CONDENSED SERVICE DATA

Tractor Model	C	D	L	LA	R	S	V	VA
GENERAL								
Engine Make	Own	Own	Own	Own	Wauk.	Own	Cont.	Own
Engine Model	C	D	L	LA	FC	S	F124	VA
Cylinders	4	4	4	4	4	4	4	4
Bore—Inches	3⅞ or 4.0	3⅞ or 4.0	4⅝	4⅝	3¼	3½ or 3⅝	3	3¼
Stroke—Inches	5¼	5¼	6	6	4	4	4⅜	3¾
Displacement—Cubic Inches	260 or 276.4	260 or 276.4	404	404	133	154 or 165	124	124
Compression Ratio—Gas., 3⅞ Inch Bore		5.58		4.83				6.0
Compression Ratio—Dist., 3⅞ Inch Bore		4.88		4.09				
Pistons Removed From:	A & B	A & B	A & B	A & B	A & B	A & B	Above	Above
Main Brgs., Number of	3	3	3	3	3	3	3	3
Main Brgs., Adjustable?	Yes	Yes	Yes	Yes	(12)	No	No	No
Rod Brgs., Adjustable?	Yes	Yes	Yes	Yes	(12)	No	No	No
Cylinder Sleeves	Wet	Wet	Wet	Wet	Dry	Wet	Dry	Wet
Forward Speeds	3	4	3	4	4	4	4	4
Generator Make	Auto-Lite							
Starter Make	Auto-Lite							
TUNE UP								
Firing Order	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Valve Tappet Gap—Inlet	18C	18C	18C	18C	10C	10C	14C	14C
Valve Tappet Gap—Exhaust	18C	18C	18C	18C	12C	10C	14C	14C
Inlet Valve Face Angle	45	45	45	45	45	45	30	30
Exhaust Valve Face Angle	45	45	45	45	45	45	45	45
Inlet Seat Angle	45	45	45	45	45	45	30	30
Exhaust Seat Angle	45	45	45	45	45	45	45	45
Ignition Distributor Make							Auto-Lite	
Ignition Distributor Model							See paragraph 133	
Ignition Magneto Make	Case	Case	Bosch	Case	Case	Case	F-M	Case
Ignition Magneto Model	4JMA	41	MJA-4B112	4CMA	4CMA	41	FMJ-4B	41
Magneto Model Before Tractor 4607033		4CMA						
Distributor Breaker Gap							.020	.020
Magneto Breaker Gap	.015	.010	.015	.015	.015	.010	.020	.010
Distributor Timing Retard							TC	TC
Distributor Timing—Full Advance								
Magneto Impulse Trip Point	TC	TC	TC	TC	TC	½" BTC	TC	3/16"ATC
Magneto Lag Angle—Degrees	25	25	30	30	35	25	15	25
Magneto Lag Angle Prior Tractor 4607033		30						
Magneto Running Timing	25°		30°	30°	35°		15°	
Flywheel Mark Indicating:								
Magneto Impulse Trip Point	D	D	D	D	DC1	3/16" Hole	DC	
Distributor Retard Timing							DC	DC
Spark Plug Make	AC	AC	AC	AC	AC	AC	AC	AC
Model for Gasoline & LPG	75	85S Com	AC75	85S Com	84	45 Com	85	87 Com
Model for Low Octane	75	85S Com	AC75	85S Com	84	45 Com	85	87 Com
Electrode Gap	.025	.025	.025	.030	.030	.025	.025	.025
Carburetor Make	Zenith	Zenith	Zenith	Zenith	Zenith	Zenith	M-S	M-S Zenith
Model & Assembly No.	Refer to Carburetor Application Table, paragraph 98.							
Float Setting (Marvel-Schebler)							9/32	9/32
Float Setting (Zenith)	1 39/64	1 39/64	1 49/64	1 49/64	1 5/32	1 5/32		1 5/32
Calibration	Refer to Model Number in Standard Units Manual.							
Engine Low Idle RPM	500	500	500	500	400	500	500	500
Engine High Idle RPM	1175	1390	1200	1200	1555	1760	1600	*
Engine Loaded RPM	1100	1200	1100	1100	1425	1550	1425	*
Belt Pulley Loaded RPM	C-973 CC-846	818	780	779	991	1078	969	*
Belt Pulley No Load RPM		948	860	850	1080	1224	1088	*
PTO Loaded RPM	536	540	550	550	543	541	559	*
PTO No Load RPM	573	622	600	600	595	614	628	*
SIZES-CAPACITIES-CLEARANCES (Clearances in Thousandths)								
Crankshaft Journal Diameter	2.250	2.250	2.750	2.750	2.1245	2.500	2.250	2.249
Crankpin Diameter	2.2495	2.2495	2.7495	2.7495	1.7495	2.3745	1.937	1.937
Rod C to C Length	10¾	10¾	12	12	7¼	8½	7	7
Camshaft Journal Dia., Front	1.8075	1.8075	2.2665	2.2665	2.1235	1.9025	1.872	1.7495
Camshaft Journal Dia., Center	1.7775	1.7775	2.2465	2.2465	1.8735	1.8715	1.746	1.7495
Camshaft Journal Dia., Rear	1.7475	1.7475	2.2265	2.2265	1.4985	1.8405	1.247	1.7495
Piston Pin Diameter	1.2333	1.2333	1.4848	1.4848	.875	.9993	.8592	.8592
Valve Stem Diameter	7/16	7/16	7/16	7/16	5/16	5/16	11/32	11/32
Compression Ring Width	1/8	1/8	5/32	5/32	1/8	1/8	1/8	1/8
Oil Ring—Width	1/4	1/4	5/32	5/32	3/16	3/16	1/4	1/4

*Refer to paragraph 105A.

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Tractor Model	C	D	L	LA	R	S	V	VA
SIZES—CAPACITIES—CLEARANCES continued . . .								
Main Brgs., Diam. Clearance	1.5-3	1.5-3	1.5-3	1.5-3	.5-2.5	1.5-2.5	1.5-3	1.5-3
Rod Brgs., Diam. Clearance	1.5-3	1.5-3	1.5-3	1.5-3	.5-2.5	1-3	1.5-2	1.5-2
Piston Skirt Clearance	4-5	4-5	6-8	6-8	3-4	3.5-5	3-4	3-4
Crankshaft End Play	4-10	4-10	4-10	4-10	5-7	4-8	4-6	4-6
Camshaft Bearing Clearance	2-4	2-4	2-4	2-4	1.5-2	2-4	2-4	2-4
Cooling System—Gallons	5.0	6.75	12.5	15.25	4.25	4.0	3.0	3.25
Crankcase Oil—Quarts	7.0	7.0	12.0	12.0	7.0	5.0	4.0	4.0
Trans. & Diff.—Quarts	36.0	42.0	68.0	68.0	43.0	43.0	20.0	28.0
(Early Production)						36.0		
Final Drive, Each—Quarts	0.0	6.0	0.0	0.0	0.0	0.0	0.0	1.5
Torque Tube—Quarts	0.0	0.0	0.0	0.0	0.0	0.0	8.0	8.0
(Refill)								6.0
Hydraulic System—Quarts	0.0	10.0	0.0	13.0	0.0	9.5	(7)	(6)
(If 2 work cylinders)		11.5				11.0		
Add for BP—Quarts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Add for PTO Continuous type—Quarts	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0

(6) Torque tube is reservoir for hydraulic system. (7) Models with Kingston pump mounted on belt pulley unit use the torque tube lubricant. All other models use the transmission oil. (12) Bearings have shims which only control crush of shell insert.

FRONT SYSTEM—TRICYCLE AND AXLE TYPE

ADJUSTMENT OF PEDESTAL (Vertical Spindle) & FRONT STEERING GEAR

This section applies to the complete front system on all models except that it does not cover the steering gear units which are mounted on the torque tube or transmission. It does cover the steering mechanism mounted in the front support. For information on servicing the steering gears which are mounted on torque tube or transmission refer to MAIN STEERING GEAR beginning with paragraph 22.

Single Wheel Models CC-DC-DC3-RC-SC-VC-VAC prior 5570000 (Refer to paragraph 3 for dual wheel type)

The front axle pedestal (support) on these models houses the integral vertical spindle and wheel fork. On models VAC prior 5570000 and VC, the vertical spindle rotates in a bushing (3—Fig. C1) at the upper end, and in a taper roller bearing (5) at the lower end. On all other models, the vertical spindle rotates in two bushings. Refer to Fig. C2.

An all models, except VAC and VC, spindle end thrust is carried by either a roller or ball thrust type bearing (20). On VAC and VC, the end thrust is carried by the vertical spindle taper roller bearing (5—Fig. C1).

1. To adjust vertical spindle end play on all except models VC and VAC, vary the number of shims (18—Fig. C2) which are located between lower side of steering spindle arm (8) and top of pedestal (22), until all end play is removed and yet spindle rotates freely. To gain access to shims (18), remove the steering spindle arm.

On models VC and VAC, vertical spindle end play adjustment is controlled by the spindle retaining nut (1—Fig. C1) which should be tightened to remove all end play and yet permit same to rotate freely. To gain access to the nut, remove tractor grille.

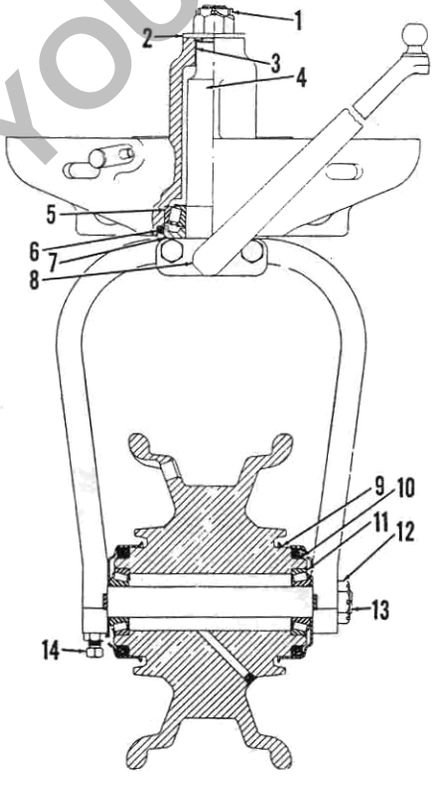


Fig. C1—Model VAC prior 5570000 and VC single wheel tricycle version front support assembly.

1. Spindle retaining nut
2. Washer
3. Bushing
4. Wheel fork & vertical spindle
5. Bearing cup & cone
6. Felt seal
7. Felt seal retainer
8. Steering arm
9. Felt retainer
10. Felt
11. Bearing cup & cone
12. Axle retaining nut
13. Wheel axle shaft
14. Set screw

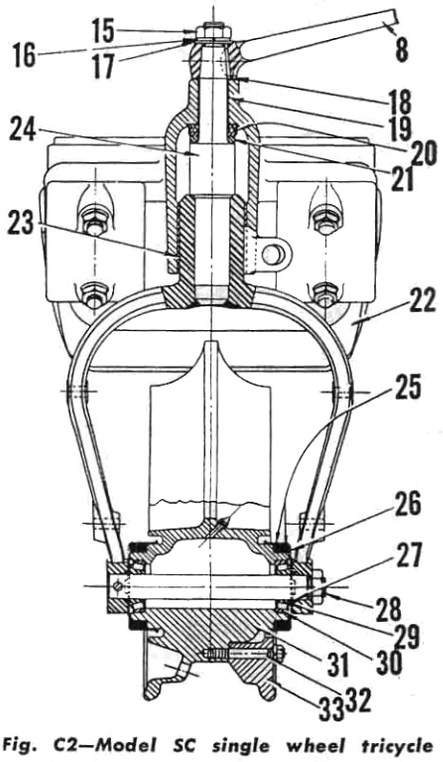


Fig. C2—Model SC single wheel tricycle version front support assembly. Models CC-DC-DC3-RC are similar.

8. Steering arm
15. Spindle retaining nut
16. Lock washer
17. Washer
18. Shims
19. Bushing
20. Thrust bearing
21. Bearing collar
22. Pedestal (support)
23. Bushing
24. Wheel fork & vertical spindle
25. Felt (2 used)
26. Retainer
27. Seal
28. Wheel axle shaft
30. Bearing cup & cone
31. Hub (serviced with brg. cups)
32. Rim retaining stud

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Single Wheel Model VAC after 5570000
(Refer also to paragraph 4)

The front support Fig. C3 on this model carries the main steering gear unit housing and integral vertical spindle and fork assembly.

2. To adjust vertical spindle bearings (two taper roller bearings) first remove tractor grille. Remove steering gear housing cap (1) and cotter pin from spindle nut. Tighten spindle nut (3) to remove all end play and yet permit same to rotate freely.

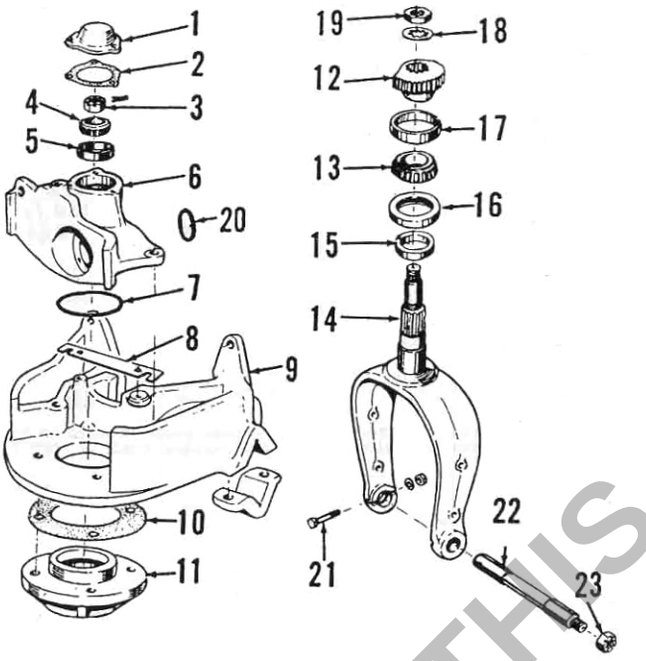
2A. To reduce play in steering wormshaft bearings, first remove tractor grille. Then, disconnect lower shaft (38—Fig. C4) from wormshaft universal joint (37). Move wormshaft (30) to determine amount of end play which is present. Remove 3 cap screws retaining worm housing sleeve cap (28—Fig. C4) to steering gear housing, and remove the sleeve cap to gain access to shims (29). Remove shims until shaft has zero end play. The plastic shims can be identified for thickness by their color. Green colored shims are .003; blue, .005 and brown, .010. After adjusting worm shaft bearings, check the gear mesh.

2B. To adjust gear mesh, first adjust wormshaft bearings as outlined in paragraph 2A. Locate mid-position of the gear by turning steering gear from one extreme position to the other; then, back half way. With gear in mid-position, remove 3 cap screws which retain worm housing sleeve and cap (28) to gear housing. Slowly rotate steering worm sleeve (34) which is eccentric, while checking amount of gear backlash by feeling for play in vertical spindle. Continue to rotate steering worm sleeve until zero play in vertical spindle is obtained, when steering gear is in mid-position.

With mesh adjustment completed, temporarily reinstall the three retaining cap screws and check the mesh adjustment by rotating the steering gear from full left to full right. Wormshaft should have a slight amount of backlash when gear is moved either way from the mid-position or high point.

Dual Wheel Models CC-DC-DC3-RC-SC-VC-VAC prior 5570000
(Single wheel is paragraph 1)

The front pedestal on these models houses the vertical spindle. On early production CC models, refer to Fig.



1. Gear housing cap
2. Gasket
3. Spindle nut
4. Bearing cone
5. Bearing cup
6. Steering gear housing
7. "O" ring
8. Radiator bracket
9. Front support
10. Gasket
11. Spindle bearing carrier
12. Sector
13. Bearing cone
14. Wheel fork & vertical spindle
15. Thrust collar
16. Oil seal
17. Bearing cup
18. Washer
19. Sector retaining nut
20. "O" ring
21. Retaining bolt
22. Wheel axle shaft
23. Retaining nut

Fig. C3—Model VAC after 5570000 single wheel tricycle version front support and main steering gear. Refer to Fig. C4 for steering gear worm and shaft assembly.

26. Cap screw
27. Cap screw
28. Sleeve worm housing cap
29. Shims
30. Steering worm
31. Ball bearing race
32. Ball bearing & cage
33. Key
34. Steering worm sleeve
36. Bushing
37. Universal joint yoke
38. Lower steering shaft
39. Bracket
40. Upper steering shaft
41. Upper bearing & extension
42. Bushing
43. Dust seal

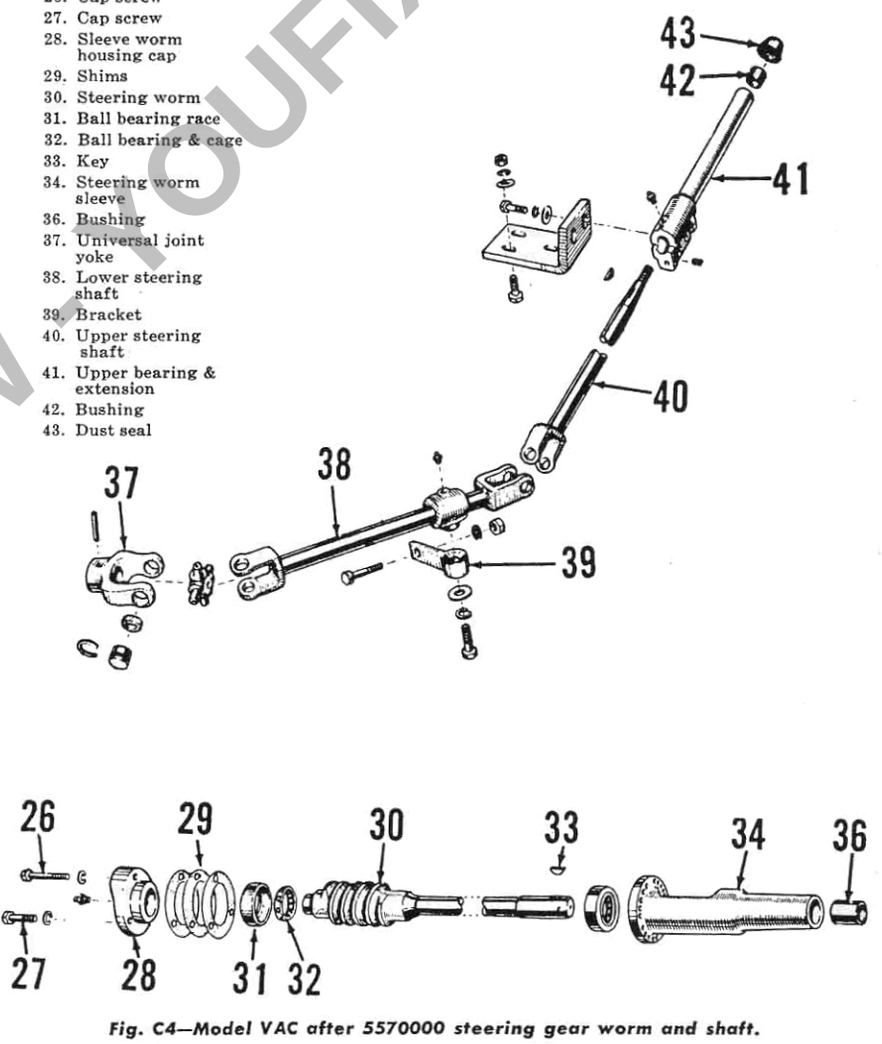


Fig. C4—Model VAC after 5570000 steering gear worm and shaft.

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SHOP MANUAL

J. I. CASE

SERIES	PRODUCTION	SERIES	PRODUCTION
C	1937-1939	R	1937-1940
D	1939-Current	S	1941-Current
L	1937-1940	V	1940-1942
LA	1940-Current	VA	1942-Current

Serial number located on instrument panel name plate. On all series except V and VA, engine serial number is stamped on left rear side of engine block in vicinity of air cleaner. On series V and VA, engine serial number is stamped on right side of engine block.

BUILT IN THESE VERSIONS

SERIES	MODEL DESIGNATIONS Tricycle Single Wheel	Tricycle Double Wheel	MODEL DESIGNATIONS Axle Type Non-Adjustable	Axle Type Adjustable
C	CC	CC	C-CC-CO	—
D	DC-DC3	DC-DC3	D-DC-DC4-DCS-DH-DO-DS-DV	DC-DC3
L	—	—	L	—
LA	—	—	LA	—
R	RC	RC	R	RC
S	SC	SC	S-SO	SC
V	VC	VC	V-VO	VC
VA	VAC-VAC11	VAC-VAC12	VA-VAO	VAC-VAC13-VAC14-VAH

(For tractor cross-sectional views, refer to pages 45 and 59.)

INDEX (By Starting Paragraph)

SERIES	C	D	L	LA	R	S	V	VA
BELT PULLEY	269	269	269	269	269	269	270	270
Pulley brake adjustment	140A	140A	140A	140A	140A	140A	—	—
BRAKES								
Contracting band type	245	245	245	245	245	—	—	—
Disc type (Single)	—	257	—	—	—	259	261	261
Disc type (Double)	—	266	—	266	—	266	—	—
Shoe type (Mechanical)	—	—	247	247	—	—	—	255
Shoe type (Hydraulic)	—	—	—	249	—	—	—	—
CARBURETOR								
Gasoline & Distillate	98	98	98	98	98	98	98	98
LPG carburetor	—	99	—	99J	—	—	—	—
LPG filter	—	100	—	100	—	—	—	—
LPG regulator	—	100A	—	100B	—	—	—	—
CLUTCH								
Engine clutch	140	140, 141	140	140	142	141	143	143
Engine clutch shaft	165	165	165	165	165	165	148	148
Power take-off clutch	—	280	—	—	—	280	—	—
COOLING SYSTEM								
Fan and Belt	117 and 118							
Pump	121	121	121	121	—	121	121	121
Radiator	120	120	120	120	120	120	120	120
Thermostat	116	116	116	116	—	116	116	116
DIFFERENTIAL	201	201	201	201	201	201	204	207
ENGINE								
Assembly R & R	40	40	40	40	40	40	41	41
Cam followers	48	48	48	48	49	48	49	48
Camshaft	60	60	60	60	61	60	62	63
Connecting rods & brgs.	71	71	71	71	72	73	73	73
Crankshaft & bearings	74	74	74	74	75	76	76	76
Cylinder head	42	42	42	42	43	42	43	42
Cylinder sleeves	67	67	67	67	67	67	67	67
Flywheel	82	82	82	82	82	82	82	82
Front oil seal	81	81	81	81	81	81	81	81
Main bearings	74	74	74	74	75	76	76	76

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stalled with damper coils nearest to the cylinder head on all valve-in-head engines, or nearest to the valve head on all L-head engines.

On valve-in-head engines, springs can be renewed after removing the rocker arms and shaft as an assembly. On series R and V L-head engines, springs can be renewed after removing the cylinder head and valve.

An alternate method for removing the valve spring without removing the head on series R and V L-head engines is as follows: Turn adjusting screw down against lock and holding the valve up with a wire inserted through spark plug hole, remove the spring.

Springs which are rusted, distorted or do not meet the pressure specifications shown in the table, should be renewed.

VALVE SPRING SPECIFICATIONS

Series	Free Length	Tension
C-D	2 3/8	39-44 Lbs. @ 1 29/32 or 99-108 Lbs. @ 1 15/32
L-LA	3 1/8	88-96 Lbs. @ 2 1/4
R	2 1/4	32-40 Lbs. @ 1 29/32 or 60-71 Lbs. @ 1 5/8
S	2 1/32	25-28 Lbs. @ 1 3/4 or 61-69 Lbs. @ 1 13/32
V	2	47-53 Lbs. @ 1 45/64 or 96- 104 Lbs. @ 1 27/64
VA	2 3/8	53-59 Lbs. @ 1 7/8 or 108-114 Lbs. @ 1.524

CAM FOLLOWERS (Tappets)

Series C-D-L-LA-S-VA

48. The mushroom type cam followers (tappets) operate directly in machined bores of the cylinder block. (Series S tractors prior to serial 4806466 were originally equipped with cylindrical (barrel) type cam followers. However, mushroom type are being supplied for servicing engines originally equipped with cylindrical type followers.) Cam followers are supplied in the standard size as well as .010 oversize for all series except VA. In addition, cam followers of .020 oversize are available for the series LA. On series VA, only the standard size followers are available. Tappets should have a suggested diametral clearance of .0005-.002 with a maximum allowable clearance of .007 in block bores.

48A. Mushroom type cam followers can be removed after removing the oil pan, rocker arms and shaft assembly, oil pump on all except VA series, battery ignition unit on models so equipped, timing gear cover and camshaft.

On series S equipped with cylindrical (barrel) type cam followers, same should be replaced with the later mushroom type. Cylindrical type followers can be extracted after rocker arms and shaft assembly and push rods have been removed by using a long wooden dowel tapered at one end. Insert dowel into the follower bore and lift the follower out through the push rod opening.

Adjust both inlet and exhaust valve tappet (rocker arm) gaps as follows:

Series	Tappet Gap
C-D-L-LA	.018 Cold
S	.010 Cold
VA	.014 Cold

Series R-V

49. Mushroom type cam followers as used in the series R engines, and cylindrical (barrel) type cam followers as used in the series V engines operate directly in machined bores of the cylinder block. Oversize cam followers are not supplied. Tappets should have a suggested diametral clearance of .0005-.002 with a maximum allowable clearance of .007.

49A. On series R engines, cam followers can be removed after removing the camshaft. On series V engines, any cam follower can be removed by first removing the valve spring which is accomplished by turning the adjusting screw down against the lock and holding the valve up with a wire inserted through the spark plug hole. Now remove the tappet screw and lock element from the tappet, and withdraw the cam follower.

Adjust tappets cold to .010 for inlet and .012 for exhaust on series R engines, and .014 cold for both inlet and exhaust on series V engines.

VALVE ROCKER ARMS

Series C-D-L-LA-S-VA

50. Rocker arms and shaft assembly can be removed after removing the hood (raise hood on VA series), valve cover, oil line on L and LA series, and rocker shafts supports retaining bolts and/or nuts.

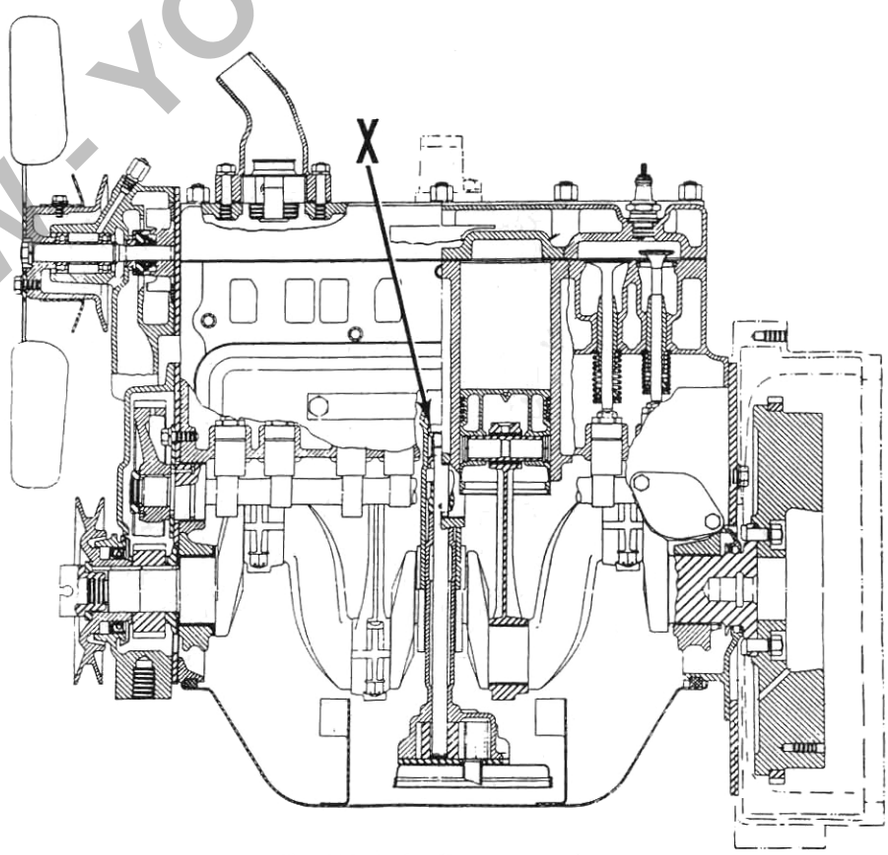


Fig. C34—Series V tractor engine.

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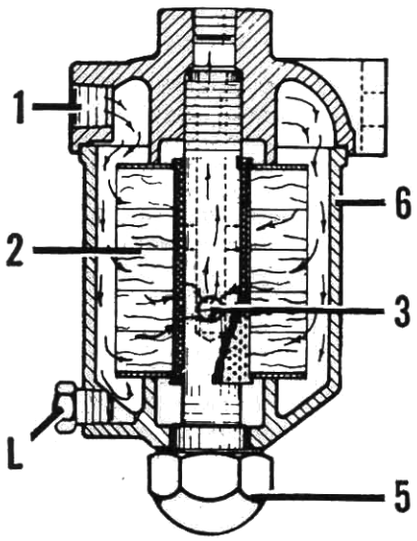


Fig. C61—LP-Gas filter used on series D and LA.

L. Drain plug
1. Fuel inlet
2. Filter cartridge
3. Outlet passage
5. Stud nut
6. Filter bowl

this pressure without leakage. Unit should be drained periodically at the blow off cock (L—Fig. C61). When major engine work is being performed, it is advisable to remove the lower part of the filter, thoroughly clean the interior and renew the felt cartridge of same if not in good condition.

LP-GAS REGULATOR

Series D (Ensign Model W)

100A. **HOW IT OPERATES.** Fuel from the supply tank enters the regulating unit inlet (A—Fig. C62) at a tank pressure of 25 to 80 psi and is reduced from tank pressure to about 4 psi at the high pressure reducing valve (C) after passing through the strainer (B). Flow through high pressure reducing valve is controlled by the adjacent spring and diaphragm. When the liquid fuel enters the vaporizing chamber (D) via the valve (C) it expands rapidly and is converted from a liquid to a gas by heat from the water jacket (E) which is connected to the coolant system of the engine. The vaporized gas then passes at a pressure slightly below atmospheric pressure via the low-pressure reducing valve (F) into the low pressure chamber (G) where it is drawn off to the carburetor via outlet (H). The low pressure reducing valve is controlled by the larger diaphragm and small spring.

Fuel for the idling range of the engine is supplied from a separate outlet (J) which is connected by tubing to a separate idle fuel connection on the carburetor. Adjustment of the carburetor idle mixture is controlled by the idle fuel screw (K) and the calibrated orifice (L) in the regulator. The balance line (M) is connected to the air inlet horn of the carburetor so as to reduce the flow of fuel and thus prevent over-richening of the mixture which would otherwise result when the air cleaner or air inlet system becomes restricted.

Series LA (Ensign Model R)

100B. **HOW IT OPERATES.** Liquid LP-Gas from the supply tank enters the model R regulator at (1—Fig. C63) and is reduced from tank pressure to about 4 psi at high pressure reducing valve (3) after passing through the strainer. Flow through high pressure valve is controlled by diaphragm (4), lever (5) and spring (6). When the liquid fuel enters the vaporizer coil (7) it expands rapidly and is converted from a liquid to a gas by heat from the engine coolant system water which surrounds the vaporizing coil. The vaporized gas then passes (at a pressure slightly below atmospheric pressure) via the main valve (8) to the carburetor via the outlet (9). Control of the outlet pressure is obtained by operation of the

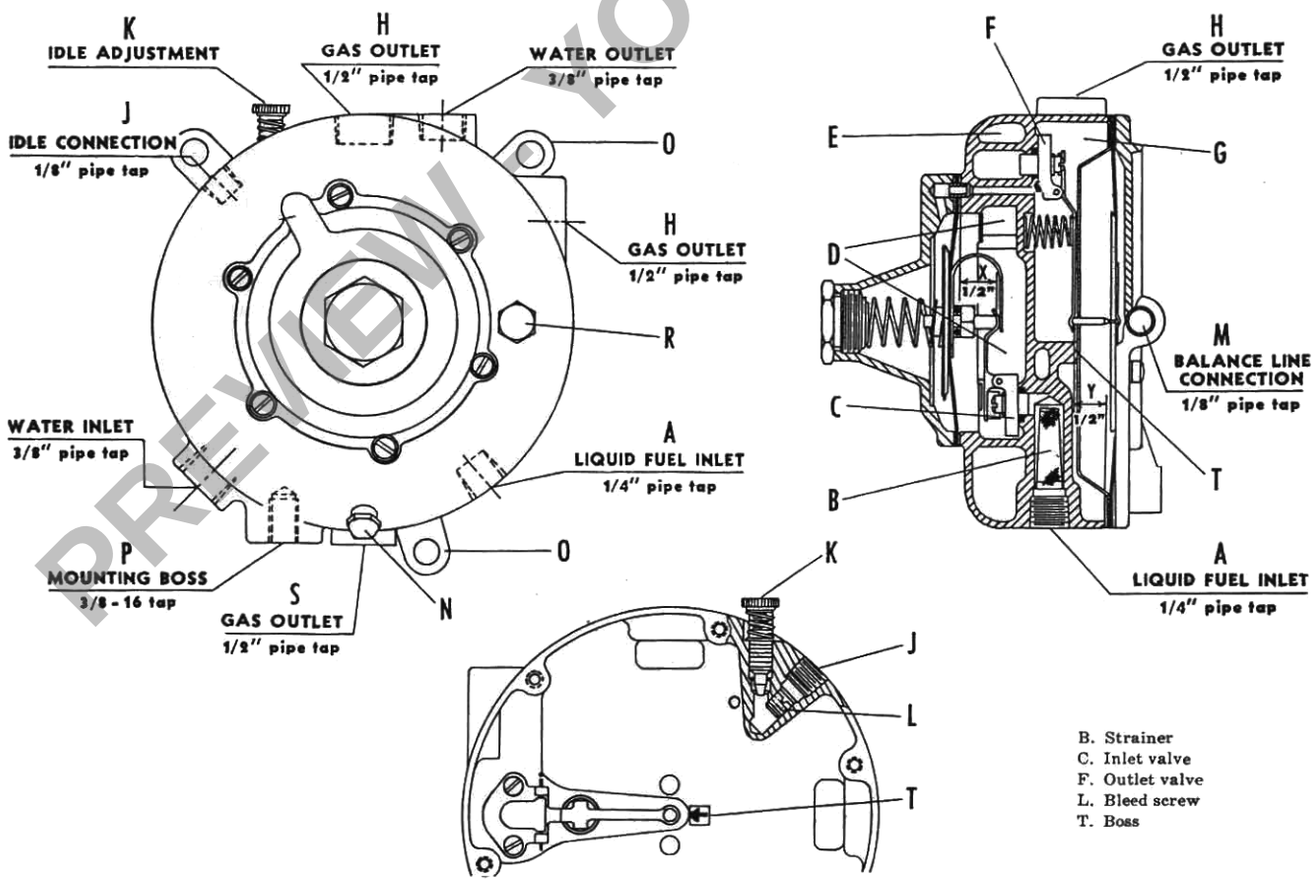
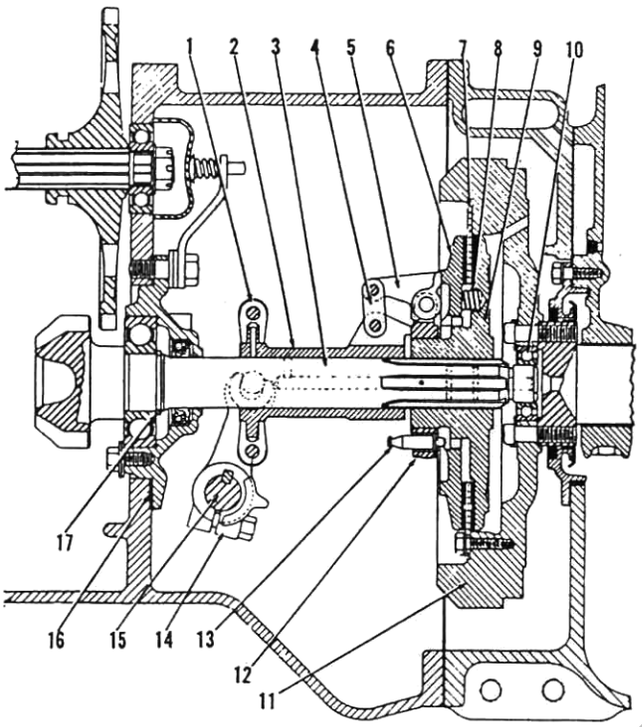


Fig. C62—Model W Ensign LPG regulator used on series D engines—assembled view.

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1. Sleeve collar
2. Sliding sleeve
3. Clutch shaft
4. Lever link
5. Clutch finger
6. Floating plate
7. Lined plate (driving disc)
8. Release spring
9. Back plate
10. Pilot bearing
11. Flywheel
12. Adjusting yoke
13. Lock pin
14. Release fork
15. Release fork shaft
16. Shims
17. Snap ring

Fig. C96—Series R clutch installation.

140A. BELT PULLEY BRAKE ADJUSTMENT. After adjusting the engine clutch, check the belt pulley brake to be sure that it contacts the pulley on series C, L and R, or the pulley hub on series D and LA when the clutch lever is pulled all the way back or when the clutch lever is in the disengaged position. To adjust the brake on series C, L and R, loosen both lock nut (B—Fig. C97) and set screw lock nut. Rotating set screw (A) will move the pulley brake in or **out.** Tighten nut (B) and set screw lock nut.

On series D and LA, loosen lock nuts on both set screws (A—Fig. C98). Loosening the lower set screw and tightening the upper set screw will apply the brake earlier during rearward movement of the clutch hand lever. Lock adjustment by tightening the set screw lock nuts.

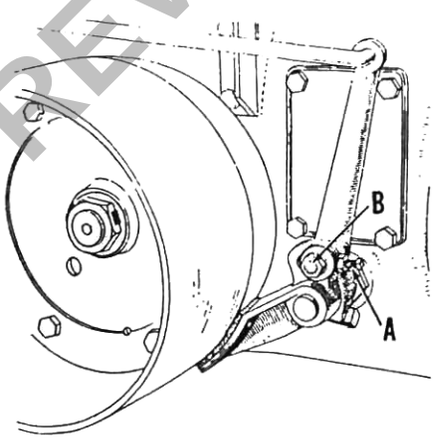


Fig. C97—To adjust pulley brake on series C, L and R, loosen nut (B) and turn set screw (A) in or out.

Series D after 4818099-S Over-Center Type

(For Spring Loaded Type, Refer to Page 120.)

141. Remove inspection plate from left side of transmission housing compartment. Place transmission gear shift lever in neutral, and disengage the clutch. Crank engine until the spring loaded lockpin (6—Fig. C95) in clutch collar adjusting ring (11) is visible through inspection plate opening. A raised boss on the pressure plate (7) or a white paint mark on the cover plate (4) will indicate exact location of the lockpin. With a piece of ¼ inch or 5/16 inch diameter rod which is bent to form a 110 degree angle, depress the lockpin. With the lockpin depressed, rotate adjusting collar **down** or in a counter-clockwise direction (viewed from rear of tractor) to tighten the clutch (decrease clearance between lined plate and pressure plate). Rotate the adjusting ring until a noticeable drag is felt as the belt pulley is rotated by hand, indicating that the clutch facings are dragging slightly. Then, rotate the adjusting ring upward (clockwise) until the drag disappears. Clutch should be adjusted to a point where no slippage will occur under load, and yet not so

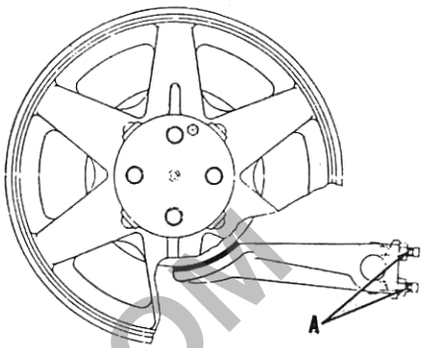


Fig. C98—To adjust pulley brake on series D and LA, loosen both set screws (A), then rotate upper set in to decrease the clearance between the brake and pulley hub.

tight that difficulty is encountered when engaging the operating lever. Release the lockpin, making certain that it engages the adjusting ring.

After adjusting engine clutch, readjust belt pulley brake as outlined in paragraph 140A.

Series R

142. Follow same procedure as outlined in paragraph 140 for the series D prior 4818100, C, L, and LA. Refer to Fig. C96.

Series V-VA

143. With clutch fully engaged, the clutch pedal should have 1½-2 inches of free travel. This amount of free travel produces the desired ⅛-3/16 inch clearance between release bearing face and face of the release levers. This adjustment is made by turning the yoke clevis at the pedal end of the operating rod (9—Fig. C102).

R & R CLUTCH UNIT

Series C-D-L-LA-R-S

(For Spring Loaded Type, Refer to Page 120.)

144. **SPLITTING TRACTOR.** To remove the clutch assembly, it is necessary to split the tractor (detach engine from transmission). To perform a tractor split proceed as follows: Block the rear wheels, as shown in Fig. C99, disengage clutch, and place transmission in neutral. Drain oil from clutch housing. Remove hood and disconnect engine controls, fuel line, oil pressure gauge line, and heat indicator. Disconnect drag link at steering drop arm, and if tractor is equipped with radius rod disconnect same from transmission housing. On S series only, remove air cleaner oil cup. On all series, remove hand hole covers from sides of transmission housing clutch compartment. Support front end of transmission housing and remove the ¾ or 1 inch bolts from each side of transmission case flange and insert in their place

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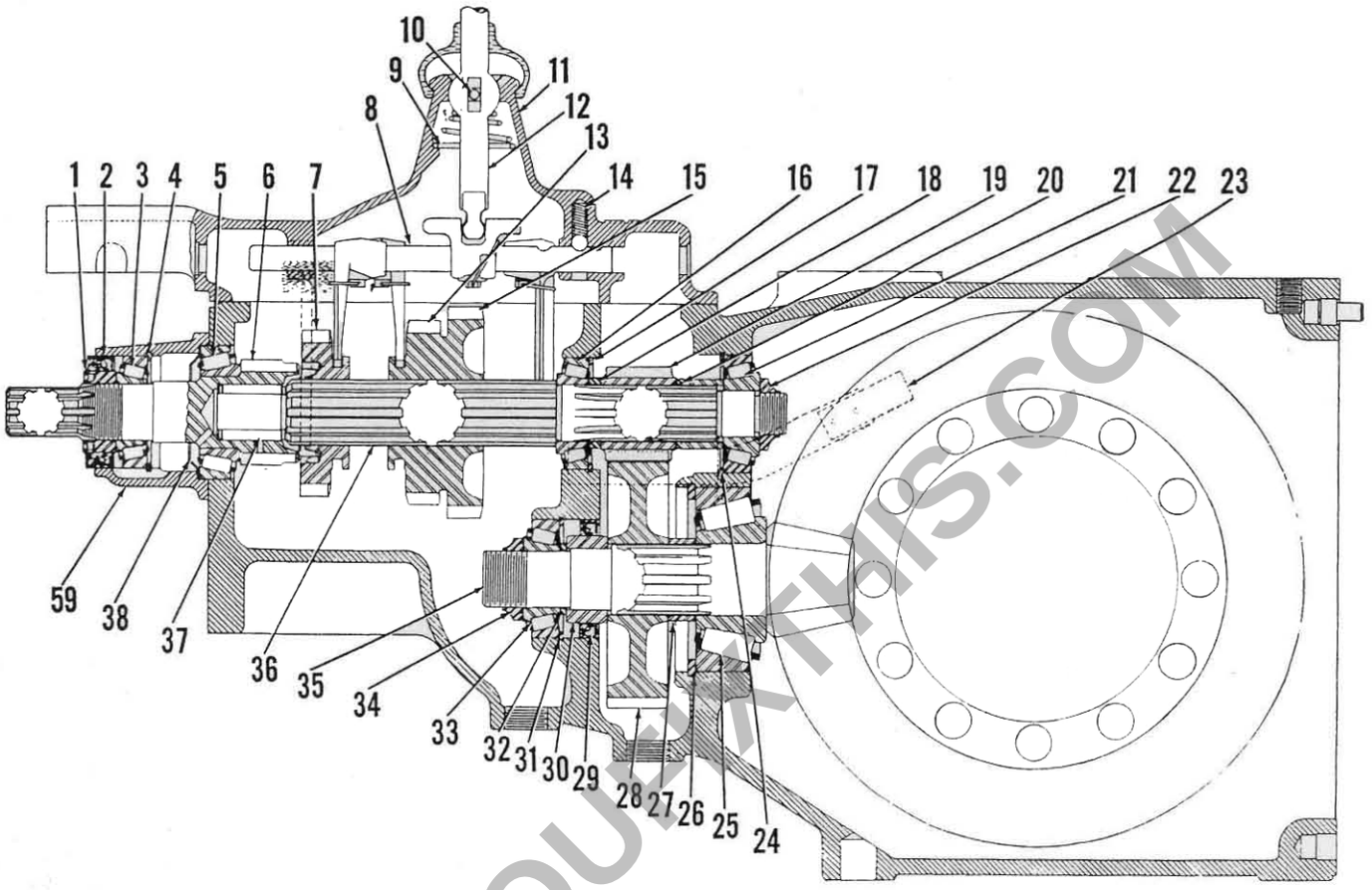
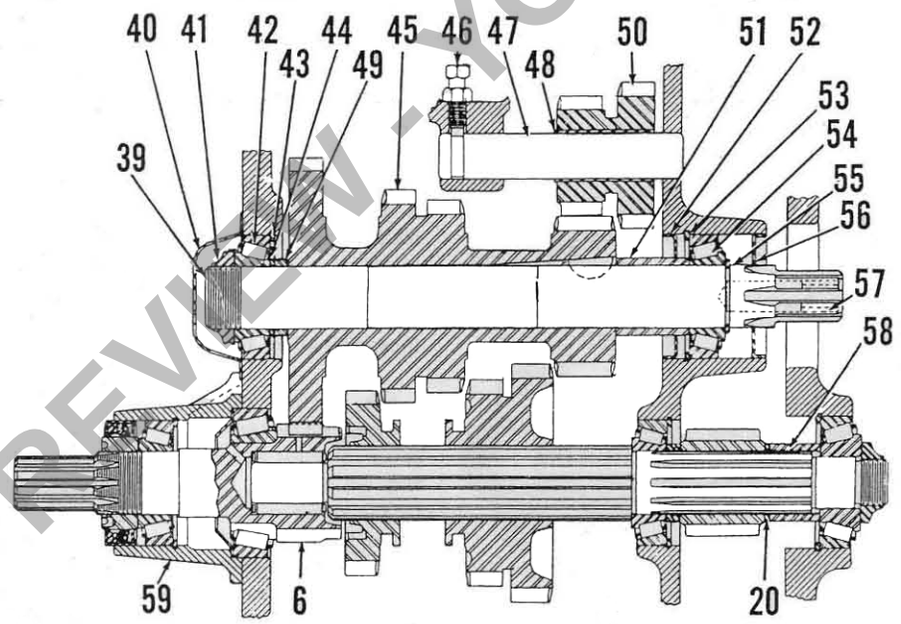


Fig. C129—Series V tractor transmission—side sectional view. Refer to Fig. C129A.



1. Adjusting nut
2. Oil seal
3. Bearing cup & cone
4. Snap ring
5. Bearing cup & cone
6. Main drive gear & shaft
7. 3rd & 4th gear
8. Shifter rails
9. Support spring
10. Pivot pin
11. Top cover
12. Shifter lever
13. 2nd gear
14. Detent ball & spring
15. 1st gear
16. Bearing cup & cone
17. Snap ring
18. Spacer
19. Main (sliding gear) shaft reduction gear
20. Spring washer (or narrow spacer & shims)
21. Bearing cup & cone
22. Adjusting nut
23. Oil trough
24. Snap ring
25. Bearing
26. Snap ring
27. Spacer
28. Bevel pinion shaft reduction gear
29. Oil seal
30. Spacer
31. Snap ring
32. Spring washer (or narrow spacer & shims)
33. Bearing cup & cone
34. Adjusting nut
35. Main drive bevel pinion & shaft
36. Main (sliding gear) shaft
37. Main shaft pilot bearing
38. Oil shield
39. Countershaft
40. Bearing cover
41. Adjusting nut
42. Bearing cup & cone
43. Snap ring
44. Spring washer (or narrow spacer & shims)
45. Countershaft gear cluster
46. Set screw
47. Reverse idler shaft
48. Bushing
49. Spacer
50. Reverse idler
51. Spacer
52. Oil shield
53. Snap ring
54. Bearing cup & cone
55. Snap ring
56. Oil shield
57. PTO shaft bushing
58. Spacer
59. Bearing carrier

Fig. C129A—Series V tractor transmission—top sectional view. Refer to Fig. C129.

shims, or reduce width of spacer by using emery cloth and a flat surface. After obtaining correct bearing adjustment check fore and aft movement of reduction gear (19). Gear movement of .005 is controlled with shims inserted between narrow spacer (20) and wide spacer (58).

173. COUNTERSHAFT. To remove countershaft (39) and gear cluster (45), first remove main (input) drive-gear and main (sliding) gearshaft as in paragraphs 171 and 172. From front face of transmission housing, remove bearing cover (40) and unstake and remove bearings adjusting nut (41). While bucking-up the gear cluster bump countershaft rearward until cluster gear woodruff key is exposed and remove key. Continue bumping shaft rearward and out of transmission, being careful not to lose spacer (49) and spring washer (44).

On some early models, the fore and

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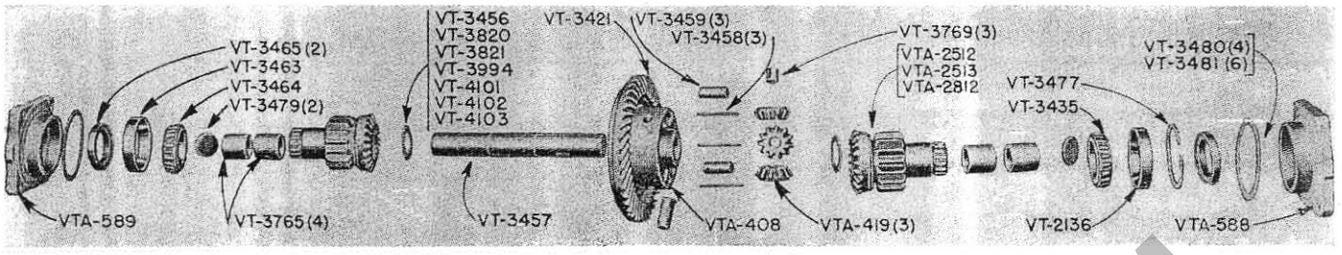


Fig. C150—Bevel ring gear, differential unit, bull pinions and components as used on models VA, VAC and VAO tractors prior 5555000.

408. Differential case	2136. Bearing cup	3456. Thrust washer	3463. Bearing cup	3479. Welch plug
419. Differential pinion	2512. Bull pinion	3457. Differential shaft	3464. Bearing cone	3480. Shims
588. Bearing carrier	3421. Bevel ring gear	3458. Retaining pin	3465. Oil seal	3765. Bushings
589. Bearing carrier	3435. Bearing cone	3459. Pinion shaft	3477. Snap ring	3769. Bushing

two pinion open case type on models VAH. Differential unit is located back of the transmission housing dividing wall. Differential carrier bearings are shim adjusted, taper roller type, mounted in carriers. Refer to Figs. C150, C150A and C150B. On models VA, VAC and VAO, carriers are covered by their respective brake units; on model VAH, the carriers are covered by their respective final drive (drop) housings.

206. **BEARING ADJUSTMENT.** To adjust differential carrier bearings and the ring gear backlash, proceed as outlined in paragraph 192 and 192A.

207. **REMOVE AND REINSTALL.** To remove the differential unit and bevel ring gear assembly, first drain the transmission and differential compartments. On models VA, VAC, and VAO, support tractor under transmission housing, and detach rear axle housing from transmission housing. On models prior 4828245, remove brake housing covers and remove nut (located on inside of brake housing) from stud attaching rear axle housing to transmission. Remove both brake assemblies from outer ends of the differential shafts.

On model VAH, support tractor under transmission housing and remove both final drive (drop) housings. Also, remove both brake assemblies, and transmission housing rear cover, or pto unit.

207A. On all models, support differential unit and remove differential bearing carriers. On models VA, VAC, and VAO, remove differential side and integral bull pinion gears. On all models, lift differential unit and bevel ring gear assembly out through rear opening in transmission housing. A groove in the transmission case will permit left end of differential shaft to be removed first.

207B. Reinstallation is reverse of removal procedure. Note on all except VAH that the left differential bearing carrier (5—Fig. C150B) which takes the ring gear thrust, contains the oil seals (VT3465) are installed, install same with lip of seal facing the differential unit.

Adjust carrier bearings and ring gear backlash as outlined in paragraphs 192 and 192A.

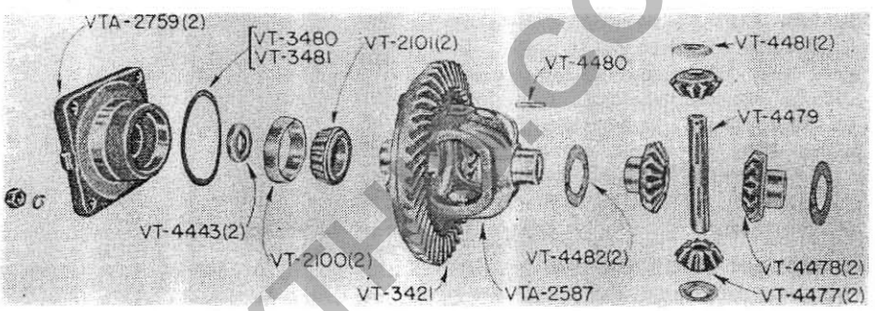


Fig. C150A—Bevel ring gear, differential unit and components as used on model VAH.

2101. Bearing cone	3421. Bevel ring gear	4477. Differential pinion	4480. Retaining pin
2587. Differential case	3480. Shims	4478. Diff. side gear	4481. Thrust washer
2759. Bearing carrier	4443. Oil seal	4479. Pinion shaft	4482. Thrust washer

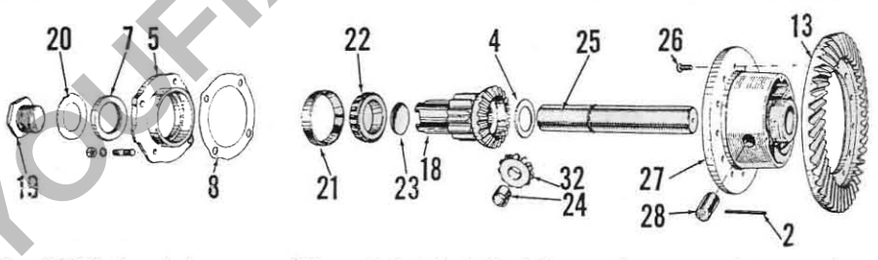


Fig. C150B—Bevel ring gear, differential unit, bull pinions and components as used on models VA, VAC, and VAO tractors after 5554999.

2. Retaining pin	13. Bevel ring gear	21. Bearing cup	25. Differential shaft
4. Thrust washer	18. Bull pinion	22. Bearing cone	26. Rivet
5. Bearing carrier	19. Brake drum retaining bolt	23. Welch plug	27. Differential case
7. Oil seal	20. Lock washer	24. Bushing	28. Pinion shaft
8. Shims			32. Differential pinion

larger (wider) bearing cup (21). The left carrier can be identified from the right carrier as the right bearing carrier has a spacer in the form of a snap ring (VT3477—Fig. C150) inserted under the bearing cup. Install both bearing carriers so that the oil drain hole is facing downward. If new differential bearing carrier should be installed with the lip facing inward.

208. **OVERHAUL.** To disassemble differential unit, bump out the pinion shaft pins (2—Fig. C150B) and remove pinion shafts which fit .001-.003 loose in their bores. The differential pinions can now be removed. Differential pinion Oilite bushings (24) used on models VA, VAC and VAO should have .003-.004 diametral clearance on the .809-.810 diameter pinion shafts (28). On models VA, VAC and VAO units, the differential shaft (25) which is a .002-.0035 tight press fit in the differential case can be removed by pressing the shaft on the right end and out toward left end of differential case. The oil seal (7) which is located in the

208A. The bull pinions which are integral with the differential side gears rotate on renewable bushings (VT-3765—Fig. C150) on models VA, VAC and VAO prior 5555000. Bushings require final sizing after installation to provide .0025-.004 running clearance. The bull pinions used in models VA, VAC, and VAO after 5554999 are not bushed.

208B. The bevel ring gear, which is available separately from the bevel pinion, is riveted to the differential

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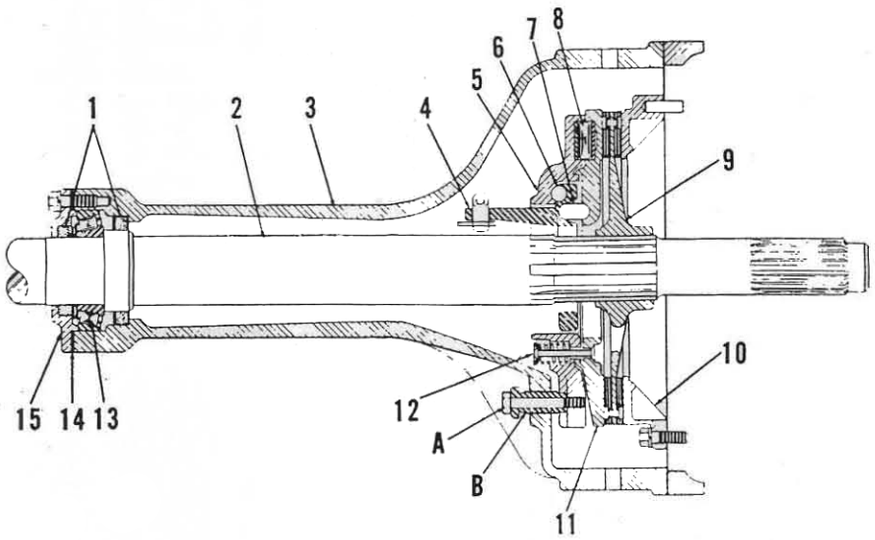


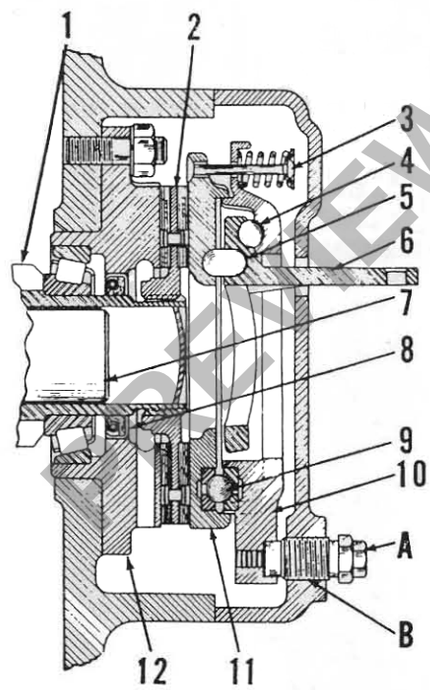
Fig. C187—Series V wheel axle shaft, housing, and single disc type brake assembly.

A. Adjustment lock screw
B. Adjusting screw
1. Seal (felt)
2. Wheel axle shaft
3. Axle shaft housing
4. Actuating lever
5. Power plate
6. Ball
7. Plunger
8. Roller and insert
9. Lined plate
10. Secondary brake plate
11. Primary plate
12. Retaining pin
13. Bearing cup & cone
14. Shims
15. Bearing retainer

is obtained when rotating the wheel; then back off the adjusting pinion one full turn. Recheck the adjustment and lock same by tightening the three cap screws (D). Do the same to the other brake. Equalize the brakes by backing off the adjusting pinion on the tight brake.

260. **R & R AND OVERHAUL.** To remove lined plate (3—Fig. C185), first disconnect the brake pedal linkage from the actuating lever. Remove four nuts retaining the brake housing cover (primary plate, adjusting ring, and power plate assembly) to the transmission housing. The lined plate which is splined to the bull pinion sprocket shaft can now be removed.

Disassembly of the primary and power plates assembly is self-evident after an examination and with reference to Fig. C185.



A. Adjustment lock screw
B. Adjusting screw
1. Bull pinion
2. Lined plate
3. Retaining pin
4. Ball
5. Plunger
6. Actuating lever
7. Differential shaft
8. Oil seal
9. Ball and insert
10. Power plate
11. Primary plate
12. Bearing carrier

Fig. C188—Single disc type brakes as used on some VA, VAC, and VAO tractors. Model VAH is similar except that the brake units are located on the inner ends of the final drive bull pinion shafts.

Some VA, VAC, VAH and VAO *(Refer also to paragraph 255)*

The brakes as used on these models are of the single disc type. On series V, the brake units are located on and are splined to the inner ends of the wheel axle shafts as shown in Fig. C187. On models VA, VAC, VAO prior 5455001, *the disc type brake units are mounted on the outer ends of the bull pinion shafts as shown in Fig. C188. On models VAH, the disc type brake units (similar to the units shown in Fig. C188) are located on and are splined to the inner ends of the bull pinion shafts which are located in the final drive (drop) housings as shown in Fig. C156.*

261. **ADJUSTMENT.** To adjust brakes, jack-up and support rear of tractor. Loosen the three adjustment lock screws (A). Rotate the three adjusting screws (B) in a clockwise direction until same are fully bottomed. This is to assure parallelism or full contact between the primary plate (11) and lined plate. Then, back off each adjusting screw (B) an equal amount of approximately one full turn or until all drag is eliminated. Lock the adjustment by tightening the lock screws (A). Equalize the brakes by backing off all of the adjusting screws on the tight brake.

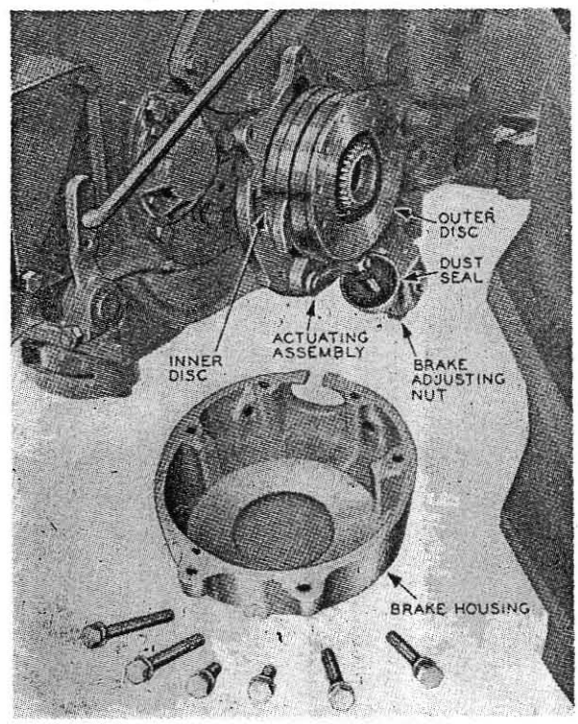


Fig. C189—Double disc type brake installation with brake housing removed on series D after 5601106. Series LA and S which are equipped with the double disc type brakes are similar.

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is not equipped with a sleeve retainer.

298B. Reinstall spring, shims and cup nut. Make certain that the "O" ring as used on the cup nut is in good condition. The "O" ring replaces the copper washer as used on earlier units. After installing the pump and valves unit on the tractor, check and adjust the relief valve pressure as per paragraph 294.

299. VALVE CONTROL LEVER. On single valve control systems, only one control lever is used. On dual control systems, two valve control levers, Fig. C227, are used.

It is not necessary to remove the pump and valve body unit to service the valve control levers. First, remove the valve body cover plate. Working through the cover plate opening, remove the valve control shifter arm retaining machine screw. Withdraw valve control lever and shaft from valve body and valve shifter arm. On dual valve systems, the lower valve control lever and shaft, Fig. C227, must be removed before the upper valve control lever can be removed.

299A. Assemble the valve control lever felt seal and "O" ring on the lever shaft in the order as shown in Fig. C228 or C229. Install the control lever in the pump body so that the lever is parallel with the valve body mounting flange surface when the control valve spool is in the neutral position; then tighten the shifter arm machine screw. On dual control valve systems, install the second control lever in a similar manner so that it is parallel with the valve body mounting flange surface. Reinstall the valve body cover plate, and adjust hand control lever linkage as per paragraph 292B.

300. VALVE CONTROL SPOOL. To remove the valve control spool or spools, first remove the pump and valve body as per paragraph 292, and control valve lever or levers as per paragraph 299; then remove the pump cover, and pump body as outlined in paragraph 293. From pump side of the valve body, remove the spool holding poppet or poppets (detents) as shown in Fig. C218 or C219. Remove both valve heads from the valve body and withdraw the valve control spool or spools.

Inspect the spool holding poppet or poppets as outlined in paragraph 293B.

Reinstall the valve control spool by reversing the removal procedure.

301. VALVE HEADS. The left and right hand valve heads on the single valve system are similar in design as

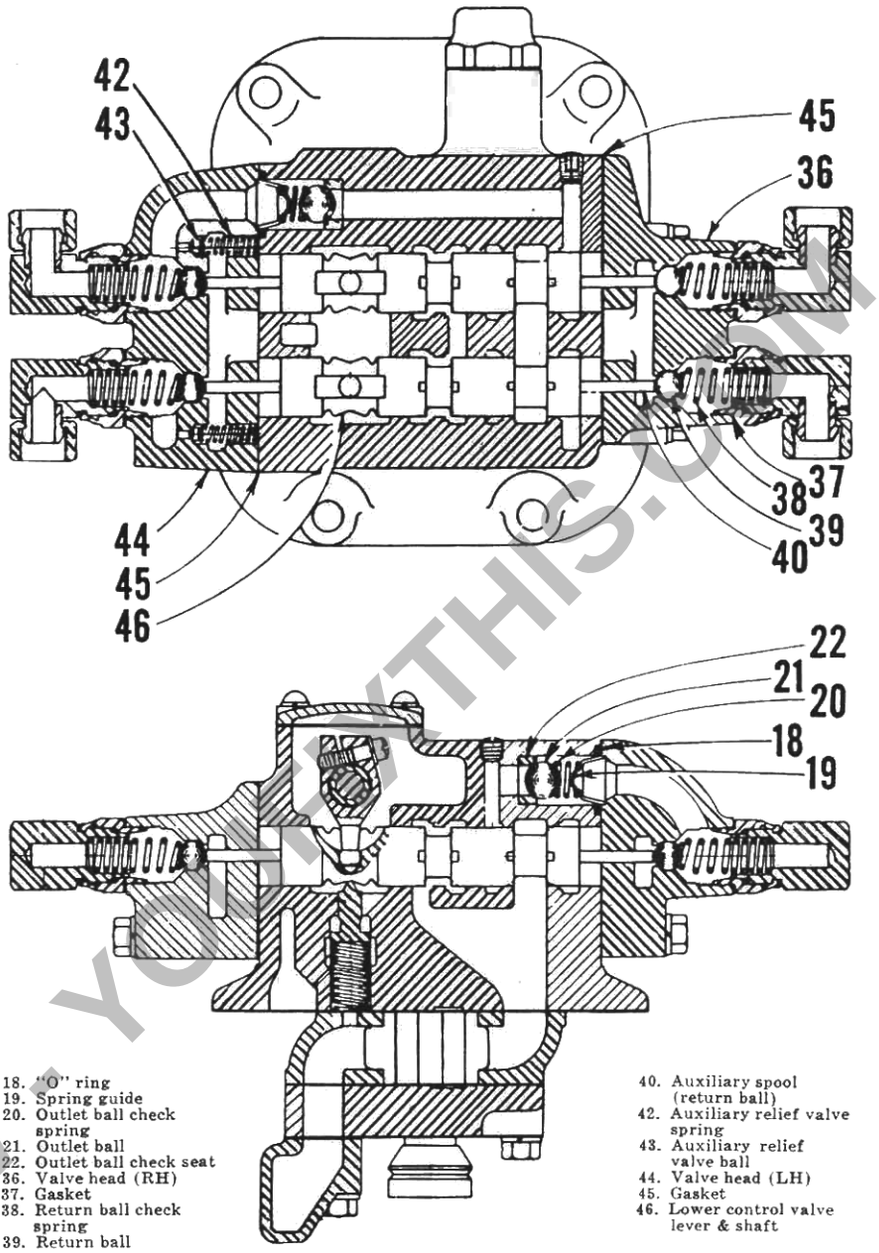


Fig. C227A—Rear and lower side cross-sectional views of the gear type pump and a dual valve control body as used on series D, LA and S.

are the heads on a dual valve system. The only functional difference between the two heads is that the left head contains a non-adjustable auxiliary relief valve or valves. Both valve heads contain the outlet valve or valves and the return valve or valves. Refer to Figs. C230, C231, and C232.

Service data covering the foregoing valves are outlined in paragraphs 302 through 304B.

302. *Auxiliary Relief Valve.* The non-adjustable auxiliary relief (high pressure safety) valve or valves are located in the left head of the valve body and are preset to unload at 1500 psi. One auxiliary relief valve is used in the single valve system, Fig. C230, and two auxiliary relief valves are used in the dual valve systems, Fig. C231.

302A. To service the auxiliary relief valve, it is not necessary to remove the pump and valves unit from the tractor. To remove the auxiliary relief valve, first disconnect work cylinder hose or hoses from left valve head. Remove cap screws attaching left head to valve body and remove the head.

302B. Check the auxiliary relief valve ball seat, which is integral with the valve head, for roughness. If the seat is not damaged badly, same can be reseated by placing the ¼ inch auxiliary relief valve ball on the seat

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