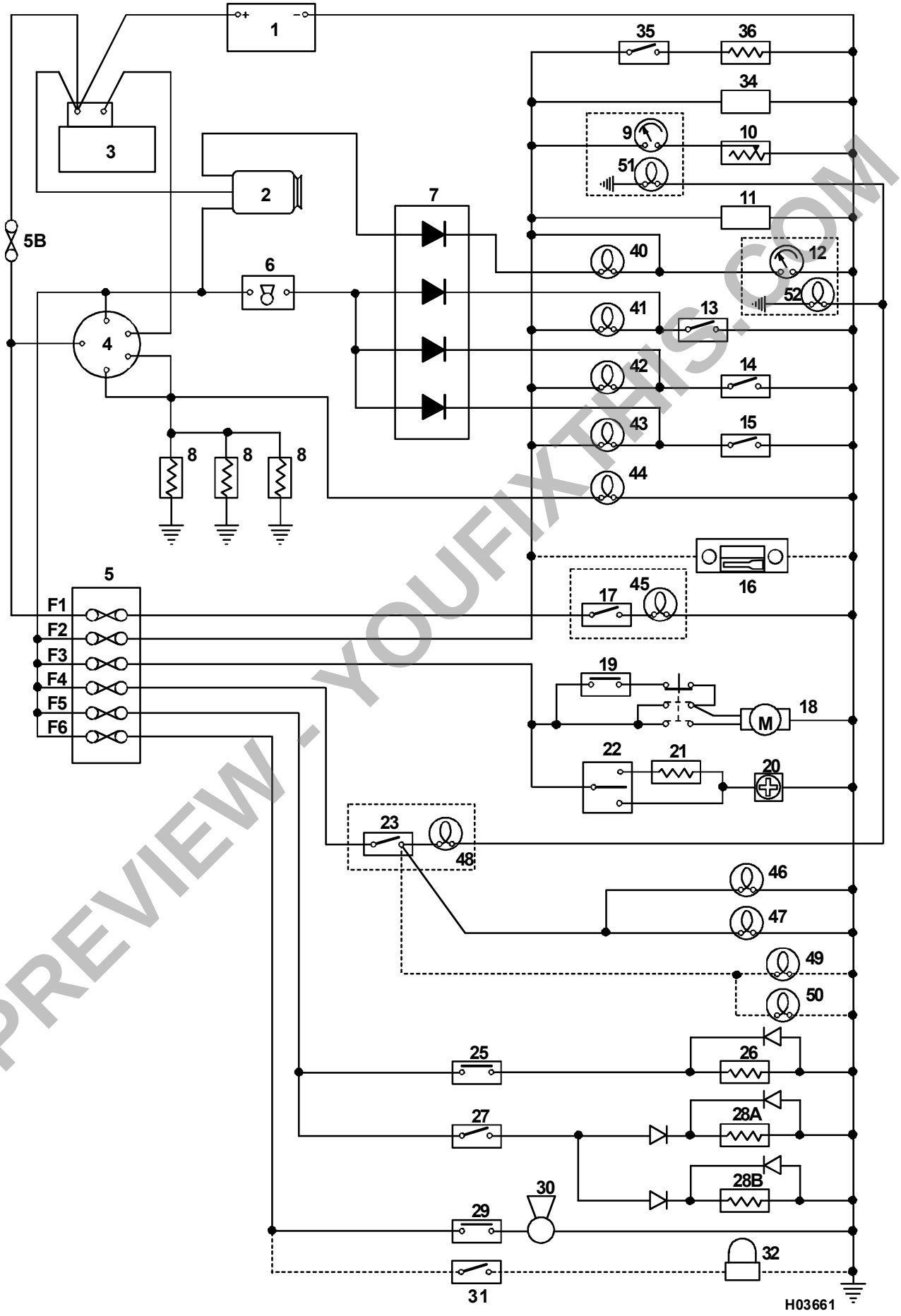
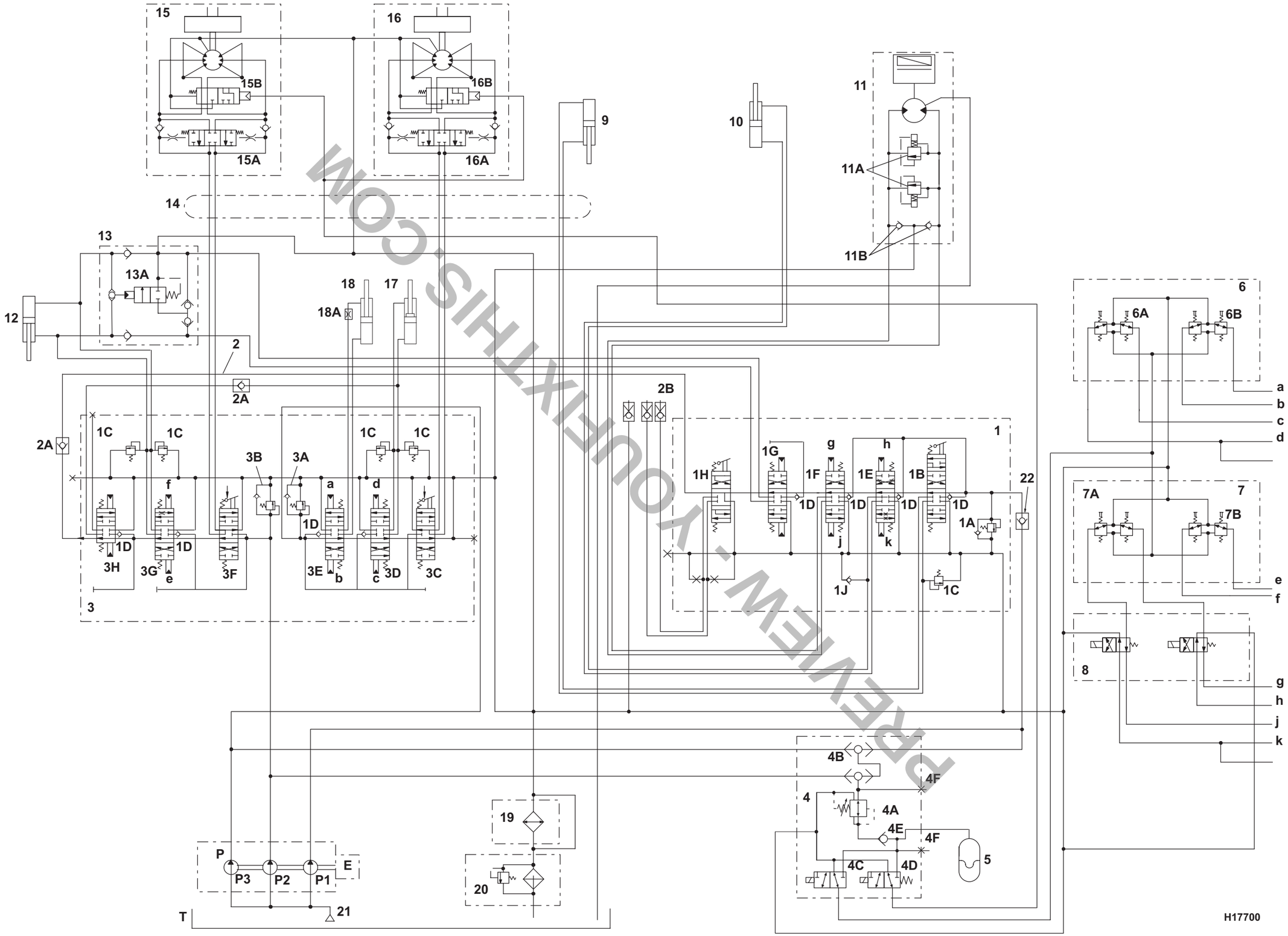


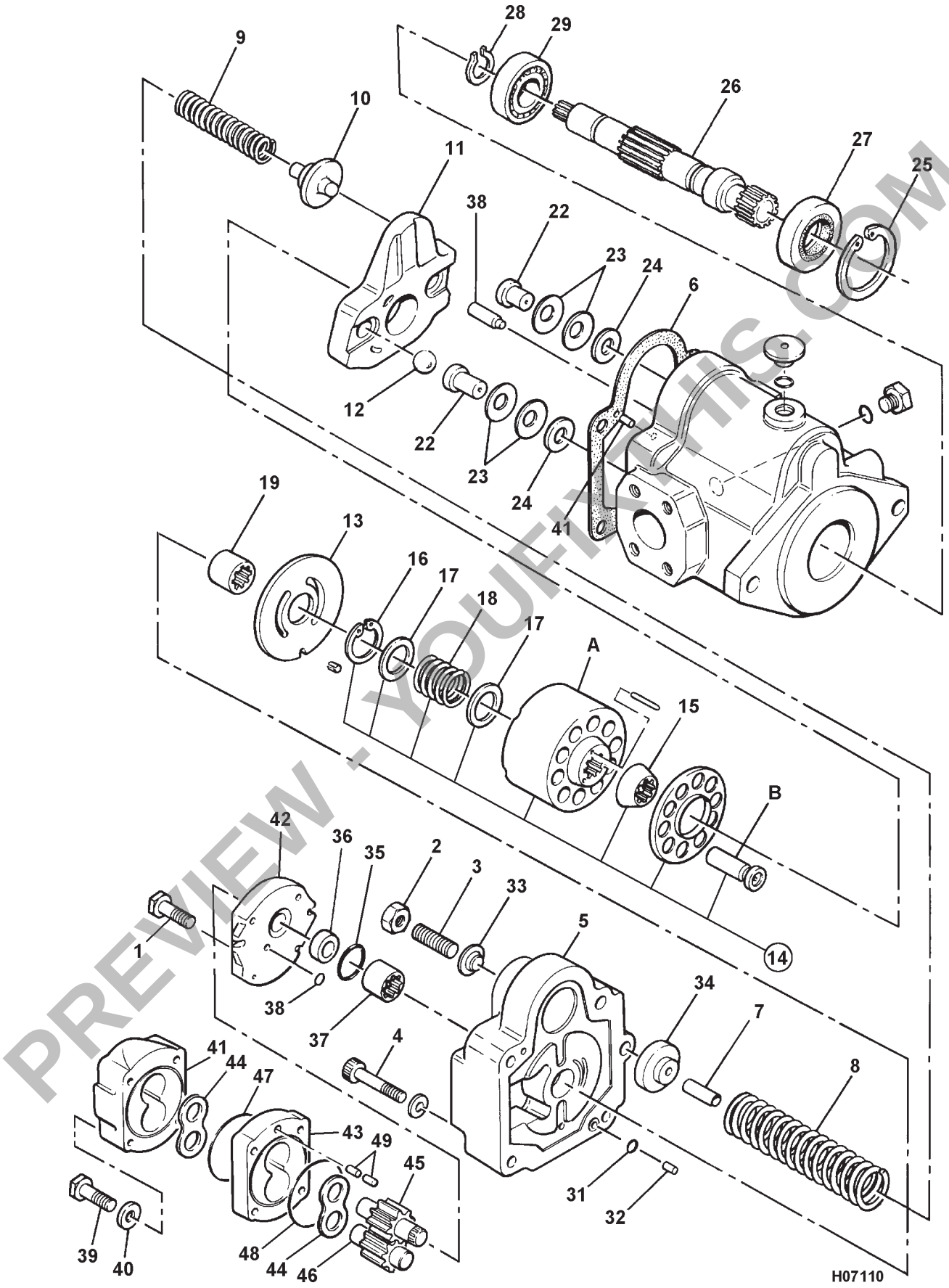

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## Torque settings

Only use following when no setting is specified in text of manual.

**CAUTION:** All bolts used on JCB equipment are high tensile and must not under any circumstances be replaced with bolts of a lesser tensile specification.

**Metric Grade 8.8 Bolts**

| Bolt Size | (mm) | Hexagon (A/F) mm | Torque Settings Nm | kgf m | lbf ft |
|---|---|---|---|---|---|
| M5 | (5) | 8 | 7 | 0.7 | 5 |
| M6 | (6) | 10 | 12 | 1.2 | 9 |
| M8 | (8) | 13 | 28 | 3.0 | 21 |
| M10 | (10) | 17 | 56 | 5.7 | 42 |
| M12 | (12) | 19 | 98 | 10 | 72 |
| M16 | (16) | 24 | 244 | 25 | 180 |
| M20 | (20) | 30 | 476 | 48 | 352 |
| M24 | (24) | 36 | 822 | 84 | 607 |
| M30 | (30) | 46 | 1633 | 166 | 1205 |
| M36 | (36) | 55 | 2854 | 291 | 2105 |

## Table of important tightening torques

| Tightening Points | Tightening Torque Nm | kgf m | lbf ft |
|---|---|---|---|
| Track motor to undercarriage | 113 | 11.5 | 83 |
| Retaining bolts | 250 | 25.5 | 184 |
| Track roller | 244 | 25 | 180 |
| Idler yoke | 98 | 1 0 | 72 |
| Rotary coupling mounting | 56 | 5.7 | 41 |
| Rotary coupling torque arm | 35 | 3.6 | 26 |
| Slew ring | 120 | 12.3 | 89 |
| Slew gearbox case | 244 | 25 | 180 |
| Hydraulic oil tank | 56 | 5.7 | 41 |
| Fuel tank | 56 | 5.7 | 41 |
| Hydraulic filter cover | 28 | 3.0 | 21 |
| Rod end - controls | 56 | 5.7 | 41 |
| Silencer bolt | 28 | 3.0 | 21 |
| Exhaust tail pipe | 56 | 5.7 | 41 |
| Engine shock absorber (to slew frame) | 56 | 5.7 | 41 |
| Engine shock absorber (to engine) | 98 | 1 0 | 72 |
| Engine bracket | 118 | 12 | 87 |
| Engine support (to bell housing) | 98 | 10 | 72 |
| Counterweight | 98 | 10 | 72 |
| Track gearbox cover | 56 | 5.7 | 41 |
| Slew ring to superstructure (802.7 / 803) | 100 | 10.2 | 74 |
| Slew ring to superstructure (804) | 160 | 16.3 | 118 |

**Rams:** See Section E

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## Rams - Boom, Dipper and Bucket

**802.7 and 803 Machines with:**
**Boom Ram Part No.: 903/16600**
**Dipper Ram Part No.: 903/16500**
**Bucket Ram Part No.: 903/16400**

**Removal & Replacement**

**WARNING**

**Fine jets of hydraulic oil at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic oil leaks. Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leak and then inspect the cardboard for signs of hydraulic oil. If hydraulic oil penetrates your skin, get medical help immediately.**
HYD001

**WARNING**

**A raised and badly supported machine can fall on you. Position the machine on a firm, level surface before raising one end. Ensure the other end is securely chocked. Do not rely solely on the machine hydraulics or jacks to support the machine when working under it.**
**Disconnect the battery, to prevent the engine being started while you are beneath the machine.**
GEN001

**WARNING**

**If air or hydraulic pressure is used to force out the piston assembly, ensure that the end cap is securely fitted. Severe injury can be caused by a suddenly released piston rod.**
HYD002

**When Removing**

1 With the engine idling, set the machine with the bucket on the ground.

2 Support the excavator under the angle between the dipper and boom to ensure it will not move when the ram is removed.

3 On boom and bucket rams, remove the protection plate. Support the ram under the gland bearing and remove locknut **A** and bolt **B** from the pivot at the eye end of the ram. Drive out the pivot pin **C**.

4 With the engine idling, gently retract the ram rod into the cylinder by operating the relevant service.

5 On manual control machines, stop the engine. Operate the lever controlling the ram to be removed, in both directions to vent any trapped pressure.
Remove the hoses, plug and cap any open hydraulic ports to prevent ingress of dirt.
On servo machines, run the engine at idle and with the servo isolator lock in the operate position move the control lever rapidly in both directions to vent any trapped pressure. Stop the engine.

**CAUTION**

**This operation may not fully release all the trapped pressure. Consequently, when removing the hoses, progressively slacken the fittings to vent any residual pressure to atmosphere.**

6 Support the ram and remove the locknut **D** and the bolt **E** from the pivot at the base of the piston. Drive out the pivot pin **F**. Remove the ram from the machine.

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## Hydraulic System - General Fault Diagnosis

Before carrying out the following checks, ensure that where applicable :-

**1** The correct hydraulic fluid is used and the system filled to the correct level.
**2** The hydraulic fluid, filter and suction strainer are clean.
**3** There are no visible leaks in the system.
**4** Engine maximum speed and condition is as specification
**5** Hydraulic pressures for each service are correct to specification

If possible the machine should be operated to identify the fault and to bring the systems to their normal working temperature.

After completing these initial checks, proceed as follows :-

**A** If all the hydraulic services are at fault start at check 1.
**B** If servo controllers only are at fault start at check 13.
**C** If tracking services only are at fault start at check 16.
**D** If slew service only is at fault start at check 21.

| Check | | Action |
|---|---|---|
| **1** | Is the fault in all services or one only? | ALL : Check 2<br>ONE : Check 6 |
| **2** | Are the hydraulics inoperative or lacking in power? | INOPERATIVE : Check 4<br>POOR PERFORMANCE :Check 3 |
| **3** | Is the servo pressure to specification? | YES : Check 4.<br>NO : Adjust |
| **4** | Is the pump operating correctly? | YES : Check M.R.V's.<br>NO : Check 5. |
| **5** | Is the pump noisy in operation? (803 Super & 804 Super only). | YES : Purge air from pump casing.<br>NO : Check 6 |
| **6** | Is the pump drive broken? | YES : Renew<br>NO : Check 7. |
| **7** | Is one service only down on pressure? | YES : Check 8.<br>NO : Check 9. |
| **8** | Is the cable adjustment correct? (Dozer control only) | YES : Check 9.<br>NO : Adjust cable see **Section D.** |
| **9** | Is the control valve spool sticking? | YES : Overhaul valve block section<br>NO : Check 10. |
| **10** | Is the service A.R.V. operating correctly? | YES : Check 11.<br>NO : Reset or renew |
| **11** | Is the valve block section cracked? | YES : Renew section and check valve block mounting |
| **12** | Are the rams faulty? | YES : Overhaul or renew |

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## Technical Data

### General

| | |
|---|---|
| **Model** | KE 103-15 IDI |
| **Type** | Vertical in-line, 3 cylinder, normally aspirated, 4 stroke, water cooled diesel. |
| **Swept Volume** | 1.493 litre (91.29 $in^3$) |
| **Power Output** | **802.7** - to M747210 - 20.9 kW (27 hp) @ 2345 rev/min.<br>**803** - to M827239 - 20.1 kW (26.8 hp) @ 2200 rev/min.<br>**804** - to M734833 - 19.2 kW (25.6 hp) @ 2110 rev/min.<br>**802.7** - M747211on - 21 kW (28 hp) @ 2200 rev/min.<br>**803** - M827240 on - 21 kW (28 hp) @ 2200 rev/min.<br>**804** - M734833 on - 21 kW (28 hp) @ 2200 rev/min. |
| **Bore** | 84 mm (3.31 in.) |
| **Stroke** | 90mm (3.54in.) |
| **Firing Order** | 1 - 2 - 3 |
| **Valve Clearance (cold)** | 0.2 mm (0.008 in.) |
| **Compression Ratio** | 22.5:1 |
| **Compression Pressure** | 29.4 bar (30 $kgf/cm^2$, 427 $lbf/in.^2$) |
| **Injection Timing / Injection Pump** | $22^0$ - $23^0$ B.T.D.C. |
| **Injector Setting** | 152 - 161.7 bar (155 - 165 $kgf/cm^2$, 2204 - 2346 $lbf/in^2$) |
| **Oil Capacity (min - max)** | 4.5 - 5.7 litres (1.0 - 1.3 U.K. gallons 1.2 - 1.56 US Gal) |
| **Oil Pressure** | 1.7 - 4.1 bar (1.8 - 4.2 $kgf/cm^2$, 25 - 60 $lbf/in.^2$) |
| **Weight (dry)** | 135 kg (297 lb) |
| **Idling Speed** | 1050 rev/min. |
| **Maximum No load Speed** | **802.7 Plus** - 2580 rev/min<br>**802.7 Super** - 2420 rev/min*<br><br>**803 Plus** - 2420 rev/min<br>**803 Super** - 2420 rev/min*<br><br>**804 Plus** - 2320 rev/min<br>**804 Super** - 2420 rev/min* |

***Note:*** All American machines have JCB low emission (EPA) diesel engines fitted. European machines are being progressively fitted with the EPA engines. On the EPA engines, it is not possible to adjust the engine idle speed, other than throttle cable adjustment.

***Note:*** * indicates that the engine fitted to these machines is a sealed unit. Do not attempt to adjust the engine idle speed. You must seek the advice of a registered JCB distributor to rectify this type of problem.

For complete engine servicing refer to Perkins 100 Series Service Manual.

| | |
|---|---|
| **Coolant Capacity** | 2.65 litres (0.6 U.K. gallons 0.72 US Gals) |

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## Every 10 operating hours or daily
**whichever occurs first**

**Clean**

**1** Machine generally

**Check and adjust where necessary (engine stopped)**

**2** Generally for damage
**3** Hydraulic oil level
**4** Engine oil level
**5** Engine coolant
**6** Fuel system for leaks
**7** Engine air filter pre-cleaner
**8** Track adjustment

**Check and adjust where necessary (engine running)**

**9** Operation of horn
**10** Operation of all other electrical equipment
**11** Exhaust (excessive smoke)
**12** Dozer operation
**13** Excavator operation
**14** Track and running gear operation
**15** Hourmeter operation

## Every 50 operating hours or weekly
**whichever occurs first**

Do the daily jobs plus:

**Clean**

**1** Drain and clean fuel filter
**2** Drain fuel sediment bowl
**3** Radiator matrix

**Check and adjust where necessary (engine stopped)**

**4** Fan belt adjustment

***Note:*** *Failure to maintain correct fan belt adjustment can result in damage to timing case cover.*

**First 100 hours only**

Do the jobs listed in 50 hours (above) plus:

**Change**

**1** Engine oil and filter canister

**Check**

**2** Track tension (rubber tracks only)

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B1 OPERATION B1

## Introduction

This chapter is arranged to guide you step-by-step through the task of learning how to use the machine. Read it through from beginning to end. By the end of the chapter you should have a good understanding of the machine and how to operate it.

Pay particular attention to all safety messages. They are there to warn you of possible hazards. Do not just read them-think about what they mean. Understand the hazards and how to avoid them.

If there is anything you do not understand, ask your JCB dealer, he will be pleased to advise you.

When you have learned where the driving controls are and what they do, practise using them. Practise driving the machine in a safe, open space clear of other people.

Get to know the "feel" of the machine and its driving controls.

Move on to the attachment controls only when you can drive the machine confidently and safely.

Take great care when practising with the attachment controls. Practise in an open space, keep people clear. Do not jerk the controls: operate them slowly until you understand the effect they have on the machine.

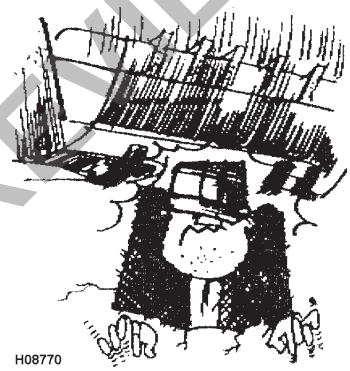
Finally, do not rush the job of learning. Take you time and take it safely.

Remember **BE CAREFUL**
**BE ALERT**
**SAFE**

B2 BEFORE ENTERING THE CAB B2

**WARNING**

**Walking or working under raised attachments can be hazardous. You could be crushed by the attachments or get caught in the linkages.**


H08770

**Lower the attachments to the ground before doing these checks. If you are new to his machine, get an experienced operator to lower them for you.**

**If there is nobody to help you, study this handbook until you have learned how to lower the attachments. Also make sure that the swing lock is fitted before doing these checks.**

**HOP26**

The following checks should be made each time you return to the machine after leaving it for any period of time. We advise you also to stop the machine occasionally during long work sessions and do the checks again.

All these checks concern the serviceability of the machine. Some concern your safety. Get your service engineer to check and correct any defects.

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**Contents** **Page No.**

**Servo Hand Controllers**

- Description and Operation ..... 4 - 1
- Port Identification ..... 4 - 3
- Switchable ISO/SAE Mode ..... 4 - 4
- Changing the Excavator Control Mode ..... 4 - 5

Track Levers ..... See section B 6 - 3

Dozer Lever ..... See section B 6 - 3

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B74

## USING THE ATTACHMENTS AND SITE SAFETY

B74

This section explains some techniques for efficient and safe use of the machine and its attachments. Attention is also drawn to the various safety aspects of operating on site. Read and understand this section before you start working with the machine. Practice using the attachments until you are completely familiar with the controls and what they do.

Before using the attachments, study the lifting and digging diagrams in the Specification section of the maintenance publication.

Before you start using the machine, tell your workmates what you will be doing and where you will be working. On a busy site, use a signalman.

Remember that your machine is mobile. Whenever possible, manoeuvre your machine into a position which combines safety with efficiency. If you have to choose remember that

**SAFETY MUST COME FIRST!**

Choose the correct attachment for the job. Do not use an oversize bucket for rocky material. It could overload the system and shorten service life.

**WARNING**

**General site safety**

Before you start using this machine, inspect the job sites. You could be killed or injured if the ground gives way under your machine or if piled material collapses onto it. Check for potholes and hidden debris, logs, ironwork etc. Any of these could cause you to lose control of your machine.

HOP52

**CAUTION**

**Legal liability**

You and/or your company could be legally liable for any damage you cause to public utilities. Make sure that you know the locations of all public utility cables or pipes on the site which could be damaged by your machine.

HOP53

B75

## USING THE ATTACHMENTS AND SITE SAFETY - continued

B75

**WARNING**

**Electrical power cables**

You could be electrocuted or badly burned if you get the machine or its attachments to close to electrical power cables.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near electric power lines.

HOP54

**WARNING**

**Buried electric power cables**

Before you start using the machine, check with your electricity supplier if there are any buried power cables on the site. HOP55

**WARNING**

**Overhead electric power cables**

There is a minimum clearance required for working beneath overhead power cables. You must obtain details from you local electric company. HOP56

**WARNING**

If you will be working with a labourer, make sure that you both understand what each other will be doing. Learn and use the recognised signalling procedures. Do not rely on shouting he will not hear you! HOP58

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B88

## TRANSPORTING THE MACHINE

B88

### Preparing for road travel

Before loading the machine on to its trailer (see transporting the machine), remove all loose dirt that may otherwise come off and obstruct the highway and damage other vehicles.

**Note:** *Before transporting the machine make sure you will be obeying the local rules and laws regarding machine transportation of all the areas that the machine will be carried through.*

Make sure that the transporting vehicle is suitable. See Maintenance section for the dimensions and weight of your machine. There is a travel height label fitted to the cab.

Try to make sure that the truck driver knows the clearance height before he drives away. See section D for machine height figures.

**Note:** *The transport position height does not include the truck/trailer height, add the two figures together for the clearance height.*

**CAUTION**

**Make sure that the two speed tracking selector is set to low speed before loading or unloading the machine.**

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B89

## BEFORE USING THE TRAILER

B89

**WARNING**

**Before moving the machine onto the trailer, make sure that the trailer and ramp are free from oil, grease and ice. Remove oil, grease and ice from the machine tracks. Make sure the machine will not foul on the ramp angle.** HOP69

**1** Remove any dirt or debris from the trailer.

**2** Check the operation of the parking brake.

**3** Check the trailer bodywork for signs of damage.

**4** Check the tyre pressures are correct (consult the Manufacturer's handbook).

**5** Check the lights are working and are the correct voltage for the towing vehicle (consult the Manufacturer's handbook).

**6** Check the breakaway cable is serviceable.

**WARNING**

**The safe transit of the load is the responsibility of the transport contractor and driver. Any machine, attachment or parts that may move during transit must be adequately secured.** 5-2-5-3



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