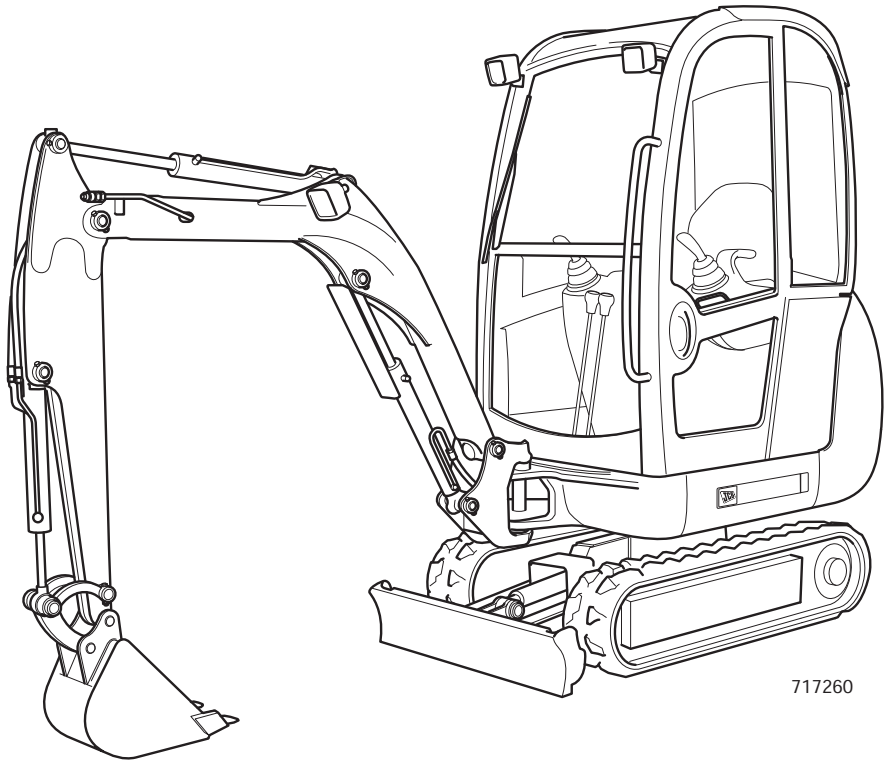
Controls

Service Manual - 8014, 8016, 8018, 8020



717260

Publication No.
9803/9350-4

Issued by JCB Technical Publications, JCB Aftermarket Training, Woodseat, Rocester, Staffordshire, ST14 5BW, England. Tel +44 1889 591300 Fax +44 1889 591400

Notes:

Contents **Page No.**

Page left intentionally blank

D-ii

Servo Hand Controllers

Introduction

This section deals with the Remote Control Valve which provides pilot pressure for the hydraulic control valve and electrical switching to flow-control solenoids.

The remote control valve is a pressure reduction valve used to control the pilot pressure operated system. Four pressure reduction valves used to control the pilot pressure are located in the main housing. Direction of the output pilot pressure is controlled by selective movement of the control lever. The valves and control levers are mounted in the arm rests on both sides of the operator's seat.

Operation

The pressure reduction unit comprises spools **26**, pressure control springs **18**, return springs **13** and spring seats **17**. The spools **26** are held against the plungers **16** by the return springs **13**.

The lower end of the main body **21** contains the main inlet port **P** fed from the pump, exhaust port **T** connected to tank and the pilot pressure outlet ports **1**, **2**, **3** and **4**.

The pilot pressure controls the stroke and direction of the main control valve spools.

Oil supplied by the hydraulic pilot pump enters at port **P** and the function of the spools **16** is to direct oil from the inlet port **P** to the output ports **1**, **2**, **3** and **4** or alternatively, to the exhaust port **T** to tank. The pressure control springs **18** act on the spools **26** to determine pressure at each port. Plungers **16** slide in the guides **15** to vary the compression in the springs **18**. The control handle, fixed to the adjusting nut **10** and circular rocker plate **11** is operated to move the plungers **16**. The control handle is able to rotate 360° around the knuckle joint **9**.

The return springs **13** operate between the casing **21** and the seats **17**, regardless of the outlet pilot pressure, returning the plungers **16** to their outer positions, ensuring the spools **26** return to their neutral (closed) positions. The springs **13** also provide a resistive force, giving the operator a `tactile feel' of the controls.

The control handles contain electrical push button and rocker switches which are used to operate auxiliary services.

When the control handle is tilted, the plungers **16** move down, depressing the return spring seats **17**, simultaneously compressing the pressure control springs **18**, moving the spool, allowing hydraulic oil to flow to the designated pilot port.

If the handle is held in the tilted position, the pressure in the outlet ports rises to equal the force of pressure control spring **18**; the oil pressure and spring force become balanced. If the outlet pressure exceeds the set pressure, the spool moves to allow port **T** to open. If the outlet pressure falls below the set pressure, port **T** is closed and port **P** is opened.

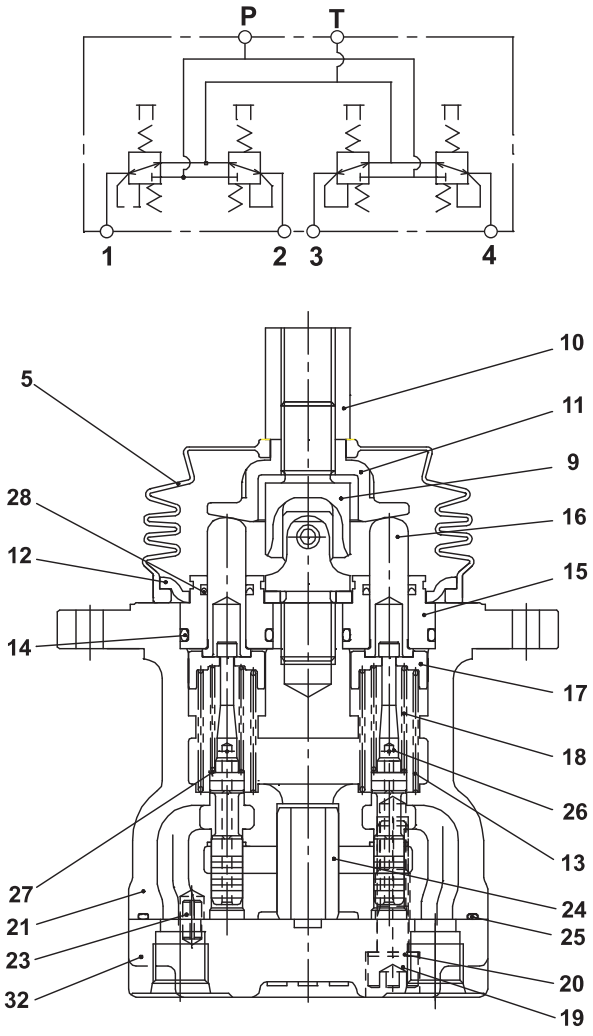


Fig 1.

Inspection

Note: *Ensure that `O'-rings and other seals are renewed during reassembly. If the body assembly screw* ***19*** *is loosened, always renew the `O'-ring* ***20****.* ⇨ *Fig 6. (D-7)**.*

Leakage Amount

Replace if the leakage exceeds 1.0 litre/min (0.22 UK gal/min, 0.26 US gal/min) with the handle in the neutral position or 2.0 litre/min (0.44 UK gal/min, 0.5 US gal/min) during operation.

Condition:

- Primary pressure 26 bar (377 lbf/in^2).
- Oil viscosity 23 cSt.

Spool

Replace when the sliding contact faces are worn more than 0.01 mm (0.0004 in) or more than the non-sliding contact faces.

Note: *The conditions are approximately the same as for the leakage above.*

Plunger

Replace if the tip is worn more than 1 mm (0.039 in).

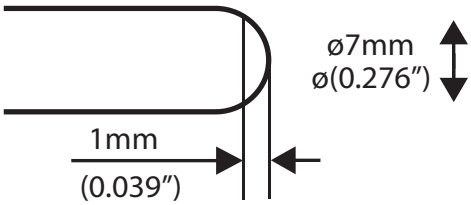


Fig 2.

Loose Movement in the Operating Controls

Replace the parts if the wear in the pin and joint produces free travel of more than 2 mm (0.079 in).

Actuation Stability

Investigate if abnormal noises, jerky operation or drops in primary pressure are experienced during operation. Replace the valve if the problem cannot be solved.

Removal and Replacement

Removal

1 Park the machine on firm level ground. Lower the excavator and dozer to the ground.

2 Stop the engine and remove the starter key.

3 Vent the hydraulic system.

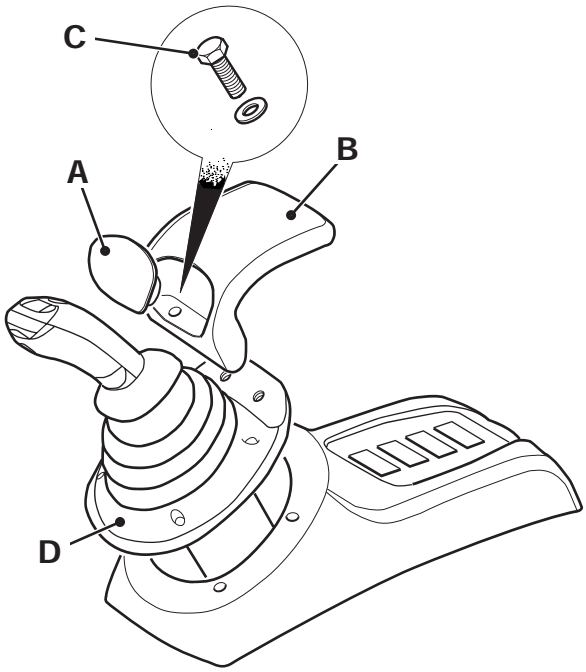


Fig 3.

4 Remove arm rest plug **A** and undo screw **C**.

5 Remove armrest **B**.

6 Remove clamping ring **D**.

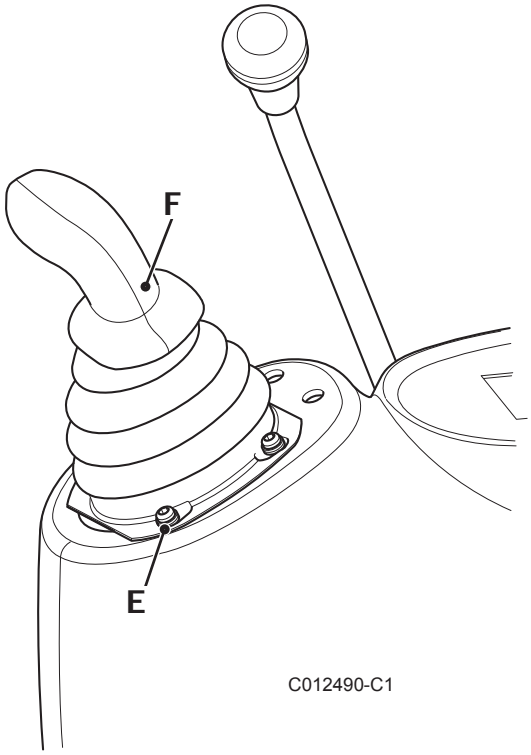


Fig 4.

7 Undo screws **E** and raise the hand controller **F** from the housing.

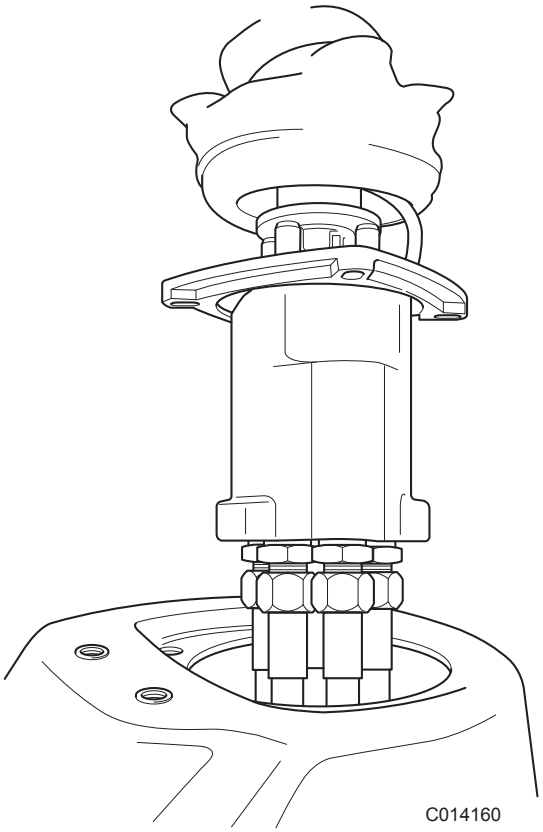


Fig 5.

8 Disconnect and blank off the six hydraulic hoses identifying them ready for replacement.

9 Disconnect spade connectors identifying them ready for replacement

10 Remove the Hand Controller

Replacement

Replacement of the track levers is the reversal of the removal sequence

Dismantling and Assembly

Dismantling

Note: *All parts are precision made and require the utmost care when being handled.*

Note: *During dismantling, do not use excessive force to separate components which could cause scratches or burrs on bearing surfaces. Failure to observe this instruction will cause oil leaks leading to poor performance.*

Note: *Label all parts during dismantling to ensure correct assembly.*

Note: *Storing the valve when dismantled could cause rusting of parts. Ensure they are suitably protected by anti-rust treatment.*

Note: *During assembly, ensure all parts are clean and free from burrs and scratches. Remove minor damage by lapping.*

Note: *Renew all `O' rings, seals and back-up rings. Take care to install seals the correct way around.*

Note: *During assembly apply hydraulic oil to `O' rings and seals.*

Note: *Ensure all screws and bolts are tightened to the torque settings given.*

1 Push down upper section of gaiter **B** and remove roll pin **C**.

2 Remove control handle **A** from mounting knuckle **D**.

Note: *Take care when removing handle to avoid damage to wiring loom and switches. These should be removed by separating the line connectors in the control handle and below the valve body.*

3 Remove gaiter **B** from valve housing.

4 Slacken locknut **E** and remove mounting knuckle **D**.

5 Slacken and remove rocker plate **F**.

Important: *When unscrewing the rocker plate **F**, ensure retaining plate **J** is held firmly against the force of springs to make sure parts do not fly out and cause injury.*

6 Remove retaining plate **J**.

7 Clean the valve exterior using approved solvent and using soft metal pads for protection, clamp the valve body into a vice.

8 If the return springs are weak, the sliding resistance of the seal will cause the guides **K** to stick in the casing. Using a screw driver, carefully ease out the guides **K** and plungers **L**.

Note: *Care must be taken to prevent damage to the guides when removing. Ensure the guides do not fly out due to the force of the return springs.*

Note: *Main body **N** is a non serviceable part, it should be replaced completely if faulty.*

Note: *Leave all parts to soak in suitable solvent until dirt is loosened. Using clean solvent, wash all parts and allow to air dry. Apply rust inhibitor to all parts.*

Assembly

Reverse the dismantling procedure, noting the following details:

1 Locate retaining plate **J** onto plunger guides **K** and screw rocker plate **F** into position. Torque tighten to 4.6 Nm (0.5 kgf m, 40 lbf in). Ensure the plungers are not depressed at this stage.

2 Ensure the switch cable is free from obstruction and the line connectors are securely fastened.

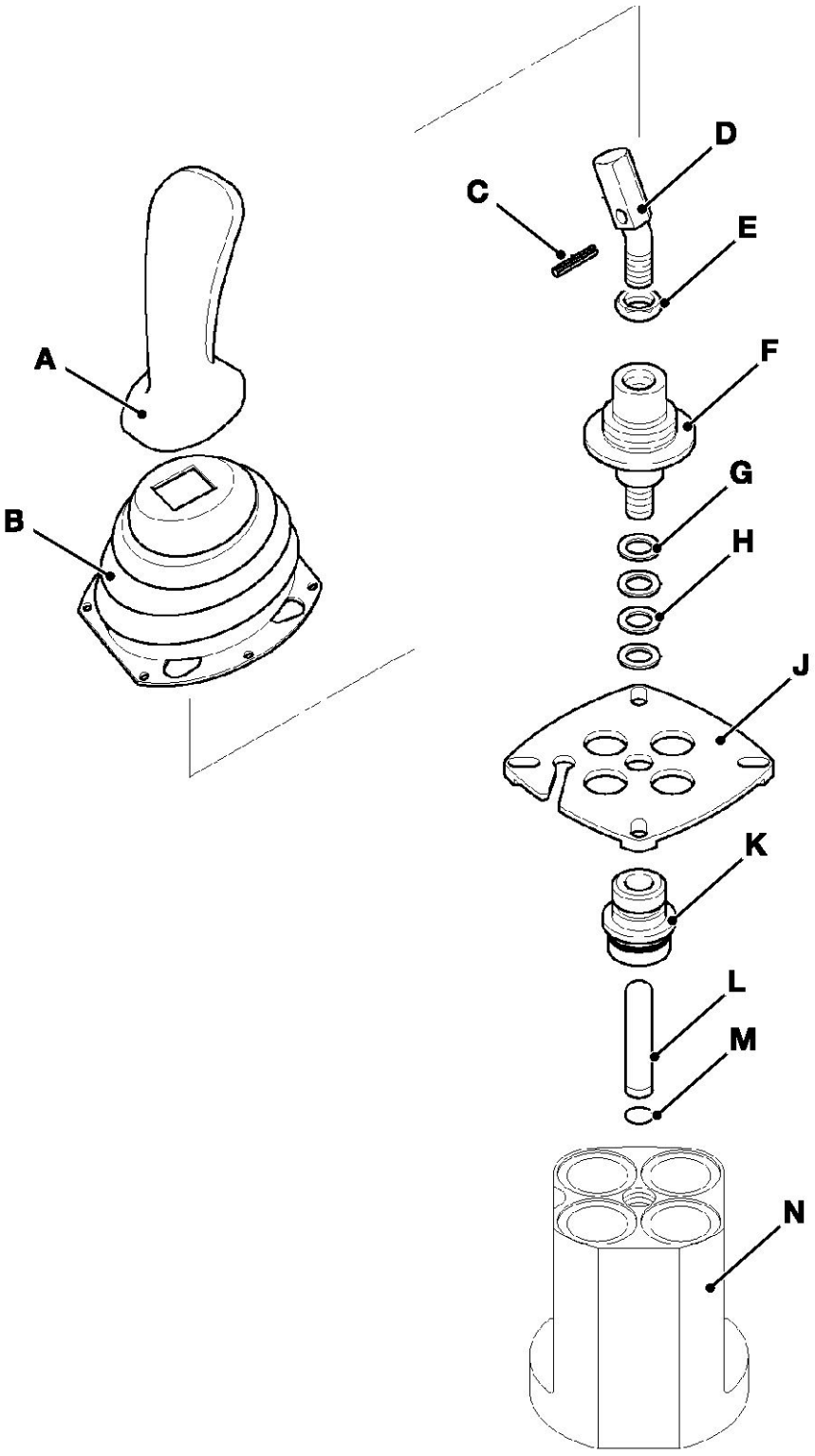


Fig 6.

Assembly

⇨ Fig 6. (D-7).

Note: *During assembly, ensure all parts are clean and free from burrs and scratches. Remove minor damage by lapping.*

Note: *Renew all `O' rings, seals and back-up rings. Take care to install seals the correct way around.*

Note: *During assembly apply hydraulic oil to `O' rings and seals.*

Note: *Ensure all screws and bolts are tightened to the torque settings given.*

Reverse the dismantling procedure, noting the following details:

1 Locate retaining plate **12** onto plunger guides **15** and screw knuckle joint **9** into position. Torque tighten to 4. 6 Nm (0.5 kgf m, 40 lbf in).

2 Locate rocker plate **11** and tighten until it makes contact with the plungers **16**. Ensure the plungers are not depressed at this stage.

3 Holding the rocker plate **11** in this position, screw down joint nut **10**. Torque tighten to 6.7 Nm (0.7 kgf m, 60 lbf in).

4 When fitting the body assembly screws **19**, torque tighten to 1.9 Nm (0.2 kgf m, 17 lbf in).

5 Ensure the switch cable is free from obstruction and the line connectors are securely fastened.

Fault Finding

Table 1.

Symptom	Possible cause	Remedy
1 Low secondary pressure.	Primary pressure is low.	Check servo pressure maintenance valve.
	Spring is damaged.	Renew the spring.
	Clearance between the spool and seating is too large.	Renew the remote control valve assembly.
	The handle unit is loose.	Dismantle, reassemble or renew the handle unit.
2 Unstable secondary pressure.	Sliding parts are sticking.	Release the sticking part.
	Fluctuations in the tank line pressure.	Check return line and filter for blockage.
	Air is trapped in the piping.	Operate the valve several times to remove the air.
3 High secondary pressure.	The tank line pressure is too high.	Check return line and filter for blockage.
	Sliding parts are sticking.	Release the sticking part.

Track Levers

Removal and Replacement

Removal

1 Remove knobs **A** from track levers

2 Undo fixing **B** and retain for replacement.

3 Lift clamp ring and gaiter off track levers.

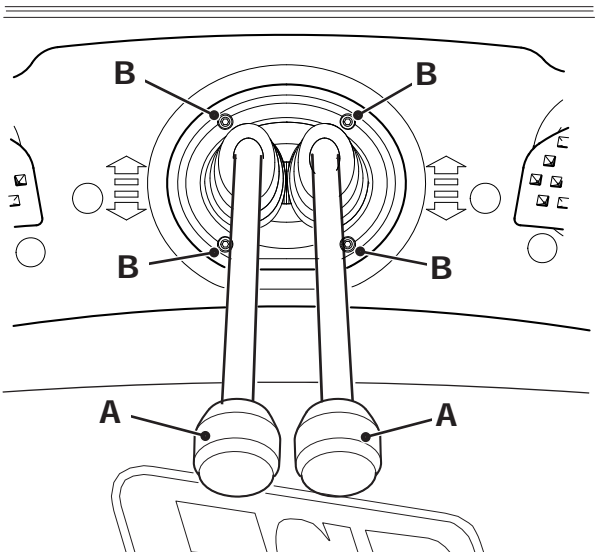


Fig 1.

4 Undo Fixings **C** and remove track levers **D**.

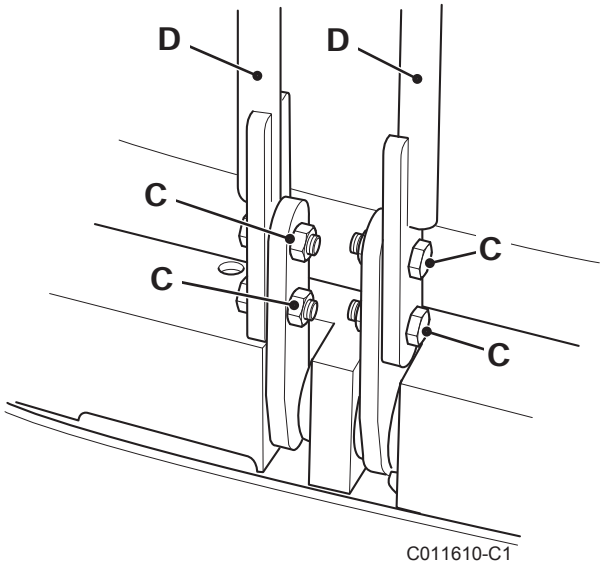


Fig 2.

Replacement

Replacement of the track levers is the reversal of the removal sequence.

Dozer Lever

Removal and Replacement - Lever

Removal

1 Park the machine on firm level ground. Lower the excavator and dozer to the ground.

2 Stop the engine and remove the starter key.

3 Remove knob from dozer lever

4 Undo fixings **B** and remove instrument panel **A** .

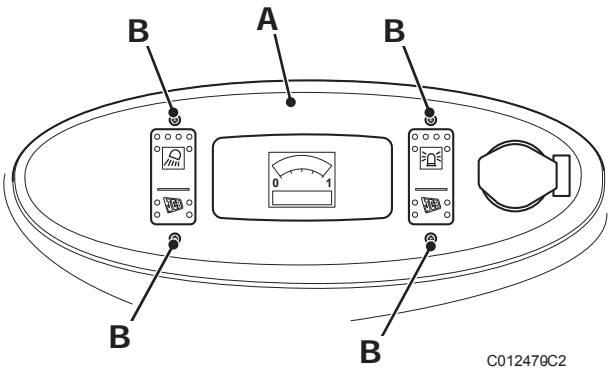


Fig 1.

5 Disconnect Dozer lever cable **E** by removing clip **F** and undoing locknut **G**.

6 Undo Fixings **D** and remove dozer lever **C**.

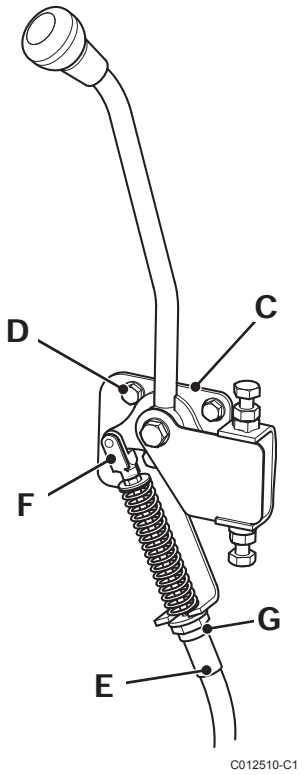


Fig 2.

Replacement

Replacement of the dozer lever is the reversal of the removal sequence.

Removal and Replacement - Cable

Removal

1 Remove the LH side Skirt.

2 Remove clip **F** to release dozer push/pull cable from control bar.

3 Undo locknut **G** to release cable from support bracket **H**.

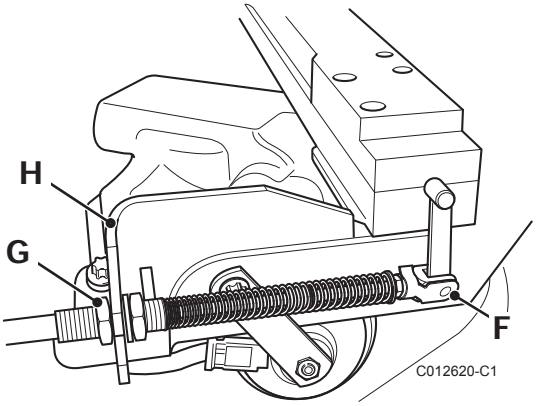


Fig 3.

4 Working inside the cab, undo fixings **B** and remove instrument panel **A**.

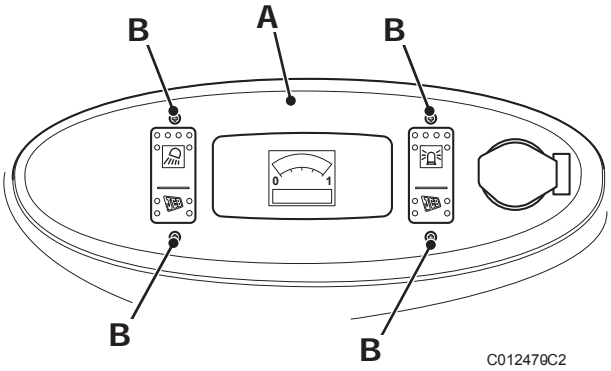


Fig 4.

5 Disconnect Dozer push/pull cable **C** by releasing clip **D** and undoing locknut **E**.

6 Remove dozer push/pull cable **C**.

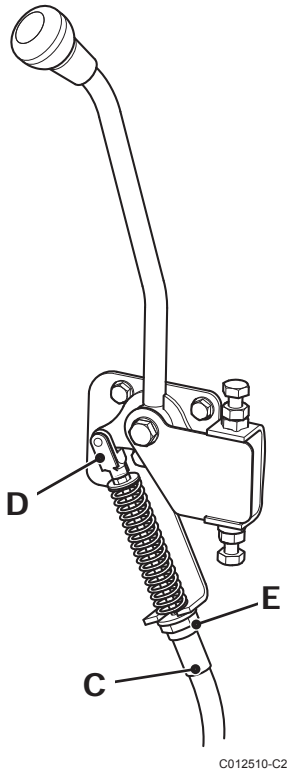


Fig 5.

Replacement

Replacement of the dozer lever cable is the reversal of the removal sequence.

Engine Throttle

Removal, Replacement and Adjustment

Removal

1 Park the machine on firm level ground. Lower the excavator and dozer to the ground.

2 Stop the engine and remove the starter key.

3 Working in the engine compartment locate engine throttle.

4 Undo nut **A** and disconnect throttle cable clip **B**.

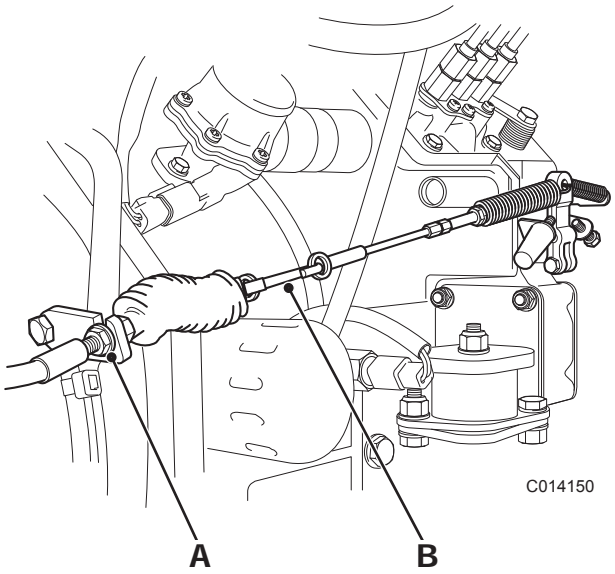


Fig 1.

5 Working inside the cab, locate starter control panel. Undo fixings **B** and remove panel **A** to give access to Throttle lever.

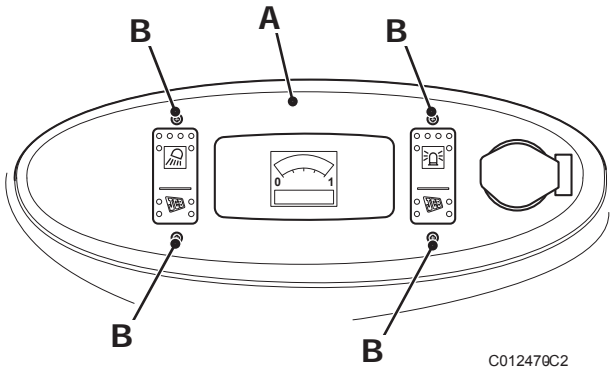


Fig 2.

6 Remove control knob **C** from lever.

7 Undo fixings **D** and remove lever **E** with cable.

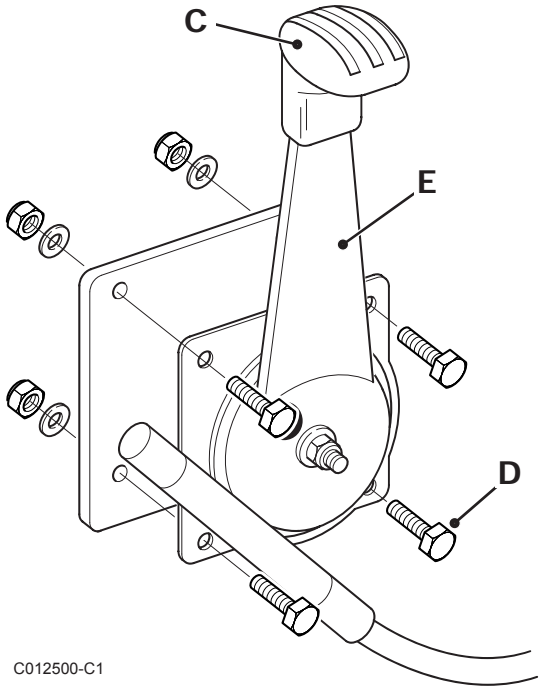


Fig 3.

Replacement

Replacement of the engine throttle cable is the reversal of the removal sequence.

Check that the engine speed is correct. If incorrect, adjust the throttle adjusting nut, ⇨ *Adjustment (D-14)*

Adjustment

Engine idle speed is adjusted by turning adjusting nut **A**.

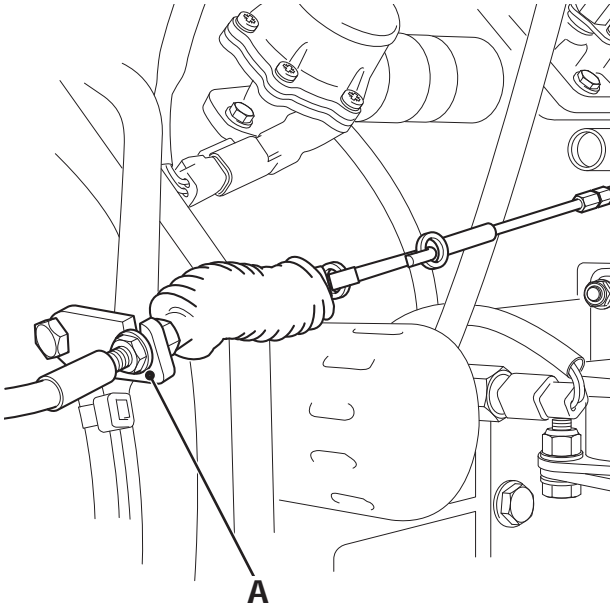


Fig 4.

Control Bar

Operation

The control bar is constructed from a main bar and three concentric tubes which are used to transfer movement from levers and pedals to the valve block.

Movement of the dozer lever **A** will move the dozer link **E** which in turn moves dozer lever pressing **M** activating dozer valve spool.

Movement in the auxiliary pedal **B** moves swing link LH **F** which in turn moves swing link RH **K** activating auxiliary valve spool.

Movement in RH Track Lever **C** moves RH lever link **G** which in turn moves RH lever link **L** activating RH track valve spool.

Movement in LH Track Lever **D** moves LH lever link **H** which in turn moves LH lever link **J** activating LH track valve spool.

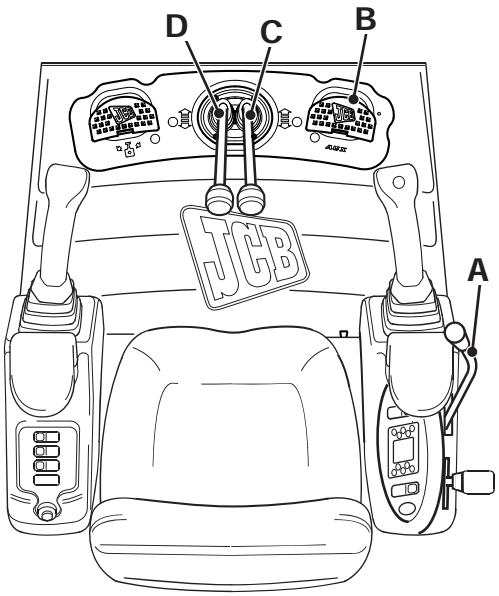


Fig 1.

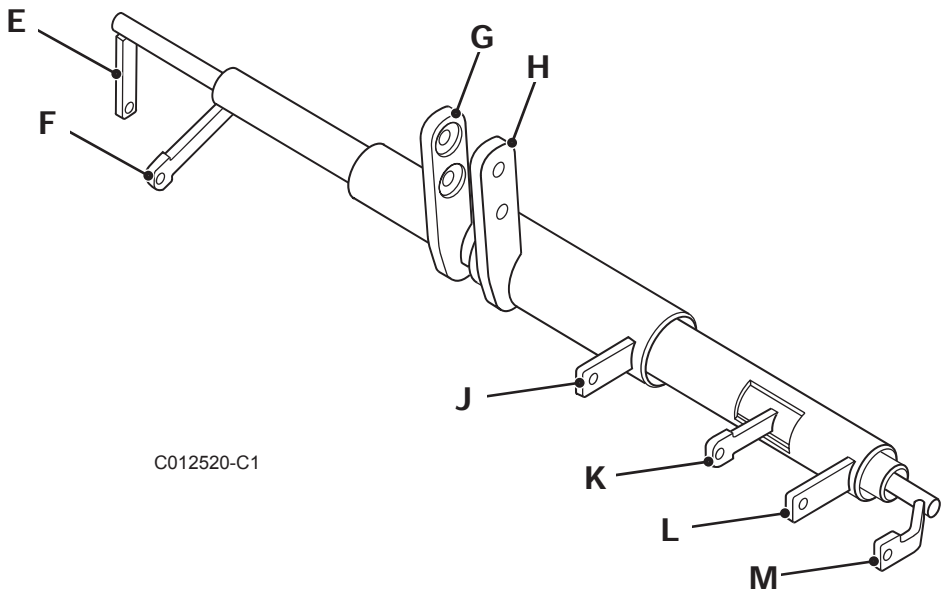


Fig 2.

Removal and Replacement

Removal

1 Working inside the cab, remove knobs from track levers.

2 Flip auxiliary pedal pad **A** over to give access to fixings. Undo nut **B** and remove bolt and pedal pad.

3 Repeat procedure 2 for swing pedal **C**.

4 Undo screws **D** and retain for plate replacement.

5 Lift cover plate **E** clear of control levers ensuring gaiters remain on plate.

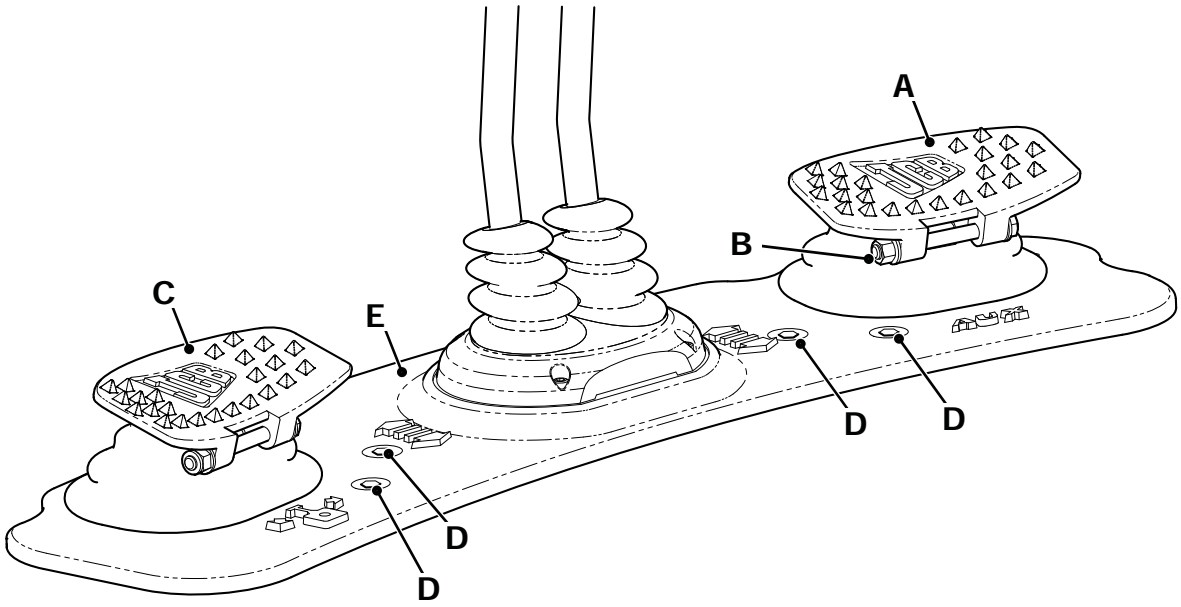


Fig 3.

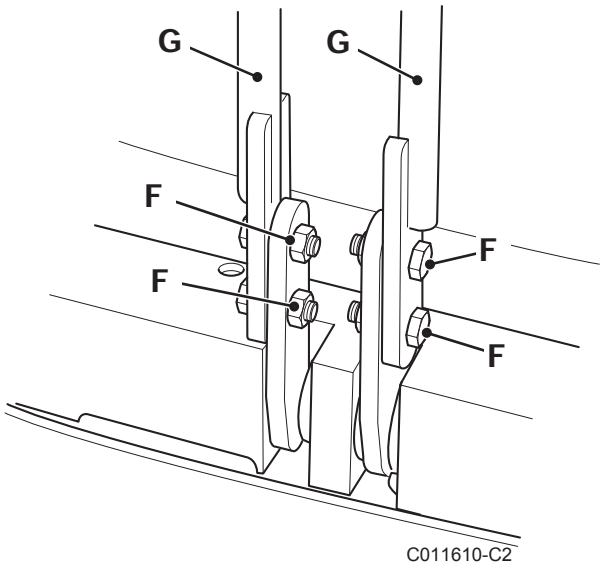


Fig 4.

6 Undo Fixings **F** and remove track levers **G**.

7 Disconnect control rod assembly **H** from pedal pivot block **J** and Control Bar **K**.

8 Undo bolt **L** and remove pedal pivot block **J**.

9 Disconnect dozer control cable **M** by removing clip **N**

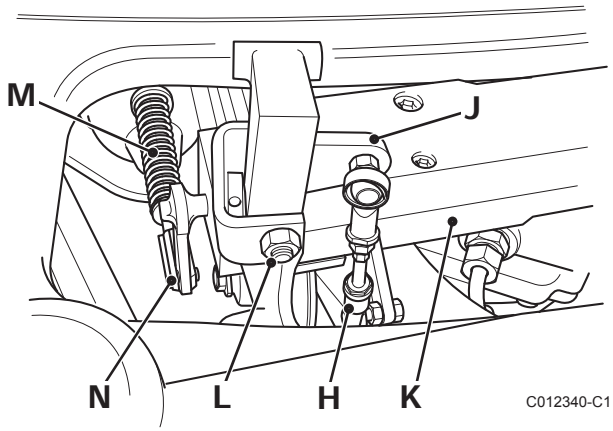


Fig 5.

10 Disconnect control rod assembly **T** from pedal pivot block **P** and Valve Block .

11 Undo bolt **U** and remove pedal pivot block **P**.

12 Undo bolt **R** and remove pedal pivot support bracket **Q**.

13 Disconnect Control Bar from valve block by removing clip **S** and pin.

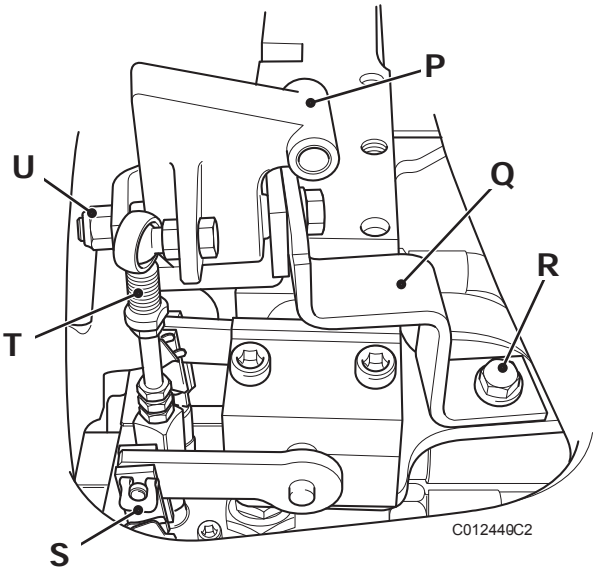


Fig 6.

14 Remove remaining Clips **V** and pins from control bar linkage to valve block.

15 Undo screws **W** and **X**, remove control bar.

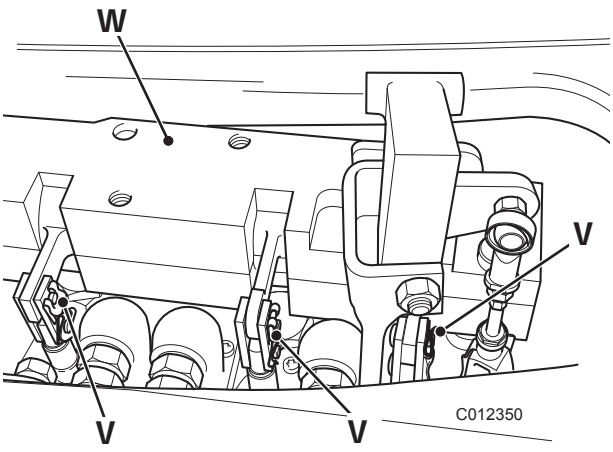


Fig 7.

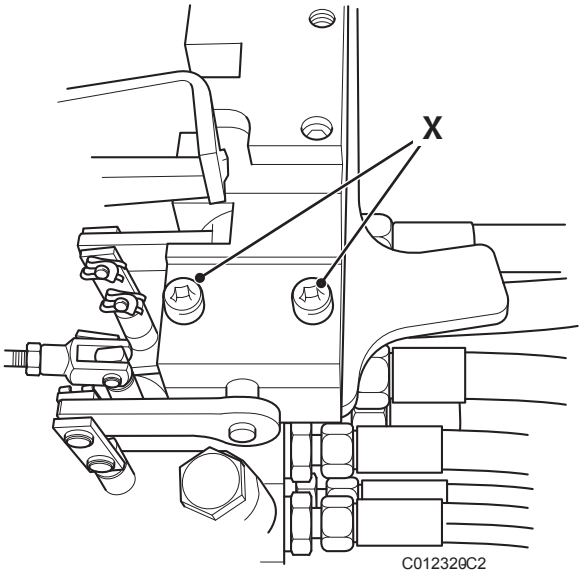


Fig 8.

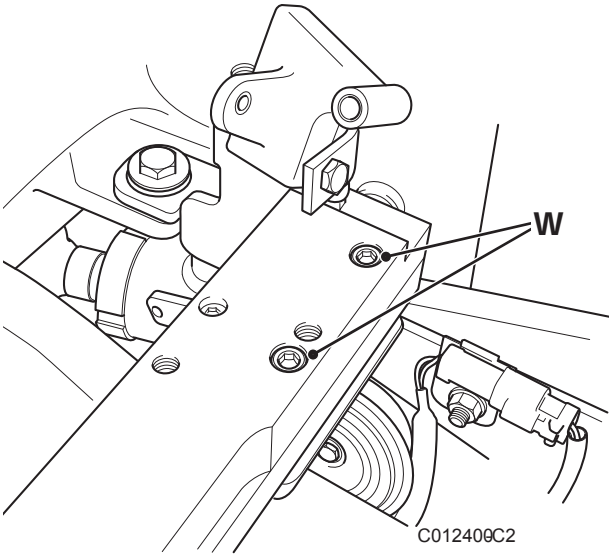


Fig 9.

Replacement

Replacement of the control bar is the reversal of the removal sequence.

Dismantling and Assembly

Dismantling

Note: *Non serviceable unit, replace if worn or damaged. Assembly to be dismantled for inspection purposes only.*

1 Undo cap screws **A** and lift off upper control bar bearing **B** to expose control bar assembly.

2 Inspect parts for wear or damage.

Assembly

Assembly is the reversal of dismantling procedure.

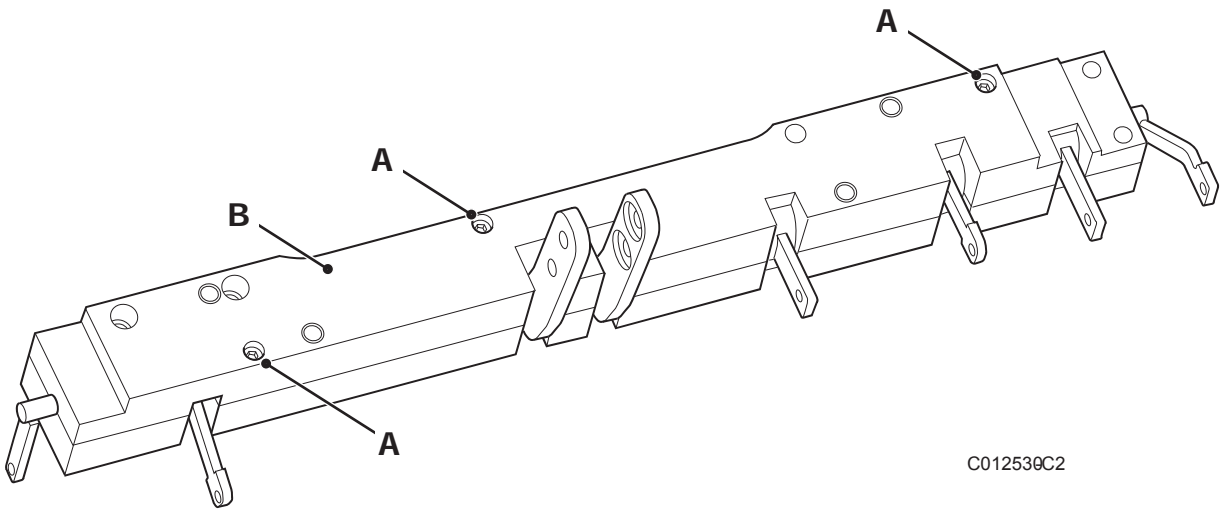


Fig 10.

Page left intentionally blank