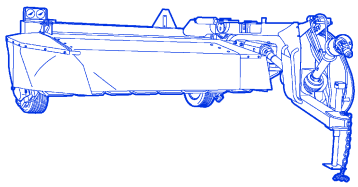


NEW HOLLAND H6830

SERVICE MANUAL

NEW HOLLAND AGRICULTURE

SERVICE

84207322 2/09
1st Printing

H6830
SERVICE MANUAL
CONTENTS

The sections used through out all New Holland product Service manuals may not be used for each product. Each Service manual will be made up of one or several books. Each book will be labeled as to which sections are in the overall Service manual and which sections are in each book.

The sections listed above are the sections utilized for the H6830.

Contents

INTRODUCTION

Contents

INTRODUCTION

Legal advice

All repair and maintenance works listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given; and using, whenever possible, the special tools.

Anyone who carries out the above operations without complying with the procedures shall be responsible for the subsequent damages.

The manufacturer and all the organizations of it's distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages due to the anomalous behavior of parts and/or components not approved by the manufacturer himself, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages due to an anomalous behavior of parts and/or components not approved by the manufacturer.

The information in this manual is up-to-date at the date of the publication. It is the policy of the manufacturer for continuous improvement. Some information could not be updated due to modifications of a technical or commercial type, as well as to suit the laws and regulations of different countries.

In case of questions, refer to your Sales and Service Networks.

Foreword - Ecology And The Environment

ECOLOGY AND THE ENVIRONMENT

Soil, air, and water are vital factors of agriculture and life in general. When legislation does not yet rule the treatment of some of the substances which are required by advanced technology, common sense should govern the use and disposal of products of a chemical and petrochemical nature.

NOTE: *The following are recommendations which may be of assistance:*

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, antifreeze, cleaning agents, etc., with regard to their effect on man and nature and how to safely store, use and dispose of these substances.
- Agricultural consultants will, in many cases, be able to help you as well.

HELPFUL HINTS

- Avoid filling tanks using cans or inappropriate pressurized fuel delivery systems which may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances which may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when draining off used engine coolant mixtures, engine, gearbox and hydraulic oils, brake fluids, etc. Do not mix drained brake fluids or fuels with lubricants. Store them safely until they can be disposed of in a proper way to comply with local legislation and available resources.
- Modern coolant mixtures, i.e. antifreeze and other additives, should be replaced every two years. They should not be allowed to get into the soil but should be collected and disposed of properly.
- Do not open the air-conditioning system yourself. It contains gases which should not be released into the atmosphere. Your New Holland dealer or air conditioning specialist has a special extractor for this purpose and will have to recharge the system properly.
- Repair any leaks or defects in the engine cooling or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, allowing the loss of oils, coolant, etc.

Safety rules

PRECAUTIONARY STATEMENTS

Personal Safety

Throughout this manual and on machine signs, you will find precautionary statements ("DANGER", "WARNING", and "CAUTION") followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take the time to read them.

⚠ DANGER ⚠

This word "DANGER" indicates an immediate hazardous situation that, if not avoided, will result in death or serious injury. The color associated with Danger is RED.

M1169

⚠ WARNING ⚠

This word "WARNING" indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. The color associated with Warning is ORANGE.

M1170

⚠ CAUTION ⚠

This word "CAUTION" indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW .

M1171

FAILURE TO FOLLOW THE "DANGER", "WARNING", AND "CAUTION" INSTRUCTIONS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH.

Machine Safety

The precautionary statement ("IMPORTANT") is followed by specific instructions. This statement is intended for machine safety.

IMPORTANT: *The word "IMPORTANT" is used to inform the reader of something they need to know to prevent minor machine damage if a certain procedure is not followed.*

Information

NOTE: *Instructions used to identify and present supplementary information.*

LEGAL OBLIGATIONS

This machine may be equipped with special guarding or other devices in compliance with local legislation. Some of these require active use by the operator. Therefore, check local legislation on the usage of this machine.

ACCIDENT PREVENTION

Most accidents or injuries that occur in workshops are the result of a non compliance to simple and fundamental safety regulations. For this reason, IN MOST CASES THESE ACCIDENTS CAN BE AVOIDED by foreseeing possible causes and consequently acting with the necessary caution and care.

Accidents may occur with all types of machines, regardless of how well the machine in question was designed and built.

A careful and informed service technician is the best guarantee against accidents.

Decisive awareness of the most basic safety rule is normally sufficient to avoid many serious accident.

⚠ **DANGER** ⚠

Shut down the machine, remove key, be sure all moving parts have stopped and all pressure in the systems is relieved before cleaning, adjusting or lubricating the equipment. Failure to comply will result in death or serious injury.

M871

SAFETY REQUIREMENTS FOR FLUID POWER SYSTEMS AND COMPONENTS - HYDRAULICS (EUROPEAN STANDARD PR EM 982)

Flexible hose assemblies must not be constructed from hoses which have been previously used as part of a hose assembly.
Do not weld hydraulic piping.
When flexible hoses or piping are damaged, replace them immediately.
It is forbidden to modify a hydraulic accumulator by machining, welding or any other means.
Before removing hydraulic accumulators for servicing, the liquid pressure in the accumulators must be reduced to zero.
Pressure check on hydraulic accumulators shall be carried out by method recommended by the accumulator manufacturer.
Care must be taken not to exceed the maximum allowable pressure of the accumulator. After any check or adjustment there must be no leakage of gas.

SAFETY RULES

General guidelines

- Carefully follow specified repair and maintenance procedures.
- Do not wear rings, wrist watches, jewelry, unbuttoned or loose articles of clothing such as: ties, torn clothing, scarves, open jackets or shirts with open zips which may remain entangled in moving parts. It is advised to wear approved safety clothing. For example: non-slip footwear, gloves, safety goggles, helmets, etc.
- Do not carry out repair operations with someone sitting in the driver's seat, unless the person is a trained technician who is assisting with the operation in question.
- Do not operate the machine or use any of the implements from different positions, other than the driver's seat.
- Do not carry out operations on the machine with the engine running, unless specifically indicated.
- Stop the engine and bleed off residual hydraulic pressure before removing components, caps, valves, covers or etc.
- All repair and maintenance operations must be carried out using extreme care and attention.
- Service steps and platforms used in the workshop or elsewhere should be built according to standard accident prevention regulations.
- Disconnect the Power Take Off (PTO) from the machine, and label all controls to indicate that the machine is being serviced. Any parts that are to be raised must be locked in position.
- Brakes are inoperative when manually released for repair or maintenance purposes. Use blocks or similar devices to control the machine in these conditions.
- Only use specified towing points for towing the machine. Connect parts carefully. Make sure that all pins and/or locks are secured in position before applying traction. Never remain near the towing bars, cables or chains that are operating under load.
- When loading or unloading the machine from the trailer (or other means of transport), select a flat area capable of sustaining the trailer or truck wheels. Firmly secure the machine to the truck or trailer and lock the wheels in the position used by the carrier.
- Electric heaters, battery-chargers and similar equipment must be powered only by auxiliary power supplies with efficient ground insulation to avoid electrical shock hazards.
- Always use suitable hoisting or lifting devices when raising or moving heavy parts.
- Take extra care if bystanders are present.
- Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non-flammable, non-toxic commercially available solvents.

- Wear safety goggles with side guards when cleaning parts with compressed air.
- Reduce tire air pressure according to the local regulations in force.
- Do not run the engine in confined spaces without suitable ventilation.
- Never use open flames for lighting when working on the machine or checking for leaks.
- All movements must be carried out carefully when working under, on or near the machine. Wear protective equipment: helmets, goggles and special footwear.
- When carrying out checks with the engine running, request the assistance of an operator in the driver's seat. The operator must maintain visual contact with the service technician at all times.
- If operating outside the workshop, position the machine on a flat surface and lock in position. If working on a slope, lock the machine in position. Move to a flat area as soon as is safely possible.
- Damaged or bent chains or cables are unreliable. Do not use them for lifting or towing. Always use suitable protective gloves when handling chains or cables.
- Chains should always be safely secured. Make sure that the hitch-up point is capable of sustaining the load in question. Keep the area near the hitch-up point, chains or cables free of all bystanders.
- Maintenance and repair operations must be carried out in a CLEAN and DRY area. Eliminate any water or oil spillage immediately.
- Do not create piles of oil or grease-soaked rags as they represent a serious fire hazard. Always store rags in a closed metal container.
- Before engaging the machine, make sure that there are no persons within the machine or implement range of action.
- Empty your pockets of all objects that may fall accidentally unobserved into the machine inner compartments.
- In the presence of protruding metal parts, use protective goggles or goggles with side guards, helmets, special footwear and gloves.
- When welding, use protective safety devices: tinted safety goggles, helmets, special overalls, gloves and footwear. All persons present in the area where welding is taking place must wear tinted goggles. NEVER LOOK DIRECTLY AT THE WELDING ARC WITHOUT SUITABLE EYE PROTECTION.
- If welding in close proximity to a computer module, then the battery should be disconnected, and also the module should be removed from the machine.
- Metal cables tend to fray with repeated use. Always use suitable protective devices (gloves, goggles, etc.) when handling cables.
- Handle all parts carefully. Do not put your hands or fingers between moving parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

Machine Start Up

- Never run the engine in confined spaces that are not equipped with adequate ventilation for exhaust gas extraction.
- Never place the head, body, limbs, feet, hands, fingers or clothing near rotating and moving parts.

Hydraulic systems

- A liquid leaking from a tiny hole may be almost invisible but, at the same time, be powerful enough to penetrate the skin. Therefore, NEVER USE HANDS TO CHECK FOR LEAKS but use a piece of cardboard or wood for this purpose. If any liquid penetrates skin tissue, call for medical aid immediately. Failure to treat this condition with correct medical procedure may result in serious infection or death.
- In order to check the pressure in the system use suitable instruments.

Wheels and Tires

- Make sure that the tires are correctly inflated at the pressure specified by the manufacturer. Periodically check the rims and tires for damage.
- Stand away from (at the side of) the tire when checking inflation pressure.
- Do not use parts of recovered wheels as incorrect welding brazing or heating may weaken and eventually cause damage to the wheel.
- Never cut or weld a rim mounted with an inflated tire.

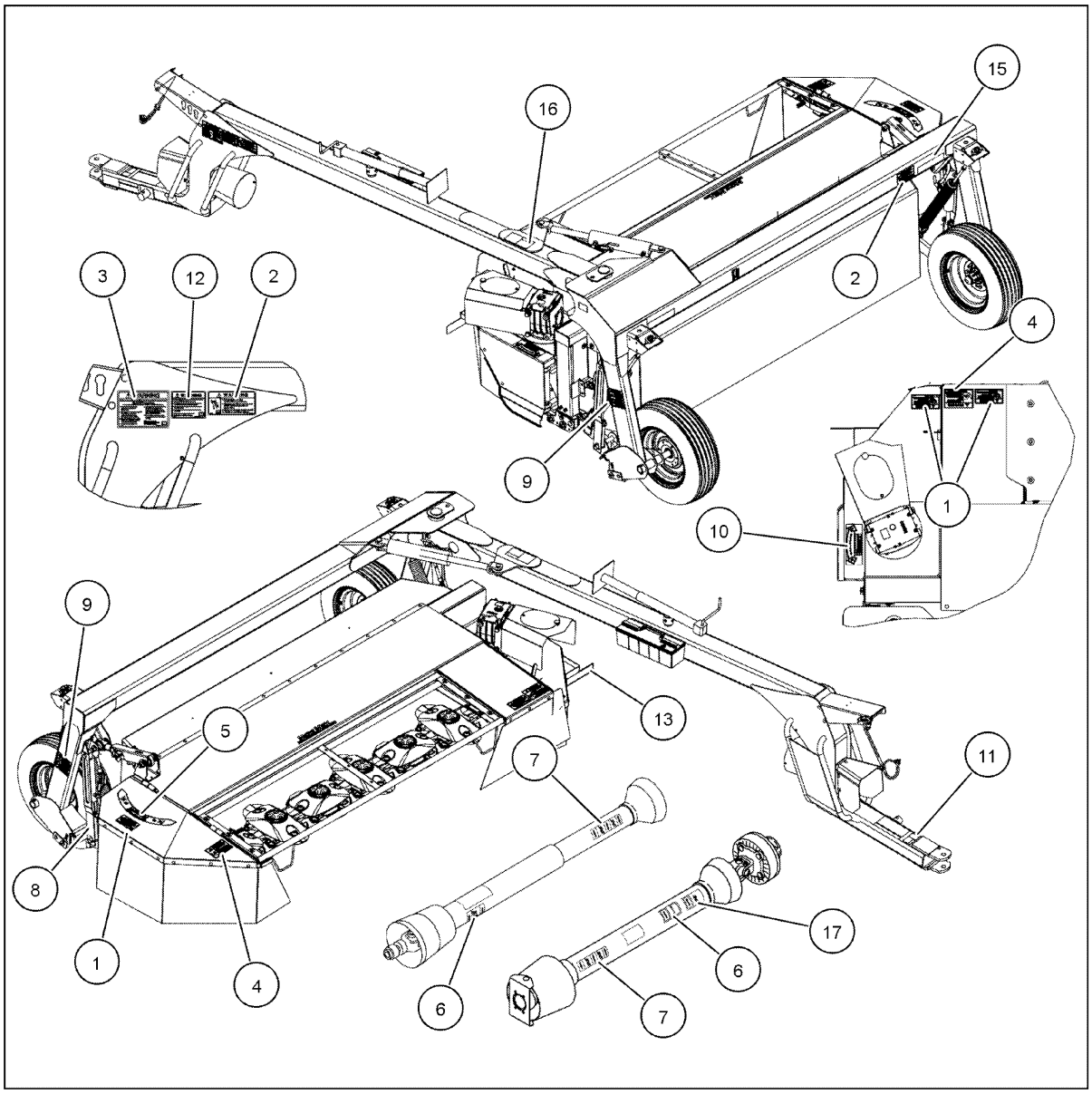
- To remove the wheels, lock all wheels. After having raised the machine, position supports underneath, according to regulations in force.
- Deflate the tire before removing any objects that may be jammed in the tire tread.
- Never inflate tires using flammable gases, as this may result in explosions and injury to bystanders.

Removal and Installation

- Lift and handle all heavy parts using suitable hoisting equipment. Make sure that parts are sustained by appropriate hooks and slings. Use the hoisting eyebolts for lifting operations. Extra care should be taken if persons are present near the load to be lifted.
- Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.
- Avoid twisting chains or metal cables. Always wear safety gloves when handling cables or chains.

Decals

The following safety decals have been placed on your machine in the areas indicated. They are intended for your personal safety and for those working with you. Please take this manual and walk around your machine to note the content and location of these warning signs. Review these warning signs and the operating instructions detailed in this manual with your machine operators. Keep the decals legible. If they are not, obtain replacements from your authorized dealer. The decal replacement part numbers are listed with each decal.



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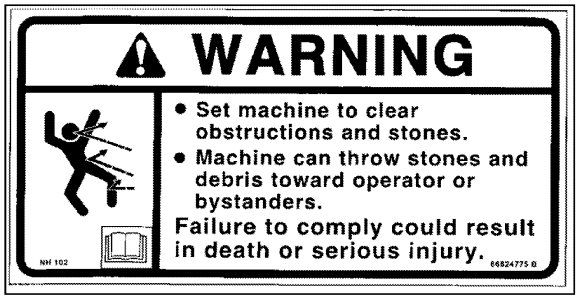
86611825 2

2. Part # 86624775



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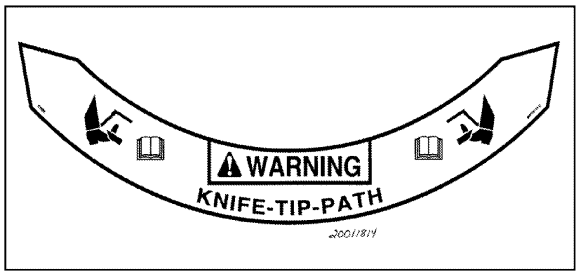

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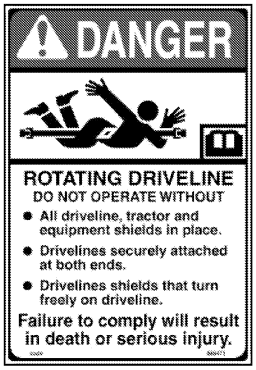

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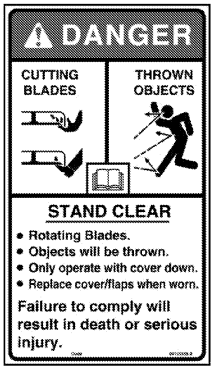

84135369_A 9

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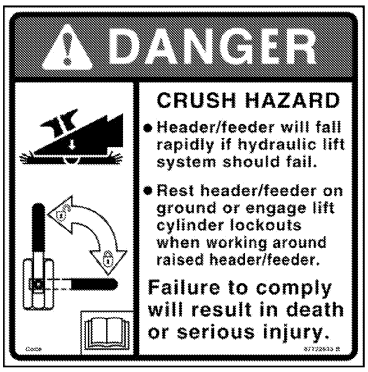


87722933_B 10

10. Part # 87744190

87744190_B 11

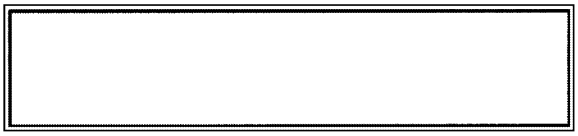
11. Part # 87041061

87041061 12

12. Part # 87041060

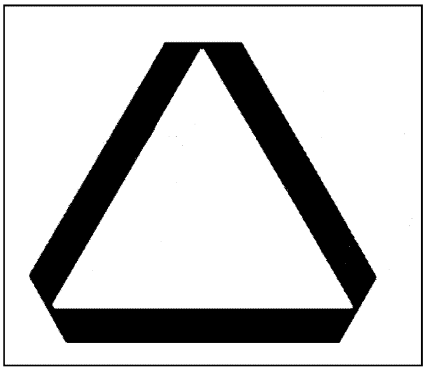
87041060 13

13. Part # 86547782- Reflective Tape, Yellow



86547782 14

14. Part # 86547710- Slow Moving Vehicle (Not Shown)



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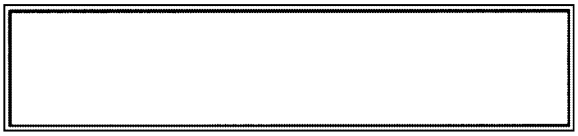

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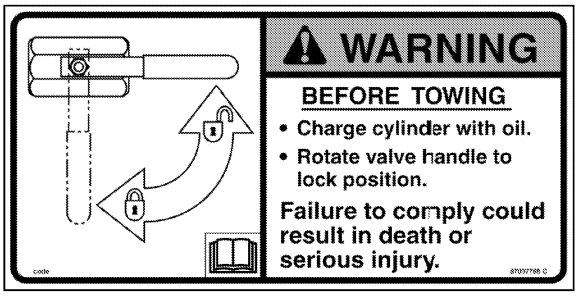

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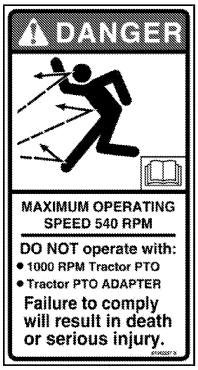

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Basic instructions - How To Use and Navigate Through This Manual

Technical Information

This manual has been produced by a new technical information system. This new system is designed to deliver technical information electronically through CDROM and in paper manuals. A coding system called ICE has been developed to link the technical information to other Product Support functions, e.g., Warranty.

Technical information is written to support the maintenance and service of the functions or systems on a customer's machine. When a customer has a concern on his machine it is usually because a function or system on his machine is not working at all, is not working efficiently, or is not responding correctly to his commands. When you refer to the technical information in this manual to resolve that customer's concern, you will find all the information classified using the new ICE coding, according to the functions or systems on that machine. Once you have located the technical information for that function or system then you will find all the mechanical, electrical or hydraulic devices, components, assemblies and sub assemblies for that function or system. You will also find all the types of information that have been written for that function or system, the technical data (specifications), the functional data (how it works), the diagnostic data (fault codes and troubleshooting) and the service data (remove, install adjust, etc.).

By integrating this new ICE coding into technical information , you will be able to search and retrieve just the right piece of technical information you need to resolve that customer's concern on his machine. This is made possible by attaching 3 categories to each piece of technical information during the authoring process.

The first category is the Location, the second category is the Information Type and the third category is the Product:

- LOCATION - is the component or function on the machine, that the piece of technical information is going to describe e.g. Fuel tank.
- INFORMATION TYPE - is the piece of technical information that has been written for a particular component or function on the machine e.g. Capacity would be a type of Technical Data that would describe the amount of fuel held by the Fuel tank.
- PRODUCT - is the model for which the piece of technical information is written.

Every piece of technical information will have those 3 categories attached to it. You will be able to use any combination of those categories to find the right piece of technical information you need to resolve that customer's concern on his machine.

That information could be:

- the description of how to remove the cylinder head
- a table of specifications for a hydraulic pump
- a fault code
- a troubleshooting table
- a special tool

How to Use this Manual

This manual is divided into Sections. Each Section is then divided into Chapters. Contents pages are included at the beginning of the manual, then inside every Section and inside every Chapter. An alphabetical Index is included at the end of a Chapter. Page number references are included for every piece of technical information listed in the Chapter Contents or Chapter Index.

Each Chapter is divided into four Information types:

- Technical Data (specifications) for all the mechanical, electrical or hydraulic devices, components and, assemblies.
- Functional Data (how it works) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- Diagnostic Data (fault codes, electrical and hydraulic troubleshooting) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- Service data (remove disassembly, assemble, install) for all the mechanical, electrical or hydraulic devices, components and assemblies.

Sections

Sections are grouped according to the main functions or a systems on the machine. Each Section is identified by a letter A, B, C etc. The amount of Sections included in the manual will depend on the type and function of the machine that the manual is written for. Each Section has a Contents page listed in alphabetic/numeric order. This table illustrates which Sections could be included in a manual for a particular product.

	SECTION										
	A - Distribution Systems										
		B - Power Production									
			C - Power Train								
				D - Travelling							
					E - Body and Structure						
						F - Frame Positioning					
							G - Tool Positioning				
								H - Working Arm			
									J - Tools and Couplers		
										K - Crop Processing	
											L - Field Processing
PRODUCT											
Tractors	X	X	X	X	X	X		X	X		
Vehicles with working arms: backhoes, excavators, skid steers, ...	X	X	X	X	X	X	X	X	X		
Combines, forage harvesters, balers, ...	X	X	X	X	X	X	X	X	X	X	
Seeding, planting, floating, spraying equipment, ...	X	X	X	X	X	X	X		X		X
Mounted equipment and tools, ...					X	X	X		X		

Section Contents

SECTION	LETTER	DESCRIPTION
DISTRIBUTION SYSTEMS	A	This Section covers the main systems that interact with most of the functions of the product. It includes the central parts of the hydraulic, electrical, electronic, pneumatic, lighting and grease lubrication systems. The components that are dedicated to a specific function are listed in the Chapter where all the technical information for that function is included.
POWER PRODUCTION	B	This Section covers all the functions related to the production of power to move the machine and to drive various devices. In the case of a pulled-type machine, this Section covers the power take-off function where power is provided from the towing machine.
POWER TRAIN	C	This Section covers all the functions related to the transmission of power from the engine to the axles and to internal or external devices. This Section also covers the power take-off function where power is provided to the pull-type machine and additional Process Drive functions.
TRAVELLING	D	This Section covers all the functions related to moving the machine, including tracks, wheels, steering and braking. It covers all the axles; both driven axles and non-driven axles, including any axle suspension.
BODY AND STRUCTURE	E	This Section covers all the main functions and systems related to the structure and the body of the machine, including the frame, the shields, the operators cab and the platform. The functions related to the positioning of the machine frame are included in Section F, Frame Positioning.
FRAME POSITIONING	F	This Section covers all the main functions and systems related to positioning of the machine frame or to positioning the attachment on the supporting machine frame.
TOOL POSITIONING	G	This Section covers all the functions related to the final and/or automatic positioning of the tool once the tool is positioned using the Working Arm or the machine frame.
WORKING ARM	H	This Section covers all the functions related to the articulated or single arms mounted on the front or rear of the machine. A working arm can have various tools and quick couplers mounted on to it. The tools and quick couplers are included in Section J, Tools and Couplers.
TOOLS AND COUPLERS	J	This Section covers all the functions related to the specific tools that mount on the front, rear or beside the machine. The tools described here can be mounted with the positioning systems (lifting, side shift, swing) listed in Section G Tool Positioning. This Section covers all the quick coupling systems, located between the tool and the positioning system. The tools used for field preparation, soil preparation and treatment, planting and seeding are included.
CROP PROCESSING	K	This Section covers all the functions related to crop processing. Examples of crop processing include threshing, baling, windrowing, cutting and conditioning.
FIELD PROCESSING	L	This Section covers all the field processing functions of the machine. Examples of field process include seeding, fertilizer application, seedbed preparation and chemical application.

This manual contains these Sections:

Contents

Chapters

Each Chapter is identified by a letter and number combination e.g. Engine B.10.A The first letter is identical to the Section letter i.e. Chapter B.10 is inside Section B, Power Production.

CONTENTS

The Chapter Contents lists all the technical data (specifications), functional data (how it works), service data (remove, install adjust, etc..) and diagnostic data (fault codes and troubleshooting) that have been written in that Chapter for that function or system on the machine.

Contents

INDEX

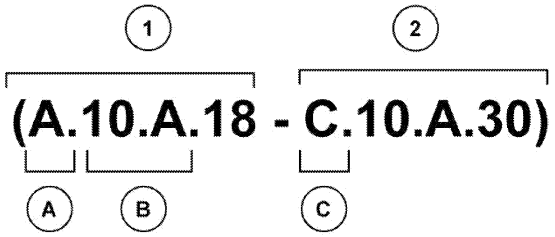
The Chapter Index lists in alphabetical order all the types of information (called Information Units) that have been written in that Chapter for that function or system on the machine.

Index

Information Units and Information Search

Each chapter is composed of information units. Each information unit has the ICE code shown in parentheses which indicates the function and the type of information written in that information unit. Each information unit has a page reference within that Chapter. The information units provide a quick and easy way to find just the right piece of technical information you are looking for.

example information unit	Stack valve - Sectional View (A.10.A.18 - C.10.A.30)				
Information Unit ICE code	A	10.A	18	C	10.A.30
ICE code classification	Distribution systems	Primary hydraulic power	Stack valve	Functional data	Sectional view



CRIL03J033E01 1

Navigate to the correct information unit you are searching for by identifying the function and information type from the ICE code.

- **(1)** Function and **(2)** Information type.
- **(A)** corresponds to the sections of the repair manual.
  (B) corresponds to the chapters of the repair manual.
  (C) corresponds to the type of information listed in the chapter contents, Technical data, Functional Data, Diagnostic or Service.
  (A) and **(B)** are also shown in the page numbering on the page footer.
  THE REST OF THE CODING IS NOT LISTED IN ALPHANUMERIC ORDER IN THIS MANUAL.
- You will find a table of contents at the beginning and end of each section and chapter.
  You will find an alphabetical index at the end of each chapter.
- By referring to **(A)**, **(B)** and **(C)** of the coding, you can follow the contents or index (page numbers) and quickly find the information you are looking for.

Page Header and Footer

The page header will contain the following references:

- Section and Chapter description

The page footer will contain the following references:

- Publication number for that Manual, Section or Chapter.
- Version reference for that publication.
- Publication date
- Section, chapter and page reference e.g. A.10.A / 9

Basic instructions - Shop and Assembly

SHIMMING

For each adjustment operation, select adjusting shims and measure individually using a micrometer, then add up the recorded values. Do not rely on measuring the entire shimming set, which may be incorrect, or the rated value indicated on each shim.

ROTATING SHAFT SEALS

For correct rotating shaft seal installation, proceed as follows:

- before assembly, allow the seal to soak in the oil it will be sealing for at least thirty minutes.
- thoroughly clean the shaft and check that the working surface on the shaft is not damaged.
- position the sealing lip facing the fluid; with hydrodynamic lips, take into consideration the shaft rotation direction and position the grooves so that they will deviate the fluid towards the inner side of the seal.
- coat the sealing lip with a thin layer of lubricant (use oil rather than grease) and fill the gap between the sealing lip and the dust lip on double lip seals with grease.
- insert the seal in its seat and press down using a flat punch or seal installation tool. Do not tap the seal with a hammer or mallet.
- whilst inserting the seal, check that it is perpendicular to the seat; once settled, make sure that it makes contact with the thrust element, if required.
- to prevent damaging the seal lip on the shaft, position a protective guard during installation operations.

O-RING SEALS

Lubricate the O-RING seals before inserting them in the seats, this will prevent them from overturning and twisting, which would jeopardise sealing efficiency.

SEALING COMPOUNDS

Apply one of the following sealing compounds on the mating surfaces when specified: SILMATE® RTV1473, or **LOCTITE RTV 598** or **LOCTITE® INSTANT GASKET 587 BLUE**. Before applying the sealing compound, prepare the surfaces as directed on product container or as follows:

- remove any incrustations using a metal brush.
- thoroughly de-grease the surfaces using a locally approved cleaning agent such as safety solvent or brake parts cleaner.

SPARE PARTS

Only use "CNH Original Parts" or " New Holland Parts".

Only genuine spare parts guarantee the same quality, duration and safety as original parts, as they are the same parts that are assembled during standard production. Only "CNH Original Parts" or " New Holland Parts" can offer this guarantee.
When ordering spare parts, always provide the following information:

- machine model (commercial name) and serial number
- part number of the ordered part, which can be found in the "Microfiches" or the "Service Parts Catalogue", used for order processing

PROTECTING THE ELECTRONIC/ ELECTRICAL SYSTEMS DURING CHARGING OR WELDING

To avoid damage to the electronic/electrical systems, always observe the following:

1. Never make or break any of the charging circuit connections, including the battery connections, when the engine is running.
2. Never short any of the charging components to ground.
3. Always disconnect the ground cable from the battery before arc welding on the combine or on any header attached to the combine.
   - position the welder ground clamp as close to the welding area as possible
   - if welding in close proximity to a computer module, then the module should be removed from the combine
   - never allow welding cables to lay on, near or across any electrical wiring or electronic component while welding is in progress
4. Always disconnect the negative cable from the battery when charging the battery in the combine with a battery charger.

IMPORTANT: *If welding must be performed on the unit, either the combine or the header (if it is attached), the battery ground cable must be disconnected from the combine battery. The electronic monitoring system and charging system will be damaged if this is not done.*

Remove the battery ground cable. Reconnect the cable when welding is completed.

⚠ WARNING ⚠

Battery acid causes severe burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing. Antidote - EXTERNAL: flush with water. INTERNAL: drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetables oil. Call physician immediately. EYES: flush with water for 15 minutes and get prompt medical attention.

84-110

TOOLS

The tools that New Holland suggests and illustrate in this manual have been:

- specifically researched and designed for use with New Holland machines
- essential for reliable repair operations
- accurately built and rigorously tested so as to offer efficient and long-lasting operation

By using these tools, repair personnel will benefit from:

- operating in optimal technical conditions
- obtaining the best results
- saving time and effort
- working in safe conditions

NOTE: *The terms "front", "rear", "right-hand" and "left-hand" (when referred to different parts) are determined from the rear, facing in the direction of travel of the machine during operation.*

Torque - Minimum Hardware Tightening Torques for Normal Assembly Applications

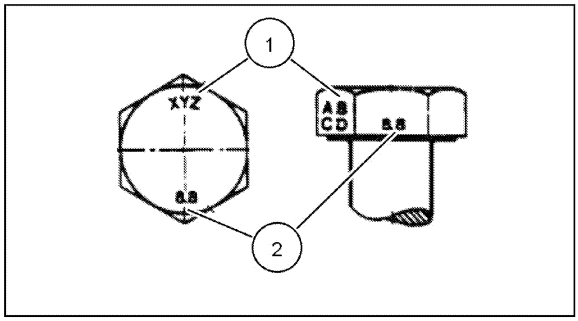
METRIC NON-FLANGED HARDWARE AND LOCKNUTS

NOMINAL SIZE	CLASS 5.8		CLASS 8.8		CLASS 10.9		LOCKNUT CL.8 W/CL8.8 BOLT
	UN-PLATED	PLATED W/ZnCr	UN-PLATED	PLATED W/ZnCr	UN-PLATED	PLATED W/ZnCr	
M4	1.7 N·m (15 lb in)	2.2 N·m (19 lb in)	2.6 N·m (23 lb in)	3.4 N·m (30 lb in)	3.7 N·m (33 lb in)	4.8 N·m (42 lb in)	2.3 N·m (20 lb in)
M6	5.8 N·m (51 lb in)	7.6 N·m (67 lb in)	8.9 N·m (79 lb in)	12 N·m (102 lb in)	13 N·m (115 lb in)	17 N·m (150 lb in)	7.8 N·m (69 lb in)
M8	14 N·m (124 lb in)	18 N·m (159 lb in)	22 N·m (195 lb in)	28 N·m (248 lb in)	31 N·m (274 lb in)	40 N·m (354 lb in)	19 N·m (169 lb in)
M10	28 N·m (21 lb ft)	36 N·m (27 lb ft)	43 N·m (32 lb ft)	56 N·m (41 lb ft)	61 N·m (45 lb ft)	79 N·m (58 lb ft)	38 N·m (28 lb ft)
M12	49 N·m (36 lb ft)	63 N·m (46 lb ft)	75 N·m (55 lb ft)	97 N·m (72 lb ft)	107 N·m (79 lb ft)	138 N·m (102 lb ft)	66 N·m (49 lb ft)
M16	121 N·m (89 lb ft)	158 N·m (117 lb ft)	186 N·m (137 lb ft)	240 N·m (177 lb ft)	266 N·m (196 lb ft)	344 N·m (254 lb ft)	164 N·m (121 lb ft)
M20	237 N·m (175 lb ft)	307 N·m (226 lb ft)	375 N·m (277 lb ft)	485 N·m (358 lb ft)	519 N·m (383 lb ft)	671 N·m (495 lb ft)	330 N·m (243 lb ft)
M24	411 N·m (303 lb ft)	531 N·m (392 lb ft)	648 N·m (478 lb ft)	839 N·m (619 lb ft)	897 N·m (662 lb ft)	1160 N·m (855 lb ft)	572 N·m (422 lb ft)

NOTE: *M4 through M8 hardware torque specifications are shown in pound-inches. M10 through M23 hardware torque specifications are shown in pound-feet.*

IDENTIFICATION

Hex cap screw and carriage bolts, classes 5.6 and up



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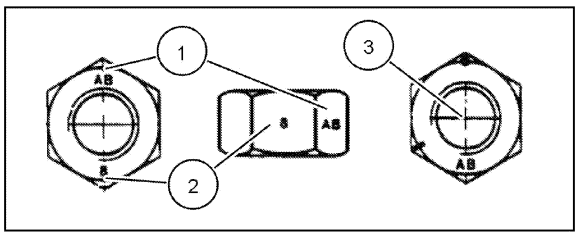
1. Manufacturer's Identification
2. Property Class

Hex nuts and locknuts, classes 05 and up



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1. Manufacturer's Identification
2. Property Class
3. Clock Marking

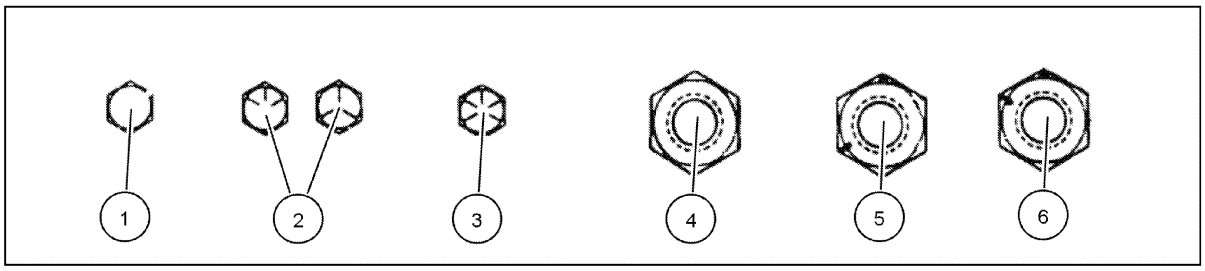
INCH NON-FLANGED HARDWARE AND LOCKNUTS

NOMINAL SIZE	SAE GRADE 2		SAE GRADE 5		SAE GRADE 8		LOCKNUT GrB W/ Gr5 BOLT	LOCKNUT GrC W/ Gr8 BOLT
	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD		
1/4	6.2 N·m (55 lb in)	8.1 N·m (72 lb in)	9.7 N·m (86 lb in)	13 N·m (112 lb in)	14 N·m (121 lb in)	18 N·m (157 lb in)	8.5 N·m (75 lb in)	12.2 N·m (109 lb in)
5/16	13 N·m (115 lb in)	17 N·m (149 lb in)	20 N·m (178 lb in)	26 N·m (229 lb in)	28 N·m (250 lb in)	37 N·m (324 lb in)	17.5 N·m (155 lb in)	25 N·m (220 lb in)
3/8	23 N·m (17 lb ft)	30 N·m (22 lb ft)	35 N·m (26 lb ft)	46 N·m (34 lb ft)	50 N·m (37 lb ft)	65 N·m (48 lb ft)	31 N·m (23 lb ft)	44 N·m (33 lb ft)
7/16	37 N·m (27 lb ft)	47 N·m (35 lb ft)	57 N·m (42 lb ft)	73 N·m (54 lb ft)	80 N·m (59 lb ft)	104 N·m (77 lb ft)	50 N·m (37 lb ft)	71 N·m (53 lb ft)
1/2	57 N·m (42 lb ft)	73 N·m (54 lb ft)	87 N·m (64 lb ft)	113 N·m (83 lb ft)	123 N·m (91 lb ft)	159 N·m (117 lb ft)	76 N·m (56 lb ft)	108 N·m (80 lb ft)
9/16	81 N·m (60 lb ft)	104 N·m (77 lb ft)	125 N·m (92 lb ft)	163 N·m (120 lb ft)	176 N·m (130 lb ft)	229 N·m (169 lb ft)	111 N·m (82 lb ft)	156 N·m (115 lb ft)
5/8	112 N·m (83 lb ft)	145 N·m (107 lb ft)	174 N·m (128 lb ft)	224 N·m (165 lb ft)	244 N·m (180 lb ft)	316 N·m (233 lb ft)	153 N·m (113 lb ft)	215 N·m (159 lb ft)
3/4	198 N·m (146 lb ft)	256 N·m (189 lb ft)	306 N·m (226 lb ft)	397 N·m (293 lb ft)	432 N·m (319 lb ft)	560 N·m (413 lb ft)	271 N·m (200 lb ft)	383 N·m (282 lb ft)
7/8	193 N·m (142 lb ft)	248 N·m (183 lb ft)	495 N·m (365 lb ft)	641 N·m (473 lb ft)	698 N·m (515 lb ft)	904 N·m (667 lb ft)	437 N·m (323 lb ft)	617 N·m (455 lb ft)
1	289 N·m (213 lb ft)	373 N·m (275 lb ft)	742 N·m (547 lb ft)	960 N·m (708 lb ft)	1048 N·m (773 lb ft)	1356 N·m (1000 lb ft)	654 N·m (483 lb ft)	924 N·m (681 lb ft)

***NOTE: 1/4 in** and **5/16 in** hardware torque specifications are shown in pound-inches. **3/8 in** through **1 in** hardware torque specifications are shown in pound-feet.*

IDENTIFICATION

Cap screws and carriage bolts



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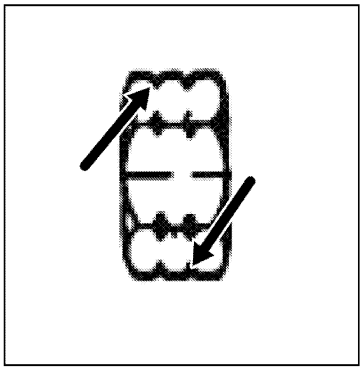
1. SAE Grade 2
2. SAE Grade 5
3. SAE Grade 8
4. Regular Nuts
5. SAE Grade 5 Hex Nuts
6. SAE Grade 8 Hex Nuts

Locknuts



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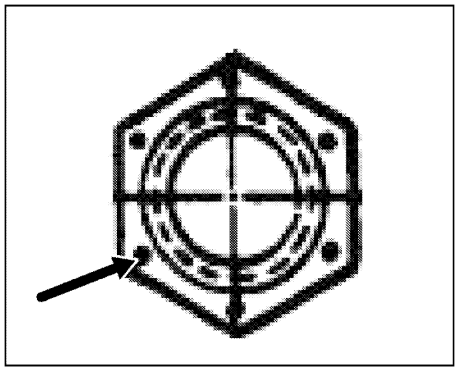
Grade Identification

- Grade A: No Notches
- Grade B: One Circumferential Notch
- Grade C: Two Circumferential Notches



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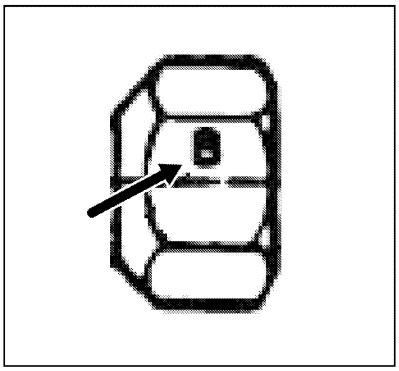
- Grade A: No Marks
- Grade B: Three Marks
- Grade C: Six Marks

NOTE: *Marks need not be located at corners.*



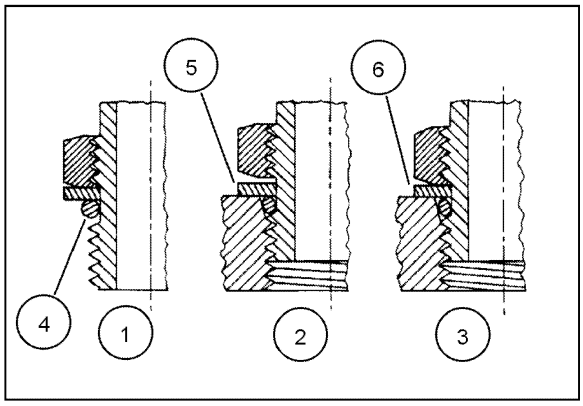
20083685 6

Grade Identification

- Grade A: No Mark
- Grade B: Letter B
- Grade C: Letter C

Torque - Standard Torque Data for Hydraulics

INSTALLATION OF ADJUSTABLE FITTINGS IN STRAIGHT THREAD O RING BOSSES



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1. Lubricate the O-ring by coating it with a light oil or petroleum. Install the O-ring in the groove adjacent to the metal backup washer which is assembled at the extreme end of the groove **(4)**.
2. Install the fitting into the SAE straight thread boss until the metal backup washer contacts the face of the boss **(5)**.

   NOTE: *Do not over tighten and distort the metal backup washer.*
3. Position the fitting by turning out (counterclockwise) up to a maximum of one turn. Holding the pad of the fitting with a wrench, tighten the locknut and washer against the face of the boss **(6)**.

STANDARD TORQUE DATA FOR HYDRAULIC TUBES AND FITTINGS

TUBE NUTS FOR 37° FLARED FITTINGS				O-RING BOSS PLUGS ADJUSTABLE FITTING LOCKNUTS, SWIVEL JIC- 37° SEATS
SIZE	TUBING OD	THREAD SIZE	TORQUE	TORQUE
4	**6.4 mm (1/4 in)**	7/16-20	**12 - 16 N·m (9 - 12 lb ft)**	**8 - 14 N·m (6 - 10 lb ft)**
5	**7.9 mm (5/16 in)**	1/2-20	**16 - 20 N·m (12 - 15 lb ft)**	**14 - 20 N·m (10 - 15 lb ft)**
6	**9.5 mm (3/8 in)**	9/16-18	**29 - 33 N·m (21 - 24 lb ft)**	**20 - 27 N·m (15 - 20 lb ft)**
8	**12.7 mm (1/2 in)**	3/4-18	**47 - 54 N·m (35 - 40 lb ft)**	**34 - 41 N·m (25 - 30 lb ft)**
10	**15.9 mm (5/8 in)**	7/8-14	**72 - 79 N·m (53 - 58 lb ft)**	**47 - 54 N·m (35 - 40 lb ft)**
12	**19.1 mm (3/4 in)**	1-1/16-12	**104 - 111 N·m (77 - 82 lb ft)**	**81 - 95 N·m (60 - 70 lb ft)**
14	**22.2 mm (7/8 in)**	1-3/16-12	**122 - 136 N·m (90 - 100 lb ft)**	**95 - 109 N·m (70 - 80 lb ft)**
16	**25.4 mm (1 in)**	1-5/16-12	**149 - 163 N·m (110 - 120 lb ft)**	**108 - 122 N·m (80 - 90 lb ft)**
20	**31.8 mm (1-1/4 in)**	1-5/8-12	**190 - 204 N·m (140 - 150 lb ft)**	**129 - 158 N·m (95 - 115 lb ft)**
24	**38.1 mm (1-1/2 in)**	1-7/8-12	**217 - 237 N·m (160 - 175 lb ft)**	**163 - 190 N·m (120 - 140 lb ft)**
32	**50.8 mm (2 in)**	2-1/2-12	**305 - 325 N·m (225 - 240 lb ft)**	**339 - 407 N·m (250 - 300 lb ft)**

These torques are not recommended for tubes of **12.7 mm** (**1/2 in**) OD and larger with wall thickness of **0.889 mm** (**0.035 in**) or less. The torque is specified for **0.889 mm** (**0.035 in**) wall tubes on each application individually.

Before installing and torquing **37 °** flared fittings, clean the face of the flare and threads with a clean solvent or Loctite cleaner and apply hydraulic sealant **LOCTITE® 569** to the **37 °** flare and the threads.

Install fitting and torque to specified torque, loosen fitting and retorque to specifications.

PIPE THREAD FITTING TORQUE

Before installing and tightening pipe fittings, clean the threads with a clean solvent or Loctite cleaner and apply sealant **LOCTITE® 567 PST PIPE SEALANT** for all fittings including stainless steel or **LOCTITE® 565 PST** for most metal fittings. For high filtration/zero contamination systems use **LOCTITE® 545**.

Thread Size	Torque (Maximum)
1/8-27	**13 N·m (10 lb ft)**
1/4-18	**16 N·m (12 lb ft)**
3/8-14	**22 N·m (16 lb ft)**
1/2-14	**41 N·m (30 lb ft)**
3/4-14	**54 N·m (40 lb ft)**

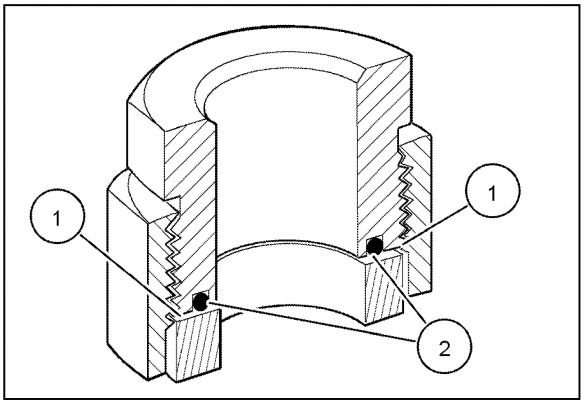
INSTALLATION OF ORFS (O-RING FLAT FACED) FITTINGS

When installing ORFS fittings thoroughly clean both flat surfaces of the fittings **(1)** and lubricate the O-ring **(2)** with light oil. Make sure both surfaces are aligned properly. Torque the fitting to specified torque listed throughout the repair manual.

IMPORTANT: *If the fitting surfaces are not properly cleaned, the O-ring will not seal properly. If the fitting surfaces are not properly aligned, the fittings may be damaged and will not seal properly.*

IMPORTANT: *Always use genuine factory replacement oils and filters to ensure proper lubrication and filtration of engine and hydraulic system oils.*

The use of proper oils, grease, and keeping the hydraulic system clean will extend machine and component life.



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