Service Manual

Wheeled Loading Shovel - 411, 416

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Section A - Attachments

Section B - Body and Framework

Section C - Electrics

Section E - Hydraulics

Section F - Transmission

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Section H - Hydraulic Steering

Section K - Engine



Publication No.

9803/4150-17



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Issued by JCB Technical Publications, JCB Aftermarket Training, Woodseat, Rocester, Staffordshire, ST14 5BW, England. Tel +44 1889 591500 Fax +44 1889 591400

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4th Spool Switch
SRS Switch
Rear Cab Connector
Engine Connector
Rear Chassis Connector 1
Transmission Connector
ZF Diagnostic Plug
Heated Rear Screen 1
Heated Rear Screen 2
Prop. Aux. Connector
12V/24V Converter
Cab Roof Connector
Cigar Lighter 12V
12V Aux. Feed
Seat Connector
Heated Seat
Tow Hitch Connector
Brake/Reverse Relay
Reverse Fan Relay

Transmission Harness

Transmission Harness

Harness No.	Issue	Remarks	Drawing
332/S5092	1	Replaces 721/12155	⇨ C-241)
Main components connected to this harness:		Output speed sensor	
		Turbine speed senor	
		Gear chain speed sensor	
		Engine speed	
		Control unit	
		Cab connector	

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Filter	
Filtration Size	10 Micron
By pass Setting	1.5 bar
Suction Strainer Size	140 Micron

Oil Cooler By-pass	bar	kgf/cm²	lbf/in²
	3	3.05	43.5

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Fault Code	MEANING OF THE FAULT CODE / possible reason for fault detection	Reaction of the TCU	Possible Repair Actions
26	S.C. TO GROUND AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT.	No reaction TCU uses default temperature OP-Mode: normal	Check the cable from TCU to the sensor
	The measured voltage is too low:		Check the connectors
	Cable is defective and is contacted to vehicle ground		Check the temperature sensor
	Temperature sensor has an internal defect		
	Connector pin is contacted to vehicle ground		
27	S.C. TO BATTERY VOLTAGE OR O.C. AT CONVERTER OUTPUT TEMPERATURE SENSOR INPUT.	No reaction TCU uses default temperature OP-Mode: normal	Check the cable from TCU to the sensor
	The measured voltage is too high:		Check the connectors
	Cable is defective and is contacted to battery voltage		Check the temperature sensor
	Cable has no connection to TCU		
	Temperature sensor has an internal defect		
	Connector pin is contacted to battery voltage or is broken		
28	S.C. TO GROUND AT CONVERTER OUTPUT TEMPERATURE SENSOR INPUT.	No reaction TCU uses default temperature OP-Mode: normal	Check the cable from TCU to the sensor
	The measured voltage is too low:		Check the connectors
	Cable is defective and is contacted to vehicle ground		Check the temperature sensor
	Temperature sensor has an internal defect		
	Connector pin is contacted to vehicle ground		
31	S.C. TO BATTERY VOLTAGE OR O.C. AT ENGINE SPEED INPUT.	OP-Mode: substitute clutch control	Check the cable from TCU to the sensor
	TCU measures a voltage higher than 7.00 V at speed input pin:		Check the connectors
	Cable is defective and is contacted to battery voltage		Check the speed sensor
	Cable has no connection to TCU		
	Speed sensor has an internal defect		
	Connector pin is contacted to battery voltage or has no contact		

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Earthing - Cab and Cab Roof

Table 25.

Connections: See ⇨ Fig 76. (🗋 C-99)	
	Cab Earth Point 3 Side Console
A	⇨ Fig 71. (🗋 C-88)
B	⇨ Fig 68. (🗋 C-81)
C	⇨ Fig 74. (🗋 C-94)
D	⇨ Fig 75. (🗋 C-96)
E	⇨ Fig 75. (🗋 C-96)
F	⇨ Fig 75. (🗋 C-96)
G	⇨ Fig 72. (🗋 C-90)
H	⇨ Fig 73. (🗋 C-92)
I	⇨ Fig 73. (🗋 C-92)
J	⇨ Fig 69. (🗋 C-83)
K	⇨ Fig 73. (🗋 C-92)
L	⇨ Fig 74. (🗋 C-94)
M	⇨ Fig 74. (🗋 C-94)
N	⇨ Fig 74. (🗋 C-94)
O	⇨ Fig 74. (🗋 C-94)
P	⇨ Fig 74. (🗋 C-94)
Q	⇨ Fig 68. (🗋 C-81)
R	⇨ Fig 69. (🗋 C-83)
	Rear Chassis
S	⇨ Fig 71. (🗋 C-88)
T	⇨ Fig 70. (🗋 C-85)
U	⇨ Fig 70. (🗋 C-85)
V	⇨ Fig 71. (🗋 C-88)
W	⇨ Fig 71. (🗋 C-88)
X	⇨ Fig 71. (🗋 C-88)
Y	⇨ Fig 71. (🗋 C-88)
Z	⇨ Fig 73. (🗋 C-92)
AA	⇨ Fig 73. (🗋 C-92)
AB	⇨ Fig 66. (🗋 C-77)
AC	⇨ Fig 67. (🗋 C-79)
	Engine
AD	⇨ Fig 68. (🗋 C-81)
AE	⇨ Fig 68. (🗋 C-81)
AF	⇨ Fig 73. (🗋 C-92)
AG	⇨ Fig 67. (🗋 C-79)
AH	⇨ Fig 67. (🗋 C-79)
AI	⇨ Fig 67. (🗋 C-79)
AJ	⇨ Fig 67. (🗋 C-79)
AK	⇨ Fig 66. (🗋 C-77)
AL	⇨ Fig 67. (🗋 C-79)
AM	⇨ Fig 67. (🗋 C-79)
AN	⇨ Fig 66. (🗋 C-77)
AO	⇨ Fig 73. (🗋 C-92)
AP	⇨ Fig 73. (🗋 C-92)
AQ	⇨ Fig 69. (🗋 C-83)
AR	⇨ Fig 67. (🗋 C-79)
	Rear Roof Loads
AS	⇨ Fig 71. (🗋 C-88)
AT	⇨ Fig 71. (🗋 C-88)
AU	⇨ Fig 70. (🗋 C-85)
AV	⇨ Fig 70. (🗋 C-85)
AW	⇨ Fig 70. (🗋 C-85)
AX	⇨ Fig 70. (🗋 C-85)
AY	⇨ Fig 70. (🗋 C-85)
	Interior Roof Loads
AZ	⇨ Fig 68. (🗋 C-81)
BA	⇨ Fig 68. (🗋 C-81)
BB	⇨ Fig 69. (🗋 C-83)
BC	⇨ Fig 71. (🗋 C-88)
BD	⇨ Fig 71. (🗋 C-88)
BE	⇨ Fig 69. (🗋 C-83)
BF	⇨ Fig 72. (🗋 C-90)
BG	⇨ Fig 70. (🗋 C-85)
BH	⇨ Fig 73. (🗋 C-92)
BI	⇨ Fig 70. (🗋 C-85)
BJ	⇨ Fig 70. (🗋 C-85)
BK	⇨ Fig 70. (🗋 C-85)
BL	⇨ Fig 73. (🗋 C-92)
BM	⇨ Fig 72. (🗋 C-90)
BN	⇨ Fig 70. (🗋 C-85)
BO	⇨ Fig 70. (🗋 C-85)
	Front Roof Loads
BP	⇨ Fig 70. (🗋 C-85)
BQ	⇨ Fig 70. (🗋 C-85)
BR	⇨ Fig 70. (🗋 C-85)
BS	⇨ Fig 70. (🗋 C-85)
BT	⇨ Fig 73. (🗋 C-92)
BU	⇨ Fig 73. (🗋 C-92)
	Rear Cab Harness
BV	⇨ Fig 69. (🗋 C-83)
BW	⇨ Fig 69. (🗋 C-83)
BX	⇨ Fig 67. (🗋 C-79)
	Cab Earth Point 2 Rear Console
BY	⇨ Fig 73. (🗋 C-92)
BZ	⇨ Fig 73. (🗋 C-92)
CA	⇨ Fig 70. (🗋 C-85)
CB	⇨ Fig 67. (🗋 C-79)
CC	⇨ Fig 67. (🗋 C-79)
CD	⇨ Fig 73. (🗋 C-92)
CE	⇨ Fig 69. (🗋 C-83)
CF	⇨ Fig 66. (🗋 C-77)

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Fig 228.

Note: *For these diagnostic tools to work correctly, the Data Link Adaptor (892/01174) must be connected (in conjuction with the interrogation lead 71820237) between the Diagnostic Connector and the PC, and the machine's ignition must be turned ON.*

EMS Tools

Following is an outline of the available software tools and how they are to be used.

Service Tools

1 

Flash Loader program – to download the latest software files to the EMS (these are called Application files). This can be used by double clicking the icon as shown.

2 

Set-up program – to enter the machine Serial Number, Rolling Radius etc. and Languages. This program can be used by double clicking the icon as shown

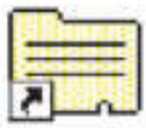
Service Tools

3 

Diagnostics program – to help fault find on the machine. This includes information about the Electronic Engine, Transmission and the EMS. This program can be used by double clicking the icon as shown.

4 

Service History program – for checking when the machine was last maintained by a JCB Dealer. This program can be used by double clicking on the icon as shown.

5 

Data Logger program – this program logs various conditions of the machine before a failure, which will help in the diagnosis of certain problems. This program can be selected by double clicking on the icon as shown.

Flash Loader Program

In order to download the latest software, the following has to be done: -

1 Connect the DLA (Data Link Adapter), to the 9 Pin Deutsch diagnostic connector in the cab and to the PC. ⇨ ***Connecting the Interrogation Lead (C-321)***.

2 Turn the ignition to the first position so that the EMS is powered up.

3 Double click on the "Flash Loader" icon. ⇨ ***EMS Tools (C-313)***.

This icon is used to download the latest Software to the EMS. This Software is referred to as the "Application code". The icon launches a windows application called the "Flash Downloader".

4 The following "Flash Downloader" screen will appear:

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