

Coffee Express 100 Coffee Express Harvester

SERVICE MANUAL

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English

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SERVICE MANUAL

Coffee Express 100 Model year 2016 [PRCYE100VGPB00320 -]

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INTRODUCTION

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Advice

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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 services without complying with the procedures will be responsible for the subsequent damages

In any case, no warranty is given or attributed on the product manufactured or marketed by CNH in case of damages due to anomalous behavior of parts or components not approved by CNH.

The information in this manual is up-to-date at the date of the publication. CNH has the policy of continuous improvement.

International symbols

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As a guide to the operation of the machine, various universal symbols have been utilized on the instruments, controls, switches, and fuse box. The symbols are shown below with an indication of their meaning.

	Heater plug for cold start		Turning signal		Power Take-Off (PTO)		Reaction control
	Alternator charging	KAM	Activated memory	N	Transmission in neutral		Accessories socket
	Fuel level		Turn signals		Creeper selection		Implement socket
	Automatic fuel shut-off		Turn signals - one trailer		Low speed selection		Percentage slip
	Engine speed (rpm x 100)		Turn signals - two trailers		High speed selection		Raising of the hydraulic lift
	Hour meter		Wind shield washer		Road speed		Rear hitch lower
	Engine oil pressure		Windscreen wash wipe		Differential Lock		Hydraulic lift height threshold
	Engine coolant temperature		Heating temperature control		Rear axle oil temperature		Hydraulic lift disabled
	Coolant level		Cab recirculation fan		Transmission oil pressure		Transmission filters and hydraulic filters
	Machine lights		Air conditioner		Auxiliary Front Wheel Drive (AFWD) operated		Remote control valve extension
	Main beam head		Air Filter Restriction		Warning!		Remote control valve command retraction
	Low beam		Parking brake		Danger warning lights		Remote control valve flotation
	Work lamps		Brake fluid level		Variable control		Malfunction! See Operator's
	Stop lamp		Trailer brake		Pressurized! Open carefully		Malfunction! (alternative symbol)
	Klaxon		Warning! Corrosive substance		Position control		Brake fluid level

Foreword

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Soil, air, and water are vital factors of agriculture and life in general. Where 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.

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 unsuitable containers or inappropriate pressurized fuel delivery systems that may cause spillages.
- If you are exposed to or come in contact with hazardous chemicals you can be seriously injured. The fluids, lubricants, paints, adhesives, coolants, etc. required for the function of the machine can be hazardous. They may be attractive and harmful to domestic animals as well as humans.
- Dispose of all fluids, filters, and containers in an environmentally safe manner according to local laws and regulations. Check with local environmental and recycling centers or your dealer for correct disposal information. Store fluids and filter in accordance with local laws and regulations. Use only appropriate containers for the storage of chemicals or petrochemical substances.
- 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, gear box 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 safely.
- The air-conditioning system contains gases that are harmful to the environment when released into the atmosphere. Do not attempt to service or repair the system. Your dealer or air conditioning specialist has a special extractor for this purpose and will be able to recharge the system in any case.
- Repair any leaks or defects in the engine cooling or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this could cause the components to explode.
- Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, causing the loss of oils, coolant, etc.
- Keep chemicals out of reach of children or other unauthorized persons. Additional precautions are required for applied chemicals. Obtain complete information from the manufacturer or distributor of the chemicals before using them.

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Mandatory recycling

The battery is essentially composed of lead plates and sulfuric acid solution. Since the battery contains heavy metals such as lead, CONAMA Resolution 401/2008 orders that all used batteries must be returned to the battery dealer at the time of replacement. Do not dispose of the battery in the garbage. Points of sale are obliged to accept the return of your used battery, and to store it in a suitable place and return it to the manufacturer for recycling.

Improper disposal of batteries can contaminate the soil, groundwater and waterways. The consumption of contaminated water can cause high blood pressure, anemia, depression, weakness, leg pain, and drowsiness. Contact of the acid solution with eyes causes chemical conjunctivitis. Contact of the acid solution with skin causes contact dermatitis. In the case of accidental contact with the eyes or skin, immediately wash with running water and seek medical treatment.



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Safety rules

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Safety during maintenance

- Always keep safety and information decals clean and visible. Replace decals that are damaged, lost, painted over or cannot be read.
- When assembling, operating or servicing the machine, wear protective clothing and personal safety devices that are necessary for the particular procedure. Some safety equipments that may be necessary are protective shoes, face and/or eye protection, hard hat, heavy gloves, filter mask and hearing protection.
- DO NOT wear jewelry or loose fitting clothing that may get caught in moving parts. Always wear clothing that will not catch on objects. Keep hands, feet, clothing and hair away from moving parts.
- Always shut down the engine and remove the ignition key when leaving the operator's seat or machine or tractor.
- To carry out maintenance on the machine, always position it on a firm, level surface. When you remove or open guards for maintenance, always put them back before operating the machine. Never operate the machine with the guards opened, or without them.
- Keep the area used to maintenance clean and dry. Wet or oily floors are slippery. Wet spots can be dangerous when working with electrical equipment. Be sure all electrical outlets and tools are properly grounded.

Safety against fire

- Fire risks can be minimized by the frequent cleaning of material accumulated from the harvest or residues from the machine.
- Remove daily material of the harvest or residues of the machine. Especially check the engine area and exhaust system.
- Engine fuel can cause an explosion or fire. DO NOT fuel the tank with the engine running, or if close to fire, welding, smoking, etc.

Battery safety

- DO NOT CREATE sparks or flame next to the battery.
- When disconnecting battery terminals, remove the Negative (-) cable first; then remove the Positive (+). When connecting the cables, connect first the Positive (+), then the Negative (-).
- Disconnect the battery (both terminals) before welding on any part of the machine. Not taking this precaution can cause damage to sensitive electric components.
- BATTERY ACID CAUSES SERIOUS 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. DO NOT induce vomiting. Seek medical attention immediately. EYES - Wash with water for **15 min** and immediately seek a doctor. BATTERIES PRODUCE EXPLOSIVE GASES. Keep all open flames, sparks and cigarettes away. Ventilate when loading or using in enclosed space. Always use eye protection when working near batteries. Wash hands after handling. KEEP OUT OF REACH OF CHILDREN.
- When working near stored batteries, remember that exposed parts of metal are conductors. Never place a metal object on the terminals because it can cause a spark, short circuit, explosion or personal injury.
- Battery posts, terminals and other related accessories contain lead and lead compounds. Wash hands after handling.

Safety in machine operation

- DO NOT allow other people to hitch a ride on the machine. They may fall or cause an accident.
- DO NOT operate the machine while under the influence of alcohol or drugs.
- Be alert and always know the location of all the workers in your area. Keep other people out of the way of your machine. Injury or death can result if you do not follow these instructions.
- Keep away of dangerous areas as ditches and inclines. Walk through the working location before starting and note the dangers.

Hazardous chemicals

- Whether you are exposed or come into contact with dangerous chemical products, you can be seriously injured. The fluids, lubricants, paints, adhesives, coolants, etc., used in your machine can be hazardous.
- Material Safety Data Sheets (MSDS) provide information about the chemical substances within a product, safe handling procedures, first aid measures and procedures to be taken when the product is accidentally leaked. MSDS are available from your CASE IH dealer.
- Before carrying out maintenance or service on your machine, check MSDS for each fluid, lubricant, etc., used. This information indicates the risks and how to carry out the maintenance in a safe manner. Follow this information when servicing the machine.
- Before servicing in this machine and before discarding fluid and lubricants used, always remember the environment. DO NOT put oil or fluids into the ground or into containers that can leak.
- Check with the local authority of environmental protection or recycling, or with your dealer, the correct procedure for disposal.

Safety Precautions

Most farm machinery accidents can be avoided by observing a few simple precautions. To avoid accidents, read the instructions below carefully before you operate the harvester. Farm machinery should only be operated by responsible, mature and skilled people.

Operation

- The machine should be operated by trained personnel who are familiar with all the controls and techniques of the harvester and in fields with up to 15% of inclination. Operation of equipment you are not familiar with may lead to a serious accident.
- When driving on public roads:
 - Observe traffic regulations.
 - Adapt your speed to local conditions and ensure that all road lights are in perfect working order.
- Do not permit anyone other than the operator to ride on the harvester.
- Do not brake abruptly to avoid tipping of the machine.
- Before starting the engine, ensure everyone is clear of the harvester.
- Keep children away from and off the harvester at all times.
- Check daily the front and rear wheel tightening torques.
- Do not attempt to clean, lubricate or carry out any adjustments on the harvester while it is in motion or while the engine is running.
- Before leaving the cab, apply the parking brake and remove the starter switch key.
- Do not stand under the machine without using shims.
- Do not work around the machine in loose clothing that might catch in any of the moving parts.
- Keep hands away from moving parts of the machine
- Keep the loaded fire extinguisher within reach of the operator and inside the validity period.
- Do not try to go up over the cab.

Engine

- Keep engine area clean of dust, trash and straw to prevent the possibility of fires.
- Never operate the harvester in an enclosed area without proper ventilation as the exhaust gases could cause death.
- Exercise care when removing the radiator cap while the engine is hot. If you cannot wait until the engine has cooled, cover the cap with a rag and turn it slowly to the first stop to allow the pressure to escape before removing the cap completely. NEVER add cold water to a hot radiator. In the event of loss of the expansion tank cover, always replace it with an original CASE IH cover. A non-approved cap may not be safe.
- The fuel oil in the injection system is under high pressure and fuel oil leaks can penetrate the skin. Do not attempt to remove or adjust a fuel injection pump, injectors or nozzles.

- Prolonged contact with used engine oil may affect your skin. Protect your skin by wearing rubber gloves.
- Be very careful to avoid contact with hot engine oil. If the engine oil is extremely hot, allow the oil to cool to a moderately warm temperature for safe removal.
- Do not handle a hot oil filter with bare hands.

Fuel

- Never remove the tank cap nor fill it up while the engine is running or hot.
- Do not smoke or use a naked flame when refueling or when standing near fuel tanks.
- Do not fill the tank completely; allow some space for expansion.
- Wipe up spilled fuel immediately.
- Always keep the tank cap firmly tightened.
- If the cap is lost, replace it with a genuine CASE IH cap. A non-approved cap may not be safe.
- Never use fuel for cleaning purposes.
- Keep equipment clean and properly maintained.
- Do not drive the harvester near open fires.
- Keep the screen (filter) inside the filler neck during the fueling.

Legal obligations

The harvester may be fitted with guards and other devices in compliance with legislation. Some of these require active application by the operator. Moreover, check the local legislation about the use of harvesters.

Fire extinguisher

It is recommended to keep a fire extinguisher in the harvesters during operation to help extinguish starting fires.

NOTICE: *It is essential that the extinguishers receive adequate maintenance and that the operator receives instructions of how to use it.*

Monthly checks

1. Check if the extinguisher is in the validity period.
2. Check if the pressure indicator is in the green band.
3. Check that the seals are intact.
4. Check if there is the INMETRO conformity mark.
5. Check if the durability and validity terms of the hydrostatic test are not expired.
6. Check if the external general appearance is in good condition (without any corrosion, dents and other damages).

ATTENTION: *If any of the items above are not correct, replace the extinguisher.*

Safety Precautions

1. Do not test the extinguisher, any use will cause pressure loss, making it inoperative.
2. Involuntary contact with residue of the extinguisher agent can cause irritation to the skin, eyes and breathing passages.
3. If you are in physical discomfort, seek medical attention.
4. Contents under pressure. Never perforate, dent or expose it to flame, after discharged.

Extinguisher specification

CASE IH part number: 00943470

Extinguisher capacity: 2A: 20-B: C

Fire class: ABC

Charge: **4 kg**

Extinguishing agent: Monoammonium Phosphate

Operation and use instructions

The user should have minimum knowledge for the correct utilization of the product. The basic sequence of operation is shown in the instructions chart (label) of the extinguisher.

The information to follow is complementary and can be used for users' training:

1. Remove the extinguisher from the retaining bracket
2. Press the trigger and move the jet in an arc. If the fuel is liquid, do not apply the jet directly over the surface to avoid increasing the burning area.
3. When the fire is extinguished, be alert to a possible reigniting. Only ABC powders can provide reasonable assurance in preventing inflammable solids from reigniting.
4. Evacuate and ventilate the area. The smoke is always toxic and could cause irritation to the respiratory system or even lead to the loss of consciousness.

ATTENTION:

- A. The discharge time of the powder type KIDDE extinguisher is small. Due to the short duration of the discharge, the operator should be alert regarding wasting extinguisher agent.
- B. Combating fires in liquid fuels (Class B) should be accomplished with continuous discharge of the spray.
- C. For solid fuels (Class A), depending on the proportions of the fire, the use of intermittent discharge may be necessary.

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Personal safety





This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

 DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

 WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

 CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: Notice indicates a situation that, if not avoided, could result in machine or property damage.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Safety rules

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Standard safety precautions

Be informed and notify personnel of the laws in force regulating safety, and provide documentation available for consultation.

- Keep working areas as clean as possible.
- Ensure that working areas are provided with emergency boxes. They must be clearly visible and always contain adequate sanitary equipment.
- Fire extinguishers must be properly identified and always be clear of obstructions. Their efficiency must be checked on a regular basis and personnel must be trained on proper interventions and priorities.
- Keep all emergency exits free of obstructions and clearly marked.
- Smoking in working areas subject to fire danger must be strictly prohibited.

Prevention of injury

- Wear suitable work attire and safety glasses with no jewelry such as rings and chains when working close to engines and equipment in motion.
- Wear safety gloves and goggles when performing the following operations:
 - Topping off or changing lubrication oils.
 - Using compressed air or liquids at a pressure greater than **2 bar (29 psi)**.
- Wear a safety helmet when working close to hanging loads or equipment working at head level.
- Always wear safety shoes and fitting clothes.
- Use protection cream for hands.
- Change wet clothes as soon as possible.
- In the presence of voltages exceeding **48 - 60 V**, verify the efficiency of the ground and mass electrical connections. Ensure that hands and feet are dry and use isolating foot boards. Workers should be properly trained to work with electricity.
- Do not smoke or start an open flame close to batteries and any fuel material.
- Place soiled rags with oil, diesel fuel or solvents in specially provided anti-fire containers.
- Do not use any tool or equipment for any use other than what it was originally intended for. Serious injury may occur.
- If running an engine indoors, make sure there is a sufficient exhaust fan in use to eliminate exhaust fumes.

During maintenance

- Never open the filler cap of the cooling system when the engine is hot. High temperature liquid at operating pressure could result in serious danger and risk of burn. Wait until the temperature decreases under **50 °C (122 °F)**.
- Never add coolant to an overheated engine and use only appropriate liquids.
- Always work when the engine is turned off. Certain circumstances require maintenance on a running engine. Be aware of all the risks involved with such an operation.
- Always use adequate and safe containers for engine fluids and used oil.
- Keep engine clean of any spilled fluids such as oil, diesel fuel, and or chemical solvents.
- Use of solvents or detergents during maintenance may emit toxic vapors. Always keep working areas aerated. Wear a safety mask if necessary.
- Do not leave soiled rags that may contain any flammable substances close to the engine.
- Always use caution when starting an engine after any work has been performed. Be prepared to cut off intake air in case of engine runaway.
- Never disconnect the batteries while the engine is running.

- Disconnect the batteries prior to performing any work on the equipment.
- Disconnect the batteries to place a load on them with a load tester.
- After any work is performed, verify that the battery clamp polarity is correct and that the clamps are tight and safe from accidental short circuit and oxidation.
- Before disconnecting any pipelines (pneumatic, hydraulic, fuel pipes, etc.), verify that all pressure has been released. Take all necessary precautions bleeding and draining residual pressure. Always wear the proper safety equipment.
- Do not alter the lengths of any wires.
- Do not connect any electronic service tool to the engine electrical equipment unless specifically approved by CASE IH.
- Do not modify the fuel system or hydraulic system unless approved by CASE IH. Any unauthorized modification will compromise warranty assistance and may affect engine operation and life span.

For engine equipped with an electronic control unit

- Do not weld on any part of the equipment without removing the control unit.
- Remove the in case of work requiring heating over **80 °C (176 °F)**.
- Do not paint the components and the electronic connections.
- Do not alter any data filed in the electronic control unit driving the engine. Any manipulation or alteration of electronic components will void engine warranty assistance and may affect the correct working order and life span of the engine.

Respect of the Environment

- Respect of the environment should be of primary importance. Take all necessary precautions to ensure personnel's safety and health.
- Inform the personnel of the laws regarding the dispensing of used engine fluids.
- Handle batteries with care, storing them in a well ventilated environment and within anti-acid container.

Safety rules

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General safety regulations

General Aspects

- Strictly follow repair and maintenance procedures.
- Do not wear rings, wrist watches, jewelry, accessories, unbuttoned items of clothing, unsecured clothing like ties, torn clothing, scarves, or open jackets or shirts with open zippers that could get caught in moving parts. Use approved safety clothing, such as anti-slip footwear, sleeves, protective goggles, helmets, etc.
- Wear safety goggles with side shields when cleaning parts using compressed air.
- Worn or damaged cables and chains are not reliable. Do not use these elements in lifting or towing operations.
- Use regulation safety equipment, such as approved eye protection, helmets, clothes, sleeves, and special footwear whenever you are welding. All individuals near the welding process must use regulation eye protection. Never look at the welding arc without using suitable eye protection.
- Never perform any repairs on the machine if there is someone in the operator seat, except when the person is a qualified operator who is helping with the service to be performed.
- Never operate the machine or use accessories from a place other than the operator seat or next to the machine when operating the fender switches.
- Never perform any operations on the machine with the engine running, except when specifically instructed to do so. Shut down the engine and release all the pressure from the hydraulic circuits before removing covers, cases, valves, etc.
- You must conduct all repair and maintenance operations with the utmost care and attention.
- Disconnect the batteries and put warning labels on all of the controls to warn that the machine is being repaired. Lock the machine and all the equipment that you remove.
- Never check or fill the fuel tank or batteries or use starting fluid when you are smoking or near a naked flame, because these fluids are flammable.
- The fuel filling gun must remain in contact with the filler neck. Maintain the contact until the fuel stops flowing into the tank in order to avoid sparks caused by static electricity build-up.
- To transport a faulty machine, use a trailer or a low loader platform trolley, if available.
- To load and unload the machine from the mode of transportation, choose a flat area that offers firm support for the wheels of the truck or trailer. Securely fasten the machine to the platform of the trailer or truck, in accordance with the transporter's requirements.
- Always use hoist mechanisms with an appropriate capacity for lifting or moving heavy components.
- Chains must always be securely fastened. The fastening device must have sufficient capacity to support the intended load. It is prohibited for bystanders to be near the fastening position.
- The work area must always be clean and dry. Clean it immediately if any water or oil is spilled.
- Never use gasoline, diesel, or other flammable liquids for cleaning. Use only non-toxic solvents.
- Do not allow cloths soaked with oil or grease to accumulate because they can cause a fire risk. Always keep these cloths in a metal container.

Starting

- Never start the engine in enclosed spaces that are not equipped with a suitable exhaust system or gas-extraction system.
- Never bring your head, body, arms, legs, feet, hands, or fingers close to fans or rotating belts.

Engine

- Always loosen the radiator cap slowly before removing it, in order to dissipate the system pressure. You must top up the coolant with the engine stopped.
- Do not fill up the fuel tank when the engine is running.

- Never adjust the fuel injection pump when the machine is in motion.
- Never lubricate the machine when the engine is running.

Electrical systems

- If it is necessary to use auxiliary batteries, you must connect the cables on both sides as follows: (+) to (+) and (-) to (-). Avoid causing the terminals to short circuit. The gas that the batteries release is highly flammable. During charging, leave the battery compartment open to improve ventilation. Avoid sparks and naked flames near the battery. Do not smoke.
- Do not charge the batteries in enclosed spaces.
- Always disconnect the batteries before carrying out any type of servicing on the electrical system.

Hydraulic system

- A little fluid coming out of a small bore could be almost invisible, but strong enough to penetrate the skin. For this reason, never use your hands to check for leaks. Instead, use a piece of cardboard or wood. If any fluid penetrates your skin, seek medical assistance immediately. Failure to seek immediate medical assistance could result in serious infections or dermatitis.
- Always read the system pressure using suitable gauges.

Wheels and tires

- Make sure that the tires are correctly inflated at the pressure specified by the manufacturer. Inspect the rims and tires regularly for any damage.
- Remain next to the tire when filling it with air.
- Only check the pressure when the platform is unloaded and the tires are cold, in order to prevent inaccurate readings caused by overpressure.
- Never cut or weld a rim with a full tire fitted.
- To remove the wheels, lock both the front and rear wheels of the machine. Lift the machine. Install stable and secure supports under the machine, as per the legislation in force.
- Deflate the tire before removing any objects that may be caught in the tire tread.
- Never inflate tires using flammable gases, as they could cause explosions and injure bystanders.

Remove and install

- Lift and handle all heavy components using hoist devices of appropriate capacity. You must suspend the parts using suitable hooks and slings. Use the hoist eyes provided for this purpose. Be careful if there are any bystanders near the hoisted load.

Safety rules

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Health and safety precautions

Many of the procedures involved in machine maintenance and repair services involve physical hazards and other health risks. This section lists some of these hazardous procedures and the materials and equipment associated with them.

Acids and alkalis

Avoid splashing into your eyes and nose, or onto your skin and clothing. Wear suitable sleeves and protective goggles. Irritate and corrode the skin, eyes, nose, and throat. Causes burns. Do not inhale the fumes.

Adhesives and sealants

These are highly flammable. You must store them in no smoking areas. Use applicators when possible or secondary containers. The containers must be labeled.

Resin-based adhesives/sealants

Skin contact could result in irritation, dermatitis, and the absorption of toxic or harmful chemicals through the skin. Splashes could cause eye injuries. Ensure that there is adequate ventilation and avoid contact with the skin and the eyes. Follow the manufacturer's instructions.

Ensure that there is adequate ventilation as volatile harmful or toxic chemicals may be released.

Anti-freeze

These are highly flammable. You must store them in no smoking areas.

Anti-freeze can be absorbed through the skin in toxic or harmful quantities. Ingesting anti-freeze can cause death and you must seek medical assistance immediately.

Chemicals – General

You must always take care when using and handling chemicals such as solvents, sealants, adhesives, paints, foam resins, battery acids, anti-freeze, brake fluid, oils and greases. They may be harmful, toxic, corrosive, irritant, or highly flammable. They may also emit hazardous fumes or dust.

Do

Remove chemicals from skin and clothing as soon as possible after contact. Change very dirty clothes and make provision for cleaning them.

Read and strictly adhere to the safety recommendations on the chemical containers.

When working with chemicals, wash before breaks, and before eating, smoking, drinking, or using the bathroom. Keep work areas clean, organized, and free of spillages. Store according to local and national legislation. Keep chemicals out of the reach of children.

Do not

Do not mix chemicals, except in accordance with the manufacturer's instructions. Some substances could form other chemical substances that are toxic or harmful, emit toxic or harmful fumes, or become explosive after mixing. Do not spray chemicals, especially solvent-based chemicals, in enclosed spaces.

Do not apply heat or flames to chemicals, except in accordance with the manufacturer's instructions. Some are highly flammable or could release toxic or harmful fumes.

Do not leave containers open. The fumes emitted could accumulate in toxic, harmful, or explosive concentrations. Some fumes are heavier than air and will accumulate in confined areas, trenches, etc. Do not put chemicals in unmarked containers.

Do not clean your hands or clothes with chemicals. Chemicals, particularly solvents and fuels, dry out the skin and can cause irritation and dermatitis. Some can be absorbed through the skin in toxic or harmful quantities.

Do not use empty containers to store other chemicals, except when they have been cleaned under supervision. Do not attempt to sniff or inhale chemicals. Rapid exposure to high concentrations of fumes can be toxic or harmful.

Anti-corrosive protective material

These materials are varied and you must follow the manufacturers' instructions. They may contain solvents, resins, petroleum derivatives, etc. You must avoid contact with the skin and the eyes. You must carry out spraying with adequate ventilation and never in enclosed spaces.

Post

Dust, powders, or clouds may be irritant, harmful, or toxic. Avoid inhaling the chemical powders or dusts that result from dry abrasion services. Use respiratory protection if ventilation is not adequate.

Electric shock

Electric shocks result from the use of faulty electrical equipment or from incorrect use.

You must keep electrical equipment in good condition and test it frequently.

Electrical equipment must be protected by a fuse with an appropriate nominal capacity.

Use low-voltage equipment (**110 volt**) for work lights and inspection lights, wherever possible. Use pneumatic equipment instead of electrical equipment wherever possible.

In the event of electrocution:

- Turn off the electricity before approaching the victim.
- If that is not possible, push or pull the victim away from the source of the electricity using a dry, non-conductive material.
- If you have been trained, start giving first aid.
- Seek medical assistance.

Exhaust fumes

These fumes contain asphyxiating, toxic or harmful chemical substances. You must only run engines in adequate extraction or general ventilation conditions, and never in enclosed spaces.

Fiber insulation

The fibrous nature of cut surfaces and edges can cause skin irritation. In general, the effect is physical and not chemical. You must take precautions to avoid excessive skin contact. Take care when organizing your work methods. Wear sleeves.

Fire

Many materials relating to vehicle repair are highly flammable. Some release toxic or harmful fumes when burned.

Scrupulously observe the fire prevention safety recommendations when storing and handling flammable materials or solvents, particularly in the vicinity of electrical equipment or welding processes.

Before using any electrical or welding equipment, ensure that there is no risk of fire. Always have an appropriate fire extinguisher nearby when using welding or heating equipment.

Foams – Polyurethane

See fire. Used for soundproofing. Cured foams used in seat cushions and finishes. Follow the manufacturer's instructions.

Components that have not reacted are irritants and could be harmful to the eyes and the skin. Wear sleeves and protective goggles. Individuals with chronic respiratory illnesses, asthma, bronchial problems, or a history of allergic illnesses must not work with or be in proximity to uncured materials.

Components, fumes, and aerosol clouds can cause irritation and sensitization reactions, and may be toxic or harmful. You must apply these materials with adequate respiratory protection and adequate ventilation. Do not remove the respirator when you have finished spraying. Keep the respirator on until the fumes and clouds disperse.

Burning uncured components and cured foams can generate toxic and harmful fumes. Do not permit smoking, the presence of naked flames, or the use of electrical equipment during the application of foam, and until the fumes/clouds have dispersed. The hot cutting of cured or partially cured foam must be performed in an environment with a ventilation system with extraction.

Kerosene (Paraffin)

Ingesting kerosene can cause irritation to the mouth and throat. The greatest danger from ingesting kerosene is the possibility of breathing it into the lungs. Liquid contact dries the skin and can cause irritation or dermatitis. Splashes on the skin and in the eyes cause mild irritation.

Avoid contact with the eyes and the skin as far as possible and ensure that there is adequate ventilation.

Fuel oil (diesel fuel)

When the quantities are large or the exposure period is long, skin contact with fuel oils with a high boiling point can cause serious skin diseases, including skin cancer.

Gas cylinders

See fire. In general, gases, such as oxygen, carbon dioxide, argon, and propane, are stored in cylinders with pressures of up to **140 bar (2000 lb/in²)**. You need to take sufficient care when handling them to prevent physical damage to the cylinders and the valve accessories. The content of each cylinder must be clearly identified with suitable labels.

You must store the cylinders in a well-ventilated room, protected from ice, rain, and direct sunlight. You must not store combustible gases near to oxygen cylinders.

Be careful to prevent leaks from the cylinders and the gas lines, and to avoid ignition sources. Only qualified personnel may perform services using the cylinders.

General workshop equipment and tools

You must keep all equipment and tools in good condition and you must use the correct safety equipment whenever necessary.

Never use tools or equipment for any purpose other than that for which they are intended. Never overload equipment such as hoists, jacks, chassis bases and axles, or hoisting slings. The damage caused by overloading does not always appear immediately and could cause a fatal accident the next time that the equipment is used.

Do not use faulty or damaged equipment or tools, particularly high-speed equipment, such as emery wheels. A damaged emery wheel can disintegrate suddenly and cause serious injury. Use protective goggles whenever you use equipment for grinding, cutting, polishing, or sandblasting.

Oil test equipment, lubrication test equipment, and high-pressure air test equipment, in accordance with local legislation

Always keep high-pressure equipment in good condition and carry out regular maintenance, particularly on connections and fittings. Never point a high-pressure nozzle at the skin as the fluid can cause serious injuries.

Legal aspects

Various laws and regulations lay down the health and safety requirements for working with materials and equipment in workshops. Always observe the regulations and laws in force in the country in which you are working.

Workshops must comply with the relevant regulations and laws. Consult the local supervisory authorities or related government bodies if you are in any doubt.

Lubricants and greases

Avoid prolonged or recurrent contact with mineral oils, particularly used oils.

Thoroughly wash the skin after tasks using oil. Do not use gasoline, paraffin, or other solvents to remove oil from the skin. Lubricants and greases can cause mild eye irritation.

You must avoid repeated or prolonged skin contact by wearing protective clothing where necessary. Do not allow your work clothes to become contaminated with oil. Wash or dry clean work clothes regularly. Discard oil-soaked shoes.

Do not use used engine oil as a lubricant or for applications where it might come into contact with the skin.

Paints

You should preferably perform spraying in a ventilated cab with an exhaust system to remove the fumes and spray from the breathing area. Individuals working in cabs must use respiratory protection. Personnel carrying out small-scale repair work must use respirators with an air supply.

Solvents

Contact dries out the skin, and prolonged or recurrent contact can cause irritation and dermatitis. Some can be absorbed through the skin in toxic or harmful quantities. Splashes into the eyes can cause serious irritation and even lead to blindness.

Wear protective sleeves, protective goggles and protective clothing. Ensure that there is good ventilation during use, avoid inhaling smoke, fumes, and spray clouds, and keep containers securely closed. Do not use in enclosed spaces.

Do not apply heat or flame, except in accordance with specific and detailed instructions from the manufacturer.

Arc welding

This process emits a high level of ultraviolet radiation that can burn the eyes and skin of the welder and of other people nearby. Gas-protected welding processes are particularly dangerous in this respect. Personal protection is mandatory. Barriers to protect other people are also necessary. You also need to use suitable eye and skin protection because of metal splashes.

The heat of arc welding will produce gases and fumes from the metals that are being melted, and from the coatings applied to or contamination on the worked surfaces. These gases and fumes may be toxic and you must avoid inhaling them. You may need to use ventilation with extraction to remove smoke from the work area, particularly in cases where there is not enough general ventilation or in places where a considerable amount of welding is expected to take place. In extreme cases, where adequate ventilation cannot be guaranteed, you may need to use respirators with an air supply.

Torque

Coffee Express 100

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Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphite lubricants, Molydisulfide greases, or other extreme pressure lubricants are used.

Decimal hardware

Grade 5 bolts, nuts, and studs

Size	Nm	lb in/lb ft
1/4 in	12 - 15 Nm	108 - 132 lb in
5/16 in	23 - 28 Nm	204 - 252 lb in
3/8 in	48 - 57 Nm	420 - 504 lb in
7/16 in	73 - 87 Nm	54 - 64 lb ft
1/2 in	109 - 130 Nm	80 - 96 lb ft
9/16 in	149 - 179 Nm	110 - 132 lb ft
5/8 in	203 - 244 Nm	150 - 180 lb ft
3/4 in	366 - 439 Nm	270 - 324 lb ft
7/8 in	542 - 651 Nm	400 - 480 lb ft
1 in	787 - 944 Nm	580 - 696 lb ft
1-1/8 in	1085 - 1193 Nm	800 - 880 lb ft
1-1/4 in	1519 - 1681 Nm	1120 - 1240 lb ft
1-3/8 in	1980 - 2278 Nm	1460 - 1680 lb ft
1-1/2 in	2631 - 2983 Nm	1940 - 2200 lb ft

Markings for Grade 5 hardware



Grade 8 bolts, nuts, and studs

Size	Nm	lb in/lb ft
1/4 in	16 - 20 Nm	144 - 180 lb in
5/16 in	33 - 39 Nm	288 - 348 lb in
3/8 in	61 - 73 Nm	540 - 648 lb in
7/16 in	95 - 114 Nm	70 - 84 lb ft
1/2 in	149 - 179 Nm	110 - 132 lb ft
9/16 in	217 - 260 Nm	160 - 192 lb ft
5/8 in	298 - 358 Nm	220 - 264 lb ft
3/4 in	515 - 618 Nm	380 - 456 lb ft
7/8 in	814 - 976 Nm	600 - 720 lb ft
1 in	1220 - 1465 Nm	900 - 1080 lb ft
1-1/8 in	1736 - 1953 Nm	1280 - 1440 lb ft
1-1/4 in	2468 - 2712 Nm	1820 - 2000 lb ft
1-3/8 in	3227 - 3688 Nm	2380 - 2720 lb ft
1-1/2 in	4285 - 4827 Nm	3160 - 3560 lb ft

Markings for Grade 8 hardware



NOTE: Use thick nuts with Grade 8 bolts.

Metric hardware

Grade 8.8 bolts, nuts, and studs

Size	Nm	lb in/lb ft
4 mm	3 - 4 Nm	24 - 36 lb in
5 mm	7 - 8 Nm	60 - 72 lb in
6 mm	11 - 12 Nm	96 - 108 lb in
8 mm	26 - 31 Nm	228 - 276 lb in
10 mm	52 - 61 Nm	456 - 540 lb in
12 mm	90 - 107 Nm	66 - 79 lb ft
14 mm	144 - 172 Nm	106 - 127 lb ft
16 mm	217 - 271 Nm	160 - 200 lb ft
20 mm	434 - 515 Nm	320 - 380 lb ft
24 mm	675 - 815 Nm	500 - 600 lb ft
30 mm	1250 - 1500 Nm	920 - 1100 lb ft
36 mm	2175 - 2600 Nm	1600 - 1950 lb ft

Markings for Grade 8.8 hardware



Grade 10.9 bolts, nuts and studs

Size	Nm	lb in/lb ft
4 mm	4 - 5 Nm	36 - 48 lb in
5 mm	9 - 11 Nm	84 - 96 lb in
6 mm	15 - 18 Nm	132 - 156 lb in
8 mm	37 - 43 Nm	324 - 384 lb in
10 mm	73 - 87 Nm	54 - 64 lb ft
12 mm	125 - 150 Nm	93 - 112 lb ft
14 mm	200 - 245 Nm	149 - 179 lb ft
16 mm	310 - 380 Nm	230 - 280 lb ft
20 mm	610 - 730 Nm	450 - 540 lb ft
24 mm	1050 - 1275 Nm	780 - 940 lb ft
30 mm	2000 - 2400 Nm	1470 - 1770 lb ft
36 mm	3500 - 4200 Nm	2580 - 3090 lb ft

Markings for Grade 10.9 hardware



Grade 12.9 bolts, nuts, and studs

Size	Nm	lb in/lb ft
Typically the torque values specified for grade 10.9 hardware can be used satisfactorily on grade 12.9 hardware.		

Markings for Grade 12.9 hardware



Steel hydraulic fittings

37° flare fitting

Tube outside diameter/Hose inside diameter		Thread size	Nm	lb in/lb ft
mm	inch			
6.4 mm	1/4 in	7/16-20 in	8 - 16 Nm	72 - 144 lb in
7.9 mm	5/16 in	1/2-20 in	11 - 22 Nm	96 - 192 lb in
9.5 mm	3/8 in	9/16-18 in	14 - 34 Nm	120 - 300 lb in
12.7 mm	1/2 in	3/4-16 in	20 - 57 Nm	180 - 504 lb in
15.9 mm	5/6 in	7/8-14 in	34 - 79 Nm	300 - 696 lb in
19.0 mm	3/4 in	1-1/16-12 in	54 - 108 Nm	40 - 80 lb ft
22.2 mm	7/8 in	1-3/16-12 in	81 - 135 Nm	60 - 100 lb ft
25.4 mm	1 in	1-5/16-12 in	102 - 158 Nm	75 - 117 lb ft
31.8 mm	1-1/4 in	1-5/8-12 in	169 - 223 Nm	125 - 165 lb ft
38.1 mm	1-1/2 in	1-7/8-12 in	285 - 338 Nm	210 - 250 lb ft

Straight threads with O-ring

Tube outside diameter/Hose inside diameter		Thread size	Nm	lb in/lb ft
mm	inch			
6.4 mm	1/4 in	7/16-20 in	16 - 26 Nm	144 - 228 lb in
7.9 mm	5/16 in	1/2-20 in	22 - 34 Nm	192 - 300 lb in
9.5 mm	3/8 in	9/16-18 in	34 - 54 Nm	300 - 480 lb in
12.7 mm	1/2 in	3/4-16 in	57 - 91 Nm	540 - 804 lb in
15.9 mm	5/6 in	7/8-14 in	79 - 124 Nm	58 - 92 lb ft
19.0 mm	3/4 in	1-1/16-12 in	108 - 174 Nm	80 - 128 lb ft
22.2 mm	7/8 in	1-3/16-12 in	136 - 216 Nm	100 - 160 lb ft
25.4 mm	1 in	1-5/16-12 in	159 - 253 Nm	117 - 187 lb ft
31.8 mm	1-1/4 in	1-5/8-12 in	224 - 357 Nm	165 - 264 lb ft
38.1 mm	1-1/2 in	1-7/8-12 in	339 - 542 Nm	250 - 400 lb ft

Split flange mounting bolts

Size	Nm	lb in/lb ft
5/16-18 in	20 - 27 Nm	180 - 240 lb in
3/8-16 in	27 - 34 Nm	240 - 300 lb in
7/16-14 in	47 - 61 Nm	420 - 540 lb in
1/2-13 in	74 - 88 Nm	55 - 65 lb ft
5/8-11 in	190 - 203 Nm	140 - 150 lb ft

O-ring face seal end

Nominal SAE dash size	Tube outside diameter		Thread size	Nm	lb in/lb ft
	mm	in			
-4	6.4 mm	1/4 in	9/16-18 in	14 - 16 Nm	120 - 144 lb in
-6	9.5 mm	3/8 in	11/16-16 in	24 - 27 Nm	216 - 240 lb in
-8	12.7 mm	1/2 in	13/16-16 in	43 - 54 Nm	384 - 480 lb in
-10	15.9 mm	5/8 in	1-14 in	62 - 76 Nm	552 - 672 lb in
-12	19.0 mm	3/4 in	1-3/16-12 in	90 - 110 Nm	65 - 80 lb ft
-14	22.2 mm	7/8 in	1-3/16-12 in	90 - 110 Nm	65 - 80 lb ft
-16	25.41 mm	1.0 in	1-7/16-12 in	125 - 140 Nm	92 - 105 lb ft
-20	31.8 mm	1-1/4 in	1-11/16-12 in	170 - 190 Nm	125 - 140 lb ft
-24	38.1 mm	1-1/2 in	2-12 in	200 - 254 Nm	150 - 180 lb ft

INTRODUCTION

O-ring boss end fitting or lock nut

Nominal SAE dash size	Tube outside diameter		Thread size	Nm	lb in/lb ft
	mm	in			
-4	6.4 mm	1/4 in	7/16-20 in	23 - 27 Nm	204 - 240 lb in
-6	9.5 mm	3/8 in	9/16-18 in	34 - 41 Nm	300 - 360 lb in
-8	12.7 mm	1/2 in	3/4-16 in	61 - 68 Nm	540 - 600 lb in
-10	15.9 mm	5/8 in	7/8-14 in	81 - 88 Nm	60 - 65 lb ft
-12	19.0 mm	3/4 in	1-1/16-12 in	115 - 122 Nm	85 - 90 lb ft
-14	22.2 mm	7/8 in	1-13/16-12 in	129 - 136 Nm	95 - 100 lb ft
-16	25.41 mm	1.0 in	1-5/16-12 in	156 - 169 Nm	115 - 125 lb ft
-20	31.8 mm	1-1/4 in	1-5/6-12 in	201 - 217 Nm	150 - 160 lb ft
-24	38.1 mm	1-1/2 in	1-7/8-12 in	258 - 271 Nm	190 - 200 lb ft

Frame - Special tools

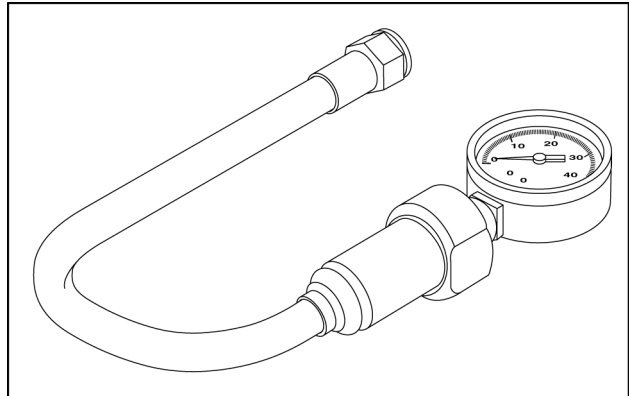
Coffee Express 100

Engine compression measuring gauge

Current code: **38000303**

Previous: 291309, NHT-0607, CNH100011

Use: requirement



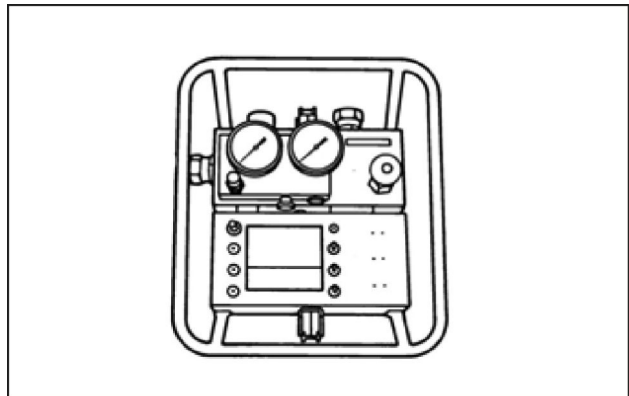
BRIL12CE0084A0A 1

Imported flowmeter

Current code: **380001731**

Previous: OEM1239, 380001806, CNH350044

Use: recommendation



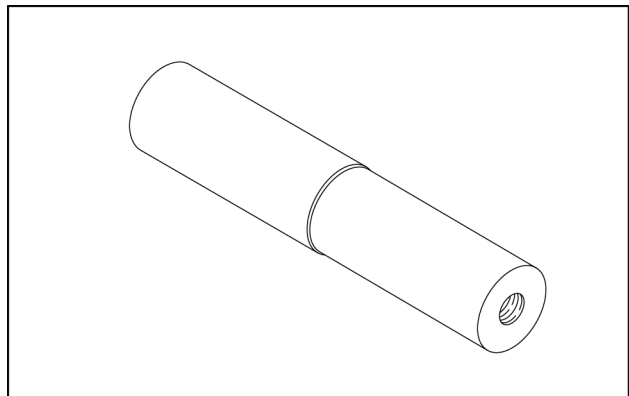
BRIL12CE0083A0A 2

Device for installing rods

Current code: 380003055

Previous: 00943249, 943249, CNH390001

Use: requirement

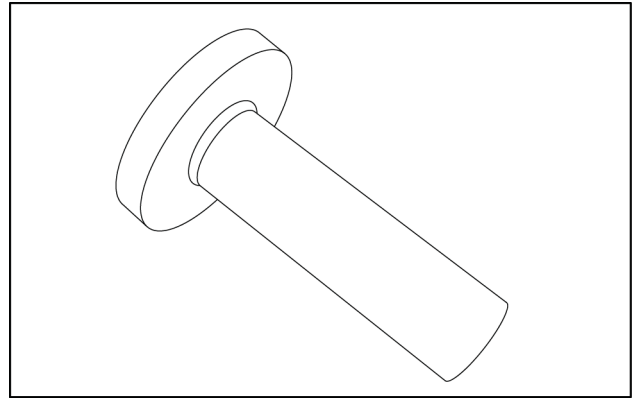


BRIL12CE0076A0A 3

Bearing beater of the wheel hub – 02

Current code: 380003065
Previous: D-0340, CNH440008

Use: requirement

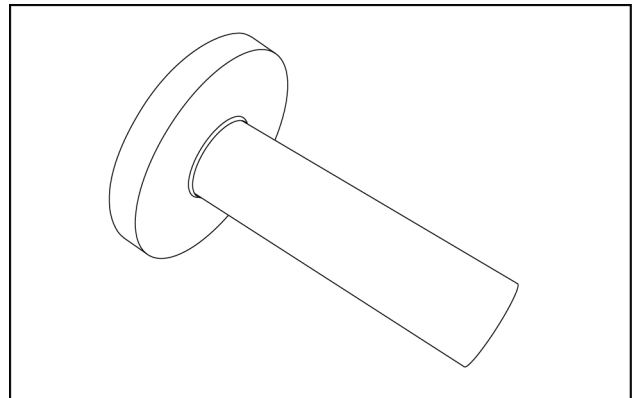


BRIL12CE0078A0A 4

Bearing beater of the wheel hub

Current code: 380003066
Previous: D-0341, CNH440009

Use: requirement

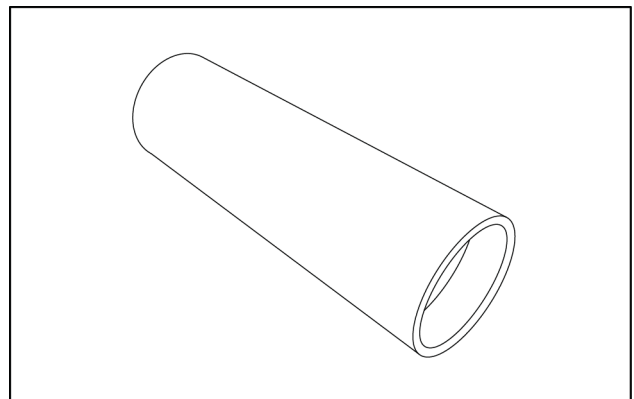


BRIL12CE0079A0A 5

Shaft bearing beater

Current code: 380003067
Previous: D-0342, CNH390002

Use: requirement

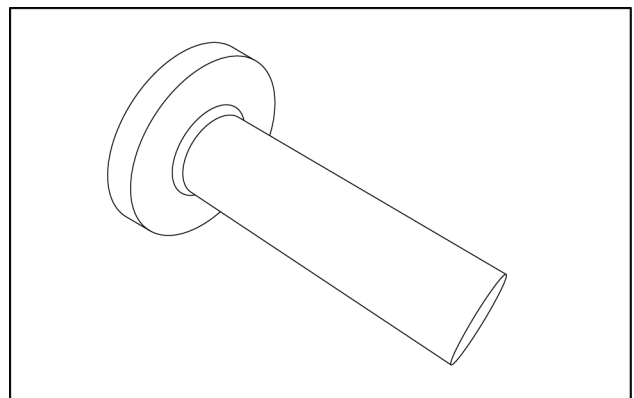


BRIL12CE0073A0A 6

Retainer beater of the shaker unit cover

Current code: 380003068
Previous: D-0343, CNH390003

Use: requirement

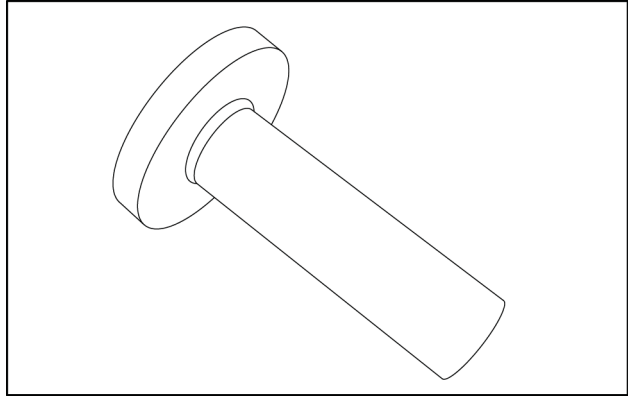


BRIL12CE0074A0A 7

Retainer beater of the wheel hub

Current code: 380003069
Previous: D-0344, CNH440010

Use: requirement

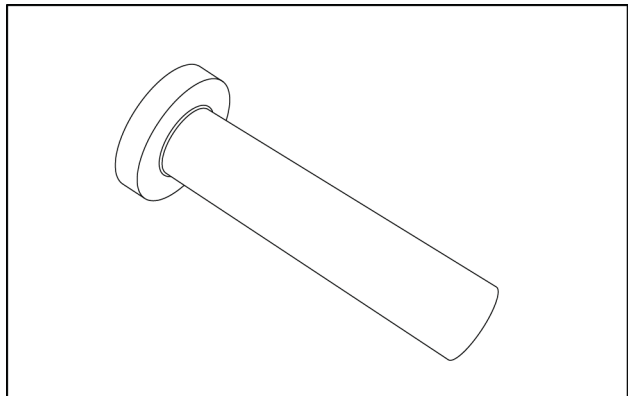


BRIL12CE0078A0A 8

Bearing beater of the counterweight shaft

Current code: 380003070
Previous: D-0345, CNH390004

Use: requirement

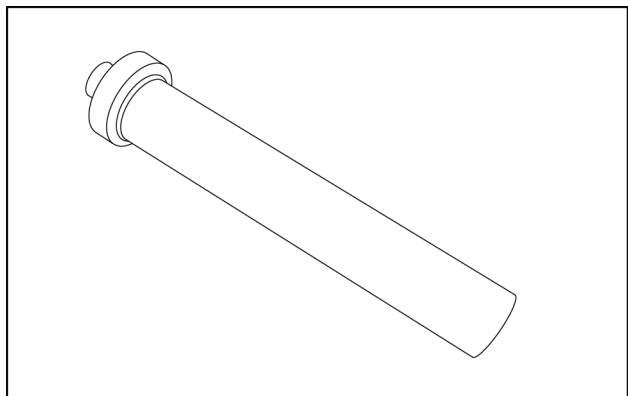


BRIL12CE0091A0A 9

Bearing beater of the arm of the intensity and reverser unit

Current code: 380003071
Previous: D-0346, CNH880013

Use: requirement

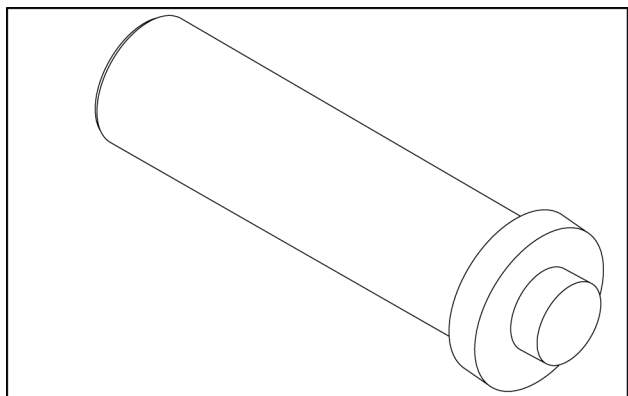


BRIL12CE0075A0A 10

Retainer beater of the gear of the arm of the intensity and reverser unit

Current code: 380003072
Previous: D-0347, CNH880014

Use: requirement



BRIL12CE0066A0A 11

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