MOCK UP

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Chapter : Requirement Set: osb\_main\_requirement

Description

ONE SIDE BRAKING SYSTEM REQUIREMENT SPECIFICATION

1 OVERVIEW

Requirement Type Functional

ID 1

Description

This document describes a requirement specification for an automobile one side braking system in a Tractor. The one side braking system provides functionality to rest the inner wheel of the vehicle while turning automatically.

2 SYSTEM OVERVIEW

Requirement Type Functional

ID 2

Description

2.1

Requirement Type Functional

ID 2.1 SYSTEM INPUTS

Description

2.1.1

Requirement Type Functional

ID 2.1.1 Ignition Switch buttons (Digital Input).

Description

2.1.1.1

Requirement Type Functional

ID 2.1.1.1 If ON- OSB is engaged.

Description

2.1.1.2

Requirement Type Functional

ID 2.1.1.2 If OFF- OSB is disengaged

Description

2.1.2

Requirement Type Functional

ID 2.1.2 OSB Switch (Digital Input).

Description

2.1.2.1

Requirement Type Functional

ID 2.1.2.1 If ON- OSB is engaged.

Description

**If ON- OSB is engaged.**

2.1.2.2

Requirement Type Functional

ID 2.1.2.2 If OFF- OSB is disengaged.

Description

2.1.3

Requirement Type Functional

ID 2.1.3 Vehicle Speed (Measured as frequency).

Description

2.1.3.1

Requirement Type Functional

ID 2.1.3.1 If Frequency is below 10 kmph- OSB is engaged.

Description

2.1.3.2

Requirement Type Functional

ID 2.1.3.2 If Frequency is above 10 kmph- OSB is disengaged

Description

2.1.4

Requirement Type Functional

ID 2.1.4 Wheel Angle (Analog Input)

Description

2.1.4.1

Requirement Type Functional

ID 2.1.4.1 If wheel angle is in between 0 to 30° - Left Turn

Description

2.1.4.2

Requirement Type Functional

ID 2.1.4.2 If wheel angle is in between 30° to 60° - Centre

Description

2.1.4.3

Requirement Type Functional

ID 2.1.4.3 If wheel angle is in between 60° to 90° - Right Turn

Description

2.1.5

Requirement Type Functional

ID 2.1.5 Engine RPM (Measured as frequency) \*Calculate the threshold based on the speed 10kmph

Description

2.1.5.1

Requirement Type Functional

ID 2.1.5.1 If Frequency is below threshold- OSB is engaged

Description

2.1.5.2

Requirement Type Functional

ID 2.1.5.2 If Frequency is above threshold- OSB is disengaged

Description

2.1.6

Requirement Type Functional

ID 2.1.6 Brake Pedal sensor (Analog Input)

Description

2.1.6.1

Requirement Type Functional

ID 2.1.6.1 If brake pedal is pressed

Description

Apply brake by wire.

Activate - PWM Valve

Activate - LH + RH Valve

2.2

Requirement Type Functional

ID 2.2 SYSTEM OUTPUT

Description

2.2.1

Requirement Type Functional

ID 2.2.1 OSB Indicator Light (Digital Output)

Description

one indicator light is installed onto the instrument panel.

2.2.1.1

Requirement Type Functional

ID 2.2.1.1 Light is Turned ON when the OSB system is activated.

Description

2.2.1.2

Requirement Type Functional

ID 2.2.1.2 Light is Turned OFF when the OSB system is deactivated.

Description

2.2.2

Requirement Type Functional

ID 2.2.2 LH / RH Light (Digital Output)

Description

2.2.2.1

Requirement Type Functional

ID 2.2.2.1 LH is Turned ON when the OSB system is activated, and vehicle is moving left.

Description

2.2.2.2

Requirement Type Functional

ID 2.2.2.2 RH is Turned ON when the OSB system is activated, and vehicle is moving Right.

Description

2.2.2.3

Requirement Type Functional

ID 2.2.2.3 No light is ON when tractor is moving straight.

Description

2.2.3

Requirement Type Functional

ID 2.2.3 Rear Side Turning Indicator Light (Digital Output

Description

2.2.3.1

Requirement Type Functional

ID 2.2.3.1 Left side Light is Turned ON when the OSB system is activated, and tractor is turning left.

Description

2.2.3.2

Requirement Type Functional

ID 2.2.3.2 Right side Light is Turned ON when the OSB system is activated, and tractor is turning right.

Description

2.2.3.3

Requirement Type Functional

ID 2.2.3.3 No activation when tractor is moving straight.

Description

2.2.4

Requirement Type Functional

ID 2.2.4 PWM Valve (PWM Controlled Output)

Description

2.2.4.1

Requirement Type Functional

ID 2.2.4.1 PWM VALVE is Turned ON when the OSB system is activated, and tractor is turning left side.

Description

2.2.4.2

Requirement Type Functional

ID 2.2.4.2 PWM VALVE is Turned ON when the OSB system is activated, and tractor is turning right side.

Description

2.2.4.3

Requirement Type Functional

ID 2.2.4.3 No activation when tractor is moving straight.

Description

2.2.4.4

Requirement Type Functional

ID 2.2.4.4 if brake pedal sensor is pressed –

Description

**if brake pedal sensor is pressed -**

· Activate - PWM Valve

· Activate - LH + RH Valve

2.2.5

Requirement Type Functional

ID 2.2.5 LH/RH Valve (Current Controlled Output)

Description

Two valves are used to control the brake onto the Tractor.

2.2.5.1

Requirement Type Functional

ID 2.2.5.1 LH is activated when the OSB system is activated, and tractor is turning left side.

Description

2.2.5.2

Requirement Type Functional

ID 2.2.5.2 RH is activated when the OSB system is activated, and tractor is turning right side.

Description

2.2.5.3

Requirement Type Functional

ID 2.2.5.3 No LH/RH activation when tractor is moving straight.

Description

2.2.5.4

Requirement Type Functional

ID 2.2.5.4 if brake pedal sensor is pressed –

Description

**if brake pedal sensor is pressed -**

· Activate - PWM Valve

· Activate - LH + RH Valve

2.3

Requirement Type Functional

ID 2.3 OSB MODES

Description

There are three modes for the OSB system:

2.3.1

Requirement Type Functional

ID 2.3.1 Disabled

Description

There are three modes for the OSB system:

2.3.2

Requirement Type Functional

ID 2.3.2 Enabled

Description

The OSB system is operational and is ready to control the vehicle, but the controls have not yet been taken over by the system.

2.3.3

Requirement Type Functional

ID 2.3.3 Activated

Description

The OSB system is taking over the driver's Brake control based on the wheel angle sensor value, brake paddle sensor, and the speed specified by the OSB system.

3

Requirement Type Functional

ID FUNCTIONAL REQUIREMENTS

Description

3.1

Requirement Type Functional

ID 3.1 ENABLING OSB

Description

3.1.1

Requirement Type Functional

ID 3.1.1 Ignition is ON.

Description

3.1.2

Requirement Type Functional

ID 3.1.2 OSB switch is ON.

Description

3.1.3

Requirement Type Functional

ID 3.1.3 Vehicle speed is within the target speed range (below 10kmph)

Description

3.2

Requirement Type Functional

ID 3.2 DISABLING OSB

Description

3.2.1

Requirement Type Functional

ID 3.2.1 OSB is disabled when one or more of the following are met:

Description

3.2.2

Requirement Type Functional

ID 3.2.2 Ignition is OFF.

Description

3.2.3

Requirement Type Functional

ID 3.2.3 OSB switch is OFF.

Description

3.2.4

Requirement Type Functional

ID 3.2.4 Vehicle speed is more than the target speed range (above 10kmph).

Description

3.2.5

Requirement Type Functional

ID 3.2.5 Wheel angle sensor output is within the range for moving straight.

Description

3.2.6

Requirement Type Functional

ID 3.2.6 Brake paddle has been pressed.

Description

3.3

Requirement Type Functional

ID 3.3 ACTIVATING OSB

Description

3.3.1

Requirement Type Functional

ID 3.3.1 OSB is activated when the following conditions are met:

Description

3.3.2

Requirement Type Functional

ID 3.3.2 Ignition is ON.

Description

3.3.3

Requirement Type Functional

ID 3.3.3 OSB switch is ON.

Description

3.3.4

Requirement Type Functional

ID 3.3.4 Vehicle speed is within the target speed range (below 10kmph).

Description

3.3.5

Requirement Type Functional

ID 3.3.5 Wheel angle sensor output is within the range for either turn.

Description

3.3.6

Requirement Type Functional

ID 3.3.6 Brake paddle has not been pressed.

Description

3.4

Requirement Type Functional

ID 3.4 SYSTEM INPUTS

Description

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Units** | **Description** |
| ignition\_button | boolean | - | Ignition Button |
| osb\_button | boolean | - | OSB Button |
| wheel\_angle | single |  | Wheel angle sensor |
| vehicle\_speed | single |  | Vehicle speed sensor |
| brake\_pedal | single |  | Brake pedal sensor |
| engine\_rpm | single |  | Engine RPM |

3.5

Requirement Type Functional

ID #83

Description

3.6

Requirement Type Functional

ID 3.5 SYSTEM OUTPUTS

Description

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Data type** | **Units** | **Description** |
| rh\_valve | boolean | - | Bucher Valve RH |
| lh\_valve | boolean | - | Bucher Valve LH |
| pwm\_valve | single | % | Bucher Valve Break solenoid. |
| left\_indicator | boolean | - | Left side indicator for cluster and rear fender |
| right\_indicator | boolean | - | Right side indicator for cluster and rear fender |