

EAGLE TUGS



Parts and Service Manual



Vehicle Type: MTT
Motor Type: A/C Electric

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INTRODUCTION

From everyone at Eagle Tugs, we would like to say Thank You for purchasing an Eagle MTT series tow tractor. We take a lot of pride in the quality of the products that we build, as well as, our continued customer service. Our goal is to build a long term relationship with our customers. We want you, the customer, to be 100% satisfied with your Eagle experience. To us, this means that your Eagle MTT series tractor is functionally superior to any other products you have used. This also means that your Eagle product is continually supported in a professional, timely manner.

PURPOSE & USE OF THIS MANUAL

This manual is designed as a reference guide to make the reader more familiar with the components of the Eagle MTT series tow tractor models. This manual includes part numbers and descriptions to assist the reader in ordering component spare/service parts. The manual also outlines the Scheduled Maintenance Intervals recommended by Eagle in order to keep your vehicle running properly. In this manual you will also find the Eagle Standard Warranty on all of the MTT series tow tractors. However, for more detailed information on the Eagle Warranty and procedure, as well as information pertaining to the safe operation of your Eagle product, please see the Eagle Operations Manual that was also included with your vehicle.

TECHNICAL ASSISTANCE

When addressing a repair procedure or operational problem, please remember that Eagle technical support is only a phone call away. Eagle technicians are available to assist you in vehicle diagnostics and recommended repair procedures. We encourage you to use this service to reduce machine down-time and to gain a better understanding of proper repair procedures.

ORDERING SPARE/SERVICE PARTS

Eagle inventories most of the component parts found in its MTT series tow tractors, and most spare/service parts can be shipped the same day the order is received. Parts orders need to be received at Eagle by 12:00 pm (Noon) EST in order for the parts to be shipped that same day. Parts ordered after 12:00 pm EST will most likely be shipped the following day.

NOTE: PLEASE CHECK OUR WEBSITE PERIODICALLY FOR MANUAL UPDATES AS WELL AS SERVICE BULLETINS.

Eagle Corporate Office

26111 Northline Rd
Taylor, MI 48180
(800) 671-0431
www.eagletugs.com

Customer Service

customerservice@eagletugs.com
(734) 442-1000 -- (800) 671-0431

Parts & Service

parts@eagletugs.com
(734) 442-1000 -- (800) 671-0431

Technical Support

support@eagletugs.com
(734) 442-1000 -- (800) 671-0431

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WARRANTY

IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all industrial equipment as well as the personal safety of the individual performing the work. This Service Manual provides general directions for accomplishing service and repair work with tested and effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools and parts for servicing equipment, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish he compromises his/her personal safety, and/or the equipment integrity by his/her choice of methods, tools or parts.

WARNINGS

The following list contains some general WARNINGS that you should follow when you work on equipment:

Always wear safety glasses for eye protection.

Use safety stands whenever a procedure requires you to be under the equipment.

Be sure that the ignition switch is always in the OFF position, and battery is disconnected unless otherwise required by the procedure.

Set the parking brake (if equipped) when working on the equipment. Place wood blocks (4" x 4" or larger) to the front and rear surfaces of the tires to provide further restraint from inadvertent equipment movement.

Keep yourself and your clothing away from moving parts when the motor is running.

Do not smoke while working on the equipment.

To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on the equipment. Tie long hair securely behind the head.

When disconnecting the MTT from the battery to perform service, a residual charge may still exist in the system. To drain the system of all power, turn the keyswitch on after disconnecting the battery. This will drain any remaining electricity in the system and ensure that the truck is safe to perform work on.

For more information regarding safety please refer to the operations manual provided with your tug. This manual can also be found on the Eagle Tugs website at www.eagletugs.com.

WARRANTY


VEHICLE ID INFORMATION

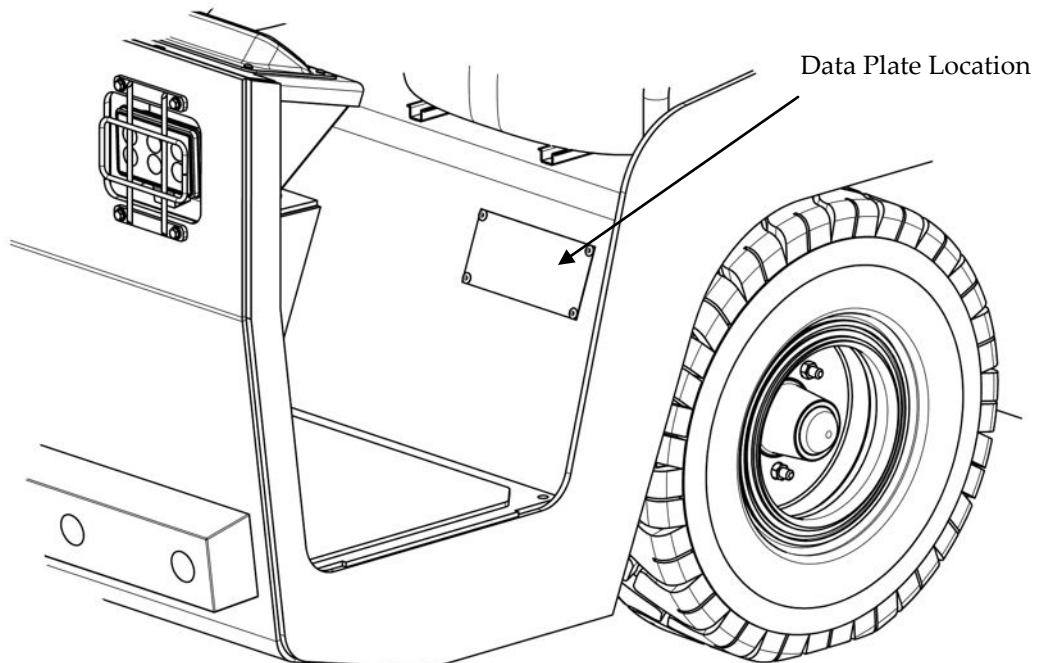
This information can be found on the tractor's I.D. Plate located on the firewall next to the driver's seat. Additionally, there is a permanent serial number located on the rear bulkhead inside the engine compartment.

MODEL _____

SERIAL NO _____

MFG DATE _____

VEHICLE S/N	<input type="text"/>	CONTROLLER S/N	<input type="text"/>
MFG. DATE	<input type="text"/>	NOMINAL VOLTAGE	<input type="text"/>
MODEL #	<input type="text"/>	TRACTOR MASS	kg <input type="text"/> lb <input type="text"/>
MOTOR S/N	<input type="text"/>	DRAW BAR PULL	N <input type="text"/> lbf <input type="text"/>
AC DRIVE S/N	<input type="text"/>	TOW CAPACITY	kg <input type="text"/> lb <input type="text"/>
		VERTICAL HITCH CAP.	N <input type="text"/> lbf <input type="text"/>
<p>MANUFACTURED BY:</p>  <p>26111 NORTHLINE RD. TAYLOR, MI 48180 USA PHONE: 800-671-0431</p> <p>sales@eagletugs.com www.eagletugs.com</p>			



EAGLE STANDARD WARRANTY

Standard Limited Warranty Information*

The Eagle Tugs (EAGLE) Standard Warranty covers all MTT, RTT-series and Transit Pro tow tractors, as well as all Eagle tow tractor models used in industrial applications. Eagle Tugs warrants that these tractors will be free from defects in material and workmanship for a period of 1 year or 2,000 operating hours, with the exception of the electrical system (see electrical component warranty below), from date of delivery to the first customer (or first use), whichever comes first. Written notice of any claimed defect must be given to Eagle within the warranty period and within thirty (30) days after such defect is discovered. Liability under this warranty is limited to either replacing or repairing, at Eagle's election, any part or parts deemed defective after examination by Eagle or an Authorized Service Representative. Any Eagle tractor or any of its parts returned by the customer to Eagle or an Authorized Service Representative via prepaid transportation, and which is found to be defective, will be repaired or replaced and returned to the customer prepaid. On the other hand, should a part be found not defective, inspection and handling charges may be charged to the customer or Authorized Service Representative by Eagle.

Electrical Component Warranty: Electrical components including but not limited to display, starters, alternators and electric fans shall be covered under the respective original manufacturers warranty for each individual component. Copies of the respective warranties are available upon request.

This warranty does not extend to the tires, batteries, and battery chargers as these are warranted directly to the user by their respective manufacturer and not by Eagle or an Authorized Service Representative.

This warranty does not apply to any Eagle tow tractor, or component part(s) that have been subjected to misuse, accident, vandalism, environmental conditions, improper handling or application, maintenance neglect, including lack of lubricants or fluids; nor does it extend to the Eagle tow tractor and/or parts which have been repaired or altered outside of Eagle's plant or the facility of an Authorized Service Representative without the permission of Eagle.

This warranty does not apply to routine maintenance or wearable parts of the Eagle tow tractor such as filters, seals, plugs, hoses, belts, brake pads or shoes, light bulbs, fuses or similar items. Moreover, this warranty does not extend beyond its original term for any Eagle tow tractor or part replaced or repaired under warranty.

This warranty does not cover or provide credit for the following: tractor rental or other substitute equipment; lodging; loss of time, income, sales or profits; loss of the use of tractor; telephone calls or communication expense; lift truck; storage fees; injury or death to persons or damage or destruction of property; or consequential, incidental or punitive damages.

Labor Allowance: A labor allowance may be issued upon request at Eagle's discretion. Allowable labor hours and a per hour labor rate will be determined by Eagle according to reasonable automotive standards.

Warranty Claim Procedure: When a warranty situation arises, it is essential that the customer contact Eagle's Warranty Department at +1 734-442-1000. The customer will need to provide Eagle with the tow tractor serial number and engine hours. A customer service representative will analyze the problem and determine the next steps. In many cases Eagle's technical support personnel will be able to analyze the problem and recommend adjustments that will solve the problem and reduce down time. If further service is required, an Eagle customer service representative will work with customer personnel to arrange a service provider and/or parts be sent to your facility for the repair as quickly as possible.

EXCEPT AS SET FORTH ABOVE, ALL WARRANTIES, CONDITIONS, REPRESENTATIONS, INDEMNITIES AND GUARANTEES, EXPRESS OR IMPLIED, WHETHER ARISING BY STATUTE, CUSTOM OF TRADE OR UNDER ORAL OR WRITTEN STATEMENTS MADE BY OR ON BEHALF OF EAGLE NEGOTIATIONS WITH CUSTOMER, DISTRIBUTOR, DEALER OR ANY REPRESENTATIVE, ARE HEREBY OVERRITTEN AND EXCLUDED, AND NO LIABILITY SHALL ATTACH TO EAGLE, EITHER IN CONTRACT OR IN TORT, OR STRICT LIABILITY IN TORT, FOR ANY DAMAGE TO PROPERTY, LOSS OF PROFITS, DAMAGES, COSTS, CHARGES, LIABILITY OR EXPENSES, WHETHER DIRECT OR INDIRECT, CONSEQUENTIAL OR OTHERWISE, WHICH ARISE OUT OF OR IN CONNECTION WITH THE SALE OR USE OF ANY EAGLE MACHINE OR THE SUPPLY OF SERVICES.

SUBJECT TO CHANGE WITHOUT NOTICE

Please check our website www.eagletugs.com periodically for service bulletins and manual updates.

*Note - The Eagle Tugs **3-Year Warranty** covers TT-series, eTT-series, XL-series, eXL-series and USATS tow tractors which are used in aviation applications. All MTT and RTT-series, and Transit Pro models, as well as all Eagle tow tractor models which are used in industrial applications, are covered under the Eagle Standard Warranty of 1 Year or 2,000 hours. Eagle Bob Tails are covered under Ford Motor Company's Standard Warranty for each respective Ford truck model.

WARRANTY

WARRANTY REGISTRATION INFORMATION

Please complete the Eagle Tugs Warranty Registration found on line at www.eagletugs.com.

Battery

Refer to the battery manufacturer's documentation for the traction battery warranty.

NOTE: At the time a warranty claim is filed it may be necessary for Eagle Tugs to request a copy of the maintenance records kept on your tug. For your convenience a printable Preventative Maintenance Schedule page is available in the Maintenance section of this manual.

SERVICE PARTS ILLUSTRATIONS & DETAIL

IDENTIFICATION KEY

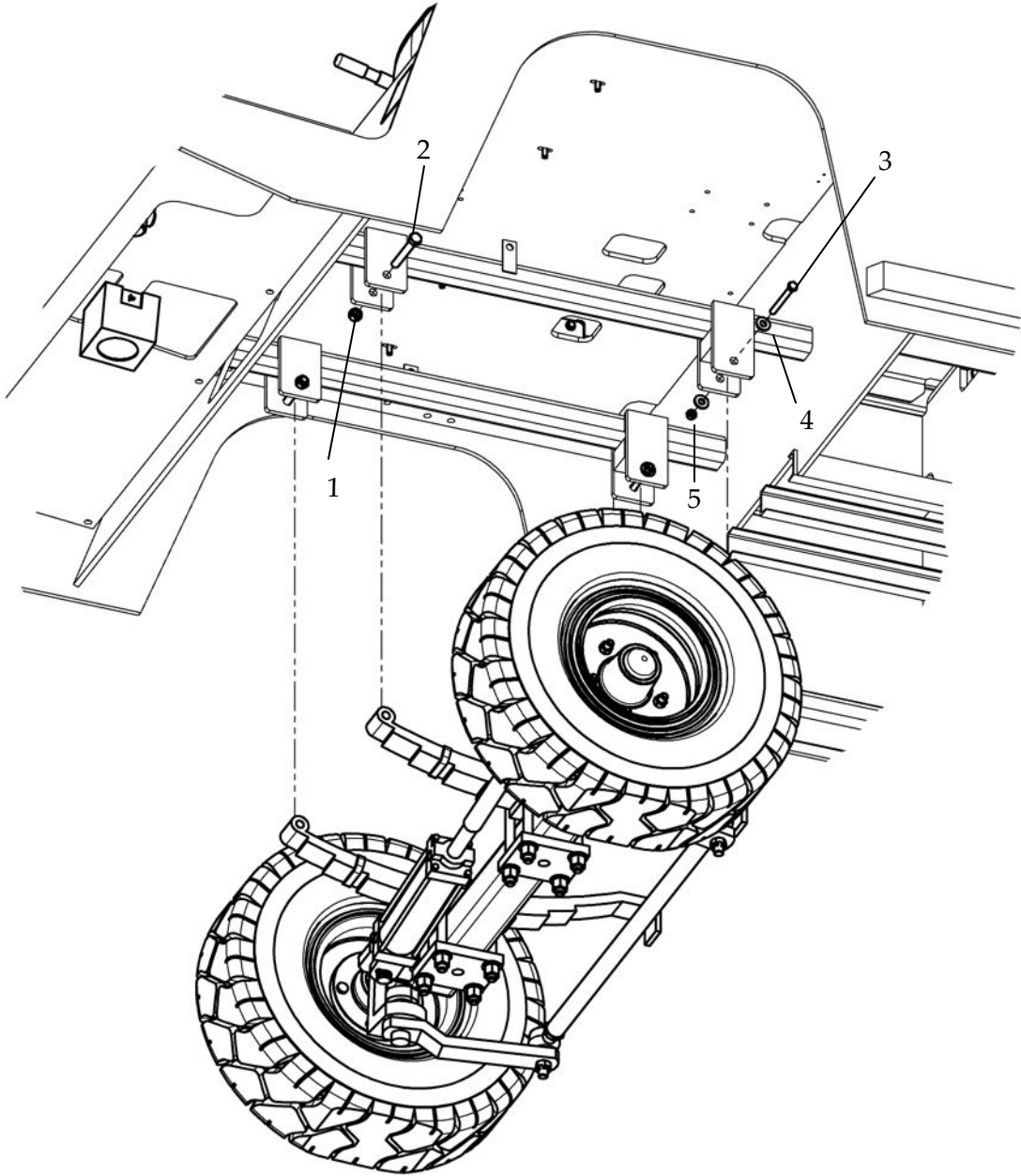
The following abbreviations are used throughout the parts lists in this section.

Abbreviation	Meaning	Purpose
NL	Not Listed	Part required but not shown on diagram
NPN	No Part Number	Parts shown and numbered, but not stocked and sold by Eagle. Typically used for bolts, clamps, etc...
AR	As required	

**TO HELP US SERVICE YOU BETTER. HAVE TUG MODEL AND SERIAL NUMBER AVAILABLE
WHEN ORDERING PARTS**

AXLES

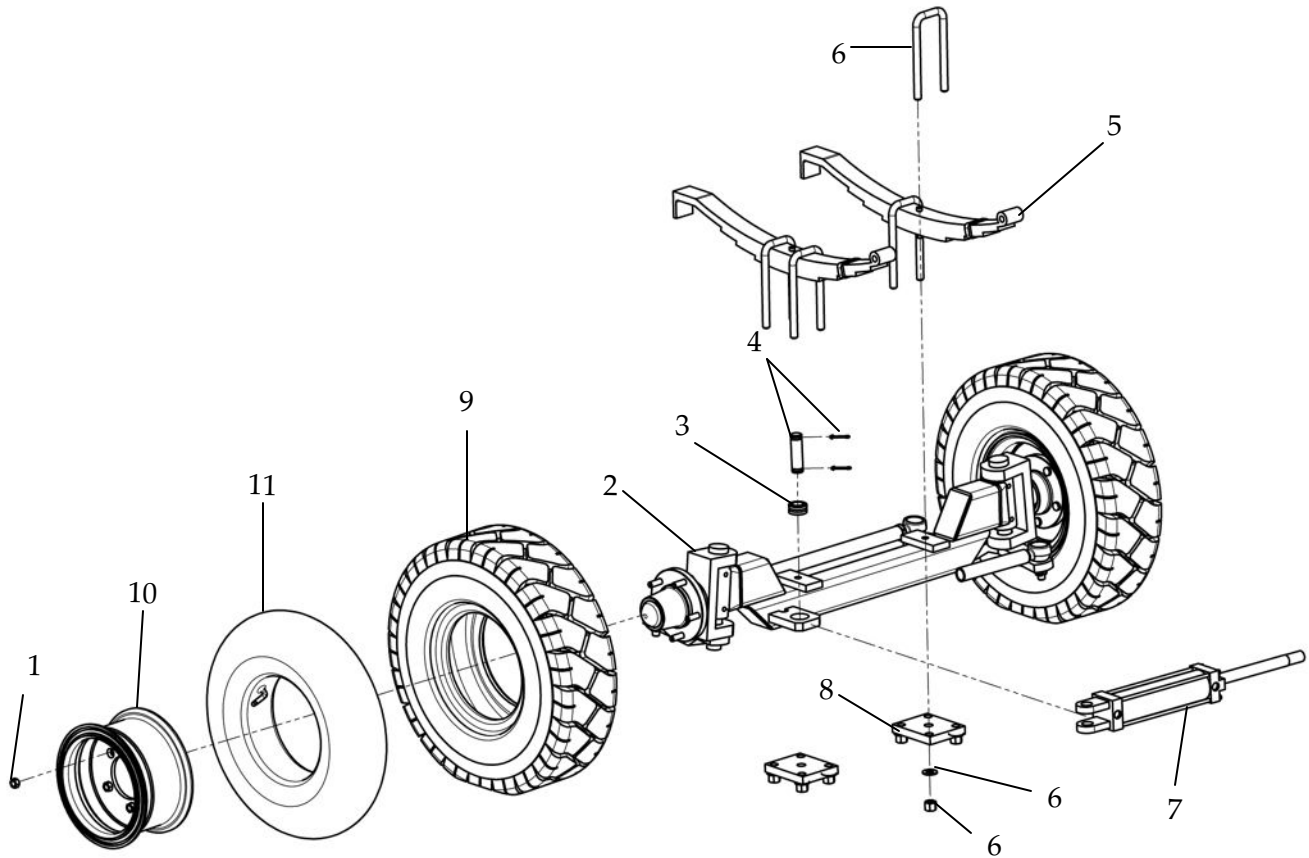
FRONT AXLE INSTALL



Item	Part Number	Qty.	Description
1	NPN	2	9/16-18 LOCK NUT
2	NPN	2	9/16-18 X 3.5 GR8 BOLT
3	NPN	2	3/8-16 X 3.5 GR8 BOLT
4	NPN	2	3/8 FLAT WASHER
5	NPN	4	3/8-16 LOCK NUT

AXLES

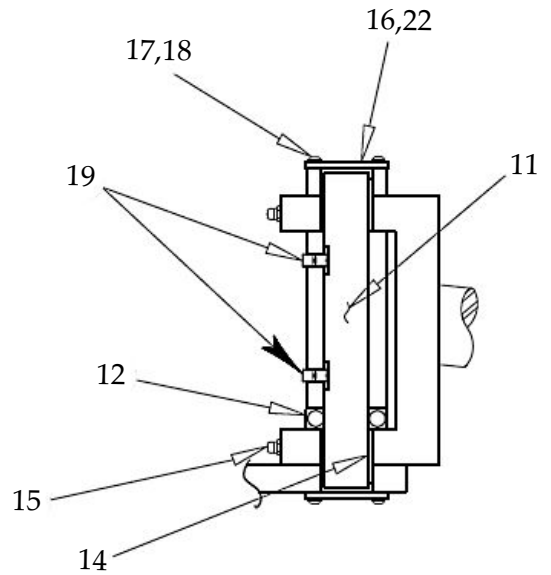
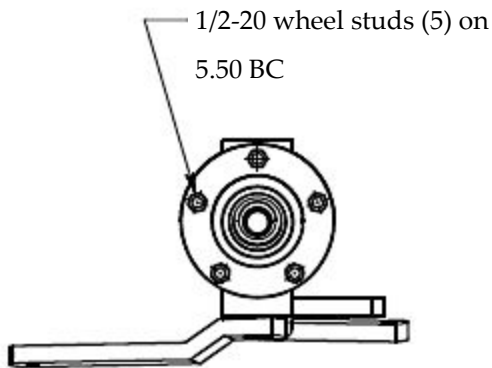
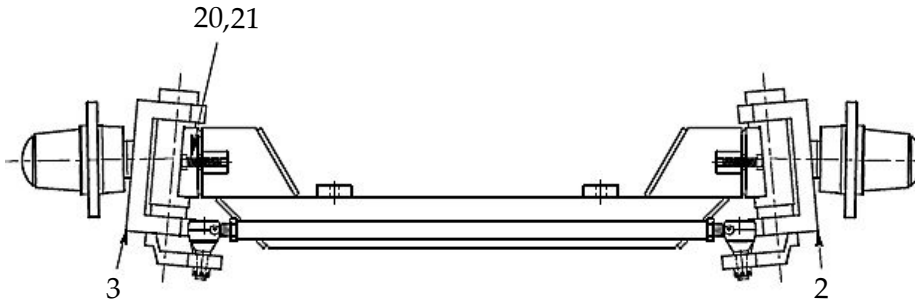
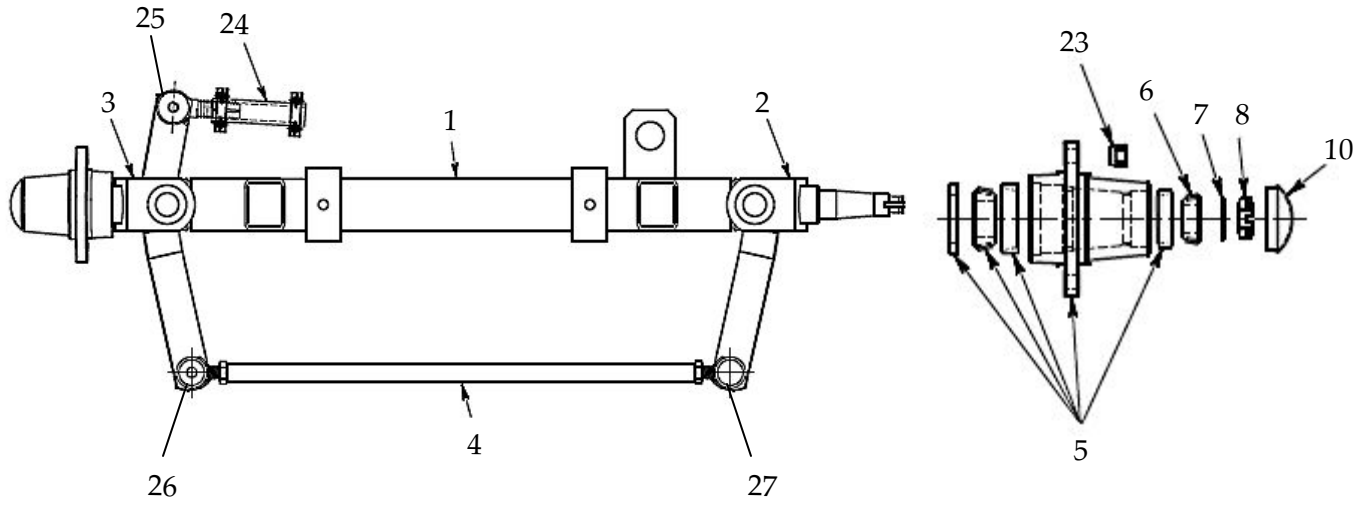
FRONT AXLE ASSEMBLY



Item	Part Number	Qty.	Description
1	06-13144	10	1/2-20 UNF TAPERED WHEEL NUT
2	A-MTT5-0430	1	FRONT AXLE (WITHOUT BRAKES)
3	A-TT10-00826	1	CYLINDER BEARING
4	A-TT10-00803A	1	HYD CYL PIVOT & COTTER PIN SET
5	A-TT4-00116	2	LEAF SPRING
6	A-MTT5-0510	4	U-BOLT KIT (INCLUDES BOLT, NUT & WASHER)
7	A-TT10-00803-1	1	STEERING CYLINDER
8	A-MTT5-0212	2	FRONT U-BOLT PLATE
9	A-MTT5-0520B	1	FRONT TIRE
10	A-MTT5-0520A	1	FRONT RIM
11	A-MTT5-0520C	1	TIRE TUBE
12	A-MTT5-0520	1	FRONT TIRE AND RIM ASSEMBLY

AXLES

FRONT AXLE WITHOUT BRAKES



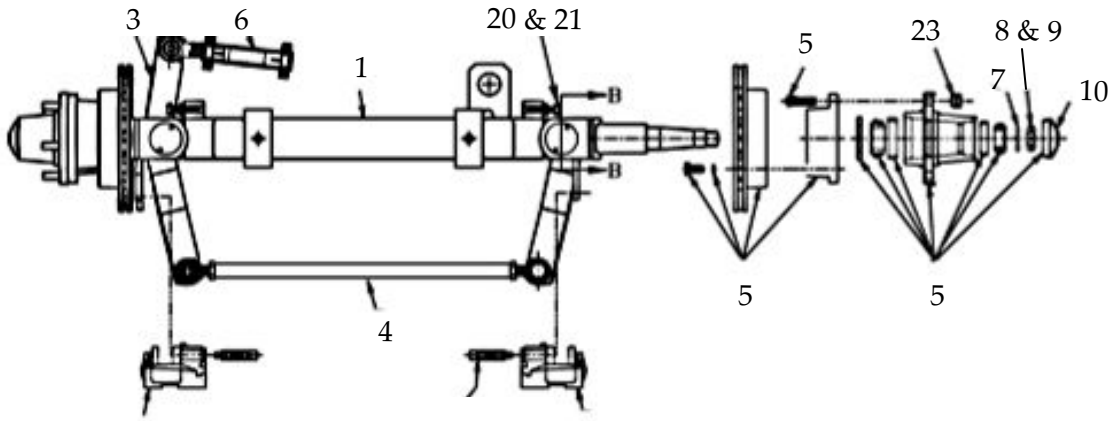
AXLES

FRONT AXLE WITHOUT BRAKES

Item	Part Number	Qty.	Description
1	03-30860	1	AXLE BEAM WELDMENT
2	03-30861	1	RH KNUCKLE WELDMENT
3	03-30682	1	LH KNUCKLE WELDMENT
4	02-21004	1	TIE ROD TUBE ASSY
5	02-20322	2	#623 HUB ASSY
6	130355100	2	OUTER CONE #15123
7	06-13108	2	TONGUED SPINDLE WASHER
8	06-62085	2	NUT, 1-14 SPINDLE, 12 SLOTTED
9	324604160	2	COTTER PIN, 3/16 X 2 1/2
10	06-12016	2	GREASE CAP
11	06-62415	2	KING PIN
12	06-60498	2	THRUST BEARING
13	06-60603	2	KING PIN SHIM
14	06-61721	4	KING PIN BUSHING
15	390406410	4	GREASE ZERK
16	06-60547	4	KING PIN CAP
17	06-61080	8	SCREW, 10-24 X 5/8 BHC
18	06-61081	8	WASHER, #10 LOCK
19	06-60811	8	3/8-16 SHSC
20	321800090	2	NUT, 1/2- HX JAM
21	320224100	2	SCREW, 1/2-13 X 2 HX HD
22	06-61376	4	KING PIN COVER GASKET
23	06-13144	10	NUT, 1/2-20 UNF TAPERED WHEEL
24	02-21005	1	FRONT TIE ROD ASSY
25	06-60332	1	CYLINDER TIE ROD END
26	A-TT4-00402	1	LEFT TIE ROD END
27	A-TT4-00403	1	RIGHT TIE ROD END

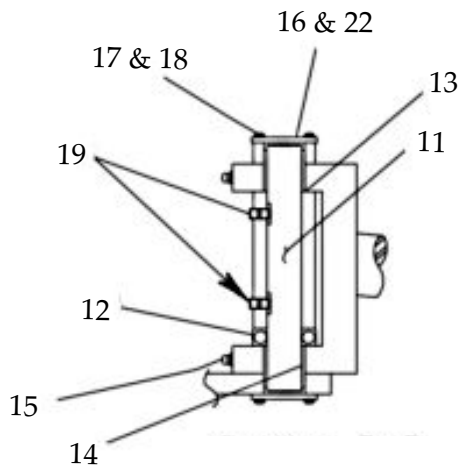
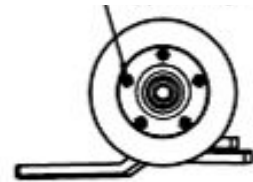
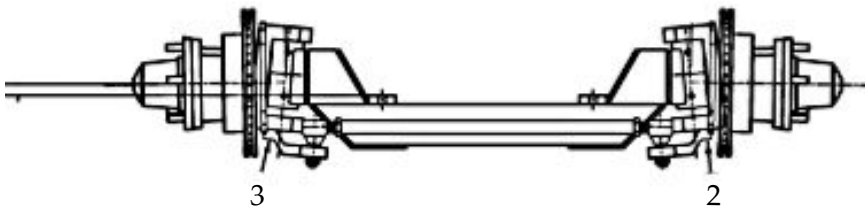
AXLES

FRONT AXLE WITH BRAKES



Apply locktite blue (2.42)
Torq to 35 FT Lbs

1/2-20 wheel studs (5) on
5.50 BC



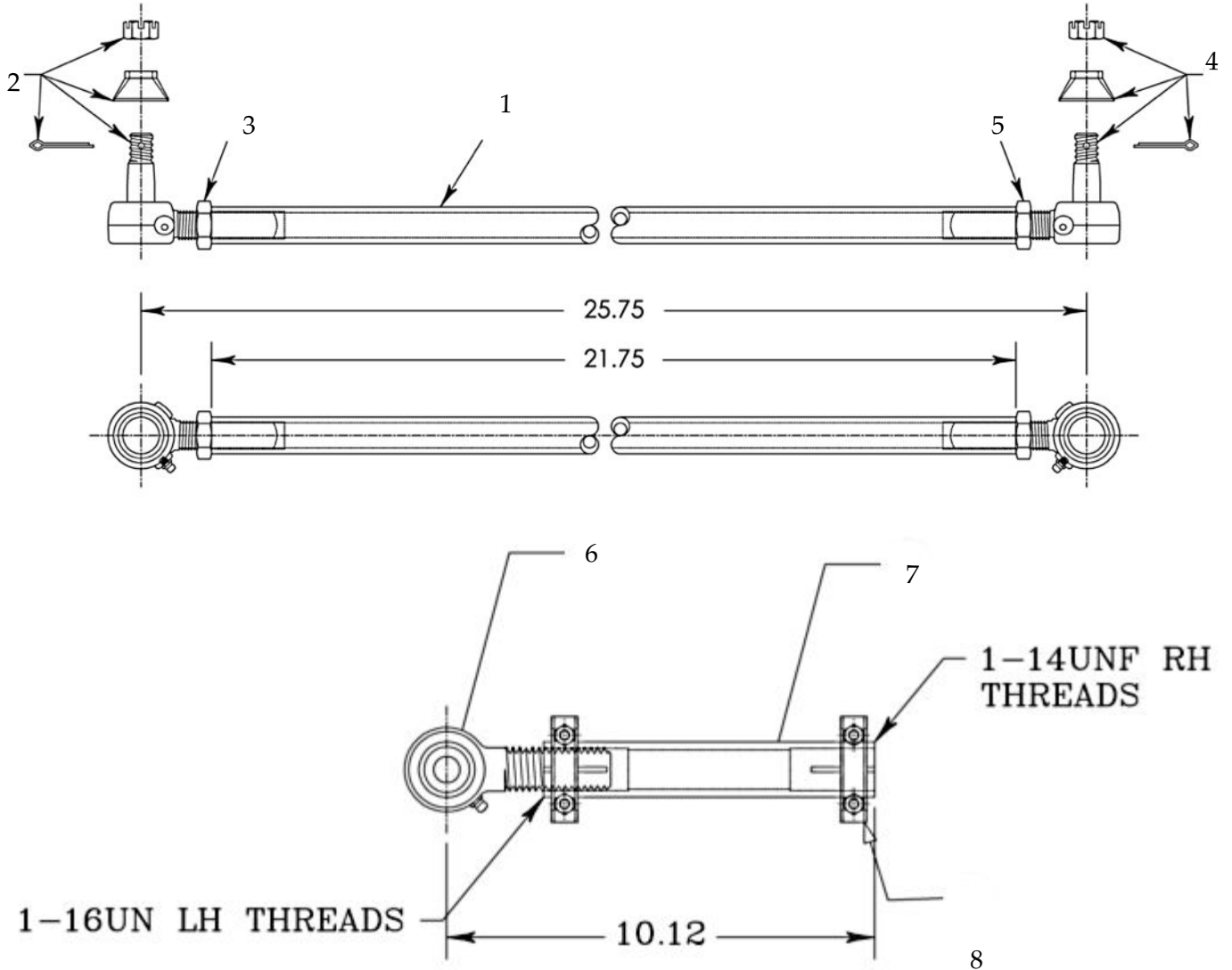
AXLES

FRONT AXLE WITH BRAKES

Item	Part Number	Qty.	Description
1	03-30865	1	AXLE BEAM WELDMENT
2	03-30866	1	RH KNUCKLE WELDMENT
3	03-30687	1	LH KNUCKLE WELDMENT
4	02-21012	1	TIE ROD TUBE ASSY
5	02-20643	2	HUB & ROTOR ASSY
6	02-21013	2	FRONT TIE ROD ASSY
7	06-13108	2	TONGUED SPINDLE WASHER
8	06-62085	2	NUT, 1-14 SINDLE, 12 SLOTTED
9	324604160	2	COTTER PIN, 3/16 X 2 1/2
10	06-12016	2	GREASE CAP
11	06-62415	2	KING PIN
12	06-60498	2	THRUST BEARING
13	06-60603	2	KING PIN SHIM
14	06-61721	4	KING PIN BUSHING
15	390406410	4	GREASE ZERK
16	06-60547	4	KING PIN CAP
17	06-61080	8	SCREW, 10-24 X 5/8 BHC
18	06-61081	8	WASHER, #10 LOCK
19	06-60811	8	3/8-16 SHSC
20	321800090	2	NUT, 1/2-13 JAM
21	320224100	2	SCREW, 1/2-13 X 2 HX HD
22	06-61376	4	KING PIN COVER GASKET
23	06-13144	10	NUT, 1/2-20 UNF TAPERED WHEEL
24	06-63022	1	RH CALIPER W/ MINERAL OIL SEAL
25	06-63023	1	LH CALIPER W/ MINERAL OIL SEAL

AXLES

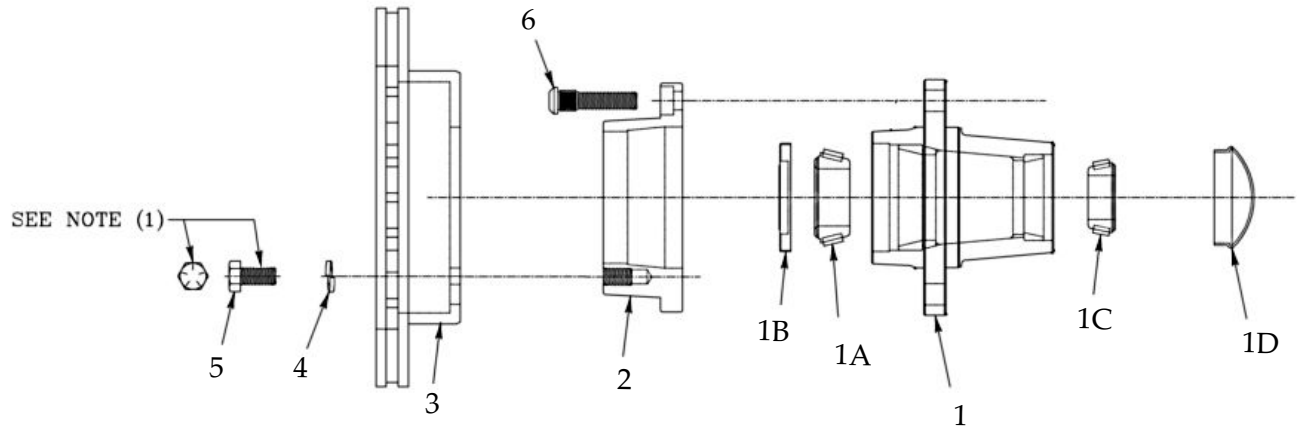
FRONT AXLE WITH BRAKES -TIE ROD



Item	Part Number	Qty.	Description
1	06-63016	1	TIE ROD TUBE
2	A-TT4-00402	1	TIE ROD END LEFT
3	06-60359	1	LEFT JAM NUT 3/4-16 UNF HEX
4	A-TT4-00403	1	TIE ROD END RIGHT
5	06-60361	1	RIGHT JAM NUT 3/4-16 UNF HEX
6	06-60332	1	CYLINDER TIE ROD END
7	06-63017	1	TIE ROD TUBE
8	06-61772	1	SPLIT COLLAR 1 1/4 ID

AXLES

FRONT AXLE WITH BRAKES-HUB & ROTOR ASSY

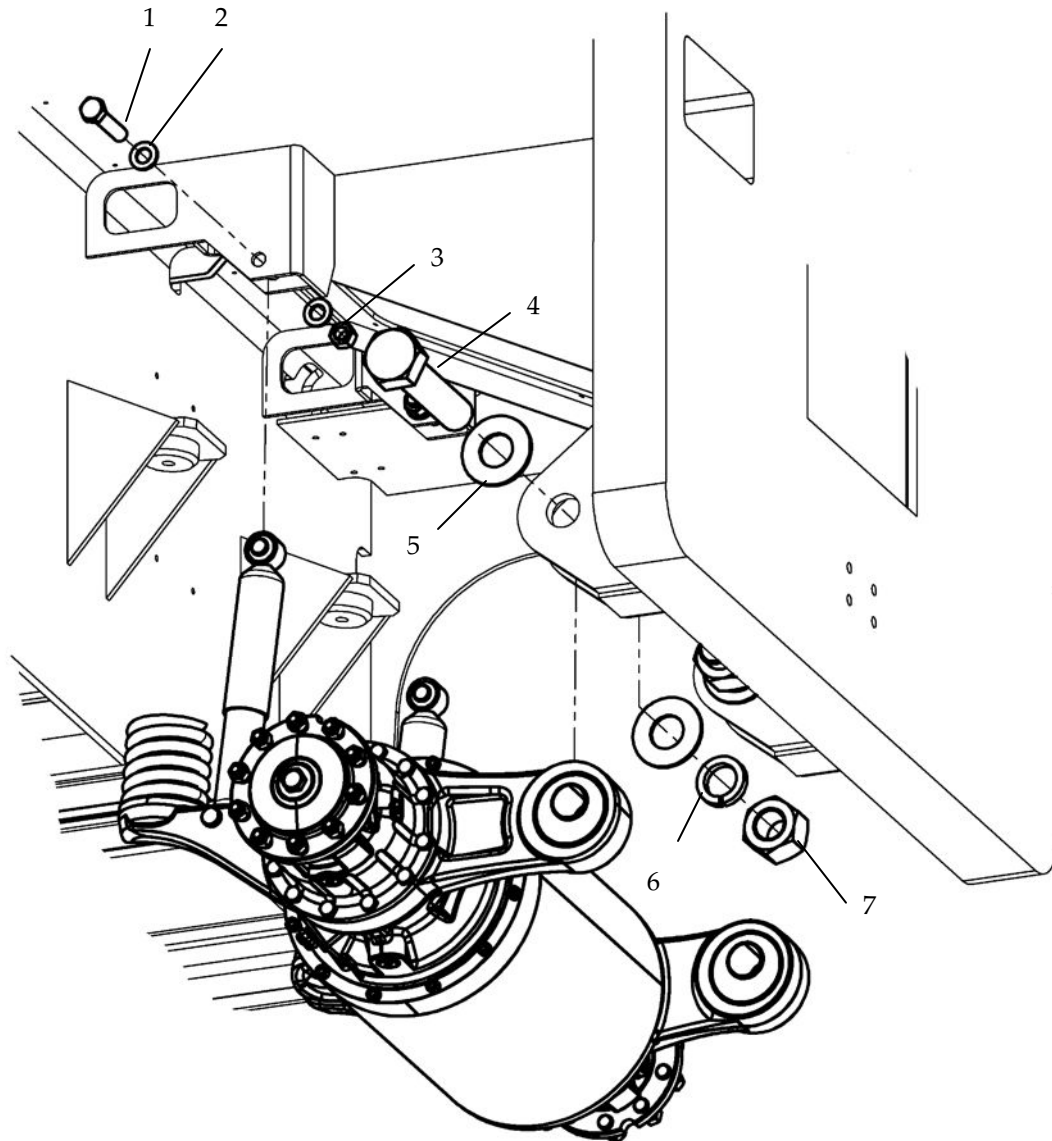


1.) GRADE 8 BOLT, LOCTITE RED & TORQUE TO 110 FT LBS.

Item	Part Number	Qty.	Description
1	02-03916b	1	HUB #623 CUPPED & STUDDED
1A	130400100	1	INNER CONE #24780
1B	02-03207	1	GREASE SEAL #623
1C	130355100	1	OUTER CONE #15123
1D	06-12016	1	GREASE CAP #523
2	06-61448M	1	ROTOR SPACER
3	06-51459	1	ROTOR, 10.75 DIA
4	06-12104	10	WASHER, 1/2 LOCK
5	06-61570	5	SCREW, 1/2-13 HX HD X 1.00 LG GR8
6	06-61511	5	WHEEL STUD, 1/2-20

AXLES

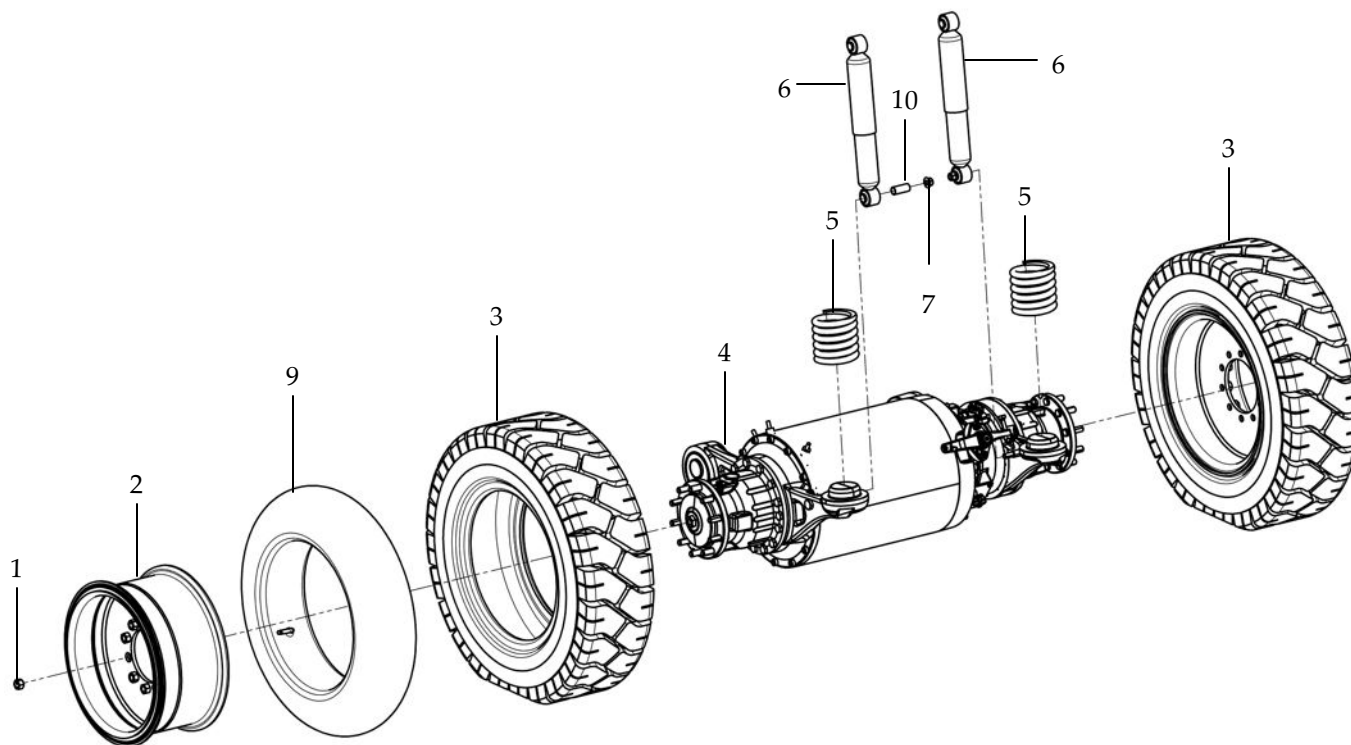
REAR AXLE INSTALL



Item	Part Number	Qty.	Description
1	NPN	1	FRONT DRIVE AXLE
2	NPN	2	3/4-10 FLAT WASHER
3	NPN	1	3/4-10 LOCK NUT
4	A-RTT50-00101	4	1 3/4 X 9 GR8 HCS BOLT
5	A-RTT50-00103	2	1 3/4 FLAT WASHER
6	A-RTT50-00104	1	1 3/4 LOCK WASHER
7	A-RTT50-00102	1	1 3/4 GR8 NUT

AXLES

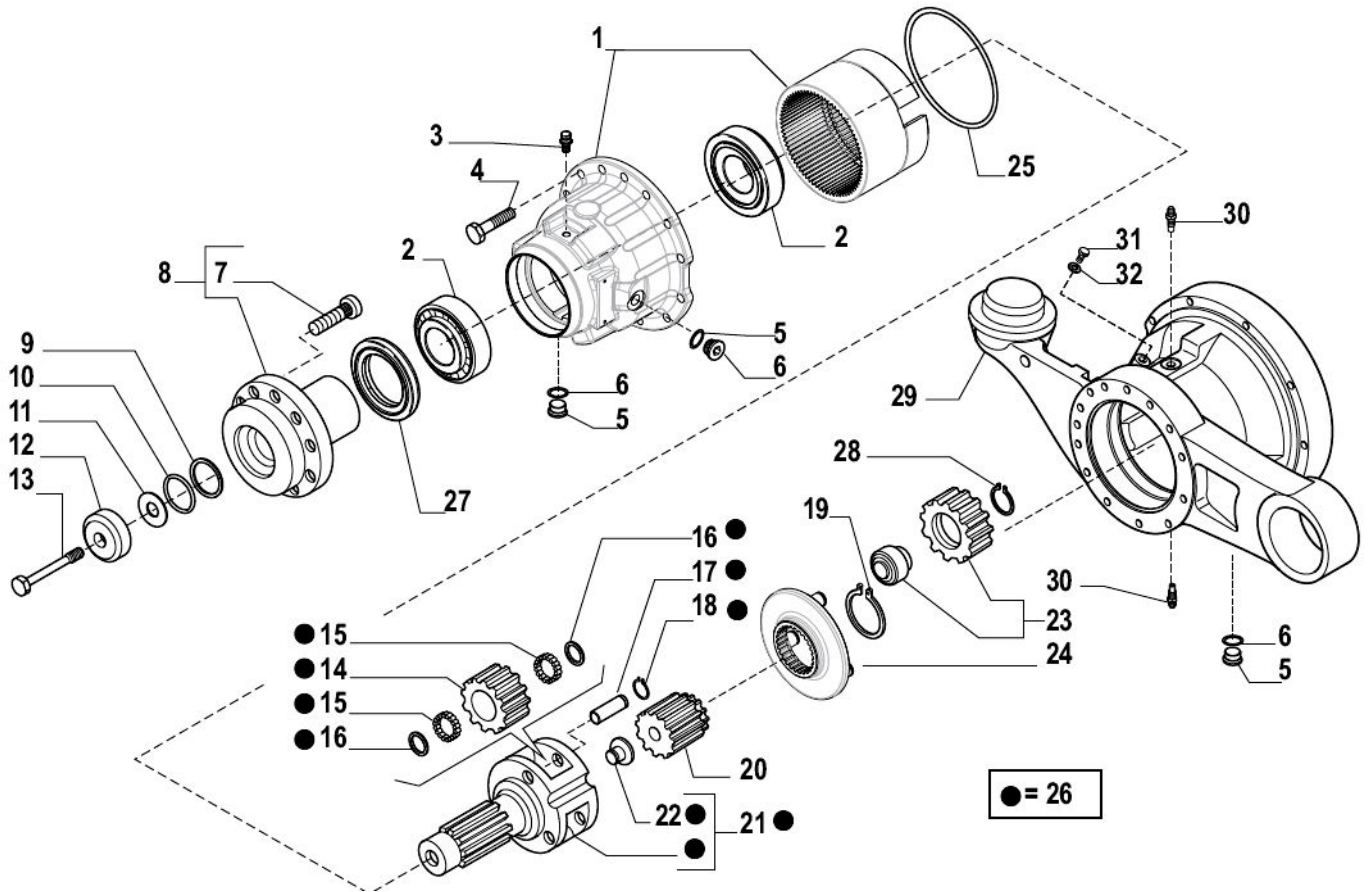
REAR AXLE, TIRES, SPRINGS & SHOCKS



Item	Part Number	Qty.	Description
1	A-RTT12-00123	20	WHEEL NUT M14-1.5 90 DEG
2	A-MTT5-0522A	2	REAR RIM
3	A-MTT5-0522B	2	REAR TIRE
4	A-RTT50-00361	1	REAR AXLE
5	A-RTT50-00112	2	REAR AXLE COIL SPRING
6	A-MTT5-0540	2	REAR AXLE SHOCK
7	A-MTT5-0541	2	M12 X 1.75 STOVER LOCK NUT
8	A-MTT5-0522	2	TIRE AND RIM ASSEMBLY
9	A-MTT5-0522C	2	TIRE TUBE
10	A-MTT5-0542	1	SHOCK ADAPTER

AXLES

REAR RH REDUCTION UNIT



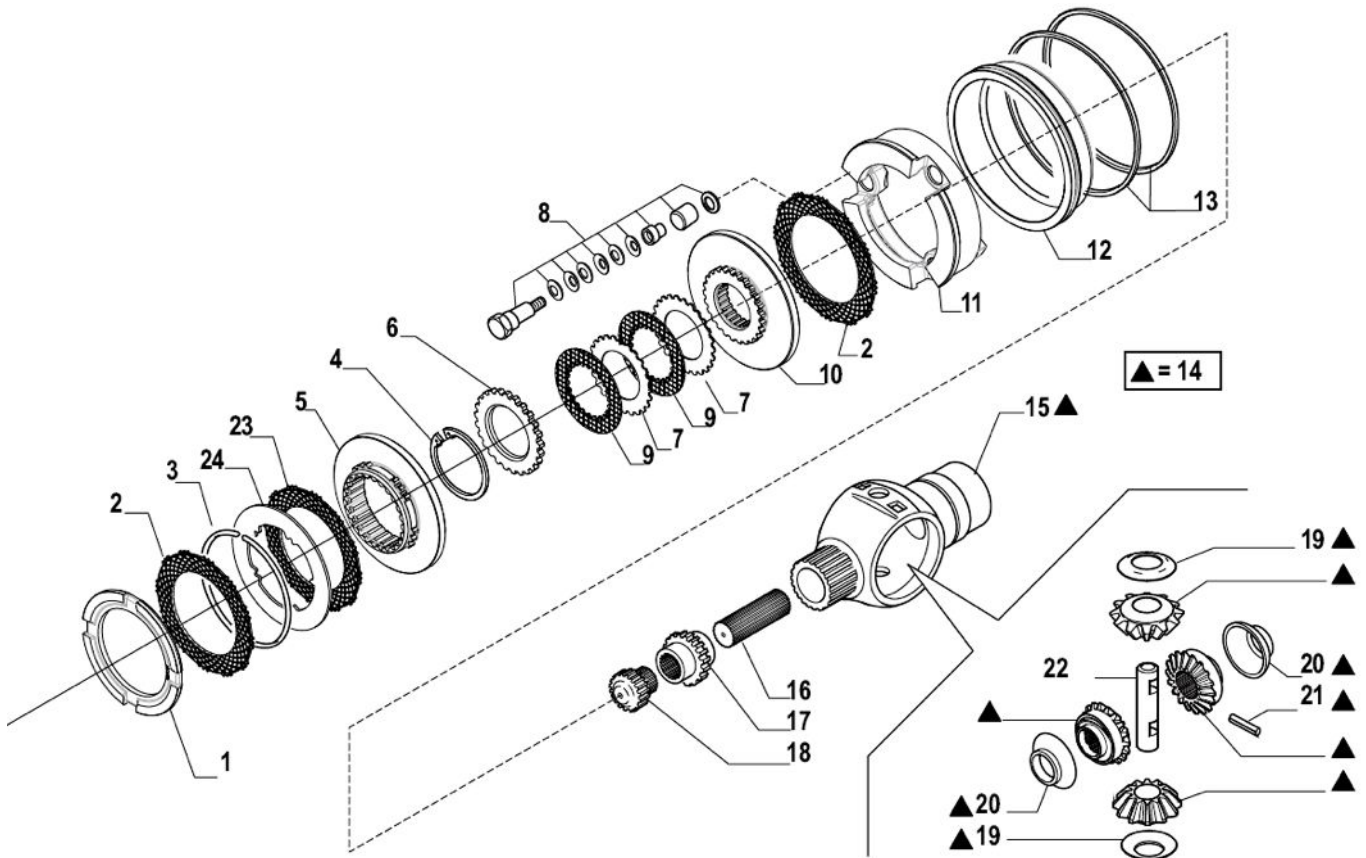
AXLES

REAR RH REDUCTION UNIT

Item	Part Number	Qty.	Description
1	A-MTT-145793	1	RH HOUSING KIT
2	A-MTT-132413	2	BEARING
3	A-ES12-137474	1	BREATHER M10 X 1
4	A-ETT8-021163	14	BOLT M12 X 50
5	A-MTT-023268	3	WASHER
6	A-MTT-021554	3	PLUG M24 X 1.5
7	A-MTT-129707	10	BOLT M14 X 48
8	A-MTT-066780	1	WHEEL HUB ASSY (INCLUDES ITEM 7)
9	A-MTT-132350	1	THRUST WASHER
10	A-MTT-028134	1	O-RING
11	A-MTT-123721		SHIM 0.05MM
11	A-MTT-123310		SHIM 0.10MM
11	A-MTT-123311		SHIM 0.30MM
11	A-MTT-123312		SHIM 0.50MM
12	A-MTT-132349	1	THRUST WASHER
13	A-MTT-132347	1	BOLT M6 X 88
14	A-MTT-136455	3	GEAR Z23(INCLUDED IN ITEM 26)
15	A-MTT-028370	9.6	BEARING NEEDLES (BY TENS) (INCLUDED IN ITEM 26)
16	A-MTT-136456	6	THRUST WASHER (INCLUDED IN ITEM 26)
17	A-MTT-137280	3	SHAFT (INCLUDED IN ITEM 26)
18	A-MTT-024900	3	SNAP RING D.21 (INCLUDED IN ITEM 26)
19	A-MTT-025031	1	SNAP RING
20	A-MTT-132354	1	PINION Z26
21	A-MTT-066716	1	PLANETARY CARRIER (INCLUDED IN ITEM 26)
22	A-MTT-115682	1	LOCKING PAD (INCLUDED IN ITEM 26)
23	A-MTT-066893	3	GEARS KIT
24	A-MTT-372472	1	PLANETARY CARRIER
25	A-TN3E-028568	1	O-RING
26	A-MTT-066275	1	PLANETARY CARRIER ASSY (INCLUDES ITEMS 14-18)
27	A-MTT-643797	1	OIL SEAL RING
28	A-MTT-025027	3	LOCK RING
29	A-MTT-142219	1	RH HOUSING
30	A-ES12-116792	2	BREATHER M10 X 1

AXLES

REAR DIFFERENTIAL AND BRAKES



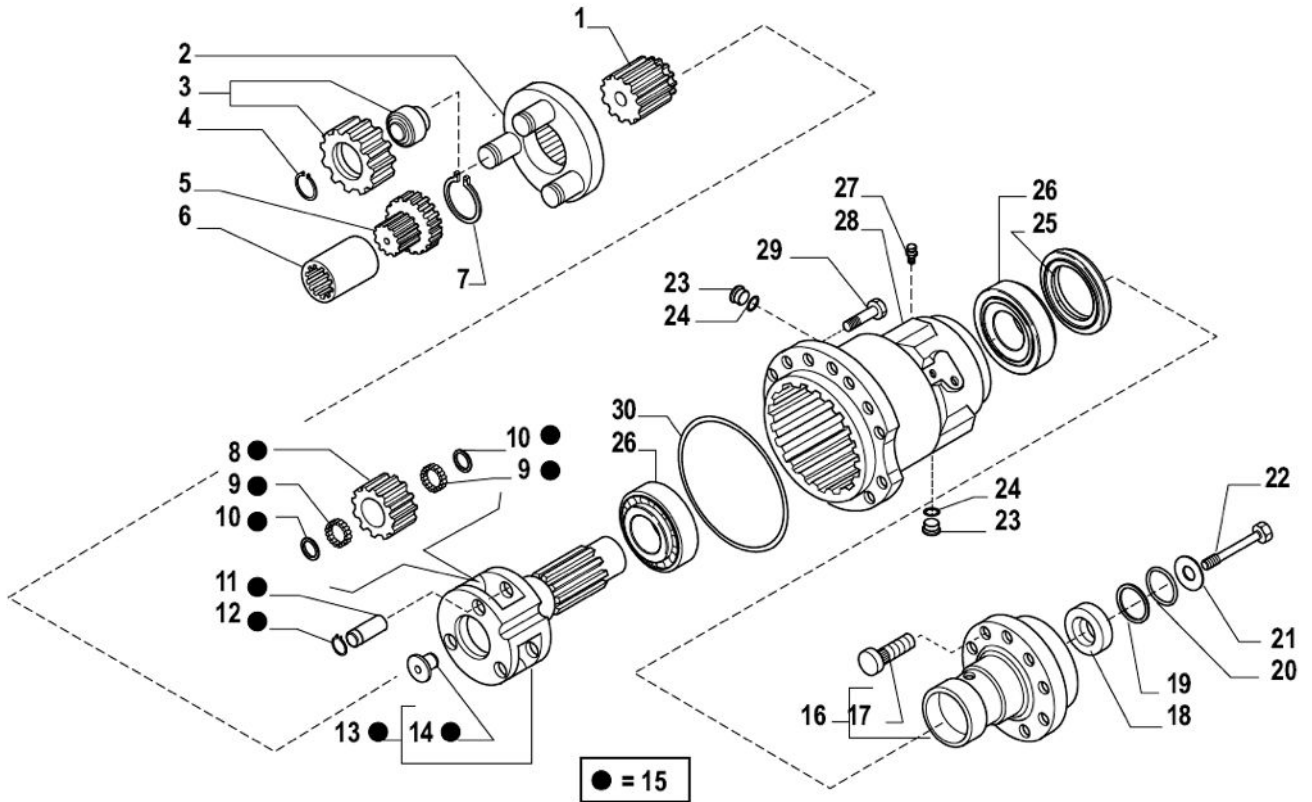
AXLES

REAR DIFFERENTIAL AND BRAKES

Item	Part Number	Qty.	Description
1	A-MTT-134103	1	FLANGE
2	A-TN3E-133953	2	BRAKE DISC
3	A-TN3E-107905	1	LOCK RING
4	A-MTT-024916	1	SNAP RING D.75
5	A-MTT-383652	1	COUNTER DISC
6	A-MTT-374140	1	FLANGE
7	A-TN3E-134101	2	COUNTER DISC
8	A-TN3E-066633	1	SELF ADJUST KIT
9	A-TN3E-110644	2	DISC
10	A-MTT-134098	1	COUNTER DISC
11	A-MTT-134071	1	ACTUATOR BODY
12	A-TN3E-148323	1	BRAKE PISTON
13	A-TN3E-147312	2	O-RING
14	A-MTT-066277	1	DIFFERENTIAL GEARS KIT (INCLUDES ITEMS 19-22)
15	A-MTT-134755	1	DIFFERENTIAL HOUSING
16	A-MTT-142262	1	RH HALF SHAFT
17	A-MTT-142261	1	SLEEVE
18	A-MTT-142260	1	GEAR
19	A-MTT-134897	2	THRUST WASHER
20	A-MTT-134896	2	THRUST WASHER
21	A-MTT-024389	1	PIN D5X36
22	A-MTT-132361	1	SHAFT
23	A-MTT-133952	1	BRAKE DISC
24	A-MTT-134100	1	COUNTER DISC

AXLES

REAR LH REDUCTION UNIT



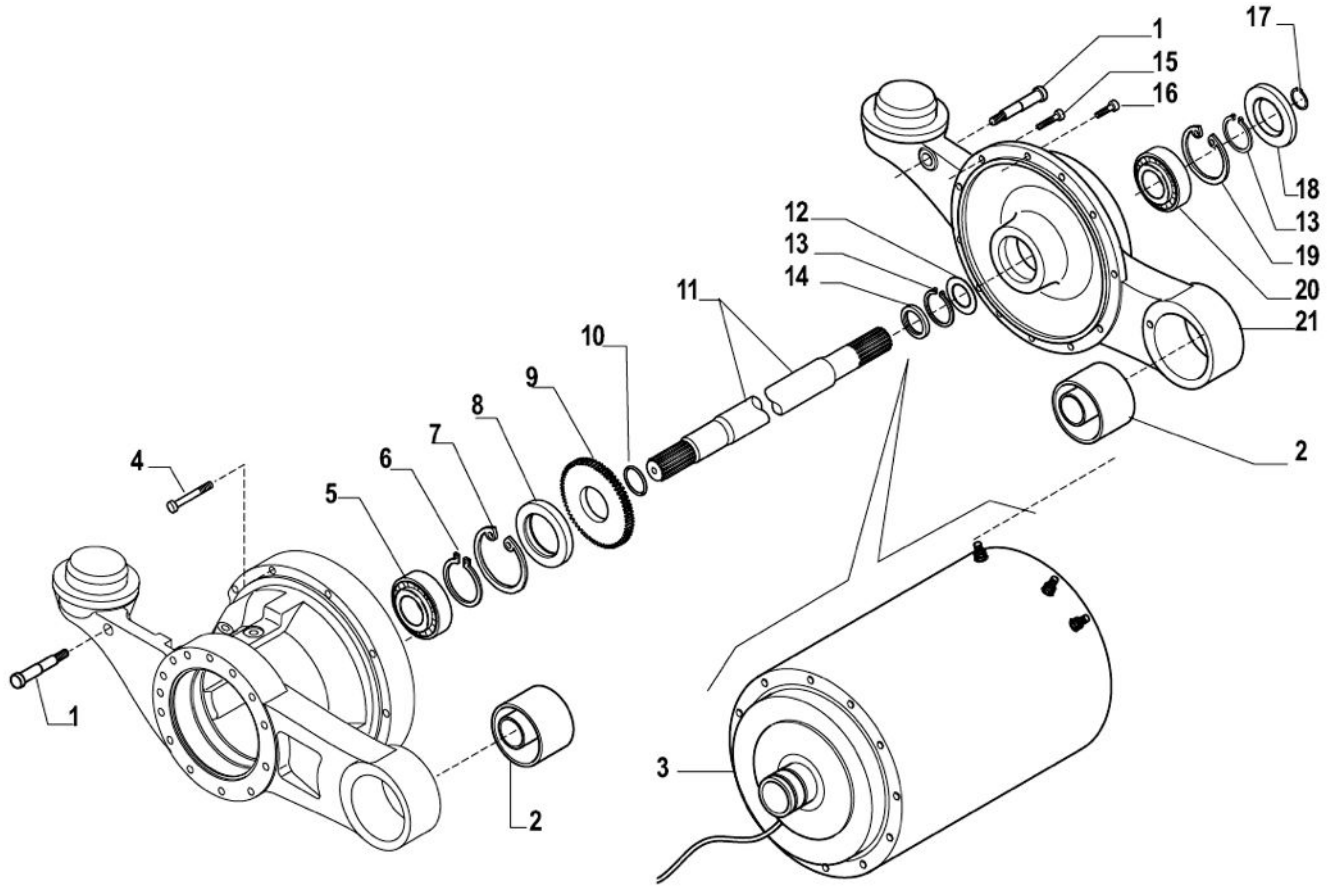
AXLES

REAR LH REDUCTION UNIT

Item	Part Number	Qty.	Description
1	A-MTT-132354	1	PINION Z26
2	A-MTT-372472	1	PLANETARY CARRIER
3	A-MTT-066893	3	GEAR KIT
4	A-MTT-025027	3	LOCK RING
5	A-MTT-142260	1	GEAR Z=17
6	A-MTT-142263	1	SLEEVE LH
7	A-MTT-025031	1	SNAP RING
8	A-MTT-136455	3	GEAR Z23(INCLUDED IN ITEM 15)
9	A-MTT-028370	9.6	BEARING NEEDLES(BY TENS) (INCLUDED IN ITEM 15)
10	A-MTT-136456	6	THRUST WASHER (INCLUDED IN ITEM 15)
11	A-MTT-137280	3	SHAFT(INCLUDED IN ITEM 15)
12	A-MTT-024900	3	SNAP RING D.21 (INCLUDED IN ITEM 15)
13	A-MTT-066716	1	PLANETARY CARRIER (INCLUDED IN ITEM 15)
14	A-MTT-115682	1	LOCKING PAD (INCLUDED IN ITEM 15)
15	A-MTT-066275	1	PLANETARY CARRIER ASSY (INCLUDES ITEMS 8-14)
16	A-MTT-066780	1	WHEEL HUB ASSY (INCLUDES ITEM 17)
17	A-MTT-129707	10	BOLT M14 X 48
18	A-MTT-132349	1	THRUST WASHER
19	A-MTT-132350	1	THRUST WASHER
20	A-MTT-028134	1	O-RING
21	A-MTT-123721		SHIM 0.05MM
21	A-MTT-123310		SHIM 0.10MM
21	A-MTT-123311		SHIM 0.30MM
21	A-MTT-123312		SHIM 0.50MM
22	A-MTT-132347	1	BOLT M6 X 8
23	A-MTT-021554	2	PLUG M24 X 1.5
24	A-MTT-023268	2	WASHER
25	A-MTT-643797	1	OIL SEAL RING
26	A-MTT-132413	2	BEARING
27	A-ES12-137474	1	BREATHER M10 X 1
28	A-MTT-145794	1	LH HOUSING
29	A-ETT8-021163	14	BOLT M12 X 50
30	A-TN3E-028568	1	O-RING

AXLES

REAR HALFSHAFT AND PHONIC WHEEL



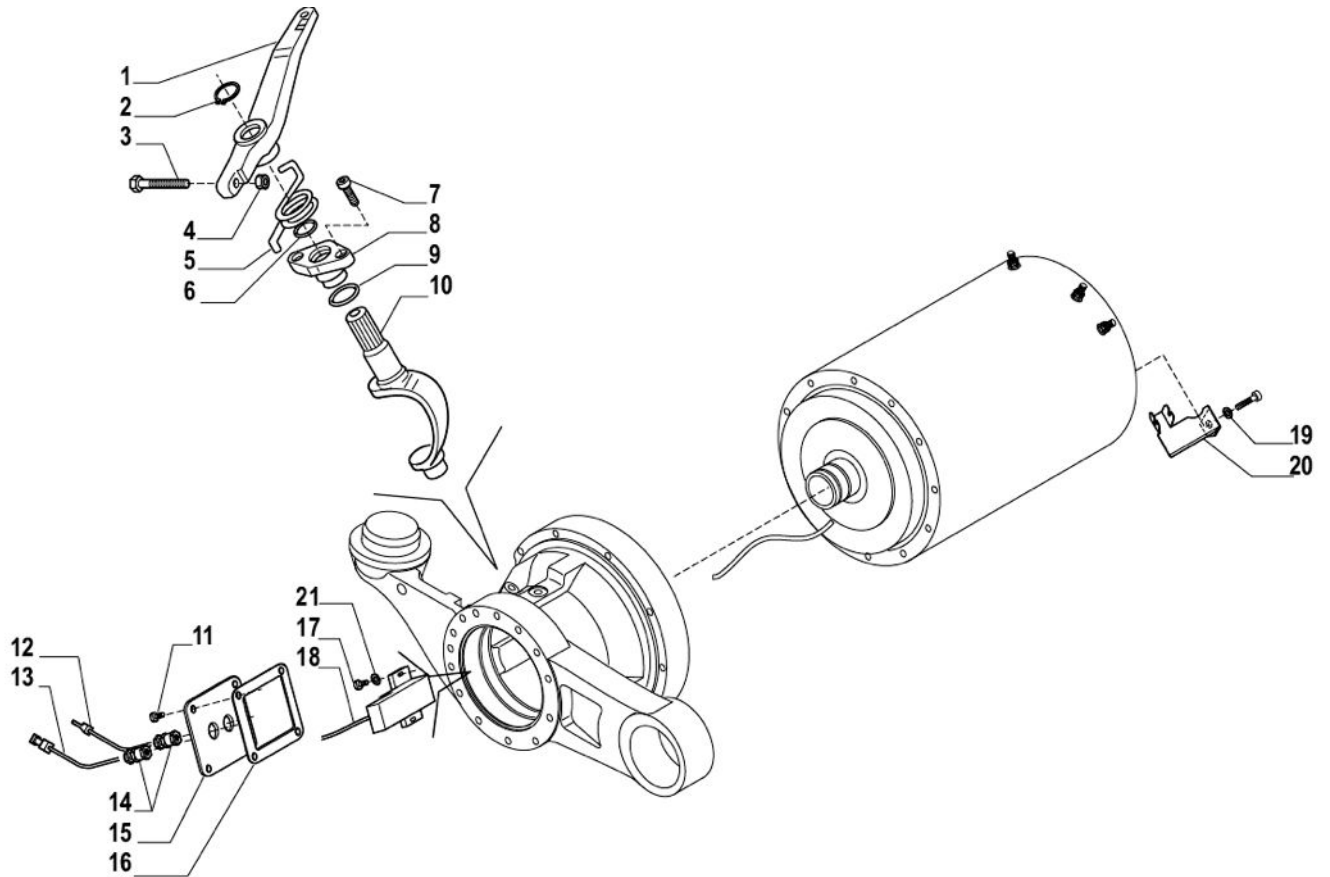
AXLES

REAR HALFSHAFT AND PHONIC WHEEL

Item	Part Number	Qty.	Description
1	A-MTT-144124	2	BOLT
2	A-MTT-641618	2	BUSHING
3	A-MTT-143092	1	MOTOR
4	A-MTT-021965	12	BOLT M10 X 65
5	A-MTT-025742	1	BEARING
6	A-MTT-024816	1	SNAP RING D65
7	A-MTT-024940	1	SNAP RING D100
8	A-MTT-025828	1	SEAL RING
9	A-MTT-143787	1	PHONIC WHEEL
10	A-MTT-028678	1	O-RING
11	A-MTT-142264	1	HALF SHAFT
12	A-MTT-144463	1	WASHER
13	A-ES12-024800	2	SNAP RING
14	A-MTT-025838	1	SEAL RING
15	A-ES12-021408	10	BOLT M10 X 30
16	A-MTT-021963	2	BOLT M10 X 45
17	A-MTT-024739	1	SNAP RING
18	A-MTT-025592	1	SEAL RING
19	A-MTT-024926	1	SNAP RING
20	A-MTT-025999	1	BEARING
21	A-MTT-142220	1	LH HOUSING

AXLES

REAR HAND BRAKE LEVER AND SENSOR



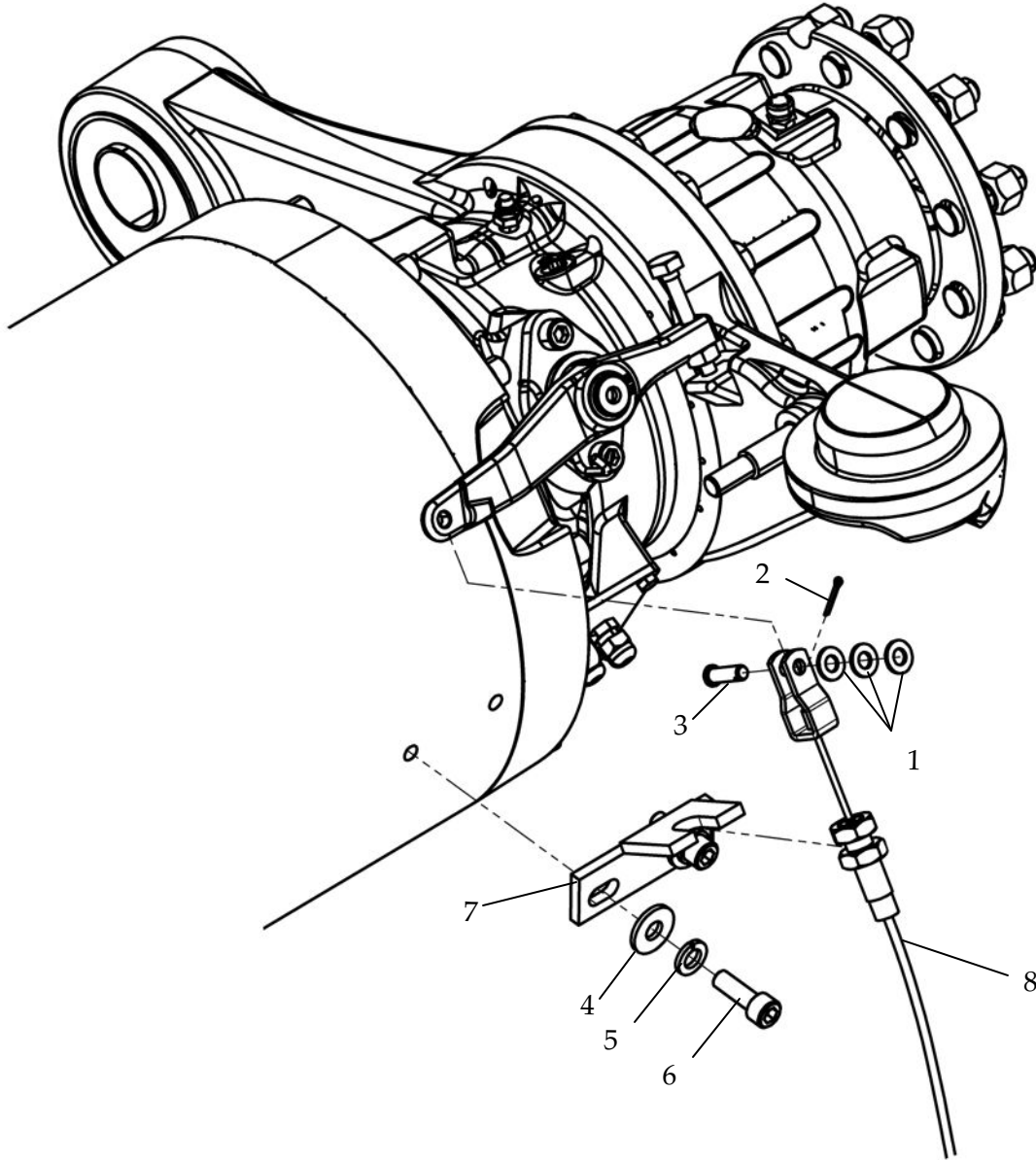
AXLES

REAR HAND BRAKE LEVER AND SENSOR

Item	Part Number	Qty.	Description
1	A-MTT-143091	1	BRAKE LEVER
2	A-MTT-024777	1	SNAP RING D.22
3	A-MTT-020881	1	SCREW M10 X 60
4	A-MTT-022119	1	NUT M.10
5	A-MTT-132415	1	SPRING
6	A-MTT-028117	1	O-RING
7	A-MTT-021409	2	BOLT M10 X 25
8	A-MTT-132371	1	BUSH/PIN
9	A-MTT-028523	8	O-RING
10	A-MTT-132368	1	FORK
11	A-MTT-020743	4	BOLT M6 X 10
12	A-MTT-144368	1	THERMOSTAT
13	A-MTT-144680	1	SENSOR CONNECTOR KIT
14	A-MTT-143454	2	CABLE-LOCKING
15	A-MTT-144939	1	COVER
16	A-MTT-144940	1	GASKET
17	A-ES12-021356	2	BOLT M4 X 20
18	A-MTT-150177	1	SENSOR
19	A-MTT-144516	1	WASHER
20	A-MTT-147624	1	SUPPORT
21	A-MTT-023060	2	WASHER

PARKING BRAKE

PARKING BRAKE CABLE ASSEMBLY



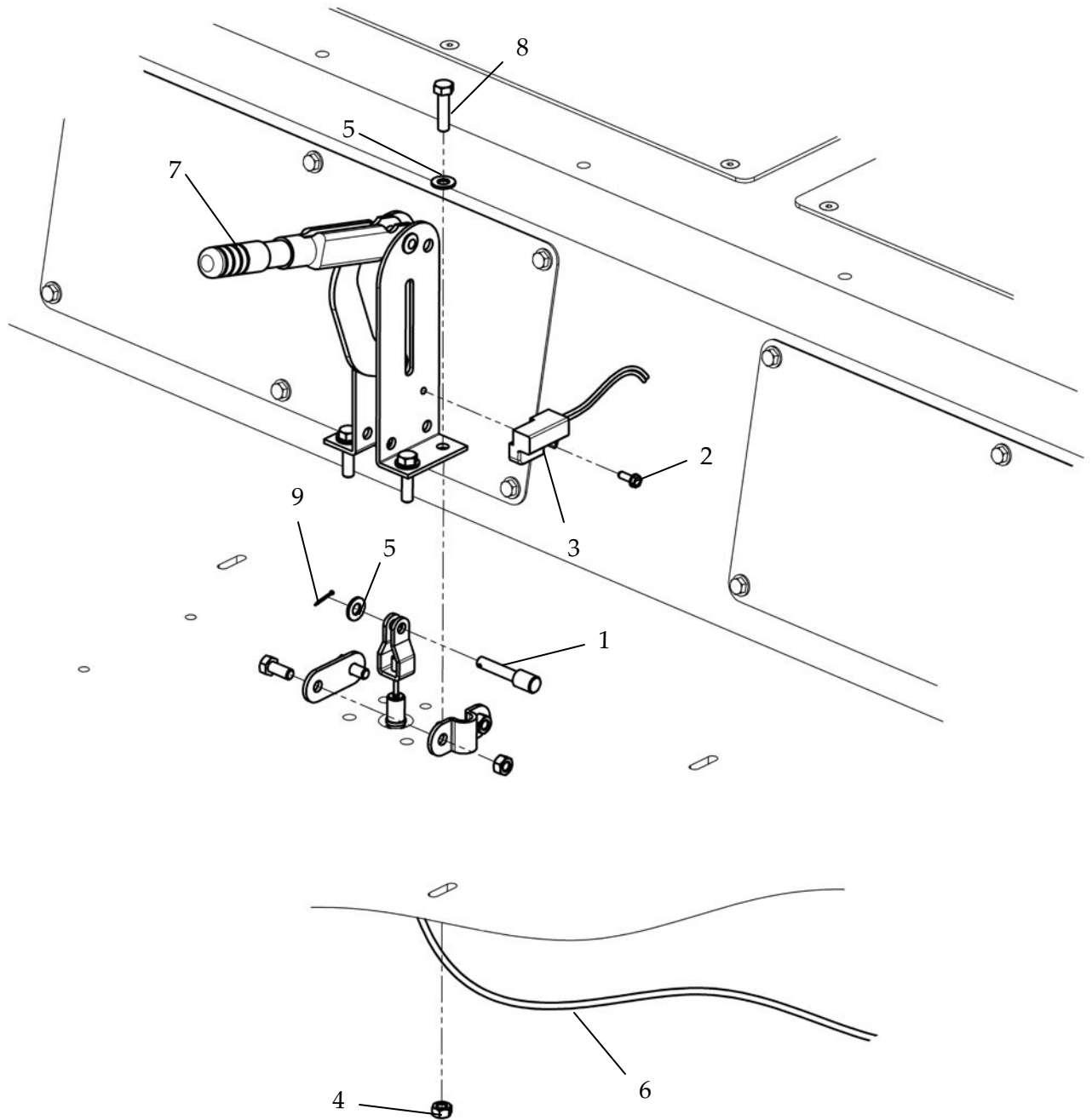
PARKING BRAKE

PARKING BRAKE CABLE ASSEMBLY

Item	Part Number	Qty.	Description
1	NPN	3	1/4 FLAT WASHER
2	NPN	1	3/32 COTTER PIN
3	NPN	1	5/16 PIN
4	NPN	1	3/8 FLAT WASHER
5	NPN	1	3/8 LCOK WASHER
6	NPN	1	10MM-1.5 X 30 BOLT
7	A-MTT5-0323	1	PARKING BRAKE BRACKET
8	A-MTT5-0550	1	PARKING BRAKE CABLE

PARKING BRAKE

PARKING BRAKE HANDLE ASSEMBLY



PARKING BRAKE

PARKING BRAKE HANDLE ASSEMBLY

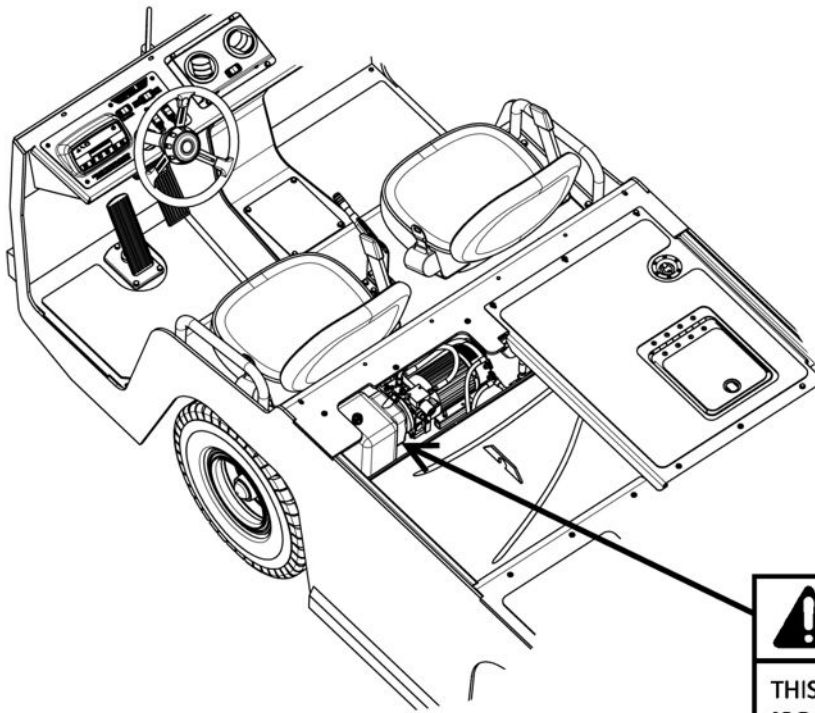
Item	Part Number	Qty.	Description
1	81008429	1	CONTACT PIN
2	82066700	1	MOUNTING SCREW
3	82050000	1	PROXIMITY SENSOR
4	NPN	4	1/4-20 LOCK NUT
5	NPN	5	1/4 FLAT WASHER
6	A-MTT5-0550	1	PARKING BRAKE CABLE
7	A-TT4-00141	1	PARKING BRAKE HANDLE
8	NPN	4	1/4-20 X 1.25 GR5 HCS
9	NPN	1	3/32 COTTER PIN

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM FLUID LEVEL CHECKING

To check fluid level: The best way to check the fluid level is to remove the LH battery cover. The tank features a small raised dot with the word "MAX" adjacent to it. The fluid level should be filled to this point. Alternately, the tank can be filled through the small access door provided. Add an appropriate amount of ISO 15/32 mineral oil based hydraulic fluid (see chart below) to tank.

The MTT features a hydraulic return filter to catch any contaminants in the hydraulic system. The filter should be replaced after the first 250 traction hours and then every 400 traction hours afterward.



**FILL ONLY WITH MINERAL-OIL
BASED HYDRAULIC FLUID**

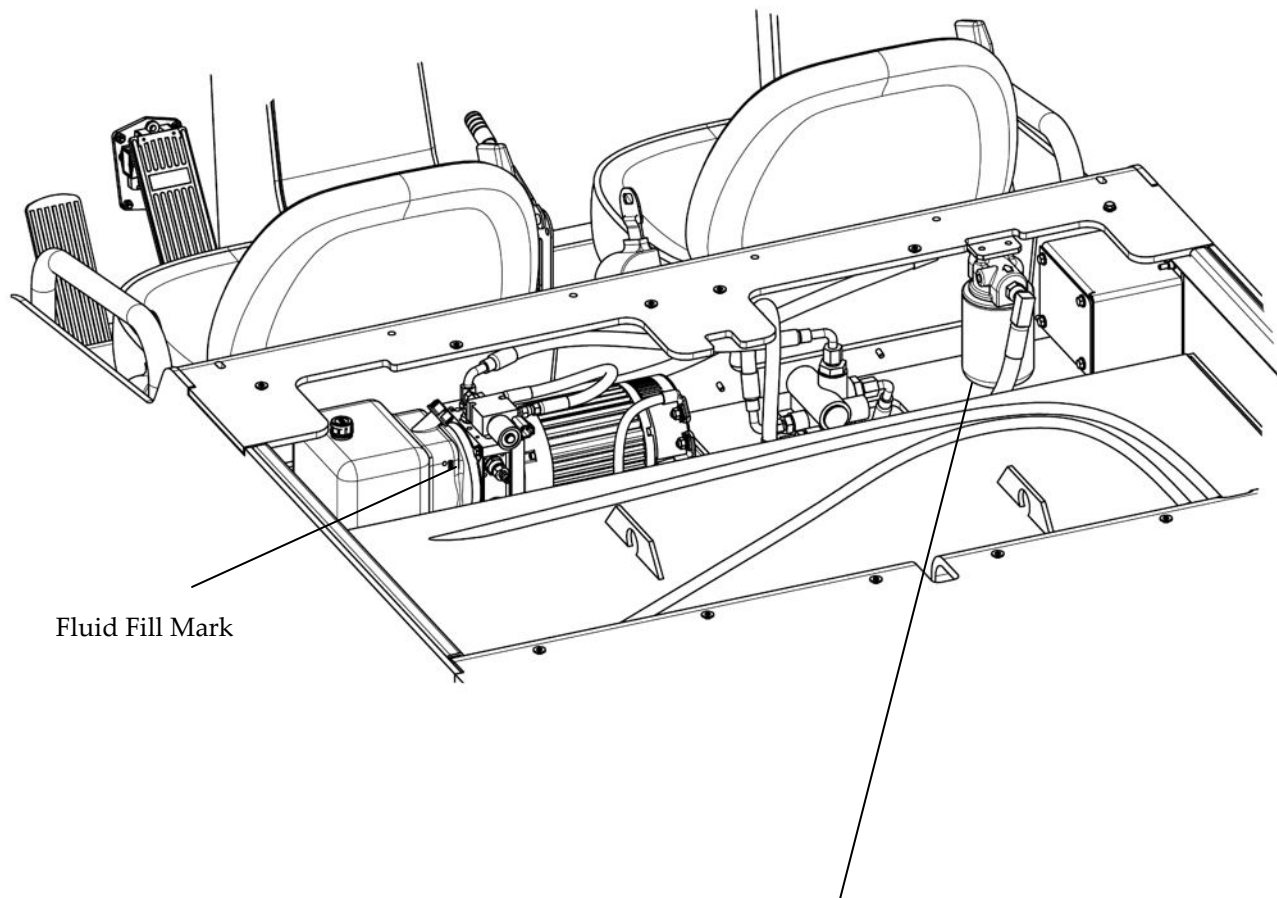
**THIS TRACTOR HAS BEEN FILLED WITH
ISO XX FLUID AT THE FACTORY**

**USE THE APPROPRIATE FLUID FOR LOCAL AMBIENT
(AIR) TEMPERATURES PER THE CHART:**

MIN TEMP	MAX TEMP	FLUID WEIGHT
-27°F (-33°C)	70°F (21°C)	ISO 10
-9°F (-23°C)	91°F (33°C)	ISO 15
5°F (-15°C)	111°F (44°C)	ISO 22
18°F (-8°C)	127°F (53°C)	ISO 32
28°F (-2°C)	143°F (62°C)	ISO 46

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM CARE

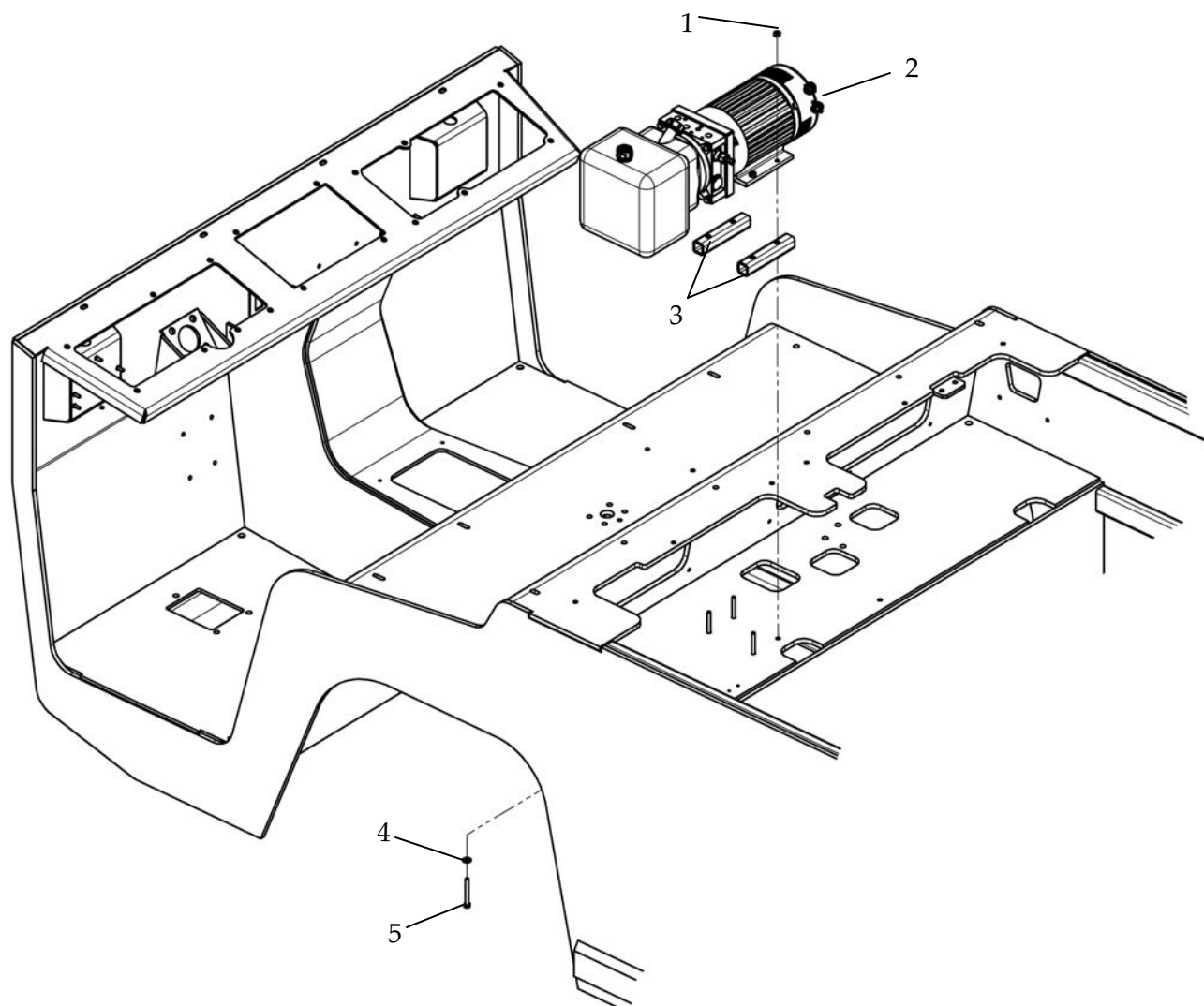


Fluid Fill Mark

Hydraulic Filter Element A-ES12-0486

HYDRAULIC SYSTEM

HYDRAULIC PUMP INSTALL



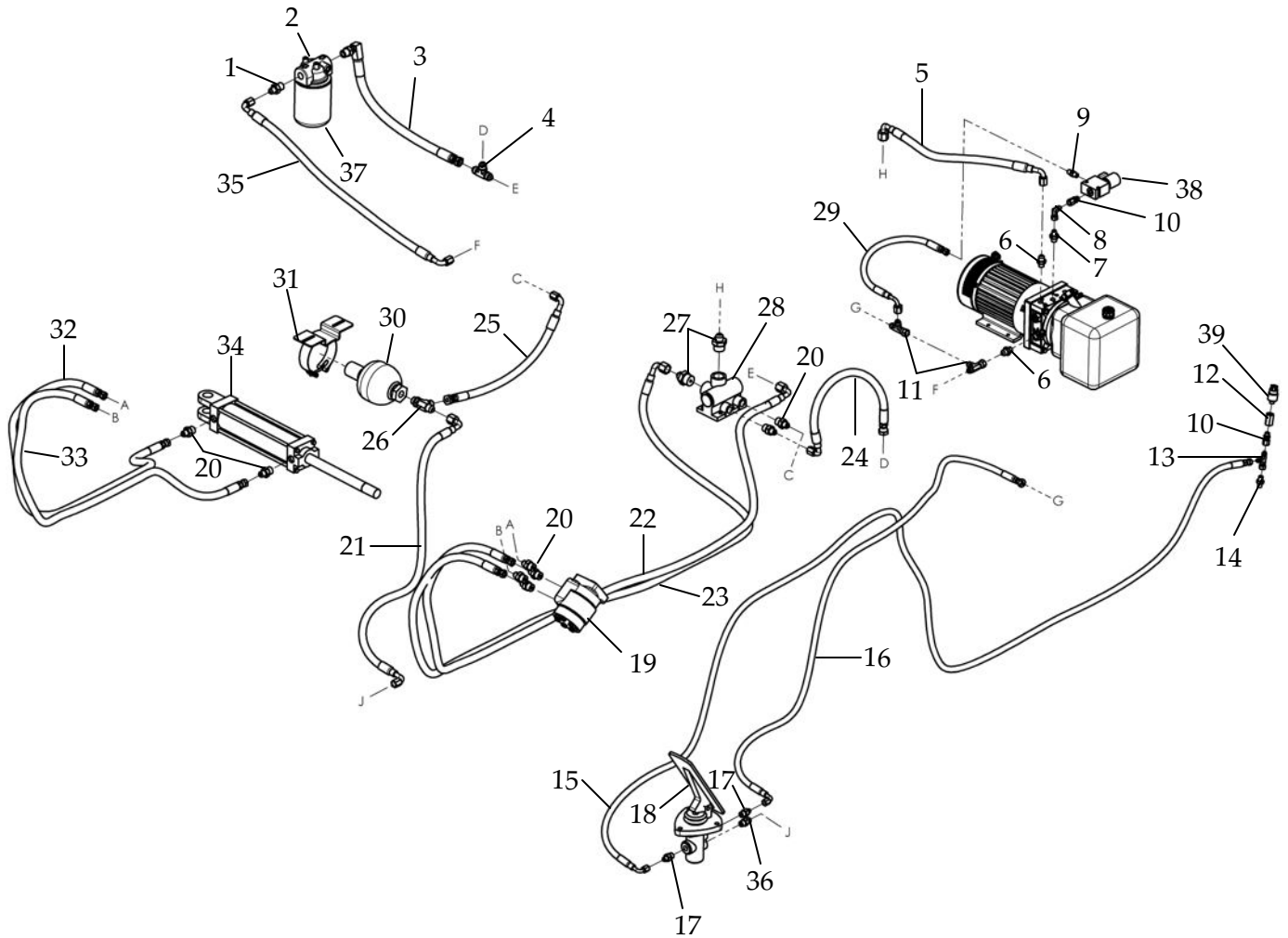
HYDRAULIC SYSTEM

HYDRAULIC PUMP INSTALL

Item	Part Number	Qty.	Description
1	NPN	4	1/4-20 LOCK NUT
2	A-MTT5-0460	1	HYPAC 80V W/9.9CC PUMP W/4L TANK
3	A-MTT5-0216	2	HYDRAULIC PUMP MOUNT
4	NPN	4	1/4 FLAT WASHER
5	NPN	4	1/4-20 X 2 GR5 HCS

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM WITH SINGLE BRAKE



HYDRAULIC SYSTEM

HYDRAULIC SYSTEM WITH SINGLE BRAKE

Item	Part Number	Qty.	Description
1	C5205X6X8	1	.5 MNPT TO .375 JIC
2	A-ES12-0485	1	FILTER HEAD
3	08U608-16.5-08UM08	1	H42508 HYDRAULIC HOSE
4	C5705X8	1	TEE, 3 X .50M JIC
5	060U666-18-06U668	1	H42506 HYDRAULIC HOSE
6	MB5315X6X4	2	.25 BSPP TO .375 JIC
7	MB5315X4X4	1	.25 BSPP TO .25 JIC
8	C5506X4	1	.25 M JIC TO .25 F JIC SWIVEL 90 DEG ELBOW
9	C5315X4	1	.25 M SAE O-RING TO M JIC
10	C5216X4X4	2	.25 M SAE O-RING TO .25 F JIC
11	C5706X6	2	TEE, 2 X .375 M JIC TO .375 F JIC
12	4G5HG5-S	1	.25 FSAE TO .25 FSAE
13	C5706X4	1	TEE, 2 X .25 M JIC TO .25 F JIC
14	MC5315X4X10	1	M10 DIN TO .25 JIC
15	04U664-131-04U604	1	H42504 HYDRAULIC HOSE
16	04U606-62-04U664	1	H42504 HYDRAULIC HOSE
17	C5315X4X6	2	.375 SAE O-RING TO .25 JIC
18	A-MTT5-0451	1	MICO BRAKE MODULATING VALVE
19	A-TU-00801	1	CHAR LYN PUMP
20	C5315X6X8	8	.5 SAE O-RING TO .375 JIC
21	06U668-34-06U666	1	H42506 HYDRAULIC HOSE
22	06U668-85-06U606	1	H42506 HYDRAULIC HOSE
23	06U668-86-06U606	1	H42506 HYDRAULIC HOSE
24	06U666-16-06U608	1	H42506 HYDRAULIC HOSE
25	06U666-23.5-06U608	1	H42506 HYDRAULIC HOSE
26	C5716X8	1	1/2 X .5 MJIC TO .5 MSAE
27	C5315X8X12	2	.75 SAE O-RING TO .5 JIC
28	A-MTT5-0452	1	ACCUMULATOR CHARGE VALVE
29	04U604-15-04U666	1	H42504 HYDRAULIC HOSE
30	A-MTT5-0453	1	30 CU IN ACCUMULATOR
31	A-MTT5-0454	1	ACCUMULATOR MOUNTING BRACKET
32	06U606-62-06U606	1	H42506 HYDRAULIC HOSE
33	06U606-56-06U606	1	H42506 HYDRAULIC HOSE
34	A-TT10-00803-1	1	STEERING CYLINDER
35	06U666-34-06U666	1	H42506 HYDRAULIC HOSE
36	C5315X6X8	1	ADAPTOR, .375 SAE O-RING TO .375 JIC
37	A-ES12-0486	1	HYDRAULIC FILTER ELEMENT
38	A-MTT5-0458	1	12 V BYPASS VALVE
39	A-MTT5-0468	1	BRAKE LIGHT SWITCH

HYDRAULIC SYSTEM

HYDRAULIC ASSIST WITH SINGLE BRAKE SYSTEM SCHEMATIC LEGEND

ID	DESCRIPTION	PART NO.	QTY
A1	.25 FSAE TO .25 FSAE	4G5HG5-S	1
A3	.5 MNPT TO .375 JIC	C5205X6X8	1
A4	.25 M SAE O-RING TO .25 F JIC	C5216X4X4	2
A5	.25 M SAE O-RING TO .25 M JIC	C5315X4	1
A6	.375 SAE O-RING TO .25 JIC	C5315X4X6	2
A7	.5 SAE O-RING TO .375 JIC	C5315X6X8	8
A8	.75 SAE O-RING TO .5 JIC	C5315X8X12	2
A9	.25 M JIC to .25 F JIC SWIVEL 90 DEG ELBOW	C5506X4	1
A11	TEE, 3X .50 M JIC	C5705X8	1
A12	TEE, 2X .25 M JIC TO .25 F JIC	C5706X4	1
A13	TEE, 2X .375 M JIC TO .375 F JIC	C5706X6	2
A14	TEE, 2X .5 M JIC TO .5 MSAE	C5716X8	1
A15	.25 BSPP TO .25 JIC	MB5315X4X4	1
A16	.25 BSPP TO .375 JIC	MB5315X6X4	2
A17	M10 DIN TO .25 JIC	MC5315X4X10	1
A18	ADAPTOR, .375 SAE O-RING TO .375 JIC	C5315X6	1
H1	HOSE FITTING, CRIMP, STRAIGHT	04U-604	2
H2	HOSE FITTING, CRIMP, STRAIGHT	04U-606	1
H3	HOSE FITTING, CRIMP, 90 DEG	04U-664	2
H4	HOSE FITTING, CRIMP, 90 DEG	04U-666	1
H6	HOSE FITTING, CRIMP, STRAIGHT	06U-606	6
H7	HOSE FITTING, CRIMP, STRAIGHT	06U-608	2
H9	HOSE FITTING, CRIMP, 90 DEG	06U-666	6
H10	HOSE FITTING, CRIMP, 90 DEG	06U-668	4
H11	HOSE FITTING, CRIMP, STRAIGHT	08U-608	1
H12	HOSE FITTING, CRIMP, STRAIGHT	08U-M08	1

HYDRAULIC SYSTEM

HYDRAULIC ASSIST WITH SINGLE BRAKE SYSTEM SCHEMATIC LEGEND

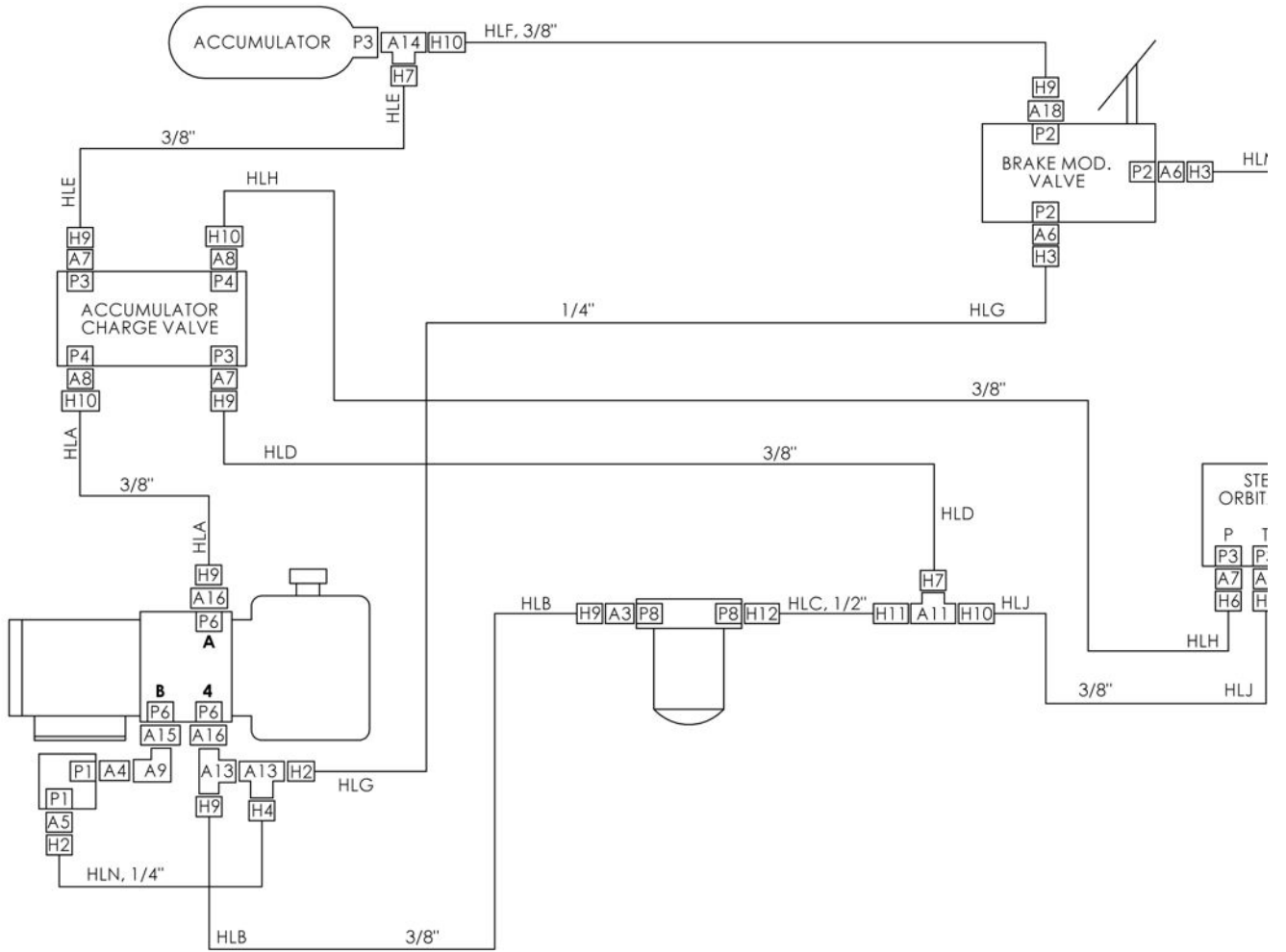
HOSE ID	SIZE	PART NO.	LENGTH (IN)	END 1	END 2
HLA	.375 HP	H42506	18	06U-666	06U-668
HLB	.375 HP	H42506	34	06U-666	06U-666
HLC	.50 HP	H42508	16.5	08U-608	08U-M08
HLD	.375 HP	H42506	16	06U-666	06U-608
HLE	.375 HP	H42506	23.5	06U-666	06U-608
HLF	.375 HP	H42506	34	06U-668	06U-666
HLG	.25 HP	H42504	62	04U-606	04U-664
HLH	.375 HP	H42506	86	06U-668	06U-606
HLJ	.375 HP	H42506	85	06U-668	06U-606
HLK	.375 HP	H42506	62	06U-606	06U-606
HLL	.375 HP	H42506	56	06U-606	06U-606
HLM	.25 HP	H42504	131	04U-664	04U-604
HLN	.25 HP	H42504	15	04U-604	04U-666

PORT SIZES	
P1	1/4 F SAE O-RING
P2	3/8 F SAE O-RING
P3	1/2 F SAE O-RING
P4	3/4 F SAE O-RING
P5	1/4 M SAE O-RING
P6	1/4 F BSPP O-RING
P8	1/2 F NPT
P9	M10 X1 F O-RING

SEE DIAGRAM ON NEXT PAGE

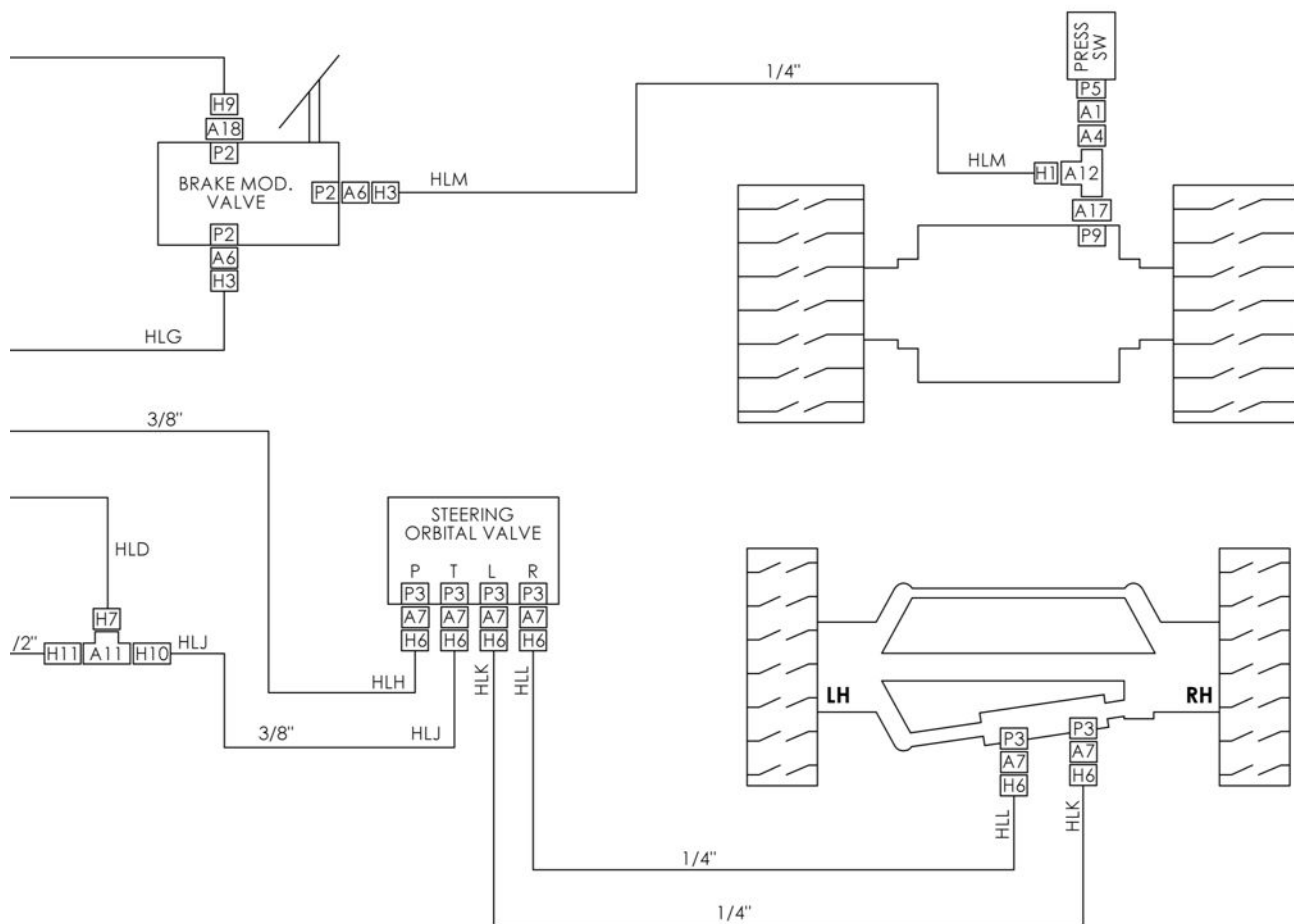
HYDRAULIC SYSTEM

HYDRAULIC ASSIST WITH SINGLE BRAKE SYSTEM SCHEMATIC



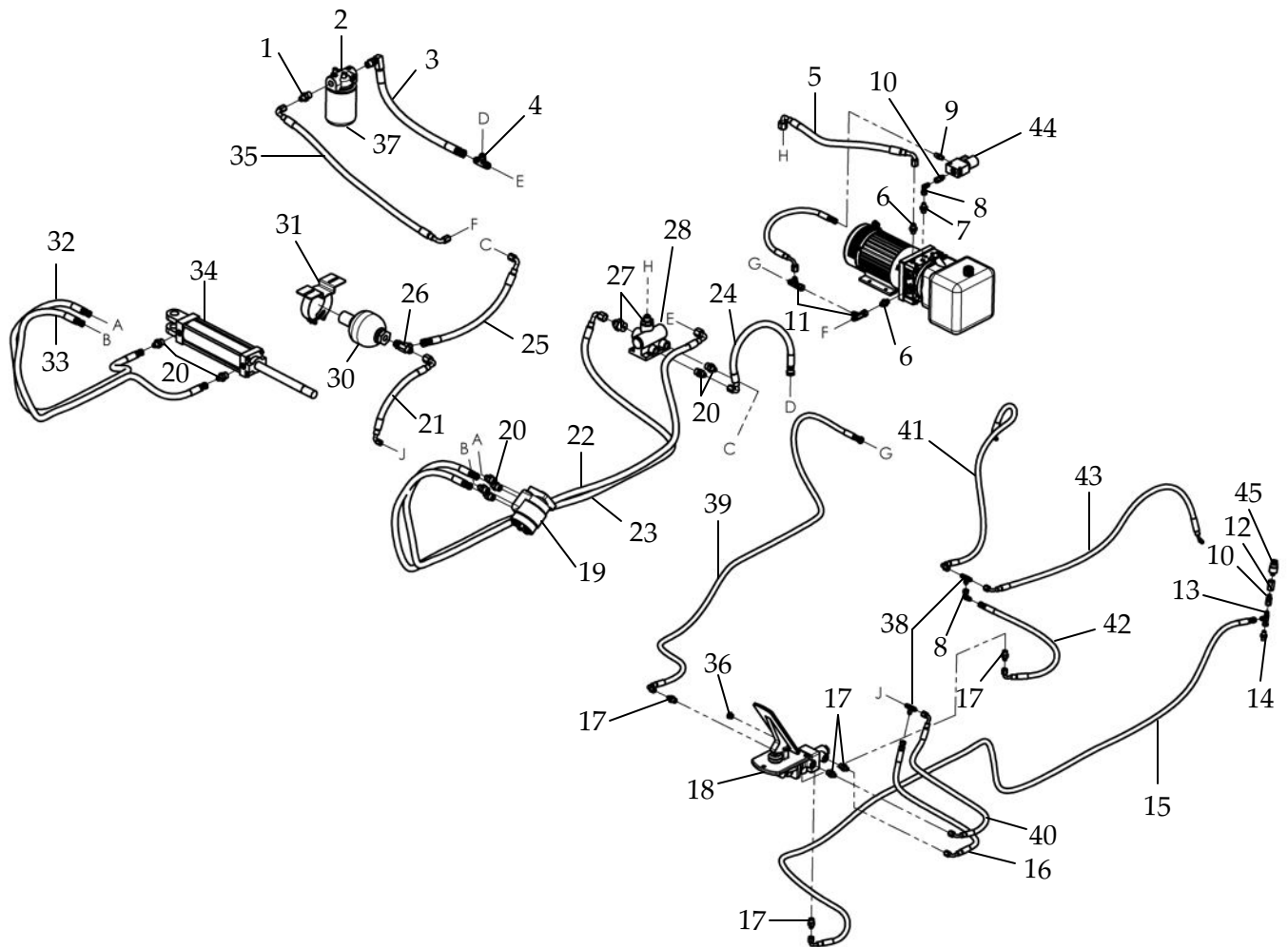
HYDRAULIC SYSTEM

HYDRAULIC ASSIST WITH SINGLE BRAKE SYSTEM SCHEMATIC



HYDRAULIC SYSTEM

HYDRAULIC SYSTEM WITH DUAL BRAKE



Item	Part Number	Qty.	Description
1	C5205X6X8	1	.5 MNPT TO .375 JIC
2	A-ES12-0485	1	FILTER HEAD
3	08U608-16.5-08UM08	1	H42508 HYDRAULIC HOSE
4	C5705X8	1	TEE, 3 X .50M JIC
5	060U666-18-06U668	1	H42506 HYDRAULIC HOSE

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM WITH DUAL BRAKE

Item	Part Number	Qty.	Description
6	MB5315X6X4	2	.25 BSPP TO .375 JIC
7	MB5315X4X4	1	.25 BSPP TO .25 JIC
8	C5506X4	1	.25 M JIC TO .25 F JIC SWIVEL 90 DEG ELBOW
9	C5315X4	1	.25 M SAE O-RING TO M JIC
10	C5216X4X4	2	.25 M SAE O-RING TO .25 F JIC
11	C5706X6	2	TEE, 2 X .375 M JIC TO .375 F JIC
12	4G5HG5-S	1	.25 FSAE TO .25 FSAE
13	C5706X4	1	TEE, 2 X .25 M JIC TO .25 F JIC
14	MC5315X4X10	1	M10 DIN TO .25 JIC
15	04U664-131-04U604	1	H42504 HYDRAULIC HOSE
16	04U664-26-04U604	1	H42504 HYDRAULIC HOSE
17	C5315X4X6	2	.375 SAE O-RING TO .25 JIC
18	A-MTT5-0455	1	MICO BRAKE MODULATING VALVE
19	A-TU-00801	1	CHAR LYN PUMP
20	C5315X6X8	8	.5 SAE O-RING TO .375 JIC
21	06U668-11-06U664	1	H42506 HYDRAULIC HOSE
22	06U668-85-06U606	1	H42506 HYDRAULIC HOSE
23	06U668-86-06U606	1	H42506 HYDRAULIC HOSE
24	06U666-16-06U608	1	H42506 HYDRAULIC HOSE
25	06U666-23.5-06U608	1	H42506 HYDRAULIC HOSE
26	C5716X8	1	.5 X .5 M JIC TO .5 MSAE
27	C5315X8X12	2	.75 SAE O-RING TO .5 JIC
28	A-MTT5-0452	1	ACCUMULATOR CHARGE VALVE
29	04U604-15-04U666	1	H42504 HYDRAULIC HOSE
30	A-MTT5-0453	1	30 CU IN ACCUMULATOR
31	A-MTT5-0454	1	ACCUMULATOR MOUNTING BRACKET
32	06U606-62-06U606	1	H42506 HYDRAULIC HOSE
33	06U606-56-06U606	1	H42506 HYDRAULIC HOSE
34	A-TT10-00803-1	1	STEERING CYLINDER
35	06U666-34-06U666	1	H42506 HYDRAULIC HOSE
36	7238X6	1	.375 M SAE O-RING PLUG
37	A-ES12-0486	1	HYDRAULIC FILTER ELEMENT
38	C5705X4	2	TEE, 3X .25 M JIC
39	04U664-70-04U606	1	H42504 HYDRAULIC HOSE
40	04U664-23.5-04U664	1	H42504 HYDRAULIC HOSE
41	04U664-41-04UB43	1	H42504 HYDRAULIC HOSE
42	04U604-18-04U664	1	H42504 HYDRAULIC HOSE
43	04U664-41-04UB43	1	H42504 HYDRAULIC HOSE
44	A-MTT5-0458	1	12 V BYPASS VALVE
45	A-MTT5-0468	1	BRAKE LIGHT SWITCH

HYDRAULIC SYSTEM

HYDRAULIC ASSIST WITH DUAL BRAKE SYSTEM SCHEMATIC LEGEND

ID	DESCRIPTION	PART NO.	QTY
A1	.25 FSAE TO .25 FSAE	4G5HG5-S	1
A2	.375 M SAE O-RING PLUG	7238X6	1
A3	.5 MNPT TO .375 JIC	C5205X6X8	1
A4	.25 M SAE O-RING TO .25 F JIC	C5216X4X4	2
A5	.25 M SAE O-RING TO .25 M JIC	C5315X4	1
A6	.375 SAE O-RING TO .25 JIC	C5315X4X6	5
A7	.5 SAE O-RING TO .375 JIC	C5315X6X8	8
A8	.75 SAE O-RING TO .5 JIC	C5315X8X12	2
A9	.25 M JIC to .25 F JIC SWIVEL 90 DEG ELBOW	C5506X4	2
A10	TEE, 3X .25 M JIC	C5705X4	2
A11	TEE, 3X .50 M JIC	C5705X8	1
A12	TEE, 2X .25 M JIC TO .25 F JIC	C5706X4	1
A13	TEE, 2X .375 M JIC TO .375 F JIC	C5706X6	2
A14	TEE, 2X .5 MJIC TO .5 MSAE	C5716X8	1
A15	.25 BSPP TO .25 JIC	MB5315X4X4	1
A16	.25 BSPP TO .375 JIC	MB5315X6X4	2
A17	M10 DIN TO .25 JIC	MC5315X4X10	1
H1	HOSE FITTING, CRIMP, STRAIGHT	04U-604	4
H2	HOSE FITTING, CRIMP, STRAIGHT	04U-606	1
H3	HOSE FITTING, CRIMP, 90 DEG	04U-664	8
H4	HOSE FITTING, CRIMP, 90 DEG	04U-666	1
H5	HOSE FITTING, CRIMP, 45 DEG	04U-B43	2
H6	HOSE FITTING, CRIMP, STRAIGHT	06U-606	6
H7	HOSE FITTING, CRIMP, STRAIGHT	06U-608	2
H8	HOSE FITTING, CRIMP, 90 DEG	06U-664	1
H9	HOSE FITTING, CRIMP, 90 DEG	06U-666	5
H10	HOSE FITTING, CRIMP, 90 DEG	06U-668	4
H11	HOSE FITTING, CRIMP, STRAIGHT	08U-608	1
H12	HOSE FITTING, CRIMP, STRAIGHT	08U-M08	1

HYDRAULIC SYSTEM

HYDRAULIC ASSIST WITH DUAL BRAKE SYSTEM SCHEMATIC LEGEND

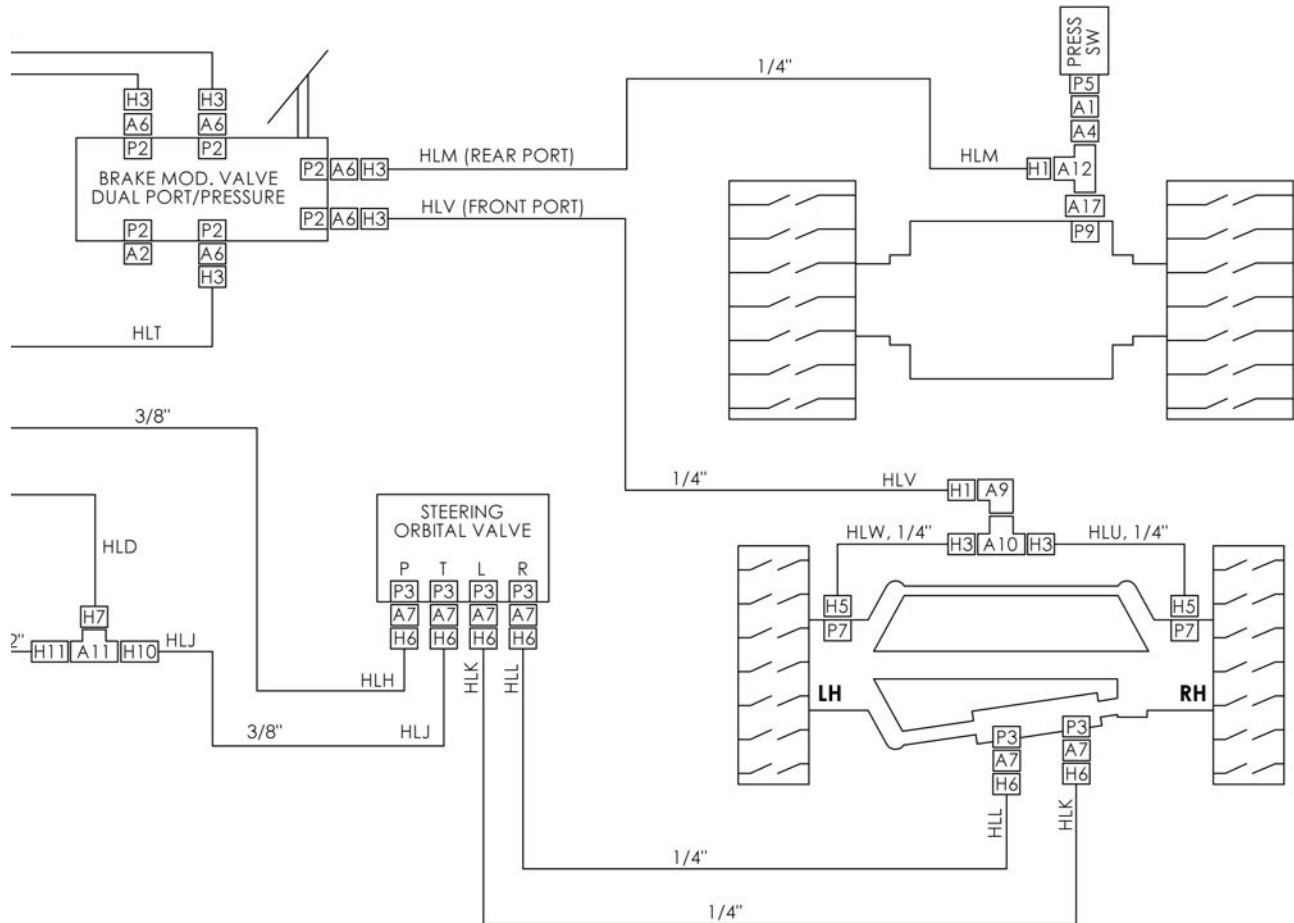
HOSE ID	SIZE	PART NO.	LENGTH (IN)	END 1	END 2
HLA	.375 HP	H42506	18	06U-666	06U-668
HLB	.375 HP	H42506	34	06U-666	06U-666
HLC	.50 HP	H42508	16.5	08U-608	08U-M08
HLD	.375 HP	H42506	16	06U-666	06U-608
HLE	.375 HP	H42506	23.5	06U-666	06U-608
HLH	.375 HP	H42506	86	06U-668	06U-606
HLJ	.375 HP	H42506	85	06U-668	06U-606
HLK	.375 HP	H42506	62	06U-606	06U-606
HLL	.375 HP	H42506	56	06U-606	06U-606
HLM	.25 HP	H42504	131	04U-664	04U-604
HLN	.25 HP	H42504	15	04U-604	04U-666
HLP	.25 HP	H42504	26	04U-664	04U-604
HLR	.25 HP	H42504	23.5	04U-664	04U-664
HLS	.375 HP	H42506	11	06U-668	06U-664
HLT	.25 HP	H42504	70	04U-664	04U-606
HLU	.25 HP	H42504	41	04U-664	04U-B43
HLV	.25 HP	H42504	18	04U-604	04U-664
HLW	.25 HP	H42504	41	04U-664	04U-B43

PORT SIZES	
P1	1/4 F SAE O-RING
P2	3/8 F SAE O-RING
P3	1/2 F SAE O-RING
P4	3/4 F SAE O-RING
P5	1/4 M SAE O-RING
P6	1/4 F BSPP O-RING
P7	3/8 INV FLARE
P8	1/2 F NPT
P9	M10 X1 F O-RING

SEE DIAGRAM ON NEXT PAGE

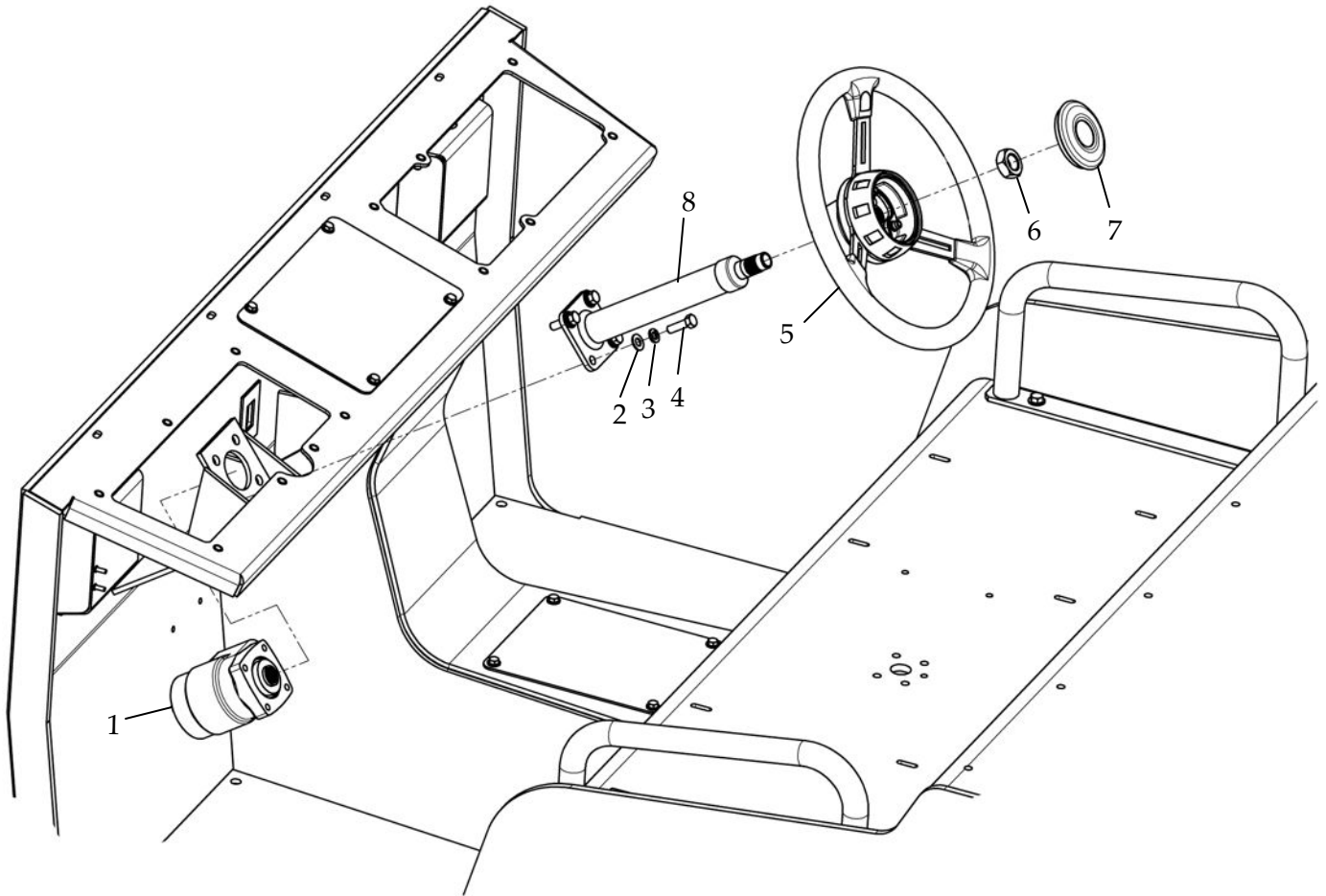
HYDRAULIC SYSTEM

HYDRAULIC ASSIST WITH DUAL BRAKE SYSTEM SCHEMATIC



OPERATOR COMPARTMENT

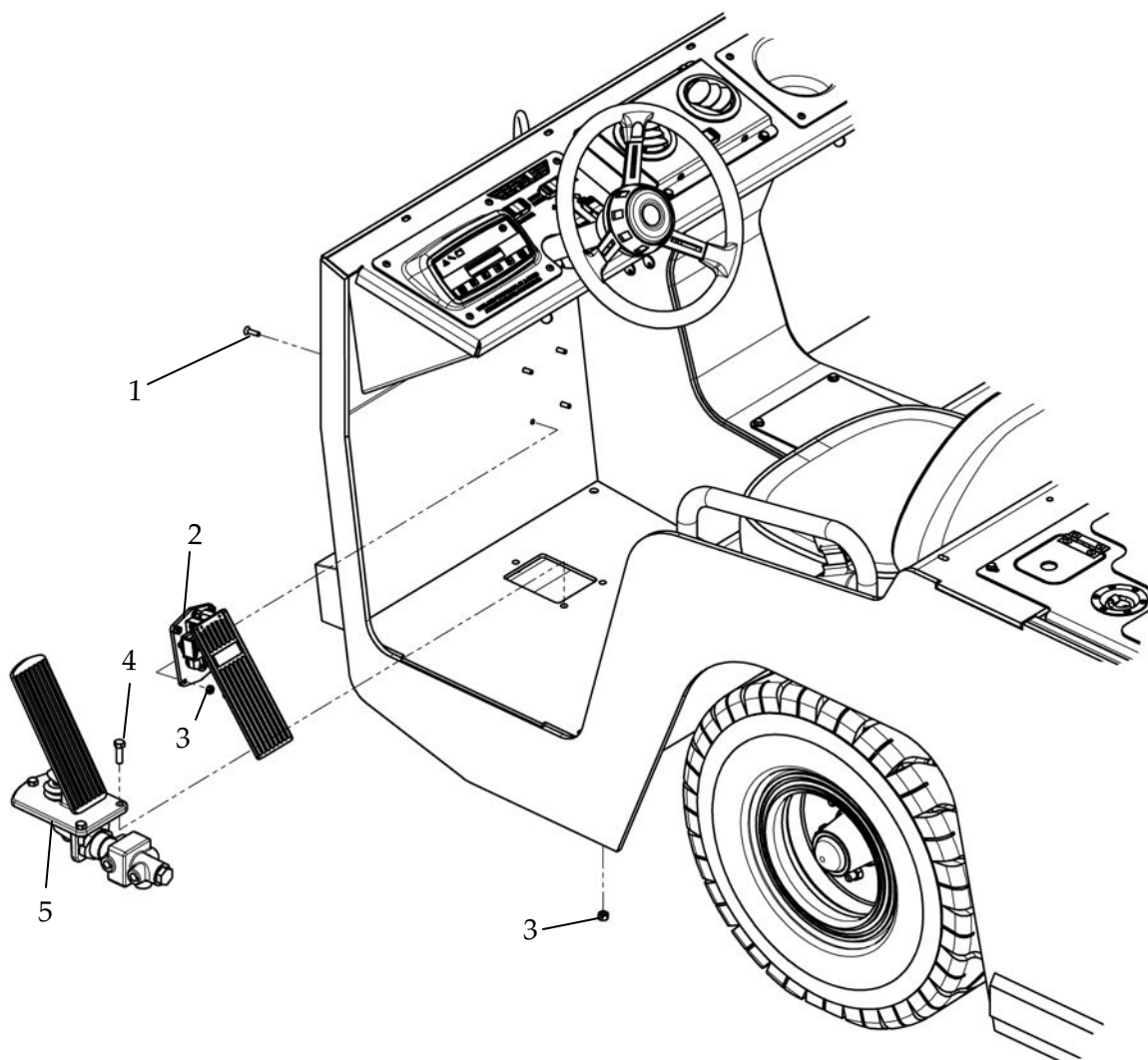
STEERING COLUMN



Item	Part Number	Qty.	Description
1	A-TU-00801	1	CHAR LYNN PUMP
2	NPN	4	3/8 FLAT WASHER
3	NPN	4	3/8 LOCK WASHER
4	NPN	4	3/8-16 X 1 BOLT
5	A-TN4-00809E	1	STEERING WHEEL
6	A-TT10-00813	1	WHEEL NUT
7	A-TT4-00811	1	HORN BUTTON
8	A-MTT5-0807	1	STEERING COLUMN

OPERATOR COMPARTMENT

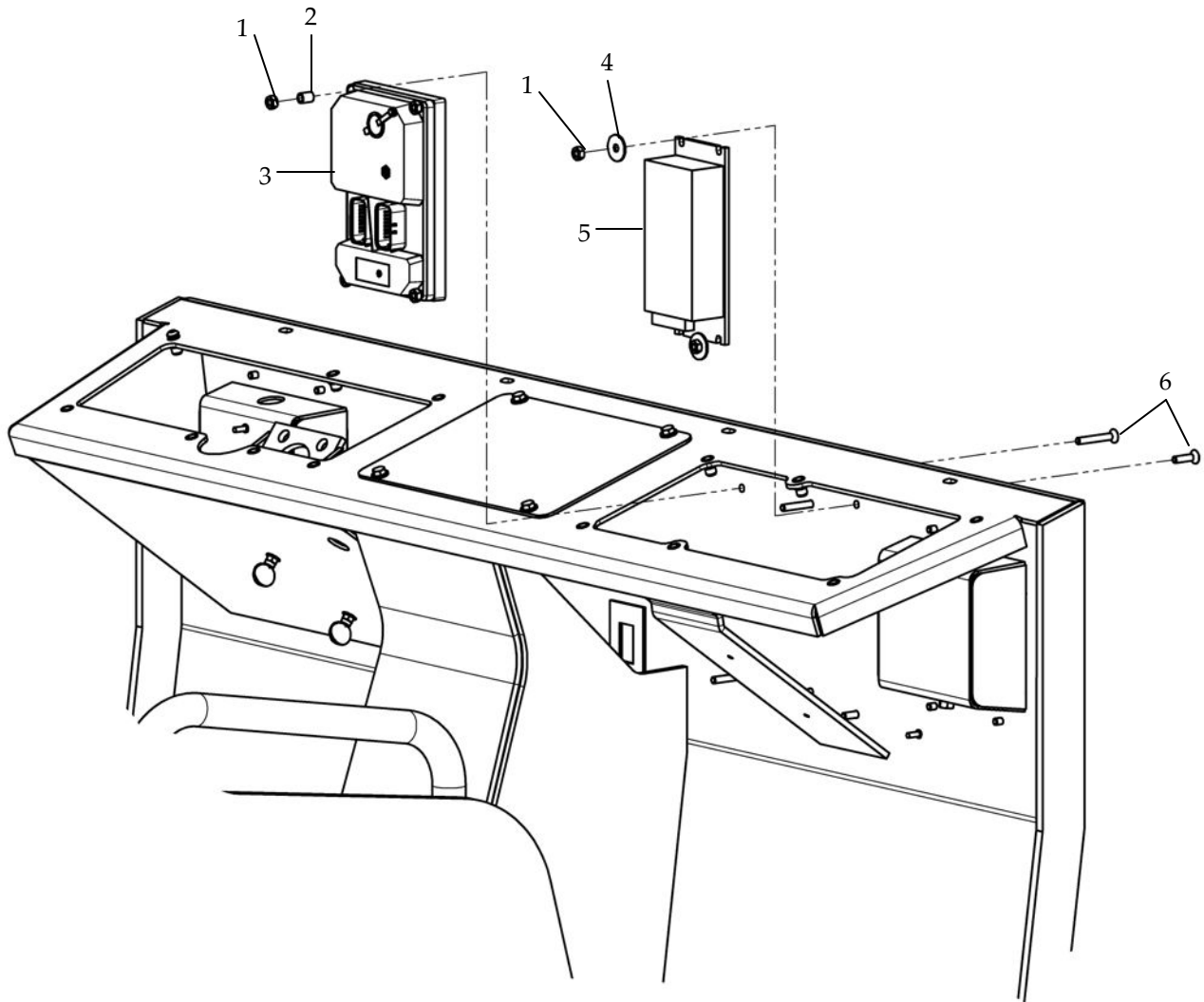
BRAKE AND ACCELERATOR PEDAL INSTALL



Item	Part Number	Qty.	Description
1	NPN	4	1/4-20 X 1.25 FHSCS STAINLESS STEEL
2	A-TT4-00289	1	ACCELERATOR PEDAL
3	NPN	7	1/4-20 LOCK NUT
4	NPN	3	1/4-20 X 1 HCS
5	A-MTT5-0455	1	DUAL BRAKE VALVE PEDAL
5	A-MTT5-0451	1	SINGLE BRAKE VALVE PEDAL(NOT SHOWN)

OPERATOR COMPARTMENT

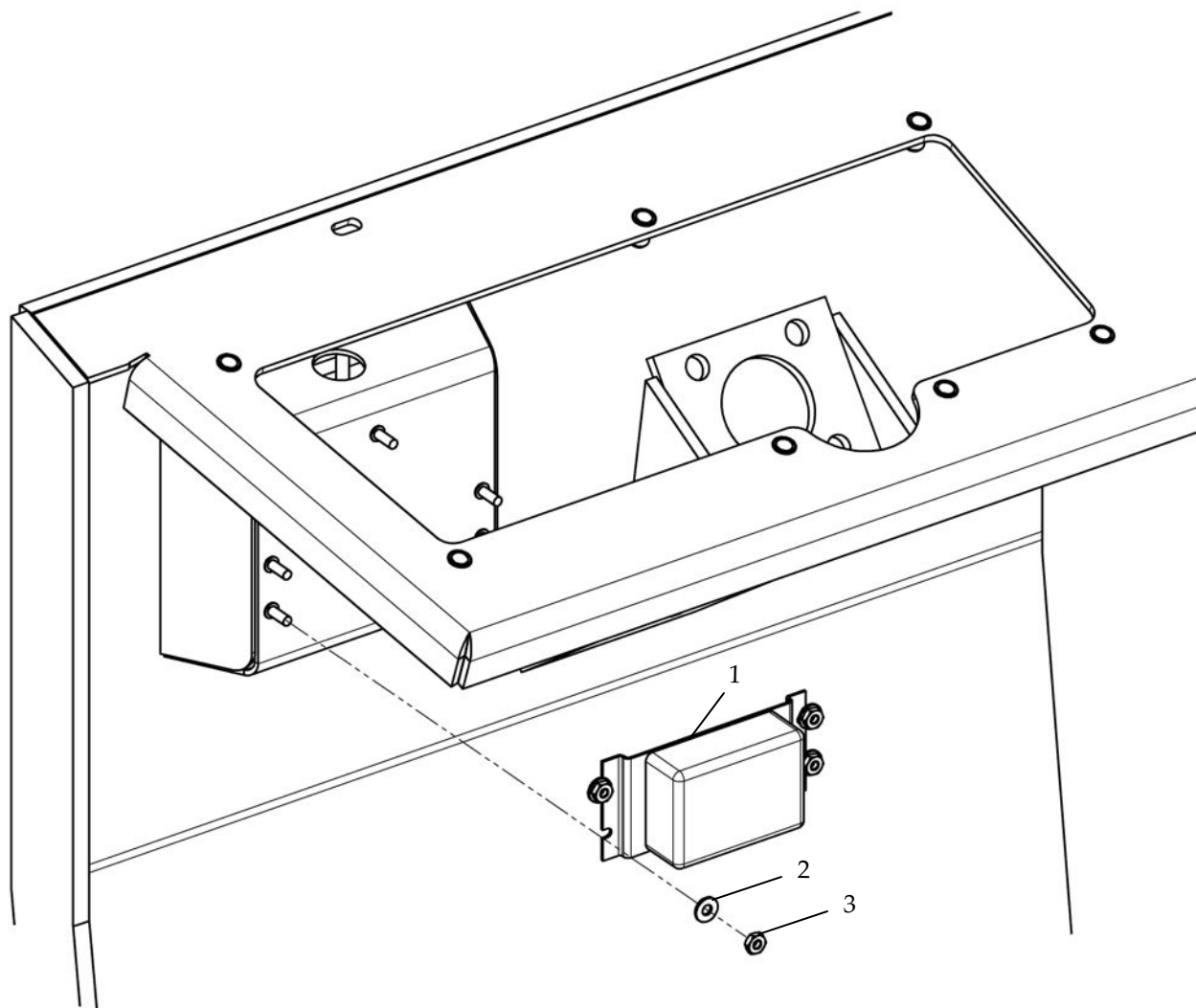
UNDER DASH COMPONENTS



Item	Part Number	Qty	Description
1	NPN	7	1/4-20 LOCK NUT
2	NPN	1	SPACER 1/4 OD X 1/2" LONG
3	A-ES12-0424	1	VMC 30 VEHICLE CONTROLLER
4	NPN	3	1/4 FLAT WASHER
5	A-MTT5-0414	1	DC-DC CONVERTER(WITH CAB OPTION ONLY)
6	NPN	7	1/4-20 X 1.25 FHSCS

OPERATOR COMPARTMENT

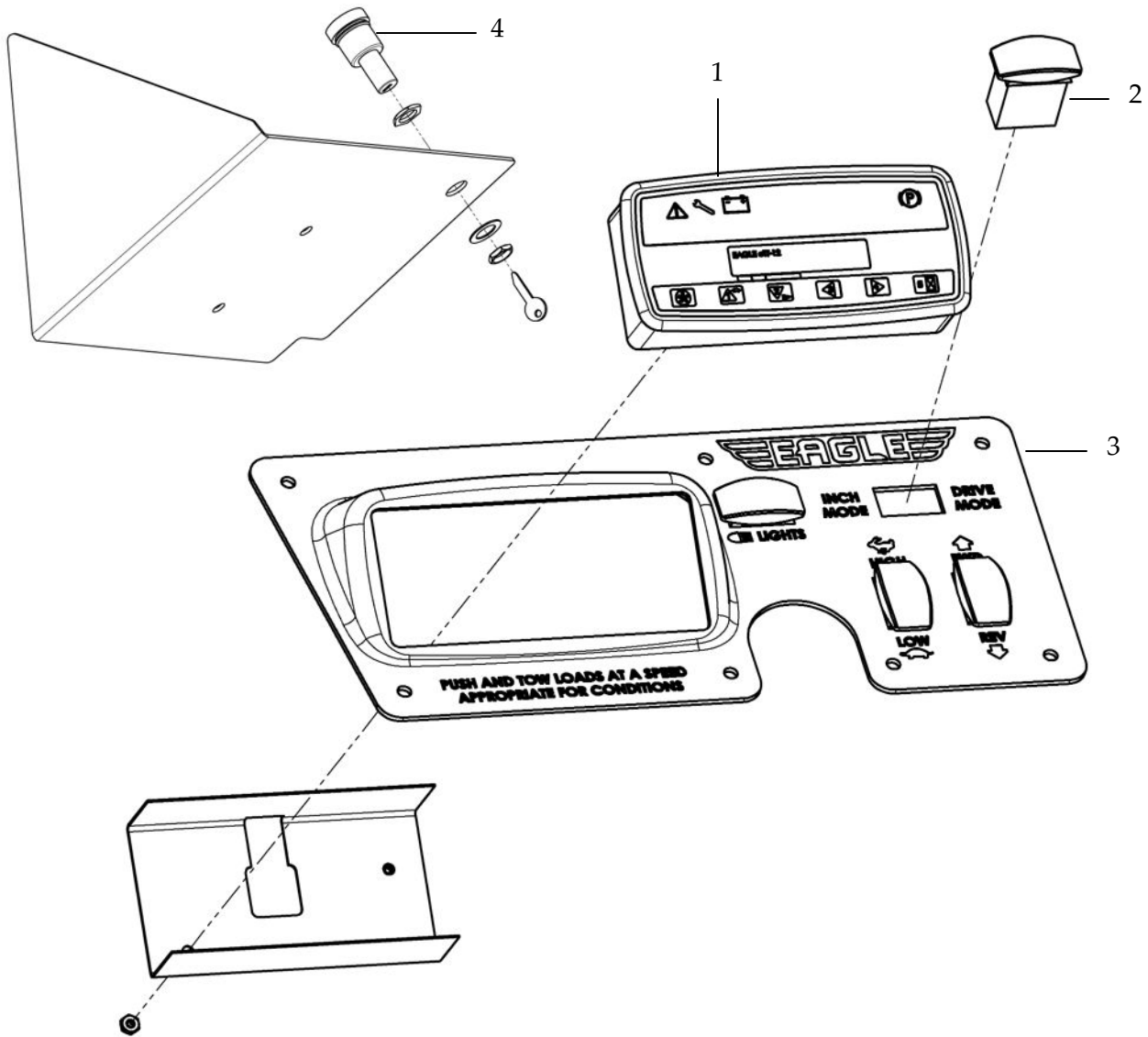
UNDER DASH COMPONENTS



Item	Part Number	Qty	Description
1	A-ES12-0413	1	DC-DC CONVERTER
2	NPN	4	#10 FLAT WASHER
3	NPN	4	10-32 LOCK WASHER

OPERATOR COMPARTMENT

DASH PANEL & IGNITION SWITCH

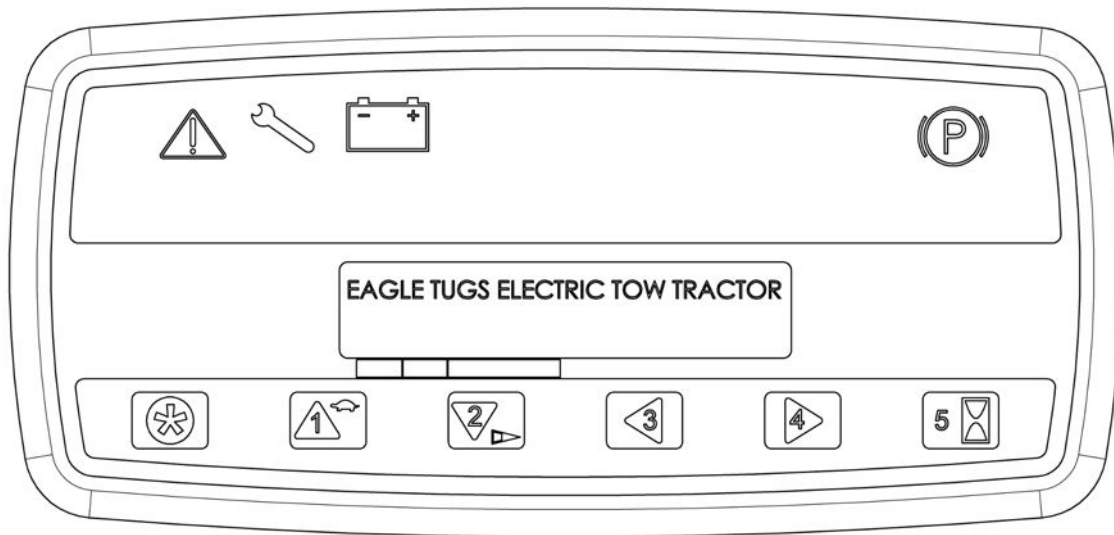


Item	Part Number	Qty	Description
1	A-RTT-00415	1	OPT 10 VEHICLE DISPLAY
2	A-ES12-0801	4	ROCKER SWITCH
3	A-ES12-0800	1	DASH PANEL
4	A-TT4-00422-4	1	KEYED IGNITION SWITCH ASSY
5	AE-OPT-0433-ETT	1	KEYLESS IGNITION SWITCH(OPTIONAL)

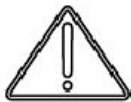
OPERATOR COMPARTMENT

MTT Digital Display:

The MTT line of tow tractors features an OPT10 digital display. The OPT10 panel provides many useful features and benefits to the operator. Below, you will find standard operating instructions for the OPT10.

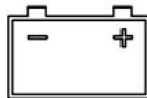


Error Indicator:



Light on display which illuminates indicating an error with tractor operation. The type of error will also display on the menu screen.

Battery Indicator:



Battery indicator light will illuminate when battery capacity falls below 20% and tractor will be forced into limp mode (speed limit 1 mph).

OPERATOR COMPARTMENT

Parking Brake Indicator:



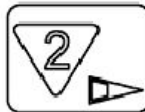
When the parking brake indicator is illuminated the parking brake is activated. Note that the accelerator pedal will not function with the parking brake engaged.

Up Button:



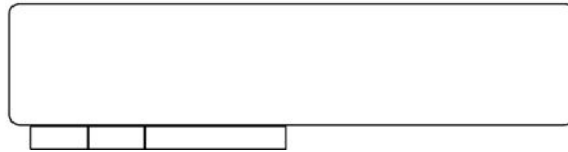
By depressing 1 you will be able to scroll Up through the display menu

Down Button:



By depressing 2 you will be able to scroll Down through the display menu

Display Menu:



The display screen will automatically come on when the key is in the ON position. Using the button labeled 1 to scroll UP through the menu and the button labeled 2 to scroll DOWN through the menu. The menu will display the following:

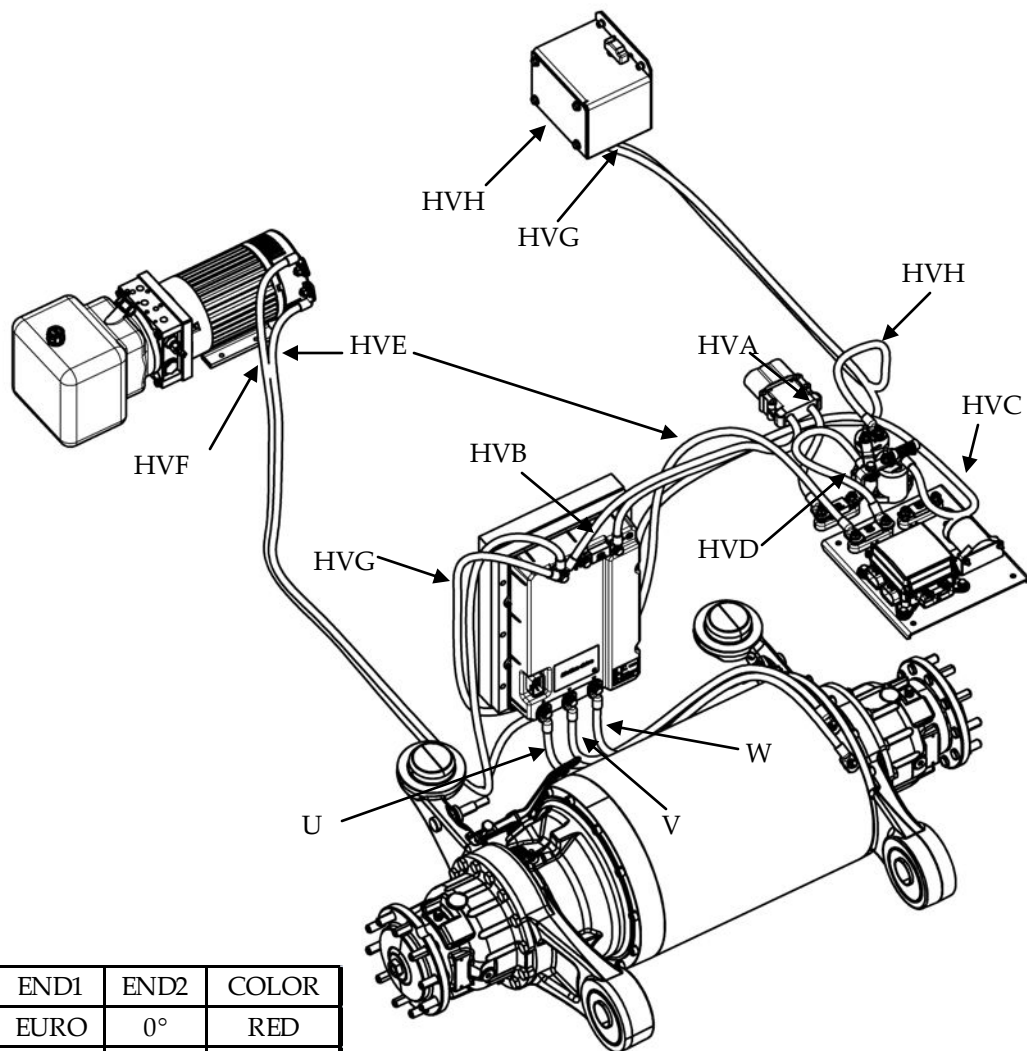
- Battery charge status
- Miles per hour (mph)
- Traction hours and key-on hours
- Diagnostic codes

Display Maintenance:

- Clean with soap and water
- Do Not pressure wash
- Do Not clean with solvent

ELECTRICAL

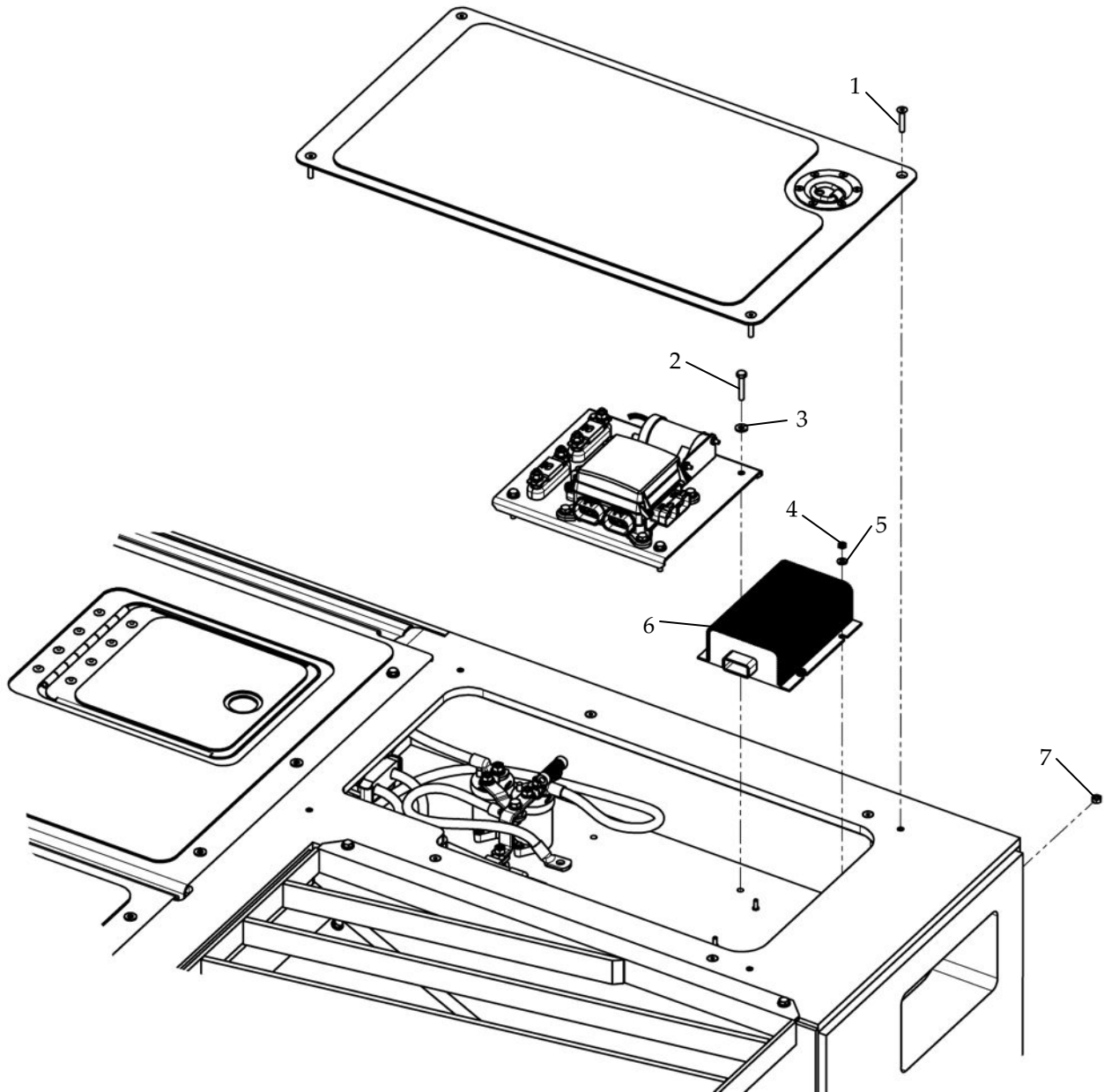
HIGH VOLTAGE WIRES



ID	LENGTH	END1	END2	COLOR
HVA		EURO	0°	RED
HVB		EURO	45°	BLACK
HVC	41	0°	45°	RED
HVD	15	0°	45°	RED
HVE	116	90°	0°	RED
HVF	86	90°	45°	BLACK
HVG	111	0°	45°	BLACK
HVH	57	0°	0°	RED
U	23	0°	0°	BLACK
V	28	0°	0°	BLACK
W	29	0°	0°	BLACK
625 AH OPTION ONLY				
ID	LENGTH	END1	END2	COLOR
HVA	39	EURO	0°	RED
HVB	47	EURO	45°	BLACK

ELECTRICAL

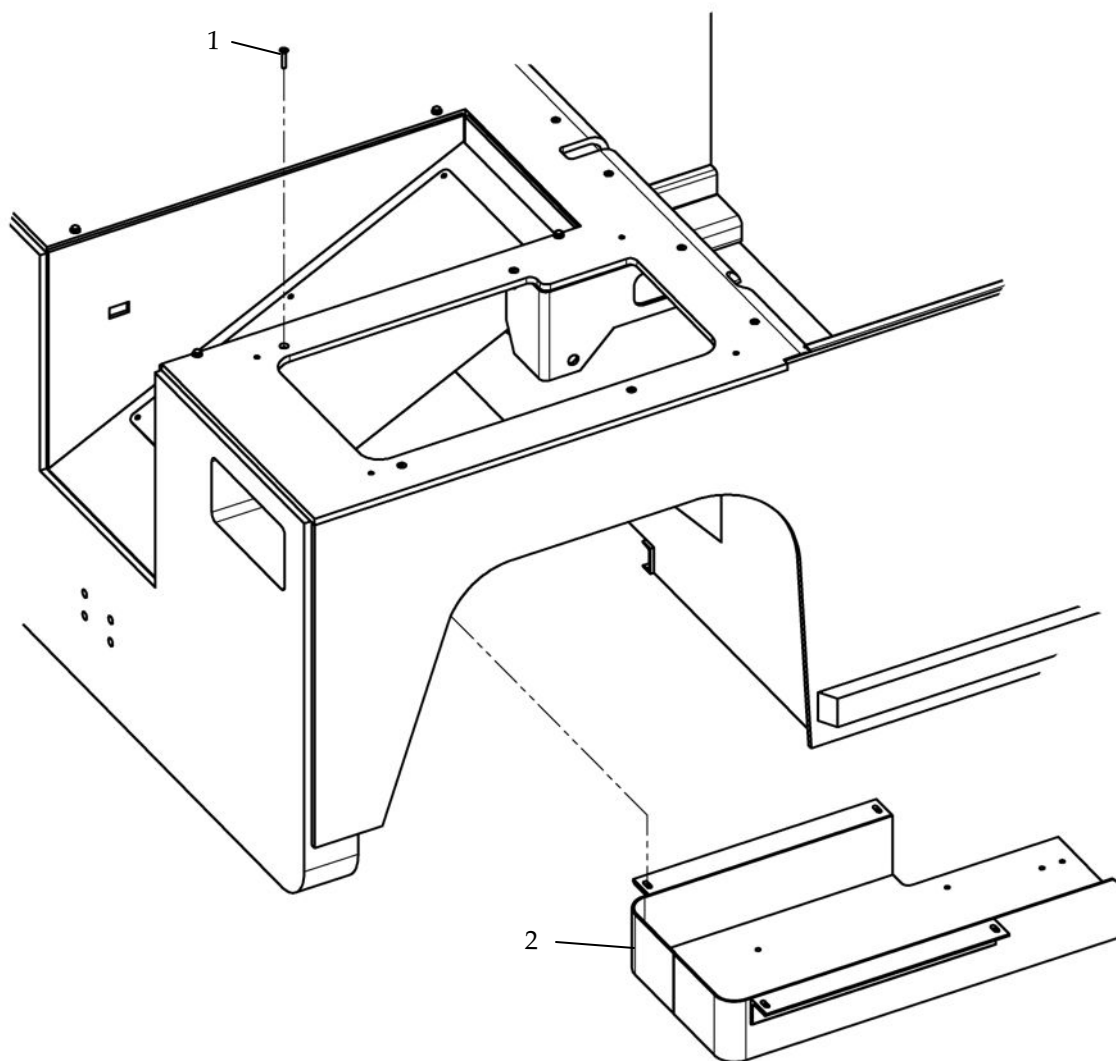
ELECTRICAL SUB PANEL INSTALL



Item	Part Number	Qty	Description
1	NPN	4	1/4-20 X 3/4 FHSCS
2	NPN	4	1/4-20 X 1.5 GR 5 HCS
3	NPN	4	1/4 FLAT WASHER
4	NPN	4	10-32 LOCK NUT
5	NPN	4	#10 FLAT WASHER
6	A-ES12-0414	1	DC DC CONVERTOR 80-12V
7	NPN	4	1/4-20 LOCK NUT

ELECTRICAL

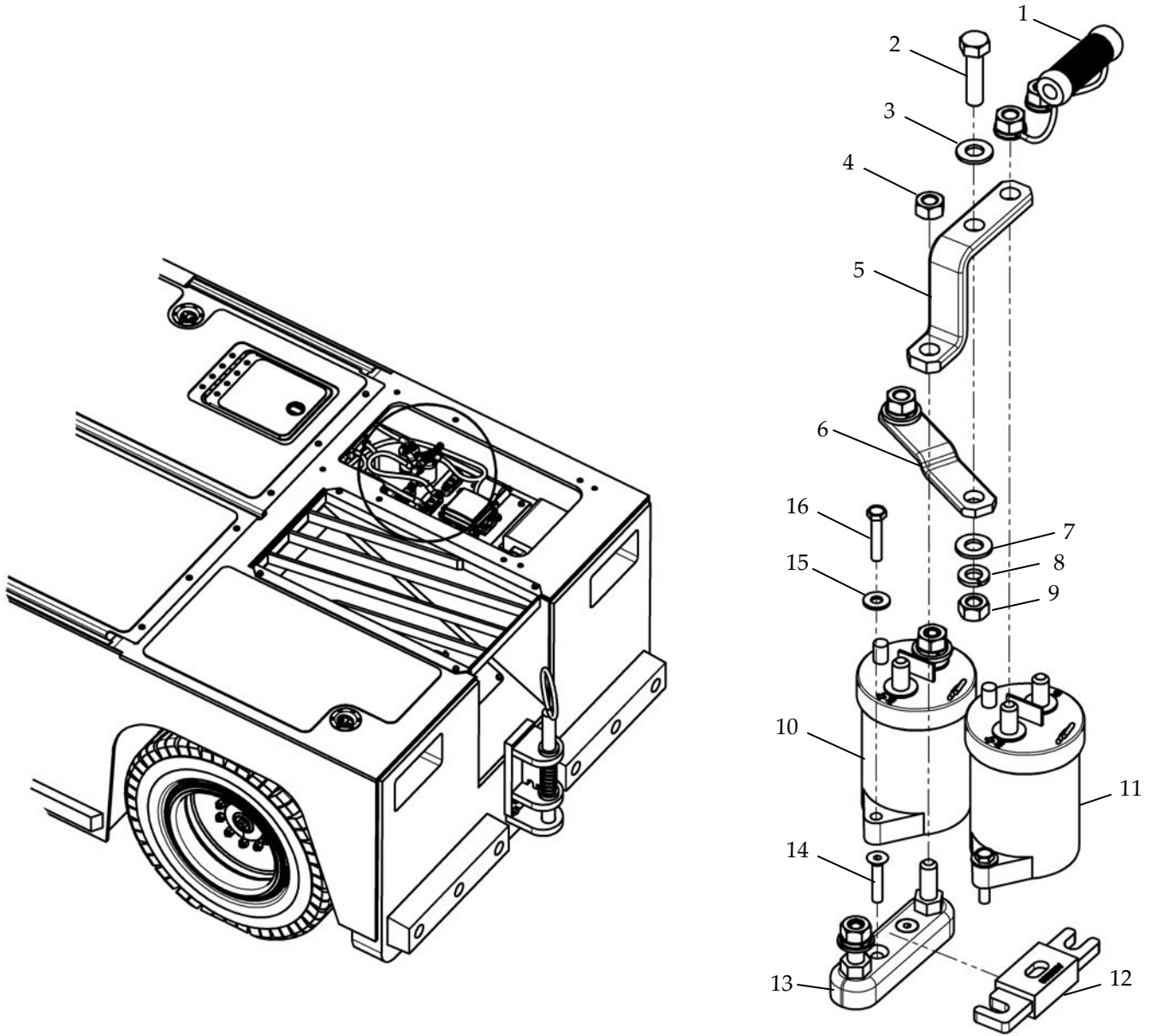
ELECTRICAL BOX INSTALL



Item	Part Number	Qty	Description
1	NPN	4	1/4-20 X 1 FHSCS STAINLESS STEEL
2	A-MTT5-0150	1	ELECTRICAL BOX TRAY

ELECTRICAL

BUSS BARS



ELECTRICAL

BUSS BARS

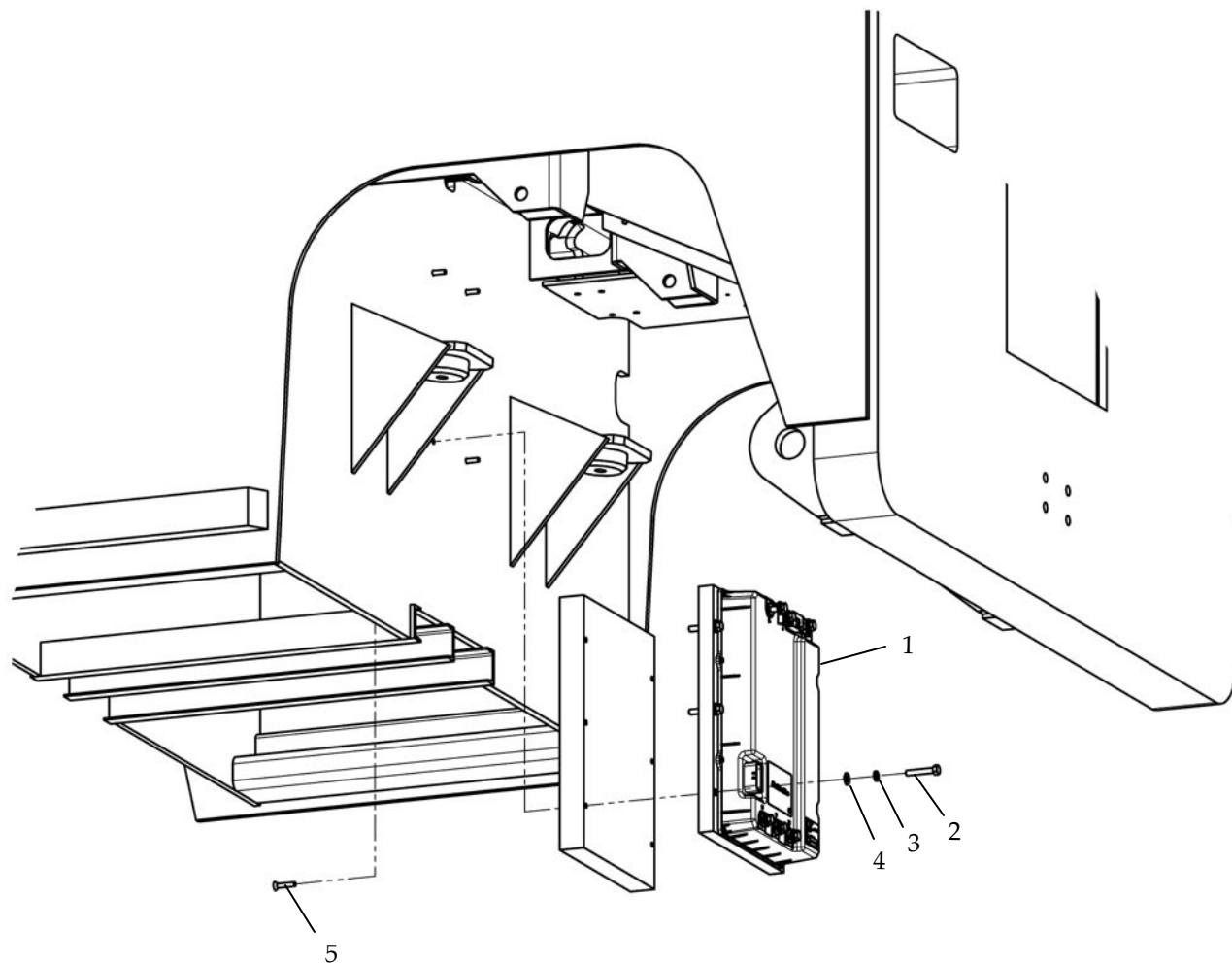
Item	Part Number	Qty.	Description
1	A-RTT12-00429	1	PRE-CHARGE RESISTOR
2	NPN	1	8MM-1.5 X 30 10.9 HCS
3	NPN	1	5/16 FLAT WASHER
4	NPN	1	8MM X 1.25 LOCK NUT
5	A-ES12-0571	1	BUSSBAR DET B
6	A-ES12-0571	1	BUSSBAR DET D
7	NPN	1	5/16 FLAT WASHER
8	NPN	1	8MM LOCK WASHER
9	NPN	1	8MM-1.5 NUT
10	A-ES12-0415-1	1	12V CONTACTOR
11	A-ES12-0416-1	1	24V CONTACTOR
12	A-ES12-0423	1	FUSE, ANN-800
13	A-MTT5-0225	1	FUSE HOLDER
14	NPN	1	10-32 X 1 FHSCS
15	NPN	1	#10 FLAT WASHER
16	NPN	1	10-32 X1 SWIF HEX

ELECTRICAL

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ELECTRICAL

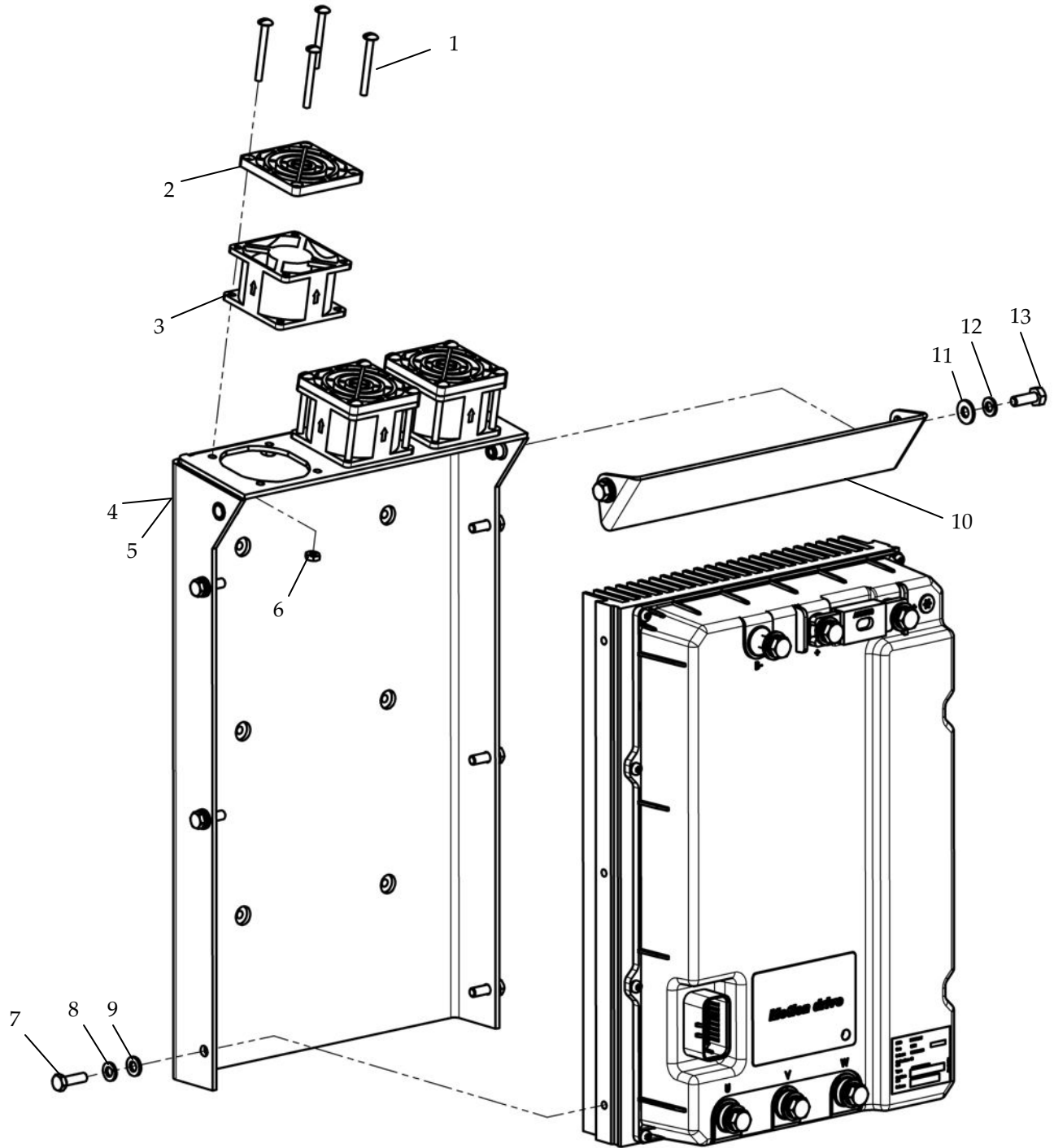
AC DRIVE INSTALL FOR S/N 5M106 AND BEFORE



Item	Part Number	Qty.	Description
1	A-ES12-0422	1	AC DRIVE CONTROLLER
2	NPN	6	3/8-16 X 1.5 HCS
3	NPN	6	3/8 FLAT WASHER
4	NPN	6	3/8 LOCK WASHER
5	NPN	4	5/16-18 x 1 FHSCS STAINLESS STEEL

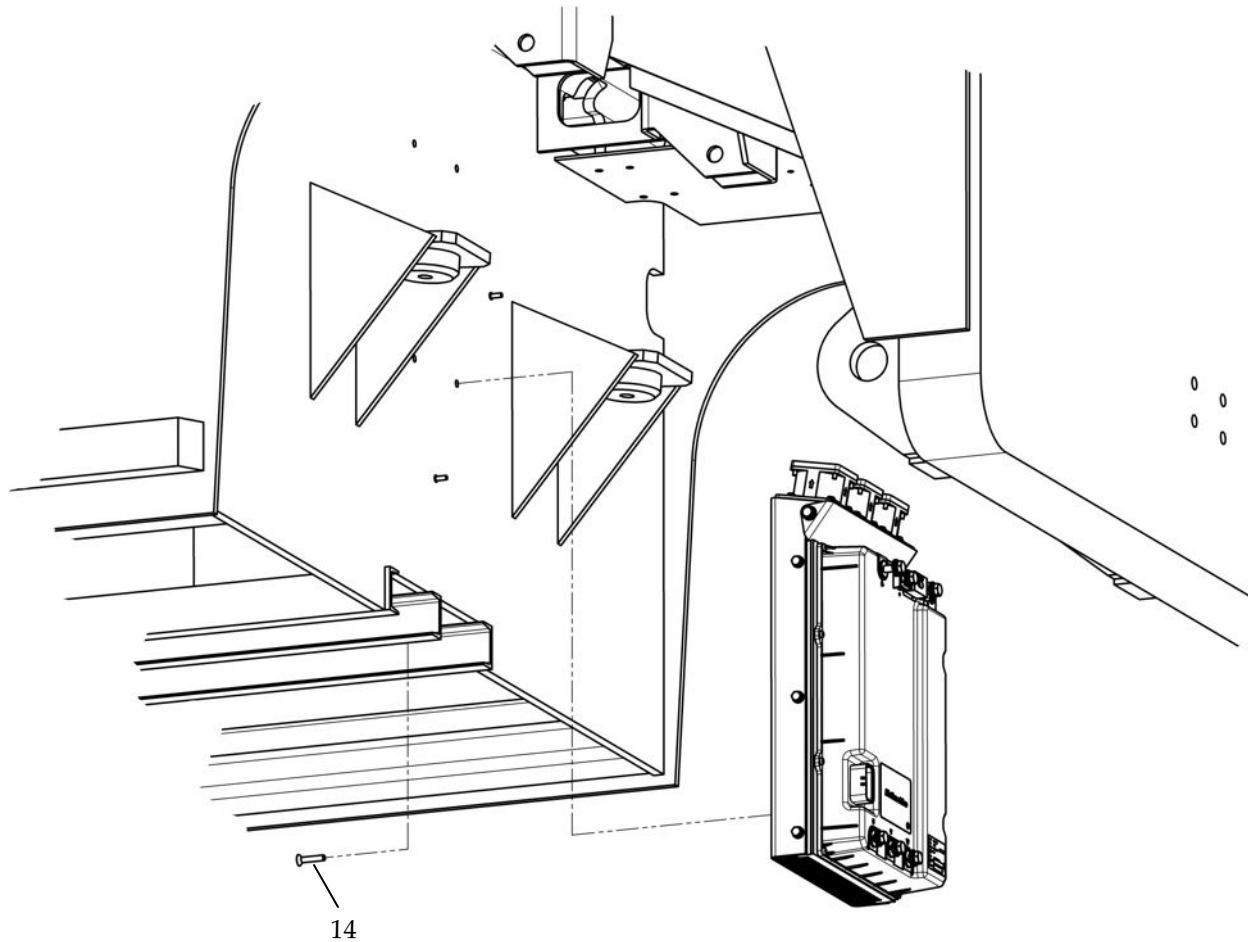
ELECTRICAL

AC DRIVE INSTALL FOR S/N 5M107 AND LATER



ELECTRICAL

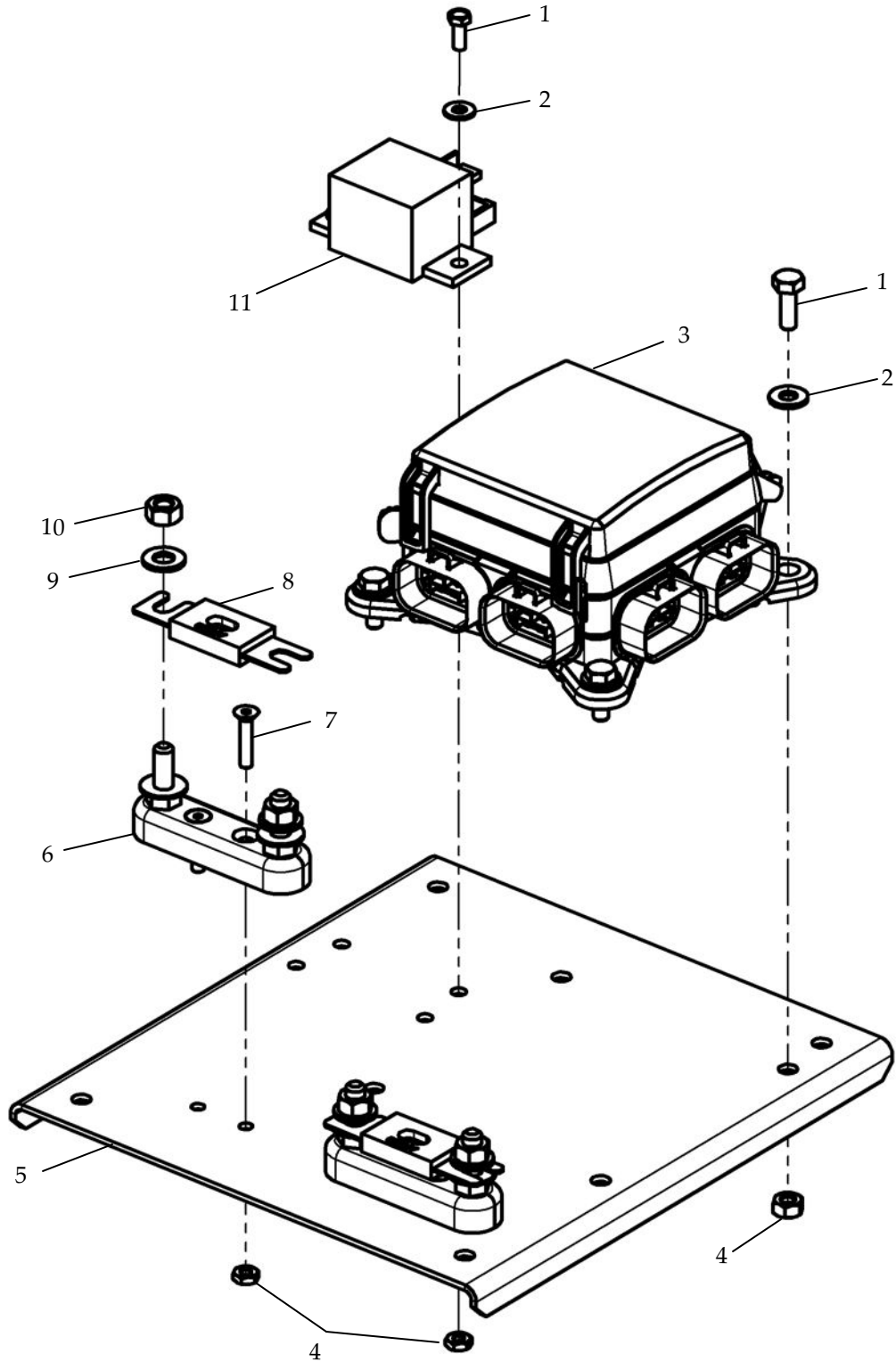
AC DRIVE INSTALL FOR S/N 5M107 AND LATER



Item	Part Number	Qty.	Description
1	NPN	12	#8-32 X 2.25 MACHINE SCREW
2	NVSP-08-001-CA	3	FAN FINGER GUARD
3	A-ES12-0806	3	60MM COOLING FAN
4	MTT5-10-001-SA	1	FINNED HEATSINK FAN PLENUM
5	ET00-10-002-SA	1	FINNED HEATSINK MOUNT PLATE
6	NPN	12	#8-32 NYLOCK NUT
7	NPN	6	M6-1.0 X 20 HHCS
8	NPN	6	M6 SPLIT LOCK WASHER
9	NPN	6	M6 FLAT WASHER
10	ET00-10-003-SA	1	FINNED HEATSINK PLENUM COVER
11	NPN	2	1/4 FLAT WASHER
12	NPN	2	1/4 SPLIT LOCK WASHER
13	NPN	2	1/4-20 X .75 HHCS
14	NPN	1	1/4-20 X 1.0 FHS

ELECTRICAL

ELECTRICAL PANEL A-WITHOUT CAB OPTION



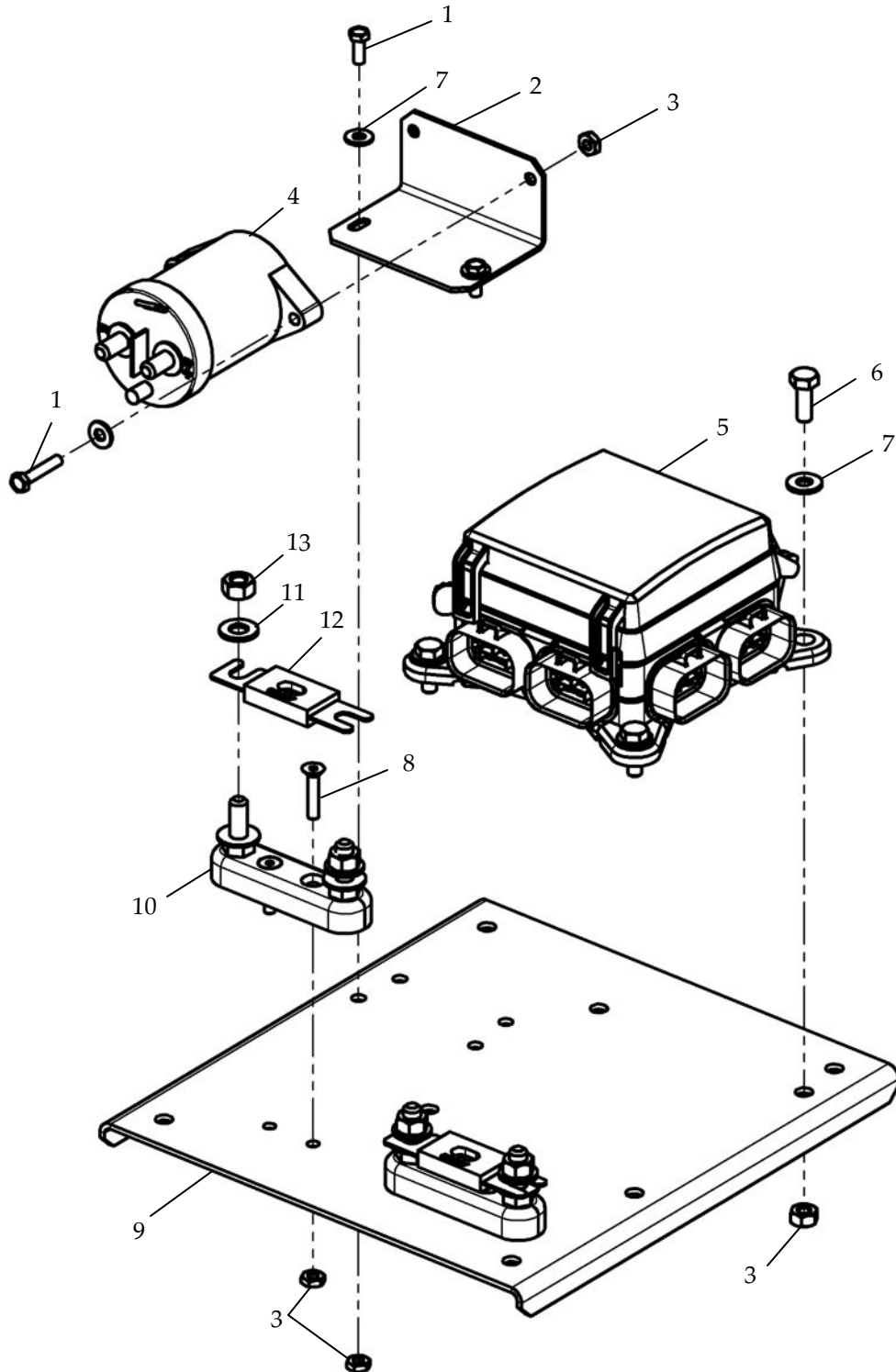
ELECTRICAL

ELECTRICAL PANEL A-WITHOUT CAB OPTION

Item	Part Number	Qty.	Description
1	NPN	5	10-32 X .75 SLOT WITH HEX
2	NPN	5	#10 FLAT WASHER
3	A-MTT5-0412-1	1	BUSSMAN BOX
4	NPN	4	10-32 LOCK NUT
5	A-MTT5-0220	1	ELECTRICAL SUB PANEL A
6	A-MTT5-0225	2	FUSE HOLDER
7	NPN	2	10-32 X 1 FHSCS
8	A-MTT5-0228	2	FUSE ANN-60
9	NPN	4	1/4 FLAT WASHER
10	NPN	4	5/16-24 NUT
11	7A5012	1	ACS RELAY

ELECTRICAL

ELECTRICAL PANEL A-WITH CAB OPTION



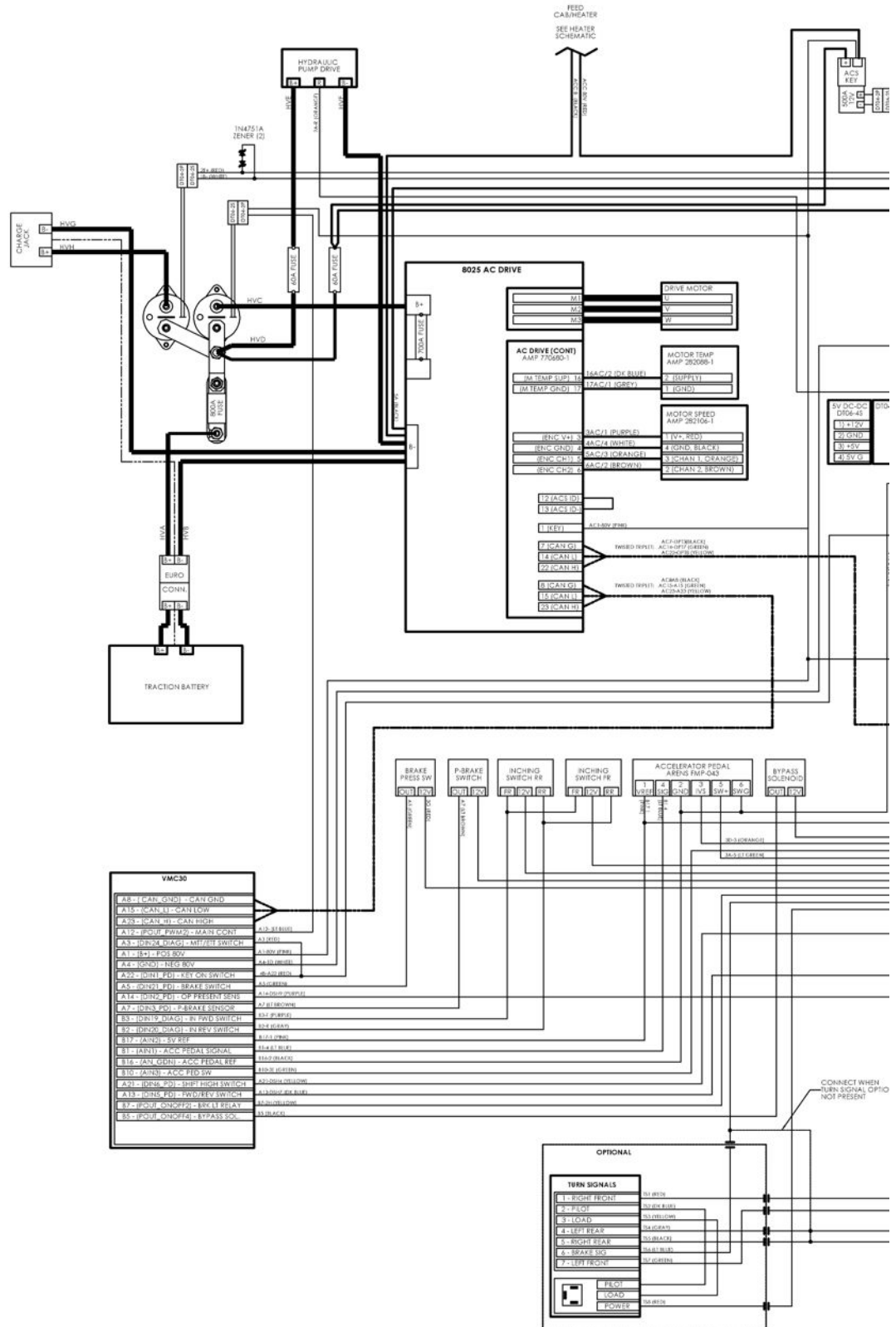
ELECTRICAL

ELECTRICAL PANEL A-WITH CAB OPTION

Item	Part Number	Qty.	Description
1	NPN	2	10-32 X .75 SLOT WITH HEX
2	A-ES12-0572	1	CONTACTOR FLOOR MTG BRACKET
3	NPN	4	10-32 LOCK NUT
4	A-ES12-0415-1	1	12V CONTACTOR
5	A-MTT5-0412-1	1	BUSSMAN BOX
6	NPN	4	10-32 X .75 SLOT WITH HEX
7	NPN	5	#10 FLAT WASHER
8	NPN	2	10-32 X 1 FHSCS
9	A-MTT5-0220	1	ELECTRICAL SUB PANEL A
10	A-MTT5-0225	2	FUSE HOLDER
11	NPN	4	1/4 FLAT WASHER
12	A-MTT5-0228	2	FUSE ANN-60
13	NPN	4	5/16-24 NUT

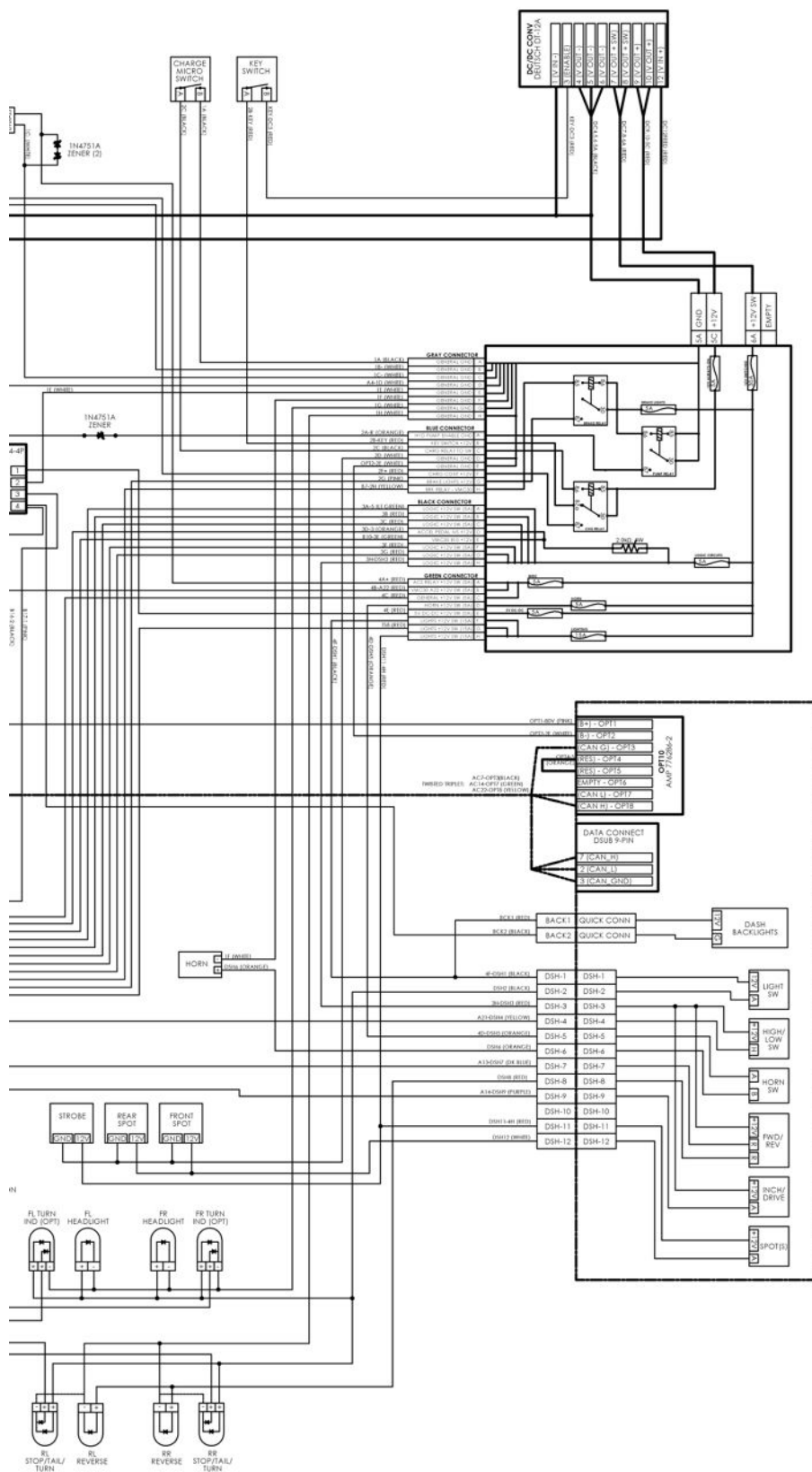
ELECTRICAL SCHEMATICS

ELECTRICAL SCHEMATIC DRIVE LH FOR S/N 5M106 AND BEFORE



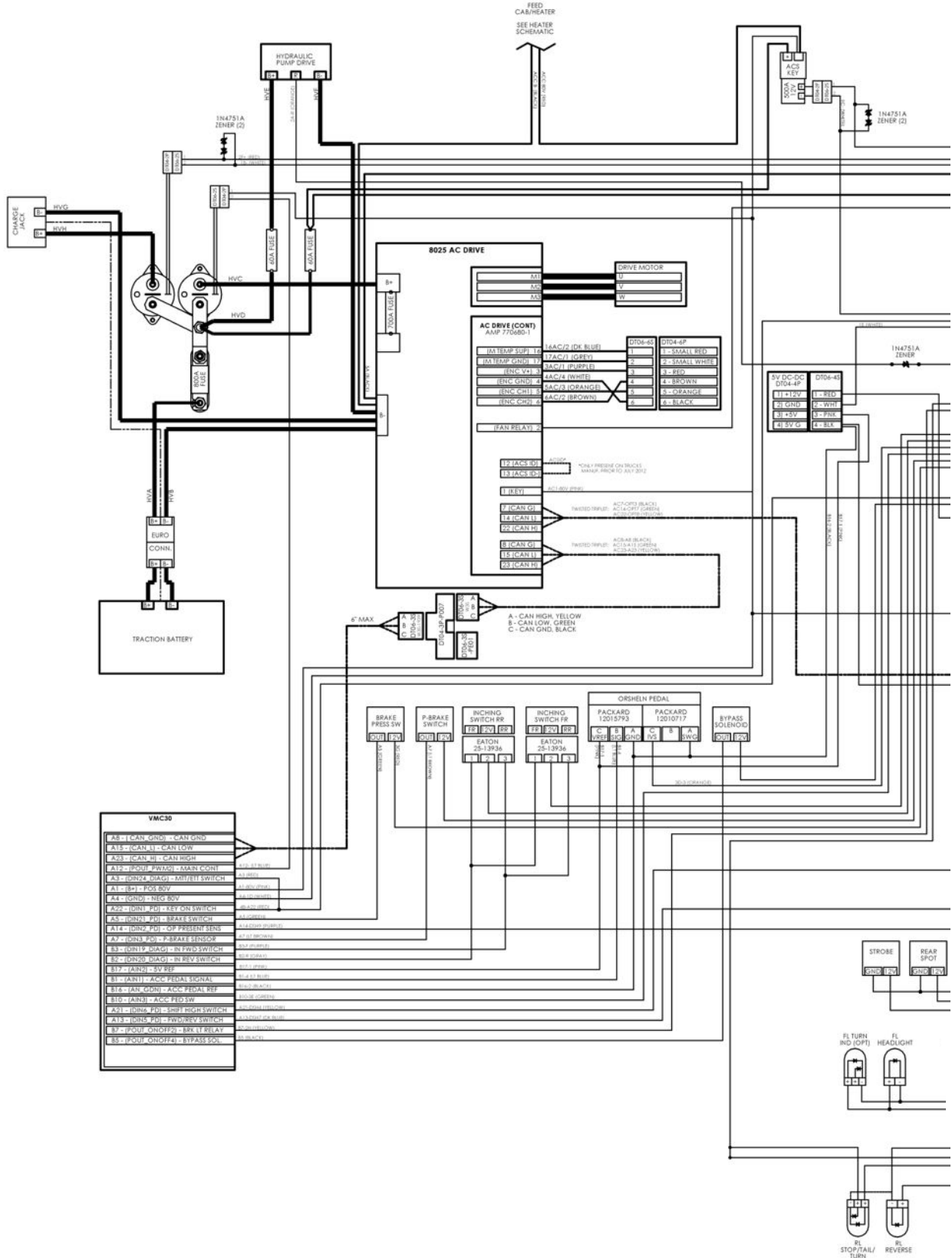
ELECTRICAL SCHEMATICS

ELECTRICAL SCHEMATIC DRIVE RH FOR S/M 5M106 AND BEFORE



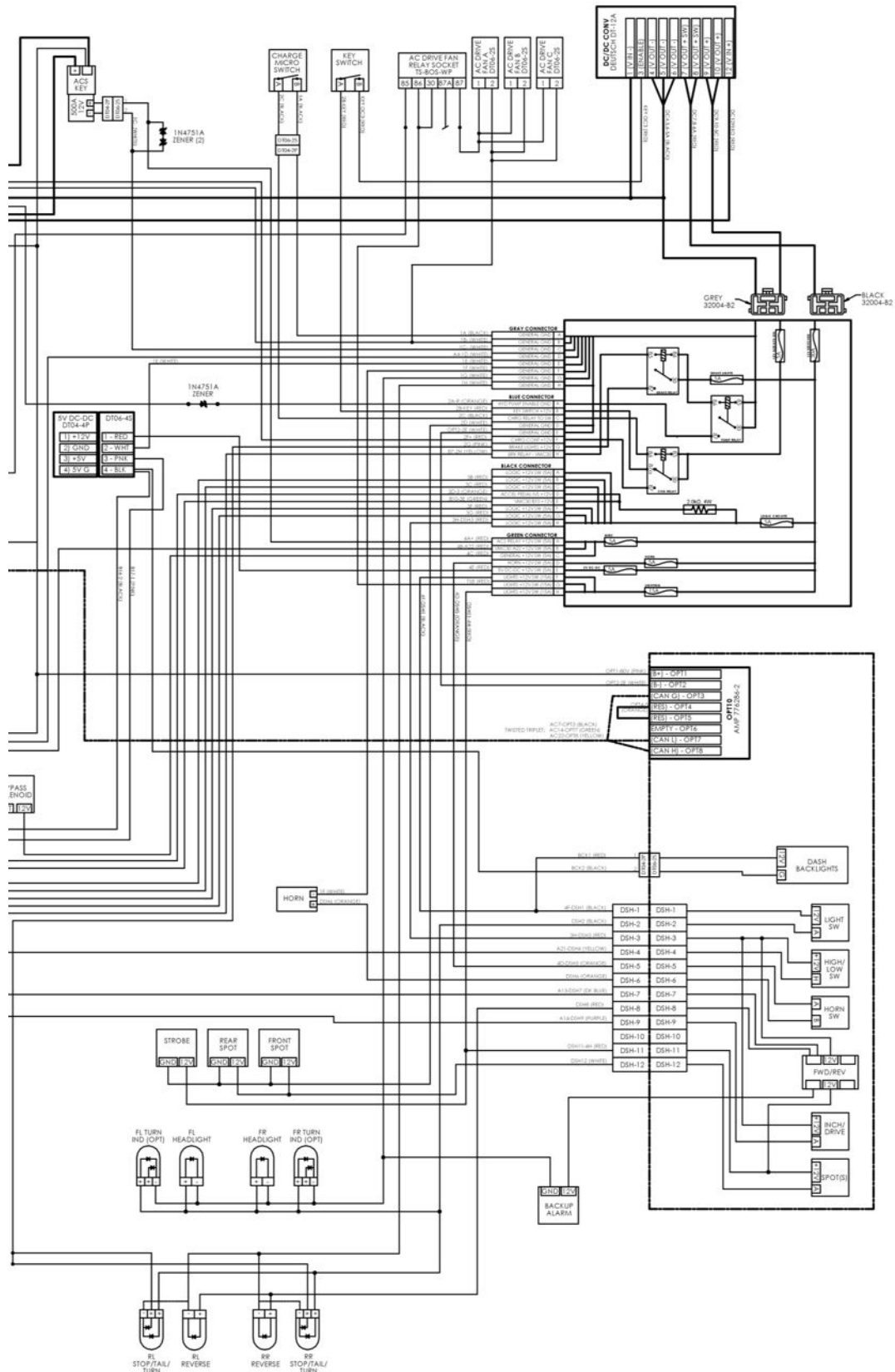
ELECTRICAL SCHEMATICS

ELECTRICAL SCHEMATIC DRIVE LH FOR S/N 5M107 AND AFTER



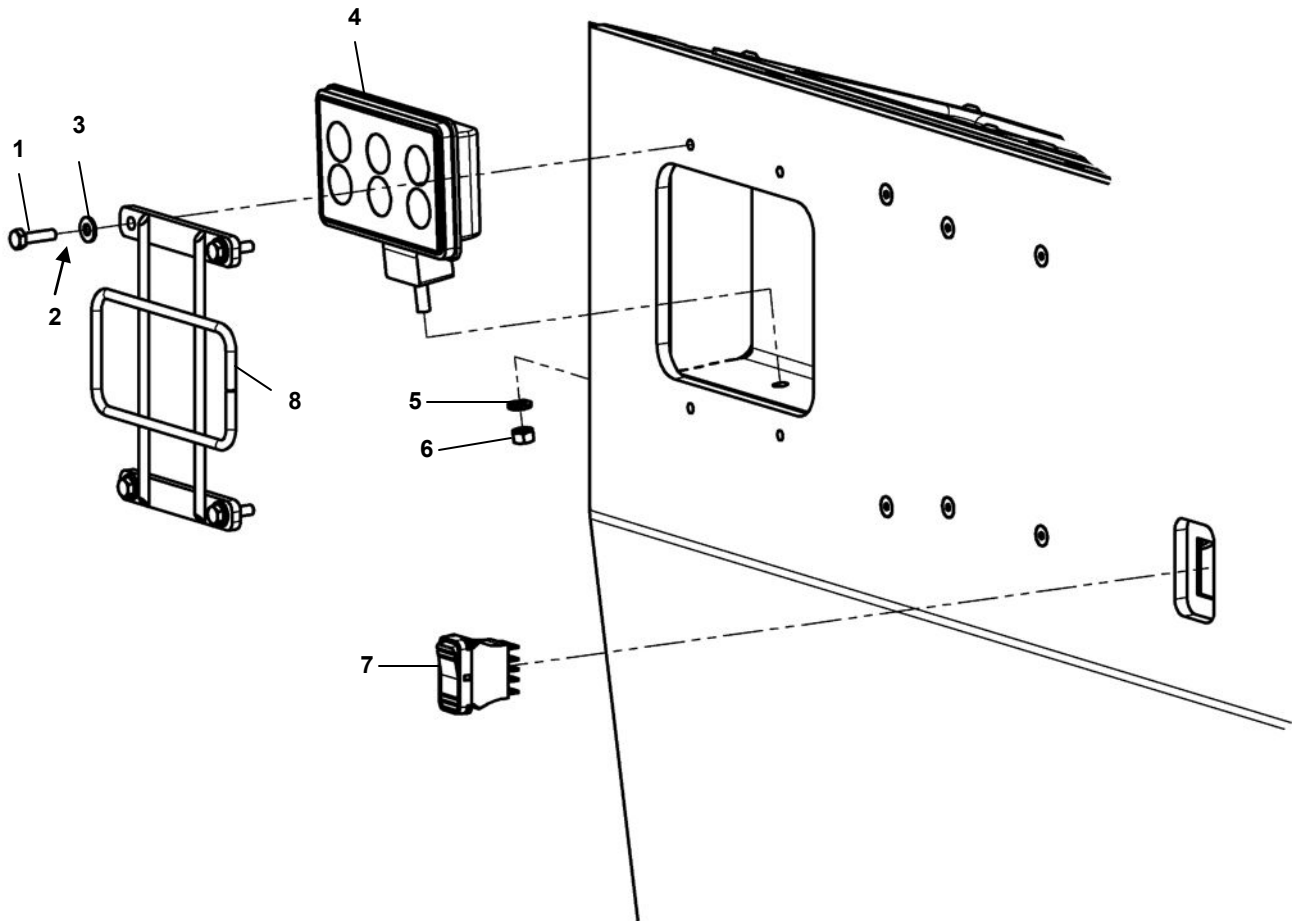
ELECTRICAL SCHEMATICS

ELECTRICAL SCHEMATIC DRIVE RH FOR S/M 5M107 AND AFTER



LIGHTS

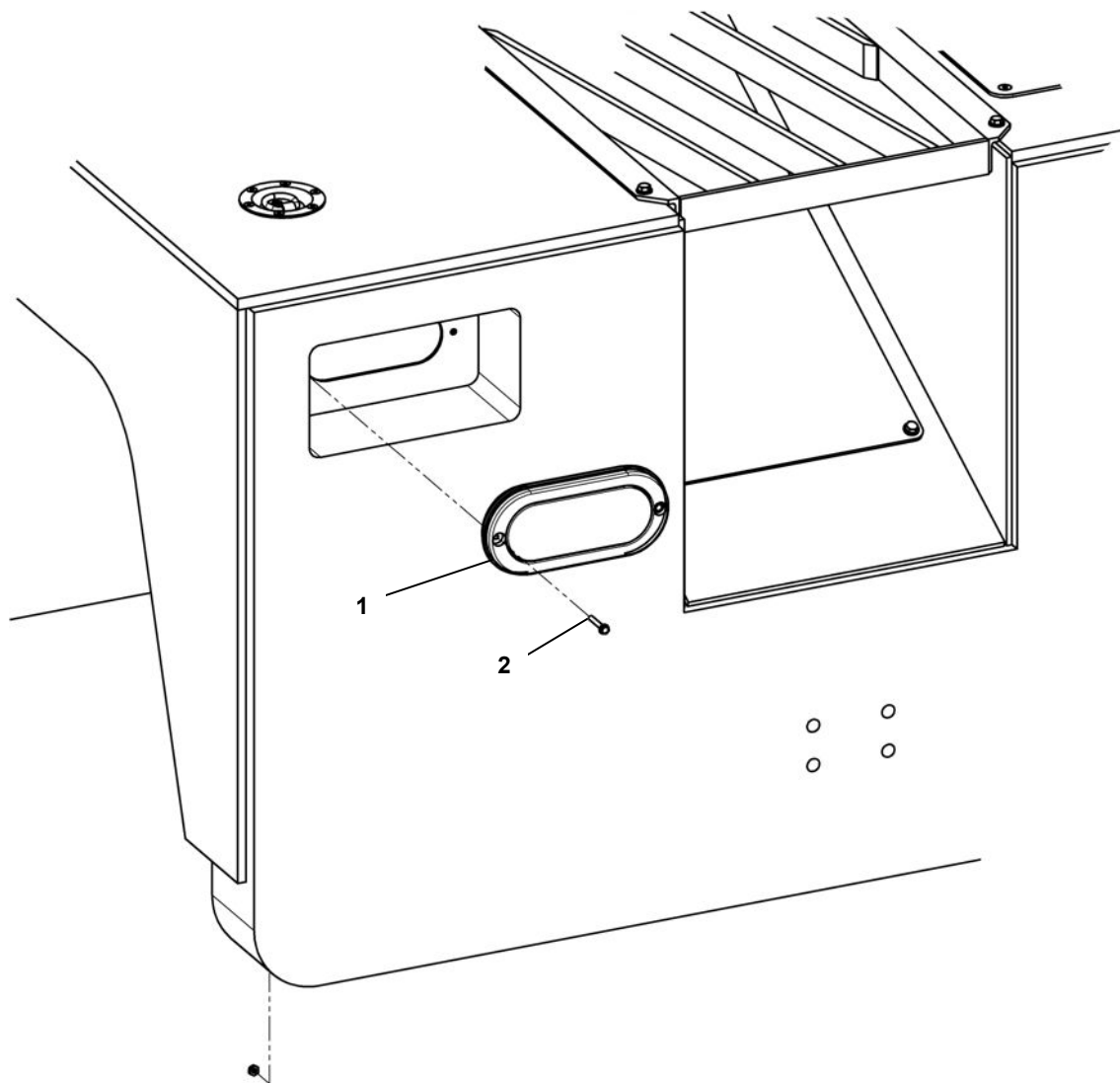
HEADLIGHTS



Item	Part Number	Qty	Description
1	NPN	8	1/4-20 X 1 BOLT
2	NPN	8	1/4-20 LOCK WASHER(NOT SHOWN)
3	NPN	8	1/4 FLAT WASHER
4	A-ES12-0492	2	LED HEADLIGHT
5	NPN	2	8MM FLAT WASHER
6	NPN	2	8MM-1.5 LOCK NUT
7	A-ES12-0803	1	INCHING SWITCH *S/N BEFORE 5M107
7	ET00-14-001-CA	1	INCHING SWITCH *S/N 5M107 AND LATER
8	A-MTT5-0213	2	HEAD LIGHT GUARD

LIGHTS

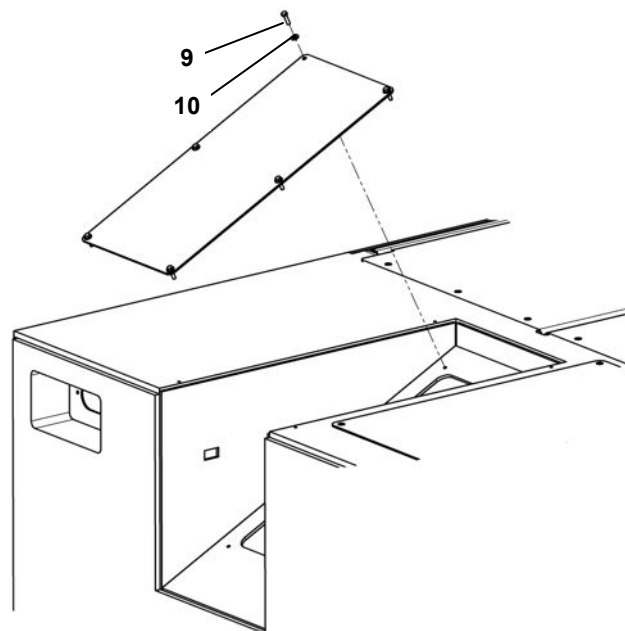
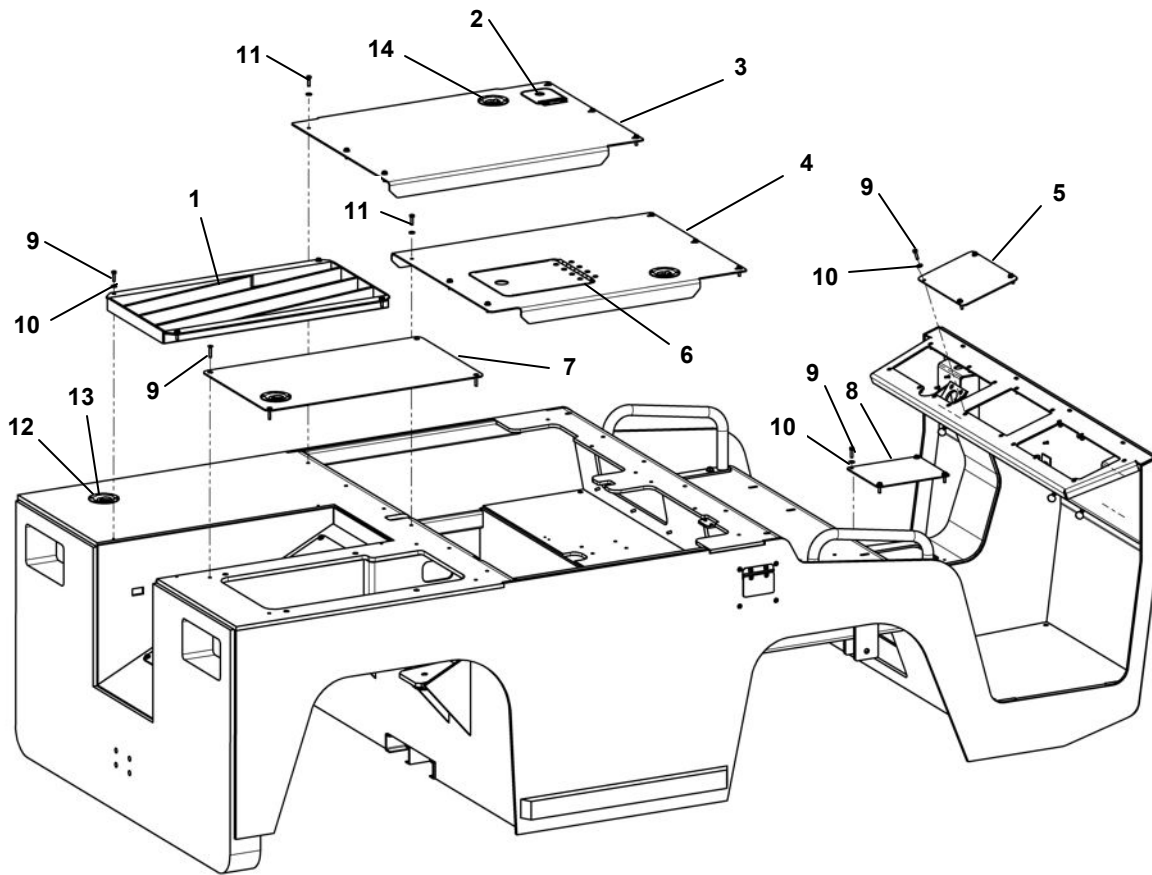
TAILLIGHTS



Item	Part Number	Qty	Description
1	A-MTT5-0492	2	TAIL LIGHT
2	NPN	4	10-32 X 1 BOLT
3	NPN	4	10-31 LOCK NUT(NOT SHOWN)

OTHER ASSEMBLY

BODY PANELS



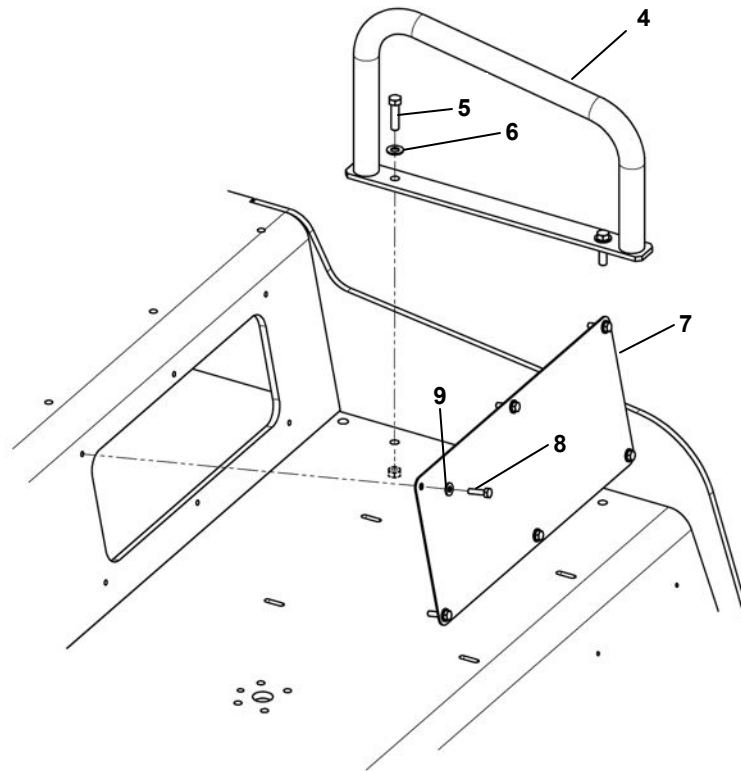
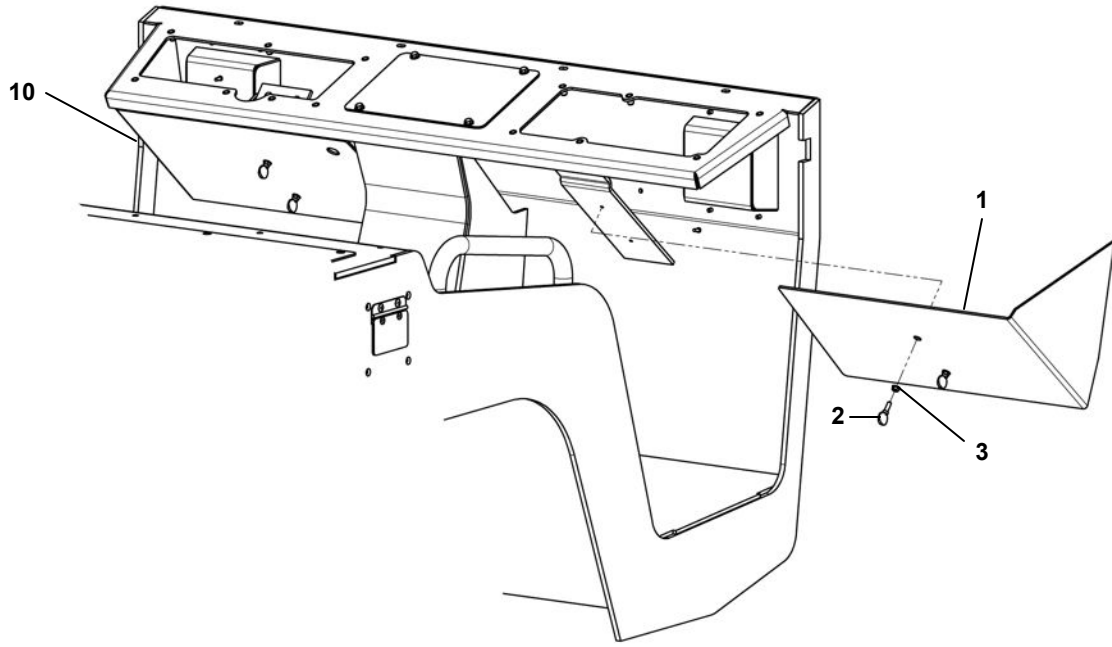
OTHER ASSEMBLY

BODY PANELS

Item	Part Number	Qty	Description
1	A-MTT5-0233	1	SIGHT TUNNEL COVER
2	A-MTT5-0203	1	HYDRAULIC PUMP FILLER DOOR
3	A-MTT5-0210	1	LH BATTERY HOOD
4	A-MTT5-0211	1	RH BATTERY HOOD
5	NPN	1	HEATER BOX COVER
6	A-MTT5-00219	1	BATTERY ACCESS COVER
7	A-MTT5-0222	1	ELECTRICAL COVER PANEL
8	A-MTT5-0221	1	CONSOLE COVER PLATE
9	NPN	22	1/4-20 X 3/4 HCS
10	NPN	22	1/4 FLAT WASHER
11	NPN	12	1/4-20 X 3/4 STAINLESS FHSCS
12	NPN	3	10-32 x 1 FHSCS STAINLESS
13	NPN	15	10-32 X1/2 FHSCS STAINLESS
14	NPN	12	1/4-20 X 3/4 STAINLESS FHSCS

OTHER ASSEMBLY

BODY PANELS



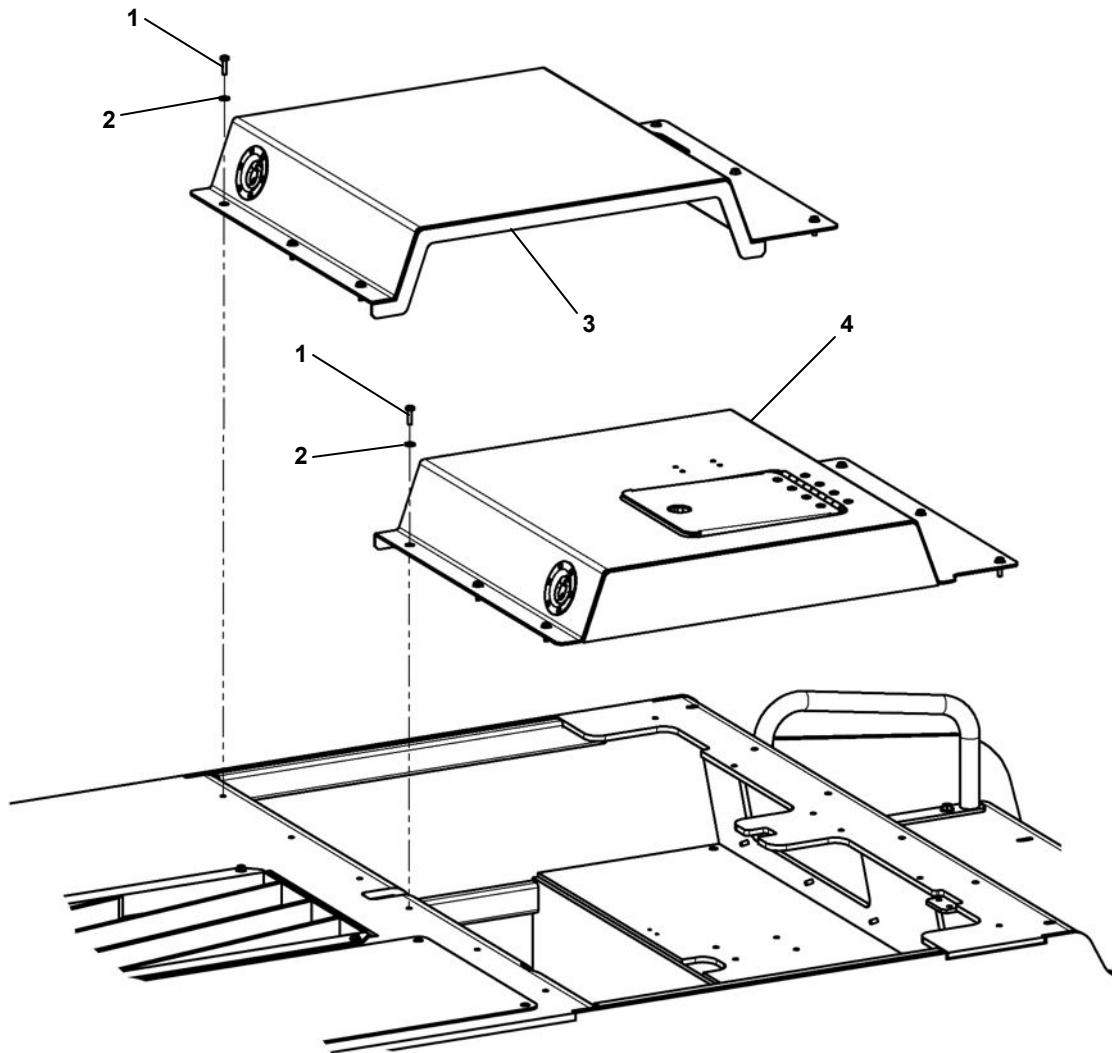
OTHER ASSEMBLY

BODY PANELS

Item	Part Number	Qty	Description
1	A-MTT5-0805	1	DASH COVER PANEL
2	NPN	4	1/4-20 X 3/4 THUMP SCREW
3	NPN	4	1/4-20 SERRATED FLANGE NUT
4	A-MTT5-0215	2	GRAB HANDLE
5	NPN	4	3/8-16 X 1 GR 8 HCS
6	NPN	4	3/8 FLAT WASHER
7	A-MTT5-0207	2	HYD ACCESS COVER
8	NPN	12	1/4-20 X 3/4 GR8 HCS
9	NPN	12	1/4 FLAT WASHER
10	A-MTT5-0206	1	DASH COVER PANEL

OTHER ASSEMBLY

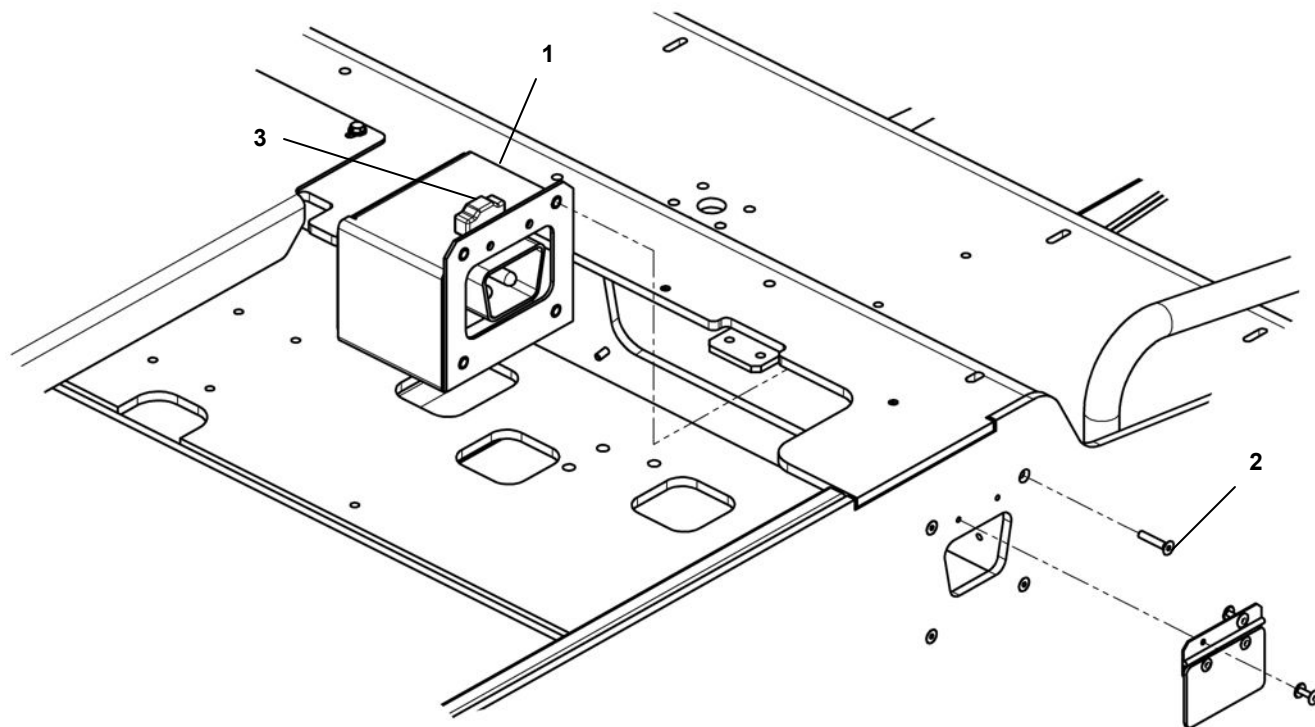
BODY PANELS-625 AH BATTERY OPTION



Item	Part Number	Qty	Description
1	NPN	12	3/4-20 X 1 FHSCS
2	NPN	12	3/4 FLAT WASHER
3	A-MTT5-0160-A	1	LH BATTERY HOOD
4	A-MTT5-0160-B	1	RH BATTERY HOOD

OTHER ASSEMBLY

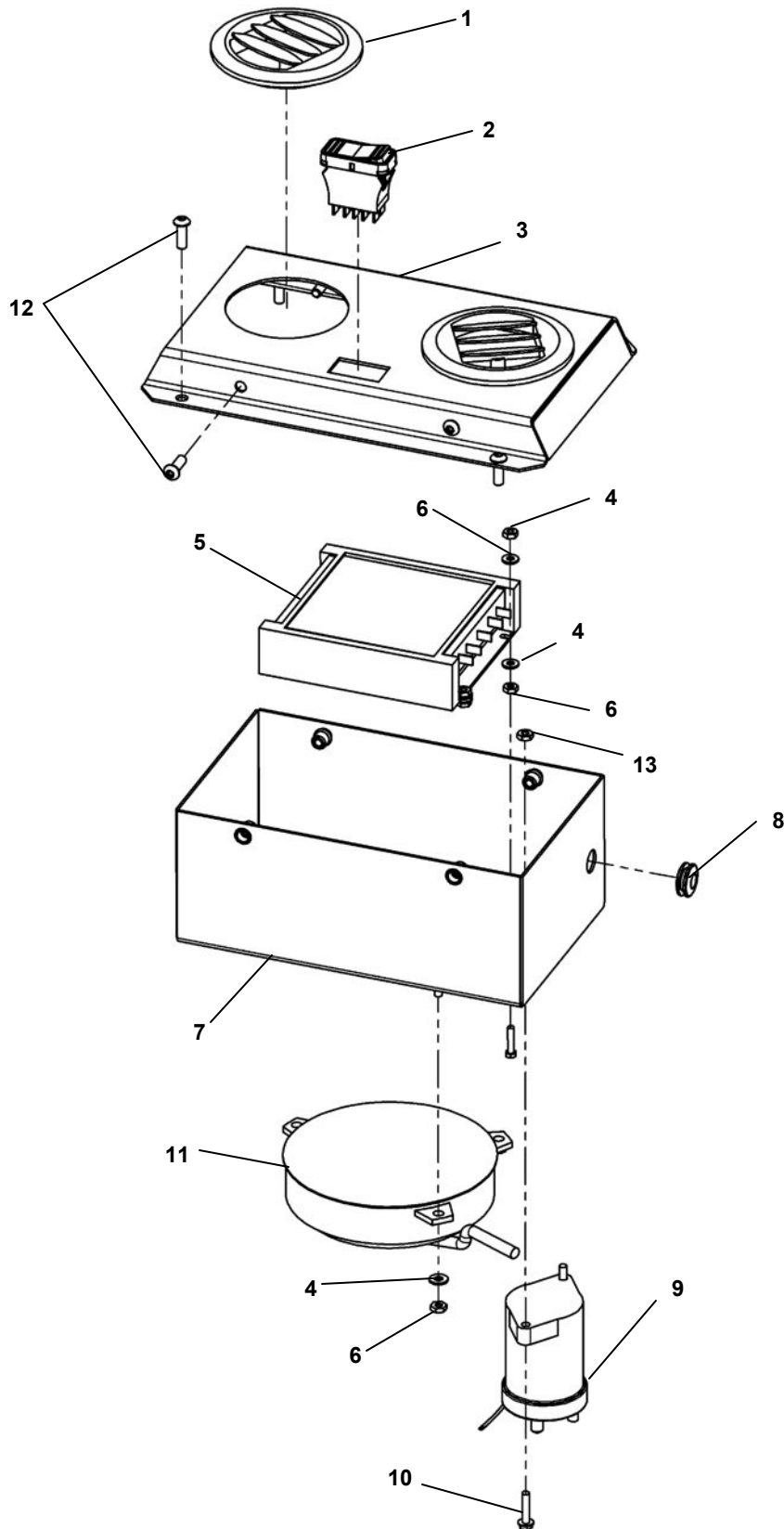
CHARGE JACK ASSEMBLY



Item	Part Number	Qty	Description
1	A-ES12-0442	1	BURTON CONNECTOR
2	NPN	4	1/4-20 X 1 FHSCS STAINLESS
3	A-ES12-0445	1	LIMIT SWITCH

OTHER ASSEMBLY

HEATER MODULE



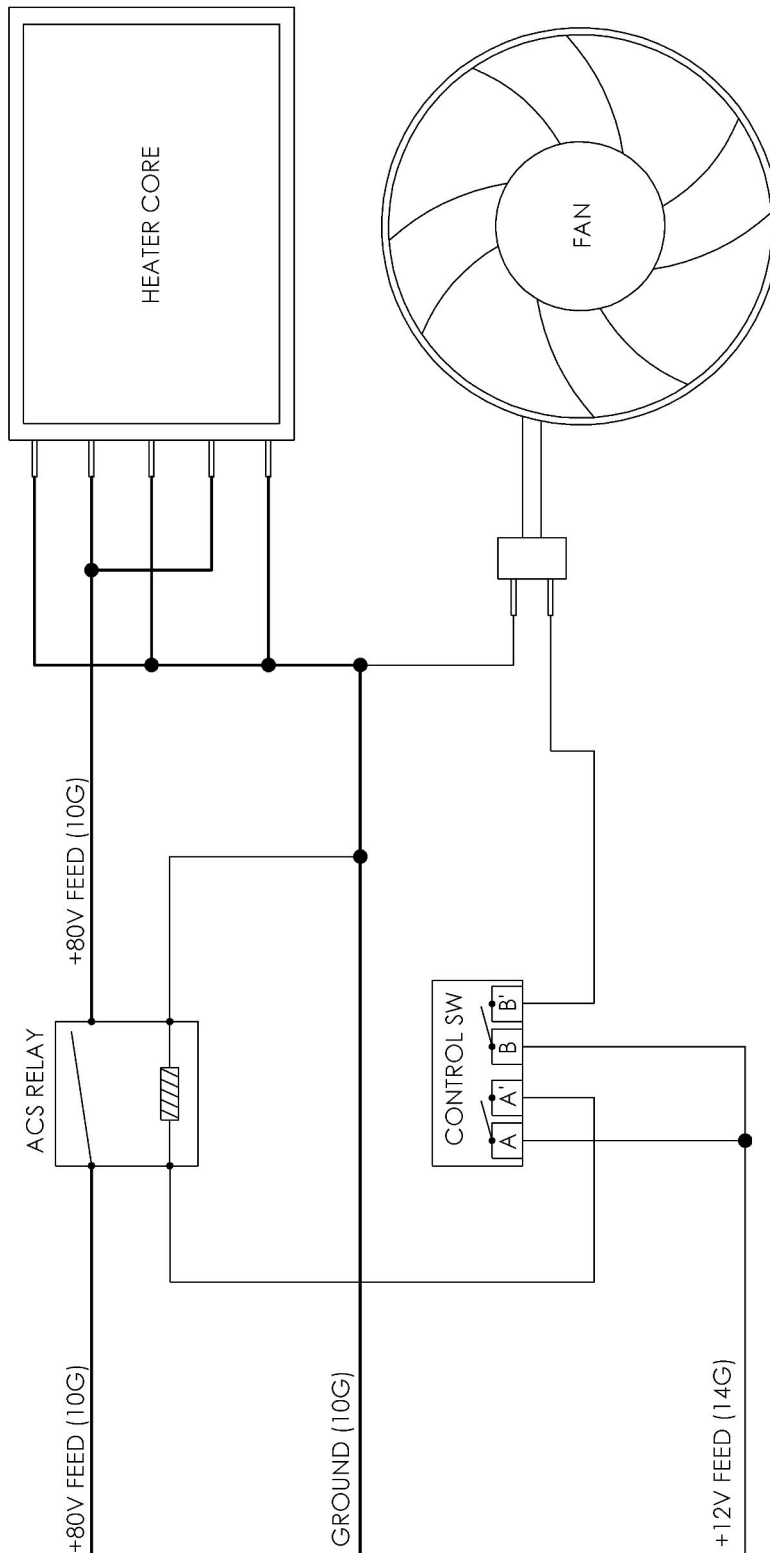
OTHER ASSEMBLY

HEATER MODULE

Item	Part Number	Qty	Description
1	A-MTT5-0236	2	ADJUSTABLE LOUVER
2	A-ES12-0801	1	ROCKER SWITCH
3	A-MTT5-0230	1	HEATER MODULE COVER
4	NPN	11	10-32 LOCK WASHER
5	A-MTT5-0601	1	HEATER CORE
6	NPN	11	#10 FLAT WASHER
7	A-MTT5-0231	1	HEATER MODULE BASE
8	AE-OPT-0320-E	1	GROMMET
9	A-ES12-00415-1	1	CONTACTOR
10	NPN	7	10-32 X 1 BOLT
11	A-MTT5-0235	1	HEATER FAN
12	NPN	6	1/4-20 X 1 BOLT
13	NPN	11	10-32 LOCK NUT

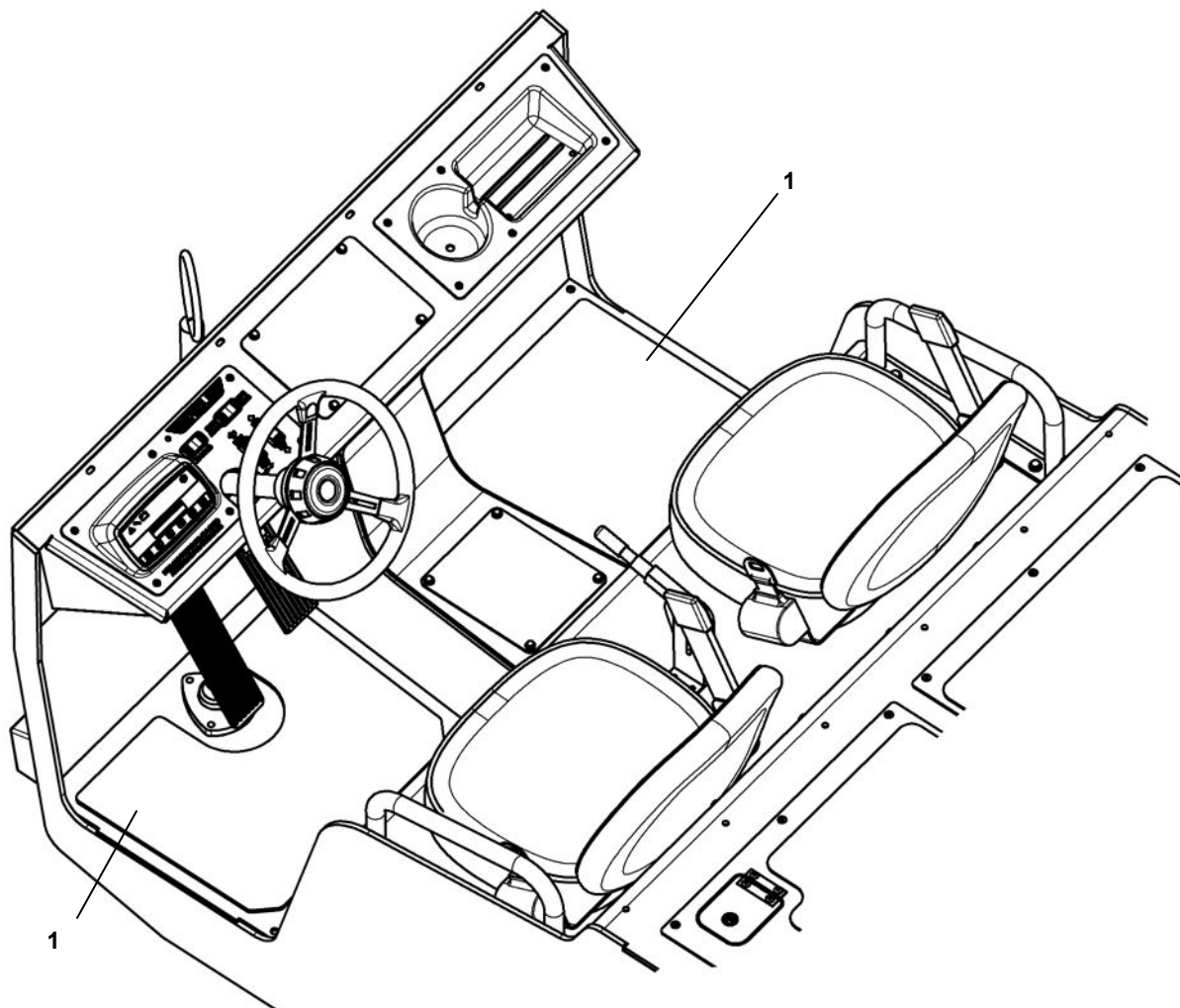
OTHER ASSEMBLY

HEATER SCHEMATIC



OTHER ASSEMBLY

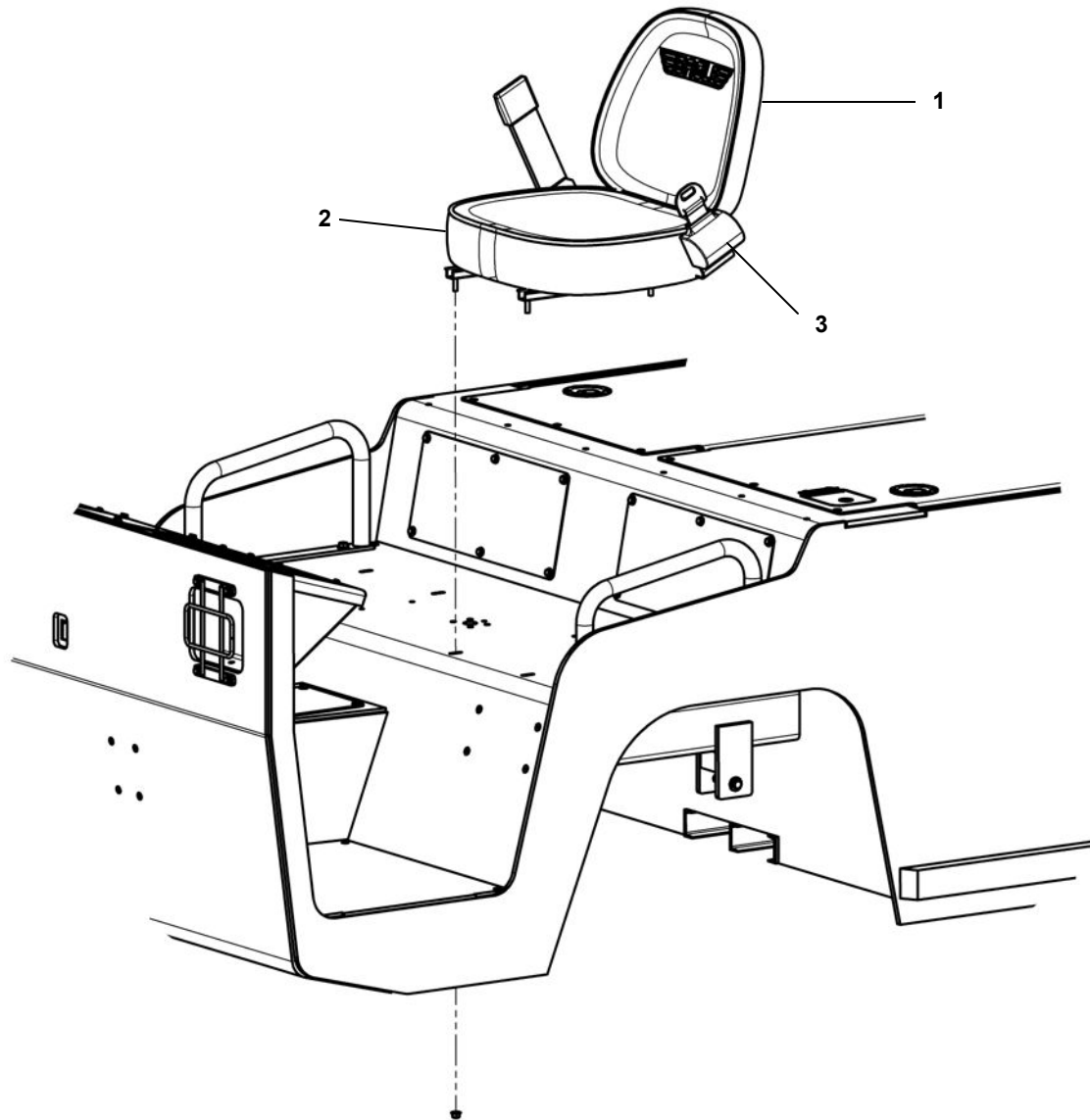
FLOOR MATS



Item	Part Number	Qty	Description
1	A-MTT5-0820	1	FLOOR MAT SET

OTHER ASSEMBLY

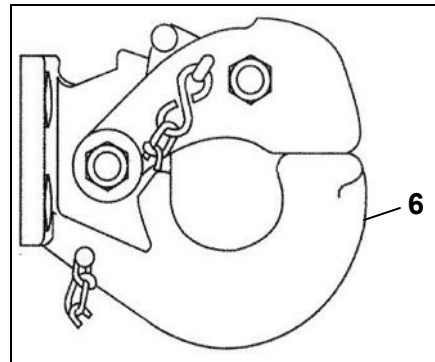
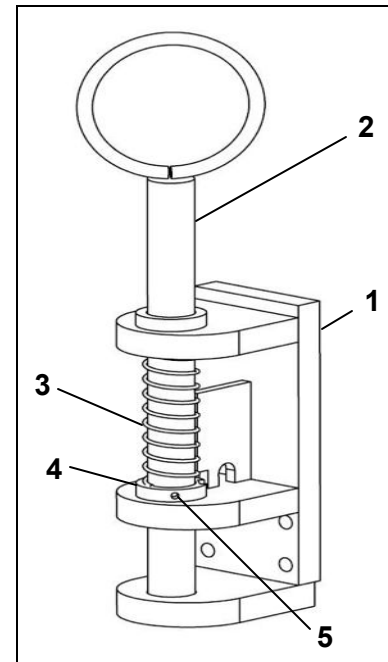
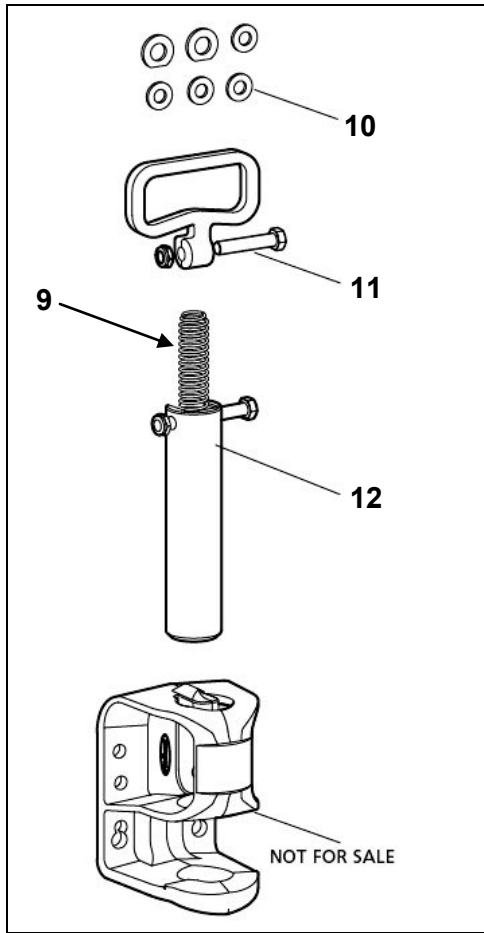
SEAT ASSEMBLY



Item	Part Number	Qty	Description
1	A-TT4-0048-1	1	STANDARD SEAT COMPLETE
2	AE-OPT-0055-A	1	SEAT BOTTOM CUSHION ONLY
3	E10000	1	SEAT BELT ONLY

OPTIONS

HITCH OPTIONS

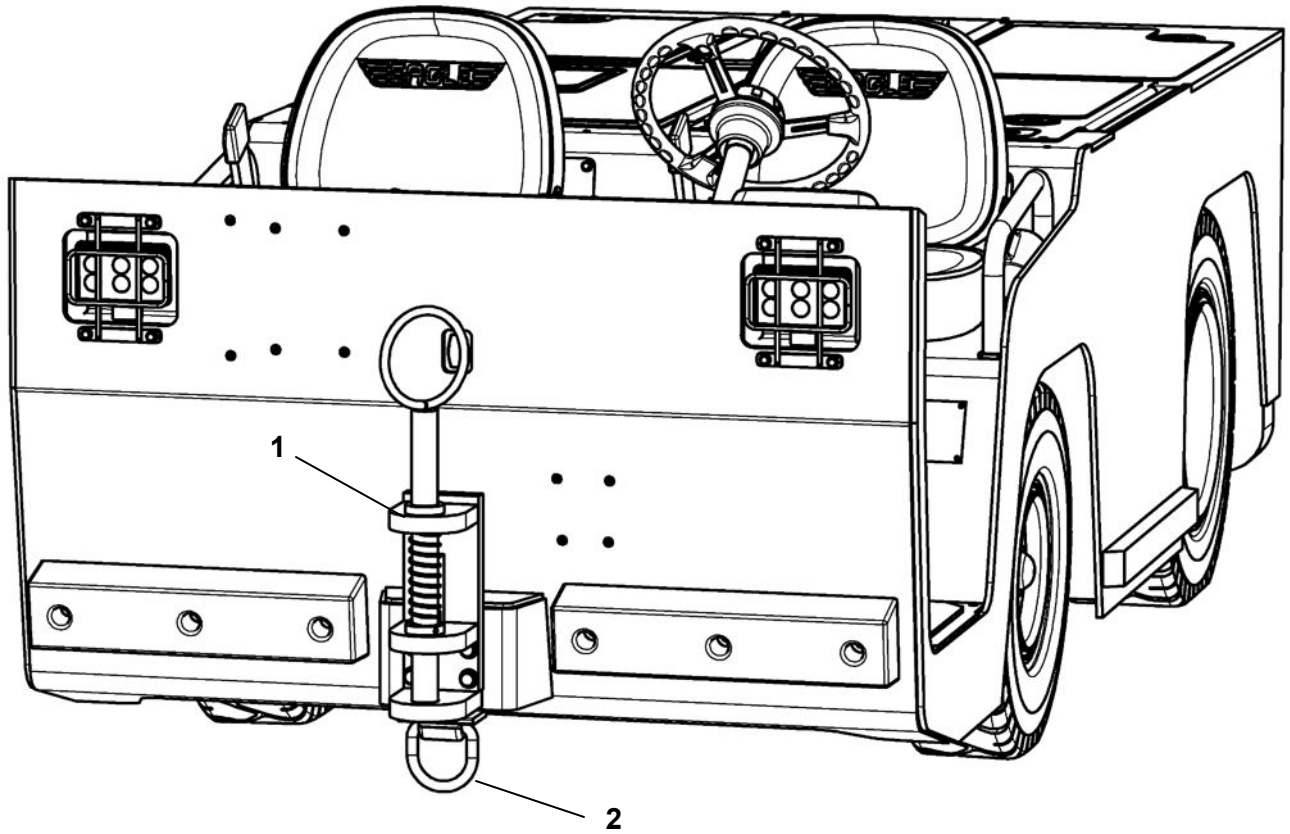


Item	Part Number	Qty	Description
1	AE-OPT-0033	1	E-HITCH 1 1/2 " PIN-COMplete ASSEMBLY
2	B-TT3-0008 DET2	1	E-HITCH GUIDE 1 1/2" GUIDE PIN WITH RING
3	B-TT3-0008A	1	E-HITCH SPRING
4	B-TT3-0008 DET5	1	LOCKING COLLAR
5	B-TT3-0008B	1	ROLL PIN
6	AE-OPT-0028	1	PINTLE HOOK
7	AE-OPT-0026	1	AIRLINE HITCH 3" PIN WITH CABLE(NOT SHOWN)
8	AE-OPT-0093	1	AIRLINE HITCH 2 3/8" PIN (NOT SHOWN)
9	AE-OPT-0033-1	1	HOLLAND HITCH
10	RK-11438	1	WASHER SET HOLLAND HITCH
11	RK-11440	1	HANDLE KIT HOLLAND HITCH
12	RK-11439	1	PIN & SPRING KIT HOLLAND HITCH

* The above are standard hitch options. Please call for special hitch options information

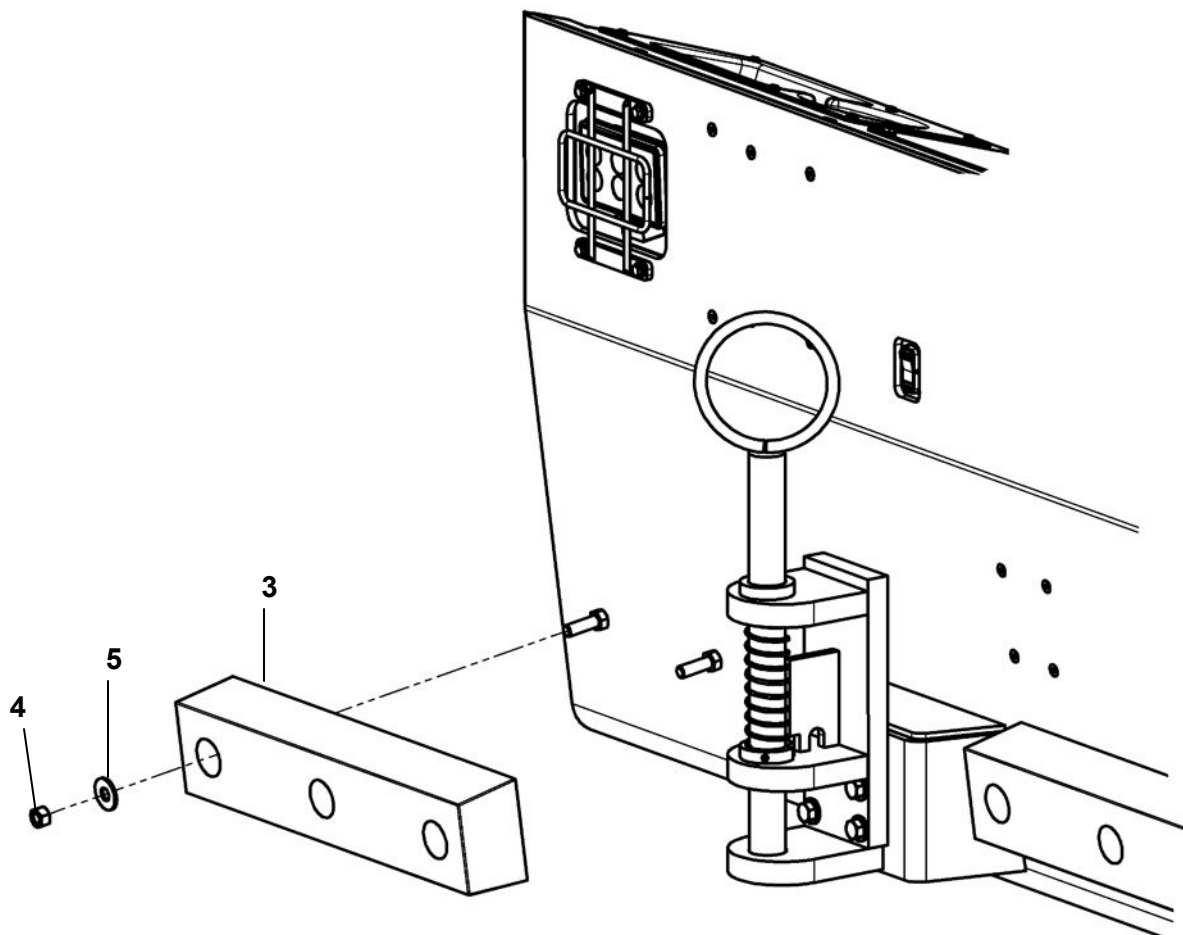
OPTIONS

FRONT HITCH & TIE DOWN RING



OPTIONS

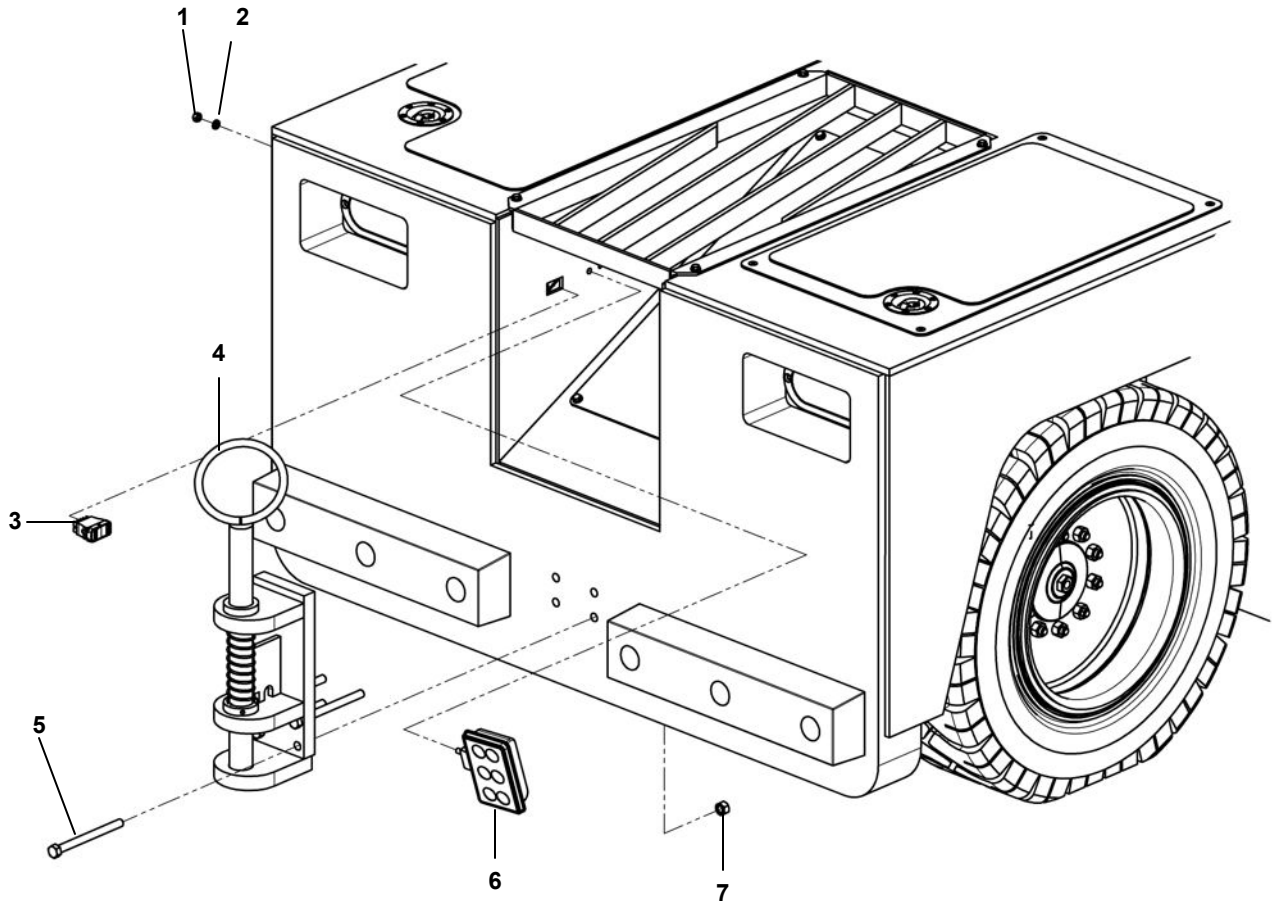
FRONT HITCH , TIE DOWN RING & BUMPERS



Item	Part Number	Qty	Description
1	AE-OPT-0033	1	E-HITCH 1 1/2 " PIN-COMPLETE ASSEMBLY
2	AE-OPT-0064-A	1	TIE DOWN RING
3	AE-OPT-0119-1	2	FRONT BUMPER
4	NPN	6	1/2-13 LOCK NUT
5	NPN	6	1/2 FLAT WASHER

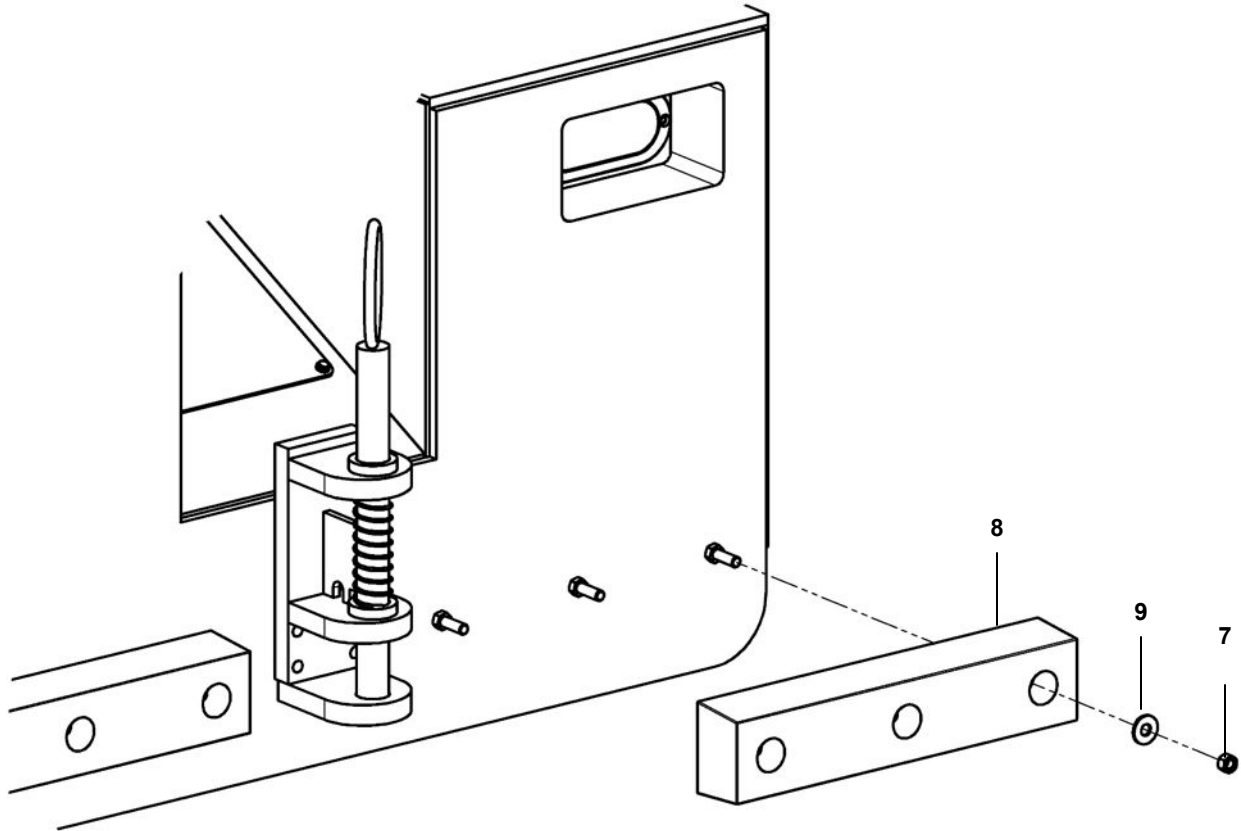
OPTIONS

REAR HITCH, SPOT LIGHT & BUMPERS



OPTIONS

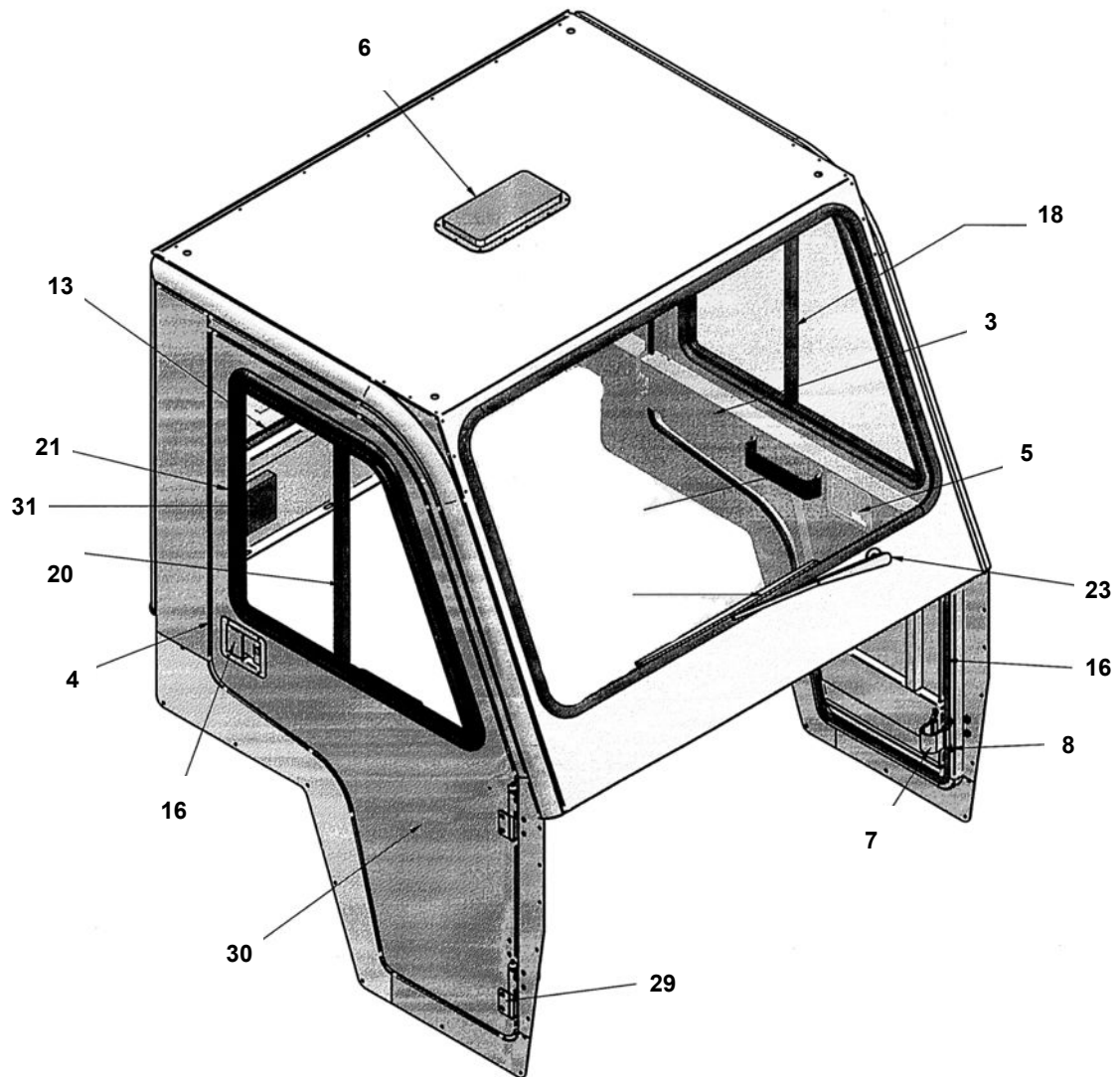
REAR HITCH, SPOT LIGHT & BUMPERS



Item	Part Number	Qty	Description
1	NPN	1	8MM-1.5 LOCK NUT
2	NPN	1	8MM FLAT WASHER
3	A-ES12-0803	1	INCHING SWITCH *S/N BEFORE 5M107
3	ET00-14-001-CA	1	INCHING SWITCH *S/N 5M107 AND LATER
4	AE-OPT-0033	1	STANDARD E-HITCH(OPTIONAL)
5	NPN	4	1/2" BOLT (LENGTH VARIES L=BUMPER WIDTH+ HITCH WIDTH+ 2 INCHES)
6	A-TMM5-0491	2	SPOT LIGHT(OPTIONAL)
7	NPN	6	1/2-13 LOCK NUT
8	AE-OPT-0119-1	2	REAR BUMPER(OPTIONAL)

OPTIONS

CAB



OPTIONS

CAB

Item	Part Number	Qty	Description
1	1504010	1	ROTARY LOCK
2	V-1158	1	HANDLE, OUTSIDE PADDLE
3	MTT-5-0002-17	2	LATCH COVER
4	V-0080	2	STRIKER BOLT
5	V-0389	2	NON-LOCKING PADDLE HANDLE
6	V-1814	1	SIDE VENT
7	V-1442	4	DOOR STOP STRAP
8	V-1377	12	STEEL FOOTMAN LOOP
9	VENT-HAT	1	VENT HAT
10	V-1945	1	REAR WINDOW
11	V-1946	1	FRONT WINDOW
12	V-0156	2	WIPER MOTOR
13	V-0110-170	1	REAR WINDOW RUBBER 170 INCHES
14	V-0110-170	1	FRONT WINDOW RUBBER 170 INCHES
15	V-1158	1	HANDLE, OUTSIDE PADDLE
16	V-0126	1	MINI TRIM 160 INCHES
17	V-1939	1	SLIDER LH DOOR
18	V-0110-103	1	SLIDER RUBBER 103 INCHES
19	V-1991	1	DOMELIGHT
20	V-1940	1	SLIDER RH DOOR
21	V-0110-103	1	SLIDER DOOR RUBBER 103 INCHES
22	V-1990	1	ISOLATED GROUND FAN
23	V-1992	2	WIPER ARM 18 INCHES
24	V-1993	2	WIPER BLADE 22 INCHES
25	V-1989	2	SOFT DOOR HANDLE
26	MTT-5-HINGE-LH	2	HINGE LH
27	MTT-5-HINGE RH	2	HINGE RH
28	MTT-5-0003-RH	1	RH DOOR WELDMENT
29	V-0548	1	1 INCH FOAM INSULATION
30	WIPER ISOLATER OUTSIDE	2	ISOLATING WASHER OUTSIDE
31	WIPER ISOLATER WASHER INSIDE	2	ISOLATING WASHER INSIDE
32	MTT-5-1100	1	MTT-5 CAB WELDMENT
33	MTT-5-0006	1	VENT TRIM
34	MTT-5-0003-100	1	LH DOOR WELDMENT
35	V-0400	1	ROTARY LOCK

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MAINTENANCE

DAILY OPERATOR RESPONSIBILITIES

The following inspections should be conducted each day prior to the first operation of the tractor. Additional inspections may be required due to unusual operating conditions.

Walk-A-Round Inspection

- Look for evidence around and under tractor for gear oil, hydraulic fluid or battery acid leaks.
- Check tire rims and wheel stud nuts for possible damage.
- Check tire for under inflation, cuts, breaks or excessive wear and remove any objects stuck in tread.
- Wipe clean, if necessary, all lights, mirror and reflectors.
- Open battery compartment hood and inspect battery cables.

When disconnecting the MTT from the battery to perform service, a residual charge may still exist in the system. To drain the system of all power, turn the key switch on after disconnecting the battery. This will drain any remaining electricity in the system and ensure that the truck is safe to perform work on.

MAINTENANCE CHART

Description of Check/Service	Every 300 Hrs	Every 400 Hrs	Every 500 Hrs	Every 1000 Hrs	Every 2000 Hrs
Hydraulic Fluid Filter Replacement First Replacement 250 Hrs		X			
Hydraulic Fluid Replacement				X	
Front Axle-Brake Check <i>See Brake Check In Front Axle Maintenance Section</i>			X		
Front Axle-Lubricate Grease Zerks <i>See Front Axle Maintenance Section</i>			X		
Front Axle-Inspect Hub Caps & Hub Grease Seals For Damage			X		
Front Axle-Re Lubricate Front Wheel Bearings				X	
Front Axle-Check For Play In Front Tie Rod Ends				X	
Front Axle-Inspect Thrust Bearings Between Axle Beam & Steering Knuckle				X	
Front Axle-Inspect King Pin/Bushings For Wear				X	
Rear Axle Oil Change First Replacement 150-200 Hrs					X
Rear Axle-Clean Oil Plugs First Replacement At First Oil Change					X
Rear Axle-Check & Adjust Oil Level First Replacement 50-100 Hrs			X		
Rear Axle-Clean Oil Breather Area First Replacement 50-100 Hrs	X				

See Axle Maintenance Section For Instructions

MAINTENANCE

TROUBLE SHOOTING

- 1) Tractor won't move when the gas pedal is pressed
 - a) Verify that the parking brake is released
 - b) Verify that the tractor is in drive mode and not inch mode
 - c) Verify that there are no codes on the screen preventing movement
 - d) Check that nothing is resting on the brake pedal
 - e) Verify that the parking brake switch is working by releasing the parking brake and ensuring that the light on the dash is not illuminated
 - f) Call Eagle Tugs technical support

- 2) Tractor won't inch when switches are pressed
 - a) Verify that the surface you are on is flat and level
 - b) Verify that the parking brake is released
 - c) Verify that the low gear switch is correct
 - d) Verify that the tractor is in inch mode and not drive mode
 - e) Switch the drive mode / inch mode switch to drive mode and then back to inch mode (for safety, the tractor needs to be started in drive mode and then switched to inch mode before inching is enabled)
 - f) Call Eagle Tugs technical support

- 3) Tractor displays "42: LOW BATTERY VOLTAGE LEVEL" and stops moving or goes into limp mode
 - a) The battery is too low for the load you are trying to move or the speed you are trying to move at. Recharge the battery

- 4) Tractor displays "14: WARN. TRACTION MOTOR TEMP HIGH" or "25: ERR. TRACTION HEAT SINK TEMP HIGH" and slows down or stops
 - a) The drive components on the tractor have exceeded a specified temperature. Please allow the tractor to sit so that the components can cool down

If the error continues, call Eagle Tugs technical support

- 5) Tractor displays "47: INCHING SWITCH FAULT"
 - a) Either the front or rear inching switches are short circuiting. Check for frayed wiring or corrosion
 - b) Check switch for excessive moisture in the switch

MAINTENANCE

ERROR CODES

Should the MTT have a system error, the built in diagnostics can show one or several of the below error codes and descriptions. When calling Eagle Tech Support, please have any displayed errors readily available. This will allow us to troubleshoot your issue as fast as possible.

- | | |
|--|---------------------------------------|
| 1: SWITCH ACTIVE AT KEYON | 25: ERR. TRACTION HEAT SINK TEMP HIGH |
| 2: DIRECTION ERROR | 26: ERR. TRACTION NOT RESPONDING |
| 3: TRACT POT ERROR | 27: ERR. TRACTION OTHER |
| 4: UNDERVOLTAGE ERROR | 28: ERR. TRACTION |
| 5: OVERVOLTAGE ERROR | 29: ERR. TRACTION OTHER |
| 6: CAN ERROR ERROR | 30: LOW BATTERY VOLTAGE LEVEL |
| 7: UNDEFINED ERROR | 31: THROTTLE FAULT |
| 8: UNDEFINED ERROR | 32: DC DC CONVERTER FAULT |
| 9: UNDEFINED ERROR | |
| 10: WARN. TRACTION DC BUS LOW | |
| 11: WARN. TRACTION DC BUS HIGH | |
| 12: WARN. TRACTION SPEED SENSOR | |
| 13: WARN. TRACTION MOTOR TEMP LOW | |
| 14: WARN. TRACTION MOTOR TEMP HIGH | |
| 15: WARN. TRACTION TEMPERATURE SENSOR | |
| 16: WARN. TRACTION HEAT SINK TEMP LOW | |
| 17: WARN. TRACTION HEAT SINK TEMP HIGH | |
| 18: WARN. TRACTION HEAT SINK TEMP SENS | |
| 19: WARN. TRACTION OTHER | |
| 20: WARNING LOW BATTERY | |
| 21: ERR. TRACTION SHORT CIRCUIT | |
| 22: ERR. TRACTION LOW VOLTAGE | |
| 23: ERR. TRACTION HIGH VOLTAGE | |
| 24: ERR. TRACTION MOTOR TEMP HIGH | |

MAINTENANCE

RECOMMENDED MTT TOOL LIST

- | | |
|--|---|
| 1) Screwdrivers
Philips #1, #2 4" long
Slotted 1/8 X 4, 3/16 X 4, 1/4 X 6, 5/16 X 8 | 16) Extension 1/2 Drive
3, 6, 10 inch |
| 2) Torx
T25, T27, T30, T40 | 20) 12 volt test light |
| 3) Nut Drivers
1/4", 5/16", 3/8" | 17) Torque Wrench
25-250 Foot Pounds |
| 4) Allen Wrench
7/64, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16, 3/8 | 18) 7 inch diagonal pliers |
| 5) Adjustable Wrench
8" & 10" | 19) 8 inch long nose pliers |
| 6) Metric Combination Wrenches
8MM, 10MM, 12MM, 13MM, 14MM, 15MM,
16MM, 17MM, 18MM, 19MM, 20MM, 21MM | 20) 6 3/4 inch slip joint pliers |
| 7) Standard Combination Wrenches
1/4, 5/16, 11/32, 3/8, 7/16, 1/2, 9/16, 5/8, 11/16,
3/4, 13/16, 7/8, 15/16, 1 1/8 | 21) 9 1/2 inch arc joint pliers |
| 8) 3/8 Drive Deep Standard Sockets
3/8, 7/16, 1/2, 9/16 | 22) Multimeter |
| 9) 1/2 Drive Deep Standard Sockets
9/16, 3/4, 15/16, 1 1/8 | 23) Pickle Fork |
| 10) 3/8 Drive Standard Sockets
5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 11/16, 3/4 | 24) Snap wring pliers |
| 11) 3/8 Drive Metric Sockets
7, 8, 9, 10, 11, 12, 13, 14, 15, 16 | 25) Ball Pien Hammer 32 oz |
| 12) 1/2 Drive Metric Sockets
16, 17, 18, 19, 20, 21, 22, 23, 24 | 26) Oil Filter wrench
2 3/4 inch to 3 3/4 inch in diameter |
| 13) 1/2 Drive Standard Sockets
9/16, 5/8, 11/16, 3/4, 13/16, 7/8, 15/16, 1, 1 1/8 | 27) Grease gun with 20" flex hose |
| 14) Swivel Universal
1/2, 3/8 Drives | 28) Oil drain pan |
| 15) Extension 3/8 Drive
3, 6, 10 inch | 29) Funnel |

NOTE:

*Eagle Tugs does not sell tools. Please refer to your local tool supplier to purchase any of the above recommended tools.

MAINTENANCE

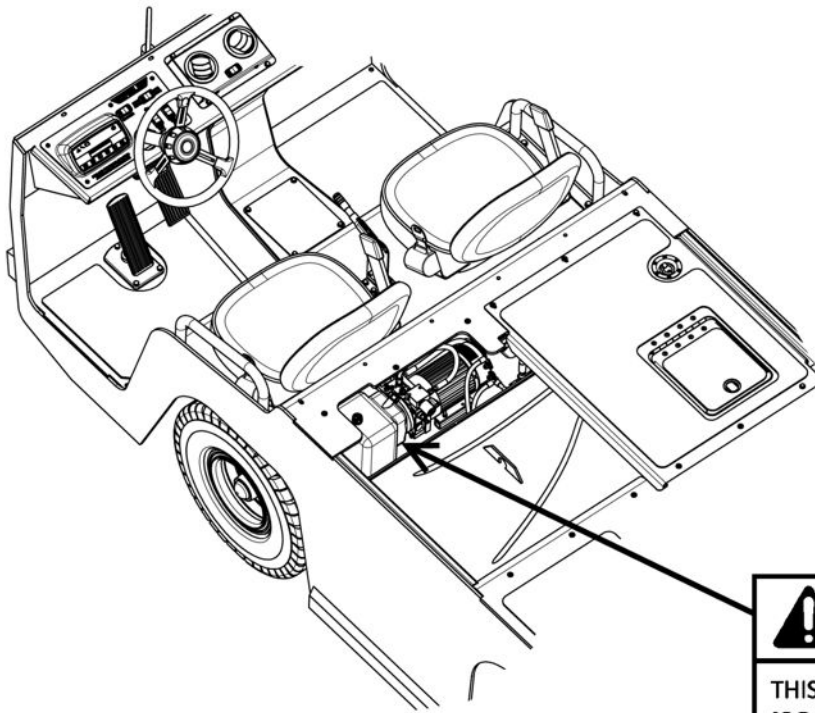
COLD WEATHER CARE

MTT Cold Weather Operation:

The MTT tow tractor has some specific maintenance and operational needs when used in cold weather conditions. Of specific concern are the hydraulic fluid weight and the battery health. Below are guidelines for proper care of these components.

Hydraulic Fluid:

The MTT tractor uses a single viscosity mineral oil based hydraulic fluid. Your tractor has been filled at the factory with a fluid weight appropriate for the climate it was sold into. It is the customer's responsibility to maintain the tractor fluid and replace with an alternate weight should it be necessary. Use of improper fluid weights could result in damage to the hydraulic system components. For direction on appropriate fluid weights, see the label on the inside of the tractor front panel adjacent to the hydraulic fluid tank or the below table.



⚠ FILL ONLY WITH MINERAL-OIL BASED HYDRAULIC FLUID

THIS TRACTOR HAS BEEN FILLED WITH ISO XX FLUID AT THE FACTORY
 USE THE APPROPRIATE FLUID FOR LOCAL AMBIENT (AIR) TEMPERATURES PER THE CHART:

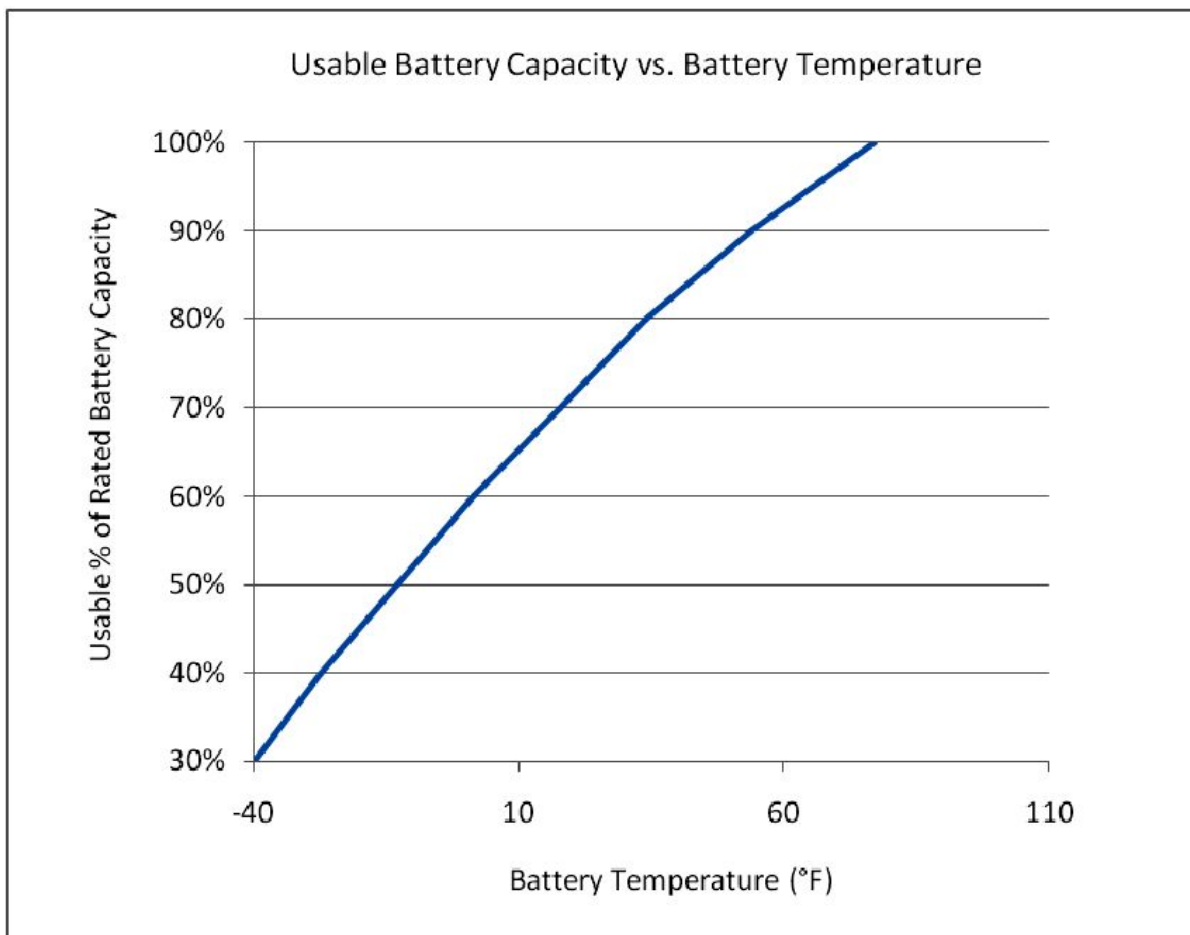
MIN TEMP	MAX TEMP	FLUID WEIGHT
-27°F (-33°C)	70°F (21°C)	ISO 10
-9°F (-23°C)	91°F (33°C)	ISO 15
5°F (-15°C)	111°F (44°C)	ISO 22
18°F (-8°C)	127°F (53°C)	ISO 32
28°F (-2°C)	143°F (62°C)	ISO 46

MAINTENANCE

COLD WEATHER CARE

Reduced Capacity at Low Temperatures:

Flooded lead acid batteries are negatively affected by cold temperatures. As temperatures decrease below room temp, the chemical reactions in a battery slow down which decreases the usable capacity of the battery. Under steady use the battery will generate heat internally which can offset some of these effects. Below is a chart that shows the expected capacity that will be delivered by a battery cold soaked at a certain temperature. These numbers should be used as a guide with the understanding that a battery that is under steady or heavy use will heat up internally. This internal heating will restore some of the lost capacity. Also note that a battery that is stored at room temperature will not experience a loss of capacity by being used in a cold environment. The internal heat generation will prevent the battery from dropping to ambient temperatures.

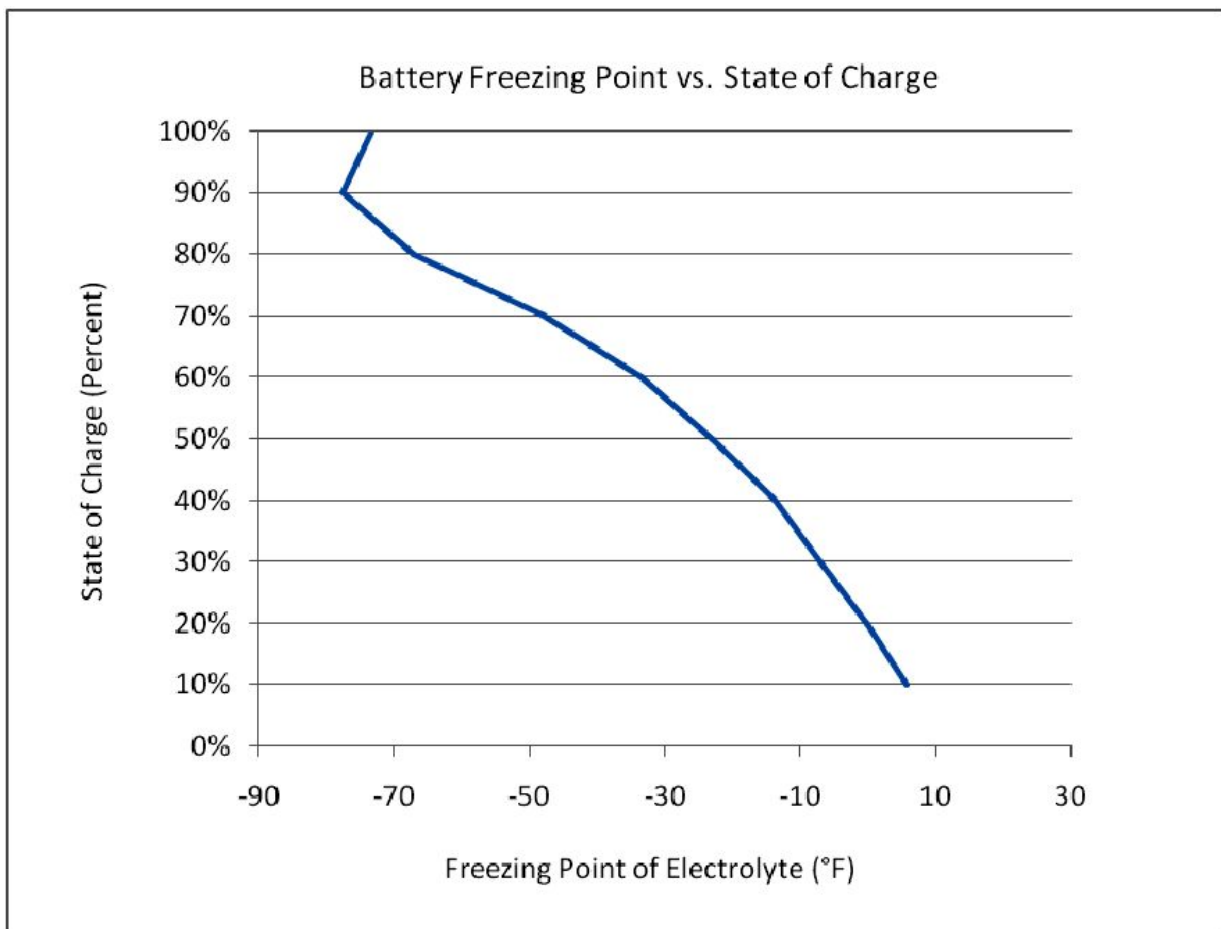


MAINTENANCE

COLD WEATHER CARE

Freezing Danger:

Also of concern is the freezing temperature of the battery electrolyte. The electrolyte is a sulfuric acid mixture. This mixture contains water and will freeze at a low enough temperature. As the battery is discharged, the electrolyte mixture loses its acidity and therefore freezes at a higher temperature. In cold weather a battery should always be stored with an acceptable level of charge. A discharged battery can freeze at low temperatures which will result in severe damage to the battery. The below chart shows the relationship between state of charge and freezing temperature of the electrolyte.



MAINTENANCE

BATTERY CHARGING AND MAINTENANCE QUICK GUIDE



Warning: Never water a cold battery. Only water a battery during the degassing process of an equalization charge, or immediately after an equalization charge. Watering a cold battery will result in overflowing of battery acid which will reduce battery life and damage the truck and/or battery.

Eagle Tugs Battery Charging and Maintenance Quick Guide

This document provides guidelines for charging, discharging, and maintaining the Deka D-series industrial traction battery used in the Eagle eTT and MTT tow tractors. These instructions assume the most common options package and may differ from your truck.

This recommended battery maintenance procedure is not intended to replace the battery manufacturer's recommendations and procedures. Where a conflict may exist between this document and the battery manufacturer's recommendations and procedures, the battery manufacturer's requirements shall be followed.

Charging Procedures for Opportunity Charge Batteries:

- 1) Charging the battery is as simple as plugging the charger cord into the quick charge port on the side of the truck. For an opportunity charge or a full charge, nothing else is required. The charger will display the charge process and the "Charge Complete" LED on the charger will illuminate when the charge cycle has been completed. For a general idea of charge times, please see the Estimated Charge Times table on the second page of this Guide.
- 2) The battery may be opportunity charged as required on a daily basis. To stop the charge process, disconnect the charger from the truck, or press the stop button on the charger.
- 3) In order to complete a full charge, leave the charger connected until the "Charge Complete" LED on the charger illuminates. Note: The charger is programmed to only charge the battery higher than 80% once per day so to not cause damage to the battery.
- 4) The battery must be "equalize" charged once per week, or every 80 hours of use. The charger will automatically schedule an equalization charge if it has been 10 days since the last equalization. The charger will blink the "Equalize" LED to let you know that it will perform an equalization charge at the end of the current charge cycle. To manually perform an equalization charge, press the "Equalize" button during charging. The LED will begin blinking to confirm that an equalization has been scheduled. Note: An Equalization charge should not be performed more than 1 time per week so to not cause damage to the battery.
- 5) Add water to the battery weekly as part of the equalization charge process. Add water while on charge during degassing (the equalization portion of the charge), or as soon as possible after the charge cycle. The filling system should only be connected long enough for the cells to fill (usually 1 to 3 minutes). When the flow indicator stops spinning, or nearly stops, the cells are full and the quick-disconnect coupler should be disconnected. CAUTION: The plugs continue to drop a very small amount of water even when the floats are up and overfilling could result if the supply line is left connected.

MAINTENANCE

BATTERY CHARGING AND MAINTENANCE QUICK GUIDE

General Battery Maintenance Guidelines:

- 1) Only allow the battery to discharge to a 30% level. Discharging past 20% will result in battery damage. The eTT/MTT will go into a “limp home” mode when the battery gets to a 30% charge. The battery should be charged prior to the tug reaching “limp home” mode to keep from causing damage to the battery.
- 2) Battery electrolyte temperature should always be between 50°F and 115°F.
- 3) Periodically use a neutralizing solution (baking soda and water may be used) on the battery to clean up any noticeable acid on the battery surface. Lightly wash with clean water after using the solution.

Estimated Charge Times:

These charge times apply to charging the eTT-12 or MTT 625 Ahr battery using the Posicharge SVS-100 charger. Times are approximate and may change based on temperature and battery condition.

20% charge to 80% charge – 3 hours 45 min

40% charge to 80% charge - 2 hours 30 min

60% charge to 80% charge - 1 hour 15 min

80% charge to 100% charge - 45 minutes

100% to completion of equalization – 3 to 4 hours

Battery Lifting:

Batteries should be installed into and removed from the truck using the proper lifting equipment. A wooden beam lift intended for use with traction batteries provides the proper lifting geometry by acting as a spreader bar as well as insulating the battery hooks to prevent any short circuits. Batteries can weigh in excess of two tons and overhead hoists should be rated to handle the appropriate load. Lifting with improper equipment can not only result in damage to the battery or equipment, but also to extreme danger for the equipment operators. For further details, refer to the battery manufacturers' recommendations.

Battery as Ballast:

Your Eagle tractor has been designed as a complete system including the battery. When considering replacement of the battery in the future, care must be taken to match the weight and size of the OEM installed battery. Failure to replace with the same specification battery can result in reduced performance and vehicle instability. Please consult Eagle tugs for assistance when considering any battery replacements.

MAINTENANCE

TRANSPORTING INSTRUCTIONS

The MTT tow tractor is not able to be moved by forklift.

The MTT tow tractor may be flat towed or towed on the rear tires for short distances. The battery must be disconnected for towing, and the towing speed should not exceed 13 mph.

MAINTENANCE

ACCUMULATOR MAINTENANCE

The MTT Tractor features an accumulator backed brake system. This system stores hydraulic pressure in an accumulator to provide continued braking in the event of a system power or fluid loss. Over time it is possible to lose pre-charge pressure in the accumulator. If over time you find that the number of power off brake cycles is reduced, you may have a loss of accumulator pre-charge pressure.

In order to test the number of power off brake cycles, do the following:

- 1) Turn on the tractor
- 2) Repeatedly press and release the brake pedal until you hear the charge valve charge the brake accumulator
- 3) Turn off the tractor
- 4) Repeatedly press and release the brake pedal until you hear the charge valve release

You should have at least 5 power off brake cycles based on the test above.

The accumulator is located under the passenger seat floor above the front axle. Removal of the front RH wheel and tire will allow access. Pre-charge rates should be checked if the power off brake performance is degraded. If necessary, the accumulator should be pre-charged back to factory specs per the accumulator manufacturer's directions. For recharge service please contact your local welding supply company.

MTT brake accumulator pre-charge rate: 750 psi

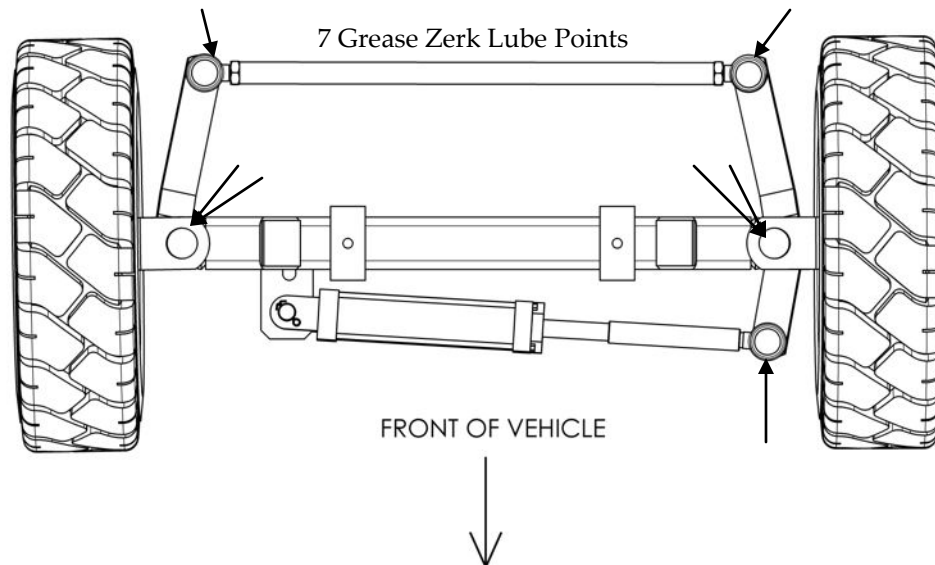
MAINTENANCE

FRONT AXLE MAINTENANCE

Maintenance Schedule for Steering Axles

500 Hours:

- 1) Lubricate axle. Our axle has 7 grease zerks: one for each of three rod ends, and two each on the steering knuckles.
- 2) Inspect brake system.
 - Inspect pads for wear and replace when necessary.
 - Inspect brake lines and calipers for fluid leaks.
- 3) Inspect hub caps and hub grease seals for damage.



1000 Hours:

- 1) Re lubricate wheel bearings.
- 2) While vehicle is safely and securely jacked, check for play in all rod ends.
- 3) While vehicle is safely and securely jacked, inspect thrust bearing between axle beam and steering knuckle for wear and tear.
- 4) While vehicle is safely and securely jacked, inspect king pin/bushings for wear. Can the spindle be rocked up and down, indicating wear between the king pin and bushing? If there is play, replace king pin, thrust bearings, and bushings.

MAINTENANCE

REAR AXLE MAINTENANCE-OIL CHANGE

**ALL OPERATIONS MUST ONLY BE PERFORMED BY TRAINED PERSONNEL

- (1) Which of both conditions comes first
- (2) 50 hours for severe operating conditions
- (3) At the season end if you have not reached the indicated hours

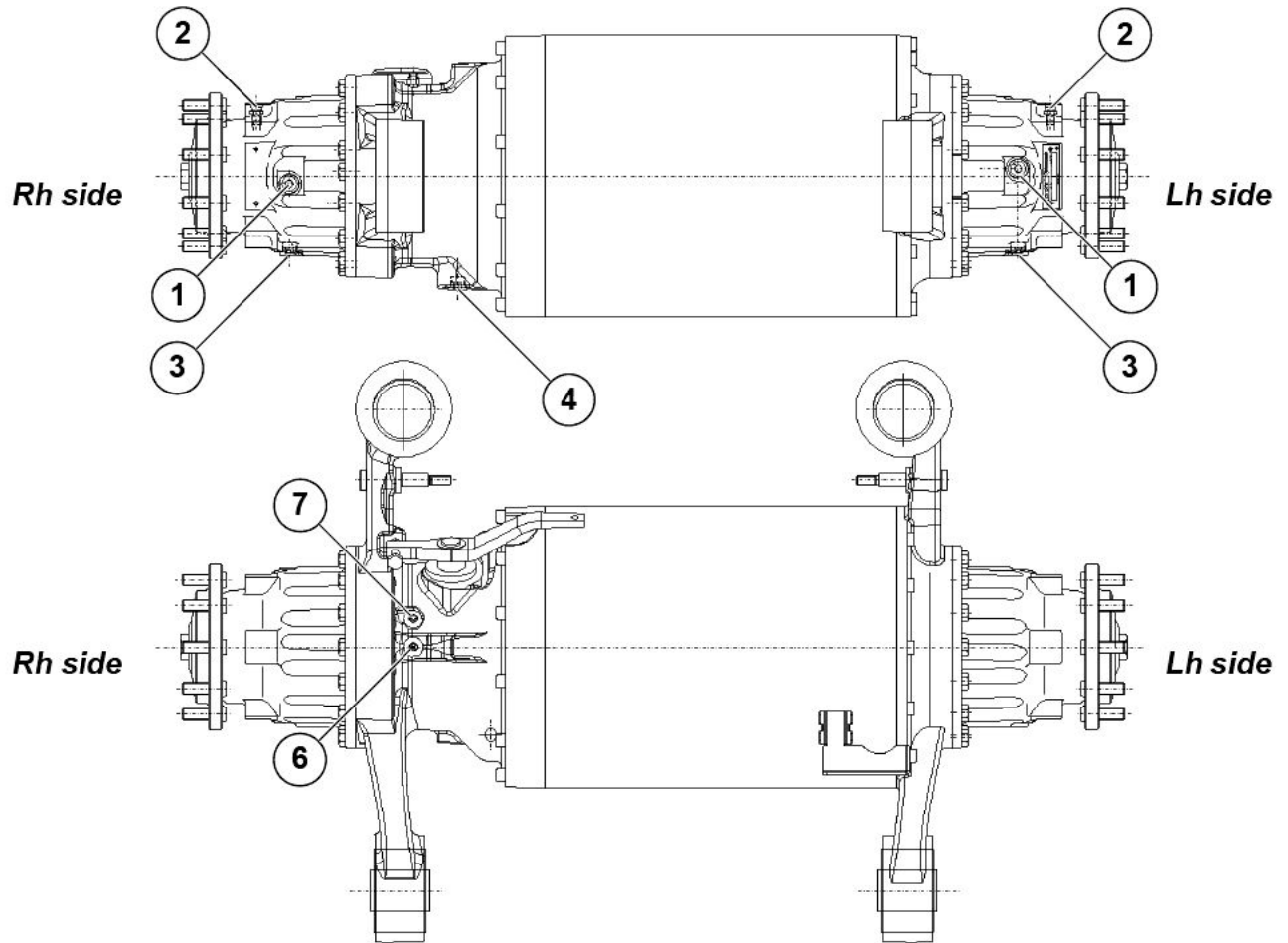
Value	Description
SAE 80W-90 EP TO COMPLY API GL4 RESPECTIVELY MIL-L-2105	OIL SPECIFICATION: USE RECOMMENDED OIL ENRICHED IN ADDITIVES. DO NOT USE SYNTHETIC OR VEGETABLE OIL WITHOUT CONSENT OF THE AXLE MANUFACTURER
0.95/1.00 LITERS	EPICYCLIC REDUCTION GEAR OIL CAPACITY (RH SIDE)
0.60/0.65 LITERS	EPICYCLIC REDUCTION GEAR OIL CAPACITY (LH SIDE)
IMPORTANT NOTE: DO NOT USE BRAKE DOT FLUID INTO BRAKE CIRCUIT	

REAR AXLE MAINTENANCE CHART

Description of Check/Service	Every 300 Hrs	Every 400 Hrs	Every 500 Hrs	Every 1000 Hrs	Every 2000 Hrs
Rear Axle Oil Change First Replacement 150-200 Hrs					X
Rear Axle-Clean Oil Plugs First Replacement At First Oil Change					X
Rear Axle-Check & Adjust Oil Level First Replacement 50-100 Hrs			X		
Rear Axle-Clean Oil Breather Area First Replacement 50-100 Hrs	X				

MAINTENANCE

REAR AXLE MAINTENANCE—OIL CHANGE

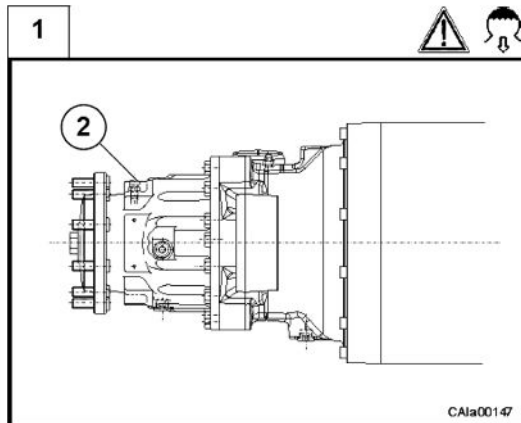


Item	Description
1	OIL FILLING AND LEVEL PLUG
2	OIL BREATHER
3	OIL DRAIN PLUG OF EPICYCLIC REDUCTION GEAR OIL
4	DIFFERENTIAL OIL DRAIN PLUG
5	GREASING POINT
6	OIL BLEED PLUG
7	OIL BRAKE CONNECTION

MAINTENANCE

REAR AXLE MAINTENANCE-OIL CHANGE

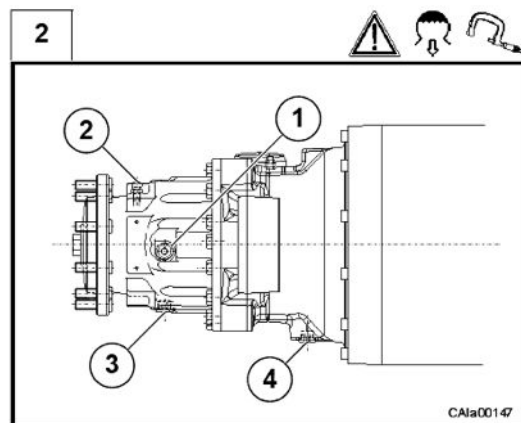
C.5.2 Oil change



Warning: to drain and fill the oil and to check the oil level the axle must be horizontal.

Danger: risk of violent oil ejection, follow carefully all the safety procedures indicated in this manual and in the vehicle manual.

Clean the breather (2) and the surrounding area.



Before draining the oil, loosen the breather (2) to release possible internal pressure.

To drain the oil remove for first the level plug (1) and then the two drain plugs (3) and (4).

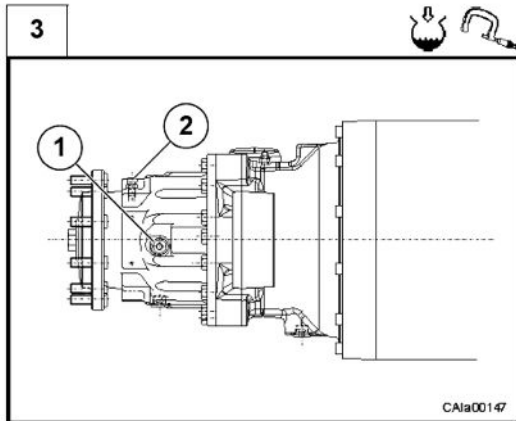
Danger: risk of violent oil ejection.

See: previous step

Clean and tighten the plugs (3) and (4) with a torque wrench to the prescribed torque.

MAINTENANCE

REAR AXLE MAINTENANCE-OIL CHANGE



Unscrew the oil fill plug (1) and fill to the bottom of the level plug hole with the specified oil.

Wait to allow the oil to flow through the axle. Check the oil level and fill to the specified level if necessary.

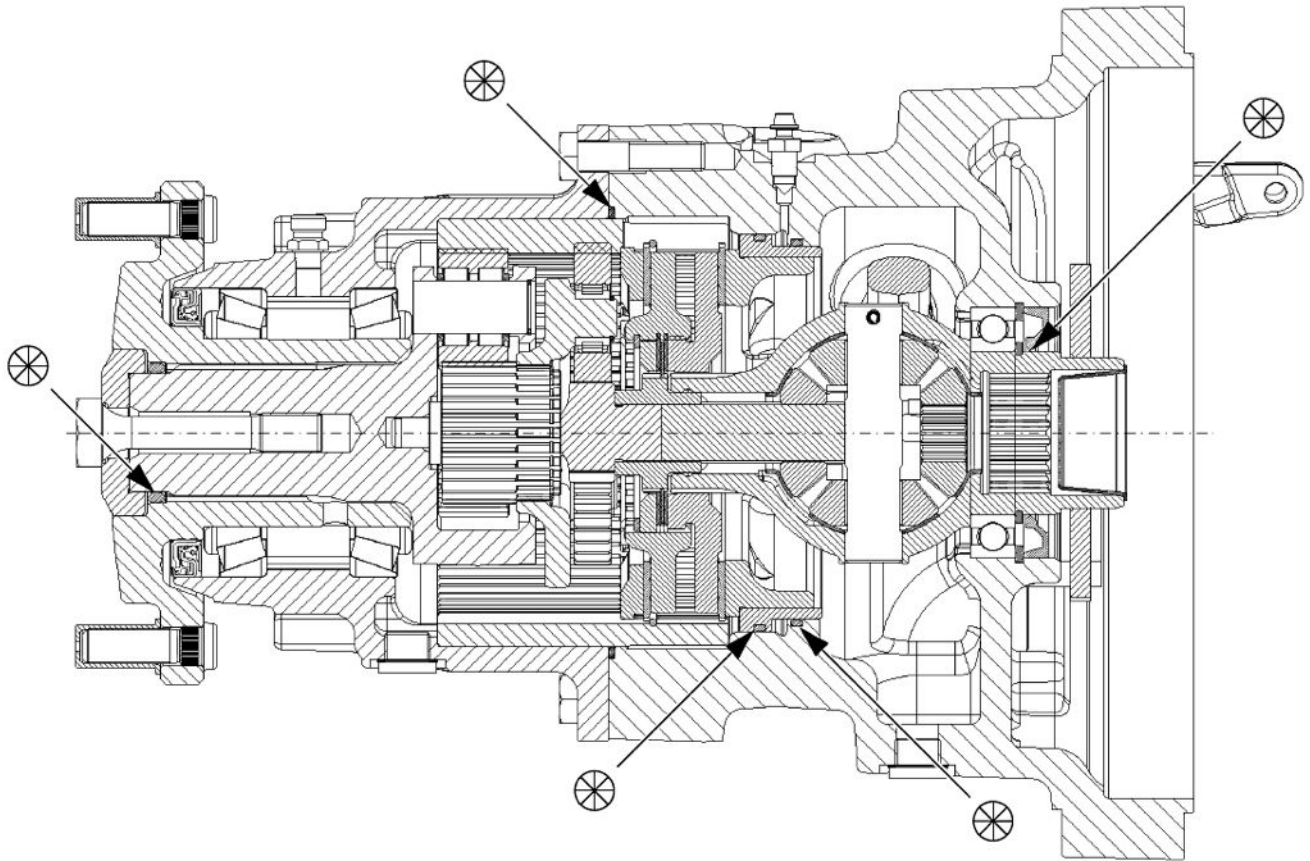
Assemble and tighten the plug (1) to the prescribed torque.

Tighten the breather plug (2) to the prescribed torque.

MAINTENANCE

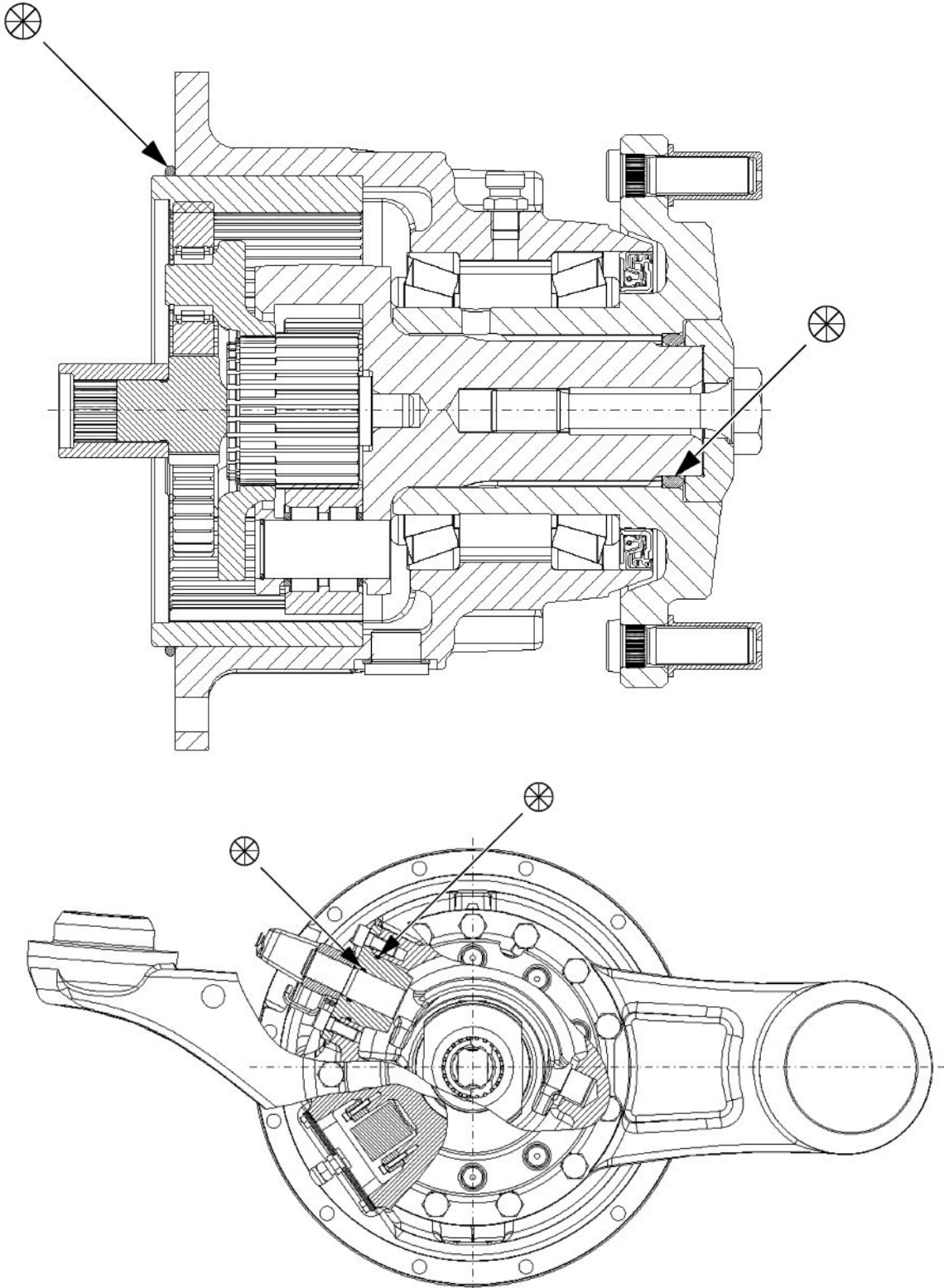
REAR AXLE MAINTENANCE-GREASE IN ASSEMBLY

<i>Grease application in assembly</i>		
⊗	Tecnolube® POLYMER 400	<i>Apply on the indicated surfaces</i>



MAINTENANCE

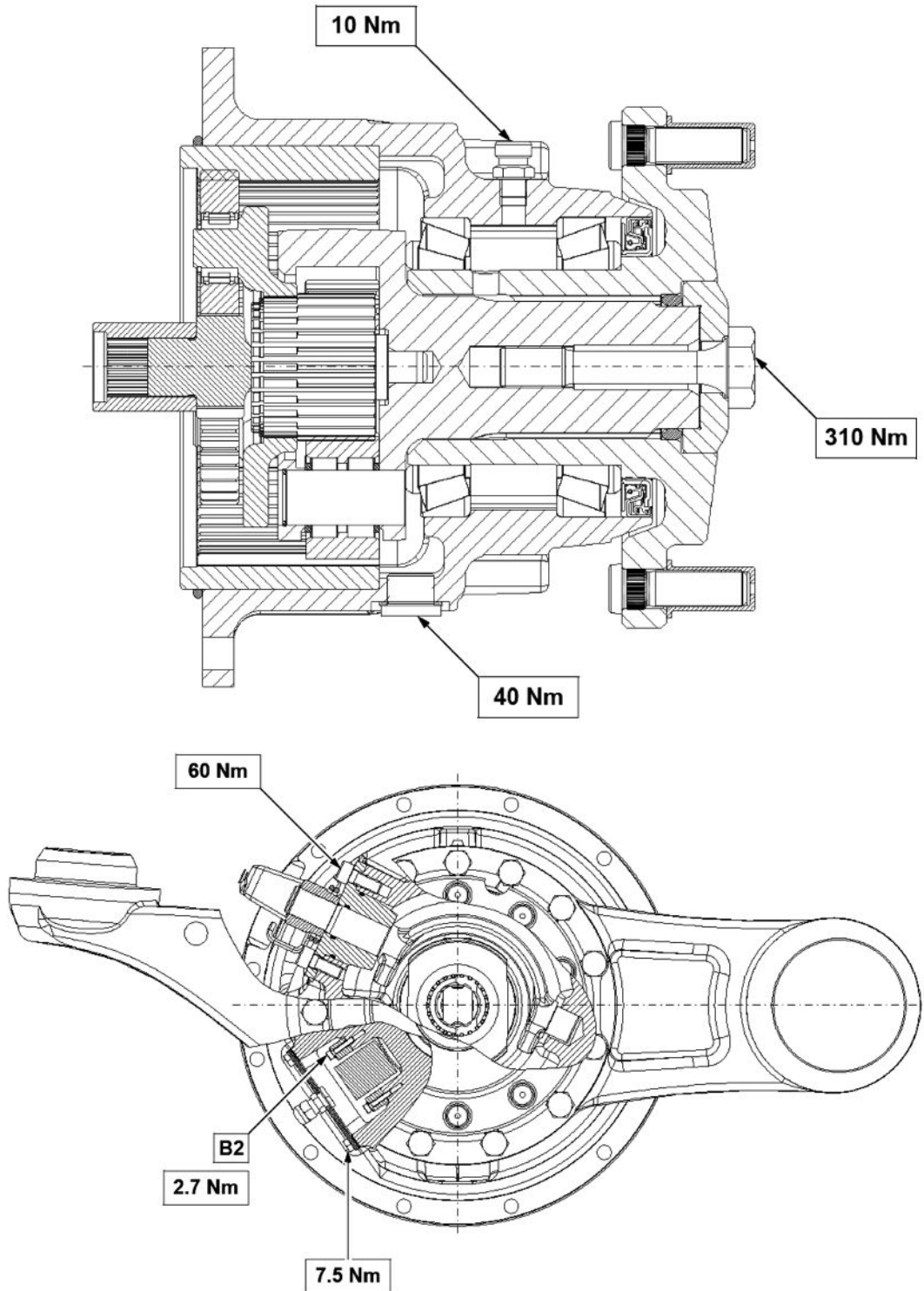
REAR AXLE MAINTENANCE-GREASE IN ASSEMBLY



MAINTENANCE

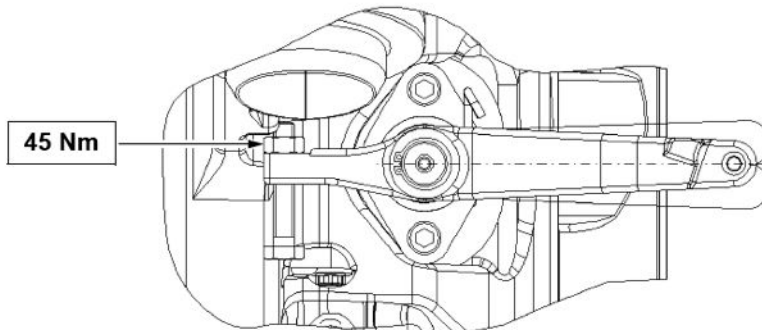
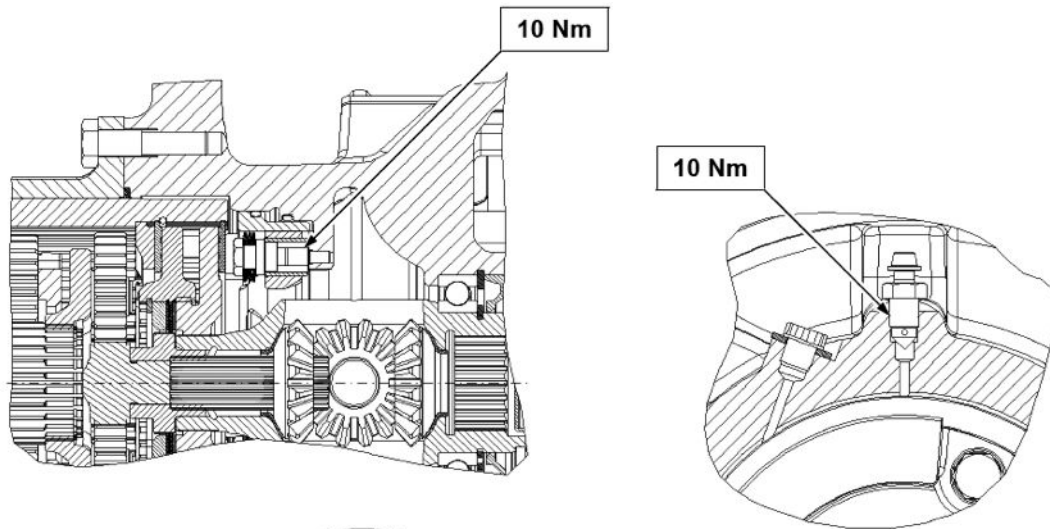
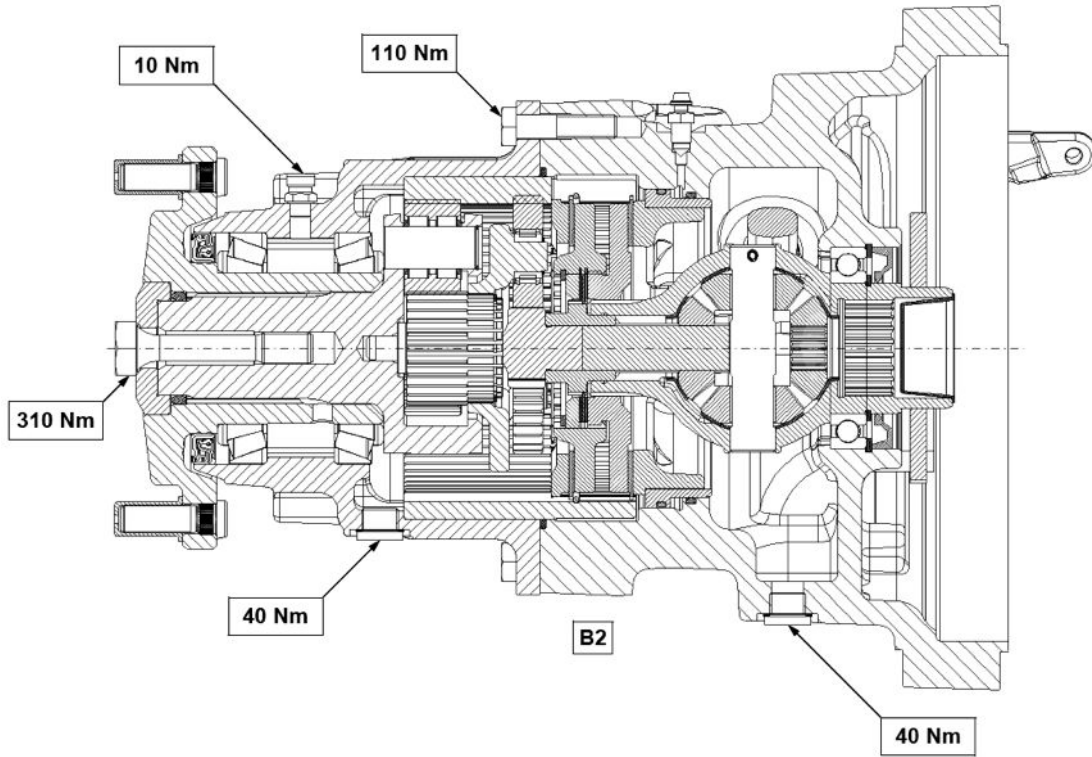
REAR AXLE MAINTENANCE-ADHESIVES AND TORQUE SPECIFICATIONS

Item	Application
B2	LOCTITE 270-THREAD PARTS SEALANT(LOCKING OF THREADED PARTS-HIGH STRENGTH**)



MAINTENANCE

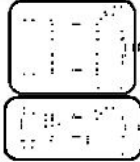
REAR AXLE MAINTENANCE-ADHESIVES AND TORQUE SPECIFICATIONS



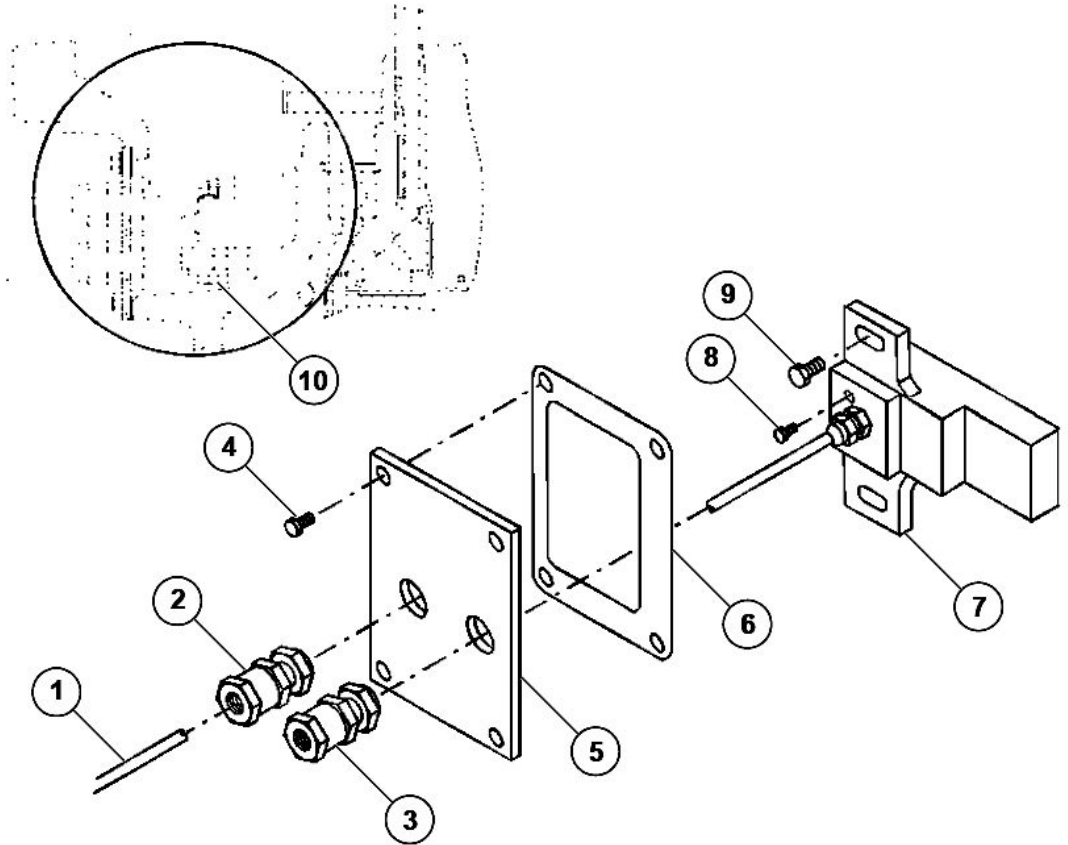
MAINTENANCE

REAR AXLE MAINTENANCE-SENSOR GROUP DISASSEMBLY

kit CA144680

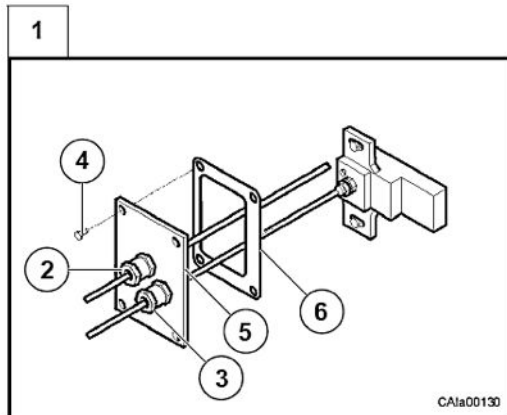


kit CA144368



D.1.1 Disassembly

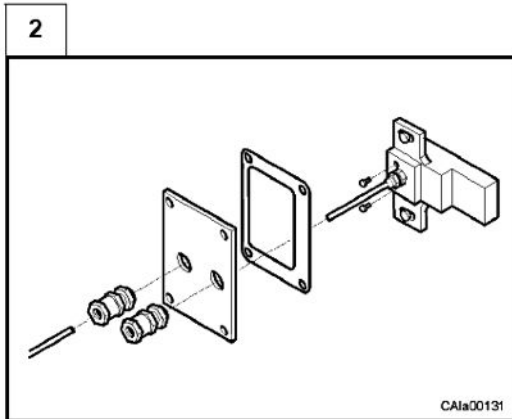
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



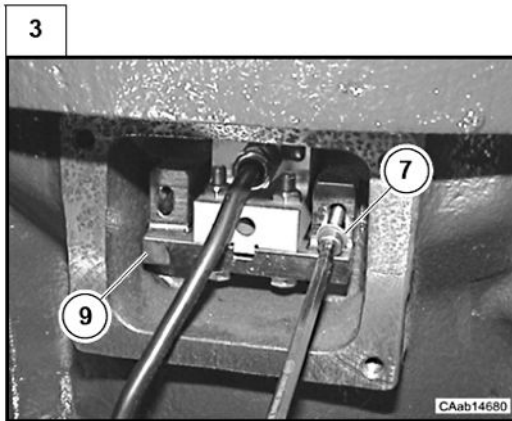
Loose the two cable-locking (2) and (3).
Remove the sensor cover (5) and the gasket (6) unscrewing the related fastening screws.

MAINTENANCE

REAR AXLE MAINTENANCE-SENSOR GROUP DISASSEMBLY



Remove the wirings and disassemble all the parts if necessary.



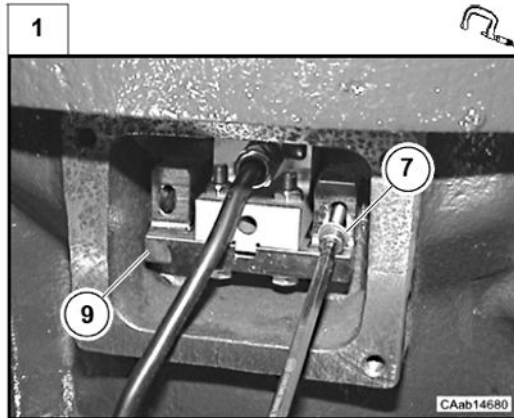
Disassemble the sensor (7) removing the related fastening screws (9).

MAINTENANCE

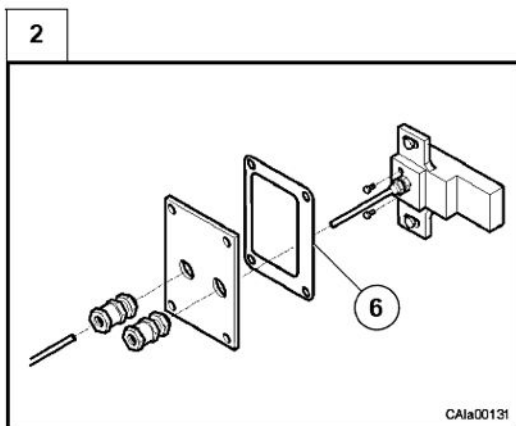
REAR AXLE MAINTENANCE-SENSOR GROUP ASSEMBLY

D.1.2 Assembly

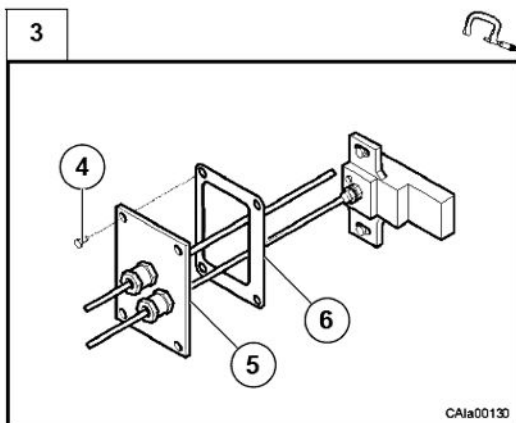
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Assemble the sensor (7) to right side housing with the related fastening screws (9).
Tighten the fastening screws with a dynamometric wrench to the requested torque.



Assemble the wiring parts, as shown in figure.
Note: insert the gasket (6) before joining cables end.



Assemble the cover (5) and the gasket (6) tightening the fastening screws (4) with a dynamometric wrench to the requested torque.

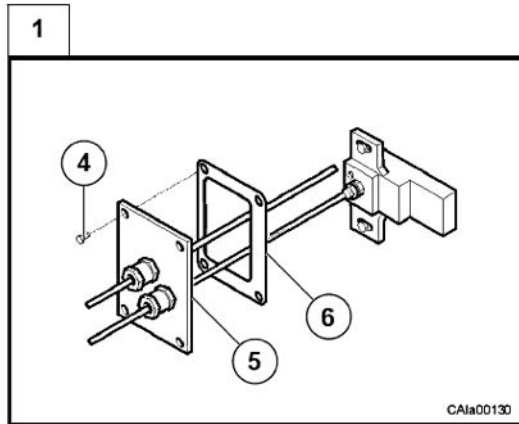
Note: it's necessary to remove the cover to perform the sensor adjustment.

MAINTENANCE

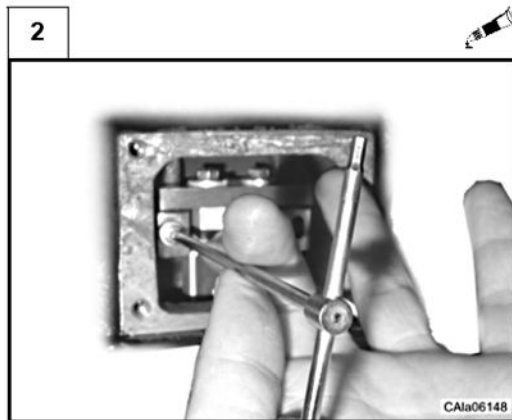
REAR AXLE MAINTENANCE-SENSOR ADJUSTMENT

D.1.3 Sensor adjustment

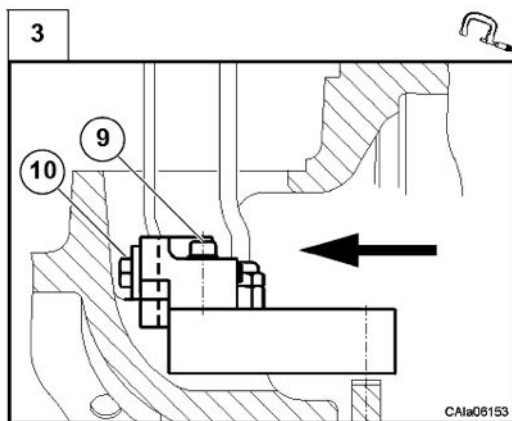
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Unscrew the fastening screws (4) and remove the cover (5) and the gasket (6)



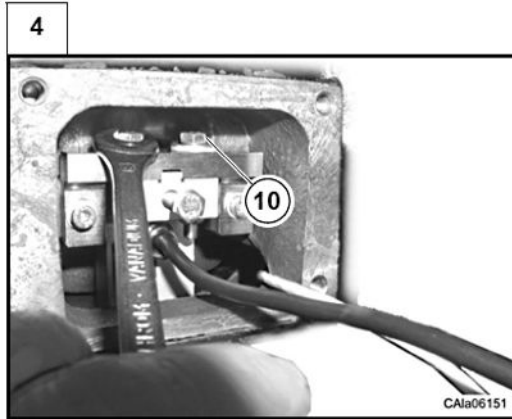
Remove the sensor fastening screws (9) and apply Loctite® 270 on the thread.
Assemble the fastening screws (9).



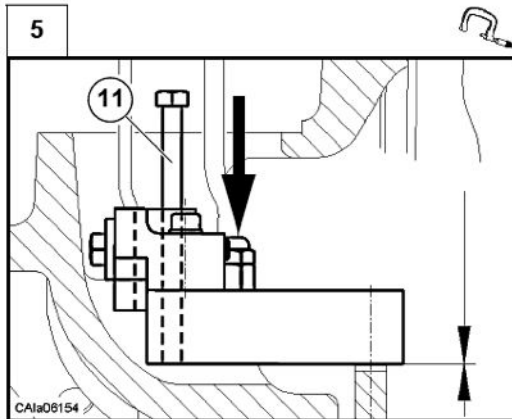
Keep the sensor backward against its seat and tighten the fastening screws (9) to the prescribed torque (2.7 Nm)

MAINTENANCE

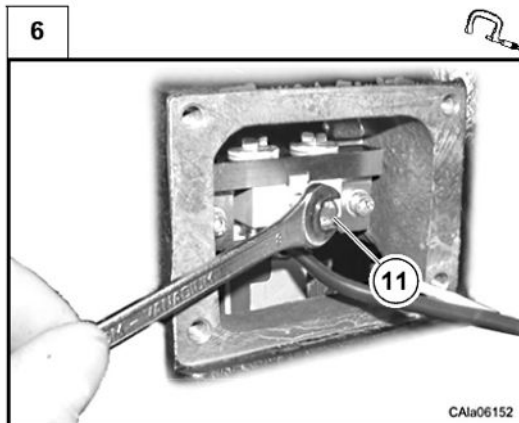
REAR AXLE MAINTENANCE-SENSOR ADJUSTMENT



Loosen the lock screws (10) to allow sensor sliding without backlash.



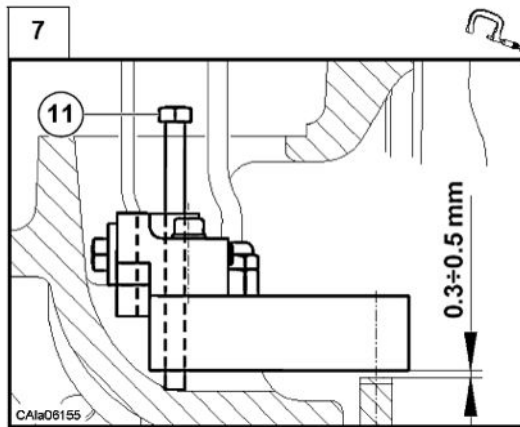
Assemble a M5x50 screw (11) to the sensor as shown in figure. Push lightly the sensor until it touches the speed meter wheel.



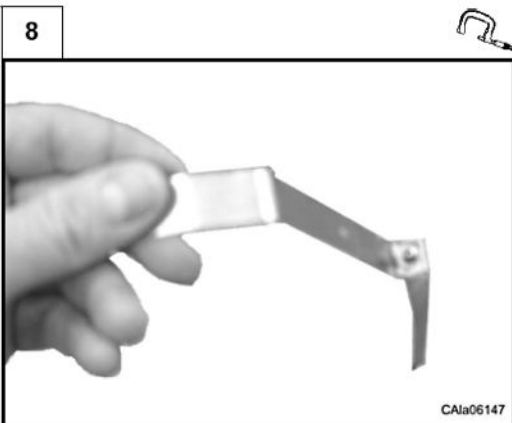
Screw in slowly the screw (11) (M5x50) until the screw end touches the body axle.

MAINTENANCE

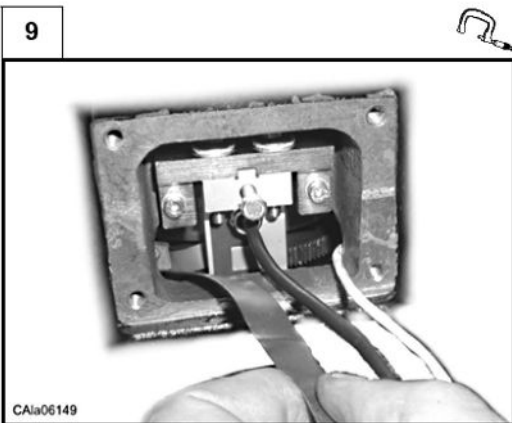
REAR AXLE MAINTENANCE-SENSOR ADJUSTMENT



Screw in the screw (11) of 1/2 turn + 1/8 turn to position the sensor to the indicated distance from the speed meter wheel.



To check the gap from the sensor and the wheel use the prescribed shaped shim.

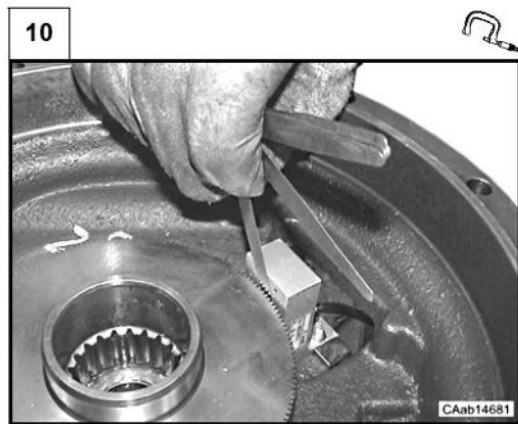


Check the correct sensor position indicated in scheme [7], as shown in figure.

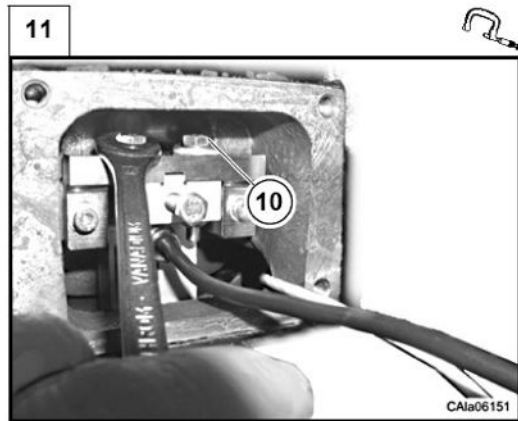
Note: it's possible check the right sensor position connecting the sensor to the vehicle electrical system.

MAINTENANCE

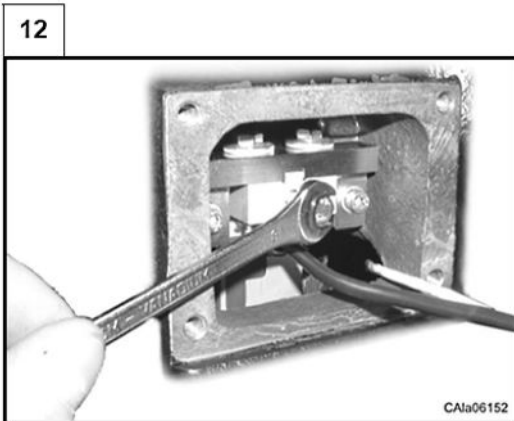
REAR AXLE MAINTENANCE-SENSOR ADJUSTMENT



If the housing has been removed (operation carried out on a workbench), use a normal shim as shown in figure.



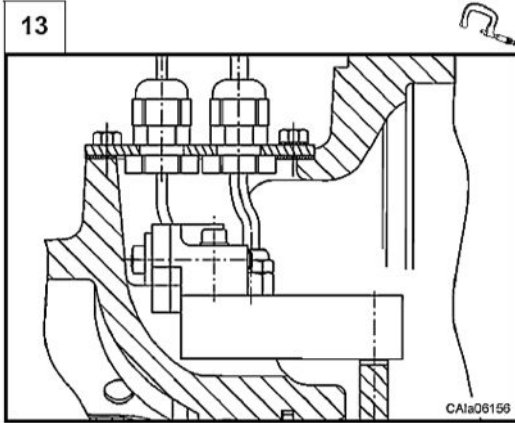
Tighten the fastening screws (10) to the requested torque (5.5 Nm) to lock the sensor in the correct position.



Remove the adjustment screw (11).

MAINTENANCE

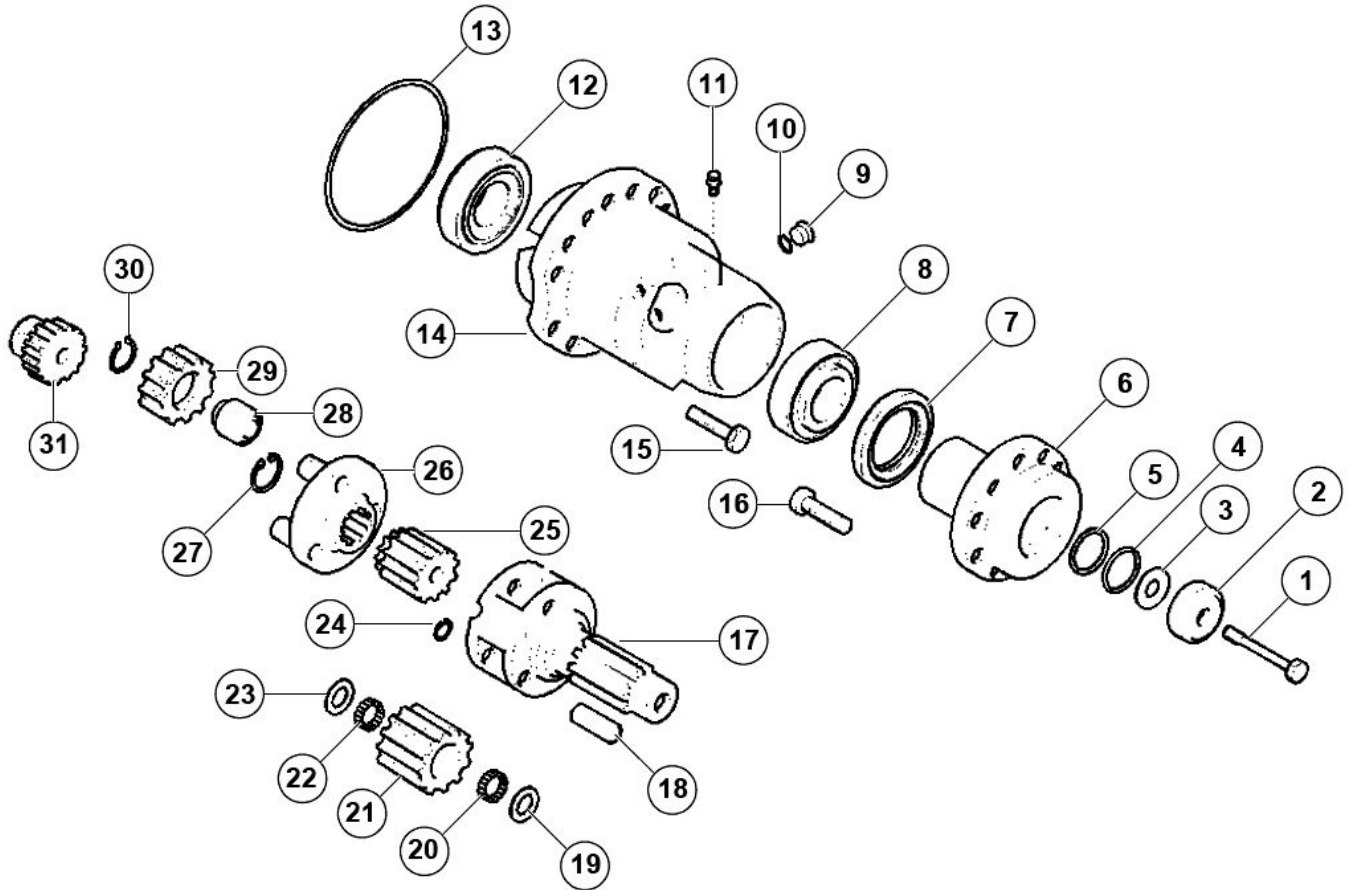
REAR AXLE MAINTENANCE-SENSOR ADJUSTMENT



Assemble the cover (5) and the gasket (6) tightening the fastening screws (4) to the requested torque.

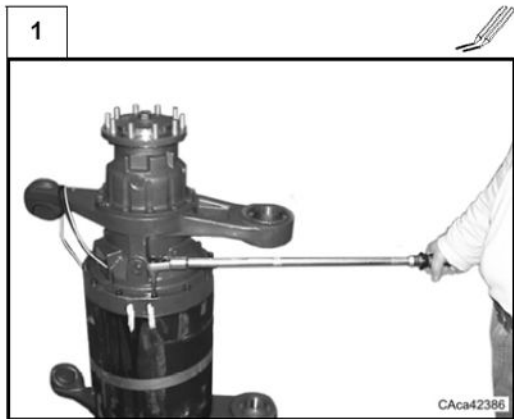
MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY



D.2.1 Disassembly

Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.

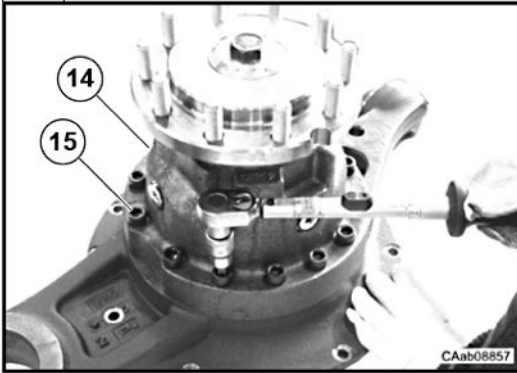


Remove the housing fastening screws from the electrical motor.
Note: it's advisable mark the housing and electrical motor before disassembling to reassemble the two parts in the same position.

MAINTENANCE

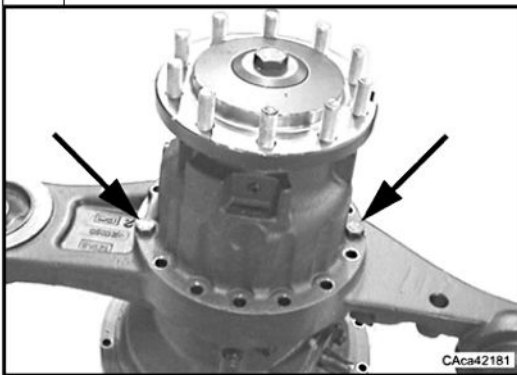
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY

2



Remove the fastening screws (15) from reduction gear group (14) but leave at least two opposed screws to fix the group.
See: next step.

3



Note: do not remove at least two the fastening screws (15).

4



Hook the reduction gear/housing group by means of a suitable lifting system.

Danger: hung up heavy bodies, use only carrier parts comply the safety law in force.

MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY

4



Hook the reduction gear/housing group by means of a suitable lifting system.

Danger: hung up heavy bodies, use only carrier parts comply the safety law in force.

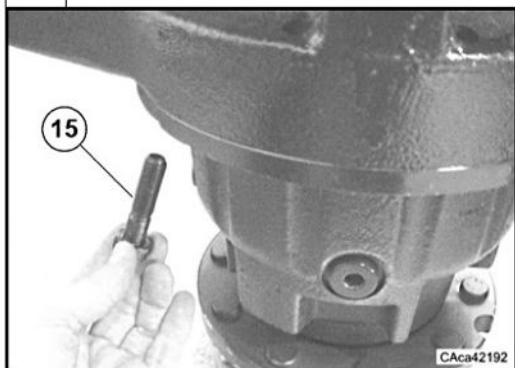
5



Remove the reduction gear/housing unit from the electrical motor then place it on a suitable workbench.

Overturn the whole.

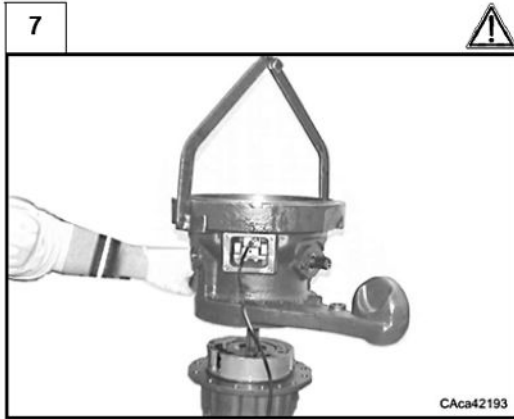
6



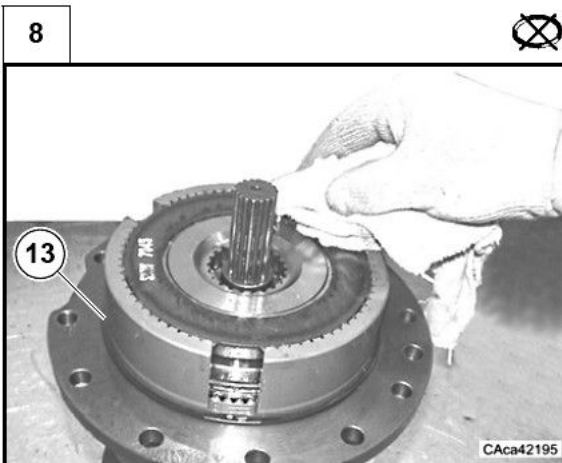
Remove the fastening screws (15).

MAINTENANCE

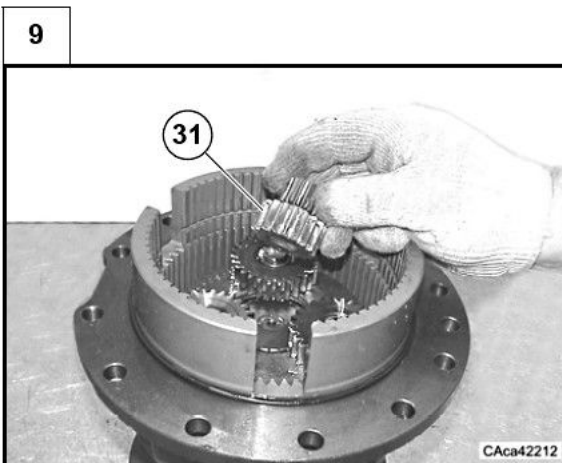
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY



Remove the housing from the reduction gear unit.
Danger: hung up heavy bodies, use only carrier parts comply the safety law in force.



Remove the O-Ring (13).
 Clean with care and remove brake group parts.
See: D.3.



Remove the gear (31).

MAINTENANCE

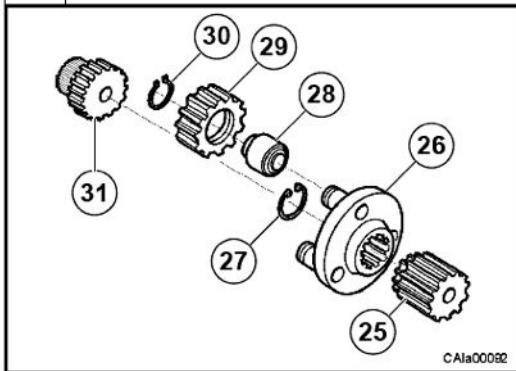
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY

10



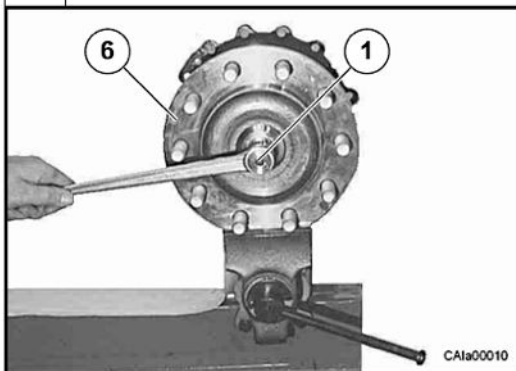
Remove the planetary carrier group.

11



If necessary disassemble the planetary carrier (26) removing the lock rings (30) and the planetary gear (29) with related bearings (28). Remove the lock ring (27) and take the pinion out of planetary carrier (26).

12

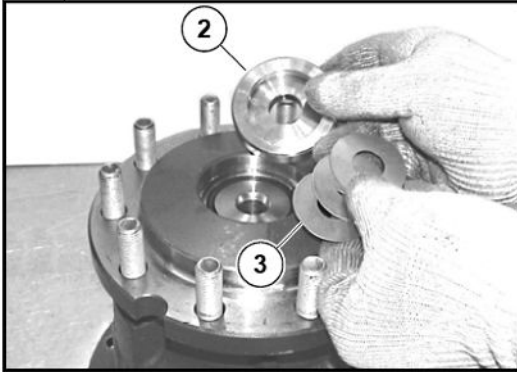


Lock the wheel hub (6) and remove the selflocking fastening screw (1). **Note:** it is advisable to place the group in a vice as shown in figure; this operation is destructive for the self-locking screw, then the screw must be replaced in assembly.

MAINTENANCE

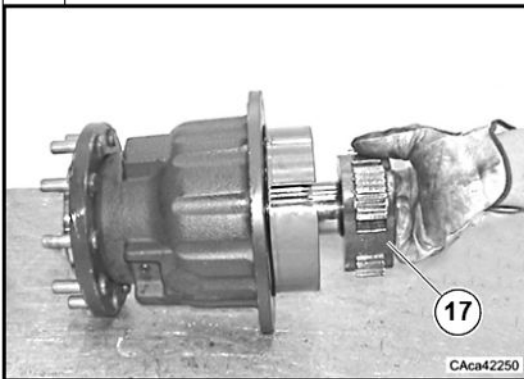
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY

13



Collect the trust washer (2) and the shims (3).

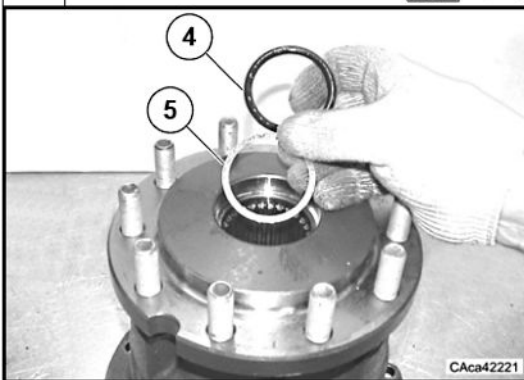
14



Extract the planetary carrier (17).

Note: if necessary push on the shaft end with a driver and a hammer; keep the planetary carrier with the splined end upward, the pins of the differential gears can come out easily and free all the group parts (needle bearings, gears and washers).

15



Remove the O-Ring (4) and the thin washer (5).

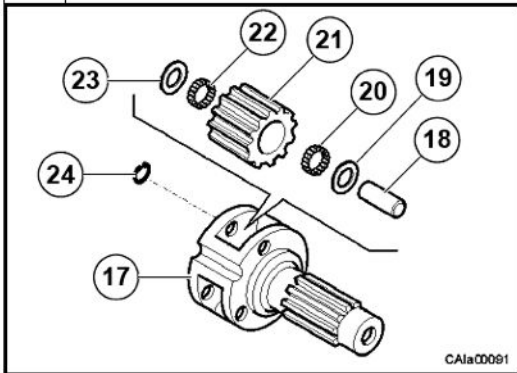
Note: the O-Ring must be replaced.

Warning: keep the planetary carrier with the splined end upward, the pins of the differential gears can come out easily and free all the group parts (needle bearings, gears and washers).

MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY

16



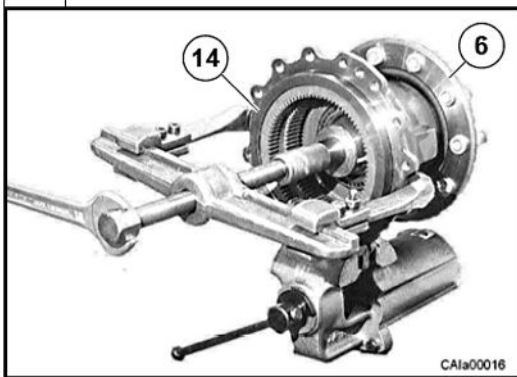
To carry out any possible replacements of the planetary gears:

- remove the pin (18);
- take the planetary gears (21) out;
- collect the needle bearings (20, 22) and the thrust washers (19, 23).

Note: if replace the gears use new needle bearings.

Remove the lock ring (24) only if necessary.

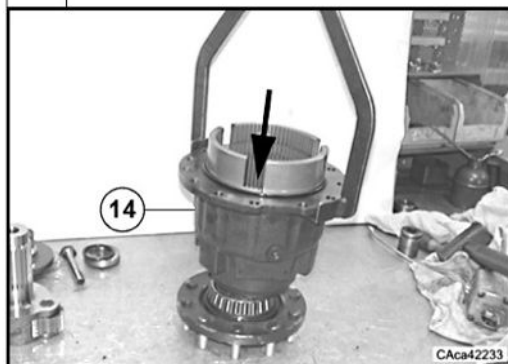
17



Remove the wheel hub (6) from the right side trumpet (14), using a suitable puller and the driver CA716038.

Note: it is advisable use a three holding point puller.

18

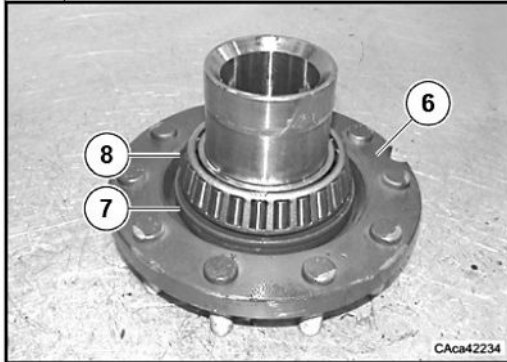


It's also possible to hook the trumpet (14) and beat on the wheel hub shaft end using a pad with a hammer.

MAINTENANCE

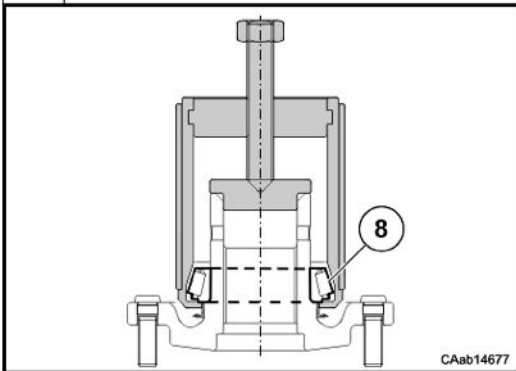
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY

19



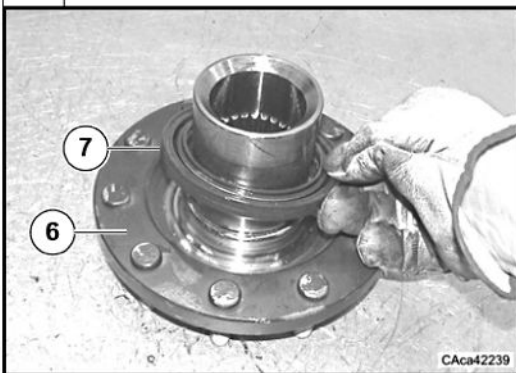
Place the wheel hub (6) on a flat surface to remove the bearing cone (8) and seal ring (7).

20



Remove the bearing cone (8) using the special tool CA716035.

21

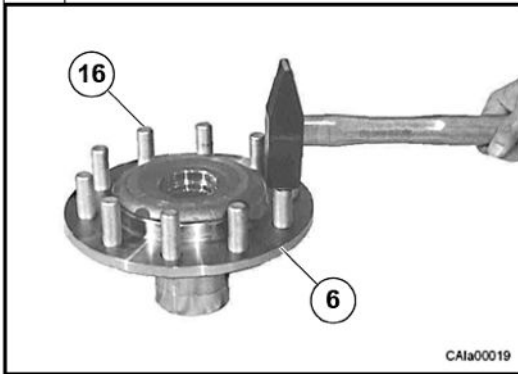


Remove the seal ring (7).
Note: this is a destructive operation for the seal ring.

MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP DISASSEMBLY

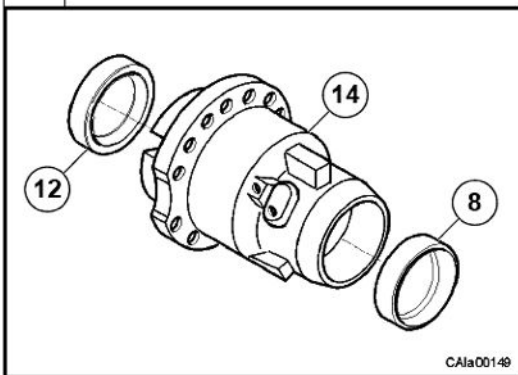
22



If necessary replace the wheel fastening studs (16), remove them from wheel hub (6) with a hammer.

Note: this is a destructive operation for the studs.

23



Remove the bearings cup (8) and (12) from the trumpet (14).

24



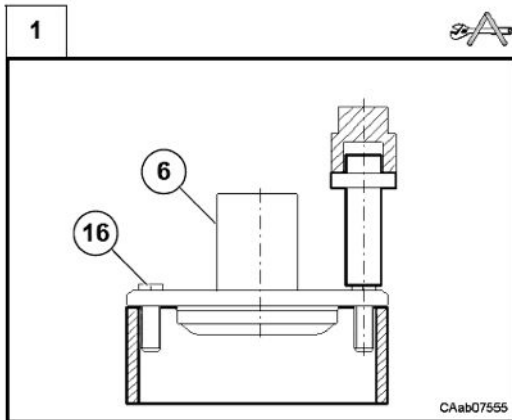
To remove the bearings cup (8) and (12) from the trumpet (14) it's advisable use a punch and a hammer.

MAINTENANCE

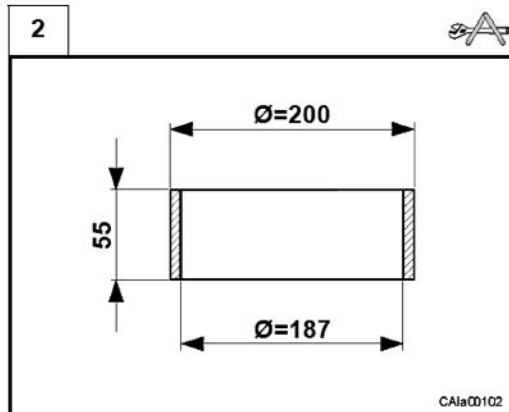
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY

D.2.2 Assembly

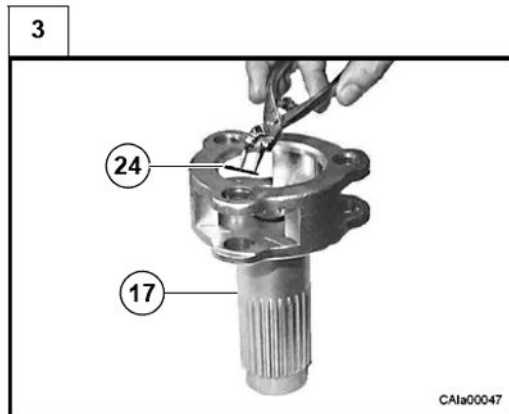
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Place the wheel hub (6) under a press on a suitable support, it is advisable use a ring of steel with the dimensions shown in the next figure [2].
Fit with a suitable driver all the studs (16) under the press action.



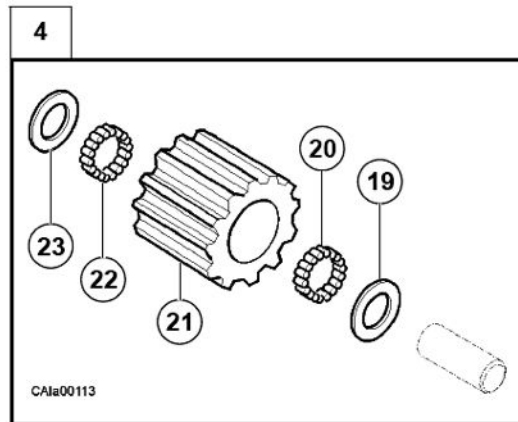
To support the wheel hub (6) it is advisable use a ring of steel with the dimensions shown in figure.



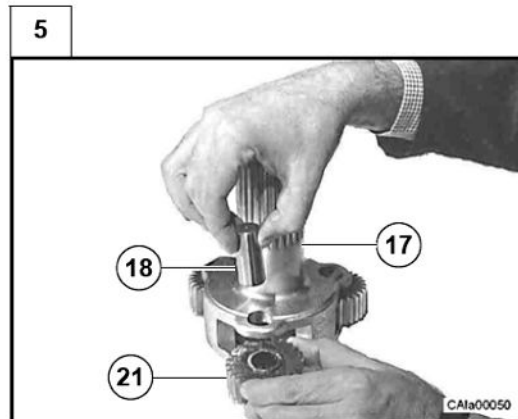
Place the planetary carrier (17) on a workbench, with the splined end downward.
Insert the lock ring (24) in the pin holes using a suitable pliers.

MAINTENANCE

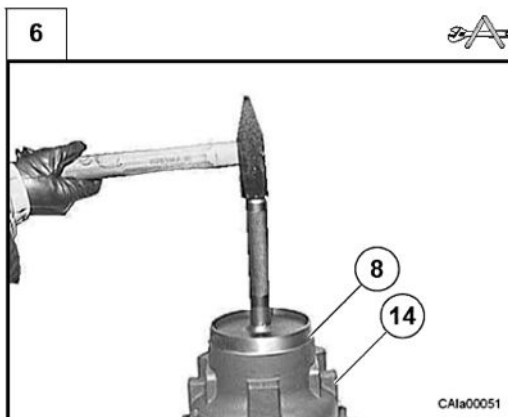
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Grease the inner part of planetary gears (21) in order to help the right positioning of the needle bearings (20, 22). Insert the needle bearings (20, 22) and the trust washers (19, 23) in the planetary gears as shown in figure.



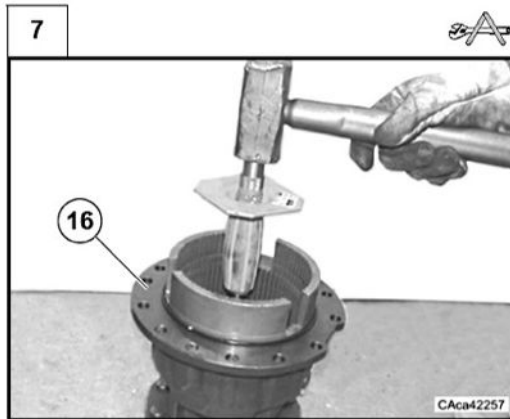
Place the planetary carrier (17) on a workbench with the splined end upward. Insert every gear (21) in the planetary carrier, with the related needle bearings and trust washers in the grease, then insert the pin (18).



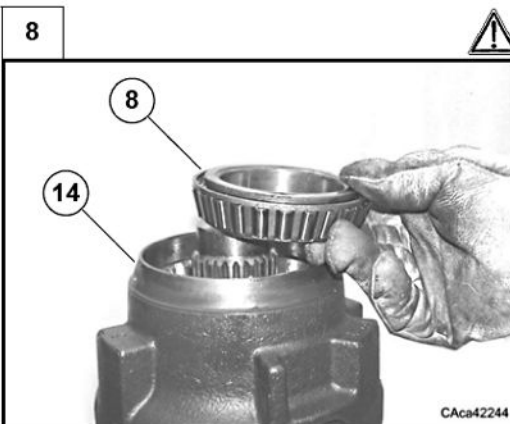
Place the trumpet (14) on a flat surface and assemble the wheel hub bearing cup (8) with the driver CA715933.

MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY

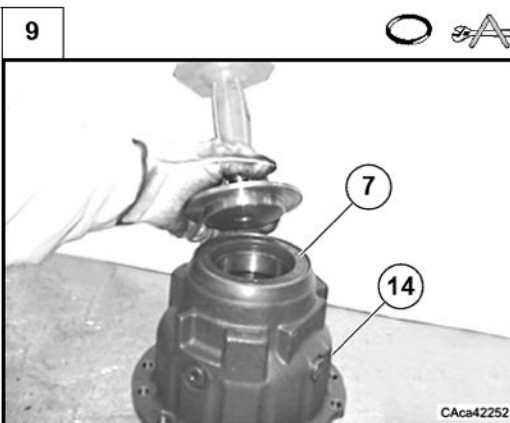


Turn the trumpet (14) upside down and assemble the other wheel hub bearing cup (12) with the driver CA715933.



Warning: next operations from [9] to [13] must be carried out quickly to take advantage of the thermal expansion of the bearings.
Heat the wheel hub bearing cone (8) (wheel side) at 110°C then place it in the trumpet (14).

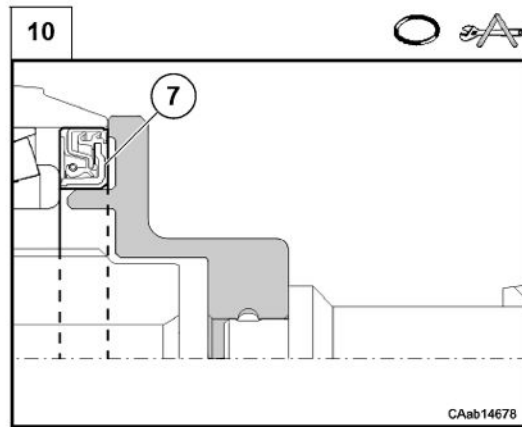
Danger: burn, wear safety gloves.



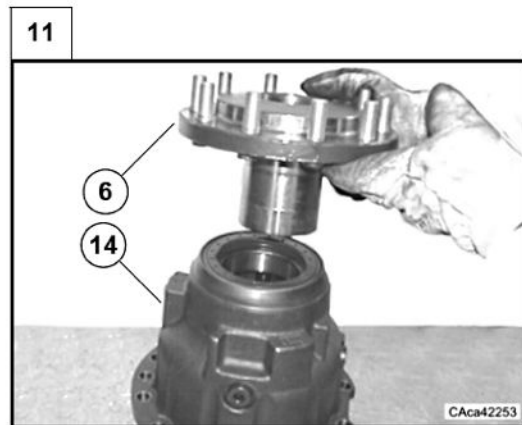
Before assemble seal ring (7), spread a thin layer of oil on the inner leap.
Assemble the seal ring (7) in the trumpet (14) with the driver CA716272.

MAINTENANCE

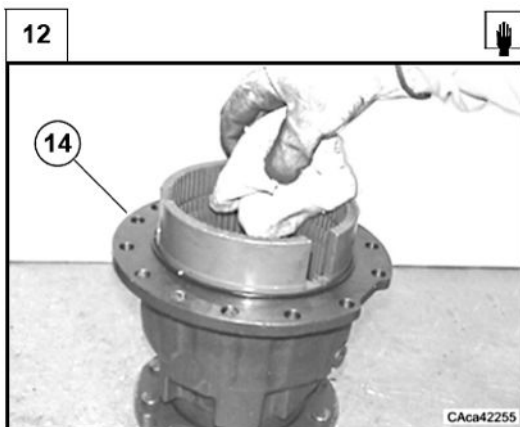
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Assembly scheme of the seal ring (7) in the trumpet (14) with the driver CA716272.



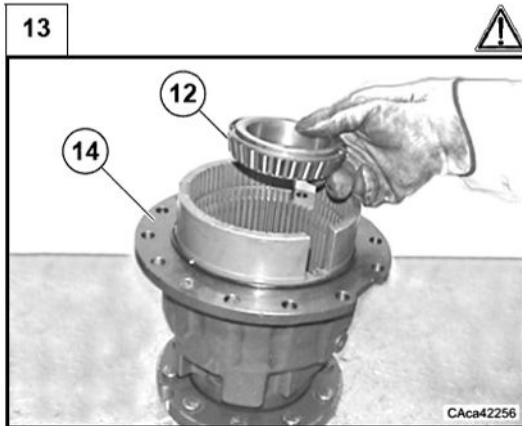
Insert with attention the wheel hub (6) in the trumpet (14) until the end of the stroke is reached.



Overturn the trumpet (14) upside down and clean with care the bearing cup (12) seat.

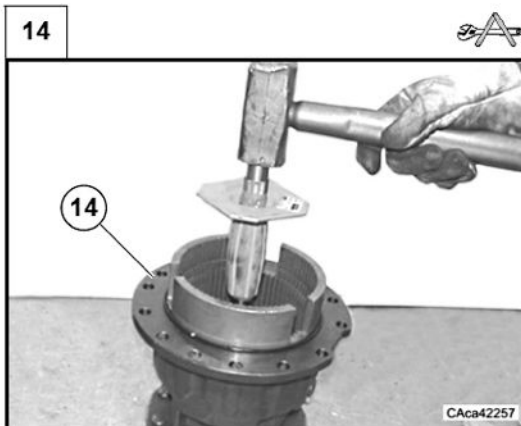
MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY

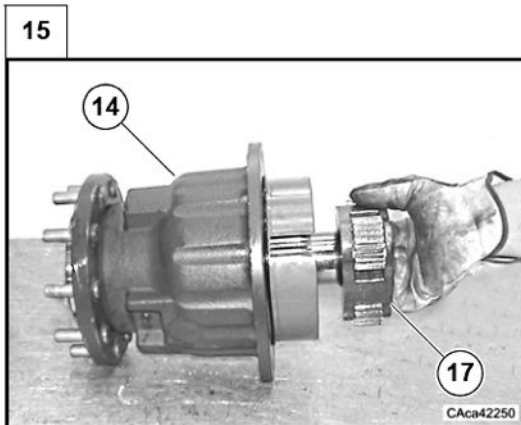


Heat the wheel hub bearing cone (12) at 110°C then place it in the trumpet (14).

Danger: burn, wear safety gloves.



Assemble the wheel hub bearing cone (12) with a driver and a hammer.



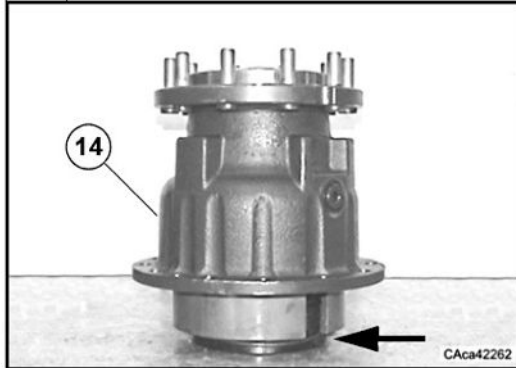
Insert the planetary carrier (17) into the trumpet (14).

Note: do not overturn the planetary carrier, the pins of the differential gears can come out easily and free all the group parts (needle bearings, gears and washers).

MAINTENANCE

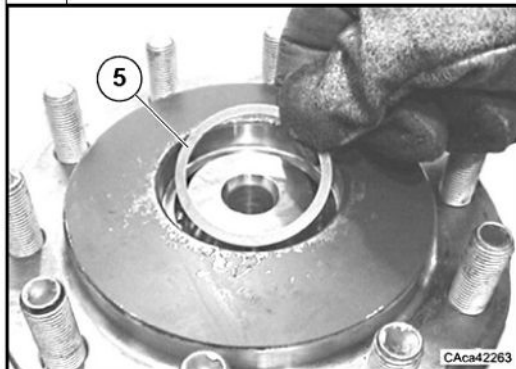
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY

16



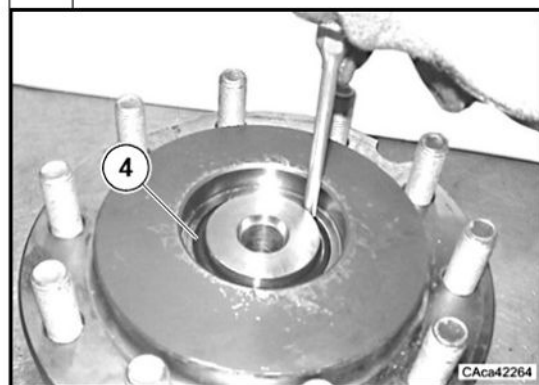
Place the planetary carrier (17) on a support of minimum thickness 40 mm, then complete the assembly of the trumpet (14) on the planetary carrier (17) in order to assure the right positioning of the bearings parts (12).

17



Install the thin washer (5).

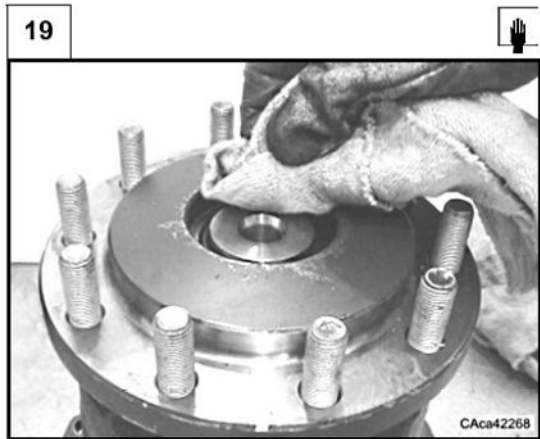
18



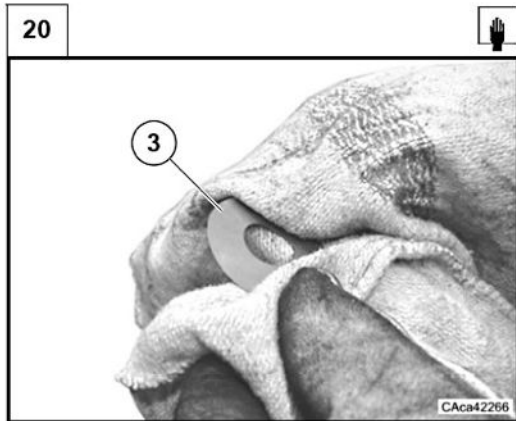
Assemble the new O-ring (4).

MAINTENANCE

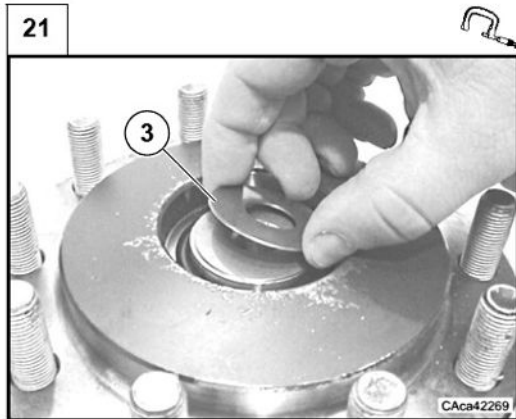
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Clean with care the assembly surface.



Clean with care the shims (3). All the shims must be dry and well degreased.



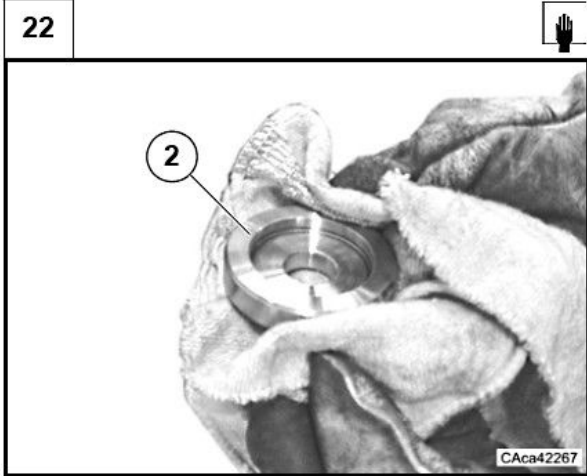
SHIM RANGE				
Thickness	0.05	0.10	0.30	0.50
Quantity	---	---	---	---

Choose among the available shims (3) a quantity in a way to reach the recommended value $X = 0.8 \text{ mm}$.

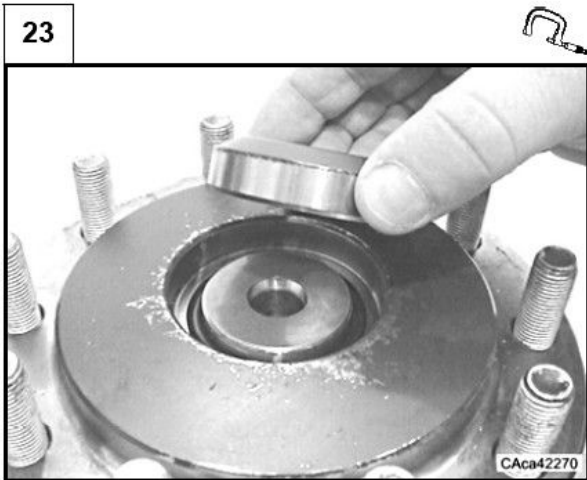
See: D.2.3.

MAINTENANCE

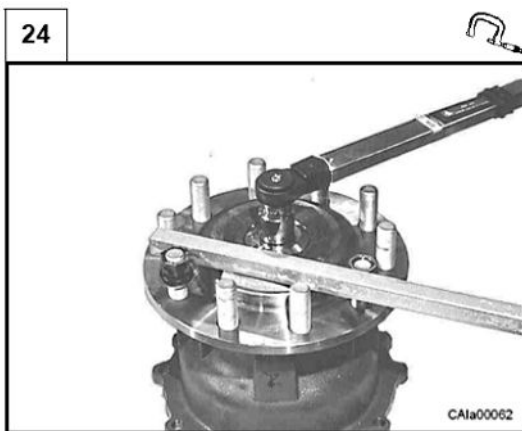
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Clean with care the washer (2).



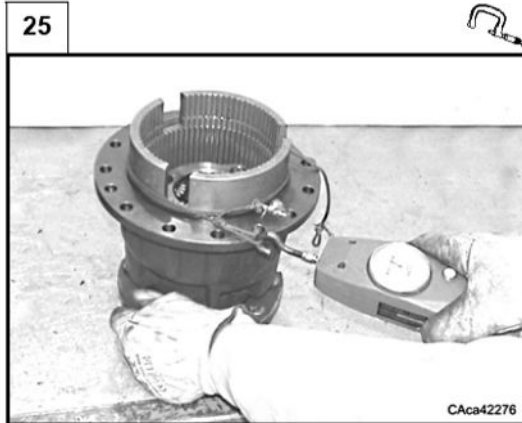
Assemble the washer (2) to the wheel hub (6).



*Assemble a screw **M16x80** in the seat of the screw (1) to the prescribed torque (see C.7) by means of a dynamometric wrench and a lever.
Note: in order to not damage the thread of the studs, screw two nuts for the lever support.*

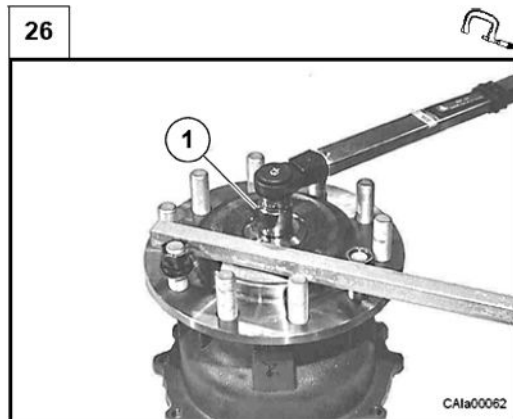
MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



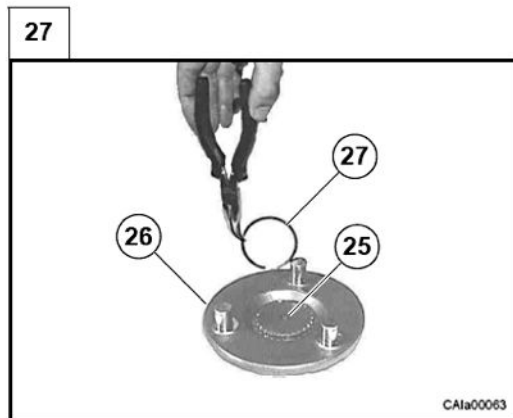
Overturn the group and check the conical bearings preload:

- if this value exceed 62 N it is necessary to add some shims (0.05 mm or multiple);
- if this value is lower than 38 N it is necessary to take off some shims (0.05 mm or multiple).



When the prescribed value of preloading has been reached remove the screw M16x80 and assemble the screw (1) to the prescribed torque (see C.7) by means of a dynamometric wrench and a lever.

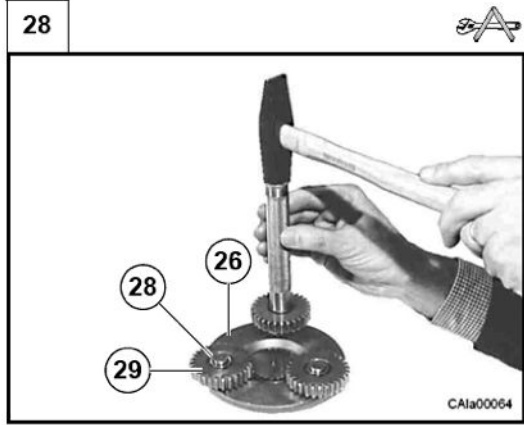
Note: in order to not damage the thread of the studs, screw two nuts for the lever support.



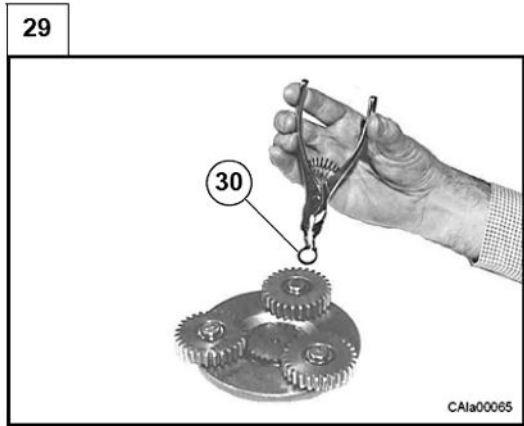
Assemble the pinion gear (25) in the planetary carrier (26) then lock it with the lock ring (27).

MAINTENANCE

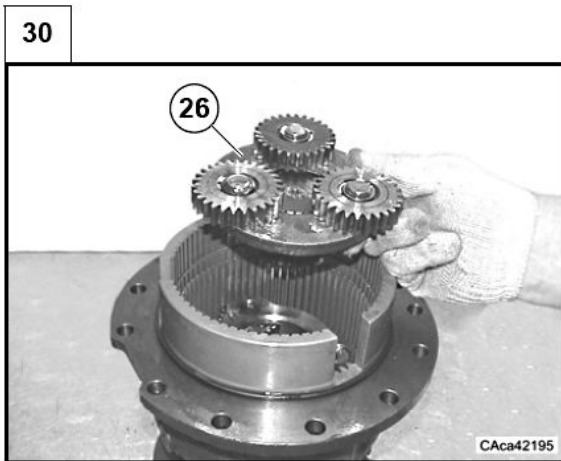
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Assemble the planetary gears (29) on the planetary carrier (26) using the driver CA715006 and a hammer.
Note: the planetary gears have the bearing (28) preassembled.



Assemble the lock rings (30) with suitable pliers.

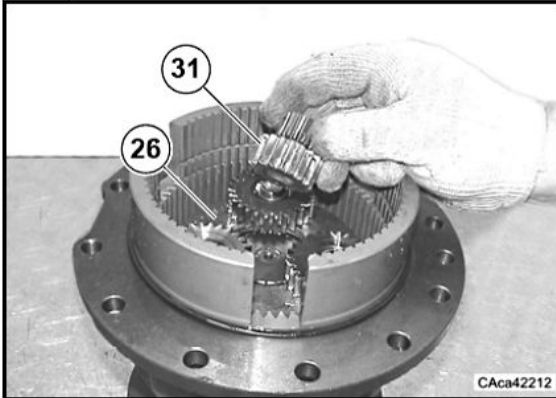


Assemble the planetary carrier (26) to the trumpet group.

MAINTENANCE

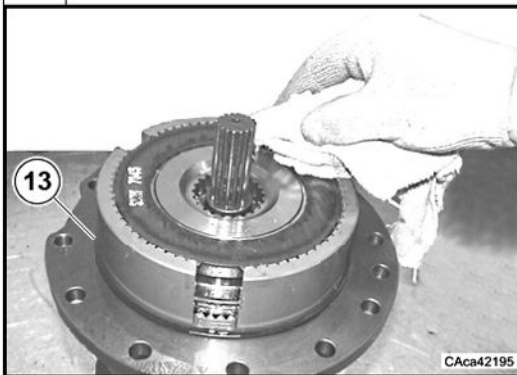
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY

31



Insert the pinion gear (31) in the planetary carrier(26).

32



Note: before assemble the right side housing to the reduction gear group, assemble the brake group (see D.3) and the housing group (see D.4).

Assemble a new well lubricated O-Ring (13).
Clean with care the coupling surfaces.

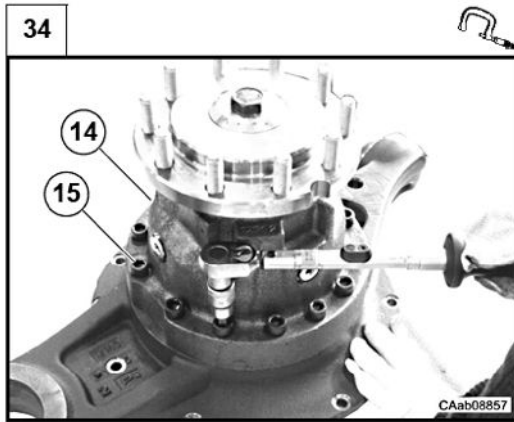
33



Place the motor housing on the right reduction gear lifting it with a hoist.
Danger: hung up heavy bodies, use only carrier parts comply the safety law in force.

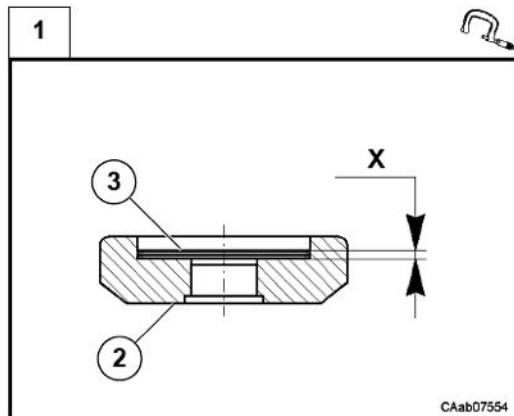
MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Fit the right reduction gear (14) to the housing tightening the fastening screws (15) to the prescribed torque (see C.7) by means of a dynamometric wrench.

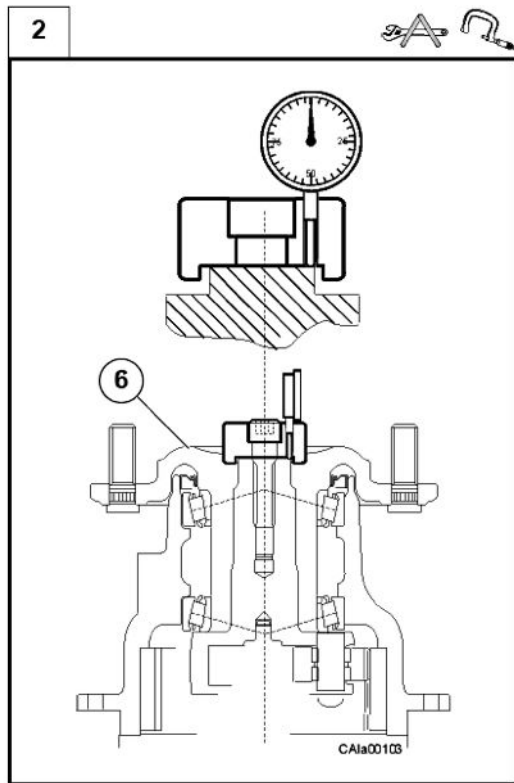
D.2.3 Definition of starting thickness value (X) for the adjustment of wheel hub roller bearings preloading



This procedure must be employed to define the value of the starting thickness (X) for the wheel hub roller bearings preloading adjustment.
Note: it's recommended use a quantity of shims in a way to reach the starting value $X = 0.8 \text{ mm}$ (see D.2.2.24).

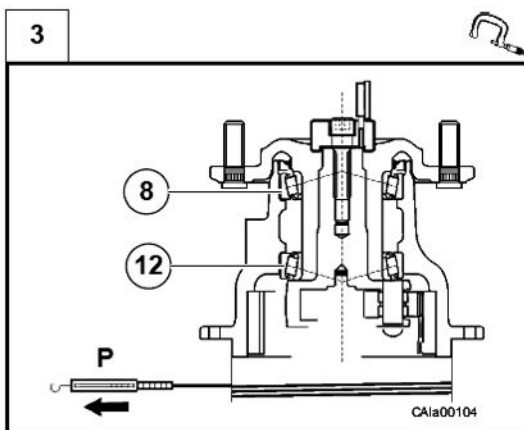
MAINTENANCE

REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Register wheel hub (6) roller bearings preloading:

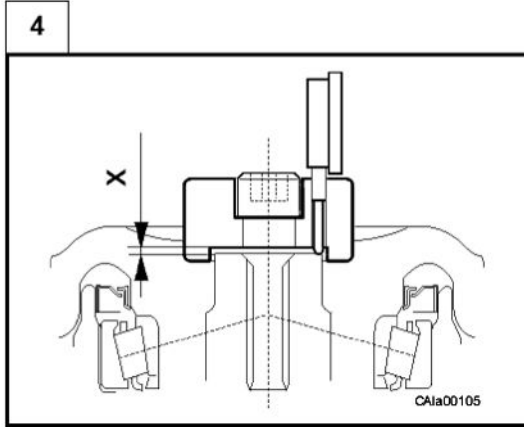
- hold firmly on a vice or in a specific tool the flange of the wheel hub (6);
- set to zero the adjustment equipment CA 715005 by means of the dial gauge on a surface plate, as shown in figure;
- assemble the group on the wheel hub (6) locking it by means of a screw TCEI M16x80.



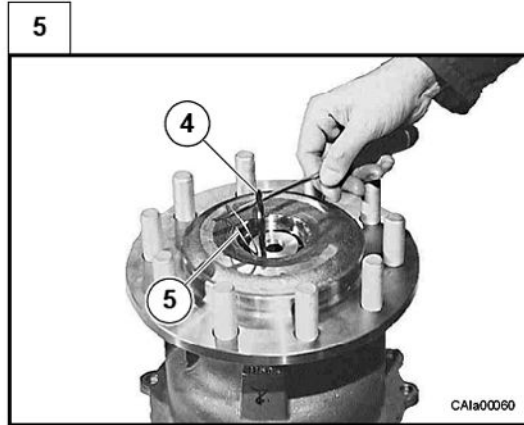
- preload the tapered bearings (8, 12) with the screw M16x80 up to a 38÷62 N measured load (P) tangent to the diameter shown in figure, applying a rotation of about 15 revs/min. Carry out the operation using only the components shown in figure.

MAINTENANCE

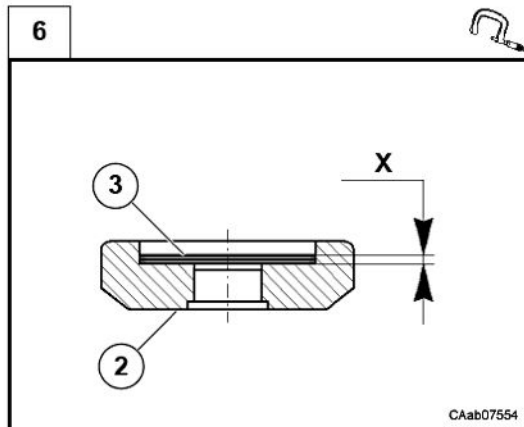
REAR AXLE MAINTENANCE-RH REDUCTION GEAR GROUP ASSEMBLY



Read the value (X) from the dial gauge as shown in figure.



Disassemble the tool CA715005 and the dial gauge. Install the thin washers (5) and the new O-ring (4).

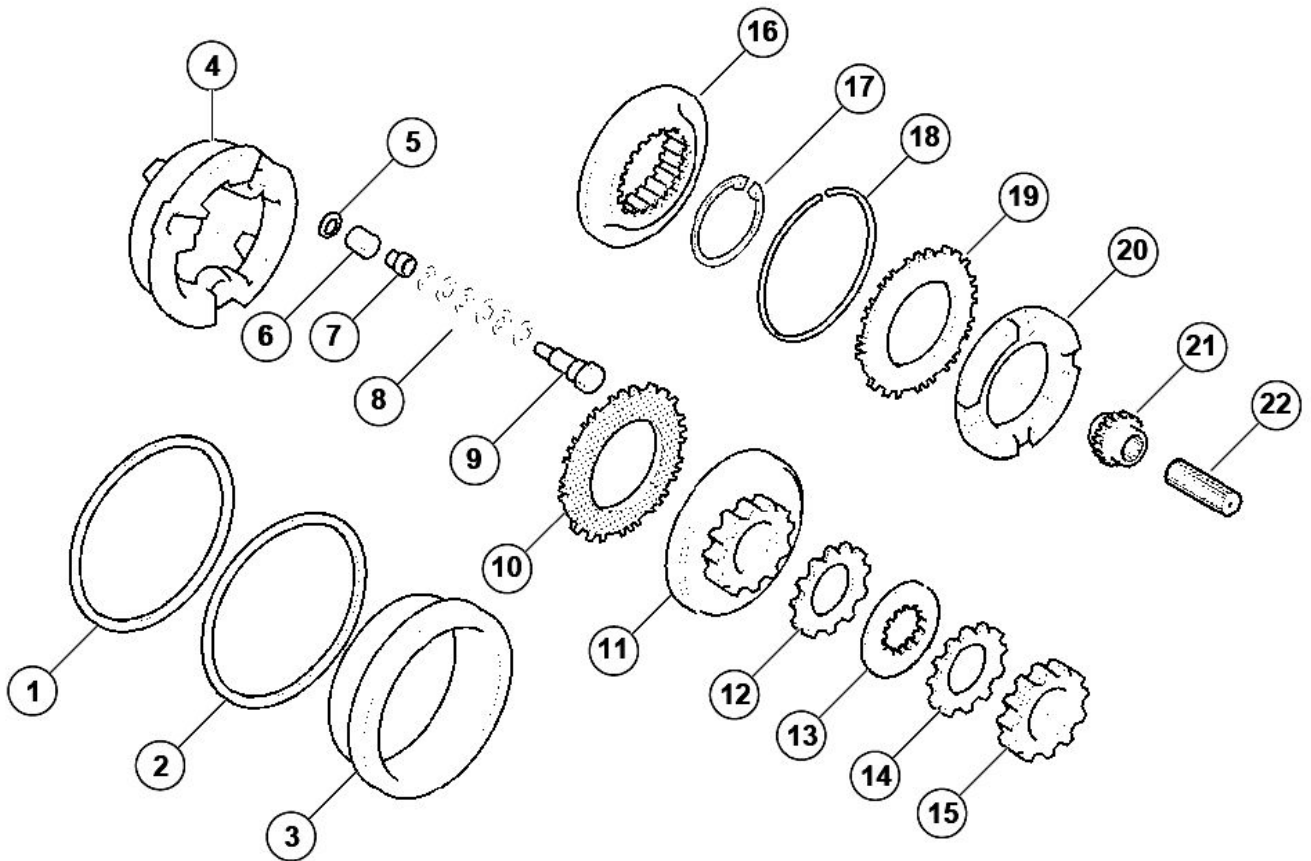


SHIM RANGE				
Thickness	0.05	0.10	0.30	0.50
Quantity	---	---	---	---

Choose among the available shims (3) a quantity in a way to reach the previously measured value (X) and place them in the washers (2). Follow the instructions from step D.2.2.18.

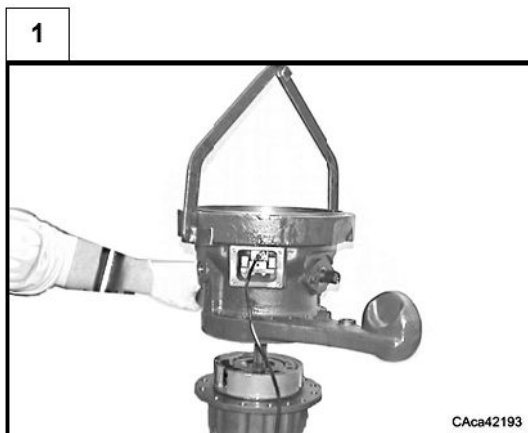
MAINTENANCE

REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY



D.3.1 Disassembly

Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.

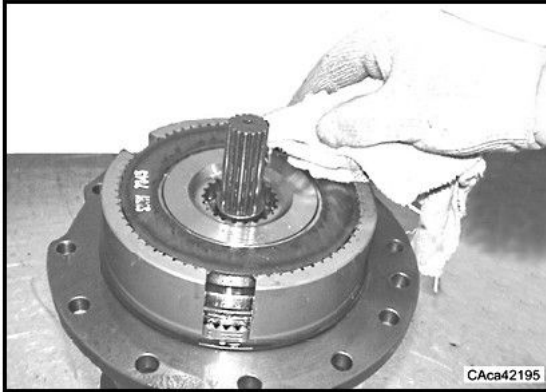


Disassemble the right reduction gear from the housing.
See: D.7

MAINTENANCE

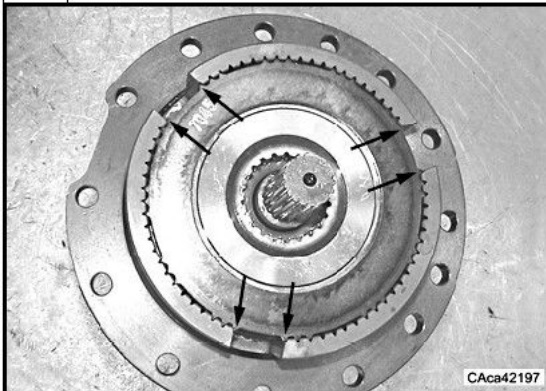
REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY

2



Remove the residual oil and properly clean the disks.

3



Note the position of the brake disk teeth.

4

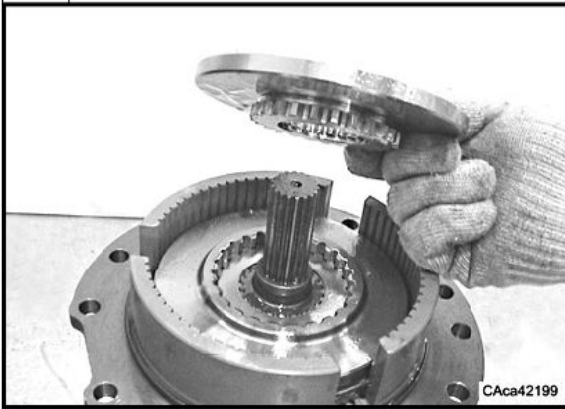


Remove the brake disk (10) from the reduction unit.

MAINTENANCE

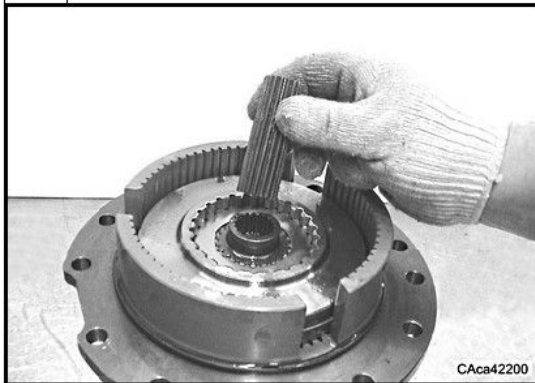
REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY

5



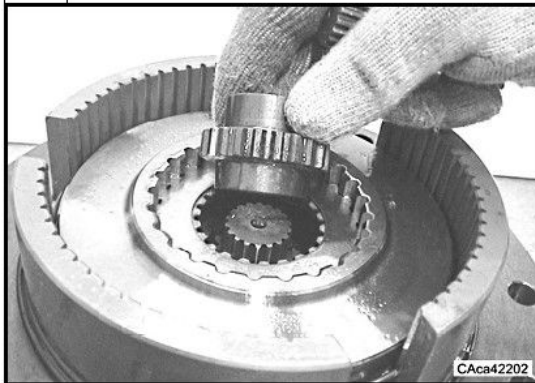
Remove the counterdisk (11).

6



Remove the half-shaft (22).

7

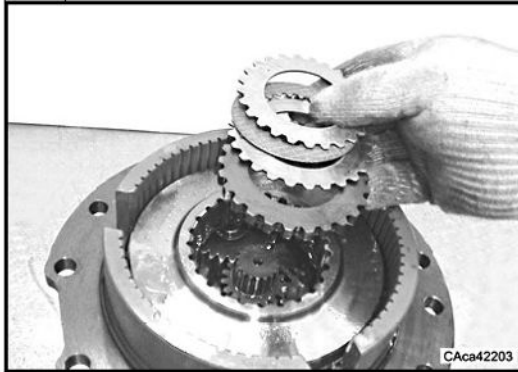


Remove the sleeve (21).

MAINTENANCE

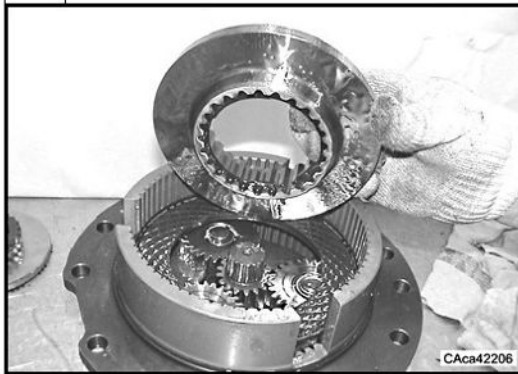
REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY

8



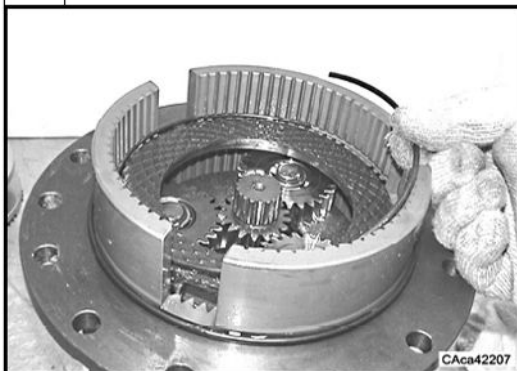
Remove the counterdisks (12) and (14), the disk (13) and the counterdisk (15).

9



Remove the counterdisk (16).

10

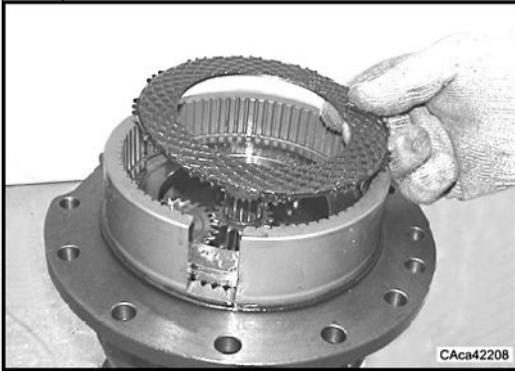


Remove the lock ring (18).

MAINTENANCE

REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY

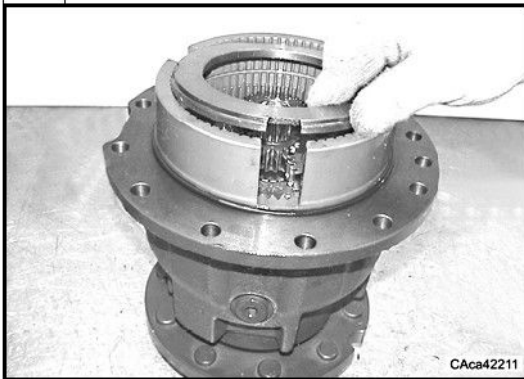
11



Remove the brake disk (19).

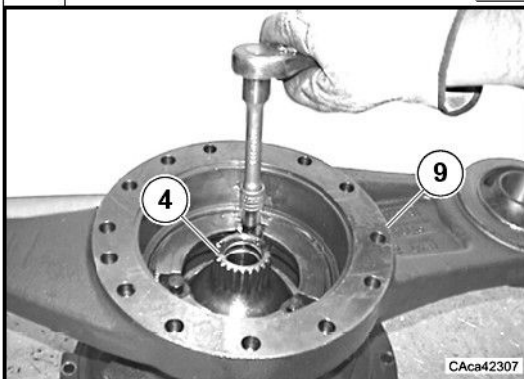
Note: make attention to the positions of the disks teeth as done in D.3.1.3.

12



Remove the flange (20).

13



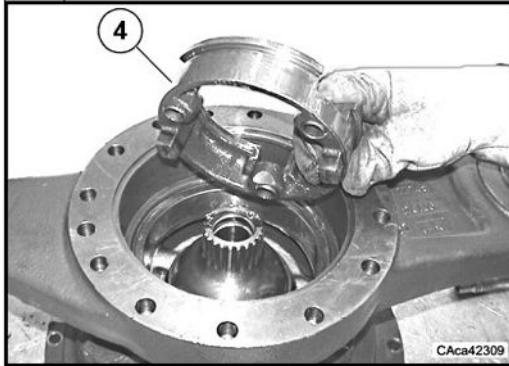
Remove the self-adjust screws (9) from the housing with a suitable wrench.

Warning: the self-adjust screws must be replaced in the assembly

MAINTENANCE

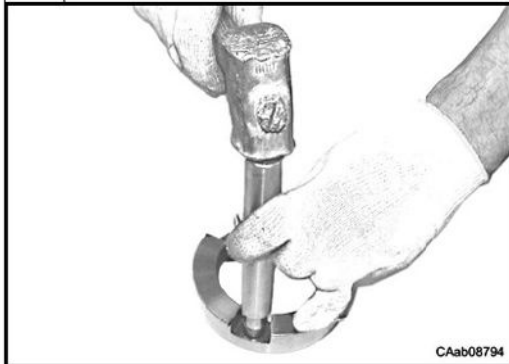
REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY

14



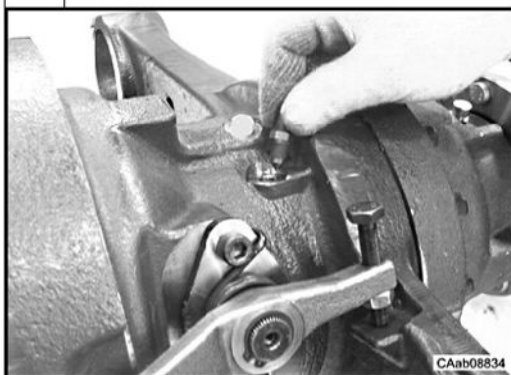
Extract the actuator (4) from the housing.

15



If necessary the replacement, remove from the actuator the three pins (6) of the self-adjust groups.

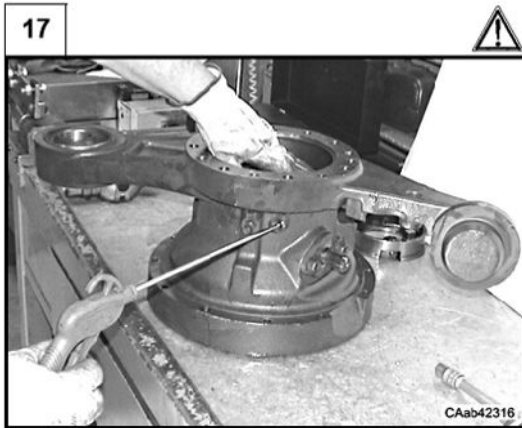
16



Remove the brakes oil bleed plug.

MAINTENANCE

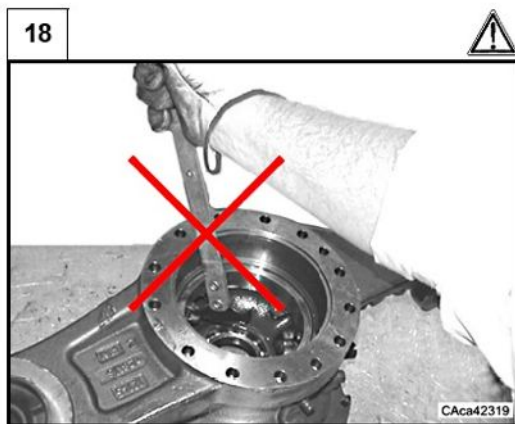
REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY



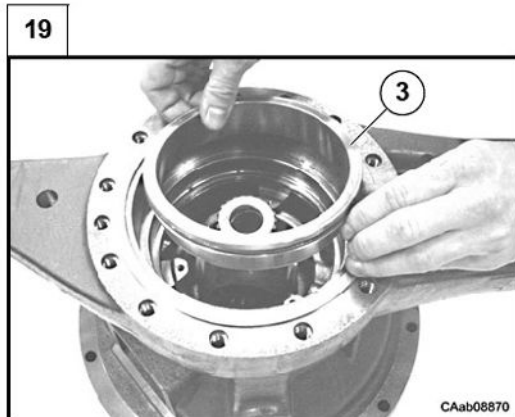
Take off the brake piston (3) blowing in the oil breather hole with compressed air (max 1 Atm).

Warning: be careful during the extraction of the piston.

Note: not use a lever (see next step).



Do not use a lever to take off the brake piston (3).

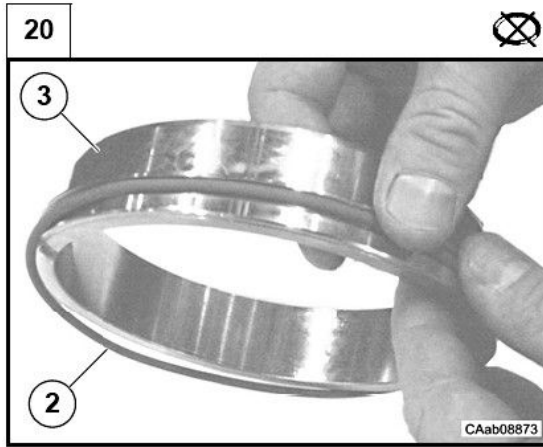


Collect the brake piston (3).
Remove the differential box.

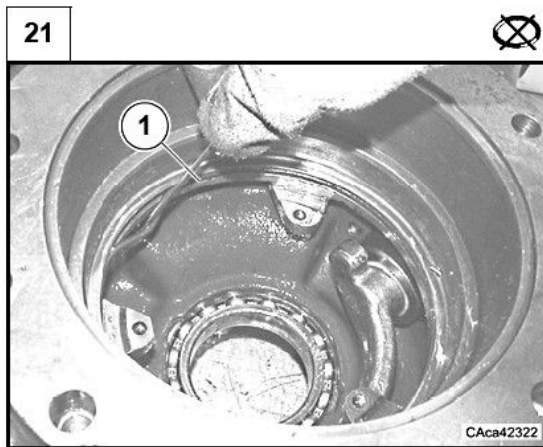
See: D.5

MAINTENANCE

REAR AXLE MAINTENANCE-BRAKE GROUP DISASSEMBLY



Remove the O-Ring (2) from the brake piston (3).



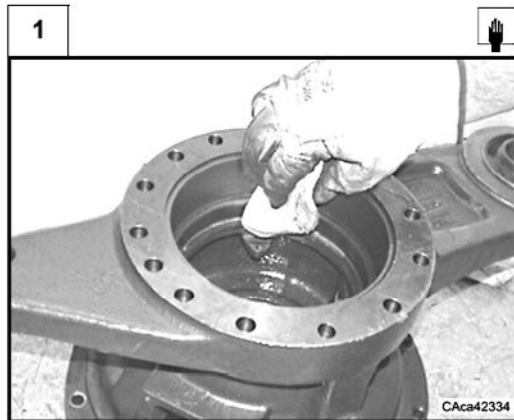
Remove the O-Ring (1) from the piston seat in the housing.

MAINTENANCE

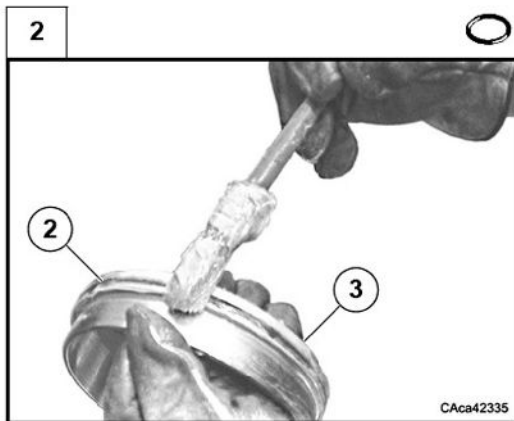
REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY

D.3.2 Assembly

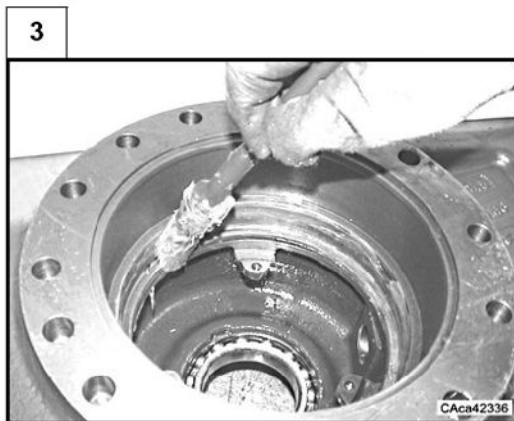
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Clean with care the piston and the piston seat into the housing.



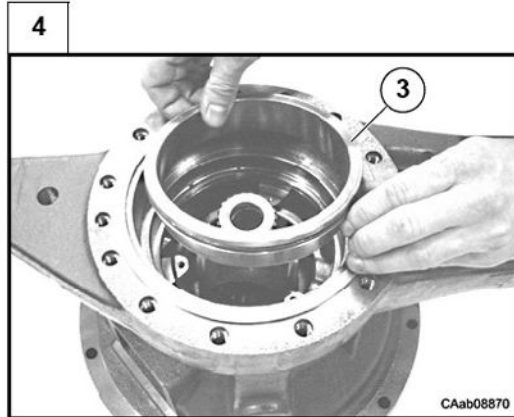
Assemble new well lubricated O-Ring (2) on the brake piston (3).



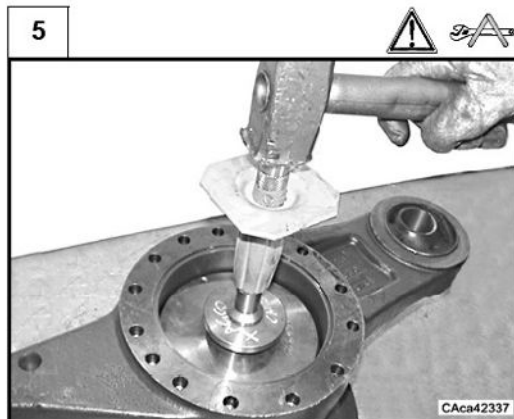
Lubricate also the piston seat into the housing.

MAINTENANCE

REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY

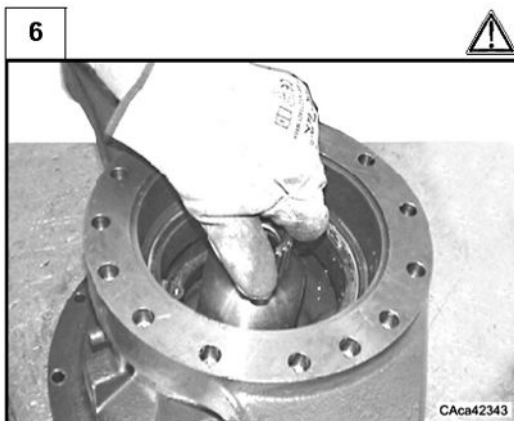


Place the brake piston (3) into the housing.



Assemble the brake piston (3) with the special tool CA715008 and a hammer.

Warning: take care to do not damage the O-Ring in the assembly operation.



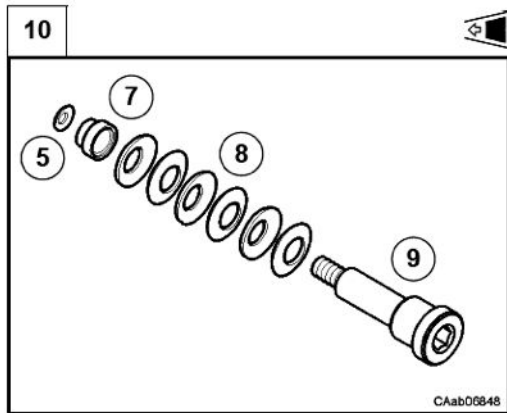
Warning: place the differential housing in the housing.

See: D.4.

Assemble differential housing in the roller bearing then lock it with the related lock ring.

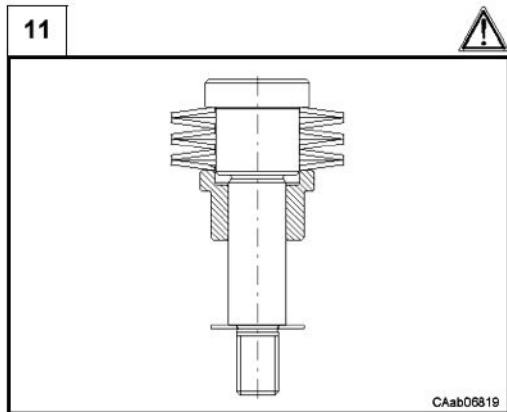
MAINTENANCE

REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY

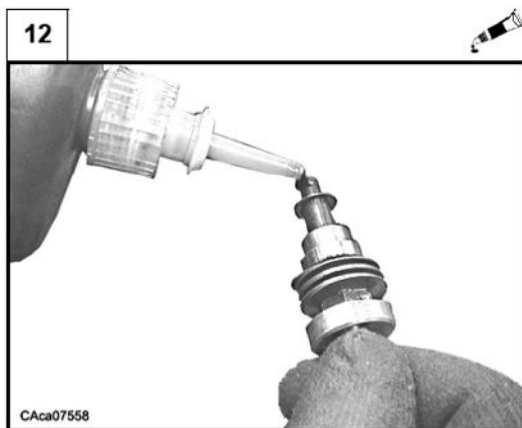


Assemble the self-adjust groups as in figure: washer (5), bush (7), Belleville washers (8) and screw (9).

Note: the Belleville washers must be assembled in opposition.



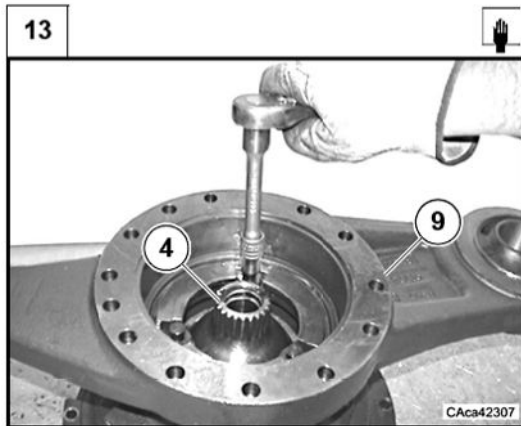
Warning: the Belleville washers must assemble in opposition and aligned.



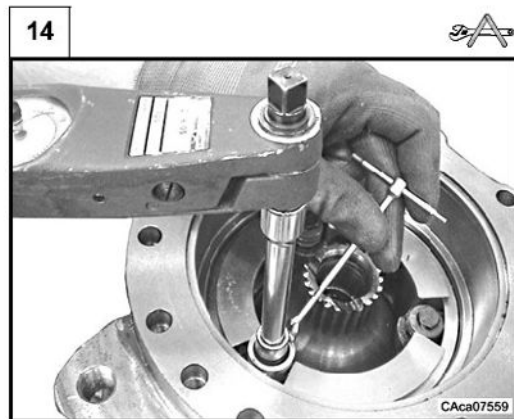
Apply prescribed sealant on the thread of the self-adjust kit new screws (9).

MAINTENANCE

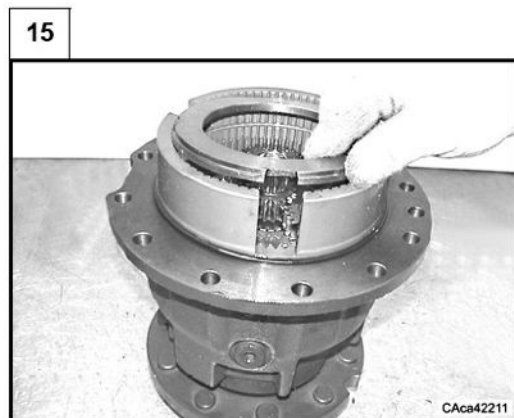
REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY



*Clean with care the threaded holes of self-adjust screws, blow excessive oil out with compressed air.
Assemble the actuator (4) to the housing, locking it with the self-adjust screws (9).*



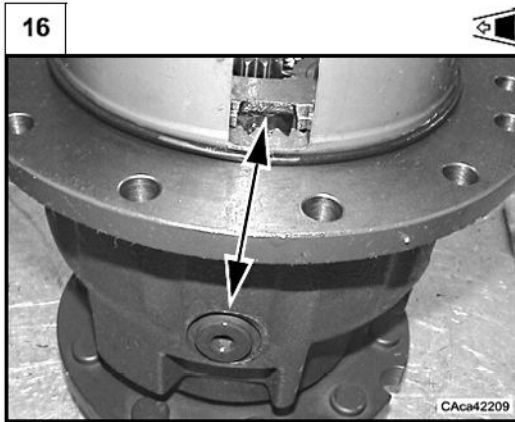
*Tighten self-adjust screws (9) with dynamometric wrench to the requested torque (see C.7).
Note: to keep the bellville washers aligned use the special tool CA715783.*



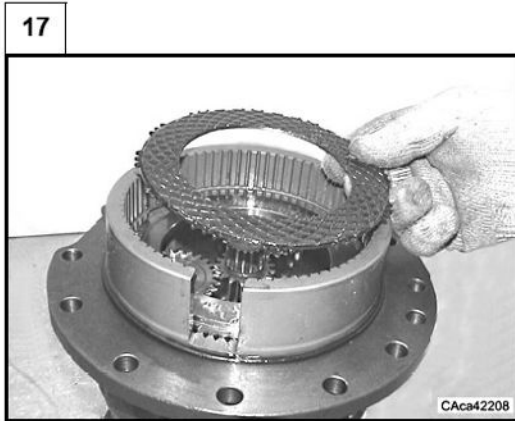
*Assemble the flange (20).
Note: one of the flange's groove must be position in correspondence of the drain plug.
See: next step.*

MAINTENANCE

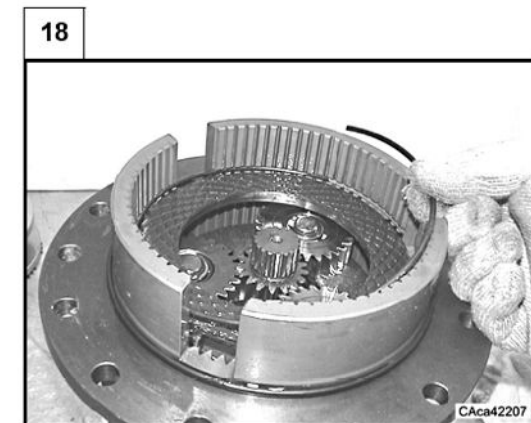
REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY



Respect the assembly positions: one of the flange's groove must be position in correspondence of the drain plug.



*Assembly the brake disk (19).
See: C.4 (large brake disks specifications).
Note: position the brake disk's teeth as in D.3.1.11.*

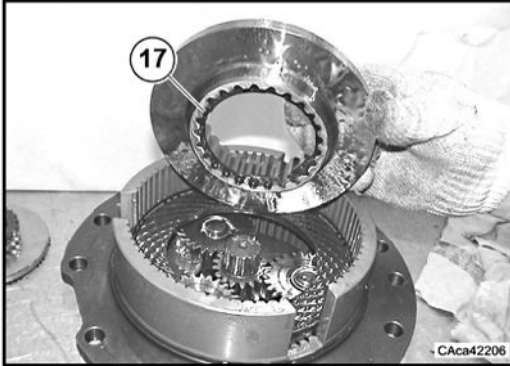


Assemble the lock ring (18).

MAINTENANCE

REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY

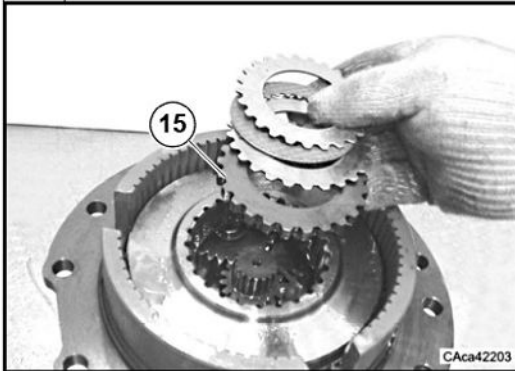
19



Assemble the counterdisk (16).

Note: the retaining ring (17) must be correctly assembled in the counterdisk (16).

20

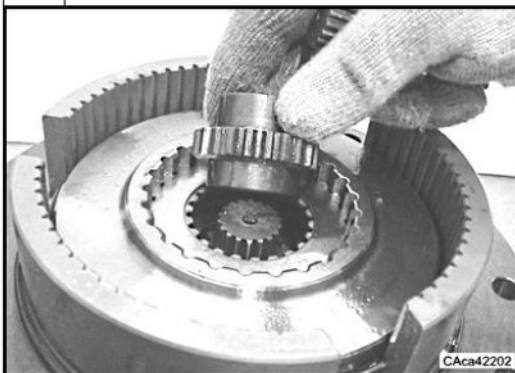


Assemble the counterdisk (15), the counterdisks (12) and (14) and the disk (13).

Note: the counterdisk (15) must be assembled with the bevelling toward the retaining ring (17).

See: C.4 (small brake disks specifications).

21

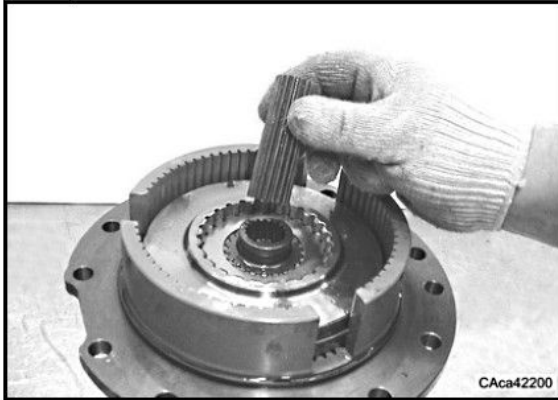


Assemble the sleeve (21).

MAINTENANCE

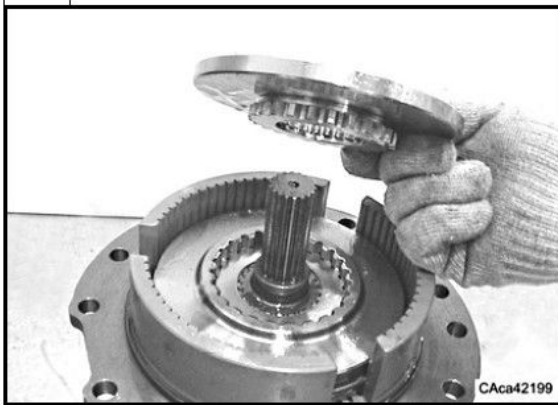
REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY

22



Assemble the half-shaft (22).

23



Assemble the counterdisk (11).

MAINTENANCE

REAR AXLE MAINTENANCE-BRAKE GROUP ASSEMBLY

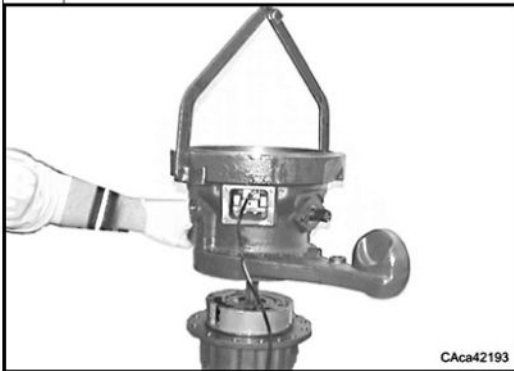
24



Assemble the brake disk (10).

Note: position the brake disk's teeth as in D.3.1.3.

25

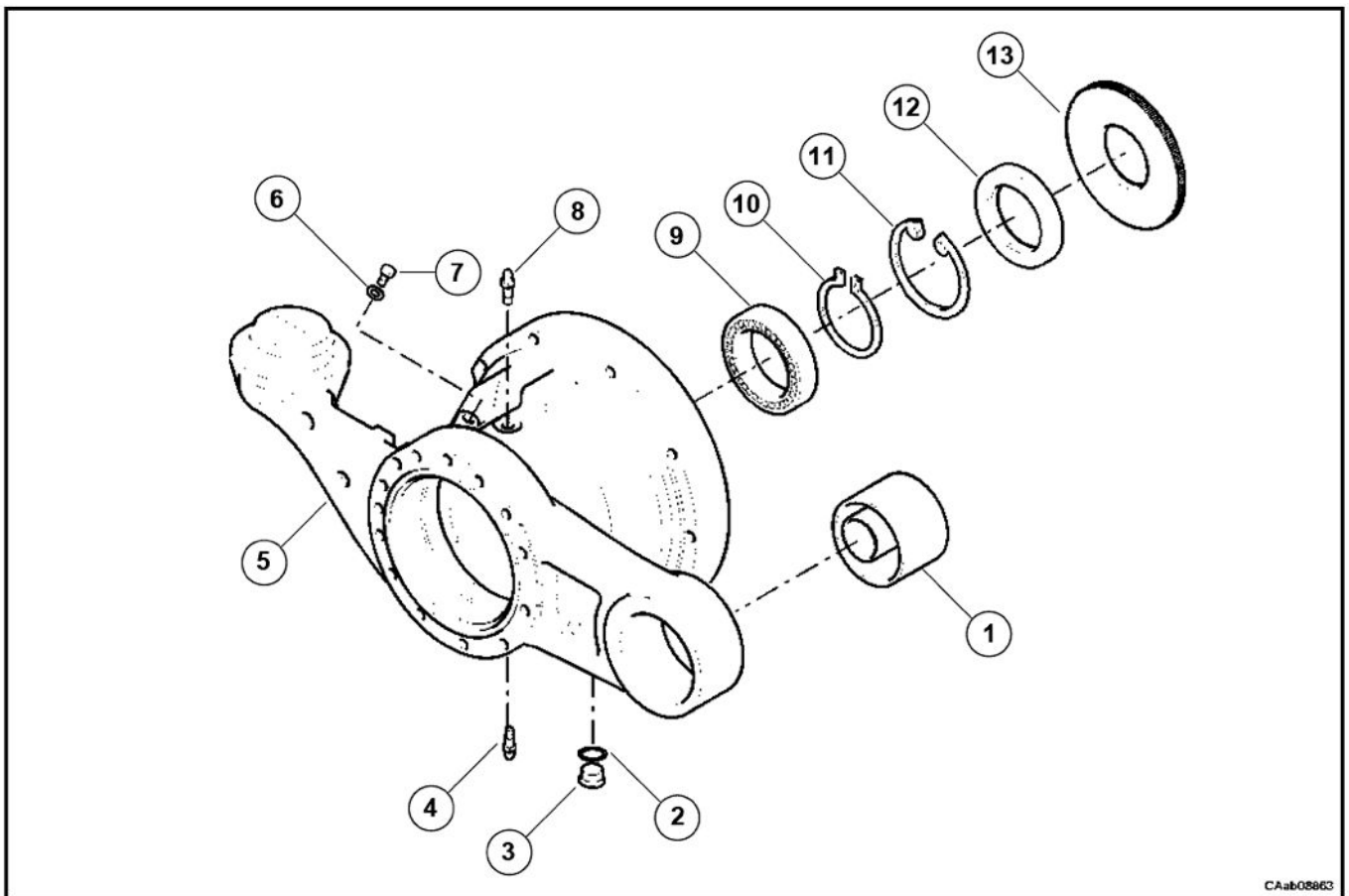


Note: after brake group assembly, assemble the housing on the reduction gear.

See: D.7

MAINTENANCE

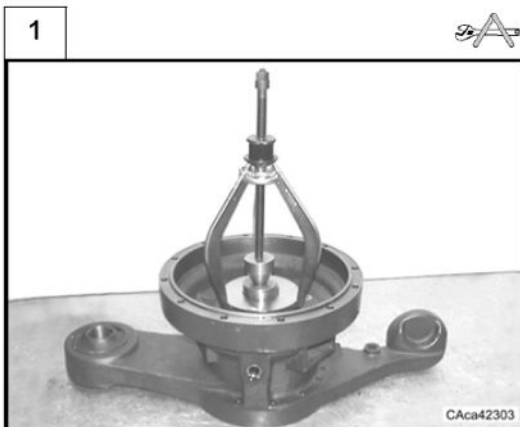
AXLE MAINTENANCE—RH HOUSING GROUP DISASSEMBLY



CAab0863

D.4.1 Disassembly

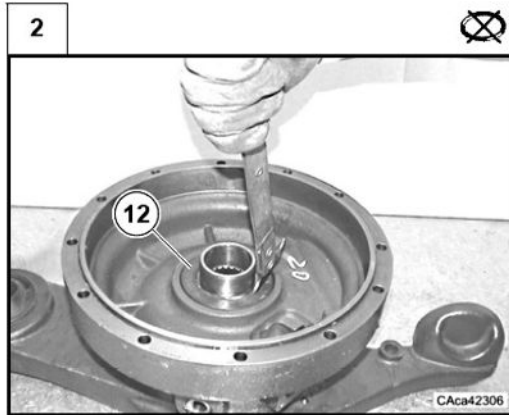
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



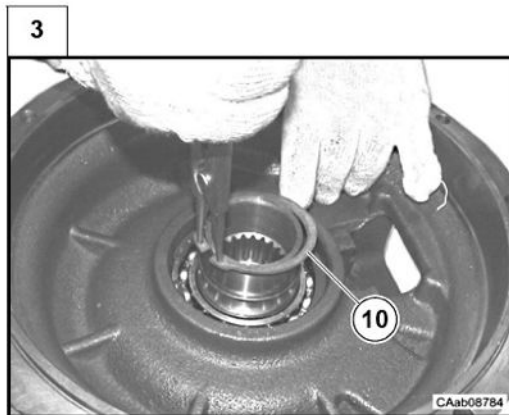
Place the right housing on a workbench.
Remove the speed meter wheel (13) from the differential housing using the special tool CA716038 with a three holding point puller.

MAINTENANCE

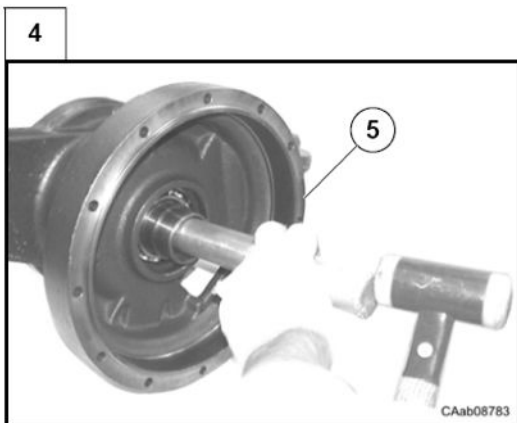
AXLE MAINTENANCE—RH HOUSING GROUP DISASSEMBLY



Extract the seal ring (12) from the housing (5) with a lever.
Note: destructive operation for the seal ring; the seal ring must be replaced.



Remove the lock ring (10) from the differential housing.

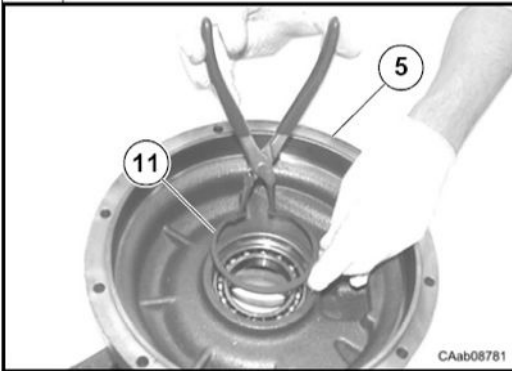


Extract the differential housing by means of a tender material driver and a hammer.

MAINTENANCE

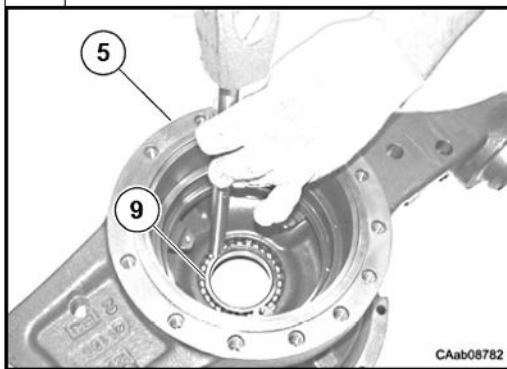
AXLE MAINTENANCE—RH HOUSING GROUP DISASSEMBLY

5



Remove the lock ring (11) from the bearing.

6



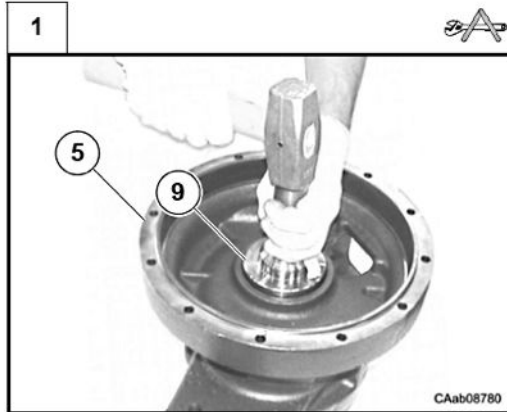
Turn the housing (5) upside down and extract the bearing (9) with a driver and a hammer.
Only if the replacement is necessary, remove the bush (1).

MAINTENANCE

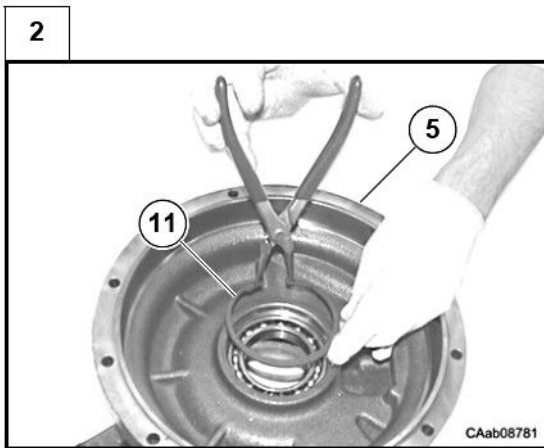
AXLE MAINTENANCE—RH HOUSING GROUP ASSEMBLY

D.4.2 Assembly

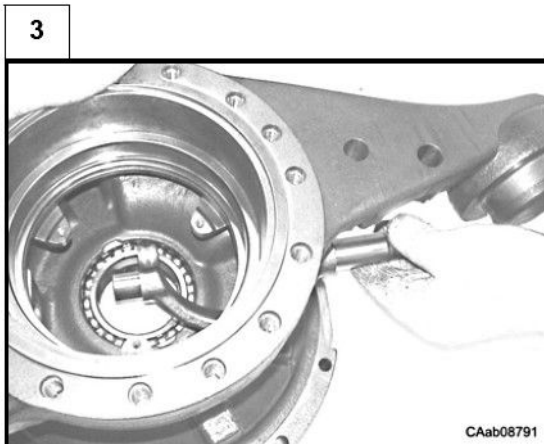
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Place the housing (5) on a workbench and assemble the bearing (9) with the driver CA715007 and a hammer.



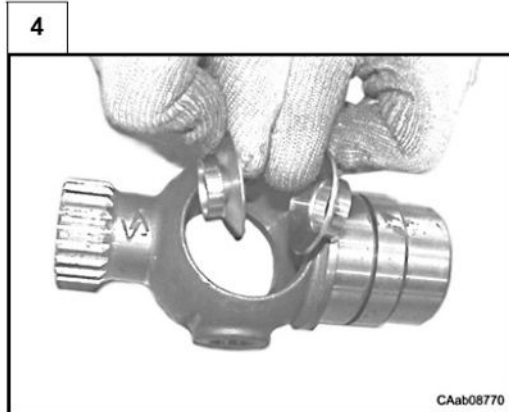
Assemble the lock ring (11).



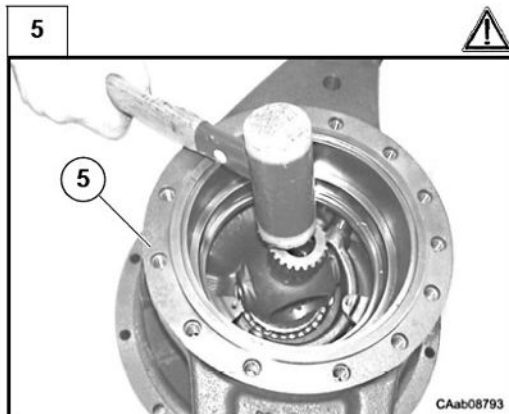
Assemble in the housing the control brake group.
See: D.3.2

MAINTENANCE

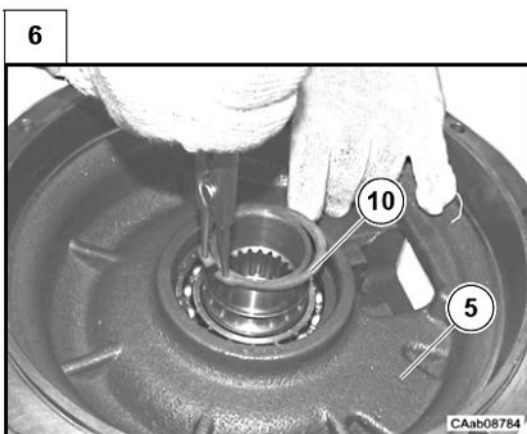
AXLE MAINTENANCE—RH HOUSING GROUP ASSEMBLY



Assemble the differential group.
See: D.5.2



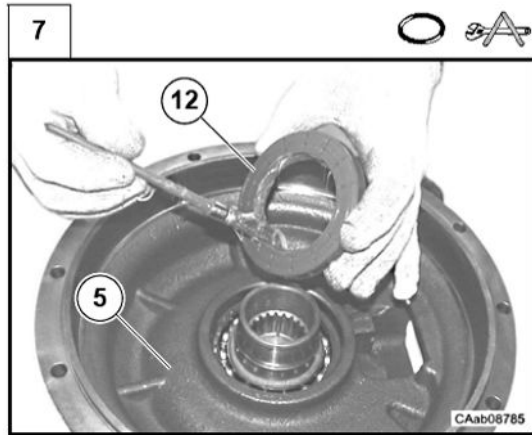
Assemble the differential group to the bearing (9) with a plastic hammer.
Warning: don't damage the differential housing.



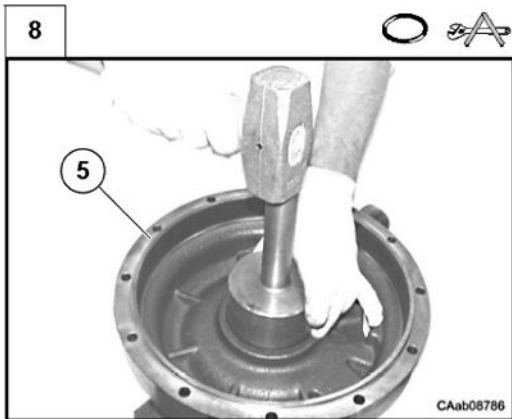
Overturn the housing (5).
Assemble the lock ring (10) on the differential housing.

MAINTENANCE

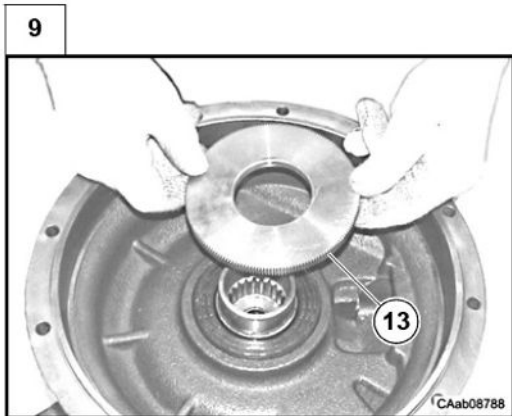
AXLE MAINTENANCE—RH HOUSING GROUP ASSEMBLY



Note: lubricate the inner side of the new seal ring (12).



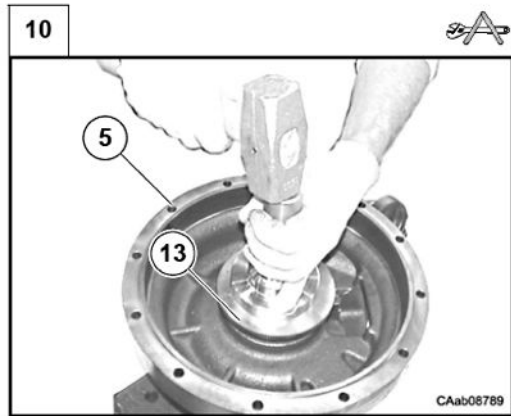
Assemble a seal ring (11) with the driver CA715009 and a hammer.



Assemble the speed meter wheel (13) on the differential housing.

MAINTENANCE

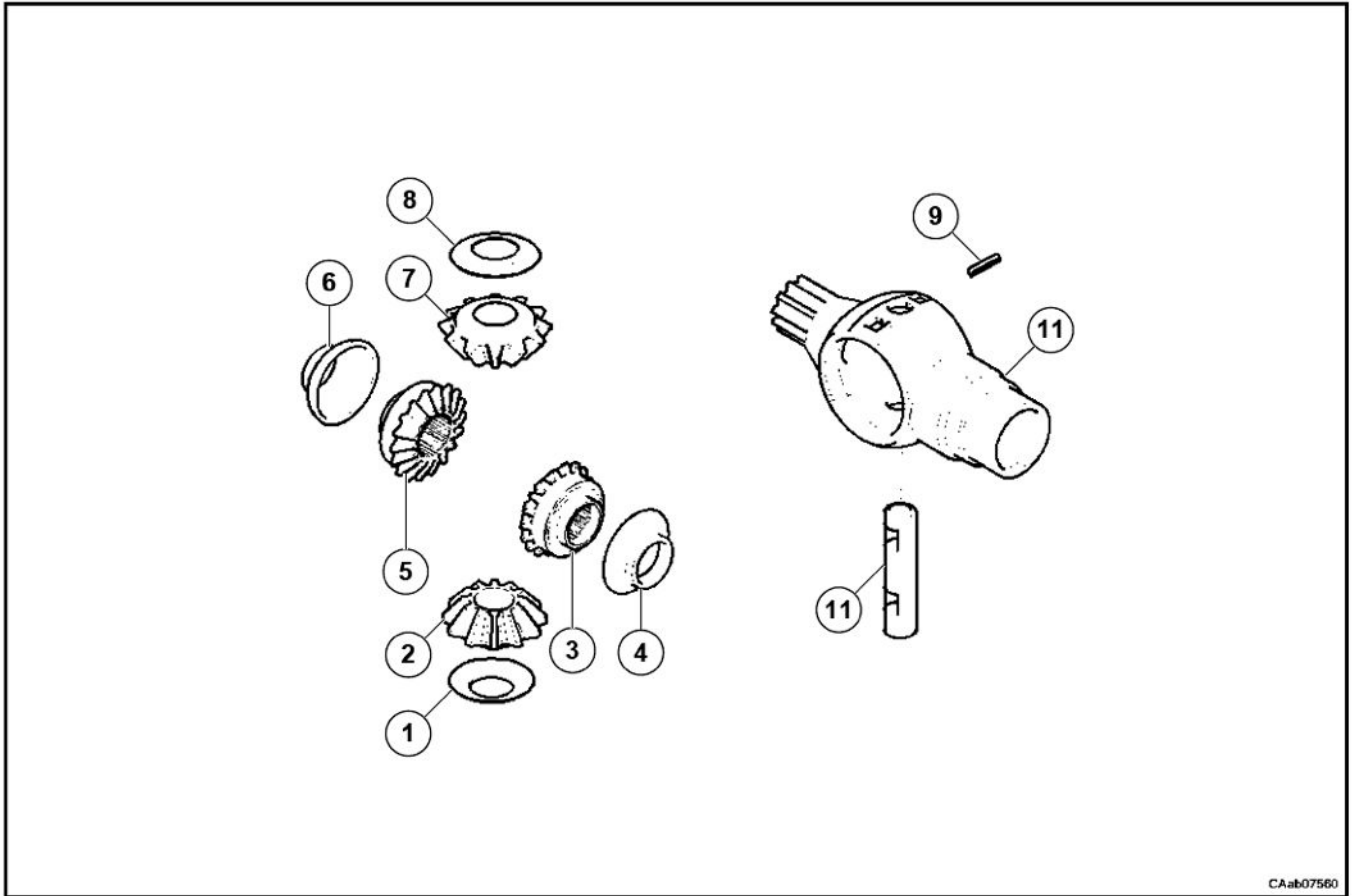
AXLE MAINTENANCE—RH HOUSING GROUP ASSEMBLY



Drive the speed meter wheel (13) on the differential housing with the pad CA715416 and a hammer.

MAINTENANCE

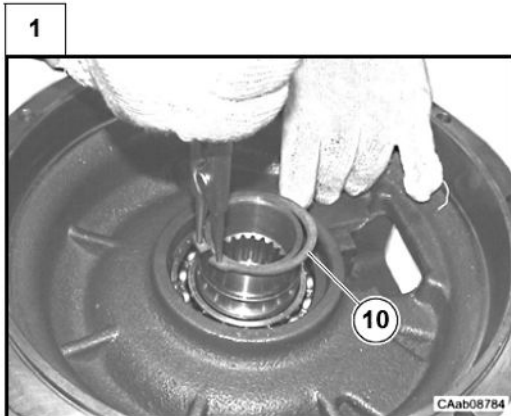
AXLE MAINTENANCE—REAR DIFFERENTIAL GROUP DISASSEMBLY



CAab07560

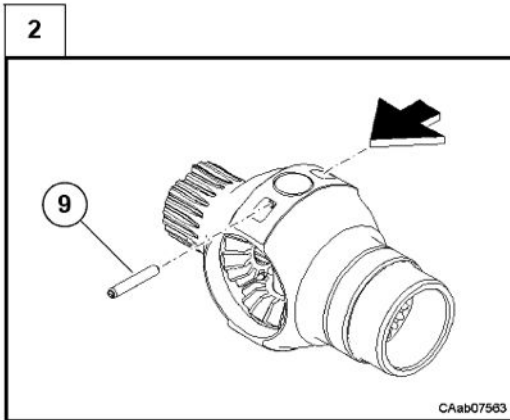
D.5.1 Disassembly

Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



MAINTENANCE

AXLE MAINTENANCE—REAR DIFFERENTIAL GROUP DISASSEMBLY



*Place the differential housing (10) on a suitable workbench.
Extract the fastening pin (9) with a drift and a hammer.*



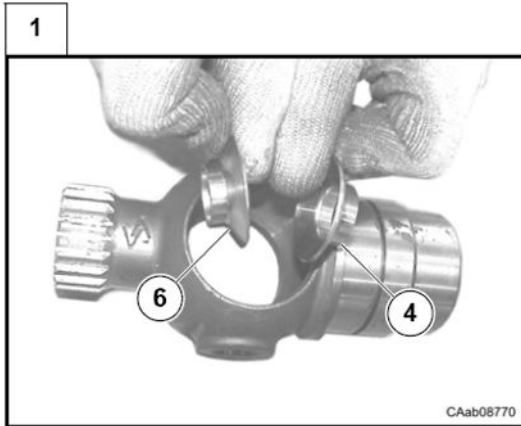
*Extract the pin (11) and remove all the parts in the differential housing
(1, 2, 3, 4, 5, 6, 7, 8).
Check the wear conditions of all parts.*

MAINTENANCE

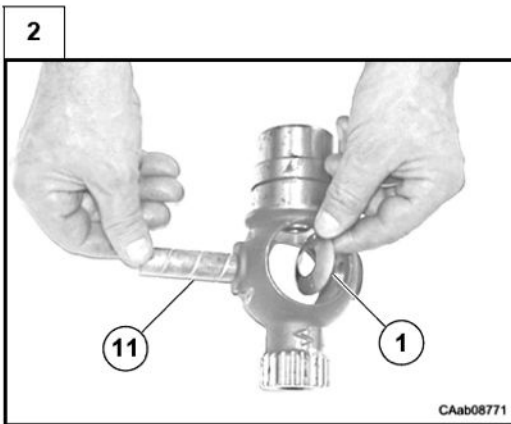
AXLE MAINTENANCE—REAR DIFFERENTIAL GROUP ASSEMBLY

D.5.2 Assembly

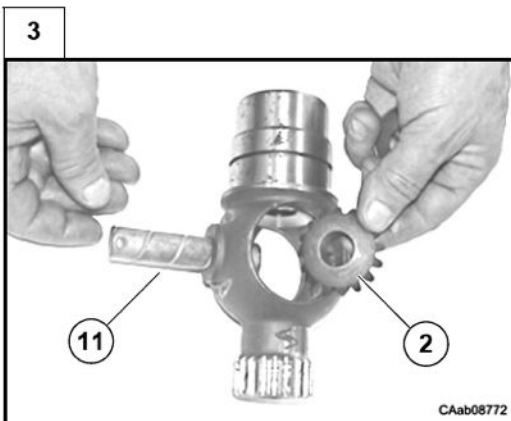
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Assemble the trust washers (4) and (6) in the differential housing (10).



Assemble the pin (11) and the trust washers (1) in the differential housing (10).

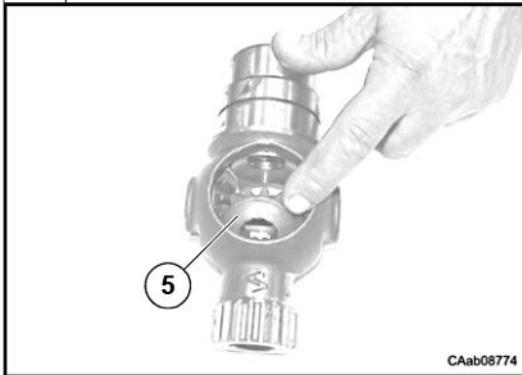


Assemble the gears (2) then assemble the gears (7) and trust washers (8) in the differential housing (10).
Fit all assembled parts with the pin (11).

MAINTENANCE

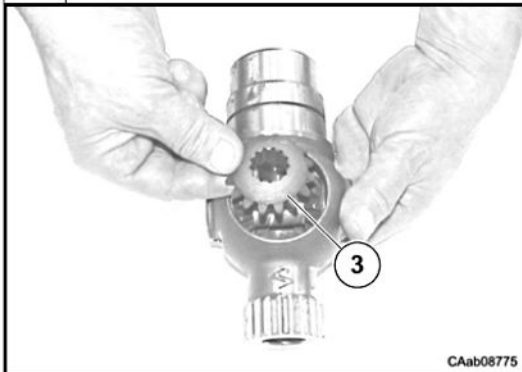
AXLE MAINTENANCE – REAR DIFFERENTIAL GROUP ASSEMBLY

4



*Assemble the gear (5) in the differential housing (10).
Rotate the gears (5) to place it to the bottom.*

5

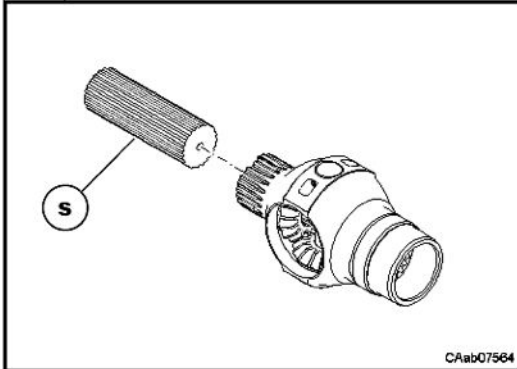


*Assemble the gear (3) opposite to gear (5) in the differential housing (10).
Rotate the gears (3) and (5) to place them on the axis.
See: next step*

MAINTENANCE

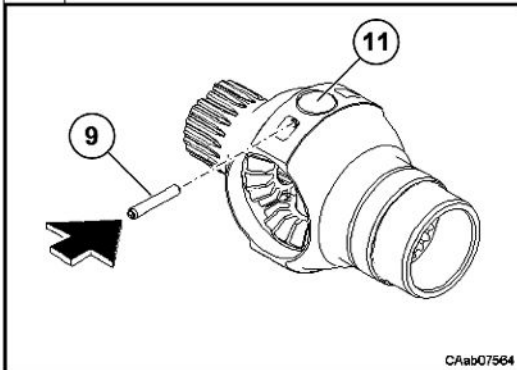
AXLE MAINTENANCE—REAR DIFFERENTIAL GROUP ASSEMBLY

6



Note: to check the correct alignment of the gears (3) and (5) insert into the assembled differential housing (10) the right half-shaft (9); the alignment is correct when the half-shaft can be assembled on both side of the housing.

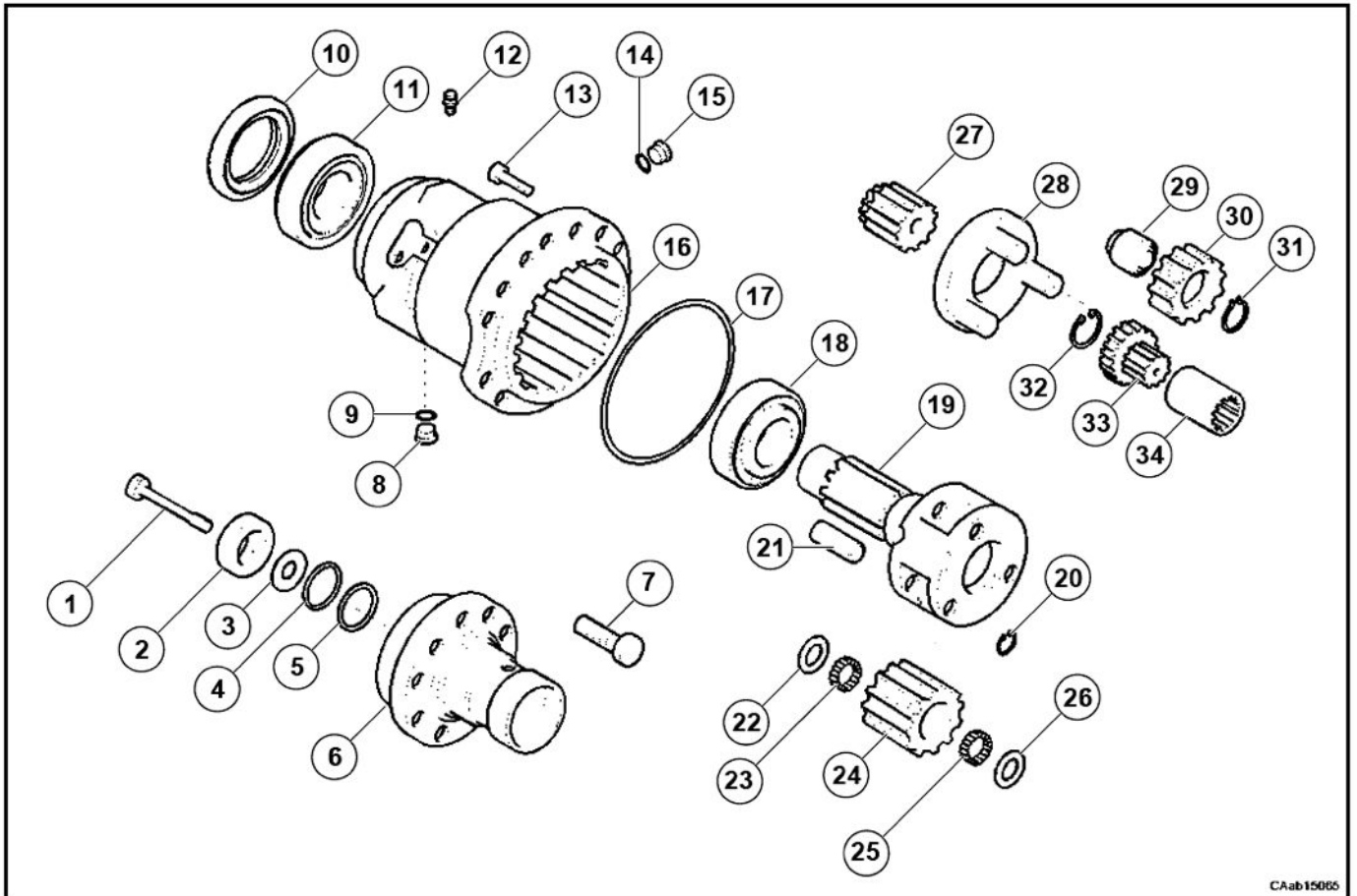
7



Assemble the pin (9) in the differential housing (10) to lock the pin (11).

MAINTENANCE

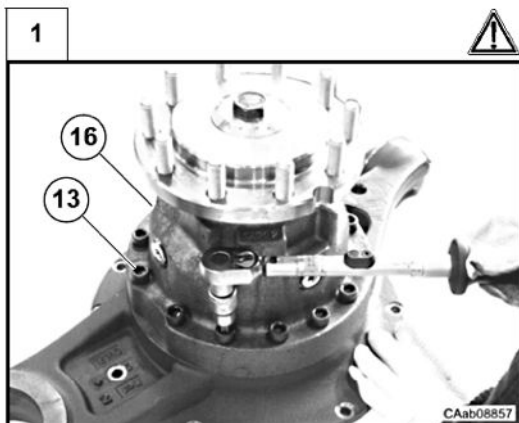
AXLE MAINTENANCE – LH REDUCTION GEAR GROUP DISASSEMBLY



CAab15065

D.6.1 Disassembly

Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



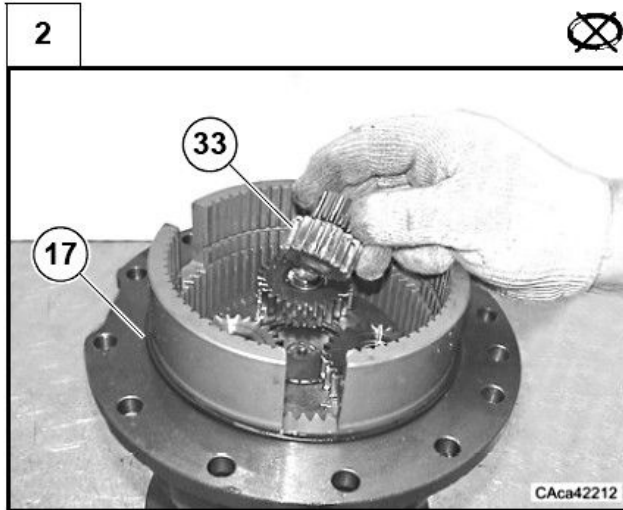
Remove left side reduction gear group (16) from the motor housing unscrewing the fastening screws (13).

Note: do not remove the left housing from the motor.

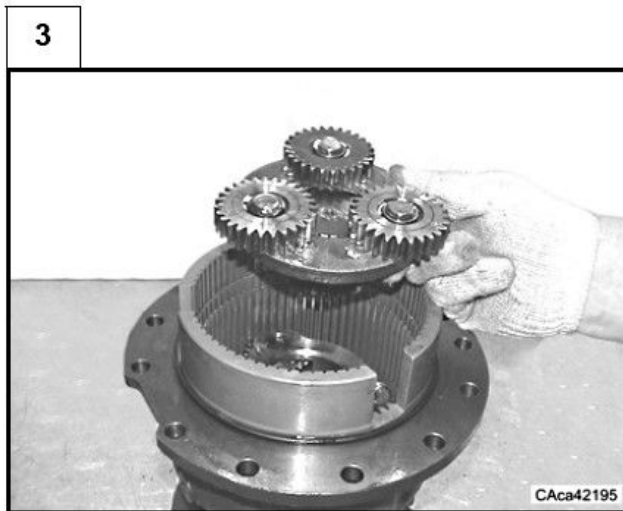
Warning: this operation free some parts of the reduction gear.

MAINTENANCE

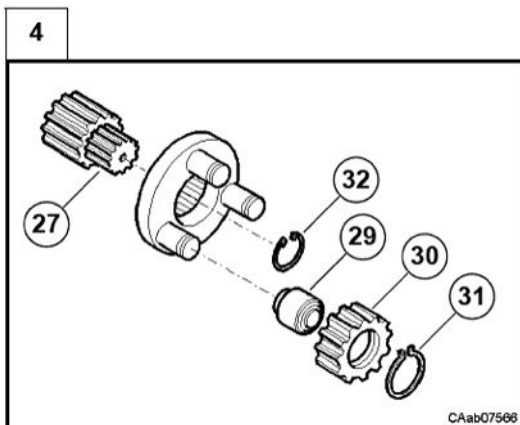
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP DISASSEMBLY



Remove the O-Ring (17).
Remove the splined sleeve (34) and gear (33).



Remove the planetary carrier group.



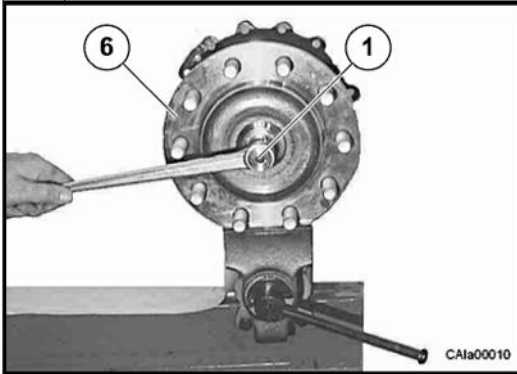
If necessary disassemble the planetary carrier (28):

- remove the lock rings (31)
- remove the planetary gear (30) with related bearings (29).
- remove the lock ring (32)
- take the pinion (27) out of planetary carrier (28).

MAINTENANCE

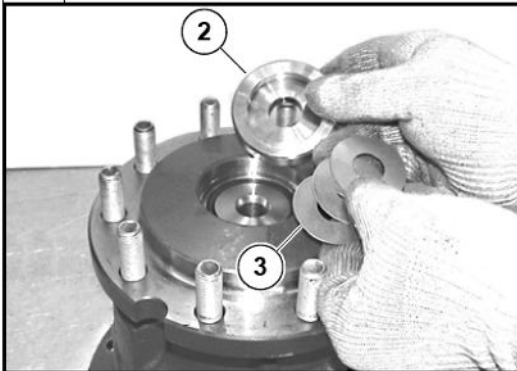
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP DISASSEMBLY

5



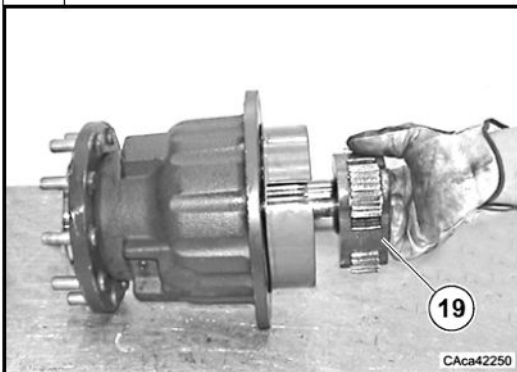
Lock the wheel hub (6) and remove the selflocking fastening screw (1).
Note: it is advisable to place the group in a vice as shown in figure; this operation is destructive for the self-locking screw, then the screw must be replaced in assembly.

6



Collect the trust washer (2) and the shims (3).

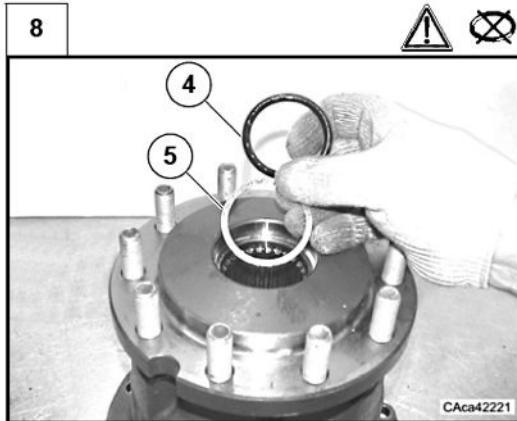
7



Extract the planetary carrier (19).
Note: if necessary push on the shaft end with a driver and a hammer; keep the planetary carrier with the splined end upward, the pins of the differential gears can come out easily and free all the group parts (needle bearings, gears and washers).

MAINTENANCE

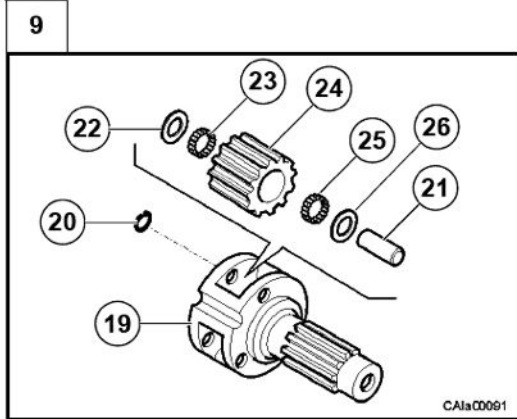
AXLE MAINTENANCE – LH REDUCTION GEAR GROUP DISASSEMBLY



Remove the O-Ring (4) and the thin washer (5).

Note: the O-Ring must be replaced.

Warning: keep the planetary carrier with the splined end upward, the pins of the differential gears can come out easily and free all the group parts (needle bearings, gears and washers).



To carry out any possible replacements of the planetary gears:

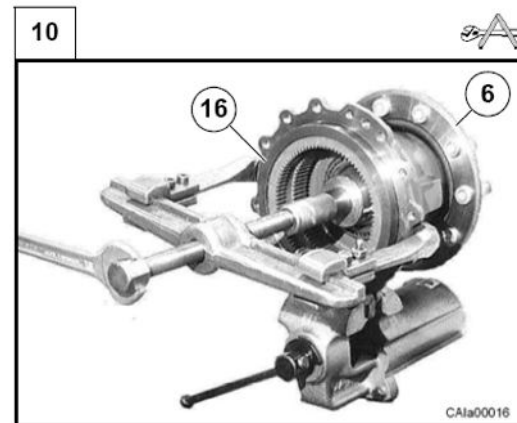
- remove the pin (21);

- take the planetary gears (24) out;

- collect the needle bearings (23, 25) and the thrust washers (22, 26).

Note: if replace the gears use new needle bearings.

Remove the lock ring (20) only if necessary.



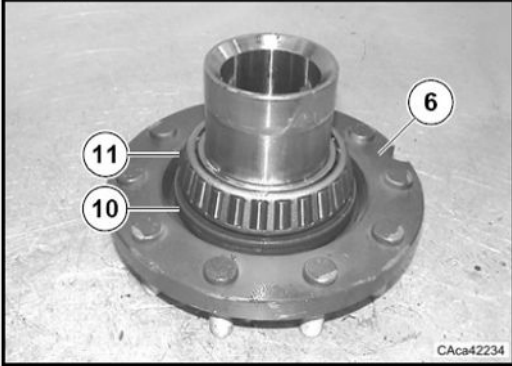
Remove the wheel hub (6) from the right side trumpet (16), using a suitable puller and the driver CA716038.

Note: it is advisable use a three holding point puller.

MAINTENANCE

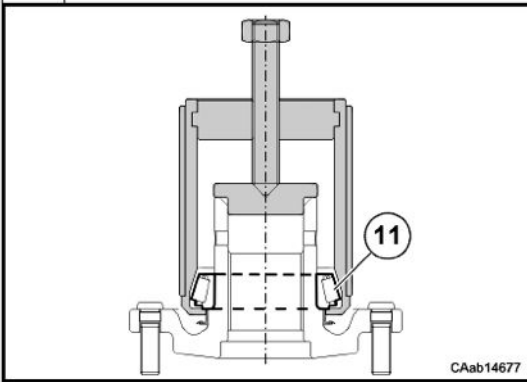
AXLE MAINTENANCE – LH REDUCTION GEAR GROUP DISASSEMBLY

11



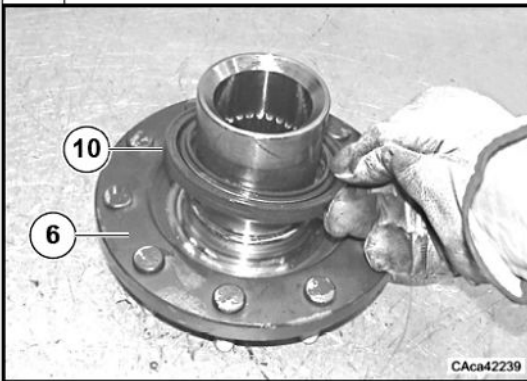
Place the wheel hub (6) on a flat surface to remove the bearing cone (8) and seal ring (7).

12



Remove the bearing cone (11) using the special tool CA716035.

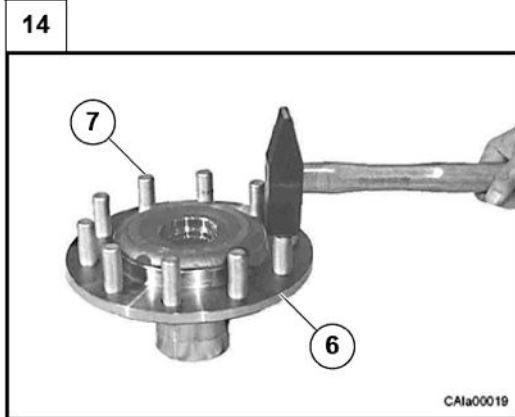
13



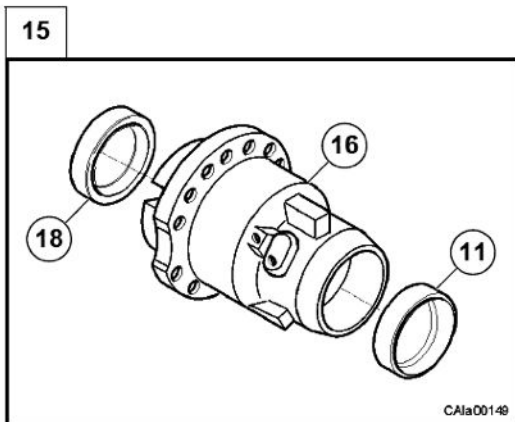
Remove the seal ring (10).
Note: this is a destructive operation for the seal ring.

MAINTENANCE

AXLE MAINTENANCE—LH REDUCTION GEAR GROUP DISASSEMBLY



If necessary replace the wheel fastening studs (7), remove them from wheel hub (6) with a hammer.
Note: this is a destructive operation for the studs.



Remove the bearings cup (1) and (18) from the trumpet (16).



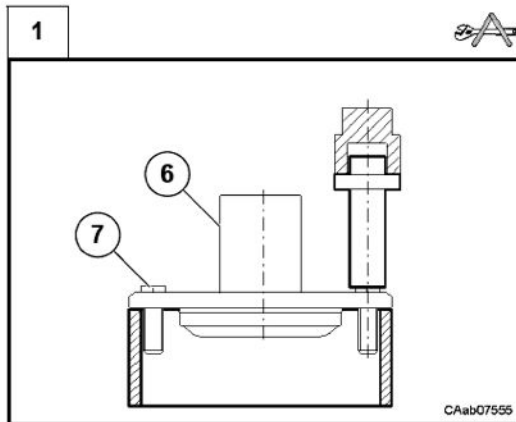
To remove the bearings cup (11) and (18) from the trumpet (16) it's advisable use a punch and a hammer.

MAINTENANCE

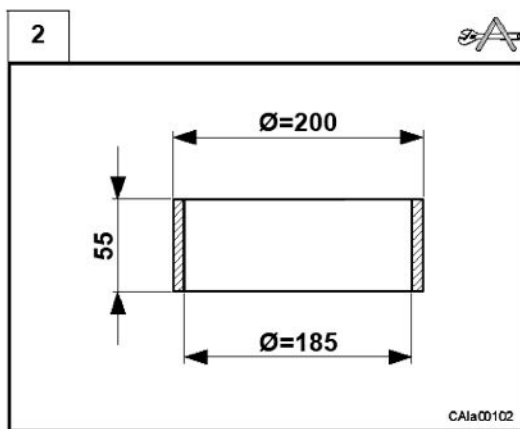
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY

D.6.2 Assembly

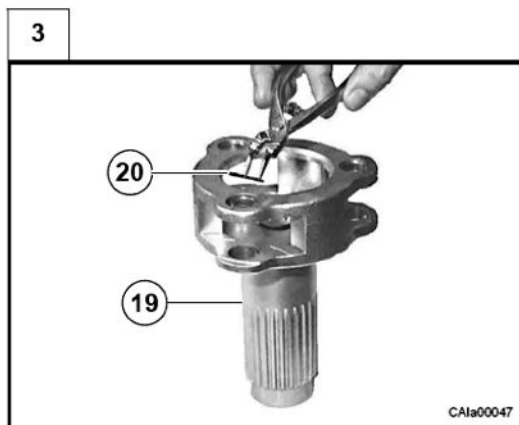
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Place the wheel hub (6) under a press on a suitable support, it is advisable use a ring of steel with the dimensions shown in the next figure [2].
Fit with a suitable driver all the studs (7) under the press action.



To support the wheel hub (6) it is advisable use a ring of steel with the dimensions shown in figure.

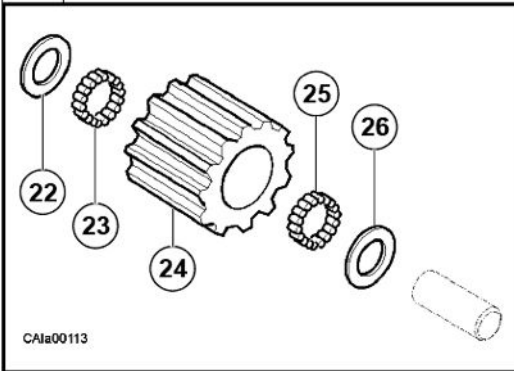


Place the planetary carrier (19) on a workbench, with the splined end downward.
Insert the lock ring (20) in the pin holes using a suitable pliers.

MAINTENANCE

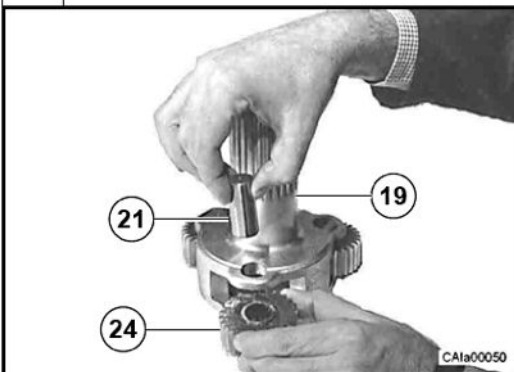
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY

4



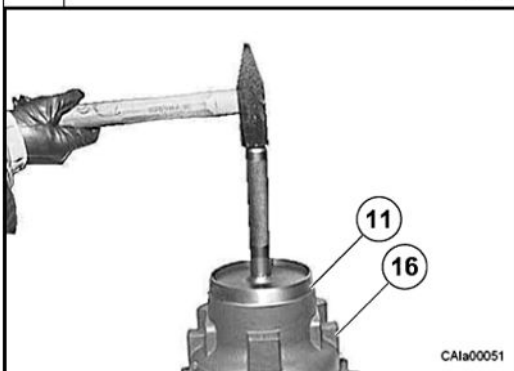
Grease the inner part of planetary gears (24) in order to help the right positioning of the needle bearings (23, 25). Insert the needle bearings (23, 25) and the trust washers (22, 26) in the planetary gears as shown in figure.

5



Place the planetary carrier (19) on a workbench with the splined end upward. Insert every gear (24) in the planetary carrier, with the related needle bearings and trust washers in the grease, then insert the pin (19).

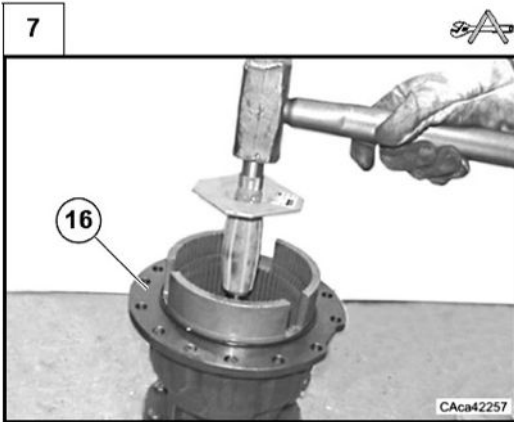
6



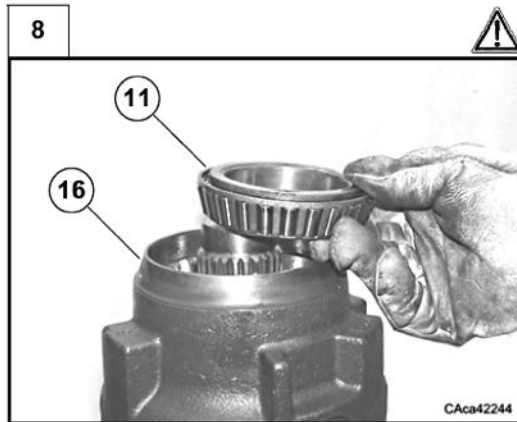
Place the trumpet (16) on a flat surface and assemble the wheel hub bearing cup (11) with the driver CA715933.

MAINTENANCE

AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY

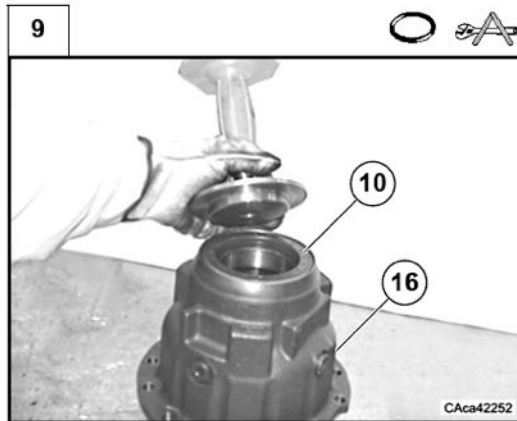


Turn the trumpet (16) upside down and assemble the other wheel hub bearing cup (18) with the driver CA715933.



Warning: next operations from [9] to [13] must be carried out quickly to take advantage of the thermal expansion of the bearings.
Heat the wheel hub bearing cone (11) (wheel side) at 110°C then place it in the trumpet (16).

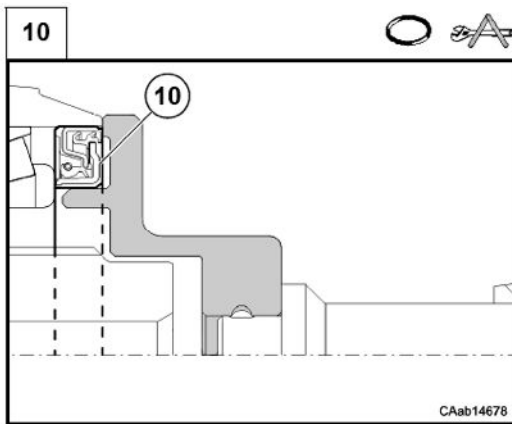
Danger: burn, wear safety gloves.



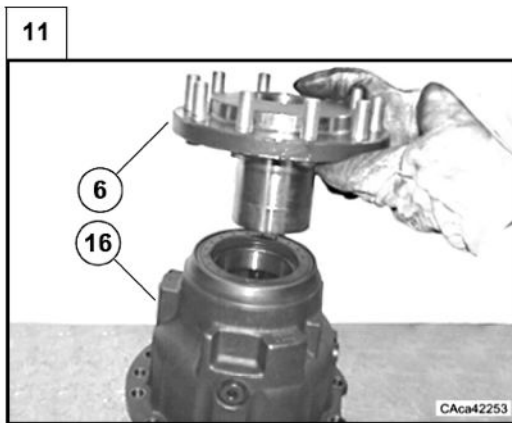
Before assemble seal ring (7), spread a thin layer of oil on the inner leap.
Assemble the seal ring (7) in the trumpet (14) with the driver CA716272.

MAINTENANCE

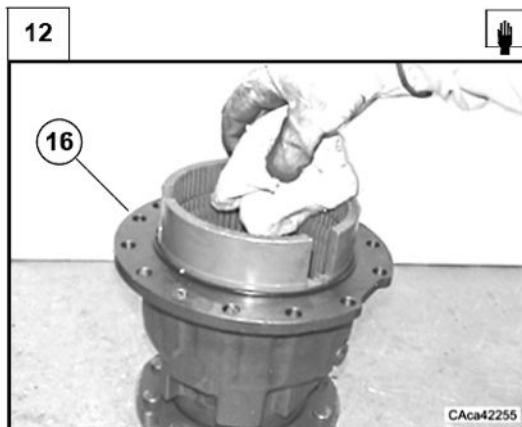
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY



Assembly scheme of the seal ring (7) in the trumpet (14) with the driver CA716272.



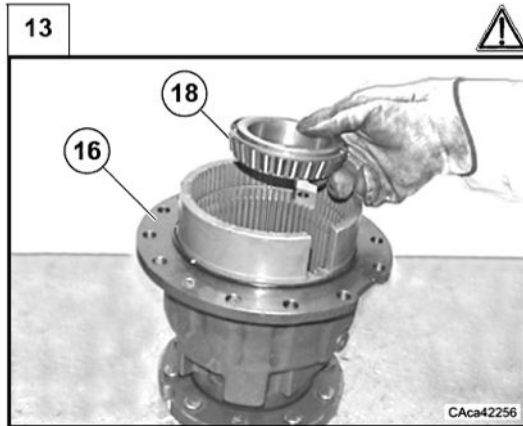
Insert with attention the wheel hub (6) in the trumpet (16) until the end of the stroke is reached.



Overturn the trumpet (16) upside down and clean with care the bearing cup (18) seat.

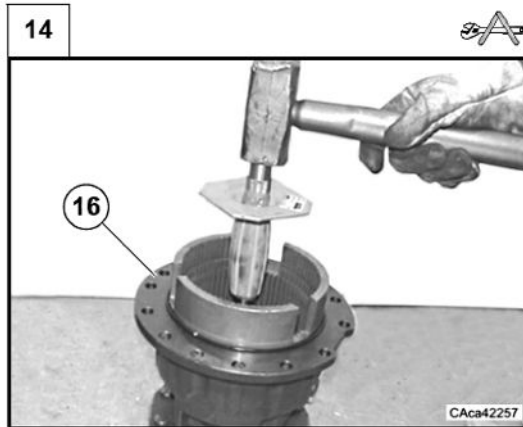
MAINTENANCE

AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY

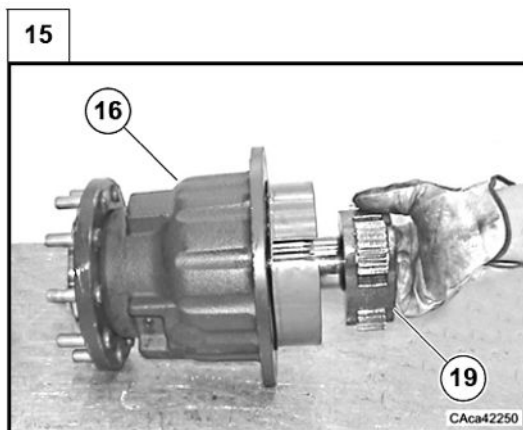


Heat the wheel hub bearing cone (18) at 110°C then place it in the trumpet (16).

Danger: burn, wear safety gloves.



Assemble the wheel hub bearing cone (18) with a driver and a hammer.

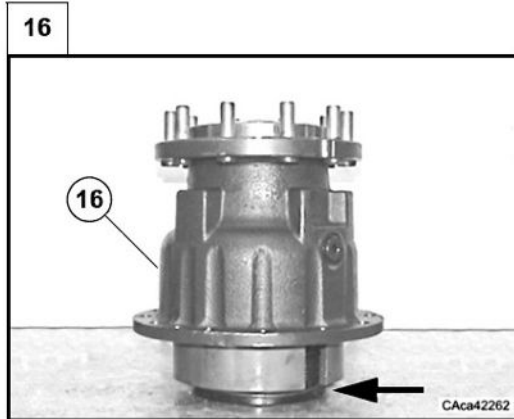


Insert the planetary carrier (19) into the trumpet (16).

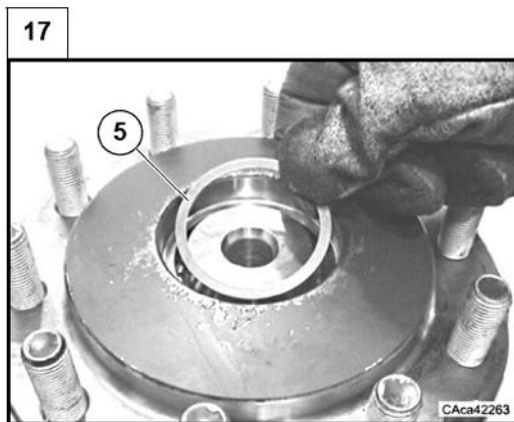
Note: do not overturn the planetary carrier, the pins of the differential gears can come out easily and free all the group parts (needle bearings, gears and washers).

MAINTENANCE

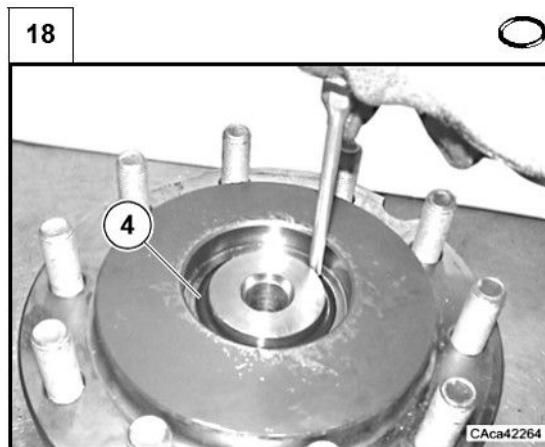
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY



Place the planetary carrier (19) on a support of minimum thickness 40 mm, then complete the assembly of the trumpet (16) on the planetary carrier (19) in order to assure the right positioning of the bearings parts (18).



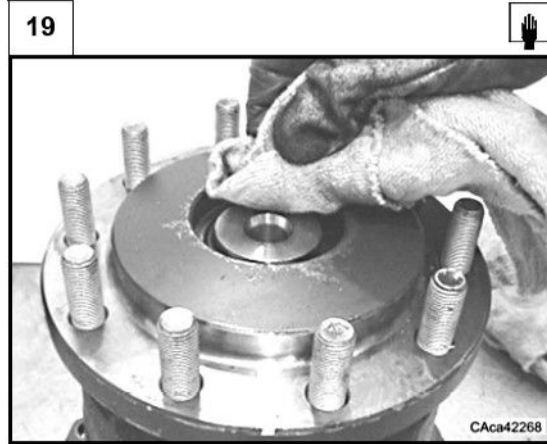
Install the thin washer (5).



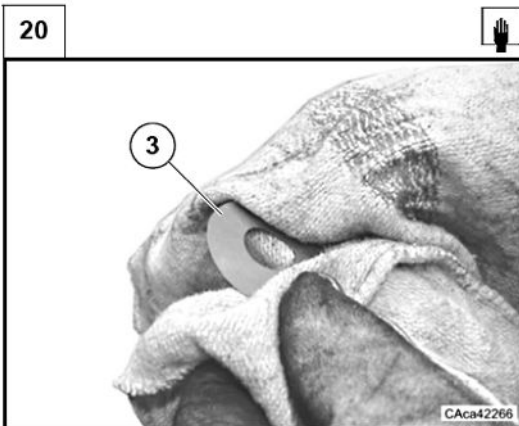
Assemble the new O-ring (4).

MAINTENANCE

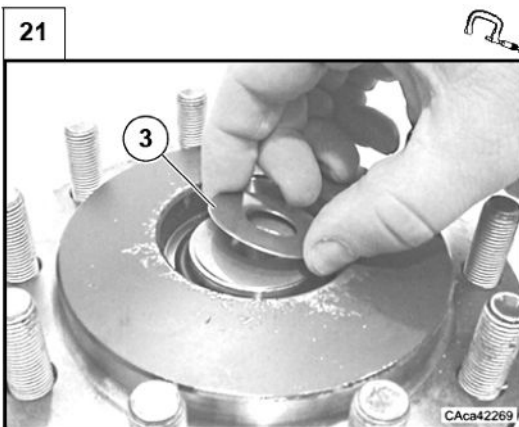
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY



Clean with care the assembly surface.



Clean with care the shims (3). All the shims must be dry and well degreased.



SHIM RANGE				
Thickness	0.05	0.10	0.30	0.50
Quantity	—	—	—	—

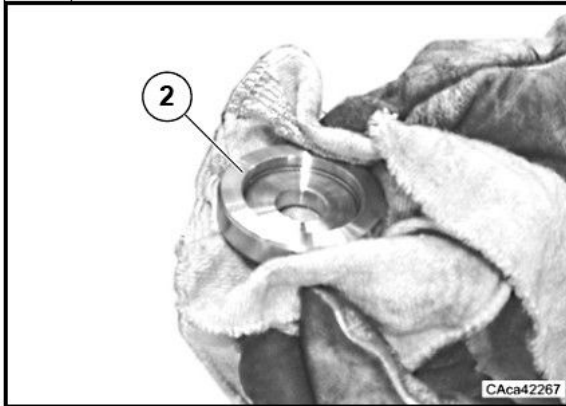
Choose among the available shims (3) a quantity in a way to reach the recommended value $X= 0.8 \text{ mm}$.

See: D.2.3.

MAINTENANCE

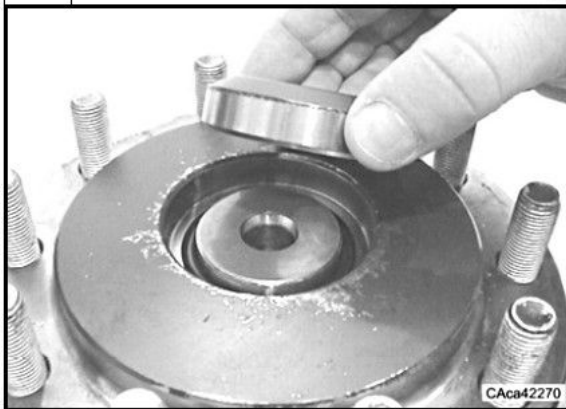
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY

22



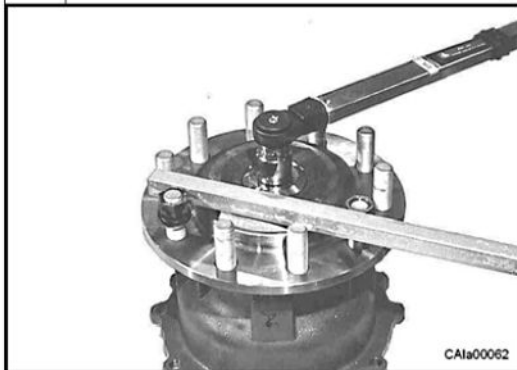
Clean with care the washer (2).

23



Assemble the washer (2) to the wheel hub (6).

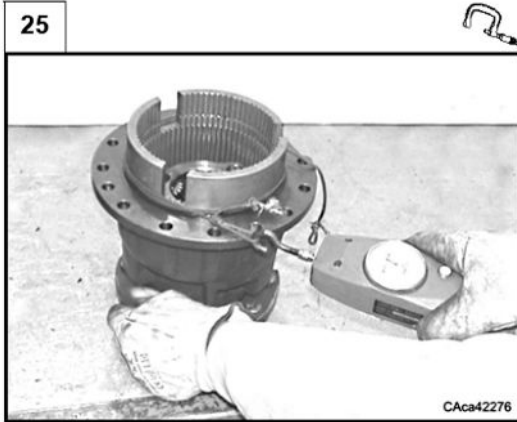
24



*Assemble a screw **M16x80** in the seat of the screw (1) to the prescribed torque (see C.7) by means of a dynamometric wrench and a lever.
Note: in order to not damage the thread of the studs, screw two nuts for the lever support.*

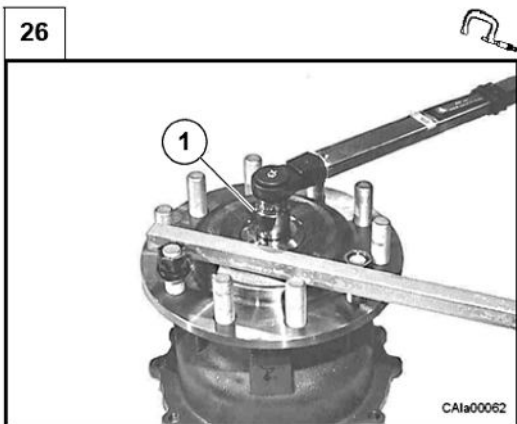
MAINTENANCE

AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY



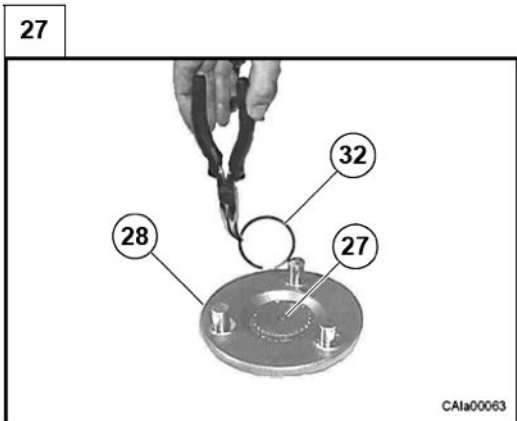
Overturn the group and check the conical bearings preload:

- if this value exceed 62 N it is necessary to add some shims (0.05 mm or multiple);
- if this value is lower than 38 N it is necessary to take off some shims (0.05 mm or multiple).



When the prescribed value of preloading has been reached remove the screw **M16x80** and assemble the screw (1) to the prescribed torque (see C.7) by means of a dynamometric wrench and a lever.

Note: in order to not damage the thread of the studs, screw two nuts for the lever support.

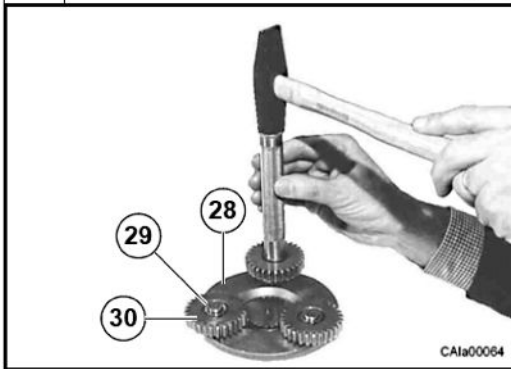


Assemble the pinion gear (27) in the planetary carrier (28) then lock it with the lock ring (32).

MAINTENANCE

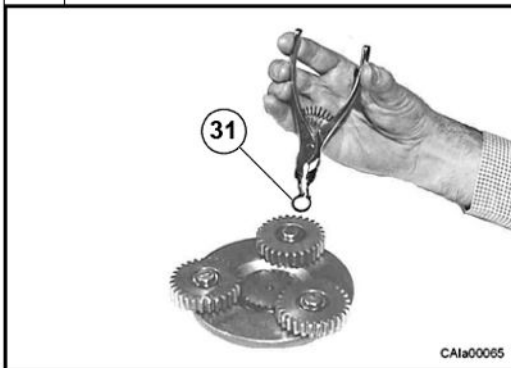
AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY

28



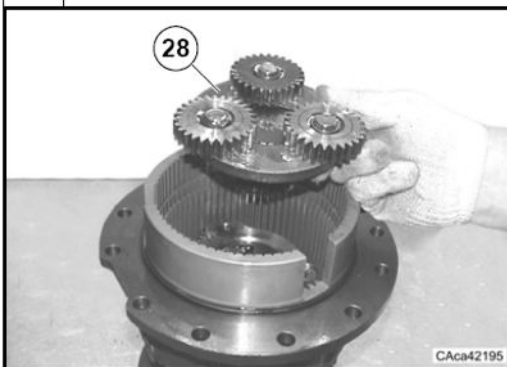
Assemble the planetary gears (30) on the planetary carrier (28) using the driver CA715006 and a hammer. The planetary gears have the bearing (29) preassembled.

29



Assemble the lock rings (31) with suitable pliers.

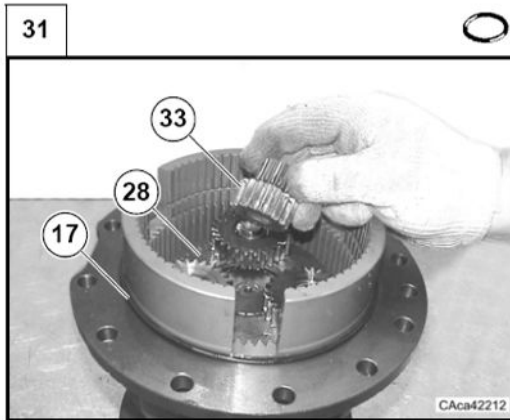
30



Assemble the planetary carrier (28) to the trumpet group.

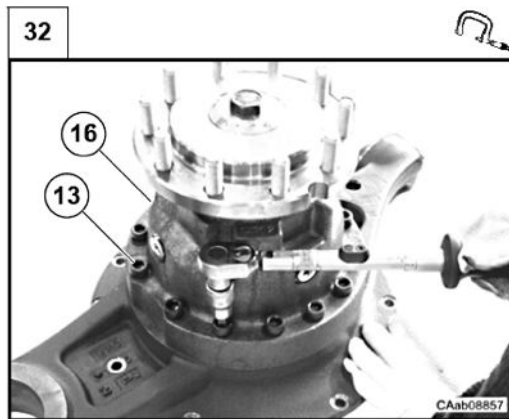
MAINTENANCE

AXLE MAINTENANCE—LH REDUCTION GEAR GROUP ASSEMBLY



Assemble a new well lubricated O-Ring (17) in the related seat on the reduction gear.

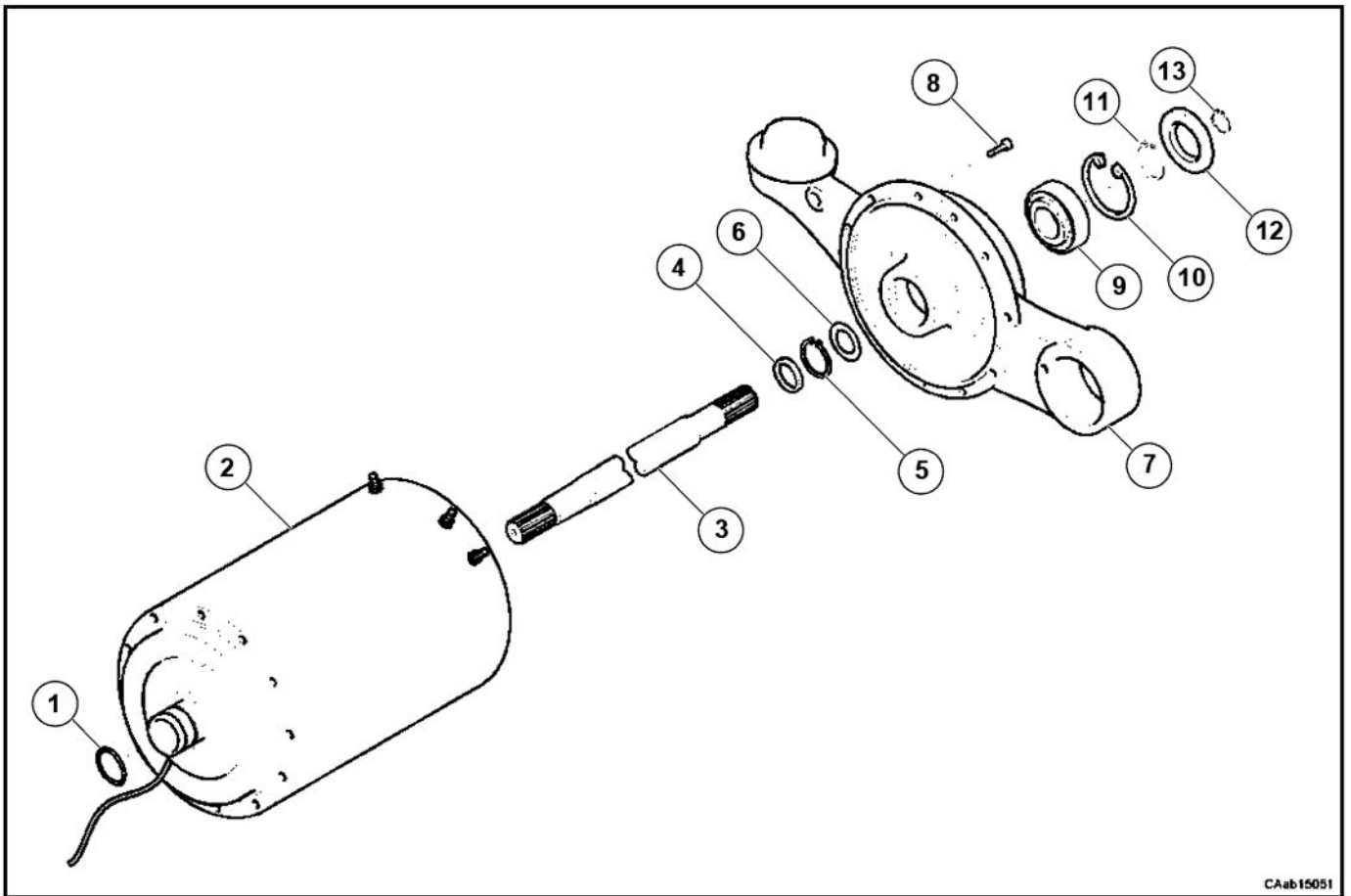
Insert the pinion gear (33) into the planetary carrier (28) and assemble the splined sleeve (34) to the pinion gear (33).



Fit the left reduction gear (16) to the housing preassembled with the motor (see D.6), tightening the fastening screws (13) to the prescribed torque (see C.7) by means of a dynamometric wrench.

MAINTENANCE

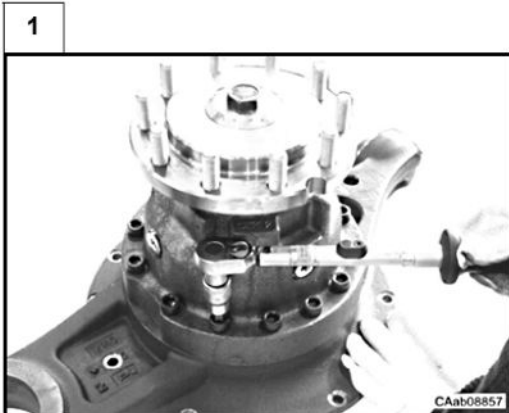
AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR DISASSEMBLY



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D.7.1 Disassembly

Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Remove left side reduction gear group (16) from the motor housing unscrewing the fastening screws (13).

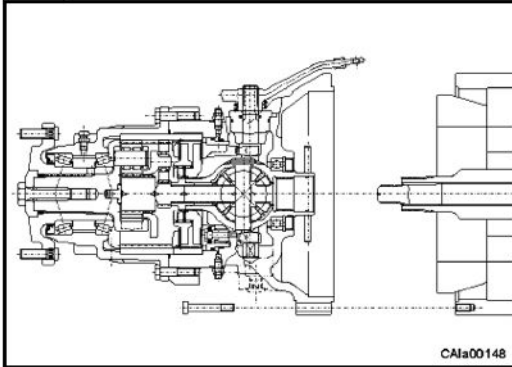
See: D.6

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MAINTENANCE

AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR DISASSEMBLY

2

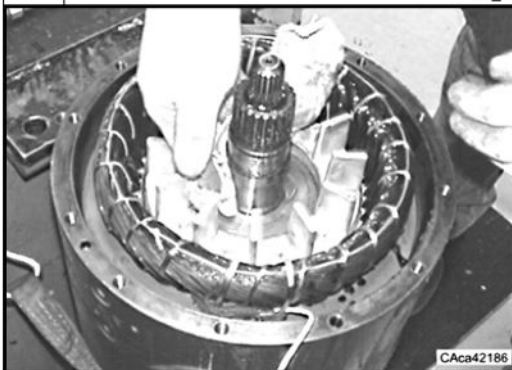


Disassemble the housing/reduction gear group.

See: D.2

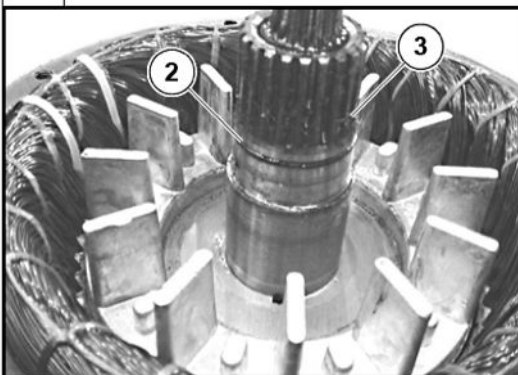
Note: if the motor replacement and/or the O-Ring (1) replacement are not necessary, do not remove the housing/reduction group and go to step 5.

3



Remove the possible oil residual.

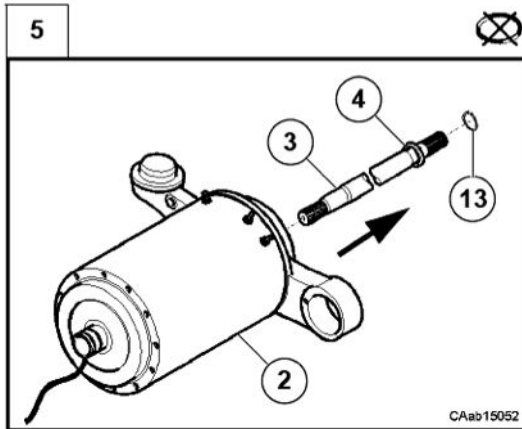
4



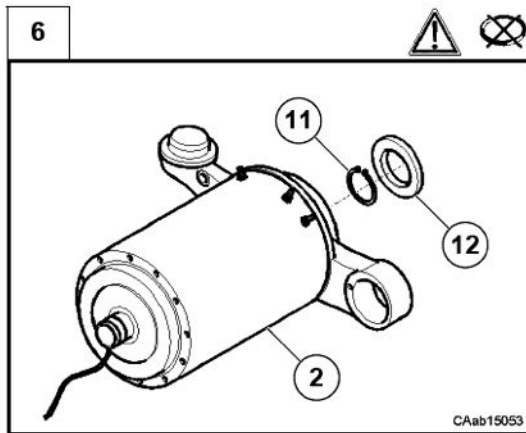
Remove the O-Ring (1) from the motor shaft (3).

MAINTENANCE

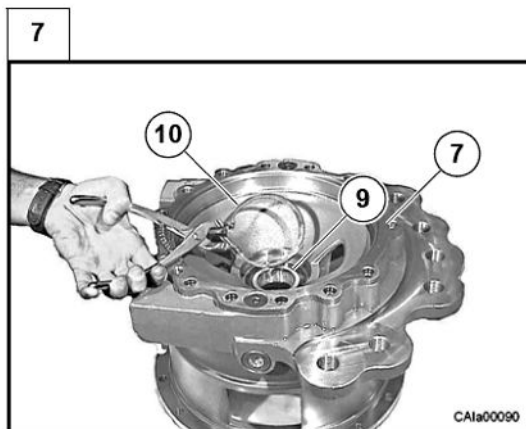
AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR DISASSEMBLY



Remove the lock ring (13) and extract the half-shaft (3).
Note: the seal (4) is removed with the half-shaft.
 Remove the seal (4) from the half-shaft (3).
Note: this is a destructive operation for the seal (4); the seal must be replaced.



Remove with a lever the seal ring (12) from the housing (7).
Note: this is a destructive operation for the seal (4); the seal must be replaced.
Warning: do not damage the bearing (9).
 Remove the lock ring (11).

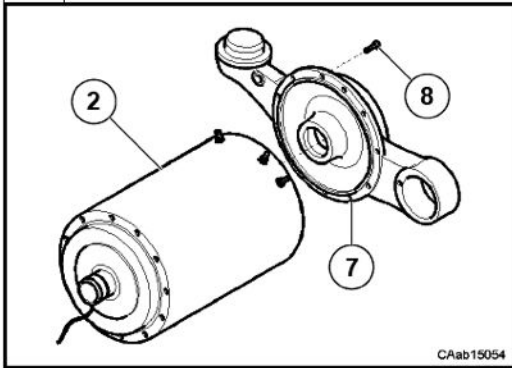


Remove from the housing (7) the bearing (9) lock ring (10).

MAINTENANCE

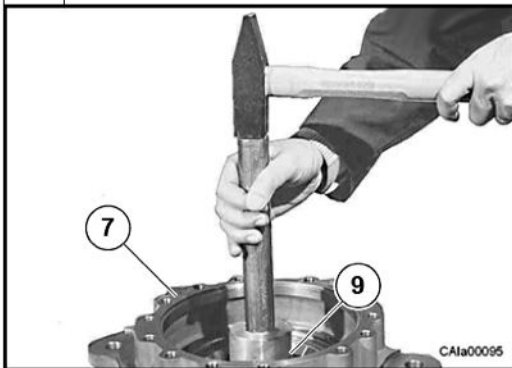
AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR DISASSEMBLY

8



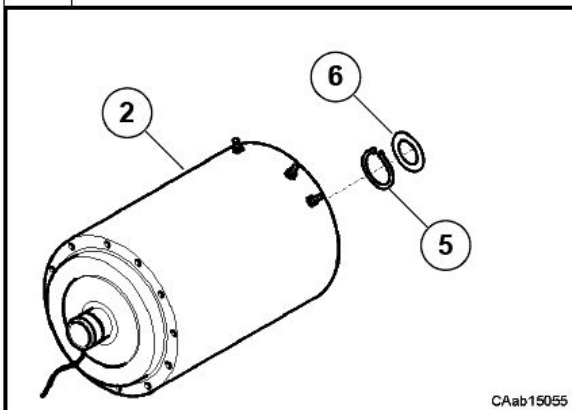
Remove the fastening bolts (8).
By keeping the rotor pushed, disassemble the housing (7) from the motor group (2).

9



Turn the left housing (7) upside down and extract the bearing (9) with a driver and a hammer.

10



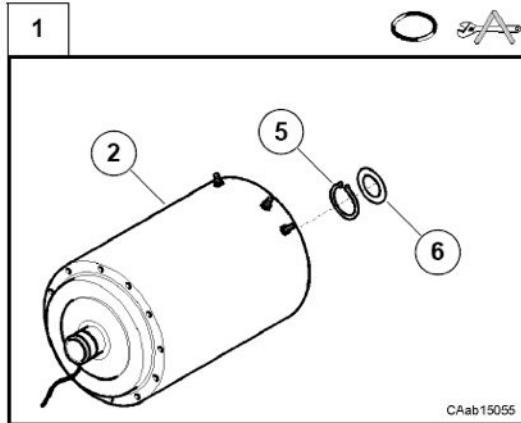
Collect the washer (6) from the motor shaft.
Remove the lock ring (5) from the motor shaft.

MAINTENANCE

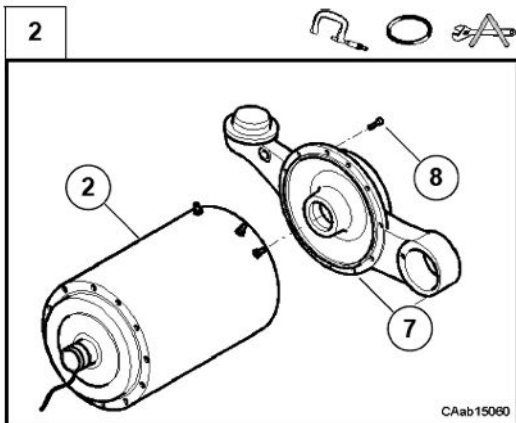
AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR ASSEMBLY

D.7.2 Assembly

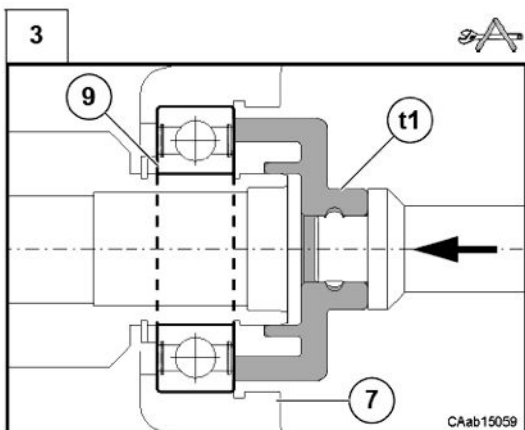
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Assemble the lock ring (5) on the motor shaft.
Insert the washer (6) on the motor shaft.



Assemble the left housing (7) to the electrical motor (2), screwing the related fastening screw (8) to the prescribed torque.
See: C.7

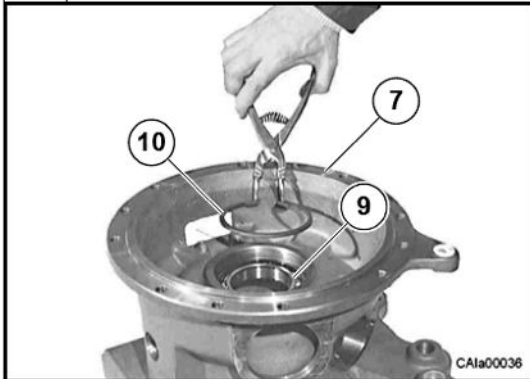


Assemble to the housing (7) the bearing (9) with the driver CA715418 (t1), using the special tool CA119133 and a hammer.

MAINTENANCE

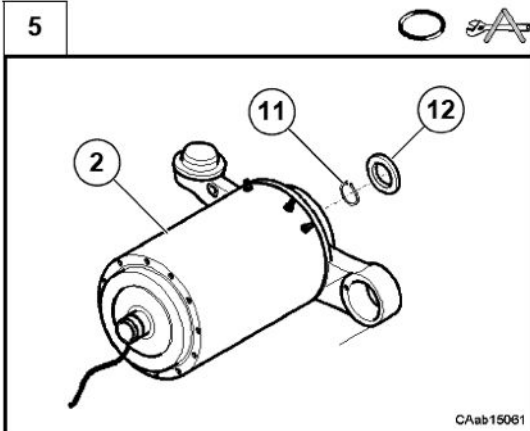
AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR ASSEMBLY

4



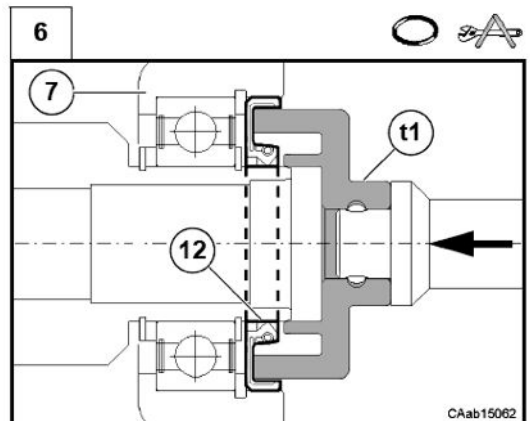
Assemble the lock ring (10) of the bearing (9).

5



Assemble the lock ring (11) on the motor shaft.
Insert a new seal ring (12) into the housing (7).
See: next point.

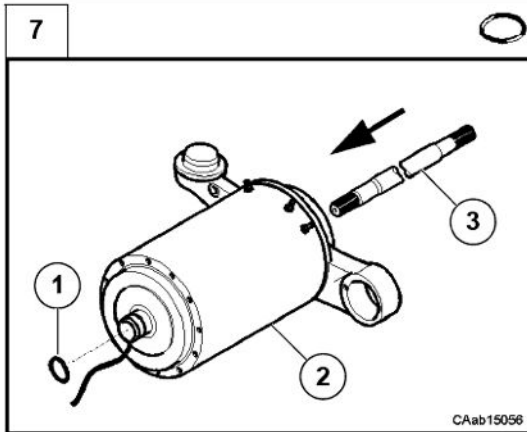
6



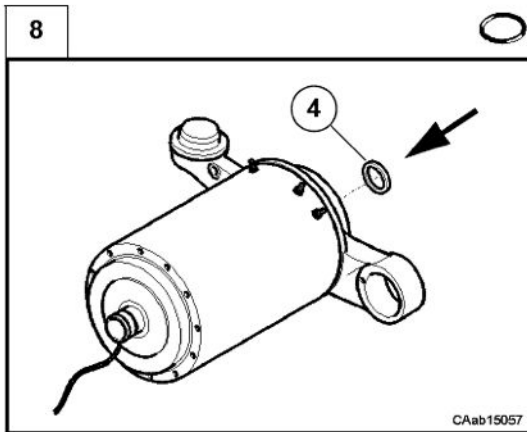
Assemble the seal (12) with the driver CA715418 (t1), using the special tool CA119133 and a hammer.

MAINTENANCE

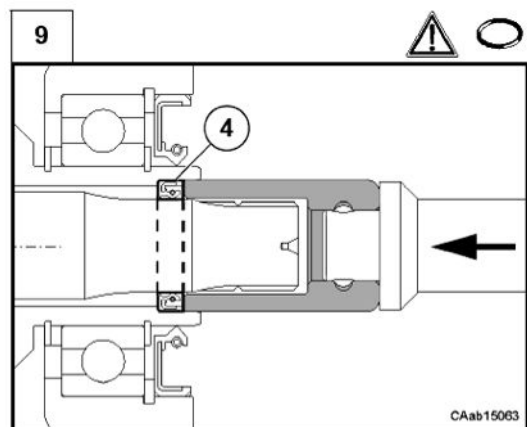
AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR ASSEMBLY



Insert the half-shaft (3) in the electrical motor.
Assemble the lock ring (13) on the half-shaft (3).
Only if previously removed, assemble a new well lubricated O-Ring (1) on the motor shaft (3).



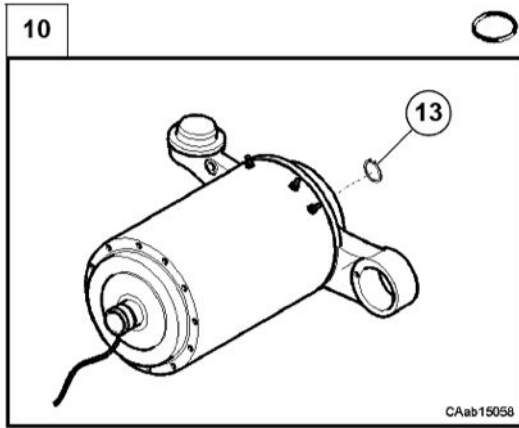
Assemble a new seal ring (4).
See: next point.
Note: lubricate the seal lip.



Assemble the new seal ring (4) with the special tool CA715419, using the special tool CA119133 and a hammer.
Warning: do not damage the seal ring (4).

MAINTENANCE

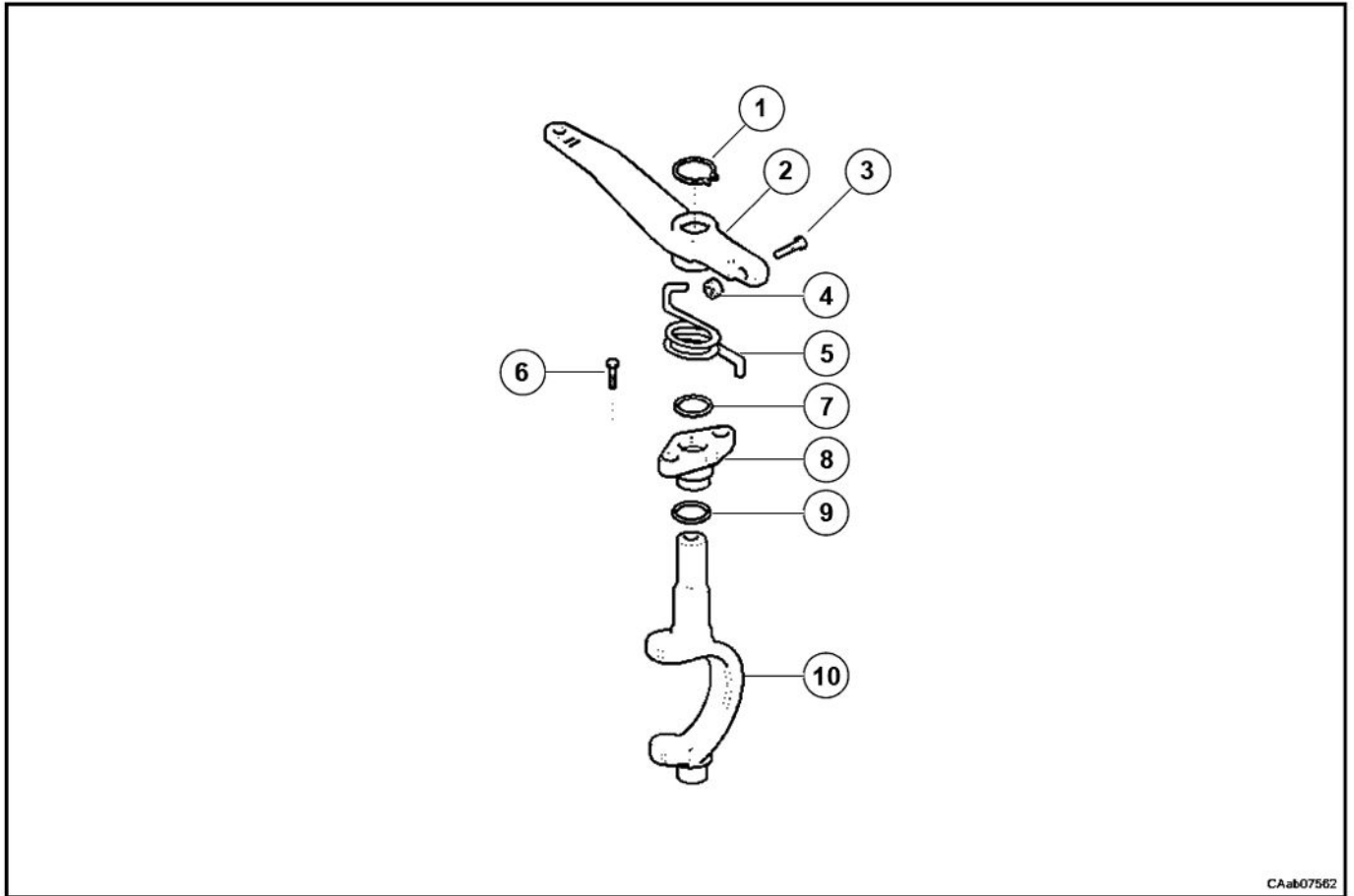
AXLE MAINTENANCE—LH HOUSING AND ELECTRIC MOTOR ASSEMBLY



Assemble the lock ring (13) on the half-shaft (3).

MAINTENANCE

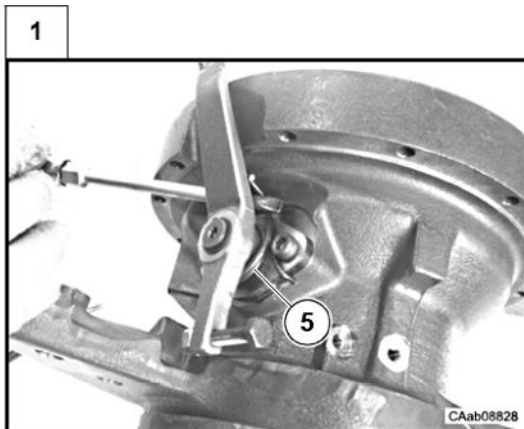
AXLE MAINTENANCE—BRAKE CONTROL GROUP DISASSEMBLY



CAab07562

D.8.1 Disassembly

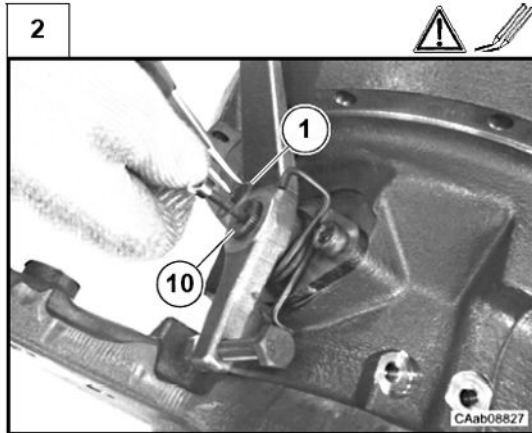
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Place the right housing horizontal, on flat surface.
Release the spring (5) with a screwdriver.

MAINTENANCE

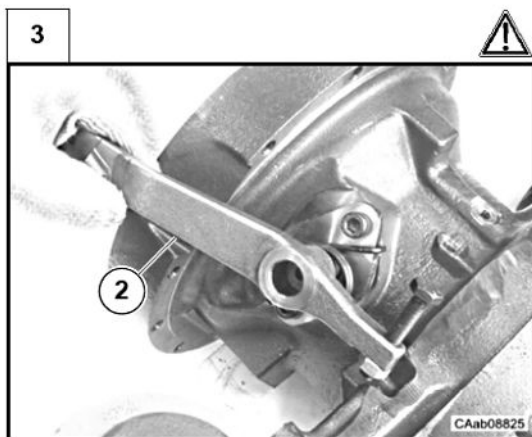
AXLE MAINTENANCE—BRAKE CONTROL GROUP DISASSEMBLY



Warning: make reference signs on the fork-pin head (10) and brake control lever (2) in order to know the related position in the assembly operation.

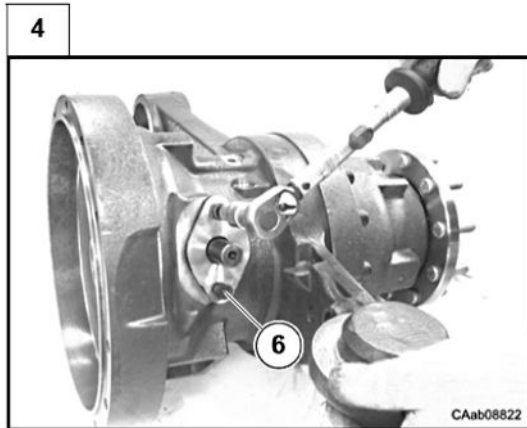
Remove the lock ring (1) from the fork-pin (10).

Note: if necessary extract the fork-pin head (10) with a screw as in figure.



Remove the control service brake lever (2) and the related spring (5).

Danger: the spring can be ejected with force against the operator, keep the spring while extract the lever.

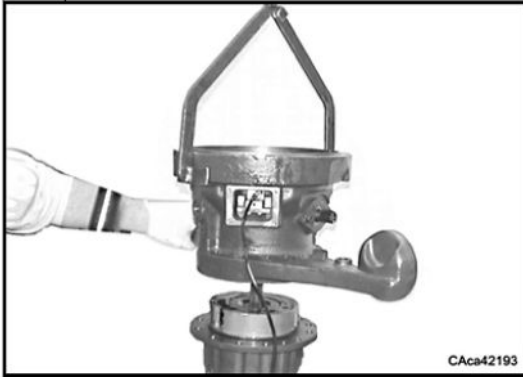


Remove the fastening screws (6) of the bush (8).

MAINTENANCE

AXLE MAINTENANCE—BRAKE CONTROL GROUP DISASSEMBLY

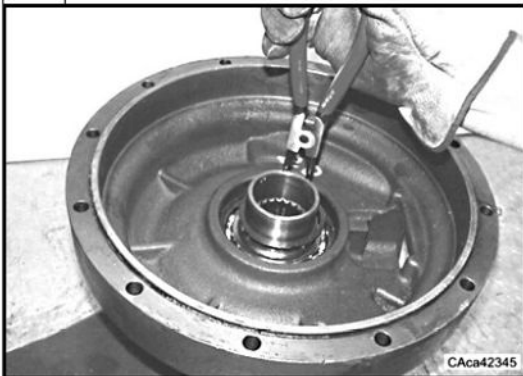
5



Disassemble the right reduction gear from the housing and remove the brake group.

See: D.3

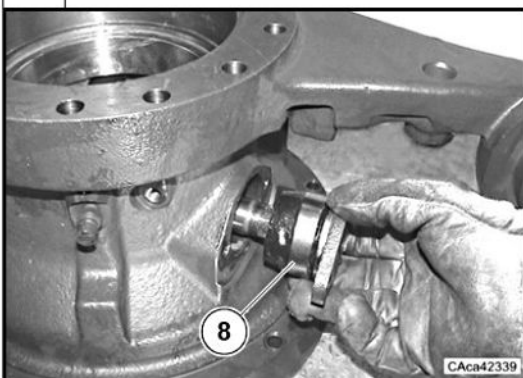
6



Turn the housing upside down and remove: the speed meter wheel, the seal ring, the lock rings and the differential housing.

See: D.4

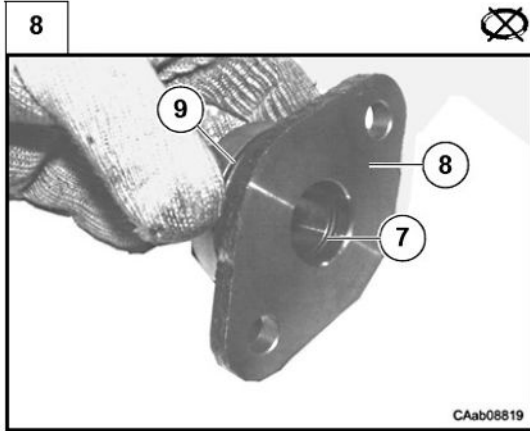
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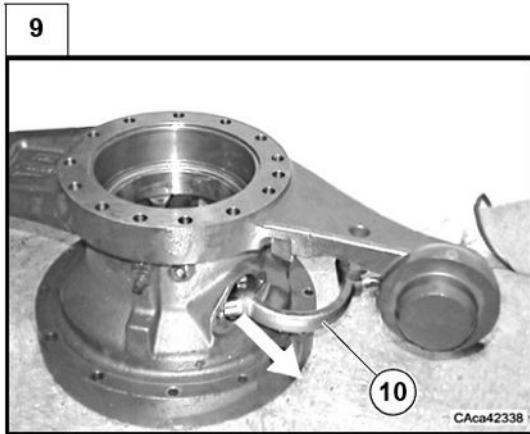
Remove the bush (8).

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AXLE MAINTENANCE—BRAKE CONTROL GROUP DISASSEMBLY



*Remove the O-Rings (7, 9).
Extract from the housing the control service brake fork-pin (10).*



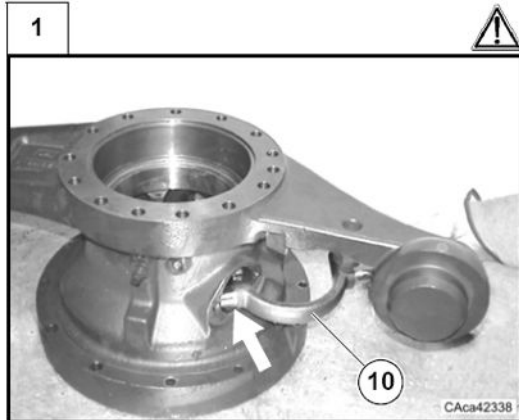
Extract from the housing the control service brake fork-pin (10).

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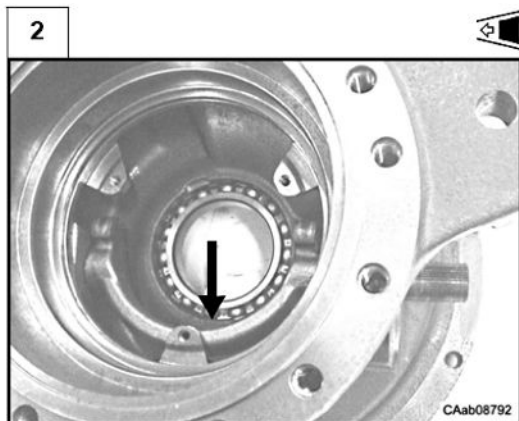
AXLE MAINTENANCE—BRAKE CONTROL GROUP ASSEMBLY

D.8.2 Assembly

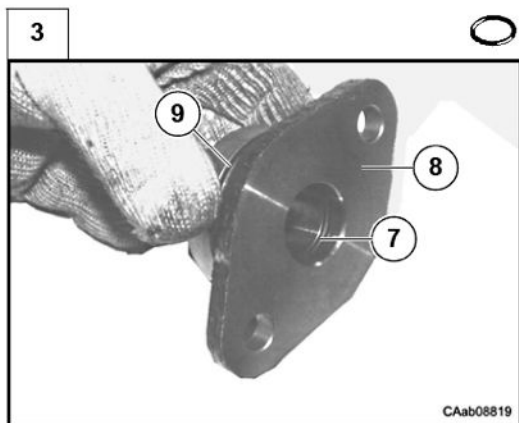
Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Insert in the housing the fork-pin (10).
Warning: respect the correct assembly position.



Place the fork-pin (10) on the indicated side.

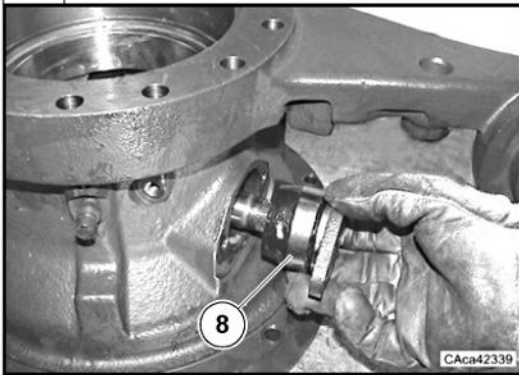


Assemble new well lubricated O-Rings (7, 9) in the related seats on the bush.

MAINTENANCE

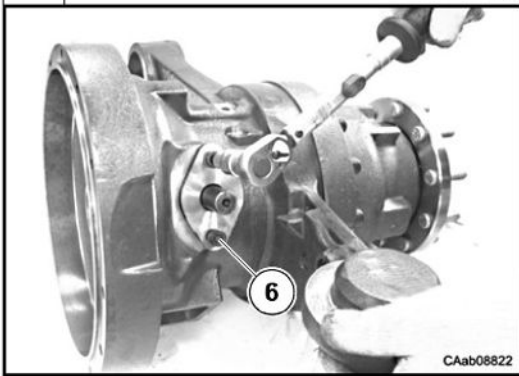
AXLE MAINTENANCE—BRAKE CONTROL GROUP ASSEMBLY

4



Assemble the bush (8).

5



Assemble and tighten the fastening screws (6) of the bush (8) with a dynamometric wrench to the prescribed torque.

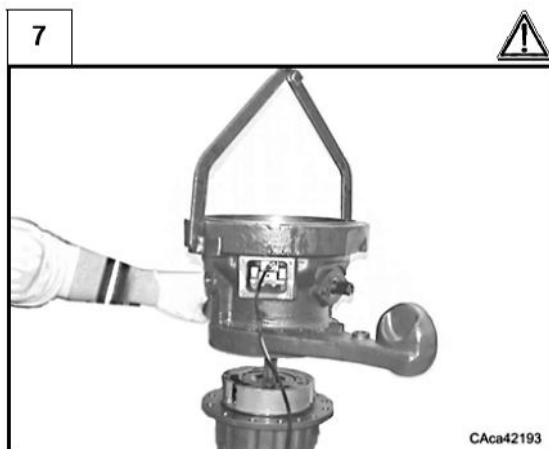
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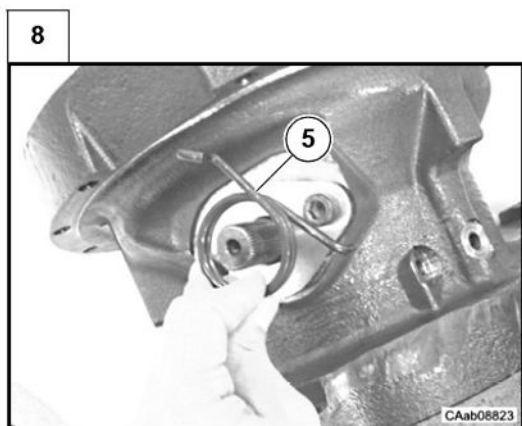
Assemble the brake group.
See: D.3.

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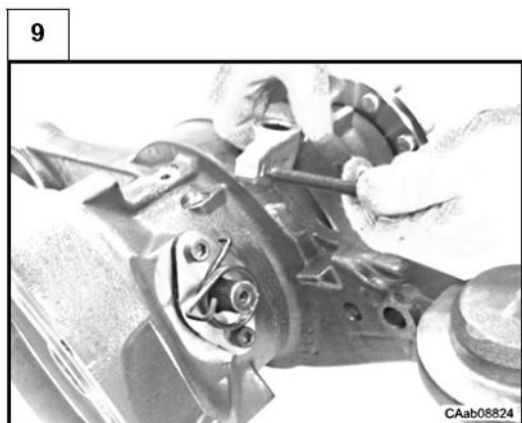
AXLE MAINTENANCE—BRAKE CONTROL GROUP ASSEMBLY



*Assemble the housing on the reduction gear.
See: D.7.*



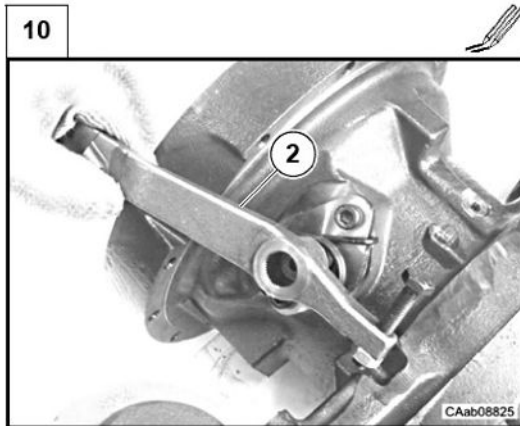
Assemble the spring (5).



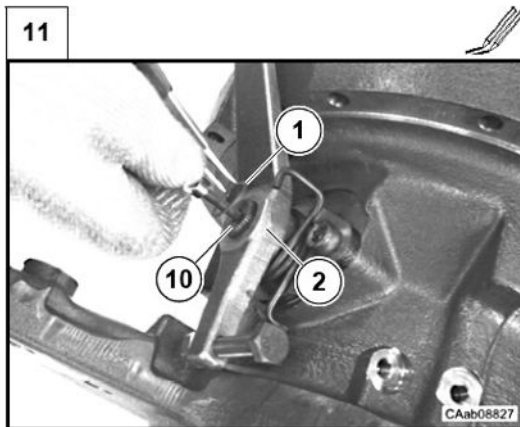
Assemble the bolt (3) and nut (4) to the control service brake lever (2).

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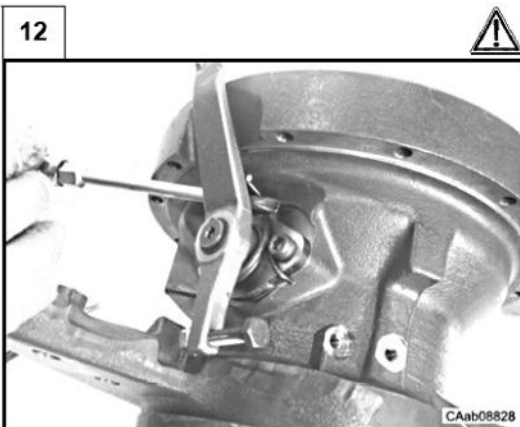
AXLE MAINTENANCE—BRAKE CONTROL GROUP ASSEMBLY



Assemble the control service brake lever (2).
Note: align the reference mark made in the disassembly on the fork-pin (10) and the control service brake lever (2).



Assemble the lock ring (1) to the fork-pin (10).
Note: if necessary extract the fork-pin head (10) with a screw as in figure.



Connect the spring (5) to the control brake lever (2) by means of a screwdriver.

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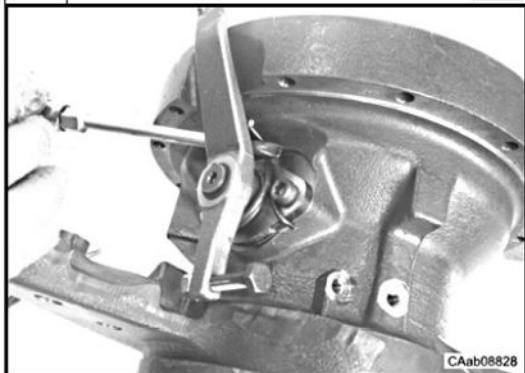
AXLE MAINTENANCE—BRAKE CONTROL GROUP ASSEMBLY

13



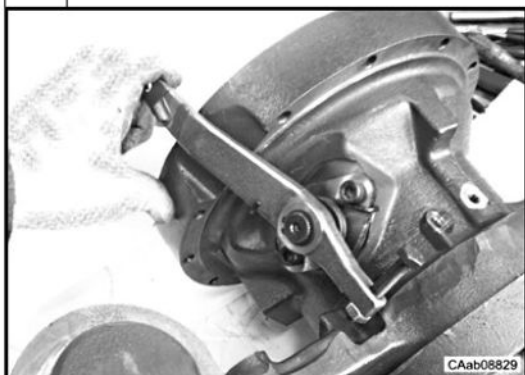
Check that the control service brake lever (2) are not locked.

12



Connect the spring (5) to the control brake lever (2) by means of a screwdriver.

13



Check that the control service brake lever (2) are not locked.

MAINTENANCE

AXLE MAINTENANCE—TROUBLE SHOOTING

Note: It is recommended that diagnosis and repairs be done by an authorized Carraro dealer in your area. Unauthorized work may void axle warranty.

This chapter is a descriptive and explanatory guide to common axle problems. This guide suggests the repair correct procedures to be followed.

Problem	Cause	Action
<i>Ring gear tooth broken at the outer side</i>	<ol style="list-style-type: none"> 1. Excessive gear load compared to the one foreseen 2. Incorrect gear adjustment (excessive backlash) 3. Pinion nut loose 	<p>Replace bevel gear set Follow carefully the recommended operations for the adjustment of bevel gear set backlash</p>
<i>Ring gear tooth broken side</i>	<ol style="list-style-type: none"> 1. Load bump 2. Incorrect gear adjustment (insufficient backlash) 3. Pinion nut loose 	<p>Replace bevel gear set Follow carefully the recommended operations for the adjustment of bevel gear set backlash.</p>
<i>Pinion or ring gear teeth or worn</i>	<ol style="list-style-type: none"> 1. Insufficient lubrication 2. Contaminated oil 3. Incorrect lubrication or depleted additives 4. Worn out pinion bearings that cause an incorrect pinion axle backlash and wrong contact between pinion and ring. 	<p>Replace bevel gear set. Follow carefully the recommended operations for the adjustment of bevel gear set backlash. Use correct lubricants, fill up to the right levels and replace according to the recommended program.</p>
<i>Overheated ring and pinion teeth. See if gear teeth have faded</i>	<ol style="list-style-type: none"> 1. Prolonged functioning at high temperatures 2. Incorrect lubrication 3. Low oil level 4. Contaminated oil 	<p>Replace bevel gear set. Use proper lubrication, fill up to right level and replace at recommended program.</p>
<i>Pinion teeth pitting</i>	<ol style="list-style-type: none"> 1. Excessive use 2. Insufficient lubrication 	<p>Replace bevel gear set. Use correct lubrication, fill up to the right level and substitute at recommended intervals</p>
<i>Axle beam body bent</i>	<ol style="list-style-type: none"> 1. Vehicle over loaded 2. Vehicle's accident 3. Load bump 	<p>Replace axle beam body</p>
<i>Worn out or pitted bearings</i>	<ol style="list-style-type: none"> 1. Insufficient lubrication 2. Contaminated oil 3. Excessive use 4. Normal wear out 5. Pinion nut loose 	<p>Replace bearings. Use correct lubrication fill up, to the right level and replace at recommended intervals</p>
<i>Oil leakage form gaskets and seals</i>	<ol style="list-style-type: none"> 1. Prolonged functioning at high temperature of the oil 2. Oil gasket assembled incorrectly 3. Seal lip damaged 4. Contaminated oil 	<p>Replace the gasket or seal and matching surface if damaged. Use correct lubrication and replace at recommended intervals.</p>
<i>Excessive wearing out of input flange spline</i>	<ol style="list-style-type: none"> 1. Exhaustive use 2. Pinion nut loose 3. Pinion axle backlash 	<p>Replace the flange. Check that the pinion spline is not excessively worn out. Replace bevel gear set if required.</p>
<i>Fatigue failure of pinion teeth See if the fracture line is well defined (wave lines, beach lines)</i>	<ol style="list-style-type: none"> 1. Exhaustive use 2. Continuous overload 	<p>Replace bevel gear set</p>

MAINTENANCE

AXLE MAINTENANCE—TROUBLE SHOOTING

Problem	Cause	Action
<i>Pinion and ring teeth breakage</i>	<i>1. Crash load of differential components</i>	<i>Check and/or replace other differential components.</i>
<i>Side gear spline worn out (Excessive backlash)</i>	<i>Excessive use</i>	<i>Replace differential gear group. Replace half-shaft if required</i>
<i>Thrust washer surface worn out or scratched.</i>	<i>1. Insufficient lubrication 2. Incorrect lubrication 3. Contaminated oil</i>	<i>Use correct lubrication and fill up to right level. Replace at intervals recommended. Replace all scratched washers and those with 0,1mm thickness lower than the new ones.</i>
<i>Inner diameter of tapered roller bearing worn out.</i>	<i>1. Excessive use 2. Excessive pinion axial backlash 3. Insufficient lubrication 4. Contaminated oil</i>	<i>Replace bearing. Check pinion axial backlash. Use proper lubrication, fill up to right level and replace at recommended intervals.</i>
<i>Bent or broken half-shaft</i>	<i>Vehicle intensively operated or overloaded</i>	<i>Replace</i>
<i>Half-shaft broken at wheel side</i>	<i>1. Wheel support loose 2. Beam body bent</i>	<i>Replace Check that wheel support is not worn out or wrongly adjusted.</i>

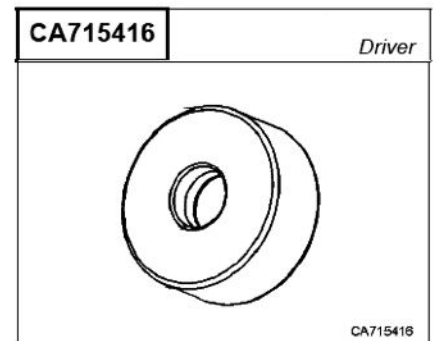
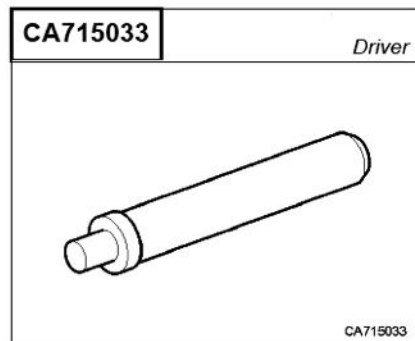
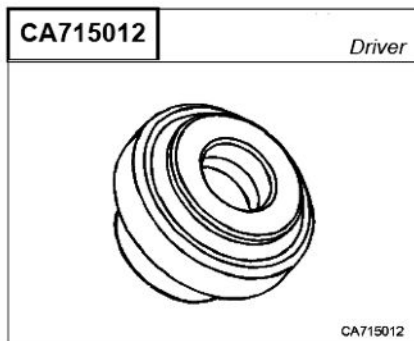
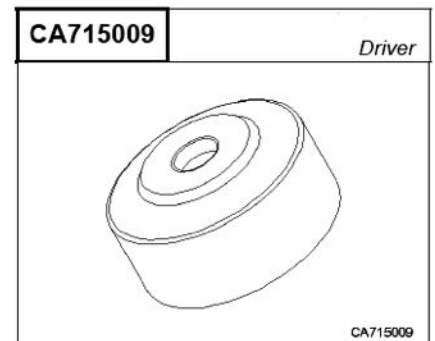
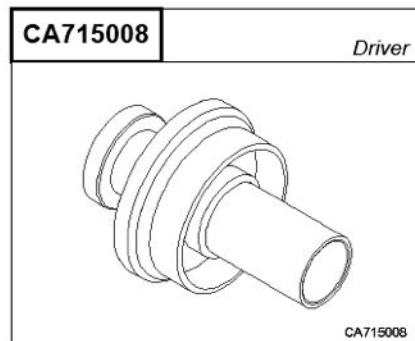
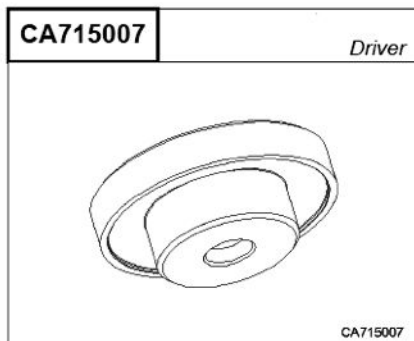
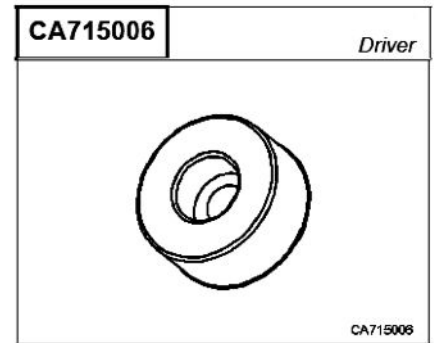
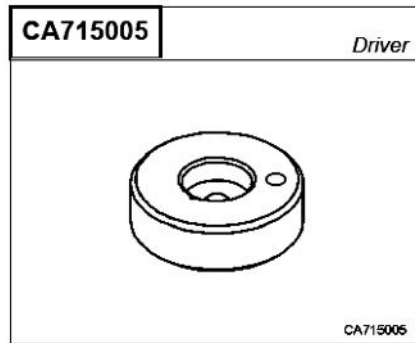
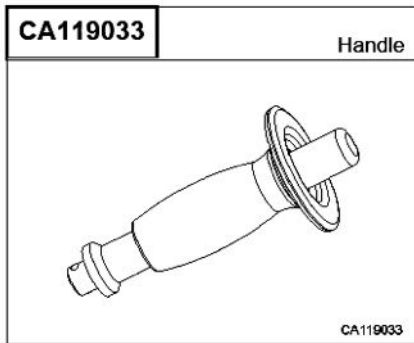
MAINTENANCE

AXLE MAINTENANCE—SPECIAL TOOLS

Note: The following tools are specific to Carraro Axle and can be purchased through a Carraro dealer.

F.1 Special tools

The special drifts/pad used to assembly the seals, bearings and bushes should always be used with the interchangeable handle CA119033; its use is recommended together with a suitable safety handle in order to protect the hands.



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AXLE MAINTENANCE—SPECIAL TOOLS

