LEGEND

MAIN PRESSURE & RETURN LINES

PILOT LINES

DRAIN LINES

ELECTRICAL LINES

12 VOLT BATTERY

2/4 WHEEL DRIVE SWITCH

TRACTION LOCK SWITCH

2/4 WHEEL DRIVE VALVE

FORWARD REVERSE SELECTOR SWITCH

FORWARD

NEUTRAL

REVERSE

INCHING VALVE

F/R SECTION

REAR DRIVE MOTOR

REAR DRIVE MOTOR

FLUSHING VALVE SECTION

220 PSI

.071 DIA

FRONT DRIVE MOTOR (DA CONTROL)

6800 PSI

6300 PSI

380-480 PSI

DRIVE PUMP (DA CONTROL)

REV

FWD

SUCTION FILTER B_8 =75

RETURN FILTER B_8 =75

25 PSI

FILLER/ BREATHER

100 MESH

RESERVOIR (NON-PRESSURIZED)

TRACTION LOCK VALVE

PST1

PST2

.039

50

STABILIZER CYLINDER

.03

1000

STABILIZER SWITCH

12 VOLT BATTERY

ENGINE OIL PRESSURE SWITCH

OPTIONAL REAR AXLE STABILIZER VALVE

120°

70 PSID

THERMAL BYPASS VALVE

12 VOLT BATTERY

PARK BRAKE SWITCH

IMPLEMENT PUMP 3.627 CU.IN./REV.

PRIORITY FLOW DIVIDER

BP

P (3.25 GPM)

PRIORITY FLOW DIVIDER

PP

CF

EF

LS

STEERING ORBITROL

LP

STEER CYLINDERS

SERVICE BRAKE

PARK BRAKE

PARK BRAKE SOLENOID VALVE

BRAKE VALVE

RP

PB

300

SWAY CYLINDER

.062

COMPENSATING CYLINDER

TILT CYLINDER

3800 PSI

AUX.

2000 PSI

AUXILIARY HYDRAULICS (OPTION)

SWAY

TILT

3250 PSI

CROWD

2700 PSI

LIFT

3000 PSI

MAIN CONTROL VALVE

JOY STICK

LIFT CYLINDERS

CROWD CYLINDER

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HYDRAULIC SCHEMATIC
534D-9
9134-9010

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Keep all windows and mirror(s) clean. Adjust mirror(s) as required for maximum visibility, before and during operation.

Never permit diesel engine to run out of fuel. Doing so can cause severe engine damage.

DO NOT burn or drill holes in forks. Modifying any part of machine or attachment may affect machine capacity and/or stability.

Keep head, arms, hands, legs and all other body parts inside the operator's cab at all times.

DO NOT approach power lines, overhead or underground cables or other power sources with any part of your material handler or load unless all local, state/ provincial and federal regulations have been met and the appropriate utility company has been contacted to de-energize the lines.

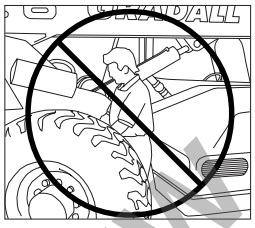
Whenever leaving the cab, perform standard shut-down procedure:

Standard Shut-Down Procedure

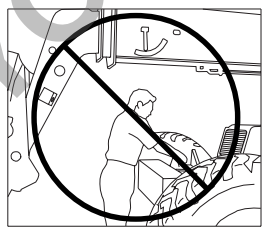
Position the handler in a safe location, apply parking brake, lower forks to ground, move all controls to "Neutral", allow engine to run at low idle for 3 to 5 minutes. Stop engine and remove ignition key. Block wheels.

Pinch Points

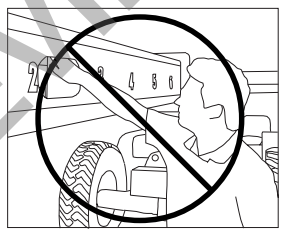
Stay clear of pinch points and rotating parts on the material handler. Getting caught in a pinch point or a moving part can cause serious injury or death. Before performing any maintenance on machine, follow the "STANDARD SHUT-DOWN PROCEDURE".



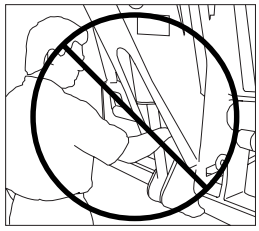
Rear Steering Axle



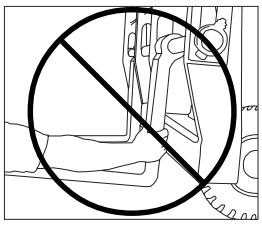
Boom



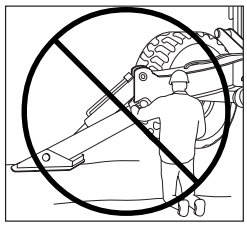
Boom Holes



Attachment Tilt



Carriage Forks



Stabilizers (D10 only)

WARNING

Contact The Gradall Company prior to welding on machine.





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LEGEND

MAIN PRESSURE & RETURN LINES

PILOT LINES

DRAIN LINES

ELECTRICAL LINES

12 VOLT BATTERY

2/4 WHEEL DRIVE SWITCH

TRACTION LOCK SWITCH

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RETURN FILTER B_8 =75

25 PSI

FILLER/ BREATHER

100 MESH

RESERVOIR (NON-PRESSURIZED)

TRACTION LOCK VALVE

6800 PSI

6800 PSI

50%

50%

PST1

PST2

12 VOLT BATTERY

PARK BRAKE SWITCH

IMPLEMENT PUMP 3.627 CU.IN./REV.

PRIORITY FLOW DIVIDER

P (3.25 GPM)

PRIORITY FLOW DIVIDER

STEERING ORBITROL

STEER CYLINDERS

SERVICE BRAKE

PARK BRAKE

PARK BRAKE SOLENOID VALVE

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.062

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3800 PSI

AUX.

AUXILIARY HYDRAULICS (OPTION)

2000 PSI

SWAY

TILT

3250 PSI

CROWD

2700 PSI

LIFT

3000 PSI

MAIN CONTROL VALVE

JOY STICK

LIFT CYLINDERS

CROWD CYLINDER

4000 PSI

OUTRIGGER CYLINDERS

STABILIZER CYLINDER

STABILIZER SWITCH

12 VOLT BATTERY

ENGINE OIL PRESSURE SWITCH

OPTIONAL REAR AXLE STABILIZER VALVE

120

70 PSID

THERMAL BYPASS VALVE

HYDRAULIC SCHEMATIC
534D-10
9135-9010

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6.0 ENGINE OPERATION

Starting the Engine

1. Make sure all controls are in "Neutral" and all electrical components (lights, heater, defroster, etc.) are turned off. Set parking brake.

2. Depress accelerator pedal approximately 1/4 to 1/3 of travel from top.

3. Turn ignition switch to "START" to engage starting motor. Release key immediately when engine starts. If engine fails to start within 20 seconds, release key and allow starting motor to cool for a few minutes before trying again.

4. After engine starts, observe oil pressure gauge. If gauge remains on zero for more than ten seconds, stop engine and determine cause. Correct malfunction before restarting engine. Minimum pressure at operating temperature:
   Low idle: 10 PSI (69kPa)

5. Warm up engine at approximately 1/2 throttle until engine coolant temperature reaches operating range.

⚠ WARNING

Operator must be seated with seat belt fastened, forward/reverse lever in "Neutral" position, parking brake applied and all hydraulic controls in "Neutral" before starting engine.

⚠ CAUTION

Turning ignition switch to "START" position while engine flywheel is rotating may cause serious damage to engine and/or starting motor.

NOTE!

Engine will not start unless forward/reverse lever is in "Neutral" and parking brake switch is applied.

Cold-Weather Starting Aids

In cold weather situations, a supplemental starting aid may be required. Gradall-approved starting aids employ ether. If your handler is equipped with an ether starting aid, the following applies:

Cummins Engine
- Hold switch on for 3 seconds to fill valve.
- Release switch to discharge ether while cranking engine.
- As engine starts, use additional ether as required to keep engine running.

Deere Engine
- Ether application is triggered by temperature gauge located on engine.
- At start-up, temperature gauge on engine will detect if ether is needed. Follow normal start-up procedure, shown above.
- Ether is employed and additional will be released if needed, to keep engine running.
- A second battery is added for additional cold-cranking capacity.

⚠ CAUTION

If you use a starting aid employing ether or a similar substance, pay particular attention to manufacturer's warnings. Excessive ether may cause severe engine damage.

Battery-Boosted Starting

If you ever have to battery-boost start (jump-start) your handler, proceed as follows:
- Never allow vehicles to touch
- Connect the positive (+) jumper cable to positive (+) post of discharged battery
- Connect opposite end of positive (+) jumper cable to positive (+) post of booster battery
- Connect the negative (-) jumper cable to negative (-) post on booster battery
- Connect opposite end of negative (-) jumper cable to ground point on machine away from discharged battery
- Follow standard starting procedures
- Remove cables in reverse order after machine has started

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8.0 PARKING THE HANDLER

Precautions

- Avoid parking on slopes or near an excavation.
- Park on level ground and chock wheels.
- Avoid parking on roads or highways. If it cannot be avoided,be sure to display warning flags during day and flares or flashing lights at night.
- Position boom-head or attachment on ground; never leave machine with boom in air.
- If parking on a slope cannot be avoided, position the handler at a right angle across the slope, straighten rear wheels and chock all wheels.

Parking procedure

1. Using service brake, stop the handler in an appropriate parking area.
2. Move parking brake switch to "On."
3. Shift forward/reverse lever to "Neutral."
4. Position attachment on ground.
5. Allow engine to cool at idle speed for 3 to 5 minutes, stop engine and remove ignition key.
6. Chock wheels as an extra precaution against rolling.
7. Fill fuel tank to minimize condensation.
8. Lock cab and install protective covers, if so-equipped.
9. Disconnect batteries if unit is in an area where tampering is a risk.

9.0 STEERING SYSTEM

- Rear-wheel power steering is provided to reduce operator fatigue and to permit high maneuverability in close quarters.
- It is imperative that the operator practice maneuvering the handler in a safe, open area to become thoroughly familiar with steering response and clearance required for tail swing and load when turning.

⚠ WARNING

Be alert for any increase in effort needed to steer. If any difference is noted, notify maintenance personnel immediately. If power assist feature should fail for any reason, IT WOULD BECOME VERY DIFFICULT TO STEER. For this reason it is extremely important that you NEVER TURN ENGINE OFF WHILE TRAVELING.

In the event power steering fails, stop as soon as possible. Do not drive handler until problem has been corrected.

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1.0 SAFETY HIGHLIGHTS

Read and understand all manuals and instructional material listed on cover, inside front cover and introduction page of this Manual before starting, operating or performing maintenance procedures on this equipment.

Operators of this equipment must have successfully completed a training course in the safe operation of this type of material handling equipment.

Regardless of previous experience operating similar equipment, the operator must be given sufficient opportunity to practice with the handler in a safe, open area (not hazardous to people or property) to gain operating skills and the proper "feel" for controls and operating clearances required for safe, efficient operation.

GRADALL Material Handlers are equipped with a right-side rearview mirror. This mirror is intended as an operator's aid and does not replace the requirement for line-of-sight. Certain job site and machine conditions may require use of a signal person to help the operator when picking, placing or transporting a load. Never operate the handler until you know pick-up point, line of travel and landing point are clear. Always be aware that objects in mirror are closer than they appear.

Safety Precautions

Make sure all **DANGER, WARNING, CAUTION and INSTRUCTIONAL DECALS** are in place and can be read. Clean or replace decals as required.

Ensure handler is on a firm, level surface before lifting or placing load. Have surface leveled if necessary. **Unit can tip over if load is raised with handler on a soft or uneven surface.**

Always look in the direction of travel. **Reduce speed and be especially careful when traveling in reverse and/or turning. Be aware of tail swing due to rear-pivot steering.**

If load or conditions obstruct view, **use a signal person** when lifting, carrying or placing a load.

Loose clothing can get caught in moving machinery and can also cause accidental actuation of controls. **Dress properly for the job.**

Be alert to any unusual response to controls. If unusual response is noticed, position handler in a safe area, lower forks to ground, apply parking brake, stop engine and remove key from ignition switch. Tag steering wheel to forbid operation and **notify maintenance personnel.**

Keep hands, gloves, shoes, control knobs and pedals clean. **Slippery controls can cause accidents.** Keep a firm grip on the steering wheel when traveling.

Load capacities are based on load center being within 24 inches (610mm) from front vertical face of forks.

Never service the handler with the engine running.

Release trapped pressure before disconnecting, opening or removing any hydraulic component.

WATCH FOR THESE SYMBOLS ; THEY CALL YOUR ATTENTION TO SAFETY NOTICES.

⚠ DANGER

This symbol indicates an extreme hazard which will result in high probability of death or serious injury if proper precautions are not taken.

⚠ WARNING

This symbol indicates a hazard which could result in death or serious injury if proper precautions are not taken.

⚠ CAUTION

This symbol indicates a hazard which may result in injury or damage to equipment or property if proper precautions are not taken.

⚠ WARNING

Operator must be seated with seat belt fastened, forward reverse lever in "Neutral" position, parking brake applied and all hydraulic controls in "Neutral" before starting engine.

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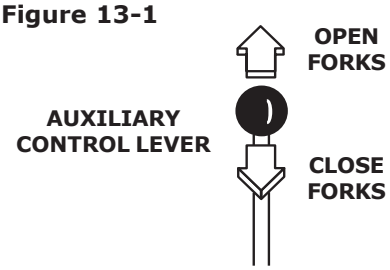
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Fork Positioner

Capacity:
Maximum load capacity for fork positioner carriage is the same as standard carriage without fork positioner. **Refer to Attachment Capacity Chart.** Capacity varies with boom extension and elevation positions.

Controls:
Figure 13-1



The auxiliary control lever is used to adjust fork position. Pull lever back to close forks, push lever forward to open forks.

Installation Procedure:
1. Remove standard carriage/fork combination or other attachment from boom head. ***(See "Attachment Installation" Page 13.1)***

2. Install carriage/fork combination with positioner.

3. Connect auxiliary hydraulic hoses to positioner cylinders.

Operation:
- Always adjust fork position before engaging load. Moving forks after engaging load could cause load to fall from forks.

WARNING

PRECAUTIONS
- *Always adjust fork position before engaging load.*
- *As with all other attachments, handler must be level before handling a load more than four feet (1.2m) above ground level.* ***(See "Leveling The Handler," Page 11.0)***

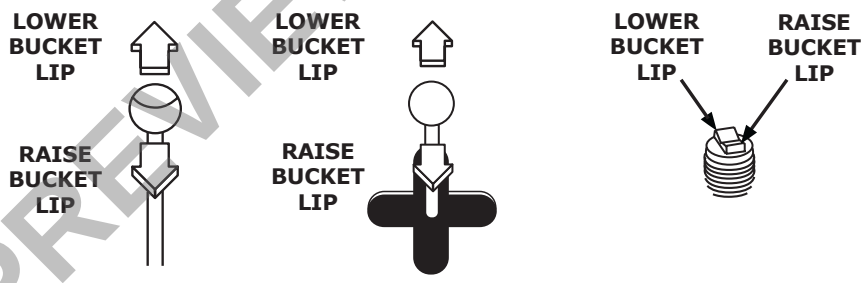
WARNING

Observe all precautions and load capacity limits (listed previously) when handling loads with carriage/ fork positioner.

Light Material Bucket

Capacity:
Maximum capacity of light material bucket is shown on the attachment serial number plate and may be used in areas where it does not exceed capacities shown on standard carriage/fork capacity chart. Capacity must be reduced for areas where maximum bucket capacity would exceed standard carriage/fork capacity chart.

Attachment Tilt Controls:
Figure 13-2



Because the carriage tilt cylinder is used to tilt the bucket, the carriage tilt lever is used to control the bucket. Pull lever back to raise bucket lip push lever forward to lower bucket lip.

Installation Procedure:
1. Remove carriage/fork combination or other attachment from boom head. ***(See Page 13.1)***

2. Install light material bucket on boom head.

3. Retract boom fully and tilt bucket up or down as required to position bottom of bucket parallel with ground.

WARNING

PRECAUTIONS
- *Handler must be level before handling a load more than four feet (1.2m) above ground level.* ***(See Page 11.0)***
- *Retract boom fully before loading bucket. Loading bucket with boom extended could damage structural members or extension chains/cables.*
- *Avoid shock loads; drive into stockpile smoothly to load bucket.*
- *Do not use bucket as a lever to pry heavy material. Excessive prying forces could damage the bucket.*
- *Do not use bucket for "back dragging." This could cause severe damage to Quick Switch fittings.*

WARNING

Observe all precautions and load capacity limits (listed previously) when handling loads with light material bucket.

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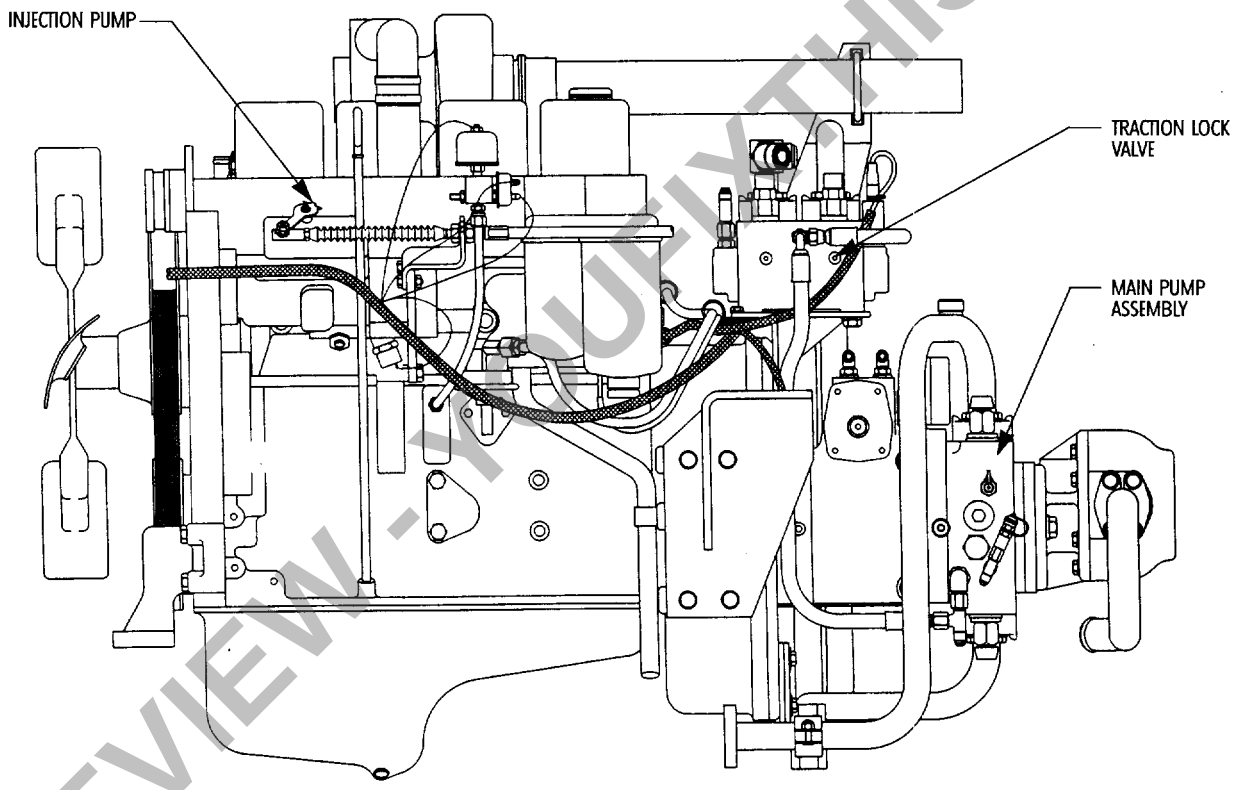
III. Engine Speed

Reason for Engine Speed Check

Low engine RPM can reduce control pressure. Control pressure determines machine speed. This condition can slow machine speed at full RPM.

Check engine speed with an adequate tachometer. At low idle, it should be 800-900 RPM. Adjust engine speed using the screw on the injection pump. At full throttle with no load, it should be 2500-2700 RPM. When testing engine speed, make sure the injection pump lever is contacting the stop. The sealed adjustment screw on the pump is not adjustable. Please note the initial adjustment on current accelerator pedals. ***See Figure 4, Figure 5, Figure 6 and Figure 7***

FIGURE 4
ENGINE ASSEMBLY (LEFT SIDE)



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MERITOR™

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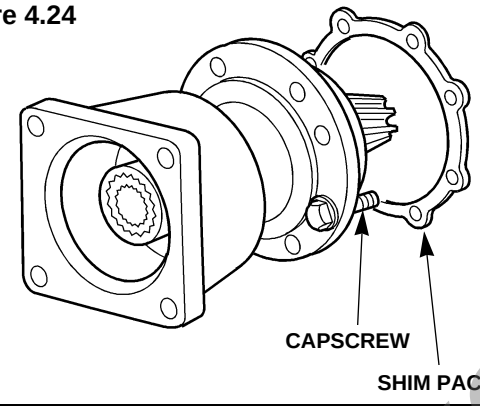
Install Pinion Bearing Cage Assembly on Main Housing

NOTE

Use minimum of three shims in pack. If pack is made from different thickness shims, install thinnest shims on both sides of pack for maximum sealing.

1. Install correct shim pack between bearing cage and main housing. **Figure 4.24.**

Figure 4.24

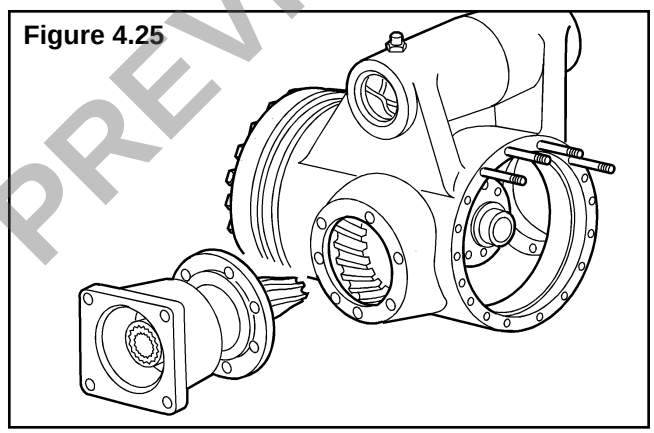


WARNING

Do not hit steel parts with a steel hammer during assembly and installation procedures. Parts can break and cause serious personal injury.

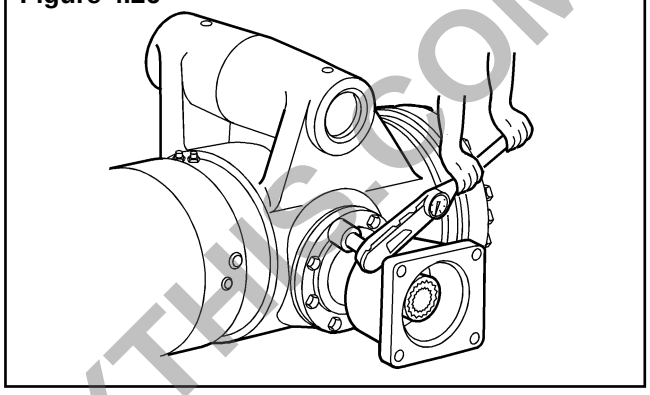
2. Install drive pinion and bearing cage into carrier. If necessary, use rubber, plastic or leather mallet to tap assembly into position. **Figure 4.25.**

Figure 4.25



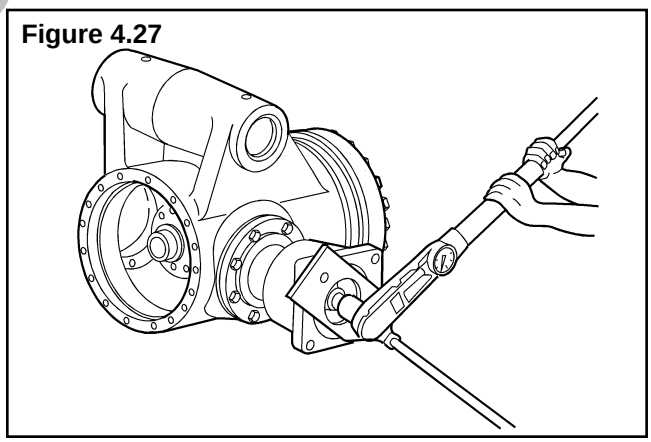
3. Install two capscrews and washers that fasten bearing cage. Tighten to minimum torque of 67 lb-ft (90 N•m). **Figure 4.26.** T

Figure 4.26



4. Install yoke or flange and pinion nut. Fasten yoke or flange with appropriate tool. Tighten pinion nut to minimum specified torque of 465-570 lb-ft (630-775 N•m). **Figure 4.27.** T

Figure 4.27



CAUTION

The fit between input yoke or flange splines and drive pinion is tight. To install yoke or flange into pinion, use pinion nut and appropriate tool to fasten it. Never use hammer or mallet. A hammer or mallet will damage yoke or flange.

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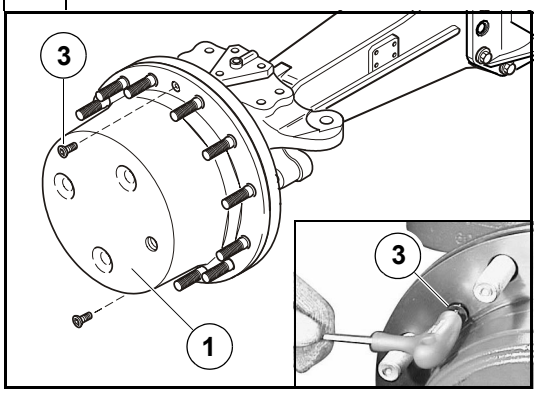
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A *GENERAL INFORMATION*

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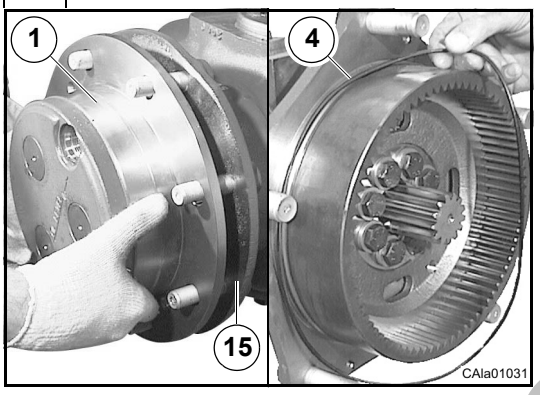
2



Svitare le due viti di fissaggio (**3**) del treno portasatelliti (**1**).

*Unscrew both fastening screws (**3**) of the planetary carrier (**1**).*

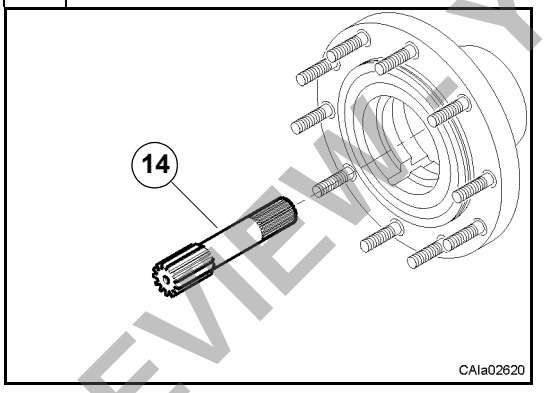
3



Rimuovere il treno portasatelliti (**1**) dal mozzo ruota (**15**) e recuperare il relativo anello OR (**4**).
Posizionare il treno portasatelliti (**1**) su di un piano e verificarne le condizioni di usura.

*Remove the planetary carrier (**1**) from the wheel hub (**15**) and collect the relative O-Ring (**4**).*
*Position the planetary carrier (**1**) on a workbench and check its wear conditions.*

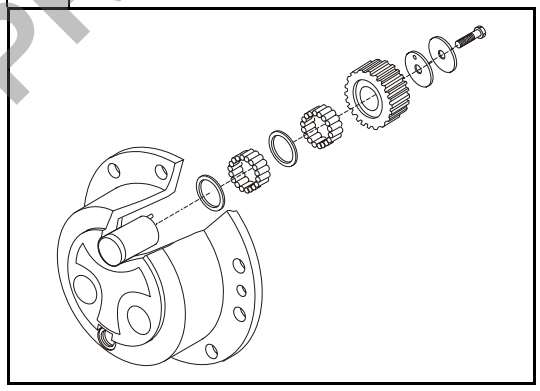
4



Rimuovere l'albero (**14**) dal mozzo ruota (**15**).

*Remove the shaft (**14**) from the wheel hub (**15**).*

5



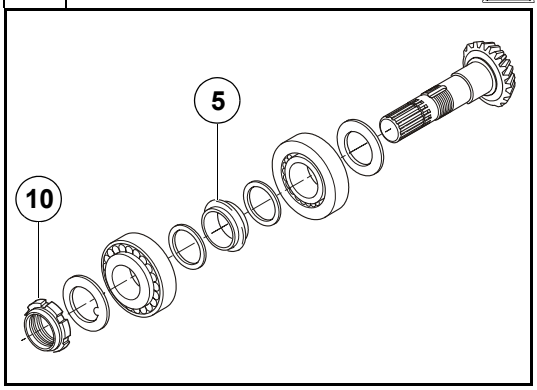
Per eseguire l'eventuale sostituzione degli ingranaggi satelliti (**9**):
- rimuovere la vite di fissaggio (**13**) di ogni ingranaggio satellite (**9**);
- rimuovere le rondelle (**12**) e (**10**);
- estrarre i satelliti (**9**) dai perni;
- recuperare i relativi rullini (**8**) e (**6**) verificandone le condizioni;
- recuperare le rondelle di rasamento (**7**) e (**5**).

*To carry out any possible replacements of the planetary gears (**9**):*
*- remove the fastening screws (**13**) on every planetary gear (**9**);*
*- remove the washers (**12**) and (**10**);*
*- take the planetary gears (**9**) out of the pins;*
*- collect the needle bearings (**8**) and (**6**) checking their conditions;*
*- collect the thrust washers (**7**) and (**5**).*

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6



Controllare le condizioni di tutti i particolari del pignone.
Attenzione: la ghiera (**10**) ed il distanziale elastico (**5**) in fase di rimontaggio devono essere sostituiti.

Check all pinion components for wear.
Warning: *the ring nut (**10**) and the collapsible spacer (**5**) must be replaced when reassembling the unit.*

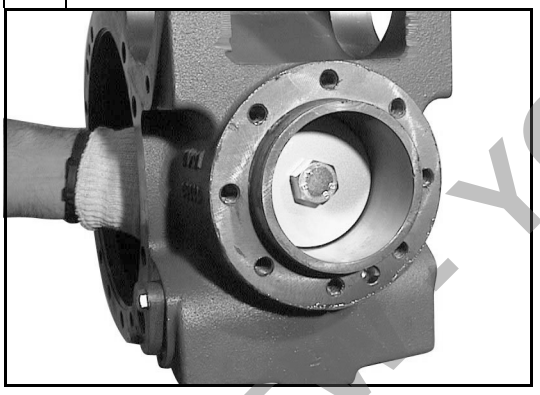
D.7.2 Montaggio

Alcune figure che seguono potrebbero non mostrare esattamente il vostro assale, ma la procedura rimane la stessa.

D.7.2 Assembly

Some of the following pictures may not show exactly your axle, but the process is the same.

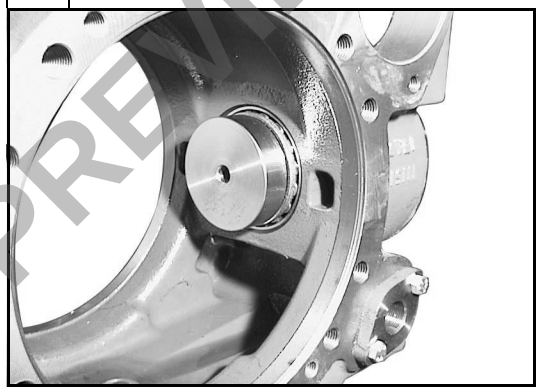
1



Posizionare su un banco di lavoro il corpo centrale (**7**).
Piantare le coppe dei cuscinetti (**3**) e (**8**) nelle proprie sedi con il kit attrezzature speciali CA715639.

*Place the central body (**7**) on a workbench.*
*Fit the bearing cups (**3**) and (**8**) into their seats using the special tools kit CA715639.*

2



Inserire nelle sedi i coni dei cuscinetti (**3**) e (**8**) ed il falso pignone CA715638.
Serrare con la ghiera (**10**) fino ad eliminare il gioco.

*Insert into the seats the bearing cups (**3**) and (**8**) and the false pinion CA715638.*
*Tighten the ring nut (**10**) to eliminate the backlash.*

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THE FOLLOWING SYMBOLS CALL YOUR ATTENTION TO IMPORTANT SAFETY NOTICES:

DANGER	This symbol indicates an extreme hazard which would result in high probability of death or serious injury if proper precautions are not taken.
WARNING	This symbol indicates a hazard which could result in death or serious injury if proper precautions are not taken.
CAUTION	This symbol indicates a hazard which could result in injury or damage to equipment or property if proper precautions are not taken.

DANGER, WARNING and CAUTION notes in this Manual will help you avoid injury and damage to the equipment.

Any procedure not specifically recommended by Gradall must be thoroughly evaluated from the standpoint of SAFETY before it is placed in practice. If you are not sure, contact your Authorized Gradall Distributor.

Do not modify this machine without written permission from Gradall.

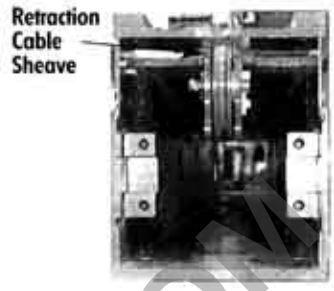
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→ **Stage 2, Retract Cable and Hose Sheaves**

532C-6, 534C-6 & 534D-6 ONLY!

1. Install the retraction cable sheave to the bracket at rear of Area 3.
2. Install the cable around the sheave and lock it in place using ***LOCTITE* 242** on threads.
3. Install the cable adjustment block to the cable at the other end.



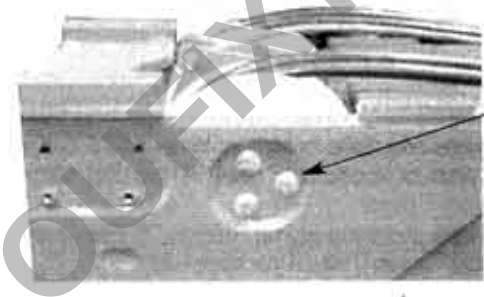
RETRACTION CABLE ADJUSTMENT BLOCK



4. Install the tilt (and auxiliary electric/hydraulic) circuit hose rollers and hoses to the rear of the boom at Area 3.

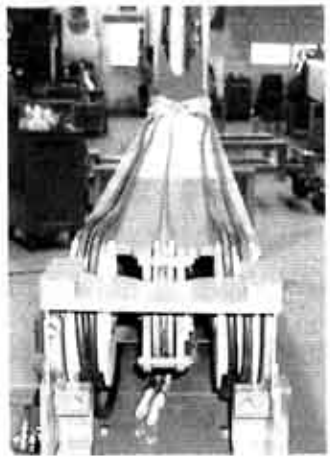


HOSE ROLLERS AND HOSES



5. Lay out hoses and cable to the top of the boom in preparation for installation into Boom-Section 1.
6. Lubricate all bearing pad slide surfaces.

BOOM-SECTIONS 2 & 3 UPSIDE-DOWN: STANDARD & AUXILIARY CIRCUITS INSTALLED



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Appendix A: Fastener Torque Chart

Metric Fasteners

Nominal Size	Stress Area (mm^2)	CLASS 4.6		CLASS 8.8		CLASS 9.8		CLASS 10.9		CLASS 12.9	
		400 Megapascals Min. Tensile Str.		830 Megapascals Min. Tensile Str.		900 Megapascals Min. Tensile Str.		1040 Megapascals Min. Tensile Str.		1220 Megapascals Min. Tensile Str.	
		(Nm)	(ft-lb.)	(Nm)	(ft-lb.)	(Nm)	(ft-lb.)	(Nm)	(ft-lb.)	(Nm)	(ft-lb.)
M 2.0	2.1	0.14	0.10	0.37	0.27	0.40	0.30	0.52	0.38	0.61	0.45
M 2.5	3.4	0.28	0.21	0.76	0.56	0.82	0.61	1.06	0.78	1.24	0.92
M 3.0	5.0	0.51	0.37	1.35	1.00	1.47	1.08	1.88	1.39	2.21	1.63
M 3.5	6.8	0.80	0.59	2.13	1.57	2.31	1.70	2.96	2.18	3.47	2.56
M 4.0	8.8	1.18	0.87	3.15	2.32	3.41	2.52	4.38	3.23	5.14	3.79
M 5.0	14.2	2.39	1.76	6.36	4.69	6.90	5.09	8.86	6.54	10.59	7.67
M 6.0	20.1	4.05	2.99	10.81	7.97	11.72	8.65	15.05	11.10	17.66	13.02
M 6.3	22.6	4.78	3.53	12.76	9.41	13.84	10.21	17.77	13.11	20.84	15.37
M 8.0	36.6	9.84	7.26	26.25	19.36	28.46	20.99	36.54	26.95	42.87	31.62
M 10.0	58.0	19.49	14.37	51.99	38.35	56.38	41.58	72.38	53.39	84.91	62.63
M 12.0	84.3	33.99	25.07	90.68	66.88	98.33	72.52	126.25	93.12	148.10	109.23
M 14.0	115.0	54.10	39.90	144.32	106.45	156.49	115.42	200.93	148.20	235.70	173.85
M 16.0	157.0	84.40	62.25	255.18	166.08	244.17	180.09	313.50	231.22	367.76	271.24
M 20.0	245.0	164.64	121.43	439.24	323.96	476.28	351.29	611.52	451.03	717.36	529.10
M 24.0	353.0	284.66	209.95	759.43	560.13	823.48	607.37	1057.31	779.83	1240.30	914.80
M 30.0	561.0	565.49	417.08	1508.64	1112.72	1635.88	1206.56	2100.38	1549.16	2463.91	1817.29
M 36.0	817.0	988.24	728.89	2636.49	1944.58	2858.85	2108.58	3670.62	2707.31	4305.92	3175.88
M 42.0	1120.0	1580.54	1165.75	4216.66	3110.05	4572.29	3372.35	5870.59	4329.93	6886.66	5079.34

Note!

To check Gradall torque values, set the torque wrench at 95% of rated torque value and check the fastener. If the torque wrench releases before the fastener moves, assume that fastener torque is correct. When setting Gradall torque values, use values given on the chart, not exceeding allowances.

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