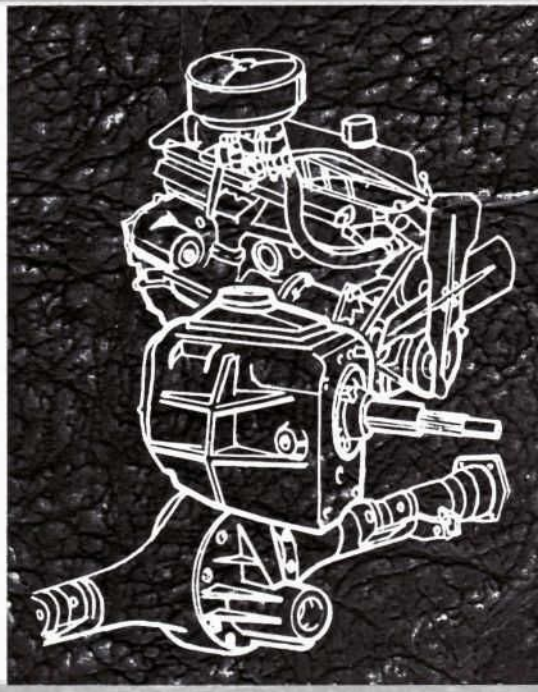


A PRELIMINARY SHOP MANUAL

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

TABLE OF CONTENTS

The descriptions, testing procedures, and specifications in this handbook were in effect at the time the handbook was approved for printing. Ford Motor Company reserves the right to discontinue models at any time, or change specifications, design, or testing procedures without notice and without incurring obligations.

NATIONAL SERVICE OFFICE

FORD DIVISION

FIRST PRINTING—AUGUST, 1967

INTRODUCTION

TO THE TECHNICIAN . . .

This handbook, "Introduction to the 1968 Ford Product Line," has two major purposes. It is designed to combine the functions of an Introductory Service Training Handbook and a Preliminary Shop Manual for the new vehicles you will service. In classroom and shop, this handbook brings you comprehensive coverage of the most important new service features of the 1968 line of Ford cars and trucks.

You'll notice that this service information is organized by groups, the same as in your regular Shop Manuals. The first portion of each group covers Ford cars; the second portion covers Ford Trucks. To further your product knowledge, the reasons for many of the changes in the 1968 Ford cars and trucks are presented along with the instructions and specifications you'll need. But where the changes to a system or component have brought about no great difference in service procedures, only the significant details are covered. As a result, this handbook is more compact and convenient to use.

In addition to putting the maximum amount of service reference information at your fingertips, this training handbook can help you learn '68 service facts in another way. In the upper right portion of many pages you'll find questions about important items described in the accompanying text.

Choose the answer you think is correct, and then turn to the bottom of the indicated page to see how well you've retained what you have read.

Don't dismiss these questions as being unimportant and not worthy of your time. They are actually a strong training technique that takes advantage of one simple trait of human nature. People learn facts and retain them better if they are encouraged to repeat them. And that's all these questions do — they ask you to repeat the facts you've read, in slightly rearranged form. So think of them as a game, if you'd like — *but answer them and check your answers!* You'll find it's a painless way to help you retain important facts.

When using this handbook, please remember that it is intended merely as a preliminary service information publication which by no means will replace the detailed information provided by the 1968 Shop Manuals and any service bulletins. When this more up-to-date literature becomes available, it will supersede this publication.

FORD MOTOR COMPANY
SERVICE TRAINING DEPARTMENT

SERVICE PROCEDURES AFFECTED

A = ADJUSTMENT S = SPECIFICATIONS P = PROCEDURES

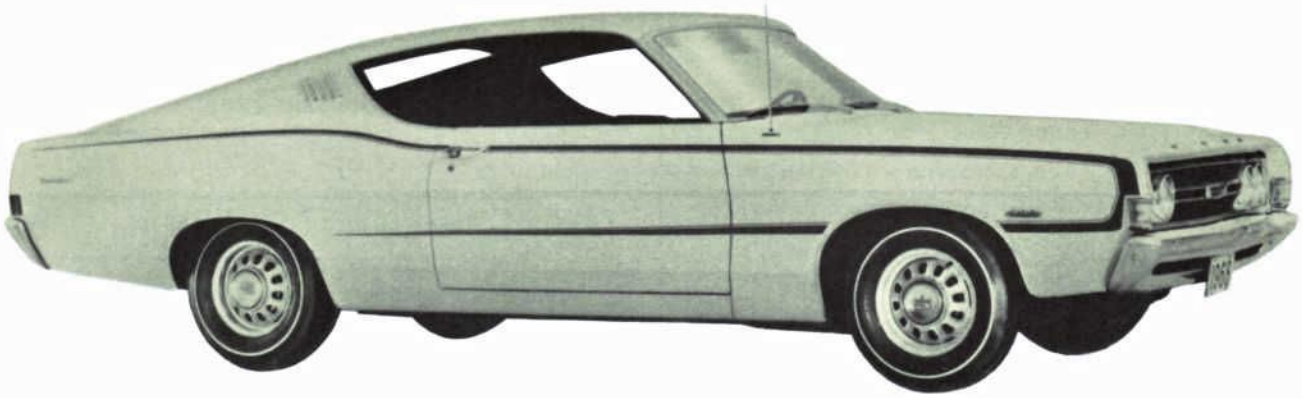
AREA	AREA AFFECTED	VEHICLE AFFECTED	A	S	P
Group 1 – Vehicle Identification	Vehicle Identification	All Car Lines – All Trucks		X	
Group 2 – Brakes	Floating Caliper Power Disc Brakes	All Car Lines			X
	10-1/2 Inch Single Diaphragm Booster	Ford	X		X
	Brake Pressure Differential Valve	All Car Lines	X		X
	Floating Caliper Power Disc Brakes	F-250 4x2, F-350			X
	Split Hydraulic System	Medium and Heavy-Duty Trucks	X		X
Group 3 – Suspension, Steering, Wheels and Tires	Rear Suspension Leveling System	Ford			X
	Shock Absorbers	Ford			X
	Energy-Absorbing Steering Columns	All Car Lines			X
	Front Wheel Bearings	All Car Lines	X		
	Rear Suspension	F-100, F-250 Trucks			X
	Kingpin Preload Spacer	Bronco, F-100 4x4 Truck	X		X
	Front Wheel Lock-Out Hub	Bronco, F-100 4x4 Truck			X
Group 4 – Rear Axle	Differential Drive Pinion Flange	Thunderbird			X
	Differential Gear Tooth Patterns	All Car Lines	X	X	
	Straight-Air Shift Systems	N and H Series Trucks			X
	Conical-Type Differential Carriers	Medium and Heavy-Duty Trucks			X
	Differential Gear Tooth Patterns	F-100 Truck	X	X	
	Wheel Bearing Seals	Medium and Heavy-Duty Trucks			X
Group 5 – Drive Shaft and Clutch	Drive Shaft and Universal Joints	Thunderbird			X
	Clutch Pedal Assist Spring	Fairlane, Falcon			X
Group 6 – Manual Shift Transmission	Car Manual-Shift Transmissions	Ford, Fairlane, Falcon, Mustang			
	Warner T-19 Four-Speed Transmission	F-100 Thru F-600 Trucks			X
	New Process 541 Five-Speed Transmission	Medium-Duty Trucks			X
	Clark 280-V Series Five-Speed Transmissions	Medium-Duty Trucks			X
	Clark 380-V Series Five-Speed Transmissions	Heavy-Duty Trucks			X
	Fuller RT-510 Ten-Speed Transmissions	Medium and Heavy-Duty Trucks			X
Group 7 – Automatic Transmission	Cruise-O-Matic Transmission	Ford	X	X	X
	C4 and C6 Transmissions	All Car Lines		X	
	Shift Linkage	Fairlane, Falcon			X
	Console Shift Tower	Ford	X		X
	Neutral Start Switch, Column-Mounted	Ford, Fairlane, Falcon, Thunderbird	X		X
	Automatic Transmissions	F-100 thru F-350 Trucks	X	X	X
Group 8 – Engine	429 V-8 Engine	Thunderbird	X	X	X
	302 V-8 Engine	Ford, Fairlane, Falcon Mustang		X	X
	427 V-8	Ford, Fairlane			
	Thermactor Systems	Ford, Fairlane, Falcon, Mustang		X	X
	Piston Pin Tool	All Car Lines			X
	Intake Manifold Bolt Torquing	All Car Lines			X
	Engine Oil Requirements	All Car Lines		X	
	360 and 390 V-8 Engines	F-100 thru F-350 Trucks			X
	4-Ring Pistons	Medium and Heavy-Duty Trucks			
	Engine Oil	All Trucks		X	
Group 9 – Ignition System	Dual Diaphragm Distributor	All Car Lines			X
	Distributor Vacuum Control Valve	All Car Lines			X
	Distributor Vacuum Advance Control Valve	Ford, Falcon			X
	Ignition Switch	All Car Lines			X
	Dual Diaphragm Distributors	Bronco, F-100 thru F-350 Trucks			X
Group 10 – Fuel System	Idle Adjustments	All Car Lines			X
	Autolite Model 1100 1-V Carburetor	Fairlane, Falcon			X
	Carter Model YF 1-V Carburetor	Ford, Falcon			
	Autolite Model 2100 2-V and 4100 4-V Carburetor	All Car Lines			

SERVICE PROCEDURES AFFECTED (Continued)

AREA	AREA AFFECTED	VEHICLE AFFECTED	A	S	P
Group 10 – Fuel System (Continued)	Autolite Model 4300 4-V Carburetor	All Car Lines	X	X	X
	Holley Model 4150 4-V Carburetor	Fairlane, Mustang			
	Hot and Cold Air Cleaners	All Car Lines			X
	Light-Duty Truck Carburetors	F-100 Thru F-350 Trucks			X
	Light-Duty Truck Air Cleaners	F-100 Thru F-350 Trucks		X	
	Excess Fuel Device	B, F, N and C Series Dorset Diesel	X		X
	Fuel Shut-Off Solenoid	B, F, N and C Series Dorset Diesel	X		X
Group 11 – Cooling System	Cross-Flow Radiator	Ford			X
	Cam Lock Thermostat	All Car Lines			X
	Distributor Vacuum Control	All Car Lines			X
	Flexible Blade Fan				
	Cam Lock Thermostat	F-100 Thru F-350 Trucks			X
Group 12 – Exhaust System	Spherical Exhaust Manifold Flange Joints	Ford, Fairlane, Mustang, Thunderbird			X
	Exhaust System Routing	Fairlane		X	
	Tuned Muffler	F-100, F-250 Trucks		X	
Group 13 – Charging System	One-Piece Alternator Terminal Connector	All Car Lines			X
	Low Electrolyte Level Warning	All Car Lines			X
	Autolite Alternator Regulator	All Car Lines	X		X
	Truck Charging System	F-100	X		X
Group 14 – Starting System	Solenoid Starter	Thunderbird		X	X
Group 15 – Lights, Horns and Instruments	Retracting Headlight Door System	Ford, Thunderbird	X	X	X
	Front Marker Lights	Ford, Fairlane, Mustang, Thunderbird		X	
	Supplemental Stop/Turn Signal lights	Thunderbird		X	X
	Fiberoptic Stoplight/Taillight Monitor	Thunderbird			X
	Four-Note Horn System	Thunderbird	X	X	
	Flasher Unit Locations	Ford, Fairlane, Falcon, Mustang			X
	Seat Belt Warning Light Switch Location	All Car Lines			X
	Turn Signal/Warning Flasher Switch	All Car Lines			X
	Instrument Panel	All Car Lines		X	X
	Turn Signal Flasher Unit Location	All Trucks			X
	Instrument Cluster Wire Codes	All Trucks		X	
Group 16 – Ventilation, Heating and Accessories	Heating and Ventilation System	Ford	X		X
	Comfort Stream Ventilation	Fairlane	X		
	Rear Window Defogger	All Car Lines			X
	Air Conditioning and Heating System	Fairlane			X
	Air Conditioner	Ford			X
	Automatic Climate Control	Thunderbird	X		X
	Speed Control	Thunderbird, Ford, Mustang			X
	Radios	All Car Lines	X		
	Heater/Air Conditioner	F-100 – F-350	X		X
Group 17 – Body, Doors and Windows	Front Bumper	Thunderbird			X
	Grille	Fairlane			X
	Ventless Door Glass	Fairlane	X		X
	Quarter Window	Fairlane	X		X
	Ventless Rear Door Glass	Fairlane	X		X
	Vacuum Door Locks	Thunderbird, Ford			X
	Power Window Switch Lock/Dual Action Tailgates	Ford, Fairlane			X
	Body Trim Side Rails	Ford, Fairlane			X
	Pressure Sensitive Wood Grain Transfer Film	Ford, Fairlane			X
	Instrument Panel Pad	Fairlane, Falcon			X
	Grille and Door Glass	Ranchero			X
Group 18 – Trim, Seats and Convertible Tops	Locking Front Seat Backs	All Car Lines			X
	Manually Adjustable Headrests	Ford	X		X
	Locking Seat Backs	Bronco, Ranchero			X

FORD CAR AND TRUCK

CAR



Fairlane Torino GT Fastback Hardtop

NEW MODELS

For 1968, you'll find some changes in model line-ups. Thunderbird has added bench-type front seat models. The Ford line includes new fastback hardtops and two new Custom Ranch Wagons. Fairlane also has new fastback hardtops and a new Torino series. Falcon and Mustang line-ups remain unchanged from '67.

WARRANTY PLATES

Warranty plates are located in the same positions as in '67 models. The following chart provides information on *Serial Numbers and Body Codes that have changed this year.*

1968 SERIAL AND BODY CODE CHANGES

Warranty Plate Code		
Serial No.	Body	Body Type
THUNDERBIRD		
83	65C	2-Door Hardtop, Bench Seat
83	65A	2-Door Hardtop, Bucket Seat
84	65D	2-Door Landau, Bench Seat
84	65B	2-Door Landau, Bucket Seat
86	57D	4-Door Sedan, Bench Seat
86	57A	4-Door Sedan, Bucket Seat
87	57C	4-Door Landau, Bench Seat
87	57B	4-Door Landau, Bucket Seat

Warranty Plate Code		
Serial No.	Body	Body Type
FORD		
Galaxie 500		
55	63B	2-Door Hardtop – Fastback
58	65C	2-Door Hardtop – Formal Roof
Ford XL (Bucket Seats and Console Standard)		
60	63C	2-Door Hardtop – Fastback
61	76B	2-Door Convertible
Ford LTD		
62	65A	2-Door Hardtop – Formal Roof

Q 1-3 b) Too bad! You missed it. Take another look at the illustration of the Truck Specification List. Your answer's there, in the lower right corner of the form.

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1968 SERIAL AND BODY CODE CHANGES		
Warranty Plate Code		
Serial No.	Body	Body Type
FORD		
Station Wagons		
71	71H	Custom Ranch Wagon – 6-Passenger
72	71J	Custom Ranch Wagon – Dual-facing Rear Seats
73	71B	Country Sedan – 6-Passenger
74	71C	Country Sedan – Dual-facing Rear Seats
75	71E	Country Squire – 6-Passenger
76	71A	Country Squire – Dual-facing Rear Seats
FAIRLANE		
Fairlane		
30	65A	2-Door Hardtop – Formal Roof
Fairlane 500		
33	65B	2-Door Hardtop – Formal Roof
35	63B	2-Door Hardtop – Fastback
Torino		
41	54C	4-Door Sedan
40	65C	2-Door Hardtop – Formal Roof
Torino GT (Bucket Seats and V-8 standard)		
44	65D	2-Door Hardtop – Formal Roof
42	63D	2-Door Hardtop – Fastback
43	76D	2-Door Convertible

EXTERIOR COLORS

A total of twelve new exterior colors has been released for Ford Division passenger cars. Of these new colors, ten are available on Thunderbird models — including five new exclusive colors. Ford, Fairlane, Falcon and Mustang models have seven new colors. Paint and order codes for these new colors are listed at the top of the next page.

ENGINE CODES

Some new engines have been released for Ford passenger cars. There's an all-new 429 4-barrel V-8 for Thunderbird and a pair of 302s for other cars in the line. Here's how the *new engine code designations* stack up.

Quick-Quiz

Q 1-1 What are the warranty plate serial number and body code designations for the sharp-looking car on the previous page?

a) 44 65D (See page 55)

b) 42 63D (See page 117)

c) 43 76D (See page 126)

1968 ENGINE CODE CHANGES		
Code	Cylinders	Displacement and Type
F	8	302-2V
J	8	302-4V
N	8	429-4V

TRANSMISSION CODES

Transmission codes are basically unchanged for 1968. However, the new FMX automatic transmission replaces last year's FX unit and bears the same code designation as last year's FX — the letter, "X."

AXLE RATIOS

1968 REAR AXLE RATIO CODES		
Ratio	Conventional Differential	Locking Differential
2.50:1	B	2
2.75:1	C	
2.79:1	D	
2.80:1	E	3
2.83:1	F	
3.00:1	G	4
3.10:1	H	
3.20:1	J	7
3.25:1	K	5
3.36:1	L	
3.50:1	M	6
3.89:1	N	

Axle ratio codes have changed completely from the method used last year. Conventional differentials are

Q 17-3 b) That's not so, unless you consider the *elimination* of the rolling door lock feature as a modification! You will find some changes in the vacuum door lock system, though. They're described in the article near the question you just answered.

NEW 1968 EXTERIOR PAINTS				
Order Code	M30J/32J Number	Color	Ford, Fairlane, Falcon, Mustang	Thunderbird
B	3059A	Royal Maroon	X	X
F	3065A	Gulfstream Aqua (Metallic)	X	
J	3080A	Midnight Aqua (Metallic)		X
L	3060A	Silver Pearl (Gray Metallic)		X
R	3067A	Highland Green (Metallic)	X	X
V	3062A	Alaska Blue		X
W	3120A	Meadowlark Yellow	X	X
X	3061A	Presidential Blue (Metallic)	X	X
Y	3073A	Sunlit Gold (Metallic)	X	X
Z	2044A	Oxford Gray (Metallic)		X
O	2040A	Sea Foam Green	X	
4	3069A	Twilight Green (Metallic)		X

(For remaining 1968 colors, use 1967 data.)

now indicated by letters instead of numbers. And the locking type differentials are now assigned numbers instead of letters. The chart at the beginning of this paragraph lists all of the 1968 axle ratios used in Ford Division's cars.

OTHER CODES

Procedures for interpreting warranty plate codes for Date, District, Assembly Plant, Consecutive Unit Number and Model Year remain identical with 1967 methods.

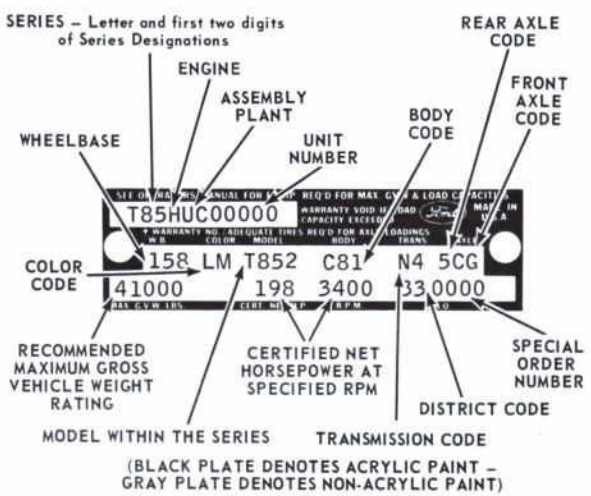
TRUCK

Bronco and the Ford light-duty, medium-duty and heavy-duty truck lines enter the 1968 model year with many refinements but relatively few major changes. Worthy of particular note are the bigger optional engines and changes that provide improved ride and better braking for the pickup truck lines. These and other features affecting service are covered in more detail in the following groups in this manual.

Ranchero, which is merchandised as part of the Ford truck line for the first time this year, has a longer and lower appearance that is highlighted by ventless side glass and a shorter roof. Because of the many similarities to its parent Fairlane car line, Ranchero is treated primarily as a car for the purposes of this manual. However, any service features unique to Ranchero — not shared by Fairlane cars — will be covered in the truck sections.

TRUCK RATING PLATES

Truck rating plates are located in the same positions as in 1967 models. There have been some detail changes in the codes used to present information on the rating plates. The charts in this group contain only data for truck code symbols that have changed from the 1967 designations.



Truck Rating Plate

1968 MODEL CODE PREFIX CHANGES	
Prefix	Type
G	Parcel Delivery – Diesel
J	School Bus Chassis – Diesel
P	Parcel Delivery – Gas

Q 17-4 b) No! All of the pad attaching screws can be easily reached without removing anything. But there's one nut that should be reached for removal this way before the pad will come loose. Then you've got a clear path to the instrument cluster.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

EXTERIOR COLORS

Eleven colors, including a new yellow, are available on Ford trucks. With the exception of the truck pure white, these colors are also used for Bronco. And Bronco has two exclusive colors — Peacock Blue (turquoise) and Signal Flare Red — for a total of twelve. The new Meadowlark Yellow is code letter "W" and specification number 3120-A.

SEQUENTIAL SERIAL NUMBERING SYSTEM

Here's the uniform sequential serial numbering system that is used for 1968 model trucks and Bronco vehicles.

1968 SEQUENTIAL SERIAL NUMBERING SYSTEM

Month of Production	Serial Numbers
August, 1967	C10,000 through C13,999
September, 1967	C14,000 through C27,999
October, 1967	C28,000 through C41,999
November, 1967	C42,000 through C55,999
December, 1967	C56,000 through C69,999
January, 1968	C70,000 through C83,999
February, 1968	C84,000 through C97,999
March, 1968	C98,000 through D11,999
April, 1968	D12,000 through D25,999
May, 1968	D26,000 through D39,999
June, 1968	D40,000 through D53,999
July, 1968	D54,000 through D67,999
August, 1968	D68,000 through D81,999

ENGINE CODES

You'll find some new engines in 1968 Ford trucks. Displacement of the biggest V-8 for last year's light trucks has been increased to 360 cubic inches and a new 390 CID V-8 has also been made available for these vehicles.

1968 GASOLINE ENGINE CODE CHANGES

Code	Engine
H	8-Cylinder 390 CID 2V
Y	8-Cylinder 360 CID 2V
8	8-Cylinder 360 CID 2V (Low Compression)

TRANSMISSION CODES

There are a few changes in main transmission codes primarily as a result of the replacement of certain five-speed transmissions with new or modified models. A new Warner four-speed transmission and a new Fuller ten-speed transmission have also been added. Auxiliary transmission codes are unchanged for 1968. The two charts that follow list the changes in main transmission code designation for rating plate use.

1968 TRANSMISSION CODE CHANGES – BRONCO, 100 THROUGH 600 AND 6000 SERIES

Code	Transmission
P	4-Speed Warner T-19
T	5-Speed New Process 541 FO Overdrive
2	5-Speed Clark 282-V Direct
4	5-Speed Clark 280-VO Overdrive
9	5-Speed New Process 541 FD Direct

1968 TRANSMISSION CODE CHANGES – N-500-600; C-550-600; 700 THROUGH 1000 SERIES

Code	Transmission
C	10-Speed Fuller RT-510 Direct
E	5-Speed Fuller 5H74 Direct
F	4-Speed Warner T-18
G	5-Speed Clark 380-VO Overdrive
K	5-Speed Spicer 6453A Direct
M	5-Speed Clark 285-V Direct
P	4-Speed Warner T-19
P* D#	5-Speed Clark 387-V Direct
T	5-Speed New Process 541 FL Direct
1	5-Speed Spicer 8552A Direct
2	5-Speed Clark 282-V Direct
4	5-Speed Clark 280-VO Overdrive
7	5-Speed Clark 385-V Direct
9	5-Speed New Process 541 FD Direct

* with gasoline engines # with diesel engines

AXLE CODES

There have been numerous changes in axle codes for 1968 — plus the addition of several new axles. The chart that follows lists all these changes.

Q 14-1 c) Nope! In fact, you've got another "relay" to consider when testing the starting circuit for the 429! The starter solenoid acts as a relay in providing current to the starting motor, in addition to its other job.

BRONCO	
Regular	**Ratio-Rating**
17	3.25:1 3300 lb.
08	3.50:1 3300 lb.
09	3.70:1 3300 lb.

Quick-Quiz

Q 1-2 Most of the changes in truck transmission codes are due to:

a) the addition of a number of new or modified five-speed units. (See page 51)

b) the inclusion of a new Ford-built five-speed transmission. (See page 139)

c) a complete change in the method used last year to identify transmissions. (See page 138)

TRUCK 100/600, 6000
(Except N500/600 and C550/600)

Code	Axle	Ratio and Rating
37	Dana 60	3.54-5.2M
C7	Dana 60 Limited Slip	3.54-5.2M
36	Dana 70	3.73-7.4M
D6	Dana 70 Limited Slip	3.73-7.4M
F1	Eaton 15201 2-Speed	5.14/7.17-15M
F2	Eaton 15201 2-Speed	5.83/8.17-15M
F3	Eaton 15201 2-Speed	6.33/8.81-15M
G4	Eaton 16802 2-Speed	6.14/8.55-17M
51	Rockwell H-170	5.38-17.5M
52	Rockwell H-170	5.86-17.5M
53	Rockwell H-170	6.14-17.5M
54	Rockwell H-170	6.83-17.5M
55	Rockwell H-170	7.17-17.5M
E1	Eaton 16244 2-Speed	5.57/7.75-17.5M
E2	Eaton 16244 2-Speed	6.17/8.58-17.5M
E3	Eaton 16244 2-Speed	6.50/9.04-17.5M
F1	Eaton 15201 2-Speed	5.14/7.17-15M
F2	Eaton 15201 2-Speed	5.83/8.12-15M
F3	Eaton 15201 2-Speed	6.33/8.81-15M
81	Rockwell H-340 2-Speed	5.41/7.17-17M
82	Rockwell H-340 2-Speed	6.16/8.48-17M
G4	Eaton 16802 2-Speed	6.14/8.55-17M
51	Rockwell H-170	5.38-17.5M
52	Rockwell H-170	5.86-17.5M
53	Rockwell H-170	6.14-17.5M
54	Rockwell H-170	6.83-17.5M
55	Rockwell H-170	7.17-17.5M
E1	Eaton 16244 2-Speed	5.57/7.75-17.5M
E2	Eaton 16244 2-Speed	6.14/8.55-17.5M

Code	Axle	Ratio and Rating
E3	Eaton 16244 2-Speed	6.50/9.04-17.5M
AQ	Eaton 17101	4.33-18.5M
BQ	Eaton 17101	4.56-18.5M
CQ	Eaton 17101	4.88-18.5M
DQ	Eaton 17101	5.29-18.5M
EQ	Eaton 17101	5.57-18.5M
FQ	Eaton 17121	6.14-18.5M
GQ	Eaton 17121	6.50-18.5M
HQ	Eaton 17121	7.17-18.5M
IQ	Eaton 17121	7.60-18.5M
AH	Eaton 17201 2-Speed	4.35/5.90-18.5M
BH	Eaton 17201 2-Speed	4.56/6.21-18.5M
CH	Eaton 17201 2-Speed	4.88/6.65-18.5M
DH	Eaton 17201 2-Speed	5.29/7.21-18.5M
EH	Eaton 17201 2-Speed	5.57/7.60-18.5M
FH	Eaton 17221 2-Speed	6.14/8.38-18.5M
GH	Eaton 17221 2-Speed	6.50/8.87-18.5M
HH	Eaton 17221 2-Speed	7.17/9.77-18.5M
91	Rockwell L-146	5.83-18.5M
92	Rockwell L-146	6.50-18.5M
AJ	Eaton 18301	5.91-22M
BJ	Eaton 18301	6.21-22M
CJ	Eaton 18301	6.65-22M
AK	Eaton 18101	4.88-22M
FK	Eaton 18101	5.29-22M
BK	Eaton 18101	5.57-22M
CK	Eaton 18121	6.14-22M
DK	Eaton 18121	6.50-22M
EK	Eaton 18121	7.17-22M

Q 6-6 b) Right! On both countershaft drive gears, the tooth which is aligned with the keyway and stamped with an "O" should be fitted between the opposing pairs of marked teeth on the drive gear to properly time the countershaft assemblies.

Code	Axle	Ratio and Rating
AB	Eaton 18201 2-Speed	4.33/5.91-22M
BB	Eaton 18201 2-Speed	4.56/6.21-22M
CB	Eaton 18201 2-Speed	4.88/6.65-22M
HB	Eaton 18201 2-Speed	5.29/7.21-22M
DB	Eaton 18201 2-Speed	5.57/7.60-22M
EB	Eaton 18221 2-Speed	6.14/8.38-22M
FB	Eaton 18221 2-Speed	6.50/8.87-22M
GB	Eaton 18221 2-Speed	7.17/9.77-22M
GG	Eaton 19121	3.70-23M
AG	Eaton 19121	4.11-23M
BG	Eaton 19121	4.33-23M
HG	Eaton 19121	4.56-23M
CG	Eaton 19121	4.88-23M
DG	Eaton 19121	5.43-23M
EG	Eaton 19121	6.17-23M
FG	Eaton 19121	6.67-23M
AX	Eaton 19301	5.89-23M
BX	Eaton 19301	6.64-23M
FP	Eaton 19221 2-Speed	3.70/5.04-23M
GP	Eaton 19221 2-Speed	4.11/5.60-23M
AP	Eaton 19221 2-Speed	4.33/5.90-23M
HP	Eaton 19221 2-Speed	4.56/6.21-23M
BP	Eaton 19221 2-Speed	4.88/6.64-23M
CP	Eaton 19221 2-Speed	5.43/7.39-23M
DP	Eaton 19221 2-Speed	6.17/8.40-23M
EP	Eaton 19221 2-Speed	6.67/9.08-23M
W1	Rockwell SHHD	5.29-30M
W2	Rockwell SHHD	5.83-30M
W3	Rockwell SHHD	6.17-30M
W4	Rockwell SHHD	6.80-30M
W5	Rockwell SHHD	7.20-30M
W6	Rockwell SHHD	7.80-30M
AC	Eaton 30DSC	4.62-32M
BC	Eaton 30DSC	4.88-32M
CC	Eaton 30DSC	5.57-32M
DC	Eaton 30DSC	6.14-32M
EC	Eaton 30DSC	6.50-32M
FC	Eaton 30DSC	7.17-32M
GC	Eaton 30DSC	7.60-32M
HC	Eaton 30DSC	6.43-32M
AD	Eaton 30DPC	6.43-32M
BD	Eaton 30DPC	6.78-32M
CD	Eaton 30DPC	7.75-32M
DD	Eaton 30DPC	8.85-32M
AL	Eaton 30DTC 2-Speed	4.63/6.43-32M
BL	Eaton 30DTC 2-Speed	4.88/6.78-32M
CL	Eaton 30DTC 2-Speed	5.57/7.75-32M
DL	Eaton 30DTC 2-Speed	6.14/8.55-32M

Code	Axle	Ratio and Rating
EL	Eaton 30DTC 2-Speed	6.50/9.04-32M
FL	Eaton 30DTC 2-Speed	7.17/9.97-32M
CS	Eaton 30DTC 3-Speed	4.63/5.53/6.43-32M
DS	Eaton 30DTC 3-Speed	4.88/5.83/6.78-32M
ES	Eaton 30DTC 3-Speed	5.57/6.66/7.75-32M
FS	Eaton 30DTC 3-Speed	6.14/7.35/8.55-32M
GS	Eaton 30DTC 3-Speed	6.50/7.77/9.04-32M
LF	Eaton 34DSC	3.70-34M
JF	Eaton 34DSC	4.11-34M
BF	Eaton 34DSC	4.33-34M
CF	Eaton 34DSC	4.56-34M
DF	Eaton 34DSC	4.88-34M
EF	Eaton 34DSC	5.29-34M
FF	Eaton 34DSC	5.57-34M
GF	Eaton 34DSE	6.14-34M
HF	Eaton 34DSE	6.50-34M
IF	Eaton 34DSE	7.17-34M
KF	Eaton 34DSE	7.60-34M
IW	Eaton 34DTC 2-Speed	3.70/5.05-34M
AW	Eaton 34DTC 2-Speed	4.11/5.61-34M
BW	Eaton 34DTC 2-Speed	4.33/5.91-34M
CW	Eaton 34DTC 2-Speed	4.56/6.21-34M
DW	Eaton 34DTC 2-Speed	4.88/6.65-34M
KW	Eaton 34DTC 2-Speed	5.29/7.21-34M
EW	Eaton 34DTC 2-Speed	5.57/7.60-34M
FW	Eaton 34DTE 2-Speed	6.14/8.38-34M
GW	Eaton 34DTE 2-Speed	6.50/8.87-34M
HW	Eaton 34DTE 2-Speed	7.17/9.77-34M
GN	Eaton DFE	8.38-34M
AN	Eaton 34DPC	5.05-34M
BN	Eaton 34DPC	5.60-34M
CN	Eaton 34DPC	5.91-34M
DN	Eaton 34DPC	6.21-34M
EN	Eaton 34DPC	6.65-34M
FN	Eaton 34DPC	7.60-34M
FI	Eaton 38DSC	4.11-38M
GI	Eaton 38DSC	4.33-38M
AI	Eaton 38DSC	4.56-38M
BI	Eaton 38DSC	4.88-38M
HI	Eaton 38DSC	5.29-38M
CI	Eaton 38DSC	5.59-38M
DI	Eaton 38DSE	6.14-38M
EI	Eaton 38DSE	6.50-38M
AR	Eaton 38DPC	5.05-38M
BR	Eaton 38DPC	5.61-38M
CR	Eaton 38DPC	5.91-38M
DR	Eaton 38DPC	6.21-38M
ER	Eaton 38DPC	6.65-38M

Q 7-1 c) Sorry, but "no rear pump" doesn't mean no rear lubrication system! The control valve body assembly provides a supplemental flow of fluid to the rear lubrication system through a tube that replaces the pump discharge tube.

Code	Axle	Ratio and Rating
FR	Eaton 38DPC	7.60-38M
GR	Eaton 38DPE	8.38-38M
AZ	Eaton 38DTC 3-Speed	4.11/4.86/5.61-38M
BZ	Eaton 38DTC 3-Speed	4.33/5.12/5.91-38M
CZ	Eaton 38DTC 3- speed	4.56/5.39/6.21-38M
DZ	Eaton 38DTC 3-Speed	4.88/5.77/6.65-38M
EZ	Eaton 38DTC 3-Speed	5.57/6.59/7.60-38M
FZ	Eaton 38DTE 3-Speed	6.14/7.29/8.38-38M
GZ	Eaton 38DTE 3-Speed	6.50/7.68/8.86-38M

Truck Serial Number Plate

OFFICIAL SERIAL NUMBER PLATE

An official serial number plate is attached to the right end of the instrument panel. This plate is embossed with the same serial number as shown on the rating plate.

Quick-Quiz

Q 1-3 If the owner of a '68 Ford truck loses the Truck Specification List, a replacement can be procured:

a) for one dollar from Autolite/Ford Parts Division, Livonia, Michigan. (See page 120)

b) for fifty cents through your dealership's Parts Department. (See page 5)

TRUCK SPECIFICATION LIST

A truck specification list has been placed in the glove compartment of all trucks except B- and F-500 and 600. This list is a ready reference for part numbers of all major components of the truck.

FORD MOTOR COMPANY TRUCK SPECIFICATION LIST

SERIES	WHEEL BASE	DSO REFERENCE NO.	SERIAL NO.

BRAKE SYSTEM	SUSPENSION	POWER TRAIN	WHEELS - HUBS - DRUMS
BRAKE ASSY. FRONT R.H. -2010- DSO	FRONT SPRING -5310- DSO	AUXILIARY TRANSMISSION DSO	HUB OR SPIDER & DRUM FRONT DSO
BRAKE ASSY. FRONT L.H. -2011- DSO	REAR SPRING-SINGLE AXLE -5560- DSO	DRIVESHAFT # 1 DSO	HUB OR SPIDER & DRUM REAR SINGLE AXLE OR REAR/REAR, IF TANDEM DSO
BRAKE ASSY. REAR R.H. DSO	TANDEM SUSPENSION ASSY. DSO	DRIVESHAFT # 2 DSO	HUB OR SPIDER & DRUM FORWARD REAR IF DIFFERENT FROM REAR/REAR (TANDEM ONLY) DSO
BRAKE ASSY. REAR L.H. DSO	**FRONT AXLE & STEERING**	DRIVESHAFT # 3 DSO	DISC WHEELS OR RIMS FRONT DSO
BRAKE CHAMBER ASSY. FRONT DSO	FRONT AXLE ASSY. DSO	DRIVESHAFT # 4 DSO	DISC WHEELS OR RIMS REAR DSO
BRAKE CHAMBER ASSY. REAR SINGLE AXLE OR REAR/REAR TANDEM DSO	TIE ROD -3280- DSO	REAR AXLE ASSY. SINGLE AXLE OR REAR/REAR, (TANDEM ONLY) DSO	RETAIN ONE COPY OF THIS LIST IN TRUCK AT ALL TIMES
BRAKE CHAMBER ASSY. FORWARD REAR AXLE (TANDEM ONLY) DSO	STEERING GEAR DSO	REAR AXLE ASSY. FORWARD REAR (TANDEM ONLY) DSO	IT CONTAINS THE INFORMATION NECESSARY TO CORRECTLY IDENTIFY THE COMPONENTS SHOWN
BRAKE BOOSTER ASSY. SINGLE AXLE OR REAR/REAR (TANDEM ONLY) DSO	**MISCELLANEOUS**	GEAR SHIFT TOWER ASSY. DSO	
BRAKE BOOSTER ASSY. FORWARD REAR, (TANDEM ONLY) DSO	SPEEDOMETER GEAR-DRIVING DSO	AUXILIARY GEAR SHIFT ASSY. -7B072- DSO	ADDITIONAL COPIES AVAILABLE ON REQUEST FROM:
ELECTRICAL	SPEEDOMETER GEAR-DRIVEN -17322- DSO	TRANSMISSION ASSY. DSO	AUTOLITE/FORD PARTS DIVISION SPECIAL ORDER SECTION P.O. BOX 3020 LIVONIA, MICHIGAN 48151
ALTERNATOR -10300- DSO	DSO	ENGINE DSO	
WIRING DASH PANEL TO ENGINE -14398- DSO	**INSPECTOR**		ENCLOSE $1.00 FOR EACH COPY. IDENTIFY THE VEHICLE BY SERIAL NUMBER SHOWN ABOVE
WIRING-COWL -14401- DSO			

MFD ENG MAY '67 AAD-7125 LSVL (PRINTED IN U.S.A.)

3 - OWNER'S GLOVE BOX COPY

Q 11-1 a) Sorry — you missed one. You should tighten the valve to the specified torque, all right. But then you should turn it in any extra amount under a full turn that's needed to place the fittings where they should be.

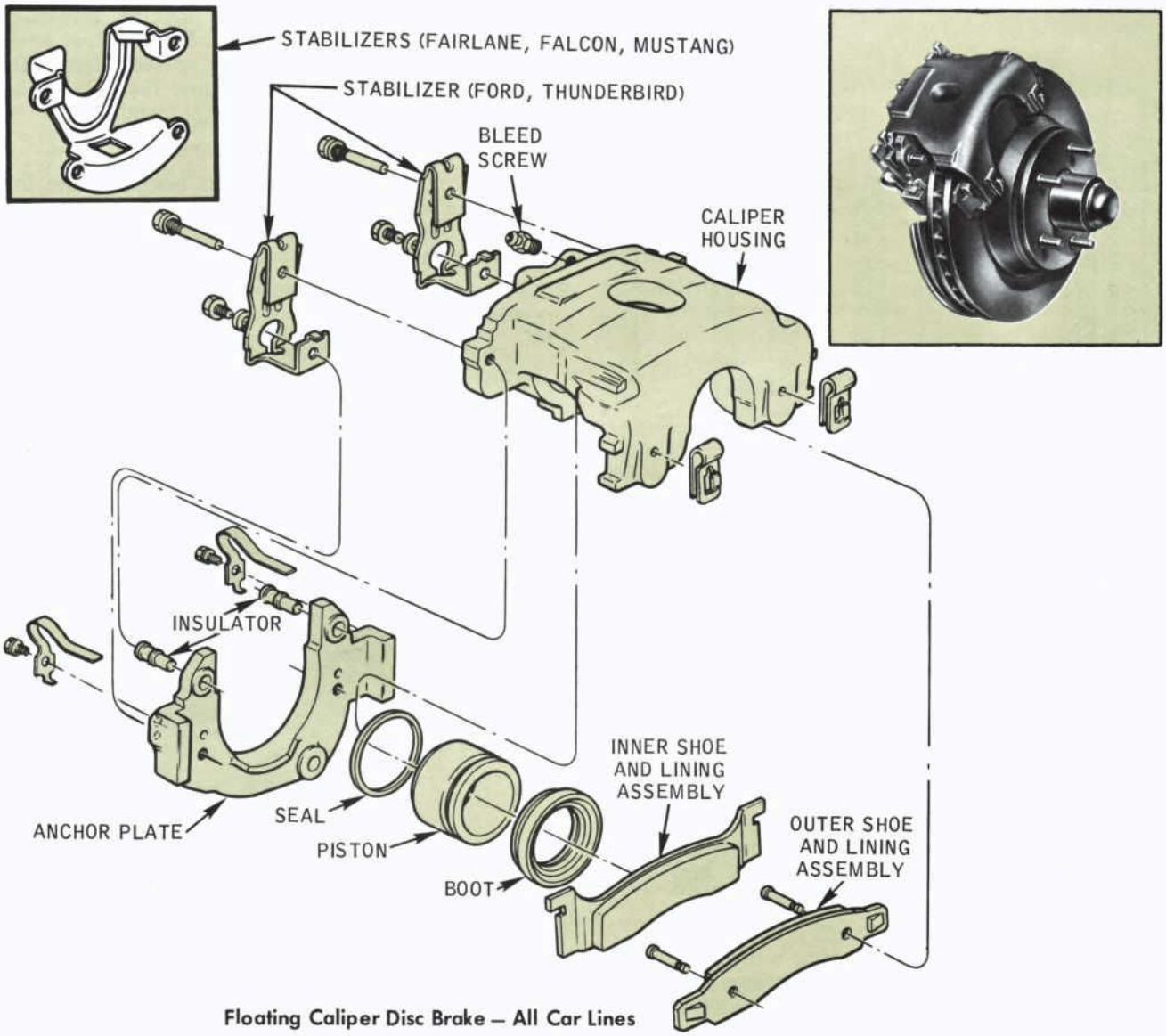
FORD CAR AND TRUCK

CAR

FLOATING CALIPER POWER DISC BRAKES – ALL CAR LINES

For 1968, all cars having power brakes are equipped with front wheel disc brakes of a new design. These new brakes have a splash shield and rotor that are practically the same as last year's disc brakes, and the caliper is in the same location as in '67 models — but here the similarities end! The caliper has a one-piece housing, not a two-piece assembly. And it's not held in a fixed position — it's free to move inboard and outboard as the brakes are applied and released. Only one piston is used in each caliper. It's a double-acting piston that applies braking pressure directly to the inboard brake shoe, and indirectly to the outboard shoe through the movable caliper.

The caliper is positioned over an anchor plate bolted to the wheel spindle. On brake application, braking thrust is transferred from the caliper and brake shoes to the anchor plate, preventing rotation of the entire assembly. The caliper is held in position on the anchor plate by flexible steel stabilizers. The transverse movement of the caliper is guided by two



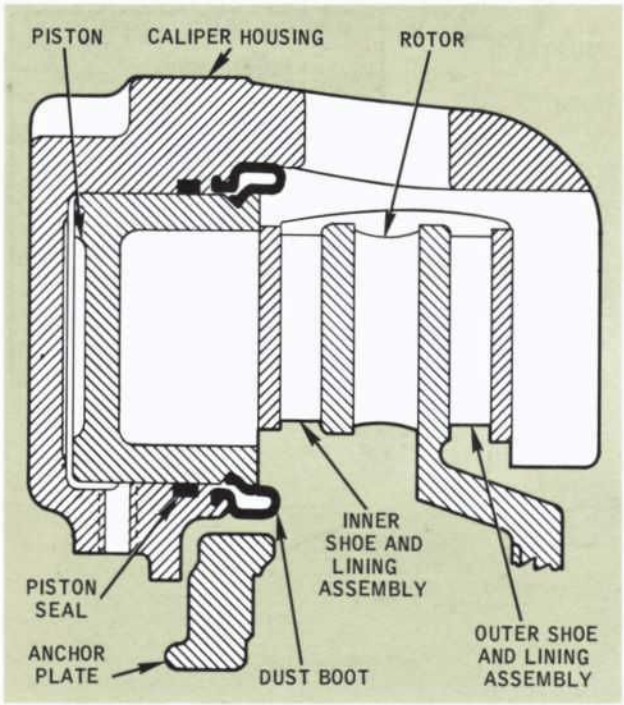
Floating Caliper Disc Brake – All Car Lines

Q 7-3 a) Nope! Unlike the forward clutch friction plates, these plates come in only one size. There's another way to make this adjustment—review the instructions and take another crack at the question!

locating pins that pass through rubber insulators in the anchor plate.

Operation

When brakes are applied, hydraulic pressure moves the piston outward, bringing the lining of the inboard brake shoe against the inner face of the rotor. However, no appreciable braking action occurs until more fluid enters the brake cylinder and slides the entire caliper inward. This movement brings the lining of the outboard shoe, which is attached to the caliper, into contact with the outer face of the rotor. Then any increase in hydraulic pressure in the brake cylinder is transmitted equally to both brake shoes to provide balanced braking pressures against both faces of the rotor.



Disc Brake Operation

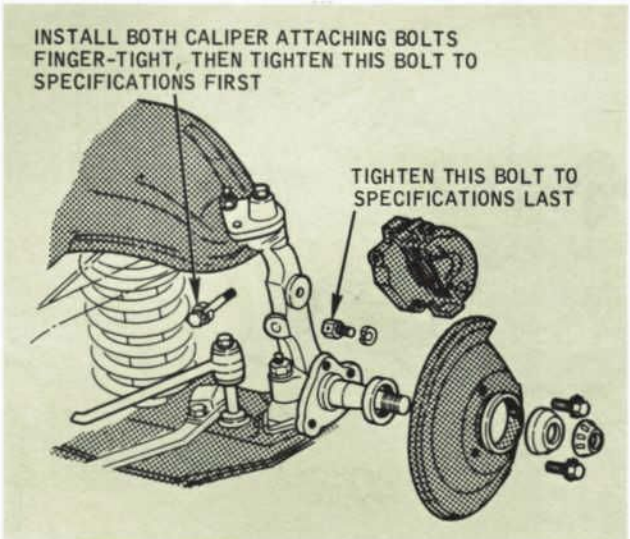
When braking pressure is released, the square cross-section piston seal retracts the piston, just as in the earlier disc brake design. At the same time, the flexible insulators around the two caliper locating pins function in the same manner to withdraw the caliper about half of the distance that the piston is retracted. As a result of these two actions, adequate running clearance is restored between the rotor and both linings.

Repair Hints

Caliper Removal and Installation: Caliper removal requires no unusual procedures. Simply remove the two attaching bolts to the wheel spindle, and the brake line through bolt, and lift off the caliper and anchor plate assembly. However, correct alignment of the anchor plate upon installation depends upon the use of the proper sequence of bolt installation.

Don't deviate from the following procedure!

1. After you set the caliper and anchor plate in position on the rotor and spindle, install the lower bolt that holds the anchor plate to the spindle and run it up, finger-tight.
2. Then install the upper bolt and torque it to specifications.
3. Torque the lower bolt to specifications. And when you safety wire the bolts, be sure to twist the ends at least five turns. Then position the twisted ends of the wires away from the brake hose.



Caliper Attaching Bolt Tightening Procedure

Quick-Quiz

Q 2-1 One difference between the new floating caliper disc brakes for the '68 full size Ford and the '68 Mustang is:

a) they require two different procedures for attaching the anchor plates. (See page 39)

b) in the design of the stabilizers. (See page 50)

Q 7-5 b) Right on target! If any "hunting" of the selector lever is required in "Park" to make the engine start, the neutral start switch should be removed and adjusted. Some "hunting" is permissible in "Neutral," though.

Caliper Repair: You can completely disassemble the new floating caliper in a few minutes. No special tools or unusual procedures are required. Reassembly is just as easy. However, there are some points to watch so the brakes will operate properly when the caliper is installed.

1. The rubber insulators in the anchor plate for the caliper locating pins should be replaced. Also, if the locating pins are rusted or corroded, or the stabilizer on light cars is rusted or corroded, they should be replaced.
2. Never use oil, grease or other conventional lubricant on the caliper locating pins and rubber insulators. When assembling use M-1044-C fluid to install the pins in the insulators. This fluid will evaporate after assembly and permit the pins to operate in a "dry" condition.
3. Always use a new piston seal and dust boot if the piston is removed.
4. You should leave caliper locating pins and stabilizer attaching bolts finger-tight, then torque them to specifications after the caliper is installed and with the brakes energized.

Lining Replacement: Unlike the previous disc brakes, shoes with worn linings can be replaced only by removing the caliper and anchor plate from the spindle. You can then replace the linings on the car or disconnect the brake hose and remove the caliper for disassembly.

1. Then slide the inboard shoe and lining assembly from under the spring clips and off the anchor plate ledge.
2. Pull off the clips on the outboard side of the caliper, remove the pins that they retain, and lift out the outboard shoe and lining assembly.
3. Remove the stabilizer(s) attaching bolts and caliper locating pins.
4. Replace the locating pin insulators in the anchor plate. Replace the locating pins if they are rusted or corroded.
5. On light cars — Falcon, Fairlane and Mustang — replace the stabilizer.
6. Install the new parts. Check the preceding write-up on Caliper Repair to be sure that the stabilizers and locating pins are installed correctly.

In contrast to last year's disc brakes, the inboard and outboard shoe and lining assemblies are not interchangeable. The inboard assembly is similar to last year's shoe and lining, with supporting ears on the outer ends of the shoe. The outboard shoe and lining assembly is longer and has no ears. Instead, it has two abutments which mate with the outboard legs of the caliper housing. Be sure you install them in their proper positions. After installation, force the linings apart by turning a hammer handle between them. This will provide clearance to slip the assembly over the rotor.

Precautions and Tips: Handle rotor and caliper assemblies with care to prevent deforming the rotor and damaging the surface of the linings. Keep the caliper and braking surfaces of the rotor clean and free of grease when you're working on them.

Be fussy about obtaining the proper adjustment of front wheel bearing end play. (See the article on front wheel bearing adjustment in Group 3.) This is particularly important with disc brakes. Too much end play can cause excessive brake pedal travel and other problems.

Before you move the vehicle after any brake repair operation, make certain you have a firm brake pedal. If the piston has been pushed far back into its bore in the caliper during servicing, you'll get no braking effect on initial application. Pump the pedal several times until pedal travel will not decrease any more.

There are a number of possible reasons for heavy brake drag with the pedal released — stuck pistons, poor booster push rod adjustment, and so on. But if the brake system has been serviced previously, don't overlook the possibility that the lines to the master cylinder may have been conneced in the wrong order. If the front brake lines are connected to the rear brake outlet of the master cylinder, the residual pressure check valve in this outlet will prevent the disc brake pistons from retracting.

10-1/2 INCH SINGLE DIAPHRAGM BOOSTER – FORD

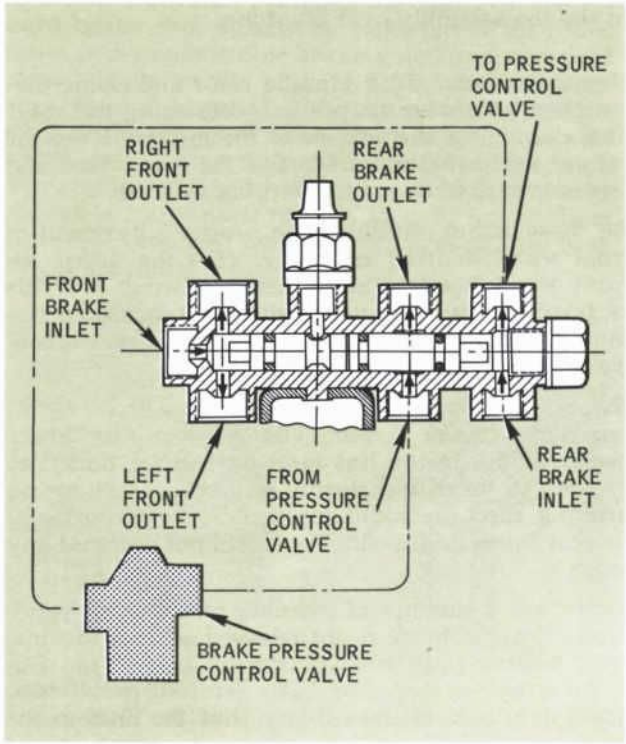
1968 Fords with power brakes are equipped with new single diaphragm vacuum booster units, 10-1/2 inches in diameter, supplied by both Midland-Ross and Bendix. There are no changes in service procedures for this new unit. You can use your existing push rod adjustment gauges to check the setting of the adjustment screw. As with the earlier units, the new boosters are serviced by replacement only, so don't attempt to overhaul them.

BRAKE PRESSURE DIFFERENTIAL VALVE – DISC BRAKE CARS

All 1968 cars with disc brakes have a new pressure differential valve with seven connections and a hydraulically operated mechanical switch for the brake warning light. On the inside the valve plunger has three O-rings to separate the valve into three sec-

Q 10-3 a) Nope! When the engine's fully warmed up, the hot and cold air cleaner takes in only unheated air, regardless of whether the engine's idling or "revved-up." The vacuum motor has an effect only when a *cold* engine is accelerated to high speed.

tions. As you can see in the illustration, the extra connections are used to route the rear brake fluid through the pressure control valve.



Pressure Differential Valve Cross-Section

Quick-Quiz

Q 2-2 To help the caliper locating pins slip into place in the new insulators when you're building up the disc brake caliper, use:

a) just a bit of light engine oil. (See page 125)

b) the special fluid which evaporates and leaves the pins dry. (See page 143)

The big difference occurs in the event of front brake system failure. If this happens, the valve plunger moves towards the front brake connections, actuates the light switch by lifting the plunger and, permits hydraulic fluid to pass directly between the rear brake inlet and rear brake outlet, bypassing the pressure control valve. This new feature of the differential valve gives balanced front and rear brake action when both systems are operating, plus maximum rear brake action in the event of front system failure.

There are no special or different servicing procedures you will need to know for the 1968 pressure differential valve or rear brake pressure control valve. If either unit malfunctions or fails, replace with a new assembly. Also, the differential valve centering procedure is the same as in 1967.

TRUCK

FLOATING CALIPER POWER DISC BRAKES — F-250 4x2, F-350

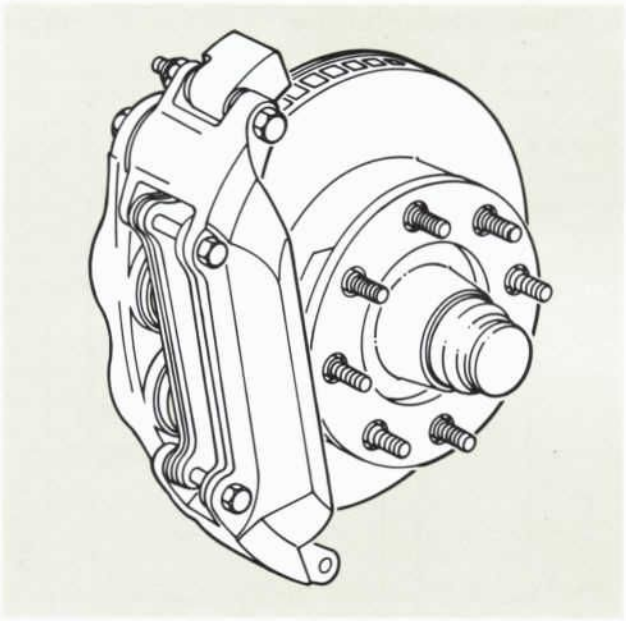
F-250 4x2 and F-350 trucks in 1968 are available with a new floating caliper disc brake. There are four major assemblies in the truck disc brake — caliper, cylinder housing, support, and hub and disc. The caliper is a machined casting and holds the two linings, one on either side of the disc, with retaining pins. When the brakes are applied it transmits the braking force directly to the support assembly. The cylinder assembly is bolted to the inboard side of the caliper and contains two pistons. The pistons act directly on the inboard lining. One bleeder screw is used for both pistons. The support assembly is bolted to the front wheel spindle and holds the caliper in position over the disc with pins mounted in bushings. The pins and bushings permit the caliper to move inboard and outboard, or "float," yet hold the caliper rigidly in a circular direction. A dust shield is part of the support assembly. The hub and disc is a one piece design and is carried directly on the spindle with a conventional bearing set-up. The disc is ventilated for maximum brake cooling.

Operation

When the brakes are applied the initial reaction of the hydraulic pressure forces the two pistons outward, causing the inboard lining to rub against the disc. Once this occurs, further pressure causes the caliper and cylinder assemblies to move in the opposite direction, bringing the outboard lining into contact with the disc. This causes both linings to grip the disc equally, and the amount of braking force is then dependent on the fluid pressure.

Q 5-1 a) Right! Although index marks are made at the factory, the real "pros" still take a moment to chalk a line of their own before pulling the drive shaft. When the job's done, there's no question of whether they've got the shaft back like it was before.

When the brakes are disengaged, normal road vibrations maintain sufficient clearance to prevent lining wear. Excessive piston knock back with subsequent loss of pedal travel is prevented by drag rings on the back side of the piston.



Floating Caliper Disc Brakes — F-250 4x2, F-350 Trucks

Service

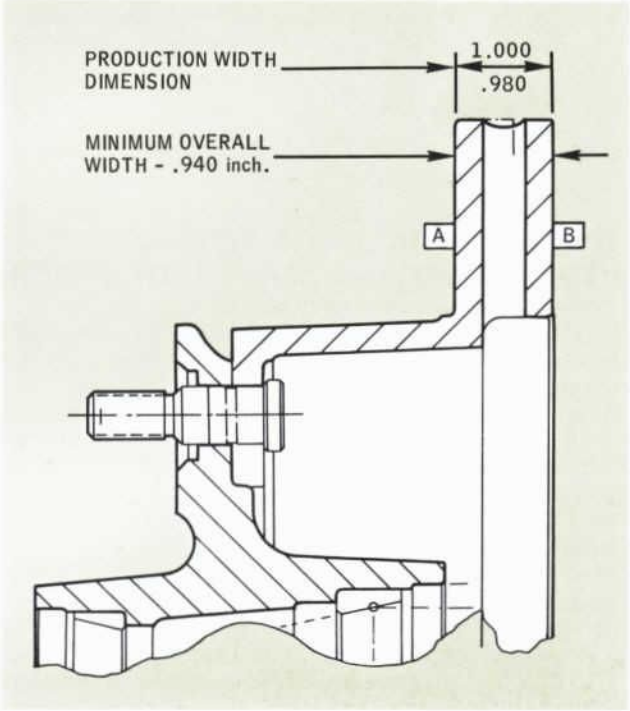
Lining Replacement: Brake linings should be replaced when they are worn to a minimum of 1/16-inch in thickness at any point. (Combined thickness of shoe and lining 1/4-inch.) Lining replacement is relatively easy, similar to last year's car disc brakes. There is no need to remove the caliper. Here is the procedure.

1. With the wheel and tire off, remove the lining mounting bolts and springs.
2. Then lift the linings out of the opening in the top of the housing.
3. Remove master cylinder cover.
4. Loosen piston and cylinder housing mounting bolts a sufficient amount to provide clearance for installing new linings. *Do not provide clearance by forcing pistons back into housing.*
5. Place new shoe and lining assemblies into position.
6. Install lining mounting bolts and springs. Be sure spring tangs are located in holes provided in lining shoes. Tighten bolts to 17-23 ft-lbs. torque.
7. Place shims or feeler gauges of 0.023 to 0.035-inch thickness between the metal backing plate of the outboard lining and the caliper. Tighten the piston and cylinder housing mounting bolts equally and alternately until the housing is against the caliper.

   Note: Check master cylinder for fluid overflow.
8. Loosen the piston and cylinder housing mounting bolts a sufficient amount to remove the shims behind the outboard brake shoe. Then tighten bolts to 155-185 ft-lbs. torque.
9. Check master cylinder fluid level and add fluid as required. Install master cylinder cover.

Brake Overhaul: The construction of the truck disc brakes is straightforward and the amount of parts is at a minimum. As long as you follow good brake service practice and observe the following points, these new brakes should present no unusual service problems.

1. The cylinder housing and caliper assembly should be removed as one unit, and then disassembled on the bench.
2. The piston assembly should be pulled from the cylinder housing after boot retainers and boots are removed.
3. Always replace piston seals. Check pistons for breaks in hard coated surface, also drag rings and cylinder bores for wear.
4. Use a mallet to install pistons. Keep brake fluid off insulators on top of pistons. Be sure pistons don't cock in the bores and push them in until they bottom.

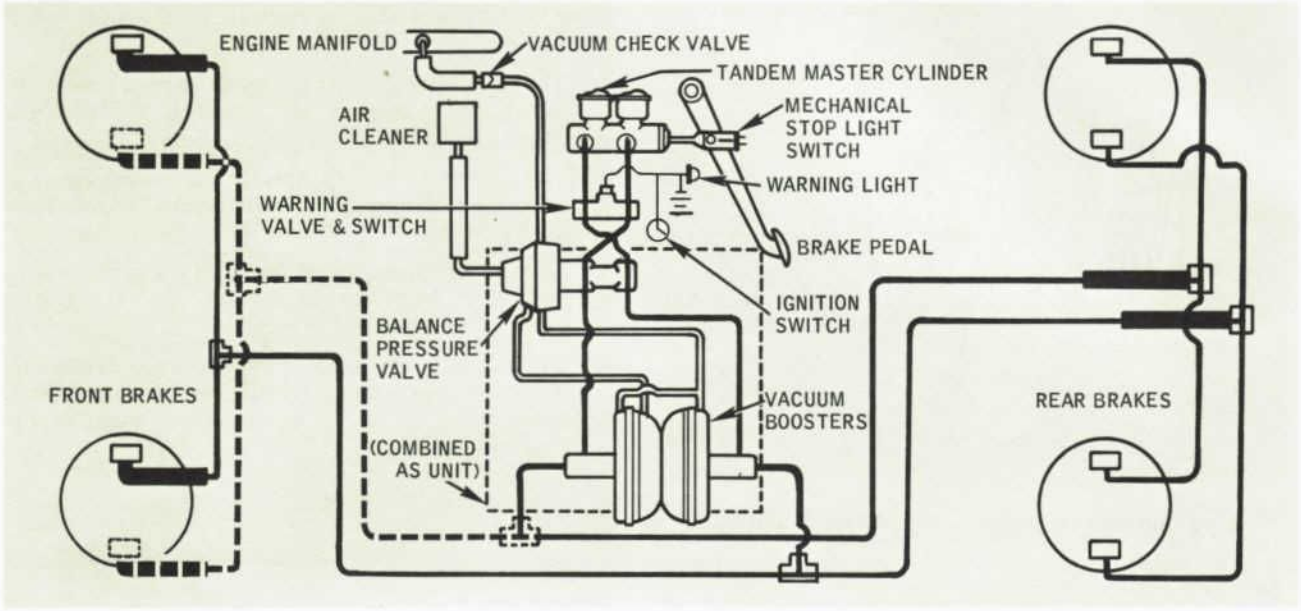


Disc Brake Rotor Refinishing Dimensions

Rotor Refinishing: Rotors with minor concentric grooves can be used "as is" with new brake linings. Rotor with minor warps, surface imperfections or more than minor grooves may be refinished. However, don't waste time refinishing a rotor that is cracked or has a major warp condition (over 0.020"). Rotors in this condition should be replaced with a new rotor and hub assembly. If inspection

indicates a rotor is suitable for refinishing, use the following procedure.

1. Machine an equal amount of material off both surfaces "A" and "B." A nominal of 0.020-inch of material may be removed from each surface. After refinishing, the width of the rotor must not be less than 0.940-inch.
2. The surface finish on both sides must be within 15-80 RMS.
3. The thickness variation between surfaces "A" and "B" must not exceed 0.001 inch when measured circumferentially at any radius. Variations over 0.001-inch can cause brake roughness and/or vehicle shudder.
4. Surface "B" must be flat within 0.010-inch Total Indicator Reading.



Split Hydraulic Brake System Schematic — Medium-Duty and Heavy-Duty Vehicles

SPLIT HYDRAULIC BRAKE SYSTEMS — MEDIUM-DUTY AND HEAVY-DUTY VEHICLES

Medium-duty and heavy-duty buses now have split hydraulic power brake systems. And you may find systems of this type used on some other single rear axle trucks, too. With the split hydraulic system, each of the two lines from the tandem master cylinder actuates one brake cylinder at each wheel for vehicles with 15 by 3-inch front brakes. On vehicles with 14 by 2-1/2-inch front duo-servo brakes, the single brake cylinders in both front wheels are actuated by one line that also operates one cylinder at each rear wheel. Power boosters are dash-mounted on vehicles with duo-servo front brakes and rear axle capacities up to 15,000 pounds (21,000 pounds GVW). Other vehicles have frame-mounted boosters. Automatic adjusters are used with all wheel brakes.

C-Series Features: Split hydraulic brake systems for C-550 through C-950 and C-6000 and C-7000 trucks have two unique features. The tandem master cylinder is mounted transversely in the cab and the power booster is located behind the rear axle. However, they function the same as the other split hydraulic systems.

Service Tips

Good service practices normally observed with any truck braking systems should also be followed when working on these split hydraulic brake systems. In addition, here are two tips to help you service these new brakes.

Bleeding: You may have to bleed each line of systems having frame-mounted boosters twice. After completing the first bleeding cycle, pump the brake pedal a few times. Then repeat the bleeding procedure if the pedal is even slightly spongy.

Centering the Pressure Differential Valve: The pressure differential valve used with the split hydraulic systems has a self-centering spring. Resetting the valve is simple — just unscrew the hex-shaped electrical switch body from the center of the valve body until the valve centers. Then tighten it. You won't need to depress the brake pedal to center the valve.

FORD CAR AND TRUCK

CAR

REAR SUSPENSION LEVELING SYSTEM — FORD

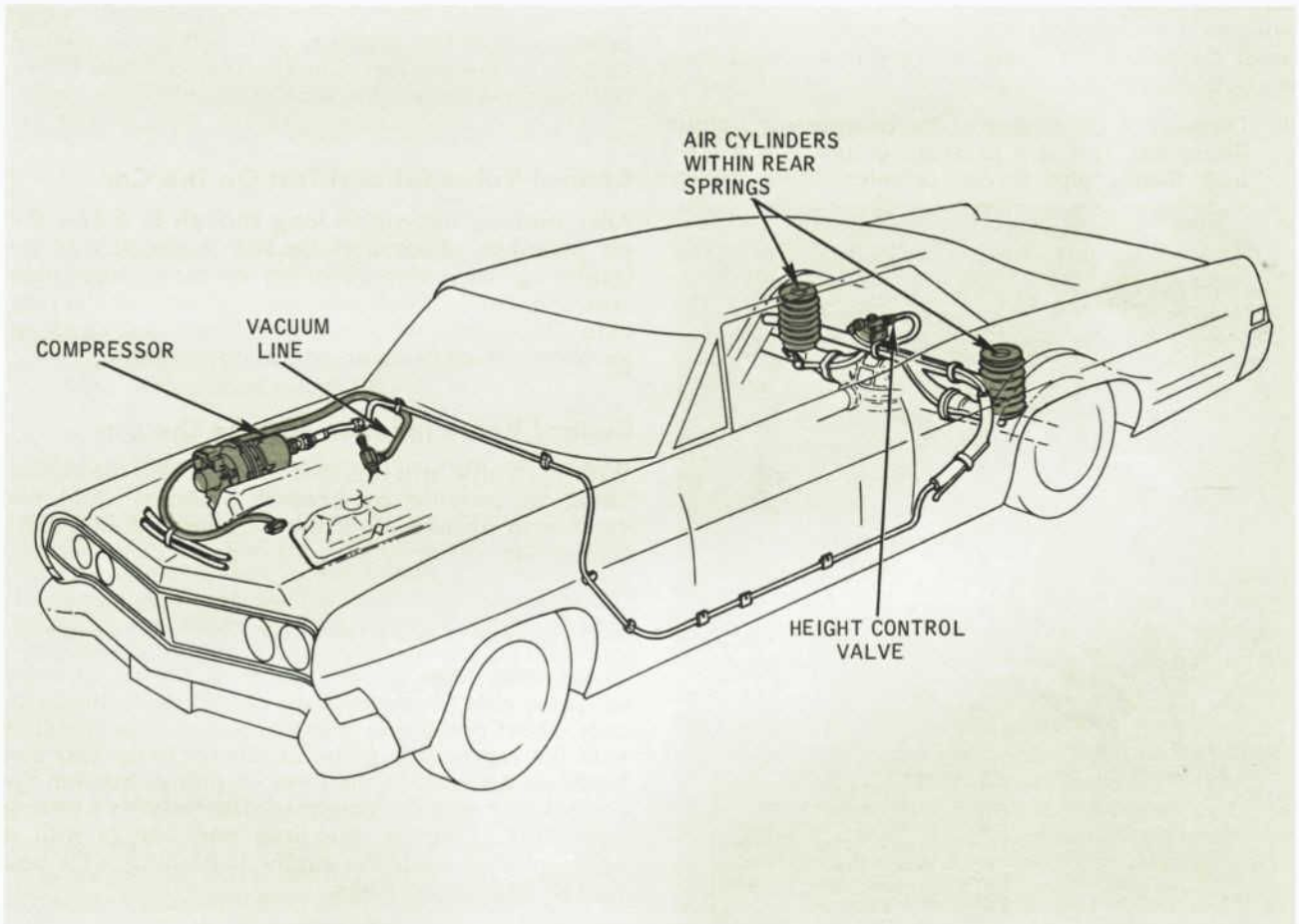
Full-size Ford cars have an optional pneumatic rear suspension leveling system that automatically maintains proper rear end height with added loads of up to 250 pounds on the rear axle. The automatic load leveler consists of heavy-duty rubber air cylinders, similar to conventional auxiliary air springs, that are fitted inside the rear coil springs; a vacuum-operated compressor that supplies air at pressures ranging from 12 to 20 psi; a height control valve with a built-in time delay that admits or exhausts air from the cylinders to restore the correct suspension height; and the connecting lines and fittings.

Pre-Delivery Service

As a part of normal pre-delivery service on a new '68 Ford station wagon equipped with the automatic load leveler, be sure to remove the red clamp from the rubber vacuum hose between the engine and compressor. It is put there only to keep the system from operating when the station wagon is driven on or off an auto carrier.

Quick Operating Check

In case of a borderline complaint on this new automatic load leveler where you're not quite sure that it's justified, here's a quick way to determine if you have trouble.



Automatic Load Leveler — Ford

Q 11-1 b) Sure! Of course, the valve threads just might do a pretty fair job of sealing the hole in the outlet housing casting without help when the valve's torqued down. But don't take chances — *use the sealer and be sure!*

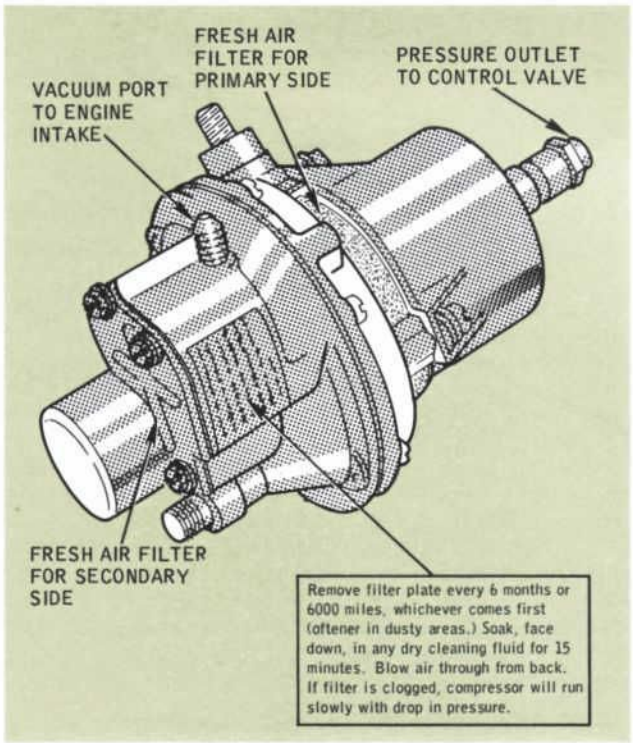
1. If the fuel tank isn't full, add an equivalent weight (6 pounds per gallon) to the luggage compartment or rear compartment area. Other than that, the car should be empty.
2. Then add a two-passenger load (no more than 250 pounds) to the bumper or tailgate to make the car settle lower, and start the engine. In two minutes or less, the car should rise to the correct height with the load in place.
3. Finally, remove the load to cause the rear end to rise higher, and watch for it to lower to the proper height.

If the automatic load leveler fails to function properly, check the air supply and control sections separately with the tests that follow.

Compressor Output Test On The Car

Before testing compressor output, make sure the vacuum hose is connected to the side of the compressor. Obviously, the compressor can't operate unless it has a supply of engine vacuum. Also check to be sure the filter has been maintained in accordance with the instructions on the label. If this fails to uncover the cause of trouble, proceed to test compressor output as follows:

1. Disconnect the tubing at the compressor output fitting and install a pressure gauge with a 1/8-inch female pipe thread adapter to the outlet.



Compressor – Automatic Load Leveler System

Quick-Quiz

Q 3-1 You just drove a new Country Squire over from the new car storage lot . . . and the automatic load leveler doesn't work! The first thing to check for is:

a) the red clamp on the vacuum hose. (See page 158)

b) proper compressor output with a vacuum gauge. (See page 127)

c) how the system responds to a load on the tailgate. (See page 142)

2. Start the engine and check for a buildup of pressure to a minimum of 12 psi in ten seconds.
3. Then stop the engine and watch the gauge for a drop in pressure that indicates an air leak.

If the sintered metal filter plate is clean but compressor output is unsatisfactory, replace the compressor — don't attempt repairs. Satisfactory output indicates that the problem is in either the control section or the lines or fittings. The tests that follow will help you isolate the cause of trouble.

Control Valve Exhaust Test On The Car

After running the engine long enough to inflate the air cylinders, disconnect the link at the arm of the height control valve mounted on the number four crossmember — the frame crossmember by the rear axle. Then hold the valve arm down and check to see if the cylinders deflate within 30 seconds.

Control Valve Inflation Test On The Car

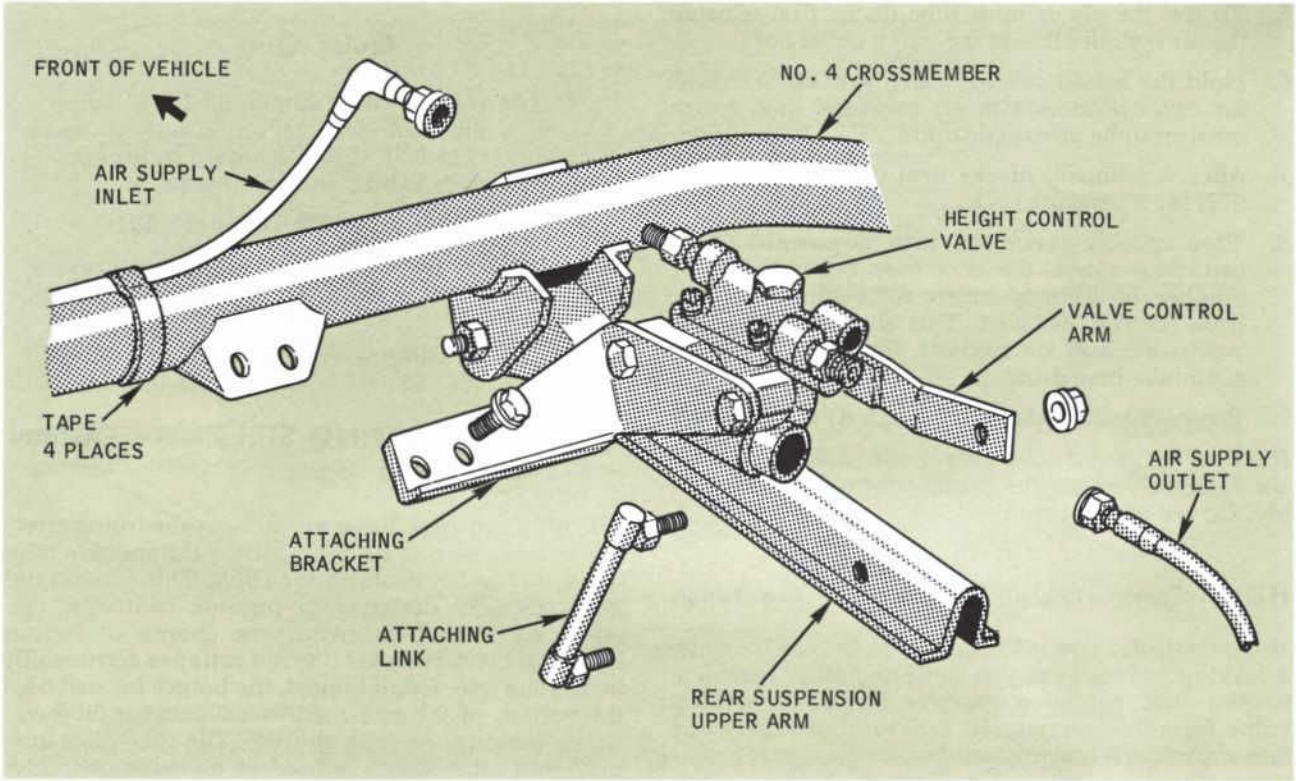
With the valve arm link disconnected and the engine idling to provide compressor pressure, hold the valve arm up and see if the cylinders inflate within 60 seconds.

Air Leaks and Obstructions

Compressor supply line leaks: If the compressor operates either continuously or intermittently with only short periods of rest when the car is standing with the engine idling and no change in the rear end load, an air leak in the lines or fittings between the compressor and the height control valve is a strong possibility. Painting the lines and fittings with a soap solution while the engine is running is the best way to detect small leaks.

Air cylinder lines obstructed: If the height control valve exhaust or inflation tests were unsatisfactory,

Q 13-1 b) Afraid not! With very few changes, the '68s use the same alternator and regulator as was used in last year's dependable charging systems . . . and since there was no adjustment at the alternator last year, there isn't in '68, either!



Height Control Valve — Automatic Load Leveler System

remove the lines between the valve and both air cylinders and check for obstructions or restrictions in the tubing. If the exhaust test was normal but it took too much time for the cylinders to inflate, you'll have to remove the height control valve and test it for leaks as described later.

Air cylinder or line leaks: If the air cylinders inflate and then leak down during the control valve inflation test — or any other time, for that matter — you probably have a leak in an air cylinder or the air line from the valve. To track down the leak, paint the two air cylinders and the lines and fittings between the cylinders and the height control valve with a soap and water solution. Then start the engine, disconnect the link at the height control valve arm and raise the arm while looking and listening carefully for signs of a leak. A leaking air cylinder must be replaced — it can't be repaired.

Control Valve Time Delay Test On The Car

A damping piston within the height control valve acts as a time delay mechanism by preventing air transfer due to normal ride movements while the car is in motion. If you suspect that the time delay mechanism is faulty on a complaint of irregular, constantly changing rear suspension height, you can get some clue by jouncing the rear end of the car up and down with the engine running. But to confirm your suspicions, you'll need to make the following test — and it's a good idea to make the test at any time you've performed the control valve exhaust and inflation tests, just to be sure the time delay is within specifications. Here's how to test the time delay:

1. With the engine running, disconnect the air cylinder line at the valve.
2. With the link disconnected from the height control valve arm, move the arm down about an inch (measured at the end of the lever) from its neutral position. Hesitate for a moment in this position to insure that the damping piston will be in the proper position to begin the test.
3. Then quickly move the control valve arm upward about two inches and at the same time, begin timing the number of seconds before air starts to escape from the valve outlet port to the air cylinders. The interval should be from one to six seconds.
4. This test, which tests the air intake time delay, should be repeated at least once.

Q 14-1 b) No, sir! It may help if you'll think of the starting circuit as being the same as last year's . . . but with an additional "relay" (the solenoid) added to provide current to the starting motor.

5. To test the air exhaust time delay, first reinstall the air cylinder line at the valve outlet port.
6. Hold the height control valve arm up to charge the two cylinders with air pressure, then return the arm to its neutral position.
7. After a moment, lift the arm upward about an inch for a brief interval.
8. Then quickly move the arm downward about two inches and at the same time, begin timing the number of seconds before air begins to escape from the exhaust port. This should also be between one and six seconds, the same as for the air intake time delay.
9. Repeat this test (steps 6 through 8) at least once.

If either test is not within the specified limit of one to six seconds, replace the height control valve assembly. Do not attempt repairs.

Height Control Valve Leak Test On The Bench

If the control valve inflation test on the car indicates a leaking valve, or if you have any other reason to suspect that condition, remove the height control valve from the car, clean its exterior thoroughly and then make the following leak test:

1. Connect a 20 psi air pressure source to the valve port for the compressor air inlet supply line with a 1/4-inch female pipe thread adapter. If any air escapes when the control valve arm is in its neutral position, replace the valve height control assembly.
2. Shut off the air pressure in the line and transfer the connection to the valve outlet port to the air cylinders. Then turn the air on again.
3. With air pressure applied to the outlet port, no air should escape when the control valve arm is in its neutral position. If air escapes from the outlet port, replace the height control valve assembly. If the only air leak is from under the valve cover plate, replace the cover gasket and repeat the test.

SHOCK ABSORBER INSTALLATION – FORD

Be particularly careful not to exceed torque specifications when tightening the retaining nuts on the mounting studs of 1968 Ford shock absorbers. These studs have coarse threads that are less susceptible to stripping in severe service and make removal of the nut easier. But if you exceed the nut installing torque limit, you'll place too much strain on the stud, either weakening it or breaking it. And remember to lightly oil the threads before installing the nut to reduce friction that could affect your torque readings.

Quick-Quiz

Q 3-2 If the Ford automatic load leveler air cylinders inflate properly and then leak down, it would be *unnecessary* to hunt for an air leak in:

a) the air cylinders. (See page 58)

b) the lines between the height control valve and the cylinders. (See page 123)

c) the compressor. (See page 28)

ENERGY-ABSORBING STEERING COLUMN – ALL CAR LINES

All '68 Ford cars have an energy-absorbing steering column — one of Ford Motor Company's most important safety features for 1968. This column has been specially designed to provide controlled collapse on impact to reduce the chance of serious injury to the driver, yet it won't collapse accidentally in normal use. Upon impact, the bulges formed near the bottom of the one-piece outer column tube collapse, making the tube shorter. The two-piece integral shift tube, which is used in all columns to give added resistance to sideway forces, will telescope upon impact. And the two-piece steering shaft collapses in a similar manner.

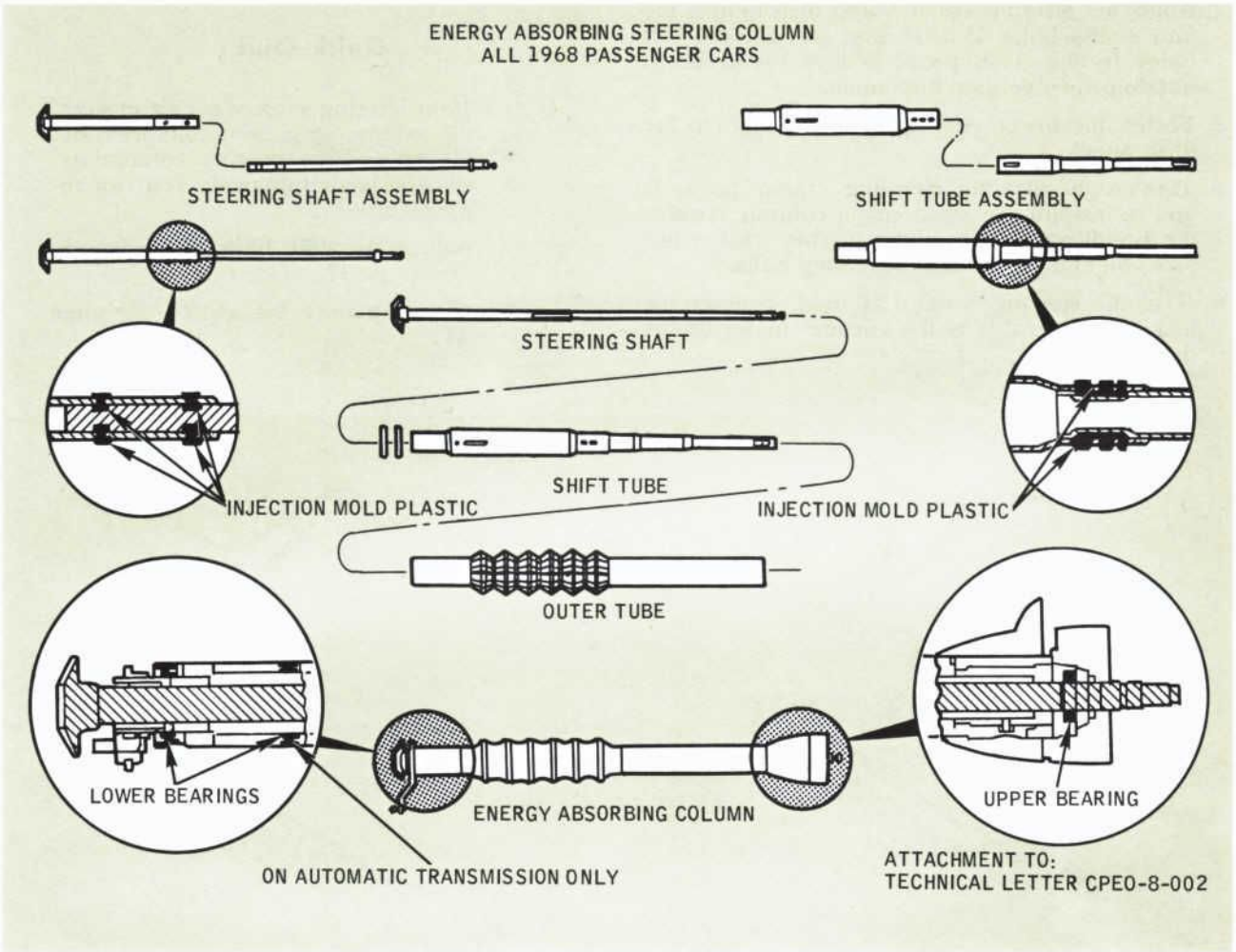
The method of mounting the column to the instrument panel is changed to allow the column and brackets to separate from the panel as the column begins to collapse. Electrical wiring is routed along the outside of the column, enclosed in a protective cover. A flexible coupling links the steering shaft to the steering gear.

Mandatory Service Procedure!

There is one precaution which positively *must be observed* to avoid serious internal damage to the steering column assembly. *Under no circumstances should the steering shaft ever be struck with a hammer or other tool!* Don't even use a knock-off type puller to remove the steering wheel. Use only the approved steering wheel remover, Tool No. 3600-AA, to insure that you won't inadvertently damage the column. And if the column has been collapsed, you'll have to replace the entire column assembly and all mounting brackets.

Compressed steering shaft: There is one exception to this rule of replacing the entire column assembly after collapse. If only the *steering shaft* of the *fixed* steering column has been telescoped (by dropping

Q 6-1 b) You're right! This is pictured just to the left of the question. And the removal procedure is given in step 3, immediately below the illustration. You couldn't miss with clues like these, could you?



Energy-Absorbing Steering Column — All Car Lines

the column assembly on its lower end for instance) and all other components are in good condition, the column assembly can be pulled out to length. To do this, place your feet on the steering coupling flange, get a firm grip on the top of the column outer jacket, and pull! However, be careful that you pull the assembly out only to its specified length of 33.20 inches for Thunderbird, 32.50 inches for Ford, Fairlane and Falcon or 35.64 inches for Mustang. This repair will not affect the function of the *fixed* steering column. However, if a *tilt* steering column has been dropped and damaged, *it must be replaced.*

Thunderbird Steering Column Installation

1. Fasten the small bracket, "D," to the two studs on the upper clamp.
2. Loosely assemble the forward end of the upper clamp to the bracket "E."
3. Loosely assemble the two clamp halves to the column.
4. Insert the lower end of the steering shaft into the flexible coupling.
5. Attach the small bracket, "D," to the instrument panel.
6. Attach bracket "E" to bracket "G" and then tighten the nuts holding the forward end of the upper clamp to bracket "E."

Q 6-5 b) You've got the right idea, but the wrong end! RT-510 countershafts are stepped with the smaller diameters toward the forward end of the shaft, so the gears must come off and go on that way.

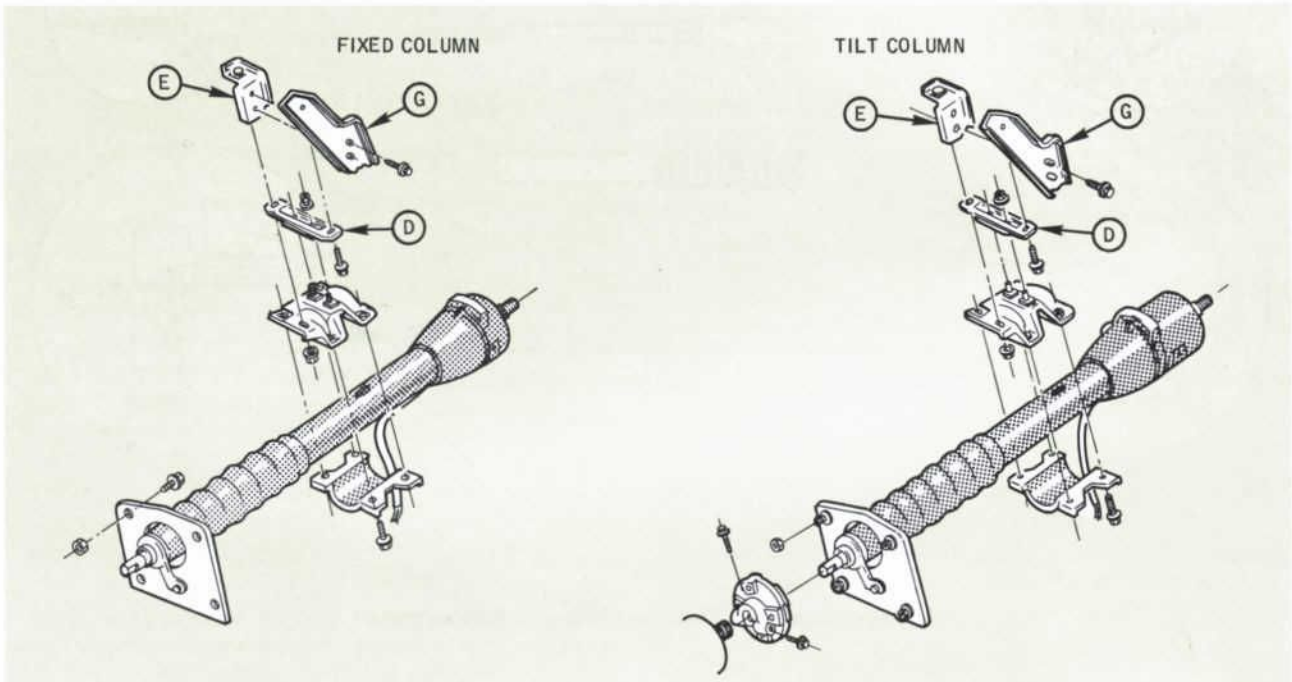
7. Align the steering column and then tighten the four clamp bolts. If necessary, elongate the bolt holes in the dash panel with a round file to obtain proper column alignment.
8. Fasten the lower steering column flange to the dash panel.
9. Tighten the flexible coupling clamp bolts. If you're installing a replacement column, remove the handling spacers and centering washer before you tighten the coupling clamp bolts.
10. If a tilt steering column is used, connect the locking pawl cable to the vacuum motor on the dash panel.

Quick-Quiz

Q 3-3 If the steering shaft of a Falcon steering column has been collapsed, but the rest of the steering column assembly is undamaged, you can repair it by:

a) pulling the shaft back out to length. (See page 37)

b) replacing only the shaft. (See page 54)

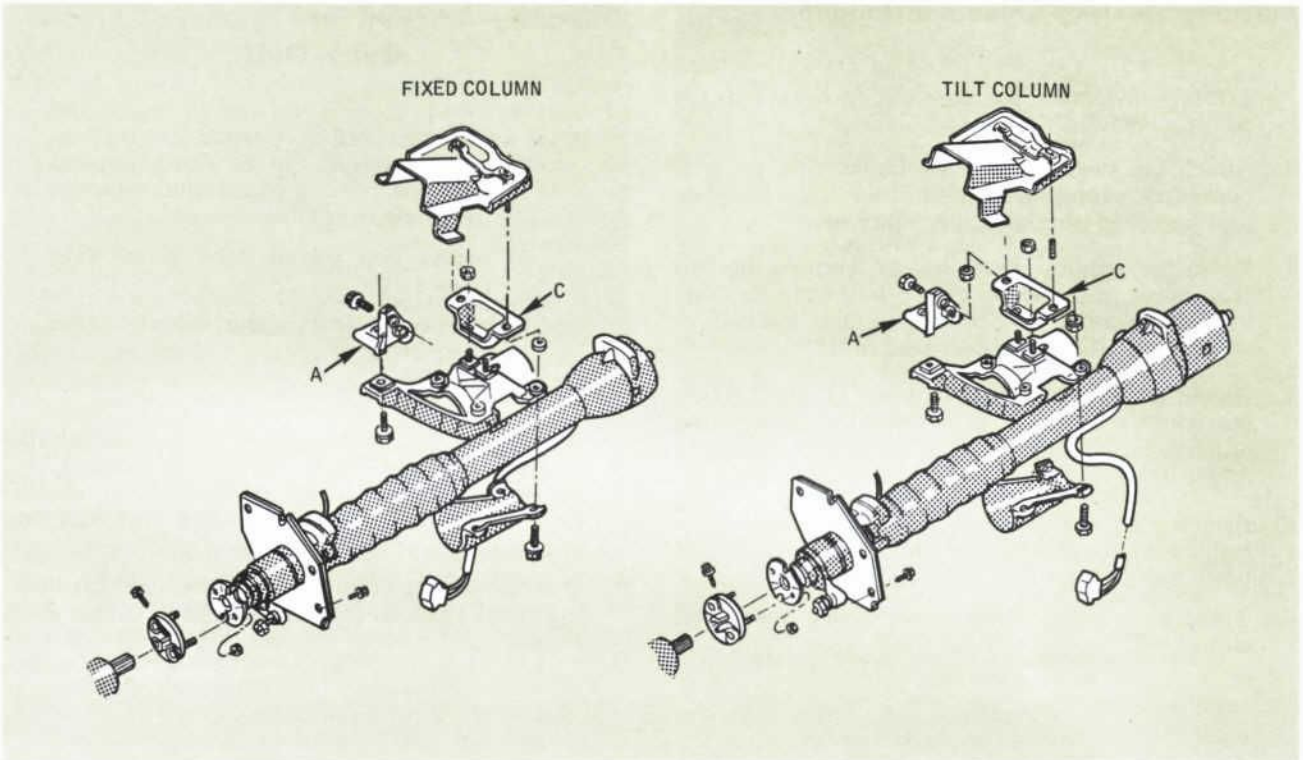


Steering Columns and Attaching Parts — Thunderbird

Ford Steering Column Installation

1. Loosely attach the small bracket, "A," to the forward end of the upper column clamp.
2. Fasten the bracket, "C," to the two studs on the upper clamp.
3. Loosely assemble the two clamp halves to the column. Be sure the tang in the upper clamp fits into the slot in the column outer tube.
4. Carefully move the column assembly forward and attach the flexible coupling. If necessary, elongate the bolt holes in the dash panel with a round file to obtain proper coupling alignment.
5. Tighten the bolt attaching the upper clamp half to the bracket, "A." Then tighten the four clamp bolts.
6. Fasten the lower steering column flange to the dash panel.
7. Tighten the nuts attaching the column to the instrument panel. If you're installing a replacement column, remove the shipping spacer.
8. If a tilt steering column is used, connect the locking pawl cable to the vacuum motor on the dash panel.

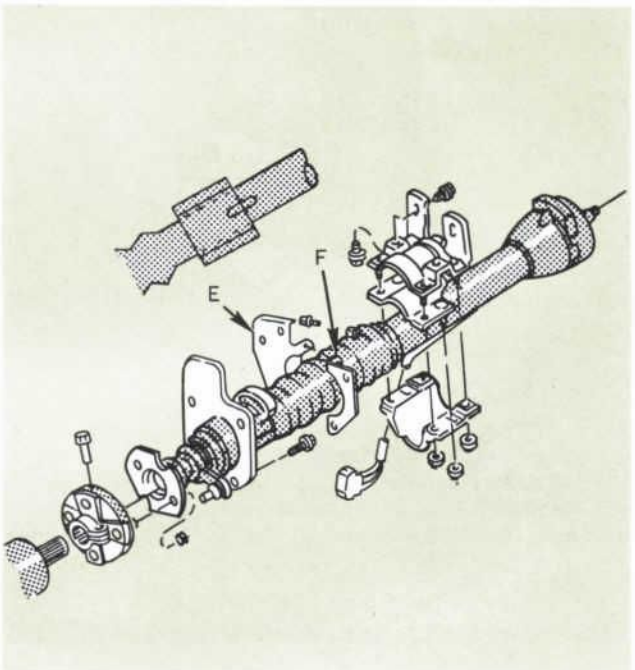
Q 9-3 b) You're so right! Just use the original lock cylinder (or a replacement) and turn the switch with the key. No special tool is needed . . . *and don't ever try to do this job with a screwdriver!*



Steering Columns and Attaching Parts – Ford

Fairlane and Falcon Steering Column Installation

1. Loosely assemble the two clamp halves to the column, being sure the tang fits in the slot of the column outer tube.
2. Attach the flexible coupling to the flange at the end of the steering shaft.
3. Set the column in place in the car. Align the flexible coupling with the steering gear shaft and tighten the clamp bolt. If necessary, elongate the bolt holes in the dash panel with a round file to obtain proper alignment.
4. Tighten only the two rear nuts that hold the clamp to the instrument panel.
5. Loosely assemble the two halves of the toe plate, "E" and "F," around the column forward of the neutral start switch. Then fasten the toe plate and lower column flange to the dash panel.
6. Tighten the bolts holding the two toe plate halves together. Then tighten the four remaining nuts at the lower clamp half. Remove the centering spacer if you're installing a replacement column assembly.



Steering Columns and Attaching Parts – Fairlane, Falcon

Q 7-3 b) Definitely not! Tampering with the waved cushion spring plate — or any other clutch pack component, for that matter — is not the way to adjust the clearance. See if you can find the right answer!

Mustang Steering Column Installation

1. Loosely assemble the two clamp halves to the column.
2. Attach the steering shaft to the steering gear. If necessary, elongate the bolt holes in the toe plate and flange to obtain proper alignment.
3. Raise the column assembly to engage the two rear holes in the lower clamp half with the studs in the attaching bracket, "C," under the instrument panel. Install the two stud nuts.
4. Install the two toe plate halves, "D" and "E," on the column forward of the tabs on the column outer tube. Tighten the two bolts and nuts only finger tight.
5. Attach the toe plate to the dash panel, then tighten the two bolts and nuts that hold the toe plate halves together.
6. Tighten the remaining nuts under the lower clamp half.

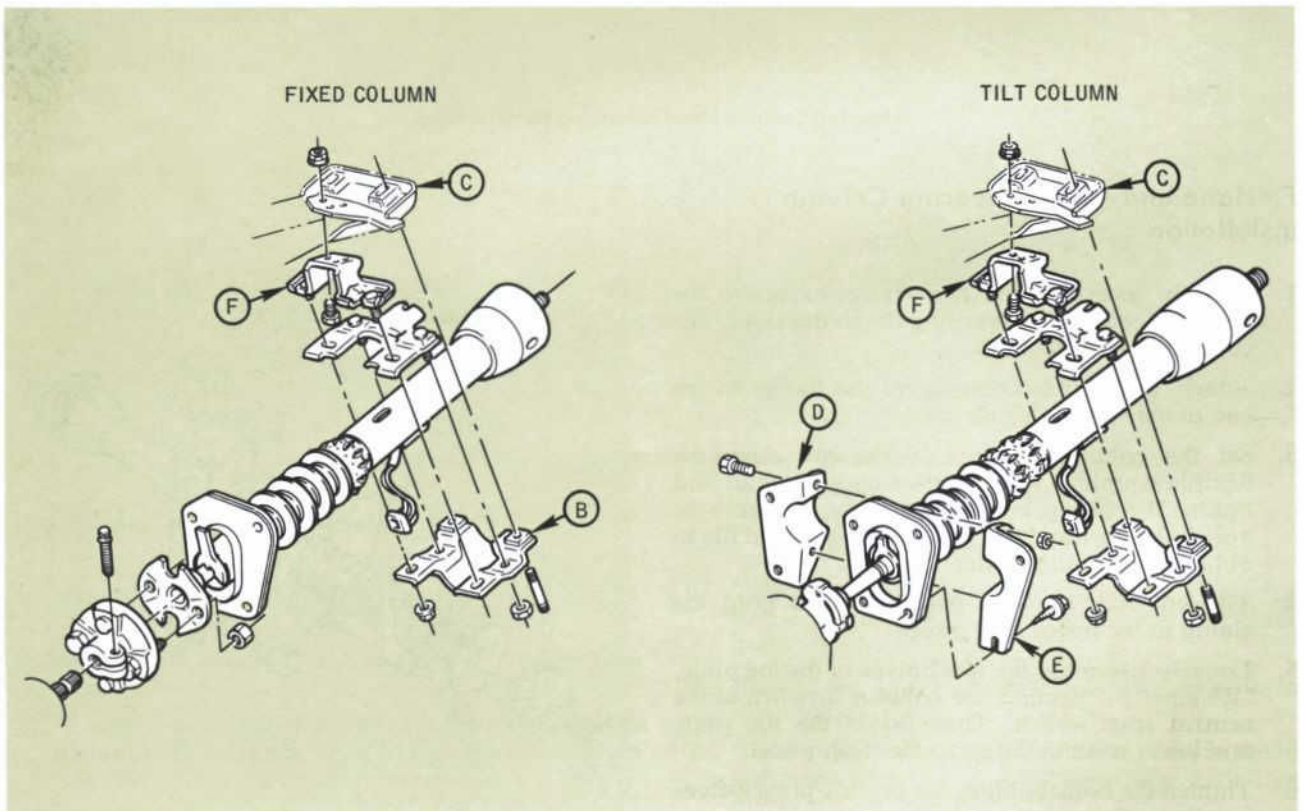
Quick-Quiz

Q 3-4 When installing a replacement steering column in any '68 Ford Division car, it's recommended that you remove any handling spacers:

a) before you install the column. (See page 131)

b) after you install the column. (See page 26)

7. Install the two bolts and nuts that attach the angle spacer, "F," to the attaching bracket, "C." If you're installing a replacement column assembly, remove the shipping spacers and centering spacer.
8. If a tilt steering column is used, connect the locking pawl cable to the vacuum motor on the dash panel.

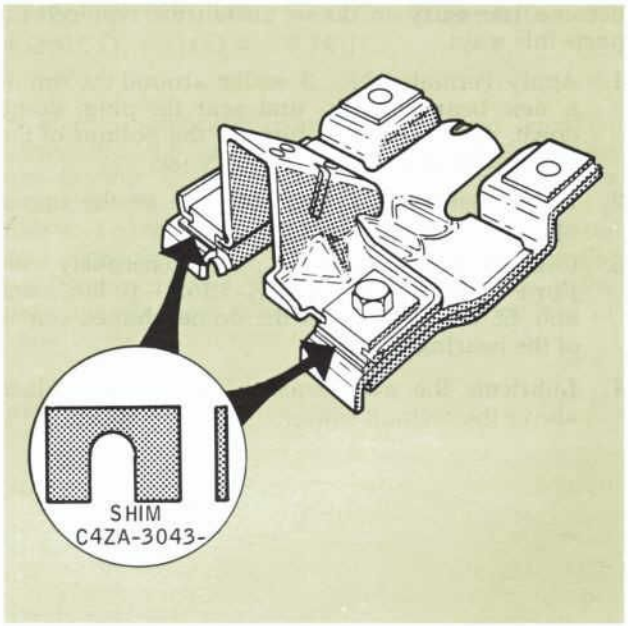


Steering Columns and Attaching Parts – Mustang

Q 3-4 b) Right! Since these new collapsible steering columns are more susceptible to damage than those of previous years, it's a good idea to take advantage of the added support of the spacers during installation.

Mustang Steering Wheel Height Adjustment

If required, you can raise the height of the Mustang steering wheel by the addition of shims between the forward end of the upper clamp half and the angle spacer under the instrument panel. The shims, which bear the part number C4ZA-3043, come in three thicknesses as indicated by suffix letters. Use any combination required to accomplish the desired height increase, *provided the total shim pack is not over 1/4-inch thick.* Loosen the clamp stud nuts, insert the shims around the forward stud on both sides of the column, and tighten the stud nuts.



Steering Wheel Height Adjustment – Mustang

FRONT WHEEL BEARING ADJUSTMENT PROCEDURE – ALL CARS

There has been a slight change in the recommended front wheel bearing adjustment procedure for all cars. After torquing the adjusting nut to 17 to 25 foot-pounds to seat the bearing, *back the adjusting nut off 1/2-turn. Then retighten it to 10 to 15 inch-pounds* (finger tight) and install the nut lock and cotter pin. This is in keeping with the principle that for greatest accuracy, the final bearing adjustment should be made in a tightening direction. Of course, all other wheel bearing adjustment steps and precautions are the same as listed in your 1967 Shop Manuals.

TRUCK

REAR SUSPENSION – F-100 and F-250 PICKUP TRUCKS

Rear leaf springs of the 1968 F-100 and F-250 pickup trucks are joined to the frame structure by a new compensating shackle. This provides a smoothly increasing spring rate during jounce — a feature that permits a reduction in the empty vehicle spring rate to less than half of that of the 1967 models. Consequently, spring action is soft in the unloaded condition and gradually stiffens under increasing load. The resulting ride is more carlike, particularly when the truck has a partial load or no load. Greater isolation of road shock and vibration is provided by an additional set of rubber bushings between the spring eye and the frame attachment.

KINGPIN PRELOAD SPACER – BRONCO, F-100 4 x 4 TRUCK

Bronco and the F-100 four-wheel-drive truck have a new kingpin feature that should eliminate front wheel shimmy under normal use for the entire life of the vehicle. Two high density polyurethane spacers, one against each kingpin bearing in the steering knuckle, work as an effective anti-shimmy device.

Installation and Adjustment

Chances are that you'll seldom, if ever, have to replace any of these kingpin spacers. But if it does

Q 8-2 b) Too bad! Would you care to try another answer? Thanks to those studs in the heads, you won't need any special intake manifold alignment tools for the 429.

become necessary to do so, install the replacement parts this way:

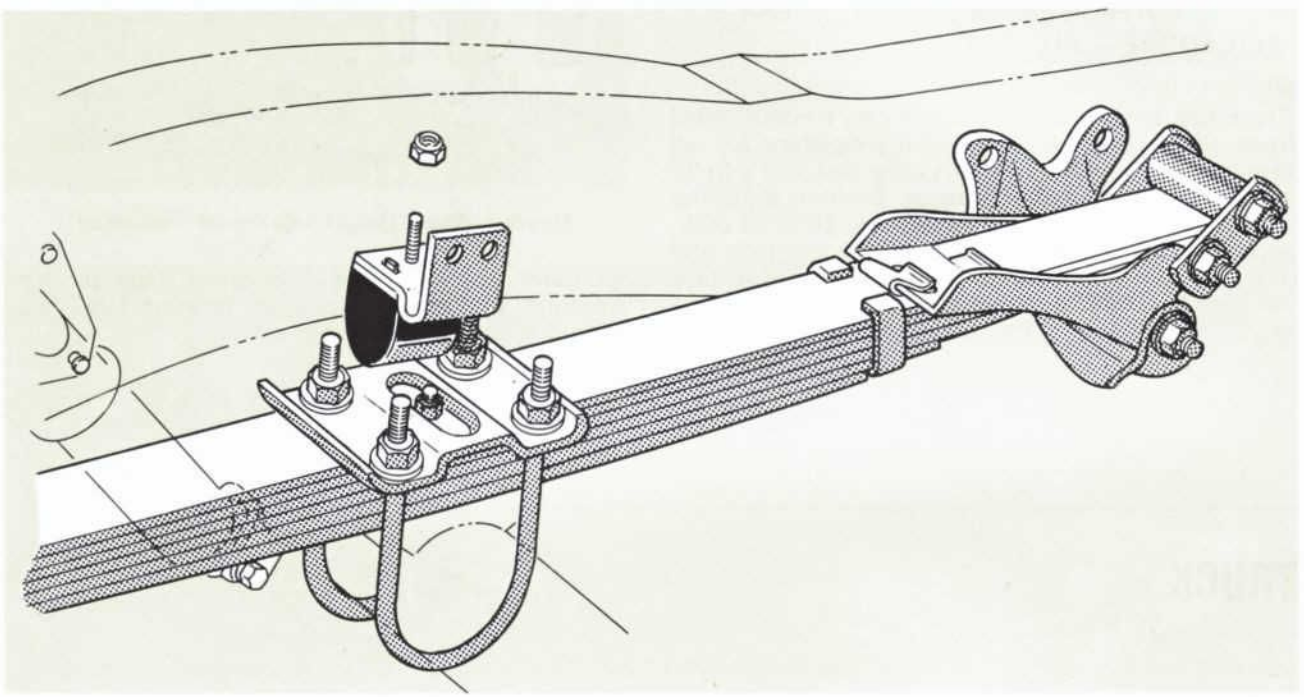
1. Apply Permatex No. 3 sealer around the rim of a new bearing plug, and seat the plug, dome down, in the recessed bore at the bottom of the upper arm of the axle housing yoke.
2. Install the kingpin bearing cone in the upper arm of the yoke.
3. Coat the plastic preload spacer generously with Ford chassis lube C1AZ-19590-B lubricant and fit the spacer into the dome-shaped center of the bearing plug.
4. Lubricate the wave washer and set it in place above the preload spacer.

Quick-Quiz

Q 3-5 The anti-shimmy device that's standard in the 1968 F-100 4x4 truck steering mechanism is:

a) a polyurethane spacer against each kingpin bearing. (See page 36)

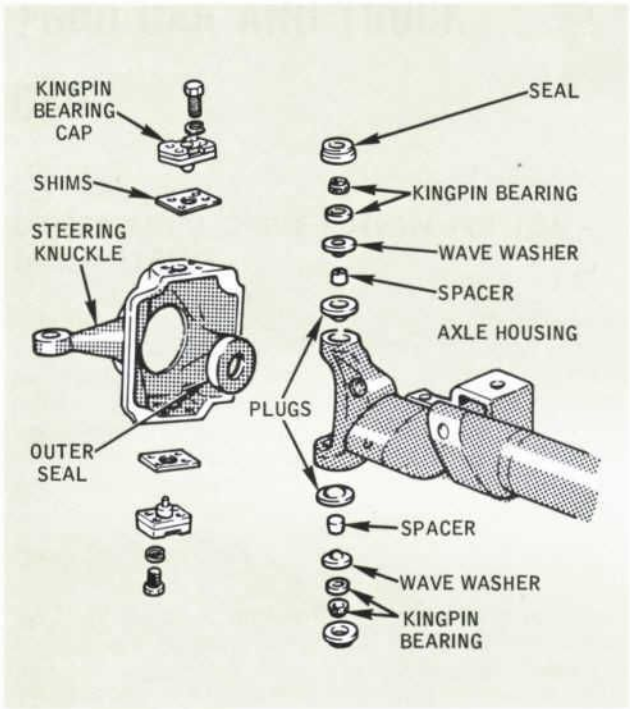
b) a compensating shackle that increases spring rate during jounce. (See page 56)



Compensating Shackle Rear Suspension — F-100 and F-250 4x2 Trucks

5. Pack the kingpin bearing rollers and cage with lubricant and install the bearing in the cone. The bearing will not seat in the cone at this point, because the preload spacer has not yet been compressed.
6. Drive the lubricant seal in place in the top of the bore in the yoke arm.
7. Following the procedure given in steps 1 through 6, install the bearing plug, bearing cone, preload spacer, wave washer, bearing and seal in the lower arm of the axle housing yoke. Remember to install the plug with the dome facing up in the recessed bore at the top of the lower yoke arm.
8. Install the steering knuckle, using the original shims under the upper kingpin bearing cap. When you tighten the kingpin bearing cap retaining bolts to specifications, you'll compress the two plastic preload spacers.
9. Check kingpin bearing preload by turning the steering knuckle with a torque wrench attached to any one of the four upper kingpin bearing cap retaining bolt heads. With the tie rod disconnected from the steering knuckle, the knuckle should move when 9 to 16 ft-lbs of torque are applied to the wrench. Add or remove shims from under the upper kingpin bearing cap if bearing preload adjustment is needed.

Q 3-2 c) You're right, that's wrong! If the cylinders inflate, the compressor is doing its job. The symptoms point to an air leak in the cylinders, lines or fittings downstream from the height control valve, don't they?



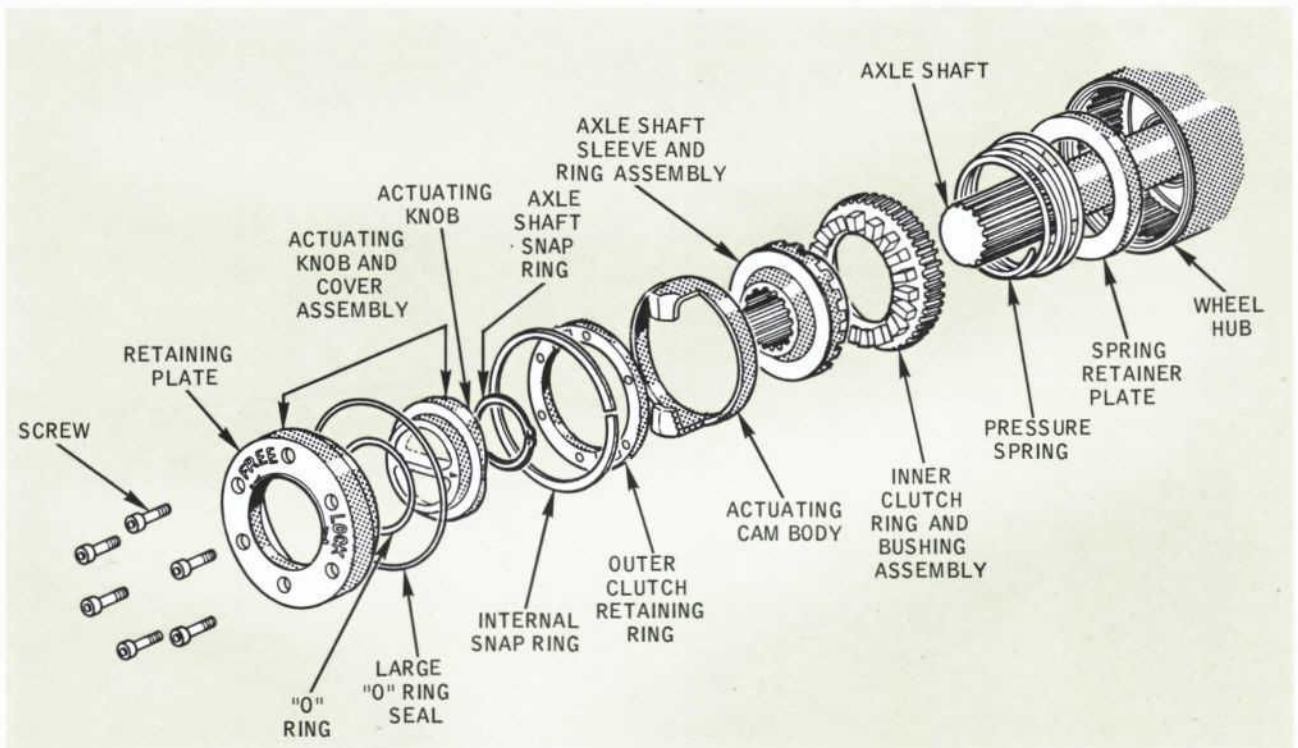
Steering Knuckle Disassembled – Bronco, F-100 4x4

FRONT WHEEL DRIVE LOCK-OUT HUB – BRONCO, F-100 4 x 4 TRUCK

To reduce lubricant contamination and lengthen service life, the optional free-running front wheel hubs for the '68 Bronco and F-100 4x4 truck have been changed to improve sealing. The actuating knob and cover assembly is now secured to the outer clutch retaining ring with six screws — double the amount used in last year's hub. Appearance of the knob has changed slightly, making its method of actuation more apparent to the owner.

Service Tips

Before installing the actuating knob and cover assembly, be sure to align the parts so the embossed arrow on the actuating knob is pointing to either "Free" or "Lock" on the retaining plate. If you don't do this, the arrow might be 180° out of phase with the two positions when the attaching screws are installed. With the addition of this precaution, service procedures are essentially unchanged from those given for the lock-out hub in your '67 Shop Manuals.



Internal-Locking Front Wheel Drive Lock-Out Hub – Bronco, F-100 4x4

Q 13-1 a) Sounds good, but it's wrong! About the only change in these regulators is the identifying blue color of the cover. They've been proven so dependable that most any occasional problem with them is cured better by replacement than by adjustment.

DIFFERENTIAL DRIVE PINION FLANGE – THUNDERBIRD

The double cardan universal joint at the rear of the Thunderbird drive shaft and the differential drive pinion flange have flat mating surfaces. A center pilot protrusion on the U-joint flange fits a matching recess in the center of the drive pinion flange to assure proper alignment of the two units when they are bolted together.

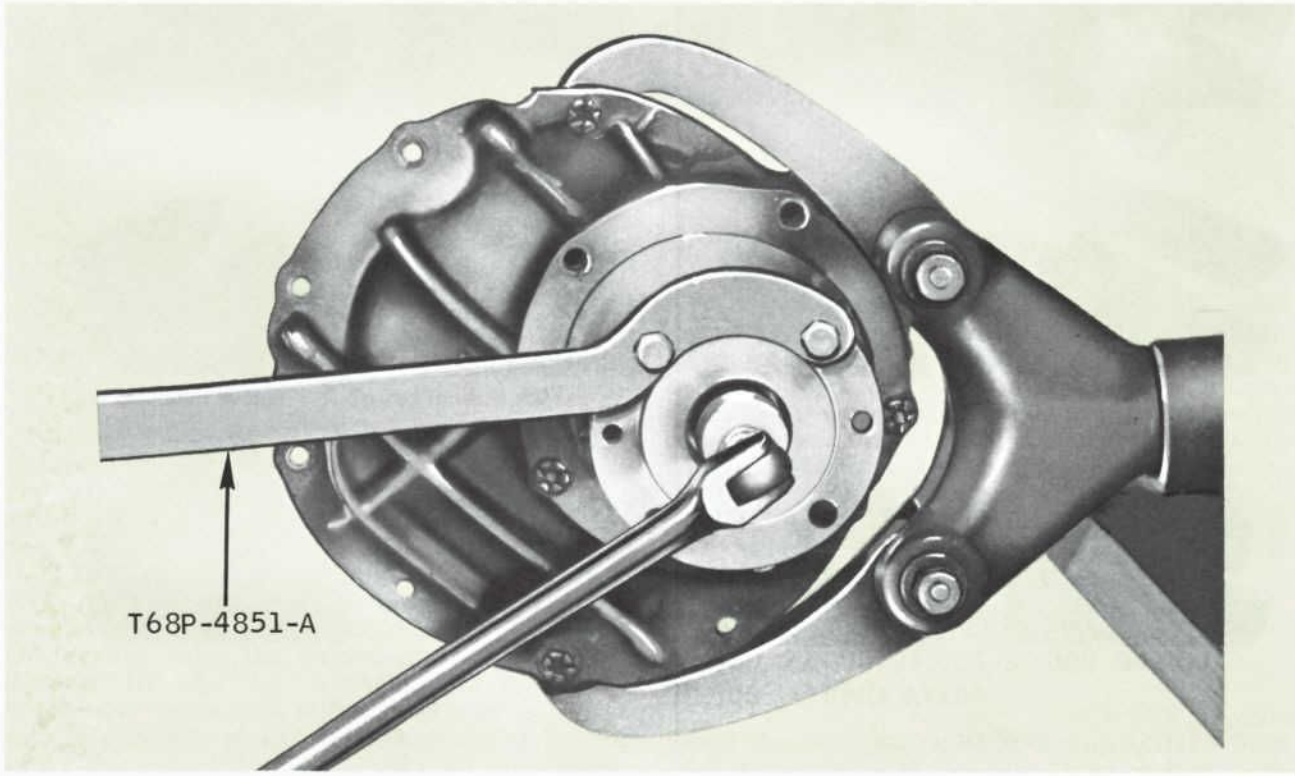
New Service Tool

To hold the drive pinion flange stationary while you loosen and remove the pinion shaft nut, you'll need the new Universal Joint Flange Holder, Tool No. T68P-4851-A. Then you can pull the flange off the pinion with Tool No. T65L-4851-A.

ACCEPTABLE DIFFERENTIAL GEAR TOOTH PATTERNS – ALL FORD-BUILT REAR AXLES

As a result of extensive testing, it has been found that *any combination of the drive and coast patterns shown here* will produce acceptable differential performance in any Ford-built rear axle, regardless of whether the gear set is of the hunting, non-hunting or partial non-hunting type. Consequently, it is recommended that you refer to this illustration for a guide to adjustment of the differential drive pinion gear and ring gear tooth contact in all 1968 Ford-built rear axles.

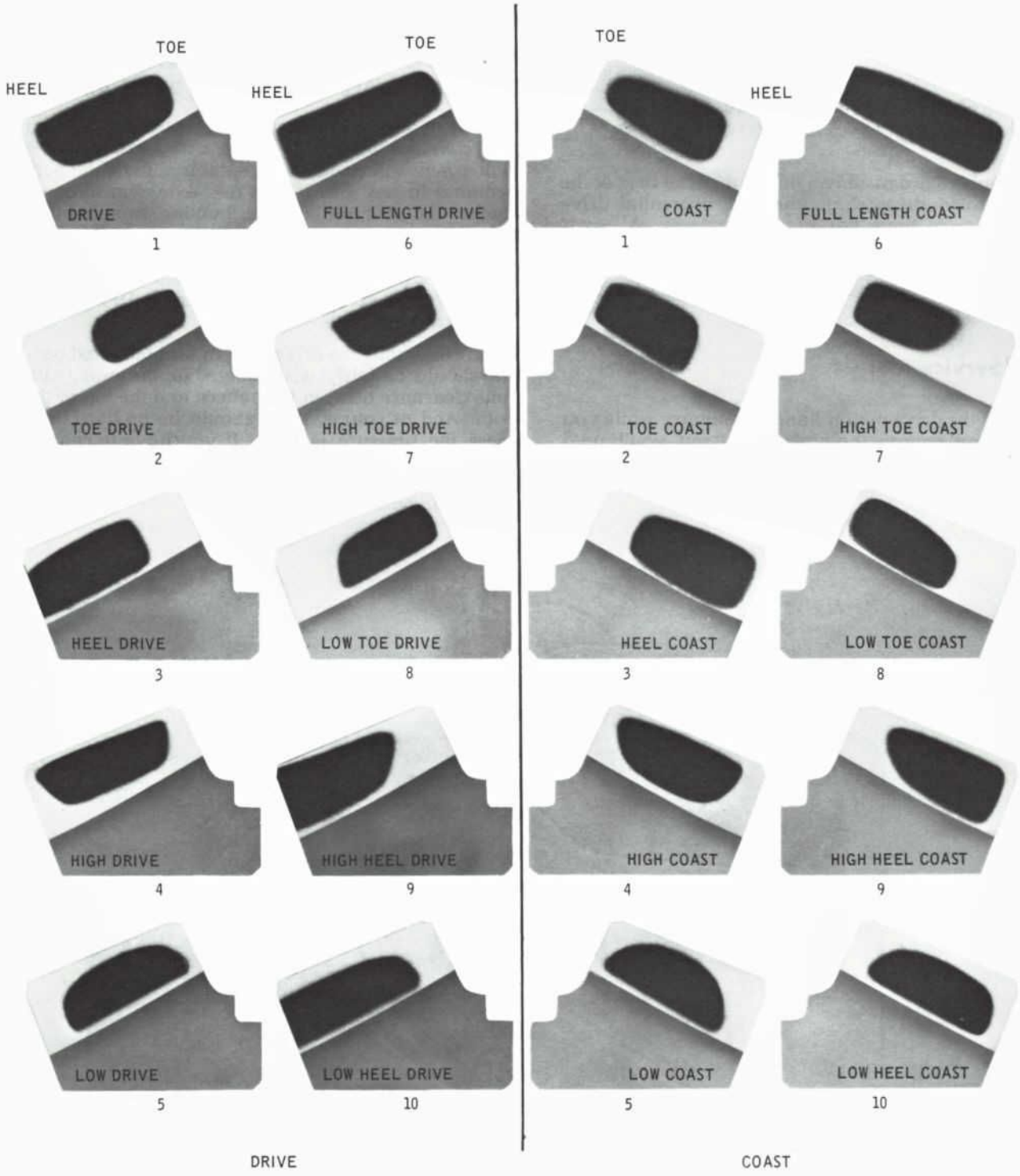
In general, both the drive pattern and the coast pattern should be fairly well centered on the tooth, with some clearance between the pattern and the top of the tooth. And of course, there should be no hard lines where the pressure is high. If you have to change shims to adjust the tooth contact, *be sure that gear backlash is set to specifications before you roll another pattern.*



Removing Differential Pinion Shaft Nut – Thunderbird

Q 8-3 b) Nice try . . . but you missed it! It would be sort of difficult to replace the air filter element for the 1968 Thermactor air pump, since it doesn't have one! The centrifugal impeller slings particles out of the air entering the pump, so no filter is needed.

ANY COMBINATION OF DRIVE AND COAST PATTERNS SHOWN PERMISSIBLE



Axle Drive and Coast Patterns

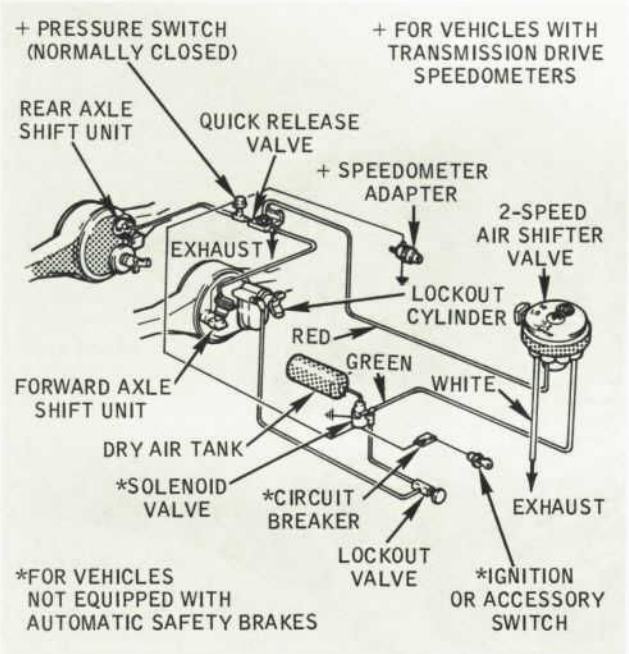
Q 6-6 c) Oops! You missed one! These marks are not to be made until the *assembly* of the transmission is well under way — not during disassembly! With that tip, see if you can find the right answer.

TRUCK

EXPANDED APPLICATION OF STRAIGHT-AIR SHIFT SYSTEMS – N AND H SERIES TRUCKS

Your 1967 Truck Shop Manual describes the Eaton 3-speed tandem axle straight-air shift system (page 4-95) and provides testing information for this system (page 4-6). Usage of this basic straight-air shift system is soon to be expanded to include 2-speed tandem axles.

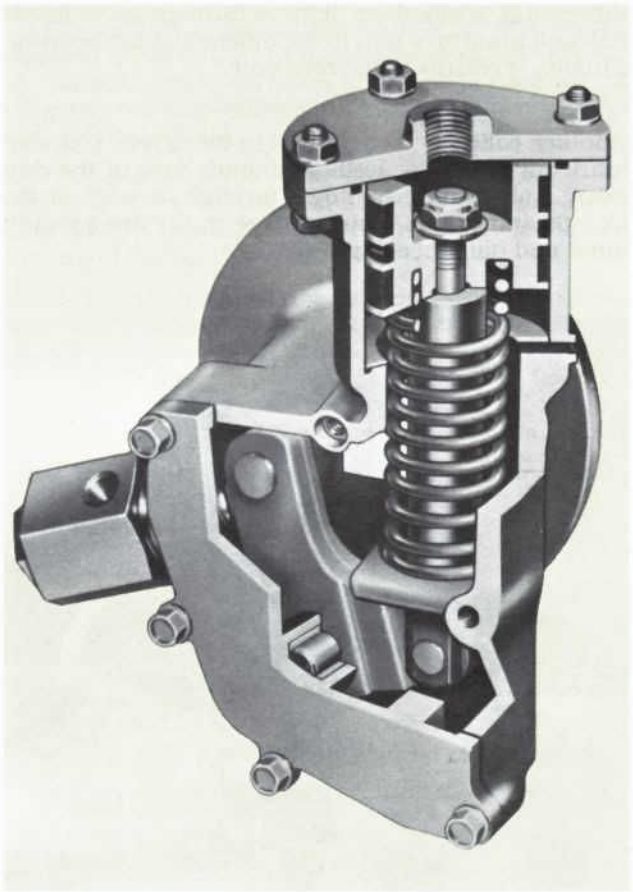
Essentially, the 2-speed system is similar to the previously covered 3-speed system as regards most operating components. However, the driver's control knob is a two-position air valve and the system plumbing is simpler.



Straight-Air Shift System – 2-Speed Tandem Axle

2-Speed Tandem Axle System: In more detail, here are the differences between the 2-speed system and the 3-speed system. The air shifter valve, as mentioned before, is a two-position unit — "Hi" and "Lo." The air line from the lockout valve goes directly to the lockout cylinder on the forward axle, since there's no need for a lockout control valve on the forward axle. The lockout system will operate in both "Hi" and "Lo." A single quick-release exhaust valve controls the shift units at both rear axles, with a *normally closed* pressure switch in the line to the rear axle shift unit. And only one speedometer adapter is needed with the 2-speed system.

New Shift Units



Eaton Piston Air Shift Unit

New piston-type air shift units are used on 2-speed or 3-speed tandem rear axles with the Eaton straight-air shift systems. These improved shift units contain a piston which moves downward against a compression spring to shift the axle to high ratio when compressed air is admitted to the cylinder. When the air is exhausted, the spring returns the axle gearing to low ratio. These new units are fully interchangeable with earlier air-torsion spring units on all models of Eaton axles. Conversion kits are available for field installation.

CONICAL-TYPE DIFFERENTIAL CARRIERS – 18,500, 22,000, 23,000, 30,000, 34,000, 38,000 POUND AXLES

Eaton 2-speed rear axles with capacities from 18,500 pounds to 38,000 pounds are equipped with cone-shaped differential carriers that feature a

Q 14-2 a) Congratulations . . . you've scored again! Presently, this new Autolite starter is used only the the Thunderjet 429 engine in the '68 Thunderbird — not on any truck engine.

unique forced-flow positive lubricating system. Rear axle lubricant is picked up by the gear support case and propelled to the pickup trough formed in a stationary wiper blade. The trough directs lubricant through a carrier passage to the right bearing of the differential. From there, it flows through the differential and planetary unit to the differential left bearing. Finally, it returns to the reservoir.

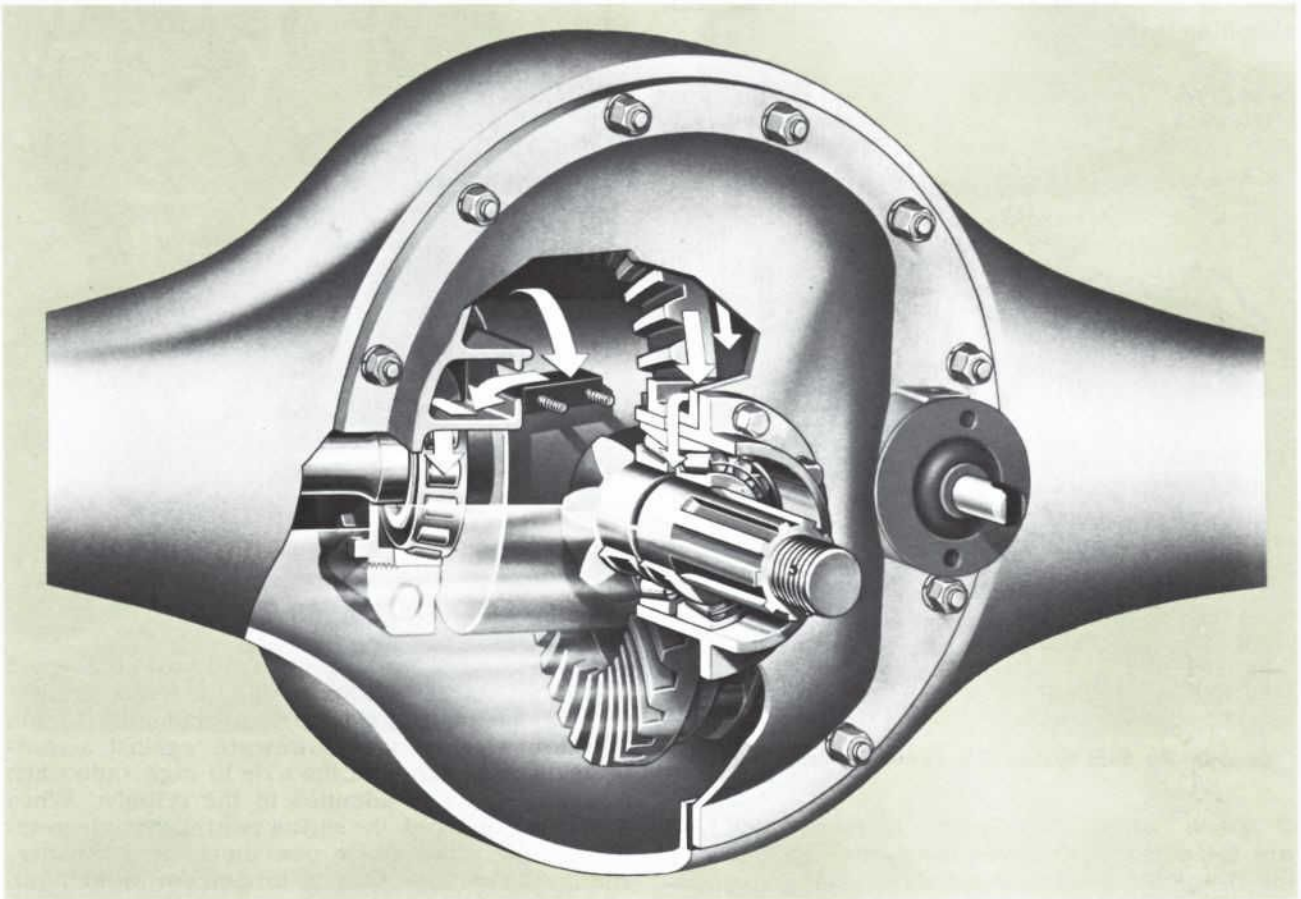
Another collector trough built in the carrier picks up lubricant from the teeth and back face of the ring gear. Lubricant then flows through a port in the trough and pinion bearing cage to the drive pinion inner and outer bearings.

Quick-Quiz

Q 4-1 Eaton 2-speed rear axles with conical-type differential carriers have:

a) forced-flow differential bearing lubrication. (See page 85)

b) a unique snap-type plug in the front filler hole. (See page 41)



Conical-Type Differential Carrier — Eaton Rear Axles

Lubrication Service Simplified

Lubricant is added through the rear filler hole to the level of the bottom of the hole, the same as with the ribbed-type differential carriers used previously. But with the new conical-type carriers, there's no need to add an extra pint of lubricant to fill the channels in the carrier assembly. In fact, you won't even find a front filler hole in the carrier!

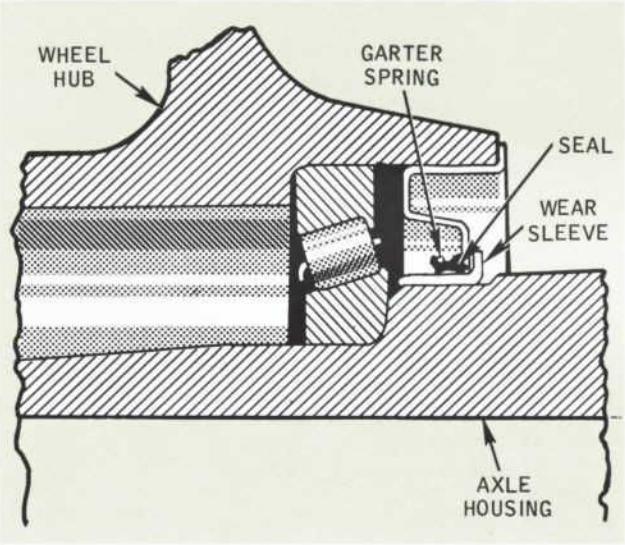
DIFFERENTIAL GEAR TOOTH PATTERNS — ALL FORD-BUILT REAR AXLES

In the car section of this group, you'll find an article

Q 7-3 c) You're doing great! With the four different thicknesses of snap rings available, it's a cinch to pick the one that'll give the specified clearance of 0.030-inch to 0.055-inch when it's installed.

illustrating drive and coast patterns for differential drive pinion and ring gear tooth contact that are now considered acceptable for all Ford-built rear axles. This information also applies to the F-100 light truck rear axles built by Ford.

WHEEL BEARING SEALS – MEDIUM AND HEAVY DUTY TRUCKS



Typical Rear Wheel Bearing Seal – Medium and Heavy Duty Trucks

By October, all Rockwell and Eaton single and tandem rear axles will have a new "wet" rear wheel bearing lubrication system that utilizes differential carrier lubricant as a permanent lubricant for the bearings. In the "wet" system, there are no seals at the outer ends of the axle housing tubes to prevent the mixing of wheel bearing grease and differential carrier lubricant. An improved double lip seal of synthetic material is installed in the inner end of the wheel hub to retain the lubricant. The new synthetic seal rides on a wear sleeve pressed on the axle housing.

With this "wet" seal configuration, axle lubricant can flow outward along the axle shaft and then into the wheel hub and bearings. This lubricant seeks the close tolerances inaccessible to grease, and it won't channel out of the bearings. It's less susceptible to temperature extemes — it won't stiffen when chilled or break down when heated. The improved lubrication means there is no longer a need for periodic rear wheel bearing lubrication. However, when the wheels are removed for brake relining or other service, the bearings and hubs should be cleaned and the bearings should be repacked.

Bearing Packing Precautions

Using a pressure bearing packer, pack the cleaned bearings only with ESA-MIC-75-B ball joint and multi-purpose chassis lubricant, Ford part number C1AZ-19590-B. *Do not use ESA-MIC-60-A wheel bearing lubricant, Ford part number C2AZ-19585-A,* since the multi-purpose lubricant is used for the original bearing lubrication *and these two greases are not compatible.*

Do not put any lubricant into the hub cavity — it will only block the essential flow of differential lubricant to the bearings and prevent the proper functioning of the "wet" system.

After you've installed the wheels (see instructions headed "Wheel Installation"), fill the axle with the differential lubricant to the bottom of the filler plug hole and install the plug. Then remove the axle housing vent and add more differential lubricant as follows:

11,000, 13,000, 15,000 and 17,000 pound single axles; 30,000 pound tandem axles: Add 1/2-pint of differential lubricant to the single axles. Add 1/2-pint to each axle of the tandem unit.

18,500 pound single axles; 34,000 tandem axles: Add 1 pint per axle.

22,000 and 23,000 pound single axles; 38,000 and 44,000 pound tandem axles: Add 1-1/2-pint per axle.

Be sure you give the vent a good cleaning before you install it on the axle.

Seal and Sleeve Replacement

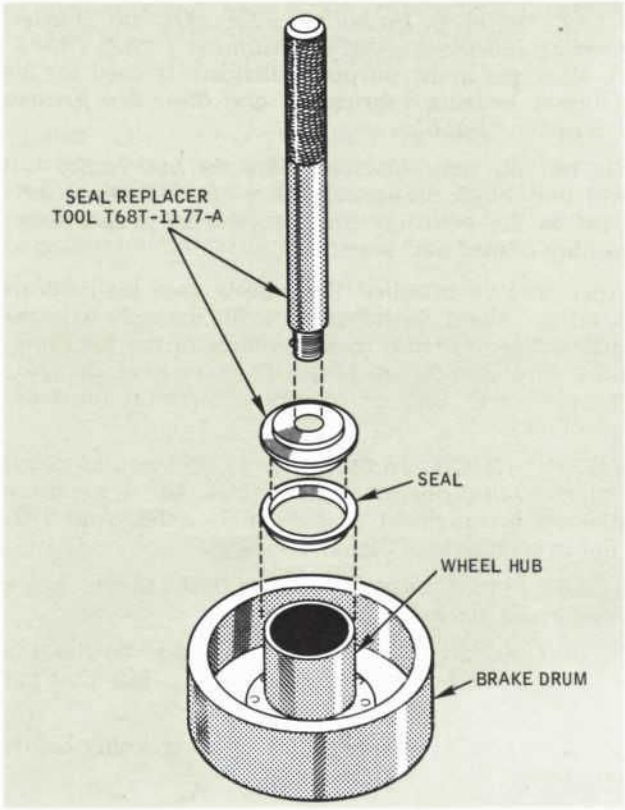
It's recommended that you install a new seal every time a wheel is removed. And if there's any visible damage to the wear sleeve, replace it. For these jobs, you'll need to use the new special tools provided in the 1968 special tool kit for super duty truck dealers.

The new seal replacer, Tool T68T-1177-A, has drivers for six different seal diameters. Application by axle capacity is stamped on the face of each driver. Since the seal material is synthetic, you don't need to soak it in oil before installation. And don't apply gasket cement or sealer to the outer rim of the seal — it's already coated with a plastic sealer. Install the seal this way:

1. Use a soft face hammer to start the seal into the wheel hub.
2. Select the proper driver and install the seal installer handle.
3. Drive the seal into place with a soft face hammer. The seal is properly installed when the flange bottoms on the hub all around. After you with-

Q 7-1 b) No, you won't need a completely new overhaul procedure for the '68 Cruise-O-Matics. Except for the points highlighted in this handbook, you can "unbutton" 'em and build 'em up like the earlier jobs.

draw the driver, check to be sure the garter spring is still in place in the spring groove behind the primary seal lip. Hammer impacts may jar this spring out of position.



Installing Rear Wheel Bearing Seal

The new wear sleeve replacer, Tool T68T-1173-B, comes in six different sizes. Application by axle capacity is stamped on each replacer. Replacement sleeves are coated with a rust preventative oil — but if the new sleeve appears dry, coat the inside diameter with a light oil before installing it. Then proceed as follows:

1. Tap the sleeve gently with a soft face hammer to start it on the axle housing. Keep it as straight and square as possible on the housing.
2. Place the wear sleeve replacer tool against the sleeve and drive it in place with a soft face hammer. When the tool bottoms , the sleeve should be properly located to provide a 0.010 inch to 0.025 inch clearance between the sleeve and the bearing cone when the wheel is installed.

Wheel Installation

The synthetic material used in the new seal contributes to the effectiveness of the seal, but this material

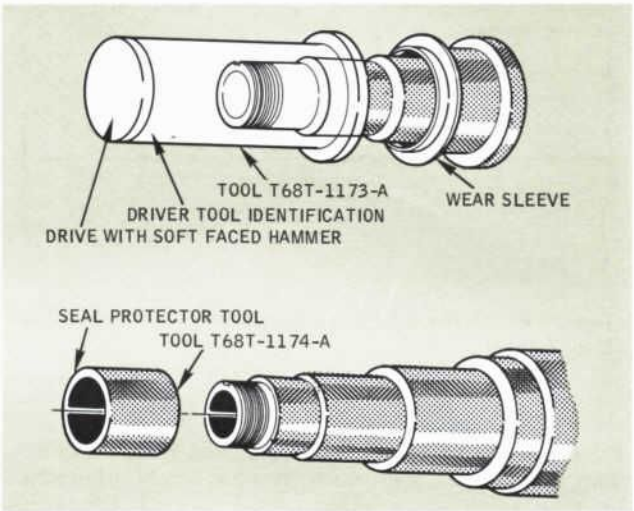
Quick-Quiz

Q 4-2 When installing a new seal in a heavy-duty truck rear wheel hub with "wet" bearing lubrication:

a) be sure the garter spring is in place behind the seal lip after installation. (See page 42)

b) soak the new seal in oil before installation. (See page 63)

is more easily damaged during wheel installation than a leather seal would be. Consequently, seal

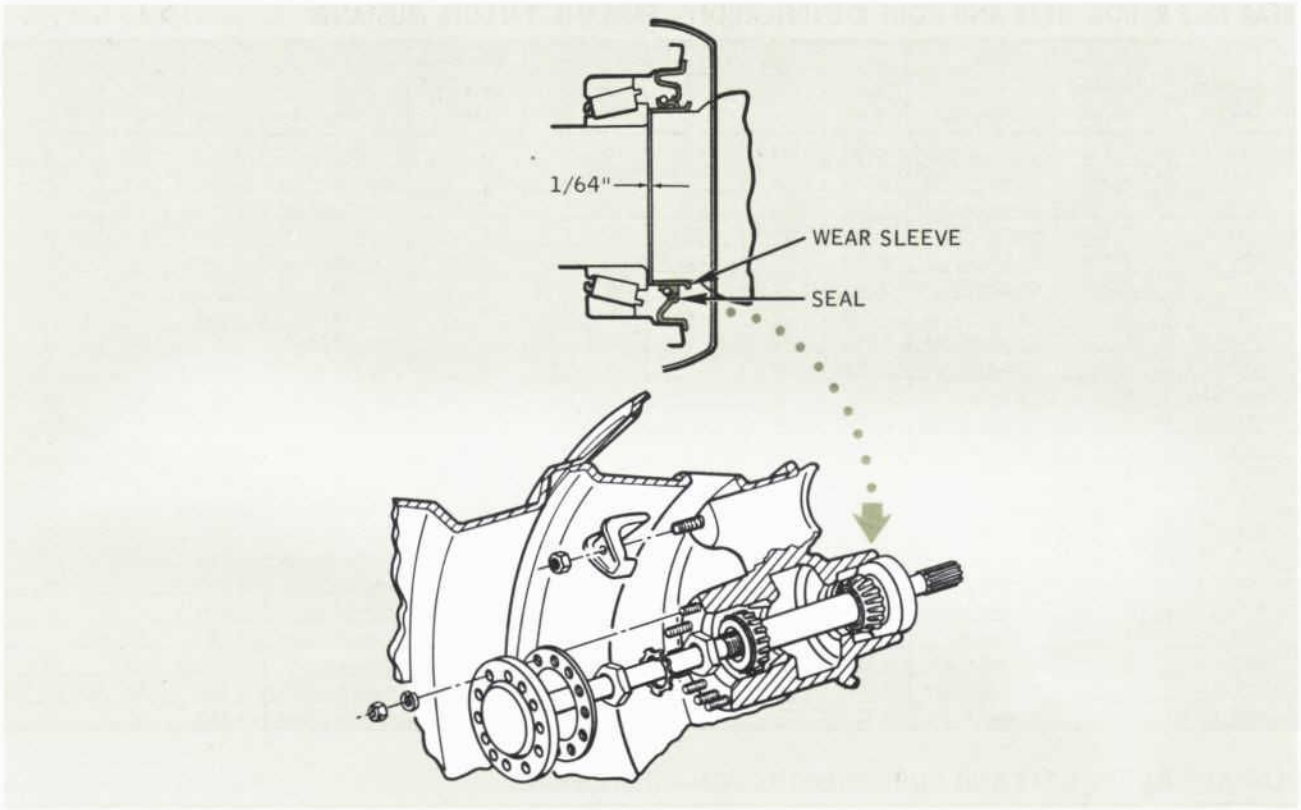


Installing Wear Sleeve

protector tools are provided in the 1968 special tool kit for super duty truck dealers. These seal protectors, Tool T68T-1174-A, come in five sizes with application by axle capacity stamped on each one. Here's the correct way to install a wheel to prevent damaging the seal:

1. Mount the wheel and hub on a wheel jack.
2. Select the proper size seal protector and slide it over the outer end of the axle housing spindle.
3. Adjust the height of the wheel and tilt it so the hub can be moved squarely into position on the axle housing.
4. When the wheel is in position, remove the seal protector and install the wheel outer bearing. Then complete the installation of the wheel as you would for previous rear wheels.

Q 3-5 a) You bet! In fact, those high-density polyurethane spacers have proven so effective that they'll probably last as long as the truck itself under normal conditions!



Installing Rear Wheels with Wet Bearing Lubrication System

SPECIFICATIONS

REAR AXLE RATIOS, GEAR AND CODE IDENTIFICATION – FORD

Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	No. of Teeth		Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	No. of Teeth	
				Ring Gear	Pinion					Ring Gear	Pinion
WDC-AS1	8-3/4	Conventional	3.25:1	39	12	WDT-J1	9-3/8	Conventional	3.25:1	39	12
WDC-AT3	9	Conventional	3.00:1	39	13	WDT-L1	9-3/8	Conventional	3.50:1	35	10
WDC-AU3	9	Conventional	3.25:1	39	12	WDT-N1	9-3/8	Limited Slip	3.25:1	39	12
WDC-AV1	8-3/4	Conventional	3.00:1	39	13	WDT-R1 ①	9-3/8	Conventional	3.25:1	39	12
WDC-CA	9	Conventional	2.75:1	44	16	WDT-S1 ①	9-3/8	Conventional	3.50:1	35	10
WDL-N1	9	Limited Slip	3.00:1	39	13	WDT-T1 ①	9-3/8	Limited Slip	3.25:1	39	12
WDL-W1	8-3/4	Limited Slip	3.00:1	39	13	WDT-U1	9-3/8	Limited Slip	2.80:1	42	15
WDL-Z	8-3/4	Limited Slip	3.25:1	39	12	WER-A	8-1/2	Conventional	3.10:1	31	10
WDT-G1	9-3/8	Conventional	3.00:1	39	13	WER-C	8-1/2	Conventional	2.80:1	42	15
WDT-F1	9-3/8	Conventional	2.80:1	42	15						

① Equipped with U-Joint torsional damper.

Q 3-3 a) That's true. If the only damage to any *fixed* steering column is a telescoped steering shaft, the shaft can be pulled out to its original length . . . *but be careful not to pull it beyond that length!*

REAR AXLE RATIOS, GEAR AND CODE IDENTIFICATION – FAIRLANE, FALCON, MUSTANG

Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	No. of Teeth		Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	No. of Teeth	
				Ring Gear	Pinion					Ring Gear	Pinion
WDV-A1	7-1/4	Conventional	2.83:1	34	12	WEB-G	9	Conventional	3.89:1	35	9
WDV-B1	7-1/4	Conventional	2.83:1	34	12	WEB-H	9	Conventional	2.75:1	44	16
WDV-C1	7-1/4	Conventional	3.20:1	32	10	WEB-J	9	Conventional	2.75:1	44	16
WDV-E	7-1/4	Limited Slip	3.20:1	32	10	WEC-F	9	Conventional	2.75:1	44	16
WDV-G	7-1/4	Conventional	3.20:1	32	10	WEC-G	9	Conventional	2.75:1	44	16
WDV-H	7-1/4	Limited Slip	3.20:1	32	10	WES-H	9	Conventional	3.50:1	35	10
WDW-K1	8	Conventional	2.79:1	39	14	WED-A5	9	Limited Slip	3.25:1	39	12
WDW-B1	8	Conventional	3.00:1	39	13	WED-D5	9	Limited Slip	3.00:1	39	13
WDW-C1	8	Conventional	3.25:1	39	12	WEE-D5	9	Limited Slip	3.00:1	39	13
WDW-D1	8	Conventional	3.50:1	35	10	WES-F	9	Conventional	3.00:1	39	13
WDW-J	8	Conventional	2.79:1	39	14	WES-G	9	Limited Slip	3.25:1	39	12
WDW-F	8	Conventional	3.00:1	39	13	WCY-R1	7-1/4	Conventional	2.83:1	34	12
WDY-A1	8	Conventional	3.00:1	39	13	WCY-E1	7-1/4	Conventional	3.20:1	32	10
WDY-B1	8	Conventional	3.25:1	39	12	WCY-AJ1	7-1/4	Conventional	3.20:1	32	10
WDY-C1	8	Conventional	3.50:1	35	10	WCZ-F1	8	Conventional	3.00:1	39	13
WDZ-B1	8	Limited Slip	3.00:1	39	13	WCZ-V	8	Conventional	2.79:1	39	14
WDZ-C1	8	Limited Slip	3.25:1	39	12	WDJ-C1	8	Limited Slip	3.00:1	39	13
WDZ-E	8	Limited Slip	3.00:1	39	13	WEC-D5	9	Conventional	3.00:1	39	13
WEA-A1	8	Limited Slip	3.00:1	39	13	WEC-E5	9	Conventional	3.25:1	39	12
WEA-F1	8	Limited Slip	3.25:1	39	12	WEZ-A	7-1/4	Conventional	3.20:1	32	10
WEB-E5	9	Conventional	3.00:1	39	13	WEZ-C	7-1/4	Conventional	2.83:1	34	12
WEB-F5	9	Conventional	3.25:1	39	12	WES-M	9	Conventional	3.25:1	39	12

REAR AXLE RATIOS, GEAR AND CODE IDENTIFICATION – THUNDERBIRD

Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	No. of Teeth		Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	No. of Teeth	
				Ring Gear	Pinion					Ring Gear	Pinion
WDC-AT3	9	Conventional	3.00:1	39	13	WDT-H1	9-3/8	Limited Slip	3.00:1	39	13
WDC-BZ	9	Conventional	3.00:1	39	13	WDT-Z	9-3/8	Conventional	3.00:1	39	13
WDT-G1	9-3/4	Conventional	3.00:1	39	13	WDT-AA	9-3/8	Limited Slip	3.00:1	39	13

ADJUSTMENTS

Description	Inch
Maximum Runout of Backface of Ring Gear	0.003
Maximum Radial Runout of Companion Flange Thunderbird	0.005
Differential Side Gear Thrust Washer Thickness	0.030-0.032
Differential Pinion Gear Thrust Washer Thickness	0.030-0.032
Drive Pinion Bearing Solid Spacers (Used with 9-3/8 ring gear)	
6 Spacers in increments of 0.002 inch	0.466-0.476
14 Spacers in increments of 0.001 inch	0.477-0.490
Differential Bearing Preload (Case Spread Across Differential) New Bearings	0.008-0.012
Original Bearings	
7-1/4 Ring Gear	0.003-0.005
7-3/4, 8, 8-3/4, 9, 9-3/8 Ring Gear	0.005-0.008
8-1/2 Ring Gear	0.006-0.010
Original Bearings – Thunderbird	0.005-0.008

Description	Inch
Nominal Pinion Locating Shim	
Ford – (except 8-1/2 Ring Gear)	0.015
Ford 8-1/2 Ring Gear	0.030
Falcon, Fairlane, Mustang Integral Carrier Type – Rear Bearing Cone to Pinion Gear	0.017
Removable Carrier Type 8 Dia. Ring Gear	0.022
8-3/4-9 Dia. Ring Gear	0.015
Thunderbird	0.015
Available Pinion Shims (in steps of 0.001 inch) Ford	0.010-0.029
8-3/4, 9, 9-3/8 inch	0.010-0.029
8-1/2 inch	0.022-0.038
Falcon, Fairlane, Mustang Integral Carrier Type 7-1/4 Ring Gear	0.008-0.024
8-9 Ring Gear	0.010-0.029
Thunderbird	0.010-0.029
Backlash Between Ring Gear and Pinion	0.008-0.012
Maximum Backlash Variation Between Teeth	0.003

Q 8-4 a) Sorry, but you "jumped the gun!" Pinching off the vacuum line merely sets the air by-pass valve up for the test. It reduces internal vacuum so that when normal vacuum is restored by releasing the line, the valve will respond by interrupting airflow.

LUBRICANT CAPACITIES ③

Ring Gear Size	Lubricant Level	U.S. Measure Capacity (Pints)	Imperial Measure Capacity (Pints)
8-3/4-9 inch Conventional ①	To Bottom of Filler Hole	5.0	4.0
8-3/4-9 inch Limited Slip ②	To Bottom of Filler Hole	5.0	4.0
9-3/8 inch Conventional ①	To Bottom of Filler Hole	5.0	4.0
9-3/8 inch Limited Slip ②	To Bottom of Filler Hole	5.0	4.0
8-1/2 inch Conventional ①	1/2 inch Below Bottom of Filler Hole	4.0	3.2
7-1/4 inch Conventional ①		2.5	2.0
7-1/4 inch Limited Slip ②		2.5	2.0
8 inch Conventional ①		4.0	3.2
8 inch Limited Slip ②		4.0	3.2
9 inch Conventional ①		5.0	4.0
9 inch Limited Slip		5.0	4.0

① All Conventional axles use ESW-M2C-105-A Lubricant (C6AZ-19580-B)
② All Limited Slip axles use ESW-M2C-104-A Lubricant (C6AZ-19580-C)
③ Lubricant color characteristics vary from a yellowish green when new, to a beige or gray as mileage increases.

REAR AXLE TORQUE LIMITS (FT-LBS)

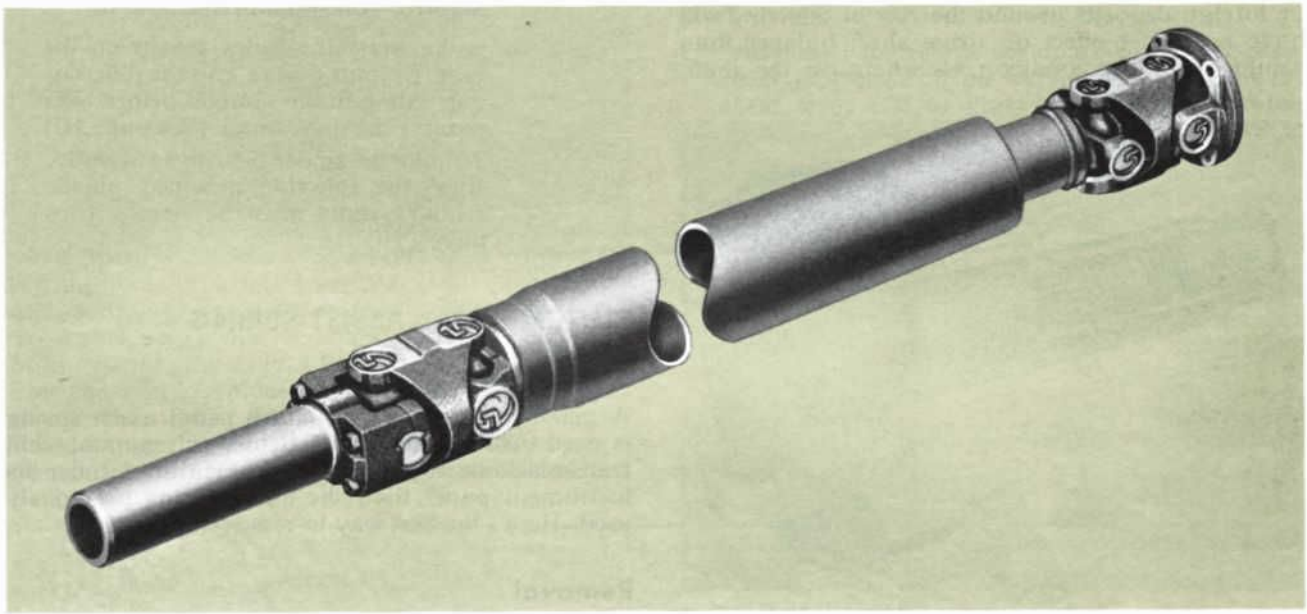
Description	Ford	Falcon, Fairlane, Mustang			Thunderbird
		Integral Carrier	Removable Carrier 7-3/4"-8"	Removable Carrier 9"	
Differential Bearing Cap Bolts	70-85 ①	40-55	55-70	70-85	70-85
Differential Bearing Adjusting Nut Lock Bolts	12-25	12-25	12-25	12-25	12-25
Carrier to Housing Stud Nuts	30-40		30-40	30-40	30-40
Pinion Retainer to Carrier Bolts	30-45		30-45	30-45	30-45
Ring Gear Attaching Bolts	65-80	40-55	65-80	65-80	65-80
Rear Axle Shaft Bearing Retaining Bolts Lt. Duty	30-40	30-40	30-40	30-40	50-70
Rear Shock Absorber to Spring Clip Plate Assembly Nuts	15-25	15-25	15-22	15-22	15-25
Pinion Flange U-Bolt Nuts	12-15	7-10	12-15	12-15	12-15 Single Cardan 20-24 Double Cardan
Brake Backing Plate Bolt Nuts	30-40 ⑥				
Oil Filler Plug	25-50	25-50	25-50	25-50 (in carrier) 60-80 (in housing)	
Differential Pinion Shaft Lock Pin	15-22 ⑥				
Minimum Torque Required to Tighten Pinion Nut to Obtain Correct Pinion Bearing Preload	175 ⑤ 140 ⑥	140	175 ③	175 ③	175 ③
Rear Cover Bolts	25-35 ⑥	25-35			
Pinion Bearing Preload (Collapsible Spacer) New Bearings (In-Lbs)	22-32	17-27	17-32 ④	22-32 ④	22-32
Original Bearings (In-Lbs)	8-14	6-12	8-14	8-14	8-14
Pinion Bearing Preload (Solid Spacer) (In-Lbs) Seal in Place	15-35				15-35
Differential Bearing Preload (Case Spread) New Bearings	0.008-0.012	0.008-0.012	0.008-0.012	0.008-0.012	0.008-0.012
Original Bearings	0.005-0.008 0.006-0.010 ⑥	0.003-0.005	0.005-0.008	0.005-0.008	0.005-0.008
Spring Clip Nuts (Rear Spring to Axle Housing)		13-20	30-45	30-45	30-45

① 8-3/4"-9" Gear, 60-70 for Doweled 9-3/8" Gear
③ If This Torque Cannot Be Obtained with a Used Spacer, Install a New Spacer.
④ And New Seal
⑤ 9" Ring Gear, 180-220 for 9-3/8" Ring Gear
⑥ Ford 8-1/2" Ring Gear

Q 2-1 a) Sorry . . . you're wrong! You should use the same procedure for attaching the anchor plate for *all* floating caliper disc brakes. It's the only way to get the anchor plate aligned correctly.

TORQUE CHECK (FT-LBS) REAR AXLES WITH LIMITED-SLIP DIFFERENTIAL

		Thunderbird, Ford, Falcon, Fairlane, Mustang	
		All Axles Except Integral Carrier Type	Integral Carrier Type
Minimum Torque Required to Turn Axle Shaft and Gear with One Wheel on the Ground		75	50
Bench Check	With New Clutch Plates	155-195	100-125
After Assembly	With Original Clutch Plates	75 Min.	50 Min.



Drive Shaft and Universal Joints – Thunderbird

DRIVE SHAFT WITH DOUBLE CARDAN UNIVERSAL JOINTS – THUNDERBIRD

Last year's 4-door Thunderbird has a double cardan universal joint at the rear of the drive shaft. For 1968, the use of this type of universal joint has been extended to all Thunderbird models, and it is used at both ends of the drive shaft. This type of universal joint is a constant-speed unit. Consequently, it eliminates one cause of drive train vibrations — the increasing and decreasing speed of drive shaft rotation through a single revolution when the conventional single-spider type of universal joint is operating at an angle.

Service Tips

Differential companion flange: Unlike the yoked pinion flange design of the double cardan universal joint used last year, the rear universal joint of the 1968 Thunderbird is joined to the differential drive pinion by means of a round, flat-faced companion flange and a mating flat-faced surface at the rear of the universal joint. There's a protruding boss in the center of the universal joint mating surface that pilots in a matching recess at the center of the companion flange to maintain alignment of the shaft and pinion.

The two flanges are held together by four bolts in holes spaced so that it is possible to connect the flanges in either of two ways, 180-degrees apart. *Be sure to make matching index marks on both parts before disassembly, and align the marks when you join these parts so you'll retain the original balance.*

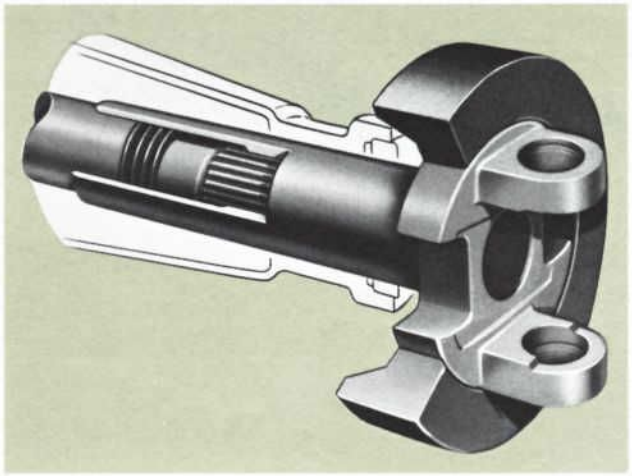
Universal joint bearing replacement: Disassembly and assembly of these new double cardan universal joints is very similar to the procedures for the rear universal joint of the '67 Thunderbird 4-door model. However, there is one feature that you should be aware of. The universal joint spider bearings are originally retained by injection-moulded plastic that is flowed into retaining grooves in the yokes. To remove the bearings, just press them out with tool CJ91B until the plastic snaps away. Then install the new bearings from the universal joint kit and retain them with the new internal snap rings provided.

DRIVE SHAFT INERTIA RING – FORD

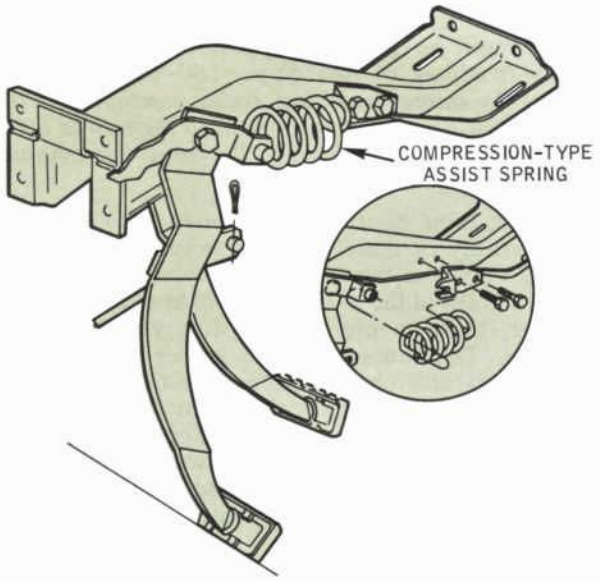
The forward end of the drive shaft for the 1968 Ford incorporates an inertia ring that supplies a flywheel

Q 4-1 b) Too bad! You missed the last sentence in the article on the conical-type differential carrier. *There is no front filler hole in these units,* so there can't be any plug in it!

effect to dampen out undesirable drive train vibration frequencies. Drive shaft servicing procedures are unaffected by this new feature, but be sure to inspect this ring carefully when vibration due to drive shaft unbalance is suspected. Any displacement of metal or foreign deposits around the rim of this ring will have a greater effect on drive shaft balance than would a similar condition elsewhere on the shaft.



Drive Shaft Inertia Ring — Ford



Clutch Pedal Assist Spring Removal — Fairlane, Falcon

Quick-Quiz

Q 5-1 When you overhaul the double cardan universal joints of a '68 Thunderbird, you should remember to:

a) make matching index marks on the rear U-joint flange and the differential companion flange before you remove the drive shaft. (See page 16)

b) remove the spider bearings carefully, since the injection-moulded plastic retainer rings must be reused. (See page 140)

CLUTCH PEDAL ASSIST SPRING — FAIRLANE, FALCON

A new compression-type clutch pedal assist spring is used on Fairlanes and Falcons with manual-shift transmissions. It provides more clearance under the instrument panel than the assist spring previously used. Here's the best way to remove this spring.

Removal

1. Remove the cotter pin from the clutch rod at the pedal lever, and disengage the rod from the lever. *Hang on tightly to the pedal lever when you do this* — the spring will tend to force the pedal upward when the clutch rod is released.
2. Push the pedal down past its over-center position and allow it to rest on the floor.
3. Remove the forward bolt at the assist spring bracket and loosen the rear bolt a turn or two.
4. Use an adjustable wrench or vise grip to turn the spring bracket upward until the spring end slides free of the slot in the end of the bracket.
5. Slip the other end of the spring out of the pedal lever extension.

Installation

1. Slip the end of the spring into the pedal lever extension.
2. Turn the spring bracket down as you fit the other end of the spring into the slot in the bracket.
3. Continue turning the bracket down until you can install the forward bolt. Then tighten both bolts.
4. Pull the clutch pedal up until you can slip the end of the clutch rod into the pedal lever. *Again*

Q 4-2 a) Right! That little garter spring has a big job to do . . . and if you jar it out of place behind the primary seal lip when you drive the seal into the hub, you have to fit it back in place or the seal won't be effective.

be sure you have a firm grip on the pedal lever to prevent it from snapping up beyond its normal position.

5. When the clutch rod is in place in the lever, install a new cotter pin.

CLUTCH PEDAL FREE TRAVEL ADJUSTMENT— FAIRLANE, FALCON, MUSTANG

Clutch pedal free travel — the distance the pedal will move downward before the clutch release bearing contacts the release fingers and begins to move them — must never be under 1/2 inch, measured at the pedal itself. Otherwise, the fingers may contact the bearing continuously, preventing full engagement and leading to early clutch failure. Excessive pedal free travel, on the other hand, may prevent the clutch from disengaging fully when the pedal is depressed. This can lead to transmission problems like synchronizer wear, hard shifting and worn or chipped splines or gear teeth. These are the reasons why precise clutch pedal free travel adjustment is essential.

1968 Adjustment Specifications

Adjustment specifications for 1968 Fairlane, Falcon and Mustang clutch pedal free travel adjustment are changed from the 1967 published specifications. Here's how to make the adjustment.

1. Disconnect the return spring at the clutch release lever and back off the swivel locknut on the release lever rod to give yourself some working room.
2. Then move the release lever backward until you feel the resistance that indicates the release bearing has lightly contacted the clutch release fingers.
3. Insert a 0.178-inch (390 V-8) or 0.136-inch (all other engines) feeler gauge between the rear face of the swivel and the locknut, and tighten the nut fingertight against the gauge.
4. Finally, remove the gauge and torque the second nut to 17-25 ft-lbs while holding the first nut to be sure it doesn't move.

TRUCK

SUSPENDED CLUTCH PEDAL MOUNTING — PARCEL DELIVERY TRUCKS

1968 Ford parcel delivery trucks, both gasoline and diesel versions, have a new suspended clutch pedal mounting. Outside of slight appearance and configuration changes, the main difference from a service viewpoint between this new suspended pedal mounting and most other suspended pedal mountings is the absence of a pedal retracting spring.

GROUP 6

MANUAL SHIFT TRANSMISSION

FORD CAR AND TRUCK

CAR

MINOR CHANGES IN MANUAL-SHIFT TRANSMISSIONS

Virtually no changes of significance to service personnel have been made in the manual-shift transmissions used in 1968 cars. There are a few detail changes in shift linkages, but service procedures are identical to '67 instructions.

All three-speed units are fully synchronized in all forward gears, since the model 2.77 transmission has been dropped from the lineup.

Federal Regulations require that a power train serial number be stamped into the main case of all transmissions. On manual shift transmissions, this serial number will be stamped on the front face of the main case. This number is assigned and stamped by the car assembly plant and has no meaning as far as service identification is concerned.

TRUCK

WARNER T-19 FOUR-SPEED TRANSMISSION

The Warner T-19 four-speed transmission is quite similar to the Warner T-18 that is covered in your 1967 Ford Truck Shop Manual, pages 6-55 to 6-58. Unlike the T-18, however, the new T-19 is synchronized in all four forward speeds. Consequently, you will find a few internal modifications.

T-19 Output Shaft Assembly

The most obvious difference between the output shaft assemblies of the T-18 and T-19 is the large first speed gear on the rear of the T-19 output shaft. There is also an added blocking ring ahead of the gear to synchronize shifts into first speed. A sliding reverse idler gear is also used.

A raised shoulder is formed on the output shaft (instead of a thrust washer and snap ring) just ahead of the second speed gear of the T-19. That means that all components forward of this shoulder must be removed and installed from the front end of the shaft, while all components behind the shoulder must be removed and installed from the rear end of the shaft.

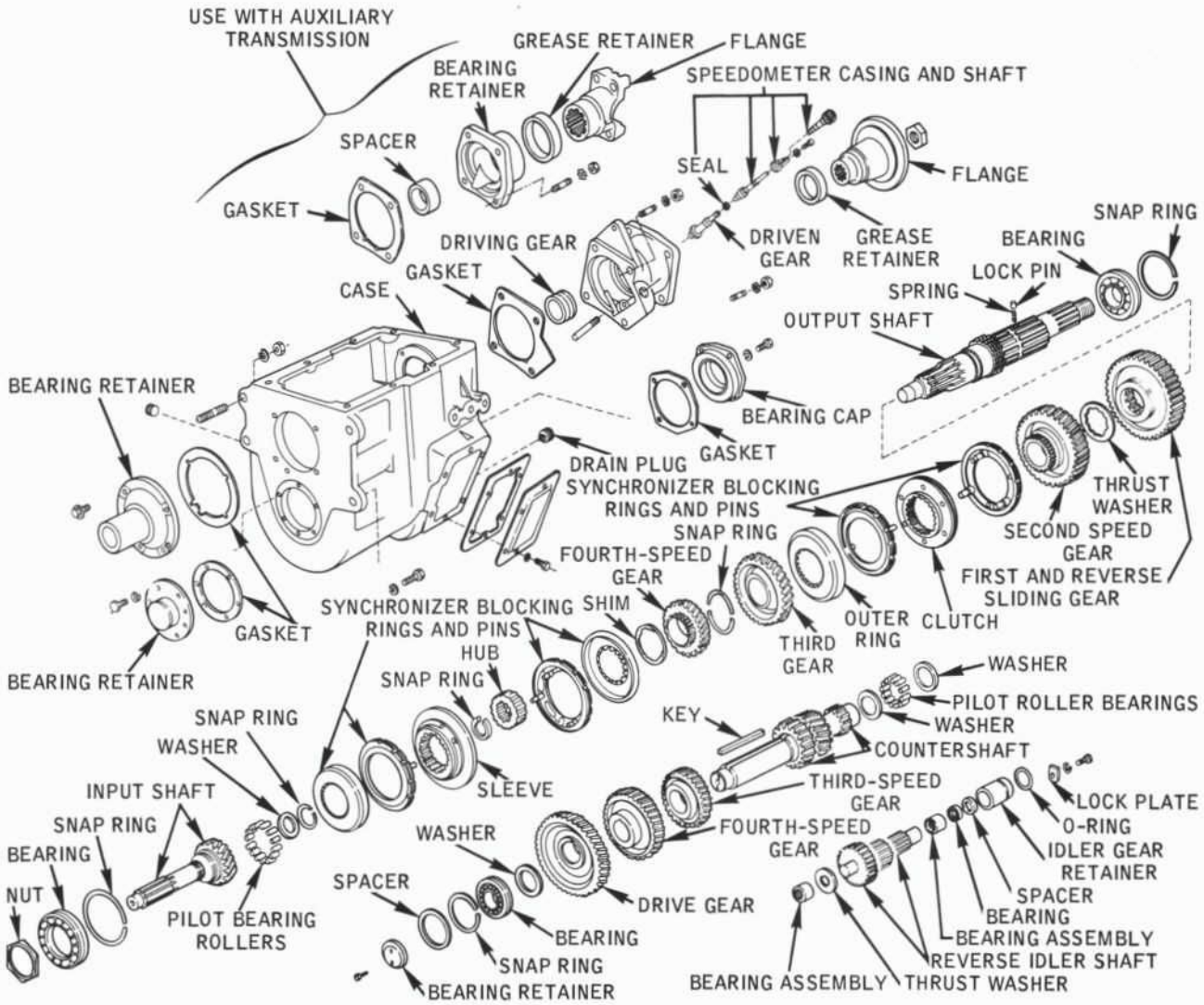
NEW PROCESS 541 FIVE-SPEED TRANSMISSION

The New Process 541-FD and 541-FO five-speed transmissions have been used on previous Ford trucks. Beginning in March, 1966, a number of them were used for a brief interval as alternate units to certain Clark five-speed units in F and B 500 and 600 trucks. However, since these transmissions were not covered in previous shop manuals, the information you'll need to service them is provided here.

Disassembly

1. Shift the transmission into second gear, and remove the gear shift housing bolts. Raise the housing and turn the output shaft to position one of the second and third-speed blocking ring pins directly over the center of the output shaft. While lifting the housing off the case, rotate it slowly in a clockwise direction and tilt it toward the right side of the case.
2. Lock the output shaft by shifting the transmission into two gears, at one time and remove the output shaft nut. Remove the parking brake drum and spline flange. Disconnect the brake actuating lever, and remove the brake shoe assembly. Remove the bearing retainer and the speedometer gear.
3. Remove the input shaft bearing retainer and input shaft bearing retaining nut. *This Nut Has A Left-Hand Thread.* Remove the retaining snap ring from the input shaft bearing outer race and remove the input shaft and bearing from the case. Remove the snap ring and washer retaining the output shaft pilot roller bearings in the input shaft bore and remove the roller bearings.
4. Remove the output shaft bearing. Slide the output shaft toward the rear of the case, and remove the front synchronizer blocking rings and sleeve. Remove the shims from the fourth-speed gear. Remove the output shaft assembly from the case.
5. Remove the reverse idler shaft lock plate, and tap the front of the idler shaft until the retainer can be removed from the case. Remove the thrust bearing from the rear of the shaft and the thrust washer and O-ring from the retainer. Remove the shaft and front bearing from the case.

Q 11-1 c) Uh, uh! Not unless you want to take a trip to the Parts Department for another vacuum control valve! Use your torque wrench on the hex-shaped part of the valve just above the threads — that's what it's there for.



New Process 541 Five-Speed Transmission Disassembled

6. Remove the four countershaft rear bearing and retainer cap bolts. Remove the countershaft front bearing retainer and gasket. Cut the lock wire and remove the bearing inner retainer attaching bolts and retainer. With a drift, drive the countershaft through the front bearing toward the rear, until the countershaft rear bearing and retainer cap comes out of the case. Remove the bearing and cap from the countershaft. Lift the countershaft assembly out of the case. Remove the thrust washer from the front of the countershaft. Remove the countershaft front bearing from the case.

Gear Shift Housing Disassembly

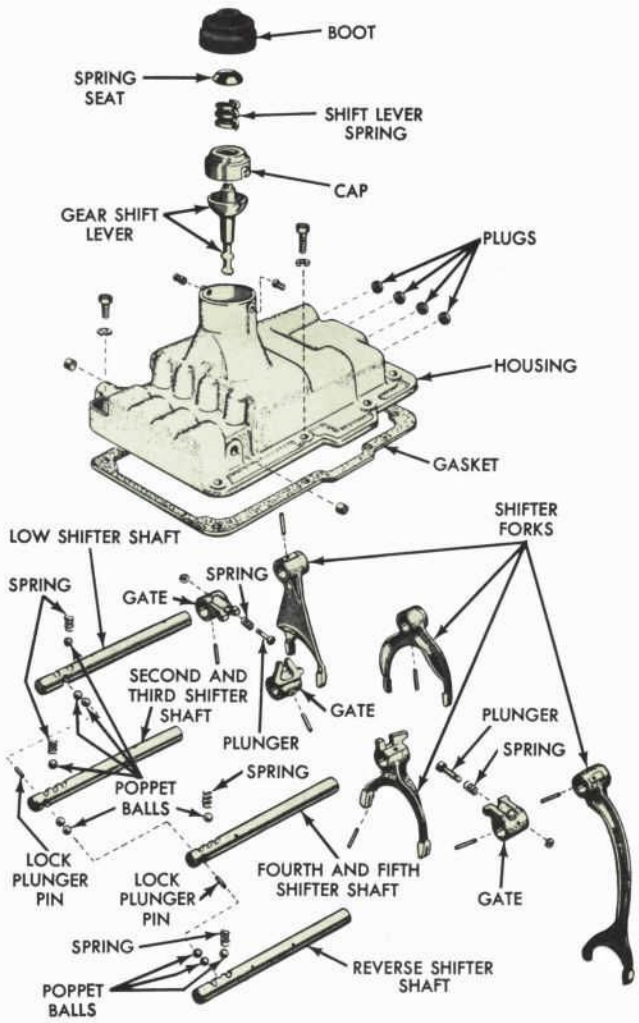
Marking Shifter Fork and Gate — New Process 541 Five-Speed Transmission

1. Mount the housing in a bench fixture or soft-jawed vise. Mark each fork and gate for location at assembly. Shift all the shifter shafts into neutral position.

2. With a punch, drive the four expansion plugs out of the housing.

3. *With a screw extractor,* remove the pins that hold the forks and gates on the shifter shafts.

4. Insert a pin punch in any one of the shifter shaft pin holes and slide the shaft through the rear of the housing. As the shaft clears the front support, catch the detent ball and spring. Mark the end of the shifter shaft to insure proper assembly. The remaining shafts may be removed in the same manner.



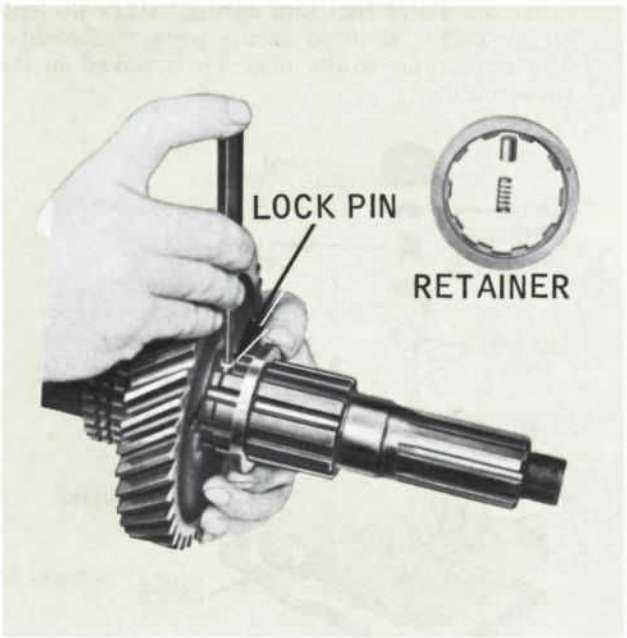
Gear Shift Housing Disassembled — New Process 541 Five-Speed Transmission

Output Shaft Disassembly

1. Remove the snap ring at the front of the output shaft, and remove the synchronizer hub and fourth-speed gear.

2. With a screwdriver, remove the split-type snap ring at the front of the third-speed gear. Remove the gear. Remove the second- and third-speed synchronizer. Slide the low and reverse sliding gear off the rear of the output shaft.

Q 6-2 a) No — but don't feel bad about missing this! It's a tricky question! In actual practice, you'd have found out that the nut had a left-hand thread when you removed it . . . and the left-hand thread was mentioned in "Disassembly."



Removing Second-Speed Gear Thrust Washer — New Process 541 Five-Speed Transmission

3. With a pin punch, depress the spring-loaded lock pin that retains the second-speed gear thrust washer. Rotate the washer one spline tooth, and slide the washer over the depressed pin. Remove the second-speed gear.

Countershaft Disassembly

If any of the countershaft gears are to be replaced, press the gears off the shaft.

Input Shaft Disassembly

If the input shaft bearing is to be replaced, use Tool No. T53T-7065-A to remove the bearing from the shaft.

Cleaning, Inspection, Repair

After the transmission is disassembled, clean and inspect all components. Repair or replace all worn or damaged parts, then assemble the transmission.

Input Shaft Assembly

Press the bearing onto the input shaft. Place the output shaft pilot roller bearings in the input shaft and install the retainer and snap ring.

Countershaft Assembly

Apply lubricant to the gear bores, and press the gears onto the countershaft.

Quick-Quiz

Q 6-1 In the New Process 541 transmission, the second-speed gear thrust washer is retained on the output shaft with:

a) a split-type snap ring. (See page 175)

b) a spring-loaded lock pin in the shaft. (See page 22)

c) a tight press-fit to a shoulder on the shaft. (See page 66)

Removing Input Shaft Bearing — New Process 541 Five-Speed Transmission

Output Shaft Assembly

1. Slide the second-speed gear onto the output shaft. Install the spring and locking pin in the output shaft. Slide the thrust washer over the pin, and rotate the washer to the hole in the pin and spring.
2. Slide the low and reverse sliding gear onto the output shaft, with the fork groove toward the front. Install the second- and third-speed synchronizer with the long hub on the sliding clutch toward the front of the shaft.
3. Install the third-speed gear on the output shaft, with the clutch teeth toward the rear. Install the split-type snap ring.

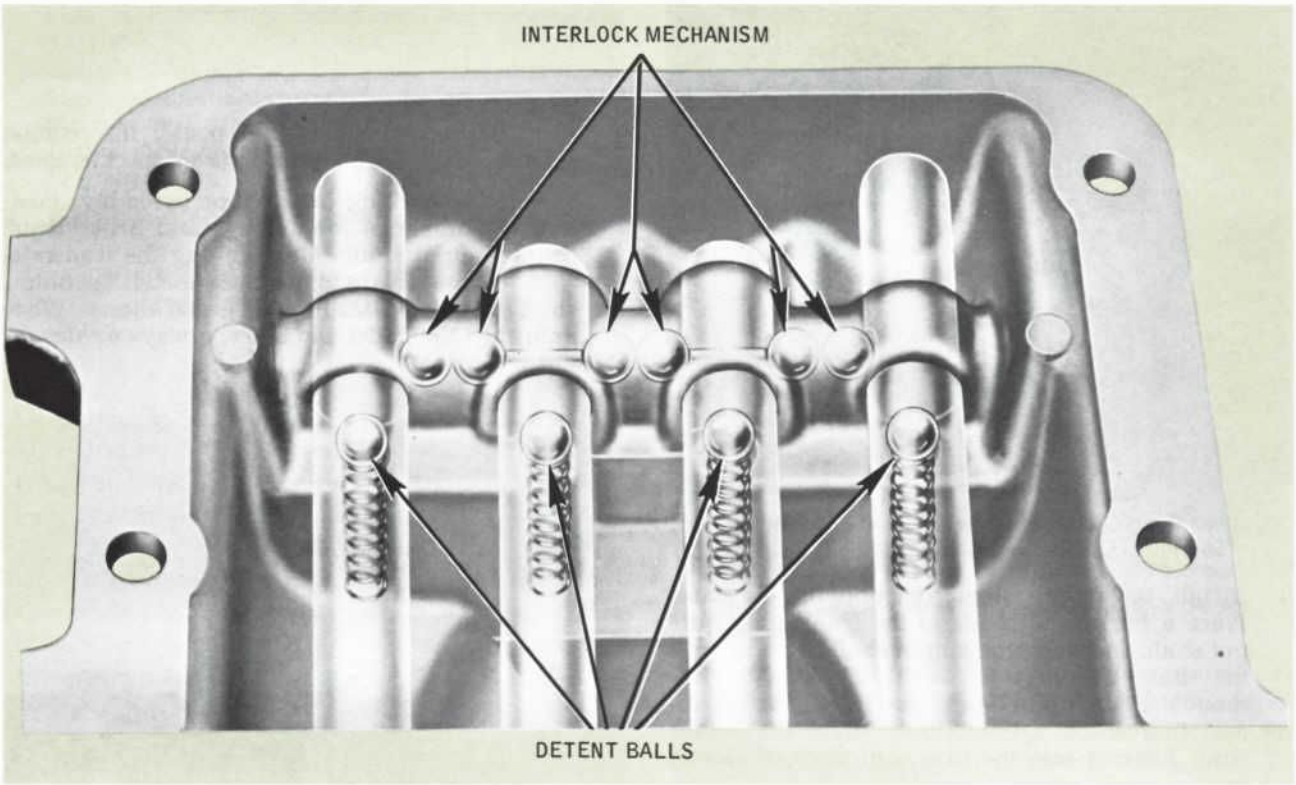
Q 17-2 a) Sorry — you're wrong! All adjusting points for the quarter windows of Fairlane hardtops and convertibles are located under the trim panel . . . and they're kinda hard to reach with the panel in place!

4. Place the fourth-speed gear on the output shaft, with the clutch teeth toward the front. Slide the shims over the fourth-speed clutch teeth. Place the fourth- and fifth-speed synchronizer clutch hub on the output shaft, with the oil slots toward the rear. Install the snap ring that retains the synchronizer hub. Check the clearance between the snap ring and hub. Maximum clearance is 0.003 inch. Replacement snap rings are available in the following thicknesses: 0.086-0.088, 0.089-0.091, 0.092-0.094, 0.095-0.097 inch.

the housing. Expand the plugs with a flat faced bar or punch by striking them in the center.

ASSEMBLY

1. Install the snap ring on the countershaft front bearing outer race, and tap the bearing into the case. Install the front bearing outer retainer without a gasket. Place the thrust washer (spacer) on the front of the assembled countershaft, and place the countershaft in the front bearing. Tap the countershaft from the rear until the thrust



Gear Shift Housing Interlocking System — New Process 541 Five-Speed Transmission

Gear Shift Housing Assembly

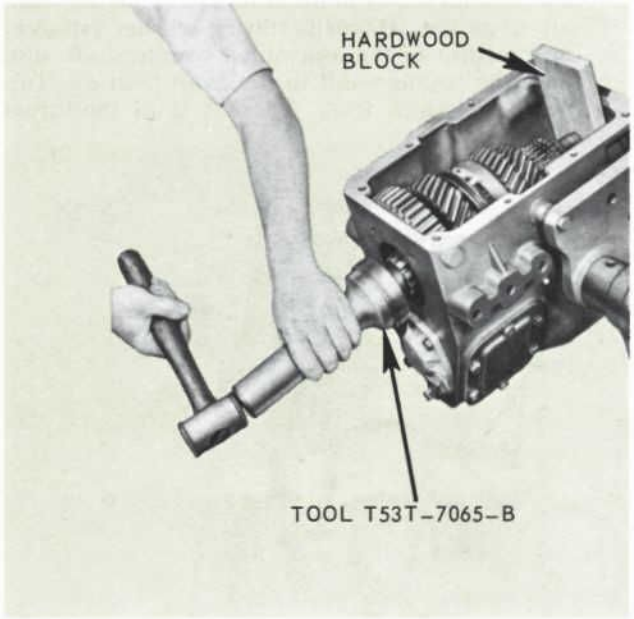
1. Install the reverse shifter shaft detent ball and spring in the housing. Install the reverse shifter shift, fork and gate.
2. Place the interlocking balls in the housing. Install the remaining shifter shafts, forks, gates and detent balls. The interlocking pins must be installed in the center shafts.
3. Check the operation of the interlocking system. Install the retaining pins in the forks and gates.
4. Coat the outer edges of new expansion plugs with an oil-resistant sealer, and install them in washer (spacer) bottoms on the front bearing.

Install the countershaft rear bearing and retainer cap and gasket. Torque the bolts to specifications. Remove the countershaft front bearing outer retainer. Install the inner retainer that holds the countershaft on the bearing inner race. Torque the inner retainer bolts to specifications and install lockwire. Install the front bearing outer retainer and gasket. Tighten the retainer bolts to specifications.

2. Place the idler gear on the idler shaft with the shift fork groove toward the front. Install the thrust washer on the front of the idler shaft with the tang toward the front. Place the shaft and gear in the case, aligning the thrust washer tang with the slot in the case. Install the thrust bearing

Q 6-4 a) Nope! The RT-510 front section countershaft has two-piece bearings, while they are one-piece bearings in the RT-910. And there are *no* mainshaft gear snap rings in the RT-510!

on the rear of the idler shaft and the thrust washer in the rear bearing retainer. Place a new O-ring in the retainer groove. Install the rear bearing retainer, lock and bolt.



Installing Output Shaft Bearing — New Process 541 Five-Speed Transmission

3. Install the output shaft assembly in the case. Place a hardwood block at the front of the output shaft, and drive the output shaft bearing onto the shaft, using Tool No. T53T-7065-B. Remove the hardwood block, and install the fourth- and fifth-speed synchronizer. Drive the output shaft bearing into the case with the tool shown in illustration above.
4. Using a driver, install the input shaft and bearing in the case. Shift the transmission into two gears, at one time and install the bearing attaching nut. Stake the nut. Install the input shaft bearing retainer without a gasket. Tighten the retainer bolts only enough to bottom the retainer on the bearing snap ring. With a feeler gauge, check the clearance between the bearing retainer and case. This clearance should be 0.003-0.006 inch.

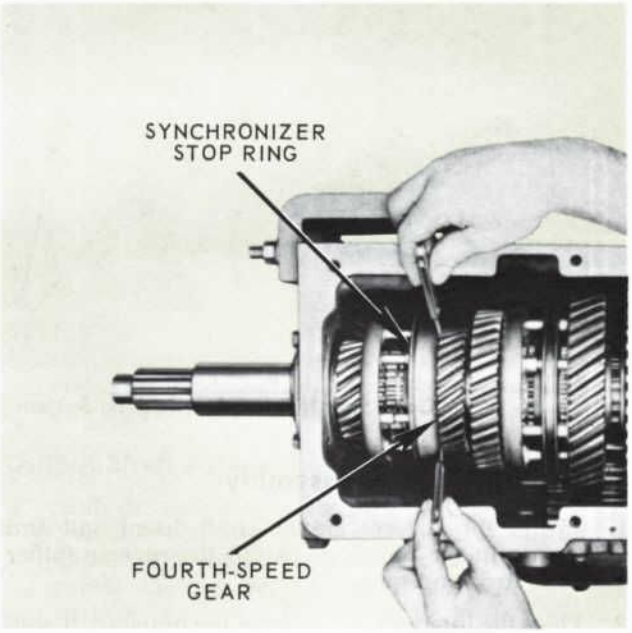
   Remove the retainer, and select a gasket pack which will insure a seal at the outer edge of the retainer, and at the same time eliminate end play between the retainer and bearing outer race snap ring. Torque the bolts to specifications.
5. Install the spacer and speedometer gear on the output shaft. Place a new gasket on the output shaft bearing retainer, and install the retainer on the case. Torque the bolts to specifications.
6. Install the parking brake shoe assembly. Position the universal joint flange and brake drum on the output shaft. After shifting the transmission into two gears at one time, install the output shaft nut and torque to specifications. When lining up the cotter pin holes, always *tighten* the nut.

Quick-Quiz

Q 6-2 The input shaft bearing attaching nut (see step 4 on this page) of the New Process 541 transmission has:

a) right-hand threads. (See page 47)

b) left-hand threads. (See page 69)



Checking Synchronizer to Fourth-Speed Gear Clearance — New Process 541 Five-Speed Transmission

7. Shift the transmission into fourth gear. With two feeler gauges, check the clearance between the fourth-speed synchronizer outer ring and the fourth-speed gear (see illustration above). Position the synchronizer so that one pin is directly

Q 2-1 b) Nice goin' . . . you're right! The light car stabilizers are different than those of the larger cars, as shown in the first illustration in the brake group. Pays to study the pictures, too . . . doesn't it?

above the center of the output shaft, and do not rock the synchronizer while making this check. If the clearance is not between 0.050 and 0.070 inch, change the shim which was installed on the front side of the fourth-speed gear. Shims are available in the following thicknesses: 0.009-0.011, 0.014-0.016 inch.

8. Shift the second- and third-speed synchronizer into second gear. Shift all other gears into neutral. Shift the second- and third-speed shifter fork into second gear. Place a new gasket on the gear shift housing, and install the housing on the case. *There are two special bolts that fasten the gear shift housing to the case. They are locating bolts and are installed, one on each side of the housing at the second hole from the front. Install these and the remaining bolts, and torque to specifications.*
9. Install and adjust the parking brake assembly.

TORQUE LIMITS – NEW PROCESS 541 FIVE-SPEED TRANSMISSION

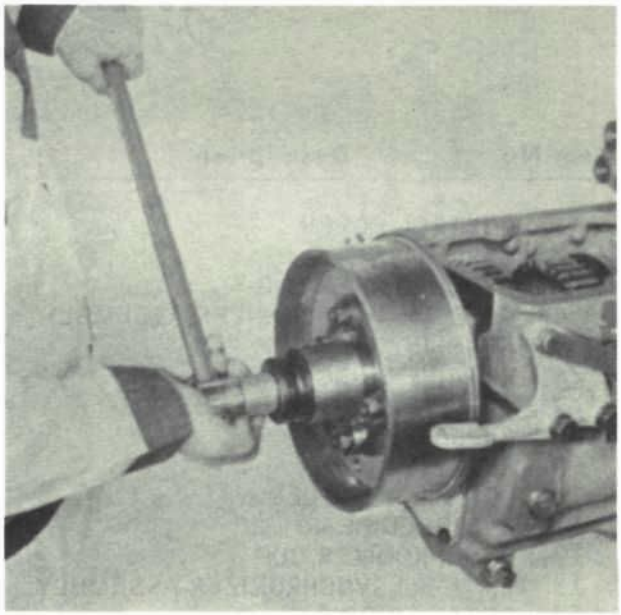
Part Name	Ft-Lbs
Clutch Housing Stud Nuts	90-95
Clutch Housing Bolts (to Transmission)	85-90
Output Shaft Bearing Retainer Bolts	25-35
Input Shaft Bearing Retainer Bolts	25-30
Gear Shift Housing Bolts	18-25
Gear Shift Lever Housing Bolts	35-40
Countershaft and Idler Shaft Retainer Bolts	18-25
Output Shaft Nut	225-275
Cross Shaft Housing Bolts	40-45
Shift Gate Plunger Retainer	–
Countershaft Rear Bearing Retainer Bolts	25-30
Countershaft Front Bearing Inner Retainer Bolts	20-25
Countershaft Front Bearing Outer Retainer Bolts	25-30
Reverse Idler Shaft Retainer Bolt	18-25
Countershaft Rear Bearing Nut	275-325
Rocker Arm Pivot Bolt	100-115
Parking Brake Lever Sector Bolts	35-40
Parking Brake Drum Mounting Bolts (or Nuts)	70-75

CLARK 280-V SERIES FIVE-SPEED TRANSMISSIONS

Clark 280-VO, 282-V and 285-V five-speed transmissions include a number of features different from other Clark units used on recent Ford trucks. Shift rods are retained in a separate support assembly under the transmission case cover. An external band parking brake is used on the output shaft. Slightly cone-shaped stop-ring cups are used with the pin-type synchronizers to give a smooth shift action.

Disassembly Tips

The exploded view of the 280-V series transmission will serve as a general guide to disassembly. Many components of this transmission series are quite similar to other Clark five-speed units, and should give you no unusual problems. Just observe the same precautions you would with any similar unit. In addition, here are some details peculiar to the 280-V series transmissions.



Shift Rod Support Assembly – Clark 280-V Series Transmissions

After removing the shift lever or remote control assembly and the shift rod cover, the shift rods, forks and support assembly can be removed as an assembly.

After removing the parking brake band, lock the transmission in two gears and remove the brake drum and companion flange as a unit.

When removing the input shaft, be careful not to dislodge the mainshaft pilot bearing rollers. After removing the input shaft and mainshaft rear bearing, the entire mainshaft assembly can be lifted out as a unit.

After removing the mainshaft first- and-reverse sliding gear, support the remainder of the mainshaft assembly vertically, forward end up, in a soft-jawed vise or appropriate holder and remove the gears, sleeves, synchronizers, washers and retaining snap rings. As you remove each part, note its position for reference in assembly.

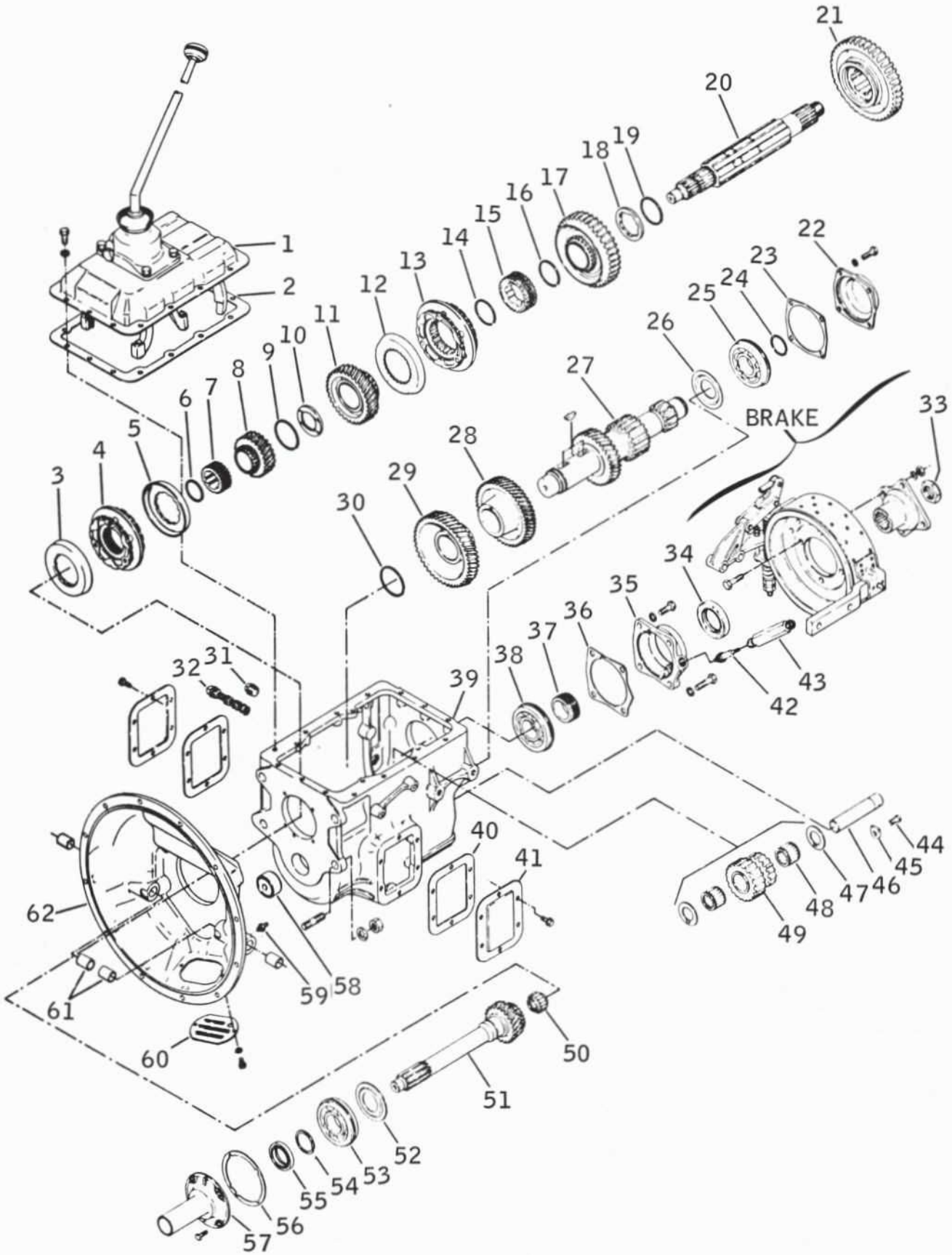
In the shift rod support assembly, the 2nd-3rd shift fork and the 4th-5th shift fork are retained to their shift rods by roll pins, which must be driven out with

Q 1-2 a) That's the answer! And you'll find some useful service instructions for these new five-speed Clark and New Process transmissions — plus other new units — included in Group 6 of his handbook.

280V-SERIES TRANSMISSION

Item No.	Description
1	CONTROL COVER
2	GASKET
3	SYNCHRONIZER CUP
4	4th & 5th SYNCHRONIZER ASSEMBLY
5	SYNCHRONIZER CUP
6	RETAINER RING
7	4th & 5th SHIFT HUB SLEEVE
8	4th SPEED GEAR
9	RETAINER RING
10	LOCATING WASHER
11	3rd SPEED GEAR
12	SYNCHRONIZER CUP
13	2nd & 3rd SYNCHRONIZER ASSEMBLY
14	RETAINER RING
15	2nd & 3rd SHIFT HUB SLEEVE
16	RETAINER RING
17	2nd SPEED GEAR
18	WASHER
19	RETAINER RING
20	MAINSHAFT
21	1st SPEED GEAR
22	COUNTERSHAFT REAR BEARING CAP
23	GASKET
24	RETAINER RING
25	COUNTERSHAFT REAR BEARING
26	OIL SLINGER
27	COUNTERSHAFT
28	COUNTERSHAFT 4th SPEED GEAR
29	COUNTERSHAFT DRIVE GEAR
30	RETAINER RING
31	FILLER PLUG

Item No.	Description
32	MAGNETIC DRAIN PLUG
33	FLANGE NUT
34	MAINSHAFT REAR OIL SEAL
35	MAINSHAFT REAR BEARING CAP
35A	SPEEDOMETER DRIVEN GEAR BUSHING
36	GASKET
37	SPEEDOMETER DRIVE GEAR
38	MAINSHAFT REAR BEARING
39	CASE
40	GASKET
41	P.T.O. COVER PLATE
42	SPEEDOMETER DRIVEN GEAR
43	SPEEDOMETER TUBE NUT
44	REVERSE IDLER SHAFT LOCK SCREW
45	REVERSE IDLER SHAFT LOCK
46	REVERSE IDLER SHAFT
47	THRUST WASHER
48	BEARING
49	REVERSE IDLER GEAR
50	BEARING
51	MAIN DRIVE GEAR
52	OIL SLINGER
53	BEARING
54	RETAINER RING
55	OIL SEAL
56	GASKET
57	CAP
58	COUNTERSHAFT PILOT BEARING
59	PEDAL SHAFT GREASE FITTING
60	CLUTCH HOUSING INSPECTION PLATE
61	CLUTCH PEDAL SHAFT BUSHING
62	CLUTCH HOUSING



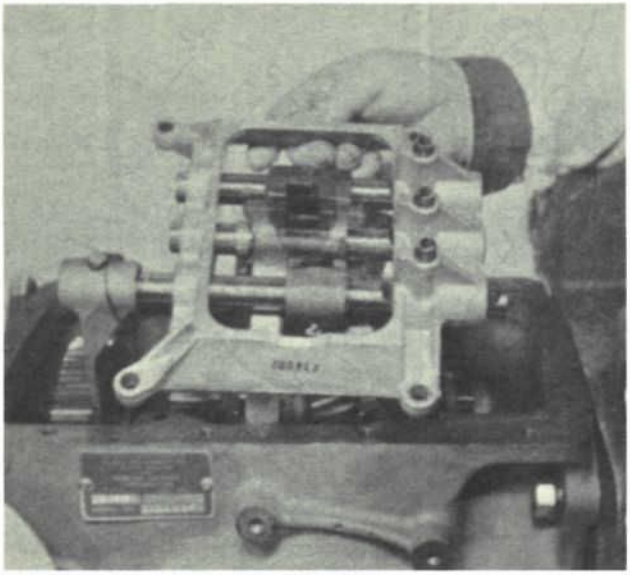
Clark 280-V Series Five-Speed Transmission Exploded View

a small drift or pin before the rods and forks can be removed from the support. Don't lose the interlock cross pin or 2nd speed overshift spacer during disassembly.

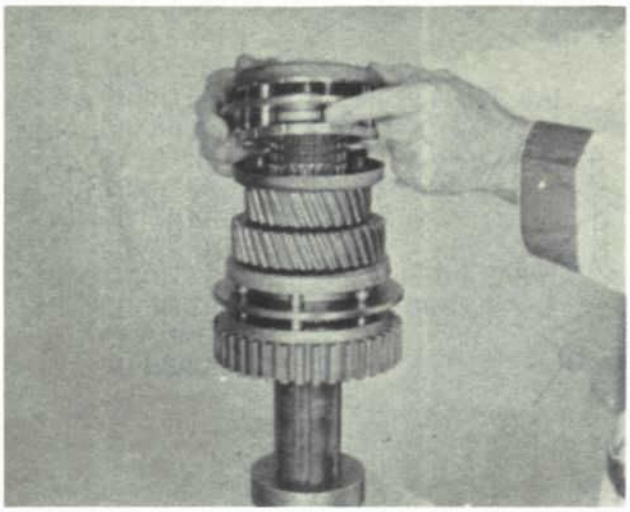
Assembly Tips

After cleaning and inspecting all components, and repairing or replacing all defective parts, the transmission can be *assembled in the reverse order of disassembly.* Watch for these items.

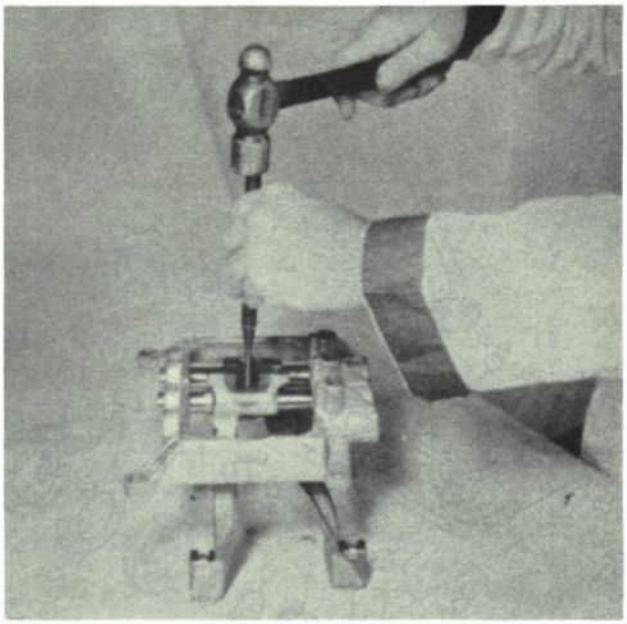
After you install the 1st-reverse lug lockscrew when assembling the shift rod support assembly, don't forget to lockwire it to prevent loosening.



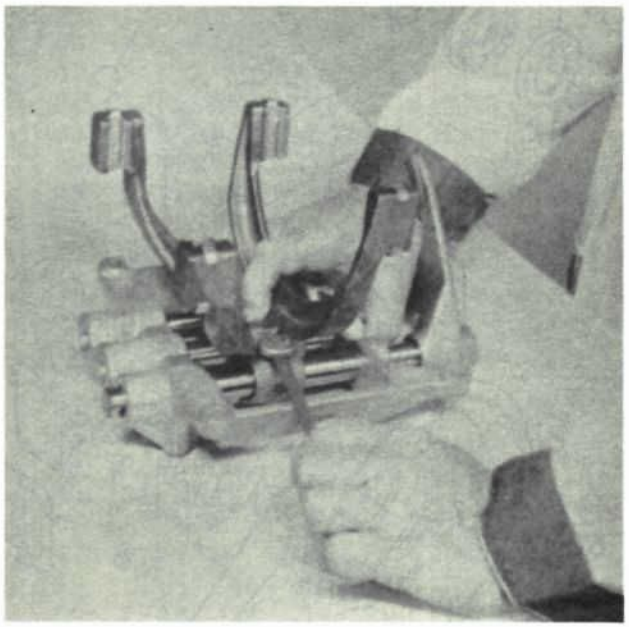
Removing Brake Drum and Companion Flange — Clark 280-V Series Transmissions



Removing 4th-5th Synchronizer — Clark 280-V Series Transmissions

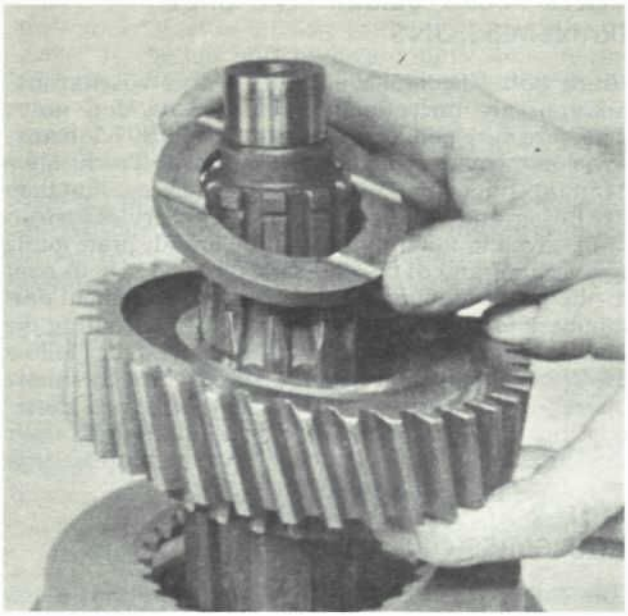


Removing Shift Fork Roll Pin — Clark 280-V Series Transmissions



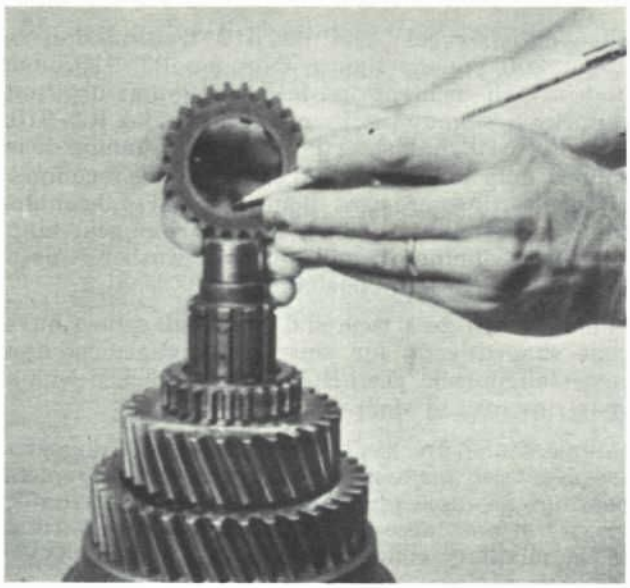
Installing 1st-Reverse Lug Lockscrew — Clark 280-V Series Transmission

Q 3-3 b) You missed one! A collapsed shaft in any fixed column can be pulled out to its original length. But if there's any other damage that would affect safety or operation, the entire column assembly must be replaced.



Installing 3rd Speed Gear and Locating Washer — Clark 280-V Series Transmissions

Install the 2nd speed gear and the 3rd speed gear with clutching teeth facing toward each other, separated by the shift hub sleeve.



Installing 4th-5th Shift Hub Sleeve — Clark 280-V Series Transmissions

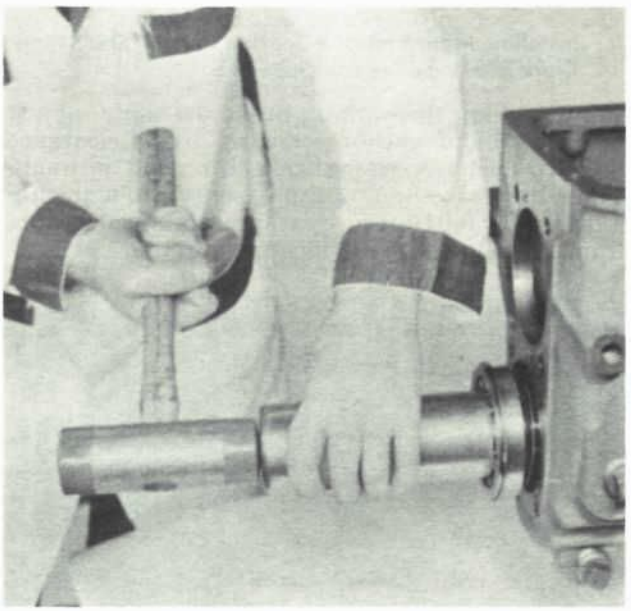
After installing the 4th speed gear, clutching teeth toward the front of the mainshaft, install the bottom cup of the synchronizer to the clutching teeth. Then install the 4th-5th shift hub sleeve with the chamfered ends of its inner splines toward the 4th speed gear.

Quick-Quiz

Q 6-3 When installing a *new* mainshaft pilot bearing in a Clark 280 V-8 series transmission:

a) slide the assembled bearing from the plastic sleeve into the input shaft bore. (See page 145)

b) stick the rollers in the bearing cage with grease and install the bearing. (See page 80)



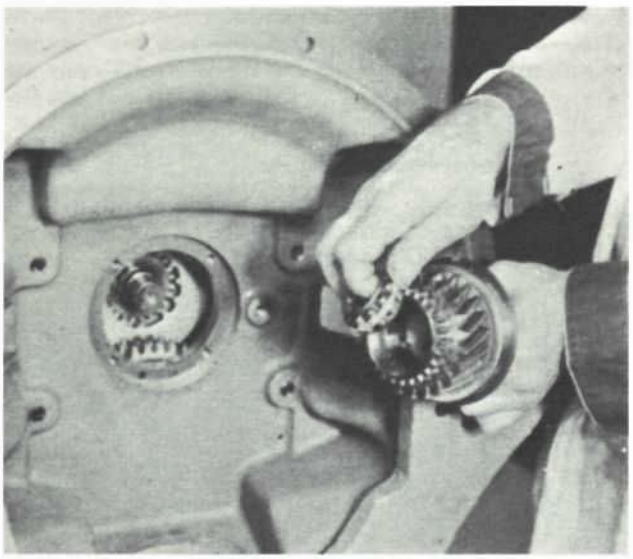
Installing Rear Countershaft Bearing — Clark 280-V Series Transmissions

When driving the rear countershaft bearing into its bore in the case, support the countershaft drive gear with a 1/4-inch flat bar on each side to prevent damage to the countershaft pilot bearing.

To install the old mainshaft pilot bearing, set the rollers in the bearing cage and hold them in place with a rubber band.

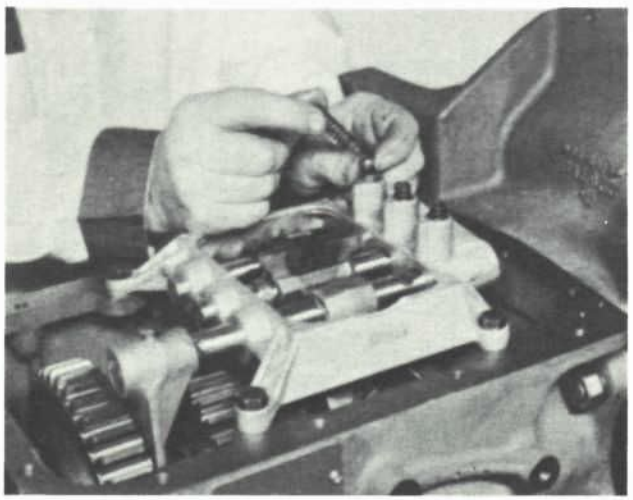
Slide the bearing rollers and cage as a unit from the rubber band into the bearing bore in the input shaft. (New bearings are enclosed in a plastic sleeve. Slide them from the sleeve into the bore.)

Q 1-1 a) Pretty close . . . but not right! The 65 series body codes indicate the *formal roof* 2-door hardtop. And the Torino GT in the picture is a *fastback*. Go back and try again.



Installing Mainshaft Pilot Bearing in Input Shaft — Clark 280-V Series Transmissions

After installing the parking brake assembly, adjust the brake band anchor screw to give a clearance of 0.010 inch between the brake drum and the band. Adjust the brake band locating screw and adjusting bolt to give 0.010 inch clearance around the entire drum. Then lockwire the anchor clip screw.



Installing Shift Mesh Lock Balls and Springs — Clark 280-V Series Transmissions

Shift the transmission into neutral before installing the shift rod support assembly. After the assembly is installed, place the three mesh lock balls and springs in the support housing. They will be retained by the shift support cover.

CLARK 380-V SERIES FIVE-SPEED TRANSMISSIONS

Clark 380-VO, 385-V and 387-V five-speed transmissions are a new family of extra heavy duty units. They are very similar to the 305-V and 307-V transmissions covered in the 1967 Ford Truck Shop Manual, pages 6-94 through 6-99, except that they are larger and have greater capacity. Service instructions given in that manual will be an adequate guide to overhaul any of the 380 series, but be sure to refer to the parts manual for the proper replacement part numbers for these bigger units. When installing the mainshaft pilot bearing in the input shaft, follow the instructions given in this group for the same operation on the Clark 280-V series five-speed transmission. The 380-V series bearing, although larger than the 280-V series bearing, is of the same design.

FULLER RT-510 TEN-SPEED TRANSMISSION

The Fuller RT-510 ten-speed transmission is a new unit, very similar to the RT-910 units covered in last year's Ford Truck Shop Manual, Volume One. However, the RT-510 is lighter and has a lower torque capacity than the RT-910. This new transmission may be used with the 477 and 534 super duty gasoline engines, and Cummins and Caterpillar mid-range diesel engines.

RT-510 Comparison with RT-910

Design differences: The RT-510 transmission is about 200 pounds lighter than the RT-910 units and is 7/16-inch shorter. It has a 12-pint lubricant capacity — slightly less than half that of the RT-910. The RT-510 mainshaft is fixed, not floating. It is splined only in the gear and sliding clutch locations. Needle bearings are used at the pilot end of the mainshaft and auxiliary mainshaft. Mainshaft gear snap rings are eliminated, and only one washer is used to hold the gear axial positions.

Sliding clutch gear teeth and mainshaft splines have cone-shaped ends for smoother engagement and easier alignment. The drive gear is attached with a snap ring instead of a nut.

Countershafts are stepped with the larger diameter to the rear to make gear pressing easier. Two-piece bearings are used on the front section countershafts, instead of one-piece bearings. And the front portion of the auxiliary countershafts act as idler shafts for the reverse idler gears.

Air system: The RT-510 air system control valve and slave valve are the same as those of the RT-910, as are the air regulator and filter assembly. The air valve is installed on the right side of the transmission with the supply port to the front and the end

Q 3-5 b) Definitely not! The compensating shackle feature has its own job to do — giving a more carlike feel to the ride of our conventional pickup trucks — and it does this very well. But an anti-shimmy device? Not hardly!

cap to the rear, breather up. The side port nearest the supply port is the low range port which is connected to the top port in the auxiliary shift cylinder. The high range port is the side port nearest the end cap. It is connected to the port in the cover of the auxiliary shift cylinder. The end cap of the air valve is connected to the "Out" port of the control valve.

The air filter and regulator assembly is mounted on the left side of the transmission with the air regulator to the rear. The regulator output port is up and the exhaust port faces away from the transmission.

Transmission Disassembly

Despite its strong resemblance to the heavier RT-910 units, the recommended disassembly procedure for the Fuller RT-510 transmission is different from that of the RT-910.

1. Remove the range shift air system (the air regulator and filter assembly, the control valve, the air valve and connecting lines).
2. Remove the gear shift lever housing and shifting bar housing. If desired, the shift lever housing and control valve can be removed as a unit by turning out the four cap screws which attach the housing to the transmission.
3. Lock the transmission in two gears and remove the universal joint flange.
4. Remove the auxiliary section from the front section.
5. Remove the clutch housing from the front section.
6. Remove the left reverse idler gear assembly from the main transmission:
   a. Use a curved pry bar to walk the bearing from the idler bore in the case.
   b. Remove the rear idler washer and holder from the bore.
   c. Remove the bearing from the reverse idler gear and remove the gear and washer from the case.
7. Remove the auxiliary drive gear assembly:
   a. Remove the needle pilot bearing from the bore in the rear of the mainshaft.
   b. Remove the snap ring from the mainshaft in the bore of the auxiliary drive gear.
   c. Pull the drive gear from the splines of the mainshaft.
8. Remove the input shaft:
   a. Remove the four front bearing cover cap screws and move the drive gear and input shaft forward from inside the case to break the gasket seal.

Quick-Quiz

Q 6-4 Fuller RT-510 and RT-910 ten-speed transmissions use the same design of:

a) front section countershaft bearings and mainshaft gear snap rings. (See page 49)

b) air system control valve, slave valve, air regulator and filter. (See page 86)

   b. Remove the front bearing cover.
   c. Remove the snap ring from the input shaft.
   d. Hold the shaft in position and tap the drive gear forward toward the front of the case as far as possible to unseat the front bearing.
   e. Use a bearing puller of the proper size to remove the bearing.
   f. Remove the drive gear washer and snap ring.
   g. Pull the shaft forward, out of the drive gear.
   h. Remove the pilot needle bearing from the front of the mainshaft.
   i. Move the drive gear rearward over the sliding clutch and against the fourth speed gear.
9. Remove the bearings from the right countershaft:
   a. Remove the bearing retaining snap ring from the slot in the rear bore of the case.
   b. Move the countershaft forward until the groove in the front bearing is clear out of the case.
   c. Use an approved bearing puller to remove the bearing from the countershaft.
   d. Remove the rear countershaft bearing from the bore in the case. If necessary, tap the bearing lightly from inside the case or move the countershaft rearward against the bearing.
10. Remove the mainshaft and countershafts:
   a. Block the right countershaft to the right as far as possible and lift the mainshaft from the case.
   b. Remove the right countershaft from the case.
   c. Remove the left countershaft bearings in the same manner that you removed the bearings from the right countershaft.
   d. Remove the left countershaft from the case.

Q 14-2 b) Would you believe . . . that's wrong? There *was* a solenoid-actuated starter used on some truck engines in '65, but not an Autolite unit. So don't confuse 'em — they're two different breeds!

11. Remove the right reverse idler gear assembly in the same manner as you removed the left reverse idler gear (Step 6).
12. Disassemble the mainshaft assembly:
    a. Remove the drive gear and small clutch gear from the front of the mainshaft.
    b. Remove the small fourth speed gear key from the slot in the mainshaft, align the fourth speed gear washer with the mainshaft splines and remove the gear and washer.
    c. Pull the long key from the mainshaft to free the interlock washers. Align the washers with the mainshaft splines and remove the gears, washers and sliding clutches.
13. Disassemble the countershaft assemblies:
    a. Disengage the snap ring from the groove in front of the countershaft and allow it to remain on the shaft between the groove and the bearing shoulder.
    b. Press the drive gear from the shaft, removing the gear, snap ring and front bearing inner race. *All gears must be pressed off the forward end of the shaft because the countershaft is stepped with the larger diameters to the rear.*
    c. Press the fourth speed gear, PTO and third speed gear, second speed gear, first speed gear and reverse gear from the shaft, in that order.
    d. Disengage the rear snap ring from the groove in the shaft and move it against the inner race of the rear bearing.
    e. Use an approved puller or a hand press to remove the snap ring and bearing inner race from the shaft.
    f. Remove the three long keys from the shaft only if necessary.
14. Remove the rear bearing cover from the auxiliary section of the transmission, and remove the speedometer gear and washer from the tailshaft.
15. Remove the auxiliary countershafts:
    a. From inside of the case, use a long punch to move the outer race of the countershaft rear bearings to the rear about one-half inch.
    b. Pull the countershaft assemblies forward and out of the case.
16. Disassemble the auxiliary countershaft assemblies by pulling the bearing inner race from the rear of the shaft and pressing the drive gear forward and off the shaft. Remove the key from the countershaft only if necessary.

Transmission Reassembly

After inspecting the components of the transmission as outlined in the 1967 Shop Manual and replacing or repairing damaged parts, assemble the transmission. Always use new gaskets.

1. Install the low speed gear and tailshaft assembly in the auxiliary section:
    a. Be sure the magnetic cleaner is installed in the recess in the auxiliary case.
    b. Place the splined spacer in the hub of the low speed gear, shoulder to the rear of the gear.
    c. Install the low speed gear and spacer over the rear of the shaft and against the shoulder, with the recessed side of the gear to the front.
    d. Fit the low speed gear washer on the shaft and against the gear, chamfer to the rear.
    e. Mark timing teeth on the low speed gear in this manner. Mark any two adjacent gear teeth on the low speed gear, then mark the two adjacent teeth directly opposite the first set marked. There should be the same number of teeth between the markings on each side of the gear.
    f. Set the forward end of the tailshaft on a one-inch wood block and place the auxiliary housing over the rear of the shaft so that the shaft extends through the rear bore.
    g. Seat the mainshaft rear bearing on the shaft and in the bore. Be sure the washer between the bearing and the low speed gear is tight.
2. Install the range shift air cylinder.
3. Install the synchronizer assembly and range shift air piston:
    a. Assemble the synchronizer assembly as described on page 6-133 of the 1967 Ford Truck Shop Manual.
    b. Install the shifting yoke on the piston shaft with the fork towards the threaded end.
    c. Align the slots in the shaft with the bores in the yoke hub and install the two lockscrews, securing them with safety wire.
    d. Place the yoke in the slot of the sliding clutch, with the threaded end of the piston shaft towards the larger low range synchronizer.
    e. Place the entire assembly into the auxiliary housing, threading the splined sliding clutch on the tailshaft and inserting the shaft through the cylinder bore.
    f. Install the brass washer on the threaded end of the shaft.

Q 3-2 a) Not so! If the cylinders inflate as they should when the valve sends compressed air to them, and then they leak down, there's a strong possibility that one or both may be leaking.

g. Install the O-ring on the piston, then install the piston on the shaft and against the brass washer, flat side of the piston out.

h. Install the elastic stop nut on the shaft.

i. Lightly coat the cover gasket with Permatex sealer and install the cylinder cover, tightening the four cap screws securely.

4. Install the two countershafts:

a. Install a Woodruff key in the countershaft and press the drive gear on the countershaft, long hub to the rear.

b. Install the snap ring in the front of the countershaft and the bearing inner race on the rear of the countershaft.

c. Mark the tooth on the countershaft low speed gear which is aligned with the keyway in the drive gear. This gear tooth will be stamped with an "O."

d. Place the two countershafts into position in the auxiliary housing, meshing the marked low speed gear tooth on each countershaft between a set of marked gear teeth on the low speed gear.

e. Holding the countershafts in position, install the outer races of the countershaft rear bearings on the shafts and into the case bore. Seat the races securely.

5. Install the speedometer parts and rear bearing cover:

a. Install a new oil seal in the rear bearing cover with the lip of the seal to the rear.

b. Install the speedometer gear rear washer on the tailshaft and against the bearing with the chamfered inner diameter of the washer towards the bearing.

c. Install the speedometer gear (or replacement spacer) on the shaft against the washer.

d. Install the rear bearing cover with the speedometer bore up and to the left. Tighten the cap screws securely.

6. Install the right reverse idler gear assembly in the front section of the transmission:

a. Install the smaller front washer for the reverse gear on the pin in the lower right part of the case. Be sure the oil slots are outward to face the gear.

b. Set the reverse gear in position next to the washer with the long hub to the rear.

c. Install the needle bearing through the rear bore and into the hub of the reverse gear.

Quick-Quiz

Q 6-5 To install gears on an RT-510 front section countershaft, they must be pressed on, one at a time:

a) from the front of the shaft. (See page 68)

b) from the rear of the shaft. (See page 23)

c) from the end of the shaft nearest the gear position. (See page 119)

d. Fasten the rear washer in its holder (if previously removed), oil slot down. Place the washer and holder assembly into the reverse gear case bore with the oil slots towards the gear.

e. Install the auxiliary countershaft front bearing into the reverse gear case bore to hold the reverse idler gear assembly in position until the front and rear sections of the transmission are mated. The front portion of each auxiliary countershaft serves as the journal for its related reverse idler gear.

7. Install the countershaft assemblies:

a. Install the three Woodruff keys in the countershaft, a 4 inch key in the center of a 3-inch key at each end. Be sure the snap ring grooves at each end of the shaft are clear.

b. Install the snap ring in the groove at the rear of the countershaft, identified by the smaller diameter bearing journal and narrower shoulder between the groove and journal.

c. Press the gears on the shaft *from the front of the shaft*, one at a time, in the following order: reverse gear (tight against the snap ring, long hub towards the front of the shaft); second gear (long hub to the rear of the shaft); power take-off gear ("bullet nosed" teeth towards the front of the shaft); third speed gear (long hub towards the front of the shaft); fourth speed gear (long hub towards the front of the shaft); and fifth speed gear (long hub to the rear of the shaft).

d. Install the snap ring in the groove at the front of the shaft.

e. Install the bearing inner races on the front and rear of the shaft.

f. On the drive gear of each countershaft, mark the gear tooth which is aligned with the keyway. This tooth will be stamped with an "O."

Q 18-1 b) That's wrong! You can adjust the left guide rod of the manually adjustable headrest only vertically . . . and a bind usually means that a horizontal adjustment's needed! You can make this adjustment at the *right* guide rod.

g. Place the two countershaft assemblies into position in the forward section case, *but do not install the bearings yet.*

8. Assemble the mainshaft assembly:

a. Place the mainshaft in a soft-jawed vise with the smaller pilot end down. Keep the keyway free for insertion of the long Woodruff key. Parts are to be assembled on the large diameter portion of the shaft first, starting with the second speed gear position. The wide splined areas of the mainshaft are sliding clutch locations and the narrow splined areas are gear locations. The second speed gear location is the third narrow splined area from the pilot end of the mainshaft.

b. Install the second speed gear washer to the second speed gear location. Insert the long Woodruff key from the bottom just far enough to lock this washer in position.

c. Install the second speed gear on the splined washer, clutch teeth down.

d. Install the first speed gear on the shaft with its hub against the second speed gear and the clutch teeth up.

e. Insert the splined washer in the hub of the first speed gear and under the mainshaft splines. Align the washer slot with the keyway and move the Woodruff key up to lock the washer in position.

f. Install the first-reverse sliding clutch and align the slot in the clutch with the keyway.

g. Install the reverse gear splined washer in the second groove from the rear of the shaft. Align the washer slot with the keyway and move the Woodruff key up to lock the clutch and washer.

h. Install the reverse gear on the splined washer and install the rear reverse gear washer with its flat side towards the gear. Secure the washer with the key.

i. Remove the assembly from the vise and place the shaft on the bench with the pilot end up.

j. Install the second-third sliding clutch gear over the front of the shaft, aligning it with the key.

k. Install the third speed gear splined washer so the face of the washer is flush with the large diameter shoulder of the shaft.

l. Pull the long Woodruff key up just far enough to align the washer slot with the key and reinstall the key to lock the third speed gear washer.

m. Install the third speed gear on the splined washer, clutch teeth down.

n. Install the fourth speed gear with its hub against the third speed gear.

o. Install the splined washer, aligning the slot with the keyway. Secure it with the short Woodruff key, fitting the pin through the key and into the bore in the mainshaft. (In some models, the fourth speed gear is secured with a snap ring in the mainshaft rather than with a splined washer and short key.)

p. Install the fourth-fifth sliding clutch, engaging it with the fourth speed gear.

9. Install the mainshaft assembly:

a. Mark any two adjacent teeth on the drive gear, then mark the two adjacent teeth which are directly opposite the first set marked. There should be the same number of teeth between the markings on each side of the gear.

b. Install the drive gear on the mainshaft and move it against the fourth speed gear.

c. Move the right countershaft to the right in the case as far as possible. Place the mainshaft assembly in position in the case and block up the front of the shaft to center it in the front bore.

d. Install the rear bearing on the mainshaft and in the case bore. Seat the bearing securely.

e. Install the pilot bearing on the front of the mainshaft.

f. Install the input shaft to the splines of the drive gear until the snap ring groove in the gear is exposed.

g. Move the drive gear and shaft as far forward as possible and install the snap ring in the drive gear.

h. Install the bearing washer, flat side towards the rear, and install the drive gear bearing. Seat the bearing securely so the snap ring groove in the input shaft is exposed.

i. Install the snap ring in the shaft.

10. Time the countershaft assemblies:

a. Place the marked tooth in the left countershaft drive gear into mesh with the two marked teeth in the drive gear.

b. Holding the left countershaft in position, install the front and rear bearings. Install the snap ring in the bore of the case to secure the rear countershaft bearing.

Q 13-1 c) **Sure it is! Coupled with the alternator's good output at low speeds, the regulator setting made at the factory should be "right on the button" for any operating condition.**

c. Repeat steps "a" and "b" above to time the right countershaft assembly.

11. Install the auxiliary drive gear assembly:
    a. Install the bearing retainer ring on the case, fitting the shoulder over the bearing.
    b. Bend the pointed locking lugs down and over the edge of the retainer ring and bend the square locking lugs up against the cap-screws.
    c. Install the auxiliary drive gear on the splines of the mainshaft.
    d. Install the snap ring with its chamfer to the outside in the groove to the shaft to secure the drive gear.
    e. Install the auxiliary mainshaft pilot bearing in the bore in the end of the front section mainshaft.
12. Install the right reverse idler gear in the same manner you installed the left reverse idler gear (step 6).
13. Install the clutch housing on the transmission.
14. Install the auxiliary section on the front section.
15. Install the universal joint flange.
16. Install the shifting bar housing and the gear shift lever housing.
17. Install the range shift air system (the air regulator and filter, the air valve, the control valve and the connecting lines).

Quick-Quiz

Q 6-6 It's necessary to mark two adjacent teeth on opposite sides of the RT-510 drive gear as a guide in:

a) installing the drive gear on the mainshaft. (See page 89)

b) timing the left and right countershaft assemblies. (See page 10)

c) proper disassembly. (See page 32)

FORD CAR AND TRUCK

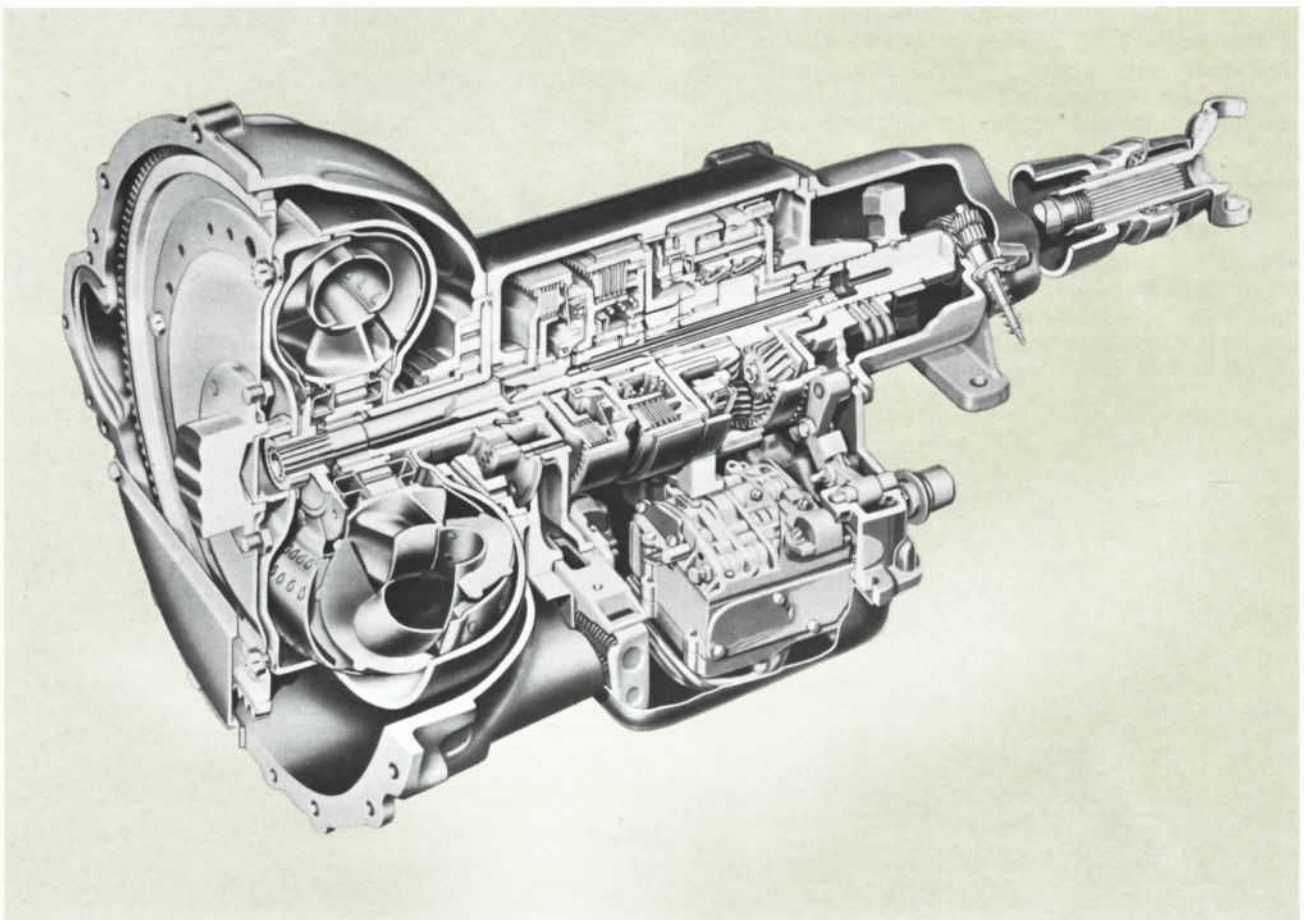
CAR

TRANSMISSION MODIFICATIONS AFFECTING SERVICE

While there are no entirely new Ford automatic transmissions for 1968, you'll find a number of significant changes from the '67 units. The most sweeping changes have occurred in the cast-iron case Cruise-O-Matic units used in Ford cars with 302 and 390 V-8 engines. In addition, there are detail changes in the C4 and C6 transmissions. Control linkage and neutral start switches have changed, too, If you'll keep in mind the facts that are given here, you'll encounter no unusual service problems when working with 1968 Ford automatic transmissions.

CRUISE-O-MATIC TRANSMISSION CHANGES

Probably the most apparent differences between the current cast-iron case Cruise-O-Matic transmissions and their 1967 counterparts is the absence of a rear pump. This means that push starts are no longer possible with these transmissions. Both the cast-iron case Cruise-O-Matic "big box" (designated MX) and "small box" (designated FMX) use the same basic control valve body and control pressure regulator, with a number of minor changes in the control valve body to improve shift quality. Both transmissions have the "series" type of oil cooler flow system. Converter hub pump drive has been



Cruise-O-Matic Transmissions for 1968

Q 4-2 b) Nope! Unlike leather seals which need preconditioning before installation, the synthetic seal should be used "as is." Better review the whole story on these new seals again — that's easier than learning by experience!

changed to flats on the hub, similar to the C4 and C6 transmissions. And there are gear train changes in the "small box" unit which affect service procedures. *(See next page for illustration.)*

Control Valve Body Change Details: In comparison with last year's design, you'll notice that the rear pump check valve has been eliminated, a spring is added under the transition valve, and the rear servo lockout vlave is now a two-piece valve. The ball check orifice bypass valve in the intermediate servo release line is used in only the "big box" (MX) control valve body assembly. And in the "big box" control valve body for taxi and police use, the throttle pressure booster valve sleeve, plug and spring are replaced by a plug.

"Small Box" Gear Train Change Details: In the cast-iron case "small box" (FMX) transmission, most gear train components are dimensionally the same as last year's FX design. However, clutch pack clearances are adjustable for both the forward and reverse-and-high clutches. PHA models have four friction plates and three steel plates in the forward clutch, while PHB models have five friction plates and four steel plates in the forward clutch. The waved cushion plate in the reverse-and-high clutch is moved to the piston end of the clutch pack.

Since the rear pump is eliminated, the pump housing is replaced by a rear support assembly with an integral oil delivery sleeve. In place of the pump discharge tube, a smaller tube supplies supplemental lubrication from the control valve body to the transmission's rear lubrication system whenever the engine is running. The oil cooler return and lubricating oil flow is similar to last year's "big box" system.

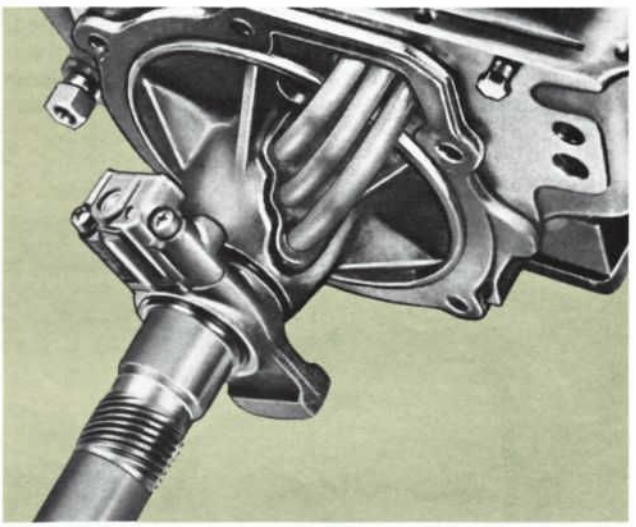
Quick-Quiz

Q 7-1 Changes in the '68 cast-iron case Cruise-O-Matic mean that:

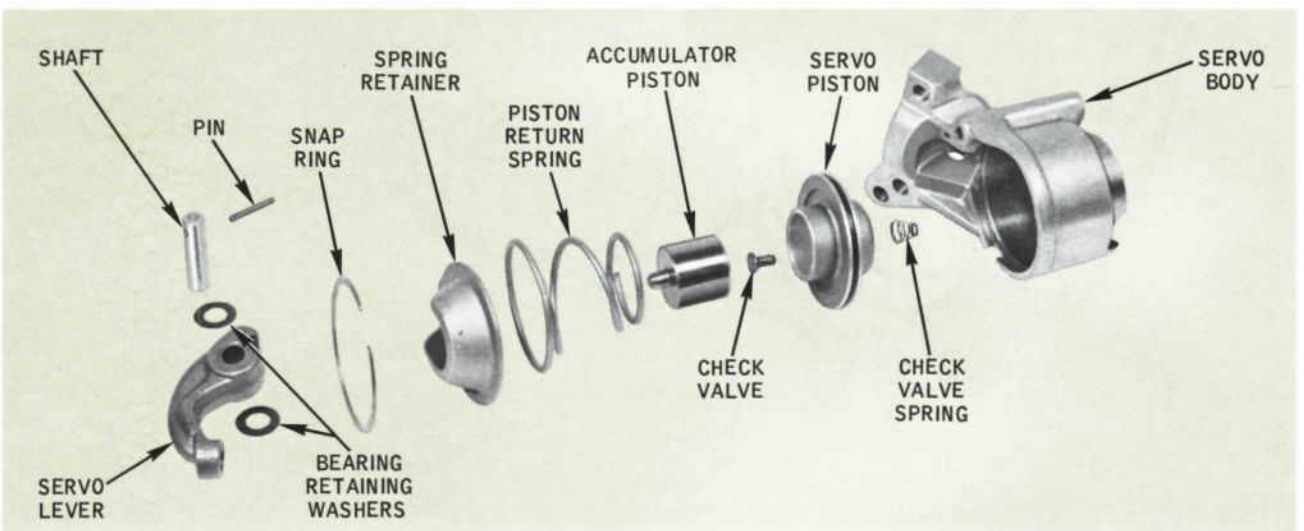
a) you can't push-start any '68 car with automatic transmission. (See page 70)

b) a completely new overhaul procedure must be used. (See page 35)

c) there is no rear lubrication system in either unit. (See page 11)

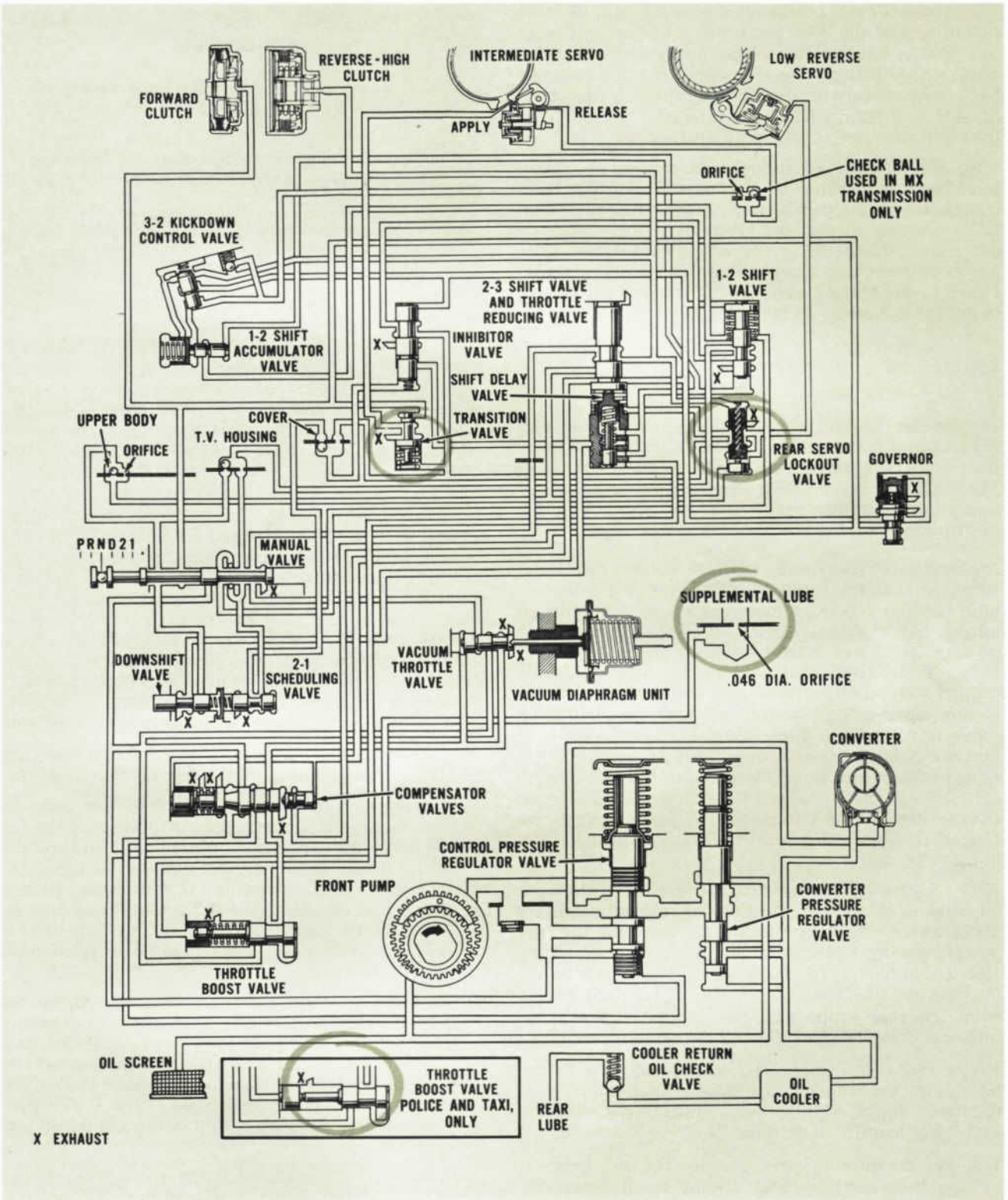


End Support and Governor — "Small Box" (FMX) Transmission



Rear Servo Disassembled

Q 8-5 a) Strike three! In '68, there is no 352 CID engine for light trucks. It's been replaced with the new optional 360 and 390 cubic inch V-8 engines in the F-100 through F-350 (4x2 models) trucks. Take another turn at bat with this question!



Hydraulic Control System — MX and FMX

Q 8-1 c) Sorry . . . you missed this one! The technique of bleeding down the lifters and setting the clearance between the rocker arm and the tip of the valve stem to specifications is definitely *not recommended*!

The governor has been turned around from its 1967 position, and the rear servo has a fast acting "take-up" piston between the band apply lever and the main apply piston. The transmission main case has been strengthened by adding reinforcing ribs, both outside and inside. The filler tube now extends from the main case and is sealed by an O-ring.

"Big Box" Changes: Although rear pump operation has been eliminated in the cast-iron "big box" transmission, the pump driving gear has been kept in its housing to seal the lubrication flow of fluid to other components. Only the rear pump driven gear has been removed. Supplemental lubrication is provided to the transmission's rear lubrication system in the same manner as in the "small box" unit.

Repair Tips

Despite the changes in these 1968 units, the service instructions for last year's Cruise-O-Matic transmissions (designated as FX-MX in the 1967 Shop Manual) will serve as an excellent guide for repair operations. Supplement these instructions with the information that follows.

Diagnosis of Hydraulic Control System Problems: Band and clutch apply and release sequences remain unchanged from last year's units, but you no longer need to consider the effect of the rear pump in diagnosis since it isn't used. In the disassembled view of the 1968 cast-iron case Cruise-O-Matic control valve body, notice that the transition valve is now spring loaded and the rear servo lockout valve is now a two-piece assembly. And remember that the control pressure regulator provides a series type of oil cooler flow. Notice, too, the elimination of the ball check valve in the intermediate servo release line in the control valve body *only in the Cruise-O-Matic "big box" unit* (designated as MX in the schematic).

Rear Support Bushing: To remove or install the bushing in the rear support on the transmission, use the same tools as were required for servicing the rear pump housing bushing in last year's transmissions. Use Tools T64L-7003-A2 and -B2 to remove the bushing on the "small box" and chisel the bushing from the rear support on the "big box." For either unit, use Tool T64L-7003-A2 to install the bushing.

Front Band Removal: The lengthwise web in the bottom of the transmission case makes removal of the front band slightly more difficult, but it's no great problem if you do it this way:

1. After the band is loose, position the ends between the case webbing and tilt the band rearward.
2. Squeeze the ends of the band together and remove it from the rear of the case.

Quick-Quiz

Q 7-2 To adjust forward clutch clearance of the "small box" (FMX) transmission:

a) replace all friction plates with thicker ones to get 0.010-inch clearance. (See page 133)

b) use the thickest top friction plate that will give at least 0.010-inch clearance. (See page 88)

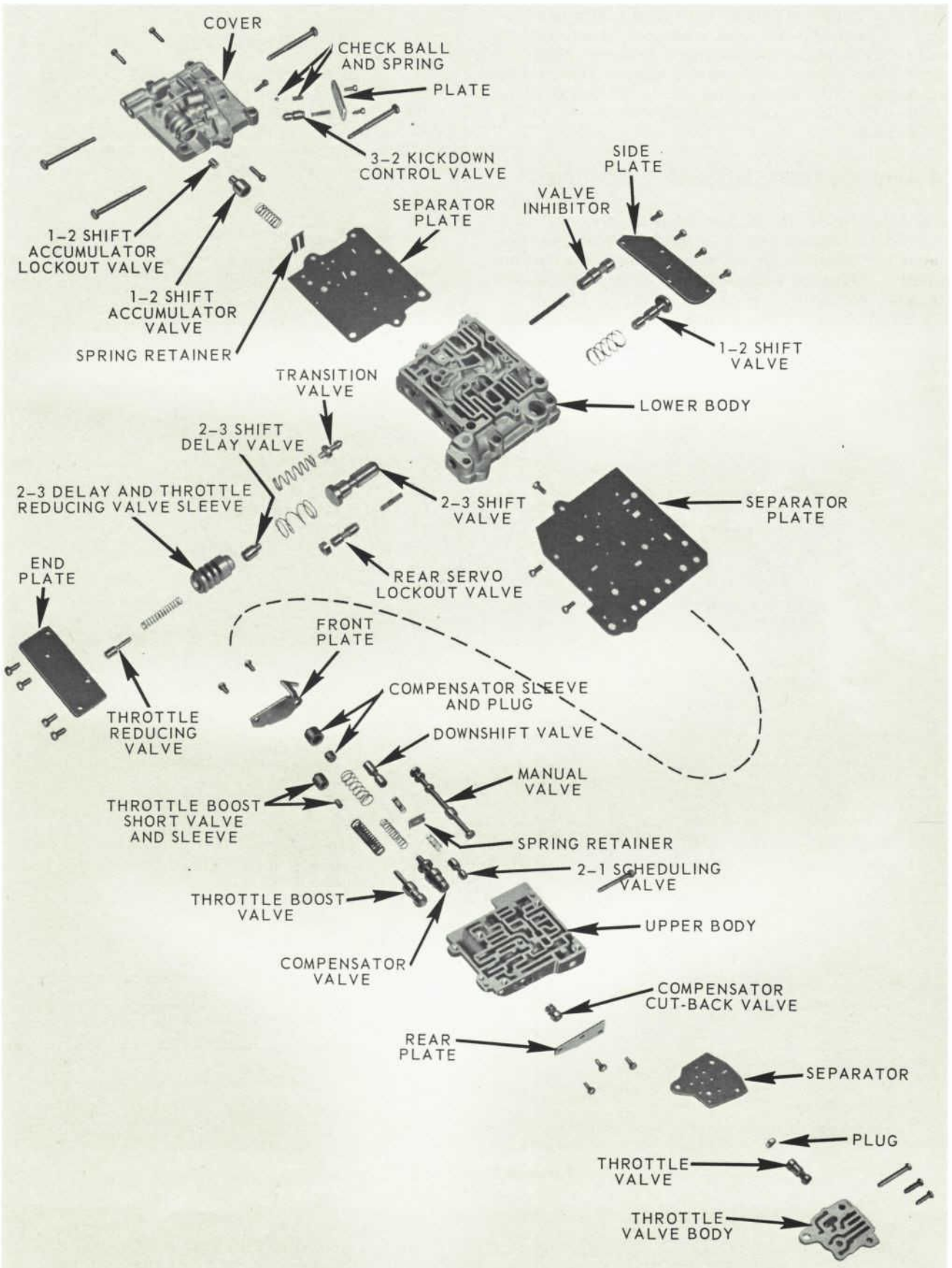
Sun Gear Shaft Seals: Seal rings of the primary sun gear shaft may be either of two types — cast-iron seals or new Teflon seals. However, all service replacement seals are the cast-iron type. When you replace these seals, be sure the ring ends have a clearance of 0.002 inch to 0.009 inch when in their bores.

Forward Clutch Build-Up — "Small Box" (FMX) Transmission: The forward clutch pack of any "small box" (FMX) transmission must have an assembled clearance of at least 0.010 inch in either the PHA or PHB models. Friction plates for these clutch packs are supplied in three thicknesses — 0.0605 to 0.063 inch; 0.0785 to 0.081 inch; and 0.0965 to 0.099 inch. The thinnest plate is the same as for the 1967 clutch; the other two plates are new. Here's how to use them when building up the forward clutch pack in the "small box" transmission:

1. Assemble the complete clutch pack, using only the thinnest friction plates for the first build-up.
2. Gently compress the clutch pack and measure the clearance between the top plate and the top of the clutch cylinder shoulder on which the input shaft flange bottoms. The purpose of this measurement is to determine the thickest top friction plate you can use while still maintaining a clearance of at least 0.010 inch. *Only one thicker plate is to be used, and it is to be installed at the top of the pack.*
3. If your original clearance measurement is between 0.010 and 0.028 inch, complete the assembly without changing the top plate. If clearance is between 0.029 and 0.046 inch, replace the top plate with a 0.0785 to 0.081 inch thick plate. If clearance is between 0.047 and 0.070 inch, replace the top plate with a 0.0965 to 0.099 inch plate.

Reverse-and-High Clutch Build-Up — "Small box" (FMX) Transmission: In assembling the reverse-and-high clutch pack, a steel plate goes next to the piston, then the waved cushion spring plate, a steel

Q 6-1 c) That's wrong! If the thrust washer was a tight press-fit on the shaft, you couldn't slide if off (as described in the procedure) after releasing the retaining device, could you? Try another answer!



Control Valve Body Exploded View — Cruise-O-Matic Transmissions

plate and alternate friction and steel plates to complete the pack. Clutch pack clearance is adjusted to 0.030-0.055 inch by selecting a pressure plate retainer snap ring of the proper thickness. These rings are supplied in thicknesses of 0.060-0.064 inch; 0.074-0.078 inch; 0.088-0.092 inch; and 0.102-0.106 inch.

C4 AND C6 TRANSMISSIONS MODIFIED

New Intermediate Band: The intermediate band used in 1968 C4 transmissions is made of stainless steel and is very flexible. However, it has the same friction material facing as was used last year. Band struts are also changed to match the ends or lugs of the new band design. You can use this new intermediate

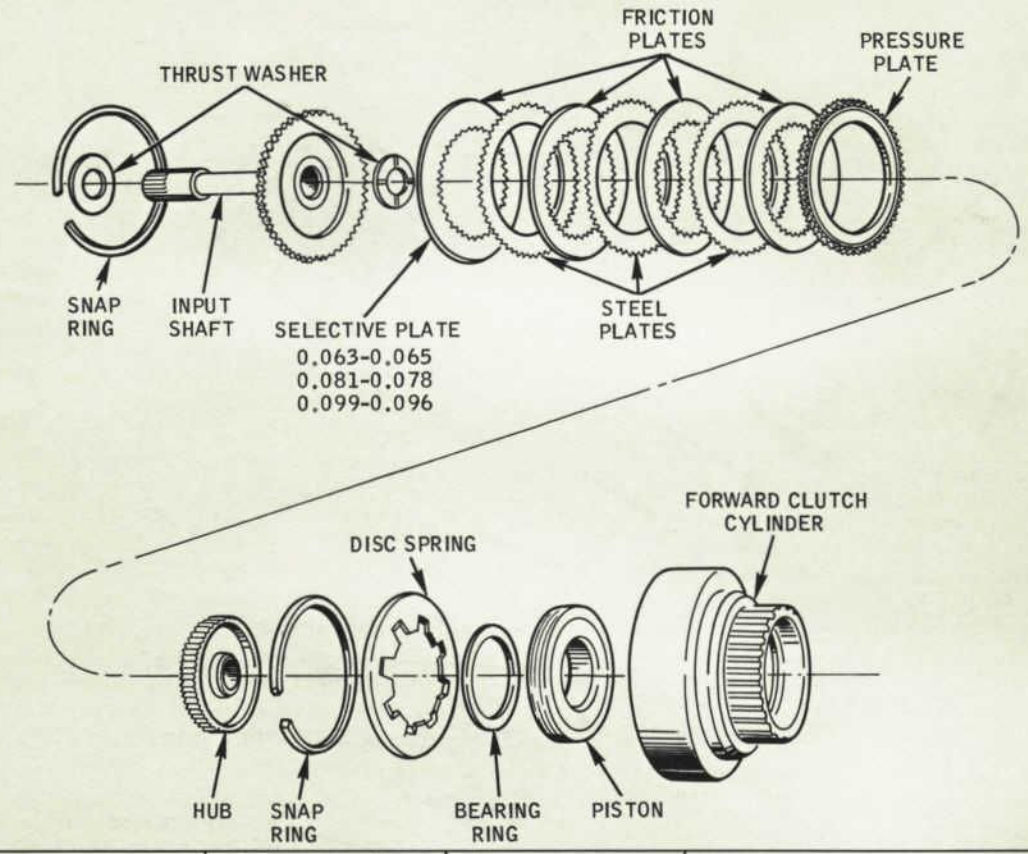
Quick-Quiz

Q 7-3 To adjust the reverse-and-high clutch clearance of the "small box" (FMX) transmission:

a) use the thickest top friction plate that will give at least 0.030-inch clearance. (See page 13)

b) bend the waved cushion spring plate. (See page 25)

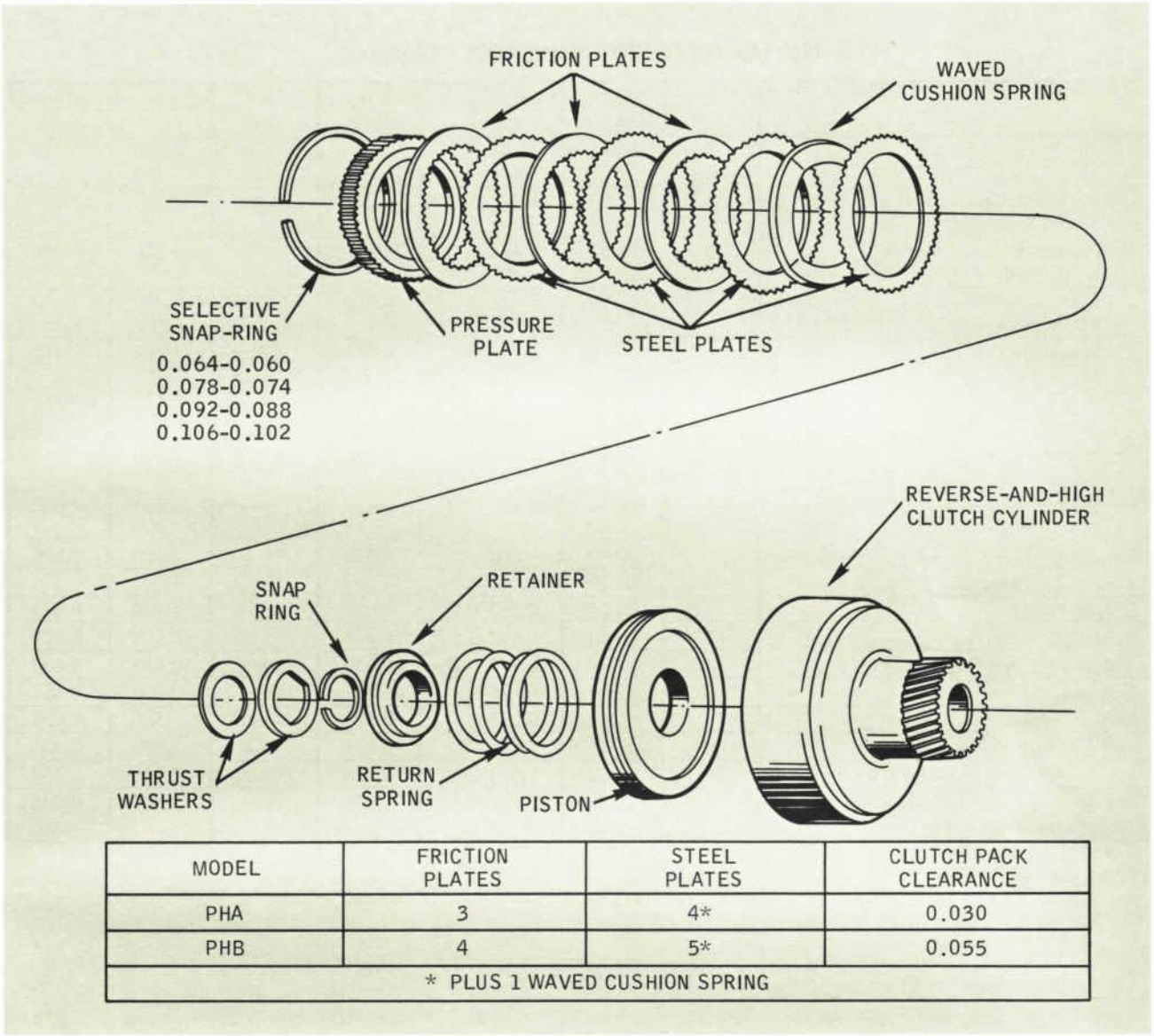
c) use a plate retainer snap ring that's thick enough to give 0.030-0.055-inch clearance. (See page 34)



MODEL	FRICTION PLATES	STEEL PLATES	MINIMUM CLUTCH PACK CLEARANCE
PHA	4	3	0.010
PHB	5	4	

Forward Clutch – FMX

Q 6-5 a) Certainly! That's the *only way* they will go on. RT-510 countershafts are of a stepped design with the larger diameters toward the rear of the shaft. So the gears come off and go on from the forward end.



MODEL	FRICTION PLATES	STEEL PLATES	CLUTCH PACK CLEARANCE
PHA	3	4*	0.030
PHB	4	5*	0.055
* PLUS 1 WAVED CUSHION SPRING			

Reverse-and-High Clutch Build-Up — "Small Box" (FMX) Transmission

1968 FMX-MX CONTROL VALVE BODY

Spring	Total Coils	Free Length	Spring Dia.	Wire Dia.	Paint Ident.	Length at Lbs. Load	
						Load	Length
1-2 Shift Accumulator Valve Model PFA-B1	8.5	1.250	0.470 O.D.	0.038	Pink	4.600	0.445
1-2 Shift Accumulator Valve Model PFB	8.5	1.170	0.470 O.D.	0.035	Yellow	2.900	0.445
1-2 Shift Accumulator Valve Model PFA-D1, F	9	1.260	0.470 O.D.	0.038	None	4.250	0.445

Q 6-2 b) Correct! Did you know it . . . or just guess? The left-hand thread was mentioned in "Disassembly" because that's where it might give you trouble if you didn't know this fact.

1968 FMX-MX CONTROL VALVE BODY – Continued

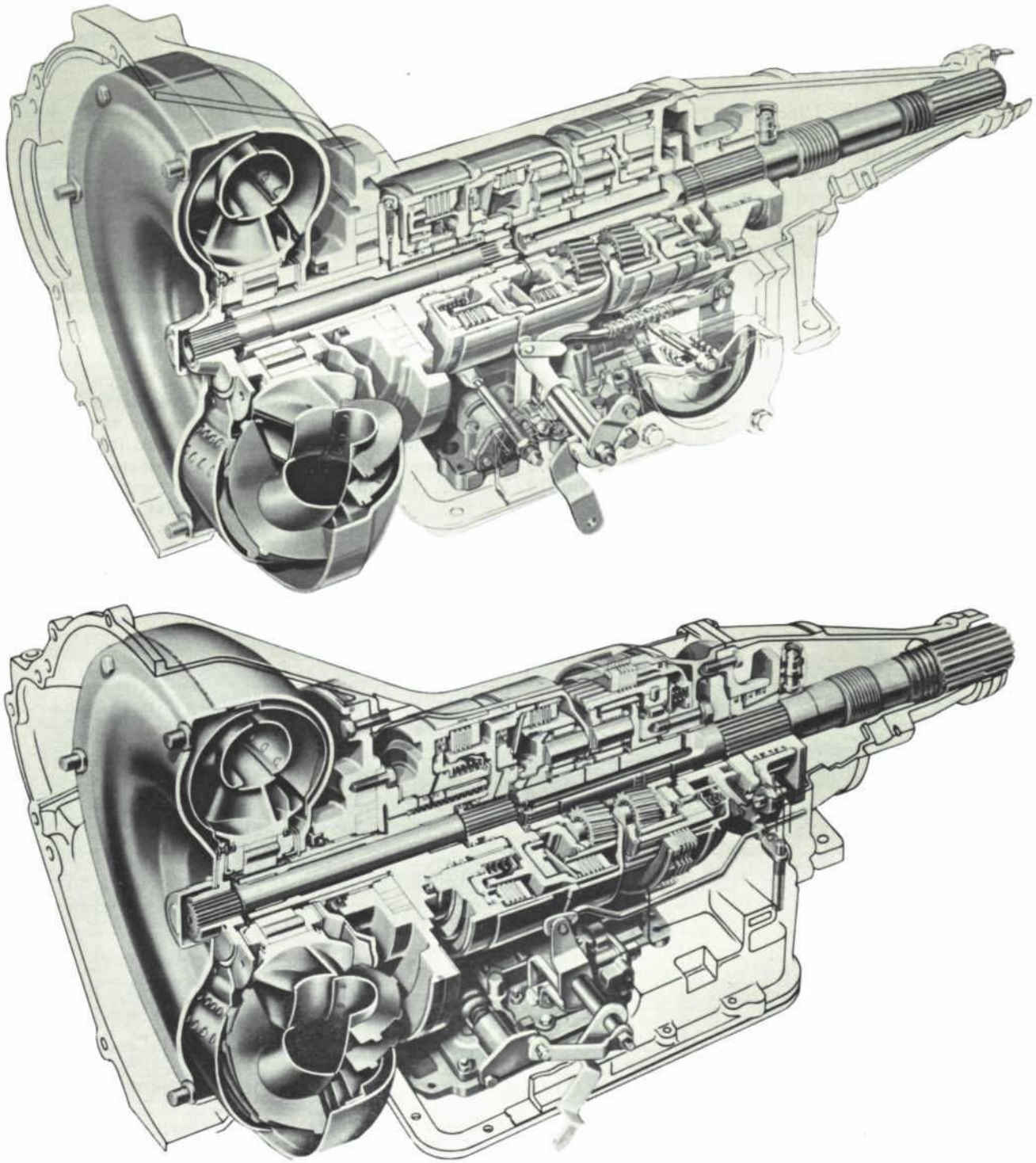
Spring	Total Coils	Free Length	Spring Dia.	Wire Dia.	Paint Ident.	Length at Lbs. Load	
						Load	Length
1st-2nd Shift Control Valve Model PHA-PFA-D1, F	7	1.880	0.725 O.D.	0.044	White	4.600	0.560
*Throttle Press. Booster Valve Model PHA-PHB-PFA-B1	15.5	1.980	0.470 O.D.	0.047	Blue	6.650	0.890
*Throttle Press. Booster Valve Model PFB	15.5	1.660	0.470 O.D.	0.047	Green	5.250	0.890
2-1 Scheduling Valve Model PHA-PHB	11	0.880	0.265 O.D.	0.026	Orange	2.400	0.415
2-1 Scheduling Valve Model PFA	12	0.910	0.250 O.D.	0.023	(2) Pink Stripes	1.300	0.415
2-1 Scheduling Valve Model PFB	12	1.030	0.265 O.D.	0.023	Orange Daub	1.725	0.415
Low Inhibitor Valve Model PHA-PHB-PFA	42	2.140	0.205 O.D.	0.028	Yellow	1.900	1.660
Low Inhibitor Valve Model PFB	49	2.530	0.205 O.D.	0.028	Pink	2.865	1.660
Control Oil Press. Comp. Valve – Outer	8	1.640	0.509 I.D.	0.038	White	3.200	0.500
Control Oil Press. Comp. Valve – Inner	13.5	1.620	0.310 I.D.	0.023	Pink	1.000	0.460
Downshift Valve	13.5	1.107	0.250 O.D.	0.023	None	1.400	0.640
Control Check Valve	12	0.480	0.214 O.D.	0.014	None	0.100	0.280
3rd-2nd Downshift Control Valve	14.5	0.820	0.200 O.D.	0.018	Purple	0.605	0.520
Transition Valve	8	1.600	0.470 I.D.	0.031	None	2.000	0.460
2nd-3rd Shift Valve – Inner	21	1.340	0.295 O.D.	0.028	Green	1.500	0.670
2nd-3rd Shift Valve – Outer	4	0.950	0.692 I.D.	0.041	None	2.800	0.430
Low Servo Modulator Valve	29.5	1.800	0.235 O.D.	0.028	None	2.975	1.050
1-2 Shift Accumulator Valve Models PHA, PHB	8.5	1.320	0.470 O.D.	0.035	None	3.500	0.445

*None used on PFA-D1, F.

MX-FMX PRESSURE SPECIFICATIONS

Engine Speed	Throttle	Manifold Vac. In. Hg	Range	Line Pressure (psi)		
				PHA-B, PHB-A	PFA-B	PFA-D, F, PFB
Idle	Closed	Above 18"*	P, N, D, 2, 1	57-73	57-73	57-77
			R	66-101	66-101	64-105
As Required	As Required	10"	D, 2, 1	83-110	82-111	82-111
As Required	Wide Open	Below 10"	D, 2, 1	147-173	147-173	146-175
			R	191-213	191-213	201-213

Q 7-1 a) Okay, you scored again! The elimination of the rear pump prevents push-starting a car with these transmissions. But that's no great loss, anyway . . . there are better ways to start a balky engine than pushing the car.



C4 and C6 Automatic Transmissions for 1968

Q 7-4 a) Here's a case where being half-right is wrong! You can use the new flexible intermediate band in earlier C4 transmissions, all right . . . but you must also use the new apply strut with it!

band in previous C4 transmission models if you'll also install the new apply strut. In fact, this new band was used in a few late '67 transmissions, so you may already be familiar with it. The flexible stainless steel intermediate band should be adjusted the same as described for the earlier C4 band in your '67 Shop Manuals.

Other Changes: The 1968 C4 forward clutch friction plate facings are of an improved friction material. And the forward planet carrier has an improved caged roller thrust bearing to give better durability. Both items can be used in earlier C4 transmissions.

The 1-2 and 3-2 shift quality of the C4 transmission has been improved by changes in the intermediate servo accumulator valve operation in the control valve body. This valve has a new spring application and a change in the body casting that makes the valve sensitive to reverse-and-high clutch apply pressure.

C6 Modifications

Two changes have been made in the C6 control valve body. A spring has been added to the main oil pressure booster valve and the control pressure coasting regulator is now a one-piece valve. The spring in the booster valve increases minimum pressure at engine idle and during closed throttle operation in D range. The control pressure coasting booster valve improves the operation of the coasting booster system.

The only other noteworthy changes in the C6 transmission are in the stator support, the reverse-and-high clutch piston release spring and the intermediate servo release spring. In the new stator support, a ball check valve is built into the reverse-and-high clutch hydraulic circuit. These changes don't affect service operations, but they do change performance on the road.

Quick-Quiz

Q 7-4 Components for 1968 C4 transmissions which can be used in earlier models include:

a) the intermediate band, but *not* the new apply strut. (See page 71)

b) the new forward clutch friction plates and forward planet carrier. (See page 159)

1968 C4 CONTROL VALVE BODY SPRING IDENTIFICATION

Spring	Total Coils	Free Length	Spring Dia.	Wire Dia.	Paint Ident.	Lbs. Load at Length	
Manual Valve Detent	9	0.74	0.295 O.D.	0.045	None	7.5	0.601
2-3 Backout Control Valve	10	1.515	0.450 O.D.	0.026	White	1.353	0.580
Main Oil Press. Reg. Valve	12	2.53	0.615 O.D.	0.047	Pink	7.24	0.716
Throttle Press. Modulator	15	1.513	0.292 O.D.	0.028	Yellow	3.675	0.620
Drive 2 Valve	10	0.735	0.230 O.D.	0.019	Gray	0.80	0.450
(1) Throttle Downshift Valve	9	0.962	0.380 O.D.	0.034	Dark Green	3.44	0.440
(2) Throttle Downshift Valve	9	1.00	0.380 O.D.	0.036	Yellow	4.64	0.440
(3) Throttle Press. Booster Valve	15	1.39	0.249 I.D.	0.036	Purple	5.250	0.730
(4) Throttle Press. Booster Valve	15	1.279	0.254 I.D.	0.036	White	4.172	0.730
Control Press. Booster Valve	12.8	1.66	0.350 I.D.	0.028	None	1.63	0.696
#(6) Inter. Band Accumulator Valve	11	1.38	0.375 I.D.	0.024	White	1.0	0.400
#(7) Inter. Band Accumulator Valve	10	1.293	0.375 I.D.	0.0258	None	1.25	0.400
#(5) Inter. Band Accumulator Valve	9.5	1.28	0.375 O.D.	0.028	Dark Blue	1.56	0.400
(2) Line Press. Coasting Boost Valve	8.8	0.820	0.346 O.D.	0.038	Pink	5.23	0.464
(1) Line Press. Coasting Boost Valve	10	1.03	0.346 O.D.	0.034	White	4.42	0.464

(1) Used on models PEA-A1. M, N, P; PEB-A2, B1, C2, E1, F2; PEE-C1, H2, K1, R, S, U, V, M, N
(2) Used on models PEA-E1, F1, J1, K1, R, S, T, U
(3) Used on all models except PEE-K1
(4) Used only on model PEE-K1
(5) Used on models PEE-R, S, U
(6) Used on models PEA-A1, E1, F1, J1, K1, M, N, P; PEC
(7) Used on models PEB-2, B1, C2, E1, F2; PEE-C1, H2, M, N, V
None used on models PEA-T, U, R, S; PEE-K1

Q 16-4 a) No — you're probably still thinking of last year's radios. In the '68 AM/FM stereo radios, you can tune each of the five push buttons to an AM station *and* an FM station. That's why they're called "5 by 10" push buttons!

C4 PRESSURE SPECIFICATIONS

Engine Speed	Throttle	Manifold Vac. In. Hg	Range	Pressure (psi)
Idle	Closed	Above 18"*	P, N, D 2, 1 R	55-61 55-108 55-182
As Required As Required	As Required Wide Open	10" Below 1.0"	D, 2. 1 D, 2, 1 R	93-101 142-150 254-268

1968 C6 CONTROL VALVE BODY SPRING IDENTIFICATION

Spring	Total Coils	Free Length	Spring Dia.	Wire Dia.	Paint Ident.	Length at Lbs. Load	
						Length	Load
(1) Manual Valve Detent	9	0.740	0.295 O.D.	0.045	None	0.601	7.5
(2) Manual Valve Detent	11.5	0.800	0.295 O.D.	0.041	Yellow	0.601	5.25
(3) 2-1 Scheduling Valve	12	0.660	0.250 O.D.	0.023	Yellow Daub	0.385	0.980
(4) 2-1 Scheduling Valve	12	0.700	0.250 O.D.	0.023	Green Daub	0.385	1.050
(5) 2-1 Scheduling Valve	12	0.730	0.250 O.D.	0.023	Green	0.385	1.20
# Inter-Servo Accumulator Valve – Inner	9.1	1.630	0.500 O.D.	0.035	None	1.297	1.0
# Inter-Servo Accumulator Valve – Outer	7.2	1.500	0.615 O.D.	0.044	None	1.297	1.140
1-2 Shift Valve	20	1.160	0.235 O.D.	0.025	White	0.650	1.725
Throttle Modulator Valve	17.6	1.257	0.280 O.D.	0.0286	Pink	0.660	2.30
Throttle Press. Booster Valve	18	1.570	0.310 O.D.	0.379	Yellow	0.917	5.900
3-2 Shift Timing Valve	18.5	1.900	0.340 O.D.	0.032	None	0.784	4.250
Inter Oil Pressure Boost Valve	17	2.097	0.480 O.D.	0.032	None	0.734	1.500
Inter Servo Capacity Modulator Valve	9.5	0.580	0.250 O.D.	0.020	Brown	0.330	0.630
Throttle Downshift Valve	12	0.790	0.240 O.D.	0.023	White Daub	0.480	1.150
Front Pump Relief Valve	14	1.020	0.250 O.D.	0.032	Brown	0.750	3.300
Main Oil Press. Regulator Valve	7	1.190	0.690 O.D.	0.054	None	0.549	6.450
Converter Press. Relief Valve	18.5	1.120	0.180 I.D.	0.041	Blue	0.900	5.0
2-3 Backout Shift Valve	11.6	0.812	0.270 O.D.	0.026	Blue	0.485	1.570

(1) Used on all models except PGC
(2) Used only on models PGC
(3) Used only on models PGC
(4) Used only on models PGA-K3; PGB-J
(5) Used on all models except PGA-K3; PGB-J; PGC
None used on models PGB-F1, G1, H1

Q 8-5 c) Absolutely! Four-ring pistons are new for the heavy duty 330, 361 and 391 V-8 engines for 1968 trucks. Last year, four-ring pistons were used only on the super duty engines.

C6 PRESSURE SPECIFICATIONS

Engine Speed			Idle		As Required			As Required		
Throttle			Closed		As Required			As Required		
Manifold Vacuum (Inches Hg)			Above 18 (1)		10			Below 1.0		
Range			Control Pressure (psi)		TV Pressure (psi)	Control Pressure (psi)	TV Pressure (psi)	Control Pressure (psi)		TV Pressure (psi)
			P, N, D, 2, 1	R		D, 2, 1		D, 2, 1	R	
	Barometric Pressure in Inches Hg	Nominal Altitude (Feet)								
psi at Barometric (2) Pressure	29.5	Sea Level	56-62	71-86	7-10	100-115	40-44	160-190	240-300	77-84
psi at (3) Barometric Pressure	28.5	1000	49-59	65-80	4-7	99-114	41-37	158-176	233-290	74-80
	27.5	2000	49-56	60-75	2-5	96-111	35-39	156-174	228-284	72-78
	26.5	3000	49-56	56-71	0-3	91-106	32-36	151-169	222-277	69-75
	25.5	4000	49-56	56-65	0	88-103	30-34	146-164	215-269	66-72
	24.5	5000	49-56	56-65	0	84-98	27-31	143-161	211-264	64-70
	23.5	6000	49-56	56-65	0	80-95	25-29	138-156	204-256	61-67

(1) It may not be possible to obtain 18 inches of engine vacuum at idle. For idle vacuums of less than 18 inches the following table provides idle speed pressure specifications in D range:

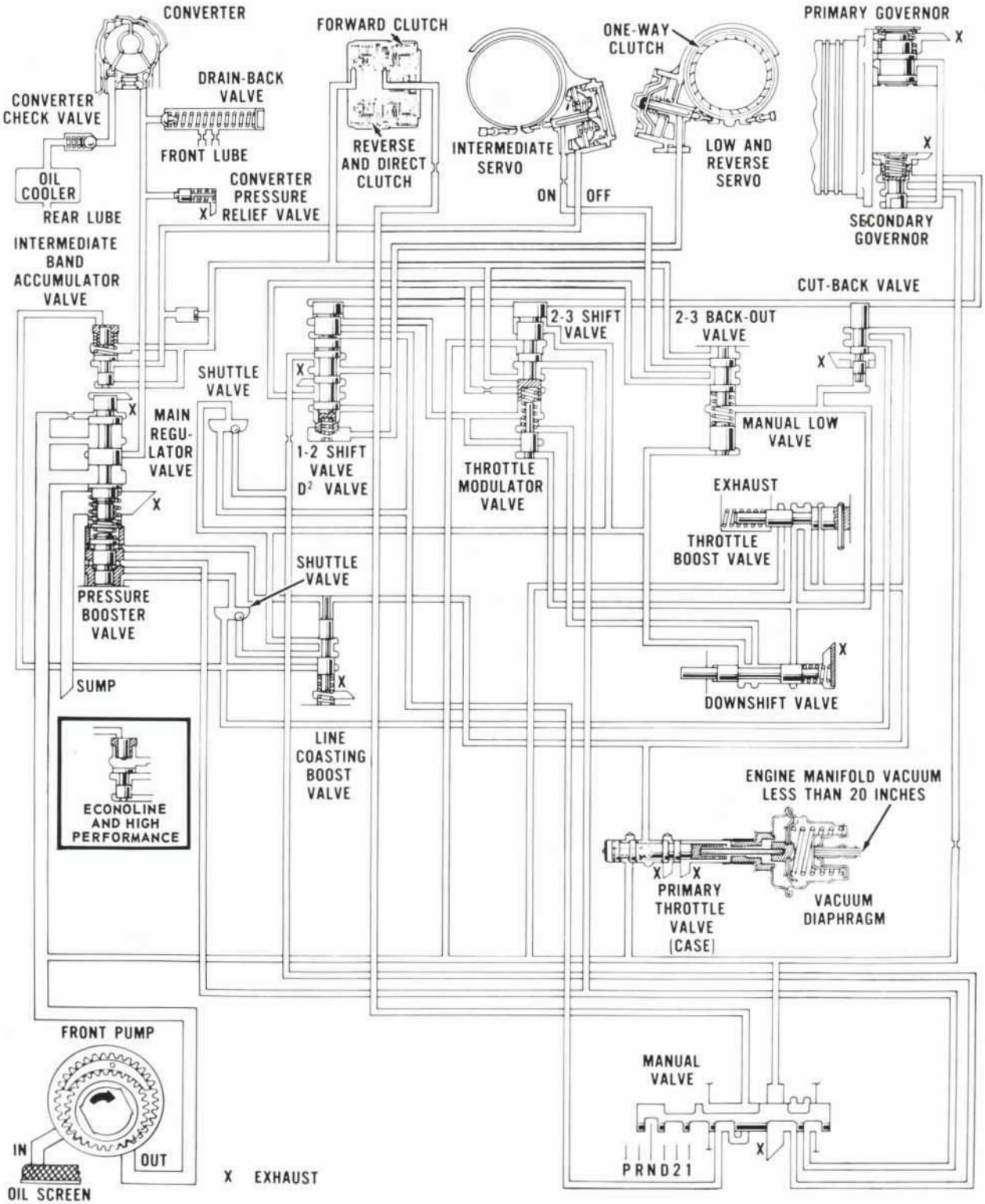
Manifold Vacuum	Barometric Pressure at 29.5 Inches (2)		Barometric Pressure at 24.5 Inches (4)	
	T.V.	Cont.	T.V.	Cont.
17	11-14	56-69	0-1	49-56
16	15-18	56-75	2-5	49-56
15	20-22	56-84	7-9	49-61
14	23-26	56-92	10-13	56-67
13	28-31	56-98	15-18	56-75
12	32-35	56-105	19-22	56-84
11	36-40	56-111	23-27	56-92

(2) These specifications apply at observed barometric pressure of 29.5 inches (nominal sea level)
(3) Specifications for barometric pressures of less than 29.5 inches.
(4) At barometric pressures between 29.5 inches and 24.5 inches idle pressures should fall between the values shown.

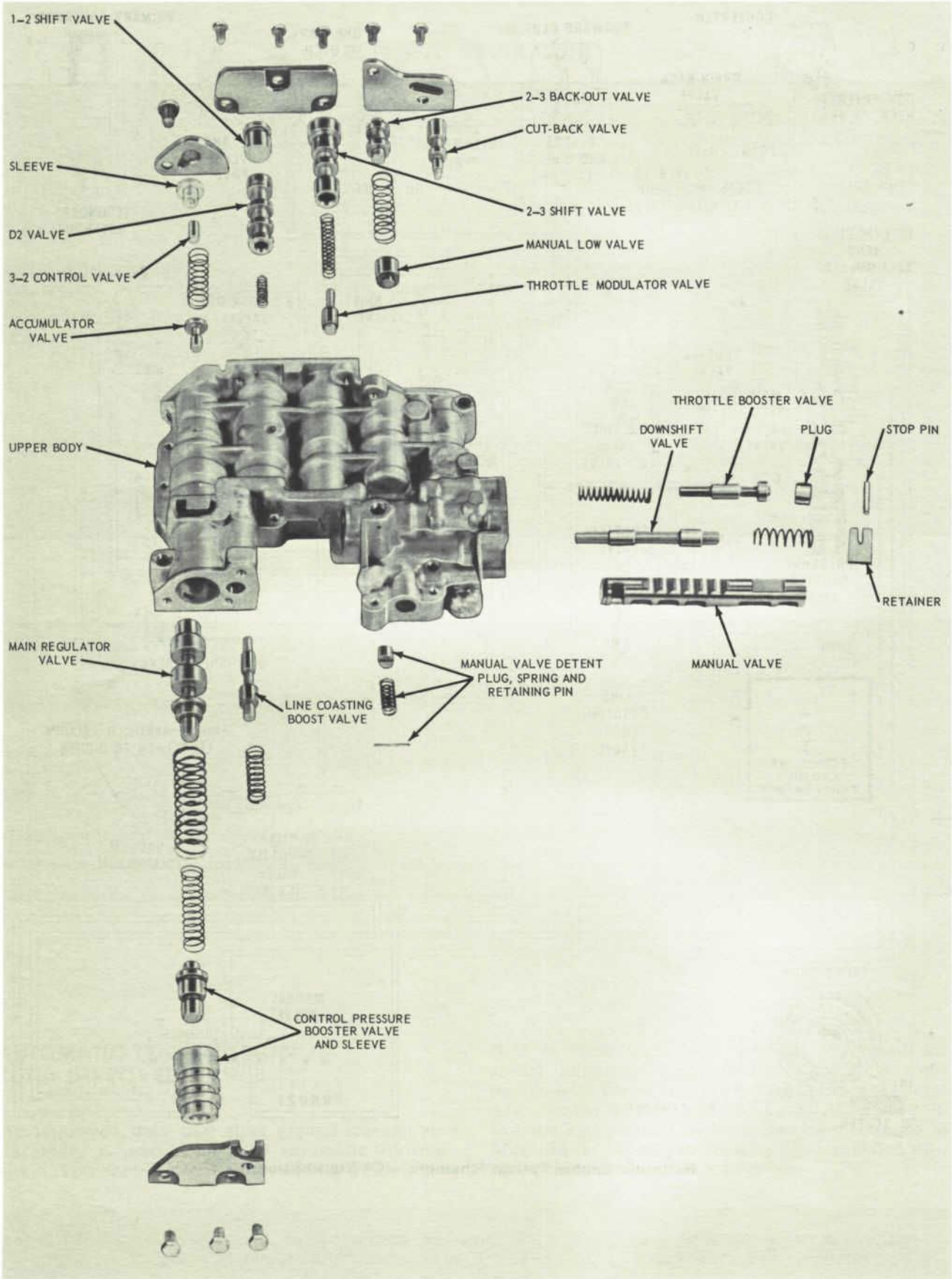
AUTOMATIC TRANSMISSION FLUID IMPROVED

An improved fluid that gives greater transmission durability is used in all 1968 automatic transmissions. You should use it when adding or changing fluid in these units. And you can also use it for earlier automatic transmissions since it is compatible with the earlier Ford fluid. It bears the same part number as the earlier fluid — C1AZ-19582-A. But the specification number has been changed to M2C 33-F. When provided by Ford qualified suppliers, this new fluid has a *2P prefix.*

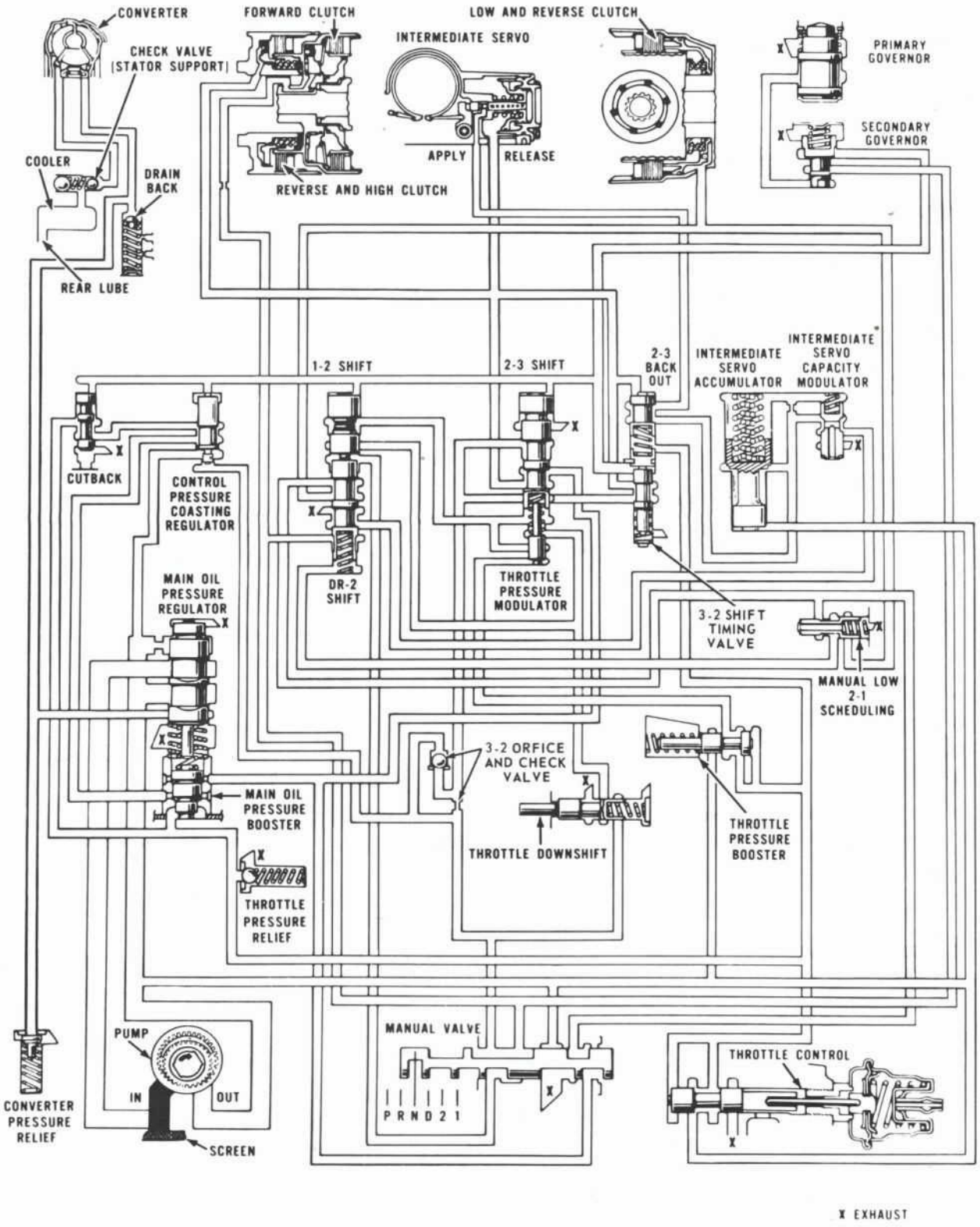
Q 17-3 a) Too bad . . . you've missed this one! There has been *quite a change* in the rolling door lock feature — *it's not used in '68!* That should simplify any work you'll have on the vacuum door lock systems of the new cars.



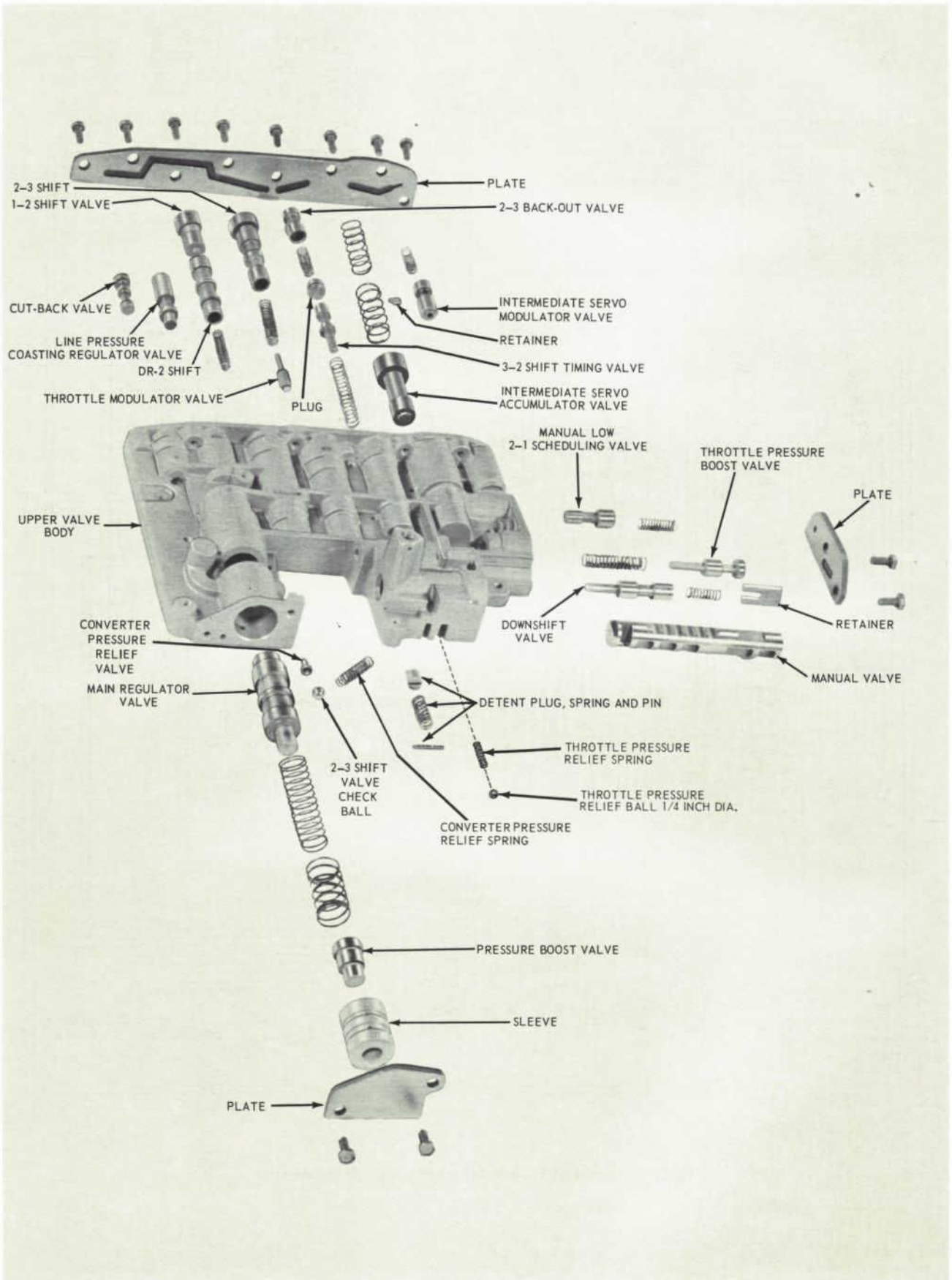
Hydraulic Control System Schematic — C4 Transmission



Control Valve Body Exploded View – C4 Transmission



Hydraulic Control System Schematic — C6 Transmission

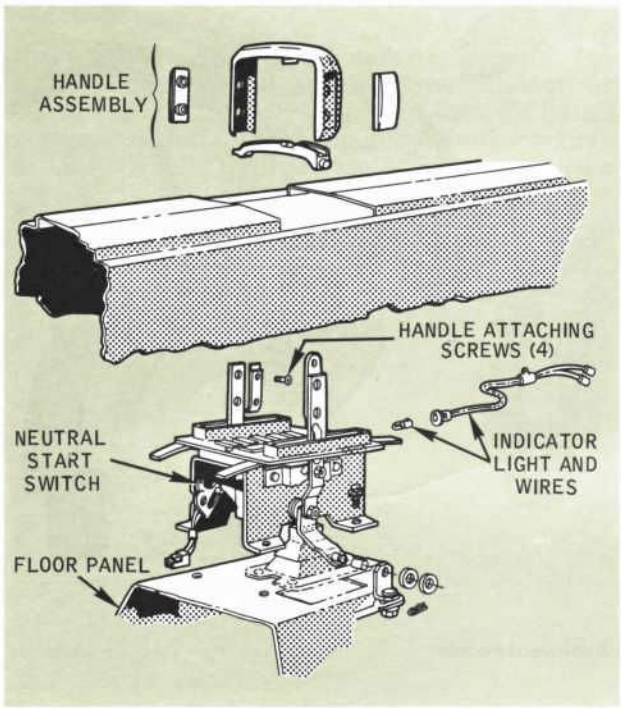


Control Valve Body Exploded View – C6 Transmission

SHIFT LINKAGE INSTALLATION PRECAUTION – FAIRLANE, FALCON

When installing the manual shift rod to the automatic transmission in a Fairlane or Falcon, be sure you don't install it backwards! If you do, you'll get interference between the rod and the steering column flexible coupling that will prevent a shift into the 1 and 2 positions. Service replacement rods have a spot of green paint at the column end to help you install the rod properly.

If you install the original rod after service, the only way you'll be able to tell for sure that it's in its proper position is to attempt a shift to 1 and 2. If you can't move the selector lever into either of those positions, reverse the rod, end for end, and try again.



Console Shift Lever Tower – Ford

CONSOLE SHIFT TOWER – FORD

The automatic transmission console shift mechanism in the Ford has an aircraft-styled selector lever with a handle that must be squeezed to release a detent before it can be moved to a different position. Dial indicator lighting is tied in to the instrument panel lighting circuit and controlled by the instrument panel light switch.

Bulb Replacement and Neutral Start Switch Adjustment

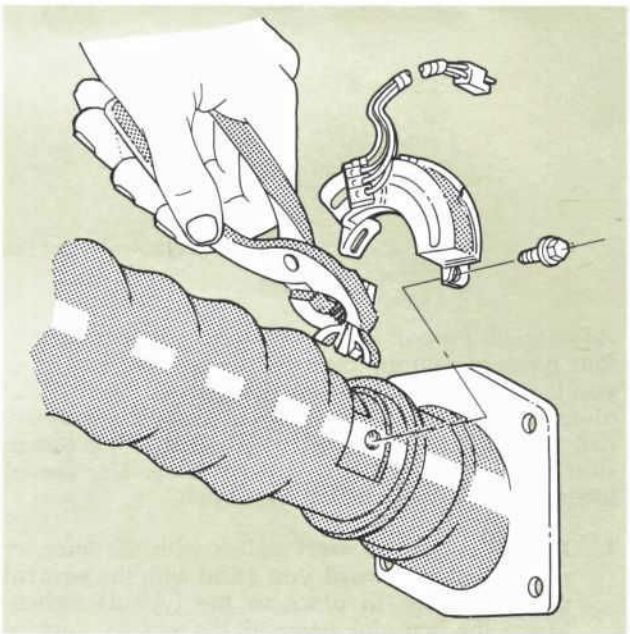
To replace the dial indicator bulb or adjust the neutral start switch, you'll have to remove the four screws in the selector handle and remove the handle. Then remove the console to gain access to the bulb or neutral start switch.

NEUTRAL START SWITCH, COLUMN-MOUNTED

Column-mounted neutral start switches have been redesigned. They are still mounted on the top of the steering column jacket, but have been moved closer to the toeboard just below the collapsible section of the jacket. There are four different types of switches—two are used on Thunderbird, and two are used on Ford, Fairlane and Falcon, with the individual application depending upon installation details.

Switch Adjustment

To discover if the neutral start switch requires adjustment, attempt to start the engine in each of the following selector lever positions — Park, Reverse, Neutral and Drive. The engine should start in Park without any "hunting" movement required at the selector lever. However, some "hunting" in Neutral is permissible. And of course, the engine absolutely *must not start in either Reverse or Drive.*



Type D Neutral Start Switch Actuating Lever Removal – Ford, Fairlane, Falcon

Q 9-3 a) Don't spend too much time looking for this special tool — it doesn't exist! To position the ignition switch for continuity tests, all you need to use is the original lock cylinder (or a replacement) and a key!

To adjust the neutral start switch, it must be removed from the column. Put the selector lever in Neutral and set the parking brake. Then disconnect the electrical and vacuum connections and remove the two fastening screws to allow you to lift the switch straight up and out.

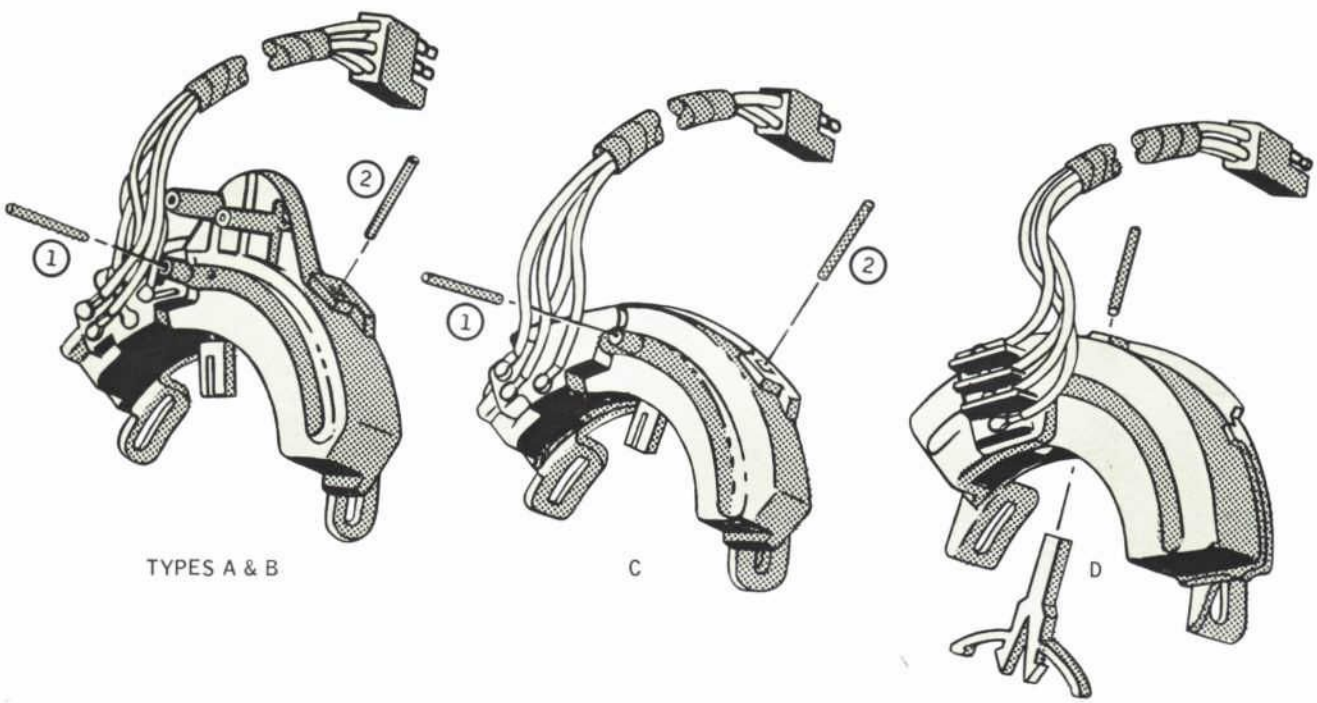
After you remove the switch body of the type D neutral start switch used on some Ford, Fairlanes and Falcons, you'll have to remove the separate actuator lever. Compress the protruding ends of the lever with pliers and lift the lever out of the column. All other types of switches have actuating levers that are integral with the switches.

Quick-Quiz

Q 7-5 With a properly adjusted column-mounted neutral start switch, the engine must start *without any "hunting movement of the transmission selecto lever:*

a) in the "Neutral" position. (See page 160)

b) in the "Park" position. (See page 14)



Neutral Start Switch Adjustment Points

Adjustment Procedure: To properly adjust any of the four types of column-mounted neutral start switches, you'll need a gauge pin — a length of 0.0937 inch diameter drill rod is preferred, but a number 43 drill rod that "mikes" as close as possible to this dimension without exceeding it is acceptable. Use the following procedure to adjust the switch.

1. Hold the neutral start switch with the wire terminal facing toward you (and with the separate actuator lever in place in the type D switch). Move the actuator lever all the way to your left, but *don't force it* or you'll damage the switch internally.
2. Insert the gauge pin in the hole in the tapered round boss facing you on all switches except type D. On a type D switch, insert the pin 1/2 inch into the hole in the boss on the top of the switch.
3. Gently but firmly move the actuator lever back to the right until it stops. Excessive pressure on the lever will damage the switch, so be careful! This will move the Park circuit to its position of minimum travel, which must be done if the switch is to function properly upon installation.
4. Pull out the gauge pin and fit it in the hole on the top surface of the switch case to engage the

Q 6-3 b) No — why do it the hard way? The assembled replacement bearing comes enclosed in a plastic sleeve, designed so you can slip the bearing directly from the sleeve into the shaft bore. That's much easier and better!

switch internal carrier in the neutral position, in all except type D switches. For type D switches, remove the gauge pin while you align the two gauge pin holes in the switch case. Then reinsert the pin.

5. If you're servicing a type D neutral start switch (with the separate actuator lever), install the actuator lever to the column by squeezing it slightly and pressing it carefully into position in the shift tube.
6. With the transmission selector lever held positively against the stop in the neutral detent position, set the switch in place on the column and fasten it with the two screws.
7. Connect the electrical connector and any vacuum hoses, and be sure to remove the gauge pin before operating the selector lever.

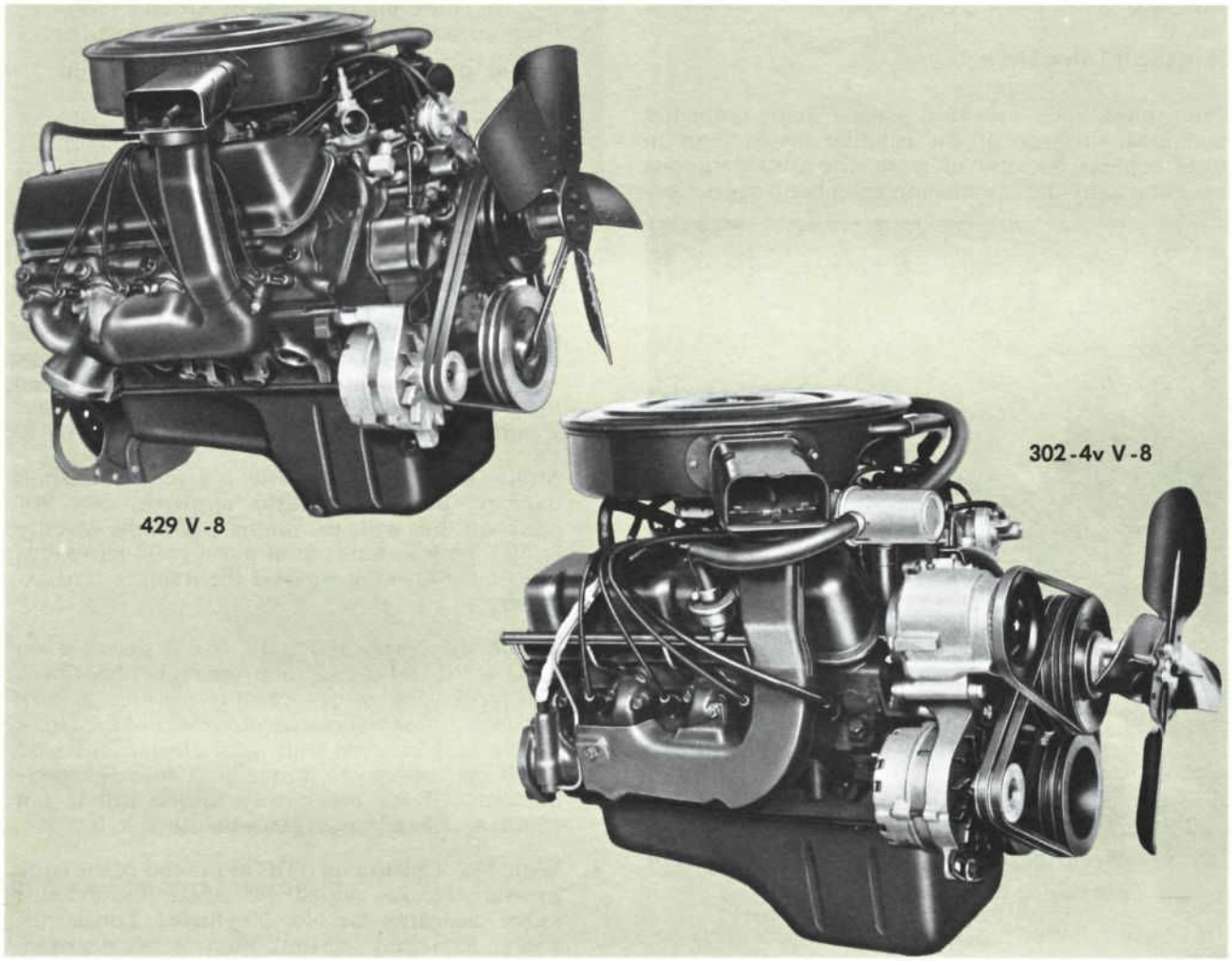
TRUCK

EXPANDED TRANSMISSION LINEUP — LIGHT DUTY TRUCKS

For 1968, Ford offers two V-8s for F-100 to F-350 pickup trucks with greater displacement than the largest engine in the 1967 pickup line. To handle the torque output of these 360 and 390 CID engines, the C6 automatic transmission has been adapted to light truck use. It is essentially the same unit that is described in the Ford car section of this group.

A heavy-duty version of the cast-iron case Cruise-O-Matic transmission for trucks incorporates the changes described for this series in the car section. And the information given there for the C4 units also applies to the light truck version of that transmission.

CAR



New V-8 Engines

TWO NEW ENGINES

You'll find two new engines in some of the 1968 Ford products. Thunderbird's new optional Thunderjet 429 V-8 is a lightweight, skirtless block design having 4-barrel carburetion and modified wedge (quench) combustion chambers with new, more rounded contours. Valves, operated by stud-mounted rocker arms and hydraulic lifters, are canted to conform to combustion chamber design. Intake and exhaust ports are round in cross section. From the service standpoint, this new engine bears many similarities to the 289 V-8.

The other new engine is the 302 V-8. The 2-barrel carburetor type is the basic V-8 in 1968 Ford and Fairlane models. A more powerful 4-barrel version is optional for Falcon and Mustang. Either version is similar to the 289 V-8, but with the stroke increased to 3 inches. Improved combustion chamber design, a new high lift camshaft and the added displacement combine to give better performance. The 289 will continue to be used in its 2-barrel version in Fairlane (base series only), Falcon and Mustang, and in the high performance 4-barrel type in Mustang GT only.

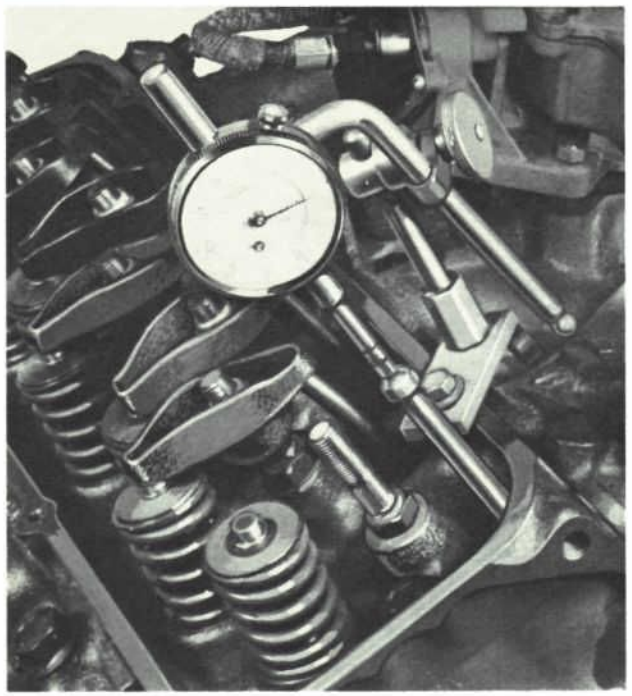
Q 16-2 c) That's it! In the regulator assembly of the Thunderbird speed control, a flyweight governor replaces the copper and magnetic discs of the '67 unit. There are other changes, too — as you noticed when you read the text.

429 V-8 ENGINE — THUNDERBIRD

Thunderbird's new optional Thunderjet 429 V-8 introduces no new or unusual service problems. Applicable instructions in your 1967 Shop Manual for the 289 V-8 can be used as a general guide. Here are some items you'll want to be aware of.

Camshaft Lobe Lift

Valve push rods are at a greater angle to the flat machined surfaces of the cylinder heads than in other engines because of geometric considerations necessitated by the combustion chamber design. Consequently, when the dial indicator is properly installed so its shaft is in line with push rod movement, the shaft may seem to be at an unusual angle in relation to the cylinder head. Don't be concerned about this — the important thing is to have the dial indicator shaft directly in line with the movement of the push rod so it will accurately measure cam lobe lift.



Measuring Cam Lobe Lift — 429 V-8

Valve Clearance Adjustment

1967 Shop Manuals describe two methods of adjusting valve clearance for the 289 V-8 — a preferred procedure and an alternate procedure. For the Thunderjet 429, *use only the preferred procedure* of adjusting clearance for both valves of each cylinder, as follows:

1. *Disconnect the brown lead (I terminal) and the red and blue lead (S terminal) at the starter relay.* Install an auxiliary starter switch between the battery and S terminals of the starter relay. *Crank the engine with the ignition switch OFF.*
2. Make three chalk marks on the crankshaft damper. Space the marks approximately 90° apart so that with the timing mark, the damper is divided into four equal parts (90° represents 1/4 of the distance around the damper circumference).
3. Rotate the crankshaft until No. 1 piston is on TDC at the end of the compression stroke. *Check the breakaway torque (torque required to turn nut in a counterclockwise direction)* of the No. 1 intake and exhaust stud nuts. Replace the stud nut if the breakaway torque does not meet specifications. If the breakaway torque still is not within specifications, replace the stud.
4. With No. 1 piston on TDC at the end of the compression stroke, adjust the intake and exhaust valve clearance for No. 1 cylinder. Loosen the rocker arm stud nut until there is end clearance in the push rod, then tighten the nut to just remove all the push rod to rocker arm clearance. This may be determined by rotating and/or moving the push rod with the fingers as the stud nut is tightened. When the push rod to rocker arm clearance has been eliminated, tighten the stud nut an additional 3/4 turn to place the hydraulic lifter plunger in the desired operating range.
5. Repeat this procedure for the remaining set of valves, turning the crankshaft with an auxiliary starter switch, 1/4 turn at a time, in the direction of rotation, while adjusting the valves in the firing order sequence. The firing order is 1-5-4-2-6-3-7-8.

Quick-Quiz

Q 8-1 When adjusting valve clearance on the new 429 V-8 engine, use:

a) either the preferred or alternate procedures for the 289. (See page 118)

b) only the preferred procedure for the 289. (See page 173)

c) only the alternate procedure for the 289. (See page 65)

Q 17-1 b) No — the fore-and-aft adjustment of the door glass for Fairlane hardtops and convertibles does require removal of the door trim panel. But other adjustments (except a major adjustment to the front stop) can be made with the panel in place.

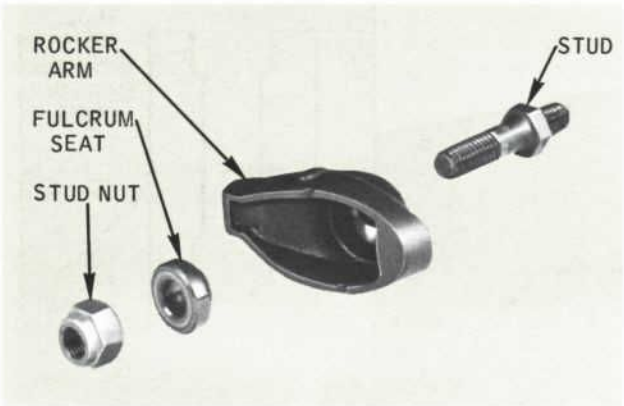
An alternate method is to remove the distributor cap and turn the crankshaft with an auxiliary starter switch until the breaker points are on the next peak of the distributor cam lobe. When the breaker points are on the next distributor cam lobe, the valves for the cylinder next in the firing order can be adjusted.

These procedures require two complete turns of the crankshaft.

6. Operate the engine and check for rough engine idle or a noisy lifter(s). Valve clearance set too tight will cause rough engine idle, and valve clearance set too loose will cause a noisy lifter(s).

Rocker Arm Stud Replacement

Rocker arm studs in the 429 V-8 are screwed into threaded bores in the bosses in the cylinder heads, like those used in the high performance 289 V-8 with solid lifters. Follow those Shop Manual instructions for stud replacement.



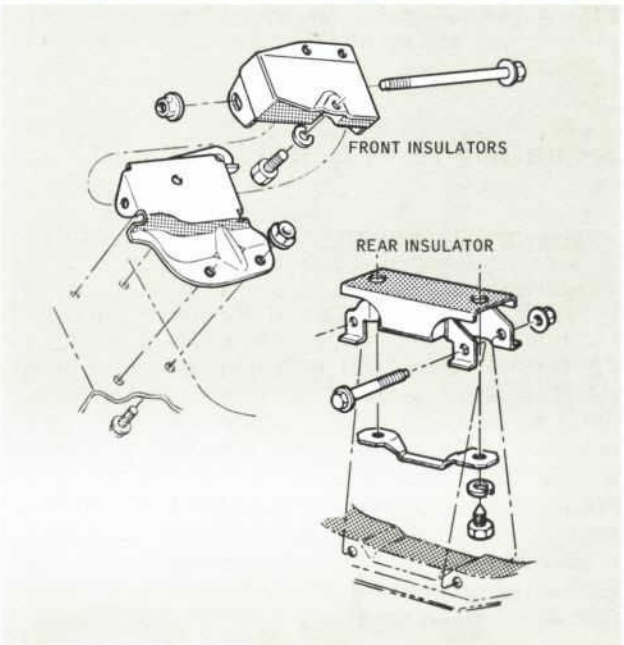
429 V-8 Rocker Arm and Stud Assembly (A-1790B)

Engine Support Insulators

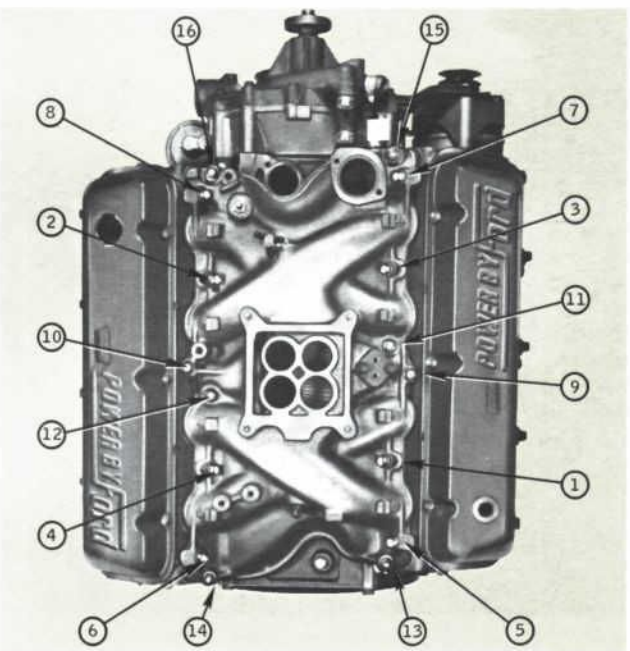
There's nothing unusual about removing or installing the engine support insulators for the Thunderjet 429 V-8. Use the accompanying view of the insulators as a guide. Just remember not to support the engine in the area of the crankshaft damper when you raise it to unload the front insulators. Position your wood block and jack farther back on the pan.

Intake Manifold Installation

You won't need intake manifold alignment tools when installing the 429 V-8 intake manifold. Two vertical studs in the manifold mating surface of each cylinder head assure proper manifold alignment. It's advisable to snug up the nuts evenly on these four studs to hold the manifold in position before installing and tightening the manifold retaining bolts in the proper sequence as shown by the illustration



Engine Support Insulators Disassembled — 429 V-8 Engine



429 V-8 Intake Manifold Torque Tightening Sequence

Q 4-1 a) Well, you did it again! Another correct answer! This forced-flow lubrication system eliminates the need for the separate oil distributor scoop, spring and plug used in the top of the ribbed-type differential carrier.

of the intake manifold. And don't forget to retorque the bolts with the manifold warm, as described later in this group.

Compressing Valve Springs — In Chassis

Valve Spring Compressor Modifications: You can use the fork-shaped T62F-6565-A Valve Spring Compressor on the 429 V-8 — but you'll have to modify it first. File or grind the inside portion of both tips of the fork to provide a clearance of 3/4-inch between them, 3/8-inch into the throat of the tool. This is necessary to provide clearance for removal of the valve retainer locks. Also file or grind the inside of the throat all the way back to the stud nut seat to provide a minimum of 3/8-inch clearance for the larger studs used on the 429 V-8. With these modifications, you can still use this tool for servicing other engines that have stud-mounted rocker arms.

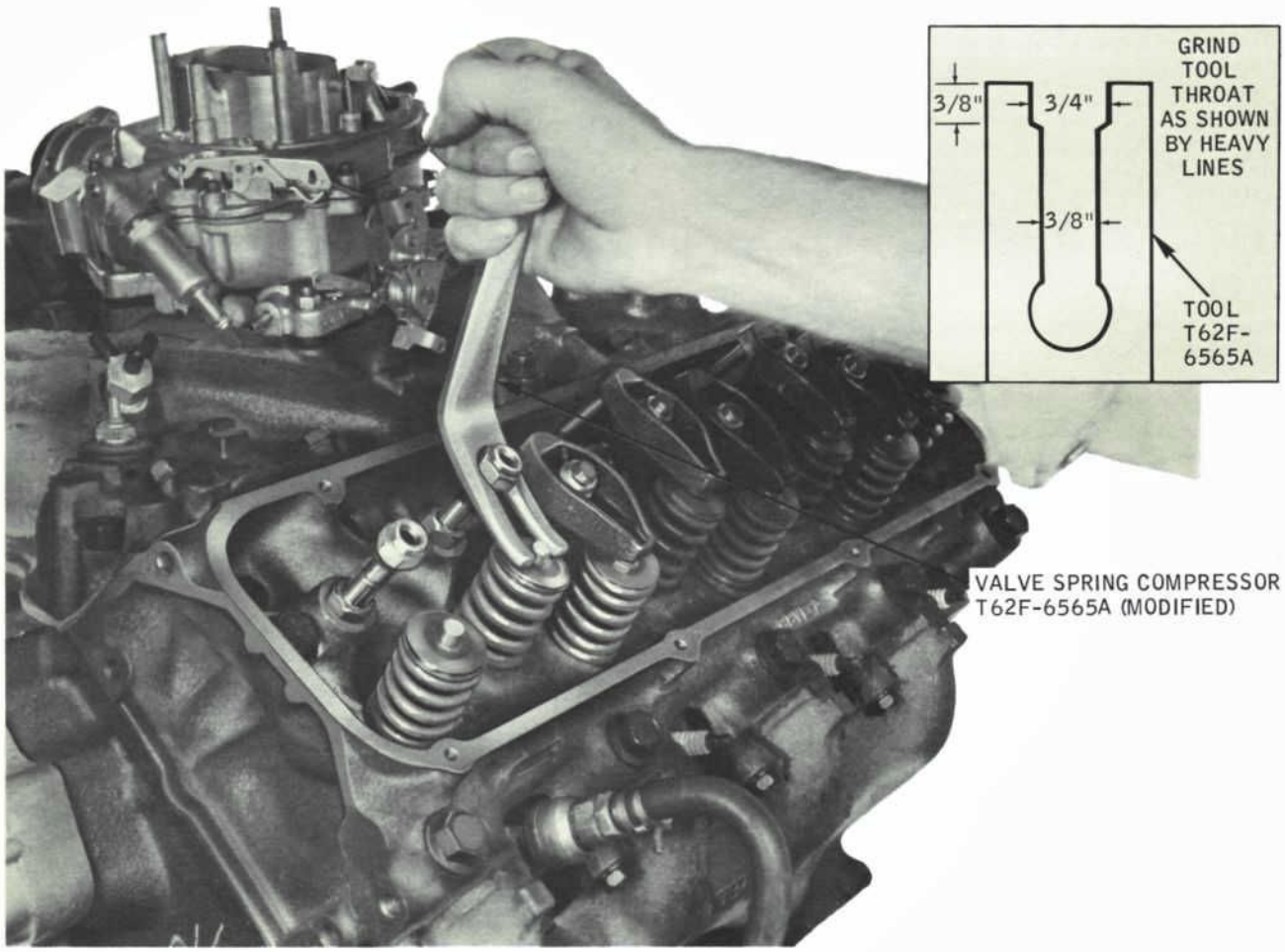
Quick-Quiz

Q 8-2 When installing the intake manifold on the 429 V-8 engine:

a) use the 289 bolt tightening sequence. (See page 174)

b) use four special intake manifold alignment tools (See page 27)

c) retorque the bolts in sequence with the manifold warmed up. (See page 190)

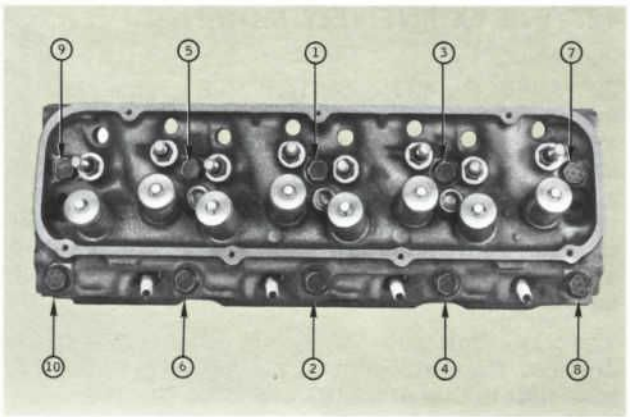


Compressing 429 V-8 Valve Spring in Chassis

Q 6-4 b) True! The RT-510 range shift air system has the same components as that of the RT-910. But inside the two transmissions there are a lot of differences! That's why there is so much material on the new RT-510 in this handbook.

A Final Precaution

When you're servicing the Thunderjet 429 V-8, remember that you're working on a *new* engine! Don't trust to memory or your experience with other engines when it comes to proper torque values for installing the various nuts, bolts, studs, etc. Always refer to the published torque values for this engine. You'll find these specifications listed at the end of this group.



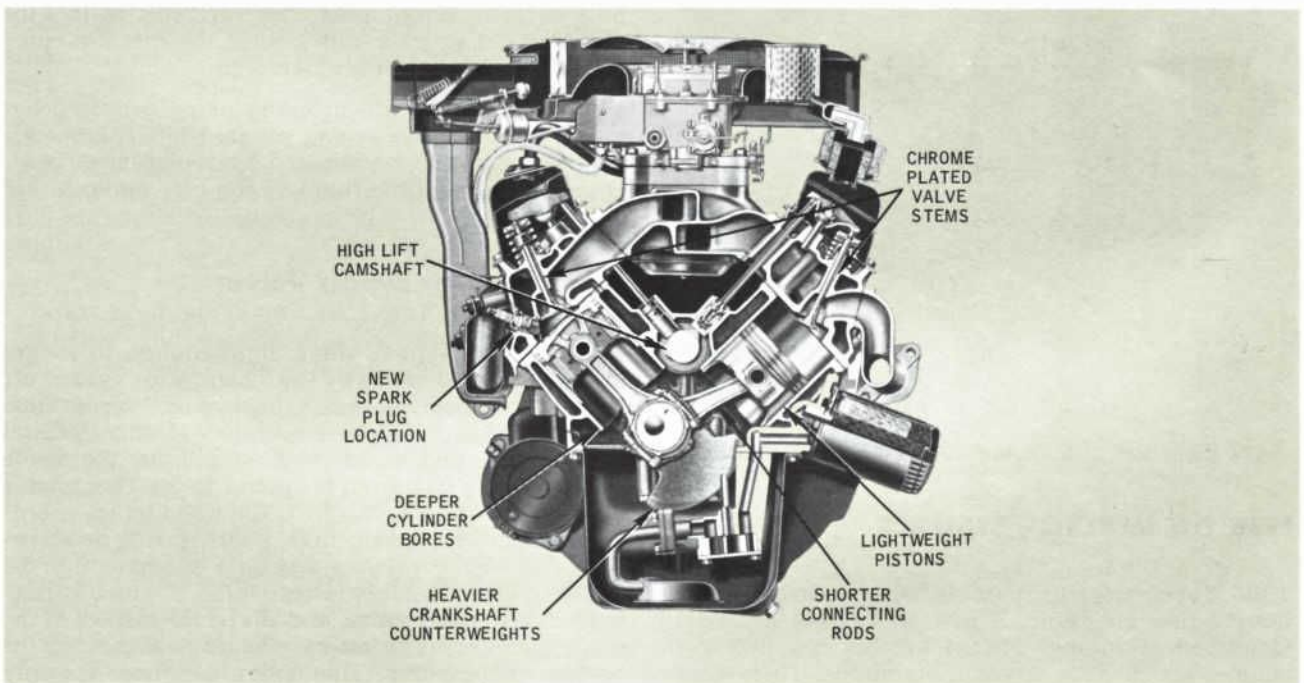
429 V-8 Cylinder Head Torque Tightening Sequence

302 V-8 ENGINE – FORD, FAIRLANE, FALCON, MUSTANG

As implied earlier, the 302 V-8 engines are "big brothers" of the familiar 289s. Stroke has been increased to 3 inches for the 302s, but bore diameter is unchanged from the 289 V-8. Service operations are essentially the same for both. However, don't assume that parts are interchangeable between the two engines — check your parts lists for proper numbers for the 302 V-8. From the design point of view, the 302 is a lot more engine! Here are a few examples.

In the cylinder heads, combustion chamber design has smoother wall contours and a new spark plug location. Cylinder bores extend deeper into the block. Valve train improvements include a newly designed high lift camshaft and chrome plated stems on all valves. The crankshaft has more mass in the counterweights. Connecting rods are shorter and more rigid. New lightweight pistons have thick underhead ribs and balance pads at the sides of the pin bosses.

External air manifolds are used for Thermactor air distribution on 302 V-8s teamed with manual-shift transmissions. New engine rear supports are used on Fairlane, Falcon and Mustang. For these cars, the drive belt arrangement is also new.



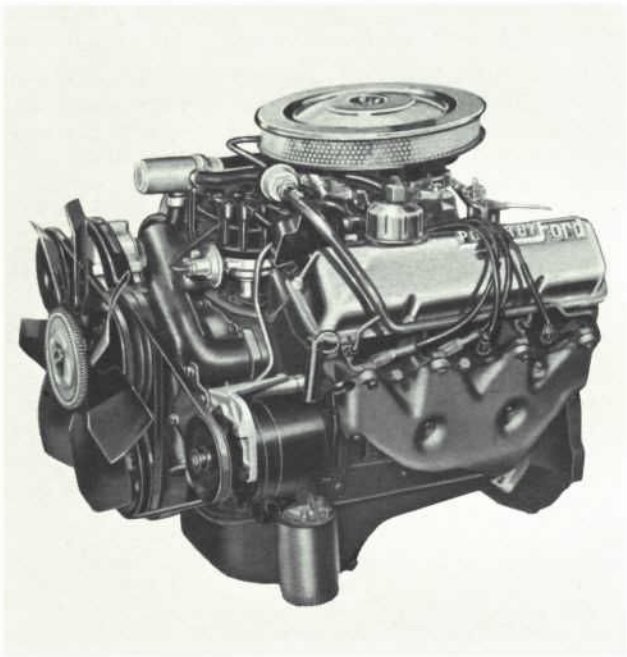
302 V-8 Engine

Q 8-4 c) Uh, uh! You're thinking of the diaphragm leak test, not the simulated bypass cycle test for the air bypass valve. Review the test procedures again and take another shot at the question!

427 V-8 EXTENSIVELY MODIFIED

For 1968, the 427 cubic inch V-8 engine has been modified considerably. The most notable changes are the use of hydraulic tappets instead of solid lifters, and the use of the engine only with an automatic transmission instead of with the four-speed manual-shift transmission. But there are many other changes, more subtle in nature. The cylinder block, of course, contains oil galleries for the hydraulic tappets.

The crankshaft, camshaft, cylinder heads and pistons are new. The crankshaft vibration damper, also new, is similar to that of the '67 428-4V Police Interceptor engine. Tappets, push rods, rocker arm and shaft assemblies and connecting rod bearings are identical with those of the current 390 and 428 V-8s, while the intake manifold and connecting rods are identical to those of the current 428 Police Interceptor engine. The Thermactor exhaust emission control system is used on this engine.



427 Cubic Inch V-8 Engine — Ford, Fairlane, Mustang

1968 THERMACTOR SYSTEMS

1968 Thermactor exhaust emission control systems have a new air pump, a new air bypass valve and simplified plumbing. Except for the new 302 V-8 engines which have external manifolds, Thermactor air manifolding to the exhaust ports is the same as in 1967 engines.

Quick-Quiz

Q 8-3 The 1968 Thermactor air pump:

a) should be overhauled if airflow output is low. (See page 156)

b) requires periodic replacement of the air filter element. (See page 31)

c) has a color-coded pressure setting plug. (See page 124)

Thermactor Air Pump

One feature of the new Thermactor air pump that becomes immediately apparent is that the separate pump air cleaner and hose of previous installations is absent. This function has been taken over by the centrifugal impeller that draws air into the pump. Located directly behind the pump pulley, the vanes of this impeller literally sling contaminants out of the air entering the pump. Air, being lighter than the foreign particles suspended in it, is less affected by the centrifugal force and flows readily into the pump.

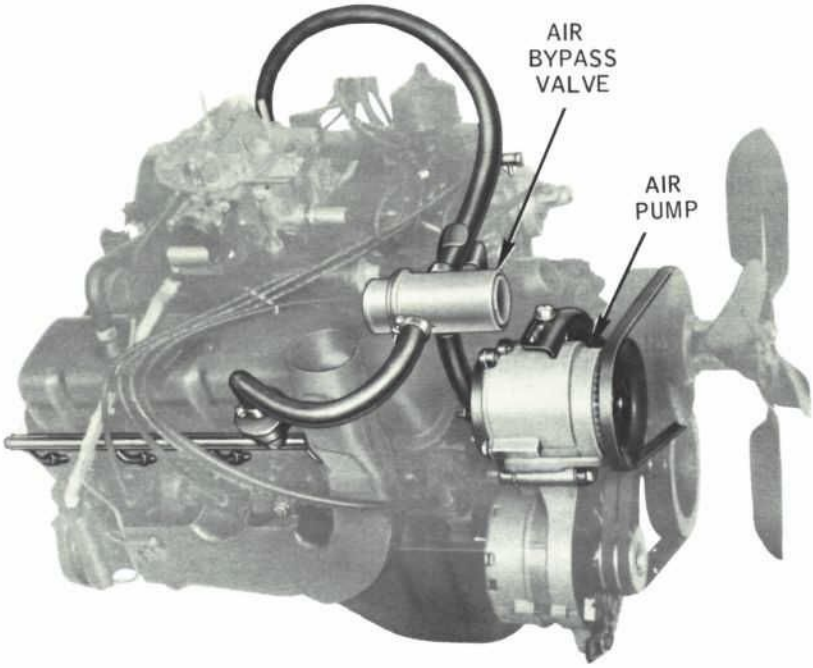
Service features: The relief valve of the new Thermactor air pump has no silencer. The valve is made of plastic and contains a color-coded pressure setting plug. If necessary, you can remove the plug with a pair of long nosed pliers. Be sure you replace the pressure setting plug with one of the specified color code for the engine you're servicing.

With the exception of installing new plastic impeller vanes and pressure setting plugs, 1968 Thermactor air pumps are to be serviced by replacement only. Disassembly and overhaul of the new pump is not authorized.

Thermactor Air Bypass Valve

The new air bypass vlave, light enough in weight to be supported solely by the Thermactor system air hoses, performs the same basic functions as last year's backfire suppressor valve. Under normal acceleration and road load conditions, the valve permits air to flow from the pump to the Thermactor air manifold check valve(s). But when intake manifold vacuum rises to a high value during deceleration, this strong vacuum acts on a diaphragm in the bypass valve assembly to reposition a simple spring-loaded two-plate valve and divert the airflow to the atmosphere through an air silencing chamber at the bottom of the valve. This action continues for only a brief interval until pressures on both sides of the diaphragm equalize through a calibrated bypass

Q 7-2 b) Good . . . you're right! You should use the thinnest friction plates for your first build-up of the clutch pack, then replace *only the top plate* with a thicker one as necessary to get the required clearance.

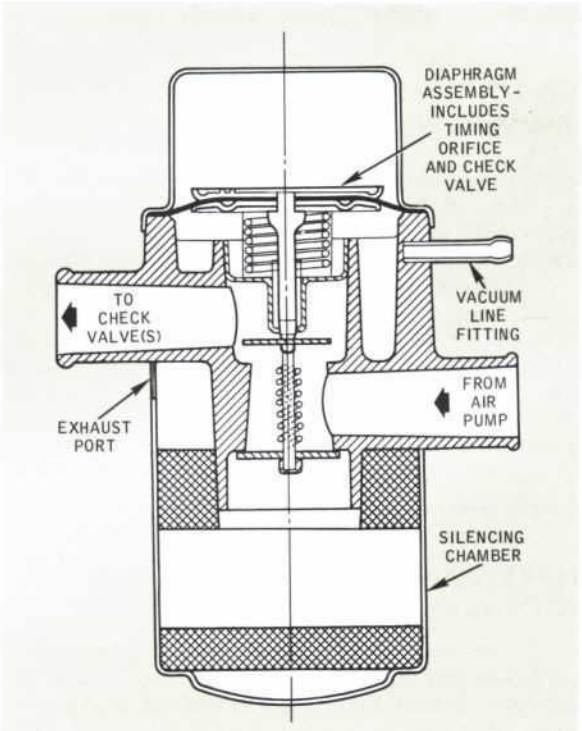


Thermactor Exhaust Emission Control System

timing orifice in the diaphragm. By interrupting Thermactor air delivery during deceleration, the bypass valve prevents backfiring which might otherwise occur due to increased burning of the enriched exhaust mixture. Since the bypass valve can also control Thermactor system air pressure, it eliminates the need for the relief valve which was installed in last year's air pump. Check valves located in the diaphragm allow any increase in air pressure within the diaphragm chamber to equalize immediately. This effectively compensates for transient vacuum conditions.

Functional Tests: If you encounter a complaint of backfiring and suspect that the air bypass valve might be at fault, here's how to test the valve:

1. Remove the hose or hoses to the air manifold check valve(s) at the air bypass valve connection.
2. With the transmission in neutral and the parking brake on, start the engine and allow it to idle. You should be able to note a definite flow of air from the outlet port(s) for the disconnected hose(s).
3. To simulate the air bypass cycle, pinch off the small intake manifold vacuum supply hose to the valve for about five seconds, then release it. When the hose is released, airflow through the



Thermactor Air Bypass Valve

Q 6-6 a) **Sorry! Although the procedures tell you to mark the drive gear teeth just before installing the drive gear on the mainshaft, the marks themselves aren't used until later, when you're installing the two countershaft assemblies.**

bypass valve should diminish or stop for a short period. This interval may vary, since the time is dependent on engine vacuum and the length of time the vacuum hose is pinched off.

The previous test checks the general functioning of the valve components. However, it is possible that a bypass valve could check out acceptably on that test and still have an air leak in the diaphragm area that would render the unit unfit for service. Here's how to test for an air leak:

1. Disconnect the intake manifold vacuum supply hose at the bypass valve. Insert a T-connection in the disconnected end of the hose, connect a vacuum gauge to one of the remaining ends of the connection and a short length of hose (about 3 inches long) to the other end of the connection. Plug the open end of this hose.
2. Note the vacuum reading on the gauge with the engine fully warmed up and running at normal idle speed.
3. Remove the plug from the end of the short length of hose and connect the hose to the vacuum hose fitting on the bypass valve. After a full minute, again note the vacuum reading with the engine idling. If this reading shows a vacuum less than that of the first reading, an air leak is indicated.

If the bypass valve fails either of the foregoing tests, it should be replaced. Do not attempt repairs.

NEW UNIVERSAL PISTON PIN REMOVER/INSTALLER

A new universal piston pin remover/installer, Tool No. T68P-6135-A, is available for servicing all pistons with semi-floating, press-fit piston pins. It's the only authorized service tool that will fit the Thunderjet 429 pistons. It can also be used for servicing all 6-cylinder engines and the 289 and 302 V-8s in 1968 models, plus earlier engines having press-fit piston pins. As indicated in the illustration, it is used in the same manner as former special tools designed to remove and install piston pins for specific engines. It's as easy to use as the earlier tools and it saves you the trouble of having to look for a different tool for each engine you work on!

INTAKE MANIFOLD BOLT TORQUING PROCEDURE – V-8 ENGINES

Here's an additional step you'll want to remember when you install the intake manifold on any V-8 engine. After you torque the manifold bolts to specifications, run the engine long enough to heat the manifold thoroughly. Then stop the engine and retorque the bolts in sequence to the specified value while the manifold's still warm.

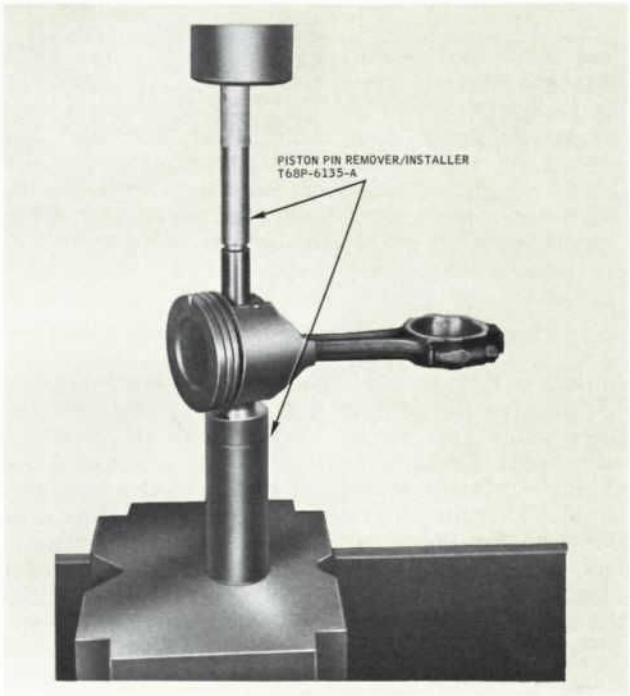
Quick-Quiz

Q 8-4 When simulating the bypass cycle during air bypass valve tests, airflow should diminish or stop:

a) when the vacuum line is pinched off. (See page 38)

b) when the vacuum line is released. (See page 187)

c) if the vacuum drops after a full minute. (See page 87)



T68P-61351A Piston Pin Remover/Installer

NEW ENGINE OIL REQUIREMENTS

Exhaust emission control systems required by law on all U.S. cars have affected Ford Motor Company's engine oil requirements. To keep these emission control systems operating efficiently, the use of a high grade engine oil with some new characteristics is *essential.* Ford 6000 Mile Motor Oil is formulated to meet these requirements, which are spelled out in Ford Specification 101-B.

Q 16-4 b) Absolutely right! You just set the radio to AM and tune the five push buttons to five AM stations . . . then set the radio to FM and tune the push buttons to five FM stations! Each button does double duty!

Certain other brands of engine oil also meet this specification. These brand names are printed in an Approved Oil List folder supplied with every 1968 Thunderbird, Ford, Fairlane, Falcon and Mustang. Your dealership will also be provided with a periodically updated list of products which are known to meet Ford Specification 101-B. This more current information should be made available to owners upon request.

The need for this engine oil requirement cannot be emphasized too strongly. In addition to other requirements, *evidence of use of a Ford Specification 101-B oil is required for annual certification of the owner's warranty for any 1968 Ford Motor Company automobile.* The 6 month or 6000 mile oil and filter change requirement remains in effect with this new oil, of course.

Oil Viscosity Recommendations

The following charts list the oil viscosity ratings for anticipated temperature ranges for 1968 cars using 101-B oils:

MULTI-VISCOSITY OILS	
Anticipated Temperature Range	**Use SAE Viscosity Number**
Below -10°F to +32°F	5W-30
-10°F to +90°F	10W-30
0°F to +90°F	10W-40
+32°F to above +90°F	20W-40

SINGLE VISCOSITY OILS	
Anticipated Temperature Range	**Use SAE Viscosity Number**
-10°F to +10°F	10W
+10°F to +32°F	20-20W
+32°F to +90°F	30
Above +90°F	40

TRUCK

NEW V-8 ENGINES — LIGHT DUTY TRUCKS

Two new optional V-8s are available in F-100 through F-350 light duty trucks, except four-wheel-drive models. One engine displaces 360 cubic inches, while the other has a 390 cubic-inch displacement. Both use Autolite 2100 2-barrel carburetors and operate on regular fuel.

When servicing these engines, you'll find they are similar to last year's 352 V-8 truck engine. Refer to Volume Two of your present Truck Shop Manual for service information.

4-RING PISTONS — HEAVY DUTY V-8 ENGINES

Heavy duty V-8 truck engines with displacements of 330, 361 and 391 cubic inches have new 4-ring pistons. When installing rings on these pistons, be sure to stagger the ring gaps alternately, about 30° off the centerline of the piston pin, to prevent the gaps from aligning and reducing the effectiveness of the compression seal.

Piston and Rings — 330 HD, 361, 391 V-8s

Q 16-2 b) Sorry — you get no point for this one! The retard solenoid valve has been moved slightly, but not eliminated. It's mounted directly on the brake booster this year, not alongside it.

OTHER ENGINE SERVICE TIPS

For more service information on 1968 engines, refer to the preceding section on Ford car engines. You'll be particularly interested in the article on the Thermactor system, since this method of exhaust emission control will be found on six-cylinder engines and the 289, 302, 360 and 390 V-8s in Bronco and F-100 trucks. And the new universal piston pin remover/installer, Tool No. T68P-6135-A, that's described there will come in handy for servicing six-cylinder truck engine piston pins.

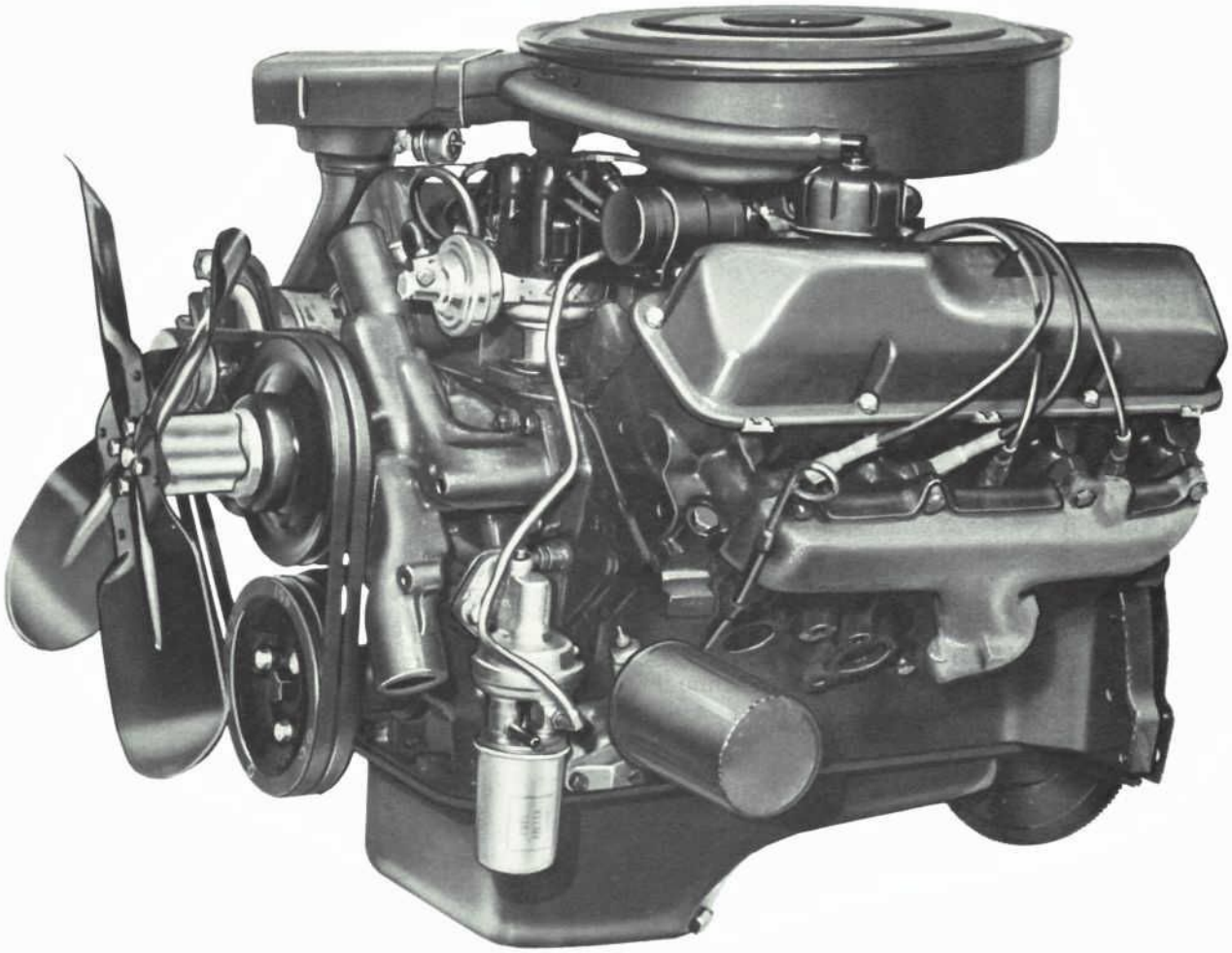
Quick-Quiz

Q 8-5 For 1968, four-ring pistons are used in:

a) the 352 CID truck engine. (See page 64)

b) the new 390 V-8 for light duty trucks. (See page 147)

c) the heavy duty 330 truck engine. (See page 73)



360 and 390 V-8s — Light Duty Trucks

Q 17-2 b) That's correct — run up another point on your scoreboard! A tubular run is used to guide the front end of both glass assemblies. However, the rear run is tubular for the door glass, channel-and-roller for the quarter window.

ENGINE OIL RECOMMENDATIONS

Ford Truck Gasoline Engines

An article in the car section of this group describes the need for use of an engine oil that meets Ford Specification 101-B for efficient operation of emission control systems. For obvious reasons, this type of oil should also be used in all Ford truck gasoline engines having emission control systems. In addition, the use of oils of this type is recommended for Ford truck gasoline engines which do not have emission control systems.

MULTI-VISCOSITY OILS		SINGLE VISCOSITY OILS	
Anticipated Temperature Range	Use SAE Viscosity Number	Anticipated Temperature Range	Use SAE Viscosity Number
Below -10°F	5W-30*	Below -10°F	10W*
-10°F to +32°F	10W-30	-10°F to +32°F	20-20W
+32°F to +90°F	10W-40 or 20W-40	+32°F to +90°F	30
		Above +90°F	40

* Where sustained operation or driving above 50 mph is anticipated, use SAE 10W-30 below 0°F.

* Where sustained operation or driving above 50 mph is anticipated, use SAE 20-20W below 0°F.

Ford Diesel Engines

Lubricating oil for Ford diesel engines should be HD type oil. It must meet the quality requirements of former U.S. Military Specification MIL-L-2104 (S-1) using 1.0% sulfur diesel fuel (supplement 1) as specified under Federal Test Method No. 791 Method No. 345-T. In addition, this oil should also meet or exceed car manufacturers' requirements for engine operating sequence needs for service MS.

For diesel engines manufactured by suppliers other than Ford Motor Company, refer to the appropriate Operator's Manual supplied with the truck for engine lubricating oil specifications.

SPECIFICATIONS

CAR

ENGINE IDENTIFICATION AND APPLICATION

Engine	Wrty Plate Code	Ford	Ford Police & Taxi	F'Lane	Falcon	Mustang	F'Lane Ranch-ero	F'Lane Taxi	T'Bird	Exhaust Emission System		
										IMCO	Thermactor	
										Auto. Trans.	Auto. Trans.	Std. Trans.
170 Six 1-V	U				X					X		X
200 Six 1-V	T			X	X	X	X	X		X		X
240 Six 1-V	V	X								X		X
240 Six 1-V	B		Police							X		X
240 Six 1-V	E		Taxi							X		X
289 V-8 2-V	C				X	X				X		X
289 V-8 4-V (1)	K					X					X	X
302 V-8 2-V	F	X	Police Taxi	X			X	X		X		X
302 V-8 4-V	J				X	X				X		X
390 V-8 2-V	Y	X		X			X			X		X
390 V-8 4-V	Z	X							X	X		X
390 V-8 4-V (3)	S			X		X	X				X	X
427 V-8 4-V (1)	W	X		X		X					X	
428 V-8 4-V	Q	X								X		X
428 V-8 4-V	P		Police								X	
429 V-8 4-V	N								X	X		

(1) High Performance (2) Premium Fuel (3) GT

GENERAL SPECIFICATIONS

Engine (2)	Compression Ratio	Bore and Stroke	Taxable Horsepower (1)	Brake Horsepower (1)	Gross Torque Ft-Lbs (1)	Compression Pressure PSI (Sea Level) (3) at Cranking Speed
170 Six (Falcon)	9.1:1	3.50 x 2.94	29.40	105 at 4400	158 at 2400	150-200
170 Six (Econo & Bronco)	9.1:1	3.50 x 2.94	29.40	105 at 4400	158 at 2400	
200 Six	9.2:1	3.68 x 3.13	32.50	120 at 4400	190 at 2400	
240 Six (Ford)		4.00 x 3.18	38.40	150 at 4000	234 at 2200	150-200
240 Six (Police & Taxi)				155 at 4200	239 at 2200	150-200
240 Six (Econo)				150 at 4000	234 at 2200	
289 V-8 (4V) HP	10.0:1	4.00 x 2.87	51.20	271 at 6000	312 at 3400	130-170
289 V-8 (2V)	9.3:1	4.00 x 2.87		200 at 4400	282 at 2400	
302 (2V)	9.5:1	4.00 x 3.00		210 at 4400	295 at 2400	
302 (4V)	10.5:1	4.00 x 3.00		235 at 4800	318 at 3200	
390 V-8 (2V & 4V) (Premium Fuel)	10.5:1	4.05 x 3.78	52.49	315 at 4600	427 at 2800	170-210
390 V-8 (2V) (Regular Fuel)	9.5:1			270 at 4400	403 at 2600	160-200
390 V-8 (4V) (GT)	10.5:1			320 at 4800	427 at 3200	170-210
427 V-8 (4V) HP	10.9:1	4.23 x 3.78	57.33	390 at 5600	460 at 3200	160-200
428 V-8 (4V)	10.5:1	4.13 x 3.98	54.58	345 at 4600	462 at 2800	
428 V-8 (4V) (Police)	10.5:1	4.13 x 3.98	54.58	360 at 5400	459 at 3200	170-210
429 V-8	11.0:1	4.36 x 3.59	60.82	360 at 4600	476 at 2800	180-200
462 V-8 (4V)	10.25:1	4.38 x 3.83	61.37	340 at 4600	485 at 2800	160-200

(1) At specified rpm.
(2) Engine No. shown is the piston displacement in cubic inches.
(3) Allowable tolerance between cylinders – 20 psi.

GENERAL SPECIFICATIONS

Engine	Engine Idle RPM – with Lights On (1)			Oil Pressure – Hot at 2000 RPM	Firing Order
	Thermactor		IMCO		
	Standard Transmission	Automatic Transmission in Drive	Automatic Transmission in Drive		
170, 200 Six	700	550	550 (2)	35-60	1-5-3-6-2-4
240 Six	600		500	35-60	1-5-3-6-2-4
289 V-8 (2-V)	625		550	35-60	1-5-4-2-6-3-7-8
302 V-8	625		550 (2)	35-60	1-5-4-2-6-3-7-8
390, 428 V-8	625		550	35-60	1-5-4-2-6-3-7-8
390 V-8 (4V) GT	700				1-5-4-2-6-3-7-8
427 V-8			600	35-60	1-5-4-2-6-3-7-8
428 Police V-8			600	35-60	1-5-4-2-6-3-7-8
429 V-8			550	35-60	1-5-4-2-6-3-7-8

(1) On A/C equipped vehicles, the engine idle speed should be set with the air conditioner operating at maximum cooling.
(2) On A/C equipped vehicles, adjust engine idle speed with air conditioner off.

CYLINDER HEAD

Engine	Combustion Chamber Volume	Valve Guide Bore Dia. (Std. Intake and Exhaust)	Valve Seat Width		Valve Seat Angle	Valve Seat Runout (Maximum)	Valve Arrangement (Front to Rear)	Rocker Arm Stud Bore Dia. – Std.	Gasket Surface Flatness
			Intake	Exhaust					
170, 200	51.5 - 54.0	0.3115 - 0.3125	0.040 - 0.060	0.070 - 0.090		0.0015	E-I-I-E-I-E-E-I-E-I-I-E	–	
240	66.0 - 69.0	0.3433 - 0.3443	0.060 - 0.080	0.080 - 0.090		0.0015	E-I-E-I-E-I-E-I-E-I-E-I	0.3685 - 0.3695	
289 - 2V	60.5 - 63.5	0.3433 - 0.3443	0.060 - 0.080	0.060 - 0.080	Intake and Exhaust	0.0015	Rt. I-E-I-E-I-E-I-E Lt. E-I-E-I-E-I-E-I	0.3685 - 0.3695	0.003 inch in any 6 inches 0.007 overall
302 - 2V	60.5 - 63.5	0.3433 - 0.3443	0.060 - 0.080	0.060 - 0.080	45°	0.0015	Rt. I-E-I-E-I-E-I-E Lt. E-I-E-I-E-I-E-I	0.3685 - 0.3695	
302 - 4V	52.0 - 55.0	0.3433 - 0.3443	0.060 - 0.080	0.060 - 0.080		0.0015	Rt. I-E-I-E-I-E-I-E Lt. E-I-E-I-E-I-E-I	0.3685 - 0.3695	
390, 428	67.1 - 70.1	0.3728 - 0.3738	0.060 - 0.080	0.070 - 0.090		0.0020	E-I-E-I-I-E-I-E	–	
427 - 4V	72.7 - 75.7	0.3728 - 0.3738	0.060 - 0.080	0.070 - 0.090	Intake 30° Exhaust 45°	0.0020	E-I-E-I-I-E-I-E	–	
429	70.5 - 73.5	0.3735	0.040 - 0.060	0.060 - 0.080	45°	0.0015	Rt. I-E-I-E-I-E-I-E Lt. E-I-E-I-E-I-E-I		

VALVE ROCKER ARMS, ROCKER ARM SHAFT, PUSH RODS AND TAPPETS

Engine	Rocker Arm Shaft O.D.	Rocker Arm to Rocker Shaft Clearance	Rocker Arm Bore Diameter	Rocker Arm Lift Ratio	Valve Push Rod (Maximum Runout)	Valve Tappet or Lifter		
						Standard Diameter	Clearance to Bore (2)	Hydraulic Lifter Leak Down Rate
170, 200	0.780 - 0.781	0.002 - 0.0045 (1)	0.783 - 0.784	1.50:1	0.025	0.8740 - 0.8745	0.0005 - 0.0020	5 - 50 seconds maximum measured at 1/16 inch plunger travel
240	–	–	–	1.61:1	0.025			
289, 302	–	–	–	1.61:1	0.015			
390, 427, 428	0.839 - 0.840	0.003 - 0.0055 (1)	0.843 - 0.844	1.73:1	0.025			
429	–	–	–	1.75:1	0.015	0.8742 - 0.8745	0.0015 - 0.0018	

(1) Wear limit – 0.006 (2) Wear limit – 0.005

VALVE SPRINGS

Engine	Valve Spring Pressure – Lbs at Specified Length		Valve Spring Free Length Approximate	Valve Spring Assembled Height Pad to Retainer	Valve Spring Out-of-Square (Maximum)
	Pressure	Wear Limit			
170 Falcon and 200	51 - 57 at 1.590 142 - 158 at 1.222	46 at 1.590 128 at 1.222	1.79	1 - 9/16 – 1 - 39/64	
240 Except Police and Taxi	76 - 84 at 1.700 187 - 207 at 1.300	68 at 1.700 162 at 1.300	1.99	1 - 35/64 – 1 - 39/64	
240 Police and Taxi Intake	76 - 84 at 1.700 187 - 207 at 1.300	68 at 1.700 167 at 1.300	1.99	1 - 43/64 – 1 - 47/64	
Exhaust	77 - 85 at 1.580 182 - 202 at 1.180	69 at 1.580 162 at 1.180	1.87	1 - 35/64 – 1 - 39/64	
289, 302	71 - 79 at 1.660 171 - 189 at 1.230	68 at 1.660 162 at 1.230	1.97	1 - 5/8 – 1 - 11/16	5/64
390, 428 (Except Police, GT)	85 - 95 at 1.820 209 - 231 at 1.380	77 at 1.820 186 at 1.380	2.12	13/16 – 1 - 27/32	
390 GT, 427 and 428 Police	80 - 90 at 1.820 255 - 280 at 1.320	72 at 1.820 230 at 1.320	2.06	1 - 51/64 – 1 - 53/64	
429	76 - 84 at 1.810 240 - 266 at 1.330	66 at 1.810 216 at 1.330	2.03	1 - 51/64 – 1 - 53/64	

VALVES

Engine	Valve Stem to Valve Guide Clearance		Valve Lash (Mechanical Tappets) Intake and Exhaust		Valve Clearance Hydraulic Lifters (4)		Valve Head Diameter		Valve Face	Minimum Allowable Valve Stem
	Intake	Exhaust	Cold	Hot	Allowable	Desired	Intake	Exhaust	Angle (5)	Tip Length
170, 200	0.0008-0.0025	0.0010-0.0027	0.018	0.018	(170)0.066-0.166 (200)0.095-0.195	170-.117 200-.145	1.642-1.657	1.381-1.396	Intake and Exhaust 44°	–
240 (6)	0.0010-0.0027 (2)	0.0010-0.0027 (2)	–	–	0.082-0.152	0.117	1.772-1.787	1.552-1.567		7/32
289, 302 (6)	0.0010-0.0027 (1)	0.0010-0.0032 (1)	0.022	0.018	0.067-0.167	0.117	1.773-1.783	1.442-1.457		5/16
289 HP	0.0010-0.0027 (1)	0.0020-0.0037 (1)	0.022	0.018	– –	0.017	1.773-1.783	1.442-1.457		7/32(0.210)
390, 428	0.0010-0.0024 (1)	0.0015-0.0032 (3)	–	–	0.100-0.200	0.150	2.022-2.037	1.551-1.566		–
427	0.0010-0.0024 (1)	0.0020-0.0034 (3)	–	–	0.100-0.200	–	2.080-2.097	1.645-1.660	Intake 29° Exhaust 44°	–
429	0.0010-0.0027	0.0010-0.0027	–	–	0.075-0.175	0.125	2.090-2.075	1.646-1.661	44°	–

(1) Wear limit 0.0045
(2) Wear limit 0.0047
(3) Wear limit 0.0055
(4) Clearance specified is obtained at the valve stem tip with the tappet collapsed.
(5) Valve face runout – all engines – maximum 0.0020
(6) Hydraulic valve lifter adjustment turns down after contact.

VALVES – Continued

Engine	Valve Stem Diameter							
	Standard		0.003 Oversize		0.015 Oversize		0.030 Oversize	
	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust
170,200	0.3100-0.3107	0.3098-0.3105	0.3130-0.3137	0.3128-0.3135	0.3250-0.3257	0.3248-0.3255	0.3400-0.3407	0.3398-0.3405
240	0.3416-0.3423	0.3416-0.3423	0.3446-0.3453	0.3446-0.3453	0.3566-0.3573	0.3566-0.3573	0.3716-0.3723	0.3716-0.3723
289, 302	0.3416-0.3423	0.3411-0.3418	0.3446-0.3453	0.3441-0.3448	0.3566-0.3573	0.3561-0.3568	0.3716-0.3723	0.3711-0.3718
390, 428	0.3711-0.3718	0.3706-0.3713	0.3741-0.3748	0.3736-0.3743	0.3861-0.3868	0.3856-0.3863	0.4011-0.4018	0.4006-0.4013
427	0.3711-0.3718	0.3701-0.3708	0.3741-0.3748	0.3731-0.3738	0.3861-0.3868	0.3851-0.3858	0.4011-0.4018	0.4001-0.4008
429	0.3416-0.3423	0.3416-0.3423	0.3446-0.3453	0.3446-0.3453	0.3566-0.3573	0.3566-0.3573	0.3716-0.3723	0.3716-0.3723

CAMSHAFT

Engine	Lobe Lift (1)		Theoretical Valve Lift		Camshaft End Play		Camshaft Journal to Bearing Clearance	
	Intake	Exhaust	Intake	Exhaust	End Play	Wear Limit	Clearance	Wear Limit
170 Falcon	0.2320	0.2320	0.3480	0.3480	0.001-0.007	0.012	0.001-0.003	0.006
200	0.2320	0.2320	0.3480	0.3480	0.001-0.007			
240	0.2330	0.2490	0.3760	0.4000	0.001-0.007			
289 and 302	0.2303	0.2375	0.3680	0.3810	0.0005-0.0055	0.007		
390-2V	0.2470	0.2490	0.4270	0.4300	0.001-0.007	0.012		
390-4V	0.2530	0.2530	0.4400	0.4400				
390 GT	0.2780	0.2830	0.4810	0.4900				
427	0.2780	0.2830	0.4810	0.4900				
428	0.2530	0.2530	0.4400	0.4400				
428 Police	0.2780	0.2830	0.4810	0.4900				
429	0.2530	0.2780	0.4430	0.4860	0.001-0.006	0.012		

(1) Maximum allowable lobe lift loss (all engines) 0.005.

CAMSHAFT – Continued

Item	Bearing	ENGINE				
		170, 200	240	289, 302	390, 427, 428	429
Camshaft Journal Diameter – Standard (1)	(No. 1)	1.8095-1.8105	2.0170-2.0180	2.0805-2.0815	2.1238-2.1248	2.1238-2.1248
	(No. 2)			2.0655-2.0665		
	(No. 3)			2.0505-2.0515		
	(No. 4)			2.0355-2.0365		
	(No. 5)			2.0205-2.0215		
Camshaft Bearings Inside Diameter	(No. 1)	1.8115-1.8125	2.0190-2.0200	2.0825-2.0835	2.1258-2.1268	2.1258-2.1268
	(No. 2)			2.0675-2.0685		
	(No. 3)			2.0525-2.0535		
	(No. 4)			2.0375-2.0385		
	(No. 5)			2.0225-2.0235		
Camshaft Bearing Location (2)	(No. 1)	0.1150-0.1250	0.0202-0.0350	0.0050-0.0200	0.0050-0.0200	0.0400-0.0600

(1) Camshaft journal maximum runout
All engines 0.005
Camshaft journal maximum out-of-round
170, 200, 289, 302 . . . . . 0.0005
All others 0.0010

(2) Distance in inches that the front edge of the bearing is installed towards the rear from the front face of the cylinder block.

CAMSHAFT DRIVE MECHANISM

Engine	Camshaft Gear to Crankshaft Gear Backlash	Camshaft Gear or Sprocket		Crankshaft Gear or Sprocket		Timing Chain Deflection (Maximum)
		Face Runout T.I.R. Max.	Assembled Face Runout T.I.R. Max.	Face Runout T.I.R. Max.	Assembled Face Runout T.I.R. Max.	
170, 200	–	0.002	0.006	0.003	0.006	0.500
240	0.002-0.004					–
289 and 302	–	0.001		0.001		0.500
390 and 428	–	0.002				
427	–					
429	–	0.004	0.008			

CAMSHAFT VALVE TIMING

Engine	Intake Valve		Exhaust Valve	
	Opens	Closes	Opens	Closes
170 Falcon	0.002 inch at 9° BTDC	0.005 inch at 51° ABDC	0.002 inch at 42° BBDC	0.005 inch at 18°ATDC
200	0.002 inch at 9° BTDC	0.005 inch at 51° ABDC	0.002 inch at 42° BBDC	0.005 inch at 18° ATDC
240	0.004 inch at 12° BTDC	0.006 inch at 62° ABDC	0.004 inch at 60° BBDC	0.006 inch at 28° ATDC
289, 302	0.004 inch at 16° BTDC	0.006 inch at 70° ABDC	0.002 inch at 52° BBDC	0.005 inch at 24° ATDC
390, 390-2V, 428	0.004 inch at 16° BTDC	0.006 inch at 60° ABDC	0.004 inch at 55° BBDC	0.006 inch at 21° ATDC
390 GT, 428 Police	0.004 inch at 18° BTDC	0.006 inch at 72° ABDC	0.004 inch at 68° BBDC	0.006 inch at 22° ATDC
427	0.004 inch at 18° BTDC	0.006 inch at 72° ABDC	0.004 inch at 68° BBDC	0.006 inch at 22° ATDC
429	0.004 inch at 16° BTDC	0.006 inch at 60° ABDC	0.004 inch at 70° BBDC	0.006 inch at 20° ATDC

CYLINDER BLOCK

Engine	Cylinder Bore Diameter-(Standard) Spreads for 8 Grades) (1)	Cylinder Bore Diameter 0.003 O.S.	Tappet Bore Dia.	Main Bearing Bore Dia.	Cylinder Block Distributor Shaft Bearing Bore Diameter	Head Gasket Surface Flatness (2)
170	3.5000-3.5024	3.5024-3.5036	0.875-0.876	2.4012-2.4020	0.4525-0.4535	Overall 0.003 inch in any 6 inches or 0.007 inch
200	3.6800-3.6824	3.6824-3.6836		2.4012-2.4020	0.4535-0.4535	
240	4.0000-4.0024	4.0024-4.0036		2.5902-2.5910	–	
289, 302	4.0004-4.0028	4.0028-4.0040		2.4412-2.4420	0.4525-0.4541	
390	4.0500-4.0524	4.0524-4.0536		2.9412-2.9420	0.4525-0.4535	
427	4.2328-4.2352	4.2352-4.2364				
428	4.1300-4.1324	4.1324-4.1336				
429	4.3600-4.3624	4.3624-4.3636		3.1922-3.1944	0.5153-0.5166	

(1) Maximum out-of-round 0.001
Wear limit 0.005
Cylinder bore surface finish R.M.S.
All 15-35

(2) Head gasket surface finish R.M.S.
All except 240 90-150
240 60-150

CRANKSHAFT AND FLYWHEEL

Engine	Main Bearing Journal Diameter (2)	Main Bearing Journal Runout – Maximum	Main Bearing Journal Thrust Face Runout	Main Bearing Journal Taper Maximum	Thrust Bearing Journal Length	Main and Rod Bearing Journal Finish R.M.S. Max.	Main & Rod Bearing Journal Thrust Face Finish R.M.S.
170, 200	2.2482-2.2490	0.0025 (1)	0.001	0.0003 Per Inch	1.275-1.277	12	35 Front 25 Rear
240	2.3982-2.3990				1.199-1.201		
289,302	2.2482-2.2490	0.002			1.137-1.139		
390,427 428	2.7484-2.7492	Wear Limit			1.124-1.126		
429	2.9994-3.0002	0.003					

(1) Wear limit 0.0035.
(2) Connecting rod and main bearing journal out-of-round maximum 0.0004 (all engines).

CRANKSHAFT AND FLYWHEEL – Continued

Engine	Connecting Rod Journal Diameter	Connecting Rod Bearing Journal Maximum Taper	Crankshaft Free End Play	Crankshaft To Rear Face of Block Runout T.I.R. Max.	Flywheel Clutch Face Runout	Flywheel O.D. Runout Transmission Stand.	Flywheel O.D. Runout Transmission Auto.
170, 200	2.1232-2.1240	0.0003 Per Inch	0.004-0.008 (1)	0.010	0.007	0.018	0.020
240	2.1228-2.1236	0.0003 Per Inch			0.010		
289, 302	2.1228-2.1236	0.0004 Per Inch					
390, 427, 428	2.4380-2.4388	0.0003 Per Inch	0.004-0.010 (2)				
429	2.4992-2.5000		0.004-0.008		–	–	0.017

(1) Wear limit 0.012
(2) Wear Limit 0.014
(3) Connecting rod and main bearing journal out-of-round maximum 0.0004 (all engines)

CRANKSHAFT BEARINGS

Engine	Connecting Rod Bearings			Main Bearings		
	To Crankshaft Clearance		Wall Thickness	To Crankshaft Clearance		Wall Thickness
	Desired	Allowable	Standard (2)	Desired	Allowable	Standard (1)
170, 200	0.0008-0.0015	0.0008-0.0024	0.0571-0.0574	0.0005-0.0015	0.0005-0.0022	0.0758-0.0761
240		0.0008-0.0024	0.0754-0.0757		0.0005-0.0022	0.094-0.0957
289, 302		0.0008-0.0026	0.0572-0.0577		0.0005-0.0024 0.0001-0.0018 #1	0.0957-0.0962 0.0961-0.0966 #1
390, 427, 428		0.0008-0.0026	0.0755-0.0760		0.0005-0.0025	0.0956-0.0961
428 (Police No. 1)	0.0010-0.0020	0.0008-0.0026	0.0755-0.0760	0.0010-0.0015	0.0008-0.0012	0.0956-0.0961
428 (Police No. 2-5)	0.0010-0.0020	0.0008-0.0026	0.0755-0.0760	0.0010-0.0020	0.0005-0.0025	0.0956-0.0961
429	0.0008-0.0015	0.0008-0.0026	0.0756-0.0761	0.0005-0.0015	0.0005-0.0025	0.0955-0.0958

(1) 0.002 U.S. thickness
200, 289, 302 . . . . . Add 0.0010 to standard thickness
(others) 0.0966-0.0971

(2) 0.002 U.S. thichness
289, 302, 390, 427, 428, 429, ... Add 0.0010 to standard thickness
200 . . . . . 0.0583-0.0588

CONNECTING ROD

Engine	Piston Pin Bore or Bushing I.D. (1)	Connecting (2) Rod Bearing Bore Diameter Red	Connecting Rod Bearing Bore Diameter Blue	Connecting Rod Length Center to Center	Connecting Rod Alignment Maximum Total Difference (3)		Connecting Rod Assembly (Assembled to Crankshaft)	
					Twist	Bend	Side Clearance	Wear Limit
170, 200	0.9107-0.9112	2.2390-2.2398	–	4.7135-4.7165	0.008	0.004	0.0035-0.0105	0.014
240	0.9104-0.9112	2.2750-2.2758	–	6.7932-6.7962	0.012		0.0060-0.0130	0.018
289, 302	0.9104-0.9112	2.2390-2.2398	–	5.1535-5.1565 (302) 5.0885-5.0915			0.0100-0.0200	0.023
390, 427, 428	0.9752-0.9755	2.5907-2.5911	2.5911-2.5915	6.4860-6.4900			0.0100-0.0200	0.023
429	1.0386-1.0393	2.6522-2.6530	–	6.6035-6.6065			0.0100-0.0200	0.023

(1) Piston pin bushing or bore
Maximum out-of-round:
390, 427 and 428 . . . . . 0.0004
429 . . . . . 0.0003
Maximum taper
390, 427 and 428 . . . . . 0.0003
429 . . . . . 0.0005

(2) Connecting rod bearing bore maximum out-of-round and taper (all engines) 0.0004

(3) Pin bushing and crankshaft bearing bore must be parallel and in the same vertical plane within the specified total difference at ends of 8-inch long bar measured 4-inches on each side of rod.

PISTON PIN

Engine	Length	Diameter			To Piston Clearance	To Connecting Rod Bushing Clearance
		Standard	0.001 Oversize	0.002 Oversize		
170, 200	3.010-3.040	0.9119-0.9124	0.9130-0.9133	–	0.0003-0.0005 (1)	(2)
240						
289					0.0002-0.0004	
390, 427	3.156-3.170	0.9750-0.9753	0.9760-0.9753	0.9770-0.9773	0.0001-0.0003 (1)	0.0001-0.0005 (3)
428 except Police	3.480-3.500					
428 Police	3.165-3.175					(2)
429	3.290-3.310	1.0400-1.0403	–	–	0.0002-0.0004	

(1) Wear limit 0.0008 (2) Interference fit (3) Wear limit 0.0010

PISTON

Engine	Diameter (1)			Piston to Cylinder Bore Clearance	Piston Pin Bore Diameter	Ring Groove Width
	Coded Red	Coded Blue	0.003 Oversize			
170	3.4982-3.4987	3.4993-3.4999	3.5001-3.5005	0.0014-0.0020	0.9122-0.9125	Upper Compression Ring (all engines) 0.080-0.081)
200	3.6778-3.6784	3.6790-3.6796	3.6802-3.6808			
240	3.9984-3.9990	3.9996-4.0002	4.0008-4.0014	0.0014-0.0022	–	Low Compression Ring (all engines except 427) 0.080-0.081 (427) 0.096-0.097
289, 302				0.0018-0.0026	0.9123-0.9126	
390	4.0484-0.0490	4.0496-4.0502	4.0508-4.0514	0.0015-0.0023	0.9752-0.9755	
427	4.2293-4.2299	4.2305-4.2311	4.2317-4.2323	0.0030-0.0038		
428	4.1284-4.1290	4.1296-4.1302	4.1308-4.1314	0.0015-0.0023		Oil Ring (all engines) 0.1880-0.1890
429	4.3585-4.3591	4.3597-4.3603	4.3609-4.3615	0.0014-0.0022	1.0402-1.0405	

(1) Measured at the piston pin bore centerline at 90° to the pin bore.

PISTON RINGS

Engine	Ring Width		Side Clearance		Oil Ring	Ring Gap Width		Oil (2) Ring
	Compression Ring		Compression Ring (1)			Compression Ring		
	Top	Bottom	Top	Bottom		Top	Bottom	
170	0.077-0.078	0.077-0.078	0.002-004	0.002-0.004	Snug	0.010-0.020	0.010-0.020	0.015-0.055
200								
240								0.015-0.069
289, 302								
390						0.010-0.031		0.015-0.066
427	0.062-0.063	0.062-0.063				0.018-0.028	0.015-0.025	0.015-0.055
428	0.077-0.078	0.077-0.078				0.010-0.020	0.010-0.020	0.015-0.066
429	0.077-0.078	0.077-0.078				0.010-0.031	0.010-0.031	0.015-0.066

(1) Wear limit – all engines 0.006

(2) Steel rail

WATER PUMP

Engine and Vehicle	Water Pump Pulley to Engine Ratio	Water Pump Assembly Dimensions		Water Pump Drive Arrangement
		Front Face of Pulley Hub to Pump Housing Face	Impeller to Housing Mounting Surface Clearance	
170	1.04:1	3.94	0.011-0.045	Water pump, fan and alternator belt driven from crankshaft damper. (Dual belts used on the Thunderbird)
200	1.04:1 A/C 1.04:1	3.94	0.011-0.045	
240	.96:1 A/C 1.25:1	3.60	0.010-0.050	
289 and 302	.95:1 A/C 1.13:1	5.420	0.030-0.050	
390 Ford, T'Bird, 427, 428	.94:1 A/C 1.10:1	7.569	0.070-0.080	
390 Fairlane	.94:1 A/C 1.25:1	7.569	0.070-0.080	
390 Mustang 428 Police	.94:1 A/C 1.10:1	7.569	0.070-0.080	
429 T'Bird	.96:1 A/C 1.10:1	7.569	0.070-0.080	

OIL PUMP

Engine	Rotor-Type Oil Pump Reliev Valve Spring Tension Lbs at Specified Length	Drive Shaft to Housing Bearing Clearance	Reliéf Valve Clearance	Rotor Assembly End Clearance	Outer Race to Housing (Radial Clearance)
170, 200	9.0-10.1 at 1.078				
240	20.6 - 22.6 at 2.49				
289, 302	11.15 - 11.75 at 1.704				
390	9.0 - 9.6 at 1.53				
427	8.0 - 13.0 at 1.56	0.0015-0.0029	0.0015-0.0029	0.0011-0.0041	0.006-0.012
428	8.7 - 9.5 at 1.56				
428 Police	11.1 - 11.8 at 1.56				
429	20.6 - 22.6 at 2.49				

APPROXIMATE OIL PAN CAPACITIES (1)

Engine	U.S. Measure	Imperial Measure
170, 200	4-1/2 quarts	3-1/2 quarts
240, 289, 302	5 quarts	4 quarts
390	5 quarts	4 quarts
427 (2)	6 quarts	5 quarts
428	5 quarts	4 quarts
429	5 quarts	4 quarts

(1) Includes one quart required with filter replacement.

(2) 5 quarts U.S. and 4 quarts Imperial for Mustang.

TORQUE LIMITS

Engine	Cylinder Head Bolts			Oil Pan to Cylinder Block	Manifolds to Cylinder Head		Water Outlet Housing	Flywheel to Crankshaft	Distributor Vacuum Control Valve
	Step 1	Step 2	Step 3		Intake	Exhaust			
170, 200	55	65	70 - 75	7 - 9	–	13 - 18			
240	50 - 55	60 - 65	70 - 75	10 - 12	23 - 28	23 - 28			
289, 302	50	60	65 - 72	9 - 11 (5/16 - 18) (1)	20 - 22	15 - 20			
390, 428	70	80	80 - 90	9 - 11	32 - 35	18 - 24 (2)	12 - 15	75 - 85	15 - 18
427	70	80	80 - 90	9 - 11	32 - 35	18 - 24			
429	75	105	130 - 140	6 - 9	25 - 30	15 - 21			

(1) 7 - 9 (1/4 - 20)

(2) Montego, Cougar 15 - 20

TORQUE LIMITS – Continued

Engine	Main Bearing Cap Bolts (1)	Oil Pan Drain Plug	Oil Pump to Cylinder Block	Oil Pump Cover Plate	Oil Filter Adapter to Cylinder Block	Oil Filter to Adapter or Cylinder Block	Cylinder Front Cover
170, 200	60 - 70	15 - 20	12 - 15	6 - 9	10 - 15	With grease on the gasket surface, hand-tighten until gasket contacts adapter face, then tighten 1/2 turn more.	7 - 9
240			12 - 15	6 - 9	38 - 42		15 - 20
289 and 302			23 - 28	9 - 12	60 - 100		12 - 15
390 and 428	95 - 105		20 - 25	6 - 9	12 - 15		
427				6 - 9	12 - 15		
429		20 - 30		8 - 11	10 - 13		10 - 13

(1) Main bearing cross bolts, step 1 is 20, step 2 is 40.

TORQUE LIMITS – Continued

Engine	Water Pump to Cylinder Block or Front Cover	Camshaft Sprocket to Camshaft	Camshaft Thrust Plate to Block	Damper or Pulley to Crankshaft	Connecting Rod Nuts	Valve Rocker Arm Cover
170, 200	12 - 15	35 - 45	12 - 15	85 - 100	19 - 24	3 - 5
240	15 - 20	–	19 - 21	130 - 150	40 - 45	7 - 9
289 and 302	12 - 15	40 - 45	6 - 9	70 - 90	19 - 24	3 - 5
390, 427 and 428	20 - 25	35 - 45	12 - 15	70 - 90	(1)	4 - 7
429	20 - 25	40 - 45	6 - 9	75 - 90	40 - 45	2.5 - 4

(1) 390 and 428 (except Police) 40 - 45, 427 and 428 Police 53 - 58.

TORQUE LIMITS – Continued

Engine	Oil Inlet Tube to Oil Pump	Fuel Pump to Cylinder Block or Cylinder Front Cover	Air Manifold to Cylinder Head Thermactor	Thermal Sensing Unit	Check Valve to Air Manifold or Supply Tube Thermactor	Adjusting Arm to Air Pump Thermactor
170, 200	12 - 15	12 - 15	14 - 16	23 - 30	16 - 19 (1)	15 - 20 (1)
240		12 - 15	14 - 16			
289 HP		20 - 25	14 - 16			
302			14 - 16			
390, 427 and 428			14 - 16			
429	10 - 13		14 - 16		16 - 19	15 - 20

(1) Except 427.

TORQUE LIMITS – Continued

Engine	Valve Rocker Shaft Support to Cylinder Head	Valve Rocker Arm Stud to Cylinder Head	Valve Push Rod Chamber Cover	Valve rocker arm adjusting nut Removal torque (break-a-way) counterclockwise
170, 200	30 - 35	–	–	240, 289, 302 and 429 . . . . . 4.5 - 15 Ft-Lbs
240	–	–	1.0 - 1.5	Self-locking valve rocker arm adjusting screw (Minimum torque required to rotate)
390 and 427	40 - 45	–	–	170 . . . . . 7 Ft-Lbs
428	45 - 50	–	–	
429	–	65 - 75	–	

ENGINE SUPPORT TORQUE LIMITS – FT-LBS

Supports	Ford			Fairlane-Falcon			Mustang		
	240	302	390, 427 428	170 & 200	289 & 302	390 & 427	200	289 & 302	390 & 427
Engine Front Supports									
Front Insulator to Engine	35-50	35-50	35-50			35-50		25-40	
Front Support Insulator Bracket to Engine				–	–		18-24		35-50
Front Support Insulator Bracket to Insulator				18-25	–		–		45-60
Front Insulator to Support Bracket	45-60	35-50	45-60	24-34	–	45-60		35-50	35-50
Front Insulator to Mounting Bracket							25-35		
Support Bracket to Mounting Bracket						45-60		20-30	20-30
Support Bracket to Frame	20-30	20-30	20-30						
Support Bracket to Crossmember				20-30	20-30				
Mounting Bracket to Frame							20-30	20-30	20-30
Mounting Bracket to Crossmember						–			
Crossmember Assembly to Frame							45-60	45-60	
Engine Rear Supports									
Rear Support Assembly to Transmission	40-50	40-50	40-50						30-42
Insulator Assembly to Trans. – Standard				30-60	30-60	30-60	20-30	20-30	
– Automatic				30-60	30-60	30-60	30-42	30-42	
Insulator to Crossmember				25-35	25-35	25-35	25-35	25-35	
Rear Support Assembly to Crossmember	20-30	20-30	20-30						25-35
Crossmember to Frame	30-50	35-50	35-50	50-70	50-70	50-70	10-20	10-20	10-20

THUNDERBIRD ENGINE SUPPORT TORQUE LIMITS

Item	Ft-Lbs
Rear Support to Crossmember	12-20
Rear Support Retainer to Extension Housing	40-60
Front Insulator to Engine 390 V-8	45-65
Front Insulator to Support	
Bolt	25-40
Nut	15-25
Front Support to Crossmember	
Bolt	12-20
Nut	10-15

TORQUE LIMITS FOR VARIOUS SIZE BOLTS

Caution: If any of the torque limits listed in this table disagree with any of those listed in the preceding tables, the limits listed in the preceding tables prevail.

Size (Inches)	1/4-20	1/4-28	5/16-18	5/16-24	3/8-,/3/8-24	
Torque (Ft-lbs)	6-9	6-9	12-15	15-18	23-28	30-35
Size (Inches)	7/16-14	7/16-20	1/2-13	1/2-20	9/16-18	5/8-18
Torque (Ft-lbs)	45-50	50-60	60-70	70-80	85-95	130-145