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simplex

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Automatic brake adjuster

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compliance

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:retarders

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:engine brake

:()
() ()

drive shaft
drive traine braking rotor
braking rotor braking stator
braking stator braking rotor .
braking rotor
drive shaft braking rotor

:()

: brake systems

:

()
operating concepts ()
design ()

:service brake system

: single-circuit brake system ()

: dual-circuit brake system ()

: secondary brake system

: parking brake system

: brake system on combination vehicle

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/ AGVW over run

: single-line brake system

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: dual-line brake system

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:operating concepts

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energy-assisted ()

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: muscular-energy brake system

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: power-assisted brake system

: power-brake system

: brake system with hydraulic energy as primary or boost medium

idle

brake valve ()
energy-assisted

power-assisted brake system with penumatic energy as primary or boost medium :

: vacuum-brake system

(manifold)
manifold
bar / bar () full throttle bar
/
/ / bar

: compressed-air brake system

idle

idle

bar

bar

;

;

:braking action

symbols

=a

t(b)

=a(m)

=a(max)

(N)

=F

(g)

=g

(N)

=G

(N)

=G(z)

(kg)

=m

(kg)

=m(z)

(bar)

=p

(bar)

=p(b)

$$\begin{aligned}
 & \text{(m)} & =s(o) \\
 & \text{(m)} & =s(b) \\
 & \text{(m)} & =s \text{ (tot)} \\
 & \text{(s)} & =t(o) \\
 & \text{(s)} & =t(a) \\
 & \text{(s)} & =t(b) \\
 & \text{(s)} & =t(\text{tot}) \\
 & \text{(s)} & =t(s) \\
 & \text{(s)} & =t(v) \\
 & \text{(m/s)} & =v \\
 & \text{(m/s)} & =v(1) \\
 & z=F/G & =z \\
 z \text{ (max)} & =(F.p(b)-0.4\text{bar}) / (G(z) .p -0.4\text{bar}) & =z \text{ (max)} \\
 & = \mu & \\
 & & : \mu \text{ (HF)}
 \end{aligned}$$

$$\begin{aligned}
 & \text{(a)} \\
 & \text{()}
 \end{aligned}$$

$$\begin{aligned}
 & \text{(t(b))} \\
 & \text{(t(a))} \\
 & \text{(t(s))} & \text{(a(max))} \\
 & \text{(t(b))} \\
 a(m) & =(v(1) - v(2)) / t(b) : \\
 : & v(2)=0 : & -() - \\
 & a(m)= v(1) / t(b) \\
 & t(b)
 \end{aligned}$$

$$t(s) \quad a(max)$$

$$t(b) = t(a) + (t(s) / v(1) / a(max)) \quad :$$

$$t(b) = \frac{t(s)}{v(1) / a(max)} + \frac{t(s)}{v(1) / a(max)} = \frac{t(s)}{v(1) / a(max)}$$

$$a(m) = \frac{t(s)}{v(1) / a(max)} = \frac{t(s)}{v(1) / a(max)}$$

braking retardation:

$$z = F/G$$

$$a = z.g$$

$$z(max) = \frac{F.p(b) - 0.4bar}{(G(z).p - 0.4bar)}$$

$$m(z) = \frac{F}{G(z)}$$

$$G(z) = \frac{F}{m(z)}$$

$$z(max) = \left(\frac{F}{m(z)} \right) * \left(\frac{F}{m(z)} \right)$$

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EU

, = service brake system

, = secondary brake system

, = parking brake system

total braking time :

$t(tot)$

$t(tot) = t(a) + t(b) + t(s)$

, = $t(tot) = (v(1) - v(2)) / a + (v(2) - v(1)) / b + t(s)$

total braking distance :

$s(tot)$

:

$v(1) - v(2)$

$s(tot) = \frac{v(1)^2 - v(2)^2}{2a} + \frac{v(2)^2 - v(1)^2}{2b} + v(1)t(s)$

$s(tot) = \frac{v(1)^2 - v(2)^2}{2a} + \frac{v(2)^2 - v(1)^2}{2b} + v(1)t(s)$

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$s(tot) = \frac{v(1)^2 - v(2)^2}{2a} + \frac{v(2)^2 - v(1)^2}{2b} + v(1)t(s)$

(brake force coefficient) static coefficient of friction

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: $\mu(HF)$

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$\mu(HF)$

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-()

-()

-()

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(ABS)

braking efficiency :

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$z (\max)$

:

:

$\mu (HF)$

$\epsilon = z (\max) / \mu (HF)$

:

:ABS

ABS

()

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)

(

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ABS

-()

-()

brake away-()

-()

driver counter steer-()

control concept :

ABS

(ECU)

λ

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() (ECU)

(ECU)

()

()

braking

ABS

over

brake slip

components :

ABS

-()

-() (ECU)

-() ()

:

wheel-speed sensor with pulse ring:

AC

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()

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(ECU) :

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ECU

ABS

ECU

.(- ECU -)

ECU

ABS

()

ABS

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-()

ABS

ABS

-()

pressure control valve :

operation :

ABS

-()

() .

yawing-moment build up delay:

μ -split

ABS

()

()

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applications :

IRM/4S/4K

4K

4S

IR

IRM

ASR traction control :ASR

:

ASR.

ABS

ASR

ASR.

:

brake control circuit :

"

ECU

ECU .

(shuttle)

ASR

ASR

closed-loop engine control circuit :

ECU

ECU

-()

-()

() p

-()

() M

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(drive)

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ECU

mand pare

ASR