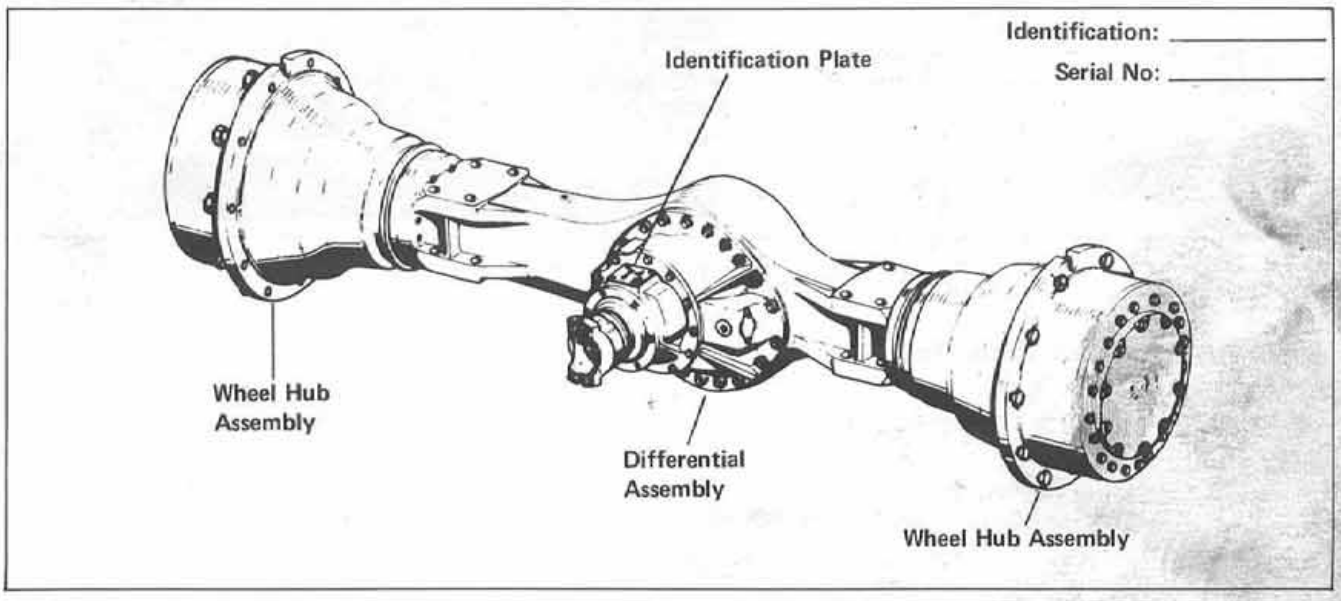
STEIGER

RABA AXLE

COUGAR II
PANTHER II
TURBO-TIGER II



IMMEDIATE ACTION LETTER REFERENCE:

No/Date

1_____4_____7_____

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3_____6_____9_____

SERVICE BULLETIN REFERENCE:

No/Date

1_____4_____7_____

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SERVICE NEWS REFERENCE:

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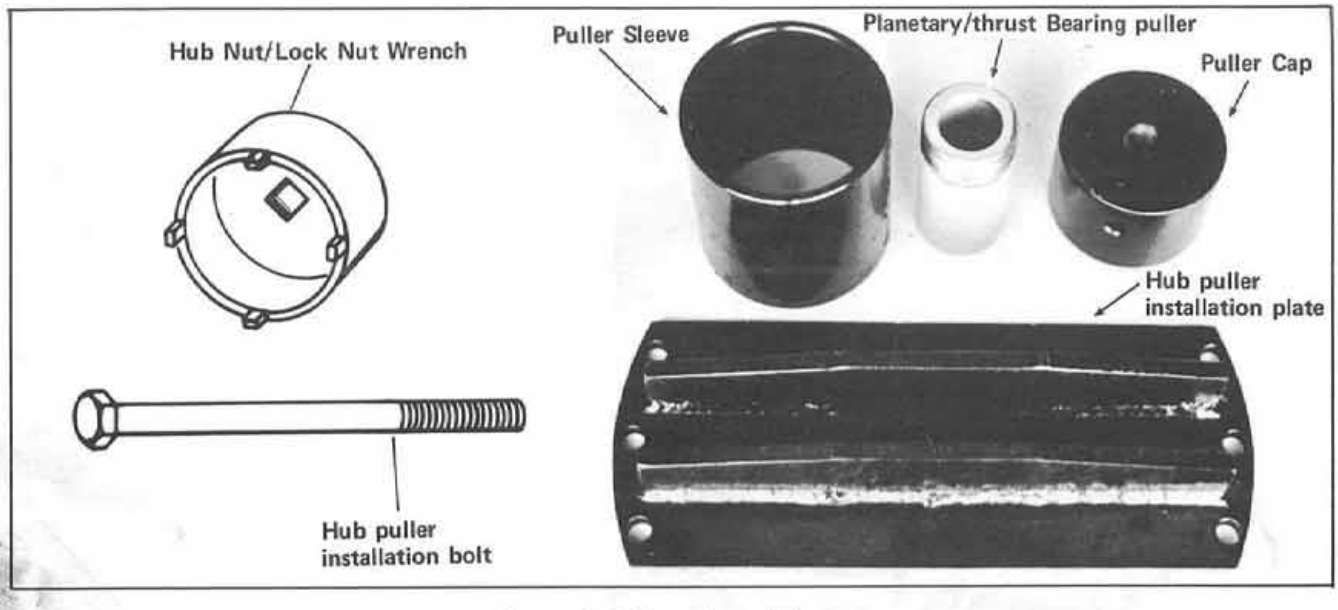


Special Service Tools

TOOLS REQUIRED

_____ 1-1/4 & 1-1/2 Std. Socket

_____ Metric Socket
(See Specification pp. CC-5 and CC-6)

_____ Torque Wrenches
(See Specifications pp. CC-5 and CC-6)

_____ 30 Ton Power Twin Unit (Owatonna Tool Co.)

_____ Outside Diameter Bearing Pullers

_____ Inside Diameter Bearing Pullers

_____ 6" Machinists Rule

CONTENTS

FORWARD

The Steiger-Raba Axle went into service on some 1975 models, Cougar II, Panther II and Turbo Tiger II. This axle features a dual planetary wheel hub and a high speed differential ratio. This arrangement allows shock and stress to be more evenly distributed through out the axle, thus reducing wear and failure.

This service manual includes all information necessary to maintain and over-haul the axle.

Certain repairs can be done without removing the axle from the tractor or without jacking the tractor.

Repair of the planetary carriers, axle shafts and differential section, can be done without removing entire axle or jacking tractor. (Jacking required to remove differential from rear axle on Series II tractors).

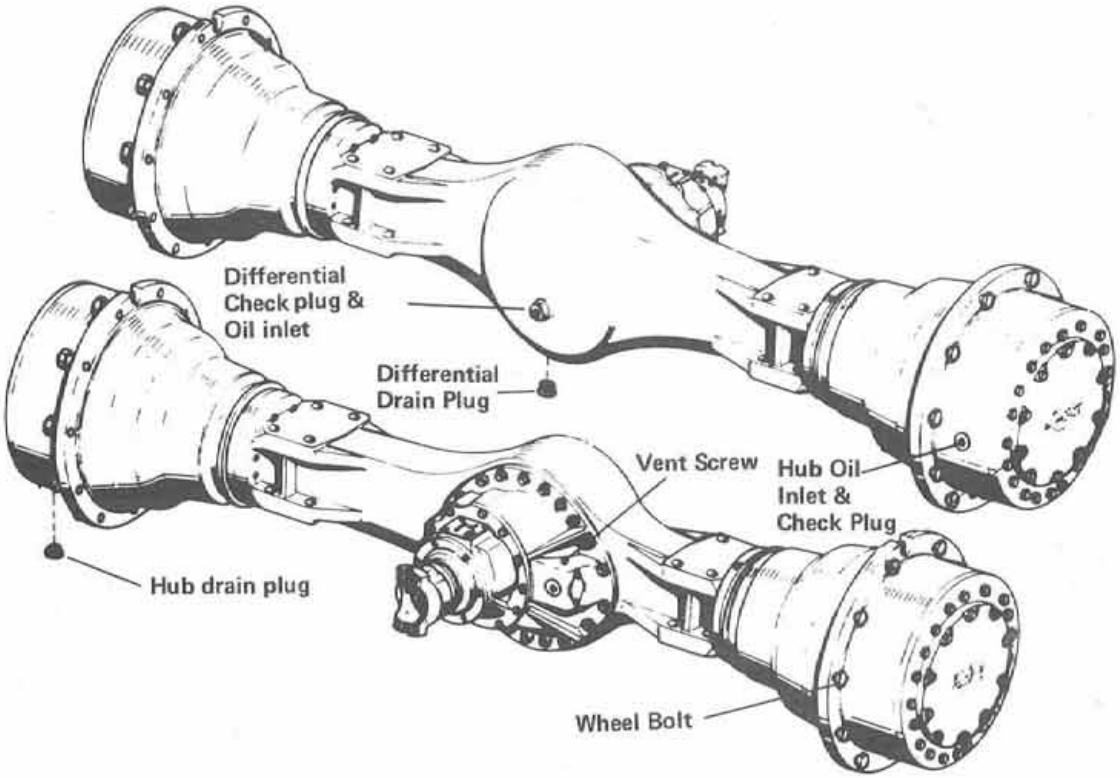
Repair of hub seals, hub bearings, and planetary ring gears require either the entire axle be removed or the tractor jacked and supported.

Be sure to read and follow the instructions provided in this manual before attempting to service the Steiger-Raba Axle.

On page CC-8 and CC-13 cutaway drawings provide an internal view of the axle components and their assembled position. All parts are listed and numbered. Reference to these drawings will be made throughout the manual.

Special tools are recommended in cases where certain operations cannot be done with standard shop tools or tools normally available in shops equipped to work on heavy tractors.

Throughout the manual the number of bolts have been listed to aid in identifying the part to be removed or assembled. (Example: Remove the 14 mm bolts (20). Twenty is the number of bolts.



Checking Oil Level

The oil should be changed after 100 hours of operation. Oil should be changed after every 500 hours of operation thereafter.

The oil level should be checked after every 100 hours of operation

Hubs

The oil level of the hubs should be checked as follow:

A. Turn hub position till the lower edge of the drain plug is located 1-1/2'' below the horizontal center line of the axle. Oil should be level with the lower edge of the hole in this position.

B. Each hub should contain approximately 7-1/2 quarts of oil.

C. Check each drain plug for metal particles and contamination. Clean the plug by washing in clean fuel oil and blowing clean debris with compressed air.

CAUTION: ⚠ Always direct compressed air away from body and towards a safe area.

Differential Section

The oil should be changed after 100 hours of operation. Oil should be changed after every 500 hours of operation thereafter.

A. The oil level in the differential section should be level with the lower edge of the check plug hole.

B. The differential section should contain approximately 8-1/2 quarts of oil.

C. Check the plug for contamination and metal particles. Clean the plug by washing in clean fuel oil and blow clean with compressed air.

CAUTION: ⚠ Always direct compressed air away from body and towards a safe area.

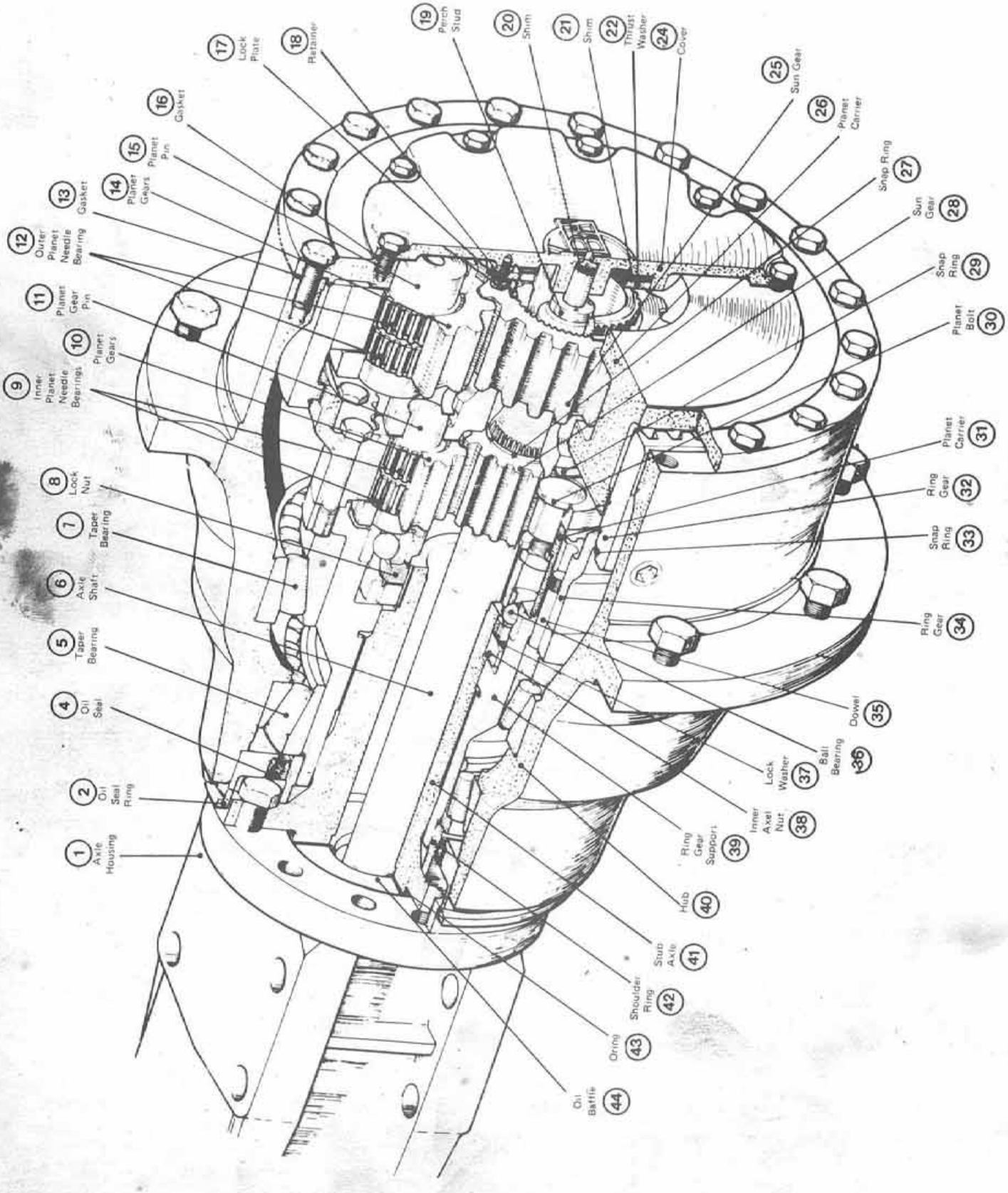
Air Vent Screw.

Remove the air vent screw and throughly clean in clean fuel and blow clean with compressed air.

Torque

Check all wheel bolts, dual bolts, and plugs for tightness. Check specification for tightness values. If any part of axle is disassembled, reassemble using new gaskets and tighten all bolts with a torque wrench to the values listed in specifications.

STEIGER/RABA AXLE
Hub Cutaway Illustration



STEIGER-RABA AXLE SPECIFICATIONS

LUBRICATION:	Metric	U.S. Standard
Wheel Hub(s)	7 liter	approx. 7-1/2 quarts
Differential Section	8 liter	approx. 8-1/2 quarts
Lubrication Oil		EP-90 MIL-L-2105-B
Grease Pack Thrust washer and perch stud in hub cover.		MPGM 3-5 molydenum disulfide mil-m-7866

FITTING SPECIFICATIONS-DIFFERENTIAL SECTION:

Ring Gear Run Out (See figure 23 pp CC-17)		0-.003 Total Indicator Runout
Differential Assembly Bearing Preload		.001-.002"
Differential/Pinion Backlash	.2mm-.5mm	.008-.020
Bevel Pinion Gear Bearing Preload (Rotating torque) (See figure 26 pp CC-18)	1-2 mkp	86-172 in.lb.

FITTING SPECIFICATIONS-HUB SECTION:

Hub Taper Bearing Preload		0-.002"
Inner Planetary/Cover Thrust Bearing Clearance (See figure 35 pp CC-21)	.05-1.0 mm	1/64-1/32 in. .019-.039 in.
Axle Shaft/Cover Perch Stud Clearance (See figure 35 pp CC-21)	.05-1.0 mm	1/64-1/32 in. .019-.039 in.

TORQUE SPECIFICATIONS: **To convert mkg to ft.lbs. multiply x 7.235**

Thread size	No.	Assembly	Wrench size	Meter Kilograms mkp	Foot Pound ft. lbs.
41 mm	(1)	Pinion Shaft Nut	54 mm	55-60	398-434
12 mm	(12)	Differential Housing Bolts	19 mm	8-10	58- 73
18 mm	(12)	Ring Gear to differential housing flange	27 mm	30-35	217-253
24 mm	(2)	Differential Bearing Cap bolts	37 mm	55-60	398-434
12 mm	(18)	Differential Drive housing to Axle Housing	19 mm	7.8	56

SPECIFICATIONS Cont.

TORQUE SPECIFICATIONS (cont.)

Thread size	No.	Assembly	Wrench size	Meter Kilograms mkp	Foot Pound ft. lbs.
14 mm	(12)	Pinion Housing to Differential Case bolts	22 mm	12-14	87-101
8 mm	(6)	Pinion Shaft seal plate bolts	14mm	2-3	14- 22
105 mm	(1)	Hub to Axle Nut (Outer Locknut)	5" spanner	35-41	250-300
14 mm	(24)	Ring Gear Support to Inner Ring Gear	22 mm	18	130
Special Shoulder bolt	(3)	Inner Planet Carrier Nuts	10 mm hex	20-25	145-180
14 mm	(20)	Outer Planet-Carrier to Hub	22 mm	20	145
10 mm	(10)	Hub Cover to Planet Carrier	17 mm	3.6	26
7/8" std	(10)	Wheel bolts	1-1/4"-1-5/16" std	45	325
1"	(8)	Axle to frame mount bolts	1-1/2 std	62	450
20 mm	(16)	Stud Axle to Axle Housing	30 mm	34	245

RATIOS:

Ring Gear/Pinion	27/13 = 2.077
Inner Planetary	64/26 + 1 = 3.46
Outer Planetary	64/26 + 1 = 3.46
Total Ratio	24.885

Disassembly of the Raba Wheel Hub

Special Tools Required: Metric wrenches
(See specifications pp CC-5 & CC-6)

Special puller tools: hoist 1-1/2 ton capacity, torque wrenches, 3/4" hex wrench, dial indicator with magnetic swivel arm, machinist's rule (metric or standard). special axle tools, bearing pullers, approximate 10 ton press.

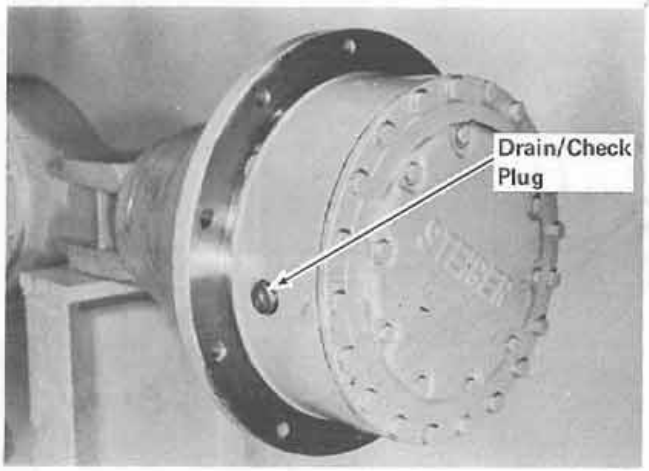


Figure 1

NOTE: *Steps 1 through 5 may be done without jacking and supporting the tractor.*

Step 1 Drain all oil from the entire axle before disassembly. Oil flows to all compartments within the axle. To prevent further damage from contamination, fresh oil should be placed in the axle when reassembled. Axle contains 5.8 gallons of oil. Use at least a 6 gallon container when draining to prevent spillage. Turn drain plugs on hubs to lowest point to get complete drainage.

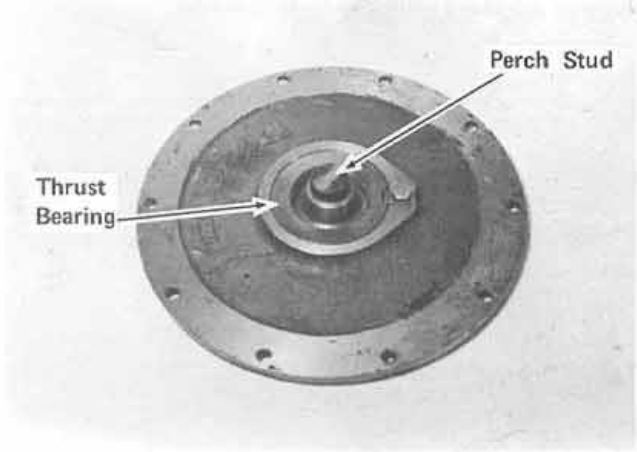


Figure 2

Step 2 Remove cap screws and pry cover from hub.

NOTE: *Check for the perch stud and thrust bearing in center of cover. There is a shim pack under the stud and under the bearing. Keep the shim pack intact for reassembly.*

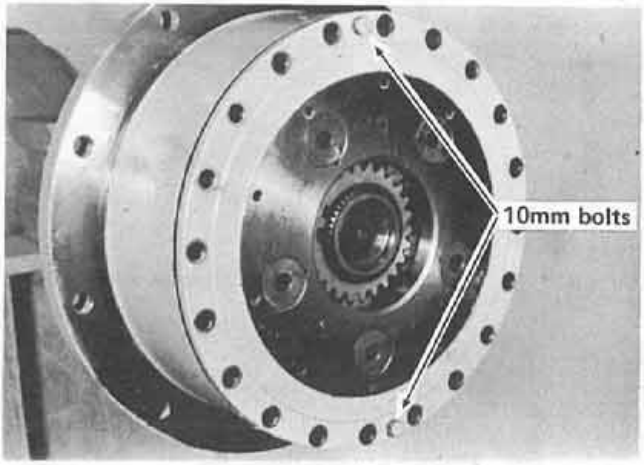


Figure 3

NOTE: *Check step 67 in reassembly section pp CC-21 for correct proceedure to set end play clearance.*

Step 3 Remove the cap screws (20). Pull outer planet carrier by turning two 10 mm bolts into the threaded holes on opposite sides of the planet carrier flange.

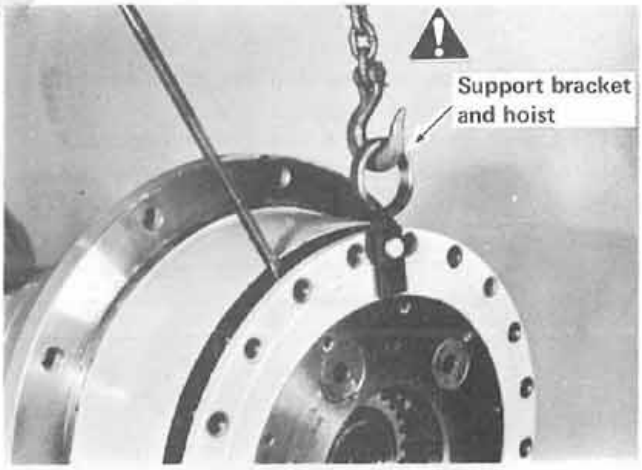


Figure 4

CAUTION:

Use a hoist to support and lower carrier assembly.

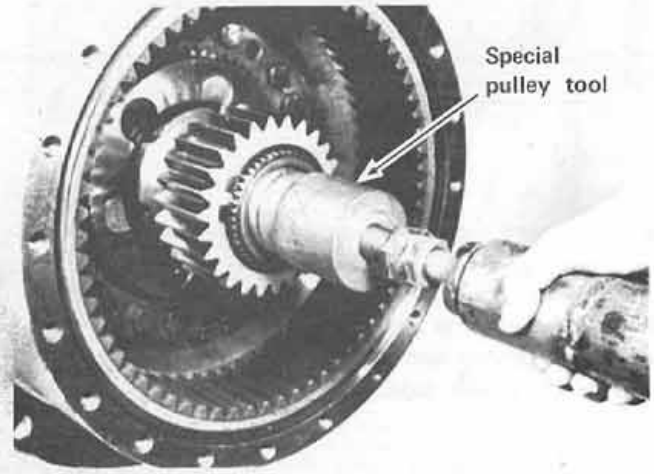


Figure 5

Step 4 Remove the inner planet carrier with the threaded socket puller and puller bolt. A slide hammer may be used to pull assembly. (See figure 5).

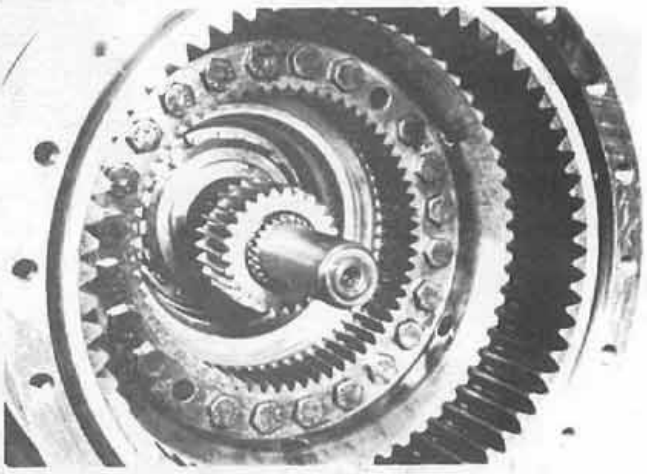


Figure 6

Step 5 Remove axle shaft and sun gear. The axle will slide out of the center section freely. There is no fastener on the axle in the center section. (See figure 6).

Step 6 Sun gears may be removed from the axle shaft and the inner planet carrier by removing snap rings and sliding sun gear from spline.

Outer Planetary Disassembly

Step 7 Disassemble the Outer Planet Carrier.

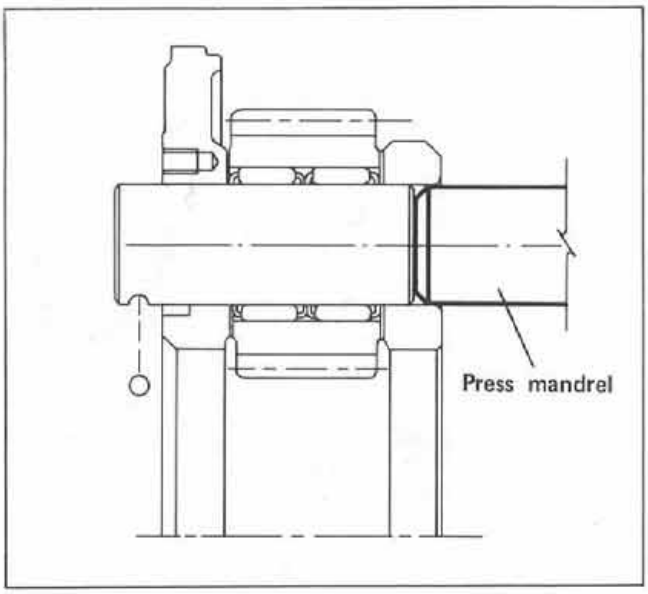


Figure 7, Illustration 1

Note: *Mark each planet gear, pin and planet pin bore to assure the same location for reassembly.*

A. **Press out planetary gear pin toward outer flange. (see figure 7) Be sure to catch ball lock as pin emerges.**

B. Replace pin and bearing as a matched set.

Inner Planetary Disassembly

Step 8 Disassemble the Inner Planet Carrier.

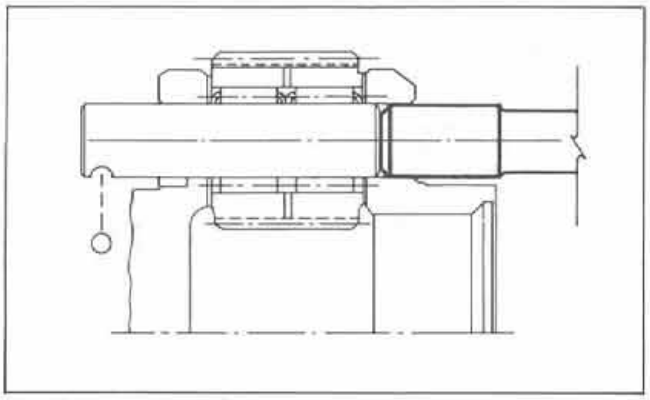


Figure 8, Illustration 2

A. Remove the ball bearing with a O.D. bearing puller. (See number 36 Page CC-8).

NOTE: *Bearing may remain in hub housing. Pull with I.D. bearing puller. [See No. 36 page CC-8]*

B. Remove the snap ring and press out planetary gear pins toward sun gear side. Be sure to catch the lock ball(s) as pin(s) emerge.

C. The inner planet carrier may be disassembled by removing the 3 hex head bolts. Be sure to match mark the carrier halves for alignment upon reassembly.

NOTE: *Further disassembly steps 9 through 29 require the tractor to be jacked and supported by safety stands.*

NOTE: *Clean and thoroughly inspect the hub assembly before removing from axle. Inspect gear and bearing surfaces for damage, wear and excessive play. Check for contamination, metal particles or other foreign matter that may be in the hub housing.*

IMPORTANT: ***Entire axle should be drained and flushed if breakage has occurred. Pieces of metal may have flowed to other areas of the axle in the oil.***

Step 9 Remove wheel and tires to continue axle disassembly. The axle should be supported on a suitable stand capable of supporting the weight of the axle.

CAUTION: ⚠ Place hoist in place directly over hub. Support hub by bolting chain to wheel mount flange. The hub weighs approximately 300 lbs. Hoist and chain must support this weight as hub is pulled free. Be sure the opposite end of the axle is supported so tipping does not occur when hub is removed.

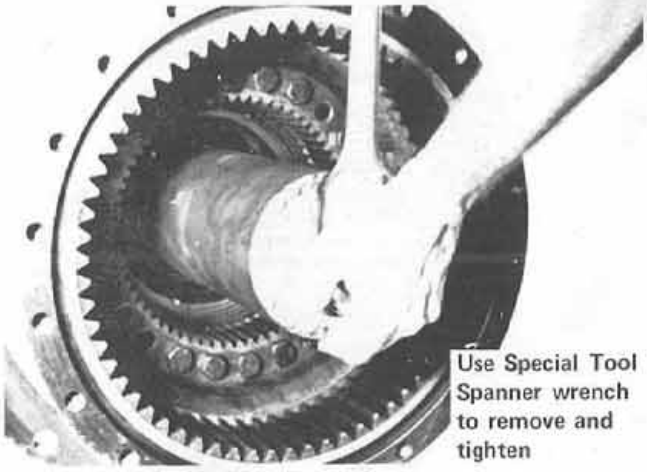


Figure 9

Step 10 Remove axle lockwasher and nut with spanner type wrench. (see figure 9) Install the puller cap over axle threads. (see figure 10) Place a 30 ton power-twin hydraulic unit between puller cap, plate and remove hub assembly. (See figure 11 page CC-12). Bolt the puller plate across hub and fasten with 10mm bolts. (See figure 12 page CC-12).

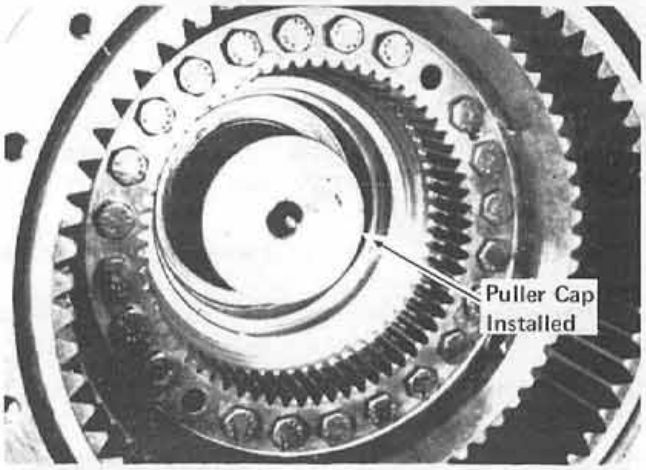


Figure 10

STEIGER/RABA AXLE

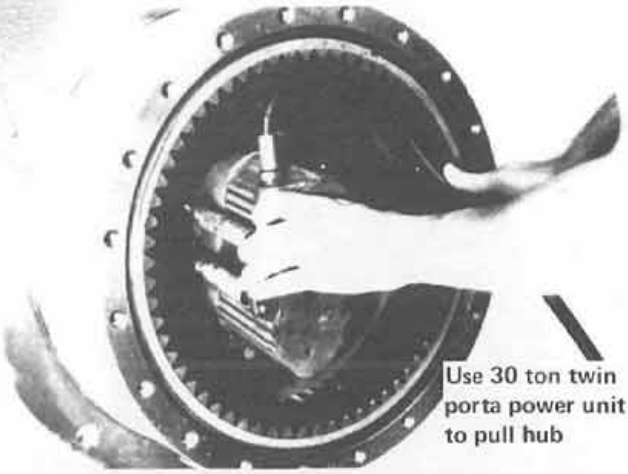


Figure 11

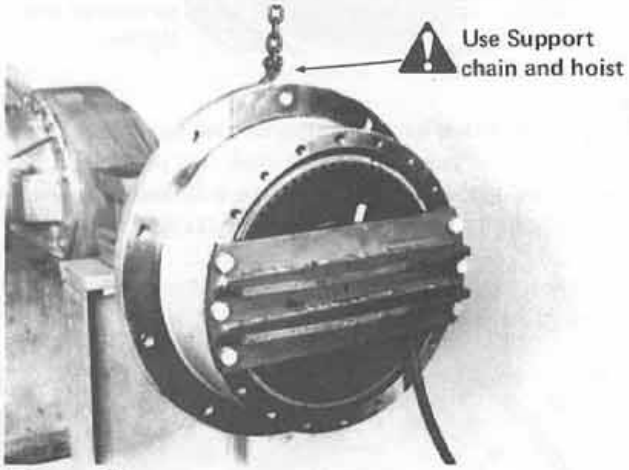


Figure 12

Step 11 Remove the double ring gear by removing 24 mm bolts secured to the ring gear support. (See figure 10 page CC 11).

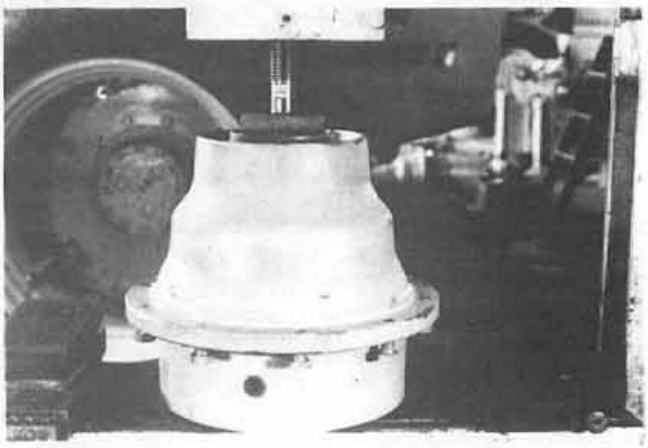


Figure 13

Step 12 Remove the ring gear support seal shouldering ring and rear taper roller bearing by pressing out the carrier on a 10 ton press. Place the outer end of the hub down on the press table and press out stationary ring gear. Place a wooden block under the hub carrier to prevent damage to the carrier or bearings when it presses free from the hub. (See figure 14)

Figure 14

Step 13 Bearings may be removed from the hub carrier by pulling them with a bearing puller. The inner bearing may be pushed off by threading 3 bolts thru the flange holes. Place bolts equal distance apart on flange.

Step 14 Bearing cups should be removed from the hub using an inside diameter expanding bearing puller.

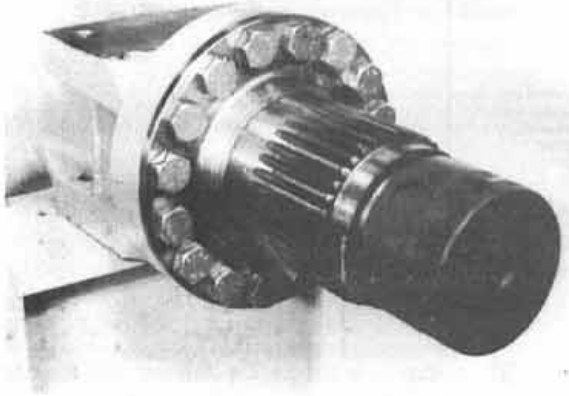


Figure 15

Step 15 Remove axle stub from axle housing by removing 20mm bolts. Remove 5-1/4" diameter O ring and oil baffle seated behind spindle. (See No. 43 and 44 pp CC 8)

STEIGER/RABA AXLE

Step 56 Mount the special puller cap on the stub axle thread. This will protect the lip of the oil seal from being damaged on the axle threads when mounting the hub. (See figure 30 pp CC-19).

NOTE: *Seal stub axle with No. 2 Permatex before mounting hub assembly.*

Step 57 Lift the hub to a in line position with the axle stub and push the hub on the axle stub until the spline aligns and engages.

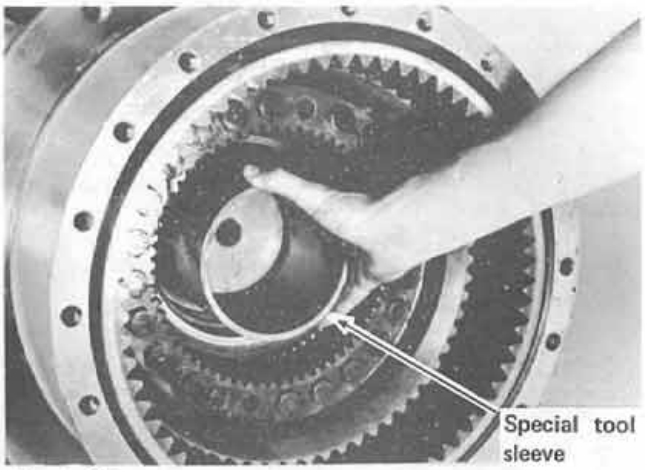


Figure 31

Step 58 Place the special push collar over the puller cap. Place a 30 ton power-twin unit against the push collar and install the 1" puller bolt through the port-a-power unit. Engage the bolt threads till the port-a-power unit is snug against the collar.

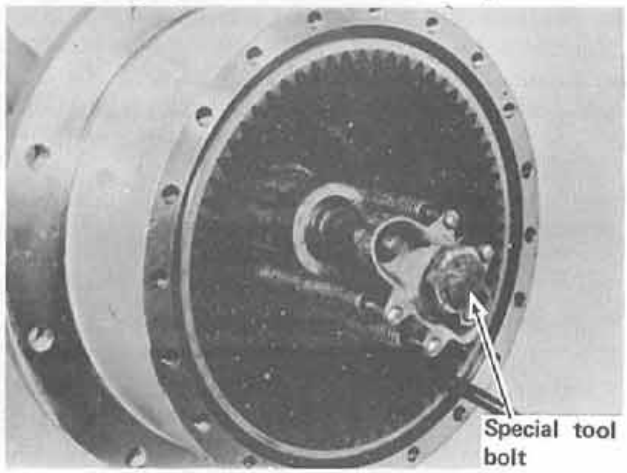


Figure 32

Owatonna Tool Co Model Y30A

Step 59 Pull the hub onto the splined axle stub until it is completely engaged on the splined axle stub.

Step 60 Remove the puller, bolt and puller cap from the axle stub.

Step 61 Install the axle nut and tighten till there is no end play in the bearings. This may require that end play be measured until no measurement of end play exists as the nut is being tightened.

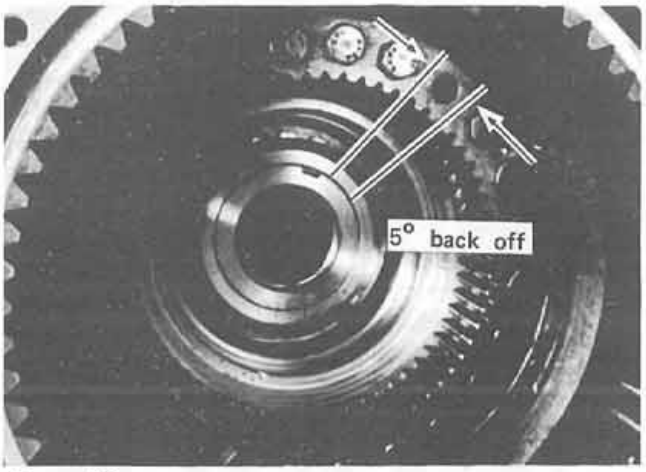


Figure 33

Step 62 When nut is tightened till no end play exists, loosen the nut 5 degrees to 10 degrees and lock it with the lock washer. Place the outer lock nut in place and tighten to 250-300 ft. lbs. with a torque wrench. Lock the nut with the lockwasher previously installed.

Step 63 Bump the outer side of the hub to loosen the preload of the bearings. The hub should turn but with resistance from the oil seal and tight bearing. No end play should exist.

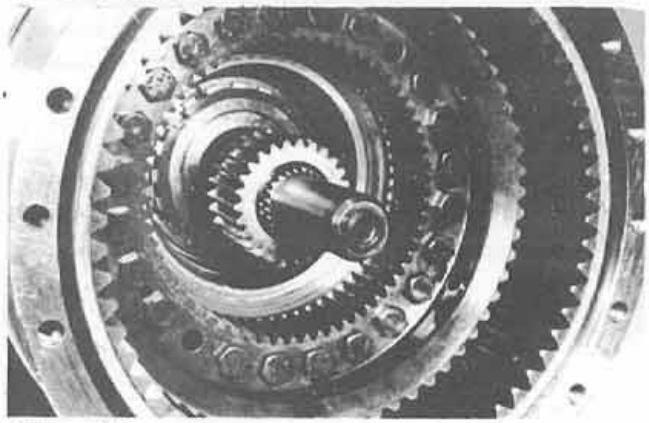


Figure 34

Step 64 Place the axle shaft with attached sun gear into the housing engaging the axle spline into the differential side gear spline.

Step 65 Reassemble the inner planetary unit, press or drive the planetary bearing into the ring gear support till firmly seated.

A. Place new bearings in the planet gears. With spacer washers on each side, press pin into carrier bearing and gear. Be sure to align the lock ball grooves when installing pin.

IMPORTANT: *Realign pins and gears to their original holes in the carrier.*

B. Replace all 3 pin bearing and gear assemblies and place snap ring on carrier.

C. Press the ball bearing on the planetary carrier.

D. Hang planet carrier on axle sun gear and slide into place. Drive bearing into seat with soft lead hammer or wooden block.

Step 66 Place new gasket in place on the hub, seal all surfaces with a non-hardening sealer. Place the outer planetary over the sun gear on the inner planet carrier and mesh with outer stationary sun gear. Tighten all 10 mm bolts to 145 ft. lbs. with a torque wrench.

The clearance must be adjusted between the inner planetary sun gear shaft and thrust washer in the cover and the axle shaft and the perch stud in the cover before replacing the cover.

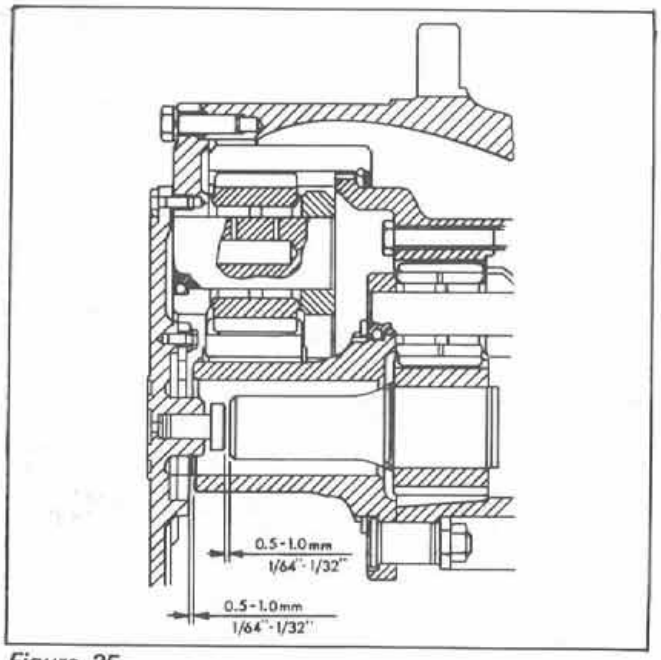


Figure 35

Step 67 To check the clearance between the planetary axle and the thrust washer in the cover measure the distances in fig. 36 and use the following formula to determine the clearance. Measure the distances with a straight edge and machinists rule. Place the straight edge and rule as illustrated. Place new gasket on cover when taking cover measurements.

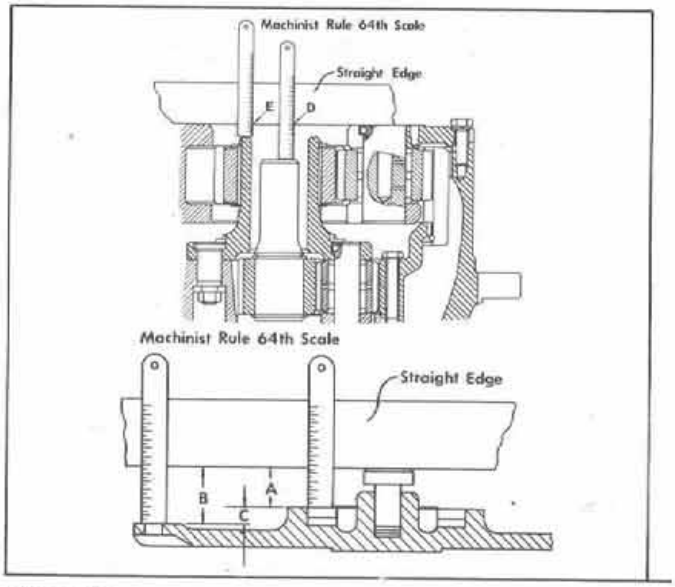


figure 36

Measure B _____
Measure A subtract from B - _____
Difference equals C _____
Measure E _____
Subtract C _____
Difference equals clearance _____

Clearance should be 1/64" to 1/32". Add or subtract shims under the washer till correct clearance is established. The washer is removed by pulling with the same tool that threads into the inner planetary shaft. (See fig. 37)

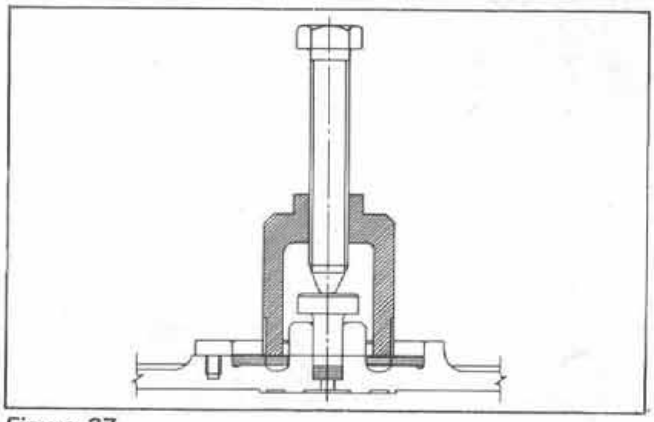


Figure 37

Step 68 To check clearance between axle shaft and perch stud, measure distances in fig. -- as illustrated. Be sure axle shaft is pushed all the way into the differential against the spider thrust surface.

Measure B _____
Measure D subtract from B - _____
Difference equals clearance _____

Clearance should be 1-64" to 1-32". Add or subtract shims under perch stud till correct clearance is established. The perch stud is removed by driving a straight punch through the center hole on the outside of the cover.

NOTE: *If a no spin has been installed in the differential, it will be necessary to place cover on one side of the axle and check axle shaft clearance from one side only. This is because a floating spacer slug replaces the stationary spider, that is normally in the differential. All play must be removed by pushing the axles against the perch bolt on the opposite side of the axle. Then, complete measurement as outlined in Step 67 & 68. The clearance specification will now be doubled, 1/32" minimum to 1/16" maximum.*

Step 69 Seal all surfaces with a non-hardening gasket sealer and place gasket and cover in place. Tighten all cover bolts to 26 ft. lbs. with a torque wrench.

Step 70 Reassemble axle to tractor to operating positions. Attach drive shaft. Reattach all other components (ie hitch, draw bar, etc.)

Step 71 Fill each hub end with 7-1/2 qts. of oil. Fill the differential section with 8-1/2 qts. of oil.