Automatic Air Brake Controllers

Westinghouse No 4 Automatic Brake Valve
Westinghouse G-6 Automatic Brake Valve
Westinghouse 5-ET and Westinghouse 6-ET braking systems
Westinghouse A-6-ET and Westinghouse A-7-EL braking systems (Australia)
Westinghouse 6-B braking system
Westinghouse 8-ET braking system
Westinghouse 14-EL Braking System
Westinghouse 24-RL braking system
Westinghouse 26-L braking system
Westinghouse M6a brake valve and Westinghouse M8a brake valve (UK)
Metcalfe Oerlikon FV4 brake valve (UK)
Davies & Metcalfe E70, Westinghouse 'Westcode' DW1, DW2 and DW3 brake systems
SNCF PBL brake system
Driver's Valve No. 394 (Russia)
Knorr Driver's Brake Valves K1 No 8 No 10 No 14
Knorr Self Regulating Driver's Brake Valves Type C
Knorr Self Regulating Driver's Brake Valves Type D
Knorr St 60 Driver's Brake Valve
Knorr St 125 Driver's Brake Valve

EP Brake Controllers

Westinghouse type 'A' electro-pneumatic braking system
Westinghouse electro-pneumatic braking system used on LT O and P stock
Westinghouse type 'D' electro-pneumatic braking system
Westinghouse Westcode 3 step braking system
Driver's Valve No. 395 (Russia)

Vacuum Brake Controllers

Vacuum Brake Controller for Steam Locomotives with Combination Ejector
Vacuum Brake Controller for Steam Locomotives with Separate Ejector and Electric Trains
Gresham & Craven Type SJ Self-Lapping controller with Combination Ejector
Gresham & Craven Type SSJ Self-Lapping controller with Separate Ejector
Vacuum Brake Controller for Diesel and Electric Locomotives
Vacuum Brake Controller for Diesel Multiple Units using Twin Pipe Vacuum Brakes
Westinghouse M6a brake valve and Westinghouse M8a brake valve
Metcalfe Oerlikon FV4 brake valve

Westinghouse No 4 Automatic Brake Valve
Westinghouse G-6 Automatic Brake Valve

Does not have graduated release (also not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Brake pipe connected directly to Main Reservoir – brakes released rapidly, ATP may be overcharged.	TrainBrakesControllerOverchargeStart
Running	Brake Pipe pressure controlled by Eq Res - creates and maintains 70 psi in brake pipe.	TrainBrakesControllerReleaseStart
Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Apply	Allows air to escape slowly from brake pipe. Used to obtain service application.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

Westinghouse 5-ET and Westinghouse 6-ET braking systems

Westinghouse H-5 Automatic Brake Valve (used in 5-ET braking system)
Westinghouse H-6 Automatic Brake Valve (used in 6-ET and 6-B braking systems)

Train brake – automatic air brake does not have graduated release (also is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Brake pipe connected directly to Main Reservoir – brakes released rapidly, ATP may be overcharged*.	TrainBrakesControllerOverchargeStart
Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
Holding	Creates and maintains working pressure in brake pipe - Only train brakes are released - Locomotive (and tender) brakes NOT released.	*Not currently available in OR*
Lap**	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Apply	Allows air to escape slowly from brake pipe. Used to obtain service application.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

* Engine drivers are instructed not to leave the handle in this position as this would lead to overcharging – they should return the handle to the Running position when working pressure is reached.

** This position is also the ‘neutral’ position that should by used by the second locomotive when double heading.

Westinghouse S-5 Independent Brake Valve (used in 5-ET braking system)
Westinghouse S-6 Independent Brake Valve (used in 6-ET braking system)

Locomotive brake – independent air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Releases locomotive brake fully even when train brake is applied	EngineBrakesControllerFullQuickReleaseStart * Bail Off *
Running	Releases locomotive brake to the same amount as automatic train brake	EngineBrakesControllerRunningStart
Lap	Holds brake cylinder pressure	EngineBrakesControllerHoldLappedStart
Slow Application	Gradually applies locomotive brake	EngineBrakesControllerFullServiceStart
Quick Application	Rapidly applies locomotive brake	EngineBrakesControllerEmergencyStart

Westinghouse A-6-ET and Westinghouse A-7-EL braking systems

(Australian version of 6-ET braking system and equivalent for diesel and electric locomotives.)

Train brake – automatic air brake does not have graduated release (also is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release*	Brake pipe connected directly to Main Reservoir – brakes released rapidly, ATP may be overcharged*.	TrainBrakesControllerOverchargeStart*
Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
Lap	Gives a minimum reduction of 6-8 psi after which brake pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerMinimalReductionStart
Apply	Allows air to escape slowly from brake pipe. Used to obtain service application.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

* Engine drivers are instructed not to leave the handle in this position as this would lead to overcharging – they should return the handle to the Running position when 70 psi is reached. Air is released through a small valve to provide an audible reminder when the brake handle is in this position.

Locomotive brake – independent air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Releases locomotive brake fully even when train brake is applied	EngineBrakesControllerFullQuickReleaseStart * Bail Off *
Running	Releases locomotive brake to the same amount as automatic train brake	EngineBrakesControllerRunningStart
Lap	Holds brake cylinder pressure	EngineBrakesControllerHoldLappedStart
Slow Application	Gradually applies locomotive brake	EngineBrakesControllerFullServiceStart
Quick Application	Rapidly applies locomotive brake	EngineBrakesControllerEmergencyStart

Westinghouse 6-B braking system

Westinghouse H-6 Automatic Brake Valve (used in 6-ET and 6-B braking systems)

Train brake – automatic air brake does not have graduated release (also is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Brake pipe connected directly to Main Reservoir – brakes released rapidly, ATP may be overcharged*.	TrainBrakesControllerOverchargeStart
Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
Holding	Creates and maintains working pressure in brake pipe - Only train brakes are released - Locomotive (and tender) brakes NOT released.	*Not currently available in OR*
Lap**	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Apply	Allows air to escape slowly from brake pipe. Used to obtain service application.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

* Engine drivers are instructed not to leave the handle in this position as this would lead to overcharging – they should return the handle to the Running position when working pressure is reached.

** This position is also the ‘neutral’ position that should by used by the second locomotive when double heading.

Westinghouse LA-6P Independent Brake Valve (used in 6-B braking system)

Locomotive brake is self-lapping and has graduated release.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running*	Releases locomotive brake*	*Bail Off* EngineBrakesControllerFullQuickReleaseStart*
Full Application	Pressure in brake cylinder depends on position of handle	EngineBrakesControllerContinuousServiceStart

* If the brake handle is pushed downwards in this position the engine brake is release or ‘Bail Down’ an automatic brake application on all locomotives regardless of the train brake position.

Westinghouse 8-ET braking system

Westinghouse L-8-PA Brake Valve (used in 8-ET braking system)

Train brake – automatic air brake does not have graduated release (also is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Brake pipe connected directly to Main Reservoir – brakes released rapidly, ATP may be overcharged*.	TrainBrakesControllerOverchargeStart
Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
First Service	Gives a minimum reduction of 6-8 psi	TrainBrakesControllerMinimalReductionStart
Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Apply	Allows air to escape slowly from brake pipe. Used to obtain service application.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

* Engine drivers are instructed not to leave the handle in this position as this would lead to overcharging – they should return the handle to the Running position when the working pressure is reached. Air is released through a small valve to provide an audible reminder when the brake handle is in this position.

Locomotive brake – independent air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Releases locomotive brake fully even when train brake is applied	EngineBrakesControllerFullQuickReleaseStart * Bail Off *
Running	Releases locomotive brake to the same amount as automatic train brake	EngineBrakesControllerRunningStart
Lap	Holds brake cylinder pressure	EngineBrakesControllerHoldLappedStart
Slow Application	Gradually applies locomotive brake	EngineBrakesControllerFullServiceStart
Quick Application	Rapidly applies locomotive brake	EngineBrakesControllerEmergencyStart

Westinghouse 14-EL Braking System

Westinghouse K-14 Brake Valve (used in 14-EL braking system)

Train brake – automatic air brake does not have graduated release (also is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Brake pipe connected directly to Main Reservoir – brakes released rapidly, ATP may be overcharged.	TrainBrakesControllerOverchargeStart
Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
Holding	Creates and maintains working pressure in brake pipe - Only train brakes are released - Locomotive (and tender) brakes NOT released.	*Not currently available in OR*
Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Apply	Allows air to escape slowly from brake pipe. Used to obtain service application.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

Locomotive brake – independent air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Releases locomotive brake fully even when train brake is applied	EngineBrakesControllerFullQuickReleaseStart * Bail Off *
Running	Releases locomotive brake to the same amount as automatic train brake	EngineBrakesControllerRunningStart
Lap	Holds brake cylinder pressure	EngineBrakesControllerHoldLappedStart
Slow Application	Gradually applies locomotive brake	EngineBrakesControllerFullServiceStart
Quick Application	Rapidly applies locomotive brake	EngineBrakesControllerEmergencyStart

Westinghouse 24-RL braking system

This system can be used as an ‘EP’ braking system if used with coaching stock fitted with ‘EP’ brakes. Air train pipe pressure is reduced for all brake applications.

Westinghouse D-24 Automatic Brake Valve (used in 24-RL braking system)

Train brake – automatic air brake does not have graduated release (also is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Brake pipe connected to Main Reservoir via feed valve – overcharge is not possible.	TrainBrakesControllerFullQuickReleaseStart
Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
Pressure Maintaining	Maintains Reduced pressure in brake pipe against leakage.	TrainBrakesControllerRunningStart
Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Service	Allows air to escape slowly from brake pipe. Used to obtain service application.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

S-40 Indpendent Brake Valve (used in 24-RL braking system)

Locomotive brake is self-lapping and has graduated release.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running*	Releases locomotive brake*	*Bail Off*
Full Application	Pressure in brake cylinder depends on position of handle	EngineBrakesControllerContinuousServiceStart
Freight Emergency	Full brake application on all locomotives – overides delay in Freight mode	EngineBrakesControllerEmergencyStart

* If the brake handle is pushed downwards in this position the engine brake is release or ‘Bail Down’ an automatic brake application on all locomotives regardless of the train brake position.

Westinghouse 26-L braking system

This system can be used as an ‘EP’ braking system if used with coaching stock fitted with ‘EP’ brakes. Air train pipe pressure is reduced for all brake applications.

Westinghouse 26-C Automatic Brake Valve (used in 26-L braking system)

Train brake – automatic air brake is self lapping and has graduated release in Passenger Mode, but brake system does not have graduated release in Freight Mode

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running	Creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
Minimum Reduction	Minimum brake pipe pressure reduction	TrainBrakesControllerContinuousServiceStart
Service	Reduction in brake pipe pressure depends on position of handle	
Suppresion	Full Service brake application is made and any penalty application is suppressed.	TrainBrakesControllerSuppressionStart
Neutral Handle Off	Neutral position for trailing cabs	TrainBrakesControllerNeutralHandleOffStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

SA-26 Indpendent Brake Valve (used in 26-L braking system)

Locomotive brake is self-lapping and has graduated release.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running*	Releases locomotive brake*	EngineBrakesControllerFullQuickReleaseStart*
Apply	Pressure in brake cylinder depends on position of handle	EngineBrakesControllerContinuousServiceStart

* If the brake handle is pushed downwards in this position the engine brake is released regardless of the train brake position.

The train brake controllers described on this page were used in UK on dual braked locomotives fitted with both twin pipe air brakes and single pipe vacuum brakes.

For vacuum brake operation see below.

Westinghouse M6a brake valve and Westinghouse M8a brake valve (air operation)

Train brake – automatic air brake has graduated release and is self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release*	Overcharges brake pipe to 76 psi / 5.4 bar Releases brakes and charges reservoirs	TrainBrakesControllerOverchargeStart*
Running	Creates and maintains 70 psi / 5.0 bar in ATP Releases brakes	TrainBrakesControllerReleaseStart
First Application	Reduces ATP pressure to 63 psi / 4.5 bar	TrainBrakesControllerContinuousServiceStart
	Reduction in brake pipe pressure depends on position of handle	
Full Service	Reduces ATP pressure to 45 psi / 3.2 bar	
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

* Release position is sprung

Metcalfe Oerlikon FV4 brake valve (air operation)

Train brake – automatic air brake has graduated release and is self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
Fill*	Overcharges brake pipe to 75-78 psi Releases brakes and charges reservoirs	TrainBrakesControllerOverchargeStart*
Running	Creates and maintains 70 psi in ATP Releases brakes	TrainBrakesControllerReleaseStart
Initial	Gives minimal reduction in ATP pressure	TrainBrakesControllerContinuousServiceStart
	Reduction in brake pipe pressure depends on position of handle	
Full Service	Gives full service reduction in ATP pressure	
Re-Application	Reduces ATP pressure below full service	*Not currently available in OR*
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

* Fill position is sprung

Indpendent Brake Valve (Metcalfe Oerlikon FD1 and similar Westinghouse)

Locomotive straight air brake is self-lapping and has graduated release.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Brake Off	Pressure in brake cylinder depends on position of handle	EngineBrakesControllerContinuousServiceStart
Brake On		

Davies & Metcalfe E70, Westinghouse ‘Westcode’ DW1, DW2 and DW3 brake systems

This system can be used as an ‘EP’ braking system if used with coaching stock fitted with ‘EP’ brakes. Air train pipe pressure is reduced for all brake applications.

In UK, when used on HST, class 90+DVT and class 91+DVT formations electrical signals are used to propagate brake application from both ends of the train – hence the system operates similarly to an EP system for power cars, locomotives and driving trailers, but as a conventional twin pipe air brake on intermediate trailer vehicles.

Train brake – automatic air brake has graduated release and is self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
RELS*	Used to rapidly realease the brakes	TrainBrakesControllerFullQuickReleaseStart*
RUN	Creates and maintains 5.0 bar in ATP Releases brakes	TrainBrakesControllerReleaseStart
1. INI	Reduces ATP pressure to 4.60 bar	TrainBrakesControllerEPApplyStart
2.	Reduces ATP pressure to 4.35 bar	TrainBrakesControllerEPApplyStart
3.	Reduces ATP pressure to 4.10 bar	TrainBrakesControllerEPApplyStart
4.	Reduces ATP pressure to 3.85 bar	TrainBrakesControllerEPApplyStart
5.	Reduces ATP pressure to 3.60 bar	TrainBrakesControllerEPApplyStart
6. FULL SERV**	Reduces ATP pressure to 3.35 bar	TrainBrakesControllerEPApplyStart
EMGY	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

* Release position is sprung
* Release position is blanked off on HST power cars

* A separate **OVERCHARGE** button is provided on locomotives and DVT when pressed and released this automatically overcharges the brake pipe to 5.4 bar.

** This is the neutral position for trailing cabs.

Locomotive brake – independent air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Releases locomotive brake	EngineBrakesControllerReleaseStart
Lap	Holds brake cylinder pressure	EngineBrakesControllerRunningStart
Apply	Gradually applies locomotive brake	EngineBrakesControllerFullServiceStart

SNCF PBL 90 brake system

This system can be used as an ‘EP’ braking system if used with coaching stock fitted with ‘EP’ brakes. Air train pipe pressure is reduced for all brake applications.

Train brake – automatic air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release*	Increases train pipe pressure – up to maximum 5.0 bar - releases brakes	TrainBrakesControllerReleaseStart*
Lap	Holds brake pipe pressure	TrainBrakesControllerEPHoldStart
Apply*	Reduces brake pipe pressure – from maximum4.8 bar to minimum 3.35 bar - applies brakes	TrainBrakesControllerEPFullServiceStart*

* Release and Apply positions are sprung. Train brake controller returns automatically to lap position if released.

A seperate **EMERGENCY** push button is provided to apply brakes in an emergency.

A separate **OVERCHARGE** button is provided, which automatically overcharges the brake pipe when pressed and released.

Locomotive brake – independent air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Releases locomotive brake	EngineBrakesControllerReleaseStart
Lap	Holds brake cylinder pressure	EngineBrakesControllerRunningStart
Apply	Gradually applies locomotive brake	EngineBrakesControllerFullServiceStart

Driver's Valve No. 394

Train brake – *automatic air brake has graduated release (?)* (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
I. Release	Brake pipe connected to Main Reservoir	TrainBrakesControllerOverchargeStart
II. Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
III. Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
IV. Pressure Maintaining	Maintains Reduced pressure in brake pipe against leakage.	
V. Service	Allows air to escape slowly from brake pipe at normal service application rate.	TrainBrakesControllerFullServiceStart
VA. Slow Service	Allows air to escape from brake pipe more slowly than normal service application rate.	*Not currently available in OR*
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

Knorr Driver's Brake Valves K1, No 8, No 10, No 14

Train brake – automatic air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
I. Release and Fill	Brake pipe connected to Main Reservoir	TrainBrakesControllerOverchargeStart
II. Running	Brake Pipe pressure controlled by Eq Res - creates and maintains 5 bar in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
III. Neutral*	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
IV. Lap	Maintains Reduced pressure in brake pipe against leakage.	TrainBrakesControllerRunningStart
V. Service	Allows air to escape slowly from brake pipe at normal service application rate.	TrainBrakesControllerFullServiceStart
VI.Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

*neutral position used for locomotives and cabs not in use, also to test brake pipe for leakage

Knorr Self Regulating Driver's Brake Valves Type C

Train brake – automatic air brake has graduated release and is self-lapping.

Brake Valve Position	Description of Operation	OR Brake Controller Token
[Overcharge]*	[Brake pipe connected to Main Reservoir] * locked out of use in normal operation	TrainBrakesControllerOverchargeStart
[Neutral]*	[Brake pipe isolated] * locked out of use in normal operation	TrainBrakesControllerNeutralHandleOffStart
Running	Creates and maintains 5 bar in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
Service 1	Maintains 4.50 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 2	Maintains 4.35 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 3	Maintains 4.20 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 4	Maintains 4.05 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 5	Maintains 3.90 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 6	Maintains 3.75 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 7	Maintains 3.60 bar in brake pipe	TrainBrakesControllerEPApplyStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

*Note: This controller was not able to operate EP brakes and the **TrainBrakesControllerEPApplyStart** token should be replaced with **TrainBrakesControllerBrakeNotchStart** if this token becomes available in Open Rails.*

Knorr Self Regulating Driver's Brake Valves Type D2

Train brake – automatic air brake has graduated release and is self-lapping.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release and Fill	Brake pipe connected to Main Reservoir	TrainBrakesControllerOverchargeStart
Running	Creates and maintains 5 bar in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
III. Neutral*	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Service 1	Maintains 4.60 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 2	Maintains 4.45 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 3	Maintains 4.30 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 4	Maintains 4.15 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 5	Maintains 4.00 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 6	Maintains 3.85bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 7	Maintains 3.70 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 8	Maintains 3.55 bar in brake pipe	TrainBrakesControllerEPApplyStart
Service 9	Maintains 3.40 bar in brake pipe	TrainBrakesControllerEPApplyStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

*neutral position used for locomotives and cabs not in use, also to test brake pipe for leakage

*Note: This controller was not able to operate EP brakes and the **TrainBrakesControllerEPApplyStart** token should be replaced with **TrainBrakesControllerBrakeNotchStart** if this token becomes available in Open Rails.*

Knorr St 60 Driver's Brake Valve

Train brake – automatic air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Rapid Release of Train Brakes	TrainBrakesControllerFullQuickReleaseStart
Running	Gradual Release of Train Brakes	TrainBrakesControllerReleaseStart
Release Engine Brake	Reduces pressure in engine brake cylinder only	***EngineBrakesControllerFullQuickReleaseStart ** = Bail Off*
Lap-NeutralHandleOff*	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerNeutralHandleOffStart
Apply Engine Brake	Increases pressure in engine brake cylinder only.	***EngineBrakesControllerFullServiceStart***
Apply Train Brake	Allows air to escape slowly from brake pipe at normal service application rate.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe – and applies straight air brake.	TrainBrakesControllerEmergencyStart

** combining train and engine brake controllers in this way is not possible in Open Rails

Knorr St 125 Driver's Brake Valve

Train brake – automatic air brake has graduated release (but is not self-lapping).

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Rapid Release of Train Brakes	TrainBrakesControllerFullQuickReleaseStart
Running	Gradual Release of Train Brakes	TrainBrakesControllerReleaseStart
Lap-NeutralHandleOff*	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerNeutralHandleOffStart
Service Brake I	Allows air to escape from brake pipe more slowly than service rate.	*Not currently available in OR*
Service Brake II	Allows air to escape from brake pipe at normal service application rate.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe – and applies straight air brake.	TrainBrakesControllerEmergencyStart

Westinghouse type ‘A’ electro-pneumatic braking system

Westinghouse No 18 EP Driver’s Brake Valve (used in type A EP braking system)

EP brake does not have graduated release and is not self-lapping.

Automatic air brake brake does not have graduated release and is not self-lapping.

Air train pipe pressure is not reduced when EP brake is applied.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running	Releases both EP brakes and air brakes	TrainBrakesControllerReleaseStart
Hold EP	Holds EP brake application at a certain level	TrainBrakesControllerEPHoldStart
Apply EP	Gradually increases EP brake application	TrainBrakesControllerEPFullServiceStart
Lap Air	Holds air train pipe pressure at a certain level	TrainBrakesControllerHoldLappedStart
Apply Air	Gradually reduces air train pipe pressure	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

Westinghouse electro-pneumatic braking system used on LT O and P stock

This was a modification of the Type ‘A’ controller to include regenerative braking.

EP brake does not have graduated release and is not self-lapping.

Automatic air brake brake does not have graduated release and is not self-lapping.

Air train pipe pressure is not reduced when EP brake is applied.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running	Releases both EP brakes and air brakes	TrainBrakesControllerReleaseStart
Hold EP	Holds EP brake application and/or regenerative brake application	TrainBrakesControllerEPHoldStart
Regeneration 1	Dynamic brake only is applied	*Not currently available in OR*
Regeneration 2 and EP	Gradually increases EP and dynamic brake application	TrainBrakesControllerEPFullServiceStart
Regeneration 3 and EP	Gradually increases EP and dynamic brake application	
Lap Air	Holds air train pipe pressure at a certain level	TrainBrakesControllerHoldLappedStart
Apply Air	Gradually reduces air train pipe pressure	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

Westinghouse type ‘D’ electro-pneumatic braking system

EP brake has graduated release and is self-lapping.

Automatic air brake brake does not have graduated release and is not self-lapping.

Air train pipe pressure is not reduced when EP brake is applied.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running	Releases both EP brakes and air brakes	TrainBrakesControllerReleaseStart
Service EP	Strength of EP brake application depends on position of brake handle	TrainBrakesControllerEPApplyStart
Lap Air	Holds air train pipe pressure at a certain level	TrainBrakesControllerHoldLappedStart
Apply Air	Gradually reduces air train pipe pressure	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

Westinghouse Westcode 3 step braking system

EP brake has graduated release and is self-lapping.

EP brake is controlled by fail safe train wire – there is no air train pipe.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running	Releases brakes	TrainBrakesControllerReleaseStart
I	Makes initial application of brakes	TrainBrakesControllerEPApplyStart
II		TrainBrakesControllerEPApplyStart
III	Makes full service application of brakes	TrainBrakesControllerEPApplyStart
Emergency*	Makes emergency application of brakes	TrainBrakesControllerEmergencyStart

***** Emergency brake can not be released until speed is below 5 mph – in some units there is also a time delay.

Pulse modulated EP braking system

EP brake has graduated release and is self-lapping.

EP brake is controlled by fail safe train wire – there is no air train pipe.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release / Running	Releases both EP brakes and air brakes	TrainBrakesControllerReleaseStart
Service EP	Strength of EP brake application depends on position of brake handle	TrainBrakesControllerEPApplyStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

PBL 90 brake system see above

Driver’s Valve No. 395

EP *brake has graduated release (?)* (and is not self-lapping).

Automatic air brake *has graduated release (?)* (and is not self-lapping).

Air train pipe pressure is not reduced when EP brake is applied.

Brake Valve Position	Description of Operation	OR Brake Controller Token
I. Release	Brake pipe connected to Main Reservoir	TrainBrakesControllerOverchargeStart
II. Running	Brake Pipe pressure controlled by Eq Res - creates and maintains working pressure in brake pipe - releases both train and locomotive brakes.	TrainBrakesControllerReleaseStart
III. Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
IV. Pressure Maintaining	Maintains Reduced pressure in brake pipe against leakage.	
VЭ. EP Service	Increases EP braking at service rate. (No reduction in ATP pressure.)	TrainBrakesControllerEPFullServiceStart
V. Air Service	Allows air to escape slowly from brake pipe at normal service application rate.	TrainBrakesControllerFullServiceStart
Emergency	Rapidly releases all air from brake pipe.	TrainBrakesControllerEmergencyStart

Vacuum Brake Controller for Steam Locomotives with Combination Ejector

This type of controller is not self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Large ejector is operated – train pipe is rapidly evacuated – used to charge brake system	TrainBrakesControllerReleaseStart
Running	Small ejector creates and maintains vacuum in brake pipe – used to release brakes	TrainBrakesControllerRunningStart
Apply	The position of the handle controls the rate at which air is allowed to enter the train pipe – applies brakes	TrainBrakesControllerVacuumApplyContinuousServiceStart

Vacuum Brake Controller for Steam Locomotives with Separate Ejector and Electric Trains

This type of controller is not self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
Running	Small ejector or vacuum pump creates and maintains vacuum in brake pipe – used to release brakes – Large ejector may be operated if required – for rapid release or charging	TrainBrakesControllerReleaseStart
Apply	The position of the handle controls the rate at which air is allowed to enter the train pipe – applies brakes	TrainBrakesControllerVacuumApplyContinuousServiceStart

Gresham & Craven Type SJ Self-Lapping controller with Combination Ejector

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release	Large ejector is operated – train pipe is rapidly evacuated – used to charge brake system	TrainBrakesControllerReleaseStart
Running	Small ejector creates and maintains vacuum in brake pipe – used to release brakes	TrainBrakesControllerVacuumContinuousServiceStart
Apply	The position of the handle controls the vacuum in the brake pipe	

Gresham & Craven Type SSJ Self-Lapping controller with Separate Ejector

Brake Valve Position	Description of Operation	OR Brake Controller Token
Off	Small ejector creates and maintains vacuum in brake pipe – used to release brakes - Large ejector may be operated if required – for rapid release or charging	TrainBrakesControllerVacuumContinuousServiceStart
On	The position of the handle controls the vacuum in the brake pipe	

Vacuum Brake Controller for Diesel and Electric Locomotives

This type of controller is not self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release (sprung)*	Exhauster at fast speed – train pipe is rapidly evacuated – used to charge brake system	TrainBrakesControllerFullQuickReleaseStart
Running	Exhauster at normal speed creates and maintains vacuum in brake pipe – used to release brakes	TrainBrakesControllerReleaseStart
Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
Apply	The position of the handle controls the rate at which air is allowed to enter the train pipe – applies brakes	TrainBrakesControllerVacuumApplyContinuousServiceStart
Emergency	Vacuum in train pipe rapidly destroyed	TrainBrakesControllerEmergencyStart

* A separate exhauster fast speed button may be provided

Vacuum Brake Controller for Diesel Multiple Units using Twin Pipe Vacuum Brakes*

This type of controller is not self-lapping
**Twin pipe vacuum brake system is not currently modelled in Open Rails*

Brake Valve Position	Description of Operation	OR Brake Controller Token
Off	Vacuum reservoir creates and maintains vacuum in brake pipe – used to release brakes	TrainBrakesControllerReleaseStart
Lap	Brake Pipe isolated. Pressure may drop slowly due to leakage.	TrainBrakesControllerHoldLappedStart
On	The position of the handle controls the rate at which air is allowed to enter the train pipe – applies brakes	TrainBrakesControllerVacuumApplyContinuousServiceStart

The train brake controllers described on this page were used in UK on dual braked locomotives fitted with both twin pipe air brakes and single pipe vacuum brakes.

For vacuum brake operation see above.

Westinghouse M6a brake valve and Westinghouse M8a brake valve (vacuum operation)

Train brake – automatic air brake has graduated release and is self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
Release*	Exhauster at fast speed – train pipe is rapidly evacuated – used to charge brake system	TrainBrakesControllerFullQuickReleaseStart*
Running	Exhauster at normal speed creates and maintains vacuum in brake pipe – used to release brakes	TrainBrakesControllerReleaseStart
First Application	Reduces vacuum in train pipe by about 5in	TrainBrakesControllerVacuumContinuousServiceStart
	Reduction in brake pipe vacuum depends on position of handle	
Full Service	Reduces vacuum in train pipe to zero	
Emergency	Rapidly reduces vacuum in train pipe to zero	TrainBrakesControllerEmergencyStart

* Release position is sprung

Metcalfe Oerlikon FV4 brake valve (air operation)

Train brake – automatic air brake has graduated release and is self-lapping

Brake Valve Position	Description of Operation	OR Brake Controller Token
Fill*	Exhauster at fast speed – train pipe is rapidly evacuated – used to charge brake system	TrainBrakesControllerFullQuickReleaseStart*
Running	Exhauster at normal speed creates and maintains vacuum in brake pipe – used to release brakes	TrainBrakesControllerReleaseStart
Initial	Reduces vacuum in train pipe by about 5in	TrainBrakesControllerVacuumContinuousServiceStart
	Reduction in brake pipe vacuum depends on position of handle	
Full Service	Reduces vacuum in train pipe to zero	
Re-Application	Reduces vacuum in train pipe to zero	*Not currently available in OR*
Emergency	Rapidly reduces vacuum in train pipe to zero	TrainBrakesControllerEmergencyStart

* Fill position is sprung

Indpendent Brake Valve (Metcalfe Oerlikon FD1 and similar Westinghouse)

Locomotive straight air brake is self-lapping and has graduated release.

Brake Valve Position	Description of Operation	OR Brake Controller Token
Brake Off	Pressure in brake cylinder depends on position of handle	EngineBrakesControllerContinuousServiceStart
Brake On		