

Using the Caterpillar Monitoring System for the System Calibration.

The following chart provides specifications for system calibration on the various machine models.

Table 1

Calibration Specifications

Sales Model	Steer Type	Trans Type	Track Type	App No.	Steering Clutch High Pressure	Steering Clutch Low Pressure	Brake Low Pressure
D5M	Clt/Brk	PSDD	LGP	696	2240 ±30 kPa (325 ±4 psi)	50 ±35 kPa (7 ±5 psi)	50 ±35 kPa (7 ±5 psi)
D5M	Clt/Brk	PSTC	XL	697	2240 ±30 kPa (325 ±4 psi)	50 ±35 kPa (7 ±5 psi)	50 ±35 kPa (7 ±5 psi)
D5M	Clt/Brk	PSTC	LGP	698	2240 ±30 kPa (325 ±4 psi)	50 ±35 kPa (7 ±5 psi)	50 ±35 kPa (7 ±5 psi)
D5N	Clt/Brk	PSTC	XL	850	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D5N	Clt/Brk	PSTC	LGP	852	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
561N	Clt/Brk	PSTC	LGP	852	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6M	Clt/Brk	PSTC	XL	694	2240 ±30 kPa (325 ±4 psi)	50 ±35 kPa (7 ±5 psi)	50 ±35 kPa (7 ±5 psi)
D6M	Clt/Brk	PSTC	LGP	695	2240 ±30 kPa (325 ±4 psi)	50 ±35 kPa (7 ±5 psi)	50 ±35 kPa (7 ±5 psi)
D6N	Clt/Brk	PSTC	XL	851	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6N	Clt/Brk	PSTC	LGP	853	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6N	Diff/Steer	PSTC	XL	855	NA	NA	35 ±20 kPa (5 ±3 psi)
D6N	Diff/Steer	PSTC	LGP	857	NA	NA	35 ±20 kPa (5 ±3 psi)

D6R	Clt/Brk	PSTC	STD	705	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R	Clt/Brk	PSTC	XL	708	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R	Clt/Brk	PSTC	XR	710	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R	Clt/Brk	PSTC	LGP	712	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R	Clt/Brk	PSDD	LGP	747	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R	Diff/Steer	PSTC	STD	706	NA	NA	35 ±20 kPa (5 ±3 psi)
D6R	Diff/Steer	PSTC	XL	709	NA	NA	35 ±20 kPa (5 ±3 psi)
D6R	Diff/Steer	PSTC	XR	711	NA	NA	35 ±20 kPa (5 ±3 psi)
D6R	Diff/Steer	PSTC	LGP	713	NA	NA	35 ±20 kPa (5 ±3 psi)
D6R Series II	Clt/Brk	PSTC	STD	897	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R Series II	Diff/Steer	PSTC	STD	898	NA	NA	35 ±20 kPa (5 ±3 psi)
D6R Series II	Clt/Brk	PSTC	XL	899	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R Series II	Diff/Steer	PSTC	XL	900	NA	NA	35 ±20 kPa (5 ±3 psi)

D6R Series II	Clt/Brk	PSTC	LGP	903	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6R Series II	Diff/Steer	PSTC	LGP	904	NA	NA	35 ±20 kPa (5 ±3 psi)
D6R Series II	Diff/Steer	PSTC	XW	905	NA	NA	35 ±20 kPa (5 ±3 psi)
D6R Series II	Clt/Brk	PSTC	LGP	906	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D6RLS	Diff/Steer	PSTC	LGP	715	NA	NA	35 ±20 kPa (5 ±3 psi)
D7R	Clt/Brk	PSTC	STD	716	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D7R	Clt/Brk	PSTC	LGP	717	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D7R	Diff/Steer	PSTC	STD	718	NA	NA	35 ±20 kPa (5 ±3 psi)
D7R	Diff/Steer	PSTC	LGP	719	NA	NA	35 ±20 kPa (5 ±3 psi)
D7R Series II	Clt/Brk	PSTC	STD	881	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D7R Series II	Diff/Steer	PSTC	STD	884	NA	NA	35 ±20 kPa (5 ±3 psi)
D7R Series II	Clt/Brk	PSTC	XR	882	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D7R Series II	Diff/Steer	PSTC	XR	885	NA	NA	35 ±20 kPa (5 ±3 psi)

D7R Series II	Clt/Brk	PSTC	LGP	883	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D7R Series II	Diff/Steer	PSTC	LGP	886	NA	NA	35 ±20 kPa (5 ±3 psi)
572R Series II	Clt/Brk	PSTC	LGP	883	2275 ± 30 kPa (330 ± 4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
572R	Clt/Brk	PSTC	STD	827	2240 ±30 kPa (325 ±4 psi)	35 ±20 kPa (5 ±3 psi)	35 ±20 kPa (5 ±3 psi)
D8R Series II	Diff/Steer	PSTC	STD	849	NA	NA	35 ±20 kPa (5 ±3 psi)

Note: The submodes 01 through 40 are used to perform actual tests and adjustments. Enter the submodes when you are performing the procedures that are listed in this manual only.

For more information, refer to System Operation, "Calibration Operation".

Note: If the Caterpillar Electronic Technician (Cat ET) service tool is used in order to perform the calibrations, see "Performing Calibrations With the Cat ET Service Tool".

Accessing Calibration And Display Modes Of The Monitoring System

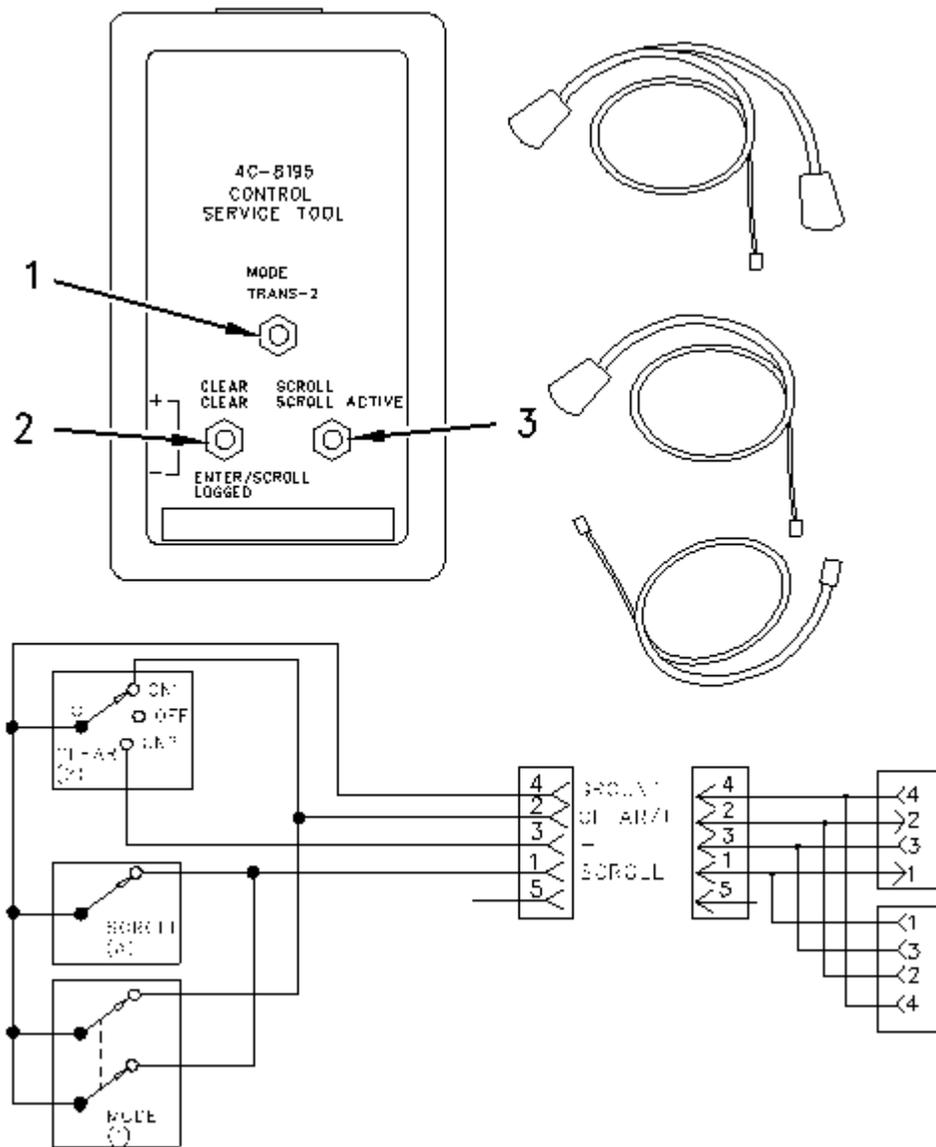


Illustration 1

g00860708

4C-8195 Control service tool

- (1) Mode switch
- (2) Clear switch
- (3) Scroll switch

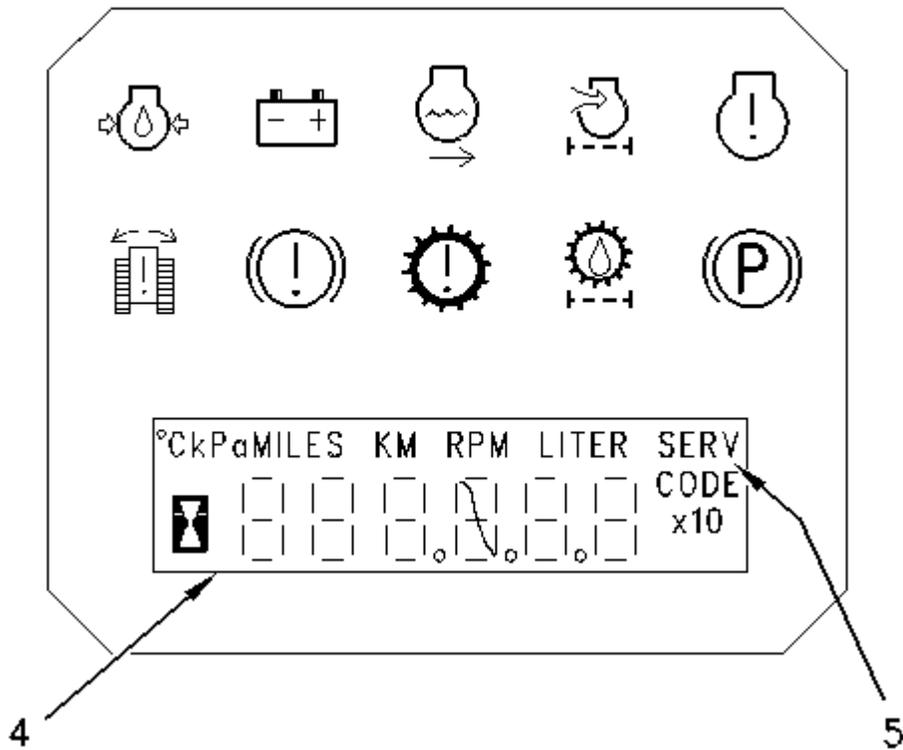


Illustration 2

g00597263

Typical example of the main display module of the Caterpillar monitoring system

(4) Display area. (5) Diagnostic code indicator ("SERV CODE").

Table 2

Calibration Modes		
Parking Brake Status	Submode ⁽¹⁾ Number	Submode Description
Steering/Braking Calibration Mode Mode No. 6... , D5N, D6N, D6R Series II, D7R Series II, 572R Series II, D8R Series II, D10R, and D11R Mode No. 5... D5M, D6M, D6R, and D7R		
ON	01	Set Application
OFF	02	Left Brake Adjustment
OFF	03	Right Brake Adjustment

ON	04	Left Steer Clutch High Pressure Adjustment
ON	05	Right Steer Clutch High Pressure Adjustment
OFF	06	Left Brake Low Pressure Adjustment
OFF	07	Right Brake Low Pressure Adjustment
ON	08	Left Steer Clutch Low Pressure Adjustment
ON	09	Right Steer Clutch Low Pressure Adjustment
Transmission Calibration Mode Mode No. 7... D5N, D6R Series II, D7R Series II, 572R Series II, D8R Series II, D10R, and D11R Mode No. 6... D5M, D6M, D6N, D6R, D7R and 561N		
ON	20	Set Forward High Speed Lockout
ON	21	Set Reverse High Speed Lockout
ON	22	Transmission Direction Lever Adjustment
ON	31	Clutch 1 Engagement Calibration
ON	32	Clutch 2 Engagement Calibration
ON	33	Clutch 3 Engagement Calibration
ON	34	Clutch 4 Engagement Calibration
ON	35	Clutch 5 Engagement Calibration
ON	40	Clutch Fill Calibration
Component Data Display Mode Mode No. 8... D6R Series II, D7R Series II, D8R Series II, D10R, and D11R Mode No. 7... D5M, D6M, D6R, and D7R		
ON	None	Component Data

⁽¹⁾ Only the submodes that are required for a particular machine will appear. Submodes 10 through 19, 23 through 30, and 36 through 39 are not used at this time.

Service personnel access the calibration submodes by using the **4C-8195** Control Service Tool .

To Enter A Mode - Press and hold the mode switch (1) . Release the mode switch when the desired mode number from the chart is shown in display area (4) .

To Scroll Through The Submodes - Press and hold the scroll switch (3) . Release the scroll switch when the correct number for the submode is being shown.

To Adjust A Value Within A Submode - The "+" and "-" positions of clear switch (2) are used to change the value within a submode.

To Scroll Through The Component Identifiers Of Component Data Display Mode - Use the "+" and "-" positions of clear switch (2) in order to move through the component list.

Component Data Display Mode

Note: The component data display mode for the D5M, D6M, D6R, D7R, and 572R is mode number 7. For the D6R Series II, D7R Series II, D8R Series II, the mode is mode number 8.

The component data display mode will show the values of data that is received by the ECM from system components of the power train. Each component is referenced by a unique Component Identifier. Use the "+" and "-" positions of the clear switch that is on the service tool to move through the component list. The identifying number for a component will be displayed for 2 seconds. The parameter value for that component will be displayed after the identifying number is displayed. The components are listed in numerical order of the identifying number. For a list of component identifiers, see the table below. The values for different types of components appear in the following forms:

- The data for the position sensor is displayed in "%" duty cycle.
- The data for the temperature sensor is displayed in °C.

Data for switches is displayed by using "O" and "C" for each throw of the switch. "O" stands for "Open". "C" stands for "Closed". The normally open contact is displayed by the left character for double-throw switches. The normally closed contact is displayed by the right character.

Currents for proportional solenoids are shown on a 0 - 255 scale. "0" represents no current and "255" represents full current (1.25 Amperes).

Currents for On/Off solenoids are displayed by using "0" for OFF and "1" for ON.

Performing Calibrations With the Cat ET Service Tool

In order to perform calibrations by using the Cat ET service tool, connect Cat ET service tool and select the steering/braking/trans ECM. Select "Calibrations" from the "Service Menu" and then select the desired calibrations from the sub-menu. The calibrations are grouped into general categories.

Note: Steering, clutch/brake pressure calibrations and brake touch-up calibrations will include calibrations that do not apply for differential steering tractors. For differential steering tractors, unselect all calibrations in these two categories except left brake low pressure calibration and left brake touch-up calibration. These are the only calibrations that apply to differential steering machines in these two categories. If the other calibrations are performed in these categories Cat ET service tool will indicate that the procedure failed. This failure warning can be ignored. Once the desired calibrations have been selected the calibration process can be performed by pressing the "Begin" key and then following the instructions displayed on the screen.

Note: If a calibration fails when you use the Cat ET service tool, try performing the same calibration by using the Caterpillar Monitoring System.

Component Data Display Description			
Component Number	Component Description	Data Format	Normal Conditions and Limits
0000	Steering/Brake Sensors Quick Check	Left character = left steering lever Middle character = right steering lever Right character = service brake pedal 572R Pipelayer: First character = left steering lever Second character = right steering lever Third character = left brake pedal Fourth character = right brake pedal	Steering Levers: 0 = released 1 = detent 2 = full stroke - = in between Brake Pedals: 0 = released 1 = fully depressed - = in between
0070	Parking Brake Switch	Left character = normally open contact Right character = normally closed contact O = contact open C = contact closed	OC = parking brake released CO = parking brake applied CC = invalid switch state OO = invalid switch state
0177	Transmission Oil Temperature Sensor	Degrees C	40 to 127 = normal range -999 = out of range low 999 = out of range high
0190	Engine Speed Sensor	RPM	0 to 4000 = display range
0298	Brake Pedal Switch	O = contact open C = contact closed	O = normal for pedal release C = normal for pedal depress
0299	Transmission (Direction) Lever Position Sensor	Right side = % Duty Cycle Left side first character = direction switch normally open contact Left side second character = direction switch normally closed contact	Finger Tip Control: CO 6% < Reverse < 27% OC 32% < Neutral < 47% OC 54% < Forward < 79% Differential Steer: CO 11% < Reverse < 33% OC 40% < Neutral < 60%

			OC 65% < Forward < 92%
0468	Brake Pedal Position Sensor	Right side = % Duty Cycle left side = brake pedal switch contact	O 8% < Released < 37% C Depressed < 61%
	Brake Pedal Position Sensor D5N, D6N Only	Right side = % Duty Cycle Left side = brake pedal	O 8% < Released < 34% C Depressed 65%
0490	Implement Lockout Switches	Left character = normally open contact Right character = normally closed contact O = contact open C= contact closed	OC = Implement locked out CO = Implement enabled CC = invalid switch state OO = State not determined
0573	Inching Pedal Position Sensor	% Duty Cycle	5% < Released < 37% Depressed < 67%
0621	Downshift Switch	Left character = normally open contact Right character = normally closed contact O = contact open C= contact closed	OC = switch released CO = switch depressed CC = invalid switch state OO = invalid switch state
0622	Upshift Switch	Left character = normally open contact Right character = normally closed contact O = contact open C= contact closed	OC = switch released CO = switch depressed CC = invalid switch state OO = invalid switch state
0623	Direction Switch (Reverse)	Left character = normally open contact Right character = normally closed contact O = contact open C= contact closed	CO = Reverse OC = Neutral OC = Forward CC = invalid switch state OO = invalid switch state
0671	Transmission Output Speed Sensor 1	RPM	0 to 5000 = display range
0672	Torque Converter Output Speed Sensor	RPM	0 to 5000 = display range
0673	Transmission Output Speed Sensor 2	RPM	0 to 5000 = display range
0674	Transmission Intermediate Speed Sensor 1	RPM	0 to 3000 = display range

0675	Transmission Intermediate Speed Sensor 2	RPM	0 to 3000 = display range
0676	Left Steering Lever Position Sensor	% Duty Cycle ⁽¹⁾	4% < Released < 22% Full Stroke < 90%
0677	Right Steering Lever Position Sensor	% Duty Cycle ⁽¹⁾	4% < Released < 22% Full Stroke < 90%
0681	Parking Brake Solenoid	Unitless command value	0 = solenoid off 1 = solenoid on
0689	Left Brake Solenoid	Unitless command value	0 to 215 = possible range
0690	Right Brake Solenoid	Unitless command value	0 to 215 = possible range
0691	Reverse Clutch Solenoid	Unitless command value	0 to 255 = possible range
0692	Forward Clutch Solenoid	Unitless command value	0 to 255 = possible range
0693	Speed 3 Clutch Solenoid	Unitless command value	0 to 255 = possible range
0694	Speed 2 Clutch Solenoid	Unitless command value	0 to 255 = possible range
0695	Speed 1 Clutch Solenoid	Unitless command value	0 to 255 = possible range
0697	Priority Valve	Unitless logic state value	0 = solenoid off 1 = solenoid on
0698	Left Steering Clutch Solenoid	Unitless command value	0 to 215 = possible range
0699	Right Steering Clutch Solenoid	Unitless command value	0 to 215 = possible range
0722	Secondary Brake Solenoid	Unitless logic state value	0 = solenoid off 1 = solenoid on
1327	Left Brake Pedal Position Sensor (pipelayer)	Right side = % Duty Cycle left side = brake pedal switch contact	O 8% < Released < 37% C Depressed < 61%
1328	Right Brake Pedal Position Sensor (pipelayer)	Right side = % Duty Cycle left side = brake pedal switch contact	O 8% < Released < 37% C Depressed < 61%

1329	Left Brake Pedal Switch (pipelayer)	O = contact open C = contact closed	O = normal for pedal release C = normal for pedal depress
1330	Right Brake Pedal Switch (pipelayer)	O = contact open C = contact closed	O = normal for pedal release C = normal for pedal depress
1488	Implement Lever Detent Electromagnet	0 or 1	0 = electromagnet OFF 1 = electromagnet ON
SPN	Software Part Number	Numeric Text Characters	Display shows last five digits of software part number

⁽¹⁾ The difference in duty cycle from the fully deflected forward to the fully deflected rearward positions must be greater than 61%. If the difference between the two extremes is less than 61% the function will not operate.

Submode 01 - Set Application

This submode is used to set the application number for the power train electronic control system. The application number is specified in Table 3.

Note: The mode for the "steering/braking calibration" for the D5M, D6M, D6R, and D7R and on all Series II machines is mode number 5.

Procedure

1. In Table 3, find the application number that matches the sales model, the serial number prefix, the type of steering, the type of transmission, and the type of track for the machine that is being adjusted.
2. Place the parking brake switch in the ON position.
3. With the **4C-8195** Control Service Tool , enter "Steering/Braking Calibration". Then, enter submode 01.
4. Use the "+" and "-" positions of the clear switch in order to move through the list of application numbers until the correct application number from Step 3 is displayed.
5. Exit submode 01 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 02 - Left Brake Touch Up Adjustment

This submode sets the command value from the ECM for the brake touch-up. The ECM applies a current for 20 seconds to the left brake solenoid when the clear switch is placed in the "-" position. The ECM will turn off the current after the clear switch is momentarily placed in the "+" position or

after the current has been applied for 20 seconds. Observe the track speed while the current is being applied in order to complete the adjustment of the brake.

Note: This calibration provides smooth brake engagement. Many conditions can affect this calibration. Some conditions that can affect the calibration are power train oil temperature and track tension. If the calibration procedures for submode 2 and for submode 3 are performed and there is harsh engagement of the brakes, readjust the values that were set in the calibration procedure.

Left Brake Adjustment Procedure For Power Shift Torque Converter (PSTC) Transmission

1. Warm up the power train oil to a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands may be used or the blade and the ripper may be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard and level.

2. Release the parking brake. Set the engine speed to low idle for the D6R Series II, D7R Series II, 572R Series II and D8R Series II. Set the engine speed to 910 rpm for the D5M, D6M, D6R, and D7R.
3. With the **4C-8195** Control Service Tool , enter the steering/braking calibration mode. Enter submode 02.
4. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
5. Begin the test. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the left brake solenoid for 20 seconds.
6. Observe the left track in order to determine if the left track stops. Wait for 20 seconds in order to determine if the track stops. Do not press the clear switch more than one time during the same test. The test current is removed automatically after 20 seconds. The track speed will return to normal speed. The track can also be returned to normal speed by pressing and then releasing the clear switch to the INCREMENT (+) position.
 - If the left track stops before returning to normal speed, the preset value must be increased to 5 units higher. The present value is shown on the display. This creates a new starting point. Press and release the clear switch to the INCREMENT (+) position until the value is changed. Proceed to 5 and repeat the test.
 - If the left track DOES NOT STOP before returning to normal speed, proceed to Test Step 7.
7. Decrease the present value that is showing on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value is changed. The 20 second test will begin again. Observe the left track in order to determine if the track stops. Wait for 20 seconds for the track to stop.
 - If the left track stops at any time before returning to normal speed, calibration of the left brake is complete. Exit submode 02 by scrolling to the next submode. Use the scroll switch or use the mode switch also to exit the calibration.

- If the left track does not stop before returning to normal speed, exit this procedure and perform this procedure again.

Left Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS)

Note: This procedure is not for R Series II machines. For R Series II machines, proceed to the bottom of this procedure.

The following procedure requires monitoring engine speed. Engine speed can be monitored by using the status screens in the Cat ET service tool or by using an external tachometer. If the ability to monitor engine speed is not available, use the "Alternate Left Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS)".

1. Warm up the power train oil to a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard. The ground surface should also be level.

2. Release the parking brake. Set the engine speed to 910 ± 5 rpm.
3. Shift the transmission to third gear forward and allow the tracks to rotate for at least three seconds. After three seconds, record the average engine speed as engine speed A.
4. Calculate engine speed B with the following formulas:

D5M - engine speed B rpm = engine speed A rpm - 27 rpm

D6R - engine speed B rpm = engine speed A rpm - 115 rpm
5. With the **4C-8195** Control Service Tool , enter the steering/braking calibration mode. Then, enter submode 02.
6. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
7. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the left brake solenoid for 20 seconds.
8. Wait at least three seconds from the start of the test. Observe engine speed in order to determine if the speed drops below engine speed B. Wait for 20 seconds so that the engine speed can stabilize. Do not press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed and engine speed and track speed will return to normal speed. The engine and the track can also be returned to normal speed by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.
 - If the speed of the engine drops below engine speed B and the engine has not returned to normal speed, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to the INCREMENT (+) position until the value has changed. Return to Step 5 in order to repeat the test.

- If the speed of the engine does not drop below engine speed B and the engine has returned to normal speed, proceed to Test Step 9.
9. Decrease the present value that is shown on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value has changed. The 20 second test will begin again. Wait at least three seconds. Observe the engine speed to determine if the speed drops below engine speed B. Wait for 20 seconds so that the engine speed can stabilize.
 - If the speed of the engine drops below engine speed B and the engine has not returned to normal speed, the calibration of the left brake touch up is complete. Exit submode 02 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.
 - If the speed of the engine does not drop below engine speed B and the engine has returned to normal speed, exit this procedure and perform this procedure again.

Left Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS) On R Series II Machines

The following procedure requires monitoring engine fuel position. Engine fuel position can be monitored using the status screens (engine) in the Cat ET service tool or the left brake adjustment procedure should be performed using the Cat ET service tool. If the ability to monitor engine fuel position is not available, use the alternate left brake adjustment procedure for direct drive power shift transmission (DDPS).

1. Warm up the power train oil a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard and level.
2. Release the parking brake.
3. Set the engine speed to low idle (800 rpm).
4. Shift the transmission to third gear forward and allow the tracks to rotate for at least three seconds. After 3 seconds, record the average engine fuel position as fuel position A.
5. Calculate engine fuel position "B" with the following formula: D6R, Series II - engine fuel position B = engine fuel position A + 15
6. With the 4C-8195 Control Service Tool, enter the steering/braking calibration mode. Then enter submode 02.
7. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
8. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the left brake solenoid for 20 seconds.
9. Wait at least three seconds from the start of the test. Observe engine fuel position in order to determine if the engine fuel position increases above engine fuel position B. Wait for 20

seconds so that the engine fuel position can stabilize. Do not press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed. The left brake adjustment test current can also be returned to normal by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.

Note: If the engine fuel position increases above engine fuel position B and the engine fuel position has not returned to normal, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to the INCREMENT (+) position until the value has changed. Return to Step 5 in order to repeat the test. If the engine fuel position does not increase above engine fuel position B and the engine fuel position has returned to normal, proceed to Test Step 10.

10. Decrease the present value that is shown on the display to 1 unit lower. Press and released the clear switch to the DECREMENT (-) position until the value has changed. The 20 seconds test will begin again. Wait at least three seconds. Observe the engine fuel position to determine if the engine fuel position increases above engine fuel position B. Wait for 20 seconds so that the engine fuel position can stabilize.

Note: If the engine fuel position increases above the engine fuel position B and the engine fuel position has not returned to normal, the calibration of the left brake touch up is complete. Exit submode 02 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration. If the engine fuel position does not increase above the engine fuel position B and the engine fuel position has returned to normal, repeat Step 9.

Alternate Left Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS)

Note: This procedure is not for R Series II machines. For R Series II machines, proceed to the bottom of this procedure.

1. Warm up the power train oil to a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If this procedure is performed with the machine on the ground, the ground surface should be hard. The ground surface should also be level.

2. Release the parking brake. Set the engine speed to 910 ± 5 rpm.
3. With the **4C-8195** Control Service Tool , enter the steering/braking calibration mode. Then, enter submode 02.
4. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
5. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the left brake solenoid for 20 seconds.
6. Observe the left track for a visible decrease in track speed. Wait for 20 seconds so that the track speed can decrease. Do not press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed and track speed will return to

normal speed. The track can also be returned to normal speed by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.

- If the speed of the left track decreases at any time before returning to normal speed, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to the INCREMENT (+) position until the value has changed. Return to Step 5 in order to repeat the test.
 - If the speed of the left track does not decrease before returning to normal speed, proceed to 7.
7. Decrease the present value that is shown on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value has changed. The 20 second test will begin again. Observe the left track for a visible decrease in track speed. Wait for 20 seconds so that the speed can decrease.
- If the speed of the left track decreases at any time before returning to normal speed, calibration of the left brake is complete. Exit submode 02 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.
 - If the speed of the left track does not decrease before returning to normal speed, repeat Step 7.

Alternate Left Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS) On R Series II Machines

1. Warm up the power train oil a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard and level.
2. Release the parking brake. Set the engine speed to low idle (800 rpm).
3. Shift the transmission to third gear forward and allow the tracks to rotate for at least three seconds. After three seconds, record the average engine speed as engine speed A.
4. Calculate engine speed B with the following formula: D6R Series II - engine speed B = engine speed A - 25 rpm.
5. With the 4C-8195 Control Service Tool, enter the steering/braking calibration mode.
6. Enter submode 02
7. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
8. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the left brake solenoid for 20 seconds.
9. Observe the engine speed for a visible decrease in track speed. The decrease in track speed will last one to two seconds before returning to normal speed. Do not press the clear switch more

than one time during the same test. After 20 seconds, the test current is automatically removed. The left brake adjustment test current can also be returned to normal by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.

Note: If the engine speed drops below engine speed B at any time before returning to normal speed, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to INCREMENT (+) position until the value has changed. Return to Step 5 in order to repeat the test. If the engine speed does not drop below engine speed B at any time before returning to normal speed, proceed to Step 9

10. Decrease the present value that is shown on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value has changed. The 20 second test will begin again. Observe the engine speed to determine if the engine speed drops below engine speed B at any time.

Note: If the engine speed drops below engine speed B at any time before returning to normal speed, the calibration of the left brake touch up is complete. Exit submode 02 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration. If the engine speed does not drop below engine speed B at any time before returning to normal speed, repeat Step 9.

Submode 03 - Right Brake Touch Up Adjustment

This submode sets the command value for a smooth brake touch up. The ECM applies a test current for 20 seconds to the right brake solenoid when the clear switch is placed in the DECREMENT (-) position. The ECM will turn off the test current when the clear switch is placed in the INCREMENT (+) position or when the test current has been applied for 20 seconds. The brake adjustment is performed by observing the effect of the test current on the speed of the track.

Note: This calibration provides smooth brake engagement. Many conditions can affect this calibration. Some conditions that can affect the calibration are power train oil temperature and track tension. If the calibration procedures for submode 2 and for submode 3 are performed and there is harsh engagement of the brakes, readjust the values that were set in the calibration procedure.

Right Brake Adjustment Procedure For Power Shift Torque Converter (PSTC) Transmission

1. Warm up the power train oil to a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard and level.

2. Release the parking brake. Set the engine speed to low idle for the D6R Series II, D7R Series II, and D8R Series II. Set the engine speed to 910 rpm for the D5M, D6M, D6R, and D7R.
3. With the **4C-8195** Control Service Tool , enter the steering/braking calibration mode. Then, enter submode 03.
4. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.

5. Begin the test by pressing the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the right brake solenoid for 20 seconds.
6. Observe the right track in order to determine if the track stops. Wait for 20 seconds for the track to stop. Do not press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed and the track speed will return to normal speed. The track can also be returned to normal speed by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.
 - If the right track stops at any time before returning to normal speed, increase the present value to 5 units higher. The value is shown on the display. Press and release the clear switch to the INCREMENT (+) position until the value is changed. Return to 5 and repeat the test.
 - If the right track does not stop before returning to normal speed, proceed to the next step.
7. Decrease the present value that is shown on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value is changed. The 20 second test will begin again. Observe the right track in order to determine if the track stops. Wait for 20 seconds for the track to stop.
 - If the right track stops at any time before returning to normal speed, calibration of the right brake is complete. Exit submode 03 by scrolling to the next submode. The scroll switch and the mode switch can also be used to exit the calibration.
 - If the right track does not stop before returning to normal speed, return to 7.

Right Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS)

Note: This procedure is not for R Series II machines. For R Series II machines, proceed to the bottom of this procedure.

The following procedure requires monitoring engine speed. Engine speed can be monitored by using the status screens in the Cat ET service tool or by using an external tachometer. If the ability to monitor engine speed is not available, use the "Alternate Right Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS)".

1. Warm up the power train oil to a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard. The ground surface should also be level.

2. Release the parking brake. Set the engine speed to 910 ± 5 rpm.
3. Shift the transmission to third gear forward and allow the tracks to rotate for at least three seconds. After three seconds, record the average engine speed as engine speed "A".
4. Calculate engine speed B with the following formulas:

D5M - engine speed B rpm = engine speed A rpm - 27 rpm

D6R - engine speed B rpm = engine speed A rpm - 115 rpm

5. With the **4C-8195** Control Service Tool , enter steering/braking calibration mode. Then, enter submode 03.
6. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
7. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the right brake solenoid for 20 seconds.
8. Wait at least three seconds from the start of the test. Observe engine speed in order to determine if the speed drops below engine speed B. Wait for 20 seconds so that the engine speed can stabilize. Do not press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed and engine speed and track speed will return to normal speed. The engine and the track can also be returned to normal speed by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.
 - If the speed of the engine drops below engine speed "B" and the engine has not returned to normal speed, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to the INCREMENT (+) position until the value has changed. Return to Step 5 in order to repeat the test.
 - If the speed of the engine does not drop below engine speed B and the engine has returned to normal speed, proceed to 9.
9. Decrease the present value that is shown on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value has changed. The 20 second test will begin again. Wait at least three seconds. Observe the engine speed to determine if the speed drops below engine speed B. Wait for 20 seconds so that the engine speed can stabilize.
 - If the speed of the engine drops below engine speed B and the engine has not returned to normal speed, the calibration of the right brake touch up is complete. Exit submode 03 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.
 - If the speed of the engine does not drop below engine speed B and the engine has returned to normal speed, Repeat Step 9.

Right Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS) On R Series II Machines

The following procedure requires monitoring engine fuel position. Engine fuel position can be monitored using the status screens (engine) in the Caterpillar Electronic Technician (ET) service tool or the right brake adjustment procedure should be performed using the Cat ET service tool. If the ability to monitor engine fuel position is not available, use the Alternate Right Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS).

1. Warm up the power train oil a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard. The ground surface should also be level.

2. Release the parking brake. Set the engine speed to low idle (800 rpm).
3. Shift the transmission to third gear forward and allow the tracks to rotate for at least three seconds. After 3 seconds, record the average engine fuel position as fuel position A.
4. Calculate engine fuel position B with the following formula: D6R, Series II - engine fuel position B = engine fuel position A + 15
5. With the 4C-8195 Control Service Tool, enter the steering/braking calibration mode. Then enter submode 03.
6. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
7. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the right brake solenoid for 20 seconds.
8. Wait at least three seconds from the start of the test. Observe engine fuel position in order to determine if the engine fuel position increases above engine fuel position B. Wait for 20 seconds so that the engine fuel position can stabilize. Do not press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed. The right brake adjustment test current can also be returned to normal by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.
 - If the engine fuel position increases above engine fuel position B and the engine fuel position has not returned to normal, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to the INCREMENT position (+) until the value has changed. Return to Step 5 in order to repeat the test.
 - If the engine fuel position does not increase above engine fuel position B and the engine fuel position has returned to normal, proceed to Step 9.
9. Decrease the present value that is shown on the display to 1 unit lower. Press and released the clear switch to the DECREMENT (-) position until the value has changed. The 20 seconds test will begin again. Wait at least three seconds. Observe the engine fuel position to determine if the engine fuel position increases above engine fuel position B. Wait for 20 seconds so that the engine fuel position can stabilize.
 - If the engine fuel position increases above the engine fuel position B and the engine fuel position has not returned to normal, the calibration of the right brake touch up is complete. Exit submode 02 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.
 - If the engine fuel position does not increase above the engine fuel position B and the engine fuel position has returned to normal, repeat Step 9.

Alternate Right Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS)

Note: This procedure is NOT for R Series II machines. For R Series II machines, proceed to the bottom of this procedure.

1. Warm up the power train oil to a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If this procedure is performed with the machine on the ground, the ground surface should be hard. The ground surface should also be level.

2. Release the parking brake. Set the engine speed to 910 ± 5 rpm.
3. With the **4C-8195** Control Service Tool , enter "Steering/Braking Calibration Mode". Then, enter submode 03.
4. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
5. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the right brake solenoid for 20 seconds.
6. Observe the right track for a visible decrease in track speed. Wait for 20 seconds so that the track speed can decrease. DO NOT press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed and track speed will return to normal speed. The track can also be returned to normal speed by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.
 - If the speed of the right track decreases at any time before returning to normal speed, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to the INCREMENT (+) until the value has changed. Return to Step 5 in order to repeat the test.
 - If the speed of the right track does not decrease before returning to normal speed, proceed to 7.
7. Decrease the present value that is shown on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value has changed. The 20 second test will begin again. Observe the right track for a visible decrease in track speed. Wait for 20 seconds so that the speed can decrease.
 - If the speed of the right track decreases at any time before returning to normal speed, calibration of the right brake is complete. Exit submode 03 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.
 - If the speed of the right track does not decrease before returning to normal speed, repeat Step 7.

Alternate Right Brake Adjustment Procedure For Direct Drive Power Shift Transmission (DDPS) On R Series II Machines

1. Warm up the power train oil a minimum of 60 °C (140 °F). Lift the tractor off the ground. Jack stands can be used or the blade and the ripper can be used.

Note: The procedure can be performed with the track on the ground. If these procedures are performed with the machine on the ground, the ground surface should be hard and level.

2. Release the parking brake. Set the engine speed to low idle (800 rpm).
3. Shift the transmission to third gear forward and allow the tracks to rotate for at least three seconds. After three seconds, record the average engine speed as engine speed A.
4. Calculate engine speed B with the following formula: D6R Series II - engine speed B = engine speed A - 25 rpm.
5. With the 4C-8195 Control Service Tool, enter the steering/braking calibration mode. Then enter submode 03.
6. Shift the transmission to third gear forward and allow the tracks to rotate for several revolutions.
7. Press the clear switch to the DECREMENT (-) position and then release the switch. The test current will be applied to the right brake solenoid for 20 seconds.
8. Observe the engine speed for a visible decrease in engine speed. The decrease in track speed will last one to two seconds before returning to normal speed. Do not press the clear switch more than one time during the same test. After 20 seconds, the test current is automatically removed. The left brake adjustment test current can also be returned to normal by pressing the clear switch to the INCREMENT (+) position and then releasing the switch.
 - If the engine speed drops below engine speed B at any time before returning to normal speed, increase the present value that is shown on the display to 5 units higher. Press and release the clear switch to INCREMENT (+) position until the value has changed. Return to Step 5 in order to repeat the test.
 - If the engine speed does not drop below engine speed B at any time before returning to normal speed, proceed to Step 9.
9. Decrease the present value that is shown on the display to 1 unit lower. Press and release the clear switch to the DECREMENT (-) position until the value has changed. The 20 second test will begin again. Observe the engine speed to determine if the engine speed drops below engine speed B at any time during 20 second test.
 - If the engine speed drops below engine speed B at any time before returning to normal speed, the calibration of the right brake touch up is complete. Exit submode 03 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.
 - If the engine speed does not drop below engine speed B at any time before returning to normal speed, repeat Step 9.

Submode 04 - Left Steering Clutch High Pressure Adjustment

This submode sets the pressure for full engagement for the left steering clutch.

Procedure

1. Warm up the power train oil to a minimum of 60 °C (140 °F).
2. Connect a pressure gauge that has a range up to at least 3447 kPa (500 psi) to the pressure fitting for the left steering clutch. The **8T-0855** Pressure Gauge or the **6V-7830** Pressure Gauge can be used.
3. Set the engine speed to high idle with the transmission in neutral. Put the parking brake switch in the BRAKE ON position.
4. Refer to table 3 in order to find the value for the "Steering Clutch High Pressure". Find the value that corresponds to the application number of the machine that is being adjusted.
5. With the **4C-8195** Control Service Tool , enter "Steering/Braking Calibration Mode". Then, enter submode 04.
6. Use the INCREMENT position ("+") and the DECREMENT ("-") position of the clear switch in order to adjust the clutch pressure until the pressure gauge shows the pressure that was found in Step 4.
7. Exit submode 04 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 05 - Right Steering Clutch High Pressure Adjustment

This submode sets the pressure for full engagement for the right steering clutch.

Procedure

1. Warm up the power train oil to a minimum of 60 °C (140 °F).
2. Connect a pressure gauge that has a range up to at least 3447 kPa (500 psi) to the pressure fitting for the right steering clutch. The **8T-0855** Pressure Gauge or the **6V-7830** Pressure Gauge can be used.
3. Set the engine speed to high idle with the transmission in neutral. Put the parking brake switch in the BRAKE ON position.
4. Refer to table 3 in order to find the value for the "Steering Clutch High Pressure". Find the value that corresponds to the application number of the machine that is being adjusted.
5. With the **4C-8195** Control Service Tool , enter "Steering/Braking Calibration Mode". Then, enter submode 05.

6. Use the INCREMENT (+) and the DECREMENT (-) positions of the clear switch to adjust the clutch pressure until the pressure gauge shows the pressure that was found in Step 4.
7. Exit submode 05 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 06 - Left Brake Low Pressure Adjustment

This submode sets the lowest range of pressure for the left brake.

Procedure

1. Warm up the power train oil to a minimum of 60 °C (140 °F).
2. Connect a pressure gauge that has a range that is no greater than 483 kPa (70 psi). Connect the gauge in line with a valve to the pressure fitting for the left brake. The valve should be closed. The **8T-0853** Pressure Gauge or the **6V-7830** Pressure Gauge can be used.

NOTICE

Use of the 6V-7830 Pressure Gauge is highly recommended. It does not need a valve in line for protection. However, if a standard low pressure gauge such as 8T-0853 Pressure Gauge is used, a valve must be used in line with the gauge to protect the gauge from high pressure while changing submodes. If a valve is not used for the standard gauge, the gauge may become permanently damaged while changing submodes.

3. Set the engine speed to high idle with the transmission in neutral. Put the parking brake switch in the BRAKE OFF position.
4. Refer to table 3 in order to find the value for the "Brake Low Pressure". Find the value that corresponds to the application number of the machine that is being adjusted.
5. With the **4C-8195** Control Service Tool , enter "Steering/Braking Calibration Mode". Then, enter submode 06.
6. Open the valve. Use the INCREMENT (+) position and the DECREMENT (-) position of the clear switch to adjust the brake pressure until the pressure gauge shows the pressure that was found in Step 4.

Note: The value in table 3 for the "brake low pressure" may not be attainable. This is due to various conditions. Some of the conditions are no low pressure gauge, gauge hysteresis, and cold power train oil. Bring the pressures as close as possible to the specified value. The adjustments for low brake pressure do not need to be exactly on the mark.

7. **Close the valve or disconnect the gauge before submode 06 is exited.** Exit submode 06 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 07 - Right Brake Low Pressure Adjustment

This submode sets the lowest range of pressure for the right brake.

Procedure

1. Warm up the power train oil to a minimum of 60 °C (140 °F).
2. Connect a pressure gauge that has a range that is no greater than 483 kPa (70 psi). Connect the gauge in line with a valve to the pressure fitting for the right brake. The valve should be closed. The **8T-0853** Pressure Gauge or the **6V-7830** Pressure Gauge can be used.

NOTICE

Use of the 6V-7830 Pressure Gauge is highly recommended. It does not need a valve in line for protection. However, if a standard low pressure gauge such as 8T-0853 Pressure Gauge is used, a valve must be used in line with the gauge to protect the gauge from high pressure while changing submodes. If a valve is not used for the standard gauge, the gauge may become permanently damaged while changing submodes.

3. Set the engine speed to high idle with the transmission in neutral. Put the parking brake switch in the BRAKE OFF position.
4. Refer to table 3 in order to find the value for the brake low pressure. Find the value that corresponds to the application number of the machine that is being adjusted.
5. With the **4C-8195** Control Service Tool , enter "Steering/Braking Calibration Mode ". Then, enter submode 07.
6. Open the valve. Use the INCREMENT (+) position and the DECREMENT (-) position of the clear switch to adjust the brake pressure to the pressure that was found in Step 4.

Note: The value in table3 for the brake low pressure may not be attainable. This is due to various conditions. Some of the conditions are no low pressure gauge, gauge hysteresis, and cold power train oil. Bring the pressures as close as possible to the specified value. The adjustments for low brake pressure do not need to be exactly on the mark.

7. **Close the valve or disconnect the gauge before submode 07 is exited.** Exit submode 07 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 08 - Left Steering Clutch Low Pressure Adjustment

This submode sets the lowest pressure range for the left steering clutch.

Procedure

1. Warm up the power train oil to a minimum of 60 °C (140 °F).
2. Connect a pressure gauge that has a range that is no greater than 483 kPa (70 psi). Connect the gauge in line with a valve to the pressure fitting for the left steering clutch. The valve should be closed. The **8T-0853** Pressure Gauge or the **6V-7830** Pressure Gauge can be used.

NOTICE

Use of the 6V-7830 Pressure Gauge is highly recommended. It does not need a valve in line for protection. However, if a standard low pressure gauge such as 8T-0853 Pressure Gauge is used, a valve must be used in line with the gauge to protect the gauge from high pressure while changing submodes. If a valve is not used for the standard gauge, the gauge may become permanently damaged while changing submodes.

3. Set the engine speed to high idle with the transmission in neutral. Put the parking brake switch in the "BRAKE ON" position.
4. Refer to Table 3 in order to find the value for the steering clutch low pressure. Find the value that corresponds to the application number of the machine that is being adjusted.
5. With the **4C-8195** Control Service Tool , enter steering/braking calibration mode. Then, enter submode 08.
6. Open the valve. Use the INCREMENT (+) position and the DECREMENT (-) position of the clear switch to adjust the clutch pressure to the pressure that was found in Step 4.

Note: The value in Table 3 for the "steering clutch low pressure" may not be attainable. This is due to various conditions. Some of the conditions are no low pressure gauge, gauge hysteresis, and cold power train oil. Bring the pressures as close as possible to the specified value. The adjustments for "steering clutch low pressure" do not need to be exactly on the mark.

7. **Close the valve or disconnect the gauge before submode 08 is exited.** Exit submode 08 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 09 - Right Steering Clutch Low Pressure Adjustment

This submode sets the lowest pressure range for the right steering clutch.

Procedure

1. Warm up the power train oil to a minimum of 60 °C (140 °F).
2. Connect a pressure gauge that has a range that is no greater than 483 kPa (70 psi). Connect the gauge in line with a valve to the pressure fitting for the right steering clutch. The valve should be closed. The **8T-0853** Pressure Gauge or the **6V-7830** Pressure Gauge can be used.

NOTICE

Use of the 6V-7830 Pressure Gauge is highly recommended. It does not need a valve in line for protection. However, if a standard low pressure gauge such as 8T-0853 Pressure Gauge is used, a valve must be used in line with the gauge to protect the gauge from high pressure while changing submodes. If a valve is not used for the standard gauge, the gauge may become permanently damaged while changing submodes.

3. Set the engine speed to high idle with the transmission in neutral. Put the parking brake switch in the BRAKE ON position.
4. Refer to Table 3 in order to find the value for the steering clutch low pressure. Find the value that corresponds to the application number of the machine that is being adjusted.
5. With the **4C-8195** Control Service Tool , enter steering/braking calibration mode. Then, enter submode 09.
6. Open the valve. Use the INCREMENT (+) position and the DECREMENT (-) position of the clear switch to adjust the clutch pressure to the pressure that was found in Step 4.

Note: The value in Table 3 for the "steering clutch low pressure" may not be attainable. This is due to various conditions. Some of the conditions are no low pressure gauge, gauge hysteresis, and cold power train oil. Bring the pressures as close as possible to the specified value. The adjustments for steering clutch low pressure do not need to be exactly on the mark.

7. **Close the valve or disconnect the gauge before submode 09 is exited.** Exit submode 09 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 10 And 11 - Inching Pedal Released Position And Inching Pedal Depressed Position

These procedures calibrate the released position and the depressed position of the inching pedal. Always perform the calibrations for both the released position and the depressed position.

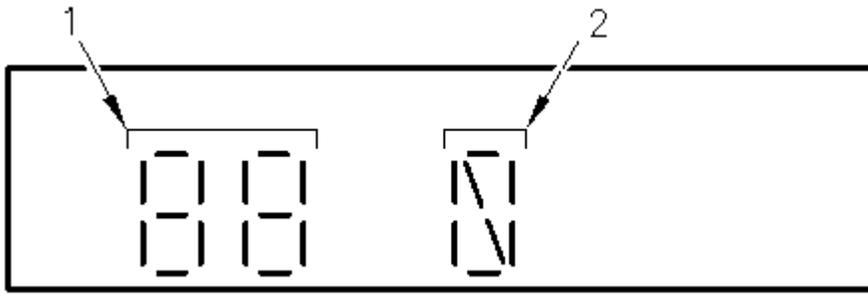


Illustration 3

g00597744

Display Area

(1) Submode identifier. (2) Accept status identifier.

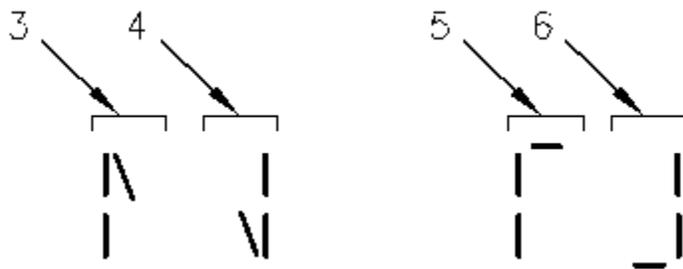


Illustration 4

g00597745

Symbols that are shown on the accept status identifier

(3) Accepted Symbol. (4) Accepted symbol. (5) Not accepted symbol. (6) Not accepted symbol.

1. With the **4C-8195** Control Service Tool , enter steering/braking calibration mode. Then, enter submode 10.
2. Depress the inching pedal completely. Release the inching pedal slowly.
3. While the inching pedal is released, press the clear switch to the DECREMENT (-) position in order to store the calibration value for the released position. While the switch is pressed, the accept status identifier (2) will briefly show the accepted symbol (4) or the not accepted symbol (6) . Observe the accept status identifier (2) when the switch is pressed.

Expected Result: The accepted symbol (4) or the not accepted symbol (6) shows on the accept status identifier.

Results:

- The accepted symbol (4) was showing. Proceed to 4.

- The not accepted symbol (6) was showing. Check that the inching pedal is completely released. Repeat step 3. If the not accepted symbol (6) is shown or if a CID 0573 FMI 08 diagnostic code is present, use the component data display mode in order to check the range of the inching pedal position sensor. The acceptable range is listed in the component data display mode section of this manual. The CID 0573 FMI 08 procedure may need to be performed.
4. Press the scroll switch in order to enter submode 11.
 5. Depress the inching pedal completely by using normal effort to hold the pedal in the depressed position. Do not press hard on the pedal. While the pedal is held in the depressed position, press the clear switch to the DECREMENT (-) position in order to store the calibration value for the DEPRESSED position. When the switch is depressed, the accept status identifier (2) will briefly show accepted symbol (4) or not accepted symbol (6) . Observe the accept status identifier (2) when the switch is pressed.

Expected Result: The accepted symbol (4) or the not accepted symbol (6) shows on the accept status identifier.

Results:

- Accepted symbol "4" was showing. The calibration of the inching pedal is complete. Exit the inching pedal calibration mode by using the scroll switch. The mode switch can also be used to exit the calibration.
- Not accepted symbol "6" was showing. Determine if the inching pedal is completely depressed. Repeat step 5. If not accepted symbol "6" is shown or if a CID 0573 FMI 08 diagnostic code is present, use the "Component Data Display Mode" section of this manual. The CID 0573 FMI 08 procedure may need to be performed.

Submode 12 And 13 - Service Brake Pedal Released Position And Service Brake Pedal Depressed Position

These adjustments modes are used to calibrate the released position and the depressed position of the service brake pedal. Always perform both released and depressed position calibrations.

Note: This calibration applies to the D5N and D6N only.

The service brake pedal sensor values must be within the following limits to complete the calibration procedure. If it is outside of these limits a service brake pedal sensor calibration fault will be active CID 0468 FMI 13.

- Brake pedal released calibration --> sensor duty cycle between 10% and 33%
- Brake pedal depressed calibration --> sensor duty cycle between 40% and 62%
- Brake pedal range --> sensor duty cycle delta between 22% and 36%
- (Change in value between released calibration and depressed calibration)

If the service brake pedal sensor value is 5.5% duty cycle lower than the calibrated released position or 5.5% duty cycle higher than the calibrated depressed position, a service brake pedal sensor calibration fault will be active CID 0468 FMI 13.

The service brake pedal sensor duty cycle must be between 8% and 64% duty cycle. If the sensor is outside of these limits a service brake pedal sensor out of range fault will be active CID 0468 FMI 08 and a service brake pedal sensor calibration fault will be active CID 0468 FMI 13.

If a short circuit to battery diagnostic condition occurs on the secondary brake dump valve circuit before the service brake pedal position sensor value has reached (Brake pedal released calibration value + 17%), a secondary brake solenoid short circuit to battery diagnostic will be active CID 0722 FMI 03. This may be caused by a secondary brake switch that is closed when the service brake pedal position sensor indicates that the secondary brake switch should be open.

If a short circuit to battery diagnostic condition does not occur on the secondary brake dump valve circuit (this is how the ECM reads the status of the service brake pedal switch) before the service brake pedal position sensor value has reached.

Note: Brake pedal depressed calibration value - 1%, a Secondary brake switch invalid diagnostic will be active CID 0298 FMI 02. This may be caused by a secondary brake switch that is open when the service brake pedal position sensor indicates that the secondary brake switch should be closed. This fault will stay active until the service brake pedal switch activation has been detected at the proper service brake pedal position (based on service brake pedal position sensor value

- The service brake pedal sensor **must** calibrate within the proper range of values.
- The service brake pedal sensor **must** operate within the proper range of values.
- The service brake pedal switch **must not** close before the sensor reaches the proper range of values.
- The service brake pedal switch **must** close before the service brake pedal position exceeds the proper range of values.

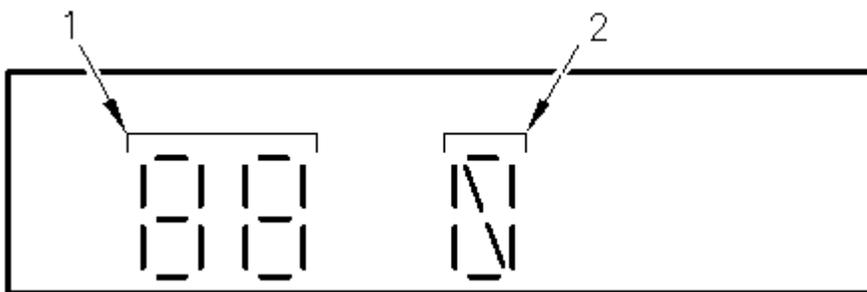


Illustration 5

g00597744

Display Area

(1) Submode identifier. (2) Accept status identifier.

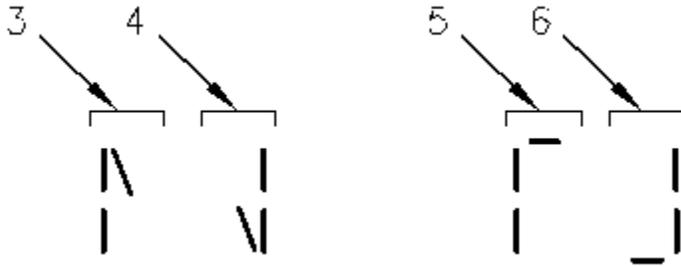


Illustration 6

g00597745

Symbols that are shown on the accept status identifier

(3) Accepted Symbol. (4) Accepted symbol. (5) Not accepted symbol. (6) Not accepted symbol.

Table 4

Sub mode	Calibration Parameter Description	Data	Service Brake Pedal Calibration Limits
12	Brake pedal released position	Right side = % Duty Cycle Left side = submode	10 % < Released < 34 %
13	Brake pedal depressed position	Right side = % Duty Cycle Left side = submode	39 % < Depressed < 63 %
	Brake pedal travel range	Depressed - Released = Range (change in duty cycle)	21 % < Range < 37 %
	Brake pedal switch range (switch must inside this range)	Releases position + 16 % < SW closure < Depressed - 1 %	

1. Using the **4C-8195** Control Service Tool , enter the steering/braking calibration mode. Then, enter submode 12.
2. Depress the service brake pedal completely. Release the service brake pedal slowly.
3. While the service brake pedal is released, press the clear switch to the DECREMENT (-) position in order to store the calibration value for the RELEASED position. When the switch is pressed, the accept status identifier (2) will briefly show the accepted symbol (4) or the not accepted symbol (6) . Observe the accept status identifier (2) when the switch is pressed.

Expected Result: The accepted Symbol (4) or the not accepted symbol (6) shows on the accept status identifier (2) .

Results:

- The accepted symbol (4) was showing. Proceed to Test Step 4.
- The not accepted symbol (6) was showing. Check that the service brake pedal is completely released. Repeat step 4. If not accepted symbol (6) is shown or if a CID 0468 FMI 08 diagnostic code is present, use the component data display mode in order to check the range of the service brake pedal position sensor.

4. Press the scroll switch in order to enter submode 13.

5. Depress the service brake pedal completely by using normal effort to hold the pedal in the depressed position. Do not press hard on the pedal. While the pedal is held in the depressed position, press the clear switch to the DECREMENT (-) position in order to store the calibration value for the DEPRESSED position. When the switch is depressed, the accept status identifier (2) will briefly show accepted symbol (4) or not accepted symbol (6) . Observe the accept status identifier (2) when the switch is pressed.

Expected Result: The accepted symbol (4) or the not accepted symbol (6) shows on the accept status identifier.

Results:

- The accepted symbol "4" was showing. The calibration of the inching pedal is complete. Exit the service brake pedal calibration mode by using the scroll switch. The mode switch can also be used to exit the calibration.
- The not accepted symbol "6" was showing. Determine if the service brake pedal is completely depressed. Repeat step 5. If not accepted symbol "6" is shown or if a CID 0468 FMI 08 diagnostic code is present, use the component data display mode in order to check the service brake pedal sensor.

Submode 20 - Set Forward High Speed Lockout

This submode sets the highest speed that is obtainable when the machine is in forward.

Note: The transmission calibration mode for the D5M, D6M, D6R, and the D7R is mode number 6. The mode for the D6R Series II, D7R Series II, and the D8R Series II is mode number 7.

Procedure

1. With the **4C-8195** Control Service Tool , enter transmission calibration mode. Then, enter submode 20.
2. Use the INCREMENT (+) position and the DECREMENT (-) position of the clear switch to select the desired maximum speed (F2 or F3).

3. Exit submode 20 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 21 - Set Reverse High Speed Lockout

This submode sets the highest speed that is obtainable when the machine is in reverse.

Note: The transmission calibration mode for the D5M, D6M, D6R, and the D7R is mode number 6. The mode for the D6R Series II, D7R Series II, and the D8R Series II is mode number 7.

Procedure

1. With the **4C-8195** Control Service Tool , enter transmission calibration mode. Then, enter submode 21.
2. Use the INCREMENT (+) position and the DECREMENT (-) position of the clear switch to select the desired maximum speed (R2 or R3).
3. Exit submode 21 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submode 22 - Transmission Direction Lever Position Sensor Calibration

This submode sets the NEUTRAL position for the position sensor of the transmission direction control lever. The ECM monitors the sensor signal as the lever is moved in and out of neutral at least four times. When three dashes are showing in the display area, the calibration is complete. A flashing letter will normally be displayed. The procedure should be performed when the sensor has been replaced.

During this calibration, error codes ("EXX") can occur. The error codes appear in the display area if there is a problem with the conditions for the calibration or if there is a problem with the results of the calibration. The error codes that can appear are listed below:

E02 - The engine speed is not zero.

E03 - The sensor calibration is faulty.

1. Exit the transmission calibration mode.
2. Return to the transmission calibration mode and repeat the procedure.
3. If the error code is still present, replace the sensor.
4. Exit the transmission calibration mode.
5. Return to the transmission calibration mode and repeat the procedure.
6. If the error code is still present, replace the detent assembly.

7. Exit the transmission calibration mode.
8. Return to the transmission calibration mode and repeat the procedure.

E08 - The diagnostic code CID 0299 is active. Correct the problem.

E09 - The machine speed is not zero.

Procedure

Note: The steps for this procedure must be performed exactly. The steps must be performed in sequence. This procedure can terminate if any unexpected functions are activated or if a diagnostic code is present. Do not change any switch positions. Do not move any levers. Do not depress any pedals. If there is a problem with the conditions for the calibration or if there is a problem with the results of the calibration, an error code ("EXX") will appear in the display area.

1. Place the transmission direction control lever in the NEUTRAL position.
2. With the **4C-8195** Control Service Tool , enter transmission calibration mode. Then, enter submode 22.
3. Watch the display area of the Caterpillar monitoring system. The letter "F" should be flashing. Move the lever to the FORWARD position. The lever might need to be returned to the NEUTRAL position and the FORWARD position several times in order to stop the letter "F" from flashing.

Note: If the conditions for setup are not correct, the flashing letter "F" is not shown in the display area. An error code ("EXX") will appear. The calibration will not run until all necessary conditions are met or error codes are corrected. Correct the error code and restart these procedures.

4. Now, the letter "N" should be flashing. Move the lever to the NEUTRAL position. The lever may need to be returned to the FORWARD position and the NEUTRAL position several times in order to stop the flashing letter "N".
5. Now, the letter "R" should be flashing. Move the lever to the REVERSE position. The lever may need to be returned to the NEUTRAL position and REVERSE position several times in order to stop the flashing letter "R".
6. Continue moving the lever to the position that matches the flashing letter. When the display area shows three dashes, the calibration is complete.
7. Exit submode 22 by scrolling to the next submode with the scroll switch. The mode switch can also be used to exit the calibration.

Submodes 31 to 35 and 40 - ECPC Clutch Calibrations

The power train ECM includes two calibration procedures for the transmission clutches on machines that have electronic clutch pressure control (ECPC).

- The clutch engagement pressure calibration sets the electrical current of each clutch solenoid in order to obtain the correct pressure of each transmission clutch.
- The clutch fill calibration sets the parameters for the transmission clutch fill. This calibration will affect the quality of the shifting of the transmission.

The transmission system needs to be calibrated if any of the following events have occurred:

- A clutch solenoid valve has been replaced.
- A clutch solenoid valve has been substituted.
- A clutch solenoid valve has been cleaned.
- A different power train ECM has been installed.
- A transmission clutch has been rebuilt.
- Shifting is harsh.

When the calibrations are performed for machines that have the ECPC, error codes ("EXX") can occur. The error codes appear in the display area if there is a problem with the conditions or if there is a problem with the results of the calibration. The possible error codes are listed within each of the following procedures.

Submode 31 - Clutch 1 Engagement; Submode 32 - Clutch 2 Engagement; Submode 33 - Clutch 3 Engagement; Submode 34 - Clutch 4 Engagement; Submode 35 - Clutch 5 Engagement

Table 5

Engagement Pressure Specifications For Transmission Clutches					
Sales Model	Clutch 1 - Reverse	Clutch 2 - Forward	Clutch 3 - 3rd Gear	Clutch 4 - 2nd Gear	Clutch 5 - 1st Gear
D5M PSTC ⁽¹⁾	2205 kPa (320 psi)	2415 kPa (350 psi)	2550 kPa (370 psi)	2550 kPa (370 psi)	2480 kPa (360 psi)
D5N PSTC	2205 kPa (320 psi)	2415 kPa (350 psi)	2550 kPa (370 psi)	2550 kPa (370 psi)	2480 kPa (360 psi)
D6M PSTC	2205 kPa (320 psi)	2205 kPa (320 psi)	2690 kPa (390 psi)	2690 kPa (390 psi)	2415 kPa (350 psi)
D6N PSTC	2344 kPa (340 psi)	2413 kPa (350 psi)	2690 kPa (390 psi)	2690 kPa (390 psi)	2415 kPa (350 psi)

D6R Series II, D6R PSTC	2205 kPa (320 psi)	2205 kPa (320 psi)	2550 kPa (370 psi)	2550 kPa (370 psi)	2205 kPa (320 psi)
D7R Series II, D7R PSTC	2205 kPa (320 psi)	2205 kPa (320 psi)	2690 kPa (390 psi)	2690 kPa (390 psi)	2205 kPa (320 psi)
D5M PSDD ⁽²⁾	2205 kPa (320 psi)	2205 kPa (320 psi)	2550 kPa (370 psi)	2550 kPa (370 psi)	2550 kPa (370 psi)
D6R Series II, D6R PSDD	2205 kPa (320 psi)	2205 kPa (320 psi)	2550 kPa (370 psi)	2550 kPa (370 psi)	2205 kPa (320 psi)
D8R Series II, D8R PSTC	2586 kPa (375 psi)	2586 kPa (375 psi)	2690 kPa (390 psi)	2690 kPa (390 psi)	2205 kPa (320 psi)

⁽¹⁾ PSTC = Power Shift Torque Converter.

⁽²⁾ PSDD = Power Shift Direct Drive.

Table 6

Tools Needed		
Part Number	Description	Quantity
4C-8195	Control Service Tool	1
8T-0855	4150 kPa (600 psi) Pressure Gauge	1

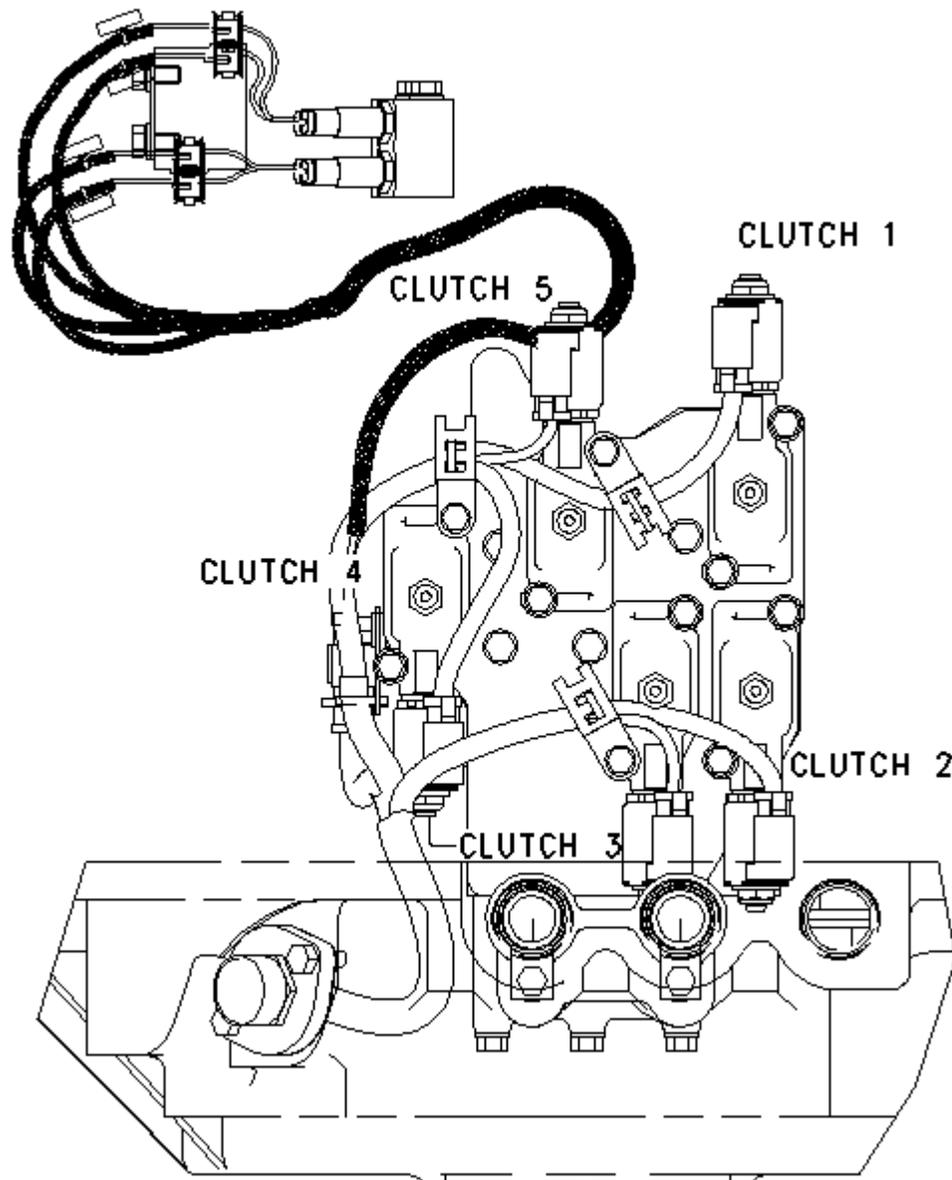


Illustration 7

g00859862

Identification of the Solenoid Valves for Clutches on the machines that have the ECPC

The life of the transmission is affected when the pressure for clutch engagement is correct. These submodes set the pressure for the engagement of each clutch. The mechanic must adjust the electrical current that is sent to each clutch solenoid valve in order to obtain the specified pressure for the engagement of the clutch. This calibration should be performed prior to performing the "clutch fill calibration" (submode 40).

During this calibration, error codes ("EXX") can occur. The error codes appear in the display area if there is a problem with the calibration or if there is a problem with the results of the calibration. The error codes that can appear are listed below:

E01 - There is a problem with the active clutch solenoid or the speed sensor.

E04 - The transmission direction control lever is not in neutral.

E05 - The transmission oil temperature is below the threshold of 40 °C (104 °F) or there is a problem with the transmission oil temperature sensor.

E06 - The engine speed is below the threshold of 1500 rpm.

E07 - The parking brake is not on.

E08 - CID 0299(sensor) is active. Correct the problem.

E09 - The machine speed is not zero.

E10 - The service brake pedal is pressed.

Procedure

Note: The steps of this procedure must be performed exactly. The Steps of this procedure must be performed in sequence. This procedure can terminate if any unexpected functions are activated or if a diagnostic code is present. Do not change any switch positions. Do not move any levers. Do not depress any pedals. If there is a problem with the calibration or if there is a problem with the results of the calibration, an error code ("EXX") will appear in the display area.

1. If a new clutch solenoid valve was installed, shift the transmission at least 12 times into a gear that uses the solenoid valve. Allow sufficient time for the corresponding clutch to be fully pressurized.
2. Warm the transmission oil to at least 40 °C (104 °F). The component data display mode (Mode number 7) can be used to monitor the temperature of the transmission oil. The CID number is 0177.
3. Place a pressure gauge on the clutch that needs to be calibrated. A gauge that can measure 3500 kPa (508 psi) is desired.
4. Place the transmission direction control lever in the NEUTRAL position.
5. Place the parking brake switch in the ON position. **The transmission will shift to NEUTRAL.**
6. Set the engine speed to high idle.
7. With the **4C-8195** Control Service Tool , enter "Transmission Calibration Mode" (Mode 6) for the D5M, D6M, D6R and the D7R. The mode for the D6R Series II, D7R Series II, and the D8R Series II is mode number 7. Then, enter the submode that corresponds to the clutch that is being calibrated.
 - Submode 31 - Clutch 1 Engagement
 - Submode 32 - Clutch 2 Engagement
 - Submode 33 - Clutch 3 Engagement
 - Submode 34 - Clutch 4 Engagement

- Submode 35 - Clutch 5 Engagement

8. If all the conditions are correct for calibration, the specified pressure for the engagement for the particular clutch is shown in the display area. The value that is shown is in units of ten kPa. For the actual value, multiply the value that is showing by 10. Record the value. In the remaining Steps, adjustments are made so that the pressure is the actual reading for pressure from the pressure gauge. The pressure that is specified in the procedure is also listed in the engagement pressure specifications table.

Note: If the conditions for setup are not correct, the pressure is not shown in the display area. An error code ("EXX") appears instead of the pressure value. The calibration will not run until all error codes are corrected. Correct the error code and restart these procedures.

9. When the pressure is showing on the display, move the transmission direction control lever to the FORWARD position. This pressurizes the clutch that is being calibrated.

10. The display will change. Now, the display shows a number that corresponds to the electrical current of the particular solenoid valve. The INCREMENT (+) position and the DECREMENT (-) position of the clear switch can now be used to adjust the electrical current of the solenoid valve. The solenoid valve controls the pressure of the engagement of the clutch.

While the pressure gauge is monitored, use the clear switch in order to adjust the pressure. Adjust the pressure until the value that is on the pressure gauge matches the pressure that was specified in Step 8.

11. Move the transmission direction control lever to the NEUTRAL position. The calibration is complete.

12. Use the scroll switch to go to the submode that corresponds to the next clutch that needs to be calibrated. The scroll switch may also be used to go to the "Clutch Fill Calibration" (submode 40). To exit transmission calibration mode, use the mode switch.

Submode 40 - Clutch Fill

Table 7

Tools Needed		
Part Number	Description	Quantity
4C-8195	Control Service Tool	1

The quality of the shifting of the transmission can be affected by the calibration of the clutch fill. The calibration procedure is automatic. The clutch engagement calibration (submodes 31 through 35) should be performed prior to performing the clutch fill calibration.

During this calibration, error codes ("EXX") can occur. The error codes appear in the display area if there is a problem with the calibration or if there is a problem with the results of the calibration. The error codes that can appear are listed below:

E01 - There is a problem with an active clutch solenoid or a speed sensor.

E04 - The transmission direction control lever is not in neutral.

E05 - The transmission oil temperature is below the threshold of 68 °C (154 °F) or the transmission oil temperature sensor is faulty.

E06 - The engine speed is below the threshold of 1500 rpm.

E07 - The parking brake is not on.

E08 - CID 0299 (sensor) is active. Correct the problem.

E09 - The machine speed is not zero.

E10 - The service brake pedal is pressed.

E21 - Clutch 1 is at A limit.

E22 - Clutch 2 is at A limit.

E23 - Clutch 3 is at A limit.

E24 - Clutch 4 is at A limit.

E25 - Clutch 5 is at A limit.

For error codes E21, E22, E23, E24, or E25 the calibration software will select values that do the best job possible, but the error indicates something is wrong with either the calibration conditions or the control system. Things to check for E21 through E25 are:

- The oil and the transmission is fully warmed for the calibration.
- The valves are correctly torqued when the machine is cool.
- The seals are not worn.
- The clutch is not worn beyond the allowable range.
- The valve is not damaged.
- If a new valve was installed, shift the tractor into a gear that uses the new valve at least 12 times before beginning the procedure.
- Check that the priority valve solenoid is off.

Once problems are fixed, run the clutch fill calibration (submode 40) again.

Procedure

Note: The steps of this procedure must be performed exactly. The Steps of this procedure must be performed in sequence. This procedure can terminate if any unexpected functions are activated or if a diagnostic code is present. Do not change any switch positions. Do not move any levers. Do not depress any pedals. If there is a problem with the calibration or if there is a problem with the results of the calibration, an error code ("EXX") will appear in the display area.

1. The clutch engagement calibration (submodes 31 through 35) should be performed prior to performing the clutch fill calibration.
2. If a new clutch solenoid valve was installed, shift the transmission at least 12 times into a gear that uses the solenoid valve. Allow sufficient time for the corresponding clutch to be fully pressurized.
3. Warm the transmission oil to at least 68 °C (154 °F). The component data display mode can be used to monitor the temperature of the transmission oil. The mode for the D6R Series II, D7R Series II, and the D8R Series II is mode number 8. The mode for the D5M, D6M, D6R, and the D7R is mode number 7. The CID number is 0177. Operate the machine or allow the transmission to spin in NEUTRAL in order to ensure that the transmission is fully warmed.
4. Place the transmission direction control lever in the NEUTRAL position.
5. Place the parking brake switch in the ON position. The transmission will shift to NEUTRAL and to first speed.
6. On machines that have the power shift torque converter, set the engine speed to 1600 rpm. If the calibration fails at 1600 rpm, recalibrate with the engine at 2000 rpm. On machines that have the power shift direct drive, set the engine speed to 2000 rpm.
7. With the **4C-8195** Control Service Tool , enter the transmission calibration mode (Mode 6). Then, enter submode 40.
8. If all the conditions are correct for calibration, "0's" will move across the display area.

Note: If the conditions for setup are not correct, "0's" are not shown in the display area. An error code ("EXX") appears. The calibration will not run until all error codes are corrected. Correct the error code and restart the procedures.

9. When "0's" are moving across the display, move the transmission direction control lever to the FORWARD position. The clutch fill calibration will begin.
10. The display changes. The display now shows the number of the active clutch (1 through 5). The calibration automatically changes in order to perform the calibration for each clutch.

Note: During the calibration, there are many clutch fills occurring. Remain seated. Vibration and noise will be present . If any of the conditions for setup are not followed during the calibration, then the calibration will be stopped and a corresponding error code ("EXX") will be shown. Correct the error code and restart the procedures.

11. When the calibration is completed successfully, "---" will be shown on the display. An error code may also be displayed. The error code indicates that the calibration had a problem.
12. Operate the machine in order to check the quality of the shifting of the transmission.
13. Exit submode 40 by scrolling to another submode with the scroll switch. The mode switch can also be used to exit the calibration.