Standard Torque Settings

Zinc Plated Fasteners and Dacromet Fasteners

T11-002

Introduction

Some external fasteners on JCB machines are manufactured using an improved type of corrosion resistant finish. This type of finish is called Dacromet and replaces the original Zinc and Yellow Plating used on earlier machines.

The two types of fasteners can be readily identified by colour and part number suffix. ⇒ *Table 1. Fastener Types (1-7)*.

Table 1. Fastener Types

Fastener Type	Colour	Part No. Suffix
Zinc and Yellow	Golden finish	'Z' (e.g. 1315/3712Z)
Dacromet	Mottled silver finish	'D' (e.g. 1315/3712D)

Note: *As the Dacromet fasteners have a lower torque setting than the Zinc and Yellow fasteners, the torque figures used must be relevant to the type of fastener.*

Note: *A Dacromet bolt should not be used in conjunction with a Zinc or Yellow plated nut, as this could change the torque characteristics of the torque setting further. For the same reason, a Dacromet nut should not be used with a Zinc or Yellow plated bolt.*

Note: *All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.*

Note: *Dacromet bolts, due to their high corrosion resistance are used in areas where rust could occur. Dacromet bolts are only used for external applications. They are not used in applications such as gearbox or engine joint seams or internal applications.*

Bolts and Screws

Use the following torque setting tables only where no torque setting is specified in the text.

Note: *Dacromet fasteners are lubricated as part of the plating process, do not lubricate.*

Torque settings are given for the following conditions:

Condition 1

- Un-lubricated fasteners
- Zinc fasteners
- Yellow plated fasteners

Condition 2

- Zinc flake (Dacromet) fasteners
- Lubricated zinc and yellow plated fasteners
- Where there is a natural lubrication. For example, cast iron components

Verbus Ripp Bolts

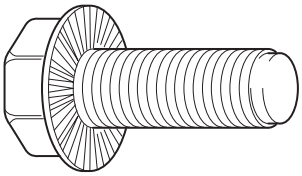


Fig 1.

Torque settings for these bolts are determined by the application. Refer to the relevant procedure for the required settings.

Table 6. Torque Settings - Rivet Nut Bolts/Screws

Bolt Size				
ISO Metric Thread	mm	Nm	kgf m	lbf ft
M3	3	1.2	0.1	0.9
M4	4	3.0	0.3	2.0
M5	5	6.0	0.6	4.5
M6	6	10.0	1.0	7.5
M8	8	24.0	2.5	18.0
M10	10	48.0	4.9	35.5
M12	12	82.0	8.4	60.5

Table 7. Torque Settings - Internal Hexagon Headed Cap Screws (Zinc)

Bolt Size			
ISO Metric Thread	Nm	kgf m	lbf ft
M3	2.0	0.2	1.5
M4	6.0	0.6	4.5
M5	11.0	1.1	8.0
M6	19.0	1.9	14.0
M8	46.0	4.7	34.0
M10	91.0	9.3	67.0
M12	159.0	16.2	117.0
M16	395.0	40.0	292.0
M18	550.0	56.0	406.0
M20	770.0	79.0	568.0
M24	1332.0	136.0	983.0

ISO-07B

Part Number: 817/70018

Description: Crush hazard. Do not operate the controls from outside of the machine.


817-70018-2

ISO-010A

Part Number: 817/70029

Description: Crush hazard. Wear the seatbelt when you operate the machine.


817-70029-3

ISO-07D

Part Number: 817/70112

Description: Crush hazard. Keep a safe distance from the moving parts.


817-70112-2

ISO-12A

Part Number: 817/70106

Description: Strike to whole body (machine swing). Keep a safe distance from the machine.


817-70106-2

ISO-09A

Part Number: 332/P4581

Description: Severing of hands or fingers. Keep clear of/do not reach into the moving parts. Stop the engine and remove the starter key before you start maintenance work. Refer to ***Making the Machine Safe (Routine Maintenance Section)***.


332-P4581-1

ISO-11D

Part Number: 817/70100

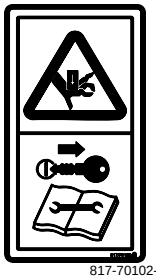
Description: Fall. Enter and dismount safely. Refer to ***Entering and Leaving the Cab (Operation Section)***.


817-70100-2

ISO-09C

Part Number: 817/70102

Description: Crushing of fingers or hands. Remove the starter key and refer to the Service Manual before you start maintenance work.

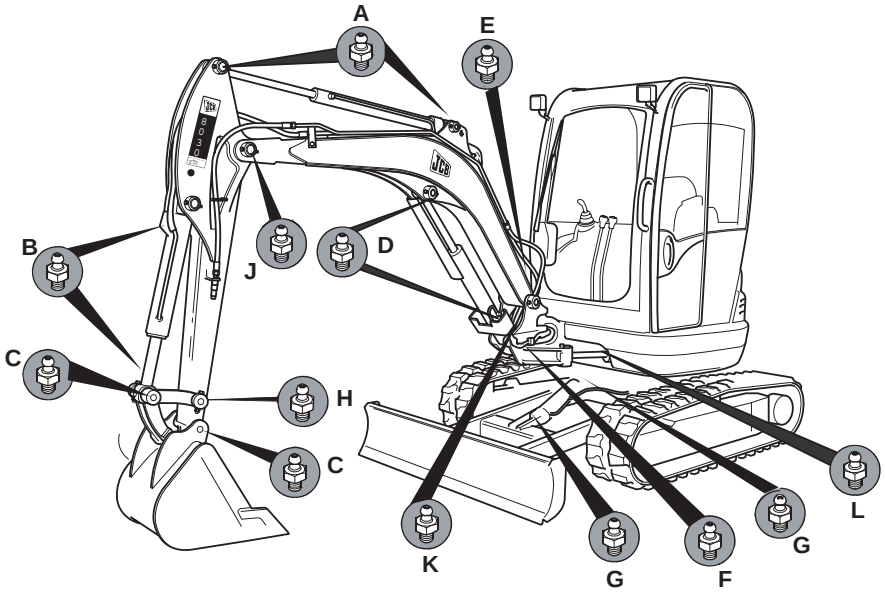

817-70102-3

ISO-11E

Part Number: 817/70006

Description: Fall. Unexpected machine movement because of accidental contact with the machine controls if the hydraulic functions are not isolated..


817-70006-2



800840-4

Fig 3.

Installing a Bucket on a Quickhitch

See ***Bucket Selection.***

1 Position the Bucket

Set the bucket on firm level ground. Use safe and correct lifting equipment to move the bucket.

2 Position the machine

a Position the machine so that the Quickhitch and bucket are correctly aligned for connection as shown.

b Use the excavator controls to engage jaw **A** of the Quickhitch with the pivot pin **B** of the bucket.

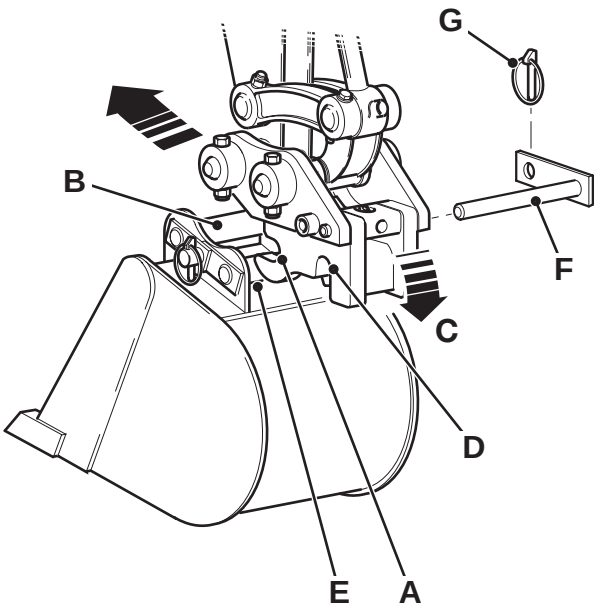


Fig 11.

c Use the excavator controls to roll the Quickhitch in the direction of arrow **C** until the latch hook **D** has fully engaged the pivot pin **E** on the bucket. Due to the light weight of some bucket it may be necessary to apply a load on the bucket teeth to achieve Quickhitch connection.

Alternatively, use the tommy bar to lever the latch off, allowing the attachment pivot pin **E**, to locate in jaw **D** of the Quickhitch.

⚠ CAUTION

Make sure that the latch hook has fully engaged.

2-4-4-3

d Fit the latch hook locking pin **F** and secure with lynch pin **G**.

⚠ WARNING

Always fit the Quickhitch latch hook locking pin. Failure to fit the pin will result in possible failure of the latching mechanism. Such a failure would result in the sudden release of an attachment from the machine; you or others could be killed or seriously injured.

3-4-1-9

⚠ CAUTION

When the Quick-Hitch is installed and its attachment fitted, there is a danger of the attachment hitting the underside of the boom. Operate the boom and dipper carefully when the Quick-Hitch and its attachment are fitted.

2-4-4-2

Starter Motor

TC-005

Starting Circuit Test

Before carrying out the voltmeter tests, check the battery condition and ensure that all connections are clean and tight.

To prevent the engine starting during the tests ensure that the engine stop fuse is removed, (refer to ***Fuse Identification*** page).

Check the readings in the following sequence using a voltmeter. Unless otherwise stated, the readings must be taken with the starter switch held in the 'start' position ('HS') and the transmission forward/reverse selector in neutral.

Note: *Do not operate the starter motor for more than 20 seconds at one time. Let the starter motor cool for at least two minutes between starts.*

1 Connect the voltmeter across the battery terminals. ⇒ *Fig 7. (C-10)*. Reading in 'start' position: 10.0V approximately. Minimum permissible reading in 'start' position 9.5V.

A low reading probably indicates a fault in the starter motor.

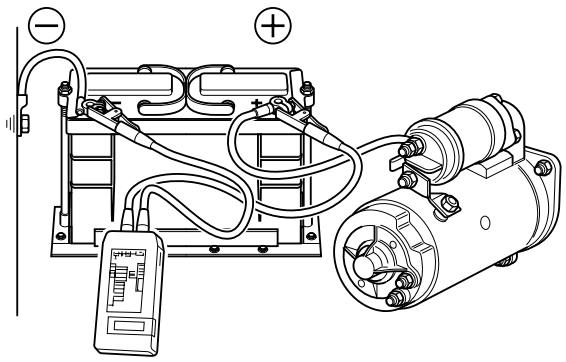


Fig 7.

2 Connect the voltmeter between the starter main terminal **8-A** and the commutator end bracket **8-B**. In the 'start' position, the reading should not be more than 0.5V below the reading obtained in Step 1. Minimum permissible reading in 'start' position 9.0V.

If the reading is within this limit, continue to Step 3. If the reading is outside the limit, proceed to Step 4 and Step 5.

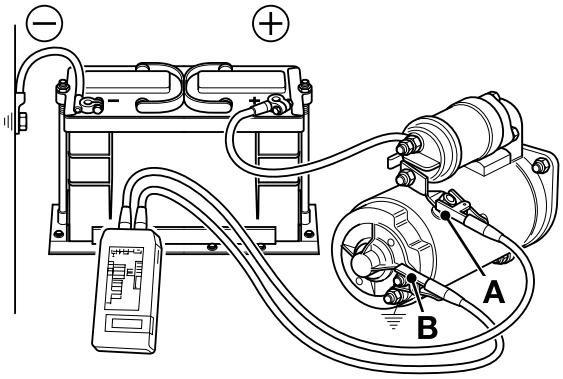


Fig 8.

3 Connect the voltmeter between the solenoid terminal **9-C** and a good earth. Minimum permissible reading in 'start' position: 8.0V.

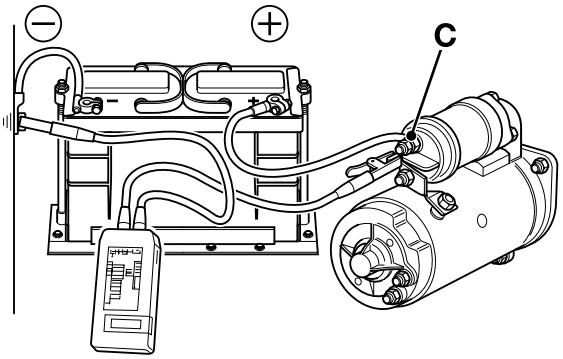


Fig 9.

a If the reading is less than specified, connect the voltmeter between the neutral start relay terminal **10-D** and earth. An increase in reading to 8.0V indicates a fault in the wiring from the start relay to the solenoid.

Wire Numbers and Functions

Wires 000-199

These numbers are reserved for ignition feeds, heater start circuits and start circuits. These can be further categorised by:

- Wires **000 - 099** are allocated to unfused ignition feeds.
- Wires **100 - 199** are allocated to fused ignition feeds.

Note: *Feeds via ignition relays are classed as ignition feeds.*

Wires 200-399

These numbers are reserved for battery feeds, They can be further categorised by:

- Wires **200 - 299** are allocated to unfused battery feeds.
- Wires **300 - 399** are allocated to fused battery feeds.

Wires 400-599

These numbers are reserved for instruments, i.e. alternators to tachos, temperature switches to warning lights, etc. and signal wires used in electronic systems.

Wires 600-799

These numbers are used for earth wires. When the number is printed onto a wire **A** it is prefixed by the Earth symbol **B**. ⇨ *Fig 2. (C-44)*. This symbol is printed onto the wire, it may however be omitted from harness drawings.

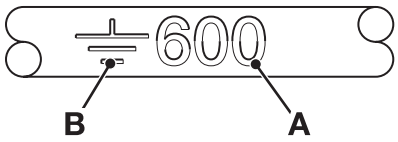


Fig 2.

Where a load is switched negative, the wire number from the load to the switch shall be different to that of the wire from the switch to the earth.

Wires 800-999

These numbers are reserved for switched supplies to electrical loads, i.e. to lights, etc.

Wires In Splices

The main input wire is allocated with a wire number and a suitable description, i.e. Wire **640** earth splice to earth. The additional wires in the splice are allocated the same wire number and a postfix, i.e. **640A**, **640B**, etc. ⇨ *Fig 3. (C-44)*.

Note: *The letters I, O, Q and S are not used.*

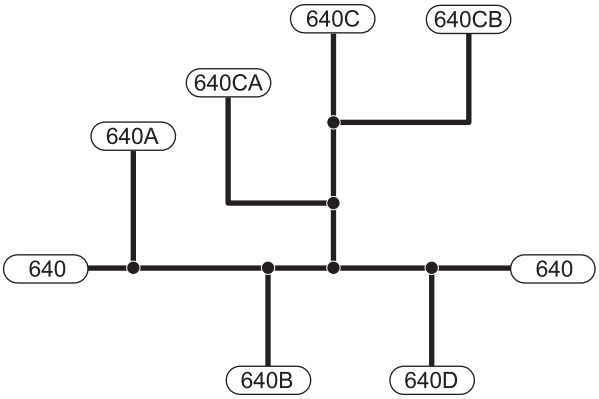


Fig 3.

General Points

1 Wires continue to have the same number even after passing through a connector block to another harness.

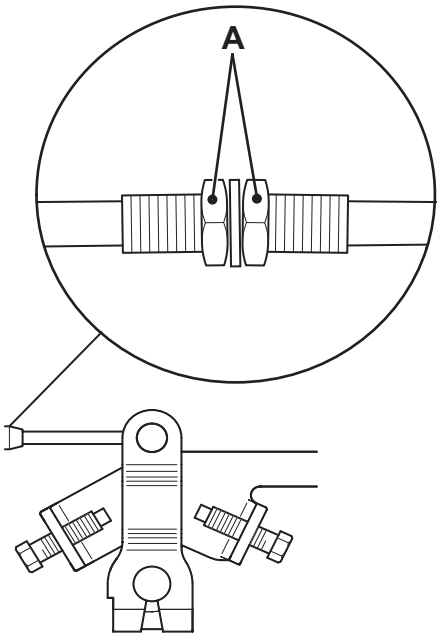
2 If all the numbers in a category have been allocated, then the category is re-used with an additional prefix '1', i.e. 1832.

Engine Throttle

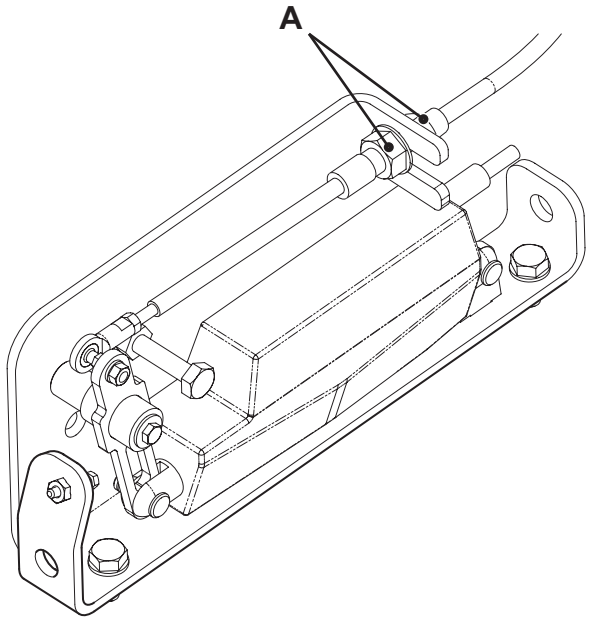
Cable Adjustment and Calibration

Cable Adjustment

Note: *Throttle adjustments/calibrations only need to be performed if the machine is new or if the system falls out of adjustment/calibration. For example, after installation of replacement components in the throttle control system.*



1 Ensure the throttle cable is correctly attached at the injector pump (engine) side. Position the locknuts **A** on the outer throttle cable so that they are centred along the threaded portion.



2 Ensure the throttle cable is correctly attached at the throttle motor side. Release the locknuts **A** on the outer cable.

Example of Schematic Circuit

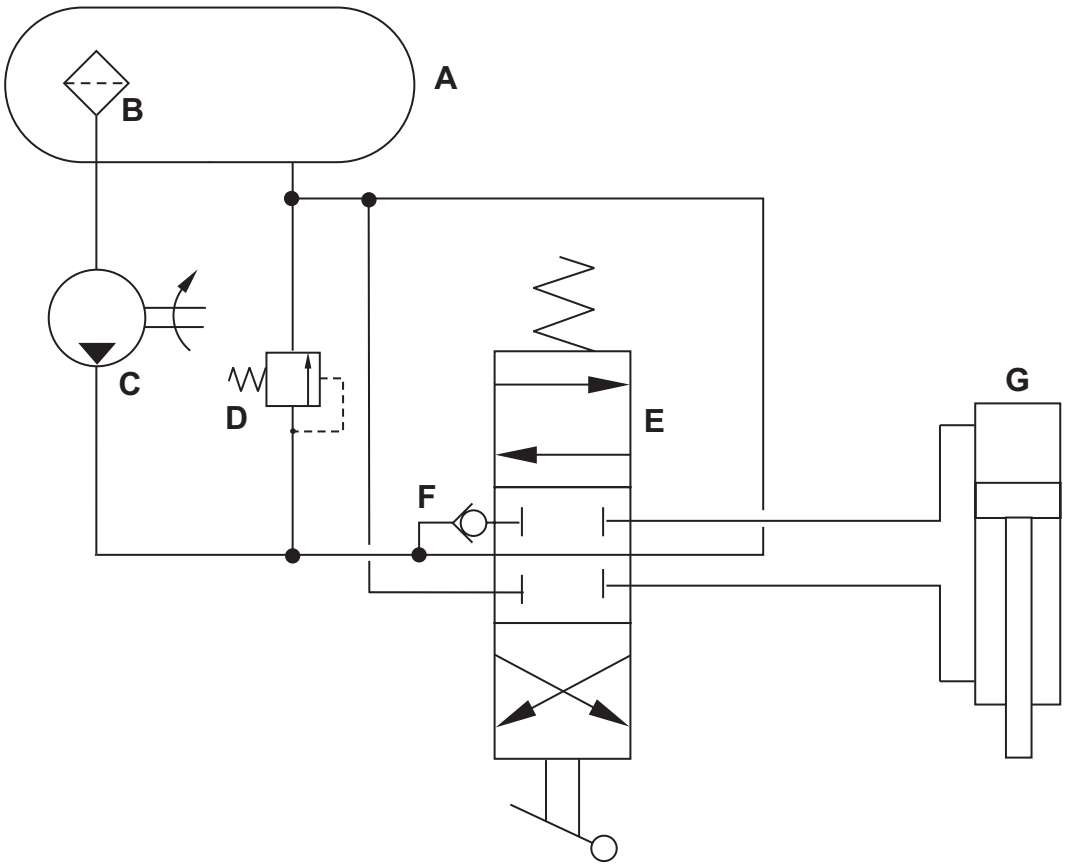


Fig 7. Simple Schematic Circuit

Some of the symbols described on the preceding pages have been arranged into a simple schematic circuit. ⇨ *Fig 7. (1-8)*.

Hydraulic tank **7-A** is a pressurised tank with an internally mounted strainer **7-B** on the suction line to the fixed displacement pump **7-C**. System pressure is limited to the setting of relief valve **7-D**.

Valve spool **7-E** is an open-centre spool that is in neutral position; flow from the pump passes through the spool and returns to the hydraulic tank.

If the lever operated spool is moved away from neutral position hydraulic fluid is directed to either head side or rod side of hydraulic ram **7-G**. Notice that the fluid must first open one way valve **7-F** before flowing to the ram.

Example Circuit Key

7-A	Hydraulic Tank
7-B	Strainer
7-C	Fixed Displacement Pump
7-D	Relief Valve
7-E	Spool
7-F	One Way Valve
7-G	Double Acting Hydraulic Ram

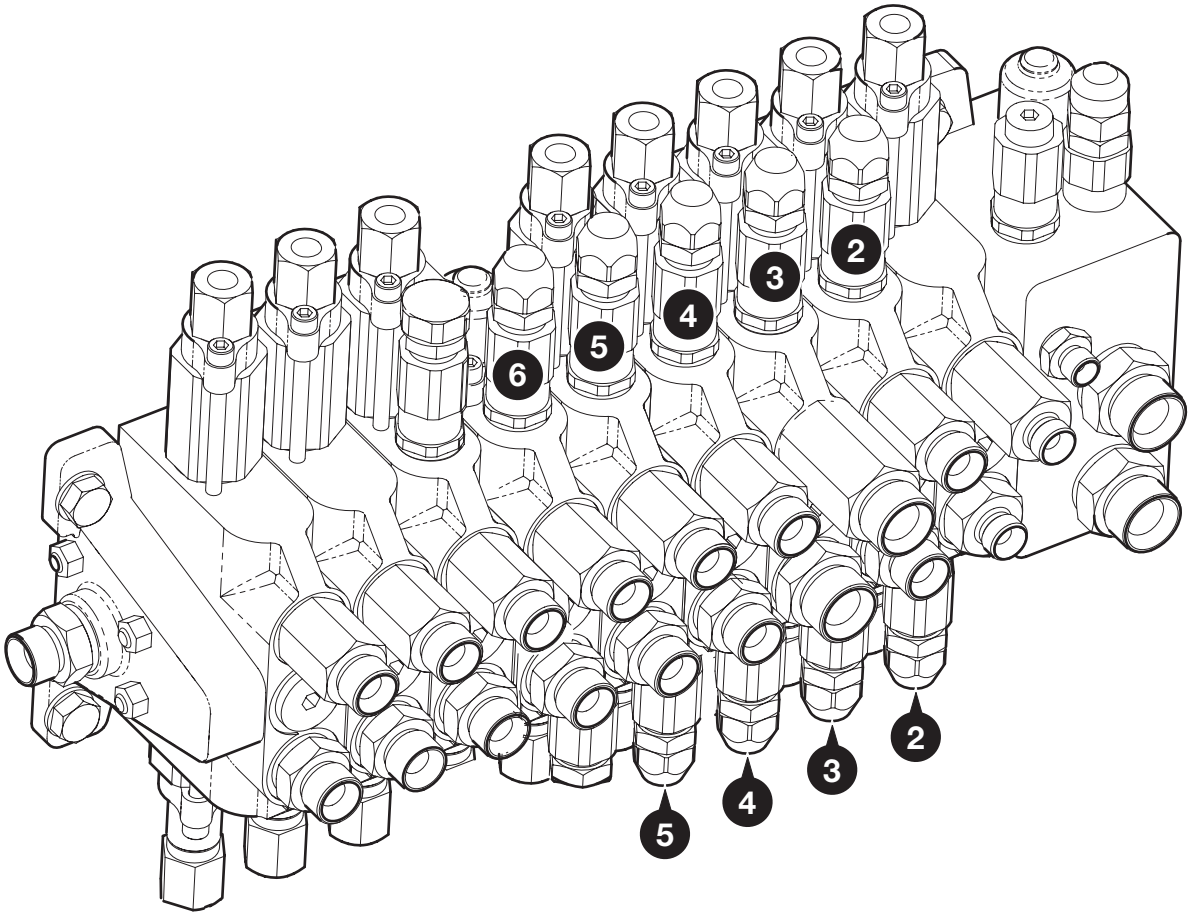


Fig 1.

Pump

The illustration shows a completely dismantled pump for reference only. It does not imply that all the items shown are available as spares.

The numerical annotations correspond to the spares listed in the Spares Catalogue 9802/5510, to which reference should be made for part numbers.

Dismantling

Examine items removed for wear or damage, replace any faulty items.

Assembly

Renew all O-rings and oil seals.

Set up the pump before use (see ***Pump Setup Procedure***).

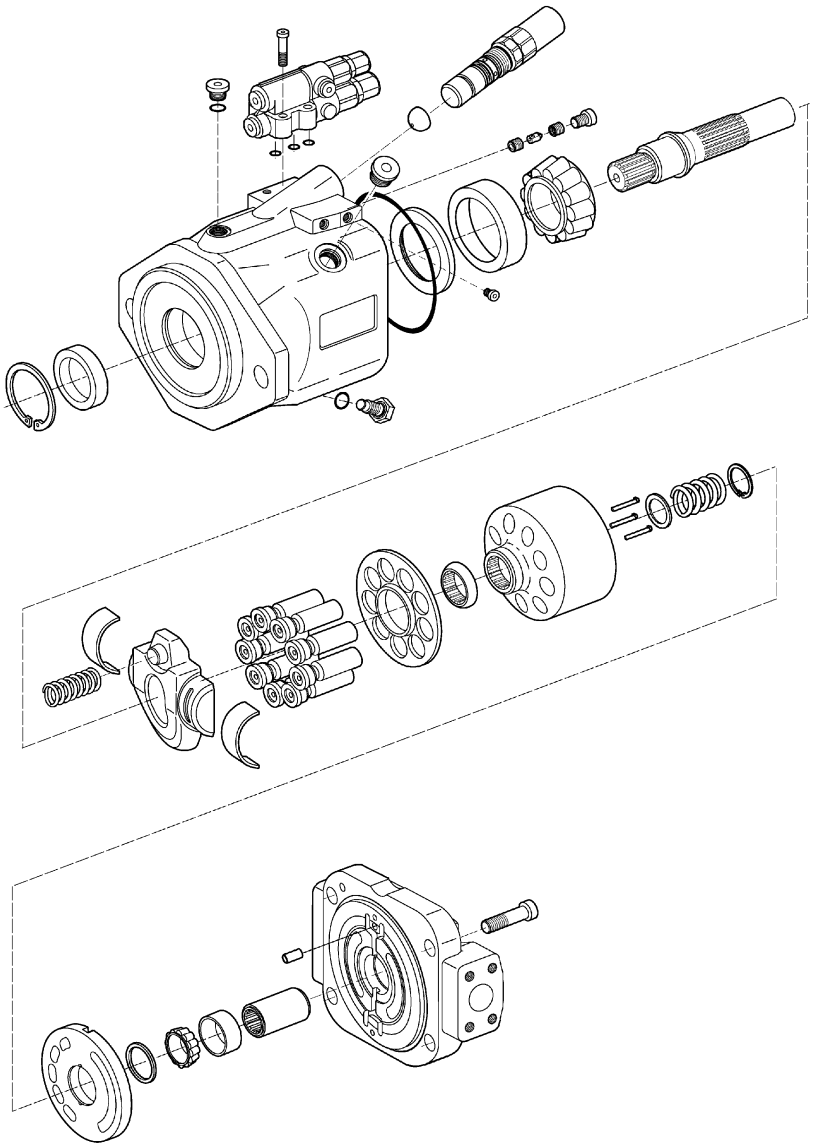


Fig 18.

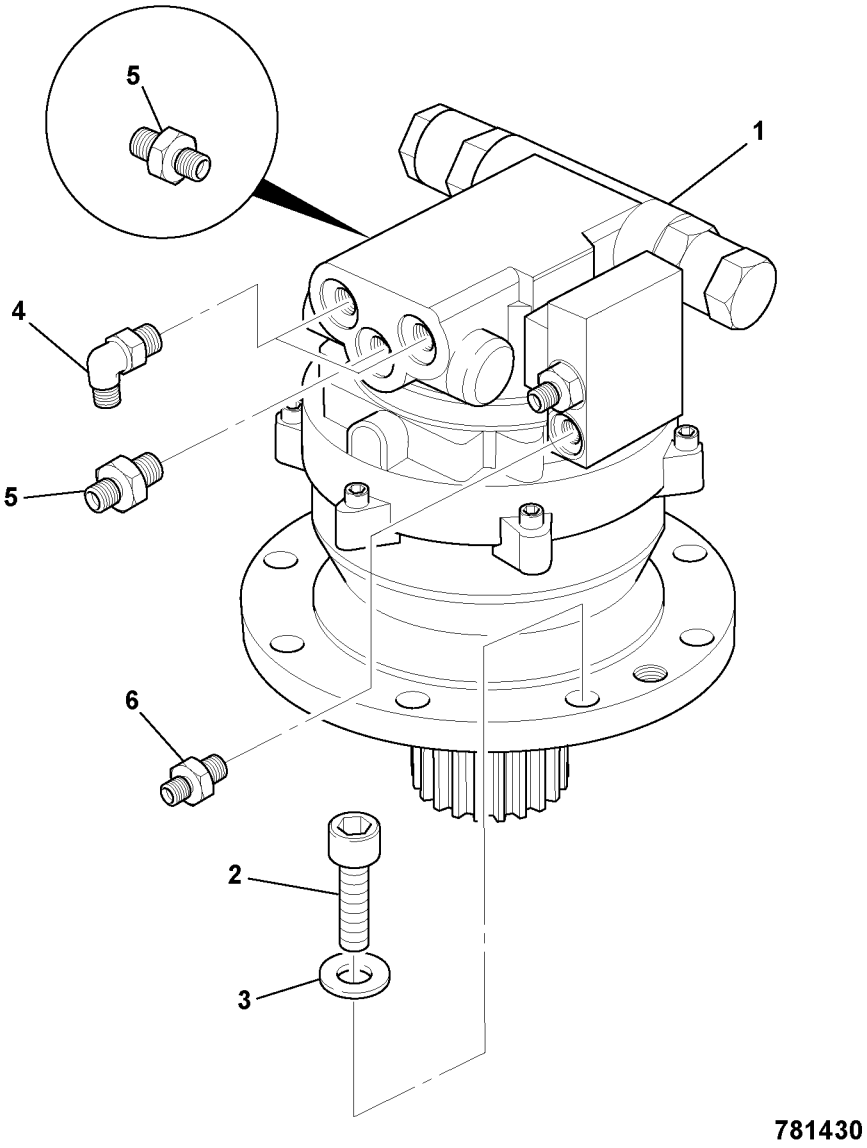


Fig 12.

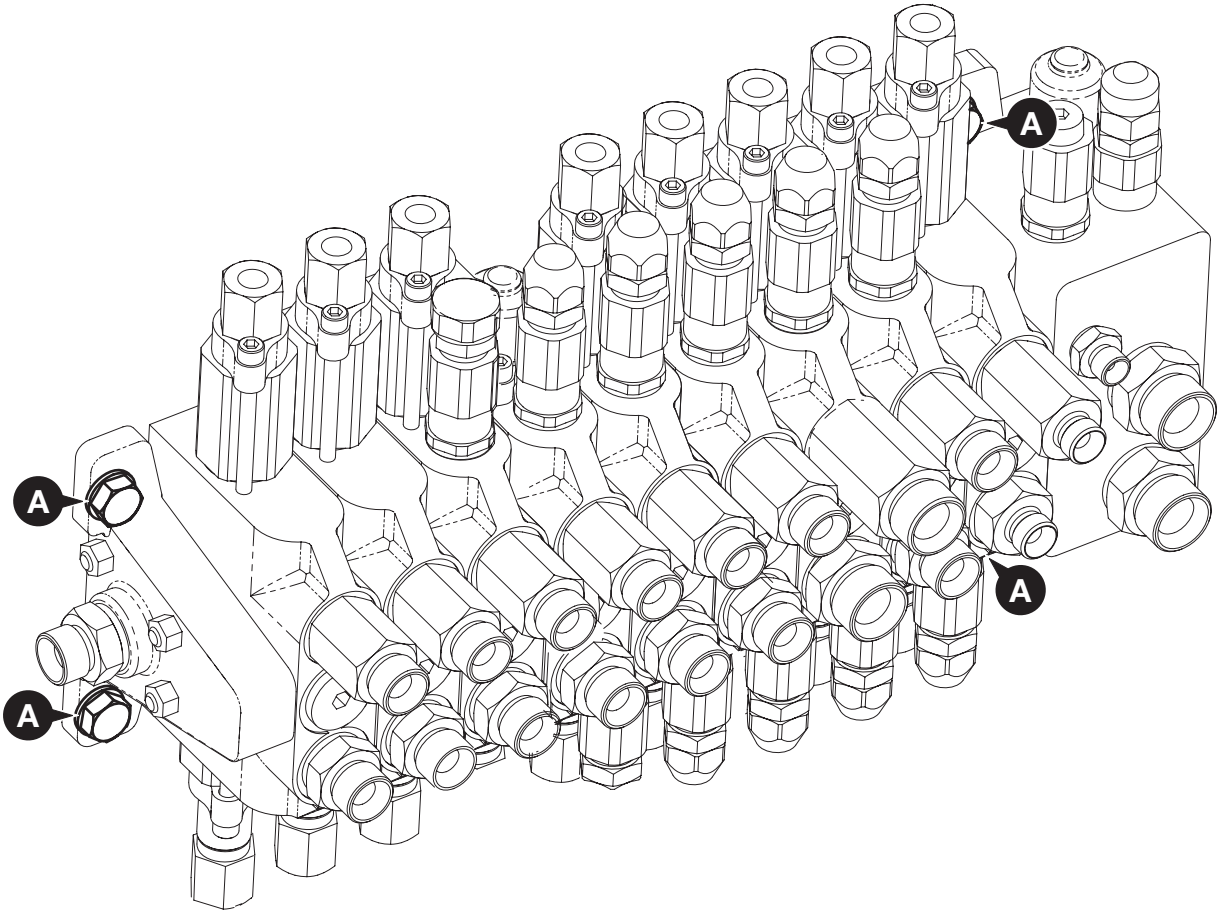


Fig 8.

Rotary Coupling

Removal and Replacement

Removal

Note: *Before removing a suspected leaking coupling, ensure that the leak is from the coupling core and not a hose adaptor. Ensure all adaptors are tight.*

WARNING

Fluid Under Pressure

Fine jets of fluid at high pressure can penetrate the skin. Keep face and hands well clear of fluid under pressure and wear protective glasses. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of fluid. If fluid penetrates your skin, get medical help immediately.

INT-3-1-10_2

1 Raise cab to gain access to rotary coupling.

WARNING

Postion the machine on a firm, level surface before tilting the cab. The tilting gas struts must be fully raised and locked in position before attempting any service procedure.

8-5-1-4

2 Identify and remove the hydraulic hoses from the adaptors. Blank both the hoses and the adaptors.

3 Remove the four bolts, nuts and washers **A** securing the rotary coupling to the undercarriage and lift clear of the mainframe. ⇒ ***Fig 1. (1-131)***

Replacement

1 Replace in reverse order of removal.

2 Reconnect hydraulic hoses using new lightly lubricated 'O' rings.

3 Test the assembly for leaks.

Technical Data

General Description

This range of Excavators is fitted with three gearboxes, one providing drive for slewing of the upper structure and one each for the machine tracks. The gearboxes produce high speed reduction while maintaining high torque.

The slew gearbox is mounted on the main frame of the upper structure and transmits drive to the slew ring.

The track gearboxes are mounted onto flanges on the undercarriage side frames and are covered by guards. Drive to the track is transmitted through the gearbox output pinion to the track assembly driven sprocket

For Slew Gearbox information, refer to ***Section E***