Service Manual

JS200
from machine no. 705001
JS210
from machine no. 705648
JS220
from machine no. 705001
JS240
from machine no. 708001
JS260
from machine no. 708501

PUBLISHED BY THE
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OF JCB SERVICE; ©
WATERLOO PARK, UTTOXETER,
STAFFORDSHIRE, ST14 5PA, ENGLAND
Tel. ROCESTER (01889) 590312
PRINTED IN ENGLAND

Publication No. 9803/6400
Issue 2

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Introduction

This publication is designed for the benefit of JCB Distributor Service Engineers who are receiving, or have received, training by JCB Technical Training Department.

These personnel should have a sound knowledge of workshop practice, safety procedures, and general techniques associated with the maintenance and repair of hydraulic earthmoving equipment.

Renewal of oil seals, gaskets, etc., and any component showing obvious signs of wear or damage is expected as a matter of course. It is expected that components will be cleaned and lubricated where appropriate, and that any opened hose or pipe connections will be blanked to prevent excessive loss of hydraulic fluid and ingress of dirt. Finally, please remember above all else

SAFETY MUST COME FIRST!

The manual is compiled in sections, the first three are numbered and contain information as follows:

1 = General Information - includes torque settings and service tools.
2 = Care & Safety - includes warnings and cautions pertinent to aspects of workshop procedures etc.
3 = Routine Maintenance - includes service schedules and recommended lubricants for the whole machine.

The remaining sections are alphabetically coded and deal with Dismantling, Overhaul etc. of specific components, for example:

A = Optional Equipment
B = Body & Framework ...etc

The page numbering in each alphabetically coded section is not continuous. This allows for the insertion of new items in later issues of the manual.

Section contents, technical data, circuit descriptions, operation descriptions etc. are inserted at the beginning of each alphabetically coded section.

All sections are listed on the front cover; tabbed divider cards align directly with individual sections on the front cover for rapid reference.

Page cross references are generally made by presenting the subject title printed in bold, followed by the title of the section containing the subject. For example:

"**24** If the axle is still on the machine, fit the brake calipers (see **Brake Caliper Removal and Replacement**, Section G)."

Note: If only the subject title in bold is given, i.e. no section title, the cross reference is to another part of the same section.

Use the contents list at the beginning of each section to find the exact page number.

Where a torque setting is given as a single figure it may be varied by plus or minus 3%. Torque figures indicated are for dry threads, hence for lubricated threads may be reduced by one third.

'Left Hand' and 'Right Hand' are as viewed from the rear of the machine facing forwards.

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Bolt and Nut Torque Specifications

Tighten the bolts and nuts according to the table. Before and after daily work, check the bolts and nuts for looseness and for those missing. Tighten if loose and replace if missing.

Tighten the bolts and nuts after the first 50 hours of the running-in stage and every 250 hours thereafter.

Tightening Torque Table

*

No	Tightening Point	Bolt Diameter	Wrench	JS200/210/220/240/260		
				Tighten Torque		
				Nm	kgf m	lbf ft
1†	Travel Motor	M16	24mm	270~310	27.2~31.8	200~230
2†	Drive Sprocket	M16	24mm	270~310	27.2~31.8	200~230
3†	Idler Wheel	M16	24mm	270~310	27.2~31.8	200~230
4†	Upper (Carrier) Roller	M20	30mm	520~608	53.2~62.2	385~450
5†	Lower (Track) Roller	M18	27mm	370~430	37.8~44.1	275~315
6†	Track Guard	M18	27mm	380~440	38.7~45.2	280~325
7	Shoe Bolt	M16	24mm	380~450	38.7~46.0	275~330
8	Counter weight	M27/M30	41/46mm	1058~1235/1335~1545	108~126/136~158	780~910/985~1140
9†	Turntable Bearing (Undercarriage)	M20/M24	30/36mm	475~550/780~910	48.4~55.3/80~93	350~400/575~670
10†	Turntable Bearing (Slew Frame)	M20/M24	30/36mm	475~550/780~910	48.4~55.3/80~93	350~400/575~670
11†	Slew Equipment	M20/M24	30/36mm	525~605/785~910	53.1~62/80~93	390~440/580~670
12†	Engine (Engine Mount)	M16	24mm	265~310	27.0~32	195~230
13†	Engine Bracket	M10	17mm	65~75	6.6~7.6	47~55
14	Radiator	M16	24mm	150~175	15~18	108~130
15†	Hydraulic Pump	M10	17mm	65~75	6.6~7.6	47~55
16†	Hydraulic Oil Tank	M16	24mm	235~285	23.7~29.5	175~210
17†	Fuel Tank	M16	24mm	255~285	25.7~29.5	185~210
18†	Control Valve	M16	24mm	270~310	27.6~31.8	200~230
19†	Rotary Coupling	M12	19mm	110~125	11.1~13	80~94
20	Cab	M16	24mm	127~135	13~14	94~101
21	Battery	M10	17mm	20~30	2.1~2.9	15~21

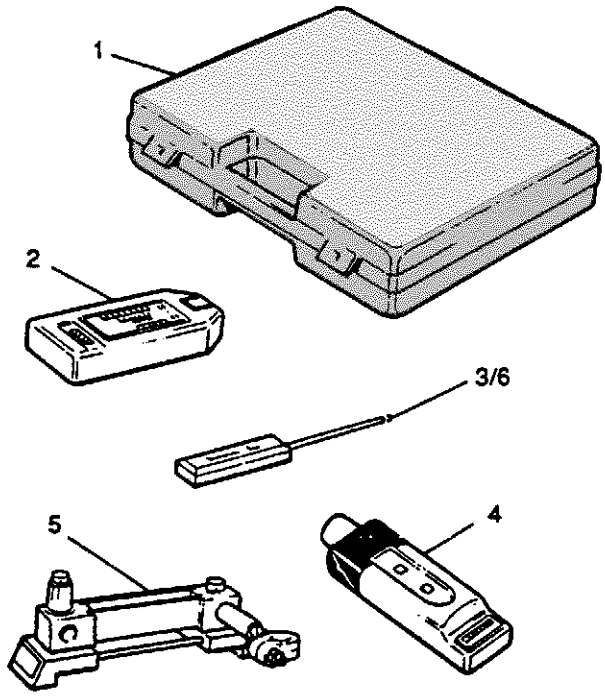
Note: *Use Loctite 262 (adhesive) on those marked † and tighten to the torque listed in the above table.*

The tightening torque for the bolts and nuts not listed above are as follows:

Bolt Diameter (size)			M6	M8	M10	M12	M14	M16	M18	M20
Hex. bolt	Wrench	mm	10	13	17	19	22	24	27	30
	Tightening Torque	Nm	6.9	15.7	32.3	58.8	98.0	137.2	196.0	274.4
		kgf m	0.7	1.6	3.2	5.9	9.8	13.7	19.6	27.4
		lb ft	5	12	24	43	72	101	145	202
Hex. socket head bolt	Wrench	mm	5	6	8	10	12	14	14	17
	Tightening Torque	Nm	8.8	21.6	42.1	78.4	117.6	176.4	245.0	343.0
		kgf m	0.8	2.2	4.2	7.8	11.8	17.6	24.5	34.3
		lb ft	6.5	16	31	58	87	130	181	253

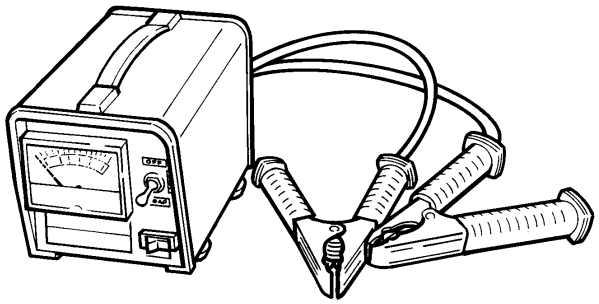
Service Tools

SECTION C - ELECTRICS



Electrical Test Equipment

	1	892/00283	Tool Kit Case
	2	892/00281	AVO Meter
*	**3**	892/00286	Surface Temperature Probe
	4	892/00284	Microtach Digital Tachometer
	5	892/00282	Shunt - open type
	6	892/00285	Hydraulic Oil Temperature Probe
	7	892/00298	Fluke 85 Multimeter



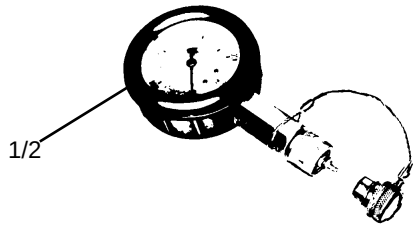
993/85700 Battery Tester

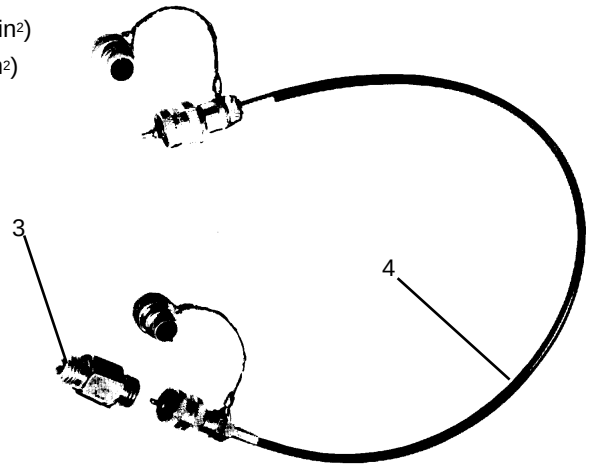
Service Tools *(continued)*

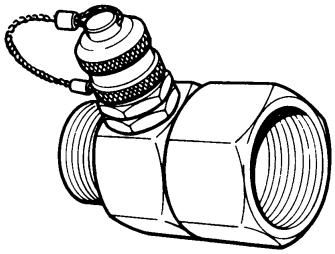
SECTION E - HYDRAULICS

Hydraulic Pressure Test Gauges and Connections

1	892/00279	Pressure Gauge 0-400 bar (0-6000 lbf/in²)
2	892/00346	Pressure Gauge 0-70 bar (0-1000 lbf/in²)
3	892/00347	Connector
4	892/00254	Hose

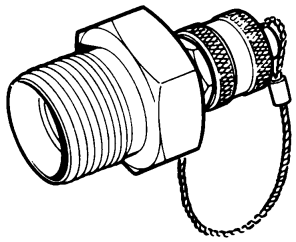






Pressure Test 'T' Adapters

892/00262	1/4 in BSP x 1/4 in F BSP x Test Point
816/55038	3/8 in BSP x 3/8 in F BSP x Test Point
816/55040	1/2 in BSP x 1/2 in F BSP x Test Point
892/00263	5/8 in BSP x 5/8 in F BSP x Test Point
892/00264	3/4 in BSP x 3/4 in F BSP x Test Point
892/00265	1 in M BSP x 1 in F BSP x Test Point
892/00266	1,1/4 in M BSP x 1,1/4 in F BSP x Test Point
892/00267	1,1/2 in M BSP x 1,1/2 in F BSP x Test Point

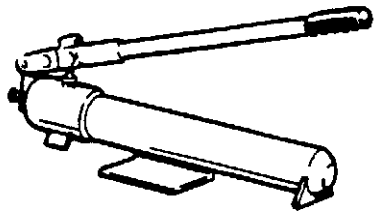


Pressure Test Adapters

892/00255	1/4 in BSP x Test Point
892/00256	3/8 in BSP x Test Point
892/00257	1/2 in BSP x Test Point
892/00258	5/8 in BSP x Test Point
816/15118	3/4 in BSP x Test Point
892/00259	1 in BSP x Test Point
892/00260	1,1/4 in BSP x Test Point
892/00261	5/8 in UNF x Test Point

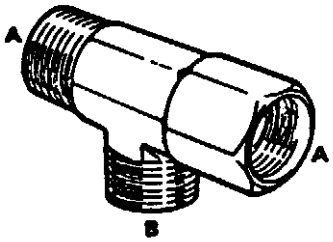
Service Tools *(continued)*

SECTION E - HYDRAULICS

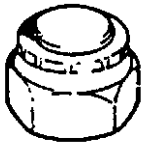


Hand Pump Equipment

892/00223	Hand Pump
892/00137	Micro-bore Hose 1/4 in BSP x 5 metres
892/00274	Adapter 1/4 in M BSP x 3/8 in M BSP Taper
892/00262	1/4 in M BSP x 1/4 in F BSP x Test Point
892/00706	Test Probe
892/00278	Gauge 0 - 40 bar (0 - 600 lb/in^2)
892/00279	Gauge 0 - 400 bar (0 - 6000 lb/in^2)
892/00280	Gauge 0 - 600 bar (0 - 8500 lb/in^2)

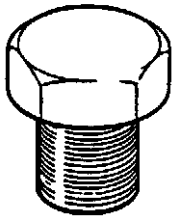


816/50005	1/2 in BSP (A) x 1/2 in BSP (B)
816/60096	3/4 in BSP (A) x 3/4 in BSP (B)
816/00018	1 in BSP (A) x 1 in BSP (B)



Female Cone Blanking Plug

892/00055	1/4 in BSP
892/00056	3/8 in BSP
892/00057	1/2 in BSP
892/00058	5/8 in BSP
892/00059	3/4 in BSP
892/00060	1 in BSP



Male Cone Blanking Plug

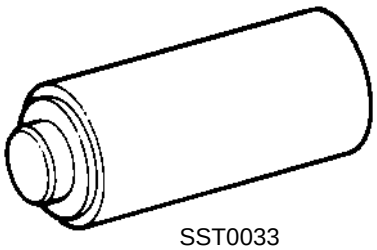
816/00294	1/4 in BSP
816/00189	3/8 in BSP
816/00190	1/2 in BSP
816/00197	5/8 in BSP
816/00196	3/4 in BSP
816/00193	1 in BSP

Service Tools *(continued)*

SECTION E - HYDRAULICS

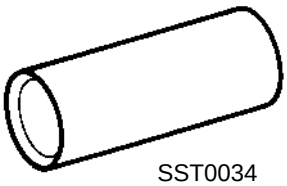
Slew Motor Jig

SST0033 Oil Seal Jig
SST0034 Taper Bearing Ring Jig
SST0035 Inner Ring Jig
SST0036 Seal Press Fit Jig
(All dimensions are in mm.)



SST0033





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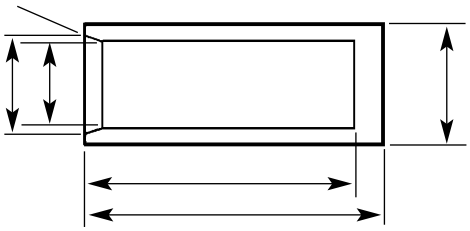



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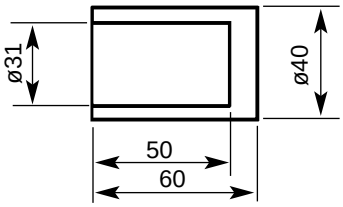
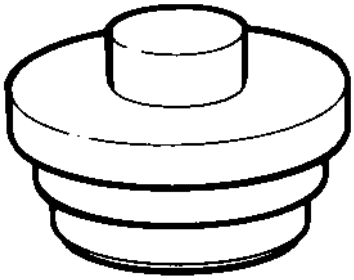
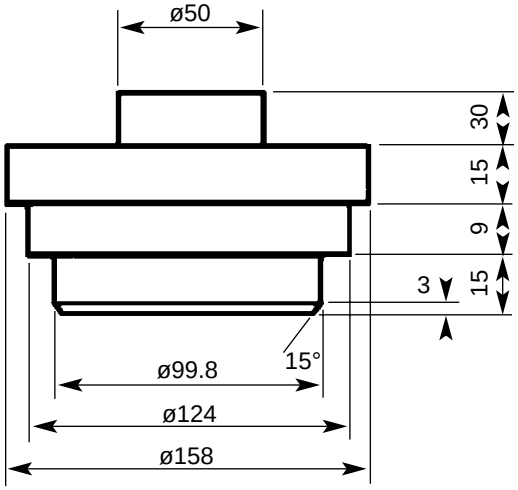




SST0036



Service Tools *(continued)*

SECTION E - HYDRAULICS

Ram Dismantling and Assembly

Ram Piston Head Nut (Rig Assembly - Section E, page 75 - 10)

Item	Part Number	Description	Quantity
1	993/99525	Rig assembly (not including spanners and ram)	1
2	993/99522	Anchor side plate (supplied loose unwelded)	1
3	993/99523	Anchor cross member (supplied loose unwelded)	1
4	993/99524	Ram eye end modification	1
5	556/43400	Lift ram	1
6	545/18000	Lynch pin	1
7	811/50232	$1^{1}/_{4}$ in Pivot pin	1

Spanner Requirements		
JS200/JS200LC/JS220/JS220LC		
993/99518	Bucket ram	90 mm A/F Nut
SSP0047	Boom ram	95 mm A/F Nut
993/99519	Dipper ram	100 mm A/F Nut
JS240/JS240LC/JS260/JS260LC		
993/99519	Bucket ram	100 mm A/F Nut
993/99519	Boom ram	100 mm A/F Nut
993/99521	Dipper ram	115 mm A/F Nut

Note: *All spanners have operating centres of 500 mm.*

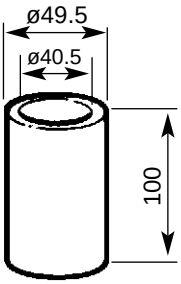
Service Tools *(continued)*

SECTION F - TRANSMISSION

Track Motor Jig

SST0028	Inner Rail Press Jig
SST0029	Snap Ring Jig
SST0030	Oil Seal Jig
SST0031	Case Fixing Jig
SST0032	Bearing Jig

(All dimensions are in mm.)



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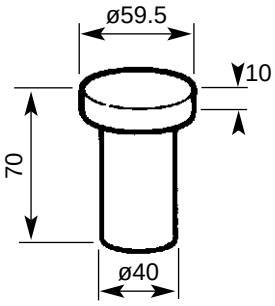

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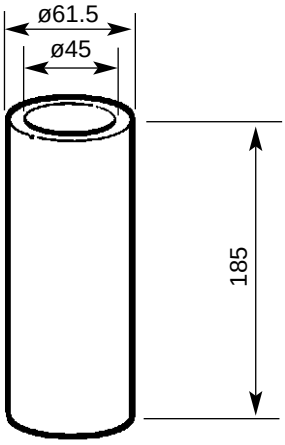

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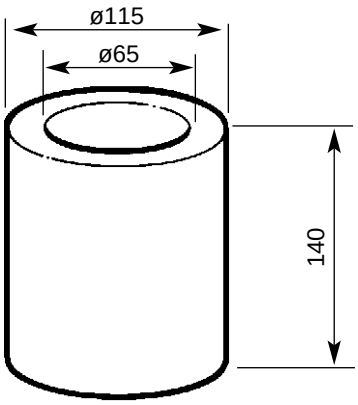

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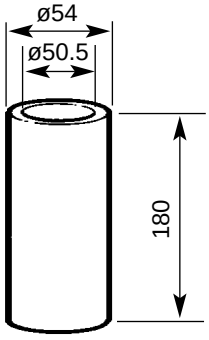


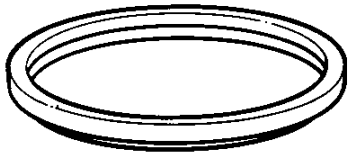
SST0032

Service Tools *(continued)*

SECTION F - TRANSMISSION

Track Gearbox Jig

SST0037 Re-sealing Tool
SST0038 Main Bearing Tool
SST0039 Main Bearing Tool
(All dimensions are in mm.)



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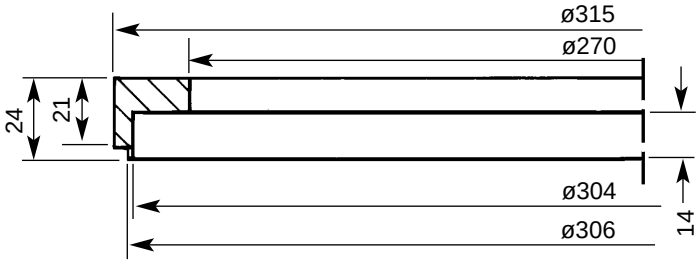
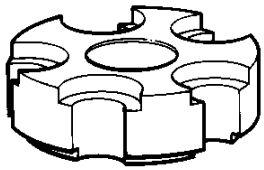
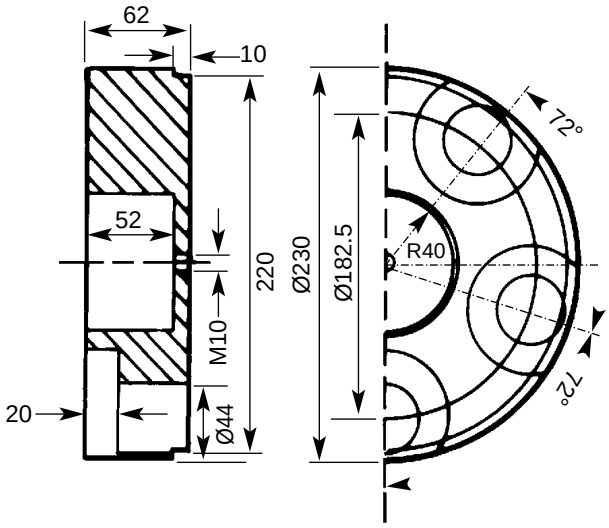
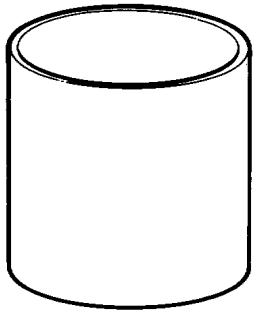




SST0038





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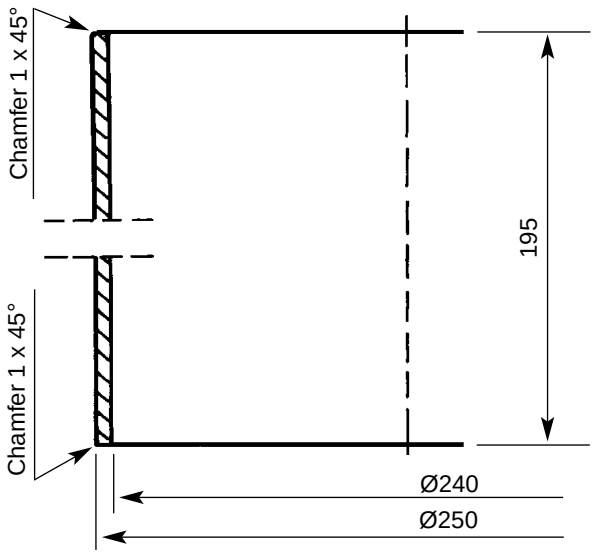
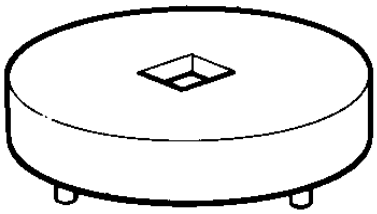


Service Tools *(continued)*

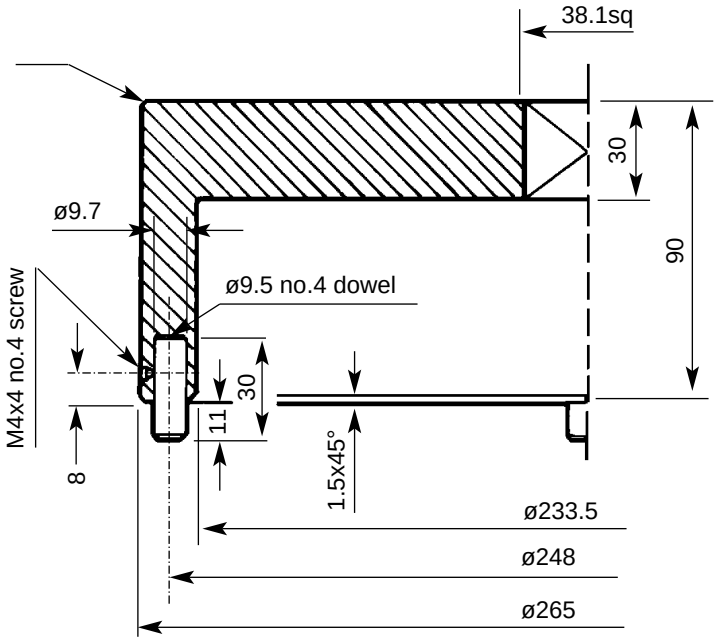
SECTION F - TRANSMISSION

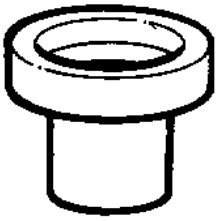
Track Gearbox Jig

SST0040 Ring Nut Tool
SST0041 Planet Gear Tool
(All dimensions are in mm.)

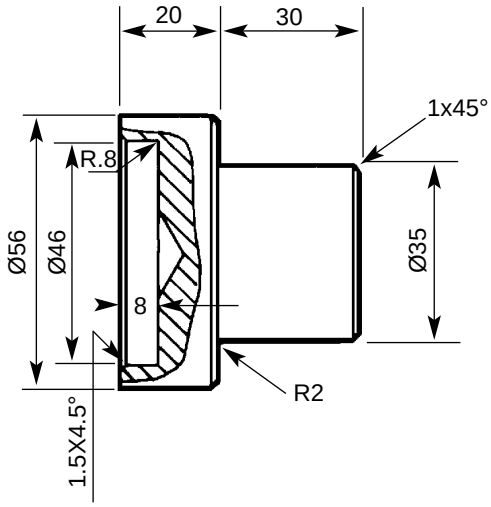


SST0040





SST0041



* Sealing and Retaining Compounds

JCB Multi-Gasket	A medium strength sealant suitable for all sizes of gasket flanges, and for hydraulic fittings of 25-65 mm diameter.	4102/1212	50 ml
JCB Threadlocker	For threads of 50 mm diameter upwards, e.g. suction strainer.	4101/0451	50 ml
JCB Threadlocker (High Strength)	A high strength locking fluid for use with threaded components. Gasketing for all sizes of flange where the strength of the joint is important.	4102/0551	50 ml
JCB Retainer (High Strength)	For all retaining parts which are unlikely to be dismantled.	4101/0651	50 ml
JCB Threadlocker and Sealer	A medium strength locking fluid for sealing and retaining nuts, bolts, and screws up to 50 mm diameter, and for hydraulic fittings up to 25 mm diameter.	4101/0250 4101/0251	10 ml 50 ml
JCB Threadlocker and Sealer (High Strength)	A high strength locking fluid for sealing and retaining nuts, bolts, and screws up to 50 mm diameter, and for hydraulic fittings up to 25 mm diameter.	4101/0550 4101/0552	10 ml 200 ml
JCB Threadseal	A medium strength thread sealing compound.	4102/1951	50 ml
JCB Activator	A cleaning primer which speeds the curing rate of anaerobic products.	4104/0251 4104/0253	Aerosol (1 ltr) Bottle (200 ml)
JCB Cleaner/Degreaser	For degreasing components prior to use of anaerobic adhesives and sealants.	4104/1557	Aerosol (400 ml)
Anti-Seize Paste	A compound used for assembly and prevention of parts seizure.	4003/0211	
Direct Glazing Kit	For one pane of glass; comprises items marked † below plus applicator nozzle etc.		
† Ultra Fast Adhesive	For direct glazing	4103/2109	310 ml
† Active Wipe 205	For direct glazing	4104/1203	250 g
† Black Primer 206J	For direct glazing	4201/4906	30 ml
Clear Silicone Sealant	To seal butt jointed glass.	4102/0901	

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In this publication and on the machine, there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

⚠ DANGER

Denotes an extreme hazard exists. If proper precautions are not taken, it is highly probable that the operator (or others) could be killed or seriously injured.

INT-1-2-1

⚠ WARNING

Denotes a hazard exists. If proper precautions are not taken, the operator (or others) could be killed or seriously injured.

INT-1-2-2

⚠ CAUTION

Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator (or others) and possible damage to the machine.

INT-1-2-3

All construction and agricultural equipment can be hazardous. When JCB Excavator is correctly operated and properly maintained, it is a safe machine to work with. But when it is carelessly operated or poorly maintained it can become a danger to you (the operator) and others.

Do not work with the machine until you are sure that you can control it.

Do not start any job until you are sure that you and those around you will be safe.

If you are unsure of anything, about the machine or the job, ask someone who knows. Do not assume anything.

Remember

BE CAREFUL
BE ALERT
BE SAFE

GEN-1-6

As well as the warnings in the following pages, specific warnings are given throughout the book. This section is designed to give a safety code for use of the machine generally and for operation and maintenance practices.

Note: *This section includes a certain amount of operating safety information. But remember that whenever you drive the machine or operate its controls, you are in effect a machine operator. Therefore you should read and understand the information given in the Operator Handbook before driving the machine or operating its controls.*

General Safety

WARNING

Lifting Equipment

You can be injured if you use faulty lifting equipment. Make sure that lifting equipment is in good condition. Make sure that lifting tackle complies with all local regulations and is suitable for the job. Make sure that lifting equipment is strong enough for the job.

INT-1-3-7

WARNING

Clothing

You can be injured if you do not wear the proper clothing. Loose clothing can get caught in the machinery. Wear protective clothing to suit the job. Examples of protective clothing are: a hard hat, safety shoes, safety glasses, a well fitting overall, ear-protectors and industrial gloves. Keep cuffs fastened. Do not wear a necktie or scarf. Keep long hair restrained.

INT-1-3-6

WARNING

Care and Alertness

All the time you are working with or on the machine, take care and stay alert. Always be careful. Always be alert for hazards.

INT-1-3-5

WARNING

Raised Equipment

Raised equipment can fall and injure you. Do not walk or work under raised equipment unless safely supported.

13-1-1-6

DANGER

Before removing the boom from the machine, ensure that the counterweight is adequately supported as in certain ground conditions the machine could tip backwards. Never travel or transport the machine with the boom removed.

BF6-3

Operating Safety

⚠WARNING

Engine

The engine has rotating parts. Do not open the engine cover while the engine is running. Do not use the machine with the cover open.

INT-2-1-6

⚠WARNING

Entering/Leaving

Always face the machine when entering and leaving the cab. Use the step(s) and handrails. Make sure the step(s), handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, use the handrails.

INT-2-1-7

⚠WARNING

Controls

You or others can be killed or seriously injured if you operate the control levers from outside the cab. Operate the control levers only when you are correctly seated inside the cab.

INT-2-1-3

⚠WARNING

Visibility

Accidents can be caused by working in poor visibility. Keep windows clean and use your lights to improve visibility. Do not operate the machine if you cannot see properly.

INT-2-1-11

⚠WARNING

Machine Limits

Operating the machine beyond its design limits can damage the machine, it can also be dangerous. Do not operate the machine outside its limits. Do not try to upgrade the machine performance with unapproved modifications.

INT-2-1-4

⚠WARNING

Exhaust Gases

Breathing the machine exhaust gases can harm and possibly kill you. Do not operate the machine in closed spaces without making sure there is good ventilation. If possible, fit an exhaust extension. If you begin to feel drowsy, stop the machine at once. Get out of the cab into fresh air.

INT-2-1-10

⚠WARNING

Hazardous Atmospheres

This machine is designed for use in normal outdoor atmospheric conditions. It shoul not be used in an enclosed area without adequate ventilation. Do not use the machine in a potentially explosive atmosphere, i.e. combustible vapours, gas or dust, without first consulting your JCB Distributor.

INT-2-1-14

⚠WARNING

Ramps and Trailers

Water, mud, ice, grease and oil on ramps or trailers can cause serious accidents. Make sure ramps and trailers are clean before driving onto them. Use extreme caution when driving onto ramps and trailers.

INT-2-2-6

⚠WARNING

Communications

Bad communications can cause accidents. Keep people around you informed of what you will be doing. If you will be working with other people, make sure any hand signals that may be used are understood by everybody. Work sites can be noisy, do not rely on spoken commands.

INT-2-2-3

⚠ DANGER

Sparks

Explosions and fire can be caused by sparks from the exhaust or the electrical system. Do not use the machine in closed areas where there is flammable material, vapour or dust.

INT-2-2-10

⚠WARNING

Controls

Keep the machine controls clean and dry. Your hands and feet could slide off slippery controls. If that happens, you will lose control of the machine.

2-2-3-6

Maintenance Safety

⚠WARNING

Soft Ground

A machine can sink into soft ground. Never work under a machine on soft ground.

INT-3-2-4

⚠WARNING

Metal Splinters

You can be injured by flying metal splinters when driving metal pins in or out. Use a soft faced hammer or drift to remove and fit metal pins. Always wear safety glasses.

INT-3-1-3

⚠WARNING

Communications

Bad communications can cause accidents. If two or more people are working on the machine, make sure each is aware of what the others are doing. Before starting the engine, make sure the others are clear of the danger areas; examples of danger areas are: the rotating blades and belt on the engine, the attachments and linkages, and anywhere beneath or behind the machine. People can be killed or injured if these precautions are not taken.

INT-3-1-5

⚠WARNING

Diesel Fuel

Diesel fuel is flammable; keep naked flames away from the machine. Do not smoke while refuelling the machine or working on the engine. Do not refuel with the engine running. There could be a fire and injury if you do not follow these precautions.

INT-3-2-2

⚠WARNING

Petrol

Do not use petrol in this machine. Do not mix petrol with the diesel fuel; in storage tanks the petrol will rise to the top and form flammable vapours.

INT-3-1-6

⚠WARNING

Oil

Oil is toxic. If you swallow any oil, do not induce vomiting, seek medical advice. Used engine oil contains harmful contaminants which can cause skin cancer. Do not handle used engine oil more than necessary. Always use barrier cream or wear gloves to prevent skin contact. Wash skin contaminated with oil thoroughly in warm soapy water. Do not use petrol, diesel fuel or paraffin to clean your skin.

INT-3-2-3

⚠WARNING

Fires

If your machine is equipped with a fire extinguisher, make sure it is checked regularly. Keep it in the operator's cab until you need to use it.

Do not use water to put out a machine fire, you could spread an oil fire or get a shock from an electrical fire. Use carbondioxide, dry chemical or foam extinguishers. Contact your nearest fire department as quickly as possible. Fire fighters should use self-contained breathing apparatus.

INT-3-2-7/1

⚠WARNING

Battery

A battery with frozen electrolyte can explode if it is used or charged. Do not use a machine with a frozen battery. To help prevent the battery from freezing, keep the battery fully charged.

INT-3-1-7

⚠WARNING

Battery Gases

Batteries give off explosive gases. Keep flames and sparks away from the battery. Do not smoke close to the battery. Make sure there is good ventilation in closed areas where batteries are being used or charged. Do not check the battery charge by shorting the terminals with metal; use a hydrometer or voltmeter.

INT-3-1-8

⚠WARNING

Battery Terminals

The machine is negatively earthed. Always connect the negative pole of the battery to earth.

When connecting the battery, connect the earth (-) lead last.

When disconnecting the battery, disconnect the earth (-) lead first.

INT-3-1-9

⚠WARNING

Electrical Circuits

Understand the electrical circuit before connecting or disconnecting an electrical component. A wrong connection can cause injury and/or damage.

INT-3-1-4

⚠ CAUTION

Never use water or steam to clean inside the cab. The use of water or steam could damage the on-board computer and render the machine inoperable. Remove dirt using a brush or damp cloth.

8-3-4-8

Maintenance Safety *(continued)*

⚠ CAUTION

Arc Welding

Before carrying out any arc welding on the machine, completely remove the Control Computer to avoid damage to the circuits; also disconnect the alternator plug and battery leads.

When welding items to the mainframe make sure that the earth clamp is positioned on the mainframe and when welding to the undercarriage make sure that the earth clamp is positioned on the undercarriage. If you earth one and weld the other, you may cause severe damage to the slew ring.

Always connect the earth clamp to any other component being welded, i.e. boom or dipper, to avoid damage to pivot pins and bushes.

8-1-2-6/1

⚠ WARNING

Hydraulic Hoses

Damaged hoses can cause fatal accidents. Inspect the hoses regularly for:
Damaged end fittings
Chafed outer covers
Ballooned outer covers
Kinked or crushed hoses
Embedded armouring in outer covers
Displaced end fittings.

INT-3-3-2

⚠ WARNING

DO NOT remove the hydraulic tank filler cap or cover plate when the engine is running. The hydraulic system is under pressure. You or others could be injured. First stop the engine and then release the pressure.

8-3-4-4/1

⚠ WARNING

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses, stop the engine and operate the controls to release pressure trapped in the hoses. Make sure the engine cannot be started while the hoses are open.

INT-3-1-11/1

⚠ WARNING

Hydraulic Fluid

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

INT-3-1-10/1

⚠ CAUTION

Rams

The efficiency of the rams will be affected if they are not kept free of solidified dirt. Clean dirt from around the rams regularly. When leaving or parking the machine, close all rams if possible to reduce the risk of weather corrosion.

INT-3-2-10

⚠ CAUTION

Cleaning

Cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

INT-3-2-11

⚠ CAUTION

'O'-rings, Seals and Gaskets

Badly fitted, damaged or rotted 'O'-rings, seals and gaskets can cause leakages and possible accidents. Renew whenever disturbed unless otherwise instructed. Do not use Trichloroethane or paint thinners near 'O' rings and seals.

INT-3-2-12

⚠ WARNING

Hot Coolant

The cooling system is pressurised when the engine is hot. Hot coolant can spray out when you remove the radiator cap. Let the system cool before removing the radiator cap. To remove the cap; turn it to the first notch and let the system pressure escape, then remove the cap.

INT-3-2-9

⚠ CAUTION

If the machine is operated at full load, before its initial run-in procedure is complete, it may cause scuffing and seizing which can adversely effect the service life of the machine.

8-3-1-5