



**Train Examination
(Braking System)
Addendum**

**Lesson Plan
and
WorkBook**

(Generic Version)

Version 1

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IMPORTANT NOTICE

This booklet is one of a series of generic training and assessment templates developed by the Association of Tourist & Heritage Rail Australia Inc (ATHRA) as guides for heritage railway operators seeking to develop or upgrade their local training and assessment resources.

This booklet and others in the series are not intended to be training resources in their own right but rather to be suitably customised, embellished and adapted by railway operators to match the specific context of their own railway, e.g. types of locomotives, rollingstock and associated equipment, the track layout and infrastructure, the local standard procedures and rules, the safety management and safeworking systems, the railway organisational structure, and the roles and functions of personnel in the railway, etc.

Railway operators seeking to use this booklet and others in the series should initially refer to the ***ATHRA Customisation Guidelines Booklet*** which provides important information on how the generic templates should be used.

Disclaimer

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**SEPARATE ATTACHMENT 1: Train examination (braking system)--
knowledge checklist**

**SEPARATE ATTACHMENT 2: Train examination (braking system)--
performance checklist**

1 HOW TO USE THIS WORKBOOK

This section of the workbook provides an overview of the contents of your workbook and how you should use it for your lessons.

The workbook is intended to provide you with a systematic approach to the learning of the skills, knowledge and understanding you need to fulfil your role and responsibilities when conducting a train examination (braking system) on your railway. A mentor who is already a qualified and highly experienced train examiner has been appointed by your railway to assist you in this learning process.

The first part of the booklet includes a simple summary of the structure and contents and the learning activities contained in the booklet for the development of what you need to know and what you need to be able to do. It describes the mutual roles of you and your mentor and summarises other publications issued by your railway that you need to use such as operating and service manuals, checklists, safeworking rules, standard procedures, timetables, route maps, safety management systems, etc.

There are two topic areas covered by the booklet. The topic section outlines the theory and practical for a number of listed sub-topics. The outline gives a basic framework of what you need to know and be able to do in the topic area concerned. However, you will need to **build your knowledge** further by having discussions with your mentor and by reading the relevant sections of the publications issued by your railway to persons conducting train examinations (braking system).

Each topic section also contains space for you to write your own notes on the various sub-topics based on discussions with your mentor and your own experiences during training and guided practice.

2 LIST OF REFERENCE MATERIAL

The following is a list of key reference material which will be available to you during the course of your learning activities for the lesson:

- Your railway's job description for *train examination (braking system)*
- Safety management system
- Rail safety requirements and practices
- Rail Operator's Rule book and General Instructions, including:
 - Safeworking forms
 - Special Notices / Train Notices
 - Route maps
 - Timetables
 - Yard and shed/depot diagrams
 - etc.

3 OBJECTIVES OF THE LESSON PLAN

This Lesson Plan aims to provide a program of learning that will enable the learner to develop the theory (i.e. what you need to know and understand) and the practical requirements (i.e. what you need to be able to do) in a number of topic areas ...,,

- The role and responsibilities of a train examiner or qualified person carrying out train examinations (braking system)
- Conducting a train examination (braking system)

Your **mentor** will work with you in the following ways:

- Help you to develop the required understanding and skills through interactive discussions and explanations,
- Demonstrate required tasks and equipment functions,
- Assist you to obtain, read and interpret your railway's documents and manuals as well as applicable regulatory requirements,
- Observe and comment on your practice of the required skills in real and simulated situations, and
- Periodically check of what you have learnt (i.e. your knowledge and understanding and what you are able to do).

At all times, if you are in doubt or need to clarify an issue, check with your mentor or other suitably qualified and experienced persons on your railway.

4 ROLE AND RESPONSIBILITIES OF A PERSON CONDUCTING A TRAIN EXAMINATION (BRAKING SYSTEM)

4.1 FUNCTIONS AND DUTIES OF A PERSON CONDUCTING A TRAIN EXAMINATION (BRAKING SYSTEM)

Theory

The role may be performed by a train examiner or, dependant upon the organisation, by either the driver or the guard as detailed. It applies to both Westinghouse Air Brake and Vacuum Brakes:

- Mechanical examination of the consist – this is performed by the driver as part of the duties detailed in the applicable lesson plans
- Checking the brakes as detailed in this document

Practical

Obtain a copy of your railway's job description or duty statement for persons conducting train examinations (braking system). Describe to your mentor the various functions and duties you must perform when carrying out a train examination (braking system). Work with a qualified person carrying out a train examination (braking system) and observe the various functions as they are being performed by that person.

4.2 STATUTORY RESPONSIBILITIES INCLUDING RAIL SAFETY AND SAFEWORKING REQUIREMENTS AND REGULATIONS RELATED TO TRAIN EXAMINATION (BRAKING SYSTEM)

Theory

Train examination (braking system) the checking of a train's brakes.. Persons conducting train examinations (braking system) must therefore be very familiar with the rail safety requirements related to their work and all pertinent safeworking rules and requirements including trackside safety awareness procedures. You need to make sure you are familiar with the railway and other documents that describe your statutory responsibilities and that you understand their contents and the implications for your work when conducting a train examination (braking system).

Practical

In conjunction with your mentor, make sure you have a copy of the relevant documents and understand the requirements and responsibilities described in them. If in doubt on any aspect of your statutory responsibilities ask your mentor to clarify them with you and if necessary demonstrate to you how these responsibilities need to be fulfilled in practice.

Demonstrate to your mentor your understanding of your responsibilities and how these are applied in your role as a person conducting a train examination (braking system).

4.3 STANDARD PROCEDURES OF THE RAIL OPERATOR APPLICABLE TO TRAIN EXAMINATION (BRAKING SYSTEM), INCLUDING RECORD KEEPING AND THE REPORTING OF DEFECTS AND INCIDENTS

Theory

Make sure you have a copy of those standard procedures of the operator of your railway that apply to the functions and duties of a person conducting a train examination (braking system). You should read these procedures and make sure that you are thoroughly familiar with them and can apply them when performing train examination (braking system) tasks. It is important that you not only can follow these procedures but also understand their significance and the reasons why following them is so important. These procedures will include record keeping and the required action to be taken in the event of an equipment defect or a safety incident.

Practical

In conjunction with your mentor, make sure you have a copy of the relevant standard procedures and understand how they must be applied during train examination (braking system) functions. If in doubt on any aspect of the procedures, ask your mentor to clarify them with you and if necessary, demonstrate to you how the various procedures should be carried out. In turn, you should gradually learn how to apply these procedures yourself progressively through your training -- gradually developing your expertise through guided practice, as instructed by your mentor.

**4.4 ROLE AND RESPONSIBILITIES OF A PERSON CONDUCTING A
TRAIN EXAMINATION (BRAKING SYSTEM) -- LEARNER'S NOTES**

Insert your own notes here

5.0 CONDUCTING A TRAIN EXAMINATION (BRAKING SYSTEM)

Note that this section would need to be suitably altered and customised to suit the type of braking system and organisational arrangements and procedures used in the railway concerned)

5.1 WESTINGHOUSE AIR BRAKE SYSTEM CHECK PERFORMED BY THE DRIVER

Theory

With the auxiliary reservoirs charged to regulation pressure, the driver fully applies the brakes by three service reductions making a total application of from 20 to 25 lb p.s.i.

The driver then walks along the length of the train checking that:

- all brakes are applied,
- all hose pipes properly coupled,
- brake pipe cocks are fully open (except at the extremities)
- the brake piston travel is within prescribed limits,
- the grade control handles are properly positioned and load compensating handles correctly located
- there is no evidence of any defects.

On reaching the last vehicle of the train, the driver signals to the fireman to release the brake. The driver then walks along the opposite side of the train checking that:

- all brakes are fully released,
- hand brakes are off,
- no sprags or chocks are located in the wheels,
- all air brake equipment is in good order,
- there is no evidence of any defects.

Should any evidence be identified of a defect or a deficiency in the braking system, the required action is taken as per the railway's standard procedure to record and report the deficiency and to initiate appropriate action to rectify the problem.

5.2 WESTING HOUSE AIR BRAKE SYSTEM CHECK PERFORMED BY THE GUARD

Theory

With the auxiliary reservoirs charged to regulation pressure, the driver applies the brakes by a service reduction

The guard notes the time then walks along the length of the train on the driver's side (where practical) checking that:

- the train is properly coupled
- where necessary all cables for electrical or public address systems are properly coupled
- any carriage to carriage safety bars or other equipment is in place
- all brakes are applied,
- all air hose are properly coupled,
- brake pipe cocks are fully open (except at the extremities)
- the brake piston travel is within prescribed limits,
- any grade control handles are properly positioned and any load compensating handles correctly located
- there is no evidence of any defects.

On reaching the last vehicle of the train, the guard signals to the driver to release the brake. The guard observes that the brakes release on the last bogie on the consist then commences to walk back along the opposite side of the train (where practical) checking that:

- all brakes are fully released,
- hand brakes are off,
- no sprags or chocks are located in or under the wheels,
- all air brake equipment is in good order,
- there is no evidence of any air leaks or defects.

On arrival at the engine the guard'

- notes the time,
- asks the driver if there is any train pipe leakage
- if there is an excessive train pipe leakage the driver and guard takes action to find the leakage and correct the problem
- if there is no train pipe leakage completes the relevant train examination form and hands it to the driver to sign.
- The original copy remains on the engine and the other copy in the book

If another vehicle is attached to the consist during the running of the train the guard will carry out a train examination (braking system) as detailed above on the wagon being attached to the consist.

When the train has again been coupled and the air brake system coupled, the guard moves to the last vehicle on the consist and signals for the driver to "apply brakes" When the brakes are observed to have applied, the guard signals to the driver to "release brakes" and observes that the brake blocks fully release on the bogie. The guard then signals the driver "all right"

If the locomotive is detached from the train for any reason whatsoever such as running round at terminus, taking water, etc., when it is reattached to the consist and train pipe pressure is restored, the guard proceeds to the rear of the consist and signals the driver "apply brakes". When the brakes blocks are seen to apply to the wheels the guard signals to the driver to "release brakes". When the brake blocks are seen to release the guard signals the driver "all right"

Should any evidence be identified of a defect or a deficiency in the braking system, the required action will be taken as per the railway's standard procedure to record and report the deficiency and to initiate appropriate action to rectify the problem.

5.3 VACUUM BRAKE SYSTEM CHECK PERFORMED BY THE DRIVER

Brake Tests and Vehicle Defects

Before any train commences a journey and at any time during the trip that the consist is altered, a vacuum brake test must be carried out by the driver and the

guard and the relevant form completed by both persons. Vehicles found to have defects are to be dealt with as follows:

1. The train crew must take steps to remedy any defect which might interfere with the safe running of a train, failing which, the vehicle is to be detached;
2. Any vehicle not safe to travel must have a red card ("Not to Go") affixed by the driver and the vehicle not used for traffic until repaired;
3. If there are repairs of a non-urgent nature and which do not render the vehicle unsafe, a green card ("For Repairs") must be affixed and the vehicle may remain in traffic

Vacuum Brake System testing a train prior to departure

When the train has been marshalled and the locomotive attached to the consist, the required vacuum must be created as quickly as possible.

1. The driver initially completes the following tasks:
 - blows up vacuum to 21 inches hg and ensures the handbrake on the loco is hard on.
 - proceeds to the guards van and notes the vacuum on the vans gauge, this should not be below 18 inches hg.
 - checks the condition and position of the rear brake pipe on the dummy on the rear carriage.
 - then walks up one side of the carriage set noting the condition of the brake blocks and brake rigging,
 - listens for leakage through neck rings,
 - checks the condition of interconnecting hoses and listens for leakage.
 - ensures all vacuum brake cylinder piston rods are at the bottom of the cylinders.
 - on returning to the engine, pulls the brake lever to the on position destroying vacuum in the bottom of the cylinder applying the brakes.

The driver then makes a full service application of the brakes

2. The guard then commences at the locomotive and move to the rear of the train ensuring that the brakes have applied on a vehicles and that the vacuum

piston travel is within specified limits (minimum 50 mm to a maximum of 150 mm) and that all couplings have been made between vehicles

3. On arrival at the last vehicle on the consist, the guard must request the driver to release the brakes on the train.
4. The guard must check the vacuum registration gauge on the rear of the train to ensure that it has reached 65 kPa
5. The guard then returns to the front of the train ensuring that the brakes have released on every vehicle and that the hand brakes are off
6. On arrival at the locomotive, the guard issues a brake certificate

Vacuum Continuity Test

A vacuum continuity test shall be conducted at Terminal Stations and at locations when vehicles have been added to the train.

1. The vacuum continuity test is conducted by the driver and guard.
2. The guard ensures that an adaptor plate and vacuum gauge are installed on the last vehicle on the train
3. When the vacuum registration on the end of train gauge has reached the value specified in the *Brake Power Requirements* the driver must be advised. The driver must then make a full service brake application
4. When the vacuum registration on the end of train gauge falls to zero the guard checks that the brakes have applied on the last two bogie or four single vehicles and advises the driver.
5. The driver then re-creates the vacuum and the guard must check to ensure that the brakes have released on the last vehicles on the train.
6. When the registration on the end of train gauge reaches the value stipulated in the *Brake Power Requirements* the guard must advise the driver then remove the gauge. The adaptor plate remains in place on the last vehicle on the train.
7. When the foregoing procedures have been successfully concluded the train may proceed.

System Failure

1. When a locomotive is attached to a train, the required vacuum must be created as quickly as possible by *the use of the large ejector*. The time allowed to create the required amount of vacuum through a train is ten minutes for goods trains and one minute for passenger trains. Should the time allowed be exceeded a report must be supplied giving full details of extra time allowed
2. A driver and guard must report any irregularity in conjunction with the working of the vacuum brake and any defects in its action or other special circumstances
3. When the vacuum brake fails and the driver is unable to remedy the defect in a reasonable time, the driver must obtain a relief locomotive
4. When it is necessary to isolate a vacuum cylinder, the auxiliary hose must be removed from the train pipe and the branch pipe plugged using a cork. The vacuum release must be operated to fully release the brakes. The auxiliary hose must be left disconnected and the vehicle green carded for attention. *(This suggests the piston is stuck up with brake applied, This might suggest a twisted rolling ring whose remedy is basically a crow bar and removing the plug in the base of the cylinder).*

Practical

Under the supervision of your mentor, observe and practice how to carry out an examination of a train examination (braking system) on your railway. Discuss with your mentor the appropriate action to be taken in the event of a number of simulated typical defects or deficiencies that could be identified during a train examination (braking system).

Learn and demonstrate to your mentor how you would carry out a train examination (braking system) and the action you would take if various simulated defects or deficiencies were identified during a train examination (braking system).

**5.4 CONDUCTING A TRAIN EXAMINATION (BRAKING SYSTEM) --
LEARNER'S NOTES**

Insert your own notes here