1965 FORD TRUCK

SHOP MANUAL

COMPLETE SET
ALL THREE VOLUMES

1965 Ford Truck Shop Manual
EAN: 978-1-60371-073-2
ISBN: 1-60371-073-6

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

Note from the Publisher

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

Disclaimer

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

1965 FORD

TRUCK

SHOP MANUAL
VOLUME ONE

1965 FORD TRUCK

SHOP MANUAL

VOLUME ONE

SERVICE DEPARTMENT
FORD DIVISION
Ford MOTOR COMPANY

FIRST PRINTING—SEPTEMBER, 1964

GROUP INDEX

VOLUME TWO

VOLUME THREE

SPECIFICATIONS AND SPECIAL SERVICE TOOLS AT END OF EACH GROUP

FOREWORD

The three volumes of this shop manual provide the Service Technician with complete information for the proper servicing of all 1965 Ford Trucks except Econoline and Ranchero.

The information is grouped according to the type of work being performed, such as diagnosis and testing, frequently performed adjustments and repairs, in-vehicle adjustments, overhaul, etc. Specifications, maintenance information and recommended special tools are included.

Refer to the opposite page for important vehicle identification data.

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

SERVICE DEPARTMENT

FORD MOTOR COMPANY

VEHICLE IDENTIFICATION

GROUP 1

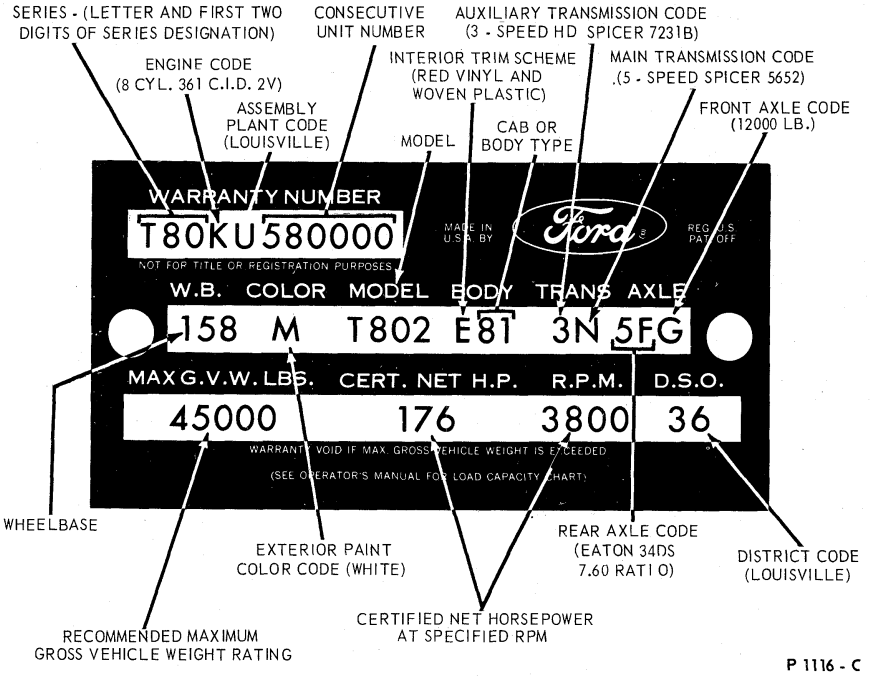


FIG. 1—Typical Truck Rating Plate

Figure 1 illustrates a typical truck Rating Plate. The Rating Plate is riveted to the rear (lock) face of the left front door on Conventional Cabs, 89 inch BBC (bumper-to-back of cab) and Tilt Cab trucks. On cowl and windshield units, the Rating Plate is mounted on the glove compartment inner panel inside the glove compartment door.

The Official Serial Number, for title and registration purposes, is stamped on the following locations: P-Series—right frame side rail approximately 4 inches to rear of the front crossmember; N, NT, F, T and B-Series—right frame side rail approximately 24 inches forward of the No. 2 crossmember; C-Series—10 inches forward of the rear cab support on the upper flange of the right frame side rail.

Do not use the Warranty Number which appears on the Rating Plate for title or registration purposes.

VEHICLE WARRANTY NUMBER

The Warranty 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 warranty number codes.

VEHICLE DATA

The Vehicle Data appears on the Rating Plate on the two lines following the Warranty 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 horse power rating of the engine with 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. A 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.

MODEL CODE

Prefix	Type
A	Fwd. Axle Tilt Cab Tandem Rear Axle—Diesel
B	School Bus Chassis—Gas
C	Tilt Cab 2 Axle—Gas
D	Tilt Cab 2 Axle—Diesel
F	Conventional 2 Axle—Gas
H	Forward Axle Tilt Cab 2 Axle—Gas
J	Fwd. Axle Tilt Cab Tandem Rear Axle—Gas
K	Conventional 2 Axle—Diesel
L	Tilt Cab Tandem Rear Axle—Gas
N	89" BBC Conventional 2 Axle—Gas
P	Parcel Delivery
U	Conventional Tandem Rear Axle—Diesel
R	89" BBC Conventional 2 Axle—Diesel
S	89" BBC Conventional Tandem Rear Axle—Gas
T	Conventional Tandem Rear Axle—Gas
W	89" Conventional Tandem Rear Axle—Diesel
Y	Fwd. Axle Tilt Cab 2 Axle—Diesel

ENGINE CODES

Code	Engine
A	6 Cyl. 330 CID (2V-MD)
B	6 Cyl. 300 CID (1V)
D	8 Cyl. 352 CID (4V)
E	6 Cyl. 330 CID Diesel (DGHM)
F	6 Cyl. 1673 Caterpillar Diesel
G	8 Cyl. 401 CID (2V)
H	8 Cyl. 477 CID (2V)
I	6 Cyl. CF 180 Diesel
J	6 Cyl. 240 CID (1V)
K	8 Cyl. 361 CID (2V)
M	8 Cyl. 330 CID (2V HD)
N	6 Cyl. C 180 Diesel
O	6 Cyl. 855 CID Cummins (NH-250)
P	8 Cyl. 401 CID (4V)
Q	8 Cyl. 477 CID (4V)
R	8 Cyl. 534 CID (4V)
S	6 Cyl. 200 CID (1V)
T	6 Cyl. 170 CID (1V)
V	6 Cyl. 672 CID Cummins (NH-180)
X	6 Cyl. 743 CID Cummins (NH-220)
Y	6 Cyl. 743 CID Cummins (NH-180)
Z	6 Cyl. 743 CID Cummins (NH-195)
2	6 Cyl. C 160 Diesel
3	8 Cyl. 784 CID Cummins (V8-265)-
4	4 Cyl. 220 CID Diesel (DGHM)
6	6 Cyl. 588 CID Cummins (V6E-195)
7	8 Cyl. 785 CID Cummins (V8E-235)
8	6 Cyl. 855 CID Cummins (NHE-225)
9	8 Cyl. 391 CID (4V)
K	6 Cyl. 300 CID (1V)*
S	8 Cyl. 361 CID (2V)*
W	8 Cyl. 330 CID (2V-MD)*
1	6 Cyl. 240 CID (1V)*
2	6 Cyl. 200 CID (1V)*
3	6 Cyl. 170 CID (1V)*
5	8 Cyl. 330 CID (2V-HD)*

* Low Compression

ASSEMBLY PLANT CODES

Code Letter	Assembly Plant
A	Atlanta
D	Dallas
E	Mahwah
G	Chicago
H	Lorain
J	Los Angeles
K	Kansas City
L	Michigan Truck
N	Norfolk

Code Letter	Assembly Plant
P	Twin Cities
R	San Jose
S	Pilot Plant
T	Metuchen
U	Louisville
W	Wayne
Y	Wixom
Z	St. Louis

CONSECUTIVE UNIT NUMBER

Basically, the system assigns the monthly assignment of serial numbers into blocks as follows, beginning with August 1964:

August	580,000 thru 587,999
September	588,000 thru 599,999
October	600,000 thru 611,999
November	612,000 thru 623,999
December	624,000 thru 635,999
January	636,000 thru 647,999
February	648,000 thru 659,999
March	660,000 thru 671,999
April	672,000 thru 683,999
May	684,000 thru 695,999
June	696,000 thru 707,999
July	708 000 thru 719,999
August	720,000 thru 731,999

W.B. (WHEELBASE)

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

EXTERIOR PAINT COLOR CODES

Code	M-30J/M-32J* Spec. Number	Color
A	1734-A	Black
B	556-A	Turquoise
C	1525-A	Special White (RPO)
G	1526-A	Chrome Yellow
J	1515-A	Red
K	1706-A	Tan
L	1237-A	Dk. Green
M	1619-A	White
O	1732-A	Lt. Peacock
P	1738-A	Palomino Met.
V	1729-A	Yellow
W	1742-A	Med. Blue

M-32-J Acrylic Paint Alternate with M-30-J

SERIES, MODEL CODES, AND GROSS VEHICLE WEIGHT (G.V.W.)—100-350 AND P SERIES

Series	Model Code	Rating GVW (lb)	Nominal (ton)
F-100	F-100	5,000	½
	F-101	4,200	½
	F-102	5,000	½
F-100 (4x4)	F-110	5,600	½
	F-111	4,900	½
	F-112	5,600	½
P-100	P-100	4,300	½
	P-101	5,000	½
F-250	F-250	7,500	¾
	F-251	4,800	½
F-250 (4x4)	F-260	6,800	¾
	F-261	4,900	½
	F-262	7,700	¾
F-350	F-350	10,000	1
	F-351	8,000	¾
P-100	P-100	4,300	½
	P-101	5,000	½
P-350	P-350	8,000	¾
	P-351	5,900	½
P-400	P-400	10,000	1
	P-401	7,700	¾
P-500	P-500	15,000	1½
	P-501	10,000	1
P-600	P-600	17,000	2
	P-601	15,000	1½
P-3500	G-350	8,000	¾
	G-351	5,900	½
P-4000	G-400	10,000	1
	G-401	7,700	¾
P-5000	G-500	15 000	1½
	G-501	10,000	1

SERIES, MODEL CODES, AND GROSS VEHICLE WEIGHT (G.V.W.)—500-800 SERIES

Series	Model Code	Rating GVW (lbs)	Nominal (ton)
B-500	B-500	15,000	1½
	B-501	10,000	1
	B-502	16,000	1½
	B-503	17,000	2
	B-504	18,000	2
	B-505	20,000	2
B-600	B-600	17,000	2
	B-601	15,000	1½
	B-602	20,000	2
B-610	B-610	21,000	2½
	B-611	22,000	2½
	B-612	23,000	2½
B-700	B-700	20,500	2½
	B-701	17,000	2
	B-702	21,000	2½
	B-703	22,500	2½
	B-704	23,000	2½
	B-705	24,000	2½
	B-706	23,500	3
	B-707	23,000	2½
	B-708	23,000	2½
B-750	B-750	22,500	2½
	B-751	17,000	2
	B-752	23,000	2½
	B-753	24,000	2½
	B-754	25,500	3
	B-755	23,000	2½
	B-756	23,000	2½
C-550	C-550	15,000	1½
	C-551	10,000	1
	C-552	17,000	2
	C-553	19,000	2
	C-554	20,000	2
C-600	C-600	20,000	2
	C-601	15,000	1½
	C-610	21,000	2½
	C-611	22,000	2½
	C-612	22,000	2½
	C-613	22,000	2½
	C-614	22,000	2½
C-700	C-700	24,000	2½
	C-701	17,000	2
	C-702	25,500	3
	C-703	25,500	3
C-750	C-750	24,000	2½
	C-751	17,000	2
	C-752	25,500	3
	C-753	25,500	3

Series	Model Code	Rating GVW (lbs)	Nominal (ton)
C-800	C-800	27,000	3½
	C-801	20,000	2
	C-802	27,500	3½
	C-803	27,500	3½
	C-804	27,500	3½
	C-805	27,500	3½
CT-750	L-750	39,000	3½
	L-751	27,000	2½
	L-752	41,000	4
CT-800	L-800	43,000	4
	L-801	27,000	2½
	L-802	39,000	3½
	L-803	45,000	4
	L-804	49,000	5
F-500	F-500	15,000	1½
	F-501	10,000	1
	F-502	16,000	1½
	F-503	17,000	2
	F-504	18,000	2
	F-505	20,000	2
F-600	F-600	17,000	2
	F-601	15,000	1½
	F-602	20,000	2
	F-610	21,000	2½
	F-611	22,000	2½
	F-612	23,000	2½
	F-613	23,000	2½
	F-614	23,000	2½
F-700	F-700	22,000	2½
	F-701	17,000	2
	F-702	23,000	2½
	F-703	24,000	2½
	F-704	25,500	3
	F-705	23,000	2½
	F-706	23,000	2½
	F-707	25,500	3
F-750	F-750	22,500	2½
	F-751	17,000	2
	F-752	23,000	2½
	F-753	24,000	2½
	F-754	25,500	3
	F-755	23,000	2½
	F-756	25,500	3
F-800	F-800	23,000	2½
	F-801	17,000	2
	F-802	24,000	2½
	F-803	25,500	3
	F-804	27,500	3½

Series	Model Code	Rating GVW (lbs)	Nominal (ton)
F-800	F-805	23,000	2½
	F-806	25,500	3
	F-807	27,500	3½
	F-808	27,500	3½
N-500	N-500	15,000	1½
	N-501	10,000	1
	N-502	16,000	1½
	N-503	17,000	2
	N-504	18,000	2
	N-505	20,000	2
N-600	N-600	17,000	2
	N-601	15,000	1½
	N-602	20,000	2
	N-610	21,000	2½
	N-611	22,000	2½
	N-612	23,000	2½
	N-613	23,000	2½
	N-614	23,000	2½
N-700	N-700	22,000	2½
	N-701	17,000	2
	N-702	23,000	2½
	N-703	24,000	2½
	N-704	25,500	3
	N-705	23,000	2½
	N-706	23,000	2½
	N-707	25,500	3
N-750	N-750	22,500	2½
	N-751	17,000	2
	N-752	23,000	2½
	N-753	24,000	2½
	N-754	25,500	3
	N-755	23,000	2½
	N-756	25,500	3
T-700	T-700	28,000	3
	T-701	22,000	2
	T-702	29,000	3
	T-703	36,000	3½
	T-704	37,000	3½
T-750	T-750	37,000	3½
	T-751	27,000	2½
	T-752	39,000	3½
	T-753	41,000	4
T-800	T-800	43,000	4
	T-801	27,000	2½
	T-802	45,000	4
	T-803	49,000	5
	T-804	43,000	4

SERIES, MODEL CODES, AND GROSS VEHICLE WEIGHT (G.V.W.)—DAGENHAM DIESEL POWERED UNITS

Series	Model Code	RATING	
		GVW (lbs)	Nominal (ton)
C-6000	D-600	20,000	2
	D-601	15,000	1½
	D-610	21,000	2½
	D-611	22,000	2½
	D-612	22,000	2½
	D-613	22,000	2½
	D-614	22,000	2½
C-7000	D-700	24,000	2½
	D-701	17,000	2

Series	Model Code	RATING	
		GVW (lbs)	Nominal (ton)
C-7000	D-702	25,500	2½
	D-703	25,500	3
N-6000	R-600	20,000	2
	R-601	15,000	1½
	R-610	21,000	2½
	R-611	22,000	2½
	R-612	23,000	2½
	R-613	23,000	2½
	R-614	23,000	2½

Series	Model Code	RATING	
		GVW (lbs)	Nominal (ton)
N-7000	R-700	22,000	2½
	R-701	17,000	2
	R-702	23,000	2½
	R-703	24,000	2½
	R-704	25,500	3
	R-705	23,000	2½
	R-706	23,000	2½

SERIES, MODEL CODES, AND GROSS VEHICLE WEIGHT (G.V.W.)—850-1100 SERIES

Series	Model Code	GVW (lbs)	Nominal (ton)
F-850	F-850	25,000	3
	F-851	20,000	2
	F-852	25,000	3
	F-853	27,000	3½
	F-854	27,000	3½
	F-855	27,000	3½
	F-856	25,500	3
	F-857	27,500	3½
F-950	F-950	28,000	3½
	F-951	24,000	2½
	F-952	30,000	4
	F-953	30,000	4
	F-954	32,000	4½
	F-955	32,000	4½
	F-956	34,000	5
	F-957	29,000	3½
	F-958	31,000	4
	F-959	33,000	4½
HT-850	J-850	41,000	
	J-851	32 000	
	J-852	45,000	
	J-853	48,000	
H-950	H-950	30,000	
	H-951	24,000	
	H-952	32,000	
	H-953	34,000	
CT-850	L-850	39,000	3½
	L-851	27,000	2½
	L-852	41,000	4
	L-853	43,000	4
	L-854	45,000	4
	L-855	49,000	5
CT-950	L-950	47,000	5
	L-951	30,000	3½
	L-952	49,000	5
	L-953	53,000	6
N-850	N-850	25,000	3
	N-851	20,000	2
	N-852	25,000	3
	N-853	27,000	3½
	N-854	27 000	3½
	N-855	27,000	3½
	N-856	25,500	3
	N-857	27,500	3½
*F-1000-D	K-000	32,000	4½
	K-001	26 000	3
	K-002	34 000	5
	K-003	36,000	5
HT-1000-D	Y-000	32 000	
	Y-001	26,600	
	Y-002	34,000	
N-1000	N-000	32,000	4½
	N-001	26 000	3
	N-002	34,000	5
	N-003	36,000	5
F-1000	F-000	32,000	4½
	F-001	26 000	3
	F-002	34,000	5
	F-003	36,000	5
F-1100	F-010	38,000	5½
	F-011	30,000	3½

Series	Model Code	GVW (lbs)	Nominal (ton)
C-850	C-850	27,000	3½
	C-851	20,000	2
	C-852	27,000	3½
	C-853	27,000	3½
	C-854	27,000	3½
	C-855	27,500	3½
HT-950	J-950	41,000	4
	J-951	32,000	3
	J-952	45,000	4
	J-953	49,000	5
H-1000	H-000	30,000	4
	H-001	24,000	2½
	H-002	32,000	4½
	H-003	34,000	5
*H-1000-D	Y-000	32,000	4½
	Y-001	26,000	3
	Y-002	34,000	5
*N-1000-D	R-000	32 000	4½
	R-001	26,000	3
	R-002	34,000	5
	R-003	36,000	5
	R-004	27,500	3½
NT-850	S-850	39,000	3½
	S-851	27,000	2½
	S-852	41,000	4
	S-853	43,000	4
	S-854	43,000	4
	S-855	45,000	4
	S-856	49,000	5
NT-850-D	W-850	43,000	4
	W-851	27,000	2½
	W-852	39,000	3½
	W-853	41,000	4
	W-854	45,000	4
	W-855	49,000	5
*F-1100-D	K-010	38,000	5½
	K-011	30,000	3½
*T-850-D	U-850	39,000	3½
	U-851	27 000	2½
	U-852	41,000	4
	U-853	43,000	4
	U-854	45 000	4
	U-855	49,000	5
	U-856	51,000	6
*F-950-D	K-950	28,000	3½
	K-951	24,000	2½
	K-952	30,000	4
	K-953	30,000	4
	K-954	32,000	4½
	K-955	32,000	4½
	K-956	34 000	5
	K-957	29,000	3½
	K-958	31 000	4
	K-959	33,000	4½
	K-960	25 500	3
	K-961	27,500	3½
C-950	C-950	30,000	4
	C-951	24,000	2½
	C-952	30 000	4
	C-953	32,000	4½
	C-954	32,000	4½
	C-955	34 000	5
	C-956	34 000	5
	C-957	31,000	4
	C-958	33,000	4½

Series	Model Code	GVW (lbs)	Nominal (ton)
C-1000	C-000	32 000	4½
	C-001	26 000	3
	C-002	34 000	5
	C-003	36,000	5
C-1100	C-010	36,000	5
	C-011	30,000	3½
T-850	T-850	39,000	3½
	T-851	27,000	2½
	T-852	41,000	4
	T-853	43,000	4
	T-854	43,000	4
	T-855	45,000	4
	T-856	49,000	5
	T-859	51,000	6
T-950	T-950	47,000	5
	T-951	30,000	3½
	T-952	49 000	5
	T-953	53,000	6
	T-954	55,000	7
	T-955	59 000	8
	T-956	65,000	9
	T-957	75 000	10
	T-958	78,000	10
N-950	N-950	28,000	3½
	N-951	24,000	2½
	N-952	30 000	4
	N-953	30 000	4
	N-954	32 000	4½
	N-955	32,000	4½
	N-956	34,000	5
	N-957	29,000	3½
	N-958	31,000	4
	N-959	33,000	4½
*N-950-D	R-950	28 000	3½
	R-951	24,000	2½
	R-952	30,000	4
	R-953	30 000	4
	R-954	32 000	4½
	R-955	32 000	4½
	R-956	34 000	5
	R-957	29,000	3½
	R-958	31,000	4
	R-959	33,000	4½
	R-960	25,500	3
	R-961	27,500	3½
NT-950	S-950	47,000	5
	S-951	30,000	3½
	S-952	49 000	5
	S-953	53,000	6
	U-954	56,000	7
*NT-950-D	W-950	47,000	5
	W-951	30 000	3½
	W-952	49,000	5
	W-953	53,000	6
*T-950-D	U-950	47,000	5
	U-951	30,000	3½
	U-952	49,000	5
	U-953	53,000	6
	U-954	56,000	7
*HT-950-D	A-950	41,000	4
	A-951	32,000	3
	A-952	45,000	4
	A-953	49,000	5
*N-1100-D	R-010	38 000	5½
	R-011	30,000	3½
N-1100	N-010	38 000	5½
	N-011	30,000	3½

*Diesel engines

INTERIOR TRIM CODES

Code	Trim Scheme
2	Blue Vinyl
3	Green Vinyl
4	Beige Vinyl
5	Red Vinyl
6	Black Vinyl
A	Grey Woven Plastic and Vinyl
B	Blue Woven Plastic and Blue Vinyl W/Foam Cushion
C	Green Woven Plastic and Green Vinyl W/Foam Cushion
D	Beige Woven Plastic and Beige Vinyl W/Foam Cushion
E	Red Woven Plastic and Red Vinyl W/Foam Cushion
J	Grey Vinyl W/Foam Cushion
K	Blue Woven Plastic and Blue Vinyl W/Foam Cushion
L	Green Woven Plastic and Green Vinyl W/Foam Cushion
M	Beige Woven Plastic and Beige Vinyl W/Foam Cushion
N	Red Woven Plastic and Red Vinyl W/Foam Cushion
O	Black Vinyl

BODY CODES

Code	Body Type
81	Conventional Cab
84	Cowl and Chassis
85	Cowl and Windshield
91	Tilt Cab

AUXILIARY TRANSMISSION CODES*—500-1100 SERIES

Code	Type	Ratio
1	3 Speed Spicer 5831-C	1.27/ .85
2	3 Speed Spicer 5831-D	2.0 / .85
3	3 Speed H.D. Spicer 7231-B	1.24/ .86
4	3 Speed H.D. Spicer 7231-D	2.14/ .86
5	4 Speed Spicer 8341-C	2.40/1.29/.84
6	3 Speed Spicer 8031-C	2.59/ .79
7	3 Speed Spicer 8031-P	1.19/ .84
8	4 Speed Spicer 7041	2.31/1.21/.83

NOTE: When required, the auxiliary transmission code will be stamped directly in front of the transmission code.

*If the "New Process" transmission is installed, the auxiliary transmission code will bear the suffix "N".

TRANSMISSION CODES—100-350 SERIES

Code	Description
A	3-Speed Ford Standard Duty
B	3-Speed Ford W/Warner T86 Overdrive
D	3-Speed Warner T89-C (MD)
E	3-Speed Warner T87-E (HD)
F	4-Speed Warner T98-A
G	3-Speed HD Cruise-O-Matic
J	5-Speed Clark 250-V Direct
K	5-Speed Clark 251-VO Overdrive
L	5-Speed Clark 2653 VI Direct
M	5-Speed Clark 264 VO Overdrive
N	4-Speed New Process 435
W	5-Speed Clark 2622 VI Direct

TRANSMISSION CODES—500-1100 SERIES

Code	Description
A	4 Speed New Process 435
B	5 Speed Spicer 8051-C Overdrive (Iron)
C	5 Speed Spicer 8052 Direct (Iron)
D	10 Speed Fuller R-96 Direct (Iron)
E	10 Speed Fuller RA-96 Direct (Alum)
F	Clark 305V Direct
G	10 Speed Fuller RA-960 Overdrive (Alum)
J	5 Speed Clark 250-V Direct
K	5 Speed Clark 251-VO Overdrive
L	5 Speed Clark 2653 VI Direct
M	5 Speed Clark 264-VO Overdrive
N	5 Speed Spicer 5652 Direct
O	12 Speed Spicer 8125 Overdrive (Alum)
P	5 Speed Spicer 5756-B Direct
Q	5 Speed Spicer 6352 Direct (Iron)
R	5 Speed Spicer 6852-G Direct (Iron)
S	5 Speed Spicer 6453-A Overdrive (Iron)
U	5 Speed Spicer 6352-B Direct (Iron)
V	5 Speed Spicer 6452-A Direct (Iron)
W	5 Speed Clark 2622 VI Direct
X	5 Speed 5H74 Fuller
Y	5 Speed Spicer 8055-C Overdrive (Alum)
Z	5 Speed Spicer 8054 Direct (Alum)
1	Clark 307V Direct
2	6 Speed Transmatic MT-40
3	6 Speed Transmatic MT-42
4	5 Speed Spicer 6354 Direct (Alum)
5	5 Speed Spicer 6455-A Overdrive (Alum)
6	5 Speed Spicer 6854-G Direct (Alum)
7	5 Speed Spicer 6454-A Direct (Alum)
9	5 Speed 5H75 Fuller

REAR AXLE CODES—100-600 AND P SERIES

Code	Ratio and Rating
07	3.25—3.3M*
08	3.50—3.3M*
09	3.70—3.3M*
10	4.11—3.3M*
22	4.88—7.2M*
23	5.13—7.2M*
24	4.10—5.2M*
25	4.56—5.2M*
26	4.88—5.2M*
29	5.87—7.2M*
30	5.29—11M*
32	6.20—11M*
34	6.80—11M*
41	5.83—13M*

Code	Ratio and Rating
42	6.20—13M*
44	6.80—13M*
62	6.20—15M*
64	6.80—15M*
66	7.20—15M*
73	6.50—17M*
74	6.80—17M*
75	7.17—17M*
76	7.20—17M*
87	6.50—18M*
88	7.17—18M*
89	7.67—18M*
A8	3.54—3.3M*
A9	3.54—3.3M*

Code	Ratio and Rating
B4	4.10—5.2M*
B5	4.56—5.2M*
B6	4.88—5.2M*
C1	3.31—3.3M*
C2	3.73—3.3M*
C3	3.92—3.3M*
C4	4.09—3.3M*
C5	4.10—3.3M*
D1	5.83/8.11—13M*
F7	5.83/8.11—15M*
F8	6.33/8.81—15M*
G3	6.50/9.04—17M*
H7	6.50/8.87—18M*
H8	7.17/9.77—18M*

*Pounds Capacity in Thousands

REAR AXLE CODES— 500-1100 SERIES

EATON 34 DP

Code	Ratio and Rating
1N	7.60—34M*
3N	8.38—34M*
4N	5.05—34M*
5N	5.60—34M*
6N	5.91—34M*
7N	6.21—34M*
8N	6.65—34M*

EATON 34 DS

1F	4.56—34M*
2F	4.88—34M*
3F	5.57—34M*
4F	6.14—34M*
5F	6.50—34M*
6F	7.17—34M*
7F	7.60—34M*
8F	4.11—34M*
9F	4.33—34M*

EATON 34 M

1E	4.56—34M*
2E	5.85—34M*
3E	6.69—34M*
4E	7.80—34M*
6E	8.60—34M*

EATON 34 DTA

W1	4.33/5.91—34M*
W2	4.56/6.21—34M*
W3	4.88/6.65—34M*
W4	5.57/7.60—34M*
W5	6.14/8.38—34M*
W6	6.50/8.87—34M*
W7	7.17/9.77—34M*
W8	4.11/5.61—34M*

EATON 30 D-3

3S	4.63/5.53/6.43—32M*
4S	4.88/5.83/6.77—32M*
5S	5.57/6.66/7.75—32M*
6S	6.14/7.35/8.55—32M*
7S	6.50/7.77/9.04—32M*

EATON 34 D-3

1T	4.11/4.86/5.61—34M*
2T	4.33/5.12/5.91—34M*
3T	4.56/5.39/6.21—34M*
4T	4.88/5.76/6.65—34M*
5T	5.57/6.59/7.60—34M*
6T	6.14/7.26/8.38—34M*
7T	6.14/7.25/8.87—34M*

EATON 38 D-3

1U	4.11/4.86/5.61—38M*
2U	4.33/5.12/5.91—38M*
3U	4.56/5.39/6.21—38M*
4U	4.88/5.76/6.65—38M*
5U	5.57/6.59/7.60—38M*
6U	6.14/7.26/8.38—38M*
7U	6.50/7.68/8.87—38M*

EATON 38 DS

17	5.57—38M*
27	4.56—38M*
37	6.14—38M*
47	6.50—38M*
57	4.88—38M*

EATON 42 DP

Code	Ratio and Rating
13	7.60—44M*
23	8.38—44M*

EATON 38 DP

18	7.60—38M*
38	8.38—38M*
48	5.05—38M*
58	5.60—38M*
68	5.91—38M*
78	6.21—38M*
98	6.65—38M*

EATON 22M

1A	6.70—22M*
2A	7.79—22M*

EATON 1790—A—91A

81	4.33—18.5M*
82	4.56—18.5M*
83	4.88—18.5M*
84	5.57—18.5M*
86	6.14—18.5M*
87	6.50—18.5M*
88	7.17—18.5M*
89	7.67—18.5M*

EATON 17800-01

H1	4.33/5.91—18.5M*
H2	4.56/6.21—18.5M*
H3	4.88/6.65—18.5M*
H4	5.57/7.60—18.5M*
H6	6.14/8.38—18.5M*
H7	6.50/8.87—18.5M*
H8	7.17/9.77—18.5M*

EATON 1880-1

K1	4.88—22M*
K2	5.57—22M*
K3	6.50—22M*
K4	7.17—22M*
K5	6.14—22M*

EATON 18802-3

S1	4.88/6.65—22M*
S2	5.57/7.60—22M*
S3	6.50/8.87—22M*
S4	7.17/9.77—22M*
S5	4.33/5.91—22M*
S6	4.56/6.21—22M*
S7	6.14/8.38—22M*

EATON 1911

M1	4.11—23M*
M2	4.33—23M*
M3	4.88—23M*
M4	5.43—23M*
M5	6.17—23M*
M6	6.67—23M*

EATON 1919

N1	4.11—23M*
N2	4.33—23M*
N5	4.88—23M*
N6	5.43—23M*
N7	6.17—23M*
N8	6.67—23M*

EATON 19503

U2	4.33/5.89—23M*
U3	4.88/6.63—23M*
U4	5.43/7.39—23M*
U5	6.14/8.36—23M*
U6	6.71/9.13—23M*

EATON 19801

Code	Ratio and Rating
V2	4.33/5.89—23M*
V3	4.88/6.63—23M*
V4	5.43/7.39—23M*
V5	6.14/8.36—23M*
V6	6.67/9.08—23M*

EATON 9503

N3	5.89—23M*
N4	6.63—23M*

EATON 8802-3

J1	5.91—22M*
J2	6.65—22M*
J3	6.21—22M*

EATON 1919

NA	4.11—34M*
NB	4.33—34M*
NE	4.88—34M*
NF	5.43—34M*
NG	6.17—34M*
NH	6.67—34M*

EATON 19801

VB	4.33/5.89—34M*
VC	4.88/6.63—34M*
VD	5.43/7.39—34M*
VE	6.14/8.36—34M*
VF	6.71/9.13—34M*

EATON 19503

UB	4.33/5.89—34M*
UC	4.88/6.63—34M*
UD	5.43/7.39—34M*
UE	6.14/8.36—34M*
UF	6.14/8.36—34M*

EATON 30 DP

1D	7.75—32M*
2D	8.55—32M*
3D	6.43—32M*
4D	6.78—32M*

EATON 30 DS

1C	4.63—32M*
2C	4.88—32M*
3C	5.57—32M*
4C	6.14—32M*
5C	6.50—32M*
6C	7.17—32M*
7C	7.60—32M*

EATON 30 DTA

1L	4.63/6.43—32M*
2L	4.88/6.77—32M*
3L	5.57/7.75—32M*
5L	6.14/8.54—32M*
6L	6.50/9.04—32M*
7L	7.17/9.77—32M*

EATON 1350

D1	5.83/8.11—13M*

EATON 13802

F7	5.83/8.11—15M*
F8	6.33/8.81—15M*

EATON 1614-15

73	6.50—17M*
75	7.17—17M*

*M—Pounds Capacity in Thousands

REAR AXLE CODES— 500-1100 SERIES (Cont'd)

EATON 16802-3

Code	Ratio and Rating
G3	6.50/9.04—17M*

TIMKEN Q246P

L1	4.92—22M*
L2	5.63—22M*
L3	6.39—22M*
L4	7.27—22M*
L5	6.04—22M*

TIMKEN Q346-P

T1	4.92/6.76—22M*
T2	5.63/7.73—22M*
T3	6.39/8.78—22M*
T4	7.33/10.07—22M*
T5	6.00/8.24—22M*

TIMKEN RT-241P

P1	4.62—23M*
P2	4.99—23M*
P3	5.46—23M*
P4	6.10—23M*
P5	7.21—23M*

TIMKEN RT-341P

X1	4.68/5.88—23M*
X2	5.06/6.35—23M*
X3	5.34/6.71—23M*
X4	6.18/7.76—23M*
X5	7.01/8.80—23M*

TIMKEN R-202P

Q1	4.41—23M*
Q2	4.77—23M*
Q3	5.54—23M*
Q6	6.26—23M*
Q7	7.09—23M*

TIMKEN R-302P

Y1	4.41/5.64—23M*
Y2	4.89/6.23—23M*
Y3	5.54/7.09—23M*
Y4	6.42/8.38—23M*
Y5	7.09/9.07—23M*

TIMKEN U200

R1	6.38—29M*
R2	7.03—29M*
R3	7.79—29M*
R4	5.91—29M*

TIMKEN U300

Z1	6.42/8.38—29M*
Z2	7.09/9.07—29M*
Z3	5.54/7.09—29M*

TIMKEN SLDD

4G	7.67—34M*
5G	8.44—34M*

TIMKEN C-100

32	6.20—11M*
34	6.80—11M*

TIMKEN D-100

Code	Ratio and Rating
41	5.83—13M*
42	6.20—13M*
44	6.80—13M*

TIMKEN F-106

62	6.2—15M*
64	6.8—15M*
66	7.2—15M*

TIMKEN H-140

76	7.20—17M*

TIMKEN R-302P

YA	4.41/5.64—34M*
YB	4.89/6.23—34M*
YC	5.54/7.09—34M*
YD	6.42/8.38—34M*
YE	7.09/9.07—34M*

TIMKEN SRDD

14	7.54—44M*
24	8.31—44M*

TIMKEN SUDD

15	7.98—50M*
25	9.00—50M*

TIMKEN SFDD 4640

16	8.07—60M*
26	9.03—60M*
36	10.16—60M*

TIMKEN SLHD

1H	4.63—34M*
2H	5.29—34M*
3H	5.83—34M*
4H	6.83—34M*
5H	7.80—34M*
6H	8.60—34M*
7H	4.11—34M*
8H	4.44—34M*

TIMKEN SLHD (W/Lt. Wt. Susp.) (Aluminum)

AH	4.63—34M*
BH	5.29—34M*
CH	5.83—34M*
DH	6.83—34M*
EH	7.80—34M*
FH	8.60—34M*
GH	4.11—34M*
HH	4.44—34M*

TIMKEN SLHD (W/Lt. Wt. Susp.) (MALLEABLE)

AQ	4.63—34M*
BQ	5.29—34M*
CQ	5.83—34M*
DQ	6.83—34M*
EQ	7.80—34M*
FQ	8.60—34M*
GQ	4.11—34M*
HQ	4.44—34M*

TIMKEN SQHD

Code	Ratio and Rating
19	4.11—38M*
39	4.63—38M*
49	5.29—38M*
59	5.83—38M*
69	6.83—38M*
79	7.80—38M*
99	8.60—38M*
29	4.44—38M*

TIMKEN SQHD (W/Lt. Wt. Susp.) (MALLEABLE)

AR	4.11—38M*
BR	4.44—38M*
CR	4.63—38M*
DR	5.29—38M*
ER	5.83—38M*
FR	6.83—38M*
GR	7.80—38M*
HR	8.60—38M*

TIMKEN SQDD

11	7.54—38M*
21	8.31—38M*

TIMKEN R171-P

90	4.11—23M*
91	4.33—23M*
92	4.63—23M*
93	4.88—23M*
94	5.29—23M*
95	5.86—23M*
96	6.14—23M*
97	6.83—23M*

TIMKEN R-202P

QA	4.41—34M*
QB	4.77—34M*
QC	5.54—34M*
QF	6.26—34M*
QG	7.09—34M*

TIMKEN RT-341-P

XA	4.68/5.88—34M*
XB	5.06/6.35—34M*
XC	5.34/6.71—34M*
XD	6.18/7.76—34M*
XE	7.01/8.80—34M*

* M—Pounds Capacity in Thousands

FRONT AXLE CODES

Code	Capacity
A	5.5M*
B	5.5M*
C	6M*
D	7M*
E	9M*
F	11M*
G	12M*
H	15M*
I	18M*
L	6M*†
M	6M*† or 7M*†
N	9M*†

* Pounds Capacity in Thousands
† Heavy Duty Front Brakes

MAX. G.V.W. LBS.

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

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

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

D.S.O.

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 DSO space including the District Code Number.

DISTRICT CODES

Code	District
11	Boston
12	Buffalo
13	New York
14	Pittsburgh
15	Newark
21	Atlanta
22	Charlotte
23	Philadelphia
24	Jacksonville
25	Richmond
26	Washington
31	Buffalo
32	Cleveland
33	Detroit
34	Indianapolis
35	Lansing
36	Louisville
41	Chicago
42	Fargo
43	Rockford
44	Twin Cities

Code	District
45	Davenport
51	Denver
52	Des Moines
53	Kansas City
54	Omaha
55	St. Louis
61	Dallas
62	Houston
63	Memphis
64	New Orleans
65	Oklahoma City
71	Los Angeles
72	San Jose
73	Salt Lake City
74	Seattle
81	Ford of Canada
83	Government
84	Home Office Reserve
85	American Red Cross
89	Transportation Services
90-99	Export

BRAKES

GROUP 2

PART 2-1 GENERAL BRAKE SERVICE

Hydraulically operated service brakes are standard equipment on all 100 through 800 Series and on some 850 and 950 Series Ford trucks.

The standard hydraulic brake system on some trucks is assisted by a vacuum booster which may be installed as either standard or optional equipment. Other trucks use an optional compressed air booster (air-hydraulic unit) to provide a power assist to the hydraulic brakes. Service information on these two booster units is given in Parts 2-4 and 2-5.

The full air brake system, optional on some models and standard on most 850 through 1100 models, is covered in Part 2-7.

1 DIAGNOSIS AND TESTING

HYDRAULIC BRAKES

The trouble-diagnosis symptoms, causes, and corrections given under "Diagnosis Guide–Standard Hydraulic Brakes," apply to all truck hydraulic brakes including those with a vacuum booster or an air-hydraulic unit.

PRELIMINARY CHECKS

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.

Road test the truck and apply the brakes at a speed of about 20 mph to see if the truck stops evenly. If not, the brakes should be adjusted.

Perform the road test only when the brakes will apply and the truck can be safely stopped.

DIAGNOSIS GUIDE—STANDARD HYDRAULIC BRAKES

BRAKES DO NOT APPLY	If the brake pedal travels all the way down to the floor without noticeable brake action, check the brake fluid level in the master cylinder reservoir. Refill the reservoir if necessary. Check the entire hydraulic system for fluid leaks, and make the necessary adjustments. If the brake pedal feels spongy when pushed down, air has entered the hydraulic lines. Air can enter the lines if the fluid level in the master cylinder reservoir is too low, or if the brake wheel cylinder pistons are not held firmly in place when the brake	shoes are serviced. A defective check valve can cause a loss of residual pressure in the system causing air to enter at the wheel cylinder piston. Bleed the system to remove air from the lines, and adjust the brakes. Refill the master cylinder reservoir with heavy-duty brake fluid. If the brakes do not apply after making these checks and adjustments, fluid may be leaking past the piston cups in the master cylinder or brake wheel cylinder(s). If the trouble is in the master cylinder or brake wheel cylinder(s), remove and repair.
EXCESSIVE PEDAL TRAVEL	Check for air in the brake lines and bleed the system if necessary. Ad-	just or reline the brakes as needed.
UNEVEN NOISY, GRABBING, OR HARD OPERATING BRAKES	Remove the brake drums so that a complete inspection of the brake assemblies can be made to determine the cause of the trouble. Excessive dust and dirt in the brake lining rivet holes or in the brake drum can cause brake squeal. Remove the dirt with a scraper and an air hose. Drums which are out-of-round or loose at the hub; frozen master cylinder or brake cylinder piston(s); defective check valve; improper brake	shoe adjustment; warped or misaligned shoes; webs glazed or greasy linings; and incorrectly ground or wrong linings, are a few of the causes for uneven, noisy, pulling, grabbing, or hard brakes. Adjust or replace the parts as needed to eliminate the trouble. Lining glaze can be removed by rubbing the lining with medium-grade sandpaper until the lining has a dull finish. **Always adjust the brakes after correcting any of these brake troubles.**
BRAKES DO NOT RELEASE	Check for an improperly adjusted brake pedal, a restricted by-pass port in the master cylinder, or swollen master cylinder piston cups. Check for a defective check valve restricting fluid passing through the system. Check for sticking brake cylinder pistons caused by dirty or contaminated brake fluid. Adjust the brake pedal if necessary. If the adjustment does not correct the trouble, check the condition of the brake fluid. Replace dirty or contaminated fluid. **Clean the entire hy-**	**draulic system with clean denatured alcohol before adding new brake fluid.** If the trouble is in the master cylinder, remove and rebuild the cylinder. **If the truck must be moved when the brakes are locked, open a brake cylinder bleeder screw for a moment to let out a few drops of brake fluid. This operation will release the brakes but will not eliminate the cause of the trouble.**

PRELIMINARY TESTS—POWER BRAKES

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.

VACUUM TESTS

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 18-21 inches of vacuum. 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 inches or is unsteady, an engine tune-up is needed.

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

BOOSTER TEST—BENDIX PISTON TYPE

Disconnect the vacuum line from the booster end plate. Install a tee fitting in the end plate, and connect a vacuum gauge (No. 1) and the vacuum line to the fitting. Install a second vacuum gauge (No. 2) in place of the pipe plug in the booster control valve body.

Start the engine, and note the vacuum reading on both gauges. If both gauges do not register manifold vacuum, air is leaking into the vacuum system. If both gauges register manifold vacuum, stop the engine and note the rate of vacuum drop on both gauges. If the drop exceeds one inch in 15 seconds on either gauge, air is leaking into the vacuum system. Tighten all vacuum connections and repeat the test. If leakage still exists, the leak may be localized as follows:

1. Disconnect the vacuum line and gauge No. 1 from the booster.

2. Connect vacuum gauge No. 1 directly to the vacuum line. Start the engine and note the gauge reading. Stop the engine and check the rate of vacuum drop. If gauge No. 1 does not register manifold vacuum, or if the vacuum drop exceeds 1 inch in 15 seconds, the leak is in the vacuum line or check valve connections.

3. Reconnect vacuum gauge No. 1 and the vacuum line to the tee fitting. Start the engine, and run it at idle speed for one minute. Depress the brake pedal sufficiently to cause vacuum gauge No. 2 to read from zero to 1 inch of vacuum. Gauge No. 1 should register manifold vacuum of 18-20 inches. If the drop of vacuum on gauge No. 2 is slow, the air cleaner, or air cleaner line, may be plugged. Inspect and clean the air cleaner if necessary.

4. Release the brake pedal and observe the action of gauge No. 2 Upon releasing the pedal, the vacuum gauge must register increasing vacuum until manifold vacuum is reached. The rate of increase must be smooth, with no lag or slowness in the return to manifold vacuum. If the gauge readings are not as outlined, the booster is not operating properly and should be removed and overhauled.

BOOSTER TEST—MIDLAND DIAPHRAGM TYPE

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.

HYDRAULIC PRESSURE TEST

Connect a 2000-psi hydraulic pressure gauge to a bleeder screw opening at one of the brake cylinders. **Bleed the air from the hydraulic system at the point of attachment of the gauge.**

Remove the pipe plug from the rear of the booster body or the trailer brake control line port, and connect a vacuum gauge at this point. With the engine running, apply the brakes enough to obtain a zero reading on the vacuum gauge. Then, note the reading on the pressure gauge. The minimum hydraulic pressure for each type and size of vacuum booster is given in Part 2-8. **If the engine vacuum is higher or lower than 20 inches Hg, the vacuum booster hydraulic pressure will be proportionately higher or lower than the pressure given in Part 2-8.**

Hold the brakes in the fully-applied position for at least one minute, and note the reading on the pressure gauge. The hydraulic system should hold pressure for at least one minute without losing pressure. A low pressure reading or a drop in pressure, indicates leakage in the booster or in the hydraulic system.

DIAGNOSIS GUIDE—POWER BRAKES VACUUM BOOSTERS—FRAME MOUNTED

BRAKE PEDAL KICKS BACK WHEN APPLIED	This condition may be caused by a defective hydraulic piston check valve or slave cylinder piston cup.	Replace the slave cylinder piston and/or piston cup.
ROUGH ENGINE IDLE WITH BRAKES RELEASED	Check for vacuum leaks in the vacuum line, loose hose connections, a loose body clamp, or a weak control valve piston return spring. Check all connections and tighten them or replace damaged parts as	required. This condition may also be caused by vacuum leaks at the control valve diaphragm, at the valve piston assembly, or at the power diaphragm. Remove and overhaul the booster assembly.

CONTINUED ON NEXT PAGE

DIAGNOSIS GUIDE—POWER BRAKES VACUUM BOOSTERS—FRAME MOUNTED—(Cont'd)

ROUGH ENGINE IDLE OR STALL AND HARD PEDAL WITH BRAKES APPLIED	Check the condition of the air cleaner. If it is clogged with dirt, replace the air cleaner felt. A sticking control valve piston, leaks at the control valve diaphragm or atmospheric valve seal, dirt on the control	valve plate, or the control valve piston not seating properly on the plate may also cause this condition. In addition, the booster diaphragm may be damaged. Remove and overhaul the booster assembly.
INTERMITTENT HARD BRAKE PEDAL	Check for an obstructed air cleaner, a defective vacuum check valve, or a slave cylinder piston sticking in the bore due to dirt or inferior hy-	draulic fluid. Clean or replace damaged parts, refill the hydraulic system with new heavy-duty type brake fluid, and bleed the system.
HARD PEDAL—BOOSTER DIAPHRAGM RUPTURED	When a ruptured diaphragm is found, check for gasoline odor on the diaphragm. Gasoline will deteriorate the diaphragm and cause a premature failure.	Gasoline can get on the diaphragm from the intake manifold if the vacuum check valve is defective or if hoses are not routed correctly.
BRAKES DO NOT RELEASE	Check the rear of the vacuum chamber for damage. This condition may also be caused by a sticking control valve piston, a faulty slave cylinder piston check valve, dirty brake fluid, a sticking slave cylinder piston, a sticking push rod, or a faulty check valve in the end cap. Remove and overhaul the booster.	In case of emergency, if a sticking control valve piston holds the brakes in an applied position, disconnect the booster vacuum line from the vacuum check valve and install a pipe plug in the check valve opening. This permits the brakes to release. Manual application of brakes may then be made without assistance from the booster.

DIAGNOSIS GUIDE—POWER BRAKES VACUUM BOOSTER—MIDLAND DASH MOUNTED

BOOSTER INOPERATIVE HARD PEDAL	Check as follows to see if the power unit is operating: With the engine stopped, depress the brake pedal several times to eliminate all vacuum from the system. Apply the brakes, and while maintaining pressure on the pedal, start the engine. If the unit is operating, the brake pedal will move forward slightly when engine vacuum power is added to the foot pressure on the pedal. If the unit is not operating, there will be no pedal action. If this check shows that the unit is not operating, check for the following:	Brake pedal linkage sticking. Faulty vacuum check valve. Collapsed or leaking vacuum hose. Plugged vacuum fittings. Leaking vacuum chamber. Vacuum check valve stuck in closed position. Leak in bellows assembly. Diaphragm assembly out of place in housing locating radii: Vacuum leak in automatic transmission T.V. vacuum line connection or fitting. Vacuum leak in forward, vacuum housing.
BRAKES DRAG	Sticking valve plunger.	
BRAKES GRAB	Sticking actuating valve assembly.	
SELF APPLICATION OF BRAKES WHEN ENGINE STARTS	Leak in rear housing. Diaphragm out of locating radii in housings and allowing atmos-	pheric pressure into rear chamber. Sticking or unseated atmospheric valve.

CONTINUED ON NEXT PAGE

DIAGNOSIS GUIDE—POWER BRAKES VACUUM BOOSTER—BENDIX DASH MOUNTED

BOOSTER INOPERATIVE—HARD PEDAL	The trouble may be caused by vacuum leakage. Disconnect the vacuum line at the booster, remove the vacuum manifold and check valve assembly, and look for a sticking or faulty check valve. Check all vacuum connections for leakage or obstruction. Check all hoses for a leaking or collapsed condition. Repair or replace parts as necessary. If the foregoing procedure does not eliminate the trouble, remove the	booster from the car. Separate the front shell from the rear shell, and check the valve and rod assembly reaction disc, diaphragm plate, and diaphragm assembly for damage that would cause leaks. When assembling, be sure that the diaphragm assembly is properly positioned. Improper location could cause leakage between the vacuum and atmospheric sides of the diaphragm.
BRAKES DRAG OR GRAB	The condition is probably caused by a sticking valve plunger assembly. Remove and disassemble the booster.	Clean, inspect, and replace parts as necessary.
SELF APPLICATION OF BRAKES WHEN ENGINE STARTS	Remove and disassemble the booster. Check for a leak in the rear shell. Check the diaphragm for being out of locating radii in the housing. Check for a sticking or unseated	valve poppet. Clean, inspect, and replace parts as necessary. Be sure that the diaphragm is properly located when assembling.

AIR SUPPLY SYSTEM

The same air supply system is used with either the air booster brake system (Part 2-5) or the full air brake system (Part 2-7). In the air booster system, air pressure increases or "boosts" the hydraulic pressure applied to the shoes. In the full air system, air pressure is applied directly to the shoes through a diaphragm and mechanical linkage.

If either of these two brake systems is not operating properly, the air supply system should be checked first.

OPERATING TESTS

Before performing any of the following tests, operate the engine until the air pressure builds up to 90 psi. With the air brake system charged, open the drain cocks in each reservoir. Close the drain cocks after all moisture is drained from the reservoirs.

Low Pressure Indicator. Exhaust the brake system pressure and observe the pressure at which the warning buzzer sounds. The contacts in the indicator should close the circuit to the buzzer, when reservoir pressure is between 54 psi minimum and 66 psi maximum. If the buzzer does not start to sound within this pressure range during discharge, or if a sounding buzzer does not stop within this pressure range during the pressure build-up, the electrical connections are loose or the indicator valve is defective.

Reservoir Safety Valve. To determine if the safety valve is operative, pull the exposed end of the valve stem. If the safety valve does not "blow off" when the stem is pulled, the valve ball is probably stuck in its seat. In such a case, remove and disassemble the valve for cleaning.

Governor. With the engine running, build up air pressure in the system, and observe at what pressure reading on the dash gauge the pressure stops climbing. This is the point of governor cutout which should be between 100 and 105 pounds.

With the engine still running, slowly reduce the air pressure in the system by applying and releasing the brakes. Observe the pressure reading on the dash gauge at the point where the pressure starts to build up again. This is the point of governor cut-in which should be between 80 and 85 pounds.

If the governor does not cut the compressor in and out according to these specifications, adjust the governor pressure settings. Before adjusting the governor, check the accuracy of the dash gauge with a test gauge.

Check Pressure Build-Up. With the engine running at fast idle speed, observe the time required to raise system pressure from 50 to 90 pounds. If more than five minutes is required, perform the leak tests as outlined in the following paragraphs.

Also check for no unloading valve clearance, low engine idle speed, a slipping compressor drive belt, excessive carbon in the compressor cylinder head, or a worn out air compressor.

LEAK TESTS

Compressor. With the engine stopped, discharge valve leakage can be detected by carefully listening at the compressor for the sound of escaping air. With air pressure applied to the unloader cavity (with governor cut-out), remove the air filter or the air pick up tube on SD V-8 engines and check for air leaks by squirting oil around the unloader plunger and stem. If excessive air leaks are found, replace the unloader piston seal.

Governor. With the governor in the "cutout" position, test for leakage at the exhaust valve by applying soap suds to the exhaust vent in the body.

With the governor in the "cut-in" position, test for leakage of the inlet valve by applying soap suds to the exhaust vent in the body.

In either of the foregoing tests, leakage in excess of 1-inch soap bubble in three seconds indicates a defective governor.

Coat the entire governor with soap suds to detect diaphragm, gasket, and cap screw leakage. No leakage is permissible.

Reservoir Safety Valve. Coat the end of the safety valve with soap suds. Leaks causing not more than a 3-inch soap bubble in three seconds are permissible.

DIAGNOSIS GUIDE—AIR SUPPLY SYSTEM

AIR PRESSURE BELOW NORMAL	Defective air gauge. Compressor worn out. Compressor discharge valve leakage. Slipping compressor drive belt. Open reservoir drain cock. Excessive leakage at lines and fittings to reservoir tank.	Low engine speed. Excessive carbon in the compressor head or discharge line. Clogged compressor air strainer. Defective or improperly adjusted governor. Compressor inlet valves stuck closed.
AIR PRESSURE RISES ABOVE NORMAL	Defective or improperly adjusted governor. Compressor unloading valves stuck closed. Restriction in the passage between the governor and the compressor unloading mechanism. Defective air gauge.	Excessive clearance at the compressor unloading valves. Leak at compressor unloading piston seal. Carbon deposits in cavities beneath unloading piston and passages in the compressor cylinder head.
CONTINUOUS OR INTERMITTENT COMPRESSOR KNOCKS	Loose drive pulley. Worn or burned out compressor bearings.	Excessive carbon deposits in the compressor cylinder head.
SAFETY VALVE "BLOWS-OFF"	Governor "cut-out" setting adjusted too high.	Above normal system pressure. Defective or improperly adjusted safety valve.
EXCESSIVE OIL OR WATER IN THE BRAKE SYSTEM	Failure to drain the reservoirs at regular intervals.	Worn compressor piston rings. Dirty compressor air filter.

AIR-HYDRAULIC BRAKES

The trouble diagnosis procedures given here apply only to the booster unit and the applicable air system components.

First make the trouble diagnosis checks outlined under "Hydraulic Brakes" and "Air Supply System." Then perform the tests outlined in the following paragraphs.

OPERATING TESTS

Air Discharge Test. With the air pressure at 90 psi, depress the brake pedal several times and listen for air discharge as the pedal is released. Rapid release of air pressure indicates that the booster unit is operating. If no air discharge is heard, the booster control valve is defective or the connecting lines are restricted.

Air Leak Test. Operate the engine until the air pressure builds up to 90 psi. Stop the engine and watch the pressure gauge. If the air pressure drops more than 5 pounds in 15 seconds, check for internal leaks in the system, particularly at hose or pipe connections, a defective valve or piston in the booster, a defective air gauge (registering incorrectly), or leaking governor or compressor discharge valves.

Hydraulic Pressure Test. Connect a hydraulic pressure gauge (capable of reading at least 1200 psi pressure) to a bleeder screw opening at one of the brake cylinders.

Remove the lubrication pipe plug from the rear of the booster body assembly and connect an air pressure test gauge at this point. Apply the brakes until approximately 60 psi is registered on the air gauge. Note the reading on the hydraulic pressure gauge. Hydraulic pressure should be 950 to 1100 psi when air pressure is at 60 psi. If air pressure is higher or lower than 60 psi, hydraulic pressure will be proportionately higher or lower than 950 to 1100 psi.

Hold the brakes in the fully applied position for at least one minute. Note the reading on the hydraulic pressure gauge. A low pressure reading, or a drop in pressure indicates leakage in the booster unit or in the other hydraulic system components.

Booster Test. With the air pressure at 90 psi, depress the brake pedal. Measure and record the distance from the pedal to the floor.

Release the pedal and bleed all the air from the system. Depress the pedal, and again measure the distance from the pedal to the floor. The second measurement should be approximately ½ inch more than the dimension obtained with the booster system operating under air pressure. If there is no noticeable difference in the measurements, the booster is defective.

DIAGNOSIS GUIDE—AIR-HYDRAULIC BRAKES

INSUFFICIENT BRAKING	Binding control valve piston due to swollen piston seals.	Defective hydraulic cylinder piston.
BRAKES APPLY TOO SLOWLY	Brake shoes improperly adjusted. Low system air pressure. Control valve delivery pressure too low.	Excessive air leakage when brakes are applied. Restricted brake lines or hoses.
BRAKES RELEASE TOO SLOWLY	Weak control valve piston return spring. Restricted control valve exhaust port.	Hydraulic piston binding in the cylinder.
BRAKES DO NOT APPLY	Restricted or broken lines or hoses. Clogged or damaged control valve.	Dented or damaged booster body.
BRAKES DO NOT RELEASE	Defective control valve piston. Defective hydraulic piston. Clogged master cylinder vent.	Broken booster piston return spring.
BRAKES GRAB	Intermittent bind in the control valve piston.	

AIR BRAKES

Some of the air brake system components vary slightly from one truck model to another in design or location. However, all components are essentially the same in principle and service procedure.

First make the trouble diagnosis checks outlined under "Air Supply System," and then perform the tests outlined in the following paragraphs.

OPERATING TESTS

Check Stop Light Switch. With all air pressure exhausted from the air brake system, start the engine and move the brake valve to the applied position. Stop lights should light before the dash gauge registers 10 psi pressure. Release the brakes.

Quick Release Valve and Relay Valve. With the air brake system fully charged, apply the brakes. Inspect the brake action on the wheels controlled by the quick release valve or relay valve in question. The brakes should apply promptly. Release the brakes and inspect to be sure that the air pressure is exhausted rapidly from the exhaust port. Be sure the exhaust port is not restricted.

LEAK TESTS

With the engine stopped and the brakes fully **applied,** watch the rate of drop in air pressure as registered by the dash gauge. If the pressure drops faster than 3 pounds per minute, check the items outlined in the following paragraphs.

Brake Valve. With the pedal fully released, coat the exhaust port with soap suds to check for leaks. With the pedal fully applied, coat the exhaust port with soap suds and check for leaks. Leaks causing not more than a three inch soap bubble in three seconds are permissible.

Brake Chambers. With the brakes fully applied, coat the clamp ring and bolt flanges holding the diaphragm in place with soap suds. No leaks are permissible.

Quick Release Valve. With brakes applied, coat the exhaust port with soap suds to detect leakage. Leakage in excess of a 3-inch soap bubble in three seconds is not permissible.

Relay Valve. With the brakes **released,** coat the exhaust port with soap suds and observe the leakage.

With the brakes fully **applied,** coat the exhaust port with soap suds and observe the leakage.

Leakage in either of the foregoing tests should not exceed a 3 inch soap bubble in three seconds.

DIAGNOSIS GUIDE—AIR BRAKES

INSUFFICIENT BRAKING ACTION	Low reservoir pressure. Brakes need lubrication, adjustment, or relining. Foot control valve delivery pressure too low due to a malfunction in the valve or incorrect adjustment of the treadle linkage.	
SLOW BRAKE ACTION	**SLOW APPLICATION** Lack of lubrication at brake shoe camshafts. Low reservoir pressure. Excessive leakage during brake application. Restricted or damaged pipes or hoses. Defective foot control valve and treadle linkage.	**SLOW RELEASE** Restricted port, weak return spring, or other defect in foot control valve. Brakes require lubrication or adjustment. Restricted or damaged pipes or hoses. Defective or restricted quick release valve or relay valve. Broken retraction springs or binding hold pins.

CONTINUED ON NEXT PAGE

DIAGNOSIS GUIDE—AIR BRAKES (Continued)

BRAKES INOPERATIVE	**BRAKES DO NOT RELEASE** Restricted brake lines. Weak return spring or other defect in foot control valve. Broken brake shoe retracting springs or rusted front anchor pins.	**BRAKES DO NOT APPLY** Low reservoir pressure. Restricted or broken pipes or hoses. Defective foot control valve.
UNEVEN OR GRABBING BRAKES	Grease on brake linings. Out-of-round brake drums. Bind in brake shoe mountings. Defective foot control valve. Wet brakes.	Brakes need adjustment, lubrication, or relining. Leaking brake chambers. Broken brake chamber piston return spring.
QUICK AIR PRESSURE DROP WITH ENGINE STOPPED	**BRAKES RELEASED** Excessive leakage at foot control valve, governor, compressor discharge valve, or at other points in the system.	**BRAKES APPLIED** Excessive leakage in brake chambers, brake chamber diaphragms, tube and hose connections, or foot control valve.

2 COMMON ADJUSTMENTS AND REPAIRS

BRAKE PEDAL ADJUSTMENT

When the brake pedal free-travel, which is the movement of the brake pedal before the push rod touches the master cylinder piston, is less than 3/16 inch or more than 3/8 inch (Fig. 1), the pedal should be adjusted.

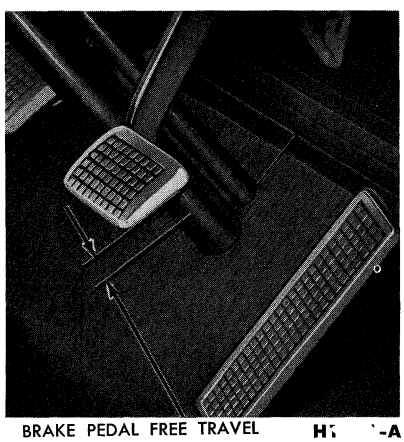


FIG. 1—Pedal Free Travel Check

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.

BRAKE DRUM REPAIR 250 THROUGH 1100 SERIES EXCEPT 4-WHEEL DRIVE-FRONT

The service procedures covered here apply to both hydraulic and air brakes. Since the F- and P-100 (front and rear) and the 4-wheel drive front brake drum procedures apply to hydraulic brakes only, they are covered in Section 3 of Part 2-2.

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. 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 retaining nuts. Remove the wheel or rim and tire from the hub and drum.

5. Remove the brake drum retainers and retaining bolts, screws, or bolts and nuts.

6. Remove the brake drum from the hub.

7. Check the drum for defects 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.

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. 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 (cast type only), and the wheel stud nuts.

12. With 4,000 through 7,000 lb front axles, torque the adjusting nut to specifications while rotating the wheel. Back off the adjusting nut at least one, but not more than two

castellations (about ⅛ to ¼ turn). Lock the adjusting nut in this position with a new cotter pin.

With 9,000 lb., 11,000 or 15,000 lb. axles, torque the adjusting nut to specifications while rotating the wheel. Back off the nut ¼ to ⅓ turn, and install the locking ring. **Do not exceed the ¼ to ⅓ turn if the adjusting nut must be moved to align the nut pin with a hole in the locking ring.**

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 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, lockwasher, 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 defects 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.

8. Position the brake drum to the hub and install the retaining 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 lockwasher and locknut.

11. Install a new rear axle oil seal, axle shaft and gasket, stud adapters, and retaining nuts.

12. Install the wheel and tire as an assembly.

13. Adjust the brake shoes and then remove the stand and lower the truck.

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. The refinished diameter should not be more than 0.060 inch oversize for steel backed drums and 0.090 for cast iron drums. For original brake drum sizes, see Part 2-8.

If the diameter of the drum is less than 0.030 inch oversize after refinishing, install standard linings on the brake assemblies. If the diameter is over 0.030 inch, install oversize or shimmed linings.

BRAKE SHOE RELINING

1. Remove the rivets and remove the old lining.

2. Clean the shoe thoroughly with cleaning fluid, especially the rim surface. Wipe the shoe dry and remove all burrs or rough spots from the shoe.

3. Check the inside diameter of the brake drum. If the diameter is less than 0.030 inch oversize, install standard linings. If the diameter is 0.030-0.060 inch oversize, install oversize or shimmed linings.

4. Position the new lining on the shoe and install new rivets, beginning with the rivet holes near the center of the shoe. On some trucks, 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 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.

3 CLEANING AND INSPECTION

BRAKE CYLINDER

1. Clean all brake cylinder parts in clean denatured 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 denatured alcohol.

MASTER CYLINDER

1. Clean all master cylinder parts in clean denatured 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. 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 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 denatured alcohol.

BRAKE DRUMS AND LININGS

1. After removing one front wheel and drum from the truck, inspect the drum and brake shoe linings for wear or damage that would affect brake operation. **Do not let oil or grease touch the drum or linings.**

2. A brake shoe should be relined when the lining face is worn to with-

in 1/32 inch of any rivet head, or when the lining has been soaked with 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 other three wheels will usually be about the same as that found at the wheel that was removed.**

5. Add enough heavy-duty brake fluid to the master cylinder reservoir to bring the level to within ½ 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.

BRAKE BOOSTER

1. After disassembly, immerse all metal parts in a suitable solvent. Use only alcohol on rubber parts or parts containing rubber. After the parts have been thoroughly cleaned and rinsed in cleaning solvent, the metal parts which come in contact with hydraulic brake fluid should be rewashed in clean alcohol before assembly. Use an air hose to blow dirt and cleaning fluid from the recesses and internal passages. When overhauling a power booster, use all parts furnished in the repair kit. **Discard all old rubber parts.**

2. Inspect all other parts for damage or excessive wear. Replace damaged or excessively worn parts. If the inside of the booster body is rusted or corroded, polish it with steel wool or fine emery cloth. Replace the body shell when scored. Inspect the master cylinder bore for signs of scoring, rust, pitting or etching. Any of these conditions will require replacement of the cylinder.

AIR BRAKE AND CAMSHAFT

1. Inspect the camshaft bushings and replace if worn or damaged.

2. Check the anchor pins and shoe-to-cam rollers for wear or damage, and replace, if required.

3. Check thickness of the brake lining at the center of the shoe, and replace, if necessary.

4. Clean, inspect, and replace worn or damaged parts. Coat the anchor pins and cam lobes with Lubriplate before installing the shoes.

PART 2-2 HYDRAULIC BRAKES

1 DESCRIPTION AND OPERATION

Hydraulically operated service brakes (Fig. 1) are standard equipment on all 100 through 800 Series and on some 850 and 950 Series Ford trucks.

The standard hydraulic brake sys-

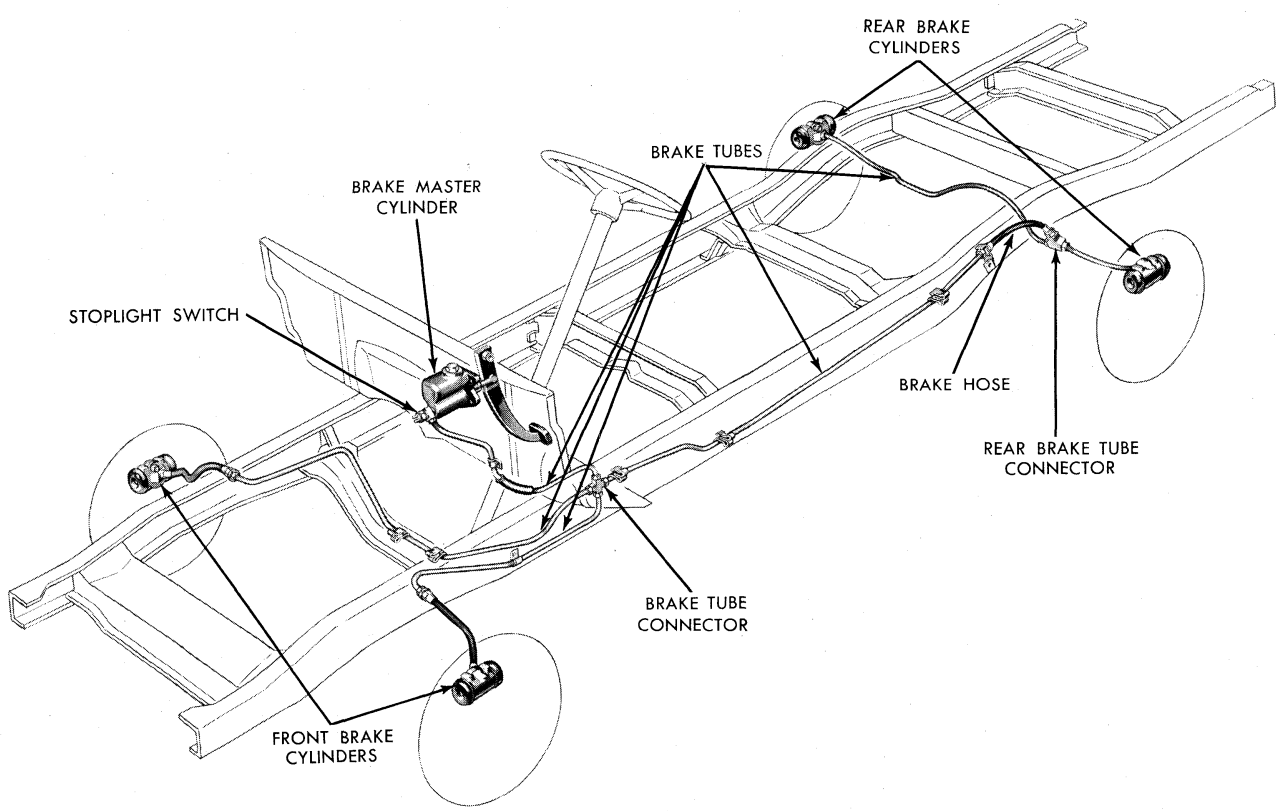


FIG. 1—Typical Hydraulic Brake System

tem on some trucks is assisted by a vacuum booster which may be installed as either standard or optional equipment. Other trucks use an optional compressed air booster (air-hydraulic unit) to provide a power assist to the hydraulic brakes.

The master cylinder converts physical force from the brake pedal and booster into hydraulic pressure against the pistons in the wheel cylinders. The wheel cylinder pistons in turn convert hydraulic pressure back into physical force at the brake shoes.

All Ford truck brakes have internal expanding shoes. The different types of brake assembly 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 uni-servo, single anchor brake, the wheel cylinder has only one piston which exerts force against the upper end of the primary shoe (Fig. 12). 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 (Fig. 2).

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 (Fig. 5).

The front wheels of some trucks are equipped with two cylinders, each having one piston (Fig. 13). 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 trucks are equipped with two cylinders, each having two pistons (four pistons total). Each of the four pistons exerts force against one end of one shoe (Figs. 14 and 15).

SELF ADJUSTING BRAKES

Single anchor duo servo type brake assemblies equipped with a self adjusting mechanism are used front and rear on F- and P-100 trucks.

The self-adjusting brake mechanism consists of a cable, cable guide, adjusting lever, and adjuster spring (Fig. 2). The cable is hooked over the anchor pin at the top and is connected to the lever at the bottom. The cable is connected to the secondary brake shoe by means of the cable guide. The adjuster spring is hooked to the primary brake shoe and to the lever.

The automatic adjuster operates only while the truck is moving rearward and the brake pedal pressure is firmly applied.

With the truck moving rearward and the brakes applied, the "wrap-around" action of the shoes following the drum forces the upper end of the primary shoe against the anchor pin. The action of the wheel cylinder moves the upper end of the secondary shoe away from the anchor pin. The movement of the secondary shoe causes the cable to pull the adjusting lever upward and against the end of a tooth on the adjusting screw star-wheel. The upward travel of the lever increases as lining wear increases. When the lever can move upward far enough it passes over the end of the tooth and engages the tooth. When the brakes are released, the adjuster spring pulls the lever downward causing the star-wheel to turn and expand the shoes. The star-wheel is turned 1 tooth at a time as the linings progressively wear.

With the truck moving forward and the brakes applied, the secondary shoe is against the anchor pin and the primary shoe is moved toward the drum. Therefore, the adjuster does not operate.

The rear brake assembly is basically the same as the front brake. The conventional parking brake lever, link, and spring are used in the rear brake.

The anchor pins on F- and P-100 brakes are fixed and non-adjustable.

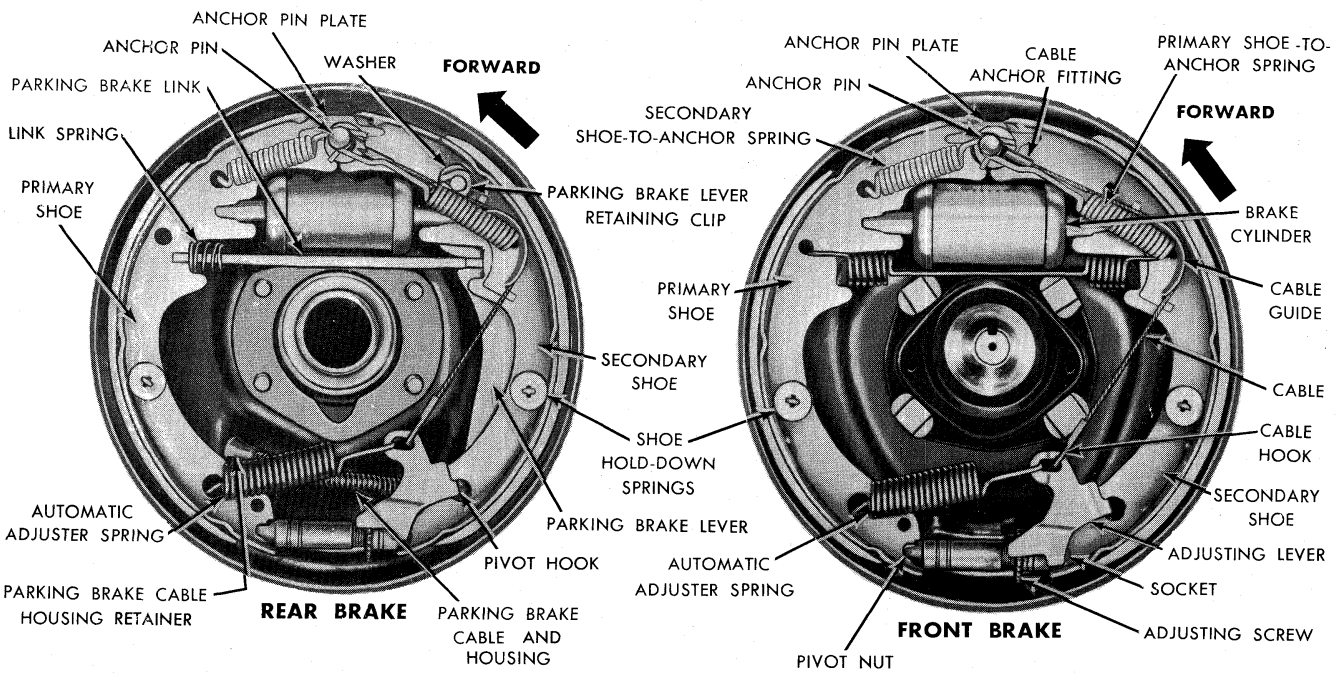


FIG. 2—Self Adjusting Brake Assemblies

2 IN-TRUCK ADJUSTMENTS AND REPAIRS

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

A major brake adjustment includes the adjustment of the brake shoe anchor pins, as well as the brake shoes. Adjustment of the anchor pin permits the centering of the brake shoes in the drum.

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

SELF ADJUSTING BRAKES

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

1. After the shoes have been installed or the adjusting screw has been turned, install the drum. Be sure that all excess grease, oil and other foreign material are wiped off the carrier plate and drum.

Before installing the brake drum on the front wheel spindle, wipe the spindle completely free of grease. Install the drum carefully so that the grease seal retainers within the hub will not be damaged.

2. Remove the adjusting hole cover from the carrier plate and, from the carrier plate side, turn the adjusting screw upward to expand the shoe. Expand the shoes until a slight drag is felt when the drum is rotated.

3. Remove the drum. Mark the tooth on the star wheel where the lever contacts the adjusting screw. While holding the adjusting lever out of engagement with the adjusting screw, back off the adjusting screw ¾ of a turn with the fingers. If finger movement will not turn the screw, free it up; otherwise, the self-adjusting lever will not turn the screw. Lubricate the screw with a thin uniform coating of high temperature grease.

Any other adjustment procedure may cause damage to the adjusting screw with consequent self adjuster problems.

4. Apply a small quantity of high-temperature grease to the points where the shoes contact the carrier plate, being careful not to get the lubricant on the linings. Install the drum.

On a front wheel, install the wheel outer bearing, washer, and adjusting nut, then adjust the wheel bearings as outlined in Part 3-4, Section 2.

On rear wheels, install the three Tinnerman nuts and tighten securely.

5. Install the wheel on the drum and tighten the mounting nuts to specification.

6. Install the adjusting hole cover on the brake carrier plate.

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

8. After the brake shoes have been properly adjusted, check the operation of the brakes.

SINGLE ANCHOR BRAKE

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

1. Raise the truck 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 (Fig. 3).

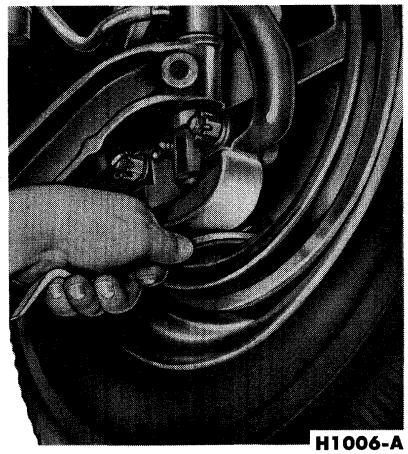


FIG. 3—Single Anchor Brake Shoe Adjustment

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. 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 carrier 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 truck. Road test the truck and check the operation of the brakes. **Perform the road test only when the brakes will apply and the truck can be safely stopped.**

Major Adjustment. A major brake adjustment should be made when dragging brakes are not corrected by a minor adjustment, when brake shoes are relined or replaced, or when brake drums are machined.

1. Raise the truck until the wheel clears the floor.

2. Rotate the drum until the feeler slot is opposite the lower end of the secondary (rear) brake shoe.

3. Insert a 0.010-inch feeler gauge through the slot in the drum. Move the feeler up along the secondary shoe until it is wedged between the secondary shoe and the drum.

4. Turn the adjusting screw (star wheel) to expand the brake shoes until a heavy drag is felt against the drum. Back off the adjusting screw just enough to establish a clearance of 0.010 inch, between the shoe and the drum at a point 1½ inches from each end of the secondary shoe. This adjustment will provide correct operating clearance for both the primary and secondary shoes. If the 0.010-inch clearance cannot be obtained at both ends of the secondary shoe, the anchor pin must be adjusted.

5. To adjust the anchor pin set-

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 a right or left hand brake assembly (Fig. 10).

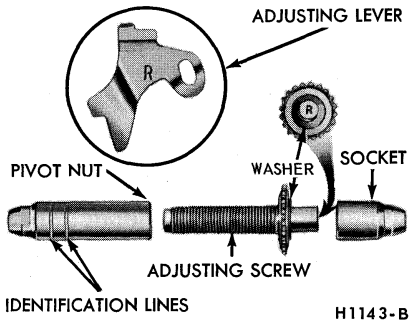


FIG. 10—Adjusting Screw and Lever Identification

11. 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.

12. Pull the adjuster lever, cable and automatic adjuster spring down and toward the rear to engage the pivot hook in the large hole in the secondary shoe web (Fig. 2).

13. 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, 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 ot 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:

a. 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.

b. Check the cable length. The cable should measure 11¼ inches (plus or minus 1/64 inch) from the far edge of the cable anchor hole to the inside edge of the cable hook.

c. 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.

d. Check the pivot hook on the lever. The hook surfaces should be square with the body of the lever for proper pivoting. Repair the hook or replace the lever if the hook shows damage.

e. See that the adjusting screw socket is properly seated in the notch in the shoe web.

SINGLE ANCHOR BRAKE SHOE REMOVAL

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.**

On a truck equipped with a vacuum or air booster, be sure the engine is stopped and there is no vacuum or air pressure in the system before disconnecting the hydraulic lines.

2. Clamp the brake cylinder boots against the ends of the cylinder, and remove the brake shoe retracting springs from both shoes (Fig. 11).

3. Remove the anchor pin plate (Fig. 12).

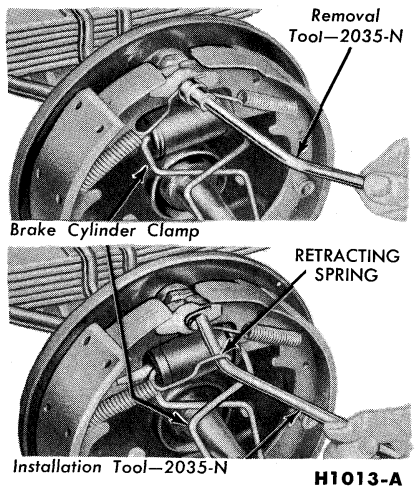


FIG. 11—Spring Replacement

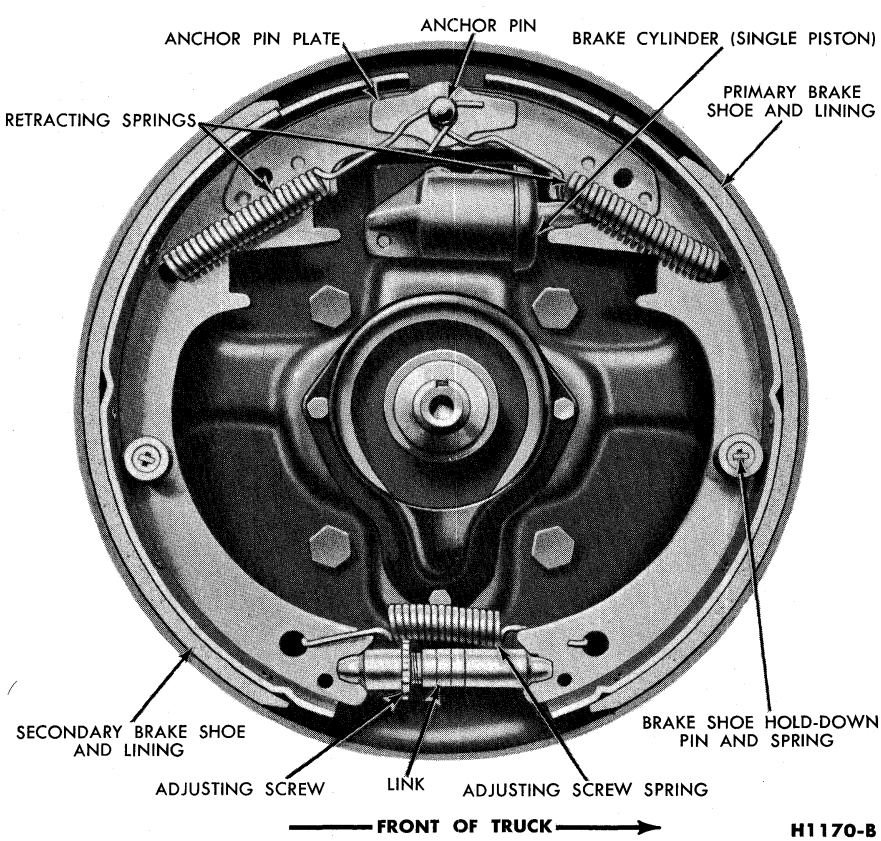


FIG. 12—Single Anchor Brake Assembly

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.** If the shoes on a rear brake assembly are being removed, remove the parking brake lever, link, and spring with the shoes. Unhook the parking brake cable from the lever as the shoes are being removed.

5. Remove the hold-down spring pins from the carrier plate.

6. Remove the adjusting screw parts from the brake shoes. If the shoes are from a rear brake assembly, remove the parking brake lever from the secondary shoe.

INSTALLATION

1. Coat all points of contact between the brake shoes and the other brake assembly parts with Lubriplate or a 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. When assembling a rear brake, connect the parking brake lever to the secondary shoe, and install the link and spring with the shoes. Be sure to hook the parking brake cable to the lever.

4. Install the anchor pin plate on the pin.

5. Install the brake shoe retracting springs on both shoes (Fig. 11), 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 boots.

7. Install the wheel and drum.

8. Bleed the system and adjust the brakes. Check the brake pedal operation after bleeding the system. Then lower the truck.

TWO-CYLINDER BRAKE SHOE —FRONT

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. **Mark the hub and drum to aid assembly in the same position.**

On a truck equipped with a vacuum or air booster, be sure the engine is stopped and there is no vacuum or air pressure in the system before disconnecting the hydraulic lines.

2. Remove both brake shoe return springs (Fig. 13) using brake spring pliers.

3. Remove the C-washer and the flat washer from the adjusting cam and hold-down stud. Lift the shoes off the carrier plate.

INSTALLATION

1. Install the anti-rattle spring washer on each cam and shoe guide stud, with the pronged side facing the adjusting cam.

2. Place a shoe assembly on the carrier plate with the cam and shoe guide stud inserted through the hole in the shoe web. Locate the shoe toe in the wheel cylinder piston shoe guide and position shoe heel in the slot in the anchor block.

3. Install the flat washer and the C-washer on the cam and shoe guide stud. Crimp the ends of the C-washer together.

4. After installing both shoes, install the brake shoe return springs (Fig. 13). To install each spring, place

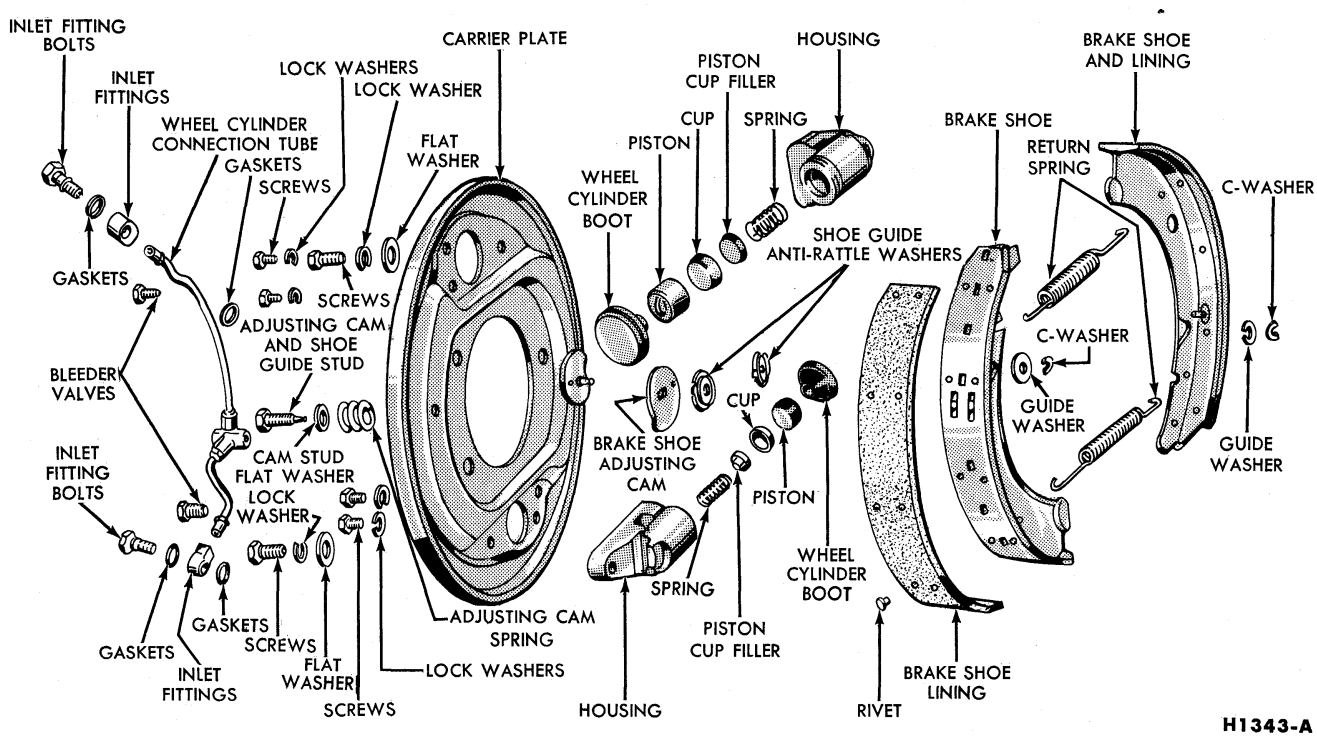


FIG. 13—Two-Cylinder Brake—Front

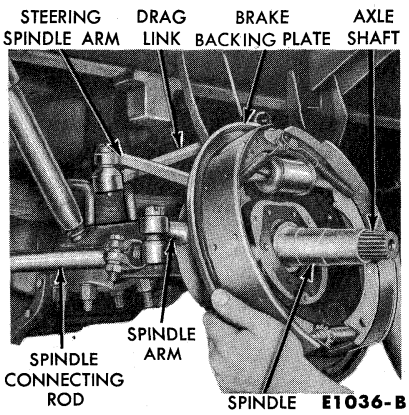


FIG. 18—Brake Carrier Plate Removal or Installation

5. Remove the cap screws which retain the brake carrier plate and spindle to the spindle arm. Remove the brake carrier plate and spindle (Fig. 18).

INSTALLATION

1. Position the spindle and the brake carrier plate on the steering arm, and then install the retaining cap screws (Fig. 18). Install the oil baffle.

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 bearing adjusting nut to bring the bearing rollers into proper contact. After the bearings are firmly seated, back off the adjusting nut ⅛ turn (45°). Place the bearing adjusting lock washer on the spindle. Make sure the locking dowel on the adjusting nut enters the lock washer hole which most closely aligns with the dowel. Install the lock nut and torque to 40 ft-lbs. (Fig. 17).

4. Install the driving hub and snap ring. Install the grease cap.

5. Fill the spindle arm with the proper grade and amount of lubricant.

BRAKE CARRIER PLATE—250 THROUGH 950 SERIES TRUCKS EXCEPT 4-WHEEL DRIVE—FRONT

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.

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.

3. Remove the brake shoes and adjusting screw from the carrier 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 carrier plate retaining bolts and nuts, then remove the carrier plate from the front wheel spindle or rear axle housing.

5. Remove the retaining bolts and lock washers, and the brake cylinder from the carrier plate.

INSTALLATION

1. Assemble the brake cylinder to the carrier plate with the retaining bolts and lock washers.

2. Mount the carrier plate to the front wheel spindle or to the rear axle housing flange, and secure with the retaining bolts and nuts.

3. Install the brake shoes and adjusting screw to the carrier 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 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 Part 3-5.

Install a rear wheel hub and drum assembly on the rear axle housing. 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 retaining nuts, then torque to specifications.

5. Install the wheel and tire.

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

MASTER CYLINDER—B-, F-, N-, AND T-SERIES TRUCKS

REMOVAL

If the truck 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. If the stoplight switch is mounted on the master cylinder, 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 truck 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 trucks 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 truck 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 trucks 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 heavy-duty brake fluid to within ½ 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 trucks equipped with dash-mounted booster, the cylinder can be bled at the bleed screw on the cylinder.

On a truck 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 heavy-duty brake fluid to within ½ 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. If the stoplight switch is mounted on the master cylinder, 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.

MASTER CYLINDER—P-SERIES TRUCKS

REMOVAL

1. If the truck 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.

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 truck.

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. On a truck equipped with a vacuum booster, connect the push rod and insert the clevis pin at the lower holes of the pedal extension. 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 heavy-duty brake fluid to the specified level.

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 heavy-duty brake fluid to the specified level, 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.

MASTER CYLINDER—C-SERIES TRUCK

REMOVAL

If the truck 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 2 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 specificatons.

2. Connect the brake line to the master cylinder fitting, but leave the brake line fitting loose.

3. Fill the master cylinder reservoir with heavy-duty brake fluid to within ½ 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 truck 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 heavy-duty brake fluid to within ½ 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 7 retaining screws, and place the floor mat in its proper position.

7. Check and, if necessary, adjust the brake pedal free-travel.

BRAKE PEDAL—B-, F-, N-, OR T-SERIES AND P-100 TRUCK

REMOVAL

1. Remove the brake pedal retracting spring (Fig. 19).

2. Remove the brake master cyl-

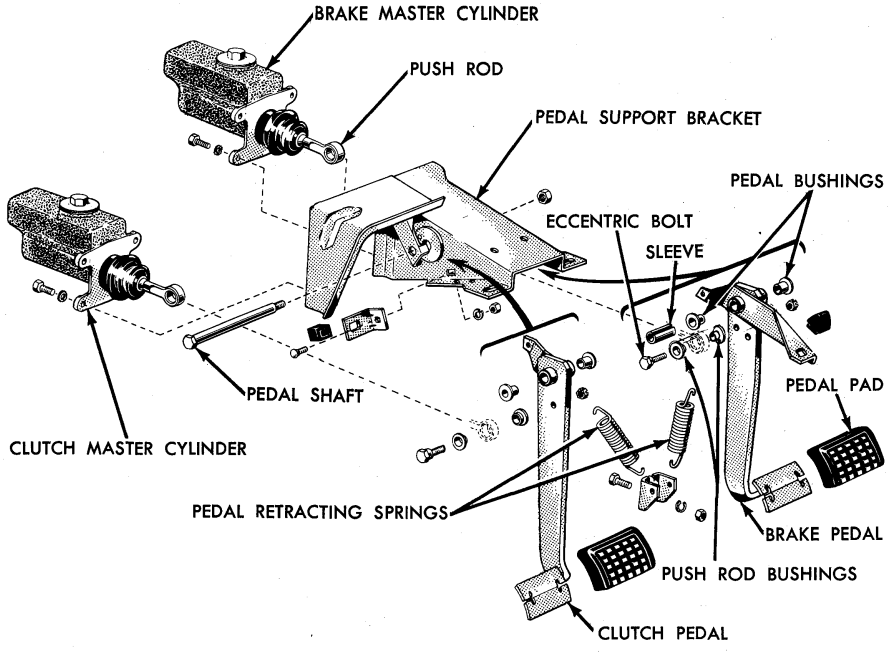


FIG. 19—B-, F-, N-, or T-Series and P-100 Brake Pedal and Related Parts

inder push rod eccentric bolt nut, and remove the bolt and 2 nylon bushings.

3. Remove the nut from the pedal shaft. Then slide the shaft to the left and remove the brake pedal and sleeve.

4. Remove the 2 bushings from the pedal, and remove the bumper from the pedal extension bracket.

INSTALLATION

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

2. Install the bumper on the pedal extension bracket, and position the nylon bushings in the brake pedal shaft bore.

3. 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.

4. 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.

5. Adjust the brake pedal free travel to 9/16-5/8 inch (Fig. 1, Part 2-1). Torque the eccentric bolt nut to specifications.

BRAKE PEDAL—P-SERIES TRUCKS EXCEPT P-100

REMOVAL

1. Open the hood 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.

2. Remove the pedal pads from the clutch and brake pedal (Fig. 20).

3. 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.

4. Remove the eight floor plate retaining screws. Pull the accelerator pedal from the accelerator linkage and remove the floor plate.

5. Disconnect the clutch and brake pedal retracting springs.

6. Loosen the pedal support bracket clamp bolt. Remove the cotter pins and clevis pins from the clutch and brake pedals.

7. 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 truck. 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

1. 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.

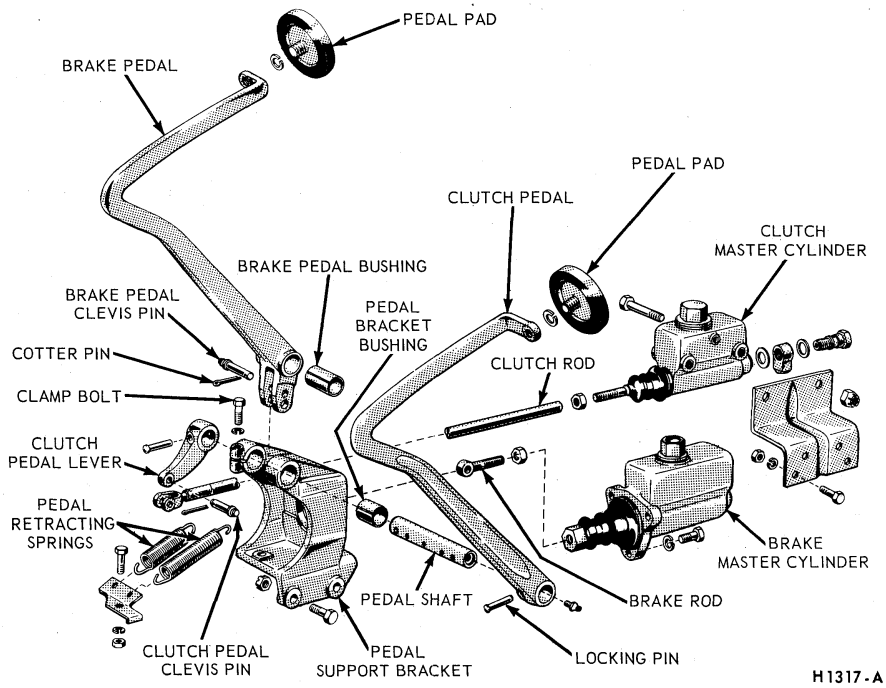


FIG. 20—P-Series Brake Pedal and Related Parts Except P-100

PART 2-3 PARKING BRAKES

1 DESCRIPTION AND OPERATION

CABLE ACTUATED REAR WHEEL PARKING BRAKE

On a F-100, F-250, or P-350 Series truck with a 3-speed light or medium-duty transmission, a cable actuated parking brake assembly is contained in each rear wheel brake assembly (Fig. 1).

On the F-100 and F-250 Series, the manually operated parking brake lever cable is routed to the equalizer lever (Fig. 5), which through the equalizer assembly and brake cables connects to the parking brake lever assembly in each rear wheel.

On the P-350 Series, the operating procedure is the same except that the equalizer lever is not used. The lever cable is routed directly to the equalizer assembly.

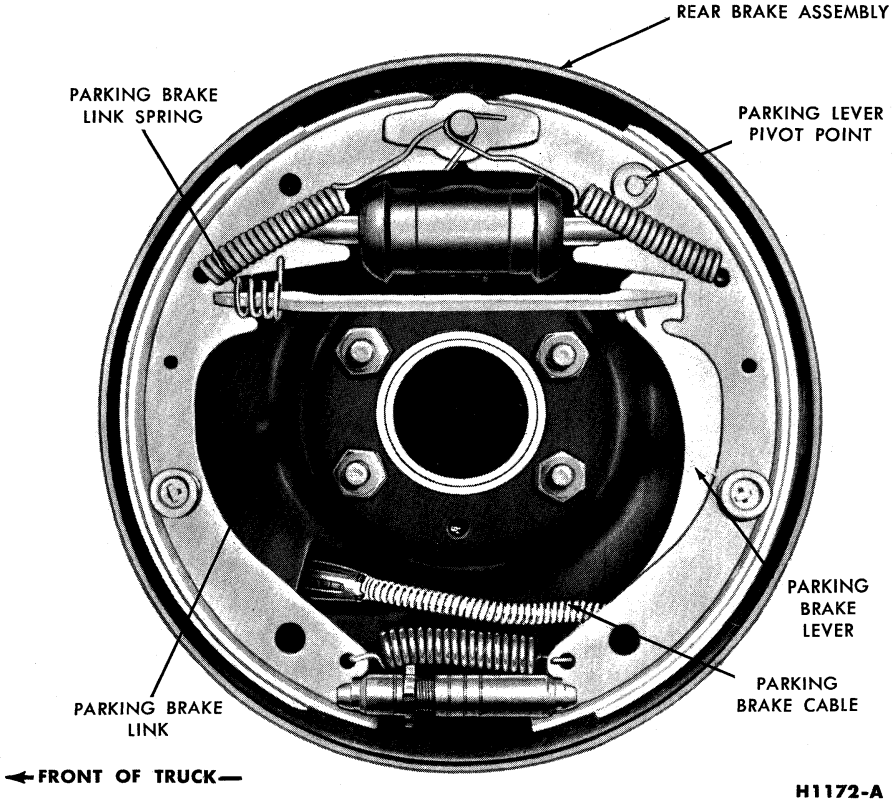


FIG. 1—Parking Brake Assembly

EXTERNAL CONTRACTING BAND TYPE PARKING BRAKE

The band type parking brake consists of a brake drum bolted to the transmission main shaft companion flange, and an external contracting type band mounted on the rear of the transmission (Fig. 6).

INTERNAL EXPANDING SHOE TYPE PARKING BRAKE

The internal shoe-type parking brake, mounted on the transmission includes a brake drum attached to the drive shaft (or coupling shaft), two brake shoes, an actuating cam mechanism, and rod-type linkage connected to a parking brake lever. The brake with the 9-inch drum is used on 500 through 700 Series trucks (Fig. 7). The 12-inch drum is used on 700 through 1100 Series trucks (Fig. 7).

system pressure to enter the Fail-Safe pressure chamber. System pressure, in the Fail-Safe or safety chamber, bears against the Fail-Safe piston holding the actuating spring in its compressed position (Fig. 4). The center connection allows metered pressure from the service brake control valve to enter the diaphragm chamber for normal brake operation.

SAFETY OPERATION

In case of pressure loss, the actuating spring will release and force the Fail-Safe piston against the diaphragm and the plate and push rod to apply the brakes mechanically (Fig. 4).

If air pressure cannot be restored immediately, it will be necessary to compress the actuating spring manually in order to move the truck. Loosen the lock clip retaining screw and disengage the lock clip from the release bolt (Fig. 8). To compress the spring, turn the release bolt clockwise until it bottoms (approximately 18 turns).

Be sure to release the spring as soon as normal air pressure is restored. To release the spring, turn the release bolt counterclockwise until it bottoms (approximately 18 turns). Lock the release bolt with the lock clip.

PARKING OPERATION

For parking, a control valve is provided in the cab. Pulling the valve knob out will release the air from the Fail-Safe pressure chamber. The actuating spring will then apply the brakes mechanically as in emergency operation. The spring will be compressed again and the brakes released, as soon as system air pressure is restored by the compressor.

2 IN-TRUCK ADJUSTMENTS AND REPAIR

PARKING BRAKE ADJUSTMENT—CABLE ACTUATED REAR WHEEL TYPE

Adjust the service brakes before attempting to adjust the parking brake cables.

Place the parking brake lever in the fully released position, then check for slack in the parking brake two rear cables (Fig. 5).

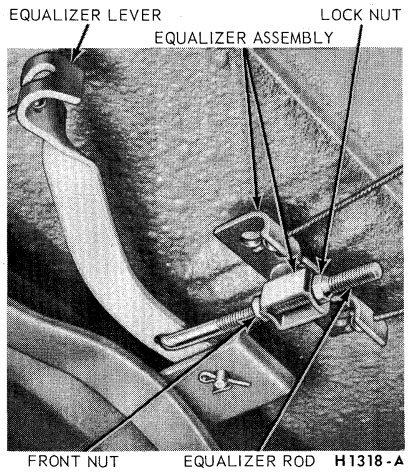


FIG. 5—Parking Brake Cable Adjustment

The cables should be tight enough to provide full application of the rear brake shoes, when the parking brake lever is placed in the fully applied position, yet loose enough to ensure complete release of the brake shoes when the lever is in the released position.

If the cables are loose, adjust them as follows:

1. Loosen the locknut on the equalizer rod, and then turn the nut in front of the equalizer several turns forward.

2. Turn the locknut forward against the equalizer until the cables are just tight enough to remove the slack. **Excessive tightening may pull the brake shoes off their anchors.**

3. When the cables are properly adjusted, tighten both nuts against the equalizer.

PARKING BRAKE ADJUSTMENT—EXTERNAL BAND TYPE

1. On cable-controlled parking brakes (Fig. 6), move the parking brake lever to the fully released position. On a truck with a rod-type linkage, set the lever at the first notch.

2. Check the position of the cam to make sure the flat portion is resting on the brake band bracket. If the cam is not flat with the bracket, remove the clevis pin from the upper part of the cam, and adjust the clevis rod to allow the flat portion of the cam to rest on the brake band bracket. Install the clevis pin and cotter pin (Fig. 6).

3. Remove the lock wire from the anchor adjusting screw, and turn the adjusting screw clockwise until a clearance of 0.010 inch is established between the brake lining and the brake drum at the anchor bracket. Install the lock wire in the anchor adjusting screw.

4. Loosen the lock nut on the adjusting screw for the lower half of the brake band, and adjust the screw to establish a 0.010 inch clearance between the lining and the brake drum at the lower half of the brake band (Fig. 6). Tighten the lock nut.

5. Turn the upper band adjusting rod nut until a 0.010 inch clearance is established between the upper half of the band and the drum.

PARKING BRAKE ADJUSTMENT—INTERNAL SHOE TYPE

NINE-INCH DIAMETER DRUM

1. Release the parking brake lever in the cab.

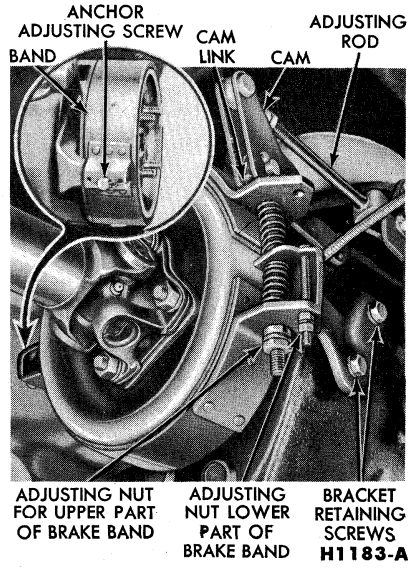


FIG. 6—Typical Band Type Parking Brake

INSTALLATION

1. Position the parking brake drum and output shaft flange assembly to the transmission output shaft, and install the retaining nut.
2. Position the parking brake band assembly over the drum, and install the bracket retaining screws.
3. Install the brake band adjusting bolt and nuts and springs.
4. Connect the cam link to the lower end of the cam with clevis and cotter pin.
5. Connect the adjusting rod to the upper end of the cam with clevis and cotter pin.
6. Adjust the parking brake, and install a lock wire in the anchor adjusting screw.
7. Apply the parking brake, torque the transmission output shaft flange nut to specifications, then release the parking brake.
8. With the transmission in low gear, connect the drive shaft at the flange and torque the four retaining nuts.

INTERNAL SHOE PARKING BRAKE

REMOVAL

1. Remove the universal joint assembly and drive shaft from the parking brake drum.
2. Remove the drum. Disconnect the parking brake actuating lever from the linkage.
3. On all transmissions except Transmatic Drive, remove the transmission spline flange. Remove the bolts retaining the carrier plate to the transmission housing. Slide the carrier plate with the brake shoes and retaining springs from the transmission. Remove the actuating lever, shoe retaining springs, and then remove the shoes.
4. On Transmatic Drive, pry the parking brake shoe lower retaining spring from the shoes. Remove the bolts and lockwashers retaining the carrier plate to the transmission. **Do not remove the bolt that retains the spline flange to the output shaft.**
5. With one hand on the actuating lever, slide the carrier plate away from the transmission housing and at the same time remove the actuating lever. Rotate the carrier plate and shoes as an assembly approximately 180 degrees, disconnect the brake shoe upper retaining springs, and remove the shoes.

INSTALLATION

If the brakes require relining, see Part 2-1 for relining procedures.

1. On all transmissions except Transmatic Drive, install the brake shoe lower retaining spring on the shoes. Position the shoes and lower retaining spring on the back side of the carrier plate, install the shoe upper retaining springs and the actuating lever. Place the assembly on the transmission and install the retaining bolts. Install the transmission spline flange.
2. On Transmatic Drive, position the brake shoe lower retaining spring in place. Lift the two shoes and spring as an assembly and place on the top back side of the carrier plate. The spring should be on the transmission side of the shoes. The carrier plate is still 180 degrees out of its normal position to facilitate the installation of the shoe upper retaining springs.
3. Install the brake shoe upper retaining springs. Rotate the carrier plate 180 degrees, position the actuating lever in the ball socket, and push the carrier plate toward the transmission. **Be sure the ends of the actuating lever are properly seated.** Install the lockwashers and bolts to retain the carrier plate to the transmission housing.
4. Install the brake drum and the drive shaft.
5. Connect the actuating lever to the parking brake linkage. Check the brake operation and adjust the linkage as necessary.

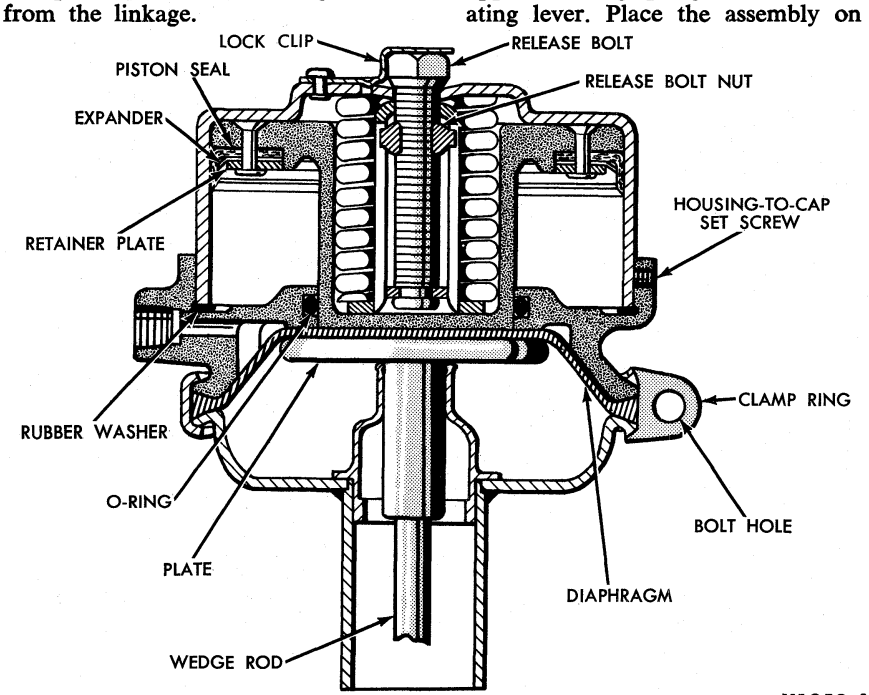


FIG. 8—Spring Manually Compressed for Removal and Repair of Fail-Safe Unit

MAXIBRAKE

REMOVAL

1. Release all the air from the system, and then disconnect the air lines from the brake chamber.
2. Disconnect the push rod yoke from the slack adjuster.
3. Remove the mounting nuts and remove the brake chamber.

INSTALLATION

1. Position the brake chamber assembly on the mounting bracket and install the retaining nuts.
2. Connect the push rod yoke to the slack adjuster.
3. Connect the air lines to the brake chamber and build up the air pressure.

FAIL SAFE UNIT

REMOVAL

1. Exhaust the air from the system by opening the reservoir drain cocks. Disconnect the air lines from the Fail-Safe housing.
2. Loosen the lock clip retaining screw and disengage the lock clip from the release bolt. Compress the actuating spring by turning the release bolt (Fig. 8) clockwise until

6. Remove the nut and washer used to compress the piston and push rod return spring.

7. Connect the air lines to the brake chamber and build up the air pressure.

8. With the safety chamber under pressure, and the safety piston in a retracted position, run the flange nut up snug on the push rod and install the clevis yoke.

Maintain a distance of $2\frac{13}{16} \pm \frac{1}{16}$ of an inch between the centerline of the clevis pin holes in the yoke, and the mounting flats of the cylinder assembly. Tighten the flange nut against the yoke to lock it in place.

FAIL-SAFE UNIT

DISASSEMBLY

1. Loosen the housing to cap set screws, and unscrew the housing from the cap (Figs. 7 and 8). Remove the O-ring and the rubber washer from the Fail-Safe housing.

2. Pull the Fail-Safe piston from the housing cap. If the piston cannot be withdrawn easily, loosen the release bolt a few turns. If the Fail-Safe piston seal is worn or damaged, replace the entire piston assembly.

3. If the housing cap assembly is damaged, replace the complete cap assembly. **Do not attempt to remove the spring from the assembly. Serious injury could result.**

Inspection. Check all components for wear or damage and replace as necessary. Clean all parts. **Do not use solvent on the leather seal.** Brush coat all internal surfaces (Fail-Safe housing and housing cap) with specified grease (M1C-69-A) or equivalent before assembly.

ASSEMBLY

1. Insert the piston in the housing cap.

2. Install a new rubber washer and a new O-ring in the Fail-Safe housing.

3. Screw the housing onto the cap, and tighten the housing to cap set screws.

PART 2-4 VACUUM BOOSTERS

1 DESCRIPTION AND OPERATION

Three different types of vacuum boosters—diaphragm, piston, and tandem piston—are used either as standard or optional equipment with Ford truck hydraulic brakes. A typical frame-mounted vacuum booster installation is shown in Fig. 1.

Service information for only the vacuum boosters is given here. Adjustments and repairs for the hydraulic brake systems are given in Part 2-2.

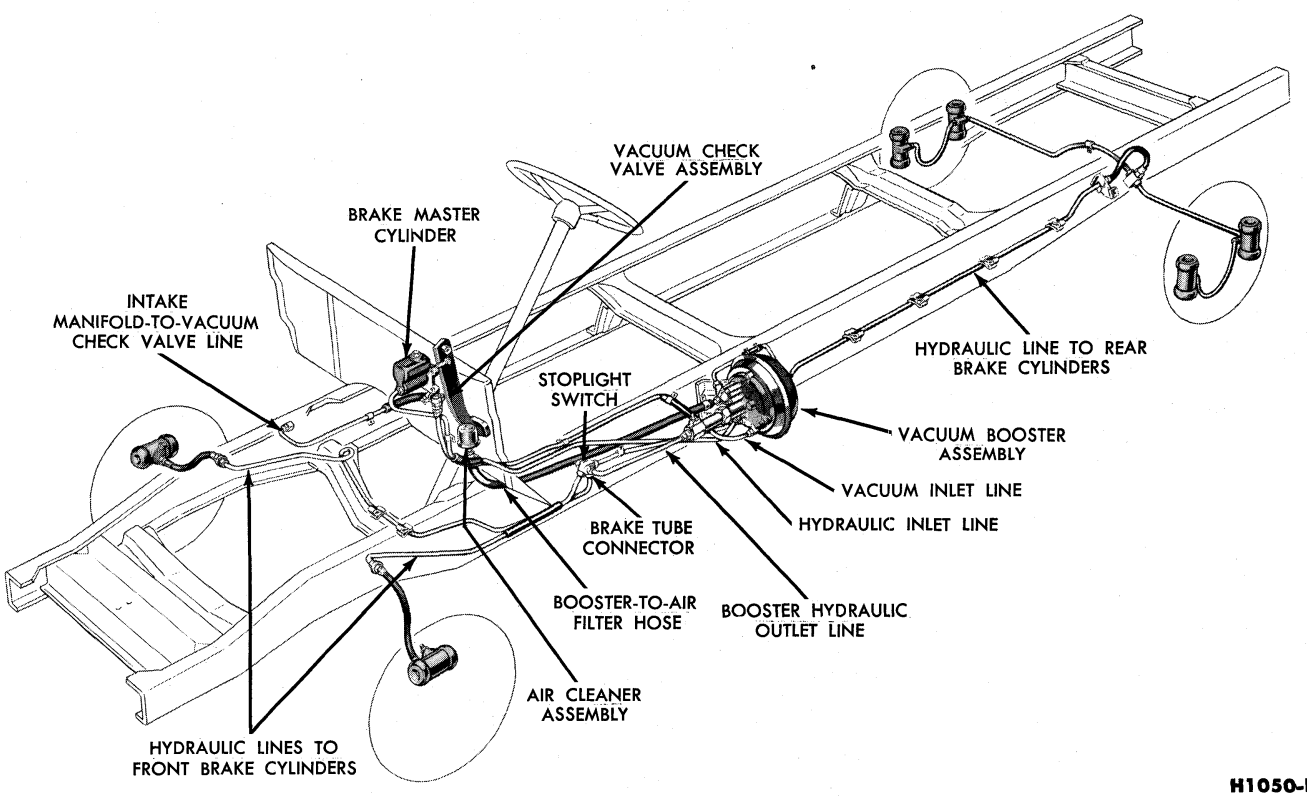


FIG. 1—Typical Frame-Mounted Vacuum Booster Installation—Diaphragm Type Shown

BENDIX DIAPHRAGM-TYPE, DASH-MOUNTED, BOOSTER— F-100 AND 250

The diaphragm-type brake booster is a self contained vacuum-hydraulic braking unit mounted on the engine side of the dash panel.

The vacuum power chamber consists of a front and rear shell locked together. Within the vacuum chamber are the rubber diaphragm and the integral valve hub and diaphragm plate. The rubber diaphragm fits over the plate, and the outer bead of the diaphragm is locked between the front and rear shells (Fig. 2). The diaphragm return spring is located between the diaphragm plate and the front shell.

The valve hub section of the diaphragm plate protrudes from the rear shell. A synthetic rubber and plastic seal is used between the valve hub and the rear shell. The seal and the valve hub are protected from dirt by a plastic shield located between the dash panel and the rear shell. The control valve assembly fits into the hub and is connected to the brake pedal by the valve operating rod. The control valve assembly consists of a plunger, a valve body which supports a single poppet of flexible rubber, and two return springs. When the brake pedal is in the released position the valve return spring holds the valve assembly and operating rod away from the diaphragm plate. In this position, the poppet on the valve body is off the vacuum port seat which is a part of the diaphragm plate. The poppet return spring likewise holds the poppet against the atmospheric port seat which is a part of the plunger.

The hydraulic master cylinder which contains all of the components of the conventional master cylinder is bolted to the booster front shell. The hydraulic push rod forms the link between the master cylinder piston and the vacuum power diaphragm assembly. The end of the push rod, that enters the master cylinder piston, is equipped with a self-locking adjusting screw. The opposite end has a piston head which enters the diaphragm plate. A seal, located in the front shell, seals the opening between the hydraulic push rod and the shell.

Engine manifold vacuum is supplied to the booster through a vacuum check valve located in the front shell. Air is admitted through the air filter located at the end of the valve hub. The hydraulic push rod is actuated by pedal pressure assisted by the diaphragm, which derives power from the pressure differential existing between the vacuum on its front side and atmospheric pressure on its rear side. A passage in the diaphragm plate permits vacuum to pass from the front to the rear side of the diaphragm when the vacuum port opens as the brakes are released.

RELEASED POSITION

With the engine running and the brakes released (Fig. 3), vacuum from the intake manifold is admitted through the check valve to the front (constant vacuum) chamber of the power unit. In the released position (no pressure applied to the brake pedal), the valve operating rod and valve plunger are held to the rear of the valve hub by the valve return spring to CLOSE the atmospheric port and OPEN the vacuum port. With the valve in this position, the rear (control vacuum) chamber is also open to vacuum through the porting in the diaphragm and valve hub assembly. The vacuum power diaphragm is then "balanced" or suspended in vacuum, since vacuum is present on both sides of the power diaphragm. With the power diaphragm balanced in vacuum, the diaphragm return spring holds the diaphragm and hydraulic push rod in the fully released position. With the hydraulic push rod in this position, the hydraulic compensating port in the hydraulic master cylinder is OPEN. The open port permits

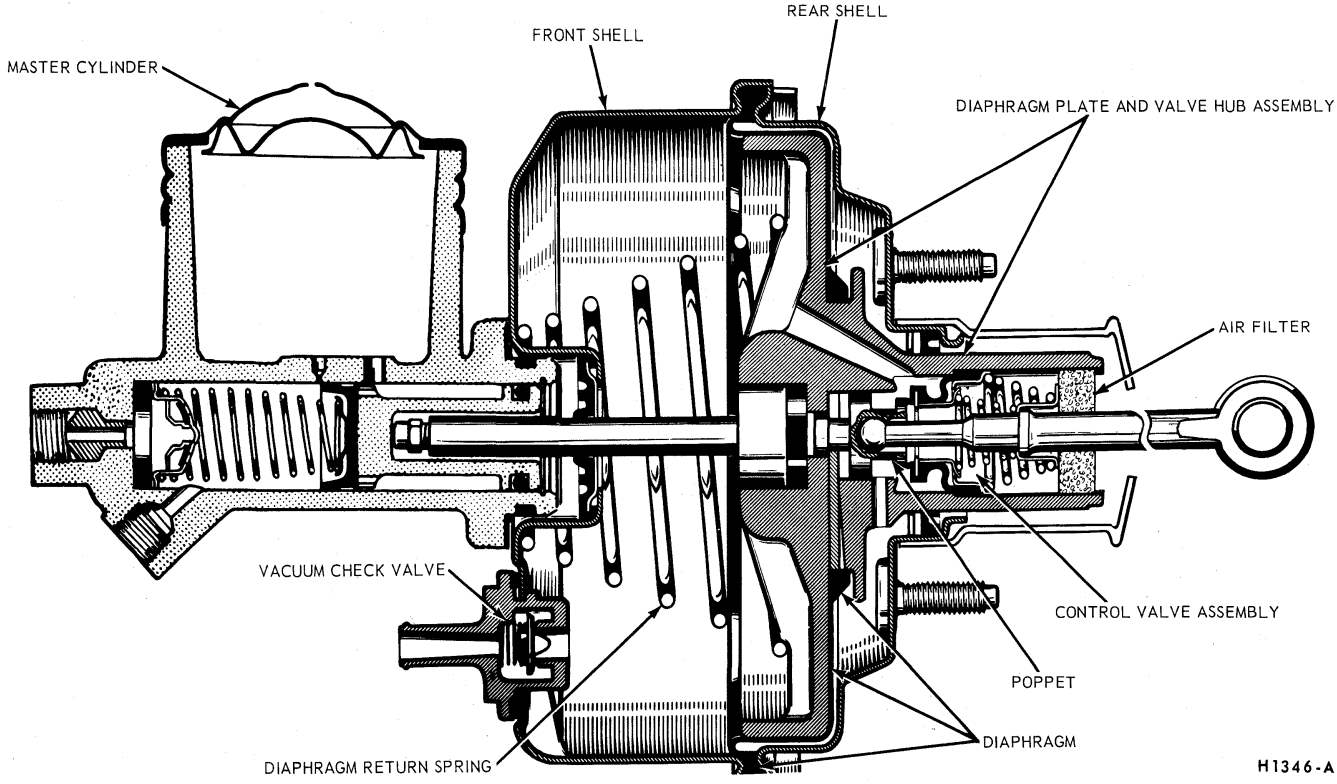


FIG. 2—Cutaway View of Vacuum Booster

by additional movement of the control valve diaphragm.

As the air is admitted, it flows through a cavity in the control valve housing to the back side of the rear vacuum piston, through the piston rod, out the four holes in the piston rod to the back side of the front vacuum piston. Air pressure on the back side of both pistons working with vacuum on the front side of both pistons, sets the pistons in motion transmitting their combined force to the hydraulic piston in the hydraulic cylinder, through the push rod.

As the hydraulic piston starts to move, the check ball seats, trapping fluid under pressure ahead of the piston. This initial hydraulic pressure from the master cylinder is multiplied several times.

When the brake pedal is released, hydraulic pressure in the master cylinder, and in the control valve piston cavity of the booster, decreases. The vacuum diaphragm return spring moves the diaphragm and the control valve piston rearward permitting spring pressure to seat the atmospheric valves, and unseat the vacuum valve. The check valve in the hydraulic cylinder closes. As the vacuum valve opens, air in the booster is exhausted into the intake manifold of the engine, allowing the vacuum piston return spring to return the vacuum and hydraulic cylinder pistons to their released position. As the hydraulic cylinder piston returns, the check ball opens permitting brake fluid to flow through the piston, allowing it to return to its fully released position.

Normal operation of the booster is such that both vacuum pistons are set in motion at the same time. However, when a fast, hard brake stop is made, the front vacuum piston may lag behind the rear vacuum piston. A fast application is used to overcome the lag of the front piston by admitting an additional volume of air to the back side of the front piston. Vacuum, from the constant vacuum line, is applied to the back side of the fast application valve diaphragm. The fast application valve is held in a closed position by a spring. When a fast or hard brake stop is made, atmospheric pressure is transmitted through the control by-pass tube to the front side of the fast application valve diaphragm. This causes the diaphragm to move to the left, lifting the valve from its seat and admitting a large volume of air from the air inlet by-pass hose to the back side of the front piston, thus providing the same degree of power to both vacuum pistons.

MIDLAND DIAPHRAGM-TYPE, DASH-MOUNTED BOOSTER

The booster consists of a vacuum chamber, atmospheric valve, control valve plunger assembly, diaphragm and an atmospheric chamber (Figs. 8, 9, and 10).

Atmospheric pressure is present at all times in the atmospheric chamber at the front side of the atmospheric valve. The air intake to the atmospheric chamber is protected by an air filter. The atmospheric chamber is separated from the vacuum chamber by the bellows assembly within the vacuum chamber.

Vacuum is present at all times in that area of the vacuum chamber forward of the diaphragm. Vacuum is supplied through a hose from the intake manifold to the vacuum manifold and check valve assembly on the booster body. With this integral check valve and vacuum chamber, it is possible to obtain several power assisted brake applications with the engine shut off. This arrangement makes a vacuum reservoir unnecessary. For a greater reserve, however, a vacuum reservoir is available as optional equipment on some trucks.

Either vacuum from the forward side of the diaphragm or air from the bellows (atmospheric chamber) can be connected to the rear side of the diaphragm through porting in the control valve hub and the plunger assembly.

APPLIED POSITION

As the brake pedal is depressed, the valve operating rod and valve plunger assembly move forward com-

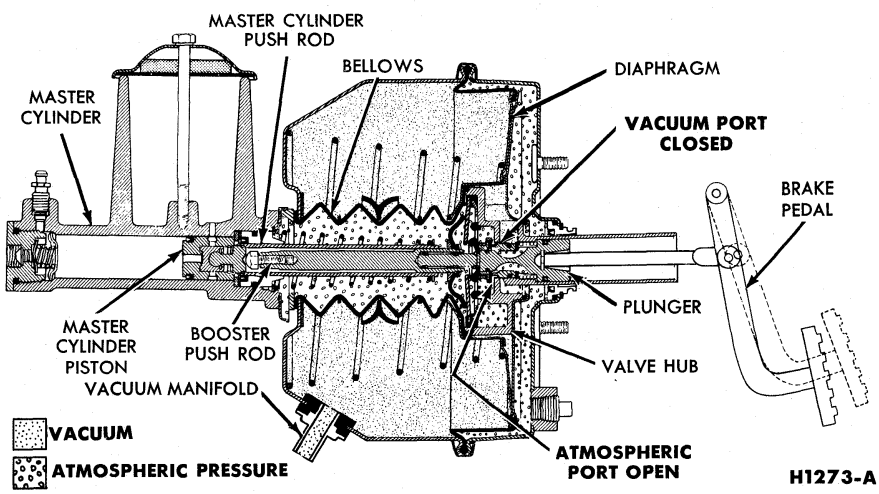


FIG. 8—Booster in Applied Position

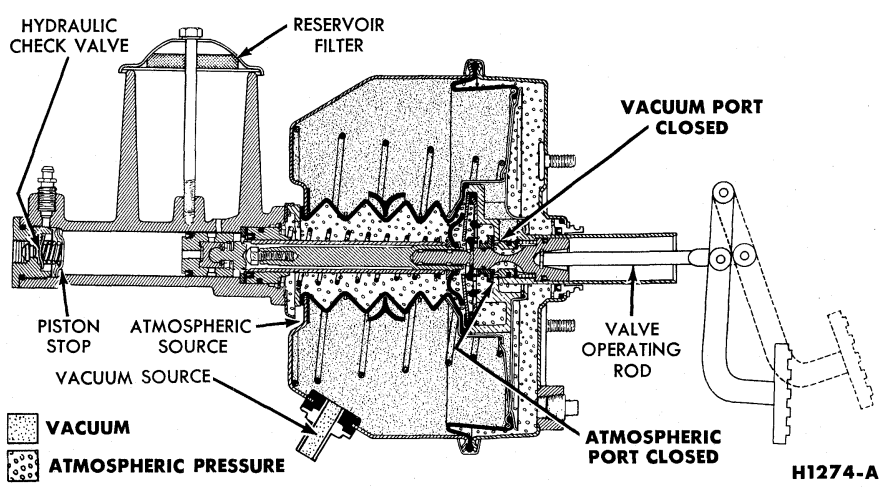


FIG. 9—Booster in Holding Position

2. Remove the master cylinder-to-booster retaining nuts.

3. Remove the clip that retains the master cylinder outlet line to the bracket on the dash panel.

4. Loosen the clamp that secures the manifold vacuum hose to the booster and remove the hose. Remove the reservoir hose from the booster unit, if so equipped.

5. Pull the master cylinder off the booster, and leave it supported by the prop far enough away to allow removal of the booster assembly.

6. From inside the cab, remove the eccentric bolt and lock nut that secure the booster valve operating rod to the brake pedal. Remove the nuts that retain the booster mounting bracket to the dash panel.

7. Remove the booster assembly from the engine compartment.

INSTALLATION

1. Mount the booster and bracket assembly to the engine side of the dash panel by sliding the bracket mounting studs and the valve operating rod in through the holes in the dash panel.

2. From inside the cab, install the booster mounting bracket-to-dash panel retaining nuts.

3. Position the master cylinder to the booster assembly, install the retaining nuts, and remove the prop.

4. Position the master cylinder outlet line to the bracket on the dash panel, and install the retaining clip.

5. Connect the manifold vacuum hose to the booster and secure with the clamp. Connect the reservoir hose to the booster, if so equipped.

6. From inside the cab, connect the booster valve operating rod to the brake pedal with the eccentric bolt and lock nut. Adjust the brake pedal free travel as described in Part 2-2.

7. Start the engine and check the operation of the brake system.

MIDLAND DIAPHRAGM-TYPE, FRAME-MOUNTED BOOSTER

REMOVAL

1. With the engine stopped, depress the brake pedal several times to remove all vacuum from the booster system.

2. Disconnect the 2 hydraulic lines and vacuum hose from the booster.

3. Loosen the air breather hose clamp and disconnect the hose from the booster.

4. Remove the 3 mounting bolts and lock washers and remove the booster.

Do not remove the breather or the vacuum check valve unless operating conditions indicate repairs are necessary.

INSTALLATION

1. Position the brake booster on the mounting bracket, and install the mounting bolts, using new lockwashers.

2. Connect the hydraulic lines to the booster. Tighten connections securely.

3. Attach the air intake hose to the control valve air inlet fitting, and tighten the clamp securely. If necessary, clean the air inlet element.

4. Bleed the brake system as outlined under "Hydraulic System Bleeding," Part 2-2.

5. Connect the vacuum hose to the vacuum check valve (or tube) on the booster. Tighten the clamps securely.

6. Perform the checks and tests as outlined in Part 2-1.

BENDIX (HYDROVAC) BOOSTER PISTON TYPE

REMOVAL

1. Depress the brake pedal several times to remove all vacuum from the system.

2. Loosen the booster air inlet tube clamp, and remove the tube. Disconnect the hydraulic lines and the vacuum hose at the booster.

3. Remove the booster mounting bolts, then remove the booster. **Do not remove the breather or the vacuum check valve unless operating conditions indicate repairs are necessary.**

INSTALLATION

1. Position the booster on the mounting bracket, and install the mounting bolts, using new lockwashers.

2. Connect the hydraulic lines to the booster. Tighten connections securely.

3. Connect the air intake hose to the control valve air inlet tube. Tighten the hose clamp securely. If necessary, clean the air inlet element.

4. Bleed the brake system as outlined under "Hydraulic System Bleeding," Part 2-2.

5. Connect the vacuum tube to booster hose to the booster. Tighten the hose clamps securely.

6. Perform the checks and tests as outlined in Part 2-1.

BENDIX (HYDROVAC) BOOSTER TANDEM PISTON TYPE

REMOVAL

1. Depress the brake pedal several times to remove all vacuum from the system.

2. Loosen the air inlet hose clamp at the center plate and air inlet tube, and disconnect the hose from the booster.

3. Disconnect the master cylinder and brake cylinder to booster hydraulic lines from the booster.

4. Loosen the vacuum line to booster hose clamps at the booster, and disconnect the line.

5. Remove the booster to mounting bracket bolts, and remove the booster.

INSTALLATION

1. Position the assembly on the mounting brackets, and install the attaching bolts. Tighten the bolts firmly.

2. Connect the master cylinder hydraulic line to the front end plate. Connect the brake cylinder hydraulic line to the hydraulic cylinder end cap.

3. Attach the air inlet hose to the control valve air inlet fitting, and check and tighten all connections.

4. Bleed the brake system as outlined under "Hydraulic System Bleeding," Part 2-2.

5. Attach the vacuum hose to the booster, then tighten the clamp securely.

6. Perform the checks and tests as outlined in Part 2-1.

4 MAJOR REPAIR OPERATIONS

BENDIX DIAPHRAGM-TYPE, DASH-MOUNTED BOOSTER— F-100 AND 250

DISASSEMBLY

1. Remove the retaining nuts and lock washers and remove the mounting brackets from the rear shell (Fig. 15).

2. Slide the plastic dust shield off the valve hub.

3. Pull the hydraulic push rod and front seal (Fig. 16) from the front shell.

4. Scribe an index mark across the front and rear shells.

5. Place the booster in a vise as shown in Fig. 17. Press downward on the rear shell and at the same time, turn it counterclockwise with a flat bar to release it from the front shell. Release the pressure on the rear shell slowly to prevent the diaphragm plate return spring from flying out.

6. Separate the two shells and remove the return spring.

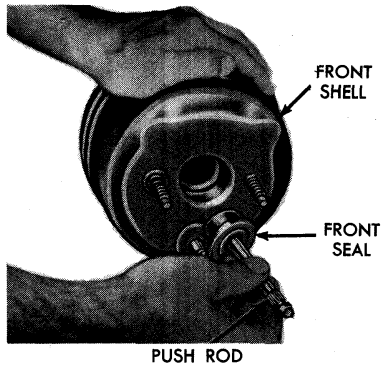


FIG. 16—Removing Front Seal and Push Rod

7. Withdraw the diaphragm plate and diaphragm from the rear shell.

8. Remove the diaphragm from the diaphragm plate as shown in Fig. 18.

9. Pry the filter retainer off the diaphragm plate being careful not to chip or damage the plate.

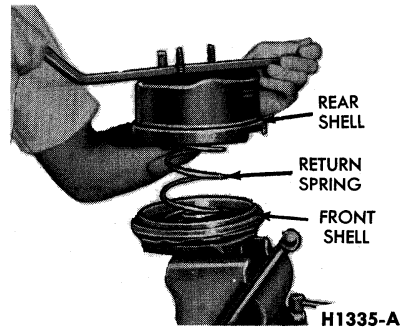


FIG. 17—Separating Booster Shells

10. Hold the diaphragm plate so that the valve retainer is facing downward. Press the valve push rod inward to release the tension on the retainer and allow it to drop out of the plate (Fig. 19).

11. Withdraw the valve and rod from the plate.

12. Press the reaction disc out of the diaphragm plate.

13. Drive the seal out of the rear

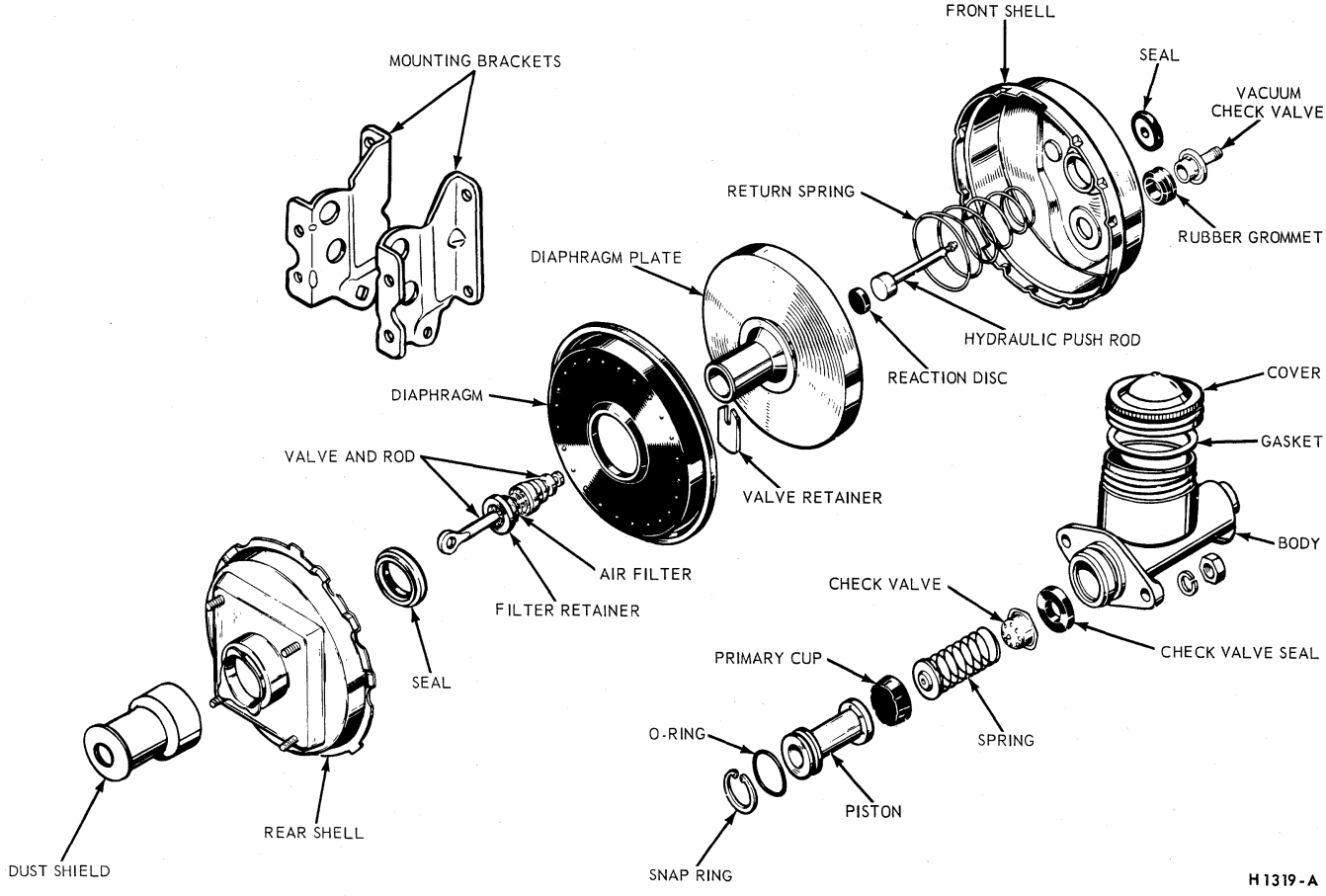


FIG. 15—Bendix Dash-Mounted Booster Disassembled

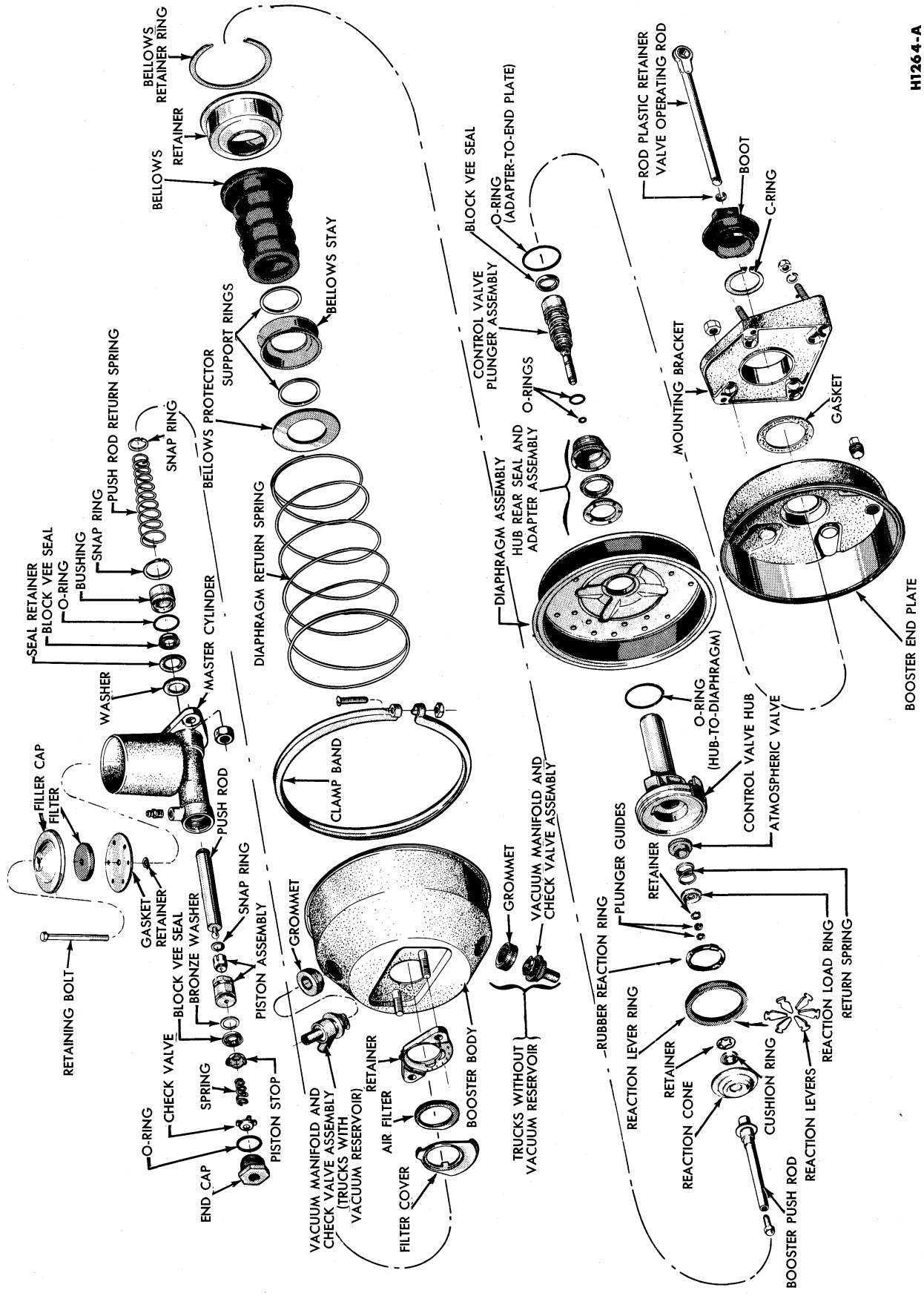


FIG. 23—Dash-Mounted Booster Disassembled

except where indicated in the procedure steps and illustrations.

DISASSEMBLY

1. Loosen the control tube hose clamps and slide the hose off the end of the tube (Figs. 30 and 31).

2. Remove the air inlet tube snap ring and remove the air inlet tube, seal, and spring from the control valve body.

3. Remove the five control valve body mounting screws and remove the body, return spring, diaphragm, and gasket from the end plate. The poppet valve cannot be removed from the valve body.

4. Mount the end cap in a vise, loosen the hydraulic cylinder lock nut, and unscrew the end plate and booster body assembly from the hydraulic cylinder.

5. Unscrew the hydraulic cylinder from the end cap, then remove the lock nut and seal from the cylinder. Remove the bleeder screw and copper gasket from the end cap then remove the end cap from the vise (Figs. 30 and 31).

On a 9½-inch booster, remove the check valve snap ring, washer, spring, and check valve (Fig. 31). **A truck with a 9½-inch booster has a check valve mounted in the end cap. Therefore, a check valve is not used in the master cylinder on these trucks.**

6. Scribe a line across the booster body and end plate so that these parts can be reassembled in their original position. Remove the four hook bolts, and slide the booster body from the vacuum piston assembly.

7. Compress the vacuum piston return spring by pressing down on the end plate and using hook-type clamps similar to those in Fig. 32. Hold the spring compressed.

8. Remove the hydraulic piston from the push rod by sliding the retainer spring (on the hydraulic piston) back, and removing the retainer pin.

9. Remove the hook clamps and separate the vacuum piston and push rod assembly, and the return spring from the end plate.

10. Clamp one of the bolt flanges of the end plate in a vise. Unscrew the control valve cylinder from the end plate, then remove the rubber gasket from the cylinder. Remove the snap ring retainer and stop washer, then press the control valve piston assembly from the cylinder (Figs. 30 and 31). The piston should come out of the front end of the cylinder to avoid damage to the cups.

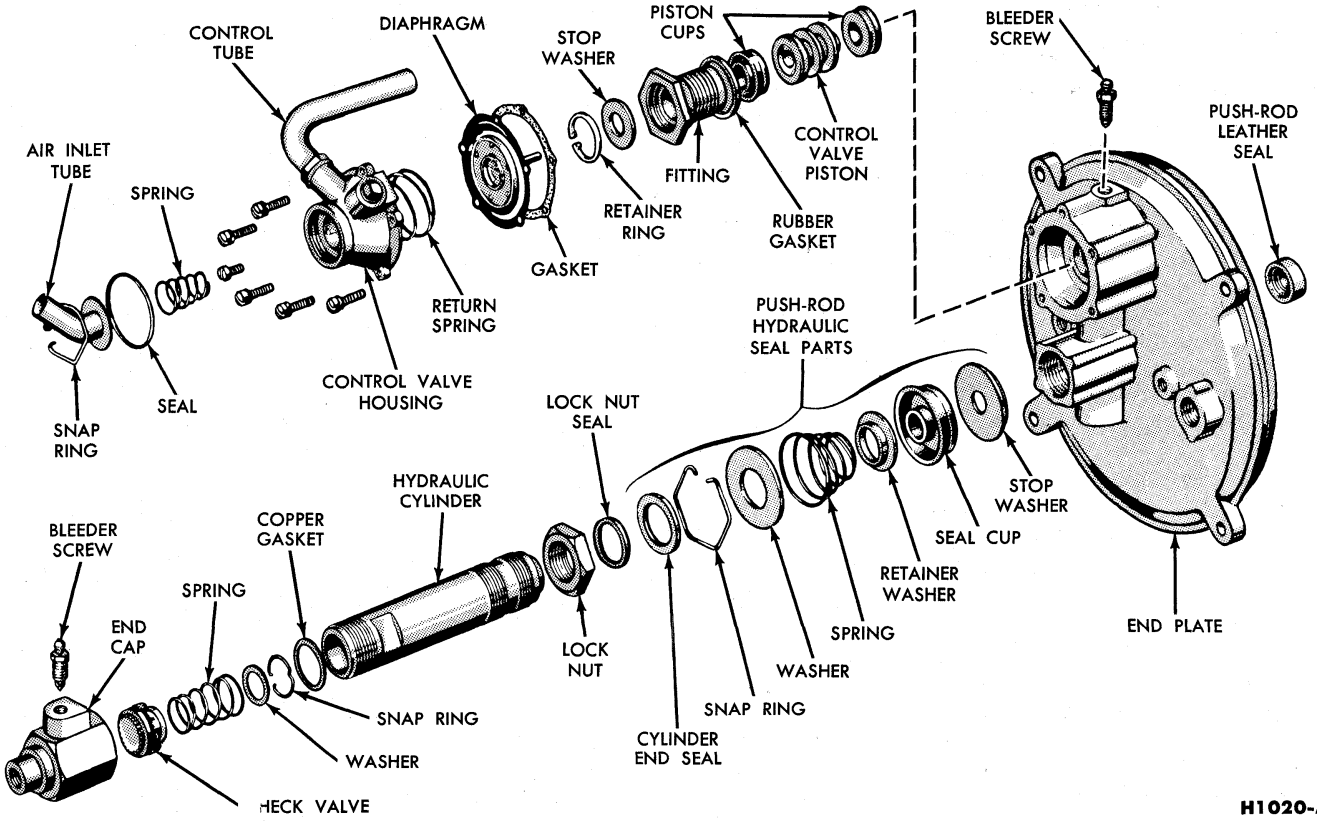
11. On a 6¾-inch booster, remove the small retainer, then remove the piston cups and spacer from the control valve piston (Fig. 30).

On a 9½-inch booster, remove the cups from the piston (Fig. 31).

12. Remove the hydraulic cylinder end seal from the end plate (Figs. 30 and 31). Remove the snap ring, then remove the push rod seal cup parts from the end plate (6¾-inch—retainer washer, spring spacer, seal retainer, seal cup and stop washer as shown in Fig. 30). (9½-inch—washer, spring, retainer washer, seal cup, and stop washer as shown in Fig. 32.)

13. Remove the end plate from the vise and place it on two wooden blocks with the hydraulic cylinder side up. Drive the push rod leather seal assembly out of the end plate, using a flat end rod or drift.

14. On a 6¾-inch booster, clamp the vacuum piston and push rod assembly in a vise at the hexagonal nut. Remove the vacuum piston retaining



H1020-A

FIG. 31—End Play Disassembled—9½-Inch Booster

PART 2-5 AIR-HYDRAULIC BOOSTER

1 DESCRIPTION AND OPERATION

The air-hydraulic brake system (Fig. 1) uses a compressed air booster-type unit to assist the hydraulic brakes. The air-hydraulic unit consists of a booster cylinder, a hydraulic cylinder, and a hydraulically operated control valve.

Depressing the brake pedal builds up hydraulic pressure in the system. This initial pressure unseats the check ball in the hydraulic cylinder piston, and opens the check valve, permitting the pressure to be transmitted to the brake cylinders, where braking action begins (Fig. 2).

As soon as hydraulic pressure builds up sufficiently, it moves the control valve piston forcing the diaphragm against spring pressure. Movement of the control valve piston unseats the poppet valve, allowing compressed air from the air system reservoir to pass around the poppet valve and into the booster cylinder. The force of air on the booster piston drives the hydraulic cylinder piston forward, seating the check ball, to prevent the return of brake fluid to the master cylinder during brake application.

As the booster piston travels, additional hydraulic pressure is transmitted to the brake cylinders to actuate the brakes. The initial hydraulic pressure is thus multiplied several times.

The amount of braking action can be controlled because the poppet valve is subject to both hydraulic pressure and applied air pressure. The opposing forces, hydraulic pressure and air pressure, control the movement of the diaphragm (and control valve piston) which, in turn, control the amount of booster action.

When the brake pedal is released, hydraulic pressure in the master cylinder and control valve piston cavity decreases. Spring pressure closes the air inlet side of the poppet valve and opens the atmospheric side of the valve. The check valve in the hydraulic cylinder closes. As the atmospheric poppet opens, compressed air in the booster cylinder rushes out through the exhaust port, allowing the booster piston return spring to return the hydraulic cylinder and booster pistons to their released position. As the hydraulic cylinder piston returns, the check ball opens permitting brake fluid to flow through the piston, allowing it to return to its fully released position.

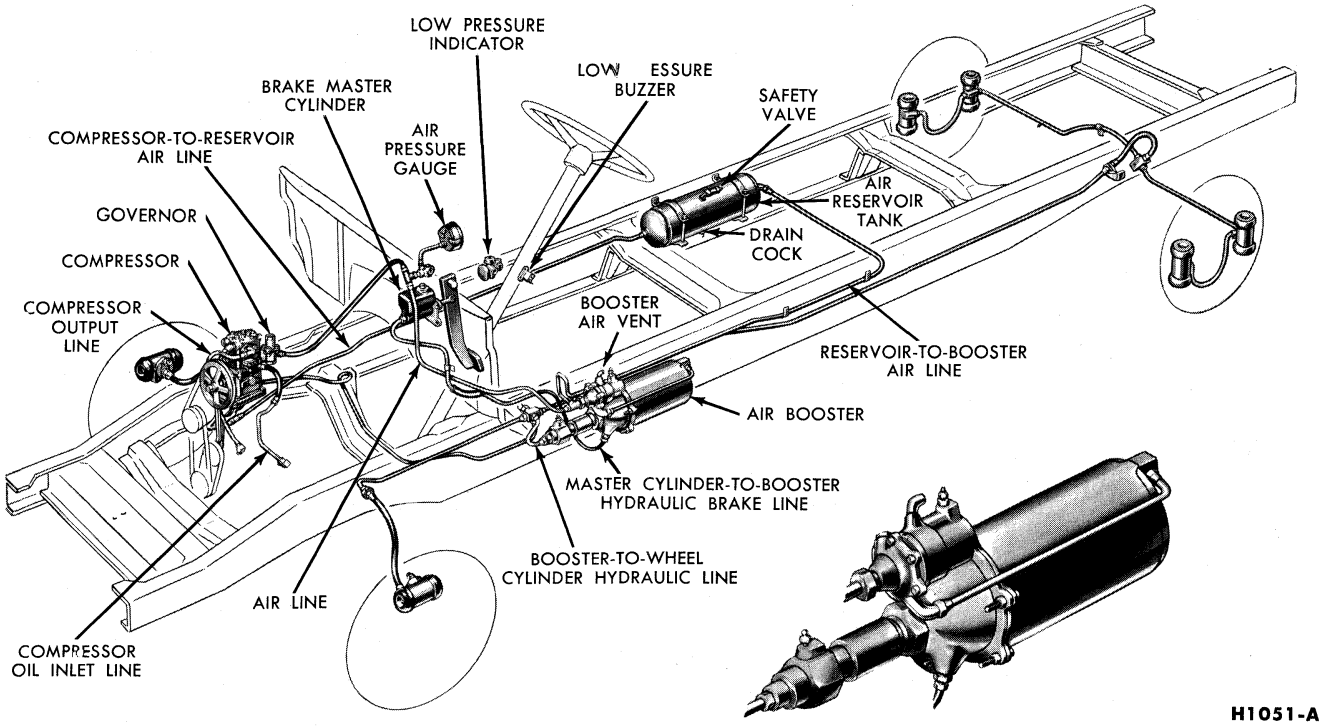


FIG. 1—Air-Hydraulic Brake System

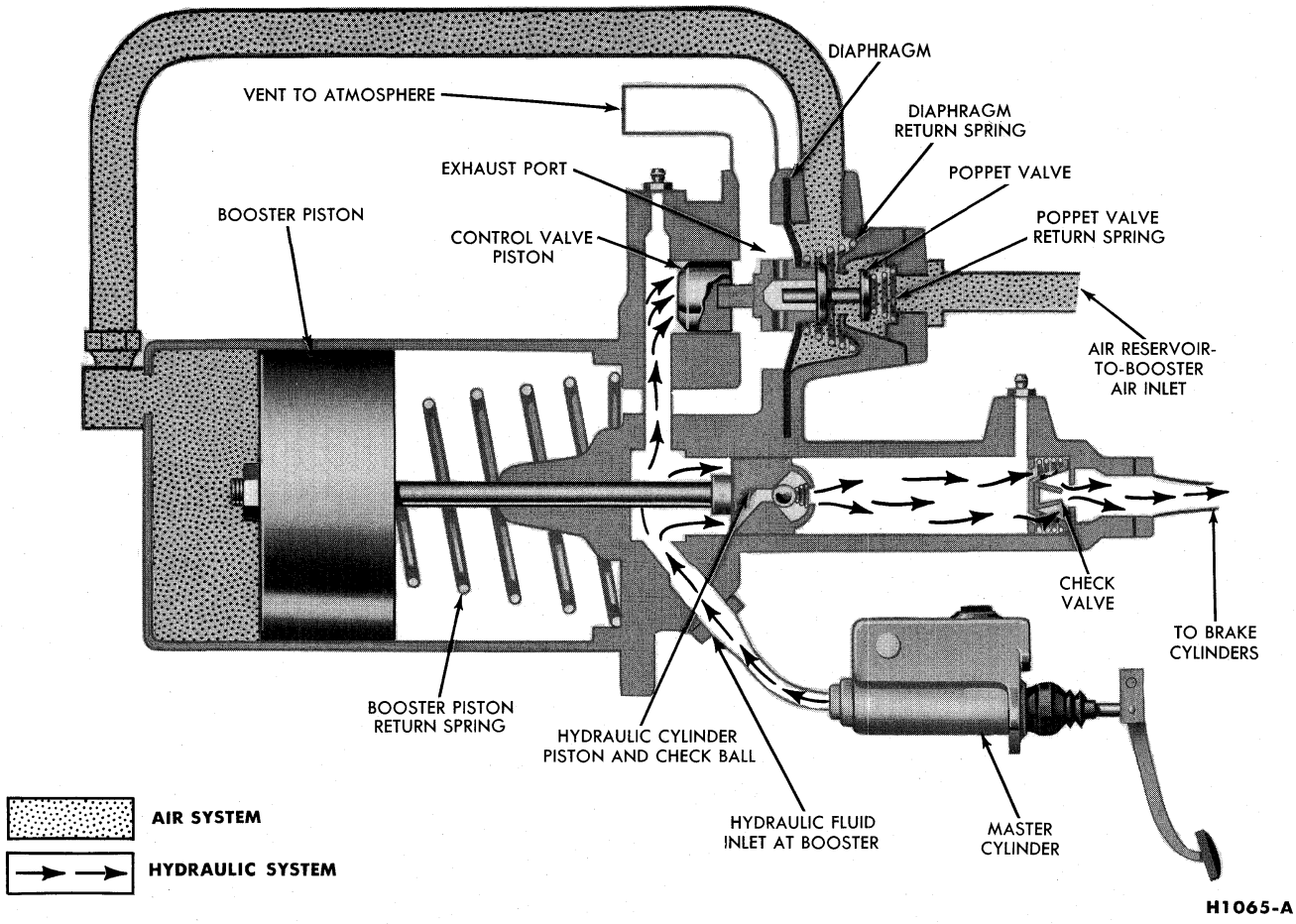


FIG. 2—Air-Hydraulic Booster

2 IN-TRUCK ADJUSTMENTS AND REPAIRS

(Not applicable to this section.)

3 REMOVAL AND INSTALLATION

AIR-HYDRAULIC BOOSTER

REMOVAL

The truck should be on level ground, with the engine stopped, and the service brakes completely released.

1. Check the air gauge reading. If the gauge indicates compressed air in the system, open the drain cock on the reservoir to release the pressure.

2. Disconnect the air supply line attached to the end plate assembly. Cover the open line to prevent dirt from getting into the air system.

3. Disconnect the two hydraulic lines from the ports.

4. Remove the mounting nuts and remove the booster unit from the mounting brackets and away from the truck.

5. Drain excess hydraulic fluid from the booster unit.

INSTALLATION

1. Position the booster on the truck. Install the mounting bracket bolts.

2. Connect the air and hydraulic lines at the booster unit.

3. Remove the ⅛ inch filler plug at the rear of the air-hydraulic unit. Add vacuum cylinder oil until the oil runs out of the port.

4. Install and tighten the plug.

During lubrication, do not run the engine or apply the brakes. **Do not lubricate the unit until it has been installed in the truck.**

5. Bleed the brake system as outlined under "Bleeding Hydraulic Brakes" in Part 2-2.

6. Test the booster unit for leaks and operation.

sembly from the body assembly by gently tapping the body on a flat surface.

Hydraulic Cylinder

1. Clamp the hydraulic cylinder end cap in a vise.

2. With a wrench, loosen the hydraulic cylinder lock nut. Unscrew the end plate from the hydraulic cylinder.

3. Unscrew the hydraulic cylinder from the end cap. Remove the end cap from the vise.

End Plate

1. To disengage the push rod from the hydraulic piston assembly, place the booster piston assembly over the booster return spring (Fig. 4). Compress the booster return spring by pressing toward the end plate to move the push rod forward. Remove the pin retaining the hydraulic piston to the push rod. Remove the hydraulic piston assembly.

2. Remove the booster piston assembly, booster return spring, and push rod from the end plate assembly. **A hook clamp may be used to hold the booster return spring in the compressed position while removing the pin (Fig. 4). The clamp should hook through one of the holes in the end plate and over the end of the booster piston assembly. The clamp should be fabricated as shown in Fig. 4.**

3. Remove the hydraulic piston O-ring (Fig. 5). Remove the snap ring, washer, seal retainer and spacer, cup, fiber stop washer, and spring from the bore of the end plate.

4. To remove the push rod seal and gasket from the end plate, thread a ¼ inch pipe tap into the seal. Drive the seal out from the booster body assembly end of the end plate using a short piece of rod against the pipe tap. Remove the gasket.

5. With a special tool (Fig. 5), remove the control valve cylinder from the end plate. Remove the seal.

6. Remove the bleeder screw. Remove the fitting bolt and gaskets.

7. Remove the end plate from the vise.

Control Valve Cylinder

1. Remove the retainer from the control valve cylinder and press the control valve piston out of the valve cylinder.

2. Remove the two cups from the piston.

Hydraulic Cylinder End Cap

1. Clamp the hydraulic cylinder end cap in a vise.

2. Remove the snap ring from the end cap. Remove the retaining washer, spring, and check valve.

3. Remove the bleeder screw. Remove the fitting bolt and gasket.

Booster Piston

1. To disassemble the booster piston, use a holding fixture (Fig. 6), to prevent damaging the piston.

2. Mount the holding fixture in a vise and place the booster piston assembly over the fixture.

3. Remove the packing retainer nut. Separate the retainer, expander ring, wick, packing retainer, and packing leather from the top of the piston.

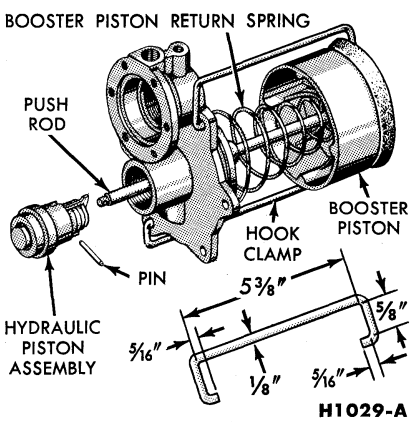


FIG. 4—Push Rod Pin Removal

ASSEMBLY

When assembling the air-hydraulic booster, use extreme care in the handling of the hydraulic system parts. Do not allow any of the parts to come in contact with mineral oil or grease.

Booster Piston

1. To aid in the reassembly of the booster piston, make an assem-

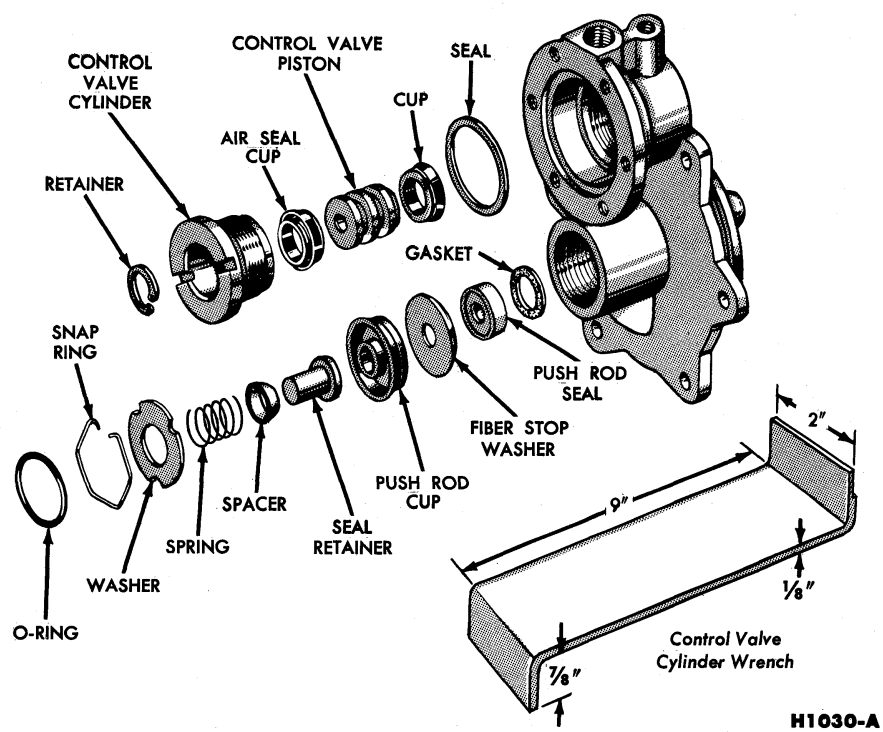


FIG. 5—End Plate—Disassembled

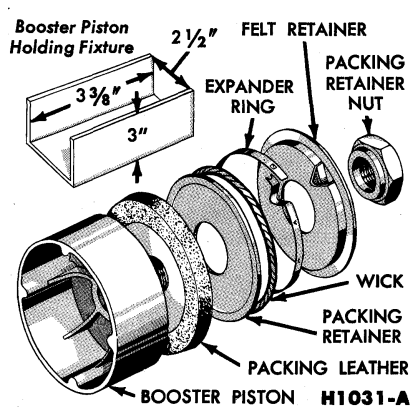


FIG. 6—Booster Piston—Disassembled

keyed to the compressor crankshaft, and which enters the accessory gear case where it is driven by the camshaft gear. The fuel pump is flange mounted to the front of the air compressor and must be removed before the air compressor can be removed.

REMOVAL

On H-Series trucks, unlock the tilt cab. On H- and N-Series trucks, the air intake system components have to be removed to obtain access for compressor removal.

Air Intake Lines—H- and N-Series Trucks Only

1. Disconnect the air intake duct from the air cross-over manifold (Fig. 11).

2. Loosen the hose clamps on the cross-over manifold connection hose.

3. Loosen the compressor air intake hose at the air cross-over manifold and at the compressor.

4. Remove the retaining bolts and the right hand air cross-over manifold from the intake manifold.

Fuel Pump and Air Compressor—F-, H-, T-, and N-Series Trucks

1. Disconnect the throttle linkage and lines from the fuel pump, and remove the fuel pump from the front of the compressor as described in Group 10.

2. Drain the cooling system and exhaust the air reservoirs.

3. Disconnect the air outlet line from the compressor.

4. On F- and T-Series trucks, loosen the compressor air intake hose clamps at the main intake duct and at the compressor.

5. On F-, T- and N-Series trucks, remove the floor pan cover at the gear shift lever to obtain access to the line connections and the rear of the compressor.

On H-Series trucks, this access is obtained by tilting the cab at the beginning of the removal procedure.

6. Disconnect all air lines at the governor.

7. Disconnect the water lines at the air compressor, the cylinder block, and at the water crossover connection.

8. Unclamp any water or air lines as necessary to provide clearance for compressor removal.

9. On F-, T- and N-Series trucks, remove the water crossover pipe from the rear of the cylinder heads in order to gain access to the accessory drive rear support plate. On H-Series trucks, it is not necessary to remove the crossover pipe because the crossover pipe goes over the top of the accessory gear case as shown in Fig. 12.

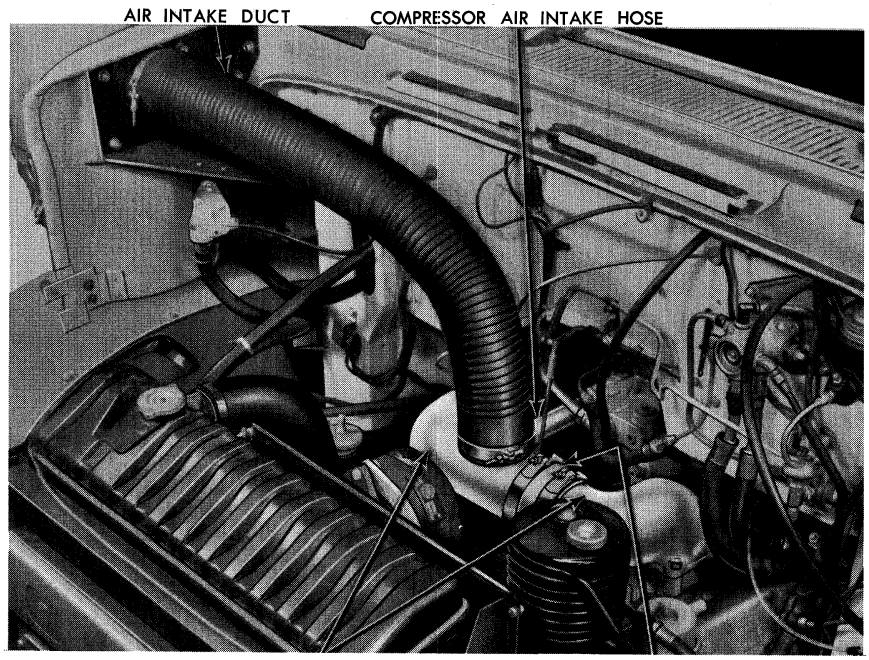


FIG. 11—Air Intake System—N-Series—Typical of H-Series

10. Remove the bolts and lock washers that secure the rear support plate and the compressor to the accessory gear case. Remove the rear support plate from the rear side of the gear case (Fig. 12), and remove the compressor from the front side of the gear case.

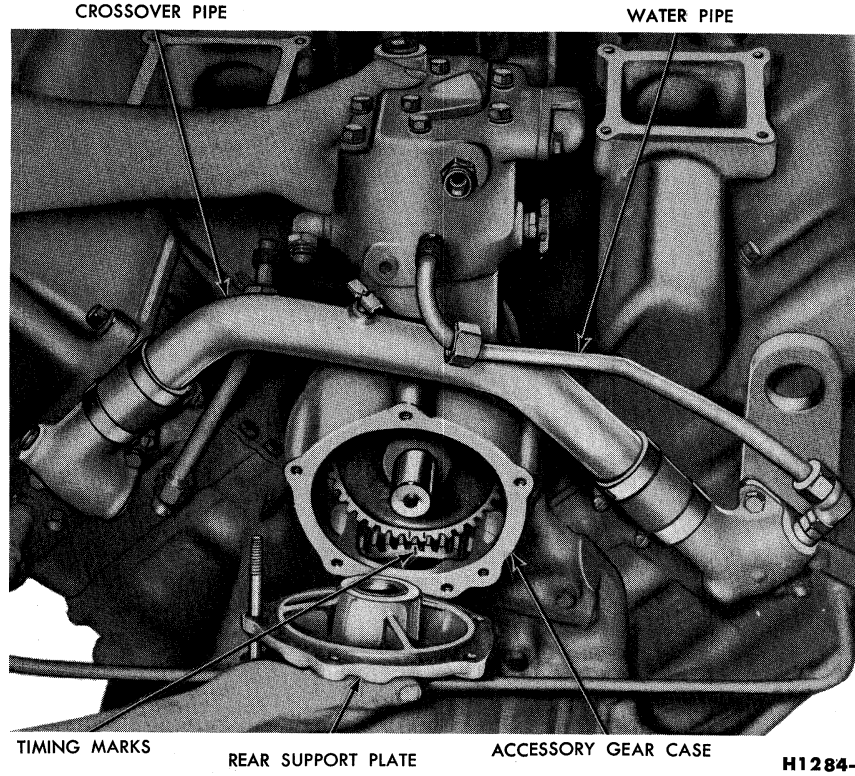


FIG. 12—Removing or Installing V-6 Air Compressor—H-Series Typical of F-, T-, and N-Series

INSTALLATION

Fuel Pump and Air Compressor—F-, H-, T- and N-Series Trucks

1. Clean the gasket material from the compressor, gear case, and accessory drive rear support plate.

2. Position the air compressor with a new gasket to the front side of the gear case so that the timing marks on the air compressor drive gear are aligned with the marks on the camshaft gear (Fig. 12). Be sure that the gears mesh properly.

3. Position the accessory drive rear support plate with a new gasket to the rear side of the gear case, then secure the support plate and air compressor to the gear case with the lockwashers and retaining bolts.

4. On F-, T- and N-Series trucks, clean the gasket material from the water crossover pipe and the rear of the cylinder heads. Position the crossover pipe to the cylinder heads with new gaskets and install the retaining bolts.

5. Connect the two water lines (compressor - to - cylinder block and compressor-to-water crossover connection).

6. Connect the main air outlet line to the compressor.

7. Connect to the governor all air lines that were disconnected during removal.

8. On F- and T-Series trucks, connect the compressor air intake hose and secure with two clamps.

9. Secure any water or air line-to-sheet metal clamps that were disconnected during removal.

10. On F-, T- and N-Series trucks, install the floor pan cover at the gear shift lever.

11. Clean the gasket material from the pump mounting surfaces, position a new gasket, install the fuel pump to the front side of the compressor, and connect the throttle linkage and lines as described in Group 10.

12. On F- and T-Series trucks, fill the cooling system, charge the reservoirs and check for leaks.

On H- and N-Series trucks, first install the air intake system components as outlined in the following procedure.

Air Intake Lines—H- and N-Series Trucks Only

1. Install the right air cross-over manifold to the engine intake manifold, connect the compressor air intake hose to the cross-over manifold and to the compressor, and position the connection hose on the right and left cross-over manifolds (Fig. 11).

2. Install the air cross-over manifold retaining bolts, and tighten the two clamps on the compressor air intake hose.

3. Tighten the clamps on the connection hose.

4. Connect the air intake duct to the air cross-over manifold and tighten the clamp.

5. Fill the cooling system, charge the reservoirs, and check for leaks.

GOVERNOR

REMOVAL

The governor is mounted to the compressor with two retaining bolts. Mating ports in the governor and compressor bodies connect governor pressure to the unloading pistons in the compressor. Reservoir pressure is connected to the governor through a hose or tube.

1. Exhaust the air brake system.

2. On vertically-mounted units, disconnect the governor hose (end opposite governor) from the fitting in the reservoir pressure line. On side-mounted units, disconnect the pressure line at the governor.

3. Remove the two mounting bolts, then remove the governor.

INSTALLATION

1. On vertically-mounted units, transfer the hose to the replacement governor.

2. Install the governor and gasket and the two retaining bolts to the compressor. Apply sealer.

3. On vertically-mounted units, connect the hose to the fitting on the reservoir pressure line. On side-mounted units, connect the pressure line to the governor.

4. Test the governor as outlined in Part 2-1.

PRESSURE INDICATOR VALVE

The low pressure indicator valve is mounted at the passenger side of the dash panel (Fig. 13), and taps into a reservoir pressure line on the engine side of the panel.

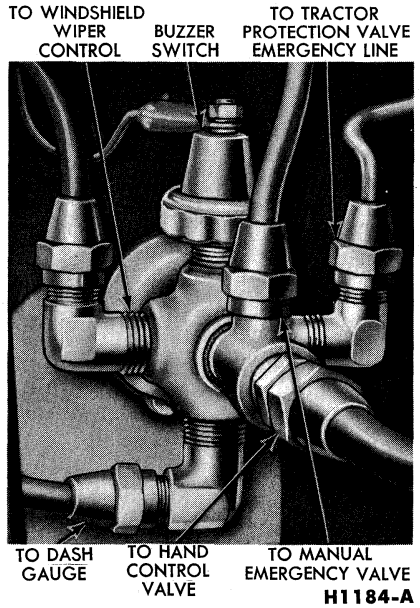


FIG. 13—Pressure Indicator Valve

REMOVAL

1. Turn the ignition switch to the "off" position and exhaust the air from the brake system.

2. Disconnect the wire at the buzzer switch.

3. Disconnect the air line to the dash gauge and the line to the windshield wiper control. On some full air systems, also disconnect the lines to the tractor protection valve, to the manual emergency valve, and to the hand control valve (Fig. 13).

4. Unscrew the pressure indicator fitting at the engine side of the dash panel, and remove the assembly from the passenger side.

INSTALLATION

1. Mount the replacement unit to the passenger side of the dash panel and secure it to the panel by screwing on the pressure indicator fitting at the engine side.

2. Connect the wire to the buzzer switch, and connect the dash gauge and windshield wiper control lines. On some full air systems, connect the other lines as shown in Fig. 13.

4 MAJOR REPAIR OPERATIONS

Major repair operations are not applicable to this section. If the compressor, reservoirs, governor, low pressure indicator, and/or dash gauge is defective, the component must be replaced.

PART 2-7 AIR BRAKES

1 DESCRIPTION AND OPERATION

Full air brakes are available on all 600 through 1100 Series trucks. Some of the system components vary slightly from one truck model to another in design or location. However, all components are essentially the same in principle and service procedure.

TRACTOR AIR BRAKE SYSTEM

The full air brake system consists of the air supply system described in Part 2-6 and the braking system.

BRAKING SYSTEM

The braking system consists of the foot control valve, the four brake chambers and slack adjusters, and two quick releasing valves (Fig. 1). The distance the brake treadle is depressed regulates the amount of compressed air delivered by the foot control valve to the brake chambers. The amount of air, in turn, determines the braking force applied by the slack adjusters to the shoes.

Foot Control Valve

APPLYING POSITION. Depressing the treadle forces the plunger, rubber graduating spring, and piston downward against the resistance of the return spring (Fig. 2). As the piston moves down against the exhaust seat, it closes the passage between the brake chamber ports and

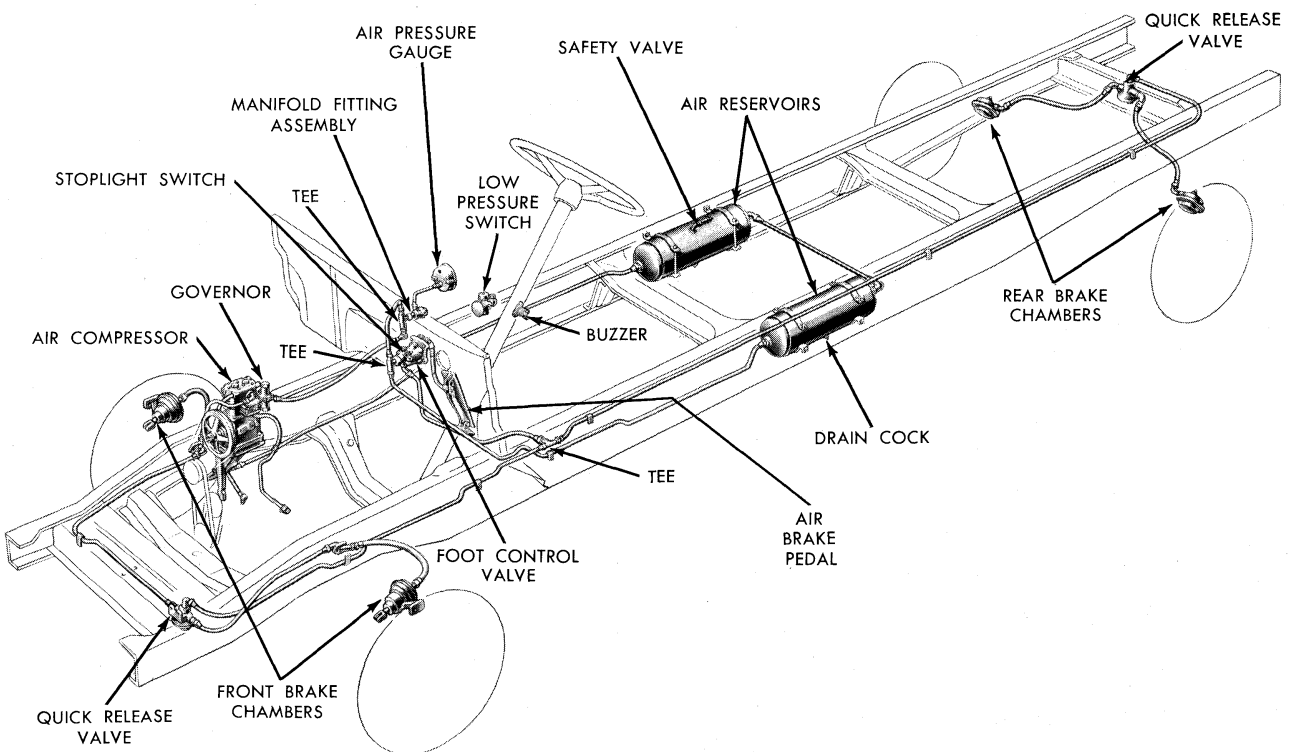


FIG. 1—Typical Air Brake System

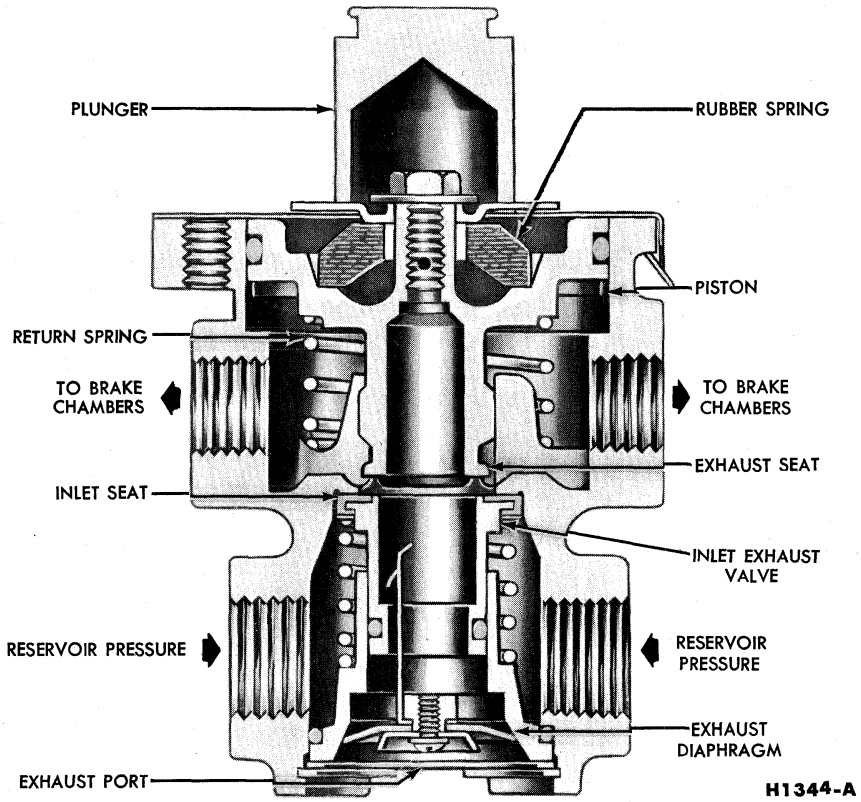


FIG. 2—Foot Control Valve Operation

the exhaust port. Further downward movement of the piston forces the inlet-exhaust valve from the inlet seat (Fig. 2) to open the passage between the reservoir pressure ports and the brake chamber ports.

BALANCED POSITION. When the air pressure in the cavity beneath the piston and the air pressure being delivered to the brake chambers equals the mechanical force on top of the piston, the piston lifts and the inlet valve closes, cutting off any further flow of air from the reservoir pressure ports through the valve body. The exhaust valve remains closed, however, because the mechanical pressure at the treadle holds the piston (seat) down against the valve. With both valves closed, no more air can enter and air already admitted can not escape. The valve is thus in a balanced position.

If the treadle is depressed further, mechanical pressure overcomes air pressure in the cavity beneath the piston opening the inlet valve again. This permits more reservoir air to enter until the pressure below the piston equals the mechanical pressure above and the inlet valve closes again. Complete depression of the treadle releases full reservoir pressure to the brake chambers.

RELEASED POSITION. If the treadle is partially released, air pressure beneath the piston overcomes the mechanical pressure above, raising the piston and the inlet-exhaust valve assembly. This action closes the intake valve and opens the exhaust valve allowing air pressure from the brake chambers and lines to be released through the exhaust port. The air continues to exhaust until air pressure below the piston equals the mechanical pressure above. The foot control valve is again in balanced position. If the treadle is allowed to return to the fully released position, the exhaust valve remains open to exhaust all air from the chambers and fully release the brakes.

Brake Chamber and Slack Adjuster. Compressed air, admitted to the brake chamber by the foot control valve, enters the chamber behind a diaphragm which forces the push rod outward (Fig. 12). The outward movement of the push rod rotates the slack adjuster which in turn rotates the brake camshaft and cam forcing the shoes against the drum.

When the air pressure is released from the brake chamber, the brake shoe release springs and the brake chamber release springs return the brake shoes, brake cam, slack adjuster, and the pushrod and diaphragm assembly to released position.

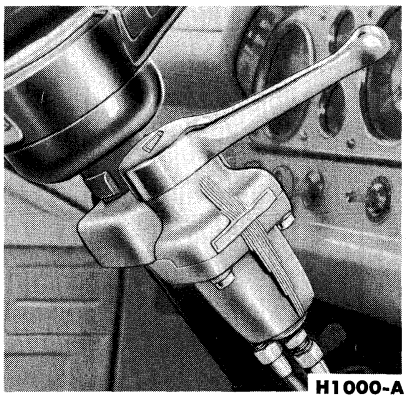


FIG. 3—Hand Control Valve

Quick Release Valves and Relay Valve. The quick release valve (Fig. 1) reduces the time required to release the brakes by hastening the exhaust of air from the brake chambers. The valve body contains a spring-loaded diaphragm so arranged as to permit supply pressure from the control valve to flow through the release valve to the brake chambers in one direction. When supply pressure is reduced, the air, which has passed through, is permitted to escape rapidly through the exhaust port.

The quick release valve is used with both front and rear brake chambers, or with front chambers only as in the case of a T-Series truck.

On a T-Series truck, the relay valve is used in place of the rear quick release valve (Fig. 20). The relay valve functions somewhat the same as the quick release valve, except that it services four rear brake chambers on a T-Series truck instead of two. The relay valve is also more sensitive to the action of the control valve in that it can assume a balanced position as well as apply and release.

TRACTOR-TRAILER AIR BRAKE SYSTEM

Tractor-trailer air brake equipment is available as a regular production option. The following items are included in the package.

HAND CONTROL VALVE

The hand operated brake application valve (Fig. 3) is mounted on the steering column. It controls the application of the trailer brakes independent of the tractor brakes.

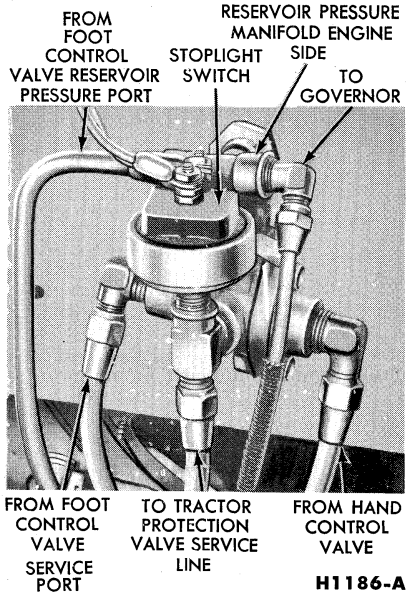


FIG. 4—Double Check Valve

DOUBLE CHECK VALVE

The double check valve is a shuttle type valve which is connected between the hand operated and foot operated brake control valves. The double check valve prevents air from exhausting through one of the brake control valves while the other is being applied.

In a typical installation (Fig. 4), the double check valve is connected to a reservoir pressure manifold mounted to the engine side of the dash panel. The pressure indicator valve also ties into this manifold from the passenger side (Part 2-6, Fig. 13).

MANUAL EMERGENCY VALVE

The manual emergency valve is mounted under the edge of the instrument panel (Fig. 5). This is a two-way valve by which the operator manually controls the operation of the tractor protection valve for either normal or emergency operation of the brakes.

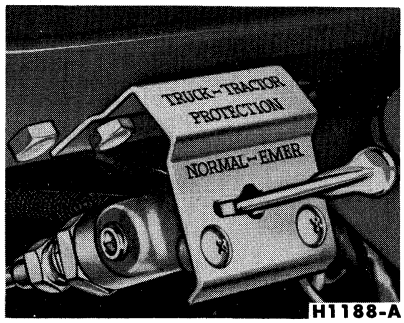


FIG. 5—Manual Emergency Valve

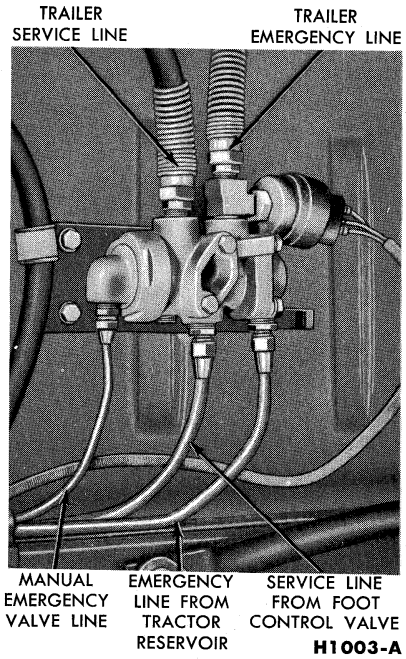


FIG. 6—Tractor Protection Valve

TRACTOR PROTECTION VALVE

The tractor protection valve is mounted on the rear of the cab (Fig. 6). When the tractor protection valve is open it keeps the service and emergency lines open to the trailer for normal operation. When closed the tractor protection valve performs the following function:

1. Closes automatically when tractor reservoir pressure drops below normal operating pressure (24 psi). This stops passage of air to the trailer until tractor reservoir pressure builds up again.

2. Closes by action of the manual emergency control valve to effect emergency application of the trailer brakes in the event of tractor brake failure.

3. Closes by action of the manual emergency control valve, if the trailer breaks away, to prevent the loss of tractor reservoir pressure.

RELAY EMERGENCY VALVE

The relay emergency valve is located on the trailer near the trailer reservoir. During normal operation it charges the trailer reservoir and applies and releases the trailer brakes in unison with the tractor brakes. During emergency operation, or in the case of trailer break-away, the relay emergency valve automatically applies the trailer brakes.

HOSE HANGERS AND CONNECTORS

The trailer brake hoses (emergency line and service line) are suspended from the center of the cab, above the rear cab window, by coil springs (Fig. 7). When the trailer is not in use, the connectors are hung

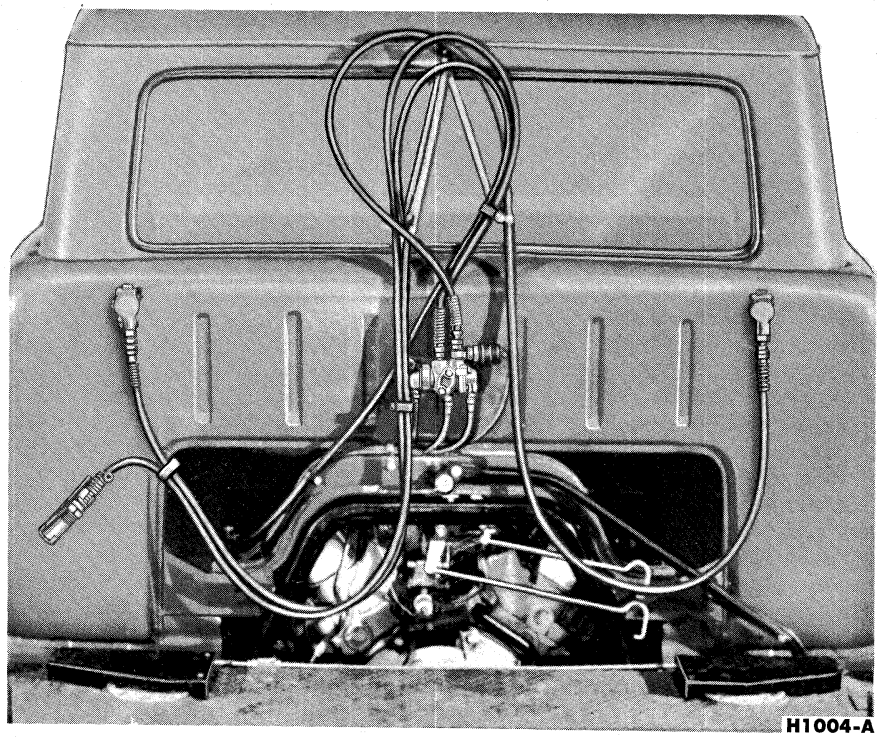


FIG. 7—Trailer Brake Hoses and Connections

applies pressure to the shoe web to avoid cocking the shoe.

3. Install the shoe retracting springs.

4. Install the wheel, hub, and drum assembly. **If equipped with Fail-Safe Units, turn the release bolt counterclockwise (approximately 18 turns) to release the manual compression of the actuating spring.**

FOOT CONTROL VALVE

The brake valve has two tiers of four ports each (Figs. 17 and 19). The lower tier of ports connects to the reservoir pressure lines; the upper tier connects to the lines carrying brake service pressure. Of the four lower ports, one receives reservoir pressure; one sends reservoir pressure to the governor; and the other two (depending upon the model) either send reservoir pressure to some other part of the system, or they are plugged. On tractors, for example, the trailer emergency line connects to one of these ports in order to carry tractor reservoir pressure to the trailer reservoir.

One of the four upper ports sends valve delivery pressure to the stop light switch. Any or all of the three remaining ports (depending upon the model) can be used to deliver service pressure to the brake chambers or to the trailer. Any unused ports are plugged.

F-, B-, C-, N-, and T-SERIES TRUCKS

REMOVAL

1. Open the reservoir drain cock(s) to exhaust the system.

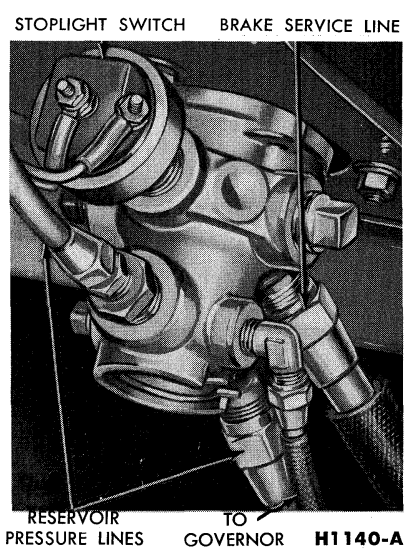


FIG. 17—Typical Foot Control Valve Installation

2. Disconnect all but one line from the valve ports (Fig. 17). Loosen, but do not disconnect, the remaining line. This line will prevent the valve from falling when the retaining bolts are removed.

3. Remove the cotter key and pivot pin that connect the brake treadle to the control valve mounting plate.

4. Remove the three control valve retaining bolts (Fig. 18).

5. Disconnect the remaining air line from the control valve and remove the control valve.

INSTALLATION

1. If a replacement valve is being installed, transfer all brass fittings and the stop light switch to the replacement. Apply sealer to the threads before installation.

2. Remove the actuating button and the rubber seal from the control valve mounting plate to facilitate the positioning of the new valve (Fig. 18).

3. Position the new valve to the lower dash panel and mounting plate, then install three retaining bolts.

4. Install the actuating button in the mounting plate bore, then install the rubber seal to the button and mounting plate.

5. Assemble the brake treadle to the control valve mounting plate with the pivot pin and cotter key.

6. Connect the stop light wires

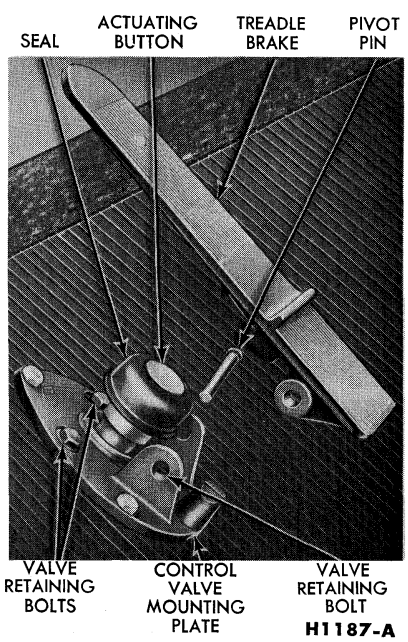


FIG. 18—Brake Treadle and Mounting Plate

(two nuts and flat washers), and connect the battery cable (Fig. 17).

7. Connect the brake service line(s) to the upper ports in the valve.

8. Connect the compressor governor line and the reservoir pressure line(s) to the lower ports in the valve.

9. Start the engine to build up pressure. Check for leaks.

H-SERIES TRUCKS

Removal

1. Open the reservoir drain cock(s) to exhaust the system.

2. Disconnect the compressor governor line and the reservoir pressure line(s) (Fig. 19).

3. Disconnect the brake service line(s).

4. Disconnect the battery cable, then disconnect the two wires from the stop light switch (Fig. 8).

5. Disconnect the control valve actuating arm from the valve mounting bracket by removing the cotter pin and clevis pin (Fig. 19).

6. Remove the three retaining bolts and the valve assembly from the mounting bracket.

Installation

1. If the valve is being replaced, transfer all brass fittings and the stop light switch to their corresponding ports on the replacement valve. Apply sealer to the threads before installation.

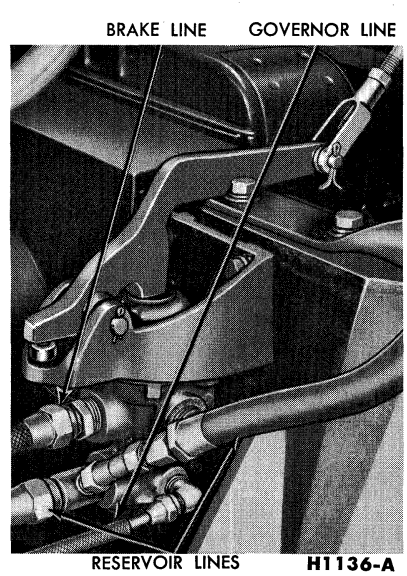


FIG. 19—H-Series Brake Valve Installation

PART 2-8 SPECIFICATIONS

HYDRAULIC BRAKE DIMENSIONS—F-100 THROUGH 350 AND P-SERIES—FRONT AND REAR

Truck Model		Brake Drum Diameter (Inches)		Brake Lining Dimensions (Inches)						Brake Cylinder Bore Diameter (Inches)	Brake Master Cylinder Piston Diameter (Inches)
				Length		Width		Thickness			
		Normal	Maximum Oversize	Primary	Secondary	Primary	Secondary	Primary	Secondary		
F-100 and P-100	Front	11	11.060	10.65	11.91	2	2	0.187	0.250	1 1/16	1 1/16
	Rear	11	11.060	10.65	11.91	1 3/4	1 3/4	0.187	0.250	7/8	
F-250	Front	12 1/8	12.185	13.09	13.09	2	2	0.250	0.250	1 1/8	1 1/4
	Rear	12 1/8	12.185	13.09	13.09	2	2	0.250	0.250	1 1/8	
F-350	Front	12 1/8	12.185	13.09	13.09	2	2	0.250	0.300	1 1/8	1 1/4
	Rear	13	13.060	12.71	13.95	2	2	0.250	0.250	1 1/4	
P-350 (Spicer 60)	Front	12 1/8	12.185	13.09	13.09	2	2	0.250	0.300	1 1/8	1 1/4
	Rear	12 1/8	12.185	13.09	13.09	2	2	0.250	0.300	1 1/8	
P-350, P-400-3500-P-4000	Front	12 1/8	12.185	13.09	13.09	2	2	0.250	0.300	1 1/8	1 1/4
	Rear	13	13.060	12.71	13.95	2	2	0.250	0.250	1 1/4	
P-500, P-5000	Front	13	13.060	12.68	13.95	2 1/4	2 1/4	0.250	0.250	15/16	1 1/4
	Rear	14 1/8	14.185	14.42	14.42	3	3	0.375	0.375	1 1/2	

HYDRAULIC BRAKE DIMENSIONS—FRONT BRAKES

SINGLE SERVO SINGLE ANCHOR										
Truck Model	Brake Drum Diameter (Inches)		Brake Lining Dimensions (Inches)						Brake Cylinder Bore Diam. (Inches)
			Length		Width		Thickness		
	Normal	Maximum Oversize	Primary	Secondary	Primary	Secondary	Primary	Secondary	
F-N-B-500-600, C-550-600-6000, F-B-N-700-750, F-800, T-700, N-6000-7000	14	14.060	13.66	15.03	2 1/2	2 1/2	1/4	5/16	1

HYDRAULIC BRAKE DIMENSIONS—FRONT BRAKES

DOUBLE ANCHOR, SINGLE CYLINDER									
Truck Model	Brake Drum Diameter (Inches)		Brake Lining Dimensions (Inches)						Brake Cylinder Bore Diam. (Inches)
			Length		Width		Thickness		
	Normal	Maximum Oversize	Primary	Secondary	Primary	Secondary	Primary	Secondary	
F-B-C-N-600-700-750, N-6000-7000, C-7000, F-800, T-700-750	15	15.060	16.62	16.62	3	3	5/16	5/16	1 1/8
F-C-T-800, T-750 (9000 and 12000 lb. Front Axle)	15	15.060	16.62	16.62	3	3	5/16	5/16	1 1/4

FRONT HYDRAULIC BRAKE DIMENSIONS—FRONT BRAKES

Double Anchor, Two-Cylinder									
Truck Model	Brake Drum Diameter (Inches)		Brake Lining Dimensions (Inches)						Brake Cylinder Bore Diam. (Inches)
			Length		Width		Thickness		
	Normal	Maximum Oversize	Primary	Secondary	Primary	Secondary	Primary	Secondary	
F-N-850-950 (7000-lb Front Axle)	15	15.60	16.62	16.62	3	3	5/16	5/16	1⅛
C-F-N-850-950 (9000-lb Front Axle)	15	15.60	16.62	16.62	3	3	5/16	5/16	1¼
T-NT-850 (9000-lb and 12000-lb Front Axle)	15	15.60	16.62	16.62	3	3	5/16	5/16	1¼

HYDRAULIC BRAKE DIMENSIONS—REAR BRAKES

TWO-CYLINDER									
Truck Model	Brake Drum Diameter (Inches)		Brake Lining Dimensions (Inches)						Brake Cylinder Bore Diam. (Inches)
			Length		Width		Thickness		
	Normal	Maximum Oversize	Primary	Secondary	Primary	Secondary	Primary	Secondary	
F-B-N-500-600, C-550-600-6000, N-6000, T-700 (13000 lb, 14000 lb, 15000 lb, and 22000 lb Rear Axles)	15	15.060	15.315	15.315	4	4	⅜	⅜	1½
F-B-N-600, N-6000, C-600-6000 (15000 lb Rear Axle)	15	15.060	15.84	15.84	4½	4½	½	½	1 1/16
F-B-N-600-700-750, C-600-6000-700-750-7000, N-6000-7000, F-800 (17000 lb Rear Axle)	15	15.060	15.315	15.315	5	5	½	½	1 1/16
T-700-750 (30000 lb Rear Axle)	15	15.060	15.315	15.315	5	5	½	½	1 1/16
F-B-C-N-700-750, C-N-7000, F-C-800 (18500 lb Rear Axle)	16	16.060	16.89	16.89	5	5	½	½	1¾
T-800 (34000 lb Rear Axle)	16	16.060	16.89	16.89	5	5	½	½	1¾
F-C-800 (22000 lb Rear Axle)	16	16.060	16.89	16.89	6	6	½	½	1 13/16
T-NT-850 (30000-lb Rear Axle)	15	15.60	15.84	15.84	5	5	½	½	1⅝
C-F-N-850 (18500 lb Rear Axle)	16	16.60	16.89	16.89	5	5	½	½	1¾
T-NT-850 (34000-lb Rear Axle)	16	16.60	16.89	16.89	5	5	½	½	1¾
C-F-N-850-950 (22000-lb Rear Axle)	16	16.60	16.89	16.89	6	6	½	½	1⅞

HYDRAULIC BRAKE PEDAL FREE TRAVEL

All Trucks	3/16-⅜ Inch

VACUUM BOOSTERS—LIGHT TRUCKS

Make and Type	Effective Diameter (Inches)	Slave Cylinder Diameter (Inches)	Minimum Hydraulic Pressure (psi) at 20 Inches Hg	Truck Application
Bendix (Hydrovac) Piston—Frame-Mounted	6¾	1	625	P-400, P-4000, P-350
Midland—Diaphragm—Dash-Mounted	8⅛	.97		F-350

VACUUM BOOSTERS—MEDIUM DUTY TRUCKS

Make and Type	Effective Diameter (Inches)	Slave Cylinder Diameter (Inches)	Minimum Hydraulic Pressure (psi) at 20 Inches Hg	Truck Application
Midland (Hy-Power) Diaphragm—Frame Mounted	8⅛	⅞	960	F-, B-500-600, C-550-600 N-500, 600, 6000 P-500, P-5000
Bendix (Hydrovac) Diaphragm	10¼	⅞	1420	F-, B-, C-700, 750, F-, C-800 N-700, 750, 7000
Bendix (Hydrovac) Piston	9½	1 3/16	1325	T-700
Bendix (Hydrovac) Tandem Piston	9½	1⅛	1300	T-750-800

VACUUM BOOSTERS—HEAVY DUTY TRUCKS

Truck Series				
	*STD.	T-850 NT-850	F-950 N-950 T-850 NT-850	C-850 F-850 N-850
	*RPO		F-850 N-850 C-850 C-950	
Type		Diaphragm	Piston	Diaphragm
Make		Bendix	Bendix	Bendix
Outside Diameter (Inches)		11.00	(Piston Dia.) 9.50	12.75
Effective Area (Sq. In.)		57	70.88	76.50
Slave Cylinder Diameter (Inches)		.75	.812	.875
Stroke (Inches)		3.75	6.25	4.55
Displacement (Cubic Inches)		1.1	3.2	2.6
Vacuum Booster Weight (Lbs.)				19.5

*Frame Mounted.

AIR BOOSTER

Make	Bendix Air-Pac
Effective Diameter	4½ inches
Slave Cylinder Diameter	1⅛ inches
Stroke	3¾ inches
Displacement (Cubic Inches)	3½
Truck Application	F-600-800, N-600-6000-750-7000, C-600-800-6000-7000, B-600-750, T-700
	C-850, C-950 F-850, F-950 N-850, N-950

HYDRAULIC BRAKE MASTER CYLINDER

Piston Diameter (Inches)	1.25	1.50	1.75
Stroke (Inches)		1.44	

REAR BRAKE CABLE ACTUATING TYPE PARKING BRAKE

Truck Model		Lining Type	Lining Thickness (Inches)	Drum Diameter (Inches)	Drum Width (Inches)
F-100	2-Wheel Drive	Moulded	Pri. -.1875 Sec.-.1875	11.00	1.75
	4-Wheel Drive	Moulded	Pri. -.1875 Sec.-2.50	11.00	1.75
F-250		Moulded	.250	12.12	2.00
P-350 with 3-speed LD & MD Transmissions		Moulded	Pri. -.250 Sec.-.250	12.12	2.00

EXTERNAL CONTRACTING BAND TYPE PARKING BRAKE

Truck Model	Lining Type	Lining Thickness (Inches)	No. of Pieces and Length (Inches)	Drum Diameter (Inches)	Drum Width (Inches)
F-350	Woven	.156	1—24.63	8.00	2.00
P-350, P-400, P-500, P-4000, P-5000	Moulded	.250	2—7.89 1—7.30	7.812	2.50

INTERNAL EXPANDING SHOE TYPE PARKING BRAKE—500-800 SERIES

Truck Model	Transmissions	Lining Thickness (Inches)	No. of Pieces and Length (Inches)	Drum Diameter (Inches)	Drum Width (Inches)
F-B-N-500-600-700, C-550-600-700	Warner T-98 4-Speed	0.21	2 @ 10.57	9.00	2.00
F-B-N-500-600, C-550-600-6000, N-6000	5-Speed M.D. Clark 250-V, 251-V0, 2622-2653-V1 H.D. 264-V0 H.D.				
F-B-N-600-700, C-550-600-700, C-N-6000-7000	New Process 435NP (Use with 330 Engine)				
F-B-C-N-T-700, C-N-7000	5-Speed M.D. Clark 250-V, 251-V0	0.21	2 @ 10.57	9.00	3.00
F-C-700-750-800, B-700-750, N-700-750, C-7000	5-Speed H.D. Clark 264-V0, 2622-V1				
F-B-N-700-750, T-C-700-750, C-7000-800, T-800, CT-750-800	5-Speed H.D. Clark 2653-V1				
F-B-N-750	5-Speed EHD Spicer 5652, 5756-B				
C-T-700	6-Speed MT-30 Transmatic				
F-800, C-T-CT-750-800	6-Speed MT40 Transmatic				
C-CT-750-800, F-800	5-Speed EHD, Spicer 5652, 5756-B	0.25	2 @ 13.95	12.00	4.00
T-CT-750-800	5-Speed Fuller R-46				

INTERNAL EXPANDING SHOE TYPE PARKING BRAKE—850-1100 SERIES

TRUCK SERIES	F-850 F-950 C-850 C-950 N-850 N-950 NT-850	CT-850 CT-950 NT-950	F-850 F-950 F-950-D F-1000 F-1000-D F-1100 F-1100-D	C-850 C-950 C-1000 C-1100 CT-850 CT-950 N-850 N-950 N-950-D N-1000 N-1000-D N-1100 N-1100-D	NT-850 NT-850-D NT-950 NT-950-D T-850 T-850-D T-950 T-950-D	F-950 F-950-D F-1000 F-1000-D F-1100 F-1100-D C-950 C-1000 C-1100 N-950 N-950-D N-1000 N-1000-D N-1100 N-1100-D NT-850-D NT-950-D T-850-D T-950-D	F-950 N-1000-D NT-850-D NT-950-D T-950-D	F-950-D F-1000-D N-950-D N-1000-D NT-850-D NT-950-D T-850-D T-950-D	F-950-D F-1000-D N-950-D N-1000-D NT-850-D	F-850 F-950 F-950-D F-1000 F-1000-D F-1100-D C-850 C-950 C-1000 N-850 N-950 N-950-D N-1000 N-1000-D N-1100-D NT-850-D NT-950-D T-850-D	F-950-D F-1000-D N-950-D N-1000-D NT-850-D T-850-D
TRANSMISSION	5-Spd. Exclusive HD Spicer—5652, 5756-B	5-Spd. Excl. HD Spicer 5652		5-Spd. Exclusive HD Spicer—6352		5-Spd. Exclusive HD Spicer—6352-B	5-Spd. Excl. HD Spicer 6354	5-Spd. Excl. HD Spicer 6354	5-Spd. Excl. HD Spicer 6452-A	5-Spd. Exclusive HD Spicer—6453-A	5-Spd. Excl. HD Spicer 6454-A
Handbrake—Type	Rockwell Standard Internal Shoe										
Drum Part Number											
Diameter	12.00										
Width	4.00										
Lining	Molded										
Type											
Length and Number of Pieces	2 @ 13.95										
Width	4.00										
Thickness—Primary	0.25										
Thickness—Secondary	0.25										
Material	Marshall 9051-C American Brake Bloc 693-539										
Area Sq. In.	111.60										
Location	Rear of Main or Auxiliary Transmission										
Hand Control Std.	Floor Lever										
Hand Control RPO											
Handbrake Assy. Weight	50.00										

TRUCK SERIES	F-950-D F-1000-D N-950-D N-1000-D T-850-D NT-850-D NT-950-D	F-850 F-950 F-950-D F-1000 F-1000-D C-850 C-950 C-1000 N-850 N-950 N-950-D N-1000 N-1000-D NT-850 NT-850-D NT-950-D	F-950-D F-1000-D N-950-D N-1000-D NT-850-D NT-950-D	N-950-D N-1000-D N-1100-D NT-850-D NT-950-D	N-950-D N-1000-D NT-850-D NT-850-D	F-850 F-950 F-1000 N-850 N-950 N-1000 C-850 C-950 C-1000 T-850 T-950 CT-850 CT-950 NT-850 NT-950	F-950-D F-1000 F-1000-D F-1100 F-1100-D N-950-D N-1000 N-1000-D N-1100 N-1100-D T-850 T-850-D T-950 T-950-D NT-850 NT-850-D NT-950 NT-950-D C-1000 C-1100	F-950-D F-1000 F-1000-D F-1100 F-1100-D N-950-D N-1000 N-1000-D N-1100-D T-850 T-850-D T-950 T-950-D NT-850 NT-850-D NT-950 NT-950-D C-1000 C-1100	F-1000 F-1000-D F-1100 F-1100-D N-950-D N-1000-D N-1100-D C-1000 C-1100 T-850 T-850-D T-950 T-950-D NT-850-D NT-950-D	F-850 F-950 C-850 C-950 T-850 T-950	F-850 F-950 F-1000 F-1100 C-850 C-950 C-1000 C-1100 T-850 T-950
TRANSMISSION	5-Spd. Excl. HD Spicer 6455-A	5-Spd. Excluding HD Spicer—6852-G	5-Spd. Excl. HD Spicer 6854-G	5-Spd. Max. Duty Spicer 8051-C, 8052	5-Spd. Max. Duty Spicer 8054, 8055-C	5-Spd. Fuller R-46	10-Spd. Max. Duty Fuller R-96, R-960	10-Spd. Max. Duty Fuller RA-96, RA-960	12-Spd. Max. Duty Spicer 8125	6-Spd. Transmatic MT-40	6-Spd. Transmatic MT-42
Handbrake—Type	Rockwell Standard Internal Shoe										
Drum Part Number											
Diameter	12.00										
Width	4.00										
Lining	Molded										
Type											
Length and Number of Pieces	2 @ 13.95										
Width	4.00										
Thickness—Primary	0.25										
Thickness—Secondary	0.25										
Material	Marshall 9051-C American Brake Bloc 683-539										
Area Sq. In.	111.60										
Location	Rear of Main or Auxiliary Transmission										
Hand Control Std.	Floor Lever										
Hand Control RPO											
Handbrake Assy. Weight	50.00										

MAXI PARKING BRAKE

Truck Applications	B-C-F-600-700-750, F-800, N-600 thru 750, T-700 thru 800	B-C-F-N-700-750, C-F-T-800	F-C-800
Transmission			
Rear Axle (Pounds)	16000 30000	18000 34000	21000
Chamber Area (Square Inches)	20	24	30
Overall Diameter (Inches)	6.78	7.25	8.125

MAXI PARKING BRAKE—Continued

Truck Applications	B-C-F-600-700-750, F-800, N-600 thru 750, T-700 thru 800	B-C-F-N-700-750, C-F-T-800	F-C-800
Maximum Stroke (Inches)	2.25	2.25	2.50
Spring Force at "O" Stroke (Pounds)	1925	1925	1925
Spring Force at Normal Working Stroke (Pounds)	1550	1550	1550

BRAKE AIR COMPRESSOR

Truck Series	All 600 through 800 Series F- and N-850 through 11000 C-850 through 11000 CT-850-950 T-NT-850-950 H-1000, HT-950	F-C-N-850 through 1100 T-CT-NT-850 and 950 HT-950, H-1000	F-950-D through 1100-D N-950-D through 1100-D T-NT-850, D-950-D HT-950-D, H-1000-D	NT-850-D and 950-D N-1000-D H-1000-D
Type (2 Cyl. Water Cooled)	Bendix Westinghouse	Bendix Westinghouse	Cummins	Bendix
Bore and Stroke (Inches)	2.06 x 1.50	2.50 x 1.69	3.44 x 1.90	2.50 x 1.69
Displacement and Engine rpm	7.25 Cu. Ft. @ 1250 rpm	12 Cu. Ft. @ 1250 rpm	12 Cu. Ft. @ 1250 rpm	12 Cu. Ft. @ 1250 rpm
Operated Speed Recommended		3000 rpm		
H.P. @ Rated Speed of 1250 rpm and 100 psi	1.2		1.8	
Oil Type		Same as Engine		

AIR BRAKE SYSTEM PRESSURE SETTINGS

Working Pressure	123-127 psi
Safety Valve Setting (Air Reservoir)	150 psi
Warning Buzzer Operating Pressure	60 psi
Cut-out Pressure (Governor)	100-105 psi
Cut-in Pressure (Governor)	80-85 psi

SLACK ADJUSTERS

	Front	Rear
Type	Rod and Lever	360° Rotating Worm and Gear
Length of Arm (Inches)	5	6
Cab Radius	0.5	

AIR BRAKE VALVE

Type Pre-Loaded	Bendix—Westinghouse
Operation—Valve Treadle Assembly	
Force for Full Brake Application	100 lbs.

AIR BRAKE SHOE CAMSHAFT

	Front	Rear
Diameter at Bushing (Inches)	1.493-1.495	1.493-1.495
Bushing I.D. (Inches)	1.499-1.501	1.499-1.501

BRAKE CHAMBER PUSH ROD ADJUSTMENT TABLE

Brake Chamber Type		Maximum Travel	Readjustment Travel
Front—Type (standard)	# 9	1⅜ Inch	¾ Inch
	#12	1⅜ Inch	¾ Inch
	#16	1¾ Inch	¾ Inch
Rear—Type (standard)	#20	1¾ Inch	1 Inch
	#24	1¾ Inch	1 Inch
	#30	2 Inch	1 Inch
	#36	2¼ Inch	1 Inch
Rear—Type (Maxibrake)	#20	1¾ Inch	1 Inch
	#24	1¾ Inch	1 Inch
	#30	2 Inch	1 Inch

FRONT AIR BRAKE CHAMBER

Front Axle	6,000	7,000		9,000						11,000
Truck Series	F-B-N-600-700-750, F-800, C-600 N-C-6000-7000	F-700-850, B-N-700-750 C-600-700-750-6000-7000, N-850-7000, T-700	F-950 F-950-D N-950 N-950-D	CT-750-800 F-C-800 T-750-800 F-850 F-950 F-950-D F-1000 F-1000-D F-1100 F-1100-D	N-850 N-950 N-950-D N-1000 N-1000-D N-1100 N-1100-D	NT-850 NT-850-D NT-950 NT-950-D C-950 C-1000 C-1100	CT-850 CT-950 T-850 T-950	T-850-D T-950-D H-1000 H-1000-D	F-850 N-850 NT-850 NT-850-D T-850 T-850-D	C-850 CT-850
Area (Square Inches)		9					12			
Overall Diameter (Inches)		5.25					5.69			
Maximum Stroke (Inches)		1.75					1.75			
Maximum Stroke at which Brake should be adjusted (Inches)		1.375					1.375			
Spring Force at "0" Stroke		7.75					12.25			
Increase Per Inch of Stroke		1.25					2.50			
Adjust To:		0.75					0.75			
A.L. Factor		45					60			

FRONT AIR BRAKE CHAMBER

Front Axle	11,000 and 12,000				15,000			
Truck Series	T-800 C-CT-800 F-950 F-950-D F-1000 F-1000-D F-1100 F-1100-D	N-950 N-950-D N-1000 N-1000-D N-1100 N-1100-D NT-950 NT-950-D	C-950 C-1000 C-1100 CT-950 T-950 T-950-D	HT-950 HT-950-D H-1000 H-1000-D	T-850-D T-950 T-950-D NT-850 NT-850-D NT-950 NT-950-D	CT-850 CT-950 C-850 C-950 C-1000 C-1100	F-1000 F-1000-D F-1100 F-1100-D N-1000 N-1000-D N-1100 N-1100-D	HT-950 HT-950-D H-1000 H-1000-D
Area (Square Inches)				16				
Overall Diameter (Inches)				6.38				
Maximum Stroke (Inches)				2.25				
Maximum Stroke at which Brake should be Adjusted (Inches)				1.75				
Spring Force at "0" Stroke				18.50				
Increase Per Inch of Stroke				4.50				
Adjust To:				0.75				
A.L. Factor		80				88		

REAR AIR BRAKE CHAMBER

Rear Axle	30,000		18,000		34,000	29,000
Truck Series	CT-850 T-850-D	NT-850 NT-850-D HT-950 HT-950-D	F-850 N-850 C-850 H-1000	H-1000-D NT-850-D HT-950 HT-950-D	T-850 T-850-D CT-850 NT-850 NT-850-D HT-950 HT-950-D	F-1100 F-1100-D N-1100 N-1100-D C-1100
Area (Square Inches)	20			24		36
Overall Diameter (Inches)	6.78			7.25		9.00
Maximum Stroke (Inches)	2.25			2.25		3.00
Maximum Stroke at which Brake should be Adjusted (Inches)	1.75			1.75		2.25

REAR AIR BRAKE CHAMBER

Rear Axle	22,000		23,000		38,000	44,000	50,000	60,000
Truck Series	F-850 F-950 F-950-D N-850 N-950 N-950-D	C-850 C-950 H-1000 H-1000-D	F-950 F-950-D F-1000 F-1000-D N-950 N-950-D N-1000 N-1000-D	C-950 C-1000 HT-950 HT-950-D H-1000 H-1000-D	NT-850-D NT-950 NT-950-D T-950 T-950-D HT-950 HT-950-D	T-950 T-950-D	T-950	ET-950
Area (Square Inches)				30				
Overall Diameter (Inches)				8.125				
Maximum Stroke (Inches)				2.50				
Maximum Stroke at which Brake should be Adjusted (Inches)				2.00				

AIR BRAKE CHAMBERS

	Rear		
	F-B-C-N-600-700-750, N-C-6000-7000, CT-750, T-700-750-800, F-800	F-B-C-N-700-750, C-N-7000, F-C-T-CT-800	F-C-800
Type and Area (Square Inches)	20	24	30
Overall Diameter (Inches)	$6\frac{25}{32}$	$7\frac{1}{4}$	$8\frac{1}{8}$
Maximum Stroke (Inches)	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$
Maximum Stroke when Brakes are to be adjusted (Inches)	$1\frac{3}{4}$	$1\frac{3}{4}$	2
Spring Force "O" Stroke (Pounds)	$25\frac{3}{4}$	$30\frac{3}{4}$	$39\frac{1}{2}$
Increase per Inch of Stroke (Pounds)	$6\frac{1}{4}$	8	$10\frac{1}{2}$
Adjust Stroke to (Inches)	1	1	1

STOPMASTER BRAKE CHAMBERS

Front Axle	9,000	11,000 and 12,000					
Rear Axle			18,000	34,000	22,000	23,000	38,000
Truck Series	H-1000 H-1000-D	H-1000 H-1000-D HT-950 HT-950-D	H-1000 H-1000-D HT-950 HT-950-D	HT-950 HT-950-D	H-1000 H-1000-D HT-950 HT-950-D		HT-950 HT-950-D
Area (Square Inches)	12	16	9			12	
Overall Diameter (Inches)	5.68	6.38	5.25			5.68	
Maximum Stroke (Inches)	1.31	1.31	1.31			1.31	
Maximum Stroke at which Brake should be Adjusted (Inches)	1.06	1.06	1.06			10.6	
Adjust To:	50	50	38			38	

AIR BRAKE SHOE RETURN SPRING

Brake Usage	Free Length (Inches)	Extended Length		Application
		Inches	@ Lbs. Load	
Front	6.25	6.875	50	All Models Except 15,000 Lb. Front Axle
Front	6.875	7.312	70	15,000 Lb. Front Axle
Rear	10.62	11.50	75	All 16½" Brakes Except 4½" Width
Rear	10.62	11.50	100	16½" x 4½" Brakes only

FRONT AIR BRAKE DIMENSIONS— 600 THROUGH 800 SERIES TRUCKS

Truck Model	Front Axle Capacity (Pounds)	Brake Drum		Brake Lining Length (Inches)
		Length (Inches)	Width (Inches)	
F-B-N-600, N-6000	6000	16	2½	16¾
F-B-N-700-750, C-600-6000-7000, N-7000	6000 7000			
C-700-750-7000	7000			
F-800	6000 7000 9000			
T-700	6000			
T-700-750	7000			
T-CT-750-800	9000			
T-CT-750, F-C-T-CT-800	9000 11000 12000	16¼	3½	17 1/64
T-CT-800	15000	17¼	3½	18 1/16

REAR AIR BRAKE DIMENSIONS— 600 THROUGH 800 SERIES TRUCKS

Truck Model	Rear Axle Capacity (Pounds)	Brake Drum		Brake Lining Length (Inches)
		Length (Inches)	Width (Inches)	
F-B-C-N-600, C-N-6000	17000	16	2½	16¾
F-B-C-N-700-750, C-N-7000	17000 18500			
F-800	17000 18500 22000			
C-800	18500 22000			
T-700-750, CT-750	30000			
T-CT-800	34000			
F-800	17000 18500 22000	16¼	3½	17 1/64
C-800	18500 22000			
T-CT-750	30000			
T-CT-800	34000			
T-CT-800	34000	17¼	3½	18 1/16

AIR BRAKE DIMENSIONS 850 THROUGH 1100 SERIES TRUCKS

FRONT AIR BRAKE LINING—16.00 x 2.50 Inches

Truck Series		F-850 N-850	C-850	F-950 F-950-D N-950 N-950-D	C-950 H-1000	F-1000 N-1000 C-1000 F-1000-D	N-1000-D H-1000-D	F-1100 F-1100-D N-1100 N-1100-D C-1100	T-850 T-850-D NT-850 NT-850-D CT-850	T-850 T-850-D NT-850 NT-850-D CT-850	NT-850-D NT-850	NT-850-D T-950 T-950-D NT-950 NT-950-D CT-950
AXLE USAGE	Front	7,000 9,000	9,000	7,000 9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
	Rear	18,000 22,000	18,000 21,000	22,000 23,000 18,500	22,000 23,000	23,000	18,000 18,500 22,000 23,000	29,000	30,000	34,000	18,000 DA 23,000	38,000
No. Pieces per Shoe							One					
Thickness (Inches)							0.31					
Length (in.) Primary							16.75					
Length (in.) Secondary							16.75					

FRONT AIR BRAKE LINING—16.25 x 3.50 Inches

Truck Series		F-850 N-850 C-850	F-950 F-950-D N-950 N-950-D C-950 H-1000	F-1000 C-1000 F-1000-D N-1000	N-1000-D H-1000-D	F-1100 F-1100-D N-1100 C-1100 N-1100-D	T-850 NT-850 T-850-D CT-850	T-850 NT-850 T-850-D CT-850	NT-850-D NT-850	T-950 T-950-D NT-950 NT-950-D CT-950	HT-950 HT-950-D	T-950
AXLE USAGE	Front	9,000 11,000 12,000				9,000 11,000 12,000					11,000 12,000	
	Rear	18,500 22,000	18,500 22,000 23,000	23,000	18,000 18,500 21,000 23,000	29,000	30,000	34,000	18,000DA 23,000 30,000 34,000 38,000	38,000	18,000DA 23,000 30,000 34,000 38,000	44,000
No. of Pieces per Shoe							One					
Thickness (Inches)							0.44					
Length (in.) Primary							17.02					
Length (in.) Secondary							17.02					

FRONT AIR BRAKE LINING—15.0 x 3.50 Inches

Truck Series		H-1000 H-1000-D	HT-950 HT-950-D			
AXLE USAGE	Front	9,000 11,000	11,000			
	Rear	18,000 21,000 23,000	18,000 DA	23,000	34,000	38,000
No. Pieces per Shoe				Two		
Thickness (Inches)				0.31		
Length (in.) Primary				16.5 (Total)		
Length (in.) Secondary				16.5 (Total)		

FRONT AIR BRAKE LINING—17.25 x 3.50 Inches

Truck Series		F-1000 N-1000 C-1000 F-1000-D	N-1000-D H-1000-D	C-950 H-1000	F-1100 N-1100 F-1100-D C-1100 N-1100-D	T-850 T-850-D CT-850 NT-850	T-950	NT-850-D HT-950 HT-950-D	T-950-D CT-950 NT-950 NT-950-D
AXLE USAGE	Front				15,000				
	Rear	23,000	18,000 18,500 22,000 23,000	22,000 23,000	29,000	30,000 34,000	38,000 44,000 50,000 60,000	18,000DA 23,000 30,000* 34,000 38,000	38,000
No. Pieces per Shoe					One				
Thickness (Inches)					0.44				
Length (in.) Primary					18.06				
Length (in.) Secondary					18.06				

*Used W/HT-Model w/15,000 Lb. Front Axle Only.

REAR AIR BRAKE LINING—16.50 x 4.50 Inches

Truck Series		T-850 T-850-D CT-850 NT-850 NT-850-D	HT-950 HT-950-D
AXLE USAGE	Front	9,000 11,000 12,000	11,000 12,000 15,000
	Rear	30,000	
No. Pieces Per Shoe		Two	
Thickness (Inches)		.075	
Length (In.) Primary		8.75 Per Block	
Length (In.) Secondary		8.75 Per Block	

REAR AIR BRAKE LINING—16.50 x 5.50 Inches

Truck Series		T-850 T-850-D CT-850 NT-850 NT-850-D	HT-950 HT-950-D
AXLE USAGE	Front	9,000 11,000 12,000	11,000 12,000