

# SHOP MANUAL

# CASE INTERNATIONAL

## (DAVID BROWN)

## MODELS

**1190-1194-1290-1294-1390-  
1394-1490-1494-1594-1690**

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## DUAL DIMENSIONS

This service manual provides specifications in both metric (SI) and U.S. customary systems of measurement. The first specification is given in the measuring system perceived by us to be the preferred system when servicing a particular component, while the second specification (given in parenthesis) is the converted measurement. For instance, a specification of "0.28 mm (0.011 inch)" would indicate that we feel the preferred measurement in this instance is the metric (SI) system of measurement and the U.S. customary equivalent of 0.28 mm is 0.011 inch.

# CONDENSED SERVICE DATA

	MODELS				
	1190	1290	1390	1490	1690
<b>GENERAL</b>					
Engine Make .....	Own				
No. of Cylinders .....	3	4	4	4	6
Bore .....	100 mm (3.939 in.)				
Stroke .....	114.3 mm (4.5 in.)	*	114.3 mm (4.5 in.)		
Displacement .....	2.7 liter (164 cu. in.)	*	3.6 liter (219 cu. in.)	3.6 liter (219 cu. in.)	5.4 liter (329 cu. in.)
Compression Ratio .....	17:1	17:1	17:1	16:1	16:1
Battery .....	12-Volt, Negative Ground				
No. of Forward Speeds .....	12				

\* 1290 models with independent pto clutch manufactured before P.I.N. 11052369, or 1290 models with continuous pto clutch manufactured before P.I.N. 11052410 use a 3.2 liter (195 cu. in.) engine which has a stroke of 101.6 mm (4.0 inches). All 1290 models manufactured after these used 3.6 liter (219 cu. in.) engines which have a 114.3 mm (4.5 inches) stroke. Service procedures are the same for either engine.

## TUNE-UP

Firing Order .....	1-2-3	1-2-4-3			1-5-3-6-2-4
Valve Clearance (Cold) .....	0.25 mm (0.010 in.)				
Injection Timing .....	16° BTDC	17° BTDC	17° BTDC	20° BTDC	25° BTDC
Engine Low Idle Rpm .....	750				
Engine High Idle (No-Load) Rpm .....	2350-2375				2450
Engine Rated Speed (Full Load) .....	2200				
Power Rating .....	37 kW (49 hp)	45 kW (60 hp)	52 kW (70 hp)	66 kW (88 hp)	82 kW (110 hp)

## SIZES AND CLEARANCES

Crankshaft Main Journal Diameter .....	63.474-63.487 mm (2.4990-2.4995 in.)		66.65-66.66 mm (2.6240-2.6245 in.)		69.84-69.85 mm (2.749-2.750 in.)
Crankpin Journal Diameter .....	60.27-60.29 mm (2.3730-2.3735 in.)		63.45-63.46 mm (2.4980-2.4985 in.)		60.27-60.28 mm (2.3728-2.3732 in.)
Main and Rod Bearing Running Clearance .....	0.05-0.10 mm (0.002-0.004 in.)				
Crankshaft End Play .....	0.05-0.25 mm (0.002-0.010 in.)				0.15-0.25 mm (0.006-0.010 in.)
Cylinder Bore .....	100.046-100.066 mm (3.9388-3.9396 in.)				
Piston Diameter .....	99.86-99.88 mm (3.9315-3.9323 in.)				
Valve Stem Diameter .....	9.454-9.479 mm (0.3722-0.3732 in.)				
Camshaft Journal Specifications, See Paragraph .....	97	98	98	98	99

## CAPACITIES

Cooling System .....	8.5 liters (9 qts.)	14.2 liters (15 qts.)			15.3 liters (16 qts.)
Crankcase (With Filter) ....	6.25 liters (6.6 qts.)	7.4 liters (7.8 qts.)			12.5 liters (13.2 qts.)
Transmission, Hydraulic and Differential Case .....	27.5 liters (29 U.S. qts.)			42 liters (44.5 U.S. qts.)	
Fluid Type .....	Case PTF Fluid or Hy-Tran Plus				

## CONDENSED SERVICE DATA CONT.

	MODELS				
	1190	1290	1390	1490	1690
<b>CAPACITIES (Cont.)</b>					
Final Drive (Each) .....	2.3 liters (2.5 U.S. qts.)		6.8 liters (7 U.S. qts.)		7.5 liters (8 U.S. qts.)
Fluid Type .....	Case ET HB Fluid				
Power Steering .....	0.9 liters (1 U.S. qt.)	1.25 liters (1.5 U.S. qts.)			
Fluid Type .....	Case TCH Fluid				
Manual Steering Gear .....	1.2 liters (1.3 U.S. qts.)	....	....	....	....
Fluid Type .....	Case FDL SAE 140	....	....	....	....
Front Drive Axle Differential—					
David Brown .....	....	8 liters (8.5 U.S. qts.)			....
Fluid Type .....	Case FDL SAE 90				
Carraro .....	....	....	....	4 liters (4.25 U.S. qts.)	
Fluid Type .....	Case FDL SAE 90				
Front Drive Axle Final					
Drive (Each)—					
David Brown .....	....	0.9 liters (1 U.S. qt.)			....
Fluid Type .....	Case FDL SAE 90				
Carraro .....	....	....	....	1.4 liters (1.5 U.S. qts.)	
Fluid Type .....	Case FDL SAE 90				

	MODELS				
	1194	1294	1394	1494	1594
<b>GENERAL</b>					
Engine Make .....	Own				
No. of Cylinders .....	3	4	4	4	6
Bore .....	100 mm (3.939 in.)				
Stroke .....	114.3 mm (4.5 in.)				
Displacement .....	2.7 liter (164 cu. in.)	3.6 liter (219 cu. in.)			5.4 liter (329 cu. in.)
Compression Ratio .....	17:1	17:1	16:1		
Battery .....	12 volts, Negative Ground				
No. of Forward Speeds .....	12				
<b>TUNE-UP</b>					
Firing Order .....	1-2-3	1-2-4-3			1-5-3-6-2-4
Valve Clearance (Cold) .....	0.25 mm (0.010 in.)				
Injection Timing .....	16° BTDC	17° BTDC	17° BTDC	20° BTDC	25° BTDC
Engine Low Idle Rpm .....	750	600-650			
Engine High Idle					
(No-Load) Rpm .....	2350-2375				
Engine Full Load Rpm .....	2200				
Power Rating .....	35 kW (49 hp)	45 kW (62 hp)	53 kW (77 hp)	61 kW (85 hp)	72 kW (97 hp)

# CONDENSED SERVICE DATA CONT.

	MODELS				
	1194	1294	1394	1494	1594
<b>SIZES AND CLEARANCES</b>					
Crankshaft Main Journal					
Diameter .....		63.474-63.487 mm (2.4990-2.4995 in.)		66.65-66.66 mm (2.6240-2.6245 in.)	69.84-69.85 mm (2.749-2.750 in.)
Main and Rod Bearing					
Running Clearance .....			0.05-0.10 mm (0.002-0.004 in.)		
Crankshaft End Play .....			0.05-0.25 mm (0.002-0.010 in.)		0.15-0.25 mm (0.006-0.010 in.)
Cylinder Bore .....			100.46-100.66 mm (3.9388-3.9396 in.)		
Piston Diameter .....			99.86-99.88 mm (3.9315-3.9323 in.)		
Camshaft Journal Specifications, Refer to Paragraph .....	97	98	98	98	99
<b>CAPACITIES</b>					
Cooling System .....	8.5 liters (9 U.S. qts.)		14.2 liters (15 U.S. qts.)		15.3 liters (16 U.S. qts.)
Crankcase (with Filter) .....	6.25 liters (6.6 U.S. qts.)		7.4 liters (7.8 U.S. qts.)		12.5 liters (13.2 U.S. qts.)
Transmission, Hydraulic and Differential Case— Synchronesh .....	27.5 liters (29 U.S. qts.)	27.5 liters (29 U.S. qts.)	36.5 liters (38.5 U.S. qts.)	42 liters (44.5 U.S. qts.)	42 liters (44.5 U.S. qts.)
Power Shift .....	....	....	42 liters (44.5 U.S. qts.)	42 liters (44.5 U.S. qts.)	42 liters (44.5 U.S. qts.)
Fluid Type .....			Case PTF Fluid or Hy-Tran Plus		
Final Drive (Each) .....		2.3 liters (2.5 U.S. qts.)		6.8 liters (7 U.S. qts.)	7.5 liters (8 U.S. qts.)
Fluid Type .....			Case ETHB Fluid		
Power Steering .....	0.9 liters (1 U.S. qt.)			1.25 liters (1.5 U.S. qts.)	
Fluid Type .....			Case TCH Fluid		
Front Drive Axle					
Differential .....	....	6 liters (6.25 U.S. qts.)	NOTE 1	NOTE 2	NOTE 3
Fluid Type .....	....		Case FDL SAE 90		
Front Drive Axle					
Final Drive (Each) .....	....	1.4 liters (1.5 U.S. qts.)	NOTE 1	NOTE 2	NOTE 3
Fluid Type .....	....		Case FDL SAE 90		

NOTE 1: Prior to P.I.N. 11503001, differential capacity is 6 liters (6.25 U.S. qts.) and final drive capacity is 1.4 liters (1.5 U.S. qts.). P.I.N. 11503001 and after, differential capacity is 4 liters (4.25 U.S. qts.) and final drive capacity is 1 liter (1.06 U.S. qt.).

NOTE 2: Prior to P.I.N. 11518001, differential capacity is 6 liters (6.25 U.S. qts.) and final drive capacity is 1.4 liters (1.5 U.S. qts.). P.I.N. 11518001 and after, differential capacity is 4 liters (4.25 U.S. qts.) and final drive capacity is 1 liter (1.06 U.S. qt.).

NOTE 3: Prior to P.I.N. 11221501, differential capacity is 5 liters (5.25 U.S. qts.) and final drive capacity is 1.7 liters (1.75 U.S. qts.). P.I.N. 11221501 and after, differential capacity is 4 liters (4.25 U.S. qts.) and final drive capacity is 1 liter (1.06 U.S. qt.).

# FRONT AXLE (TWO-WHEEL DRIVE)

## FRONT WHEEL BEARINGS

### All Models

1. A typical front wheel spindle, wheel hub and bearing assembly are shown in Fig. 1.

It is recommended that wheel bearings be lubricated with multipurpose lithium base grease using a pressure grease gun after every 50 hours of normal operation.

To adjust wheel bearings, tighten slotted nut (17—Fig. 1) to 95 N·m (70 ft.-lbs.) torque while turning the wheel. Loosen the nut, then retighten to 40 N·m (30 ft.-lbs.) torque while turning the wheel. Make certain wheel turns freely. Loosen nut, if necessary, to align hole for cotter pin, then install a new pin.

## SPINDLES

### All Models

#### 2. REMOVE AND REINSTALL.

To remove spindle (9—Fig. 1), support front of tractor and remove wheel from

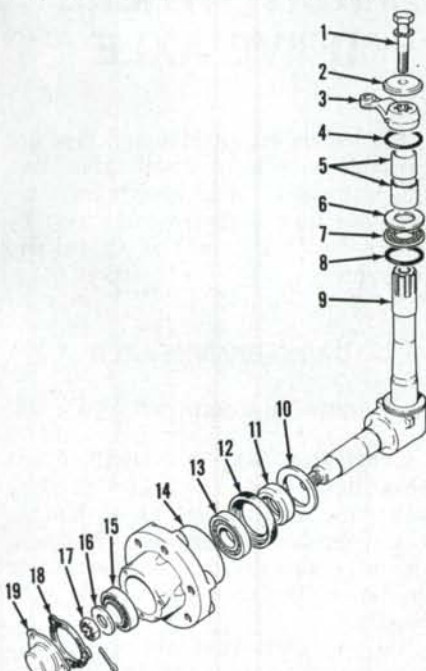


Fig. 1—Exploded view of typical front spindle assembly showing component parts and their relative positions.

- |                   |                          |
|-------------------|--------------------------|
| 1. Cap screw      | 11. Oil seal wear sleeve |
| 2. Special washer | 12. Oil seal             |
| 3. Steering lever | 13. Bearing              |
| 4. "O" ring       | 14. Hub                  |
| 5. Bushings       | 15. Bearing              |
| 6. Thrust washer  | 16. Washer               |
| 7. Thrust bearing | 17. Slotted nut          |
| 8. "O" ring       | 18. Gasket               |
| 9. Spindle        | 19. Hub cap              |
| 10. Dirt seal     |                          |

side to be serviced. Remove cap screw (1) and washer (2) which retains steering arm (3), and remove steering arm from spindle.

**NOTE: If steering arm (3) is tight on spindle (9), reinstall cap screw (1) minus washer (2) and rap head of cap screw sharply to loosen steering arm. Care should be taken not to damage cap screw or threads in spindle.**

Remove spindle and upper "O" ring (4—Fig. 1). Remove thrust washer (6) on all models and thrust bearing (7) on 1490, 1494, 1594 and 1690 models. On all models remove lower "O" ring (8).

With spindle removed, upper and lower spindle bushings (8 and 10—Fig. 2) can be removed from axle extension (9) using a suitable puller or drift punch. New bushings should be pressed into axle extension until flush with outer surface of axle extension. Bushings are presized and should not require reaming if carefully installed.

Reinstall by reversing removal procedure making certain thrust bearing (7—Fig. 1) and thrust washer (6) are in proper sequence on 1490, 1494, 1594 and 1690 models. On all models, tighten steering arm retaining cap screw (11) to 163 N·m (120 ft.-lbs.) torque.

## TIE RODS AND TOE-IN

### All Models

3. Toe-in of front wheels should be 3

mm (1/8 inch), measured between wheel rims at front and rear of wheels. Toe-in can be adjusted by lengthening or shortening threaded tie rod ends equally.

Tie rod ends are nonadjustable. If excessively worn, they must be renewed as complete units.

## AXLE MAIN MEMBER

### All Models

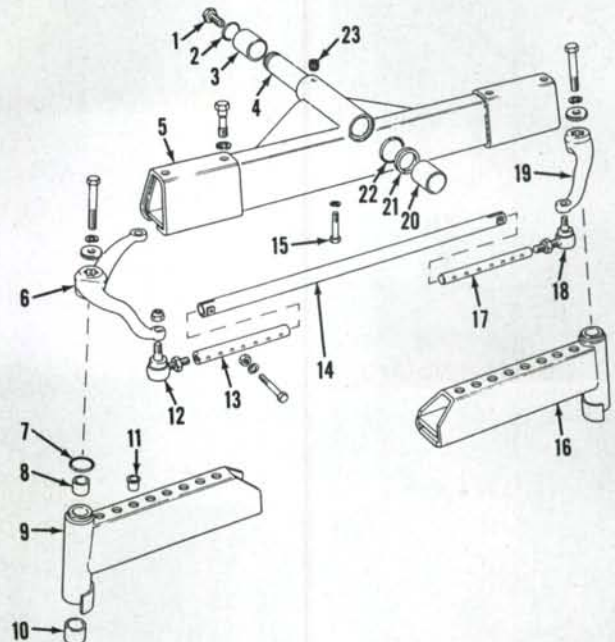
#### 4. REMOVE AND REINSTALL.

Refer to appropriate Fig. 2, 3 or 4 for an exploded view of front axle assembly. Disconnect drag link (manual steering), steering cylinder lines (power steering) or steering cylinder as necessary for model being serviced. Support front of tractor with suitable stand. Loosen trunnion pin retaining bolt (15) about five turns, then rap head of bolt with a hammer to dislodge threaded insert (23). Remove bolt and insert. Remove expansion plug from trunnion pin bore if so equipped. Screw slide hammer puller into trunnion pin (4) and remove pin. Raise front of tractor until axle is clear. Remove thrust washer (21) and "O" rings (2 and 22). Drive bushings (3 and 20) out of bore noting placement if different in size or length. Models 1190 and 1194 have a blind hole at the rear, remove bushing with a chisel.

On all models, drive new bushings in until flush with housings. Bushings are presized and should not require reaming if carefully installed. Check trun-

Fig. 2—Exploded view of front axle used on Models 1190 and 1194. Front axle used on Model 1294 and early Model 1394 (before P.I.N. 11504412) is similar.

- |                   |                         |
|-------------------|-------------------------|
| 1. Bolt adapter   | 15. Axle retaining bolt |
| 2. "O" ring       | 16. Axle extension      |
| 3. Bushing        | 17. Tie rod             |
| 4. Trunnion pin   | 18. Tie rod end         |
| 5. Center beam    | 19. Steering lever      |
| 6. Steering lever | 20. Bushing             |
| 7. "O" ring       | 21. Thrust washer       |
| 8. Bushing        | 22. "O" ring            |
| 9. Axle extension | 23. Threaded insert     |
| 10. Bushing       |                         |
| 11. Plastic plug  |                         |
| 12. Tie rod end   |                         |
| 13. Tie rod       |                         |
| 14. Spacer tube   |                         |



### Paragraphs 5-8

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nion pin for free fit and lubricate pin, bushings, thrust washer and "O" rings during assembly.

Check axle front to rear float on trunnion pin. Axle should pivot freely with a slight front to rear float. If end float is excessive, renew trunnion pin thrust washer.

#### FRONT SUPPORT

##### Models 1190 and 1194

##### 5. REMOVE AND REINSTALL.

Front support for Models 1190 and 1194 is an integral part of the main frame casting. To renew front support, first split tractor as outlined in paragraph 217. Remove side covers and engine cover support framework. Drain engine oil. Remove radiator hoses and radiator. Remove battery and battery support. Remove all engine mounting bolts. Disconnect all necessary pipes, control rods and electrical wiring. Remove engine oil pan. Use a hoist and remove engine. Remove any remaining components from main frame and support with a suitable lifting device. Remove front axle as outlined in paragraph 4.

Reassemble by reversing disassembly procedure.

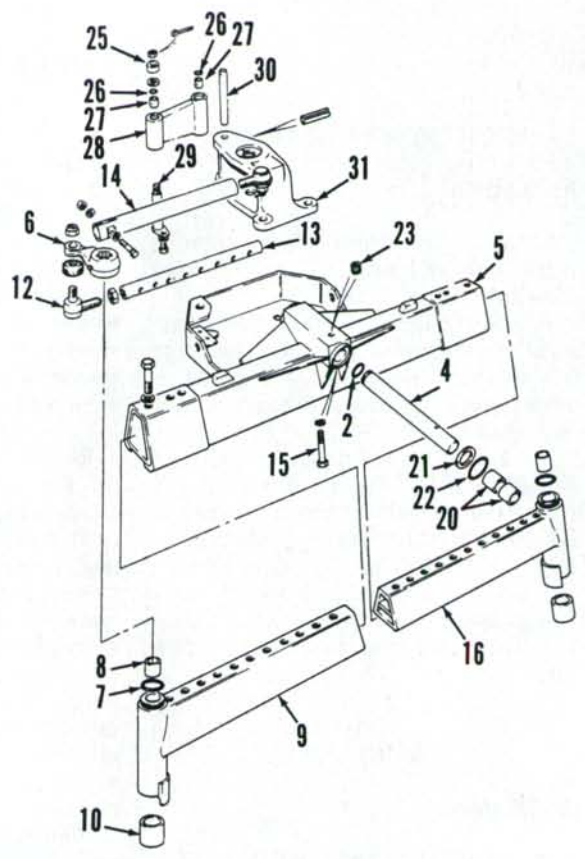
##### Models 1290-1294-1390-1394-1490-1494-1594-1690

##### 6. REMOVE AND REINSTALL.

Front support (main frame extension) bolts to main frame just forward of engine. To remove front support, first remove engine side covers, air cleaner assembly, battery and supports. Drain transmission and radiator. Remove oil

Fig. 4—Exploded view of typical front axle assembly used on 1490, 1494, 1594 and 1690 models.

- 2. "O" ring
- 4. Trunnion pin
- 5. Center beam
- 6. Steering lever
- 7. "O" ring
- 8. Bushing
- 9. Axle extension
- 10. Bushing
- 12. Tie rod end
- 13. Tie rod
- 14. Spacer tube
- 15. Axle retaining bolt
- 16. Axle extension
- 20. Bushings
- 21. Thrust washer
- 22. "O" ring
- 23. Threaded insert
- 25. Spacer
- 26. "O" ring
- 27. Bushing
- 28. Pivot link
- 29. Pivot pin
- 30. Pivot pin
- 31. Anchor fork



cooler and lines (if so equipped), hydraulic pumps, lines and drive shaft. Remove radiator and hoses. Raise front of tractor and remove front axle as outlined in paragraph 4 for two-wheel drive models, or paragraph 8 or 25 for models equipped with front drive axle. Attach a hoist to front support and remove retaining bolts. Remove front support.

Reassemble by reversing disassembly procedure.

### FRONT-WHEEL DRIVE AXLE

All models except 1190 and 1194 are available with front-wheel drive. Two different axles, David Brown and Carraro, are used. Carraro axles may be equipped with standard or limited slip differential.

#### DAVID BROWN AXLE

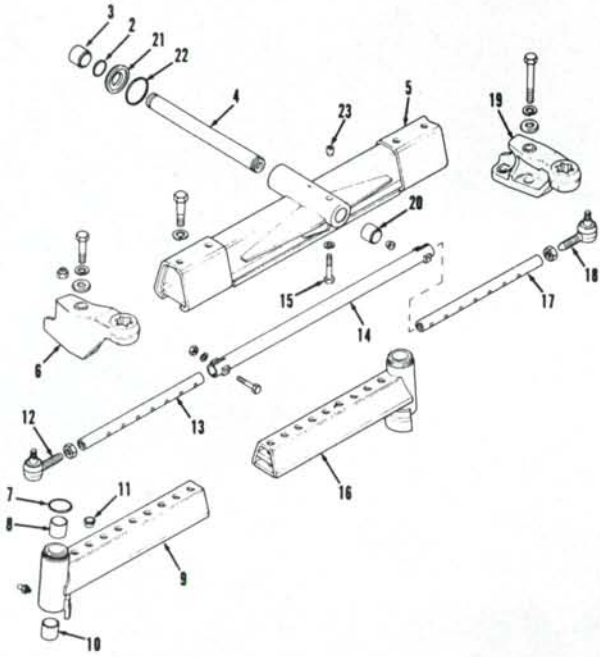
##### All Models So Equipped

**7. TIE RODS AND TOE-IN.** Front wheel toe-in should be 0-1.5 mm (0-1/16 inch) measured from wheel rim to wheel rim at front and rear of wheels. Toe-in is adjusted by lengthening or shortening the threaded tie rod ends equally.

Tie rod ends that are excessively worn must be renewed as complete units.

**8. R&R AXLE.** Front drive axle final drives and differential may be serviced without removing entire axle and differential housing assembly. However, if housing or trunnion pin are to be serviced, it will be necessary to remove axle housing assembly.

Fig. 3—Exploded view of front axle used on late Model 1394 (P.I.N. 11504412 and after). Refer to Fig. 2 for legend.



To remove assembly, first disconnect all steering lines and cap openings. Loosen locknuts (6—Fig. 5) on trunnion shaft cotter pins (31) until they are even with threaded ends. Using care to avoid damaging threads, drive cotter pins (31) through trunnion shaft. Remove locknuts and washers from cotter pins and remove pins (raise right end of axle for more clearance). Support axle and remove core plug (7) from trunnion shaft bore with punch and hammer. Use slide hammer to pull trunnion shaft (33). Raise front of tractor enough to clear axle and remove axle. Remove thrust washers (36) and "O" rings (35 and 37).

To reinstall, reverse removal procedure. Bleed steering system as outlined in paragraph 58.

**9. RENEW TRUNNION SHAFT BUSHINGS.** Remove axle assembly as outlined in paragraph 8. Remove the four trunnion shaft bushings (34—Fig. 5) using a suitable puller. Install bushings making certain grease hole in each bore is between the two bushings. Refer to Fig. 6 for correct bushing placement.

If trunnion shaft bracket (32—Fig. 5) is to be renewed, remove bracket from axle housing and remove dowel pins. Loosely bolt new bracket to housing and drive dowel pins in. Tighten bolts to 203-244 N·m (150-180 ft.-lbs.) torque.

Lubricate "O" rings and place in thrust washer grooves. When reinstalling thrust washers (36), "O" ring is toward front at front position and toward rear at rear position.

**10. FINAL DRIVE AND STUB AXLE.** Left and right final drive removal procedure is similar. To remove, raise and support side to be serviced and remove tire and wheel. Rotate hub so drain plug is at bottom and drain fluid. Remove end plate (12—Fig. 7) and use pry bars to pull sun gear (15) and shaft (1—Fig. 8) out approximately 5 mm ( $\frac{3}{16}$  inch).

**NOTE:** Axle shaft seals can be damaged if axle shaft is pulled out too far.

Hold axle shaft out and push sun gear in until split rings (14—Fig. 7) can be removed. Remove sun gear (15) and thrust washer (16).

**NOTE:** Do not push axle shaft into axle housing as oil seal damage could occur.

Bend tab washer (2—Fig. 7) away from locknut (1) and remove nut with special spanner wrench (CAS-1607). Remove tab washer (2), planetary ring gear (3) and bearing cup assembly (4).

Note number and thickness of shims (5) and remove. Remove spacer (6) and hub (7). Seal (10) in hub will be tight on axle and should stay on stub axle as hub is removed. Remove bearing (9) and seal (10).

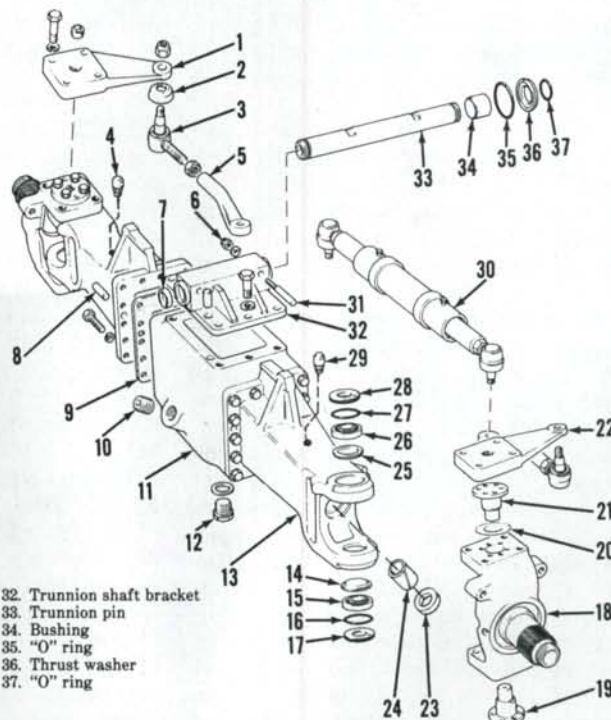
Oil seal wear sleeve (11) should be renewed if damaged or worn. Use a

chisel to cut through wear sleeve being careful not to damage surface of stub axle. Install new sleeve on axle making sure side with inside chamfered edge goes onto axle first.

Remove steering lever (4—Fig. 8) and bolts retaining upper and lower bearing pins (6 and 10). Remove bearing pins

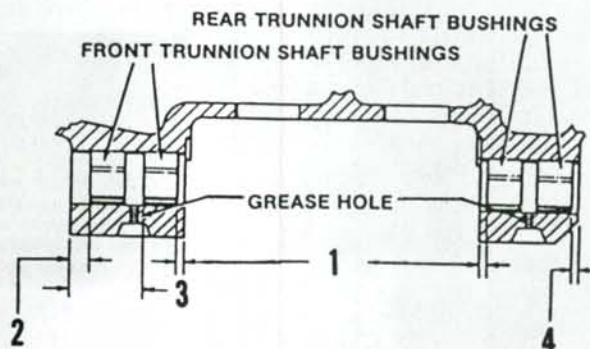
**Fig. 5—Exploded view of David Brown front drive axle used on some models showing component parts and their relative positions.**

1. Steering lever
2. Rubber cover
3. Tie rod end
4. Breather
5. Steering link
6. Cotter pin nut
7. Core plug
8. Dowel pin
9. Gasket
10. Plug
11. Differential housing
12. Drain plug
13. Axle housing
14. Shield
15. Bearing
16. "O" rings
17. Sealing disc
18. Stub axle
19. Bearing pin
20. Shim
21. Bearing pin
22. Steering lever
23. Oil seal
24. Bushing
25. Shield
26. Bearing
27. "O" ring
28. Sealing disc
29. Breather
30. Steering cylinder
31. Pin
32. Trunnion shaft bracket
33. Trunnion pin
34. Bushing
35. "O" ring
36. Thrust washer
37. "O" ring



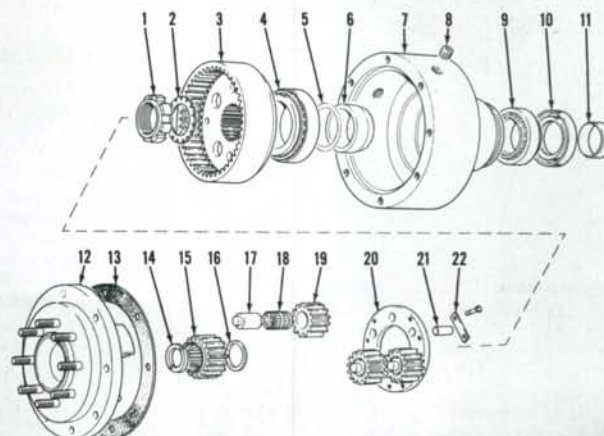
**Fig. 6—Diagram showing correct dimensions for the placement of trunnion shaft bushings for models equipped with David Brown front drive axles.**

1. 3 mm ( $\frac{1}{8}$  inch)
2. 15 mm ( $\frac{19}{32}$  inch)
3. 55 mm ( $2\frac{3}{16}$  inches)
4. 3 mm ( $\frac{1}{8}$  inch)



**Fig. 7—Exploded view of David Brown front drive axle final drive showing relative position of its component parts.**

1. Locknut
2. Tab washer
3. Planetary gear
4. Bearing
5. Shim
6. Spacer
7. Hub
8. Plug
9. Bearing
10. Oil seal
11. Sleeve
12. End plate
13. Gasket
14. Split ring
15. Sun gear
16. Thrust washer
17. Bearing pin
18. Bearing
19. Planet gear
20. Planet gear carrier
21. Dowel
22. Lockplate





## Paragraphs 11-14

## CASE INTERNATIONAL (DAVID BROWN)

using jack screws in threaded hole of bearing pins. Retain shims (7) for use in reassembly. Hold axle shaft in place while removing stub axle assembly to prevent damage to oil seals. Remove axle shaft from housing.

Remove upper and lower sealing discs (28 and 17—Fig. 5), "O" rings (27 and 16) and bearings (26 and 15) from axle housing (13). Use a suitable puller to remove upper and lower bearing cups from axle housing. Remove upper and lower shields (25 and 14).

Remove seal (2—Fig. 8) from inside stub axle (8). Using a suitable bushing driver, drive bushing (3) out oil seal end of stub axle. Install new bushing from seal end until it seats in stub axle. Install new oil seal with lip of seal entering bore first.

To reassemble, reverse disassembly procedure using care not to let axle shafts damage oil seals and noting preload must be set on bearing pin bearings and stub axle bearings.

To set bearing pin preload, reassemble unit minus shims (7—Fig. 8). Tighten lower bearing pin mounting bolts to 68 N·m (50 ft.-lbs.) torque and upper bearing pin mounting bolts to 20 N·m (15 ft.-lbs.) torque. Push stub axle up tight against bottom of axle housing and use a feeler gage to measure gap between upper bearing pin flange and stub axle. See Fig. 9. Remove upper bearing pin, then assemble shims so total thickness is 0.381 mm (0.015 inch) less than feeler gage measurement. This will correctly preload bearings to 0.10-0.15 mm (0.004-0.006 inch) when full load is on axle. Tighten upper bearing pin bolts to 68 N·m (50 ft.-lbs.) torque. Refer to paragraph 11 to set stub axle bearing preload.

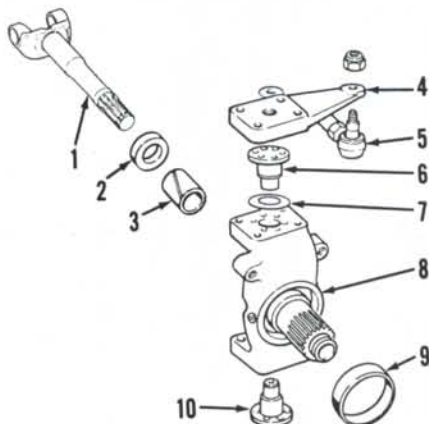


Fig. 8—Exploded view of David Brown front drive stub axle showing component parts and their relative positions.

- |                     |                 |
|---------------------|-----------------|
| 1. Axle drive shaft | 6. Bearing pin  |
| 2. Oil seal         | 7. Shim         |
| 3. Bushing          | 8. Stub axle    |
| 4. Steering lever   | 9. Wear sleeve  |
| 5. Tie rod end      | 10. Bearing pin |

**11. WHEEL HUB BEARING PRELOAD.** To set stub axle bearing preload, install shims (5—Fig. 7) having a total thickness of 2 mm (0.080 inch) next to spacer (6). Install planetary ring gear (3) and nut (1) minus tab washer (2). Using special spanner wrench (CAS-1607), tighten nut (1) to 203 N·m (150 ft.-lbs.) torque. Mount dial indicator so point of probe contacts outside face of hub. See Fig. 10. Measure and record amount of end play. Correct amount of bearing preload is 0.08-0.13 mm (0.003-0.005 inch). Subtract shims equal to measured end play plus 0.10 mm (0.004 inch) from previously installed shim pack to obtain correct bearing preload.

Reassemble unit installing tab washer (2—Fig. 7) and making sure flat side of nut (1) faces inward. Tighten nut to 203 N·m (150 ft.-lbs.) torque, then secure with tab washer. Fill each final drive with 0.9 L (1 quart) of Case FDL SAE 90 gear lubricant or equivalent.

**12. PLANETARY GEAR ASSEMBLIES.** Drain fluid, then remove end plate (12—Fig. 7). Remove lockplates (22) and bolts retaining planetary gear carrier (20) to end plate (12). Mark gear carrier, pins, gears and bearings prior to disassembly so they can be reassembled in their original positions. Remove carrier, gears and bearings.

Reassemble by reversing disassembly procedure making certain gears, bearings and pins are reinstalled in

their original positions. Install lockplates so they cover dowel pin holes and tighten bolts to 40 N·m (30 ft.-lbs.) torque. Reinstall end plate, tighten bolts to 100 N·m (75 ft.-lbs.) torque and fill hub to proper level with Case FDL SAE 90 gear lubricant or equivalent.

**13. AXLE HOUSINGS.** Axle shaft seal (23—Fig. 5) and bushings (24) can be renewed with axle housings in place.

If removal of housing is necessary, raise and support front of tractor and remove tire and wheel from side to be serviced. Drain oil from differential housing. Capacity is approximately 8 L (8.5 quarts). Attach hoist to axle housing so weight is equally balanced. Disconnect steering linkage and remove bolts retaining axle housing to differential housing, then remove axle housing. Remove final drive from axle housing if necessary.

To reinstall axle housing, reverse the removal procedure. Tighten housing mounting bolts to 110-130 N·m (80-95 ft.-lbs.) torque. Fill differential housing to correct level with Case FDL SAE 90 gear lubricant or equivalent.

**14. R&R DIFFERENTIAL ASSEMBLY.** Differential assembly may be removed with differential housing and axle housing installed on tractor. It is necessary, however, to first remove left and right stub axle assemblies as outlined in paragraph 10.

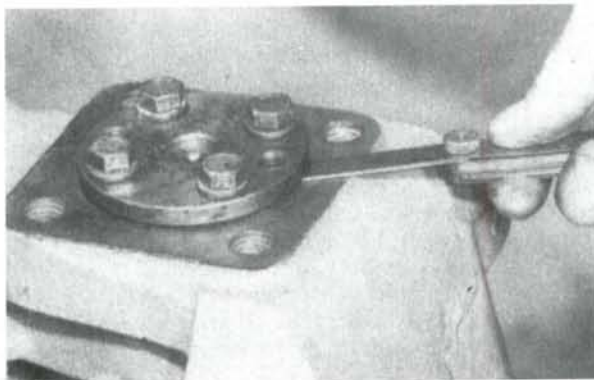


Fig. 9—To set bearing pin preload, use a feeler gage to measure gap between bearing pin flange and stub axle housing. Refer to text.

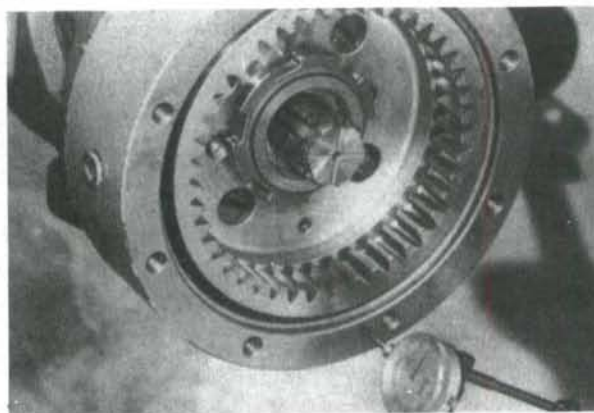


Fig. 10—To set stub axle bearing preload, mount a dial indicator so probe contacts face of wheel hub. Measure end play and refer to text.

SHOP MANUAL

Paragraphs 15-16

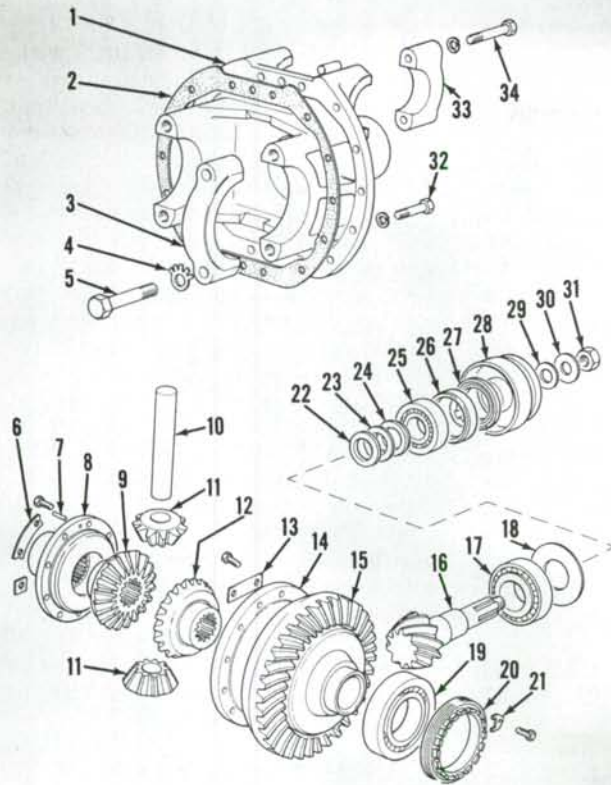


Fig. 11—Exploded view of David Brown differential assembly showing component parts and their relative positions.

1. Differential support bracket
2. Gasket
3. Bearing cap
4. Tab washer
5. Bearing cap bolt
6. Lockplate
7. Dowel pin
8. End plate
9. Side gear
10. Differential pin
11. Differential pinion gear
12. Side gear
13. Lockplate
14. Differential cage
15. Bevel gear
16. Pinion shaft
17. Bearing
18. Shim
19. Bearing
20. Adjuster wheel
21. Tab washer
22. Front spacer
23. Shim
24. Rear spacer
25. Bearing
26. Spacer
27. Seal
28. Flange
29. Sealing washer
30. Retaining washer
31. Locknut
32. Cap screw
33. Steering cylinder cap
34. Cap screw

With stub axle assemblies and axle drive shafts removed, remove main drive shaft and steering cylinder. Support differential unit on floor jack and remove retaining bolts. Carefully move differential assembly out of housing and lower to floor.

Reinstall by reversing removal procedure. Tighten differential assembly retaining bolts to 68 N·m (50 ft.-lbs.) torque and drive shaft bolts to 54 N·m (40 ft.-lbs.) torque. Fill differential to correct level with Case FDL SAE 90 gear lubricant or equivalent.

**15. OVERHAUL DIFFERENTIAL.** Remove differential assembly and place in a stand with flange end toward floor. Mark bearing caps so they

can be reinstalled in their original positions and remove. Remove adjuster rings. Remove differential bevel ring gear and cage as an assembly.

Remove pinion shaft locknut (31—Fig. 11), then drive pinion shaft through flange (28) and carrier (1). Front spacer (22), shims (23) and rear spacer (24) should remain on pinion shaft as it is removed. Remove remaining bearing cups and shims from carrier (1) as necessary. Inspect bearings and spacers on pinion shaft and renew as necessary.

Mark end plate (8), cage (14) and bevel ring gear (15) so they may be reassembled in their original positions. Remove carrier bearings and separate end plate (8) from cage (14). Remove axle

gears, pinion gears and pin (10). Separate bevel ring gear from cage as necessary.

Bevel ring gear and pinion shaft are serviced as matched sets only and must be installed as such.

If bevel ring gear and pinion shaft, pinion shaft bearings or carrier are renewed, pinion shaft protrusion must be set as outlined in paragraph 16. Reassemble by reversing disassembly procedure. Adjust carrier bearings and bevel gear backlash as outlined in paragraph 17.

**16. PINION SHAFT PROTRUSION AND BEARING PRELOAD.**

Special tool (DB-8208) is required to set pinion shaft protrusion on David Brown axle, and all bearings, cups and spacers to be used in final assembly must be installed.

Assemble pinion shaft in carrier minus shims (18—Fig. 11), oil seal (27), spacer (26), sealing washer (29), front spacer (22), shims (23) or rear spacer (24). Install flange (28), retaining washer (30), and locknut (31) on pinion shaft (16) and tighten locknut until all end play of pinion shaft is just removed, then tighten locknut just a small amount more to slightly preload bearings. Install special tool in carrier bearing bores as shown in Fig. 12. Install shaft (CAS-1236-6), probe and spacer (CAS-1609) and locknut (CAS-1234-4) of special tool so probe point lightly contacts face of pinion shaft gear. Tighten locknut to lock probe in this position. Using a feeler gage, measure and record amount of gap between spacer and probe. See Fig. 13.

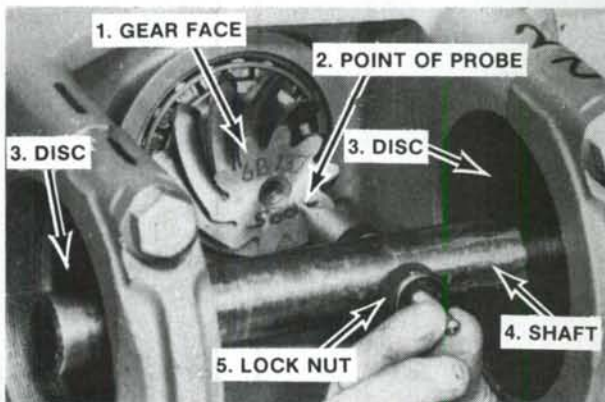


Fig. 12—To set pinion shaft protrusion, install special tool set (DB-8208) in carrier housing as shown. Refer to Fig. 13 and to text to determine thickness of shims required to correctly set shaft protrusion.

**GAP BETWEEN SPACER AND PROBE**

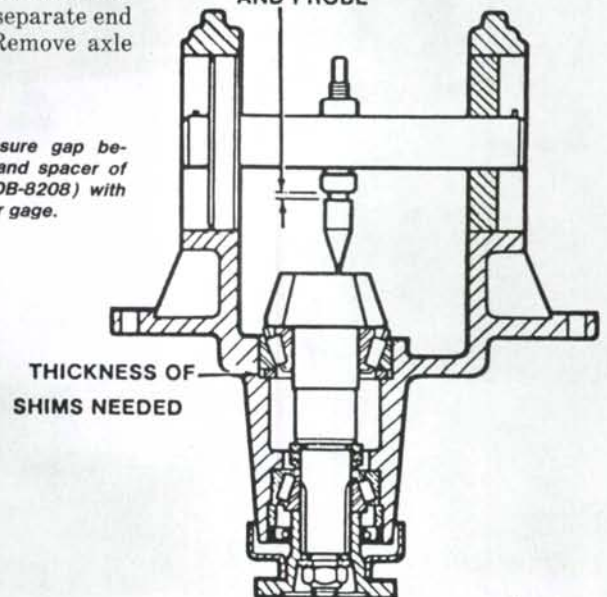


Fig. 13—Measure gap between probe and spacer of special tool (DB-8208) with a feeler gage.