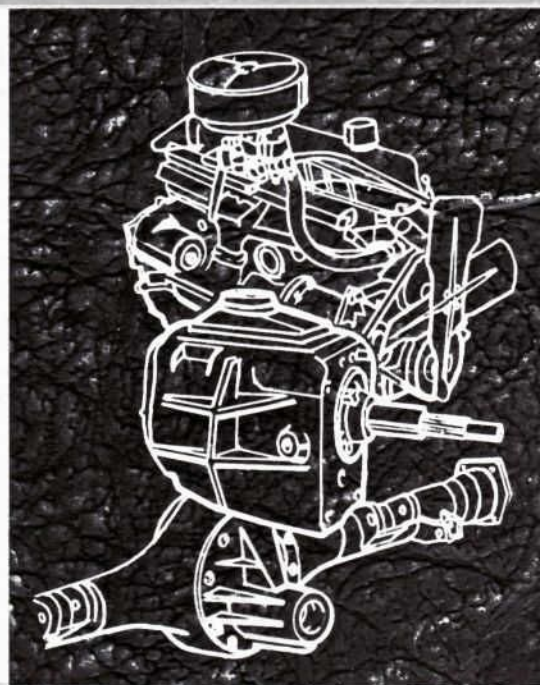


INTRODUCTION to the 1968 FORD PRODUCT LINE



VOL. 68 S1 L2



A PRELIMINARY SHOP MANUAL

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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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



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DEARBORN, MICHIGAN

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

SERVICE PROCEDURES AFFECTED (Continued)

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

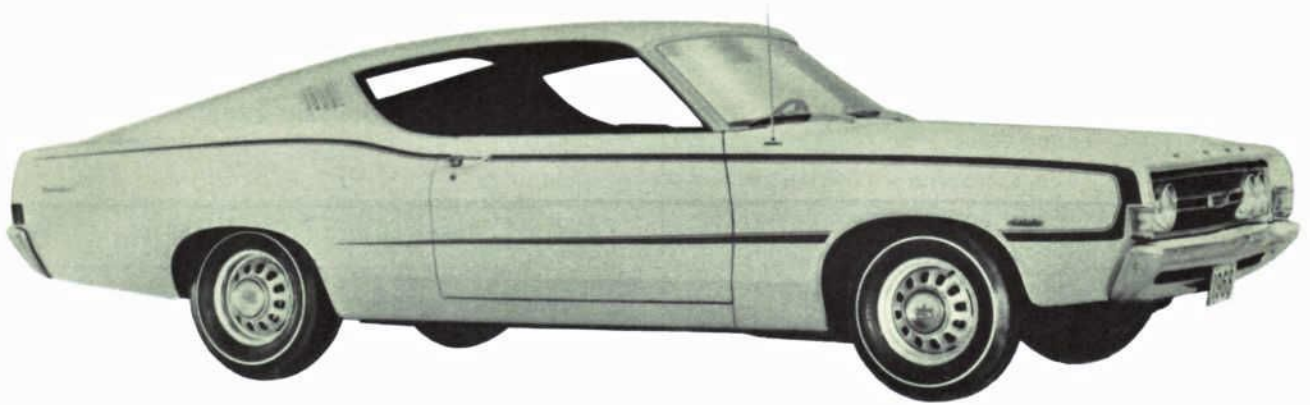
GROUP 1

VEHICLE IDENTIFICATION

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		
<u>Galaxie 500</u>		
55	63B	2-Door Hardtop — Fastback
58	65C	2-Door Hardtop — Formal Roof
<u>Ford XL (Bucket Seats and Console Standard)</u>		
60	63C	2-Door Hardtop — Fastback
61	76B	2-Door Convertible
<u>Ford LTD</u>		
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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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.

A PRELIMINARY SHOP MANUAL

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.

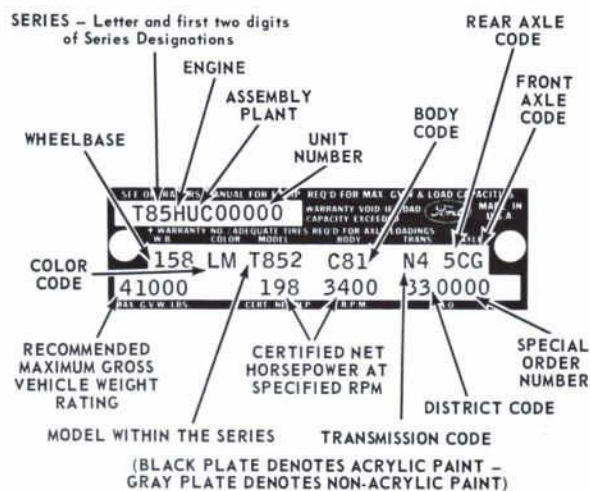
OTHER CODES

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 Plate

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.

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



A PRELIMINARY SHOP MANUAL

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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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:
- the addition of a number of new or modified five-speed units. (See page 51)
 - the inclusion of a new Ford-built five-speed transmission. (See page 139)
 - 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.

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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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Cqde	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 em-

Quick-Quiz

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

- for one dollar from Autolite/Ford Parts Division, Livonia, Michigan. (See page 120)
- for fifty cents through your dealer-ship's Parts Department. (See page 5)

bossed with the same serial number as shown on the rating plate.

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	
BRAKE ASSY. FRONT R.H.	DSO	FRONT SPRING	DSO
-2010-		-5310-	
BRAKE ASSY. FRONT L.H.	DSO	REAR SPRING-SINGLE AXLE	DSO
-2011-		-5560-	
BRAKE ASSY. REAR R.H.	DSO	TANDEM SUSPENSION ASSY.	DSO
BRAKE ASSY. REAR L.H.	DSO		
FRONT AXLE & STEERING		POWER TRAIN	
BRAKE CHAMBER ASSY. FRONT	DSO	FRONT AXLE ASSY.	DSO
BRAKE CHAMBER ASSY. REAR SINGLE AXLE OR REAR/REAR TANDEM	DSO	TIE ROD	DSO
BRAKE CHAMBER ASSY. FORWARD REAR AXLE (TANDEM ONLY)	DSO	-3280-	
BRAKE BOOSTER ASSY. SINGLE AXLE OR REAR/REAR (TANDEM ONLY)	DSO	STEERING GEAR	DSO
BRAKE BOOSTER ASSY. FORWARD REAR (TANDEM ONLY)	DSO		
MISCELLANEOUS		WHEELS - HUBS - DRUMS	
SPEEDOMETER GEAR-DRIVING	DSO	REAR AXLE ASSY. SINGLE AXLE OR REAR/REAR (TANDEM ONLY)	DSO
SPEEDOMETER GEAR-DRIVEN	DSO	REAR AXLE ASSY. FORWARD REAR (TANDEM ONLY)	DSO
-17322-		GEAR SHIFT TOWER ASSY.	DSO
ELECTRICAL		TRANSMISSION ASSY.	
ALTERNATOR	DSO	-7B072-	
WIRING DASH PANEL TO ENGINE	DSO	ENGINE	DSO
-14398-			
WIRING-COWL	DSO	INSPECTOR	
-14401-			

RETAIN ONE COPY OF THIS LIST IN TRUCK AT ALL TIMES

IT CONTAINS THE INFORMATION NECESSARY TO CORRECTLY IDENTIFY THE COMPONENTS SHOWN

ADDITIONAL COPIES AVAILABLE ON REQUEST FROM:

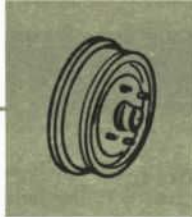
AUTOLITE/FORD PARTS DIVISION
SPECIAL ORDER SECTION
P.O. BOX 3020
LIVONIA, MICHIGAN 48151

ENCLOSE \$1.00 FOR EACH COPY. IDENTIFY THE VEHICLE BY SERIAL NUMBER SHOWN ABOVE

MFG 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

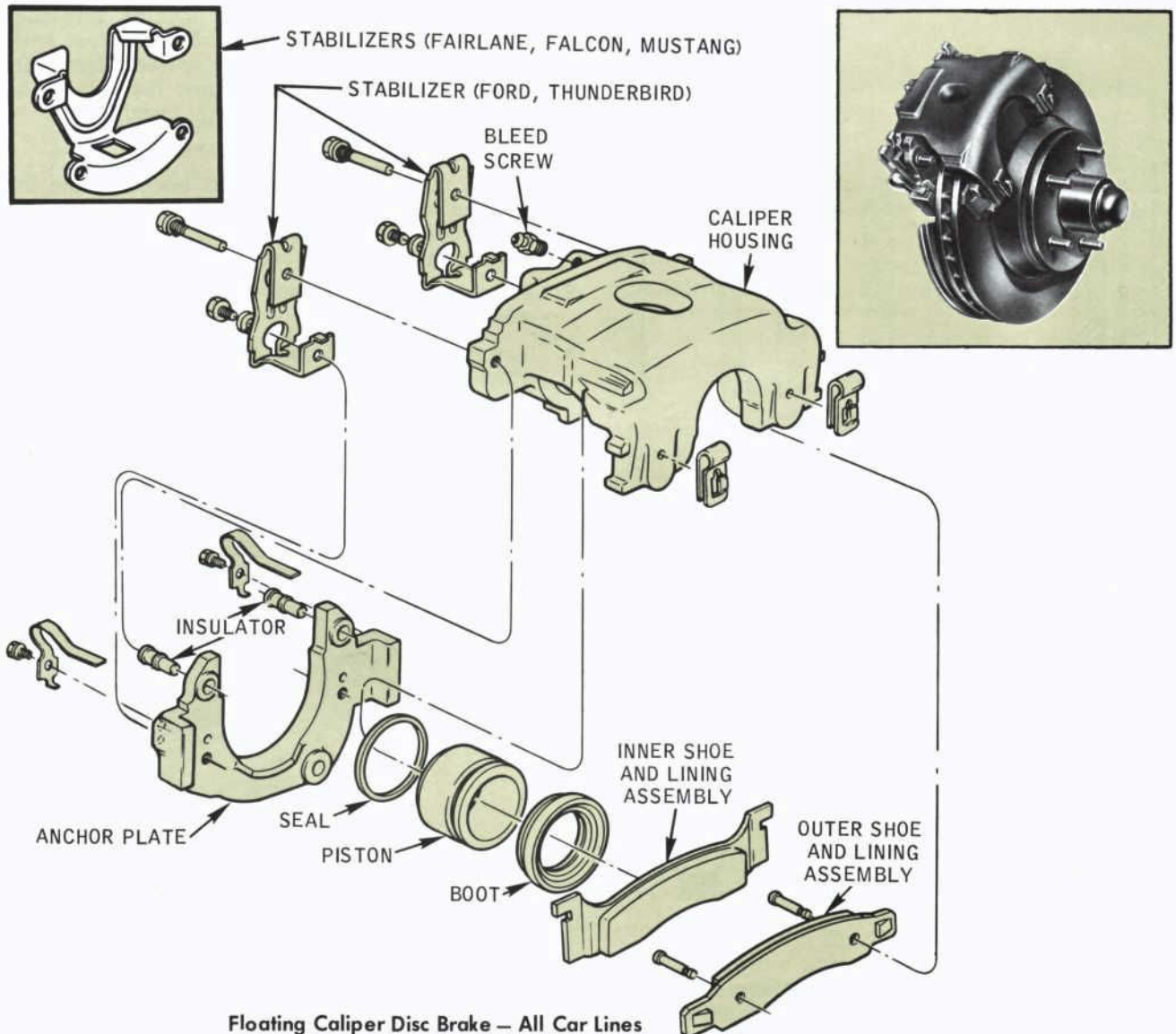
CAR

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

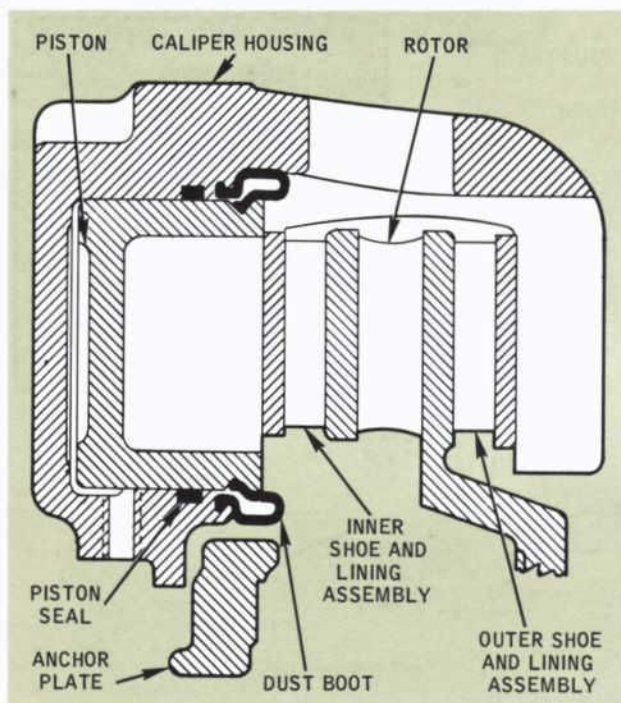
Q 7-3 a) Nope! Unlike the forward clutch friction plates, these plates come in only one size. There's another way to make this adjustment—review the instructions and take another crack at the question!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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 in-board 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

Quick-Quiz

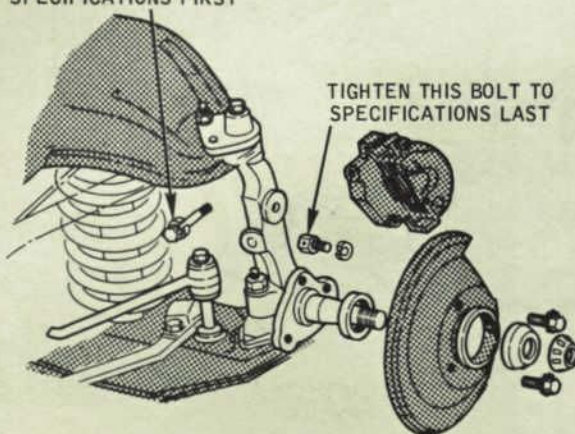
- Q 2-1** One difference between the new floating caliper disc brakes for the '68 full size Ford and the '68 Mustang is:
- they require two different procedures for attaching the anchor plates. (See page 39)
 - in the design of the stabilizers. (See page 50)

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!

- 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.
- Then install the upper bolt and torque it to specifications.
- 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.

INSTALL BOTH CALIPER ATTACHING BOLTS FINGER-TIGHT, THEN TIGHTEN THIS BOLT TO SPECIFICATIONS FIRST



Caliper Attaching Bolt Tightening Procedure

- 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. In-

stead, 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 connected 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.

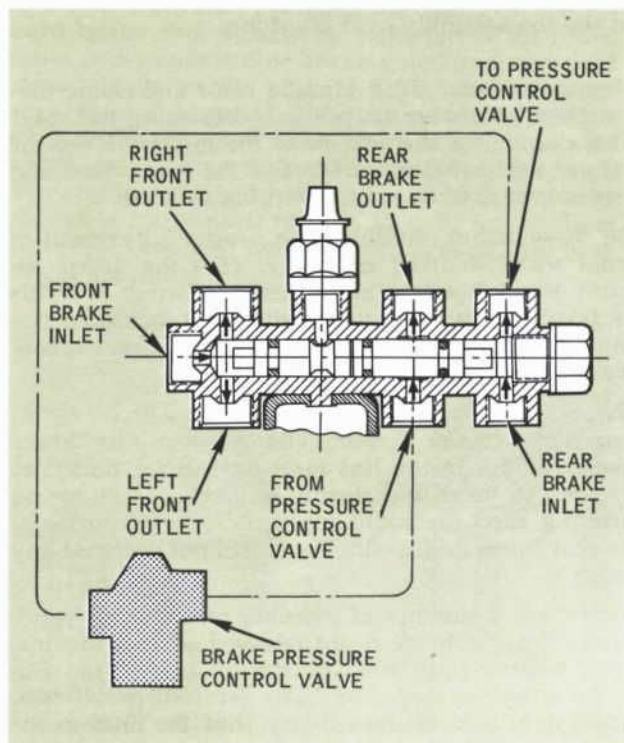
BRAKE PRESSURE DIFFERENTIAL VALVE — DISC BRAKE CARS

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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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.

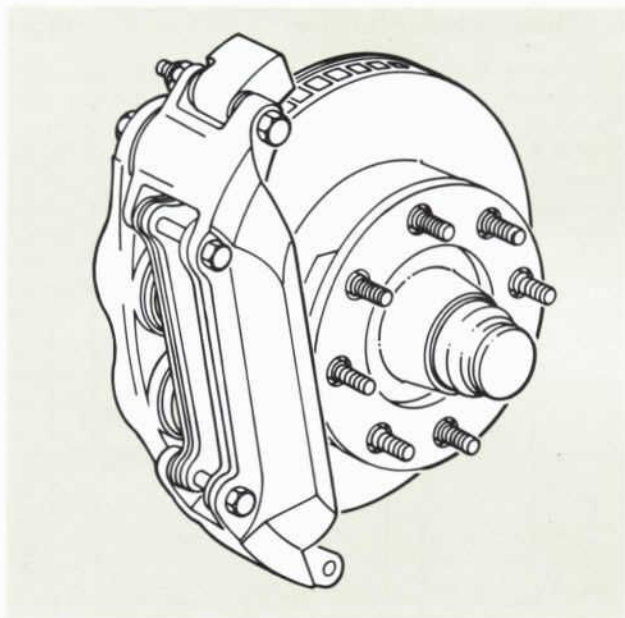
Operation

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.

A PRELIMINARY SHOP MANUAL

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.

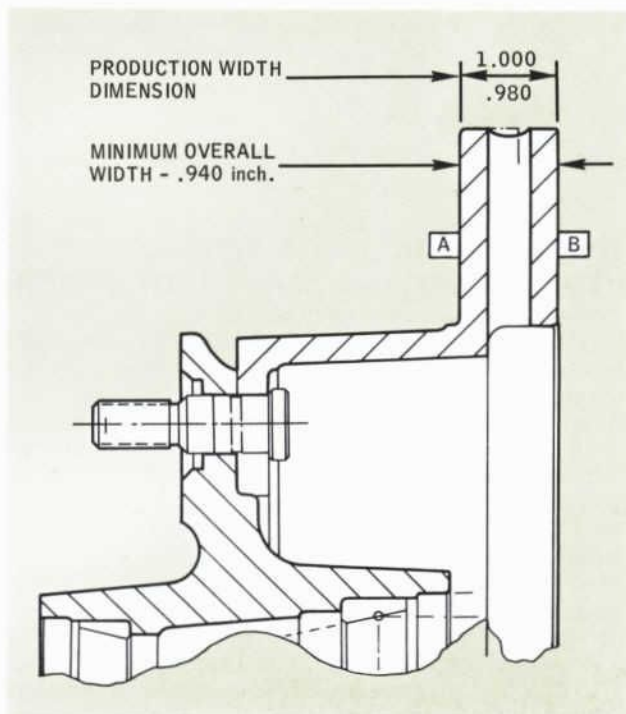
1. With the wheel and tire off, remove the lining mounting bolts and springs.
2. Then lift the linings out of the opening in the top of the housing.
3. Remove master cylinder cover.
4. Loosen piston and cylinder housing mounting bolts a sufficient amount to provide clearance for installing new linings. *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.



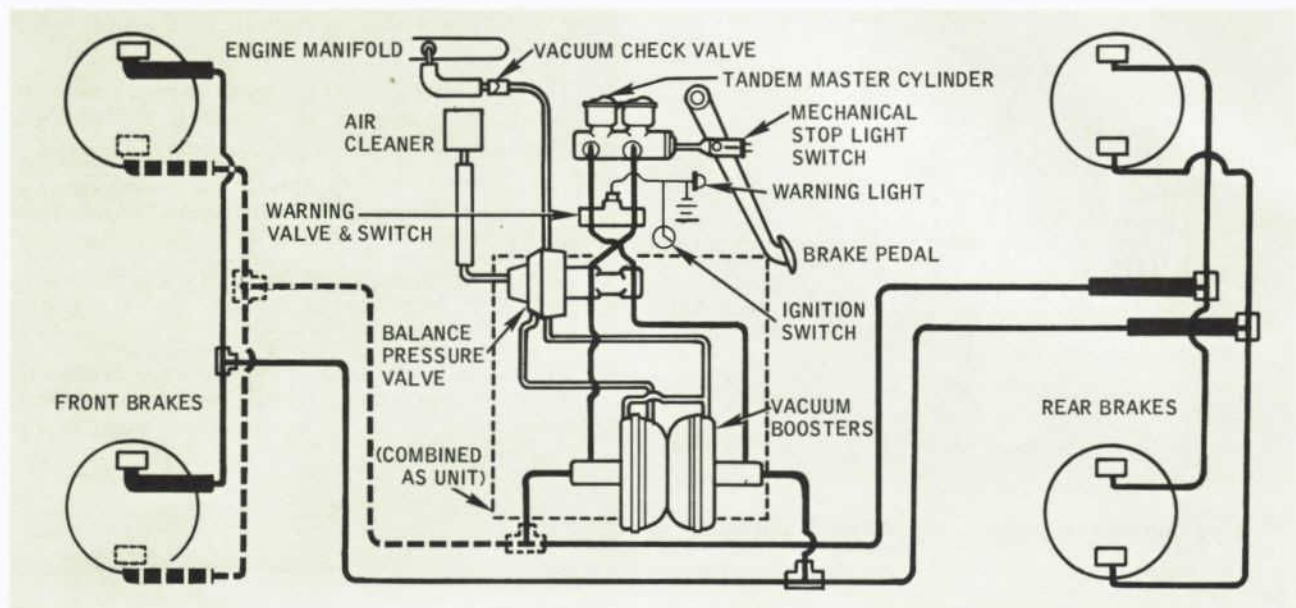
Disc Brake Rotor Refinishing Dimensions

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

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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. Surfaces "A" and "B" must be true and round, 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. How-

ever, 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.

GROUP 3

SUSPENSION, STEERING, WHEELS AND TIRES

FORD CAR AND TRUCK



CAR

REAR SUSPENSION LEVELING SYSTEM — FORD

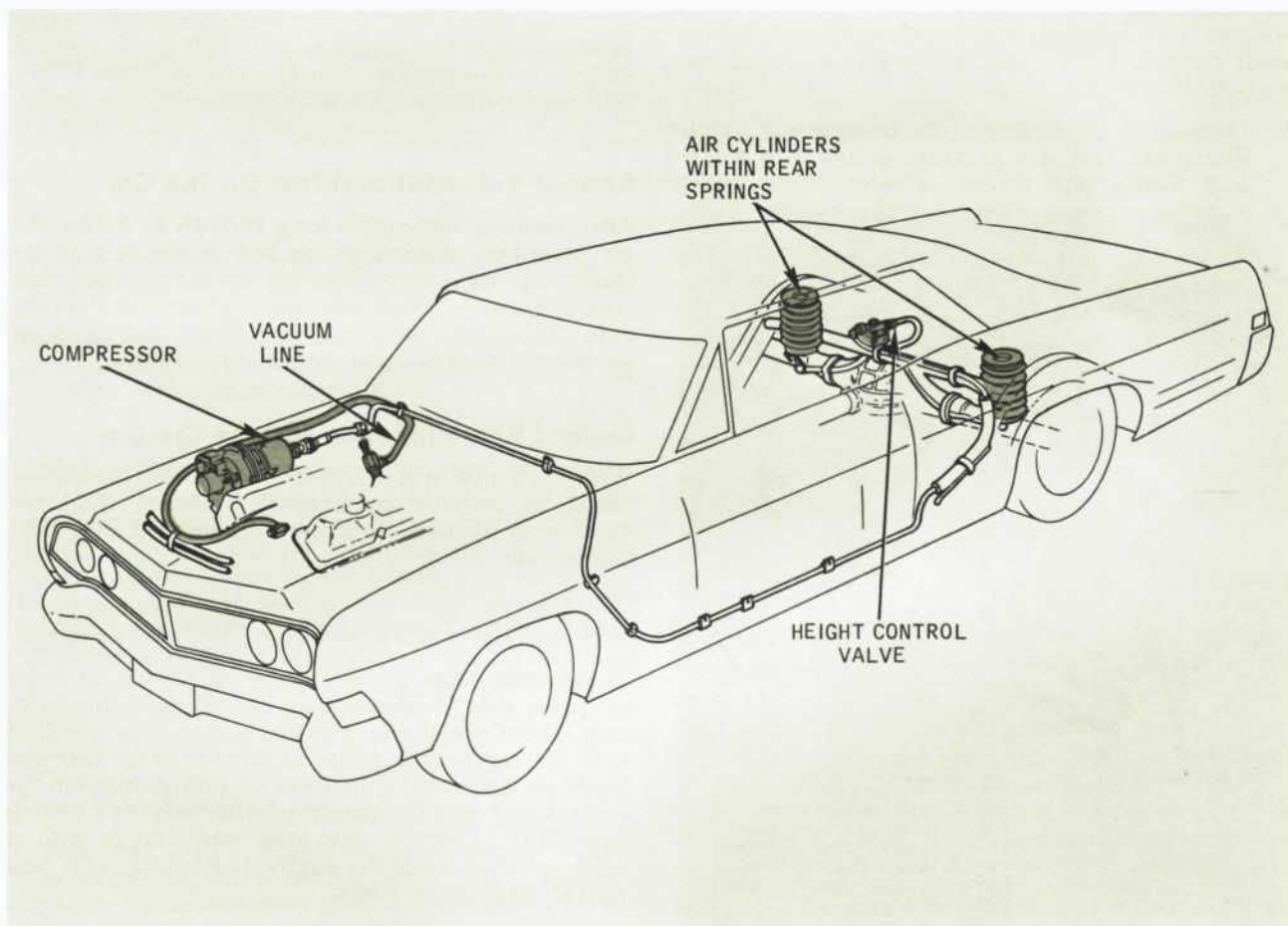
Full-size Ford cars have an optional pneumatic rear suspension leveling system that automatically maintains proper rear end height with added loads of up to 250 pounds on the rear axle. The automatic load leveler consists of heavy-duty rubber air cylinders, similar to conventional auxiliary air springs, 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!*

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

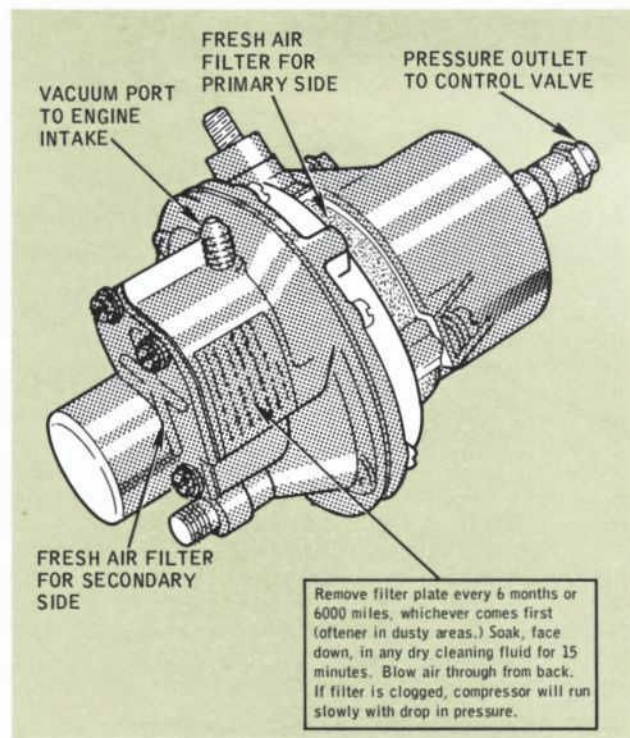
1. If the fuel tank isn't full, add an equivalent weight (6 pounds per gallon) to the luggage compartment or rear compartment area. Other than that, the car should be empty.
2. Then add a two-passenger load (no more than 250 pounds) to the bumper or tailgate to make the car settle lower, and start the 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

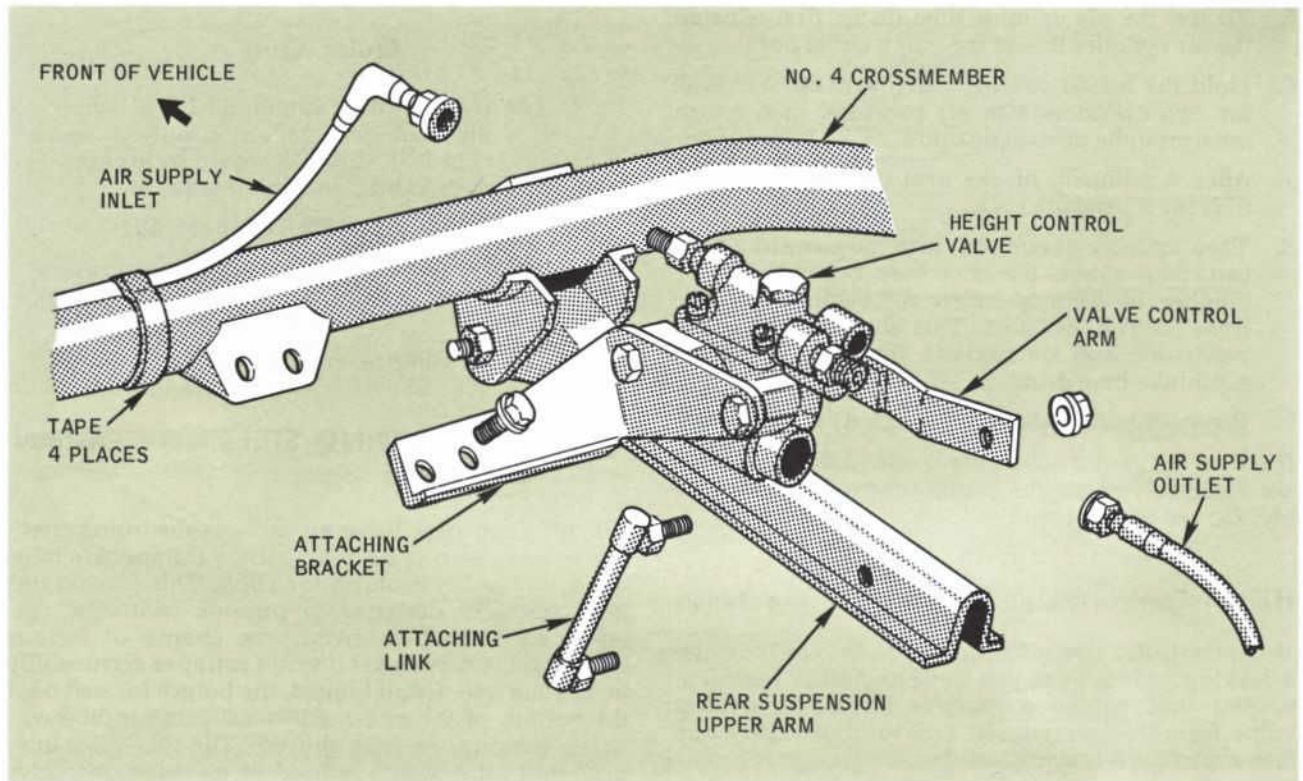
With the valve arm link disconnected and the engine idling to provide compressor pressure, hold the valve arm up and see if the cylinders inflate within 60 seconds.

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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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 sideways 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!

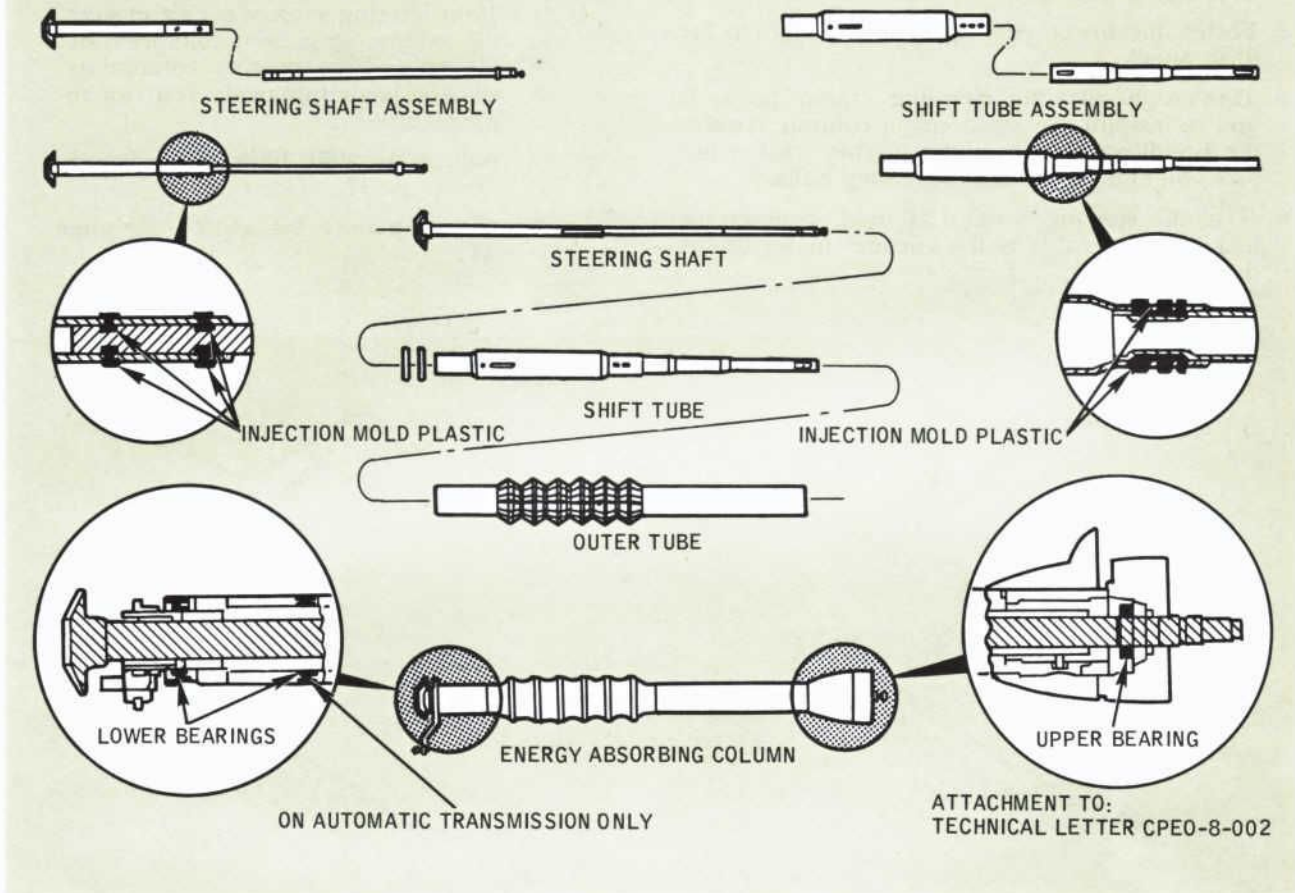
There is one precaution which positively *must be observed* to avoid serious internal damage to the steering column assembly. *Under no circumstances should the steering shaft ever be struck with a hammer or other tool!* Don't even use a knock-off type puller to remove the steering wheel. Use only the 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?

A PRELIMINARY SHOP MANUAL

ENERGY ABSORBING STEERING COLUMN ALL 1968 PASSENGER CARS



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."

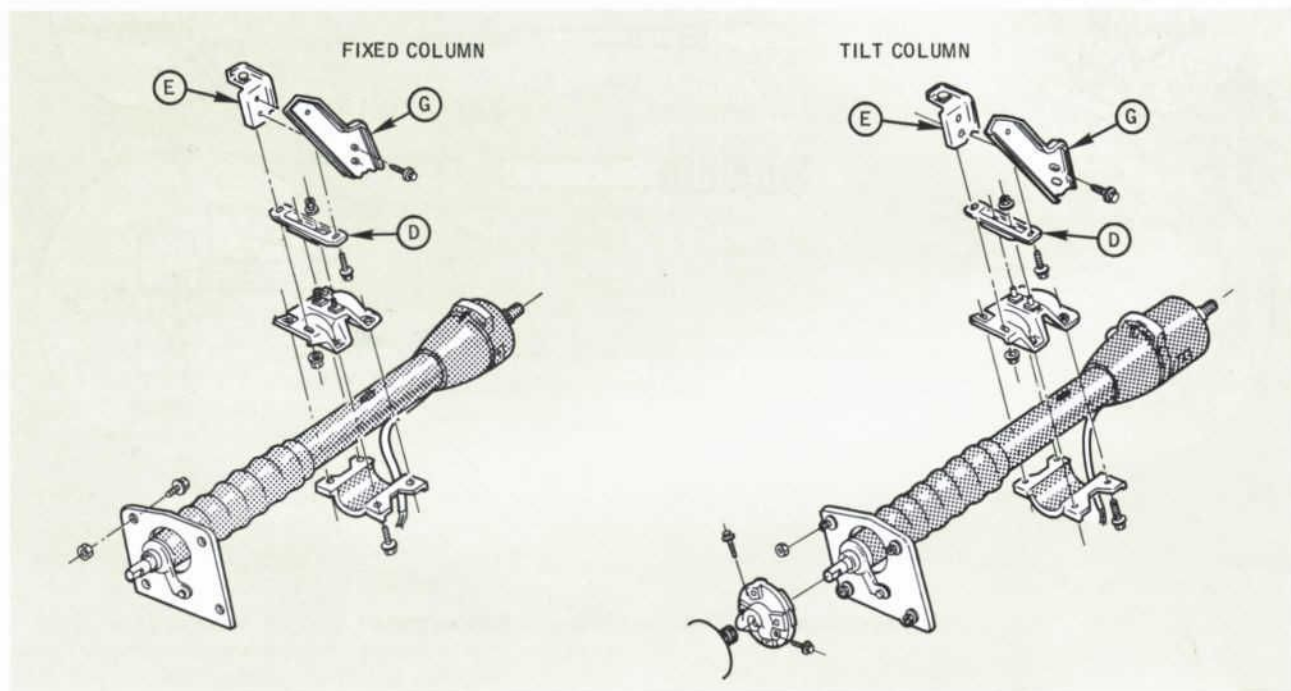
Q 6-5 b) You've got the right idea, but the wrong end! RT-510 countershafts are stepped with the smaller diameters toward the forward end of the shaft, so the gears must come off and go on that way.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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)



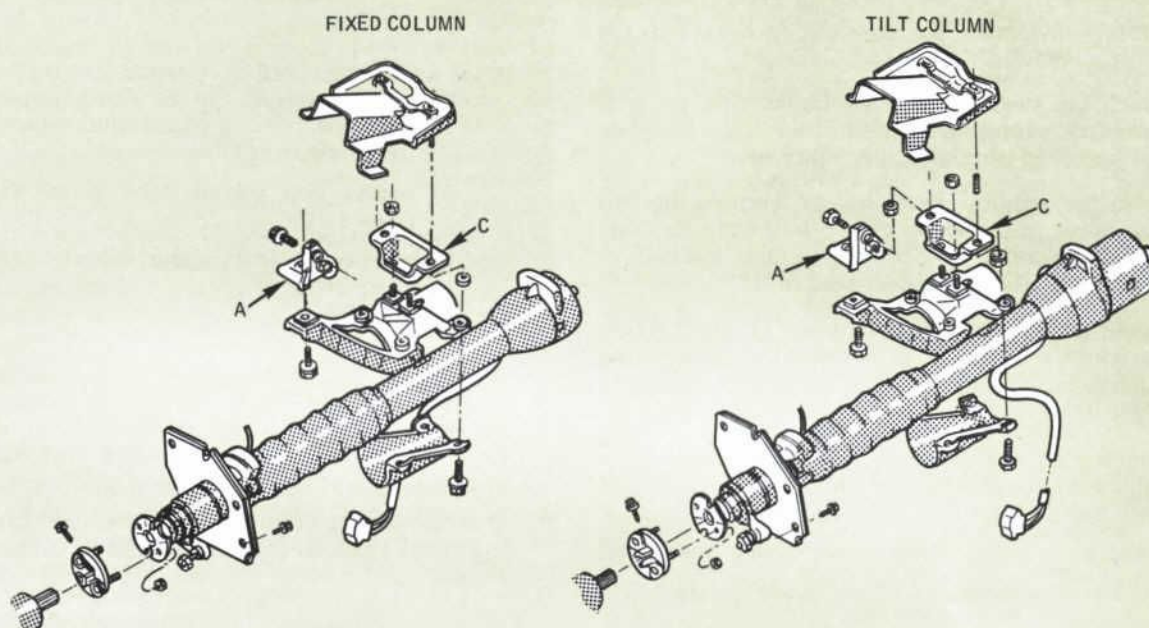
Steering Columns and Attaching Parts — Thunderbird

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!

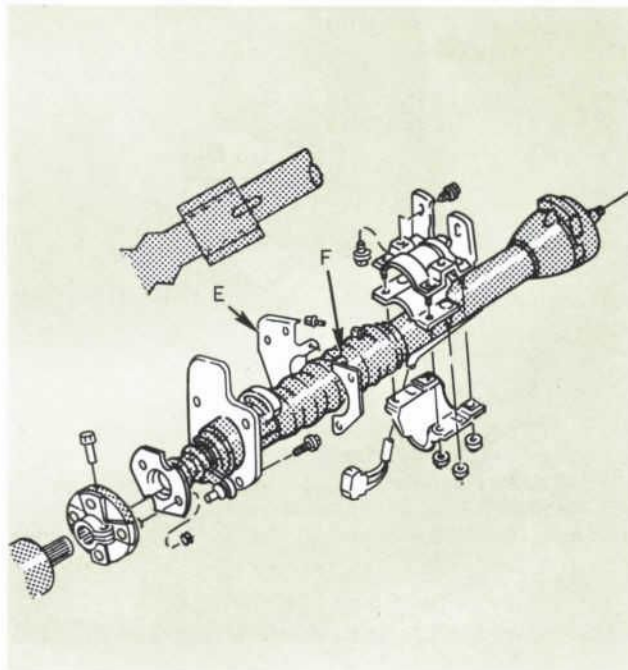
A PRELIMINARY SHOP MANUAL



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!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Mustang Steering Column Installation

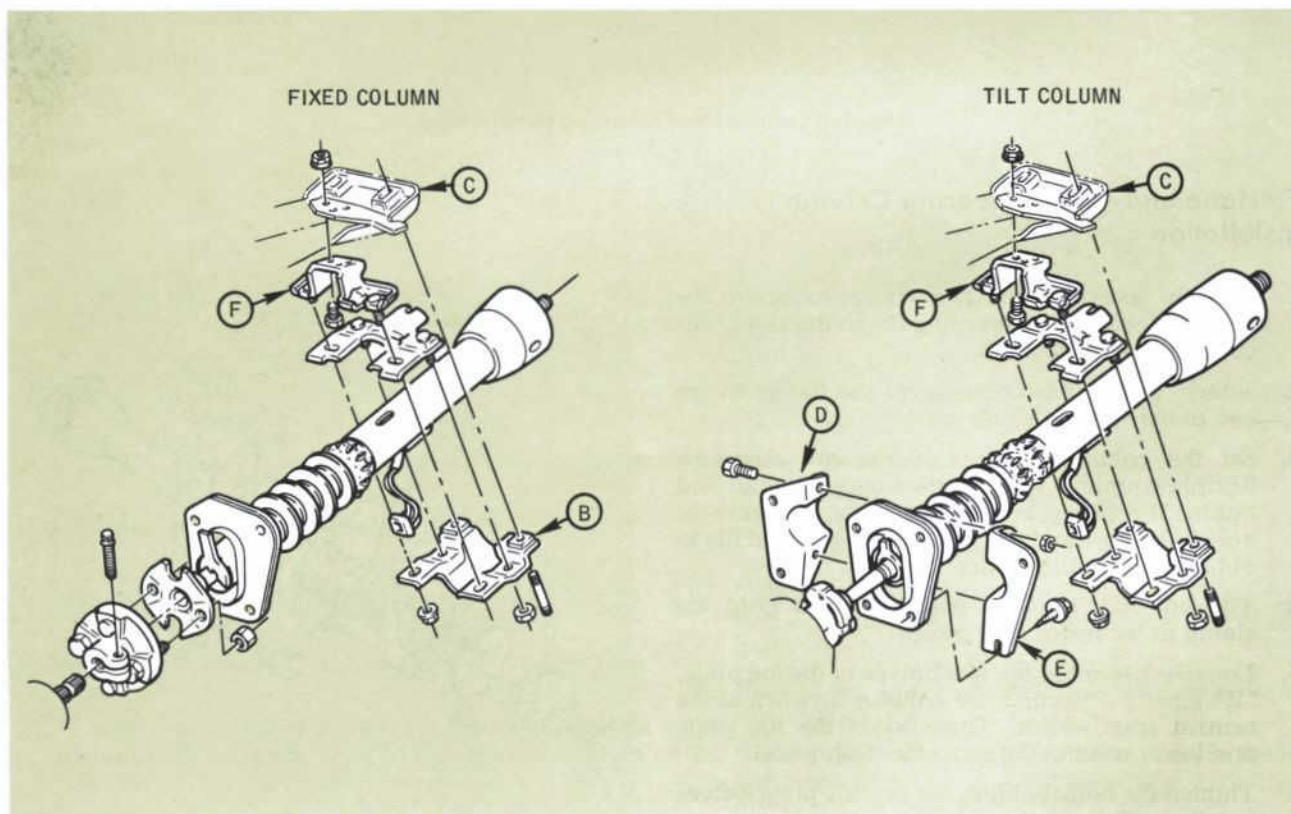
1. Loosely assemble the two clamp halves to the column.
2. Attach the steering shaft to the steering gear. If necessary, elongate the bolt holes in the toe plate and flange to obtain proper alignment.
3. Raise the column assembly to engage the two rear holes in the lower clamp half with the studs in 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.

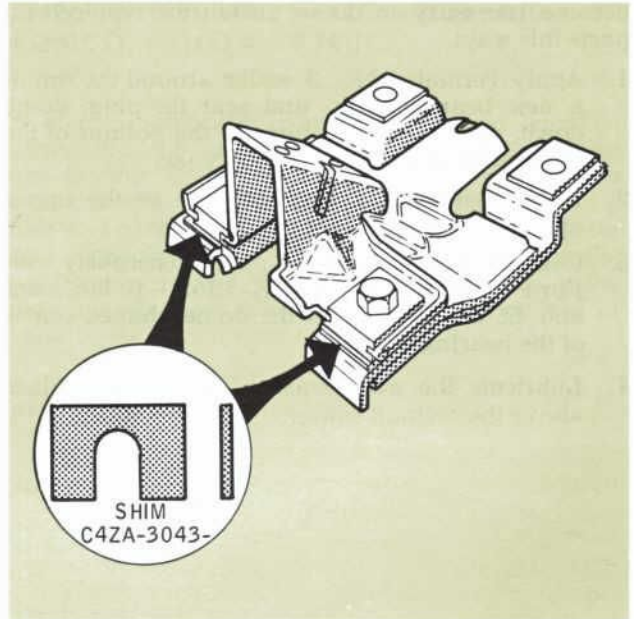
A PRELIMINARY SHOP MANUAL

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.

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,



Steering Wheel Height Adjustment — Mustang

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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

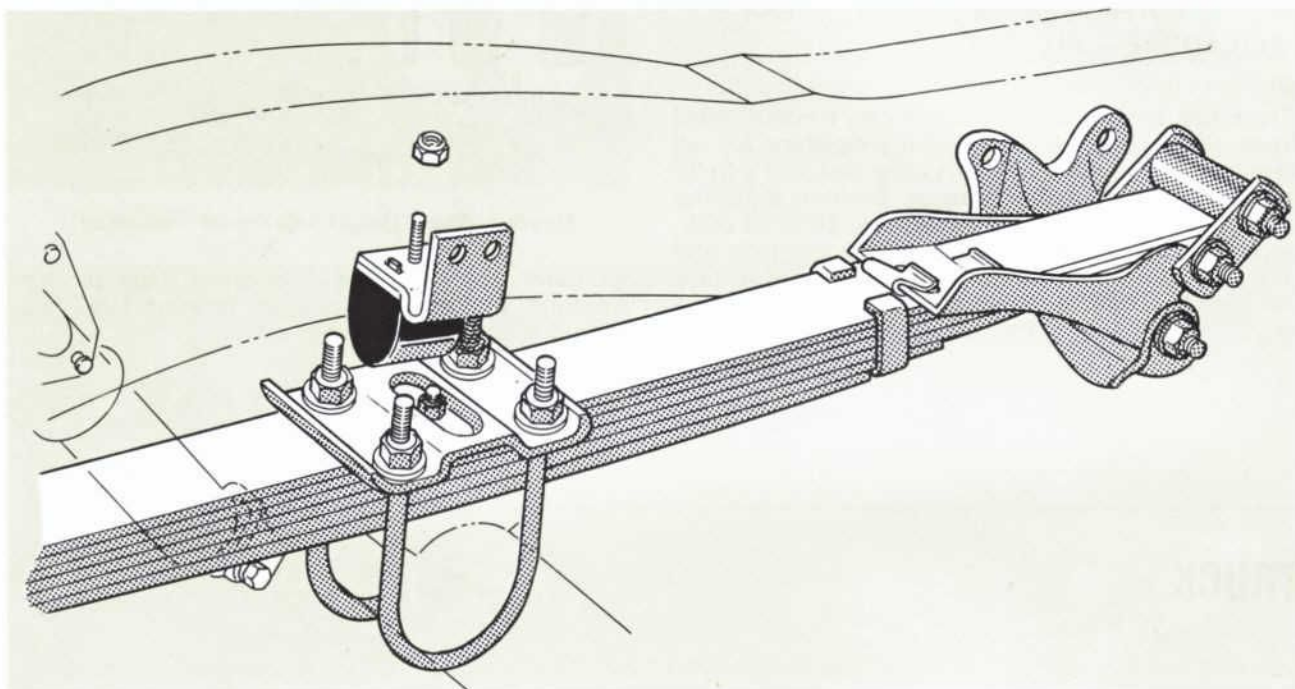
become necessary to do so, install the replacement parts this way:

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)



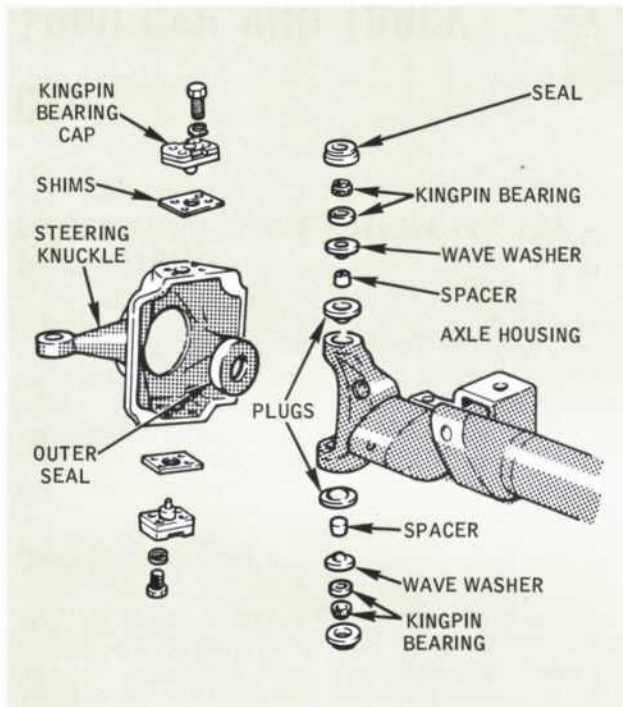
Compensating Shackle Rear Suspension — F-100 and F-250 4x2 Trucks

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?

A PRELIMINARY SHOP MANUAL

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

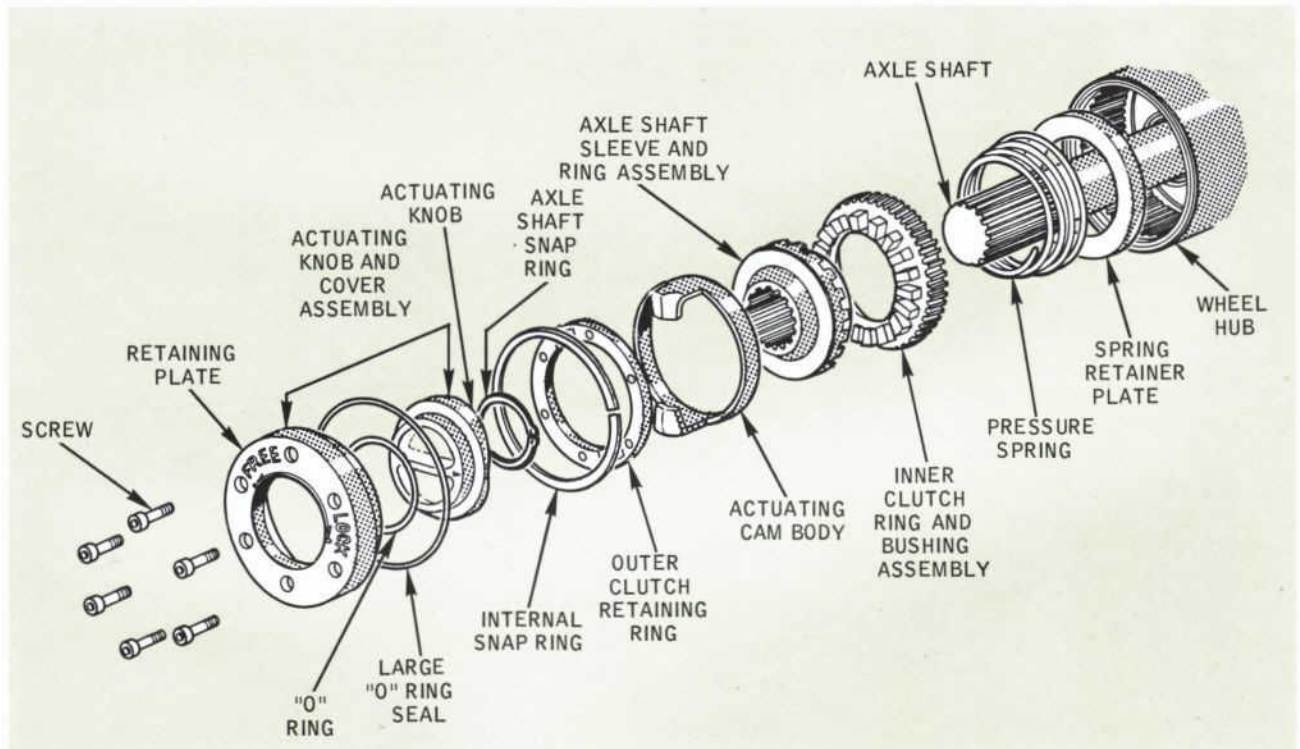


To reduce lubricant contamination and lengthen service life, the optional free-running front wheel hubs for the '68 Bronco and F-100 4x4 truck have been changed to improve sealing. The actuating knob and cover assembly is now secured to the outer clutch retaining ring with six screws — double the amount 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.

Steering Knuckle Disassembled — Bronco, F-100 4x4



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.

FORD CAR AND TRUCK

CAR



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.

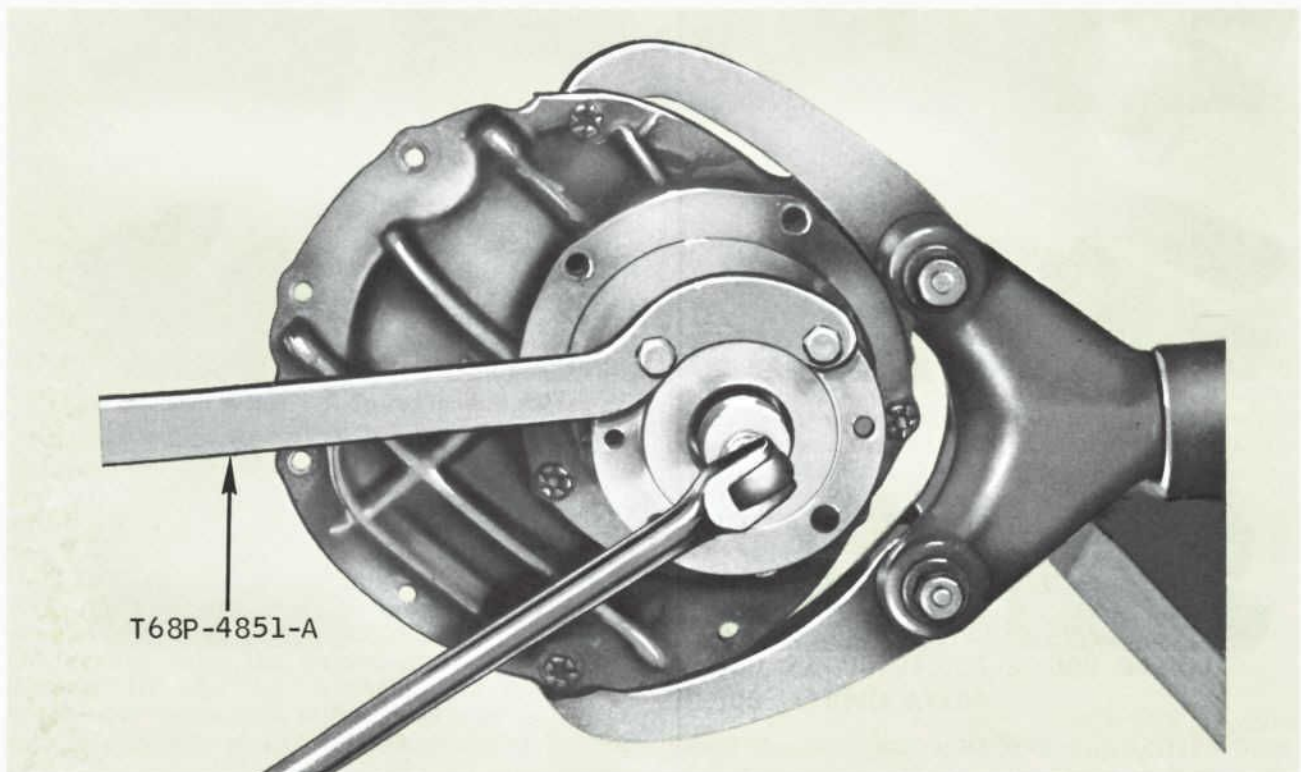
New Service Tool

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.*

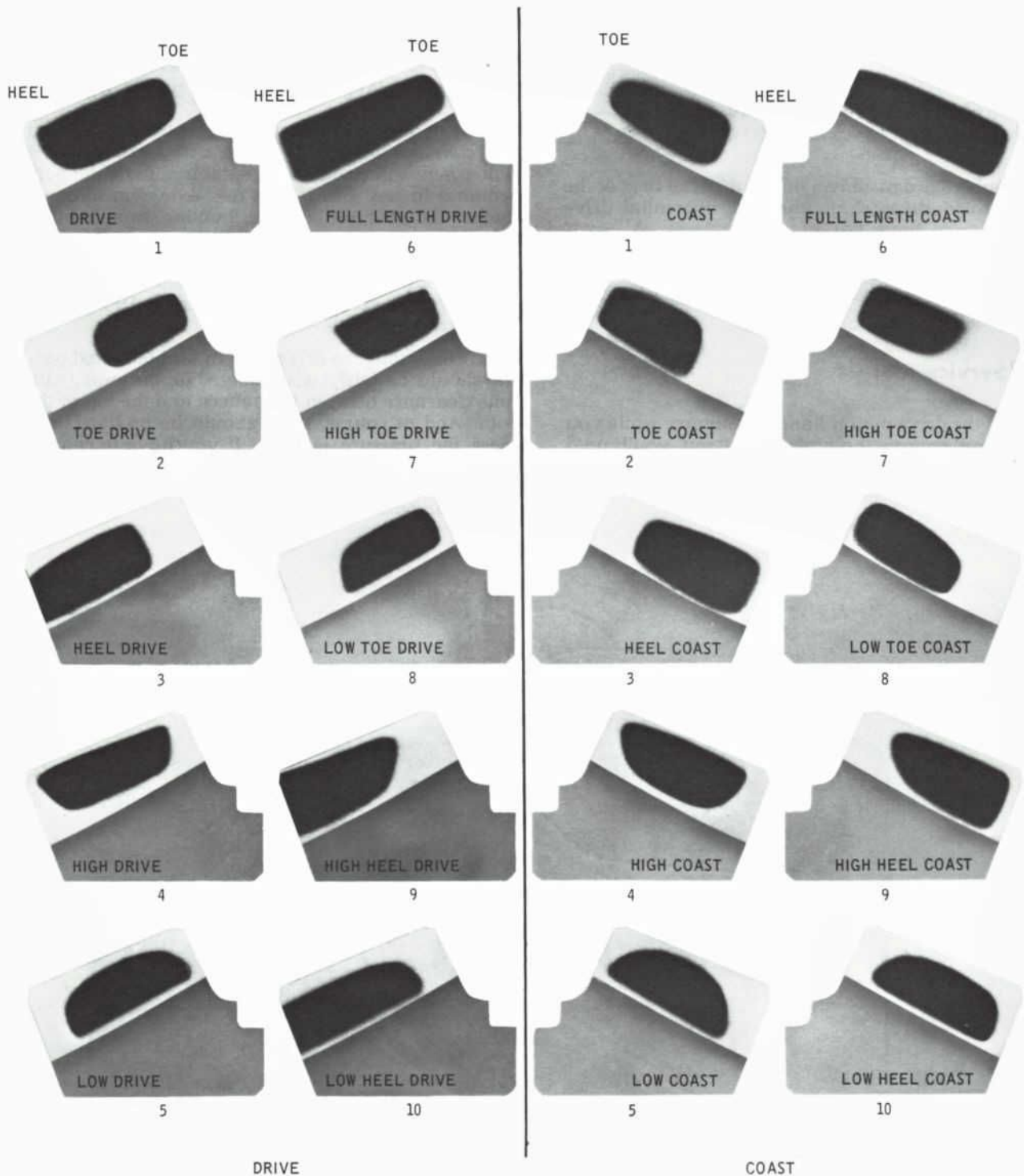


Removing Differential Pinion Shaft Nut – Thunderbird

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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

ANY COMBINATION OF DRIVE AND COAST PATTERNS SHOWN PERMISSIBLE



Axle Drive and Coast Patterns

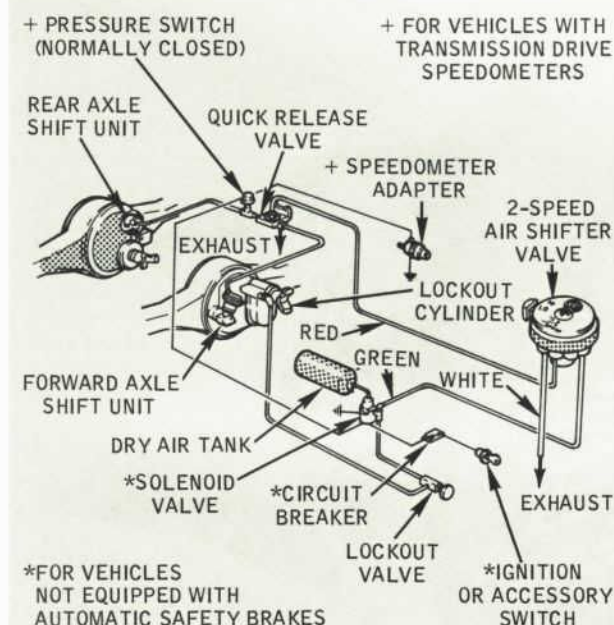
Q 6-6 c) Oops! You missed one! These marks are not to be made until the *assembly* of the transmission is well under way — not during *disassembly*! With that tip, see if you can find the right answer.

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.

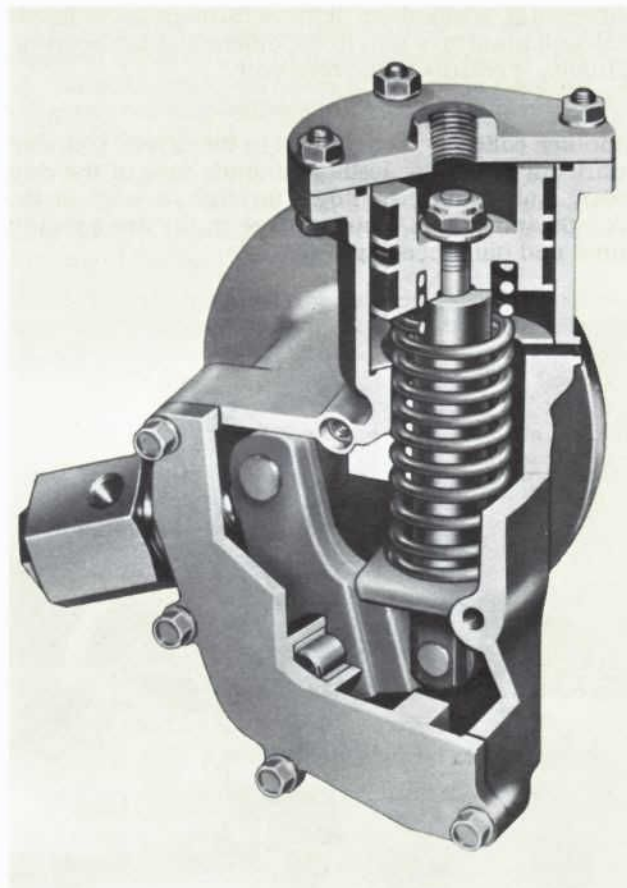
Essentially, the 2-speed system is similar to the previously covered 3-speed system as regards most operating components. However, the driver's control knob is a two-position air valve and the system plumbing is simpler.



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.

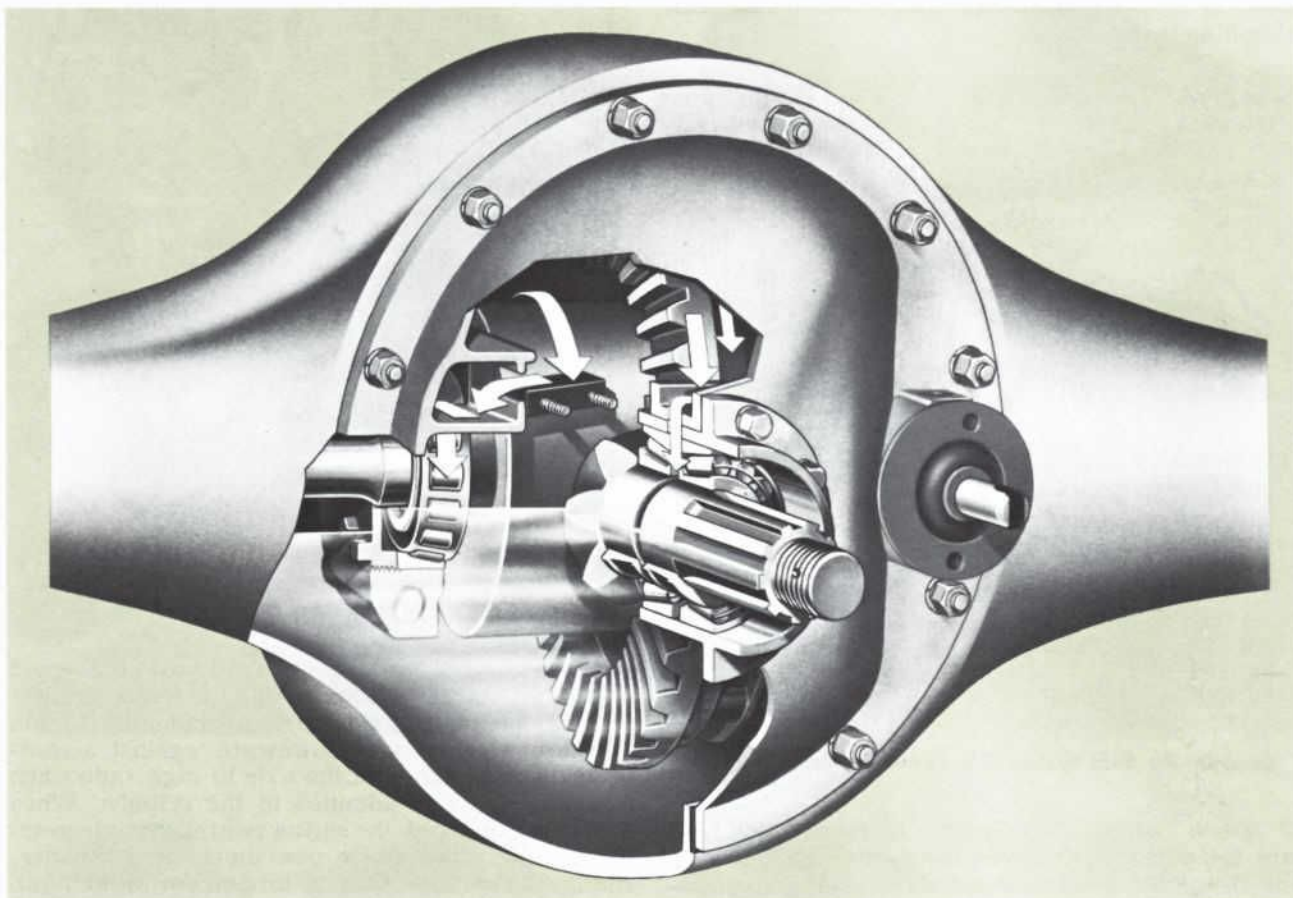
INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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!

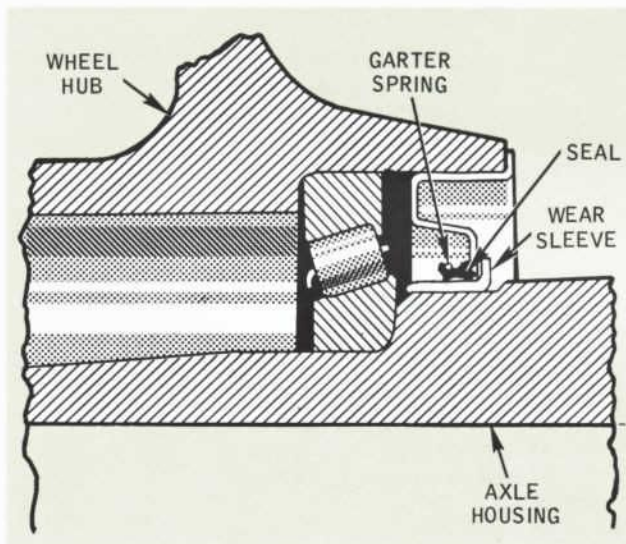
DIFFERENTIAL GEAR TOOTH PATTERNS — ALL FORD-BUILT REAR AXLES

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 extremes — 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.

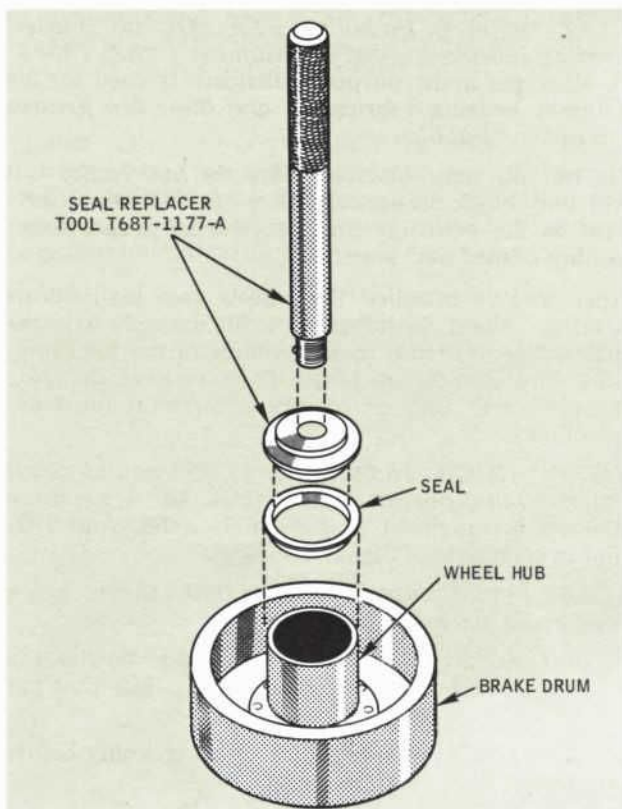
The new seal replacer, Tool T68T-1177-A, has drivers for six different seal diameters. Application by axle capacity is stamped on the face of each driver. Since the seal material is synthetic, you don't need to soak it in oil before installation. And don't apply gasket cement or sealer to the outer rim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

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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

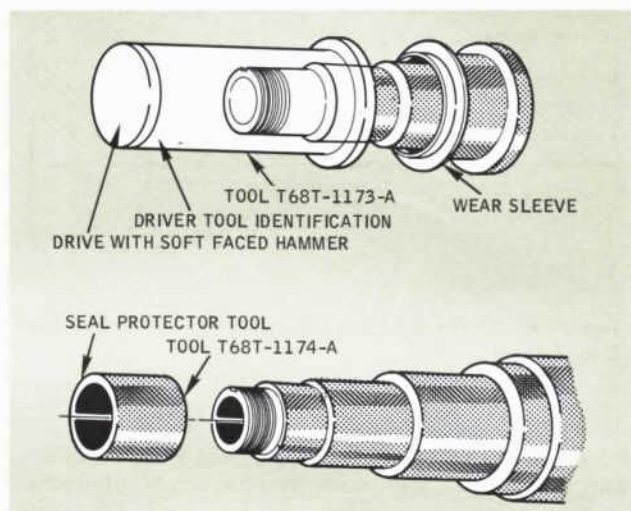
The synthetic material used in the new seal contributes to the effectiveness of the seal, but this material

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



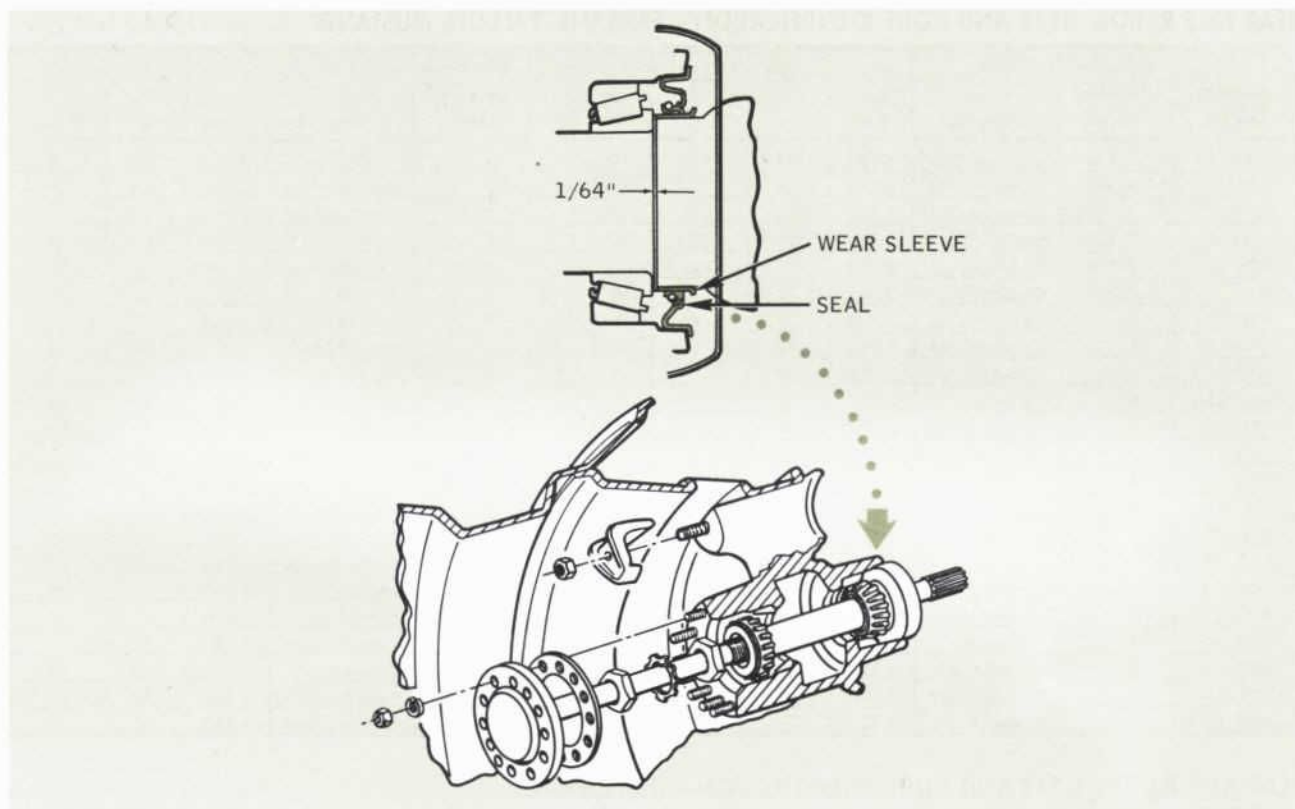
Installing Wear Sleeve

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!

A PRELIMINARY SHOP MANUAL



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!*

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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	Description	Inch
Maximum Runout of Backface of Ring Gear	0.003	Nominal Pinion Locating Shim	
Maximum Radial Runout of Companion Flange Thunderbird	0.005	Ford – (except 8-1/2 Ring Gear)	0.015
Differential Side Gear Thrust Washer Thickness	0.030-0.032	Ford 8-1/2 Ring Gear	0.030
Differential Pinion Gear Thrust Washer Thickness	0.030-0.032	Falcon, Fairlane, Mustang Integral Carrier Type – Rear Bearing Cone to Pinion Gear	0.017
Drive Pinion Bearing Solid Spacers (Used with 9-3/8 ring gear)		Removable Carrier Type	
6 Spacers in increments of 0.002 inch	0.466-0.476	8 Dia. Ring Gear	0.022
14 Spacers in increments of 0.001 inch	0.477-0.490	8-3/4 - 9 Dia. Ring Gear	0.015
Differential Bearing Preload (Case Spread Across Differential)	0.008-0.012	Thunderbird	0.015
New Bearings		Available Pinion Shims (in steps of 0.001 inch)	
Original Bearings		Ford	0.010-0.029
7-1/4 Ring Gear	0.003-0.005	8-3/4, 9, 9-3/8 inch	0.010-0.029
7-3/4, 8, 8-3/4, 9, 9-3/8 Ring Gear	0.005-0.008	8-1/2 inch	0.022-0.038
8-1/2 Ring Gear	0.006-0.010	Falcon, Fairlane, Mustang Integral Carrier Type	
Original Bearings – Thunderbird	0.005-0.008	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 bypass 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.

A PRELIMINARY SHOP MANUAL

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 Hvy. Duty	30-40 50-70	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 New Bearings (In-Lbs) (Collapsible Spacer)	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 New Bearings (Case Spread)	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
 ④ And New Seal

③ If This Torque Cannot Be Obtained with a Used Spacer, Install a New Spacer.

⑤ 9" Ring Gear, 180-220 for 9-3/8" Ring Gear
 ⑥ Ford 8-1/2" Ring Gear

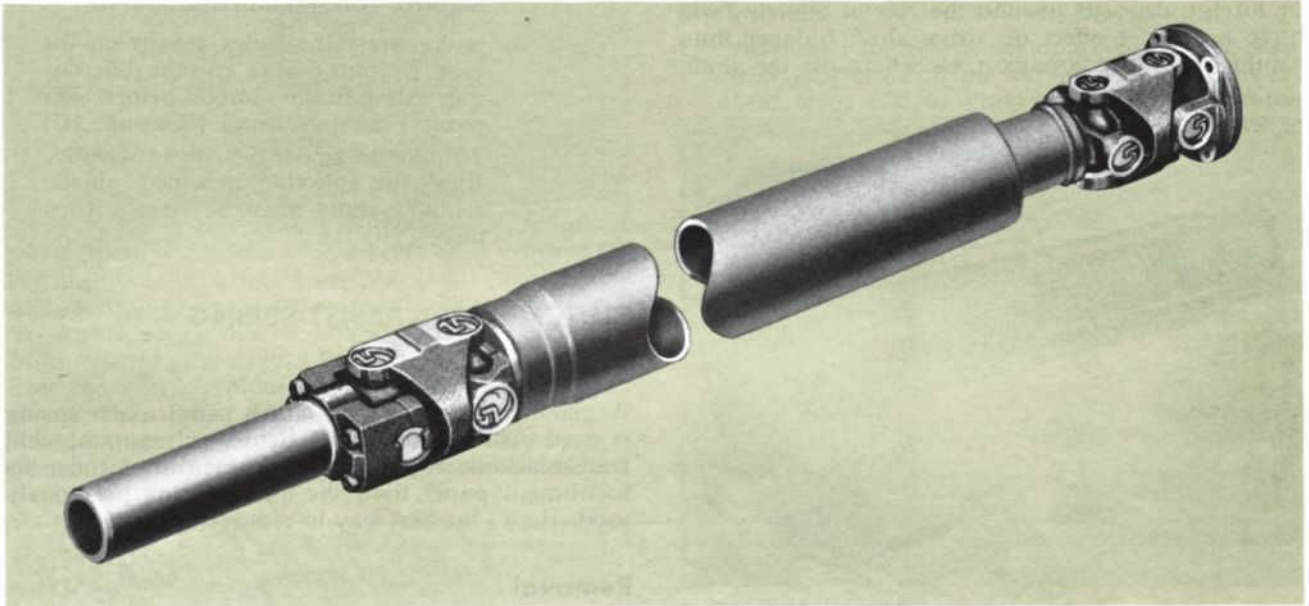
Q 2-1 a) Sorry . . . you're wrong! You should use the same procedure for attaching the anchor plate for *all* floating caliper disc brakes. It's the only way to get the anchor plate aligned correctly.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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.

FORD CAR AND TRUCK



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 com-

panion 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.

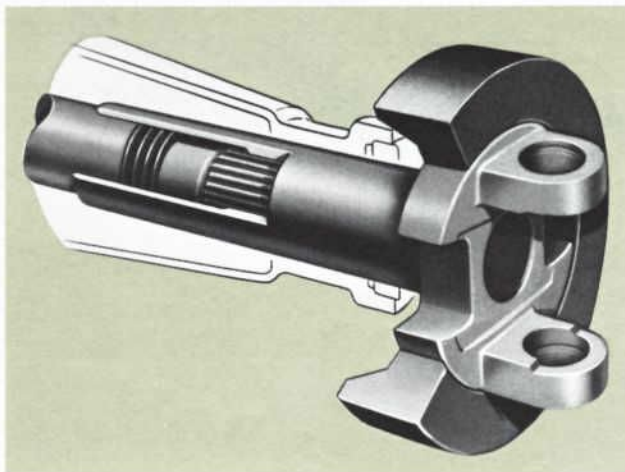
DRIVE SHAFT INERTIA RING — FORD

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

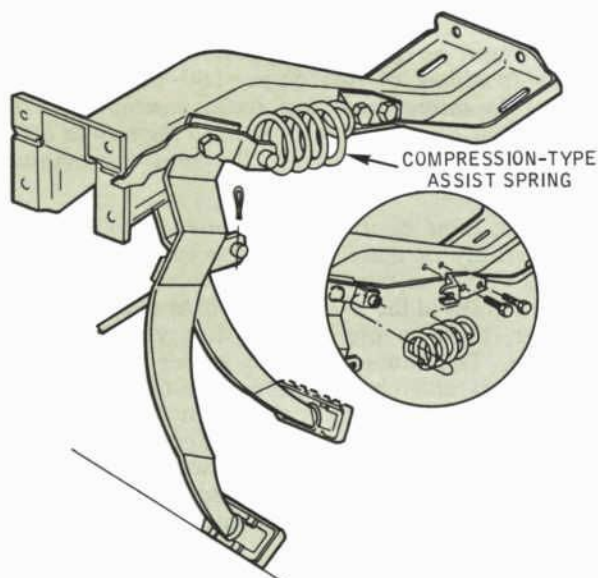
Q 4-1 b) Too bad! You missed the last sentence in the article on the conical-type differential carrier. *There is no front filler hole in these units, so there can't be any plug in it!*

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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 serv-

ice viewpoint between this new suspended pedal mounting and most other suspended pedal mountings is the absence of a pedal retracting spring.

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

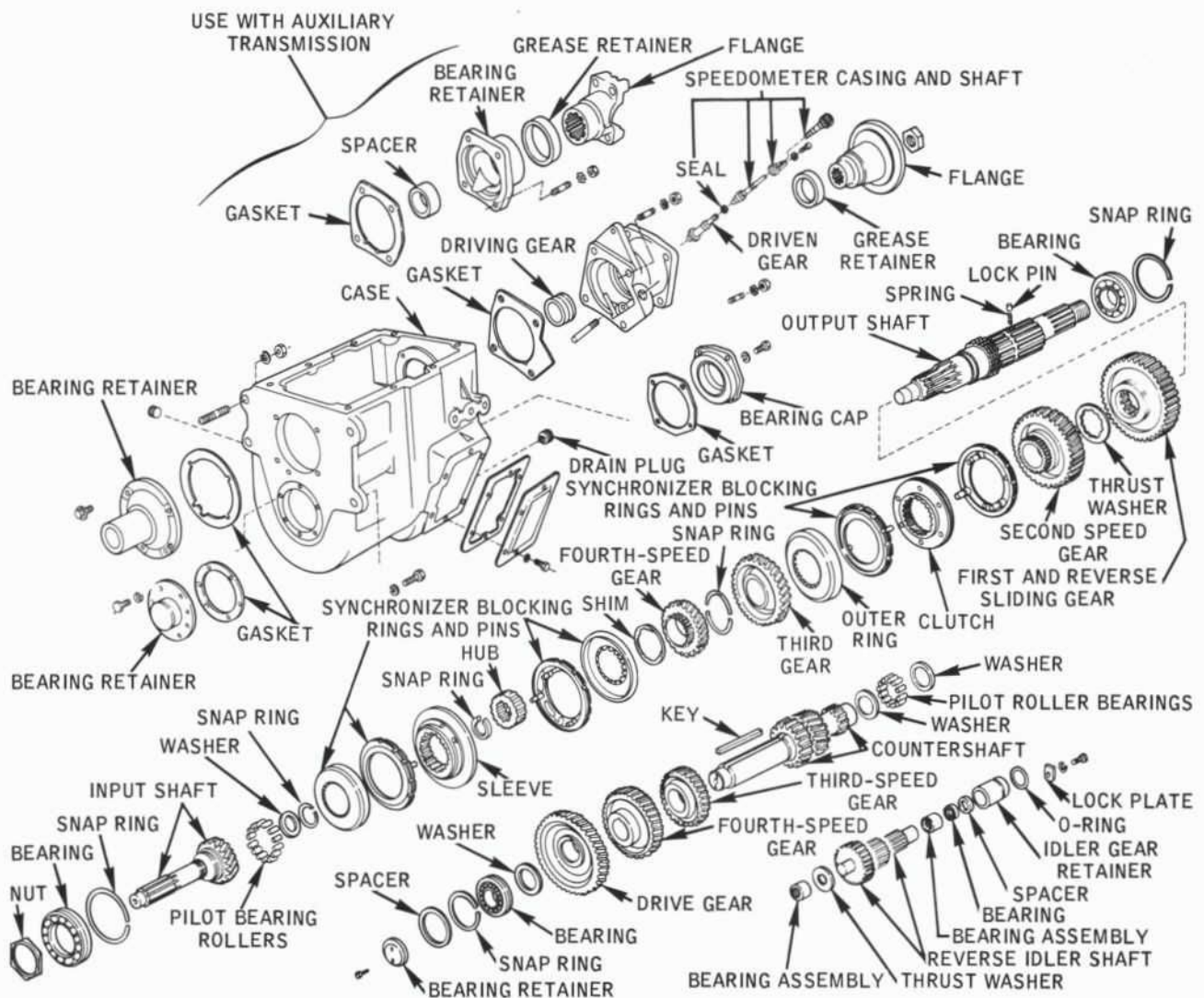
The New Process 541-FD and 541-FO five-speed transmissions have been used on previous Ford trucks. Beginning in March, 1966, a number of them were used for a brief interval as alternate units to certain Clark five-speed units in F and B 500 and 600 trucks. However, since these transmissions were not 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.

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New Process 541 Five-Speed Transmission Disassembled

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- 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.

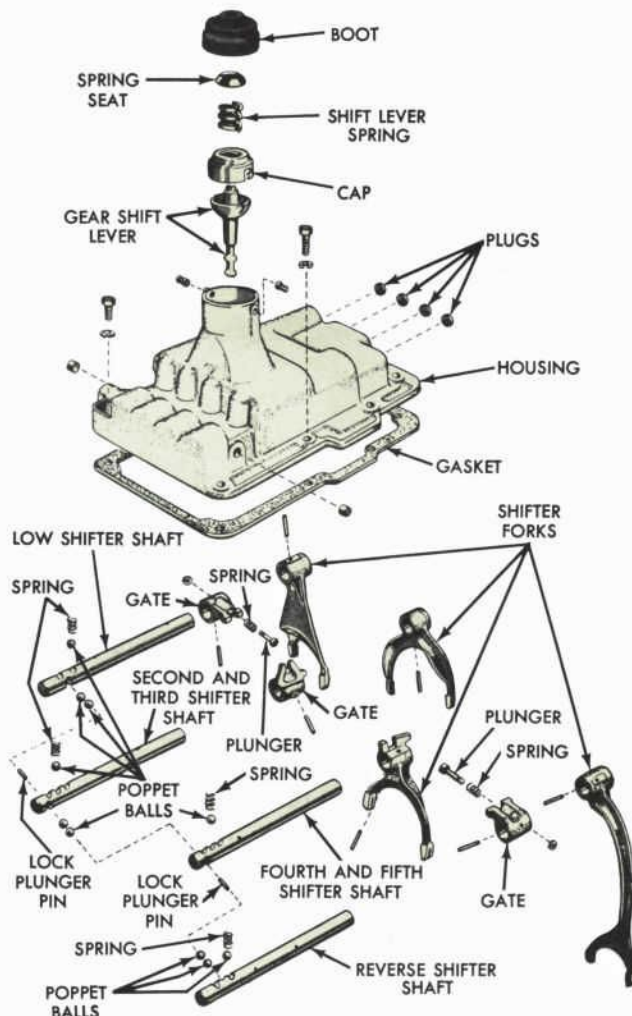
Gear Shift Housing Disassembly



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

- 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.
- With a punch, drive the four expansion plugs out of the housing.
- With a screw extractor, remove the pins that hold the forks and gates on the shifter shafts.
- 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

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

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**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 hard-tops and convertibles are located under the trim panel . . . and they're kinda hard to reach with the panel in place!

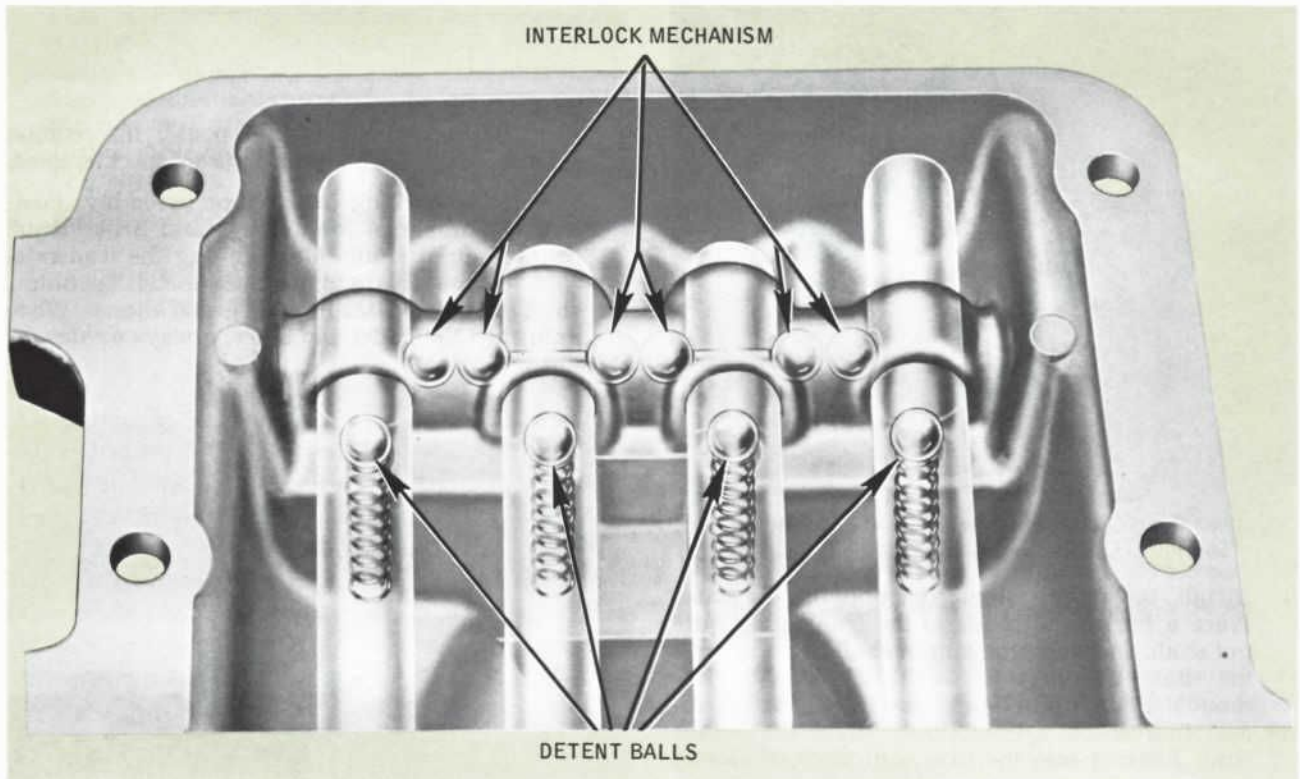
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4. Place the fourth-speed gear on the output shaft, with the clutch teeth toward the front. Slide the shims over the fourth-speed clutch teeth. Place the fourth- and fifth-speed synchronizer clutch hub on the output shaft, with the oil slots toward 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.

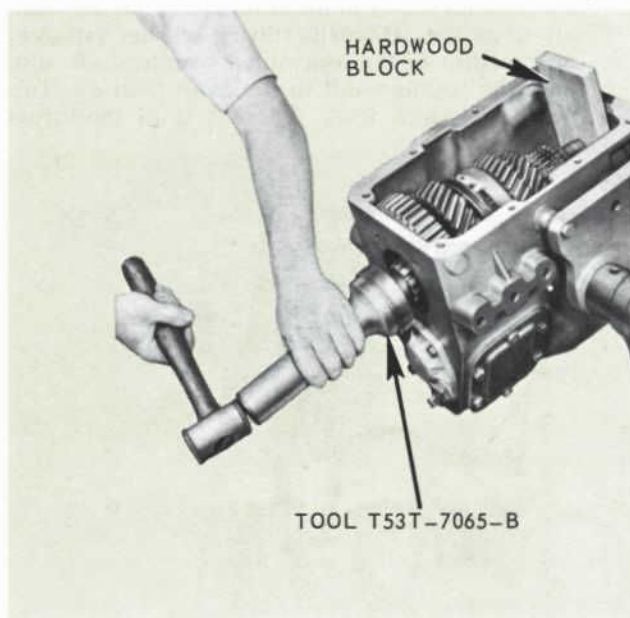
Install the countershaft rear bearing and retainer cap and gasket. Torque the bolts to specifications. Remove the countershaft front bearing outer retainer. Install the inner retainer that holds the countershaft on the bearing inner race. Torque the inner retainer bolts to specifications and install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

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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

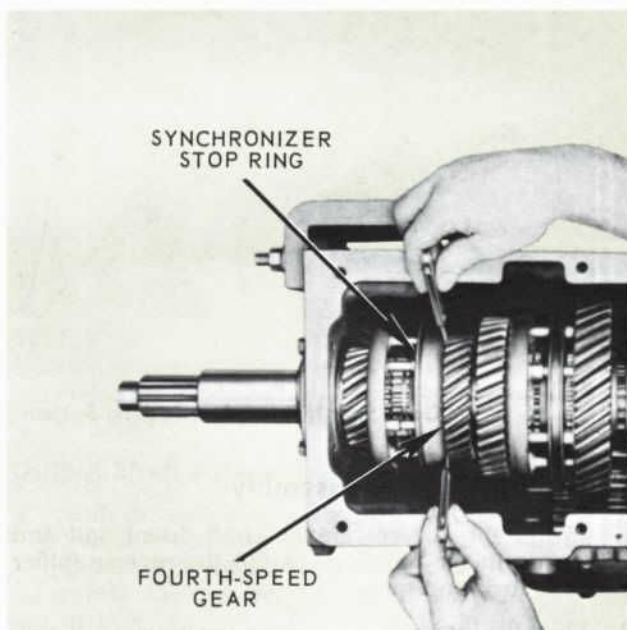
Quick-Quiz

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)

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.



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

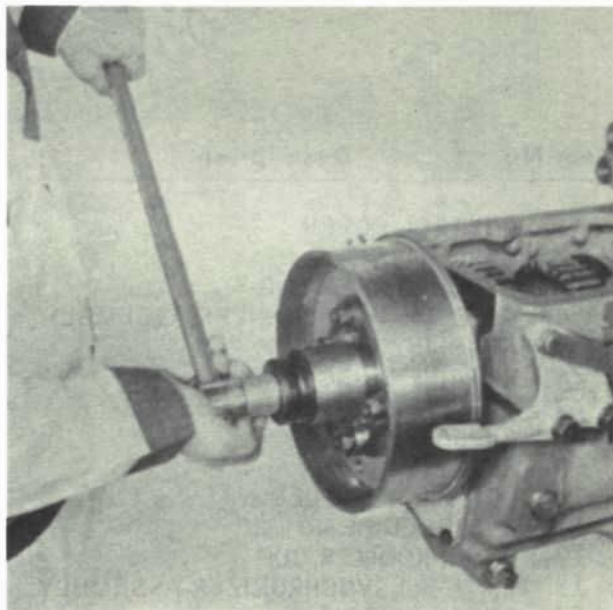
Part Name	Ft.-Lbs
Clutch Housing Stud Nuts	90-95
Clutch Housing Bolts (to Transmission)	85-90
Output Shaft Bearing Retainer Bolts	25-35
Input Shaft Bearing Retainer Bolts	25-30
Gear Shift Housing Bolts	18-25
Gear Shift Lever Housing Bolts	35-40
Countershaft and Idler Shaft Retainer Bolts	18-25
Output 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

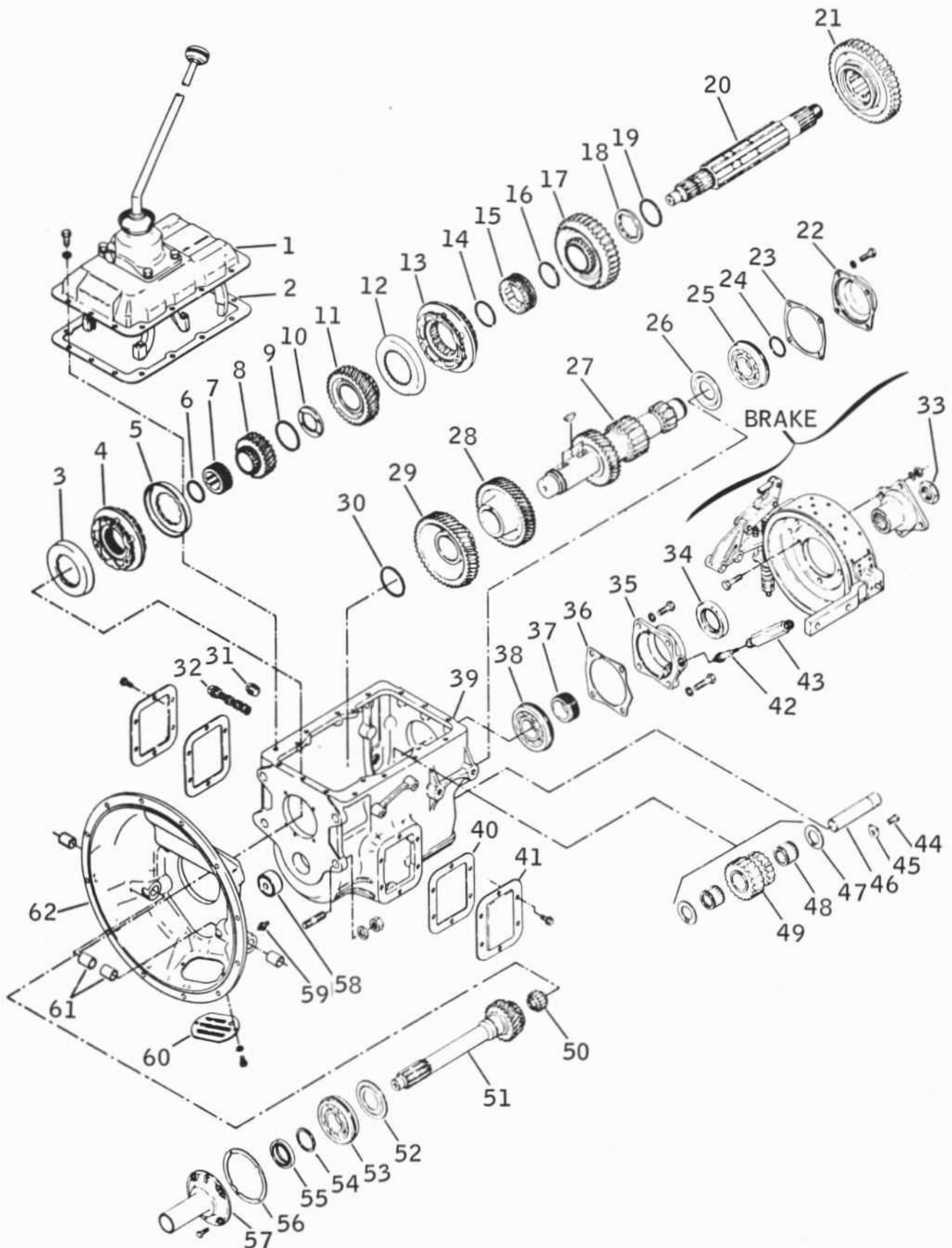
Q 1-2 a) That's the answer! And you'll find some useful service instructions for these new five-speed Clark and New Process transmissions — plus other new units — included in Group 6 of his handbook.

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280V-SERIES TRANSMISSION

Item No.	Description	Item No.	Description
1	CONTROL COVER	32	MAGNETIC DRAIN PLUG
2	GASKET	33	FLANGE NUT
3	SYNCHRONIZER CUP	34	MAINSHAFT REAR OIL SEAL
4	4th & 5th SYNCHRONIZER ASSEMBLY	35	MAINSHAFT REAR BEARING CAP
5	SYNCHRONIZER CUP	35A	SPEEDOMETER DRIVEN GEAR BUSHING
6	RETAINER RING	36	GASKET
7	4th & 5th SHIFT HUB SLEEVE	37	SPEEDOMETER DRIVE GEAR
8	4th SPEED GEAR	38	MAINSHAFT REAR BEARING
9	RETAINER RING	39	CASE
10	LOCATING WASHER	40	GASKET
11	3rd SPEED GEAR	41	P.T.O. COVER PLATE
12	SYNCHRONIZER CUP	42	SPEEDOMETER DRIVEN GEAR
13	2nd & 3rd SYNCHRONIZER ASSEMBLY	43	SPEEDOMETER TUBE NUT
14	RETAINER RING	44	REVERSE IDLER SHAFT LOCK SCREW
15	2nd & 3rd SHIFT HUB SLEEVE	45	REVERSE IDLER SHAFT LOCK
16	RETAINER RING	46	REVERSE IDLER SHAFT
17	2nd SPEED GEAR	47	THRUST WASHER
18	WASHER	48	BEARING
19	RETAINER RING	49	REVERSE IDLER GEAR
20	MAINSHAFT	50	BEARING
21	1st SPEED GEAR	51	MAIN DRIVE GEAR
22	COUNTERSHAFT REAR BEARING CAP	52	OIL SLINGER
23	GASKET	53	BEARING
24	RETAINER RING	54	RETAINER RING
25	COUNTERSHAFT REAR BEARING	55	OIL SEAL
26	OIL SLINGER	56	GASKET
27	COUNTERSHAFT	57	CAP
28	COUNTERSHAFT 4th SPEED GEAR	58	COUNTERSHAFT PILOT BEARING
29	COUNTERSHAFT DRIVE GEAR	59	PEDAL SHAFT GREASE FITTING
30	RETAINER RING	60	CLUTCH HOUSING INSPECTION PLATE
31	FILLER PLUG	61	CLUTCH PEDAL SHAFT BUSHING
		62	CLUTCH HOUSING

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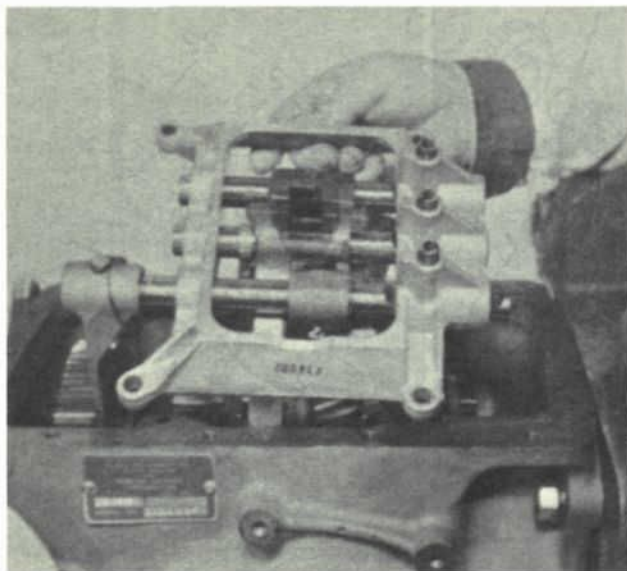
Clark 280-V Series Five-Speed Transmission Exploded View

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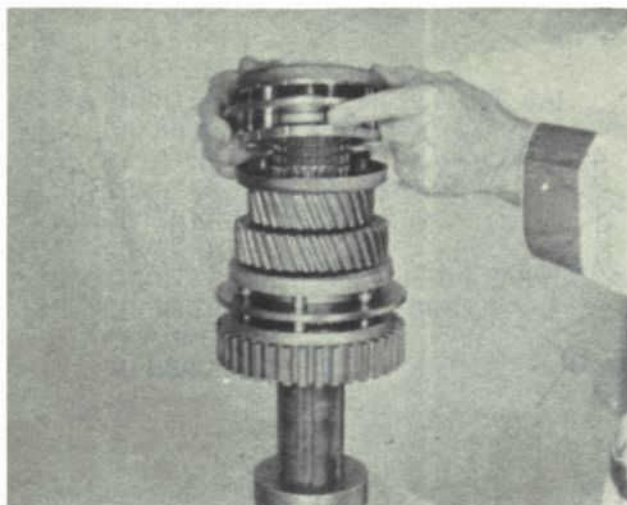
a small drift or pin before the rods and forks can be removed from the support. Don't lose the interlock cross pin or 2nd speed overshift spacer during disassembly.

Assembly Tips

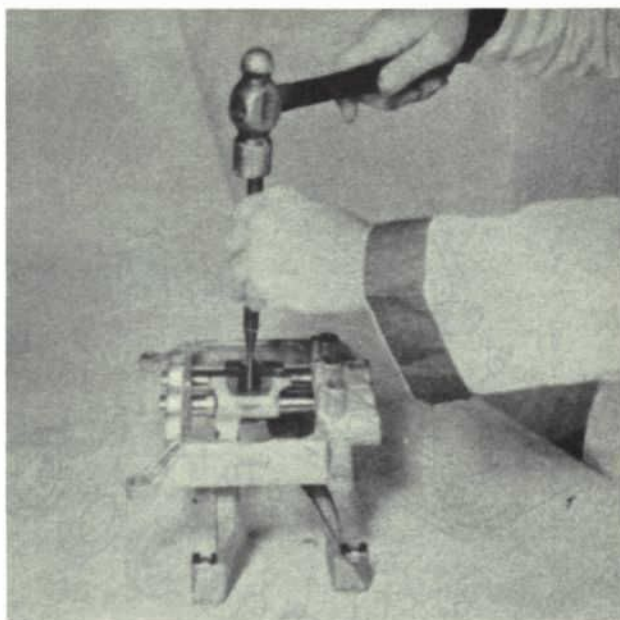
After cleaning and inspecting all components, and repairing or replacing all defective parts, the trans-



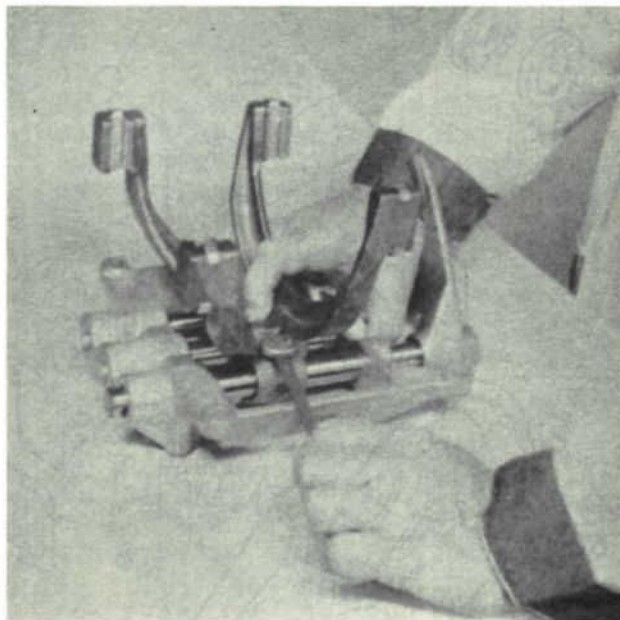
Removing Brake Drum and Companion Flange —
Clark 280-V Series Transmissions



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



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



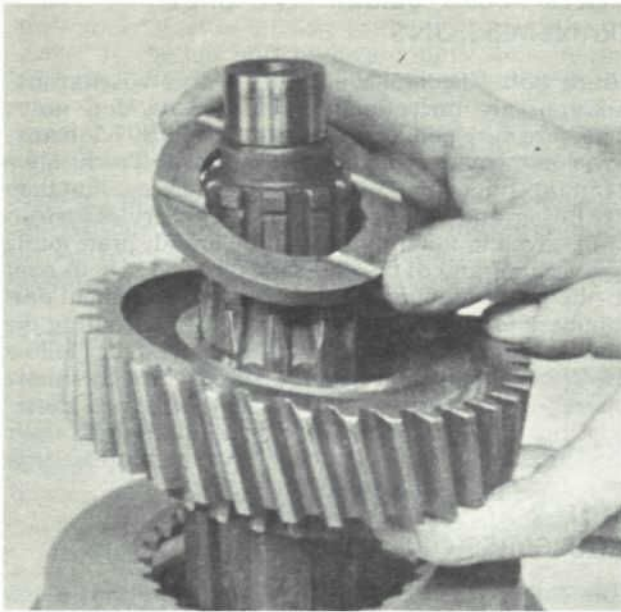
Installing 1st-Reverse Lug Lockscrew — Clark 280-V
Series Transmission

mission 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.

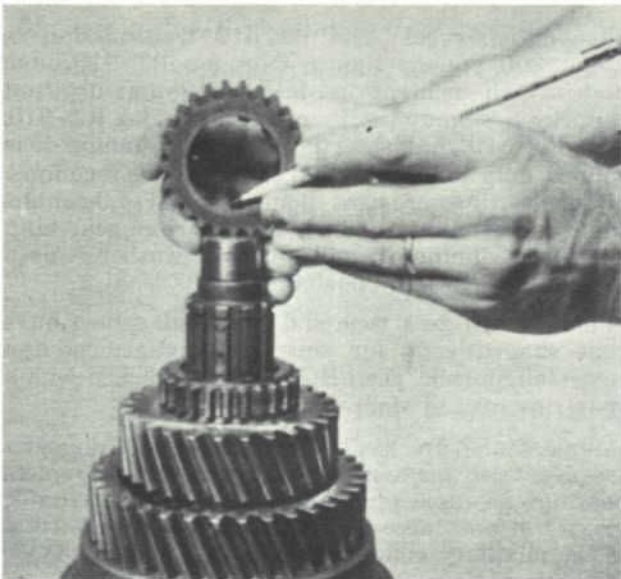
Q 3-3 b) You missed one! A collapsed shaft in any fixed column can be pulled out to its original length. But if there's any other damage that would affect safety or operation, the entire column assembly must be replaced.

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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

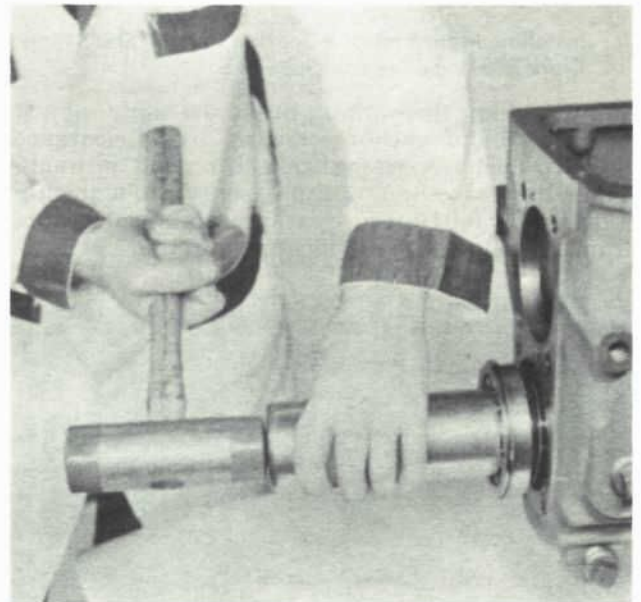
After installing the 4th speed gear, clutching teeth toward the front of the mainshaft, install the bottom

Quick-Quiz

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

- slide the assembled bearing from the plastic sleeve into the input shaft bore. (See page 145)
- stick the rollers in the bearing cage with grease and install the bearing. (See page 80)

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.



Installing Rear Countershaft Bearing — Clark 280-V Series Transmissions

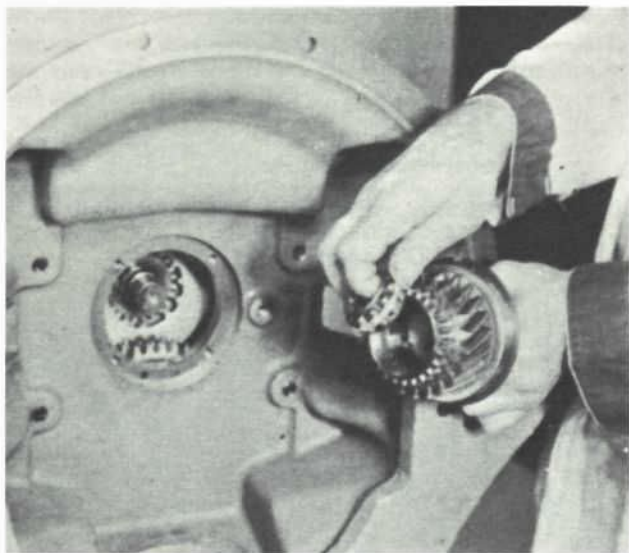
When driving the rear countershaft bearing into its bore in the case, support the countershaft drive gear with a 1/4-inch flat bar on each side to prevent damage to the countershaft pilot bearing.

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.)

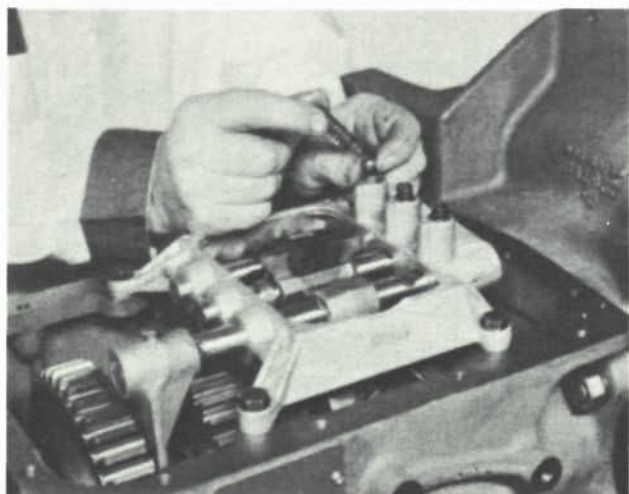
Q 1-1 a) Pretty close . . . but not right! The 65 series body codes indicate the *formal roof* 2-door hardtop. And the Torino GT in the picture is a *fastback*. Go back and try again.

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**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!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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.

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- 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.

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- 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

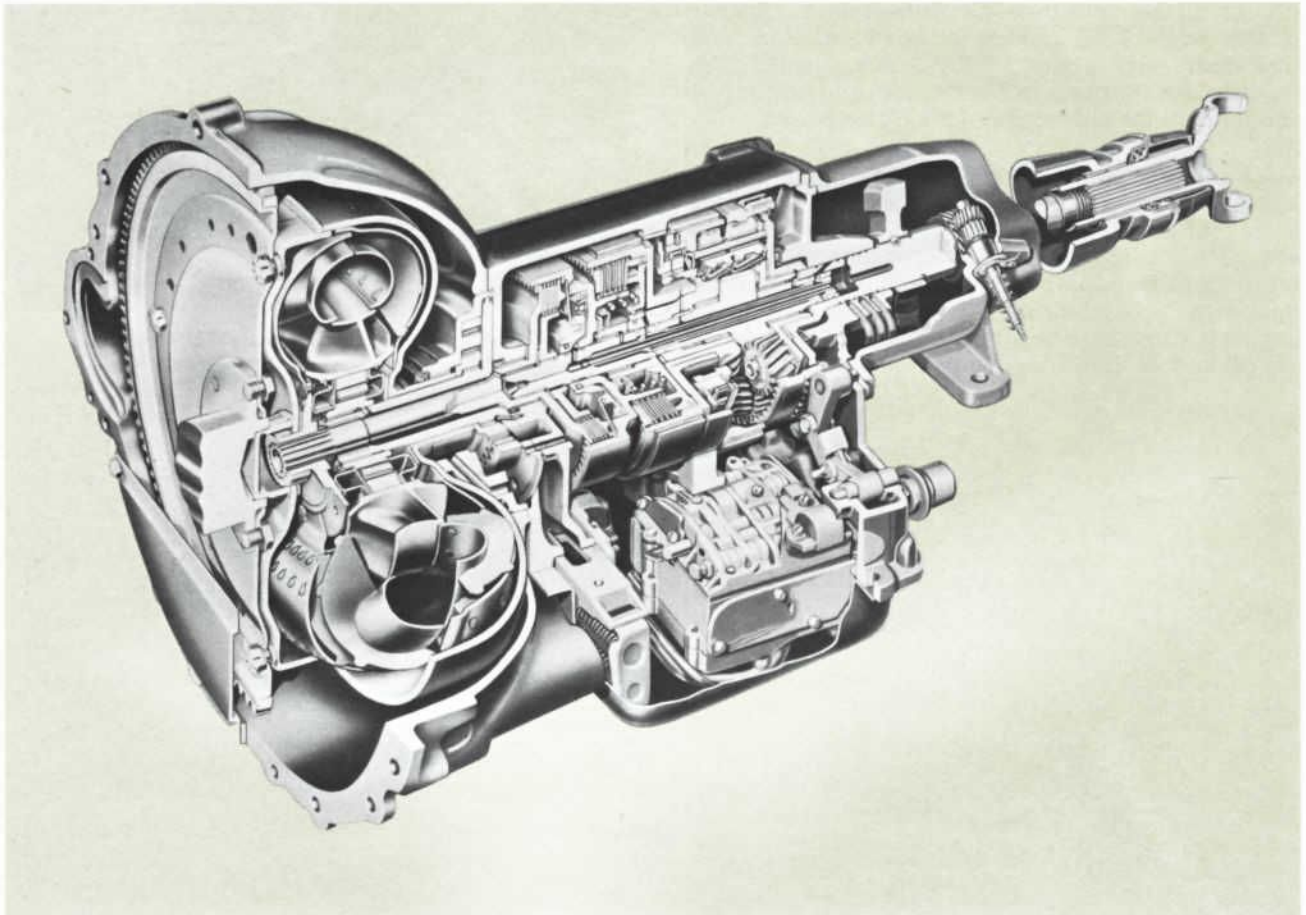
CAR

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!

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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 valve 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.

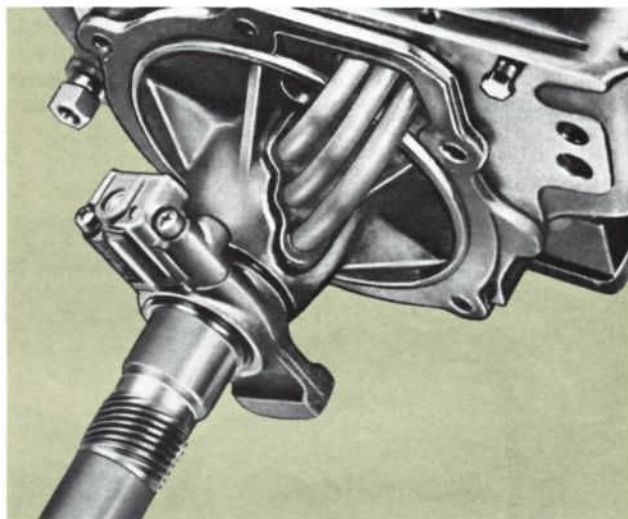
"Small Box" Gear Train Change Details: In the cast-iron case "small box" (FMX) transmission, most gear train components are dimensionally the same as last year's FX design. However, clutch pack clearances are adjustable for both the forward and reverse-and-high clutches. PHA models have four friction 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.

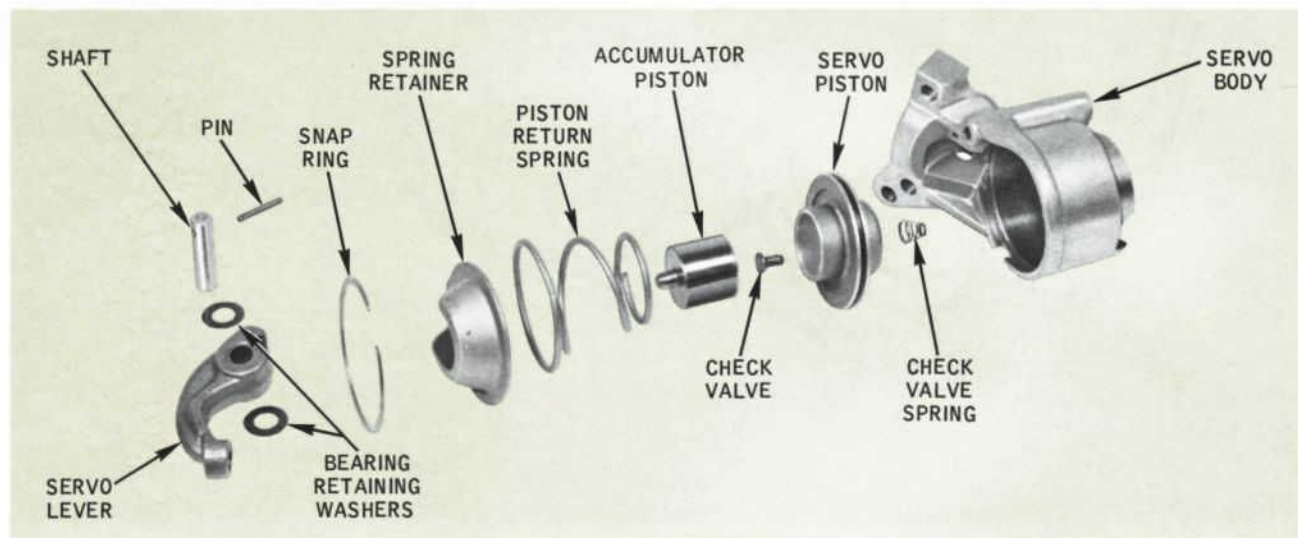
Quick-Quiz

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)



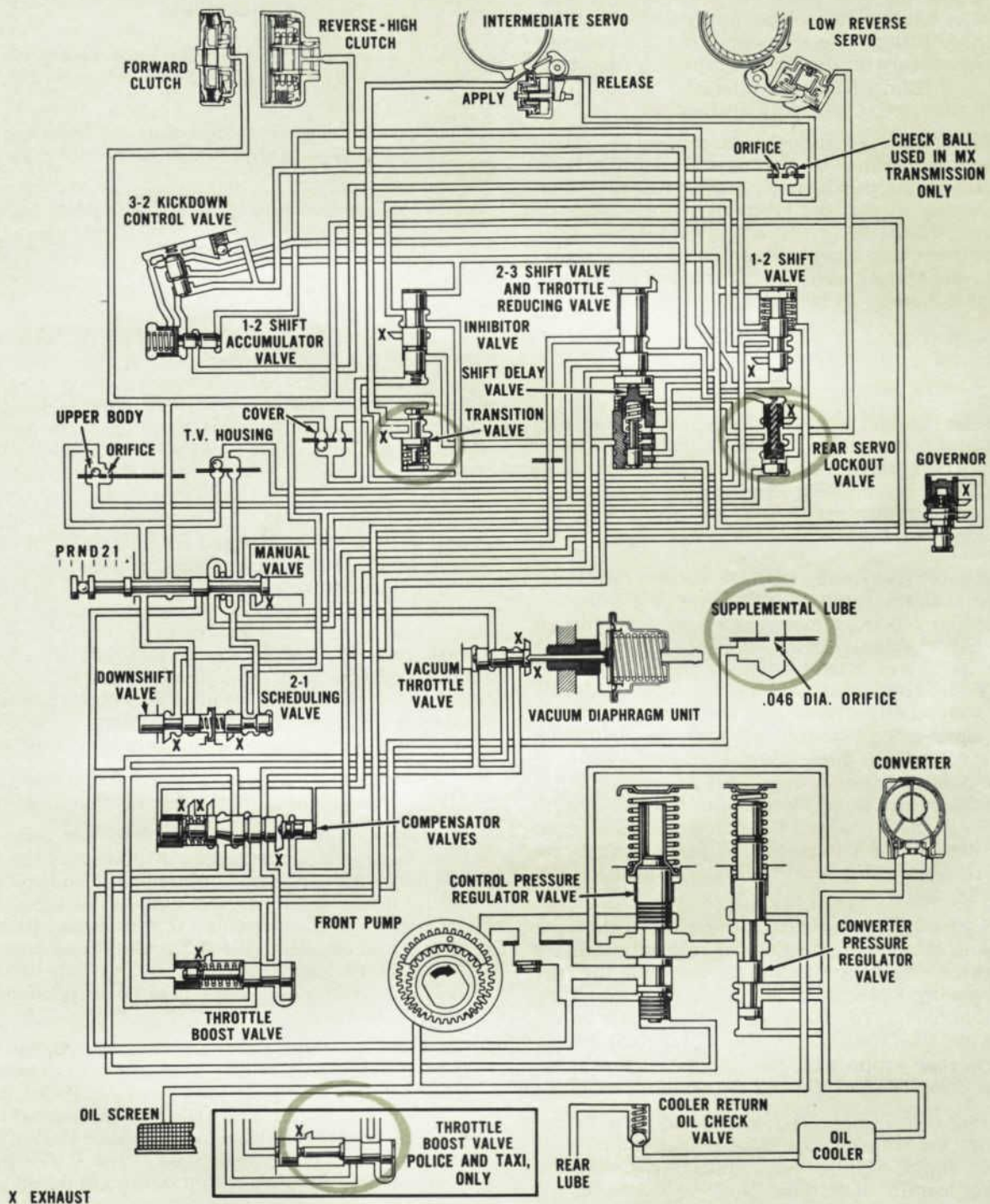
End Support and Governor — "Small Box" (FMX) Transmission



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!

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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!

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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.

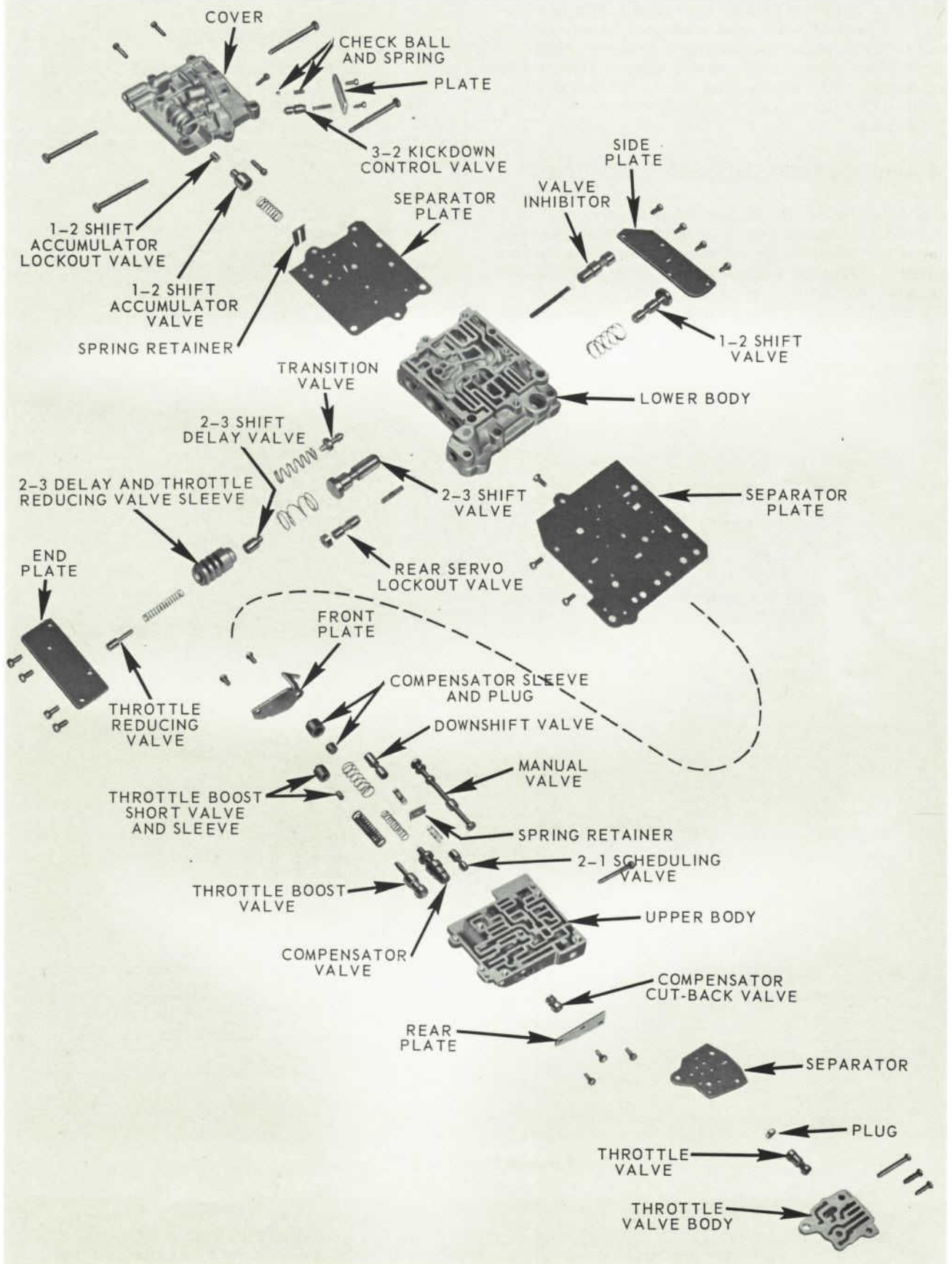
Forward Clutch Build-Up — "Small Box" (FMX) Transmission: The forward clutch pack of any "small box" (FMX) transmission must have an assembled clearance of at least 0.010 inch in either the PHA or PHB models. Friction plates for these clutch packs are supplied in three thicknesses — 0.0605 to 0.063 inch; 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 it off (as described in the procedure) after releasing the retaining device, could you? Try another answer!

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

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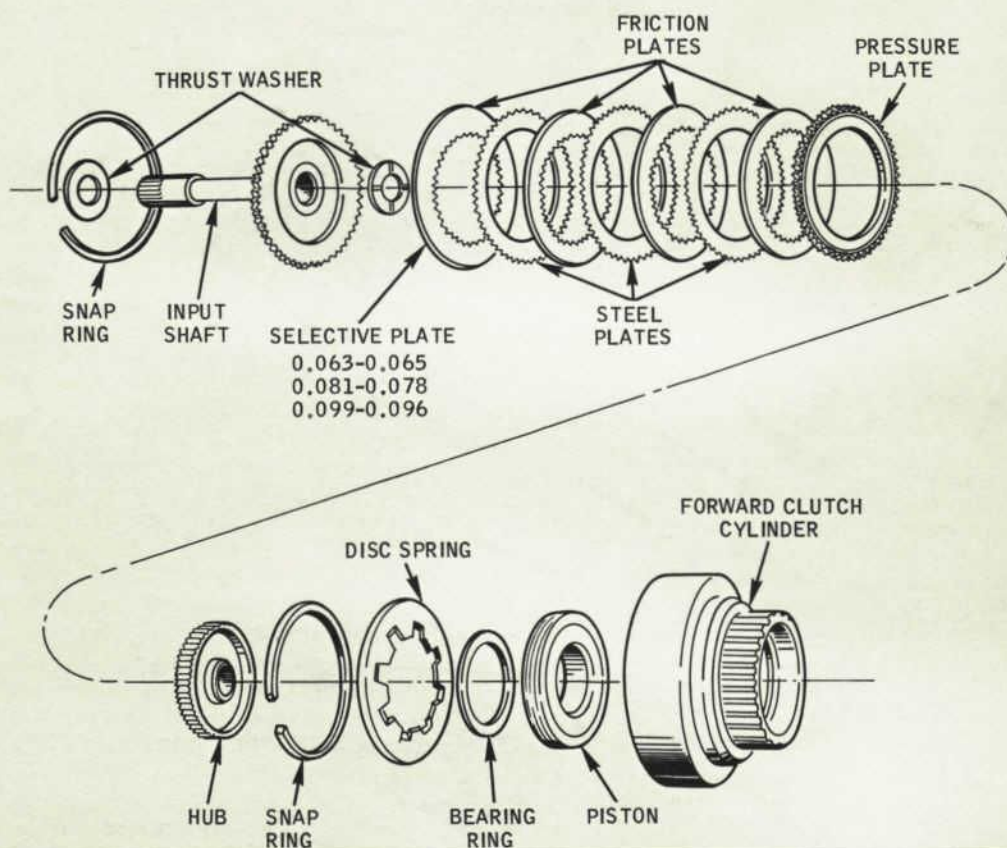
plate and alternate friction and steel plates to complete the pack. Clutch pack clearance is adjusted to 0.030-0.055 inch by selecting a pressure plate retainer snap ring of the proper thickness. These rings are supplied in thicknesses of 0.060-0.064 inch; 0.074-0.078 inch; 0.088-0.092 inch; and 0.102-0.106 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:
- use the thickest top friction plate that will give at least 0.030-inch clearance. (See page 13)
 - bend the waved cushion spring plate. (See page 25)
 - use a plate retainer snap ring that's thick enough to give 0.030-0.055-inch clearance. (See page 34)

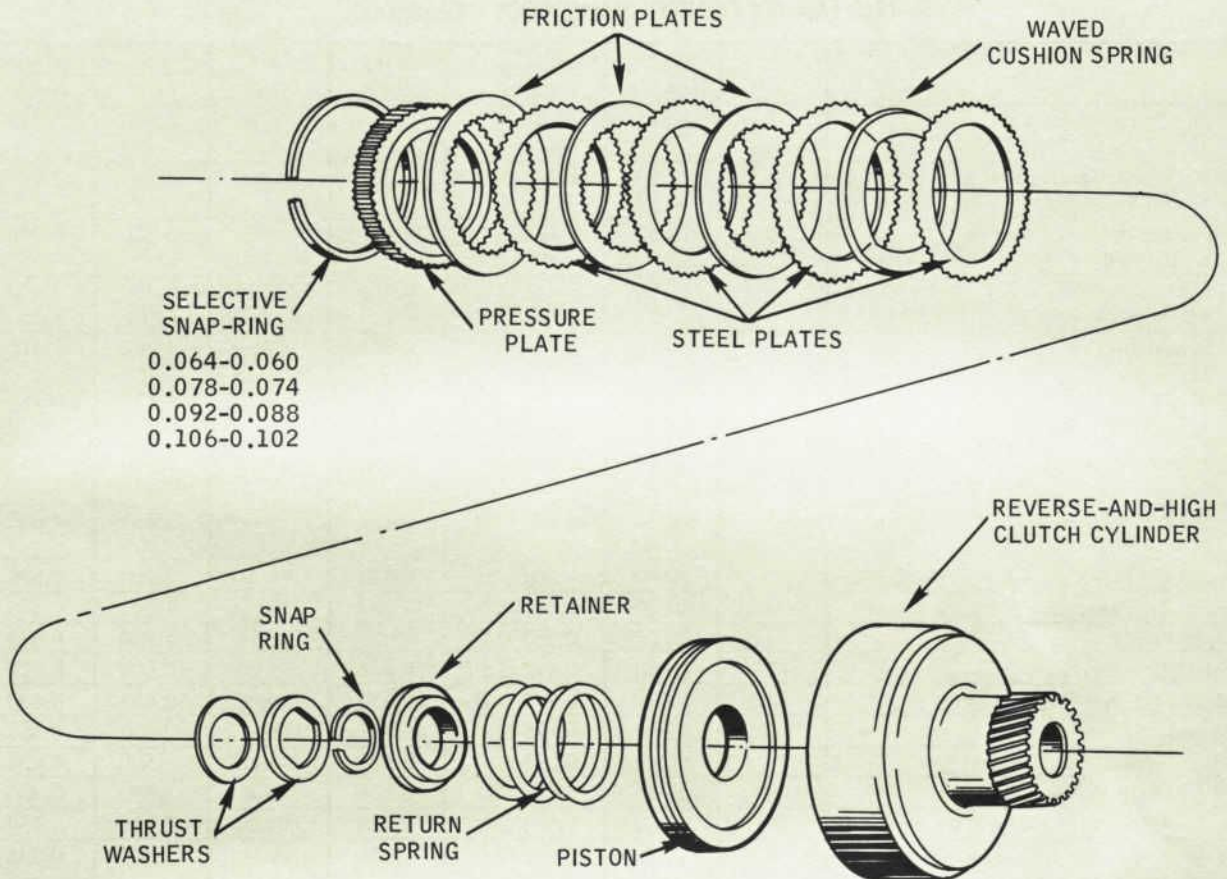


MODEL	FRICTION PLATES	STEEL PLATES	MINIMUM CLUTCH PACK CLEARANCE
PHA	4	3	0.010
PHB	5	4	

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.

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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.

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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

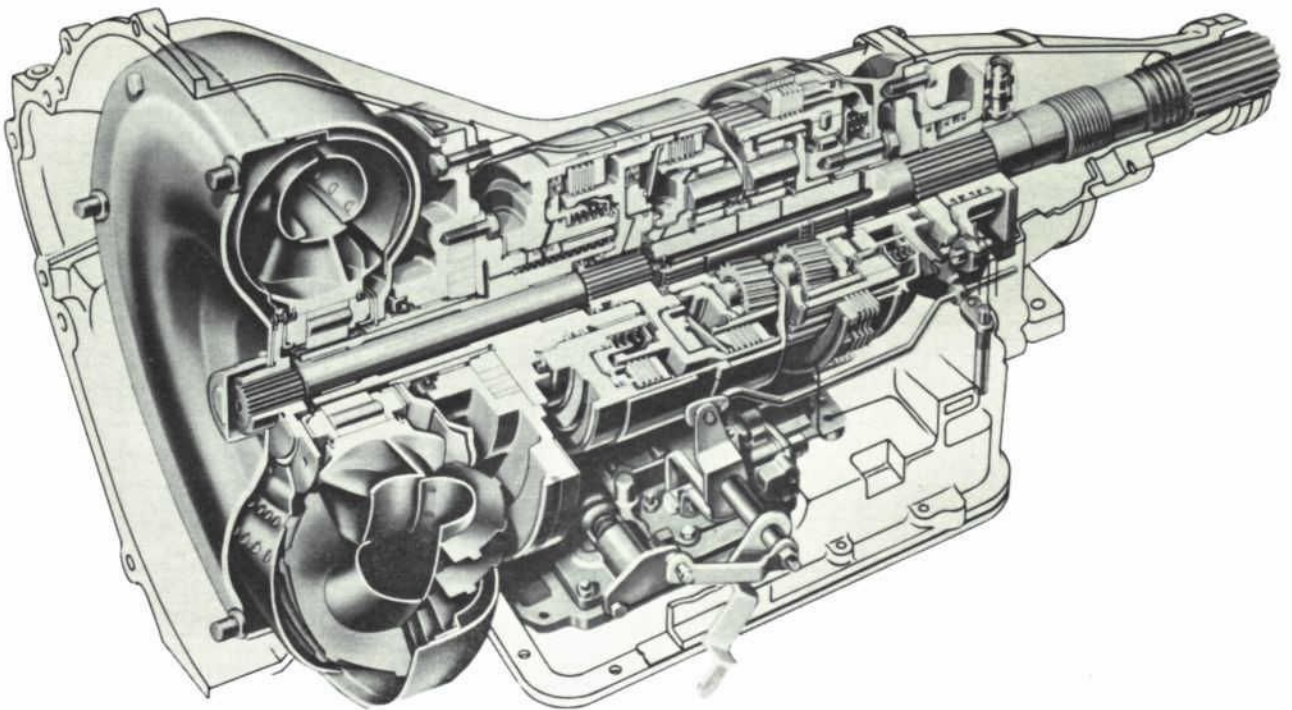
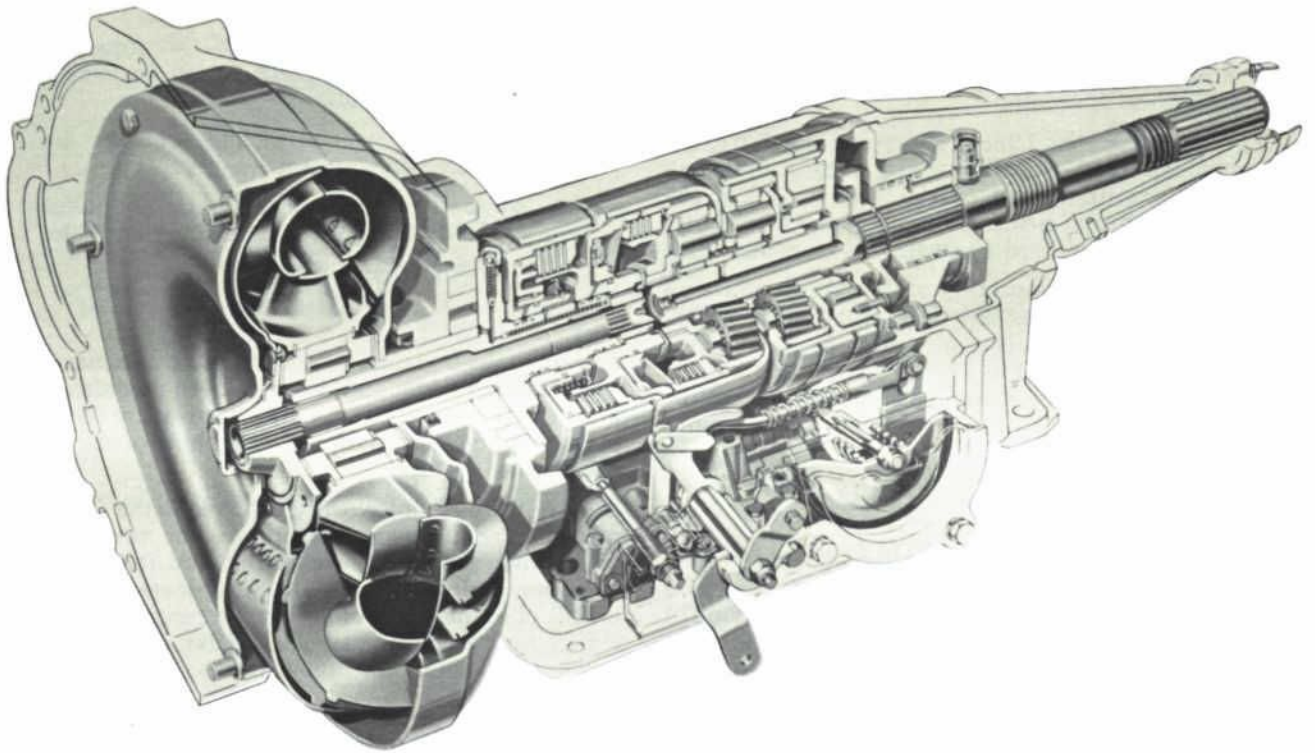
*None used on PFA-D1, F.

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.

A PRELIMINARY SHOP MANUAL



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!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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

Quick-Quiz

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

- the intermediate band, but *not* the new apply strut. (See page 71)
- the new forward clutch friction plates and forward planet carrier. (See page 159)

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.

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

- Used on models PEA-A1, M, N, P; PEB-A2, B1, C2, E1, F2; PEE-C1, H2, K1, R, S, U, V, M, N
- Used on models PEA-E1, F1, J1, K1, R, S, T, U
- Used on all models except PEE-K1
- Used only on model PEE-K1

- Used on models PEE-R, S, U
- Used on models PEA-A1, E1, F1, J1, K1, M, N, P; PEC
- 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!

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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	10"	D, 2, 1	93-101
As Required	Wide Open	Below 1.0"	D, 2, 1 R	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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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) D, 2, 1	TV Pressure (psi)	Control Pressure (psi)		TV Pressure (psi)
			P, N, D, 2, 1	R				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.

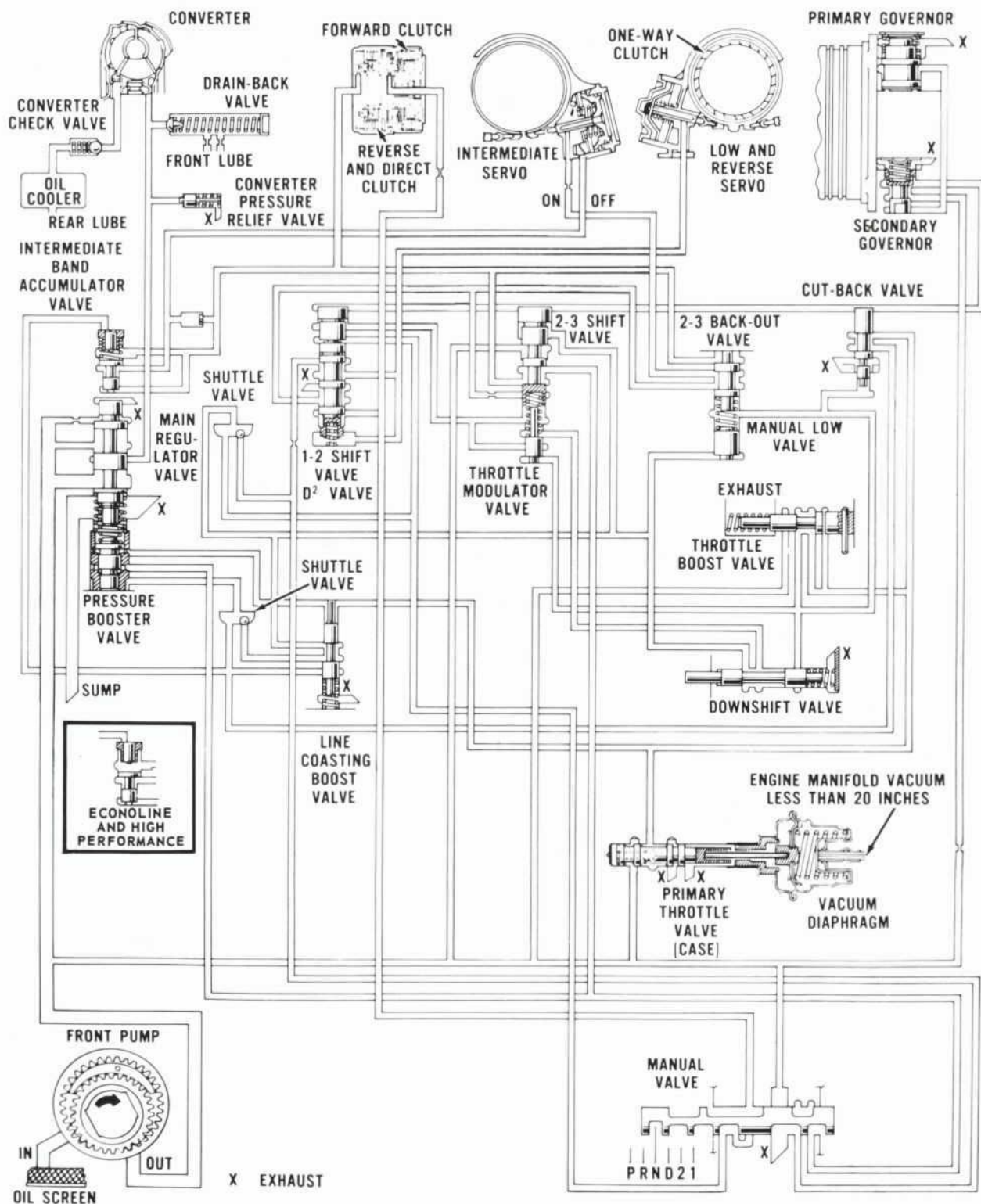
AUTOMATIC TRANSMISSION FLUID IMPROVED

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*.

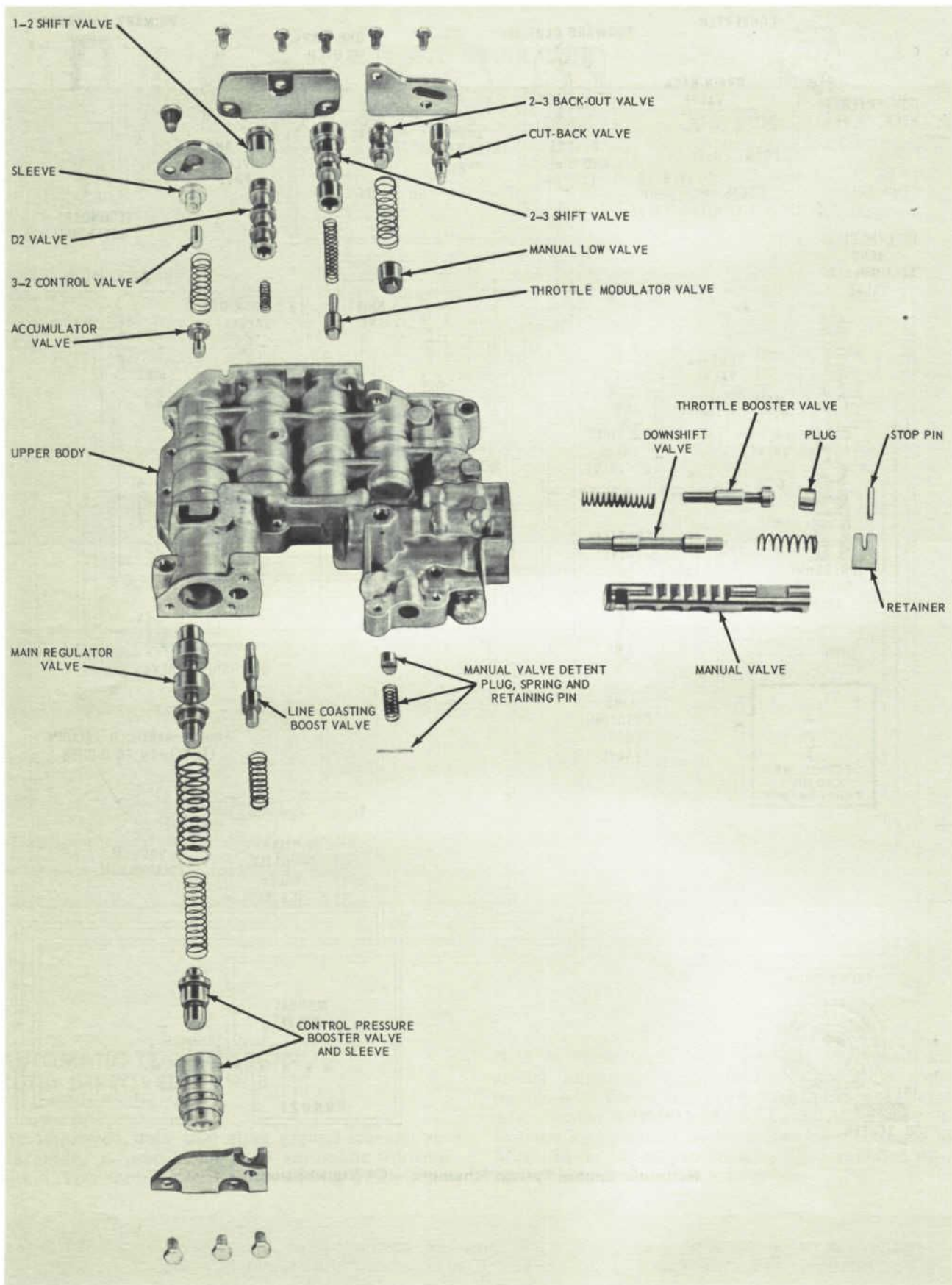
Q 17-3 a) Too bad . . . you've missed this one! There has been *quite a change* in the rolling door lock feature — *it's not used in '68!* That should simplify any work you'll have on the vacuum door lock systems of the new cars.

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Hydraulic Control System Schematic — C4 Transmission

INTRODUCTION TO THE 1968 FORD PRODUCT LINE



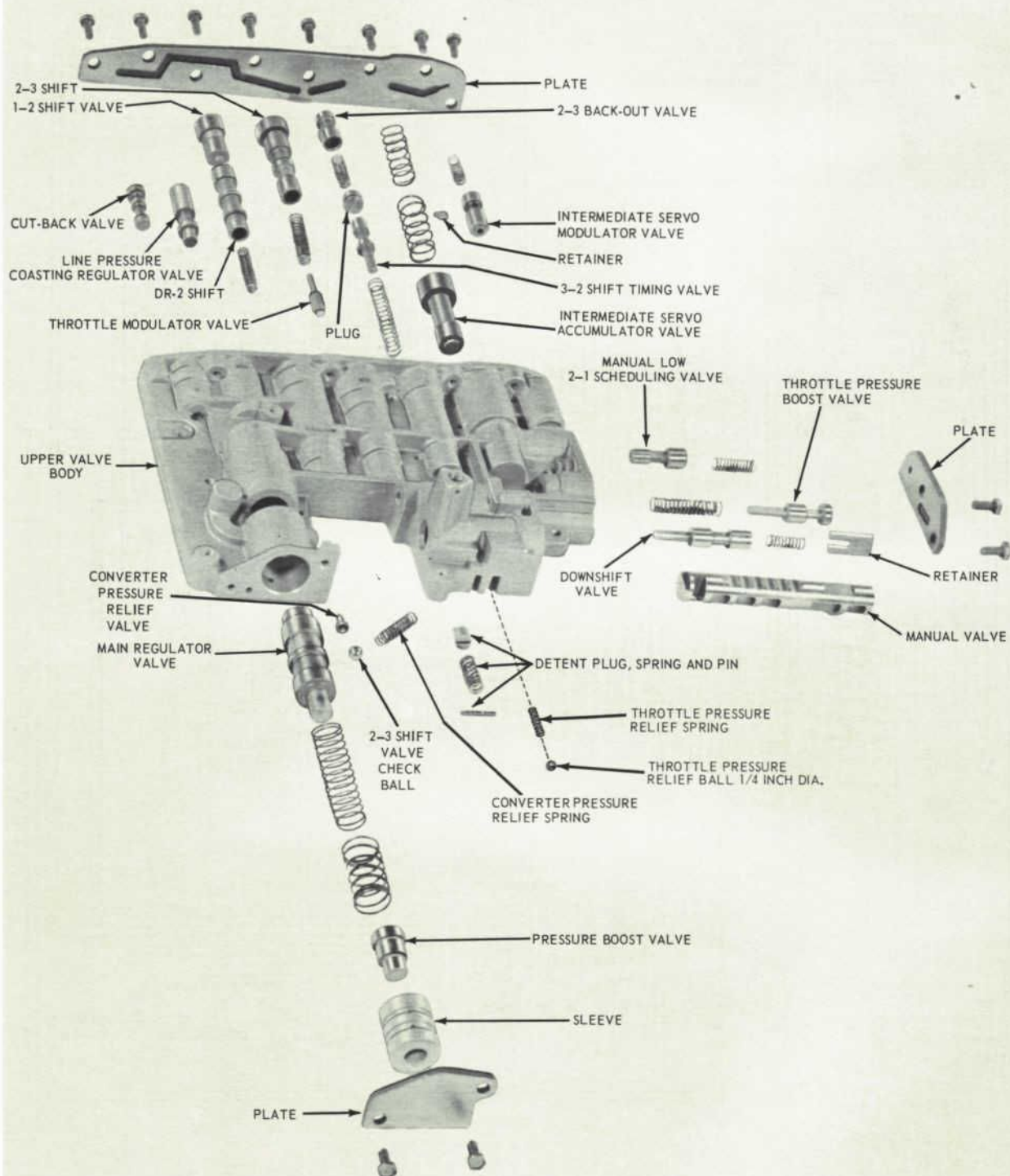
Control Valve Body Exploded View — C4 Transmission

A PRELIMINARY SHOP MANUAL



Hydraulic Control System Schematic – C6 Transmission

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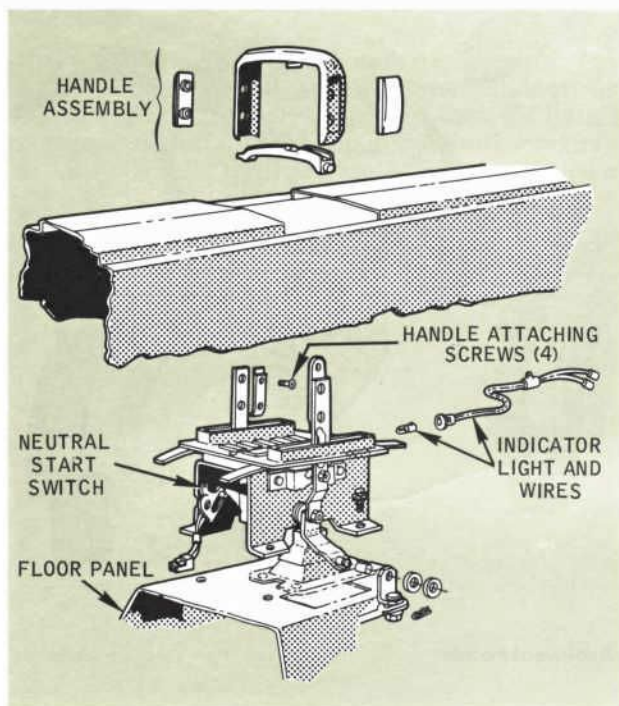
Control Valve Body Exploded View – C6 Transmission

A PRELIMINARY SHOP MANUAL

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

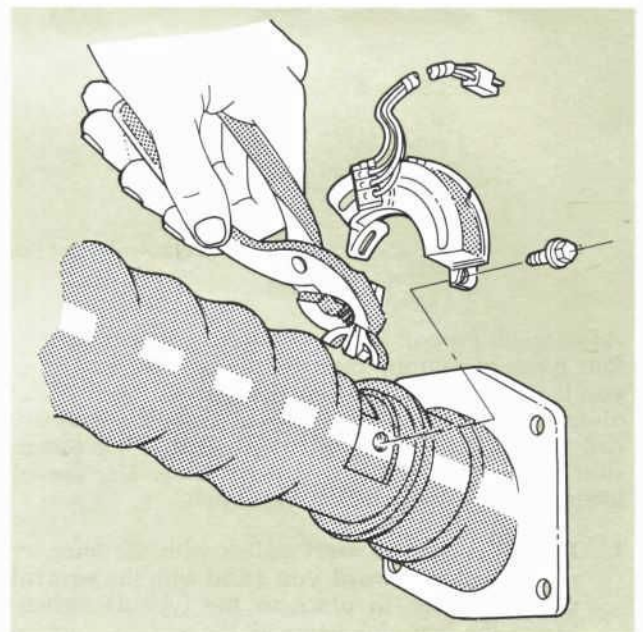
To replace the dial indicator bulb or adjust the neutral start switch, you'll have to remove the four screws in the selector handle and remove the handle. Then remove the console to gain access to the bulb or neutral start switch.

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.*



- 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!

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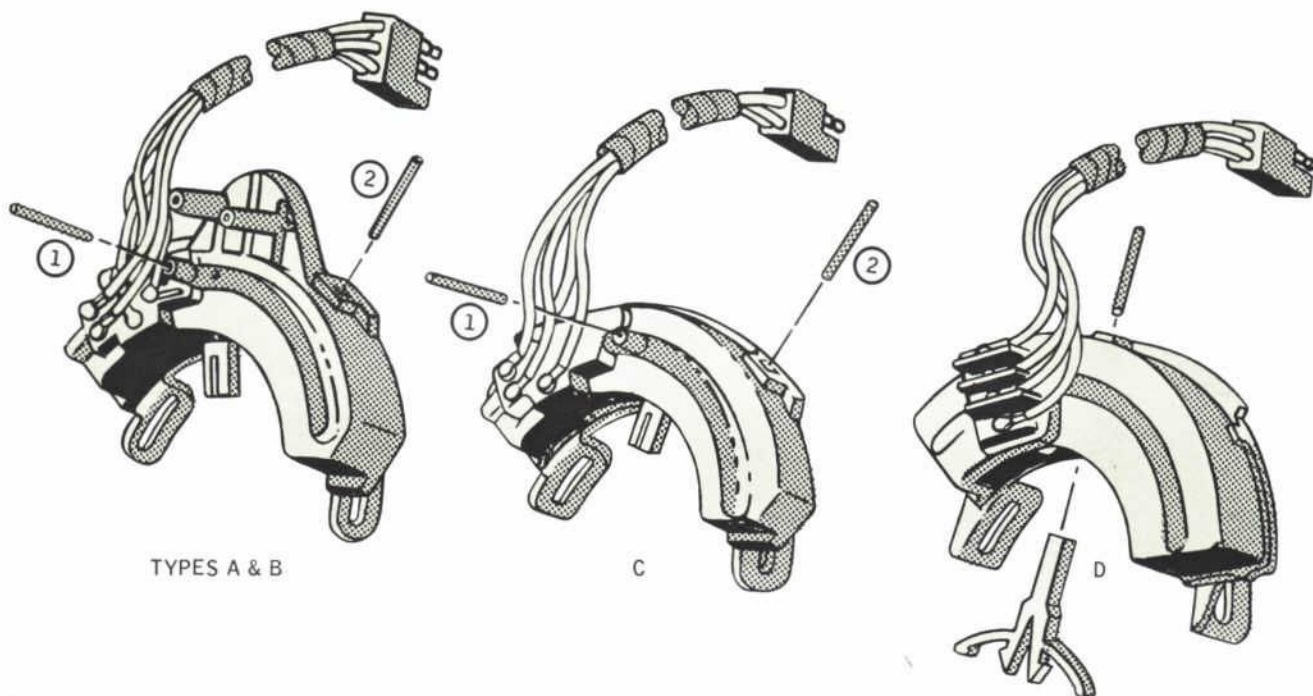
To adjust the neutral start switch, it must be removed from the column. Put the selector lever in Neutral and set the parking brake. Then disconnect the electrical and vacuum connections and remove the two fastening screws to allow you to lift the switch straight up and out.

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 selector 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

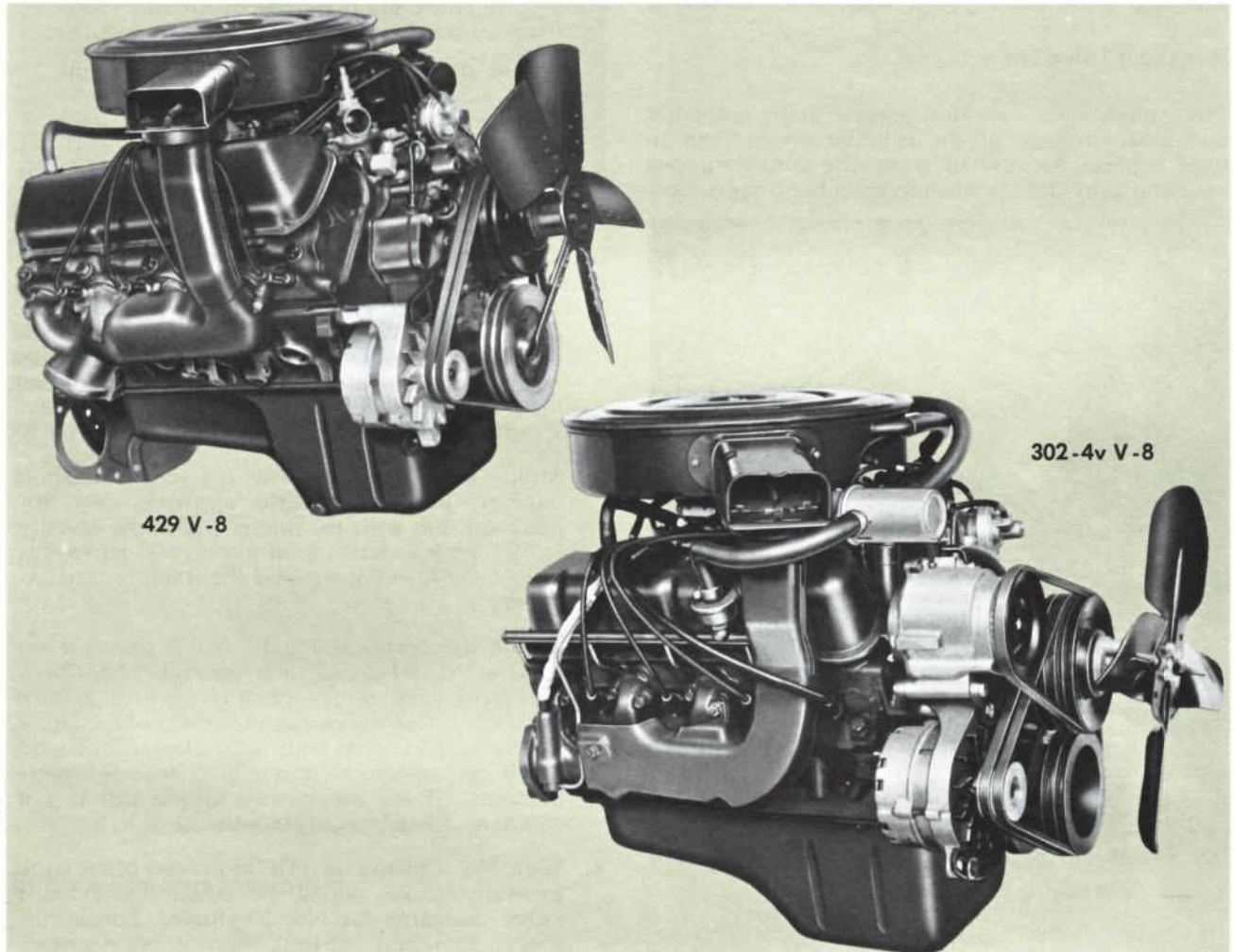
For 1968, Ford offers two V-8s for F-100 to F-350 pickup trucks with greater displacement than the largest engine in the 1967 pickup line. To handle the torque output of these 360 and 390 CID engines, the C6 automatic transmission has been adapted to

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.

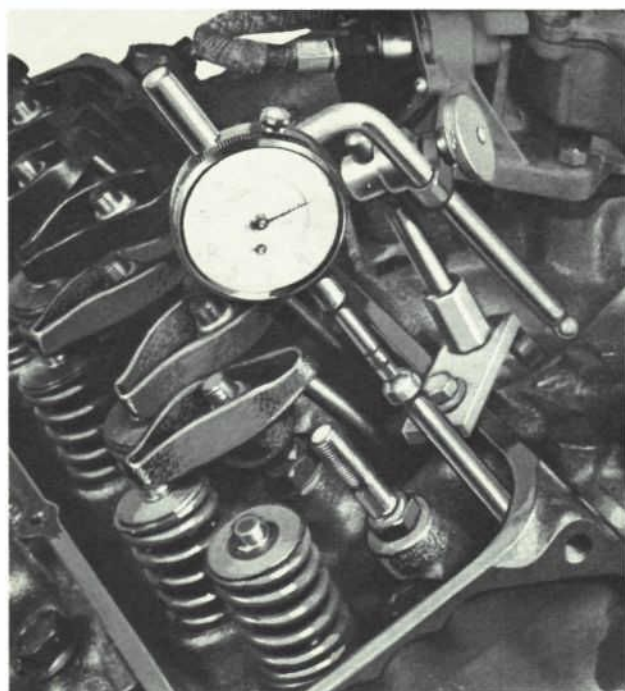
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429 V-8 ENGINE — THUNDERBIRD

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. Con-



Measuring Cam Lobe Lift — 429 V-8

sequently, 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.

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

Quick-Quiz

- Q 8-1 When adjusting valve clearance on the new 429 V-8 engine, use:
- either the preferred or alternate procedures for the 289. (See page 118)
 - only the preferred procedure for the 289. (See page 173)
 - only the alternate procedure for the 289. (See page 65)

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.

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.

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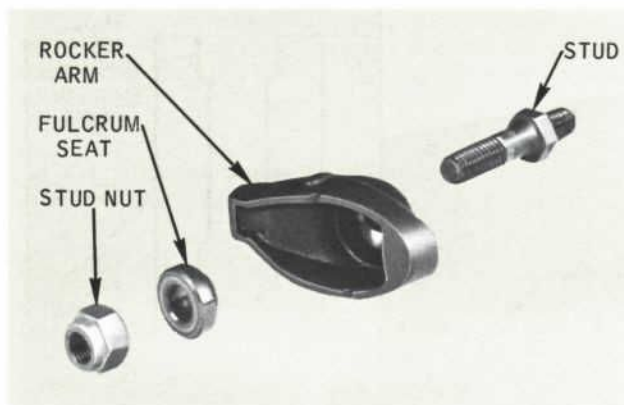
An alternate method is to remove the distributor cap and turn the crankshaft with an auxiliary starter switch until the breaker points are on the next peak of the distributor cam lobe. When the breaker points are on the next distributor cam lobe, the valves for the cylinder next in the firing order can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



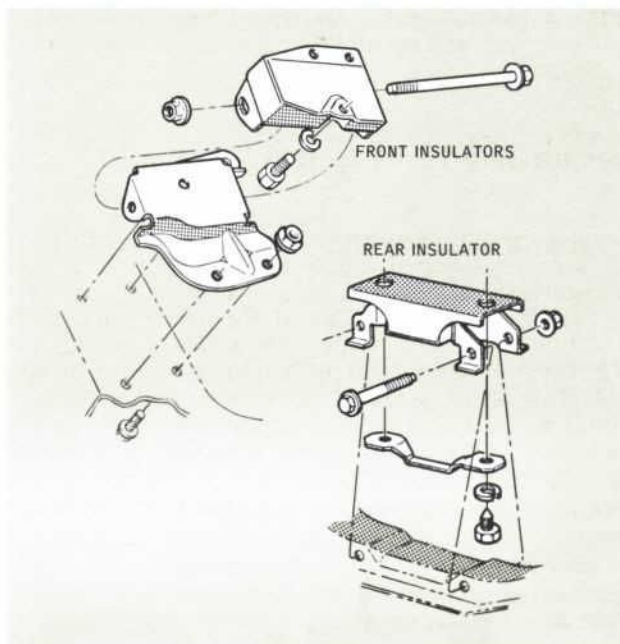
429 V-8 Rocker Arm and Stud Assembly (A-1790B)

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.

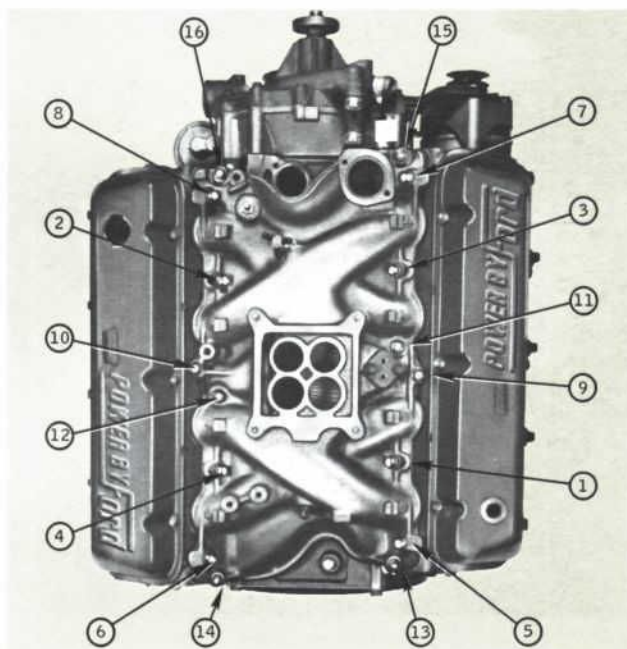
Intake Manifold Installation

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



Engine Support Insulators Disassembled — 429 V-8 Engine

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



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.

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

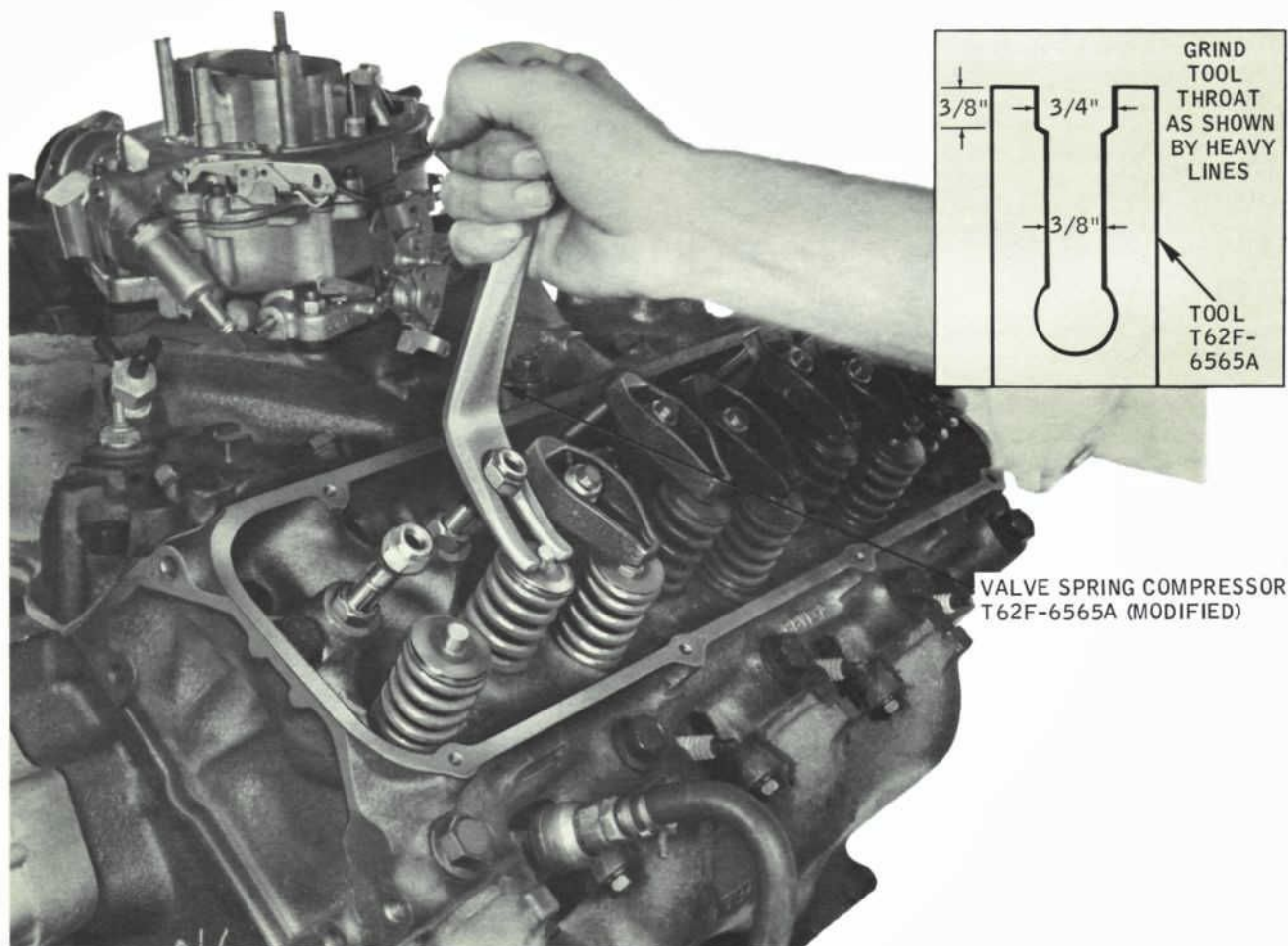
Compressing Valve Springs — In Chassis

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

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

these modifications, you can still use this tool for servicing other engines that have stud-mounted rocker arms.



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 PRELIMINARY SHOP MANUAL

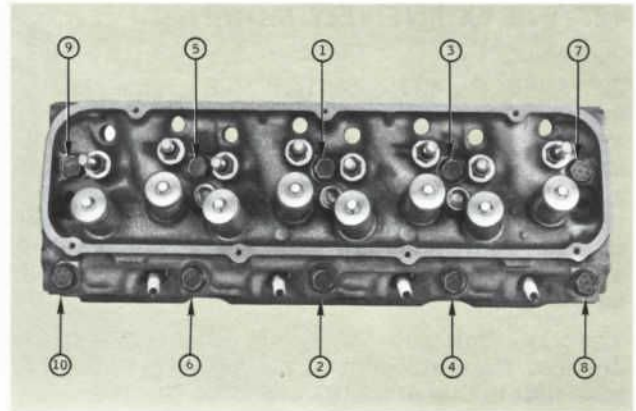
A Final Precaution

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.

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.

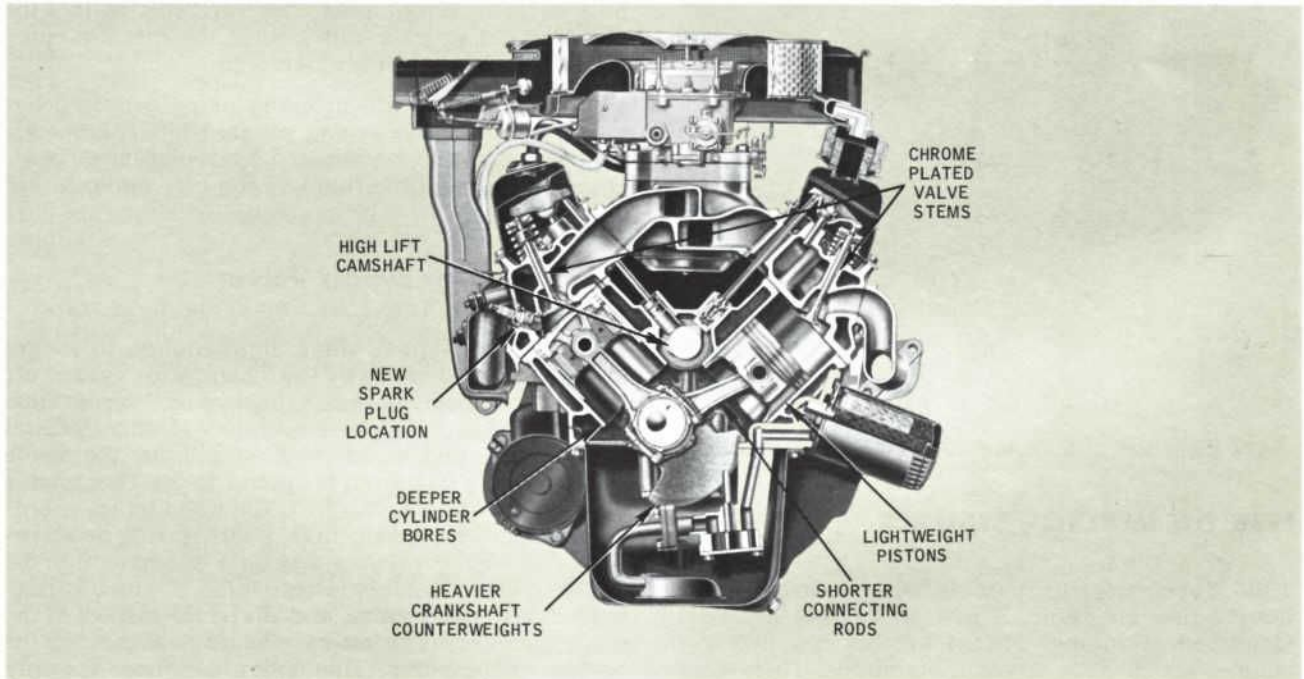
In the cylinder heads, combustion chamber design has smoother wall contours and a new spark plug



429 V-8 Cylinder Head Torque Tightening Sequence

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

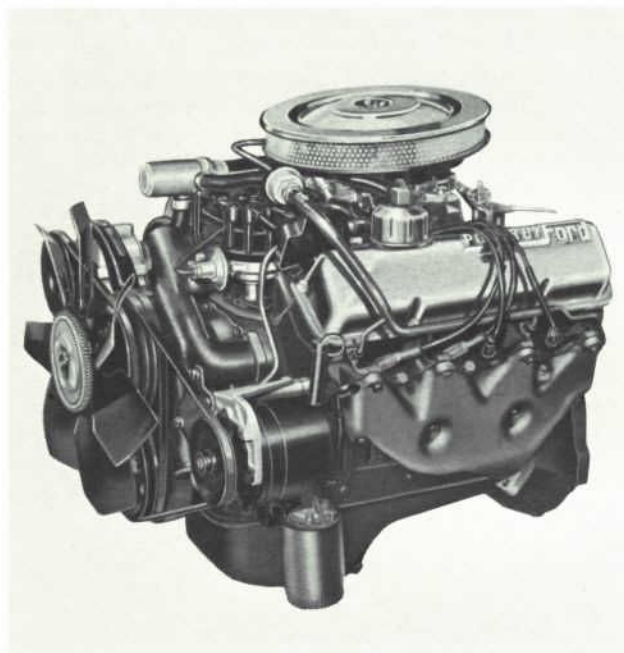
Q 8-4 c) Uh, uh! You're thinking of the diaphragm leak test, not the simulated bypass cycle test for the air bypass valve. Review the test procedures again and take another shot at the question!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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.

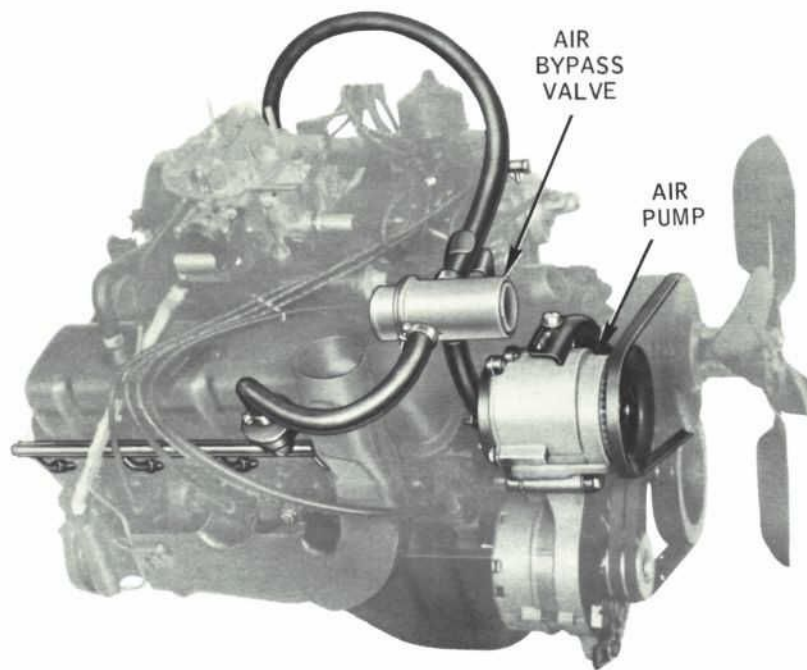
Service features: The relief valve of the new Thermactor air pump has no silencer. The valve is made of plastic and contains a color-coded pressure setting plug. If necessary, you can remove the plug with a pair of long nosed pliers. Be sure you replace the pressure setting plug with one of the specified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

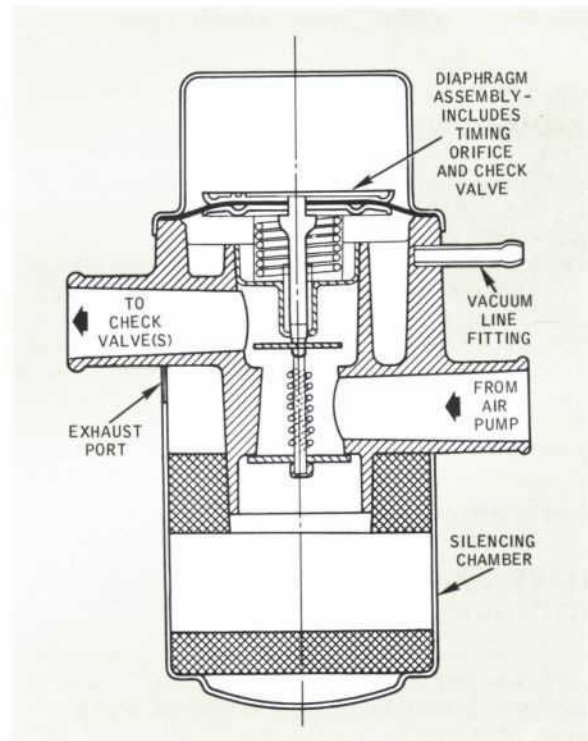


Thermactor Exhaust Emission Control System

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.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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!

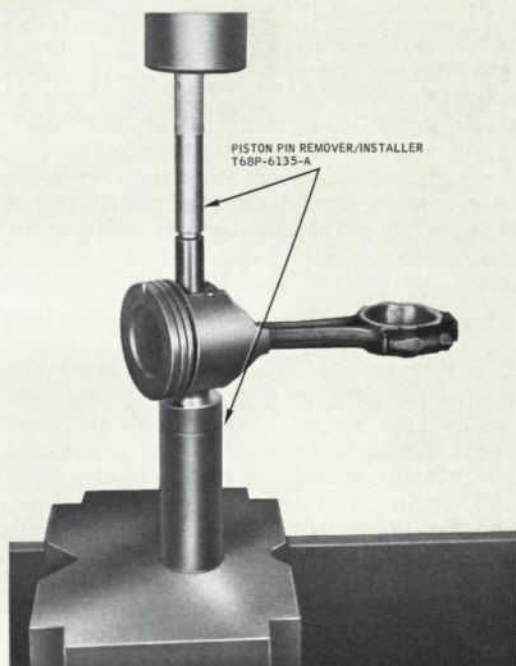
INTAKE MANIFOLD BOLT TORQUING PROCEDURE — V-8 ENGINES

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

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

the bolts in sequence to the specified value while the manifold's still warm.

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!

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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.

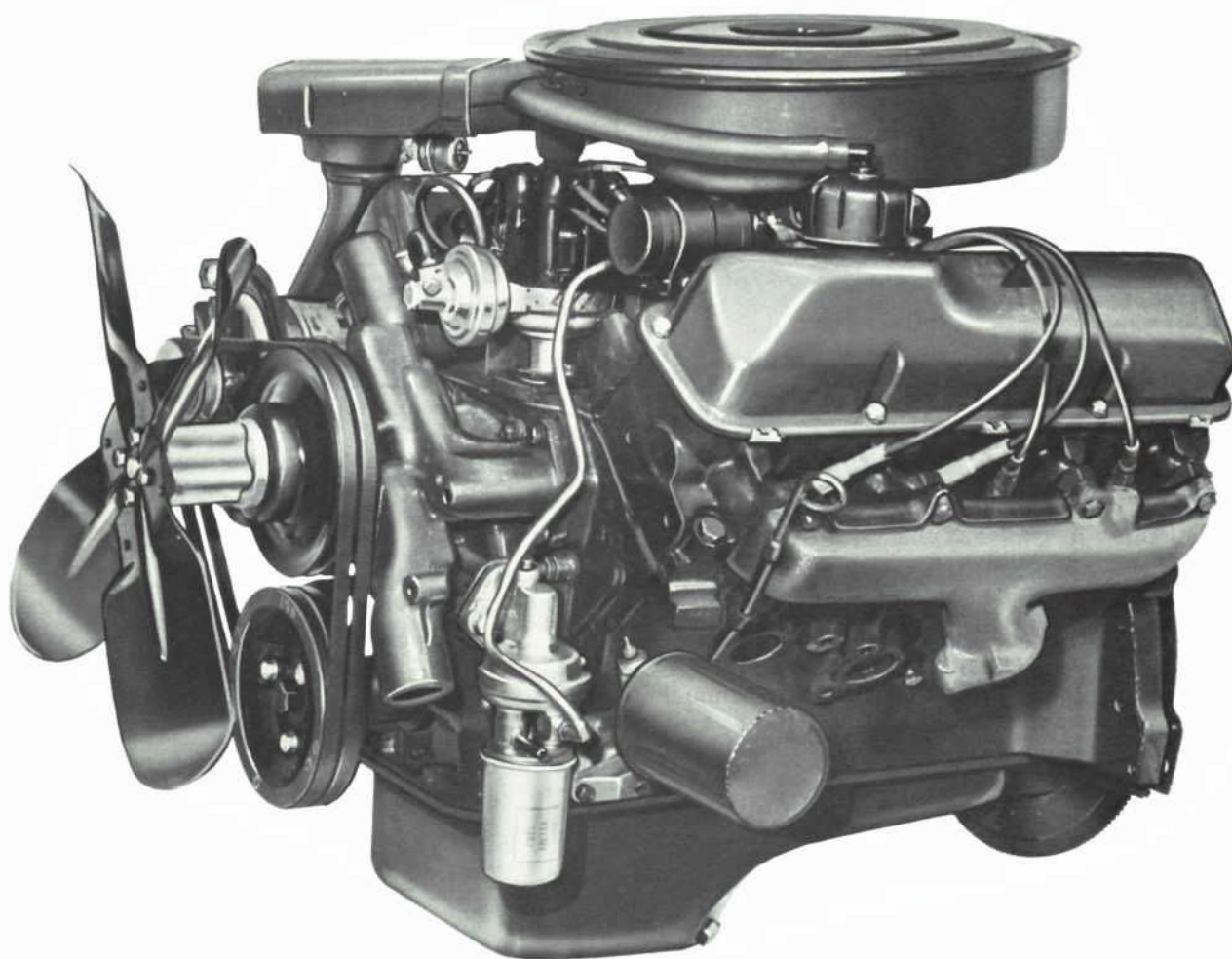
INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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.

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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 emis-

sion 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	Wrt 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

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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.

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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	Intake and Exhaust 45°	0.0015	E-I-I-E-I-E-I-E-I-E-I-E	—	0.003 inch in any 6 inches 0.007 overall
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		0.0015	Rt. I-E-I-E-I-E-I-E-I-E Lt. E-I-E-I-E-I-E-I-E-I	0.3685 - 0.3695	
302 - 2V	60.5 - 63.5	0.3433 - 0.3443	0.060 - 0.080	0.060 - 0.080		0.0015	Rt. I-E-I-E-I-E-I-E-I-E Lt. E-I-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-I-E Lt. E-I-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	Intake 30° Exhaust 45°	0.0020	E-I-E-I-I-E-I-E-I-E	—	
427 - 4V	72.7 - 75.7	0.3728 - 0.3738	0.060 - 0.080	0.070 - 0.090		0.0020	E-I-E-I-I-E-I-E-I-E	—	
429	70.5 - 73.5	0.3735	0.040 - 0.060	0.060 - 0.080		0.0015	Rt. I-E-I-E-I-E-I-E-I-E Lt. E-I-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
240	—	—	—	1.61:1	0.025			measured at 1/16 inch plunger travel
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	5/64
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 Exhaust	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	
	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	
	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	
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	

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

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 Angle (5)	Minimum Allowable Valve Stem Tip Length
	Intake	Exhaust	Cold	Hot	Allowable	Desired	Intake	Exhaust		
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.

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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

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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		3.1922-3.1944	0.5153-0.5166		
429	4.3600-4.3624	4.3624-4.3636					

- (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	2.7484-2.7492	Wear Limit						
428								
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	
						Stand.	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					
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)		—	—	0.017
429	2.4992-2.5000		0.004-0.008				

- (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)

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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. thickness

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					0.0002-0.0004	
289						
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					
429	3.290-3.310	1.0400-1.0403	—	—	0.0002-0.0004	(2)

(1) Wear limit 0.0008

(2) Interference fit

(3) Wear limit 0.0010

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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 Low Compression Ring (all engines except 427) 0.080-0.081 (427) 0.096-0.097 Oil Ring (all engines) 0.1880-0.1890
200	3.6778-3.6784	3.6790-3.6796	3.6802-3.6808	0.0014-0.0022	—	
240	3.9984-3.9990	3.9996-4.0002	4.0008-4.0014	0.0018-0.0026	0.9123-0.9126	
289, 302						
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		
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	0.002-0.004	0.002-0.004	Snug	0.010-0.020	0.010-0.020	0.015-0.055
200								
240								
289, 302								
390						0.010-0.031		0.015-0.069
427	0.062-0.063	0.062-0.063						0.015-0.066
428	0.077-0.078	0.077-0.078				0.018-0.028	0.015-0.025	0.015-0.055
						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	.94:1	7.569	0.070-0.080	
428 Police	A/C 1.10:1			
429 T'Bird	.96:1 A/C 1.10:1	7.569	0.070-0.080	

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OIL PUMP

Engine	Rotor-Type Oil Pump Relief Valve Spring Tension Lbs at Specified Length	Drive Shaft to Housing Bearing Clearance	Relief Valve Clearance	Rotor Assembly End Clearance	Outer Race to Housing (Radial Clearance)
170, 200	9.0 - 10.1 at 1.078	0.0015 - 0.0029	0.0015 - 0.0029	0.0011 - 0.0041	0.006 - 0.012
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				
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	12 - 15	75 - 85	15 - 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)			
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.

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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	
390 and 427	40 - 45	—	—	Self-locking valve rocker arm adjusting screw (Minimum torque required to rotate) 170 7 Ft-Lbs
428	45 - 50	—	—	
429	—	65 - 75	—	

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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

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

THERMACTOR EXHAUST EMISSION SYSTEM TORQUE LIMITS

Check Valve to Air Manifold	16 - 19
Air Manifold to Cylinder Head	14 - 16
Air Pump Drive Pulley to Pump Hub	7 - 11
Air Pump Mounting Bolts.	23 - 28

NEW SPECIAL TOOLS – ENGINE

Description	Ford Tool No.	Application
Front cover oil seal replacer	T68P-6700-A	429 V-8 engine
Front cover alignment tool	T68P-6019-A	429 V-8 engine
Piston pin remover/replacer	T68P-6135-A	All 6-cylinder engines; 289, 302, 429 V-8 engines
Crankshaft rear oil seal replacer	T68P-6701-A	429 V-8 engine
Cylinder block core plug replacer	T68P-6266-A	All engines
Engine lifting bracket	T68P-6000-A	429 V-8 engine

THERMACTOR DRIVE BELT TENSION

New	140 Lbs
Used (and belt-operated over 10 minutes)	110 Lbs

LUBRICANTS

Exhaust Control Valve Lubricant	Ford Part No. C0AZ-19A501-A, R-149-A
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SEALERS

Loctite (thread locking compound)	Ford Part No. C3AZ-19554-A
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FUEL TANK CAPACITIES

Car Model	Gallons	
	U.S. Measure	Imperial Measure
Ford — exc. Station Wagons	25	21
Ford Station Wagons	20	16-3/4
Falcon — exc. Station Wagon	16	13-1/4
Falcon Station Wagon	20	16-3/4
Fairlane	20	16-3/4
Mustang	16	13-1/4
Thunderbird	22	18-1/2

A PRELIMINARY SHOP MANUAL

TRUCK

ENGINE IDENTIFICATION AND APPLICATION – GASOLINE

Engines	Rating Plate Identification	Application	Engines	Rating Plate Identification	Application
Light Duty Trucks					
240 Six	A		300 LD Six	B	F-100, -250 and -350; P-350, -400 and -500; F-100 and -250 (4 x 4)
			360 V-8	Y	F-100, -250 (4 x 2), and -350
			390 V-8	H	F-100, -250 (4 x 2), and -350
Medium Duty Trucks					
240 Six	A	F-, N- and B-500 and -600	330 HD V-8 2V	D	F-, C-, N-, and B-600 and -700; T-700
300 LD Six	B	F-, N- and B-500			
300 HD Six	B	F-, N- and B-600; C-500 and -600	361 HD V-8 2V	E	F-, N-, B-750; C-, CT-, and T-750, and -800; F-800
330 MD V-8	C	F-, N- and B-500 and -600; C-550 and -600; B-700	391 HD V-8	F	F-, N-, C- and CT-750; F-, C- and CT-800
Heavy Duty Trucks					
401 V-8 4V	H	F-, N-, C-, T-, NT- and CT-850 and -900	534 V-8 4V	L	T- and CT-850 and -950; F-, N-, NT- and C-1000, -1100
477 V-8 4V	K	F-, N-, C-, T-, NT- and -850 and -950; F-, N- and C-1000, -1100			

GENERAL SPECIFICATIONS

Engine	Compression Ratio	Bore and Stroke	Taxable Horsepower	Brake Horsepower at Specified RPM (Gross)	Torque – Ft. Lbs at Specified RPM (Gross)	Compression Pressure – PSI (2) (Sea Level at Cranking Speed)
240 Six	9.2:1	4.000 x 3.180	38.40	150 at 4000	234 at 2200	150 - 200
300 LD Six	8.8:1	4.000 x 3.980	38.40	165 at 3600	294 at 2000	150 - 200
300 HD Six	8.8:1	4.000 x 3.980	38.40	170 at 3600	283 at 14 - 2400	150 - 200
330 MD V-8	7.4:1	3.875 x 3.500	48.05	190 at 4000	305 at 2000	120 - 160
330 HD V-8	7.4:1	3.875 x 3.500	48.05	190 at 4000	306 at 2000	120 - 160
360	8.4:1	4.050 x 3.500	52.49	215 at 4400	327 at 2600	120 - 160
361 V-8	7.4:1	4.050 x 3.500	52.49	210 at 4000	345 at 2000	120 - 160
390	8.6:1	4.050 x 3.786	52.49	255 at 4400	376 at 2600	120 - 160
391 V-8	7.4:1	4.050 x 3.786	52.49	235 at 4000	372 at 2000	120 - 160
401 V-8 (4-V)	7.5:1	4.125 x 3.750	54.00	226 at 3600	343 at 20 - 2600	130 - 170
477 V-8 (4-V)	7.5:1	4.500 x 3.750	65.00	253 at 3400	415 at 20 - 2600	130 - 170
534 V-8	7.5:1	4.500 x 4.200	65.00	266 at 3200	481 at 16 - 1800	130 - 170

- (1) Engine No. shown is the piston displacement in cubic inches.
 (2) Allowable variation between cylinders: 330, 361 and 391 (30 psi). All other engines (20 psi).

GENERAL SPECIFICATIONS – Continued

Engine*	Engine Idle RPM (1)				Engine Governed Speed – RPM				Oil Pressure Hot at 2000 RPM	Firing Order
	Without Exhaust Emission Control		IMCO Thermactor		Manual Trans.		Auto. Trans.			
	Man.	Auto.(2)	Auto.(2)	Man.	Load	No Load	Load	No Load		
240	525	500	500	600	3800	4000	3800	4000	35-60 psi	1-5-3-6-2-4
300	525	500	500	600	3600	3800	3600	3800	35-60 psi	
330 MD	525				3600	3900	3600	3900	35-60 psi	
330 HD	525	500			3600	3800	3600	3800	35-60 psi	1-5-4-2-6-3-7-8
360	525	500	550	625	3600	3800	3600	3800	35-60 psi	
361	525	500			3600	3800	3600	3800	35-60 psi	
390	525	500	550	625	3600	3800	3600	3800	35-60 psi	
391	525	500			3600	3800	3600	3800	35-60 psi	
401	525	500			3400	2500-3600	3600	3800	35-60 psi	1-5-4-8-6-3-7-2
477	525	500			3200	2500-3400	3400	3600	35-60 psi	
534	525	500			3000	2500-3200	3200	3400	35-60 psi	

- (1) With headlights on. If unit is equipped with air conditioner, it should be operated at least 20 minutes before setting engine idle speed. Refer to Group 10 for proper procedures in setting idle speed.
 (2) In drive minimum inches of Mercury specified engine rpm (Sea Level). This includes automatic transmission in Neutral.

* Engine idle manifold vacuum 17" Hg all engines.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

IGNITION TIMING

Engine	Non-Thermactor, Non-IMCO (BTDC)		Thermactor (BTDC)	IMCO (BTDC)
	Standard Transmission	Automatic Transmission	Standard Transmission	Automatic Transmission
240 LD	6° (1)	10° (1)	6° (1)	6° (1)
240 MD	6° (1)	10° (1)	6° (1)	6° (1)
300	6° (1) (2)	10° (1) (2)	6° (1)	6° (1)
330 MD	12° (1) (2)			
330 HD and 361	10° (1) (2)	10° (1) (2)		
360	10° (1) (2)	10° (1) (2)	6° (1)	6° (1)
390	10° (1) (2)	10° (1) (2)	6° (1)	6° (1)
391	8° (1) (2)	8° (1) (2)		
401, 477 and 534	8° (1)	8° (1)		

- (1) If the individual requirements of the vehicle and/or the use of sub-standard fuels dictate, the initial timing may have to be retarded from the recommended setting to eliminate detonation (spark knock). If retarding is necessary, it should be done progressively and not to exceed 2° BTDC.
- (2) For altitude operation, and/or in order to obtain optimum engine performance and fuel economy, vehicles sold and/or operating outside of the United States using engines coded (**), the initial ignition timing may be advanced to a maximum of 5° in excess of the "normal" setting. No further improvement in engine performance or fuel economy will be achieved by advancing beyond this point. Advance the timing progressively until engine detonation (spark knock) is evident under actual road test acceleration. Retard the timing until the detonation (spark knock) is eliminated.

CYLINDER HEAD

Engine	Combustion Chamber Volume CC	Valve Guide Bore Diameter Standard Int. and Exh.	Valve Seat Width	Valve Seat Angle	Valve Seat Runout (Max.)	Valve Arrangement Front to Rear	Valve Seat Insert Bore Diameter Standard (3)	Rocker Arm Stud Bore Dia.—Std.	Gasket Surface Flatness (4)
240, 300 LD	66.0-69.0	0.3433-0.3443	Int. 0.060-0.080 Exh. 0.070-0.090	Int. and Exh. 45°	0.0015	E-I-E-I- E-I-E-I- E-I-E-I-		0.3685-0.3695	0.003 inch in any 6 inches or an overall of 0.007
300 HD	75.0-78.0	0.3433-0.3443	Int. 0.060-0.080 Exh. 0.088-0.102						
360, 390	67.1-70.1	0.3728-0.3738	Int. 0.060-0.080 Exh. 0.070-0.090						
330 MD	78.5-81.5	0.3728-0.3738	Int. 0.070-0.090 Exh. 0.090-0.110						
330 HD, 361, 391	78.5-81.5	(2)	Int. 0.070-0.090 Exh. 0.095-0.110		0.0020	E-I-E-I- I-E-I-E-	Int. 1.8120-1.8130 Exh. 1.6260-1.6270		
401, 477, 534	109.5-114.0(1) 138.0-143.5(1) 155.5-161.0(1)	0.4368-0.4375	0.090-0.110				Int. 2.2165-2.2175 Exh. 1.7405-1.7415		

- (1) In cylinder block. (2) Intake 0.3728-0.3738 — Exhaust 0.4368-0.4378.
- (3) Valve seat insert to bore interference fit—standard (intake and exhaust 0.002-0.004). The valve insert diameter — standard minimum and standard maximum is 0.003 larger than the insert bore diameter.
- (4) Head gasket surface finish RMS 90 - 150.

VALVE ROCKER ARMS, ROCKER ARM SHAFT, PUSHRODS 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 (Max. Runout)	Valve Tappet or Lifter		
						Standard Diameter	Clearance to Bore (3)	Hydraulic Lifter Leakdown Rate
240, 300	—	—	—	1.61:1	0.025			
360, 390	0.839-0.840	0.0035-0.0055(1)	0.8430-0.8440	1.73:1		0.8740-0.8745	0.0005-0.0020	5-50 seconds max. — measured at 1/16 inch plunger travel
330, 361, 391	0.839-0.840	0.0030-0.0055(1)	0.8425-0.8440	1.73:1				
401, 477, 534	0.781-0.782	0.0010-0.0030(2)	0.7830-0.7840	1.58:1				

(1) Wear limit — 0.0065

(2) Wear limit — 0.0070

(3) Wear limit — 0.005

A PRELIMINARY SHOP MANUAL

VALVE SPRINGS

Engine	Valve Spring Pressure — Lbs at Length		Free Length (Approx.)	Assembled Height (Pad to Retainer)	Out of Square (Max.)
240	76 - 84 at 1.700 Wear Limit 68 at 1.700	187 - 207 at 1.300 Wear Limit 166 at 1.300	1.99	1 - 43/64 - 1 - 47/64	5/64 (.078)
300 HD	Intake 76 - 84 at 1.700 Wear Limit 68 at 1.700	Intake 187 - 207 at 1.300 Wear Limit 166 at 1.300	Intake 1.99	Intake 1 - 43/64 - 1 - 47/64	
	Exhaust 77 - 85 at 1.580 Wear Limit 69 at 1.300	Exhaust 182 - 202 at 1.180 Wear Limit 162 at 1.180	Exhaust 1.87	Exhaust 1 - 35/64 - 1 - 39/64	
300 LD	77 - 85 at 1.580 Wear Limit 69 at 1.580	183 - 202 at 1.180 Wear Limit 165 at 1.180	1.87	1 - 35/64 - 1 - 39/64	
330 MD	94 - 104 at 1.820 Wear Limit 85 at 1.820	180 - 198 at 1.420 Wear Limit 162 at 1.420	2.26	1 - 13/16 - 1 - 27/32	
330 HD, 361, 391	76 - 84 at 1.670 Wear Limit 69 at 1.670	175 - 194 at 1.240 Wear Limit 163 at 1.240	2.00	1 - 41/64 - 1 - 11/16	
360, 390	85 - 95 at 1.820 Wear Limit 77 at 1.820	209 - 231 at 1.380 Wear Limit 186 at 1.380	2.12	1 - 13/16 - 1 - 27/32	
401, 477, 534	73 - 81 at 1.700 Wear Limit 65 at 1.700	171 - 189 at 1.280	2.02	1 - 11/16 - 1 - 23/32	

VALVES — Continued

Engine	Valve Stem Diameter							
	Standard		0.003 Oversize		0.015 Oversize		0.030 Oversize	
	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust
240, 300	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
330 MD	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
330 HD, 361, 391	0.3711 - 0.3718	0.4338 - 0.4348	0.3741 - 0.3748	0.4368 - 0.4378	0.3861 - 0.3868	0.4488 - 0.4498	0.4011 - 0.4018	0.4638 - 0.4648
360, 390	0.3711 - 0.3718	0.3711 - 0.3718	0.3741 - 0.3748	0.3741 - 0.3748	0.3861 - 0.3868	0.3861 - 0.3868	0.4011 - 0.4018	0.4011 - 0.4018
401, 477, 534	0.4349 - 0.4358	0.4335 - 0.4344	0.4379 - 0.4388	0.4365 - 0.4374	0.4499 - 0.4508	0.4485 - 0.4494	0.4649 - 0.4658	0.4635 - 0.4644

VALVES

Engine	Valve Stem to Valve Guide Clearance		Valve Lash (Cold or Hot) or Clearance (Hot)	Valve Head Diameter		Valve Face Angle	Valve Face Runout (Maximum)	Minimum Allowable Valve Stem Tip Length
	Intake	Exhaust		Intake	Exhaust			
240(5) and 300 LD	0.0010 - 0.0027(2)	0.0010 - 0.0027(2)	0.082 - 0.152(4)	1.772 - 1.787	1.552 - 1.567	Seat 45°	0.0020	0.210
300 HD	0.0010 - 0.0027(2)	0.0010 - 0.0027(2)					0.0015	
330 MD	0.0010 - 0.0024(1)	0.0028 - 0.0042(3)	0.100 - 0.200 (4)	1.745 - 1.760	1.500 - 1.510		0.0015	
330 HD	0.0010 - 0.0024(1)	0.0020 - 0.0037(3)				Face 44°	0.0015	
360, 390	0.0010 - 0.0024(1)	0.0020 - 0.0034(3)		2.022 - 2.037	1.551 - 1.566		0.0020	
361, 391	0.0010 - 0.0024(1)	0.0020 - 0.0037(3)		1.745 - 1.760	1.500 - 1.510		0.0015	
401, 477, 534	0.0010 - 0.0026(1)	0.0024 - 0.0040(3)	0.020	2.015 - 2.025	1.630 - 1.640		0.0015	

(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) Hydraulic valve lifter adjustment turns down after contact — 240 Six

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

CAMSHAFT

Engine	Lobe Lift (1)		Theoretical Valve Lift		Camshaft End Play		Camshaft Journal to Bearing Clearance
	Intake	Exhaust	Intake	Exhaust	End Play	Wear Limit	
240	0.2330	0.2490	0.376	0.400	0.003-0.007	0.012	0.001-0.003 Wear Limit - 0.006
300	0.2490	0.2490	0.400	0.400	0.003-0.007		
330	0.2446	0.2329	0.423	0.403	0.001-0.007		
360, 390	0.247	0.249	0.427	0.430	0.001-0.007		
361, 391	0.2448	0.2448	0.423	0.423	0.001-0.007		
401, 477 and 534	0.2780	0.2780	0.439	0.439	0.001-0.007		

(1) Maximum allowable lobe lift loss (All Engines) 0.005

CAMSHAFT - Continued

Item	Bearing	Engine			
		240, 300	360, 390	330, 361, 391	401, 477, 534
Camshaft Journal Diameter - Standard (1)	Front	2.0170-2.0180	2.1238-2.1248	2.1238-2.1248	2.4740-2.4750
	Others				2.3700-2.3710
Camshaft Bearings Inside Diameter	Front	2.0190-2.0200	2.1258-2.1268	2.1258-2.1268	2.4760-2.4770
	Others				2.3720-2.3730
Camshaft Bearings Location (2)	(No. 1)	0.020-0.035	0.005-0.020	0.005-0.020	0.310-0.330

(1) Camshaft Journal maximum runout
 All engines 0.005
 Camshaft Journal maximum out-of-round
 240, 300 0.0010
 All others 0.0005

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

CAMSHAFT VALVE TIMING

Engine	Intake Valve		Exhaust Valve	
	Opens	Closes	Opens	Closes
240	0.004 in. at 12° BTDC	0.006 in. at 62° ABDC	0.004 in. at 60° BBDC	0.006 in. at 28° ATDC
300	0.004 in. at 18° BTDC	0.006 in. at 70° ABDC	0.004 in. at 58° BBDC	0.006 in. at 30° ATDC
330	0.002 in. at 27° BTDC	0.005 in. at 55° ABDC	0.002 in. at 61° BBDC	0.005 in. at 21° ATDC
360, 390	0.004 in. at 13° BTDC	0.006 in. at 63° ABDC	0.004 in. at 3° BBDC	0.006 in. at 23° ATDC
361	0.002 in. at 28° BTDC	0.005 in. at 60° ABDC	0.002 in. at 68° BBDC	0.005 in. at 20° ATDC
391	0.003 in. at 24° BTDC	0.005 in. at 64° ABDC	0.002 in. at 64° BBDC	0.005 in. at 24° ATDC
401, 477, 534	0.0159 in. at 20° BTDC	0.0159 in. at 56° ABDC	0.0159 in. at 59° BBDC	0.0159 in. at 17° ATDC

A PRELIMINARY SHOP MANUAL

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.	
240	0.002-0.004	0.002	0.006	0.003	0.006	—
300	0.002-0.004	0.002	0.006	0.003	0.006	—
330	—	0.003	0.007	0.001	0.002	0.680
360, 390	—	0.002	0.006	0.001	0.006	0.500
361, 391	—	0.003	0.007	0.001	0.002	0.680
401, 477, 534	0.002-0.004	0.001	—	0.001	—	—

CYLINDER BLOCK

Engine	Cylinder Bore Diameter (1)	Cylinder Bore Diameter 0.003 O.S.	Tappet Bore Diameter	Main Bearing Bore Diameter	Distributor Shaft Bearing Bore Diameter	Head Gasket Surface Flatness (2)
240 and 300	4.0000-4.0024	4.0024-4.0036	0.875-0.876	2.5902-2.5910	—	Overall — 0.003 inch in any 6 inches or, 0.007 inch for 170, and 0.006 inch for all others.
330 MD	3.8750-3.8774	3.8774-3.8786	0.875-0.876	2.9412-2.9420	0.4525-0.4535	
330 HD	3.8750-3.8774	3.8774-3.8736	0.875-0.876	2.9412-2.9420	0.5155-0.5165	
360, 390	4.0500-4.0524	4.0524-4.0536	0.875-0.876	2.9412-2.9420	0.4525-0.4535	
361 and 391	4.0500-4.0524	4.0524-4.0536	0.875-0.876	2.9412-2.9420	0.5155-0.5165	
401	4.1250-4.1274	4.1274-4.1286	0.875-0.876	3.3176-3.3184	0.4525-0.4535	
477 and 534	4.5000-4.6024	4.5024-4.5036	0.875-0.876	3.3176-3.3184	0.4525-0.4535	

- (1) Maximum out-of-round 0.001
Wear Limit — All except 330, 361 and 391 0.005
— 330, 361 and 391 0.003
Maximum taper 0.010
Wear Limit — All except 330, 361 and 391 0.010
— 330, 361 and 391 0.005
Cylinder bore surface finish RMS
All except 401, 477 and 534 15-35
401, 477 and 534 20-35

- (2) Head gasket surface finish RMS
All except 340, 401, 477 and 534 . . . 90-150
401, 477 and 534 60-110
240 60-150

CRANKSHAFT AND FLYWHEEL

Engine	Main Bearing Journal Diameter (1)	Main Bearing Journal Runout Maximum	Main Bearing Journal Thrust Face Runout	Main Bearing Journal Max. Taper	Thrust Bearing Journal Length	Main and Rod Bearing Journal Finish RMS Max.	Main and Rod Bearing Journal Thrust Face Finish RMS
240	2.3982-2.3990	0.002 Wear Limit 0.003	0.001	0.0003 Per Inch	1.1990-1.2010	12	35 Front
300	2.3982-2.3990				1.1990-1.2010		25 Rear
330 MD	2.7484-2.7492				1.1240-1.1265		20
360, 390	2.7484-2.7492				1.1240-1.1260		35 Front
330 HD, 361	2.7479-2.7487				1.1240-1.1265		25 Rear
391	2.7472-2.7480				1.1240-1.1265		20
401, 477, 534	3.1246-3.1254				1.2790-1.2810		

(1) Maximum out-of-round 0.0004

(2) Wear limit 0.0035

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Engine	Connecting Rod Journal Diameter (1)	Connecting Rod Bearing Journal Maximum Taper	Crankshaft Free End Play	Crankshaft to Rear Face of Block Runout T.I.R. Maximum	Flywheel Clutch Face Runout	Flywheel O.D. Runout Transmission	
						Standard	Automatic
240	2.1228-2.1236	0.0003 Per Inch	0.004-0.008	0.010	0.010	0.018	0.020
300	2.1228-2.1236		Wear Limit 0.012				
330 MD	2.4380-2.4388					0.030	0.030
360, 390	2.4380-2.4388	0.0003 Per Inch	0.004-0.010	0.010		0.018	0.020
330 HD, 361	2.4377-2.4385		Wear Limit				
391	2.4377-2.4385		0.014	0.005		0.030	0.030
401, 477, 534	2.7092-2.7100	0.0004 Per Inch	0.004-0.008 (2)	0.010		0.018	0.020

(1) Maximum Out-of-round 330 HD, 361 and 391 0.0005
All Others 0.0004

(2) Wear Limit 0.012

CRANKSHAFT BEARINGS

Engine	Connecting Rod Bearings			Main Bearings		
	To Crankshaft Clearance		Wall Thickness	To Crankshaft Clearance		Wall Thickness
	Desired	Allowable	— Standard (1)	Desired	Allowable	— Standard (2)
240	0.0008-0.0015	0.0008-0.0024	0.0754-0.0757	0.0005-0.0015	0.0005-0.0022	0.0954-0.0957
300 LD	0.0008-0.0015	0.0008-0.0024	0.0754-0.0757	0.0009-0.0015	0.0009-0.0026	0.0950-0.0955
300 HD	0.0009-0.0015	0.0009-0.0027	0.0752-0.0757	0.0009-0.0015	0.0009-0.0028	0.0950-0.0955
330 MD	0.0008-0.0020	0.0008-0.0025	0.0755-0.0758	0.0011-0.0020	0.0011-0.0029	0.0954-0.0957
330 HD	0.0011-0.0020	0.0011-0.0029	0.0755-0.0760	0.0010-0.0020	0.0010-0.0030	0.0956-0.0961
360, 390	0.0008-0.0015	0.0008-0.0026	0.0755-0.0760	0.0005-0.0015	0.0005-0.0024	0.0956-0.0961
361	0.0011-0.0020	0.0011-0.0029	0.0755-0.0760	0.0010-0.0020	0.0010-0.0030	0.0956-0.0961
391	0.0011-0.0020	0.0011-0.0029	0.0755-0.0760	0.0010-0.0020	0.0010-0.0030	0.0956-0.0961
401	0.0017-0.0025	0.0017-0.0035	0.0957-0.0962	0.0018-0.0025	0.0018-0.0036	0.0951-0.0956 (3)
477	0.0017-0.0025	0.0017-0.0035	0.0957-0.0962	0.0018-0.0025	0.0018-0.0036	0.0951-0.0956 (3)
534	0.0017-0.0025	0.0017-0.0035	0.957-0.0962	0.0018-0.0025	0.0018-0.0036	0.0951-0.0956 (3)

(1) 0.002 U.S. Clearance

(2) 0.002 U.S. Clearance

(240, 300) 0.0762-0.0767

(All) Add 0.0010 to standard clearance

(Others) Add 0.0010 to standard clearance

(3) Thrust Bearing Wall Thickness 0.0949-0.0954

CONNECTING ROD

Engine	Piston Pin Bore or Bushing I.D. (1)	Connecting (2) Rod Bearing Bore Diameter	Connecting Rod Length Center to Center	Connecting Rod (3) Alignment Max. Tot. Difference		Connecting Rod Assy. (Assembled to Crankshaft)	
				Twist	Bend	Side Clearance	Wear Limit
240	0.9104-0.9112	2.2750-2.2758	6.7932-6.7962	0.012	0.004	0.006-0.013	0.018
300			6.2082-6.2112				
330 MD, 360	0.9752-0.9755	2.5907-2.5915	6.5380-6.5420			0.010-0.020	0.023
330 HD, 361, 390, 391			6.4860-6.4900				
401, 477, 534			7.7390-7.7410			0.006-0.014	0.017

(1) Piston pin bushing or bore
Maximum out-of-round
360, 390 0.0004
330, 361, 391 0.0003
401, 477, 534 0.0002
Maximum taper
330 MD 0.0004
360, 390, 330HD, 361, 391 0.0003
401, 477, 534 0.0002

(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.

A PRELIMINARY SHOP MANUAL

PISTON PIN

Engine	Length	Diameter			To Piston Clearance	To Connecting Rod Bushing Clearance
		Standard	0.001 Oversize	0.002 Oversize		
240,300	3.010-3.040	0.9119-0.9124	0.9130-0.9133	—	0.0002-0.0004 (2)	(1)
330,361,391	3.150-3.170	0.9750-0.9753	0.9760-0.9763	0.9770-0.9773	0.0003-0.0005	0.0001-0.0003 (3)
360,390	3.156-3.170	0.9750-0.9753	0.9760-0.9763	0.9770-0.9773	0.0001-0.0003	0.0001-0.0005 (3)
401	3.335-3.350	1.2198-1.2201	1.2208-1.2211	1.2218-1.2221	0.0003-0.0005	0.0001-0.0006 (3)
477,534	3.840-3.855	1.2198-1.2201	1.2208-1.2211	1.2218-1.2221	0.0003-0.0005	0.0001-0.0006 (3)

(1) Interference Fit.

(2) 0.0003-0.0005 for 300 engines

(3) Wear Limit 0.0010

PISTON PINS

Engine	Diameter			Piston (2) to Cylinder Bore Clearance	Piston Pin Bore Diameter	Ring Groove Width
	Coded Red	Coded Blue	0.003 Oversize			
240	3.9984-3.9990	3.9996-4.0002	4.0008-4.0014	0.0014-0.0022	0.9123-0.9126	Top (240, 300) 0.0800-0.0810 (330,352,361,391) 0.0805-0.0815 (401,477,534) 0.0965-0.0975 Intermed. (401,477,534) 0.0965-0.0975 Bottom (240,300) 0.0800-0.0810 (330,361,391) 0.0805-0.0815 (352) 0.0960-0.0970 (401,477,534) 0.0965-0.0975 Oil (330HD,361,391) 0.1885-0.1895 (Others) 0.1880-0.1890
300	3.9984-3.9990	3.9996-4.0002	4.0008-4.0014	0.0014-0.0022	0.9124-0.9127	
330 MD	3.8725-3.8731	3.8737-3.8743	3.8749-3.8755	0.0017-0.0025	0.9754-0.9757	
330 HD	3.8724-3.8730	3.8736-3.8742	3.8748-3.8754	0.0025-0.0033	0.9754-0.9757	
360,390	4.0484-4.0490	4.0496-4.0502	4.0508-4.0514	0.0015-0.0023	0.9752-0.9755	
361 HD	4.0474-4.0480	4.0486-4.0492	4.0498-4.0504	0.0025-0.0033	0.9754-0.9757	
391 HD	4.0474-4.0480	4.0486-4.0492	4.0498-4.0504	0.0025-0.0033	0.9754-0.9757	
401	4.1233-4.1239	4.1245-4.1251	4.1257-4.1263	0.0028-0.0034	1.2202-1.2205	
477	4.4983-4.4989	4.4995-4.5001	4.5007-4.5013	0.0028-0.0034	1.2202-1.2205	
534	4.4983-4.4989	4.4995-4.5001	4.5007-4.5013	0.0028-0.0034	1.2202-1.2205	

(1) Measured 90° to pin centerline and at pin centerline height.

(2) Refer to Part 8-1 for the proper procedures for measuring piston to bore clearance. Wear limit (all engines) 0.008.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

PISTON RINGS

Engine	Ring Width			Side Clearance			Ring Gap Width		
	Compression Ring(1)		Oil Ring	Compression Ring(1)		Oil Ring	Compression Ring		Oil Ring
	Top	Bottom		Top	Bottom		Top	Bottom	
240	0.0774-0.0781	0.0770-0.0780		0.0019-0.0036(3)	0.0020-0.0040(3)	Snug	0.010-0.020	0.010-0.020	0.015-0.055(5)
300	0.0774-0.0781	0.0770-0.0780		0.0019-0.0036(3)	0.0025-0.0045(3)	Snug	0.010-0.020	0.010-0.020	0.015-0.055(5)
330 MD	0.0774-0.0781	0.0930-0.0940		0.0024-0.0041(3)	0.0024-0.0041(3)	0.0190-0.0360	0.010-0.031	0.010-0.031	0.015-0.038(5)
330 HD (6)(7)(8)	0.0774-0.0781	0.0770-0.0780	0.1859-0.1866	0.0024-0.0041(4)	0.0030-0.0050(4)	0.0190-0.0360	0.010-0.031	0.010-0.031	0.015-0.038(5)
360, 390	0.0774-0.0781	0.0770-0.0780	0.1815-0.1875	0.0019-0.0036(3)	0.0020-0.0040(3)	0.0005-0.0075	0.015-0.023	0.010-0.020	0.015-0.055(5)
361,391 (6)(7)(8)	0.0774-0.0781	0.0770-0.0780	0.1859-0.1866	0.0024-0.0041(4)	0.0024-0.0041(4)	0.0190-0.0360	0.015-0.036	0.015-0.036	0.015-0.038(5)
401,477, 534	0.0929-0.0936	0.0930-0.0940	0.1859-0.1866	0.0029-0.0046(3)	0.0025-0.0045(3)	0.0014-0.0031(4)	0.018-0.039	0.015-0.036(2)	0.013-0.039

- (1) Intermediate ring width and clearance on 401, 477 and 534 are same as top compression ring for these engines.
 (2) Intermediate ring gap width on 401, 477 and 534 is same as bottom compression ring for these engines.
 (3) Wear limit 0.0060 (4) Wear limit 0.0070 (5) Steel rail
 (6) Intermediate ring width 330-361-391 — 0.0774-0.0781 (7) Intermediate ring gap width 330-361-391 — 0.015-0.036
 (8) Intermediate ring side clearance 330-361-391 — 0.0024-0.0041

WATER PUMP

Engine and Model	Water Pump Pulley to Engine Ratio	Water Pump Assembly Dimensions	
		Front Face of Pulley Hub to Pump Housing Face	Impeller to Housing Cover Mounting Surface Clearance
240 All	0.96:1	3.60	0.010-0.050
300 All	0.96:1	4.10	0.010-0.050
330 MD All	0.97:1	7.569	0.070-0.080
330 HD All	0.95:1	4.825-4.855	0.006-0.032
360, 390	0.94:1	7.569	0.070-0.080
361, 391 All	0.95:1	4.825-4.855	0.008-0.032
401, 477, 534 Conventional Cab	0.90:1	5.48	0.005-0.025
401, 477, 534 Tilt Cab	0.90:1	5.40	0.005-0.025

OIL PUMP

Engine	Relief Valve Spring Tension — Lbs Specified Length	Drive Shaft to Housing Bearing Clearance	Relief Valve Clearance	Rotor Assembly End Clearance (Pump Assembled)	Outer Race to Housing (Radial Clearance)
240 and 330	20.6-22.6 at 2.490	All Engines 0.0015-0.0029	All Engines 0.0015-0.0029	0.0011-0.0041	0.006-0.012
330 MD	9.0- 9.6 at 1.530				
330 HD	11.1-11.8 at 1.560				
360, 390	9.0- 9.6 at 1.530				
361 and 391	11.1-11.8 at 1.560				
401	10.7-11.9 at 1.07			0.0010-0.0035	0.006-0.011
477 and 534					

A PRELIMINARY SHOP MANUAL

APPROXIMATE OIL PAN CAPACITIES

Crankcase Capacity (Quarts)	Engine				
	240 (F-100/250 4x2)	240 (Except F-100-250 4x2), 300 (F-100/250 4x4, F-B-N-500/550, F-350 4x2, P-350/500) and 360, 390	300 HD (F-B-N-600, C-550/600)	330, 361 and 391	401, 477 and 534
U. S. Measure	4.00 (1)	5.00 (1)	6.00 (1)	8.00 (1)	9.00 (2)
Imperial Measure	3.33 (1)	4.25 (1)	5.00 (1)	6.75 (1)	7.20 (2)

(1) Add one quart extra when changing oil filter.

(2) Add two quarts extra when changing oil filter.

TORQUE LIMITS

NOTE: All values given are in Ft-Lbs unless otherwise stated. Oil threads with lightweight engine oil unless the threads require oil-resistant or water-resistant sealer.

Item	Engines Applicable	Torque	Item	Engines Applicable	Torque
Cylinder Head Bolts Step 1	240, 300	50-55	Intake Manifold to Cylinder Head	300	20-25
	330,360,390,361,391	70		330,360,390,361,391	32-35
	401,477,534	130-140		240,401,477,534	23-28
Cylinder Head Bolts Step 2	240,300	60-65	Exhaust Manifold to Cylinder Head	300	20-25
	330,360,390,361,391	80		330,361,391	18-24
	401,477,534	150-160		360,390	12-18
Cylinder Head Bolts Step 3	240,300	70-75		240,401,477,534	23-28
	330,360,390,361,391	80-90	Intake to Exhaust Manifold	240	28-33
	401,477,534	170-180		240,300	12-15
Main Bearing Cap Bolts	240,300	60-70	Oil Pump to Cylinder Block	330,360,390,361,391	20-25
	330,360,390,361,391	95-105		401,477,534	23-28
	401,477,534	130-150	Oil Pump Cover Plate	330,361,391	7-9
Oil Pan to Cylinder Block	240,300,360,390	10-12		All Other Engines	6-9
	330,361,391	9-11	Oil Filter Center Bolt	300	20-25
	401,477,534	10-13		330 HD, 361, 391	20-25
Oil Pan Drain Plug	401,477,534	25-35		401,477,534	45-50
	All Other Engines	15-20			

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

TORQUE LIMITS – Continued

NOTE: All values given are in Ft-Lbs unless otherwise stated. Oil threads with lightweight engine oil unless the threads require oil-resistant or water-resistant sealer.					
Item	Engines Applicable	Torque	Item	Engines Applicable	Torque
Flywheel to Crankshaft	401,477,534	100-110	Thermactor Air Manifold to Cylinder Head	240,300	5-7
	All Other Engines	75-85	Oil Filter Adapter to Cylinder Block	300 LD	15-20
Exhaust Manifold to Muffler Inlet Pipe	Light Trucks	25-35		240,300 HD	38-42
	Medium and Heavy Duty Trucks	25-30		330,360,390,361,391, 401,477,534	14-19
Engine Governor to Cylinder Block	401,477,534	23-28	Damper or Pulley to Crankshaft	240	130-150
Valve Rocker Arm Adjustment Screw-Locknut	401,477,534	30-35		300,401,477,534	130-145
Valve Rocker Arm Stud Adjusting Nut (with Tappet on Camshaft Base Circle, Turn Adjusting Nut Counterclockwise)	240,300	4.5-15		330 MD, 360,390	70-90
				330 HD, 361,391	150-175
Thermactor Adjusting Arm to Air Pump	240,300	15-20	Valve Rocker Shaft Support to Cylinder Head	330,360,390,361,391	40-45
Thermactor Check Valve to Air Manifold	240,300	16-19	Water Pump to Cylinder Block or Front Cover	240,300	12-15
				360,390	20-25
				330,361,391,401, 477,534	23-28

TORQUE LIMITS – Continued

NOTE: All values given are in Ft-Lbs unless otherwise stated. Oil threads with lightweight engine oil unless the threads require oil-resistant or water-resistant sealer.					
Item	Engines Applicable	Torque	Item	Engines Applicable	Torque
Oil Pick-Up Tube to Oil Pump	330,361,391	9-13	Cylinder Front Cover	240	15-20
	All Other Engines	12-15		300,360,390	12-15
Valve Rocker Arm Cover	240,300	7-9		330,361,391	
	330,360,390,361,391	10-12		3/8-16	23-28
	401,477,534	5-7		5/16-18	12-15
Valve Push Rod Chamber Cover	240,300	1.0-1.5	Water Outlet Housing	401,477,534	35-40
	401,477,534			240,300,360,390	12-15
	Center End Bolts	10	All Other Engines		23-28
Fuel Pump to Cylinder Block or Cylinder Front Cover	Side Bolts	7	Camshaft Sprocket or Gear to Camshaft	330,360,390,361,391	34-45
	240,300			401,477,534	20-24
Oil Cooler to Cylinder Block	All Other Engines	20-25	Oil Filter Insert to Adapter	330 HD, 361,391	50-60
	401,477,534	20-25	Camshaft Thrust Plate to Block	240,300,360,390	19-21
Connecting Rod Nuts	240,300,330,360, 390,361,391	40-45	Fuel Filter Center Bolt	All Other Engines	12-15
	401,477,534	60-65		401,477,534	18-22

A PRELIMINARY SHOP MANUAL

LIGHT TRUCK ENGINE SUPPORT TORQUE LIMITS

Truck	Application	Engine	Thread Size	Torque Ft-Lbs
Front Supports				
F-100, 250, 350	Engine Insulator to Support Bracket	240, 300 LD Six	3/8-16	18-24
F-100 4x4	Front Engine Mount Bracket to Frame		7/16-14	50-70
F-250 4x4				30-40
P-350, 400, 500	Insulator to Engine Bracket & Crossmember	240, 300 LD Six	9/16-18	70-90
P-350, 400, 500	Front Insulator Support Bracket to Block	240, 300 LD Six	7/16-14	45-55
F-100, 250, 350	Engine Front Bracket to Frame Assembly	240, 300 LD Six 360, 390 V-8	3/8-16	30-35
F-100, 250, 350	Front Insulator Stud to Frame Bracket		7/16-14	40-60
F-100, 250, 350	Front Engine Insulator to Engine Block	240, 300 Six 360, 390 V-8	7/16-14	45-55
F-100-250	#2 Crossmember to Frame		7/16-14	35-45
Rear Supports				
F-100, 250, 350	Engine Rear Support to Frame Assembly or Bracket	240, 300 LD Six	1/2-13	40-60
F-250 4x4	Engine Rear Support Bracket to Frame	240, 300 LD Six 360, 390 V-8	7/16-14	30-40
F-350				
P-350, 400, 500	Engine Insulator to Frame & Clutch Housing	240, 300 LD Six	9/16-12	90-110
F-100, 250, 350	Rear Engine Insulator to Transmission Extension		1/2-13	55-65

MEDIUM AND HEAVY TRUCK ENGINE SUPPORT TORQUE LIMITS

Supports	Engine	Application	Thread Size	Torque Ft-Lbs
Front	240, 300 LD and HD Six	Insulator to Front Engine Mount or Support	9/16-18	70-90
		Engine Front Support Bracket to Engine	7/16-14	60-65
	330, 361 and 391 V-8	Insulator to Front Engine Mount or Support	9/16-18	70-90
		Engine Front Mounting Bracket to Engine Cover	3/8-16	40-45
	401, 477 and 534 V-8	Front Engine Bracket to Front Engine Support	5/8-18	145-165 (1)
		Engine Front Mounting Bracket to Engine Cover	3/8-16	40-45
		Insulator to Engine Front Support Bracket	1/2-20	85-105
		Engine Front Support Bracket to Front Support	1/2-20	45-55
Rear	240, 300 LD and HD Six	Crossmember to Clutch Housing	9/16-18	70-90
	330, 361 and 391 V-8	Crossmember to Clutch Housing	9/16-18	70-90
	401, 477 and 534 V-8	Rear Engine Support to Clutch Housing Bracket	5/8-18	145-165 (1)
		Engine Rear Mounting Bracket to Clutch Housing	1/2-13	85-105
		Flywheel Housing Bracket to Crossmember	5/8-18	145-165 (1)
		Rear Engine Support Bracket to Flywheel Housing	1/2-13	70-90
			5/8-18	120-150

(1) Torque to specification and advance to permit installation of cotter pin.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

GENERAL TORQUE LIMITS

TORQUE LIMITS FOR VARIOUS SIZE BOLTS.

CAUTION: In case any of the limits below disagree with those above, the above limits prevails.

Size (Inches)	1/4 - 20	1/4 - 28	5/16 - 18	5/16 - 24	3/8 - 16	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	40 - 60	60 - 70	70 - 80	85 - 95	130 - 145

ENGINE APPLICATIONS – DIESEL

Engine	Make	Rating Plate Identification	Engine Usage	Engine	Make	Rating Plate Identification	Engine Usage
242	Ford	J	P-3500, 4000 and 5000	NTC-335	Cummins	M, N, P, Q, or R.	W-1000-D WT-1000-D
363		W	F-, N-, B- and C-6000 and 7000	V8E-235		F	
				V8-265		G	
CF-160	Cummins	X	F-, T- and C-8000	1673	Caterpillar	K	
C-160		Z		1673-B		L	
C-180		Y		6-71NE-N55		9	
V6E-195		B	F-950-D, and 1000-D T-850-D, and 950-D	6-71N-N60	Detroit Diesel	5	
				6-71N-N65		2	
NHE-195		D	N-1000-D, NT-850-D and 950-D	8V-71NE-N55		7	
NH-220		E	and W- and WT-1000-D	8V-71N-N60		6	
NHC-250		A, H, or J	N-1000-D, NT-850-D and 950-D and W- and WT-1000-D	8V-71N-N65		T	

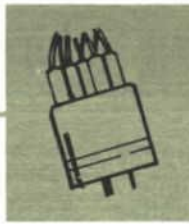
FUEL PUMPS

Mechanical Fuel Pumps	Electric Fuel Pumps
Fuel Pump Static Pressure — psi at 500 Engine rpm	Minimum Volume (Flow) at 11.8 - 12.3 volts and 3 psi
240 and 300 Six 4.0 - 6.0	330 1 quart within 40 seconds
330, 360, 361, 390 and 391 V-8 4.5 - 6.5	361 1 quart within 37 seconds
Minimum Fuel Pump Volume — Flow at 500 Engine rpm	391 1 quart within 34 seconds
All 6-Cyl. Engines 1 pint in 30 seconds	401 1 quart within 36 seconds
All 8-Cyl. Engines 1 pint in 20 seconds	477 1 quart within 33 seconds
Minimum Intake Static Vacuum — Inches of Mercury	534 1 quart within 30 seconds
at 500 Engine rpm	
All Engines 6	
Eccentric Total Lift — Inches	
170, 240 and 300 Six 0.290 - 0.310	
330, 360, 361, 390 and 391 V-8 0.690 - 0.710	

AIR CLEANERS

Type			Oil Capacity		
Standard — All Engines Oil Bath Extra Capacity (D.S.O.)—401 and 477 V-8 Dry			Engine	U.S. Measure	Imperial Measure
			170, 240 and 300 Six	1 Pint	0.8 Pint
Oil Viscosity					
Engine	Above 32°F	Below 32°F	330, 361 and 391 V-8	1 Quart	0.8 Quart
All Engines	SAE 30	SAE 20	401, 477 and 534 V-8	3-1/4 Pints	2-3/4 Pints

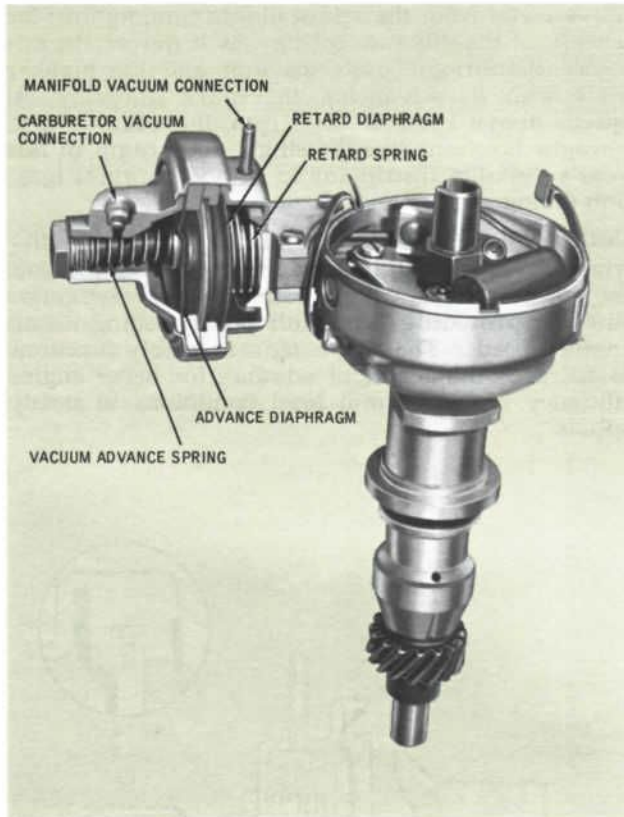
FORD CAR AND TRUCK



CAR

DUAL DIAPHRAGM DISTRIBUTOR

1968 exhaust emission control systems require a specially retarded spark for more complete combustion at idle and low engine speeds, combined with the usual spark advance at normal road speeds. To provide this extended range of spark control, many 1968 engines are equipped with a dual diaphragm distributor.

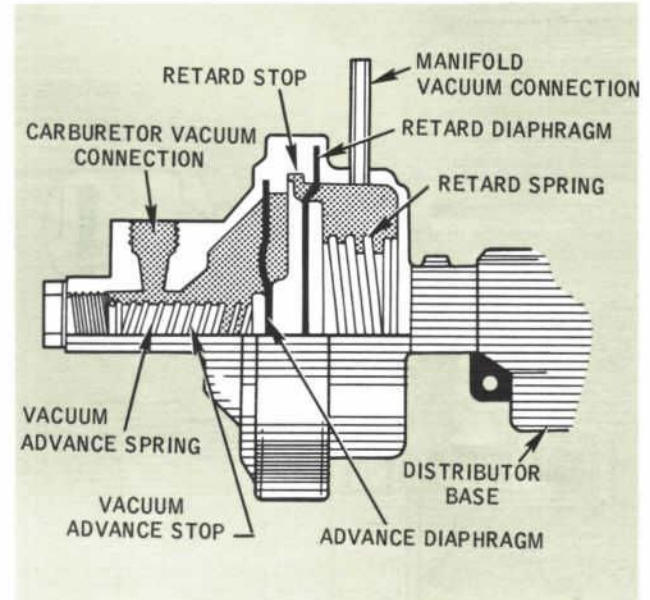


Dual Diaphragm Distributor

Construction Details

With the exception of the diaphragm assembly, this new distributor design is similar to the Autolite dual advance units used on some '67 engines. However, there are two diaphragms instead of one contained in the diaphragm assembly housing. One diaphragm — the outer one — controls spark advance in the same manner as the single diaphragm of last year's unit. The other diaphragm works in the opposite direction to retard the spark at low engine speeds and during deceleration.

Calibrated coil springs bear on the vacuum sides of both diaphragms to supply resistance to the actuating force of the vacuum. Only the outer diaphragm is linked to the distributor breaker plate. The link passes through the center of the inner diaphragm without contacting it. The inner diaphragm serves to position a return stop for the outer diaphragm to govern the amount of spark retard when spark advance vacuum is reduced.



Diaphragm Assembly

Operation

The dual diaphragm assembly is designed to provide the distributor with two distinct spark retard stops — a normal retard of 6° before top dead center, and an additional twelve degrees of retard to 6° after top dead center. The normal retard gives the desired spark timing for starting, while the additional retard position provides a setting that's best for more complete combustion and minimum contaminant emission after starting.

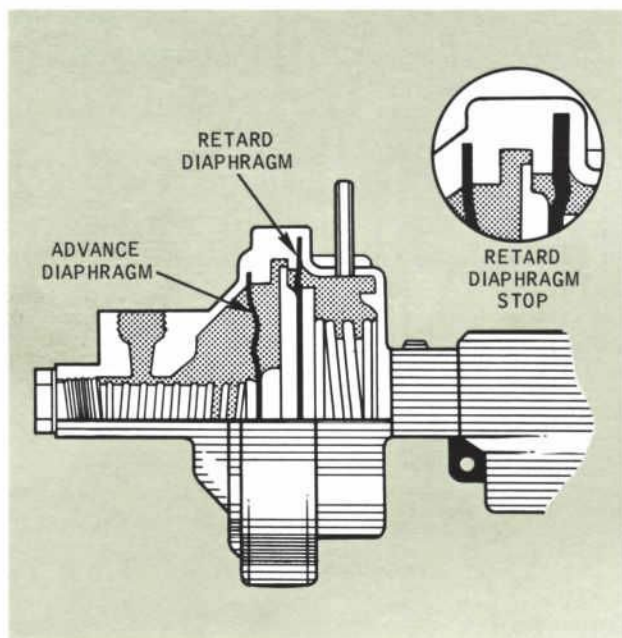
The vacuum sides of the two diaphragms are at either extreme of the diaphragm housing, so they provide opposing operating forces. Carburetor vacuum from a port above the throttle plate is supplied to the outer diaphragm, called the advance diaphragm. Vacuum from the intake manifold or below the carburetor throttle plate is supplied to the inner diaphragm — the retard diaphragm.

Q 1-1 b) That's it! The trim identifies the pictured car as one of the Fairlane Torino series . . . and that distinctive roofline ties it down to the 42—63D Torino GT fastback, doesn't it?

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Starting: When the engine is being cranked by the starter, neither carburetor vacuum nor intake manifold vacuum is strong enough to actuate the diaphragms. Consequently, both remain at rest and the diaphragm link holds the breaker plate in the normal retard position until the engine starts.

Idle and Low Speeds: As the engine starts and begins to run at idle or fast idle rpm, the vacuum from the carburetor is weak because of the closed or nearly closed throttle plates. For the same reason, intake manifold vacuum is strong. The resulting high vacuum against the retard diaphragm moves the diaphragm assembly toward the distributor housing against the resistance of the retard spring until the rim of the diaphragm plate contacts the edge of the retard stop groove around the interior of the diaphragm housing.



Diaphragm Assembly — Full Retard Position

Carburetor vacuum isn't strong enough to overcome the tension of the vacuum advance spring at the other end of the housing. Consequently, this spring expands to move the advance diaphragm until the small plate at its center is stopped by the retard diaphragm plate. In this position, the diaphragm link turns the breaker plate in the direction of distributor cam rotation to retard the ignition timing another twelve degrees.

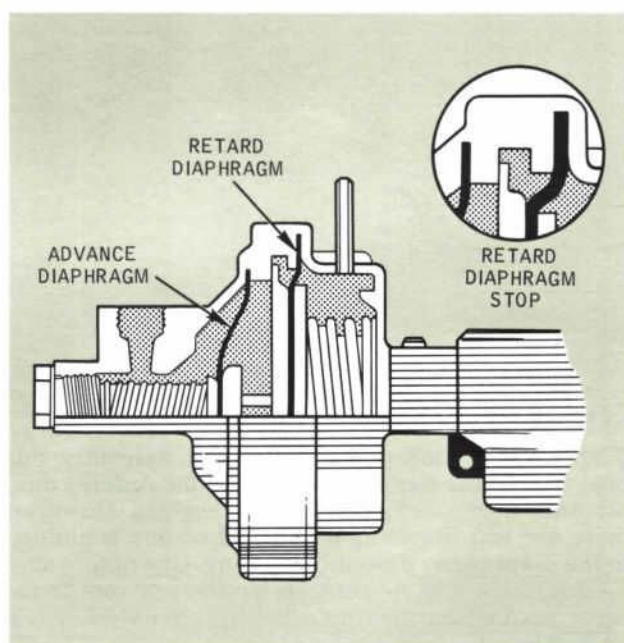
Medium and High Speeds: As the carburetor throttle plates are opened to increase engine speed and power output, carburetor vacuum gets stronger. This increased vacuum causes the advance diaphragm to

Quick-Quiz

- Q 9-1** In an Autolite dual diaphragm distributor, the two diaphragms:
- a) are the only distributor components affecting spark advance or retard. (See page 137)
 - b) work with the centrifugal advance mechanism to control spark advance. (See page 182)

move away from the retard diaphragm, against the tension of the advance spring. As it moves, the advance diaphragm pulls the link and the breaker plate with it, advancing the spark smoothly. At speeds above 1400 to 1600 rpm, the advance diaphragm functions like the single diaphragm of last year's Autolite distributor to provide normal ignition timing.

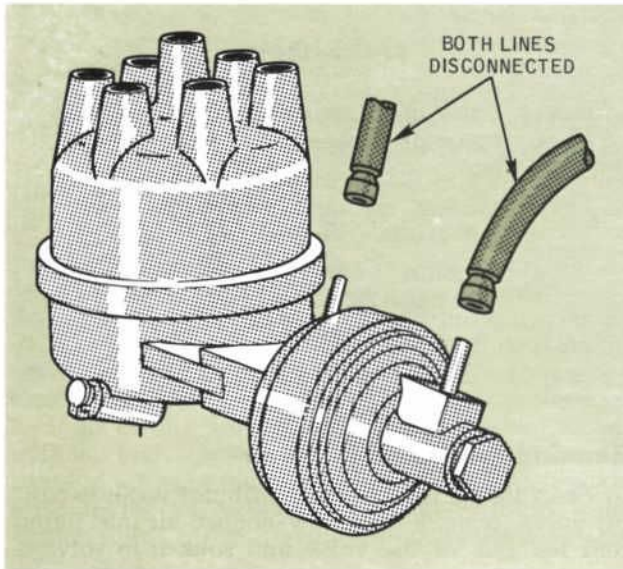
Centrifugal Advance: As in the earlier Autolite distributor, the centrifugal advance mechanism controls the position of the cam in relation to the distributor shaft to provide a basic full power setting for all engine speeds. The diaphragm assembly functions to increase the degree of advance for better engine efficiency under normal load conditions at steady speeds.



Diaphragm Assembly — Full Advance Position

- Q 8-1 a)** Whoa, there! Only *one* of the two procedures given for the 289 V-8 engine in the '67 Shop Manual should be used to adjust the valve clearance in the Thunderjet 429. Check the text again, then take another crack at the question!

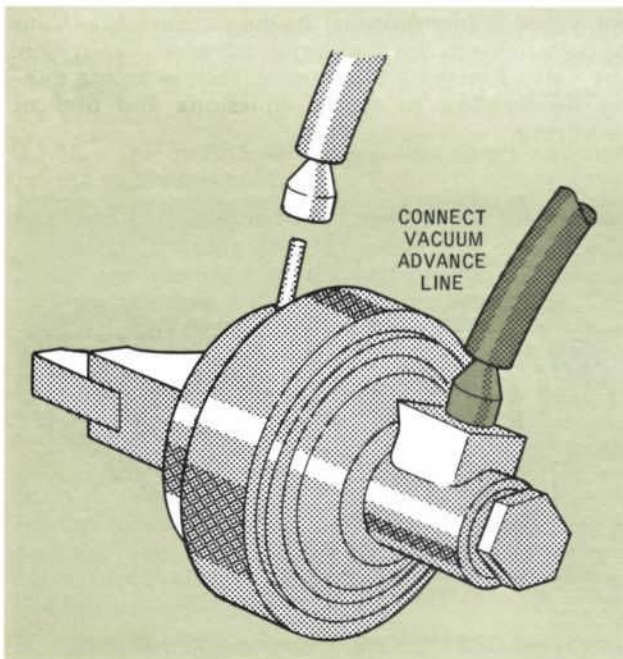
A PRELIMINARY SHOP MANUAL



Disconnect Both Vacuum Lines to Begin Test

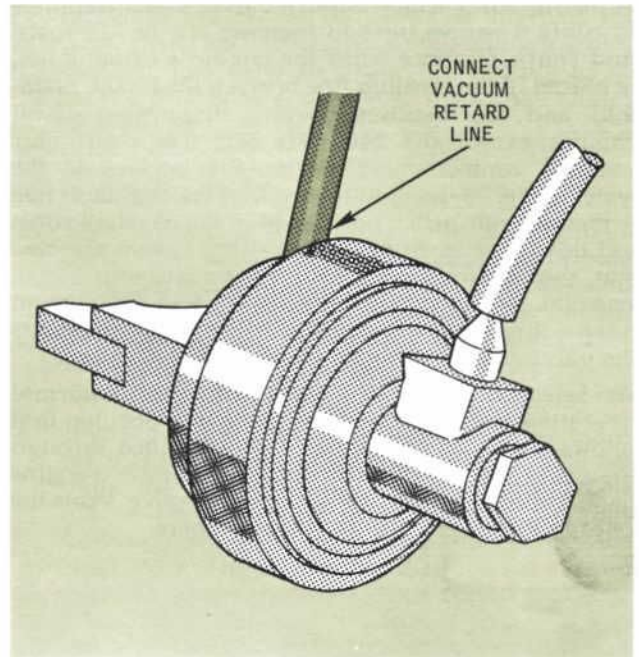
Distributor Service Suggestions

Initial Timing and Spark Advance Tests: Remove both vacuum lines from the distributor and plug the manifold vacuum line. Attach your timing light to the engine, then start the engine and set the idle to 550-600 rpm. Use the timing light to check initial timing, and make any needed adjustments.



Test Vacuum Advance

To quickly check the centrifugal advance mechanism, "rev up" the engine to about 2000 rpm and see if the timing has advanced as it should. Then check the vacuum advance by dropping engine speed to 1500 rpm and noting the degree of spark advance. Install the carburetor vacuum line and fitting in the end of the diaphragm housing and take another look at the timing marks. You should get a further advance with the hose connected if the vacuum advance diaphragm is functioning.



Test Vacuum Retard

Finally, check the vacuum retard. Return engine speed to 550-600 rpm. Unplug the manifold vacuum line and slip the end in position on the tube leading to the retard diaphragm, checking the ignition timing both before and after doing this. If the retard diaphragm is functioning, the spark timing should retard after the vacuum hose is connected.

Overhaul Tips: Service dual diaphragm distributors in the same way you'd handle a similar job on '67 Autolite dual advance units. If your tests prove the diaphragm assembly is defective, install a new assembly — you can't repair the old one!

If there's no visible breakage, points should *not* be replaced unless the voltage drop across the contacts is over 0.25 volt or metal transfer is estimated to be greater than the specified gap — 0.017-inch on V-8 points or 0.025-inch for sixes. Use only a dwell meter to set point gap if you aren't replacing points. Normal metal transfer on used points often makes a feeler gauge check worthless.

- Q 6-5 c) That's not the way! Since the RT-510 countershafts are stepped with the larger diameters toward the rear, all of the gears must be removed and installed from the front of the shaft.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Don't replace a condenser unless it tests defective on an approved tester. If a used condenser checks out okay, chances are that it will hold up in service as long as a new one would . . . and maybe longer, because you can be reasonably sure it's matched to the kind of driving the owner does!

DISTRIBUTOR VACUUM CONTROL VALVE — ALL ENGINES EXCEPT 240 SIX

A distributor vacuum control valve, which responds to coolant temperature to increase engine idle speed and spark advance when the engine is running hot, is placed in the vacuum line between the intake manifold and the distributor retard diaphragm of all engines except the 240 CID Six. The distributor vacuum control valve assembly is located in the water outlet housing at the front of the engine. It has a thermostatic pellet, positioned in the constant coolant flow area in front of the cooling system thermostat, that controls a vent valve for distributor retard vacuum. All outside air used for venting the vacuum passes through a sintered iron filter before it enters the valve and the retard diaphragm vacuum line.

As long as engine temperature is within normal operating limits, the valve remains in a position that allows manifold vacuum to be transmitted through the valve to the retard diaphragm. But when engine heat rises above a set value, the valve vents the retard diaphragm line to the atmosphere.



Distributor Vacuum Control Valve

With normal atmospheric pressure reaching the distributor retard diaphragm, the distributor will revert to the normal retard position — not the extended amount of retard it's designed to provide at idle. This results in a higher idle rpm which increases engine cooling.

Quick-Quiz

Q 9-2 The distributor vacuum control valve prevents a fully retarded spark to:

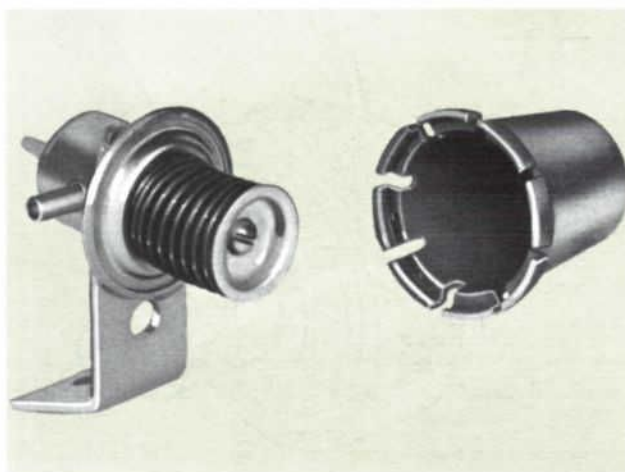
- a) counter engine overheating tendencies at idle. (See page 141)
- b) minimize backfiring on deceleration. (See page 129)

Cleaning the Valve Air Filter

To clean the air filter of the distributor vacuum control valve, remove the elbow-shaped air inlet fitting from the side of the valve and soak it in solvent. Then blow it out with clean compressed air from the valve side of the fitting. *Don't attempt to remove the sintered iron filter from the fitting to clean it.*

DISTRIBUTOR VACUUM ADVANCE CONTROL VALVE — 170 AND 240 CID SIXES WITH MANUAL-SHIFT TRANSMISSION

On the 170 and 240 CID sixes with manual-shift transmissions, a distributor vacuum advance control valve is incorporated in the vacuum line from the carburetor to the distributor advance diaphragm. The valve functions to advance ignition timing during deceleration to reduce emissions and prevent backfiring.



Distributor Vacuum Advance Control Valve

Q 1-3 a) Sure! And this is worth remembering, because the Truck Specification List tells a lot about that individual truck. Requests should be sent to the address in the lower right corner of the form.

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The valve has three ports. To one, the vacuum hose from the carburetor is attached. The second port is connected to the hose leading to the distributor advance diaphragm. These two ports are interconnected through the valve, except during deceleration. The third port, which is normally closed off by the spring-loaded valve, is connected to a hose leading to the intake manifold.

During periods of closed-throttle deceleration, intake manifold vacuum is very strong — even stronger than at idle. This high vacuum, transmitted to the vacuum advance control valve by the hose from the manifold, is sufficient to move the valve against the tension of the valve spring. When the valve moves, it closes off the port to the carburetor hose and admits the high vacuum to the port leading to the distributor advance diaphragm. This holds the breaker plate in the fully advanced position and gives an earlier spark for more complete combustion during deceleration.

Vacuum Advance Control Valve Functional Tests

Diaphragm Leak Test: To determine if the distributor vacuum advance control valve is functioning properly, you should make the following tests in the order given. Begin with the diaphragm leak test:

1. Using a 1/4-inch diameter T-fitting, connect a vacuum gauge into the hose from the intake manifold to the valve.
2. Clamp close the vacuum hose between the valve and the distributor, and also clamp close the vacuum hose between the valve and the carburetor.
3. Run the engine at normal idle speed and note the vacuum reading.
4. Then clamp close the hose between the vacuum gauge T-fitting and the valve, and compare the gauge reading with the first reading. If the second reading indicates a stronger vacuum than the first reading, the diaphragm is leaking and you must replace the distributor vacuum advance control valve assembly.
5. Remove the vacuum gauge and clamps, and connect the hose between the valve and intake manifold.
2. Using a 3/16-inch diameter T-fitting, connect a vacuum gauge into the vacuum hose between the valve and the distributor.
3. Run the engine at idle speed with the parking brake on and the transmission in Neutral.
4. Clamp close the hose between the vacuum advance control valve and the intake manifold. Remove the distributor vacuum hose at the distributor and clamp it closed or plug it.
5. With the engine idling, vacuum in the distributor line must not exceed six inches of mercury. If it does, check and adjust idle speed, ignition timing and air-fuel ratio to bring the vacuum to six inches of mercury or below before continuing the test.
6. Stop the engine, then remove the clamps and connect the vacuum hose to the distributor.
7. Start the engine and run it up to 2000 rpm for about five seconds. Then release the throttle, watching the vacuum gauge as you do. Distributor vacuum should increase to over sixteen inches of mercury for at least one second. Then within three seconds after the throttle is released, distributor vacuum must fall to six inches or less.
8. If the vacuum rises to sixteen inches or above for less than one second or more than three seconds, the valve should be adjusted. Remove the plastic dust cover from the valve. Turn the adjusting screw at the spring end of the valve shaft clockwise to decrease the time the vacuum remains above six inches, or counterclockwise to increase the time it remains above sixteen seconds. Install the plastic dust cover before testing your adjustment. If you can't adjust the valve to specifications, it should be replaced.
9. If the carburetor is equipped with a dashpot, set it to specifications. Then repeat the test given in step 7. If the distributor vacuum does not fall below six inches of mercury within four seconds after the throttle is released, the dashpot requires further adjustment or replacement.

Normal Setting and Deceleration Tests: After you're sure the diaphragm is satisfactory, check for proper valve functioning at idle and during deceleration. Use this procedure:

1. Connect a tachometer to the engine. If the carburetor is equipped with a dashpot, adjust it so that it does not contact the throttle lever at idle speed.

IGNITION SWITCH — ALL CARS

All 1968 cars have a new ignition switch. It is removed and installed in the same manner as last year's switch, but testing procedures are different. If you encounter electrical circuit problems which you have reason to believe are caused by a faulty ignition switch, here's how to test switch continuity with a self-powered test light or an ohmmeter.

1. Remove the ignition switch from the panel and install a lock cylinder and key in the switch. *Don't attempt to use a screwdriver or any other device to actuate the switch during the tests that follow or you may damage the switch.*

Q 17-1 a) You're right! Not only that . . . you can also adjust the upper stops (small adjustments only for the front stop) without removing the door trim panel of Torino GT and other Fairlane hardtops and convertibles.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

2. *With the switch in the "Off" position*, there should be no continuity between any two switch terminals.
3. *With the switch in the "Accessory" position*, there should be continuity only between the "Battery" terminal and the "Accessory" terminal.
4. *With the switch in the "On" position*, there should be continuity between the "Battery" and "Ignition" terminals, between the "Battery" and "Accessory" terminals, and between the "Ignition" and "Accessory" terminals.
5. *With the switch in a position past the "On" position but before the "Start" position*, there should be continuity between each "Prove-Out" terminal and ground, between the "Battery" and "Ignition" terminals, and between both "Prove-Out" terminals. Continuity between the "Prove-Out" terminals should be maintained through the "Start" position, with no continuity in the "On" position.
6. *With the switch in the "Start" position*, there should be continuity between the "Battery" and

Quick-Quiz

Q 9-3 To set the 1968 ignition switch in the various positions for continuity tests, use:

- a) a tool from the 1968 Special Tool Package. (See page 79)
- b) a lock cylinder and key. (See page 24)
- c) a screwdriver. (See page 178)

"Start" terminals, between the "Battery" and "Ignition" terminals, between the "Ignition" and "Start" terminals, between the two "Prove-Out" terminals and between each "Prove-Out" terminal and ground.

An ignition switch that meets all of these continuity requirements is not defective.

TRUCK

DUAL DIAPHRAGM DISTRIBUTORS — LIGHT-DUTY TRUCKS, BRONCO

The new 360 and 390 V-8 truck engines used with manual-shift transmissions and all 240 and 300 six-cylinder truck engines used on light-duty trucks have a new dual diaphragm distributor. This type of distributor is also used on Bronco six-cylinder and V-8 engines.

Distributor Vacuum Advance Control Valve: The distributor vacuum advance control valve is used in

conjunction with the dual diaphragm distributor on the 170 and 240 six-cylinder Bronco and light truck engines with manual-shift transmissions.

Description, Operation and Service

Construction and operation of the truck engine dual diaphragm distributor and vacuum advance control valve are similar to those described for the car ignition system components. The service information given in the car portion of this group will also apply to truck equipment. But be sure you use the *truck* ignition system specifications for distributor service!



FORD CAR AND TRUCK

CAR

EMISSION CONTROL MEASURES AFFECT CARBURETOR DESIGN AND SERVICE

All 1968 carburetors have been recalibrated to conform to the requirements of Ford Motor Company's vehicle emission control system program. Devices to prevent overly rich air-fuel mixtures during low engine rpm conditions have been built into the idle systems. Plastic limiter caps have been fitted to the knurled ends of the idle mixture adjusting screws of Autolite carburetors to prevent enrichening the idle mixture beyond precise factory settings. Holley and single-venturi Carter carburetors contain preset, fixed restrictions in idle fuel passages that accomplish the same purpose.

Carburetion, however, is but one portion of an entire emission control system. Either of two exhaust emission control systems is used on every 1968 Ford Motor Company car engine built for use in the United States. Generally, engines with automatic transmissions use the IMCO (Improved Combustion) system, while engines with manual-shift transmissions use the Thermactor system discussed in Group 8 — Engine. *However, there are exceptions to this rule!* The 289-4V high performance engine, and the 390 GT and 427 V-8 engines use the Thermactor system for all applications.

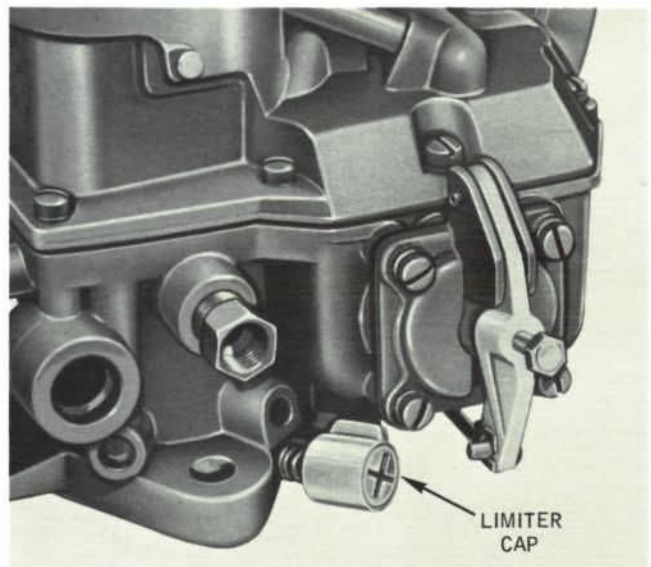
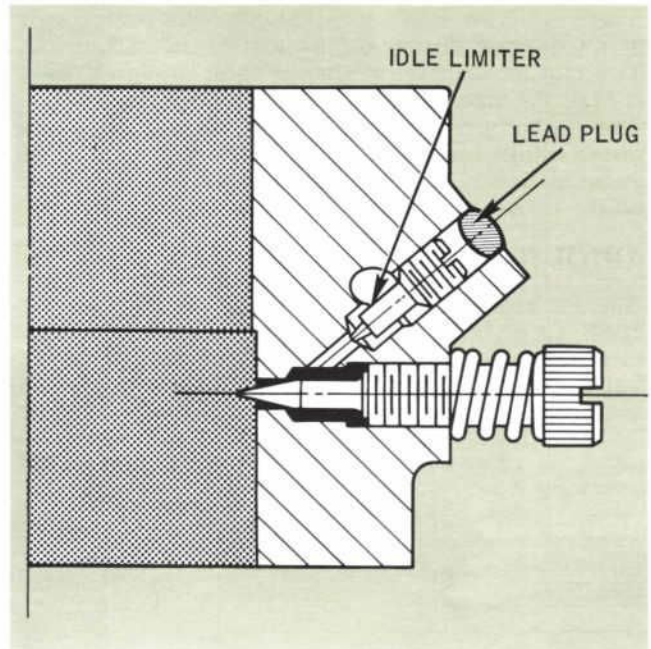
Hot-and-cold-type air intake systems are used on all engines except the 427-4V and 289-4V high performance engines and the 428 Police Interceptor V-8 to provide better warm-up performance in cold weather.

NEW IDLE ADJUSTING PROCEDURE — ALL ENGINES

One important aspect of Ford Motor Company's exhaust emission control program is the use of leaner air-fuel mixtures at idle and low speeds. In conjunction with a retarded spark at slow engine speeds and a number of engine modifications, a level of hydrocarbon and carbon monoxide emissions below the Federally-established legal limit has been achieved. In order to retain this essential control over air-fuel mixtures during carburetor service, limiter devices have been incorporated in the idle systems of the carburetors.

However, these limiting devices don't relieve the Service Technician of the responsibility for properly adjusting engine idle speed and mixture. If performed in accordance with the procedures outlined in the service training handbook entitled "Vehicle Emission Control Systems," it should be no problem

to make these adjustments to the satisfaction of the customer and remain within the legal limits for hydrocarbon and carbon monoxide emissions.



Idle Mixture Limiters

- Q 3-2 b) No. With those symptoms, there's a good chance that one of the lines that convey compressed air between the two air cylinders and the height control valve might be leaking. And don't forget to check the fittings, too!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Idle Adjustment Precaution for Ford with Automatic Load Leveler Option: The automatic load leveler system for Ford cars described in Group 3 of this book utilizes engine intake manifold vacuum for operation. Because of the possibility that operation of the vacuum-operated compressor in the load leveler system might affect engine idling conditions, *it is essential that the compressor be inactive during all idle speed and mixture adjustments to the carburetor.*

There are two ways to make sure the compressor won't operate during adjustment of the carburetor. You can let the engine operate long enough to fully charge the automatic load leveler reservoir, at which time the compressor will stop operating. This should occur within two minutes. Or you can disconnect the vacuum line to the compressor and temporarily cap off the vacuum take-off source.

AUTOLITE MODEL 1100 1-V CARBURETORS

Autolite Model 1100 single-venturi carburetors for 1968 six-cylinder engines have a number of fuel metering modifications. A new gradient-type power valve gives a regulated, variable power enrichment that matches the actual mixture needs of the engine for any power increase more closely than the "on-off" type of power valve. The calibration shims at

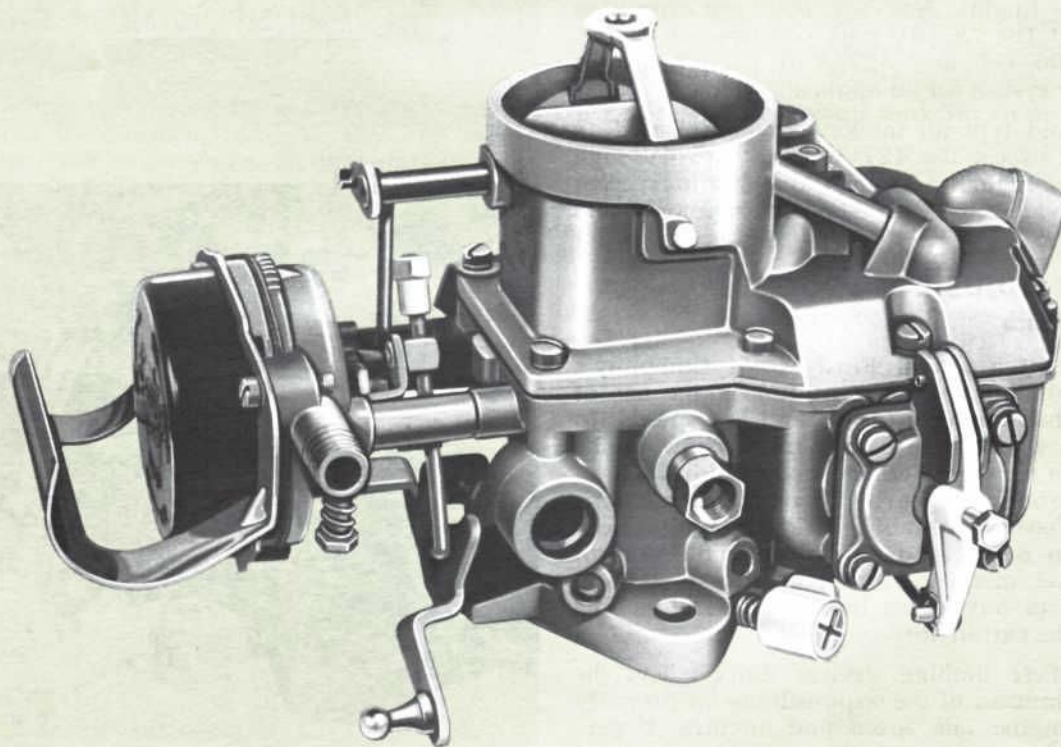
the bottom of the power valve piston stem have been replaced by an adjusting nut which should not be disturbed during service.

The idle mixture adjusting screw is fitted with a plastic limiter cap that will prevent excessive enrichment of the idle mixture beyond the limits established for legal emission control.

Quick-Quiz

Q 10-1 Emission control measures affecting carburetion include:

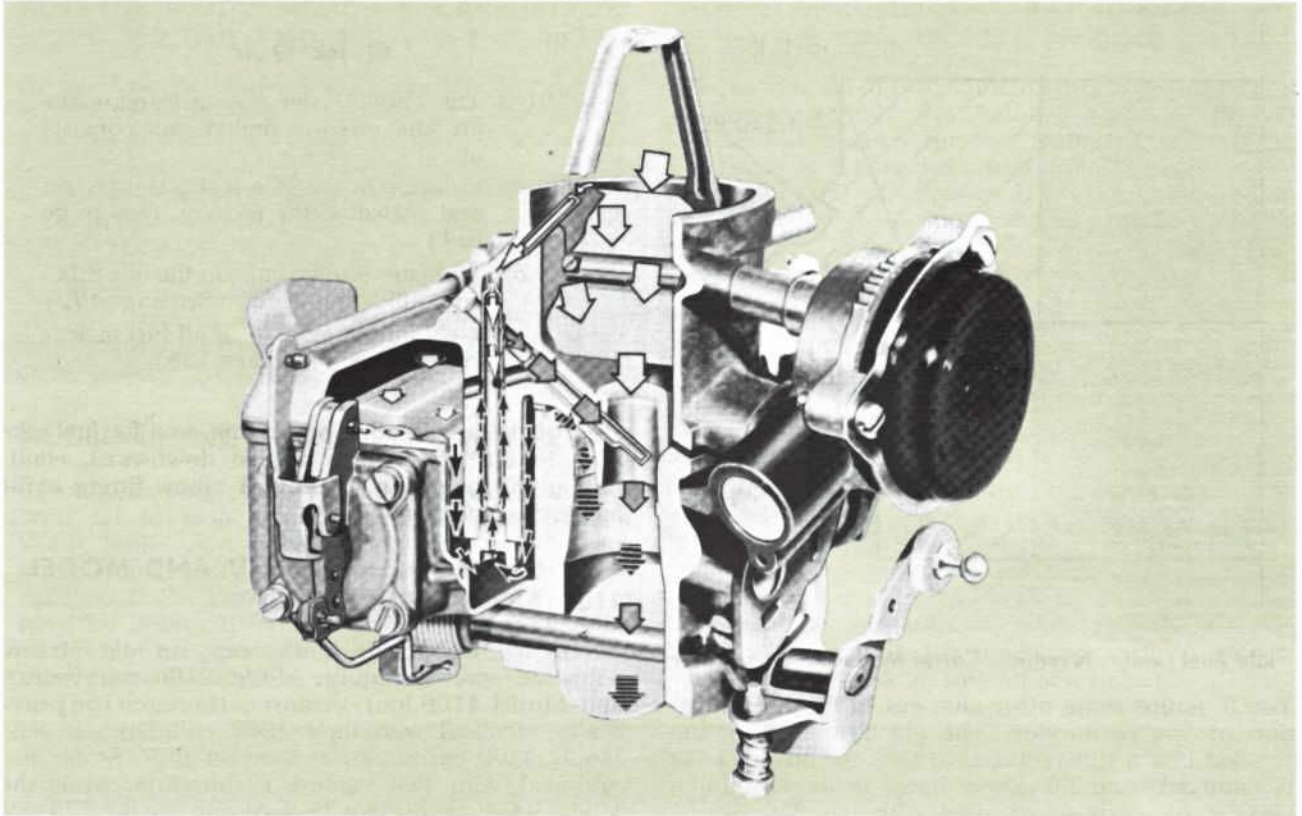
- a) much leaner air-fuel mixtures at high speeds. (See page 128)
- b) devices to prevent overly-rich idle system mixtures. (See page 148)
- c) plastic limiter caps on all accelerating pumps. (See page 153)



Autolite Model 1100 Carburetor

Q 8-3 c) Right! The pressure setting plug in the relief valve of the 1968 Thermactor air pump is color-coded to indicate its setting. When you replace one of these plugs, check the "specs" to be sure you install the correct color.

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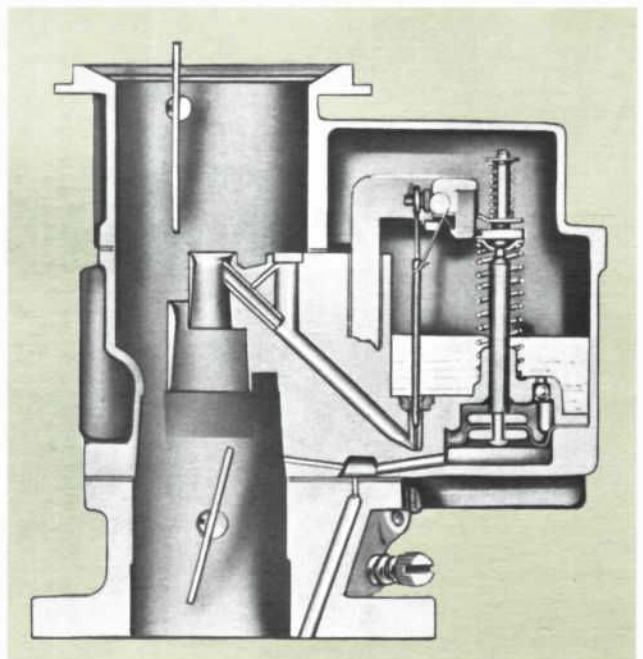


High - Low Lift Main Metering System — Autolite Model 1101 Carburetor

Model 1101 Variations: Certain versions of the basic Autolite Model 1100 carburetor, designated as Model 1101, contain a new high - low lift main metering system that includes a smaller diameter crossover passage from the main well to the main discharge tube. Accelerating pump discharge passages are routed directly up from the diaphragm chamber to the air horn and then cross over to the discharge nozzle, instead of passing through the bottom of the fuel bowl and then up to the nozzle.

CARTER MODEL YF 1-V CARBURETOR

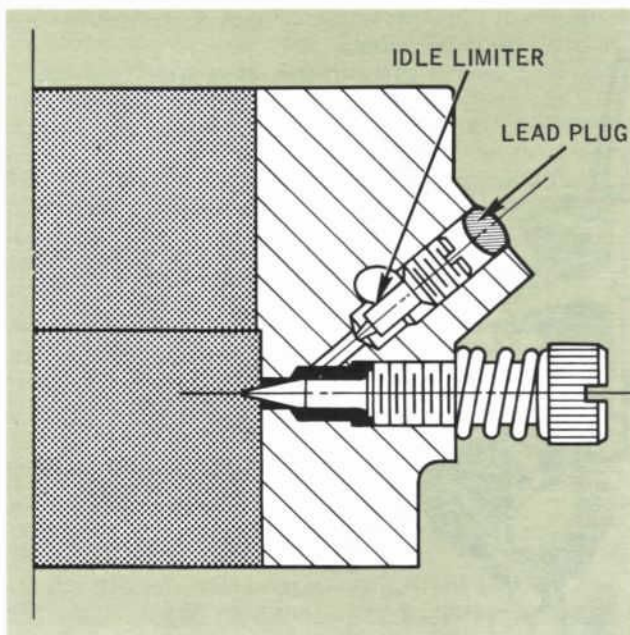
The Carter YF single-venturi carburetor used on some 170-cubic-inch and 240-cubic-inch Sixes has a lower silhouette for 1968. This has been accomplished primarily by lowering the height of the air horn. With the exception of the idle system, fuel metering systems are virtually identical to those of the 1967 unit. You won't find a plastic limiter cap on the idle mixture adjusting screw of this carburetor, but an internal limiter in the idle channel accomplishes the same purpose of preventing an overly-rich idle mixture. This limiter is an adjustable needle in the passage just above the idle mixture screw that has been set at the factory and sealed with a lead ball.



Carter Model YF Carburetor

Q 2-2 a) Nope! You missed the second point listed under "caliper repair." Oil or any other conventional lubricant could soon make quite a mess out of those brand new rubber insulators, you know!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE



Idle Fuel Limiter Needle — Carter Model YF Carburetor

You'll notice some other changes in the configuration of this carburetor. The air cleaner mounting bracket has a different appearance, the throttle lever is changed, and the lower body is an aluminum casting on carburetors used with the 240 Six. A throttle shaft return spring has been added in the

Quick-Quiz

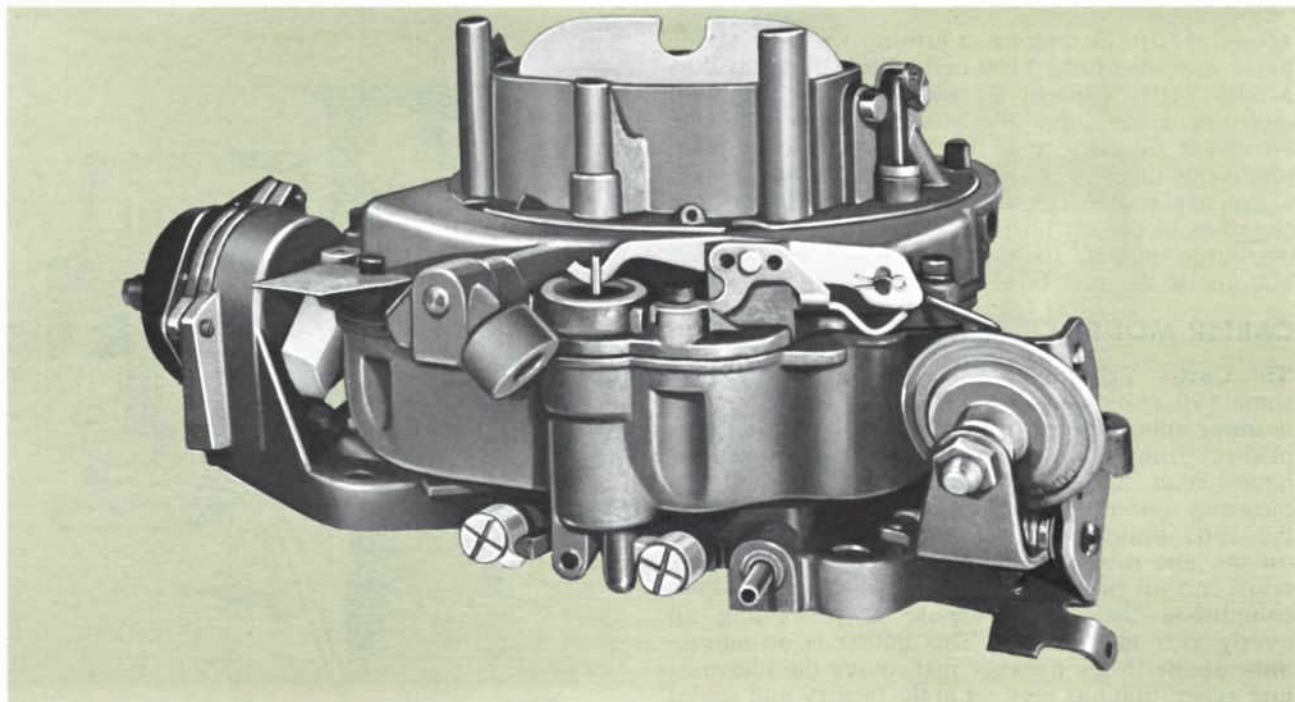
Q 10-2 The 1968 Carter YF carburetor has an idle mixture limiter that consists of:

- a) a needle in the idle fuel passage, set and sealed at the factory. (See page 134)
- b) a plastic limiter cap on the idle mixture adjusting screw. (See page 172)
- c) a complete revision of all fuel metering systems. (See page 135)

area of the accelerating pump link, and the fuel inlet boss in the air horn is angled downward, eliminating the need for an angled elbow fitting at the fuel line connection.

AUTOLITE MODEL 2100 2-V AND MODEL 4100 4-V CARBURETORS

Except for the plastic limiter caps on idle mixture adjusting screws, Autolite Model 2100 two-venturi and Model 4100 four-venturi carburetors are practically identical with their 1967 counterparts. The Model 2100 carburetor is used on all V-8s that are equipped with two-venturi carburetors, while the Model 4100 carburetor is used only on the 428-4V Police Interceptor engine.



Autolite Model 4300 Carburetor

Q 1-1 c) Chalk up a near-miss! You picked the code for another car in the Fairlane Torino GT series — the convertible! Check the roofline of the car in the picture and see if you can pick the correct codes next time.

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AUTOLITE MODEL 4300 4-V CARBURETOR — 289, 302, 390 AND 428 V-8 ENGINES

In the Autolite Model 4300 four-barrel carburetor for all engines except Thunderbird's new optional Thunderjet 429 V-8, the air bypass idle system has been replaced with the "cracked throttle plate" type of idle system used in the Model 4100 and other carburetors. Consequently, you'll find no idle air bypass screws in the 1968 version of this carburetor.

An idle speed adjustment screw has been added to this carburetor. Plastic limiter caps are installed on the idle mixture screws and the throttle linkage has been revised.

ACCELERATING PUMP—ALL CARBURETORS

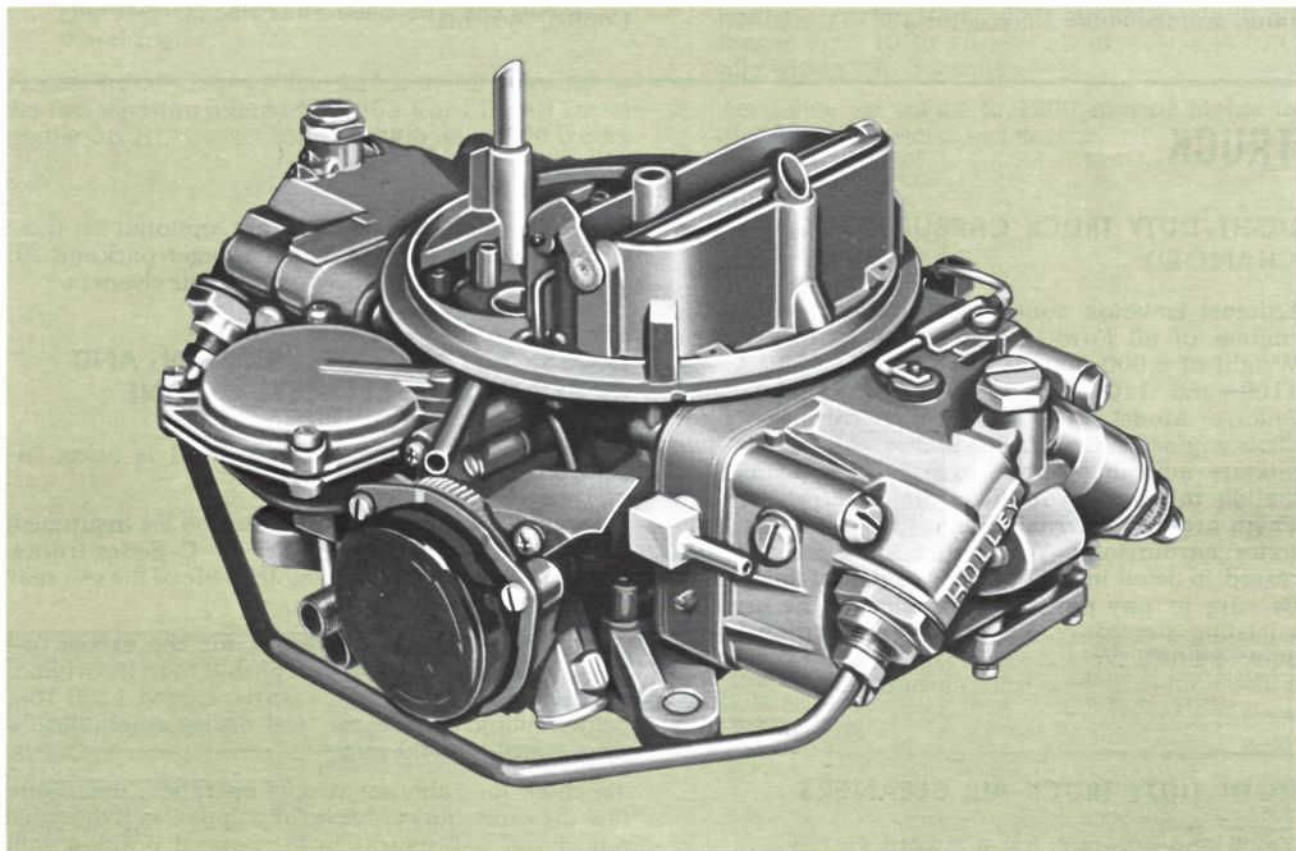
The accelerating pump stroke of all carburetors has been set to help keep the exhaust emission level within limits, *and should not be changed*. The other pump adjustment holes are for specific engine applications. If the stroke has been changed from the specified setting, it should be returned to the specified position. Then the fuel bowl vent valve clearance should be adjusted, if so equipped.

AUTOLITE MODEL 4300 4-V CARBURETOR — THUNDERJET 429 V-8 ENGINE

Except for the plastic limiter caps on the idle mixture adjusting screws, the Autolite Model 4300 four-venturi carburetor for the Thunderjet 429 V-8 is identical in appearance and operation to the 1967 Autolite 4300 carburetors. However, be sure to refer to the proper 1968 specifications when servicing this carburetor, since some adjustment dimensions and metering specifications may differ from the '67 carburetors.

HOLLEY MODEL 4150 4-V CARBURETOR

Holley Model 4150 four-venturi carburetors used with the 390 GT and 427 V-8 engines are quite similar to last year's design. However, there are a few notable changes for 1968. There's an integral screen-type fuel filter in the new fuel inlet fitting. A dashpot is used for all transmission applications. Idle system fuel passages have internal idle flow limiters to maintain low emission levels in service. And a single gasket is used between the carburetor and intake manifold, instead of a spacer.

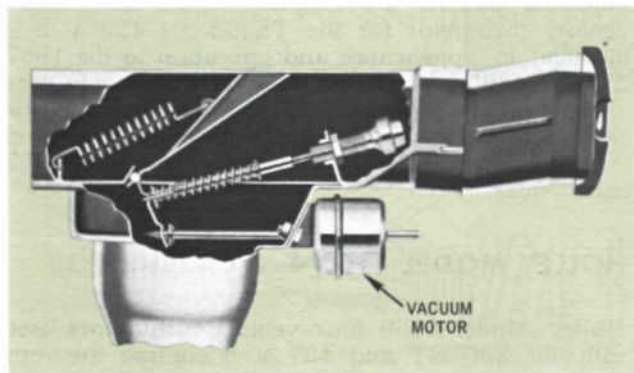


Holley Model 4150 Carburetor

Q 3-1 b) No — there's a more obvious item to check, first! You may *eventually* have to check compressor output . . . but you can't do it until you're sure this item is as it should be, anyway! Pick another answer.

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HOT AND COLD AIR CLEANERS — ALL ENGINES EXCEPT HIGH PERFORMANCE AND POLICE INTERCEPTOR



Hot and Cold Air Cleaner Vacuum Control

Hot and cold air cleaners have been used on 289-V-8's for the past few years. For 1968, their use has been extended to all engines except Mustang's optional High Performance 289-4V, the optional High Performance 427-4V for Ford, Fairlane and Mustang, and the Police Interceptor 428-4V engines.

Quick-Quiz

Q 10-3 The vacuum motor on the hot and cold air cleaner has an effect on air cleaner operation when the engine is:

- a) fully warmed up. (See page 15)
- b) cold. (See page 155)

New Vacuum-Modified Thermostatic Valve

The action of the thermostatic valve in the hot and cold air cleaner has been modified by the addition of a vacuum motor that will open the valve halfway when intake manifold vacuum drops at high engine speeds with a cold engine. This serves to provide the engine with a sufficient supply of cooler, more dense air that prevents any starving of the induction system under conditions when a high rate of airflow is demanded. For service instructions, refer to the service training handbook entitled "Vehicle Emission Control Systems."

TRUCK

LIGHT-DUTY TRUCK CARBURETORS CHANGED

Exhaust emission control systems are used for the engines of all Ford trucks having a Gross Vehicle Weight of 6,000 pounds or less. The Autolite Model 1100 and 1101 single-venturi carburetors and Autolite Model 2100 two-venturi carburetors for these engines have plastic limiter caps on the idle mixture adjusting screws to prevent enrichment of the idle mixture beyond legal limits during service. There are also internal changes in the Model 1100 series carburetors. You'll find these features discussed in detail in the Ford car section of this group. Be sure to pay particular attention to the new idle adjusting procedure outlined in the training handbook entitled, "Vehicle Emission Control Systems" — it also applies to these truck carburetors.

LIGHT-DUTY TRUCK AIR CLEANERS

You'll find dry-type hot and cold air cleaners used on Bronco and F-100 through F-350 trucks for

1968. Oil bath air cleaners are optional on these models and standard with the Ranger package. All parcel delivery trucks have oil bath air cleaners.

EXCESS FUEL DEVICE — B-, F-, N- AND C- SERIES DORSET DIESEL ENGINE

An excess fuel device remote control is being installed in production.

The remote control knob is located on the instrument panel except on C-Series. On the C-Series trucks, the control is located on the left side of the cab rear support.

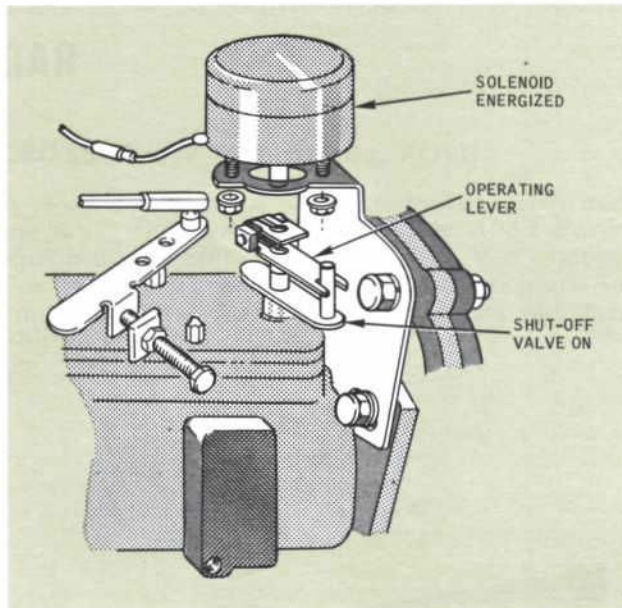
To operate the remote control for the excess fuel device pull the knob out and push it in to its original position. When the engine starts, exceed 1200 rpm before idling. The excess fuel device automatically disengaged at 1200 rpm.

To check the cable for proper operation, make sure that the excess fuel valve is fully tipped with the cable pulled out and returns to the normal position with the cable pushed in.

Q 10-1 a) No, not at high speeds. Although carburetor calibrations have changed, the emphasis is mainly on preventing overly-rich mixtures at or near closed-throttle operation, where undesirable emissions are usually greatest.

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FUEL SHUT-OFF SOLENOID INSTALLATION — 363 DORSET DIESEL



Fuel Shut-Off Solenoid Installation — 363 Dorset Diesel Engine

Proper installation of the fuel shut-off solenoid to the fuel injection pump of the 363 Ford Dorset Diesel engine on B-, C-, F- and N-6000 and 7000 trucks

is essential to good starting performance. The operating lever should be clamped to the solenoid shaft with the solenoid energized and the shut-off valve lever in the "on" position.

If the solenoid is improperly installed (with the shut-off valve lever in the "Off" position and the solenoid not energized), it is possible that the valve will not open fully when the solenoid is energized. This has been found to be the cause of numerous hard starting complaints. If the solenoid is properly installed, the following procedure will be effective in starting the Dorset engine, regardless of outside temperature.

Starting Procedure

1. Regardless of the outside temperature, engage the excess fuel device before the initial start of the day or any time the engine has cooled to outside temperature.

Caution: Indiscriminate use of ether for starting must be avoided at temperatures above freezing. Use no more than a 1/2-second squirt from an aerosol can. (With a properly adjusted fuel shut-off solenoid, even this much is generally not needed.)

2. Hold the accelerator pedal fully open and crank until the engine starts. This should occur in no longer than 10 to 15 seconds at most, and usually within 2 to 3 seconds.
3. Accelerate the engine to 1200 rpm or higher to disengage the excess fuel device.

FUEL TANK CAPACITIES

Car Model	Gallons	
	U.S. Measure	Imperial Measure
Ford — exc. Station Wagons	25	21
Ford Station Wagons	20	16-3/4
Falcon — exc. Station Wagon	16	13-1/4
Falcon Station Wagon	20	16-3/4
Fairlane	20	16-3/4
Mustang	16	13-1/4
Thunderbird	22	18-1/2

FUEL PUMP

Engine Application	Min. Volume Flow at 500 Eng. RPM	Static Pressure PSI at 500 Eng. RPM	Intake Static Vacuum (Min.) In. Hg at 500 Eng. RPM	Eccentric Total Lift — Inches	Booster Pump Static Vacuum (Min.) In. Hg at 500 Eng. RPM
170 Six	1 pint/30 seconds	4.0 - 6.0	6.0	0.290-0.310	10.00
200 and 240 Six					Not Applicable
289 and 302	1 pint/20 seconds	4.5-6.5		0.690-0.710	10.00
390, 427 and 428 V-8					Not Applicable
429				0.340-0.360	

Q 9-2 b) No . . . but you're close! You probably confused the distributor vacuum control valve with the distributor vacuum advance control valve which prevents (rather than "mini-mizes") backfiring on deceleration.

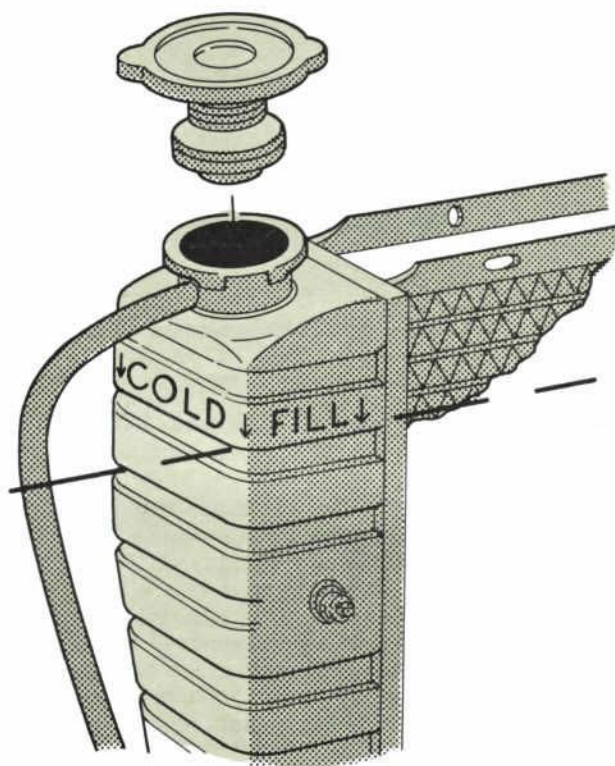


FORD CAR AND TRUCK

CAR

CROSS-FLOW RADIATOR — FORD

A cross-flow radiator, similar to that of current and previous Thunderbirds, is used in 1968 Fords equipped with 390, 427 or 428 CID V-8 engines. For servicing instructions, follow those given in your 1967 Shop Manual for the Mercury radiator, which is also a cross-flow design.



Cross-Flow Radiator Fill Level — Ford

Filling Precaution

In this cross-flow radiator, check coolant level only while the engine is cold and not running. Fill only to the cold fill reference mark stamped in the left side tank about two inches below the fill cap seat.

CAM LOCK THERMOSTAT — ALL ENGINES

As a running change in the 1967 model year, the use of the cam lock design thermostat had been extended

to other engines besides the sixes and the 289 V-8. For '68, it's used on all Ford passenger car engines. To lock this type of thermostat in position upon installation, turn it clockwise after placing it in the water outlet housing.

DISTRIBUTOR VACUUM CONTROL VALVE IN OUTLET HOUSING — ALL ENGINES EXCEPT 240 CID SIXES

A distributor vacuum control valve is located in the cooling system outlet housing of all 1968 engines except the 240 CID six-cylinder engine. The function of this thermostatic valve, which senses coolant temperature, is explained in Group 9. This location places the thermostatic capsule of the valve in a constant coolant flow area, isolated from other influencing components, to provide a rapid and accurate response to engine temperature changes.

Installation Tips

Apply water-resistant sealer to the valve body threads and torque the valve to 15-18 ft-lbs in the outlet housing. Then continue to turn it in as necessary — but no more than a full turn — until the vacuum hose fittings are in their original positions. Use only the hexagonal portion of the valve body to screw the valve in or out.

FLEXIBLE BLADE FAN USAGE EXPANDED

Last year, Fords with the 289 V-8 and factory-installed air conditioning were equipped with a unique Flex Blade cooling system fan. This fan design provides its maximum pitch for increased air flow at slow engine speeds. As the fan rotates faster with higher engine speeds, its pitch decreases to reduce the drag on the engine.

Usage of the Flex Blade fan is increased for 1968. On Thunderbird, a 17-1/2-inch 5-blade fan is used on the 429 V-8 with standard cooling. All 1968 Fords with 302 V-8 engines and factory-installed air conditioning have a 18-inch 5-blade fan. Ford Police Interceptor 390 and 428 V-8s have a 19-1/2-inch 7-blade fan with either standard cooling or air conditioning. When a 289 or 302 V-8 is used with air conditioning in Fairlane, Falcon or Mustang, a 17-1/2-inch 5-blade fan is used.

Q 3-4 a) No — not according to the procedures given in this handbook. If you'll examine them, step by step, you'll find that removal of spacers invariably comes after everything's tightened up.

TRUCK

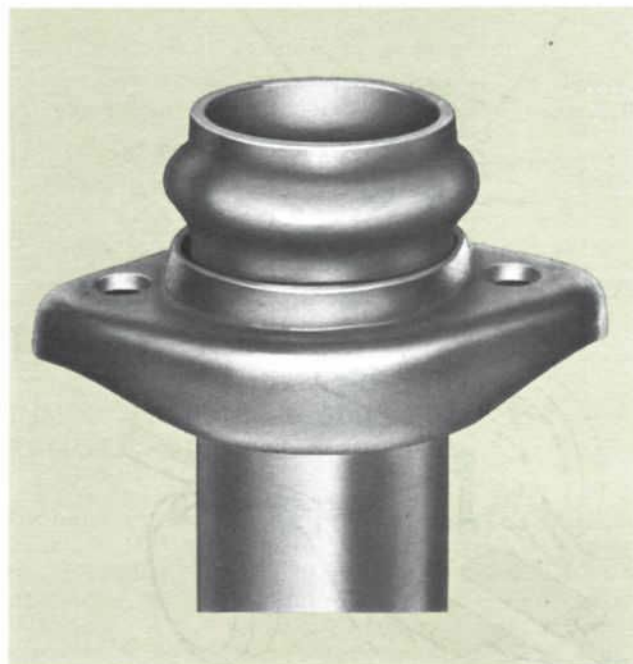
CAM LOCK THERMOSTAT – 360 AND 390 V-8 ENGINES

The 360 and 390 V-8 engines available in the F-100 through F-350 4x2 trucks use a cooling system thermostat that incorporates the cam lock feature to prevent improper installation. Although the application is new for '68, the idea is not. This thermostat design feature was introduced in last year's six-cylinder engines, so you should be familiar with it.

Quick-Quiz

- Q 11-1* When installing the distributor vacuum control valve in an outlet housing, remember to:
- a) tighten it only to the specified torque, regardless of which direction the vacuum hose fittings point. (See page 12)
 - b) use water-resistant sealer on the threads. (See page 19)
 - c) turn the valve with pliers on the vacuum hose fittings (See page 45)

FORD CAR AND TRUCK CAR



Spherical Exhaust Manifold Flange Joint — 390 & 428 V-8s

SPHERICAL EXHAUST MANIFOLD FLANGE JOINTS — 390 AND 428 V-8 ENGINES

At the exhaust manifold to muffler inlet pipe flange joint of all Thunderbird engines and the Ford 390 and 428 V-8 engines (except Police Interceptor), you'll find a new type of connection — one that will make your job of aligning the exhaust system easier! On exhaust systems used with these engines, the forward end of the muffler inlet pipe is now smoothly rounded, instead of being tapered. And the exhaust manifold flange has a matching concave counter-sunk seating area for this ball joint end of the pipe.

Incidentally, you'll no longer find a manifold heat control valve at the flange, except on the special 428 police engine. This valve isn't needed with the hot and cold type air cleaner that's used on '68 engines.

Installation Tips

With the spherical flange joint, you don't need to use a flange gasket. Just fit the end of the pipe into the seat in the manifold flange and install the retaining nuts loosely. Draw the two nuts up evenly until you have 13/16 inch clearance from the bottom of the inlet pipe flange to the tips of the studs, but *don't*

tighten them to the specified torque until after you've gone through the rest of the system to be sure it's properly aligned.

Then turn the two retaining nuts up alternately, a little at a time, until they are properly torqued. This is important, since it is essential to keep the two flanges parallel as they are drawn closer together. By following this method, you'll install the pipe without any undue stresses and the ball and socket will seal effectively.

EXHAUST SYSTEM ROUTING — FAIRLANE WITH 427 V-8

On the following page is the exhaust system illustration for the Fairlane hardtop with 427 V-8, showing the routing and clearance dimensions.

EXHAUST SYSTEM SPECIFICATIONS

Torque Limits
(Ft-Lbs)

THUNDERBIRD

Muffler Inlet Pipe to Manifold 17-25
Support Clamp 20-28

FORD

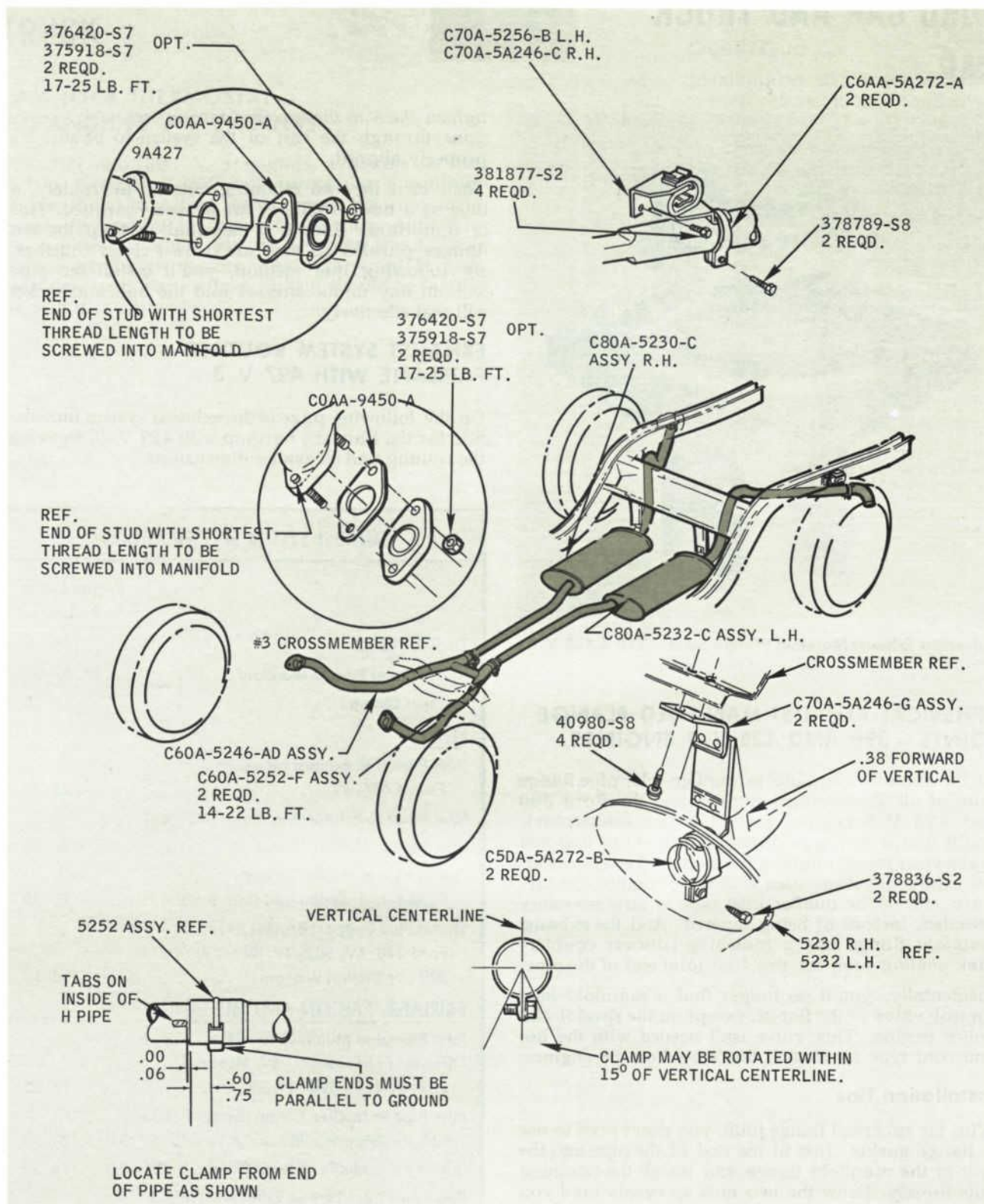
Inlet Pipe(s) to Exhaust Manifold(s)
(Except 427-4V) 25-35
Inlet Pipes to Exhaust Manifolds (427-4V) 40-53
Inlet Pipe to Muffler Clamp 20-28
Outlet Pipe to Muffler Clamp
(Ford 6-Cyl. Sedan and Convertible) 20-28
Outlet Pipe Support Bracket to Frame — Nut
(Ford 240-1V, 302-2V, 390-2V,
390-4V Station Wagon) 10-15

FAIRLANE, FALCON AND MUSTANG

Inlet Pipe(s) to Manifold(s) — Nuts
(Except Fairlane 427-4V, Mustang
289-4V H.P., 390-4V GT) 17-25
Inlet Pipe to Muffler Clamp (Except Fairlane
427-4V, Mustang 289-4V H.P., 390-4V GT) 20-28
Inlet Pipe to Muffler Clamp (Fairlane 427-4V) 14-22
Resonator Inlet Pipe to Exhaust Manifold
(Mustang 289-4V H.P., 390-4V GT) 17-25

Q 7-2 a) No point for you on this one! To bring the clutch pack clearance down to the specified dimension, the only friction plate you should exchange for a thicker one is the *top plate* of the pack — not *all* of them!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE



Fairlane Hardtop Exhaust System — 427 V-8

Q 10-2 a) Good . . . you're correct! The setting of that adjustable needle in the idle fuel passage has been precisely checked at the factory before it was sealed in place. It won't allow mixtures richer than the legal limit.

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EXHAUST SYSTEM SPECIFICATIONS (Cont'd)

Torque Limits (Ft-Lbs)	Torque Limits (Ft-Lbs)
Resonator or Support Bracket to Mounting Plate and Resonator (Mustang 289-4V H.P., 390-4V GT) 14-22	Muffler to Inlet and Outlet Pipe — Clamp (Mustang 289-4V H.P., 390-4V GT) 20-28
Resonator Inlet Pipe Flanges (Mustang 289-4V H.P., 390-4V GT) 20-28	Outlet Pipe and Crossover Pipe Clamps (Mustang 289-4V H.P., 390-4V GT) 20-28
Muffler Insulator Bracket to Outlet Pipe Bracket and Mounting Pipe 20-28	Outlet Pipe Support Bracket to Frame (Falcon 289-2V, 302-4V Sedan and Convertible) 14-22

TRUCK

TUNED MUFFLER — F-100 AND F-250 RANGER PACKAGE

Included in the Ranger package option for 1968 Ford F-100 and F-250 Pickup trucks is a new tuned muffler, similar in design to those used on passenger cars. In addition, the muffler outlet pipe is longer. When replacing exhaust system components in any Ranger Pickup, be sure you use the Ranger parts listed in your parts book, not the conventional Pickup parts.

EXHAUST SYSTEM SPECIFICATIONS

Torque Limits (Ft-Lbs)
Inlet Pipe to Exhaust Manifold — Ranchero 17-25
Light Trucks
Gasoline 25-35
Diesel 25-30
Heavy Truck
Diesel (1/2-13) 60-70
(3/8-24) 25-35
Gasoline
6 Cylinder (7/16-14) 25-30
(3/8-16) 25-30
8 Cylinder (3/8-24) 25-30
(7/16-14) 25-35
Inlet Pipe Clamps — Nuts
(3/8-16) 12-15
(5/16-18) 10-14
Diesel (3/8-24) 12-15

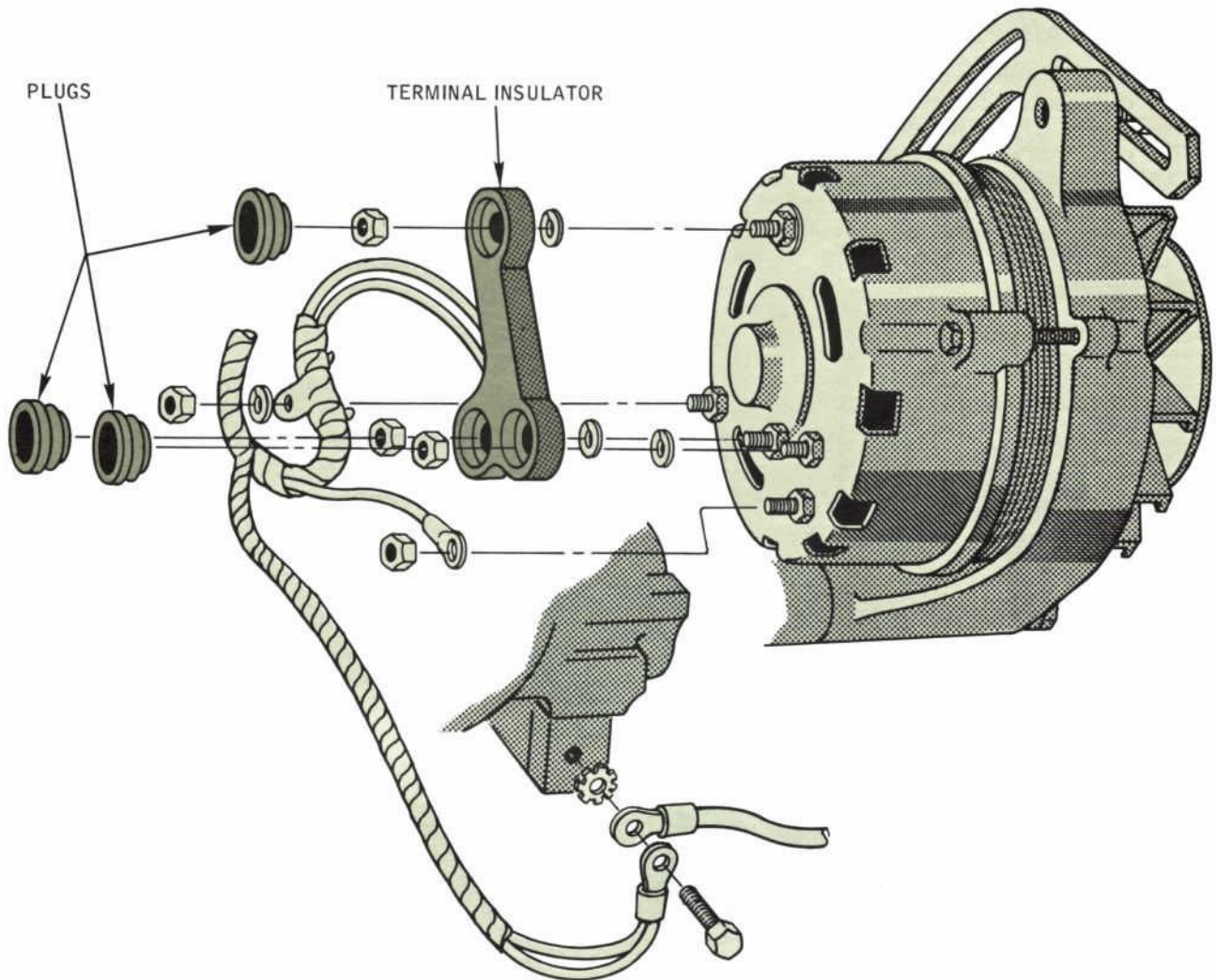
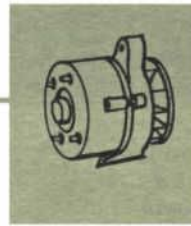
EXHAUST SYSTEM SPECIFICATIONS (Cont'd)

Torque Limits (Ft-Lbs)
Inlet Pipe Clamps — Bolts (5/16-18) 10-14
Muffler Clamp — Ranchero 20-28
Inlet and Outlet Pipe Supports to Frame — Light Trucks
Inlet to Engine (170 only, 3/8-16) 18-25
Diesel (5/16-18) 10-14
(3/8-24) 12-15
Outlet Pipe to Side Rail (F-100 4x2, F-100 4x4, F-250, 3/8-16) 18-25
Outlet Pipe to Side Rail (F-100 4x2, F-100 4x4, F-250, 5/16-18) 10-14
Outlet Pipe to Side Rail (F-250 4x4, F-350, 3/8-16) 18-25
Exhaust System Mounting to Side Rail (All P Series, 5/16-18) 10-14
Heavy Trucks
(5/16-24) 10-14
(5/16-18) 10-14
(3/8-24) 25-30
(5/8-11) 120-150

Q 10-2 c) That's not so! Fuel metering systems are the same as in last year's carburetor, except for the internal limiter needle in the idle system that prevents an overly-rich idle mixture.

FORD CAR AND TRUCK

CAR



Alternator Terminal Connections

ONE-PIECE ALTERNATOR TERMINAL CONNECTOR

A one-piece moulded rubber insulator is now provided in the charging system wiring harness for added protection of the alternator field, battery and stator terminal connections. The connectors are attached to the terminal posts in the same manner as last year — a lockwasher is first placed on the terminal post between the terminal base nut and the connector, and then the terminal nut is tightened

down against the connector to compress the lockwasher. But in addition, you now must cover the terminal nut with a snap-in plug. And when you remove any one alternator lead, you must remove all three.

Service Precaution

The moulded-in connectors provide added protection against accidentally shorting the battery connector to a ground when the connector assembly is

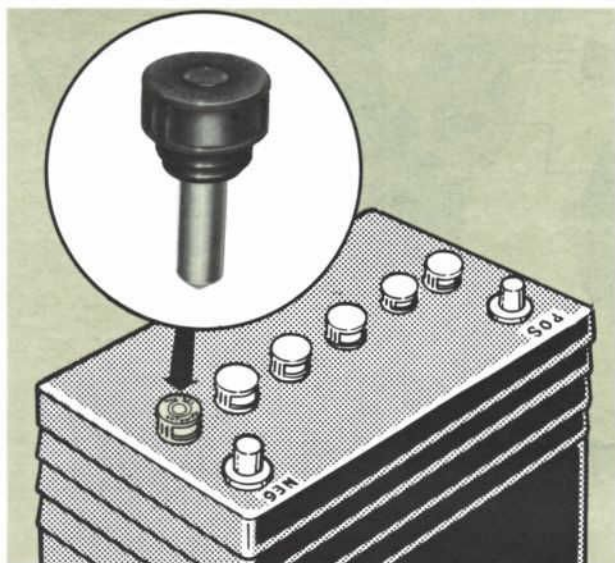
Q 9-1 a) No sir! Those two diaphragms do a lot of things to give the proper spark advance or retard, but they don't do it all! As in earlier units, a centrifugal advance mechanism is used to give a basic advance in proportion to engine speed.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

removed. But don't trust to this feature to provide complete protection when removing the alternator — play it safe by *always disconnecting a battery cable*. The consequences of failing to do this could be serious!

LOW ELECTROLYTE LEVEL WARNING — AUTOLITE BATTERY

When you raise the hood of any 1968 car, glance at the cap nearest the grounded negative terminal of the battery. If you see a definite glow in the center of the cap, that's your cue to reach for the battery filler container and add water to the cells! The center of the cap contains a rod of refractive plastic that remains dark as long as the electrolyte level is high enough to cover its lower end, but glows when the level drops below that point.



Autolite Battery Low Electrolyte Indicator

Additional New Features

Tops of all original equipment batteries are painted, not only for appearance but also to show up more clearly any dirt and acid deposits that could lead to self-discharge if the battery remains idle for an extended period. All battery caps are now red, instead of being color-coded to indicate battery capacity. And the polarity caution note is now incorporated in a decal on the warranty pad, right on the battery.

Quick-Quiz

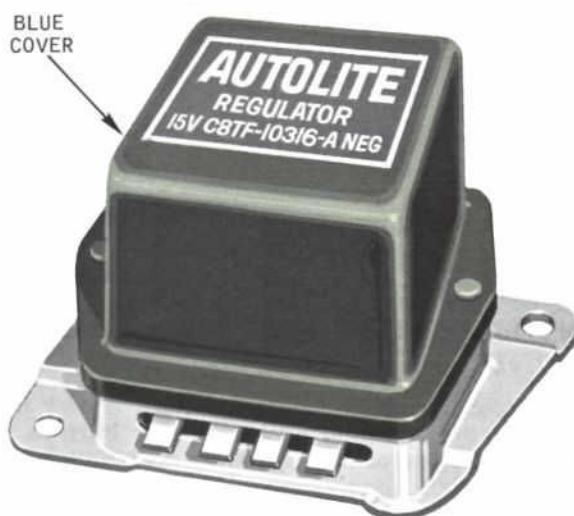
Q 13-1 Autolite alternator regulators with blue covers should *not* be adjusted because:

- a) they are an all-new design that requires no adjustment, even during manufacture. (See page 29)
- b) the adjustments are now made at the alternator. (See page 20)
- c) the original setting is best for any operating condition. (See page 60)

AUTOLITE ALTERNATOR REGULATOR NOT ADJUSTABLE

1968 Autolite alternator regulators have permanently attached covers, painted blue for identification. *These regulators are not to be adjusted.* If electrical tests prove one of these alternator regulators to be faulty, it should be replaced.

Two factors have influenced this change in policy. Because of the alternator's inherently superior charging characteristics at low engine speeds, it's not necessary to "tailor" the alternator regulator setting to match certain owners' operating habits. And field experience has proved the Autolite alternator regulator to be a consistently durable, trouble-free unit. Consequently, the original factory adjustment should be the best obtainable for all ranges of operating conditions.



Don't Adjust Blue Cover Regulators!

Q 1-2 c) Nope! It's the axle ratio codes for cars that have changed completely for '68 — not the codes for truck transmission. That leaves two other possible answers to the question. Try again!

A PRELIMINARY SHOP MANUAL

TRUCK

TRUCK CHARGING SYSTEM CHANGES SAME AS FOR CARS

Changes for 1968 to truck alternators and alternator regulators are the same ones described for

Ford cars in this publication. These changes include the one-piece terminal connector for Autolite alternators, the non-adjustable Autolite alternator regulator and the new Autolite battery with the low electrolyte level warning. Details are given in the car section.

SPECIFICATIONS

ALTERNATOR SPECIFICATIONS									
Engine Model	Part Number	ALTERNATOR			Engine Model	Part Number	ALTERNATOR		
		Field Current Draw at 12 Volts	Output (Amps) Cut-In RPM	RPM			Field Current Draw at 12 Volts	Output (Amps) Cut-In RPM	RPM
170 CID	C6DF-10300-A	2.4	840	38-4520	390 CID	C6AF-10300-A	2.8-3.3	840	42-4200
	C6AF-10300-A	2.8-3.3	840	42-4200		C6AF-10300-C	2.8-3.3	840	42-4200
	C6TF-10300-F	2.8-3.3	940	55-4200		C6AF-10300-F	2.8-3.3	940	55-4200
200 CID	C6AF-10300-G	2.8-3.3	940	55-4200		C6AF-10300-G	2.8-3.3	940	55-4200
	C6AF-10300-B	2.8-3.3	840	42-4200	(Leece-Neville)	C5TF-10300-K	3	700	60-2400
	C6DF-10300-A	2.4	840	38-4520		C6AF-10300-G	2.8-3.3	940	55-4200
	C6AF-10300-G	2.8-3.3	940	55-4200		C7AF-10300-A	2.9	720	65-3280
240 CID	C6AF-10300-A	2.8-3.3	840	42-4200		C6AF-10300-A	2.8-3.3	840	42-4200
	C6AF-10300-C	2.8-3.3	840	42-4200		C6TF-10300-F	2.8-3.3	940	55-4200
	C6AF-10300-G	2.8-3.3	940	55-4200	427 CID	C6AF-10300-C	2.8-3.3	840	42-4200
	C6TF-10300-E	2.8-3.3	940	55-4200	428 CID	C6AF-10300-C	2.8-3.3	840	42-4200
	C6TF-10300-F	2.8-3.3	940	55-4200		C6TF-10300-E	2.8-3.3	940	55-4200
	C7TF-10300-C	2.8-3.3	840	42-4200		C6TF-10300-F	2.8-3.3	940	55-4200
289 CID	C6DF-10300-A	2.4	840	38-4520		C6AF-10300-G	2.8-3.3	940	55-4200
	C6DF-10300-B	2.4	840	38-4520	(Leece-Neville)	C5TF-10300-K	3	720	60-2400
	C6AF-10300-F	2.8-3.3	940	55-4200		C7AF-10300-A	2.9	720	65-3280
	C6AF-10300-G	2.8-3.3	940	55-4200	429 CID	C6AF-10300-G	2.8-3.3	940	55-4200
	C6AF-10300-D	2.8-3.3	840	42-4200					
302 CID	C6AF-10300-B	2.8-3.3	840	42-4200					
	C6AF-10300-C	2.8-3.3	840	42-4200					
	C6AF-10300-F	2.8-3.3	940	55-4200					
	C6AF-10300-G	2.8-3.3	940	55-4200					
	C7AF-10300-A	2.9	720	65-3280					

REGULATOR SPECIFICATIONS							
Regulator							
Part Number	Field Relay			Regulator			Current Control (Amps)
	Air Gap	Point Gap	Volts to Close	Air Gap	Point Gap	Volts at 50° to 120°F	
C8AF-10316-A	*	*	2.3 to 4.2	*	*	13.5 to 15.3	**
C8TF-10316-A	*	*	2.3 to 4.2	*	*	13.5 to 15.3	**
C5TF-10316-B	.015	.025	3 to 4	.045 .052	.010 .015	14.3 15.1	**

* These clearances are to be set only at the manufacturing plant and the regulator cover is then riveted in place. Data not available for service.

** Not related to Autolite (GPD) or Leece-Neville systems.

Q 1-2 b) No. The Ford-built 3.03 three-speed transmission has been carried over for the '68 Bronco and some light trucks with no change in the code designation, but there are no Ford-built five-speed units listed in this handbook. Try again!

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BATTERY SPECIFICATIONS

Engine Model	Vendor Make and Number	Amp. Hr. Capacity	Volts	Terminal Grounded	Dimensions		
					Length	Width	Height
200, 170, 240, 289, 302	C5AF-10655-A	45	12	Negative	9-27/64	6-13/16	8-61/64
200, 302, 390	C5AF-10655-B	55	12		10-3/4	6-13/16	8-61/64
390, 427, 428, 429	C5VF-10655-A	80	12		12-1/2	6-13/16	9-9/64
240, 302, 390	C7AF-10655-E	70	12		12-1/2	6-13/16	9-9/64
240, 289, 302, 390	C5AF-10655-C	70	12		12-1/2	6-13/16	9-9/64

STARTER SPECIFICATIONS

Engine Model and Starter Part No.	Lock Test			No-Load Test			Brush Spring Tension
	Amps	Volts	Torque	Amps	Volts	RPM	
170 & 200 CID							
C7ZF-11001-A	460	6	9	70	12	8,500	40 ounces
C7OF-11001-A	670	5	15.5	70	12	9,500	40 ounces
C7DF-11001-A	460	6	9	70	12	8,500	40 ounces
240, 289 & 302 CID							
C7AF-11001-B	670	5	15.5	70	12	9,500	40 ounces
C7AF-11001-D	670	5	15.5	70	12	9,500	40 ounces
C7AF-11001-F	670	5	15.5	70	12	9,500	40 ounces
390, 427 & 428 CID							
C7AF-11001-C	670	5	15.5	70	12	9,500	40 ounces
C7AF-11001-E	700	4	15.5	70	12	11,000	40 ounces
429 CID							
C7VF-11001-A	700	4	15.5	70	12	11,000	40 ounces
C8VF-11001-A	700	5	15.5	70	12	10,000	40 ounces

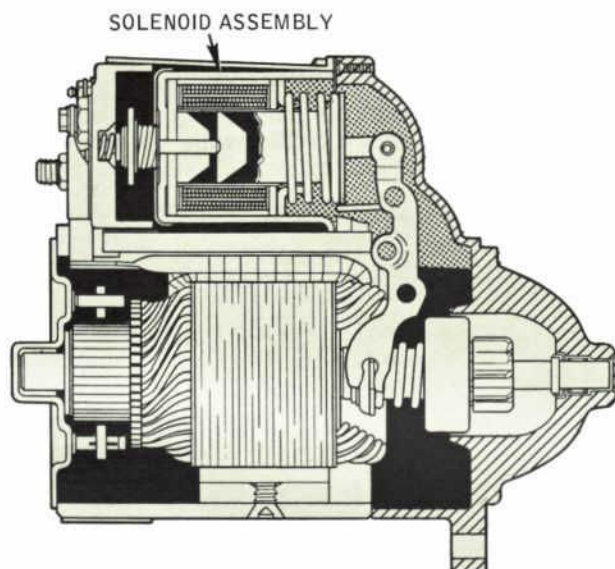
Q 5-1 b) No! In fact, you're bound to break away the plastic retaining the bearings when you press them out of the yokes — they won't come out any other way. But don't worry . . . new snap rings come with the replacement bearings.

FORD CAR AND TRUCK

CAR

SOLENOID STARTER FOR 429 V-8 — THUNDERBIRD

The Autolite starter for the Thunderjet 429 V-8 is a solenoid actuated positive engagement unit. It has a 4-brush, 4-field, 4-pole series wound motor with the circuit splitting to parallel through the two pairs of field coils. Major subassemblies are: frame and field coil assembly, armature assembly, brush plate assembly, drive housing assembly, drive assembly, shift lever assembly and solenoid assembly.



Autolite Solenoid Actuated Starting Motor — 429 V-8

Operation

When the ignition switch is turned to "start," the starter relay supplies voltage to the solenoid. The solenoid is energized through two separate windings — a pull-in coil and a hold-in coil. This draws the plunger into the coil windings, moving the shift fork to slide the drive pinion into mesh with the flywheel ring gear. As the plunger nears the end of its travel, it presses against a spring-loaded pin attached to a contact plate. The contact plate completes the circuit to the starting motor only after the pinion gear is engaged. The plunger also closes a set of contacts that bypass the pull-in coil. When the ignition switch

is released, the spring-loaded pin pushes the plunger out of the solenoid coils and breaks the circuit to the starting motor.

Testing

Hard Starting: Except for the solenoid (which can be considered as a starting motor relay from the viewpoint of electrical circuitry), electrical tests on the Thunderbird 429 V-8 starting circuit follow the same practice as for the '67 Thunderbird. When you've eliminated other possible causes of hard starting — a weak battery, faulty ignition system, etc., — check voltage drops in the circuit with a voltmeter.

1. Disconnect and ground the high tension lead from the ignition coil to keep the engine from starting.
2. Connect the voltmeter between the battery side of the starter relay and the battery terminal on the starter solenoid. Read the voltage drop with the starting circuit energized through the ignition switch.
3. In the same manner, check the voltage drop between the battery negative post and the starting motor frame.
4. In the same manner, check the voltage drop between the battery terminal on the solenoid and the "S" terminal on the solenoid.

If the voltage drop exceeds 0.10-volt on any of these tests, excessive resistance is indicated. Step 2 tests the battery circuit to the relay. Step 3 tests the effectiveness of the starter ground. Step 4 tests for resistance in the relay and the circuit between the relay and the solenoid.

Inoperative Starting System: If the starter solenoid does not pull in when the circuit is energized, connect one voltmeter lead to the solenoid "S" terminal and ground the other lead. If the voltage reading with the circuit energized is close to battery voltage (ten volts or more), a defective solenoid is indicated. The starter should be removed for solenoid replacement.

Lower voltage readings, or no voltage, indicate trouble in the circuit ahead of the solenoid. Isolate the source by moving the voltmeter lead from the solenoid "S" terminal to the starter terminal on the relay, the ignition switch terminal on the relay and the battery terminal on the relay, in that order, until a proper voltage reading is registered on the meter.

Q 9-2 a) Right on the nose! The vacuum control valve vents the distributor vacuum retard line when the engine gets hot . . . which gives less spark retard at idle . . . which gives a faster idle . . . which gives better cooling! Quite a chain reaction, isn't it?

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

If necessary, test for grounded armature and field windings after the starter has been removed as you would on any other Autolite positive engagement starter.

Removal and Installation Tips

To provide working clearance, turn the front wheels fully to the right and disconnect the steering idler arm from the frame before you remove the starter. When installing the starter, be sure all mating surfaces are clean to insure a good electrical ground. To maintain proper alignment, hold the starter squarely against the mounting plate and fully inserted into the mounting hole while you snug up the mounting bolts.

Solenoid Removal

1. Remove the screw and washer attaching the starter solenoid motor terminal to the starter field connector strap.
2. Remove the two screws and washers which attach the solenoid to the drive housing, and remove the solenoid and rubber seal.

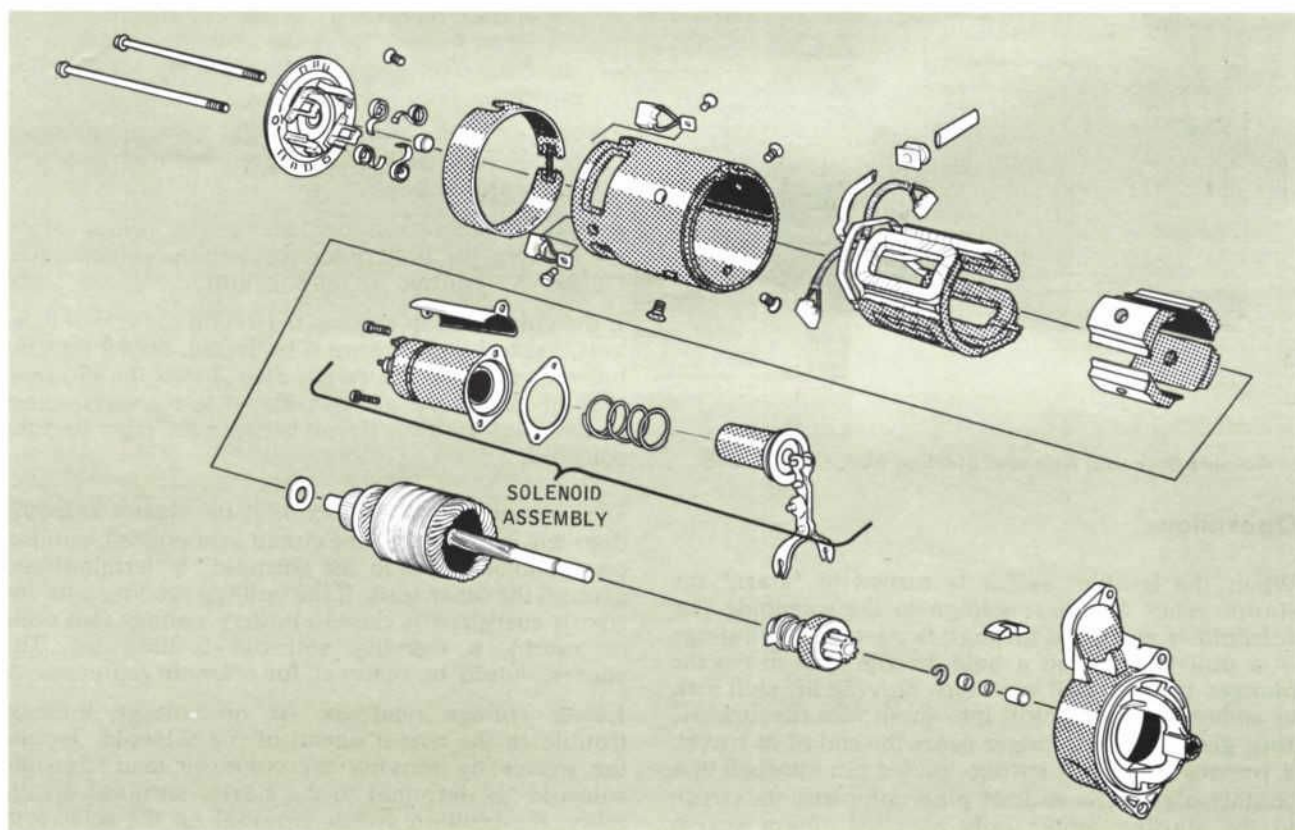
Quick-Quiz

Q 14-1 Electrical circuit tests on the starting system for the Thunderjet 429:

- a) follow 1967 practice except for testing the solenoid. (See page 184)
- b) are entirely new because of the new starter. (See page 21)
- c) are identical with 1967 tests except that no relays are involved. (See page 9)

Solenoid Installation

1. Set the solenoid and seal on the drive housing. Be sure that the heat shield is in position and that the rubber seal is properly aligned, all around. Fasten the solenoid to the housing with the two screws and washers (45-85 lbs.-in.).
2. Attach the field connector strap to the motor terminal on the solenoid with the screw and washer (20-30 lbs.-in.).



Autolite Solenoid Actuated Starting Motor Disassembled

Q 3-1 c) Wrong! All the quick operating check tells you is whether or not the automatic load leveler system is working . . . and you've already found out it isn't! Try again!

A PRELIMINARY SHOP MANUAL

Overhaul Tips

Disassembly and Inspection: Before you remove the solenoid plunger and shift lever assembly, notice the position of the shift lever tangs on the drive assembly so you'll be able to position the tangs properly during assembly. Inspect parts as you remove them, and make any needed tests in the same manner as you would for other Autolite starters. *Never use solvent on the drive assembly* — just wipe it clean with a cloth. Solvent may affect the operation of the drive pinion gear overrunning clutch.

Assembly Procedure:

1. Apply a small amount of Lubriplate to the armature shaft splines. Install the drive assembly on the armature shaft and install a new stop-ring.
2. Apply a small amount of Lubriplate on the shift lever pivot pin. Position the solenoid plunger and shift lever assembly in the drive housing.
3. Place a new retainer in the drive housing. Apply a small amount of Lubriplate to the drive end of the armature shaft. Place the armature and drive assembly into the drive housing. Be sure the shift lever tangs properly engage the drive assembly.
4. Place the fiber washer on the commutator end of the armature and apply a small amount of Lubriplate on the shaft.
5. Position the frame and field assembly to the drive housing. Be sure the frame is properly indexed to the drive housing assembly.
6. Position the brush plate assembly to the frame assembly. Be sure the brush plate is properly indexed to the frame. Install the through-bolts and tighten to 55-75 lbs.-in.
7. Place the brushes in their holders and center the brush springs on the brushes. Dress the insulated brush leads away from all other interior components to prevent possible shorts.
8. Install the starter solenoid and heat shield assembly.
9. Position the cover band and tighten the retaining screw.
10. Connect the starter to a battery to check its operation.

STARTING MOTOR: C8VF-11001-A

Stall Test (at 4 Volts)		Description:	
Minimum Torque		Manufacture:	Autolite-Ford
Pounds Feet:	15.3	Type:	12 volt, 4-1/2 inch, solenoid actuated
Maximum Current			positive engagement
Amps:	600		3 hole mount
Free Run Test			
Maximum Current			
Amps at 12 Volts and 10,000 RPM	70 Max.		
Brushes			
Number Used:	4		
Original Length (inches)	1/2		
Reusable Length (inches)	5/16		
Spring Tension (ounces)	40		
Drive			
Type:	Overrunning Clutch (deep cam)		
Part Number:	C8VF-11350-A		
Number of Teeth:	9		
Lead Pitch (inches):	6		
Tooth Pitch:	12/14		
Solenoid			
Part Number:	C8VF-11390-A		

Q 2-2 b) Good . . . you got it right! That M-1044-C fluid is just the ticket for helping with this part of the job without damaging either the insulator or the pin. Got enough in *your* shop?

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

TRUCK

TRUCK STARTING SYSTEMS UNCHANGED FROM '67

Bronco, light duty, medium duty and heavy duty truck starting systems are similar to those used in the previous models. Use 1967 service instructions for these systems. The only change in the Ranchero starting system is the use of new neutral start switches with automatic transmissions. This is covered in the car section of Group 7 of this publication.

Quick-Quiz

Q 14-2 The Autolite solenoid starter isn't mentioned for truck engine applications in this handbook because:

- a) it's not used with truck engines. (See page 33)
- b) it's not *new* for trucks, having been used in 1965. (See page 57)

SPECIFICATIONS

STARTERS

Starter Motor						Starter Brushes			Mounting Bolt Torque (Ft-Lbs)		
Dia. (Inches)	Current Draw Under Normal Load (Amps)	Normal Engine Cranking Speed (rpm)	Min. Stall Torque at 5 Volts (Ft-Lbs)	Max. Load (Amps)	No Load (Amps)	Mfg. Length (Inches)	Wear Limit (Inches)	Spring Tension (Ounces)	Through Bolt Torque (In-Lbs)	3/8-In. Bolt Two- Hole Mfg.	5/16-In. Bolt Three- Hole Mfg.
4-1/2	150-200	250-290	15.5	670	70	0.50	0.25	40	55-75	15-20	12-15

Maximum Commutator runout is 0.005 inch. Maximum starting circuit voltage drop (battery positive terminal to starter terminal) at normal engine temperature is 0.5 volt.



FORD CAR AND TRUCK

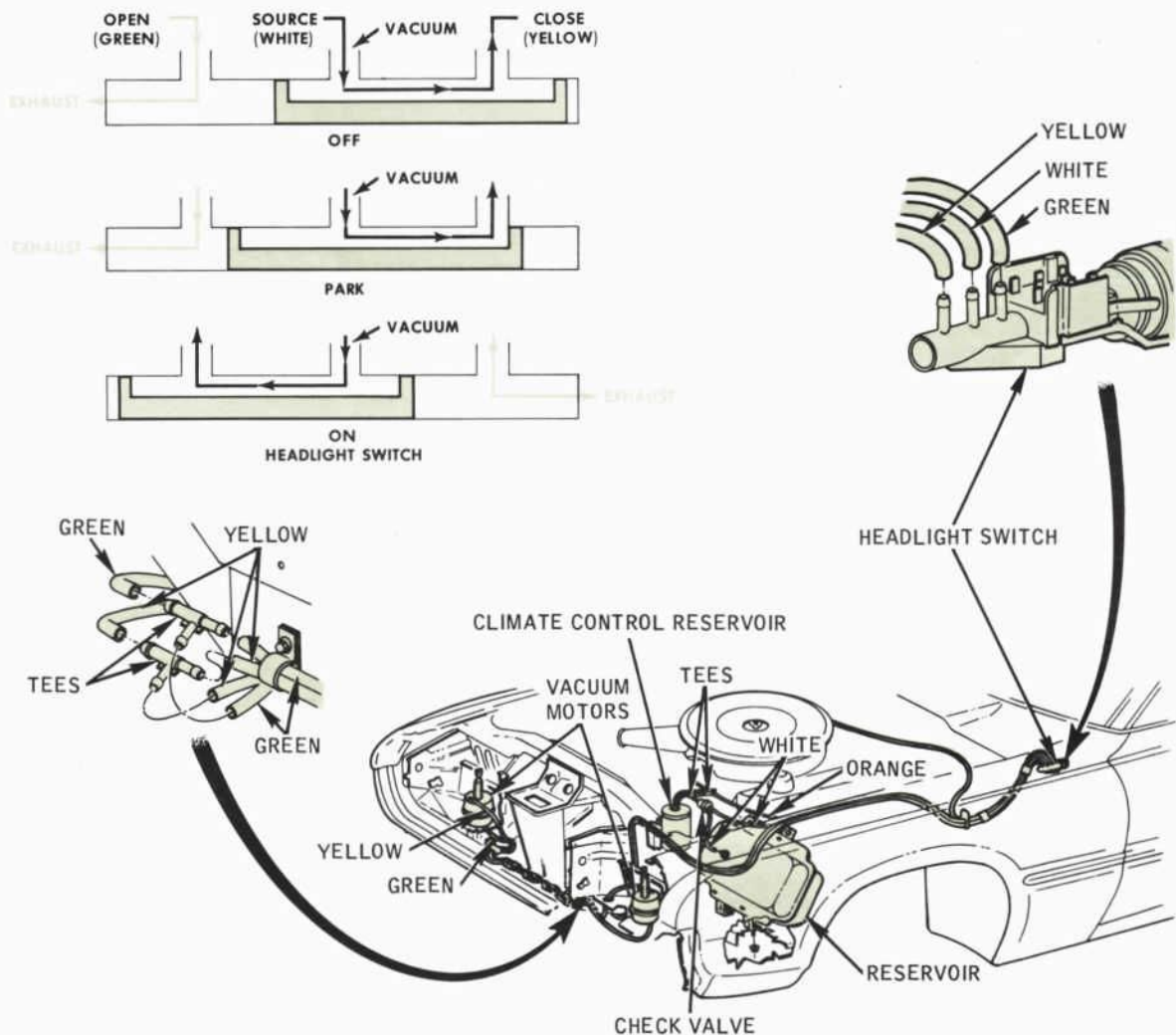
CAR

RETRACTING HEADLIGHT DOOR SYSTEM – THUNDERBIRD

The actuating system for Thunderbird's retracting headlight doors has been simplified for 1968. Vacuum distribution and venting is provided by a three-port valve mounted directly in front of the headlight switch and controlled by the switch control knob shaft. Hose routing is similar to that of last year's Thunderbird, except that the valve at the headlight switch takes the place of the electrically actuated control valve in the engine compartment of the '67

models. A separate check valve in the vacuum source line from the engine prevents reverse venting of system vacuum to the manifold and provides a vacuum storage for operation without running the engine.

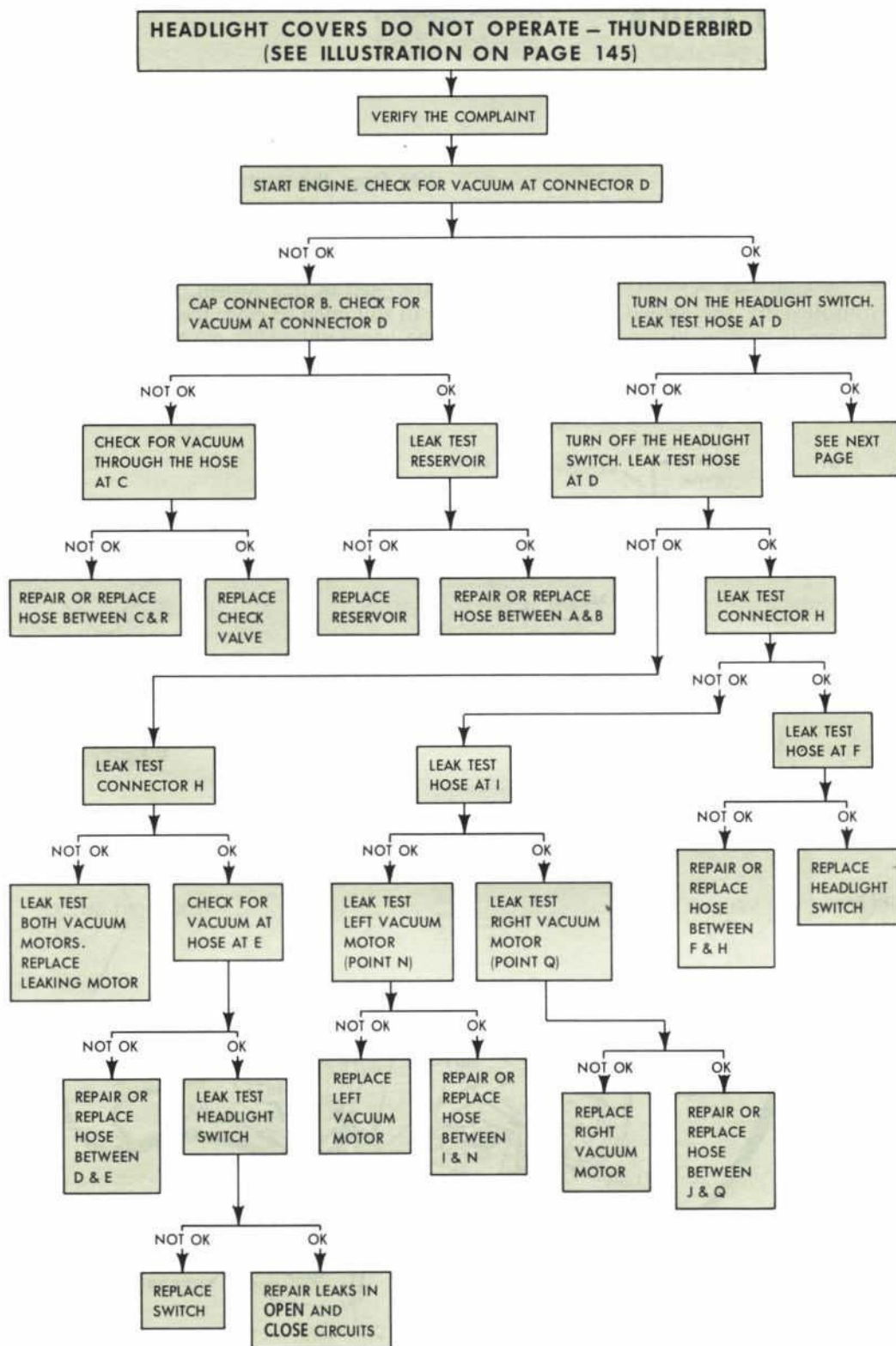
Two vacuum motors and a single vacuum reservoir are used in this system. In case of vacuum loss, you can still open or close the doors manually. Just place the headlight switch control knob in the corresponding position — "ON" to raise the headlight doors, "OFF" or "PARK" to lower the doors — and move the doors to the desired position.



Vacuum Distribution Valve for Retracting Headlight Doors – Thunderbird

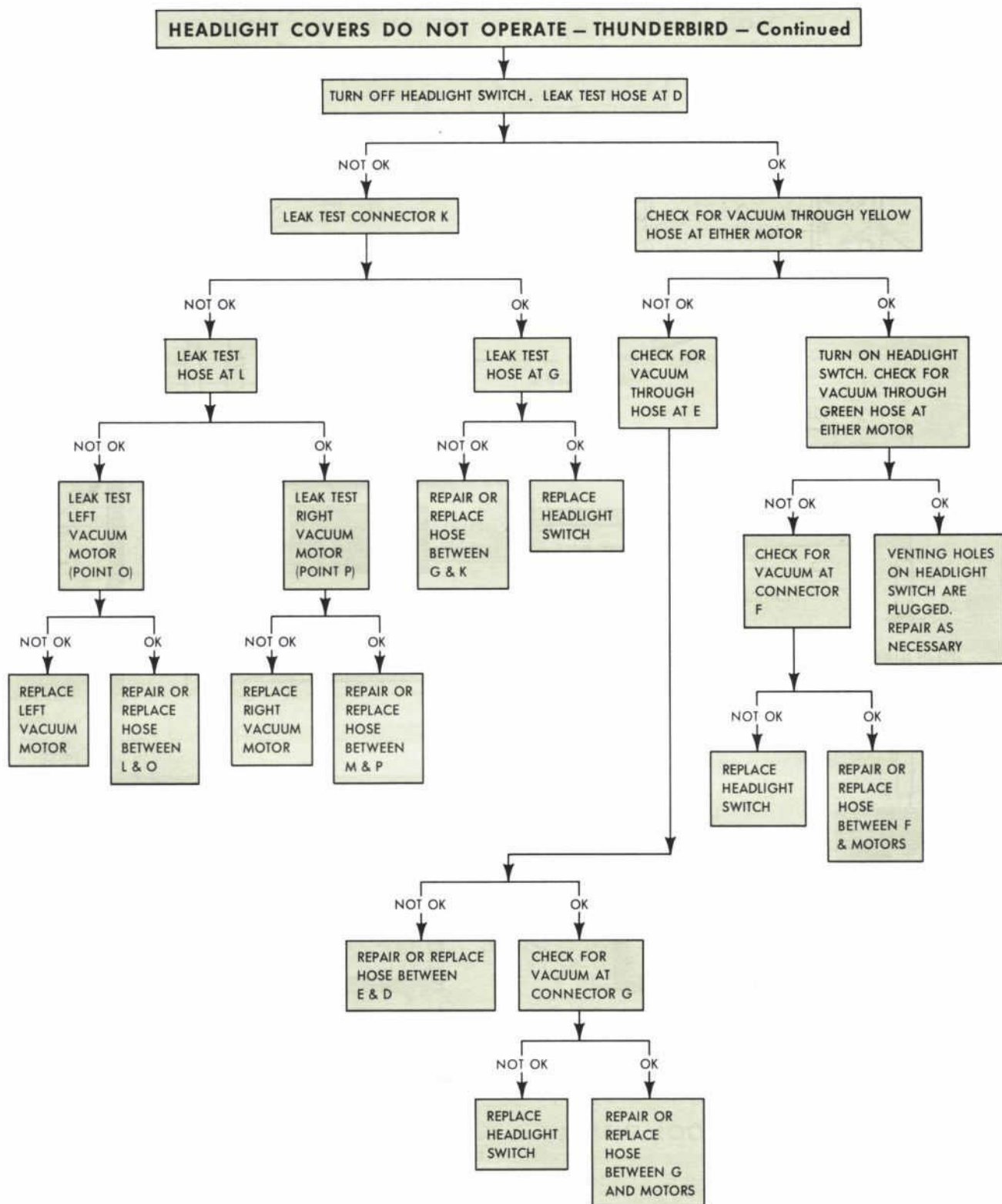
Q 6-3 a) That's the way to do it! It's an easy way to install a new mainshaft pilot bearing . . . and it's practically foolproof! To reinstall the *old* bearing, you can use a rubber band in place of the sleeve, with the same good results.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE



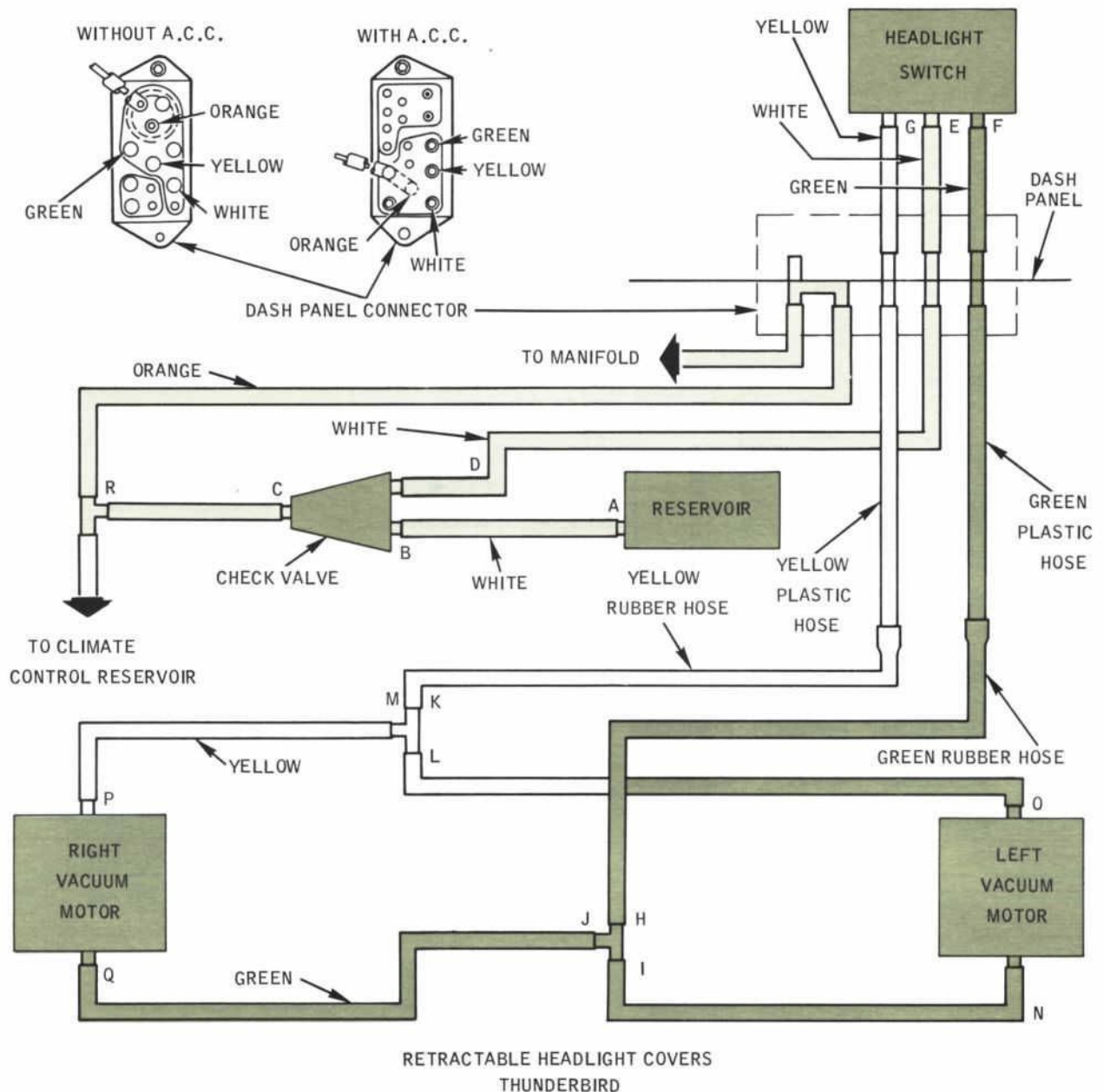
Q 16-4 c) Sorry . . . that's not what's meant by "5 by 10" push buttons! Each of the five buttons can be set to an FM station *and* an AM station, giving a total of ten — but not all of one type!

A PRELIMINARY SHOP MANUAL



Q 8-5 b) Nope! The 390 V-8 is similar to last year's 352 in most respects . . . and three-ring pistons is one detail that's included in these similarities! Four-ring pistons are new for the heavy duty 330 engine . . . and the 361 and 391 engines, too.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE



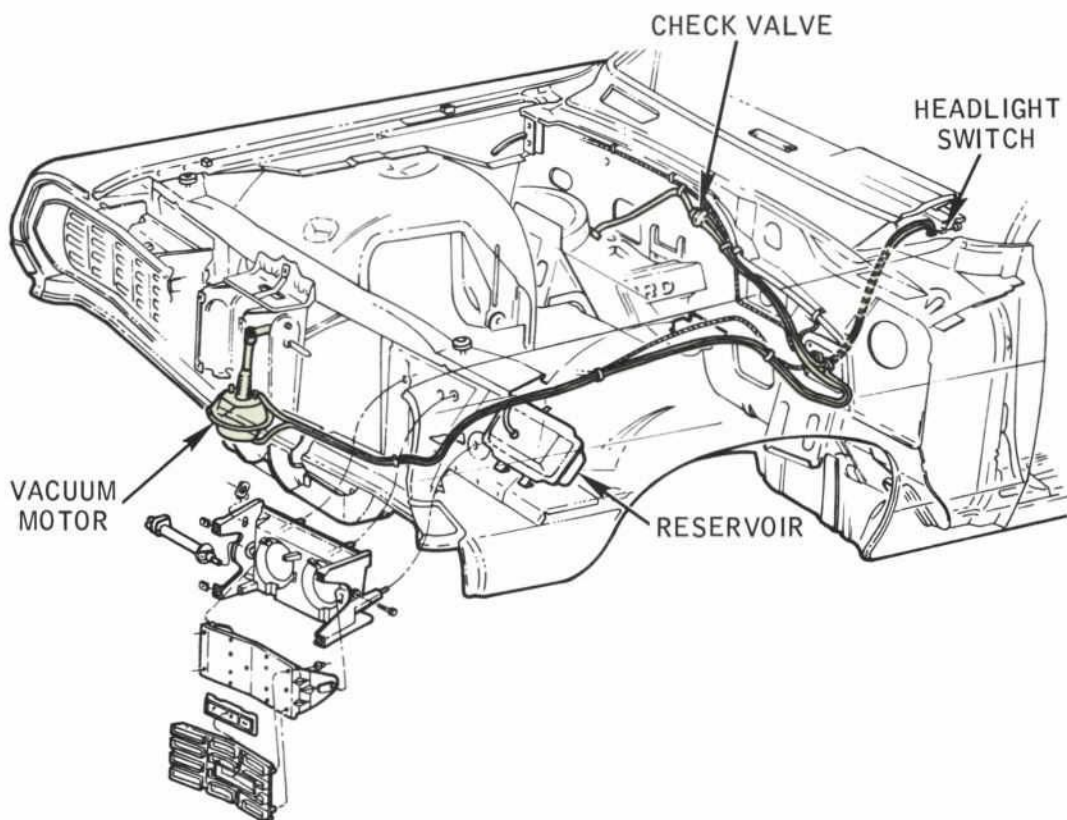
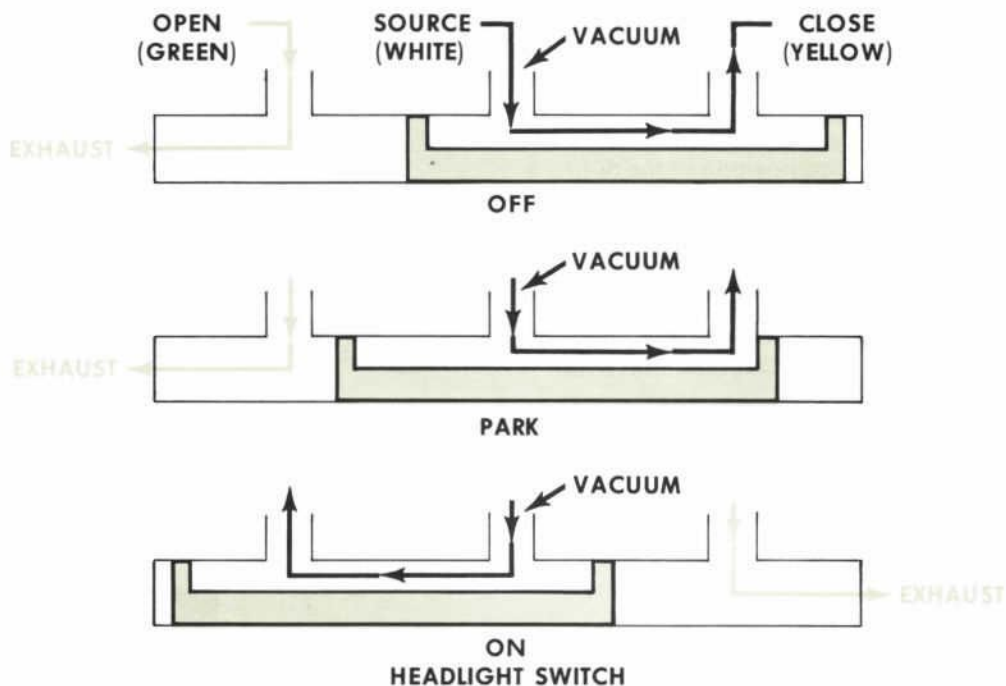
RETRACTING HEADLIGHT DOOR SYSTEM – FORD

The 1968 Ford XL and LTD series cars and their station wagon counterparts have retracting head-

light doors. The vacuum control system is similar to that of the 1968 Thunderbird system, except that only one vacuum motor is used. This motor is mounted behind the center of the grille, below the hood lock hook. It drives a center shaft that, in turn, drives two outer shafts to the covers.

Q 10-1 b) You're right! Overly-rich idle system adjustments can be a big offender for excessive exhaust emissions. So all '68 car carburetors have devices to prevent enriching the idle mixture beyond a legal limit.

A PRELIMINARY SHOP MANUAL



Retractable Headlight Door System — Ford

Q 15-1 b) Good — you've scored again! The Ford system uses one vacuum motor to actuate the headlight doors while Thunderbird has two vacuum motors.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Headlight Door Adjustment

There are two adjustable bumpers on the inboard sides of both headlamp housings. These bumpers contact a rubber-covered stop pin on the headlamp cover assembly to limit the travel of the cover. The upper stop determines the open position of the door, while the lower stop determines the door's closed position.

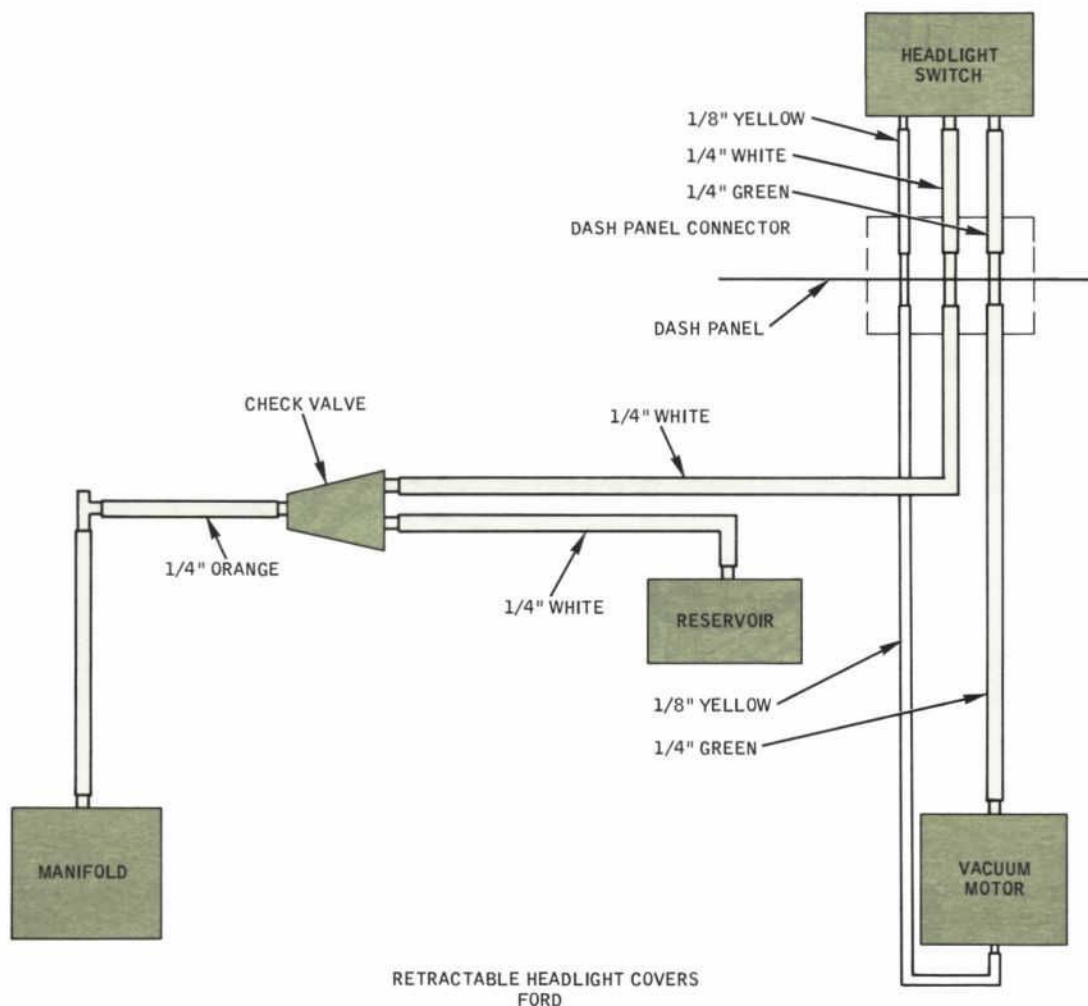
To adjust the position of any bumper, simply loosen the stop bracket bolt slightly, make your adjustment with the door in the desired position, then tighten the bolt. Be sure the engine is running while you adjust the position of the doors, so you'll have full vacuum in the vacuum motor.

If it is necessary to open or close the doors manually, follow the instructions given for the Thunderbird unit.

Quick-Quiz

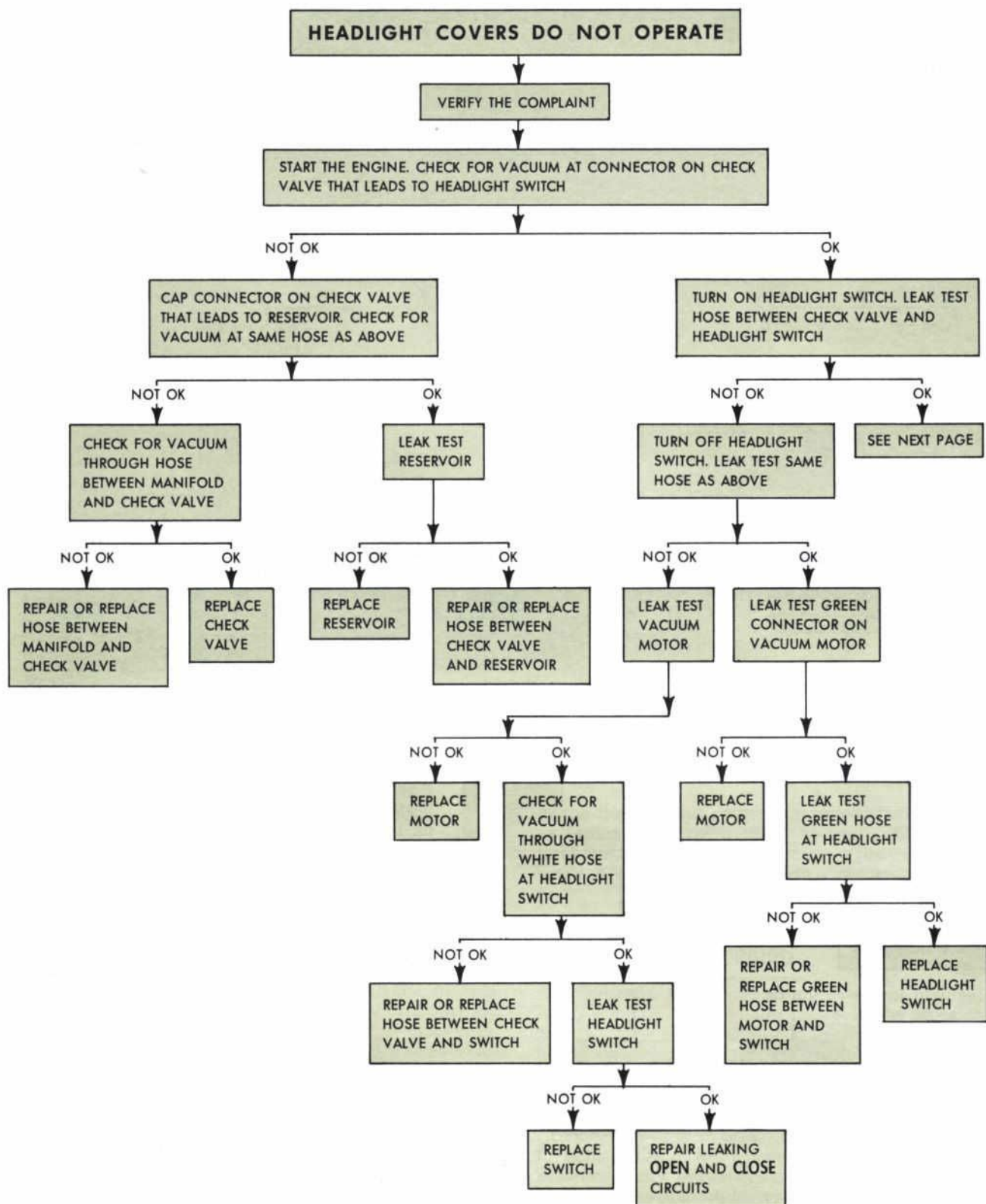
Q 15-1 The Ford retracting headlight door system differs from the Thunderbird system in the:

- a) function of the valve at the headlight switch. (See page 191)
- b) number of vacuum motors used. (See page 149)
- c) procedure for opening the doors manually. (See page 200)



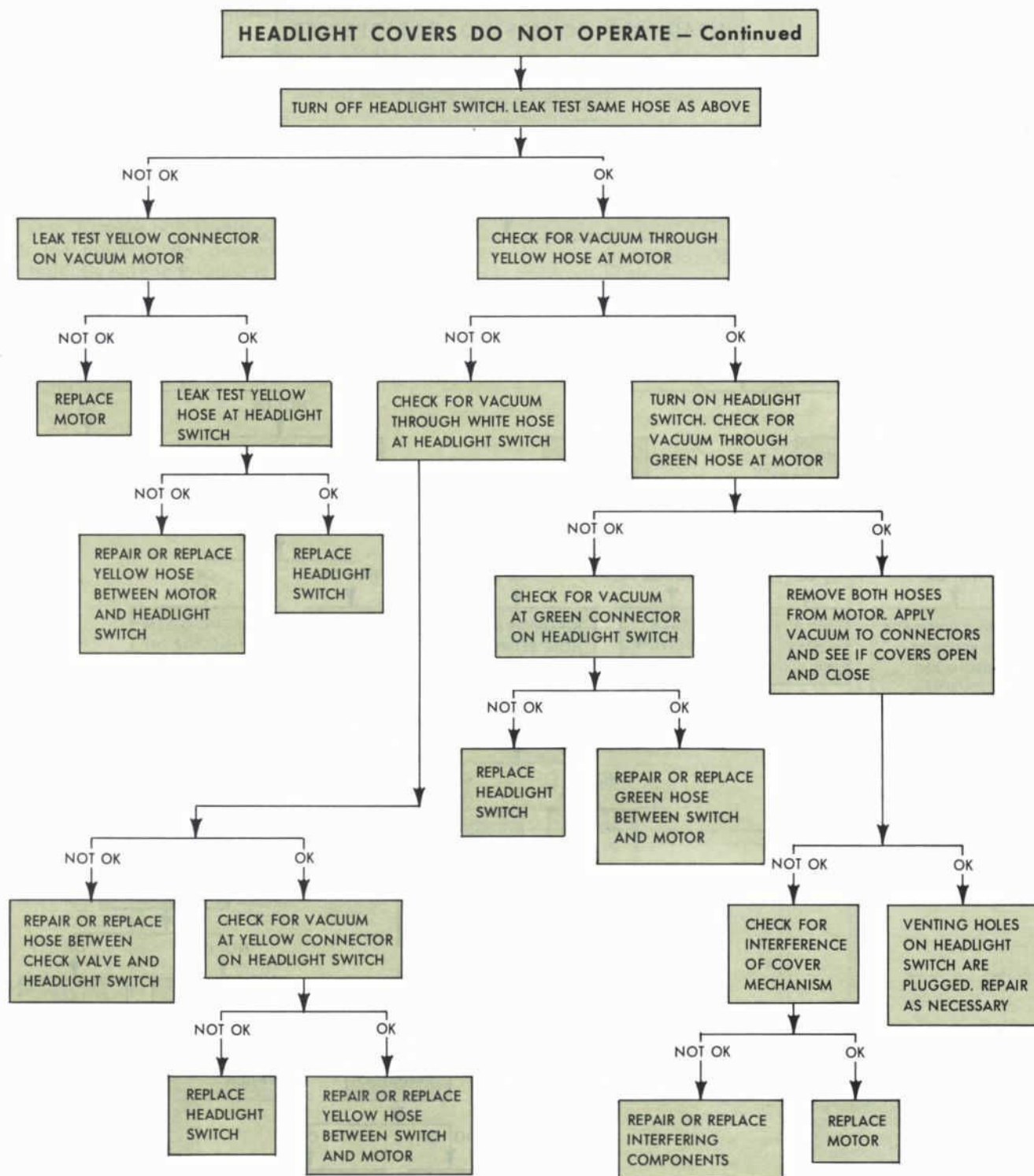
Q 15-3 b) No — in the new turn signal/warning flasher switch design, the warning switch knob is an integral part of the switch. You can't replace it separately. Try another answer, please!

A PRELIMINARY SHOP MANUAL



Q 15-4 c) You're right . . . and how! Removal of the instrument panel pad in either a Fairlane or a Falcon is a snap. And with the pad off, all of the cluster attaching screws are right out in the open, where you can easily get to them.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE





Front Marker/Cornering Light — Thunderbird

FRONT MARKER LIGHTS — ALL CARS EXCEPT FALCON

Amber front marker lights are used on all Ford Division cars except Falcon, which has an amber front reflector. These marker lights are illuminated by bulbs wired in parallel with the headlight circuit. Thunderbird and Mustang have separate front marker lights, while Ford and Fairlane marker lights are integrated into the turn signal and parking lights. They are visible from the side of these cars. Reflectors are used on the rear quarter panels of all cars for after dark identification from the side.

Thunderbird Marker/Cornering Lights

Cornering lights are available on the Thunderbird for 1968. They are mounted with the marker lights in the front fender. The bulb for each cornering light is wired in parallel in the turn signal circuit ahead

of the flasher unit. When the turn signal is actuated to indicate a turn in either direction, the cornering light on that side is illuminated to provide light forward and outward in the direction of the intended turn.

SUPPLEMENTAL STOP/TURN SIGNAL LIGHTS — THUNDERBIRD

Supplemental high level stop lights and turn signal lights located in two slim cases in the sides of the rear window are available in the Thunderbird. Two bulbs are used in each case. Illumination is controlled by two relays in the turn signal relay assembly — one relay for both bulbs in each case. When the brake lights go on, both relays are closed to feed current from the luggage compartment light circuit to both bulbs in both cases. When the turn signal is actuated, only the relay for that side is energized as the middle sequential turn signal light goes on.

Q 10-1 c) No — that's not where the limiter caps are used. You'll find 'em on the ends of the idle mixture adjusting screws in 1968 Autolite carburetors . . . and the purpose of these caps is to prevent overly-rich idle mixtures.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Troubleshooting Tip

When troubleshooting these supplemental lights, always bear in mind that although they are tied in with their respective signalling circuits, they are actually fed by the luggage compartment light circuit through relays. When checking a "no light" condition for all four bulbs, begin by testing the luggage compartment light circuit.

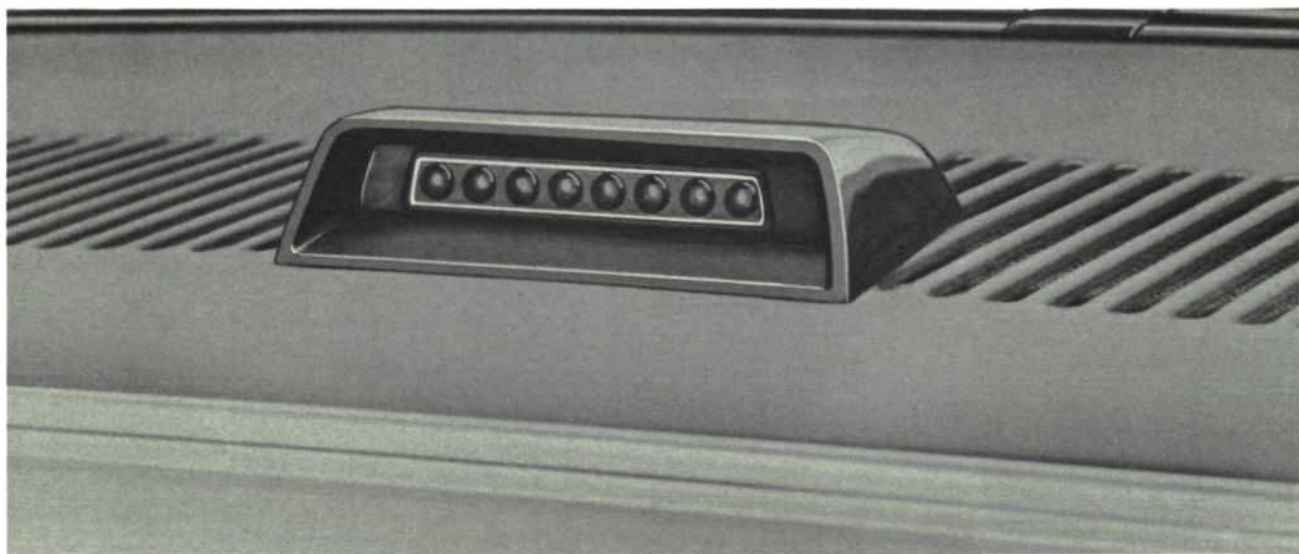
FIBEROPTIC STOPLIGHT/TAILLIGHT MONITOR — THUNDERBIRD

Thunderbird offers a new monitor for stoplights and taillights. This equipment consists in a series

Quick-Quiz

Q 15-2 In Thunderbird's supplemental stop/turn signal lights:

- a) one relay controls all of the bulbs. (See page 199)
- b) one relay controls the two left bulbs and one relay controls the two right bulbs. (See page 196)
- c) there's a separate relay for each bulb. (See page 193)



Stoplight/Taillight Monitor System — Thunderbird

of flexible fiberoptic plastic rods which extend from the taillights through the luggage compartment to small light jewels in an indicator lens housing in the package tray, where they are visible in the rearview mirror.

The principle behind these new fiberoptic plastic rods is simple. When light from the stoplight/taillight bulb enters the lower end of the rod, it is transmitted with very little loss through the various curves of the rod until it emerges from the upper end, directly behind the transparent indicator jewel.

Any damage — even a scratch — in the polished surface of the rod will cause it to "leak" light. That is why the fiberoptic rods are bundled inside a protective cover for most of their length. Don't overlook the possibility of damage anywhere along the length of the rod when searching for the cause of poor indicator illumination.

FOUR-NOTE HORN SYSTEM — THUNDERBIRD

A four-note horn system is available for Thunderbird. To the existing two-note horns, this system adds a higher frequency horn and a lower frequency horn. The system uses an overlay wiring harness which includes a horn relay mounted on the right side of the radiator and front fender support apron. The horn button operates the standard horn on the left side. It also operates the horn relay, providing power for the other horns from the hot side of the starter relay through a fuse in the overlay harness.

On Thunderbirds equipped with speed control, a horn relay is already provided for the standard two-note horn system. This relay is mounted at the top of the brake pedal support on the left side. Thunderbirds with both speed control and the four-note horns have two horn relays. The speed control horn relay operates one horn and the four-note horn relay. The horns are connected in parallel.

Q 16-1 a) Rack up another point! The power servo switch controls the circuit to the blower motor, routing the current through resistors to slow the blower when the temperature is close to the desired setting.

A PRELIMINARY SHOP MANUAL

Three horns are of the standard type; the other is of the trumpet type. Each operates within its own prescribed frequency of sound vibration. Each horn has an adjusting screw for calibration from 4.0-5.0 amperes at 12 volts if required.

FLASHER UNIT LOCATIONS – FORD, FAIRLANE, FALCON, MUSTANG

The following chart lists the locations of the flasher units for the turn signal and emergency flasher circuits for Ford, Fairlane, Falcon and Mustang.

Model	Turn Signal Flasher Unit	Emergency Flasher Unit
Ford	At the back of the instrument cluster, to the right of the speedometer.	At the left of the brake pedal support.
Fairlane and Falcon	At the bottom of the instrument panel, just to the right of the steering column.	At the bottom of the instrument panel, just to the left of the steering column.
Mustang	At the right side of the brake pedal support, under the dash panel.	At the left side of the steering column "Y" brace.

SEAT BELT WARNING LIGHT SWITCH LOCATIONS – ALL CAR LINES

The following chart lists the locations of the switch for the seat belt warning light in all Ford car lines.

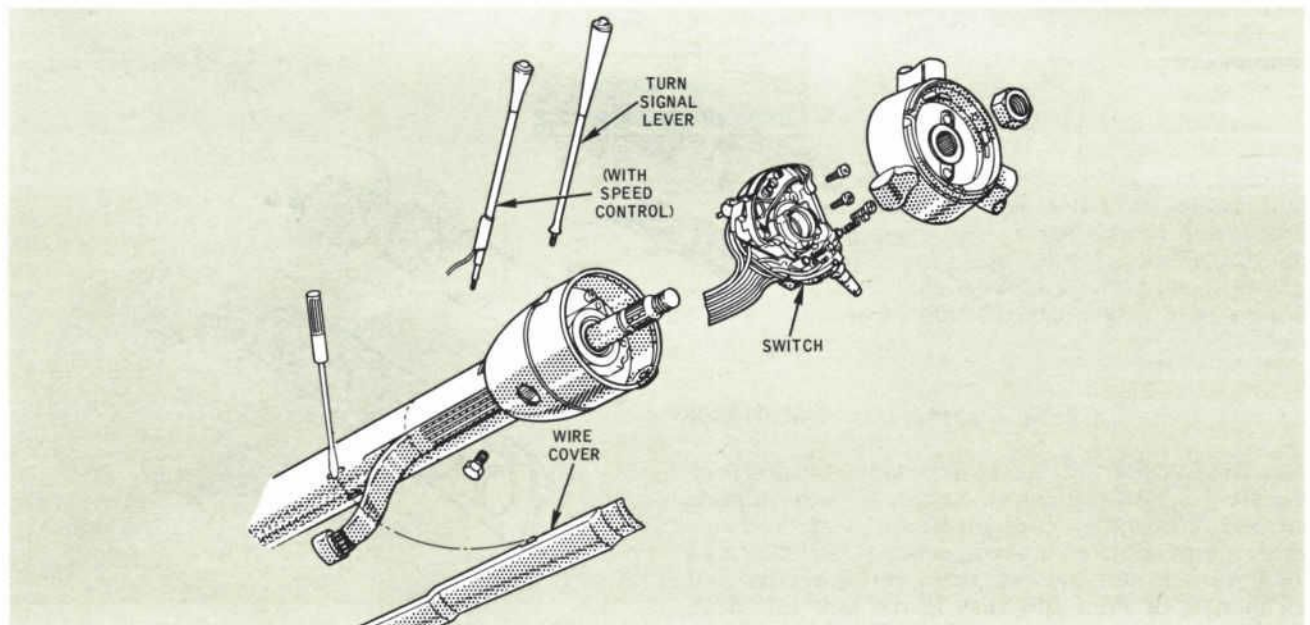
Model	Seat Belt Warning Light Switch Location
Thunderbird	At the right side of the brake pedal support bracket, under the instrument panel.
Ford	Under the center of the instrument panel, to the left of the glove box above the ash tray (in either of two locations).
Fairlane and Falcon	At the bottom of the instrument panel, to the left of the ash tray.
Mustang	On a bracket above and to the left of the fuse panel.

The Ford seat belt warning light switch will be found in either of two positions in the same general location. The switch is located either above the ash tray at the left side of the support bracket, or above the ash tray at the right side of the bracket.

To determine which installation is used on a specific car, open the ash tray and look up underneath the panel. If the switch is to the left of the support bracket, remove the ash tray for access to the switch. If the switch is to the right of the support bracket, remove the glove box for access to the switch.

TURN SIGNAL/WARNING FLASHER SWITCH – ALL CAR LINES

The combination turn signal and hazard warning switch for cars with fixed steering columns has been redesigned for 1968. The warning switch knob is now an integral part of the switch and is no longer replaceable. Electrical wiring is bonded for ease of installation.



Turn Signal/Warning Switch Removal – All Cars with Fixed Columns

Q 10-3 b) You're a winner! The vacuum motor is a refinement that gives a cold engine just a bit more "oomph" when it needs it — when the heated air supply from the exhaust manifold shroud can't meet high airflow demands at high engine speeds.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Switch Removal

1. Disconnect the battery and remove the steering wheel.
2. Remove the protective wire cover that runs along the bottom of the steering column tube and disconnect the electrical plug, noting the color codes and location.
3. If the car is equipped with automatic speed control, remove the sleeve around the wiring and pull the first three automatic speed control wires out of the column.
4. Remove the turn signal lever. Then remove the three screws holding the switch to the column and lift the switch from the column.

Switch Installation

1. Set the switch assembly in place on the steering column, slipping the bonded wiring into position through the steering column upper flange and down along the column tube.
2. Install the screws to secure the switch assembly to the column.
3. Install the turn signal lever. If a speed control is used, thread the three speed control wires into the

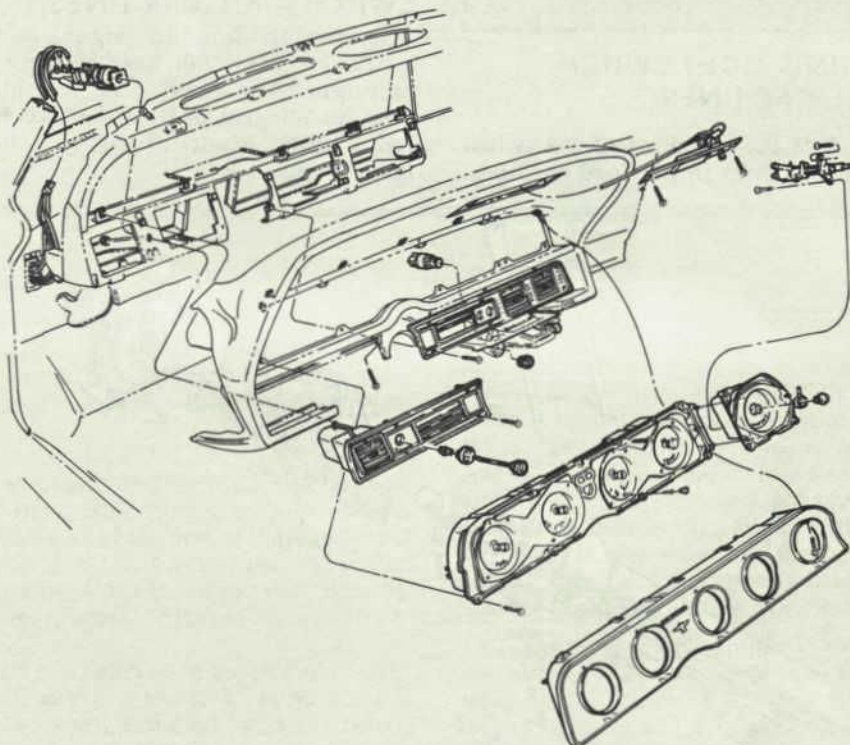
Quick-Quiz

Q 15-3 A feature of 1968 turn signal/warning flasher switches is that:

- a) all wires are bonded together. (See page 180)
- b) the warning switch knob is replaceable separately. (See page 150)
- c) all speed control knobs are on the instrument panel. (See page 195)

column upper flange and position them with the bonded wiring.

4. Install the wiring sleeve and connect all wires to their electrical plugs.
5. Install the protective wire cover to the steering column tube.
6. Install the steering wheel.
7. Connect the battery and check the operation of the flasher switch.



Thunderbird Instrument Panel Disassembled

Q 8-3 a) Not by a long shot! Any troubles with this new Thermactor air pump that can't be fixed by replacing the pressure setting plug or impeller vanes call for replacement of the pump. Don't try to disassemble it!

INSTRUMENT PANEL — THUNDERBIRD

The 1968 Thunderbird instrument cluster is a new design. The face covering gives the illusion of five integrated housings. Actually, only the four to the left form the main cluster — the right housing is attached to the main instrument panel. The housings can not be removed individually until the cluster cover, lens and mask have been removed.

Instrument Panel Details

Relocated Components: You'll find a number of significant changes in this instrument panel. Individual instruments are fastened to the cluster by screws and clipped to the flexible printed circuit. The instrument voltage regulator is located between the two left housings — the oil pressure-fuel level housing and the speedometer housing. Rear vent and windshield wiper controls are incorporated in concentric round knobs in the center of the right housing. The brake warning light and seat belt light are

also in this housing, except in cars having the overhead console. In these cars only, the seat belt light is in the console.

The air conditioner or heater controls are mounted to the left of the steering column, with the optional rear window defogger switch located in the same area.

Sequential Turn Signal Indicator Lights: Perhaps the most unusual feature of the new Thunderbird instrument panel is the single sequential turn signal indicator lens. This indicator gives the same effect as the rear turn signal sequential lights — a moving bar of light that travels in the direction of the turn.

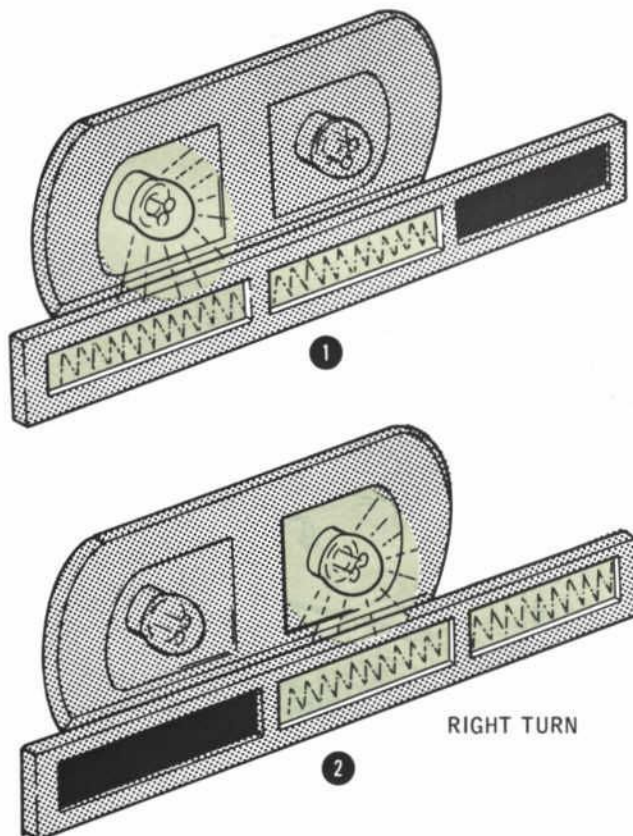
Sequential turn signal operation is unchanged from last year's system, but the new indicator light function was achieved by four changes. One of the emergency flasher relays was eliminated, as was the emergency flasher relay for the overhead convenience panel. The turn signal indicator relay was changed from a normally closed relay to a normally open relay, and the two turn signal indicator bulbs were brought closer together, side by side, under a three-section lens.

Here's what this new system does. The indicator circuit is integrated into the front turn signal light circuit. When the turn signal flasher motor for the rear lights reaches the second step in the sequence, the front turn signal light goes on and so does the panel indicator light corresponding to the side opposite the turn. As the turn signal sequence switches to the third step, the opposite side indicator light goes off. But at the same time, the panel indicator light on the side of the turn goes on. In the next step, the flasher motor turns off all the lights in the signalling circuits.

The two indicator light patterns overlap in the center section of the indicator lens, and when the first light goes off simultaneously as the second light comes on, the effect of a bar of light moving in the direction of the indicated turn is created. Emergency flasher operation causes both indicator lights to go on and off simultaneously.

INSTRUMENT PANEL — FORD

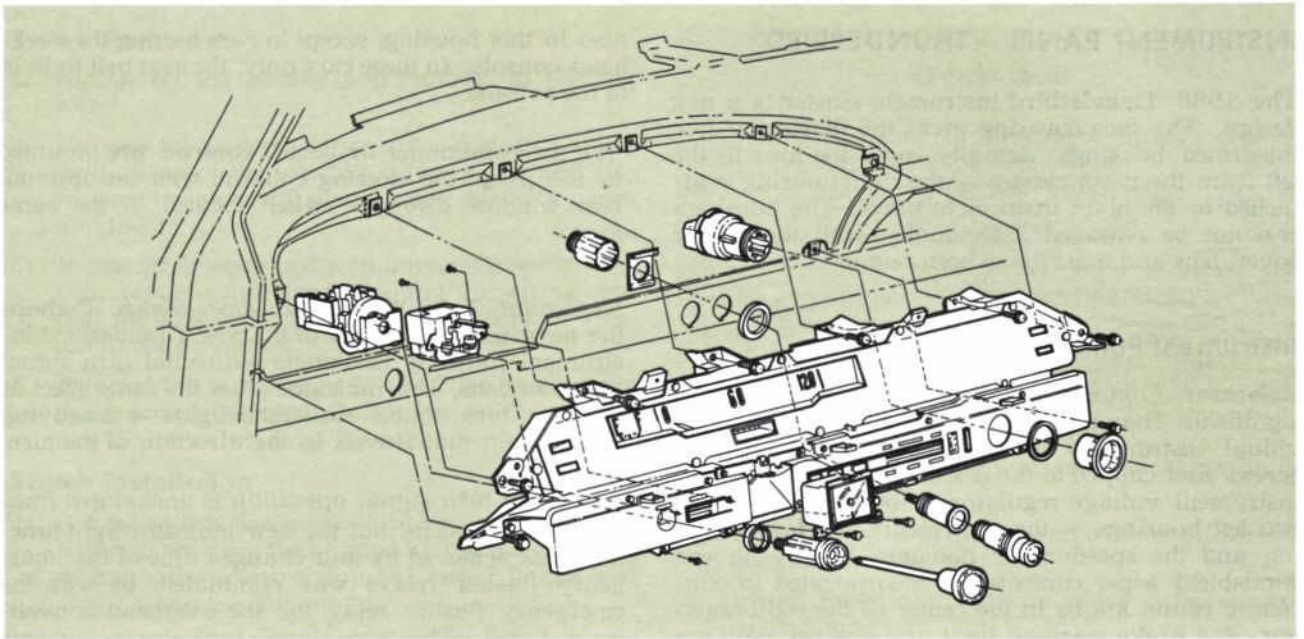
Instrument panel service for the 1968 Ford cars should pose no unfamiliar problems for experienced Ford Technicians. With only minor changes, the new instrument panel bears a close resemblance to that of the 1966 Ford. Service information published for that model year will serve as a guide for most problems. (See illustration next page.)



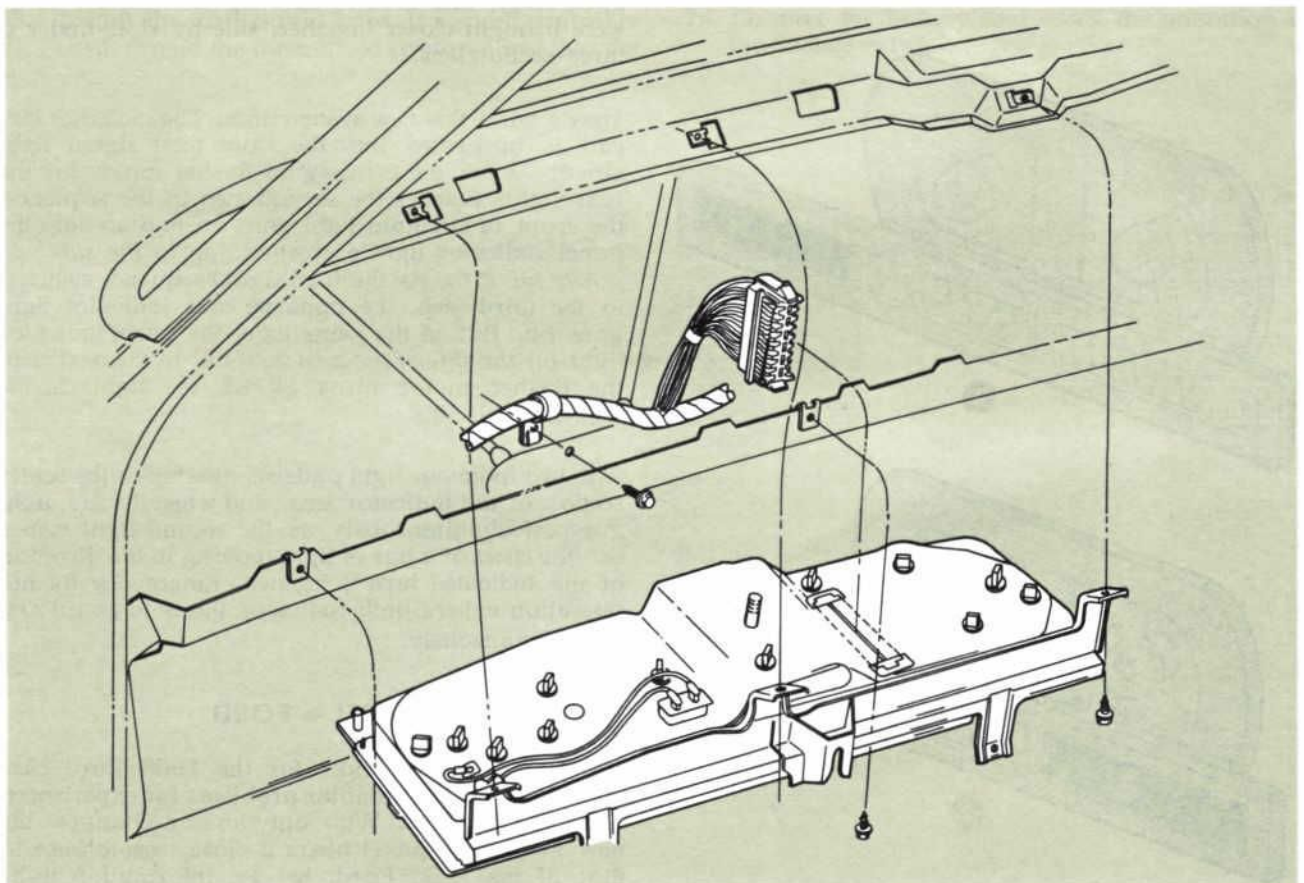
Sequential Turn Signal Indicator — Thunderbird

Q 16-1 b) Nope! No separate blower switch is used with Thunderbird's automatic climate control system. Blower speed is controlled by the position of the power servo switch, which routes current through resistors to the blower motor.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE



Ford Instrument Panel Exploded View



Fairlane Instrument Panel Exploded View

Q 3-1 a) Right! A clamp, colored red so you can spot it more easily, is fastened on the compressor vacuum hose of Ford station wagons to keep the automatic load leveler from working during transportation. Don't forget to remove it.

INSTRUMENT PANEL — FAIRLANE

1968 Fairlanes have new instrument clusters with flexible printed circuits. Two types of clusters are used — a standard cluster and a cluster that includes the optional tachometer. Each has its own specific printed circuit panel. With either cluster, the instrument panel gives the illusion of having four pods. Actually only the three pods to the left are for the instrument cluster. The right pod, which is attached to the instrument panel pad, is used for the optional clock. This pod will accommodate the convenience unit, which is attached to the instrument panel pad. However, when deluxe seat belts are installed in a car without the convenience unit, the seat belt light will be found in the left-hand pod above the brake warning light.

Instrument Accessibility — Fairlane

In the 1968 Fairlane, accessibility to instruments is outstanding. No longer is it necessary to work up from underneath. Removal of the instrument panel

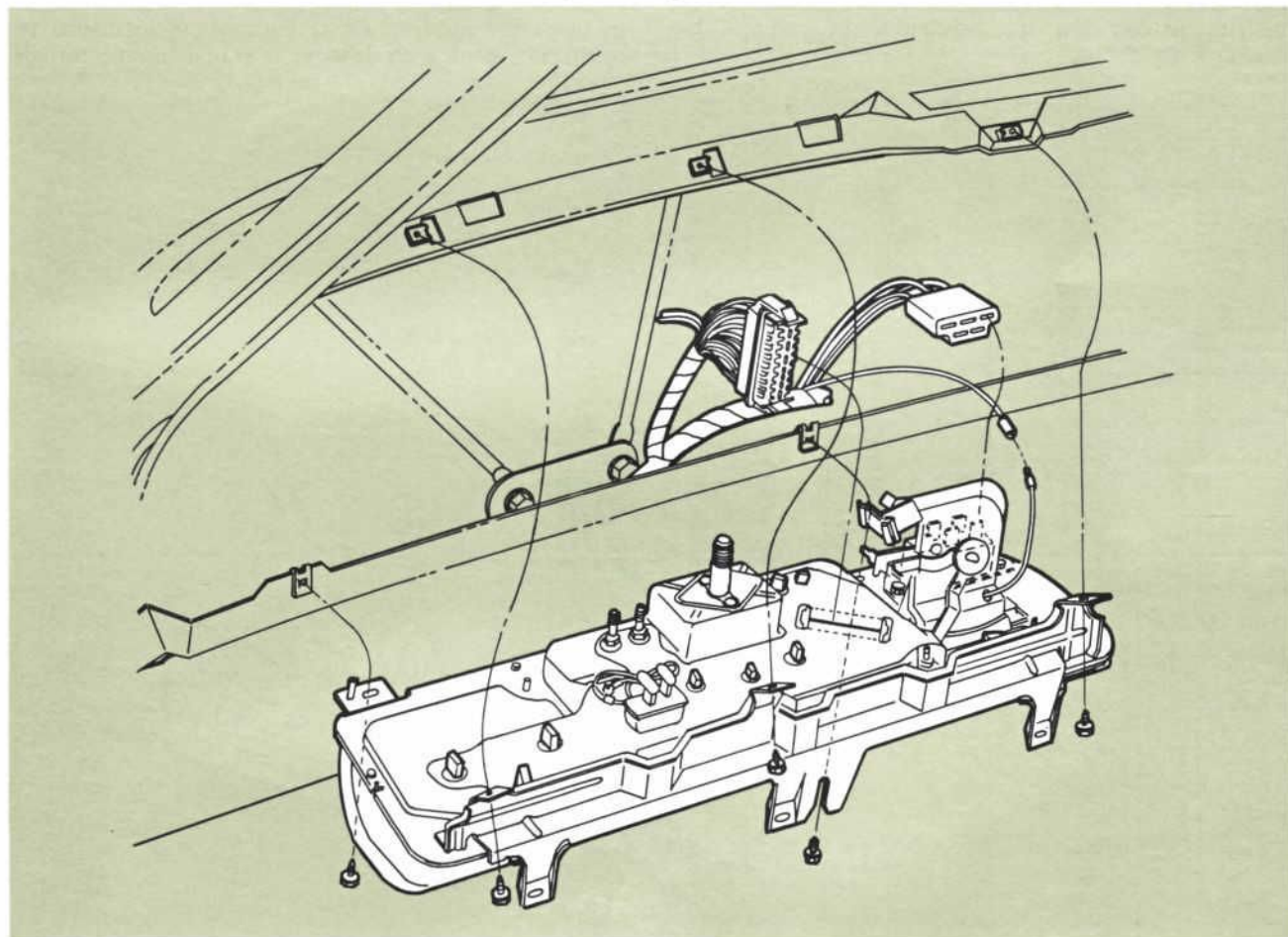
pad exposes the instrument cluster to your view and reach from above. You'll find the instrument voltage regulator at the upper left side of the back of the flexible circuit.

The oil, alternator, and illumination bulbs on the lower right side of the instrument panel can be changed by reaching under the instrument panel and pulling the bulb socket from the panel and replacing the bulb.

The instrument panel control nomenclature bulbs can be changed after the panel cover has been removed to allow access to the bulbs.

To change any of the thirteen bulbs in the instrument cluster, it is necessary to remove the panel cover and position the cluster out to replace the bulbs.

But for most other instrument panel service, it's best to remove the cluster. If it is necessary to remove the instrument cluster for service, remember that the three left pods share a single common mask of clear plastic.



Falcon Instrument Panel Exploded View

Q 7-4 b) You bet you can! In addition to using the '68 forward clutch friction plates and forward planet carrier in earlier C4 units, you can also use the new intermediate band *provided* you also install the new apply strut!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

INSTRUMENT PANEL – FALCON

The Falcon instrument cluster assembly with a flexible printed circuit is also new for 1968. The optional convenience panel, containing the seat belt light and the door ajar and low fuel warning lights, is located below the alternator and brake system warning lights at the left of the instrument panel. When the deluxe seat belt option is installed without the convenience panel, only the seat belt light is located in this area.

Instrument Accessibility – Falcon

The 1968 Falcon instruments, like those of the Fairlane, are easily accessible by removing the instrument panel pad. The instrument voltage regulator is at the top of the cluster, to the left of the speedometer. Instrument panel bulbs can be removed and replaced without removing the pad. For most other instrument service, it's advisable to remove the cluster from the car.

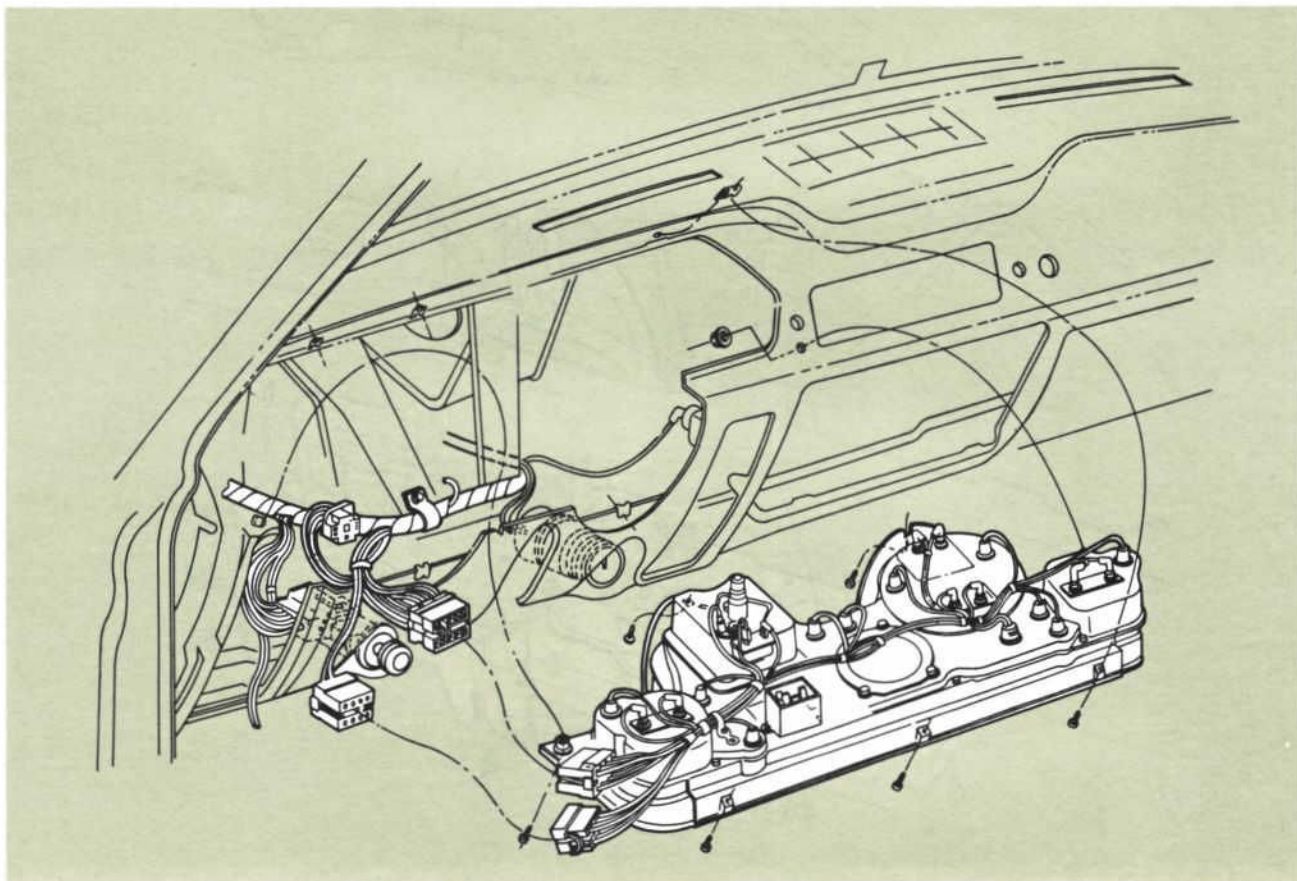
Quick-Quiz

Q 15-4 The 1968 Fairlane and Falcon instrument clusters are:

- a) 1967 clusters with only appearance changes. (See page 181)
- b) hand-wired with new wiring harnesses. (See page 183)
- c) easily accessible with the panel pad removed (See page 151)

INSTRUMENT PANEL – MUSTANG

Changes to the Mustang instrument panel are mainly appearance changes. In the standard cluster, the oil pressure and fuel level gauge positions have been reversed. In the tachometer-equipped panel, these two gauges remain in the same positions as in the 1967 models. Other component locations remain identical with last year's instrument panels.



Mustang Instrument Panel Exploded View

Q 7-5 a) Nice try . . . but wrong! Some "hunting" in the "Neutral" position is permissible *but there must be none in the "Park" position*. Otherwise, the neutral start switch should be removed and adjusted.

A PRELIMINARY SHOP MANUAL

TRUCK

TURN SIGNAL FLASHER UNIT LOCATION – LIGHT DUTY TRUCKS

The turn signal flasher unit has been relocated in all 1968 Ford light duty trucks. It is now mounted on the left side of the forward face of the instrument cluster, just above the instrument voltage regulator.

INSTRUMENT CLUSTER WIRE COLOR CODES CHANGED

Color-coding of the wires to the instrument panels of most trucks has been changed slightly from the 1967 models. However, you'll have no trouble finding the proper connections for these wires at the instrument cluster since the names of the correct color codes are stamped into the cluster housings adjacent to the wire connector sockets.

SPECIFICATIONS

CAR

BULB USAGE CHART – FORD

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Standard Equipment				
Headlamps – Hi & Lo	2	37.5 & 50 watts	4002	C4AB-13007-A
Headlamps – Hi-Beams	2	37.5 watts	4001	C4AB-13007-B
Front Park & Turn Signal & Front Side Marker	2	4-32 cp	1157NA	C6MB-13465-A
Rear Tail/Stop/Turn Signal (Sedan)	2	4-32 cp	1157	C3AB-15198-A
Rear Tail/Stop/Turn Signal (Sta. Wag.)	4	4-32 cp	1157	C3AB-15198-A
Four-Way Emergency Flasher – Included in "Front & Rear Turn Signals"				
Back-Up Lamps	2	32 cp	1156	C3DB-13465-A
License Plate Lamp	1	4 cp	97	C6AB-13465-A
Dome Lamp 62, 71, 54A, B&E, 57B	1	15 cp	1003	FDU-13730-A
Courtesy Lamp ("C" Pillar), 63, 65, 57, 54C	2	15 cp	1003	FDU-13730-A
Inst. Courtesy Lamp (Convertible)	1	6 cp	631	C3VB-13730-A
Cargo Lamps (Sta. Wag.) Models 71A; B; C; 71E; RPO 71-D, H, -J	1	15 cp	1003	FDU-13730-A
Door Courtesy 65A	2	6 cp	631	C3VB-13730-A
Door Courtesy 54C-57F	4	6 cp	631	C3VB-13730-A
Instrument Panel				
Hi-Beam Indicators	1	2 cp	1895	C3AB-13466-B
Turn Signal Indicators	2	2 cp	1895	C3AB-13466-B
Warning Lights – (Oil, Alt., Hot, Cold, Brakes)	5	2 cp	1895	C3AB-13466-B
Seat Belts Warning	1	2 cp	1895	C3AB-13466-B
Open Door Warning (Taxis)	1	2 cp	1895	C3AB-13466-B
Park Brake Rel. Warn. (RPO)	1	2 cp	257	C0AF-10A918-A
Instruments	5	2 cp	1895	C3AB-13466-B
Tachometer (Console) (RPO)	2	2 cp	1895	C3AB-13466-B
Clock	1	3 cp	1816	FEY-15021-A
Heater Control Pnl.	2	2 cp	1895	C3AB-13466-B
Optional Equipment				
Spotlight 4.4" Dia.	1	30 watts	4405	FDT-15330-B
Fog Lamps – Clear	2	35 watts	4415	FDU-15220-A
Fog Lamp Switch	1	1 cp	53X	8MB-15021
Air Conditioner Cont.	1	2 cp	1895	C3AB-13466-B
Radio Pilot Light	1	1.9 cp	1893	C1VF-18843-A
Convenience Panel: Low Fuel Warning	1	2 cp	1895	C3AB-13466-B
Door Ajar Warning	1	2 cp	1895	C3AB-13466-B
Seat Belt Warning	1	2 cp	1895	C3AB-13466-B
Park Brake Warn'g	1	2 cp	1895	C3AB-13466-B
Tachometer	1	2 cp	1895	C3AB-13466-B
Auto. Trans. Select. Ind.	1	2 cp	158	C2AB-13730-B
Map Lamp	1	6 cp	631	C3VB-13730-A
Ash Tray Recept.	1	2 cp	1895	C3AB-13466-B

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

BULB USAGE CHART – FORD – Continued

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Glove Compt.	1	3 cp	1816	FEY-15021-A
Speed Control Actuator Ind.	1	1 cp	161	C2AB-13730-A
Luggage Compt. (Exc. 71)	1	6 cp	631	C3VB-13730-A
Portable Trunk Lamp	1	15 cp	1003	FDU-13730-A
Engine Compt.	1	6 cp	631	C3VB-13730-A
Floor Shift-Auto. Trans. Select. Ind.	1	1.5 cp	1445	FDU-15021-A
Auxiliary Instrument Cluster	1	2 cp	1895	C3AB-13466-B

BULB USAGE CHART – FALCON

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Standard Equipment				
Headlamps	2	50 & 40 watts	6012	C4DB-13007-A
Front Park & Turn Signal	2	4-32 cp	1157NA	C6MB-13465-A
Front Side Marker	2	4 cp	1178A	C8ZB-13465-A
Rear Tail/Stop/Turn Signal	2	4-32 cp	1157	C3AB-15198-A
Back-Up Lamp – Sedan	2	32 cp	1156	C3DB-13465-A
Back-Up Lamp – Sta. Wgn.	2	32 cp	1076	C1TB-13465-A
License Plate Lamp	1	4 cp	97	C6AB-13465-A
Dome Lamp	1	15 cp	1003	FDU-13730-A
Emergency Flasher – Included in "Front and Rear Turn Signals"				
Map Lamp 62D Only	1	6 cp	631	C3VB-13730-A
Instrument Panel				
Instr. Courtesy Lamp (Conv. Only)	2	6 cp	631	C3VB-13730-A
Hi-Beam Indicators	1	2 cp	194	C8MB-13465-B
Turn Signal Indicators	2	2 cp	194	C8MB-13465-B
Emergency Flasher Indicators – Included in "Turn Signal Indicators"				
Warning Lights – (Oil, Alt., Hot, & Brakes)	4	2 cp	194	C8MB-13465-B
Convenience Panel: Low Fuel, Belts, Door Ajar, Park (RPO)	4	2 cp	1895	C3AB-13466-B
Ignition Switch	1	2 cp	1895	C3AB-13466-B
Speedometer & Fuel Gauge	2	2 cp	194	C8MB-13465-B
Heater Controls	1	2 cp	1895	C3AB-13466-B
Optional Equipment				
Spotlight – 4.4" Dia.	1	30 watts	4405	FDT-15330-B
Air Cond. Control	1	2 cp	1895	C3AB-13466-B
Radio Pilot Light	1	1.9 cp	1893	C1VF-18843-A
Warning – Open Door	1	2 cp	1895	C3AB-13466-B
Warning – Park Brake	1	1.6 cp	257	C0AF-10A918-A
Safety Conv. Pkg: Low Fuel, Belts, Door Ajar, Park	4	2 cp	1895	C3AB-13466-B
Courtesy Lamp (Instr. Pnl.)	2	6 cp	631	C3VB-13730-A
Auto. Trans. Select. Ind.	1	1 cp	161	C2AB-13730-A
Tachometer	1	2 cp	1895	C3AB-13466-B
Ash Tray	1	1.5 cp	1445	FDU-15021-A
Glove Compt.	1	2 cp	1895	C3AB-13466-B
Clock	1	3 cp	1816	FEY-15021-A
Luggage Compt.	1	6 cp	631	C3VB-13730-A
Engine Compt.	1	6 cp	631	C3VB-13730-A
Portable Trunk Lamp	1	15 cp	1003	FDU-13730-A
Auxiliary Instrument Cluster	1	2 cp	1895	C3AB-13466-B
Map Lamp (Except 62D)	1	6 cp	631	C3VB-13730-A
Cargo Lamp – Sta. Wagon	1	15 cp	1003	FDU-13730-A

A PRELIMINARY SHOP MANUAL

BULB USAGE CHART – FAIRLANE

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Standard Equipment				
Headlamps – Hi & Lo	2	37.5 & 50 watts	4002	C4AB-13007-A
Headlamps – Hi-Beams	2	37.5 watts	4001	C3AB-13007-B
Front Park & Turn Signal	2	4-32 cp	1157NA	C6MB-13465-A
Front Side Marker – Included in "Front Park Lamp"				
Rear Tail/Stop/Turn Signal (Sedan)	2	4-32 cp	1157	C3AB-15198-A
Rear Tail/Stop/Turn Signal (Sta. Wgn.)	4	4-32 cp	1157	C3AB-15198-A
Back-Up Lamp	2	32 cp	1156	C3DB-13465-A
License Plate Lamp	1	4 cp	97	C6AB-13465-A
Dome Lamp	1	15 cp	1003	FDU-13730-A
Four-Way Emergency Flashers – Included in "Front & Rear Turn Signals"				
Instrument Panel				
Instrument Panel Courtesy Lamp (Conv. Only)	2	6 cp	631	C3VB-13730-A
Hi-Beam Indicator	1	2 cp	194	C8MB-13465-B
Turn Signal Indicators	2	2 cp	194	C8MB-13465-B
Emergency Flasher Indicator – Included in "Turn Signal Indicators"				
Warning Lights – (Oil, Alt., Hot, Cold, Brakes)	5	2 cp	194	C8MB-13465-B
Convenience Panel: Fuel, Door Ajar, Park Brake, Belts (RPO)	4	2 cp	1895	C3AB-13466-B
Fuel Gauge, Speedometer	4	2 cp	194	C8MB-13465-B
Glove Compt. (RPO)	1	2 cp	1895	C3AB-13466-B
Ignition Switch	1	2 cp	1895	C3AB-13466-B
Clock	2	2 cp	1895	C3AB-13466-B
Ash Receptacle	1	1.5 cp	1445	FDU-15220-A
Nomenclature Bar	4	2 cp	1895	C3AB-13466-B
Deluxe Seat Belt Option	1	2 cp	1895	C3AB-13466-B
Optional Equipment				
Instr. Panel Courtesy Lamp (Exc. Conv.)	2	6 cp	631	C3VB-13730-A
Fog Lamps – Clear	2	35 watts	4415	FDU-15220-A
Fog Lamp – Switch	1	1 cp	53X	8MB-15021
Spotlight (4.4" Dia.)	1	30 watts	4405	FDT-15330-B
Warning – Park Brake	1	1.6 cp	257	C0AF-10A918-A
Radio Pilot Light	1	1.9 cp	1893	C1VF-18843-A
Tachometer	1	2 cp	1895	C3AB-13466-B
Auto. Trans. Select. Indicator	1	1 cp	161	C2AB-13730-A
Console Lamp	2	3 cp	1816	FEY-15021-A
Luggage Compt.	1	6 cp	631	C3VB-13730-A
Engine Compt.	1	6 cp	631	C3VB-13730-A
Portable Trunk Lamp	1	15 cp	1003	FDU-13730-A
Floor Shift-Auto. Trans. Select. Ind.	1	1.9 cp	1893	C1VF-18843-A
Auxiliary Instrument Cluster	1	2 cp	1895	C3AB-13466-B
Map Lamp	1	6 cp	631	C3VB-13730-A
Cargo Lamp – Sta. Wagon	1	15 cp	1003	FDU-13730-A

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

BULB USAGE CHART – MUSTANG

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Standard Equipment				
Headlamps – Hi & Lo	2	40 & 50 watts	6012	C4DB-13007-A
Front Park & Turn Signal	2	4-32 cp	1157A	C3AB-13465-A
Front Side Marker	2	4 cp	1178A	C8ZB-13465-A
Rear Tail/Stop/Turn Signal	2	4-32 cp	1157	C3AB-15198-A
Four-Way Emergency Flashers – Included in "Front & Rear Turn Signals"				
Back-Up Lamp	2	21 cp	1142	C4ZB-13730-A
License Plate Lamp	1	4 cp	97	C6AB-13465-A
Courtesy Lamp – Fastback (Qtr. Panel)	2	15 cp	1003	FDU-13730-A
Courtesy Lamp – Under Inst. Pnl. (63 & 76)	1	6 cp	631	C3VB-13730-A
Dome Courtesy (65 Only)	1	15 cp	1003	FDU-13730-A
Instrument Panel				
Hi-Beam Indicators	1	2 cp	1895	C3AB-13466-B
Turn Signal Indicators	2	2 cp	1895	C3AB-13466-B
Turn Signal Indicators – Are also Emergency Flasher Indicators				
*Warning Lights – (Oil, Alt., & Brakes)	3	2 cp	1895	C3AB-13466-B
Glove Compt. Light	1	2 cp	1895	C3AB-13466-B
**Instruments	7	2 cp	1895	C3AB-13466-B
Optional Equipment				
Courtesy Lamp 65-63-76 RPO	2	6 cp	631	C3VB-13730-A
Fog Lamps	2	35 watts	4415	FDU-15220-A
Fog Lamp – Switch	1	1 cp	53X	8MB-15021
Spotlight – 4.4" Dia.	1	30 watts	4405	FDT-15330-B
Radio Pilot Light	1	1.9 cp	1893	C1VF-18843-A
Warning Light – Brake	1	1.6 cp	256	C4SB-13466-A
Convenience Panel: Seat Belt & Low Fuel	2	2 cp	1895	C3AB-13466-B
Convenience Panel: Door Ajar & Park Brake	2	1 cp	257	C0AF-10A918-A
Courtesy Lamp – Console	2	3 cp	1816	FEY-15021-A
Glove Compt. Lamp (Console)	1	2 cp	1895	C3AB-13466-B
Floor Shift-Auto. Trans. Select. with Console	1	1.9 cp	1893	C1VF-18843-A
Auto. Trans. without Console	1	1.9 cp	1893	C1VF-18843-A
Illuminated Emblem	1	15 cp	1003	FDU-13730-A
Luggage Compt. Lamp	1	6 cp	631	C3VB-13730-A
Engine Compt. Lamp	1	6 cp	631	C3VB-13730-A
Portable Trunk Lamp	1	15 cp	1003	FDU-15021-A
Auxiliary Instrument Cluster	1	2 cp	1895	C3AB-13466-B
Interior Lamp (Quarter Panel)	2	2 cp	1895	C3AB-13466-B
Door Courtesy RPO (76-65-63)	2	6 cp	1895	C3AB-13466-B
Roof Console RPO	2	6 cp	631	C3VB-13730-A

NOTES: (*) Oil and Alt. Warning Lights are Required with Tachometer Installation Only.

(**) Six (6) Illumination Bulbs only with Tachometer Installation.

A PRELIMINARY SHOP MANUAL

BULB USAGE CHART – THUNDERBIRD

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Standard Equipment				
Headlamps – Hi & Lo	2	37.5 & 50 watts	4002	C4AB-13007-A
Headlamps – Hi-Beams	2	37.5 watts	4001	C4AB-13007-B
Front Park & Turn Signal	2	4-32 cp	1157A	C3AB-13465-A
Rear Tail/Stop/Turn Signal	8	4-32 cp	1157	C3AB-15198-A
Four-Way Emergency Flasher – Included in "Front & Rear Turn Signals"				
Back-Up Lamp	2	32 cp	1156	C3DB-13465-A
License Plate Lamp	1	4 cp	97	C6AB-13465-A
"C" Pillar Light	2	15 cp	1003	FDU-13730-A
Glove Compt.	1	2 cp	1895	C3AB-13466-B
Auto. Trans. Select. Ind. – Fixed & Tilt Column	1	1.5 cp	1445	FDU-15021-A
Courtesy – Door	4	12 cp	211 or 211-1	C3AB-13730-A or C7SB-13465-A
Map Light	2	3 cp	1816	FEY-15021-A
Luggage Compt.	1	6 cp	631	C3VB-13730-A
Front Side Marker	2	4 cp	97NA	C8MB-13465-A
Instrument Panel				
Inst. Panel Courtesy Light	2	6 cp	631	C3VB-13730-A
Hi-Beam Indicators	1	2 cp	194	C8MB-13465-B
Turn Signal Indicators	2	2 cp	194	C8MB-13465-B
Warning-Brakes & Belts	2	2 cp	194	C8MB-13465-B
Ignition Switch	1	2 cp	158	C2AB-13730-B
Instruments	5	2 cp	194	C8MB-13465-B
Heater Controls	1	2 cp	1895	C3AB-13466-B
Control Nomenclature, Rear Vent & Wipers	2	2 cp	194	C8MB-13465-B
Optional Equipment				
Fog Lamps – Clear	2	35 watts	4415	FDU-15220-A
Fog Lamp – Switch	1	1 cp	53X	8MB-15021
Spotlight – 4.4" Dia.	1	30 watts	4405	FDT-15330-A
Manual A/C Control	1	2 cp	1895	C3AB-13466-B
ATC Control	1	2 cp	1895	C3AB-13466-B
Radio Pilot Light	1	1.9 cp	1893	C1VF-18843-A
Park Brake Signal	1	2 cp	1895	C3AB-13466-B
Convenience Panel: Low Fuel Warning	1	2 cp	1891	2702289
Door Ajar Warning	1	1.6 cp	256	C4SB-13466-A
Seat Belt Warning	1	2 cp	1891	2702289
Emergency Flasher Warning	1	2 cp	1891	2702289
Cigar Lighter	1	2 cp	1895	C3AB-13466-B
Engine Compt.	1	6 cp	631	C3VB-13730-A
Portable Trunk Lamp	1	15 cp	1003	FDU-13730-A
Auxiliary Instrument Cluster	1	2 cp	1895	C3AB-13466-B
Tachometer	1	2 cp	1895	C3AB-13466-B
Supplemental Stop Lamp	4	32 cp	1156	C3DB-13465-A

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

TRUCK

BULB USAGE CHART — TRUCK

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Standard Equipment				
Headlights — (Heavy Tilt) N1000D, NT850D, NT950D & "H" Series	2	50 & 40 watts	6013	C1TF-13007-A
Headlights — 7	2	50 & 40 watts	6012	C4DB-13007-A
Front Parking Light	2	4 cp	97	C6AB-13465-A
Rear License & Stop	1 or 2	4-32 cp	1157	C3AB-15198-A
License (Styleside & Integral Box)	1	4 cp	97	C6AB-13465-A
License (Separate Box)	1 or 2	4 cp	97	C6AB-13465-A
Dome Lamp	1	15 cp	1004	C3SB-13464-A
Back-Up Lamp	2	32 cp	1156	C3DB-13465-A
Instrument Panel				
Hi-Beam Ind. (Tilt Cab)	1	2 cp	1895	C3AB-13466-B
Hi-Beam Ind. (Conv. Cab)	1	2 cp	1895	C3AB-13466-B
Instruments — (Tilt Cab)	2	2 cp	1895	C3AB-13466-B
Instruments — Conv. Cab (F800-1000)	3	2 cp	1895	C3AB-13466-B
Turn Signal Ind.	2	2 cp	1895	C3AB-13466-B
Instruments (Conv. & Bus F-500-F-750) (B-500-B-750)	2	2 cp	1895	C3AB-13466-B
F-100 and 350 Conv. Standard & Custom (Model 81)				
Hi-Beam Indicator	1	2 cp	1895	C3AB-13466-B
Turn Signal Indicator	2	2 cp	1895	C3AB-13466-B
Warning Lights — (Oil & Gen.)	2	2 cp	1895	C3AB-13466-B
Warning — Brakes	1	1.5 cp	1445	FDU-15021-A
Instruments	2	2 cp	1895	C3AB-13466-B
Optional Equipment				
Fog Lamps — Amber	2	35 watts	4415A	FDU-15220-B
Fog Lamp Switch	1	1 cp	53X	8MB-15021
Spotlight (Par 46)	1	30 watts	4435	FDT-15330-A
Spotlight (Par 36)	1	30 watts	4405	FDT-15330-B
Front Turn Signal	2	32 cp	1156	C3DB-13465-A
Parking & Turn Signal Lamp Intgr.	2	4-32 cp	1157	C3AB-15198-A
Rear Turn Signal	2	32 cp	1156	C3DB-13465-A
Radio Pilot Light, F-100 to F-750	1	1.9 cp	1893	C1VF-18843-A
Radio Pilot Light, F-800 Up, C, W, & C.O.E.	1	2 cp	1895	C3AB-13466-B
Warning Light — Belts (RPO)	1	2 cp	1895	C3AB-13466-B
Glow Plug Indicator — Lamp Ass'y.	1	1 cp	53X	8MB-15021
Power Divider Diff. Lock — Lamp Ass'y.	1	1 cp	53X	8MB-15021
Trans. Retarder Oil Temp — Lamp Ass'y.	1	1 cp	53X	8MB-15021
Water Temp — Lamp Ass'y.	1	1 cp	53X	8MB-15021
Low Oil Pressure — Lamp Ass'y.	1	1 cp	53X	8MB-15021
Heavy Truck				
Warning Light — Differential Lockout	1	1.5 cp	1445	FDU-15021-A
•Low Oil Pressure	1	1.5 cp	1445	FDU-15021-A
Water Temp.	1	1.5 cp	1445	FDU-15021-A
Hydraulic	1	1.5 cp	1445	FDU-15021-A
Glow Plug Indicator	1	1.5 cp	1445	FDU-15021-A
Brake	1	1.5 cp	1445	FDU-15021-A
Parking Brake Signal	1	2 cp	1895	C3AB-13466-B
Auto. Cigar Lighter	1	1.5 cp	1445	FDU-15021-A
Engine Comp.	1	1.5 cp	93	FDT-13799-A
Identification Lamp (Cab — Roof)	3	4 cp	97	C6AB-13465-A
Marker Lamp (Cab — Roof)	2	4 cp	97	C6AB-13465-A
Marker Lamp — Stake & Platform	8	4 cp	97	C6AB-13465-A
Vacuum Gauge	2	2 cp	1895	C3AB-13466-B
Tachometer	1	2 cp	1895	C3AB-13466-B
Air Pressure Gauge	1	2 cp	1895	C3AB-13466-B

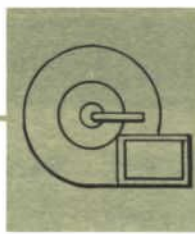
A PRELIMINARY SHOP MANUAL

BULB USAGE CHART – TRUCK – Continued

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
"W" Series Truck				
Instrument Panel				
Tachometer	1	3 cp	1816	FEY-15021-A
Speedometer	1	3 cp	1816	FEY-15021-A
Indicator Gauges	6	2 cp	1895	C3AB-13466-B
Parcel Delivery				
Instrument Panel Hi-Beam Indicator	1	2 cp	1895	C3AB-13466-B
Turn Signal Indicator	2	2 cp	1895	C3AB-13466-B
Gen. Illumination	3	2 cp	1895	C3AB-13466-B

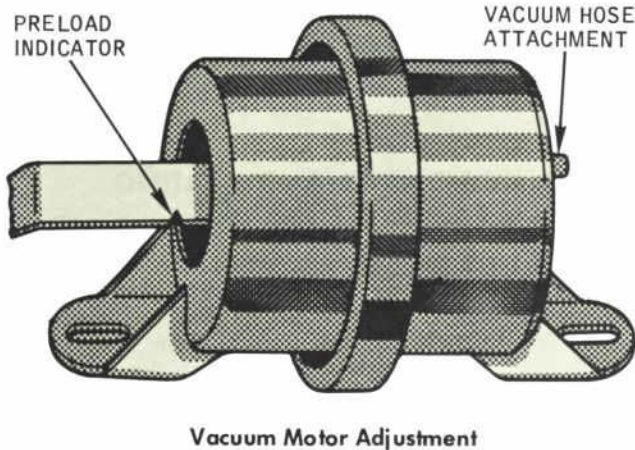
BULB USAGE CHART – BRONCO

Lamp Description	Number of Bulbs Required	Candlepower or Wattage	Trade Number	Ford Part Number
Standard Equipment				
Headlamps – 7"	2	50 & 40 watts	6012	C4DB-13007-A
Front Park & Turn Signal	2	4-32 cp	1157A	C3AB-13465-A
Rear Tail/Stop/Turn Signal	2	4-32 cp	1157	C3AB-15198-A
License Plate Lamp	1	4 cp	1178	C5TB-13465-A
Map Lamp	1	6 cp	631	C3VB-13730-A
Back-Up Lamp	2	32 cp	1156	C3DB-13465-A
Instrument Panel				
Hi-Beam Indicator	1	2 cp	1895	C3AB-13466-B
Turn Signal Indicator	2	2 cp	1895	C3AB-13466-B
Instruments	3	2 cp	1895	C3AB-13466-B
Optional Equipment				
Radio Pilot Light	1	2 cp	1895	C3AB-13466-B
Warning – Brakes	1	2 cp	1895	C3AB-13466-B
Engine Compt. Lamp – Models, 96-98	1	6 cp	631	C3AB-13730-A
Portable Trunk Lamp – Models, 96-98	1	15 cp	1003	FDU-13730-A
Courtesy Lamp (RPO)	1	6 cp	631	C3VB-13730-A
Seat Belt Warning	1	2 cp	1895	C3AB-13466-A



FORD CAR AND TRUCK

CAR



HEATING AND VENTILATION SYSTEM — FORD

Vacuum Motor Adjustment

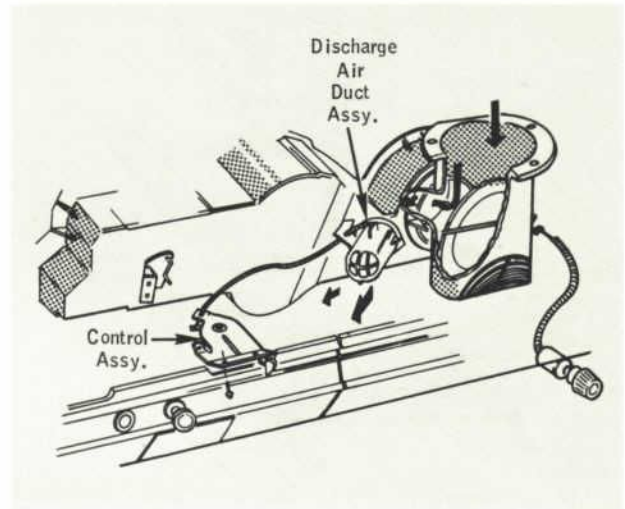
Vacuum motors (actuators) used to operate any of the air doors in the Ford heating and ventilating systems should be adjusted so the return spring in the motor is preloaded slightly by the link when no vacuum is applied. To adjust a vacuum motor, loosen the attaching screws or nuts just enough to allow the motor to be moved. Then slide the motor so that the preload indicator notch in the link is flush with the motor body when the air door is in its normal position and no vacuum is applied, and tighten the screws or nuts.

Heater Blower Motor Access

On the '68 Ford, you won't need to remove the hood to gain access to the heater motor. Just remove the right front wheel and take the retaining bolts out of the fender apron so you can pull the apron down and block it out of the way. You'll also have to remove the starter solenoid and heater hose bracket from the apron, of course.

COMFORT STREAM VENTILATION — FAIRLANE

Comfort Stream ventilation is new for the 1968 Fairlane. Forced fresh air ventilation is provided by



Comfort Stream Ventilation — Fairlane

an additional discharge air duct on the heater plenum that distributes outside air to the front seat area from below the instrument panel. The three-speed heater blower is utilized for this system. The duct contains a damper, controlled by a lever on the instrument panel adjacent to the heater controls, which opens for Comfort Stream ventilation and closes for normal heater operations.

Adjustment

Adjust the Comfort Stream control cable with the damper in the "Off" position. You can make this adjustment at either end of the control cable.

REAR WINDOW DEFOGGER — ALL CAR LINES

All Ford Division car lines offer a rear window defogger, except in convertible and station wagon models. This device consists of a blower aimed at the inside of the rear window and controlled by a switch on the instrument panel. The Mustang 2+2 Fastback has a remote blower in the luggage compartment with ducting to the discharge openings. All other installations have the blower and plenum suspended below the package shelf.

Q 16-1 c) Pretty close . . . but still a miss! The vacuum motor for one of the doors does control blower speed, all right. But it's the vacuum motor that operates the temperature blend door and the power servo switch! This is the switch that controls the blower speed.

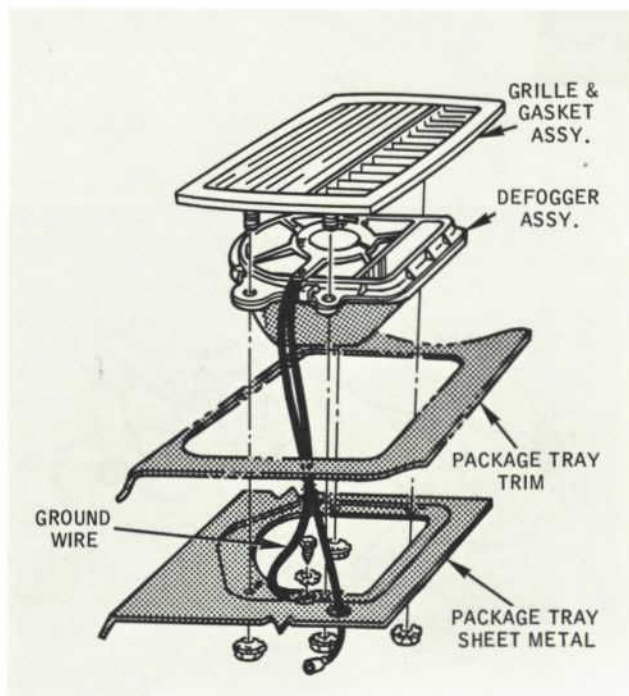
INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Service Tips

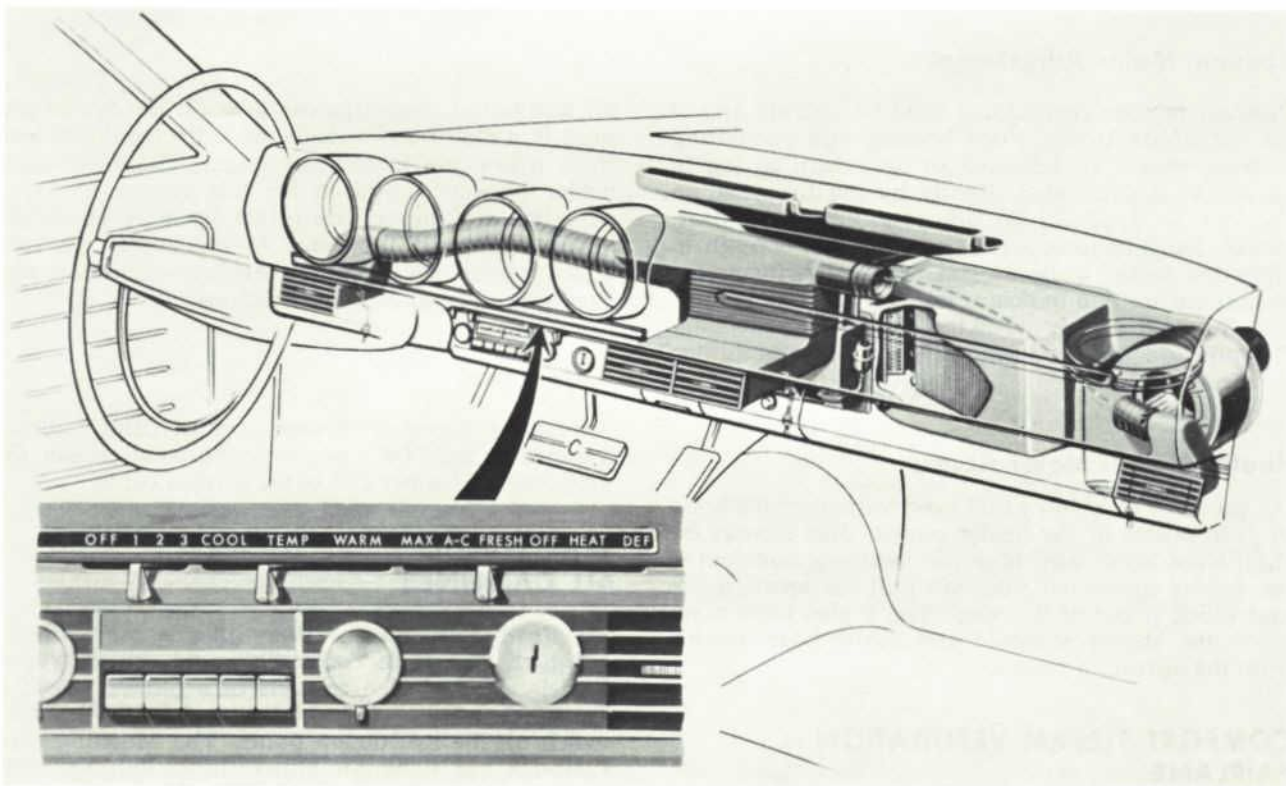
On the Mustang Fastback, you can disconnect the duct work and remove the blower for service from the luggage compartment. On all other installations, you can remove the motor mounting nuts and disconnect the motor wire from the luggage compartment. Then you'll need to get inside the car to remove the defogger assembly from the package shelf. Before you lift the unit all the way out, be sure to disconnect the ground wire.

AIR CONDITIONING AND HEATING SYSTEM — FAIRLANE

With the exception of new controls and a few other changes, the Fairlane air conditioning and heating system is basically the same as the unit used last year. You'll find the air conditioner thermostat switch and blower resistor located on the rear face of the evaporator case near the plenum chamber. The clutch switch is a vacuum actuated electrical switch on the water valve mounting plate. And the expansion valve no longer has a capillary tube — a diaphragm is used to sense the pressure and temperature of the refrigerant leaving the evaporator.



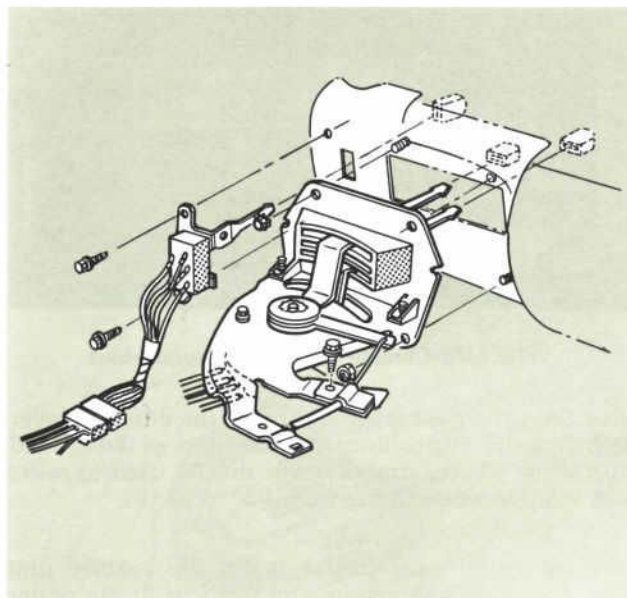
Rear Window Defogger — Typical



Air Conditioning and Heating System — Fairlane

Q 18-1 a) Right is right, as the saying goes! Only the *right* guide rod of the manually adjustable headrest can be adjusted horizontally . . . and that's the way you'll have to move it to eliminate a bind in the guide rods!

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Control Assembly Removed — Fairlane

Control Assembly Removal

1. Remove the three control knobs from the right instrument panel pod.
2. Remove the instrument panel pod as described in Group 17.
3. Remove the three control mounting nuts and the two blower switch mounting nuts from the rear of the instrument cluster.
4. Disconnect the control cable, the four vacuum hoses at the control assembly, and the multiple connector at the blower switch. Then remove the control assembly and blower switch.

After completing any required servicing of the control assembly or components, use the illustration of the control assembly as a guide to installation.

AIR CONDITIONER SERVICE TIPS — FORD

Testing

System Pressure Tests: Minimum pressure reading for the high pressure gauge when testing the air conditioning refrigeration system pressures is 120 psi. And if you get a low pressure reading above normal (above 50 psi, in other words) with the high pressure reading within limits (under 300 psi), check the heater water valve to be sure it is closed. Then operate the system on "Maximum Cooling" and be sure the outside air door is closed.

Thermostatic Switch Test: Here's a good test for proper operation of the thermostatic switch. It determines the ability of the switch to stop the current flow to the magnetic clutch when evaporator temperature drops to the point where heavy frosting of the fins could occur.

1. Fill a container with crushed ice and water. Add enough salt to cause the temperature of the solution to drop to 25°F. or lower.
2. Remove the thermostatic switch from the evaporator. If the switch is the adjustable type, set it for maximum cooling.
3. Use a self-powered test light or ohmmeter connected to the switch terminals to see if the switch is closed at room temperature.
4. Place the sensing tube in the ice water and salt solution. *Be sure no salt water gets into the control.* The switch contacts should open and remain open while the tube is in the solution.
5. Remove the sensing tube from the solution and hold it in your hand to warm it. As the tube warms up, the contacts should close. An ohmmeter check between the switch terminals should show a resistance of less than one ohm. If the control fails to operate as outlined, replace the switch.

Receiver-Drier Test: Operate the air conditioner for at least five minutes. Then run your hand along the length of the receiver-drier from one end to the other. You shouldn't be able to notice any difference in temperature in the unit. Cold spots indicate that the refrigerant flow is being restricted, and the receiver-drier should be replaced. Never try to "bake out" moisture from the unit with heat. This will only cause traces of refrigerant compressor oil that are present to coat the drying agent in the unit, destroying its effectiveness.

Servicing Recommendations

Refrigerant Service: When discharging the refrigeration system through the manifold gauge set, open both the high pressure service valve and the low pressure service valve just enough to allow the refrigerant to discharge slowly. Don't allow it to rush out or oil from the compressor will be forced out, too.

When charging the system, be sure you use only pure Refrigerant 12. Never attempt to use refrigerant that was canned for pressure-operated accessories such as boat air horns or collapsible spare tires. This fluid is not pure enough for air conditioner use and will cause a refrigeration system malfunction.

Compressor Oil Level Check: If you've had to draw out excess oil from the compressor, recheck the oil

Q 16-2 a) No . . . they're still in their '67 positions — right there on the steering wheel spoke! They're both used in the same way as in '67, too. Go ahead and try another answer — it's free!

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level after operating the system for five minutes. This second check is important — if there's too much oil in the system, all of it won't have returned to the compressor before you made your first check. And before you connect the compressor back into the system, evacuate the compressor at both the high pressure and low pressure service valve gauge ports.

Air Door Vacuum Motor Adjustment: The single-acting vacuum motors for air door actuation in the air conditioning system are adjusted in the same manner as the heater vacuum motors. This adjustment was described earlier in this group.

Heater Core and Heater Access: On the 1968 Ford, the best way to get to the heater core and heater hoses of the air conditioning unit for removal and installation is through the space made available after you've moved the right fender apron out of the way. This, too, has been described earlier in this group.

Expansion Valve Installation: When you install the expansion valve to the evaporator, clean the suction line and temperature sensing bulb clamp to assure a good contact before you slide the bulb in the clamp.

Thermostatic Switch Adjustment: After you install the spring clip that retains the control arm to an adjustable thermostatic switch, adjust the Bowden cable so the switch is at the maximum warm position when the control lever is still 1/8 inch from the full "Warm" position.

Temperature Regulator Control Valve, Heat Door Vacuum Motor and Blower Motor Resistor Locations: The temperature regulator control valve, the heat door vacuum motor and the blower motor resistor are mounted on top of the evaporator case in the engine compartment. Remove the plastic cover to gain access to any of these parts.

Compressor Crankshaft Seal: A secondary dust shield has been added to the compressor for 1968. After you remove the clutch and Woodruff key, remove this dust shield carefully to avoid marring the compressor shaft. Press the secondary dust shield, cupped portion toward the seal plate, on the shaft as far as possible with your fingers before you install the Woodruff key and clutch.

AUTOMATIC CLIMATE CONTROL — THUNDERBIRD

The new automatic climate control system used in the 1968 Thunderbird provides fully automatic control of the temperature, blower speed and excess humidity of discharge air from the combination air conditioner-heater of which it is an integral part. Only two instrument panel slide levers are used to



Automatic Climate Controls — Thunderbird

give the driver complete control of the unit — a lever with five detent positions for selection of the desired operating phase, and a lever that is used to select any interior temperature from 65° to 85°F.

The air conditioner-heater is an all-weather unit that provides a constant supply of fresh air under all conditions except when maximum cooling is necessary. It is a reheat type of unit in which the maximum amount of moisture is extracted from the air by the evaporator before heating to the desired temperature. Discharge temperature is controlled by an automatically regulated temperature blend door that divides air flow downstream from the evaporator, some to the heater core and some bypassing it, as necessary to provide the proper blend of warm and cold air.

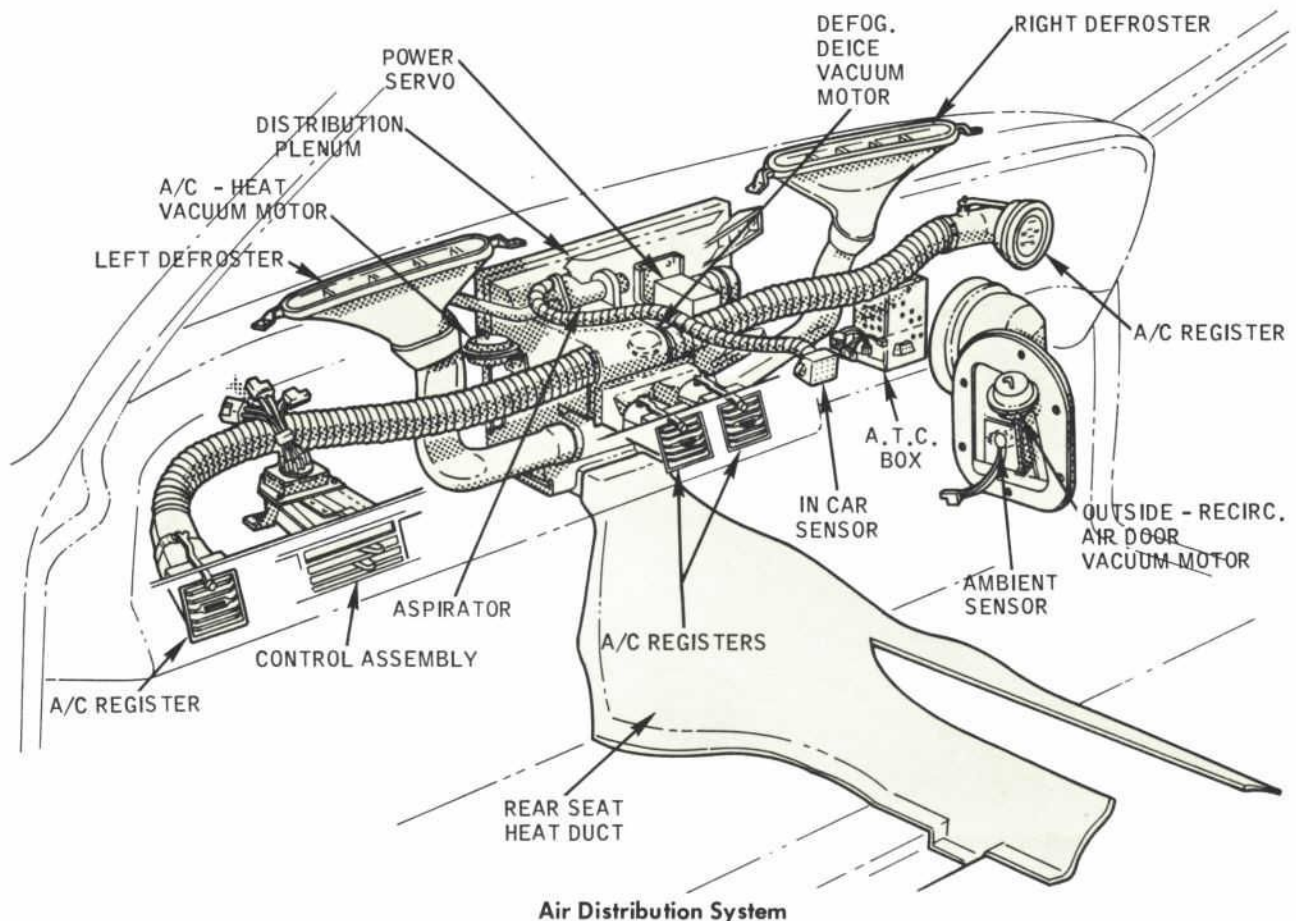
Controls

Operating Phase Selector: The slide lever in the instrument panel that gives the driver a selection of operating phases has five positions — "High," "Low," "Off," "Defog" and "Deice." The fastest blower speeds are provided with the lever set in the "High" position. Only when the unit is operating in the "High" position to lower the temperature of the car's interior — in other words, maximum air conditioner operation — the air supply for use in the unit is taken from inside the car for fast cooldown. Then, as interior temperature approaches the desired range, the unit automatically switches from recirculating to fresh air operation.

When "Low" is selected, blower speeds are reduced and no provision is made for recirculating air — all air used in the unit comes from the cowl grille vent. Blower speed is determined by the discrepancy between the setting of the temperature control lever and the actual interior temperature within the passenger compartment, modified slightly by the temperature of the air entering the unit. However, the blower will not operate to warm the car's interior until engine coolant temperature has reached at least 130°F.

Q 10-2 b) No, don't expect to find a limiter cap on the idle mixture adjusting screw of the Carter YF carburetor. Idle mixture richness is limited by an internal needle in the fuel passage, instead. You missed this one!

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Air Distribution System

When "Defog" is selected, blower speed and temperature are modulated automatically, the same as in "High." However, 40% of the discharge air flows to the defroster vents, and there is no delay in blower operation until the engine warms up.

For "Deice," the maximum heat and highest blower speed are supplied all the time — there is no modulation. 90% of the air discharged from the unit flows through the defroster vents. There is also no blower delay for coolant warm-up in this position.

"Off," of course, shuts the unit off entirely. It even halts the flow of coolant through the heater core.

Temperature Selector: The temperature selector slide lever operates a rheostat that sends an electrical signal to the automatic climate control box. On its way to the control box, the temperature signal from the rheostat is modulated by two temperature-sensitive thermistors — devices in which the electrical resistance varies according to the temperature to which the thermistor is exposed.

One of these thermistors, the in-car sensor, senses the temperature of the air within the car, while the

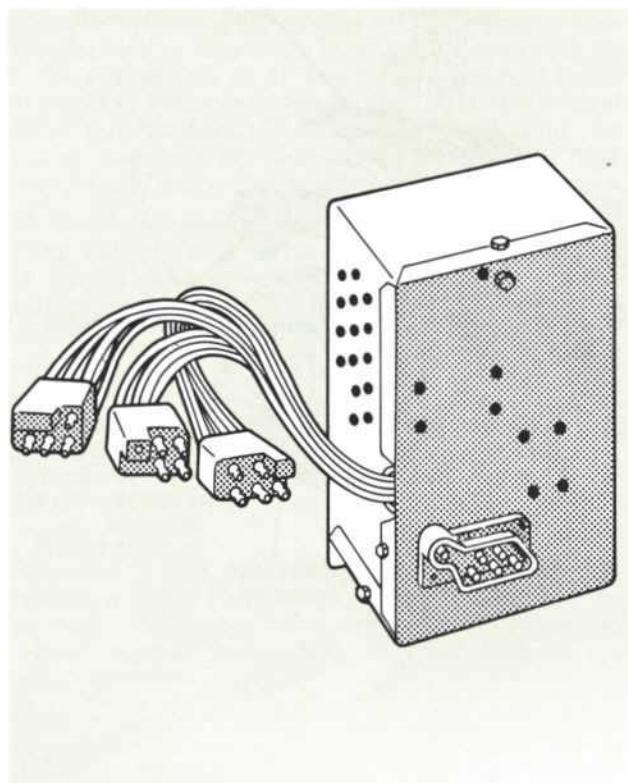
other thermistor, the ambient sensor, senses the temperature of the air just before it enters the blower. The in-car sensor exercises primary control over the final temperature signal, with the ambient sensor modifying it slightly.

Within the automatic climate control box, other signals — both electrical and vacuum — are generated. These signals operate the various airflow directional doors and other units that operate the air conditioner-heater. The temperature blend door, which can be positioned to either extreme to route all blower discharge air either through the heater core or past it, or any position in between, is operated by the power servo switch assembly. This is a vacuum actuated unit with a rotary electrical switch (a potentiometer) that sends a signal back to the control box, advising it of the position of the temperature blend door. This signal is used by the control box in determining whether heating or air conditioning operation is needed.

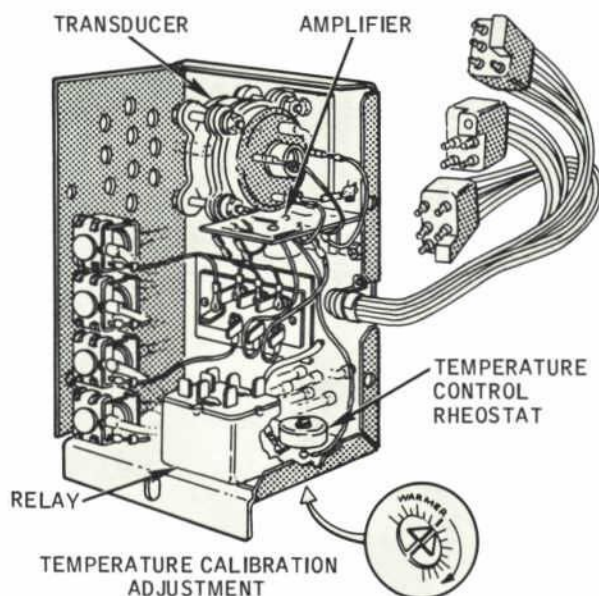
Naturally, there are other components involved in the complete control system, but they will be briefly described later.

Q 8-1 b) Fine! You got it! Use only the preferred procedure of tightening the stud nut 3/4-turn beyond the point where you've eliminated all clearance between the push rod and the rocker arm. The full procedure is in this handbook.

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Automatic Climate Control Box

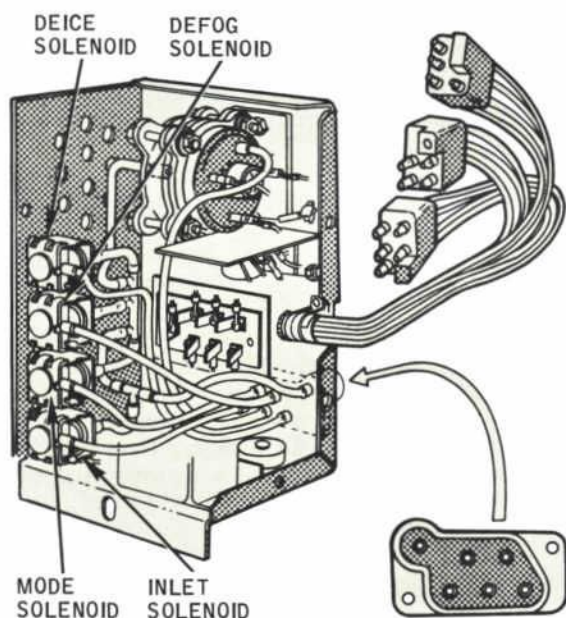


Automatic Climate Control Box Electrical Systems

Functional Check-Out of Automatic Climate Control System

Here's a fairly simple test of the entire automatic climate control system that should be an excellent starting point for diagnosing service problems. And you would be wise to use it as a part of your new car "prep" procedure, too!

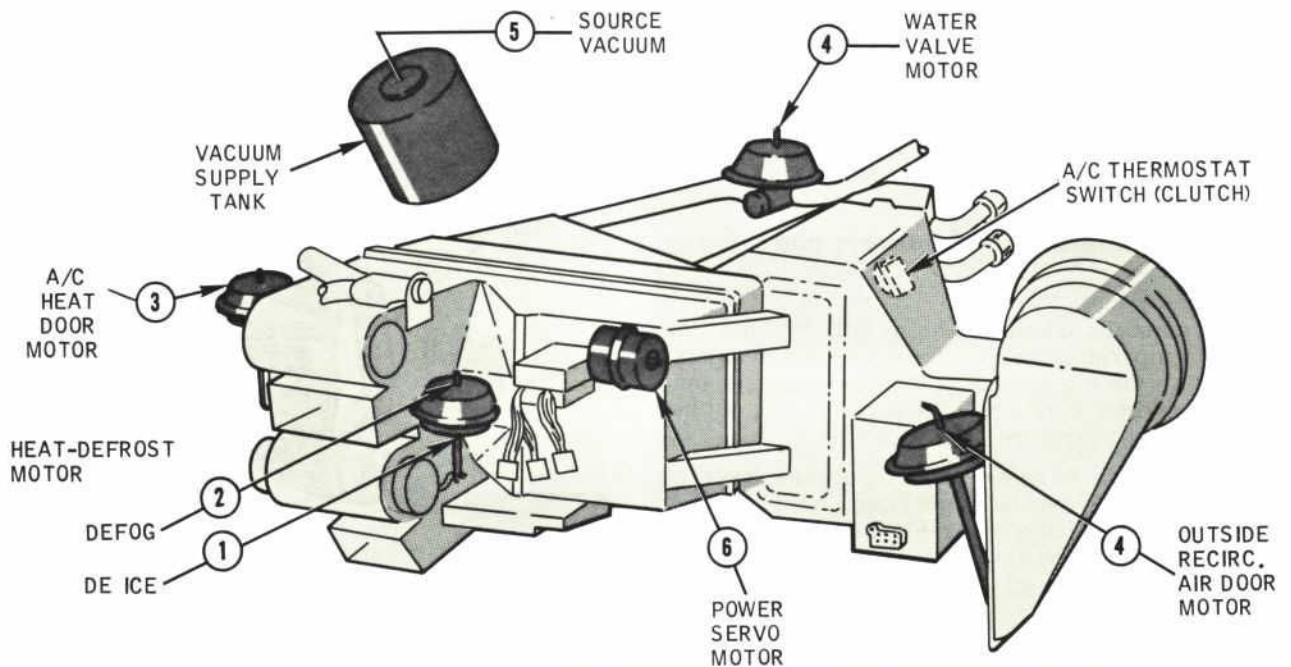
1. Place the selector lever in the "Off" position and start the engine. Check to be sure the blower is off and the right cowl damper door is open to the interior of the car.
2. Set the temperature lever to 65°F. and put the selector lever in "Deice." Keep the controls this way until the engine warms up (190°F.). During this time, make sure the blower is on high speed and hot air is coming from both defroster outlets. You should also be able to feel a slight flow of air from the low-level heater outlets. See if the right cowl damper door is closed — in the fresh air position.
3. When the temperature inside the car is 75°F. or above, move the selector lever to "High." Momentarily, there should be a high speed discharge of air from the outlets, but it should drop off rapidly. Then the airflow should change to the air conditioning outlets and the air should get cooler. The blower speed should also increase and the right cowl damper door should open to the recirculating position as the air conditioner cuts in.



Automatic Climate Control Box Vacuum Systems

Q 8-2 a) No, sir! Although the design of many components of the Thunderjet 429 resemble those of the 289 V-8, the intake manifold bolt patterns and tightening sequences *are far different*. Stick to the illustrated sequence and avoid problems.

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VACUUM LINE COLOR CODE AND NUMBER		HIGH AUTOMATIC	LOW AUTOMATIC	OFF	DEFOG	DE-ICE
Yellow	1	Vac	Vac	Vent	Vent	Vent
Red	2	Vac	Vac	Vent	Vac	Vent
Tan	3 *	Vent Vac	Vent Vac	Vent	Vent	Vent
Brown	4 *	Vent Vac	Vent	Vac	Vent	Vent
Black	5	Source Vacuum				
White	6	Transducer Vacuum				Vent
A/C Thermostat Switch (Clutch)		Clutch On		Clutch Off	Clutch On	

* Depends upon mode of operation selected by control system.

Q 6-1 a) No, it isn't! A split-type snap ring holds the third-speed gear in place, but the second-speed gear thrust washer is retained another way. See if you can find the answer in the procedures.

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4. Move the selector lever to "Low." Immediately, there should be a drop in air flow and the right cowl damper door should move to the fresh air position. You'll also notice a lessening of noise from the unit.
5. Finally, move the selector lever to "Defog." You should get a high blower speed, with about the same amount of airflow from the defroster outlets and heater outlets (actually, it's a 40-60% distribution). Discharge air temperature should stay cool.

Functional Check - Out of Sensors and Rheostat

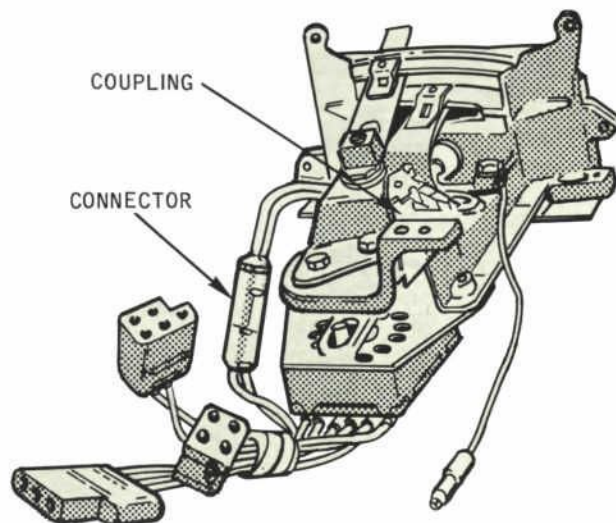
If the automatic climate control fails to hold the desired temperature or you have any other reason to question the functioning of the temperature signal sending devices, here's a quick way to check out the sensors and temperature lever rheostat.

With the engine running, the temperature lever at 75°F. and the selector lever in "High," hold a lighted match in front of the aspirator inlet to the in-car sensor at the instrument panel. Within 15 seconds, the system should go to high blower air conditioning.

If the system fails to react to this test, you'll have to test the sensors and rheostat separately. Follow this procedure.

1. With the interior of the car at 70° to 80°F., set the temperature lever at 75°F. and disconnect the battery.
2. Disconnect the red wiring at the automatic climate control box and connect an ohmmeter between the green wire and a ground. The resistance should be between 1200 and 1300 ohms at 70° to 80°F. if the sensors and rheostat are okay.
3. To see if the rheostat is faulty, take a reading with the ohmmeter hooked up as in step 2 and the temperature lever set at 85°F. Then take another reading with the lever set to 65°F. If the difference between the two readings is between 400 and 500 ohms, the rheostat is functioning correctly. (However, it may need adjustment, which will be described later.)
4. To test the ambient sensor, remove the connector and connect your ohmmeter across the two terminals. The reading should be between 165 and 185 ohms at 70° to 80°F.
5. Test the in-car sensor only after you're sure the rheostat is good. Connect the ohmmeter between the terminal on the sensor for the blue wire and

a suitable ground. Set the temperature lever to 65°F and read the meter. It should indicate between 750 and 900 ohms.



Temperature Lever and Rheostat Adjustment Points

Temperature Lever and Rheostat Adjustment

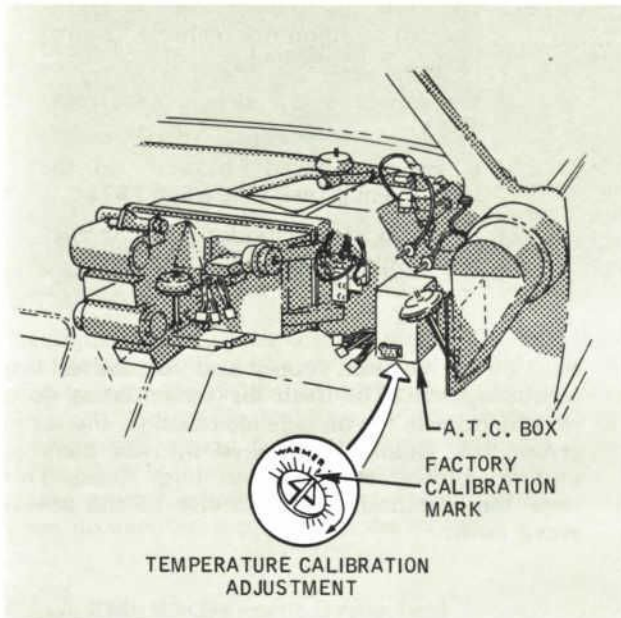
A temperature calibration control is provided at the bottom of the automatic climate control box. This control, which is preset at the factory, gives you a means of making minor adjustments to discharge air temperature to suit the owner's particular requirements. However, before you alter the original setting of the temperature calibration control, it's advisable to assure yourself that the temperature selector rheostat and lever at the instrument panel are properly adjusted to give the full range of control they are capable of providing. Here's how to check and adjust the lever and rheostat.

1. Loosen the coupling between the temperature lever and rheostat shaft. Set the lever to the 75°F. position.
2. Disconnect the two-wire connector to the rheostat from the wiring harness. Connect an ohmmeter between the terminals for the black wire and the white wire at the connector.
3. Without moving the temperature lever, turn the rheostat shaft until you get an ohmmeter reading of 268 ohms. Tighten the coupling between the lever and shaft. Recheck your adjustment —

Q 16-3 a) You're on the ball! If the speed control "hunts" or won't lock in, or if the car continues to accelerate slowly with the speed control engaged, it's a pretty safe bet that the regulator is acting up.

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268 ohms at 75°F. lever setting — to be sure nothing slipped when you tightened the coupler.



Temperature Calibration Control Adjustment

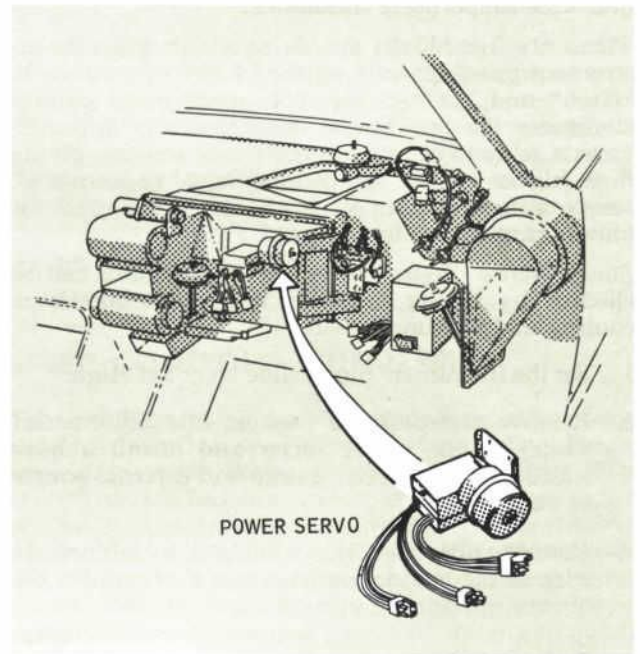
Temperature Calibration Control Adjustment

The automatic climate control box mounted in front of the dash panel near the glove box has an adjustable temperature calibration control which provides about 30° of adjustment. This control consists of an indicator and dial in the bottom of the box, preset at the factory to the center of the adjustment range. If necessary, the setting can be altered to suit an owner's individual preferences.

Before you change the temperature calibration control setting, make sure the temperature lever and rheostat are properly adjusted. Use the procedure given earlier. And if any other part of the automatic climate control system is not functioning properly, never attempt to compensate for it by adjusting this calibration control — instead, correct the source of the problem.

Control Adjustment: Mark the original control setting before adjustment. If the owner has complained that the car is too cold for a given temperature lever setting, rotate the dial clockwise, in the direction of the "warmer" arrow. If the car is too warm, rotate the dial in the other direction. Each calibration division is roughly equal to a 2° change in temperature.

Control Adjustment After Service: With the engine running, set the slide levers to "75°F." and "High." While you're waiting for the temperature within the car to stabilize, tape an accurate thermometer to the instrument panel pad adjacent to the aspirator inlet, and take the car out on the road. At about 40 miles an hour and with the internal temperature stabilized, the thermometer should read 80°F. for a 75°F. lever setting. The system is designed for this initial calibration. If your test indicates a need for further temperature calibration adjustment, repeat this test after making the adjustment.



Power Servo Location

Power Servo Switch Tests and Adjustment

Power Servo Operation: The power servo switch works in conjunction with the automatic temperature control box to provide control over temperature. Electrical temperature signals from the control lever rheostat and two sensors are received by the control box, where they are amplified and transmitted to a transducer in the box. The transducer operates a valve which meters vacuum to the power servo switch at the temperature blend door, and the strength of the vacuum determines the position of the door. A strong vacuum will call for less heat, and a weak vacuum (or no vacuum) will call for increased heat.

A potentiometer in the power servo unit sends an electrical signal back to the amplifier in the control

Q 17-4 c) Definitely not! You don't need to do anything to the defroster ducts — just remove the nut at the forward edge of the pad through the glove box opening and turn out the screws around the edges of the pad. You're home free!

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box, reflecting the position of the temperature blend door. This signal is used to determine when to switch from heater operation to air conditioning, or vice versa.

Blower Speed Control: The power servo switch also controls the electrical circuit to the blower motor, routing the circuit through resistors to slow blower speed when the door is near a position which indicates that discharge air temperature is close to the desired setting. As the door moves farther from this position, the resistors are bypassed one at a time by the power servo switch to step up blower speed and increase air circulation for faster response to undesirable temperature conditions.

There are five blower speeds available when the instrument panel lever is set for "Low" operation. In "High" and "Defog," the instrument panel control eliminates the two lowest speed resistors and activates a relay to cut out an additional resistor, giving three higher blower speeds. In "Deice," of course, all resistors are eliminated from the circuit and the blower runs at maximum speed.

Power Servo Tests: Power servo operation can be checked by testing its ability to provide maximum cooling and maximum heat.

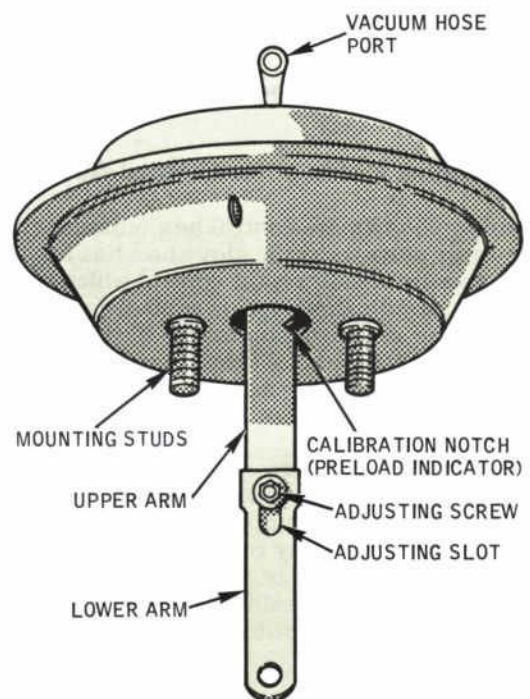
1. Set the instrument panel slide lever to "High."
2. Remove and plug the vacuum line (color coded white) at the power servo and install a hose leading to a vacuum gauge and external source of vacuum.
3. Connect one lead of a voltmeter to the orange wire in the engine compartment that supplies the blower motor, and ground the other lead.
4. Start the engine.
5. Admit vacuum (at least 12 inches of mercury) to the power servo. The fresh air-recirculating door should go to the recirculating position — open to the interior of the car. The link between the power servo crank and the temperature door should be pulled out of the plenum. The blower should go to high speed immediately.
6. Check the voltmeter reading. It should be between 10 and 12 volts.
7. Slowly and carefully reduce the vacuum to the power servo until the blower speed changes. Blower motor voltage should drop about 1 1/2 volts, within the limits of 8 1/2 to 10 1/2 volts.
8. Again reduce vacuum carefully until blower speed changes. Check for another 1 1/2 volt drop in the circuit, within the range of 7 to 9 volts. This completes the maximum cooling portion of your test.

Quick-Quiz

Q 16-1 In "Low," the blower speed of Thunderbird's automatic climate control system is controlled by:

- a) the power servo switch. (See page 154)
- b) a switch marked "blower" on the instrument panel. (See page 157)
- c) the fresh air-recirculating door vacuum motor. (See page 169)

9. Shut off the vacuum supply and vent the test line to atmosphere. The fresh air-recirculating door should close to the outside air position, the servo crank link should be pushed into the plenum, and the blower should to to high speed. This tests the maximum heat ability of the power servo switch.



ADJUSTMENT

1. LOOSEN ADJUSTING SCREW.
2. HOLD AIR DOOR IN ITS NORMAL POSITION WITH NO VACUUM APPLIED.
3. MOVE THE UPPER ARM UNTIL THE PRELOAD INDICATOR IS FLUSH WITH THE MOTOR BODY.
4. TIGHTEN ADJUSTING SCREW.

Vacuum Motor Adjustment Points

Q 9-3 c) You're 'way off base! Using a screwdriver to set the ignition switch in the different positions required for continuity tests is an open invitation to trouble. Use a lock cylinder and key for this job.

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Power Servo Adjustment: If either extreme of travel of the link between the power servo crank and the temperature door is restricted, loosen the three power servo mounting screws and push the servo firmly toward the dash panel, applying at least two pounds of force to the link on the door. Holding the servo in this position, tighten the three screws.

Vacuum Motor Adjustment

Vacuum motors that control the air conditioning-heat door and the fresh air-recirculating door are two-position actuators. The vacuum motor for the defroster door is a three-position actuator which can not be adjusted.

To adjust either the air conditioning-heat door vacuum motor or the fresh air-recirculating door vacuum motor, loosen the adjusting screw in the two-piece actuating shaft. Hold the air door in its normal position and adjust the shaft so the indicator notch in the shaft is flush with the motor body. Then tighten the adjusting screw. Perform this adjustment only when no vacuum is applied to the motor.

Blower Motor Current Draw Test

Connect a 0-50 amp ammeter between the positive post of the battery and the orange blower motor supply wire in the engine compartment. The motor should operate, and its current draw should be between 12 and 23 amperes.

High Range Relay Test

When "High" operation is selected, the high range relay on the right fender apron bypasses resistors in the blower motor circuits to give faster blower speeds. If blower speed doesn't drop with a switch from "High" to "Low" operation when conditions call for high blower speeds, the relay may not be functioning properly. To check this, set the temperature control lever to the extreme that will call for the greatest change in interior temperature, and switch from "High" to "Low" with the engine running. Blower speed should drop noticeably.

Water Control Valve Test

The heater water flow valve halts the flow of coolant through the heater core when maximum air conditioning with recirculated air is called for. It also cuts off flow when the lever is moved to "Off." To test the valve, set the controls for "Low" and "85°F." and run the engine until it's warmed up. (If necessary, first lower the car's interior temperature as much as possible with the air conditioning.) Warm air should

be discharged from the heater ducts. If the air isn't warm, remove the vacuum line from the valve and see if vacuum is present. If there's vacuum in the line, the valve is defective. If no vacuum is present, the trouble is in the vacuum system.

Component Removal Tips

Before removing the heater core, you'll have to remove the hood, carburetor air cleaner and the transmission dipstick tube. Only the dipstick tube must be removed to remove the icing control switch for the air conditioner evaporator.

Items accessible from inside the car include the power servo unit, the automatic climate control box and the in-car sensor. To remove the power servo unit or the control box, first remove the glove box and disconnect the right-hand defroster duct and register duct. To remove the in-car sensor, first remove the glove box and then disconnect the right-hand register duct and move it away from the sensor.

SPEED CONTROL — THUNDERBIRD

The speed control in the 1968 Thunderbird has been changed from last year's unit. However, the driver's controls provide the same operating features. The On/Off switch has been relocated to the lower edge of the instrument panel to the left of the steering wheel. The Set Speed and Resume/Retard switches remain in the same positions in the steering wheel spoke. And the brake stoplight switch is actuated to cancel the speed control whenever the brake pedal is depressed.

Mainly, the changes are internal or involve relocation of certain components. Five relays — the on/off relay, the anti retard relay, the brake release relay, the retard disconnect relay and the stoplight relay — are mounted on the regulator mounting bracket. The retard solenoid valve is mounted directly on the brake booster. And there is a horn relay included in the electrical system of cars having the speed control, but this relay has no control over the speed control system.

In the regulator assembly, the most notable change is the use of a flyweight governor to sense car speed. The speed regulator valve magnetically couples the governor to the modulating air valve to meter atmospheric air pressure for blending with manifold vacuum. Except for the substitution of flyweights for the copper and magnetic discs of the previous unit.

Q 17-3 c) Right! The rolling door lock feature is *not* used with the vacuum door lock systems in '68. There are some other changes, too — changes that make the system simpler and easier to work on.

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On/Off Switch Test

Disconnect switch from circuit. Connect a self-powered test light across the connector outside terminals. The light should glow. Now push the switch to the "OFF" position, the light should go out. Move one end of the test light to the center terminal. The light should not glow. Now push the switch to the "ON" position and the light should glow.

On/Off Relay Test

Disconnect the relay from the circuit. Perform a continuity test by connecting a self-powered test light across the two connectors. This being a normally open relay, the light should not glow.

To perform an operation test, connect a test light to the terminal in the middle of the connector. Apply a 12-volt supply lead to the other connector. (Be sure relay is properly grounded.) This should energize the relay coil, close the normally open points and the test light should glow.

Brake Release Relay and Retard Disconnect Relay Test

Disconnect the relay from the circuit. Connect a self-powered test light across the two female connectors. Since this is a normally closed relay, the light should glow. Apply a 12-volt lead to the relay male terminal. (Be sure relay is properly grounded.) This should energize the relay coil, open the contact points and the light should go out.

Set Speed Switch Test

Remove switch from the steering wheel and disconnect from circuit. Connect a self-powered test light across one of the center terminals and one of the outside terminals, the light should not glow. Hold the button down and the light should glow. Repeat test between center terminal and other outside terminal.

Resume/Retard Switch Test

Remove switch from the steering wheel and disconnect from circuit. Connect a self-powered test light between the left and center terminal, the light should not glow. Hold down Resume portion of switch, light should glow. Move test light from left to right connector. Light should not glow. Hold Retard portion of switch down, light should glow.

Slip Rings and Brushes Test

Remove the switches from the steering wheel and disconnect from circuit. Disconnect connector E at lower

Quick-Quiz

Q 16-2 Changes in the Thunderbird speed control for '68 include:

- a) relocating the set/speed and resume/retard switches. (See page 171)
- b) elimination of the retard solenoid valve. (See page 91)
- c) the use of a flyweight governor to sense car speed. (See page 83)

end of steering column. Using a self-powered test light check for continuity from the connectors in the steering wheel through the slip rings and brushes to connector P at the lower end of the steering column. The light should glow in each test. If the light does not glow, remove the steering wheel and repair or replace slip rings or brushes.

Anti-Retard Relay Test

Disconnect the relay from the circuit. Connect a self-powered test light across the two center connectors. Since this is a normally closed relay, the light should glow. Apply a 12-volt lead to the connector end female terminal. (Be sure relay is properly grounded.) This should energize the relay coil, open the contact points and the light should go out.

Place the test light across the male and adjacent female connector. The light should not glow, since this is a normally open switch. Apply power to the end female terminal. The test lamp should light.

Brake Retard Relay Test

Disconnect wiring connectors from valve. Ground one of the terminals. Start the engine to provide vacuum to the brake booster. Observe brake pedal when 12-volt supply is connected to other terminals on brake retard valve. Pedal should go down as the booster applies the brake lightly. If the pedal does not go down, the valve is not working.

Simulated Road Test

The road test may be simulated by raising the vehicle on a hoist enough to have the rear wheels clear the floor. Remove the vacuum hose from the servo, install a vacuum gauge so that it can be read from the driver's seat.

Start engine, place transmission into Drive and raise speed over 30 mph. System is now ready to test.

Q 15-3 a) You're right . . . and that's a big time-saver when it's time to install those wires. You just thread the bonded assembly down through the upper flange of the steering column — no taping together of separate wires to keep from getting 'em confused.

Vacuum Test

Remove vacuum source hose at the regulator. Install vacuum gauge in the hose and start engine. Readings should be the same as engine vacuum.

Replace hose on the regulator. Remove regulator to servo vacuum hose at the regulator.

Simulate road test. Attach a vacuum hose to the regulator. Install a vacuum gauge in the hose. Increase speed to 40 mph. Press Set/Speed button.

Vacuum reading on gauge indicates system is engaged. No reading indicates system is not engaged.

Servo Test

Disconnect servo vacuum hose at the regulator. Collapse servo and seal end of hose. If servo remains collapsed, servo and hose do not have a leak. If servo expands, there is a leak in the servo or hose.

Servo Adjustment

Adjust the ball chain to maintain a 1/2 to 1 ball link slack with the engine at hot idle.

Regulator Test

1. Disconnect the regulator from the wiring harness. This isolates the regulator from any other electrical components which may be faulty.
2. Check the case of the regulator for a good ground. Connect a 12-volt test light from battery (+) power to the regulator case. If the light glows brightly, the case is well grounded. If the light glows dimly or does not glow, the ground is poor. Repair the ground.
3. With the regulator case properly grounded and the vehicle prepared for the simulated road test, apply battery (+) power to the connector white wire terminal.

The vacuum control valve should open and the gauge should indicate vacuum. If no vacuum is indicated, replace the regulator.

If vacuum was indicated on the gauge, reduce the speed below 20 mph. The inhibit switch should open. The vacuum control valve should close and the gauge should indicate no vacuum.

4. Increase speed to 35 mph. Apply battery (+) power to the connector white wire terminal. Apply battery (+) power to the connector yellow wire terminal. Remove power from the white wire terminal. No change should occur in the vacuum reading. If there is any change in the vacuum gauge reading, replace the regulator.

5. Vary the vehicle speed between 30 and 40 mph. Note the vacuum reading. As the speed is increased, the vacuum should drop. As the speed is decreased, the vacuum should increase. If the vacuum does not vary as the speed is increased and decreased, replace the regulator.
6. With the speed held steady at 35 mph, apply battery (+) power to the connector red wire terminal. The vacuum should show an increase. Remove the power from the red wire terminal. Vacuum should drop. If the vacuum does not change, replace the regulator.

The regulator that passes these tests is okay.

SPEED CONTROL – FORD, MUSTANG

Ford and Mustang speed control units are new for 1968. Both speed controls are similar in design, so they will be treated as a unit here. In operation, these units can best be compared with last year's Mustang speed control, with which they share many functional features.

Operation

These new speed controls have flyweights in the regulator assembly to sense car speed and operate controlling components. However, the operation of the solenoids and valves is slightly different. The advance solenoid coil, for instance, is not energized until the set speed button is depressed to the first detent at speeds above 30 mph — and when the solenoid is energized, it closes the valve to block air from entering the regulator. At the same time, the vacuum solenoid valve is energized to open it and admit intake manifold vacuum to the regulator. This vacuum is transmitted to the bellows servo, where it increases throttle opening.

When the set speed button is released at the desired road speed, the advance solenoid is de-energized. This permits air to enter the regulator. But the vacuum solenoid valve remains energized, thanks to a holding circuit that is supplied with electrical power whenever the speed control is turned on.

The holding circuit also supplies current to the coupling coil, or clutch. But this coupling coil circuit is routed through the advance solenoid in such a way that the circuit is completed to ground only when the advance solenoid valve is de-energized and open. And this, of course, occurs when the set-speed button is released. When the coupling coil is energized in this manner, it locks the governor to the orifice metering valve. Then the metering valve allows just enough air to enter the bellows to equalize vacuum and stabilize the car's speed at the desired setting.

Q 15-4 a) Definitely not! Fairlane and Falcon instrument cluster designs are brand-new for '68 with flexible printed circuits. Not only that, they're much easier to get to for service than they've ever been before. Just remove the panel pad.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Instrument Panel Switch Test

1. Turn the ignition switch to the accessory position.
2. Pull out on the switch knob. The knob should stay in the out position.
3. If the knob does not stay in the out position, check for voltage between the voltage supply connector (green wire) and ground with a test light or voltmeter.
4. If there was voltage at the supply connector, and the knob does not stay in the out position, the switch is defective. Replace it.

Turn Signal Lever Set Speed Switch Test

1. Disconnect the set speed switch connector (three-wire connector at the base of the steering column).
2. With the switch in the normal out position, check for continuity between the connector terminals with the ohmmeter of a self-powered test light. There should be continuity between the center terminal of the connector and the violet wire terminal. There should be no continuity between the two outer terminals.
3. Depress the switch to the first detent. There should be no continuity between the center terminal of the connector and the violet wire terminal. There should be continuity between the two outer terminals.
4. Depress the switch all the way. There should be no continuity between any of the terminals.

Brake Release Relay Test

1. Disconnect the brake release relay at the quick disconnect. The relay is mounted on the speed control regulator bracket in the engine compartment.
2. Connect an ohmmeter or self-powered test light between the black orange wire relay terminal and ground. There should be continuity. If there is no continuity, the relay is defective.
3. Connect the blue-white wire relay terminal to the battery positive terminal with a jumper wire. The relay should click, and there should be no continuity between the black-orange wire terminal and ground. If the relay does not fulfill these conditions, it is defective.

Quick-Quiz

Q 16-3 If the Mustang speed control "hunts" during road testing, it's an indication:

- a) of a faulty regulator assembly. (See page 176)
- b) that the speed control is working properly. (See page 194)
- c) of a short circuit in the set/speed switch. (See page 185)

Regulator Assembly Road Test

After checking both connections of the vacuum hose to the regulator assembly, visually inspecting the regulator assembly housing for cracks, loose cover screws, excessive dirt and other defects, and making sure that all electrical connections in the system are good, road test the speed control as follows:

1. Start the engine and pull the on/off switch to the "ON" position.
2. Accelerate the car to 35 mph and push the set speed button to the first detent. The speed control system should control the speed.
3. Push the set speed button all the way in. The car should slow down.
4. When the speed slows to 30 mph, release the set speed button slowly. The speed control unit should control the speed at about 30 mph.
5. Depress the brake pedal. The speed control system should be cancelled.

Failure of the speed control regulator is usually indicated if the speed control will not lock in at any speed when all other system components are in good condition, or if the car continues to accelerate slowly or "hunts" above and below the set speed. If further testing is needed, continue with the following tests.

Regulator Assembly Electrical Tests

1. Disconnect the regulator assembly electrical connector and connect jumper wires from the regulator side of the harness connector to its mating half of the connector.
2. Start the engine and remove the manifold vacuum supply line from the regulator assembly. Check for sufficient vacuum at the regulator assembly. If OK, connect the hose to the regulator assembly.

Q 9-1 b) Bullseye! The centrifugal advance mechanism in the distributor provides a basic spark advance in relation to engine speed, and this advance is increased or decreased by the actions of the two diaphragms.

A PRELIMINARY SHOP MANUAL

3. Depress the set speed switch button to the first detent. Check for voltage with a test light between ground and the violet and the white wires. The test light should glow for both voltage checks. If the test light does not glow, check the set speed and on/off switches.
4. Depress the set speed switch button all the way (second detent). Check for voltage with a test light between ground and the violet and the white wires. The test light should not glow for either voltage check. If the test light glows, check the set speed switch in the turn signal lever.
5. Check the black-orange stripe wire for continuity to ground with an ohmmeter or a self-powered test light. There should be continuity to ground. If there is no continuity to ground, check the brake release relay.
6. Turn the ignition switch off and disconnect the jumper wires from the regulator assembly connector and the mating half of the connector.

If any defect is noted in the previous test procedure, the regulator must be replaced. After installing a new regulator assembly, check it for proper operation by performing the preceding road test and checks.

Servo Assembly Test

1. Check the servo assembly for binding linkage and loose vacuum hose. Check the linkage for proper adjustment.
2. Disconnect the servo vacuum hose at the speed control regulator. Compress the servo bellows,

hold your thumb over the end of the vacuum hose, and observe the servo assembly. The bellows should not expand.

3. If the bellows do expand, check the bellows hose for leaks. If the hose is in good condition, the servo assembly has a leak.

Brake Stoplight Switch Test

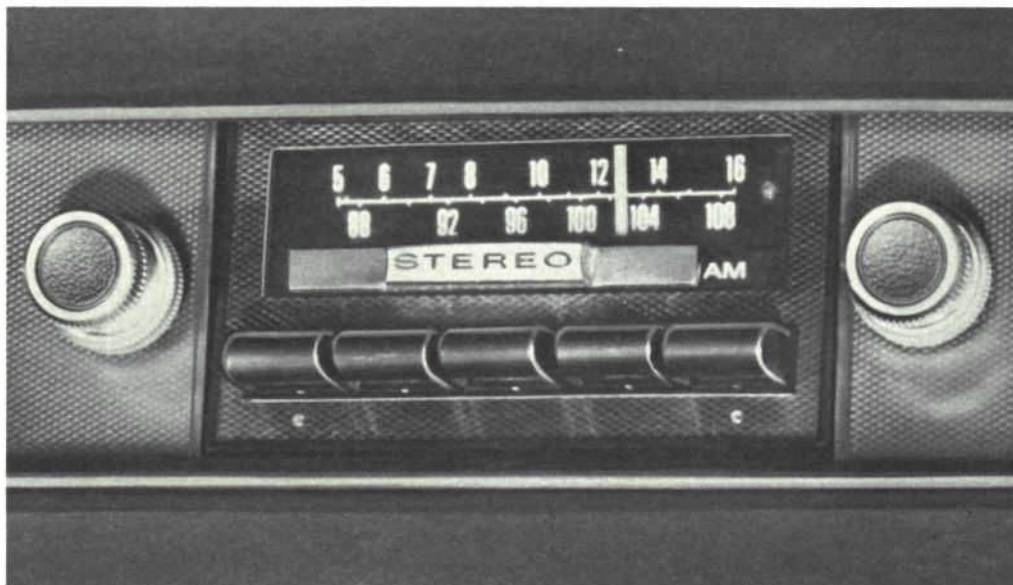
1. Disconnect the stoplight switch connector at the switch.
2. Connect an ohmmeter or self-powered test light to the two switch terminals.
3. Depress the brake pedal. The switch should show continuity. If it does not, it is defective.

RADIOS — ALL CAR LINES

There is a new line up of radios for '68, giving a choice of push button AM radios, push button AM radios with stereo tape players, or AM/FM stereo radios with "5 by 10" push buttons that can be tuned to five AM stations and five FM stations.

Stereo FM broadcasts will be reproduced with full stereo sound.

Generally, you'll be on familiar ground with all these new radios. There is one feature, however, that deserves explanation. The AM/FM stereo radios have a conventional array of five push buttons, but contrary to previous practice, each push button can be tuned to both an AM station and an FM station. It's simple to do — here's how.



AM/FM Stereo Radio — Ford

Q 15-4 b) No, sir! An outstanding feature of these new Fairlane and Falcon instrument clusters is a flexible printed circuit that eliminates most of the wiring of last year's clusters. Accessibility, too, is excellent with the panel pad removed.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

"5 by 10" Push Button Tuning – AM/FM Stereo Radios

After the radio has warmed up for 15 minutes, slide the dial selector to "AM" and set each push button by pulling it out, manually tuning in the desired AM station, and depressing the button. Then slide the dial selector over to "FM" and repeat the procedure to tune in five FM stations. Don't worry — you won't disturb the AM settings!

For the most accurate setting of the push buttons, have the antenna extended to 33 inches and lower the volume almost to a whisper when making your final fine tuning manual adjustments before depressing each push button.

Quick-Quiz

Q 16-4 Push buttons of the '68 AM/FM stereo radios can be tuned to:

- a) five stations, either AM or FM. (See page 72)
- b) five AM stations and five FM stations. (See page 90)
- c) ten AM or ten FM stations. (See page 146)

TRUCK

HEATER/AIR CONDITIONER – F-100 THROUGH F-350 TRUCKS

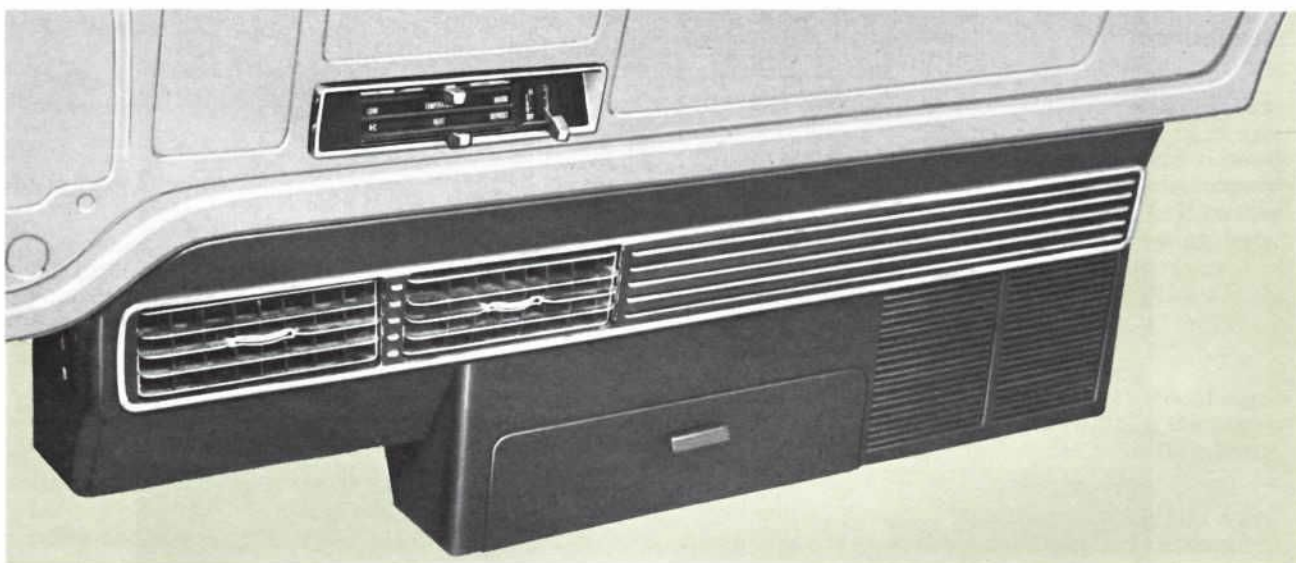
There's a new factory-installed combination fresh air heater and air conditioner available in 1968 F-100 through F-350 light trucks. Three slide lever controls at the center of the instrument panel operate the unit for either heating or air conditioning. The top horizontal lever provides temperature control for heating and cooling. It controls two Bowden cables, one to the water control valve in the heater inlet hose and the other to the thermostatic switch that controls evaporator temperature by cycling the compressor when the air conditioner is operating. The bottom horizontal lever, which allows the driver to select either heating or air conditioner operation,

also controls two Bowden cables that operate the air door and the defroster door in the unit housing. The small vertical lever to the right of the two horizontal levers is a blower motor switch.

Operating Note: To turn the unit off so that neither the heater nor the air conditioner is operating, move the lower horizontal lever to "A/C" and the blower switch to "Off." Later models will have an "Off" position detent added to the lower lever.

Service Tips

Technicians with experience servicing other air conditioning units should have no problems with this



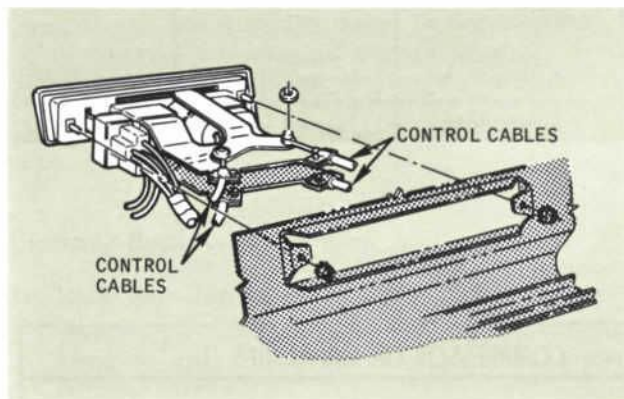
Heater/Air Conditioner – Light Trucks

Q 14-1 a) Give yourself credit for another correct answer! Voltage drop tests for the circuit are the same as in '67. Of course, the starter battery terminal is on the solenoid, instead of on the starting motor frame . . . but that's no problem!

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new combination heater/air conditioner. Accessibility to all components is excellent. However, here are a few tips to make your work easier.

Installation: If you've removed the heater/air conditioner unit from the truck for service, be sure you get everything (defroster nozzle hoses, for instance) back in place under the instrument panel before you install the unit. And remember to securely seat all electrical connectors.



Control Assembly Installation

When you're ready to install the controls and unit, here's how to do it:

1. Be sure the four Bowden cable housings extend 1/4 inch beyond the rear edges of the cable clamps on the control assembly and the clamp screws are tight. Then mount the control assembly to the instrument panel.
2. Set the two horizontal slide levers in their centered positions and secure them positively in that position until you've completed the installation of the entire heater/air conditioner.
3. Route the heater temperature control cable (the upper left cable from the front of the control assembly) through the insulator in the dash. Connect the cable to the crank of the water temperature control valve at the heater inlet hose in the engine compartment. Hold the crank toward the front of the truck while you clamp the cable housing to the valve bracket.
4. Place the heater/air conditioner unit on the floor of the cab.
5. Connect the heater and air conditioner control cable (the cable with a turnbuckle that comes from the lower right of the control assembly) to the crank link for the heater/air conditioner air door. Push the crank forward until it stops and hold it there while you clamp the cable housing to the bracket.

6. Connect the thermostatic switch control cable (the cable with a vinyl sleeve and a turnbuckle that is attached to the upper right of the front of the control assembly) to the thermostatic switch crank arm. Push the crank to the right (toward the passenger's side of the cab) until it stops and hold it there while you clamp the cable housing to the bracket.
7. Install the heater/air conditioner unit to the dash panel and instrument panel. Don't forget to connect the ground wire to the side panel above the fresh air duct before you install the flexible duct connector.
8. Connect the defroster control cable (the short cable from the lower left of the front of the control assembly) to the defroster door crank at the top left side of the unit. Pull the crank rearward until it stops and hold it there while you clamp the cable housing to the hold down bracket.
9. Remove whatever device you used to secure the two control slide levers in their centered positions and work the two levers to both extremes of travel to see if they operate freely. If it takes much effort to move the levers to any extreme position, proceed with the adjustment that follows.

Control Cable Adjustment: A turnbuckle is located in the right cable from each of the two horizontal slide levers to provide an adjustment for the cable. If either lever must be forced, to move it to either end of the slot, the cable length is not correct. Remove the glove box to gain access to the turnbuckles and adjust them as follows:

1. If the temperature selector lever (upper lever) binds, turn the turnbuckle in the cable to the thermostatic switch. If binding occurs at the left end of the lever slot, adjust the turnbuckle to extend the length of the cable. If binding occurs at the right end of the slot, shorten the cable. *Never turn the turnbuckle more than one full turn from its original position.*
2. If the "Heat-A/C" selector lever (lower lever) binds, turn the turnbuckle in the cable to the heater/air conditioner air door. If binding occurs at the left end of the lever slot, adjust the turnbuckle to extend the length of the cable. If binding occurs at the right end of the slot, shorten the cable. *Never turn the turnbuckle more than one full turn from its original position.*

Caution: If you ever have to disconnect any of the control cables for any reason, never do so without first securing the control slide levers in their centered positions as described previously in step 2 under Installation. And be sure to position all affected components as described in that procedure when you connect the cables. Also test the levers for freedom of operation after the cables are connected.

Q 16-3 c) Nope! The likely cause is a faulty regulator assembly. Besides, you should have tested continuity at the set/speed switch before you took the car out for a road test if you suspected the switch to be at fault!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

SPECIFICATIONS

VENTILATING – HEATING – AIR CONDITIONING – RADIO					
Refrigerant 12 Capacity (Pounds)	Current Draw at 12.5 Volts				
	Blower Motor (High Speed)		Radio (A.M.)	Magnetic Clutch	Antenna
	Heater	Air Conditioner			
2-1/4	6-8 Amps	13-16 Amps	0.8 Amp Max.	1.5-3.5 Amps	8 Amps

AIR CONDITIONING COMPRESSOR (ALL CARS)			COMPRESSOR OIL CAPACITIES (1)	
Torque Limits (Ft-Lbs)			Tecumseh	Min. 7/8 - inch Max. 1 - 5/8 - inch (11 Fluid Ounces)
Description	Tecumseh	York		
Cylinder Head	20 - 24	15 - 23	York	Min. 13/16 - inch Max. 13/10 - inch (10 Fluid Ounces)
Front Seal Plate	6 - 10	7 - 13	Driven Belt Tension (Between Fan Pulley and Air Conditioner Compressor:	
Service Valve (Rotolock)	25 - 35	25 - 35		
Mounting Bolt	20 - 30	20 - 30	New	140
Oil Filler Plug	18 - 22	4 - 11	Used (2)	110
Clutch Mounting	20 - 30	20 - 30	(1) Use Suniso #5 or Capella E. (2) Belt Operated for a Minimum of 10 minutes is con- sidered a Used Belt.	
Base Plate		14 - 22		
Back Plate		9 - 17		

RADIO APPLICATIONS			
Car Line	AM Radio	AM/FM Multiplex Radio	AM Radio/Stereo Tape Player
Thunderbird	Philco 8TPS	Bendix F8TBS	Motorola T8MS
Ford	Philco or Motorola 8TPE	Bendix F8TBF	Motorola T8MF
Fairlane, Falcon	Philco 8TPO	Bendix F8TBO	
Mustang	Philco 8TPZ	Bendix F8TBZ	Motorola T8MZ



FORD CAR AND TRUCK

CAR

FRONT BUMPER – THUNDERBIRD

The 1968 Thunderbird has a new two-piece bumper. The bumper has a slotted center section to permit a greater flow of air to the radiator and provide better engine cooling. The lower section of the bumper is painted the same color as the body. The adjusting plate used on last year's model is carried over this year.

Bumper Replacement

1. Raise the vehicle.
2. Remove the bolts and nuts retaining the bumper arms to the frame and remove the complete bumper assembly.
3. Remove the bolts and nuts retaining the bumper arms reinforcement and extension to the upper and lower bumper.
4. Install the extension, bumper arms and reinforcements to the new bumper.
5. Position the complete bumper assembly to the vehicle and install the retaining bolts and nuts.
6. Align, as necessary, and torque the bolts to specifications.
7. Lower the vehicle.
5. Remove the grille assembly.
6. Remove the headlamp doors, headlamp housings, sealed beam units and grille ornament, and transfer them to the new grille.
7. Position the grille assembly to the body, and install the bolts that attach the grille to the hood lock hook support and stone deflector.
8. Install the bolts that attach the headlamp housings to the body and headlamp supports.
9. Connect the sealed beam unit wires, and close the hood.

GRILLE – FAIRLANE

The grille replacement for the 1968 Fairlane is slightly more involved than in 1967 because the attaching screws are very hard to gain access to.

GRILLE REPLACEMENT

1. Lift the hood and disconnect the sealed beam unit wires.
2. Remove the bolts attaching the headlamp housings to the body.
3. Remove the bolts attaching the headlamp housings to the headlamp supports.
4. Remove the bolts attaching the grille to the hood lock hook support and the stone deflector.

VENTLESS DOOR GLASS – FAIRLANE HARDTOPS AND CONVERTIBLE

Ventless door glass is used in the Fairlane hardtop and convertible doors. The bottom of the glass assembly has two guides that fit on tubular vertical runs, and the window moves up and down on these runs. Window adjustment is new, but easy. In fact, you'll be able to make most adjustments without even removing the door trim panel!

Inboard-Outboard Tilt Adjustment

At the bottom surface of the door, you'll find two screws — one near the front of the door and the other near the rear. To adjust the inboard-outboard tilt of the glass, just loosen these two screws. Then run the window full up and move it in or out so it fits properly in the roof rail weatherstrip.

Upper Rear Stop Adjustment

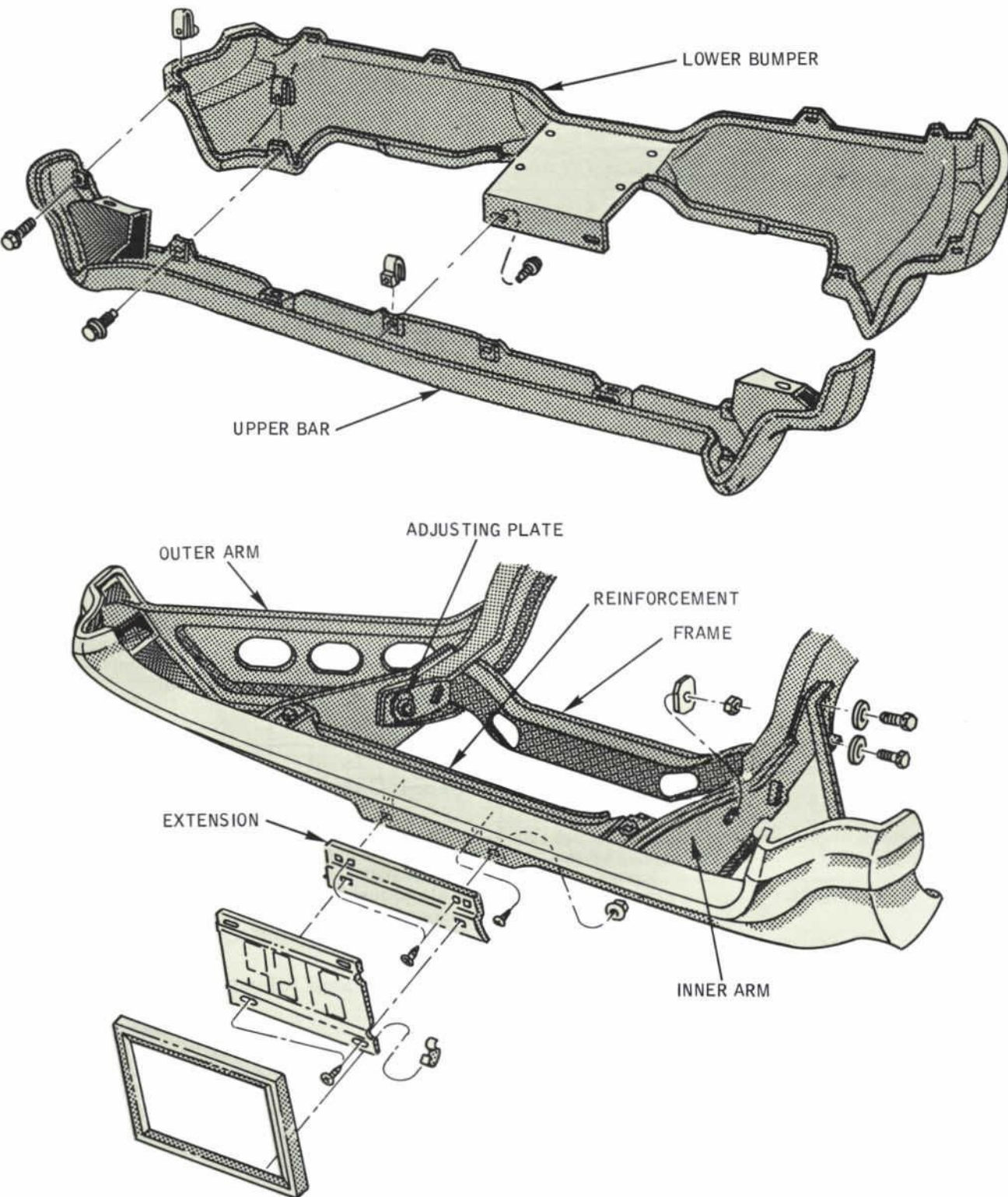
At the rear surface of the door, near the top, you'll see two screws close together in a small cover plate. To adjust the upper rear stop, loosen these two screws and move them and the cover plate up or down to position the stop so the window will fit properly in the vertical direction in the roof rail weatherstrip when it's fully up.

Upper Front Stop Adjustment

You can make small adjustments to the upper front stop without removing the door trim panel. Run the

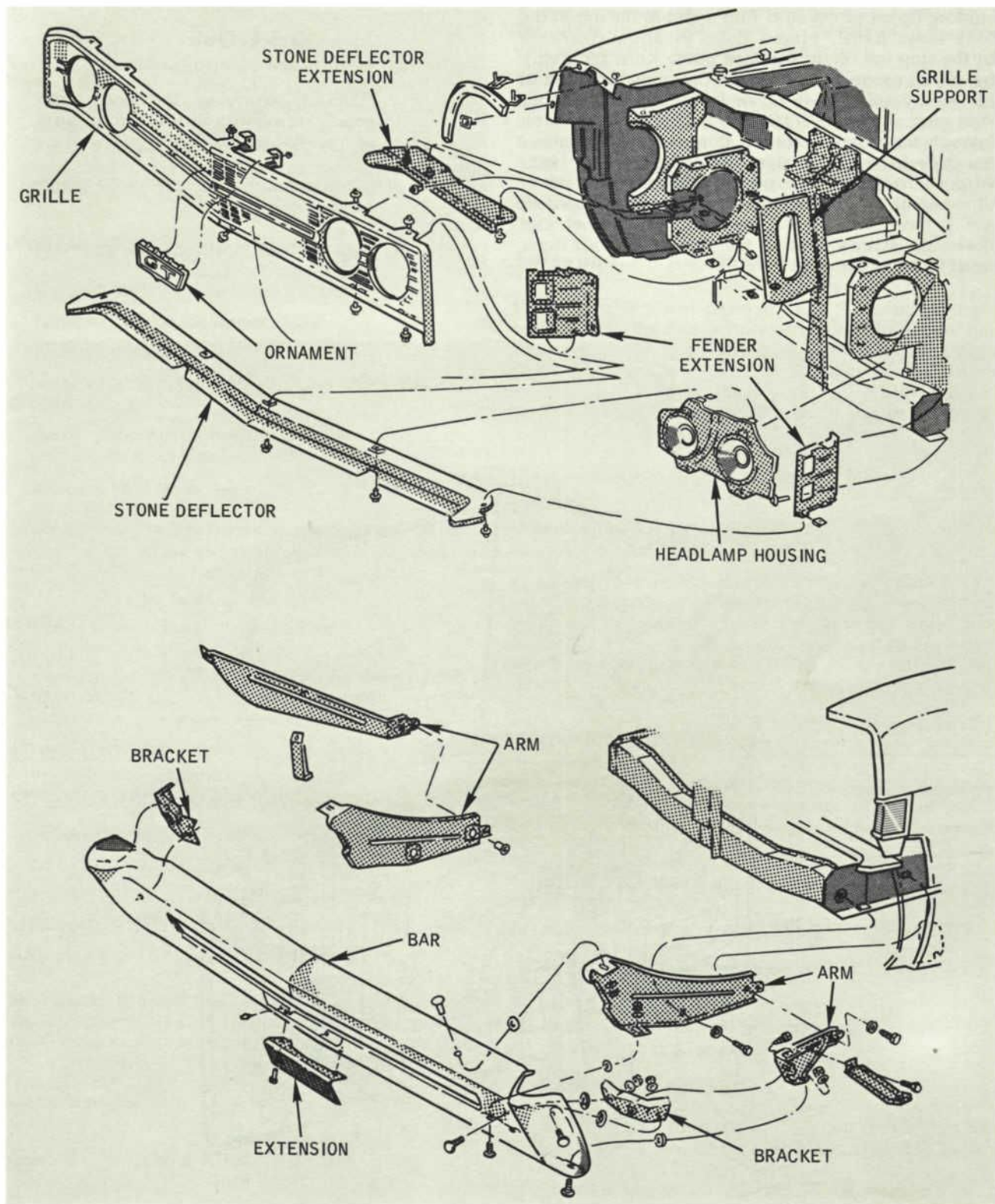
Q 8-4 b) You've scored again! Pinching off the vacuum line reduces internal vacuum in the bypass valve. When you release the line, normal vacuum causes the valve to respond by interrupting airflow to the outlet port or ports.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE



Front Bumper – Thunderbird

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Bumper and Grille – Fairlane

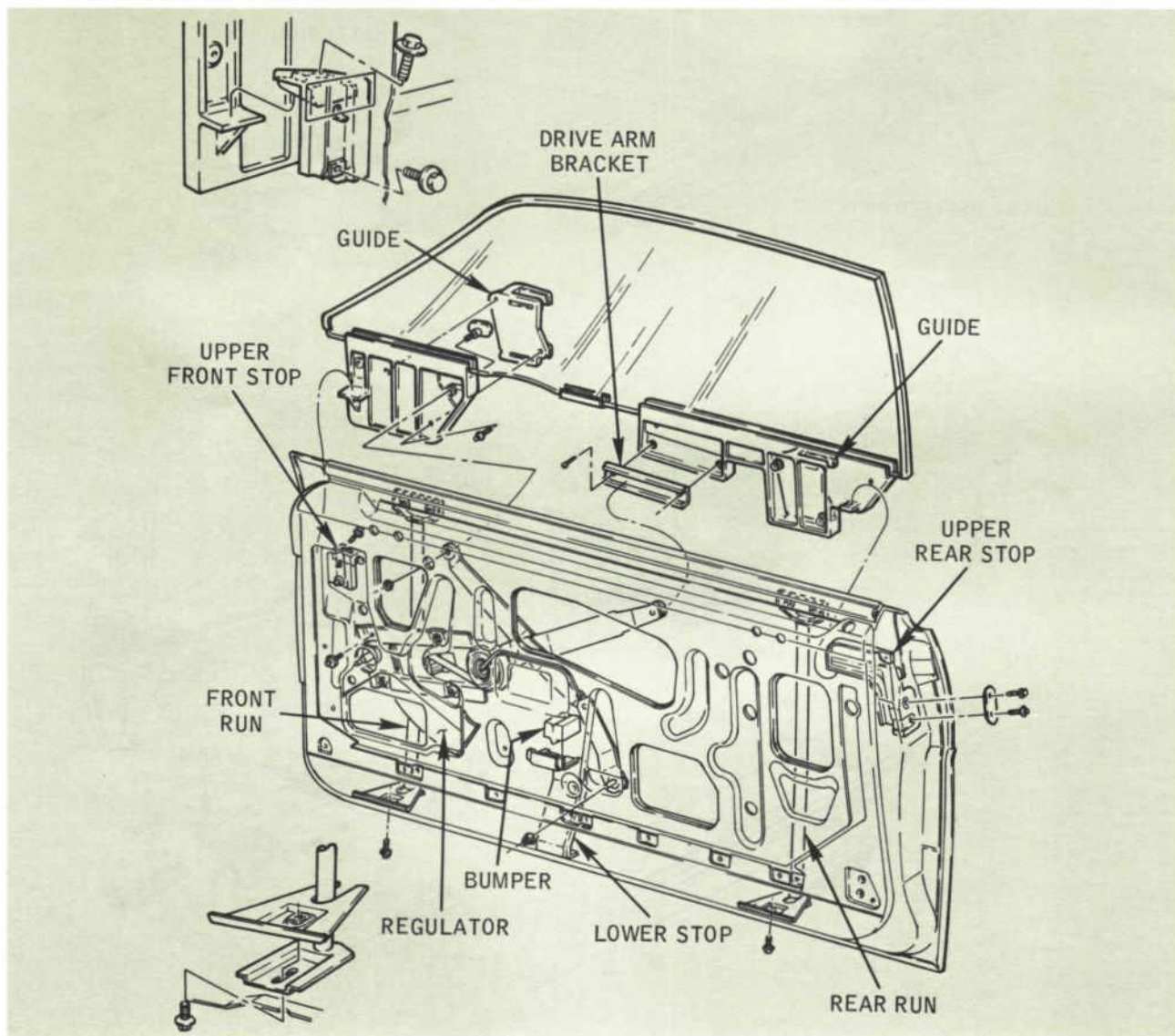
INTRODUCTION TO THE 1968 FORD PRODUCT LINE

window down and you'll find a slot in the top of the door inner panel, placed there to allow clearance for the stop tab on the forward guide when removing the glass assembly. Below and slightly forward of this slot you'll find a screw in the top of the upper front stop. Insert a 7/16 inch socket and extension through the slot and loosen this screw. Then move the screw forward to raise the stop bumper, or rearward to lower it. This provides a limited range of adjustments — if a greater adjustment is needed, you'll have to remove the door trim panel and loosen the screws holding the stop to the door inner panel to move the stop.

Quick-Quiz

Q 17-1 Without removing the door trim panel, you can adjust the door glass of any Torino GT for proper:

- a) inboard - outboard tilt. (See page 121)
- b) fore-and-aft position. (See page 84)



Door Window Mechanism — Fairlane Hardtop and Convertible

Q 8-2 c) Yep! On the Thunderjet 429 . . . and other V-8 engines, too . . . it's a good idea to go through the torque tightening sequence a second time after engine heat has caused the parts to "snuggle down!"

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Fore-and-Aft Adjustment

Fore-and-aft adjustment of the ventless door glass requires removal of the door trim panel. With the window fully up, you'll be able to get to a nut at the top of the regulator arm through a hole in the door inner panel, near the top front of the door. Loosen this nut and move the glass forward or rearward until it fits the weatherstrip on the front pillar.

Ventless Door Glass Removal

1. Remove the trim panel and watershield.
2. Remove both of the upper stops.
3. Remove both guides.
4. Remove the drive arm bracket from the rear glass assembly.
5. Remove the nut and bolt retaining the regulator arm to the front glass assembly.
6. Remove the glass assembly from the door. To lift the glass assembly free from the door, tilt it slightly and guide the two stop tabs on the bottom of the glass assembly through the slots in the top of the door structure, one at a time.

Ventless Door Glass Installation

1. Position the glass assembly in the door and attach the nut and bolt retaining the regulator arm to the front glass assembly.
2. Install the drive arm bracket to the rear glass assembly.
3. Install both guides and upper stops.
4. Adjust the window as necessary.
5. Install the watershield and trim panel.

QUARTER WINDOW – FAIRLANE HARDTOPS AND CONVERTIBLE

The quarter window mechanism of Fairlane hardtops and convertibles is also new. The glass assembly slides up and down on a tubular run in front and in a conventional channel-and-roller run in the rear. All adjusting points are located under the quarter trim panel.

Inboard-Outboard Tilt Adjustment

With the trim panel removed and the window up, loosen the two screws that attach the bottom of the

guide assembly to the body structure. Then move the glass in or out to get the proper fit in the roof rail weatherstrip and tighten the screws.

If the front edge of the window needs to be moved in or out to align it with the door glass, loosen the screw in the top of the tubular run that's accessible through the hole in the forward face of the center pillar near the top and adjust as necessary. It will be necessary to remove the rubber seal at the top of the pillar to gain access to the screw.

Fore-and-Aft Adjustment

With the trim panel removed and the window lowered, loosen the two screws attaching the top of the rear run to the body structure at the top of the run. On some models, you'll have to remove the lower stop on the rear run and lower the window all the way to reach these screws. Then raise the window and move it backward or forward to align it with the door glass. When it's in position, carefully lower it and tighten the screws.

Fore-and-Aft Tilt Adjustment

If necessary, the glass can be tilted forward or backward to align it with the door glass and weatherstrip. With the trim panel removed, loosen the screw that holds the lower end of the regulator arm to the body structure. Then make the desired adjustment and tighten the screw.

Upper Stop Adjustment

The two upper stops are adjustable with the trim panel removed. The upper stops are located at either end of the channel.

Quarter Window Removal

1. Remove the quarter trim panel.
2. Remove the rear regulator arm channel bracket from the glass assembly.
3. Remove the bolts and nut retaining the regulator, and remove the regulator.
4. Remove both upper stops.
5. Remove the lower stop from the rear guide to allow the wheel on the rear glass assembly to be removed from the rear guide.
6. Remove the bolts retaining the front guide to the front glass assembly, and remove the guide.

Q 15-1 a) No! The valve at the front of the headlight switch that routes engine vacuum to open the headlight doors functions in the same way for both the Ford and the Thunderbird systems. Try another answer!

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

7. Remove the rubber seal assembly at the top front side of the quarter pillar.
8. Remove the front regulator arm channel bracket from the glass assembly.
9. Remove the quarter window belt line weather-strip.
10. Remove the glass assembly.

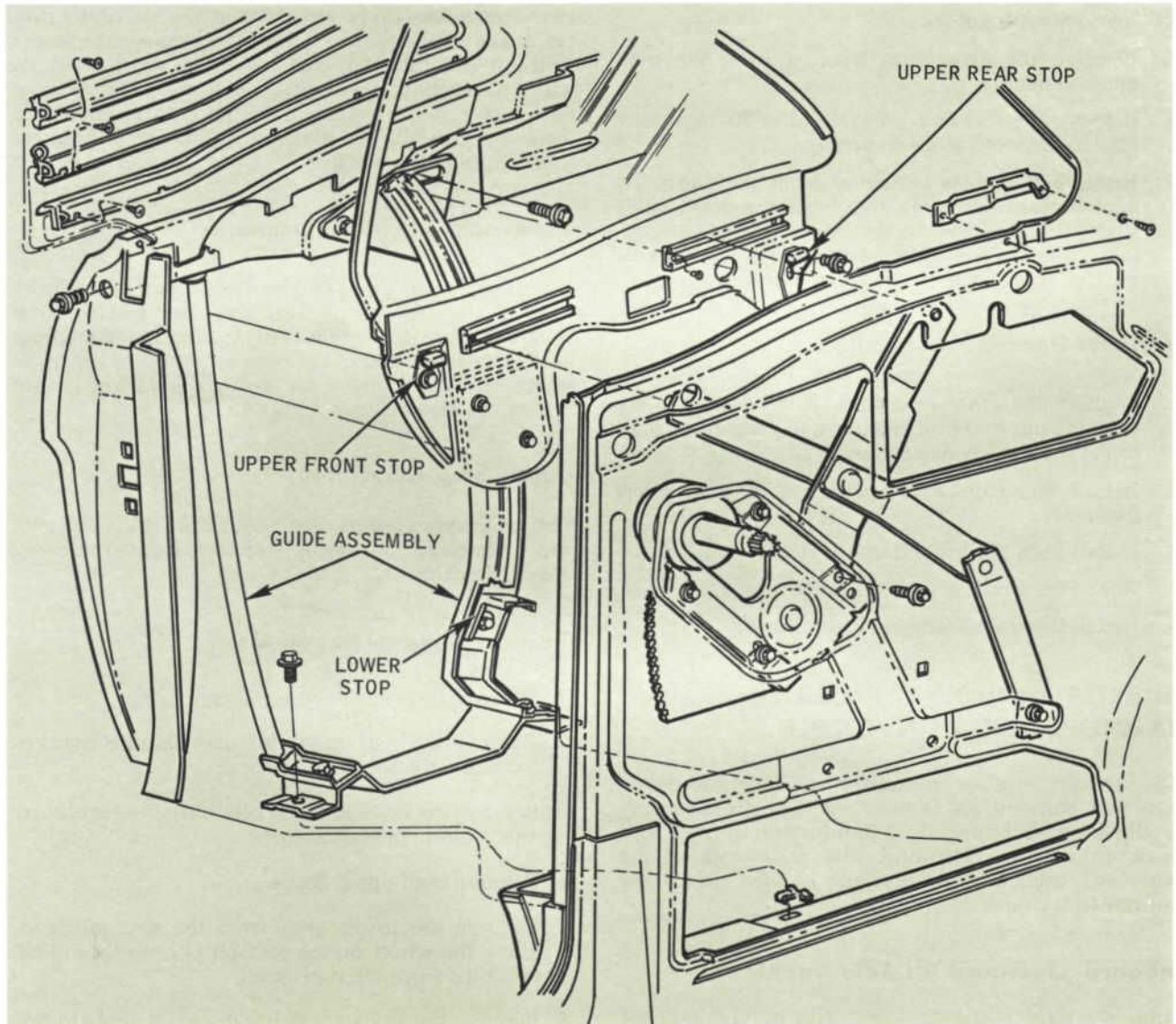
Quarter Window Installation

1. Position the new quarter window assembly in the quarter.

Quick-Quiz

Q 17-2 In Fairlane hardtops and convertibles, the quarter window mechanism is similar to the door window mechanism in that:

- a) some glass adjustments can be made without removing the trim panel. (See page 48)
- b) the front run in both mechanisms is tubular. (See page 92)



Quarter Window Mechanism — Fairlane Formal Roof Hardtop

Q 17-4 a) That's right! With the exception of this one nut, you can reach all of the attaching parts for the pad from around the outside edges of the pad. It's quick, easy . . . and then it's a snap to get at instrument panel components!

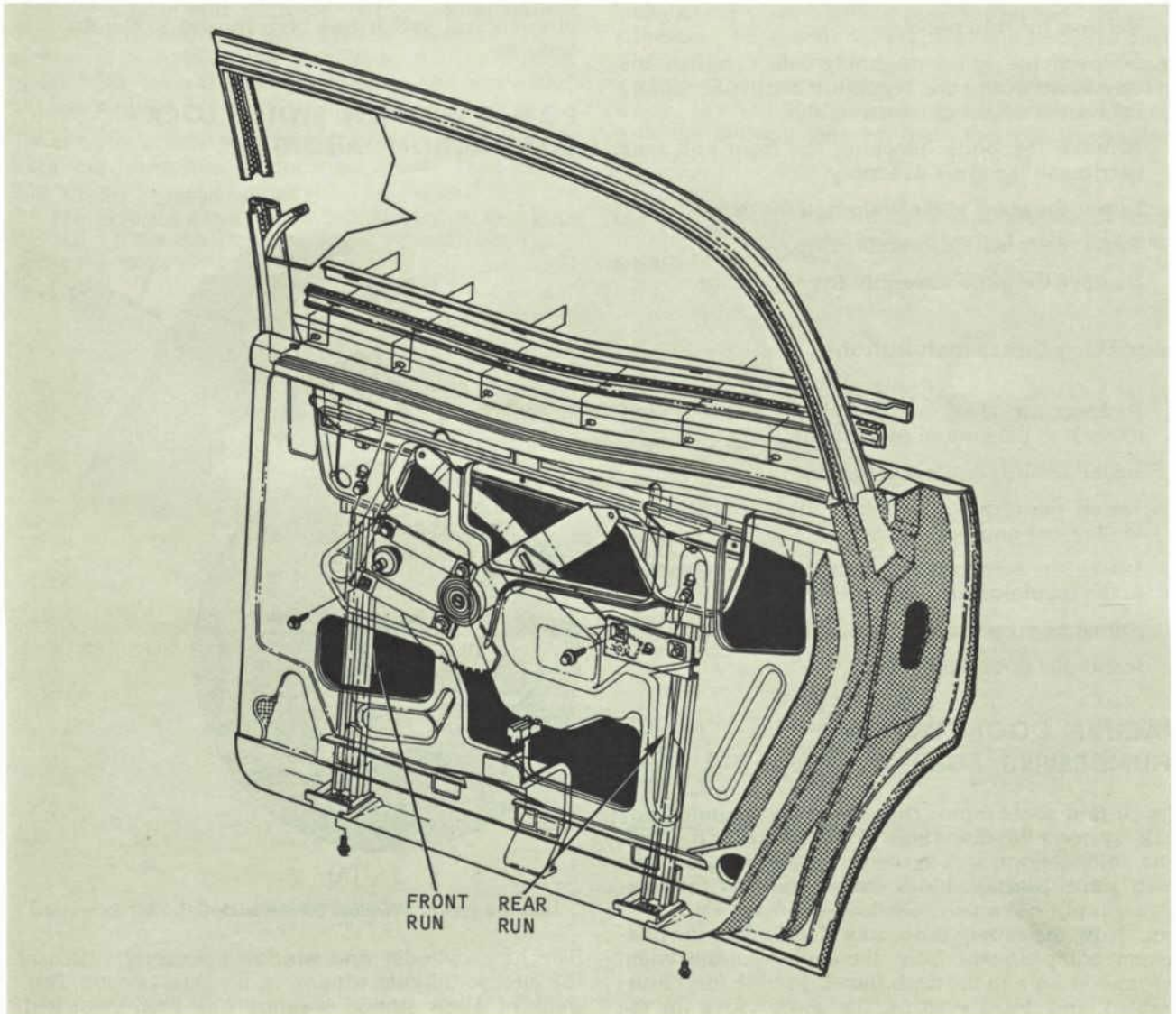
A PRELIMINARY SHOP MANUAL

2. Install the belt line weatherstrip.
3. Install the front regulator arm channel bracket.
4. Install the front guide.
5. Position the wheel on the rear glass assembly into the rear run, and install the lower stop.
6. Install the regulator after positioning the front regulator arm wheel in the front regulator arm bracket on the glass assembly.
7. Position the rear regulator arm bracket on the rear regulator arm wheel and attach to glass assembly.
8. Install both upper stops.

9. Install the seal assembly on the quarter pillar.
10. Adjust as necessary.
11. Install the trim panel.

VENTLESS REAR DOOR GLASS — FAIRLANE 4-DOOR SEDANS

Fairlane four-door sedans have a new rear door glass assembly. Unlike last year's Fairlane rear doors, these doors do not have permanent vent windows. Two vertical channel runs guide the window when it is raised or lowered.



Rear Door Window Mechanism — Fairlane 4-Door Sedans

Q 15-2 c) Afraid this doesn't jibe with what's written in the text. There are two relays — one for the two right bulbs, one for the two left bulbs. These relays are in the turn signal relay assembly so that either will indicate a turn while both indicate brake application.

INTRODUCTION TO THE 1968 FORD PRODUCT LINE

Adjustments

Hard operation of the glass assembly can be relieved without taking off the trim panel. Just loosen the two screws that are accessible at the bottom of the door and run the window up and down a few times. Then tighten the screws.

Fore-and-aft adjustment of the glass assembly requires removal of the trim panel. Then run the glass assembly to its full up position and loosen the four screws in the glass channel that secure the two roller carriers to the channel. Make any necessary adjustment, then tighten the screws.

Rear Door Glass Removal

1. Remove the trim panel.
2. Support the glass assembly and remove the screws attaching the regulator arm roller channel bracket to the glass assembly.
3. Remove the bolts attaching the front and rear carriers to the glass assembly.
4. Lower the glass to the bottom of the door.
5. Remove the belt line weatherstrip.
6. Remove the glass assembly from the door.

Rear Door Glass Installation

1. Position the glass assembly into the door and lower it to the bottom of the door.
2. Install the belt line weatherstrip.
3. Install the screws that retain the glass assembly to the front and rear carriers.
4. Install the screws that retain the glass assembly to the regulator arm channel bracket.
5. Adjust as necessary.
6. Install the door trim panel.

VACUUM DOOR LOCKS — THUNDERBIRD, FORD

You'll find some minor changes in the vacuum door lock systems for the 1968 Thunderbird and Ford. The rolling door lock system is no longer used. The dash panel junction block connections for the vacuum supply have been eliminated on the Ford system. Now the supply hose runs directly into the passenger compartment from the engine compartment through a hole in the dash panel. In both the Thunderbird and Ford systems, the check valve for the vacuum supply system is now located near the top

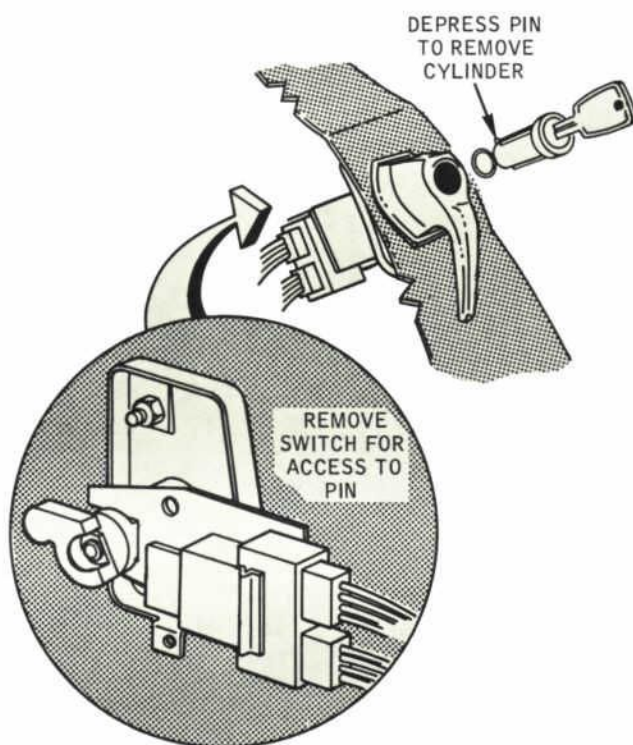
Quick-Quiz

Q 17-3 The rolling door lock feature for Thunderbird and Ford cars with vacuum door locks:

- a) is carried over without change for '68. (See page 74)
- b) has been extensively modified for '68. (See page 6)
- c) was eliminated for '68. (See page 179)

of the cowl in the engine compartment. The Thunderbird control switch has been moved to the driver's armrest.

POWER WINDOW SWITCH LOCK — DUAL-ACTION TAILGATES



Tailgate Power Window Switch Lock Cylinder Removed

The lock cylinder and window operating switch of the electric tailgate window in the Dual-Action Tailgate of 1968 station wagons has been relocated. They are now within the outside latch release handle.

Q 16-3 b) No, it isn't! A speed control that "hunts" when it should be holding the car at a steady speed needs service . . . and possibly a new regulator assembly! Check it out with the tests given in this handbook.

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Lock Cylinder Removal Tips

You'll have to remove the interior trim panel and access cover from the tailgate and then raise the window to get at the window switch and wiring. To remove the switch from the handle, insert a small steel rod into the two holes in the switch and spread the spring clips outward. Then turn the latch handle to the full clockwise position, depress the cylinder retaining pin at the top of the handle assembly inside the tailgate and remove the cylinder.

BODY TRIM SIDE RAILS — SQUIRE STATION WAGONS

The simulated wood grain side rails of the Ford Country Squire and Fairlane Torino Squire station wagons are attached with hidden fasteners. Each section of the side rails is held to the body sheet metal with several clips and one or two screw and nut assemblies.

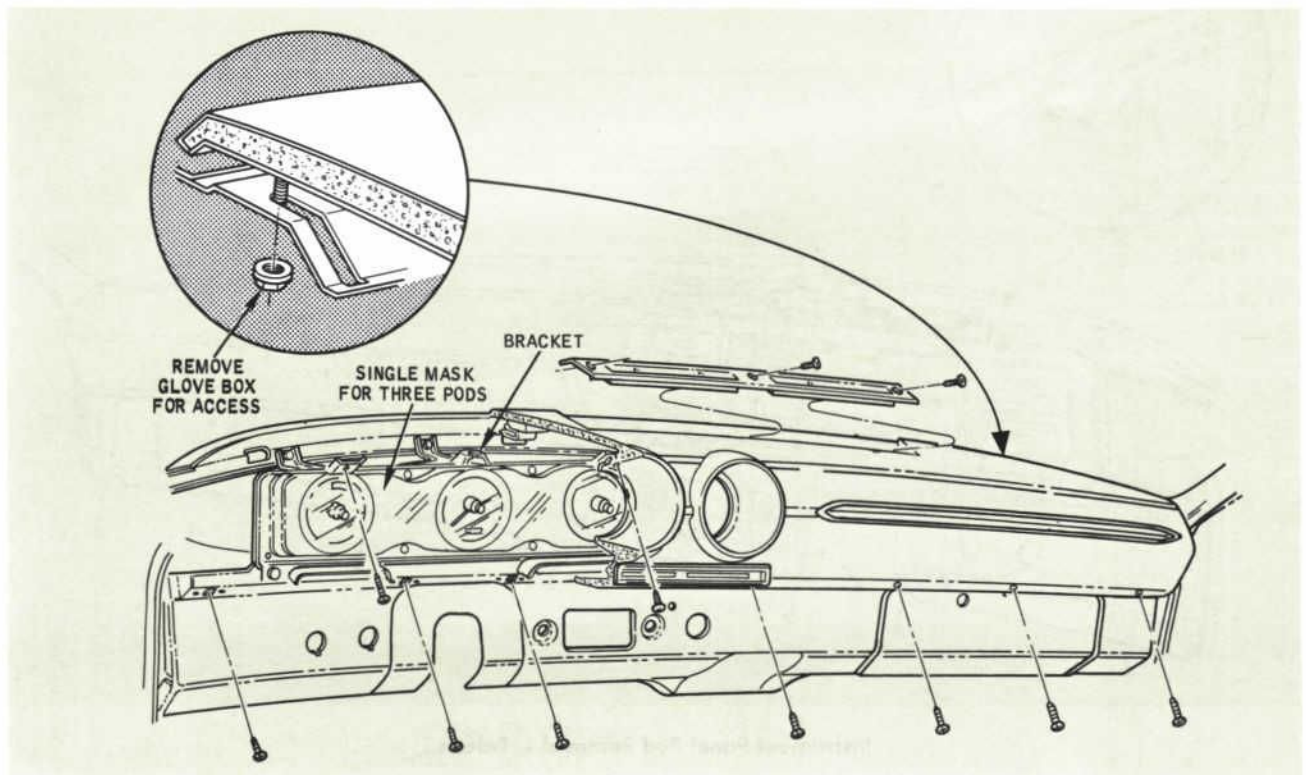
To remove a side rail, first remove the nut or nuts from the underside of the sheet metal. Then slip a thin sheet of vinyl or other suitable material between the rail and the body to protect the finish, and pop the rail off the clips by inserting a screwdriver blade under the rail.

NEW PRESSURE-SENSITIVE WOOD GRAIN TRANSFER FILM

A new pressure-sensitive wood grain transfer film is available from the Autolite-Ford Parts Division in patterns suitable for use in body repairs on 1968 cars to replace the original pressure-sensitive film. On the car, this new film can be identified by a duller appearance with a greater wood grain effect than Di-Noc film. And the brown primer applied to the body under Di-Noc, which is visible around the exposed edges of the film when the body trim side rails are removed, is not used with the new pressure-sensitive film.

You don't need to use adhesive with this new film because it's coated with a special pressure-sensitive adhesive. To install it, you just wet both the back of the film and the prepared body surface with a wetting solution of Liquid Car Wash and warm water, lay the film in place and adjust it to line up with the pattern, then squeegee the wetting solution out from between the film and the panel.

Di-Noc replacement film is also available for body repairs on cars originally trimmed with this material.



Instrument Panel Pad Removal — Fairlane

Q 15-3 c) Sorry, but you're wrong! The set/speed switch for all speed controls except the Thunderbird unit is in the end of the turn signal lever . . . and you'll have to pull the speed control wires from the column to remove the lever.

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INSTRUMENT PANEL PAD — FAIRLANE, FALCON

The fully padded upper section of the safety instrument panel in Fairlanes and Falcons extends completely across the width of the car. This pad is designed to collapse uniformly upon severe impact to absorb impact forces. But there is another feature to this padded upper section that should be of interest to you! Removal of this pad exposes many instrument panel components so they are easily accessible for service.

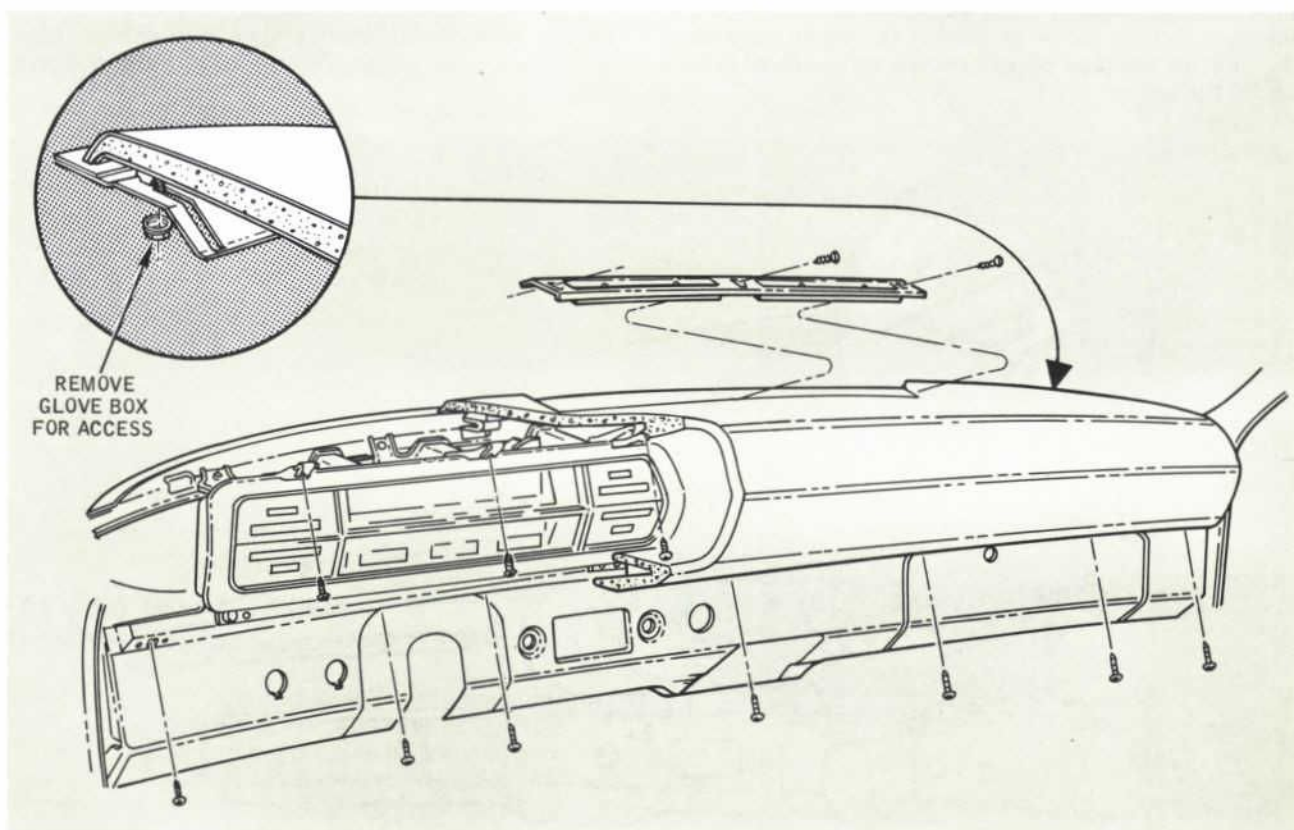
Instrument Panel Pad Removal: Removal of the padded upper section of the instrument panel is quite simple. Just remove the glove box so you can reach in and remove the nut from the stud that secures the forward edge of the pad. Then remove the screws retaining the pad to the panel and remove the pad. You'll find screws in the defroster outlets, under the lip above the instruments, and in the instrument panel moulding — all accessible from outside the instrument panel.

Quick-Quiz

Q 17-4 Before removing the Falcon instrument panel pad, you should remove the glove box so you can reach:

- a) one nut at the forward edge of the pad. (See page 192)
- b) all of the pad attaching screws. (See page 7)
- c) the defroster outlet ducts. (See page 177)

Fairlane Instrument Panel Pad Installation Tip: When positioning the Fairlane instrument panel pad, be sure you guide the locating pin that's in the center of the brow over the instrument cluster in the notched bracket that extends over the instruments.



Instrument Panel Pad Removal — Falcon

Q 15-2 b) That's right! The two relays are in the turn signal relay assembly. Only one is energized to signal a turn, but both are energized to signal brake application. Feed is from the luggage compartment light circuit.

TRUCK

GRILLE AND DOOR GLASS — RANCHERO

The Ranchero grille, like that of its parent Fairlane, is attached in a manner that makes removal and installation more involved than it was last year. And Ranchero's door glass is ventless, like that of the

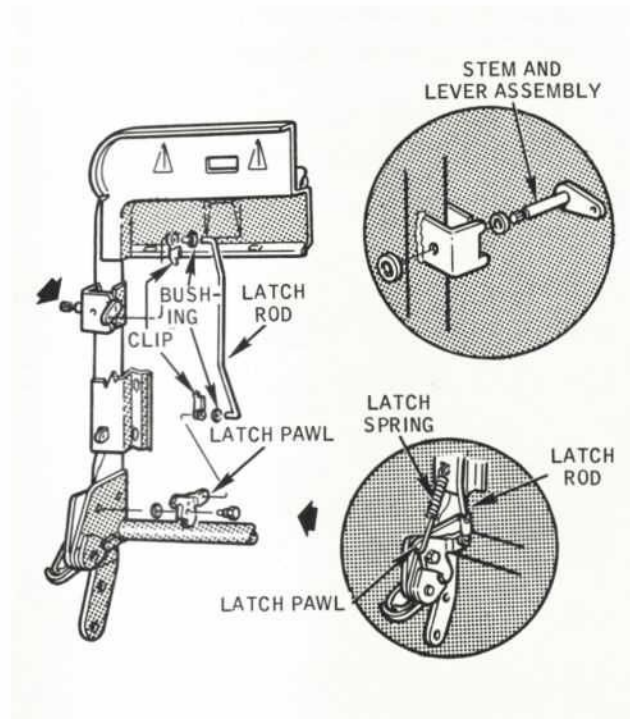
Fairlane hardtop and convertible. Both of these subjects are adequately covered in the car section of this group and should be referred to when servicing the Ranchero grille or door glass.

CAR

LOCKING FRONT SEAT BACKS

All folding front seats and the second seat of three-seat station wagons have a safety latch designed to hold the seat back in place in the event of an emergency stop or a crash situation. For rear seat passenger entry and exit, a handle on the side of the seat back releases the safety latch.

If the seat back will not lock in position or the lock mechanism will not unlock, remove the seat back trim cover far enough to inspect the locking mechanism. Then replace any broken parts and tighten any loose parts to put the locking system in proper working order.



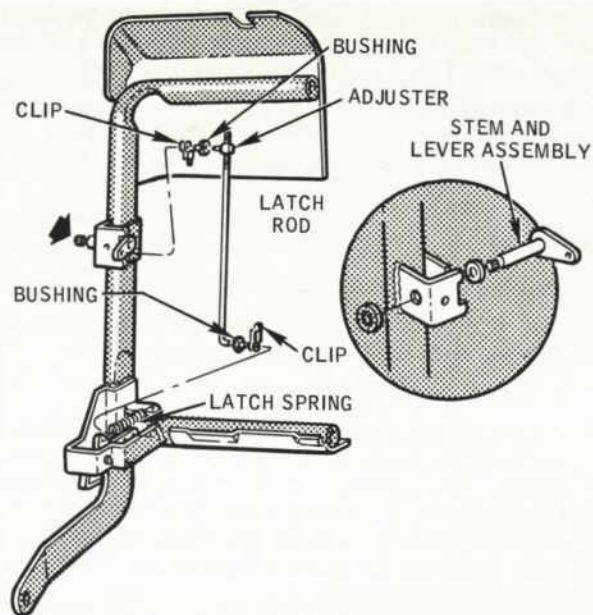
Seat Back Locking Mechanism — Typical of Split Bench Seat Back

MANUALLY ADJUSTABLE HEADRESTS — FORD

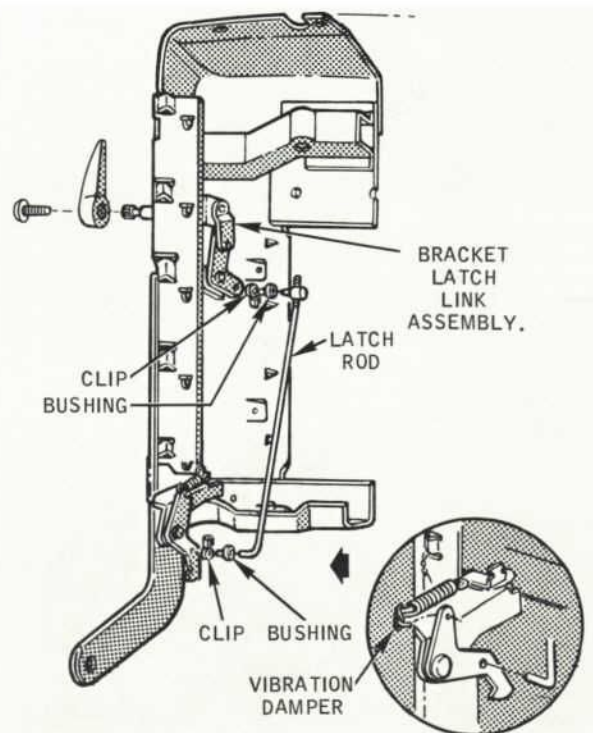
Manually adjustable headrests are available in the 1968 Ford. The headrest is supported in the top of the front seat back by two guide rods. Nuts on the underside of the headrest provide adjustment points



TRIM, SEATS AND CONVERTIBLE TOP



Seat Back Locking Mechanism — Typical of Bench Seat Back



Seat Back Locking Mechanism — Typical of Bucket Seat Back

- Q 15-2 a) One relay? Not really! Thunderbird's supplemental stop/turn signal light system has *two* relays in the turn signal relay assembly. One relay energizes the two right bulbs, the other relay energizes the two left bulbs.

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for the guide rods. The right rod (as viewed from behind the seat) is adjustable both vertically and horizontally, while the left rod is adjustable only vertically. Consequently, you can adjust either rod to compensate for a tilted appearance of the headrest, but only the right rod can be adjusted to relieve a bind caused by the rods not being parallel.

If a bind in the guide rods cannot be eliminated by adjusting them, you'll have to check for bent rods and problems in the components in the seat back.

Removal

1. Pull the headrest up and off the seat back.
2. Use a 9/16 inch allen wrench to unscrew the sleeves from the top of the seat back.
3. Remove the seat back cover.
4. On bench seat backs, remove the two bolts and washers holding each bracket to the seat back frame, and remove the two bracket assemblies. On bucket seat backs, remove the nut and washer holding each guide bolt to the seat back structure, and remove the two guide bolts.

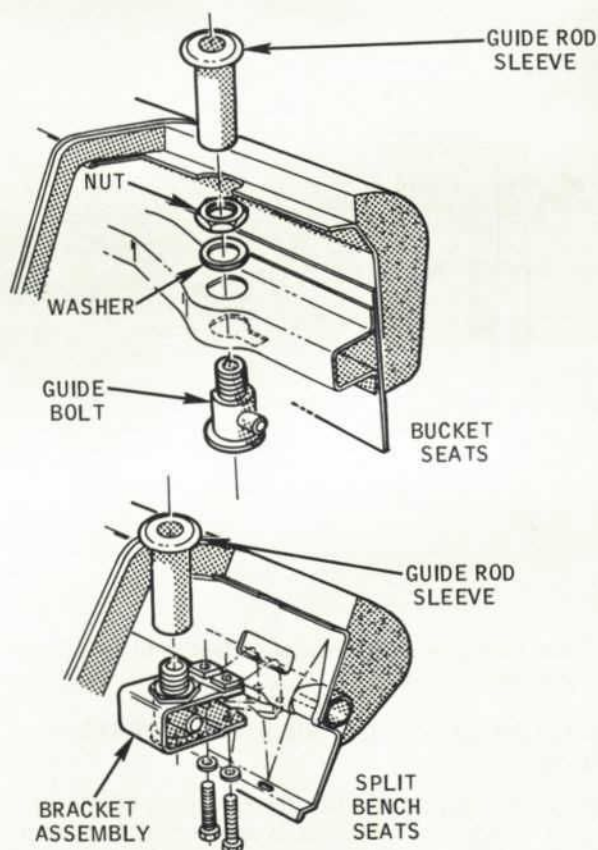
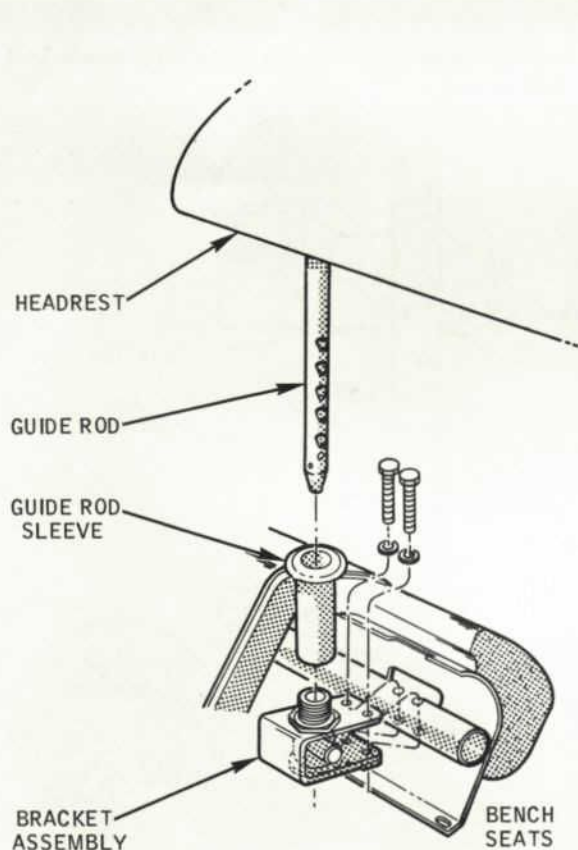
Quick-Quiz

Q 18-1 If you encounter a bind in the manually adjustable headrest in a '68 Ford, you can probably eliminate it by adjusting the:

- a) right guide rod. (See page 170)
- b) left guide rod. (See page 59)

Installation

1. Install the two bracket assemblies (bench seats) or guide bolts (bucket seats).
2. Install the seat back cover.
3. Install the two sleeves in the top of the seat back.
4. Install the headrest and check for proper operation.



Manually Adjustable Headrests — Ford

Q 15-1 c) Nope! To open the headlight doors manually on either the Ford or the Thunderbird, pull the headlight switch to "On" and move the doors open by hand. To close 'em, put the switch in "Off" or "Park" and push the doors closed.

TRUCK

LOCKING SEAT BACKS – BRONCO, RANCHERO

Bronco and Ranchero folding seat backs are equipped with safety latches like those described in the car section of this group. To service the locking

seat backs, follow the instructions given in the previous section.

