

The logo is a red shield with a white border, centered on a grey diamond plate background. The shield contains the text 'TMC' in large white letters, 'TECHNICAL & MAINTENANCE CONFERENCE' in smaller white letters with a horizontal line below it, and 'PACCAR & DEALER' in white letters with a small truck icon above the word 'PACCAR'.

TMC

TECHNICAL & MAINTENANCE
CONFERENCE

PACCAR & DEALER

2017



Smart braking systems

Bob Woodward - ATA / RFT, Session Chair

Thomas Belcher – Federal Department of Infrastructure & Regional Development, Standards Division

Ian Thomson - BPW Transpec, Engineering

Peter Verde - SAF Holland

Chris Blanchard - Herb Blanchard Haulage

David McCormick - Rivet Energy



Bob Woodward
Australian Trucking Association
& Ron Finemore Transport
Session Chair



Thomas Belcher

Standards Development & International
Vehicle Safety Standards Branch



Australian Government

Department of Infrastructure and Regional Development



BACKGROUND

HEAVY VEHICLE BRAKING

Mandating Electronic Stability Control (ESC) for heavy vehicles is an agreed priority under the National Road Safety Strategy (NRSS) and 2015-2017 Action Plan, as endorsed by transport Ministers in November 2014.

Implementation:

- Development of a regulatory package in accordance with the NRSS.
- Adoption of Australian Design Rule (ADR) requirements (subject to Regulation Impact Statement outcomes).

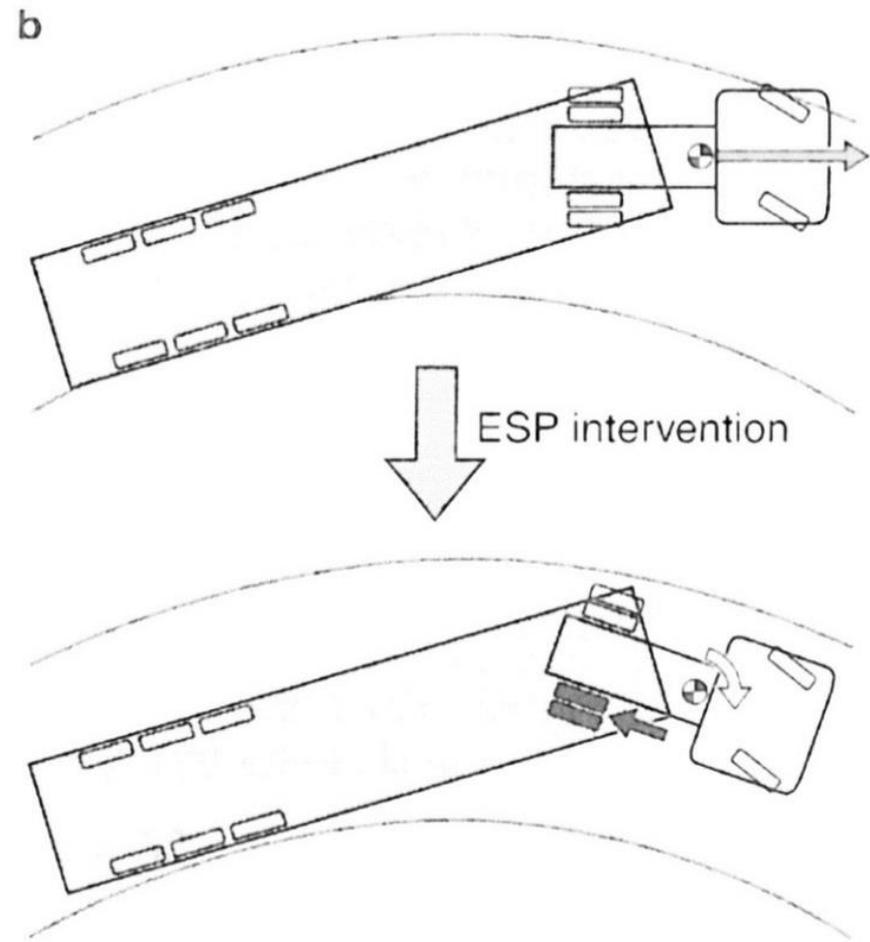
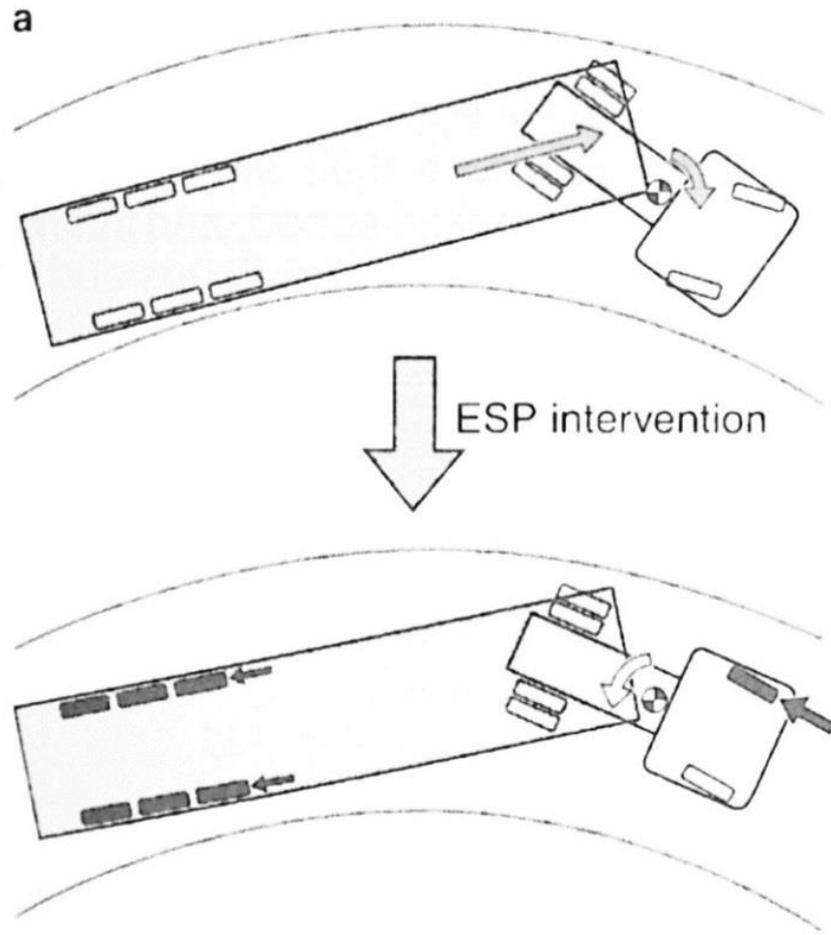


ADR 35 AND 38 DEVELOPMENT

- Working with industry reference group on development of draft ADRs
- ADR 35/06 being developed to require stability control for prime movers and heavy buses
 - Functional requirements (directional and rollover)
 - Demonstration of ESC performance through United Nations UN ECE R13/11 Approval or a J-turn test based on that in US
- ADR 38/05 being developed to require stability control for heavy trailers.
 - Functional requirements (rollover only)
 - Excludes converter dollies and certain low-loaders

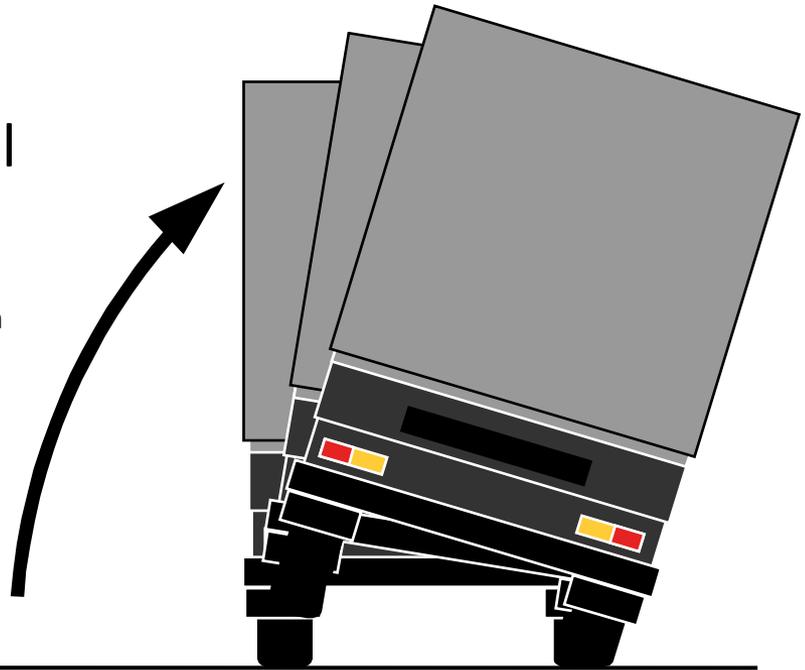
a) Vehicle oversteering,
b) Vehicle understeering.

- ➔ Braking force
- ↻ Yaw-moment adjustment
- ➔ } Direction of motion
- ↻ } of the (part) vehicle



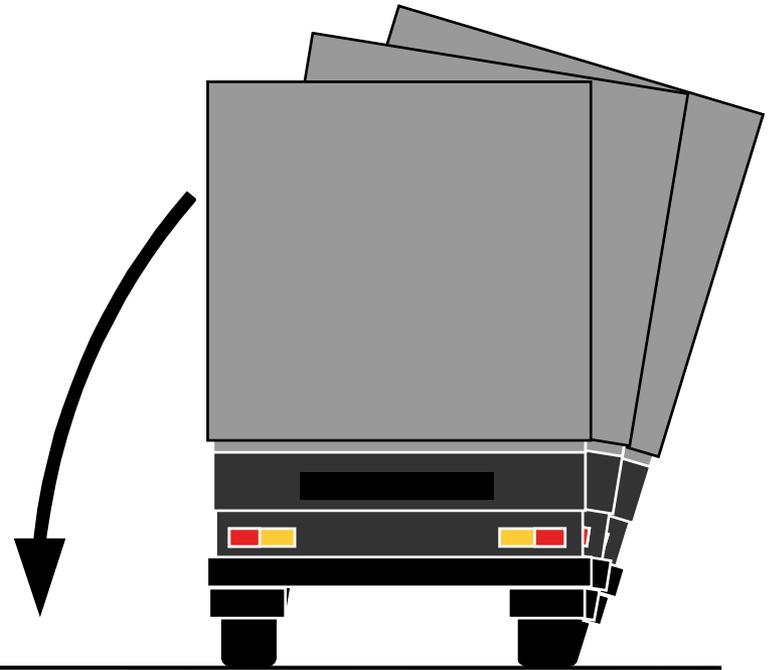
- Stability function needs to incorporate at least rollover control (RSC).

- Rollover control automatically brakes at least two wheels of each Axle or Axle Group when the system detects, from values of the vertical force on the tyre(s) or lateral acceleration and wheel speeds, that the trailer is at risk of rollover.



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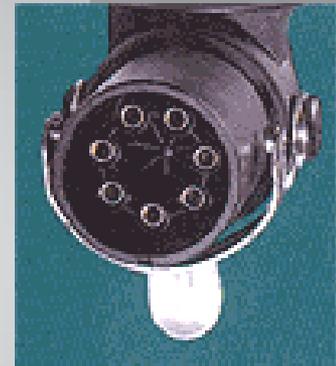
ELECTRICAL CONNECTORS FOR TRAILER ABS/RSC

- A 24 V connector required for trucks designed to be used in 'Road Train' combinations, to power trailer ABS/RSC systems

Additional 12 V connector permitted

- A 24 V connector required at front and rear of 'Road Train' trailers designed to tow another trailer (>4.5 tonnes 'ATM')

Additional 12 V connector permitted





OTHER KEY ELEMENTS OF THE DRAFT ADRs 35 AND 38

- Auto slack adjusters for all trucks/trailers
- Operation of the parking brake control must result in application of trailer spring brakes (no parking on air)
- Switch allowed for operator to disable truck and trailer stability control system for low speed manoeuvring
 - Truck systems must also automatically reset on each ignition cycle
- Trailers (excluding converter dollies and certain low-loaders) to be equipped on each Axle Group with an Antilock Brake System (ABS)



PUBLIC CONSULTATION PROCESS

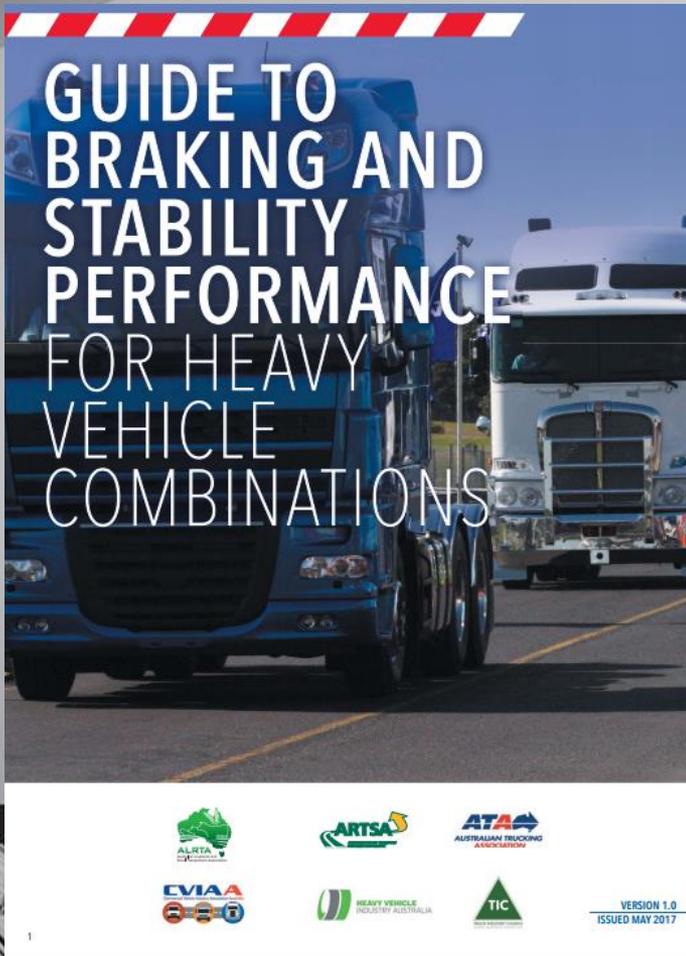
- Regulation Impact Statement (RIS) released around late October 2017 for a minimum of 4 weeks
- DRAFT ADRs released with RIS
- FINAL ADRs determined following RIS consultation
- Usually at least 18-24 months lead time once published (therefore from approx. 2019-20 onwards)
- Shorter lead time needed for trailers than for trucks and buses



Ian Thomson
BPW Transpec
Stability control

Smart Braking:

- Hope you are all familiar with the guide by now
- If not please download or request a hard copy
- If you need any interpretations or assistance please ask.
- The aim of the guide is to help



Smart Braking

Use the guide to:

- Determine best braking combinations from your fleet
- Assist with purchase decisions for you fleet
- Achieve safer braking and stability outcomes for a given combination
- Give confidence/assurance of how a combination is put together

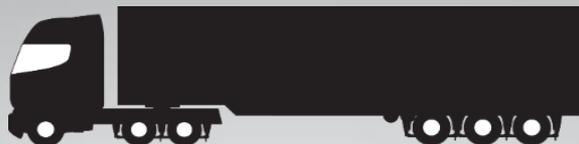


Brake System: Truck	Trailer Brake System Power Yes/No	Brake System: Semi Trailer/ Dog Trailer / Lead Trailer/Dolly														
		Basic			LSV			ABS			T-EBS (No Roll Stability)			T-EBS with Roll Stability		
		Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability
Basic	✓	2	1	1	1	2	1	2	2	1	1	3	1	1	3	3
	x	2	1	1	1	2	1	2	1	1	2	1	1	2	1	1
LSV	✓	1	1	1	3	2	1	1	2	1	4	3	1	4	3	3
	x	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1
ABS	✓	2	2	1	1	2	1	2	3	1	1	4	1	1	4	4
	x	2	2	1	1	2	1	2	3	1	2	2	1	2	2	1
ABS with ESC	✓	2	3	3	1	3	3	2	4	3	1	5	3	1	5	5
	x	2	3	3	1	3	3	2	4	3	2	3	3	2	3	3
EBS - Truck (No ESC)	✓	1	2	1	4	2	1	1	3	1	5	4	1	5	4	4
	x	1	2	1	3	2	1	1	3	1	1	2	1	1	2	1
EBS with ESC	✓	1	3	3	4	3	3	1	4	3	5	5	3	5	5	5
	x	1	3	3	4	3	3	1	4	3	1	3	3	1	3	3

Table 3: performance rating for truck and trailer

Rating:	Poor	Base	Good	Better	Best
	1	2	3	4	5

Compatibility development truck & semi trailer



Brake System: Truck	Trailer Brake System Power Yes/No	Brake System: Semi Trailer / Dog Trailer / Lead Trailer / Dolly														
		Basic			LSV			ABS			T-EBS (No Roll Stability)			T-EBS with Roll Stability		
		Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability	Light Braking	Heavy Braking	Roll Stability
Basic	✓	2	1	1	1	2	1	2	2	1	1	3	1	1	3	3
	✗	2	1	1	1	2	1	2	1	1	2	1	1	2	1	1
LSV	✓	1	1	1	3	2	1	1	2	1	4	3	1	4	3	3
	✗	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1
ABS	✓	2	2	1	1	2	1	2	3	1	1	4	1	1	4	4
	✗	2	2	1	1	2	1	2	3	1	2	2	1	2	2	1
ABS with ESC	✓	2	3	3	1	3	3	2	4	3	1	5	3	1	5	5
	✗	2	3	3	1	3	3	2	4	3	2	3	3	2	3	3
EBS - Truck (No ESC)	✓	1	2	1	4	2	1	1	3	1	5	4	1	5	4	4
	✗	1	2	1	3	2	1	1	3	1	1	2	1	1	2	1
EBS with ESC	✓	1	3	3	4	3	3	1	4	3	5	5	3	5	5	5
	✗	1	3	3	4	3	3	1	4	3	1	3	3	1	3	3



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Basic	✓	2	1	1	1	2	1	2	2	1	1	3	1	1	3	3
	✗	2	1	1	1	2	1	2	1	1	2	1	1	2	1	1
LSV	✓	1	1	1	3	2	1	1	2	1	4	3	1	4	3	3
	✗	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1
ABS	✓	2	2	1	1	2	1	2	3	1	1	4	1	1	4	4
	✗	2	2	1	1	2	1	2	3	1	2	2	1	2	2	1
ABS with ESC	✓	2	3	3	1	3	3	2	4	3	1	5	3	1	5	5
	✗	2	3	3	1	3	3	2	4	3	2	3	3	2	3	3
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	✗	1	2	1	3	2	1	1	3	1	1	2	1	1	2	1
EBS with ESC	✓	1	3	3	4	3	3	1	4	3	5	5	5	5	5	5
	✗	1	3	3	4	3	3	1	4	3	1	3	3	1	3	3



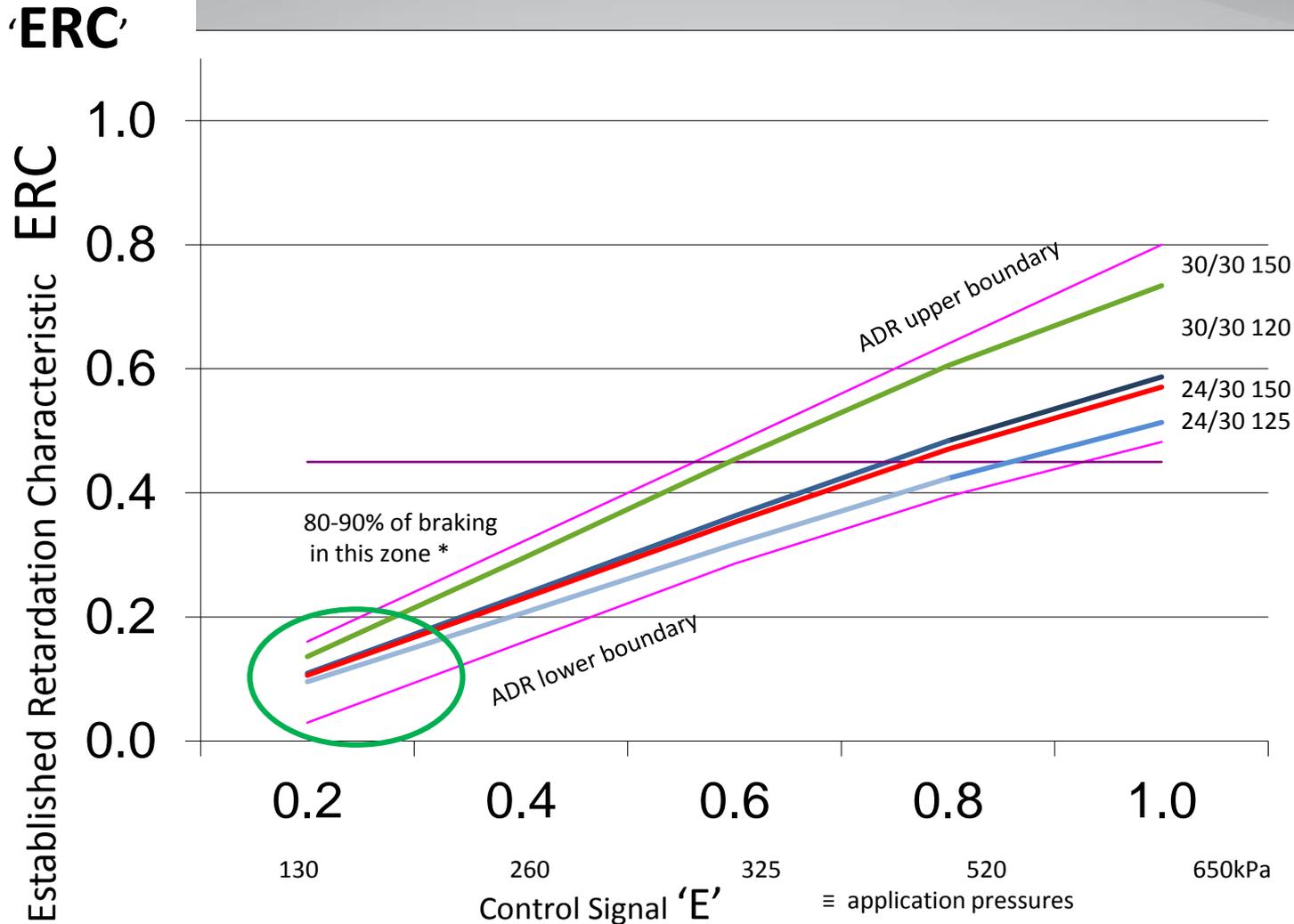
Euro vs US type settings

- We have a mixture of European and US style truck brake settings in our market
- European settings have typically used load sensing in their truck EBS settings for some time and US typically don't account for load sensing but rely more on the ABS function to prevent lock up
- The difference in these settings can add to the complexity of brake compatibility and wear issues
- For best compatibility each part of the combination should look after the brake load of that part.



Onset of Braking

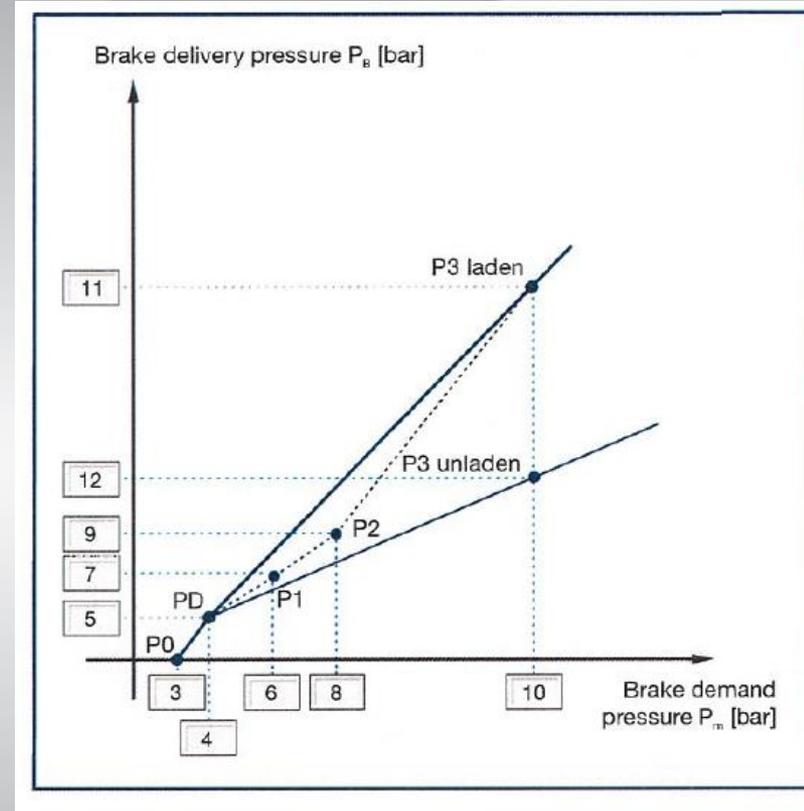
- With ABS you cant modify braking onset
- With EBS you can modify the braking onset



Contact Pressure and Onset points

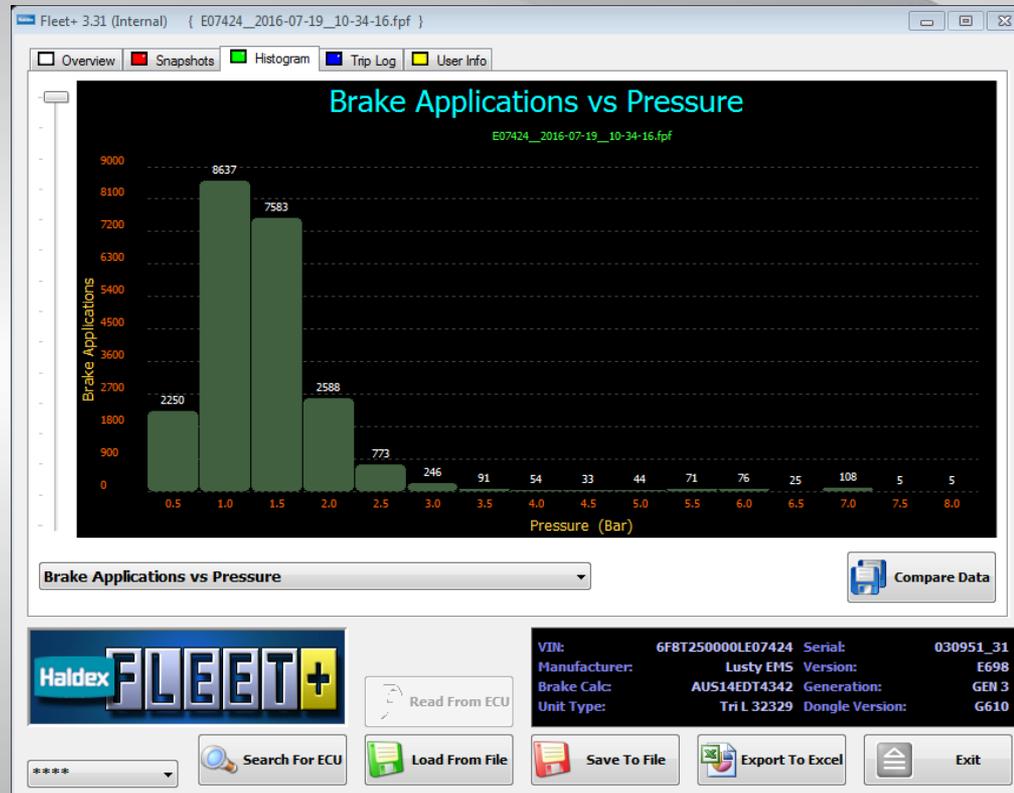
EBS enables greater flexibility for brake settings:

- The Brake booster size and slack adj. length effect brake onset
- Disc and drum brake start to operate at different pressures
- Through the EBS programming we can set some of the brake pressures
- The changes we make to pressure settings help better match overall brake performance across the whole vehicle
- **Always start with a correctly adjusted mechanical/pneumatic brake set up**



Trailer EBS (TEBS) Brake outputs

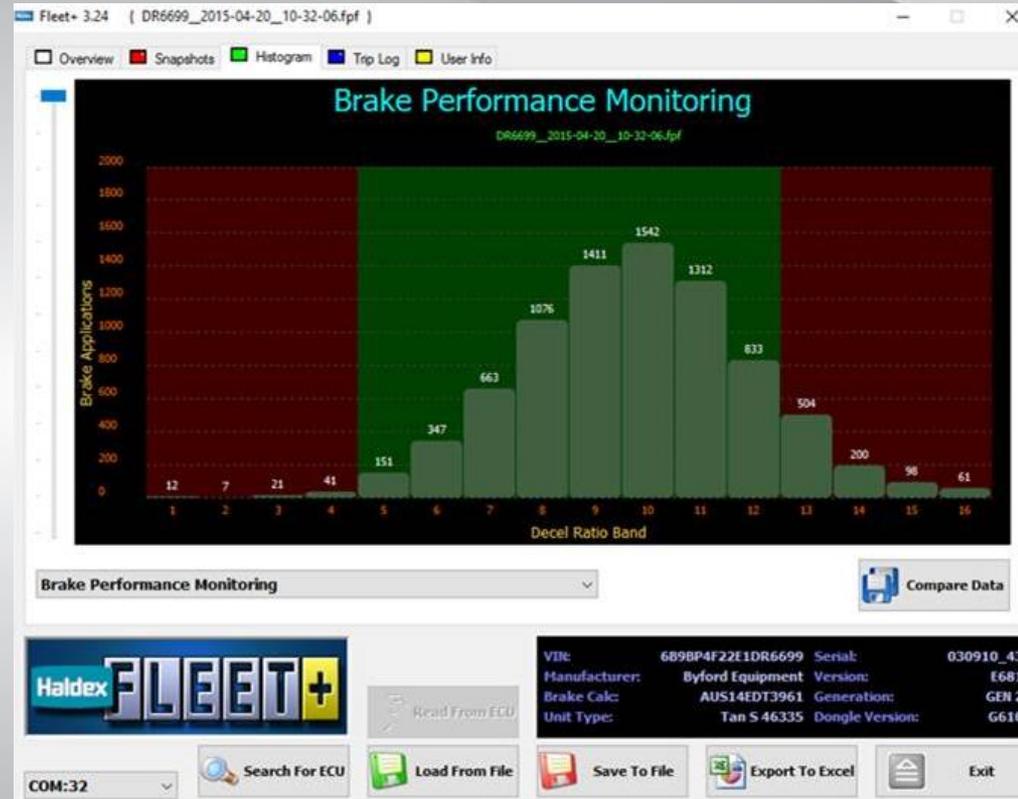
TEBS logs data to help with assessing what adjustments are required to improve the braking, it can also provide feedback to help reduce maintenance costs and encourage safer driving practises



Trailer EBS (TEBS) Brake outputs

With TEBS:

- Varying systems will give a log of Brake Performance or harsh brake application counts
- These logs also help with assessing how the vehicle braking and or driver is performing



Additional things to consider

- Simple ongoing checks/maintenance of wiring and connectors will limit problems
- Take care to check the basics: brake adjustment, booster condition, EBS power, air supply cleanliness and valve air filter...
- ABS/EBS and Roller Brake testing?



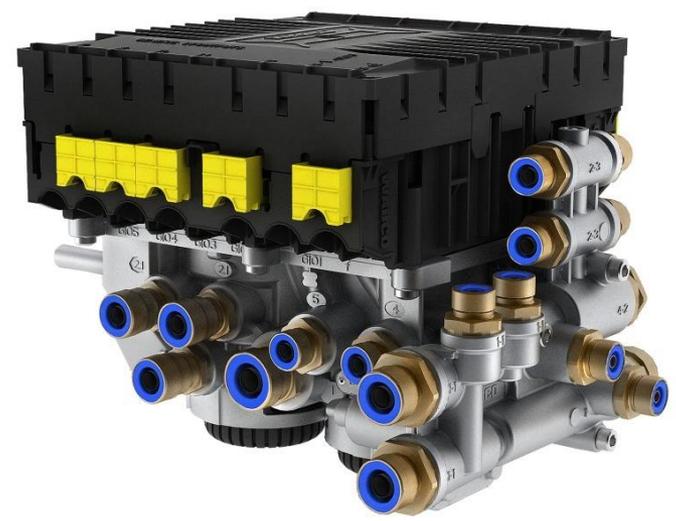
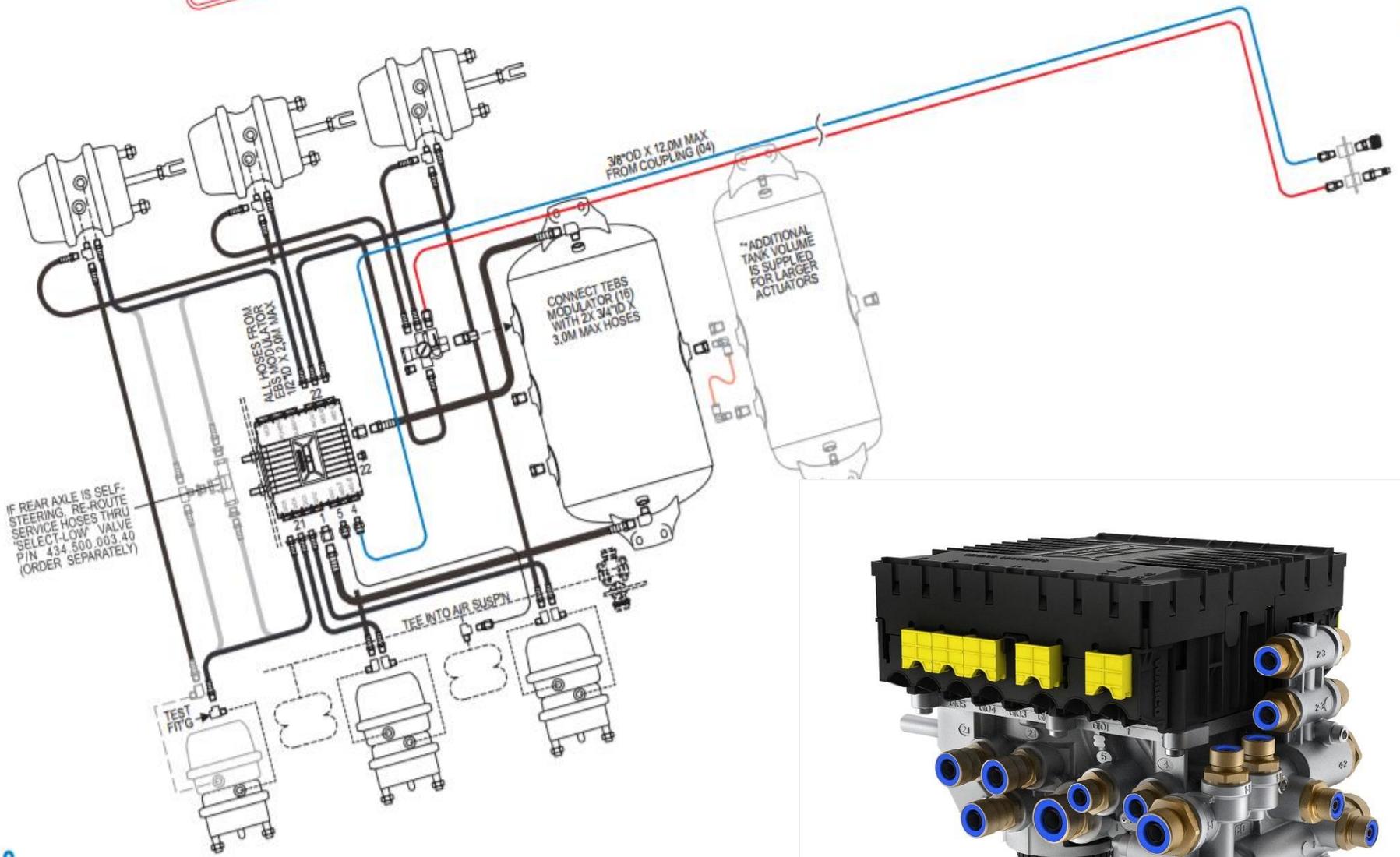


Chris Blanchard
Herb Blanchard Haulage
TEBS by accident



3 AXLE SEMI TEBS+RSS

38/04 SARN
30731





TEBS by accident!

'06 Trailers with smart brake systems & retro'ing older units

'07 PBS compliant units with TEBS equipped trailers

- Tyre flat spotting
- Brake by wire and balance with improved performance
- Reduced maintenance costs through improved brake wear, up to 150% life improvement
- Safer empty braking and excellent loaded performance
- Driver reluctance and acceptance
- ODR/OBD => reporting
(ABS/jackknife/heavy braking & rollover interventions)

Backup –

System supplier diagnostic software/training FoC for owner



TEBS by accident!

Design issues

- TEBS over ABS
- '06 - 24volt Vs 12volt / CAN comm's
- ADR's did not assist ABS/TEBS on some new vehicles

Maintenance issues

Very few running highway and regional roads with bit of dirt

- Dirty poll rings ≈
wheel seal failure, sensors moving, excessive bearing play



TEBS by accident!

Moving forward with TEBS

- Onboard in Dash Scales => Smart Board (if fitted)
- ETASC (Electronic Trailer Air Suspension Control)
- Optiturn - improved turning / reduced tyre wear at low speeds
- Tailguard - Improved safety and damage reversing

Many other untapped functions

- AEB (Autonomous Emergency Braking) may need TEBS

Not 1 flat spotted tyre on a smart trailer since 2006!

\$\$\$\$\$\$\$ saved

Safety! How many unknown accidents has it saved us?



dirna

HERB
plantha
HAULAGE
ON 66421

HAULAGE



David McCormick

Rivet Energy

Learnings and Maintenance to Ensure EBS
works correctly



Rivet Maintenance Long and Short Haul

To ensure our fleet is compliant and all braking systems are working correctly Rivet has put in to place a stringent service and maintenance schedule

Asset Code	REGO	Service Freq
RMVP2048	1HL5GJ	20k (45d), 600k (1,350d)
MVP887	ZSQ699	15k (45d), 600k (1,350d)
RMVP2043	1HL5FX	20k (45d), 600k (1,350d)
RMVP2047	1HE2XY	20k (45d), 600k (1,350d)
MVP884	ZSQ681	20k (45d), 600k (1,350d)
MVP892	1KJ7SY	20k (45d), 600k (1,350d)
RMVP867	1FW9VU	20k (45d), 600k (1,350d)
RMVP2055	1HO6QO	20k (45d), 600k (1,350d)
MVP869	1FV8OF	20k (45d), 600k (1,350d)
RMVP2053	1HO6QJ	20k (45d), 600k (1,350d)
MVP2040	LPG555	20k (45d), 600k (1,350d)
MVP2044	1HL5GI	20k (45d), 600k (1,350d)
RMVP866	1KP1RC	20k (45d), 600k (1,350d)
RMVP2054	1HO6QK	20k (45d), 600k (1,350d)
RMVP881	ZST254	20k (45d), 600k (1,350d)
RMVP2049	1HL5GM	20k (45d), 600k (1,350d)
RMVP856	LPG777	15k (45d), 600k (1,350d)
MVP826	1JM1SC	15k (45d), 600k (1,350d)
RMVP2020	1AD1UY	20k (45d), 600k (1,350d)
RMVP2050	1HL5FZ	20k (45d), 600k (1,350d)
RMVP2017	1EW1UI	20k (45d), 600k (1,350d)
RMVP2010	1EW1OR	20k (45d), 600k (1,350d)
MVP2014	1EW1UH	15k (45d), 600k (1,350d)
RMVP2009	1ER2AS	20k (45d), 600k (1,350d)
MVP850	1KU6XN	20k (45d), 600k (1,350d)
MVP894	ZUQ718	20k (45d), 600k (1,350d)
MVP851	1KF4WV	20k (45d), 600k (1,350d)
RMVP2012	HTC100	20k (45d), 600k (1,350d)



Maintenance Trailing Equipment

- 45 days as a minimum
- Tyre pressures checked
- Brake test / shaker completed
- Wheel bearings checked
- Autoslacks checked
- Brake stroke checked to ensure no over stroking
- EBS leads and wiring checked
- 6 Monthly: quality audits on all equipment
- All tow operators must comply to our maintenance standards
- Annually: wheel bearings complete strip/ inspect and replacement if required



Month of Sep

Company and Tow Haulier:

- 953193 kms travelled
- Average of 12709 kms per vehicle
- CPK average .373 (Company Fleet)

Road Authority Inspections for Sep 17: 5

Defects Issued 1 (Brake Imbalance/Adjustment)

Inspections Jan 17 to Sep 17 Total: 91

Defects issued (Brake imbalance/Adjustment) **3**



Smart braking systems and getting the best out of them

Panel Q &A

Bob Woodward - ATA / RFT, Session Chair

Thomas Belcher - DIRD, Standards Division

Ian Thomson - BPW Transpec, Engineering

Peter Verde - SAF Holland, Engineering

Chris Blanchard - Herb Blanchard Haulage

David McCormick - Rivet Energy