



## Section D

# Controls

Service Manual - Compact Loadalls

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## Section D - Controls

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# Manual Control Levers

## Component Identification

Table 1. Control Levers

Item	Function
<b>A</b>	Joystick: Boom (Lift and Lower) Carriage (Crowd and Dump)
<b>B</b>	Control lever, Boom (Extend and Retract)
<b>C</b>	Control lever, Auxiliary controls

Table 2. Control Rod Assemblies

Item	Function
<b>1</b>	Boom (Extend and Retract)
<b>2</b>	Carriage (Crowd and Dump)
<b>3</b>	Boom (Lift and Lower)
<b>4</b>	Auxiliary controls

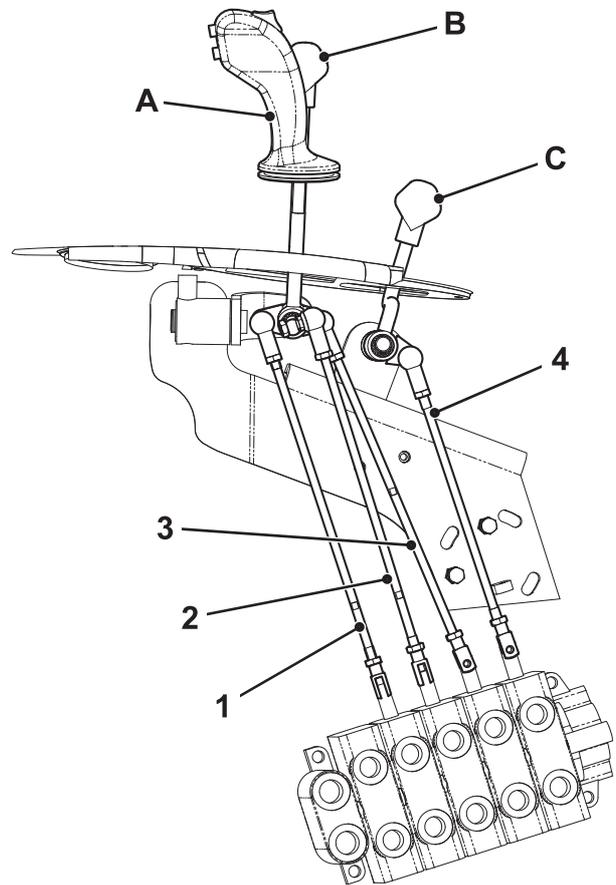


Fig 1.

### Joystick

#### Basic Electrical Operation

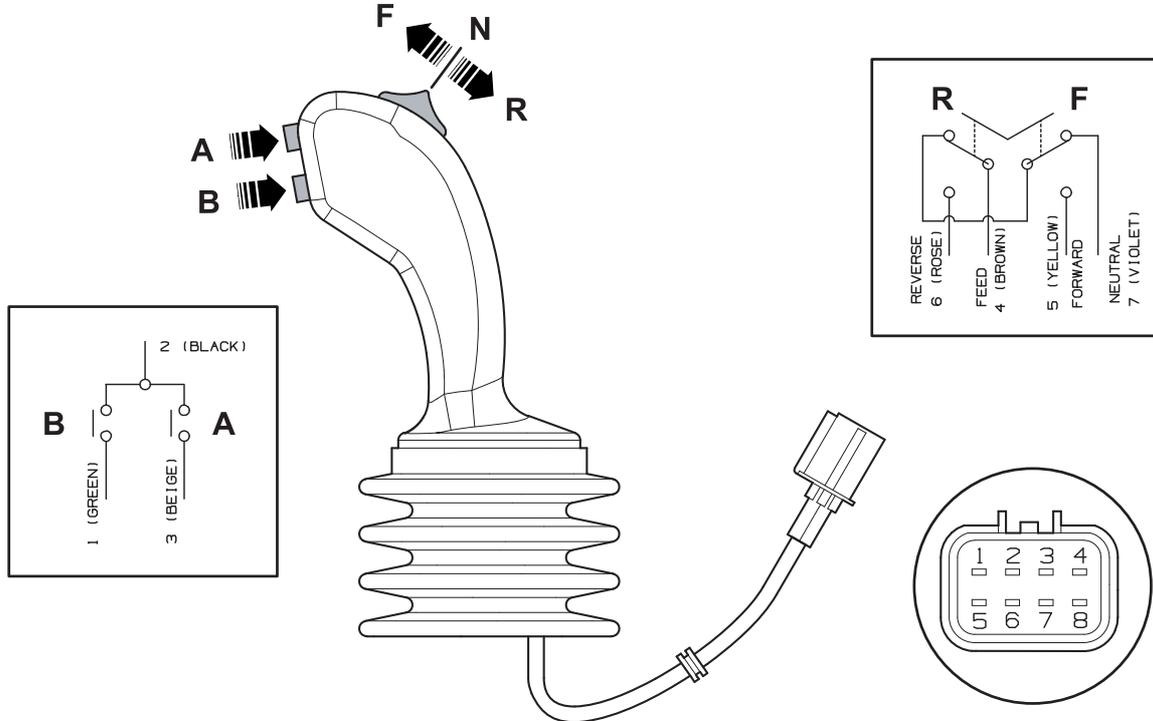


Fig 2.

Table 3. Switch Functions

Item	Function
<b>A</b>	Horn
<b>B</b>	No function
<b>F</b>	Forward Drive (Forward/Reverse Switch)
<b>N</b>	Neutral (Forward/Reverse Switch)
<b>R</b>	Reverse Drive (Forward/Reverse Switch)

Table 4. Wire Identification

Pin	Colour	Function
1	Green	Output (Button <b>B</b> )
2	Black	Input (Horn <b>A</b> and Button <b>B</b> )
3	Beige	Output (Horn <b>A</b> )
4	Brown	Supply (Forward/Reverse Switch)
5	Yellow	Forward (Forward/Reverse Switch)
6	Rose	Reverse (Forward/Reverse Switch)
7	Violet	Neutral (Forward/Reverse Switch)
8		No function

### Removal and Replacement

#### Removal

- 1 Make the machine safe.
  - a Park the machine on level, solid ground.
  - b Engage the park brake.
  - c Set the transmission to the neutral position.
  - d Lower the attachment to the ground.
  - e Stop the engine and remove the starter key.
  - f Disconnect the battery.
- 2 Remove the side console. Refer to **Section B, Cab**.
- 3 Disconnect the harness connector (A). [⇒ Fig 3. \(□ D-3\)](#).
- 4 Release the locknut (B).
- 5 Remove the joystick (C).

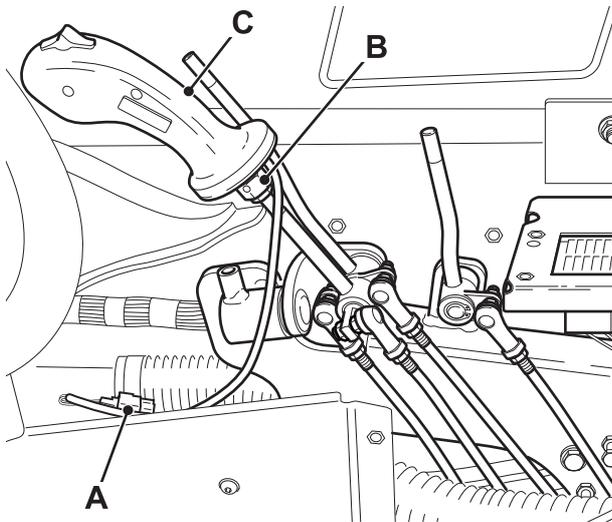


Fig 3.

#### Replacement

The replacement procedure is the reverse of the removal procedure.

Apply JCB Threadlocker and Sealant to the joystick thread.

Do not set the joystick (C) to point to the front of the machine. Before you tighten the locknut (B), turn the joystick a small distance to the left.

Operate the controls to make sure that they function correctly.

**Control Assembly**

**Removal and Replacement**

**Removal**

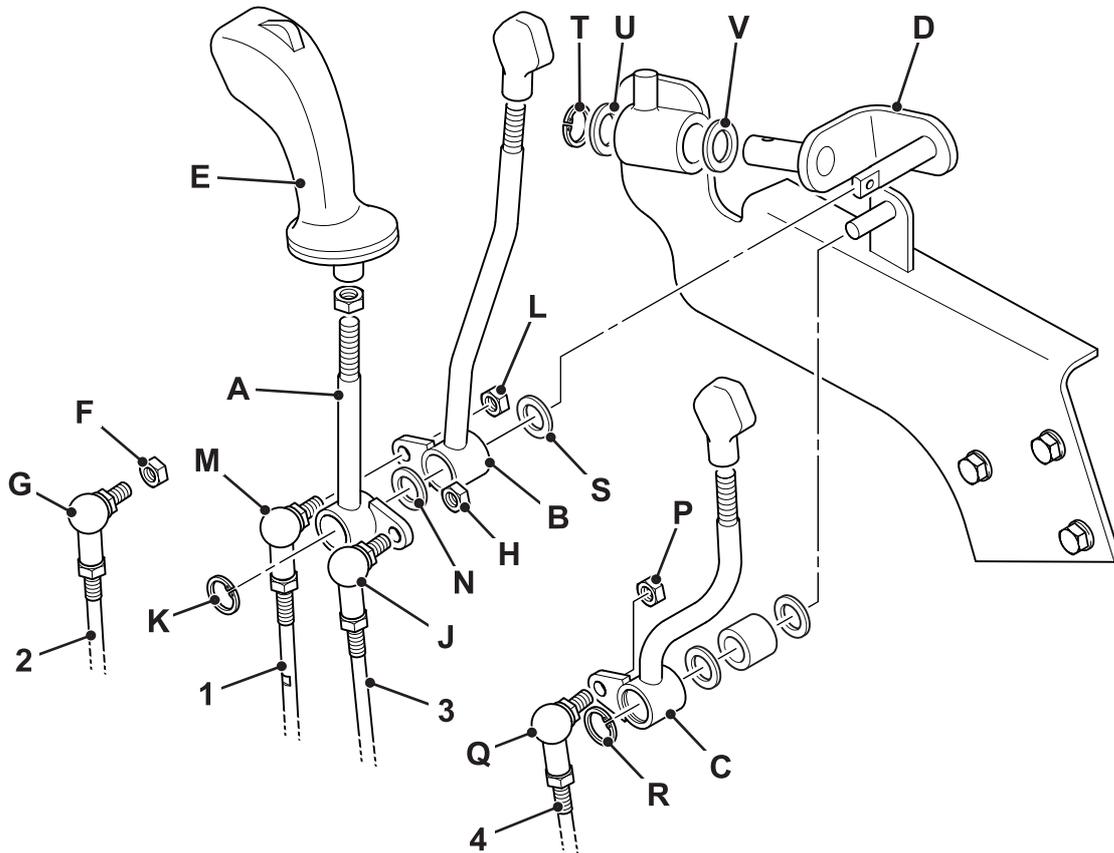


Fig 4.

- A ⇒ Boom (Lift/Lower) and Carriage Control Lever (□ D-5)
- B ⇒ Boom (Extend/Retract) Control Lever (□ D-5)
- C ⇒ Auxiliary Control Lever (□ D-5)
- D ⇒ Control Lever Pivot (□ D-6)

### Boom (Lift/Lower) and Carriage Control Lever

- 1 Make the machine safe.
  - a Park the machine on level, solid ground.
  - b Engage the park brake.
  - c Set the transmission to the neutral position.
  - d Lower the attachment to the ground.
  - e Stop the engine and remove the starter key.
  - f Disconnect the battery.
- 2 Remove the side console. Refer to **Section B, Cab**.
- 3 Remove the joystick (E). → [Removal \(□ D-3\)](#).
- 4 Identify the control rod assembly (2) which connects to the control lever pivot (D). → [Fig 4. \(□ D-4\)](#).
- 5 Remove the nut (F) from the ball joint (G).
- 6 Remove the control rod assembly from the control lever assembly.
- 7 Identify the control rod assembly (3) which connects to the control lever (A). → [Fig 4. \(□ D-4\)](#).
- 8 Remove the nut (H) from the ball joint (J).
- 9 Remove the control rod assembly from the control lever assembly.
- 10 Remove the circlip (K).
- 11 Remove the control lever (A).

### Boom (Extend/Retract) Control Lever

- 1 Remove the Boom (Lift/Lower) and Carriage Control Lever. → [Boom \(Lift/Lower\) and Carriage Control Lever \(□ D-5\)](#).
- 2 Identify the control rod assembly (1) which connects to the control lever (B). → [Fig 4. \(□ D-4\)](#).
- 3 Remove the nut (L) from the ball joint (M).
- 4 Remove the control rod assembly from the control lever assembly.
- 5 Remove the shim (N). → [Fig 4. \(□ D-4\)](#).
- 6 Remove the control lever (B).

### Auxiliary Control Lever

- 1 Make the machine safe.
  - a Park the machine on level, solid ground.
  - b Engage the park brake.
  - c Set the transmission to the neutral position.
  - d Lower the attachment to the ground.
  - e Stop the engine and remove the starter key.
  - f Disconnect the battery.

**Note:** You can remove the auxiliary control lever with the side console in position. To get better access to remove the Auxiliary Control Lever remove the Side Console first.

- 2 Identify the control rod assembly (4) which connects to the control lever (C). → [Fig 4. \(□ D-4\)](#).
- 3 Remove the nut (P) from the ball joint (Q).
- 4 Remove the control rod assembly from the control lever assembly.
- 5 Remove the circlip (R).
- 6 Remove the control lever (C).

### Control Lever Pivot

- 1 Remove the Boom (Lift/Lower) and Carriage Control Lever. → [Boom \(Lift/Lower\) and Carriage Control Lever \(□ D-5\)](#).
- 2 Remove the Boom (Extend/Retract) Control Lever. → [Boom \(Extend/Retract\) Control Lever \(□ D-5\)](#).
- 3 Remove the shim (S). → [Fig 4. \(□ D-4\)](#).
- 4 Remove the circlip (T).
- 5 Remove the shim (U).
- 6 Remove the control lever pivot (D) and the shim (V).

### Replacement

The replacement procedure is the reverse of the removal procedure. Operate the controls to make sure that they function correctly.

Before you install a control lever (A, B, C) or the control lever pivot (D):

- Do a check of the needle bearings (W). → [Fig 5. \(□ D-6\)](#). Replace worn or damaged bearings.
- Apply some grease to the needle bearings (W).

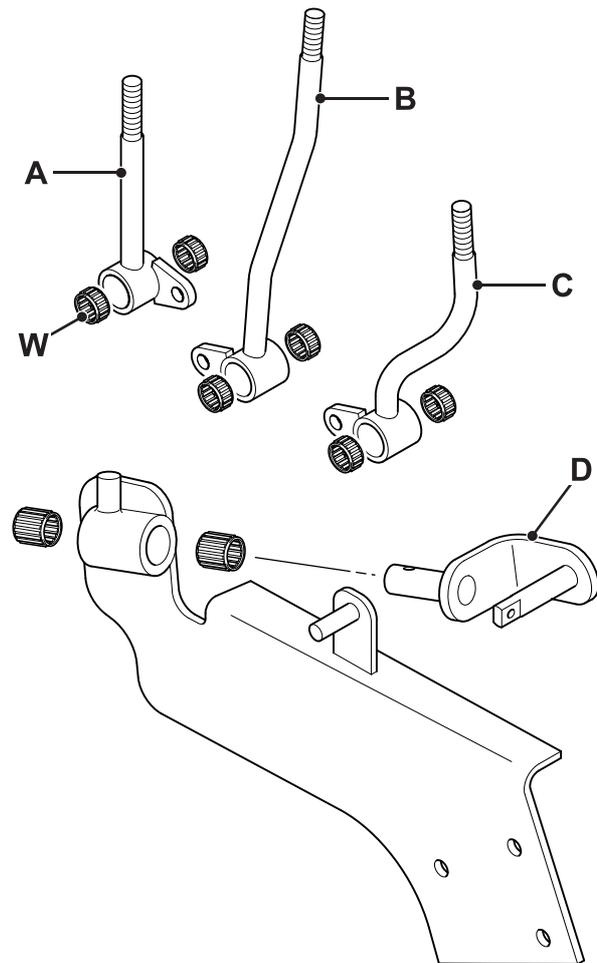


Fig 5.

### Control Rod Assembly

#### Removal and Replacement

##### Removal

**Note:** This procedure is for the removal of a typical control rod assembly.

- 1 Make the machine safe.
  - a Park the machine on level, solid ground.
  - b Engage the park brake.
  - c Set the transmission to the neutral position.
  - d Lower the attachment to the ground.
  - e Stop the engine and remove the starter key.
  - f Disconnect the battery.
- 2 Remove the side console. Refer to **Section B, Cab**.
- 3 Identify the control rod assembly. → [Component Identification \(□ D-1\)](#).
- 4 Remove the nut (A) from the ball joint (B). → [Fig 6. \(□ D-7\)](#).
- 5 Remove the clip (C) and pin (D) from the clevis (E). → [Fig 6. \(□ D-7\)](#).
- 6 Remove the control rod assembly.

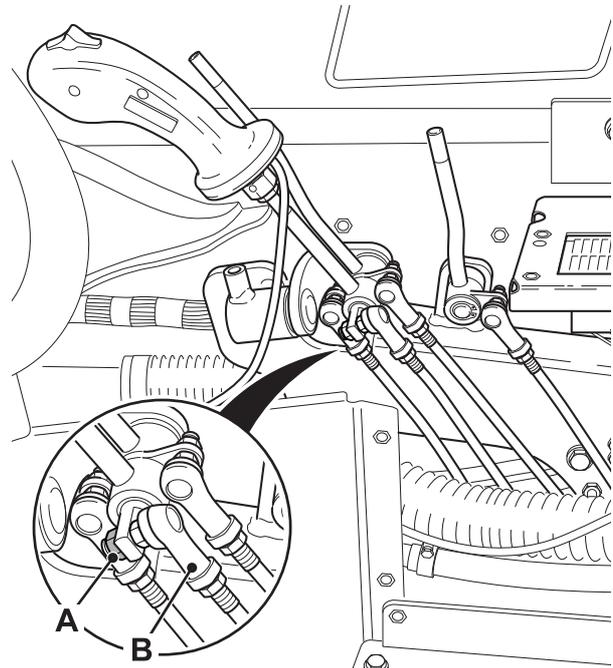


Fig 6.

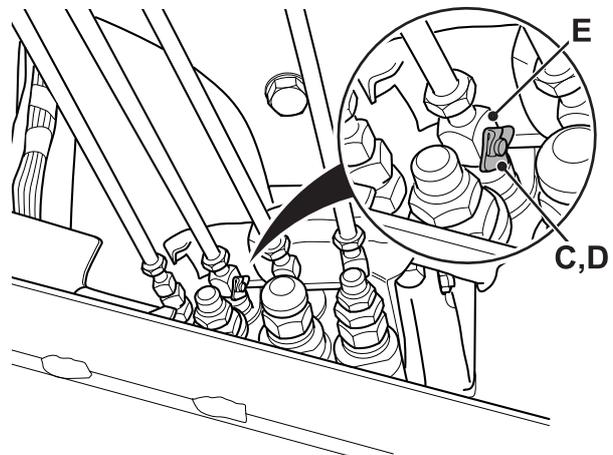


Fig 7.

#### Replacement

The replacement procedure is the reverse of the removal procedure. Operate the controls to make sure that they function correctly.

If necessary, adjust the length of the control rod assembly so that the control lever is in the correct position. → [Fig 8.](#) (□ [D-8](#)).

- 1 Loosen the locknuts (2).
- 2 Turn the control rod (3) as necessary to increase or decrease the length of the control rod assembly.
- 3 Tighten the locknuts (2).

**Important:** To prevent damage to the control rod, hold the control rod when you tighten the locknuts.

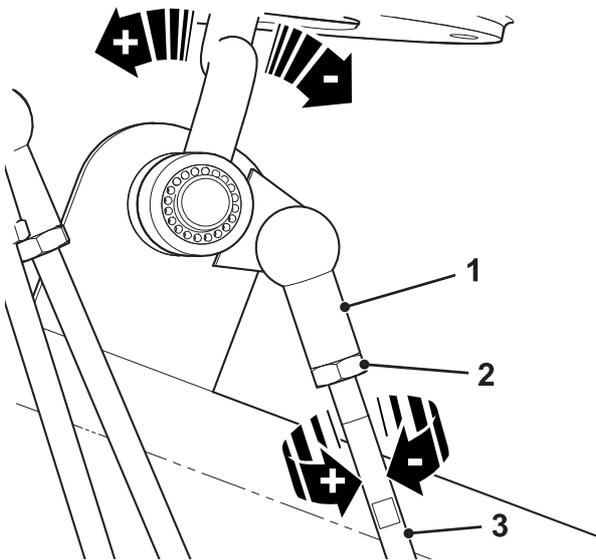


Fig 8.

# Servo Control Lever

## Component Identification

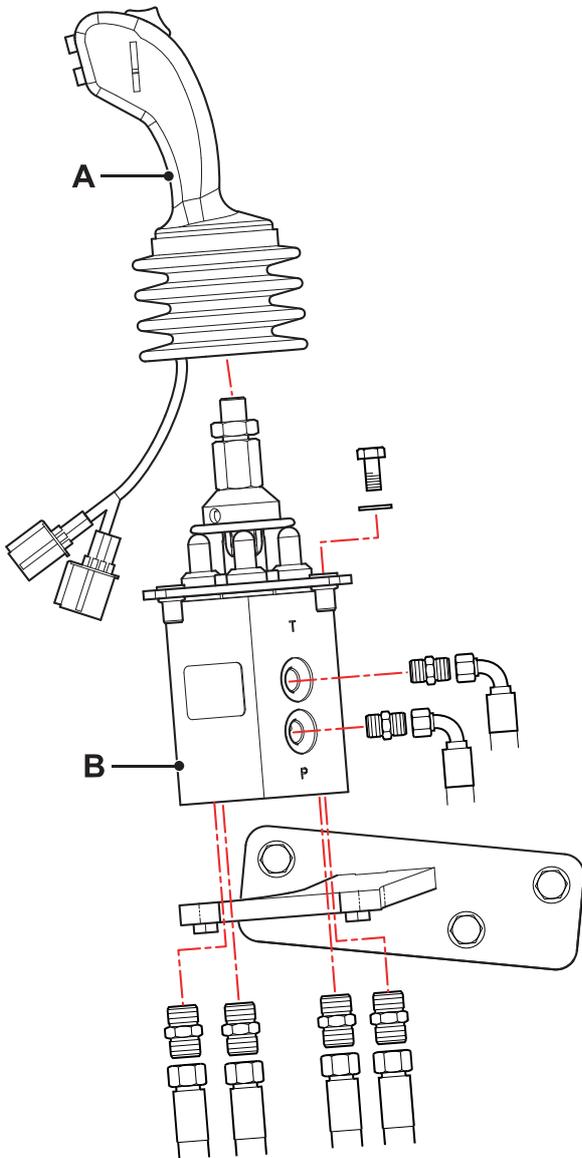


Fig 9.

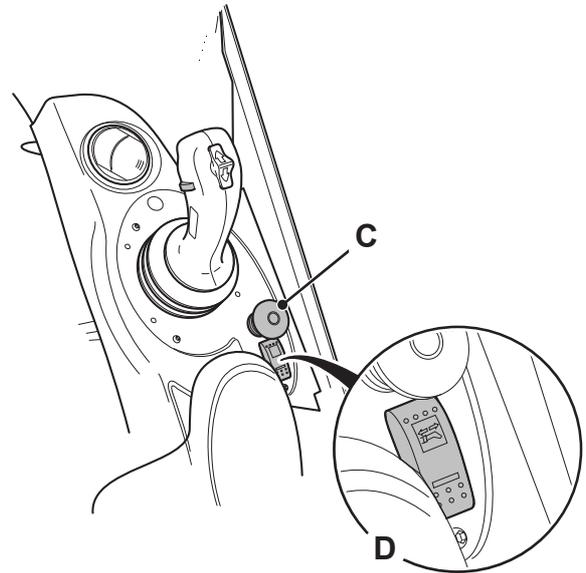


Fig 10.

Table 5.

Item	Description
A	⇒ <a href="#">Joystick (□ D-10)</a>
B	⇒ <a href="#">Servo Control Unit (□ D-13)</a>
C	Push-Button, Emergency
D	Switch, Emergency Boom Extend/Retract

## Joystick

### Basic Electrical Operation

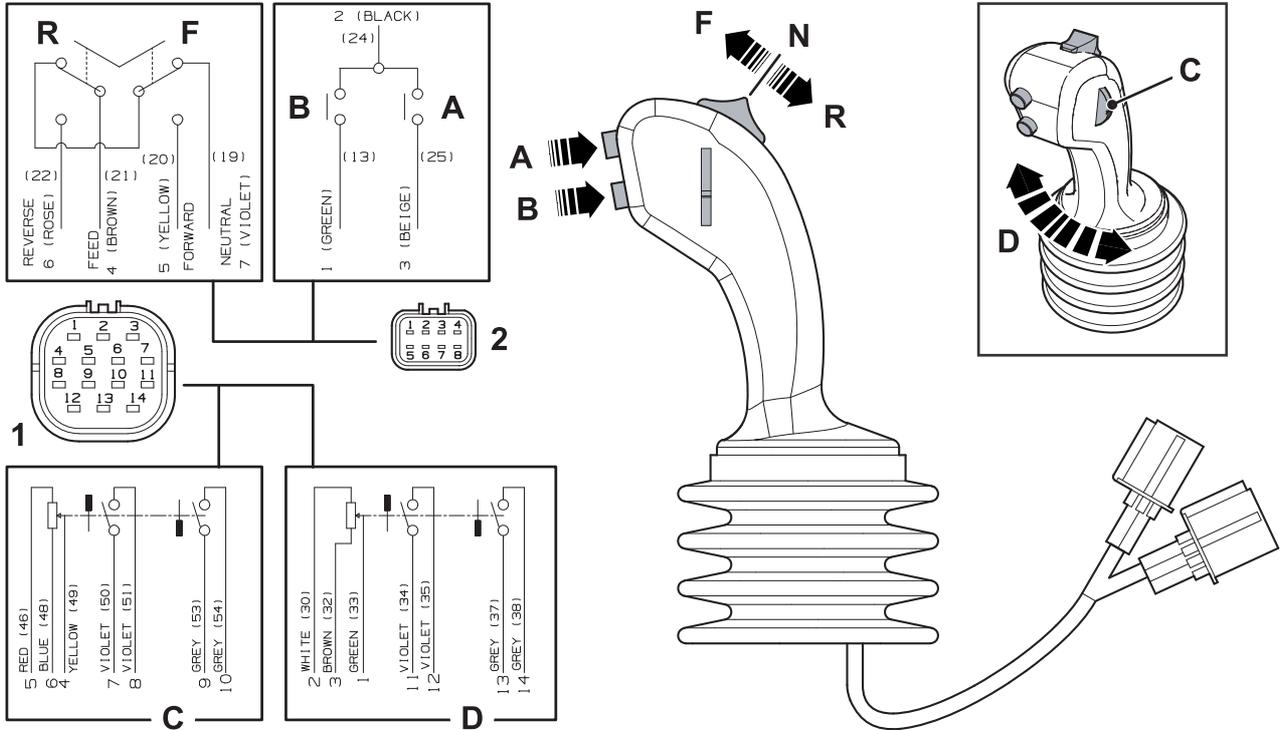


Fig 11.

Table 6. Switch Functions

Item	Function
A	Horn
B	No function
C	Boom (Extend and Retract)
D	Auxiliary Controls
F	Forward Drive (Forward/Reverse Switch)
N	Neutral (Forward/Reverse Switch)
R	Reverse Drive (Forward/Reverse Switch)

⇒ [Table 7. Wire Identification \(Connector 1\) \(D-11\)](#)

⇒ [Table 8. Wire Identification \(Connector 2\) \(D-11\)](#)



**Table 7. Wire Identification (Connector 1)**

Pin	Colour	Function
1	Green	
2	White	
3	Brown	
4	Yellow	
5	Red	
6	Blue	
7	Violet	
8	Violet	
9	Grey	
10	Grey	
11	Violet	
12	Violet	
13	Grey	
14	Grey	

**Table 8. Wire Identification (Connector 2)**

Pin	Colour	Function
1	Green	Output (Button <b>B</b> )
2	Black	Input (Horn <b>A</b> and Button <b>B</b> )
3	Beige	Output (Horn <b>A</b> )
4	Brown	Supply (Forward/Reverse Switch)
5	Yellow	Forward (Forward/Reverse Switch)
6	Rose	Reverse (Forward/Reverse Switch)
7	Violet	Neutral (Forward/Reverse Switch)
8		No function

### Removal and Replacement

#### Removal

- 1 Make the machine safe.
  - a Park the machine on level, solid ground.
  - b Engage the park brake.
  - c Set the transmission to the neutral position.
  - d Lower the attachment to the ground.
  - e Stop the engine and remove the starter key.
  - f Disconnect the battery.
- 2 Remove the screws (A).
- 3 To prevent damage to the wires and the connectors (B), carefully move the panel forward.
- 4 Disconnect the switches (C) and remove the panel.
- 5 Remove the side console. Refer to **Section B, Cab**.

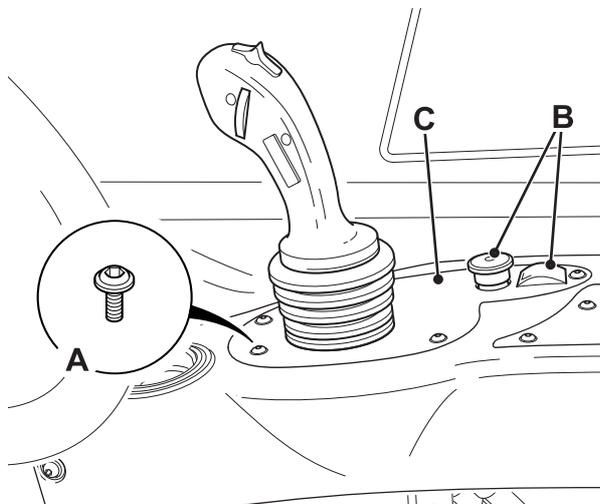


Fig 12.

- 6 Disconnect the harness connector (D).
- 7 Release the locknut (E).
- 8 Remove the joystick (F).

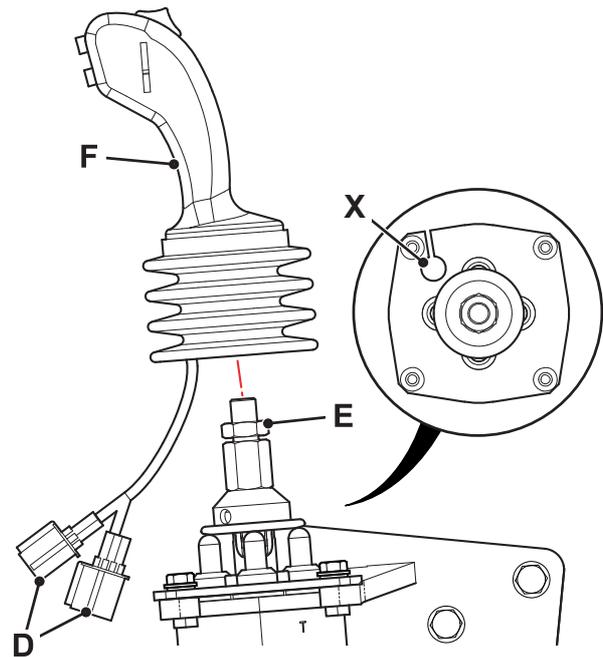


Fig 13.

#### Replacement

The replacement procedure is the reverse of the removal procedure.

Put the harness through the slot (X) on the top of the servo control unit. → [Fig 13.](#) (□ [D-12](#)).

Apply JCB Threadlocker and Sealant to the joystick thread.

Do not set the joystick (F) to point to the front of the machine. Before you tighten the locknut (E), turn the joystick a small distance to the left.

Operate the controls to make sure that they function correctly.

## Servo Control Unit

### Basic Hydraulic Operation

Component locations: ⇒ [Fig 14.](#) ([□ D-14](#)).

The pressure reduction unit comprises of the spools (**A**), the pressure control springs (**B**), the return springs (**C**) and the spring seats (**D**). The spools (**A**) are held against the plungers (**E**) by the return springs (**C**).

The housing (**F**) contains:

- The main inlet port (**P**) supplied by the pump.
- The exhaust port (**T**) connected to tank.
- The pilot pressure outlet ports (**1**, **2**, **3** and **4**) connected to the main control valve.

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

The hydraulic pump supplies oil to the main inlet port (**P**). The spools (**A**) direct the oil from the main inlet port (**P**) to the output ports (**1**, **2**, **3** and **4**) or to the exhaust port (**T**) to tank. The pressure control springs (**B**) act on the spools (**A**) to determine the pressure at each port. The plungers (**E**) move in the guides (**G**) to change the compression in the springs (**B**). The joystick connects to the handle stem (**H**). When the joystick is operated, the rocker plate (**J**) moves the plungers (**E**). The joystick can rotate 360° around the knuckle joint (**K**).

The return springs (**C**) operate between the housing (**F**) and the seats (**D**), regardless of the outlet pilot pressure, returning the plungers (**E**) to their outer positions. This makes sure that the spools (**A**) return to their neutral (closed) positions. The springs (**C**) also provide a resistive force, giving the operator a 'tactile feel' of the controls.

When the joystick is tilted, the plungers (**E**) compress the return spring seats (**D**) and the pressure control springs (**B**) at the same time. The resulting movement of the related spool lets the oil to flow to the designated pilot port.

If the handle is held in the tilted position, the pressure in the outlet ports increases to equal the force of pressure control spring (**B**); the oil pressure and the spring force become balanced. If the outlet pressure is more than the set pressure, the spool moves to let the port **T** open. If the outlet pressure is below the set pressure, port **T** is closed and port **P** is opened.

**Table 9. Port Identification**

Port	Function
<b>1</b>	Boom (Lift)
<b>2</b>	Boom (Lower)
<b>3</b>	Carriage (Dump)
<b>4</b>	Carriage (Crowd)
<b>P</b>	Main inlet port (supplied by the pump)
<b>T</b>	Exhaust port (connected to tank)

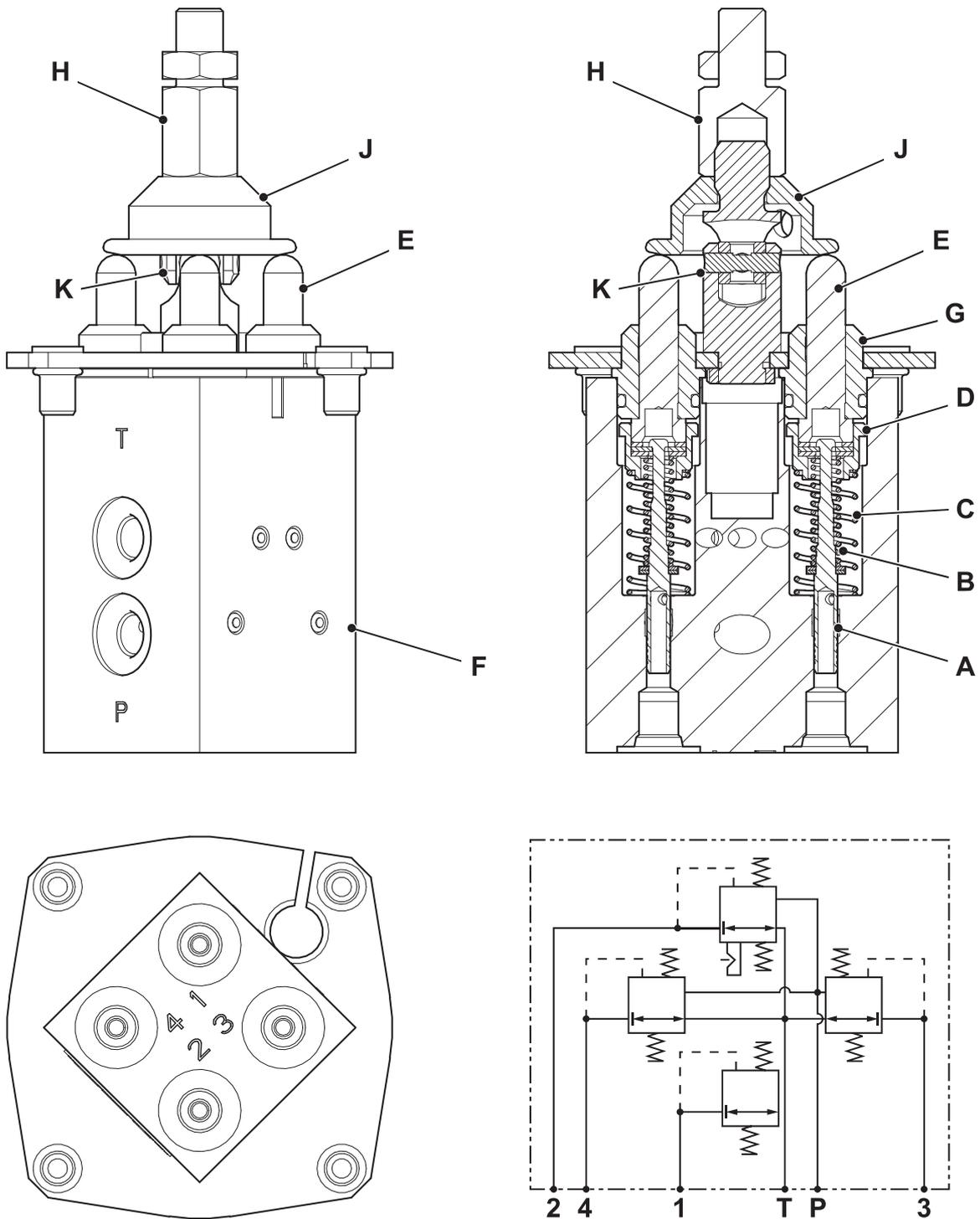


Fig 14.

### Removal and Replacement

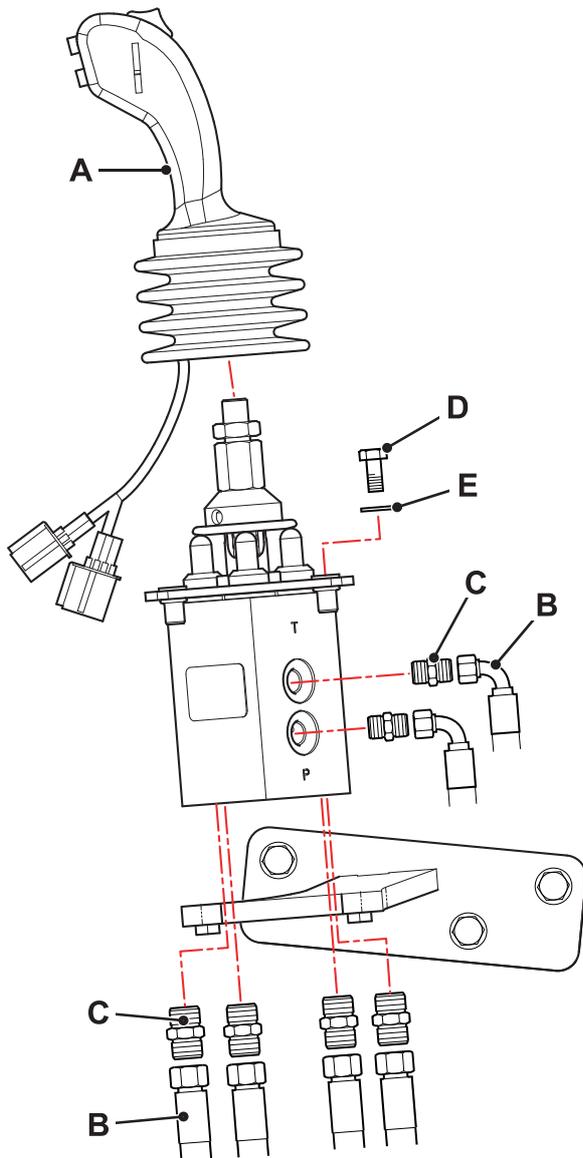


Fig 15.

### Removal

- 1 Make the machine safe.
  - a Park the machine on level, solid ground.
  - b Engage the park brake.
  - c Set the transmission to the neutral position.
  - d Lower the attachment to the ground.
  - e Stop the engine and remove the starter key.
  - f Disconnect the battery.
- 2 Operate the controls to release remaining hydraulic pressure.
- 3 Remove the side console. Refer to **Section B, Cab**.
- 4 Remove the joystick (A). → [Removal \(D-12\)](#).
- 5 Disconnect all hydraulic hoses (B).

**Note:** Make sure that you apply labels before you disconnect the hydraulic hoses.

- 6 Attach a blanking plug to each hydraulic hose (B).
- 7 Attach a blanking cap to each hydraulic adapters (C).
- 8 Remove the screws (D) and the washers (E).
- 9 Remove the servo control unit (F).

### Replacement

The replacement procedure is the reverse of the removal procedure. Operate the controls to make sure that they function correctly.

Apply JCB Threadlocker and Sealant to the joystick thread.

Table 10. Torque Values

Item	Nm	lbf ft
B	24	17.7

### Dismantle and Assembly

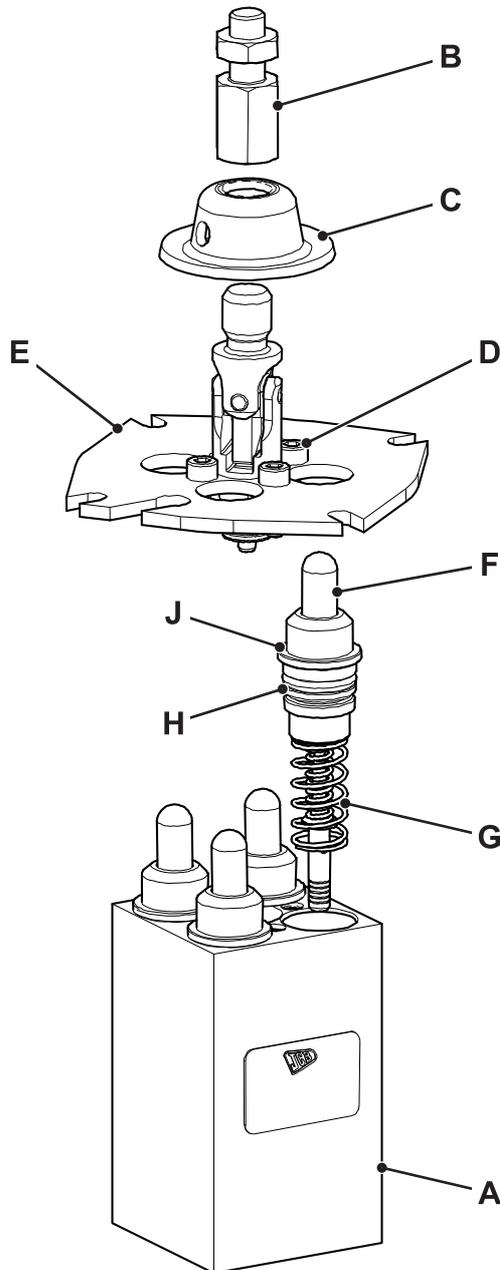


Fig 16.

### Dismantle

1 Remove the servo control unit from the machine.  
 ⇒ [Removal \(□ D-15\)](#).

2 Put the servo control unit in a vice.

**Important:** Use soft metal pads to protect the housing (A) from damage.

3 Remove the handle stem (B).

Use a hook wrench to hold the rocker plate (C) while you remove the handle stem (B).

### ⚠ WARNING

**Always wear safety glasses when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidentally flying out.**

GEN-6-2

4 To aid assembly, make a record of the location of the slot (X).

5 Remove the capscrews (D) which hold the joint mechanism assembly (E) in position.

**Important:** The assembly is spring-loaded. Before you remove the last capscrew, hold the joint mechanism assembly (E) against the force of the springs to make sure parts are not ejected.

6 Carefully remove the joint mechanism assembly (E).

7 To aid assembly, make a record of the locations for plunger assemblies (F).

8 Remove the plunger assemblies (F).

**Note:** The plunger assemblies are spring-loaded. If the return springs (G) are weak, the sliding resistance of the seal (H) causes the guides (J) to stick to the housing (A). Use a screwdriver to carefully ease out the plunger assembly. Take care to prevent damage to the plunger assembly and the housing during the removal.

#### Assembly

Component locations: ⇒ [Fig 16.](#) (□ [D-16](#)).

- 1 Make sure that all the parts are clean and free from sharp edges, scratches. Remove minor damage by lapping. If necessary, replace damaged parts.
- 2 Apply hydraulic oil to the seals on the plunger assemblies.
- 3 Put the plunger assemblies (F) into the housing (A).

**Note:** Make sure that the nose of the spools engage into the bores in the housing (A).

#### **WARNING**

**Always wear safety glasses when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidentally flying out.**

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- 4 Push and hold the joint assembly mechanism (E) against the plunger assemblies.

Use the capscrews (D) to attach the joint assembly mechanism to the casing (A).

- 5 Tighten the capscrews (D) to a torque of 9.5 Nm (7 lbf ft).
- 6 Install the rocker plate (C) on the joint assembly mechanism. Put the rocker plate into the correct position so that it touches the plunger assemblies (E) and does not displace them. ⇒ [Fig 17.](#) (□ [D-17](#)).
- 7 Install the handle stem (B).

Use a hook wrench to hold the rocker plate (C) while you install the handle stem (B).

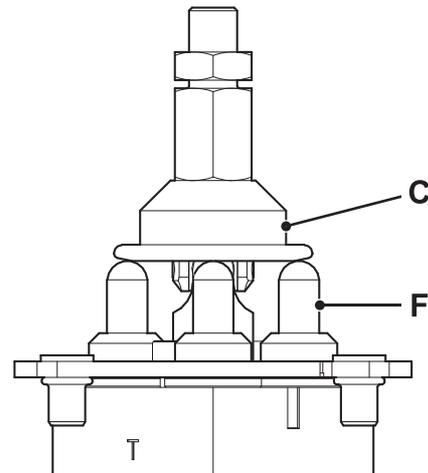


Fig 17.



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