



Complete set of Volumes 1-5

1972 truck shop manual

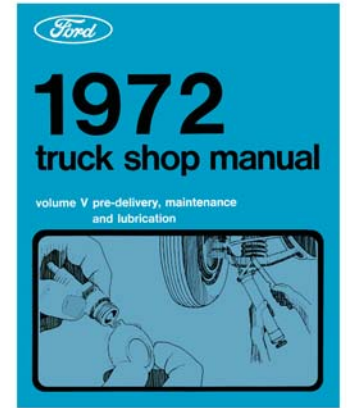
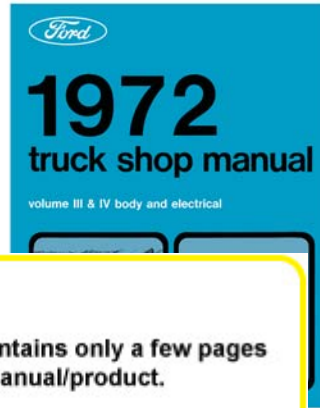
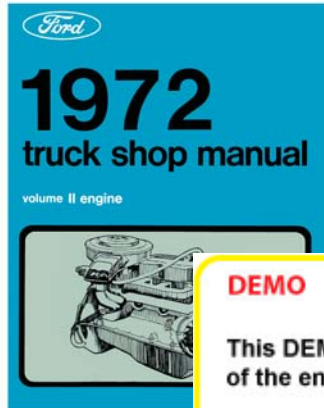
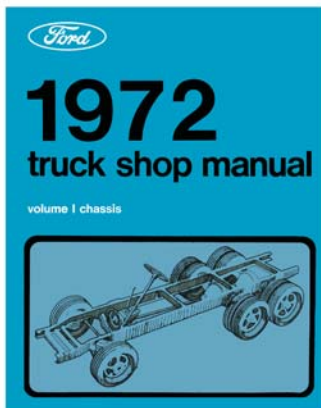


Vol. 1 - Chassis

Vol. 2 - Engine

Vol. 3 & 4 - Body and Electrical

Vol. 5 - Pre-Delivery Maintenance and Lubrication



DEMO

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

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

Features:

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



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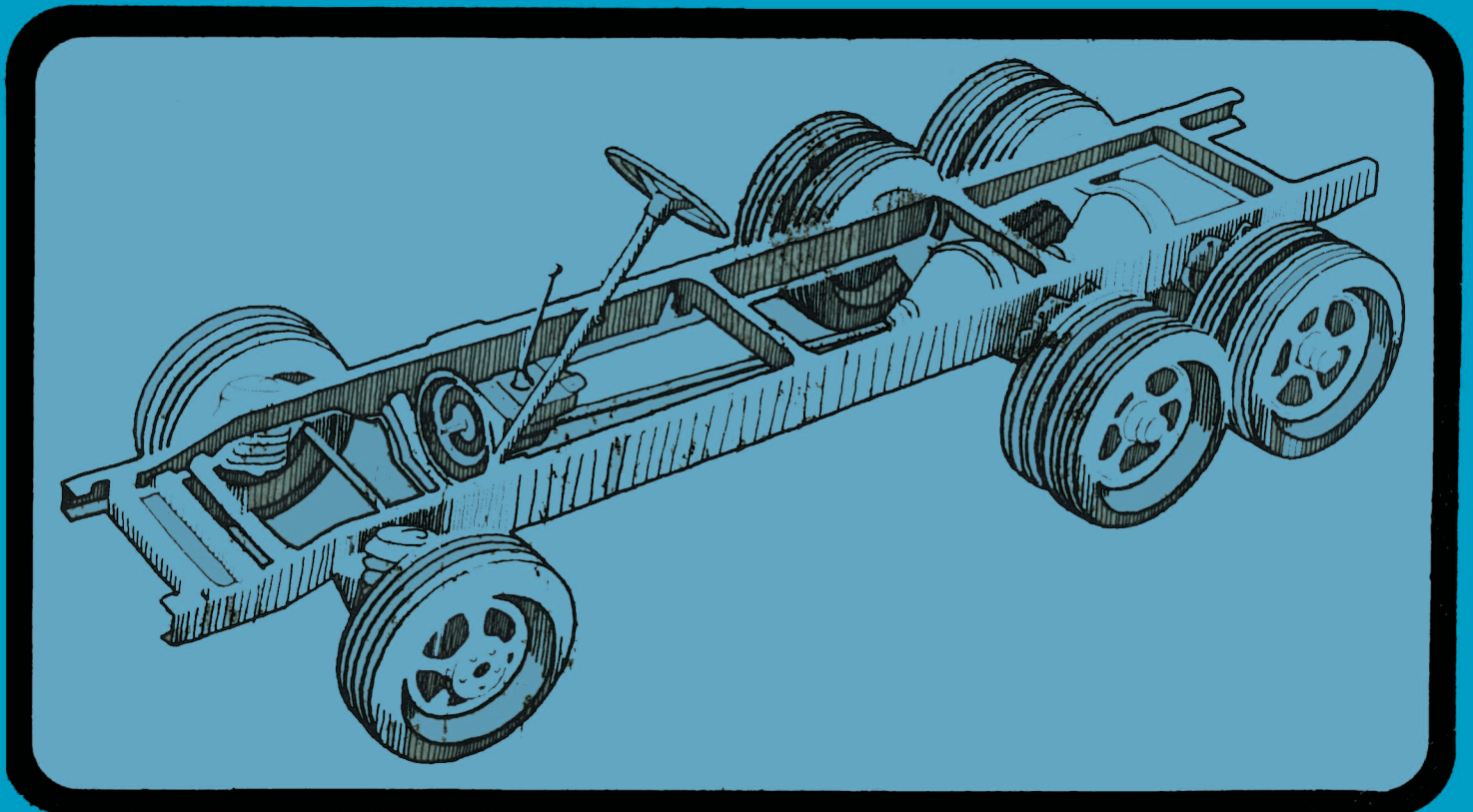
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1972

truck shop manual

volume I chassis



1972 truck shop manual

volume 1 chassis

group index

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Ford Marketing Corporation
Ford Customer Service Division
Service Technical Communications Department
Publications Section

FOREWORD

This manual is divided into five volumes: 1. Chassis; 2. Engine; 3. and 4. Electrical and Body; 5. Maintenance and Lubrication. These volumes should provide Service Technicians with complete information covering normal service repairs on all 1972 model trucks built by the Ford Companies in the U.S. and Canada. As changes in the product occur, this information will be updated by Technical Service Bulletins that will supersede the information in the manual.

Information in each volume is grouped by system or component plus "General Service" part which contains information common to several similar components.

The table of contents on the first page of each volume indicates the general content of the book and provides a handy tab locator to make it easy to find the first page of each "Group." That page will contain an index to "Parts" and the first page of each "Part" contains a detailed index which gives page location for each service operation covered. Page numbers are consecutive in each "Part."

To make reference easier, information has been broken down into smaller units so that essentially there is now one "Part" for each component or system. Group numbers indicate the volume in which the group may be found.

EXAMPLE:

11-02-7

Volume 1 – Group 11; Part 02; Page 7

The descriptions and specifications in this manual were in effect at the time this manual was approved for printing. The Ford Companies reserve the right to discontinue models at any time, or change specifications or design, without notice and without incurring obligation.



Service Publications

Identification Codes

GROUP
10

GENERAL INFORMATION

VEHICLE CERTIFICATION LABEL

The Vehicle Certification Label (V.C. Label) is attached to the rear face of the driver's door. The upper half of the label contains the name of the manufacturer, the month and year of manufacture and the certification statement. The V.C. Label also contains the Vehicle Identification Number.

The remaining information codes on the V.C. Label are the same as the Truck Rating Plate Codes (Fig. 1). Vehicle codes shown on the Truck Rating Plate are explained in the following paragraphs.

RATING PLATE

Figure 1 illustrates a typical Truck Rating Plate. On light and medium cowl and windshield vehicles, the Rating Plate is mounted on the right side of the cowl top panel under the hood. On stripped Parcel Delivery vehicles, the rating plate is placed in an envelope and included in the Boxed Items parts. On Bronco mod-

els, the plate is mounted on the inside panel of the glove compartment door. On all other vehicles, the Rating Plate is mounted on the rear face of the left front door.

Vehicle Identification Number

The identification number is the first line of numbers and letters appearing on the Rating Plate (Fig. 1). The first letter and two numbers indicate the truck model and series (the letter prefix identifies the type of body or cab and the numbers are the first two numbers of a truck series). The letter following the truck series code designates the engine identification code. The letter following the engine identification code indicates the assembly plant at which the vehicle was built. The remaining numbers indicate the consecutive unit number. The charts that follow list the various vehicle identification number codes.

Vehicle Data

The Vehicle Data appears on the Rating Plate on the two lines following the

identification number. The first three digits under W.B. designate the wheelbase in inches. the one or two letters under **COLOR** identify the exterior paint color (two letters designate a two-tone). The letter and three digits under **MODEL** designate the truck model within a series. The letter and numerals under **BODY** designate the interior trim and body type (the letter identifies the interior trim scheme and the numerals identify the body or cab type). The transmission installed in the vehicle is identified under **TRANS** by either a numeric or alphabetical code (if two symbols appear, the first identifies the auxiliary transmission, if so equipped, and the second symbol identifies the main transmission). A letter and a number or two numbers under **AXLE** identify the rear axle ratio (when required, a letter is also stamped behind the rear axle code to identify the front axle capacity). The maximum gross vehicle weight in pounds is stamped under **MAX. G.V.W.** Following **MAX. G.V.W.**, the horsepower rating of the engine with

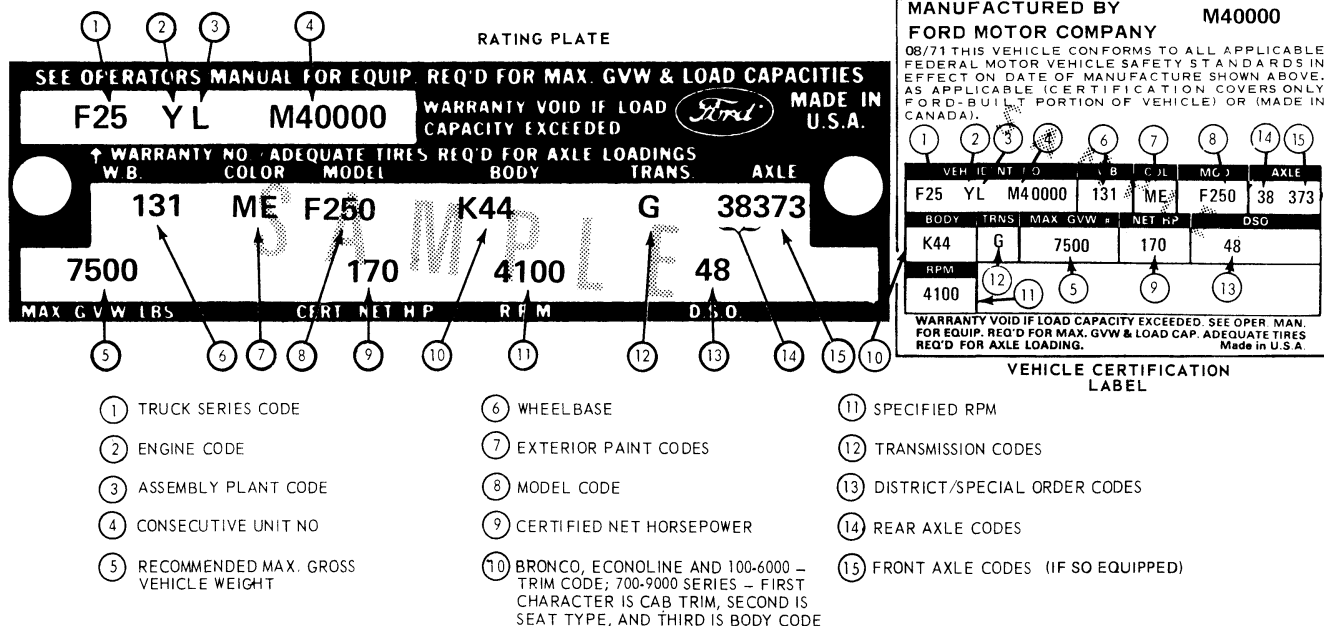


FIG. 1 Typical Truck Rating Plate and Vehicle Certification Label

which the vehicle is equipped is stamped under **CERT. NET H.P.** and the rpm required to develop the given horsepower is stamped under **R.P.M.** Two-digit number is stamped under **D.S.O.** to identify the district which ordered the vehicle. If the vehicle is built to special order (Domestic Special Order, Foreign Special Order, Limited Production Option, or other special order), the complete order number will also appear under **D.S.O.** The charts that follow list the various vehicle data codes.

W.B. (WHEELBASE)

The wheelbase in inches is entered in this space.

MAX. G.V.W. LBS

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

CERT. NET H.P.

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

SPECIFIED RPM

The rpm required to develop the certified net horsepower is marked at this location.

D.S.O.

If vehicle is built on a **D.S.O., F.S.O., L.P.O.** (special orders) the complete order number will be reflected under the **D.S.O.** space including the District Code Number.

MODEL DESIGNATION (FIRST 3 CODE SYMBOLS - WARRANTY SERIAL NO. LINE)

U	<u>Bronco</u>	F	Conventional	(Gas)	F-70	F-700
	<u>Basic Series</u>	K	Conventional	(Diesel)	F-75	F-750
U-14	U-100 (Pickup) 4 x 4		Chassis		F-80	L-800
U-15	U-100 (Wagon) 4 x 4	Pick-up	Cab	Basic Series	F-81	L-800
		F-10	F-17	F-100	F-90	L-900
E	<u>Econoline</u>	F-11	F-18	F-100 4 x 4	K-80	L-8000 (Diesel)
	<u>Basic Series</u>	F-25	F-27	F-250	K-81	L-8000
	<u>100 Series</u>	F-26	F-28	F-250 4 x 4	K-90	L-9000
E-11	E-100 Club Wagon	F-35	F-37	F-350	N-60	LN-600
E-12	E-100 Custom Club Wagon				N-61	LN-600
E-13	E-100 Chateau Wagon				N-70	LN-700 (Gas)
E-14	E-100 Regular Van	F-50		F-500	N-75	LN-750
E-15	E-100 Window Van	F-60		F-600	N-80	LN-800
E-16	E-100 Display Van	F-61		F-600	N-90	LN-900
	<u>200 Series</u>	F-65, F-66		F-600 4 x 4	R-60	LN-6000
E-21	E-200 Club Wagon	K-60		F-6000 (Diesel)	R-61	LN-6000
E-22	E-200 Custom Club Wagon	K-61		F-6000 (Diesel)	R-70	LN-7000 (Diesel)
E-23	E-200 Chateau Wagon	K-70		F-7000 (Diesel)	R-80	LN-8000
E-24	E-200 Regular Van	B	Bus	(Gas)	R-81	LN-8000
E-25	E-200 Window Van	J	Bus	(Diesel)	R-90	LN-9000
E-26	E-200 Display Van	B-50		B-500	S-80	LNT-800
	<u>Bus Models</u>	B-60		B-600	S-90	LNT-900 (Gas)
E-27	E-200 Standard	B-61		B-600	W-90	LNT-8000
E-28	E-200 Custom	B-70		B-700	W-90	LNT-9000 (Diesel)
E-29	E-200 Chateau	B-75		B-750	C-60	C-600
E-30	Camper	B-70		B-700	C-61	C-600
	<u>300 Series</u>	J-70		B-7000 (Diesel)	C-70	C-700 (Gas)
E-31	E-300 Club Wagon	P	Parcel	(Gas)	C-75, C-76	C-750
E-32	E-300 Custom Club Wagon	G	Parcel	(Diesel)	C-80	C-800
E-33	E-300 Chateau Wagon	P-35		P-350	C-90	C-900
E-34	E-300 Regular Van	P-40		P-400	D-60	C-6000
E-35	E-300 Window Van	P-50		P-500	D-70	C-7000 (Diesel)
E-36	E-300 Display Van	P-60		P-600 (DSO)	D-80	C-8000
	<u>Bus Models</u>	G-50		P-5000 (Diesel)	T-80	LT-800
E-37	E-300 Standard		Motor Home	(Gas)	T-90	LT-900 (Gas)
E-38	E-300 Custom	M-35		M-350 (DSO)	U-80	LT-8000
E-39	Chateau	M-40		M-400 (DSO)	U-90	LT-9000 (Diesel)
		M-50		M-500 (DSO)	L-80	CT-800
					L-90	CT-900 (Gas)
					Q-80	CT-8000 (Diesel)
					Z-90	W-9000
					X-90	WT-9000 (Diesel)

TRUCK SERIES CODE, MODEL CODE, RECOMMENDED GROSS VEHICLE WEIGHT
HEAVY AND EXTRA HEAVY TRUCK

SERIES	MODEL CODE	GVW (lbs.)
LT-8000	U-813	56,000
	U-814	62,000
LTS-8000	Y-800	39,000
	Y-801	27,000
	Y-802	42,000
	Y-803	43,000
	Y-804	46,000
	Y-805	50,000
	Y-806	50,000
	Y-807	52,000
	Y-808	54,000
	Y-809	56,000
	Y-810	56,000
	Y-811	58,000
	Y-812	60,000
	Y-813	62,000
	Y-814	64,000
	Y-815	43,000
	Y-816	42,000
Y-817	39,000	
LNT-8000	W-800	39,000
	W-801	27,000
	W-802	42,000
	W-803	43,000
	W-804	45,000
	W-805	46,000
	W-806	50,000
	W-807	50,000
	W-808	54,000
	W-809	43,000
	W-810	42,000
CT-8000 ⊕	Q-800	43,000
	Q-801	27,000
	Q-802	39,000
	Q-803	45,000
	Q-804	49,000
	Q-805	41,000
	Q-806	51,000
L-900	F-900	25,500
	F-901	24,000
	F-902	27,500
	F-903	29,000
	F-904	30,000
	F-905	31,000
	F-906	32,000
	F-907	33,000
	F-908	34,000
	F-909	35,000
	F-910	33,000
F-911	27,500	
LN-900	N-900	25,500
	N-901	24,000
	N-902	27,500
	N-903	29,000
	N-904	30,000
	N-905	31,000
	N-906	32,000
	N-907	33,000
	N-908	34,000
	N-909	35,000
N-910	31,000	
C-900	C-900	27,000
	C-901	20,000
	C-902	24,000
	C-903	26,000
	C-904	27,500
	C-905	30,000
	C-906	31,000
	C-907	32,000
	C-908	32,000
	C-909	33,000
	C-910	34,000
	C-911	34,000
	C-912	36,000
C-913	31,000	
LT-900	T-900	39,000
	T-901	27,000

SERIES	MODEL CODE	GVW (lbs.)
LT-900	T-902	41,000
	T-903	42,000
	T-904	43,000
	T-905	45,000
	T-906	46,000
	T-907	50,000
	T-908	50,000
	T-909	54,000
	T-910	56,000
	T-911	60,000
	T-912	43,000
	T-913	46,000
	LTS-900	V-900
V-901		27,000
V-902		42,000
V-903		43,000
V-904		46,000
V-905		50,000
V-906		50,000
V-907		52,000
V-908		54,000
V-909		56,000
V-910		56,000
V-911		58,000
V-912		60,000
V-913		62,000
LNT-900	S-900	39,000
	S-901	27,000
	S-902	41,000
	S-903	42,000
	S-904	43,000
	S-905	45,000
	S-906	46,000
	S-907	50,000
	S-908	50,000
	S-909	54,000
	S-910	43,000
	S-911	42,000
	S-912	39,000
	S-913	46,000
CT-900	L-900	39,000
	L-901	27,000
	L-902	30,000
	L-903	41,000
	L-904	43,000
	L-905	45,000
	L-906	47,000
	L-907	49,000
	L-908	49,000
	L-909	51,000
	L-910	39,000
	L-911	43,000
L-912	41,000	
L-9000	K-900	27,500
	K-901	24,000
	K-902	32,000
	K-903	34,000
	K-904	35,000
	K-905	32,000
K-906	34,000	
LN-9000	R-900	27,500
	R-901	24,000
	R-902	32,000
	R-903	34,000
	R-904	35,000
R-905	35,000	
W-9000 ⊕	Z-900	32,000
	Z-901	26,000
	Z-902	34,000
	Z-903	36,000
LT-9000	U-900	43,000
	U-901	27,000
	U-902	45,000
	U-903	46,000

SERIES	MODEL CODE	GVW (lbs.)
LT-9000	U-904	50,000
	U-905	50,000
	U-906	54,000
	U-907	56,000
	U-908	60,000
	U-909	43,000
	U-910	45,000
	U-911	52,000
	U-912	56,000
	U-913	62,000
LTS-9000	Y-900	43,000
	Y-901	27,000
	Y-902	46,000
	Y-903	50,000
	Y-904	50,000
	Y-905	52,000
	Y-906	54,000
	Y-907	56,000
	Y-908	56,000
	Y-909	58,000
	Y-910	60,000
	Y-911	62,000
	Y-912	64,000
	Y-913	43,000
Y-914	46,000	
Y-915	50,000	
Y-916	66,000	
Y-917	68,000	
Y-918	70,000	
LNT-9000	W-900	41,000
	W-901	27,000
	W-902	45,000
	W-903	46,000
	W-904	50,000
	W-905	50,000
	W-906	54,000
	W-907	43,000
	W-908	43,000
	W-909	41,000
W-910	46,000	
WT-9000 ⊕	X-900	41,000
	X-901	32,000
	X-902	45,000
	X-903	49,000
B-700	B-700	20,500
	B-701	17,000
	B-702	21,000
	B-703	22,500
	B-704	23,000
	B-705	24,000
	B-706	25,500
	B-707	23,000
	B-708	23,000
B-709	22,000	
B-7000	J-700	20,500
	J-701	17,000
	J-703	22,500
	J-704	23,000
	J-705	24,000
	J-706	25,500
	J-707	23,000
	J-708	23,000
	J-709	22,000
B-750	B-750	22,500
	B-751	17,000
	B-752	23,000
	B-753	24,000
	B-754	25,500
	B-755	23,000
B-756	23,000	
⊕ Special Order.		

ENGINE CODES BRONCO-ECONO-CLUB WAGONS-PARCEL-SCHOOL BUS-LT & MED TRUCKS			
Code	CID	Engine	Cyl.
F	Gas	170-1V	6
G		302-2V	8
A	Gas	240-1V	6
G		302-2V	8
A	Gas	240-1V	6
B		300-1V	6
G		302-2V	8
Y		360-2V	8
H		390-2V	8
B	Gas	300-1V	6
B	(600 Series)	300-1V H.D.	6
C		330-2V	8
D		330-2V H.D.	8
E		361-2V	8
U	Diesel	522 (V 150)	8
V		522 (V-175)	8
A	Gas	240-1V	6
B		300-1V	6
K	Diesel (Detroit)	353N	3 (DSO)
1	Gas	240-1V	6
2		300-1V H.D.	6
3		302-2V	8
4		330-2V H.D.	8
8		360-2V	8
5		361-2V	8
Heavy and Extra Heavy Truck-Series 700 through 9000 LN 500-9000 and C-500-900			
Code	Cylinders	Engine C.I.D.	
A	6	240-1V	
B	6	300-1V	
C	8	330-2V M.D.	
D	8	330-2V H.D.	Gas

Consecutive Unit Numbers--
The starting serial number M40000 will be used for all the 1972 Trucks.

1971 CALENDAR YEAR

August (1971 Model)	M20,000 thru M29,999
August	M40,000 thru M59,999
September	M60,000 thru M79,999
October	M80,000 thru M99,999
November	N00,000 thru N19,999
December	N20,000 thru N39,999

ASSEMBLY PLANTS CODE LETTERS

Code	Assembly Plant
C	Ontario Truck
E	Mahwah
H	Lorain
K	Kansas City
L	Michigan Truck

AUXILIARY TRANSMISSION CODE

CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION
2	Spicer 5831D	5	Spicer 8341C	C	Fuller 3K65
3	Spicer 7231B	6	Spicer 8031C	D	Fuller 4E75
4	Spicer 7231D	8	Spicer 7041		
Heavy and Extra Heavy Truck-Series 700 Through 9000 LN 500-9000 and C-500-900					

Heavy and Extra Heavy Truck-Series 700 Through 9000 LN-500-9000 and C-500-900			
Code	Cylinders	Engine C.I.D.	
E	8	361-2V	
F	8	391-4V	
H	8	401-4V	
K	8	477-4V	Gas
L	8	534-4V	
U	8	330-2V H.D.	Liquid
W	8	361-2V	Propane
9	8	534-4V	Gas
X	8	391-4V	(DSO)
1	6	240-1V	
3	8	330-2V M.D.	Gas
4	8	330-2V H.D.	Low
5	8	361-2V	Compression
B		903 Cummins-V903-320	
C		636 Caterpillar-V8-225	
D		855 Cummins NTC-270	
E		903 Cummins-V903-270	
F		855 Cummins-NHCT-270	
G		903 Cummins V903-290	
J		855 Cummins-NHC-250	
K		855 Cummins-NHCT-270	
L		855 Cummins-NHCT-270	
M		855 Cummins-NTC-260	
N		855 Cummins NTC-280	
P		855 Cummins-NTC-300	
Q		855 Cummins-NTC-320	
R		855 Cummins-NTC-335	Diesel
T		568 Detroit 8V-71N	
U		522 Caterpillar V8-150	
V		522 Caterpillar V8-175	
W		855 Cummins-NTC-290	
X		927 Cummins-N927	
Y		927 Cummins-N927	
Z		927 Cummins-N927	
1		855 Cummins-NH-230	
2		426 Detroit 6-71N	
3		638 Caterpillar 1674	
4		573 Caterpillar-V8-200	
5		855 Cummins NHCT-270	
6		568 Detroit 8V-71N	
7		568 Detroit 8V-71NE	
8		318 Detroit 6V-53N	
9		555 Cummins V-8	

1972 CALENDAR YEAR

January	N40,000 thru N59,999
February	N60,000 thru N79,999
March	N80,000 thru N99,999
April	P00,000 thru P19,999
May	P20,000 thru P39,999
June	P40,000 thru P59,999
July	P60,000 thru P69,000

ASSEMBLY PLANTS CODE LETTERS

Code	Assembly Plant
N	Norfolk
P	Twin Cities
R	San Jose
S	Allen Park
V	Kentucky Truck

EXTERIOR PAINT COLOR CODES

Code	Color	M-30J/M-32J Spec. No.	Code	Color	M-30J/M-32J Spec. No.
2	Maroon	3059-A	Z	Lt. Copper Metallic	5035-HS
M	White	1619-A	3	Med. Bright Aqua	5006-A
C	Spec. White	1525-A	F	Lt. Green	5058-A
1	Caiypso Coral	1730-A	P	Med. Green Metallic	3462-HS
T	Candyapple Red	2008-A	L	Dk. Green	1237-A
J	Rangoon Red	1515-A	R	Lt. Aqua	3066-A
E	Med. Blue Metallic	5087-HS	S	Med. Turquoise	5054-A
N	Platinum	921-A	V	Dk. Green	5005-A
B	Lt. Blue	3029-A	D	Lt. Yellow	3439-A
7	Med. Blue	2098-A	Y	Med. Mallard Green Metallic	5019-HS
W	Med. Blue Metallic	5108-HS	K	Med. Goldenrod Yellow	3492-A
6	Bright Med. Blue	5004-A	G	Chrome Yellow	1526-A
Q	Lt. Yellow Green	5060-A	H	Med. Beige	3569-A
K	Med. Ivy Green	3151-A	W	Lt. Ginger Metallic	3516-HS
9	Prime	M6J-102B (red) M6J-103B (gray)	5	Brt. Yellow	3470-A
			O	Med. Metallic Green	5187-HS
			R	Med. Metallic Ginger	5186-HS

CLUB WAGON INTERIOR TRIM CODES

13, 14, 15	Lt. Gray/Black Vinyl
23, 24, 25	Lt. Blue/Med. Blue Vinyl or Cloth and Vinyl
33, 34, 35	Lt. Ginger/Med. Ginger Vinyl or Cloth and Vinyl
43, 44, 45	Lt. Green/Med. Green Vinyl or Cloth and Vinyl

ECONOLINE INTERIOR TRIM CODES

1, 11, 12	Lt. Gray/Black Vinyl
2, 21, 22	Lt. Blue/Med. Blue Vinyl
3, 31, 32	Lt. Ginger/Med. Ginger Vinyl
4, 41, 42	Lt. Green/Med. Green Vinyl
26, 27, 28	Lt. Blue/Med. Blue Vinyl
36, 37, 38	Lt. Ginger/Med. Ginger Vinyl
46, 47, 48	Lt. Green/Med. Green Vinyl
B, B1	Lt. Blue/Med. Blue Vinyl
C, C1, C2	Lt. Ginger/Med. Ginger Vinyl
D, D1, D3	Lt. Green/Med. Green Vinyl

LIGHT AND MEDIUM TRUCK TRIM CODES

4, 4B, 4C, 43, D, DB, M3, MB, UB	Black Vinyl
M, U	Black Cloth and Vinyl
2, 23, B, K3	Lt. Blue/Med. Blue Vinyl
2, 23	Med. Blue Cloth and Vinyl
KB, SB, 2B, 2C, BB	Black with Blue Vinyl
5, 53, E, N3	Red/Dk. Red Vinyl
N, V	Dk. Red Cloth and Vinyl
5B, 5C, EB, NB, VB	Black with Red Vinyl
6, 63, F, 03	Lt. Green/Med. Green Vinyl
O, W	Med. Green Cloth and Vinyl
6B, 6C, FB, OB, WB	Black with Green Vinyl
3, 33, C, L3	Pastel Parchment Vinyl
L, T	Light and Pastel Parchment Cloth and Vinyl
3B, 3C, CB, LB, TB	Black with parchment Vinyl

BRONCO INTERIOR TRIM CODES

3, 34	Pastel Parchment Vinyl
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HEAVY TRUCK TRIM CODES

4, D, D3, DC, 43, 4C, 4A, 4B, 41, 42, D2, DB, 46, D6, 4F, DF	Black Vinyl	CB	Black with Parchment Vinyl
B2	Lt. and Med. Blue Vinyl	11	Med. Gray Vinyl
E2	Red and Dk. Red Vinyl	11	Lt. Gray Vinyl
F2	Lt. Green/Med. Green Vinyl	12, A2	Lt. and Med. Gray Vinyl
C2	Pastel Parchment Vinyl	13, 1C, A3, AC, 14, 1D, A4, AD, 15, 1E, A5, AE	Med. Gray Vinyl
BB	Black with Blue Vinyl	A2	Gray Multicolor and Lt. Gray Vinyl
EB	Black with Red Vinyl	G4, G5, G7, GD, GE, GG	Ginger (Saddle) Vinyl
FB	Black with Green Vinyl		

**RATING PLATE "BODY" TYPE CODE
ECONOLINE-VANS & CLUB WAGONS**

CUSTOM	STANDARD	CAB/TRIM	VAN SEATS	WAGON SEATS
B	1	GRAY/BLACK	1 STATIONARY PASSENGER	3 FIRST & SECOND ROW - 5 PASSENGER
C	2	BLUE	2 FLIP PASSENGER	4 FIRST, SECOND & THIRD ROW - 8 PASSENGER
D	3	GINGER	6 DELUXE DRIVER	5 FIRST, SECOND, THIRD & FOURTH ROW - 12 PASSENGER
	4	GREEN	7 DELUXE DRIVER & DELUXE STATIONARY PASSENGER	
			8 DELUXE DRIVER & FLIP PASSENGER	

LIGHT & MEDIUM TRUCK - 100 Thru 6000 and Bronco

CUSTOM	RANGER	RANGER XLT	STD.	COLOR CAB/TRIM
B	K	S	2	BLUE
C	L	T	3	PARCHMENT
D	M	U	4	BLACK
E	N	V	5	RED
F	O	W	6	GREEN

H.D. VINYL	BRONCO REAR SEAT	STD.	SEATS
B	-	2	BENCH SEAT
C	-	3	FOAM CUSHION
-	4		BRONCO REAR SEAT

BODY TYPE	
0	PARCEL
3	FLARESIDE PICK-UP
4	STYLESIDE PICK-UP
5	PLATFORM STAKE
6	WINDSHIELD
7	COWL
8	CHASSIS CAB
9	PLATFORM

Seat Codes				Description
HD Black Vinyl	Driver w/Companion	Single Driver	Full Width	
A	-	-	1	Full Width
B	-	-	2	Full Width - Custom
-	C	3	-	L-S Unison
-	D	4	-	L-S No. 675
-	E	5	-	Bostrom Westcoaster
-	F	6	-	Bostrom T-Bar
-	G ①	7	-	National Cush-In-Aire
-	H	8	-	Bostrom Level Air

① w/Lear Siegler companion seat.

**FRONT AXLE CODES
LIGHT AND MEDIUM TRUCKS**

CODE	Weight	Configuration
A	5,000	Ford
B	5,500	
C	6,000	
D	7,000	
K	3,500	DANA 6CF HD
L	3,000	DANA 44 LOCK

Medium & Heavy Trucks (Except F-B-500-600, 6000)					
CODE			CODE		
Manual	Power	Description	Manual	Power	Description
1	J	5000 lb.	7	P	12,000 lb.
2	K	5500 lb.	8	-	12,000 lb. Steer Ease
3	L	6000 lb.	9	R	15,000 lb.
4	M	7000 lb.	-	S	16,000 lb.
5	N	9000 lb.	-	T	18,000 lb.
6	-	12,000 lb Center Point	-	U	20,000 lb.
			-	Z	DSO Front Axle

DISTRICT CODES				FORD OF CANADA	
11 BOSTON	42 CLEVELAND	72 SAN JOSE			
12 BUFFALO	43 MILWAUKEE	73 SALT LAKE CITY			
13 NEW YORK	46 INDIANAPOLIS	74 SEATTLE			
14 PITTSBURGH	47 CINCINNATI	75 PHOENIX			
15 NEWARK	48 DETROIT	76 DENVER			
16 PHILADELPHIA	52 DALLAS	83 GOVERNMENT			
17 WASHINGTON	53 KANSAS CITY	84 HOME OFFICE RESERVE			
21 ATLANTA	54 OMAHA	85 AMERICAN RED CROSS			
22 CHARLOTTE	55 ST. LOUIS	89 TRANSPORTATION SERVICES			
23 MEMPHIS	56 DAVENPORT	87 BODY COMPANY			
24 JACKSONVILLE	57 HOUSTON	90's EXPORT			
28 LOUISVILLE	58 TWIN CITIES				
41 CHICAGO	71 LOS ANGELES				
				NOTE: EXPORT ALPHABETICAL I	

TRANSMISSION CODES

Code	Description	Code	Description
Bronco		Light, Medium and Heavy Truck, Parcel Delivery and School Bus (Cont'd.)	
C	3 Speed Manual	O	Fuller T-905B 5 Speed
Econoline—Club Wagon		P	Warner T-19 4 Speed
C	3 Speed Manual	Q	Spicer 5652 5 Speed
G	Automatic	R	Spicer 8716
Light, Medium and Heavy Truck, Parcel Delivery and School Bus		S	Spicer 5756-B 5 Speed
A	New Process 435 4 Speed	T	New Process 542 FO 5 Speed
B	Warner T-85 Overdrive 3 Speed	T	Fuller RTO-9509 B 9 Speed
B	Spicer P8516 Overdrive	U	Spicer 6852G 5 Speed
C	Ford-Manual 3 Speed	V	Fuller RT-910
C	Fuller RT-610 10 Speed	W	Spicer 6352B 5 Speed
D	Warner T-89F 3 Speed	X	Fuller T-905A 5 Speed
D	Clark 387 V 5 Speed	Y	Transmatic MT-41 6 Speed
E	Warner T-87G 3 Speed	Z	Transmatic MT-40 6 Speed
E	Fuller 5 H74 5 Speed	1	Spicer 8552A 5 Speed
F	Fuller 5HA74 5 Speed	1	Transmatic MT-42 6 Speed
F	Warner T-18 4 Speed	2	Clark 282V 5 Speed
G	C-4 Automatic	3	Fuller RT-906
G	Clark 380 Overdrive 5 Speed	4	Clark 280 VO 5 Speed
J	Fuller RTO 9513	5	Fuller RTO-910
K	Spicer 6453A 5 Speed	6	Fuller RTO-915
L	Allison AT540	7	Clark 385V 5 Speed
M	Clark 285V 5 Speed	9	Fuller RT-915
N	Spicer 6352 5 Speed	9	New Process 542 FD 5 Speed
O	New Process 542FL 5 Speed		

BRONCO-ECONOLINE AXLE CODES

Bronco				Econoline							
Code	Ford 2780 Lb.	Code	Ford 3300 Lb.	Code	Ford 3050 Lb.	Code	Ford 3300 Lb.	Code	Dana 5050 Lb.	Code	Limited Slip Dana 5050 Lb.
03	4.11			11	3.50	08	3.50	71	3.54	G1	3.54
A3	4.11 Lock	A5	4.11 Lock	12	3.70	05	4.11	72	3.73		
04	4.57			10	3.25			73	4.10	G3	4.10
18	3.50	B9	3.50 Lock			17	3.25				
B8	3.50 Lock					09	3.70				

F-100 THRU 350 LIGHT TRUCK AXLE CODES

Code	Dana 5250 Lb.	Code	Limited Slip Dana 5250 Lb.	3330 Lb. Ford	3300 Lb. Ford Limited Slip	3600 Lb. Ford Limited Slip	7400 Lb. Dana 70	7400 Lb. Dana 70 Limited Slip
37	3.54	C7	3.54	17-3.25			27-4.10	D7-4.10
38	3.73			08-3.50		H2-3.50	28-4.56	
24	4.10	C8	3.73	09-3.70		H3-4.09		
25	4.56	B4	4.10	05-4.11	A2-3.70		36-3.73	
				02-3.00			22-4.88	

P- AND M-SERIES AXLE CODES

5200 Lb. Dana 60	7400 Lb. Dana 70	13000 Lb. Rockwell D-100
24-4.10	22-4.88	42-6.20
25-4.56	28-4.56	44-6.80

F & B 500 THRU 6000 AXLE CODES

13000 Lb. Rockwell D-100	15000 Lb. Rockwell F-106	15000 Lb. 2 SPD Eaton 15201	17500 Lb. Rockwell H-170	17500 Lb. 2 SPD Eaton 16244
41-5.83	62-6.20	F1-5.14/7.17	52-5.86	E1-5.57/7.75
42-6.20	64-6.80	F2-5.83/8.12	53-6.14	E2-6.17/8.58
	66-7.20	F3-6.33/8.81	54-6.83	E3-6.50/9.04
			55-7.17	

REAR AXLE CODE (2780-lb. to 7400-lb. Capacity)

Code	Description	Ratio	Code	Description	Ratio	Code	Description	Ratio
A2	Ford 3300 Ⓢ	3.70	04	Ford 2780	4.57	24	Dana 60 (5200)	4.10
A3	Ford 2780 Ⓢ	4.11	05	Ford 3300	4.11	25	Dana 60 (5200)	4.36
A5	Ford 3300 Ⓢ	4.11	08	Ford 3300	3.50	27	Dana 70	4.10
B4	Dana 60 Ⓢ (5200)	4.10	09	Ford 3300	3.70	28	Dana 70	4.36
B8	Ford 2780 Ⓢ	3.50	10	Ford 3050	3.25	71	Dana 60 (5050)	3.34
B9	Ford 3300 Ⓢ	3.50	11	Ford 3050	3.50	72	Dana 60 (5050)	3.73
C7	Dana 60 Ⓢ (5200)	3.54	12	Ford 3050	3.70	73	Dana 60 (5050)	4.10
C8	Dana 60 Ⓢ (5200)	3.73	02	Ford 3300	3.00	36	Dana 70	3.73
D7	Dana 70 Ⓢ	4.10	17	Ford 3300	3.25	37	Dana 60 (5200)	3.34
H2	Ford 3600 Ⓢ	3.50	18	Ford 2780	3.50	38	Dana 60 (5200)	3.73
H3	Ford 3600 Ⓢ	4.09	22	Dana 70	4.88			
03	Ford 2780	4.11	23	Dana 70	5.13			

Ⓢ Limited-Slip or Traction-Lok

REAR AXLE CODE (11,000-lb to 18,500-lb. Capacity)

Code	Description	Ratio	Code	Description	Ratio	Code	Description	Ratio
E1	Eaton 16244	5.57/7.75	FQ	Eaton 17121	6.14	42	Rockwell D-100	6.20
E2	Eaton 16244	6.17/8.58	GQ	Eaton 17121	6.50	44	Rockwell D-100	6.80
E3	Eaton 16244	6.50/9.04	HQ	Eaton 17121	7.17	52	Rockwell H-170	5.86
F1	Eaton 15201	5.14/7.17	JQ	Eaton 17121	7.60	53	Rockwell H-170	6.34
F2	Eaton 15201	5.83/8.12	32	Rockwell C-100	6.20	54	Rockwell H-170	6.83
F3	Eaton 15201	6.33/8.81	34	Rockwell C-100	6.80	55	Rockwell H-170	7.37
EH	Eaton 17221	5.57/7.60	31	Rockwell C-100	5.83	62	Rockwell F-106	6.20
FH	Eaton 17221	6.14/8.38	40	Rockwell D-100	5.29	64	Rockwell F-106	6.80
GH	Eaton 17221	6.50/8.87	41	Rockwell D-100	5.83	66	Rockwell F-106	7.20
HH	Eaton 17221	7.17/9.77						

REAR AXLE CODE (22,000-lb and 23,000-lb. Single-Axle)

Code	Description	Ratio	Code	Description	Ratio	Code	Description	Ratio
DB	Eaton 18221	5.57/7.60	HG	Eaton 19121	4.56	H2	Rockwell R-171	4.33
EB	Eaton 18221	6.14/8.38	DK	Eaton 18121	6.50	H3	Rockwell R-171	4.63
FB	Eaton 18221	6.50/8.87	EK	Eaton 18121	7.17	H4	Rockwell R-171	4.38
GB	Eaton 18221	7.17/9.77	GK	Eaton 18121	7.60	H5	Rockwell R-171	5.29
AG	Eaton 19121	4.11	AP	Eaton 19221	4.33/5.90	H6	Rockwell R-171	5.36
BG	Eaton 19121	4.33	CP	Eaton 19221	5.43/7.39	H7	Rockwell R-171	6.14
CG	Eaton 19121	4.88	DP	Eaton 19221	6.17/8.40	H9	Rockwell R-171	3.70
DG	Eaton 19121	5.43	EP	Eaton 19221	6.67/9.08	Y4	Rockwell R-302	6.42/8.38
EG	Eaton 19121	6.17	GP	Eaton 19221	4.11/5.60	Y5	Rockwell R-302	7.09/9.07
FG	Eaton 19121	6.67	H1	Rockwell R-171	4.11	P5	Rockwell RT-241	7.21

TANDEM REAR AXLE CODES

Code	Description	Ratio	Code	Description	Ratio	Code	Description	Ratio
EC	Eaton 30DSC	6.50	GF	Eaton 34DSE	6.14	HW	Eaton 34DET	7.17/9.77
FC	Eaton 30DSC	7.17	HF	Eaton 34DSE	6.50			
GC	Eaton 30DSC	7.60	MF	Eaton 34DSE	7.17			
JF	Eaton 34DSC	4.11	KF	Eaton 34DSE	7.60			
BF	Eaton 34DSC	4.33	LF	Eaton 34DSC	3.70			
CF	Eaton 34DSC	4.56	FW	Eaton 34DTE	6.1468.38			
DF	Eaton 34DSC	4.88	GW	Eaton 34DTE	6.50/8.87			
FF	Eaton 34DSC	5.57						

TANDEM REAR AXLE CODES

Code	Description	Ratio	Code	Description	Ratio	Code	Description	Ratio
AJ	Eaton 38DSC	4.56	AV	Eaton 42DPB	7.60	DA	Rockwell SQHD	6.17
BJ	Eaton 38DSC	4.88	CV	Eaton 42DPB	5.05	D1	Rockwell SQHD	4.11
CJ	Eaton 38DSC	5.57	DV	Eaton 42DPB	5.91	D2	Rockwell SQHD	4.44
DJ	Eaton 38DSE	6.14	BA	Rockwell SLHD	3.55	D3	Rockwell SQHD	4.63
EJ	Eaton 38DSE	6.50	B1	Rockwell SLHD	4.11	D4	Rockwell SQHD	5.29
FJ	Eaton 38DSC	4.11	B2	Rockwell SLHD	4.44	D5	Rockwell SQHD	5.83
GJ	Eaton 38DSC	4.33	B3	Rockwell SLHD	4.63	D6	Rockwell SQHD	6.83
HJ	Eaton 38DSC	5.29	B4	Rockwell SLHD	4.88	D7	Rockwell SQHD	7.80
JJ	Eaton 38DSE	7.17	B6	Rockwell SLHD	5.83	D8	Rockwell SQHD	4.88
KJ	Eaton 38DSE	7.60	B7	Rockwell SLHD	6.17	AX	Eaton 50DP	5.61
DN	Eaton 34DPC	6.21	B8	Rockwell SLHD	6.83			
FN	Eaton 34DPC	7.60	B9	Rockwell SLHD	7.80			
GN	Eaton 34DPE	8.38	B0	Rockwell SLHD	8.60			
AR	Eaton 38DPC	5.05						
DR	Eaton 38DPC	6.22						
ER	Eaton 38DPC	6.65						
FR	Eaton 38DPC	7.60						

FORD TRUCK SERIES DESIGNATIONS

Prefix	Series Numbers	Series	Prefix	Series Numbers	Series
U	100	Bronco	LNT	800 and 900	93.3" BBC Conventional Tandem-Gas
R	100 thru 300	Econoline Van	LNT	8000 and 9000	93.3" BBC Conventional Tandem-Diesel
F	100 thru 750	Conventional-Gas	C	500 thru 900	Tilt Cab-Gas
F	6000 and 7000	Conventional-Diesel	C	6000 thru 8000	Tilt Cab-Diesel
L	800 and 900	Conventional-Gas	CT	800 and 900	Tilt Cab Tandem-Gas
L	8000 and 9000	Conventional-Diesel	*CT	8000	Tilt Cab Tandem-Diesel
LT	800 and 900	Conventional Tandem-Gas	W	9000	Hi-Tilt Tractor-Diesel
LT	8000 and 9000	Conventional Tandem-Diesel	WT	9000	Hi-Tilt Tractor-Diesel
LTS	800 and 900	46" BA Conventional Tandem-Gas	B	500 thru 750	School Bus Chassis-Gas
LTS	8000 and 9000	46" BA Conventional Tandem-Diesel	B	6000 and 7000	School Bus Chassis-Diesel
LN	500 thru 750	95.3" BBC Conventional-Gas	P	350 thru 500	Parcel Delivery-Gas
LN	800 and 900	93.3" BBC Conventional-Gas	*P	600	Parcel Delivery-Gas
LN	6000 and 7000	95.3" BBC Conventional-Diesel	P	3500 thru 500	Parcel Delivery-Diesel
LN	8000 and 9000	93.3" BBC Conventional-Diesel	M	350 thru 500	Motor Home Chassis-Gas

*Special Order

CLUB & CHATEAU WAGON

CLUB		CUSTOM CLUB		CHATEAU	
Series	Code	Series	Code	Series	Code
E-100	E-110	E-200	E-223	E-200	E-233
E-200	E-210		E-224		E-234
	E-213		E-225		E-235
	E-211	E-300	E-321	E-300	E-331
	E-212		E-324		E-334
	E-214		E-325		E-335
	E-215		E-323		E-333
E-300	E-310		E-322		E-332
	E-311		E-326		E-336
	E-314				
	E-315				
	E-313				
	E-312				
	E-316				

MODEL CODES AND GROSS VEHICLE WEIGHT

BRONCO	
Code	GVW
U-140 Pickup	4300
U-141 Pickup	4500
U-142 Pickup	4900
U-150 Wagon	4300
U-151 Wagon	4500
U-152 Wagon	4900

CLUB WAGON BUS MODELS, MODEL CODES AND GROSS VEHICLE WEIGHT

CLUB			CUSTOM CLUB			CHATEAU			CUTAWAY CAMPER		
Series	Model Code	GVW	Series	Model Code	GVW	Series	Model Code	GVW	Series	Model Code	GVW
E-200	E-272	5,400	E-200	E-285	6,000	E-200	E-295	6,000	E-300	E-300	8,300
	E-275	6,000									
E-300	E-371	6,800	E-300	E-381	6,800	E-300	E-391	6,800	E-300	E-300	8,300
	E-376	6,800		E-386	6,800		E-396	6,800			
	E-372	7,500		E-382	7,500		E-392	7,500			
	E-373	7,600		E-383	7,600		E-393	7,600			
	E-374	7,800		E-384	7,800		E-394	7,800			
	E-375	7,800		E-385	7,800		E-395	7,800			

ECONOLINE

Series	Model Code	GVW	Series	Model Code	GVW	Series	Model Code	GVW
E-100	E-140	4,300	E-200	E-253	5,250	E-300	E-350	6,050
	E-141	4,600		E-254	5,450		E-351	6,200
	E-142	4,800		E-255	6,000		E-352	6,800
	E-150	4,300		E-260	5,250		E-353	7,000
	E-151	4,600		E-261	5,450		E-354	7,500
	E-152	4,800		E-262	6,000		E-355	7,700
	E-160	4,300		E-263	5,250		E-356	8,300
	E-161	4,600		E-264	5,450		E-357	7,500
	E-162	4,800		E-265	6,000		E-358	7,700
E-200	E-240	5,250	E-300	E-340	6,050	E-360	6,050	
	E-241	5,450		E-341	6,200	E-361	6,200	
	E-242	6,000		E-342	6,800	E-362	6,800	
	E-243	5,250		E-343	7,000	E-363	7,000	
	E-244	5,450		E-344	7,500	E-364	7,500	
	E-245	6,000		E-345	7,700	E-365	7,700	
	E-250	5,250		E-346	8,300	E-366	8,300	
	E-251	5,450		E-347	7,500	E-367	7,500	
	E-252	6,000		E-348	7,700	E-368	7,700	

LIGHT & MEDIUM TRUCK MODEL CODES AND GROSS VEHICLE WEIGHT

Series	Pickups	Chassis Cab	GVW	Series	Pickups	Chassis Cab	GVW
F-100 - 4 x 2	F-100	F-170	4,450	F250 - 4 x 2	F254	F-274	7,500
	F-101	F-171	4,550		F-275	8,100	
	F-102	F-172	4,800	F250 - 4 x 4	F-260	F280	6,500
	F-103	F-173	5,000		F-261	F-281	7,100
	F-104	F-174	5,500		F-262	F-282	7,700
	F-105	F-175	5,500		F-263	F-283	7,100
F-100 - 4 x 4	F-110	F-180	5,200	F-264	F-284	7,700	
	F-111	F-181	5,600	F-350 - 4 x 2	F-350	F-370	6,600
	F-112	F-182	5,200		F-351	F-371	8,000
	F-113	F-183	5,600		NA	F-372	8,300
F-250 - 4 x 2	F-250	F-270	6,200		NA	F-373	9,000
	F-251	F-271	6,900		NA	F-374	10,000
	F-252	F-272	7,500		NA	F-375	10,000
	F-253	F-273	8,100	NA	F-376	9,000	

Series	Model Code	GVW
F-500	F-500	15,000
	F-501	10,100
	F-502	16,000
	F-503	17,000
	F-504	18,000
	F-505	20,000
F-600	F-600	19,500
	F-601	15,000
	F-602	20,000
	F-603	17,000
	F-610	21,000
	F-611	22,000
	F-612	23,000
	F-613	23,000
	F-614	23,000
	F-615	24,000
	F-616	19,700
	F-617	20,000
F-618	17,990	
F-600 4 x 4	F-650	16,000
	F-651	15,000
	F-652	17,000
	F-653	18,000
	F-660	20,000
	F-661	20,000
	F-662	24,000
	F-663	24,000
F-6000 - Diesel	K-600	20,000
	K-601	15,000

Series	Model Code	GVW
F-6000 - Diesel	K-602	19,500
	K-603	17,000
	K-610	21,000
	K-611	22,000
	K-612	23,000
	K-613	23,000
	K-614	23,000
	K-615	24,000
	K-616	19,700
	B-500 - Bus	B-500
B-501		10,100
B-502		16,000
B-503		17,000
B-504		18,000
B-505		20,000
B-600 - Bus	B-600	19,500
	B-601	15,000
	B-602	20,000
	B-603	17,000
	B-610	21,000
	B-611	22,000
	B-612	23,000
	B-613	24,000
P-350 - Parcel	P-350	8,000
	P-351	6,100
	P-352	6,500
	P-353	8,000
P-400 - Parcel	P-400	10,000
	P-402	8,000

Series	Model Code	GVW
P-400 - Parcel	P-403	7,000
P-500 - Parcel	P-500	15,000
	P-501	10,100
	P-503	12,000
DSO P-600 - Parcel	P-600	17,000
	P-601	15,000
	P-602	15,000
	P-603	17,000
DSO P-5000 - Parcel Diesel	G-500	15,000
	G-501	10,100
	G-502	15,000
	G-503	12,000
G-504	12,000	

DSO Motor Home		
M-400	M-400	10,000
	M-401	10,000
	M-402	8,000
M-500	M-501	13,500
	M-502	13,500
	M-503	12,000
	M-504	12,000

N/A - Not Applicable

TRUCK SERIES CODE, MODEL CODE, RECOMMENDED GROSS VEHICLE WEIGHT
HEAVY AND EXTRA HEAVY TRUCK

SERIES	MODEL CODE	GVW (lbs.)	
LN-600	N-600	19,500	
	N-601	15,000	
	N-602	20,000	
	N-603	17,000	
	N-610	21,000	
	N-611	22,000	
	N-612	23,000	
	N-613	23,000	
	N-614	23,000	
	N-615	24,000	
	N-616	19,700	
	N-617	20,000	
	N-618	17,990	
	C-600	C-600	20,000
		C-601	15,000
		C-610	21,000
		C-611	22,000
C-612		23,000	
C-613		23,000	
C-614		23,000	
C-615		19,700	
I.N-6000		R-600	20,000
	R-601	15,000	
	R-610	21,000	
	R-611	22,000	
	R-612	23,000	
	R-613	23,000	
	R-614	23,000	
	R-615	24,000	
C-6000	D-600	20,000	
	D-601	15,000	
	D-610	21,000	
	D-611	22,000	
	D-612	23,000	
	D-613	23,000	
	D-614	23,000	
	F-7000	K-700	22,000
K-701		17,000	
K-702		23,000	
K-703		24,000	
K-704		25,500	
K-705		23,000	
K-706		23,000	
K-707		25,500	
K-708		27,500	
K-709		27,500	
LN-7000		R-700	22,000
	R-701	17,000	
	R-702	23,000	
	R-703	24,000	
	R-704	25,500	
	R-705	23,000	
	R-706	23,000	
	R-707	27,500	
	R-708	27,500	
C-7000	D-700	24,000	
	D-701	17,000	
	D-702	25,500	
	D-703	25,500	
	D-704	25,500	
	D-705	27,500	
	D-706	27,500	
	F-700	F-700	22,000
F-701		17,000	
F-702		23,000	
F-703		24,000	
F-704		25,500	
F-705		23,000	
F-706		23,000	
F-707		25,500	
F-708		17,990	
LN-700		N-700	22,000
	N-701	17,000	
	N-702	23,000	

SERIES	MODEL CODE	GVW (lbs.)	
LN-700	N-703	24,000	
	N-704	25,500	
	N-705	23,000	
	N-706	23,000	
	N-707	25,500	
	N-708	25,500	
	C-700	C-700	24,000
		C-701	17,000
C-702		25,500	
C-703		25,500	
C-704		25,500	
C-705		27,500	
F-750	F-750	22,500	
	F-751	17,000	
	F-752	23,000	
	F-753	24,000	
	F-754	25,500	
	F-755	23,000	
	F-756	25,500	
	F-757	23,000	
	F-758	27,500	
	F-759	28,000	
	F-760	27,500	
	F-761	27,500	
	LN-750	N-750	22,500
N-751		17,000	
N-752		23,000	
N-753		24,000	
N-754		25,500	
N-755		23,000	
N-756		25,500	
N-757		23,000	
N-758		25,500	
N-759		25,500	
N-760		27,500	
N-761		27,500	
C-750		C-750	24,000
	C-751	17,000	
	C-752	25,500	
	C-753	25,500	
	C-754	25,500	
	C-755	27,500	
	C-760	27,500	
	C-761	33,000	
	L-800	F-800	23,500
		F-801	20,000
		F-802	24,500
F-803		25,500	
F-804		27,500	
F-805		29,000	
F-806		31,000	
F-807		33,000	
F-808		34,000	
F-809		31,000	
LN-800	N-800	23,500	
	N-801	20,000	
	N-802	24,500	
	N-803	25,500	
	N-804	27,500	
	N-805	29,000	
	N-806	31,000	
	N-807	33,000	
	N-808	34,000	
	N-809	23,500	
	N-810	32,000	
C-800	C-800	27,000	
	C-801	20,000	
	C-802	27,500	
	C-803	27,500	
	C-804	27,500	
	C-805	27,500	
	C-806	27,500	
	LT-800	T-800	37,000
T-801		27,000	
T-802		39,000	

SERIES	MODEL CODE	GVW (lbs.)	
LT-800	T-803	42,000	
	T-804	43,000	
	T-805	45,000	
	T-806	46,000	
	T-807	50,000	
	T-808	43,000	
	T-809	37,000	
	T-810	46,000	
	LTS-800	V-800	39,000
		V-801	27,000
V-802		42,000	
V-803		43,000	
V-804		46,000	
V-805		50,000	
V-806		43,000	
V-807		42,000	
V-808	39,000		
LNT-800	S-800	37,000	
	S-801	27,000	
	S-802	39,000	
	S-803	42,000	
	S-804	43,000	
	S-805	45,000	
	S-806	46,000	
	S-807	50,000	
	S-808	43,000	
	S-809	37,000	
S-810	46,000		
CT-800	L-800	43,000	
	L-801	27,000	
	L-802	39,000	
	L-803	45,000	
	L-804	49,000	
	L-805	41,000	
L-8000	K-800	24,500	
	K-801	20,000	
	K-802	25,500	
	K-803	27,500	
	K-804	29,000	
	K-805	31,000	
	K-806	32,000	
	K-807	34,000	
	K-808	35,000	
	K-809	31,000	
	K-810	25,500	
K-811	34,000		
LN-8000	R-800	24,500	
	R-801	20,000	
	R-802	25,500	
	R-803	27,500	
	R-804	29,000	
	R-805	31,000	
	R-806	32,000	
	R-807	34,000	
	R-808	35,000	
R-809	31,000		
C-8000	D-800	27,000	
	D-801	20,000	
	D-802	27,500	
	D-803	27,500	
	D-804	26,000	
	D-805	24,000	
LT-8000	U-800	39,000	
	U-801	27,000	
	U-802	42,000	
	U-803	43,000	
	U-804	45,000	
	U-805	46,000	
	U-806	50,000	
	U-807	50,000	
	U-808	54,000	
	U-809	60,000	
	U-810	43,000	
	U-811	42,000	
U-812	52,000		

<h1 style="margin: 0;">Wheels and Tires</h1>	<p>GROUP</p> <h1 style="margin: 0;">11</h1>
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PART 11-01	Page	PART 11-10	Page
General Wheel and Tire Service	11-01-01	Wheel Hubs and Bearings—Front	11-10-01
PART 11-02		PART 11-11	
Wheels and Tires—		Wheel Hubs and Bearings—Rear	11-11-01
Drop Center Rim	11-02-01	PART 11-12	
PART 11-03		Wheel Hubs and Bearings—	
Wheels and Tires—		Front Wheel Drive	11-12-01
Two Piece Rims	11-03-01	PART 11-14	
PART 11-04		Wheel Hubs and Bearings—	
Wheels and Tires—		Rear (Full Floating Axle)	11-14-01
Three Piece Rims	11-04-01		

PART 11-01 General Wheel and Tire Service

Applies to All Models			
COMPONENT INDEX	Page	COMPONENT INDEX	Page
FRONT WHEEL BEARING		TIRE INSPECTION	01-2
Maintenance	01-1	WHEEL INSPECTION	01-2

ADJUSTMENTS

WHEEL BALANCING

See the instructions provided with the Rotunda Wheel Balancer.

Make certain that the brakes are not dragging before attempting to spin the wheels. On vehicles equipped with disc brakes, push the brake shoes into the caliper to free the rotor.

FRONT WHEEL BEARING MAINTENANCE

Wheel bearings are adjustable to correct for bearing and spindle shoulder wear. Satisfactory operation and long life of bearings depend on proper adjustment and correct lubrication. **If bearings are adjusted too tightly, they will overheat**

and wear rapidly. An adjustment that is excessively loose will cause pounding and contribute to uneven tire wear, steering difficulties and inefficient brakes. The bearing adjustment should be checked at regular inspection intervals.

CLEANING AND INSPECTION

WHEELS

Wheel stud nuts should be inspected and tightened in the first 500 miles, to avoid accidental loosening of the wheels. Loose wheel stud nuts may cause shimmy and vibration. Elongated stud holes in the wheels may also result from the loose stud nuts.

Keep the wheels and hubs clean. Stones or lumps of mud wedged between the wheel and drum will unbalance a wheel and tire.

Check for damage that would affect the runout of the wheels. Wobble or shimmy caused by a damaged wheel will eventually damage the wheel bearings. Inspect the wheel rims for dents that could permit air to leak from the tires.

TIRES

The tires should be checked frequently to be sure that the air pressures agree with those specified for the tires and vehicle model. Inspect the tire

threads, and remove all stones, nails, glass or other objects that may be wedged in the thread. Check for holes or cuts that may permit air leakage from the tire, and make the necessary repairs.

Inspect the tire side walls for cuts, bruises, and other damage. If internal damage is suspected, demount the tire from the wheel for further inspection and repair or replacement.

Check the tire valve for air leaks, and replace the valve if necessary. Replace any missing valve caps.

On F-100, 250, 350 and Econoline models, it is important that except for deep dish (dual type) all be balanced.

Fig. 1 describes common tire wear conditions.

FRONT WHEEL BEARINGS

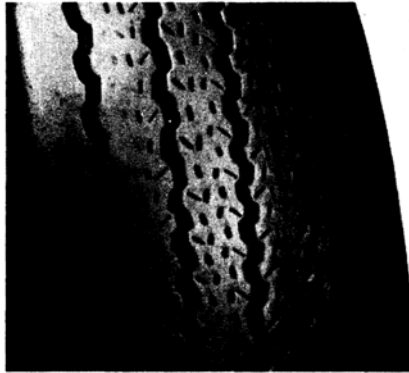
Wheel bearings are adjustable to correct for bearing and spindle shoulder wear. Satisfactory operation and long life of bearings depend on proper adjustment and correct lubrication **If bearings are**

adjusted too tightly, they will overheat and wear rapidly. An adjustment that is excessively loose will cause pounding and contribute to uneven tire wear, steering difficulties and inefficient brakes. The bearing adjustment should be cracked at regular inspection intervals.

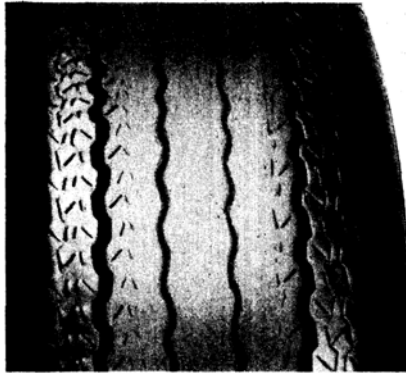
Front hubs and bearings should be cleaned, inspected and lubricated whenever the hubs are removed or at the mileage/time periods indicated in the maintenance schedule.

New hub grease seals should be installed when the hub is removed. An imperfect seal may permit bearing lubricant to reach the brake linings resulting in faulty brake operation and necessitating premature cleaning or replacement of linings.

Bearing adjustment is described in Part 11-10 for front wheels. Part 11-12 covers front drive bearing adjustment. Part 11-11, and 11-14 cover rear wheel bearing adjustments.



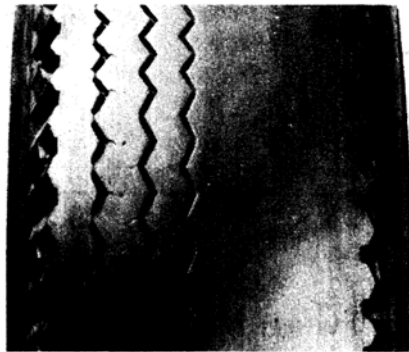
UNDERINFLATION



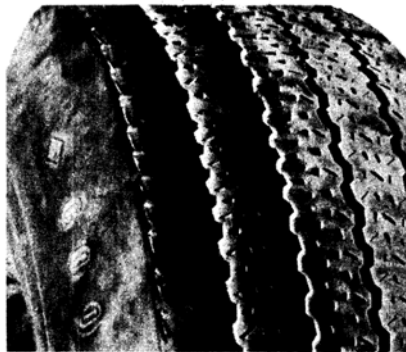
OVERINFLATION



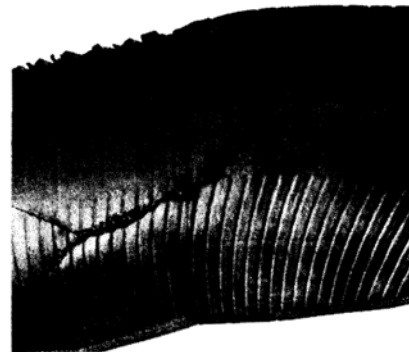
CUPPING—UNDERINFLATION AND/OR MECHANICAL IRREGULARITIES



INCORRECT TOE-IN OR EXTREME CAMBER



FEATHERING DUE TO MISALIGNMENT OR SEVERE CORNERING



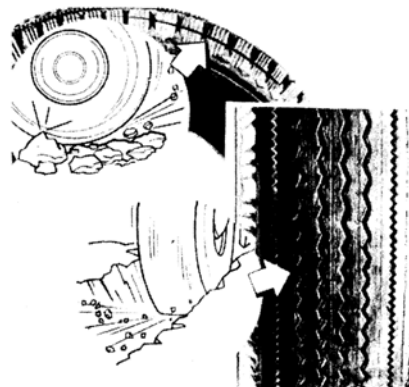
STONE BRUISE



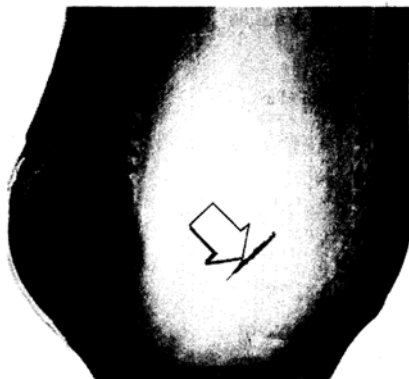
STONE BRUISE



UNDERINFLATION



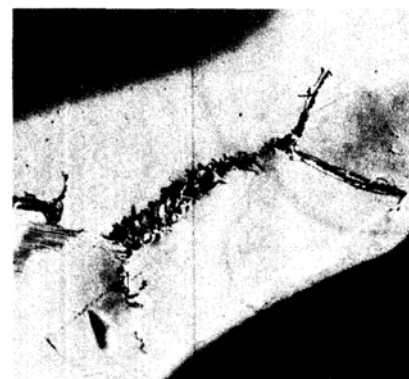
ROCK CUT



BRUISE



HEAT BRUISE



DOUBLE BRUISE—SHARP OBJECT AND RESULTING FATIGUE

F1467-D

FIG. 1 Tire Wear Conditions

PART 11-02 Wheels and Tires Drop Center Rim

Applies to F-100-350, Bronco and Econoline

COMPONENT INDEX	Page	COMPONENT INDEX	Page
FRONT WHEEL ASSEMBLY Description	02-1	REAR WHEEL ASSEMBLY Description	02-1
FRONT WHEEL ASSEMBLY 4-WHEEL DRIVE Description	02-1	WHEEL REPLACEMENT	02-3
		TIRE REPLACEMENT	02-3

DESCRIPTION

FRONT WHEEL ASSEMBLY

Each front wheel and tire assembly is bolted to its respective front hub and brake drum or rotor assembly. Two opposed tapered roller bearings are installed in each hub (Figs. 1, 2 and 3). A grease retainer is installed at the inner end of the hub to prevent lubricant from leaking into the drum. The entire assem-

bly is retained to its spindle by the lock nut and/or adjusting nut and cotter pin.

FRONT WHEEL ASSEMBLY—FOUR-WHEEL DRIVE

The front axles used on 4-wheel drive models are covered in Group 15, Parts 15-30, 15-32 and 15-33 of this manual.

REAR WHEEL ASSEMBLY

The rear wheel, hub, and drum assemblies are connected to the rear axle shaft flanges and ride on two opposed tapered roller bearings. The inner end of each axle shaft is splined to the engine powered differential.

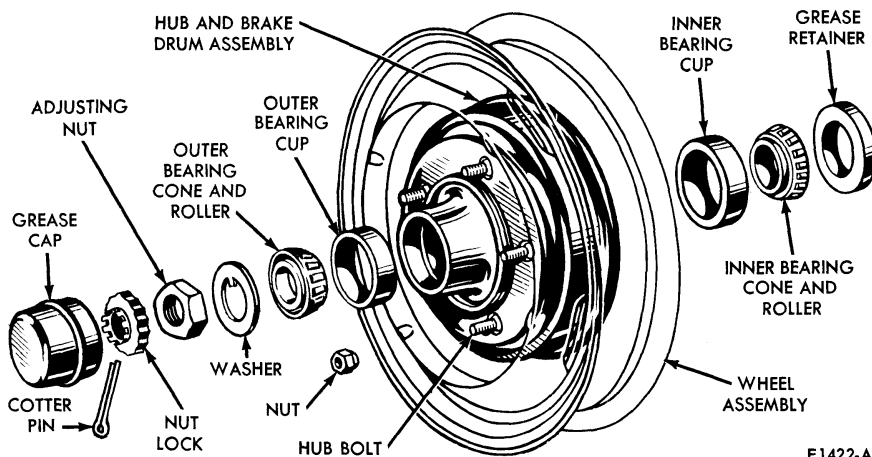
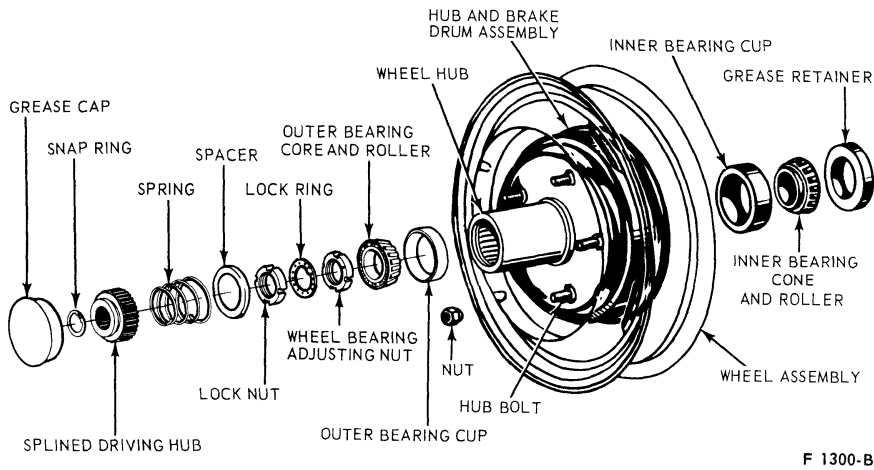
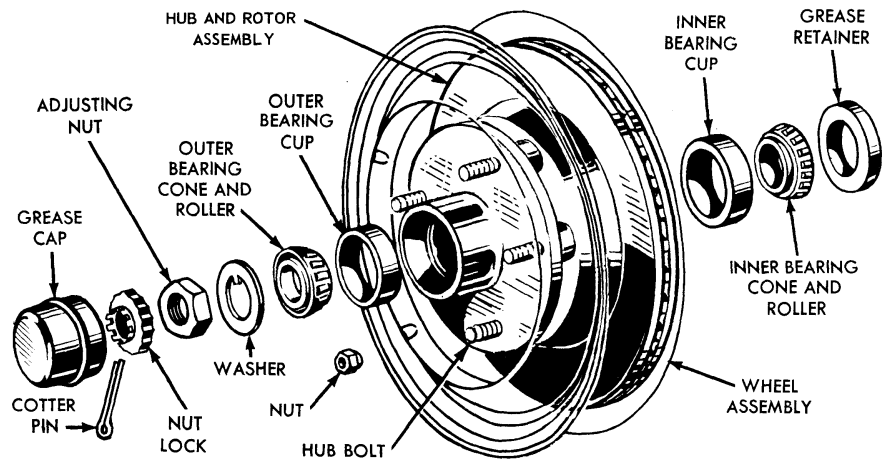


FIG. 1 Front Hub, Bearings and Grease Retainer—Drum Brakes F-100 Through F-350, Econoline



F 1300-B

FIG. 2 Front Wheel and Hub Installation—Four-Wheel Drive



F1416-A

FIG. 3 Front Hub, Bearings and Grease Retainer—Disc Brakes—Typical

REMOVAL AND INSTALLATION

WHEEL REPLACEMENT

Light Vehicles

Removal

1. Pry off the hub cap (if the vehicle is so equipped), and loosen but do not remove the wheel stud nuts.
2. Raise the truck until the wheel and tire clear the floor.
3. Remove the wheel stud nuts and the wheel and tire from the hub and drum.

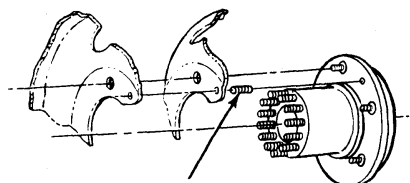
Installation

1. Clean all dirt from the hub and drum. The replacement wheel and tire must be clean.
2. Position the wheel and tire on the hub and drum, and install the wheel stud nuts. Tighten the stud nuts enough to hold the wheel firmly in place. **Always tighten alternate nuts to draw the wheel evenly against the hub and drum.**

On dual wheels, be sure to back off the outer nut before tightening the inner nut. Then tighten the outer nut. Some dual wheels have mounting bolt holes which are alternately flared inward and outward. These surfaces must be mated when the wheels are mounted. Fig. 4 illustrates the dual wheel radial alignment locating pin used on certain applications.

3. Lower the vehicle to the floor, and tighten the wheel stud nuts to the specified torque. **On a new vehicle, and each time a wheel and tire is installed, the wheel nuts should be checked for tightness.** When installing the hub cap, notice the wheel nubs. The hub cap should be positioned on the wheel over one of the retaining nubs and the two locating nubs. Be sure that the lip of the hub cap is firmly seated in the groove of the retaining nub, and then force the cap over the second retaining nub. **Any other procedure necessitates heavy pounding with possible damage to the hub cap.** —

Medium Vehicles



ALIGN DUAL WHEELS
ON LOCATING PIN

F 1829-A

FIG. 4 Dual Wheel Radial Alignment to Hub (F-350)

Removal

1. Loosen but do not remove the wheel stud nuts.
2. Raise the vehicle until the wheel and tire clear the floor.
3. Remove the wheel stud nuts and the wheel and tire from the hub and drum.

Installation

1. Clean all dirt from the hub and drum. The replacement wheel and tire must be clean.
2. Position the wheel and tire on the hub and drum, and install the wheel stud nuts. Tighten the stud nuts enough to hold the wheel firmly in place. **Always tighten alternate nuts to draw the wheel evenly against the hub and drum.**

On dual wheels, be sure to back off the outer nut before tightening the inner nut. Then tighten the outer nut.

3. Lower the truck to the floor, and tighten the wheel stud nuts to the specified torque. **On new vehicles, and each time a wheel and tire is installed, the wheel nuts should be checked for tightness.**

TIRE REPLACEMENT PRECAUTIONS

The tire must be completely deflated before removal, and the bead must not be damaged by a tire iron.

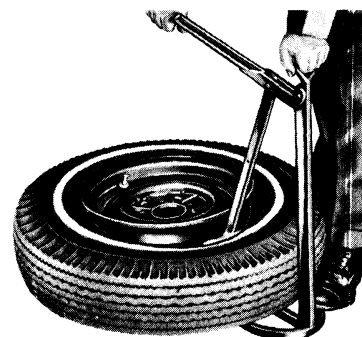
After installation, a tube tire should be inflated to recommended pressure, deflated, and then inflated again to insure that the tube is not folded inside the tire. Be sure the tube flap is properly positioned before inflating the tire. **On F-100 and 250 series, it is important that each front and rear tire and wheel be balanced.** On E-100 and E-300 all wheels should be balanced. On U-100, and vehicles with dual rear wheels, only front wheels should be balanced.

When installing tires on vehicles equipped with Safety Ledge rims, thoroughly lubricate the tire beads. Inflate the tire until the bead seats against the rim of the wheel, then deflate to the specified pressure.

Removing Conventional Tubeless Tire From Wheel

The tire can be demounted on a mounting machine. **Be sure that the outer side of the wheel is positioned downward.** If tire irons are used, follow the procedure given here.

1. Remove the valve cap and core, and deflate the tire completely.
2. With a bead loosening tool, break loose the tire side walls from the wheel (Fig. 5).
3. Position the outer side of the wheel



F1424-A

FIG. 5 Loosening Tire Bead

downward, and insert two tire irons about eight inches apart between the tire inner bead and the back side of the wheel rim. Use only tire irons with rounded edges or irons designed for removing tubeless tires.

4. Leave one tire iron in position, and pry the rest of the bead over the rim with the other iron. Take small bites with the iron around the tire in order to avoid damaging the sealing surface of the tire bead.
5. Stand the wheel and tire upright with the tire outer bead in the drop center well at the bottom of the wheel. Insert the tire iron between the bead and the edge of the wheel rim and pry the wheel out of the tire.

Mounting Conventional Tubeless Tire To Wheel

1. If a used tire is being installed remove all dirt from the tire.

If a tire is being mounted to the original wheel, clean the rim with emery cloth or fine steel wool. Check the rim for dents.

If a new wheel is being installed, coat a new valve with rubber lubricant and position the valve to the new wheel. Use a rubber hammer or a valve replacing tool to seat the valve firmly against the inside of the rim.

2. Apply RUGLYDE or a similar rubber lubricant to the sealing surface on both tire beads. With the outer side of the wheel down, pry the beads over the wheel rim with two tire irons. **Do not use a hammer or mallet to force the beads over the rim.**
3. Hold the beads against the rim flanges by positioning a tire mounting band over the tire (Fig. 6). If a mounting band is not available, tie a tourniquet of heavy cord around the circumference and in the center of the tire. Tighten the cord with a tire iron. Center the tire on the wheel with a rubber mallet.
4. Give the tire a few quick bursts of air

to seat the beads properly, then inflate the tire to 40 psi pressure. Check to see that the bead positioning rings (outer rings near the side walls) are evenly visible just above the rim flanges all the way around the tire. If the rings are not even, deflate the tire completely and inflate it again.

- When the rings are properly positioned, deflate the tire to the recommended pressure.

Removing Tube Type Tire From Wheel

The drop center rim (Fig. 7) is used for either tube or tubeless tires.

- After completely deflating the tire by removing the valve core, loosen the beads, and force them into the drop center of the rim.

- Using a pair of tire irons, pry the wheel out of the tire.

Mounting Tube Type Tire to Wheel

- After inspection and cleaning of the tire and wheel, install the valve core in the inner tube and inflate the tube until it is barely rounded out.
- Position the tube in the tire, soap the tire beads, and force the bottom bead into the drop center.
- At a point on the wheel opposite the valve, insert a tire iron between the top bead and the rim, prying the bead over the rim.
- Hold this iron in position, and with another iron, pry the bead into position all the way around the rim. **Do not use a hammer or mallet to force the beads over the rim.**

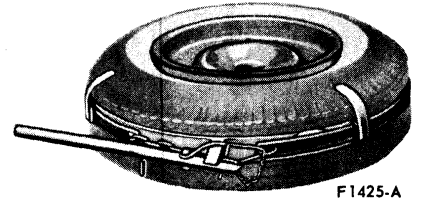


FIG. 6 Tubeless Tire Mounting Band

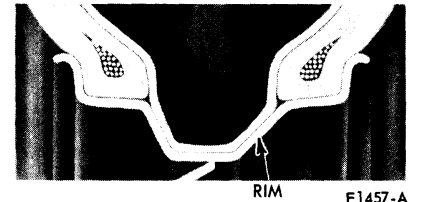


FIG. 7 Drop Center Rim

WHEEL TORQUE LIMITS – F-100 THRU F-350, ECONOLINE, BRONCO, P-350 THRU 500

Model	Nut Size	Ft-Lbs	Model	Nut Size	Ft-Lbs
E-100, E-200 F-100 (4 x 4), U-100 (Std. Wheel) P-100 F-250-250 (4 x 4) P-350 (W-5200 lb. Axle)	1/2-20	90	F-350, P-350, P-450, (W/Dual Wheels and 7400 lb Axle)	9/16-18	210
E-300 (8-Stud Wheel) F-350, P-350 P-400, (W/8-Stud Wheel and 7400 lb. Axle)	9/16-18	135	P-350, P-400 (W/17" Wheels)	5/8-18	210
			P-500	3/4-16 or 1-1/8-16	450

PART 11-03 Wheels and Tires—Two Piece Rims

Applies to All 500-9000 Series Vehicles

COMPONENT INDEX	Page	COMPONENT INDEX	Page
TIRE REMOVAL AND MOUNTING— Two-Piece Rims	03-1	TIRE REMOVAL AND MOUNTING— Two-Piece Semi-Drop Center Rims	03-2

DESCRIPTION

Two piece rims, for disc wheels are used with tube-type tires only. These rims have a 5 degree tapered seat and are available in 5.0, 5.50 and 6.5 rim sizes.

REMOVAL AND INSTALLATION

The tire must be completely deflated before removal, and the bead must not be damaged by a tire iron.

After installation, a tube tire should be inflated to recommended pressure, deflated, and then inflated again to insure that the tube is not folded inside the tire. Be sure the tube flap is properly positioned before inflating the tire.

TIRE REMOVAL AND MOUNTING—TWO PIECE RIM

Removing Tire From Wheel

To remove the rim ring (Fig. 1) from a rim without a tire, stand the wheel up so that the tool slot of the ring is at the top, and the lower portion of the ring is in the rim well. Insert the rim tool between the rim slot and the gutter of the rim, lift the ring over the gutter, and pry the ring off the rim (Fig. 2).

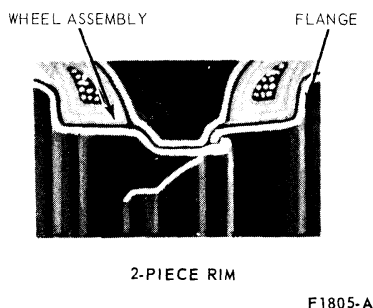


FIG. 1 Two-Piece Rim Installation

1. Place the wheel (ring side up) on the floor. Insert the hook end of the rim tool between the ring flange and the tire bead, and continuing around the ring, pry the tire off the tapered seat of the ring (Fig. 2).
2. Press the side of the ring opposite the double embossing down into the ring well. Insert the straight end of the rim tool into the notch between and below the double embossing (Fig. 4).
3. Force the tool downward to disengage the ring from the rim gutter. **Work the tool around the rim, freeing the ring from the rim, and remove the ring.**
4. Turn the wheel over and loosen the opposite tire bead from the rim by hammering the hook end of the rim tool between the rim flange and the tire bead. Pry the tire bead away from the taper, and remove the tire from the rim (Fig. 3).

Mounting Tire to Wheel

1. After positioning the tube in the tire, place the wheel gutter (Fig. 4). Hook the section soap both beads of the tire and position the tire on the rim.
2. After positioning the tube in the tire, place the wheel gutter (Fig. 4). Hook the section opposite the notch under the gutter so that the cutaway portions of the ring retaining bead span the rim gutter (Fig. 4).
3. Insert the straight end of the rim tool in the notch, and pull the ring onto

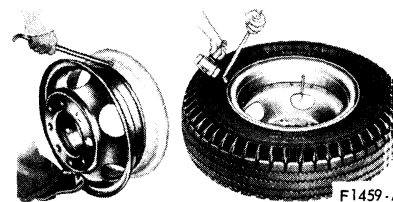


FIG. 2 Removing Ring and Loosening Tire Bead—Two-Piece Rim

the rim, at the same time forcing the ring over the gutter with a soft hammer (Fig. 5). Remove the tool, and continue to drive the ring down until it is entirely engaged in the gutter. **Press down on the ring (as shown in Fig. 5) to make certain that it will rock. If there is no movement, the ring is not completely seated and will be forced off violently, either during inflation or when the truck is operated. When inflating the tire, do not stand in front of the ring.**

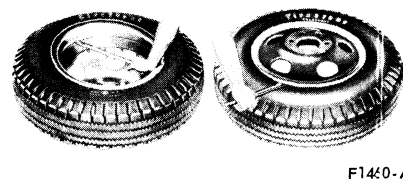


FIG. 3 Removing Ring and Removing Tire—Two-Piece Rim

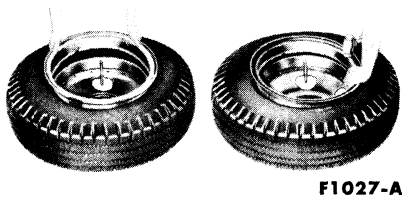


FIG. 4 Positioning and Starting Ring—Two-Piece Rim

TIRE REMOVAL AND MOUNTING—TWO-PIECE SEMI-DROP CENTER RIM WITH C-STYLE RING

This two-piece wheel uses a split C-type ring (Fig. 6).

Removal of Side Ring from Rim Without Tire

1. Stand the wheel up so that the tool slot of the ring is at the top and the lower portion of the ring is in the rim well.
2. Insert the rim tool between the rim slot and the gutter of the rim. Lift the ring over the gutter, and pry the ring off the rim.

Removal of Side Ring from Rim With Tire

1. Deflate tire completely and place the wheel (ring side up) on the floor.
2. Break the tire bead free from the rim, being careful not to damage the bead (Fig. 7).
3. Insert the straight end of the rim tool into and under the notch in the ring (Fig. 8).
4. Force the tool downward to disengage the ring from the rim gutter. Work the tool around the rim, freeing the ring from the rim, and remove the ring.
5. Turn the wheel over and loosen the opposite tire bead from the rim by hammering the hook end of the rim tool between the rim flange and the tire bead. Pry the tire bead away from the taper, and remove the tire from the rim (Fig. 9).

Mounting Tire to Wheel

1. Position the tube in the tire and place the wheel (gutter side up) on the floor. Soap both beads of the tire and position the tire on the rim. It is important that the tire be soaped well as it must

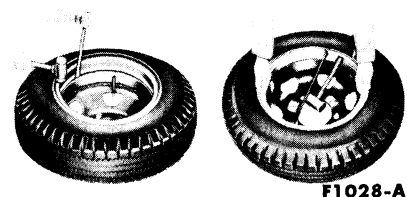


FIG. 5 Installing and Checking Ring—Two-Piece Rim

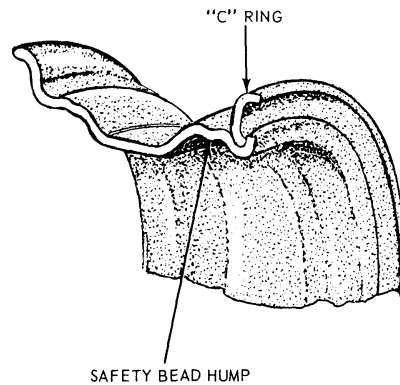


FIG. 6 Two-Piece Split Ring

- be forced over the safety bead hump and the rim edge (Fig. 10).
2. Position the ring with the notch about 3 inches from the valve stem.
3. Insert the rim tool under the ring at a position approximately 180 degrees from the notch and pry onto rim. Work the remaining section of rim over the gutter with a second tool.
4. Make certain that the ring is entirely seated in the gutter. If the ring is not seated correctly as described, it may be forced off violently, either during inflation or when the truck is operated.
5. After installation, the tire should be over-inflated to 75 psi to snap the tire beads over the bead humps and fully seat the tire against the rim and side ring. Then the tire should be deflated, and then inflated again to recommended pressure to insure that the tube is not folded inside the tire. Be sure the tube flap is properly positioned before inflating the tire. Always use a cage or safety chain during initial inflation.

It is important that the new C shaped side ring be used only with the new wheel with a bead hump. (See Fig. 6) The old style ring must be used only with the old tapered seat rim.

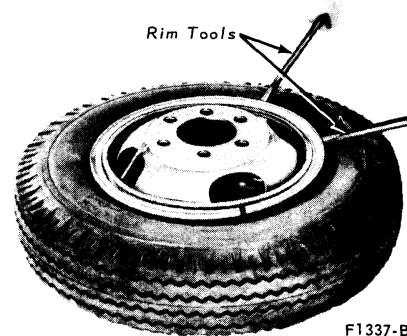
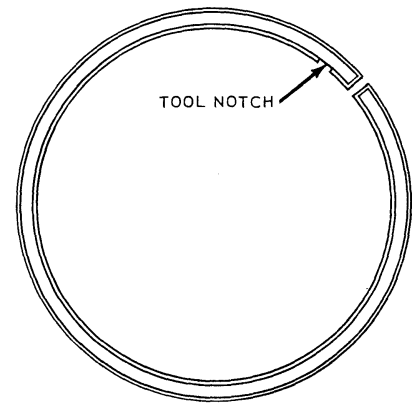
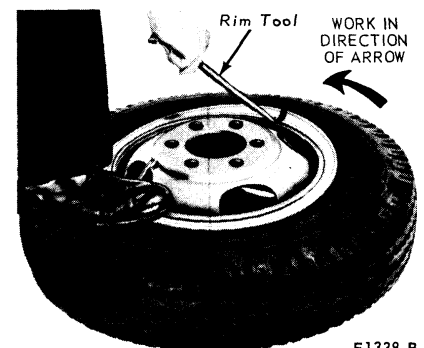


FIG. 7 Loosening Tire Bead

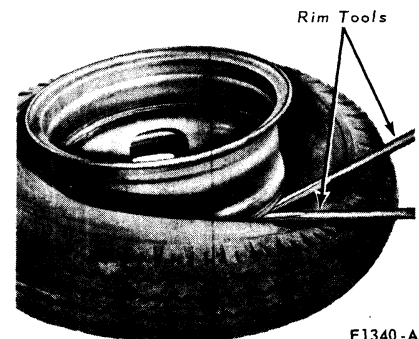


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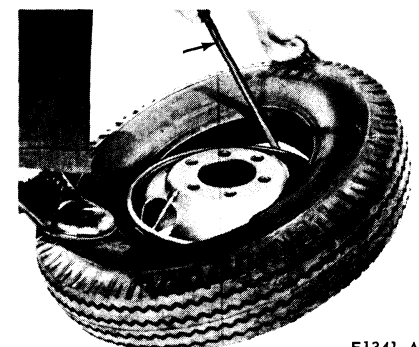
F1338-B

FIG. 8 Removing Split Ring



F1340-A

FIG. 9 Removing Tire From Rim



F1341-A

FIG. 10 Installing Tire First Bead on Wheel

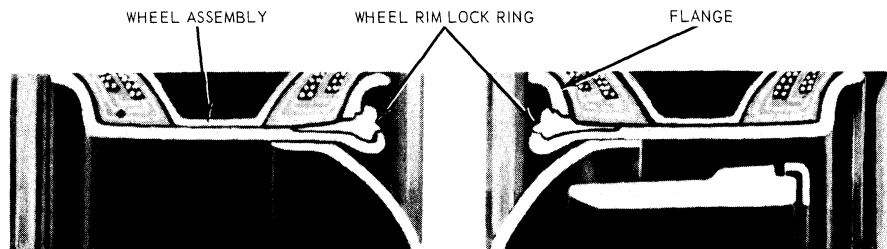
PART 11-04 Wheels and Tires—Three Piece Rims

Applies To All 500-9000 Series Vehicles			
COMPONENT INDEX	Page	COMPONENT INDEX	Page
TIRE REMOVAL AND MOUNTING— Three Piece Rims	04-1	TIRE REMOVAL AND MOUNTING— Cast Spoke Wheels	04-2

DESCRIPTION

Three piece rims are non-demountable for disc wheels or demountable for cast spoke wheels, Fig. 1, shows a dual wheel sectional view.

Demountable rims for cast-spoke wheels are secured by a lane at the back edge of each spoke, and a lug retained by a stud and nut at the edge of each spoke.



3-PIECE RIM, DUAL WHEELS

F1806-A

FIG. 1 Three Piece Rim—Dual Wheel Sectional View

REMOVAL AND INSTALLATION

The tire must be completely deflated before removal, and the bead must not be damaged by a tire iron.

After installation, a tube tire should be inflated to recommended pressure, deflated, and then inflated again to insure that the tube is not folded inside the tire. Be sure the tube flap is properly positioned before inflating the tire.

TIRE REMOVAL AND MOUNTING—THREE-PIECE RIM

Tire mounting procedures are the



F1461-A

FIG. 2 Loosening Tire Bead and Locking Ring—Three-Ring Rim

same for disc wheels and for cast wheels equipped with the three-piece rims, except that cast spoke wheels require special final centering and runout adjustment.

Removing Tire From Wheel

1. Place the wheel and deflated tire on the floor, with the ring up. Insert the straight end of the rim tool in the depression in the locking ring and loosen the tire bead by pressing down on the side ring (Fig. 2).
2. Insert the straight end of the rim tool in the notch provided in the locking ring, and pry the locking ring out of the gutter (Fig. 2). Lift out the locking ring, and remove the slide ring (Fig. 3).
3. Turn the wheel over and loosen the tire bead from the rim by hammering the hooked end of the rim tool between the rim flange and the tire bead. Pry the tire bead away from the taper all the way around the rim until the tire is free. Remove the tire.



F1462-A

FIG. 3 Removing Locking Ring and Positioning Locking Ring—Three-Piece Rim

Mounting Tire To Wheel

1. Position the wheel (gutter side up) on the floor. Soap both beads of the tire and position the tire on the rim.
2. Position the solid side ring on the tire, and insert the tapered toe of the split locking ring between the rim and the side ring (Fig. 3).
3. Using a soft hammer, drive the locking ring into place (Fig. 4). Start at one end of the split ring and progressively drive the ring into the gutter until the entire ring is seated (Fig. 4).

The ring must be entirely seated around the entire circumference of the rim. The split ends must be engaged in the gutter, or the ring will be forced off violently during inflation or when the truck is driven. When inflating the tire do not stand in front of the ring.



F1463-A

FIG. 4 Starting Locking Ring and Locking Ring Installed—Three-Piece Rim

TIRE REMOVAL AND MOUNTING—CAST SPOKE WHEELS

Removal

1. To remove the rim and tire from a

cast wheel, apply the parking brake, and block at least one wheel. Raise the vehicle and rim clamps.

2. With dual rear wheels, lift off the outer rim and tire, remove the spacer rim, and the inside rim and tire assembly.

Installation

1. To install the tire and rim on a dual wheel, place the inner tire and rim on the wheel hub. The rim must ride high enough up on the tapered retainer flange of the inner section of the wheel to prevent the assembly from sliding down on the tapered surface.
2. Position the spacer between the inner and outer rim.
3. Place the outer rim and tire assembly on the wheel, and install the 6 clamps (Fig. 5). First, draw up the top clamp tightly so that the spacer will push the inner rim up on the tapered surface of the inner section of the wheel, and then tighten the bottom clamp. This

procedure tends to center the rim on the wheel.

4. Tighten the remaining clamps alternately and evenly, and torque all wheel nuts to specification. Lateral or side run-out should not exceed 1/8 inch for front rims and 1/4-inch for dual rear rims, checked at the outer bead surface of the wheel.

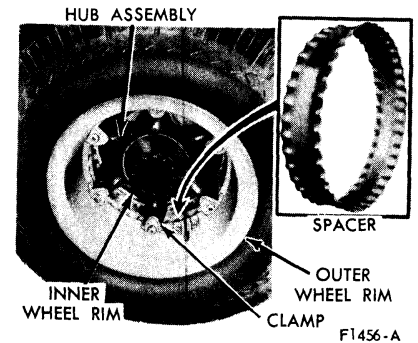


FIG. 5 Three-Piece Rim Installed on Cast Wheel

PART 11-10 Wheels, Hubs and Bearings— Front (Except Front Drive)

Applies To All Vehicles			
COMPONENT INDEX	Page	COMPONENT INDEX	Page
FRONT WHEEL ASSEMBLY Description	10-1	FRONT WHEEL GREASE SEAL AND BEARING Removal and Installation	10-2
FRONT WHEEL BEARING Adjustment	10-1	Repacking	10-2

DESCRIPTION

FRONT WHEEL ASSEMBLY

Each front wheel and tire assembly is bolted to its respective front hub and brake drum or rotor assembly. Two opposed tapered roller bearings are installed in each hub (Fig. 1, Part 11-02 and Figs. 3 and 4 of this Part). A grease retainer is installed at the inner end of the hub to prevent lubricant from leaking into the drum. The entire assembly is retained to its spindle by the locknut and/or adjusting nut and cotter pin, or an adjusting nut, lock nut combination (Figs. 3 and 4).

ADJUSTMENTS

FRONT WHEEL BEARING ADJUSTMENT

To check the wheel bearing adjustment, raise the front of the vehicle, grasp the tire at the sides, and alternately push inward and pull outward on the tire. If any looseness is felt, adjust the front wheel bearings.

F-100, 250, 350, Econoline

1. Remove the hub cap and remove the grease cap from the hub.
2. Wipe any excess grease from the end of the spindle and remove the cotter pin and nut lock.
3. While rotating the wheel, torque the adjusting nut (Fig. 1, Part 11-02) to 17-25 ft-lb to seat the bearings.
4. Install the nut lock so that the cotter pin hole in the spindle is aligned with

a slot in the nut lock.

5. Back off the adjusting nut and nut lock two slots of the nut lock and install the cotter pin.
6. Check the front wheel rotation. If the wheel rotates freely with no noticeable end play, install the grease cap. If the wheel is still loose, or it rotates roughly or noisily, the bearing cones and rollers and the cups are dirty or worn and should be cleaned or replaced.
7. Install the hub cap.

P-350 thru 500

1. Remove the hub cap, if so equipped, and remove the grease cap from the hub.
2. Remove any excess grease from the end of the spindle and remove the adjusting nut cotter pin.

3. While rotating the wheel, torque the adjusting nut (See Fig. 4, under Disassembly and Assembly) to 40-55 ft-lbs to seat the bearings.
4. Back off the adjusting nut to the next castellation if necessary to align the nut with the cotter pin hole. Then, back off the adjusting nut two castellations and install the cotter pin.
5. Check the front wheel rotation. If the wheel rotates freely with no noticeable end play, install the grease cap. If the wheel is still loose, or it rotates roughly or noisily, the bearing cones and rollers and the cups are dirty or worn and should be cleaned or replaced.
6. Install the hub cap, if used.

All Medium, Heavy and Extra Heavy Trucks

Single Nut with Cotter Pin (5000-7000 Pound Front Axles)

1. While rotating the wheel, torque the adjusting nut to 70-100 ft-lb to seat the bearings.
2. Back off the adjusting nut 180 degrees (one half turn).
3. Hand tighten the adjusting nut finger tight (13-17 in-lb) while moving the top part of the tire in and out.
4. If the cotter pin hole lines up with a castellation in the nut, insert and secure a new cotter pin. If they do not line up, back off the adjusting nut to align a castellation with the first available cotter pin hole. Final bearing adjustment must provide .001-.010 end play.
5. Install the gasket and grease cap and adjust the brakes. **The final adjustment must not result in a preloaded bearing.**

Double Nut with Lock Ring (15000 Pound Front Axle)

1. While rotating the wheel in both directions, torque the adjusting nut to 100-125 ft-lbs to seat the bearings.
2. Back off the adjusting nut one complete turn (See Fig. 4, under Removal and Installation).
3. Again while rotating the wheel in both directions, retorque the adjusting nut to 40-55 ft-lb.
4. Back off the adjusting nut to obtain an initial .004 and .010 inch end play between the wheel hub and spindle.
5. Install the lock ring.
6. Install the washer with the dimple indexed in one of the holes in the locking ring.

7. Install the lock nut and torque to 100-125 ft-lb.
8. Recheck the end play (Final limit .001 to .010 inch). Re-adjust if necessary.
9. Bend the washer outward to lock the nut in position.
10. Install the gasket and grease cap and adjust the brakes. **The final adjustment must not result in a preloaded bearing.**

Double Nut with Double Washer (12000 Pound Center Point Axle)

1. While rotating the wheel in both directions, torque the adjusting nut to 100-125 ft-lb to seat the bearings.
2. Back off the adjusting nut one complete turn (See Fig. 4, under Disassembly and Assembly).
3. Again while rotating the wheel in both directions, retorque the adjusting nut to 40-55 ft-lb.
4. Back off the adjusting nut to obtain an initial .004 to .010 inch end play between the hub and spindle.
5. Install the outer washer and lock nut and torque to 100-125 ft-lb.
6. Recheck the end play (final limit .001 to .010 inch). Re-adjust if necessary.
7. Install the gasket and grease cap and adjust the brakes. **The final adjustment must not result in a pre-loaded bearing.**

Single Nut with Cotter Pin (16000, 18000 and 20000 Pound Front Axle)

1. While rotating the wheel in both directions, torque the adjusting nut to 100-125 ft-lb to seat the bearings.
2. Back off the adjusting nut one complete turn (See Fig. 4, under Disassembly and Assembly).
3. Again while rotating the wheel in

both directions, retorque the adjusting nut to 40-55 ft-lb.

4. Back off the adjusting nut if necessary to align the nut castellations with the first available cotter pin hole.
5. Using the same cotter pin hole as a reference point, back off the adjusting nut **one additional castellation** to allow the wheel to rotate freely within the limits of .001 to .010 inch end play.
6. Insert and secure the cotter pin.
7. Install the gasket and grease cap and adjust the brakes. **The final adjustment must not result in a pre-loaded bearing.**

Double Nut with Lock Ring (9000 and 12000 Pound Front Axle)

1. While rotating the wheel in both directions, torque the adjusting nut to 100-125 ft-lb to seat the bearing.
2. Back off the adjusting nut one complete turn.
3. Again while rotating the wheel in both directions, retorque the adjusting nut to 40-55 ft-lb.
4. Back off the adjusting nut to obtain an initial .004 to .010 inch end play between the wheel hub and spindle.
5. Install the lock ring making sure the adjusting nut dowel is inserted into the lock ring.
6. Install the outer washer and lock nut. Torque to 100-150 ft-lb.
7. Recheck the end play (final limit .001 to .010 inch). Re-adjust if necessary.
8. Bend the washer outward to lock the outer nut in position.
9. Install the gasket and grease cap and adjust the brakes. **The final adjustment must not result in a pre-loaded bearing.**

DISASSEMBLY AND ASSEMBLY

FRONT WHEEL GREASE SEAL AND BEARING REMOVAL AND INSTALLATION AND/OR REPACKING

Wheel bearing lubricant has been changed from sodium base grease to lithium base grease.

Sodium base grease is not compatible with lithium base grease and should not be intermixed. Therefore, do not lubricate front and/or rear wheel bearings without first ascertaining the type of original wheel bearing lubricant. Usage of incompatible bearing lubricants could result in premature lubricant breakdown.

If bearing adjustment will not eliminate looseness or rough and noisy operation, the hub and bearings should be

cleaned, inspected, and repacked with specified wheel grease. If the bearing cups or the cone and roller assemblies are worn or damaged, they should be replaced.

Light Vehicle

1. Raise the vehicle until the wheel and tire clear the floor and remove the wheel and tire from the hub. If the drums will not remove easily, back off the brake shoe adjusting screw so that the shoes do not contact the brake drum. Remove the grease cap from the hub.
2. Remove the cotter pin, nut lock, adjusting nut and washer from the spindle (Fig. 1, Part 11-02).
3. Remove the outer bearing cone and

roller. Pull the hub and drum assembly off the wheel spindle. Then, remove the discard, the grease retainer and the inner bearing cone and roller from the hub. **Remove all traces of old lubricant from bearings, hubs, and axle spindle.**

4. Inspect the cups for scratches, pits or cracks. If the cups are worn or damaged, remove them with a drift. Clean the inner and outer bearing cones and rollers with solvent and dry them thoroughly. **Do not spin the bearings dry with compressed air.**
5. Inspect the cones and rollers for cracks, nicks, brinelling, or seized rollers. Inspect the grease retainer and replace it if it is cracked, nicked, or dented. If the new grease retainer

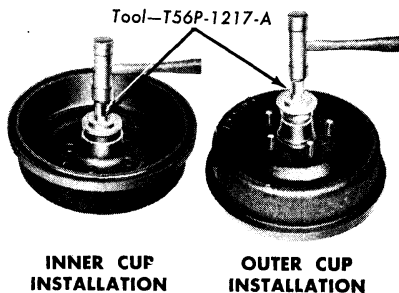
is leather, soak it in light engine oil for about 30 minutes before installation.

6. Cover the spindle with a clean cloth and brush all loose dust and dirt from the brake assembly. **Remove the cloth from the spindle carefully to prevent dirt from falling on the spindle.**
7. Install the inner and outer bearing cups in the hub with the appropriate installing Tool (Fig. 1). Be sure to seat the cups properly in the hub. The cups will be properly seated when they are fully bottomed. Pack the inside of the hub with C1AZ-19590-B wheel bearing grease. Fill the hub until the grease is flush with the inside diameters of both bearing cups. Pack the bearing cones and rollers with wheel bearing grease. Use a bearing packer for this operation. If a packer is not available, work as much lubricant as possible between the rollers and cages. Lubricate the cone surfaces with grease.
8. Place the inner bearing cone and roller in the inner cup and install the grease retainer (Fig. 2) with the appropriate driving tool. Be sure that the retainer is fully bottomed. Install the hub and drum on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.**
9. Install the outer bearing cone and roller and the flat washer on the spindle, then install the adjusting nut.
10. Adjust the wheel bearing as outlined under Adjustments.

Medium, Heavy and Extra Heavy Vehicles

There are two basic types of hub, disc and cast, shown in Fig. 3. The basic design of the hub bearings is the same in all hubs, but minor differences in size exist between the various models. The outer bearing attaching parts differ according to front axle weight capacity as indicated in Fig. 3. For further detailed views of hubs, bearings and grease retainers See Fig. 4.

1. Raise the vehicle until the tires clear the floor and install safety stands to

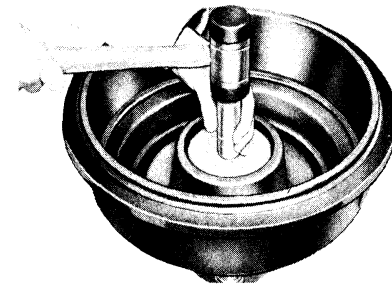


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FIG. 1 Installing Bearing Cups

support the front axle. Remove the grease cap and gasket from the hub.

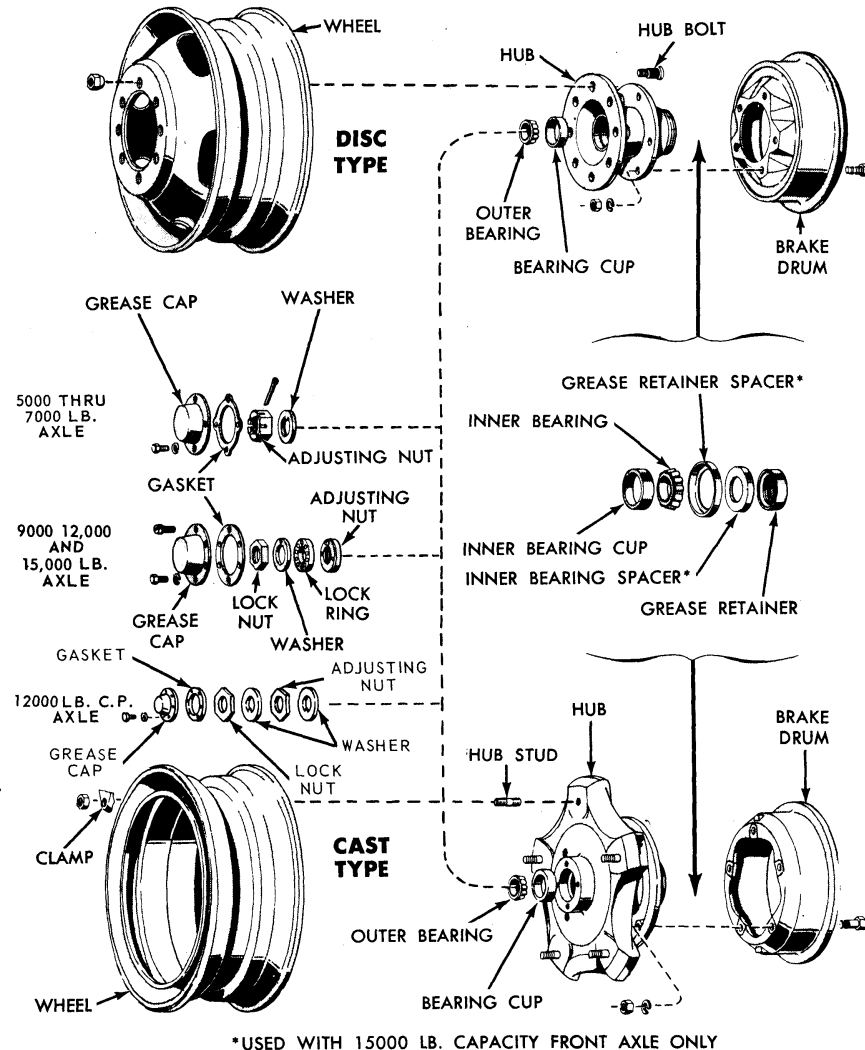
2. To check the wheel bearing adjustment, alternately push inward and outward on the tire. If any excessive looseness is felt or there is no end play, adjustment of the front wheel bearings is necessary.
3. With 5000, 5500, 6000, 7000, 16000, 18000 or 20000 pound capacity front axles, remove the cotter pin, adjusting nut and flat washer from the spindle. With 9000, 12000 or 15000 pound capacity front axles, remove the lock nut, washer, locking ring and the adjusting nut and pin. With a 12000 pound capacity center point front axle, remove the lock nut, inner washer, adjusting nut and outer washer.
4. Inspect the condition of the spindle and nut threads to insure a free running nut when reassembling.



F1465-A

FIG. 2 Installing Grease Retainer

5. Remove the outer bearing cone and roller. Pull the hub and drum assembly off the spindle. Remove the inner bearing and seal using a brass drift. **Be careful not to damage the bearing cage.**
6. Remove all traces of old lubricant



F1466-B

FIG. 3 Typical Front Hubs and Bearings

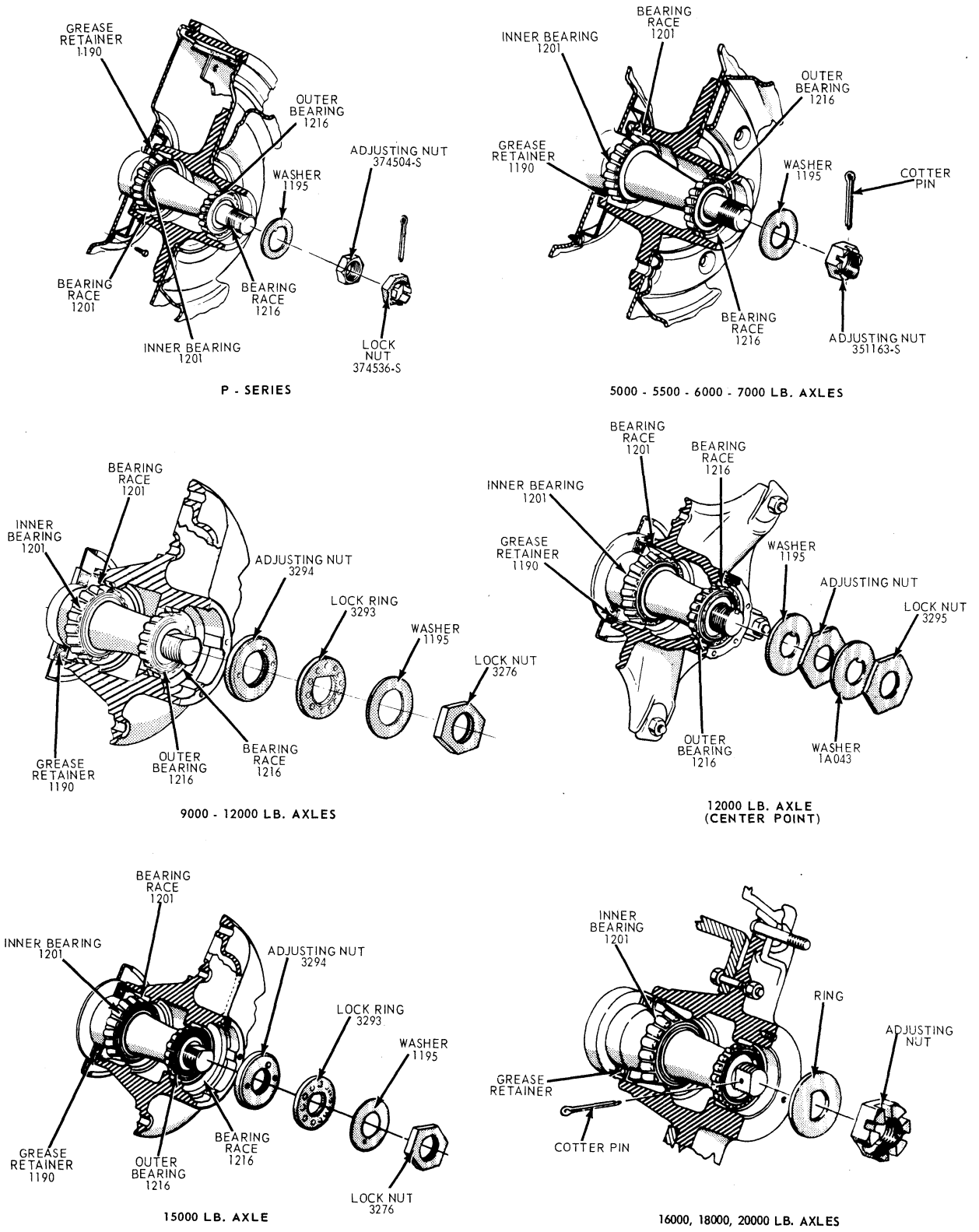


FIG. 4 Front Hubs, Bearings and Grease Retainers

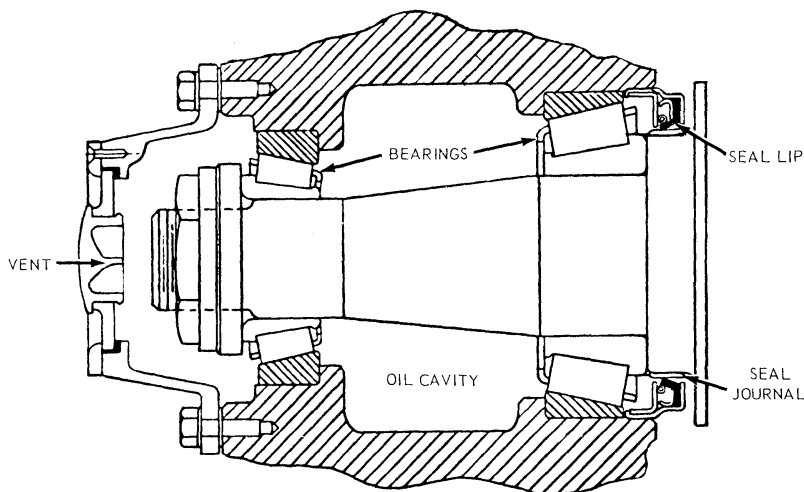
- from the bearings, hubs and axle spindle. Inspect the cups for pitting, galling or unusual wear. If either cup is worn or damaged, remove it with a brass drift. Clean the inner and outer bearing cones and rollers with solvent and dry them thoroughly. **Do not spin the bearings dry with compressed air.**
7. Inspect the cones and rollers for pitting, galling or unusual wear. Particularly inspect the rollers for end wear and flat or rough spots. Replace all worn or damaged assemblies. It is recommended that the cone and roller assemblies and cups be replaced in sets.
 8. Replace the grease retainer.
 9. Cover the spindle with a clean cloth and brush all loose dust and dirt from the brake assembly. Remove the cloth from the spindle carefully to prevent dirt falling on the spindle.
 10. Install the inner and outer bearing

cups in the hub with the appropriate tool (Fig. 1). Check for proper seating of the new bearing cups by trying to insert a 0.0015 inch feeler gauge between the cup and wheel hub. The feeler gauge should not enter.

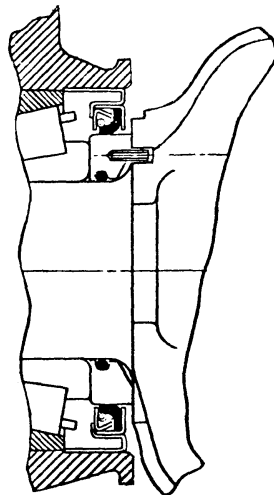
11. Pack the inside of the hub with Lithium base wheel bearing grease (C1AZ-19590-B). Fill the hub until the grease is flush with the inside diameters of both bearing cups. Pack the bearing cones and rollers with wheel bearing grease. Use a bearing packer for this operation. If a packer is not available, work as much lubricant as possible between the rollers and cages. Lubricate the cone surfaces with grease.
12. Place the inner bearing cone and roller in the inner cup and install the grease retainer with the appropriate tool. Be sure the retainer is fully bottomed. On all synthetic type seals,

coat the seal lips with wheel bearing grease (C1AZ-19590-B) before installing the hub and drum. On seals which are not coated on the OD with sealer by the supplier, coat the grease seal bore in the hub with a thin coat of non-hardening sealer prior to installing the grease seal.

13. Install the hub and drum on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.**
14. With 5000, 5500, 6000, 7000, 16000, 18000 or 20000 pound capacity front axles, install the outer bearing cone and roller and the flat washer on the spindle. Then, install the adjusting nut. With 9000, 12000 and 15000 pound capacity front axles, install the outer bearing cone and roller and the bearing adjusting nut. With a 12000 pound capacity center point front axle, install the washer and adjusting nut. Make the final bearing adjustment, under Adjustments.



VIEW FOR 15000 LB.
FRONT AXLE ONLY



E2124-A

FIG. 5 Front Seal Installation (Stemco)

Medium, Heavy and Extra Heavy Vehicles (Oil Lubrication)

Stemco Seals and National Seals available as regular production options, provide sealing where oil is used for bearing lubrication. The tools required for Stemco Seal Installation are only available from the Stemco warehouse. Refer to Specifications for the tooling required. Fig. 5 illustrates a front wheel Stemco Seal Installation. —

Front Hub Seal Installation

Clean all parts before starting the installation of Stemco Seals.

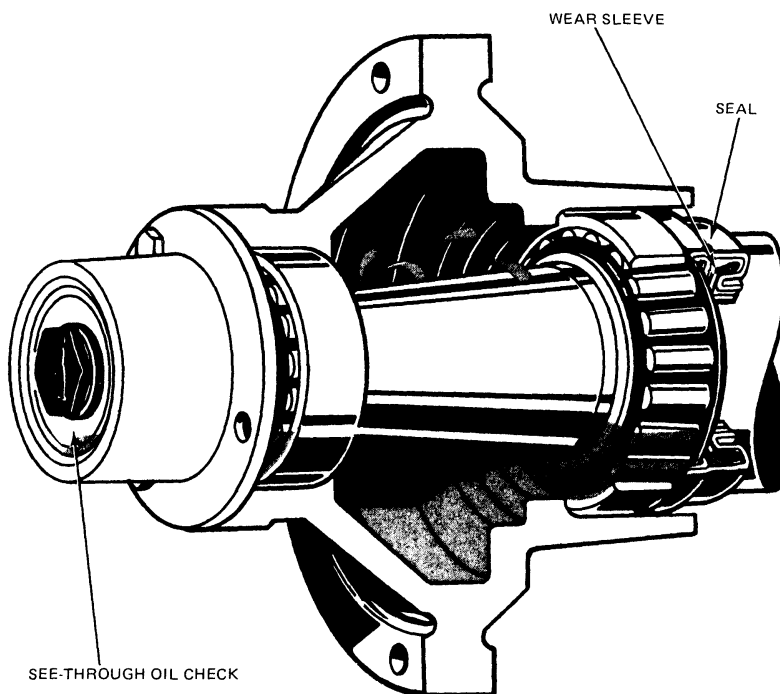
1. Oil the spindle and push the axle ring flush against the axle face where applicable.
2. Remove all burrs from the wheel hub bore seal area and clean thoroughly.
3. Position the seal in the hub bore (Part Number Up).

Drive the seal into position using the correct tool. It must be perfectly square with the bore, and bottom evenly. Install the wheel and adjust the bearings. Install the Stemco hub cap. Remove the filler plug and add oil (ESW-M2C105-B SAE 90). Double check the oil level before releasing the vehicle for service. Oil level must be between the oil level line on the hub cap and 1/4-inch above the line.

National Seals (Fig. 6) are installed as follows:

1. Clean all parts, remove rough spots and install axle ring flush against face where applicable.
2. Position the seal into the hub (notice oil side marking) with drive tool and hammer in to a press fit.
3. Install the wheel and adjust the bearings the same as for any seal installation. Install the see through hubcap

- and the retaining screws.
- Remove the filler plug and add oil to level on see through hubcap.



F1831-A

FIG. 6 National Seal Installation

SPECIFICATIONS

WHEEL TORQUE LIMITS—F-100 THRU F-350, ECONOLINE, BRONCO, P-SERIES

Model	Nut Size	Ft-Lbs
E-100, E-200	1/2-20	90
F-100 (4 x 4), U-100 (Std. Wheel)		90
F-250-250 (4 x 4) P-350-3500 (W/5200 lb. Axle)		
E-300 (Std. Wheel)	9/16-18	135
F-350, P-350		
F-350, P-350, P-450 P-3500, P-4000 (W/Dual Wheels and 7400 lb. Axle)	9/16-18	210
P-350, P-400, P-3500, P-4000 (W/17" Wheels)	5/8-18	210

WHEEL TORQUE LIMITS—500 THRU 9000 SERIES

Description	Nut Size	Ft-Lbs
Front Wheel Nut	All	450
Cast Wheel Rim Nut	5/8-11	170-200
	3/4-10	170-220

SPECIAL SERVICE TOOLS

Tool No.	Description
T-59T-1197-B	Front Wheel Bearing Adjustment Spanner Wrench
Tool 1175-AB	Grease Seal Remover Head
T50T-100-A	Impact Slide Hammer
T56P-1217-A	Front Hub Bearing Cup Replacer

SPECIAL SERVICE TOOLS—STEMCO

Ford Seal Kit Part No.	Stemco Tool No.	Ford Seal Kit Part Name
DOHZ-1190-A	5064-5351	Kit — Front Hub Grease Retainer and Wiper
	5061-5062	
DOHZ-1190-B	5066-5353	
DOHZ-1190-C	5067-5398	
DOHC-1190-D	None-5386	
DOHZ-1190-E	5007-5358	
Kits on this page consist of one axle ring and one seal for just one wheel		

PART 11-11 Wheel Hubs and Bearings—Rear

Applies To Bronco, Econoline E100, E200 and F-100 Only

COMPONENT INDEX	Page	COMPONENT INDEX	Page
AXLE SHAFT Removal and Installation	11-1	REAR WHEEL BEARING AND SEAL	
DESCRIPTION	11-1	Removal and Installation	11-1

DESCRIPTION

REAR WHEEL ASSEMBLY

The rear wheel hub and brake drum assembly is attached to studs on the rear axle shaft flange by three speed nuts. The

wheel and tire mounts on the same rear axle shaft flange studs and is held against the hub and drum by the wheel nuts. The rear wheel bearing is pressed onto the

axle shaft just inside the shaft flange, and the entire assembly is retained to the rear axle housing by the bearing retainer plate which is bolted to the housing flange.

REMOVAL AND INSTALLATION

REMOVAL OF AXLE SHAFT

The rear axle shafts, wheel bearings, and oil seal can be replaced without removing the differential assembly from the axle housing.

Synthetic wheel bearing seals are used. Removal and insertion of rear axle shafts must be performed with caution. The entire length of the shaft (including spline) up the seal journal must pass through the seal without cutting of the seal element during axle removal or installation will result in early seal failure.

1. Remove the wheel cover, wheel and tire from the brake drum.
2. Remove the nuts that secure the brake drum to the axle shaft flange, then remove the drum from flange.
3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the wheel bearing retainer plate. Then pull the axle shaft assembly out of the axle housing (Fig. 1). **The brake backing plate must not be dislodged. Install one nut to hold the plate in place after the axle shaft is removed.**

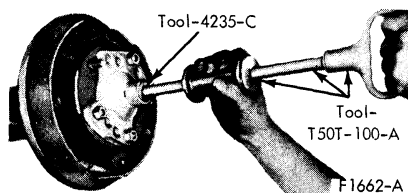


FIG. 1 Removing Axle Shaft

REMOVAL OF REAR WHEEL BEARING AND SEAL

Synthetic seals must not be cleaned, soaked or washed in cleaning solvents.

Removal of the wheel bearings from the axle shaft makes them unfit for further use.

1. Loosen the inner retainer ring by nicking it deeply with a cold chisel in several places (Fig. 2). It will then slide off easily.
2. Remove the bearing from the axle shaft with Tool T60K-1225-A.
3. **Whenever a rear axle shaft is replaced, the oil seal must be replaced.** Remove the seal with Tool 1175-AB and a slide hammer.

INSTALLATION OF REAR WHEEL BEARING AND SEAL

1. Inspect the machined surface of the axle shaft and the axle housing for rough or other irregularities which would affect the sealing action of the oil seal. Check the axle shaft splines for burrs, wear or twist. Carefully remove any burrs or rough spots. Replace worn or damaged parts.
2. Lightly coat wheel bearing bores with axle lubricant.
3. Place the bearing retainer plate on the axle shaft, and press the new wheel bearing on the shaft with the tool

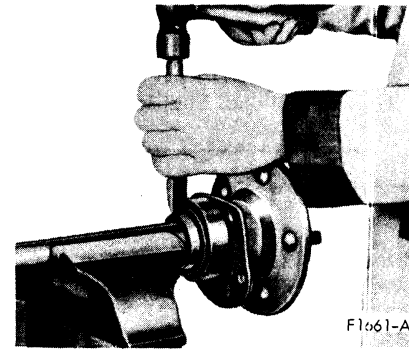


FIG. 2 Removing Rear Wheel Bearing Retainer Ring

shown in Fig. 3. **Do not attempt to press on both the bearing and the inner retainer ring at the same time.**

4. Using the bearing installation tool (Tool 4621-A), press the bearing inner retainer ring on the shaft until the retainer seats firmly against the bearing.
5. Install the new oil seal with the tools shown in Fig. 4. Wipe a small amount of oil resistant sealer on the outer edge of the seal before it is installed. **Do not put sealer on the sealing lip.**

INSTALLATION OF AXLE SHAFT

1. Carefully slide the axle shaft into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the side

- gear, and push the shaft in until the bearing bottoms in the housing.
2. Install the bearing retainer plate and the nuts that secure it. Torque the nuts to specification.
 3. Install the brake drum and the drum attaching (Tinnerman) nuts.
 4. Install the wheel and tire on the drum. Install the wheel cover.

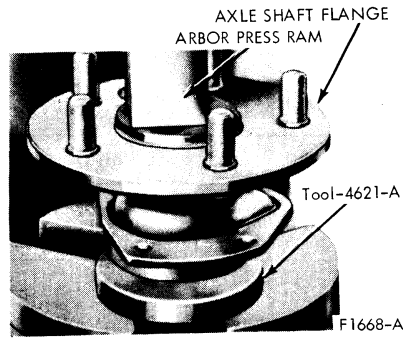


FIG. 3 Installing Rear Wheel Bearing

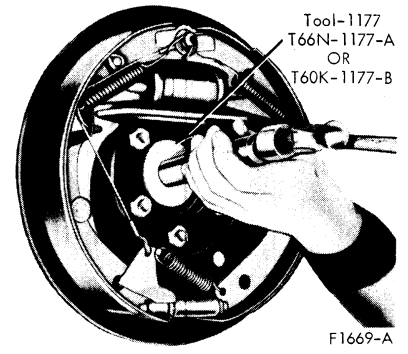


FIG. 4 Installing Rear Wheel Bearing Oil Seal

PART 11-12 Wheel Hubs and Bearings— Front Wheel Drive

Applies To Bronco, F-100, F-250 and F-600 Only

COMPONENT INDEX	Page	COMPONENT INDEX	Page
ADJUSTMENTS	12-1	DISASSEMBLY AND ASSEMBLY	12-6
DESCRIPTION	12-1	REMOVAL AND INSTALLATION	12-2

DESCRIPTION

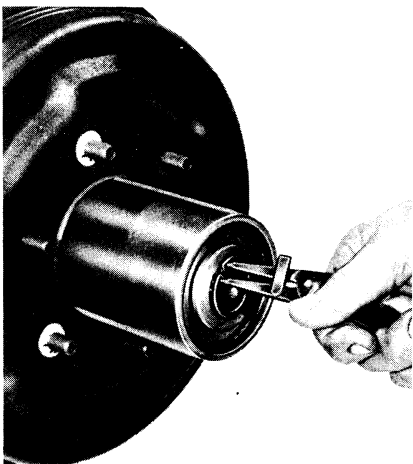
Front drive assemblies are available for Bronco, F-100, F-250 and F-600 vehicles.

ADJUSTMENTS

FRONT WHEEL BEARING ADJUSTMENT

Bronco and F-100

1. Raise the vehicle and install safety stands.
2. Back off the brake adjusting screw if necessary.
3. Remove the front hub grease cap and the driving hub snap ring (Fig. 1).
4. Remove the splined driving hub and the pressure spring. This may require a slight prying assist (Fig. 2).
5. Remove the wheel bearing lock nut and lock ring.
6. Using Tool T59T-1197-B and a torque wrench, tighten the bearing adjusting nut to 50 ft-lbs while rotat-



F 1812-A

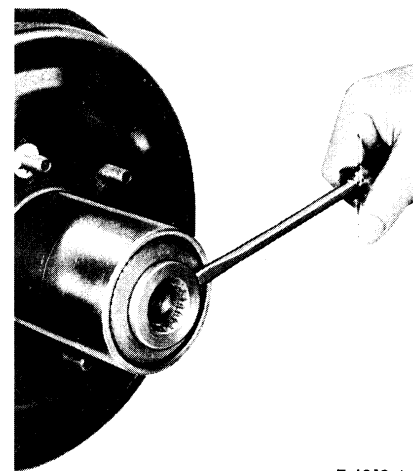
FIG. 1 Removing Snap Ring

ing the wheel back and forth to seat the bearing.

7. Continue rotating the wheel, loosen the adjusting nut and then retorque it to 30-40 ft-lbs.
8. Back off the adjusting nut approximately 1/4 turn (90 degrees).
9. Assemble the lock ring by turning the nut to the nearest notch where the dowel pin will enter.
10. Install the outer lock nut and torque to 50 ft-lbs. Final end play of the wheel on the spindle should be 0.001 to 0.010 inches.
11. Install the pressure spring and driving hub, the driving hub snap ring and after applying non-hardening sealer to the seating edge of the grease cap, install the grease cap. If equipped with free-running lock-out hubs, refer to Front Wheel Drive Lock-Out Hub Installation in Group 15.
12. Adjust the brake if it was backed off.
13. Remove the safety stands and lower the vehicle.

F-250

1. Raise the vehicle and install safety stands.
2. Back off the brake adjusting screw, if necessary. Remove the wheel cover, if installed.
3. Remove the front hub grease cap. Remove the driving hub retaining snap ring and slide the splined driving hub from between the axle shaft and the wheel hub (Fig. 2, Part 11-02). Remove the driving hub spacer. (If equipped with free running lock-out



F 1813-A

FIG. 2 Removing Splined Driving Hub

hubs, refer to Front Wheel Drive Lock-Out Hub Removal in Group 15).

4. With Tool T59T-1197-B, remove the lock nut and lock ring from the spindle.
5. Using Tool T59T-1197-B and a torque wrench, tighten the bearing adjusting nut (Fig. 2, Part 11-02) to 50 ft-lb, while rotating the wheel back and forth to seat the bearings.
6. Continue rotating the wheel and then, loosen and re-torque the adjusting nut to 30-40 ft-lb.
7. Back the adjusting nut off approximately 1/4 turn (90 degrees). Assemble the lock ring by turning the nut

to the nearest notch where the dowel pin will enter.

8. Install the outer lock nut and torque to 50 ft-lb. Final end play of the wheel on the spindle should be 0.001 to 0.010 inch.
9. Install the driving hub, spacer, snap ring and hub grease cap. Apply a thin coat of non-hardening sealer to the setting edge of the grease cap, before installation. (If equipped with free-running lock-out hubs, refer to Front Wheel Drive Lock-Out Hub Installation in Group 15).
10. Adjust the brake, if backed off to permit drum removal.
11. Remove the safety stands and lower the vehicle.

F-600

1. Remove the outer hub cap retaining screws, and remove the cap.
2. Remove the retaining lock ring (Fig. 3).
3. Remove the retaining screws and remove the splined drive plate.
4. Bend the tab of the lock washer away from the lock nut and remove the lock nut (Fig. 4).
5. Remove the lock washer and discard it.
6. While rotating the wheel back and forth to correctly seat the bearings, torque the adjusting nut to 50 ft-lbs.

7. Back off the adjusting nut from 1/4 to 1/3 turn.
8. Position a new lock washer against the adjusting nut and apply a film of oil to the outer face of the lock washer.
9. Run the lock nut up against the lock washer and torque it to 100-150 ft-lbs.
10. Bend one tab of the lock washer over the adjusting nut.
11. Bend one tab of the lock washer (in the opposite direction) over the lock nut. **Use a blunt tool when bending the tabs to avoid making any chips**

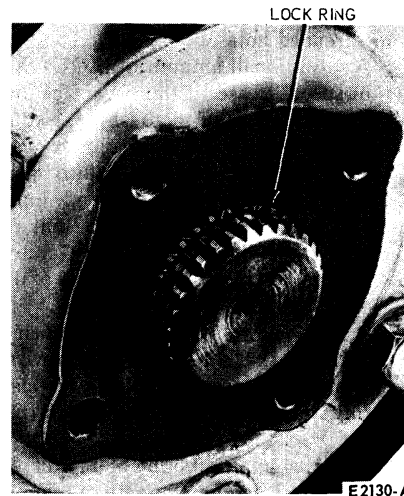


FIG. 3 Access To Lock Ring

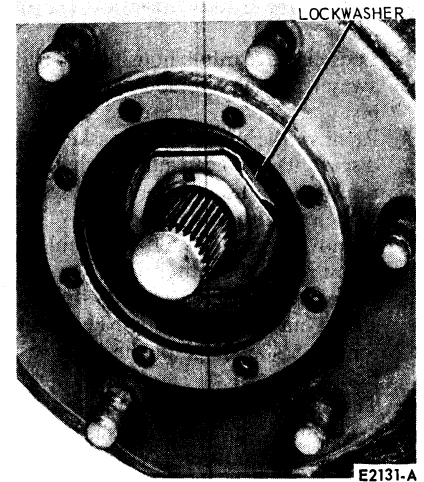


FIG. 4 Lock Nut and Washer Assembled

REMOVAL AND INSTALLATION

LOCK-OUT HUB (INTERNAL TYPE)

Bronco, F-100, F-250 (3300 Lb Axle)

Removal

1. Remove the lock-out hub screws and washers (refer to Fig. 5).
2. Remove the hub ring and the knob, wipe the parts clean.
3. Remove the internal snap ring from the groove in the hub.
4. Remove the cam body ring and clutch retainer (as an assembly) from the hub. Disassemble the parts.
5. Remove the axle shaft snap ring. It may be necessary to push inward on the gear and pull out on the axle with a bolt to make the snap ring removal easier.
6. Remove the drive gear and clutch gear. A slight rocking of the hub may make them slide out easier.
7. Remove the coil spring.
8. Remove the spring retainer ring.

Installation

1. Grease the inner hub with high speed grease (Fig. 6).

2. Install the spring retainer ring, positioned as shown with recessed undercut area going in first. Be sure it seats against the bearing (Fig. 7).
3. Install the coil spring with large end entering first (Fig. 8).
4. Install the axle shaft sleeve and ring and the inner clutch ring. Notice that the teeth are meshed together in a locked position for easy assembly. It may be necessary to rock the hub back and forth for spline alignment. Keep the two gears in locked position (Fig. 9).
5. Install the axle shaft snap ring. Push inward on gear, and if necessary, pull out axle shaft with bolt to allow clearance in groove for snap ring on the axle shaft. Be sure snap ring is fully seated in the snap ring groove of the shaft (Fig. 10).
6. Install the actuating cam body ring into the outer clutch retaining ring. Assemble into hub (Fig. 11).
7. Install the internal snap ring. Be sure snap ring is fully seated in the snap

- ring groove of the hub (Fig. 12).
8. Apply a small amount of Lubriplate Grease on the ears of the cam (Fig. 13).
9. Apply a small amount of Parker O-ring lube in groove of actuating knob before assembling outer O-ring (Fig. 13).
10. Assemble knob in hub ring and assemble to axle with knob in locked position. Assemble screws and washers alternately and evenly, making sure the retainer ring is not cocked in the hub.
11. Torque the six lock-out hub screws to 35 to 40 inch pounds. Be sure the washers are under each retaining screw. At first the lock-out hubs will probably seem hard to engage and disengage, but after mileage they should loosen up for easier operation. Either lock-out hub will fit either wheel.

Do not drive vehicle until you are sure that both lock-out hubs are engaged or disengaged. When vehicle is driven in water deep enough to cover the hubs, it is

recommended that the internal parts be disassembled and inspected for possible water or dirt. After inspection, relubricate all parts before assembly to prevent rusting or corrosion.

LOCK-OUT HUB (EXTERNAL TYPE)

F-250 (3500 Lb Axle)

Removal

1. Remove the lock-out hub screws and washers (refer to Fig. 14), and discard them.
2. Loosen the gear hub housing and slide away from the hub and drum assembly.
3. Remove the inner metal gasket (and discard it), the gear hub housing, and remove and discard the outer gasket. Wipe clean the exposed parts.
4. Remove the snap ring while holding pressure on the clutch gear.
5. Ease the clutch gear and pressure spring out of the assembly. The actuator knob should be in the lock position for this step.
6. Turn the actuator knob to the free position. With a drift, drive the lock pin out of the assembly.
7. Remove the actuating cam from the knob.
8. Remove the knob retainer snap ring and remove the knob from the knob retainer.
9. Using a capscrew pull out slightly on the axle shaft and remove the snap

ring which retains the bushing and inner clutch gear assembly.

10. Remove these parts and disassemble. If wear or damage are evident on either the inner or outer clutch gear they should both be replaced as a set.

Installation

Before assembling lock-out hubs inspect the splines of the axle shaft making sure they are free of any possible nicks or burrs.

Threaded screw holes in the wheel hub should be cleaned before assembling new retainer screws. These holes can be cleaned by directing compressed air into the threaded holes.

1. Apply a small amount of MOLY XL hi-speed grease to the back face and the thrust face of the bushing, also to the splines of the inner clutch gear. Assemble inner clutch gear into bushing. Install the bushing and inner clutch gear onto axle shaft, making sure the splines of the inner clutch gear are aligned with the splines of the axle shaft, as shown (Fig. 15).
2. Install a new snap ring. If necessary, pull out axle shaft with capscrew to allow clearance in groove for snap ring on axle shaft. Be sure snap ring is fully seated (Fig. 16).
3. Apply a small amount of Parker O-ring lubricant on the actuator knob, making sure knob is completely lubricated in the area shown. Assemble O-ring onto actuating knob.
4. Install the actuating knob into the knob retainer with arrow pointing to

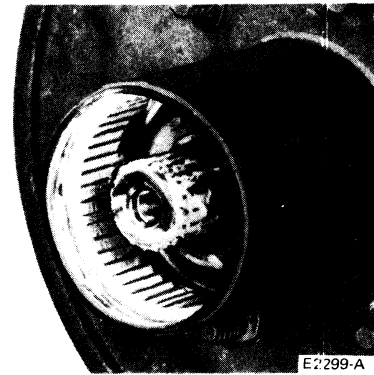


FIG. 6 Grease Application

- free position. Install the knob retainer snap ring. Spread snap ring with snap ring pliers. Use a small screwdriver to position the snap ring in the groove of the knob (Fig. 17).
5. Install the actuating cam onto the knob, aligning ears of the cam with the slots of the retainer. Position parts on a small piece of wood as shown. Assemble the lock pin through the groove of the cam and holes in the actuating knob. Be sure ends of the pin are flush with the outside diameter of the cam (Fig. 18).
6. Turn actuator knob to lock position. Apply a small amount of MOLY XL hi-speed grease to both grooves of the cam as shown (Fig. 19).

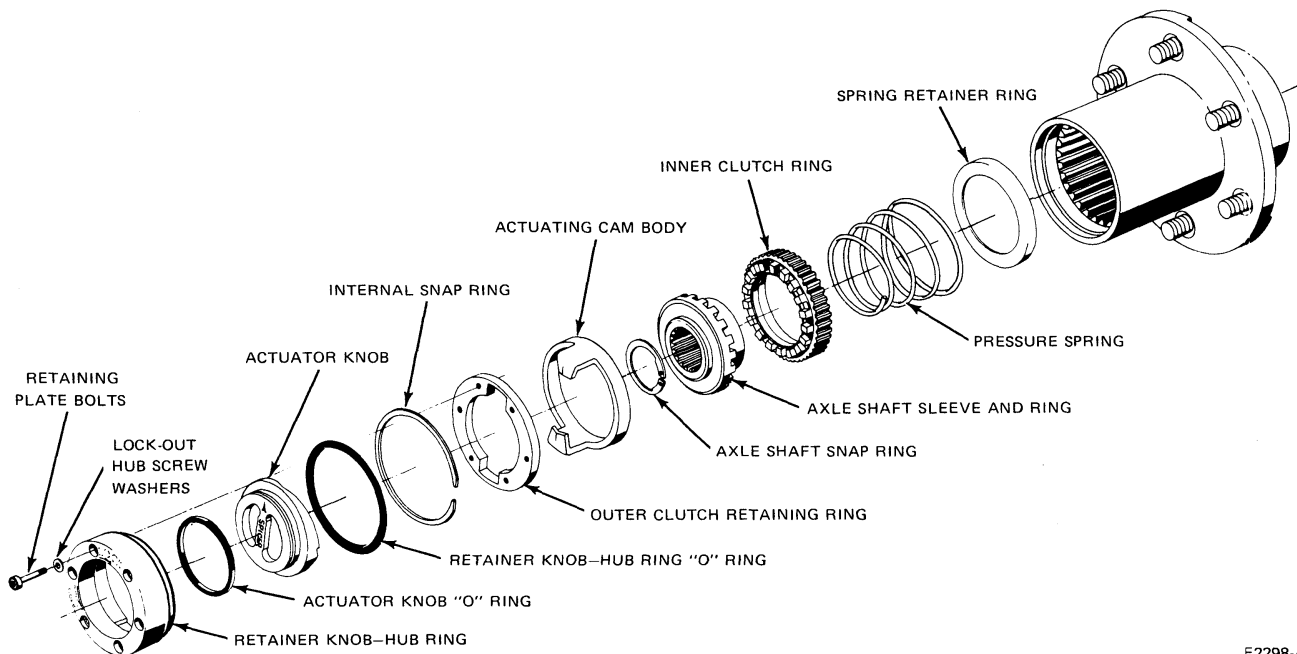


FIG. 5 Lock-Out Hub Internal Type

E2298-A

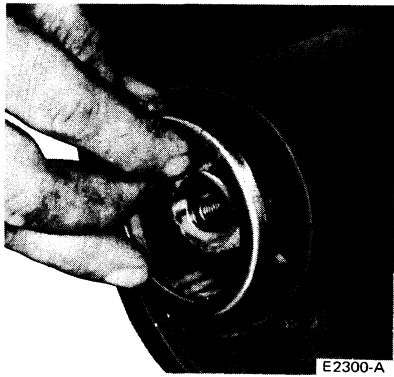


FIG. 7 Spring Retainer Ring Installation



FIG. 8 Coil Spring Installation

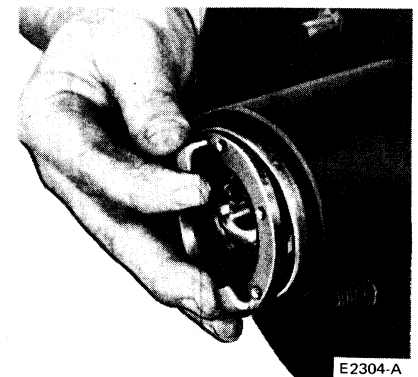


FIG. 11 Installing Cam Body Ring into the Clutch Retaining Ring

7. Install the pressure spring and outer clutch gear. compress the pressure spring by forcing down on clutch gear and assemble snap ring. Make sure snap ring is secure in the groove of the cam. Turn actuator knob to free position. Assemble six dished washers to the six retainer screws exactly as shown (Figs. 20 and 21).

8. Install 2 screws with correctly positioned washers into the knob retainer. This will properly line up the parts in steps 9 and 10. Apply a small amount of hi-speed grease to the outer spline and teeth of the outer clutch gear. Remove any excess lubricant from the gasket surface of the retainer.

9. Install a new outer retainer gasket. Assemble gear hub housing by aligning the splines of the housing with those of the outer clutch gear as shown. Assemble a new inner (metal) gasket on hub housing (Fig. 22).

10. Position the lock-out hub subassembly to axle assembly using the two new retainer screws as pilots to assure that the holes of the gasket are in alignment with the holes of the wheel hub. Tighten retainer screws to secure the lock-out hub. Turn actuator knob to lock position.

11. Install the remaining four new retainer screws with washers. Tighten screws evenly. Torque to 30-35 ft-lbs. The lock-out may be hard to engage and disengage, however after use, they should loosen up for easier operation. Either lock-out will fit either wheel.

12. **Do not drive vehicle until both lock-out hubs are either engaged or disengaged.**

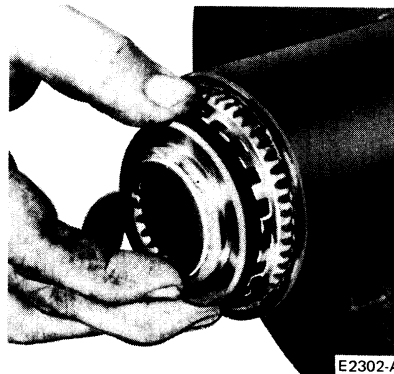


FIG. 9 Axle Shaft Sleeve and ring, and Inner Clutch Ring Installation



FIG. 12 Installing Internal Snap Ring

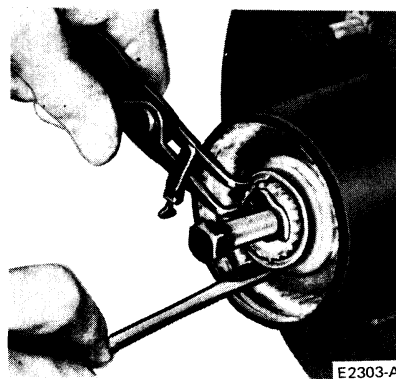


FIG. 10 Installing Axle Shaft Snap Ring

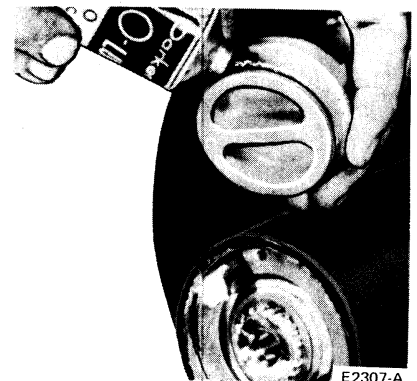
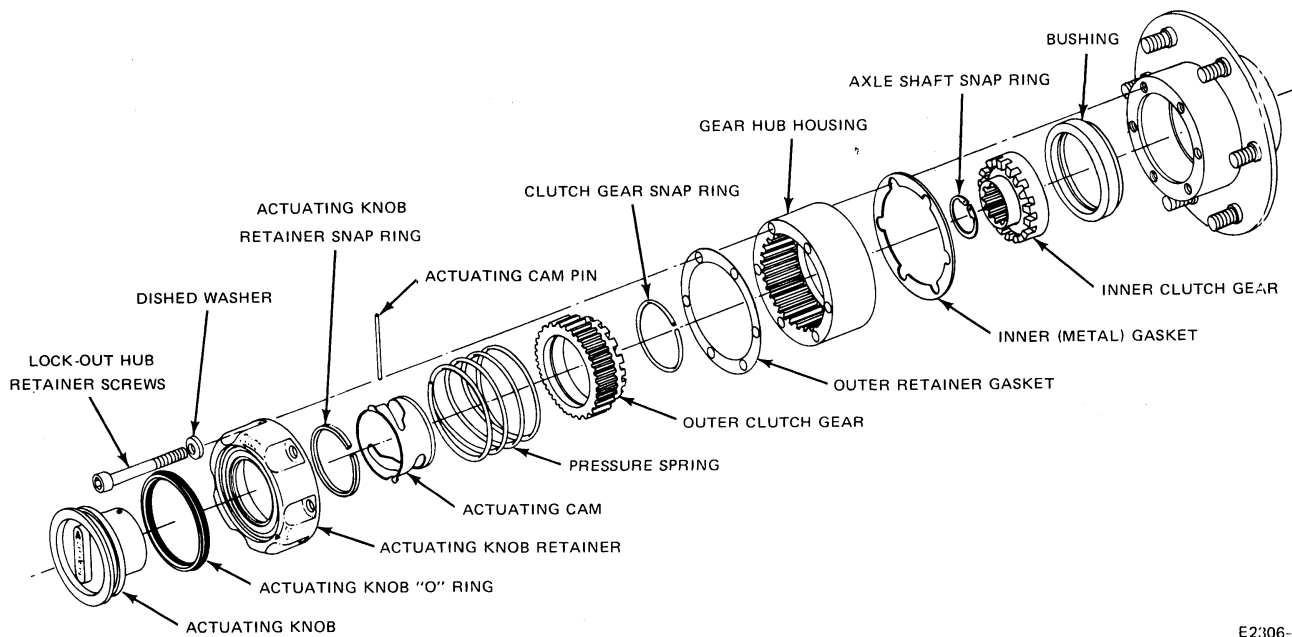
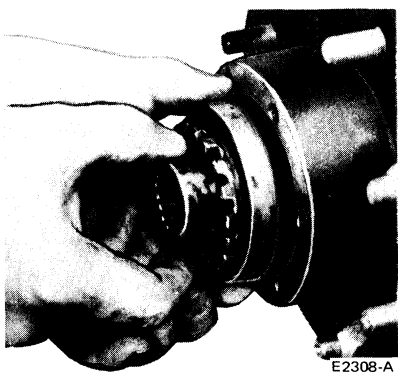


FIG. 13 Lubrication Areas



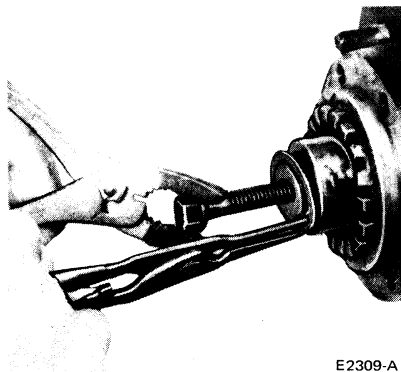
E2306-A

FIG. 14 Lock-Out Hub—External Type



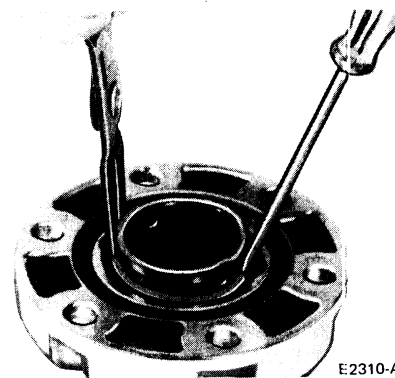
E2308-A

FIG. 15 Bushing and Inner Clutch Gear Installation



E2309-A

FIG. 16 Snap Ring Installation



E2310-A

FIG. 17 Knob Retainer Snap Ring Installation

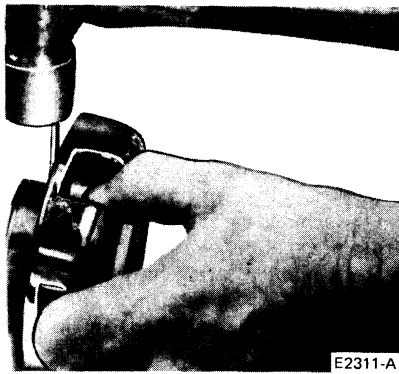


FIG. 18 Lock Pin Installation

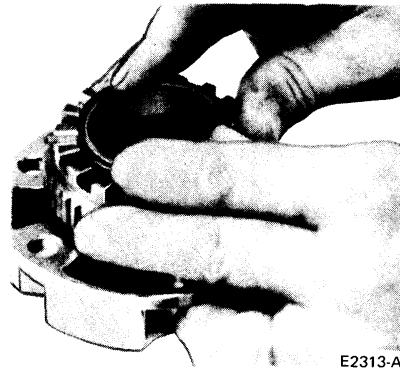


FIG. 20 Pressure Spring and Outer Clutch Gear Installation

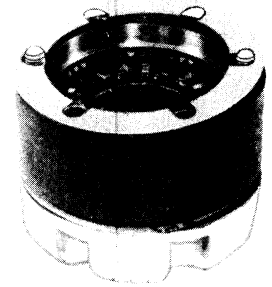


FIG. 22 Assembly Positions of Gear Hub Housing and Gaskets

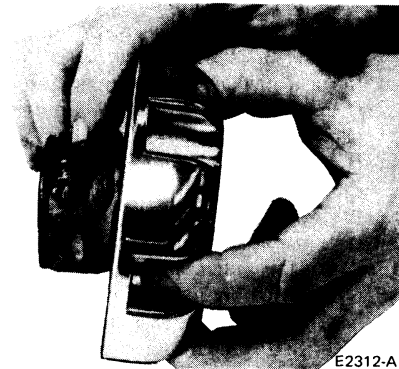


FIG. 19 Grease Application

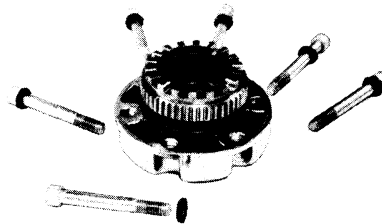


FIG. 21 Dished Washer Assembly Detail

DISASSEMBLY AND ASSEMBLY

FRONT WHEEL GREASE SEAL AND BEARING REMOVAL AND INSTALLATION AND/OR REPACKING

Wheel bearing lubricant has been changed from sodium base grease to lithium base grease.

Sodium base grease is not compatible with lithium base grease and should not be intermixed. Therefore, do not lubricate front and/or rear wheel bearing without first ascertaining the type of original wheel bearing lubricant. Usage of incompatible bearing lubricants could result in premature lubricant breakdown.

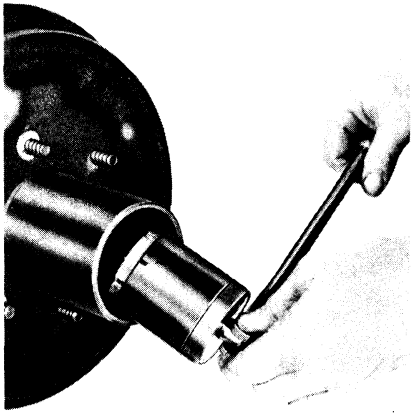
If bearing adjustment will not eliminate looseness or rough and noisy operation, the hub and bearings should be cleaned, inspected, and repacked with specified wheel grease. If the bearing cups

or the cone and roller assemblies are worn or damaged, they should be replaced.

Bronco and F-100

1. Raise the vehicle and install safety stands.
2. Back off the brake adjusting screw if necessary.
3. Remove the front hub grease cap and driving hub snap ring (Fig. 1).
4. Remove the splined driving hub and the pressure spring. This may require a slight prying assist (Fig. 2).
5. Remove the wheel bearing lock nut, lock ring, and adjusting nut (Fig. 23), using tool T59T-1197-B.
6. Remove the hub and drum assembly. The outer wheel bearing and spring retainer will slide out as the hub is removed (Fig. 24).

7. Carefully drive the inner bearing cone and grease seal out of the hub (Fig. 25) using T69L-1102-A.
8. Inspect the bearing cups for pits or cracks. If necessary, remove them with a drift (Fig. 26). **If new cups are installed, install new bearings.** The bearings should be lubricated with C1AZ-19590-B wheel bearing grease. Clean all old grease from the hub. Pack the cones and rollers. If a bearing packer is not available, work as much lubricant as possible between the rollers and the cages.
9. Position the inner bearing cone and roller in the inner cup and install the grease retainer.
10. Carefully position the hub and drum assembly on the spindle.
11. Install the outer bearing cone and roller and the adjusting nut.



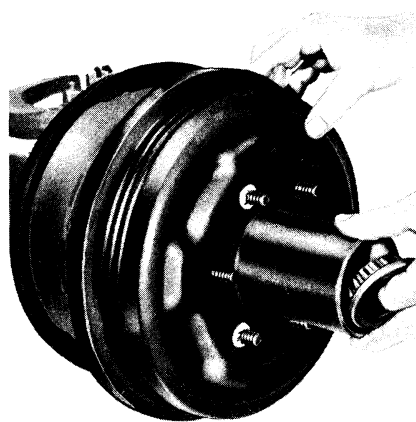
F 1814-A

FIG. 23 Lock nut, Lock Ring and Adjusting Nut Removal

12. Using Tool T59T-1197-B and a torque wrench, tighten the bearing adjusting nut to 50 ft-lbs while rotating the wheel back and forth to seat the bearings.
13. Continue rotating the wheel, loosen the adjusting nut and then retorquer it to 30-40 ft-lbs.
14. Back off the adjusting nut approximately 1/4 turn (90 degrees).
15. Assemble the lock ring by turning the nut to the nearest notch where the dowel pin will enter.
16. Install the outer lock nut and torque to 50 ft-lbs. Final end play of the wheel on the spindle should be 0.001 to 0.010 inches.
17. Install the pressure spring and driving hub snap ring and after applying non-hardening sealer to the seating edge of the grease cap, and install the grease cap. If equipped with free-running lock-out hubs, refer to Removal and Installation for the type of hub involved.
18. Adjust the brake if it was backed off.
19. Remove the safety stands and lower the vehicle.

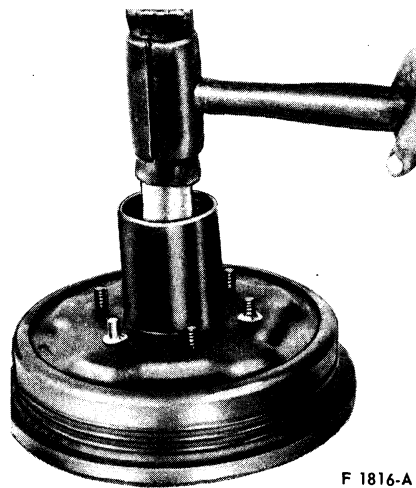
F-250

1. Raise the vehicle and install safety stands.
2. Back off the brake adjusting screw, if necessary. Remove the wheel cover, if installed.
3. Remove the front hub grease cap. Remove the driving hub retaining snap ring (Fig. 2, Part 11-02) and slide the splined driving hub from between the axle shaft and the wheel hub. Remove the driving hub spacer. If equipped with free-running lock-out hubs, refer to Removal and Installation for the type of hub involved.
4. With Tool T59T-1197-B, remove the lock nut, washer, and wheel bearing



F 1815-A

FIG. 24 Hub, Drum and Outer Bearing Removal



F 1816-A

FIG. 25 Inner Bearing Cone and Grease Seal Removal

adjusting nut (Fig. 2, Part 11-02) from the spindle. Remove the wheel, hub and drum as an assembly. The wheel outer bearing will be forced off the spindle at the same time. Protect the spindle and inner bearing cone from dirt.

5. Remove the grease retainer and the inner bearing cone and roller assembly from the hub with Tool 1175AB, and T50T-100-A. Discard the grease retainer.
6. Clean the lubricant off the inner and outer bearing cups with solvent and inspect the cups for scratches, pits, excessive wear, and other damage. If the cups are worn or damaged, remove them with a drift.
7. Thoroughly clean the inner and outer bearing cones and rollers with solvent, and dry them thoroughly. **Do not spin the bearings with compressed air.**

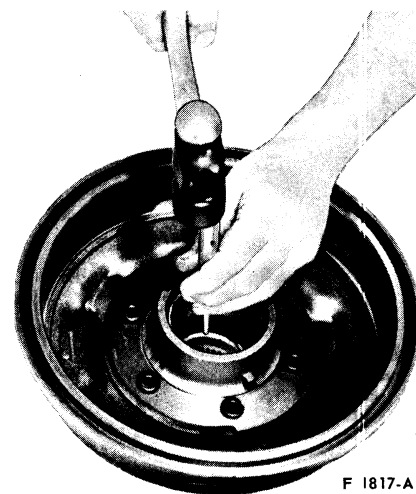
Inspect the cone and roller assemblies for wear or damage, and replace them if

necessary. The cone and roller assemblies and the bearing cups should be replaced as a unit if damage to either is encountered.

8. Thoroughly clean the spindle and the inside of the hub with solvent to remove all old lubricant.

Cover the spindle with a clean cloth, and brush all loose dust and dirt from the brake assembly. **To prevent getting dirt on the spindle, carefully remove the cloth from the spindle.**

9. If the inner bearing cup was removed, install the cup or a new cup in the hub. **Be sure to seat the cup properly in the hub.**
10. Install the outer bearing cup in the hub with a suitable tool. **Be sure the cup is properly seated in the hub.**
11. Pack the inside of the hub with specified wheel bearing grease. Add lubricant to the hub only until the grease is flush with the inside diameter of both bearing cups.
12. All old grease should be completely cleaned from the bearings before repacking them with new grease. Pack the bearing cone and roller assemblies with wheel bearing grease. A bearing packer is desirable for this operation. If a packer is not available, work as much lubricant as possible between the rollers and cages. Lubricate the cone surfaces with grease.
13. Place the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer. **Be sure that the retainer is properly seated.** Coat the grease retainer sealing lip with a liberal amount of grease.
14. Install the wheel, hub, and drum assembly on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.**



F 1817-A

FIG. 26 Bearing Cup Removal

15. Install the wheel outer bearing cone and adjusting nut. Adjust the front wheel bearings as detailed in Adjustments under Front Wheel Bearing Adjustment.

F-600

1. Remove the wheel and tire from the hub and drum. Remove the outer hub cap retaining screws, and remove the cap.
2. Remove the retaining lock ring (Fig. 3).
3. Remove the retaining screws and remove the splined drive plate.
4. Bend the tab of the lock washer away from the lock nut and remove the lock nut (Fig. 4).
5. Remove the lock washer and **discard it**.
6. Remove the adjusting nut.
7. Remove the hub and drum carefully from the spindle. Cover the spindle to protect it from dirt and foreign material. If the drum is difficult to remove, back off the brake adjustment to provide clearance.
8. Carefully remove the inner bearing and seal.
9. Clean the bearing recess and using a suitable solvent, clean the bearings. **Do not spin dry with compressed air.** Repack the bearings with grease after drying thoroughly. Inspect the bearing cups. If cracked, pitted, or otherwise damaged, they should be replaced. If they are replaced, the bearings should also be replaced.
10. The cups can be removed using a hammer and a drift.
11. Install the new cups using Tool T68T-1174-AB for the inner bearing cup and Tool T68T-1173-AB for the outer bearing cup.
12. Install the inner bearing, lubricate and install the grease seal using tool T68T-1173-AC.
13. Position the hub and drum on the spindle.
14. Install the outer bearing and the adjusting nut. Install the wheel and tire on the hub and drum.
15. While rotating the wheel back and forth to correctly seat the bearings, torque the adjusting nut to 50 ft-lbs.
16. Back off the adjusting nut from 1/4 to 1/3 turn.
17. Position a **new** lock washer against the adjusting nut and apply a film of oil to the outer face of the lock washer.
18. Run the lock nut up against the lock washer and torque it to 100-150 ft-lbs.
19. Bend one tab of the lock washer over the adjusting nut.
20. Bend one tab of the lock washer (in the opposite direction) over the lock nut. **Use a blunt tool when bending the tabs to avoid making any chips which could cause serious bearing damage.**
21. Apply Silastic Sealer to the front and rear mounting faces of the splined drive plate.
22. Position the drive plate, install the retaining screws and torque them to specifications.
23. Install the retaining lock ring.
24. Position the outer hub cap and install the retaining screws.

PART 11-14 Wheel Hubs and Bearings — Rear (Full Floating Axle)

Applies To All 250 and Higher Series Vehicles

COMPONENT INDEX		COMPONENT INDEX	
DESCRIPTION	Page	DESCRIPTION	Page
DESCRIPTION	14-1	DISASSEMBLY AND ASSEMBLY	14-2

DESCRIPTION

On all the full-floating axle wheel hubs with tapered roller bearings, a seal is installed behind the inner bearing to keep the wheel bearing lubricant from the brake lining and brake drum (Figs. 1 and 2).

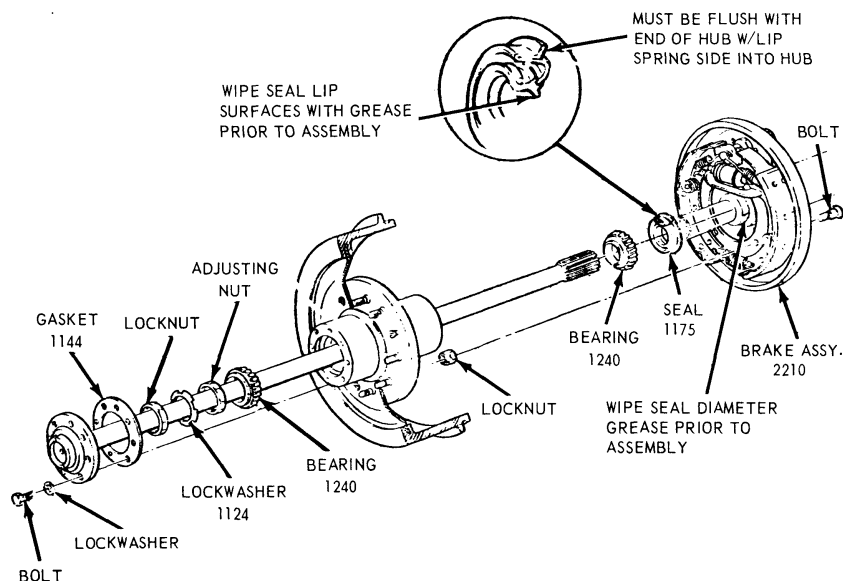
The wheel bearings are packed with wheel bearing lubricant (C1AZ-19590-B) to provide initial lubrication until axle lubricant flows into the wheel hubs and bearings during vehicle operation. On these axles the wheel hub is vented through the axle housing vent. The seal assembly (500-9000 Series) mounts on the wheel hub and seals on a wear sleeve (wiper) which is installed on the axle housing tube (Fig. 2).

The wear sleeves (500-9000 Series) must be installed squarely on the axle housing using the appropriate tools (Fig. 3). Do not use heat on the wear sleeves to facilitate installation. Use the proper tool as shown in fig. 3. The sleeves are designed with flanges to eliminate the possibility of installing the sleeves backwards. Although preservative has been applied to the wear sleeve prior to packaging, a light oil (SAE-10 or its equivalent) should be applied to the wear sleeve to facilitate assembly of the sleeve to the axle housing. After installation of the wear sleeve, the clearance between the end of the wear sleeve and inner wheel bearing shoulder should be 0.010 to 0.025 inches (Fig. 2).

The seal assembly is to be installed in the wheel hub. The garter spring should be checked to assure the spring is in the spring groove behind the primary seal lip after the seal is in position. Before installing the wheel, apply grease (C1AZ-19590-B) between the lips of the seal.

The wheel bearing must be thoroughly cleaned and repacked with lithium base grease (C1AZ-19590-B) before installing the wheel assembly.

To prevent damage to the primary and secondary lips of the seal assembly, a locator sleeve or tool should be used to guide the hub and drum onto the axle. A new seal assembly must be installed whenever a wheel is removed.



E 1972-A

FIG. 1 Rear Wheel Hub—Dana Full-Floating Axle—Models 60, 603E, and 70

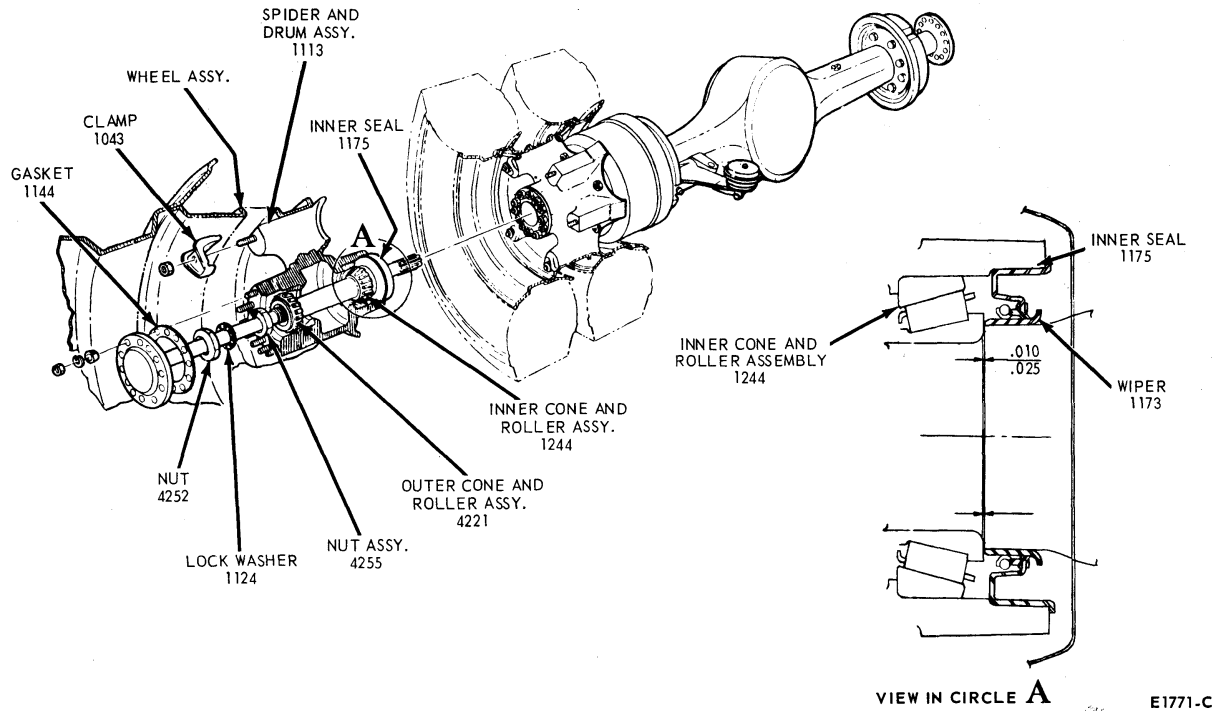


FIG. 2 Typical Rear Wheel Hub—Full-Floating Axle—500-9000 Series

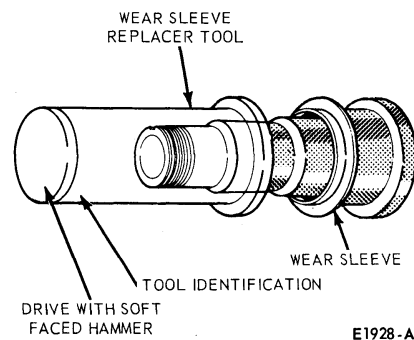


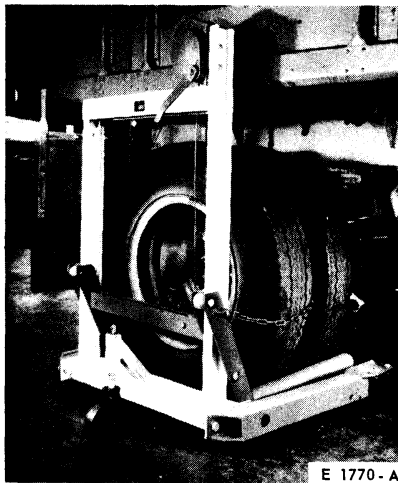
FIG. 3 Tool Application of Wear Sleeve (Wiper) Installation

DISASSEMBLY AND ASSEMBLY

BEARINGS, CUPS AND SEALS

F-250, F-350, E-300 and P-3500-4000 Series

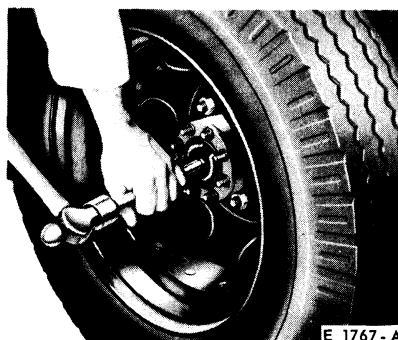
1. Set the parking brake and loosen the axle shaft retaining bolts (Fig. 1).
2. Raise the rear wheels off the floor and place work stands under the rear axle housing so that the axle is parallel with the floor. Back off the rear brake adjustment, if necessary.
3. Remove the axle shaft retaining bolts and discard them.
4. Remove the axle shafts.
5. Remove the wheel lock nut, lock washer and wheel bearing adjustment nut using tool T70T-4252-D, or T70T-4252-E. **Under no condition should the lock nut be removed with a chisel.** Discard the lock washer.
6. With the type of wheel jack shown in fig. 4, raise the wheel to the point that all weight is removed from the wheel bearings. Remove the outer bearing cone. Now, pull the wheel assembly **straight** out and away from the axle.
7. Thoroughly clean the spindle of the axle housing.
8. With a brass drift, and care to prevent damaging the bearing cage, drive the inner bearing cone and inner seal out of the wheel hub.
9. Clean all old grease and axle lubricant out of the wheel hub.
10. Inspect the bearing races and rollers for pitting, galling or erratic wear patterns. Inspect the rollers for end wear. Replace the bearings if worn or damaged.



E 1770-A

FIG. 4 Typical Wheel Jack

11. If the bearing cups are to be replaced, drive them out with a brass drift. Install the new cups with a tool such as OTC 27797.
12. Check for proper seating of the new bearing cups by trying to insert a 0.0015 inch feeler gauge between the cups and the wheel hub.
13. Pack each bearing cone and roller assembly with a bearing packing tool, using M1C75B long life lubricant.
14. Place the inner bearing cone and roller assembly in the wheel hub. Install a new hub inner seal.
15. Position the wheel assembly at the axle housing. Wrap the threads of the spindle with electricians tape. Carefully slide the wheel assembly **straight (to avoid seal damage) onto the axle housing spindle**. Remove the electricians tape.
16. Install the outer wheel bearing and start the bearing adjuster nut. Remove the wheel jack.
17. Torque the adjusting nut to 50-80 ft-lbs while rotating the wheel. Back off (loosen) the adjusting nut $\frac{3}{8}$ of a turn.
18. Install a new lock washer coated with axle lube and smooth side out. Install



E 1767-A

FIG. 5 Axle Shaft Removal—Tapered Dowels

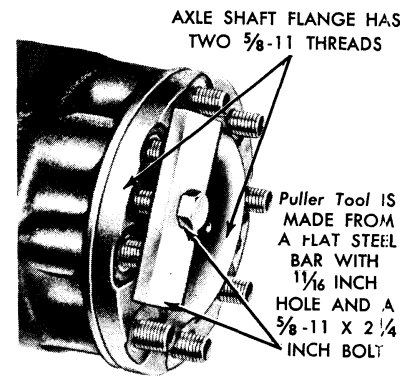
- the lock nut (Tool T70T-4252-D or T70T-4252-E). Torque the lock nut to 90-110 ft-lbs. With the lock nut at proper torque, the wheel assembly must rotate freely and with an end play of 0.001-0.010 inch. be sure of this specification. Check it closely with a suitable dial indicator set up.
19. With a satisfactory end play and freely turning wheel bend two lock washer tabs inward over flats of the adjusting nut and two tabs outward over flats of the lock nut.
 20. Install the axle shaft, new metal flange, gasket, lock washers and new axle shaft retaining bolts. torque the lock bolts to 40-50 ft-lbs.
 21. Adjust the brakes. Then, remove the work stands and lower the vehicle.

500-9000 Series

1. Release the parking brake and loosen the axle shaft stud nuts.
2. Raise the rear wheels off the floor and place the work stands under the rear axle housing so that the axle is parallel with the floor. back off the rear brake adjustment.
3. Remove the axle shaft stud nuts.
4. If tapered dowels are installed in the axle shaft flange, place a drift in the center of the flange and strike it sharply to loosen the dowels (Fig. 5). Remove the axle shaft.

On axles where tapered dowels are not used, two puller threads ($\frac{5}{8}$ -11) are provided in the axle shaft flange. These axle shafts may be pulled with a slide hammer installed in the puller threads or with the type of tool shown in Fig. 6. This tool can be made from a piece of flat steel bar with an $\frac{11}{16}$ inch hole in it, and a $2\frac{1}{4}$ inch long $\frac{5}{8}$ -11 bolt. As the bolt is turned clockwise, the axle shaft flange is pulled away from the wheel hub. If the thread load becomes excessive when pulling an axle shaft, install a second puller on the opposite side of the flange, if so equipped.

5. Bend the lock washer tab away from the lock nut, and then remove the lock nut, lock washer, and the adjusting nut.
6. With the type of wheel jack shown in Fig. 4, raise the wheel to the point that all wheel weight is removed from the wheel bearings. remove the outer bearing cone. Now, pull the wheel **straight out and away from the axle**.
7. Inspect the inner seal wear sleeve on the axle housing spindle for signs of wear or pitting. If necessary to replace the wear sleeve, use a hammer and a cold chisel. Being careful not to damage the seal journal of the axle housing, make two evenly spaced indentations in the wear sleeve sur-

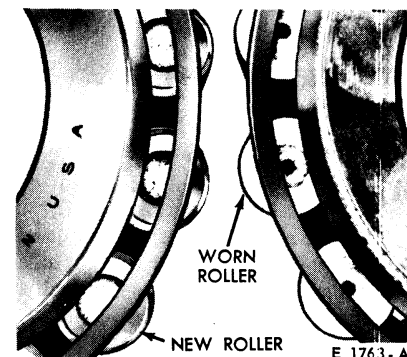


E 1768-A

FIG. 6 Axle Shaft Puller

face and slip the wear sleeve off the axle housing. Thoroughly clean the spindle of the axle housing. Then, position a new **proper size** wear sleeve squarely to the axle housing spindle and, with the use of proper driving tool (Fig. 3), and a soft faced hammer, drive the wear sleeve on the axle housing spindle until it seats evenly against the shoulder of the seal journal of the spindle. A light coating of S.A.E. 10 oil should be applied to the inner surface of the wear sleeve to facilitate assembly of the wear sleeve to axle housing.

8. With a piece of hard wood which will just clear the outer bearing cup, or a brass drift, carefully drive the inner bearing cone and inner seal out of the wheel hub.
9. Clean all the old grease or axle lubricant out of the wheel hub.
10. Inspect the bearing races and rollers for pitting, galling, and erratic wear patterns. Inspect the rollers for end wear (Fig. 7).
11. If the bearing cups are to be replaced, drive them out with a drift. Install the new cups with the tool shown in Fig. 8 or press them in.



E 1763-A

FIG. 7 Roller Bearing End

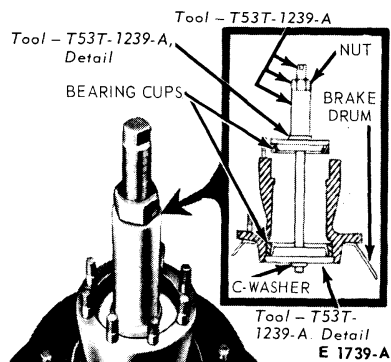


FIG. 8 Installing Bearing Cup

12. Check for proper seating of the new bearing cups by trying to insert a 0.0015 inch feeler gauge between the cup and the wheel hub.
13. Pack each bearing cone and roller assembly with a bearing packer tool.
14. Place the inner bearing cone and roller assembly in the wheel hub, and then install a new hub inner seal.
15. Apply a light film of M1C75 lubricant to the axle spindle; then position a seal protector tool over the axle spindle threads.
16. Position the wheel assembly at the axle housing. Carefully slide the wheel assembly **straight (to avoid seal damage) onto the axle housing spindle. Then, remove the seal protector from the axle spindle.**
17. Install the outer wheel bearing and start the bearing adjuster nut. Remove the wheel jack.
18. **11000-17500 lb. Single Rear Axles and 30000 lb. Tandem Rear Axles:** Torque the adjusting nut to 140 ft-lbs while rotating the wheel to seat the bearings. Back off (loosen) the adjusting nut 1/2 turn; then, torque the adjusting nut again to 50 ft-lbs while rotating the wheel. Back off (loosen) the adjusting nut 1/3 turn. Install the lock washer. Back off the adjusting nut, if necessary to align the lock

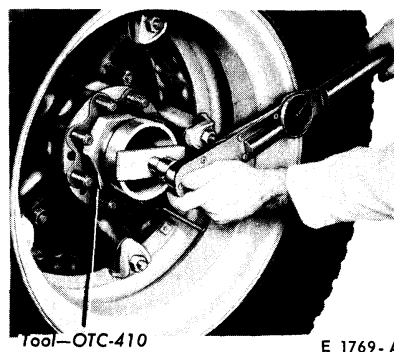


FIG. 9 Installing Lock Nut

washer hole with the dowel pin. Install the lock nut and tighten to 125 ft-lbs. The wheel assembly must rotate freely and with an end play of 0.001 to 0.010 inch. **Do not preload the bearings.**

All Other Single and tandem Rear Axles: Torque the adjusting nut to 185 ft-lbs while rotating the wheel to seat the bearings. Back off (loosen) the adjusting nut 1/2 turn; then, torque the adjusting nut again to 50 ft-lbs while rotating the wheel. Back off (loosen) the adjusting nut 1/6 turn.

19. Install a new lock washer and select a tab which is centered on one of the adjusting nut flats.

Remove the lock washer and bend this tab approximately 45 degrees such that the final bend will fit flush on the nut. Reinstall the lock washer. Install the lock nut and torque it to 125 ft-lbs (Fig. 9). With the lock nut at proper torque, the wheel assembly must rotate freely and with an end play of 0.001-0.010 inch. Do not preload the bearings. Bend the pre-bent lock washer tab flush against the flat of the adjusting nut. Bend another tab flush on the lock nut. Do not use a chisel or other sharp tool to bend the tabs as metal chips could work into the bearings.

20. Install the axle shaft, a new gasket, lock washers and axle shaft retaining

nuts. Torque the nuts to specifications.

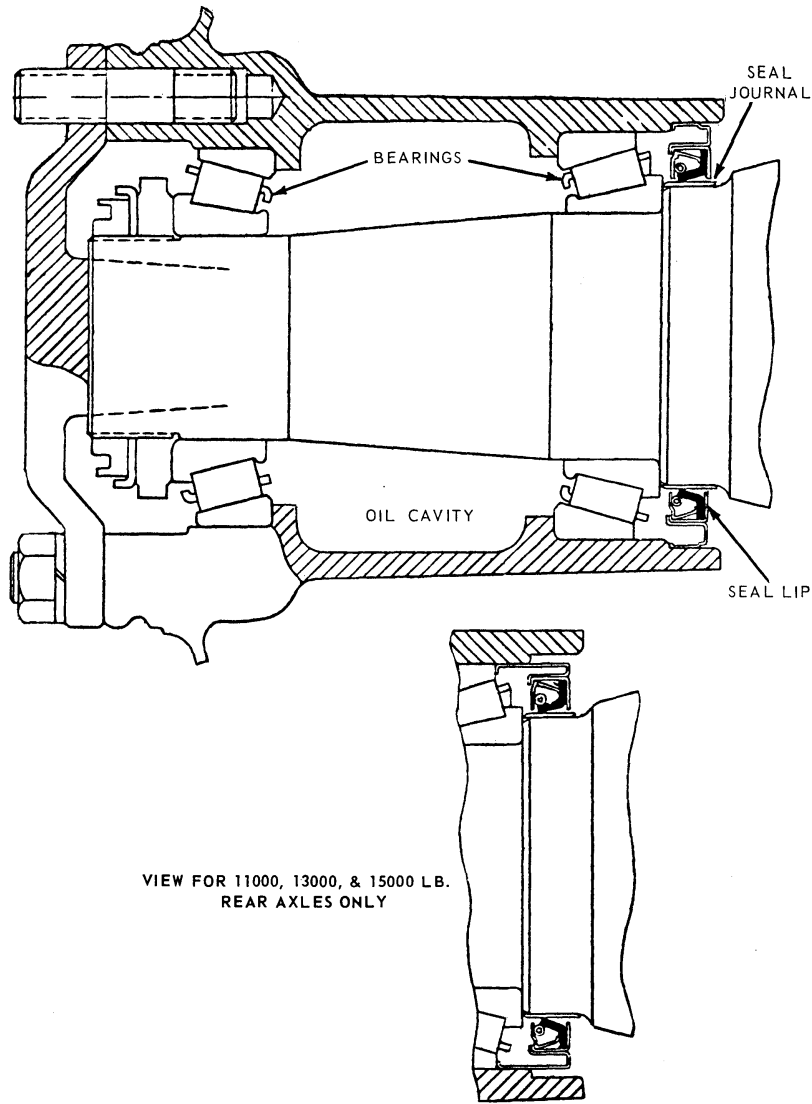
21. Adjust the brakes. Then, remove the work stands and lower the vehicle.

Medium, Heavy and Extra Heavy Vehicles (Oil Lubrication)

Stemco Seals available as regular production options, provide sealing where oil is used for bearing lubrication. The tools required for Stemco Seal Installation are only available from the Stemco warehouse. Refer to specifications for the tooling required. Fig. 10 illustrates a rear wheel Stemco Seal installation.

Rear Hub Seal Installation

1. Thoroughly clean the axle spindle.
2. If the spindle shoulder is scored or pitted apply a thin coat of Permatex No. 2.
3. Position the axle ring and drive it into position flush with the inner bearing shoulder using the correct tool. Procedures vary with different applications. Refer to the instructions packed with each seal set.
4. Remove all burrs and protrusions from the oil seal area of the wheel hub.
5. Pack the inner bearing cone with M1C75-B and position it in the bearing cup.
6. Position the oil seal at the mouth of the bore and drive it squarely into position using the correct tool. The seal must be evenly bottomed.
7. Take special care not to damage the oil seal while installing the wheel.
8. Fill the wheel cavity with oil before installing the outer bearing.
9. Pack the outer bearing with M1C75-B and install it and then adjust the bearings as outlined in Part 11-11, Adjustments.
10. Inspect axle shaft gasket mating surfaces for nicks, burrs, and dirt; then install the axle shaft.
11. Check the rear axle lube level and add oil if required.



E2125-A

FIG. 10 Rear Seal Installation (Stemco)

SPECIFICATIONS

SPECIAL SERVICE TOOLS STEMCO^①

Ford Seal Kit Part No.	Stemco Tool No.	Ford Seal Kit Part Name
D0HZ-1175-A	5008-5308	Kit - Oil Seal Inner Rear Wheel
D0HZ-1175-B	5002-5011	
D0HZ-1175-C	5074-5383	
D0HZ-1175-D	5072-5397	
D0HZ-1175-E	5071-5391	
D0HZ-1175-F	5076-5399	

^① Kits on this page consist of one axle ring and one seal for just one wheel.

CE2330-A

<h1 style="font-size: 2em; margin: 0;">Brakes</h1>	GROUP 12
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	Page		Page
PART 12-01		PART 12-54	
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PART 12-02		Diaphragm, Frame-Mounted	
Drum Brakes – Single Cylinder,		(Bendix)	12-54-1
Dual Piston	12-02-1	PART 12-58	
<hr/>		Vacuum Brake Booster – Single	
PART 12-05		Diaphragm, Dash-Mounted	
Drum Brakes – Single Cylinder,		(Midland)	12-58-1
Single Piston	12-05-1	PART 12-60	
PART 12-08		Vacuum Brake Booster – Single	
Drum Brakes – Dual Cylinders,		Diaphragm, Frame-Mounted	
Dual Pistons	12-08-1	(Midland)	12-60-1
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Drum Brakes – Dual Cylinders,		Parking Brake – Cable Actuated,	
Single Piston (Wagner)	12-09-1	Rear Wheels	12-70-1
PART 12-24		PART 12-77	
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General Air Brake Service	12-40-1	Parking Brake – Internal Shoe,	
PART 12-43		Transmission Mounted	12-79-1
Air Brakes – Single Wedge		PART 12-81	
(Rockwell)	12-43-1	Parking Brake – Internal Shoe,	
PART 12-44		Transfer Case Mounted	12-81-1
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(Bendix)	12-46-1	Parking Brake – MGM Stopgard-	
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PART 12-50		Parking Brake – MGM Shortstop, Rear	
Vacuum Brake Booster – Single		Wheels, Air	12-85-1
Diaphragm, Dash-Mounted		PART 12-86	
(Bendix)	12-50-1	Parking Brake – MGM Low Profile,	
PART 12-52		Rear Wheels, Air	12-86-1
Vacuum Brake Booster – Tandem		PART 12-87	
Diaphragm, Dash-Mounted		Parking Brake – Anchor Lok, Rear	
(Bendix)	12-52-1	Wheels, Air	12-87-1
PART 12-53			
Vacuum Brake Booster – Single			
Diaphragm, Frame-Mounted			
(Bendix)	12-53-1		

PART 12-01 General Hydraulic Brake Service

COMPONENT INDEX Applies to Models as Indicated	All Models	Econoline & Bronco	P-350-400	P-500	B-500-750, 6000-7000	F-100-350	F-500-750, L-800-900	L-8000-9000	LT-800-900, 8000,9000	C-550-900, 6000-7000	C-900 C-8000 CT800-900	LN-500-900, 8000-9000	LN-800-900,8000- 9000 LNT Series W & WT Series
BRAKE BOOSTER													
Cleaning and Inspection		N/A	01-14	01-14	01-14	01-14	01-14	N/A	01-14	01-14	N/A	01-14	N/A
Push Rod Adjustment		N/A	01-9	01-9	01-9	01-9	01-9	N/A	01-9	01-9	N/A	01-9	N/A
Testing		01-8	01-8	01-8	01-8	01-8	01-8	N/A	01-8	01-8	N/A	01-8	N/A
BRAKE CYLINDER													
Cleaning and Inspection	01-13	01-13	01-13	01-13	01-13	01-13	01-13	N/A	01-13	01-13	N/A	01-13	N/A
BRAKE DRUM													
Cleaning and Inspection	01-13												
Refinishing	01-12												
Removal and Installation	01-12												
BRAKE PEDAL													
Adjustment	01-9												
BRAKE SHOE AND LINING													
Overhaul	01-12												
BRAKE SYSTEM													
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Hydraulic Line Repair		01-11	01-11	01-11	01-11	01-11	01-11	N/A	01-11	01-11	N/A	01-11	N/A
Manual Bleeding		01-9	01-9	01-9	01-9	01-9	01-9	N/A	01-9	01-9	N/A	01-9	N/A
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Preliminary Checks		01-8	01-8	01-8	01-8	01-8	01-8	N/A	01-8	01-8	N/A	01-8	N/A
Pressure Bleeding		01-10	01-10	01-10	01-10	01-10	01-10	N/A	01-10	01-10	N/A	01-10	N/A
Warning Light Test		01-8	01-8	N/A	01-8	01-8	01-8	N/A	01-8	01-8	N/A	01-8	N/A
DISC BRAKES													
Cleaning and Inspection		N/A	N/A	N/A	N/A	01-13	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MASTER CYLINDER													
Cleaning and Inspection		01-13	01-13	01-13	01-13	01-13	01-13	N/A	01-13	01-13	N/A	01-13	N/A
PRESSURE DIFFERENTIAL VALVE													
Centralizing		01-11	01-11	01-11	01-11	01-11	01-11	N/A	01-11	01-11	N/A	01-11	N/A

A page number indicates that the item is for the vehicle(s) listed at the head of the column.

N/A indicates that the item is not applicable to the vehicle(s) listed.

DESCRIPTION

Hydraulically operated service brakes are standard equipment on all 100 through 800 Series and on some 900 Series trucks.

Automatic brake shoe adjusters are used on all 100 thru 900 Series trucks with hydraulic brakes.

A dual-master cylinder brake system (Figs. 1 through 4) is used as standard equipment on F-100 through F-350, E-100 through E-300, Bronco, and P-350-400 vehicles. The dual master cylinder is also used on F-500, L-900, LN-600-750, F-6000-7000, LN-6000-7000, C-6000-7000 and B-500-750 Series vehicles equipped with split hydraulic brakes.

Front Disc Brakes are available on F-250 and F-350 trucks.

The standard hydraulic brake system on some vehicles may be assisted by a vacuum booster installed as either standard or optional equipment. Service information on the vacuum booster units is given in Parts 12-50, 12-52, 12-53, 12-54, and 12-60.

The dual, master cylinder contains a double hydraulic cylinder with two fluid reservoirs, two hydraulic pistons (a primary and secondary) and two residual check valves, located in the outlet ports (Fig. 5). The master cylinder secondary systems outlet port is connected to the secondary hydraulic circuit and the primary system brake outlet port is connected to the primary hydraulic circuit.

The master cylinder primary and secondary pistons function together when

the primary and secondary systems are fully operative.

Brake lines (tubes) are connected from the brake master cylinder primary and secondary system outlet ports to the pressure differential valve assembly (Figs. 5 and 6). The electrical brake warning switch, and the brake lines (tubes) leading from the differential valve assembly to the front and rear wheel brake cylinders are also shown in Figs. 6 and 7.

On all 100-400 Series trucks the dual master cylinder primary and secondary circuits actuate either the front or rear wheel brakes.

On 500-900 Series trucks with a split hydraulic system, each of the two lines from the dual-master cylinder actuates one brake cylinder at each wheel (front and rear) 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. The line from the other master cylinder outlet port actuates the remaining brake wheel cylinder at each rear wheel. Power boosters are frame-mounted on LN-500-600 Series models. Other 500-900 Series models have dash-mounted boosters.

SINGLE MASTER CYLINDER BRAKE SYSTEM—500-900 SERIES

The standard hydraulic brake system

C-Series models is equipped with a single master cylinder and internal drum brakes at all wheels. On all models except P-500, the drum brakes are self adjusting.

The standard hydraulic brake system on some trucks is assisted by a vacuum booster which may be installed as either standard or optional equipment.

DRUM BRAKES

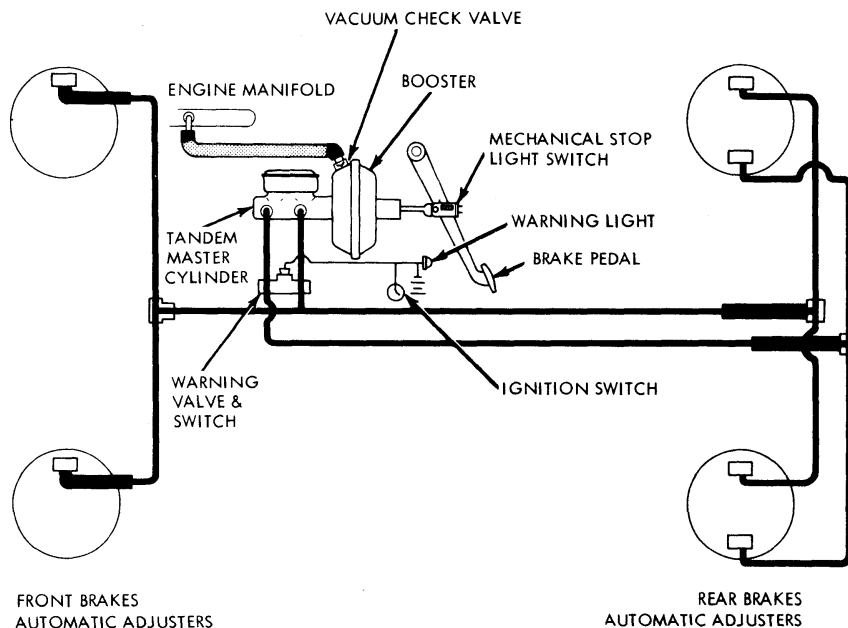
All Ford truck models have internal expanding shoes, except the F-250 and F-350 which may have front disc brakes. The different types of brake assemblies vary in the way that the shoes are anchored, in the number of wheel cylinders used at each wheel, and in the number of pistons in the wheel cylinder.

In the single anchor type, both brake shoes are mounted to the same anchor and are actuated by one wheel cylinder. In the duo-servo, single anchor brake, the wheel cylinder has two pistons. One piston exerts force against the upper end of the primary shoe; the other piston exerts force against the upper end of the secondary shoe (Figs. 7 and 8).

In the double anchor type, each shoe is mounted to a separate anchor. The shoes are actuated by one duo-servo (two piston) cylinder at the upper end.

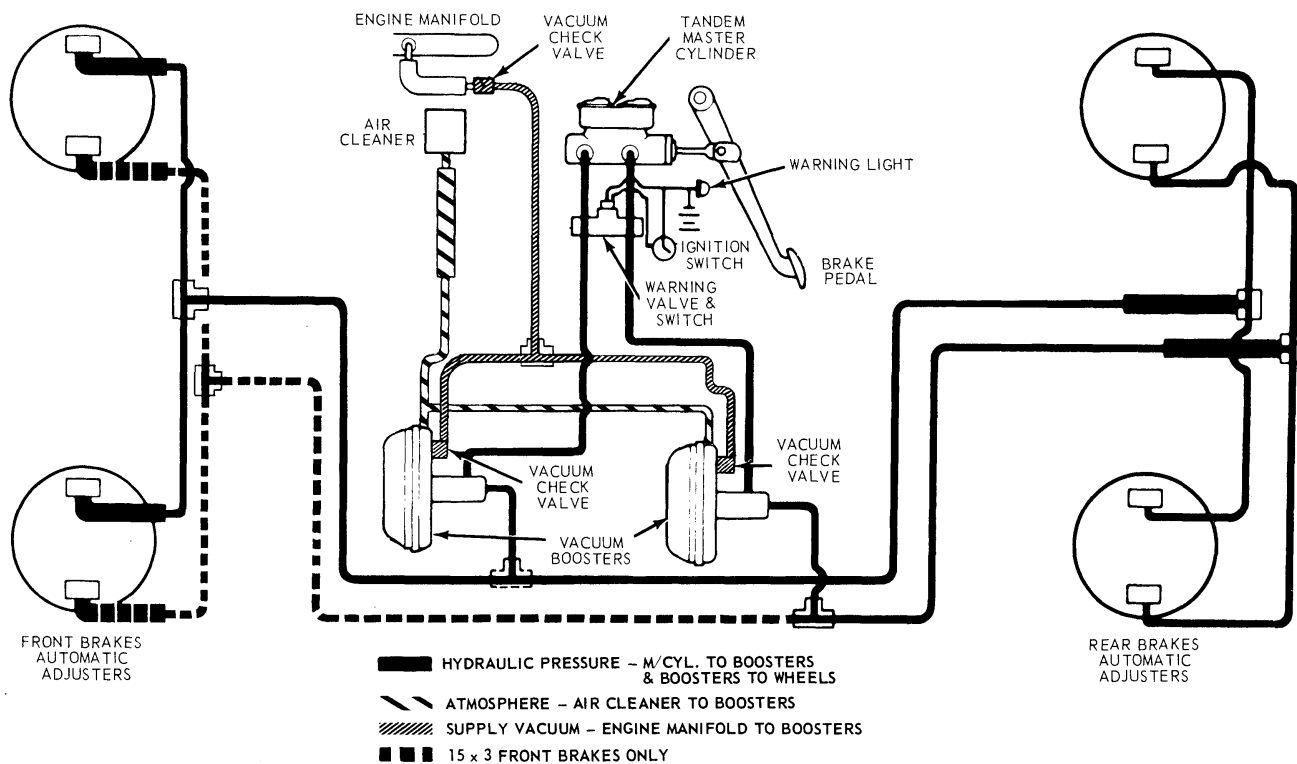
The front wheels of some trucks are equipped with two cylinders, each having one piston. The piston in one cylinder exerts force against one end of one shoe; the piston in the other cylinder exerts force against the opposite end of the other shoe.

The rear wheels of some vehicles are equipped with two cylinders, each having two pistons (four pistons total). Each of the four pistons exert force against one end of one shoe (Fig. 9).



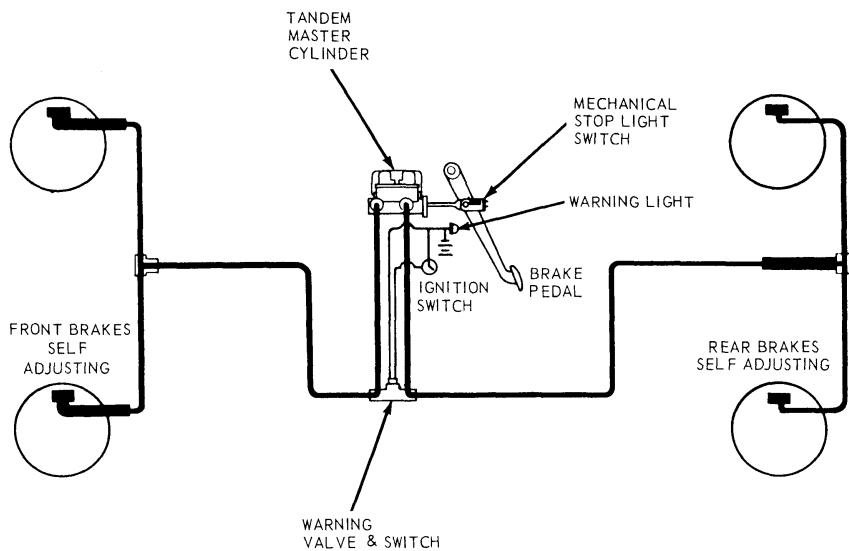
H1706-A

FIG. 1 Split Hydraulic—Vacuum Brake System with Dash-Mounted Booster



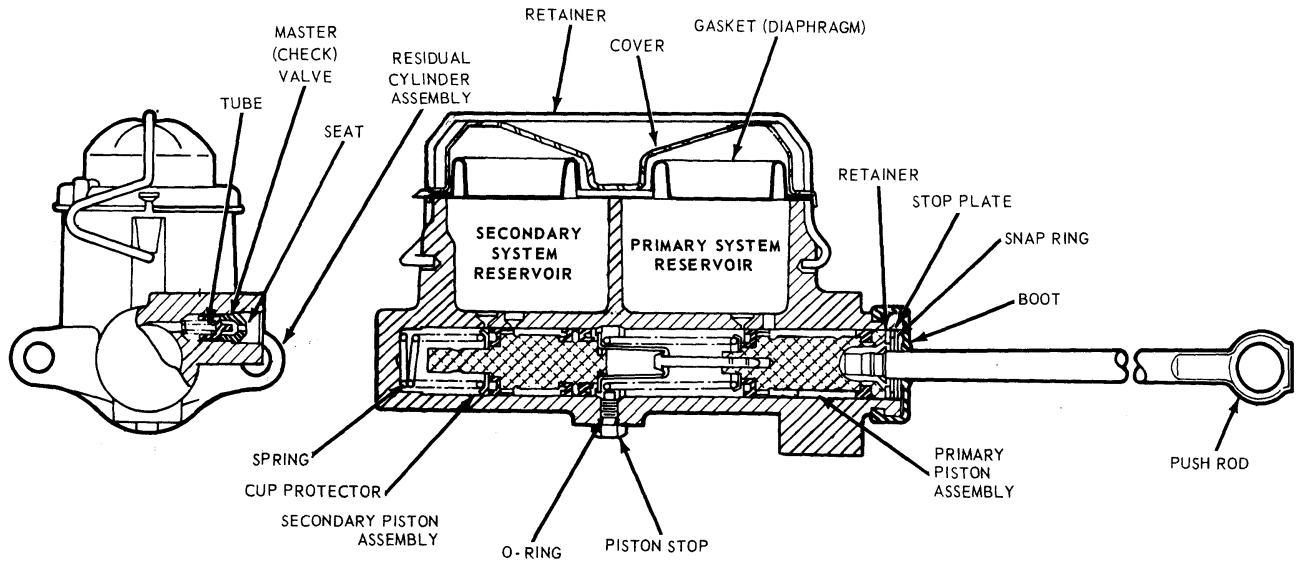
H1732-B

FIG. 2 Split Hydraulic—Vacuum Brake System with Frame-Mounted Boosters—600-900 Series



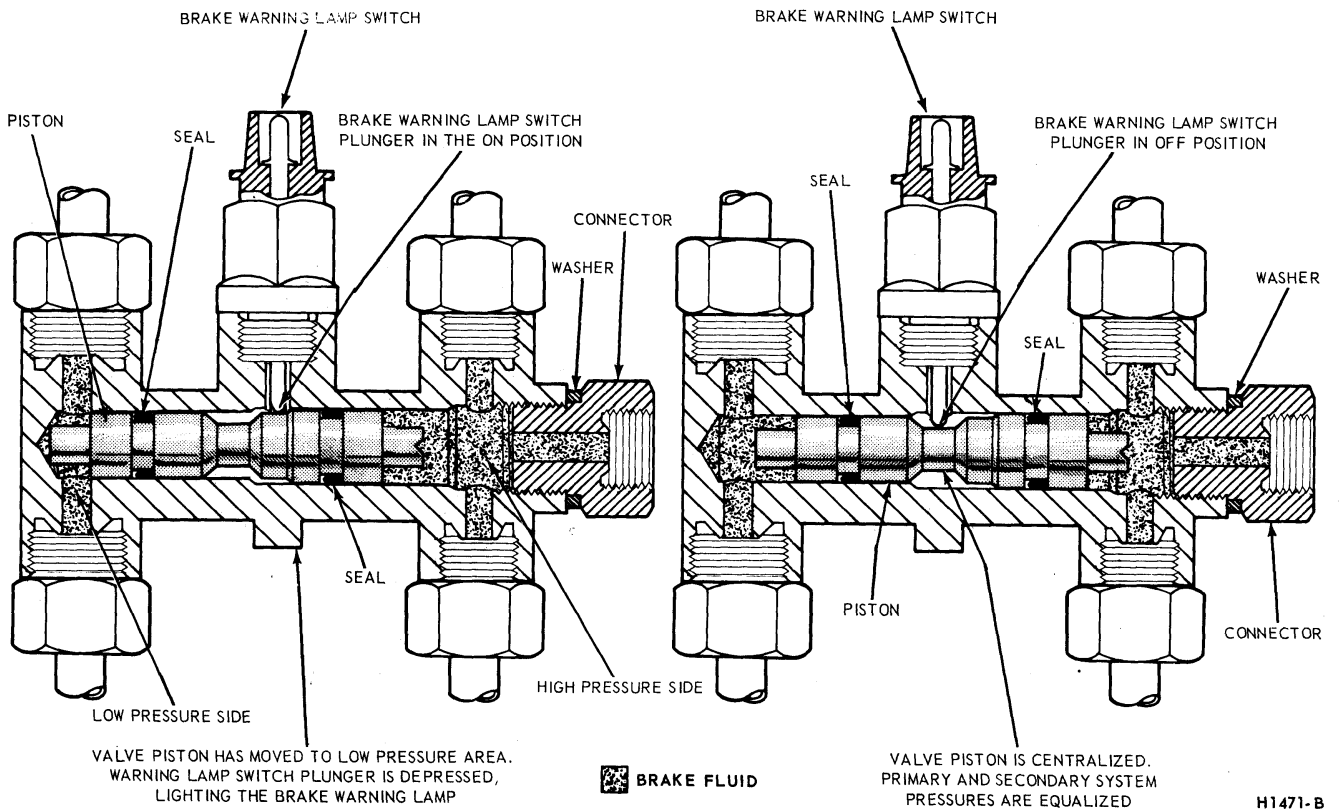
H1985-A

FIG. 3 Typical Hydraulic Brake System—Light Truck



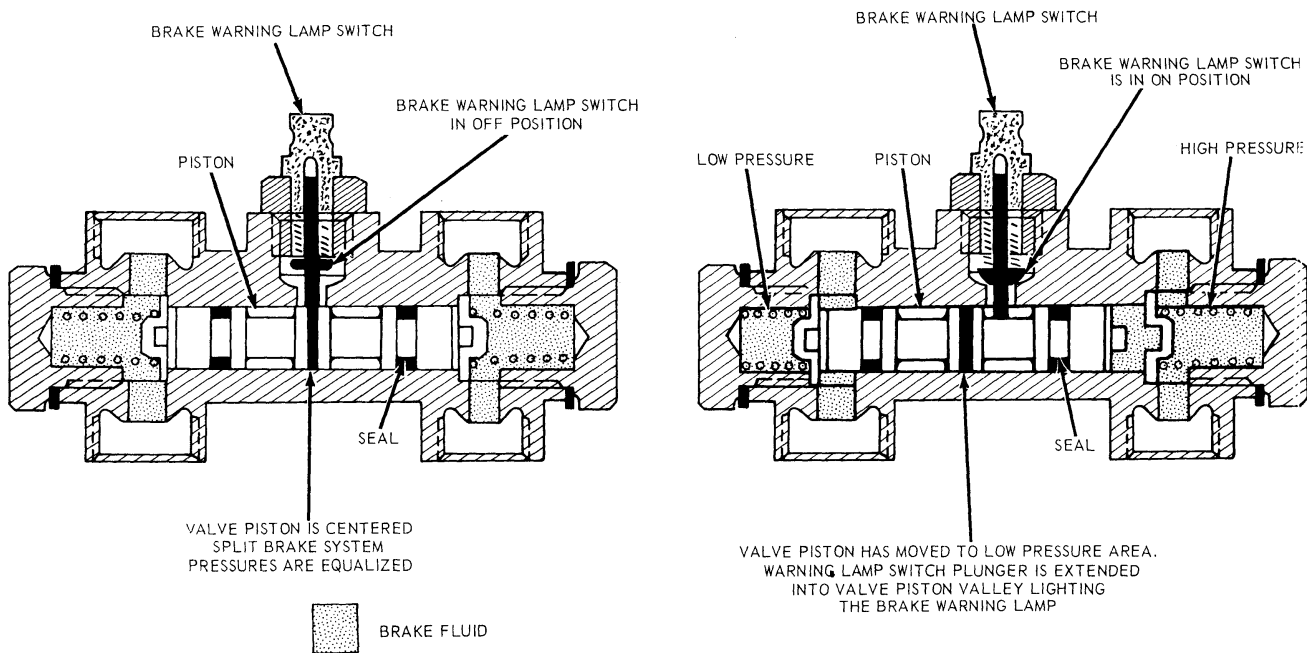
H1503-C

FIG. 4 Dual Master Cylinder—Typical (Light Truck)



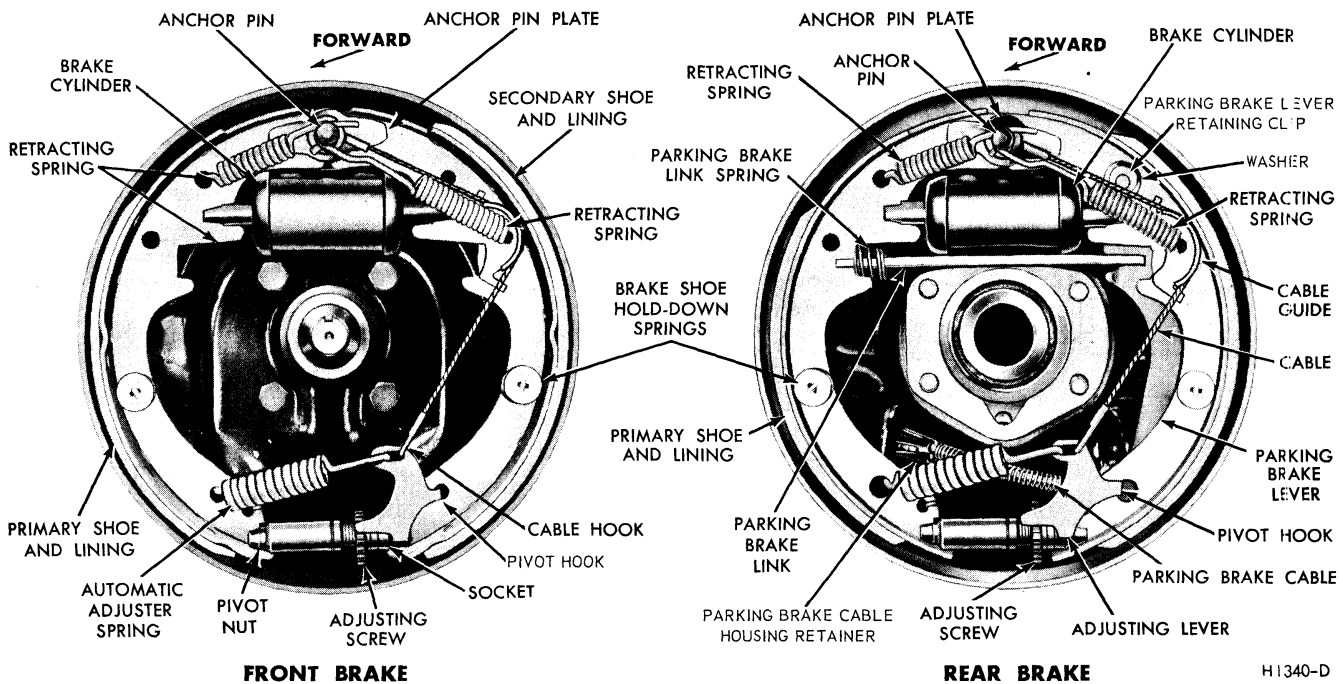
H1471-B

FIG. 5 Differential Valve System—100-400 Series



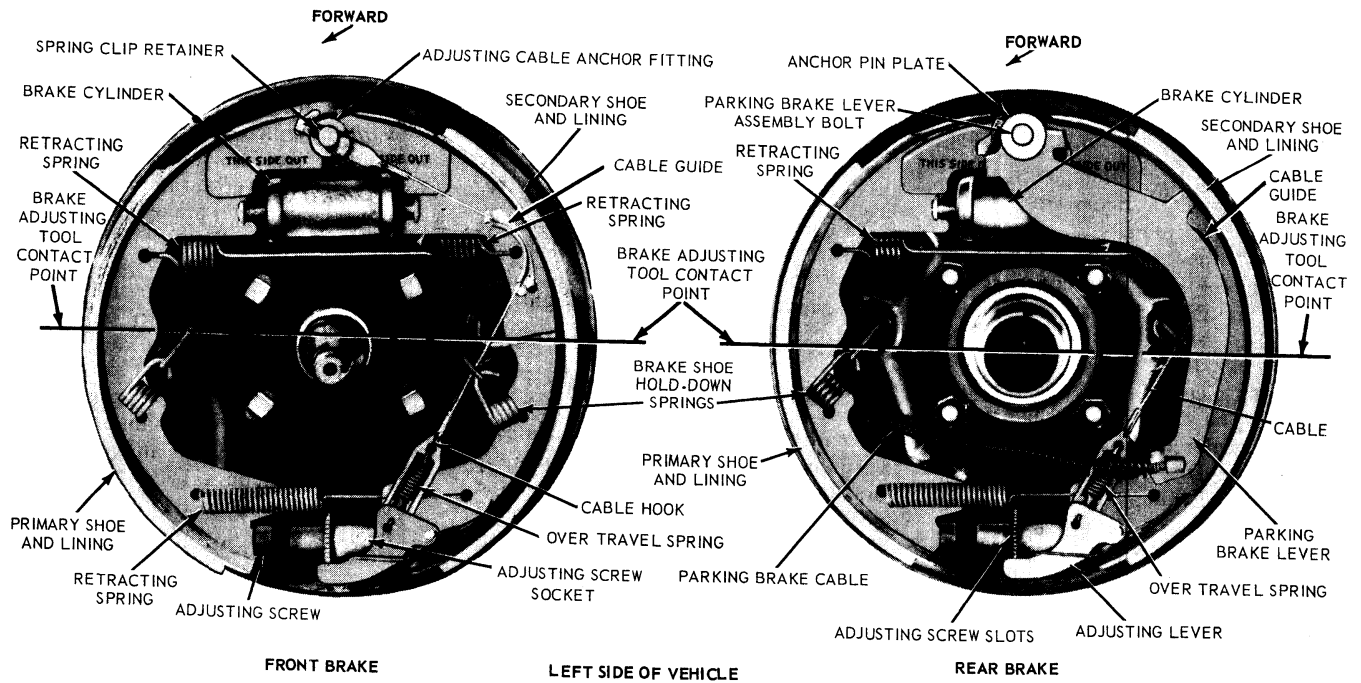
H 1671-A

FIG. 6 Differential Valve System—500-900 Series with Split Hydraulic Brakes



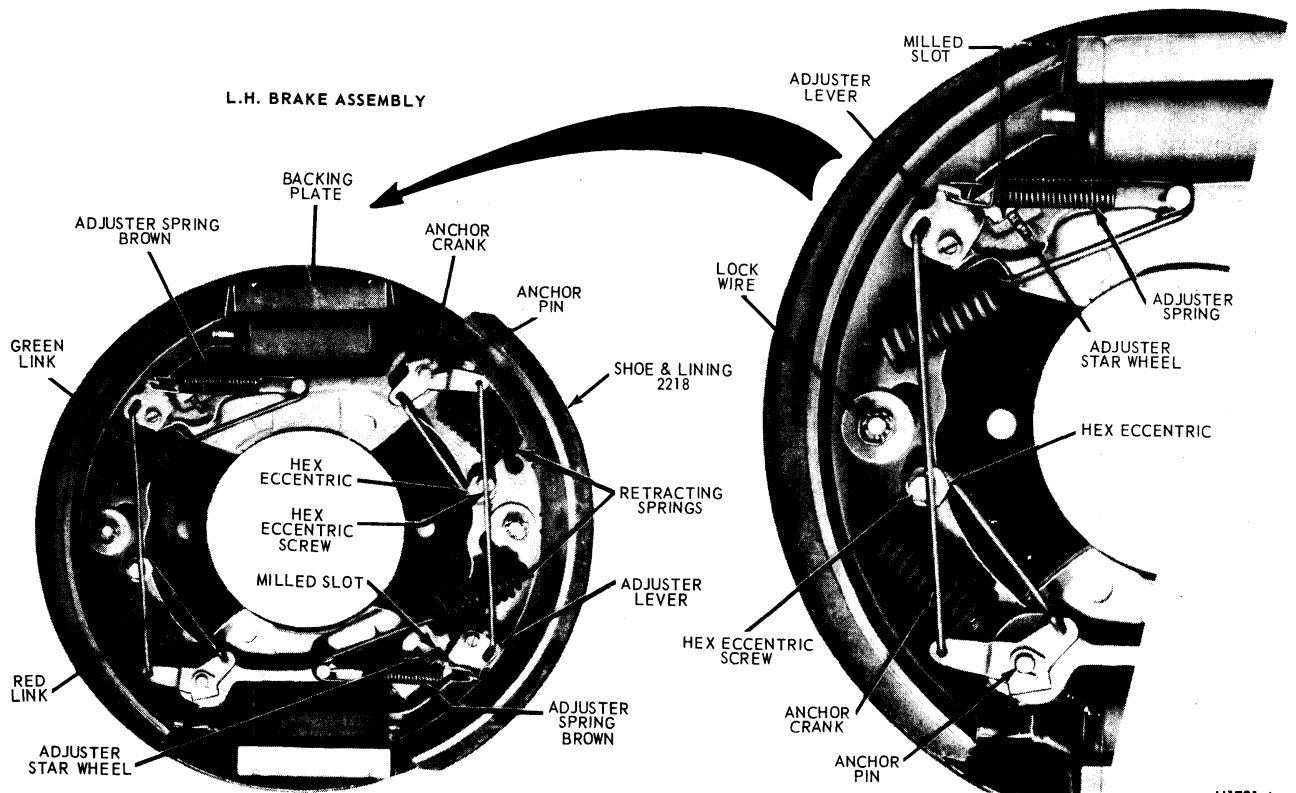
H 1340-D

FIG. 7 Self Adjusting Brake Assemblies—F-100-250, E-100-200, and Bronco



H1581-C

FIG. 8 Self Adjusting Brake Assemblies—F-250 (Heavy Duty)-350, E-300, and P-350-400



H1731-A

FIG. 9 Two-Cylinder Brake Assembly—Rear (Wagner)

TESTING

BRAKE SYSTEM PRELIMINARY CHECKS

1. Always check the fluid level in the brake master cylinder reservoir(s) before performing the test procedures. If the fluid level is not within 1/4 inch of the top of the master cylinder reservoirs, add Ford Brake Fluid-Extra Heavy Duty-Part Number C6AZ-19542-A (ESA-M6C25-A) or equivalent for all brake applications. **The extra heavy duty brake fluid is colored blue for identification purposes. Do not mix low temperature brake fluids with the specified brake fluid.**

Push the brake pedal down as far as it will go. If the pedal travels more than halfway between the released position and the floor, adjust the brakes. If the vehicle is equipped with automatic brake adjusters, several sharp brake applications while backing up may be necessary to adjust the brakes.

Road test the vehicle and apply the brakes at a speed of about 20 mph to see if the vehicle stops evenly. If not, the brakes should be adjusted. Perform the road test only when the brakes will apply and the vehicle can be safely stopped.

DUAL BRAKE WARNING LIGHT SYSTEM TESTS

1. Turn the ignition switch to the ACC or ON position. If the light on the brake warning lamp remains on, the condition may be caused by a shorted or broken switch, grounded switch wires or the differential pressure valve is not centered. Centralize the differential pressure valve as outlined under Hydraulic System Bleeding and Centralizing of the Differential Valve in this Section of the manual. If the warning light remains on, check the switch connector and wire for a grounded condition and repair or replace the wire assembly. If the condition of the wire is good, replace the brake warning lamp switch.
2. Turn the ignition switch to the start position. If the brake warning lamp does not light, check the light and wiring and replace or repair wiring as necessary.

When both brake systems are functioning normally, the equal pressure at the pressure differential valve during brake pedal application keeps the valve centered. The brake warning light will be on only when the ignition key is in the **START** position.

3. If the brake warning lamp does not light when a pressure differential con-

dition exists in the brake system, the warning lamp may be burned out, the warning lamp switch is inoperative or the switch to lamp wiring has an open circuit. Check the bulb and replace it, if required. Check the switch to lamp wires for an open circuit and repair or replace them, if required. If the warning lamp still does not light, replace the switch.

POWER BRAKE FUNCTION TEST

With the engine stopped, eliminate all vacuum from the system by pumping the brake pedal several times. Then push the pedal down as far as it will go, and note the effort required to hold it in this position. If the pedal gradually moves downward under this pressure, the hydraulic system is leaking and should be checked by a hydraulic pressure test.

With the brake pedal still pushed down, start the engine. If the vacuum system is operating properly, the pedal will move downward. If the pedal position does not change, the vacuum system is not operating properly and should be checked by a vacuum test.

FRAME-MOUNTED VACUUM BOOSTER CHECK VALVE TEST

Disconnect the line from the bottom of the vacuum check valve, and connect a vacuum gauge to the valve. Start the engine, run it at idle speed, and check the reading on the vacuum gauge.

The gauge should register 17-19 inches with standard transmission and 14-15 inches in Drive range if equipped with an automatic transmission. Stop the engine and note the rate of vacuum drop. If the vacuum drops more than one inch in 15 seconds, the check valve is leaking. If the vacuum reading does not reach 18, or is unsteady, an engine tune-up is necessary.

Remove the gauge and reconnect the vacuum line to the check valve.

VACUUM BOOSTER TEST—DIAPHRAGM TYPE

This procedure can be used to test all diaphragm boosters which are equipped with a pipe thread outlet on the atmosphere portion of the diaphragm chamber.

Remove the pipe plug from the rear half of the booster chamber, and install a vacuum gauge. Start the engine and run it at idle speed. The gauge should register 18-21 inches of vacuum.

1. With the engine running, depress the brake pedal with enough pressure to show a zero reading on the vacuum

gauge. Hold the pedal in the applied position for one minute. Any downward movement of the pedal during this time indicates a brake fluid leak. Any kickback (upward movement) of the pedal indicates brake fluid is leaking past the hydraulic piston check valve.

2. With the engine running, push down on the brake pedal with sufficient pressure to show a zero reading on the vacuum gauge. Hold the pedal down, and shut the engine off. Maintain pedal position for one minute. A kickback of the pedal indicates a vacuum leak in the vacuum check valve, in the vacuum line connections, or in the booster.

ADJUSTMENTS

AIR CHECK BOOSTER PUSH ROD ADJUSTMENT—MIDLAND ROSS BOOSTER (DASH-MOUNTED)

Whenever the master cylinder or booster has been repaired or replaced, the brake system must be checked for proper return flow of hydraulic brake fluid from the wheel cylinders to the reservoir of the master cylinder. This check will assure that the brake booster to master cylinder push rod is properly adjusted to allow the master cylinder compensating valve to open when the brake pedal is in the fully released position.

The air check is made after the brake booster and master cylinder has been installed and before the master cylinder hydraulic line connection is made and the reservoir is filled with brake fluid.

1. Connect the brake vacuum line to the vacuum booster, if required. Start the engine.
2. Carefully position the nozzle of an air hose to the master cylinder discharge port. Place a hand over the master cylinder reservoir and apply air pressure through the air hose nozzle.

Be careful not to allow dirt to enter into the system.

If free passage air pressure is felt on the hand located over the master cylinder reservoir, the brake booster push rod is properly adjusted.

If no air pressure is felt on the hand located over the reservoir, the master cylinder must be removed and the push rod length shortened. To shorten the push rod length, turn the acorn-type screw on the brake booster push rod inward, one turn at a time, until the air check shows the brake master cylinder compensating valve is open.

BRAKE PEDAL ADJUSTMENT

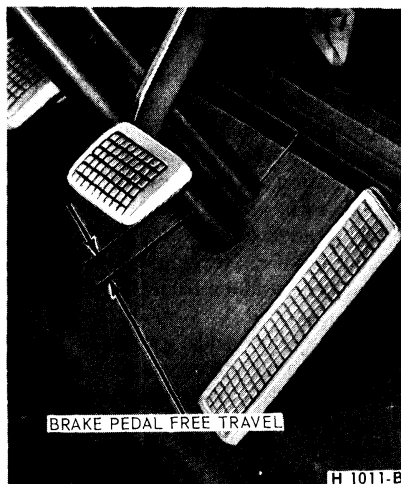


FIG. 10 Pedal Free Travel Check

On dual-brake master cylinder or brake mounted vacuum booster equipped vehicles, the brake systems are designed to permit full stroke of the master cylinder when the brake pedal is fully depressed. A brake pedal clearance adjustment is not required.

In order to release the brakes, fluid in a hydraulic brake system must flow back to the master cylinder when pedal pressure is released. A port is provided in the master cylinder to allow this flow, but the piston must move back far enough to expose the return port. To be sure that this will always happen, free-travel is built into the pedal linkage on standard and on frame-mounted booster systems. This free-travel prevents the piston from becoming trapped in a partially released position. Pedal free travel is not always perceptible in dash-mounted booster systems, however, because the operating clearance for the piston is adjusted at the booster push-rod, rather than the pedal linkage. (Refer to Parts 12-50, 12-52 and 12-58 for instructions on dash-mounted booster push rod adjustments).

Pedal free travel is not adjustable on 500-900 series trucks with a dash-mounted booster and a single or dual system or units with a dual system and a frame-mounted booster.

If the pedal free travel in a standard hydraulic brake system or frame-mounted hydraulic booster system is less than 3/16 inch or more than 3/8 inch (Fig. 10), the pedal should be adjusted. To adjust free-travel:

1. Push the brake pedal down by hand pressure, and check the free travel.
 2. Loosen the lock nut on the eccentric bolt, and rotate the eccentric bolt until the free travel is within 3/16-3/8 inch.
- On a P-Series truck, turn the hex head of the push rod to obtain the required free-travel.
3. Hold the bolt securely, and torque the lock nut to 30-35 ft-lbs.
 4. Recheck the pedal free-travel to make sure that the adjustment did not change when the lock nut was tightened.

FRONT DISC BRAKES F-250 AND F-350

The front disc brake assembly is designed so that it is inherently self-adjusting. Refer to Part 12-24.

HYDRAULIC SYSTEM BLEEDING

When any part of the hydraulic system has been disconnected for repair or replacement, air may get into the lines

and cause spongy pedal action. This requires the bleeding of the hydraulic system after it has been properly connected to be sure all air is expelled from the brake cylinders and lines. The hydraulic system can be bled manually or with pressure bleeding equipment.

When bleeding the brake system, bleed one brake cylinder at a time, beginning at the cylinder with the longest hydraulic line first. If the brake assembly is equipped with two cylinders, always bleed the upper cylinder first. Keep the master cylinder reservoir filled with the specified C6AZ-19542-A extra heavy duty brake fluid during the bleeding operation. Never use brake fluid which has been drained from the hydraulic system.

The procedure for bleeding the single master cylinder on a C-Series truck is presented separately from the standard hydraulic system bleeding procedures.

If the hydraulic system is equipped with a vacuum booster, bleed the hydraulic section of the booster before bleeding the rest of the system. On vehicles equipped with a frame-mounted booster and split hydraulic brake system, bleed the two booster slave cylinders first then again after bleeding all the wheel cylinders. The bleeding operation must be done with the engine off and with no vacuum in the system. If the brake pedal is still spongy after the first bleeding, repeat the bleeding procedure.

To bleed the hydraulic section of a vacuum booster, follow steps 1 through 4 of the manual bleeding procedure, attaching the drain tube to the bleeder screw at the end plate of the booster (or the bleeder screw nearest the power chamber). Repeat this procedure at the other bleeder screw if the booster is so equipped.

On dual-brake system hydraulic master cylinder equipped vehicles, it will be necessary to centralize the pressure differential valve after a brake hydraulic system malfunction has been corrected and the hydraulic system has been bled. Before any attempt is made to bleed the split hydraulic brake system on 500-950 Series trucks, remove the brake light warning switch from the pressure differential valve. Failure to remove the switch from the valve could result in possible damage to the switch assembly.

MANUAL BLEEDING—CONVENTIONAL, SINGLE-BRAKE SYSTEM HYDRAULIC MASTER CYLINDER

1. Attach a rubber drain tube to the bleeder screw of the brake wheel cylinder. The end of the tube should fit

- snugly around the bleeder screw.
- Submerge the free end of the tube in a container partially filled with clean brake fluid. Loosen the bleeder screw.
 - Push the brake pedal down slowly by hand, allowing it to return slowly to the fully-released position. Repeat this operation until air bubbles cease to appear at the submerged end of the tube.
 - When the fluid is completely free of air bubbles, close the bleeder screw and remove the drain tube.
 - Repeat this procedure at each brake cylinder. Refill the master cylinder reservoir after each brake cylinder is bled with **C6AZ-19542-A extra heavy duty brake fluid** and when the bleeding operation is completed.

MANUAL BLEEDING—DUAL-BRAKE SYSTEM HYDRAULIC MASTER CYLINDER

The primary and secondary hydraulic brake systems are individual systems and are bled separately. Bleed the longest line first on the individual system being serviced. **During the complete bleeding operation, DO NOT allow the reservoir to run dry. Keep the master cylinder reservoirs filled with the specified brake fluid. Never use brake fluid that has been drained from the hydraulic system.**

- Remove the brake light warning light switch from the pressure differential valve (Fig. 7) on 500-900 Series trucks.
- Bleed the master cylinder at the outlet port side of the system being serviced. On a master cylinder without bleed screws, loosen the master cylinder to hydraulic line nut. Operate the brake pedal slowly until the brake fluid at the outlet connection is free of bubbles, then tighten the tube nut to the specified torque. **Do not use the secondary piston stop screw located on the bottom of the master cylinder to bleed the brake system. Loosening or removing this screw could result in damage to the secondary piston or stop screw.** Operate the brake pedal slowly until the brake fluid at the outlet connection is free of air bubbles, then tighten the bleed screw.
- Position a suitable 3/8 inch box wrench (Fig. 11) on the bleeder fitting on the brake wheel cylinder. Attach

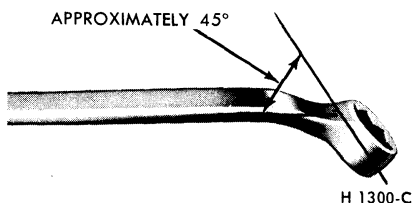


FIG. 11 Wrench for Bleeding Brake Hydraulic System

- a rubber drain tube to the bleeder fitting. The end of the tube should fit snugly around the bleeder fitting.
- Submerge the free end of the tube in a container partially filled with clean brake fluid, and loosen the bleeder fitting approximately 3/4 turn.
- Push the brake pedal down slowly thru its full travel. Close the bleeder fitting, then return the pedal to the fully-released position. Repeat this operation until air bubbles cease to appear at the submerged end of the bleeder tube.
- When the fluid is completely free of air bubbles, close the bleeder fitting and remove the bleeder tube.
- Repeat this procedure at the brake wheel cylinder on the opposite side. Refill the master cylinder reservoir after each wheel cylinder is bled.

When the bleeding operation is complete, the master cylinder fluid level should be filled to within 1/4 inch from the top of the reservoirs.

- Centralize the pressure differential valve. Refer to the Centralizing of the Pressure Differential Valve procedures in this Section.
- Install the brake warning light switch on the pressure differential valve on 500-900 Series trucks.

PRESSURE BLEEDING—CONVENTIONAL SINGLE-BRAKE SYSTEM HYDRAULIC MASTER CYLINDER

Be sure that the tank is clean and there is enough of the specified brake fluid (C6AZ-19542-A extra heavy duty) in the bleeder tank to complete the bleeding operation and that the tank is charged with 10-30 pounds of air pressure. Never exceed 50 pounds pressure.

On a C-Series truck with a single master cylinder, the master cylinder can only be bled manually. Therefore, bleed the entire hydraulic system first before bleeding the master cylinder.

- On a L-, LN-, or LT-Series truck, clean all dirt from around the filler hole on the top of the master cylinder reservoir, and attach the bleeder tank hose to the filler hole. On a C-Series truck with a single master cylinder, disconnect the line from the bottom of the master cylinder and connect the line to the pressure bleeder tank hose. Install a 5/16 inch Weatherhead plug into the bottom of the master cylinder.
- Attach a rubber drain tube to the bleeder screw of the brake cylinder. The end of the tube should fit snugly around the bleed screw.
- Submerge the free end of the tube in a container partially filled with clean brake fluid and then loosen the

bleeder screw.

- Open the valve on the bleeder tank to admit pressurized brake fluid to the master cylinder reservoir (or line).
- When air bubbles cease to appear in the fluid at the submerged end of the drain tube, close the bleeder screw and remove the tube.
- Repeat this procedure at each brake cylinder.
- When the bleeding operation is completed, close the bleeder tank valve and remove the tank hose from the filler hole. On a C-Series truck with a single master cylinder, remove the line from the tank hose and connect it to the master cylinder.
- On all vehicles, refill the master cylinder reservoir to within 1/4 inch from the top of the filler neck.

C-SERIES TRUCK SINGLE MASTER CYLINDER BLEEDING

- Loosen the fittings at the bottom of the master cylinder, approximately one turn.
- Wrap a shop cloth, or a piece of clean waste material, around the tubing below the fitting to absorb expended brake fluid.
- Push the brake pedal down slowly by hand to the floor of the cab. This will force air which may be trapped in the master cylinder to escape at the fitting.
- Hold the pedal down and tighten the fitting. Release the brake pedal. **Do not release the brake pedal until the fitting is tightened as additional air will be introduced into the master cylinder.**
- Repeat this procedure until air ceases to escape at the fitting and a firm pedal is obtained.

PRESSURE BLEEDING—DUAL BRAKE SYSTEM HYDRAULIC MASTER CYLINDER

Bleed the longest lines first. The bleeder tank should contain enough of the specified brake fluid (C6AZ-19542-A extra heavy duty) to complete the bleeding operation. The tank should be charged with approximately 10 to 30 pounds of air pressure. Never exceed 50 pounds pressure. **Never use brake fluid that has been drained from the hydraulic system.**

- Remove the brake warning light switch from the pressure differential valve on 500-900 Series trucks (Fig. 7).
- Clean all dirt from the master cylinder reservoir cover.
- Remove the master cylinder reservoir cover and rubber gasket, and fill the

master cylinder reservoir with the specified brake fluid. Install the pressure bleeder adapter tool to the master cylinder, and attach the bleeder tank hose to the fitting on the adapter.

Master cylinder pressure bleeder adapter tools can be obtained from the various manufacturers of pressure bleeding equipment. Follow the instructions of the manufacturer when installing the adapter.

4. Position a 3/8 inch box wrench (Fig. 11) on the bleeder fitting on the right rear brake wheel cylinder. Attach a bleeder tube to the bleeder fitting. **The end of the tube should fit snugly around the bleeder fitting.**
5. Open the valve on the bleeder tank to admit pressurized brake fluid to the master cylinder reservoir.
6. Submerge the free end of the tube in a container partially filled with clean brake fluid, and loosen the bleeder fitting.
7. When air bubbles cease to appear in the fluid at the submerged end of the bleeder tube, close the bleeder fitting and remove the tube.
8. Repeat steps 3 through 6 at the opposite wheel cylinder of the system being bled.
9. When the bleeding operation is completed, close the bleeder tank valve and remove the tank hose from the adapter fitting.
10. **Remove the Pressure Bleeder Adapter Tool.** Fill the master cylinder reservoirs to within 1/4 inch from the top. Install the master cylinder cover and gasket.
11. **Centralize the pressure differential valve.**
12. Install the brake warning light switch on the pressure differential valve on 500-900 Series trucks.

CENTRALIZING THE PRESSURE DIFFERENTIAL VALVE

F-100-350, E-100-300, P-350-400 and Bronco

1. Turn the ignition switch to the ACC

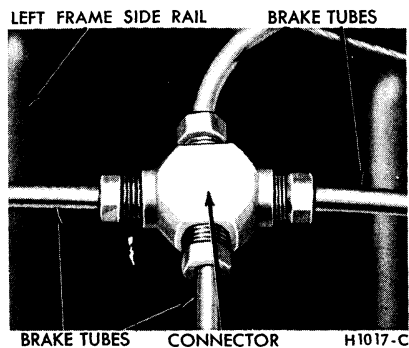


FIG. 12 Front Brake Tube Connector—Typical

or ON position. Loosen the pressure differential valve inlet tube nut on the system that remained operative, or the side opposite the system that was bled last. Operate the brake pedal carefully and gradually until the pressure differential valve is returned to a centralized position and the brake warning light goes out. Tighten the tube nut.

2. Check the fluid level in the master cylinder reservoirs and fill them to within 1/4 inch of the top with the specified C6AZ-19542-A extra heavy duty brake fluid.
3. Turn the ignition switch to the OFF position.

500-900 Series Trucks with Split Hydraulic Brakes

The pressure differential valve used with the split hydraulic brake system has a self centering spring. Use the following procedure to reset the valve:

1. Remove the switch connector wire.
2. Remove the threaded hex-shaped electrical switch body from the center of the valve. This allows the valve centering springs to re-position the valve.
3. Install the electrical switch and connect the wire.
4. Apply the brakes a few times and check the operation of the warning light. The light should go on with the ignition switch in the START position only.

HYDRAULIC LINE REPAIR

Steel tubing is used in the hydraulic lines between the master cylinder and the front brake tube connector (Fig. 12), and between the rear brake tube connector (Fig. 13) and the rear brake cylinders. Flexible hoses connect the brake tube to the front brake cylinders and to the rear brake tube connector.

When replacing hydraulic brake tubing, hoses, or connectors, tighten all connections securely. After replacement, bleed the brake system at the wheel cylinders and at the booster, if so equipped.

BRAKE TUBE

If a section of the brake tube becomes damaged, the entire section should be replaced with tubing of the same type, size, shape, and length. **Copper tubing should not be used in the hydraulic system.** When bending brake tubing to fit the frame or rear-axle contours, be careful not to kink or crack the tube.

All brake tubing should be double flared to provide good leak-proof connections. Always clean the inside of a new brake tube with clean isopropyl alcohol.

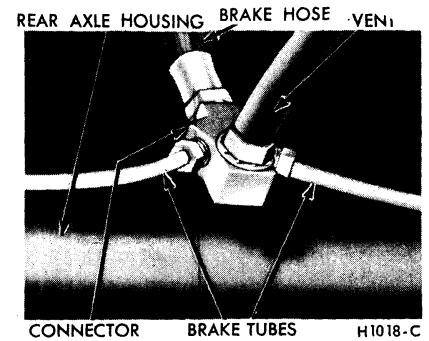


FIG. 13 Rear Brake Tube Connector

BRAKE HOSE

A flexible brake hose should be replaced if it shows signs of softening, cracking, or other damage.

When installing a new brake hose, position the hose to avoid contact with other truck parts.

REMOVAL AND INSTALLATION

BRAKE DRUM REMOVAL AND INSTALLATION THROUGH 1000 SERIES

The service procedures covered here apply to both hydraulic and air brakes. Since the F-100 through 350, E-100 through 300, Bronco or the P-350, 400 (front and rear) and the 4-wheel drive front brake drum procedures apply to hydraulic brakes only, they are covered in the Removal and Installation Section of Part 12-02.

FRONT BRAKE DRUM

1. Raise the truck until the wheel and tire clear the floor and remove the wheel and tire from the hub. Back off the brake shoe adjusting screw so that the shoes do not contact the brake drum. Remove the grease cap and the gasket (if so equipped) from the hub.
2. With 4,000 through 7,000 lb. and 18,000 lb. front axles, remove the cotter pin, adjusting nut and flat washer from the spindle.

On trucks with a 9,000 lb. or 11,000 or 15,000 lb. axle, remove the lock nut, the dimpled washer, the locking ring and the adjusting nut and pin assembly.

3. Remove the outer bearing cone and roller. Pull the hub and drum assembly off the wheel spindle.
4. Remove the front wheel to hub retaining nuts or rim and tire attaching nuts. Remove the wheel or rim and tire from the hub and drum.
5. Remove the brake drum retainers and attaching bolts, screws, or bolts and nuts.
6. Remove the brake drum from the hub.
7. Check the drum for damage or wear,

and repair or replace as necessary. If a new drum is to be installed, be sure to remove the protective coating with a suitable degreaser.

New grease retainer seals should be installed whenever a wheel and hub is removed.

8. Place the brake drum to the hub and install the retainers and retaining bolts, screws, or bolts and nuts.
9. Install the hub and drum on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.**
10. With 4,000 through 7,000 lb. and 18,000 lb. front axles, install the outer bearing cone and roller and the flat washer on the spindle, then install the adjusting nut. With front axles of 9,000 lbs., 11,000 or 15,000 lbs. capacity, install the outer bearing cone and roller and the bearing adjusting nut and pin assembly.
11. Install the wheel and tire on the hub, then install the clamps (if applicable) and the wheel stud nuts.
12. Torque the adjusting nut to specifications while rotating the wheel. Refer to Group 11 for the wheel bearing adjustment procedure.

Install the dimpled washer with the dimple indexed in one of the holes in the adjusting nut. Install the lock nut and torque to specifications. Bend the dimpled washer over a flat of the lock nut.

13. Install the gasket (if so equipped) and the grease cap, and torque the wheel stud nuts to specifications. Install the hub cap if so equipped, and adjust the brakes.

REAR BRAKE DRUM

1. Raise the truck and install safety

stands.

2. Remove the wheel and tire as an assembly. Then back off the rear brake shoe adjustment.
3. Remove the rear axle shaft retaining nuts, adapters, axle shaft, and grease seal.
4. Remove the wheel bearing locknut, lock washer, and adjusting nut.
5. Remove the hub and drum from the axle.
6. Remove the brake drum to hub retaining screws, bolts, or bolts and nuts. Then remove the brake drum from the hub.
7. Check the drum for damage or wear, and repair or replace as necessary. Brake drums must not be machined to a braking surface diameter greater than the maximum diameter shown on the drum. If a new drum is to be installed, be sure to remove the protective coating with a suitable degreaser.

New grease retainer seals should be installed whenever a wheel and hub is removed.

8. Position the brake drum to the hub and install the attaching screws, bolts, or bolts and nuts.
9. Position the hub and drum as an assembly on the axle and start the adjusting nut.
10. Adjust the wheel bearing nut and then install the wheel bearing lock washer and lock nut.
11. Install a new rear axle oil seal, axle shaft and gasket, stud adapters, and attaching nuts.
12. Install the wheel and tire as an assembly.
13. Adjust the brake shoes and then remove the safety stands and lower the truck.

OVERHAUL

BRAKE DRUM REFINISHING

Minor scores on a brake drum can be removed with fine emery cloth, provided the emery is thoroughly cleaned off the drum after the operation.

A badly scored, rough, or out-of-round drum should be ground or turned on a drum lathe. Do not remove any more material from the drum than is necessary to provide a smooth surface for the brake shoe contact. **Brake drum maximum braking surface diameter is shown on each brake drum (Fig. 14). Brake drums which exceed the maximum braking surface diameter shown on the brake drum, either through wear or refinishing,**

must be replaced. The maximum braking surface diameter specification, which is shown on each brake drum, allows for a 0.060 inch machining cut over the original nominal drum diameter plus 0.030 inch additional wear before reaching the drum-discard diameter.

BRAKE SHOE AND BAND RELINING

1. Remove the rivets and remove the old lining.
2. Clean the shoe or band thoroughly with cleaning fluid, especially the rim surface. Wipe the shoe or band dry

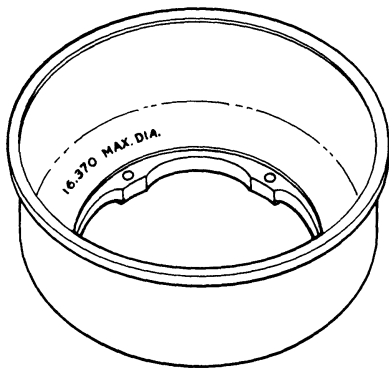
and remove all burrs or rough spots from the shoe.

3. On service brake, check the inside diameter of the brake drum.
4. Position the new lining on the shoe or band and install new rivets, beginning with the rivet holes near the center of the shoe. On some vehicles, the primary lining is shorter than the secondary lining. If this condition exists, position the shorter (primary) lining to line up with the heel end of the shoe. **Do not let brake fluid, oil or grease touch the brake lining. If a brake lining kit is used to replace the worn linings, install all the parts supplied in the kit.**

5. Check the clearance between the lining and shoe rim. The lining must seat snugly against the rim with not more than 0.005 inch separation midway between any two rivets. If only the linings are replaced on duo-servo single anchor brakes with fixed anchor pins, the brake linings must be cam ground 0.010 inch at the ends after the linings are riveted to the brake shoe.

FRONT DISC BRAKES

1. Remove the wheel and tire, brake shoe retainers, and the shoe and linings as outlined in Part 12-24.
2. Make three thickness measurements with a micrometer across the middle section of the shoe and lining. Take one reading at each side and one in the center. If the assembly has worn to a thickness of 0.210 inch (Shoe and lining together) at any one of the three measuring locations, or if the lining shows evidence of brake fluid or oil contamination that is causing a brake pull, replace all (4) shoe and lining assemblies.
3. Check caliper to spindle attaching bolt torque. Torque them to specification if required.
4. To check rotor runout, first eliminate the wheel bearing end play by tightening the adjusting nut. After tightening the nut, check to see that the rotor can still be rotated.
5. Clamp a dial indicator to the spindle



H1834-A

FIG. 14 Brake Drum Maximum Braking Surface Diameter Marking Location—Typical Medium—Heavy Truck Shown

so that the stylus contacts the rotor at a point approximately 1 inch from the outer edge. Rotate the rotor and take an indicator reading. If the reading exceeds 0.010 inch total lateral runout within a six inch radius on the

indicator, replace or resurface the disc brake rotor. **The following requirements must be met when resurfacing disc brake rotors (Fig. 15).**

Rotunda Disc Brake Refinishing Lathe, Tool FRE-1466-B should be used to refinish the disc brake rotors. The step-by-step resurfacing procedure provided with the tool must be adhered to.

A maximum of 0.020 inch material may be machined equally off each surface (A and B) maintaining a 0.940 inch minimum thickness.

The finished braking surfaces of the rotor must be flat and parallel within 0.001 inch; lateral runout must not exceed 0.010 inch total indicator reading within a six inch radius, and the surface finish of the braking surfaces are to be 15-80 micro inches.

When the runout check is finished, be sure to adjust the bearings as outlined in Part 11-10, in order to prevent bearing failure.

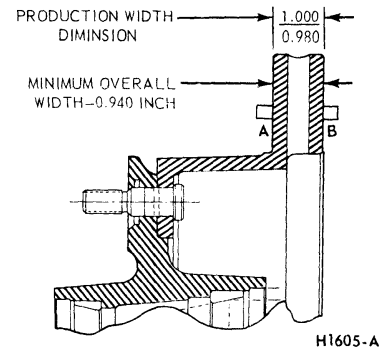
6. Check the rotor for scoring. Minor scores can be removed with a fine emery cloth. If the rotor is excessively scored, refinish it as outlined in Step 5 or replace the rotor if required.
7. Visually check the caliper. If it is cracked or if any leakage is evident, it should be replaced. Any leakage around the dust boot indicates the need for removal and disassembly.
8. Check brake hoses for signs of cracking, leaks, or abrasion. Replace if necessary.

BRAKE CYLINDER

1. Clean all brake cylinder parts in clean isopropyl alcohol. Inspect all parts for wear or damage. Check the cylinder bore for rust, scores, or other damage. Be sure that the bleeder screw passage is clean and open. Replace all parts that are worn or damaged.
2. If dirt is found in any part of the hydraulic system, flush the entire system with clean isopropyl alcohol.

MASTER CYLINDER

1. Clean all master cylinder parts in clean isopropyl alcohol, and inspect the parts for wear or damage, replacing them as required. **When a master cylinder repair kit is used, install all of the parts supplied in the kit.**
2. Check the ports and vents in the master cylinder to make sure that all are open and free of foreign matter.
3. On a single brake system master cylinder, check to see if the spring valve (riveted to the front end of the piston) is loose or has moved so that the piston ports are open, replace the piston.
4. Inspect the cylinder walls for scores



H1605-A

FIG. 15 Disc Brake Rotor Service Limits

or rust, and recondition them if necessary. Hone the cylinder walls no more than necessary (0.003 inch maximum), either to remove scores and rust, or to obtain a smooth wall surface. Remove any burrs or loose metal that may have resulted from the honing operation, and clean the cylinder with clean isopropyl alcohol.

BRAKE DRUMS AND LININGS

1. After removing one front wheel and drum and one rear wheel and drum from the vehicle, inspect the drums and brake shoe linings for wear or damage that would affect brake operation. **Do not let brake fluid, oil or grease touch the drum or linings.**
2. A brake shoe should be relined when the lining face is worn to within 1/32 inch of any rivet head, or when the lining has been soaked with brake fluid, oil or grease. If a worn lining is not replaced, the brake drum may become severely damaged. **Always replace the primary and secondary brake shoe lining assemblies on both front or both rear brake assemblies at the same time.**
3. Before relining a brake shoe, inspect the shoe for distortion, cracks, or looseness between the rim and web. If one of these conditions exists, replace the shoe. **Do not attempt to repair a damaged brake shoe.**
4. If the drum and linings are in good condition, install the wheel and drum. **The condition of the drums and linings of the opposite wheel will usually be about the same as that found at the wheel that was removed.**
5. Add enough of the specified brake fluid to the master cylinder reservoir to bring the level to within 1/4 inch of the top of the filler neck.
6. Check to be sure that the parking brake handle is fully released before making any brake adjustment.
7. Check the front brake anchor pin nut with a wrench (on brake assemblies with an adjustable anchor pin). If the bolt is loose, torque it to 80-100 ft-lbs.

SPECIAL SERVICE TOOLS

SPECIAL TOOLS

Ford Tool No.	Description
Rotunda ARE 345	Fuel Pump Tester Gauge
Rotunda FRE 1431	Brake Drum Micrometer

CH1737-A

PART 12-02 Drum Brakes — Single Cylinder, Dual Piston

Applies To Bronco, Econoline and F-100 Thru L-800 Series Trucks			
COMPONENT INDEX	Page	COMPONENT INDEX	Page
BRAKE BACKING PLATE Removal and Installation	02-6	BRAKE SHOES Adjustment	02-1
BRAKE DRUMS Removal and Installation	02-2	Removal and Installation	02-3
BRAKE MASTER CYLINDER Disassembly and Overhaul	02-14	BRAKE WHEEL CYLINDER Disassembly and Overhaul	02-14
Removal and Installation	02-7	Removal and Installation	02-6
BRAKE PEDAL Removal and Installation	02-11	SPECIFICATIONS	02-20

ADJUSTMENTS

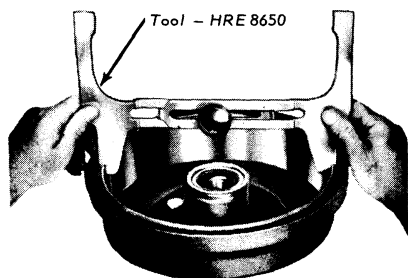
The brake drums should be at normal room temperature, when the brake shoes are adjusted. If the shoes are adjusted when the shoes are hot and expanded, the shoes may drag as the drums cool and contract.

A brake adjustment re-establishes the brake lining-to-drum clearance and compensates for normal lining wear.

Adjustment procedures for each type of brake assembly are given under the applicable heading.

Self Adjusting Brakes—F-100-350, E-100-300, P-350-400 and Bronco

The brake shoes are automatically adjusted when the vehicle is driven in reverse and the brakes applied. A manual adjustment is required only after the brake shoes have been relined or replaced. **The manual adjustment is performed while the drums are removed, using the tool and the procedure detailed below.**



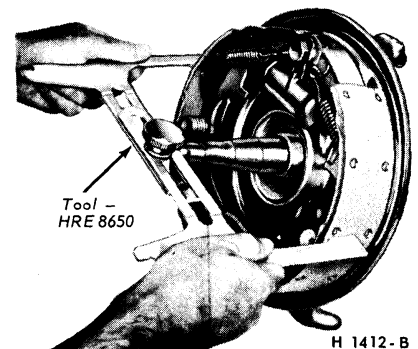
H 1411-B

FIG. 1 Measuring Drum

When adjusting the rear brake shoes, check the parking brake cables for proper adjustment. Make sure that the equalizer operates freely.

To adjust the brake shoes:

1. Use Rotunda Tool HRE8650, (Fig. 1) and adjust to the inside diameter of the drum braking surface.
2. Reverse the tool as shown in Fig. 2, and adjust the brake shoes to touch the gauge. The gauge contact points on the shoes (Fig. 2) must be parallel to the vehicle with the center line through the center of the axle. Hold the automatic adjusting lever out of engagement while rotating the adjusting screw, to prevent burring the screw slots. Make sure the adjusting screw rotates freely. If necessary, lubricate the adjusting screw threads with a thin, uniform coating of C1AZ-19590-B grease.
3. Apply a small quantity of C1AZ-19590-B high temperature grease to the points where the shoes contact the carrier plate, being careful not to get the lubricant on the linings.
4. Install the drums. Install the retaining nuts and tighten securely.
5. Install the wheels on the drums and tighten the mounting nuts to specifications.
6. Complete the adjustment by applying the brakes several times while backing the vehicle.
7. After the brake shoes have been properly adjusted, check the operation of the brakes by making several stops while operating in a forward direction.



H 1412-B

FIG. 2 Measuring Shoes

Front Brake—P-500

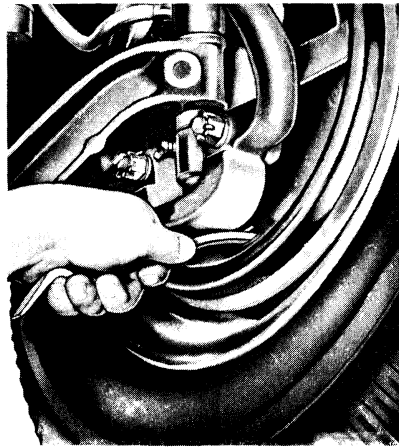
Manual Adjustment

The single anchor brake is adjusted by turning an adjusting screw located between the lower ends of the shoes.

1. Raise the vehicle until the wheels clear the floor.
2. Remove the cover from the adjusting hole at the bottom of the brake carrier plate, and turn the adjusting screw inside the hole to expand the brake shoes until they drag against the brake drum and lock up the drum. Back off the adjusting screw until a slight drag is noted (Fig. 3).
3. When the shoes are against the drum, back off the adjusting screw 10 to 12 notches so that the drum rotates freely without drag. If the drum does not rotate freely, remove the wheel and drum, and then blow out the dust and dirt from the linings. With sand paper, remove all rust from the points where the shoes contact the carrier

plate and apply a light coating of high temperature grease (C1AZ-19590-B). Be careful not to get the lubricant on the linings.

4. Install the wheel and drum, and adjust the shoes. Install the adjusting hole cover on the brake backing plate.
5. Check and adjust the other three brake assemblies.
6. Apply the brakes. If the pedal travels more than halfway down between the released position and the floor, too much clearance exists between the brake shoes and the drums. Repeat steps 2 and 3 above.
7. When all brake shoes have been properly adjusted, lower the vehicle. Road test the vehicle and check the operation of the brakes. Perform the road test only when the brakes will apply and the vehicle can be safely stopped.



H1006-B

FIG. 3 Single Anchor Brake Shoe Adjustment

REMOVAL AND INSTALLATION

BRAKE DRUMS

Front Brake Drum—F-100-350 (4 x 2), E-100-300, and P-350-4000 Series

Removal

1. Raise the vehicle so that the wheel is clear of the floor.
2. Remove the wheel cover or hub cap, wheel, bearing dust cap. Remove the cotter pin, nut lock, nut, and washer.
3. Pull the brake drum approximately two inches forward and push back into position. Remove the wheel bearing and withdraw the brake drum.

If the brake drum will not come off, insert a narrow screwdriver through the brake adjusting hole in the carrier plate, and disengage the adjusting lever from the adjusting screw. While thus holding the adjusting lever away from the adjusting screw, back off the adjusting screw with the brake adjusting tool (Figs. 4 and 5). **Back off the adjustment only if the drum cannot be removed. Be very careful not to burr, chip, or damage the notches in the adjusting screw; otherwise, the self adjusting mechanism will not function properly.**

If the adjusting screw was backed off, check to make sure that the adjusting lever is still properly seated in the shoe web.

Installation in the shoe web.

1. If the hub and drum assembly is being replaced, remove the protective coating from the new drum with carburetor degreaser. Install new bearings and grease retainer. Soak a new leather grease retainer in light engine

oil at least 30 minutes before installation. If the grease retainer is synthetic, it should be dipped in light engine oil. Pack the wheel bearings, install the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer.

If the original drum is being installed, make sure that the grease in the hub is clean and adequate.

2. **Install the drum assembly, outer wheel bearing, washer and adjusting nut.**
3. Adjust the wheel bearing, install the nut lock and cotter pin, then install the grease cap.
4. Install the wheel and hub cap. If the adjustment was backed off, adjust the brake as outlined under Brake Shoe Adjustment.

Rear Brake Drum—F-100, E-100-200 and Bronco

Removal

1. Raise the vehicle so that the wheel is clear of the floor.
2. Remove the hub cap and wheel and tire assembly. Remove the three retaining nuts and remove the brake drum.

If the brake drum will not come off, insert a narrow screwdriver through the brake adjusting hole in the backing plate, and disengage the adjusting lever from the adjusting screw. While thus holding the adjusting lever away from the adjusting screw, back off the adjusting screw with the brake adjusting tool (Fig. 4). **Back off the adjusting screw if the drum**

cannot be removed. Be very careful not to burr, chip, or damage the notches in the adjusting screw; otherwise the self adjusting mechanism will not function properly.

If the adjusting screw was backed off, check to make sure that the adjusting lever is still properly seated in the shoe web.

Installation

1. Remove the protective coating from a new drum with carburetor degreaser.
2. Adjust the brakes as outlined under Brake Shoe Adjustments.
3. Install the drum.
4. Install the three retaining nuts and tighten securely. Install the wheel on the axle shaft flange studs against the drum, and tighten the retaining nuts to specifications.

Rear Brake Drum—F-250 (Heavy Duty) 350, E-300, P-350

Removal

1. Raise the truck and install stands.
2. Remove the wheel and tire as an assembly. Then back off the rear brake shoe adjustment.
3. Remove the rear axle retaining nuts, adapters, axle shaft, and grease seal.
4. Remove the wheel bearing locknut, lock washer, and adjusting nut.
5. Remove the hub and drum from the axle.
6. Remove the brake drum to hub retaining screws, bolts, or bolts and nuts. Then remove the brake drum from the hub.

Installation

1. Check the drum for damage or wear, and repair or replace as necessary. If a new drum is to be installed, be sure to remove the protective coating with a suitable degreaser.

New grease retainer seals should be installed whenever a wheel and hub is removed.

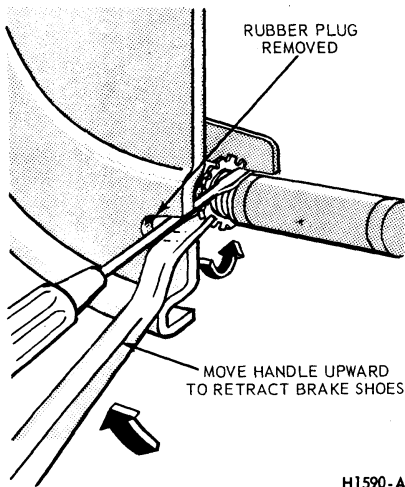
2. Position the brake drum to the hub and install the attaching screws, bolts, or bolts and nuts.
3. Position the hub and drum as an assembly on the axle and start the adjusting nut.
4. Adjust the wheel bearing nut and then install the wheel bearing lock washer and locknut.
5. Install a new rear axle oil seal, axle shaft and gasket, stud adapters, and attaching nuts.
6. Install the wheel and tire as an assembly.
7. Adjust the brake shoes and then remove the stand and lower the truck.

Front Brake Drum—F-100-250 (4 x 4) and Bronco**Removal**

1. Raise the vehicle and install stands.
2. Back off the brake shoe adjustment. Remove the hub dust cap.

Remove the hub retaining snap ring, and slide the splined driving hub from between the axle shaft and the wheel hub. Remove the driving hub spacer and spring.

3. With Tool T59T-1197-B, remove the lock nut, the nut lock, and the wheel bearing adjusting nut from the steering spindle. Remove the wheel, hub and drum as an assembly. The wheel outer bearing will be forced off the spindle at the same time. Remove the wheel inner bearing cone.



H1590-A

FIG. 4 Backing Off Brake Adjustment—F-200-250, E0100-200, and Bronco

If the vehicle is equipped with a locking type hub refer to Part 11-12.

4. Remove the front wheel to hub retaining nuts. Remove the wheel and tire from the hub and drum.
5. Remove the brake drum retaining bolts and nuts.
6. Remove the brake drum from the hub.

Installation

1. Place the brake drum to the hub and install the retaining bolts and nuts.
2. Install the wheel and tire to the hub and start the retaining nuts.
3. Install the wheel hub and drum assembly on the spindle. Install the driving hub spacer and then the wheel outer bearing cone and the adjusting nut with the dowel outboard.
4. Rotate the wheel in both directions and at the same time tighten the inner locknut to 50 ft-lbs with tool T59T-1197-A, to bring the bearing rollers into proper contact. After the bearings are firmly seated, back off the inner locknut and retighten to 30 to 40 ft-lbs while hub is rotated.
5. Back off the inner locknut 135 degrees to 150 degrees. Assemble the lockwasher by turning the nut to the nearest hole in the washer lock. Install the outer lock nut and torque to 50 ft-lbs minimum.
6. Slide the driving hub on the axle shaft and install the snap ring.

If the vehicle is equipped with a locking type hub, refer to Part 15-08.

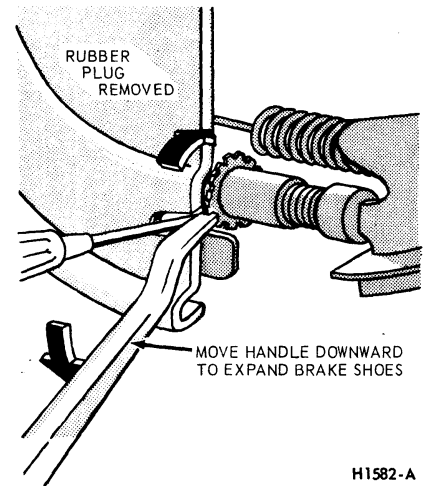
7. Adjust the brake, and then torque the wheel nuts.
8. Install the dust cap.
9. Remove the stands and lower the truck.

Brake Drums 500 Through 1000 Series

Since the brake drum service procedures for these models apply to both hydraulic and air brakes, they are covered under Removal and Installation in Part 12-01.

BRAKE SHOE AND ADJUSTING SCREW**F-100-250, E-100-200 and Bronco Except Heavy Duty****Removal**

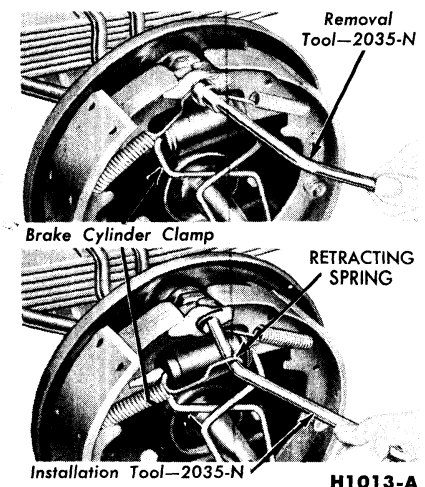
1. With the wheel and drum removed, install a clamp over the ends of the brake cylinder as shown in Fig. 6.
2. Contract the shoes as follows:
 - a. Disengage the adjusting lever from the adjusting screw by pulling backward on the adjusting lever (Fig. 7).
 - b. Move the outboard side of the adjusting screw upward and back off the pivot nut as far as it will go.



H1582-A

FIG. 5 Backing Off Brake Adjustment—F-250-350, E-300, and P-350-400

3. Pull the adjusting lever, cable and automatic adjuster spring down and toward the rear to unhook the pivot hook from the large hole in the secondary shoe web. **Do not attempt to pry the pivot hook out of the hole.**
4. Remove the automatic adjuster spring and adjusting lever.
5. Remove the secondary shoe to anchor spring with the tool shown in Fig. 6. With the same tool, remove the primary shoe to anchor spring and unhook the cable anchor. Remove the anchor pin plate, when so equipped.
6. Remove the cable guide from the secondary shoe (Fig. 7).
7. Remove the shoe hold-down springs, shoes, adjusting screw, pivot nut, and socket. Note the color of each hold-down spring for assembly.
8. On rear brakes, remove the parking brake link and spring. Disconnect the parking brake cable from the parking brake lever.



Installation Tool—2035-N

H1013-A

FIG. 6 Spring Replacement

- After removing the rear brake secondary shoe, disassemble the parking brake lever from the shoe by removing the retaining clip and spring washer (Fig. 7).

Installation

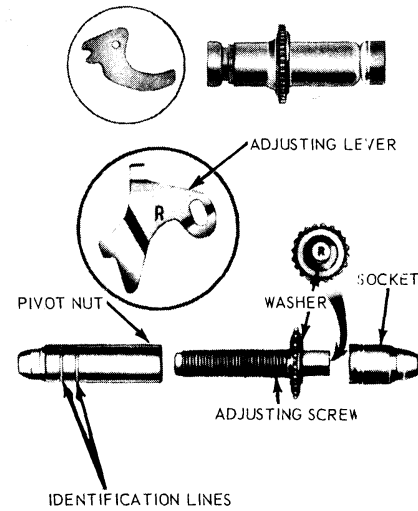
- Before installing the rear brake shoes, assemble the parking brake lever to the secondary shoe and secure with the spring washer and retaining clip.
 - Apply a light coating of high temperature grease (C1AZ-19590-B) at the points where the brake shoes contact the backing plate.
 - Position the brake shoes on the backing plate, and install the hold-down spring pins, springs, and cups. Use the aluminum colored spring on the primary shoe and the purple spring on the secondary shoe. On the rear brake install the parking brake link, spring and washer. Connect the parking brake cable to the parking brake lever (Fig. 7).
 - Install the anchor pin plate, when so equipped, and place the cable anchor over the anchor pin with the crimped side toward the backing plate.
 - Install the primary shoe to anchor spring with the tool shown in Fig. 6.
 - Install the cable guide on the secondary shoe web with the flanged holes fitted into the hole in the secondary shoe web. Thread the cable around the cable guide groove (Fig. 7).
- It is imperative that the cable be positioned in this groove and not between the guide and the shoe web.**
- Install the secondary shoe to anchor (long) spring (Fig. 6).

Be certain that the cable end is not cocked or binding on the anchor pin when installed. All parts should be flat on the anchor pin. Remove the brake cylinder clamp.

- Apply high-temperature grease (C1AZ-19590-B) to the threads and the socket end of the adjusting screw. Turn the adjusting screw into the adjusting pivot nut to the limit of the threads and then back off 1/2 turn.

Interchanging the brake shoe adjusting screw assemblies from one side of the truck to the other would cause the brake shoes to retract rather than expand each time the automatic adjusting mechanism operated. To prevent installation on the wrong side of the vehicle, the socket end of the adjusting screw is stamped with an R or L (Fig. 8). The adjusting pivot nuts can be distinguished by the number of lines machined around the body of the nut. Two lines indicate right hand nut; one line indicates a left hand nut.

- Place the adjusting socket on the screw and install this assembly between the shoe ends with the adjusting screw nearest the secondary shoe.
- Hook the cable hook into the hole in the adjusting lever from the backing plate side. The adjusting levers are stamped with an R or L to indicate their installation on the right or left hand brake assembly (Fig. 8).
- Position the hooked end of the adjuster spring in the large hole in the primary shoe web, and connect the loop end of the spring to the adjuster lever hole.
- Pull the adjuster lever, cable and automatic adjuster spring down toward

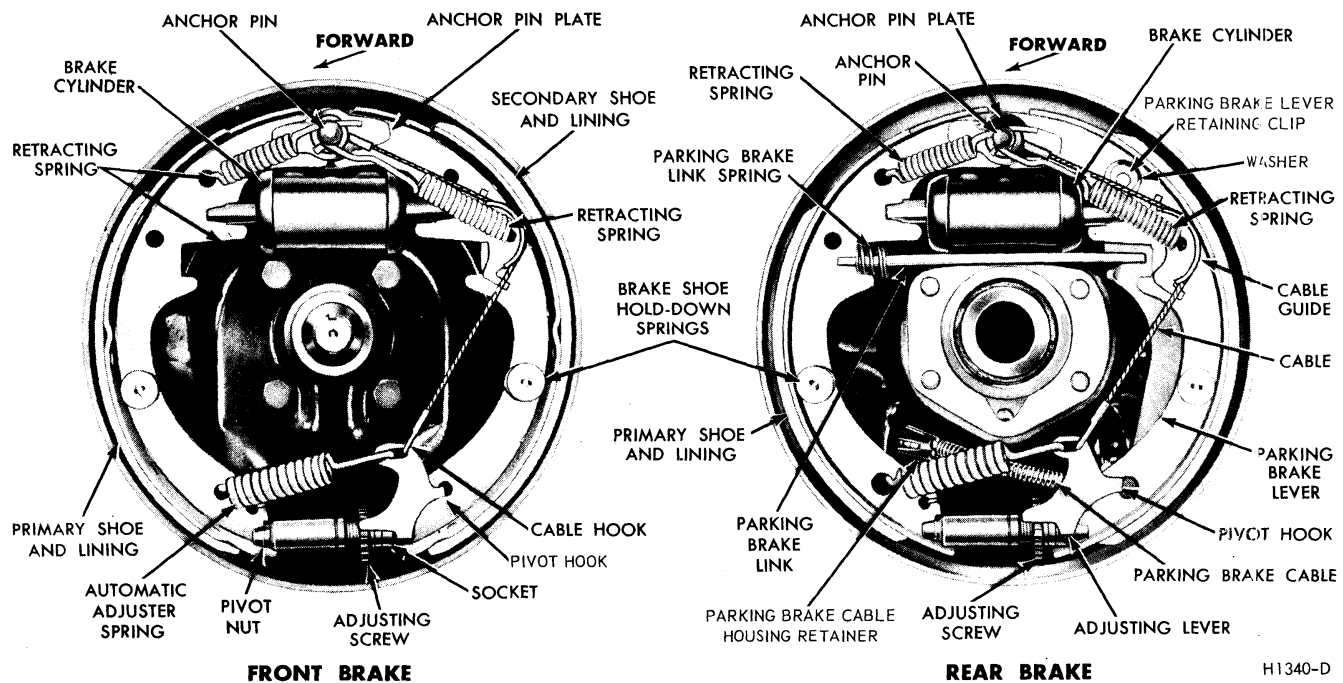


H1621-B

FIG. 8 Adjusting Screw and Lever Identification—F-100-250, E-100-200 and Bronco

the rear to engage the pivot hook in the large hole in the secondary shoe web (Fig. 7).

- After installation, check the action of the adjuster by pulling the section of the cable between the cable guide and the adjusting lever toward the secondary shoe web far enough to lift the lever past a tooth on the adjusting screw wheel. The lever should snap into position behind the next tooth,



H1340-D

FIG. 7 Self Adjusting Brake Assemblies—F-100-250, E-100-200, and Bronco

and release of the cable should cause the adjuster spring to return the lever to its original position. This return action of the lever will turn the adjusting screw one tooth.

If pulling the cable does not produce the action described, or if the lever action is sluggish instead of positive and sharp, check the position of the lever on the adjusting screw toothed wheel. With the brake in a vertical position (anchor at the top), the lever should contact the adjusting wheel one tooth above the center line of the adjusting screw. If the contact point is below this center line, the lever will not lock on the teeth in the adjusting screw wheel, and the screw will not be turned as the lever is actuated by the cable.

To determine the cause of this condition:

- Check the cable end fittings. The cable should completely fill or extend slightly beyond the crimped section of the fittings. If it does not meet this specification, possible damage is indicated and the cable assembly should be replaced.
- Check the cable guide for damage. The cable groove should be parallel to the shoe web, and the body of the guide should lie flat against the web. Replace the guide if it shows damage.
- Check the pivot hook on the lever. The hook surfaces should be square with the body on the lever for proper pivoting. Repair the hook or replace the lever if the hook shows damage.
- See that the adjusting screw socket is properly seated in the notch in the shoe web.

F-250 (Heavy Duty) 350, E-300, P-350-400 Series—Web Ledge

Removal

- Remove the wheel and drum. If the drum does not clear the brake shoes, retract the brake shoes as shown in Fig. 5.
- On a front wheel, remove the spring-clip retainer fastening the adjusting cable anchor fitting to the brake anchor pin (Fig. 9).

On a rear wheel, remove the parking brake lever assembly retaining nut from behind the backing plate and remove the parking brake lever assembly (Fig. 10).

From this point on the disassembly of the front and rear brake assemblies are the same.

- Remove the adjusting cable from the anchor pin, cable guide and adjusting lever spring.
- Remove the brake shoe retracting springs.
- Remove the brake shoe hold-down spring from each shoe.
- Remove the brake shoes and adjusting screw assembly.
- Disassemble the adjusting screw assembly.

Installation

- Clean the ledge pads (6) on the backing plate. Sand lightly to bare metal.
- Apply a light coat of (C1AZ-19590-B) high temperature grease on the ledge pads of the backing plate. Also apply C1AZ-19590-B high temperature grease to the retracting and hold-down spring contacts on the brake shoes and backing plate.

- Apply C1AZ-19590-B high temperature grease on the threads and socket end of the adjusting screw.
- Install the upper retracting spring on the primary and secondary shoes as shown in Fig. 9 and position the assembly on the backing plate with the wheel cylinder push rods positioned in the shoe slots.
- Install the brake shoe hold-down springs (Fig. 10).
- Install the brake shoe adjustment screw assembly (the slot in the head of the adjusting screw toward the primary shoe), lower retracting spring, adjusting lever spring, adjusting lever assembly and connect the adjusting cable to the adjusting lever. Position the cable in the cable guide and install the cable anchor fitting on the anchor pin.

Interchanging the brake shoe adjusting screw assemblies from one side of the truck to the other would cause the brake shoes to retract rather than expand each time the automatic adjusting mechanism operated. To prevent installation on the wrong side of the vehicle, the socket end of the adjusting screw is stamped with an R or L (Fig. 10). The adjusting pivot nuts can be distinguished by the number of lines machined around the body of the nut. Two lines indicate right hand nut; one line indicates a left hand nut.

- On a rear wheel, install the parking brake assembly in the anchor pin and secure with the retaining nut behind the backing plate.
- Adjust the brakes before installing the drums, using Rotunda Tool HRE-8650, as outlined in this Part.

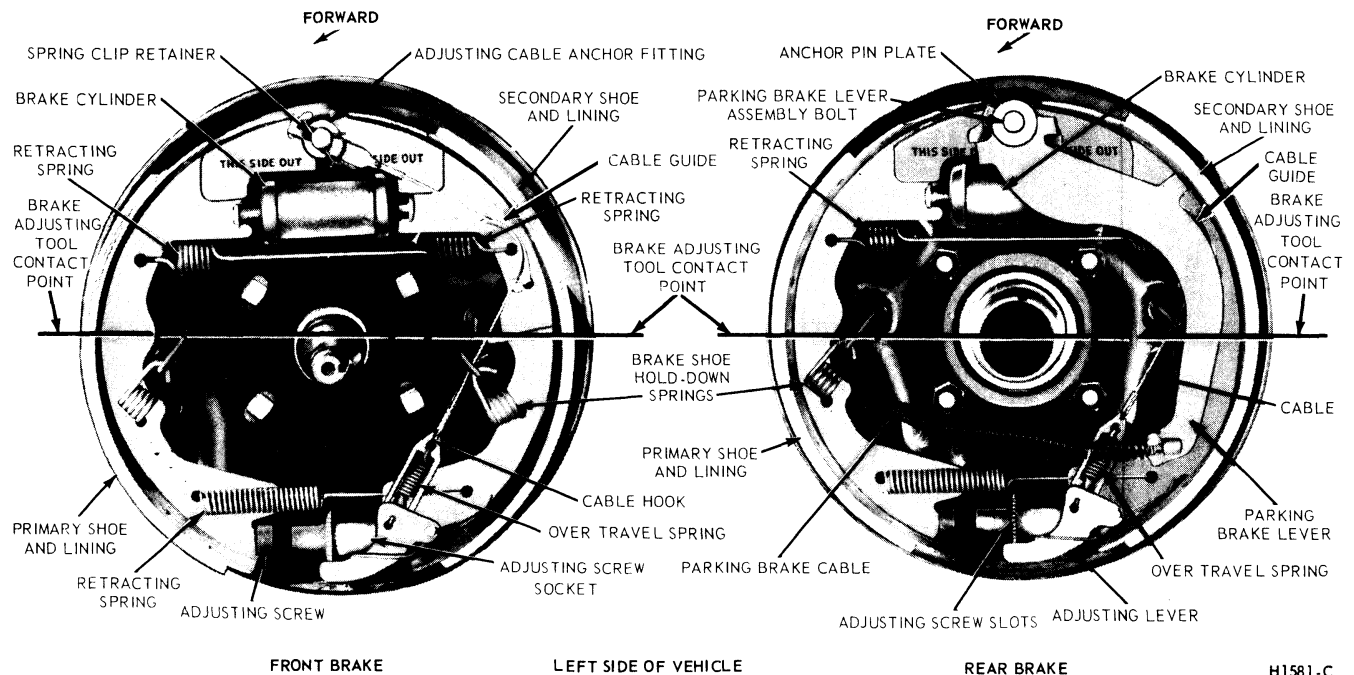


FIG. 9 Self Adjusting Brake Assemblies—F-250 (Heavy Duty)—350, E-300 and P-350-400

BRAKE WHEEL CYLINDER

Removal

1. Remove the wheel, drum, and brake shoes. Remove the cylinder-to-shoe connecting links.
2. Disconnect the brake line from the brake cylinder.
3. Remove the brake cylinder retaining bolts and lockwashers, and then remove the cylinder from the backing plate.

Installation

1. Position the brake cylinder on the backing plate and install the retaining bolts and lockwashers.
2. Install a new gasket on the brake line fitting and connect the line to the brake cylinder.
3. Install the brake shoes and the connecting links between the shoes and cylinder. Install the drum and the wheel.
4. Adjust the brakes and bleed the system. Check the pedal operation before moving the vehicle.

BRAKE BACKING PLATE

F-100-250, E-100-200 and Bronco
(Except 4 x 4 Front)

Removal

1. Remove the wheel and brake drum. Disconnect the brake line from the brake cylinder and submerge the end of the brake line in a can containing

a small amount of brake fluid. This will minimize hydraulic line bleeding. Remove the brake shoes and the brake cylinder. On the rear wheels, disconnect the parking brake lever from the cable.

2. If the rear backing plate is being removed, rotate the axle shaft so that the hole in the axle shaft flange aligns with the backing plate retaining nuts, then remove the nuts. Pull the axle shaft assembly out of the housing with tool 4235-C, and a slide hammer tool T50T-100-C, (Fig. 11). Lift off the backing plate.

If the front backing plate is being replaced, remove the bolts and nuts that secure the plate to the front wheel spindle and lift off the plate.

Installation

1. Position the rear backing plate on the retaining bolts in the axle housing flange. Insert the axle shaft assembly into the housing so that the splines engage the differential side gear, with the bearing retainer sliding onto the retaining bolts and against the carrier plate. Install the retaining nuts through the access hole in the axle shaft flange.

Position the front backing plate on the wheel spindle and install the retaining bolts and nuts.

2. Install the brake cylinder and brake shoes. On a rear brake, connect the

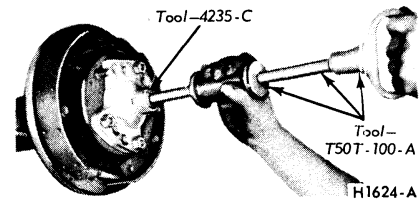


FIG. 11 Axle Shaft Removal

parking brake cable to the lever.

3. Connect the brake line to the brake cylinder, then install the wheel and brake drum. Adjust the brake shoes and bleed the hydraulic system

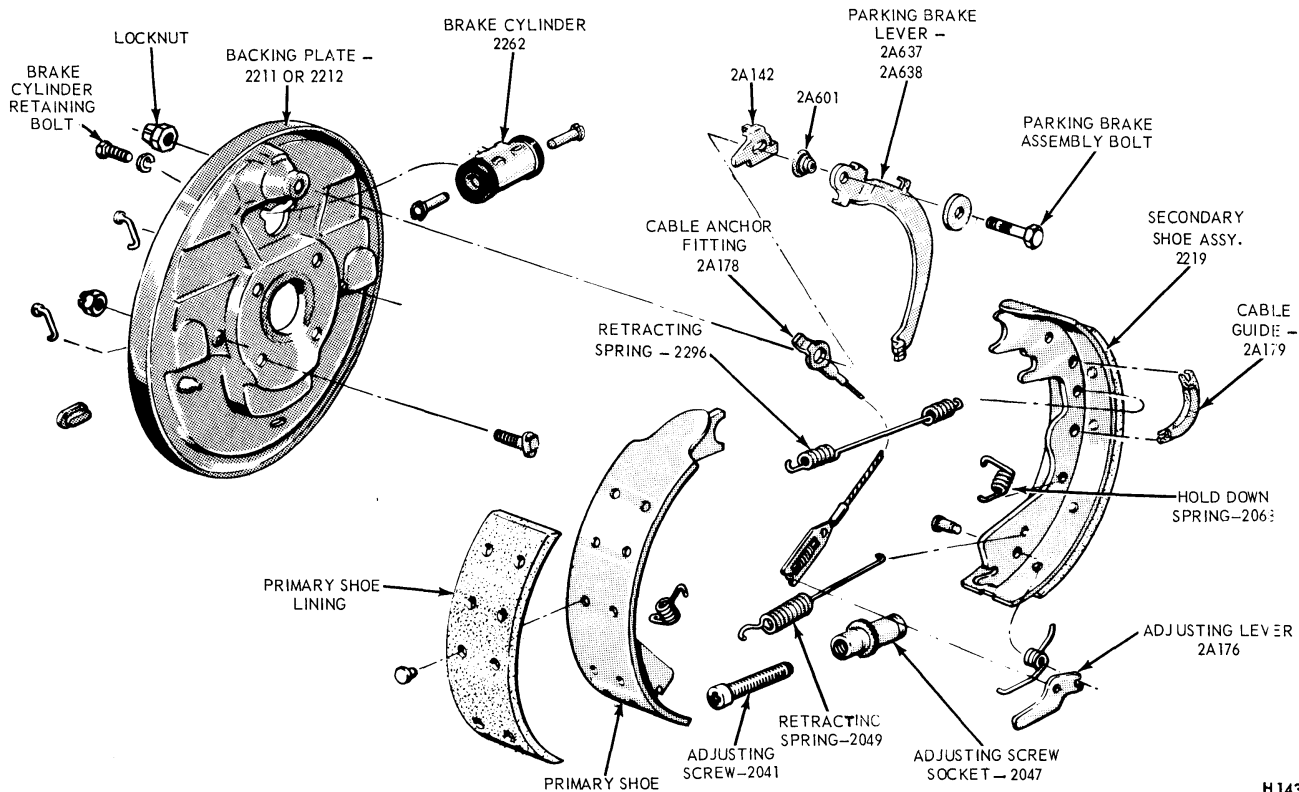
F-100 4 x 2 Series with Spicer 60—3 Axle—Rear

Brake backing plate removal and installation procedure is similar to that used on the F-100 Ford axle. However, certain precautions are necessary if a new backing plate is installed, since the side-to-side end play of the rear axle shafts can be affected. When replacing a brake backing plate with a new or different plate, refer to Group 15—Rear Axle, for assembly procedure including end-play adjustments, etc.

F-100-250 4 x 4 and Bronco Series—Front

Removal

1. Raise the vehicle on a hoist.
2. Remove the hub grease cap. Remove the hub retaining snap ring, and slide



H1430-C

FIG. 10 Rear Web Ledge Single Anchor Brake—Disassembled

the splined driving hub from between the axle shaft and the wheel hub. Remove the driving hub spacer.

If the vehicle is equipped with a locking type hub, refer to Part 15-08.

3. Remove the lock nut, washer, and wheel bearing adjusting nut from the steering spindle. Remove the wheel, hub and drum as an assembly (Fig. 12). The wheel outer bearing will be forced off the spindle at the same time. Remove the wheel inner bearing cone.
4. Remove the cap screws which retain the brake backing plate and spindle to the spindle arm. Remove the brake backing plate and spindle.

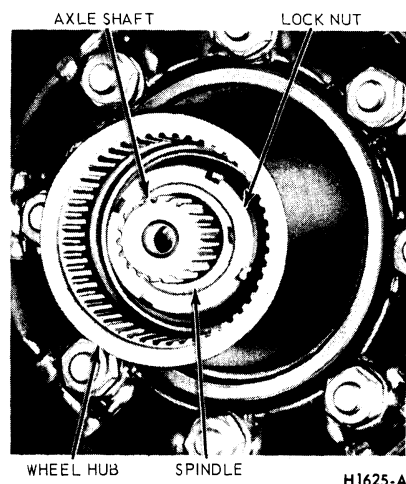
Installation

1. Position the spindle and the brake backing plate on the steering arm, and then install the retaining cap screws.
2. Install the wheel inner bearing cone on the spindle. Install the wheel hub and drum. Install the driving hub spacer and then the wheel outer bearing cone and adjusting nut.
3. Rotate the wheel in both directions and at the same time tighten the inner locknut to 50 ft-lbs to bring the bearing rollers into proper contact. After the bearings are firmly seated, back off the inner locknut and retighten to 30 to 40 ft-lbs while hub is rotated. Back off the inner locknut 135 degrees to 150 degrees. Assemble the lockwasher by turning the nut to the nearest hole in the washer lock. Install the outer lock nut and torque to 50 ft-lbs, (Fig. 12).
4. Install the driving hub and snap ring. Install the grease cap.

300 Through 900 Series

Removal

1. From front wheel spindles, remove the hub and drum attaching parts (ax-



H1625-A

FIG. 12 Front Wheel Hub—Four-Wheel Drive

les under 9,000 lbs capacity grease cap and gasket if so equipped, cotter pin, bearing adjusting nut and flat washer). (Axles 9,000 lbs capacity or over-grease cap and gasket, lock nut, dimpled washer, locking ring, and bearing adjusting nut and pin assembly). Then, remove the outer wheel bearing and the hub and drum assembly from the spindle.

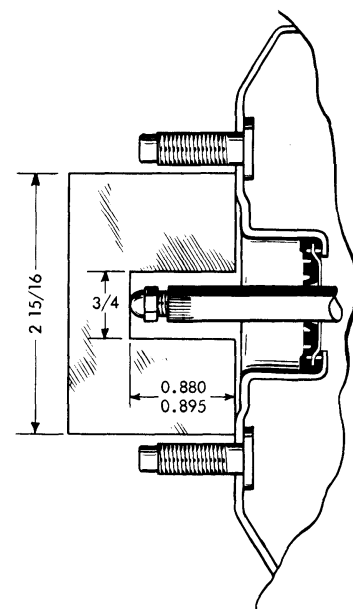
2. On rear wheels, remove the rear axle shaft flange retaining nuts and axle shaft. Remove the rear wheel bearing lock nut, lock washer, and adjusting nut, then remove the hub and drum assembly from the axle housing. Discard the grease seal.
3. Remove the brake shoes and adjusting screw from the backing plate as outlined in this Section. Disconnect the brake line from the brake cylinder and submerge the end of the brake line in a can containing a small amount of brake fluid. This will minimize hydraulic line bleeding.
4. Remove the backing plate retaining bolts and nuts, then remove the backing plate from the front wheel spindle or rear axle housing.
5. Remove the attaching bolts and lock washers, and the brake cylinder from the backing plate.

Installation

1. Assemble the brake cylinder to the backing plate with the attaching bolts and lock washers.
2. Mount the backing plate to the front wheel spindle or to the rear axle housing flange, and secure with the attaching bolts and nuts.
3. Install the brake shoes and adjusting screw to the backing plate as outlined in this section. Connect the brake line to the brake cylinder.
4. Install a front wheel hub and drum assembly and the outer wheel bearing to the spindle. Install the hub and drum attaching parts (axle under 9,000 lbs capacity—flat washer, bearing adjusting nut, cotter pin, grease cap, and gasket if so equipped, axles 9,000 lbs capacity or overbearing adjusting nut and pin assembly, locking ring, dimpled washer, lock nut, and grease cap and gasket). Adjust the front wheel bearings as outlined in Group 11.

Install a rear wheel hub and drum assembly on the rear axle housing. **The rear hub oil seal must be replaced whenever a hub is removed or installed.** Install the outer bearing and the adjusting nut, then adjust the wheel bearings. Install the lock washer and lock nut, then torque to specifications. Install the rear axle shaft, gasket and attaching nuts, then torque to specifications.

5. Install the wheel and tire.



H1330-D

FIG. 13 Bendix Booster Push Rod Gauge Dimensions and Adjustment

6. Bleed the hydraulic system and adjust the brake shoes.

BRAKE MASTER CYLINDER

F-100-600, P-350-400 and L-500-600 Series— Power Brake—Dash Mounted Booster

Removal

1. With the engine stopped, depress the brake pedal to expell vacuum or air pressure from the brake booster system.
2. Disconnect the hydraulic lines from the brake master cylinder.
3. Remove the brake booster to master cylinder retaining nuts and lockwashers. Remove the master cylinder from the brake booster.

Installation

1. Before installing the master cylinder, check the distance from the outer end of the booster assembly push rod to front face of the brake booster assembly. Turn the push rod adjusting screw in or out as required to obtain the specified length (Fig. 13).
2. Position the master cylinder assembly over the booster push rod and onto the two studs on the booster assembly. Install the attaching nuts and lockwashers and torque them to specifications.
3. Connect the hydraulic brake system lines loosely to the master cylinder.
4. Bleed the hydraulic brake system as outlined in this section of the manual. Centralize the differential valve as ou-

lined in this Section of the manual. Then, fill the dual master cylinder reservoirs to within 1/4 inch of the top with the specified C6AZ-19542-A brake fluid. Install the gasket (diaphragm) and filler cap.

F-100-350 and P-350-400 Series—Non-Power Brake

Removal

Refer to Figure 14.

1. Working from inside the vehicle below the instrument panel, disconnect the wires from the stop light switch.
2. Disconnect the dust boot from the rear of the master cylinder at the dash panel.
3. Remove the retaining nut, shoulder bolt, spacers and bushing securing the master cylinder push rod and the stop light switch to the brake pedal assembly. Remove the switch.
4. Remove the boot from the master cylinder push rod.
5. Disconnect the brake hydraulic system lines from the master cylinder.
6. Remove the master cylinder to dash panel retaining screws, and remove the master cylinder.

Installation

1. Position the master cylinder assembly on the dash panel within the engine compartment and install the retaining screws and washers. Tighten the

screws to specification.

2. Connect the hydraulic brake system lines loosely to the master cylinder.
3. Working from inside the vehicle below the instrument panel, position the boot over the push rod and secure the boot to the master cylinder.
4. Lubricate the push rod bushing with lubricant (Lubriplate). Position the bushing in the push rod.
5. Position the stop light switch on the push rod. Install the shoulder bolt and spacers. **Make sure the bushings and spacers are installed properly. Secure the push rod and stop light switch to the brake pedal assembly with the self-locking nut.**
6. Connect the wires to the stop light switch.
7. Bleed the hydraulic brake system as outlined in this section of the manual. Centralize the differential valve as outlined in this Section of the manual. Then, fill the dual master cylinder reservoirs to within 1/4 inch of the top with the specified brake fluid. Install the gasket (diaphragm) and filler cap.

Econoline and Bronco

Removal

1. Disconnect the wires from the stop light switch (Fig. 15 and 16).
2. Disconnect the brake hydraulic system lines at the master cylinder.

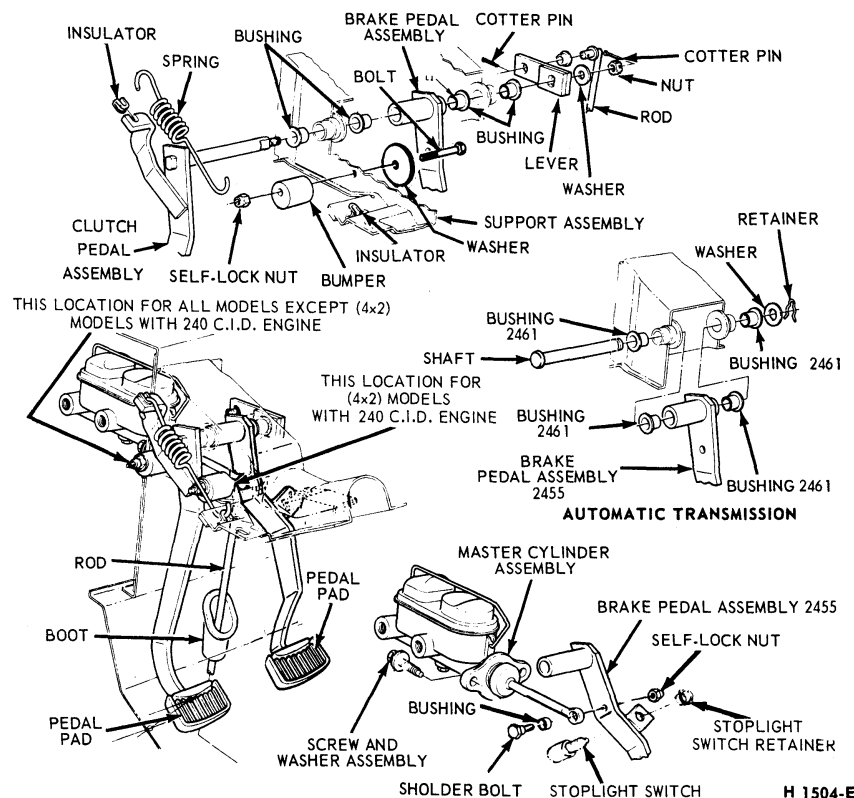


FIG. 14 Dual Master Cylinder and Brake Pedal Installation—Non-Power Brakes—F-100-350

3. On Bronco models, remove the hair pin retainer and slide the stoplight switch off the brake pedal pin just far enough for the switch outer hole to clear the pin. Remove the stop light switch from the pin.

Econoline models, remove the shoulder bolt and nut retaining the push rod to the brake pedal. Remove the push rod bushing.

4. Slide the master cylinder push rod off the brake pedal pin. Remove the bushings and washers.
5. Remove the master cylinder retaining bolts and remove the master cylinder.

Installation

1. Position the master cylinder assembly on the dash panel and install the retaining bolts. Torque the bolts to specification.
2. Connect the hydraulic brake system lines to the master cylinder.
3. On Bronco models, lubricate the push rod bushing with lubricant (SAE 10W-20W-30). Insert the bushing in the push rod. Coat the washers with the lubricant, and position the push rod and bushing, washers and stop light switch on the brake pedal pin. Install the hair pin type retainer.
4. On Econoline models, lubricate the push rod bushing. Insert the bushing in the push rod and install the shoulder bolt securing the push rod to the brake pedal.
5. Connect the stop light switch wires to the switch.
6. Bleed the hydraulic brake system.

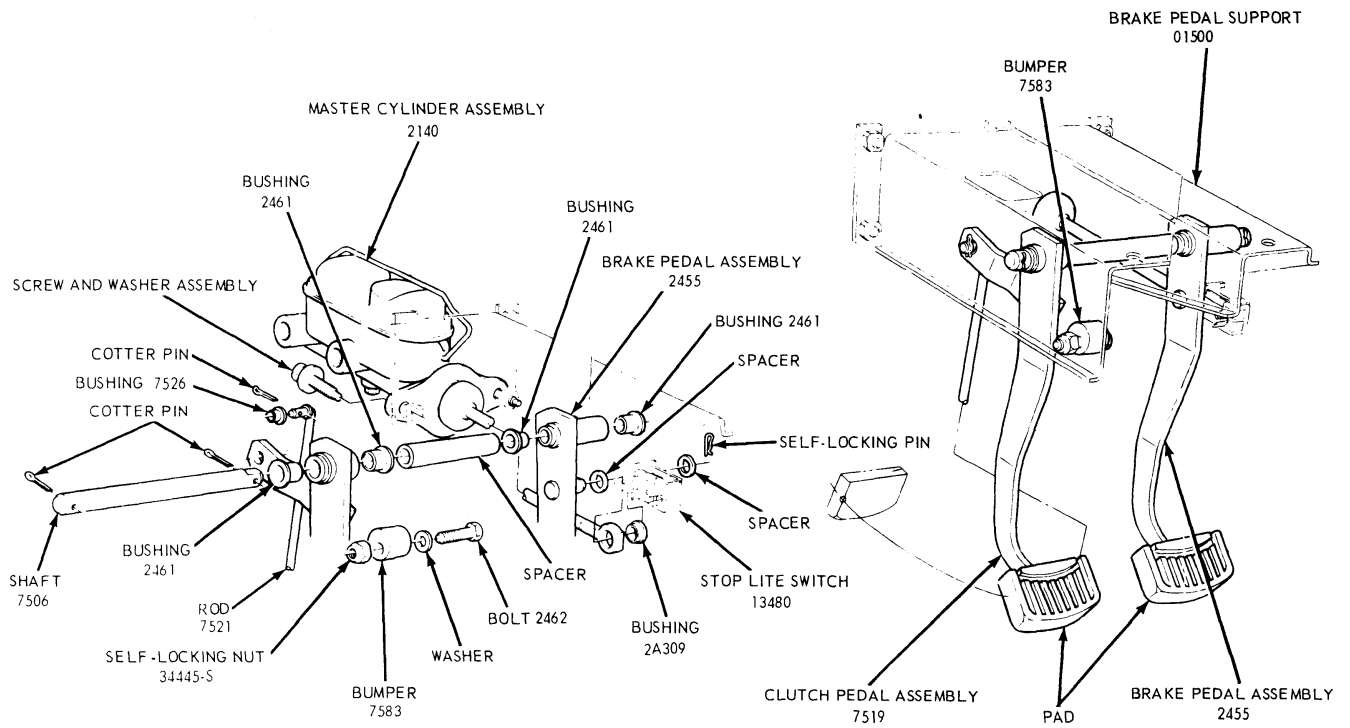
F-500-950, L-500-750 and LT-800-850 Series—Single Brake System

Removal

If the vehicle is equipped with a vacuum booster, the engine must be stopped and all vacuum must be expelled from the booster system before the hydraulic lines are disconnected.

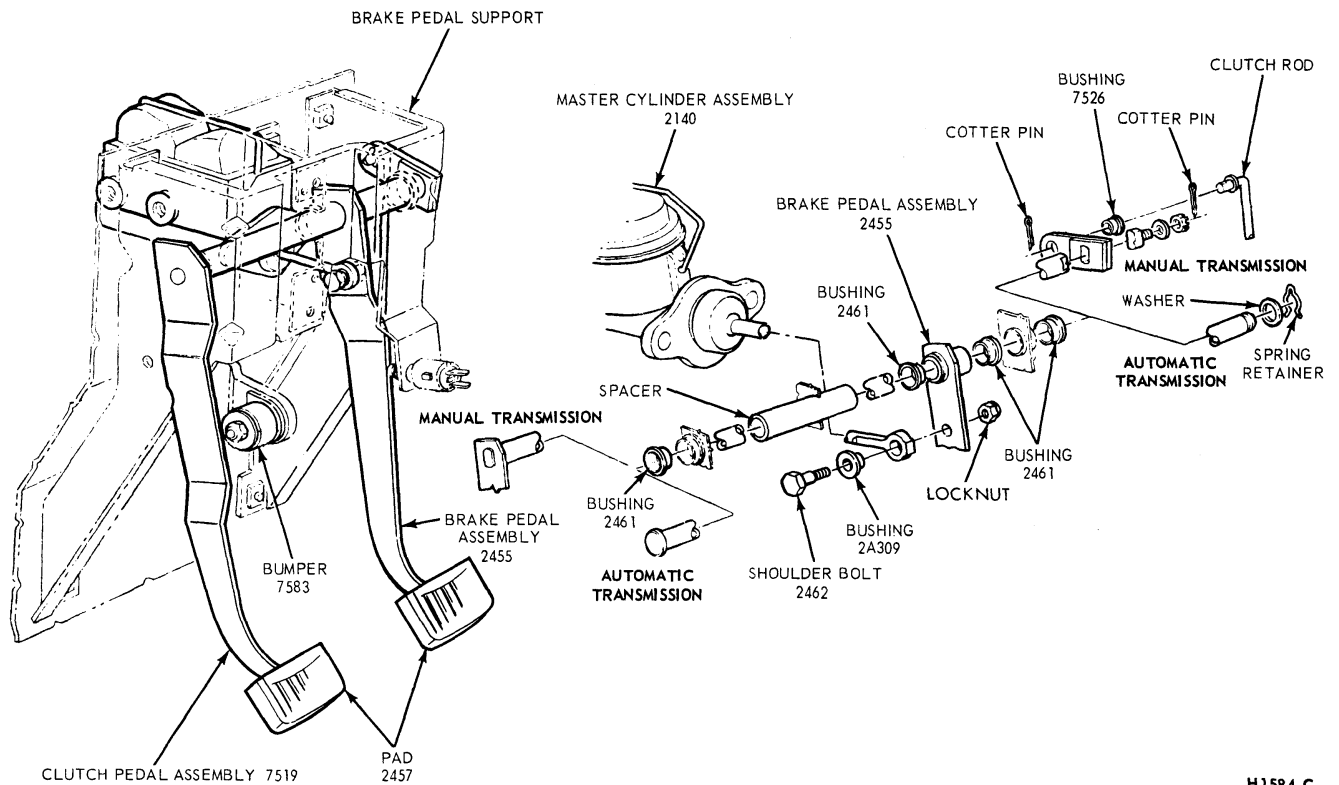
1. Disconnect the brake line from the brake fitting.
2. Force as much brake fluid as possible from the master cylinder into a suitable container by pushing down the brake pedal all the way several times.
3. On a vehicle with conventional brakes, disconnect the rubber boot from the rear end of the master cylinder in the cab. Remove the bolts that hold the master cylinder against the dash panel, and lift the cylinder away from the push rod and out of the engine compartment.

On vehicles equipped with a dash mounted booster, remove the nuts and washers that secure the master cylinder to the power booster unit, and remove the master cylinder.



H1475-B

FIG. 15 Brake Master Cylinder and Brake Pedal Installation—Bronco



H1584-C

FIG. 16 Brake Master Cylinder and Brake Pedal Installation—Econoline

Installation

1. On a vehicle with conventional brakes, position the rubber boot on the piston push rod, guide the master cylinder over the end of the push rod and position the cylinder against the mounting surface. Install the mounting bolts and torque them to specifications.

On vehicles equipped with a dash-mounted booster, install the master cylinder over the push rod onto the two studs in the power booster body. Install the lock washers and retaining nuts. Torque the nuts to specifications.

2. Connect the brake line to the master cylinder fitting, but leave the brake line fitting loose.
3. Fill the master cylinder reservoir with C6AZ-19542-A extra heavy duty brake fluid to within 1/4 inch of the top of the filler neck.
4. Push the brake pedal down slowly by hand several times to let air escape at the brake line fitting. Hold the pedal down and tighten the brake line fitting. Release the brake pedal. **Do not release the brake pedal until the fitting is tightened as additional air will be introduced into the master cylinder.**

On vehicles equipped with dash-mounted booster, the cylinder can be bled at the bleed screw on the cylinder.

On a vehicle with a frame-mounted

brake booster assembly, the master cylinder can be bled at the booster screw(s).

5. After seeing that the master cylinder reservoir is filled with the specified fluid to within 1/4 inch to the top of the filler neck, install the filler cap. Wipe off any fluid from the outside of the cylinder and brake line.
6. Connect the rubber boot to the end of the cylinder.
7. Check and, if necessary, adjust the brake pedal free-travel.

L-, LN-, and B-Series Split Brake System and Frame Mounted Booster

Removal

Refer to Figures 17 and 20.

1. Working from inside the vehicle below the instrument panel, disconnect the wires from the stop light switch.
2. On L- and LN-Series, remove the retaining nut, shoulder bolt, spacers and bushing securing the master cylinder push rod and the stop light switch to the brake pedal assembly. Remove the switch.
- On B-Series, remove the hair pin clip from the brake pedal pin. Remove the push rod, spacers, stop light switch, and bushing from the brake pedal pin.
3. Remove the boot from the master cylinder push rod.
4. Disconnect the brake hydraulic system lines from the master cylinder.
5. Remove the master cylinder to dash

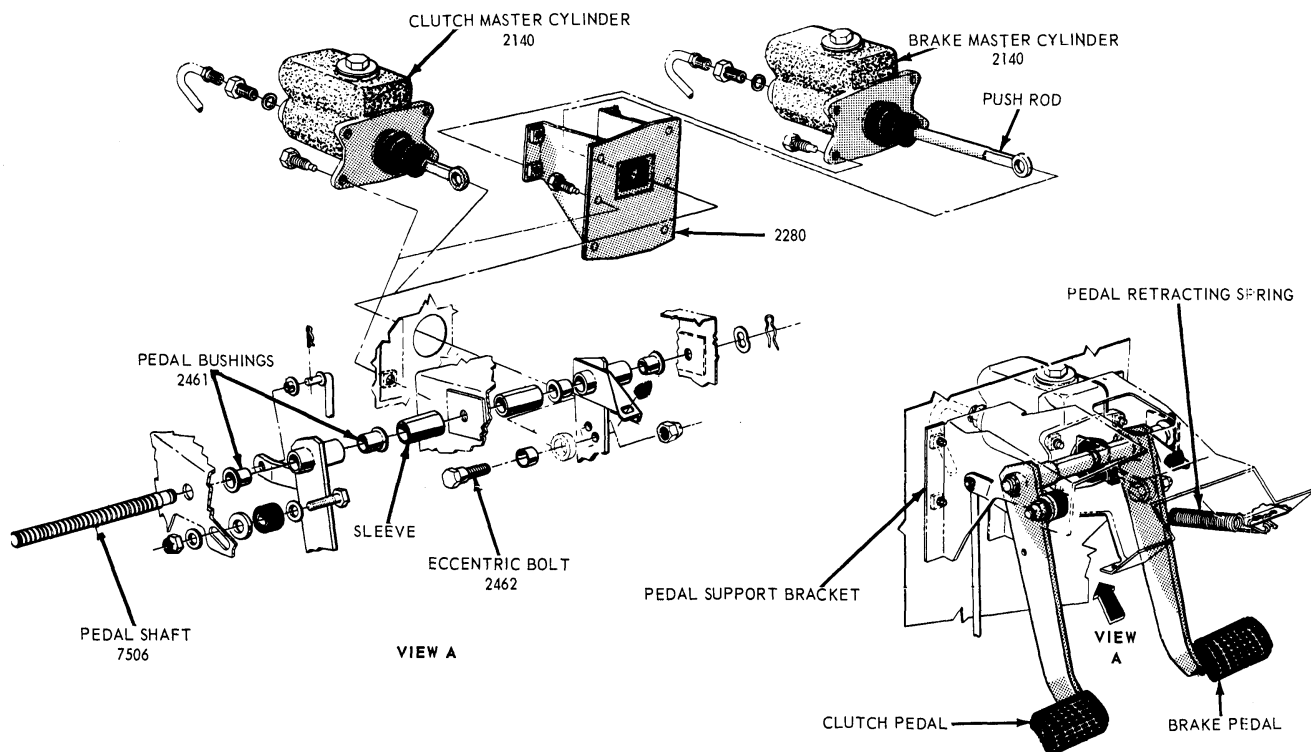
panel retaining screws and remove the master cylinder.

Installation

1. Position the master cylinder assembly on the dash panel within the engine compartment and install the retaining screws and washers. Tighten the screws to specification.
2. Connect the hydraulic brake system lines loosely to the master cylinder.
3. Lubricate the push rod bushing with lubricant (Lubriplate). Position the bushing in the push rod.
4. On L- and LN-Series, position the stop light switch on the push rod, install the shoulder bolt and spacers. **Make sure the bushings and spacers are installed properly. Secure the push rod and stop light switch to the brake pedal assembly with the self-locking nut.**

On B-Series, install the spacers, push rod, bushing and stop light switch on the brake pedal pin. Install the hair pin retainer.

5. Connect the wires to the stop light switch.
6. Bleed the hydraulic brake system as outlined in this section of the manual. Centralize the differential valve as outlined in this section of the manual. Then, fill the dual master cylinder reservoirs to within 1/4 inch of the top with C6AZ-19542-A extra heavy duty brake fluid. Install the gasket (diaphragm) and filler cap.



H1034-E

FIG. 17 L-, LN-, or LT-Series Brake Pedal and Related Parts

C-Series Single Brake System

Removal

If the vehicle is equipped with a vacuum or air booster, the engine must be stopped and all vacuum or air pressure must be expelled from the booster system before the hydraulic lines are disconnected.

1. Roll back the floor mat, remove the floor plate, and then disconnect the hydraulic line from the master cylinder.
2. Force as much brake fluid as possible from the master cylinder into a suitable container by pushing down the brake pedal all the way several times.
3. Disconnect the rubber boot from the rear end of the master cylinder in the cab.
4. Remove the two mounting bolts and lower the master cylinder away from the push rod and out of the cab.

Installation

1. With the rubber boot on the piston push rod, guide the master cylinder over the end of the push rod, and position the cylinder against the mounting surface. Install the mounting bolts, and torque them to specifications.
2. Connect the brake line to the master cylinder fitting, but leave the brake line fitting loose.
3. Fill the master cylinder reservoir with the specified brake fluid to within 1/4 inch of the top of the filler neck.
4. Push the brake pedal down slowly by hand. Hold the pedal down and tighten the brake line fitting. Release the brake pedal. **Do not release the brake pedal until the fitting is tightened as additional air will be introduced into the master cylinder. Repeat this procedure until air ceases to escape at the fitting and a firm pedal is obtained.**

On a vehicle with a brake booster assembly, the master cylinder can be bled at the booster bleed screw(s).

5. After seeing that the master cylinder reservoir is filled with the specified C6AZ-19542-A extra heavy duty

brake fluid to within 1/4 inch of the top of the filler neck, install the filler cap. Wipe off any fluid from the outside of the cylinder and brake line.

6. Connect the rubber boot to the end of the cylinder. Install the floor plate and secure with the seven retaining screws, and place the floor mat in its proper position.
7. Check and, if necessary, adjust the brake pedal free-travel.

C-Series—Split Brake System

Refer to Figure 18.

All vacuum must be relieved from the booster before hydraulic lines are disconnected.

1. Disconnect the hydraulic lines from the master cylinder. Trap the fluid drip with a shop towel or plug the ports.
2. Remove the bolt and nut connecting the push rod to the brake pedal bell crank and remove the stop light switch, bushing and spacers.
3. Remove the master cylinder mounting bolts and remove the master cylinder from the vehicle.

Installation

Refer to Figure 18.

1. If the master cylinder is being replaced, transfer the outlet ports to the new master cylinder.
2. Position the master cylinder to the dash panel and install the mounting bolts.
3. Assemble the stop light switch, bushing and spacers on the push rod and install the bolt connecting the push rod to the bell crank.
4. Connect the primary and secondary outlet tubes and tighten to specifications.
5. Bleed the brake system.

DUAL BRAKE MASTER CYLINDER PRESSURE DIFFERENTIAL VALVE ASSEMBLY

Removal

1. Raise the vehicle on a hoist. Disconnect the brake warning light wire

from the pressure differential valve assembly switch. **To prevent damage to the brake warning switch wire connector, expand the plastic lugs to allow removal of the shell-wire connector from the switch body.**

2. Disconnect the brake hydraulic lines from the differential valve assembly.
3. Remove the screw retaining the pressure differential valve assembly to the frame side rail and remove the valve assembly.
4. **If the differential valve is to be replaced, remove the brake warning lamp switch and install the switch in the new differential valve. The pressure differential valve assembly and the brake warning lamp switch are separate units and each is serviced as a separate assembly only.**

Installation

1. Mount the pressure differential valve assembly on the frame side rail and tighten the attaching screw.
2. Connect the brake hydraulic system lines to the differential valve assembly and tighten the tube nuts securely.
3. Connect the shell-wire connector to the brake warning lamp switch. **Make sure plastic lugs on the connector hold the connector securely to the switch.**
4. Bleed the brakes and centralize the pressure differential valve as outlined in this Section of the manual.

BRAKE PEDAL ASSEMBLY

F-100-350-Series

Removal

Refer to Figure 14.

1. Working inside the vehicle, below the instrument panel, disconnect the wires from the stop light switch.
2. Disconnect the clutch pedal retracting spring and remove the insulators. Remove the retaining nut, shoulder bolt, and bushing securing the push rod to the brake pedal assembly.
3. On an automatic transmission equipped vehicle, remove the retainer, washer, bushings and shaft securing the brake pedal to the support. Remove the brake pedal assembly.
4. On a standard transmission equipped vehicle, remove the cotter pin, nut, washer, bushings and lever securing the brake pedal assembly to the support. Remove the brake pedal assembly.
5. Remove the stop light switch from the bracket on the brake pedal.
6. If required, remove the pedal pad.

Installation

1. If required, install the pedal pad on the brake pedal assembly.
2. Install the stop light switch retainer and the stop light switch in the retainer on the brake pedal.

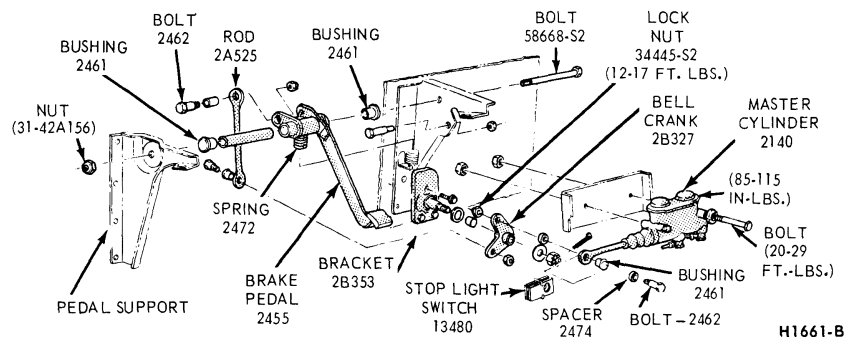


FIG. 18 Dual Master Cylinder and Brake Pedal Installation—C-Series

- On a standard transmission equipped vehicle, lubricate the bushings with lubricant (Lubriplate).

Insert the bushings in the brake pedal assembly, and install the brake pedal on the shaft. Install the bushings, lever, washer, nut and cotter pin on the shafts.

Install the bushing in the lever. Connect the rod to the lever and install the cotter pin.

- On an automatic transmission equipped vehicle, lubricate the bushings with lubricant (Lubriplate).

Insert the bushings in the brake pedal assembly. Position the bushing on the shaft. Insert the shaft through the support and the pedal assembly.

Insert the outer bushing on the shaft and install the washer and retainer.

- Lubricate the push rod bushing with lubricant (Lubriplate). Position the bushing on the push rod.
- Install the shoulder bolt. Secure the push rod to the brake pedal assembly with the self-locking nut.
- Connect the wire to the stop light switch.
- Install the clutch pedal retracting spring insulators and the spring.

Bronco

Removal

Refer to Figure 15.

- Disconnect the wires from the stop light switch.
- Remove the hair pin retainer (Fig. 15) and slide the stop light switch off the brake pedal pin just far enough for the switch outer hole to clear the pin. Remove the stop light switch from the pin.
- Slide the master cylinder push rod off the brake pedal pin. Remove the bushing and washers.
- Remove the cotter pin from the right side of the brake and clutch pedal shaft.
- Slide the shaft toward the left, just enough to allow removal of the brake pedal and two brake pedal bushings.

Installation

- Coat the brake pedal bushings and the shaft with lubricant (Rotunda Engine Oil SEA 10W-20W-30).
- Position the bushings, pedal and shaft on the brake pedal support and install the retaining cotter pin (Fig. 15). Spread the cotter pin ends.
- Lubricate the master cylinder push rod bushing with the lubricant. Insert the bushing in the push rod. Coat the washers with the lubricant, and position the push rod and bushing, washers and stop light switch on the brake pedal pin. Install the hair pin type retainer.
- Connect the wires to the stop light switch.

Econoline

Removal

Refer to Figure 16.

- Remove the shoulder bolt and nut retaining the master cylinder push rod to the brake pedal.
- On models with a manual transmission, remove the clutch lever from the clutch pedal shaft.
On models with an automatic transmission, remove the spring retainer and washer from the right end of the clutch pedal shaft.
- Slide the shaft toward the left, just enough to allow removal of the brake pedal and two brake pedal bushings.

Installation

- Coat the brake pedal bushings and the shaft with lubricant (Rotunda Engine Oil SAE 10W-20W-30).
- Position the bushings, pedal and shaft on the brake pedal support.
On Models with a manual transmission, install the clutch lever on the clutch pedal shaft.
On Models with an automatic transmission, install the washer and spring retainer on the clutch shaft.
- Lubricate the master cylinder push rod bushing with the lubricant. Insert the bushing in the push rod. Install the shoulder bolt and nut securing the master cylinder push rod to the brake pedal.

L-500-900, LN-, and LT-Series

Removal

- Remove the brake pedal retracting spring (Fig. 17).
- Remove the brake master cylinder push rod eccentric bolt nut, and remove the bolt and two nylon bushings.
- Remove the nut from the pedal shaft. Then slide the shaft to the left and remove the brake pedal and sleeve.
- Remove the two bushings from the pedal, and remove the bumper from the pedal extension bracket if so equipped.

Installation

- Coat all bushings and the pedal shaft with a small quantity of Lubriplate or an equivalent lubricant.
- Install the bumper on the pedal extension bracket (if so equipped), and position the nylon bushings in the brake pedal shaft bore.
- Position the brake pedal assembly and sleeve in the pedal support bracket. Slide the pedal shaft through the sleeve and pedal and secure with the nut. Torque the nut to specifications.
- Position the nylon bushings in the bore of the push rod. Connect the push rod to the brake pedal with the

eccentric bolt and nut. Install the pedal retracting spring.

- Adjust the brake pedal free travel to 3/16-3/8 inch (Fig. 11, Part 12-01). Torque the eccentric bolt nut to specifications.

P-350-4000-Series

Removal

Refer to Figure 19.

- Remove the brake master cylinder push rod eccentric bolt nut, and remove the bolt and nylon bushing.
- Remove the cotter pin and nut from the pedal shaft. Then slide the shaft to the right and remove the brake pedal sleeve.
- Remove the two bushings from the pedal and the two bushings from the pedal support.

Installation

- Coat all bushings and pedal shaft with a small quantity of Lubriplate or an equivalent lubricant.
- Position the nylon bushings in the brake shaft bore and the support bracket.
- Position the brake pedal assembly in the pedal support bracket. Slide the pedal shaft through the pedal and secure with the nut. Torque the nut to specifications. Install the cotter pin.
- Position the nylon bushings in the bore of the push rod. Connect the push rod to the brake pedal with the eccentric bolt and nut.

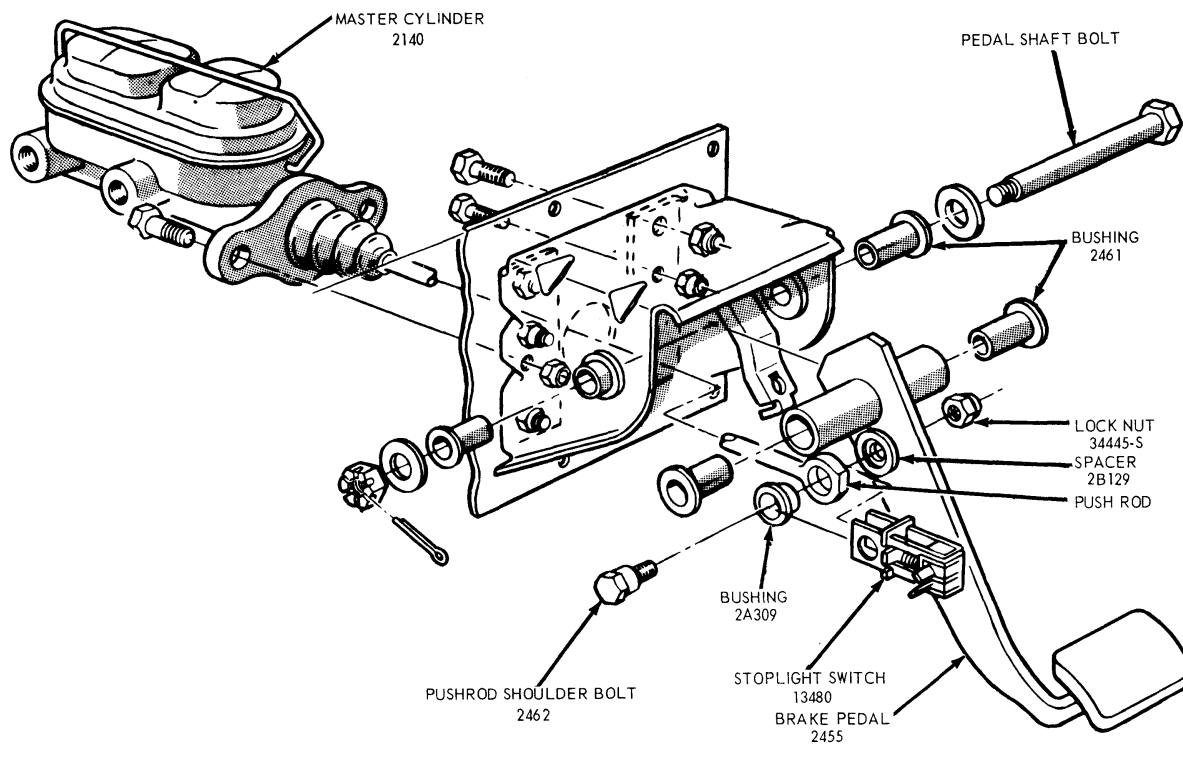
B-Series

Removal

- Remove the brake pedal retracting spring (Fig. 20).
- Remove the clevis pin retaining clip and remove the pin, spacers, master cylinder push rod bushing and switch assembly.
- Remove the clip from the pedal shaft. Then slide the shaft to the left and remove the brake pedal.
- Remove the two bushings from the pedal.

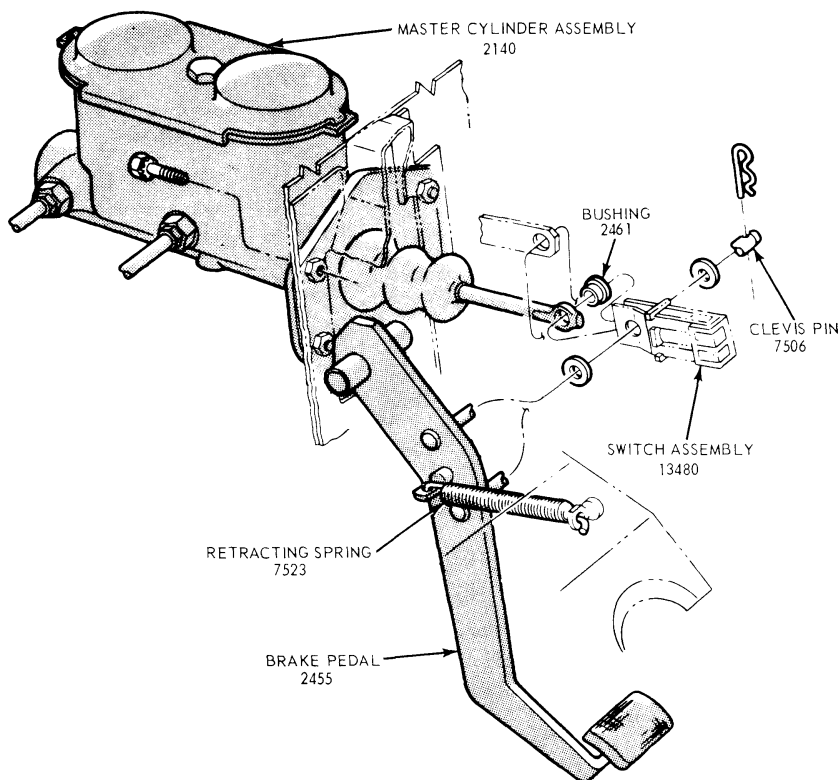
Installation

- Coat all bushings and the pedal shaft with a small quantity of Lubriplate or an equivalent lubricant.
- Position the nylon bushings in the brake pedal shaft bore.
- Position the brake pedal assembly in the pedal support bracket. Slide the pedal shaft through the pedal and secure with the retaining clip.
- Position the nylon bushing in the bore of the push rod. Connect the push rod, switch assembly and spacers to the brake pedal with the clevis pin and secure with the retaining clip.
- Install the pedal retracting spring.



H1672-B

FIG. 19 Brake Pedal and Master Cylinder Installation—P-350-400



H1627-C

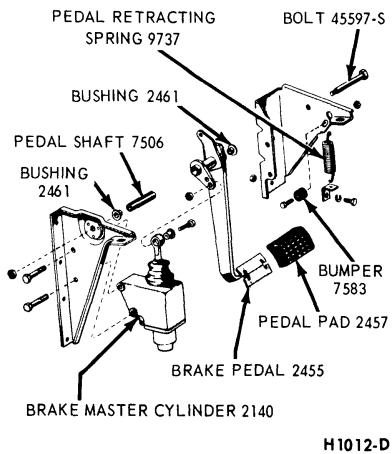
FIG. 20 F-B-Series Brake Pedal and Related Parts

C-Series**Removal**

1. Remove the brake pedal retracting spring (Figs. 18 and 21).
2. Remove the brake master cylinder push rod eccentric bolt nut, bolt and nylon bushings.
3. Remove the brake pedal bumper-to-bracket retaining nut. Then remove the bolt and bumper.
4. On models with a single hydraulic brake system, remove the master cylinder push rod by pulling up on the tab on the push rod boot, and remove the push rod and boot from the cylinder.
5. Remove the nut from the bolt, slide the bolt to the right and remove the brake pedal assembly, sleeve and bushing.
6. Remove the bushings from the pedal assembly.

Installation

1. Coat all bushings and the pedal shaft with a small quantity of Lubriplate or an equivalent lubricant. Position the nylon bushings in the brake pedal shaft bore.
2. Position the brake pedal assembly sleeve and bushing in the pedal support bracket, slide the bolt to the left



H1012-D

FIG. 21 Single Master Cylinder and Brake Pedal Installation—C-Series

- and install the nut. Torque the nut to specifications.
3. On models with a single hydraulic brake system, install the push rod and boot in the master cylinder.
4. On models with a single hydraulic brake system, install the pedal bumper bolt, bumper and nut. Tighten the nut securely.
5. Install the two nylon bushings in the push rod bore, and install the push rod eccentric bolt and nut.
6. Install the pedal retracting spring.
7. On models with a single hydraulic brake system, adjust the brake pedal free-travel to 3/16-3/8 inch. Torque the eccentric bolt nut to specifications.

MAJOR REPAIR OPERATIONS

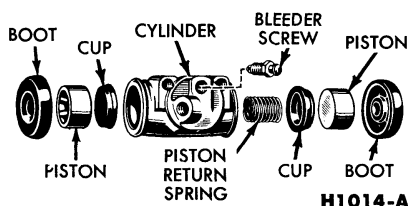
BRAKE WHEEL CYLINDER

Disassembly

1. With the wheel cylinder removed, remove the rubber boots from the ends of the brake cylinder. Remove the piston(s), cups, and piston return spring from the cylinder (Fig. 22).
2. Remove the bleeder screw from the cylinder.

Assembly

1. Coat all brake cylinder parts with clean extra heavy duty brake fluid C6AZ-19542-A.
2. Install the bleeder screw (Fig. 22) in the brake cylinder.
3. Place the piston return spring, cups, and pistons in the cylinder bore, and install a boot and link over each end of the cylinder, clamp the brake cylinder pistons against the ends of the cylinder. **When a brake cylinder repair kit is used, install all of the parts supplied in the kit.**



H1014-A

FIG. 22 Double Servo Brake Cylinder

MASTER CYLINDER

Single Brake System

Disassembly

1. With the master cylinder removed, clean the outside of the master cylinder, and remove the filler cap and gasket. Pour out any brake fluid that may remain in the cylinder and reservoir. On a C-Series truck master cylinder (Fig. 23), remove the 4 bolts that hold the cylinder body on the reservoir, and remove the gasket. Press down on the piston to compress the return spring, and remove the snap ring. Remove the piston, primary cup, piston filler, return spring, check valve, and check valve seat.

On vehicles equipped with a frame mounted vacuum brake booster, the check valve is installed in the booster instead of in the master cylinder.

2. On a L-, LN-, P-, or LT-Series truck master cylinder with a box-shaped reservoir, remove the brake bolt, fitting, and gaskets from the forward end of the cylinder (Fig. 24). Discard the gaskets. Remove the snap ring from the bore at the rear end of the cylinder, and remove the stop plate, piston cup, spring, check valve, and seat from the cylinder bore. If necessary, blow through the forward bolt hole to remove the parts.

Remove the bolt type fitting from the forward end of the cylinder. Remove the snap ring from the bore at the rear end of the cylinder, and remove the piston,

cup, spring, and valve seat. Remove the rubber bumper from the pistons (systems without booster only).

Assembly

1. Dip all parts except the master cylinder body in clean hydraulic brake fluid. **Use only C6AZ-19542-A heavy-duty brake fluid.**
2. On a L-, LN-, P-, LT-Series truck with a box-shaped master cylinder reservoir, install the brake fitting, bolt, and new gaskets (Fig. 24) on the forward end of the cylinder. Install the valve seat, valve, spring, cup, piston, and stop plate in the cylinder bore. Install the snap ring in the rear end of the bore. On a L-, LN-, or LT-Series truck with a cylindrical master cylinder reservoir, install the bolt-type fitting on the forward end of the master cylinder. In systems without a booster install the rubber bumper in the piston. Insert the valve seat, valve, spring, cup, and piston into the cylinder bore. Compress the piston against the valve spring and install the snap ring.
3. On a C-Series truck master cylinder, install the valve seat, valve, spring, piston filler, cup and piston in the cylinder bore, push down on the piston to compress the spring and install the snap ring in the bore. Position a new gasket over the cylinder body and mount the body to the reservoir. Secure with 4 bolts. Tighten bolts securely.

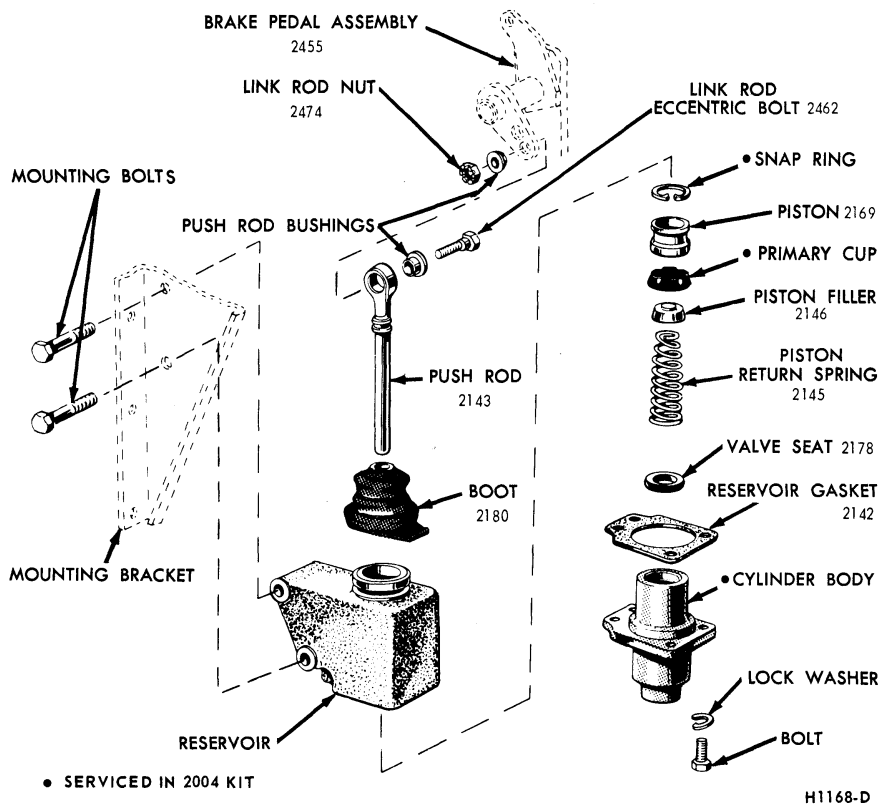


FIG. 23 C-Series Single Brake Master Cylinder

F-100-350, E-100-300, P-350-400 and Bronco

Refer to Figure 25.
The master cylinder must be removed from the vehicle to be overhauled.

When a repair is necessary on the master cylinder, it is required practice during the warranty period to replace the cylinder as a unit instead of overhauling the cylinder with a service repair kit.

Disassembly

1. Clean the outside of the master cylinder and remove the filler cap and gasket (diaphragm). Pour out any fluid that remains in the cylinder.
2. Unscrew the piston stop from the bottom of the cylinder body. Remove the O-ring seal from the piston stop. Discard the seal.
3. Remove the push rod boot, if so equipped, from the groove at the rear of the master cylinder and slide the boot away from the rear of the master cylinder.
4. Remove the snap ring (Fig. 26) retaining the primary and secondary piston assemblies within the cylinder body.
5. Remove the push rod (if so equipped) and primary piston assembly from the master cylinder. Discard the piston assembly, including the boot (if so equipped).
6. Apply an air hose to the rear brake outlet port of the cylinder body and carefully blow the secondary piston out of the cylinder body.
7. Remove the return spring, spring retainer, cup protector, and cups from the secondary piston. Discard the cup protector and cups.
8. Place the master cylinder in a vise with the outlet ports up. **Be careful to avoid damage to the master cylinder housing.**
9. Install a spare brake line tube nut in the rear brake outlet port (Fig. 27). Place a flat washer on a 1 inch No. 8 x 32 self-tapping screw and thread the screw into the tube seat insert in the port. Hold the screw from turning, and back the tube nut out of the port. This will remove the tube seat insert from the port.
Repeat the same procedure to remove the tube seat insert from the front brake outlet port.
10. Remove the master cylinder from the vise, and then remove the residual pressure check valves and check valve springs from the outlet ports.

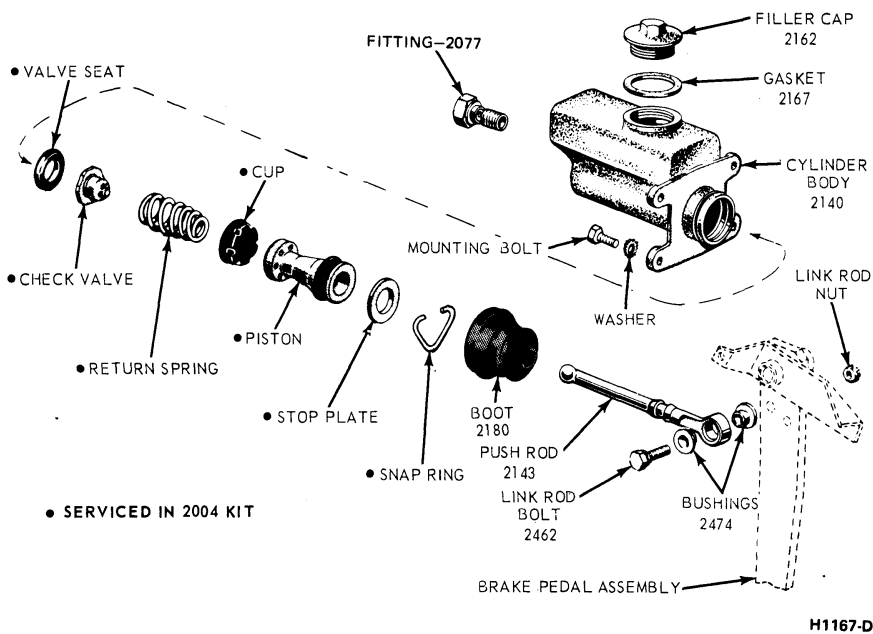


FIG. 24 L-, LN-, or LT-Series Brake Master Cylinder Reservoir

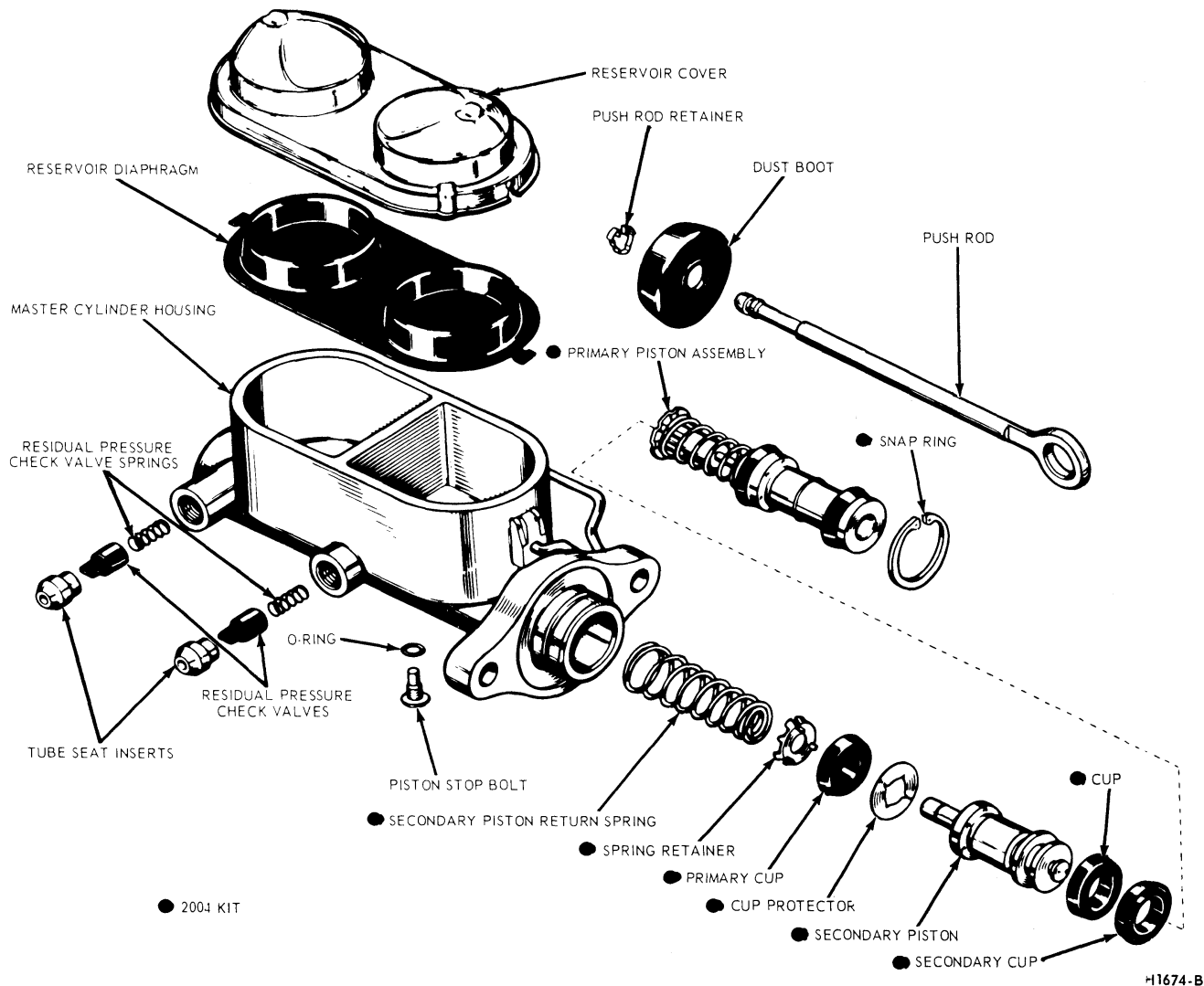


FIG. 25 Dual Master Cylinder Disassembled View—100-400 Series

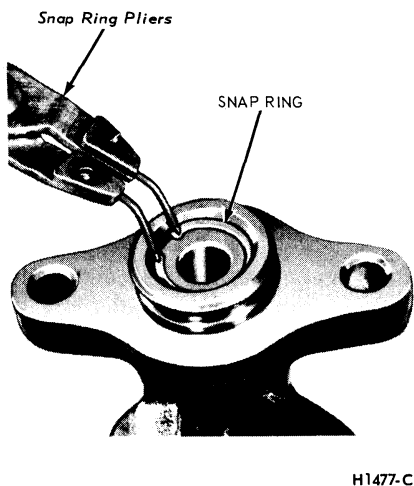


FIG. 26 Removing Snap Ring—Typical

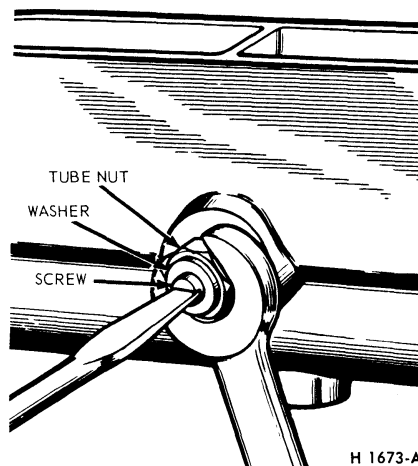


FIG. 27 Removing Residual Check Valve and Tube Seat

Inspection and Repair

1. Clean all parts in clean isopropyl alcohol, and inspect the parts for chipping, excessive wear or damage. Replace them as required. **When using a master cylinder repair kit, install all the parts supplied.**
2. Check all recesses, openings and internal passages to be sure they are open and free from foreign matter. Use the air hose to blow out dirt and cleaning solvent. Place all parts on a clean pan or paper.
3. Inspect the hydraulic master cylinder bore for signs of etching, pitting or rust. Replacement of the master cylinder will be required if any of these conditions exist.

Assembly

1. Place the master cylinder in a vise with the outlet ports up. **Be careful to**

avoid damage to the master cylinder housing.

2. Insert a check valve spring in a new residual pressure check valve, and place the assembly in the rear brake outlet port. Be sure the spring is properly seated in the bottom of the port.
3. Place a new brass tube seat insert in the port. Be sure the insert is not cocked. Thread a spare brake line tube nut in the port, and turn down the nut until the tube seat insert is bottomed in the port (Fig. 28). Remove the tube nut.
4. Repeat the above procedures at the front brake outlet port.
5. Remove the master cylinder from the vise. Check the outlet ports for brass burrs, and remove the burrs, if present.
6. Dip all the parts except the cylinder body in clean C6AZ-19542-A extra heavy duty brake fluid.
7. Assemble the two secondary cups, back-to-back, in the grooves near the end of the secondary piston. Assemble the cup protector, primary cup, spring retainer and secondary piston return spring on the other end of the secondary piston.
8. Install the secondary piston assembly in the master cylinder.
9. Install a new O-ring on the piston stop, and start the stop into the cylinder body.
10. On a vehicle equipped with standard brakes, position the boot, snap ring and push rod retainer on the push rod. **Make sure the push rod retainer is seated securely on the ball end of the rod.** Seat the push rod in the primary piston assembly.
11. Install the primary piston assembly in the master cylinder. Push the primary piston inward and tighten the secondary piston stop to retain the secondary piston in the bore.
12. On a vehicle equipped with power brakes, position the stop plate and snap ring on the primary piston. Depress the primary piston and install the snap ring in the cylinder body.
13. On a vehicle equipped with standard brakes, press the push rod and pistons inward and install the snap ring in the cylinder body.
14. Bleed the master cylinder.

Bleeding the Master Cylinder

Before the master cylinder is installed on the vehicle, the unit should be bled.

1. Support the master cylinder body in a vise, and fill both fluid reservoirs with C6AZ-19542-A extra heavy duty brake fluid.
2. Loosely install plugs in the front and rear brake outlet bores. Depress the primary piston several times until air

bubbles cease to appear in the brake fluid.

3. Tighten the plugs and attempt to depress the piston. **The piston travel should be restricted after all air is expelled.**
4. Remove the plugs. Install the cover and gasket (diaphragm) assembly, and make sure the cover retainer is tightened securely.

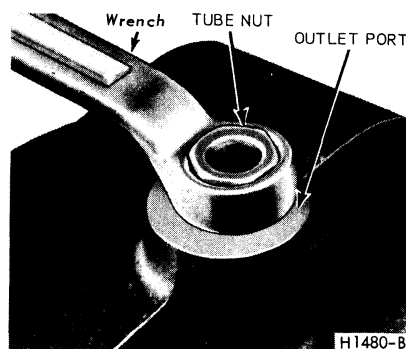


FIG. 28 Installing Residual Check Valve and Tube Seat

500-950 Series—Split Hydraulic Brakes and Frame Mounted Booster

Disassembly

Refer to Figure 29.

1. Clean the outside of the master cylinder. Remove the cylinder cover screw. Lift off the cover and the diaphragm gasket and pour off excess brake fluid. Use the push rod to stroke the cylinder, forcing fluid from the cylinder through the outlet ports.
2. Loosen and remove the piston stop screw and gasket from the right hand side of the cylinder.
3. Pull back the push rod boot and remove the snap ring from the groove in the end of the cylinder bore as shown in Fig. 26.
4. Remove the push rod and stop plate from the master cylinder.
5. Remove the internal parts from the master cylinder. If the parts will not slide out loosely assemble the cover plate and seal the primary outlet part, then apply air pressure at the secondary outlet port.

Inspection and Repair

1. Clean all parts in isopropyl alcohol. Inspect the parts for chipping, excessive wear or damage. Replace them as required. **When using a master cylinder repair kit, install all the parts supplied.**
2. Check all recesses, openings and internal passages to be sure they are open and free of foreign matter. Passages may be probed with soft copper wire, 0.020 inch OD, or smaller.
3. Minor scratches or blemishes in the

cylinder bore can be removed with crocus cloth or a clean up hone. Do not oversize the bore more than 0.007 inch.

Assembly

Refer to Figure 29.

1. Dip all parts except the master cylinder in clean extra heavy duty C6AZ-19542-A hydraulic brake fluid.
2. Install the rear rubber cup on the secondary piston with the cup lip facing the rear. All other cups face the front or closed end of the cylinder.
3. Assemble and install the secondary piston spring, front cup, and the secondary piston.
4. Install the piston stop screw and gasket, making sure the screw enters the cylinder behind the rear of the secondary piston.
5. Assemble and install the primary piston and push rod parts.
6. Locate the stop plate in the seat in the bore and engage the snap ring into the groove at the rear of the cylinder.
7. Install the push rod boot onto the push rod and groove of the cylinder housing.
8. Bleed the master cylinder.

Bleeding the Master Cylinder

Before the master cylinder is installed on the vehicle, the unit should be bled.

1. Support the master cylinder body in a vise, and fill both fluid reservoirs with C6AZ-19542-A extra heavy duty brake fluid.
2. Loosely install plugs in the front and rear brake outlet bores. Depress the primary piston several times until air bubbles cease to appear in the brake fluid.
3. Tighten the plugs and attempt to depress the piston. **The piston travel should be restricted after all air is expelled.**
4. Remove the plugs. Install the cover and diaphragm gasket assembly, and make sure the cover screw is tightened securely.

L- and LN-500-600 Series—Split Brake System and Dash Mounted Booster

Disassembly

Refer to Figure 30.

1. Clean the outside of the cylinder and remove the filler cap and gasket (diaphragm). Pour out any brake fluid that may remain in the reservoir. Stroke the push rod three times to remove fluid from the cylinder bore.
2. Remove the reservoir retainers, washers, and reservoir from the master cylinder body.
3. Remove the two rubber washers from the reservoir and the two O-rings from the reservoir retainers.

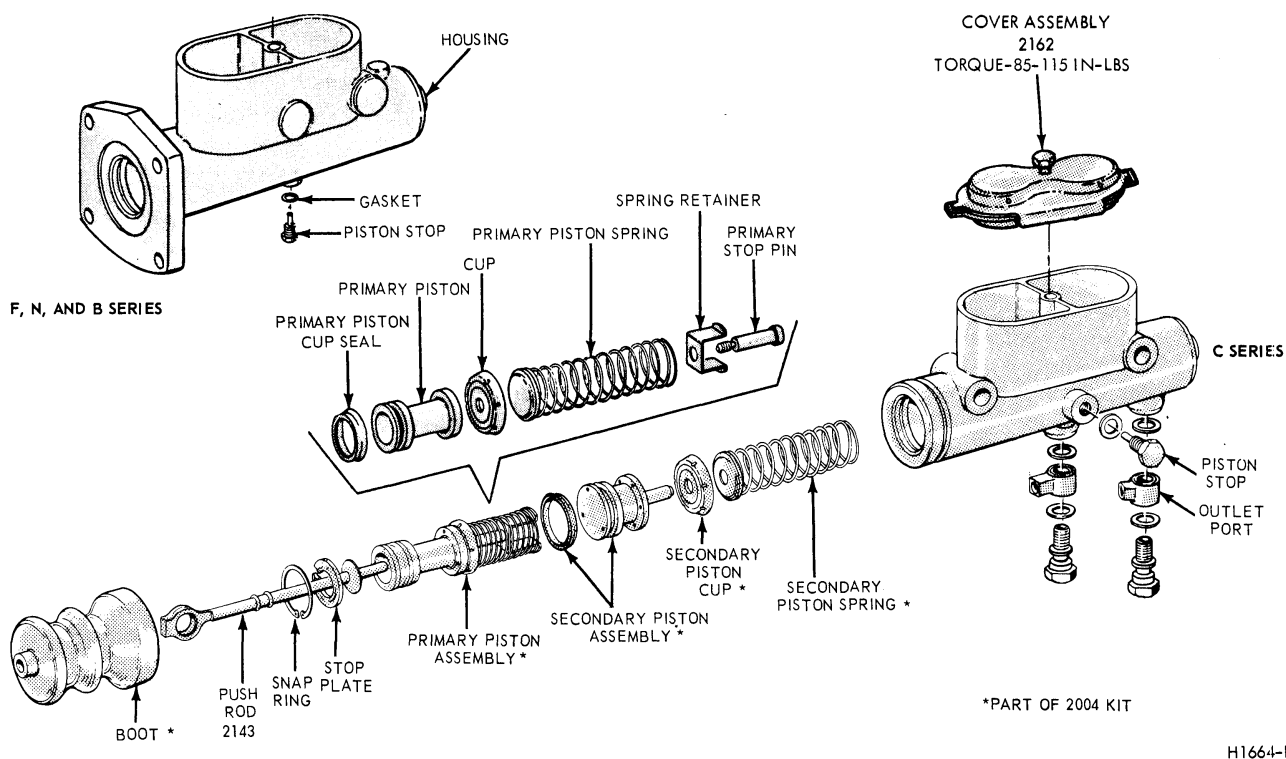


FIG. 29 Dual Master Cylinder—Disassembled View -500-900 Series Truck with Split Hydraulic Brakes and Frame-Mounted Booster

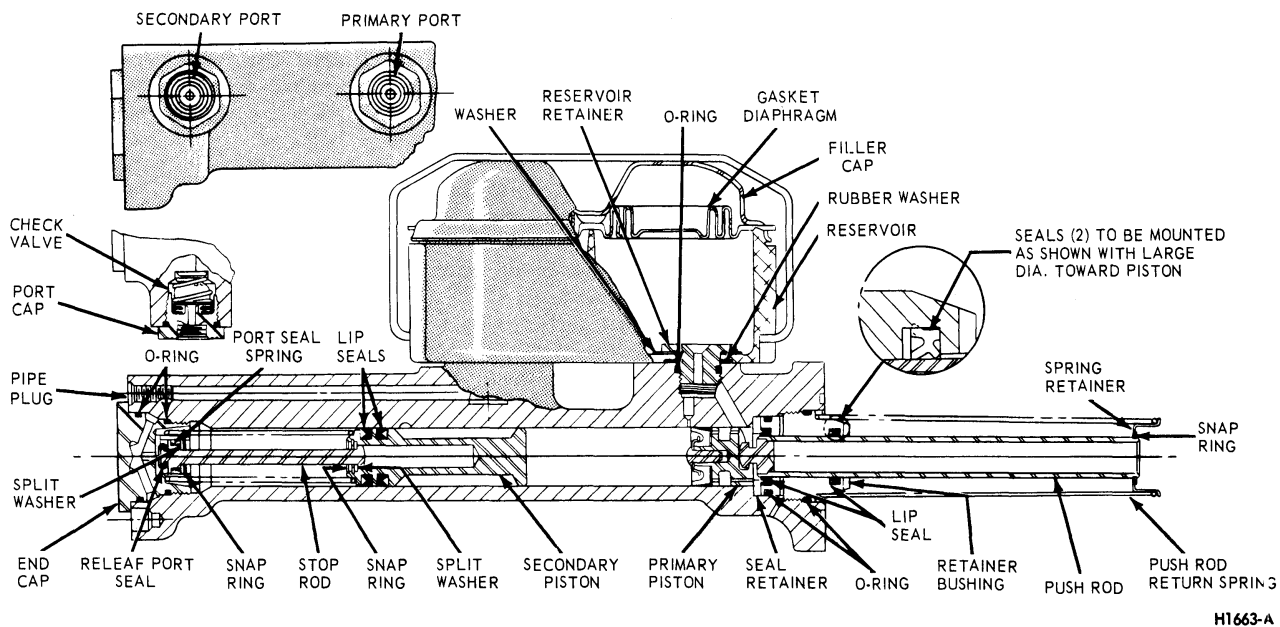


FIG. 30 Dual Master Cylinder—L-500-600, LN-6000, B-500-700 with Midland-Ross Dash-Mounted Booster

4. Remove the snap ring, spring retainer and push rod spring.
5. Unscrew the retainer bushing counterclockwise and remove the push rod, retainer bushing, seal retainer and primary piston from the master cylinder.
6. Remove the primary piston from the push rod and discard it.
7. Remove the seal retainer, and retainer bushing from the push rod. Remove the two lip seals and the two O-rings from the retainer bushing.
8. Unscrew the end cap counterclockwise and remove the end cap and secondary piston assembly from the master cylinder.
9. Remove the snap ring from the secondary piston and remove the piston and return spring from the end cap and stop rod assembly.
10. Remove the two lip seals from the piston.
11. Remove the snap ring from the end cap and remove the secondary piston stop rod, relief port seal spring, the two snap rings and the two split washers from the end cap.
12. Remove the relief port seal from the secondary piston stop rod.
13. Remove the O-rings from the end cap.
14. Remove the primary and secondary port caps and discard.
15. Remove the check valves and springs from the ports.

Assembly

Refer to Figure 30.

1. Wash all metal parts in alcohol before assembly. Dip all parts except the master cylinder body in clean C6AZ-19542-A **extra heavy duty hydraulic brake fluid**. **When using a master cylinder repair kit, install all of the parts supplied.**
2. Install a new primary piston into the front end of the master cylinder bore. Push the piston through the bore until it is flush with the retainer bushing recess. Use a non-metallic object which will not scratch the bore.
3. Assemble the O-rings and the two lip seals on the retainer bushing. Be sure the lip seals fit into the undercuts in the center of the bushing with their large diameters toward the piston end.
4. Install the retainer bushing onto the closed end of the push rod and push it onto the push rod approximately half way. Be sure the lip seal at the piston end of the retainer bushing remains in the undercut portion of the retainer bushing.
5. Install the seal retainer onto the closed end of the push rod with the raised lip toward the retainer bushing.
6. Insert the push rod into the master cylinder bore and hook the push rod onto the primary piston.
7. Slide the seal retainer into the recess in the master cylinder bore.
8. Screw the retainer bushing into the master cylinder body and tighten to 15-20 ft-lbs torque.
9. Install the push rod spring with the large end toward the master cylinder and install the spring retainer and snap ring.
10. Install the O-rings on the end cap.
11. Install the relief port seal on the secondary piston stop rod.
12. Place the port seal spring, split washer (largest of two), and snap ring (largest of two) on the piston stop rod.
13. Slide the assembly into the end cap and engage the snap ring into its groove.
14. Install the lip seals on the secondary piston with the large diameters facing outward.
15. Place the secondary piston return spring on the end cap assembly.
16. Compress the spring and place the remaining snap ring and split washer on the piston stop rod.
17. Slide the piston stop rod into the secondary piston and engage the snap ring in its groove.
18. Slide the end cap and piston assembly into the master cylinder bore and screw the end cap into the master cylinder body. Tighten the cap to 15-20 ft-lbs torque.
19. Install washers on the reservoir retainers and place the retainers in the mounting holes of the reservoir.
20. Place the rubber washers and O-rings on the retainers.
21. Place the reservoir and retainer assembly on the master cylinder body and tighten the retainers to 15-20 ft-lbs torque.
22. Replace the springs and check valves in the output ports of the cylinder.
23. Replace the primary and secondary port caps. Tighten to 15-20 ft-lbs torque.
24. Install the mounting seal on the flange of the master cylinder. Install the filler cap and gasket (diaphragm).

SPECIFICATIONS

FRONT HYDRAULIC BRAKES DIMENSIONS

Truck Series		U-100 4 x 4 F-100 4 x 4	E-100	E-200	E-300	F-100	F-250 Std.	F-250 R.P.O.	F-250 (4 x 4)	F-250 (4 x 4)	F-350	P-350- P-400-	P-500-
Axle Usage	Front	3000-U-100 3000-F-100	2500	2750	3300	2750	3000	3000	3000	3500	3800	3800	4700
	Rear	2780 3300-3600	3050	3300	4800	3300 T&C 3600 Dana	5200 (Web Ledge)	5200	5200	5200	7400 (Web Ledge)	5200 & 7400	13000
Type		DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	SSA
Size (Inches)		11 x 2	10 x 2.50	11-1/32x 3	12 x 3	11-1/32x 3	12.125 x 2.0	12.0 x 2.5	12.125 x 2.0	12.125 x 2.0	12.0 x 3.0	12.125 x 2.0	14 x 2.50
Cylinder Dia. (Inches)		1.125	1.125	1.125	1.125	1.125	1.062	1.062	1.062	1.062	1.062	1.125	0.937
Lining Thickness (Inches)-Primary		0.218	0.1875	0.218	0.1875	0.218	0.250	0.1875	0.250	0.1875	0.1875	0.250	0.210
Secondary		0.281	0.250	0.281	0.250	0.281	0.250	0.250	0.250	0.250	0.250	0.300	0.250
Lining Length (Inches)-Primary		10.80	9.00	10.74	11.68	12.29	13.09	11.68	13.09	13.09	11.68	13.09	12.58
Secondary		10.80	11.07	12.29	13.05	31.36	13.09	13.05	13.09	13.09	13.05	13.09	13.35

REAR HYDRAULIC BRAKES DIMENSIONS

Truck Series		U-100 (4x4)	U-100 (4x4)	E-100	E-200	E-300	F-100	F-100	F-100 (4x4)	F-100 (4x4)	F-250 (Std.)	F-250 (4x2)RPO P-350 F-250 (4x4)Std	F-350	P-350 (RPO)	P-350(RPO) P-500 P400(Std)	
Axle Usage	Front	3000	3000	2500	2750	3300	2750	2750	3000	3000	3000	3000 4x2 4x4 3500 4x4 3800	3800	3800	3800	4700
	Rear	2780 T&C	3300 T&C	3050	3300	4800	3300 T&C	3600 T&C	3300 T&C	3600 T&C	5200	5200 (Web Ledge)	7400 (Web Ledge)	5200 (Web Ledge)	7400 (Web Ledge)	11000 B)
Type		DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	DSSA	2 Cyl.
Size (inches)		10x2.5	11x1.75	10x1.75	11-1/32x 2.25	12x2.5	11-1/32x 2.25	11-1/32x 2.25	11-1/32x 2.25	11-1/32x 2.25	12.125x 2.0	12 x 2.50	12 x 3.0	12 x 2.5	12 x 3.0 BX	14.125x 3.50
Cylinder Dia. (Inches)		0.8125	0.8125	0.8125	0.8125	0.875	0.875	0.875	0.875	0.875	0.9375	0.9375	1.06	0.9375	1.06	1.50
Lining Thickness (Inches)- Primary		0.1875	0.218	0.1875	0.218	0.1875	0.218	0.218	0.218	0.218	0.250	0.1875	0.1875	0.1875	0.1875	375
Secondary		0.250	0.281	0.250	0.281	0.250	0.281	0.281	0.281	0.281	0.250	0.250	0.250	0.300	0.250	375
Lining Length (Inches)- Primary		9.0	10.80	8.48	10.74	11.68	10.74	10.74	10.74	10.74	13.09	11.68	11.81	11.68	11.81	14.42
Secondary		11.07	10.80	10.88	10.74	13.05	10.74	10.74	10.74	10.74	13.09	13.05	12.96	13.05	12.96	14.42

GENERAL TORQUE LIMITS

Unless Otherwise Specified, the Following Torque Ranges are to be used for Fitting or Fastener Diameters as Indicated.

Bolt or Nut Diameter	Torque Range	Bolt or Nut Diameter	Torque Range
1/4"	85-115 IN. LBS.	9/16"	110-150 FT. LBS.
5/16"	12-17 FT. LBS.	5/8"	150-205 FT. LBS.
3/8"	31-42 FT. LBS.	3/4"	220-300 FT. LBS.
7/16"	50-70 FT. LBS.	7/8"	360-480 FT. LBS.
1/2"	75-105 FT. LBS.	1.0"	540-730 FT. LBS.

SPECIFIC TORQUE LIMITS

Front Brake Backing Plate to Spindle (100–400 Series)	1/2 x 13, 55–70	7/16 x 14, 30–50	1/2 x 20, 55–75
Front Brake Backing Plate and Steering Arm to Spindle (100–400 Series)	1/2 x 13, 30–40	1/2 x 20, 50–70	
Rear Backing Plate to Axle (100–400 Series)	1/2 x 13, 75–105	1/2 x 20, 50–70	7/16 x 14, 35–45
Brake Assembly to Front Axle (500–900 Series)	9/16 x 12, 110–150	1/2 x 13, 75–105	1/2 x 20, 75–105
Brake Assembly to Rear Axle (500–900 Series)	9/16 x 12, 110–150	1/2 x 13, 75–105	1/2 x 20, 75–105
Brake Drum to Hub Nuts or Bolts (500–900 Series)	1/2 x 13, 68–85	5/8 x 18, 136–170	
Master Cylinder or Booster Push Rod to Brake Pedal (500–900 Series)	3/8 x 16, 12–17		
Master Cylinder to Dash Panel (500–900 Series)	5/16 x 18, 12–17	3/8 x 16, 31–42	
Master Cylinder to Booster (Dash Mounted Booster) (500–700 Series)	14–18		
Booster to Dash Panel (Dash Mounted Booster) (500–700 Series)	3/8 x 16, 12–17	3/8 x 24, 13–20	5/16 x 18, 12–15
Master Cylinder to Pedal Bracket	5/16 x 24, 12–15	3/8 x 24, 12–17	
Eccentric Adjuster Bolt Torque	80–120 inch lbs.		

TORQUE LIMITS – HYDRAULIC TUBE NUTS (FT-LBS)

Thread Size	Ft-Lbs. ①	Thread Size	Ft-Lbs. ①
3/8–24	8–15	1/2–20	12–17
7/16–24	12–17	9/16–18	15–25

① All hydraulic line connections (nuts) must be torqued to the specified value and free of fluid leakage.

BRAKE DRUM REPAIR LIMITS (BRAKE LATHE)

Brake drums are marked with the maximum allowable braking surface diameter. If this diameter is exceeded by wear or refinishing, the drum must be replaced.

PART 12-05 Drum Brakes — Single Cylinder, Single Piston

Applies to P-500 And B-, LN-Series Trucks with 6000-7000 Lb. Axles					
COMPONENT INDEX		Page	COMPONENT INDEX		Page
BRAKE DRUMS			Removal and Installation.....		05-2
Removal and Installation		05-2	BRAKE WHEEL CYLINDER		
BRAKE BACKING PLATE			Disassembly and Assembly.....		05-3
Removal and Installation.....		05-2	Removal and Installation.....		05-2
BRAKE SHOES					
Adjustment.....		05-1			

ADJUSTMENTS

BRAKE SHOE ADJUSTMENT

The brake drums should be at normal room temperature, when the brake shoes are adjusted. If the shoes are adjusted when the shoes are hot and expanded, the shoes may drag as the drums cool and contract.

A brake adjustment re-establishes the brake lining-to-drum clearance and compensates for normal lining wear.

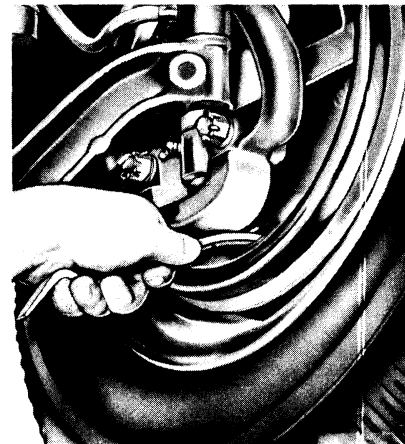
FRONT BRAKE

Manual Adjustment

The single anchor brake is adjusted by turning an adjusting screw located between the lower ends of the shoes.

1. Raise the vehicle until the wheels clear the floor.
2. Remove the cover from the adjusting hole at the bottom of the brake carrier plate, and turn the adjusting screw inside the hole to expand the brake shoes until they drag against the brake drum and lock up the drum. Back off the adjusting screw until a slight drag is noted (Fig. 1).
3. When the shoes are against the drum, back off the adjusting screw 10 to 12 notches so that the drum rotates freely without drag. If the drum does not rotate freely, remove the wheel and drum, and then blow out the dust and dirt from the linings. With sandpaper, remove all rust from the points where the shoes contact the carrier plate and apply a light coating of high temperature grease (C1AZ-19590-B). Be careful not to get the lubricant on the linings.
4. Install the wheel and drum, and adjust the shoes. Install the adjusting hole cover on the brake backing plate.

5. Check and adjust the other three brake assemblies.
6. Apply the brakes. If the pedal travels more than halfway down between the released position and the floor, too much clearance exists between the brake shoes and the drums. Repeat steps 2 and 3 above.
7. When all brake shoes have been properly adjusted, lower the vehicle. Road test the vehicle and check the operation of the brakes. Perform the road test only when the brakes will apply and the vehicle can be safely stopped.



H 006-B

FIG. 1 Single Anchor Brake Shoe Adjustment

REMOVAL AND INSTALLATION

BRAKE DRUMS

Since the brake drum service procedures for these models apply to both hydraulic and air brakes, they are covered under Adjustments in Part 12-01.

BRAKE SHOE AND ADJUSTING SCREW

Removal

Refer to Figure 2.

1. Raise the truck until the wheels clear the floor. Then remove the wheel and drum. **Do not push down the brake pedal after the brake drum has been removed.**
2. Clamp the brake cylinder boot against the end of the cylinder, and remove the brake shoe retracting springs from both shoes.
3. Remove the anchor pin plate (Fig. 2).
4. Remove the hold-down spring cups and springs from the shoes, and remove the shoes and the adjusting screw parts from the carrier plate. **Do not let oil or grease touch the brake linings.**
5. Remove the hold-down spring pins from the carrier plate.
6. Remove the adjusting screw parts from the brake shoes.

Installation

1. Coat all points of contact between the brake shoes and the other brake assembly parts with Lubriplate or similar lubricant. Lubricate the adjusting screw threads.
2. Place the adjusting screw, socket, and nut on the brake shoes so that the star wheel on the screw is opposite the adjusting hole in the carrier plate. Then install the adjusting screw spring.
3. Position the brake shoes and the adjusting screw parts on the carrier plate, and install the hold-down spring pins, springs, and cups.
4. Install the anchor pin plate on the pin.
5. Install the brake shoe retracting springs on both shoes, being careful not to bend the hooks or to stretch the springs beyond the attaching points. **The primary shoe spring must be installed first.**
6. Remove the clamp from the brake cylinder boot.
7. Install the wheel and drum.
8. Adjust the brakes, check the brake pedal operation, and lower the truck.

BRAKE WHEEL CYLINDER

Removal

1. Remove the wheel, drum, and brake shoes. Remove the cylinder-to-shoe connecting links.
2. Disconnect the brake line from the brake cylinder.
3. Remove the brake cylinder retaining bolts and lockwashers, and then remove the cylinder from the backing plate.

Installation

1. Position the brake cylinder on the backing plate and install the retaining bolts and lockwashers.
2. Install a new gasket on the brake line fitting and connect the line to the brake cylinder.
3. Install the brake shoes and the connecting links between the shoes and cylinder. Install the drum and the wheel.
4. Adjust the brakes and bleed the system. Check the pedal operation before moving the vehicle.

BRAKE BACKING PLATE

Removal

1. From front wheel spindles, remove the hub and drum attaching parts (grease cap and gasket if so equipped, cotter pin, bearing adjusting nut and flat washer). Then, remove the outer wheel bearing and the hub and drum assembly from the spindle.
2. Remove the brake shoes and adjusting screw from the backing plate as outlined in this Section. Disconnect the brake line from the brake cylinder and submerge the end of the brake line in a can containing a small amount of brake fluid. This will minimize hydraulic line bleeding.
3. Remove the backing plate retaining bolts and nuts, then remove the backing plate from the front wheel spindle.
4. Remove the attaching bolts and lockwashers, and the brake cylinder from the backing plate.

Installation

1. Assemble the brake cylinder to the backing plate with the attaching bolts and lockwashers.
2. Mount the backing plate to the front wheel spindle and secure with the attaching bolts and nuts.
3. Install the brake shoes and adjusting screw to the backing plate as outlined in this Section. Connect the brake line to the brake cylinder.
4. Install a front wheel hub and drum assembly and the outer wheel bearing to the spindle. Install the hub and drum attaching parts (flat washer,

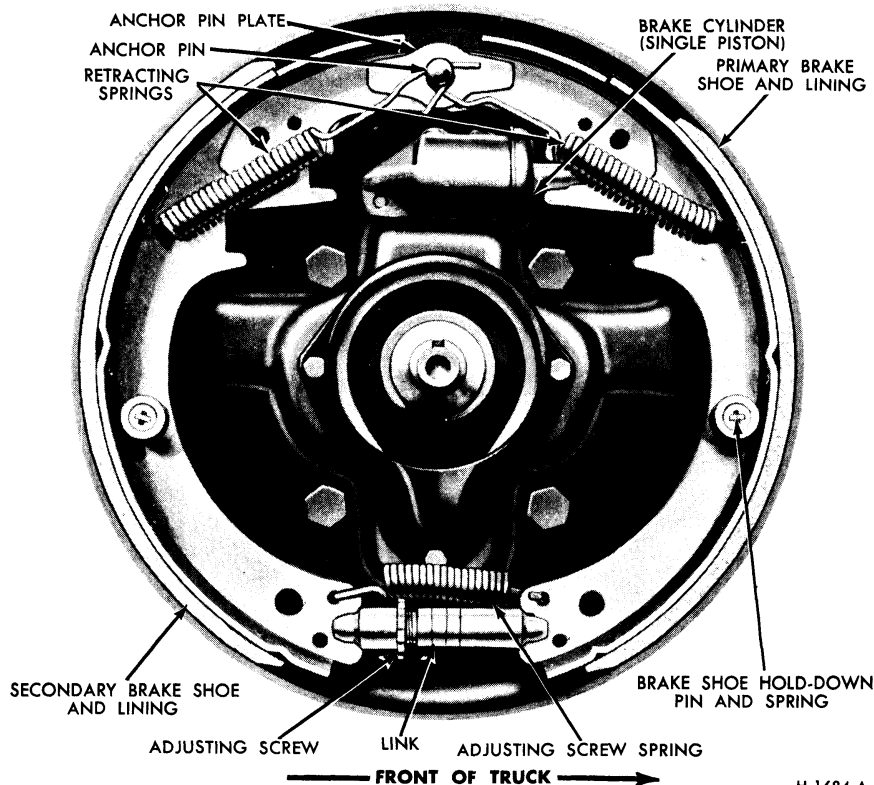


FIG. 2 Single Anchor Brake Shoe—Front—P-500

bearing adjusting nut, cotter pin, grease cap, and gasket if so equipped). Adjust the front wheel bearings as outlined in Group 11.

5. Install the wheel and tire.
6. Bleed the hydraulic system and adjust the brake shoes.

MAJOR REPAIR OPERATIONS

BRAKE WHEEL CYLINDER

Disassembly

1. With the wheel cylinder removed, remove the rubber boot from the end of the brake cylinder. Remove the piston, cup, and piston return spring from the cylinder (Fig. 3).
2. Remove the bleeder screw from the cylinder.

Assembly

1. Coat all brake cylinder parts with clean extra heavy duty brake fluid C6AZ-19542-A.

2. Install the bleeder screw (Fig. 3) in the brake cylinder.
3. Place the piston return spring, cup, and piston in the cylinder bore, and install a boot and link over each end of the cylinder, clamp the brake cylinder piston against the end of the cylinder. **When a brake cylinder repair kit is used, install all of the parts supplied in the kit.**

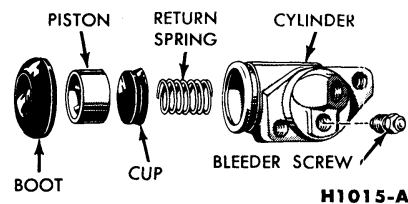


FIG. 3 Single Servo Brake Cylinder—Disassembled

PART 12-08 Drum Brakes — Dual Cylinders, Dual Pistons

Applies to 500 thru 900 Series Trucks					
COMPONENT INDEX		Page	COMPONENT INDEX		Page
BRAKE BACKING PLATE			BRAKE PEDALS		
Removal and Installation		08-5	Removal and Installation		08-7
BRAKE MASTER CYLINDERS			BRAKE SHOES		
Disassembly and Assembly		08-9	Adjustment		08-1
Removal and Installation		08-5	Removal and Installation		08-3
			SPECIFICATIONS		08-13

ADJUSTMENTS

BRAKE SHOE ADJUSTMENT

The brake drums should be at normal room temperature, when the brake shoes are adjusted. If the shoes are adjusted when the shoes are hot and expanded, the shoes may drag as the drums cool and contract.

A brake adjustment re-establishes the brake lining-to-drum clearance and compensates for normal lining wear.

Adjustment procedures for each type of brake assembly are given under the applicable heading.

Rear Brake — P-500 Series

The two-cylinder brake assembly brake shoes are adjusted by turning adjusting wheels reached through slots in the backing plate.

The brake adjustment is made with the vehicle raised. Check the brake drag by rotating the drum in the direction of forward rotation as the adjustment is made.

1. Remove the adjusting slot covers from the backing plate (Fig. 1).
2. Turn the rear (secondary shoe) adjusting screw inside the hole to ex-

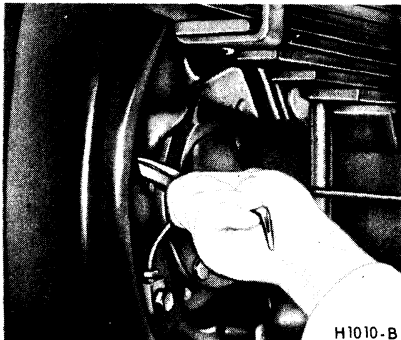


FIG. 1 Two-Cylinder Brake (Rear) Shoe Adjustment

3. pand the brake shoe until it drags against the brake drum.
3. Back off the adjusting screw so that the drum rotates freely without drag. Depress the brake pedal to center the brake shoes, and back off the adjusting screw an additional notch to provide operating clearance.
4. Repeat the above procedure on the front (primary) brake shoe.
5. Replace the adjusting hole covers.

Self Adjusting Brakes — Rear — 500-900 Series (Except P-500)

The brake shoes are automatically adjusted when the vehicle is driven in reverse and the brakes applied. A manual adjustment is required only after the brake shoes have been relined or replaced.

The two-cylinder brake assembly (Figs. 2 and 3) brake shoes are adjusted by turning adjusting wheels reached through slots in the backing plate.

Two types of two-cylinder brake assemblies are used on truck rear wheels. The assemblies differ primarily in the retracting spring hookup, and in the design of the adjusting screws and locks. However, the service procedures are the same for both assemblies.

The brake adjustment is made with the vehicle raised. Check the brake drag by rotating the drum in the direction of forward rotation as the adjustment is made.

1. Remove the adjusting slot covers from the backing plate (Fig. 1).
2. Turn the rear (secondary shoe) adjusting screw inside the hole to expand the brake shoe until a slight drag is felt against the brake drum.
3. Repeat the above procedure on the front (primary) brake shoe.
4. Replace the adjusting hole covers.

5. Complete the adjustment by applying the brakes several times while backing the vehicle.
6. After the brake shoes have been properly adjusted, check the operation of the brakes by making several stops while operating in a forward direction.

If a brake drum will not come off, remove the adjusting slot covers and back off the adjuster screws to free the drum from the shoes.

HYDRAULIC SYSTEM BLEEDING

Refer to Part 12-01 (General Hydraulic Brake Service) for hydraulic system bleeding procedures.

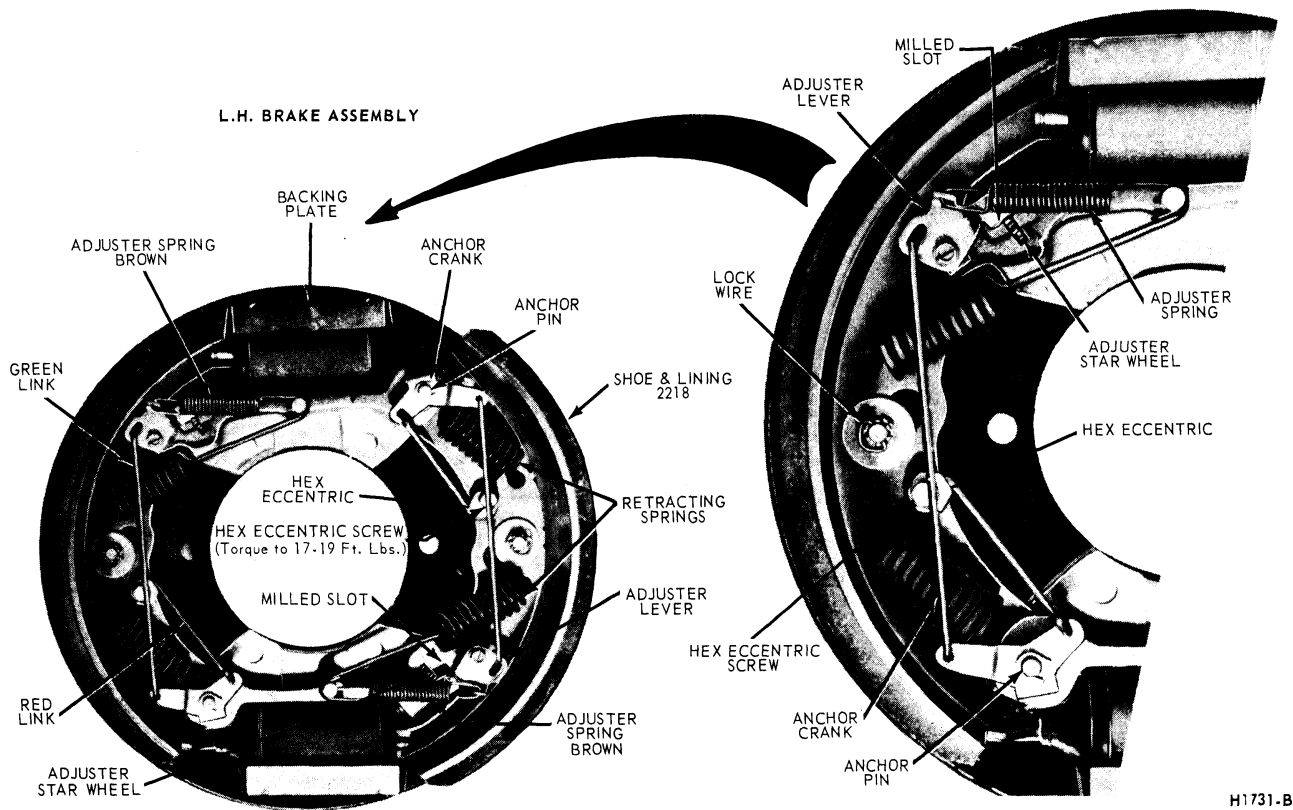


FIG. 2 Two-Cylinder Brake Shoe (Wagner) — Rear

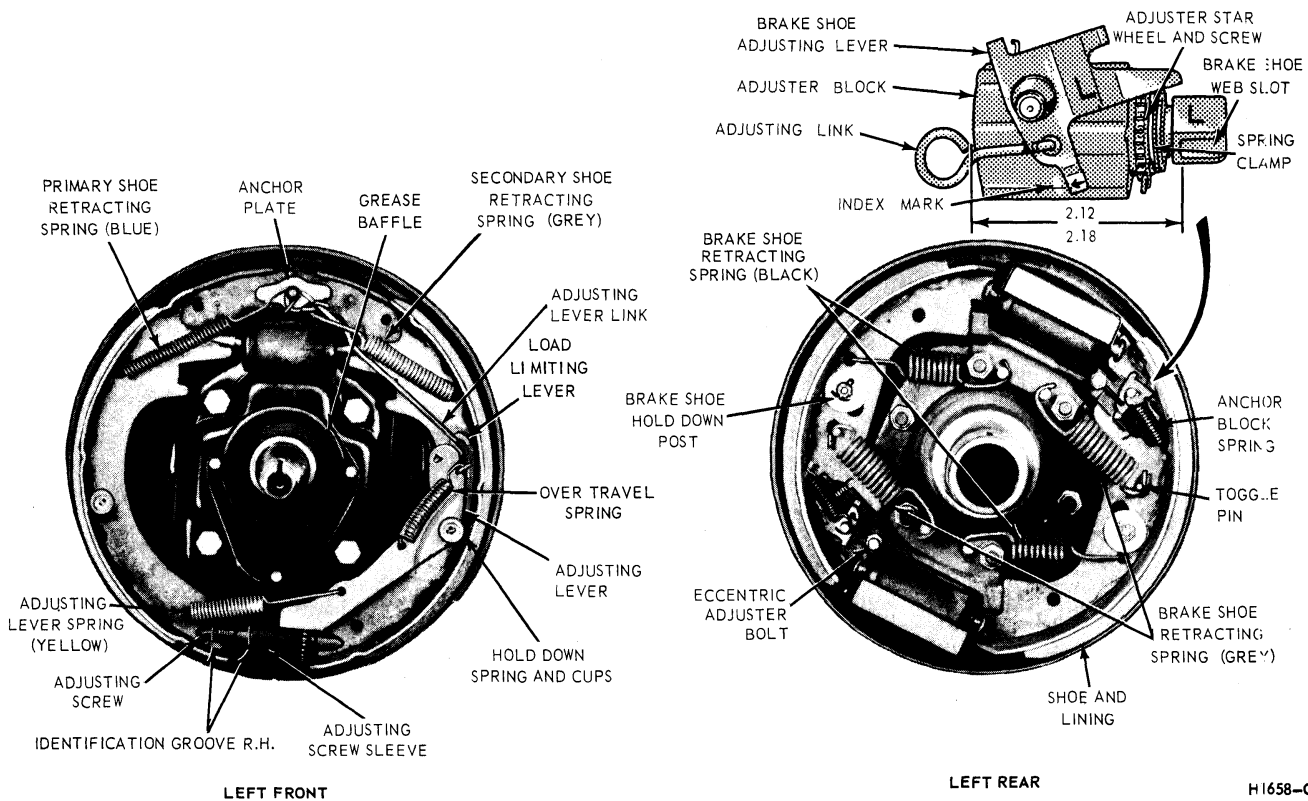


FIG. 3 Hydraulic Brake Assemblies (Kelsey-Hayes)

REMOVAL AND INSTALLATION

BRAKE SHOES AND ADJUSTING SCREW

P-500 Series — Rear

Removal

Refer to Figure 4.

1. Raise the truck until the wheels clear the floor. Remove the wheel, and then remove the drum or the hub and drum assembly. **Mark the hub and drum to aid assembly in the same position.**
2. Clamp the brake cylinder boots against the ends of the cylinder and remove the four brake shoe retracting springs.
3. Remove the brake shoe guide bolt cotter pin, nut, washer, and bolt from both shoes and remove the shoes from the carrier plate.
4. Remove the clamp-type adjusting wheel lock from the anchor pin support, and unthread the adjusting screw and wheel assembly from the anchor pin support.

Installation

1. Coat all points of contact between the brake shoes and other brake assembly parts with high temperature grease.
2. Thread the adjusting screw and wheel assembly into the anchor pin support and install the clamp-type adjusting wheel lock. Thread the adjusting wheel into the support so that the brake shoe will rest against the adjusting wheel end.
3. Place the brake shoe against the back-

ing plate, insert the ends in the brake cylinder links, and install the shoe guide bolt, washer and nut (Fig. 4). Finger tighten the nut, then back off one full turn, and install the cotter pin.

4. Install the four retracting springs with the tool shown in Fig. 5.
5. Remove the cylinder clamps, install the drum or the hub and drum assembly, then install the wheel assembly. **Align the marks on the hub and drum during installation.**
6. Adjust the brakes, and lower the truck.

600-900 Series — Rear — Wagner

Removal

1. Raise the truck until the wheels clear the floor. Remove the wheel, and then remove the drum or the hub and drum assembly. It may be necessary to back off the adjusting wheels slightly to free grooved drums. Take care not to back off adjustment so much that adjusting wheel is jammed against the friction ring on the adjuster screw as this may damage the ring.

Mark the hub and drum to aid assembly in the same position. Be sure the engine is stopped and there is no vacuum in the system before disconnecting the hydraulic lines.

2. Unhook the two automatic adjuster springs (Fig. 2). Remove each long adjuster link by pivoting back the adjusting wheel cranks until their slots

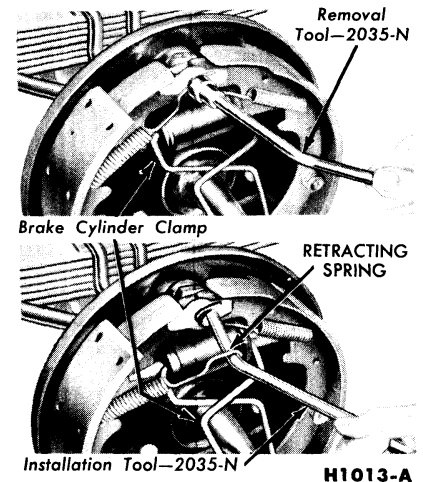


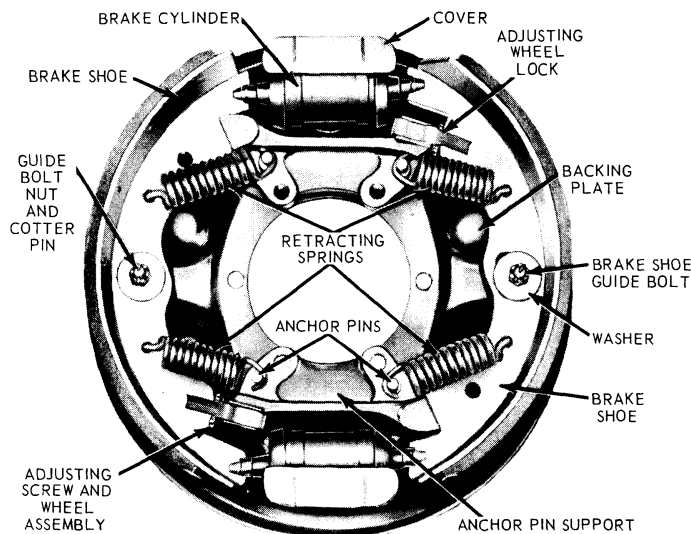
FIG. 5 Retracting Spring Replacement — Typical

align with the link hooks. Lift out the links, then slide the hooks from the anchor pin cranks. Remove the short links by rotating the anchor cranks until the link hooks clear the eccentrics on the shoe webs, then remove the smaller hooks from the cranks.

3. Spread the anchor crank C-washers and remove the cranks (it is usually unnecessary to remove the adjusting wheel cranks). If shoes are to be relined, remove adjuster eccentrics from the shoe webs by unscrewing their self-tapping screws.
4. Remove the shoe retraction springs by sliding the looped ends off the pins. Remove the shoe hold-down lock wires, castellated nuts and plain washers and lift the shoes off the backing plate.
5. Unthread the adjusting screw and adjusting wheel from each of the anchor supports.

Installation

1. Insert the adjusting wheels in the anchor support slots and thread in the adjuster screws from the shoe side, friction ring end toward the shoe. For new linings, back off adjusters, taking care not to jam the adjusting wheels. Do not lubricate adjuster screws.
2. Position the shoes (Fig. 2) to the backing plate. Locate shoe with its toe (cutaway portion of web) positioned in the adjuster slot, heel in the anchor pin slot. Install hold-down bolt, plain washer and castellated nut finger tight, then back off nut one turn and install the lockwire.
3. Install the retracting springs in the shoe web, longest end at the adjuster, and hook the springs over the pins.
4. On each shoe web, install the adjuster



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FIG. 4 Two Cylinder Brake — Rear — P-500

- hex eccentric, tightening the self-tapping screw finger-tight to permit final adjustment of the eccentrics.
- Position the anchor cranks on the anchor pins with the long end toward the shoes. Install and crimp the C-washers.
 - At each crank, install the short link with the small hook end into the short arm of the crank. Install the other link end around the eccentric on the shoe web.
 - Install the long link S-hook end to the long arm of the crank. Rotate the adjusting wheel crank so that slot lines up with link U-hook end and insert the hook. Rotate the adjusting wheel crank back to the approximate adjusting position.
 - Install the adjuster spring with the short end on the adjusting wheel crank finger and the long end on the upper groove of the spring retainer pin. Center the brake shoe assemblies to the backing plate.
 - Lift the adjuster lever up and away from the star wheel. Then loosen the hex eccentric screw and rotate each hex eccentric until the adjuster lever aligns the adjusting wheel crank pawl with the center line of the adjusting screws. **A milled slot located on the anchor support is the aligning mark.** With the eccentrics adjusted, tighten the self-tapping screws.
 - Install the drum or the hub and drum assembly, then install the wheel assembly. Align the marks on the hub and drum during installation.
 - Bleed the brake system and adjust the brakes. Lower the vehicle.

500-800 Series (Except P-500) Front — Kelsey Hayes

Removal

Refer to Figure 3.

- Raise the vehicle until the wheel clears the floor. Remove the wheel, drum and hub assembly. Refer to Part 12-01.
- Clamp the wheel cylinder boots against the ends of the cylinder.
- Remove the brake shoe retracting springs from both shoes.
- Remove the adjusting lever link, anchor plate and the adjusting lever spring.
- Remove the hold down spring cups, springs and the adjusting lever assembly.
- Remove the brake shoes and adjuster screw assembly from the backing plate.
- Remove the hold down pins from the backing plate and check the pins for straightness.

Installation

Refer to Figure 3.

- Clean all brake dust from the brake assembly parts with a **clean dry rag**.
- Coat all points of contact between the shoes and other brake parts with high temperature grease (C1AZ-19590-B or E).
- Coat the adjuster screw with high temperature grease (C1AZ-19590-B or E) before assembly. Thread the adjuster screw into the adjuster screw sleeve.
- Position the brake shoes on the backing plate and install the adjusting lever assembly, hold down pins, springs and cups.
- Position the adjuster screw assembly on the brake shoes so that the star wheel is opposite the adjusting slot in the backing plate. Install the adjusting lever spring.
- Install the anchor plate and adjusting lever link.
- Install the secondary brake shoe retracting spring.
- Install the primary brake shoe retracting spring.
- Remove the clamp from the wheel cylinder boots.
- Install the wheel, drum and hub assembly.
- Disengage the adjusting lever, and adjust the brakes. Subsequent adjustment will be automatic.

500-800 Series (Except P-500) — Rear — Kelsey Hayes

Removal

Refer to Figure 3.

- Raise the truck until the wheel clears the floor.
- Remove the wheel, hub and drum assembly. Refer to Part 12-01.
- Clamp the brake cylinder boots against the ends of the cylinder with brake piston clamps.
- Note the two different types of brake shoe retracting springs and remove the springs.**
- Remove the brake shoe hold down post cotter key, nut, and shoe hold down washer.
- Loosen and remove the eccentric adjuster bolt, lock washer, eccentric and adjusting link.
- Remove the shoe and lining assembly from the backing plate.
- Remove the anchor block spring and slide the adjuster assembly from the shoe web.
- Remove the adjuster star wheel and screw from the adjuster block. Unthread the star wheel from the adjuster screw.

Installation

Refer to Figure 3.

- Wipe all brake dust from the brake assembly parts with a **clean dry rag**. **Coat all points of contact between**

brake shoes and other parts with high temperature grease (C1AZ-19590-B or E).

- Coat the adjuster screw and the inside of the adjuster block with high temperature grease (C1AZ-19590-B or E).
- Thread the adjuster screw onto the star wheel and insert the adjuster screw assembly into the adjuster block. Maintain a 2.12-2.18 inch dimension from the end of the adjuster block to the adjuster screw web slot.
- Install the adjuster assembly onto the shoe web and attach the anchor block spring.
- Place the brake shoe over the retracting spring toggle pin and insert the ends of the shoe in the wheel cylinder links.
- Install the shoe hold down washer and nut. Do not install the cotter pin.
- Install the four brake shoe retracting springs. Make sure the retracting springs are installed as shown in Fig. 3. On 15 x 5 inch brakes the inner hook ends face the wheel cylinders. On 15 x 4 inch brakes the inner hook ends face the center of the axle.
- Install the adjusting link, eccentric, lockwasher and adjuster bolt. Do not tighten.
- Remove the brake piston clamps.
- Tighten the shoe hold down nut until there is 0.015-0.025 inch clearance between the shoe and hold down washer with the shoe held against the backing plate. Install the cotter pin.
- Center the shoes on the backing plate. Using a 1/2 inch wrench, rotate the adjuster eccentric until the adjusting lever is at the index mark (Fig. 3). Tighten the eccentric adjuster bolt to specification.
- Install the wheel, hub and drum assembly.
- Adjust the brake to obtain a slight drag. Subsequent adjustments will be automatic.

BRAKE WHEEL CYLINDER

Removal

- Remove the wheel, drum, and brake shoes. Remove the cylinder-to-shoe connecting links.
- Disconnect the brake line from the brake cylinder.
- Remove the brake cylinder retaining bolts and lockwashers, and then remove the cylinder from the backing plate. On the two-cylinder brake assemblies, remove the cover with the brake cylinder.

Installation

- Position the brake cylinder on the backing plate and install the retaining bolts and lockwashers. Torque the retaining bolts to 150-200 in.-lbs. (On the

two-cylinder brake assemblies, install the cover with the brake cylinder.

2. Install a new gasket on the brake line fitting and connect the line to the brake cylinder.
3. Install the brake shoes and the connecting links between the shoes and cylinder. Install the drum and the wheel.
4. Adjust the brakes and bleed the system. Check the pedal operation before moving the vehicle.

BRAKE BACKING PLATE

300 Through 900 Series

Removal

1. From front wheel spindles, remove the hub and drum attaching parts (axles under 9,000 lbs capacity-grease cap and gasket if so equipped, cotter pin, bearing adjusting nut and flat washer) (Axles 9,000 lbs capacity or over-grease cap and gasket, lock nut, dimpled washer, locking ring, and bearing adjusting nut and pin assembly.) Then, remove the outer wheel bearing and the hub and drum assembly from the spindle.
2. On rear wheels, remove the rear axle shaft flange retaining nuts and axle shaft. Remove the rear wheel bearing lock nut, lock washer, and adjusting nut, then remove the hub and drum assembly from the axle housing. Discard the grease seal.
3. Remove the brake shoes and adjusting screw from the backing plate as outlined in this section. Disconnect the brake line from the brake cylinder and submerge the end of the brake line in a can containing a small amount of brake fluid. This will minimize hydraulic line bleeding.
4. Remove the backing plate retaining bolts and nuts, then remove the backing plate from the front wheel spindle or rear axle housing.
5. Remove the attaching bolts and lock washers, and the brake cylinder from the backing plate.

Installation

1. Assemble the brake cylinder to the backing plate with the attaching bolts and lockwashers.
2. Mount the backing plate to the front wheel spindle or to the rear axle housing flange, and secure with the attaching bolts and nuts.
3. Install the brake shoes and adjusting screw to the backing plate as outlined in this section. Connect the brake line to the brake cylinder.
4. Install a front wheel hub and drum assembly and the outer wheel bearing to the spindle. Install the hub and drum attaching parts (axles under 9,000 lbs capacity-flat washer, bearing

adjusting nut, cotter pin, grease cap, and gasket if so equipped, axles 9,000 lbs. capacity or over-bearing adjusting nut and pin assembly, locking ring, dimpled washer, lock nut, and grease cap and gasket). Adjust the front wheel bearings as outlined in Group 11.

Install a rear wheel hub and drum assembly on the rear axle housing. **The rear hub oil seal must be replaced whenever a hub is removed or installed.** Install the outer bearing and the adjusting nut, then adjust the wheel bearings. Install the lock washer and lock nut, then torque to specifications. Install the rear axle shaft, gasket and attaching nuts, then torque to specifications.

5. Install the wheel and tire.
6. Bleed the hydraulic system and adjust the brake shoes.

BRAKE MASTER CYLINDER

500-600 Series — Power Brake — Dash Mounted Booster

Removal

1. With the engine stopped, depress the brake pedal to expell vacuum or air pressure from the brake booster system.
2. Disconnect the hydraulic lines from the brake master cylinder.
3. Remove the brake booster to master cylinder retaining nuts and lockwashers. Remove the master cylinder from the brake booster.

Installation

1. Before installing the master cylinder, check the distance from the outer end of the booster assembly push rod to front face of the brake booster assembly. Turn the push rod adjusting screw in or out as required to obtain the specified length (Fig. 6).
2. Position the master cylinder assembly over the booster push rod and onto the two studs on the booster assembly. Install the attaching nuts and lockwashers and torque them to specifications.
3. Connect the hydraulic brake system lines loosely to the master cylinder.
4. Bleed the hydraulic brake system as outlined in this section of the manual. Centralize the differential valve as outlined in this Section of the manual. Then, fill the dual master cylinder reservoirs to within 1/4 inch of the top with the specified C6AZ-19542-A brake fluid. Install the gasket (diaphragm) and filler cap.

F-500-750, C-600-900 Series — Single Brake System

Removal

The engine must be stopped and all vacuum or air pressure must be expelled

from the booster system before the hydraulic lines are disconnected.

1. Disconnect the stoplight switch wires from the switch, and disconnect the brake line from the brake fitting.
2. Force as much brake fluid as possible from the master cylinder into a suitable container by pushing down the brake pedal all the way several times.
3. On a vehicle with a frame-mounted booster disconnect the rubber boot from the rear end of the master cylinder in the cab. Remove the bolts that hold the master cylinder against the dash panel, and lift the cylinder away from the push rod and out of the engine compartment.

On vehicles equipped with a dash-mounted booster, remove the nuts and washers that secure the master cylinder to the power booster unit, and remove the master cylinder.

Installation

1. On a vehicle with a frame-mounted booster, position the rubber boot on the piston push rod, guide the master cylinder over the end of the push rod and position the cylinder against the mounting surface. Install the mounting bolts and torque them to specifications.

On vehicles equipped with a dash-mounted booster, install the master cylinder over the push rod onto the two studs in the power booster body. Install the lockwashers and retaining nuts. Torque the nuts to specifications.

2. Connect the brake line to the master cylinder fitting, but leave the brake line fitting loose.
3. Fill the master cylinder reservoir with C6AZ-19542-A extra heavy duty brake fluid to within 1/4 inch of the top of the filler neck.
4. Push the brake pedal down slowly by hand several times to let air escape at the brake line fitting. Hold the pedal down and tighten the brake line fitting. Release the brake pedal. **Do not release the brake pedal until the fitting is tightened as additional air will be introduced into the master cylinder.**

On vehicles equipped with dash-mounted booster, the cylinder can be bled at the bleed screw on the cylinder.

On a vehicle with a frame-mounted brake booster assembly, the master cylinder can be bled at the booster bleed screw(s).

5. After seeing that the master cylinder reservoir is filled with the specified brake fluid to within 1/4 inch of the top of the filler neck, install the filler cap. Wipe off any fluid from the outside of the cylinder and brake line.
6. Connect the stoplight switch wires to the switch.

7. Connect the rubber boot to the end of the cylinder.
8. Check and, if necessary, adjust the brake pedal free-travel.

L-, LN-, and B-Series Split Brake System and Frame Mounted Booster

Removal

Refer to Figures 7 and 8.

1. Working from inside the vehicle below the instrument panel, disconnect the wires from the stop light switch.
2. On L- and LN-Series, remove the retaining nut, shoulder bolt, spacers and bushing securing the master cylinder push rod and the stop light switch to the brake pedal assembly. Remove the switch.

On B-Series, remove the hair pin clip from the brake pedal pin. Remove the push rod, spacers, stop light switch, and bushing from the brake pedal pin.

3. Remove the boot from the master cylinder push rod.
4. Disconnect the brake hydraulic system lines from the master cylinder.
5. Remove the master cylinder to dash panel retaining screws and remove the master cylinder.

Installation

1. Position the master cylinder assembly on the dash panel within the engine compartment and install the retaining screws and washers. Tighten the screws to specification.
2. Connect the hydraulic brake system lines loosely to the master cylinder.
3. Lubricate the push rod bushing with lubricant (Lubriplate). Position the bushing in the push rod.
4. On L- and LN-Series, position the stop light switch on the push rod, install the shoulder bolt and spacers. **Make sure the bushings and spacers are installed properly.** Secure the push rod and stop light switch to the brake pedal assembly with the self-locking nut.

On B-Series, install the spacers, push rod, bushing and stop light switch on the brake pedal pin. Install the hair pin retainer.

5. Connect the wires to the stop light switch.
6. Bleed the hydraulic brake system as outlined in this section of the manual. Centralize the differential valve as outlined in this Section of the manual. Then, fill the dual master cylinder reservoirs to within 1/4 inch of the top with C6AZ-19542-A extra heavy duty brake fluid. Install the gasket (diaphragm) and filler cap.

P-500 Series

Removal

1. The engine must be stopped and all

vacuum must be expelled from the booster system before the hydraulic lines are disconnected.

2. Turn the front wheels all the way to the left, and remove the fender apron attaching screws so that the apron can be moved to provide access to the master cylinder.
3. Disconnect the stoplight switch wires from the switch.
4. Disconnect the brake line from the brake tube fitting.
5. Force as much brake fluid as possible from the master cylinder into a suitable container by pushing down the brake pedal all the way several times.
6. Disconnect the rubber boot from the end of the master cylinder.
7. Remove the brake pedal return spring, remove the cotter pin from the clevis pin, and remove the master cylinder push rod and boot. Remove the three mounting bolts and remove the master cylinder from the mounting bracket and away from the vehicle.

Installation

1. Assemble the master cylinder to the mounting bracket and secure with the three mounting bolts. Install the push rod and boot to the front of the master cylinder. Connect the front end of the push rod to the upper holes of the brake pedal extension with the clevis pin, and secure with a cotter pin. Install the brake pedal retracting spring.
2. Connect the brake line to the master cylinder fitting, but leave the brake line fitting loose.
3. Fill the master cylinder with extra heavy-duty brake fluid C6AZ-19542-A to the specified level (1/4 inch from the top).
4. Push the brake pedal down slowly by hand several times to let air escape at the brake line fitting. Hold the pedal down and tighten the brake line fitting. Do not release the brake pedal until the fitting is tightened, as additional air will be introduced into the master cylinder. Repeat this procedure until air ceases to escape at the fitting and a firm pedal is obtained.
5. After seeing that the master cylinder reservoir is filled with the specified C6AZ-19542-A extra heavy duty brake fluid to within 1/4 inch of the top of the reservoir, install the filler cap. Wipe off the fluid from the outside of the cylinder and brake line.
6. Connect the stoplight switch wires to the switch.
7. Connect the rubber boot to the end of the cylinder. Reposition the fender apron and secure with the five retaining bolts.
8. Check and, if necessary, adjust the brake pedal free travel.

C-Series Single Brake System

Removal

The engine must be stopped and all vacuum must be expelled from the booster system before the hydraulic lines are disconnected.

1. Roll back the floor mat, remove the floor plate, and then disconnect the hydraulic line from the master cylinder.
2. Force as much brake fluid as possible from the master cylinder into a suitable container by pushing down the brake pedal all the way several times.
3. Disconnect the rubber boot from the rear end of the master cylinder in the cab.
4. Remove the two mounting bolts and lower the master cylinder away from the push rod and out of the cab.

Installation

1. With the rubber boot on the piston push rod, guide the master cylinder over the end of the push rod, and position the cylinder against the mounting surface. Install the mounting bolts, and torque them to specifications.
2. Connect the brake line to the master cylinder fitting and tighten the fitting.
3. Fill the master cylinder reservoir with the specified brake fluid to within 1/4 inch of the top of the filler neck.
4. Bleed the brake system.
5. After seeing that the master cylinder reservoir is filled with the specified C6AZ-19542-A extra heavy duty brake fluid to within 1/4 inch of the top of the filler neck, install the filler cap. Wipe off any fluid from the outside of the cylinder and brake line.
6. Connect the rubber boot to the end of the cylinder. Install the floor plate and secure with the seven retaining screws, and place the floor mat in its proper position.
7. Check and, if necessary, adjust the brake pedal free-travel.

C-Series — Split Brake System

Removal

Refer to Figure 9.

All vacuum must be relieved from the booster before hydraulic lines are disconnected.

1. Disconnect the hydraulic lines from the master cylinder. Trap the fluid drip with a shop towel or plug the ports.
2. Remove the bolt and nut connecting the push rod to the brake pedal bell crank and remove the stop light switch, bushing and spacers.
3. Remove the master cylinder mounting bolts and remove the master cylinder from the vehicle.

Installation

Refer to Figure 9.

1. If the master cylinder is being replaced, transfer the outlet ports to the

- new master cylinder.
- Position the master cylinder to the dash panel and install the mounting bolts.
 - Assemble the stop light switch, bushing and spacers on the push rod and install the bolt connecting the push rod to the bell crank.
 - Connect the primary and secondary outlet tubes and tighten to specifications.
 - Bleed the brake system.

DUAL BRAKE MASTER CYLINDER PRESSURE DIFFERENTIAL VALVE ASSEMBLY

Removal

- Raise the vehicle on a hoist. Disconnect the brake warning light wire from the pressure differential valve assembly switch. **To prevent damage to the brake warning switch wire connector, expand the plastic lugs to allow removal of the shell-wire connector from the switch body.**
- Disconnect the brake hydraulic lines from the differential valve assembly.
- Remove the screw retaining the pressure differential valve assembly to the frame side rail and remove the valve assembly.
- If the differential valve is to be replaced, remove the brake warning lamp switch and install the switch in the new differential valve. The pressure differential valve assembly and the brake warning lamp switch are separate units and each is serviced as a separate assembly only.**

Installation

- Mount the pressure differential valve assembly on the frame side rail and tighten the attaching screw.
- Connect the brake hydraulic system lines to the differential valve assembly and tighten the tube nuts securely.
- Connect the shell-wire connector to the brake warning lamp switch. **Make sure the plastic lugs on the connector hold the connector securely to the switch.**
- Bleed the brakes and centralize the pressure differential valve as outlined in this Section of the manual.

BRAKE PEDAL ASSEMBLY

L-, LN-, and LT-Series

Removal

- Remove the brake pedal retracting spring (Fig. 7).
- Remove the brake master cylinder push rod eccentric bolt nut, and remove the bolt and two nylon bushings.
- Remove the nut from the pedal shaft. Then slide the shaft to the left and

remove the brake pedal and sleeve.

- Remove the two bushings from the pedal, and remove the bumper from the pedal extension bracket if so equipped.

Installation

- Coat all bushings and the pedal shaft with a small quantity of Lubriplate or an equivalent lubricant.
- Install the bumper on the pedal extension bracket (if so equipped), and position the nylon bushings in the brake pedal shaft bore.
- Position the brake pedal assembly and sleeve in the pedal support bracket. Slide the pedal shaft through the sleeve and pedal and secure with the nut. Torque the nut to specifications.
- Position the nylon bushings in the bore of the push rod. Connect the push rod to the brake pedal with the eccentric bolt and nut. Install the pedal retracting spring.
- Adjust the brake pedal free travel to 3/16-3/8-inch (Fig. 11, Part 12-01). Torque the eccentric bolt nut to specifications.

P-500 Series

Removal

- Open the cover and disconnect the transmission gearshift rods from the shaft levers. Set the rods so that the maximum working space is obtained at the pedal support bracket.
- Remove the pedal pads from the clutch and brake pedal (Fig. 10).
- Remove the eight screws that retain the two floor covers at the steering column, and remove the covers. Unlatch the engine cover assembly and open.
- Remove the eight floor plate retaining screws. Pull the accelerator pedal from the accelerator linkage and remove the floor plate.
- Disconnect the clutch and brake pedal retracting springs.
- Loosen the pedal support bracket clamp bolt. Remove the cotter pins and clevis pins from the clutch and brake pedals.
- Turn the front wheels full left. Through the left front fender apron, remove the locking pin from the clutch pedal and remove the pedal. Push the pedal shaft toward the centerline of the vehicle. From inside the cab, slide the pedal shaft and clutch pedal lever to the right and out of the support bracket. Remove the brake pedal from the support bracket, then remove the bushings from the pedal and the pedal support bracket.

Installation

- Coat all bushings and the pedal shaft with a small quantity of Lubriplate or an equivalent lubricant. Install new

bushings in the pedal support bracket and the brake pedal.

- Position the brake pedal in the support bracket, and slide the pedal shaft and clutch pedal lever through the bracket and pedal.
- Through the left front fender apron, install the clutch pedal on the shaft and secure it with a new locking pin.
- Position the clutch rod on the clutch pedal lever, install the clevis pin and secure it with a new cotter pin.
- Position the brake master cylinder push rod in the brake pedal, install the clevis pin and secure it with a new cotter pin.
- Install the clutch and brake pedal retracting springs.
- Adjust the brake pedal by removing the clevis pin from the master cylinder push rod and turning the hex head of the push rod until the specified free travel is obtained.

B-Series

Removal

- Remove the brake pedal retracting spring (Fig. 8).
- Remove the clevis pin retaining clip and remove the pin, spacers, master cylinder push rod bushing and switch assembly.
- Remove the clip from the pedal shaft. Then slide the shaft to the left and remove the brake pedal.
- Remove the two bushings from the pedal.

Installation

- Coat all bushings and the pedal shaft with a small quantity of Lubriplate or an equivalent lubricant.
- Position the nylon bushings in the brake pedal shaft bore.
- Position the brake pedal assembly in the pedal support bracket. Slide the pedal shaft through the pedal and secure with the retaining clip.
- Position the nylon bushing in the bore of the push rod. Connect the push rod, switch assembly and spacers to the brake pedal with the clevis pin and secure with the retaining clip.
- Install the pedal retracting spring.

C-Series

Removal

- Remove the brake pedal retracting spring (Figs. 9 and 11).
- Remove the brake master cylinder push rod eccentric bolt nut, bolt and nylon bushings.
- Remove the brake pedal bumper-to-bracket retaining nut. Then remove the bolt and bumper.
- On models with a single hydraulic brake system, remove the master cylinder push rod by pulling up on the tab on the push rod boot, and remove

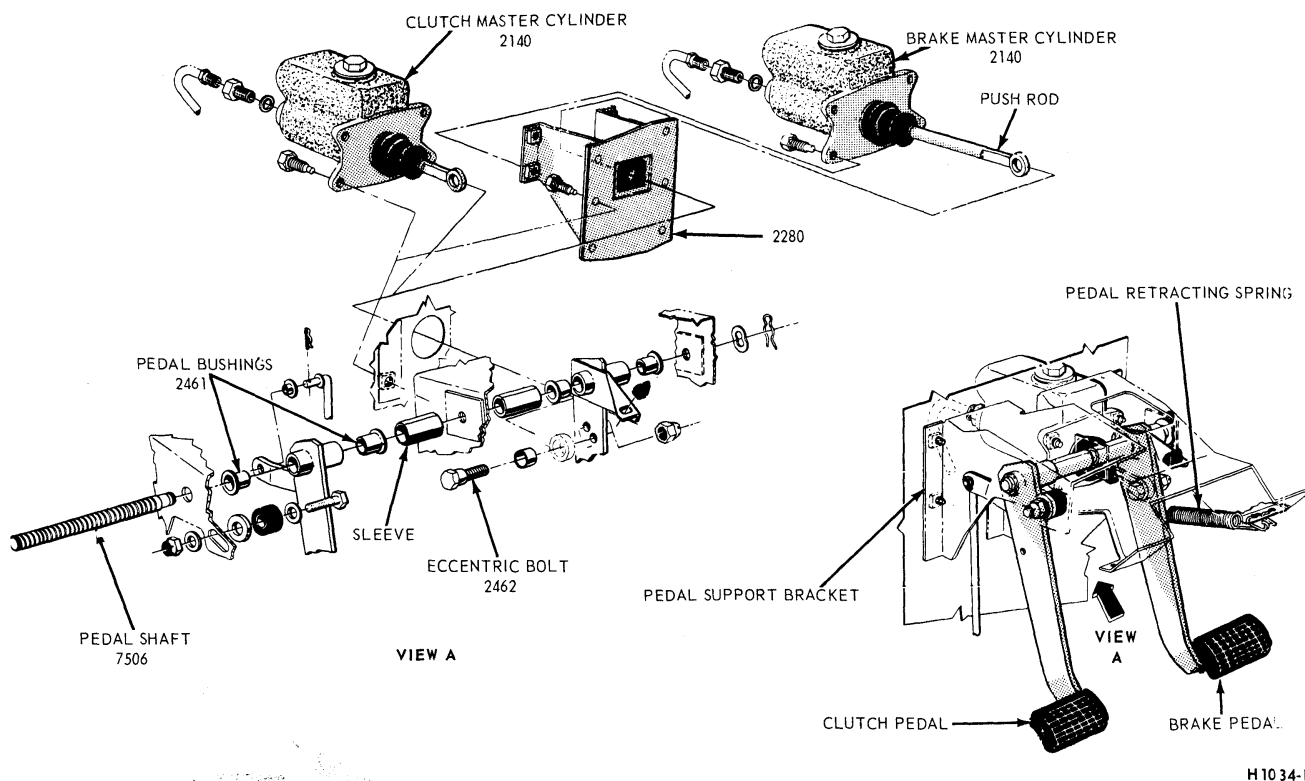


FIG. 7 L-, LN-, or LT-Series Brake Pedal and Related Parts

- the push rod and boot from the cylinder.
- 5. Remove the nut from the bolt, slide the bolt to the right and remove the brake pedal assembly, sleeve and bushing.
- 6. Remove the bushings from the pedal assembly.

- 2. Position the brake pedal assembly sleeve and bushing in the pedal support bracket, slide the bolt to the left

- and install the nut. Torque the nut to specifications.
- 3. On models with a single hydraulic

Installation

- 1. Coat all bushings and the pedal shaft, with a small quantity of Lubriplate or an equivalent lubricant. Position the nylon bushings in the brake pedal shaft bore.

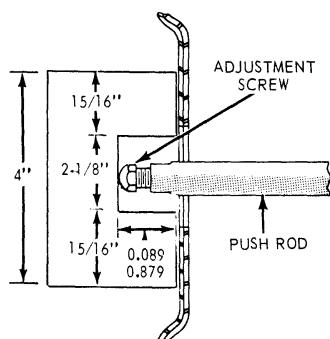


FIG. 6 Midland-Ross Booster Push Rod Gauge Dimensions and Adjustment

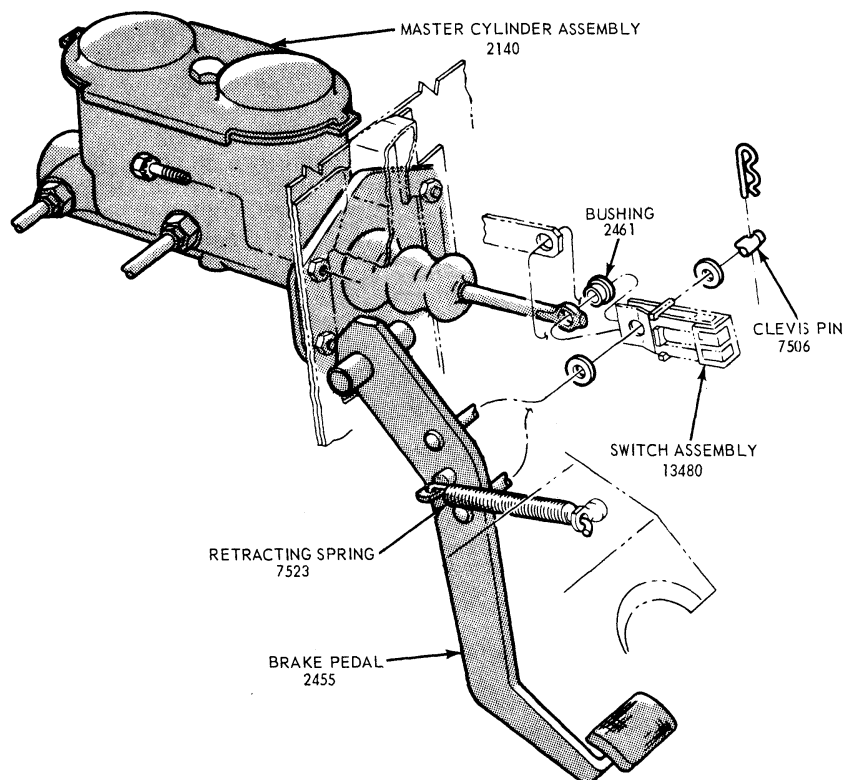
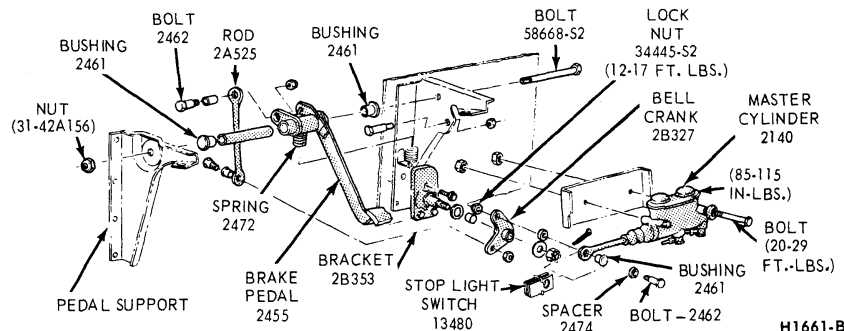


FIG. 8 B-Series Brake Pedal and Related Parts

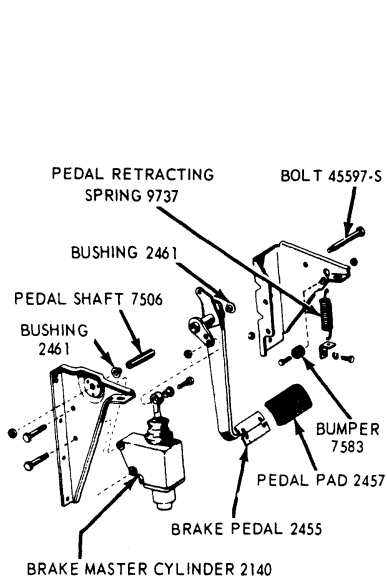
brake system, install the push rod and boot in the master cylinder.

- On models with a single hydraulic brake system, install the pedal bumper bolt, bumper and nut. Tighten the nut securely.
- Install the two nylon bushings in the push rod bore, and install the push rod eccentric bolt and nut.
- Install the pedal retracting spring.
- On models with a single hydraulic brake system, adjust the brake pedal free-travel to 3/16-3/8 inch. Torque the eccentric bolt nut to specifications.



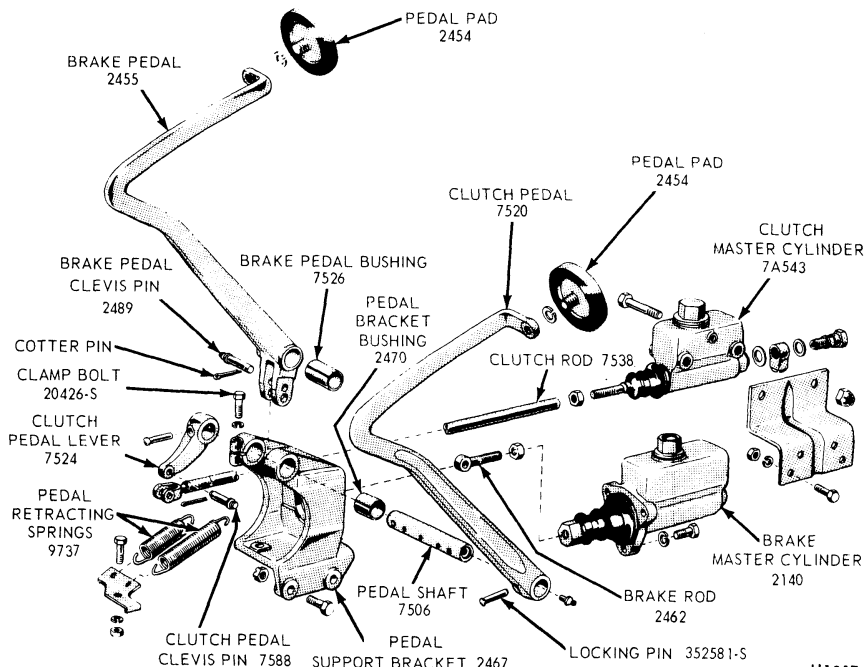
H1661-B

FIG. 9 Dual Master Cylinder and Brake Pedal Installation — C-Series



H1012-D

FIG. 11 Single Master Cylinder and Brake Pedal Installation — C-Series



H1317-B

FIG. 10 Brake Pedal and Related Parts — P-500

OVERHAUL

BRAKE WHEEL CYLINDER

Disassembly

- With the wheel cylinder removed, remove the rubber boots from the ends of the brake cylinder. Remove the pistons, cups, and piston return spring from the cylinder (Fig. 12).
- Remove the bleeder screw from the cylinder.

Assembly

- Coat all brake cylinder parts with clean extra heavy duty brake fluid C6AZ-19542-A.
- Install the bleeder screw (Fig. 12) in the brake cylinder.
- Place the piston return spring, cups, and pistons in the cylinder bore, and install a boot and link over each end

of the cylinder, clamp the brake cylinder pistons against the ends of the cylinder. **When a brake cylinder repair kit is used, install all of the parts supplied in the kit.**

MASTER CYLINDER

Single Brake System

Disassembly

- With the master cylinder removed, clean the outside of the master cylinder, and remove the filler cap and gasket. Pour out any brake fluid that may remain in the cylinder and reservoir. On a C-Series Truck master cylinder (Fig. 13), remove the 4 bolts that hold the cylinder body on the reservoir, and remove the gasket. Press down on the

piston to compress the return spring, and remove the snap ring. Remove the piston, primary cup, piston filler, return spring, check valve, and check valve seat.

On vehicles equipped with a frame mounted vacuum brake booster, the check valve is installed in the booster instead of in the master cylinder.

- On a L-, LN-, P-, or LT-Series truck master cylinder with a box-shaped reservoir, remove the stop light switch if it is mounted on the master cylinder, brake bolt, fitting, and gaskets from the forward end of the cylinder (Fig. 14). Discard the gaskets. Remove the snap ring from the bore at the rear end of the cylinder, and remove the stop plate, piston cup, spring, check valve, and seat from the

cylinder bore. If necessary, blow through the forward bolt hole to remove the parts.

Assembly

1. Dip all parts except the master cylinder body in clean hydraulic brake fluid. Use only **C6AZ-19542-A heavy duty brake fluid**.
2. On a L-, LN-, P-, LT-Series truck with a box-shaped master cylinder reservoir, install the brake fitting, bolt, and new gaskets (Fig. 14) on the forward end of the cylinder. Install the valve seat, valve, spring, cup, piston, and stop plate in the cylinder bore. Install the snap ring in the rear end of the bore.
3. On a C-Series truck master cylinder, install the valve seat, valve, spring, piston filler, cup and piston in the cylinder bore. Push down on the piston to compress the spring, and install the snap ring in the bore. Position a new gasket over the cylinder body and mount the body to the reservoir. Secure with 4 bolts. Tighten bolts securely.

500-900 Series — Split Hydraulic Brakes and Frame Mounted Booster

Disassembly

Refer to Figure 15.

1. Clean the outside of the master cylinder. Remove the cylinder cover screw. Lift off the cover and the diaphragm gasket and pour off excess brake fluid. Use the push rod to stroke the cylinder, forcing fluid from the cylinder through the outlet ports.
2. Loosen and remove the piston stop screw and gasket from the right hand side of the cylinder.
3. Pull back the push rod boot and remove the snap ring from the groove in the end of the cylinder bore.
4. Remove the push rod and stop plate from the master cylinder.
5. Remove the internal parts from the master cylinder. If the parts will not slide out loosely assemble the cover plate and seal the primary outlet port, then apply air pressure at the secondary outlet port.

Inspection and Repair

1. Clean all parts in isopropyl alcohol. Inspect the parts for chipping, excessive wear or damage. Replace them as required. **When using a master cylinder repair kit, install all the parts supplied.**
2. Check all recesses, openings and internal passages to be sure they are open and free of foreign matter. Passages may be probed with soft copper wire, 0.020 inch OD, or smaller.
3. Minor scratches or blemishes in the cylinder bore can be removed with

crocus cloth or a clean up hone. Do not oversize the bore more than 0.007 inch.

Assembly

Refer to Figure 15.

1. Dip all parts except the master cylinder in clean extra heavy duty C6AZ-19542-A hydraulic brake fluid.
2. Install the rear rubber cup on the secondary piston with the cup lip facing the rear. All other cups face the front or closed end of the cylinder.
3. Assemble and install the secondary piston spring, front cup, and the secondary piston.
4. Install the piston stop screw and gasket, making sure the screw enters the cylinder behind the rear of the secondary piston.
5. Assemble and install the primary piston and push rod parts.
6. Locate the stop plate in the seat in the bore and engage the snap ring into the groove at the rear of the cylinder.
7. Install the push rod boot onto the push rod and the groove of the cylinder housing.
8. Bleed the master cylinder.

Bleeding the Master Cylinder

Before the master cylinder is installed on the vehicle, the unit should be bled.

1. Support the master cylinder body in a vise, and fill both fluid reservoirs with C6AZ-19542-A extra heavy duty brake fluid.
2. Loosely install plugs in the front and rear brake outlet bores. Depress the primary piston several times until air bubbles cease to appear in the brake fluid.
3. Tighten the plugs and attempt to depress the piston. **The piston travel should be restricted after all air is expelled.**
4. Remove the plugs. Install the cover and diaphragm gasket assembly, and make sure the cover screw is tightened securely.

L- and LN-500-600 Series — Split Brake System and Dash Mounted Booster

Disassembly

Refer to Figure 16.

1. Clean the outside of the cylinder and remove the filler cap and gasket (diaphragm). Pour out any brake fluid that may remain in the reservoir. Stroke the push rod three times to remove fluid from the cylinder bore.
2. Remove the reservoir retainers, washers, and reservoir from the master cylinder body.
3. Remove the two rubber washers from the reservoir and the two O-rings from the reservoir retainers.

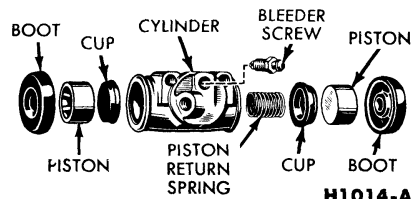
4. Remove the snap ring, spring retainer and push rod spring.
5. Unscrew the retainer bushing counterclockwise and remove the push rod, retainer bushing, seal retainer and primary piston from the master cylinder.
6. Remove the primary piston from the push rod and discard it.
7. Remove the seal retainer, and retainer bushing from the push rod. Remove the two lip seals and the two O-rings from the retainer bushing.
8. Unscrew the end cap counterclockwise and remove the end cap and secondary piston assembly from the master cylinder.
9. Remove the snap ring from the secondary piston and remove the piston and return spring from the end cap and stop rod assembly.
10. Remove the two lip seals from the piston.
11. Remove the snap ring from the end cap and remove the secondary piston stop rod, relief port seal spring, the two snap rings and the two split washers from the end cap.
12. Remove the relief port seal from the secondary piston stop rod.
13. Remove the O-rings from the end cap.
14. Remove the primary and secondary port caps and discard.
15. Remove the check valves and spring from the ports.

Assembly

Refer to Figure 16.

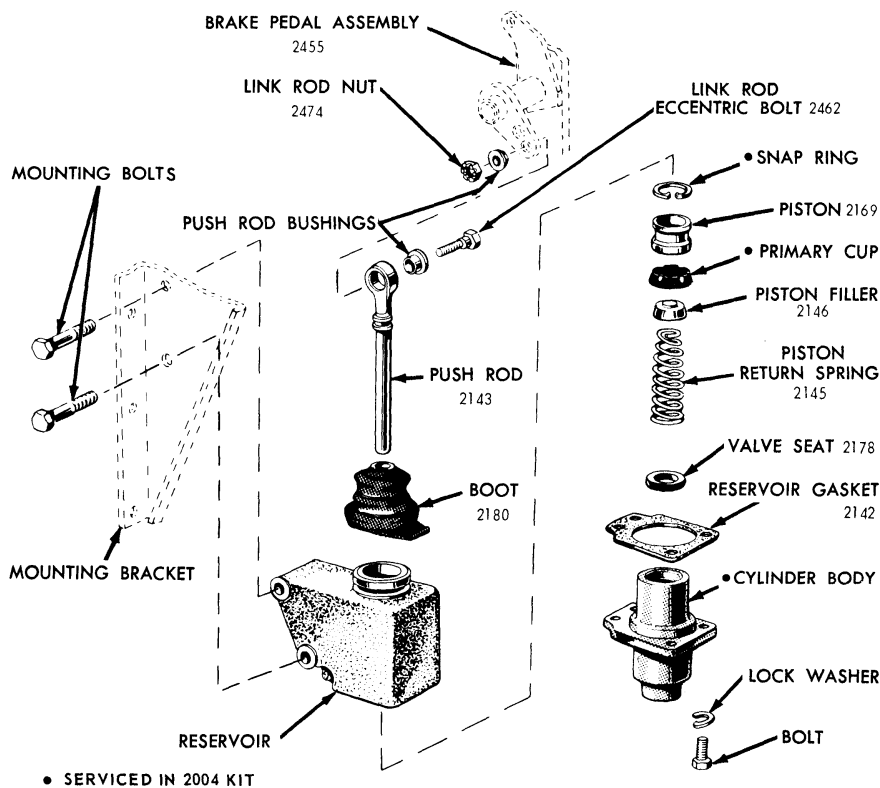
1. Wash all metal parts in alcohol before assembly. Dip all parts except the master cylinder body in clean C6AZ-19542-A extra heavy duty hydraulic brake fluid. **When using a master cylinder repair kit, install all of the parts supplied.**
2. Install a new primary piston into the front end of the master cylinder bore. Push the piston through the bore until it is flush with the retainer bushing recess. Use a non-metallic object which will not scratch the bore.
3. Assemble the O-rings and the two lip seals on the retainer bushing. Be sure the lip seals fit into the undercuts in the center of the bushing with their large diameters toward the piston end.
4. Install the retainer bushing onto the closed end of the push rod and push it onto the push rod approximately half way. Be sure the lip seal at the piston end of the retainer bushing remains in the undercut portion of the retainer bushing.
5. Install the seal retainer onto the closed end of the push rod with the raised lip toward the retainer bushing.

6. Insert the push rod into the master cylinder bore and hook the push rod onto the primary piston.
7. Slide the seal retainer into the recess in the master cylinder bore.
8. Screw the retainer bushing into the master cylinder body and tighten to 15-20 ft-lbs torque.
9. Install the push rod spring with the large end toward the master cylinder and install the spring retainer and snap ring.
10. Install the O-rings on the end cap.
11. Install the relief port seal on the secondary piston stop rod.
12. Place the port seal spring, split washer (largest of two), and snap ring (largest of two) on the piston stop rod.
13. Slide the assembly into the end cap and engage the snap ring into its groove.
14. Install the lip seals on the secondary piston with the large diameters facing outward.
15. Place the secondary piston return spring on the end cap assembly.
16. Compress the spring and place the remaining snap ring and split washer on the piston stop rod.
17. Slide the piston stop rod into the secondary piston and engage the snap ring in its groove.
18. Slide the end cap and piston assembly into the master cylinder bore and screw the end cap into the master cylinder body. Tighten the cap to 15-20 ft-lbs torque.
19. Install washers on the reservoir retainers and place the retainers in the mounting holes of the reservoir.
20. Place the rubber washers and O-rings on the retainers.
21. Place the reservoir and retainer assembly on the master cylinder body and tighten the retainers to 15-20 ft-lbs torque.
22. Replace the springs and check valves in the output ports of the cylinder.
23. Replace the primary and secondary port caps. Tighten to 15-20 ft-lbs torque.
24. Install the mounting seal on the flange of the master cylinder. Install the filler cap and gasket (diaphragm).



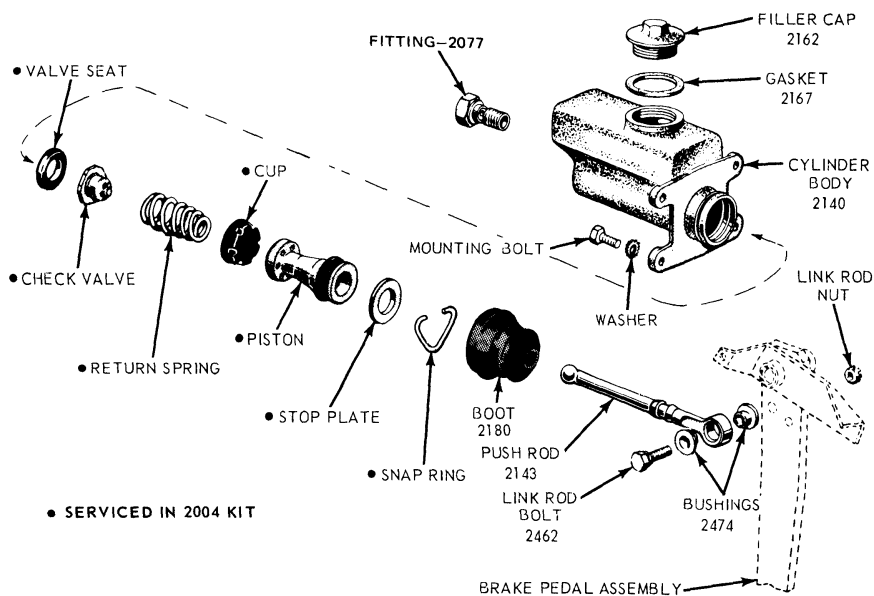
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FIG. 12 Double Servo Brake Cylinder



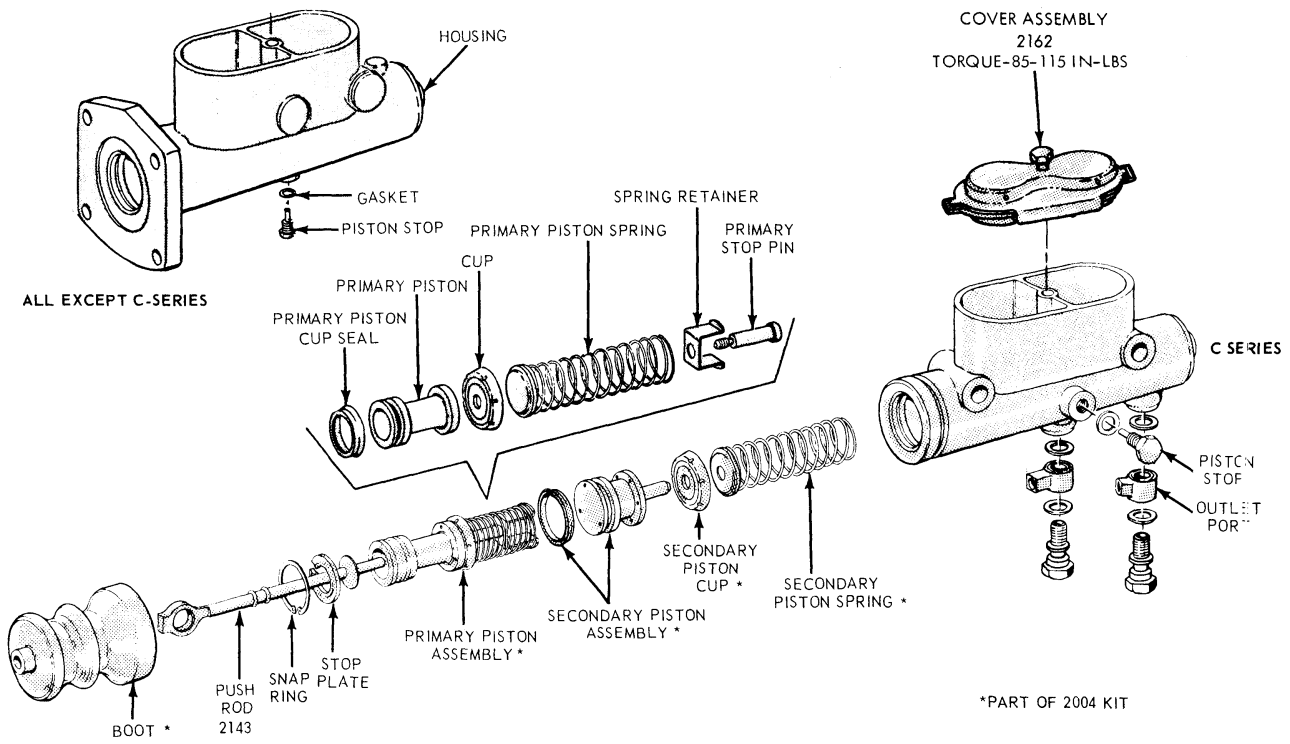
H1168-D

FIG. 13 C-Series Single Brake Master Cylinder — Disassembled



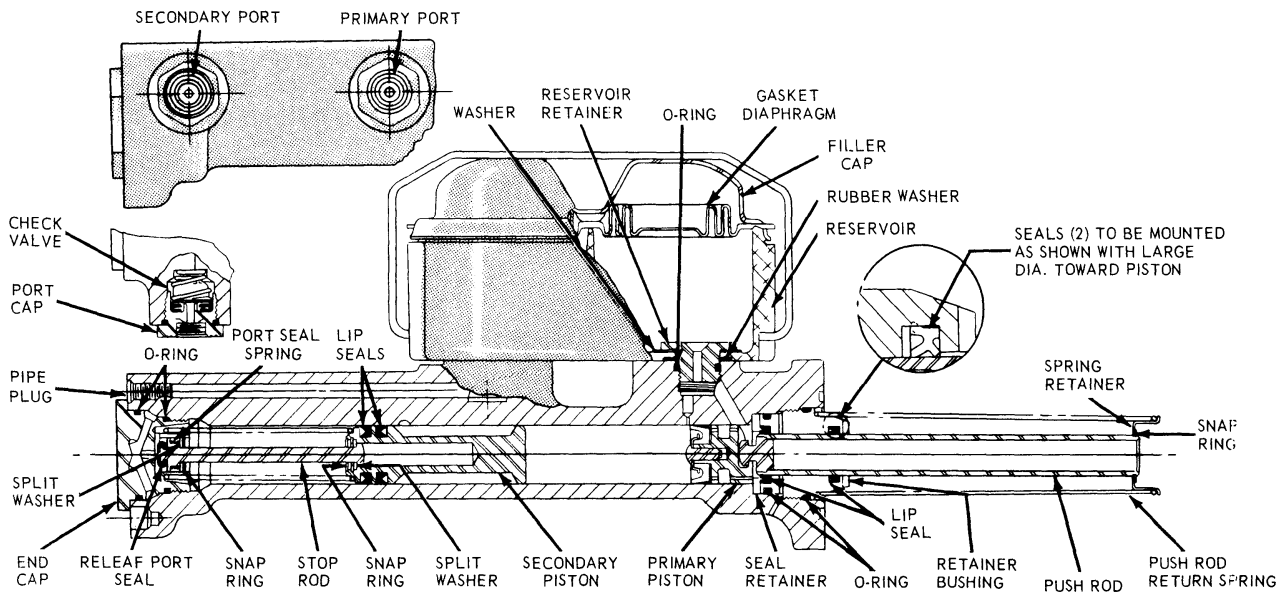
H1167-D

FIG. 14 LN-, P- or LT-Series Brake Master Cylinder — Box Shaped Reservoir



H1664-E

FIG. 15 Dual Master Cylinder — Disassembled View — 500-850-Series Trucks with Split Hydraulic Brakes and Frame-Mounted Booster



H1663-A

FIG. 16 Dual Master Cylinder — L-500-600, LN-6000, B-500-700 with Midland Ross Dash-Mounted Booster

SPECIFICATIONS

SPECIFIC TORQUE LIMITS

Front Brake Backing Plate to Spindle (100–400 Series)	1/2 x 13, 55–70	7/16 x 14, 30–50	1/2 x 20, 55–75
Front Brake Backing Plate and Steering Arm to Spindle (100–400 Series)	1/2 x 13, 30–40	1/2 x 20, 50–70	
Rear Backing Plate to Axle (100–400 Series)	1/2 x 13, 75–105	1/2 x 20, 50–70	7/16 x 14, 35–45
Brake Assembly to Front Axle (500–900 Series)	9/16 x 12, 110–150	1/2 x 13, 75–105	1/2 x 20, 75–105
Brake Assembly to Rear Axle (500–900 Series)	9/16 x 12, 110–150	1/2 x 13, 75–105	1/2 x 20, 75–105
Brake Drum to Hub Nuts or Bolts (500–900 Series)	1/2 x 13, 68–85	5/8 x 18, 136–170	
Master Cylinder or Booster Push Rod to Brake Pedal (500–900 Series)	3/8 x 16, 12–17		
Master Cylinder to Dash Panel (500–900 Series)	5/16 x 18, 12–17	3/8 x 16, 31–42	
Master Cylinder to Booster (Dash Mounted Booster) (500–700 Series)	14–18		
Booster to Dash Panel (Dash Mounted Booster) (500–700 Series)	3/8 x 16, 12–17	3/8 x 24, 13–20	5/16 x 18, 12–15
Master Cylinder to Pedal Bracket	5/16 x 24, 12–15	3/8 x 24, 12–17	
Eccentric Adjuster Bolt Torque	80–120 inch lbs.		

TORQUE LIMITS – HYDRAULIC TUBE NUTS (FT-LBS)

Thread Size	Ft-Lbs. ①	Thread Size	Ft-Lbs. ①
3/8–24	8–15	1/2–20	12–17
7/16–24	12–17	9/16–18	15–25

① All hydraulic line connections (nuts) must be torqued to the specified value and free of fluid leakage.

BRAKE DRUM REPAIR LIMITS (BRAKE LATHE)

Brake drums are marked with the maximum allowable braking surface diameter. If this diameter is exceeded by wear or refinishing, the drum must be replaced.

CH 1878-A



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